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Public Services and Procurement Canada

Burlington Canal Lift Bridge

Concept Design Report Final

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Project #

60637587/R.090216.002

Dear Ms. Ranya El Sadawy:

Subject: Burlington Canal Lift Bridge
Concept Design Report Final

Please find attached the Concept Design Report for the BCLB Rehabilitation.

Sincerely,
AECOM Canada Ltd.

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CBL:cbl
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Executive Summary

This report summarizes the existing condition, structural evaluation, and the structural evaluation of rehabilitation of the Burlington Canal Lift Bridge. The report further evaluated the construction method, construction staging options, and life cycle cost analysis for the preferred open and closed lift span rehabilitation options. A comparison of the options and their attributes is provided.

The bridge was inspected in late 2020 to review potential issues for future rehabilitation. The current Overall Bridge Functional Rating is based on the current condition of the decks and the barrier capacities and is considered inadequate at 2. While the tower, tower and approach spans are generally in fair to good condition specific areas of poor condition and poor performance were observed in the bridge. The lift span deck has a history of poor performance and is presently in poor condition with weld failures and broken bearing bars throughout. The deck grating was under-designed and has exceeded its service life and requires regular ongoing maintenance to ensure public safety. The expansion joints between the tower and approach span are in fair to poor condition; it is recommended they be replaced or converted to a link slab to reduce leakage and the resulting damage to the structure below. It is recommended that the sidewalk be widened to meet minimum standards at constraint locations in the sidewalk approach and towers spans.

The structural evaluation of the existing conditions was done in accordance with CSA S6-19 Canadian Highway Bridge Design Code (CHBDC). The tower, approach and lift span were modelled using software Midas Civil 2020. The models illustrate the loads effects on the structure using finite element analysis. The capacity of the bridge is generally acceptable. CHBDC does not provide guidance on the analysis/evaluation of riveted built-up members and more specifically for box sections acting as beam columns; for the purpose of this assignment the rivets in the tower columns were assumed to be sufficiently joined individual steel components to prevent interaction between local buckling of elements of the built-up members between the rivets and overall buckling of the compression member. An evaluation of the possible interaction buckling failure mode based on Euro Code EN 1993-1-1 should be conducted to determine the connectivity and effectiveness of the tower column members and their capacity with respect to the Eurocode.

The existing deck grating is spanning 50% further than the maximum span of a currently available comparable product. The existing traffic barriers are substandard and their anchorage to the deck grating is unconventional and does not meet current CHBDC guidance.
The rehabilitation evaluation was completed with a consideration of high-volume traffic with full CL-625 ONT loading in accordance with the current CHBDC for the lift span, towers, and counterweight main mechanical components. The sidewalk on the lift span meets the minimum MTO standards for a bridge sidewalk width and is in good condition with some local scaling and moisture penetration. Minor patch repair to the concrete and the addition of a wearing surface on the sidewalk will extend the sidewalk service life.

Lead containing paint was identified on the lift span, approach span and tower span. As a result, lead remediation is required during a rehabilitation which should be completed by a professional environmental abatement contractor and in compliance with Ontario Health and Safety Standards O.Reg. 490/09 where the paint may be disturbed during rehabilitation.

The approach and tower span rehabilitation should consist of a 225mm reinforced concrete deck replacement with an integral 20mm concrete wearing surface, structural steel repairs (including lead paint remediation), sidewalk widening (to meet minimum MTO Bridge sidewalk standards), barrier replacement, and the elimination of joints (semi integral conversion at approach span, and link slab deck between the tower and approach span). A TL-4 barrier (Four Tube Combination Traffic/Bicycle Barrier) should replace the existing barriers on the approach and tower span. In order to widen the existing sidewalk to meet minimum MTO standards, the sidewalk decking will need to be replaced with aluminum panels; a wearing surface should be added to increase the service level, match adjacent bridge sidewalk and protect the sidewalk and support structure.

A life cycle cost analysis was completed using sensitivity analysis with discount rates from 2% to 6% for the lift span deck considering the preferred two alternatives which are the deck replacement with a Rivetted Open Steel Grid Deck or a Lightweight Concrete Half-filled Grid Deck without an overlay, with a protective proprietary wearing surface. The results indicate that the deck replacement with the Rivetted open Steel Grid Deck is the most cost-effective alternative over the 50-year service life considered for the lift span.

The two preferred lift span deck systems were ranked using nine evaluation criteria. The criteria include capital cost, lift cycle cost, historical use, implication of deck weight, durability, constructability/ contractor experience, user experience, traffic/staging/schedule, environmental effects, and procurement risks. Each criterion was assigned with specific weighting according to departmental priorities. Overall, the Rivetted Open Grid Steel Deck option is the top ranked deck replacement option for lift span. A modified TL-2 barrier (to cyclist height) should be installed on the lift span and anchored to the support structure for the deck. As part of the deck replacement, modifications to intermediate transverse supports are needed in addition to local patch repairs on the sidewalk while adding a wearing surface to increase the service level and protect the sidewalk. The sidewalk is currently partially supported by the deck and needs to be supported temporarily during construction prior to the deck removal.

Low carbon concrete was considered as an alternative to normal ready-mix concrete for both the lightweight concrete infill in the closed deck option and for the approach and tower span concrete. Ontario Provincial Standard Specifications (Provincial) (OPSS.PROV) 1350 includes a requirement for a 10% reduction in greenhouse gas emissions. Within Ontario it is anticipated that meeting this component of the standard is realistic and competitive for the concrete on this project. Other proprietary Low Carbon Concrete with carbon reduction from 30-40% are currently emerging. For example, ECOPact from Lafarge has been recently approved by CSA and reduces carbon emissions while maintaining the same performance and durability. It is expected that other concrete providers will start to review their manufacturing process' and production methods to reduce carbon emissions and adjust additives to use less cement in order to document their reduction in carbon emissions so they can make claims similar to Lafarge for their products.

Waterway navigability closures are restricted to 2 months in January and February and therefore all lift span construction needs to take 2 months or less. Key to the planning of an installation over 8 weeks is a vigorous and detailed schedule. The pre-fabricated deck/stringers should be delivered by a truck and craned or launched into their designated position. The bridge has an overhead clearance restriction due to the truss and tower, therefore launching the deck panels may be preferable. Due to the horizontal curve in the approach road, the launching process may need to consist of staging from both ends of the bridge. The approach and tower span rehabilitation are anticipated to proceed with traditional construction techniques after the completion of the lift span deck replacement.

The only option which currently meets the required navigation schedule for a single season is the full closure of the road and bridge to vehicle and pedestrian traffic for the duration of construction. The report considers safety concerns such as; narrow proposed driving lanes, snow clearing, limiting the width of vehicles permitted to travel on the bridge, vehicles driving on the cantilevered portion of the deck grating, increased likelihood of collisions with a substandard deck barrier due to narrow lanes, and the challenges of anchoring temporary barriers to the deck/stringers. Staging of the bridge increases the time and costs required to construct, risks compromising the schedule and limiting access for boats to the harbour which are required for supplies to local industry.

Other staging options including single lane with traffic light control and narrow two lane staging are further discussed with reference to potential safety and timing hazards and their potential for mitigation for the recommended open grating option in the lift span. Night closures were not considered as the mitigation of lead abatement for the paint removal would extend beyond the allowable construction window. The alternative staging options considered are summarized as follows:

Open Deck Grating				
Lane Configuration Staging	**Timing for Construction (Weeks)**			**Overall Construction Cost**
	Lift Span	**Approach Spans**	**Total**	
Full Road Closure	9	12	21	$12.97M
Two lane (One year)	13	16	29	$13.5M
Two lane (Over two years)	8/8	12/12	40	$14.3M
Single lane (One year)	13	16	29	$13.95M
Single lane (Over two years)	8/8	12/12	40	$14.8M

A preliminary construction schedule is provided considering that the operational shutdown for the lift bridge is in January and February. The contractors overall planning for construction should begin no later than September.

Anticipated permitting and approval requirements have been identified, which will be undertaken during the detailed design phase. A robust communications and public relations plan should also be developed in consultation and partnership with MTO and key stakeholders, recognizing impacts to bridge users and communities, as well as the potential for strong media attention.

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1. Introduction

AECOM Canada Ltd. (AECOM) was retained by the Public Services and Procurements Canada (PSPC) to provide a concept design for the Burlington Canal Lift Bridge (BCLB). The concept design recommendations are based on the structural evaluation and mechanical evaluation of rehabilitation options for the BCLB including the approach and tower spans, lift span, towers, and counterweight main mechanical components. Two rehabilitation options for the lift span are considered for the purpose of this report including deck replacement with a partial concrete-filled grid deck grating and a rivetted deck grating.

1.1 Background

The BCLB is a tower-driven vertical steel truss-style lift bridge located between the cities of Hamilton and Burlington in Ontario. It is in a north-to-south orientation and spans the Burlington Bay Canal. The BCLB was constructed between 1959 and 1960 and has been operating since 1962 as a rail/highway bridge, replacing the original CN swing bridge nearby. In 1982, the BCLB underwent a major rehabilitation to convert it for roadway traffic use only. It currently carries four (4) lanes of Eastport Drive, two (2) lanes in each northbound (NB) and southbound (SB) direction, with an approximate AADT of 25,000 per day. When it is lifted, it accommodates commercial and recreational boat passage between Lake Ontario and Burlington Harbour. It is assumed the bridge is lifted with average usage as the BCLB typically operates from late March through to late December with approximately 3400 openings per year.

The entire bridge consists of five (5) spans, the lift span road width is 14.1m. There is two reinforced concrete decks on steel I-girder approach spans at each end of the bridge with a road width of 13.6m. The exterior approach spans (referred to as the “approach spans”) are 12.6 m long and cross over an access road/trail. The interior approach spans (referred to as the “tower spans”) are 10.6 m long (including 0.9 m long cantilevered portions at the lift span ends) and pass under the towers.

The steel truss lift span is 115.8 m long with open steel deck grating welded to steel stringers over floor beams. The tower and tower span foundations are comprised of reinforced concrete on piles with two (2) water-filled pits under the tower area. The back piles extend deeper into the concrete and below the pit base. The tower foundation is enclosed inside of a galvanized chain-link fence with a reinforced concrete protection wall under the approach span beside the access road. The approach span is supported on one end by a reinforced concrete abutment and at the other end by the rear tower beam.

The lift span is connected to the counterweights by 80 counterweight ropes that are held in place by 8 counterweight sheaves, with 10 steel ropes per sheave. Each sheave is carried by a trunnion shaft that is supported by two spherical roller bearing assemblies. The counterweight ropes are 57mm (2.25”) in diameter and the counterweight sheaves have a 4,572mm (180”) diameter at the rope groves. The bridge span balance is augmented by an auxiliary counterweight system that supports the counterweight the lower it travels, this is in order to counteract the extra weight of the main counterweight ropes as they travel over the sheave.

1.2 Scope

This concept design report will review previous studies completed for the BCLB Rehabilitation and further develop the approach and tower span rehabilitation as well as the lift span deck replacement for an open and closed type deck. The lightweight concrete half-filled grid deck with no overlay is the closed deck option proposed. The rivetted steel grid decking is the open deck option proposed. The concept design will review each of the options with consideration for technical requirements to construct the lift span bridge deck replacement including consideration of traffic management, construction methods, construction staging, schedule, and utilities. The rehabilitation developed through concept design will achieve a fair condition rating at minimum for the following:

1. Four lanes of traffic over the bridge;
2. Improvements to minimum sidewalk widths on the approach and tower spans;
3. Crash tested CHBDC compliant barrier systems;
4. Elimination of joints where feasible on the approach spans;
5. Maintenance-free service life for elements as follows:
    a. 50 years – Deck system (including stringers and floor beams);
    b. 30 years – All other structural steel;
    c. 30 years – bearings and substructure;
    d. 15 years – joint systems; and
    e. 10 years – coating system.
6. Provide cross-section, plan, and elevation for each of the two options including Class C cost estimates;

A Life cycle cost analysis is completed as part of the concept design for the open and closed deck options. Traffic management is further discussed and preliminary staging drawings including site staging areas are considered. A preliminary schedule including design, construction, commissioning, and balancing is included as part of the concept design.

Environmental planning has undergone preliminary consultation with various stakeholders including the Ministry of Ontario Transportation (MTO) and has included permitting requirements and recommended studies.

Lastly, the report considers constructability and strategies to meet design needs at the site including preliminary drawings and calculations. Based on previous studies the two options for the lift span deck replacement carried forward are included in **Table 1**.

Table 1: Summary of Options for Consideration

Options for Lift Span	
Open Steel Grid Deck	Rivetted
Half-filled Grid Deck	No Overlay, Lightweight Concrete, Matacryl (or equivalent) traffic wearing surface

Based on the proposed options for the lift span deck replacement existing mechanical components are reviewed for their suitability. A structural evaluation including preliminary stringer analysis and structural evaluation are considered.

1.3 Proposed Design Parameters

This report will further review and develop the rehabilitation concept design for the approach, tower and lift span both structurally and mechanically. For the lift span deck replacement, one closed deck and one open deck alternative have been selected for further consideration.

The aim of the rehabilitation is to improve the bridge to meet an Overall Bridge Functional Rating of 5, in accordance with the Bridge Inspection Manual as Summarized in **Table 2**. The current Overall Functional Rating is based on the current condition of the decks and barriers and is considered inadequate at 2. Improvements such as lane widenings, or the addition of cyclist lanes were not considered due to platform width limitations on the existing bridge. The proposed rehabilitation will replace the inadequate deck and barrier components while addressing localized steel repairs and performance issues.

Table 2: Overall Bridge Rating - Functional Target of Rehabilitation Evaluation[20]

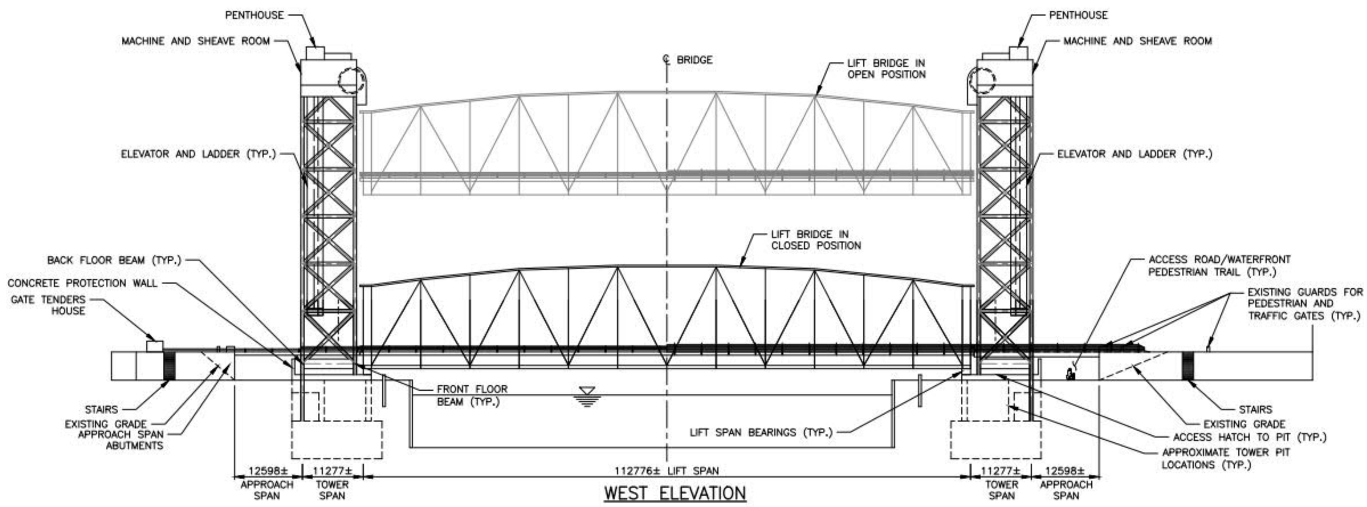
Rating	Condition	Observations
2	Inadequate	■ Structure meets current CHBDC loading requirements ■ Non crash tested barriers, deficient in terms of original design strength. ■ Repairs required at multiple locations >20% but <50%
3	Poor	■ Structure does not meet current CHBDC live loading requirements ■ Approach and bridge barriers do not meet current standards ■ Repairs required at multiple locations >50%
4	Fair	■ Structure meets current CHBDC live loading requirements ■ Approach or bridge barriers do not meet current standards ■ Repairs required at multiple locations <20% ■ Riding Quality Fair
5	Good	■ Structure meets current CHBDC live loading requirements ■ Crash tested barriers at bridge and approaches – meet current requirements ■ Riding quality - good

The recommended rehabilitation shall be designed in accordance with the Canadian Highway Bridge Design Code (CHBDC, CSA S6-19) with CL-625-ONT live loading. The rehabilitation is to follow the practices outlined in the Ministry of Transportation of Ontario (MTO) Structural Manual (MTO 2016) and current memoranda. The American Association of State Highway and Transportation Officials (AASHTO) Moveable Bridge Design Specifications (2nd Edition 2007) shall further be considered for the rehabilitation design.

2. Existing Conditions

The existing conditions for the BCLB will consider both the technical evaluations as well as a summary of the inspections and deficiencies in the existing bridge. The bridge was inspected through a comprehensive detailed inspection in 2020 by AECOM which included for arms length inspection of the structural components in the bridge, as well as mechanical and electrical inspection. An important existing condition to note is that the entire bridge is coated using lead-based paint. Any future work will need to account for environmental protection and either removal or sealing of the paint. A general Elevation for the bridge is included in Figure 1.

Figure 1: Existing Bridge Elevation Configuration



2.1.1 Structural Evaluation

The structural evaluation for the existing conditions considers the capacity and weight for the structural and mechanical components of the lift bridge and approach spans. Details of the model and calculations are included in **Appendix E**.

Midas Civil (2020) was used to evaluate the load effects on the lift bridge, towers, tower spans, and approach spans. The structural evaluation was completed in accordance with CHBDC. Structure dimensions and material properties were taken from the original construction drawings (1959) and rehabilitation drawings (1982).

2.1.1.1 Methodology

The existing bridges and towers were evaluated in accordance with CAN/CSA S6-19 Canadian Highway Bridge Design Code (CHBDC). Existing structure dimensions were taken from original construction drawings (1959) and rehabilitation drawings (1982). The existing drawings and CHBDC were referenced to determine material strengths and properties.

Dead Loads

Dead loads are considered to include the self-weight of the structure (such as girders, deck, trusses, etc.), as well as superimposed dead loads including asphalt wearing surface, sidewalks, barriers, and handrails. In accordance with CL. 3.6 – Table 3.4 in the CHBDC, **Table 3** includes the unit material weights used for evaluation purposes:

Table 3 Unit Material Weights

Material	Unit Weight, kN/m^3
Asphalt Wearing Surface	23.5
Reinforced Concrete	24.0
Steel	77.0

Material Properties

The original construction drawings list the grade of the structural steel in the original lift bridge and towers as CSA-G40-4 or ASTM A7 for carbon steel members and ASTM 242-55 for low alloy steel members. The carbon and low alloy steel based on the standards referenced would have a yield strength of 230 MPa and 350 MPa respectively. in accordance with the CISC Handbook of Steel Construction (11^{th} edition).

Structural steel members added as part of the 1982 rehabilitation were analyzed with a yield strength of 350 MPa in accordance with the rehabilitation drawings. **Table 4** summarizes the material properties utilized for the evaluation.

Table 4: Material Strengths of Structural Members

Material	Strength (MPa)	Description	Reference
1959 Original Structural Steel - Carbon	230	Yield Strength	Original Drawings & CISC
1959 Original Structural Steel – Low Allow	350	Yield Strength	ASTM (Reference)
1982 Rehab Structural Steel	350	Yield Strength	1982 Rehab Drawings

Live Loads

CHBDC defines the live load in Ontario for the design of new bridges as the CL-625-ONT Truck, which consists of a series of axle loads which total 625 kN (63 Tonnes), and the CL-625-ONT Lane Load which is made up of the CL-625-ONT Truck reduced to 80% superimposed with a uniformly distributed load of 9 kN/m. Under serviceability limit state (SLS) and ultimate limit state (ULS), the CL-625-ONT Truck load effect is increased by the addition of a dynamic load allowance (DLA) factor to account for the impact, which varies depending on how many axles are loading the component under consideration. When all axles are acting on the bridge, the DLA is 25%. The contact area of each of the wheels is 0.25 x 0.60 metres, except for the front wheels which have a contact area of 0.25 x 0.25 metres. The number of design lanes for each structure is determined in accordance with CHBDC Cl. 3.8.2 (Table 3.5). Since the roadway width of Eastport Drive on the bridge is 13.6 m, as shown on the 1982 rehabilitation drawing, four (4) design lanes are required in the analysis. Where multiple lanes are loaded, the load in each lane is reduced by the multi-lane loading factors, R_L, shown in accordance with CHBDC T14.3. These reduction factors take into account the reduced probability of more than one lane being loaded simultaneously, due to traffic distribution, volume, speed, and decrease of dynamic loads.

Evaluation Level 1, CL1-625-ONT, is identical to the live load diagram for new bridges. For live traffic loads, there are several levels of evaluation to determine the load posting required. If evaluation at level 1 indicates that a posting is required, the bridge must be evaluated for levels 2 and 3, to provide appropriate load ratings for two-unit vehicles (**Figure 4**) and single-unit vehicles (**Figure 3**).

The highway class affects the application of lane loads to each of the evaluation levels. All new bridges are designed to comply with Class A highway requirements. For evaluation purposes, the highway class for each bridge is based on the Average Annual Daily Traffic (AADT) in accordance with CHBDC §1. For evaluating the recorded AADT for Eastport Drive was estimated at approximately 25,000 vehicles per day, and as a result, Eastport Drive is considered a Class A Highway. The required lane loading for a Class A highway is 9 kN/m.

Figure 2: Live Loading: Maximum of CL-625-ONT Truck or CL-625-ONT Lane Load

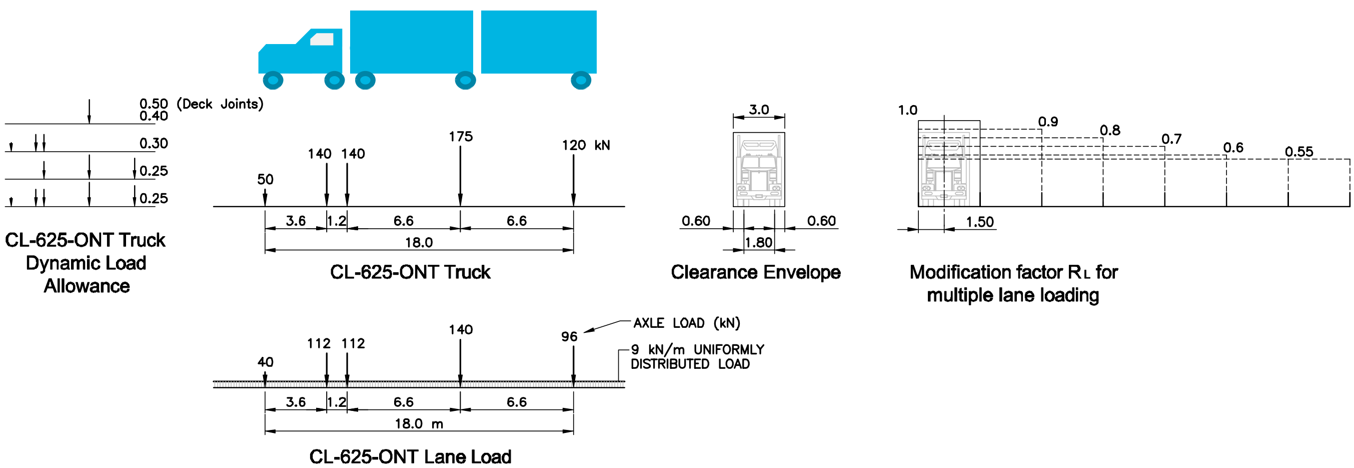


Figure 3: Live Loading: Evaluation Level 3 CL3-625-ONT Truck, Axle Load

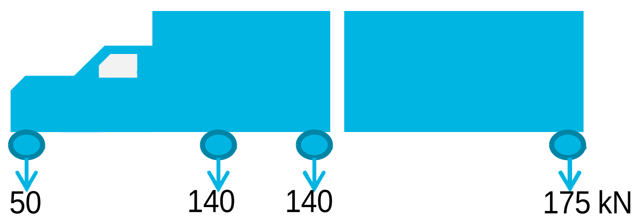
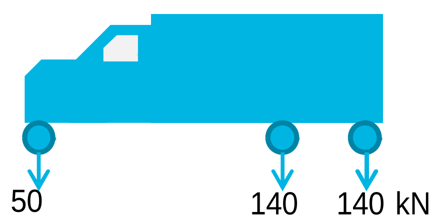


Figure 4: Live Loading: Evaluation Level 2 CL2-625-ONT Truck, Axle Loads



In addition to vehicular live load, the pedestrian live load acting on the west sidewalk was also considered in accordance with CHBDC §3.8.9. As per the code, traffic loads in design lanes were considered together with pedestrian load only at ULS, with the pedestrian load reduced by 20%.

In addition to vehicular traffic, wind and pedestrian loads are considered and tabulated in **Table 5**.

Table 5: Live Wind and Pedestrian Loads

Load	Pressure (kPa)
Wind (Bridge Lowered) (50 Year Burlington)	0.530
Wind (Bridge Raised)(CHBDC)	0.450
Wind (Bridge Raised 80km/h MAX)	0.320
Pedestrians	= 5-Span/30 <4

The values from **Table 5** are taken from CHBDC §3.5 based on the location and span of the bridge.

Load Combinations and Load Factors

According to Section 15 - Rehabilitation and Repair in the CHBDC (§15.3.2), rehabilitated members shall satisfy ULS and SLS requirements of Section 1 to 13, 16, and 17, unless the purpose of the rehabilitation is to allow passage of a controlled vehicle. Therefore, load combinations and load factors as specified in Section 3 of the CHBDC were used for the structural evaluation as this information will be used for rehabilitation purposes.

Load Combinations Considered for Structure Analysis as required by the CHBDC

The following load combinations were utilized with reference to Cl. 3.5 (Tables 3.1, 3.2, and 3.3) of the CHBDC:

1. **SLS Combination 1:** Permanent loads consisting of dead loads and superimposed dead loads. Transitory loads consisting of live load (0.9 x CL 625-ONT truck).
2. **ULS Combination 1:** Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of vehicular live load (1.70 x CL 625-ONT) and pedestrian live load (0.2 x 1.70 x P).
3. **ULS Combination 2:** Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of vehicular live load (1.60 x CL 625-ONT), pedestrian live load (0.2 x 1.60 x P) and temperature effects (1.15 x K).
4. **ULS Combination 3:** Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of vehicular live load (1.40 x CL 625-ONT), pedestrian live load (0.8 x 1.40 x P), temperature effects (1.00 x K) and wind (0.45 x W).
5. **ULS Combination 4:** Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of temperature effects (1.25 x K) and wind (1.4 x W).
6. **ULS Combination 9:** Permanent loads consisting of dead load and superimposed dead loads. (Not considered for Lift Span as per Cl13.6.11.2)

The following load combination with reference to Cl. 3.5 (Tables 3.1, 3.2 and 3.3) of the CHBDC could be evaluated in detailed design however is not part of this project scope:

7. **ULS Combination 8:** Permanent loads consisting of dead and superimposed dead loads. Exceptional Loads consisting of Collisions loads arising from highway vehicles and collisions.

The following load combinations were utilized with reference to Cl. 13.6.11.2 (Tables 13.3, 13.4) of the CHBDC:

Category 1 – Bridge Raised

1. **ULS Combination V1:** Permanent loads consisting of dead loads and superimposed dead loads. Operating Impact of 120% applied to the maximum dead load effect in all members that are in motion and to the load effect on a stationary member caused by the moving dead load. Operation of machinery loads of 155% caused by the moving and stopping of the lift span.

2. **ULS Combination V2:** Permanent loads consisting of dead loads and superimposed dead loads. Wind Load of 120% with the bridge open in any position. Operating Impact of 120% applied to the maximum dead load effect in all members that are in motion and to the load effect on a stationary member caused by the moving dead load. Operation of machinery loads of 125% caused by moving of stopping the lift span.
3. **ULS Combination V3:** Permanent loads consisting of dead loads and superimposed dead loads. Wind Load of 150% with the bridge open in any position. Operating Impact of 120% applied to the maximum dead load effect in all members that are in motion and to the load effect on a stationary member caused by the moving dead load.

Category 2 – Bridge Seated, Counterweights Supported

1. **ULS Combination V4:** Permanent loads consisting of dead loads and superimposed dead loads with counterweights supported. Transitory loads consisting of vehicular live load (1.70 x CL 625-ONT) and pedestrian live load (0.2 x 1.70 x P).

2.1.2 Approach Spans

The approach and tower span superstructure consist of a reinforced concrete deck supported by steel stringers bearing on the abutment (approach span), transverse front tower beam (tower span only), back tower beam (both approach and tower span). The tower floor beams are supported on the tower columns. The condition of the diaphragms and stringers supporting the approach and tower spans varied. With increasing distance from the transverse joints, the diaphragms and stringers are generally in good condition (**Figure 5**), the exception being the 4th stringer from the east side on the north tower span which is located under the construction joint in the concrete from the 1982 deck widening. The 4th stringer on the north end exhibits deterioration along its length and in particular inside the north span lock room. Adjacent to the joints in both the approach span and tower span the structural steel is in fair to poor condition with loss of coating on stringers and diaphragms. The concrete soffit is delaminated and spalled in areas particularly near joints. A previous condition survey indicated widespread ingress of chlorides into the concrete deck and corrosion of the reinforcing steel. It was noted that the backer rod had fallen through the joint at the north end tower/approach joint and there are indications the joint between the tower and approach span leaks.

Figure 5: Typical Condition of Steel and Concrete Soffit under Tower Span

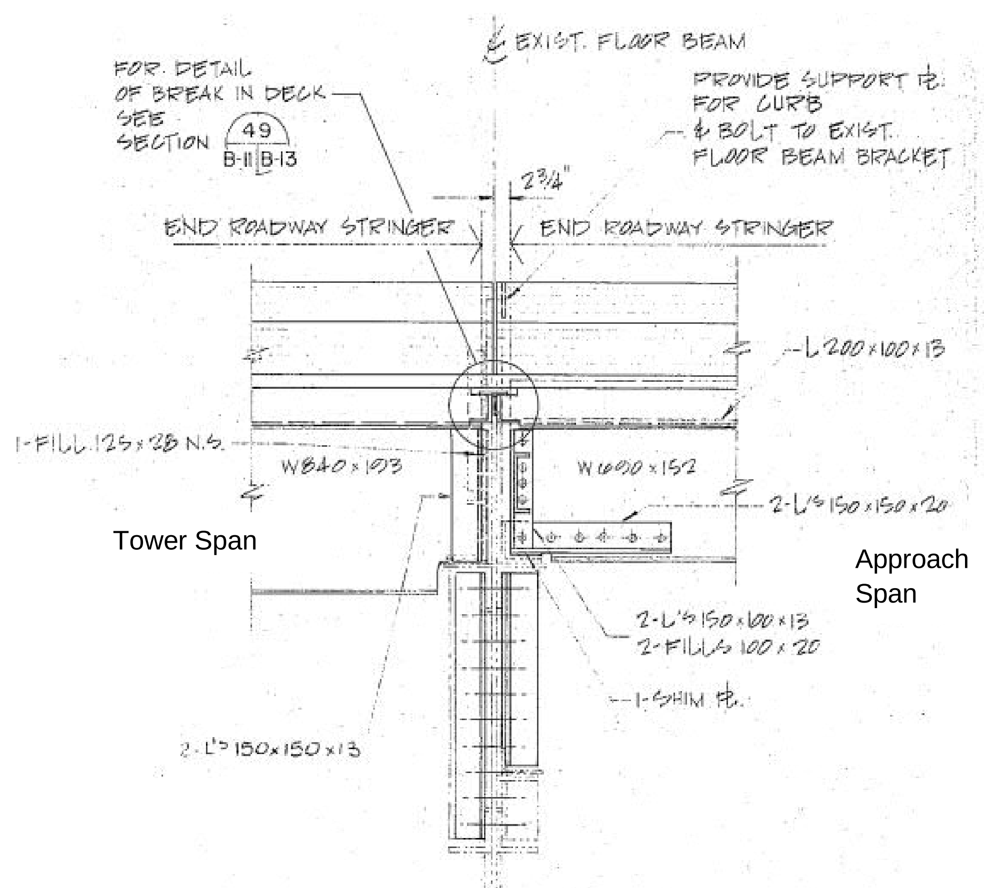
Approach Span at Rear Floor Beam

To evaluate the approach and tower spans, a grillage model was established in Midas Civil (2020) to evaluate load effects, related structural impacts and structural capacity. The superstructure was modeled using frame elements, with section properties (e.g. cross-sectional area, moment of inertia) simulating the reinforced concrete deck which is not composite with the supporting steel I-girders. The model consists of both adjacent approach and tower spans, with stringer connections between the two spans considered as pins and not moment connections. Further details including calculations and results are included in Appendix E. The evaluation of the approach and tower spans indicate that structural capacities in the superstructure are adequate under existing conditions.

The approach span and tower span (modeled together) have adequate structural capacity under existing conditions provided that some maintenance repairs are undertaken during the next rehabilitation. The model results and section calculations can be found in Exhibit D.5 and D.8 as part of **Appendix E**.

The deck joint is located between the approach and tower spans, at the location of the rear floor beam support. The stringers are pin connected to each other and the floor beam, but the deck concrete is not composite and technically free to expand and contract above the stringers. **Figure 6** shows the connection of the girders at the expansion joint (taken from the 1982 rehabilitation drawings).

Figure 6: Detail of Stringers and Deck Expansion Joint at Rear Floor Beam



2.1.3 Towers

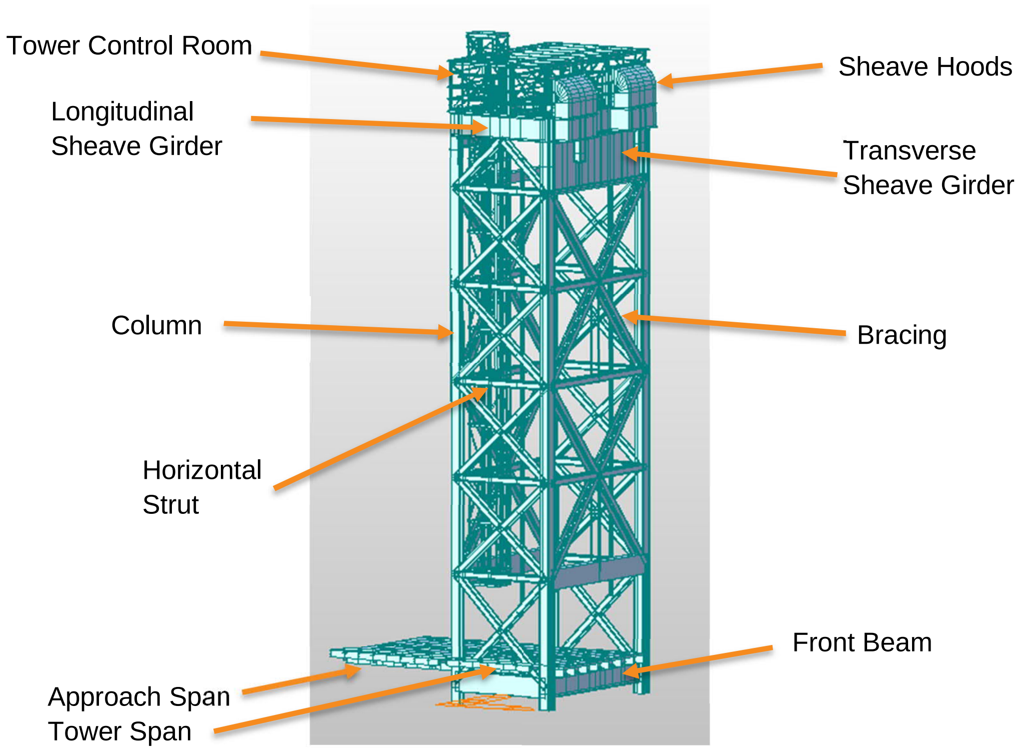
The tower at each end of the lift span supports the tower and approach spans, the counterweights, the auxiliary counterweights, mechanical components to operate the bridge, tower control rooms, the messenger cables that span across the canal between the two towers and the lift bridge weight. Even when the bridge is lowered, the tower supports most of the dead weight from the bridge except to maintain contact transfer from transitory (live) loads to the bearings Each has four columns, each column is braced with horizontal struts and diagonal bracing on all 4 tower faces. The tower condition is generally good with the front and rear beams supporting the tower and approach spans in fair to poor condition.

The tower evaluation indicates that under existing conditions the front columns on the south and north towers are acceptable. For members primarily in tension or compression, such as columns, the demand over capacity ratios are based on the tension and compression capacities of each member where the moments from the analysis were converted to an effective tension or compression force required to generate a uniform stress on the section equal to the maximum flexural stress. This simplified approach is conservative for members not susceptible to lateral torsional buckling, which is the case for the built-up members considered in this evaluation. CHBDC does not provide guidance on the analysis/evaluation of riveted built-up members and more specifically for box sections acting as beam columns; for the purpose of this analysis the rivets are assumed to be sufficiently joining individual steel components to prevent interaction between local buckling of elements of the built-up members between the rivets and overall buckling of the compression member. It is recommended that an evaluation of the possible interaction buckling failure mode based on Euro Code EN 1993-1-1 be conducted to determine the connectivity and effectiveness of the tower column members and their capacity with respect to the Eurocode. The model results and section calculations can be found in Exhibit D.4 and D.7 as part of **Appendix E**.

The evaluation of the tower consisted of assessing the capacity of the columns, horizontal struts, bracing and longitudinal and transverse sheave girders (Figure 7). The members at the machine house and penthouse floors were not evaluated although they were included in the model to determine their contribution to the self weight of the structure.

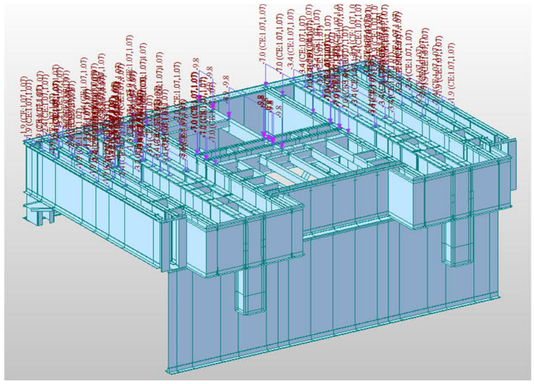
The tower was modeled and analyzed using Midas Civil (2020) to evaluate the forces in each member (**Figure 7**). Each element was modeled using frame elements, with equivalent section properties (i.e. cross-sectional area, moment of inertia) as the sections shown on the original drawings. The material weight of the lattice on the horizontal struts and bracing was accounted for through increased weight. Moment releases were applied at the connections between the columns the horizontal struts and bracing where appropriate.

Figure 7: Overall View of Tower Model



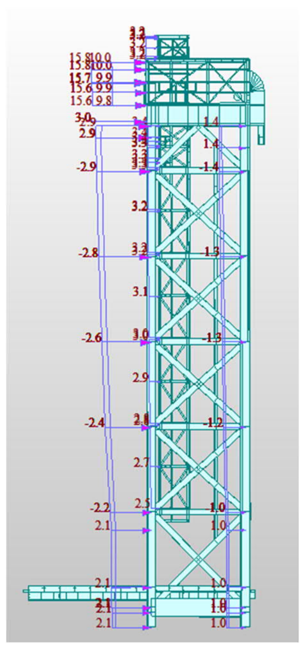
The self weight of the structure was automatically calculated by the software, given that each element was modelled with the appropriate section properties. The dead loads from the concrete floor, checkered plate floor and wall and roof panels were calculated and applied to the model as uniformly distributed loads. The weight of the sheave motor and gear were applied as a combination of uniformly distributed loads and point loads. Collateral loads, which include loads from sprinklers (0.24 kPa), ductwork (0.15 kPa) and acoustic ceiling tiles (0.1 kPa) per the National Building Code of Canada (NBCC), were applied to the roof members of the machine house and penthouse. An occupancy live load of 3.6 kPa for equipment areas and service rooms, per the NBCC, was applied to the area covered by the concrete floor in the machine house. An equal load was used for the dead load of the equipment in the machine house. A roof live load of 7.4 kPa was applied to the roof of the machine house and penthouse.

Figure 8: Concrete Floor Load Applied to Sheave Girders



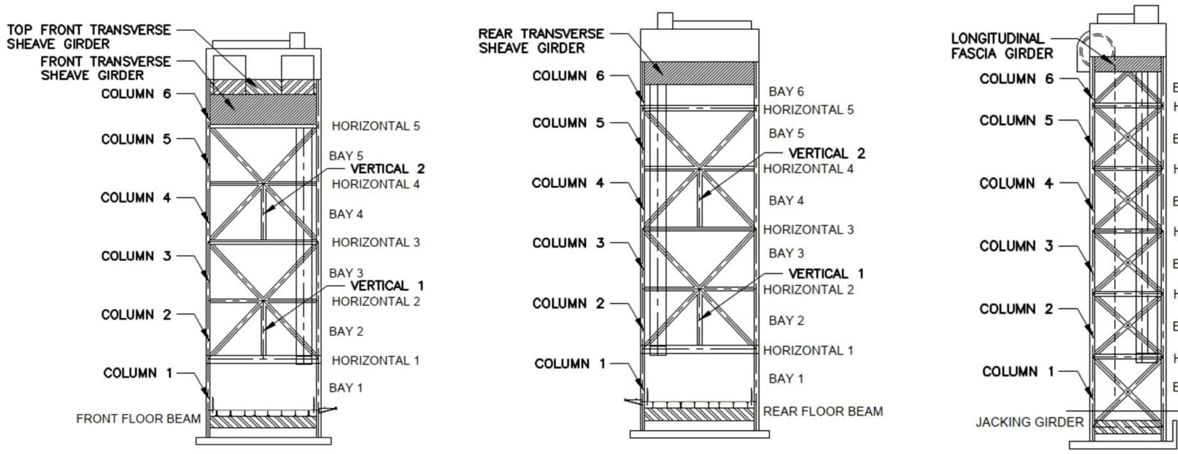
Wind loads were applied as trapezoidal pressure loads, which increased as the elevation increased, in accordance with the CHBDC. Wind load cases were established for wind acting on all four directions as well as for wind acting at a 45° angle to the main axes of the tower. The wind loads were applied on the windward and on the leeward planes of the tower. The wind loads on the leeward planes were reduced by the shielding factor, in accordance with Table C3.6 of the CHBDC.

Figure 9: Wind Load in N-S Direction



The tower was evaluated in the raised and lowered positions considering the demand and capacity for the limiting primary members for the worst case forces. The wind load for the raised bridge was reduced from CHBDC loading in the models as the lift span is only raised when wind speeds are 80km/h or less. The unfactored wind load for the tower when the existing bridge is lifted was reduced to match the lifting wind limit. Calculations are included in Appendix E Exhibit D.4 for reference. The tower members stresses are within acceptable ranges.

Figure 10: Tower Members

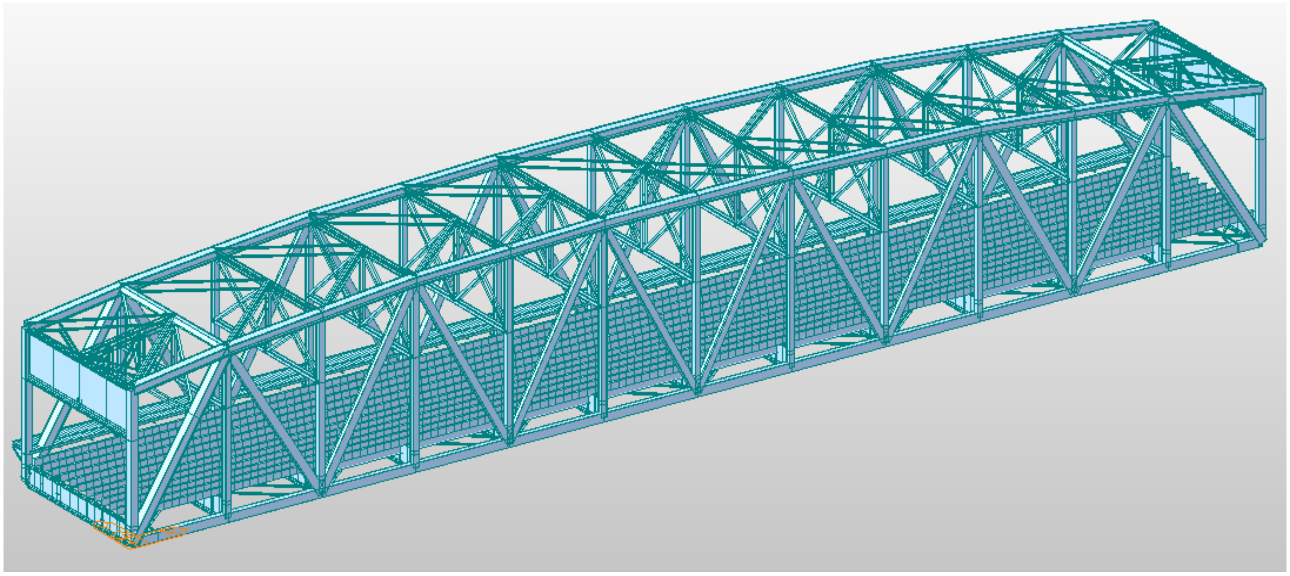


2.1.4 Lift Span

The stringers supporting the deck grating are overall in good condition, but section loss has occurred previous to the last painting and it is unknown if the stringers have suitable carbon content for welding based on their date of fabrication. A review of the sidewalk condition indicated that it is in overall good condition with a width of 1.89m between vertical truss members and the pedestrian barrier on the lift span. At expansion joints the width narrows where at the tower access ladder/stair to as little as 1.34m on the south end.

The lift span has been modeled and analyzed in Midas Civil 2020 to identify the forces in each member (**Figure 11**). The bridge is assumed to be balanced correctly for the purposes of the analysis. The 4 corner bearings in a balanced bridge are to be loaded with 6.7kN (1500lbs) when the bridge has no transitory/live loads. Based on the assumption the bridge is properly balanced the counterweight of each tower were anticipated to be proportional to provide the appropriate bearing reactions in all 4 corners. It is recommended that the actual weight in all four corners and the lateral balance be verified through testing prior to rehabilitation. This will confirm the actual load on the existing ropes and tower, further it is recommended the bridge weight be verified in order to ensure the ropes are correctly sized. If the bridge is not laterally balanced the loading to the tower and ropes will be inconsistent and loads may be elevated in one corner of the tower or in one set of ropes. Further if the bridge is not laterally balanced it may sway or oscillate with the uneven loading when raised. The bridge needs to be laterally balanced to help alleviate the main span swaying problem. The main span swaying will accelerate wear on the counterweight ropes, which will greatly shorten their useful life. The results of the analysis of Demand/Capacity for the primary Truss Members and Beam member respectively are acceptable with additional capacity in all members, details are included in **Appendix E**.

Figure 11: Lift Span Model



2.1.4.1 Lift Span Deck Grating

The steel truss lift span is 115.8m long with open steel deck grating welded to steel stringers over floor beams. The bridge deck is comprised of 98 panels (2 transverse x 49 panels longitudinally) of steel grating with transverse bearing bars welded to the longitudinal stringers. Transverse bearing bars alternate with grooved wear bars (Figure 14). The wear bars are slotted to fit together with other wear bars and bearing bars and further connected with a thin weld at the traffic level. The welds are small and they have historically proven to be susceptible to fatigue on the BCLB deck. Many of these localized weld failures have been repaired though significantly more are still present across the deck, typically located in the wheel paths of the vehicular traffic and more dominantly in the southbound lanes where the stringer spacing is higher. Line painting over the bridge was difficult to see and may be a safety hazard.

The deck grating bearing bars are cantilevered at the east and west sides of the road and support traffic barrier posts on both sides. On the west side the intermediate cantilevers for the sidewalk are partially supported on the grating edge beam (**Figure 15**). The barrier anchorage is not a crash tested type and the east barrier at 1.2m high is a substandard height for the many cyclists on the road.

The existing lift span deck grating was replaced in 1999. The design load used for the grating was CAN/CSA S6, CS-600. The type of grating included for bearing bars on 190mm increments and factory welds at cross bars and diagonal bars. (**Figure 12**). The 1999 grating manufacturer is unknown but LB Foster a US Manufacturer of this type of grating recommends it be used for lower traffic volumes with a 25 year service life. [12.] The current loading for Ontario Highways is a CL-625-ONT truck which is a total of 625kN. The CS600 design truck is a 600kN truck. Refer to **Figure 13** for each truck's axle configuration and loading. Steel deck grating is assembled in panels and the analysis considers the length of each individual grating panel. The axle spacing of CS600 and the CL625-ONT are such that the deck grating panel can only be loaded by a single axle. Since the axle load on the CS600 truck is greater than any axle load on the CL625-ONT truck (i.e. 180kN on the CS600 is greater than 175kN on the CL625-ONT), no load posting is required based on original design loads.

Figure 12: 1999 Open Steel Deck Grating

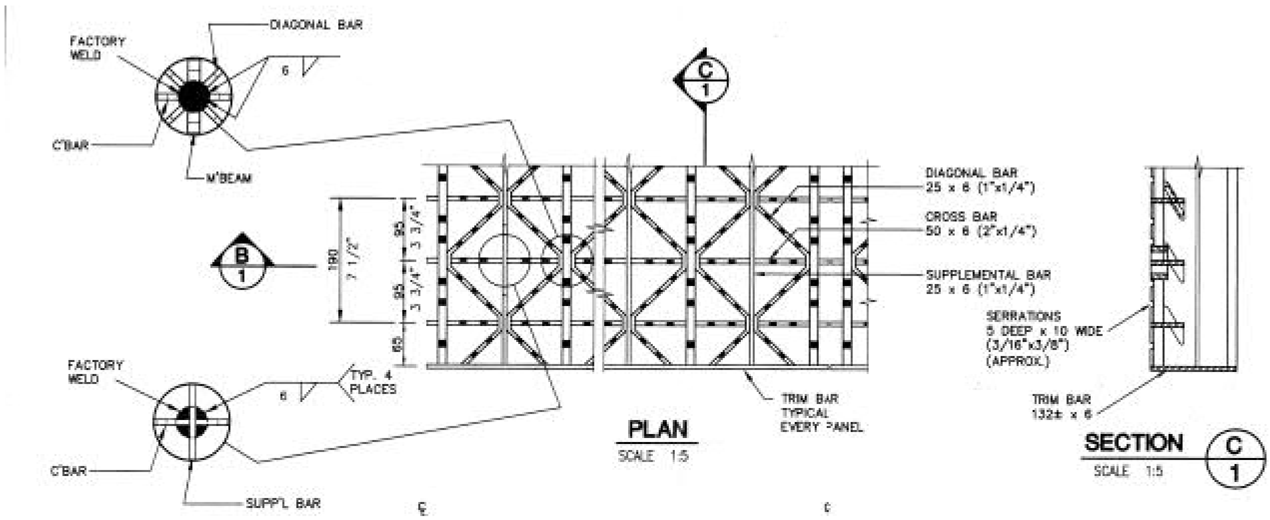
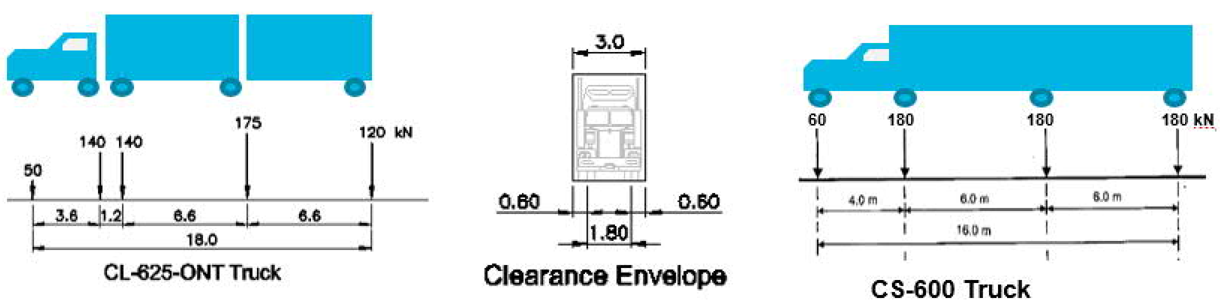


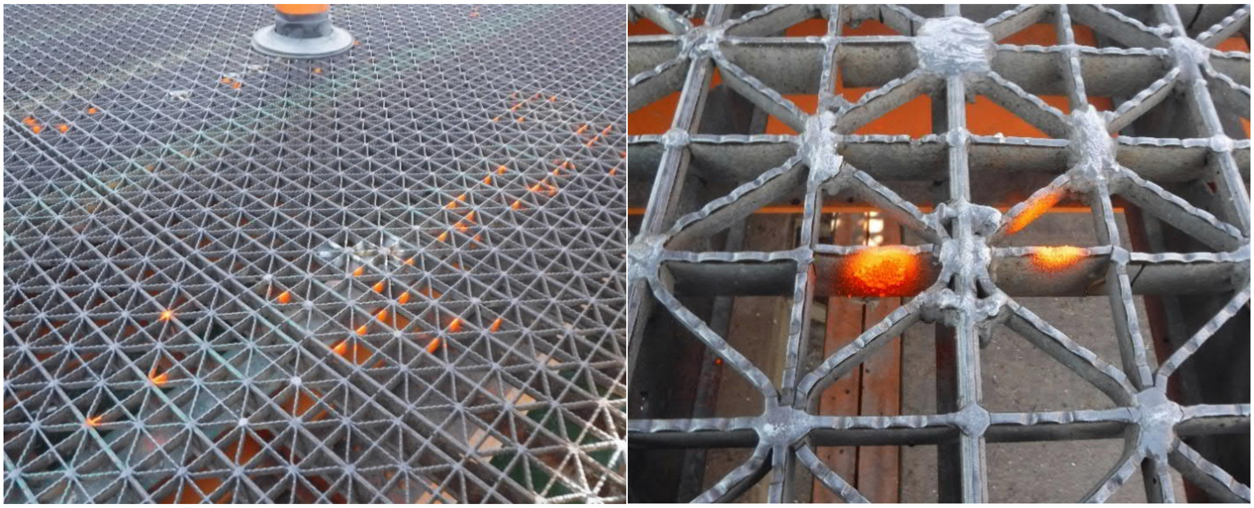
Figure 13: Truck Comparison



A load posting could be considered for the deck based on the current performance of the deck grating. A load posting would need to be implemented on a trial and error basis by installing a posting and then reviewing the deck for fatigue cracks. When a road is posted, compliance from trucks is difficult to achieve without regular MTO monitoring of the site.

Lastly, in reviewing the original deck and comparing to current design standards – the deck appears to be spanning almost 50% more than the current recommended span that fabricators such as Borden Gratings recommend for a similar weight panel designed for the CL625 ONT CHBDC loading. Borden grating carries a similar product (Type R/W-L-I) to what is installed at the site that spans 818 mm when placed perpendicular traffic. The current grating is spanning as much as 1295mm and cantilevered along the edge up to 650mm. LB Foster's comparable product is rated for light traffic with a 25-year life cycle. In order to consider LB Foster's product further for appropriateness it would need to be reviewed and designed under CHBDC. Borden grating has indicated that all of their grating designs require further information to assess their suitability to meet the CHBDC fatigue requirements. As fatigue appears to be the primary problem with the existing grating replacing the deck in kind is not recommended. While a load posting may be able to be added to the bridge to accommodate a similar replacement deck, it is unlikely a reputable proprietary deck designer and fabricator will be willing to provide a substandard deck as the liability risk is high.

Figure 14: Typical Condition of Steel Deck Grating



(Orange paint markings note the locations of localized weld failures)

Figure 15: Intermediate Cantilever Support and Grating Edge Post Support

2.1.5 Mechanical Components

The counterweight and auxiliary ropes under existing conditions were analyzed in accordance with the latest AASHTO specifications to determine if they are properly rated under the current loading conditions. Information regarding the ropes has been taken directly from the 2002 rope replacement specification. The counterweight ropes and sheave trunnion bearings were spot inspected by AECOM in March 2020 along with the other machinery components. The counterweight ropes were found to be in good condition with no strand breakage, so they will be evaluated at 100% of capacity.

The counterweight sheave shafts will be analysed for fatigue life under current loading and any additional loading that is being proposed. The shafts bearing capacity will also be verified. The trunnion shafts and bearing assemblies were found to be in good condition in the March 2020 inspection.

During the detailed annual inspection performed in 2020, the motors were found in good condition. No mechanical issues were detected.
Based on the calculated weight of the lift span the counterweight ropes are currently overstressed by about 6%. Due to the good inspection results and the fact that the ropes are designed with a 4.5 safety factor (as per CHBDC), there is no reason to change the ropes under current conditions given that there is no significant increase to loading proposed in the rehabilitation and the ropes are expected to have a long remaining service life.

Calculations with the AECOM span weight shows that the trunnion shafts have a finite fatigue life under current loading conditions. A summary of the results is included in **Table 6**.

The mechanical systems, Counterweight Rope and Counterweight Rope Sheave Trunnions specifically were analyzed using CHBDC and AASHTO to determine the limits of the existing ropes and trunnions. The ropes were analyzed to determine the total allowable loading. The trunnions were analyzed to determine if they have infinite fatigue life at the existing loading. The analysis is done with MathCad 15 and uses the latest weights from AECOM structural analysis. Calculations are included in **Appendix E** Exhibit D.9.

Table 6: Counterweight Sheave Trunnion and Rope Calculation Summary Table

	Stress in Rope (MPa)	Trunnion Shaft Capacity (lb)	Trunnion Bearing (fatigue life)
Calculated Weight (1776 tonne)	337	673512	> 100 years
Allowable	317	917225	2018 tonnes is the maximum allowable weight for a 60 years expectancy
Assessment	OK, ropes were designed with a SF of 4.5 for combined stresses	OK	OK

2.1.6 Summary

The evaluation of the approach and tower spans indicates that the stringer and floor beam support members have adequate moment and shear resistance at existing conditions. Bearing loads on the existing abutment bearings were found to be compliant with the CHBDC pressure limits. The lift span was found to have sufficient capacity in the truss and beam members. The approach decks and the lift span deck grating have exceeded their service life. The lift span deck grating in particular has an excessive span based on similar products available on the market today. The span is at least 50% more than what a current comparable deck grating would be rated for.

The tower evaluation indicates that under existing conditions the front columns on the south and north towers are acceptable. For members primarily in tension or compression, such as columns, the demand over capacity ratios are based on the tension and compression capacities of each member where the moments from the analysis were converted to an effective tension or compression force required to generate a uniform stress on the section equal to the maximum flexural stress. This simplified approach is conservative for members not susceptible to lateral torsional buckling, which is the case for the built-up members considered in this evaluation. CHBDC does not provide guidance on the analysis/evaluation of riveted built-up members and more specifically for box sections acting as beam columns; for the purpose of this analysis the rivets are assumed to be sufficiently joining individual steel components to prevent interaction between local buckling of elements of the built-up members between the rivets and overall buckling of the compression member. It is recommended that an evaluation of the possible interaction buckling failure mode based on Euro Code EN 1993-1-1 be conducted to determine the connectivity and effectiveness of the tower column members and their capacity with respect to the Eurocode.

The counterweight ropes are over stressed but in good condition. The counterweight trunnion shafts are loaded such that they have a finite fatigue life.

3. Preferred Rehabilitation Options

The primary goal of the BCLB rehabilitation is to bring the bridge rating up to a level of 5 to ensure a good ride quality, safe barriers and that the bridge is suitable for CHBDC live loading.

3.1 Traffic and Pedestrian Barrier

In accordance with CHBDC, traffic barriers shall be provided to reduce the consequence of a vehicle leaving the roadway. Traffic barriers shall meet the crash test requirements of NCHRP Report 350 or the AASHTO Manual for Assessing Safety Hardware (MASH). New traffic barriers are to satisfy the height requirements for cyclists.

Details may be changed that do not affect the geometry or strength of the system. The suitability of the anchorage shall be based on performance during crash testing. If crash testing results are not available, the deck or other supporting members shall be designed to resist the maximum load effects that can be transmitted to them. Posts in a steel barrier system can transmit large concentrated loads to the edge of a deck or curb and many proprietary deck systems such as rivetted grating and partially filled deck grating do not have the available design data to address if they are suitable for CHBDC crash loading. Further, the CHBDC suggests that it is preferable to connect the barrier system to primary load carrying members and that the primary member be designed to carry the full load from the barrier system for bridges without the deck. For the BCLB this means that the proposed deck systems require a structural member at the edge of the deck to ensure the barrier is adequately supported for crashes.

The calculations for required crash test level required indicated that a TL-2 barrier is adequate for the lift span as the road is not on a horizontal curve. A box beam guide rail modified to an overall height of 1.37m to satisfy the cyclist height requirements is recommended on the lift span adjacent to vehicular traffic similar to **Figure 16**.

All lift span deck replacement options are to consider detailing to ensure sufficient anchorage of the crash barriers for a TL-2 at a minimum. As previously indicated, since proprietary deck systems don't have the available data, it is not recommended that the existing barrier connection detail be reinstated (two steel plates sandwiching the deck grating). The barrier posts need to be carried by a primary structural steel member designed for the additional loading (i.e. outside stringer) spanning between floor beams (**Figure 16**).

Based on the calculation of crash test level required, with the horizontal curve coming into the approach spans a TL-4 barrier is required. In order to satisfy the cyclist height requirements, the Four Tube Combination Traffic/Bicycle Barrier, TL-4 (SS110-34) is recommended (**Figure 16**). A depiction of how the connection at the lift span may appear between the two barriers is included in **Figure 17**.

The pedestrian barrier on the outside of the sidewalk is adequate and, if required to accommodate widening of the sidewalk can be replaced in kind with a suitable anchorage system.

Figure 16: Proposed Deck Barriers on Approach Spans and Lift Span – Cross-Section

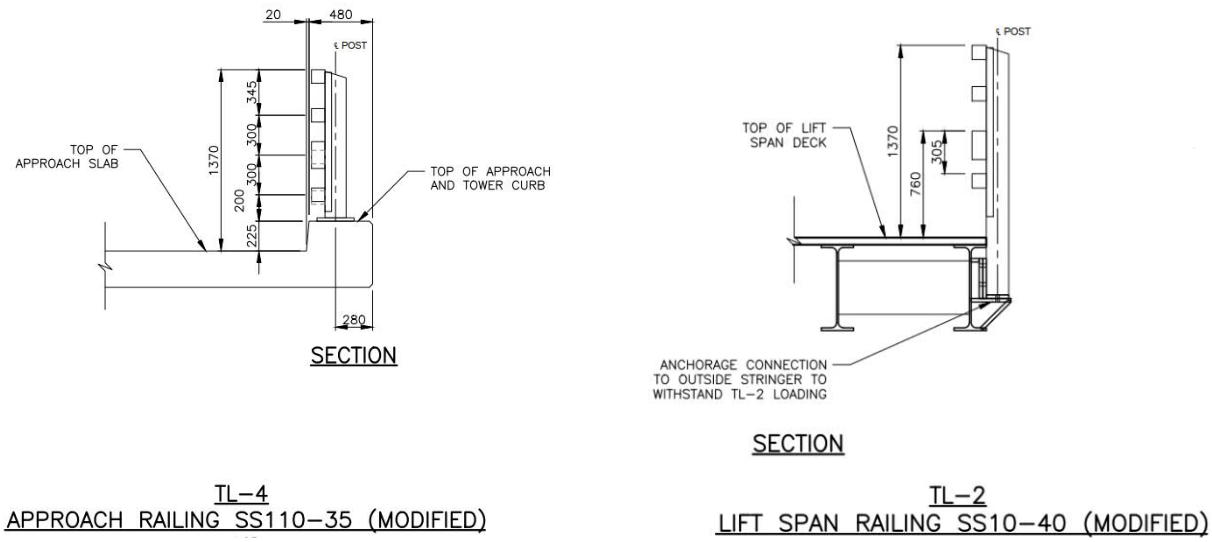
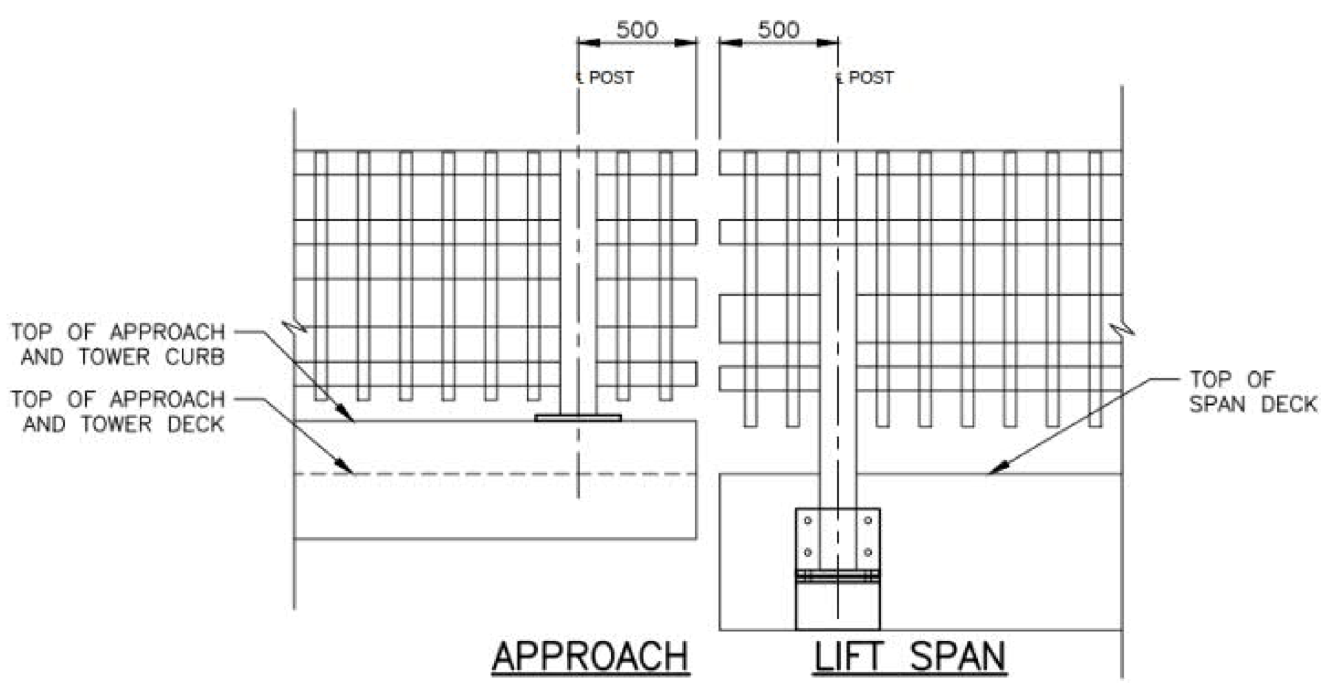


Figure 17: Proposed Deck Barriers at Tower Span to Lift Span Joint - Elevation



3.2 Approach and Tower Spans

Based on the 2020 inspection, the deck of the approach and tower spans should be replaced during the next rehabilitation. The steel superstructure is generally in good condition, with the exception of steel adjacent to leaking joints where several elements including diaphragms and connection plates require repair, maintenance or replacement.

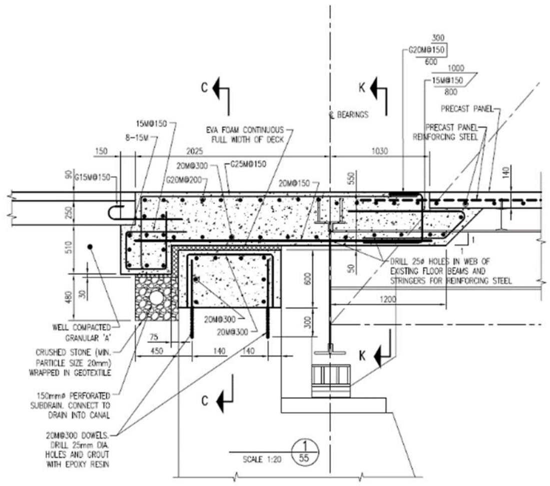
Given that the approach and tower span decks are non-composite. The feasibility of making the deck composite by installing shear studs in a deck replacement was considered. A metallurgical analysis was completed on a steel coupon for the north approach span original stringers to assess the weldability of the steel (**Appendix F**). The Carbon Content CC in the original stringers is 0.21%. Above 0.1% CC the Carbon Equivalent CE needs to be considered as well. The CE in the sample was 0.31%. In order for a CC above 0.1% to be weldable where the CE is below 0.5% preheat needs to be applied before welding which is the case for these stringers. For the chemistry observed in the original approach span stringer, to weld a shear stud for example the preheat temperatures recommended in CSA W59 or AWS D1.5 or D1.1 need to be used. In general, steels with a high carbon content and/or carbon equivalent are susceptible to hydrogen induced cracking, which is due to hydrogen from various sources such as moisture or other contaminants such as grease, oil on the welded surfaces that get into the steel when welding. To reduce the risk of cracking, the welded joint should be hot for some time to allow hydrogen to escape before the steel cools. This is achieved by slowing down the cooling rate by preheating the joint and, in some cases, by heating the joint after welding to keep hot for some time to allow hydrogen to escape. Once the joint cools, hydrogen gets trapped. Other factors also aggravate the risk of cracking: thick plates, highly restrained joints. It is recommended that a deck replacement remain non-composite and that shear studs not be installed to avoid the potential cracking risks in the stringers.

The preferred alternative for the rehabilitation of the approach and tower span is:

- Replacement of the concrete deck with 225mm reinforced concrete deck with an additional integral 20mm concrete wearing surface;
- Premium reinforcing steel is required in the top reinforcing layers of the deck;
- Elimination of expansion joints by semi-integral conversion at the approach span abutment joint (**Figure 18**);
- Link slab between the tower and approach span are preferred to replacing the existing joints, the link slab would not transfer moment;
- Steel repairs to the stringers and diaphragms in the superstructure near the joints including potential diaphragm replacement in some locations. Lead paint remediation is required along with repairs as well as bearing replacements at the abutment; and
- Concrete patch repairs in the abutment, wingwalls, retaining walls, stairs are further required during rehabilitation.

The overall calculations of the structural evaluations for the proposed tower and approach span rehabilitation is included in Exhibit D.5 and D.13 of **Appendix E**. Drawing S2 in **Appendix C** includes a general arrangement of the concept design for the approach and tower spans. In accordance with current priorities it is recommended that the deck/curb concrete used for the approach and tower span be a CSA approved concrete with similar performance to standard C-1 (28 day) air entrained concrete typically specified in Ontario to include for a reduction in greenhouse gas emissions..

Figure 18: Sample Semi-Integral Detail at Abutment

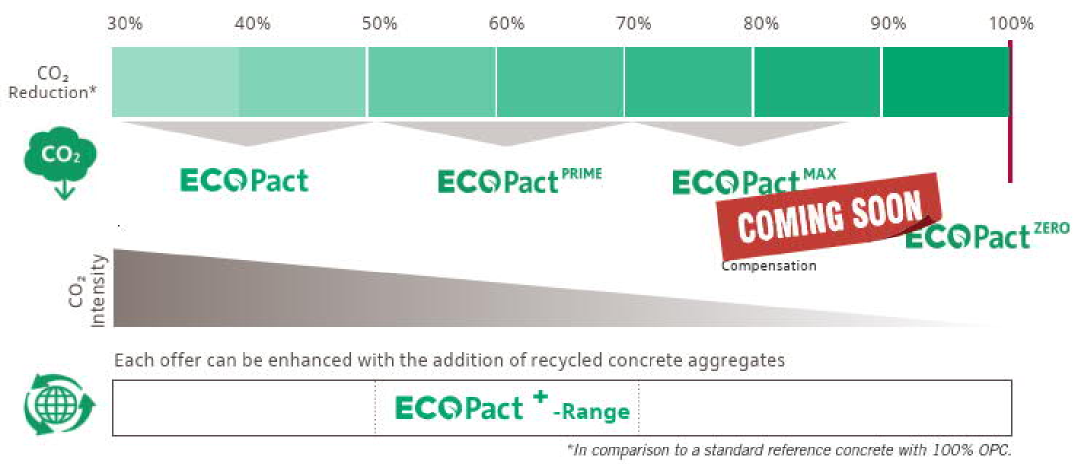


3.2.1 Low Carbon Concrete

Low carbon concrete was considered as an alternative to normal ready-mix concrete. Ontario Provincial Standard Specifications (Provincial) (OPSS.PROV) 1350 includes a requirement for a 10% reduction in greenhouse gas (GHG) emissions. The GHG reduction in the OPSS focusses on the use of Portland-limestone cement, fly ash or slag to replace at least 10% of the cement content and the use of limestone filler to reduce the cement content. Within Ontario it is anticipated that meeting this component of the standard is realistic and competitive for the concrete on this project.

Concrete producers have begun to develop lower emission concrete alternatives to reduce their carbon footprint. Proprietary Low Carbon Concrete with carbon reduction from 30-40% are currently emerging such as that from Lafarge-Holcim. They have developed a CSA approved product called ECOPact concrete which focuses on carbon reduction when compared to normal ready mix concrete. Approximate carbon reductions are shown in **Figure 19** and range from 30% to 100%[0]. Only ECOPact is currently approved by CSA at this time. Prime, Max and Zero are not approved and may have negative performance characteristics such as increased curing time. There is an approximate increase of $5 per cubic metre of concrete for this alternative. It is expected that other concrete providers will start to review their manufacturing process' and production methods to reduce carbon emissions and adjust additives to use less cement in order to document their reduction in carbon emissions so they can make claims similar to Lafarge for their products.

Figure 19: Carbon Reduction – EcoPact Concrete[11]



3.3 Lift Span Deck Replacement

The current deck on the Burlington Lift Bridge is a crimped open steel grid deck welded to the stringers. The existing system is fatigue prone which indicates that a stiffer system is desirable to improve load distribution and reduce localized stresses due to vibrations and fatigue. Two options for the deck replacement are considered: an open deck grating and closed partially filled deck grating. The related calculations and evaluations are included within Exhibit D.3 and D.10 of **Appendix E**.

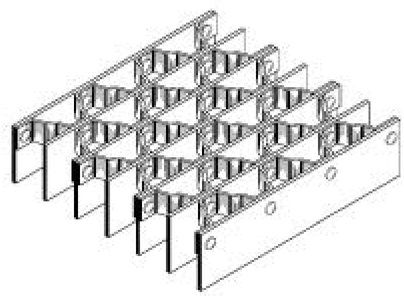
3.3.1 Open Steel Grid Deck Rivetted Roadway Grating (Open Deck)

The open deck option that is preferred is the open rivetted steel grid deck roadway grating (**Figure 20**). The existing deck on the Burlington Canal Lift Bridge consists of a crimped open steel grid deck which is welded to the stringers. However, the existing system has a fatigue prone detail as is shown in the defects identified to date.

Rivetted gratings purportedly have higher resistance to impact and fatigue. In order to avoid another fatigue prone detail, the grating should be bolted to the stringers and shimmed at the floor beams to correct any inconsistencies between supports. Welds and bolts should not be relied upon to bridge inconsistencies, as this will result in increased stress on the deck system.

New stringers are required to provide adequate support to the decking and barriers. The new deck panels consisting of rivetted open steel grid decking bolted to new steel stringers may be fabricated off-site, delivered to site and lifted or pushed into place to accelerate installation on site and improve overall quality. This method of construction is recommended to accelerate the lift span rehabilitation during the shutdown in January/February. A general arrangement for this alternative is included in Appendix C Drawing S1-01.

Figure 20: Rivetted Roadway Grating by Borden Grating



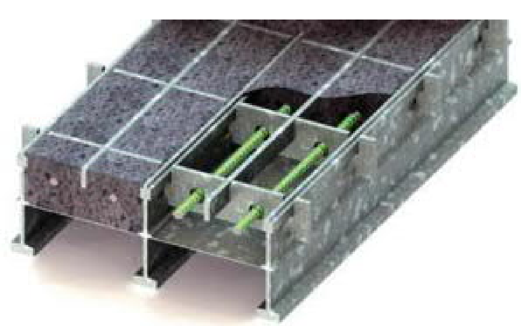
3.3.2 Half-filled Grid Deck with no Overlay (Closed Deck)

The preferred closed deck option is the lightweight concrete half-filled grid deck grating. A half-filled grid deck requires less concrete and is lighter than a fully filled grid deck. To reduce the overall weight of the deck and provide protection to the deck system, a Matacryl (or equivalent) wearing surface should be installed. A half-filled grid deck without overlay is depicted in **Figure 21**. For this option, the stringers will require replacement to optimize spacing and minimize the system's overall weight and to carry a TL2 Barrier.

The new deck panels are anchored to new steel stringers by welded stud shear connectors. The panels can be fabricated off-site, delivered to site and lifted into place allowing for an accelerated installation on site to meet the project schedule.

With the closed deck option bridge drainage is required. A drainage analysis of the deck will require a transverse and longitudinal slope from the centre of the lift span. A steel kick-plate/curb should also be installed along the edges of the deck to direct rain water to either end of the lift span where drains are required. Drains need to extend below the superstructure and terminate above new splashpads and a drainage swale or drain. A general arrangement for this alternative is included in Appendix C Drawing S1-02.

Figure 21: Concrete Half-filled Grid Deck without Concrete Overlay



The recommended alternative includes the use of lightweight concrete instead of normal weight C-1 bridge deck concrete. Per the CHBDC, the unit weight of lightweight concrete can be taken at 18kN/m^3 (approx. 1835 kg/m^3) whereas the unit weight of normal weight concrete is 23.5 kN/m^3 (approx. 2395 kg/m^3) which results in significant weight reduction and allows for a stiffer deck without impacting mechanical equipment and minimizes impacts of the new steel stringers with higher spans between stringers.

Lightweight concrete cannot be made with exposure class C-1 (air entrained) due to its natural porosity. The exposure class C-1 is used for structurally reinforced concrete exposed to chlorides with or without freezing and thawing conditions (such as bridge decks). Lightweight aggregates only meet the requirements for CSA A23.3 exposure Class F-2. Exposure class F-2 is for concrete in an unsaturated condition exposed to freezing and thawing but not chlorides (exterior walls and columns). In order to protect the lightweight concrete a protection system is required. Where a waterproofing membrane and asphalt wearing surface may be used where weight is not a consideration, for the BCLB lift span a proprietary system such as Matacryl is a good alternative to protect the closed deck. Matacryl for highway loading adds 0.2 kPa to the weight of the bridge deck compared to 2.1 kPa for 90mm of asphalt and waterproofing membrane, and has been considered in the calculations for this option.

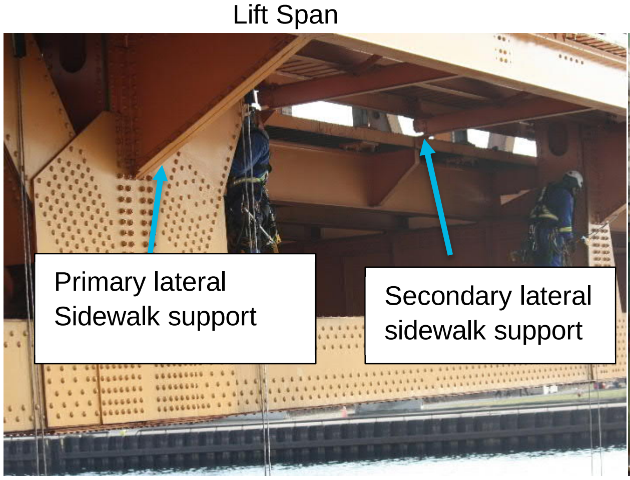
Lafarge has indicated that ECOPact discussed in 3.2.1 can be combined with lightweight concrete to improve the sustainability of the closed deck option.

3.4 Sidewalk

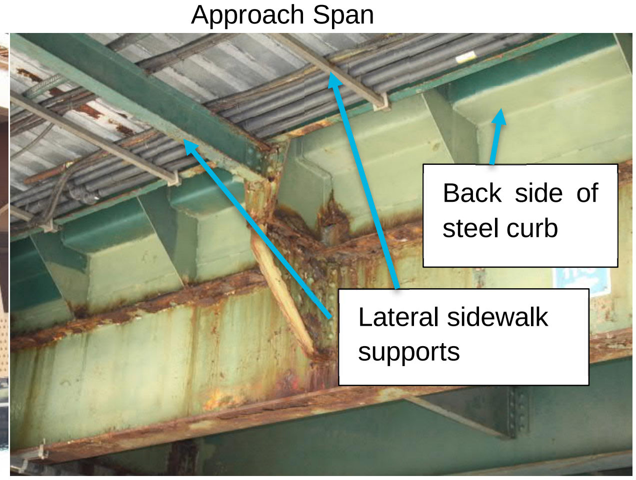
The existing sidewalk over the bridge is used by pedestrians and cyclists. In the lift span, the tower and approach spans the sidewalk is cantilevered from the primary structural members as well as from the deck with intermediate supports from the approach steel curb and deck grating (**Figure 15**). The sidewalk will require temporary support during the replacement for each deck option. The intermediate support system will require modification to allow for independent support or through a connection to the edge stringer or approach curbs in the new deck. If the sidewalk remains open through the addition of temporary support between the columns (lift span) and span (approach and tower span), the sidewalk will require protection from the construction site.

Figure 22: Sidewalk Support

Lift Span



Approach Span



3.4.1 Approach and Tower Span Sidewalk

Signs are placed at each end of the bridge instructing cyclists to dismount prior to crossing. The bridge sidewalk narrows at a few locations in the approach to the bridge and the approach and tower spans as described below:

- 1.34m in the tower spans adjacent to the stair cage; and

- 1.2m in the approach due to gate encroachment.

Widening of the sidewalk on the approach and tower spans is required to meet the minimum MTO bridge sidewalk standard of 1.5m clear width. The sidewalk decking will need to be replaced and the support structure modified in order to accommodate a widened sidewalk. The aluminum deck with pedestrian wearing surface such as Matacryl (or equivalent) is recommended for widening in the approach and tower spans because it is lightweight and will reduce the need for extensive structural modifications to the sidewalk structure. **Table 7** includes the existing minimum support requirements for the proposed aluminum deck replacement and the existing double Tee sidewalk decking. **Figure 24** shows the layout of the proposed widening of the sidewalk to improve the sidewalk to meet MTO bridge sidewalk standards. It is recommended that the sidewalk be surveyed end to end during the detailed design phase to ensure details are correct and that no other overhead, lateral or equipment impacts exist to prevent the widening of the sidewalk.

Table 7: Sidewalk Replacement Alternatives

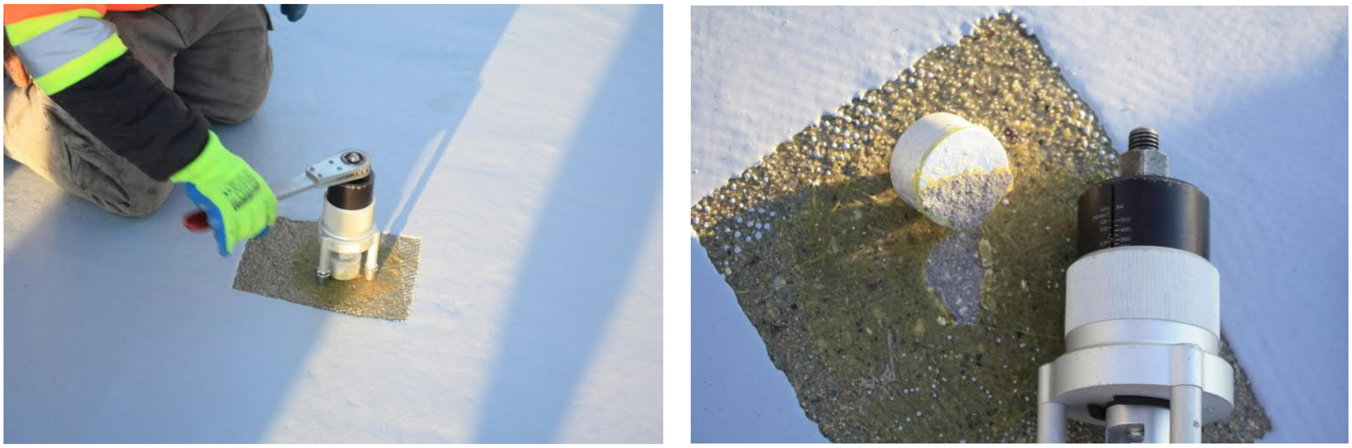
Deck Type	Exist Double Tee Sidewalk	Aluminum Deck
Unit Weight (kN/m^2)	1.55	1.00
Required Stringer spacing (metre)	Existing = 1.59 Max	1.8

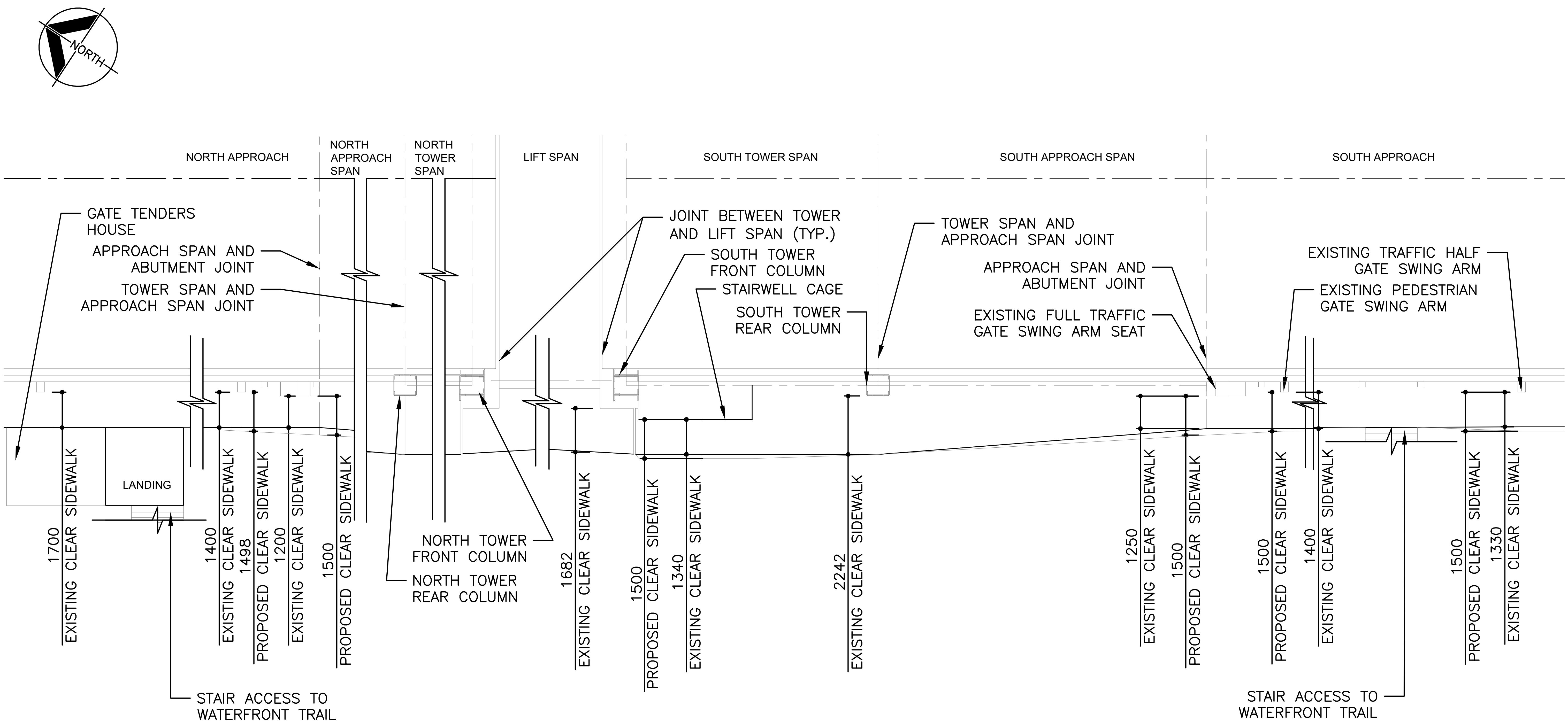
3.4.2 Lift Span Sidewalk

The existing cantilevered sidewalk in the lift span is counterbalanced by the heavier truss on the east side and the railway stringers left in place between the truss floor beams. Any consideration to increase or decrease the deck weight in the sidewalk will require a detailed analysis of the lateral balancing system on the bridge. A field evaluation including the weight of the lift span in all four corners is required. It is recommended the railway stringers be removed and a lateral counterweight system be added to ensure the bridge is laterally balanced. The bridge should be weighed at each bearing with the counterweights jacked to evaluate the current lateral balance of the bridge during the detailed design phase, prior to construction.

The existing sidewalk is in fair condition and a rehabilitation is warranted at this time. Deteriorated areas of concrete should be removed in order to perform local patch repairs, scaling levelled and a slip resistant coating (Matacryl or equivalent) be added as a wearing surface for pedestrians to increase the service level and protect the sidewalk. Adequate bonding between the existing concrete substrate and the new wearing surface are to be evaluated through bond and dryness testing (Figure **23**).The wearing surface will add approximately 0.2kPa to the weight of the sidewalk and has been included in the structure evaluation. Modification to the intermediate transverse supports on the existing deck are required for a lift span deck replacement.

Figure 23: Test to ensure adequate bond between concrete and Matacryl bonding agent





AECOM

PWGSC BURLINGTON CANAL LIFT BRIDGE DECK PRE-DESIGN SIDEWALK PLAN

DRN:	DSN:	CHK:	APP:
BS	XX	CBL	XX

PROJECT NUMBER: 60617790

SCALE: AS NOTED

FIGURE NUMBER: 24

FILE NAME: C:\USERS\BRIAN.SANDERS1\AECOM DIRECTORY\BCLB DECK PRE-DESIGN AND CONCEPT DESIGN PROP - GENERAL\900_CAD_GI

3.5 Lead Paint Remediation

As part of a previous investigation, lead containing paints were identified in the lift span, approach span, and tower span structural steel coatings.[6] As a result of the study, the following is recommended in order to manage the lead containing paints during construction.

- In areas where minor cracking/chipping/flaking is observed on lead containing paints, it should be encapsulated with a fresh coat of paint.
- In areas where severe cracking/chipping/flaking is observed on lead containing paints, it should be removed by a professional and competent environmental abatement contractor following Type 2a or Type 3 operations.

Where structural steel is being repaired or modified – it is recommended that coating in the immediate area where the steel is affected be removed and lead abated based on current requirements. Where there is a potential for the lead painted steel to impact the work area encapsulation may be preferred. Lead paint remediation and protection to be performed as part of this rehabilitation is to be done in compliance with current O.Reg. 490/09 for designated substances and the Occupational Health and Safety Act (OHSA).

3.6 Mechanical Components

The main mechanical components (motors, counterweight ropes, trunnion bearings and shafts) were evaluated for each type of deck in an effort to select viable options. The estimated weight of the two lift span deck replacement options were used for the evaluation. Calculations were completed in accordance with CHBDC and AASHTO requirements and guidelines.

3.6.1 Ropes assessment

During the official detailed annual inspection in March 2020, the main counterweight ropes were visually inspected and found to be in overall good condition with appropriate maintenance.

The ropes show wear over the running length of rope due to contact with the sheaves during operations. The wear is apparent in the form of elliptical flats on the crowns of the wires. Typically ropes show the greatest wear on the portion of rope which is in contact with the span side tangent point of the sheave when the span is seated. The largest wear flats observed along the running length of the ropes were approximately 5/8 inches which indicate a remaining strength of 95%. The rope capacity is similar to the previous inspection completed in 2018.

In October 2020, the ropes and other mechanical components were inspected during operation. No mechanical issues were detected during the inspection.

Results following evaluation of rope capacity for the two lift span deck options are included in **Table 8**. Calculations were made as per CHBDC and AASHTO requirements and are included in **Appendix E**.

3.6.2 Trunnion shaft assessment and bearings

The trunnion shafts were found to have more than 100 years of service life left for the current lift weight and number of operations per year (around 3350 lifts in 2019 as per the Bridgemasters log). If the lift span weight is significantly increased, then the trunnion shaft service life will need to be re-evaluated.

The two deck replacement options (open rivetted grating and partially filled grating) do not exceed the bearing capacities.

Results following evaluation of trunnion shaft and bearing are included in **Table 8**. Calculations were made as per CHBDC and AASHTO requirements and are included in **Appendix E**.

3.6.3 Motor assessment

The motors were replaced in 2013 as part of the complete refurbishment of the span machinery. During the detailed annual inspection performed in 2020, the motors were found in good condition. No mechanical issues were detected.

Results following evaluation of motor capacity are shown **Table 8**. Calculations were made as per CHBDC recommendations and take into consideration bearing friction, bending losses in counterweight ropes, inertial of main mechanical components, imbalance and ice and wind loads and are included in Appendix E.

3.6.4 Need and timeline for replacement

Table 8 includes a summary of the performance evaluation of the main mechanical components for each of the two proposed lift span deck replacement options based on the requirements of the CHBDC. The ropes should be replaced where the allowable stress is exceeded by 10%, The allowable stress is not exceeded by 10% for either option.

Table 8: Comparison of Mechanical Components for Deck Options

	Rivetted Roadway Grating	Half-filled Grid Deck (No Overlay)
Estimated Weight of Span (tonne) (Existing:1776)	1830	1891
Stress in ropes (MPa) (max 317 MPa)	342 MPa, 7.45% higher than allowable stress	347 MPa, 9% higher than allowable stress
Trunnion Bearing Capacity (lb) (max 917225 lb)	655600, OK	677453, OK
Trunnion Fatigue Life	>100 years	>100 years
Motor Capacity (hp) (rated capacity of 150 hp)	156 hp, 4% higher than rated capacity	158 hp, 6% higher than rated capacity

Based on the calculations, the counterweight ropes are not over stressed. Calculations are included in **Appendix E** Exhibit D.15 for reference. Counterweight ropes are designed with a 4.5 safety factor, because the ropes are in good condition a 10% overload is acceptable for continued operation with sustained inspection and maintenance. There is no reason to change the ropes considering that the deck options proposed do not exceed 9% of allowable stress. In all cases, ropes should be changed every 50+/-5 years.

The trunnion shaft fatigue life is greatly impacted by the weight of the lift span deck. concurrently

For both deck options, the motors are slightly undersized. This is due to the ice and wind load applied on the deck. In the calculations for both deck options, ice and wind loads were applied concurrently on the decks total surfaces which generates a difference in loading between the riveted open grating option and the half-filled grating deck option. This approach is considered conservative because having both maximum ice and wind loads applied on the entire deck is very unlikely. Furthermore, results for motor capacities were compared to their nominal rated capacity of 150 hp. Since CHBDC and AASHTO allow for a 125% overload on motors during operation, a change for a heavier deck option would not affect bridge operation nor service life of the motors. Also, the control systems should cut out at about 185% of full load torque. In all cases, the bridge should not be opened during ice storms when there is high winds.

If the ropes are to be replaced, provision shall be made for the independent support of the counterweights for rope replacement as per CHBDC section 13.6.21.14. Dogging devices are already installed on the bridge towers for support.

The main counterweight ropes were analyzed according to each replacement option. The counterweight ropes are over stressed by maximum of 9% for both deck options and do not require replacement, and the trunnion shaft fatigue life is infinite. Where the overstress in the ropes is less than 10% replacement of the ropes is not considered necessary (counterweight ropes are designed with a 4.5 safety factor, because the ropes are in good condition a 10% overload is acceptable for continued operation with sustained inspection and maintenance).

The remaining trunnion shaft fatigue life is infinite for the shortlisted options. The heavier weight deck options (exodermic deck, precast concrete deck and half-filled grid deck with overlay) are not recommended and were not shortlisted because they reduce the trunnion shaft fatigue life and increase the risk of trunnion failure. Calculations are included in Appendix E Exhibit D.9 and D.15. Detailed analysis of results for all mechanical components are included in **Appendix E**.

3.7 Life Cycle Cost Analysis

Where there are a variety of options for rehabilitation at a site a life cycle cost analysis (LCCA) is performed. The LCCA is a means of analyzing the expenses relating to a structure over its lifetime. These costs may include capital costs, rehabilitation costs, maintenance costs, and disposal costs for a structure. LCCA considers more than initial construction costs; the goal of LCCA is to choose the most cost effective approach to infrastructure management over the lifespan of the structure.

In order to perform an LCCA, rehabilitation and maintenance alternatives are developed, and the timing of improvements is considered. Costs for construction, rehabilitation and maintenance including engineering and administrative costs are estimated. Costs for structure users have not been considered as part of the analyses. Alternatives are considered over a 50 year period of time, and the present value of each alternative is calculated and the results of the present value costs are analyzed. The analysis period considered for the purpose of this memo is 50 years because required maintenance costs beyond 50 years generally have little effect on the LCCA. **Table 9** includes a list of typical structural elements and potential deck types at the BCLB, their repairs and anticipated service life before additional maintenance is required.

Table 9: Rehabilitation and Element Life Spans[14,15]

Element	Maintenance Life (years)	Current Age - Approach Spans	Current Age - Lift Span
		Built (Last Rehab)	
Asphalt Pavement	10-15	Unknown	-
Steel Truss	50	-	62 (38)
Steel Bridge	45	62 (38)	-
Pedestrian Steel Bridge	30	62 (38)	62 (38)
Deck Replacement (generic)	50	62	21
Rehabilitation (Overlay, Waterproof and Pave)	30	38	-
Elastomeric Bearings	25-30	38	-
Expansion Joint Seals/ Seals	5-15	38	-
Expansion Joint Assembly	15-30	38	-
Coating Systems	10-20	38-62	38-62
Wire Ropes	50+/-5	19 (last rehab 2002)	
Bearings	40-50	62	
Main Counterweight Sheave Trunnion Shafts	> 100 years (depends on fatigue life)	62	
Open Steel Grid Deck Rivetted Roadway Grating (Alternative 1)	75	NA	
Half-filled Grid Deck with no Overlay (Alternative 2)	75	NA	

3.7.1 Present Value Analysis

Present value analysis involves calculating the cost of alternative designs in present day dollars. For future years the current estimate “C” is increased to account for inflation “i”, which is as follows:

$$C_n = C(1+i)^n$$

Variations in costs may occur due to inflation or deflation. To consider this a sensitivity analysis is performed using discount rates are considered from 2% to 6%. The present value “PV” of a capital expenditure “C’” in year “n” at a discount rate “r” can be calculated as follows:

$$PV = C \big/ (1+r)^n$$

The discount rate “r” (2%-6%) sensitivity is compared for each alternative. The residual salvage value of the structure is considered as a reduction to the life cycle costs at the end of the analysis, and is calculated as a percentage of the life remaining in the most recent work scheme proposed for the structure.

3.7.2 Lift Span Life Cycle

Two alternative deck replacement schemes were considered using Life Cycle Cost Analysis (LCCA) for rehabilitation of the lift span (**Table 10**). Maintenance considerations that exist in each alternative such as bridge cleaning and plowing and existing typical mechanical maintenance are not considered. Maintenance specific to each option and where the costs for the maintenance will differ are considered.

Table 10: Summary of Deck Options Considered

Deck Type	
Open Steel Grid Deck	Rivetted
Half-filled Grid Deck	No Overlay

Alternative 1: Open Steel Grid Deck Rivetted Roadway Grating (Open Deck)

The estimated costs for recoating/sealing structural steel under this option are higher due to increased exposure to debris from road.

- Year 1 – Treatment 1 & 2: Deck Replacement with Open Grid Decking
- Year 20 – Treatment 6: Recoat/ seal structural steel coatings as needed;
- Year 30 – Treatment 7: Miscellaneous Open Grid Repairs
- Year 40 – Treatment 6: Recoat/ seal structural steel coatings as needed;

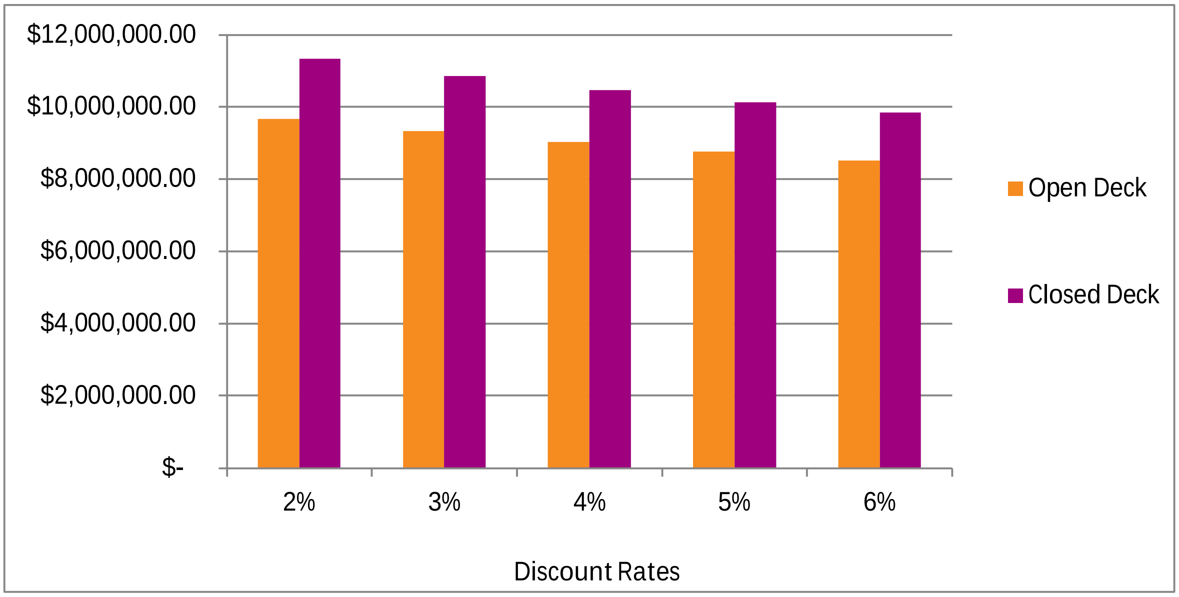
Alternative 2: Half-filled Grid Deck with no Overlay (Closed Deck)

The wearing surface will require maintenance, the new deck drainage system will require annual maintenance.

- Year 1 – Treatment 4: Deck Replacement with Half-filled Grid Deck Panels
- Year 2 to 50 – Treatment 8: Clean Deck Drains;
- Year 15 – Treatment 12: Maintain Deck wearing surface;
- Year 20 – Treatment 13: Recoat/ seal structural steel coatings as needed;
- Year 30 – Treatment 12: Maintain Deck wearing surface;
- Year 40 – Treatment 13: Recoat/ seal structural steel coatings as needed
- Year 45 – Treatment 12: Maintain Deck wearing surface;

Consideration of the two alternatives over a 50 year life cycle cost analysis was completed using sensitivity analysis **(Figure 25)** with consideration to discount rates from 2% to 6%. Based on the present value and the sensitivity analysis, Alternative 1 the replacement of the deck with a Rivetted Open Steel Grid Deck is the least expensive option over the 50 year time frame. Details relating to the lift span LCCA estimates are included in **Appendix B** Exhibit B.2**.**

Figure 25: Sensitivity Analysis – Lift Span Rehabilitation Options



3.7.3 Overall Rehabilitation Construction Estimate

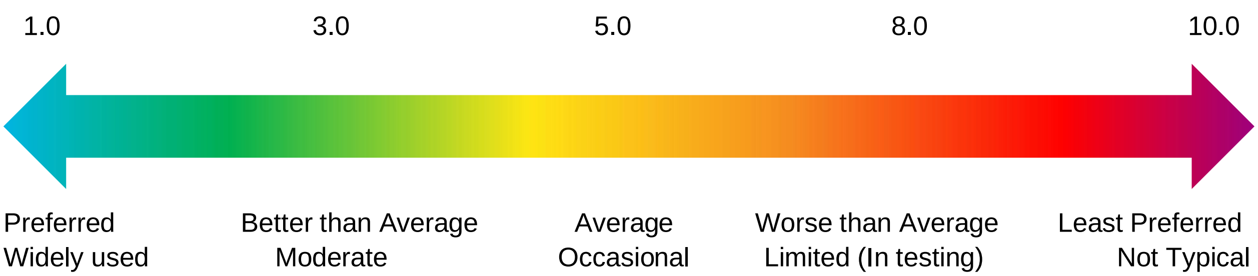
The full proposed rehabilitation for the BCLB was estimated for each of the two final lift span options inclusive of proposed approach and tower span and sidewalk rehabilitation. The process involved identifying and quantifying the elements required to complete the work. In order to ensure adequate elements were considered in addition to the Canadian Institute of Quantity Surveyors (CIQS) Elemental Cost Template items the Ontario Provincial Standards (OPS) standard and non-standard item lists were considered as well as items specific to the site. Considering and including the local standards is considered appropriate in order to ensure sufficient detail in the estimate to develop a comprehensive list of requirements for the project. Each of the items was quantified base on either CIQS or OPS standards whichever was appropriate and quantities estimated based on the proposed site work. Current costing for each of the elements was obtained from nearby distributors, contractors, recent AECOM projects and through the MTO Highway Costing (HiCo) system taking note of relevant recent pricing from southwest region. The estimate was further adjusted to take into account current market conditions particularly as they relate to ongoing fluctuations in steel pricing. Due to COVID 19 market fluctuations are expected to continue for several months. A contingency of 30% was used to mitigate the risk caused by current and future market fluctuations. Details relating to the rehabilitations estimates are include in Appendix B Exhibit B.1 and the resulting Class C estimated costs for each option are included in **Table 11** with detailed breakdown in **Table 18**.

Table 11: Class 'C' Estimate Summary

Rehabilitation Option including Approach Spans and Sidewalk Rehabilitation	Comprehensive Estimate				
	Option 1 – Single Lane Alternating Staged	Option 2 – Two Lanes Staged	Option 3a – Option 1 staged over 2 years	Option 3b – Option 2 staged over 2 years	Option 4 – Full Closure
Open Lift Span Deck – Rivetted Steel Grating Decking	$13,950,000	$13,480,000	$14,760,000	$14,300,000	$12,970,000
Closed Lift Span Deck - Half-filled Grid Decking	$15,350,000	$14,880,000	$15,760,000	$15,290,000	$14,370,000

3.8 Lift Span Deck System Ranking

The proposed lift span bridge deck system options have been evaluated and ranked based on the information presented in this report. These findings have been presented as an evaluation matrix in **Table 12**. Each deck system was ranked against the ten (10) evaluation criteria with a score between 1 and 10, with a ranking of 1 representing a deck system that best meets the criteria and 10 representing a deck system that poorly meets the criteria per the graphic below. Each of the evaluation criteria were given a weighting which when multiplied by the ranking number add up to determine the final ranking for each deck system. The deck system with the lowest value represents the preferred option.



Descriptions of the evaluation ranking criteria follow:

Capital Cost

Capital cost ranking is based on the estimated capital cost with the highest value getting a rank of 10.0 and the lowest value getting a rank of 1.0. All of the options between are prorated for their score based on the highest and lowest capital costs.

Life Cycle Cost

Life Cycle Costs (LCC) include capital costs, rehabilitation costs, maintenance costs, and disposal costs for a structure over a 50 year period. The highest LCC ranking is the most expensive over 50 years with 10.0 points and the least expensive over 50 years has 1.0 point. The remaining options are prorated based on the highest and lowest LCC.

Implications of Deck Weight

The potential impacts to the structure resulting from an increase to weight such as mechanical and operational considerations are included in this ranking. A lighter weight deck option is considered as the most desirable as their will be fewer changes to the way the bridge operates and less addition of stress to the counterweight ropes, trunnion and motors. The lightest option is scored as 1.0 points with the heaviest at 10.0 points. The remaining options are prorated between the highest and lowest option.

Durability

The durability of the deck will relate to previous experience with similar deck systems. Some systems may include more fatigue prone details and result in more moisture and debris accumulation than others. This is a qualitative evaluation based on AECOM's experience at other moveable bridge sites. A bridge deck system with lower potential for steel fatigue or welds under tension, and lower potential for corrosion in the structural elements is considered desirable. The higher the score the more durability issues are anticipated.

Historic Use on Lift Bridges

This item is being considered to take into account the historic use of some bridge deck types and their continued use on lift bridges. Deck systems with less history will be ranked with a higher number. Deck systems which have been in use for over 50 years for lift bridges will receive the lowest score of 1.0. Remaining systems will be ranked according to the approximate number of years they have been in use on lift bridges. More recent deck system usage is considered to carry a greater number of risks and unknowns. Open grating systems have been in use for more than 50 years on lift bridges and are therefore considered "widely used" under this category. The other deck systems have been in use for less than 50 years and less frequently and are therefore considered accordingly.

Constructability /Contractor Experience

The constructability and in particular Canadian contractor experience for each deck replacement option is considered in this criterion. Contractor familiarity and experience with the selected system will improve the quality of the installation. As a qualitative criterion, the success of deck installations in Ontario is considered. Lower scored deck types are more commonly constructed successfully in Ontario and Canada.

Road User Experience

Road user experience relates to the noise and impact to drivers. Steel grating is louder than a paved deck and the orientation of the bearing bars can impose increase side to side pull on tires. Drivers are more familiar with an asphalt or concrete driving surface and as such this would be considered as preferred (1.0). Lane markings can further improve the user experience. A better user experience is associated with a lower score. The existing Crimped I bar deck is loud and has a tendency to pull the vehicle laterally, lane markings are less visible and therefore this deck type is considered least preferred (score of 10).

Traffic/Staging/Schedule

Staging of traffic and construction and the ease with which the system can be panelized and delivered to site account for the score in this criterion. Where the system lends itself to staged panelized construction the score will be lower. Lighter systems and those easier to adjust on site will be preferred. Grating type decks are considered the easiest to adjust on site and score as preferred, whereas orthotropic decks and aluminum decks are harder to adjust on site and are considered worse than average as a result for the schedule.

Sustainable Materials/ Greenhouse Gas Reduction

Steel and aluminum are recyclable materials whereas concrete (and aggregate) are consider non-renewable. Where the bridge will use less material and be easier to recycle or could include recycled material the bridge is more sustainable and is considered to reduce overall greenhouse gas emissions and the score is lower. The partially filled concrete deck option is considered to be the most challenging to recycle and includes non-renewable materials and is therefore least preferred and scores 10.0 under this criteria. Low carbon concrete or cement is an option to improve the sustainability of the partially filled concrete deck, but has only recently become available in some parts of Canada. The steel grating is considered easier to recycle, uses less material and no non-renewable material.

Procurement Risk

The procurement risk considers the availability of the materials for each deck system, potential cost increases due to fluctuating material availability and exchange rates. Lastly where Canadian suppliers have expressed interest in bidding for the project this is considered to reduce risk as exchange rate impacts will be lower. A lower score indicates lower fluctuation in values and high supplier interest. The aluminum and orthotropic options are considered higher risk because both have only one supplier who has expressed interest and there are exchange rate and material risks as well.

The alternative with the highest ranking is the Rivetted Open Grid Steel Deck. The open deck option is preferred based on both financial and non-financial factors.

Table 12: Lift Span Bridge Deck System Ranking Evaluation

Deck Alternative		2	4
Ranking Criteria	**Weight**	**Riveted**	**Half-filled Grid - No Overlay**
Capital Cost	**5%**	$9,103,905	$10,613,202
		3.5	5.9
Life Cycle Cost (50 Years)	**15%**	$9,686,487	$11,307,831
		3.0	5.3
Implications of Deck Weight (kN/m^2)	**10%**	2.26	2.61
		5.4	7.9
Durability	**10%**	Worse than Average	Better than Average
		8	3
Historic Use on Lift Bridges	**5%**	Widely Used	Widely Used
		1	1
Constructability/ Contractor Experience	**20%**	Better than Average	Average
		3	5
Road User Experience	**10%**	Worse than Average	Preferred
		8	1
Traffic/ Staging/ Schedule	**10%**	Preferred	Average
		1	5
Sustainable Materials/ Greenhouse Gas Reduction	**10%**	Better than Average	Average
		3	5
Procurement Risk	**5%**	Better than Average	Average
		3	5
	100%	**Weighted Score (Lowest Best Meets Criteria)**	
		3.96	4.58
Final Ranking		1	2

4. Construction

A number of factors will contribute to issues during construction. Limitations during construction include timing for work on the lift span that affect operability of the bridge. The timing of construction while the lake is largely frozen affects delivery options. Traffic staging is affected by construction staging needs based on the existing structural stringer layouts.

4.1 Construction Limitations

Construction at the BCLB site over the waterway has several constraints including:

1. No in water works between July 15 and September 1;
2. Marine traffic cannot be interrupted. Marine traffic runs from March 1 to December 31.

All construction options assume that sidewalk repairs and the replacement of the deck for the lift span are to occur over an 8 week period from January 1 to March 1. In order to maintain pedestrian traffic on the sidewalk, temporary support will be required prior to removal of the existing decks.

The presence of the truss system and towers pose restrictions to the type and size of equipment used during construction. This includes the use of a crane for the installation of proposed pre-fabricated deck panels for the lift span. Launching the deck panels from the approach is an alternative method that can be used to overcome this limitation. The horizontal curve in the approach roadway may also pose limitations to the available area to stage and launch the deck panels. A topographic survey of the approaches is recommended and would confirm the available space to fabricate the deck and whether launching would need to be done in stages or from both ends of the bridge.

4.2 Transportation Impacts Assessment

To better understand the traffic and transportation issues as they relate to the progressing the design for the Burlington Canal Lift Bridge Deck Rehabilitation work program. AECOM completed a comprehensive examination of the construction stages and the sequence of construction activities to understand the interplay between the competing users of this transportation infrastructure and network – by mode and operation. The development of Temporary Transportation Management Plans (TTMPs), works hand-in-hand with the refinement of construction staging activities/sequences to mitigate and/or eliminate impacts and facilitate construction activities.

The Burlington Canal Lift Bridge is an important transportation link serving marine transport and land-based transport between the City of Burlington and the City of Hamilton. The bridge rehabilitation program is anticipated to require the full closure of the bridge deck, resulting in potential delays and adding to the peak period congestion in the immediate vicinity of the bridge. This transportation analysis assesses the potential impacts during construction. The analysis was conducted for the following traffic conditions:

- **Existing Conditions (2019)** - base year with pre-COVID traffic volumes under two sub-scenarios

Scenario #1 - “Bridge-Open” to all road traffic and closed for marine traffic
Scenario #2 – “Bridge-Closed” to all road traffic and open for marine traffic

- **Construction Staging Conditions (***Assumed* 2023**)** – based on the most constrained construction stage

4.2.1 Transportation Impact Study Area

The primary study area for the transportation analysis includes four intersections, of which, three are signalized on Eastport Drive - (1) Lakeshore Road, (2) Beach Boulevard, and (3 & 4) Queen Elizabeth Way (QEW) on/off-ramps. Refer to **Figure 26** for further details on the study intersections.

Figure 26: Transportation Impact Assessment Study Area

4.2.2 Data Collection

Existing traffic data - turning movement counts (TMC) and signal timing plans (STP) for the study intersections were received from the Ministry of Transportation Ontario (MTO) and City of Hamilton, as summarized in **Table 13**. Exhibit A.1. of **Appendix A** contains the traffic data received and utilized in the traffic analysis.

Table 13: Existing Traffic Data and Source

No.	Intersection Name	Signal Type	Data Type	Traffic Count Data	Source
1	Eastport Dr and QEW on/off ramps	Signalized	TMC, STP	Nov 18, 2019	City of Hamilton (TMC), MTO (STP)
	Eastport Dr and Beach Blvd	Unsignalized	TMC	Sep 12, 2018	City of Hamilton
3	Eastport Dr and Lakeshore Rd/QEW on-ramp	Signalized	TMC, STP	Nov 02, 2017	MTO
4	Eastport Dr and Lakeshore Rd/QEW off-ramp	Signalized	TMC, STP	Nov 02, 2017	MTO

Bridge Operation Schedule data - As the only gate in/out for marine traffic entering the Hamilton Harbour, the bridge's typical schedule runs from March to the end of December, 24 hours a day, 7 days a week.

When the bridge is open for marine traffic, road traffic is stopped which results in queues being generated along Eastport Dr. This conservative traffic scenario will be considered as part of the existing conditions traffic analysis.

2020 Spring Bridge Operation Schedule:

- Lift totals for March 2020 were 78
- This was converted to approx. 2.5 times in 24 hours with an average lift time of 30 minutes.

- Lift totals for April 2020 were 183
- This was converted to approx 6.1 times in 24 hours with an average lift time of 29 minutes.

2021 Winter Bridge Operation Schedule:

- The Bridge is closed to operations between January and March.

4.2.3 Methodology and Approach

The traffic operational analyses were conducted using Synchro/SimTraffic version 9 software and the Highway Capacity Manual (HCM) 2000 methodology. Measures of effectiveness (MOE) are outputted from the Synchro model, including delay, level of service, and volume-to-capacity ratio.

Delay and capacity are terms used in the measurement of the operational performance of an intersection. The delay incurred is measured in seconds and is represented in terms of "level of service" (LOS). LOS is a letter grade based on the average delay per vehicle, including control delay, incremental delay, and queue delay. Intersection and movement LOS range from LOS A to LOS F. The LOS definitions for signalized and unsignalized intersections are listed in **Table 14**.

Capacity is measured in terms of the volume-to-capacity (v/c) ratio, where a value of 1.00 correlates to the point where the theoretical capacity has been reached.

Acceptable operations are generally considered to be LOS D or better in urban areas and LOS C or better in rural areas. However, during peak hours, LOS E may be considered acceptable. LOS F is generally considered to have exceeded the operational capacity. A v/c ratio less than or equal to 0.90 is generally considered acceptable, although the v/c ratio may be greater than 0.90 and less than 1.00 in certain cases.

Table 14: Level of Service Definitions for Intersections (HCM 2000)

Level of Service (LOS)	Average Control Delay (seconds/vehicle)	
	Signalized	Unsignalized
A	≤ 10	≤ 10
B	> 10 - 20	> 10 - 15
C	> 20 - 35	> 15 - 25
D	> 35 - 55	> 25 - 35
E	> 55 - 80	> 35 - 50
F	> 80	> 50

The key parameters used in the Synchro analyses include:

- Peak hour factor (PHF) calculated from existing traffic counts, a default value of 0.92 was assumed where the data was not available.
- Analysis period of 15 minutes for the HCM delay and capacity analysis; 60 minutes for the SimTraffic queuing results. An average of five (5) runs was considered for queuing results.
- Heavy vehicle percentages as calculated from existing counts

- Signal timing and phasing parameters according to the received timing plans
- Link speeds set to posted speed limits
- Lane alignment parameters set to match typical driving behaviour in Ontario
- Synchro defaults for all other parameters

Based on the 2020 spring bridge operation schedule (see Section 4.1.1.2), the average bridge lift is up to 6.1 times per 24-hour period (about 1 lift every 4 hours) and the average lift duration is around 30 min per lift.

It should be noted that the existing daily operations information was collected for every 24-hour cycle, in which the bridge operations during traffic peak hours were not specifically identified in the received information. Given the average number of lifts observed for a 24-hour period and crossing referencing traffic operations data available via Google Maps' for typical weekday peak, it can be surmised the bridge lift does not appear to be occurring during traffic peak hours.

In this study, a conservative approach was undertaken by assuming that in the existing conditions bridge-closed scenario, the road traffic will experience one 30-min bridge closure during each one-hour traffic peak. A traffic signal based on the 2020 Spring schedule was modelled to facilitate traffic operations when the Bridge is closed for the road traffic, and the following key timing settings were applied in the Synchro models:

- Control Type: pre-time
- Phases: phase 2 for road traffic and phase 4 for marine traffic
- Cycle length: 3000 seconds, with a split of 1500 sec for each phase

It should be noted that Synchro is not capable of simulating a traffic signal with a 60 min cycle length, the maximum cycle length for the software is approx. 54.6 min (3276.7 sec).
Given the software limitations, a cycle length of 3000 seconds (50 min) was applied in the Synchro models to represent the proximity of a one-hour period, and the 1500-sec split to reflect approximately 50% of the time (~30 min in one hour) when the Bridge is closed for the road traffic.

- Intergreen time: 10 seconds (yellow plus red)

4.2.4 Existing Conditions

Existing Road Network - The existing road network in the study area is illustrated in **Figure 27.** Except for the intersection of Eastport Dr and Beach Blvd (with a STOP sign control on Beach Blvd), the other three signalized intersections are at the ramp terminals to QEW, which are under the jurisdiction of MTO.

Figure 27: Road Network

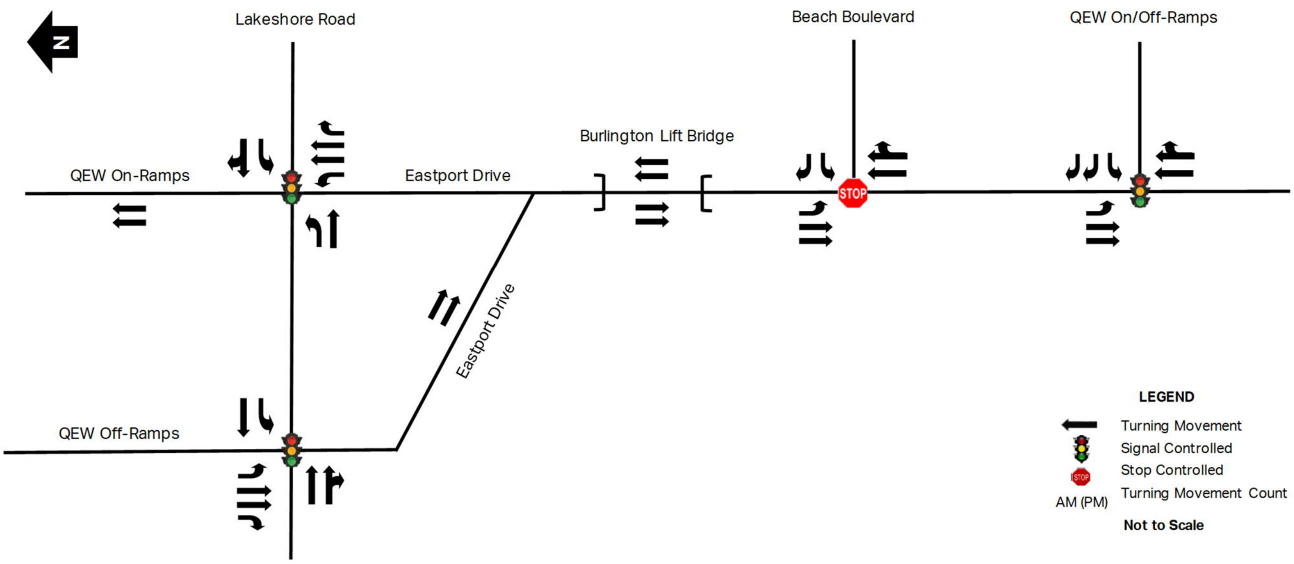


Figure 28 presents the exiting surface transportation infrastructure within the study area. The bridge provides the only crossover to the Hamilton Harbour for pedestrians and cyclists, directly connecting to Breezeway Trail on the south side (under the jurisdiction of the City of Hamilton) and Waterfront Trail on the north side (under the jurisdiction of the City of Burlington). Currently, there is a discontinuous sidewalk on the east side of Eastport Dr between Beach Blvd and Lakeshore Ct.

Figure 28: Active Transportation Network/Infrastructure

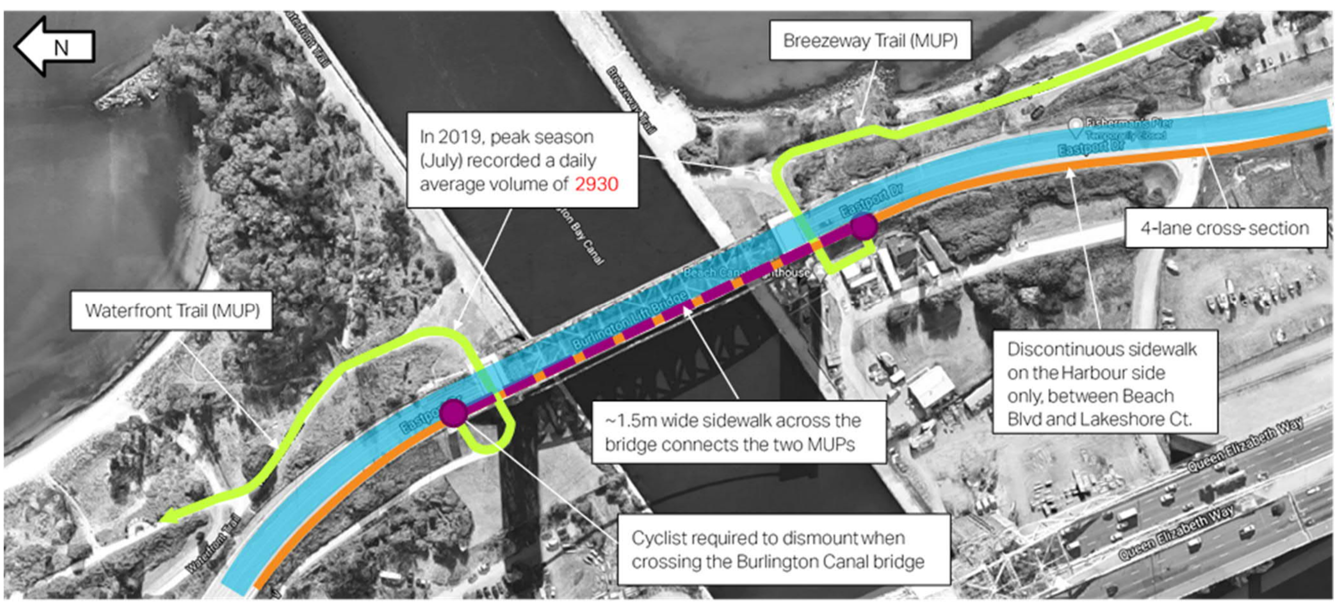


Table 15 illustrates two-way pedestrian and cyclist volumes on the Waterfront trail along the Beachway in Burlington. The data was collected in 2019 by counters located in the vicinity of 1125 Lakeshore Rd. and is provided by Transportation Services, City of Burlington. The peak volumes were observed during the summer season (from May to August), while significantly fewer pedestrians and cyclists were reported in the winter season (from January to March) when the replacement of the bridge deck is expected to take place.

Table 15: Two-Way Pedestrian and Cyclist Volumes on Waterfront Trail

Month	Daily Average	Cyclists	Pedestrians	Remarks
January	486	23	463	Proposed construction staging, replacement of the bridge deck
February	450	8	442	
March	889	61	828	
April	1575	426	1149	Pedestrians are about double cyclists
May	**2187**	**1004**	**1183**	Pedestrians and cyclists are equal
June	**2021**	**908**	**1113**	
July	**2930**	**1484**	**1446**	Peak two-way volumes for pedestrian and cyclist
August	**2427**	**1020**	**1407**	Pedestrians and cyclists are equal
September	1651	690	961	
October	794	240	554	
November	819	207	612	
December	485	95	390	

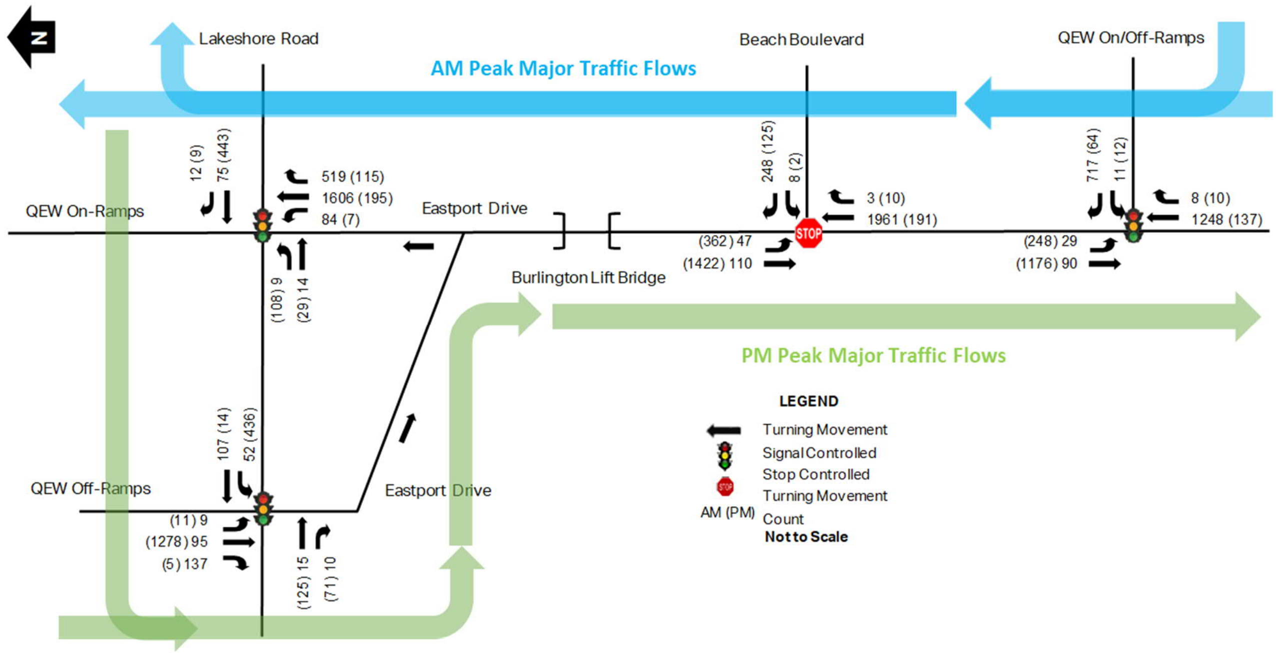
Traffic Volumes - Given the continuing impacts of COVID-19 into 2021 traffic volumes may not recover to pre-pandemic levels as soon as was originally thought. A more conservative approach was adopted, utilizing historical traffic counts collected between 2017 and 2019 before the pandemic. The traffic volumes from this period were balanced to a common base year of 2019 (pre-COVID conditions), by applying an annual growth rate of 2% to all movements in line with MTO's direction. Our review of the collected traffic counts identified some inconsistencies in volumes between QEW on/off-ramps to the south and those passing through the other three intersections in the AM peak hour within the study area. A high-level calibration/consistency exercise was performed by comparing to Google Maps' typical weekday traffic operations (see Exhibit A.3. of **Appendix A** for screenshots of Google Maps' typical weekday traffic) and through discussions with MTO area traffic staff.

As noted earlier the challenges and uncertainties surrounding COVID-19 continues to have significant impacts on road traffic during typical peak hours as most Greater Toronto and Hamilton Area (GTHA) is under some form of travel restriction or another – lockdown/stay at home and remote working or shift to more flexible working hours (i.e. off-peak hours). Based on Statistics Canada[1], nearly 25% of Canadian businesses are willing to offer the option to work remotely in a post-pandemic Canada. Although the bridge replacement work is expected to occur in 2022 or 2023, based on these forecast trends it is possible that pre-COVID traffic condition (2019) in the near term may not be seen in the near term. However, for a more conservative analysis, existing balanced traffic volumes will be utilized to assess construction staging.

The balanced existing traffic volumes are shown in **Figure 29**, including the major traffic flows in each traffic peak hour.

[1] *Statistics Canada - Daily Quotidien*

Figure 29: Existing (balanced) Traffic Volumes (Year 2019 – Pre-COVID)



Traffic Analysis - Based on the bridge operation schedule, the Bridge is open for road traffic most of the time. However, when the Bridge is lifted for marine traffic, the road traffic is stopped and generates long queues on Eastport Dr. To have a full understanding of the worst-case existing traffic operations, both the bridge-open and bridge-closed scenarios were reviewed based on the typical weekday peak-hour road traffic.

Table 16 summarizes the delay, level of service (LOS), v/c ratios, and 95th percentile queue lengths for turning movements at the study intersections for the bridge-open and bridge-closed scenarios under existing conditions. The critical movements (v/c ratio over 0.85 for regular movements and over 0.75 for ramps or 95th percentile queue length exceeding the available distance) are highlighted in RED according to the MTO General Guidelines for the Preparation of Traffic Impact Studies.

Figure 30 and **Figure 31** illustrate the critical queues for the bridge-open and bridge-closed scenarios, respectively. The Synchro and SimTraffic reports are provided in Exhibit A.2. of **Appendix A**. It should be noted that the MOE outputs (i.e. delay, LOS, and v/c ratios) are the same for all intersections in both scenarios because the MOE outputs for each intersection are calculated independently using the Synchro software.

When the bridge is open for road traffic, all the MTO ramp terminals and the stop-controlled intersection at Beach Blvd are operating under the capacity. In the AM peak hour, the westbound queues at Beach Blvd are occasionally extending approximately 1 km due to high traffic volumes on Eastport Dr. In the PM peak hour, one of the major traffic flows is the southbound traffic travelling from Lakeshore Rd and then turning left onto Eastport Dr, which results in substantial long queues (~1250 m) on Lakeshore Rd.

When the bridge is closed to road traffic for 30 minutes, excessive queues are observed on Eastport Dr in both traffic peak hours, with further impacts on the QEW ramps and side streets. In the AM peak hour, the northbound queues on Eastport Dr are extending from the south bridge to/beyond the QEW on/off-ramps terminal. The fully stopped queues block the westbound traffic turning onto Eastport Dr from Beach Blvd and QEW on/off-ramps. Based on the queueing analysis results, the ramp queues (~680 m) are expected to spill over back to the QEW mainline but will diminish quickly once the bridge is open.

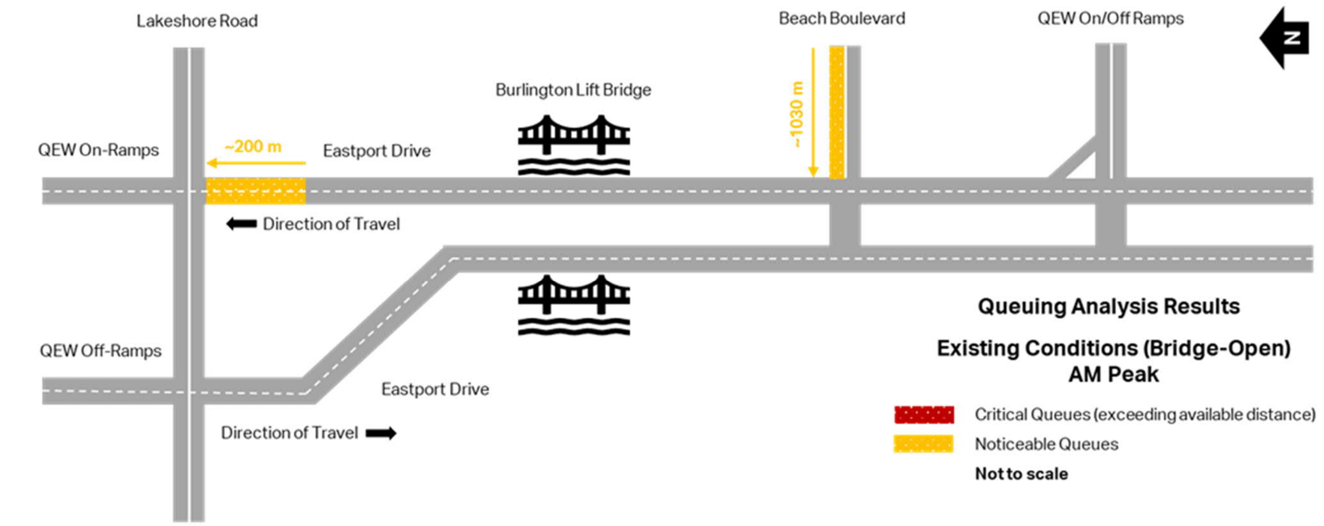
Beyond the QEW on/off-ramps terminal, the northbound queues on Eastport Dr continue accumulating for approximately 2.3 km but will not reach the next signalized intersection at Beach Blvd (approximately 3.4 km south of the ramp terminal). In the PM peak hour, the southbound queues are extending from the northbridge gate onto the QEW mainline for a very limited period. Substantial longer queues are also expected on Lakeshore Rd as the traffic is fully stopped for the bridge lift, and potentially reach the first signalized intersection at Joseph Brant Hospital access.

Although a long bridge closure significantly worsens local traffic operations with occasional impacts on the QEW mainline in both peak hours. Overall, this conservative traffic scenario was analyzed only to understand an extreme case of peak-hour traffic operations under existing conditions.

Table 16: Summary of Intersection Operations (Year 2019 – Pre COVID)

Intersection	Movements	AM Peak Hour					PM Peak Hour				
		V/C	Delay (s)	LOS	95th Queue (m)		V/C	Delay (s)	LOS	95th Queue (m)	
					Bridge Open	*Bridge Closed*				*Bridge Open*	*Bridge Closed*
Eastport Dr & QEW On/Off Ramp (Signalized)	WBL	0.52	63.7	E	16	643	0.57	72.1	E	15	16
	WBR	0.28	0.3	A	5	681	0.03	0.0	A	0	0
	NBTR	0.53	5.8	A	38	2313	0.06	4.2	A	12	10
	SBL	0.10	2.3	A	14	15	0.26	1.9	A	22	18
	SBT	0.04	1.5	A	6	3	0.44	2.7	A	27	26
	Overall Intersection	0.55	4.0	A	-	-	0.46	3.1	A	-	-
Lakeshore Rd & QEW On-Ramp (Signalized)	EBL	0.04	36.6	D	10	9	0.39	31.2	C	57	55
	EBT	0.04	36.7	D	17	15	0.05	28.0	C	19	18
	WBTR	0.13	41.0	D	27	30	0.67	47.9	D	1251	1597
	NBL	0.08	7.7	A	54	56	0.01	12.1	B	8	19
	NBT	0.76	16.9	B	199	281	0.11	12.8	B	32	81
	NBR	0.50	12.5	B	20	22	0.08	12.7	B	22	20
	Overall Intersection	0.61	16.7	B	-	-	0.27	33.0	C	-	-
Lakeshore Rd & QEW Off-Ramp (Signalized)	EBTR	0.07	79.7	E	18	14	0.48	80.7	F	66	437
	WBL	0.22	66.3	E	32	29	0.60	33.0	C	77	67
	WBT	0.37	69.0	E	56	53	0.02	23.4	C	13	10
	SBL	0.01	6.0	A	6	4	0.02	31.8	C	14	11
	SBT	0.04	6.2	A	14	12	0.93	63.5	E	169	2141
	SBR	0.09	6.5	A	23	21	0.00	31.5	C	12	14
	Overall Intersection	0.15	33.8	C	-	-	0.76	57.8	E	-	-
Eastport Dr & Beach Blvd (Unsignalized)	WBL	0.39	238.0	F	44	25	0.04	74.4	F	5	4
	WBR	0.80	46.6	E	1029	1718	0.15	9.6	A	22	90
	SBL	0.22	25.2	D	31	142	0.29	8.7	A	26	42

Figure 30: Queuing Results Summary – 'Bridge-Open'



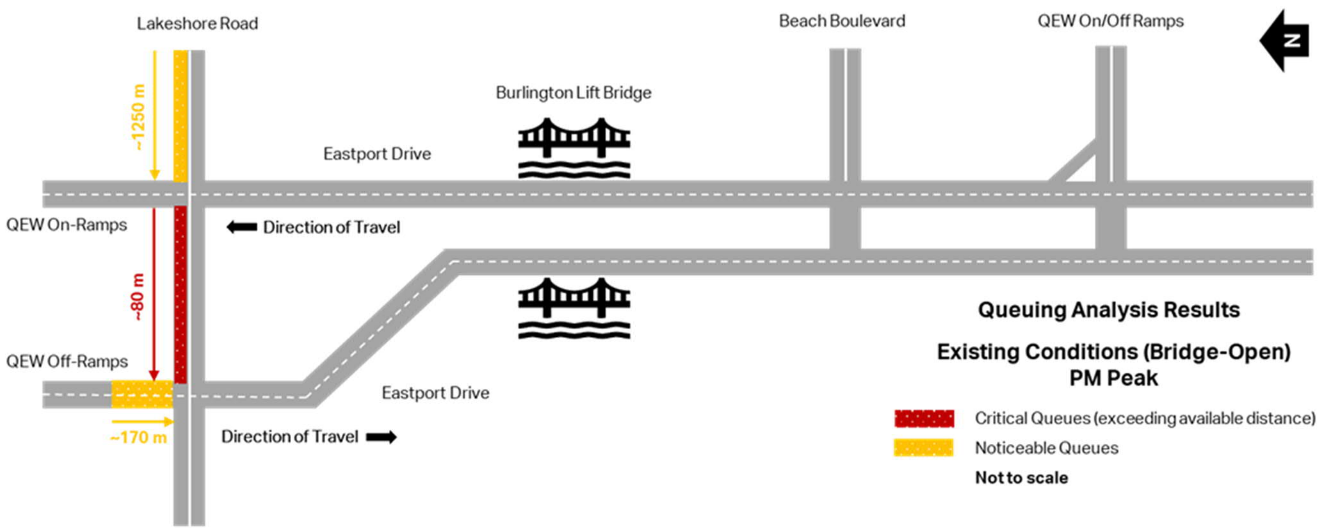
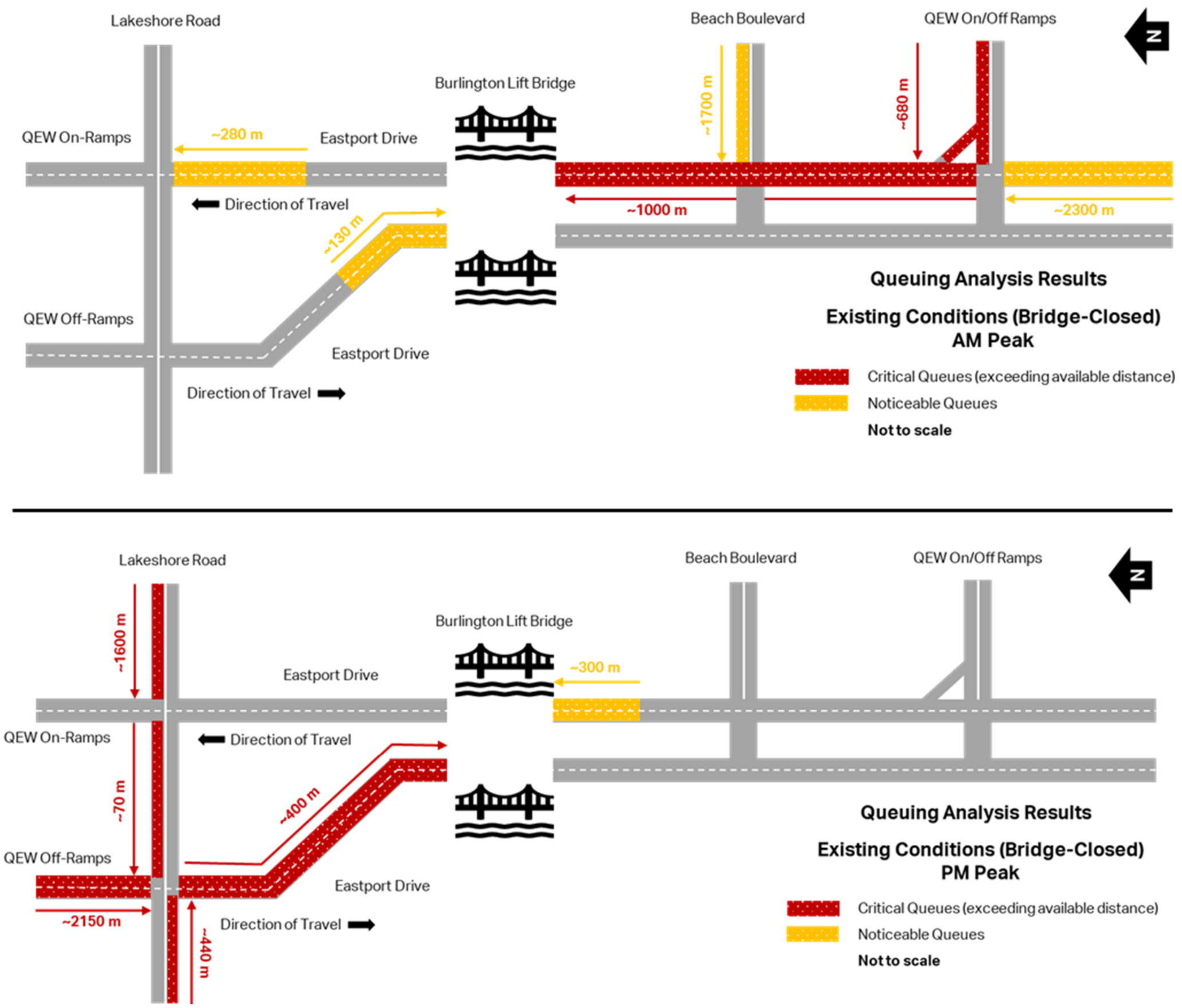


Figure 31: Queuing Results Summary – 'Bridge-Closed'



4.2.5 Staging Conditions (Construction - 2022)

Construction Staging Plan – While a full road closure is recommended by AECOM, based on the construction staging option for one traffic lane per direction to be temporarily closed over the bridge and passage for pedestrians and cyclists remaining open the bridge deck replacement is scheduled to be from January to March. The construction staging road network for the traffic analysis for this construction staging option is illustrated in **Figure 32**.

The construction staging traffic analysis was conducted for the worst-case scenario based on the potential for temporary lane configurations, with the least number of travel lanes available for road traffic. Considering the continuing impacts of COVID-19 on road traffic, pre-COVID traffic (see **Figure 29**) was utilized. According to the received bridge operations schedule, it is reasonable to assume that the bridge will be closed to marine operations (no bridge lift expected) while the construction is taking place.

Figure 32: Temporary Road Network Arrangement Restricted Traffic (Construction 2022)

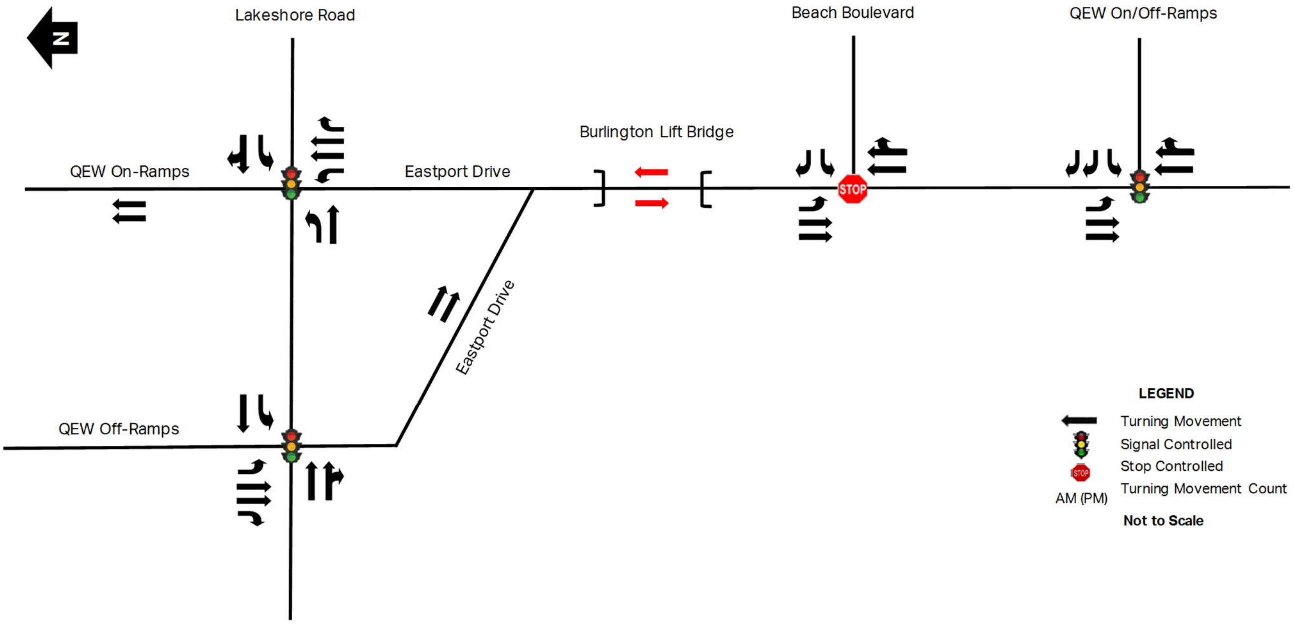


Table 17 summarizes the delay, level of service (LOS), v/c ratios, and 95th percentile queue lengths for turning movements at the study intersections for the worst-case construction staging conditions.

The MTO critical movements and the critical queues exceeding the available distance are highlighted in red text. **Figure 33** illustrates the critical queues under the construction staging conditions. The Synchro and SimTraffic reports are provided in Exhibit A.2. of **Appendix A**.

Given that there will not be any changes at the study intersections, the construction staging intersection operations results will be the same as the existing bridge-open scenario.

On the other hand, temporary lane closures will reduce traffic throughput capacity over the bridge and cause new bottlenecks at each bridge gate due to lane drop. In the AM peak hour, the northbound queues on Eastport Dr are expected to extend from the south bridge gate over beyond the QEW on/off-ramps terminal.

This excessive queue will occasionally block the westbound traffic from the QEW on-off ramps and Beach Blvd turning onto Eastport Dr, which will result in long queues on both roads. The queues on the QEW on/off-ramps (~440 m) will not reach the mainline and the southbound queues beyond the ramp terminal will also not disturb traffic operations at the downstream signalized intersection at Beach Blvd. In the PM peak hour, the queues will be comparable to the existing conditions, with relatively longer queues expected on Lakeshore Rd.

With summer traffic and normal bridge operations excessive queues are observed on Eastport Dr in both traffic directions during peak hours when the bridge is raised with further impacts on the QEW ramps and side streets. With staged construction on the bridge approaches the effects to traffic will be exasperated with a lower rate of dissipation.

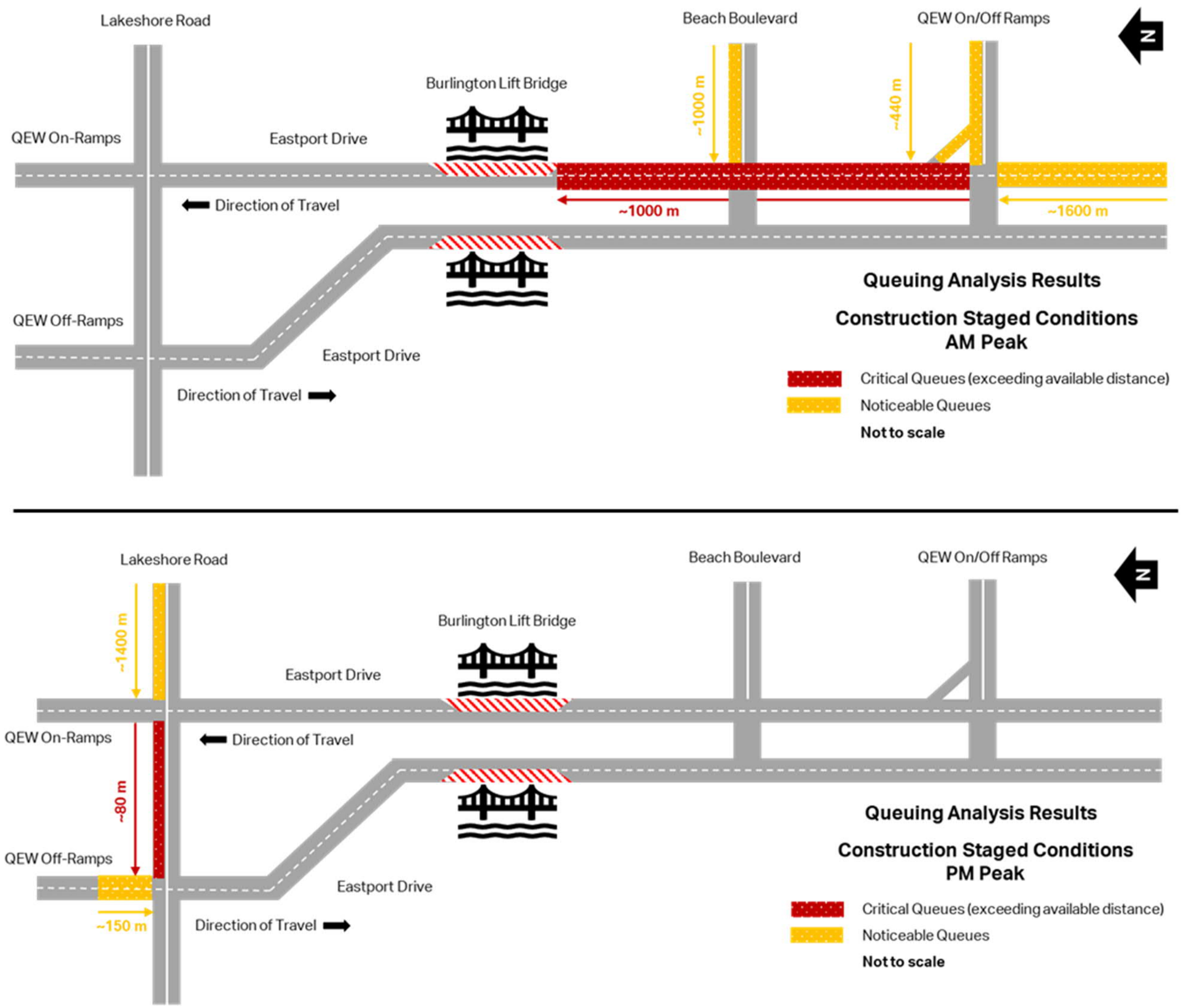
During construction, the intersection operations at the ramp terminals and Beach Blvd are predicted to be similar to the existing conditions during both traffic peak hours. The proposed lane closures over the bridge, resulting in temporary traffic bottlenecks at each bridge gate, will likely cause longer northbound queues on Eastport Dr, without affecting the QEW mainline and the adjacent signalized intersection.

The impacts of the long queues could be mitigated through effective communication and coordination with residents and businesses around the study area, by suggesting alternative routes for travel or shifting their trips to off-peak hours.

Table 17: Summary of Intersection Operations (Construction 2022)

Intersection	Movements	AM Peak Hour				PM Peak Hour			
		V/C	Delay (s)	LOS	95th Queue (m)	V/C	Delay (s)	LOS	95th Queue (m)
Eastport Dr & QEW On/Off Ramp (Signalized)	WBL	0.52	63.7	E	334	0.57	72.1	E	16
	WBR	0.28	0.3	A	442	0.03	0.0	A	0
	NBTR	0.53	5.8	A	1586	0.06	4.2	A	13
	SBL	0.10	2.3	A	13	0.26	1.9	A	21
	SBT	0.04	1.5	A	7	0.44	2.7	A	28
	Overall Intersection	0.55	4.0	A	-	0.46	3.1	A	-
Lakeshore Rd & QEW On-Ramp (Signalized)	EBL	0.04	36.6	D	10	0.39	31.2	C	57
	EBT	0.04	36.7	D	18	0.05	28.0	C	21
	WBTR	0.13	41.0	D	32	0.67	47.9	D	1434
	NBL	0.08	7.7	A	17	0.01	12.1	B	12
	NBT	0.76	16.9	B	113	0.11	12.8	B	31
	NBR	0.50	12.5	B	22	0.08	12.7	B	22
	Overall Intersection	0.61	16.7	B	-	0.27	33.0	C	-
Lakeshore Rd & QEW Off-Ramp (Signalized)	EBTR	0.07	79.7	E	16	0.48	80.7	F	65
	WBL	0.22	66.3	E	29	0.60	33.0	C	78
	WBT	0.37	69.0	E	56	0.02	23.4	C	11
	SBL	0.01	6.0	A	4	0.02	31.8	C	12
	SBT	0.04	6.2	A	14	0.93	63.5	E	152
	SBR	0.09	6.5	A	23	0.48	80.7	F	11
	Overall Intersection	0.15	33.8	C	-	0.76	57.8	E	-
Eastport Dr & Beach Blvd (Unsignalized)	WBL	0.39	238.0	F	38	0.04	74.4	F	4
	WBR	0.80	46.6	E	1028	0.15	9.6	A	23
	SBL	0.22	25.2	D	17	0.29	8.7	A	22

Figure 33: Queuing Results Summary – Bridge Raised (Construction – 2022)



Active Transportation during construction - Similar to existing conditions a shared sidewalk for pedestrians and cyclists can remain open on one side of the bridge throughout construction, retaining an undisruptive connection for both modes. During road closures over the winter period, the sidewalk will need to be fully closed to maximize road space for two-way vehicle traffic, which will require cyclists and pedestrians to be detoured/prohibited from accessing the bridge on safety.

Based on the two-way pedestrian and cyclist volumes provided by the City of Burlington, it was found there were significantly fewer pedestrians and cyclists using the bridge during the winter season (see **Table 15**) and the anticipated disruption/inconvenience should be minimal when coupled with effective communication and coordination with residents and businesses within and around the study area

A future or semi-ultimate design of the sidewalk/multi-use path over the bridge will be determined through close discussions with key stakeholders.

4.2.7 A Summary of the Findings

This transportation analysis for both existing and construction staging (1 lane each direction) conditions in support of the replacement of the deck at the Burlington Canal Lift Bridge showed traffic operations and intersection performance under pre-COVID conditions for are operating within capacity during both peak hours. The following queueing issues were identified for the Bridge-Open and Bridge-Closed scenarios, respectively:

Scenario #1 – 'Bridge-Open' (see **Figure 30**)

- **AM Peak Hour:** westbound queues (~1 km) on Beach Blvd, with approximately 1 km
- **PM Peak Hour:** westbound queues (~1.25 km) on Lakeshore Rd at QEW on-ramp terminal

Scenario #2 – 'Bridge-Closed' (see **Figure 31**)

- **AM Peak Hour:**

northbound queues (~3.3 km) on Eastport Dr extend from the south bridge gate and beyond the QEW on/off-ramp terminal, with minimal impacts at the downstream driveways
westbound queues (~680 m) on the QEW off-ramp at the southern terminal, occasionally extending onto the mainline but quickly diminishing after the bridge is open

- **PM Peak Hour:**

southbound queues (~2.5 km) on QEW off-ramp to Lakeshore Rd/Eastport Dr to the northbridge gate, occasionally extending onto the mainline but quickly diminishing after the bridge is open
westbound queues (~1.6 m) on Lakeshore Rd at QEW on-ramp terminal, occasionally reaching to Joseph Brant Hospital access

The excessive queues that occur during the bridge lift are observed from the modelling to dissipate relatively shortly after the bridge is reopened to all traffic, with temporary impacts being experienced by the QEW mainline and some local accesses. When examined more closely with the number of bridge lifts and with Google Maps' typical weekday peak traffic information, it was concluded the bridge lift was most likely not occurring during the peak traffic hours. This traffic scenario analysis represents the worst-case traffic operations for existing peak hour conditions.

Based on the conducted analysis for construction, the temporary stage condition with two lanes over the bridge (i.e. one lane per direction) is considered to be the worst-case traffic scenario. Traffic operations for other construction stages are predicted to be not too dissimilar to existing traffic operations.

For the worst-case traffic scenario during construction, all the MTO ramp terminals and the STOP sign-controlled intersection at Beach Blvd are predicted to operate within intersection capacity for both peak hours. The following queueing issues were found to occur under this scenario:

- **AM Peak Hour:**

northbound queues (~2.6 km) on Eastport Dr from the south bridge gate over beyond the QEW on/off-ramp terminal, with minimal impacts at the downstream driveways
westbound queues (~440 m) on QEW off-ramp at the southern terminal, with minimal impacts on the mainline

- **PM Peak Hour:**

westbound queues (~1.4 m) on Lakeshore Rd at QEW on-ramp terminal, with minimal impacts at the downstream driveways

During construction intersection operations were found to be comparable to existing conditions for both traffic peak hours. Whereas, the impact on queuing as a result of the lane closures on the bridge are predicted to increase on Eastport Dr in the AM peak hour, without nominal impacts to the QEW mainline and adjacent intersections.

A coordinated and inclusive communication program with local residents and businesses is recommended to advise them on alternative routes for travel and ancillary information on how shifting their trips to off-peak hours would help mitigate against delays and excessive disruption to journey times.

During temporary lane reduction/full-closure over the winter period, the existing protected sidewalk would need to be closed as opposed to being temporarily narrowed, due to structural loading constraints to preserve a minimum of two travel lanes (one lane per direction) and safety. The significantly fewer pedestrians and cyclists using the bridge during the winter season would further support this period being the least disruptive to users.

A future or semi-ultimate design of the sidewalk/multi-use path over the bridge will be determined through close discussions with key stakeholders.

With an improved understanding of the complex logistics, construction uncertainties, risks, and safety issues not all solutions are favourable within the broader context of the project, when schedule optimization and potential safety concerns compete with minimizing disruption and delay. The recommendation for a full closure would address all the issues and safety concerns.

Such issues and safety stem from narrow proposed driving lanes, limiting the width of vehicles permitted to travel on the bridge, vehicles driving on the cantilevered portion of the deck grating which is likely not designed to support such loads, increasing the likelihood of collisions with a substandard deck barrier due to narrow lanes, and the challenges of anchoring temporary barriers to the deck/stringers.

4.3 Construction Staging

Construction staging considers constraints and options to completing the project. Consideration of staging options considers temporary access restrictions to traffic and pedestrians as well as reduction to lane availability. A discussion of the staging options including graphics (**Appendix D**) is provided. Safety considerations are included in this section and consider both the public safety and worker site safety. All construction staging options consider site constraints as a result of existing and proposed configurations of the structural elements including stringers and the sidewalk supports. Multiple options have been considered for the lift span deck replacement which include a full 2 month closure, two lane traffic staging and a option to extend the lane closures into 2 construction seasons. A 24 hour construction schedule is also possible for all options considered however it is most attractive in the full closure construction staging option. It has been assumed that the bridge deck will be installed to match the current longitudinal alignment and that the joints will be similar to existing, such that no consideration to aligning or bridging height differentials at joints or in the road will be required during staging The following Options have been considered:

1. Single lane signalized alternating traffic with pedestrian and truck access throughout the project (12-14 weeks followed by 12-16 weeks for the approach and tower span rehabilitation);
2. Dual lane traffic with pedestrian access throughout the project (12-16 weeks followed by 12-16 weeks for the approach and tower span rehabilitation); and
3. Construction Staged with either Options 1 or 2 over 2 seasons (8 weeks followed by 8 weeks for the approach and tower span rehabilitation for two years); and
4. Full closure of the bridge for 5 months to both pedestrian and traffic (8-12 weeks for lift span followed by 8-12 weeks for approach and tower span rehabilitation).

The implementation of a night closure stage was not considered for this site, the nightly detour and road closure will be time consuming and reduce the amount of available hours for construction and delay the overall ability to complete the project on schedule. The remediation of lead paint on a nightly basis will be overly onerous and extend the project length well beyond the 2 month time limit required to ensure operation and navigation of the canal at the end of March.

Regardless of the option selected it is essential that the contract be tendered and awarded well in advance of the start of work to ensure that the contractor is adequately prepared in advance of site mobilization. It is recommended that the project be awarded by early September of the preceding season. This would typically mean that the tender period occurs in June and no later. Work for the lift span that does not affect boat or vehicle traffic should be done in advance where possible. The contractor will need to be extremely organized to complete the lift span deck replacement within 2 months. It is recommended that if PWGSC intends to proceed with a standard tender under this option that the work be limited to the lift span during the January to February operational closure to reduce work area conflicts and prioritize the lift span deck replacement.

4.3.1 Option 1 Single Lane alternating traffic

This option for traffic staging during construction considers that one lane would be open at all times and controlled by traffic signals at either end of the project site. During the first stage pedestrians would be routed across the access to the construction area and over the bridge. The MTO Roadside Design Manual (RDM) indicates that barriers may be impacted by snowplowing operations where there is less than 4.25m of clearance from the centreline.[16] The available lane area would be suitable for wider vehicles and trucks at 3.3m with adequate shoulders for snow clearing.

The following items have been identified as issues for consideration:

- The existing deck grating is currently cantilevered slightly less than 0.7m from the edge stringers to the edge of the grating. This area of the grating is considered a shoulder area and has not been driven on due to its barrier proximity. This cantilevered portion of the deck grating is not sufficiently stiff or strengthened for vehicular loading. The proposed staging layout for alternating single lane provides an adequate shoulder so vehicle wheels should drive on the cantilevered grating..
- During construction, temporary barriers will need to be provided and anchored to the existing stringers / deck grating to create a work zone, protect workers from vehicular traffic, and protect vehicles. Anchoring the temporary barriers to the stringers is required to maintain the safety of the site. All staging needs to be oriented as such.
- The lead paint on the existing bridge will require environmental enclosures during removals to protect the environment, public and workers. This remediation can be time consuming and staging the work for single lane would result in additional time requirements and may impact the completion of the project and the navigation of the waterway.

The approach and tower span rehabilitations should be done after the lift span deck replacement to avoid any conflicts with priorities on the construction site.

4.3.2 Option 2 Dual Lane traffic

This option for traffic staging during construction includes for two lanes in opposite directions and a pedestrian walkway being open for the duration of construction. The available lane area would be 3.04m on the approach span and 3.15m on the lift span with no shoulders. The available lane width is not suitable for wider vehicles and it is recommended trucks be routed onto a detour for this option. Further a speed limit reduction to 40km/h is recommended.

The following items have been identified as potential issues/limitations that limit viability of dual lane staged construction:

- The risk still exists that wider vehicles may attempt to cross the bridge and are restricted more than expected which may result in traffic delays and potentially construction delays.
- Snow plows which will be in full operation during construction of the lift span and are generally considered to require more space than is available in this option. The MTO Roadside Design Manual (RDM) indicates that barriers may be impacted by snowplowing operations where there is less than 4.25m of clearance from the centreline.[16] Plowing operations will require modification for this option to protect the work site, the travelling public and the plow operator.
- The existing deck grating is currently cantilevered slightly less than 0.7m from the edge stringers to the edge of the grating. This area of the grating is considered a shoulder area and has not been driven on due to its barrier proximity. This cantilevered portion of the deck grating is not sufficiently stiff or strengthened for vehicular loading. The proposed staging layout only provides narrow lanes without shoulders which will result in vehicles potentially impacting the cantilevered section of substandard deck grating. The addition of temporary stringers to support the cantilevered portion of the deck are recommended. Their installation will increase the length of the schedule.
- The existing traffic barrier on the lift span is not anchored in accordance with current standards. The proposed narrow staging lanes will increase the likelihood of a vehicular collision (albeit at a lower speed) with the substandard barrier, thus increasing the existing safety hazard.
- During construction, temporary barriers will need to be provided and anchored to the existing stringers / deck grating to create a work zone, protect workers from vehicular traffic, and protect vehicles. Anchoring the temporary barriers to the stringers is required to maintain the safety of the site. All staging needs to be oriented as such.
- The lead paint on the existing bridge will require environmental enclosures during removals to protect the environment, public and workers. This remediation can be time consuming and staging the work may result in additional time requirements and may impact the completion of the project and the navigation of the waterway.

The approach and tower span rehabilitations should be done after the lift span deck replacement to avoid any conflicts with priorities on the construction site.

4.3.3 Construction Staged Option 1 or 2 over 2 Seasons

This option considers either option 1 or option 2 being performed over 2 seasons. Where work is performed on either the west or east lanes in one season and then shifted the following season, the contractor will need to demobilize and remobilize on site the following year. In addition to those discussed in sections 4.3.1 and 4.3.2 the joint between the 2 phases will need to be protected and installed to ensure adequate shear transfer between the phases, this could be done through appropriate steel plates or equivalent.

4.3.4 Option 4 – Full Closure

This Proposed Staging Layout will restrict all vehicular and pedestrian traffic from using the bridge for the entire construction schedule for work on the lift span and approach and tower spans. All traffic will have to use alternative routes to cross the canal. Pedestrian traffic has the most significant detour however in January to February the pedestrian traffic is anticipated to be at the lowest point in the year.

The full closure option is the safest for traffic and workers on site. It ensures an efficient work site by allowing the contractor to fully control conditions throughout construction. Their full control of the site in January through to mid March is key to their completing the work on the lift span during the Navigation shut down. The consequences of failing to complete the deck replacement within the 8-12 week period and the subsequent economic disruption from the restriction to the canal navigation are considered too severe to risk the construction extending longer than 12 weeks.

4.3.5 Cost Variation for Staging Options

All Costing variation identified below are the anticipated overall cost for the construction option – except for option 3 which is in addition to option 1 or option 2 depending on chosen option. See table 11 for Overall Cost Per Construction Staging Option and See Table 18 for Detailed Breakdown. Full estimates are included in Appendix B.

4.3.5.1 Option 1 Single Lane alternating traffic

This staging option adds some additional requirements compared to the full closure option such as more Traffic control barriers and barrier anchorage, more security fence to ensure pedestrian safety and to separate traffic from the work zone. Further temporary support is required for the sidewalk, a signalized traffic light is needed to control the traffic through the alternating single lane and snow removal from the pedestrian walkway over the bridge deck surface will be altered from its current condition. The Cost associated for the additional items are summarized in Table 18.

4.3.5.2 Option 2 - Dual Lane traffic

There are additional requirements beyond what a full closure costs for the dual lane staged option. More traffic control barriers and barrier anchorage is required to protect traffic, workers and pedestrians. Snow removal costs may be increased due to narrow lanes and the pedestrian walkway modifications. The Cost associated for the additional items are summarized in Table 18.

4.3.5.3 Construction Staged Option 1 or 2 over 2 Seasons

To extend the Construction schedule from 1 season to 2 seasons there are additional costs beyond what a full closure that will need to be considered in the project budget. Inflation, roadway protection between stages and additional mobilization and demobilization are considered and the costs summarized in Table 18.

4.3.5.4 Option 4 – Full Closure

This option was used as the base option and therefore has no additional costs for constructions staging.

4.4 Site Layout

Site staging and layout is an important facet of the success of any construction project. Even more so for this upcoming rehabilitation where schedule is a limiting factor.

As shown in **Figure 34**, construction staging areas are likely going to be required at both ends of the bridge to accommodate the necessary equipment to undertake the rehabilitation. This includes an area for the launching mechanism if that is the chosen method of construction.

Laydown areas have also been identified on the north west embankment and on the south west embankment. The area on the north west embankment is accessible by foot following the stairs or by the Waterfront Trail from Eastport Drive. When small vehicles are required to access the laydown area, they can do so along the Waterfront Trail provided that sufficient traffic control measures are in place to stop trail users from accessing the trail while in use by said smaller vehicle (i.e. temporary flag person at either end of the trail). The area on the north east embankment is accessible by foot following the stairs or by the private entrance from Eastport drive.

Table 18: Class ‘C’ Estimate Breakdown

Option	Open Lift Span Deck	Closed Lift Span Deck
Design and Construction Support (25%)		
a) Option 1 – Single Lane Alternating	$3,400,000	$3,800,000
b) Option 2 – Two Lanes	$3,400,000	$3,800,000
c) Option 3 – Option 1 or 2 over 2 years	$3,500,000	$3,900,000
d) Option 4 – Full Closure	$3,200,000	$3,600,000
Approach	$50,000	$50,000
Approach and Tower Span		
a) Deck Reinforced Concrete	$1,419,000	$1,419,000
b) Steel Repairs	$244,000	$244,000
c) Sidewalk	$277,000	$277,000
d) Railing	$88,000	$88,000
Lift Span		
a) Deck Replacement (including Steel)	$6,168,000	$7,248,000
b) Sidewalk	$214,000	$214,000
c) Railing	$375,000	$375,000
Traffic Control Options		
a) Option 1 – Single Lane Alternating	$430,000	$430,000
b) Option 2 – Two Lanes	$250,000	$250,000
c) Option 4 – Full Closure	$100,000	$100,000
Access and waterway protection		
a) Staged Construction	$900,000	$900,000
b) Staged Construction over 2 years	$1,200,000	$1,200,000
c) Full Closure	$700,000	$700,000
Staging Option Construction Cost Variation		
a) Option 1 – Single Lane Alternating	$223,000	$223,000
b) Option 2 – Two Lanes	$44,000	$44,000
c) Option 3 – Option 1 or 2 over 2 years	$277,000	$501,000
d) Option 4 – Full Closure	$0	$0
Contingency (30%)	$3,000,000	$3,320,000

Key Map

General Notes:

- Navigation to never be interrupted by construction (Transport Canada waterway has priority)
- Pedestrian sidewalk to be widened.
- Limited pedestrian access during construction, Several Closures.

N
W
E
S

1:1,200
NAD 1983 UTM Zone 17N

60 30 0
Metres

Basemap:
Additional Sources:
Ortho-Imagery:BING

AECOM

BURLINGTON CANAL LIFT BRIDGE LOCATION
DECK REHABILITATION

BLCB DECK PREDESIGN AND CONCEPT DESIGN

Date: 2021-06-02

Fig: 25

ANSI B 279.4mm x 431.8mm
Approved:
Checked:
Designer:
Project Management Initials:

Last saved by: PAIGE.CROSSMAN (2021-06-02) Last Plotted: Thu Nov 19, 2021
Filename: W:\PROJECTS\FALCON\DECKREHABILITATION_20210602.MXD

4.5 Schedule

On site, work during the lift span rehabilitation should focus on replacing the lift span deck system, sidewalk maintenance and re-balancing the bridge. Work on the approach and tower spans including sidewalk widening is to be deferred until after the lift span work is complete. Any height difference between the final deck and the approach deck will need to be accommodated through temporary risers if traffic is allowed through the site and if this is considered necessary. Altering the alignment of the road is not considered essential based on the concepts designs presented. Winter construction further needs to consider allowance for temperature and weather fluctuations in both the design and construction timing. The open steel deck grating will require less time to install on site as the installation is not limited by temperature requirements. The closed partially filled deck grating option will require the installation of concrete closure strips complete with wearing surface on site both of which are temperature sensitive and will require heating and hoarding during the winter construction season. A scheduling and construction specialist should be integrated into the design team to further consider the timelines below as detailed design proceeds. A range of time has been considered given that some float time is required and that the the open and closed deck options for the lift span will have different schedule requirements.

- Traffic Staging Option 1 - Single lane signalized alternating traffic (12-14 weeks followed by 12-16 weeks for the approach and tower span rehabilitation);
- Traffic Staging Option 2 - Dual lane traffic with pedestrian access throughout the project (12-16 weeks followed by 12-16 weeks for the approach and tower span rehabilitation); and
- Traffic Staging Option 3 - Construction Staged with either Options 1 or 2 over 2 seasons (8 weeks followed by 8 weeks for the approach and tower span rehabilitation for two years); and
- Traffic Staging Option 4 - Full closure of the bridge for 5 months to both pedestrian and traffic (8-12 weeks for lift span followed by 8-12 weeks for approach and tower span rehabilitation).

The full closure of the bridge is recommended as it is the safest for traffic, pedestrians and the construction site and includes the most float time to ensure operability of the bridge by the time navigation season begins. The contractor will be at their most efficient with a full closure. Alternately construction over two seasons with traffic staged in accordance with Option 1 preferred with consideration to site safety.

4.5.1 Lift Span

It is recommended that the project be tendered and awarded well in advance with consideration to the tender period and the timelines from procurement. Further detailed site surveys and factory pre-construction of the bridge deck including the new stringers is recommended to expedite site timelines. Given contractor material procurement timelines and manufacturing timelines the contract should be executed with the contractor by the September prior to construction to avoid delays.

All lift span construction for a deck replacement is required to take place over January and February. As this is not the traditional construction season and some finishes are temperature sensitive, prefabrication of deck panels with stringers off site is preferred. Finish durability can vary widely when installed during cold temperatures. It is recommended that deck on stringer fabrication and wearing surface installation be completed as much as possible off site and that panels be connected to the floor beams and locally finished on site. The final deck product will be better fitted to the stringers and result in an overall stiffer deck system when assembled in panels off site by the fabricator and shimmed to the floor beams. All shimming between the stringer/deck system should be between the stringer and floor beam on site. The timing to do the installation will vary depending on contractor experience, timing of tender, required finishing and connections.

Key to the planning of an installation over 8 weeks is a vigorous and detailed schedule with a competent experienced contractor. Monitoring by contract administration scheduling specialist is recommended. Pay items should be tied to the review and acceptance of the schedule and meeting the schedule targets to encourage contractor compliance and planning prior to the beginning of construction.

The following is an estimated schedule for the rehabilitation of the lift span only during a full closure with open deck grating as the selected option. Up to four more weeks will be required for the closed deck option considered.

- September – Contractor to survey and measure the bridge;
- September to December – Advance work. Prefabricate bridge deck in panels including stringers and wearing surface;
- January 1 – Install detour. Close bridge to traffic (marine and vehicle);
- January – 5 to 10 days – Setup scaffold for environmental protection;
- January – 10 days - remove existing stringers, redundant members for deck, perform lead remediation: seal floor beams;
- January to February - 40 days – deliver and install deck panels, connect to floor beams, touch up coatings to steel, connect panels and touch up wearing surfaces. Rehabilitate sidewalk, connect and touch up wearing surfaces. Install all barrier systems and temporary approach modifications;
- February – 5 days – rebalance and test bridge
- March 1 – Bridge returns to normal operations for marine traffic

The following is an estimated schedule for the rehabilitation of the lift span only based on the Option 1 single alternating lane staged over 2 seasons with open deck grating as the selected option.

- September – Contractor to survey and measure the bridge;
- September to December – Advance work. Prefabricate bridge deck in panels including stringers and wearing surface;
- January 1 – 3 days. Install traffic staging including signals;
- January – 5 to 10 days – Setup scaffold for environmental protection;
- January – 10 days - remove existing stringers, redundant members for deck, perform lead remediation: seal floor beams;
- January to February - 40 days – deliver and install deck panels, connect to floor beams, touch up coatings to steel, connect panels and touch up wearing surfaces. Rehabilitate sidewalk, connect and touch up wearing surfaces. Install all barrier systems and temporary approach modifications;
- February - March – 5 days – rebalance and test bridge
- March 4 – Bridge returns to normal operations for marine traffic

4.5.2 Approach and Tower Span

It is expected the approach span and tower span rehabilitation will use traditional construction techniques. A full closure is preferred for construction improvements to the approach and tower spans. Spring construction has been considered as the bridge is not over water and not subject to the constraints of work over water. Construction may be differed to the summer season but will increase traffic impacts. Staging of the site will increase the length of time required to complete the work.

The following is an estimated schedule for the rehabilitation of the approach spans:

- September – Contractor to survey and measure approach bridges;
- September to December – Advance work. Contractor to order required materials
- March – 5 days - Install environmental enclosures;

- March – 15 days – Remove bridge deck. Perform lead remediation, repair and recoat structural steel within 3 metres of joints, seal all other lead paint, install shear studs, formwork and place concrete deck;
- March to April – 28 days - cure bridge deck;
- March – 15 days – Remove sidewalks as needed, install aluminum panels
- April – 14 Days – Install barriers
- April - 10 days – Modify sidewalk structure as needed to accommodate widened sidewalk, deliver and install aluminum sidewalk panels, connect and touch up wearing surfaces. Install all barrier systems

5. Safety Issues

There are several safety issues to consider as they relate to public infrastructure and this site. Transportation and highway safety are important to Canadians. Canadians expect a certain level of service on their roads and bridges. Many of the requirements in the CHBDC relate to safety whether by ensuring bridge load capacity or through recommendations around traffic barrier capacity and heights. Further meeting driver expectations while transitioning through a bridge or construction zone are key to maintaining safety at a bridge. This section summarizes the safety risks for the BCLB.

5.1 Existing Bridge

The existing bridge is configured for four 3250mm lanes at 50km/h with shoulders varying from 280mm on the approach and tower span to 550mm shoulders over the lift span. The existing lanes adhere to meet Transportation Association of Canada Lanes configurations for urban collector traffic. While the lane configuration remains consistent from one end of the bridge to the other, the tower constrains the approach spans and limits the available shoulder width so that the shoulder width varies across the approach spans.

Line painting on the lift span grating is difficult to maintain as it fades quickly after being applied to the deck grating. The yellow centreline and exterior white lines that experience less tire traffic are well maintained but the white lines dividing the two lanes in the same experience more tire traffic and significant fade as a result.

5.1.1 Traffic Barriers

There are a variety of traffic barriers over the BCLB and approaches, they are summarized in **Table 19**. The existing lift span steel road barriers are not a suitable height for cyclists on the east side and the anchorage for the barrier on the lift span consists of two plates sandwiching the deck grating (Figure **15**) which does not meet the CHBDC guidance for crash tested barrier anchorage.

On the approach and tower spans the railings consist of guiderail and guiderail hybrids. The guiderail on the approach span east side is flexible and the 4 m height difference to the trail below would be hazardous for an errant vehicle. The sidewalk barrier is acceptable but will need to be replaced if the sidewalk is widened as proposed.

Table 19: Existing Barriers Characteristics

Barrier	Height (m)	Max Gaps (m)	Type	Crash Tested for Bridge
Sidewalk	1.37	0.15	Cyclist	NA
Approach Span	0.7	-	Guiderail	No
Tower Span	0.7	-	Guiderail	No
Lift Span (East)	1.22	0.3	Traffic/Pedestrian	Unknown
Lift Span (West)	1.37	0.3	Traffic/Cyclist	Unknown

5.1.2 Sidewalk

The minimum standard for a sidewalk over a bridge in Ontario is 1.5m clear. This is acceptable where cyclists dismount. This minimum standard is met on the lift span but on the approach to the bridge and the lift and tower spans the sidewalk is narrower at the stairs to the tower elevator and at traffic gates. For mixed use trails such as those on the approach a 3m width is recommended. Signs exist requiring cyclists to dismount over the bridge but compliance is sporadic which results in a safety issue.

The existing sidewalk is located on the west side of the bridge which is on the opposite side from the Hamilton and Burlington waterfront community trails. This requires pedestrians and cyclists to use the stairs to go under the bridge to get back to the Hamilton/Burlington trails or crossing traffic lanes on Eastport Drive. The sidewalk terminates approximately 500m past the bridge on the east side which requires users to re-cross Eastport Drive to re-connect to the sidewalk or access trails. This is a further hazard to both trail users and traffic.

5.1.3 Lift Span Deck Grating

The existing deck is undergoing local failure of welds and bearing bars and has been since its installation. Repairs are required regularly to maintain the deck in a condition suitable for traffic. The widespread local failures are generally located along wheel paths which indicates the overall flexibility of the deck grating is excessive. A comparable deck grating currently produced by Borden Gratings (R/W-L-I) is designed to span 818mm. The installed grating spans as much as 1295mm over 50% more than the comparable grating is designed for and is cantilevered on the shoulder by up to 690mm. The deck grating remains a safety hazard to traffic as an overloaded element in the lift span. The consequence of local failure has been mitigated to date with regular welding of the bars to maintain the existing substandard capacity. Repairs of open grid decks by welding are challenging since the welded joints accumulate various contaminants that are difficult to remove and will tend to weaken the welds. The heat affected zone with each repair can also weaken the steel, so these repairs are not likely to perform better than the original welds, unless the root cause, which seems to be the flexibility, is addressed.

The CHBDC does not have clear design guidance for the design of open deck steel grating. Design standards from various steel producers varies significantly. In order to ensure a suitable replacement design for the open deck steel grating it is recommended that in addition to requiring an Ontario P.Eng Design and Reviewer stamp on the design calculations and drawings for the deck grating that an external (non-contractor) technical review be performed by a steel specialist.

5.2 Construction Issues

Construction staging of the BCLB will exacerbate the existing safety concerns over the bridge. The overstressed deck grating will be subject to higher traffic volumes in a reduced area in addition to traffic on a cantilevered section of grating that has limited structural capacity and has had limited exposure to traffic to date. The existing bridge grating introduces a tugging effect that causes motorists to weave slightly left/right. The non-compliant barriers will be in closer proximity to traffic lanes and the overall risk of vehicle collisions will be increased as lane sizes are reduced.

5.2.1 Reduced Traffic Lanes

Where construction is staged the alternative that includes maintaining two lanes of traffic over the bridge has additional safety concerns. Most construction traffic guidelines are developed assuming summer construction without consideration to how a snow event will affect traffic safety or construction site safety. According to the MTO Roadside Design Manual (RDM) barriers may be impacted by snowplowing operations where there is less than 4.25m of clearance from the centreline.[16] The tugging effect will further influence the lane width required by the plow.

Where traffic is staged the plowing of the approach to the bridge will result in the plow pushing snow onto the lift span deck grating, over the barriers into the worksite/pedestrian walkway. It is essential that the plow despite impacts to operation always plows off the bridge. The plow will further reduce lane widths while crossing and leave a windrow which will reduce safety for the oncoming lane and increase the risk of traffic accidents. Further, trucks and larger vehicles will find the lanes narrow and the speed limit should be reduced to 40 km/h.

Where the staged traffic is single alternating lane controlled by a temporary signal, the plowing width will be wider and the risk of a windrow in traffic lower. The risk to the construction site remains and the snow needs to be plowed away from the site and off the bridge to protect worker and public safety.

From a safety perspective considering the structural capacity of the barriers and grating at this site and the winter hazard issues around staged traffic, a full road closure during construction is preferred. Where staging is required a single alternating lane with traffic control at each end of the bridge is preferred.

6. Environmental Requirements

A framework for identifying detailed design approvals, including supporting studies and review agency/stakeholder consultation has been developed considering a project description that captures the limits and methods of construction, including staging, timing and duration. The framework identifies anticipated approval timeline and difficulty ratings considering the nature of proposed construction, as well as previous and current experience. Proposed ratings are as follows:

1. least complicated/straight forward/reasonable approval turnaround (less than 4 months)
2. moderately complicated/moderately straight forward with more effort/longer approval turnaround (6-8 months)
3. most complicated/requires significant supporting studies and effort, including multiple agency contacts and review/longest approval turnaround (10-12 months)

The following hereafter identifies the anticipated approvals required for the Project, as well as additional stakeholders that should be considered during detailed design. An approach to the development of a Project Communications is also included.

6.1 Permits / Approvals

6.1.1 Federal

6.1.1.1 Environment and Climate Change Canada

Species at Risk

The Species at Risk Act, 2002 prohibits the killing, harming, etc. of species listed as Extirpated, Endangered or Threatened under Schedule 1 and the damage or destruction of residences unless a permit or other authorization has been granted by Environment and Climate Change Canada. Species listed as Extirpated, Endangered or Threatened under SARA are only protected on federal lands unless they are aquatic species or migratory birds listed on Schedule 1.

The scope of work will be to review background information sources (e.g., wildlife atlases) and consult with Environment and Climate Change Canada at the onset of detailed design to obtain up-to-date data including Species at Risk records.

Site reconnaissance should be conducted during detailed design, and Species at Risk habitat assessment completed, if necessary.

In the event that Species at Risk and/or their habitat is anticipated to be lost or affected by the Project, Environment and Climate Change Canada will be consulted to confirm permitting requirements.

Permit/Approval Difficulty Rating: 2

Migratory Birds

The project is also subject to *Migratory Bird Convention Act, 1994*. The Migratory Bird Convention Act, 1994 prohibits killing, disturbing or destroying migratory birds, nests or eggs, which can have long-term negative effects on bird populations. To prevent contravention of the Act, timing constraints and protection/ mitigation measures may be required. Environment and Climate Change Canada does not provide authorizations or permits for activities that do not primarily target migratory birds, but which may cause them harm.

The existing BCLB and surrounding areas (e.g., laydown areas that require tree or vegetation removal) should be examined for migratory bird nests or suitable nesting habitat during detailed design. Avoidance is essential.

Permit/Approval Difficulty Rating: 3+

6.1.1.2 Transport Canada

The Canadian Navigable Waters Act (CNWA) applies primarily to works constructed or placed in, on, over, under, through, or across navigable waters set out under the Act. The Navigation Protection Program administers the CNWA through the review and authorization of works affecting navigable waters.

The CNWA is categorized into five sections:

1. Minor Work in any Navigable Water.
2. Major Work in any Navigable Water.
3. Works in any Waters listed in the Schedule or where an existing Navigational Project Act/NWPA permit exists.
4. Works in any Navigable Waters not listed on the Schedule.
5. No interference with Navigation.

As per the CNWA work is defined as: "any structure, device or other thing whether – temporary or permanent, that is made by humans, including a structure, device or other thing used for the repair or maintenance of another work, the dumping of fill or the excavation or dredging of materials from the bed of any navigable water".

The CNWA does not require approval for repair or maintenance work. However, if a new or temporary work is associated with the repair or maintenance and has the potential to interfere with navigation, then it may be subject to approval. The approval process typically requires a 30 day comment period after advertising. It should also be noted that if the bridge is not open by the beginning of the navigation season, the PWGSC could face significant financial penalties and there may be economic impacts to the community.

Works completed below the soffit of the bridge will require an application through the External Submission Site.

If there is a role under the CNWA, correspondence should be forwarded electronically to: EnviroOnt@tc.gc.ca with a brief description of Transport Canada's expected role.

Permit/Approval Difficulty Rating: 1

6.1.1.3 Fisheries and Oceans Canada

In-water works are not anticipated for the Project at this time. However, should in-water works (e.g. barge anchorage) be identified at detailed design, a preparation of a Fisheries Act Screening will be required.

Potential preparation of Fisheries and Oceans Canada (DFO) Request for Review (RfR), application for Authorization and an application for SARA permit will be required should impacts be identified.

Avoidance of impacts may result in the issuance of a Letter of Advice from Fisheries and Oceans Canada (DFO). Should unavoidable impacts be identified that are likely to result in Harmful Alteration, Disruption or Destruction (HADD) or death of fish, an Authorization under the *Fisheries Act* may be required.

Permit/Approval Difficulty Rating: 2

6.1.1.4 Canadian Heritage Ministry

The BCLB itself is not of historical interest; however, it should be noted that there are features of historical interest (e.g. Light Station) located within the anticipated construction limits.

Permit/Approval Difficulty Rating: 1

6.1.2 Provincial Permits / Approvals

6.1.2.1 Ministry of Transportation

MTO owns Eastport Drive on both sides of the BCLB, which is an important linkage across the navigation channel. The east side of Eastport Drive contains the MTO operation and maintenance yard. Eastport Drive is also the emergency route in the event of Burlington Skyway closures.
The Project requires temporary full closure for the decks lift span between January to March 2023. The bridge will remain closed until approach span rehabilitation is completed in May 2023.

Pre-consultation meetings were held with MTO on November 20, 2020 and May 27, 2021. MTO confirmed that an encroachment permit is required. In response to the proposed temporary full closure, MTO staff confirmed that as part of the next steps, the proposed work will need to be reviewed by MTO senior management before any approvals are issued, considering several key items:

- MTO will also provide input to what the traffic modeling requirements will be at the PWGSC RFP development stage for the detailed design.
- A business case and project scoping letter that communicates construction timelines, methodology, traffic management, and staging. The letter should describe what options for avoiding or minimizing the permanent closure were considered and justification for the proposed full temporary closure.
- Description of the proposed detour route, which at this time, is anticipated to include the Red Hill Valley Parkway which is owned by the City of Hamilton.
- Microsimulation traffic modeling that demonstrates the effects of the temporary detour.

MTO will be engaged during detailed design process to ensure that the above noted items are acceptable for MTO senior management review, as well as confirm review and approval timelines.

As per the May 27, 2021 meeting, Neave Constantine is the current MTO contact for coordinating all permitting and approvals.

Permit/Approval Difficulty Rating: 3

6.1.2.2 Ministry of the Environment, Conservation and Parks

The *Endangered Species Act, 2007* prohibits the killing, harming or harassment of Extirpated, Endangered or Threatened species and the damage or destruction of their habitat unless a permit or other authorization has been granted by the Ministry of the Environment, Conservation and Parks (MECP). This legislation does not apply to federally owned lands, which will be considered when reviewing the construction footprint to determine permitting requirements.

The successful consultant should review background information sources (e.g., wildlife atlases) and consult with the MECP at the detailed design stage to obtain up-to-date data including Species at Risk records.

Site reconnaissance should be conducted during detailed design, and Species at Risk habitat assessment completed, if necessary. In the event that Species at Risk and/or their habitat is anticipated to be lost or affected by the Project, the MECP should be consulted to confirm permitting requirements.

Permit/Approval Difficulty Rating: 2

6.1.2.3 Ministry of Forestry and Natural Resources

Peregrine Falcon is known to occur year-round at the BCLB and has regularly nested on the north tower since 2013. The species is listed as Special Concern under Schedule 1 of the *Species at Risk Act, 2002* and *Endangered Species Act, 2007* and therefore does not receive individual or habitat protection. However, as a specially protected raptor, Peregrine Falcon and their nests and eggs receive protection under the Fish and Wildlife Conservation Act, 1997. Specifically, Peregrine Falcons cannot be hunted or trapped unless authorized by the Ministry of Natural Resources and Forestry. Similarly, it is prohibited to destroy, take or possess the nest or eggs of a Peregrine Falcon unless authorized by the Ministry of Natural Resources and Forestry.

The Ministry of Natural Resources should be consulted if construction may affect nesting Peregrine Falcons (*Falco peregrinus anatum*) and cannot avoid the nesting season (early March to mid-August) or if Peregrine Falcons continue to pose a health and safety risk to workers due to aggressive defensive behaviour outside of the nesting season (early March to mid-August) despite implementation of mitigation measures outlined in the Peregrine Falcon Management Plan (AECOM, 2020).

Permit/Approval Difficulty Rating: 3

6.1.3 Municipal and Other Permits / Approvals

6.1.3.1 Conservation Halton and Hamilton Conservation Authority

The BCLB is located within an area regulated by Conservation Halton and Hamilton Conservation Authority under Section 28 of the *Conservation Authorities Act (1998).* These “Regulated Areas” are established where development could be subject to flooding, erosion or dynamic beaches, or where interference with wetlands and alterations to shorelines and watercourses might have an adverse effect on those environmental features.

The Project does not involve alterations to shoreline or in-water works as the work will be above and adjacent to water. However, the Project is situated within the regulated Conservation Halton and Hamilton Conservation areas.

A permit under the Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Regulation 161/06 may be required, especially if a deck drain is added to the bridge. The conservation authorities will be accordingly consulted during detailed design to confirm approval requirements and timelines considering the proposed construction methodology and construction footprint.

Permit/Approval Difficulty Rating: 2

6.2 Key Stakeholders

In addition to the review agencies, several key stakeholders have been identified for the Project:

- Halton Region
- City of Burlington
- City of Hamilton
- Beach Canal Lighthouse Group
- Waterfront Regeneration Trust/ Ontario Trails Council
- Hamilton Oshawa Port Authority
- Joseph Brant Hospital
- Emergency Services

6.2.1 Halton Region

The BCLB is not in close proximity to Regional Roads; however, the Halton Region Skyway Wastewater Treatment Plant is located immediately east of the BCLB. Halton Region should be engaged at the beginning of detailed design regarding any operational impacts in order to review the Project scope and approaches to mitigating operational impacts.

The current Halton Region contact is Rob Rivers (Rob.Rivers@halton.ca), Director of Waste Management & Road Operations.

6.2.2 City of Burlington

A pre-consultation meeting with City of Burlington and City of Hamilton was held December 14, 2020. During the initial meeting, it was assumed that the bridge deck replacement could be undertaken with temporary lane closure. A second pre-consultation meeting is planned to explain the updated Project conceptual design, including the proposed temporary full bridge closure during construction and next steps.

The preliminary concerns noted in the December 14, 2020 meeting included impacts to the multi-modal transportation network and access to park and waterfront trail facilities. The City also enquired whether the existing sidewalk on the harbour side of the bridge could be moved to the lake side of the bridge, which would improve linkages to the waterfront trail network, as well as public safety. AECOM and PWGSC confirmed that this can not be included as part of the proposed bridge rehabilitation; however, the conceptual design will improve sidewalk width to meet minimum standards. The conceptual design also discusses an approach to including lateral balancing system that could allow for the sidewalk to be relocated to the lakeside as part of any future project.

The current City of Burlington contacts are Vito Tolone (vito.tolone@burlington.ca), Director of Transportation Services and Jeff Black (Jeff.Black@burlington.ca), Manager of Traffic Operations and Signals.

6.2.3 City of Hamilton

A pre-consultation meeting with City of Hamilton and City of Burlington was held December 14, 2020. During the initial meeting, it was assumed that the bridge deck replacement could be undertaken with temporary lane closure. A second pre-consultation meeting is planned to explain the updated Project conceptual design, including the proposed temporary full bridge closure and next steps.

The preliminary concerns noted in the December 14, 2020 meeting included similar impacts to those noted by City of Burlington (refer to above). The City of Hamilton also noted the Project should consider the Hamilton Port Fisherman’s Pier long term plan in the context of the construction footprint.

The Hamilton Street and Railway (HSR) operates bus transit service along Eastport Drive (Route 11), which will be temporarily disrupted during construction. HSR will be engaged though the City of Hamilton during the preliminary and detailed design stages regarding temporary disruption to services and if required, detour planning.

The current City of Hamilton contacts are Chris King (Chris.King@hamilton.ca), Senior Project Manager of Transportation Systems and Mike Field (Mike.Field@hamilton.ca), Manager of Transportation Operations.

6.2.4 Beach Canal Lighthouse Group

The Beach Canal Lighthouse Group is interested in the preservation of the 1858 Light Station on the Burlington Ship Canal. The Beach Canal Lighthouse Group should be engaged at the beginning of detailed design to review project scope and approaches to mitigating impacts.

6.2.5 Waterfront Regeneration Trust/Ontario Trails Council

The Waterfront Regeneration Trust/Ontario Trails Council will be interested in any temporary closures to the Waterfront Trail. The Ontario Trails Council does not own or manage any trails. The City of Hamilton is contact for the Waterfront Trail - Hamilton Harbour.

The City of Hamilton and Waterfront Regeneration Trust/Ontario Trails Council should be engaged at the beginning of detailed design to review the Project scope and approaches to mitigating impacts.

6.2.6 Hamilton Oshawa Port Authority

While construction is planned to occur during the non-navigation period, the Hamilton Oshawa Port Authority (HOPA) will be engaged during the design and construction phases to make sure there is mutual understanding of the proposed works and mechanism for dealing with any short-term disruption to navigation (worst case scenario).

The HOPA contact is Bill Fitzgerald (bfitzgerald@hopaports.ca), Vice President of Operations.

6.2.7 Joseph Brant Hospital

Joseph Brant Hospital should be engaged at the beginning of detailed design to review project scope and approaches to mitigating impacts, including emergency access.

Communications should be circulated to Maria Babbage (mbabbage@josephbranthospital.ca), Head of Communications at the hospital.

6.2.8 Emergency Services

Emergency Services from the City of Hamilton and City of Burlington should be engaged at the beginning of detailed design to review project scope and approaches to mitigating impacts, including emergency access.

6.3 Approach to Communications

Recognizing the anticipated impacts to the bridge users and local and broader communities, the detailed design should include the development of a communications and public relations plan. The plan will include the development of plain language communication materials, including key messages that clearly outline the project benefits, construction schedule and approaches to mitigating impacts. Key messages should capture:

- What PWGSC is doing at the BCLB
- Why the Project is happening and what are the benefits
- What are the potential adverse effects during construction and how they will be mitigated
- Who will be affected by the Project
- Where, when and how the Project will take place

The plan should be developed in consultation and partnership with key agencies and stakeholders, not limited to MTO and the key stakeholders identified in this report (**Section 4.2**). The plan will outline the approach to the development and implementation of signage as it relates to where project impacts will take place. PWGSC has bridge closure and detour signage already in place, which provides the starting point to the plan.

6.4 Property and Utility Impacts

It is anticipated that during construction, work can remain generally on PSPC property with the exception of the proposed staging on the approaches of the bridge which is owned by the MTO and access to the underside of the north end of the bridge. The north side of the bridge can be accessed by the pedestrian waterfront trail accessible at Lakeshore Cr in the City of Burlington. The waterfront trail passes under the Hydro Right of Way on the east side of the bridge. The waterfront trail on the west side of Eastport Drive may be preferred to the Lakeshore Cr access and result in less property impacts.

No utility impacts are anticipated. Consideration of control and electrical conduits that are attached to the bridge will be required during the rehabilitation.

7. Conclusions

AECOM Canada Ltd. (AECOM) was retained by the Public Services and Procurements Canada (PSPC) to provide a concept design for the Burlington Canal Lift Bridge (BCLB). The concept design recommendations are based on the 2020 bridge inspection, structural evaluation and mechanical evaluation of rehabilitation options for the BCLB including the approach and tower spans, lift span, towers, and counterweight main mechanical components.

This concept design report reviewed previous studies completed for the BCLB Rehabilitation, the recent 2020 inspection completed by AECOM and further developed the approach and tower span rehabilitation as well as the lift span deck replacement for an open and closed type deck.

The existing lift span at the BCLB which consists of steel grating with transverse bearing bars welded to longitudinal stringers has exceeded its service life and is in need of a rehabilitation for the following reasons:

- The existing deck grating is spanning 50% further than what current fabricators recommend for a similar grating panel designed for CHBDC CL-625-ONT truck loading.
- The weld connections are small and are susceptible to local fatigue.
- The current traffic barrier is substandard with anchorage that does not comply with CHBDC.

The existing approach and tower spans consist of a concrete deck on steel stringers bearing on the transverse front tower beam (tower span) and back tower beams (approach and tower span) which are connected to the vertical tower posts and abutments. The concrete deck has exceeded the current service life and is in need of a rehabilitation for the following reasons:

- Previous studies have identified high chloride contamination in the concrete deck which accelerates the corrosion chemical reaction in the steel reinforcing within the concrete deck.
- The concrete deck is in fair to locally poor condition specifically near the expansion joints which have failed and leak and have caused the progression of the advanced deterioration observed
- The structural steel is in poor condition near the expansion joints which have failed and leak and have caused the progression of the advanced deterioration observed.

- The current traffic barrier is substandard
- The existing sidewalk which is used by pedestrians and cyclists does not meet the minimum MTO bridge sidewalk standard of 1.5m clear at multiple locations.

7.1 Construction Staging

The only construction staging option that is safe and that ensures continued navigation in the canal from March 1 to December 31 for the lift span deck replacement is a full closure of the road and bridge to vehicle and pedestrian traffic. The consequences of failing to complete the lift span deck replacement within the 8 week period and the subsequent economic disruption from the restriction to the canal navigation are severe. The approach and tower spans can be staged similarly to the lift span following the lift span construction or later in the summer season if desired although this will be more disruptive to the community.

The following safety concerns have been identified which limit the viability of staged construction:

- Lane widths available for dual staging Option 2 are narrow and will not allow wider vehicles and regular snowplows over the bridge which will be in full operation during the lift span construction.
- The cantilevered portion of the deck grating which is currently considered a shoulder area would be driven on as part of staged construction. This cantilevered portion of the deck grating is not sufficiently stiff or strengthened for vehicular loading.
- The narrow lane provided during staged construction will increase the likelihood of a vehicular collision with the substandard barrier.
- Staging the lead paint remediation including environmental enclosures will extend the construction duration and risks impacting the navigation of the waterway in March

The full closure of the bridge is recommended as it is the safest for traffic, pedestrians and the construction site and includes the most float time to ensure operability of the bridge by the time navigation season begins. The contractor will be at their most efficient with a full closure. Alternately construction over two seasons with traffic staged in accordance with Option 1 single alternating traffic controlled staging is preferred with consideration to site safety.

7.2 Traffic Management and Traffic staging

The assessment of impacts for staged construction based on the concept design detailed in this report shows the predicted operations and intersection performance to have an acceptable level of service during both peak hours. A viable construction window was identified upon a closer examination of the construction activities, implementation constraints/ durations, and sequencing, together with current Canal Lift Bridge operations.

The ultimate goal from the outset has been to be efficient in cost, schedule, and consider the impacts across multiple perspectives, using collaboration and open transparent consultation to develop and evaluate the concept design and the various construction solutions. As the design progresses to preliminary design and beyond, traffic and transportation impacts and how they are managed will need to be further investigated for the full closure of the Burlington Canal Lift Bridge. Transportation modelling and analysis will need to show the effects of the full closure to each direction of travel on the QEW where the off-ramp traffic remains on the QEW and/or detoured. Strategies will need to include and not be limited to

- A temporary detour route(s) for QEW traffic;
- An alternate (temporary) emergency route(s)
- A local area traffic management plan, addressing local needs and operations
- Advance variable signage plan, in support of the overall communication program.

7.3 Environmental and Permitting

The environmental and permitting scoping exercise has identified anticipated permits and approvals, which will be initiated at the beginning of detailed design. The framework identifies anticipated approval timeline and difficulty ratings considering the nature of proposed construction, as well as previous and current experience. The approvals, were ranked from least complicated/straight forward/reasonable approval turnaround to most complicated/requires significant supporting studies and effort, including multiple agency contacts and review/longest approval turnaround.

Important stakeholders to be engaged during the detailed design and construction phases have also been considered.

The Project will also benefit from a robust communications and public relations plan, recognizing impacts to bridge users and communities, as well as the potential for strong media attention.

8. Recommendations

Prior to preparing preliminary and detailed design work a detailed topographic survey is required to capture the particular details of the site. Details such as varying sidewalk widths, curb locations, impact of varying width vertical truss members to sidewalk, barrier and deck fit should be captured in this survey. In addition, overhead clearances which may impact the roadway and sidewalk should be acquired. Where proposed construction impacts the existing lead paint on the bridge. The lead paint should be sealed or remediated through appropriate sealing and/or abatement through removal of the paint and repainting.

8.1 Traffic Management and Traffic Staging

In **Section: 4.2** Transportation Impacts Assessment, the analysis considered several strategies to assess the potential impacts to traffic operations, intersection performance for pre-COVID existing, and construction staging conditions in support of the replacement of the Burlington Canal Lift Bridge.

It was found that the construction constraints and requirements ultimately guide the traffic management strategy. With an improved understanding of the complex logistics, construction uncertainties, risks, and safety issues not all solutions are favourable within the broader context of the project, when schedule optimization and potential safety concerns compete with minimizing disruption and delay. The recommendation for a full closure does, however, strategically address all the issues and safety concerns.

Such issues and safety stem from narrow proposed driving lanes, limiting the width of vehicles permitted to travel on the bridge, vehicles driving on the cantilevered portion of the deck grating which is likely not designed to support such loads, increasing the likelihood of collisions with a substandard deck barrier due to narrow lanes, and the challenges of anchoring temporary barriers to the deck/stringers.

A full-closure would be supported through a coordinated and inclusive communication program with local residents and businesses that advises them on alternative routes for travel or information on how shifting their trips to off-peak hours would help mitigate against delays and excessive disruption to journey times.

8.2 Bridge Structure

The following recommendations pertain to the proposed work to complete the rehabilitation at the BCLB.

8.2.1 Approach Spans

The approach and tower spans require a deck replacement and repairs to the steel superstructure and tower floor beams near the deck joints and the construction joint in the north tower span. The deck should be replaced in accordance with current standards including a 225mm steel reinforced concrete deck plus an integral 20mm concrete wearing surface. Premium steel in the top reinforcing layers of the deck is required. The expansion joints are to be removed and replaced with a semi integral abutment conversion at the approach span abutment, and a link slab deck between the approach span and tower span. This will prevent water infiltration and reduce deterioration of the superstructure and reduce future maintenance/repair costs.

At multiple points, the sidewalk in the approach and tower spans do not meet the minimum standard of 1.5m clearance for Ontario sidewalks. The sidewalks should be widened in those areas during the rehabilitation. The existing deck is part of the support system for the sidewalks and it is recommended they be closed to pedestrian traffic and temporarily supported while the deck is being replaced. The traffic barriers do not meet current standards and should be improved to meet CHBDC standards during the deck replacement. It is recommended that a TL-4 barrier (Four Tube Combination Traffic/Bicycle Barrier) be installed on the approach spans. The curb widths will need to be modified to ensure adequate fit with the tower span and the approach to the bridge.

8.2.2 Lift Span

Since the weight of the lift span is difficult to accurately calculate, the precise weight of the lift span should be verified through testing prior to rehabilitation. The east-west balance can be verified at the same time by measuring the differential in weights between all four corners. There is currently no lateral balancing system as the abandoned rail stringers act to laterally balance the bridge. Implementation of a lateral balancing system is recommended on the lift span as it will improve operations and potentially allow for the reduction of overall span weight.

Based on the evaluated criteria of the deck replacement options, it is recommended that Alternative 1 the replacement of the deck with a Rivetted Open Steel Grid Deck be carried out as the preferred deck replacement alternative for the lift span. AASHTO standards for steel grid decks are different than CHBDC in that the CHBDC appears to be more conservative, in particular for transversely placed grid decks. It is important to ensure that the engineered deck is designed by someone not only licensed in Ontario but with this particular type of experience with grid deck systems.

The Closed deck option “Partially Filled Deck – no overlay” reviewed is not recommended over the riveted grating based on the ranking evaluation completed in Table 12.

The current barriers and anchorage in the lift span are likely substandard; thus replacement during a rehabilitation is recommended with crash tested CHBDC compliant barriers including their anchorage to a primary structural member consistent with CHBDC requirements. It is recommended that a TL-2 barrier modified to an overall height of 1.37m (minimum cyclist height) be installed on the lift span.

The existing sidewalk is in fair condition and it is recommended that repairs (partial depth concrete repairs) be carried out followed by the installation of a slip resistant wearing surface for pedestrians (Matacryl or equivalent) to increase the service level and protect the sidewalk. The existing deck is part of the support system for the sidewalks and it is recommended they be closed to pedestrian traffic and temporarily supported while the deck is being replaced.

8.2.3 Tower

The tower evaluation indicates that under existing conditions the front columns on the south and north towers are acceptable. For members primarily in tension or compression, such as columns, the demand over capacity ratios are based on the tension and compression capacities of each member where the moments from the analysis were converted to an effective tension or compression force required to generate a uniform stress on the section equal to the maximum flexural stress. This simplified approach is conservative for members not susceptible to lateral torsional buckling, which is the case for the built-up members considered in this evaluation. CHBDC does not provide guidance on the analysis/evaluation of riveted built-up members and more specifically for box sections acting as beam columns; for the purpose of this analysis the rivets are assumed to be sufficiently joining individual steel components to prevent interaction between local buckling of elements of the built-up members between the rivets and overall buckling of the compression member. It is recommended that an evaluation of the possible interaction buckling failure mode based on Euro Code EN 1993-1-1 be conducted to determine the connectivity and effectiveness of the tower column members and their capacity with respect to the Eurocode.

8.3 Construction Staging and Approach

In general, the deck replacement in the lift span should be performed using rapid construction techniques including off-site fabrication where possible with assembly and final connections on-site minimized. Key to the planning of an installation over 8 weeks is a vigorous and detailed schedule. The only option which currently meets this schedule is the full closure of the road and bridge to vehicle and pedestrian traffic.

The approach and tower span rehabilitation should be done after the lift span deck replacement to avoid any conflicts with priorities on the construction site. Traditional construction techniques are appropriate for the approach and tower spans.

8.4 Environmental and Permitting

The environmental and permitting scoping exercise should be used as a basis for review agency permitting pre-consultation to be undertaken during detailed design. The framework identifies anticipated approval timeline and difficulty ratings considering the nature of proposed construction, as well as previous and current experience. The anticipated approvals to be confirmed during detailed design include:

- Ministry of Transportation – encroachment permit, initial business case and project scoping letter
- The Ministry of Natural Resources and Forestry – Peregrine Falcons
- Environment and Climate Change Canada – Species at Risk and Migratory Birds
- Ministry of the Environment, Conservation and Parks – Species at Risk
- Fisheries and Oceans Canada – Fisheries Act Screening
- Conservation Halton and Hamilton Conservation Authority – permit under the Development, Interference with Wetlands, and Alterations to Shorelines and Watercourses Regulation 161/06
- Transport Canada – Canadian Navigable Waters Act
- Canadian Heritage Ministry – Light Station

Key stakeholders to be engaged during the detailed design and construction phases include:

- Halton Region
- City of Burlington
- City of Hamilton
- Beach Canal Lighthouse Group
- Waterfront Regeneration Trust/ Ontario Trails Council

- Hamilton Oshawa Port Authority
- Joseph Brant Hospital
- Emergency Services

The Project will also benefit from a robust communications and public relations plan, recognizing impacts to bridge users and communities, as well as the potential for strong media attention.

9. References

5. AASHTO Moveable Bridge Design Specifications (2nd Edition 2007)

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20. Public Works and Government Services. December 2010. Bridge Inspection Manual Structures, Marine and Transportation

21. Roebling Wire Rope Charts (1932)

Appendix A

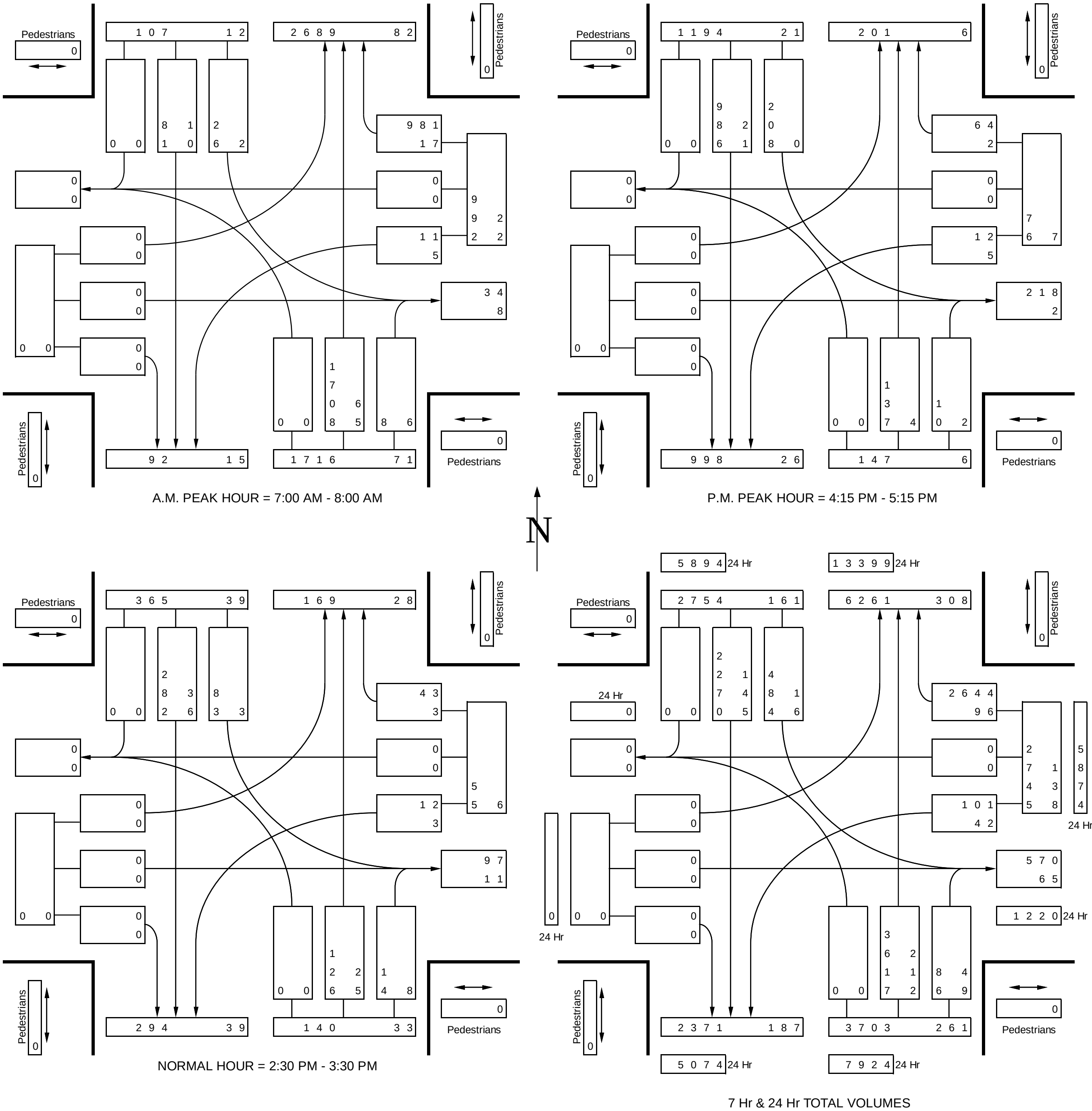
Traffic Impact Assessment Supporting Data

Exhibit A.1

Traffic Data

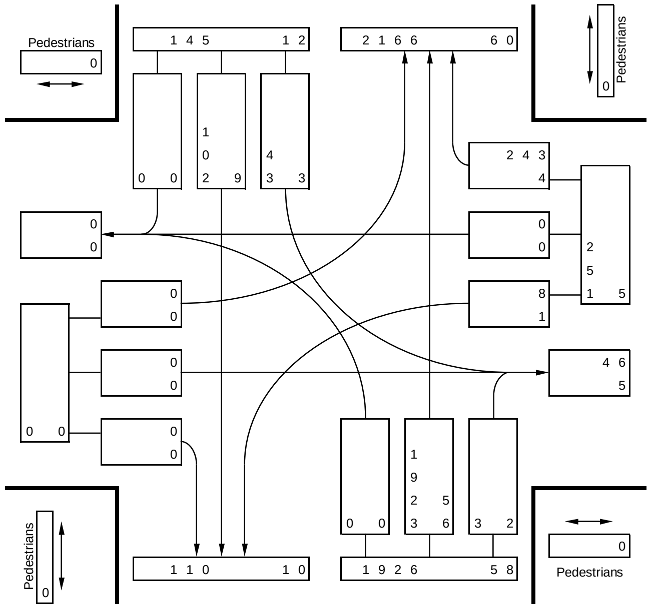
City of Hamilton **T U R N I N G M O V E M E N T F L O W C H A R T** Loc. Code: 10359

Intersection: **QEW Ramps** **at** **Eastport Dr** Total Vehicles: 9,202 Date: Monday
Direction: (East/West) (North/South) M.V.E./Year: 6.695 Nov 18, 2019
Road Condition: Wet Weather: Overcast AWDT Factor: 2.14 Period: 7 hours
Comments:

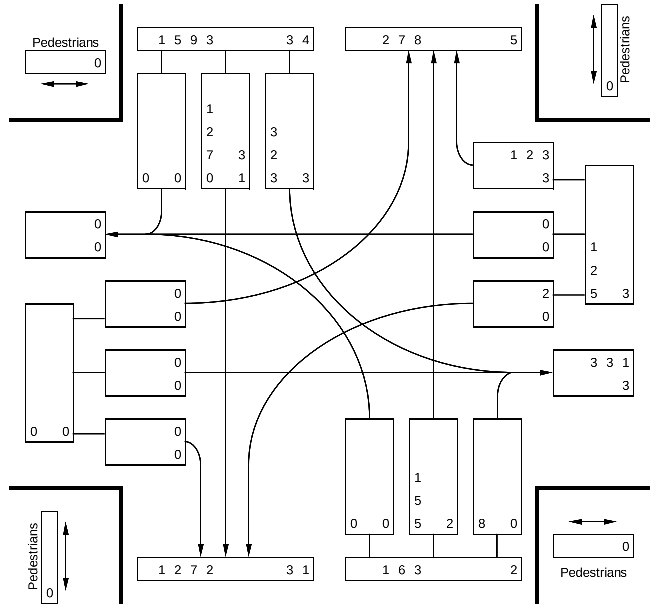


City of Hamilton **TURNING MOVEMENT FLOW CHART** Loc. Code: 130

Intersection:	**Beach Blvd**	**at**	**Eastport Dr**	Total Vehicles: 8,510	Date: Wednesday
Direction:	(East/West)		(North/South)	M.V.E./Year: 5.874	Sep 12, 2018
Road Condition: Dry		Weather: Clear		AWDT Factor: 2.03	Period: 7 hours
Comments:					

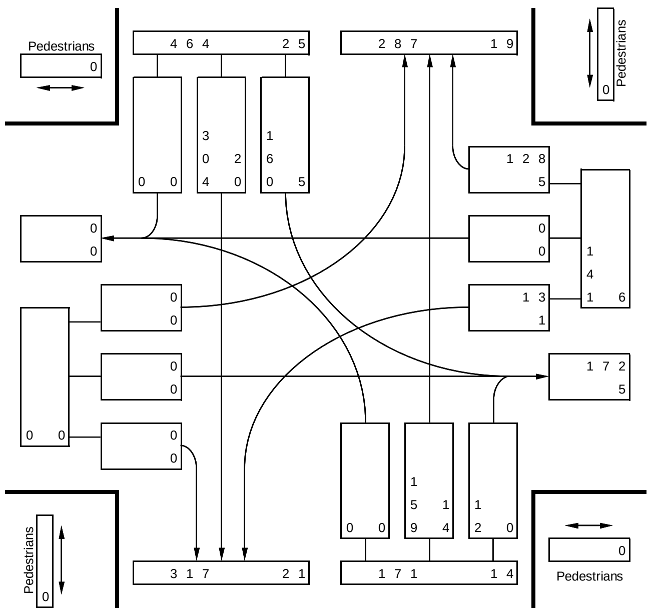


A.M. PEAK HOUR = 7:00 AM - 8:00 AM

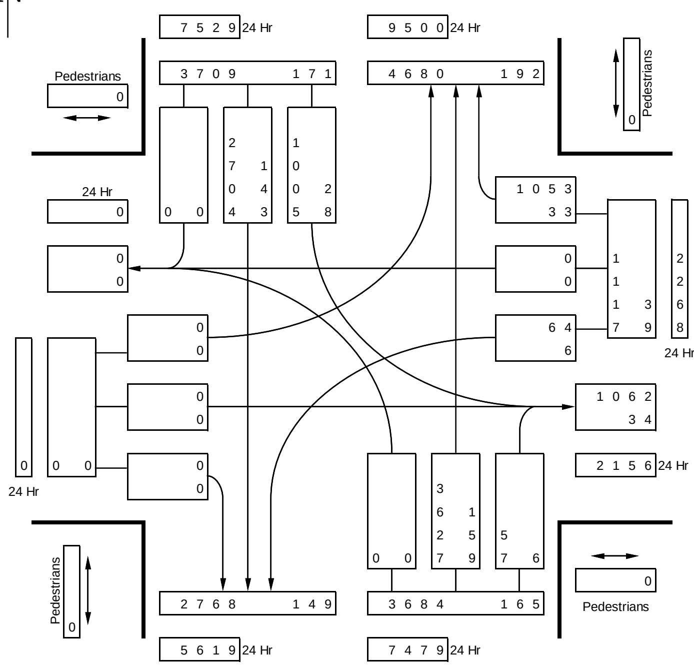


P.M. PEAK HOUR = 4:45 PM - 5:45 PM

N



NORMAL HOUR = 2:30 PM - 3:30 PM



7 Hr & 24 Hr TOTAL VOLUMES

Ministry of Transportation
Ministere des Transports
Ontario

INTERSECTION LAYOUT SHEET

DATE 2017.11.02 DAY Thurs REQUEST # 071 OBSERVER Video

GRETCH CODE (LHRS) 3101130000 FILE # ______ TFR # ______

HWY QEW LOCATION Lakeshore Rd IC-97 RAMPS East

REG/MUN. Burlington TOWN/CITY ______

COMMENTS ______

SEGMENT 1 - AM or PM (Please Circle) WEATHER Cloudy

DATASETS:

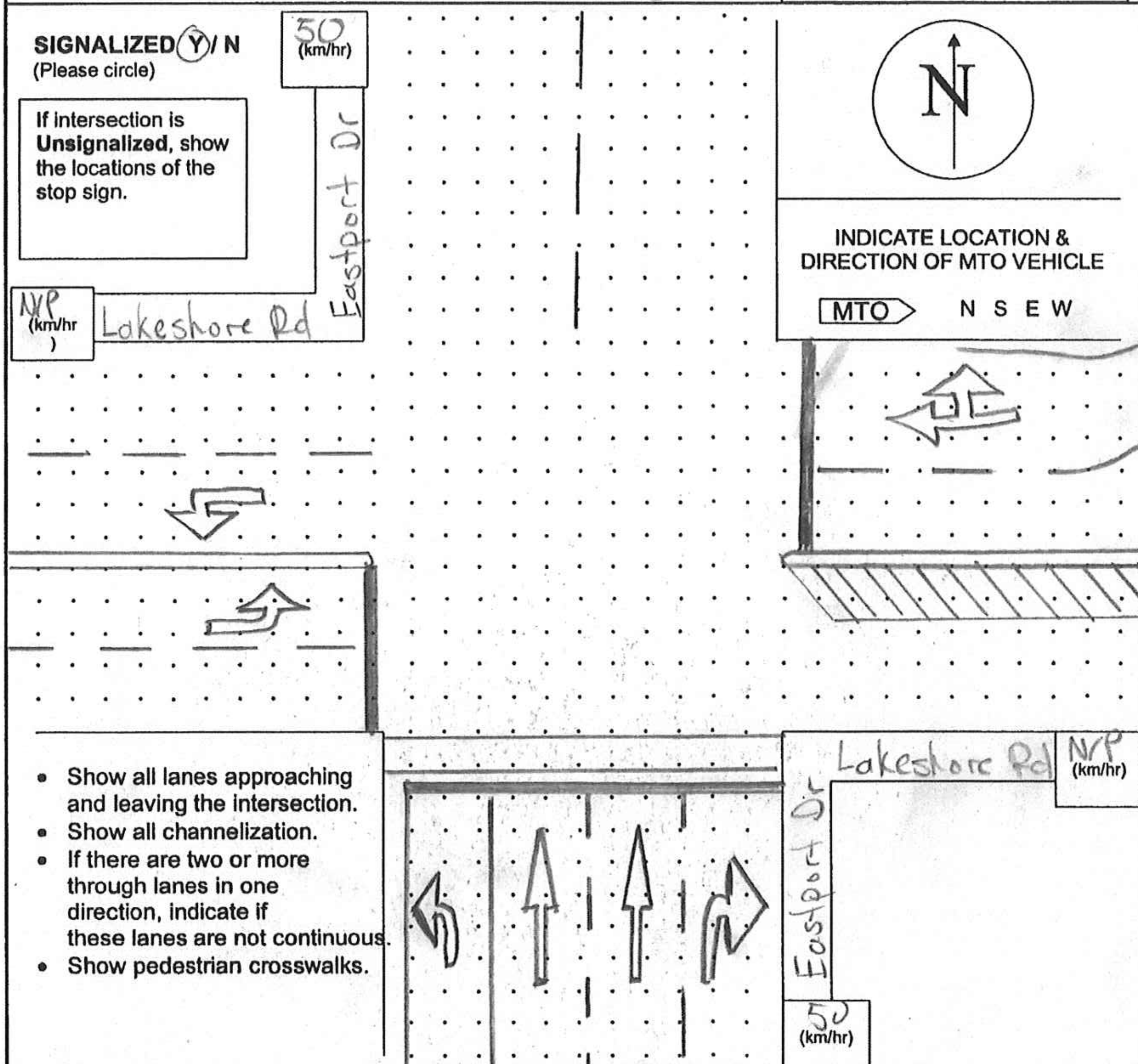
For office use only:
Edit File: ______
PM Peak: ______
Report: ______
Processed by: ______

SIGNALIZED Y / N
(Please circle)

If intersection is **Unsignalized**, show the locations of the stop sign.

INDICATE LOCATION & DIRECTION OF MTO VEHICLE

MTO N S E W



- Show all lanes approaching and leaving the intersection.
- Show all channelization.
- If there are two or more through lanes in one direction, indicate if these lanes are not continuous.
- Show pedestrian crosswalks.

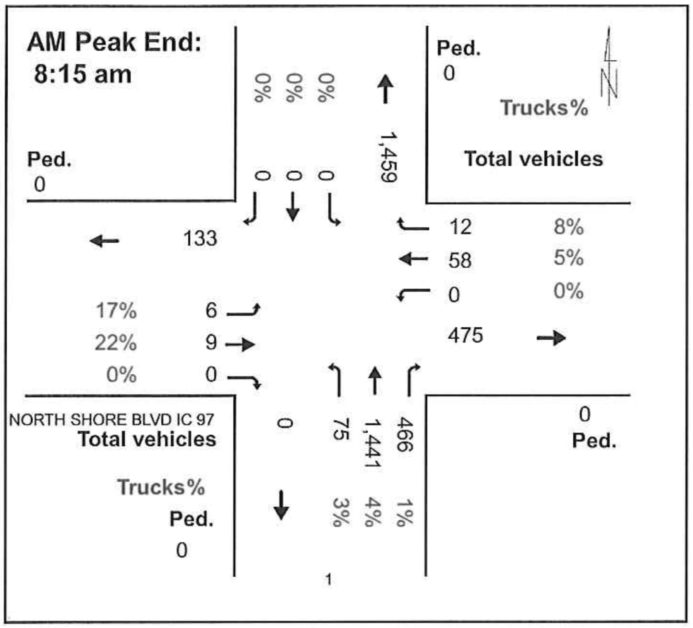
Text File #......................

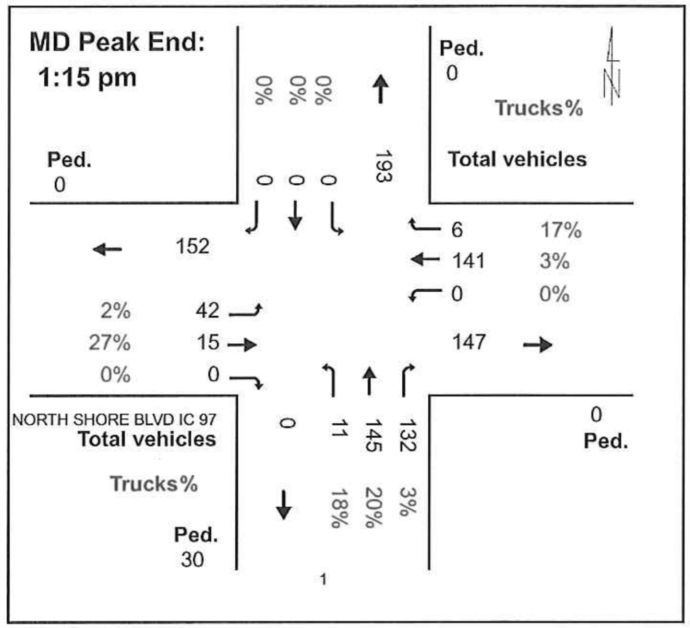
Ontario

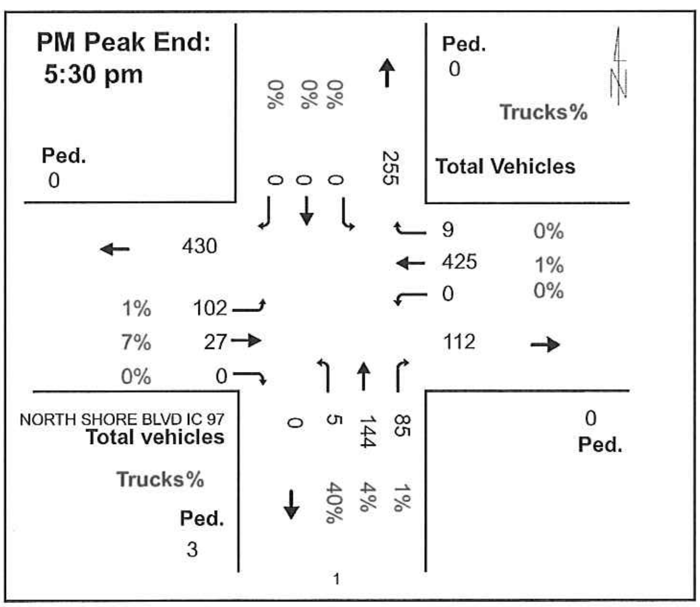
HWY 1 @ NORTH SHORE BLVD IC 97

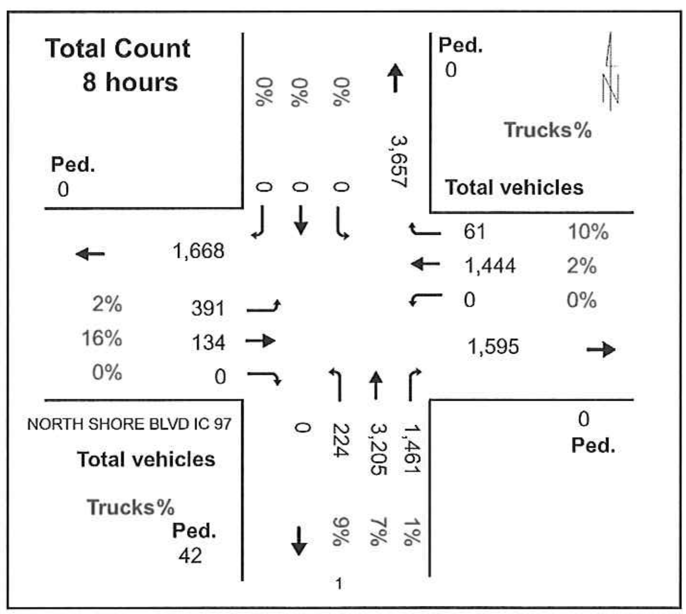
Central

Intersection ID:101130000(--E--) **Count Day: Thursday** **Count Date: 02-Nov-2017**









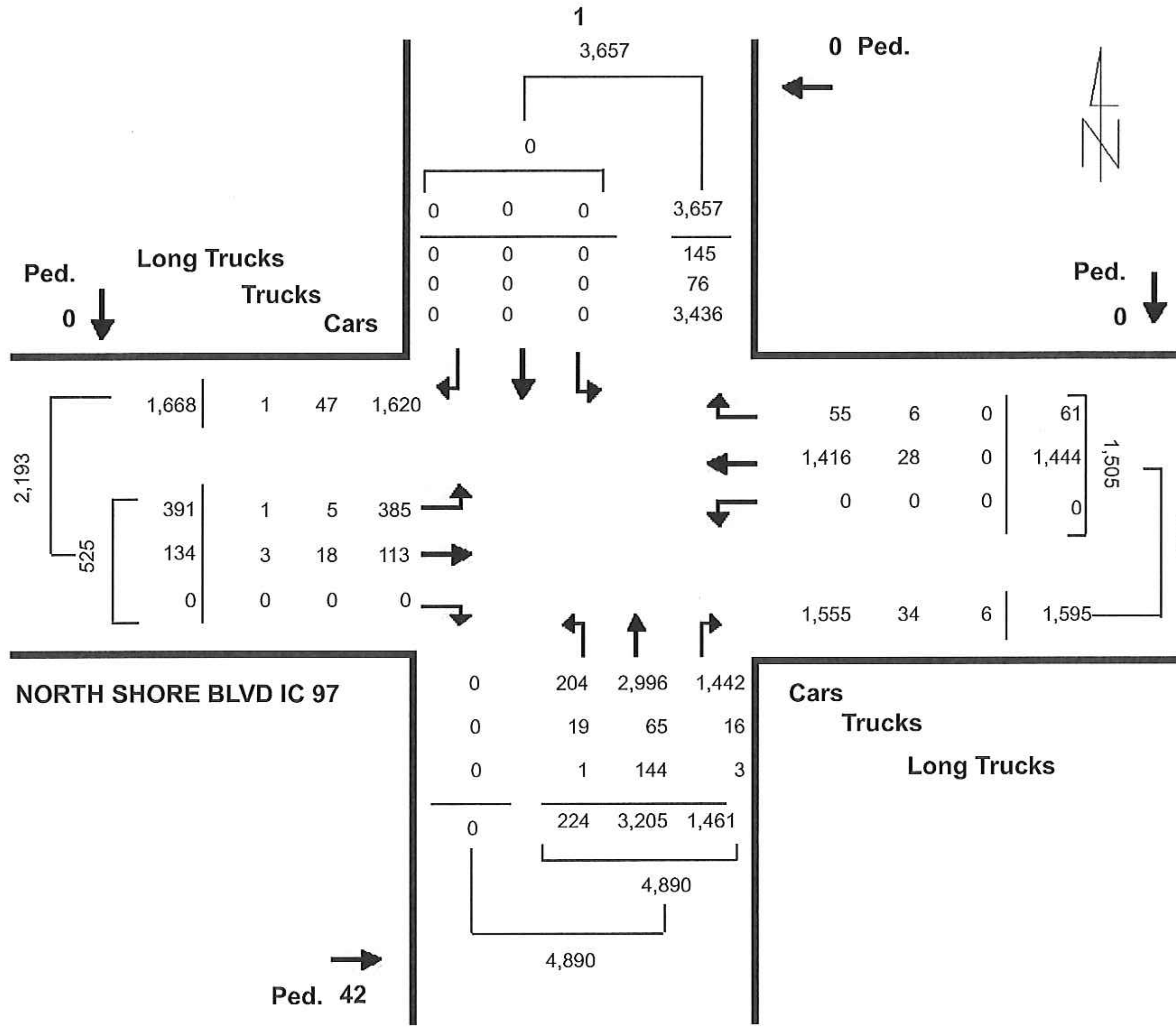
Traffic
Engineering
Software

COUNT TOTAL

HWY 1 @ NORTH SHORE BLVD IC 97

Central

Intersection ID:101130000(--E--) **Date: 02-Nov-2017**



15 MIN REPORT

Intersection ID:101130000(--E--) **HWY 1 @ NORTH SHORE BLVD IC 97** **Municipality: Central** **Date: 02-Nov-2017**

	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
7:15	0	0	0	0	0	0	0	0	0	0	0	14	0	0	1	0	0	0	0	0	10	232	100	1	6	1	1	4	0	0	0	2	0	0	0	0	0	0	0	0	372
7:30	0	0	0	0	0	0	0	0	0	0	0	12	4	0	1	0	0	0	0	0	13	327	118	0	7	3	0	10	0	0	0	3	0	0	1	0	0	0	0	0	499
7:45	0	0	0	0	0	0	0	0	0	0	0	11	2	0	1	1	0	0	0	0	16	394	116	0	5	1	0	9	0	0	0	2	0	0	0	0	0	0	0	0	558
8:00	0	0	0	0	0	0	0	0	0	0	0	13	2	0	0	0	0	0	0	0	25	397	124	2	8	0	0	10	0	0	1	0	0	0	1	0	0	0	0	0	583
8:15	0	0	0	0	0	0	0	0	0	0	0	19	3	0	1	0	0	0	0	0	19	262	104	0	6	0	0	6	0	0	4	2	0	1	0	0	0	0	0	0	427
8:30	0	0	0	0	0	0	0	0	0	0	0	14	1	0	0	0	0	0	0	0	7	29	18	1	1	0	0	2	0	0	3	1	0	0	0	0	0	0	0	0	77
8:45	0	0	0	0	0	0	0	0	0	0	0	18	2	0	1	0	0	0	0	0	26	328	165	3	10	1	0	23	0	0	4	0	0	0	1	0	0	0	0	0	582
9:00	0	0	0	0	0	0	0	0	0	0	0	23	1	0	2	1	0	0	0	0	17	192	79	0	5	3	0	3	0	1	3	1	0	1	1	0	0	0	0	0	333
9:15	0	0	0	0	0	0	0	0	0	0	0	15	3	0	4	0	0	0	0	0	18	171	67	0	3	1	0	7	0	0	3	1	0	0	0	0	0	0	0	0	293
9:30	0	0	0	0	0	0	0	0	0	0	0	17	1	0	0	0	0	0	0	0	9	50	43	1	2	1	0	2	0	0	3	2	0	0	2	0	0	0	0	0	133
9:45	0	0	0	0	0	0	0	0	0	0	0	15	0	0	1	0	0	0	0	0	10	42	42	2	1	1	0	4	0	0	1	1	0	0	1	0	0	0	0	0	121
10:00	0	0	0	0	0	0	0	0	0	0	0	12	2	0	0	1	0	0	0	0	6	27	24	1	1	0	0	2	0	0	4	3	0	0	1	0	0	1	0	0	85
Period2																																									
12:15	0	0	0	0	0	0	0	0	0	0	0	30	3	0	1	0	0	0	0	0	0	13	5	0	0	0	0	1	0	4	22	10	0	0	0	0	0	0	0	0	89
12:30	0	0	0	0	0	0	0	0	0	0	0	34	1	0	0	0	0	0	0	0	0	37	44	1	0	0	0	10	1	9	18	6	0	0	2	0	0	0	0	0	163
12:45	0	0	0	0	0	0	0	0	0	0	0	24	0	0	3	0	0	0	0	0	3	24	20	1	1	1	0	5	0	7	9	2	0	0	1	0	1	0	0	0	102
13:00	0	0	0	0	0	0	0	0	0	0	0	38	1	0	0	0	0	0	0	0	2	24	33	0	1	1	0	4	1	9	8	2	0	0	0	0	0	1	0	0	125
13:15	0	0	0	0	0	0	0	0	0	0	0	41	3	0	1	1	0	0	0	0	4	31	31	0	2	0	0	6	0	5	6	1	0	0	0	0	0	0	0	0	132
13:30	0	0	0	0	0	0	0	0	0	0	0	47	2	0	1	0	0	0	0	0	6	21	19	0	1	1	0	7	1	2	5	3	0	0	1	0	0	0	0	0	117
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Period3																																									
15:15	0	0	0	0	0	0	0	0	0	0	0	40	1	0	2	1	0	0	0	0	3	28	27	0	1	0	0	3	0	0	17	2	0	1	0	0	0	0	0	0	126
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15:45	0	0	0	0	0	0	0	0	0	0	0	74	3	0	1	0	0	0	0	0	1	35	24	1	0	0	0	4	0	0	16	7	0	0	0	0	0	0	0	0	166
16:00	0	0	0	0	0	0	0	0	0	0	0	76	5	0	0	0	0	0	0	0	2	33	22	1	1	0	0	2	0	0	34	3	0	0	1	0	0	0	0	0	180
16:15	0	0	0	0	0	0	0	0	0	0	0	80	0	0	1	0	0	0	0	0	1	32	27	0	0	0	0	2	0	0	31	6	0	0	0	0	0	0	0	0	180
16:30	0	0	0	0	0	0	0	0	0	0	0	86	0	0	1	0	0	0	0	0	1	32	27	0	0	0	0	2	0	0	31	4	0	0	0	0	0	1	0	0	185
16:45	0	0	0	0	0	0	0	0	0	0	0	94	2	0	1	0	0	0	0	0	2	37	21	2	0	0	0	1	0	2	37	6	0	0	1	0	0	0	0	0	206
17:00	0	0	0	0	0	0	0	0	0	0	0	98	0	0	0	0	0	0	0	0	0	27	21	0	0	0	0	3	0	0	20	8	0	0	0	0	0	0	0	0	177
17:15	0	0	0	0	0	0	0	0	0	0	0	126	1	0	1	0	0	0	0	0	1	33	16	0	1	1	0	0	0	1	25	4	0	0	1	0	0	0	0	0	211
17:30	0	0	0	0	0	0	0	0	0	0	0	104	6	0	1	0	0	0	0	0	0	41	26	0	0	0	0	1	0	0	19	7	0	1	0	0	0	0	0	0	206
17:45	0	0	0	0	0	0	0	0	0	0	0	9	3	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	12	5	0	0	0	0	0	0	0	0	31
18:00	0	0	0	0	0	0	0	0	0	0	0	99	0	0	2	0	0	0	0	0	0	55	45	1	0	0	0	2	0	0	6	3	0	0	1	0	0	0	0	0	214

Bicycle Count Form

Location: QEW at Lakeshore Rd (East Ramp)
Site ID: 101130000 (--E--)
Count Date: 11/02/2017

Time			APPROACH			
			North	East	South	West
07:00	to	07:15				
07:15	to	07:30				
07:30	to	07:45				
07:45	to	08:00		1	1	
08:00	to	08:15				
08:15	to	08:30				
08:30	to	08:45				
08:45	to	09:00				
09:00	to	09:15		1		
09:15	to	09:30				
09:30	to	09:45				
09:45	to	10:00				
10:00	to	10:15				
10:15	to	10:30				
10:30	to	10:45				
10:45	to	11:00				
11:00	to	11:15				
11:15	to	11:30				
11:30	to	11:45				
11:45	to	12:00				
12:00	to	12:15				
12:15	to	12:30				
12:30	to	12:45			1	
12:45	to	13:00				1
13:00	to	13:15				
13:15	to	13:30				
13:30	to	13:45				
13:45	to	14:00				
14:00	to	14:15				
14:15	to	14:30				
14:30	to	14:45				
14:45	to	15:00				
15:00	to	15:15				
15:15	to	15:30				
15:30	to	15:45				
15:45	to	16:00				
16:00	to	16:15				
16:15	to	16:30				
16:30	to	16:45				
16:45	to	17:00			1	
17:00	to	17:15				
17:15	to	17:30			1	1
17:30	to	17:45				
17:45	to	18:00				1
18:00	to	18:15				
18:15	to	18:30				
18:30	to	18:45				
18:45	to	19:00				

Ministry of Transportation
Ministere des Transports
Ontario

INTERSECTION LAYOUT SHEET

DATE 2017.11.02 DAY Thurs REQUEST # 072 OBSERVER Video

GRETCH CODE (LHRS) 410130000 FILE # TFR #

HWY QEW LOCATION Lakeshore Rd IC-97 RAMPS West

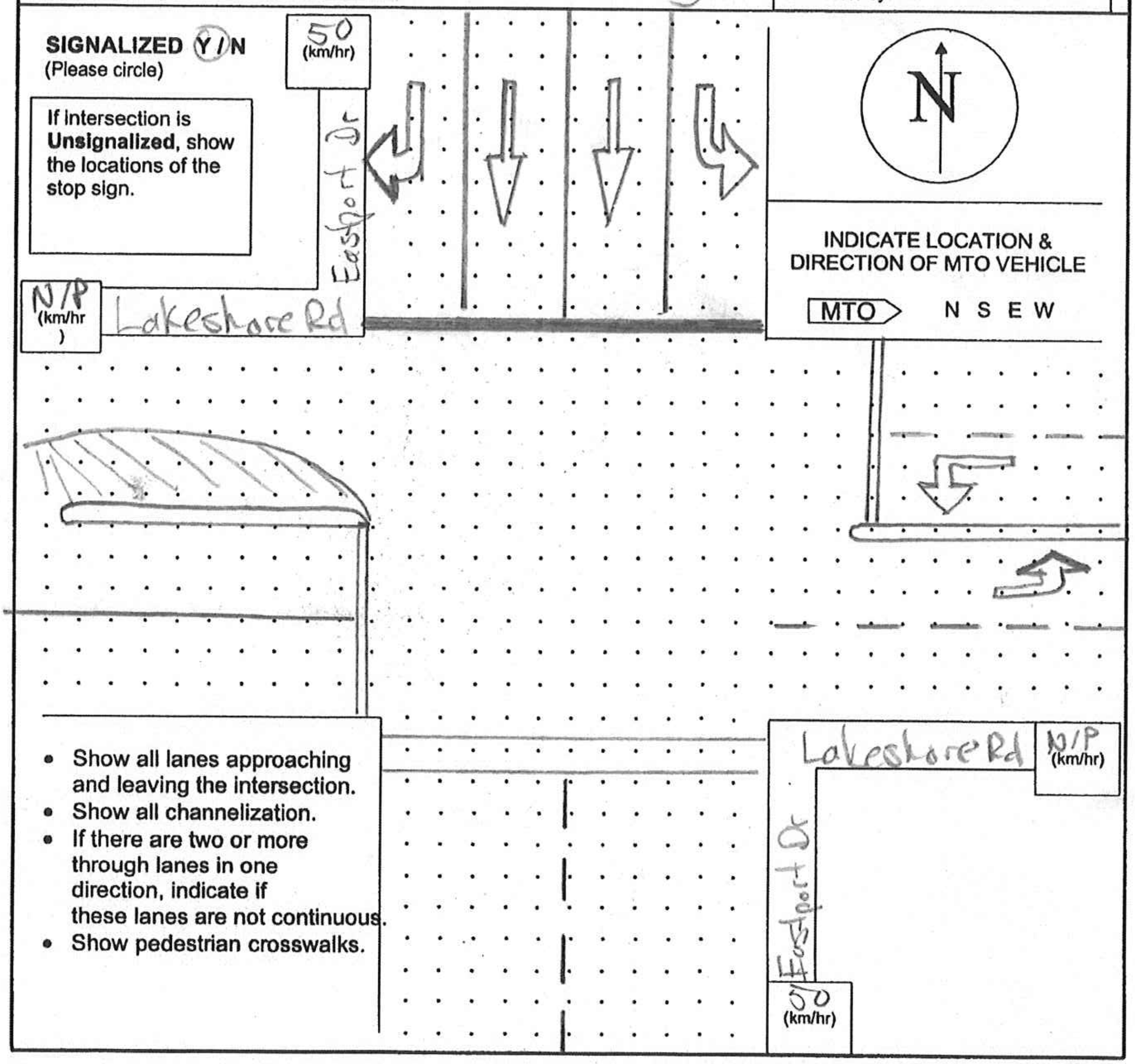
REG/MUN. Burlington TOWN/CITY

COMMENTS

SEGMENT 1 - AM or PM (Please Circle) WEATHER Cloudy

DATASETS:

For office use only:
Edit File:
PM Peak:
Report:
Processed by:



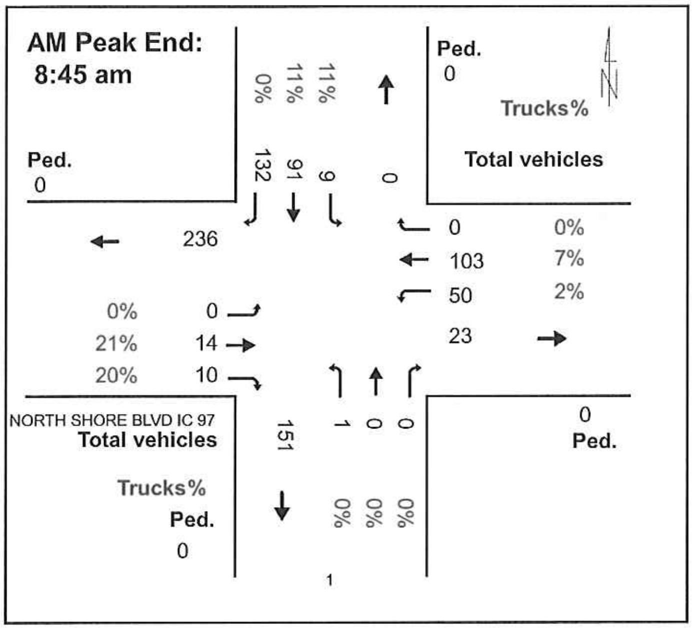
Text File #......................

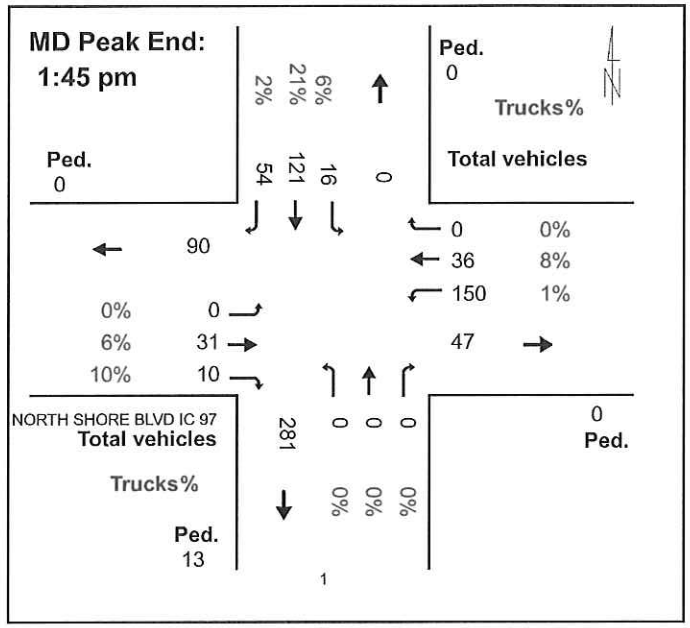
Ontario

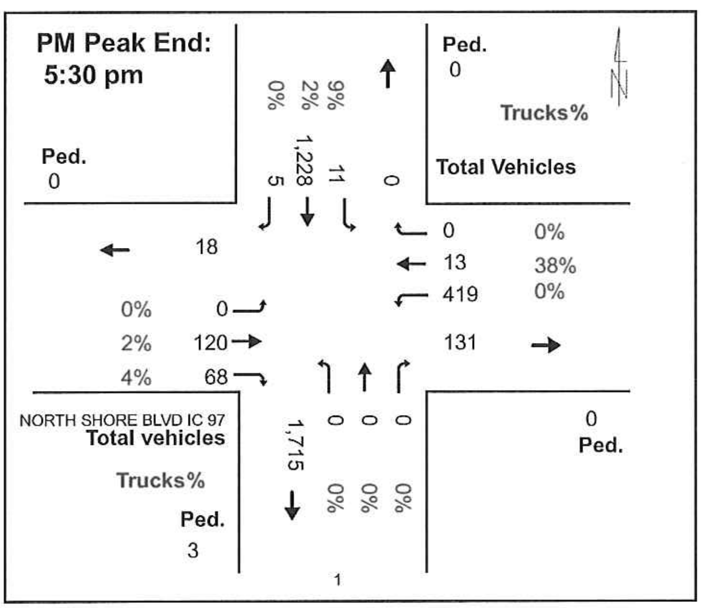
HWY 1 @ NORTH SHORE BLVD IC 97

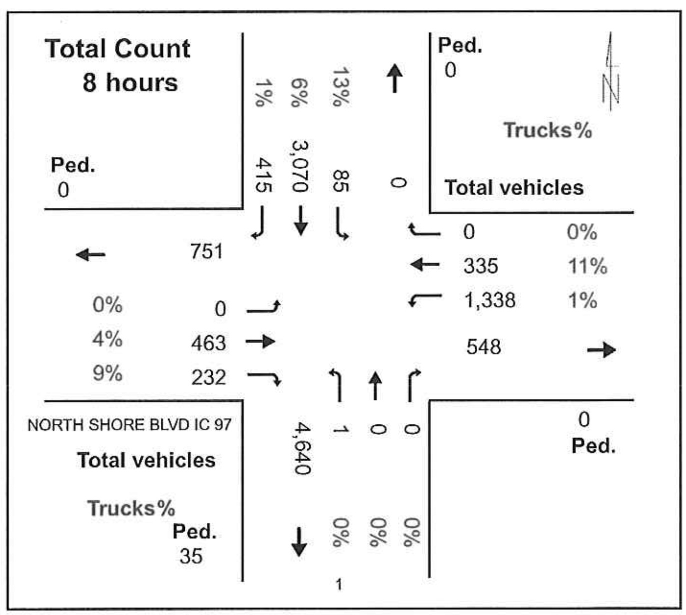
Central

Intersection ID:101130000(--W--) **Count Day:Thursday** **Count Date: 02-Nov-2017**









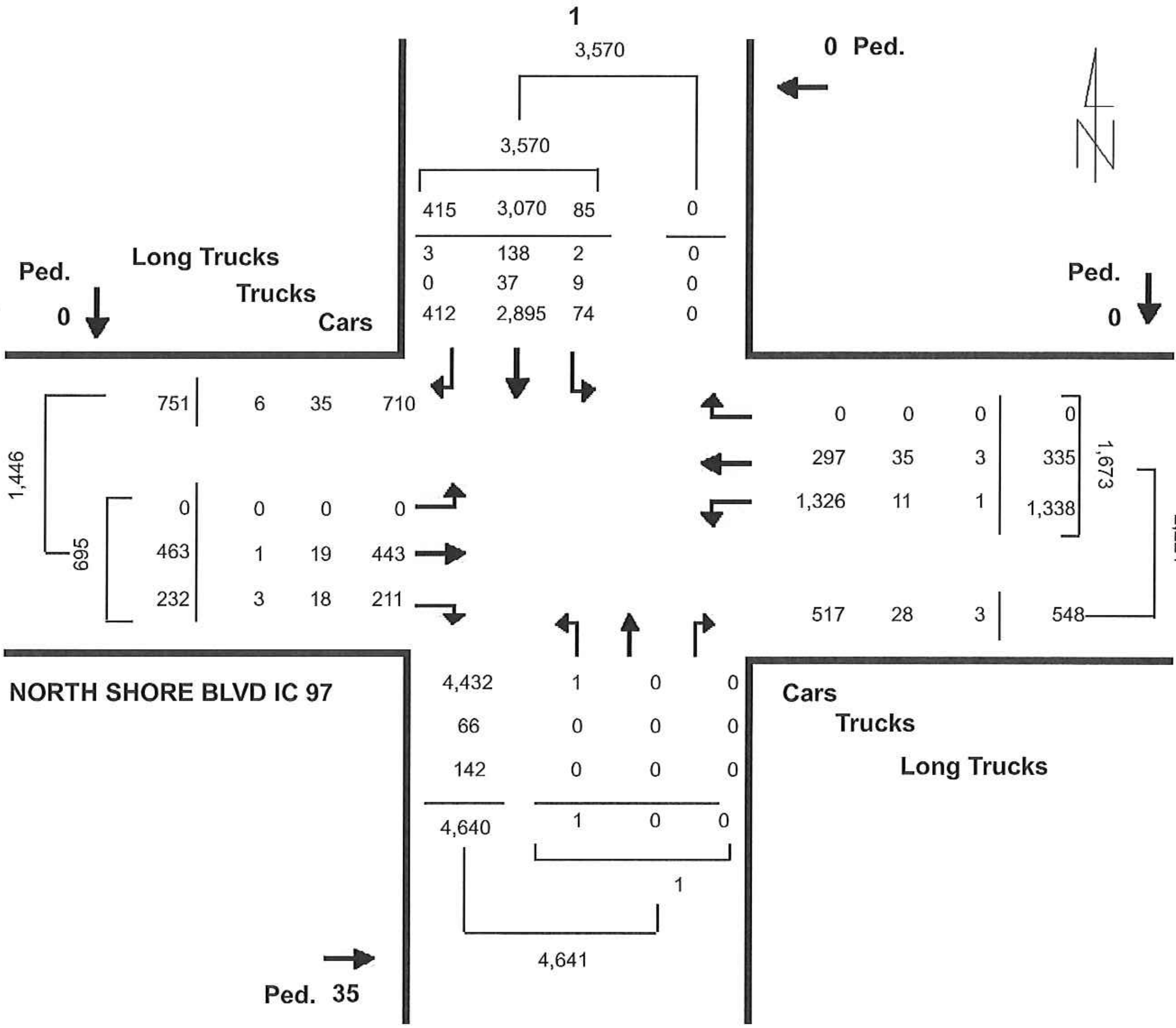
Traffic
Engineering
Software

COUNT TOTAL

HWY 1 @ NORTH SHORE BLVD IC 97

Central

Intersection ID:101130000(--W--) **Date: 02-Nov-2017**



15 MIN REPORT

Intersection ID:101130000(--W--) **HWY 1 @ NORTH SHORE BLVD IC 97** **Municipality: Central** **Date: 02-Nov-2017**

	NORTH APPROACH										EAST APPROACH										SOUTH APPROACH										WEST APPROACH										
Time	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Cars			Trucks			Heavies			Ped	Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Period1																																									
7:15	2	16	17	0	0	0	0	3	0	0	9	13	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	61
7:30	3	15	22	0	0	0	0	1	0	0	13	13	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	69
7:45	0	17	31	1	1	0	0	3	0	0	9	22	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	89
8:00	0	17	40	0	1	0	0	3	0	0	11	29	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	0	0	0	108
8:15	2	24	32	1	1	0	0	0	0	0	12	28	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	6	0	0	1	0	0	0	0	112
8:30	4	20	31	0	0	0	0	2	0	0	13	6	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	80
8:45	2	20	29	0	1	0	0	2	0	0	13	33	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	2	0	0	0	0	0	110
9:00	1	18	27	1	2	0	0	5	0	0	20	19	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	1	1	0	0	0	0	102
9:15	0	10	35	0	0	0	0	2	0	0	12	21	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	0	2	0	0	0	0	93
9:30	2	18	17	0	2	0	0	3	0	0	12	10	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	0	0	0	0	70
9:45	0	9	17	0	0	0	0	8	0	0	16	14	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	1	1	0	0	0	0	74
10:00	2	21	10	0	1	0	1	11	0	0	8	8	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	1	2	0	0	0	0	73
Period2																																									
12:15	3	26	5	0	1	0	0	1	1	0	28	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	28	8	0	0	1	0	0	0	0	108
12:30	0	23	12	1	0	0	0	5	0	0	33	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	24	2	0	1	0	0	0	0	0	114
12:45	1	22	13	1	1	0	0	8	0	0	20	8	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	11	1	0	1	1	0	0	0	0	97
13:00	3	26	17	0	0	0	1	9	1	0	26	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	6	6	0	0	0	0	0	0	0	119
13:15	3	26	16	0	2	0	0	4	0	0	36	9	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	101
13:30	2	18	13	0	2	0	0	5	0	0	49	7	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	2	0	1	0	0	0	0	0	108
13:45	7	25	7	0	1	0	0	3	0	0	37	6	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	12	1	0	1	1	0	0	0	0	103
14:00	9	16	7	0	0	0	0	3	0	0	11	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3	0	0	0	0	0	1	0	66
Period3																																									
15:15	3	43	3	0	0	0	0	1	0	0	43	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	10	0	1	1	0	0	0	0	125
15:30	0	68	1	0	1	0	0	7	1	0	61	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	9	0	1	0	0	0	0	0	177
15:45	3	110	1	0	2	0	0	3	0	0	73	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	16	0	0	1	0	0	0	0	234
16:00	1	220	2	3	3	0	0	9	0	0	72	3	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	20	0	1	0	0	0	1	0	374
16:15	1	203	0	0	1	0	0	5	0	0	85	3	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46	29	0	1	1	0	0	0	0	377
16:30	1	283	1	0	3	0	0	4	0	0	78	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	18	0	0	0	0	1	0	0	425
16:45	1	296	0	0	3	0	0	4	0	0	94	1	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	42	17	0	1	1	0	0	0	0	465
17:00	2	289	1	0	1	0	0	6	0	0	102	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	20	0	0	0	0	0	1	0	451
17:15	2	313	3	0	4	0	0	3	0	0	118	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	25	18	0	1	0	0	0	0	0	492
17:30	5	308	1	1	0	0	0	1	0	0	104	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	10	0	0	1	0	0	0	0	459
17:45	4	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	1	0	0	0	0	0	0	0	18
18:00	5	375	1	0	3	0	0	14	0	0	107	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	4	0	1	1	0	0	0	0	520

Bicycle Count Form

Location: QEW at Lakeshore Rd (West Ramp)
Site ID: 101130000 (--W--)
Count Date: 11/02/2017

Time			APPROACH			
			North	East	South	West
07:00	to	07:15				
07:15	to	07:30				
07:30	to	07:45				
07:45	to	08:00		1		
08:00	to	08:15				
08:15	to	08:30				
08:30	to	08:45				
08:45	to	09:00				
09:00	to	09:15		1		
09:15	to	09:30				
09:30	to	09:45				
09:45	to	10:00				
10:00	to	10:15				
10:15	to	10:30				
10:30	to	10:45				
10:45	to	11:00				
11:00	to	11:15				
11:15	to	11:30				
11:30	to	11:45				
11:45	to	12:00				
12:00	to	12:15				
12:15	to	12:30				
12:30	to	12:45				
12:45	to	13:00				
13:00	to	13:15		1		
13:15	to	13:30				
13:30	to	13:45				
13:45	to	14:00				
14:00	to	14:15				
14:15	to	14:30				
14:30	to	14:45				
14:45	to	15:00				
15:00	to	15:15				
15:15	to	15:30				
15:30	to	15:45				
15:45	to	16:00				
16:00	to	16:15				
16:15	to	16:30				1
16:30	to	16:45				
16:45	to	17:00				1
17:00	to	17:15				
17:15	to	17:30				
17:30	to	17:45				
17:45	to	18:00				1
18:00	to	18:15				
18:15	to	18:30				
18:30	to	18:45				
18:45	to	19:00				

ACTUATED INTERVAL TIMING AND FAZE FUNCTIONS

		PHASE 1	2	3	4	5	6	7	8
0	WALK	-		-		-		-	
1	DON'T WALK	-		-		-		-	
2	MIN INITIAL	7	20				20		7
3	TYPE 3 LIMIT	-		-		-		-	
4	ADD PER VEH	-		-		-		-	
5	VEH EXT	3.0	4.0				4.0		3.0
6	MAX GAP	3.0	4.0				4.0		3.0
7	MIN GAP	3.0	4.0				4.0		3.0
8	MAX LIMIT	120	45				45		13
9	MAXIMUM 2	-		-		-		-	
A	ADV /DLY WALK	-		-		-		-	
B	SEQUENCE TO	8	-		-		-		-
C	COND SRV MIN	-		-		-		-	
D	REDUCE EVERY	-		-		-		-	
E	YELLOW	3.0	5.9				5.9		4.1
F	RED CLEAR		2.0				2.0		2.4

PHASE BANK # 1 < C + O + F = 1 >

		9 (MAX INT)	A (ALT WALK)	B (ALT FLH D/W)	C (ALT INT)	D (ALT EXT)		E
0							RR1 DLY	
1	PHASE 1	-					RR1 CLR	
2	PHASE 2	-					EVA DLY	
3	PHASE 3	-					EVA CLR	
4	PHASE 4	-					EVB DLY	
5	PHASE 5	-					EVB CLR	
6	PHASE 6	-					EVC DLY	
7	PHASE 7	-					EVC CLR	
8	PHASE 8	-					EVD DLY	
							EVD CLR	
							RR2 DLY	
							RR2 CLR	
							EV CLR	
							EV DLY	
							RR CLR	
							RR DLY	

ALL RED START (F/1 + C +O) = **5.0**

RED REVERT (F/1 + O + F) = **5.0**

COLUMN F PHASES

		1	2	3	4	5	6	7	8
0	PERMIT	X	X				X		X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL		X				X		
4	PED RECALL								
5	PEDESTRIANS	View Only							
6	YIELD AT FLSH D/W								
7	RED REST								
8	DOUBLE ENTRY		X				X		
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	COND SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X				X		
F	FIRST PHASES								X

< C + O + F = 1 >

BI Tran Systems, Inc.
510 Bercut Dr., Sacremento, Calif. 95814
916/441-0260
Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

Date: 11-Apr-18

LOCATION

Hwy: Eastport Dr

At: QEW ramps

		A	B	C
PREEMPT		RR1-2	SP	EMER
MINIMUMS		SPEV1	EV2	VEH
A	WLK (DFLT)			4
B	FD WALK			5
C	INITAL			7

< C + O + F = 1 >

Column E Phases / Bits

		1	2	3	4	5	6	7	8
0	EXCLUSIVE								
1	RR1 CLEAR								
2	RR2 CLEAR								
3	RR2 LTD SRV								
4	PROT/PERM	X							
5	FLH TO PREMT								
6	FLASH ENTRY								
7	DISABL MIN YEL								
8	DISABL OVP YEL								
9	OVP FLH YEL								
A	EM VEH A								
B	EM VEH B								
C	EM VEH C								
D	EM VEH D								
E	EXTRA 1	X		X		X			
F	IC SELECT		X						

Column F Phases / Bits

		1	2	3	4	5	6	7	8
0									
1	EXT PERMIT 1								
2	EXT PERMIT 2								
3	EXCLU PED								
4									
5	PED 2P OUT								
6	PED 6P OUT								
7	PED 4P OUT								
8	PED 8P OUT								
9	FLH YELLOW								
A									
B									
C									
D									
E	RESTRICTED								
F	EXTRA 2								

< C + O + E = 125 >

Column F Phases / Bits

		1	2	3	4	5	6	7	8
0	ADV GRN FLH								
1	PHASE FLASH								
2	FLASH WALK								
3	GUAR PASS								
4	SIMUL GAP		X				X		
5	SEQ TIMING								
6	ADV WALK								
7	DELAY WALK								
8	EXT RECALL								
9									
A	MAX EXTEN								
B	INH PED RSRV								
C	SEMI ACTUATED								
D									
E	STRT VEH CALL	X	X				X		X
F	STRT PED CALL								

SPECIALS < C + O + F = 2 >

MANUAL PLAN **< C/0 + A + 1 >**	14
MANUAL OFFSET **< C/0 + B + 1 >**	0

MANUAL SELECTION

MANUAL PLAN

0 = Automatic (Master)
9 = Control Plan 1 - 9
14 (E) = Free (Isolated)
15 (F) = Software Flash

MANUAL OFFSET

0 = Automatic (Master)
1 = Offset A
2 = Offset B
3 = Offset C

FLASH TO PREEMPT

1 = EVA	5 = RR1
2 = EVB	6 = RR2
3 = EVC	7 = SE1
4 = EVD	8 = SE2

EXTRA 1

1 = TBC TYPE 1	5 = EXPANDED STATUS REPORTING
2 = NEMA EXT. COORD.	6 = INTERNATIONAL PED
3 = DAYLIGHT SAVINGS	7 = CLEAR OUTPUTS DURING FLASH
4 =	8 = SPLIT RING

EXTRA 2

1 = AWR ON DURING PHASE INITAL
2 = LMU INSTALLED

IC SELECT

2 = 2 WAY MODEM	5 = SIMPLEX MASTER
3 = 7 WIRE SLAVE	7 = 7 WIRE MASTER
4 = FLASH / FREE	8 = OFFSET INTURP

Pretimed

	PHASE							
	1	2	3	4	5	6	7	8
WALK	-		-		-		-	
DON'T WALK	-		-		-		-	
MIN INTIAL	7	60				60		7
TYPE 3 LIMIT	-		-		-		-	
ADD PER VEH	-		-		-		-	
VEH EXT	3.0	4.0				4.0		3.0
MAX GAP	3.0	4.0				4.0		3.0
MIN GAP	3.0	4.0				4.0		3.0
MAX LIMIT	15	45				45		13
MAXIMUM 2	-		-		-		-	
ADV / DLY WALK	-		-		-		-	
SEQUENCE TO	8	-		-		-		-
COND SRV MIN	-		-		-		-	
REDUCE EVERY	-		-		-		-	
YELLOW	3.0	5.9				5.9		4.1
RED CLEAR		2.0				2.0		2.4

PHASE BANK # < C + O + F = 1 >

Column F

	PHASES								
		1	2	3	4	5	6	7	8
0	PERMIT	X	X				X		X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL	X	X				X		X
4	PED RECALL								
5	PEDESTRIANS								
6	REST IN WALK								
7	RED REST								
8	DOUBLE ENTRY		X				X		
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	CORD SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X				X		
F	FIRST PHASES								X

< C + O + F = 1 >

LOCATION: EASTPORT DRIVE & QEW N/S-S / S-N/S RAMPS

Issued Date: 11-Apr-18

Installed Date:

BI Tran Systems, Inc.
510 Bercut Dr., Sacremento, Calif. 95814
916/441-0260
Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

Time of Day

Actuated

T.O.D FUNCTIONS

	TIME HH MM	FUN	DAY OF WEEK S 1	M 2	T 3	W 4	T 5	F 6	S 7
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
A									
B									
C									
D									
E									
F									

< C + O + 7 = 1 >

Column 4 PHASE / BITS

1	2	3	4	5	6	7	8

< C + O + E = 27 >

T.O.D FUNCTIONS

A = VEH SOFT RECALL
B = MAXIMUM 2
C = CONDITIONAL SERVICE
D = LAG PHASES
E= BIT 1- LOCAL OVERIDE
BIT 4- DISABLE DET OFF MONITOR
BIT 7- DET COUNT MONITOR
BIT 8- REAL TIME SPLIT MONITOR
F = OUTPUT BITS 1 THRU 4

0 = PERMIT PHASES
1 = RED LOCK
2 = YELLOW LOCK
3 = VEH MIN RECALL
4 = PED RECALL
5 -
6 - REST IN WALK
7 = RED REST
8 = DOUBLE ENTRY
9 = VEH MAX RECALL

LOCATION: EASTPORT DRIVE & QEW N/S-S / S-N/S RAMPS

Issued Date: 11-Apr-18

Installed Date:

Pretimed

T.O.D FUNCTIONS

	TIME HH MM	FUN	DAY OF WEEK S 1	M 2	T 3	W 4	T 5	F 6	S 7
0	15:00	9		X	X	X	X	X	
1	19:00	9		X	X	X	X	X	
2									
3									
4									
5									
6									
7									
8									
9									
A									
B									
C									
D									
E									
F									

< C + O + 7 = 1 >

Column 4 PHASE / BITS

1	2	3	4	5	6	7	8
X							

< C + O + E = 27 >

T.O.D FUNCTIONS

A = VEH SOFT RECALL
B = MAXIMUM 2
C = CONDITIONAL SERVICE
D = LAG PHASES
E = BIT 1- LOCAL OVERIDE
BIT 4- DISABLE DET OFF MONITOR
BIT 7- DET COUNT MONITOR
BIT 8- REAL TIME SPLIT MONITOR
F = OUTPUT BITS 1 THRU 4

0 = PERMIT PHASES
1 = RED LOCK
2 = YELLOW LOCK
3 = VEH MIN RECALL
4 = PED RECALL
5 -
6 - REST IN WALK
7 = RED REST
8 = DOUBLE ENTRY
9 = VEH MAX RECALL

LOCATION: ꞅT DRIVE & QEW N/S-S / S-N/

Issued Date: 11-Apr-18

Installed Date:

BI Tran Systems, Inc.
510 Bercut Dr., Sacramento, Calif. 95814
916/441-0260
Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

ACTUATED INTERVAL TIMING AND FAZE FUNCTIONS

BI Tran Systems, Inc.
510 Bercut Dr., Sacremento, Calif. 95814
916/441-0260
Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

Date: 23-Jul-18

LOCATION
Hwy: EASTPORT SB
At: LAKESHORE

	PHASE	1	2	3	4	5	6	7	8
0	WALK	-		-	10	-		-	10
1	DON'T WALK	-		-	20	-		-	20
2	MIN INITIAL		20		10			5	10
3	TYPE 3 LIMIT	-		-		-		-	
4	ADD PER VEH	-	1.0	-		-		-	
5	VEH EXT		5.6		3.5			3.5	3.5
6	MAX GAP		5.6		3.5			3.5	3.5
7	MIN GAP		5.6		3.5			3.5	3.5
8	MAX LIMIT		120		30			9	30
9	MAXIMUM 2	-	120	-	30	-		9	30
A	ADV /DLY WALK	-		-		-		-	
B	SEQUENCE TO		-		-		-	2	-
C	COND SRV MIN	-		-		-		-	
D	REDUCE EVERY	-		-		-		-	
E	YELLOW		4.5		4.1			3.0	4.1
F	RED CLEAR		1.9		2.2				2.2

PHASE BANK # 1 < C + O + F = 1 >

		9	A	B	C	D		E
0							RR1 DLY	
1	PHASE 1	-					RR1 CLR	
2	PHASE 2	32					EVA DLY	
3	PHASE 3	-					EVA CLR	
4	PHASE 4	-					EVB DLY	
5	PHASE 5	-					EVB CLR	
6	PHASE 6	-					EVC DLY	
7	PHASE 7	-					EVC CLR	
8	PHASE 8	-					EVD DLY	
		MAX INT	ALT WALK	ALT FLH D/W	ALT INT	ALT EXT	EVD CLR	
							RR2 DLY	
							RR2 CLR	
							EV CLR	
							EV DLY	
							RR CLR	
							RR DLY	

ALL RED START
(F/1 + C +O) = 5.0
RED REVERT
(F/1 + O + F) = 5.0

COLUMN F PHASES

		1	2	3	4	5	6	7	8
0	PERMIT		X		X			X	X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL		X						
4	PED RECALL								
5	PEDESTRIANS	View Only							
6	YIELD AT FLSH D/W								
7	RED REST								
8	DOUBLE ENTRY				X				X
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	COND SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X						
F	FIRST PHASES				X			X	

< C + O + F = 1 >

		A	B	C
PREEMPT		RR1-2	SP	EMER
MINIMUMS		SPEV1	EV2	VEH
A	WLK (DFLT)			4
B	FD WALK			5
C	INITAL			7

< C + O + F = 1 >

Column E Phases / Bits

		1	2	3	4	5	6	7	8
0	EXCLUSIVE								
1	RR1 CLEAR								
2	RR2 CLEAR								
3	RR2 LTD SRV								
4	PROT/PERM							X	
5	FLH TO PREMT								
6	FLASH ENTRY								
7	DISABL MIN YEL								
8	DISABL OVP YEL								
9	OVP FLH YEL								
A	EM VEH A								
B	EM VEH B								
C	EM VEH C								
D	EM VEH D								
E	EXTRA 1	X		X		X			
F	IC SELECT		X						

Column F Phases / Bits

		1	2	3	4	5	6	7	8
0									
1	EXT PERMIT 1								
2	EXT PERMIT 2								
3	EXCLU PED								
4									
5	PED 2P OUT								
6	PED 6P OUT								
7	PED 4P OUT								X
8	PED 8P OUT								X
9	FLH YELLOW								
A									
B									
C									
D									
E	RESTRICTED								
F	EXTRA 2								

< C + O + E = 125 >

Column F Phases / Bits

		1	2	3	4	5	6	7	8
0	ADV GRN FLH								
1	PHASE FLASH								
2	FLASH WALK								
3	GUAR PASS								
4	SIMUL GAP				X				X
5	SEQ TIMING								
6	ADV WALK								
7	DELAY WALK								
8	EXT RECALL								
9									
A	MAX EXTEN								
B	INH PED RSRV								
C	SEMI ACTUATED								
D									
E	STRT VEH CALL		X		X			X	X
F	STRT PED CALL				X				X

SPECIALS < C + O + F = 2 >

MANUAL PLAN **< C/0 + A + 1 >**	14
MANUAL OFFSET **< C/0 + B + 1 >**	0

MANUAL SELECTION

MANUAL PLAN
0 = Automatic (Master)
9 = Control Plan 1 - 9
14 (E) = Free (Isolated)
15 (F) = Software Flash

MANUAL OFFSET
0 = Automatic (Master)
1 = Offset A
2 = Offset B
3 = Offset C

FLASH TO PREEMPT
1 = EVA
2 = EVB
3 = EVC
4 = EVD
5 = RR1
6 = RR2
7 = SE1
8 = SE2

EXTRA 1
1 = TBC TYPE 1
2 = NEMA EXT. COORD.
3 = DAYLIGHT SAVINGS
4 =
5 = EXPANDED STATUS REPORTING
6 = INTERNATIONAL PED
7 = CLEAR OUTPUTS DURING FLASH
8 = SPLIT RING

EXTRA 2
1 = AWR ON DURING PHASE INITAL
2 = LMU INSTALLED

IC SELECT
2 = 2 WAY MODEM
3 = 7 WIRE SLAVE
4 = FLASH / FREE
5 = SIMPLEX MASTER
7 = 7 WIRE MASTER
8 = OFFSET INTURP

Pretimed

	PHASE							
	1	2	3	4	5	6	7	8
WALK	-		-	10	-		-	10
DON'T WALK	-		-	20	-		-	20
MIN INTIAL		60		25			5	25
TYPE 3 LIMIT	-		-		-		-	
ADD PER VEH	-	1	-		-		-	
VEH EXT		5.6		3.5			3.5	3.5
MAX GAP		5.6		3.5			3.5	3.5
MIN GAP		5.6		3.5			3.5	3.5
MAX LIMIT		70		30			9	30
MAXIMUM 2	-	120	-	30	-		9	30
ADV / DLY WALK	-		-		-		-	
SEQUENCE TO		-		-		-	2	-
COND SRV MIN	-		-		-		-	
REDUCE EVERY	-		-		-		-	
YELLOW		4.5		4.1			3.0	4.1
RED CLEAR		1.9		2.2				2.2

PHASE BANK # < C + O + F = 1 >

Column F

	PHASES								
		1	2	3	4	5	6	7	8
0	PERMIT		X		X			X	X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL		X		X			X	X
4	PED RECALL								
5	PEDESTRIANS								
6	REST IN WALK								
7	RED REST								
8	DOUBLE ENTRY				X				X
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	CORD SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X						
F	FIRST PHASES				X			X	

< C + O + F = 1 >

LOCATION: EASTPORT DRIVE NB & LAKESHORE ROAD

Issued Date: 23-Jul-18

Installed Date:

BI Tran Systems, Inc.
510 Bercut Dr., Sacremento, Calif. 95814
916/441-0260
Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

Time of Day

Actuated

T.O.D FUNCTIONS

	TIME HH MM	FUN	DAY OF WEEK S 1	M 2	T 3	W 4	T 5	F 6	S 7
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
A									
B									
C									
D									
E									
F									

< C + O + 7 = 1 >

Column 4 PHASE / BITS

1	2	3	4	5	6	7	8

< C + O + E = 27 >

T.O.D FUNCTIONS

A = VEH SOFT RECALL
B = MAXIMUM 2
C = CONDITIONAL SERVICE
D = LAG PHASES
E= BIT 1- LOCAL OVERIDE
BIT 4- DISABLE DET OFF MONITOR
BIT 7- DET COUNT MONITOR
BIT 8- REAL TIME SPLIT MONITOR
F = OUTPUT BITS 1 THRU 4

0 = PERMIT PHASES
1 = RED LOCK
2 = YELLOW LOCK
3 = VEH MIN RECALL
4 = PED RECALL
5 -
6 - REST IN WALK
7 = RED REST
8 = DOUBLE ENTRY
9 = VEH MAX RECALL

LOCATION: EASTPORT DRIVE NB & LAKESHORE ROAD

Issued Date: 23-Jul-18

Installed Date:

Pretimed

T.O.D FUNCTIONS

	TIME HH MM	FUN	DAY OF WEEK S 1	M 2	T 3	W 4	T 5	F 6	S 7
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
A									
B									
C									
D									
E									
F									

< C + O + 7 = 1 >

Column 4 PHASE / BITS

1	2	3	4	5	6	7	8

< C + O + E = 27 >

T.O.D FUNCTIONS

A = VEH SOFT RECALL
B = MAXIMUM 2
C = CONDITIONAL SERVICE
D = LAG PHASES
E = BIT 1- LOCAL OVERIDE
BIT 4- DISABLE DET OFF MONITOR
BIT 7- DET COUNT MONITOR
BIT 8- REAL TIME SPLIT MONITOR
F = OUTPUT BITS 1 THRU 4

0 = PERMIT PHASES
1 = RED LOCK
2 = YELLOW LOCK
3 = VEH MIN RECALL
4 = PED RECALL
5 -
6 - REST IN WALK
7 = RED REST
8 = DOUBLE ENTRY
9 = VEH MAX RECALL

LOCATION: ɔRT DRIVE NB & LAKESHOR

Issued Date: 23-Jul-18

Installed Date:

BI Tran Systems, Inc.
510 Bercut Dr., Sacremento, Calif. 95814
916/441-0260

Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

ACTUATED INTERVAL TIMING AND FAZE FUNCTIONS

		PHASE 1	2	3	4	5	6	7	8
0	WALK	-		-		-		-	7
1	DON'T WALK	-		-		-		-	9
2	MIN INITIAL		20		7			7	7
3	TYPE 3 LIMIT	-		-		-		-	
4	ADD PER VEH	-	1.0	-		-		-	
5	VEH EXT		4.0		3.5			3.5	3.5
6	MAX GAP		4.0		3.5			3.5	3.5
7	MIN GAP		4.0		3.5			3.5	3.5
8	MAX LIMIT		120		15			30	15
9	MAXIMUM 2	-	120	-	15	-		30	15
A	ADV /DLY WALK	-		-		-		-	
B	SEQUENCE TO		-		-		-	2	-
C	COND SRV MIN	-		-		-		-	
D	REDUCE EVERY	-		-		-		-	
E	YELLOW		5.9		4.1			3.0	4.1
F	RED CLEAR		1.5		2.2				2.2

PHASE BANK # 1 < C + O + F = 1 >

		9	A	B	C	D		E
0							RR1 DLY	
1	PHASE 1	-					RR1 CLR	
2	PHASE 2	32					EVA DLY	
3	PHASE 3	-					EVA CLR	
4	PHASE 4	-					EVB DLY	
5	PHASE 5	-					EVB CLR	
6	PHASE 6	-					EVC DLY	
7	PHASE 7	-					EVC CLR	
8	PHASE 8	-					EVD DLY	
		MAX INT	ALT WALK	ALT FLH D/W	ALT INT	ALT EXT	EVD CLR	
							RR2 DLY	
							RR2 CLR	
							EV CLR	
							EV DLY	
							RR CLR	
							RR DLY	

ALL RED START
(F/1 + C +O) = 5.0

RED REVERT
(F/1 + O + F) = 5.0

	COLUMN F PHASES	1	2	3	4	5	6	7	8
0	PERMIT		X		X			X	X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL		X						
4	PED RECALL								
5	PEDESTRIANS	View Only							
6	YIELD AT FLSH D/W								
7	RED REST								
8	DOUBLE ENTRY				X				X
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	COND SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X						
F	FIRST PHASES				X			X	

< C + O + F = 1 >

BI Tran Systems, Inc.
510 Bercut Dr., Sacremento, Calif. 95814
916/441-0260
Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

Date: 23-Jul-18

LOCATION

Hwy: EASTPORT SB

At: LAKESHORE

		A	B	C
PREEMPT		RR1-2	SP	EMER
MINIMUMS		SPEV1	EV2	VEH
A	WLK (DFLT)			4
B	FD WALK			5
C	INITAL			7

< C + O + F = 1 >

	Column E Phases / Bits	1	2	3	4	5	6	7	8
0	EXCLUSIVE								
1	RR1 CLEAR								
2	RR2 CLEAR								
3	RR2 LTD SRV								
4	PROT/PERM							X	
5	FLH TO PREMT								
6	FLASH ENTRY								
7	DISABL MIN YEL								
8	DISABL OVP YEL								
9	OVP FLH YEL								
A	EM VEH A								
B	EM VEH B								
C	EM VEH C								
D	EM VEH D								
E	EXTRA 1	X		X		X			
F	IC SELECT		X						

	Column F Phases / Bits	1	2	3	4	5	6	7	8
0									
1	EXT PERMIT 1								
2	EXT PERMIT 2								
3	EXCLU PED								
4									
5	PED 2P OUT								
6	PED 6P OUT								
7	PED 4P OUT								
8	PED 8P OUT								X
9	FLH YELLOW								
A									
B									
C									
D									
E	RESTRICTED								
F	EXTRA 2								

< C + O + E = 125 >

	Column F Phases / Bits	1	2	3	4	5	6	7	8
0	ADV GRN FLH								
1	PHASE FLASH								
2	FLASH WALK								
3	GUAR PASS								
4	SIMUL GAP				X				X
5	SEQ TIMING								
6	ADV WALK								
7	DELAY WALK								
8	EXT RECALL								
9									
A	MAX EXTEN								
B	INH PED RSRV								
C	SEMI ACTUATED								
D									
E	STRT VEH CALL		X		X			X	X
F	STRT PED CALL								X

SPECIALS < C + O + F = 2 >

MANUAL PLAN < C/0 + A + 1 >	14
MANUAL OFFSET < C/0 + B + 1 >	0

MANUAL SELECTION

MANUAL PLAN
0 = Automatic (Master)
9 = Control Plan 1 - 9
14 (E) = Free (Isolated)
15 (F) = Software Flash

MANUAL OFFSET
0 = Automatic (Master)
1 = Offset A
2 = Offset B
3 = Offset C

FLASH TO PREEMPT

1 = EVA	5 = RR1
2 = EVB	6 = RR2
3 = EVC	7 = SE1
4 = EVD	8 = SE2

EXTRA 1

1 = TBC TYPE 1	5 = EXPANDED STATUS REPORTING
2 = NEMA EXT. COORD.	6 = INTERNATIONAL PED
3 = DAYLIGHT SAVINGS	7 = CLEAR OUTPUTS DURING FLASH
4 =	8 = SPLIT RING

EXTRA 2

1 = AWR ON DURING PHASE INITAL
2 = LMU INSTALLED

IC SELECT

2 = 2 WAY MODEM	5 = SIMPLEX MASTER
3 = 7 WIRE SLAVE	7 = 7 WIRE MASTER
4 = FLASH / FREE	8 = OFFSET INTURP

Pretimed

PHASE

	1	2	3	4	5	6	7	8
WALK	-		-		-		-	7
DON'T WALK	-		-		-		-	9
MIN INTIAL		60		20			7	20
TYPE 3 LIMIT	-		-		-		-	
ADD PER VEH	-	1	-		-		-	
VEH EXT		4.0		3.5			3.5	3.5
MAX GAP		4.0		3.5			3.5	3.5
MIN GAP		4.0		3.5			3.5	3.5
MAX LIMIT		60		22			10	22
MAXIMUM 2	-	120	-	15	-		30	15
ADV / DLY WALK	-		-		-		-	
SEQUENCE TO		-		-		-	2	-
COND SRV MIN	-		-		-		-	
REDUCE EVERY	-		-		-		-	
YELLOW		5.9		4.1			3.0	4.1
RED CLEAR		1.5		2.2				2.2

PHASE BANK # < C + O + F = 1 >

Column F

PHASES

		1	2	3	4	5	6	7	8
0	PERMIT		X		X			X	X
1	RED LOCK								
2	YELLOW LOCK								
3	VEH MIN CALL		X		X			X	X
4	PED RECALL								
5	PEDESTRIANS								
6	REST IN WALK								
7	RED REST								
8	DOUBLE ENTRY				X				X
9	VEH MAX CALL								
A	SOFT RECALL								
B	MAXIMUM 2								
C	CORD SERVICE								
D	MAN CONT CALL								
E	YELLOW START		X						
F	FIRST PHASES				X			X	

< C + O + F = 1 >

LOCATION: EASTPORT DRIVE (SB) & LAKESHORE RD (CCIW)

Issued Date: 23-Jul-18

Installed Date:

BI Tran Systems, Inc.
510 Bercut Dr., Sacramento, Calif. 95814
916/441-0260
Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

Time of Day

Actuated

T.O.D FUNCTIONS

	TIME		DAY OF WEEK						
			S	M	T	W	T	F	S
	HH MM	FUN	1	2	3	4	5	6	7
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
A									
B									
C									
D									
E									
F									

< C + O + 7 = 1 >

Column 4
PHASE / BITS

1	2	3	4	5	6	7	8

< C + O + E = 27 >

T.O.D FUNCTIONS

A = VEH SOFT RECALL
B = MAXIMUM 2
C = CONDITIONAL SERVICE
D = LAG PHASES
E= BIT 1- LOCAL OVERIDE
BIT 4- DISABLE DET OFF MONITOR
BIT 7- DET COUNT MONITOR
BIT 8- REAL TIME SPLIT MONITOR
F = OUTPUT BITS 1 THRU 4

0 = PERMIT PHASES
1 = RED LOCK
2 = YELLOW LOCK
3 = VEH MIN RECALL
4 = PED RECALL
5 -
6 - REST IN WALK
7 = RED REST
8 = DOUBLE ENTRY
9 = VEH MAX RECALL

LOCATION: EASTPORT DRIVE (SB) & LAKESHORE RD (CCIW)

Issued Date: 23-Jul-18

Installed Date:

Pretimed

T.O.D FUNCTIONS

	TIME		DAY OF WEEK						
			S	M	T	W	T	F	S
	HH MM	FUN	1	2	3	4	5	6	7
0									
1									
2									
3									
4									
5									
6									
7									
8									
9									
A									
B									
C									
D									
E									
F									

< C + O + 7 = 1 >

Column 4
PHASE / BITS

1	2	3	4	5	6	7	8

< C + O + E = 27 >

T.O.D FUNCTIONS

A = VEH SOFT RECALL
B = MAXIMUM 2
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3 = VEH MIN RECALL
4 = PED RECALL
5 -
6 - REST IN WALK
7 = RED REST
8 = DOUBLE ENTRY
9 = VEH MAX RECALL

LOCATION: T DRIVE (SB) & LAKESHORE

Issued Date: 23-Jul-18

Installed Date:

BI Tran Systems, Inc.
510 Bercut Dr., Sacremento, Calif. 95814
916/441-0260
Traffic Signal Program 233 Ontario
Timing Sheet #2
Revised (02/95)

Yan, Yiwei

From: Dave Thomson (J) <Dave.Thomson@pwgsc-tpsgc.gc.ca>
Sent: Wednesday, October 28, 2020 8:11 AM
To: Laaber, Christine; Ranya El Sadawy
Cc: Yan, Yiwei
Subject: [EXTERNAL] RE: Bridge Operation

Good Morning

Lift totals for March 2020 were 78 with an average lift time of 30 minutes

Lift totals for April were 183 with an average lift time of 29 minutes

Bridge will be closed to operations as of January 6th at 2000 until the Welland Canal reopens in March

There will be no contractors allowed on site other than Trade Mark and Spark Power for the first 2 weeks of March for startup, testing and training.

Thank You

Dave Thomson
Bridge Master
Burlington Canal Lift Bridge
1157 Beach Blvd Hamilton On L8H-6Z9
Public Services & Procurement Canada / Government of Canada
Dave.thomson@pwgsc-tpsgc.gc.ca
Bridge: 905-544-3236
Cell : 905-630-3634
Canada

From: Laaber, Christine [mailto:Christine.Laaber@aecom.com]
Sent: October 27, 2020 1:46 PM
To: Ranya El Sadawy <Ranya.ElSadawy@tpsgc-pwgsc.gc.ca>
Cc: Dave Thomson (J) <Dave.Thomson@pwgsc-tpsgc.gc.ca>; Yan, Yiwei <yiwei.yan@aecom.com>
Subject: Bridge Operation

renseignements sur la façon de signaler les courriels suspects, veuillez consulter la page Sécurité en technologie de l’information sur maSource.

Ranya,

We are looking at options for traffic staging in particular on the BCLB approach.

In consideration for the potential for traffic delays in March/April – does Dave have information relating to average daily lifts in March/April and duration of lifts? (recent data is fine)

Christine Beard Laaber, P.Eng CAHP
Manager Structural Engineering, Transportation
M +1-226-750-5413
christine.laaber@aecom.com

AECOM
50 Sportsworld Crossing Rd
Suite 290, West Entrance
Kitchener, Ontario N2P 0A4, Canada
aecom.com

Imagine it. Delivered.

Working from home – please use M +1-226-750-5413 **to call**

Exhibit A.2

Synchro and SimTraffic reports

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	717	1248	8	29	90
Future Volume (vph)	11	717	1248	8	29	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	4.0	7.9		3.0	7.9
Lane Util. Factor	1.00	0.88	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1245	2787	3452		1671	3223
Flt Permitted	0.95	1.00	1.00		0.17	1.00
Satd. Flow (perm)	1245	2787	3452		297	3223
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	779	1357	9	32	98
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	12	779	1366	0	32	98
Heavy Vehicles (%)	45%	2%	4%	75%	8%	12%
Turn Type	Perm	Free	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	Free			6	
Actuated Green, G (s)	1.7	90.4	67.1		74.3	74.3
Effective Green, g (s)	1.7	90.4	67.1		74.3	74.3
Actuated g/C Ratio	0.02	1.00	0.74		0.82	0.82
Clearance Time (s)	6.5		7.9		3.0	7.9
Vehicle Extension (s)	3.0		4.0		3.0	4.0
Lane Grp Cap (vph)	23	2787	2562		307	2648
v/s Ratio Prot			c0.40		0.00	0.03
v/s Ratio Perm	0.01	c0.28			0.08	
v/c Ratio	0.52	0.28	0.53		0.10	0.04
Uniform Delay, d1	43.9	0.0	5.0		2.1	1.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	19.7	0.3	0.8		0.2	0.0
Delay (s)	63.7	0.3	5.8		2.3	1.5
Level of Service	E	A	A		A	A
Approach Delay (s)	1.2		5.8			1.7
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	4.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	17.4
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	248	1961	3	47	110
Future Volume (Veh/h)	8	248	1961	3	47	110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	270	2132	3	51	120
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			311			
pX, platoon unblocked	0.82	0.82			0.82	
vC, conflicting volume	2296	1068			2135	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2143	649			1948	
tC, single (s)	7.1	6.9			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.3	
p0 queue free %	61	20			78	
cM capacity (veh/h)	23	339			228	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	9	270	1421	714	51	60	60
Volume Left	9	0	0	0	51	0	0
Volume Right	0	270	0	3	0	0	0
cSH	23	339	1700	1700	228	1700	1700
Volume to Capacity	0.39	0.80	0.84	0.42	0.22	0.04	0.04
Queue Length 95th (m)	9.2	53.1	0.0	0.0	6.7	0.0	0.0
Control Delay (s)	238.0	46.6	0.0	0.0	25.2	0.0	0.0
Lane LOS	F	E			D		
Approach Delay (s)	52.8		0.0		7.5		
Approach LOS	F						

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↰	↑			↑↱		↰	↑↑	↱			
Traffic Volume (vph)	9	14	0	0	75	12	84	1606	519	0	0	0
Future Volume (vph)	9	14	0	0	75	12	84	1606	519	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Lane Util. Factor	1.00	1.00			0.95		1.00	0.95	1.00			
Frt	1.00	1.00			0.98		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1543	1557			3354		1752	3471	1599			
Flt Permitted	0.62	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	1004	1557			3354		1752	3471	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	15	0	0	82	13	91	1746	564	0	0	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	31	0	0	0
Lane Group Flow (vph)	10	15	0	0	85	0	91	1746	533	0	0	0
Heavy Vehicles (%)	17%	22%	2%	2%	5%	8%	3%	4%	1%	2%	2%	2%
Turn Type	pm+pt	NA			NA		Perm	NA	Perm			
Protected Phases	7	4			8			2				
Permitted Phases	4						2		2			
Actuated Green, G (s)	29.6	29.6			25.0		82.4	82.4	82.4			
Effective Green, g (s)	29.6	29.6			25.0		82.4	82.4	82.4			
Actuated g/C Ratio	0.24	0.24			0.20		0.66	0.66	0.66			
Clearance Time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Vehicle Extension (s)	3.5	3.5			3.5		5.6	5.6	5.6			
Lane Grp Cap (vph)	245	369			672		1157	2293	1056			
v/s Ratio Prot	0.00	c0.01			c0.03			c0.50				
v/s Ratio Perm	0.01						0.05		0.33			
v/c Ratio	0.04	0.04			0.13		0.08	0.76	0.50			
Uniform Delay, d1	36.5	36.6			40.9		7.6	14.4	10.8			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.1			0.1		0.1	2.4	1.7			
Delay (s)	36.6	36.7			41.0		7.7	16.9	12.5			
Level of Service	D	D			D		A	B	B			
Approach Delay (s)		36.6			41.0			15.5			0.0	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	124.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	15	10	52	107	0	0	0	0	9	95	137
Future Volume (vph)	0	15	10	52	107	0	0	0	0	9	95	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Lane Util. Factor		0.95		1.00	1.00					1.00	0.95	1.00
Frt		0.94		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		2811		1770	1776					1626	3252	1615
Flt Permitted		1.00		0.62	1.00					0.95	1.00	1.00
Satd. Flow (perm)		2811		1159	1776					1626	3252	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	16	11	57	116	0	0	0	0	10	103	149
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	0	37
Lane Group Flow (vph)	0	17	0	57	116	0	0	0	0	10	103	112
Heavy Vehicles (%)	2%	21%	20%	2%	7%	2%	2%	2%	2%	11%	11%	0%
Turn Type		NA		pm+pt	NA					Perm	NA	Prot
Protected Phases		8		7	4						2	2
Permitted Phases				4						2		
Actuated Green, G (s)		16.0		33.7	33.7					141.3	141.3	141.3
Effective Green, g (s)		16.0		33.7	33.7					141.3	141.3	141.3
Actuated g/C Ratio		0.08		0.18	0.18					0.75	0.75	0.75
Clearance Time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Vehicle Extension (s)		3.5		3.5	3.5					4.0	4.0	4.0
Lane Grp Cap (vph)		238		254	317					1217	2435	1209
v/s Ratio Prot		0.01		0.02	c0.07						0.03	c0.07
v/s Ratio Perm				0.02						0.01		
v/c Ratio		0.07		0.22	0.37					0.01	0.04	0.09
Uniform Delay, d1		79.5		65.8	68.1					6.0	6.1	6.4
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.2		0.5	0.8					0.0	0.0	0.2
Delay (s)		79.7		66.3	69.0					6.0	6.2	6.5
Level of Service		E		E	E					A	A	A
Approach Delay (s)		79.7			68.1			0.0			6.4	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	188.7	Sum of lost time (s)	16.7
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	64	137	10	248	1176
Future Volume (vph)	12	64	137	10	248	1176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	4.0	7.9		3.0	7.9
Lane Util. Factor	1.00	0.88	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1271	2760	3430		1805	3539
Flt Permitted	0.95	1.00	1.00		0.62	1.00
Satd. Flow (perm)	1271	2760	3430		1180	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	70	149	11	270	1278
RTOR Reduction (vph)	0	0	3	0	0	0
Lane Group Flow (vph)	13	70	157	0	270	1278
Heavy Vehicles (%)	42%	3%	3%	20%	0%	2%
Turn Type	Perm	Free	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	Free			6	
Actuated Green, G (s)	1.7	90.4	63.6		74.3	74.3
Effective Green, g (s)	1.7	90.4	63.6		74.3	74.3
Actuated g/C Ratio	0.02	1.00	0.70		0.82	0.82
Clearance Time (s)	6.5		7.9		3.0	7.9
Vehicle Extension (s)	3.0		4.0		3.0	4.0
Lane Grp Cap (vph)	23	2760	2413		1023	2908
v/s Ratio Prot			0.05		0.02	c0.36
v/s Ratio Perm	c0.01	0.03			0.19	
v/c Ratio	0.57	0.03	0.06		0.26	0.44
Uniform Delay, d1	44.0	0.0	4.2		1.7	2.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	28.1	0.0	0.1		0.1	0.5
Delay (s)	72.1	0.0	4.2		1.9	2.7
Level of Service	E	A	A		A	A
Approach Delay (s)	11.3		4.2			2.6
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	3.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	17.4
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	125	191	10	362	1422
Future Volume (Veh/h)	2	125	191	10	362	1422
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	136	208	11	393	1546
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			311			
pX, platoon unblocked						
vC, conflicting volume	1772	110			219	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1772	110			219	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	85			71	
cM capacity (veh/h)	54	923			1355	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	2	136	139	80	393	773	773
Volume Left	2	0	0	0	393	0	0
Volume Right	0	136	0	11	0	0	0
cSH	54	923	1700	1700	1355	1700	1700
Volume to Capacity	0.04	0.15	0.08	0.05	0.29	0.45	0.45
Queue Length 95th (m)	0.9	4.1	0.0	0.0	9.7	0.0	0.0
Control Delay (s)	74.4	9.6	0.0	0.0	8.7	0.0	0.0
Lane LOS	F	A			A		
Approach Delay (s)	10.5		0.0		1.8		
Approach LOS	B						

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	29	0	0	443	9	7	195	115	0	0	0
Future Volume (vph)	108	29	0	0	443	9	7	195	115	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Lane Util. Factor	1.00	1.00			0.95		1.00	0.95	1.00			
Frt	1.00	1.00			1.00		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1787	1776			3564		1289	3471	1599			
Flt Permitted	0.25	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	478	1776			3564		1289	3471	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	32	0	0	482	10	8	212	125	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	55	0	0	0
Lane Group Flow (vph)	117	32	0	0	490	0	8	212	70	0	0	0
Heavy Vehicles (%)	1%	7%	0%	0%	1%	0%	40%	4%	1%	2%	2%	2%
Turn Type	pm+pt	NA			NA		Perm	NA	Perm			
Protected Phases	7	4			8			2				
Permitted Phases	4						2		2			
Actuated Green, G (s)	41.9	41.9			25.8		70.1	70.1	70.1			
Effective Green, g (s)	41.9	41.9			25.8		70.1	70.1	70.1			
Actuated g/C Ratio	0.34	0.34			0.21		0.56	0.56	0.56			
Clearance Time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Vehicle Extension (s)	3.5	3.5			3.5		5.6	5.6	5.6			
Lane Grp Cap (vph)	298	596			737		724	1951	898			
v/s Ratio Prot	c0.04	0.02			c0.14			c0.06				
v/s Ratio Perm	0.09						0.01		0.04			
v/c Ratio	0.39	0.05			0.67		0.01	0.11	0.08			
Uniform Delay, d1	30.2	28.0			45.5		12.0	12.7	12.5			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	1.0	0.0			2.4		0.0	0.1	0.2			
Delay (s)	31.2	28.0			47.9		12.1	12.8	12.7			
Level of Service	C	C			D		B	B	B			
Approach Delay (s)		30.6			47.9			12.8			0.0	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	124.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	125	71	436	14	0	0	0	0	11	1278	5
Future Volume (vph)	0	125	71	436	14	0	0	0	0	11	1278	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Lane Util. Factor		0.95		1.00	1.00					1.00	0.95	1.00
Frt		0.95		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		3324		1805	1377					1656	3539	1615
Flt Permitted		1.00		0.41	1.00					0.95	1.00	1.00
Satd. Flow (perm)		3324		771	1377					1656	3539	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	136	77	474	15	0	0	0	0	12	1389	5
RTOR Reduction (vph)	0	43	0	0	0	0	0	0	0	0	0	3
Lane Group Flow (vph)	0	170	0	474	15	0	0	0	0	12	1389	2
Heavy Vehicles (%)	0%	2%	4%	0%	38%	0%	0%	0%	0%	9%	2%	0%
Turn Type		NA		pm+pt	NA					Perm	NA	Prot
Protected Phases		8		7	4						2	2
Permitted Phases				4						2		
Actuated Green, G (s)		20.0		95.3	95.3					79.7	79.7	79.7
Effective Green, g (s)		20.0		95.3	95.3					79.7	79.7	79.7
Actuated g/C Ratio		0.11		0.51	0.51					0.42	0.42	0.42
Clearance Time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Vehicle Extension (s)		3.5		3.5	3.5					4.0	4.0	4.0
Lane Grp Cap (vph)		352		785	695					699	1494	682
v/s Ratio Prot		0.05		c0.23	0.01						c0.39	0.00
v/s Ratio Perm				c0.07						0.01		
v/c Ratio		0.48		0.60	0.02					0.02	0.93	0.00
Uniform Delay, d1		79.5		31.6	23.4					31.7	51.8	31.5
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		1.2		1.4	0.0					0.0	11.6	0.0
Delay (s)		80.7		33.0	23.4					31.8	63.5	31.5
Level of Service		F		C	C					C	E	C
Approach Delay (s)		80.7			32.7			0.0			63.1	
Approach LOS		F			C			A			E	

Intersection Summary			
HCM 2000 Control Delay	57.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	188.7	Sum of lost time (s)	16.7
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 100: Eastport Dr & QEW On/Off Ramp

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	T	TR	L	T	T
Maximum Queue (m)	22.4	8.2	47.2	53.5	16.1	7.1	9.5
Average Queue (m)	4.3	0.3	8.4	10.9	5.1	0.3	0.8
95th Queue (m)	15.6	4.8	31.8	37.6	14.1	3.2	5.6
Link Distance (m)	492.3	492.3	2985.7	2985.7		140.6	140.6
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)					150.0		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 200: Eastport Dr & Beach Blvd

Movement	WB	WB	B1	NB	NB	B3	B5	B5	B5	B5	SB
Directions Served	L	R	T	T	TR	T	T	T	T		L
Maximum Queue (m)	72.4	146.8	859.4	1.1	5.4	2.8	41.4	58.1	43.6	12.7	34.9
Average Queue (m)	7.9	138.3	448.3	0.0	0.3	0.1	6.1	21.1	11.5	0.6	14.7
95th Queue (m)	43.5	145.4	883.3	0.9	2.6	2.1	28.6	46.3	30.2	6.7	31.3
Link Distance (m)		117.1	2097.0	105.6	105.6	15.8	140.6	140.6	140.6	140.6	
Upstream Blk Time (%)		98				0					
Queuing Penalty (veh)		0				0					
Storage Bay Dist (m)	65.0										110.0
Storage Blk Time (%)	0	100									
Queuing Penalty (veh)	0	8									

Intersection: 300: Eastport Dr/QEW EB On Ramp & Lakeshore Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	TR	L	T	T	R
Maximum Queue (m)	15.0	25.3	18.0	34.0	75.2	127.7	126.3	20.6
Average Queue (m)	2.1	5.0	5.6	12.3	13.6	86.8	97.4	15.7
95th Queue (m)	9.5	17.2	15.2	26.6	53.7	143.5	151.2	20.3
Link Distance (m)	58.7	58.7	146.9	146.9		104.8	104.8	
Upstream Blk Time (%)						4	8	
Queuing Penalty (veh)						43	92	
Storage Bay Dist (m)					75.0			10.0
Storage Blk Time (%)					0	8	24	11
Queuing Penalty (veh)					0	7	126	85

Intersection: 400: Eastport Dr/QEW WB Off-Ramp & CCIW Access Rd

Movement	EB	EB	WB	WB	SB	SB	SB	SB
Directions Served	T	TR	L	T	L	T	T	R
Maximum Queue (m)	16.6	26.5	37.1	59.5	12.5	21.1	16.9	28.3
Average Queue (m)	1.3	5.4	15.6	32.4	0.7	4.2	1.7	8.5
95th Queue (m)	7.8	17.8	32.2	56.1	5.7	14.3	9.0	23.4
Link Distance (m)	373.2		58.7	58.7		881.8	881.8	
Upstream Blk Time (%)				1				
Queuing Penalty (veh)				1				
Storage Bay Dist (m)		35.0			40.0			35.0
Storage Blk Time (%)		1						0
Queuing Penalty (veh)		0						0

Intersection: 700: Eastport Dr

Movement	WB	WB	B600
Directions Served	R	R	T
Maximum Queue (m)	57.0	71.1	4.4
Average Queue (m)	6.6	13.3	0.1
95th Queue (m)	31.5	47.3	2.5
Link Distance (m)	106.4	106.4	136.6
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 362

Intersection: 100: Eastport Dr & QEW On/Off Ramp

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	T
Maximum Queue (m)	22.8	21.6	16.7	27.4	36.5	43.4
Average Queue (m)	4.6	3.1	2.4	9.0	4.8	7.1
95th Queue (m)	15.4	12.4	10.5	21.9	20.8	27.2
Link Distance (m)	492.3	2985.7	2985.7		140.6	140.6
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				150.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 200: Eastport Dr & Beach Blvd

Movement	WB	WB	NB	SB	SB	B500	B500
Directions Served	L	R	TR	L	T	T	T
Maximum Queue (m)	7.6	25.3	4.4	33.7	2.6	5.2	5.4
Average Queue (m)	0.7	13.2	0.1	13.1	0.1	0.2	0.2
95th Queue (m)	4.5	22.2	1.8	26.3	2.0	4.0	4.2
Link Distance (m)		117.1	105.6		288.8	136.6	136.6
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (m)	65.0			110.0			
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 300: Eastport Dr/QEW EB On Ramp & Lakeshore Rd

Movement	EB	EB	WB	WB	B2	NB	NB	NB	NB
Directions Served	L	T	T	TR	T	L	T	T	R
Maximum Queue (m)	60.4	24.0	168.4	21.2	986.0	11.6	29.3	36.2	17.5
Average Queue (m)	26.4	6.1	168.2	3.4	642.6	1.2	11.0	16.3	12.9
95th Queue (m)	56.6	19.3	169.7	13.3	1081.1	7.5	23.6	32.3	21.9
Link Distance (m)	58.7	58.7	146.9	146.9	1089.0		104.8	104.8	
Upstream Blk Time (%)	2		91		7				
Queuing Penalty (veh)	1		0		0				
Storage Bay Dist (m)						75.0			10.0
Storage Blk Time (%)								26	7
Queuing Penalty (veh)								30	6

Intersection: 400: Eastport Dr/QEW WB Off-Ramp & CCIW Access Rd

Movement	EB	EB	WB	WB	SB	SB	SB	SB
Directions Served	T	TR	L	T	L	T	T	R
Maximum Queue (m)	81.6	42.5	62.2	17.8	29.1	196.4	198.2	24.0
Average Queue (m)	33.7	21.1	56.3	2.9	1.8	91.9	92.1	1.3
95th Queue (m)	66.2	44.5	77.1	12.5	13.8	166.7	169.1	11.8
Link Distance (m)	373.2		58.7	58.7		881.8	881.8	
Upstream Blk Time (%)			43					
Queuing Penalty (veh)			97					
Storage Bay Dist (m)		35.0			40.0			35.0
Storage Blk Time (%)	12	2				26	28	0
Queuing Penalty (veh)	16	1				3	1	0

Intersection: 700: Eastport Dr

Movement	EB	EB
Directions Served	T	T
Maximum Queue (m)	19.1	20.1
Average Queue (m)	0.6	0.7
95th Queue (m)	14.7	15.5
Link Distance (m)	139.9	139.9
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 156

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	717	1248	8	29	90
Future Volume (vph)	11	717	1248	8	29	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	4.0	7.9		3.0	7.9
Lane Util. Factor	1.00	0.88	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1245	2787	3452		1671	3223
Flt Permitted	0.95	1.00	1.00		0.17	1.00
Satd. Flow (perm)	1245	2787	3452		297	3223
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	779	1357	9	32	98
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	12	779	1366	0	32	98
Heavy Vehicles (%)	45%	2%	4%	75%	8%	12%
Turn Type	Perm	Free	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	Free			6	
Actuated Green, G (s)	1.7	90.4	67.1		74.3	74.3
Effective Green, g (s)	1.7	90.4	67.1		74.3	74.3
Actuated g/C Ratio	0.02	1.00	0.74		0.82	0.82
Clearance Time (s)	6.5		7.9		3.0	7.9
Vehicle Extension (s)	3.0		4.0		3.0	4.0
Lane Grp Cap (vph)	23	2787	2562		307	2648
v/s Ratio Prot			c0.40		0.00	0.03
v/s Ratio Perm	0.01	c0.28			0.08	
v/c Ratio	0.52	0.28	0.53		0.10	0.04
Uniform Delay, d1	43.9	0.0	5.0		2.1	1.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	19.7	0.3	0.8		0.2	0.0
Delay (s)	63.7	0.3	5.8		2.3	1.5
Level of Service	E	A	A		A	A
Approach Delay (s)	1.2		5.8			1.7
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	4.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	17.4
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	248	1961	3	47	110
Future Volume (Veh/h)	8	248	1961	3	47	110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	270	2132	3	51	120
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			311			309
pX, platoon unblocked	0.83	0.82			0.82	
vC, conflicting volume	2296	1068			2135	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2032	649			1948	
tC, single (s)	7.1	6.9			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.3	
p0 queue free %	68	20			78	
cM capacity (veh/h)	28	339			228	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	9	270	1421	714	51	60	60
Volume Left	9	0	0	0	51	0	0
Volume Right	0	270	0	3	0	0	0
cSH	28	339	1700	1700	228	1700	1700
Volume to Capacity	0.32	0.80	0.84	0.42	0.22	0.04	0.04
Queue Length 95th (m)	8.0	53.1	0.0	0.0	6.7	0.0	0.0
Control Delay (s)	185.2	46.6	0.0	0.0	25.2	0.0	0.0
Lane LOS	F	E			D		
Approach Delay (s)	51.1		0.0		7.5		
Approach LOS	F						

Intersection Summary			
Average Delay	6.0		
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	14	0	0	75	12	84	1606	519	0	0	0
Future Volume (vph)	9	14	0	0	75	12	84	1606	519	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Lane Util. Factor	1.00	1.00			0.95		1.00	0.95	1.00			
Frt	1.00	1.00			0.98		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1543	1557			3354		1752	3471	1599			
Flt Permitted	0.62	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	1004	1557			3354		1752	3471	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	15	0	0	82	13	91	1746	564	0	0	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	31	0	0	0
Lane Group Flow (vph)	10	15	0	0	85	0	91	1746	533	0	0	0
Heavy Vehicles (%)	17%	22%	2%	2%	5%	8%	3%	4%	1%	2%	2%	2%
Turn Type	pm+pt	NA			NA		Perm	NA	Perm			
Protected Phases	7	4			8			2				
Permitted Phases	4						2		2			
Actuated Green, G (s)	29.6	29.6			25.0		82.4	82.4	82.4			
Effective Green, g (s)	29.6	29.6			25.0		82.4	82.4	82.4			
Actuated g/C Ratio	0.24	0.24			0.20		0.66	0.66	0.66			
Clearance Time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Vehicle Extension (s)	3.5	3.5			3.5		5.6	5.6	5.6			
Lane Grp Cap (vph)	245	369			672		1157	2293	1056			
v/s Ratio Prot	0.00	c0.01			c0.03			c0.50				
v/s Ratio Perm	0.01						0.05		0.33			
v/c Ratio	0.04	0.04			0.13		0.08	0.76	0.50			
Uniform Delay, d1	36.5	36.6			40.9		7.6	14.4	10.8			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.1			0.1		0.1	2.4	1.7			
Delay (s)	36.6	36.7			41.0		7.7	16.9	12.5			
Level of Service	D	D			D		A	B	B			
Approach Delay (s)		36.6			41.0			15.5			0.0	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	124.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	15	10	52	107	0	0	0	0	9	95	137
Future Volume (vph)	0	15	10	52	107	0	0	0	0	9	95	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Lane Util. Factor		0.95		1.00	1.00					1.00	0.95	1.00
Frt		0.94		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		2811		1770	1776					1626	3252	1615
Flt Permitted		1.00		0.62	1.00					0.95	1.00	1.00
Satd. Flow (perm)		2811		1159	1776					1626	3252	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	16	11	57	116	0	0	0	0	10	103	149
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	0	37
Lane Group Flow (vph)	0	17	0	57	116	0	0	0	0	10	103	112
Heavy Vehicles (%)	2%	21%	20%	2%	7%	2%	2%	2%	2%	11%	11%	0%
Turn Type		NA		pm+pt	NA					Perm	NA	Prot
Protected Phases		8		7	4						2	2
Permitted Phases				4						2		
Actuated Green, G (s)		16.0		33.7	33.7					141.3	141.3	141.3
Effective Green, g (s)		16.0		33.7	33.7					141.3	141.3	141.3
Actuated g/C Ratio		0.08		0.18	0.18					0.75	0.75	0.75
Clearance Time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Vehicle Extension (s)		3.5		3.5	3.5					4.0	4.0	4.0
Lane Grp Cap (vph)		238		254	317					1217	2435	1209
v/s Ratio Prot		0.01		0.02	c0.07						0.03	c0.07
v/s Ratio Perm				0.02						0.01		
v/c Ratio		0.07		0.22	0.37					0.01	0.04	0.09
Uniform Delay, d1		79.5		65.8	68.1					6.0	6.1	6.4
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.2		0.5	0.8					0.0	0.0	0.2
Delay (s)		79.7		66.3	69.0					6.0	6.2	6.5
Level of Service		E		E	E					A	A	A
Approach Delay (s)		79.7			68.1			0.0			6.4	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	188.7	Sum of lost time (s)	16.7
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	64	137	10	248	1176
Future Volume (vph)	12	64	137	10	248	1176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	4.0	7.9		3.0	7.9
Lane Util. Factor	1.00	0.88	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1271	2760	3430		1805	3539
Flt Permitted	0.95	1.00	1.00		0.62	1.00
Satd. Flow (perm)	1271	2760	3430		1180	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	70	149	11	270	1278
RTOR Reduction (vph)	0	0	3	0	0	0
Lane Group Flow (vph)	13	70	157	0	270	1278
Heavy Vehicles (%)	42%	3%	3%	20%	0%	2%
Turn Type	Perm	Free	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	Free			6	
Actuated Green, G (s)	1.7	90.4	63.6		74.3	74.3
Effective Green, g (s)	1.7	90.4	63.6		74.3	74.3
Actuated g/C Ratio	0.02	1.00	0.70		0.82	0.82
Clearance Time (s)	6.5		7.9		3.0	7.9
Vehicle Extension (s)	3.0		4.0		3.0	4.0
Lane Grp Cap (vph)	23	2760	2413		1023	2908
v/s Ratio Prot			0.05		0.02	c0.36
v/s Ratio Perm	c0.01	0.03			0.19	
v/c Ratio	0.57	0.03	0.06		0.26	0.44
Uniform Delay, d1	44.0	0.0	4.2		1.7	2.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	28.1	0.0	0.1		0.1	0.5
Delay (s)	72.1	0.0	4.2		1.9	2.7
Level of Service	E	A	A		A	A
Approach Delay (s)	11.3		4.2			2.6
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	3.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	17.4
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	125	191	10	362	1422
Future Volume (Veh/h)	2	125	191	10	362	1422
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	136	208	11	393	1546
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			311			309
pX, platoon unblocked	0.50					
vC, conflicting volume	1772	110			219	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	567	110			219	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	99	85			71	
cM capacity (veh/h)	164	923			1355	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	2	136	139	80	393	773	773
Volume Left	2	0	0	0	393	0	0
Volume Right	0	136	0	11	0	0	0
cSH	164	923	1700	1700	1355	1700	1700
Volume to Capacity	0.01	0.15	0.08	0.05	0.29	0.45	0.45
Queue Length 95th (m)	0.3	4.1	0.0	0.0	9.7	0.0	0.0
Control Delay (s)	27.2	9.6	0.0	0.0	8.7	0.0	0.0
Lane LOS	D	A			A		
Approach Delay (s)	9.8		0.0		1.8		
Approach LOS	A						

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	29	0	0	443	9	7	195	115	0	0	0
Future Volume (vph)	108	29	0	0	443	9	7	195	115	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Lane Util. Factor	1.00	1.00			0.95		1.00	0.95	1.00			
Frt	1.00	1.00			1.00		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1787	1776			3564		1289	3471	1599			
Flt Permitted	0.25	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	478	1776			3564		1289	3471	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	32	0	0	482	10	8	212	125	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	55	0	0	0
Lane Group Flow (vph)	117	32	0	0	490	0	8	212	70	0	0	0
Heavy Vehicles (%)	1%	7%	0%	0%	1%	0%	40%	4%	1%	0%	0%	0%
Turn Type	pm+pt	NA			NA		Perm	NA	Perm			
Protected Phases	7	4			8			2				
Permitted Phases	4						2		2			
Actuated Green, G (s)	41.9	41.9			25.8		70.1	70.1	70.1			
Effective Green, g (s)	41.9	41.9			25.8		70.1	70.1	70.1			
Actuated g/C Ratio	0.34	0.34			0.21		0.56	0.56	0.56			
Clearance Time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Vehicle Extension (s)	3.5	3.5			3.5		5.6	5.6	5.6			
Lane Grp Cap (vph)	298	596			737		724	1951	898			
v/s Ratio Prot	c0.04	0.02			c0.14			c0.06				
v/s Ratio Perm	0.09						0.01		0.04			
v/c Ratio	0.39	0.05			0.67		0.01	0.11	0.08			
Uniform Delay, d1	30.2	28.0			45.5		12.0	12.7	12.5			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	1.0	0.0			2.4		0.0	0.1	0.2			
Delay (s)	31.2	28.0			47.9		12.1	12.8	12.7			
Level of Service	C	C			D		B	B	B			
Approach Delay (s)		30.6			47.9			12.8			0.0	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	124.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	125	71	436	14	0	0	0	0	11	1278	5
Future Volume (vph)	0	125	71	436	14	0	0	0	0	11	1278	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Lane Util. Factor		0.95		1.00	1.00					1.00	0.95	1.00
Frt		0.95		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		3324		1805	1377					1656	3539	1615
Flt Permitted		1.00		0.41	1.00					0.95	1.00	1.00
Satd. Flow (perm)		3324		771	1377					1656	3539	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	136	77	474	15	0	0	0	0	12	1389	5
RTOR Reduction (vph)	0	43	0	0	0	0	0	0	0	0	0	3
Lane Group Flow (vph)	0	170	0	474	15	0	0	0	0	12	1389	2
Heavy Vehicles (%)	0%	2%	4%	0%	38%	0%	0%	0%	0%	9%	2%	0%
Turn Type		NA		pm+pt	NA					Perm	NA	Prot
Protected Phases		8		7	4						2	2
Permitted Phases				4						2		
Actuated Green, G (s)		20.0		95.3	95.3					79.7	79.7	79.7
Effective Green, g (s)		20.0		95.3	95.3					79.7	79.7	79.7
Actuated g/C Ratio		0.11		0.51	0.51					0.42	0.42	0.42
Clearance Time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Vehicle Extension (s)		3.5		3.5	3.5					4.0	4.0	4.0
Lane Grp Cap (vph)		352		785	695					699	1494	682
v/s Ratio Prot		0.05		c0.23	0.01						c0.39	0.00
v/s Ratio Perm				c0.07						0.01		
v/c Ratio		0.48		0.60	0.02					0.02	0.93	0.00
Uniform Delay, d1		79.5		31.6	23.4					31.7	51.8	31.5
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		1.2		1.4	0.0					0.0	11.6	0.0
Delay (s)		80.7		33.0	23.4					31.8	63.5	31.5
Level of Service		F		C	C					C	E	C
Approach Delay (s)		80.7			32.7			0.0			63.1	
Approach LOS		F			C			A			E	

Intersection Summary			
HCM 2000 Control Delay	57.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	188.7	Sum of lost time (s)	16.7
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 100: Eastport Dr & QEW On/Off Ramp

Movement	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	R	T	TR	L	T	T
Maximum Queue (m)	507.2	501.0	503.4	1891.8	1899.1	32.3	5.7	8.6
Average Queue (m)	305.3	360.4	355.3	1155.2	1159.1	3.3	0.2	0.3
95th Queue (m)	643.1	681.0	674.6	2306.7	2313.7	15.4	2.3	3.3
Link Distance (m)	492.3	492.3	492.3	2985.7	2985.7		140.6	140.6
Upstream Blk Time (%)	33	44	41					
Queuing Penalty (veh)	0	0	0					
Storage Bay Dist (m)						150.0		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 200: Eastport Dr & Beach Blvd

Movement	WB	WB	B1	NB	NB	B3	B3	B5	B5	B5	B5	SB
Directions Served	L	R	T	T	TR	T	T	T	T	T		L
Maximum Queue (m)	51.8	140.6	1535.4	136.5	134.8	46.9	44.7	156.6	154.0	168.9	163.2	116.5
Average Queue (m)	3.2	135.2	778.0	104.3	105.3	28.8	30.0	126.7	127.6	140.0	77.9	52.0
95th Queue (m)	25.1	147.9	1570.5	179.0	178.2	53.9	52.8	203.4	195.9	222.1	206.2	141.8
Link Distance (m)		117.1	2097.0	105.6	105.6	15.8	15.8	140.6	140.6	140.6	140.6	
Upstream Blk Time (%)		98		56	60	55	60	47	50	83	47	
Queuing Penalty (veh)		0		548	588	362	395	231	246	408	232	
Storage Bay Dist (m)	65.0											110.0
Storage Blk Time (%)	0	99										34
Queuing Penalty (veh)	0	8										18

Intersection: 200: Eastport Dr & Beach Blvd

Movement	SB	SB
Directions Served	T	T
Maximum Queue (m)	195.3	156.8
Average Queue (m)	62.0	14.3
95th Queue (m)	206.9	94.5
Link Distance (m)	295.1	295.1
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (m)		
Storage Blk Time (%)	6	
Queuing Penalty (veh)	3	

Intersection: 300: Eastport Dr/QEW EB On Ramp & Lakeshore Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	TR	L	T	T	R
Maximum Queue (m)	15.4	23.0	16.6	43.5	82.2	129.6	127.0	17.7
Average Queue (m)	2.0	4.0	5.3	13.5	12.4	53.7	54.3	8.6
95th Queue (m)	9.0	15.0	14.5	30.3	56.0	149.5	152.7	21.7
Link Distance (m)	58.7	58.7	146.9	146.9		104.8	104.8	
Upstream Blk Time (%)						8	10	
Queuing Penalty (veh)						88	112	
Storage Bay Dist (m)					75.0			10.0
Storage Blk Time (%)						9	13	6
Queuing Penalty (veh)						7	67	47

Intersection: 400: Eastport Dr/QEW WB Off-Ramp & CCIW Access Rd

Movement	EB	EB	WB	WB	SB	SB	SB	SB
Directions Served	T	TR	L	T	L	T	T	R
Maximum Queue (m)	10.0	18.5	38.8	56.2	8.2	16.8	12.9	27.6
Average Queue (m)	1.2	4.2	12.7	28.1	0.5	3.1	1.5	7.7
95th Queue (m)	5.8	14.3	29.3	53.2	4.1	11.6	8.0	21.2
Link Distance (m)	373.2		58.7	58.7		881.8	881.8	
Upstream Blk Time (%)				1				
Queuing Penalty (veh)				1				
Storage Bay Dist (m)		35.0			40.0			35.0
Storage Blk Time (%)		0						0
Queuing Penalty (veh)		0						0

Intersection: 500: Eastport Dr/BCLB & Bridge South Gate

Movement	NB	NB	SB
Directions Served	T	T	T
Maximum Queue (m)	299.9	300.0	2.7
Average Queue (m)	251.9	254.8	0.5
95th Queue (m)	398.9	399.2	3.1
Link Distance (m)	295.1	295.1	141.9
Upstream Blk Time (%)	46	47	
Queuing Penalty (veh)	512	519	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 600: BCLB/Eastport Dr & Bridge North Gate

Movement	NB	NB	SB	SB
Directions Served	T	T	T	T
Maximum Queue (m)	146.7	149.1	127.3	126.9
Average Queue (m)	68.0	76.0	44.0	41.9
95th Queue (m)	167.0	169.3	127.6	124.3
Link Distance (m)	141.9	141.9	108.5	108.5
Upstream Blk Time (%)	1	2	18	16
Queuing Penalty (veh)	13	19	14	13
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 700: Eastport Dr

Movement	EB	EB	WB	WB
Directions Served	T	T	R	R
Maximum Queue (m)	55.2	57.2	112.9	115.9
Average Queue (m)	7.1	6.6	40.0	42.0
95th Queue (m)	37.0	36.0	125.3	128.0
Link Distance (m)	139.9	139.9	108.5	108.5
Upstream Blk Time (%)			2	2
Queuing Penalty (veh)			21	27
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 4499

Intersection: 100: Eastport Dr & QEW On/Off Ramp

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	T
Maximum Queue (m)	22.8	12.4	16.4	26.1	44.9	47.1
Average Queue (m)	4.8	1.7	2.1	5.6	3.8	4.8
95th Queue (m)	16.3	8.2	9.8	18.4	22.8	25.9
Link Distance (m)	492.3	2985.7	2985.7		140.6	140.6
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				150.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 200: Eastport Dr & Beach Blvd

Movement	WB	WB	B1	NB	NB	B3	B3	B5	SB
Directions Served	L	R	T	T	TR	T	T	T	L
Maximum Queue (m)	9.0	120.8	20.7	104.3	111.2	3.4	8.5	2.9	85.3
Average Queue (m)	0.5	27.7	1.6	12.6	13.8	0.3	0.5	0.1	10.6
95th Queue (m)	3.8	82.5	16.4	63.5	67.4	3.9	6.6	2.2	42.2
Link Distance (m)		117.1	2097.0	105.6	105.6	15.8	15.8	140.6	
Upstream Blk Time (%)		3		2	2	1	1		
Queuing Penalty (veh)		0		2	2	1	1		
Storage Bay Dist (m)	65.0								110.0
Storage Blk Time (%)		10							0
Queuing Penalty (veh)		0							1

Intersection: 300: Eastport Dr/QEW EB On Ramp & Lakeshore Rd

Movement	EB	EB	WB	WB	B2	NB	NB	NB	NB
Directions Served	L	T	T	TR	T	L	T	T	R
Maximum Queue (m)	60.7	30.8	168.4	10.2	1097.0	38.4	124.6	122.1	18.2
Average Queue (m)	20.2	4.3	166.4	1.2	849.5	2.6	19.2	19.8	7.1
95th Queue (m)	55.2	17.8	171.0	6.3	1425.9	18.5	80.4	80.7	19.5
Link Distance (m)	58.8	58.8	146.9	146.9	1089.0		104.8	104.8	
Upstream Blk Time (%)	2		96		57		3	3	
Queuing Penalty (veh)	1		0		0		4	5	
Storage Bay Dist (m)						75.0			10.0
Storage Blk Time (%)						0	3	13	5
Queuing Penalty (veh)						0	0	15	5

Intersection: 400: Eastport Dr/QEW WB Off-Ramp & CCIW Access Rd

Movement	EB	EB	WB	WB	SB	SB	SB	SB
Directions Served	T	TR	L	T	L	T	T	R
Maximum Queue (m)	383.6	42.5	61.9	19.1	26.5	1807.4	1811.6	36.0
Average Queue (m)	202.9	33.0	59.1	2.1	1.1	1139.0	1140.0	1.5
95th Queue (m)	436.8	51.9	66.6	10.4	11.3	2140.6	2138.6	13.8
Link Distance (m)	373.1		58.8	58.8		1796.5	1796.5	
Upstream Blk Time (%)	18		67			20	20	
Queuing Penalty (veh)	0		150			0	0	
Storage Bay Dist (m)		35.0			40.0			35.0
Storage Blk Time (%)	44	48				63	63	0
Queuing Penalty (veh)	58	30				7	3	0

Intersection: 500: Eastport Dr/BCLB & Bridge South Gate

Movement	NB	NB	SB	SB
Directions Served	T	T	T	T
Maximum Queue (m)	296.6	297.5	41.7	41.6
Average Queue (m)	102.2	106.0	17.6	16.6
95th Queue (m)	299.0	302.9	45.1	42.0
Link Distance (m)	295.1	295.1	141.9	141.9
Upstream Blk Time (%)	14	15		
Queuing Penalty (veh)	23	24		
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 600: BCLB/Eastport Dr & Bridge North Gate

Movement	NB	NB	SB	SB
Directions Served	T	T	T	T
Maximum Queue (m)	129.8	138.4	127.3	126.9
Average Queue (m)	7.5	11.0	68.7	69.0
95th Queue (m)	49.6	58.0	168.8	169.7
Link Distance (m)	141.9	141.9	108.5	108.5
Upstream Blk Time (%)	0	0	47	47
Queuing Penalty (veh)	0	0	423	422
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 700: Eastport Dr

Movement	EB	EB	WB	WB
Directions Served	T	T	R	R
Maximum Queue (m)	144.0	144.3	111.3	111.4
Average Queue (m)	70.6	70.7	10.6	10.9
95th Queue (m)	185.8	186.0	63.4	64.8
Link Distance (m)	139.9	139.9	108.5	108.5
Upstream Blk Time (%)	43	43	1	1
Queuing Penalty (veh)	386	385	1	2
Storage Bay Dist (m)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Network Summary

Network wide Queuing Penalty: 1951

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	11	717	1248	8	29	90
Future Volume (vph)	11	717	1248	8	29	90
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	4.0	7.9		3.0	7.9
Lane Util. Factor	1.00	0.88	0.95		1.00	0.95
Frt	1.00	0.85	1.00		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1245	2787	3452		1671	3223
Flt Permitted	0.95	1.00	1.00		0.17	1.00
Satd. Flow (perm)	1245	2787	3452		297	3223
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	12	779	1357	9	32	98
RTOR Reduction (vph)	0	0	0	0	0	0
Lane Group Flow (vph)	12	779	1366	0	32	98
Heavy Vehicles (%)	45%	2%	4%	75%	8%	12%
Turn Type	Perm	Free	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	Free			6	
Actuated Green, G (s)	1.7	90.4	67.1		74.3	74.3
Effective Green, g (s)	1.7	90.4	67.1		74.3	74.3
Actuated g/C Ratio	0.02	1.00	0.74		0.82	0.82
Clearance Time (s)	6.5		7.9		3.0	7.9
Vehicle Extension (s)	3.0		4.0		3.0	4.0
Lane Grp Cap (vph)	23	2787	2562		307	2648
v/s Ratio Prot			c0.40		0.00	0.03
v/s Ratio Perm	0.01	c0.28			0.08	
v/c Ratio	0.52	0.28	0.53		0.10	0.04
Uniform Delay, d1	43.9	0.0	5.0		2.1	1.5
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	19.7	0.3	0.8		0.2	0.0
Delay (s)	63.7	0.3	5.8		2.3	1.5
Level of Service	E	A	A		A	A
Approach Delay (s)	1.2		5.8			1.7
Approach LOS	A		A			A

Intersection Summary			
HCM 2000 Control Delay	4.0	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.55		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	17.4
Intersection Capacity Utilization	52.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	8	248	1961	3	47	110
Future Volume (Veh/h)	8	248	1961	3	47	110
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	270	2132	3	51	120
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			311			
pX, platoon unblocked	0.82	0.82			0.82	
vC, conflicting volume	2296	1068			2135	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	2143	649			1948	
tC, single (s)	7.1	6.9			4.2	
tC, 2 stage (s)						
tF (s)	3.6	3.3			2.3	
p0 queue free %	61	20			78	
cM capacity (veh/h)	23	339			228	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	9	270	1421	714	51	60	60
Volume Left	9	0	0	0	51	0	0
Volume Right	0	270	0	3	0	0	0
cSH	23	339	1700	1700	228	1700	1700
Volume to Capacity	0.39	0.80	0.84	0.42	0.22	0.04	0.04
Queue Length 95th (m)	9.2	53.1	0.0	0.0	6.7	0.0	0.0
Control Delay (s)	238.0	46.6	0.0	0.0	25.2	0.0	0.0
Lane LOS	F	E			D		
Approach Delay (s)	52.8		0.0		7.5		
Approach LOS	F						

Intersection Summary			
Average Delay	6.2		
Intersection Capacity Utilization	76.3%	ICU Level of Service	D
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	14	0	0	75	12	84	1606	519	0	0	0
Future Volume (vph)	9	14	0	0	75	12	84	1606	519	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Lane Util. Factor	1.00	1.00			0.95		1.00	0.95	1.00			
Frt	1.00	1.00			0.98		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1543	1557			3354		1752	3471	1599			
Flt Permitted	0.62	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	1004	1557			3354		1752	3471	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	10	15	0	0	82	13	91	1746	564	0	0	0
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	31	0	0	0
Lane Group Flow (vph)	10	15	0	0	85	0	91	1746	533	0	0	0
Heavy Vehicles (%)	17%	22%	2%	2%	5%	8%	3%	4%	1%	2%	2%	2%
Turn Type	pm+pt	NA			NA		Perm	NA	Perm			
Protected Phases	7	4			8			2				
Permitted Phases	4						2		2			
Actuated Green, G (s)	29.6	29.6			25.0		82.4	82.4	82.4			
Effective Green, g (s)	29.6	29.6			25.0		82.4	82.4	82.4			
Actuated g/C Ratio	0.24	0.24			0.20		0.66	0.66	0.66			
Clearance Time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Vehicle Extension (s)	3.5	3.5			3.5		5.6	5.6	5.6			
Lane Grp Cap (vph)	245	369			672		1157	2293	1056			
v/s Ratio Prot	0.00	c0.01			c0.03			c0.50				
v/s Ratio Perm	0.01						0.05		0.33			
v/c Ratio	0.04	0.04			0.13		0.08	0.76	0.50			
Uniform Delay, d1	36.5	36.6			40.9		7.6	14.4	10.8			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	0.1	0.1			0.1		0.1	2.4	1.7			
Delay (s)	36.6	36.7			41.0		7.7	16.9	12.5			
Level of Service	D	D			D		A	B	B			
Approach Delay (s)		36.6			41.0			15.5			0.0	
Approach LOS		D			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	16.7	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.61		
Actuated Cycle Length (s)	124.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	15	10	52	107	0	0	0	0	9	95	137
Future Volume (vph)	0	15	10	52	107	0	0	0	0	9	95	137
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Lane Util. Factor		0.95		1.00	1.00					1.00	0.95	1.00
Frt		0.94		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		2811		1770	1776					1626	3252	1615
Flt Permitted		1.00		0.62	1.00					0.95	1.00	1.00
Satd. Flow (perm)		2811		1159	1776					1626	3252	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	16	11	57	116	0	0	0	0	10	103	149
RTOR Reduction (vph)	0	10	0	0	0	0	0	0	0	0	0	37
Lane Group Flow (vph)	0	17	0	57	116	0	0	0	0	10	103	112
Heavy Vehicles (%)	2%	21%	20%	2%	7%	2%	2%	2%	2%	11%	11%	0%
Turn Type		NA		pm+pt	NA					Perm	NA	Prot
Protected Phases		8		7	4						2	2
Permitted Phases				4						2		
Actuated Green, G (s)		16.0		33.7	33.7					141.3	141.3	141.3
Effective Green, g (s)		16.0		33.7	33.7					141.3	141.3	141.3
Actuated g/C Ratio		0.08		0.18	0.18					0.75	0.75	0.75
Clearance Time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Vehicle Extension (s)		3.5		3.5	3.5					4.0	4.0	4.0
Lane Grp Cap (vph)		238		254	317					1217	2435	1209
v/s Ratio Prot		0.01		0.02	c0.07						0.03	c0.07
v/s Ratio Perm				0.02						0.01		
v/c Ratio		0.07		0.22	0.37					0.01	0.04	0.09
Uniform Delay, d1		79.5		65.8	68.1					6.0	6.1	6.4
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		0.2		0.5	0.8					0.0	0.0	0.2
Delay (s)		79.7		66.3	69.0					6.0	6.2	6.5
Level of Service		E		E	E					A	A	A
Approach Delay (s)		79.7			68.1			0.0			6.4	
Approach LOS		E			E			A			A	

Intersection Summary			
HCM 2000 Control Delay	33.8	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.15		
Actuated Cycle Length (s)	188.7	Sum of lost time (s)	16.7
Intersection Capacity Utilization	88.9%	ICU Level of Service	E
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	12	64	137	10	248	1176
Future Volume (vph)	12	64	137	10	248	1176
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.5	4.0	7.9		3.0	7.9
Lane Util. Factor	1.00	0.88	0.95		1.00	0.95
Frt	1.00	0.85	0.99		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)	1271	2760	3430		1805	3539
Flt Permitted	0.95	1.00	1.00		0.62	1.00
Satd. Flow (perm)	1271	2760	3430		1180	3539
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	13	70	149	11	270	1278
RTOR Reduction (vph)	0	0	3	0	0	0
Lane Group Flow (vph)	13	70	157	0	270	1278
Heavy Vehicles (%)	42%	3%	3%	20%	0%	2%
Turn Type	Perm	Free	NA		pm+pt	NA
Protected Phases			2		1	6
Permitted Phases	8	Free			6	
Actuated Green, G (s)	1.7	90.4	63.6		74.3	74.3
Effective Green, g (s)	1.7	90.4	63.6		74.3	74.3
Actuated g/C Ratio	0.02	1.00	0.70		0.82	0.82
Clearance Time (s)	6.5		7.9		3.0	7.9
Vehicle Extension (s)	3.0		4.0		3.0	4.0
Lane Grp Cap (vph)	23	2760	2413		1023	2908
v/s Ratio Prot			0.05		0.02	c0.36
v/s Ratio Perm	c0.01	0.03			0.19	
v/c Ratio	0.57	0.03	0.06		0.26	0.44
Uniform Delay, d1	44.0	0.0	4.2		1.7	2.2
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	28.1	0.0	0.1		0.1	0.5
Delay (s)	72.1	0.0	4.2		1.9	2.7
Level of Service	E	A	A		A	A
Approach Delay (s)	11.3		4.2			2.6
Approach LOS	B		A			A

Intersection Summary			
HCM 2000 Control Delay	3.1	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	90.4	Sum of lost time (s)	17.4
Intersection Capacity Utilization	51.6%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	2	125	191	10	362	1422
Future Volume (Veh/h)	2	125	191	10	362	1422
Sign Control	Stop		Free			Free
Grade	0%		0%			0%
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	136	208	11	393	1546
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None			None
Median storage veh)						
Upstream signal (m)			311			
pX, platoon unblocked						
vC, conflicting volume	1772	110			219	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1772	110			219	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	96	85			71	
cM capacity (veh/h)	54	923			1355	

Direction, Lane #	WB 1	WB 2	NB 1	NB 2	SB 1	SB 2	SB 3
Volume Total	2	136	139	80	393	773	773
Volume Left	2	0	0	0	393	0	0
Volume Right	0	136	0	11	0	0	0
cSH	54	923	1700	1700	1355	1700	1700
Volume to Capacity	0.04	0.15	0.08	0.05	0.29	0.45	0.45
Queue Length 95th (m)	0.9	4.1	0.0	0.0	9.7	0.0	0.0
Control Delay (s)	74.4	9.6	0.0	0.0	8.7	0.0	0.0
Lane LOS	F	A			A		
Approach Delay (s)	10.5		0.0		1.8		
Approach LOS	B						

Intersection Summary			
Average Delay	2.1		
Intersection Capacity Utilization	49.3%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	108	29	0	0	443	9	7	195	115	0	0	0
Future Volume (vph)	108	29	0	0	443	9	7	195	115	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Lane Util. Factor	1.00	1.00			0.95		1.00	0.95	1.00			
Frt	1.00	1.00			1.00		1.00	1.00	0.85			
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (prot)	1787	1776			3564		1289	3471	1599			
Flt Permitted	0.25	1.00			1.00		0.95	1.00	1.00			
Satd. Flow (perm)	478	1776			3564		1289	3471	1599			
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	117	32	0	0	482	10	8	212	125	0	0	0
RTOR Reduction (vph)	0	0	0	0	2	0	0	0	55	0	0	0
Lane Group Flow (vph)	117	32	0	0	490	0	8	212	70	0	0	0
Heavy Vehicles (%)	1%	7%	0%	0%	1%	0%	40%	4%	1%	2%	2%	2%
Turn Type	pm+pt	NA			NA		Perm	NA	Perm			
Protected Phases	7	4			8			2				
Permitted Phases	4						2		2			
Actuated Green, G (s)	41.9	41.9			25.8		70.1	70.1	70.1			
Effective Green, g (s)	41.9	41.9			25.8		70.1	70.1	70.1			
Actuated g/C Ratio	0.34	0.34			0.21		0.56	0.56	0.56			
Clearance Time (s)	3.0	6.3			6.3		6.4	6.4	6.4			
Vehicle Extension (s)	3.5	3.5			3.5		5.6	5.6	5.6			
Lane Grp Cap (vph)	298	596			737		724	1951	898			
v/s Ratio Prot	c0.04	0.02			c0.14			c0.06				
v/s Ratio Perm	0.09						0.01		0.04			
v/c Ratio	0.39	0.05			0.67		0.01	0.11	0.08			
Uniform Delay, d1	30.2	28.0			45.5		12.0	12.7	12.5			
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00			
Incremental Delay, d2	1.0	0.0			2.4		0.0	0.1	0.2			
Delay (s)	31.2	28.0			47.9		12.1	12.8	12.7			
Level of Service	C	C			D		B	B	B			
Approach Delay (s)		30.6			47.9			12.8			0.0	
Approach LOS		C			D			B			A	

Intersection Summary			
HCM 2000 Control Delay	33.0	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.27		
Actuated Cycle Length (s)	124.7	Sum of lost time (s)	15.7
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	125	71	436	14	0	0	0	0	11	1278	5
Future Volume (vph)	0	125	71	436	14	0	0	0	0	11	1278	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Lane Util. Factor		0.95		1.00	1.00					1.00	0.95	1.00
Frt		0.95		1.00	1.00					1.00	1.00	0.85
Flt Protected		1.00		0.95	1.00					0.95	1.00	1.00
Satd. Flow (prot)		3324		1805	1377					1656	3539	1615
Flt Permitted		1.00		0.41	1.00					0.95	1.00	1.00
Satd. Flow (perm)		3324		771	1377					1656	3539	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	136	77	474	15	0	0	0	0	12	1389	5
RTOR Reduction (vph)	0	43	0	0	0	0	0	0	0	0	0	3
Lane Group Flow (vph)	0	170	0	474	15	0	0	0	0	12	1389	2
Heavy Vehicles (%)	0%	2%	4%	0%	38%	0%	0%	0%	0%	9%	2%	0%
Turn Type		NA		pm+pt	NA					Perm	NA	Prot
Protected Phases		8		7	4						2	2
Permitted Phases				4						2		
Actuated Green, G (s)		20.0		95.3	95.3					79.7	79.7	79.7
Effective Green, g (s)		20.0		95.3	95.3					79.7	79.7	79.7
Actuated g/C Ratio		0.11		0.51	0.51					0.42	0.42	0.42
Clearance Time (s)		6.3		3.0	6.3					7.4	7.4	7.4
Vehicle Extension (s)		3.5		3.5	3.5					4.0	4.0	4.0
Lane Grp Cap (vph)		352		785	695					699	1494	682
v/s Ratio Prot		0.05		c0.23	0.01						c0.39	0.00
v/s Ratio Perm				c0.07						0.01		
v/c Ratio		0.48		0.60	0.02					0.02	0.93	0.00
Uniform Delay, d1		79.5		31.6	23.4					31.7	51.8	31.5
Progression Factor		1.00		1.00	1.00					1.00	1.00	1.00
Incremental Delay, d2		1.2		1.4	0.0					0.0	11.6	0.0
Delay (s)		80.7		33.0	23.4					31.8	63.5	31.5
Level of Service		F		C	C					C	E	C
Approach Delay (s)		80.7			32.7			0.0			63.1	
Approach LOS		F			C			A			E	

Intersection Summary			
HCM 2000 Control Delay	57.8	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	0.76		
Actuated Cycle Length (s)	188.7	Sum of lost time (s)	16.7
Intersection Capacity Utilization	105.6%	ICU Level of Service	G
Analysis Period (min)	15		
c Critical Lane Group			

Intersection: 100: Eastport Dr & QEW On/Off Ramp

Movement	WB	WB	WB	NB	NB	SB	SB	SB
Directions Served	L	R	R	T	TR	L	T	T
Maximum Queue (m)	309.3	393.4	385.3	1473.0	1471.5	15.9	8.2	13.2
Average Queue (m)	83.2	173.8	165.1	624.8	626.8	3.7	0.6	0.9
95th Queue (m)	333.6	441.9	433.7	1586.1	1586.2	12.5	4.7	6.7
Link Distance (m)	492.3	492.3	492.3	2985.7	2985.7		140.6	140.6
Upstream Blk Time (%)	8	9	9	1	1			
Queuing Penalty (veh)	0	0	0	0	0			
Storage Bay Dist (m)						150.0		
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 200: Eastport Dr & Beach Blvd

Movement	WB	WB	B1	NB	NB	B3	B3	B5	B5	B5	B5	SB
Directions Served	L	R	T	T	TR	T	T	T	T	T		L
Maximum Queue (m)	72.3	147.4	710.9	140.6	140.6	51.3	50.9	155.4	151.4	169.2	163.3	21.6
Average Queue (m)	6.0	123.6	318.5	117.0	116.3	36.0	36.1	136.5	135.1	148.7	122.2	7.2
95th Queue (m)	37.9	184.5	843.3	183.0	181.6	60.7	58.4	187.3	181.3	204.8	208.4	17.4
Link Distance (m)		117.1	2097.0	105.6	105.6	15.8	15.8	140.6	140.6	140.6	140.6	
Upstream Blk Time (%)		80		84	85	83	85	36	39	85	63	
Queuing Penalty (veh)		0		830	835	541	555	175	192	417	308	
Storage Bay Dist (m)	65.0											110.0
Storage Blk Time (%)	0	87										
Queuing Penalty (veh)	0	7										

Intersection: 300: Eastport Dr/QEW EB On Ramp & Lakeshore Rd

Movement	EB	EB	WB	WB	NB	NB	NB	NB
Directions Served	L	T	T	TR	L	T	T	R
Maximum Queue (m)	16.2	23.5	24.5	41.6	27.5	99.4	113.3	17.8
Average Queue (m)	2.4	4.1	6.8	15.1	4.1	50.3	63.1	14.3
95th Queue (m)	9.7	14.8	18.0	32.0	16.8	91.1	113.0	21.9
Link Distance (m)	58.7	58.7	146.9	146.9		104.8	104.8	
Upstream Blk Time (%)						0	0	
Queuing Penalty (veh)						0	5	
Storage Bay Dist (m)					75.0			10.0
Storage Blk Time (%)						1	23	9
Queuing Penalty (veh)						1	121	70

Intersection: 400: Eastport Dr/QEW WB Off-Ramp & CCIW Access Rd

Movement	EB	EB	WB	WB	SB	SB	SB	SB
Directions Served	T	TR	L	T	L	T	T	R
Maximum Queue (m)	14.3	21.0	33.0	59.3	8.3	19.3	21.9	30.0
Average Queue (m)	1.5	5.3	14.0	30.4	0.5	4.6	2.9	8.1
95th Queue (m)	7.2	15.7	29.3	55.7	4.2	13.8	12.7	23.4
Link Distance (m)	373.2		58.7	58.7		881.8	881.8	
Upstream Blk Time (%)				1				
Queuing Penalty (veh)				1				
Storage Bay Dist (m)		35.0			40.0			35.0
Storage Blk Time (%)								0
Queuing Penalty (veh)								0

Intersection: 700: Eastport Dr

Movement	B500	B500
Directions Served	T	
Maximum Queue (m)	295.5	290.9
Average Queue (m)	263.6	260.9
95th Queue (m)	398.0	396.2
Link Distance (m)	288.8	288.8
Upstream Blk Time (%)	10	3
Queuing Penalty (veh)	108	29
Storage Bay Dist (m)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 4196

Intersection: 100: Eastport Dr & QEW On/Off Ramp

Movement	WB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	T
Maximum Queue (m)	21.5	20.0	20.7	27.1	32.0	36.3
Average Queue (m)	4.6	3.3	3.4	8.8	5.8	7.7
95th Queue (m)	16.0	12.3	13.4	21.4	21.9	27.7
Link Distance (m)	492.3	2985.7	2985.7		140.6	140.6
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (m)				150.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 200: Eastport Dr & Beach Blvd

Movement	WB	WB	NB	SB	B600	B600
Directions Served	L	R	TR	L	T	
Maximum Queue (m)	4.6	25.8	3.7	25.8	138.1	131.5
Average Queue (m)	0.4	14.2	0.1	11.3	117.9	110.2
95th Queue (m)	3.5	22.6	2.2	21.6	164.9	169.4
Link Distance (m)		117.1	105.6		106.4	106.4
Upstream Blk Time (%)					56	36
Queuing Penalty (veh)					498	325
Storage Bay Dist (m)	65.0			110.0		
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 300: Eastport Dr/QEW EB On Ramp & Lakeshore Rd

Movement	EB	EB	WB	WB	B2	NB	NB	NB	NB
Directions Served	L	T	T	TR	T	L	T	T	R
Maximum Queue (m)	61.1	29.1	168.4	22.2	1057.7	19.4	30.0	42.4	17.5
Average Queue (m)	26.0	6.8	168.0	3.3	782.0	2.2	12.3	13.9	11.3
95th Queue (m)	56.8	21.4	170.3	14.7	1264.1	10.8	24.0	31.3	21.6
Link Distance (m)	58.7	58.7	146.9	146.9	1089.0		104.8	104.8	
Upstream Blk Time (%)	2		93		25				
Queuing Penalty (veh)	1		0		0				
Storage Bay Dist (m)						75.0			10.0
Storage Blk Time (%)								21	6
Queuing Penalty (veh)								24	6

Intersection: 400: Eastport Dr/QEW WB Off-Ramp & CCIW Access Rd

Movement	EB	EB	WB	WB	SB	SB	SB	SB
Directions Served	T	TR	L	T	L	T	T	R
Maximum Queue (m)	82.1	42.5	63.3	21.0	28.0	161.1	166.6	18.5
Average Queue (m)	33.7	23.6	56.2	2.5	1.6	84.1	89.5	1.2
95th Queue (m)	65.1	46.5	77.6	11.4	12.1	146.3	152.3	10.6
Link Distance (m)	373.2		58.7	58.7		881.8	881.8	
Upstream Blk Time (%)			45					
Queuing Penalty (veh)			101					
Storage Bay Dist (m)		35.0			40.0			35.0
Storage Blk Time (%)	14	4				24	29	0
Queuing Penalty (veh)	18	2				3	1	0

Intersection: 700: Eastport Dr

Movement	EB	EB	B500
Directions Served	T	T	T
Maximum Queue (m)	122.0	127.3	1.2
Average Queue (m)	49.3	48.5	0.0
95th Queue (m)	122.6	127.2	0.9
Link Distance (m)	139.9	139.9	288.8
Upstream Blk Time (%)	0	0	
Queuing Penalty (veh)	1	2	
Storage Bay Dist (m)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Network Summary

Network wide Queuing Penalty: 983

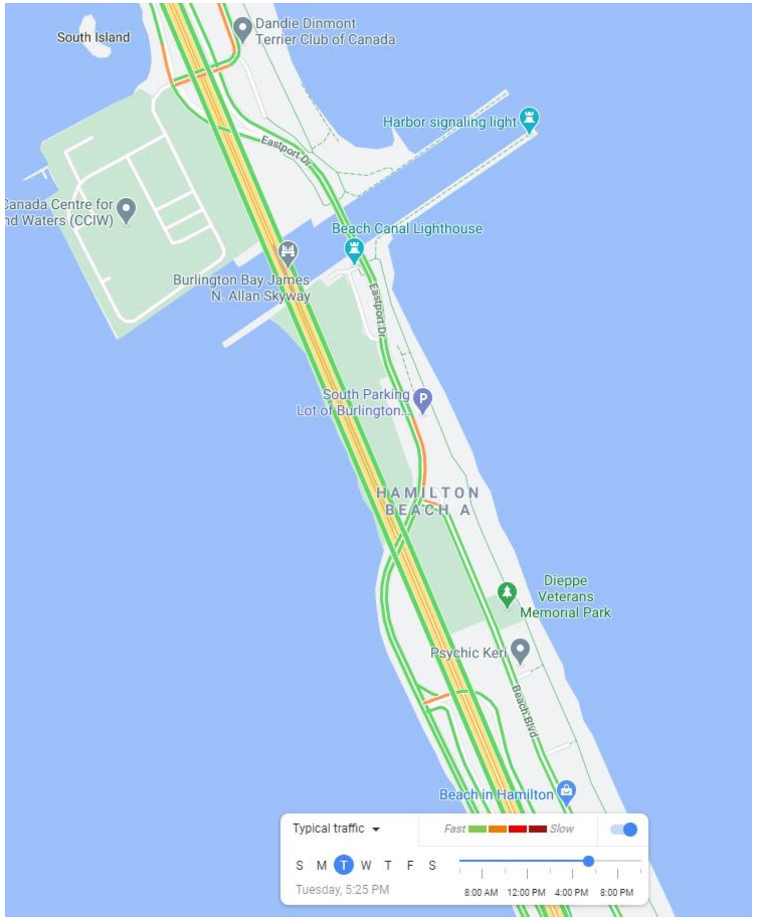
Exhibit A.3

Existing Traffic Volume Calibrations

Google Maps Typical Weekday Peak-Hour Traffic - Tuesday

AM Traffic Peak Hour

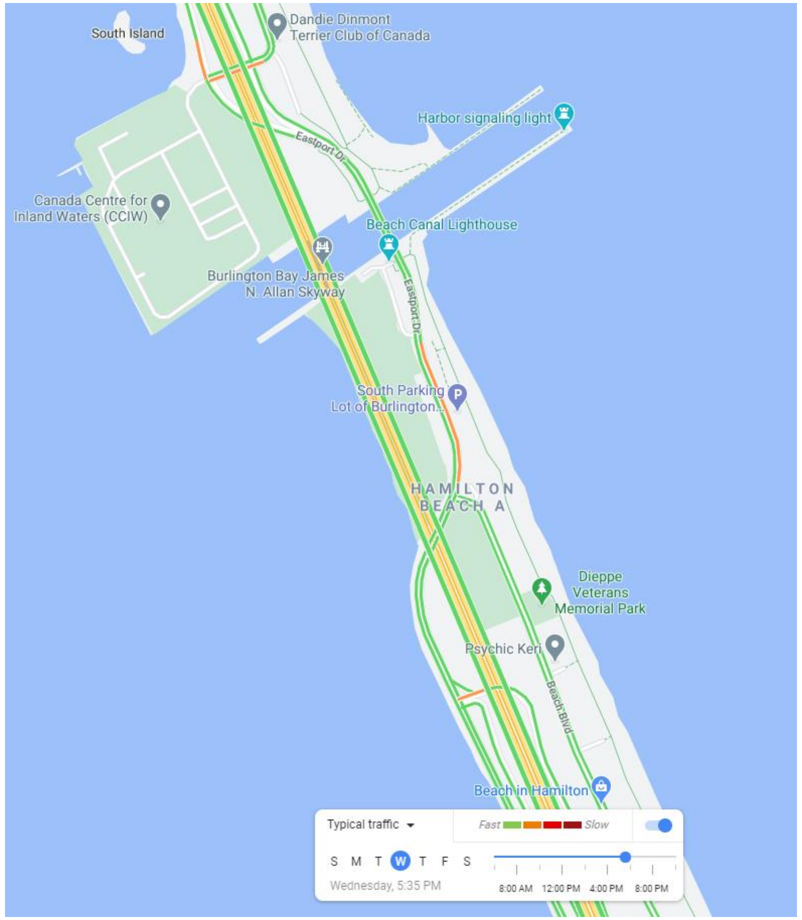
PM Traffic Peak Hour



Google Maps Typical Weekday Peak-Hour Traffic - Tuesday

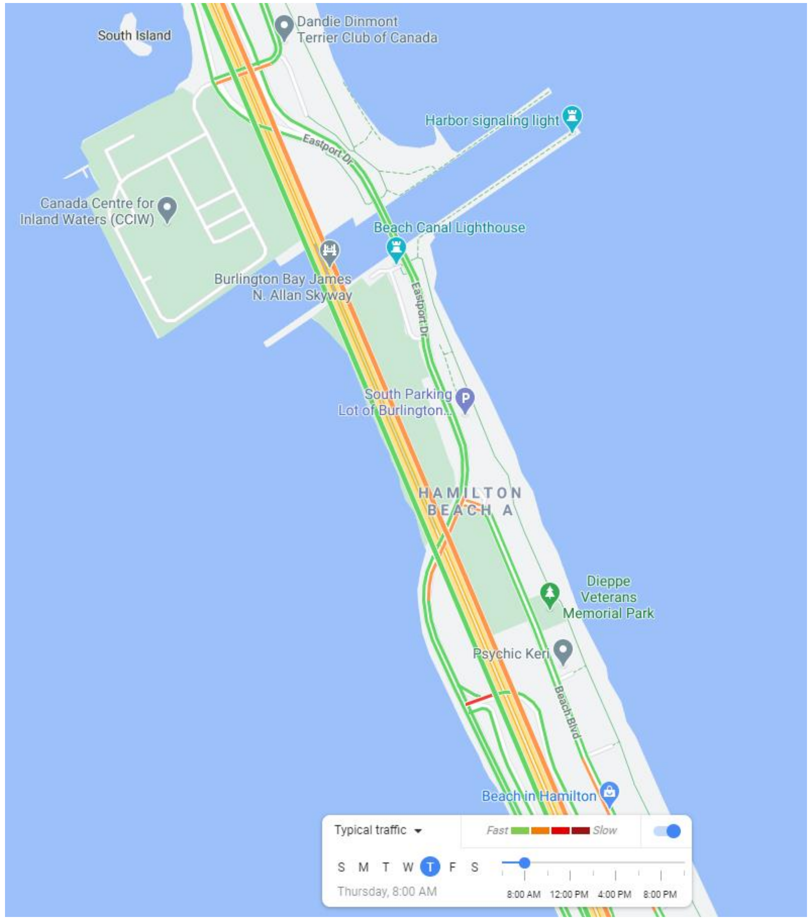
AM Traffic Peak Hour

PM Traffic Peak Hour

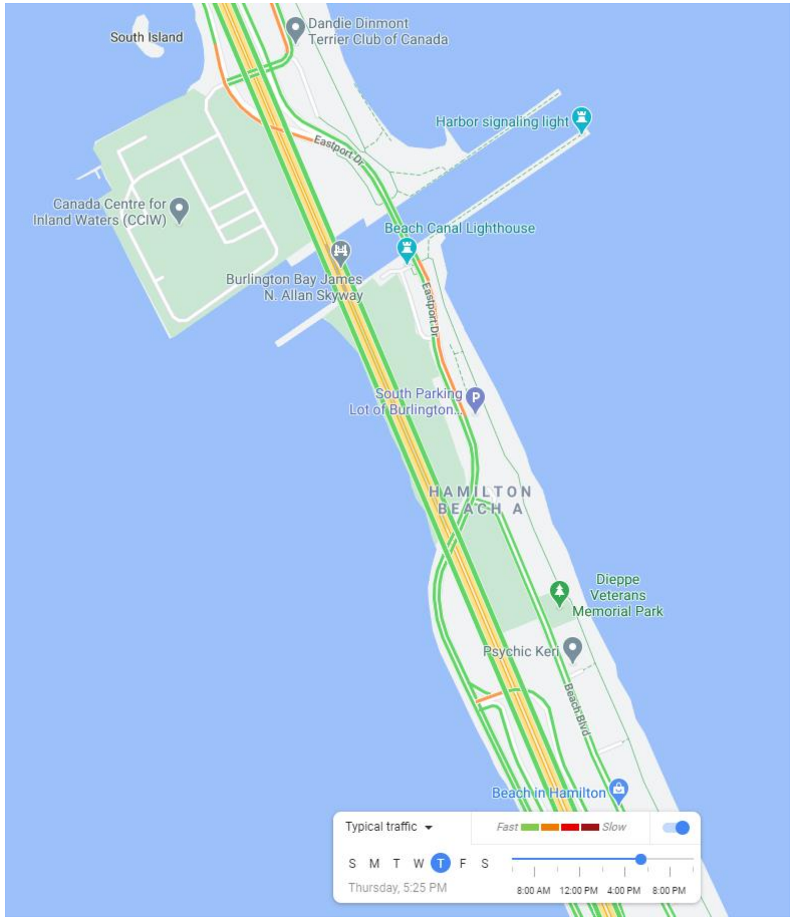


Google Maps Typical Weekday Peak-Hour Traffic - Tuesday

AM Traffic Peak Hour



PM Traffic Peak Hour



Appendix B

Cost Estimates and Life Cycle Cost Analysis

Exhibit B.1

Class C Estimates

Burlington Lift Bridge Rehabilitation - Class C Estimate					
Option 1 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 1 - Single Lane of Traffic					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 200,000	$ 200,000
2	Traffic Control (Single Lane Traffic)	LS	1.0	$ 200,000	$ 200,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 900,000	$ 900,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	155	$ 7,320	$ 1,134,600
33	Deliver New Stringers - Lift Span	t	155	$ 260	$ 40,300
34	Install New Stringers - Lift Span	t	155	$ 2,060	$ 319,300
35	Supply Deck System - Rivetted Grating	m^2	1660	$ 1,447	$ 2,401,854
36	Install New Grating - Rivetted	m^2	1660	$ 170	$ 282,200

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches - Sidewalk (Lift/Approach)	m^3			
54	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
55	Crack Injection	m	36.0	$ 250	$ 9,000
56	Dowels into Concrete	each	80.0	$ 50	$ 4,000
57	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
58	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
59	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
60	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
61	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
62	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Line Painting	m	1010	$ 50	$ 50,500
69	Counterweight Adjustment	LS	1.0	$ 100,000	$ 100,000
70	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
71	Traffic Control Light	LS	1.0	$ 230,000	$ 230,000
72	Temporary Support for Sidewalk	LS	1.0	$ 75,000	$ 75,000
73	Temporary Stringer	QTY	4.0	$ 20,000	$ 80,000
74	Security Fence	m	200.0	$ 50	$ 10,000
75	Dowel for connecting concrete barriers	EACH	1080	$ 40	$ 43,200
76	Sidewalk Snow Removal	LS	1	$ 15,000	$ 15,000
				Subtotal	**$ 10,727,509**
			Contingency	**30%**	**$ 3,218,253**
				Total	**$ 13,945,762**
* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions					

Burlington Lift Bridge Rehabilitation - Class C Estimate					
Option 1 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 2 - Two Lanes of Traffic					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 200,000	$ 200,000
2	Traffic Control (Two Lane Traffic)	LS	1.0	$ 250,000	$ 250,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 900,000	$ 900,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	155	$ 7,320	$ 1,134,600
33	Deliver New Stringers - Lift Span	t	155	$ 260	$ 40,300
34	Install New Stringers - Lift Span	t	155	$ 2,060	$ 319,300
35	Supply Deck System - Rivetted Grating	m^2	1660	$ 1,447	$ 2,401,854
36	Install New Grating - Rivetted	m^2	1660	$ 170	$ 282,200

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches - Sidewalk (Lift/Approach)	m^3			
54	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
55	Crack Injection	m	36.0	$ 250	$ 9,000
56	Dowels into Concrete	each	80.0	$ 50	$ 4,000
57	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
58	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
59	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
60	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
61	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
62	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Line Painting	m	1010	$ 50	$ 50,500
69	Counterweight Adjustment	LS	1.0	$ 100,000	$ 100,000
70	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
	Dowel for connecting concrete barriers	EACH	720	$ 40	$ 28,800
	Sidewalk Snow Removal	LS	1	$ 15,000	$ 15,000
				Subtotal	**$ 10,368,109**
			Contingency	**30%**	**$ 3,110,433**
				Total	**$ 13,478,542**
* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions					

Burlington Lift Bridge Rehabilitation - Class C Estimate					
Option 1 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 1 + 3 - Single Lane of Traffic					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 250,000	$ 250,000
2	Traffic Control (Single Lane Traffic)	LS	1.0	$ 200,000	$ 200,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 1,200,000	$ 1,200,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	155	$ 7,320	$ 1,134,600
33	Deliver New Stringers - Lift Span	t	155	$ 260	$ 40,300
34	Install New Stringers - Lift Span	t	155	$ 2,060	$ 319,300
35	Supply Deck System - Rivetted Grating	m^2	1660	$ 1,447	$ 2,401,854
36	Install New Grating - Rivetted	m^2	1660	$ 170	$ 282,200

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches - Sidewalk (Lift/Approach)	m^3			
54	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
55	Crack Injection	m	36.0	$ 250	$ 9,000
56	Dowels into Concrete	each	80.0	$ 50	$ 4,000
57	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
58	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
59	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
60	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
61	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
62	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Line Painting	m	1010	$ 50	$ 50,500
69	Counterweight Adjustment	LS	1.0	$ 100,000	$ 100,000
70	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
71	Traffic Control Light	LS	1.0	$ 230,000	$ 230,000
72	Temporary Support for Sidewalk	LS	1.0	$ 75,000	$ 75,000
73	Temporary Stringer	QTY	4.0	$ 20,000	$ 80,000
74	Security Fence	m	200.0	$ 50	$ 10,000
75	Dowel for connecting concrete barriers	EACH	1080	$ 40	$ 43,200
76	Sidewalk Snow Removal	LS	1	$ 15,000	$ 15,000
77	Temporary Steel Checker Plate	m	180.0	$ 275	$ 49,500
78	Inflation	LS	1.0	$ 227,500	$ 227,500
				Subtotal	**$ 11,354,509**
			Contingency	**30%**	**$ 3,406,353**
				Total	**$ 14,760,862**
* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions					

Burlington Lift Bridge Rehabilitation - Class C Estimate					
Option 1 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 2 + 3 - Two Lanes of Traffic					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 250,000	$ 250,000
2	Traffic Control (Two Lane Traffic)	LS	1.0	$ 250,000	$ 250,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 1,200,000	$ 1,200,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	155	$ 7,320	$ 1,134,600
33	Deliver New Stringers - Lift Span	t	155	$ 260	$ 40,300
34	Install New Stringers - Lift Span	t	155	$ 2,060	$ 319,300
35	Supply Deck System - Rivetted Grating	m^2	1660	$ 1,447	$ 2,401,854
36	Install New Grating - Rivetted	m^2	1660	$ 170	$ 282,200

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches - Sidewalk (Lift/Approach)	m^3			
54	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
55	Crack Injection	m	36.0	$ 250	$ 9,000
56	Dowels into Concrete	each	80.0	$ 50	$ 4,000
57	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
58	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
59	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
60	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
61	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
62	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Line Painting	m	1010	$ 50	$ 50,500
69	Counterweight Adjustment	LS	1.0	$ 100,000	$ 100,000
70	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
71	Dowel for connecting concrete barriers	EACH	720	$ 40	$ 28,800
72	Sidewalk Snow Removal	LS	1	$ 15,000	$ 15,000
73	Temporary Steel Checker Plate	m	180.0	$ 275	$ 49,500
74	Inflation	LS	1.0	$ 227,500	$ 227,500
				Subtotal	**$ 10,995,109**
			Contingency	**30%**	**$ 3,298,533**
				Total	**$ 14,293,642**

* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions

Burlington Lift Bridge Rehabilitation - Class C Estimate					
Option 1 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 4 - Full Closure					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 200,000	$ 200,000
2	Traffic Control (Full Closure & Detour Maintenance)	LS	1.0	$ 100,000	$ 100,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 700,000	$ 700,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	155	$ 7,320	$ 1,134,600
33	Deliver New Stringers - Lift Span	t	155	$ 260	$ 40,300
34	Install New Stringers - Lift Span	t	155	$ 2,060	$ 319,300
35	Supply Deck System - Rivetted Grating	m^2	1660	$ 1,447	$ 2,401,854
36	Install New Grating - Rivetted	m^2	1660	$ 170	$ 282,200

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
54	Crack Injection	m	36.0	$ 250	$ 9,000
55	Dowels into Concrete	each	80.0	$ 50	$ 4,000
56	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
57	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
58	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
59	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
60	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
61	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
62	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
63	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
64	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
65	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
66	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
67	Line Painting	m	1010	$ 50	$ 50,500
68	Counterweight Adjustment	LS	1.0	$ 100,000	$ 100,000
69	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
				Subtotal	**$ 9,974,309**
			Contingency	**30%**	**$ 2,992,293**
				Total	**$ 12,966,602**
* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions					

Burlington Lift Bridge Rehabilitation - Class C Estimate

Option 2 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 1 - Single Lane of Traffic					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 200,000	$ 200,000
2	Traffic Control (Single Lane Traffic)	LS	1.0	$ 200,000	$ 200,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 900,000	$ 900,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	110	$ 7,320	$ 805,200
33	Deliver New Stringers - Lift Span	t	110	$ 260	$ 28,600
34	Install New Stringers - Lift Span	t	110	$ 2,060	$ 226,600
35	carbon lightweight concrete* infill	m^2	1660	$ 1,520	$ 2,523,200
36	Install New Part Filled Concrete Grid Deck	m^2	1660	$ 130	$ 215,800

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
54	Crack Injection	m	36.0	$ 250	$ 9,000
55	Dowels into Concrete	each	80.0	$ 50	$ 4,000
56	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
57	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
58	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
59	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
60	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
61	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
62	Install Lift Span Deck Wearing Surface	m^2	1660	$ 755	$ 1,253,300
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Drainage System	LS	1.0	$ 100,000	$ 100,000
69	Steel Deck Curbs for Drainage System	LS/7	5.5	$ 1,000	$ 5,500
70	Line Painting	m	1010	$ 50	$ 50,500
71	Counterweight Adjustment	LS	1.0	$ 200,000	$ 200,000
72	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
73	Traffic Control Light	LS	1.0	$ 230,000	$ 230,000
74	Temporary Support for Sidewalk	LS	1.0	$ 75,000	$ 75,000
75	Temporary Stringer	QTY	4.0	$ 20,000	$ 80,000
76	Security Fence	m	200.0	$ 50	$ 10,000
77	Dowel for connecting concrete barriers	EACH	1080	$ 40	$ 43,200
78	Sidewalk Snow Removal	LS	1	$ 15,000	$ 15,000
				Subtotal	**$ 11,807,455**
			Contingency	**30%**	**$ 3,542,237**
				Total	**$ 15,349,692**
* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions					

Burlington Lift Bridge Rehabilitation - Class C Estimate

Option 2 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 2 - Two Lanes of Traffic					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 200,000	$ 200,000
2	Traffic Control (Two Lane Traffic)	LS	1.0	$ 250,000	$ 250,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 900,000	$ 900,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	110	$ 7,320	$ 805,200
33	Deliver New Stringers - Lift Span	t	110	$ 260	$ 28,600
34	Install New Stringers - Lift Span	t	110	$ 2,060	$ 226,600
35	carbon lightweight concrete* infill	m^2	1660	$ 1,520	$ 2,523,200
36	Install New Part Filled Concrete Grid Deck	m^2	1660	$ 130	$ 215,800

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
54	Crack Injection	m	36.0	$ 250	$ 9,000
55	Dowels into Concrete	each	80.0	$ 50	$ 4,000
56	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
57	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
58	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
59	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
60	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
61	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
62	Install Lift Span Deck Wearing Surface	m^2	1660	$ 755	$ 1,253,300
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Drainage System	LS	1.0	$ 100,000	$ 100,000
69	Steel Deck Curbs for Drainage System	LS/7	5.5	$ 1,000	$ 5,500
70	Line Painting	m	1010	$ 50	$ 50,500
71	Counterweight Adjustment	LS	1.0	$ 200,000	$ 200,000
72	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
73	Dowel for connecting concrete barriers	EACH	720	$ 40	$ 28,800
74	Sidewalk Snow Removal	LS	1	$ 15,000	$ 15,000
				Subtotal	**$ 11,448,055**
		Contingency		**30%**	**$ 3,434,417**
				Total	**$ 14,882,472**
* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions					

Burlington Lift Bridge Rehabilitation - Class C Estimate

Option 2 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 1 + 3 - Single Lane of Traffic					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 200,000	$ 200,000
2	Traffic Control (Single Lane Traffic)	LS	1.0	$ 200,000	$ 200,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 900,000	$ 900,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	110	$ 7,320	$ 805,200
33	Deliver New Stringers - Lift Span	t	110	$ 260	$ 28,600
34	Install New Stringers - Lift Span	t	110	$ 2,060	$ 226,600
35	carbon lightweight concrete* infill	m^2	1660	$ 1,520	$ 2,523,200
36	Install New Part Filled Concrete Grid Deck	m^2	1660	$ 130	$ 215,800

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
54	Crack Injection	m	36.0	$ 250	$ 9,000
55	Dowels into Concrete	each	80.0	$ 50	$ 4,000
56	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
57	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
58	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
59	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
60	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
61	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
62	Install Lift Span Deck Wearing Surface	m^2	1660	$ 755	$ 1,253,300
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Drainage System	LS	1.0	$ 100,000	$ 100,000
69	Steel Deck Curbs for Drainage System	LS/7	5.5	$ 1,000	$ 5,500
70	Line Painting	m	1010	$ 50	$ 50,500
71	Counterweight Adjustment	LS	1.0	$ 200,000	$ 200,000
72	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
73	Traffic Control Light	LS	1.0	$ 230,000	$ 230,000
74	Temporary Support for Sidewalk	LS	1.0	$ 75,000	$ 75,000
75	Temporary Stringer	QTY	4.0	$ 20,000	$ 80,000
76	Security Fence	m	200.0	$ 50	$ 10,000
77	Dowel for connecting concrete barriers	EACH	1080	$ 40	$ 43,200
78	Sidewalk Snow Removal	LS	1	$ 15,000	$ 15,000
79	Temporary Steel Checker Plate	m	180.0	$ 275	$ 49,500
80	Inflation	LS	1.0	$ 262,500	$ 262,500
				Subtotal	**$ 12,119,455**
			Contingency	**30%**	**$ 3,635,837**
				Total	**$ 15,755,292**
* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions					

Burlington Lift Bridge Rehabilitation - Class C Estimate

Option 2 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 2 + 3 - Two Lanes of Traffic					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 200,000	$ 200,000
2	Traffic Control (Two Lane Traffic)	LS	1.0	$ 250,000	$ 250,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 900,000	$ 900,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	110	$ 7,320	$ 805,200
33	Deliver New Stringers - Lift Span	t	110	$ 260	$ 28,600
34	Install New Stringers - Lift Span	t	110	$ 2,060	$ 226,600
35	carbon lightweight concrete* infill	m^2	1660	$ 1,520	$ 2,523,200
36	Install New Part Filled Concrete Grid Deck	m^2	1660	$ 130	$ 215,800

Item	Description	Unit	Est Qty	Unit Price	Total Cost
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
54	Crack Injection	m	36.0	$ 250	$ 9,000
55	Dowels into Concrete	each	80.0	$ 50	$ 4,000
56	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
57	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
58	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
59	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
60	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
61	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
62	Install Lift Span Deck Wearing Surface	m^2	1660	$ 755	$ 1,253,300
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Drainage System	LS	1.0	$ 100,000	$ 100,000
69	Steel Deck Curbs for Drainage System	LS/7	5.5	$ 1,000	$ 5,500
70	Line Painting	m	1010	$ 50	$ 50,500
71	Counterweight Adjustment	LS	1.0	$ 200,000	$ 200,000
72	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
73	Dowel for connecting concrete barriers	EACH	720	$ 40	$ 28,800
74	Sidewalk Snow Removal	LS	1	$ 15,000	$ 15,000
75	Temporary Steel Checker Plate	m	180.0	$ 275	$ 49,500
76	Inflation	LS	1.0	$ 262,500	$ 262,500
				Subtotal	**$ 11,760,055**
			Contingency	**30%**	**$ 3,528,017**
				Total	**$ 15,288,072**

* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions

Burlington Lift Bridge Rehabilitation - Class C Estimate

Option 2 - Lift Span Rivetted Grid Deck and Approach Span Deck Replacement and Sidewalk Widening					
Construction Stagging - Option 4 Ful Closure					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 200,000	$ 200,000
2	Traffic Control (Full Closure & Detour Maintenance)	LS	1.0	$ 100,000	$ 100,000
3	Environmental Protection/ Temporary Access	LS	1.0	$ 700,000	$ 700,000
4	Environmental Protection During Coating of Structural Steel (Approach Spans)	LS/m^2	800.0	$ 150	$ 120,000
5	Access to Work Area, Work Platform and Scaffolding (Approach Spans)	LS	1.0	$ 40,000	$ 40,000
6	Erosion and Sediment Control	LS	1.0	$ 30,000	$ 30,000
7	Lead Abatement and Stringer Removals - Lift Span	LS	1.0	$ 250,000	$ 250,000
8	Lead Abatement and Removals - Approach Spans	LS/m^2	225.0	$ 200	$ 45,000
9	Remove Existing Grating and Stringers	m^2	1660	$ 100	$ 166,000
10	Prepare Floor Beams	LS	1	$ 51,500	$ 51,500
11	Granular A - Approach	t	26	$ 80	$ 2,080
12	Earth Excavation for Structure Approach	m^3	37	$ 50	$ 1,850
13	Low Carbon Concrete* in Approach Deck - Deck	LS/m^3	180.0	$ 3,204	$ 576,720
14	Low Carbon Concrete* in Approach Deck - New Curbs	LS/m^3	5.0	$ 3,205	$ 16,025
15	Low Carbon Concrete* in Approach Slabs	LS/m^3	45.0	$ 1,505	$ 67,725
16	Low Carbon Concrete* Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$ 123,360
17	Low Carbon Concrete* in Approach Slab	LS/m^3	20	$ 2,505	$ 50,100
18	Low Carbon Concrete* in Sleeper Slab for Expansion Joint	LS/m^3	9	$ 2,505	$ 22,545
19	New Subdrains for Sleeper Slabs	m	100	$ 35	$ 3,500
20	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
21	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
22	Fabrication of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 6,500	$ 65,000
23	Delivery of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 250	$ 2,500
24	Erection of Steel - New TL-4 Barriers (Approach)	LS/T	10.0	$ 2,000	$ 20,000
25	Fabrication of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 6,500	$ 260,000
26	Delivery of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 250	$ 10,000
27	Erection of Steel - New TL-2 Barriers (Lift Span)	LS/T	40.0	$ 2,000	$ 80,000
28	Salvage, Modification and New Pedestrian Barriers	LS	1.0	$ 25,000	$ 25,000
29	Fabrication of Steel - New Diaphragms and Stiffeners - Approach Spans	LS/T	2.0	$ 6,500	$ 13,000
30	Delivery of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 250	$ 500
31	Erection of Steel - New Diaphragms and Stiffeners Approach Spans	LS/T	2.0	$ 2,000	$ 4,000
32	Supply New Stringers - Lift Span	t	110	$ 7,320	$ 805,200
33	Deliver New Stringers - Lift Span	t	110	$ 260	$ 28,600
34	Install New Stringers - Lift Span	t	110	$ 2,060	$ 226,600
35	Supply Deck System complete with partial depth low carbon lightweight concrete* infill	m^2	1660	$ 1,520	$ 2,523,200

Item	Description	Unit	Est Qty	Unit Price	Total Cost
36	Install New Part Filled Concrete Grid Deck	m^2	1660	$ 130	$ 215,800
37	Coating Existing Structural Steel within 3m of existing joint - Stringers, Diaphragms, Floor Beams, Front/Back Tower Beam	LS/m^2	800.0	$ 200	$ 160,000
38	Coating New Structural Steel - Approach Diaphgrams	LS/m^2	37.0	$ 200	$ 7,400
39	Coating New Structural Steel Lift Span Stringers	m^2	1660	$ 500	$ 830,000
40	Seal Existing Steel in Lift Span affected by upgrades for lead remediation	LS	1	$ 200,000	$ 200,000
41	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$ 5,600
42	Form and Fill Grooves	m	29.0	$ 50	$ 1,450
43	Bearings - Approach Span	Each	18.0	$ 3,000	$ 54,000
44	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$ 24,000
45	Concrete Removal - Partial Depth - Type A (Sidewalk)	m^3	0.5	$ 8,000	$ 4,000
46	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$ 14,000
47	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$ 36,000
48	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck - Approach Spans	LS/m^3	126	$ 1,500	$ 189,000
49	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/m^3	9	$ 1,500	$ 13,500
50	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs/ Curbs	LS/m^3	50	$ 1,500	$ 75,000
51	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$ 31,500
52	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$ 3,500
53	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$ 70,000
54	Crack Injection	m	36.0	$ 250	$ 9,000
55	Dowels into Concrete	each	80.0	$ 50	$ 4,000
56	Jacking of Superstructure	LS	1.0	$ 80,000	$ 80,000
57	Shear Connectors - Type A	each	1430	$ 40	$ 57,200
58	Modifications to Widen Sidewalk Deck Support	LS	1	$ 20,000	$ 20,000
59	Modifications to Sidewalk Support (Lift Span)	LS	1.0	$ 40,000	$ 40,000
60	Installation of Aluminum Panels in Sidewalk to widen	m^2	50	$ 4,000	$ 200,000
61	Prepare and Install Matacryl (or equivalent) Wearing Surface to Sidewalk	m^2	300	$ 755	$ 226,500
62	Install Lift Span Deck Wearing Surface	m^2	1660	$ 755	$ 1,253,300
63	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$ 1,200
64	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$ 700
65	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$ 800
66	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$ 9,000
67	Structural Steel Repairs - Approach Spans	LS	1	$ 5,000	$ 5,000
68	Drainage System	LS	1.0	$ 100,000	$ 100,000
69	Steel Deck Curbs for Drainage System	LS/7	5.5	$ 1,000	$ 5,500
70	Line Painting	m	1010	$ 50	$ 50,500
71	Counterweight Adjustment	LS	1.0	$ 200,000	$ 200,000
72	Removal of Existing Rail Stringers and Installation of Lateral Balancing System	LS	1.0	$ 50,000	$ 50,000
				Subtotal	**$ 11,054,255**
			Contingency	**30%**	**$ 3,316,277**
				Total	**$ 14,370,532**
* Low Carbon Concrete is assumed to be concrete with a 30-40% reduction in carbon emissions					

Exhibit B.2

Lift Span Life Cycle Cost Analysis

Life Cycle Cost Analysis Lift Span

P =		*Estimated Capital Cost*
Ci =	P * (1+i)^n	*Future Capital Cost Based on Present Construction Estimate*
Pr =	P/(1+r)^n	*Present Capital Cost*
i =	2.00% %	*Inflation*
r =	4.00% %	*Discount Rate*

Alternative 2 - Rivetted Deck Grating

Year	Number of Years	Estimated Capital Cost, P	Future Capital Cost, Ci	Present Capital Cost, Pr	Treatment
2023	2	$ 9,103,905	$ 9,471,703	$ 8,757,122	Treatment 2- Rivetted Open Steel Grid Deck
2044	21	$ 1,341,600	$ 2,033,418	$ 892,332	Treatment 6- Recoat/Seal Coating As needed
2054	31	$ 87,360	$ 161,405	$ 47,850	Treatment 7- Misc Deck Repairs
2074	51	$ (29,120)	$ (79,947)	$ (10,817)	Salvage value at 50 years
			Total	$ 9,686,487	

Alternative 4 - Half Filled Grid Deck

Year	Number of Years	Estimated Capital Cost, P	Future Capital Cost, Ci	Present Capital Cost, Pr	Treatment
2023	2	$ 10,613,202	$ 11,041,976	$ 10,208,927	Treatment 4- Half Filled Grating System
NA	3-50	$ 312,000	$ 536,636	$ 78,532	Treatment 8- Clean Deck, Clear Drains
2039	16	$ 283,894	$ 389,726	$ 208,078	Treatment 10 - Maintain Wearing Surface
2044	21	$ 547,300	$ 829,524	$ 364,023	Treatment 13- Recoat/Seal Coating As needed under solid deck
2054	31	$ 283,894	$ 524,519	$ 155,499	Treatment 10 - Maintain Wearing Surface
2064	41	$ 547,300	$ 1,232,629	$ 246,868	Treatment 13- Recoat/Seal Coating As needed under solid deck
2069	46	$ 283,894	$ 705,934	$ 116,207	Treatment 10 - Maintain Wearing Surface
2074	51	$ (189,263)	$ (519,605)	$ (70,303)	Salvage value at 50 years
			Total	$11,307,831	

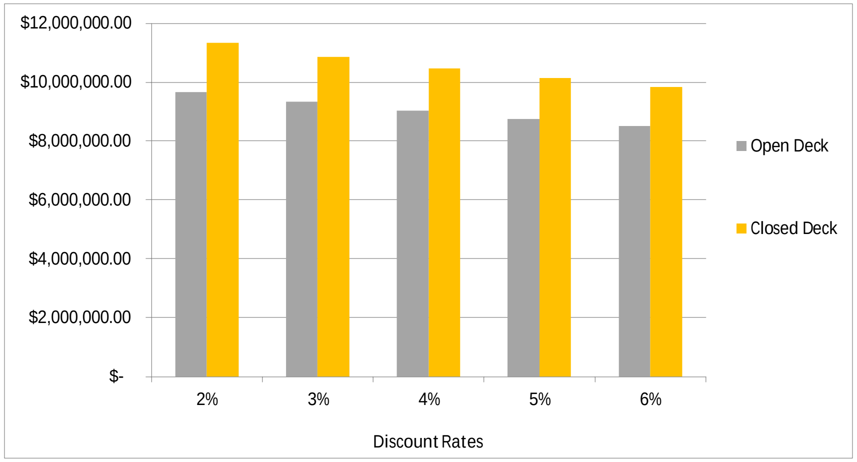
Sensitivity Analysis

Alternative 2 - Rivetted Deck Grating

Activity	n	Capital Cost	PV (For Discount Rates) 2%	3%	4%	5%	6%
Treatment 2- Rivetted Open Steel Grid Deck	2	$ 9,103,905.20	$ 8,750,389.47	$ 8,581,303.80	$ 8,417,072.12	$ 8,257,510.39	$ 8,102,443.22
Treatment 6- Recoat/Seal Coating As needed	21	$ 1,341,600.00	$ 885,155.24	$ 721,176.11	$ 588,739.16	$ 481,557.08	$ 394,638.89
Treatment 7- Misc Deck Repairs	31	$ 87,360.00	$ 47,283.25	$ 34,942.88	$ 25,898.77	$ 19,250.60	$ 14,349.30
Salvage value at 50 years	51	-$ 29,120.00	-$ 10,606.76	-$ 6,449.01	-$ 3,939.95	-$ 2,418.45	-$ 1,491.39
		Total PV	$ 9,672,221.19	$ 9,330,973.78	$ 9,027,770.09	$ 8,755,899.62	$ 8,509,940.02

Alternative 4 - Half Filled Grid Deck

Activity	n	Capital Cost	PV (For Discount Rates) 2%	3%	4%	5%	6%
Treatment 4- Half Filled Grating System	2	$ 10,613,202.33	$ 10,201,078.75	$ 10,003,961.10	$ 9,812,502.16	$ 9,626,487.38	$ 9,445,712.29
Treatment 8- Clean Deck, Clear Drains	3-50	$ 312,000.00	$ 118,235	$ 73,304	$ 45,658	$ 28,568	$ 17,954
Treatment 10 - Maintain Wearing Surface	16	$ 283,894.00	$ 206,801.40	$ 176,913.36	$ 151,573.33	$ 130,055.11	$ 111,753.82
Treatment 13- Recoat/Seal Coating As needed under solid deck	21	$ 547,300.00	$ 361,095.30	$ 294,200.72	$ 240,173.63	$ 196,449.16	$ 160,991.25
Treatment 10 - Maintain Wearing Surface	31	$ 283,894.00	$ 153,656.48	$ 113,553.95	$ 84,163.29	$ 62,558.73	$ 46,630.96
Treatment 13- Recoat/Seal Coating As needed under solid deck	41	$ 547,300.00	$ 243,006.79	$ 162,891.80	$ 109,612.11	$ 74,039.62	$ 50,197.83
Treatment 10 - Maintain Wearing Surface	46	$ 283,894.00	$ 114,169.03	$ 72,885.96	$ 46,732.89	$ 30,091.82	$ 19,457.47
Salvage value at 50 years	51	-$ 189,262.67	-$ 68,937.61	-$ 41,914.71	-$ 25,607.35	-$ 15,718.49	-$ 9,693.17
		Total PV	$ 11,329,105.18	$ 10,855,796.67	$ 10,464,808.48	$ 10,132,531.27	$ 9,843,004.71



Treatment 2- Rivetted Open Steel Grid Deck					
Item	Description	Unit	Est Qty	Unit Price	Total Cost
1	Mobilization/Demobilization	LS	1.0	$200,000	$200,000
2	Traffic Control (Full Closure & Detour)	LS	1.0	$50,000	$50,000
3	Environmental Protection/ Temporary Access	LS	1.0	$700,000	$700,000
4	Lead Abatement and Stringer Removals	LS	1.0	$250,000	$250,000
5	Remove Existing Grating and Stringers	m^2	1660	$ 75	$124,500
6	Seal Existing Steel affected by upgrades for lead remediation	LS	1	$ 200,000	$200,000
7	Prepare Floor Beams	LS	1	$ 51,500	$51,500
8	Supply New Stringers	t	155	$ 7,320	$1,134,600
9	Deliver New Stringers	t	155	$ 260	$40,300
10	Install New Stringers	t	155	$ 2,060	$319,300
11	Supply Deck System	m^2	1660	$ 1,447	$2,401,854
12	Install New Grating	m^2	1660	$ 170	$282,200
13	Coating New Structural Steel	m^2	1660	$ 500	$830,000
14	Line Painting	m	575	$ 50	$28,750
15	Modifications to Sidewalk Support	LS	1.0	$ 40,000	$40,000
16	Fabrication of Steel - New TL-2 Barriers	LS/T	40.0	$6,500	$260,000
17	Delivery of Steel - New TL-2 Barriers	LS/T	40.0	$250	$10,000
18	Erection of Steel - New TL-2 Barriers	LS/T	40.0	$2,000	$80,000
19	Counterweight Adjustment	LS	1.0	$100,000	$100,000
				Subtotal	$7,003,004
			Contingency	30%	$2,100,901
				Total	$9,103,905

Treatment 4- Half Filled Grating System					
Item	Description	Unit	Est Qty	Unit Price	Total Cost
1	Mobilization/Demobilization	LS	1.0	$200,000	$200,000
2	Traffic Control (Full Closure & Detour)	LS	1.0	$50,000	$50,000
3	Environmental Protection/ Temporary Access	LS	1.0	$700,000	$700,000
4	Lead Abatement and Stringer Removals	LS	1.0	$250,000	$250,000
5	Remove Existing Grating and Stringers	m^2	1660	$ 75	$124,500
6	Seal Existing Steel affected by upgrades for lead remediation	LS	1.0	$ 200,000	$200,000
7	Prepare Floor Beams	LS	1.0	$ 51,500	$51,500
8	Supply New Stringers	t	110	$ 7,320	$805,200
9	Deliver New Stringers	t	110	$ 260	$28,600
10	Install New Stringers	t	110	$ 2,060	$226,600
11	Supply Deck System C/W part depth semi-lightweight Concrete infill	m^2	1660	$ 1,512	$2,509,752
12	Install New Part Filled Concrete Grid Deck	m^2	1660	$ 130	$215,800
13	Install Wearing Surface	m^2	1660	$ 755	$1,253,300
14	Coating New Structural Steel	m^2	1660	$ 500	$830,000
15	Drainage System	LS	1.0	$ 100,000	$100,000
16	Modifications to Sidewalk Support	LS	1.0	$ 40,000	$40,000
17	Line Painting	m	575	$ 50	$28,750
18	Fabrication of Steel - New TL-2 Barriers	LS/T	40.0	$6,500	$260,000
19	Delivery of Steel - New TL-2 Barriers	LS/T	40.0	$250	$10,000
20	Erection of Steel - New TL-2 Barriers	LS/T	40.0	$2,000	$80,000
21	Counterweight Adjustment	LS	1.0	$200,000	$200,000
				Subtotal	$8,164,002
			Contingency	30%	$2,449,201
				Total	$10,613,202

Treatment 6- Recoat/Seal Coating As needed					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 10,000	$10,000
2	Environmental Protection/ Temporary Access	LS	1.0	$700,000	$700,000
3	Clean, Seal, Paint Structural Steel	m^2	1610	$ 200	$322,000
				Subtotal	**$1,032,000**
			Contingency	**30%**	**$309,600**
				Total	**$1,341,600**

Treatment 7- Misc Deck Repairs					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 5,000	$5,000
2	Traffic Control	LS	1.0	$30,000	$30,000
3	Deck Repairs	m^2	1610	$ 20	$32,200
				Subtotal	**$67,200**
			Contingency	**30%**	**$20,160**
				Total	**$87,360**

Treatment 8- Clean Deck, Clear Drains					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Clear Drains, Clean Deck	LS	1	$ 5,000	$5,000
				Subtotal	**$5,000**
			Contingency	**30%**	**$1,500**
				Total	**$6,500**

Treatment 10 - Maintain Wearing Surface

Item	Description	Unit	Est Qty	Unit Price	Total Cost
1	Traffic Control	LS	1	$ 5,000.00	$ 5,000.00
2	Mobilization/Demobilization	LS	1	$ 5,000.00	$ 5,000.00
3	Reapply Wearing Surface as Needed	m^2	276	$ 755	$ 208,380.00
				Subtotal	$218,380
			Contingency	30%	$65,514
				Total	$283,894

Treatment 13- Recoat/Seal Coating As needed under solid deck					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 10,000	$10,000
2	Environmental Protection/ Temporary Access*	LS	1.0	$250,000	$250,000
3	Clean, Seal, Paint Structural Steel	m^2	1610	$ 100	$161,000
				Subtotal	**$421,000**
		Contingency		**30%**	**$126,300**
				Total	**$547,300**

* Assumed work is limited to joints and deck edges

Exhibit B.3

Approach Span Life Cycle Cost Analysis

Life Cycle Cost Analysis Approach Spans

P =		*Estimated Capital Cost*
Ci = P * (1+i)^n		*Future Capital Cost Based on Present Construction Estimate*
Pr = P/(1+r)^n		*Present Capital Cost*
i =	2.00% %	*Inflation*
r =	4.00% %	*Discount Rate*

Alternative 1 - Deck Replacement with Expansion Joints

Year	**Number of Years**	**Estimated Capital Cost, P**	**Future Capital Cost, Ci**	**Present Capital Cost, Pr**	**Treatment**
2021	1	$ 2,956,876	$ 3,016,014	$ 2,900,013	Treatment 1- Deck Replacement with Expansion Joint Replacement
2031	10	$ 154,700	$ 188,578	$ 127,397	Treatment 3 - Replace Expansion Joint Seals
2041	20	$ 265,200	$ 394,073	$ 179,850	Treatment 4 - Replace Expansion Joint Seals, recoat/seal paint as needed
2051	30	$ 577,200	$ 1,045,518	$ 322,353	Treatment 5- Replace Expansion Joint Assembly, Scarify Deck and Place Overlay
2061	40	$ 265,200	$ 585,572	$ 121,968	Treatment 4 - Replace Expansion Joint Seals, recoat/seal paint as needed
2071	50	$ -	$ -	$ -	Salvage value at 50 years
			Total	$ 3,651,581	

Alternative 2 - Deck Replacement with Semi-Integral detailing

Year	**Number of Years**	**Estimated Capital Cost, P**	**Future Capital Cost, Ci**	**Present Capital Cost, Pr**	**Treatment**
2021	1	$ 3,076,203	$ 3,137,727	$ 3,017,045	Treatment 2- Semi-Integral Conversion
2041	20	$ 65,000	$ 96,587	$ 44,081	Treatment 6 - Recoat/seal paint as needed
2051	30	$ 312,000	$ 565,145	$ 174,245	Treatment 7- Scarify Deck and Place Overlay
2061	40	$ 65,000	$ 143,523	$ 29,894	Treatment 6 - Recoat/seal paint as needed
2071	50	$ (32,500)	$ (87,477)	$ (12,309)	Salvage value at 50 years
			Total	$ 3,252,956	

Sensitivity Analysis

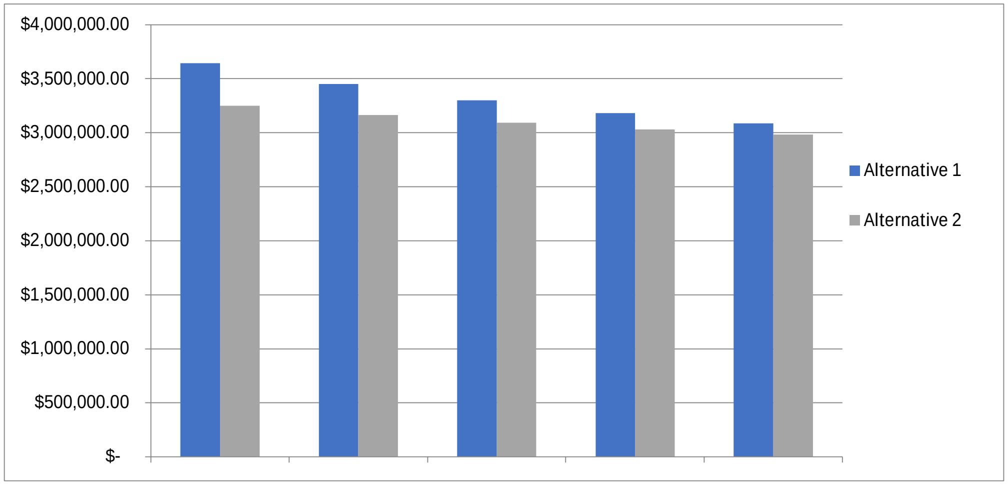
Alternative 1 - Deck Replacement with Expansion Joints

			PV (For Discount Rates)				
Activity	n	Capital Cost	2%	3%	4%	5%	6%
Treatment 1- Deck Replacement with Expansion Joint Replacement	1	$ 2,956,876.00	$ 2,898,898.04	$ 2,870,753.40	$ 2,843,150.00	$ 2,816,072.38	$ 2,789,505.66
Treatment 3 - Replace Expansion Joint Seals	10	$ 154,700.00	$ 126,907.88	$ 115,111.33	$ 104,509.78	$ 94,972.38	$ 86,383.67
Treatment 4 - Replace Expansion Joint Seals, recoat/seal paint as needed	20	$ 265,200.00	$ 178,472.00	$ 146,834.81	$ 121,033.82	$ 99,951.09	$ 82,690.61
Treatment 5- Replace Expansion Joint Assembly, Scarify Deck and Place Overlay	30	$ 577,200.00	$ 318,655.32	$ 237,798.76	$ 177,961.54	$ 133,551.06	$ 100,496.37
Treatment 4 - Replace Expansion Joint Seals, recoat/seal paint as needed	40	$ 265,200.00	$ 120,106.54	$ 81,298.87	$ 55,238.25	$ 37,670.51	$ 25,783.32
Salvage value at 50 years	50	$ -	$ -	$ -	$ -	$ -	$ -
			$ 3,643,039.77	$ 3,451,797.17	$ 3,301,893.38	$ 3,182,217.43	$ 3,084,859.64

Alternative 2 - Deck Replacement with Semi-Integral detailing

			PV (For Discount Rates)				
Activity	n	Capital Cost	2%	3%	4%	5%	6%
Treatment 2- Semi-Integral Conversion	1	$ 3,076,203.00	$ 3,015,885.29	$ 2,986,604.85	$ 2,957,887.50	$ 2,929,717.14	$ 2,902,078.30
Treatment 6 - Recoat/seal paint as needed	20	$ 65,000.00	$ 43,743.14	$ 35,988.92	$ 29,665.15	$ 24,497.82	$ 20,267.31
Treatment 7- Scarify Deck and Place Overlay	30	$ 312,000.00	$ 172,246.12	$ 128,539.87	$ 96,195.42	$ 72,189.76	$ 54,322.36
Treatment 6 - Recoat/seal paint as needed	40	$ 65,000.00	$ 29,437.88	$ 19,926.19	$ 13,538.79	$ 9,232.97	$ 6,319.44
Salvage value at 50 years	50	-$ 32,500.00	-$ 12,074.66	-$ 7,413.48	-$ 4,573.16	-$ 2,834.12	-$ 1,764.37
			$ 3,249,237.77	$ 3,163,646.36	$ 3,092,713.70	$ 3,032,803.57	$ 2,981,223.04

Sensitivity Analysis



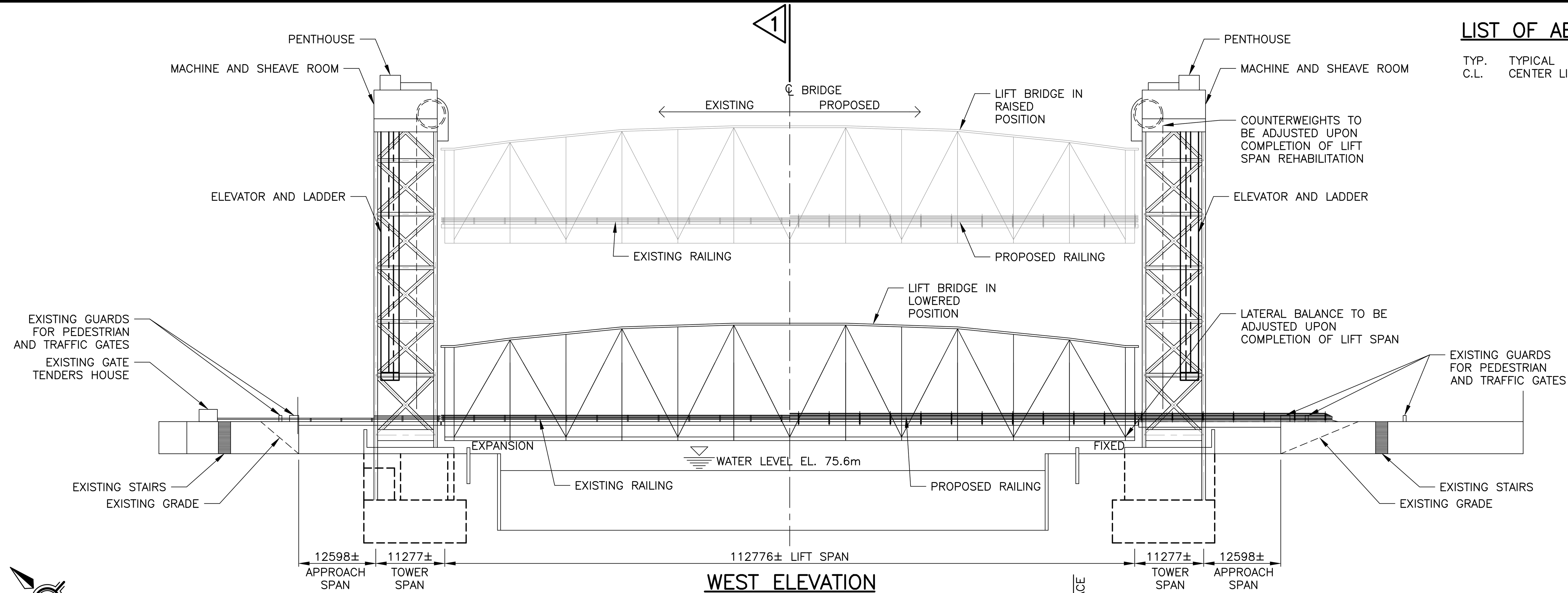
Treatment 2- Semi-Integral Conversion					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$ 100,000	$100,000
2	Traffic Control	LS	1.0	$ 85,000	$85,000
3	Traffic Protection System	LS	1	$ 30,000	$30,000
4	Erosion and Sediment Control	LS	1.0	$ 30,000	$30,000
5	Sealing Joints in Asphalt	m	30.0	$ 250	$7,500
6	Granular A	t	26	$ 80	$2,080
7	Earth Excavation for Structure	m^3	37	$ 50	$1,850
8	Concrete in Deck - Deck	LS/m^3	180.0	$ 3,204	$576,720
9	Concrete in Deck - New Curbs	LS/m^3	5.0	$ 3,205	$16,025
10	Concrete in Deck - Approach Slabs	LS/m^3	45.0	$ 1,505	$67,725
11	Concrete in Deck - Semi-Integral Deck Extension	LS/m^3	32	$ 3,855	$123,360
12	Concrete in Approach Slabs - Sleeper Slabs	LS/m^3	17	$ 2,505	$42,585
13	Concrete in Approach Slabs - Expansion Joints	LS/m^3	9	$ 2,505	$22,545
14	New Subdrains for Sleeper Slabs	m	100	$ 35	$3,500
15	Reinforcing Steel Bar	LS/T	16	$ 3,250	$ 52,000
16	Stainless Steel Reinforcing Bar	LS/T	8	$ 15,600	$ 124,800
17	Mechanical Connectors	LS/T	158	$ 50	$ 7,900
18	Stainless Steel Mechanical Connectors	each	158	$ 100	$ 15,800
19	Fabrication of Steel - New TL-4 Barriers	LS/T	10.0	$ 6,500	$65,000
20	Delivery of Steel - New TL-4 Barriers	LS/T	10.0	$ 250	$2,500
21	Erection of Steel - New TL-4 Barriers	LS/T	10.0	$ 2,000	$20,000
22	Fabrication of Steel - New Diaphragms and Stiffeners	LS/T	2.0	$ 6,500	$13,000
23	Delivery of Steel - New Diaphragms and Stiffeners	LS/T	2.0	$ 250	$500
24	Erection of Steel - New Diaphragms and Stiffeners	LS/T	2.0	$ 2,000	$4,000
25	Coating Existing Structural Steel - Girders, Intermediate Diaphragms and Floor Beams	LS/m^2	730.0	$ 200	$146,000
26	Coating New Structural Steel	LS/m^2	37.0	$ 200	$7,400
27	Environmental Protection During Coating of Structural Steel and Railing System(s)	LS/m^2	800.0	$ 150	$120,000
28	Lead Abatement and Removals	LS/m^2	225.0	$ 200	$45,000
29	Embedded Work in Structure (Utility)	LS/m	56.0	$ 100	$5,600
30	Form and Fill Grooves	m	29.0	$ 50	$1,450
32	Bearings	Each	18.0	$ 3,000	$54,000
33	Access to Work Area, Work Platform and Scaffolding	LS	1.0	$ 60,000	$60,000
34	Concrete Removal - Partial Depth - Type A	m^3	6.0	$ 4,000	$24,000
35	Concrete Removal - Partial Depth - Type B	m^3	1.0	$ 14,000	$14,000
36	Concrete Removal - Partial Depth - Type C	m^3	4.0	$ 9,000	$36,000
37	Concrete Removal (Full Depth) - Removal of Existing Concrete Deck	LS/cum	126	$ 1,500	$ 189,000
38	Concrete Removal (Full Depth) - Removal of Existing Concrete Curbs on Approach Slab	LS/cum	9	$ 1,500	$ 13,500
39	Concrete Removal (Full Depth) - Removal of Existing Approach Slabs	LS/cum	43	$ 1,500	$ 64,500
40	Concrete Removal (Full Depth) - Removal of Existing Approach Span	LS/cum	4	$ 1,500	$ 6,000
41	Concrete Removal - Deck Joint Assemblies	LS/m^3	7.0	$ 4,500	$31,500
42	Abrasive Blast Cleaning of Reinforcing Steel	m^2	35.0	$ 100	$3,500
43	Concrete Patches, Form and Pump	m^3	5.0	$ 14,000	$70,000
44	Crack Injection	m	36.0	$ 250	$9,000
45	Dowels into Concrete	each	80.0	$ 50	$4,000
46	Jacking of Superstructure	LS	1.0	$ 80,000	$80,000
47	Shear Connectors - Type A	each	1430	$ 39	$ 55,770
48	Structural Steel Removals - Removal of Existing Diaphragms	LS/t	1.2	$ 1,000	$1,200
49	Structural Steel Removals - Removal of Existing Stiffeners	LS/t	0.7	$ 1,000	$700
50	Structural Steel Removals - Removal of Existing Metal Barriers	LS/t	0.8	$ 1,000	$800
51	Structural Steel Removals - Removal of Existing Steel Curb Plates	LS/t	9	$ 1,000	$9,000
				Subtotal	**$2,366,310**
			Contingency	**30%**	**$709,893**
				Total	**$3,076,203**

Treatment 6 - Recoat/seal paint as needed					
Item	**Description**	**Unit**	**Est Qty**	**Unit Price**	**Total Cost**
1	Mobilization/Demobilization	LS	1.0	$5,000.00	$5,000.00
2	Coating Structural Steel	LS	1.0	$5,000.00	$5,000.00
3	Environmental Protection During Coating of Structural Steel	LS	1.0	$20,000.00	$20,000.00
4	Access to Work Area, Work Platform and Scaffolding	LS	1.0	$20,000.00	$20,000.00
				Subtotal	**$50,000.00**
		Contingency		**30%**	**$ 15,000.00**
				Total	**$ 65,000.00**

Treatment 7- Scarify Deck and Place Overlay					
Item	Description	Unit	Est Qty	Unit Price	Total Cost
1	Mobilization/Demobilization	LS	1.0	$50,000.00	$50,000.00
2	Traffic Control	LS	1.0	$85,000.00	$85,000.00
3	Erosion and Sediment Control	LS	1.0	$30,000.00	$30,000.00
4	Concrete in Deck - Overlay	LS/m^3	40.0	$2,500.00	$100,000.00
6	Scarify Concrete Deck	LS/sqm	50.0	$500.00	$25,000.00
				Subtotal	$240,000
		Contingency		30%	$72,000
				Total	$312,000

Appendix C

General Arrangements



WEST ELEVATION
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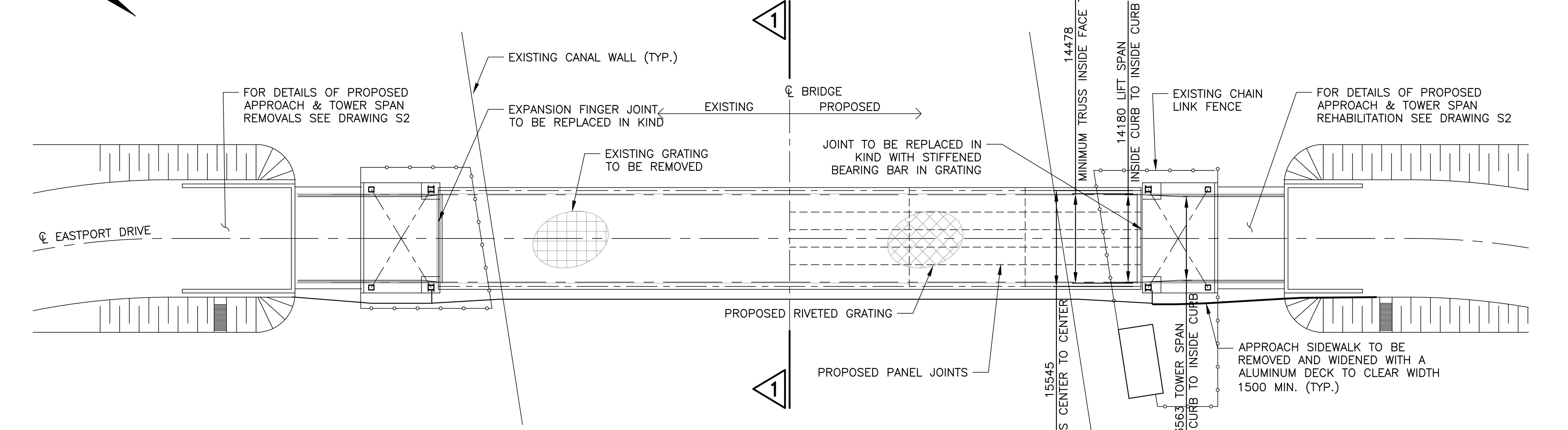

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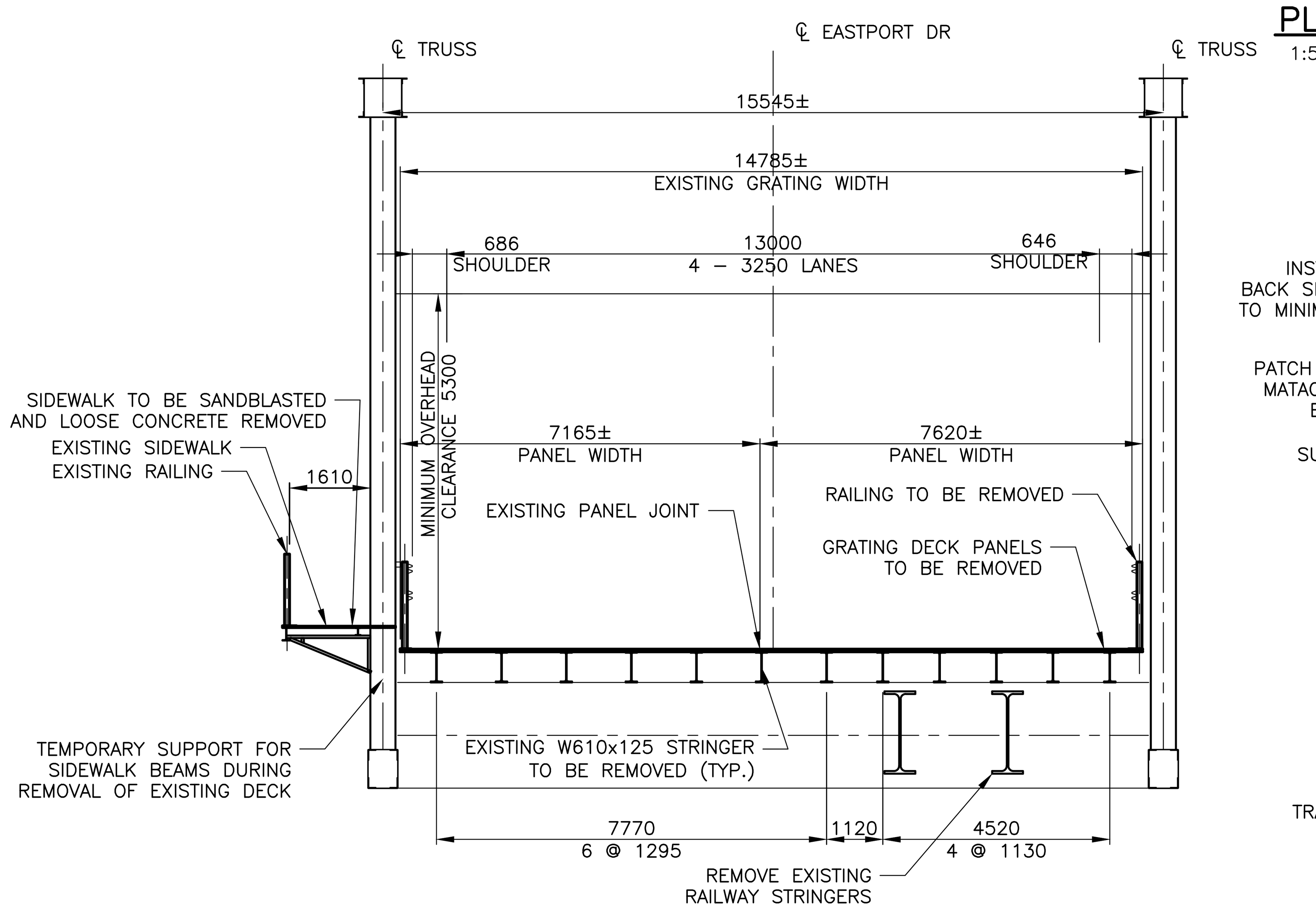

2 EXISTING
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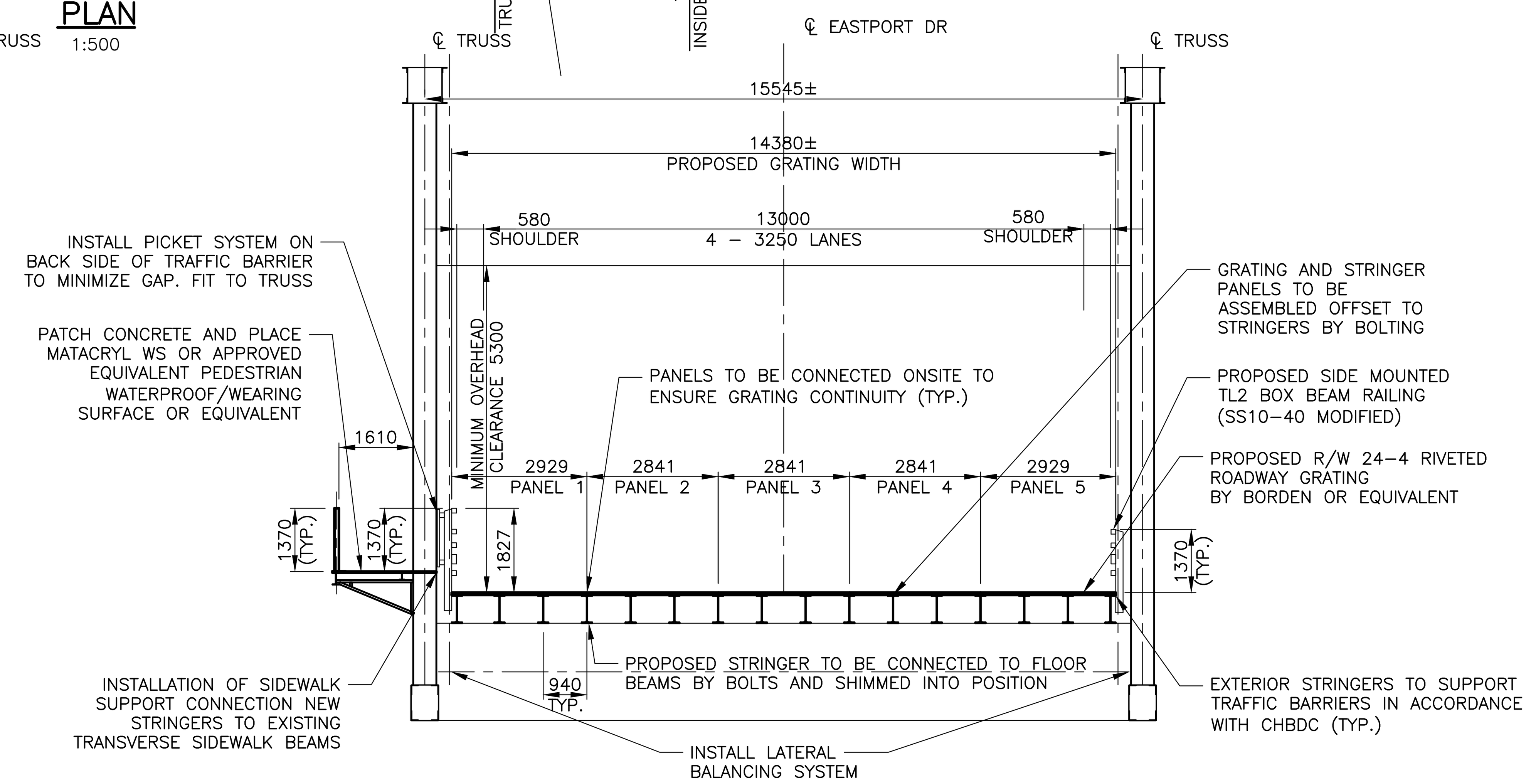

2 PROPOSED
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LIST OF ABBREVIATIONS:

TYP. TYPICAL
C.L. CENTER LINE

GENERAL NOTES:

1. DESIGN AND WORKMANSHIP:
   - CANADIAN HIGHWAY BRIDGE DESIGN CODE CAN/CSA S6-19
   - MTO STRUCTURAL MANUALS AND GUIDELINES
   - ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS
2. CLASS OF CONCRETE:

   CONCRETE IN APPROACH AND TOWER SPAN:
   MINIMUM EXPOSURE CLASS C-1 (35MPa AT 28 DAYS) PER CSA A23.1-19
   LOW CARBON EMISSION CONCRETE (LAFARGE ECOPACT OR APPROVED EQUIVALENT)

   CONCRETE IN REPAIR AREAS:
   CLASS OF CONCRETE MINIMUM EXPOSURE CLASS C-1 (35MPa AT 28 DAYS) PER CSA A23.1-19
   MAXIMUM AGGREGATE SIZE IN REPAIR AREAS: 13.3mm
   LOW CARBON EMISSION CONCRETE (LAFARGE ECOPACT OR APPROVED EQUIVALENT)

   ALL CONCRETE REPAIR MATERIALS SHALL BE APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
3. CLEAR COVER TO REINFORCING STEEL: 70±20 mm UNLESS OTHERWISE NOTED
4. STRUCTURAL STEEL GRADE 350W
   STRINGERS SHALL BE COATED WITH A DIFFERENT INDENTIFIABLE YELLOW COATING (TO SHOW WHERE LEAD PAINT HAS BEEN REMOVED) FLOOR BEAMS SHALL BE RE-COATED WITH A DIFFERENT IDENTIFIABLE GREEN COATING (TO SHOW WHERE LEAD PAINT HAS BEEN REMOVED)
5. REINFORCING STEEL:

   REINFORCING STEEL SHALL BE GRADE 400W.

   UNLESS SHOWN OTHERWISE, TENSION LAP SPLICES FOR REINFORCING STEEL BARS SHALL BE CLASS B.

   STAINLESS REINFORCING STEEL SHALL BE TYPE 316LN OR DUPLEX 2205 AND HAVE A MINIMUM YIELD STRENGTH OF 500 MPa, UNLESS NOTED OTHERWISE.

   BAR MARKS WITH PREFIX 'S DENOTE STAINLESS STEEL BARS.

   BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS, WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE MTO STRUCTURAL STANDARD DRAWING SS12-1, UNLESS INDICATED OTHERWISE.

ENVIRONMENTAL NOTES:

1. SEDIMENT AND EROSION CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO AND MAINTAINED DURING THE CONSTRUCTION PHASES TO PREVENT ENTRY OF SEDIMENT INTO THE WATER.
2. TO PROTECT LOCAL FISH POPULATIONS DURING THE SPAWNING AND NURSERY PERIODS NO IN-WATER WORK SHALL OCCUR DURING THE FOLLOWING PERIOD: FROM SEPTEMBER 16 TO JUNE 14 ANY GIVEN CALENDAR YEAR.
3. NO MACHINERY SHALL BE ALLOWED TO ENTER THE WATERCOURSE. MOVEMENT OF CONSTRUCTION EQUIPMENT IN THE VICINITY OF ANY CREEK SHALL BE LIMITED TO THE MINIMUM REQUIRED FOR CONSTRUCTION. THE CONTRACTOR SHALL NOT CARRY OUT EQUIPMENT MAINTENANCE OR REFUELING OR STORAGE OF FUEL CONTAINERS WITHIN 100 METERS OF ANY WATERCOURSE. THE CONTRACTOR SHALL NOT STOCKPILE CONSTRUCTION DEBRIS OR EMPTY FUEL/PESTICIDE CONTAINERS WITHIN THE CONTRACT LIMITS.
4. THE CONTRACTOR WILL BE REQUIRED TO MAINTAIN THE EXISTING STREAM FLOWS AND SHALL CONTROL ALL CONSTRUCTION WORK SO AS NOT TO ALLOW SEDIMENT OR OTHER DELETERIOUS MATERIAL TO ENTER STREAMS. NO WASTE OR SURPLUS ORGANIC MATERIALS, INCLUDING TOPSOIL IS TO BE STORED OR DISPOSED OF WITHIN 30 METERS OF ANY WATERCOURSE. RUN-OFF FROM EXCAVATIONS WILL NOT BE PERMITTED TO DRAIN DIRECTLY INTO WATERCOURSES BUT SHALL BE DIFFUSED ONTO VEGETATIVE AREAS A MINIMUM OF 30 METERS FROM THE WATERCOURSE. WHERE THIS MEASURE IS NOT SUFFICIENT OR FEASIBLE TO CONTROL SEDIMENT ENTERING THE WATERCOURSE, SEDIMENT TRAPS OR GEOTEXTILE COVERAGE WILL BE REQUIRED.
5. CONSTRUCTION SHOULD BE AVOIDED DURING UNUSUALLY WET, RAINY OR WINTER THAW CONDITIONS.
6. MACHINERY SHALL BE OPERATED IN A MANNER THAT MINIMIZES DISTURBANCE TO THE WATERCOURSE BANKS.
7. MACHINERY IS TO ARRIVE ON SITE IN A CLEAN CONDITION (INCLUDING FREE OF MUD/SOIL/DIRT FROM OTHER LOCATIONS: INCLUDING CLEAN WHEELS/TIRES/TRACKS) AND IS TO BE MAINTAINED FREE OF FLUID LEAKS.
8. TO REDUCE THE SPREAD OF INVASIVE SPECIES, EQUIPMENT SHOULD BE THOROUGHLY CLEANED BEFORE BEING BROUGHT ON THE SITE. FOR GUIDANCE IN THIS REGARD. PLEASE REFER TO THE CLEAN EQUIPMENT PROTOCOL FOR INDUSTRY AVAILABLE ONLINE:
   www.ontarioinvasiveplants.ca/file/cleanequipmentprotocol Mar152013 D3.pdf
9. MACHINERY IS TO LEAVE SITE IN CLEAN CONDITION. A CLEANING STATION REQUIRED IN CONJUNCTION WITH ANY MUD MATS TO BE USED.
10. KEEP AN EMERGENCY SPILL KIT ON SITE IN CASE OF FLUID LEAKS OR SPILLS FROM MACHINERY.

CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, DETAILS AND ELEVATIONS OF THE EXISTING STRUCTURE THAT ARE RELEVANT TO THE WORK SHOWN ON THE DRAWINGS PRIOR TO COMMENCEMENT OF THE WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE CONTRACT ADMINISTRATOR AND THE PROPOSED ADJUSTMENT OF THE WORK REQUIRED TO MATCH THE EXISTING STRUCTURE SHALL BE SUBMITTED FOR APPROVAL.
2. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ADEQUATE PROTECTION OF UTILITIES, SERVICES, STRUCTURES, ROADWAYS, WATERCOURSES, ETC. DURING CONSTRUCTION OPERATIONS.
3. ANY DAMAGE DONE TO EXISTING STRUCTURE DURING REMOVALS OR RECONSTRUCTION SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER AND AT NO COST TO THE OWNER.
4. SAWCUTS IN CONCRETE UNLESS OTHERWISE SHOWN SHALL BE 25 mm DEEP OR TO THE FIRST LAYER OF REINFORCING STEEL WHICHEVER IS LESS.
5. ALL EXPOSED CONCRETE TO HAVE 20 mm CHAMFER UNLESS OTHERWISE NOTED.
6. THE EXTENT OF CONCRETE REPAIRS ON STRUCTURE AND ABUTMENT WALLS SHALL BE DETERMINED ON SITE BY THE CONTRACT ADMINISTRATOR.
7. CONTRACTOR'S METHOD OF PROTECTION TO BE SUBMITTED TO CONTRACT ADMINISTRATOR FOR INFORMATION BEFORE PROCEEDING WITH THE WORK.
8. ALL EXISTING STEEL PAINT INCLUDES LEAD. WHERE THE EXISTING COATING IS IMPACTED THE CONTRACTOR IS TO EMPLOY CURRENT ACCEPTED LEAD REMEDIATION AND ENVIRONMENTAL PROTECTION MEASURES.

CONSTRUCTION NORTH	TRUE NORTH

MARK	DESCRIPTION	APP	DATE
6.			
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4.			
3.			
2.			
1.	ISSUED FOR CONCEPT DESIGN	CBL	06/10/2021

AECOM CANADA LTD.
50 SPORTSWORLD CROSSING ROAD, SUITE 290
KITCHENER, ON, N2P 0A4
TEL: 519-650-5313
FAX: 519-650-3424

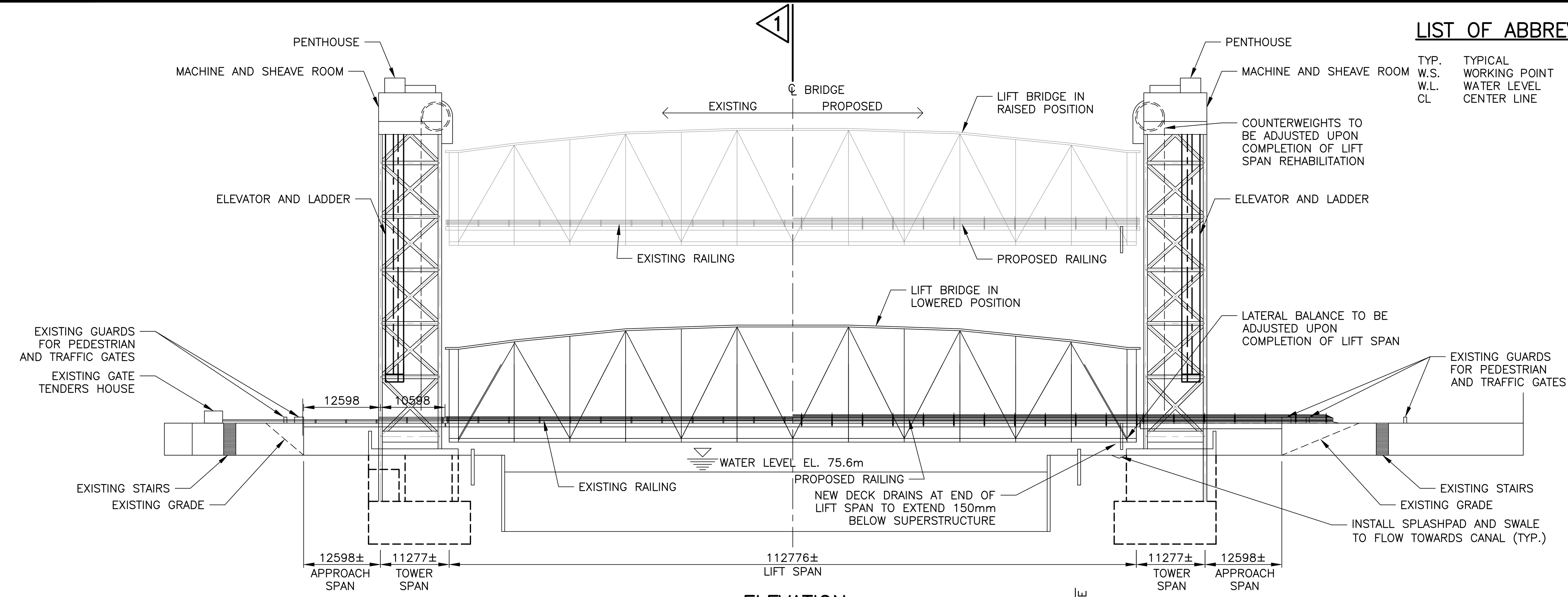
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

BURLINGTON CANAL LIFT BRIDGE REHABILITATION

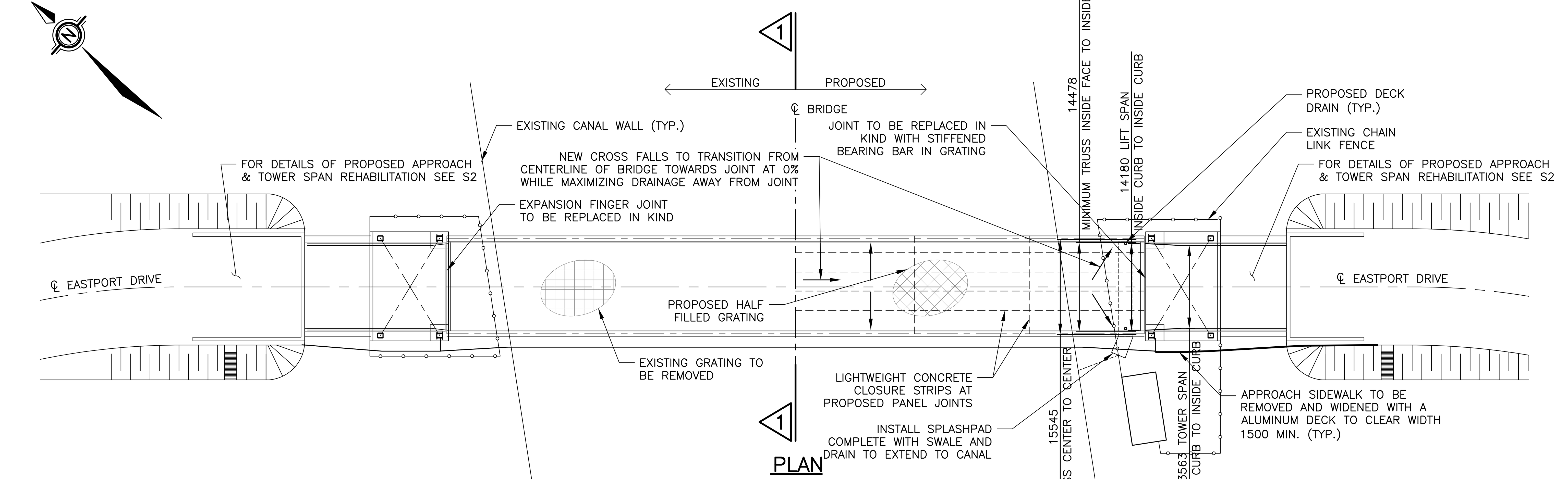
EXISTING CONDITIONS GENERAL ARRANGEMENT RIVETED GRATING OPTION 1

DRN:	DSN:	PROJECT NUMBER: 60625320
BJS	XX	Do not scale this document. All measurements must be obtained from stated dimensions.
CHK: CBL	APP: XX	
SCALE: AS NOTED	DRAWING NUMBER: S1-01	SHEET 1 OF 4

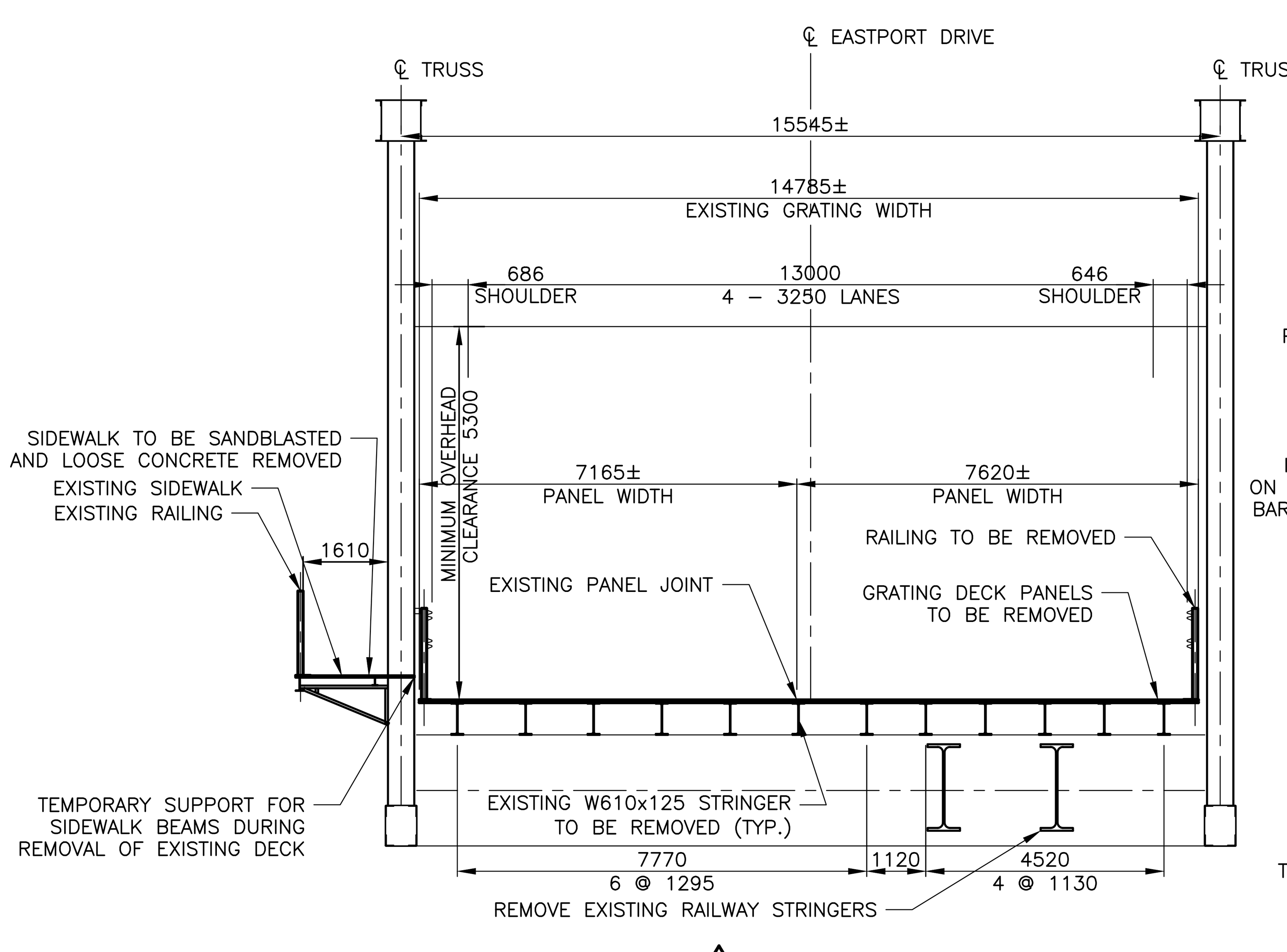
0 20 mm



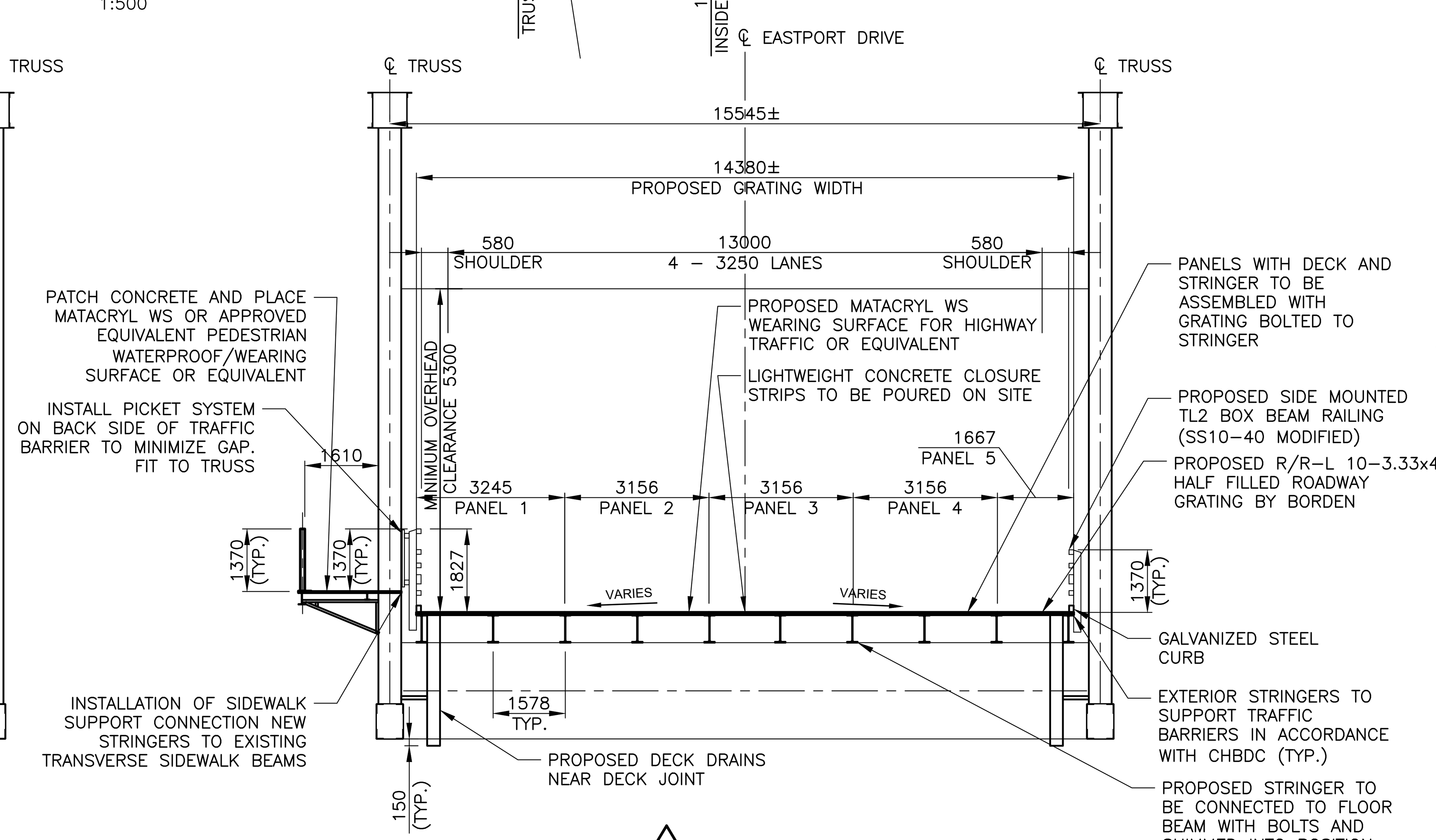
ELEVATION
1:500



PLAN
1:500



1 EXISTING
1:100



1 PROPOSED
1:100

LIST OF ABBREVIATIONS:

TYP.	TYPICAL
W.S.	WORKING POINT
W.L.	WATER LEVEL
CL	CENTER LINE

GENERAL NOTES:

1. DESIGN AND WORKMANSHIP:

– CANADIAN HIGHWAY BRIDGE DESIGN CODE CAN/CSA S6–19
– CAN/CSA S6–19
– MTO STRUCTURAL MANUALS AND GUIDELINES
– ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS

2. CLASS OF CONCRETE:

CONCRETE IN HALF FILLED GRATING:
MINIMUM EXPOSURE CLASS F–2 (35MPa AT 28 DAYS) PER SCA A23.1–19, PROVIDED THAT A WEARING SURFACE AND WATERPROOFING MEMBRANE IS INSTALLED (MATACRYL OR APPROVED EQUIVALENT)
LIGHTWEIGHT CONCRETE SHALL BE USED (18.1 kN/m³)
LOW CARBON EMISSION CONCRETE (LAFARGE ECOPACT OR APPROVED EQUIVALENT)

CONCRETE IN APPROACH AND TOWER SPAN:
MINIMUM EXPOSURE CLASS C–1 (35MPa AT 28 DAYS) PER CSA A23.1–19
LOW CARBON EMISSION CONCRETE (LAFARGE ECOPACT OR APPROVED EQUIVALENT)

CONCRETE IN REPAIR AREAS:
MINIMUM EXPOSURE CLASS C–1 (35MPa AT 28 DAYS) PER CSA A23.1–19
MAXIMUM AGGREGATE SIZE IN REPAIR AREAS: 13.2mm
LOW CARBON EMISSION CONCRETE (LAFARGE ECOPACT OR APPROVED EQUIVALENT)

ALL CONCRETE REPAIR MATERIALS WAS APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.

3. CLEAR COVER TO REINFORCING STEEL: 70±20 mm UNLESS OTHERWISE NOTED

4. STRUCTURAL STEEL: GRADE 350W
STRINGERS SHALL BE COATED WITH A DIFFERENT IDENTIFIABLE YELLOW COATING (TO SHOW WHERE LEAD PAINT HAS BEEN REMOVED)
FLOOR BEAMS SHALL BE RE–COATED WITH A DIFFERENT IDENTIFIABLE GREEN COATING (TO SHOW WHERE LEAD PAINT HAS BEEN REMOVED)

5. REINFORCING STEEL:

REINFORCING STEEL SHALL BE GRADE 400W.

UNLESS SHOWN OTHERWISE, TENSION LAP SPLICES FOR REINFORCING STEEL BARS SHALL BE CLASS B.

STAINLESS REINFORCING STEEL SHALL BE TYPE 316LN OR DUPLEX 2205 AND HAVE A MINIMUM YIELD STRENGTH OF 500 MPa, UNLESS NOTED OTHERWISE.

BAR MARKS WITH PREFIX 'S DENOTE STAINLESS STEEL BARS.

BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS, WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE MTO STRUCTURAL STANDARD DRAWING SS12–1, UNLESS INDICATED OTHERWISE.

ENVIRONMENTAL NOTES:

1. SEDIMENT AND EROSION CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO AND MAINTAINED DURING THE CONSTRUCTION PHASES TO PREVENT ENTRY OF SEDIMENT INTO THE WATER

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CONSTRUCTION NORTH	TRUE NORTH

MARK	DESCRIPTION	APP	DATE
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2.			
1.	ISSUED FOR CONCEPT DESIGN	CBL	06/10/2021

AECOM
AECOM CANADA LTD.
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KITCHENER, ON, N2P 0A4
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PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

BURLINGTON CANAL LIFT BRIDGE REHABILITATION

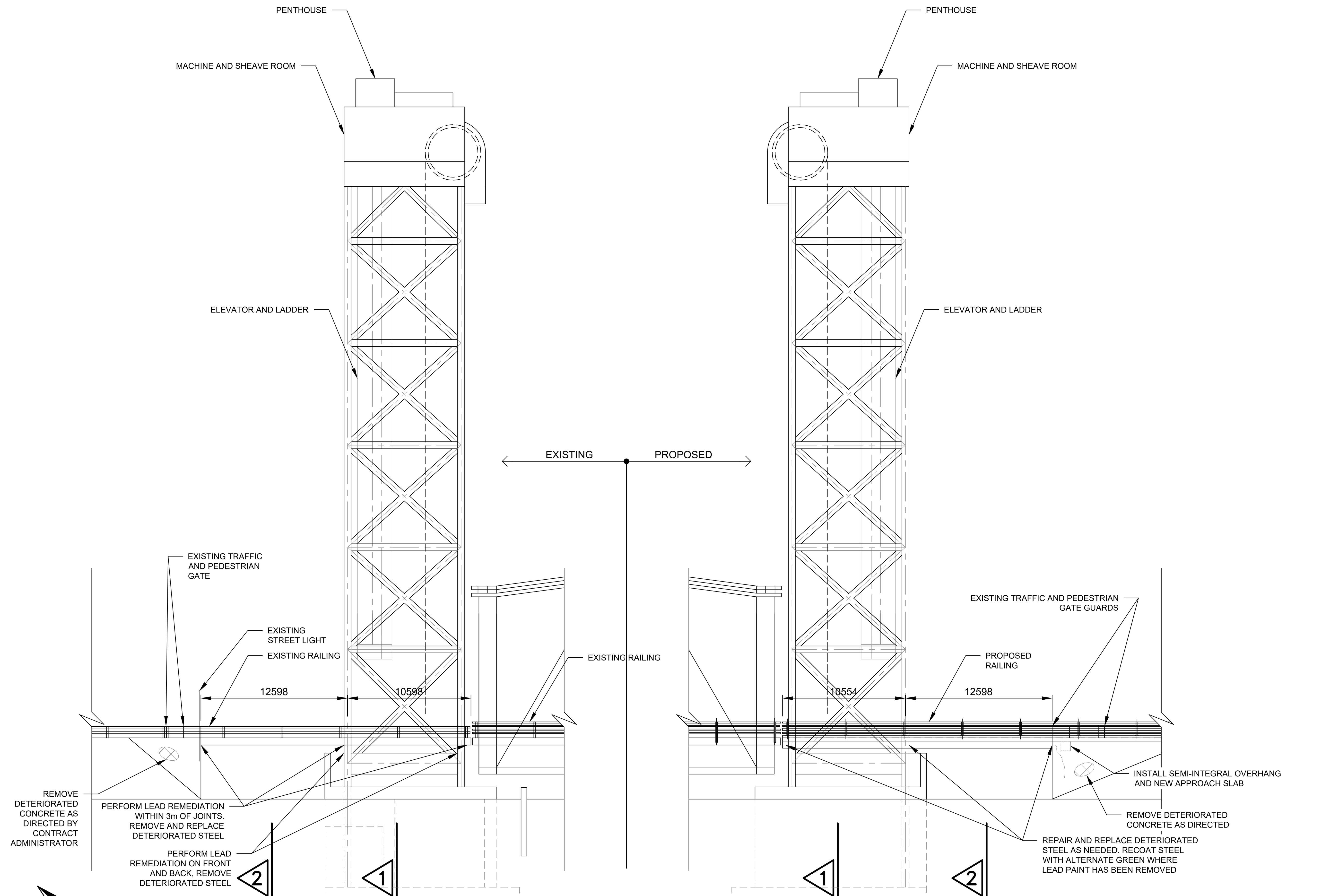
EXISTING CONDITIONS GENERAL ARRANGEMENT HAIL-FILLED GRATING OPTION 2

DRN:	DSN:	PROJECT NUMBER: 60625320
BJS	XX	Do not scale this document. All measurements must be obtained from stated dimensions.
CHK: CBL	APP: XX	
SCALE: AS NOTED	DRAWING NUMBER: S1-02	SHEET 2 OF 4

0 20 mm

FILE NAME: C:\USERS\BRIAN.SANDERS1\AECOM DIRECTORY\BCLB DECK PRE-DESIGN AND CONCEPT DESIGN PROP - GENERAL\900_CAD_GIS\910_CAD\60637587 - DECK STUDY - 08-11-2021.DWG LAST SAVED BY: BRIAN.SANDERS1 PLOT DATE: 8/11/2021 3:58:22 PM

FILE NAME: C:\USERS\BRIAN.SANDERS1\AECOM DIRECTORY\BCLB DECK PRE-DESIGN AND CONCEPT DESIGN PROP - GENERAL\900_CAD_GIS\910_CAD\INSPECTION BLB 2020 APPROACH GA 08-11-2021.DWG LAST SAVED BY: BRIAN.SANDERS1 PLOT DATE: 8/11/2021 3:58:32 PM



WEST ELEVATION
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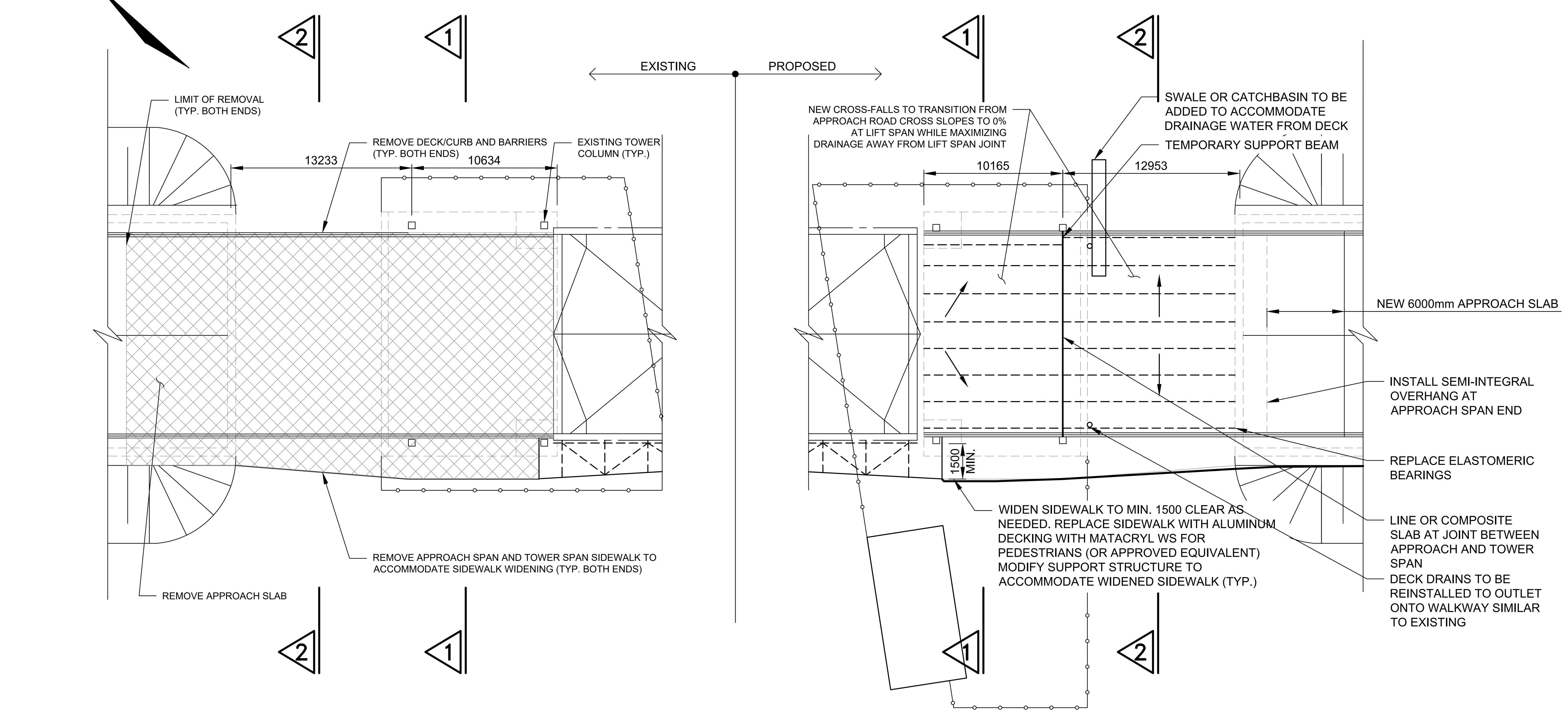


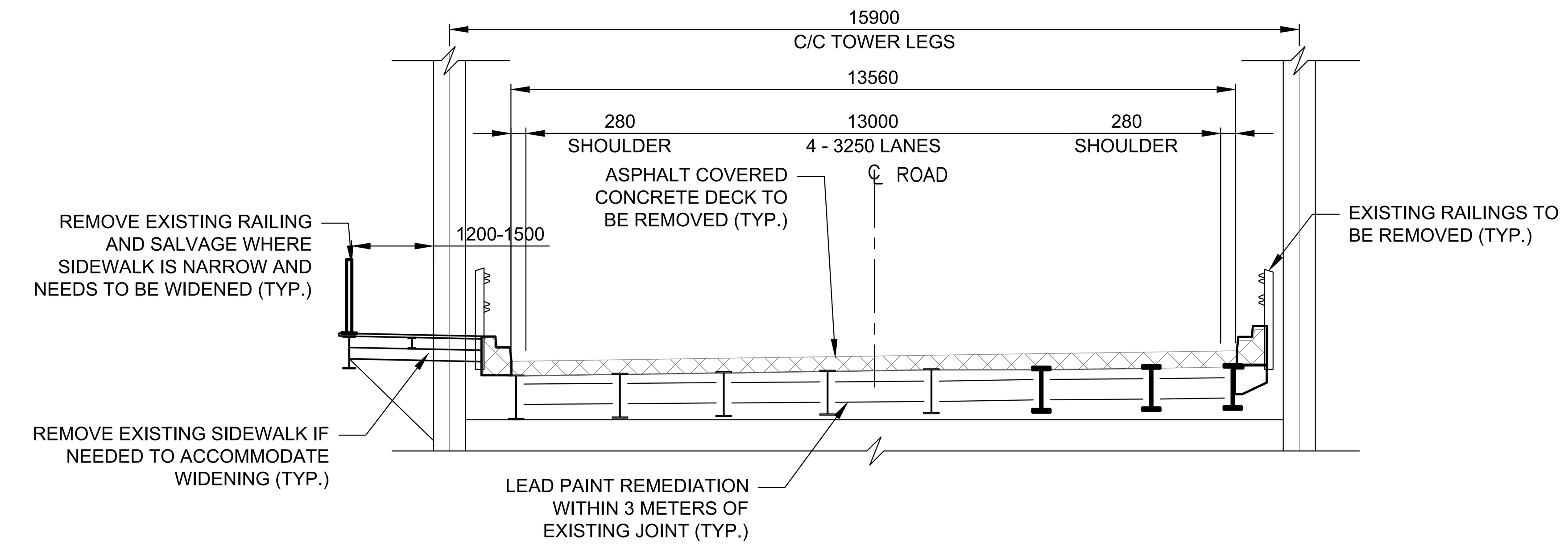
PLAN
1:250

LIST OF ABBREVIATIONS:

TYP. TYPICAL
C.W. COMES WITH
C.L. CENTER LINE

LEGEND:

CONCRETE REMOVALS
NEWER I BEAMS (RAIL REPLACEMENT)
ORIGINAL I BEAMS (ROAD WAY)



1 TOWER SPAN SECTION EXISTING
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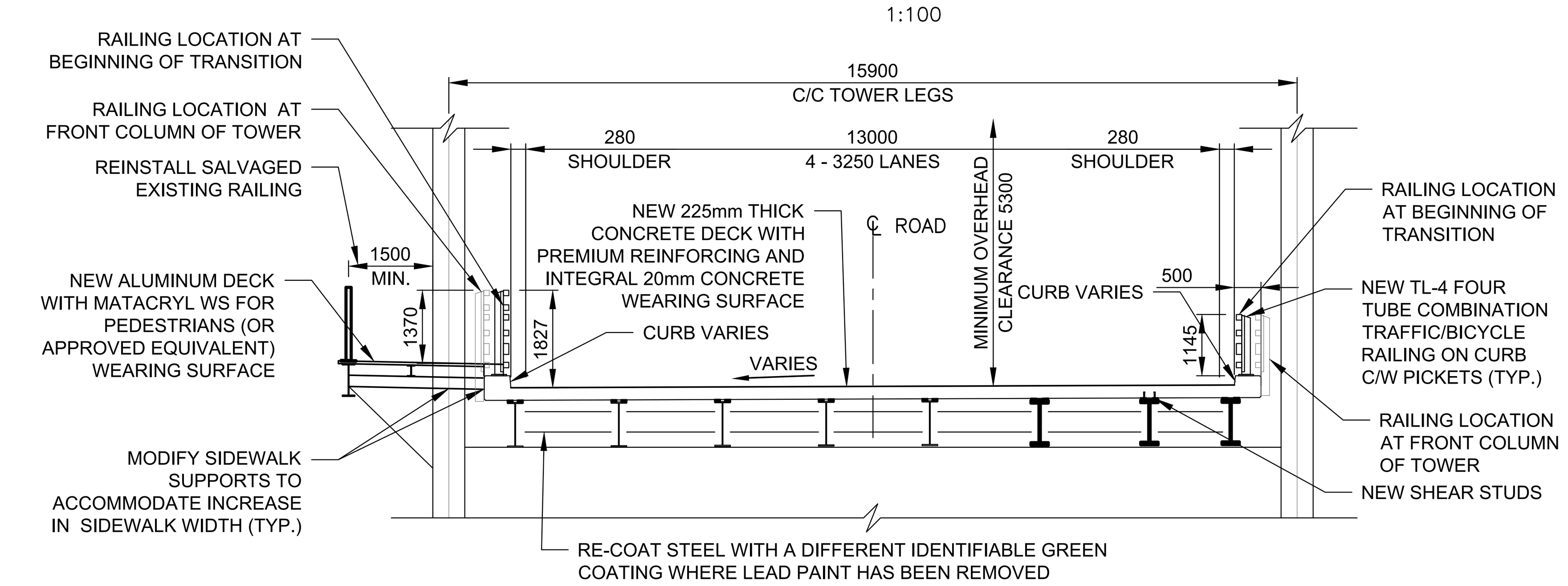

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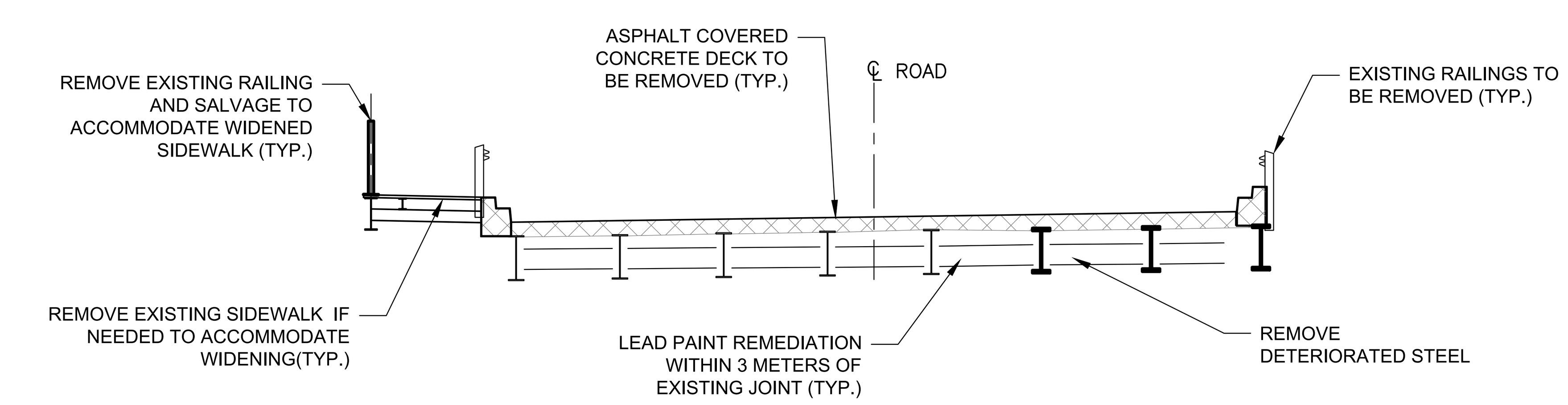

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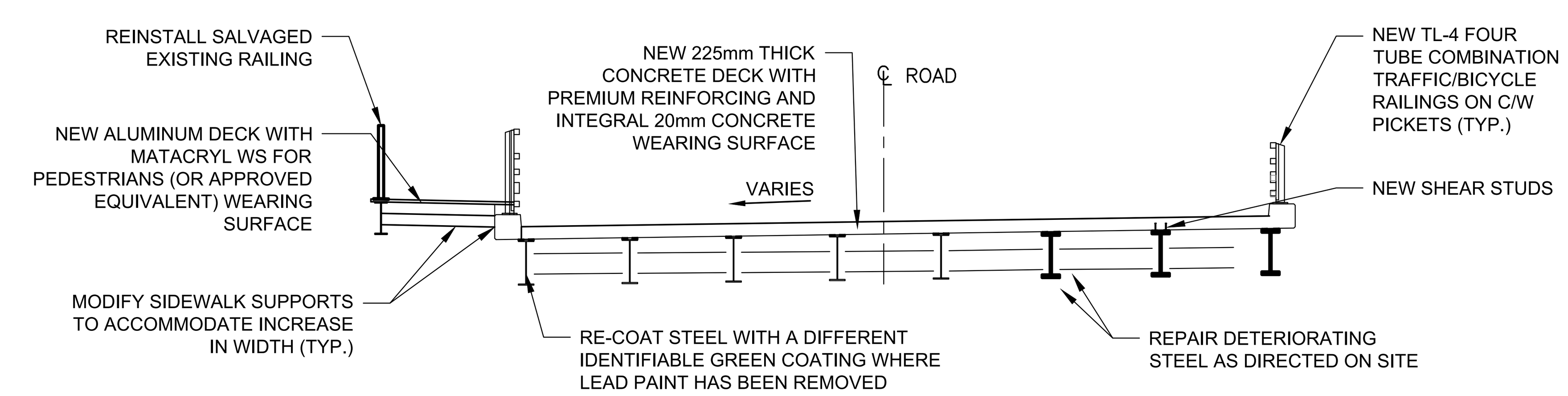

2 APPROACH SPAN SECTION PROPOSED
1:100

CONSTRUCTION NORTH	TRUE NORTH

MARK	DESCRIPTION	APP	DATE
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1.	ISSUED FOR CONCEPT DESIGN	CBL	06/10/2021

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PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

BURLINGTON CANAL LIFT BRIDGE

EXISTING CONDITIONS GENERAL ARRAGEMENT APPROACH

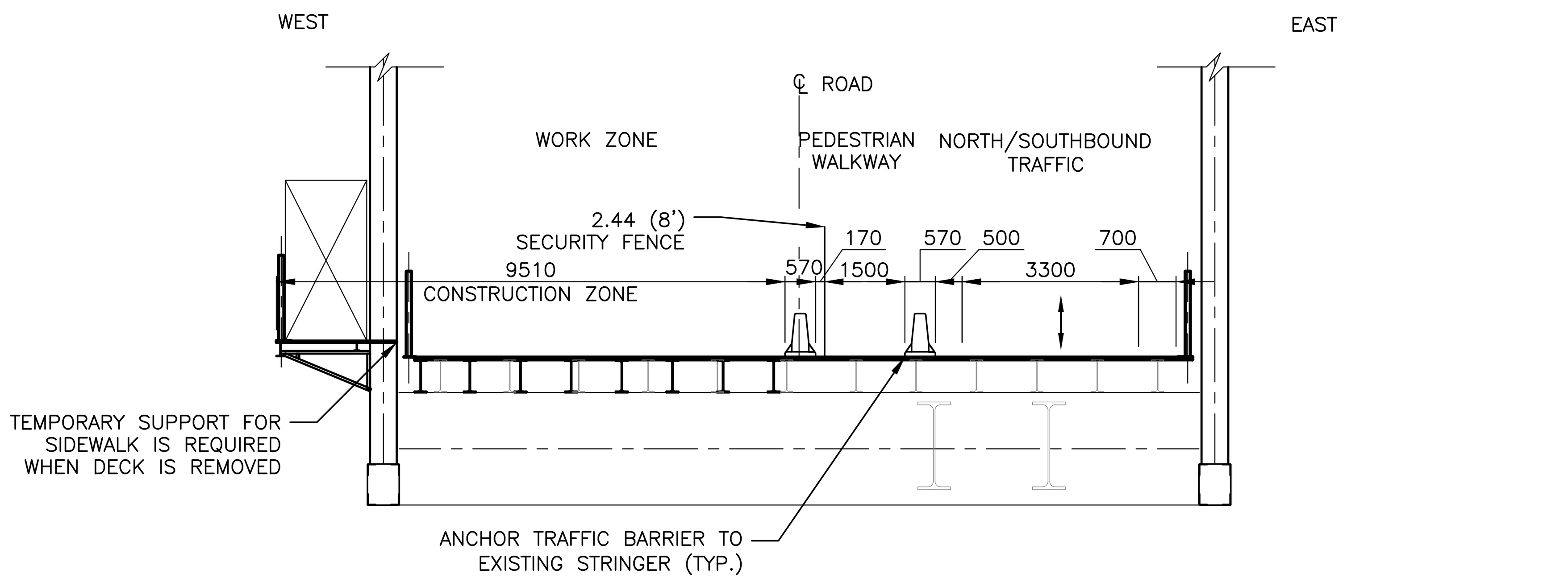
DRN:	DSN:	PROJECT NUMBER: 60625320
BJS	XX	Do not scale this document. All measurements must be obtained from stated dimensions.
CHK:	APP:	
CBL	XX	
SCALE:	DRAWING NUMBER:	
AS NOTED	S2	
	SHEET 3 OF 4	

0 20 mm

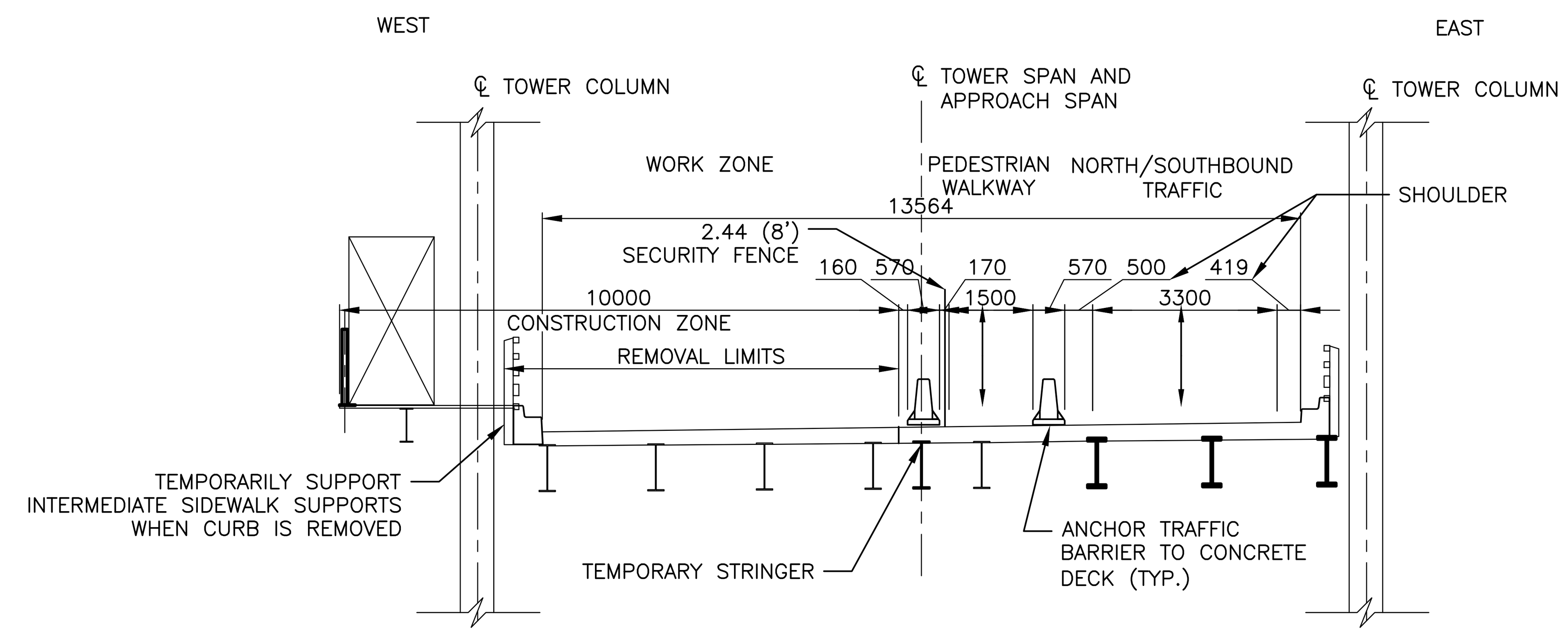
Appendix D

Staging Drawings

FILE NAME: C:\USERS\BRIAN.SANDERS1\AECOM DIRECTORY\BCLB DECK PRE-DESIGN AND CONCEPT DESIGN PROP - GENERAL\900_CAD_GIS\910_CAD\60637587 - DECK STUDY - 08-11-2021.DWG LAST SAVED BY: BRIAN.SANDERS1 PLOT DATE: 8/11/2021 3:58:00 PM

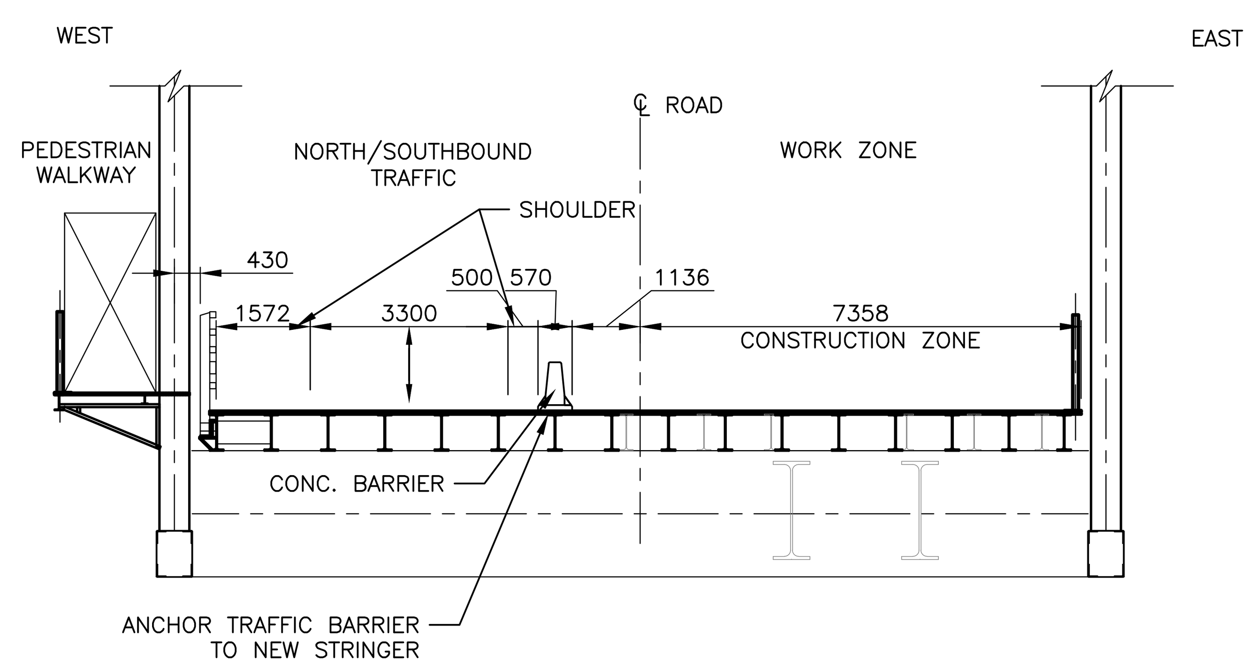


LIFT SPAN



TOWER AND APPROACH SPAN

STAGE ONE
1:100



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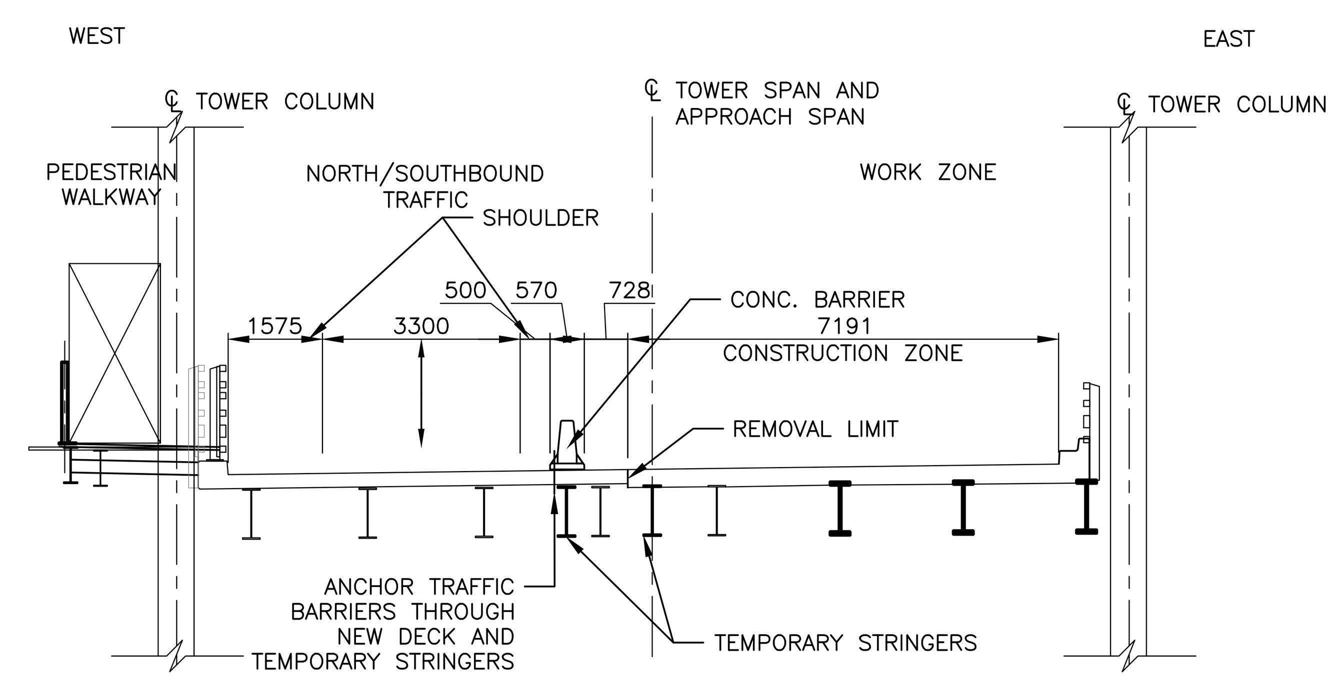
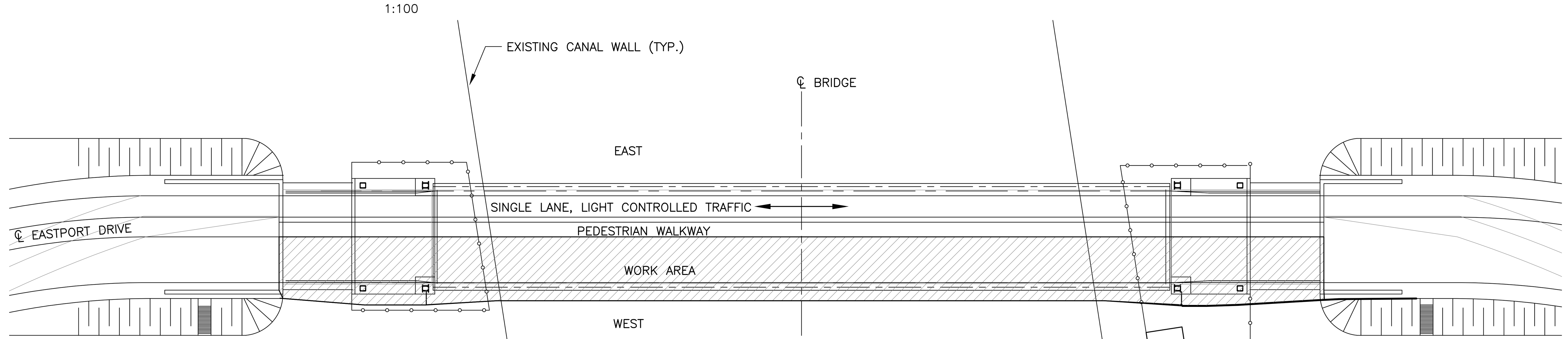


TOWER AND APPROACH SPAN

STAGE TWO
1:100



STAGE ONE
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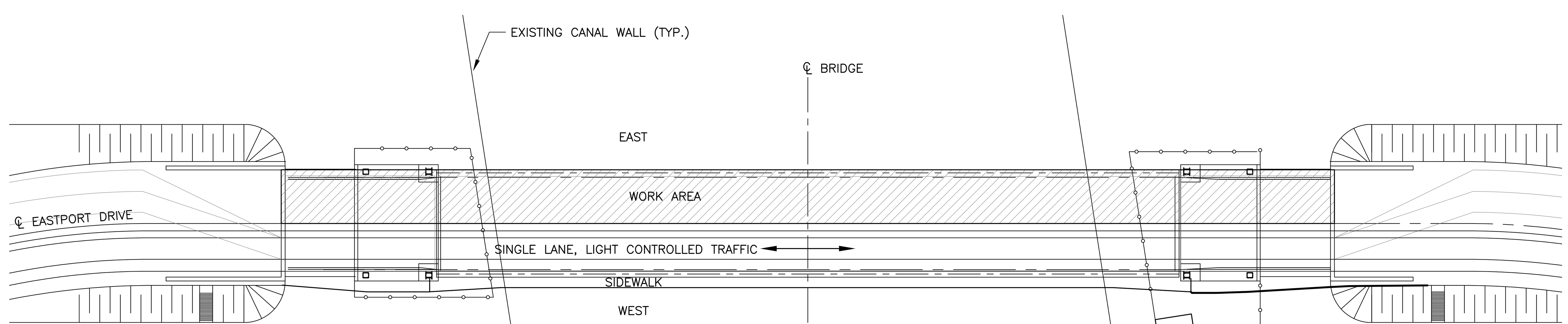

STAGE TWO
1:500

CONSTRUCTION NORTH	TRUE NORTH

MARK	DESCRIPTION	APP	DATE
6.			
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2.			
1.	ISSUED FOR CONCEPT DESIGN	CBL	06/10/2021

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PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

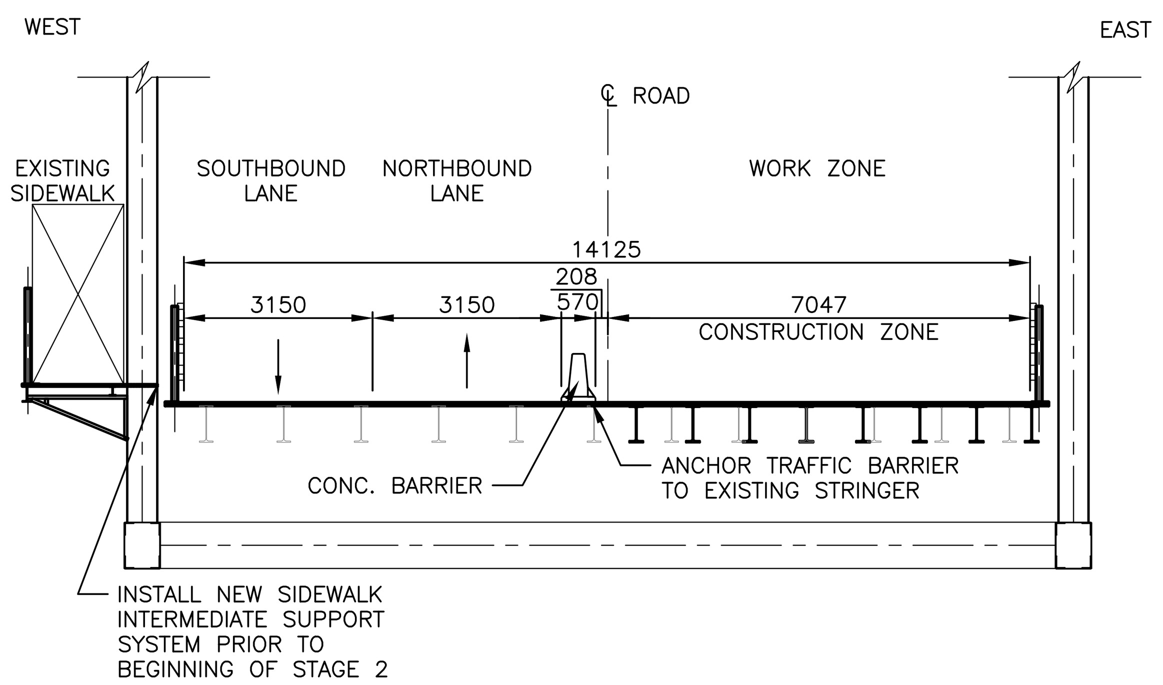
BURLINGTON CANAL LIFT BRIDGE REHABILITATION

SINGLE LANE TRAFFIC STAGING LIFT SPAN, OPTION 1 TOWER AND APPROACH SPAN

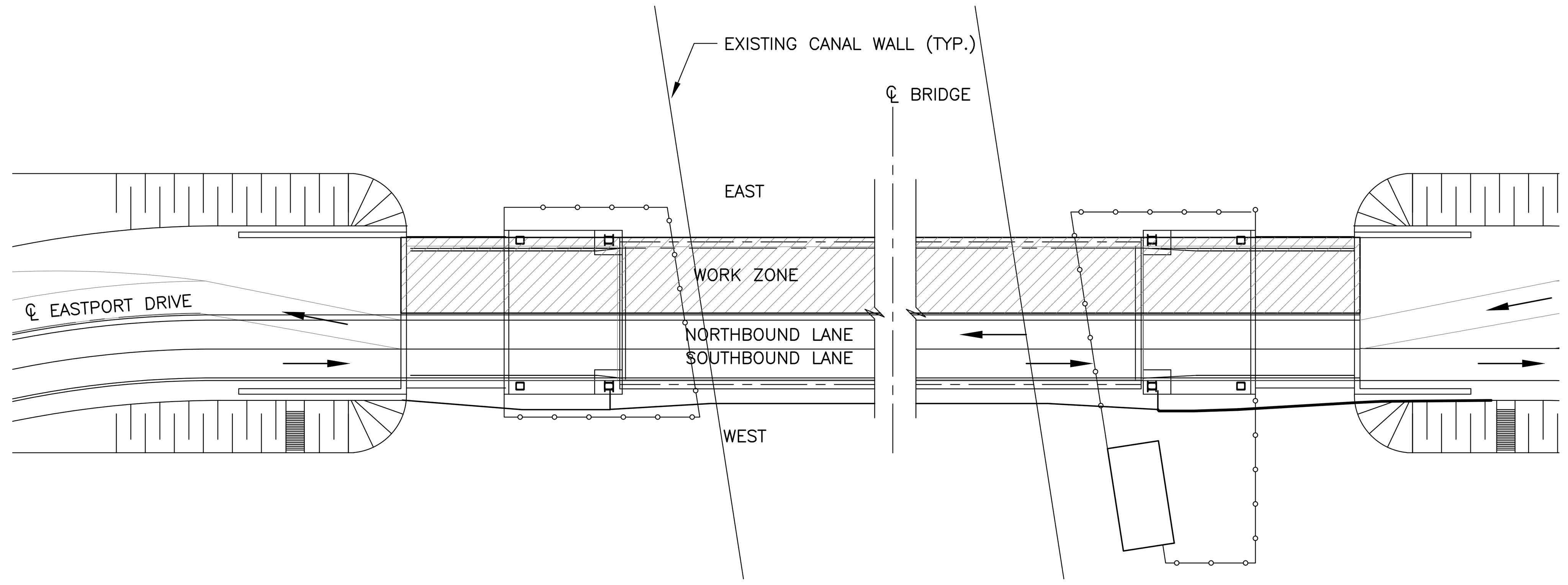
DRN:	DSN:	PROJECT NUMBER: 60637587
BJS	XX	Do not scale this document. All measurements must be obtained from stated dimensions.
CHK:	APP:	
CBL	XX	
SCALE:	DRAWING NUMBER:	
AS NOTED	CS1-01	

SHEET 1 OF 3

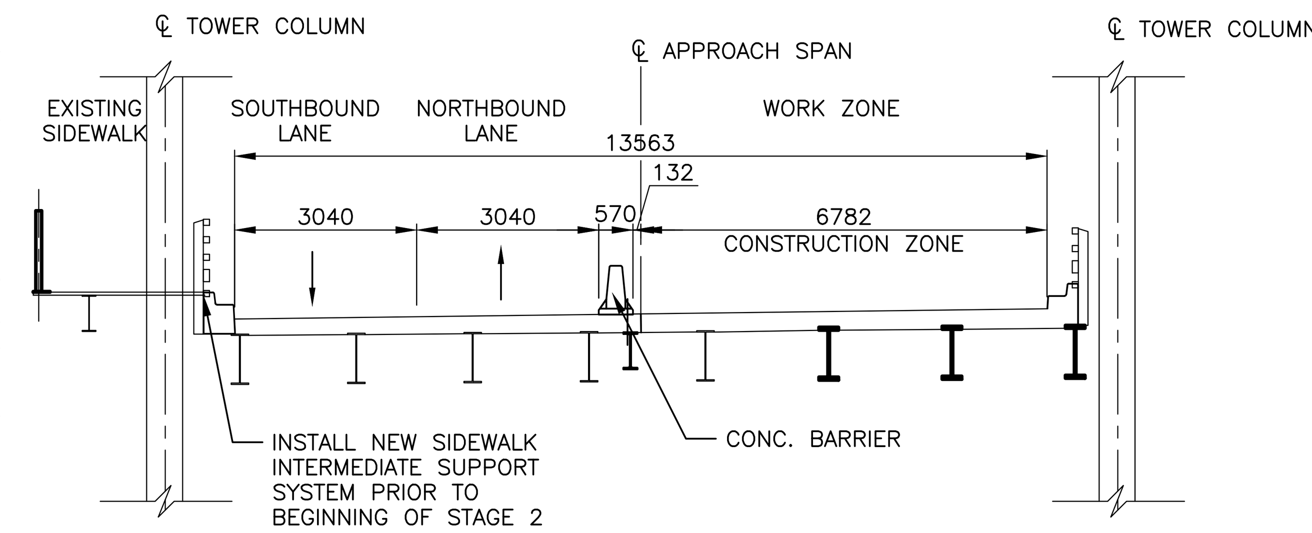
0 20 mm



LIFT SPAN STAGE ONE
1:100



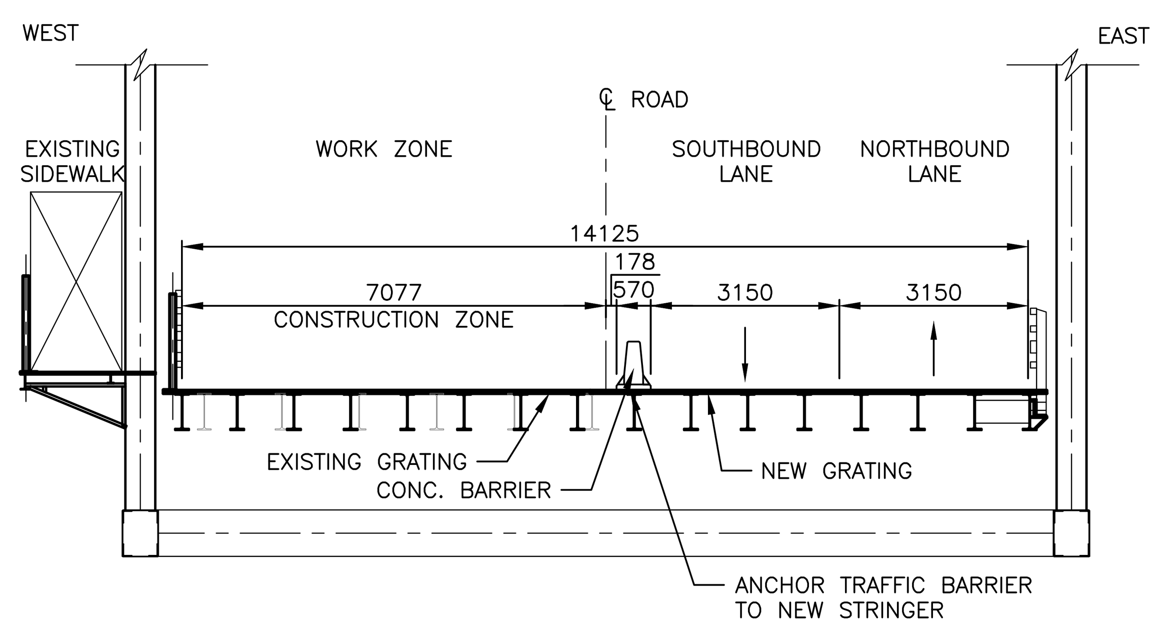
STAGE ONE PLAN CONCEPT
NTS



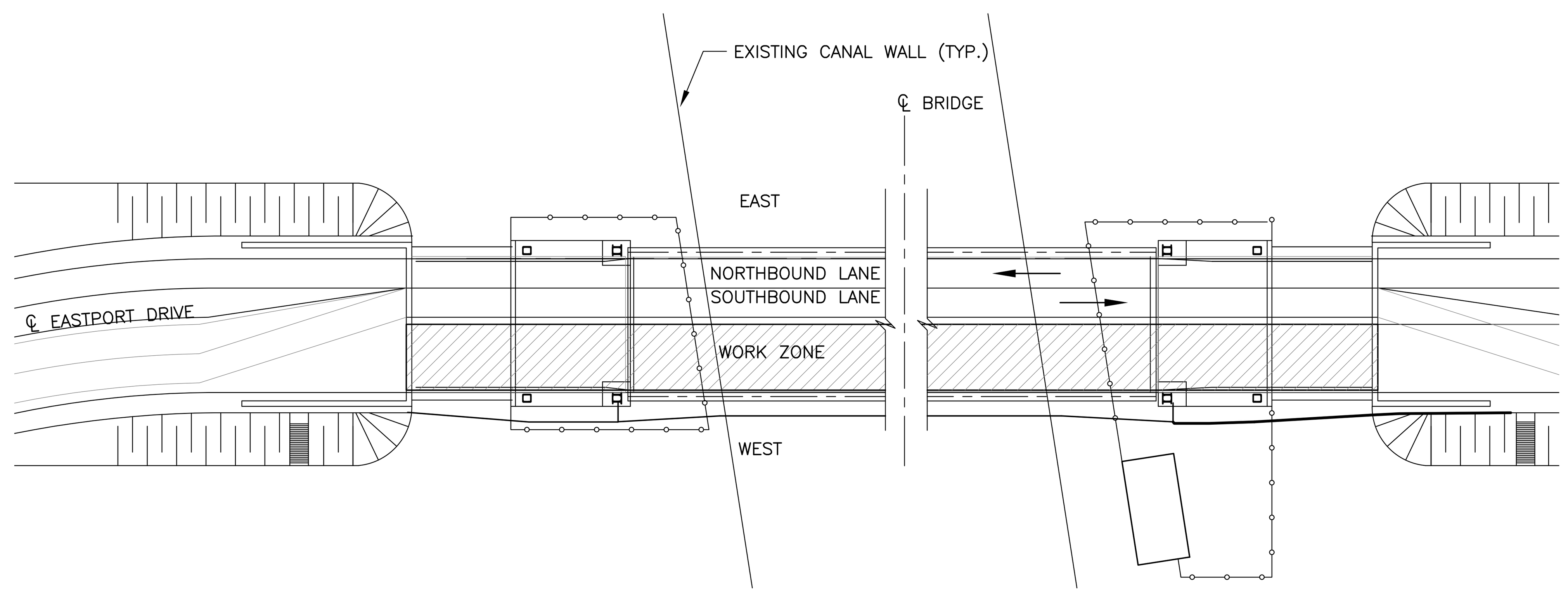
APPROACH/TOWER SPAN STAGE ONE
1:100

LEGEND:

I EXISTING STRINGER
I NEW PROPOSED STRINGER
I TEMPORARY SUPPORT



LIFT SPAN STAGE TWO
1:100



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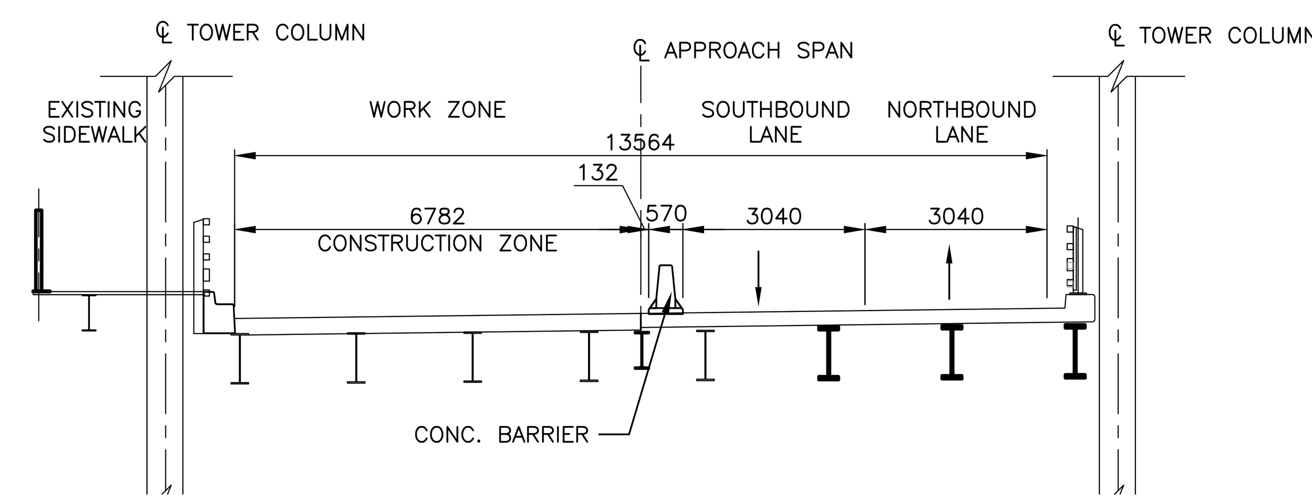
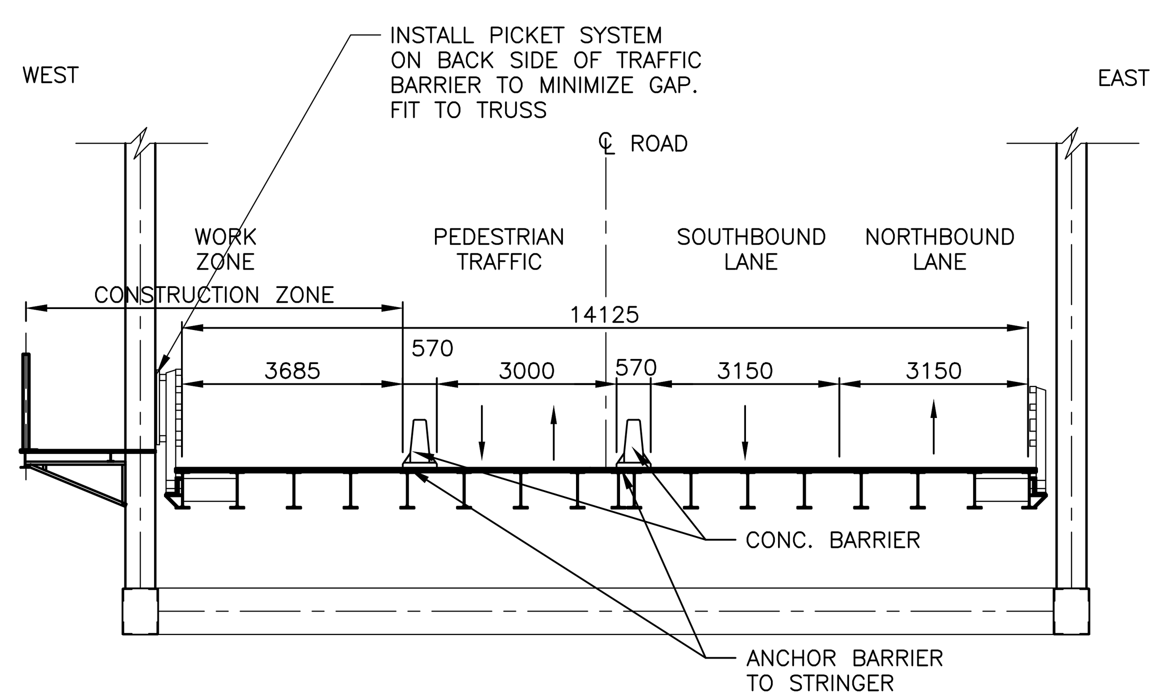


APPROACH/TOWER SPAN STAGE TWO
1:100



LIFT SPAN STAGE THREE
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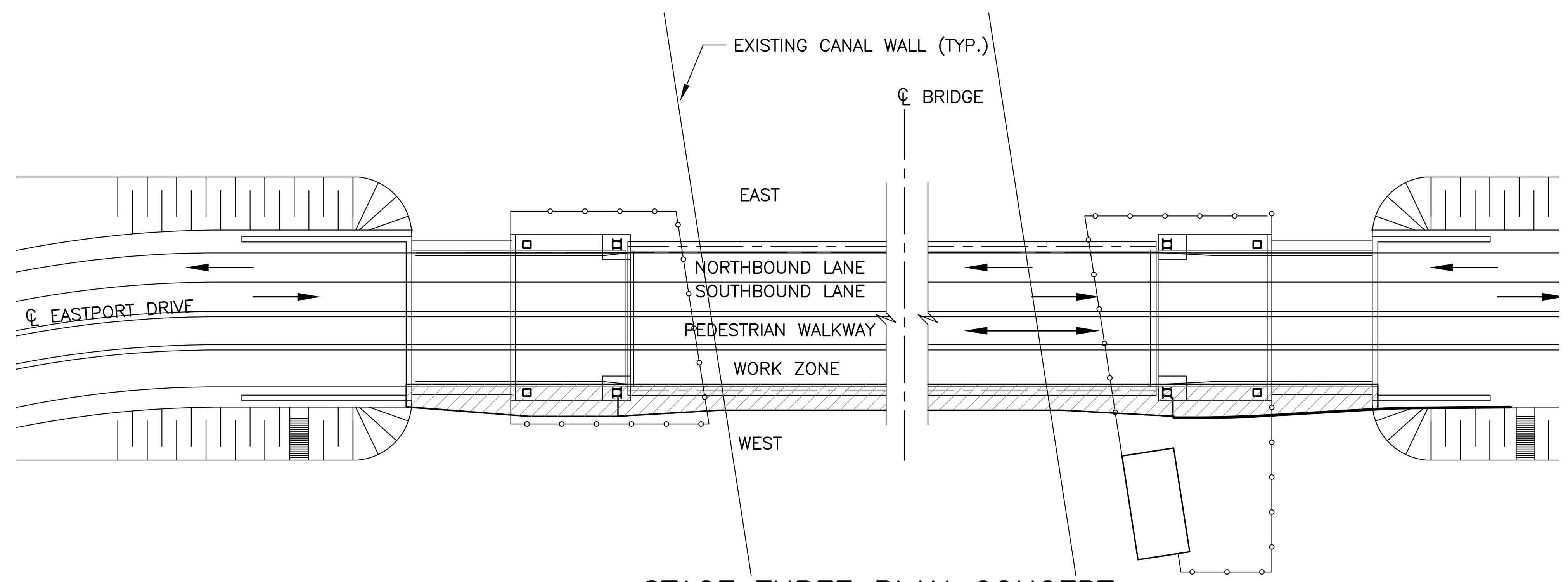
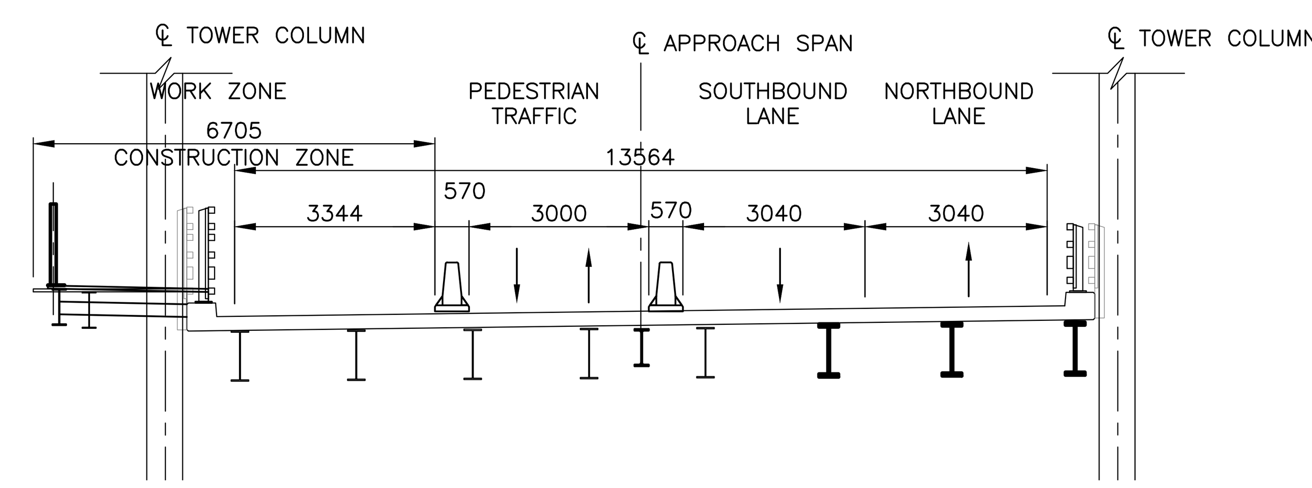


STAGE THREE PLAN CONCEPT
NTS



APPROACH/TOWER SPAN STAGE THREE
1:100

CONSTRUCTION NORTH	TRUE NORTH

MARK	DESCRIPTION	APP	DATE
6.			
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2.			
1.	ISSUED FOR CONCEPT DESIGN	CBL	06/10/2021

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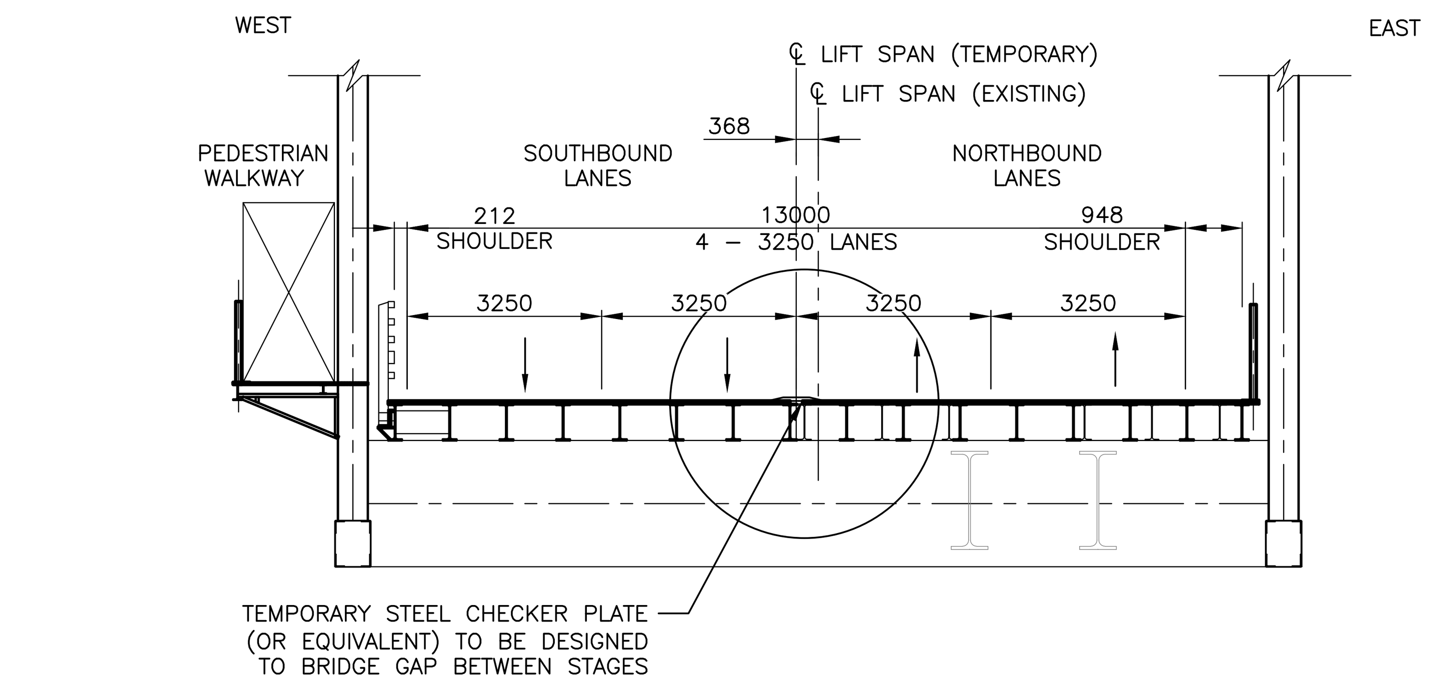
PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

BURLINGTON CANAL LIFT BRIDGE REHABILITATION

TRAFFIC STAGING
LIFT SPAN, OPTION 2
TOWER AND APPROACH SPAN

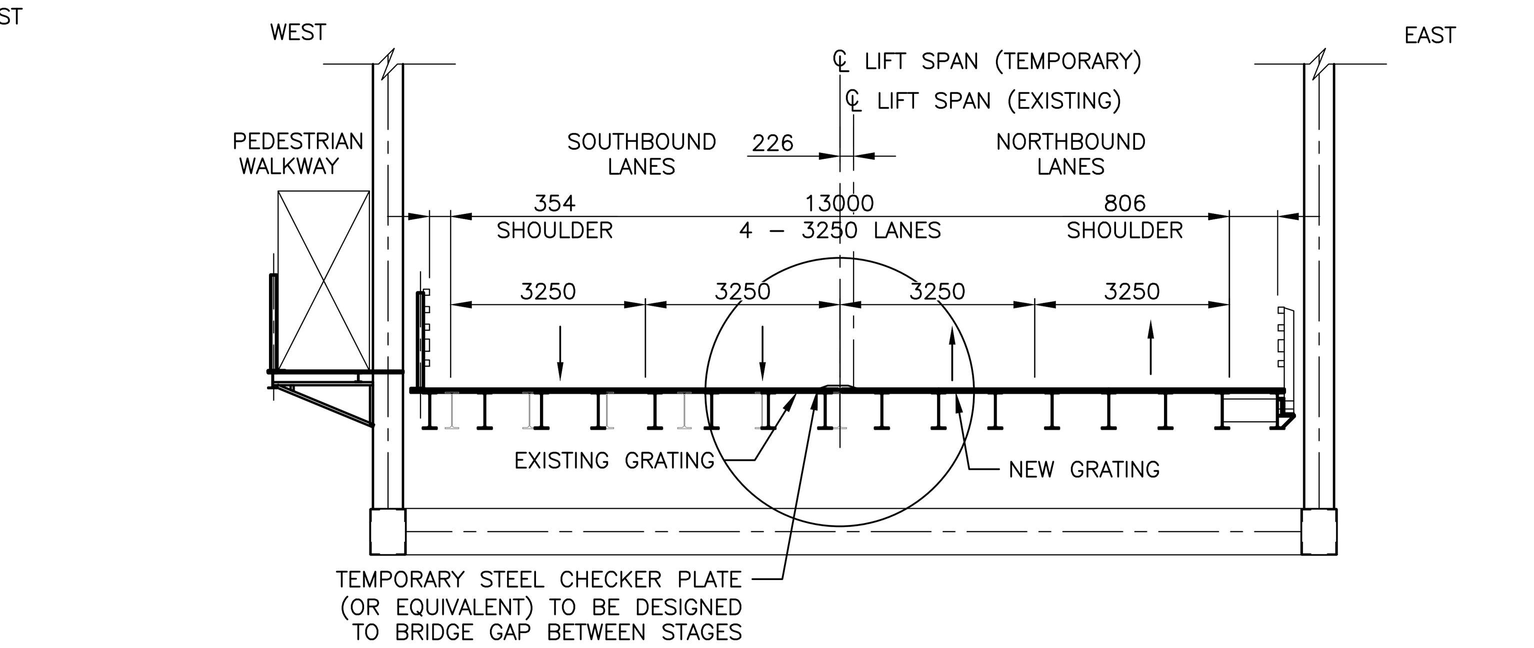
DRN:	DSN:	PROJECT NUMBER: 60637587
BJS	XX	Do not scale this document. All measurements must be obtained from stated dimensions.
CHK: CBL	APP: XX	
SCALE: AS NOTED	DRAWING NUMBER: CS2-01	
	SHEET 2 OF 3	

0 20 mm



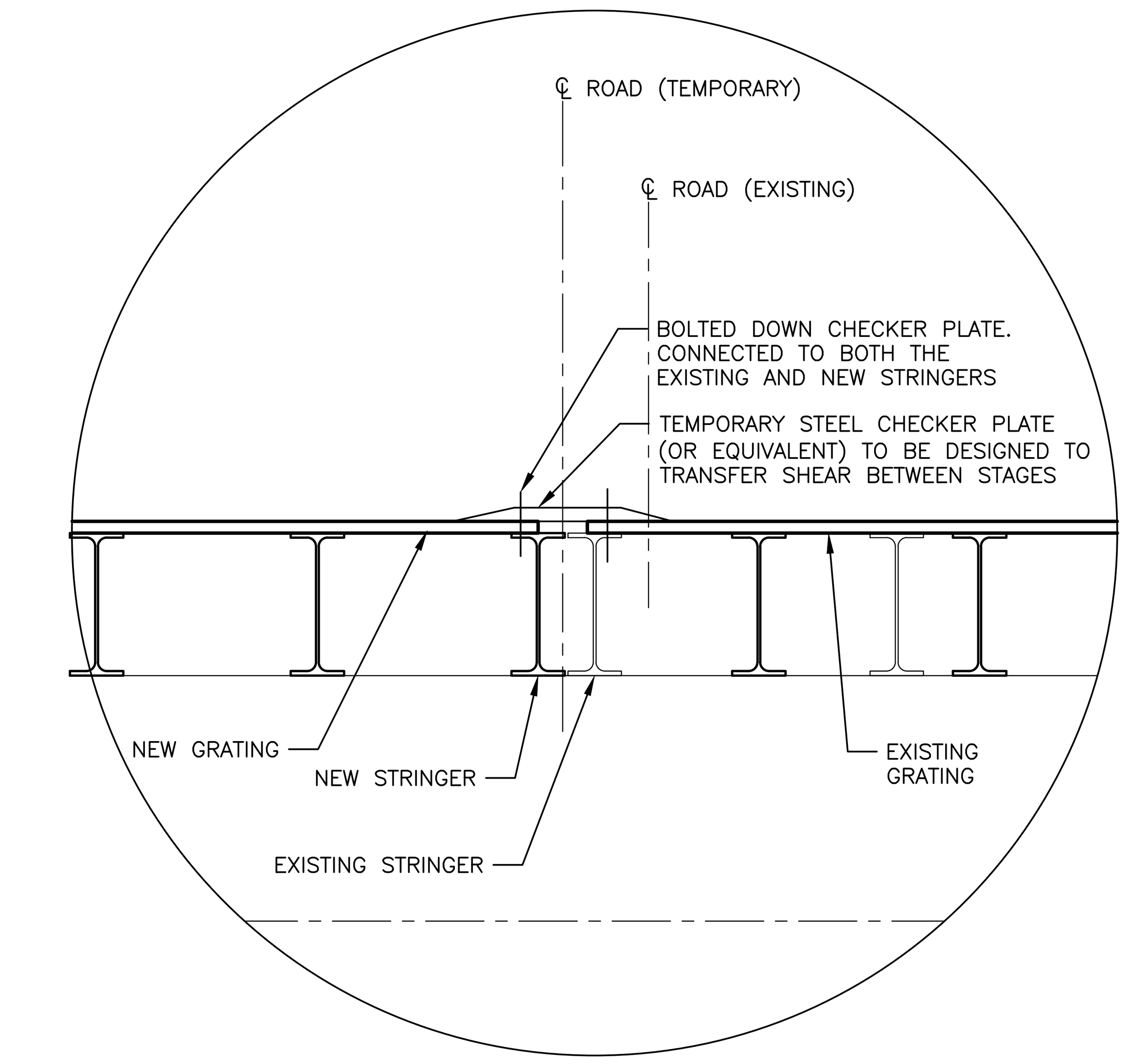
LIFT SPAN, INTERMEDIATE STAGE – OPTION 1

1:100



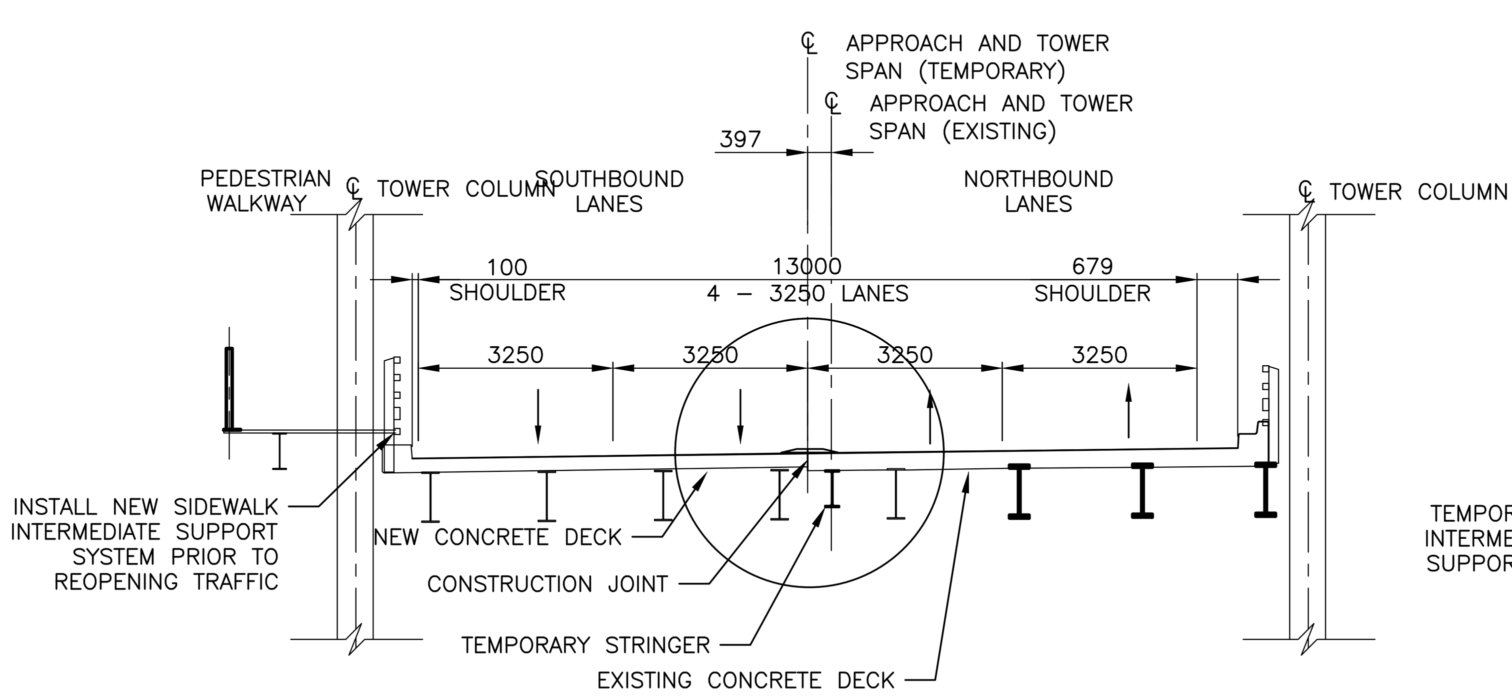
LIFT SPAN, INTERMEDIATE STAGE – OPTION 2

1:100



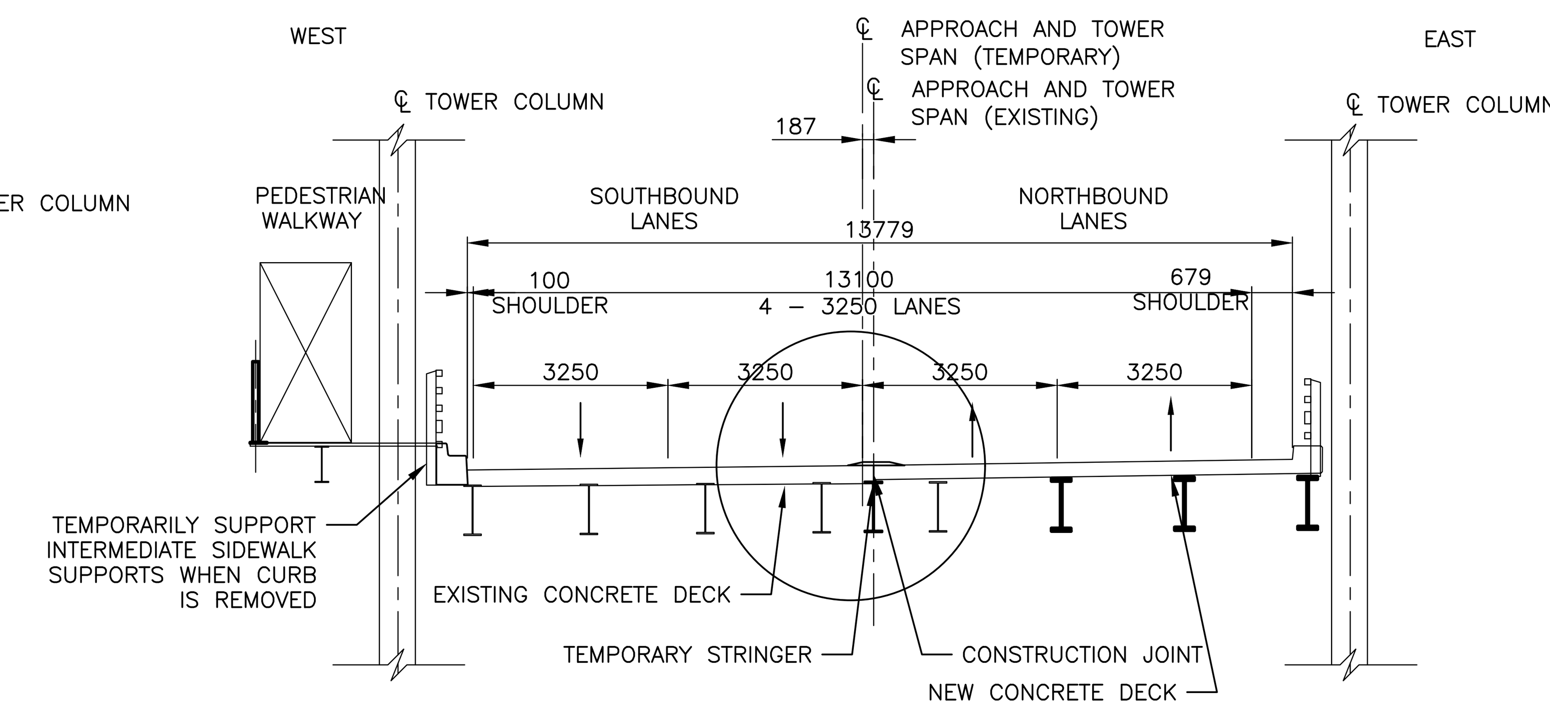
LIFT SPAN, INTERMEDIATE STAGE

1:25



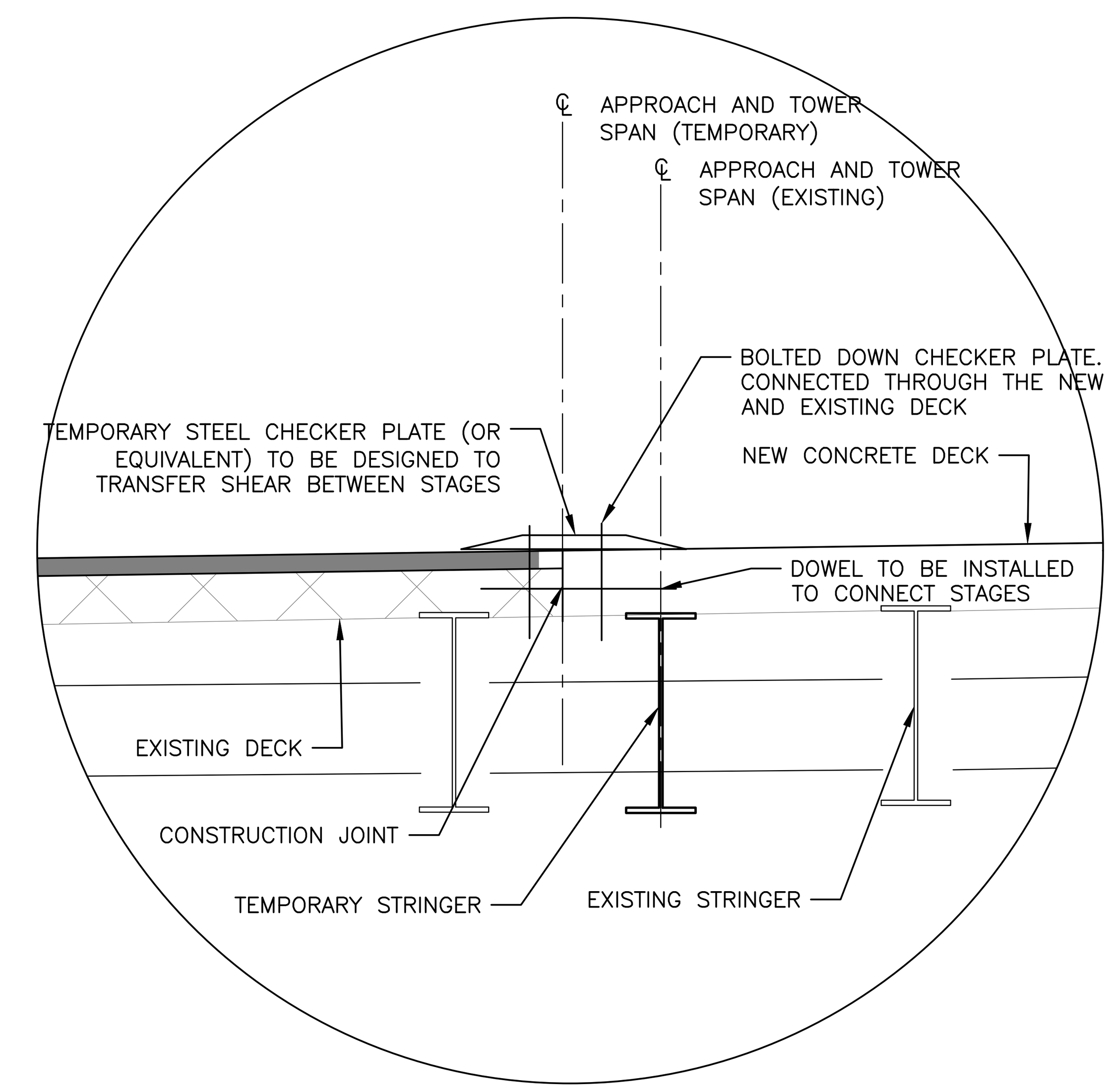
APPROACH SPAN, INTERMEDIATE STAGE – OPTION 1

1:100



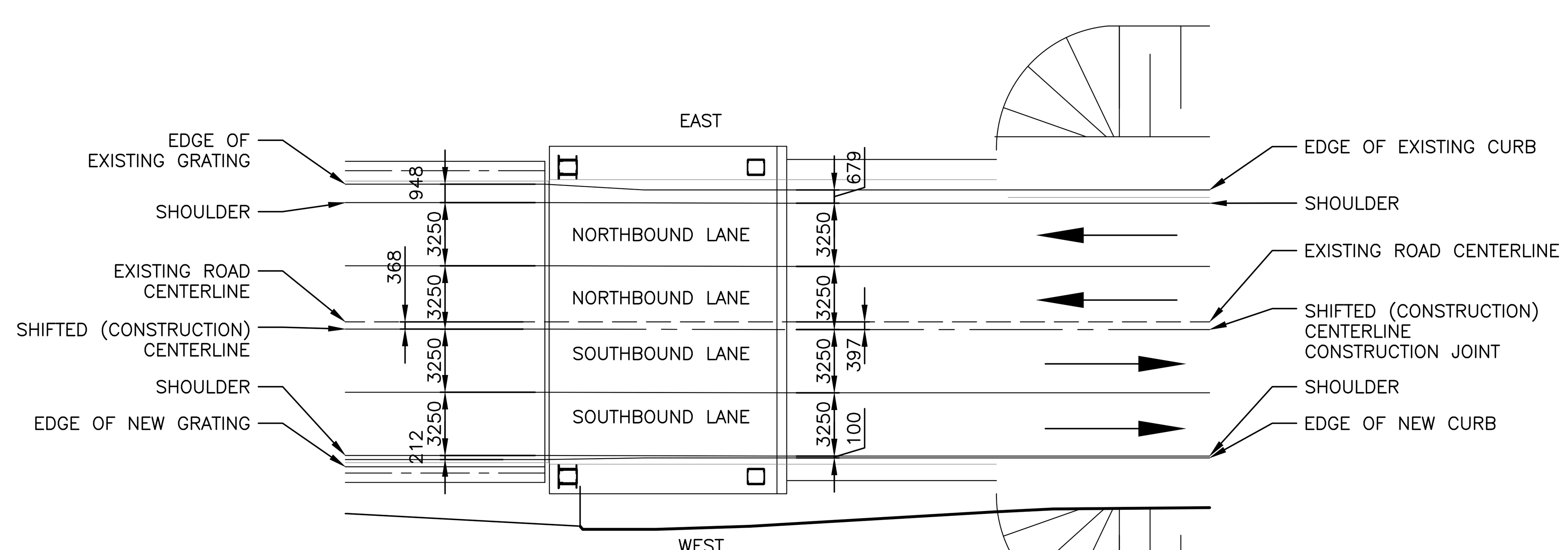
APPROACH SPAN, INTERMEDIATE STAGE – OPTION 2

1:100



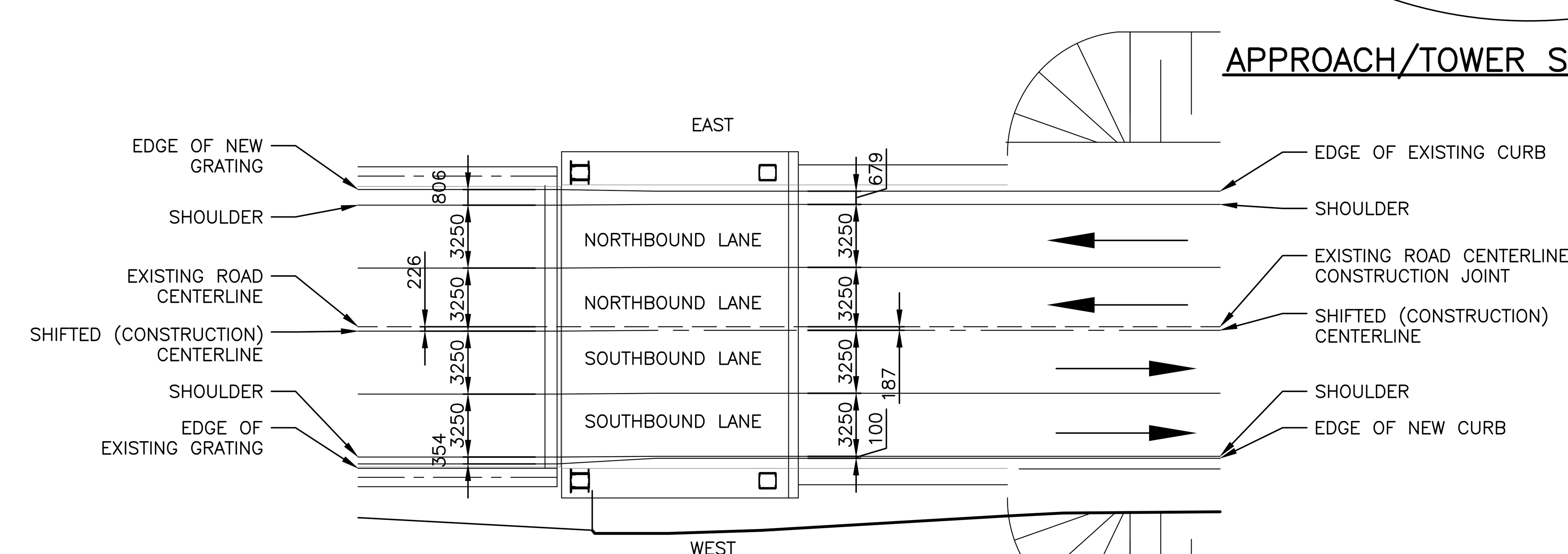
APPROACH/TOWER SPAN, INTERMEDIATE STAGE

1:25



STAGING, INTERMEDIATE STAGE – OPTION 1

1:250



STAGING, INTERMEDIATE STAGE – OPTION 2

1:250

CONSTRUCTION NORTH	TRUE NORTH

MARK	DESCRIPTION	APP	DATE
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR CONCEPT DESIGN	CBL	06/10/2021

AECOM
AECOM CANADA LTD.
50 SPORTSWORLD CROSSING ROAD, SUITE 290
KITCHENER, ON, N2P 0A4
TEL: 519-650-5313
FAX: 519-650-3424

PUBLIC WORKS AND GOVERNMENT SERVICES CANADA

BURLINGTON CANAL LIFT BRIDGE REHABILITATION

SEASONAL STAGE WITH NO CONSTRUCTION (BETWEEN STAGE ONE AND TWO) OPTIONAL

DRN: BJS	DSN: XX	PROJECT NUMBER: 60637587
CHK: CBL	APP: XX	Do not scale this document. All measurements must be obtained from stated dimensions.
SCALE: AS NOTED	DRAWING NUMBER: CS3-01	SHEET 3 OF 3

0 20 mm

Appendix E

Calculations and Models

Exhibit E.1

Loads

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	JC	DATE	30-Nov-20
CHECKED BY	JQ	DATE	18-Dec-20

1.0 Tower Loads

1.1 Dead Loads

			Bridge Weight						
		#	**DIA**	**Length**	**γ_s (kN/m3)**	**P (kN)**	**w (kN/m)**		
Counterweight cables		10			77				
			Motor						
		Width (m)	**Length (m)**	**Height (m)**	**γ_s (kN/m3)**	**P (kN)**	**w (kN/m)**		
Gearbox Pedestal						25.11			
Gearbox		0.90	1.87	1.04	77.00	134.28	71.88		
Brake		0.21		0.48	77.00	2.96			
Motor Pedestal			1.50			9.79	6.53	1.63	(divided over 4 channel sections)
Motor		0.61	1.07	0.66	77.00	33.11	31.00	7.75	(divided over 4 channel sections)
Motor Brake		0.21		0.38	77.00	1.84			
			Wall Panels						
		Height (m)	**Thickness (m)**		**γ (kN/m3)**	**P (kPa)**	**w (kN/m)**		
22ga. Liner Panels						0.09			
22ga. HF Siding Panels						0.09			
2" Mineral Wool Insulation			0.05		0.69	0.03			
Panels around elevator		4.38				0.09	0.39		
			Trib Height (m)	**Area**	**γ (kN/m3)**	**P (kPa)**	**w (kN/m)**		
Machine Room Horizontal Frames	**Bottom**		0.66			0.21	0.14		
	A		1.18			0.21	0.25		
	B		1.16			0.21	0.25		
	C		1.17			0.21	0.25		
	Top		0.53			0.21	0.11		
Penthouse Horizontal Frames	**Bottom**		0.74			0.21	0.16		
	Middle		1.07			0.21	0.23		
	Top		0.61			0.21	0.13		

		5" Concrete Slab				1/2" Chkd Plate Floor				Occupancy Live Load	
	Width (m)	Height (m)	Area (m2)	γ_c (kN/m3)	w (kN/m)	Height (m)	Area (m2)	γ_s (kN/m3)	w (kN/m)	P (kPa)	w (kN/m)
A64	0.61	0.13	0.08	24.00	1.86	0.01	0.01	77.00	0.60	3.60	2.19
A65	0.77	0.13	0.10	24.00	2.36	0.01	0.01	77.00	0.76	3.60	2.79
A30	1.06	0.13	0.13	24.00	3.23	0.01	0.01	77.00	1.04	3.60	3.82
A36	1.11	0.13	0.14	24.00	3.39	0.01	0.01	77.00	1.09	3.60	4.00
B36	1.11	0.13	0.14	24.00	3.39	0.01	0.01	77.00	1.09	3.60	4.00
A41 (Slab)	2.29	0.13	0.29	24.00	6.97					3.60	8.23
A41, B41 (Chkd Pl)	1.21					0.01	0.02	77.00	1.19		
G82, H82	1.07					0.01	0.01	77.00	1.05		
F53, G53, F53	1.07					0.01	0.01	77.00	1.05		
A82	3.21	0.13	0.41	24.00	9.79					3.60	11.57
A82 (beside hatch)	1.61	0.13	0.20	24.00	4.90					3.60	5.78
B41	2.29	0.13	0.29	24.00	6.97					3.60	8.23
B41 (beside hatch)	0.68	0.13	0.09	24.00	2.07					3.60	2.45
D36	1.11	0.13	0.14	24.00	3.39	0.01	0.01	77.00	1.09	3.60	4.00
C36	1.11	0.13	0.14	24.00	3.39	0.01	0.01	77.00	1.09	3.60	4.00
C36 (beside access)	0.43	0.13	0.05	24.00	1.32					3.60	1.55
B30	1.06	0.13	0.13	24.00	3.23	0.01	0.01	77.00	1.04	3.60	3.82
B30 (beside access)	0.38	0.13	0.05	24.00	1.16					3.60	1.37
B65	0.77	0.13	0.10	24.00	2.36	0.01	0.01	77.00	0.76	3.60	2.79
B64	0.61	0.13	0.08	24.00	1.86	0.01	0.01	77.00	0.60	3.60	2.19
Penthouse (per beam)	1.07					0.01	0.01	77.00	1.04	3.60	3.84
Access Platform around Sheave not											

Note: detailed calculations for tower control room around sheaves not considered at this stage

Wind Load - Vertical

q_{50} (Pa)	530.00
C_g	2.00
C_e	1.42
C_v	1.00
F_v (Pa)	1508.67

Wind Loads on Truss in N-S/S-N Direction

h (m)	46.89
X (m)	9.69
X/h	0.21
A_s (m2)	270.26
Columns (m2)	*75.05*
Bracing (m2)	*57.73*
Struts (m2)	*72.70*
Elevator Shaft (m2)	*64.79*
A (m2)	783.12
A_s/A	0.35
K_x	0.48

Wind Load on Windward Truss						**Wind Load on Elevator Shaft Vertical Members**		**Wind Load on Leeward Truss**		
Height (m)	**q_{50} (Pa)**	**C_g**	**C_e**	**C_h**	**$F_{h, windward}$ (Pa)**	**Trib Width (m)**	**$F_{h, elevator\ shaft}$ (kN/m)**	**K_x**	**$F_{h, leeward}$ (Pa)**	
10.00	530.00	2.00	1.00	2.00	2120.00	1.14	2.42	0.48	1015.08	U/S A61
11.81	530.00	2.00	1.03	2.00	2191.88	1.14	2.51	0.48	1049.50	A61
20.58	530.00	2.00	1.16	2.00	2449.29	1.14	2.80	0.48	1172.75	D47
29.35	530.00	2.00	1.24	2.00	2629.46	1.14	3.01	0.48	1259.01	B54
38.12	530.00	2.00	1.31	2.00	2770.59	1.14	3.17	0.48	1326.59	C47
46.89	530.00	2.00	1.36	2.00	2887.72	1.14	3.30	0.48	1382.67	B50
51.57	530.00	2.00	1.39	2.00	2943.19	1.14	3.36	0.48	1409.23	U/S of Sheave Girders
52.64	530.00	2.00	1.39	2.00	2955.26	1.14	3.38	0.48	1415.01	CL of Sheave Girders
53.71	530.00	2.00	1.40	2.00	2967.15	1.14	3.39	0.48	1420.70	Top of Sheave Girders
Wind Load on Counterweight Girder										
Height (m)	**q_{50} (Pa)**	**C_g**	**C_e**	**C_h**	**F_h (Pa)**	**Width (m)**	**Height (m)**	**Load (kN)**	**Per Node (kN)**	
45.26	530.00	2.00	1.35	2.00	2867.33	14.15	6.46	262.23	131.12	

Wind Loads on Truss in E-W/W-E Direction

h (m)	51.57
X (m)	15.90
X/h	0.31
A_s (m2)	256.64
Columns (m2)	83.83
Bracing (m2)	88.56
Struts (m2)	29.54
Elevator Shaft (m2)	54.70
A (m2)	541.65
A_s/A	0.47
K_x	0.24

Wind Load on Windward Truss						Wind Load on Elevator Shaft Vertical Members		Wind Load on Leeward Truss	
Height (m)	q_{50} (Pa)	C_g	C_e	C_h	$F_{h, windward}$ (Pa)	Trib Width (m)	$F_{h, elevator shaft}$ (kN/m)	K_x	$F_{h, leeward}$ (Pa)
10.00	530.00	2.00	1.00	2.00	2120.00	1.49	3.15	0.24	508.31
11.81	530.00	2.00	1.03	2.00	2191.88	1.49	3.26	0.24	525.55
20.58	530.00	2.00	1.16	2.00	2449.29	1.49	3.64	0.24	587.26
29.35	530.00	2.00	1.24	2.00	2629.46	1.49	3.91	0.24	630.46
38.12	530.00	2.00	1.31	2.00	2770.59	1.49	4.12	0.24	664.30
46.89	530.00	2.00	1.36	2.00	2887.72	1.49	4.29	0.24	692.39
48.96	530.00	2.00	1.37	2.00	2912.72	1.49	4.33	0.24	698.38
50.34	530.00	2.00	1.38	2.00	2928.99	1.49	4.35	0.24	702.28
51.57	530.00	2.00	1.39	2.00	2943.19	1.49	4.37	0.24	705.69
52.64	530.00	2.00	1.39	2.00	2955.26	1.49	4.39	0.24	708.58
53.71	530.00	2.00	1.40	2.00	2967.15	1.49	4.41	0.24	711.43
Wind Load on Counterweight Girder									
Height (m)	q_{50} (Pa)	C_g	C_e	C_h	F_h (Pa)	Width (m)	Height (m)	Load (kN)	
45.26	530.00	2.00	1.35	2.00	2867.33	4.29	6.46	79.56	

Wind Loads on Machine House and Penthouse

N-S/S-N Direction									
Wind Pressure						Wind Load on Columns			
Height (m)	q_{50} (Pa)	C_g	C_e	C_h	$F_{h, windward}$ (Pa)	Trib Width (kN/m)	$F_{h, exterior}$ (kN/m)	Trib Width (m)	$F_{h, interior}$ (kN/m)
53.71	530.00	2.00	1.40	2.00	2967.15	3.31	9.84	5.25	15.56
55.02	530.00	2.00	1.41	2.00	2981.50	3.31	9.88	5.25	15.64
56.07	530.00	2.00	1.41	2.00	2992.80	3.31	9.92	5.25	15.70
57.34	530.00	2.00	1.42	2.00	3006.24	3.31	9.96	5.25	15.77
58.40	530.00	2.00	1.42	2.00	3017.34	3.31	10.00	5.25	15.83
58.40	530.00	2.00	1.42	2.00	3017.34	1.07	3.22		
58.68	530.00	2.00	1.42	2.00	3020.16	1.07	3.22		
59.60	530.00	2.00	1.43	2.00	3029.64	1.07	3.23		
60.82	530.00	2.00	1.43	2.00	3041.90	1.07	3.25		

E-W Direction											
Wind Pressure						Wind Load on Columns					
Height (m)	q_{50} (Pa)	C_g	C_e	C_h	$F_{h, windward}$ (Pa)	Trib Width (m)	$F_{h, rear exterior}$ (kN/m)	Trib Width (m)	$F_{h, interior}$ (kN/m)	Trib Width (m)	$F_{h, front}$ exterior (kN/m)
53.71	530.00	2.00	1.40	2.00	2967.15	3.34	9.91	5.09	15.11	2.39	7.09
55.02	530.00	2.00	1.41	2.00	2981.50	3.34	9.96	5.09	15.18	2.39	7.13
56.07	530.00	2.00	1.41	2.00	2992.80	3.34	10.00	5.09	15.24	2.39	7.16
57.34	530.00	2.00	1.42	2.00	3006.24	3.34	10.04	5.09	15.31	2.39	7.19
58.40	530.00	2.00	1.42	2.00	3017.34	3.34	10.08	5.09	15.37	2.39	7.21
58.40	530.00	2.00	1.42	2.00	3017.34	0.86	2.61	1.59	4.79	0.90	2.72
58.68	530.00	2.00	1.42	2.00	3020.16	0.86	2.61	1.59	4.79	0.90	2.72
59.60	530.00	2.00	1.43	2.00	3029.64	0.86	2.62	1.59	4.81	0.90	2.73
60.82	530.00	2.00	1.43	2.00	3041.90	0.86	2.63	1.59	4.83	0.90	2.74

W-E Direction											
Wind Pressure						Wind Load on Columns					
Height (m)	q_{50} (Pa)	C_g	C_e	C_h	$F_{h, windward}$ (Pa)	Trib Width (m)	$F_{h, rear exterior}$ (kN/m)	Trib Width (m)	$F_{h, interior}$ (kN/m)	Trib Width (m)	$F_{h, front}$ exterior (kN/m)
53.71	530.00	2.00	1.40	2.00	2967.15	3.34	9.91	5.09	15.11	2.39	7.09
55.02	530.00	2.00	1.41	2.00	2981.50	3.34	9.96	5.09	15.18	2.39	7.13
56.07	530.00	2.00	1.41	2.00	2992.80	3.34	10.00	5.09	15.24	2.39	7.16
57.34	530.00	2.00	1.42	2.00	3006.24	3.34	10.04	5.09	15.31	2.39	7.19
58.40	530.00	2.00	1.42	2.00	3017.34	3.34	10.08	5.09	15.37	2.39	7.21
58.40	530.00	2.00	1.42	2.00	3017.34	1.68	5.06			1.68	5.06
58.68	530.00	2.00	1.42	2.00	3020.16	1.68	5.06			1.68	5.06
59.60	530.00	2.00	1.43	2.00	3029.64	1.68	5.08			1.68	5.08
60.82	530.00	2.00	1.43	2.00	3041.90	1.68	5.10			1.68	5.10

Exhibit E.2

Self-Weight of Members with Lattice

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	JC	DATE	30-Nov-20
CHECKED BY	SA	DATE	16-Dec-20

Base Weight = 77.09 kN/m^3

Member	Lattice Tie Bars										Plates					Member			Material Weight	
	L (in)	W (in)	H (in)	Spacing (in)	L (mm)	W (mm)	H (mm)	Spacing (mm)	#	Total Lattice Volume in Member (mm^3)	L (mm)	W (mm)	t (mm)	#	Total Plate Volume in Member (mm^3)	L (mm)	Area in Model (mm^2)	Total Member Volume (mm^3)	Lattice + Plate Volume/ Member Volume (%)	Modified Weight (kN/m^3)
Bracing Long (A43 B43 C43 D43)	43.13	2.75	0.63	28.00	1,095.38	69.85	15.88	711.20	44	53,443,593	977.90	787.40	15.88	4	48,894,902	9,855	23,871	235,253,479	43.5%	110.63
Bracing Long (A37 B37 C37)	39.75	2.75	0.63	25.63	1,009.65	69.85	15.88	650.88	48	53,739,328	1,041.40	727.08	15.88	4	48,080,670	10,198	20,927	213,419,718	47.7%	113.87
Bracing Short (A45 B45 C45 A54)	40.50	2.75	0.63	26.13	1,028.70	69.85	15.88	663.58	16	18,251,093	1,187.45	739.78	15.88	4	55,781,310	5,180	18,992	98,378,279	75.3%	135.10
Bracing Short (ABC79)	40.50	2.75	0.63		1,028.70	69.85	15.88	0.00	56	63,878,824	835.03	739.78	15.88	4	39,225,894	11,925	21,331	254,377,382	40.5%	108.34
Bracing Short (B94 D81)	40.50	2.75	0.63		1,028.70	69.85	15.88	0.00	20	22,813,866	889.00	739.78	15.88	4	41,761,408	5,477	21,331	116,826,673	55.3%	119.70
Bracing Short (ABCD68)	40.50	2.75	0.63		1,028.70	69.85	15.88	0.00	56	63,878,824	911.23	739.78	15.88	4	42,805,444	11,481	18,992	218,042,206	48.9%	114.81
Struts Long (B54 C47)	43.13	2.75	0.63	28.00	1,095.38	69.85	15.88	711.20	72	87,453,152	1,035.05	787.40	15.88	4	51,752,396	14,973	20,927	313,352,238	44.4%	111.34
Struts Long (AA47 B47 A47)	43.25	2.75	0.63		1,098.55	69.85	15.88	0.00	72	87,706,639	1,012.83	790.58	15.88	4	50,845,347	15,037	18,992	285,577,402	48.5%	114.49
Struts Long (D47)	43.13	2.75	0.63		1,095.38	69.85	15.88	0.00	72	87,453,152	1,022.35	787.40	15.88	4	51,117,398	14,999	23,876	358,114,961	38.7%	106.92
Struts Short (C54 AC54 AD54 D54 A81 B81)	36.88	2.75	0.63	23.63	936.63	69.85	15.88	600.08	44	45,698,144	977.90	676.28	15.88	4	41,994,412	8,709	20,927	182,257,250	48.1%	114.18
B61	45.50	2.75	0.50		1,155.70	69.85	12.70	0.00	14	14,353,020	1,003.30	971.55	12.70	2	24,758,805	7,449	6,411	47,754,740	81.9%	140.23
C94	49.00	2.75	0.50		1,244.60	69.85	12.70	0.00	14	15,457,098	561.98	952.50	12.70	2	13,596,142	7,449	6,411	47,754,740	60.8%	123.99
D45	45.50	2.75	0.50		1,155.70	69.85	12.70	0.00	16	16,403,451	917.58	971.55	12.70	2	22,643,338	8,033	6,411	51,500,209	75.8%	135.54
E45	49.00	2.75	0.50		1,244.60	69.85	12.70	0.00	14	15,457,098	1,085.85	1,031.88	12.70	2	28,459,721	8,033	6,411	51,500,209	85.3%	142.83

Exhibit E.3

Lift Span Existing and Rehabilitation Calculation Summary

General Information

Material Specifications

Structural Steel (CSA G40-4 or ASTM A7) - Original Steel

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***
Unit Weight =	77	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
G_s =	77000	MPa	

Material Properties: A-242-55 Steel

F_u =	480	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	Mpa	***[CISC 6-7, 11TH Edition, 2016]***

Structural Steel - 1982 Rehabilitation - Strength not listed on rehabilitation drawings

F_y =	300	MPa	***[CSA S6-19 cl. 14.7.4.2, Table 14.1]***
F_u =	450	MPa	***[CSA S6-19 cl. 14.7.4.2, Table 14.1]***

1.0 Load Combination for Lift Bridge - Bridge Open *CSA S6-19 Table 3.1*

1. SLS Combination 1: Permanent loads consisting of dead loads and superimposed dead loads. Transitory loads consisting of live load (0.9 x CL 625-ONT truck).
2. ULS Combination 1: Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of vehicular live load (1.70 x CL 625-ONT) and pedestrian live load (0.2 x 1.70 x P).
3. ULS Combination 2: Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of vehicular live load (1.60 x CL 625-ONT), pedestrian live load (0.2 x 1.60 x P) and temperature effects (1.15 x K).
4. ULS Combination 3: Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of vehicular live load (1.40 x CL 625-ONT), pedestrian live load (0.8 x 1.40 x P), temperature effects (1.15 x K) and wind (0.45 x
5. ULS Combination 4: Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of temperature effects (1.25 x K) and wind (0.45 x W).

1.1 Load Combination for Lift Bridge - Bridge Closed Counter Weight Supported *CSA S6-19 Table 13.3, 13.4*

6. ULS Combination V4: Permanent loads consisting of dead loads and superimposed dead loads with counterweights supported. Transitory loads consisting of vehicular live load (1.70 x CL 625-ONT) and pedestrian live load (0.2 x 1.70 x P).

2.0 Bridge Weight

Steel Density = 77 kN/m3 Individual Member Weights based on Model

2.1 Existing Roadway Grating

Drawings specify exact Weight of Panels are unavaible: therefore weight of Grating Calculated by individual components

Steel Density =	77	kN/m3
Panel Width =	2330	mm
	Per 95 mm	
	M - Beams	
Hieght =	132	mm
Area =	1303.2	mm2
Spacing =	179.2307692	mm
Area / Metre =	7270.9	mm2
Number =	13	Bars
Pannel	2330	mm
Volume	1609414.95	mm3
	C - Beam	
Hieght =	50	mm
Width =	6.35	mm
Area =	317.5	mm2
Spacing =	95	mm
Area / Metre =	3342.1	mm2
Pannel	2330	mm
Volume	739775	mm3
	Supplemental Bar	
Hieght =	25	mm
Width =	6.35	mm
Area =	158.8	mm2
Spacing =	194.1666667	mm
Area / Metre =	817.6	mm2
Inter spacing =	95	mm
Number =	12	Bars
Volume =	180975	mm3
	Diagonal Bar	
Hieght =	25	mm
Width =	6.35	mm
Area =	158.8	mm2
Spacing =	95	mm
Area / Metre =	1671	mm2
Number =	24	Bars
Volume =	361950	mm3
Combined Volume =	2892114.95	mm3/95mm
Combined Volume =	30443315	mm3/m
Total Weight =	1.006	KN/m

Grating Weight Per Girder

Location	Spacing (mm)	Girder #	Tributary Width (mm)	Unit Weight
Sidewalk Overhang	690			
Girder 1 - 2	1295	1	1337.5	1.346
Girder 2 - 3	1295	2	1295.0	1.303
Girder 3 - 4	1295	3	1295.0	1.303
Girder 4 - 5	1295	4	1295.0	1.303
Girder 5 - 6	1295	5	1295.0	1.303
Girder 6 - 7	1295	6	1295.0	1.303
Girder 7 - 8	1120	7	1207.5	1.215
Girder 8 - 9	1130	8	1125.0	1.132
Girder 10 - 11	1130	9	1130.0	1.137
Girder 11 - 12	1130	10	1130.0	1.137
Girder 12 - 13	1130	11	1130.0	1.137
Curb Side Overhang	685	12	1250.0	1.258

2.2 Existing Sidewalk Weight

Steel T's

Hieght = 2 in

Width = 2 in

Thickness = 0.25 in

Area = 604.84 mm2

Steel Plates Between T's

Area = 1130.3 mm2

Combined Steel Per 203 mm

Total Steel Area = 1735.138 mm2/(203.2mm)

Steel 0.66 kn/m2

Concrete

Concrete Thickness = 38.1 mm

Width = 203.2 mm

Area = 7741.92 mm2

Concrete Unit Weight = 23.5 kN/m3

Concrete = 0.90 kn/m2

Sidewalk Total Weight 1.55 kn/m2 Load Applied in Model

Area = 317 m2

Weight = 492.8 kN

Weight =

Total Bridge Weight

Item	Past Weight (Tonne)	Aecom Weight (Tonne)	Difference (Tonne)
Sidewalk – Steel + Concrete	140+2.4 = 142.4	50	92.4
Total Bridge Weight	1877	**1784.6**	92.4

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	RA	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Grating Alternative Weights			Current		
Length of Deck =	112776	mm	Stringer	0.999	kn/m2
Width Grating =	14785	mm	Grating and Stringer	1.999	kn/m2

Option Number	Deck System	Grating and Stringer: Unit Weights	Grating and Stringer: Total Deck Weight kN	Grating and Stringer: Total Change kN	Grating and Stringer: Total Change kg	Grating and Stringer: Total Change	Total Bridge weight (tonne)
0	Existing Grating	2.00	3332	0	0	0	1785
1	Crimped I Bar	2.08	3465	133	13527	14	1798
2	Rivetted Grating	2.24	3734	401	40935	41	1826
3	Aluminum Deck	1.65	2758	-575	-58602	-59	1726
4	Fiber-Reinforced Polymer	1.69	2821	-511	-52107	-52	1733
5	Half Filled Grid	2.79	4645	1313	133856	134	1919
6	Half Filled Grid W Overlay	3.77	6289	2957	301537	302	2086
7	Exodermic	3.55	5911	2579	262996	263	2048
8	Orthotropic Steel	**2.82**	4702	1370	139666	140	1925
9	Precast Concrete	**5.96**	9935	6603	673306	673	2458

Decking Weight in Additon to the Current Stringer Loads (kN/m)

	Option #	0	1	2	3	4	5	6	7	8	9
	Tributary Width (mm)	Existing	Crimped I Bar	Rivetted Grating	Aluminum Deck	Fiber-Reinforced	Half Filled Grid	Half Filled Grid W	Exodermic	Orthotropic Steel	Precast Concrete
Girder 1	1337.5	1.34	1.44	1.66	0.88	0.93	2.39	3.71	3.41	2.44	6.63
Girder 2	1295.0	1.30	1.40	1.61	0.85	0.90	2.31	3.59	3.30	2.36	6.42
Girder 3	1295.0	1.30	1.40	1.61	0.85	0.90	2.31	3.59	3.30	2.36	6.42
Girder 4	1295.0	1.30	1.40	1.61	0.85	0.90	2.31	3.59	3.30	2.36	6.42
Girder 5	1295.0	1.30	1.40	1.61	0.85	0.90	2.31	3.59	3.30	2.36	6.42
Girder 6	1295.0	1.30	1.40	1.61	0.85	0.90	2.31	3.59	3.30	2.36	6.42
Girder 7	1207.5	1.21	1.30	1.50	0.79	0.84	2.16	3.35	3.08	2.20	5.99
Girder 8	1125.0	1.13	1.21	1.40	0.74	0.78	2.01	3.12	2.87	2.05	5.58
Girder 9	1130.0	1.13	1.22	1.40	0.74	0.78	2.02	3.13	2.88	2.06	5.60
Girder 10	1130.0	1.13	1.22	1.40	0.74	0.78	2.02	3.13	2.88	2.06	5.60
Girder 11	1130.0	1.13	1.22	1.40	0.74	0.78	2.02	3.13	2.88	2.06	5.60
Girder 12	1250.0	1.25	1.35	1.55	0.82	0.87	2.23	3.47	3.18	2.28	6.20

3.0 Applied Load

3.1 Pedestrian Load

CSA S6-19 3.8.9

Length of Bridge = 112.78 m

Pedestrian Pressure Load over Entire Span = 1.6 Kpa

3.2 Vehicular Live Load

CSA S6-19 3.8

Figure A3.4.1
CL-625-ONT truck
(See Clause A3.4.1.)

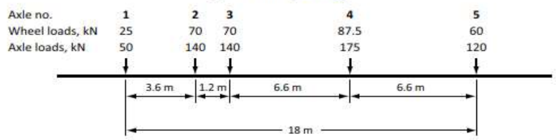
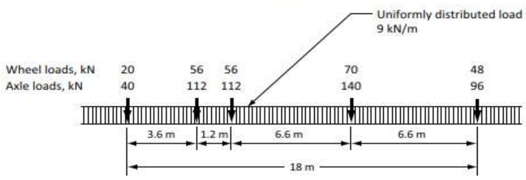


Figure A3.4.2
CL-625-ONT lane load
(See Clause A3.4.1.)



Roadway Vehicle Loads

Live Load:	CL-625-ONT (CHBDC)	DLA in accordance with CHBDC 3.8.4.5.3
	ONT Lane Load (CHBDC)	DLA in accordance with CHBDC 3.8.4.5.3

Dynamic Load Allowance

For components other than buried structures, the dynamic load allowance shall be
(a) 0.50 for deck joints;
(b) 0.40 where only one axle of the CL-W Truck is used (except for deck joints);
(c) 0.30 where any two axles of the CL-W Truck, or axles nos. 1 to 3, are used; or
(d) 0.25 where three axles of the CL-W Truck, except for axles nos. 1 to 3, or more than three axles, are used.

- Number of lanes 4

- Multi-Lane Factor

1 Lane	:	1.0
2 Lanes	:	1.0 on Track 1, 0.9 on Track 2
3 Lanes	:	1.0 on Track 1, 0.9 on Track 2, 0.8 on Track 3
4 Lanes		1.0 on Track 1, 0.9 on Track 2, 0.8 on Track 3, 0.7 on Track 4

Longitudinal Forces due to Braking Traction (LF) CHBDC Trucks

CSA S6-19 3.8.6

3.8.6 Braking force

Braking force shall be considered only at the ultimate limit states.

Braking force shall be an equivalent static force of 180 kN plus 10% of the uniformly distributed load portion of the lane load from one design lane, irrespective of the number of design lanes, but not greater than 700 kN in total.

The braking force shall be applied at the deck surface.

Breaking Force (CHBDC 3.8.6)

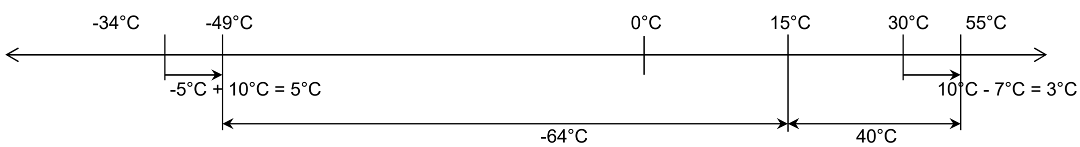
180KN +10%	Lane Load = 9 Kn/m			
10% =	36.9 kn	180+10% =	216.9 KN	5.29 kn/m

3.3 Temperature Effect (K)

CSA S6-19 3.9.4

3.3.1 Temperature Change

- Location : Burlington, ON
- Superstructure Type : A
- Construction Temperature : 15 °C
- Thermal Coefficient of Concrete : 10 x 10^{-6} / °C
- Max Effective Temperature : 25 °C above maximum mean daily temperature
  Min Effective Temperature : 15 °C below minimum mean daily temperature
- Reduction in Max Effective Temperature : 0.0 °C
  Increase in Min Effective Temperature : 0.0 °C
- Max Mean Daily Temperature : 30 °C
  Min Mean Daily Temperature : -34 °C
- Applied Max Temperature : 40 °C
  Applied Min Temperature : -64 °C
- Temperature range



3.3.2 Thermal Differential

- Height : Depth of Structure 0.7m Minimum
- Summer Top : 15.000 °C For Top Chord
  Bottom : 0.000 °C
- Winter Top : 0.000 °C
  Bottom : -8.000 °C Bottom Chord

3.4 Wind Load

Pressure (Bridge Closed)	530	Pa	*n/m2*	50 Year Return Period	S6-19 Table A3.1.1
Pressure (Bridge Open)	450	Pa	*n/m2*		S6-19 CL 13.6.4
Pressure limited by windspeed	80	km/h		Reference Report Provided	

CHBDC- Commentary Annex - Design and Reference Wind Pressures Page 162

Design and reference wind pressures

Table A3.1.1 provides design hourly mean reference wind pressures associated with return periods of 10, 25, 50, and 100 years for some 600 locations across Canada. These reference pressures are hourly mean velocity pressures at the standard anemometer height of 10 m and are computed using the mean hourly wind speed estimated for that return period and a constant air density. The relationship between the reference pressure, q (in Pa), and the corresponding mean hourly wind speed, v (in km/h) is

$q \quad = 0.05\, v^2$, Pa

Most of the reference pressures for the return period of 10 years have been taken from Chapter 1 of the *Supplement to the National Building Code of Canada* (NBC, 1990). Reference pressures for return periods of 25 and 50 years were obtained from the same source using the following interpolation procedure:

$q_{(25)} = 0.166\, q_{(10)} + 0.834\, q_{(30)}$

and

q = 320 Pa

Bridge Closed

Wind Horizontal Drag

Ce =	1.2	Hieght =	20 m	Table 3.9
Cg =	2	3.10.1.3		
Ch =	2	3.10.1.5		
q =	530	pa		
Fh =	2544	pa	Horizontal Wind Pressure Applied in the Model	

* Longitudinal Wind Force Shall Be 50% of Transverse Wind Force

Wind Vertical Pressure

Ce =	1.2	Hieght =	20 m	Table 3.9
Cg =	2	3.10.1.3		
Cv =	1	3.10.1.5		
q =	530	pa		
Fv =	1272	pa		

Bridge Raised

Wind Horizontal Drag

Ce =	1.5	Hieght =	61 m	Table 3.9
Cg =	2	3.10.1.3		
Ch =	2	3.10.1.5		
q =	320	pa		
Fh =	1920	pa	Horizontal Wind Pressure Applied in the Model	

* Longitudinal Wind Force Shall Be 50% of Transverse Wind Force — S6-19 CL 13.6.4.4

Wind Vertical Pressure

Ce =	1.5	Hieght =	61 m	Table 3.9
Cg =	2	3.10.1.3		
Cv =	1	3.10.1.5		
q =	320	pa		
Fv =	960	pa		

The Following Table Summarizes the factors for Winds at Skew angles of the Structure

S6-19 CL 3.10.3.2

Table 3.10
Modification of wind loads on superstructure with skew angle
(See Clause 3.10.3.2.)

Skew angle (measured from a line normal to the longitudinal axis), degrees	Modification coefficients			
	Truss spans		Other spans	
	Transverse horizontal or vertical load	Longitudinal horizontal load	Transverse horizontal or vertical load	Longitudinal horizontal load
0	1.00	0.00	1.00	0.00
15	0.93	0.16	0.88	0.12
30	0.87	0.37	0.82	0.24
45	0.63	0.55	0.66	0.32
60	0.33	0.67	0.34	0.38

Roadway Stringer Wind Vertical Force (kN/m)			
Member	Tributary Width (mm) =	Closed Bridge	Open Bridge
Stringer 1 (Highway Side)	1337.5	1.701	1.284
Stringer 2	1295.0	1.647	1.243
Stringer 3	1295.0	1.647	1.243
Stringer 4	1295.0	1.647	1.243
Stringer 5	1295.0	1.647	1.243
Stringer 6	1295.0	1.647	1.243
Stringer 7	1207.5	1.536	1.159
Stringer 8	1125.0	1.431	1.080
Stringer 9	1130.0	1.437	1.085
Stringer 10	1130.0	1.437	1.085
Stringer 11	1130.0	1.437	1.085
Stringer 12 (Railway Side)	1250.0	1.590	1.200

Wind Load to be taken as 85% on Grating
100% applied to model - to be factored when considering open grating

Sidewalk Stringer Wind Vertical Force (kN/m)			
Member	Tributary Width (mm) =	Closed Bridge	Open Bridge
Exterior W Section	865.2	1.101	0.831
Middle S Beam	1398.6	1.779	1.343
Interior C Beam	533.4	0.678	0.512

Analysis Method for Stress and Force: Truss Section Result for L0-L2

		L0-L2
Axial	ULS Max	4483
	ULS Min	1548
IY Bending	ULS Max	63
	ULS Min	0
IZ Bending	ULS Max	82
	ULS Min	-115

Section Calculations

	Angle	Web	T&B Plate	
Designation	8x6x1/2	30x7/16	23x3/8	
Qty=	4	2	2	
Iy =	73.6	819.5	0.1	$x10^6mm^4$
Iz =	35.84	0.2	21.9	$x10^6mm^4$
A =	17400.0	16935.5	7258.1	mm^2
dz =	318.2	0	385.0	mm^2
dy =	254.8	297.7	196.9	mm
Iyy =	1835.4	819.5	1075.7	$x10^6mm^4$
Izz =	1165.5	1500.6	303.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	41594	mm^2
A_{RHM*}=	7096.8	mm2
A_{net} =	34497	mm^2
∑Iyy =	3730.5	$x10^6mm^4$
∑Izz =	2969.3	$x10^6mm^4$
ybar=	391	mm
xbar=	303	mm

Applied Stresses & Forces			
	Formula	Value	Unit
Stress Y =	Iy bending |ULS| * ybar / Iyy	7	MPa
Stress Z =	Iz bending |ULS| * xbar / Izz	12	MPa
Force =	(Stress Y + Stress Z) * A_{net}	634	kN
Tension Combined Force =	Axial ULS Max + Force	5138	kN
Compression Combined Force =	Axial ULS Min - Force	934	kN

***Calculation process applies to all other members**

Case 0 (Existing)		Railway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4483	9212	11592	472	-4623	-7235	-7235	-4836	5736	-2245	3531	-394	-394	1487	1487	4642	1487	1467	-92	-170	1598	1566	-135	-196	1565	1560	-153	-210
	ULS Min	1548	5418	6819	-777	-7641	-11278	-12059	-7801	3453	-4423	1511	-2341	-2341	-361	-361	-349	361	303	-186	-262	484	410	-197	-307	467	415	-200	-326
IY Bending	ULS Max	63	111	126	62	121	142	154	334	128	128	98	109	109	83	83	751	11	366	6	357	0	532	2	419	12	563	0	428
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-413	-97	-101	-135	-136	-186	-205	-158	-180	-202	-224	-168	-192
IZ Bending	ULS Max	82	31	31	32	32	32	32	465	104	122	106	112	112	103	103	128	56	56	80	80	83	83	125	125	104	104	94	94
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-446	-104	-122	-106	-112	-112	-103	-103	-132	-44	-44	-110	-110	-110	-110	-101	-101	-94	-94	-85	-85
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	50	14	34	25	41	27	49	29	48	30	52	31	49
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	15	13	12	30	28	25	24	34	32	24	23	25	24
Force (kn) =		634	677	796	336	551	669	763	3202	937	978	790	890	890	701	701	4012	579	1747	941	2196	1128	2780	1090	2545	1147	2836	972	2317
Tension Combined Force (kN) =		5118	9889	12388	808	-4073	-6566	-6472	-1634	6673	-1267	4322	495	495	2189	2189	8654	2066	3215	849	2026	2726	4346	955	2349	2713	4397	819	2107
Compression Combined Force (kN) =		913	4741	6023	-1112	-8192	-11947	-12822	-11003	2516	-5402	721	-3230	-3230	-1063	-1063	-4360	-217	-1444	-1127	-2458	-644	-2370	-1286	-2852	-680	-2422	-1172	-2643
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)	10107	20676	25228	8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.45	0.42	0.43	0.08	NA	NA	NA	NA	0.43	NA	0.42	0.05	0.05	0.31	0.31	0.43	0.34	0.30	0.18	0.23	0.45	0.41	0.20	0.26	0.45	0.42	0.17	0.24
		NA	NA	NA	0.124922	0.520171	0.47964	0.481967	0.294702	NA	0.4183781	NA	0.4669002	0.4669	0.21331	0.21331	0.30408	0.04962	0.21564	0.32118	0.43684	0.14948	0.35383	0.37115	0.50703	0.15915	0.36153	0.33968	0.46928

Case 0 (Existing)		Highway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	3963	7901	9799	675	-3929	-6177	-6177	-4652	5434	-2037	3302	-283	-283	1434	1434	4629	1573	1552	-74	-129	1574	1581	-127	-163	1489	1508	-127	-165
	ULS Min	893	4314	5397	-584	-6823	-9973	-10605	-7587	3206	-4146	1326	-2194	-2194	-402	-402	-372	437	323	-169	-307	458	351	-170	-321	409	331	-157	-322
IY Bending	ULS Max	64	91	91	62	87	120	126	334	118	106	84	95	95	83	83	420	97	97	70	70	82	101	0	99	0	128	0	128
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-800	-4	-432	-51	-328	-92	-419	-97	-300	-149	-375	-110	-288
IZ Bending	ULS Max	101	31	31	32	32	32	32	415	104	122	106	112	112	103	103	272	66	233	86	172	94	161	0	124	0	72	0	18
	ULS Min	-88	-31	-31	-32	-32	-32	-32	-458	-104	-122	-106	-112	-112	-103	-103	-384	-163	-326	-179	-255	-172	-207	-144	-144	-120	-120	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	53	14	40	13	37	13	39	18	34	22	35	20	33
	Stress Z	10	2	2	3	2	1	1	13	8	12	13	13	13	13	13	43	37	71	48	66	39	45	39	37	27	26	23	22
	Force (kn) =	586	558	567	336	421	548	578	3174	875	848	702	795	795	701	701	5949	1106	4212	1058	3281	1134	3182	983	2273	1058	2309	749	1746
Tension Combined Force (kN) =		4549	8460	10366	1011	-3508	-5629	-5600	-1478	6309	-1189	4004	512	512	2135	2135	10577	2679	5764	985	3152	2708	4763	856	2109	2546	3817	622	1581
Compression Combined Force (kN) =		306	3756	4830	-920	-7244	-10522	-11182	-10761	2331	-4994	624	-2989	-2989	-1104	-1104	-6321	-670	-3889	-1227	-3588	-676	-2831	-1153	-2594	-648	-1978	-906	-2068
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.50	0.51	0.51	0.09	NA	NA	NA	NA	0.55	NA	0.55	0.06	0.06	0.30	0.30	0.52	0.45	0.54	0.20	0.36	0.45	0.45	0.18	0.24	0.42	0.36	0.13	0.18
		NA	NA	NA	0.103257	0.645613	0.667175	0.680667	0.427466	NA	0.7066378	NA	0.5069941	0.50699	0.22158	0.22158	0.4408	0.15278	0.58072	0.34958	0.63763	0.15689	0.42271	0.3327	0.46106	0.15169	0.29532	0.26262	0.36717

Case 1		Railway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4504	9260	11652	472	-4663	-7295	-7295	-4876	5765	-2267	3548	-403	-403	1491	1491	4678	1493	1473	-92	-170	1604	1572	-135	-196	1572	1567	-153	-210
	ULS Min	1568	5465	6879	-777	-7681	-11337	-12123	-7842	3483	-4445	1528	-2350	-2350	-358	-358	-349	367	309	-186	-262	491	417	-197	-307	473	421	-201	-326
IY Bending	ULS Max	63	111	126	62	121	142	154	334	128	128	98	109	109	83	83	751	11	368	6	359	0	534	2	421	12	565	0	430
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-412	-97	-101	-135	-136	-187	-206	-159	-181	-203	-225	-168	-192
IZ Bending	ULS Max	82	31	31	32	32	32	32	465	104	122	106	112	112	103	103	128	56	56	80	80	83	83	126	126	104	104	94	94
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-446	-104	-122	-106	-112	-112	-103	-103	-132	-44	-44	-110	-110	-111	-111	-101	-101	-94	-94	-85	-85
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	50	14	34	25	41	27	49	29	48	30	52	31	49
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	15	13	12	30	28	25	24	34	32	24	23	25	24
Force (kn) =		634	677	796	336	551	669	763	3202	937	978	790	890	890	701	701	4015	581	1754	944	2203	1131	2790	1093	2554	1150	2846	974	2324
Tension Combined Force (kN) =		5138	9936	12448	807	-4113	-6626	-6531	-1674	6702	-1288	4338	486	486	2192	2192	8694	2074	3228	852	2033	2735	4362	958	2358	2721	4413	821	2114
Compression Combined Force (kN) =		934	4789	6083	-1113	-8231	-12006	-12886	-11044	2546	-5423	737	-3239	-3239	-1059	-1059	-4364	-213	-1445	-1130	-2465	-641	-2373	-1289	-2861	-677	-2425	-1175	-2650
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.46	0.43	0.43	0.08	NA	NA	NA	NA	0.43	NA	0.42	0.05	0.05	0.31	0.31	0.43	0.35	0.31	0.18	0.23	0.46	0.41	0.20	0.27	0.45	0.42	0.17	0.24
		NA	NA	NA	0.124991	0.522708	0.482028	0.484359	0.295791	NA	0.4200418	NA	0.4681996	0.4682	0.21258	0.21258	0.30431	0.0487	0.2158	0.32189	0.43813	0.14874	0.35429	0.37205	0.5086	0.15838	0.36205	0.34033	0.47059

Case 1		Highway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	3980	7941	9848	676	-3964	-6229	-6229	-4691	5461	-2057	3317	-291	-291	1437	1437	4665	1579	1559	-74	-129	1580	1587	-127	-163	1494	1514	-127	-164
	ULS Min	910	4353	5446	-584	-6858	-10025	-10660	-7626	3234	-4166	1341	-2202	-2202	-399	-399	-372	443	329	-169	-307	464	357	-170	-321	415	336	-157	-322
IY Bending	ULS Max	64	91	91	62	87	120	126	334	118	106	84	95	95	83	83	419	98	98	70	70	82	101	0	98	0	128	0	127
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-800	-3	-434	-50	-330	-92	-420	-97	-301	-149	-376	-110	-289
IZ Bending	ULS Max	101	31	31	32	32	32	32	415	104	122	106	112	112	103	103	272	66	233	86	172	93	161	0	124	0	72	0	18
	ULS Min	-88	-31	-31	-32	-32	-32	-32	-458	-104	-122	-106	-112	-112	-103	-103	-385	-164	-327	-179	-256	-173	-208	-145	-145	-120	-120	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	54	14	40	13	38	13	39	18	34	22	35	20	33
	Stress Z	10	2	2	3	2	1	1	13	8	12	13	13	13	13	13	43	37	71	48	66	39	45	39	37	27	26	23	22
	Force (kn) =	586	558	567	336	421	548	578	3174	875	848	702	795	795	701	701	5958	1110	4227	1061	3292	1135	3192	984	2277	1059	2313	750	1748
Tension Combined Force (kN) =		4566	8499	10415	1011	-3543	-5681	-5651	-1517	6336	-1209	4019	504	504	2139	2139	10623	2689	5785	987	3163	2715	4779	857	2114	2553	3827	623	1584
Compression Combined Force (kN) =		323	3795	4879	-919	-7279	-10574	-11238	-10801	2359	-5014	639	-2997	-2997	-1101	-1101	-6331	-667	-3898	-1229	-3599	-671	-2835	-1154	-2599	-644	-1976	-907	-2070
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.50	0.51	0.51	0.09	NA	NA	NA	NA	0.55	NA	0.55	0.06	0.06	0.31	0.31	0.53	0.45	0.55	0.20	0.36	0.45	0.45	0.18	0.24	0.43	0.36	0.13	0.18
		NA	NA	NA	0.103215	0.648737	0.670468	0.68404	0.429034	NA	0.7094717	NA	0.5083781	0.50838	0.22091	0.22091	0.44146	0.15219	0.58207	0.35032	0.6396	0.15581	0.42334	0.33299	0.4619	0.15064	0.29507	0.26265	0.36757

Case 2		Railway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4546	9356	11774	470	-4744	-7415	-7415	-4958	5825	-2310	3581	-421	-421	1498	1498	4753	1506	1486	-92	-171	1616	1585	-135	-197	1584	1579	-153	-210
	ULS Min	1610	5562	7000	-779	-7762	-11458	-12252	-7924	3543	-4488	1561	-2368	-2368	-350	-350	-349	380	322	-186	-262	503	429	-197	-308	485	434	-201	-326
IY Bending	ULS Max	63	111	126	62	121	142	154	334	128	128	98	109	109	83	83	752	10	372	5	362	0	539	0	425	10	571	0	434
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-411	-98	-101	-136	-137	-189	-207	-160	-182	-204	-226	-170	-194
IZ Bending	ULS Max	82	31	31	32	32	32	32	465	104	122	106	112	112	103	103	129	56	56	80	81	83	83	126	126	104	104	94	94
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-446	-104	-122	-106	-112	-112	-103	-103	-133	-44	-44	-110	-111	-111	-111	-101	-101	-95	-95	-85	-85
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	50	14	34	25	41	28	50	30	48	30	53	31	49
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	15	13	12	30	28	25	24	34	32	24	23	25	24
Force (kn) =		634	677	796	336	551	669	763	3202	937	978	790	890	890	701	701	4022	585	1769	949	2218	1137	2808	1099	2572	1155	2866	979	2339
Tension Combined Force (kN) =		5180	10033	12570	806	-4194	-6746	-6652	-1757	6762	-1332	4371	468	468	2200	2200	8775	2090	3255	857	2048	2754	4393	964	2375	2739	4445	826	2129
Compression Combined Force (kN) =		976	4885	6204	-1114	-8312	-12127	-13015	-11126	2606	-5467	770	-3257	-3257	-1052	-1052	-4371	-205	-1448	-1135	-2480	-634	-2379	-1296	-2879	-670	-2432	-1179	-2665
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.46	0.43	0.44	0.07	NA	NA	NA	NA	0.43	NA	0.42	0.05	0.05	0.31	0.31	0.43	0.35	0.31	0.18	0.23	0.46	0.42	0.20	0.27	0.46	0.42	0.17	0.24
		NA	NA	NA	0.12513	0.527849	0.486867	0.489208	0.298	NA	0.4234134	NA	0.4708331	0.47083	0.21111	0.21111	0.30478	0.04683	0.21614	0.32332	0.44078	0.14723	0.35523	0.37387	0.5118	0.15681	0.36307	0.34168	0.47327

Case 2		Highway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4015	8022	9949	676	-4035	-6334	-6334	-4769	5518	-2097	3348	-308	-308	1444	1444	4738	1591	1571	-74	-129	1592	1599	-127	-163	1505	1526	-127	-164
	ULS Min	945	4433	5546	-583	-6929	-10130	-10773	-7705	3290	-4207	1371	-2219	-2219	-392	-392	-372	455	341	-169	-307	476	369	-170	-321	426	348	-157	-322
IY Bending	ULS Max	64	91	91	62	87	120	126	334	118	106	84	95	95	83	83	418	99	99	71	71	82	101	0	97	0	126	0	126
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-801	-3	-437	-50	-332	-91	-423	-97	-303	-150	-378	-110	-290
IZ Bending	ULS Max	101	31	31	32	32	32	32	415	104	122	106	112	112	103	103	274	65	235	85	174	93	162	0	125	0	73	0	18
	ULS Min	-88	-31	-31	-32	-32	-32	-32	-458	-104	-122	-106	-112	-112	-103	-103	-387	-164	-329	-180	-258	-173	-209	-145	-145	-120	-120	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	54	14	40	13	38	13	39	18	35	22	35	20	33
	Stress Z	10	2	2	3	2	1	1	13	8	12	13	13	13	13	13	43	38	72	48	66	40	46	39	37	27	26	23	22
	Force (kn) =	586	558	567	336	421	548	578	3175	875	848	702	795	795	701	701	5978	1117	4257	1066	3314	1137	3213	986	2287	1061	2321	750	1753
Tension Combined Force (kN) =		4601	8580	10515	1012	-3614	-5786	-5757	-1594	6393	-1249	4049	487	487	2145	2145	10716	2708	5828	992	3185	2729	4812	859	2124	2566	3848	623	1589
Compression Combined Force (kN) =		359	3875	4979	-918	-7350	-10679	-11350	-10881	2415	-5055	669	-3014	-3014	-1094	-1094	-6350	-662	-3917	-1235	-3621	-662	-2844	-1156	-2608	-635	-1973	-907	-2075
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.51	0.51	0.51	0.09	NA	NA	NA	NA	0.55	NA	0.56	0.06	0.06	0.31	0.31	0.53	0.45	0.55	0.21	0.36	0.46	0.45	0.18	0.24	0.43	0.36	0.13	0.18
		NA	NA	NA	0.103132	0.655068	0.677142	0.690874	0.432213	NA	0.7152132	NA	0.5111852	0.51119	0.21956	0.21956	0.44281	0.15098	0.58481	0.35178	0.64362	0.15363	0.42462	0.33358	0.4636	0.14852	0.29458	0.2627	0.36841

Case 3		Railway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4457	9052	11391	473	-4572	-7075	-7110	-4660	5608	-2152	3461	-355	-355	1471	1471	4483	1461	1441	-92	-170	1571	1539	-135	-196	1539	1533	-153	-209
	ULS Min	1521	5357	6742	-776	-7507	-11078	-11846	-7625	3325	-4330	1440	-2302	-2302	-377	-377	-349	335	277	-186	-261	458	384	-197	-307	441	388	-200	-325
IY Bending	ULS Max	63	111	126	62	121	142	154	334	128	128	98	109	109	83	83	747	12	359	9	350	3	522	5	411	15	552	3	419
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-411	-95	-100	-132	-134	-183	-202	-155	-177	-199	-220	-165	-188
IZ Bending	ULS Max	82	31	31	32	32	32	32	465	104	122	106	112	112	103	103	127	56	56	80	80	83	83	125	125	104	104	93	93
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-446	-104	-122	-106	-112	-112	-103	-103	-132	-44	-44	-109	-110	-110	-110	-101	-101	-94	-94	-85	-85
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	50	14	33	24	40	27	48	29	47	29	51	30	48
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	15	13	12	29	28	25	24	34	32	24	23	25	24
Force (kn) =		634	677	796	336	551	669	763	3202	937	978	790	890	890	701	701	3994	572	1719	933	2170	1118	2744	1080	2514	1136	2797	963	2286
Tension Combined Force (kN) =		5091	9729	12187	809	-4021	-6406	-6347	-1458	6545	-1173	4251	534	534	2173	2173	8477	2032	3160	841	2000	2689	4283	945	2318	2676	4331	810	2077
Compression Combined Force (kN) =		887	4680	5946	-1112	-8058	-11747	-12609	-10827	2389	-5309	650	-3191	-3191	-1078	-1078	-4343	-237	-1442	-1119	-2431	-660	-2360	-1276	-2820	-696	-2409	-1163	-2611
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.45	0.42	0.43	0.08	NA	NA	NA	NA	0.42	NA	0.41	0.06	0.06	0.31	0.31	0.42	0.34	0.30	0.17	0.23	0.45	0.40	0.20	0.26	0.45	0.41	0.17	0.23
		NA	NA	NA	0.124837	0.51167	0.471636	0.47395	0.289987	NA	0.4111694	NA	0.4612704	0.46127	0.21646	0.21646	0.30283	0.05398	0.2153	0.31887	0.43211	0.15325	0.3524	0.36827	0.50133	0.16282	0.35969	0.33694	0.46371

Case 3		Highway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	3941	7768	9633	675	-3884	-6111	-6111	-4484	5314	-1950	3237	-248	-248	1419	1419	4472	1546	1526	-73	-129	1549	1555	-127	-164	1465	1482	-128	-165
	ULS Min	870	4263	5334	-584	-6706	-9799	-10419	-7447	3086	-4059	1261	-2159	-2159	-417	-417	-373	410	296	-169	-307	433	325	-170	-321	385	305	-157	-322
IY Bending	ULS Max	64	91	91	62	87	120	126	334	118	106	84	95	95	83	83	418	95	97	69	69	81	100	0	103	0	133	0	131
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-796	-4	-424	-51	-324	-92	-413	-97	-297	-149	-371	-109	-285
IZ Bending	ULS Max	101	31	31	32	32	32	32	416	104	122	106	112	112	103	103	271	67	231	87	171	94	160	0	122	0	71	0	18
	ULS Min	-88	-31	-31	-32	-32	-32	-32	-458	-104	-122	-106	-112	-112	-103	-103	-383	-163	-324	-178	-254	-172	-206	-144	-144	-120	-120	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	53	14	39	13	37	14	38	18	34	22	34	20	32
	Stress Z	10	2	2	3	2	1	1	13	8	12	13	13	13	13	13	43	37	71	48	65	39	45	39	37	27	26	23	22
	Force (kn) =	587	558	567	336	421	548	578	3174	875	848	702	795	795	701	701	5924	1098	4173	1053	3254	1133	3155	981	2258	1055	2293	749	1735
Tension Combined Force (kN) =		4527	8326	10200	1010	-3463	-5562	-5533	-1311	6189	-1102	3939	547	547	2121	2121	10396	2644	5699	979	3125	2682	4710	854	2094	2519	3776	621	1570
Compression Combined Force (kN) =		284	3705	4767	-920	-7126	-10348	-10997	-10621	2211	-4908	559	-2954	-2954	-1118	-1118	-6297	-687	-3877	-1221	-3561	-700	-2830	-1152	-2579	-669	-1988	-906	-2057
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.50	0.50	0.50	0.09	NA	NA	NA	NA	0.54	NA	0.54	0.07	0.07	0.30	0.30	0.52	0.44	0.54	0.20	0.35	0.45	0.45	0.18	0.24	0.42	0.36	0.13	0.18
		NA	NA	NA	0.103312	0.635145	0.65614	0.669365	0.421881	NA	0.694364	NA	0.5009932	0.50099	0.22447	0.22447	0.43912	0.15681	0.57884	0.34804	0.63292	0.16257	0.42252	0.33234	0.45846	0.15664	0.29683	0.2625	0.36534

Case 4		Railway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4467	9075	11420	473	-4591	-7103	-7138	-4679	5622	-2162	3468	-360	-360	1473	1473	4501	1464	1444	-92	-170	1574	1542	-135	-196	1542	1536	-153	-209
	ULS Min	1531	5380	6771	-776	-7526	-11107	-11876	-7644	3340	-4340	1448	-2306	-2306	-375	-375	-349	338	280	-186	-262	461	387	-197	-307	444	391	-200	-325
IY Bending	ULS Max	63	111	126	62	121	142	154	334	128	128	98	109	109	83	83	748	12	359	8	351	3	523	5	412	15	553	3	420
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-411	-95	-100	-133	-134	-184	-202	-156	-177	-199	-221	-165	-189
IZ Bending	ULS Max	82	31	31	32	32	32	32	465	104	122	106	112	112	103	103	128	56	56	80	80	83	83	125	125	104	104	93	93
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-446	-104	-122	-106	-112	-112	-103	-103	-132	-44	-44	-109	-110	-110	-110	-101	-101	-94	-94	-85	-85
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	50	14	33	24	40	27	48	29	47	29	51	30	48
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	15	13	12	29	28	25	24	34	32	24	23	25	24
Force (kn) =		634	677	796	336	551	669	763	3202	937	978	790	890	890	701	701	3996	572	1722	934	2173	1119	2748	1081	2518	1138	2802	964	2290
Tension Combined Force (kN) =		5101	9752	12216	808	-4041	-6434	-6375	-1477	6559	-1184	4259	530	530	2174	2174	8497	2036	3166	842	2003	2693	4291	947	2322	2680	4338	811	2081
Compression Combined Force (kN) =		897	4703	5975	-1112	-8077	-11776	-12639	-10846	2403	-5319	658	-3196	-3196	-1077	-1077	-4345	-235	-1442	-1120	-2435	-658	-2362	-1278	-2825	-694	-2411	-1164	-2615
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.45	0.42	0.43	0.08	NA	NA	NA	NA	0.42	NA	0.41	0.06	0.06	0.31	0.31	0.42	0.34	0.30	0.17	0.23	0.45	0.41	0.20	0.26	0.45	0.41	0.17	0.23
		NA	NA	NA	0.124869	0.512887	0.472783	0.475098	0.290509	NA	0.4119679	NA	0.4618933	0.46189	0.21611	0.21611	0.30298	0.05354	0.21538	0.31922	0.43272	0.15288	0.35262	0.3687	0.50209	0.16245	0.35994	0.33725	0.46435

Case 4		Highway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	3949	7787	9657	675	-3901	-6136	-6136	-4503	5327	-1960	3244	-252	-252	1421	1421	4489	1549	1529	-74	-129	1552	1557	-127	-164	1467	1485	-127	-165
	ULS Min	879	4282	5358	-584	-6723	-9824	-10446	-7466	3099	-4069	1268	-2163	-2163	-415	-415	-373	413	299	-169	-307	436	328	-170	-321	388	308	-157	-322
IY Bending	ULS Max	64	91	91	62	87	120	126	334	118	106	84	95	95	83	83	418	96	97	69	69	81	100	0	102	0	132	0	130
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-797	-4	-425	-51	-324	-92	-414	-97	-297	-149	-372	-109	-285
IZ Bending	ULS Max	101	31	31	32	32	32	32	415	104	122	106	112	112	103	103	271	66	232	87	171	94	160	0	122	0	71	0	18
	ULS Min	-88	-31	-31	-32	-32	-32	-32	-458	-104	-122	-106	-112	-112	-103	-103	-383	-163	-325	-179	-254	-172	-206	-144	-144	-120	-120	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	53	14	39	13	37	13	38	18	34	22	34	20	33
	Stress Z	10	2	2	3	2	1	1	13	8	12	13	13	13	13	13	43	37	71	48	66	39	45	39	37	27	26	23	22
Force (kn) =		587	558	567	336	421	548	578	3174	875	848	702	795	795	701	701	5930	1099	4180	1054	3260	1134	3160	982	2260	1055	2295	749	1736
Tension Combined Force (kN) =		4536	8345	10224	1011	-3480	-5587	-5558	-1329	6202	-1112	3946	543	543	2122	2122	10419	2649	5709	980	3130	2686	4718	855	2096	2523	3781	621	1571
Compression Combined Force (kN) =		292	3724	4791	-920	-7143	-10373	-11023	-10640	2224	-4917	566	-2958	-2958	-1117	-1117	-6302	-686	-3881	-1223	-3567	-698	-2832	-1152	-2581	-667	-1987	-906	-2059
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.50	0.50	0.50	0.09	NA	NA	NA	NA	0.54	NA	0.54	0.07	0.07	0.30	0.30	0.52	0.44	0.54	0.20	0.35	0.45	0.45	0.18	0.24	0.42	0.36	0.13	0.18
		NA	NA	NA	0.103289	0.636644	0.657721	0.670983	0.422634	NA	0.6957223	NA	0.5016581	0.50166	0.22415	0.22415	0.43949	0.15652	0.57949	0.34838	0.63387	0.16206	0.42284	0.33248	0.45886	0.15613	0.29671	0.26251	0.36554

Case 5		Railway Truss																											
		Bottom Chord			**Top Chord**				**Diagonals**								**Verticals**												
		L0-L2	**L2-L4**	**L4-L6**	**U0-U1**	**U1-U3**	**U3-U5**	**U5-U6**	**L0-U1**	**U1-L2**	**L2-U3**	**U3-L4**	**L4-U5 (Min)**	**L4-U5 (Max)**	**U5-L6 (Min)**	**U5-L6 (Max)**	**U0-L0**	**U1-L1 (Top)**	**U1-L1 (Bot)**	**U2-L2 (Top)**	**U2-L2 (Bot)**	**U3-L3 (Top)**	**U3-L3 (Bot)**	**U4-L4 (Top)**	**U4-L4 (Bot)**	**U5-L5 (Top)**	**U5-L5 (Bot)**	**U6-L6 (Top)**	**U6-L6 (Bot)**
Axial	ULS Max	4752	9730	12245	465	-5141	-7917	-7956	-5237	6027	-2458	3693	-483	-483	1523	1523	5005	1547	1527	-91	-171	1659	1627	-135	-198	1626	1622	-153	-211
	ULS Min	1816	6033	7593	-785	-8075	-11925	-12751	-8204	3746	-4636	1673	-2430	-2430	-325	-325	-349	421	363	-185	-262	545	471	-197	-309	527	477	-201	-328
IY Bending	ULS Max	63	111	126	62	121	142	154	334	128	128	98	109	109	83	83	754	7	384	3	373	0	554	0	437	5	588	0	447
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-404	-102	-103	-140	-141	-193	-212	-164	-187	-209	-232	-174	-199
IZ Bending	ULS Max	82	31	31	32	32	32	32	466	104	122	106	112	112	103	103	131	57	57	80	81	83	83	129	129	105	105	94	94
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-446	-104	-122	-106	-112	-112	-103	-103	-135	-44	-44	-112	-113	-112	-112	-102	-102	-95	-95	-85	-85
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	50	15	36	26	42	28	51	30	50	31	54	32	51
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	15	13	13	30	29	26	25	35	33	24	23	25	24
Force (kn) =		634	677	796	336	551	669	763	3202	937	978	790	890	890	701	701	4046	600	1824	969	2273	1160	2876	1124	2638	1176	2934	995	2389
Tension Combined Force (kN) =		5386	10407	13041	800	-4590	-7248	-7193	-2035	6964	-1480	4483	407	407	2225	2225	9051	2148	3351	878	2102	2818	4503	989	2440	2802	4556	841	2178
Compression Combined Force (kN) =		1182	5357	6797	-1120	-8626	-12594	-13514	-11406	2809	-5614	883	-3319	-3319	-1027	-1027	-4395	-179	-1460	-1154	-2535	-614	-2404	-1321	-2947	-649	-2458	-1196	-2717
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.48	0.45	0.46	0.07	NA	NA	NA	NA	0.44	NA	0.43	0.04	0.04	0.32	0.32	0.45	0.36	0.32	0.18	0.24	0.47	0.43	0.20	0.28	0.47	0.43	0.17	0.25
		NA	NA	NA	0.125795	0.547763	0.505614	0.507988	0.305489	NA	0.4348433	NA	0.4797614	0.47976	0.20611	0.20611	0.30647	0.04087	0.21806	0.32895	0.45061	0.14262	0.35897	0.38111	0.52376	0.15186	0.36691	0.34637	0.48247

Case 5		Highway Truss																											
		Bottom Chord			**Top Chord**				**Diagonals**								**Verticals**												
		L0-L2	**L2-L4**	**L4-L6**	**U0-U1**	**U1-U3**	**U3-U5**	**U5-U6**	**L0-U1**	**U1-L2**	**L2-U3**	**U3-L4**	**L4-U5 (Min)**	**L4-U5 (Max)**	**U5-L6 (Min)**	**U5-L6 (Max)**	**U0-L0**	**U1-L1 (Top)**	**U1-L1 (Bot)**	**U2-L2 (Top)**	**U2-L2 (Bot)**	**U3-L3 (Top)**	**U3-L3 (Bot)**	**U4-L4 (Top)**	**U4-L4 (Bot)**	**U5-L5 (Top)**	**U5-L5 (Bot)**	**U6-L6 (Top)**	**U6-L6 (Bot)**
Axial	ULS Max	4186	8335	10337	680	-4383	-6850	-6850	-5035	5709	-2235	3451	-364	-364	1467	1467	4987	1634	1613	-74	-129	1632	1640	-126	-162	1544	1567	-126	-163
	ULS Min	1116	4824	6036	-579	-7204	-10539	-11207	-8001	3480	-4344	1474	-2275	-2275	-370	-370	-372	497	382	-169	-307	516	410	-170	-321	464	389	-156	-321
IY Bending	ULS Max	64	91	91	62	87	120	126	334	118	106	84	95	95	83	83	410	102	102	72	72	83	102	0	91	0	119	0	121
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-804	-2	-450	-48	-339	-90	-432	-97	-308	-151	-384	-110	-295
IZ Bending	ULS Max	100	31	31	32	32	32	32	413	104	122	106	112	112	103	103	282	61	243	82	180	90	165	0	129	0	75	0	18
	ULS Min	-89	-31	-31	-32	-32	-32	-32	-460	-104	-122	-106	-112	-112	-103	-103	-399	-169	-339	-184	-266	-176	-216	-147	-147	-121	-121	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	54	15	42	13	39	13	40	18	35	22	36	20	34
	Stress Z	10	2	2	3	2	1	1	14	8	12	13	13	13	13	13	44	38	74	50	69	40	47	40	38	28	26	23	22
	Force (kn) =	585	558	567	336	421	548	578	3181	875	848	702	795	795	701	701	6067	1147	4387	1088	3412	1150	3300	997	2325	1070	2354	751	1770
Tension Combined Force (kN) =		4771	8893	10904	1016	-3962	-6301	-6272	-1855	6584	-1386	4152	431	431	2168	2168	11054	2781	6000	1015	3283	2782	4940	870	2163	2614	3921	625	1607
Compression Combined Force (kN) =		531	4266	5469	-915	-7625	-11087	-11785	-11182	2605	-5193	772	-3070	-3070	-1071	-1071	-6439	-650	-4005	-1258	-3720	-634	-2890	-1166	-2646	-606	-1965	-907	-2091
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.52	0.53	0.53	0.09	NA	NA	NA	NA	0.57	NA	0.57	0.05	0.05	0.31	0.31	0.55	0.46	0.57	0.21	0.37	0.46	0.47	0.18	0.24	0.44	0.37	0.13	0.18
		NA	NA	NA	0.102702	0.679592	0.70302	0.71735	0.444167	NA	0.7346758	NA	0.5207006	0.5207	0.21498	0.21498	0.44904	0.14832	0.59805	0.35831	0.66109	0.14729	0.43154	0.33651	0.47031	0.14176	0.29338	0.26285	0.37126

Case 6		Railway Truss																													
		Bottom Chord			**Top Chord**				**Diagonals**								**Verticals**														
		L0-L2	**L2-L4**	**L4-L6**	**U0-U1**	**U1-U3**	**U3-U5**	**U5-U6**	**L0-U1**	**U1-L2**	**L2-U3**	**U3-L4**	**L4-U5 (Min)**	**L4-U5 (Max)**	**U5-L6 (Min)**	**U5-L6 (Max)**	**U0-L0**	**U1-L1 (Top)**	**U1-L1 (Bot)**	**U2-L2 (Top)**	**U2-L2 (Bot)**	**U3-L3 (Top)**	**U3-L3 (Bot)**	**U4-L4 (Top)**	**U4-L4 (Bot)**	**U5-L5 (Top)**	**U5-L5 (Bot)**	**U6-L6 (Top)**	**U6-L6 (Bot)**
Axial	ULS Max	5009	10321	12988	457	-5636	-8651	-8693	-5739	6393	-2725	3895	-594	-594	1569	1569	5459	1623	1603	-91	-172	1735	1703	-135	-199	1701	1699	-154	-213
	ULS Min	2073	6623	8334	-792	-8570	-12662	-13540	-8709	4112	-4902	1876	-2541	-2541	-280	-280	-349	496	438	-185	-263	622	548	-197	-310	602	554	-202	-330
IY Bending	ULS Max	63	111	126	62	121	142	154	333	128	128	98	109	109	83	83	759	4	407	2	392	0	583	0	460	0	619	0	471
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-399	-108	-109	-146	-148	-202	-222	-172	-195	-219	-241	-182	-208
IZ Bending	ULS Max	82	31	31	32	32	32	32	466	104	122	106	112	112	103	103	134	58	61	81	81	83	83	132	132	106	106	94	94
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-446	-104	-122	-106	-112	-112	-103	-103	-138	-44	-44	-115	-115	-114	-114	-103	-103	-95	-95	-84	-84
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	51	16	38	27	45	30	54	32	52	32	57	34	54
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	15	13	13	31	30	26	25	35	34	24	23	25	24
Force (kn) =		635	677	796	336	551	669	763	3201	937	978	790	890	890	701	701	4087	625	1930	1000	2363	1196	2990	1163	2746	1210	3053	1022	2479
Tension Combined Force (kN) =		5643	10998	13784	793	-5085	-7982	-7930	-2538	7330	-1747	4685	296	296	2270	2270	9546	2248	3533	910	2192	2931	4694	1028	2547	2911	4752	868	2266
Compression Combined Force (kN) =		1439	5946	7538	-1128	-9121	-13331	-14303	-11910	3175	-5880	1085	-3431	-3431	-982	-982	-4436	-129	-1492	-1185	-2626	-574	-2443	-1360	-3057	-608	-2500	-1224	-2809
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.50	0.47	0.48	0.07	NA	NA	NA	NA	0.47	NA	0.45	0.03	0.03	0.32	0.32	0.47	0.38	0.33	0.19	0.25	0.49	0.44	0.21	0.29	0.49	0.45	0.18	0.26
		NA	NA	NA	0.126647	0.579209	0.535217	0.537644	0.318997	NA	0.4554687	NA	0.4958718	0.49587	0.19709	0.19709	0.30935	0.02945	0.22277	0.33774	0.46672	0.13337	0.3647	0.39232	0.5433	0.14229	0.3732	0.35457	0.49883

Case 6		Highway Truss																													
		Bottom Chord			**Top Chord**				**Diagonals**								**Verticals**														
		L0-L2	**L2-L4**	**L4-L6**	**U0-U1**	**U1-U3**	**U3-U5**	**U5-U6**	**L0-U1**	**U1-L2**	**L2-U3**	**U3-L4**	**L4-U5 (Min)**	**L4-U5 (Max)**	**U5-L6 (Min)**	**U5-L6 (Max)**	**U0-L0**	**U1-L1 (Top)**	**U1-L1 (Bot)**	**U2-L2 (Top)**	**U2-L2 (Bot)**	**U3-L3 (Top)**	**U3-L3 (Bot)**	**U4-L4 (Top)**	**U4-L4 (Bot)**	**U5-L5 (Top)**	**U5-L5 (Bot)**	**U6-L6 (Top)**	**U6-L6 (Bot)**
Axial	ULS Max	4400	8828	10950	685	-4817	-7493	-7493	-5516	6054	-2482	3637	-464	-464	1509	1509	5435	1710	1689	-74	-128	1704	1715	-126	-160	1612	1641	-125	-161
	ULS Min	1330	5313	6648	-574	-7639	-11185	-11894	-8484	3824	-4593	1659	-2376	-2376	-328	-328	-371	573	457	-169	-308	588	484	-169	-320	533	461	-155	-320
IY Bending	ULS Max	64	91	91	62	87	120	126	333	118	106	84	95	95	83	83	405	108	108	75	75	85	103	0	82	0	108	0	113
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-810	0	-472	-46	-353	-89	-448	-97	-318	-153	-396	-111	-303
IZ Bending	ULS Max	100	31	31	32	32	32	32	411	104	122	106	112	112	103	103	292	56	253	77	188	85	169	0	134	0	78	0	18
	ULS Min	-89	-31	-31	-32	-32	-32	-32	-462	-104	-122	-106	-112	-112	-103	-103	-412	-174	-352	-189	-277	-181	-224	-150	-151	-123	-123	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	54	16	44	14	40	13	41	18	36	22	37	20	35
	Stress Z	10	2	2	3	2	1	1	14	8	12	13	13	13	13	13	46	40	77	51	71	41	49	40	39	28	27	23	22
	Force (kn) =	583	558	567	336	421	548	578	3187	875	848	702	795	795	701	701	6186	1191	4574	1120	3550	1165	3426	1010	2394	1084	2406	753	1800
Tension Combined Force (kN) =		4983	9387	11517	1020	-4397	-6945	-6916	-2329	6929	-1634	4338	331	331	2210	2210	11621	2900	6263	1046	3422	2868	5141	884	2234	2696	4047	628	1639
Compression Combined Force (kN) =		747	4755	6081	-910	-8060	-11733	-12472	-11670	2949	-5441	958	-3171	-3171	-1030	-1030	-6557	-618	-4117	-1289	-3858	-577	-2943	-1179	-2713	-550	-1945	-908	-2120
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.55	0.56	0.56	0.09	NA	NA	NA	NA	0.60	NA	0.60	0.04	0.04	0.32	0.32	0.58	0.48	0.59	0.22	0.39	0.48	0.49	0.18	0.25	0.45	0.38	0.13	0.18
		NA	NA	NA	0.10219	0.718318	0.744005	0.759158	0.463584	NA	0.7697993	NA	0.5378705	0.53787	0.20671	0.20671	0.45727	0.14093	0.61476	0.36728	0.68563	0.13399	0.4394	0.34015	0.48229	0.1288	0.29036	0.26317	0.37642

Case 7		Railway Truss																											
		Bottom Chord			**Top Chord**				**Diagonals**								**Verticals**												
		L0-L2	**L2-L4**	**L4-L6**	**U0-U1**	**U1-U3**	**U3-U5**	**U5-U6**	**L0-U1**	**U1-L2**	**L2-U3**	**U3-L4**	**L4-U5 (Min)**	**L4-U5 (Max)**	**U5-L6 (Min)**	**U5-L6 (Max)**	**U0-L0**	**U1-L1 (Top)**	**U1-L1 (Bot)**	**U2-L2 (Top)**	**U2-L2 (Bot)**	**U3-L3 (Top)**	**U3-L3 (Bot)**	**U4-L4 (Top)**	**U4-L4 (Bot)**	**U5-L5 (Top)**	**U5-L5 (Bot)**	**U6-L6 (Top)**	**U6-L6 (Bot)**
Axial	ULS Max	4736	10185	12817	295	-5569	-8482	-8524	-5624	6309	-2664	3848	-569	-569	1558	1558	5340	1605	1585	-102	-171	1718	1686	-140	-199	1684	1681	-154	-213
	ULS Min	2272	6571	8268	-603	-8457	-12493	-13359	-8593	4028	-4841	1829	-2516	-2516	-291	-291	-349	479	421	-175	-263	604	530	-191	-310	585	536	-201	-329
IY Bending	ULS Max	62	111	126	62	121	142	154	329	128	128	98	109	109	83	83	758	1	401	0	387	0	576	0	455	0	612	0	465
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-400	-106	-107	-144	-146	-200	-219	-170	-193	-216	-239	-180	-206
IZ Bending	ULS Max	76	22	22	23	23	23	23	378	74	87	76	80	80	74	74	109	46	60	59	60	59	59	104	116	80	80	69	69
	ULS Min	-108	-22	-22	-23	-23	-23	-23	-359	-74	-87	-76	-80	-80	-74	-74	-112	-33	-33	-90	-103	-88	-88	-77	-77	-69	-69	-59	-59
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	6	8	8	5	5	5	5	12	12	13	14	15	15	14	14	51	16	37	27	44	29	53	31	52	32	57	33	53
	Stress Z	11	1	1	2	1	1	1	11	5	7	8	7	7	9	9	12	11	13	24	26	20	19	28	30	18	17	18	18
Force (kn) =		604	645	764	304	515	634	728	2854	839	863	691	784	784	605	605	3903	560	1906	880	2246	1060	2747	1028	2597	1073	2808	897	2249
Tension Combined Force (kN) =		5340	10831	13581	598	-5053	-7848	-7795	-2769	7148	-1801	4540	216	216	2164	2164	9244	2166	3491	778	2074	2777	4433	888	2398	2757	4489	743	2036
Compression Combined Force (kN) =		1668	5926	7504	-906	-8972	-13126	-14087	-11447	3188	-5704	1138	-3300	-3300	-896	-896	-4252	-81	-1485	-1055	-2508	-455	-2217	-1218	-2907	-488	-2272	-1098	-2578
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.47	0.46	0.47	0.06	NA	NA	NA	NA	0.46	NA	0.44	0.02	0.02	0.31	0.31	0.46	0.36	0.33	0.16	0.23	0.46	0.42	0.18	0.27	0.46	0.42	0.15	0.23
		NA	NA	NA	0.10179	0.56972	0.527	0.529514	0.306596	NA	0.4417948	NA	0.4769495	0.47695	0.17988	0.17988	0.29653	0.01851	0.2217	0.30055	0.44583	0.10568	0.33103	0.35157	0.51663	0.11422	0.33917	0.31811	0.45785

Case 7		Highway Truss																											
		Bottom Chord			**Top Chord**				**Diagonals**								**Verticals**												
		L0-L2	**L2-L4**	**L4-L6**	**U0-U1**	**U1-U3**	**U3-U5**	**U5-U6**	**L0-U1**	**U1-L2**	**L2-U3**	**U3-L4**	**L4-U5 (Min)**	**L4-U5 (Max)**	**U5-L6 (Min)**	**U5-L6 (Max)**	**U0-L0**	**U1-L1 (Top)**	**U1-L1 (Bot)**	**U2-L2 (Top)**	**U2-L2 (Bot)**	**U3-L3 (Top)**	**U3-L3 (Bot)**	**U4-L4 (Top)**	**U4-L4 (Bot)**	**U5-L5 (Top)**	**U5-L5 (Bot)**	**U6-L6 (Top)**	**U6-L6 (Bot)**
Axial	ULS Max	4092	8715	10809	498	-4771	-7331	-7331	-5405	5975	-2425	3594	-441	-441	1499	1499	5317	1692	1672	-85	-128	1687	1697	-132	-160	1597	1624	-126	-161
	ULS Min	1562	5280	6613	-410	-7539	-11036	-11736	-8373	3745	-4536	1617	-2353	-2353	-338	-338	-371	556	440	-158	-301	571	467	-164	-318	517	445	-155	-320
IY Bending	ULS Max	63	91	91	62	87	120	126	329	118	106	84	95	95	83	83	407	106	106	74	74	84	102	0	84	0	110	0	115
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-809	0	-467	-46	-350	-89	-444	-97	-316	-152	-393	-111	-301
IZ Bending	ULS Max	94	22	22	23	23	23	23	327	74	87	76	80	80	74	74	270	42	239	55	184	61	147	0	114	0	74	0	18
	ULS Min	-82	-22	-22	-23	-23	-23	-23	-375	-74	-87	-76	-80	-80	-74	-74	-379	-152	-323	-159	-253	-149	-203	-121	-140	-95	-95	-61	-61
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	54	16	43	14	40	13	41	18	36	22	36	20	34
	Stress Z	10	1	1	2	1	1	1	11	6	8	9	9	9	9	9	42	35	70	43	65	34	44	33	36	22	21	16	16
Force (kn) =		556	527	534	304	387	513	542	2844	777	731	601	688	688	605	605	5950	1081	4311	979	3345	1013	3239	874	2295	946	2167	639	1592
Tension Combined Force (kN) =		4648	9242	11344	802	-4384	-6818	-6789	-2561	6751	-1694	4195	247	247	2104	2104	11267	2774	5982	895	3217	2700	4937	742	2135	2543	3790	513	1431
Compression Combined Force (kN) =		1006	4754	6079	-714	-7926	-11549	-12279	-11217	2968	-5267	1016	-3041	-3041	-943	-943	-6321	-526	-3871	-1137	-3646	-442	-2773	-1038	-2613	-428	-1722	-794	-1913
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.51	0.55	0.56	0.07	NA	NA	NA	NA	0.58	NA	0.58	0.03	0.03	0.30	0.30	0.56	0.46	0.57	0.19	0.36	0.45	0.47	0.15	0.24	0.42	0.36	0.11	0.16
		NA	NA	NA	0.080195	0.706375	0.732344	0.747403	0.445579	NA	0.745201	NA	0.5158323	0.51583	0.18932	0.18932	0.44079	0.11997	0.57799	0.32392	0.64792	0.10262	0.41398	0.29952	0.46452	0.10025	0.2571	0.23003	0.33964

Case 8		Railway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4938	10157	12782	459	-5499	-8447	-8489	-5600	6291	-2651	3839	-563	-563	1556	1556	5333	1602	1582	-91	-171	1714	1682	-135	-199	1680	1678	-154	-213
	ULS Min	2002	6459	8129	-790	-8433	-12458	-13321	-8569	4010	-4828	1820	-2510	-2510	-293	-293	-349	476	418	-185	-263	601	527	-197	-310	581	532	-201	-329
IY Bending	ULS Max	63	111	126	62	121	142	154	333	128	128	98	109	109	83	83	758	5	400	2	386	0	575	0	454	0	610	0	464
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-401	-106	-107	-144	-146	-200	-219	-170	-193	-216	-239	-180	-205
IZ Bending	ULS Max	82	31	31	32	32	32	32	466	104	122	106	112	112	103	103	133	58	60	81	81	83	83	131	131	106	106	94	94
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-446	-104	-122	-106	-112	-112	-103	-103	-137	-44	-44	-114	-114	-114	-114	-103	-103	-95	-95	-84	-84
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	51	16	37	27	44	29	53	31	52	32	56	33	53
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	15	13	13	31	29	26	25	35	34	24	23	25	24
Force (kn) =		634	677	796	336	551	669	763	3201	937	978	790	890	890	701	701	4076	618	1901	992	2338	1186	2959	1152	2716	1201	3020	1015	2455
Tension Combined Force (kN) =		5572	10834	13578	795	-4948	-7778	-7726	-2398	7228	-1673	4629	326	326	2257	2257	9409	2220	3483	901	2167	2900	4641	1018	2518	2881	4698	861	2242
Compression Combined Force (kN) =		1367	5783	7333	-1126	-8984	-13127	-14085	-11770	3073	-5807	1029	-3400	-3400	-994	-994	-4425	-143	-1483	-1177	-2601	-585	-2432	-1349	-3026	-619	-2488	-1216	-2784
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.49	0.46	0.47	0.07	NA	NA	NA	NA	0.46	NA	0.45	0.03	0.03	0.32	0.32	0.47	0.37	0.33	0.19	0.24	0.48	0.44	0.21	0.28	0.48	0.44	0.18	0.25
		NA	NA	NA	0.126411	0.57049	0.527009	0.529421	0.315251	NA	0.4497494	NA	0.4914055	0.49141	0.19959	0.19959	0.30855	0.03261	0.22147	0.3353	0.46226	0.13592	0.36312	0.38922	0.53788	0.14494	0.37147	0.3523	0.49429

Case 8		Highway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4341	8692	10780	683	-4697	-7315	-7315	-5383	5958	-2414	3585	-437	-437	1497	1497	5311	1688	1668	-74	-128	1684	1694	-126	-161	1593	1620	-126	-161
	ULS Min	1271	5178	6478	-576	-7519	-11006	-11704	-8350	3729	-4524	1608	-2348	-2348	-340	-340	-371	552	436	-169	-308	568	463	-169	-320	514	441	-155	-320
IY Bending	ULS Max	64	91	91	62	87	120	126	333	118	106	84	95	95	83	83	406	106	106	74	74	84	102	0	84	0	111	0	115
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-809	-1	-466	-46	-349	-89	-443	-97	-315	-152	-393	-111	-301
IZ Bending	ULS Max	100	31	31	32	32	32	32	412	104	122	106	112	112	103	103	289	57	250	78	186	87	168	0	133	0	77	0	18
	ULS Min	-89	-31	-31	-32	-32	-32	-32	-461	-104	-122	-106	-112	-112	-103	-103	-409	-172	-349	-187	-274	-179	-222	-150	-150	-122	-122	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	54	16	43	14	40	13	41	18	36	22	36	20	34
	Stress Z	10	2	2	3	2	1	1	14	8	12	13	13	13	13	13	45	39	76	50	71	41	48	40	39	28	27	23	22
	Force (kn) =	583	558	567	336	421	548	578	3185	875	848	702	795	795	701	701	6153	1179	4522	1111	3512	1161	3391	1006	2370	1080	2392	753	1791
Tension Combined Force (kN) =		4924	9250	11347	1019	-4276	-6766	-6737	-2198	6833	-1565	4287	359	359	2198	2198	11464	2867	6190	1037	3383	2844	5085	880	2210	2673	4012	627	1630
Compression Combined Force (kN) =		687	4620	5911	-911	-7939	-11554	-12281	-11535	2854	-5372	906	-3143	-3143	-1041	-1041	-6525	-627	-4086	-1280	-3819	-593	-2928	-1175	-2690	-566	-1950	-908	-2112
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.54	0.56	0.56	0.09	NA	NA	NA	NA	0.59	NA	0.59	0.04	0.04	0.31	0.31	0.57	0.48	0.59	0.21	0.38	0.47	0.48	0.18	0.25	0.45	0.38	0.13	0.18
		NA	NA	NA	0.102333	0.707581	0.732641	0.747566	0.4582	NA	0.7600595	NA	0.5331095	0.53311	0.209	0.209	0.45498	0.14298	0.61013	0.36479	0.67882	0.13767	0.43721	0.33914	0.47822	0.13238	0.2912	0.26309	0.37498

Case 9		Railway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	5579	11631	14637	440	-6734	-10278	-10328	-6853	7203	-3317	4343	-840	-840	1669	1669	6467	1790	1770	-90	-173	1905	1873	-135	-203	1868	1870	-155	-218
	ULS Min	2643	7930	9977	-809	-9668	-14297	-15289	-9828	4923	-5492	2325	-2788	-2788	-181	-181	-349	663	605	-184	-264	791	717	-197	-314	769	725	-203	-334
IY Bending	ULS Max	63	111	126	62	121	142	154	332	128	128	98	109	109	83	83	770	0	456	0	435	0	645	0	511	0	688	0	524
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-388	-121	-122	-159	-161	-221	-242	-189	-214	-239	-263	-200	-228
IZ Bending	ULS Max	82	31	31	32	32	32	32	466	104	122	106	112	112	103	103	141	61	68	82	82	82	82	138	138	109	109	95	95
	ULS Min	-115	-31	-31	-32	-32	-32	-32	-445	-104	-122	-106	-112	-112	-103	-103	-144	-44	-45	-120	-121	-118	-118	-105	-105	-96	-96	-83	-83
Section Properties	Area =	34497	71432	87722	44286	90245	107019	117180	126009	48045	43852	31835	35142	35142	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	5442	6307	5165	10317	11253	11454	11932	4040	3805	2380	2506	2506	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	6066	7217	6054	12393	14755	16273	18155	4494	4040	2973	3214	3214	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	403	403	407	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	302	302	483	533	533	533	533	308	305	305	302	302	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	8	8	5	5	5	5	12	12	13	14	15	15	14	14	52	18	42	29	50	32	60	35	58	35	64	37	60
	Stress Z	12	2	1	3	1	1	1	14	7	9	11	10	10	13	13	16	14	15	32	31	27	26	37	36	25	24	26	25
Force (kn) =		635	677	796	336	551	669	763	3200	937	978	790	890	890	701	701	4179	681	2167	1070	2563	1277	3245	1249	2987	1287	3318	1084	2679
Tension Combined Force (kN) =		6213	12308	15433	776	-6183	-9608	-9564	-3652	8140	-2338	5134	49	49	2371	2371	10646	2471	3937	980	2390	3182	5118	1114	2784	3154	5188	929	2461
Compression Combined Force (kN) =		2009	7253	9181	-1145	-10219	-14966	-16053	-13028	3986	-6471	1535	-3678	-3678	-882	-882	-4528	-18	-1562	-1254	-2827	-486	-2528	-1446	-3300	-518	-2593	-1287	-3013
ULS Capacity	Tension (kN)	11260	23315	28633	10751				41129	15682	14313	10391	9511	9511	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression (kN)				8905	15748	24908	26604	37336	14106	12911	9248	6918	6918	4982	4982	14340	4383	6697	3510	5626.58	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.55	0.53	0.54	0.07	NA	NA	NA	NA	0.52	NA	0.49	0.01	0.01	0.34	0.34	0.53	0.41	0.37	0.20	0.27	0.53	0.48	0.23	0.31	0.53	0.49	0.19	0.28
		NA	NA	NA	0.128535	0.64893	0.600852	0.603396	0.348946	NA	0.5011986	NA	0.5315934	0.53159	0.17709	0.17709	0.31575	0.00414	0.23323	0.35722	0.50247	0.11283	0.3774	0.41716	0.58661	0.1211	0.38716	0.37277	0.53507

Case 9		Highway Truss																											
		Bottom Chord			Top Chord				Diagonals								Verticals												
		L0-L2	L2-L4	L4-L6	U0-U1	U1-U3	U3-U5	U5-U6	L0-U1	U1-L2	L2-U3	U3-L4	L4-U5 (Min)	L4-U5 (Max)	U5-L6 (Min)	U5-L6 (Max)	U0-L0	U1-L1 (Top)	U1-L1 (Bot)	U2-L2 (Top)	U2-L2 (Bot)	U3-L3 (Top)	U3-L3 (Bot)	U4-L4 (Top)	U4-L4 (Bot)	U5-L5 (Top)	U5-L5 (Bot)	U6-L6 (Top)	U6-L6 (Bot)
Axial	ULS Max	4874	9923	12311	695	-5781	-8921	-8921	-6581	6817	-3031	4049	-688	-688	1601	1601	6429	1878	1857	-74	-127	1864	1880	-124	-156	1765	1804	-123	-156
	ULS Min	1796	6397	8004	-564	-8602	-12618	-13417	-9554	4586	-5143	2071	-2601	-2601	-237	-237	-369	741	623	-170	-309	747	647	-168	-318	686	623	-153	-318
IY Bending	ULS Max	64	91	91	62	87	120	126	332	118	106	84	95	95	83	83	392	120	120	81	81	89	105	0	60	0	82	0	94
	ULS Min	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-823	0	-522	-40	-384	-85	-483	-96	-340	-157	-421	-112	-321
IZ Bending	ULS Max	99	31	31	32	32	32	32	407	104	122	106	112	112	103	103	314	44	275	66	206	77	177	0	145	0	85	0	18
	ULS Min	-91	-31	-31	-32	-32	-32	-32	-466	-104	-122	-106	-112	-112	-103	-103	-443	-185	-381	-199	-301	-189	-243	-157	-164	-126	-126	-86	-86
	Area =	34497	63045	62561	44286	64282	90245	94439	126009	43852	35464	26513	29820	29820	25303	25303	61838	21494	37944	17319	31817	21494	37944	17319	31817	21494	37944	17319	31817
	Iy =	3731	4974	4902	5165	7358	10317	10551	11932	3805	3337	2152	2277	2277	1805	1805	4558	2080	3296	1635	2647	2080	3296	1635	2647	2080	3296	1635	2647
	Iz =	2969	5204	4739	6054	9040	12393	13000	18155	4040	3159	2397	2650	2650	2383	2383	3198	1127	1179	955	999	1127	1179	955	999	1127	1179	955	999
	Y	391	391	391	419	396	403	403	420	391	391	340	340	340	314	314	305	305	305	302	302	305	305	302	302	305	305	302	302
	Z	303	295	283	483	533	533	533	533	305	298	300	297	297	306	306	356	257	257	257	257	257	257	257	257	257	257	257	257
	Stress Y	7	7	7	5	5	5	5	12	12	12	13	14	14	14	14	55	18	48	15	44	13	45	18	39	23	39	21	37
	Stress Z	10	2	2	3	2	1	1	14	8	12	13	13	13	13	13	49	42	83	54	77	43	53	42	42	29	28	23	22
	Force (kn) =	579	558	567	336	421	548	578	3200	875	848	702	795	795	701	701	6450	1287	4988	1189	3855	1208	3706	1039	2579	1114	2523	758	1866
Tension Combined Force (kN) =		5454	10482	12877	1030	-5360	-8372	-8343	-3380	7692	-2183	4751	107	107	2302	2302	12879	3165	6845	1114	3728	3072	5586	915	2423	2879	4327	635	1710
Compression Combined Force (kN) =		1217	5839	7437	-900	-9023	-13166	-13995	-12754	3711	-5991	1369	-3396	-3396	-938	-938	-6819	-546	-4365	-1359	-4164	-461	-3059	-1207	-2897	-428	-1900	-911	-2184
ULS Capacity	Tension	9088	16665	20420	10751				30141	11555	9441	7273	8137	8137	7009	7009	20184	5993	10579	4829	8871	5993	10579	4829	8871	5993	10579	4829	8871
	Compression				8905	11220	15771	16429	25174	8728	7068	5260	5896	5896	4982	4982	14340	4383	6697	3510	5627	4307	6698	3466	5625.87	4274	6698	3452	5632
	Capacity/Need	0.60	0.63	0.63	0.10	NA	NA	NA	NA	0.67	NA	0.65	0.01	0.01	0.33	0.33	0.64	0.53	0.65	0.23	0.42	0.51	0.53	0.19	0.27	0.48	0.41	0.13	0.19
		NA	NA	NA	0.101056	0.80418	0.834876	0.851854	0.506634	NA	0.8476724	NA	0.5759403	0.57594	0.18838	0.18838	0.4755	0.12455	0.65182	0.38713	0.74006	0.10709	0.45679	0.34821	0.51488	0.10006	0.28369	0.26386	0.38784

Primary Truss	
Summary	D/C Max
Case 0	0.71
Case 1	0.71
Case 2	0.72
Case 3	0.69
Case 4	0.70
Case 5	0.73
Case 6	0.77
Case 7	0.75
Case 8	0.76
Case 9	0.85

Lift Girder	
Summary	D/C Max
Case 0	0.61
Case 1	0.62
Case 2	0.62
Case 3	0.61
Case 4	0.61
Case 5	0.64
Case 6	0.67
Case 7	0.66
Case 8	0.66
Case 9	0.74

End Floor Beam	
Summary	D/C Max
Case 0	0.43
Case 1	0.43
Case 2	0.43
Case 3	0.43
Case 4	0.43
Case 5	0.44
Case 6	0.45
Case 7	0.45
Case 8	0.45
Case 9	0.47

Int Floor Beam	
Summary	D/C Max
Case 0	0.39
Case 1	0.40
Case 2	0.40
Case 3	0.39
Case 4	0.39
Case 5	0.41
Case 6	0.43
Case 7	0.43
Case 8	0.43
Case 9	0.48

1959 Stringer	
Summary	D/C Max
Case 0	0.79

1982 Stringers	
Summary	D/C Max
Case 0	0.48

Case 0 (Existing)

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.45	NA	0.50	NA
L2-L4	0.42	NA	0.51	NA
L4-L6	0.43	NA	0.51	NA
U0-U1	0.08	0.12	0.09	0.10
U1-U3	NA	0.52	NA	0.65
U3-U5	NA	0.48	NA	0.67
U5-U6	NA	0.48	NA	0.68
L0-U1	NA	0.29	NA	0.43
U1-L2	0.43	NA	0.55	NA
L2-U3	NA	0.42	NA	0.71
U3-L4	0.42	NA	0.55	NA
L4-U5 (Min)	0.05	0.47	0.06	0.51
L4-U5 (Max)	0.05	0.47	0.06	0.51
U5-L6 (Min)	0.31	0.21	0.30	0.22
U5-L6 (Max)	0.31	0.21	0.30	0.22
U0-L0	0.43	0.30	0.52	0.44
U1-L1 (Top)	0.34	0.05	0.45	0.15
U1-L1 (Bot)	0.30	0.22	0.54	0.58
U2-L2 (Top)	0.18	0.32	0.20	0.35
U2-L2 (Bot)	0.23	0.44	0.36	0.64
U3-L3 (Top)	0.45	0.15	0.45	0.16
U3-L3 (Bot)	0.41	0.35	0.45	0.42
U4-L4 (Top)	0.20	0.37	0.18	0.33
U4-L4 (Bot)	0.26	0.51	0.24	0.46
U5-L5 (Top)	0.45	0.16	0.42	0.15
U5-L5 (Bot)	0.42	0.36	0.36	0.30
U6-L6 (Top)	0.17	0.34	0.13	0.26
U6-L6 (Bot)	0.24	0.47	0.18	0.37

Case 1

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.46	NA	0.50	NA
L2-L4	0.43	NA	0.51	NA
L4-L6	0.43	NA	0.51	NA
U0-U1	0.08	0.12	0.09	0.10
U1-U3	NA	0.52	NA	0.65
U3-U5	NA	0.48	NA	0.67
U5-U6	NA	0.48	NA	0.68
L0-U1	NA	0.30	NA	0.43
U1-L2	0.43	NA	0.55	NA
L2-U3	NA	0.42	NA	0.71
U3-L4	0.42	NA	0.55	NA
L4-U5 (Min)	0.05	0.47	0.06	0.51
L4-U5 (Max)	0.05	0.47	0.06	0.51
U5-L6 (Min)	0.31	0.21	0.31	0.22
U5-L6 (Max)	0.31	0.21	0.31	0.22
U0-L0	0.43	0.30	0.53	0.44
U1-L1 (Top)	0.35	0.05	0.45	0.15
U1-L1 (Bot)	0.31	0.22	0.55	0.58
U2-L2 (Top)	0.18	0.32	0.20	0.35
U2-L2 (Bot)	0.23	0.44	0.36	0.64
U3-L3 (Top)	0.46	0.15	0.45	0.16
U3-L3 (Bot)	0.41	0.35	0.45	0.42
U4-L4 (Top)	0.20	0.37	0.18	0.33
U4-L4 (Bot)	0.27	0.51	0.24	0.46
U5-L5 (Top)	0.45	0.16	0.43	0.15
U5-L5 (Bot)	0.42	0.36	0.36	0.30
U6-L6 (Top)	0.17	0.34	0.13	0.26
U6-L6 (Bot)	0.24	0.47	0.18	0.37

Case 2

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.46	NA	0.51	NA
L2-L4	0.43	NA	0.51	NA
L4-L6	0.44	NA	0.51	NA
U0-U1	0.07	0.13	0.09	0.10
U1-U3	NA	0.53	NA	0.66
U3-U5	NA	0.49	NA	0.68
U5-U6	NA	0.49	NA	0.69
L0-U1	NA	0.30	NA	0.43
U1-L2	0.43	NA	0.55	NA
L2-U3	NA	0.42	NA	0.72
U3-L4	0.42	NA	0.56	NA
L4-U5 (Min)	0.05	0.47	0.06	0.51
L4-U5 (Max)	0.05	0.47	0.06	0.51
U5-L6 (Min)	0.31	0.21	0.31	0.22
U5-L6 (Max)	0.31	0.21	0.31	0.22
U0-L0	0.43	0.30	0.53	0.44
U1-L1 (Top)	0.35	0.05	0.45	0.15
U1-L1 (Bot)	0.31	0.22	0.55	0.58
U2-L2 (Top)	0.18	0.32	0.21	0.35
U2-L2 (Bot)	0.23	0.44	0.36	0.64
U3-L3 (Top)	0.46	0.15	0.46	0.15
U3-L3 (Bot)	0.42	0.36	0.45	0.42
U4-L4 (Top)	0.20	0.37	0.18	0.33
U4-L4 (Bot)	0.27	0.51	0.24	0.46
U5-L5 (Top)	0.46	0.16	0.43	0.15
U5-L5 (Bot)	0.42	0.36	0.36	0.29
U6-L6 (Top)	0.17	0.34	0.13	0.26
U6-L6 (Bot)	0.24	0.47	0.18	0.37

Case 3

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.45	NA	0.50	NA
L2-L4	0.42	NA	0.50	NA
L4-L6	0.43	NA	0.50	NA
U0-U1	0.08	0.12	0.09	0.10
U1-U3	NA	0.51	NA	0.64
U3-U5	NA	0.47	NA	0.66
U5-U6	NA	0.47	NA	0.67
L0-U1	NA	0.29	NA	0.42
U1-L2	0.42	NA	0.54	NA
L2-U3	NA	0.41	NA	0.69
U3-L4	0.41	NA	0.54	NA
L4-U5 (Min)	0.06	0.46	0.07	0.50
L4-U5 (Max)	0.06	0.46	0.07	0.50
U5-L6 (Min)	0.31	0.22	0.30	0.22
U5-L6 (Max)	0.31	0.22	0.30	0.22
U0-L0	0.42	0.30	0.52	0.44
U1-L1 (Top)	0.34	0.05	0.44	0.16
U1-L1 (Bot)	0.30	0.22	0.54	0.58
U2-L2 (Top)	0.17	0.32	0.20	0.35
U2-L2 (Bot)	0.23	0.43	0.35	0.63
U3-L3 (Top)	0.45	0.15	0.45	0.16
U3-L3 (Bot)	0.40	0.35	0.45	0.42
U4-L4 (Top)	0.20	0.37	0.18	0.33
U4-L4 (Bot)	0.26	0.50	0.24	0.46
U5-L5 (Top)	0.45	0.16	0.42	0.16
U5-L5 (Bot)	0.41	0.36	0.36	0.30
U6-L6 (Top)	0.17	0.34	0.13	0.26
U6-L6 (Bot)	0.23	0.46	0.18	0.37

Case 4

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.45	NA	0.50	NA
L2-L4	0.42	NA	0.50	NA
L4-L6	0.43	NA	0.50	NA
U0-U1	0.08	0.12	0.09	0.10
U1-U3	NA	0.51	NA	0.64
U3-U5	NA	0.47	NA	0.66
U5-U6	NA	0.48	NA	0.67
L0-U1	NA	0.29	NA	0.42
U1-L2	0.42	NA	0.54	NA
L2-U3	NA	0.41	NA	0.70
U3-L4	0.41	NA	0.54	NA
L4-U5 (Min)	0.06	0.46	0.07	0.50
L4-U5 (Max)	0.06	0.46	0.07	0.50
U5-L6 (Min)	0.31	0.22	0.30	0.22
U5-L6 (Max)	0.31	0.22	0.30	0.22
U0-L0	0.42	0.30	0.52	0.44
U1-L1 (Top)	0.34	0.05	0.44	0.16
U1-L1 (Bot)	0.30	0.22	0.54	0.58
U2-L2 (Top)	0.17	0.32	0.20	0.35
U2-L2 (Bot)	0.23	0.43	0.35	0.63
U3-L3 (Top)	0.45	0.15	0.45	0.16
U3-L3 (Bot)	0.41	0.35	0.45	0.42
U4-L4 (Top)	0.20	0.37	0.18	0.33
U4-L4 (Bot)	0.26	0.50	0.24	0.46
U5-L5 (Top)	0.45	0.16	0.42	0.16
U5-L5 (Bot)	0.41	0.36	0.36	0.30
U6-L6 (Top)	0.17	0.34	0.13	0.26
U6-L6 (Bot)	0.23	0.46	0.18	0.37

Case 5

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.48	NA	0.52	NA
L2-L4	0.45	NA	0.53	NA
L4-L6	0.46	NA	0.53	NA
U0-U1	0.07	0.13	0.09	0.10
U1-U3	NA	0.55	NA	0.68
U3-U5	NA	0.51	NA	0.70
U5-U6	NA	0.51	NA	0.72
L0-U1	NA	0.31	NA	0.44
U1-L2	0.44	NA	0.57	NA
L2-U3	NA	0.43	NA	0.73
U3-L4	0.43	NA	0.57	NA
L4-U5 (Min)	0.04	0.48	0.05	0.52
L4-U5 (Max)	0.04	0.48	0.05	0.52
U5-L6 (Min)	0.32	0.21	0.31	0.21
U5-L6 (Max)	0.32	0.21	0.31	0.21
U0-L0	0.45	0.31	0.55	0.45
U1-L1 (Top)	0.36	0.04	0.46	0.15
U1-L1 (Bot)	0.32	0.22	0.57	0.60
U2-L2 (Top)	0.18	0.33	0.21	0.36
U2-L2 (Bot)	0.24	0.45	0.37	0.66
U3-L3 (Top)	0.47	0.14	0.46	0.15
U3-L3 (Bot)	0.43	0.36	0.47	0.43
U4-L4 (Top)	0.20	0.38	0.18	0.34
U4-L4 (Bot)	0.28	0.52	0.24	0.47
U5-L5 (Top)	0.47	0.15	0.44	0.14
U5-L5 (Bot)	0.43	0.37	0.37	0.29
U6-L6 (Top)	0.17	0.35	0.13	0.26
U6-L6 (Bot)	0.25	0.48	0.18	0.37

Case 6

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.50	NA	0.55	NA
L2-L4	0.47	NA	0.56	NA
L4-L6	0.48	NA	0.56	NA
U0-U1	0.07	0.13	0.09	0.10
U1-U3	NA	0.58	NA	0.72
U3-U5	NA	0.54	NA	0.74
U5-U6	NA	0.54	NA	0.76
L0-U1	NA	0.32	NA	0.46
U1-L2	0.47	NA	0.60	NA
L2-U3	NA	0.46	NA	0.77
U3-L4	0.45	NA	0.60	NA
L4-U5 (Min)	0.03	0.50	0.04	0.54
L4-U5 (Max)	0.03	0.50	0.04	0.54
U5-L6 (Min)	0.32	0.20	0.32	0.21
U5-L6 (Max)	0.32	0.20	0.32	0.21
U0-L0	0.47	0.31	0.58	0.46
U1-L1 (Top)	0.38	0.03	0.48	0.14
U1-L1 (Bot)	0.33	0.22	0.59	0.61
U2-L2 (Top)	0.19	0.34	0.22	0.37
U2-L2 (Bot)	0.25	0.47	0.39	0.69
U3-L3 (Top)	0.49	0.13	0.48	0.13
U3-L3 (Bot)	0.44	0.36	0.49	0.44
U4-L4 (Top)	0.21	0.39	0.18	0.34
U4-L4 (Bot)	0.29	0.54	0.25	0.48
U5-L5 (Top)	0.49	0.14	0.45	0.13
U5-L5 (Bot)	0.45	0.37	0.38	0.29
U6-L6 (Top)	0.18	0.35	0.13	0.26
U6-L6 (Bot)	0.26	0.50	0.18	0.38

Case 7

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.47	NA	0.51	NA
L2-L4	0.46	NA	0.55	NA
L4-L6	0.47	NA	0.56	NA
U0-U1	0.06	0.10	0.07	0.08
U1-U3	NA	0.57	NA	0.71
U3-U5	NA	0.53	NA	0.73
U5-U6	NA	0.53	NA	0.75
L0-U1	NA	0.31	NA	0.45
U1-L2	0.46	NA	0.58	NA
L2-U3	NA	0.44	NA	0.75
U3-L4	0.44	NA	0.58	NA
L4-U5 (Min)	0.02	0.48	0.03	0.52
L4-U5 (Max)	0.02	0.48	0.03	0.52
U5-L6 (Min)	0.31	0.18	0.30	0.19
U5-L6 (Max)	0.31	0.18	0.30	0.19
U0-L0	0.46	0.30	0.56	0.44
U1-L1 (Top)	0.36	0.02	0.46	0.12
U1-L1 (Bot)	0.33	0.22	0.57	0.58
U2-L2 (Top)	0.16	0.30	0.19	0.32
U2-L2 (Bot)	0.23	0.45	0.36	0.65
U3-L3 (Top)	0.46	0.11	0.45	0.10
U3-L3 (Bot)	0.42	0.33	0.47	0.41
U4-L4 (Top)	0.18	0.35	0.15	0.30
U4-L4 (Bot)	0.27	0.52	0.24	0.46
U5-L5 (Top)	0.46	0.11	0.42	0.10
U5-L5 (Bot)	0.42	0.34	0.36	0.26
U6-L6 (Top)	0.15	0.32	0.11	0.23
U6-L6 (Bot)	0.23	0.46	0.16	0.34

Case 8

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.49	NA	0.54	NA
L2-L4	0.46	NA	0.56	NA
L4-L6	0.47	NA	0.56	NA
U0-U1	0.07	0.13	0.09	0.10
U1-U3	NA	0.57	NA	0.71
U3-U5	NA	0.53	NA	0.73
U5-U6	NA	0.53	NA	0.75
L0-U1	NA	0.32	NA	0.46
U1-L2	0.46	NA	0.59	NA
L2-U3	NA	0.45	NA	0.76
U3-L4	0.45	NA	0.59	NA
L4-U5 (Min)	0.03	0.49	0.04	0.53
L4-U5 (Max)	0.03	0.49	0.04	0.53
U5-L6 (Min)	0.32	0.20	0.31	0.21
U5-L6 (Max)	0.32	0.20	0.31	0.21
U0-L0	0.47	0.31	0.57	0.45
U1-L1 (Top)	0.37	0.03	0.48	0.14
U1-L1 (Bot)	0.33	0.22	0.59	0.61
U2-L2 (Top)	0.19	0.34	0.21	0.36
U2-L2 (Bot)	0.24	0.46	0.38	0.68
U3-L3 (Top)	0.48	0.14	0.47	0.14
U3-L3 (Bot)	0.44	0.36	0.48	0.44
U4-L4 (Top)	0.21	0.39	0.18	0.34
U4-L4 (Bot)	0.28	0.54	0.25	0.48
U5-L5 (Top)	0.48	0.14	0.45	0.13
U5-L5 (Bot)	0.44	0.37	0.38	0.29
U6-L6 (Top)	0.18	0.35	0.13	0.26
U6-L6 (Bot)	0.25	0.49	0.18	0.37

Case 9

Member	Railway Truss		Highway Truss	
	Tension	Compression	Tension	Compression
L0-L2	0.55	NA	0.60	NA
L2-L4	0.53	NA	0.63	NA
L4-L6	0.54	NA	0.63	NA
U0-U1	0.07	0.13	0.10	0.10
U1-U3	NA	0.65	NA	0.80
U3-U5	NA	0.60	NA	0.83
U5-U6	NA	0.60	NA	0.85
L0-U1	NA	0.35	NA	0.51
U1-L2	0.52	NA	0.67	NA
L2-U3	NA	0.50	NA	0.85
U3-L4	0.49	NA	0.65	NA
L4-U5 (Min)	0.01	0.53	0.01	0.58
L4-U5 (Max)	0.01	0.53	0.01	0.58
U5-L6 (Min)	0.34	0.18	0.33	0.19
U5-L6 (Max)	0.34	0.18	0.33	0.19
U0-L0	0.53	0.32	0.64	0.48
U1-L1 (Top)	0.41	0.00	0.53	0.12
U1-L1 (Bot)	0.37	0.23	0.65	0.65
U2-L2 (Top)	0.20	0.36	0.23	0.39
U2-L2 (Bot)	0.27	0.50	0.42	0.74
U3-L3 (Top)	0.53	0.11	0.51	0.11
U3-L3 (Bot)	0.48	0.38	0.53	0.46
U4-L4 (Top)	0.23	0.42	0.19	0.35
U4-L4 (Bot)	0.31	0.59	0.27	0.51
U5-L5 (Top)	0.53	0.12	0.48	0.10
U5-L5 (Bot)	0.49	0.39	0.41	0.28
U6-L6 (Top)	0.19	0.37	0.13	0.26
U6-L6 (Bot)	0.28	0.54	0.19	0.39

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

L_0-L_2 East (R) Tension member Drawing Location (1959)

E56 Bottom Chord Plan

Material Properties: A-242-55 Steel Reference

F_u =	480	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

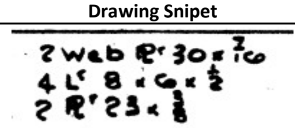
Member	**Angle**	**Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	8x6x1/2	30x7/16	23x3/8	23x3/8

Flange Perfortion Width	8	in
Rivet dia.	1	in

Member Dimensions

Length =	9398	mm
Width =	606	mm
Depth =	781	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web			**Top & Bottom Plate**			**Angle**		
Designation	30x7/16		Designation	23x3/8		Designation	8x6x1/2	
Qty =	2		Qty =	2		Qty =	4	
w =	11.1125	mm	t =	9.525	mm	b =	203.2	mm
h =	762	mm	b =	584.2	mm	d =	152.4	mm
A =	16935.45	mm^2	b_{eff} =	381	mm	t =	12.7	mm
y Bar =	303.2125	mm	A =	11129.01	mm^2	A =	4350	mm^2
z Bar =	0	mm	A_{eff} =	7258.05	mm^2	y =	62.8	mm
RHM*	4		y Bar =	0	mm	x =	37.3	mm
RHM Area =	2258.1	mm	z Bar =	390.525	mm	I_y =	18.4	$x10^6 mm^4$
			RHM*	2		I_z =	8.96	$x10^6 mm^4$
			RHM Area =	967.7	mm	A_{angle} =	17400	mm^2
						RHM*	3	
						RHM Area =	3871.0	mm

RHM* = Rivet Holes/Member

Section Calculations

	Angle	Web	T&B Plate	
Designation	8x6x1/2	30x7/16	23x3/8	
Qty=	4	2	2	
Iy =	73.6	819.5	0.1	$x10^6mm^4$
Iz =	35.84	0.2	21.9	$x10^6mm^4$
A =	17400.0	16935.5	7258.1	mm^2
dz =	318.2	0	385.0	mm^2
dy =	254.8	297.7	196.9	mm
Iyy =	1835.4	819.5	1075.7	$x10^6mm^4$
Izz =	1165.5	1500.6	303.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	41594	mm^2
A_{RHM^*}=	7096.8	mm2
A_{net} =	34497	mm^2
∑Iyy =	3730.5	$x10^6mm^4$
∑Izz =	2969.3	$x10^6mm^4$
ybar=	391	mm
xbar=	303	mm

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Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9398	mm	kyLy/ry =	28.6	< 120 therefore OK
Lz =	9398	mm	kzLz/rz =	32.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	355.6	w =	11.1	h/w =	32.0	OK
Flange	b =	279.4	t =	9.5	b/t =	29.3	OK
Flange Perforated	b =	76.2	t =	9.5	b/t =	8.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	34497	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	328.8	mm
rz =	293.4	mm
λy =	0.381	
λz =	0.427	
Cry =	10295	kN
Crz =	10107	kN
Cr Min =	10107	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	13830	kN
b)	Tr =	$\phi_u A_n F_u$	13247	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	11260	kN
		Tr Min =	11260	kN

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Bottom Chord L_2-L_4 East (R) Tension member

Drawing Location (1959)

E56 Bottom Chord Plan

Material Properties: A-242-55 Steel Reference

F_u =	480	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	350	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	Angle	Web	Web	Top Plate	Bottom Plate
Quantity	**4**	**4**	**2**	**1**	**1**
Dimensions (in)	8x6x1/2	30x11/16	14x1/2	21x3/8	21x3/8

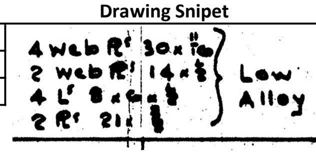
Flange Perfortion Width 8 in

Rivet dia. 1 in

Member Dimensions

Length =	9398	mm
Width =	603	mm
Depth =	781	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web				
Positioning	**Outside**	**Middle**	**Inside**	
Designation	30x11/16	30x11/16	14x1/2	
Qty =	2	2	2	
w =	17.4625	17.4625	12.7	mm
h =	762	762	355.6	mm
A =	26612.85	26612.85	9032.24	mm^2
y Bar =	292.89375	275.43125	260.35	mm
z Bar =	0	0	0	mm
RHM*	4	4	4	
RHM Area =	3548.4	3548.4	2580.6	mm

Angle		
Designation	8x6x1/2	
Qty =	4	
b =	203.2	mm
d =	152.4	mm
t =	12.7	mm
A =	4350	mm^2
z =	62.8	mm
y =	37.3	mm
I_y =	18.4	$x10^6mm^4$
I_z =	8.96	$x10^6mm^4$
A_{angle} =	17400	mm^2
RHM*	3	
RHM Area =	3871.0	mm

Top & Bottom Plate		
Designation	21x3/8	
Qty =	2	
t =	9.525	mm
b =	533.4	mm
b_{eff} =	330.2	mm
A =	10161.27	mm^2
A_{eff} =	6290.31	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	Web	Web	T&B Plate	
Designation	8x6x1/2	30x11/16	30x11/16	14x1/2	21x3/8	
Qty=	4	2	2	2	2	
Iy =	73.6	1287.7	1287.7	95.2	0.0	$x10^6mm^4$
Iz =	35.84	0.7	0.7	0.1	14.3	$x10^6mm^4$
A =	17400.0	26612.9	26612.9	9032.2	6290.3	mm^2
dz =	318.2	0	0	0	385.8	mm^2
dy =	229	292.9	275.4	260.4	171.5	mm
Iyy =	1835.4	1287.7	1287.7	95.2	936.1	$x10^6mm^4$
Izz =	951.5	2283.7	2019.6	612.3	199.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	85948.0	mm^2
A_{RHM*}=	14516.1	mm2
A_{net} =	71432	mm^2
∑Iyy =	5442.0	$x10^6mm^4$
∑Izz =	6066.0	$x10^6mm^4$
ybar=	391	mm
xbar=	302	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9398	mm	kyLy/ry =	34.0	< 120 therefore OK
Lz =	9398	mm	kzLz/rz =	32.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	355.6	w =	17.5	h/w =	20.4	OK
Flange	b =	228.6	t =	9.5	b/t =	24.0	OK
Flange Perforated	b =	25.4	t =	9.5	b/t =	2.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	71432	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	276.0	mm
rz =	291.4	mm
λy =	0.453	
λz =	0.429	
Cry =	20676	kN
Crz =	20902	kN
Cr Min =	20676	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	28578	kN
b)	Tr =	$\phi_u A_n F_u$	27430	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	23315	kN
		Tr Min =	23315	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Bottom Chord L_2-L_4 East (R) Tension member

Drawing Location (1959)
E56 Bottom Chord Plan

Material Properties: A-242-55 Steel Reference

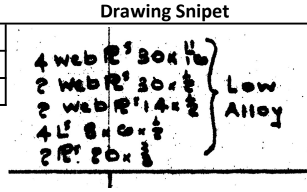
F_u =	480	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Angle**	**Web**	**Web**	**Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**2**	**2**	**1**	**1**
Dimensions (in)	8x6x1/2	30x11/16	30x1/2	14x1/2	20x3/8	20x3/8
Flange Perfortion Width		8	in			
Rivet dia.		1	in			

Member Dimensions | **Drawing Snipet** | **Member Cross-Section**

Length =	9398	mm
Width =	603	mm
Depth =	781	mm



Individual Member Properties

Web					
Positioning	**Outside 2**	**Outside 1**	**Middle**	**Inside**	
Designation	30x11/16	30x11/16	30x1/2	14x1/2	
Qty =	2	2	2	2	
w =	17.4625	17.4625	12.7	12.7	mm
h =	762	762	762	355.6	mm
A =	26612.85	26612.85	19354.8	9032.24	mm^2
y Bar =	292.89375	275.43125	260.35	247.65	mm
z Bar =	0	0	0	0	mm
RHM*	4	4	4	4	
RHM Area =	3548.4	3548.4	2580.6	2580.6	mm

Angle		
Designation	8x6x1/2	
Qty =	4	
b =	203.2	mm
d =	152.4	mm
t =	12.7	mm
A =	4350	mm^2
z =	62.8	mm
y =	37.3	mm
I_y =	18.4	$x10^6mm^4$
I_z =	8.96	$x10^6mm^4$
A_{angle} =	17400	mm^2
RHM*	3	
RHM Area =	3871.0	mm

Top & Bottom Plate		
Designation	20x3/8	
Qty =	2	
t =	9.525	mm
b =	508.0	mm
b_{eff} =	304.8	mm
A =	9677.4	mm^2
A_{eff} =	5806.44	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	Web	Web	Web	T&B Plate	
Designation	8x6x1/2	30x11/16	30x11/16	30x1/2	14x1/2	20x3/8	
Qty=	4	2	2	2	2	2	
Iy =	73.6	1287.7	1287.7	936.5	95.2	0.0	$x10^6mm^4$
Iz =	35.84	0.7	0.7	0.3	0.1	11.2	$x10^6mm^4$
A =	17400.0	26612.9	26612.9	19354.8	9032.2	5806.4	mm^2
dz =	318.2	0	0	0	0	385.8	mm^2
dy =	217	292.9	275.4	260.4	247.7	177.8	mm
Iyy =	1835.4	1287.7	1287.7	936.5	95.2	864.1	$x10^6mm^4$
Izz =	852.9	2283.7	2019.6	1312.2	554.1	194.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	104819.0	mm^2
A_{RHM^*}=	17096.7	mm2
A_{net} =	87722	mm^2
∑Iyy =	6307.0	$x10^6mm^4$
∑Izz =	7217.0	$x10^6mm^4$
zbar=	391	mm
ybar=	302	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9398	mm	kyLy/ry =	35.0	< 120 therefore OK
Lz =	9398	mm	kzLz/rz =	32.8	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	355.6	w =	17.5	h/w =	20.4	OK
Flange	b =	203.2	t =	9.5	b/t =	21.3	OK
Flange Perforated	b =	0.0	t =	9.5	b/t =	0.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	87722	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	268.1	mm
rz =	286.8	mm
λy =	0.467	
λz =	0.436	
Cry =	25228	kN
Crz =	25591	kN
Cr Min =	25228	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	34852	kN
b)	Tr =	$\phi_u A_n F_u$	33685	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	28633	kN
		Tr Min =	28633	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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LIFT SPAN

Bottom Chord L_0-L_2 West (H)

Tension member

Drawing Location (1959)

E56 Bottom Chord Plan

Material Properties: A-7 Steel

Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

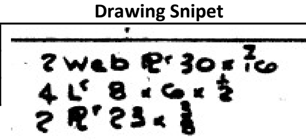
Member	Angle	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	8x6x1/2	30x7/16	23x3/8	23x3/8

Flange Perfortion Width	8	in
Rivet dia.	1	in

Member Dimensions

Length =	9398	mm
Width =	606	mm
Depth =	781	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web			Top & Bottom Plate			Angle		
Designation	30x7/16		Designation	23x3/8		Designation	8x6x1/2	
Qty =	2		Qty =	2		Qty =	4	
w =	11.1125	mm	t =	9.525	mm	b =	203.2	mm
h =	762	mm	b =	584.2	mm	d =	152.4	mm
A =	16935.45	mm^2	b_{eff} =	381	mm	t =	12.7	mm
y Bar =	303.2125	mm	A =	11129.01	mm^2	A =	4350	mm^2
z Bar =	0	mm	A_{eff} =	7258.05	mm^2	y =	62.8	mm
RHM*	4		y Bar =	0	mm	x =	37.3	mm
RHM Area =	2258.1	mm	z Bar =	390.525	mm	I_y =	18.4	$x10^6mm^4$
			RHM*	2		I_z =	8.96	$x10^6mm^4$
			RHM Area =	967.7	mm	A_{angle} =	17400	mm^2

RHM*	3	
RHM Area =	3871.0	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN	
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Section Calculations

	Angle	Web	T&B Plate	
Designation	8x6x1/2	30x7/16	23x3/8	
Qty=	4	2	2	
Iy =	73.6	819.5	0.1	$x10^6mm^4$
Iz =	35.84	0.2	21.9	$x10^6mm^4$
A =	17400.0	16935.5	7258.1	mm^2
dz =	318.2	0	385.0	mm^2
dy =	254.8	297.7	196.9	mm
Iyy =	1835.4	819.5	1075.7	$x10^6mm^4$
Izz =	1165.5	1500.6	303.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	41594	mm^2
A_{RHM*}=	7096.8	mm2
A_{net} =	34497	mm^2
∑Iyy =	3730.5	$x10^6mm^4$
∑Izz =	2969.3	$x10^6mm^4$
ybar=	391	mm
xbar=	303	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9398	mm	kyLy/ry =	28.6	< 120 therefore OK
Lz =	9398	mm	kzLz/rz =	32.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	355.6	w =	11.1	h/w =	32.0	OK
Flange	b =	279.4	t =	9.5	b/t =	29.3	OK
Flange Perforated	b =	76.2	t =	9.5	b/t =	8.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	34497	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	328.8	mm
rz =	293.4	mm
λy =	0.308	
λz =	0.346	
Cry =	6921	kN
Crz =	6846	kN
Cr Min =	6846	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9088	kN
b)	Tr =	$\phi_u A_n F_u$	11315	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	9618	kN
		Tr Min =	9088	kN

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JOB TITLE	BCLB DECK PRE-DESIGN		
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DESIGNED BY		DATE	
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CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Bottom Chord L_2-L_4 West (H) Tension member

Drawing Location (1959)
E56 Bottom Chord Plan

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	Angle	Web	Web	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	8x6x1/2	30x11/16	30x7/16	14x1/2	21x3/8	21x3/8

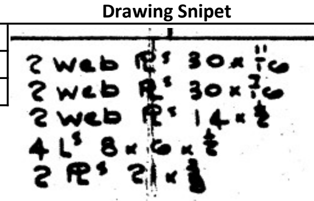
Flange Perfortion Width 8 in

Rivet dia. 1 in

Member Dimensions

Length =	9398	mm
Width =	591	mm
Depth =	781	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web				
Positioning	**Outside**	**Middle**	**Inside**	
Designation	30x11/16	30x7/16	14x1/2	
Qty =	2	2	2	
w =	17.4625	11.1125	12.7	mm
h =	762	762	355.6	mm
A =	26612.85	16935.45	9032.24	mm^2
y Bar =	286.54375	272.25625	260.35	mm
z Bar =	0	0	0	mm
RHM*	4	4	4	
RHM Area =	3548.4	2258.1	2580.6	mm

Angle		
Designation	8x6x1/2	
Qty =	4	
b =	203.2	mm
d =	152.4	mm
t =	12.7	mm
A =	4350	mm^2
z =	62.8	mm
y =	37.3	mm
I_y =	18.4	$x10^6mm^4$
I_z =	8.96	$x10^6mm^4$
A_{angle} =	17400	mm^2
RHM*	3	
RHM Area =	3871.0	mm

Top & Bottom Plate		
Designation	21x3/8	
Qty =	2	
t =	9.525	mm
b =	533.4	mm
b_{eff} =	330.2	mm
A =	10161.27	mm^2
A_{eff} =	6290.31	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
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Section Calculations

	Angle	Web	Web	Web	T&B Plate	
Designation	8x6x1/2	30x11/16	30x7/16	14x1/2	21x3/8	
Qty=	4	2	2	2	2	
Iy =	73.6	1287.7	819.5	95.2	0.0	$x10^6mm^4$
Iz =	35.84	0.7	0.2	0.1	14.3	$x10^6mm^4$
A =	17400.0	26612.9	16935.5	9032.2	6290.3	mm^2
dz =	318.2	0	0	0	385.8	mm^2
dy =	229	286.5	272.3	260.4	171.5	mm
Iyy =	1835.4	1287.7	819.5	95.2	936.1	$x10^6mm^4$
Izz =	951.5	2185.8	1255.5	612.3	199.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	76271.0	mm^2
A_{RHM*}=	13225.8	mm2
A_{net} =	63045	mm^2
∑Iyy =	4974.0	$x10^6mm^4$
∑Izz =	5204.0	$x10^6mm^4$
ybar=	391	mm
xbar=	295	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9398	mm	kyLy/ry =	33.5	< 120 therefore OK
Lz =	9398	mm	kzLz/rz =	32.7	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	355.6	w =	17.5	h/w =	20.4	OK
Flange	b =	228.6	t =	9.5	b/t =	24.0	OK
Flange Perforated	b =	25.4	t =	9.5	b/t =	2.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	63045	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	280.9	mm
rz =	287.3	mm
λy =	0.361	
λz =	0.353	
Cry =	12449	kN
Crz =	12483	kN
Cr Min =	12449	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	16665	kN
b)	Tr =	$\phi_u A_n F_u$	20679	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	17577	kN
		Tr Min =	16665	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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LIFT SPAN

Bottom Chord L_4-L_6 West (H) Tension member

Drawing Location (1959)
E56 Bottom Chord Plan

Material Properties: A-242-55 Steel Reference

F_u =	480	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	Angle	Web	Web	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	8x6x1/2	30x11/16	30x7/16	14x1/2	20x3/8	20x3/8

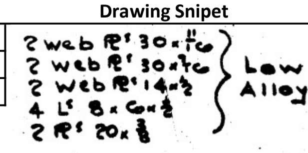
Flange Perfortion Width 8 in
Rivet dia. 1 in

Member Dimensions

Length =	9398	mm
Width =	565	mm
Depth =	781	mm

pl

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web				
Positioning	**Outside 2**	**Middle**	**Inside**	
Designation	30x11/16	30x7/16	14x1/2	
Qty =	2	2	2	
w =	17.4625	11.1125	12.7	mm
h =	762	762	355.6	mm
A =	26612.85	16935.45	9032.24	mm^2
y Bar =	273.84375	259.55625	247.65	mm
z Bar =	0	0	0	mm
RHM*	4	4	4	
RHM Area =	3548.4	2258.1	2580.6	mm

Angle		
Designation	8x6x1/2	
Qty =	4	
b =	203.2	mm
d =	152.4	mm
t =	12.7	mm
A =	4350	mm^2
z =	62.8	mm
y =	37.3	mm
I_y =	18.4	$x10^6 mm^4$
I_z =	8.96	$x10^6 mm^4$
A_{angle} =	17400	mm^2
RHM*	3	
RHM Area =	3871.0	mm

Top & Bottom Plate		
Designation	20x3/8	
Qty =	2	
t =	9.525	mm
b =	508.0	mm
b_{eff} =	304.8	mm
A =	9677.4	mm^2
A_{eff} =	5806.44	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	Web	Web	T&B Plate	
Designation	8x6x1/2	30x11/16	30x7/16	14x1/2	20x3/8	
Qty=	4	2	2	2	2	
Iy =	73.6	1287.7	819.5	95.2	0.0	$x10^6mm^4$
Iz =	35.84	0.7	0.2	0.1	11.2	$x10^6mm^4$
A =	17400.0	26612.9	16935.5	9032.2	5806.4	mm^2
dz =	318.2	0	0	0	385.8	mm^2
dy =	217	273.8	259.6	247.7	177.8	mm
Iyy =	1835.4	1287.7	819.5	95.2	864.1	$x10^6mm^4$
Izz =	852.9	1996.4	1141.1	554.1	194.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	75787.0	mm^2
A_{RHM*}=	13225.8	mm2
A_{net} =	62561	mm^2
∑Iyy =	4902.0	$x10^6mm^4$
∑Izz =	4739.0	$x10^6mm^4$
zbar=	391	mm
ybar=	283	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9398	mm	kyLy/ry =	33.6	< 120 therefore OK
Lz =	9398	mm	kzLz/rz =	34.1	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	355.6	w =	17.5	h/w =	20.4	OK
Flange	b =	203.2	t =	9.5	b/t =	21.3	OK
Flange Perforated	b =	0.0	t =	9.5	b/t =	0.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	62561	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	279.9	mm
rz =	275.2	mm
λy =	0.447	
λz =	0.455	
Cry =	18162	kN
Crz =	18097	kN
Cr Min =	18097	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	25199	kN
b)	Tr =	$\phi_u A_n F_u$	24024	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	20420	kN
		Tr Min =	20420	kN

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN	
	JOB NO.	60637587	CALCULATION NO.
	DESIGNED BY		DATE
	ORIGINATOR BY	KG	DATE 30-Nov-20
	CHECKED BY	RA	DATE 16-Dec-20

LIFT SPAN

Top Chord U_0-U_1 East (R) — Compression Member — Drawing Location (1959)

E56 Top Chord Plan

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

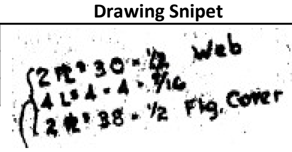
Built up Section Components

Member	**Angle**	**Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x7/16	30x1/2	38x1/2	38x1/2
Flange Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions

Length =	9482	mm
Width =	965	mm
Depth =	787	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Designation	30x1/2	
Qty =	2	
w =	12.7	mm
h =	762	mm
A =	19354.8	mm^2
z Bar =	394	mm
RHM*	4	
RHM Area =	2580.6	mm^2

Angle			
Location	Top	Bottom	
Designation	4x4x7/16	4x4x7/16	
Qty =	2	2	mm
b =	101.6	101.6	mm
d =	101.6	101.6	mm
t =	11.1	11.1	mm^2
A =	2140	2140	mm
y =	29.6	29.6	mm
x =	29.6	29.6	mm
Z bar	745.1	42.3	mm
I_y =	2.09	2.09	$x10^6 mm^4$
I_z =	2.09	2.09	$x10^6 mm^4$
A_{angle} =	4280	4280	mm^2
RHM*	3	3	mm
RHM Area =	1693.5	1693.5	mm^2

	Top Plate	**Bottom Plate**	
Designation	38x1/2	38x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	965.2	965.2	mm
b_{eff} =	965.2	711.2	mm
z Bar =	781.05	6.35	mm
A =	12258.04	12258.04	mm^2
A_{eff} =	12258.04	9032.24	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Section Calculations

	Angle Top	Angle Bottom	Web	Top Plate	Bot Plate	
Designation	4x4x7/16	4x4x7/16	30x1/2	38x1/2	38x1/2	
Qty=	2	2	2	1	1	
Iy =	4.2	4.2	936.5	0.2	0.1	$x10^6mm^4$
Iz =	4.18	4.18	0.3	951.6	95.2	$x10^6mm^4$
A =	4280.0	4280.0	19354.8	12258.0	9032.2	mm^2
dz =	326.0	376.8	25.4	362.0	412.7	mm^2
dy =	411	411	374.7	0.0	304.8	mm
Iyy =	459.1	611.8	949.0	1606.1	1538.8	$x10^6mm^4$
Izz =	725.8	725.8	2717.0	951.6	934.3	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	49205.1	mm^2
A_{RHM*}=	4919.3	mm2
A_{net} =	44286	mm^2
∑Iyy =	5164.8	$x10^6mm^4$
∑Izz =	6054.4	$x10^6mm^4$
Zbar=	419	mm
ybar=	483	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9482.3629 mm	kyLy/ry =	27.8	< 120 therefore OK
Lz =	9482.3629 mm	kzLz/rz =	25.6	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	12.7	h/w =	44.0	OK
Flange	b =	762.0	t =	12.7	b/t =	60.0	NG
Flange Perforated	b =	762.0	t =	12.7	b/t =	60.0	NG

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	44286	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	341.5	mm
rz =	369.7	mm
λy =	0.300	
λz =	0.277	
Cry =	8905	kN
Crz =	8954	kN
Cr Min =	8905	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	10751	kN
b)	Tr =	$\phi_u A_n F_u$	14526	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	12347	kN
		Tr Min =	10751	kN

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	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Top Chord U_1-U_3 East (R) Compression Member Drawing Location (1959)

E56 Top Chord Plan

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

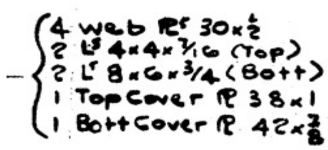
Built up Section Components

Member	Top Angle	Bottom Angle	Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x7/16	8x6x3/4	30x1	38x1	42x7/8

Flange Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	18871	mm
Width =	1067	mm
Depth =	810	mm



Individual Member Properties

Web		
Designation	30x1	
Qty =	2	
w =	25.4	mm
h =	762	mm
A =	38709.6	mm^2
z Bar =	403	mm
RHM*	4	
RHM Area =	5161.3	mm^2

Angle			
Location	Top	Bottom	
Designation	4x4x7/16	8x6x3/4	
Qty =	2	2	mm
b =	101.6	152.4	mm
d =	101.6	203.2	mm
t =	11.1	19.1	mm^2
A =	2140	6410	mm
z =	29.6	65.1	mm
y =	29.6	39.6	mm
Z bar	754.625	87.325	mm
I_y =	2.09	26.2	$x10^6mm^4$
I_z =	2.09	12.7	$x10^6mm^4$
A_{angle} =	4280	12820	mm^2
RHM*	3	3	mm
RHM Area =	2903.2	1693.5	mm^2

	Top Plate	Bottom Plate	
Designation	38x1	42x7/8	
Qty =	1	1	
t =	25.4	22.225	mm
b =	965.2	1066.8	mm
b_{eff} =	965.2	812.8	mm
z Bar =	796.925	11.1125	mm
A =	24516.08	23709.63	mm^2
A_{eff} =	24516.08	18064.48	mm^2
RHM*	2	2	
RHM Area =	1290.3	1129.0	mm^2

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.			
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JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle Top	Angle Bottom	Web	Top Plate	Bot Plate	
Designation	4x4x7/16	8x6x3/4	30x1	38x1	42x7/8	
Qty=	2	2	2	1	1	
Iy =	4.2	52.4	1873.0	1.3	0.7	$x10^6mm^4$
Iz =	4.18	25.4	2.1	1903.3	248.6	$x10^6mm^4$
A =	4280.0	12820.0	38709.6	24516.1	18064.5	mm^2
dz =	351.2	316.1	0.2	393.5	392.3	mm^2
dy =	411	421	368.3	0.0	330.2	mm
Iyy =	532.0	1333.6	1873.0	3796.8	2781.5	$x10^6mm^4$
Izz =	725.8	2293.3	5252.8	1903.3	2218.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	98390.2	mm^2
A_{RHM*}=	8145.1	mm2
A_{net} =	90245	mm^2
∑Iyy =	10317.0	$x10^6mm^4$
∑Izz =	12393.4	$x10^6mm^4$
Zbar=	403	mm
ybar=	533	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	18871.175	mm	kyLy/ry =	55.8	< 120 therefore OK
Lz =	18871.175	mm	kzLz/rz =	50.9	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	25.4	h/w =	22.0	OK
Flange	b =	762.0	t =	25.4	b/t =	30.0	OK
Flange Perforated	b =	762.0	t =	25.4	b/t =	30.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	90245	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	338.1	mm
rz =	370.6	mm
λy =	0.602	
λz =	0.550	
Cry =	15748	kN
Crz =	16293	kN
Cr Min =	15748	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	21498	kN
b)	Tr =	$\phi_u A_n F_u$	29600	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	25160	kN
		Tr Min =	21498	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
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LIFT SPAN

Top Chord U_3-U_5 East (R) Compression Member Drawing Location (1959)

E56 Top Chord Plan

Material Properties: A-242-55 Steel Reference

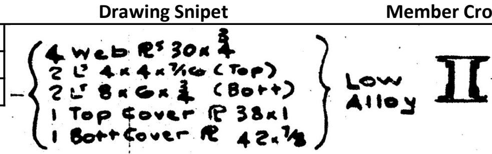
F_u =	480	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	350	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	Top Angle	Bottom Angle	Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x7/16	8x6x3/4	30x1.5	38x1	42x7/8
Flange Perfortion Width		10	in		
Rivet dia.		1	in		

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	18804	mm
Width =	1067	mm
Depth =	810	mm



Individual Member Properties

Web		
Designation	30x1.5	
Qty =	2	
w =	38.1	mm
h =	762	mm
A =	58064.4	mm^2
z Bar =	403	mm
RHM*	4	
RHM Area =	7741.9	mm^2

	Top Plate	Bottom Plate	
Designation	38x1	42x7/8	
Qty =	1	1	
t =	25.4	22.225	mm
b =	965.2	1066.8	mm
b_{eff} =	965.2	812.8	mm
z Bar =	796.925	11.1125	mm
A =	24516.08	23709.63	mm^2
A_{eff} =	24516.08	18064.48	mm^2
RHM*	2	2	
RHM Area =	1290.3	1129.0	mm^2

Angle			
Location	Top	Bottom	
Designatio	4x4x7/16	8x6x3/4	
Qty =	2	2	mm
b =	101.6	152.4	mm
d =	101.6	203.2	mm
t =	11.1	19.1	mm^2
A =	2140	6410	mm
z =	29.6	65.1	mm
y =	29.6	39.6	mm
Z bar	754.625	87.325	mm
I_y =	2.09	26.2	$x10^6mm^4$
I_z =	2.09	12.7	$x10^6mm^4$
A_{angle} =	4280	12820	mm^2
RHM*	3	3	mm
RHM Area =	2903.2	1693.5	mm^2

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
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Section Calculations

	Angle Top	Angle Bottom	Web	Top Plate	Bot Plate	
Designation	4x4x7/16	8x6x3/4	30x1.5	38x1	42x7/8	
Qty=	2	2	2	1	1	
Iy =	4.2	52.4	2809.6	1.3	0.7	$x10^6mm^4$
Iz =	4.18	25.4	7.0	1903.3	248.6	$x10^6mm^4$
A =	4280.0	12820.0	58064.4	24516.1	18064.5	mm^2
dz =	351.2	316.1	0.2	393.5	392.3	mm^2
dy =	411	421	362.0	0.0	330.2	mm
Iyy =	532.1	1333.3	2809.6	3797.6	2780.9	$x10^6mm^4$
Izz =	725.8	2293.3	7613.9	1903.3	2218.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	117745.0	mm^2
A_{RHM*}=	10725.8	mm2
A_{net} =	107019	mm^2
∑Iyy =	11253.5	$x10^6mm^4$
∑Izz =	14754.5	$x10^6mm^4$
Zbar=	403	mm
ybar=	533	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	18804.352	mm	kyLy/ry =	58.0	< 120 therefore OK
Lz =	18804.352	mm	kzLz/rz =	50.6	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	558.8	w =	38.1	h/w =	14.7	OK
Flange	b =	762.0	t =	25.4	b/t =	30.0	OK
Flange Perforated	b =	762.0	t =	25.4	b/t =	30.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	107019	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	324.3	mm
rz =	371.3	mm
λy =	0.772	
λz =	0.674	
Cry =	24908	kN
Crz =	26978	kN
Cr Min =	24908	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension Φs = 0.95

Tension Φu = 0.8

a)	Tr =	$\phi_s A_g F_y$	39150	kN
b)	Tr =	$\phi_u A_n F_u$	41095	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	34931	kN
		Tr Min =	34931	kN

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
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	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Top Chord U_5-U_5 East (R) Compression Member Drawing Location (1959)

E56 Top Chord Plan

Material Properties: A-242-55 Steel Reference

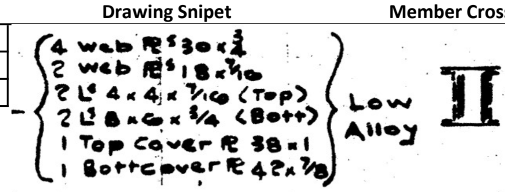
F_u =	480	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	350	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	Top Angle	Bottom Angle	Web	Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x7/16	8x6x3/4	18x7/16	30x1.5	38x1	42x7/8
Flange Perfortion Width		10	in			
Rivet dia.		1	in			

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	18796	mm
Width =	1067	mm
Depth =	810	mm



Individual Member Properties

Web			
	Outside	**Inside**	
Designation	18x7/16	30x1.5	
Qty =	2	2	
w =	11.1125	38.1	mm
h =	457.2	762	mm
A =	10161.27	58064.4	mm^2
z Bar =	454	403	mm
RHM*	4	4	
RHM Area =	2258.1	7741.9	mm^2

Angle			
Location	Top	Bottom	
Designatioı	4x4x7/16	8x6x3/4	
Qty =	2	2	mm
b =	101.6	152.4	mm
d =	101.6	203.2	mm
t =	11.1	19.1	mm^2
A =	2140	6410	mm
z =	29.6	65.1	mm
y =	29.6	39.6	mm
Z bar	754.625	87.325	mm
I_y =	2.09	26.2	$x10^6mm^4$
I_z =	2.09	12.7	$x10^6mm^4$
A_{angle} =	4280	12820	mm^2
RHM*	3	3	mm
RHM Area =	2903	1694	mm^2

	Top Plate	Bottom Plate	
Designation	38x1	42x7/8	
Qty =	1	1	
t =	25.4	22.225	mm
b =	965.2	1066.8	mm
b_{eff} =	965.2	812.8	mm
z Bar =	796.925	11.1125	mm
A =	24516.08	23709.63	mm^2
A_{eff} =	24516.08	18064.48	mm^2
RHM*	2	2	
RHM Area =	1290.3	1129.0	mm^2

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

Section Calculations

	Angle Top	Angle Bottom	Web	Web	Top Plate	Bot Plate	
Designation	4x4x7/16	8x6x3/4	18x7/16	30x1.5	38x1	42x7/8	
Qty=	2	2	2	2	1	1	
Iy =	4.2	52.4	177.0	2809.6	1.3	0.7	$x10^6mm^4$
Iz =	4.18	25.4	0.1	7.0	1903.3	248.6	$x10^6mm^4$
A =	4280.0	12820.0	10161.3	58064.4	24516.1	18064.5	mm^2
dz =	347.2	320.1	46.6	4.2	389.5	396.3	mm^2
dy =	411	421	386.6	362.0	0.0	330.2	mm
Iyy =	520.1	1366.1	199.1	2810.6	3720.4	2838.2	$x10^6mm^4$
Izz =	725.8	2293.3	1518.5	7613.9	1903.3	2218.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	127906.2	mm^2
A_{RHM*}=	10725.8	mm2
A_{net} =	117180	mm^2
∑Iyy =	11454.4	$x10^6mm^4$
∑Izz =	16273.0	$x10^6mm^4$
Zbar=	407	mm
ybar=	533	mm

Geometry Comformance Checks

10.9.1.3 **Slenderness Ratio**

Member Classification = Primary Compression Member

Ly =	18796	mm	kyLy/ry =	60.1	< 120 therefore OK
Lz =	18796	mm	kzLz/rz =	50.4	< 120 therefore OK

10.9.2 **Width to Thickness Ratio**

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	558.8	w =	38.1	h/w =	14.7	OK
Flange	b =	762.0	t =	25.4	b/t =	30.0	OK
Flange Perforated	b =	762.0	t =	25.4	b/t =	30.0	OK

10.9.3 **Axial Compression Resistance**

Φs =	0.9	
A =	117180	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	312.7	mm
rz =	372.7	mm
λy =	0.801	
λz =	0.672	
Cry =	26604	kN
Crz =	29602	kN
Cr Min =	26604	kN

10.8.2 **Axial Tensile Resistance** ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	42529	kN
b)	Tr =	$\phi_u A_n F_u$	44997	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	38248	kN
		Tr Min =	38248	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Top Chord U_0-U_1 West (H) Compression Member

Drawing Location (1959)
E56 Top Chord Plan

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Angle**	**Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x7/16	30x1/2	38x1/2	38x1/2

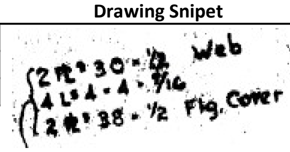
Flange Perfortion Width 10 in

Rivet dia. 1 in

Member Dimensions

Length =	9482	mm
Width =	965	mm
Depth =	787	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Designation	30x1/2	
Qty =	2	
w =	12.7	mm
h =	762	mm
A =	19354.8	mm^2
z Bar =	394	mm
RHM*	4	
RHM Area =	2580.6	mm^2

	Top Plate	**Bottom Plate**	
Designation	38x1/2	38x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	965.2	965.2	mm
b_{eff} =	965.2	711.2	mm
z Bar =	781.05	6.35	mm
A =	12258.04	12258.04	mm^2
A_{eff} =	12258.04	9032.24	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

Angle			
Location	Top	Bottom	
Designatio	4x4x7/16	4x4x7/16	
Qty =	2	2	mm
b =	101.6	101.6	mm
d =	101.6	101.6	mm
t =	11.1	11.1	mm^2
A =	2140	2140	mm
y =	29.6	29.6	mm
x =	29.6	29.6	mm
Z bar	745.1	42.3	mm
I_y =	2.09	2.09	$x10^6mm^4$
I_z =	2.09	2.09	$x10^6mm^4$
A_{angle} =	4280	4280	mm^2
RHM*	3	3	mm
RHM Area =	1693.5	1693.5	mm^2

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle Top	Angle Bottom	Web	Top Plate	Bot Plate	
Designation	4x4x7/16	4x4x7/16	30x1/2	38x1/2	38x1/2	
Qty=	2	2	2	1	1	
Iy =	4.2	4.2	936.5	0.2	0.1	$x10^6mm^4$
Iz =	4.18	4.18	0.3	951.6	95.2	$x10^6mm^4$
A =	4280.0	4280.0	19354.8	12258.0	9032.2	mm^2
dz =	326.0	376.8	25.4	362.0	412.7	mm^2
dy =	411	411	374.7	0.0	304.8	mm
Iyy =	459.1	611.8	949.0	1606.1	1538.8	$x10^6mm^4$
Izz =	725.8	725.8	2717.0	951.6	934.3	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	49205.1	mm^2
A_{RHM*}=	4919.3	mm2
A_{net} =	44286	mm^2
∑Iyy =	5164.8	$x10^6mm^4$
∑Izz =	6054.4	$x10^6mm^4$
Zbar=	419	mm
ybar=	483	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9482.3629	mm	kyLy/ry =	27.8	< 120 therefore OK
Lz =	9482.3629	mm	kzLz/rz =	25.6	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	12.7	h/w =	44.0	OK
Flange	b =	762.0	t =	12.7	b/t =	60.0	NG
Flange Perforated	b =	762.0	t =	12.7	b/t =	60.0	NG

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	44286	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	341.5	mm
rz =	369.7	mm
λy =	0.300	
λz =	0.277	
Cry =	8905	kN
Crz =	8954	kN
Cr Min =	8905	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	10751	kN
b)	Tr =	$\phi_u A_n F_u$	14526	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	12347	kN
		Tr Min =	10751	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Top Chord U_1-U_3 West Compression Member

Drawing Location (1959)
E56 Top Chord Plan

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	Top Angle	Bottom Angle	Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x7/16	8x6x9/16	30x11/16	38x11/16	42x5/8

Flange Perfortion Width 10 in
Rivet dia. 1 in

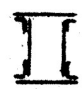
Member Dimensions

Length =	18871	mm
Width =	1067	mm
Depth =	795	mm

Drawing Snipet

2 Web PL^s 30 x 11/16
2 L^s 4 x 4 x 7/16 (Top)
2 L^s 8 x 6 x 9/16 (Bott)
1 Top Cover PL 38 x 11/16
1 Bott Cover PL 42 x 5/8

Member Cross-Section



Individual Member Properties

Web		
Designation	30x11/16	
Qty =	2	
w =	17.4625	mm
h =	762	mm
A =	26612.85	mm^2
z Bar =	397	mm
RHM*	4	
RHM Area =	3548.4	mm^2

	Top Plate	Bottom Plate	
Designation	38x11/16	42x5/8	
Qty =	1	1	
t =	17.4625	15.875	mm
b =	965.2	1066.8	mm
b_{eff} =	965.2	812.8	mm
z Bar =	786.60625	7.9375	mm
A =	16854.805	16935.45	mm^2
A_{eff} =	16854.805	12903.2	mm^2
RHM*	2	2	
RHM Area =	887.1	806.5	mm^2

Angle			
Location	Top	Bottom	
Designatio	4x4x7/16	8x6x9/16	
Qty =	2	2	mm
b =	101.6	152.4	mm
d =	101.6	203.2	mm
t =	11.1	14.3	mm^2
A =	2140	4880	mm
z =	29.6	63.4	mm
y =	29.6	37.9	mm
Z bar	748.275	79.275	mm
I_y =	2.09	20.4	$x10^6mm^4$
I_z =	2.09	9.94	$x10^6mm^4$
A_{angle} =	4280	9760	mm^2
RHM*	3	3	mm
RHM Area =	2177.8	1693.5	mm^2

RHM* = Rivet Holes/Member

Section Calculations

	Angle Top	Angle Bottom	Web	Top Plate	Bot Plate	
Designation	4x4x7/16	8x6x9/16	30x11/16	38x11/16	42x5/8	
Qty=	2	2	2	1	1	
Iy =	4.2	40.8	1287.7	0.4	0.3	$x10^6mm^4$
Iz =	4.18	19.88	0.7	1308.5	177.6	$x10^6mm^4$
A =	4280.0	9760.0	26612.9	16854.8	12903.2	mm^2
dz =	352.0	317.0	0.6	390.4	388.3	mm^2
dy =	411	419	372.3	0.0	330.2	mm
Iyy =	534.6	1021.3	1287.7	2569.0	1945.7	$x10^6mm^4$
Izz =	725.8	1732.5	3688.8	1308.5	1584.5	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	70410.9	mm^2
A_{RHM*}=	6129.0	mm2
A_{net} =	64282	mm^2
∑Iyy =	7358.3	$x10^6mm^4$
∑Izz =	9040.0	$x10^6mm^4$
Zbar=	396	mm
ybar=	533	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	18871.175	mm	kyLy/ry =	55.8	< 120 therefore OK
Lz =	18871.175	mm	kzLz/rz =	50.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	17.5	h/w =	32.0	OK
Flange	b =	762.0	t =	17.5	b/t =	43.6	OK
Flange Perforated	b =	762.0	t =	17.5	b/t =	43.6	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	64282	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	338.3	mm
rz =	375.0	mm
λy =	0.602	
λz =	0.543	
Cry =	11220	kN
Crz =	11651	kN
Cr Min =	11220	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	15385	kN
b)	Tr =	$\phi_u A_n F_u$	21084	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	17922	kN
		Tr Min =	15385	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

U3-U5 West Compression Member Drawing Location (1959)

E56 Top Chord Plan

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	Top Angle	Bottom Angle	Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x7/16	8x6x3/4	30x1	38x1	42x7/8

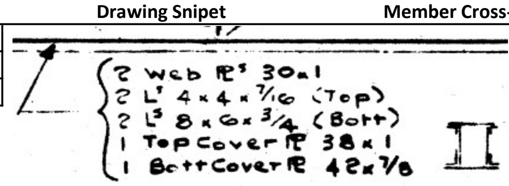
Flange Perfortion Width 10 in

Rivet dia. 1 in

Member Dimensions

Length =	18804	mm
Width =	1067	mm
Depth =	810	mm

Drawing Snipet **Member Cross-Section**



Individual Member Properties

Web		
Designation	30x1	
Qty =	2	
w =	25.4	mm
h =	762	mm
A =	38709.6	mm^2
z Bar =	403	mm
RHM*	4	
RHM Area =	5161.3	mm^2

Angle			
Location	Top	Bottom	
Designation	4x4x7/16	8x6x3/4	
Qty =	2	2	mm
b =	101.6	152.4	mm
d =	101.6	203.2	mm
t =	11.1	19.1	mm^2
A =	2140	6410	mm
z =	29.6	65.1	mm
y =	29.6	39.6	mm
Z bar	754.625	87.325	mm
I_y =	2.09	26.2	$x10^6mm^4$
I_z =	2.09	12.7	$x10^6mm^4$
A_{angle} =	4280	12820	mm^2
RHM*	3	3	mm
RHM Area =	2903.2	1693.5	mm^2

	Top Plate	Bottom Plate	
Designation	38x1	42x7/8	
Qty =	1	1	
t =	25.4	22.225	mm
b =	965.2	1066.8	mm
b_{eff} =	965.2	812.8	mm
z Bar =	796.925	11.1125	mm
A =	24516.08	23709.63	mm^2
A_{eff} =	24516.08	18064.48	mm^2
RHM*	2	2	
RHM Area =	1290.3	1129.0	mm^2

RHM* = Rivet Holes/Member

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JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle Top	Angle Bottom	Web	Top Plate	Bot Plate	
Designation	4x4x7/16	8x6x3/4	30x1	38x1	42x7/8	
Qty=	2	2	2	1	1	
Iy =	4.2	52.4	1873.0	1.3	0.7	$x10^6mm^4$
Iz =	4.18	25.4	2.1	1903.3	248.6	$x10^6mm^4$
A =	4280.0	12820.0	38709.6	24516.1	18064.5	mm^2
dz =	351.2	316.1	0.2	393.5	392.3	mm^2
dy =	411	421	368.3	0.0	330.2	mm
Iyy =	532.0	1333.6	1873.0	3796.8	2781.5	$x10^6mm^4$
Izz =	725.8	2293.3	5252.8	1903.3	2218.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	98390.2	mm^2
A_{RHM*}=	8145.1	mm2
A_{net} =	90245	mm^2
∑Iyy =	10317.0	$x10^6mm^4$
∑Izz =	12393.4	$x10^6mm^4$
Zbar=	403	mm
ybar=	533	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	18804.352	mm	kyLy/ry =	55.6	< 120 therefore OK
Lz =	18804.352	mm	kzLz/rz =	50.7	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	25.4	h/w =	22.0	OK
Flange	b =	762.0	t =	25.4	b/t =	30.0	OK
Flange Perforated	b =	762.0	t =	25.4	b/t =	30.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	90245	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	338.1	mm
rz =	370.6	mm
λy =	0.600	
λz =	0.548	
Cry =	15771	kN
Crz =	16312	kN
Cr Min =	15771	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	21498	kN
b)	Tr =	$\phi_u A_n F_u$	29600	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	25160	kN
		Tr Min =	21498	kN

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JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
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LIFT SPAN

U_5-U_5 West Compression Member Drawing Location (1959)

E56 Top Chord Plan

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

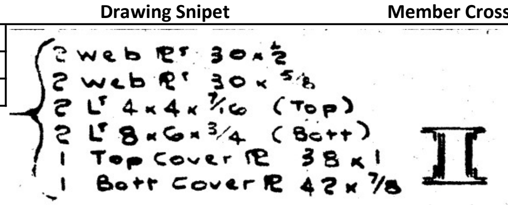
Built up Section Components

Member	Top Angle	Bottom Angle	Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x7/16	8x6x3/4	30x1.125	38x1	42x7/8

Flange Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	18796	mm
Width =	1067	mm
Depth =	810	mm



Individual Member Properties

Web		
Designation	30x1.125	
Qty =	2	
w =	28.575	mm
h =	762	mm
A =	43548.3	mm^2
z Bar =	403	mm
RHM*	4	
RHM Area =	5806.4	mm^2

Angle			
Location	Top	Bottom	
Designatio	4x4x7/16	8x6x3/4	
Qty =	2	2	mm
b =	101.6	152.4	mm
d =	101.6	203.2	mm
t =	11.1	19.1	mm^2
A =	2140	6410	mm
z =	29.6	65.1	mm
y =	29.6	39.6	mm
Z bar	754.625	87.325	mm
I_y =	2.09	26.2	$x10^6mm^4$
I_z =	2.09	12.7	$x10^6mm^4$
A_{angle} =	4280	12820	mm^2
RHM*	3	3	mm
RHM Area =	2903.2	1693.5	mm^2

	Top Plate	Bottom Plate	
Designation	38x1	42x7/8	
Qty =	1	1	
t =	25.4	22.225	mm
b =	965.2	1066.8	mm
b_{eff} =	965.2	812.8	mm
z Bar =	796.925	11.1125	mm
A =	24516.08	23709.63	mm^2
A_{eff} =	24516.08	18064.48	mm^2
RHM*	2	2	
RHM Area =	1290.3	1129.0	mm^2

RHM* = Rivet Holes/Member

Section Calculations

	Angle Top	Angle Bottom	Web	Top Plate	Bot Plate	
Designation	4x4x7/16	8x6x3/4	30x1.125	38x1	42x7/8	
Qty=	2	2	2	1	1	
Iy =	4.2	52.4	2107.2	1.3	0.7	$x10^6mm^4$
Iz =	4.18	25.4	3.0	1903.3	248.6	$x10^6mm^4$
A =	4280.0	12820.0	43548.3	24516.1	18064.5	mm^2
dz =	351.2	316.1	0.2	393.5	392.3	mm^2
dy =	411	421	366.7	0.0	330.2	mm
Iyy =	532.0	1333.5	2107.2	3797.0	2781.3	$x10^6mm^4$
Izz =	725.8	2293.3	5859.3	1903.3	2218.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	103228.9	mm^2
A_{RHM*}=	8790.3	mm2
A_{net} =	94439	mm^2
∑Iyy =	10551.1	$x10^6mm^4$
∑Izz =	12999.8	$x10^6mm^4$
Zbar=	403	mm
ybar=	533	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	18796	mm	kyLy/ry =	56.2	< 120 therefore OK
Lz =	18796	mm	kzLz/rz =	50.7	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	28.6	h/w =	19.6	OK
Flange	b =	762.0	t =	25.4	b/t =	30.0	OK
Flange Perforated	b =	762.0	t =	25.4	b/t =	30.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	94439	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	334.3	mm
rz =	371.0	mm
λy =	0.607	
λz =	0.547	
Cry =	16429	kN
Crz =	17079	kN
Cr Min =	16429	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	22556	kN
b)	Tr =	$\phi_u A_n F_u$	30976	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	26329	kN
		Tr Min =	22556	kN

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

LIFT SPAN

Vertical Member L_0-U_0 East Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-242-55 Steel Reference

F_u =	480	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	350	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	**Exterior Angle**	**Web Angles**	**Centre Web**	**Centre Web**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**2**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x3/4	5x5x3/4	13x3/4	23x7/8	23x1/2	27x1/2	27x1/2

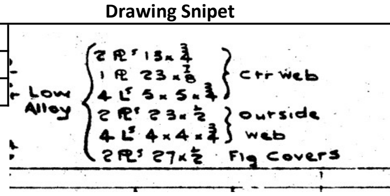
Ext. Web Perfortion Width 10 in

Rivet dia. 1 in

Member Dimensions

Length =	13259	mm
Width =	711	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x3/4	4x4x3/4	5x5x3/4	5x5x3/4		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	19.1	19.1	19.1	19.1	mm^2	
A =	3530	3530	4490	4490	mm	
z =	32.4	32.4	38.7	38.7	mm	Vert
y =	32.4	32.4	38.7	38.7	mm	Hori
Z bar	565	45.1	558	51.4	mm	
I_y =	3.24	3.24	6.57	6.57	$x10^6mm^4$	
I_z =	3.24	3.24	6.57	6.57	$x10^6mm^4$	
A_{angle} =	7060	7060	8980	8980	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	2903	2903	2903	2903	mm^2	

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	Top Plate	Bottom Plate	
Designation	27x1/2	27x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	685.8	685.8	mm
z Bar =	603.25	6.35	mm
A =	8709.66	8709.66	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web				
Location	Outside	Inside	Exterior	
Designation =	13x3/4	23x7/8	23x1/2	
Qty =	2	1	2	
w =	19.05	22.225	12.7	mm
h =	330.2	584.2	584.2	mm
h_{eff} =	330.2	584.2	330.2	mm
A =	12580.62	12983.845	14838.68	mm^2
A_{eff} =	12580.62	12983.845	8387.08	mm^2
z Bar =	305	305	305	mm
RHM*	4	4	4	
RHM Area =	3871.0	2258.1	2580.6	mm^2

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/4	4x4x3/4	5x5x3/4	5x5x3/4	
Qty=	2	2	2	2	
Iy =	6.5	6.5	13.1	13.1	$x10^6mm^4$
Iz =	6.48	6.48	13.14	13.14	$x10^6mm^4$
A =	7060	7060	8980	8980	mm^2
dz =	259.7	259.7	253.4	253.4	mm^2
dy =	311	311	68.9	68.9	mm
Iyy =	482.6	482.6	589.8	589.8	$x10^6mm^4$
Izz =	687.1	687.1	55.7	55.7	$x10^6mm^4$

	Outside	**Inside**	**Exterior**			
	Web	Web	Web	Top Plate	Bot Plate	
Designation	13x3/4	23x7/8	23x1/2	27x1/2	27x1/2	
Qty=	2	1	2	1	1	
Iy =	114.3	369.3	9.5	0.1	0.1	$x10^6mm^4$
Iz =	0.4	0.5	0.2	341.4	341.4	$x10^6mm^4$
A =	12580.6	12983.8	8387.1	8709.7	8709.7	mm^2
dz =	0.0	0.0	209.6	298.5	298.5	mm^2
dy =	20.6	0.0	349.3	0.0	0.0	mm
Iyy =	114.3	369.3	377.8	775.9	775.9	$x10^6mm^4$
Izz =	5.7	0.5	1023.2	341.4	341.4	$x10^6mm^4$

Composite Member Properties

A_{gross} =	83451	mm^2
A_{RHM*}=	21613	mm2
A_{net} =	61838	mm^2
∑Iyy =	4558.0	$x10^6mm^4$
∑Izz =	3197.9	$x10^6mm^4$
Zbar=	305	mm
ybar=	356	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
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Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	13258.8	mm	kyLy/ry =	48.8	< 120 therefore OK
Lz =	13258.8	mm	kzLz/rz =	58.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	381	w =	22.2	h/w =	17.1	OK
Flange	b =	482.6	t =	12.7	b/t =	38.0	NG
Flange Perforated	b =	482.6	t =	12.7	b/t =	38.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	61838	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	271.5	mm
rz =	227.4	mm
λy =	0.650	
λz =	0.776	
Cry =	15873	kN
Crz =	14340	kN
Cr Min =	14340	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	27747	kN
b)	Tr =	$\phi_u A_n F_u$	23746	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	20184	kN
		Tr Min =	20184	kN

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

LIFT SPAN

Vertical Member L_1-U_1 East (Bottom) Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel

			Reference
F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

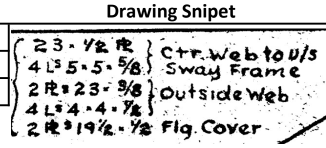
Built up Section Components

Member	**Exterior Angle**	**Web Angles**	**Centre Web**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	5x5x5/8	23x1/2	23x3/8	19.5x1/2	19.5x1/2
Ext. Web Perfortion Width		10	in			
Rivet dia.		1	in			

Member Dimensions

Length =	9560	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	12.7	12.7	15.9	15.9	mm^2	
A =	2430	2430	3790	3790	mm	
z =	30.2	30.2	37.6	37.6	mm	Vert
y =	30.2	30.2	37.6	37.6	mm	Hori
Z bar	567	42.9	559	50.3	mm	
I_y =	2.34	2.34	5.66	5.66	$x10^6 mm^4$	
I_z =	2.34	2.34	5.66	5.66	$x10^6 mm^4$	
A_{angle} =	4860	4860	7580	7580	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1935	1935	2419	2419	mm^2	

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

	Top Plate	Bottom Plate	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	305	305	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8	
Qty=	2	2	2	2	
Iy =	4.7	4.7	11.3	11.3	$x10^6mm^4$
Iz =	4.68	4.68	11.32	11.32	$x10^6mm^4$
A =	4860	4860	7580	7580	mm^2
dz =	261.9	261.9	254.5	254.5	mm^2
dy =	217	217	44.0	44.0	mm
Iyy =	338.0	338.0	502.3	502.3	$x10^6mm^4$
Izz =	234.5	234.5	26.0	26.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x1/2	19.5x1/2	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	0.1	128.6	128.6	$x10^6mm^4$
A =	7419.3	6290.3	6290.3	6290.3	mm^2
dz =	0.0	209.6	298.5	298.5	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.4	560.4	560.4	$x10^6mm^4$
Izz =	0.1	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	51170	mm^2
A_{RHM*}=	13226	mm2
A_{net} =	37944	mm^2
∑Iyy =	3295.8	$x10^6mm^4$
∑Izz =	1179.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9559.925	mm	kyLy/ry =	32.4	< 120 therefore OK
Lz =	9559.925	mm	kzLz/rz =	54.2	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	37944	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	294.7	mm
rz =	176.3	mm
λy =	0.350	
λz =	0.585	
Cry =	7520	kN
Crz =	6697	kN
Cr Min =	6697	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	11181	kN
b)	Tr =	$\phi_u A_n F_u$	12446	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	10579	kN
		Tr Min =	10579	kN

LIFT SPAN

Vertical Member L_1-U_1 East (Top) — Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel — Reference

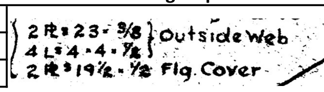
F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	23x3/8	19.5x1/2	19.5x1/2
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions | **Drawing Snipet** | **Member Cross-Section**

Length =	4961	mm
Width =	514	mm
Depth =	610	mm



Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x1/2	4x4x1/2		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	12.7	12.7	mm^2	
A =	2430	2430	mm	
z =	30.2	30.2	mm	Vert
y =	30.2	30.2	mm	Hori
Z bar	567	42.9	mm	
I_y =	2.34	2.34	$x10^6mm^4$	
I_z =	2.34	2.34	$x10^6mm^4$	
A_{angle} =	4860	4860	mm^2	
RHM*	3	3	mm	
RHM Area =	1935	1935	mm^2	

	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	305	mm
RHM*	4	
RHM Area =	1935.5	mm^2

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	
Designation	4x4x1/2	4x4x1/2	
Qty=	2	2	
Iy =	4.7	4.7	$x10^6mm^4$
Iz =	4.68	4.68	$x10^6mm^4$
A =	4860	4860	mm^2
dz =	261.9	261.9	mm^2
dy =	217	217	mm
Iyy =	338.0	338.0	$x10^6mm^4$
Izz =	234.5	234.5	$x10^6mm^4$

Location	**Exterior**			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x1/2	19.5x1/2	
Qty=	2	1	1	
Iy =	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	128.6	128.6	$x10^6mm^4$
A =	6290.3	6290.3	6290.3	mm^2
dz =	209.6	298.5	298.5	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	560.4	560.4	$x10^6mm^4$
Izz =	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties

A_{gross} =	28591	mm^2
A_{RHM*}=	7097	mm2
A_{net} =	21494	mm^2
∑Iyy =	2080.2	$x10^6mm^4$
∑Izz =	1127.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

`

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	4960.9375	mm	kyLy/ry =	15.9	< 120 therefore OK
Lz =	4960.9375	mm	kzLz/rz =	21.7	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	21494	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	311.1	mm
rz =	229.0	mm
λy =	0.172	
λz =	0.234	
Cry =	4420	kN
Crz =	4383	kN
Cr Min =	4383	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	6247	kN
b)	Tr =	$\phi_u A_n F_u$	7050	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5993	kN
		Tr Min =	5993	kN

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	DESIGNED BY		DATE	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_2-U_2 East (Bottom) Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

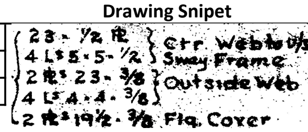
Built up Section Components

Member	**Exterior Angle**	**Web Angles**	**Centre Web**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	5x5x1/2	23x1/2	23x3/8	19.5x3/8	19.5x3/8
Ext. Web Perfortion Width	10	in				
Rivet dia.	1	in				

Member Dimensions

Length =	9562	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles								
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.				
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2				
Qty =	2	2	2	2	mm			
b =	101.6	101.6	127	127	mm	Hori		
d =	101.6	101.6	127	127	mm	Vert	1844.754	3064.51
t =	9.5	9.5	12.7	12.7	mm^2			
A =	1850	1850	3060	3060	mm			
z =	29	29	39.1	39.4	mm	Vert		
y =	29	29	39.1	39.1	mm	Hori		
Z bar	565	38.525	555	48.925	mm			
I_y =	1.84	1.84	4.68	4.68	$x10^6mm^4$			
I_z =	1.84	1.84	4.68	4.68	$x10^6mm^4$			
A_{angle} =	3700	3700	6120	6120	mm^2			
RHM*	3	3	3	3	mm			
RHM Area =	1452	1452	1935	1935	mm^2			

	Top Plate	Bottom Plate	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	302	302	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
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Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2	
Qty=	2	2	2	2	
Iy =	3.7	3.7	9.4	9.4	$x10^6mm^4$
Iz =	3.68	3.68	9.36	9.36	$x10^6mm^4$
A =	3700	3700	6120	6120	mm^2
dz =	263.1	263.1	253.0	252.7	mm^2
dy =	219	219	45.5	45.5	mm
Iyy =	259.7	259.9	401.0	400.3	$x10^6mm^4$
Izz =	180.6	180.6	22.0	22.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x3/8	19.5x3/8	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	0.1	96.4	96.4	$x10^6mm^4$
A =	7419.3	6290.3	4717.7	4717.7	mm^2
dz =	0.0	209.6	296.8	296.9	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.5	415.7	415.9	$x10^6mm^4$
Izz =	0.1	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties

A_{gross} =	42785	mm^2
A_{RHM*}=	10968	mm2
A_{net} =	31817	mm^2
∑Iyy =	2646.9	$x10^6mm^4$
∑Izz =	999.0	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9561.5125	mm	kyLy/ry =	33.2	< 120 therefore OK
Lz =	9561.5125	mm	kzLz/rz =	54.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	31817	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	288.4	mm
rz =	177.2	mm
λy =	0.358	
λz =	0.582	
Cry =	6290	kN
Crz =	5627	kN
Cr Min =	5627	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9349	kN
b)	Tr =	$\phi_u A_n F_u$	10436	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	8871	kN
		Tr Min =	8871	kN

AECOM Imagine it. Delivered.			
JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
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LIFT SPAN

Vertical Member L_2-U_2 East (Top) Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel

			Reference
F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

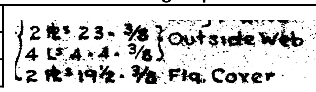
Built up Section Components

Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	23x3/8	19.5x3/8	19.5x3/8
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions

Length =	5801	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x3/8	4x4x3/8		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	9.5	9.5	mm^2	
A =	1850	1850	mm	
z =	29	29	mm	Vert
y =	29	29	mm	Hori
Z bar	565	38.525	mm	
I_y =	1.84	1.84	$x10^6mm^4$	
I_z =	1.84	1.84	$x10^6mm^4$	
A_{angle} =	3700	3700	mm^2	
RHM*	3	3	mm	
RHM Area =	1452	1452	mm^2	

1844.754

AECOM Imagine it. Delivered.			
JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

	Top Plate	**Bottom Plate**	
Designation =	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	302	mm
RHM*	4	
RHM Area =	1935.5	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations			
Angle			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x3/8	4x4x3/8	
Qty=	2	2	
Iy =	3.7	3.7	$x10^6mm^4$
Iz =	3.68	3.68	$x10^6mm^4$
A =	3700	3700	mm^2
dz =	263.1	263.1	mm^2
dy =	219	219	mm
Iyy =	259.8	259.8	$x10^6mm^4$
Izz =	180.6	180.6	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x3/8	19.5x3/8	
Qty=	2	1	1	
Iy =	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	96.4	96.4	$x10^6mm^4$
A =	6290.3	4717.7	4717.7	mm^2
dz =	209.6	296.9	296.9	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	415.8	415.8	$x10^6mm^4$
Izz =	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties		
A_{gross}=	23126	mm^2
A_{RHM*}=	5806	mm2
A_{net}=	17319	mm^2
∑Iyy =	1634.6	$x10^6mm^4$
∑Izz =	954.9	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	5800.725	mm	kyLy/ry =	18.9	< 120 therefore OK
Lz =	5800.725	mm	kzLz/rz =	24.7	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	17319	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	307.2	mm
rz =	234.8	mm
λy =	0.204	
λz =	0.267	
Cry =	3548	kN
Crz =	3510	kN
Cr Min =	3510	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	5053	kN
b)	Tr =	$\phi_u A_n F_u$	5681	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4829	kN
		Tr Min =	4829	kN

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_3-U_3 East (Bottom) Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	Exterior Angle	Web Angles	Centre Web	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	5x5x5/8	23x1/2	23x3/8	19.5x1/2	19.5x1/2

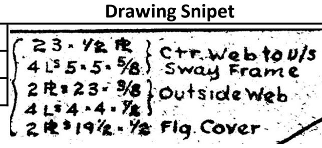
Ext. Web Perfortion Width 10 in

Rivet dia. 1 in

Member Dimensions

Length =	9558	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	12.7	12.7	15.9	15.9	mm^2	
A =	2430	2430	3790	3790	mm	
z =	30.2	30.2	37.6	37.6	mm	Vert
y =	30.2	30.2	37.6	37.6	mm	Hori
Z bar	567	42.9	559	50.3	mm	
I_y =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
I_z =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
A_{angle} =	4860	4860	7580	7580	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1935	1935	2419	2419	mm^2	

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	305	305	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

AECOM Imagine it. Delivered.			
JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8	
Qty=	2	2	2	2	
Iy =	4.7	4.7	11.3	11.3	$x10^6mm^4$
Iz =	4.68	4.68	11.32	11.32	$x10^6mm^4$
A =	4860	4860	7580	7580	mm^2
dz =	261.9	261.9	254.5	254.5	mm^2
dy =	217	217	44.0	44.0	mm
Iyy =	338.0	338.0	502.3	502.3	$x10^6mm^4$
Izz =	234.5	234.5	26.0	26.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x1/2	19.5x1/2	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	0.1	128.6	128.6	$x10^6mm^4$
A =	7419.3	6290.3	6290.3	6290.3	mm^2
dz =	0.0	209.6	298.5	298.5	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.4	560.4	560.4	$x10^6mm^4$
Izz =	0.1	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	51170	mm^2
A_{RHM*}=	13226	mm2
A_{net} =	37944	mm^2
∑Iyy =	3295.8	$x10^6mm^4$
∑Izz =	1179.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9558.3375	mm	kyLy/ry =	32.4	< 120 therefore OK
Lz =	9558.3375	mm	kzLz/rz =	54.2	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	37944	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	294.7	mm
rz =	176.3	mm
λy =	0.350	
λz =	0.585	
Cry =	7520	kN
Crz =	6698	kN
Cr Min =	6698	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	11181	kN
b)	Tr =	$\phi_u A_n F_u$	12446	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	10579	kN
		Tr Min =	10579	kN

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	DESIGNED BY		DATE	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_3-U_3 East (Top) — Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel — Reference

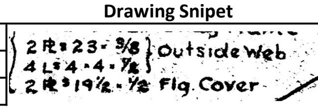
F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	23x3/8	19.5x1/2	19.5x1/2
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions | **Drawing Snipet** | **Member Cross-Section**

Length =	6645	mm
Width =	514	mm
Depth =	610	mm



Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x1/2	4x4x1/2		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	12.7	12.7	mm^2	
A =	2430	2430	mm	
z =	30.2	30.2	mm	Vert
y =	30.2	30.2	mm	Hori
Z bar	567	42.9	mm	
I_y =	2.34	2.34	$x10^6mm^4$	
I_z =	2.34	2.34	$x10^6mm^4$	
A_{angle} =	4860	4860	mm^2	
RHM*	3	3	mm	
RHM Area =	1935	1935	mm^2	

	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	305	mm
RHM*	4	
RHM Area =	1935.5	mm^2

Section Calculations			
Angle			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x1/2	4x4x1/2	
Qty=	2	2	
Iy =	4.7	4.7	$x10^6mm^4$
Iz =	4.68	4.68	$x10^6mm^4$
A =	4860	4860	mm^2
dz =	261.9	261.9	mm^2
dy =	217	217	mm
Iyy =	338.0	338.0	$x10^6mm^4$
Izz =	234.5	234.5	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x1/2	19.5x1/2	
Qty=	2	1	1	
Iy =	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	128.6	128.6	$x10^6mm^4$
A =	6290.3	6290.3	6290.3	mm^2
dz =	209.6	298.5	298.5	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	560.4	560.4	$x10^6mm^4$
Izz =	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	28591	mm^2
A_{RHM*}=	7097	mm2
A_{net} =	21494	mm^2
∑Iyy =	2080.2	$x10^6mm^4$
∑Izz =	1127.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	6645.275	mm	kyLy/ry =	21.4	< 120 therefore OK
Lz =	6645.275	mm	kzLz/rz =	29.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	21494	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	311.1	mm
rz =	229.0	mm
λy =	0.231	
λz =	0.313	
Cry =	4385	kN
Crz =	4307	kN
Cr Min =	4307	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	6247	kN
b)	Tr =	$\phi_u A_n F_u$	7050	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5993	kN
		Tr Min =	5993	kN

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_4-U_4 East (Bottom) Tension & Compression Member Drawing Location (1959)

E54 Sections of Lift Span

Material Properties: A-7 Steel Reference E59 Lift Span Top Chord

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

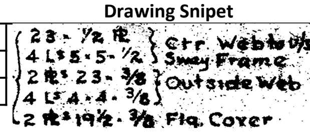
Member	Exterior Angle	Web Angles	Centre Web	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	5x5x1/2	23x1/2	23x3/8	19.5x3/8	19.5x3/8

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	9565	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles								
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.				
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2				
Qty =	2	2	2	2	mm			
b =	101.6	101.6	127	127	mm	Hori		
d =	101.6	101.6	127	127	mm	Vert	1844.754	3064.51
t =	9.5	9.5	12.7	12.7	mm^2			
A =	1850	1850	3060	3060	mm			
z =	29	29	39.1	39.4	mm	Vert		
y =	29	29	39.1	39.1	mm	Hori		
Z bar	565	38.525	555	48.925	mm			
I_y =	1.84	1.84	4.68	4.68	$x10^6mm^4$			
I_z =	1.84	1.84	4.68	4.68	$x10^6mm^4$			
A_{angle} =	3700	3700	6120	6120	mm^2			
RHM*	3	3	3	3	mm			
RHM Area =	1452	1452	1935	1935	mm^2			

	Top Plate	**Bottom Plate**	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	302	302	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations					
Angle					
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2	
Qty=	2	2	2	2	
Iy =	3.7	3.7	9.4	9.4	$x10^6mm^4$
Iz =	3.68	3.68	9.36	9.36	$x10^6mm^4$
A =	3700	3700	6120	6120	mm^2
dz =	263.1	263.1	253.0	252.7	mm^2
dy =	219	219	45.5	45.5	mm
Iyy =	259.7	259.9	401.0	400.3	$x10^6mm^4$
Izz =	180.6	180.6	22.0	22.0	$x10^6mm^4$

	Inside	Exterior			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x3/8	19.5x3/8	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	0.1	96.4	96.4	$x10^6mm^4$
A =	7419.3	6290.3	4717.7	4717.7	mm^2
dz =	0.0	209.6	296.8	296.9	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.5	415.7	415.9	$x10^6mm^4$
Izz =	0.1	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	42785	mm^2
A_{RHM*}=	10968	mm2
A_{net} =	31817	mm^2
∑Iyy =	2646.9	$x10^6mm^4$
∑Izz =	999.0	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9564.6875	mm	kyLy/ry =	33.2	< 120 therefore OK
Lz =	9564.6875	mm	kzLz/rz =	54.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	31817	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	288.4	mm
rz =	177.2	mm
λy =	0.358	
λz =	0.583	
Cry =	6289	kN
Crz =	5626	kN
Cr Min =	5626	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9349	kN
b)	Tr =	$\phi_u A_n F_u$	10436	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	8871	kN
		Tr Min =	8871	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_4-U_4 East (Top) — Tension & Compression Member

Drawing Location (1959)
E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

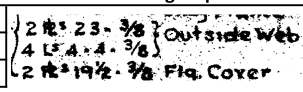
Built up Section Components

Member	Exterior Angle	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	23x3/8	19.5x3/8	19.5x3/8
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions

Length =	6920	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x3/8	4x4x3/8		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	9.5	9.5	mm^2	
A =	1850	1850	mm	
z =	29	29	mm	Vert
y =	29	29	mm	Hori
Z bar	565	38.525	mm	
I_y =	1.84	1.84	$x10^6 mm^4$	
I_z =	1.84	1.84	$x10^6 mm^4$	
A_{angle} =	3700	3700	mm^2	
RHM*	3	3	mm	
RHM Area =	1452	1452	mm^2	

1844.754 #REF!

	Top Plate	Bottom Plate	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	302	mm
RHM*	4	
RHM Area =	1935.5	mm^2

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations			
Angle			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x3/8	4x4x3/8	
Qty=	2	2	
Iy =	3.7	3.7	$x10^6mm^4$
Iz =	3.68	3.68	$x10^6mm^4$
A =	3700	3700	mm^2
dz =	263.1	263.1	mm^2
dy =	219	219	mm
Iyy =	259.8	259.8	$x10^6mm^4$
Izz =	180.6	180.6	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x3/8	19.5x3/8	
Qty=	2	1	1	
Iy =	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	96.4	96.4	$x10^6mm^4$
A =	6290.3	4717.7	4717.7	mm^2
dz =	209.6	296.9	296.9	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	415.8	415.8	$x10^6mm^4$
Izz =	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties		
A_{gross}=	23126	mm^2
A_{RHM*}=	5806	mm2
A_{net}=	17319	mm^2
∑Iyy =	1634.6	$x10^6mm^4$
∑Izz =	954.9	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	6919.9125	mm	kyLy/ry =	22.5	< 120 therefore OK
Lz =	6919.9125	mm	kzLz/rz =	29.5	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	17319	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	307.2	mm
rz =	234.8	mm
λy =	0.243	
λz =	0.318	
Cry =	3526	kN
Crz =	3466	kN
Cr Min =	3466	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	5053	kN
b)	Tr =	$\phi_u A_n F_u$	5681	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4829	kN
		Tr Min =	4829	kN

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	DESIGNED BY		DATE	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_5-U_5 East (Bottom) — Tension & Compression Member

Drawing Location (1959)

E54	Sections of Lift Span
E59	Lift Span Top Chord

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

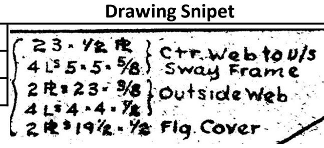
Member	Exterior Angle	Web Angles	Centre Web	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	5x5x5/8	23x1/2	23x3/8	19.5x1/2	19.5x1/2

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	9557	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	12.7	12.7	15.9	15.9	mm^2	
A =	2430	2430	3790	3790	mm	
z =	30.2	30.2	37.6	37.6	mm	Vert
y =	30.2	30.2	37.6	37.6	mm	Hori
Z bar	567	42.9	559	50.3	mm	
I_y =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
I_z =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
A_{angle} =	4860	4860	7580	7580	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1935	1935	2419	2419	mm^2	

AECOM Imagine it. Delivered.			
JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	305	305	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8	
Qty=	2	2	2	2	
Iy =	4.7	4.7	11.3	11.3	$x10^6mm^4$
Iz =	4.68	4.68	11.32	11.32	$x10^6mm^4$
A =	4860	4860	7580	7580	mm^2
dz =	261.9	261.9	254.5	254.5	mm^2
dy =	217	217	44.0	44.0	mm
Iyy =	338.0	338.0	502.3	502.3	$x10^6mm^4$
Izz =	234.5	234.5	26.0	26.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x1/2	19.5x1/2	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	0.1	128.6	128.6	$x10^6mm^4$
A =	7419.3	6290.3	6290.3	6290.3	mm^2
dz =	0.0	209.6	298.5	298.5	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.4	560.4	560.4	$x10^6mm^4$
Izz =	0.1	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties

A_{gross} =	51170	mm^2
A_{RHM*}=	13226	mm2
A_{net} =	37944	mm^2
∑Iyy =	3295.8	$x10^6mm^4$
∑Izz =	1179.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	DESIGNED BY		DATE	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9556.75	mm	kyLy/ry =	32.4	< 120 therefore OK
Lz =	9556.75	mm	kzLz/rz =	54.2	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	37944	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	294.7	mm
rz =	176.3	mm
λy =	0.350	
λz =	0.585	
Cry =	7520	kN
Crz =	6698	kN
Cr Min =	6698	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	11181	kN
b)	Tr =	$\phi_u A_n F_u$	12446	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	10579	kN
		Tr Min =	10579	kN

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

LIFT SPAN

Vertical Member L_5-U_5 East (Top) | Tension & Compression Member | Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel | Reference

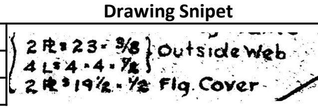
F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	23x3/8	19.5x1/2	19.5x1/2
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions | **Drawing Snipet** | **Member Cross-Section**

Length =	7207	mm
Width =	514	mm
Depth =	610	mm



Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x1/2	4x4x1/2		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	12.7	12.7	mm^2	
A =	2430	2430	mm	
z =	30.2	30.2	mm	Vert
y =	30.2	30.2	mm	Hori
Z bar	567	42.9	mm	
I_y =	2.34	2.34	$x10^6mm^4$	
I_z =	2.34	2.34	$x10^6mm^4$	
A_{angle} =	4860	4860	mm^2	
RHM*	3	3	mm	
RHM Area =	1935	1935	mm^2	

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JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
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	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	305	mm
RHM*	4	
RHM Area =	1935.5	mm^2

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations			
Angle			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x1/2	4x4x1/2	
Qty=	2	2	
Iy =	4.7	4.7	$x10^6 mm^4$
Iz =	4.68	4.68	$x10^6 mm^4$
A =	4860	4860	mm^2
dz =	261.9	261.9	mm^2
dy =	217	217	mm
Iyy =	338.0	338.0	$x10^6 mm^4$
Izz =	234.5	234.5	$x10^6 mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x1/2	19.5x1/2	
Qty=	2	1	1	
Iy =	7.1	0.1	0.1	$x10^6 mm^4$
Iz =	0.1	128.6	128.6	$x10^6 mm^4$
A =	6290.3	6290.3	6290.3	mm^2
dz =	209.6	298.5	298.5	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	560.4	560.4	$x10^6 mm^4$
Izz =	400.9	128.6	128.6	$x10^6 mm^4$

Composite Member Properties		
A_{gross} =	28591	mm^2
A_{RHM*}=	7097	mm2
A_{net} =	21494	mm^2
∑Iyy =	2080.2	$x10^6 mm^4$
∑Izz =	1127.0	$x10^6 mm^4$
Zbar=	305	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	7207.25	mm	kyLy/ry =	23.2	< 120 therefore OK
Lz =	7207.25	mm	kzLz/rz =	31.5	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	21494	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	311.1	mm
rz =	229.0	mm
λy =	0.250	
λz =	0.340	
Cry =	4370	kN
Crz =	4274	kN
Cr Min =	4274	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	6247	kN
b)	Tr =	$\phi_u A_n F_u$	7050	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5993	kN
		Tr Min =	5993	kN

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN	
	JOB NO.	60637587	CALCULATION NO.
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	ORIGINATOR BY	KG	DATE 30-Nov-20
	CHECKED BY	RA	DATE 16-Dec-20

LIFT SPAN

Vertical Member L_6-U_6 East (Bottom) — Tension & Compression Member

Drawing Location (1959)

E54	Sections of Lift Span
E59	Lift Span Top Chord

Material Properties: A-7 Steel

			Reference
F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

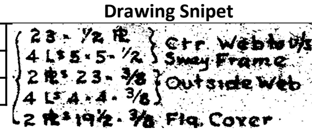
Member	Exterior Angle	Web Angles	Centre Web	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	5x5x1/2	23x1/2	23x3/8	19.5x3/8	19.5x3/8

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	9539	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles					
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2	
Qty =	2	2	2	2	mm
b =	101.6	101.6	127	127	mm
d =	101.6	101.6	127	127	mm
t =	9.5	9.5	12.7	12.7	mm^2
A =	1850	1850	3060	3060	mm
z =	29	29	39.1	39.4	mm
y =	29	29	39.1	39.1	mm
Z bar	565	38.525	555	48.925	mm
I_y =	1.84	1.84	4.68	4.68	$x10^6mm^4$
I_z =	1.84	1.84	4.68	4.68	$x10^6mm^4$
A_{angle} =	3700	3700	6120	6120	mm^2
RHM*	3	3	3	3	mm
RHM Area =	1452	1452	1935	1935	mm^2

	Top Plate	**Bottom Plate**	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	302	302	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2	
Qty=	2	2	2	2	
Iy =	3.7	3.7	9.4	9.4	$x10^6mm^4$
Iz =	3.68	3.68	9.36	9.36	$x10^6mm^4$
A =	3700	3700	6120	6120	mm^2
dz =	263.1	263.1	253.0	252.7	mm^2
dy =	219	219	45.5	45.5	mm
Iyy =	259.7	259.9	401.0	400.3	$x10^6mm^4$
Izz =	180.6	180.6	22.0	22.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x3/8	19.5x3/8	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	0.1	96.4	96.4	$x10^6mm^4$
A =	7419.3	6290.3	4717.7	4717.7	mm^2
dz =	0.0	209.6	296.8	296.9	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.5	415.7	415.9	$x10^6mm^4$
Izz =	0.1	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties

A_{gross} =	42785	mm^2
A_{RHM*}=	10968	mm2
A_{net} =	31817	mm^2
∑Iyy =	2646.9	$x10^6mm^4$
∑Izz =	999.0	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

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	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9539.3002	mm	kyLy/ry =	33.1	< 120 therefore OK
Lz =	9539.3002	mm	kzLz/rz =	53.8	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	31817	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	288.4	mm
rz =	177.2	mm
λy =	0.357	
λz =	0.581	
Cry =	6291	kN
Crz =	5632	kN
Cr Min =	5632	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9349	kN
b)	Tr =	$\phi_u A_n F_u$	10436	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	8871	kN
		Tr Min =	8871	kN

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

LIFT SPAN

Vertical Member L_6-U_6 East (Top)

Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel

			Reference
F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

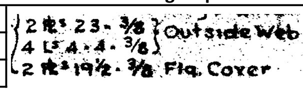
Built up Section Components

Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	23x3/8	19.5x3/8	19.5x3/8
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions

Length =	7225	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x3/8	4x4x3/8		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	9.5	9.5	mm^2	
A =	1850	1850	mm	
z =	29	29	mm	Vert
y =	29	29	mm	Hori
Z bar	565	38.525	mm	
I_y =	1.84	1.84	$x10^6mm^4$	
I_z =	1.84	1.84	$x10^6mm^4$	
A_{angle} =	3700	3700	mm^2	
RHM*	3	3	mm	
RHM Area =	1452	1452	mm^2	

	Top Plate	Bottom Plate	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	302	mm
RHM*	4	
RHM Area =	1935.5	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	
Designation	4x4x3/8	4x4x3/8	
Qty=	2	2	
Iy =	3.7	3.7	$x10^6 mm^4$
Iz =	3.68	3.68	$x10^6 mm^4$
A =	3700	3700	mm^2
dz =	263.1	263.1	mm^2
dy =	219	219	mm
Iyy =	259.8	259.8	$x10^6 mm^4$
Izz =	180.6	180.6	$x10^6 mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x3/8	19.5x3/8	
Qty=	2	1	1	
Iy =	7.1	0.0	0.0	$x10^6 mm^4$
Iz =	0.1	96.4	96.4	$x10^6 mm^4$
A =	6290.3	4717.7	4717.7	mm^2
dz =	209.6	296.9	296.9	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	415.8	415.8	$x10^6 mm^4$
Izz =	400.9	96.4	96.4	$x10^6 mm^4$

Composite Member Properties

A_{gross} =	23126	mm^2
A_{RHM*}=	5806	mm2
A_{net} =	17319	mm^2
∑Iyy =	1634.6	$x10^6 mm^4$
∑Izz =	954.9	$x10^6 mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	7224.6998	mm	kyLy/ry =	23.5	< 120 therefore OK
Lz =	7224.6998	mm	kzLz/rz =	30.8	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	17319	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	307.2	mm
rz =	234.8	mm
λy =	0.254	
λz =	0.332	
Cry =	3519	kN
Crz =	3452	kN
Cr Min =	3452	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	5053	kN
b)	Tr =	$\phi_u A_n F_u$	5681	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4829	kN
		Tr Min =	4829	kN

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

LIFT SPAN

Vertical Member L_0-U_0 East & West — Tension & Compression Member — Drawing Location (1959)

E54	Sections of Lift Span
E59	Lift Span Top Chord

Material Properties: A-242-55 Steel — Reference

F_u =	480	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

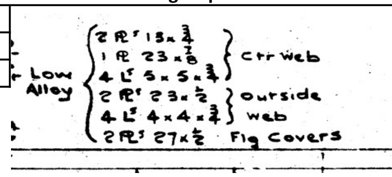
Member	Exterior Angle	Web Angles	Centre Web	Centre Web	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**4**	**2**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x3/4	5x5x3/4	13x3/4	23x7/8	23x1/2	27x1/2	27x1/2

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	13259	mm
Width =	711	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x3/4	4x4x3/4	5x5x3/4	5x5x3/4		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	19.1	19.1	19.1	19.1	mm^2	
A =	3530	3530	4490	4490	mm	
z =	32.4	32.4	38.7	38.7	mm	Vert
y =	32.4	32.4	38.7	38.7	mm	Hori
Z bar	565	45.1	558	51.4	mm	
I_y =	3.24	3.24	6.57	6.57	$x10^6 mm^4$	
I_z =	3.24	3.24	6.57	6.57	$x10^6 mm^4$	
A_{angle} =	7060	7060	8980	8980	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	2903	2903	2903	2903	mm^2	

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	Top Plate	**Bottom Plate**	
Designation	27x1/2	27x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	685.8	685.8	mm
z Bar =	603.25	6.35	mm
A =	8709.66	8709.66	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web				
Location	**Outside**	**Inside**	**Exterior**	
Designation =	13x3/4	23x7/8	23x1/2	
Qty =	2	1	2	
w =	19.05	22.225	12.7	mm
h =	330.2	584.2	584.2	mm
h_{eff} =	330.2	584.2	330.2	mm
A =	12580.62	12983.845	14838.68	mm^2
A_{eff} =	12580.62	12983.845	8387.08	mm^2
z Bar =	305	305	305	mm
RHM*	4	4	4	
RHM Area =	3871.0	2258.1	2580.6	mm^2

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/4	4x4x3/4	5x5x3/4	5x5x3/4	
Qty=	2	2	2	2	
Iy =	6.5	6.5	13.1	13.1	$x10^6mm^4$
Iz =	6.48	6.48	13.14	13.14	$x10^6mm^4$
A =	7060	7060	8980	8980	mm^2
dz =	259.7	259.7	253.4	253.4	mm^2
dy =	311	311	68.9	68.9	mm
Iyy =	482.6	482.6	589.8	589.8	$x10^6mm^4$
Izz =	687.1	687.1	55.7	55.7	$x10^6mm^4$

	Outside	**Inside**	**Exterior**			
	Web	Web	Web	Top Plate	Bot Plate	
Designation	13x3/4	23x7/8	23x1/2	27x1/2	27x1/2	
Qty=	2	1	2	1	1	
Iy =	114.3	369.3	9.5	0.1	0.1	$x10^6mm^4$
Iz =	0.4	0.5	0.2	341.4	341.4	$x10^6mm^4$
A =	12580.6	12983.8	8387.1	8709.7	8709.7	mm^2
dz =	0.0	0.0	209.6	298.5	298.5	mm^2
dy =	20.6	0.0	349.3	0.0	0.0	mm
Iyy =	114.3	369.3	377.8	775.9	775.9	$x10^6mm^4$
Izz =	5.7	0.5	1023.2	341.4	341.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	83451	mm^2
A_{RHM*}=	21613	mm2
A_{net} =	61838	mm^2
∑Iyy =	4558.0	$x10^6mm^4$
∑Izz =	3197.9	$x10^6mm^4$
Zbar=	305	mm
ybar=	356	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	13258.8	mm	kyLy/ry =	48.8	< 120 therefore OK
Lz =	13258.8	mm	kzLz/rz =	58.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	381	w =	22.2	h/w =	17.1	OK
Flange	b =	482.6	t =	12.7	b/t =	38.0	NG
Flange Perforated	b =	482.6	t =	12.7	b/t =	38.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	61838	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	271.5	mm
rz =	227.4	mm
λy =	0.650	
λz =	0.776	
Cry =	15873	kN
Crz =	14340	kN
Cr Min =	14340	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	27747	kN
b)	Tr =	$\phi_u A_n F_u$	23746	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	20184	kN
		Tr Min =	20184	kN

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JOB NO.	60637587	CALCULATION NO.	
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LIFT SPAN

Vertical Member L_1-U_1 West (Bottom) Tension & Compression Member

Drawing Location (1959)
E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

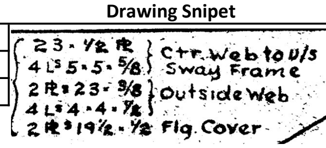
Built up Section Components

Member	**Exterior Angle**	**Web Angles**	**Centre Web**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	5x5x5/8	23x1/2	23x3/8	19.5x1/2	19.5x1/2
Ext. Web Perfortion Width		10	in			
Rivet dia.		1	in			

Member Dimensions

Length =	9560	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	12.7	12.7	15.9	15.9	mm^2	
A =	2430	2430	3790	3790	mm	
z =	30.2	30.2	37.6	37.6	mm	Vert
y =	30.2	30.2	37.6	37.6	mm	Hori
Z bar	567	42.9	559	50.3	mm	
I_y =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
I_z =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
A_{angle} =	4860	4860	7580	7580	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1935	1935	2419	2419	mm^2	

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JOB TITLE	BCLB DECK PRE-DESIGN		
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DESIGNED BY		DATE	
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	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	305	305	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

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JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8	
Qty=	2	2	2	2	
Iy =	4.7	4.7	11.3	11.3	$x10^6 mm^4$
Iz =	4.68	4.68	11.32	11.32	$x10^6 mm^4$
A =	4860	4860	7580	7580	mm^2
dz =	261.9	261.9	254.5	254.5	mm^2
dy =	217	217	44.0	44.0	mm
Iyy =	338.0	338.0	502.3	502.3	$x10^6 mm^4$
Izz =	234.5	234.5	26.0	26.0	$x10^6 mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x1/2	19.5x1/2	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.1	0.1	$x10^6 mm^4$
Iz =	0.1	0.1	128.6	128.6	$x10^6 mm^4$
A =	7419.3	6290.3	6290.3	6290.3	mm^2
dz =	0.0	209.6	298.5	298.5	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.4	560.4	560.4	$x10^6 mm^4$
Izz =	0.1	400.9	128.6	128.6	$x10^6 mm^4$

Composite Member Properties

A_{gross} =	51170	mm^2
A_{RHM*}=	13226	mm2
A_{net} =	37944	mm^2
∑Iyy =	3295.8	$x10^6 mm^4$
∑Izz =	1179.0	$x10^6 mm^4$
Zbar=	305	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9559.925	mm	kyLy/ry =	32.4	< 120 therefore OK
Lz =	9559.925	mm	kzLz/rz =	54.2	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	37944	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	294.7	mm
rz =	176.3	mm
λy =	0.350	
λz =	0.585	
Cry =	7520	kN
Crz =	6697	kN
Cr Min =	6697	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	11181	kN
b)	Tr =	$\phi_u A_n F_u$	12446	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	10579	kN
		Tr Min =	10579	kN

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_1-U_1 (Top) Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel

			Reference
F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

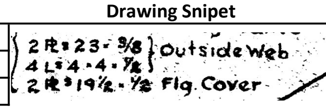
Built up Section Components

Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	23x3/8	19.5x1/2	19.5x1/2
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions

Length =	4961	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x1/2	4x4x1/2		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	12.7	12.7	mm^2	
A =	2430	2430	mm	
z =	30.2	30.2	mm	Vert
y =	30.2	30.2	mm	Hori
Z bar	567	42.9	mm	
I_y =	2.34	2.34	$x10^6mm^4$	
I_z =	2.34	2.34	$x10^6mm^4$	
A_{angle} =	4860	4860	mm^2	
RHM*	3	3	mm	
RHM Area =	1935	1935	mm^2	

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
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	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	305	mm
RHM*	4	
RHM Area =	1935.5	mm^2

Section Calculations			
	Angle		
Location	Exterior Top	Exterior Bottom	
Designation	4x4x1/2	4x4x1/2	
Qty=	2	2	
Iy =	4.7	4.7	$x10^6mm^4$
Iz =	4.68	4.68	$x10^6mm^4$
A =	4860	4860	mm^2
dz =	261.9	261.9	mm^2
dy =	217	217	mm
Iyy =	338.0	338.0	$x10^6mm^4$
Izz =	234.5	234.5	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x1/2	19.5x1/2	
Qty=	2	1	1	
Iy =	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	128.6	128.6	$x10^6mm^4$
A =	6290.3	6290.3	6290.3	mm^2
dz =	209.6	298.5	298.5	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	560.4	560.4	$x10^6mm^4$
Izz =	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	28591	mm^2
A_{RHM*}=	7097	mm2
A_{net} =	21494	mm^2
∑Iyy =	2080.2	$x10^6mm^4$
∑Izz =	1127.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	4960.9375	mm	kyLy/ry =	15.9	< 120 therefore OK
Lz =	4960.9375	mm	kzLz/rz =	21.7	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	21494	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	311.1	mm
rz =	229.0	mm
λy =	0.172	
λz =	0.234	
Cry =	4420	kN
Crz =	4383	kN
Cr Min =	4383	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	6247	kN
b)	Tr =	$\phi_u A_n F_u$	7050	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5993	kN
		Tr Min =	5993	kN

LIFT SPAN

Vertical Member L_2-U_2 (Bottom) — Tension & Compression Member

Drawing Location (1959)

E54	Sections of Lift Span
E59	Lift Span Top Chord

Material Properties: A-7 Steel

			Reference
F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

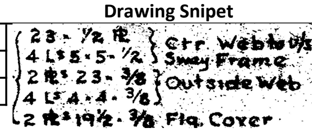
Member	Exterior Angle	Web Angles	Centre Web	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	5x5x1/2	23x1/2	23x3/8	19.5x3/8	19.5x3/8

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	9562	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	9.5	9.5	12.7	12.7	mm^2	
A =	1850	1850	3060	3060	mm	
z =	29	29	39.1	39.4	mm	Vert
y =	29	29	39.1	39.1	mm	Hori
Z bar	565	38.525	555	48.925	mm	
I_y =	1.84	1.84	4.68	4.68	$x10^6mm^4$	
I_z =	1.84	1.84	4.68	4.68	$x10^6mm^4$	
A_{angle} =	3700	3700	6120	6120	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1452	1452	1935	1935	mm^2	

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

	Top Plate	**Bottom Plate**	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	302	302	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2	
Qty=	2	2	2	2	
Iy =	3.7	3.7	9.4	9.4	$x10^6mm^4$
Iz =	3.68	3.68	9.36	9.36	$x10^6mm^4$
A =	3700	3700	6120	6120	mm^2
dz =	263.1	263.1	253.0	252.7	mm^2
dy =	219	219	45.5	45.5	mm
Iyy =	259.7	259.9	401.0	400.3	$x10^6mm^4$
Izz =	180.6	180.6	22.0	22.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x3/8	19.5x3/8	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	0.1	96.4	96.4	$x10^6mm^4$
A =	7419.3	6290.3	4717.7	4717.7	mm^2
dz =	0.0	209.6	296.8	296.9	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.5	415.7	415.9	$x10^6mm^4$
Izz =	0.1	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties

A_{gross} =	42785	mm^2
A_{RHM*}=	10968	mm2
A_{net} =	31817	mm^2
∑Iyy =	2646.9	$x10^6mm^4$
∑Izz =	999.0	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9561.5125	mm	kyLy/ry =	33.2	< 120 therefore OK
Lz =	9561.5125	mm	kzLz/rz =	54.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	31817	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	288.4	mm
rz =	177.2	mm
λy =	0.358	
λz =	0.582	
Cry =	6290	kN
Crz =	5627	kN
Cr Min =	5627	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9349	kN
b)	Tr =	$\phi_u A_n F_u$	10436	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	8871	kN
		Tr Min =	8871	kN

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_2-U_2 (Top)

Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel

Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	23x3/8	19.5x3/8	19.5x3/8

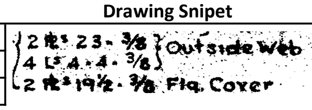
Ext. Web Perfortion Width 10 in

Rivet dia. 1 in

Member Dimensions

Length =	5801	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x3/8	4x4x3/8		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	9.5	9.5	mm^2	
A =	1850	1850	mm	
z =	29	29	mm	Vert
y =	29	29	mm	Hori
Z bar	565	38.525	mm	
I_y =	1.84	1.84	$x10^6 mm^4$	
I_z =	1.84	1.84	$x10^6 mm^4$	
A_{angle} =	3700	3700	mm^2	
RHM*	3	3	mm	
RHM Area =	1452	1452	mm^2	

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

	Top Plate	**Bottom Plate**	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	302	mm
RHM*	4	
RHM Area =	1935.5	mm^2

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN	
	JOB NO.	60637587	CALCULATION NO.
	DESIGNED BY		DATE
	ORIGINATOR BY	KG	DATE 30-Nov-20
	CHECKED BY	RA	DATE 16-Dec-20

Section Calculations			
Angle			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x3/8	4x4x3/8	
Qty=	2	2	
Iy =	3.7	3.7	$x10^6mm^4$
Iz =	3.68	3.68	$x10^6mm^4$
A =	3700	3700	mm^2
dz =	263.1	263.1	mm^2
dy =	219	219	mm
Iyy =	259.8	259.8	$x10^6mm^4$
Izz =	180.6	180.6	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x3/8	19.5x3/8	
Qty=	2	1	1	
Iy =	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	96.4	96.4	$x10^6mm^4$
A =	6290.3	4717.7	4717.7	mm^2
dz =	209.6	296.9	296.9	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	415.8	415.8	$x10^6mm^4$
Izz =	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	23126	mm^2
A_{RHM*}=	5806	mm2
A_{net} =	17319	mm^2
∑Iyy =	1634.6	$x10^6mm^4$
∑Izz =	954.9	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	5800.725	mm	kyLy/ry =	18.9	< 120 therefore OK
Lz =	5800.725	mm	kzLz/rz =	24.7	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	17319	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	307.2	mm
rz =	234.8	mm
λy =	0.204	
λz =	0.267	
Cry =	3548	kN
Crz =	3510	kN
Cr Min =	3510	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	5053	kN
b)	Tr =	$\phi_u A_n F_u$	5681	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4829	kN
		Tr Min =	4829	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_3-U_3 (Bottom) — Tension & Compression Member

Drawing Location (1959)
E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

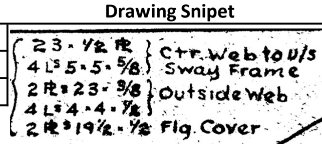
Member	**Exterior Angle**	**Web Angles**	**Centre Web**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	5x5x5/8	23x1/2	23x3/8	19.5x1/2	19.5x1/2

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	9558	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
	Angles					
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	12.7	12.7	15.9	15.9	mm^2	
A =	2430	2430	3790	3790	mm	
z =	30.2	30.2	37.6	37.6	mm	Vert
y =	30.2	30.2	37.6	37.6	mm	Hori
Z bar	567	42.9	559	50.3	mm	
I_y =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
I_z =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
A_{angle} =	4860	4860	7580	7580	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1935	1935	2419	2419	mm^2	

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	305	305	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8	
Qty=	2	2	2	2	
Iy =	4.7	4.7	11.3	11.3	$x10^6mm^4$
Iz =	4.68	4.68	11.32	11.32	$x10^6mm^4$
A =	4860	4860	7580	7580	mm^2
dz =	261.9	261.9	254.5	254.5	mm^2
dy =	217	217	44.0	44.0	mm
Iyy =	338.0	338.0	502.3	502.3	$x10^6mm^4$
Izz =	234.5	234.5	26.0	26.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x1/2	19.5x1/2	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	0.1	128.6	128.6	$x10^6mm^4$
A =	7419.3	6290.3	6290.3	6290.3	mm^2
dz =	0.0	209.6	298.5	298.5	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.4	560.4	560.4	$x10^6mm^4$
Izz =	0.1	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties

A_{gross} =	51170	mm^2
A_{RHM*}=	13226	mm2
A_{net} =	37944	mm^2
∑Iyy =	3295.8	$x10^6mm^4$
∑Izz =	1179.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9558.3375	mm	kyLy/ry =	32.4	< 120 therefore OK
Lz =	9558.3375	mm	kzLz/rz =	54.2	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	37944	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	294.7	mm
rz =	176.3	mm
λy =	0.350	
λz =	0.585	
Cry =	7520	kN
Crz =	6698	kN
Cr Min =	6698	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	11181	kN
b)	Tr =	$\phi_u A_n F_u$	12446	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	10579	kN
		Tr Min =	10579	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_3-U_3 (Top)

Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel

Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

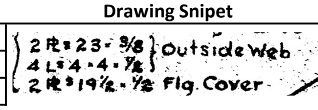
Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	23x3/8	19.5x1/2	19.5x1/2

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	6645	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x1/2	4x4x1/2	
Qty =	2	2	mm
b =	101.6	101.6	mm
d =	101.6	101.6	mm
t =	12.7	12.7	mm^2
A =	2430	2430	mm
z =	30.2	30.2	mm
y =	30.2	30.2	mm
Z bar	567	42.9	mm
I_y =	2.34	2.34	$x10^6mm^4$
I_z =	2.34	2.34	$x10^6mm^4$
A_{angle} =	4860	4860	mm^2
RHM*	3	3	mm
RHM Area =	1935	1935	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN				
JOB NO.	60637587	CALCULATION NO.			
DESIGNED BY		DATE			
ORIGINATOR BY	KG	DATE	30-Nov-20		
CHECKED BY	RA	DATE	16-Dec-20		

	Top Plate	Bottom Plate	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	305	mm
RHM*	4	
RHM Area =	1935.5	mm^2

Section Calculations			
Angle			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x1/2	4x4x1/2	
Qty=	2	2	
Iy =	4.7	4.7	$x10^6mm^4$
Iz =	4.68	4.68	$x10^6mm^4$
A =	4860	4860	mm^2
dz =	261.9	261.9	mm^2
dy =	217	217	mm
Iyy =	338.0	338.0	$x10^6mm^4$
Izz =	234.5	234.5	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x1/2	19.5x1/2	
Qty=	2	1	1	
Iy =	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	128.6	128.6	$x10^6mm^4$
A =	6290.3	6290.3	6290.3	mm^2
dz =	209.6	298.5	298.5	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	560.4	560.4	$x10^6mm^4$
Izz =	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	28591	mm^2
A_{RHM*}=	7097	mm2
A_{net} =	21494	mm^2
∑Iyy =	2080.2	$x10^6mm^4$
∑Izz =	1127.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	6645.275	mm	kyLy/ry =	21.4	< 120 therefore OK
Lz =	6645.275	mm	kzLz/rz =	29.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	21494	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	311.1	mm
rz =	229.0	mm
λy =	0.231	
λz =	0.313	
Cry =	4385	kN
Crz =	4307	kN
Cr Min =	4307	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	6247	kN
b)	Tr =	$\phi_u A_n F_u$	7050	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5993	kN
		Tr Min =	5993	kN

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	CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_4-U_4 (Bottom)

Tension & Compression Member

Drawing Location (1959)

E54	Sections of Lift Span
E59	Lift Span Top Chord

Material Properties: A-7 Steel

Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

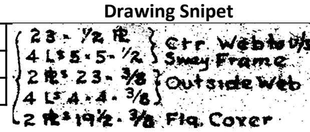
Member	**Exterior Angle**	**Web Angles**	**Centre Web**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	5x5x1/2	23x1/2	23x3/8	19.5x3/8	19.5x3/8

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	9565	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	9.5	9.5	12.7	12.7	mm^2	
A =	1850	1850	3060	3060	mm	
z =	29	29	39.1	39.4	mm	Vert
y =	29	29	39.1	39.1	mm	Hori
Z bar	565	38.525	555	48.925	mm	
I_y =	1.84	1.84	4.68	4.68	$x10^6mm^4$	
I_z =	1.84	1.84	4.68	4.68	$x10^6mm^4$	
A_{angle} =	3700	3700	6120	6120	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1452	1452	1935	1935	mm^2	

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	Top Plate	Bottom Plate	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	302	302	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

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Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2	
Qty=	2	2	2	2	
Iy =	3.7	3.7	9.4	9.4	$x10^6mm^4$
Iz =	3.68	3.68	9.36	9.36	$x10^6mm^4$
A =	3700	3700	6120	6120	mm^2
dz =	263.1	263.1	253.0	252.7	mm^2
dy =	219	219	45.5	45.5	mm
Iyy =	259.7	259.9	401.0	400.3	$x10^6mm^4$
Izz =	180.6	180.6	22.0	22.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x3/8	19.5x3/8	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	0.1	96.4	96.4	$x10^6mm^4$
A =	7419.3	6290.3	4717.7	4717.7	mm^2
dz =	0.0	209.6	296.8	296.9	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.5	415.7	415.9	$x10^6mm^4$
Izz =	0.1	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties

A_{gross} =	42785	mm^2
A_{RHM*}=	10968	mm2
A_{net} =	31817	mm^2
∑Iyy =	2646.9	$x10^6mm^4$
∑Izz =	999.0	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9564.6875	mm	kyLy/ry =	33.2	< 120 therefore OK
Lz =	9564.6875	mm	kzLz/rz =	54.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	31817	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	288.4	mm
rz =	177.2	mm
λy =	0.358	
λz =	0.583	
Cry =	6289	kN
Crz =	5626	kN
Cr Min =	5626	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9349	kN
b)	Tr =	$\phi_u A_n F_u$	10436	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	8871	kN
		Tr Min =	8871	kN

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LIFT SPAN

Vertical Member L_4-U_4 (Top) — Tension & Compression Member

Drawing Location (1959)
E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

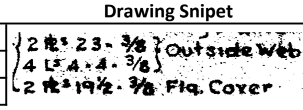
Built up Section Components

Member	Exterior Angle	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	23x3/8	19.5x3/8	19.5x3/8
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions

Length =	6920	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles				
Location	Exterior Top	Exterior Bottom		
Designation	4x4x3/8	4x4x3/8		
Qty =	2	2	mm	
b =	101.6	101.6	mm	Hori
d =	101.6	101.6	mm	Vert
t =	9.5	9.5	mm^2	
A =	1850	1850	mm	
z =	29	29	mm	Vert
y =	29	29	mm	Hori
Z bar	565	38.525	mm	
I_y =	1.84	1.84	$x10^6 mm^4$	
I_z =	1.84	1.84	$x10^6 mm^4$	
A_{angle} =	3700	3700	mm^2	
RHM*	3	3	mm	
RHM Area =	1452	1452	mm^2	

	Top Plate	**Bottom Plate**	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	302	mm
RHM*	4	
RHM Area =	1935.5	mm^2

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Section Calculations			
Angle			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x3/8	4x4x3/8	
Qty=	2	2	
Iy =	3.7	3.7	$x10^6mm^4$
Iz =	3.68	3.68	$x10^6mm^4$
A =	3700	3700	mm^2
dz =	263.1	263.1	mm^2
dy =	219	219	mm
Iyy =	259.8	259.8	$x10^6mm^4$
Izz =	180.6	180.6	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x3/8	19.5x3/8	
Qty=	2	1	1	
Iy =	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	96.4	96.4	$x10^6mm^4$
A =	6290.3	4717.7	4717.7	mm^2
dz =	209.6	296.9	296.9	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	415.8	415.8	$x10^6mm^4$
Izz =	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	23126	mm^2
A_{RHM*}=	5806	mm2
A_{net} =	17319	mm^2
∑Iyy =	1634.6	$x10^6mm^4$
∑Izz =	954.9	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	6919.9125	mm	kyLy/ry =	22.5	< 120 therefore OK
Lz =	6919.9125	mm	kzLz/rz =	29.5	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	17319	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	307.2	mm
rz =	234.8	mm
λy =	0.243	
λz =	0.318	
Cry =	3526	kN
Crz =	3466	kN
Cr Min =	3466	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	5053	kN
b)	Tr =	$\phi_u A_n F_u$	5681	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4829	kN
		Tr Min =	4829	kN

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JOB TITLE	BCLB DECK PRE-DESIGN		
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LIFT SPAN

Vertical Member L_5-U_5 (Bottom) Tension & Compression Member

Drawing Location (1959)
E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

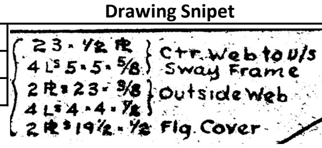
Built up Section Components

Member	**Exterior Angle**	**Web Angles**	**Centre Web**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	5x5x5/8	23x1/2	23x3/8	19.5x1/2	19.5x1/2
Ext. Web Perfortion Width		10	in			
Rivet dia.		1	in			

Member Dimensions

Length =	9557	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	12.7	12.7	15.9	15.9	mm^2	
A =	2430	2430	3790	3790	mm	
z =	30.2	30.2	37.6	37.6	mm	Vert
y =	30.2	30.2	37.6	37.6	mm	Hori
Z bar	567	42.9	559	50.3	mm	
I_y =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
I_z =	2.34	2.34	5.66	5.66	$x10^6mm^4$	
A_{angle} =	4860	4860	7580	7580	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1935	1935	2419	2419	mm^2	

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	Top Plate	**Bottom Plate**	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	305	305	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x1/2	4x4x1/2	5x5x5/8	5x5x5/8	
Qty=	2	2	2	2	
Iy =	4.7	4.7	11.3	11.3	$x10^6mm^4$
Iz =	4.68	4.68	11.32	11.32	$x10^6mm^4$
A =	4860	4860	7580	7580	mm^2
dz =	261.9	261.9	254.5	254.5	mm^2
dy =	217	217	44.0	44.0	mm
Iyy =	338.0	338.0	502.3	502.3	$x10^6mm^4$
Izz =	234.5	234.5	26.0	26.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x1/2	19.5x1/2	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	0.1	128.6	128.6	$x10^6mm^4$
A =	7419.3	6290.3	6290.3	6290.3	mm^2
dz =	0.0	209.6	298.5	298.5	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.4	560.4	560.4	$x10^6mm^4$
Izz =	0.1	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties

A_{gross} =	51170	mm^2
A_{RHM*}=	13226	mm2
A_{net} =	37944	mm^2
∑Iyy =	3295.8	$x10^6mm^4$
∑Izz =	1179.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	DESIGNED BY		DATE	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9556.75	mm	kyLy/ry =	32.4	< 120 therefore OK
Lz =	9556.75	mm	kzLz/rz =	54.2	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	37944	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	294.7	mm
rz =	176.3	mm
λy =	0.350	
λz =	0.585	
Cry =	7520	kN
Crz =	6698	kN
Cr Min =	6698	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	11181	kN
b)	Tr =	$\phi_u A_n F_u$	12446	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	10579	kN
		Tr Min =	10579	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_5-U_5 (Top)

Tension & Compression Member

Drawing Location (1959)

E54 Sections of Lift Span

E59 Lift Span Top Chord

Material Properties: A-7 Steel

Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

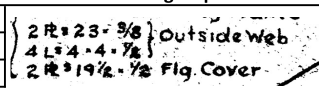
Built up Section Components

Member	Exterior Angle	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x1/2	23x3/8	19.5x1/2	19.5x1/2
Ext. Web Perfortion Width		10	in	
Rivet dia.		1	in	

Member Dimensions

Length =	7207	mm
Width =	514	mm
Depth =	610	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x1/2	4x4x1/2	
Qty =	2	2	mm
b =	101.6	101.6	mm
d =	101.6	101.6	mm
t =	12.7	12.7	mm^2
A =	2430	2430	mm
z =	30.2	30.2	mm
y =	30.2	30.2	mm
Z bar	567	42.9	mm
I_y =	2.34	2.34	$x10^6mm^4$
I_z =	2.34	2.34	$x10^6mm^4$
A_{angle} =	4860	4860	mm^2
RHM*	3	3	mm
RHM Area =	1935	1935	mm^2

	Top Plate	Bottom Plate	
Designation	19.5x1/2	19.5x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	495.3	495.3	mm
z Bar =	603.25	6.35	mm
A =	6290.31	6290.31	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Exterior**	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	305	mm
RHM*	4	
RHM Area =	1935.5	mm^2

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JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	
Designation	4x4x1/2	4x4x1/2	
Qty=	2	2	
Iy =	4.7	4.7	$x10^6mm^4$
Iz =	4.68	4.68	$x10^6mm^4$
A =	4860	4860	mm^2
dz =	261.9	261.9	mm^2
dy =	217	217	mm
Iyy =	338.0	338.0	$x10^6mm^4$
Izz =	234.5	234.5	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x1/2	19.5x1/2	
Qty=	2	1	1	
Iy =	7.1	0.1	0.1	$x10^6mm^4$
Iz =	0.1	128.6	128.6	$x10^6mm^4$
A =	6290.3	6290.3	6290.3	mm^2
dz =	209.6	298.5	298.5	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	560.4	560.4	$x10^6mm^4$
Izz =	400.9	128.6	128.6	$x10^6mm^4$

Composite Member Properties

A_{gross} =	28591	mm^2
A_{RHM*}=	7097	mm2
A_{net} =	21494	mm^2
∑Iyy =	2080.2	$x10^6mm^4$
∑Izz =	1127.0	$x10^6mm^4$
Zbar=	305	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	7207.25	mm	kyLy/ry =	23.2	< 120 therefore OK
Lz =	7207.25	mm	kzLz/rz =	31.5	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	12.7	b/t =	23.0	OK
Flange Perforated	b =	292.1	t =	12.7	b/t =	23.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	21494	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	311.1	mm
rz =	229.0	mm
λy =	0.250	
λz =	0.340	
Cry =	4370	kN
Crz =	4274	kN
Cr Min =	4274	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	6247	kN
b)	Tr =	$\phi_u A_n F_u$	7050	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5993	kN
		Tr Min =	5993	kN

LIFT SPAN

Vertical Member L_6-U_6 (Bottom) Tension & Compression Member

Drawing Location (1959)
E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

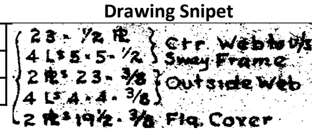
Member	Exterior Angle	Web Angles	Centre Web	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**4**	**1**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	5x5x1/2	23x1/2	23x3/8	19.5x3/8	19.5x3/8

Ext. Web Perfortion Width 10 in
Rivet dia. 1 in

Member Dimensions

Length =	9539	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	127	127	mm	Hori
d =	101.6	101.6	127	127	mm	Vert
t =	9.5	9.5	12.7	12.7	mm^2	
A =	1850	1850	3060	3060	mm	
z =	29	29	39.1	39.4	mm	Vert
y =	29	29	39.1	39.1	mm	Hori
Z bar	565	38.525	555	48.925	mm	
I_y =	1.84	1.84	4.68	4.68	$x10^6mm^4$	
I_z =	1.84	1.84	4.68	4.68	$x10^6mm^4$	
A_{angle} =	3700	3700	6120	6120	mm^2	
RHM*	3	3	3	3	mm	
RHM Area =	1452	1452	1935	1935	mm^2	

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	Top Plate	Bottom Plate	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web			
Location	**Inside**	**Exterior**	
Designation =	23x1/2	23x3/8	
Qty =	1	2	
w =	12.7	9.525	mm
h =	584.2	584.2	mm
h_{eff} =	584.2	330.2	mm
A =	7419.34	11129.01	mm^2
A_{eff} =	7419.34	6290.31	mm^2
z Bar =	302	302	mm
RHM*	4	4	
RHM Area =	1290.3	1935.5	mm^2

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x4x3/8	4x4x3/8	5x5x1/2	5x5x1/2	
Qty=	2	2	2	2	
Iy =	3.7	3.7	9.4	9.4	$x10^6mm^4$
Iz =	3.68	3.68	9.36	9.36	$x10^6mm^4$
A =	3700	3700	6120	6120	mm^2
dz =	263.1	263.1	253.0	252.7	mm^2
dy =	219	219	45.5	45.5	mm
Iyy =	259.7	259.9	401.0	400.3	$x10^6mm^4$
Izz =	180.6	180.6	22.0	22.0	$x10^6mm^4$

	Inside	**Exterior**			
	Web	Web	Top Plate	Bot Plate	
Designation	23x1/2	23x3/8	19.5x3/8	19.5x3/8	
Qty=	1	2	1	1	
Iy =	211.0	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	0.1	96.4	96.4	$x10^6mm^4$
A =	7419.3	6290.3	4717.7	4717.7	mm^2
dz =	0.0	209.6	296.8	296.9	mm^2
dy =	0.0	252.4	0.0	0.0	mm
Iyy =	211.0	283.5	415.7	415.9	$x10^6mm^4$
Izz =	0.1	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	42785	mm^2
A_{RHM*}=	10968	mm2
A_{net} =	31817	mm^2
∑Iyy =	2646.9	$x10^6mm^4$
∑Izz =	999.0	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
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DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9539.2875	mm	kyLy/ry =	33.1	< 120 therefore OK
Lz =	9539.2875	mm	kzLz/rz =	53.8	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	12.7	h/w =	30.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	31817	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	288.4	mm
rz =	177.2	mm
λy =	0.357	
λz =	0.581	
Cry =	6291	kN
Crz =	5632	kN
Cr Min =	5632	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9349	kN
b)	Tr =	$\phi_u A_n F_u$	10436	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	8871	kN
		Tr Min =	8871	kN

	JOB TITLE	BCLB DECK PRE-DESIGN		
AECOM Imagine it. Delivered.	JOB NO.	60637587	CALCULATION NO.	
	DESIGNED BY		DATE	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Vertical Member L_6-U_6 (Top) Tension & Compression Member

Drawing Location (1959)
E54 Sections of Lift Span
E59 Lift Span Top Chord

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

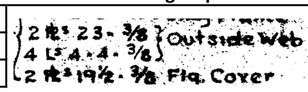
Member	**Exterior Angle**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	23x3/8	19.5x3/8	19.5x3/8

Ext. Web Perfortion Width	10	in
Rivet dia.	1	in

Member Dimensions

Length =	7225	mm
Width =	514	mm
Depth =	603	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles			
Location	Exterior Top	Exterior Bottom	
Designation	4x4x3/8	4x4x3/8	
Qty =	2	2	mm
b =	101.6	101.6	mm
d =	101.6	101.6	mm
t =	9.5	9.5	mm^2
A =	1850	1850	mm
z =	29	29	mm
y =	29	29	mm
Z bar	565	38.525	mm
I_y =	1.84	1.84	$x10^6 mm^4$
I_z =	1.84	1.84	$x10^6 mm^4$
A_{angle} =	3700	3700	mm^2
RHM*	3	3	mm
RHM Area =	1452	1452	mm^2

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JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

	Top Plate	Bottom Plate	
Designation	19.5x3/8	19.5x3/8	
Qty =	1	1	
t =	9.525	9.525	mm
b =	495.3	495.3	mm
z Bar =	598.4875	4.7625	mm
A =	4717.73	4717.73	mm^2
RHM*	2	2	
RHM Area =	483.9	483.9	mm^2

RHM* = Rivet Holes/Member

Web		
Location	Exterior	
Designation =	23x3/8	
Qty =	2	
w =	9.525	mm
h =	584.2	mm
h_{eff} =	330.2	mm
A =	11129.01	mm^2
A_{eff} =	6290.31	mm^2
z Bar =	302	mm
RHM*	4	
RHM Area =	1935.5	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	
Designation	4x4x3/8	4x4x3/8	
Qty=	2	2	
Iy =	3.7	3.7	$x10^6mm^4$
Iz =	3.68	3.68	$x10^6mm^4$
A =	3700	3700	mm^2
dz =	263.1	263.1	mm^2
dy =	219	219	mm
Iyy =	259.8	259.8	$x10^6mm^4$
Izz =	180.6	180.6	$x10^6mm^4$

	Exterior			
	Web	Top Plate	Bot Plate	
Designation	23x3/8	19.5x3/8	19.5x3/8	
Qty=	2	1	1	
Iy =	7.1	0.0	0.0	$x10^6mm^4$
Iz =	0.1	96.4	96.4	$x10^6mm^4$
A =	6290.3	4717.7	4717.7	mm^2
dz =	209.6	296.9	296.9	mm^2
dy =	252.4	0.0	0.0	mm
Iyy =	283.4	415.8	415.8	$x10^6mm^4$
Izz =	400.9	96.4	96.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	23126	mm^2
A_{RHM*}=	5806	mm2
A_{net} =	17319	mm^2
∑Iyy =	1634.6	$x10^6mm^4$
∑Izz =	954.9	$x10^6mm^4$
Zbar=	302	mm
ybar=	257	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	7224.7125	mm	kyLy/ry =	23.5	< 120 therefore OK
Lz =	7224.7125	mm	kzLz/rz =	30.8	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	381	w =	9.5	h/w =	40.0	OK
Flange	b =	292.1	t =	9.5	b/t =	30.7	OK
Flange Perforated	b =	292.1	t =	9.5	b/t =	30.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	17319	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	307.2	mm
rz =	234.8	mm
λy =	0.254	
λz =	0.332	
Cry =	3519	kN
Crz =	3452	kN
Cr Min =	3452	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	5053	kN
b)	Tr =	$\phi_u A_n F_u$	5681	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4829	kN
		Tr Min =	4829	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Diagonal Member L_0-U_1 East (R) Compression Member

Drawing Location (1959)
E54 Sections of Lift Span Trusses

Material Properties: A-242-55 Steel

			Reference
F_u =	480	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

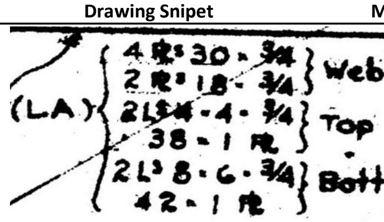
Member	Top Angle	Bottom Angle	Web	Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x3/4	8x6x3/4	18x3/4	30x1.5	38x1	42x1

Flange Perfortion Width	14	in
Rivet dia.	1	in

Member Dimensions

Length =	9231	mm
Width =	1067	mm
Depth =	813	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

	Web		
	Outside	**Inside**	
Designation	18x3/4	30x1.5	
Qty =	2	2	
w =	19.05	38.1	mm
h =	457.2	762	mm
A =	17419.32	58064.4	mm^2
z Bar =	457	406	mm
RHM*	4	4	
RHM Area =	3871.0	7741.9	mm^2

	Top Plate	Bottom Plate	
Designation	38x1	42x1	
Qty =	1	1	
t =	25.4	25.4	mm
b =	965.2	1066.8	mm
b_{eff} =	965.2	711.2	mm
z Bar =	800.1	12.7	mm
A =	24516.08	27096.72	mm^2
A_{eff} =	24516.08	18064.48	mm^2
RHM*	2	2	
RHM Area =	1290.3	1290.3	mm^2

Angle			
Location	Top	Bottom	
Designatio	4x4x3/4	8x6x3/4	
Qty =	2	2	mm
b =	101.6	152.4	mm
d =	101.6	203.2	mm
t =	19.1	19.1	mm^2
A =	3530	6410	mm
z =	32.4	65.1	mm
y =	32.4	39.6	mm
Z bar	755	90.5	mm
I_y =	3.24	26.2	$x10^6 mm^4$
I_z =	3.24	12.7	$x10^6 mm^4$
A_{angle} =	7060	12820	mm^2
RHM*	3	3	mm
RHM Area =	2903	2903	mm^2

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle Top	Angle Bottom	Web	Web	Top Plate	Bot Plate	
Designation	4x4x3/4	8x6x3/4	18x3/4	30x1.5	38x1	42x1	
Qty=	2	2	2	2	1	1	
Iy =	6.5	52.4	303.4	2809.6	1.3	1.0	$x10^6mm^4$
Iz =	6.48	25.4	0.5	7.0	1903.3	190.4	$x10^6mm^4$
A =	7060.0	12820.0	17419.3	58064.4	24516.1	18064.5	mm^2
dz =	335.3	329.2	37.5	13.3	380.4	407.0	mm^2
dy =	413	421	390.5	362.0	0.0	355.6	mm
Iyy =	800.2	1441.8	327.9	2819.9	3548.7	2993.5	$x10^6mm^4$
Izz =	1213.0	2293.3	2657.1	7613.9	1903.3	2474.6	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	137944.3	mm^2
A_{RHM*}=	11935.5	mm2
A_{net} =	126009	mm^2
∑Iyy =	11931.9	$x10^6mm^4$
∑Izz =	18155.3	$x10^6mm^4$
Zbar=	420	mm
ybar=	533	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9230.6846	mm	kyLy/ry =	30.0	< 120 therefore OK
Lz =	9230.6846	mm	kzLz/rz =	24.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	558.8	w =	38.1	h/w =	14.7	OK
Flange	b =	762.0	t =	25.4	b/t =	30.0	OK
Flange Perforated	b =	762.0	t =	25.4	b/t =	30.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	126009	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	307.7	mm
rz =	379.6	mm
λy =	0.399	
λz =	0.324	
Cry =	37336	kN
Crz =	38309	kN
Cr Min =	37336	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	45866	kN
b)	Tr =	$\phi_u A_n F_u$	48387	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	41129	kN
		Tr Min =	41129	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Diagonal Member U_1-L_2 East (R) Tension member

Drawing Location (1959)
E54 Sections of Lift Span Trusses

Material Properties: A-242-55 Steel Reference

F_u =	480	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	350	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

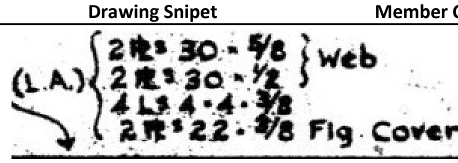
Built up Section Components

Member	Angle	Web	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	30x5/8	30x1/2	22x3/8	22x3/8

Flange Perfortion Width	8	in
Rivet dia.	1	in

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	9183	mm
Width =	616	mm
Depth =	781	mm



Individual Member Properties

Web			
Positioning	**Outside 2**	**Middle**	
Designation	30x5/8	30x1/2	
Qty =	2	2	
w =	15.875	12.7	mm
h =	762	762	mm
A =	24193.5	19354.8	mm^2
y Bar =	300.0375	285.75	mm
z Bar =	0	0	mm
RHM*	4	4	
RHM Area =	3225.8	2580.6	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6mm^4$
I_z =	1.84	$x10^6mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

Top & Bottom Plate		
Designation	22x3/8	
Qty =	2	
t =	9.525	mm
b =	558.8	mm
b_{eff} =	355.6	mm
A =	10645.14	mm^2
A_{eff} =	6774.18	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
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Section Calculations

	Angle	Web	Web	T&B Plate	
Designation	4x4x3/8	30x5/8	30x1/2	22x3/8	
Qty=	4	2	2	2	
Iy =	7.4	1170.7	936.5	0.1	$x10^6mm^4$
Iz =	7.36	0.5	0.3	17.8	$x10^6mm^4$
A =	7400.0	24193.5	19354.8	6774.2	mm^2
dz =	352.0	0	0	385.8	mm^2
dy =	250	300.0	285.8	190.5	mm
Iyy =	924.2	1170.7	936.5	1008.1	$x10^6mm^4$
Izz =	471.3	2178.5	1580.6	263.7	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	57722.0	mm^2
A_{RHM*}=	9677.4	mm2
A_{net} =	48045	mm^2
∑Iyy =	4040.0	$x10^6mm^4$
∑Izz =	4494.0	$x10^6mm^4$
zbar=	391	mm
ybar=	308	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
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Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9182.6275	mm	kyLy/ry =	31.7	< 120 therefore OK
Lz =	9182.6275	mm	kzLz/rz =	30.0	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	558.8	w =	15.9	h/w =	35.2	OK
Flange	b =	355.6	t =	9.5	b/t =	37.3	NG
Flange Perforated	b =	152.4	t =	9.5	b/t =	16.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	48045	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	290.0	mm
rz =	305.8	mm
λy =	0.422	
λz =	0.400	
Cry =	14106	kN
Crz =	14233	kN
Cr Min =	14106	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	19193	kN
b)	Tr =	$\phi_u A_n F_u$	18449	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	15682	kN
		Tr Min =	15682	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
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LIFT SPAN

Diagonal Member L_2-U_3 East (R) Tension member

Drawing Location (1959)

E54 Sections of Lift Span Trusses

Material Properties: A-242-55 Steel

			Reference
F_u =	480	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	350	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	Angle	Web	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	30x1/2	30x1/2	22x3/8	22x3/8

Flange Perfortion Width	8	in
Rivet dia.	1	in

Member Dimensions

Length =	9183	mm
Width =	610	mm
Depth =	781	mm

Drawing Snipet

Member Cross-Section

Individual Member Properties

Web			
Positioning	**Outside 2**	**Middle**	
Designation	30x1/2	30x1/2	
Qty =	2	2	
w =	12.7	12.7	mm
h =	762	762	mm
A =	19354.8	19354.8	mm^2
y Bar =	298.45	285.75	mm
z Bar =	0	0	mm
RHM*	4	4	
RHM Area =	2580.6	2580.6	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6 mm^4$
I_z =	1.84	$x10^6 mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

Top & Bottom Plate		
Designation	22x3/8	
Qty =	2	
t =	9.525	mm
b =	558.8	mm
b_{eff} =	355.6	mm
A =	10645.14	mm^2
A_{eff} =	6774.18	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
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Section Calculations

	Angle	Web	Web	T&B Plate	
Designation	4x4x3/8	30x1/2	30x1/2	22x3/8	
Qty=	4	2	2	2	
Iy =	7.4	936.5	936.5	0.1	$x10^6mm^4$
Iz =	7.36	0.3	0.3	17.8	$x10^6mm^4$
A =	7400.0	19354.8	19354.8	6774.2	mm^2
dz =	352.0	0	0	385.8	mm^2
dy =	250	298.5	285.8	190.5	mm
Iyy =	924.2	936.5	936.5	1008.1	$x10^6mm^4$
Izz =	471.3	1724.2	1580.6	263.7	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	52884.0	mm^2
A_{RHM*}=	9032.2	mm2
A_{net} =	43852	mm^2
∑Iyy =	3805.0	$x10^6mm^4$
∑Izz =	4040.0	$x10^6mm^4$
zbar=	391	mm
ybar=	305	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
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Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9182.6275	mm	kyLy/ry =	31.2	< 120 therefore OK
Lz =	9182.6275	mm	kzLz/rz =	30.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	558.8	w =	12.7	h/w =	44.0	NG
Flange	b =	355.6	t =	9.5	b/t =	37.3	NG
Flange Perforated	b =	152.4	t =	9.5	b/t =	16.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	43852	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	294.6	mm
rz =	303.5	mm
λy =	0.415	
λz =	0.403	
Cry =	12911	kN
Crz =	12976	kN
Cr Min =	12911	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	17584	kN
b)	Tr =	$\phi_u A_n F_u$	16839	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	14313	kN
		Tr Min =	14313	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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DESIGNED BY		DATE	
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LIFT SPAN

Diagonal Member U_3-L_4 East (R) Tension member

Drawing Location (1959)

E54 Sections of Lift Span Trusses

Material Properties: A-242-55 Steel Reference

F_u =	480	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

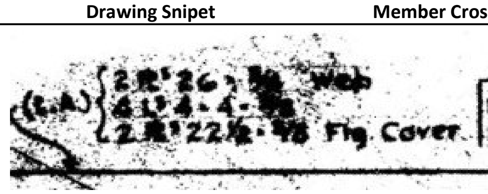
Built up Section Components

Member	**Angle**		**Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**		**2**	**1**	**1**
Dimensions (in)	4x4x3/8		26x3/4	22.5x3/8	22.5x3/8

Flange Perfortion Width	8	in
Rivet dia.	1	in

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	9148	mm
Width =	610	mm
Depth =	679	mm



Individual Member Properties

Web		
Positioning	**Middle**	
Designation	26x3/4	
Qty =	2	
w =	19.05	mm
h =	660.4	mm
A =	25161.24	mm^2
y Bar =	295.275	mm
z Bar =	0	mm
RHM*	4	
RHM Area =	3871.0	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6mm^4$
I_z =	1.84	$x10^6mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

Top & Bottom Plate		
Designation	22.5x3/8	
Qty =	2	
t =	9.525	mm
b =	571.5	mm
b_{eff} =	368.3	mm
A =	10887.075	mm^2
A_{eff} =	7016.115	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.			
JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
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Section Calculations

	Angle	Web	T&B Plate	
Designation	4x4x3/8	26x3/4	22.5x3/8	
Qty=	4	2	2	
Iy =	7.4	914.5	0.1	$x10^6mm^4$
Iz =	7.36	0.8	19.8	$x10^6mm^4$
A =	7400.0	25161.2	7016.1	mm^2
dz =	301.2	0	335.0	mm^2
dy =	257	295.3	193.7	mm
Iyy =	678.7	914.5	787.3	$x10^6mm^4$
Izz =	495.2	2194.5	283.0	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	39577.0	mm^2
A_{RHM*}=	7741.9	mm2
A_{net} =	31835	mm^2
∑Iyy =	2380.0	$x10^6mm^4$
∑Izz =	2973.0	$x10^6mm^4$
zbar=	340	mm
ybar=	305	mm

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	DESIGNED BY		DATE	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9148.3162	mm	kyLy/ry =	33.5	< 120 therefore OK
Lz =	9148.3162	mm	kzLz/rz =	29.9	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9

Webs	h =	457.2	w =	19.1	h/w =	24.0	OK
Flange	b =	368.3	t =	9.5	b/t =	38.7	NG
Flange Perforated	b =	165.1	t =	9.5	b/t =	17.3	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	31835	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	273.4	mm
rz =	305.6	mm
λy =	0.446	
λz =	0.399	
Cry =	9248	kN
Crz =	9436	kN
Cr Min =	9248	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	13159	kN
b)	Tr =	$\phi_u A_n F_u$	12225	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	10391	kN
		Tr Min =	10391	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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LIFT SPAN

Diagonal Member L_4-U_5 East (R) — Tension member

Drawing Location (1959)

E54 Sections of Lift Span Trusses

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

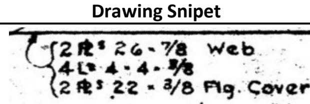
Built up Section Components

Member	**Angle**	**Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	26x7/8	22x3/8	22x3/8
Flange Perfortion Width		8	in	
Rivet dia.		1	in	

Member Dimensions

Length =	9148	mm
Width =	603	mm
Depth =	679	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Positioning	**Middle**	
Designation	26x7/8	
Qty =	2	
w =	22.225	mm
h =	660.4	mm
A =	29354.78	mm^2
y Bar =	290.5125	mm
z Bar =	0	mm
RHM*	4	
RHM Area =	4516.1	mm

Top & Bottom Plate		
Designation	22x3/8	
Qty =	2	
t =	9.525	mm
b =	558.8	mm
b_{eff} =	355.6	mm
A =	10645.14	mm^2
A_{eff} =	6774.18	mm^2
RHM*	2	
RHM Area =	967.7	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6 mm^4$
I_z =	1.84	$x10^6 mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
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Section Calculations

	Angle	Web	T&B Plate	
Designation	4x4x3/8	26x7/8	22x3/8	
Qty=	4	2	2	
Iy =	7.4	1066.9	0.1	$x10^6mm^4$
Iz =	7.36	1.2	17.8	$x10^6mm^4$
A =	7400.0	29354.8	6774.2	mm^2
dz =	301.2	0	335.0	mm^2
dy =	250	290.5	190.5	mm
Iyy =	678.7	1066.9	760.1	$x10^6mm^4$
Izz =	471.3	2478.7	263.7	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	43529.0	mm^2
A_{RHM*}=	8387.1	mm2
A_{net} =	35142	mm^2
∑Iyy =	2506.0	$x10^6mm^4$
∑Izz =	3214.0	$x10^6mm^4$
zbar=	340	mm
ybar=	302	mm

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	DESIGNED BY		DATE	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9148.2676	mm	kyLy/ry =	34.3	< 120 therefore OK
Lz =	9148.2676	mm	kzLz/rz =	30.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	457.2	w =	22.2	h/w =	20.6	OK
Flange	b =	355.6	t =	9.5	b/t =	37.3	OK
Flange Perforated	b =	152.4	t =	9.5	b/t =	16.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	35142	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	267.0	mm
rz =	302.4	mm
λy =	0.370	
λz =	0.327	
Cry =	6918	kN
Crz =	7015	kN
Cr Min =	6918	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9511	kN
b)	Tr =	$\phi_u A_n F_u$	11527	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	9798	kN
		Tr Min =	9511	kN

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
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LIFT SPAN

Diagonal Member U_5-L_6 East (R) Tension member

Drawing Location (1959)

E54 Sections of Lift Span Trusses

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

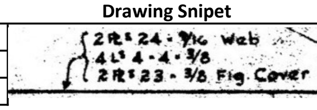
Member	Angle	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	24x9/16	23x3/8	23x3/8

Flange Perfortion Width	8	in
Rivet dia.	1	in

Member Dimensions

Length =	9144	mm
Width =	613	mm
Depth =	629	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Positioning	**Middle**	
Designation	24x9/16	
Qty =	2	
w =	14.2875	mm
h =	609.6	mm
A =	17419.32	mm^2
y Bar =	299.24375	mm
z Bar =	0	mm
RHM*	4	
RHM Area =	2903.2	mm

Top & Bottom Plate		
Designation	23x3/8	
Qty =	2	
t =	9.525	mm
b =	584.2	mm
b_{eff} =	381	mm
A =	11129.01	mm^2
A_{eff} =	7258.05	mm^2
RHM*	2	
RHM Area =	967.7	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6mm^4$
I_z =	1.84	$x10^6mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
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Section Calculations

	Angle	Web	T&B Plate	
Designation	4x4x3/8	24x9/16	23x3/8	
Qty=	4	2	2	
Iy =	7.4	539.4	0.1	$x10^6mm^4$
Iz =	7.36	0.3	21.9	$x10^6mm^4$
A =	7400.0	17419.3	7258.1	mm^2
dz =	275.8	0	309.6	mm^2
dy =	263	299.2	196.9	mm
Iyy =	570.2	539.4	695.6	$x10^6mm^4$
Izz =	519.6	1560.1	303.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	32077.0	mm^2
A_{RHM*}=	6774.2	mm2
A_{net} =	25303	mm^2
∑Iyy =	1805.0	$x10^6mm^4$
∑Izz =	2383.0	$x10^6mm^4$
zbar=	314	mm
ybar=	306	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
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Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9144	mm	kyLy/ry =	34.2	< 120 therefore OK
Lz =	9144	mm	kzLz/rz =	29.8	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	406.4	w =	14.3	h/w =	28.4	OK
Flange	b =	381.0	t =	9.5	b/t =	40.0	OK
Flange Perforated	b =	177.8	t =	9.5	b/t =	18.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	25303	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	267.1	mm
rz =	306.9	mm
λy =	0.370	
λz =	0.322	
Cry =	4982	kN
Crz =	5058	kN
Cr Min =	4982	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	7009	kN
b)	Tr =	$\phi_u A_n F_u$	8299	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	7054	kN
		Tr Min =	7009	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Diagonal Member L_0-U_1 West (H) Compression Member

Drawing Location (1959)
E54 Sections of Lift Span Trusses

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

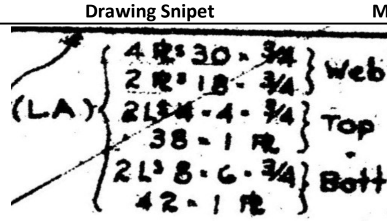
Member	Top Angle	Bottom Angle	Web	Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**2**	**2**	**1**	**1**
Dimensions (in)	4x4x3/4	8x6x3/4	18x3/4	30x1.5	38x1	42x1

Flange Perfortion Width	14	in
Rivet dia.	1	in

Member Dimensions

Length =	9231	mm
Width =	1067	mm
Depth =	813	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

	Web		
	Outside	**Inside**	
Designation	18x3/4	30x1.5	
Qty =	2	2	
w =	19.05	38.1	mm
h =	457.2	762	mm
A =	17419.32	58064.4	mm^2
z Bar =	457	406	mm
RHM*	4	4	
RHM Area =	3871.0	7741.9	mm^2

	Top Plate	**Bottom Plate**	
Designation	38x1	42x1	
Qty =	1	1	
t =	25.4	25.4	mm
b =	965.2	1066.8	mm
b_{eff} =	965.2	711.2	mm
z Bar =	800.1	12.7	mm
A =	24516.08	27096.72	mm^2
A_{eff} =	24516.08	18064.48	mm^2
RHM*	2	2	
RHM Area =	1290.3	1290.3	mm^2

	Angle		
Location	Top	Bottom	
Designation	4x4x3/4	8x6x3/4	
Qty =	2	2	mm
b =	101.6	152.4	mm
d =	101.6	203.2	mm
t =	19.1	19.1	mm^2
A =	3530	6410	mm
z =	32.4	65.1	mm
y =	32.4	39.6	mm
Z bar	755	90.5	mm
I_y =	3.24	26.2	$x10^6 mm^4$
I_z =	3.24	12.7	$x10^6 mm^4$
A_{angle} =	7060	12820	mm^2
RHM*	3	3	mm
RHM Area =	2903	2903	mm^2

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
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CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle Top	Angle Bottom	Web	Web	Top Plate	Bot Plate	
Designation	4x4x3/4	8x6x3/4	18x3/4	30x1.5	38x1	42x1	
Qty=	2	2	2	2	1	1	
Iy =	6.5	52.4	303.4	2809.6	1.3	1.0	$x10^6mm^4$
Iz =	6.48	25.4	0.5	7.0	1903.3	190.4	$x10^6mm^4$
A =	7060.0	12820.0	17419.3	58064.4	24516.1	18064.5	mm^2
dz =	335.3	329.2	37.5	13.3	380.4	407.0	mm^2
dy =	413	421	390.5	362.0	0.0	355.6	mm
Iyy =	800.2	1441.8	327.9	2819.9	3548.7	2993.5	$x10^6mm^4$
Izz =	1213.0	2293.3	2657.1	7613.9	1903.3	2474.6	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	137944.3	mm^2
A_{RHM*}=	11935.5	mm2
A_{net} =	126009	mm^2
∑Iyy =	11931.9	$x10^6mm^4$
∑Izz =	18155.3	$x10^6mm^4$
Zbar=	420	mm
ybar=	533	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9230.6846	mm	kyLy/ry =	30.0	< 120 therefore OK
Lz =	9230.6846	mm	kzLz/rz =	24.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	38.1	h/w =	14.7	OK
Flange	b =	762.0	t =	25.4	b/t =	30.0	OK
Flange Perforated	b =	762.0	t =	25.4	b/t =	30.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	126009	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	307.7	mm
rz =	379.6	mm
λy =	0.324	
λz =	0.263	
Cry =	25174	kN
Crz =	25556	kN
Cr Min =	25174	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	30141	kN
b)	Tr =	$\phi_u A_n F_u$	41331	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	35131	kN
		Tr Min =	30141	kN

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DESIGNED BY		DATE	
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LIFT SPAN

Diagonal Member U_1-L_2 East (H) Tension member

Drawing Location (1959)
E54 Sections of Lift Span Trusses

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

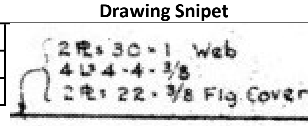
Member	Angle	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	30x1	22x3/8	22x3/8

Flange Perfortion Width	8	in
Rivet dia.	1	in

Member Dimensions

Length =	9183	mm
Width =	610	mm
Depth =	781	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Positioning	**Middle**	
Designation	30x1	
Qty =	2	
w =	25.4	mm
h =	762	mm
A =	38709.6	mm^2
y Bar =	292.1	mm
z Bar =	0	mm
RHM*	4	
RHM Area =	5161.3	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6 mm^4$
I_z =	1.84	$x10^6 mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

Top & Bottom Plate		
Designation	22x3/8	
Qty =	2	
t =	9.525	mm
b =	558.8	mm
b_{eff} =	355.6	mm
A =	10645.14	mm^2
A_{eff} =	6774.18	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	T&B Plate	
Designation	4x4x3/8	30x1	22x3/8	
Qty=	4	2	2	
Iy =	7.4	1873.0	0.1	$x10^6mm^4$
Iz =	7.36	2.1	17.8	$x10^6mm^4$
A =	7400.0	38709.6	6774.2	mm^2
dz =	352.0	0	385.8	mm^2
dy =	250	292.1	190.5	mm
Iyy =	924.2	1873.0	1008.1	$x10^6mm^4$
Izz =	471.3	3304.9	263.7	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	52884.0	mm^2
A_{RHM*}=	9032.2	mm2
A_{net} =	43852	mm^2
∑Iyy =	3805.0	$x10^6mm^4$
∑Izz =	4040.0	$x10^6mm^4$
zbar=	391	mm
ybar=	305	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9182.6275 mm	kyLy/ry =	31.2	< 120 therefore OK
Lz =	9182.6275 mm	kzLz/rz =	30.3	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	25.4	h/w =	22.0	OK
Flange	b =	355.6	t =	9.5	b/t =	37.3	OK
Flange Perforated	b =	152.4	t =	9.5	b/t =	16.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	43852	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	294.6	mm
rz =	303.5	mm
λy =	0.336	
λz =	0.327	
Cry =	8728	kN
Crz =	8754	kN
Cr Min =	8728	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	11555	kN
b)	Tr =	$\phi_u A_n F_u$	14383	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	12226	kN
		Tr Min =	11555	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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LIFT SPAN

Diagonal Member L_2-U_3 West (H) Tension member

Drawing Location (1959)
E54 Sections of Lift Span Trusses

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

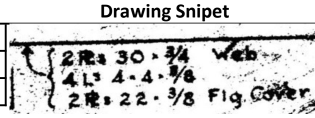
Member	Angle	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	30x3/4	22x3/8	22x3/8

Flange Perfortion Width	8	in
Rivet dia.	1	in

Member Dimensions

Length =	9183	mm
Width =	597	mm
Depth =	781	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Positioning	**Middle**	
Designation	30x3/4	
Qty =	2	
w =	19.05	mm
h =	762	mm
A =	29032.2	mm^2
y Bar =	288.925	mm
z Bar =	0	mm
RHM*	4	
RHM Area =	3871.0	mm

Top & Bottom Plate		
Designation	22x3/8	
Qty =	2	
t =	9.525	mm
b =	558.8	mm
b_{eff} =	355.6	mm
A =	10645.14	mm^2
A_{eff} =	6774.18	mm^2
RHM*	2	
RHM Area =	967.7	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6mm^4$
I_z =	1.84	$x10^6mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	T&B Plate	
Designation	4x4x3/8	30x3/4	22x3/8	
Qty=	4	2	2	
Iy =	7.4	1404.8	0.1	$x10^6mm^4$
Iz =	7.36	0.9	17.8	$x10^6mm^4$
A =	7400.0	29032.2	6774.2	mm^2
dz =	352.0	0	385.8	mm^2
dy =	250	288.9	190.5	mm
Iyy =	924.2	1404.8	1008.1	$x10^6mm^4$
Izz =	471.3	2424.4	263.7	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	43206.0	mm^2
A_{RHM*}=	7741.9	mm2
A_{net} =	35464	mm^2
∑Iyy =	3337.0	$x10^6mm^4$
∑Izz =	3159.0	$x10^6mm^4$
zbar=	391	mm
ybar=	298	mm

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9182.6275	mm	kyLy/ry =	29.9	< 120 therefore OK
Lz =	9182.6275	mm	kzLz/rz =	30.8	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	558.8	w =	19.1	h/w =	29.3	OK
Flange	b =	355.6	t =	9.5	b/t =	37.3	OK
Flange Perforated	b =	152.4	t =	9.5	b/t =	16.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	35464	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	306.7	mm
rz =	298.5	mm
λy =	0.323	
λz =	0.332	
Cry =	7086	kN
Crz =	7068	kN
Cr Min =	7068	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	9441	kN
b)	Tr =	$\phi_u A_n F_u$	11632	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	9887	kN
		Tr Min =	9441	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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LIFT SPAN

Diagonal Member U_3-L_4 West (H) — Tension member — Drawing Location (1959)

E54 Sections of Lift Span Trusses

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Angle**	**Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	26x9/16	22.5x3/8	22.5x3/8

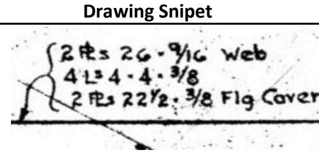
Flange Perfortion Width 8 in

Rivet dia. 1 in

Member Dimensions

Length =	9148	mm
Width =	600	mm
Depth =	679	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Positioning	**Middle**	
Designation	26x9/16	
Qty =	2	
w =	14.2875	mm
h =	660.4	mm
A =	18870.93	mm^2
y Bar =	292.89375	mm
z Bar =	0	mm
RHM*	4	
RHM Area =	2903.2	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6mm^4$
I_z =	1.84	$x10^6mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

Top & Bottom Plate		
Designation	22.5x3/8	
Qty =	2	
t =	9.525	mm
b =	571.5	mm
b_{eff} =	368.3	mm
A =	10887.075	mm^2
A_{eff} =	7016.115	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
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CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	T&B Plate	
Designation	4x4x3/8	26x9/16	22.5x3/8	
Qty=	4	2	2	
Iy =	7.4	685.8	0.1	$x10^6mm^4$
Iz =	7.36	0.3	19.8	$x10^6mm^4$
A =	7400.0	18870.9	7016.1	mm^2
dz =	301.2	0	335.0	mm^2
dy =	257	292.9	193.7	mm
Iyy =	678.7	685.8	787.3	$x10^6mm^4$
Izz =	495.2	1619.2	283.0	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	33287.0	mm^2
A_{RHM*}=	6774.2	mm2
A_{net} =	26513	mm^2
∑Iyy =	2152.0	$x10^6mm^4$
∑Izz =	2397.0	$x10^6mm^4$
zbar=	340	mm
ybar=	300	mm

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9148.3162	mm	kyLy/ry =	32.1	< 120 therefore OK
Lz =	9148.3162	mm	kzLz/rz =	30.4	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	457.2	w =	14.3	h/w =	32.0	OK
Flange	b =	368.3	t =	9.5	b/t =	38.7	OK
Flange Perforated	b =	165.1	t =	9.5	b/t =	17.3	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	26513	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	284.9	mm
rz =	300.7	mm
λy =	0.347	
λz =	0.328	
Cry =	5260	kN
Crz =	5290	kN
Cr Min =	5260	kN

10.8.2 Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	7273	kN
b)	Tr =	$\phi_u A_n F_u$	8696	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	7392	kN
		Tr Min =	7273	kN

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LIFT SPAN

Diagonal Member L_4-U_5 West (H) — Tension member — Drawing Location (1959)

E54 Sections of Lift Span Trusses

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	Angle	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	26x11/16	22x3/8	22x3/8

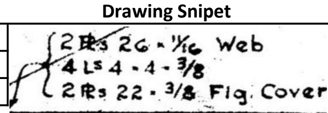
Flange Perfortion Width 8 in

Rivet dia. 1 in

Member Dimensions

Length =	9148	mm
Width =	594	mm
Depth =	679	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Positioning	**Middle**	
Designation	26x11/16	
Qty =	2	
w =	17.4625	mm
h =	660.4	mm
A =	23064.47	mm^2
y Bar =	288.13125	mm
z Bar =	0	mm
RHM*	4	
RHM Area =	3548.4	mm

Top & Bottom Plate		
Designation	22x3/8	
Qty =	2	
t =	9.525	mm
b =	558.8	mm
b_{eff} =	355.6	mm
A =	10645.14	mm^2
A_{eff} =	6774.18	mm^2
RHM*	2	
RHM Area =	967.7	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6mm^4$
I_z =	1.84	$x10^6mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	T&B Plate	
Designation	4x4x3/8	26x11/16	22x3/8	
Qty=	4	2	2	
Iy =	7.4	838.3	0.1	$x10^6mm^4$
Iz =	7.36	0.6	17.8	$x10^6mm^4$
A =	7400.0	23064.5	6774.2	mm^2
dz =	301.2	0	335.0	mm^2
dy =	250	288.1	190.5	mm
Iyy =	678.7	838.3	760.1	$x10^6mm^4$
Izz =	471.3	1915.4	263.7	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	37239.0	mm^2
A_{RHM*}=	7419.3	mm2
A_{net} =	29820	mm^2
∑Iyy =	2277.0	$x10^6mm^4$
∑Izz =	2650.0	$x10^6mm^4$
zbar=	340	mm
ybar=	297	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
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CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9148.2676	mm	kyLy/ry =	33.1	< 120 therefore OK
Lz =	9148.2676	mm	kzLz/rz =	30.7	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	457.2	w =	17.5	h/w =	26.2	OK
Flange	b =	355.6	t =	9.5	b/t =	37.3	OK
Flange Perforated	b =	152.4	t =	9.5	b/t =	16.0	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	29820	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	276.3	mm
rz =	298.1	mm
λy =	0.357	
λz =	0.331	
Cry =	5896	kN
Crz =	5945	kN
Cr Min =	5896	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	8137	kN
b)	Tr =	$\phi_u A_n F_u$	9781	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	8314	kN
		Tr Min =	8137	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
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LIFT SPAN

Diagonal Member U_5-L_6 West (H) Tension member

Drawing Location (1959)

E54 Sections of Lift Span Trusses

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	Mpa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	Mpa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

Member	Angle	Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	4x4x3/8	24x9/16	23x3/8	23x3/8

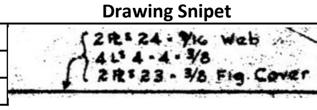
Flange Perfortion Width 8 in

Rivet dia. 1 in

Member Dimensions

Length =	9144	mm
Width =	613	mm
Depth =	629	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Web		
Positioning	**Middle**	
Designation	24x9/16	
Qty =	2	
w =	14.2875	mm
h =	609.6	mm
A =	17419.32	mm^2
y Bar =	299.24375	mm
z Bar =	0	mm
RHM*	4	
RHM Area =	2903.2	mm

Angle		
Designation	4x4x3/8	
Qty =	4	
b =	101.6	mm
d =	101.6	mm
t =	9.525	mm
A =	1850	mm^2
z =	29	mm
y =	29	mm
I_y =	1.84	$x10^6 mm^4$
I_z =	1.84	$x10^6 mm^4$
A_{angle} =	7400	mm^2
RHM*	3	
RHM Area =	2903.2	mm

Top & Bottom Plate		
Designation	23x3/8	
Qty =	2	
t =	9.525	mm
b =	584.2	mm
b_{eff} =	381	mm
A =	11129.01	mm^2
A_{eff} =	7258.05	mm^2
RHM*	2	
RHM Area =	967.7	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
DESIGNED BY		DATE		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

Section Calculations

	Angle	Web	T&B Plate	
Designation	4x4x3/8	24x9/16	23x3/8	
Qty=	4	2	2	
Iy =	7.4	539.4	0.1	$x10^6mm^4$
Iz =	7.36	0.3	21.9	$x10^6mm^4$
A =	7400.0	17419.3	7258.1	mm^2
dz =	275.8	0	309.6	mm^2
dy =	263	299.2	196.9	mm
Iyy =	570.2	539.4	695.6	$x10^6mm^4$
Izz =	519.6	1560.1	303.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	32077.0	mm^2
A_{RHM*}=	6774.2	mm2
A_{net} =	25303	mm^2
∑Iyy =	1805.0	$x10^6mm^4$
∑Izz =	2383.0	$x10^6mm^4$
zbar=	314	mm
ybar=	306	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
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Geometry Comformance Checks

10.9.1.3 Slenderness Ratio

Member Classification = Primary Compression Member

Ly =	9144	mm	kyLy/ry =	34.2	< 120 therefore OK
Lz =	9144	mm	kzLz/rz =	29.8	< 120 therefore OK

10.9.2 Width to Thickness Ratio

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4

Webs	h =	406.4	w =	14.3	h/w =	28.4	OK
Flange	b =	381.0	t =	9.5	b/t =	40.0	OK
Flange Perforated	b =	177.8	t =	9.5	b/t =	18.7	OK

10.9.3 Axial Compression Resistance

Φs =	0.9	
A =	25303	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	267.1	mm
rz =	306.9	mm
λy =	0.370	
λz =	0.322	
Cry =	4982	kN
Crz =	5058	kN
Cr Min =	4982	kN

10.8.2 Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95
Tension	Φu =	0.8

a)	Tr =	$\phi_s A_g F_y$	7009	kN
b)	Tr =	$\phi_u A_n F_u$	8299	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	7054	kN
		Tr Min =	7009	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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DESIGNED BY		DATE	
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LIFT SPAN

Lifting Girder — Tension & Compression Member — Drawing Location (1959)

E59 Lift Span Top Chord

Material Properties: A-7 Steel — Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

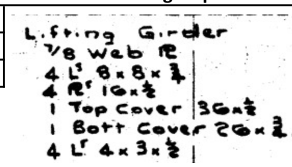
Member	**Exterior Angle**	**Web Angles**	**Centre Web**	**Web Plates**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**4**	**1**	**4**	**1**	**1**
Dimensions (in)	4x3x1/2	8x8x3/4	169.25x7/8	16x1/2	36x1/2	26x3/4

Ext. Web Perfortion Width	0	in
Rivet dia.	1	in

Member Dimensions

Length =	15545	mm
Width =	914	mm
Depth =	4375	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles						
Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.		
Designation	4x3x1/2	4x3x1/2	8x8x3/4	8x8x3/4		
Qty =	2	2	2	2	mm	
b =	101.6	101.6	203.2	203.2	mm	Hori
d =	76.2	76.2	203.2	203.2	mm	Vert
t =	12.7	12.7	19.1	19.1	mm^2	
A =	2100	2100	7360	7360	mm	
z =	21	21	57.8	57.8	mm	Vert
y =	33.9	33.9	57.8	57.8	mm	Hori
Z bar	4341	55.2	4305	121.3	mm	
I_y =	1.01	1.01	28.9	28.9	$x10^6mm^4$	
I_z =	2.12	2.12	28.9	28.9	$x10^6mm^4$	
A_{angle} =	4200	4200	14720	14720	mm^2	
RHM*	2	2	4	4	mm	
RHM Area =	1290	1290	3871	3871	mm^2	

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
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	Top Plate	Bottom Plate	
Designation	36x1/2	26x3/4	
Qty =	1	1	
t =	12.7	19.05	mm
b =	914.4	660.4	mm
z Bar =	4368.8	53.975	mm
A =	11612.88	12580.62	mm^2
RHM*	6	6	
RHM Area =	1935.5	2903.2	mm^2

RHM* = Rivet Holes/Member

Web				
Location	**Inside**	**Exterior Top**	**Exterior Bottom**	
Designation =	169.25x7/8	16x1/2	16x1/2	
Qty =	1	2	2	
w =	22.225	12.7	12.7	mm
h =	4298.95	406.4	406.4	mm
h_{eff} =	4298.95	406.4	406.4	mm
A =	95544.16	10322.56	10322.56	mm^2
A_{eff} =	95544.16	10322.56	10322.56	mm^2
z Bar =	2213	4159	267	mm
RHM*	4	4	4	
RHM Area =	2258.1	2580.6	2580.6	mm^2

Section Calculations

Angle

Location	Exterior Top	Exterior Bottom	Web Top	Web Bot.	
Designation	4x3x1/2	4x3x1/2	8x8x3/4	8x8x3/4	
Qty=	2	2	2	2	
Iy =	2.0	2.0	57.8	57.8	$x10^6mm^4$
Iz =	4.24	4.24	57.8	57.8	$x10^6mm^4$
A =	4200	4200	14720	14720	mm^2
dz =	2141.1	2145.2	2104.3	2079.1	mm^2
dy =	423	296	81.6	81.6	mm
Iyy =	19256.0	19329.1	65238.8	63684.5	$x10^6mm^4$
Izz =	756.8	373.0	155.8	155.8	$x10^6mm^4$

	Inside Web	**Exterior** Top Web	**Exterior** Bottom Web	Top Plate	Bot Plate	
Designation	169.25x7/8	16x1/2	16x1/2	36x1/2	26x3/4	
Qty=	1	2	2	1	1	
Iy =	147145.7	17.8	17.8	0.2	0.4	$x10^6mm^4$
Iz =	3.9	0.1	0.1	809.2	457.2	$x10^6mm^4$
A =	95544.2	10322.6	10322.6	11612.9	12580.6	mm^2
dz =	12.6	1958.9	1933.7	2168.4	2146.4	mm^2
dy =	0.0	17.5	17.5	0.0	0.0	mm
Iyy =	147161.0	39628.2	38614.0	54605.7	57958.6	$x10^6mm^4$
Izz =	3.9	3.3	3.3	809.2	457.2	$x10^6mm^4$

Composite Member Properties

A_{gross} =	178223	mm^2
A_{RHM*}=	22581	mm2
A_{net} =	155642	mm^2
∑Iyy =	505476.0	$x10^6mm^4$
∑Izz =	2718.4	$x10^6mm^4$
Zbar=	2200	mm
ybar=	457	mm

Geometry Comformance Checks

10.9.2 **Width to Thickness Ratio**

	Class 1	Class 2	Class 3
Webs	72.53	112.09	125.28
Top Coverplate	9.56	11.21	13.19
Bottom C.P.	9.56	11.21	

Webs	h =	3486.15	w =	22.2	h/w =	156.9	Class 4
Top Coverplate	b =	254.0	t =	25.4	b/t =	10.0	Class 2
Bottom C.P.	b =	127.0	t =	19.1	b/t =	6.7	Class 1

Class 4 Web ***[CSA S6-19 cl.10.10.4.4]***

h/w 157 >150 ***Stiffened Plate Girder***

Unbraced Length, L 7772 mm

Yeild Moment

Elastic Section Modulus, Sx 229724832 mm^3

Yield Stress, F_y 230 MPa Fu = 410 MPa

Yield Moment, M_y 52837 kNm

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design ***[CSA S6-19 cl.10.10.2.3]***

Overall Moment Resist., M_r **50195 kNm** ***[CSA S6-19 cl.10.10.3.3]***

Reduced Mr **50195 kNm** ***Girder with no longitudinal stiffeners*** ***[CSA S6-19 cl.10.10.4.4]***

Shear Resistance ***[CSA S6-19 cl. 10.10.5.1]***

a = 2000 mm Approximate Information unavailable for actual spacing ***[CSA S6-19 cl. 10.10.6.1]***

Web height, h	4299	mm
a/h	0.47	
k_v	28.67	
h/w	157	
502√kv/Fy	177.24	
621√kv/Fy	219.26	
F_{cr}	**132.71**	**MPa**
F_t	**0.00**	**MPa**
F_s	**132.71**	**MPa**
Area of Web, A_w	95544.16	mm^2

Shear Resistance, V_r **12046 kN**

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

End Floor Beam Tension & Compression Member Drawing Location (1959)

E59 Lift Span Top Chord

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

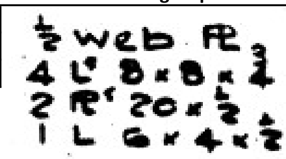
Member	Top Angle	Bottom Angles	Centre Web	Top Plate	Bottom Plate
Quantity	**2**	**2**	**1**	**1**	**1**
Dimensions (in)	8x8x3/4	8x8x3/4	71.375x1/2	20x1/2	20x1/2

Ext. Web Perfortion Width	0	in
Rivet dia.	1	in

Member Dimensions

Length =	15545	mm
Width =	508	mm
Depth =	1838	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

Angles			
Location	Web Top	Web Bot.	
Designation	8x8x3/4	8x8x3/4	
Qty =	2	2	mm
b =	203.2	203.2	mm
d =	203.2	203.2	mm
t =	19.1	19.1	mm
A =	7360	7360	mm^2
z =	57.8	57.8	mm
y =	57.8	57.8	mm
Z bar	1768	70.5	mm
I_y =	28.9	28.9	$x10^6 mm^4$
I_z =	28.9	28.9	$x10^6 mm^4$
A_{angle} =	14720	14720	mm^2
RHM*	4	4	mm
RHM Area =	3871	3871	mm^2

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

	Top Plate	**Bottom Plate**	
Designation	20x1/2	20x1/2	
Qty =	1	1	
t =	13	13	mm
b =	508	508	mm
z Bar =	1832	6	mm
A =	6452	6452	mm^2
RHM*	6	6	
RHM Area =	1935	1935	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Inside**	
Designation =	71.375x1/2	
Qty =	1	
w =	12.7	mm
h =	1812.9	mm
h_{eff} =	1812.9	mm
A =	23024.1	mm^2
A_{eff} =	23024.1	mm^2
z Bar =	919.2	mm
RHM*	4	
RHM Area =	1290.3	mm^2

Section Calculations

Angle

Location	Web Top	Web Bot.	
Designation	8x8x3/4	8x8x3/4	
Qty=	2	2	
Iy =	57.8	57.8	$x10^6mm^4$
Iz =	57.8	57.8	$x10^6mm^4$
A =	14720	14720	mm^2
dz =	848.7	848.7	mm^2
dy =	64.2	64.2	mm
Iyy =	10659.6	10659.6	$x10^6mm^4$
Izz =	118.4	118.4	$x10^6mm^4$

	Web	Top Plate	Bot Plate	
Designation	71.375x1/2	20x1/2	20x1/2	
Qty=	1	1	1	
Iy =	6306.1	0.1	0.1	$x10^6mm^4$
Iz =	0.3	138.7	138.7	$x10^6mm^4$
A =	23024.1	6451.6	6451.6	mm^2
dz =	0.0	912.8	912.8	mm^2
dy =	0.0	0.0	0.0	mm
Iyy =	6306.1	5375.7	5375.7	$x10^6mm^4$
Izz =	0.3	138.7	138.7	$x10^6mm^4$

Composite Member Properties

A_{gross} =	65367	mm^2
A_{RHM*}=	12903	mm2
A_{net} =	52464	mm^2
∑Iyy =	38376.7	$x10^6mm^4$
∑Izz =	514.5	$x10^6mm^4$
Zbar=	919	mm
ybar=	254	mm

Geometry Comformance Checks

10.9.2 **Width to Thickness Ratio**

	Class 1	Class 2	Class 3
Webs	72.53	112.09	125.28
Top Coverplate	9.56	11.21	13.19
Bottom C.P.	9.56	11.21	

Webs	h =	1406.5	w =	12.7	h/w =	110.8	Class 2
Top Coverplate	b =	50.8	t =	12.7	b/t =	4.0	Class 1
Bottom C.P.	b =	50.8	t =	12.7	b/t =	4.0	Class 1

Plastic Moment

Elastic Section Modulus, Zx 46367924 mm^3

Yield Stress, F_y 230 MPa Fu = 410 MPa

Yield Moment, M_p 10665 kNm

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design ***[CSA S6-19 cl.10.10.2.3]***

Overall Moment Resist., M_r 10131 kNm ***[CSA S6-19 cl.10.10.3.3]***

Shear Resistance ***[CSA S6-19 cl. 10.10.5.1]***

a =	1300	mm	Approximate Information unavailable for actual spacing ***[CSA S6-19 cl. 10.10.6.1]***
Web height, h	1813	mm	
a/h	0.72		
k_v	14.39		
h/w	111		
502√kv/Fy	125.54		
621√kv/Fy	155.30		
F_{cr}	**132.71**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**132.71**	**MPa**	
Area of Web, A_w	23024.15	mm^2	

Shear Resistance, V_r 2903 kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Intermediate Floor Beam Tension & Compression Member Drawing Location (1959)

E56 Lift Span Bottom Chord

Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Top Angle**	**Bottom Angles**	**Centre Web**	**Top Plate**	**Bottom Plate**
Quantity	**2**	**2**	**1**	**1**	**1**
Dimensions (in)	8x8x7/8	8x8x7/8	78.5x9/16	20x3/4	20x3/4

Ext. Web Perfortion Width	0	in
Rivet dia.	1	in

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	15545	mm
Width =	508	mm
Depth =	2032	mm

Individual Member Properties

Angles			
Location	Web Top	Web Bot.	
Designation	8x8x7/8	8x8x7/8	
Qty =	2	2	mm
b =	203.2	203.2	mm
d =	203.2	203.2	mm
t =	22.2	22.2	mm
A =	8500	8500	mm^2
z =	58.9	58.9	mm
y =	58.9	58.9	mm
Z bar	1954	78.0	mm
I_y =	33	33	$x10^6mm^4$
I_z =	33	33	$x10^6mm^4$
A_{angle} =	17000	17000	mm^2
RHM*	4	4	mm
RHM Area =	4516	4516	mm^2

	Top Plate	**Bottom Plate**	
Designation	20x3/4	20x3/4	
Qty =	1	1	
t =	19	19	mm
b =	508	508	mm
z Bar =	2022	10	mm
A =	9677	9677	mm^2
RHM*	6	6	
RHM Area =	2903	2903	mm^2

RHM* = Rivet Holes/Member

Web		
Location	**Inside**	
Designation =	78.5x9/16	
Qty =	1	
w =	14.3	mm
h =	1993.9	mm
h_{eff} =	1993.9	mm
A =	28487.8	mm^2
A_{eff} =	28487.8	mm^2
z Bar =	1016.0	mm
RHM*	4	
RHM Area =	1451.6	mm^2

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations			
Angle			
Location	Web Top	Web Bot.	
Designation	8x8x7/8	8x8x7/8	
Qty=	2	2	
Iy =	66.0	66.0	$x10^6mm^4$
Iz =	66	66	$x10^6mm^4$
A =	17000	17000	mm^2
dz =	938.1	938.1	mm^2
dy =	66.0	66.0	mm
Iyy =	15024.9	15024.9	$x10^6mm^4$
Izz =	140.2	140.2	$x10^6mm^4$

	Web	Top Plate	Bot Plate	
Designation	78.5x9/16	20x3/4	20x3/4	
Qty=	1	1	1	
Iy =	9438.1	0.3	0.3	$x10^6mm^4$
Iz =	0.5	208.1	208.1	$x10^6mm^4$
A =	28487.8	9677.4	9677.4	mm^2
dz =	0.0	1006.5	1006.5	mm^2
dy =	0.0	0.0	0.0	mm
Iyy =	9438.1	9803.4	9803.4	$x10^6mm^4$
Izz =	0.5	208.1	208.1	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	81843	mm^2
A_{RHM*}=	16290	mm2
A_{net} =	65552	mm^2
∑Iyy =	59094.8	$x10^6mm^4$
∑Izz =	697.0	$x10^6mm^4$
Zbar=	1016	mm
ybar=	254	mm

Geometry Comformance Checks

10.9.2 Width to Thickness Ratio

	Class 1	Class 2	Class 3
Webs	72.53	112.09	125.28
Top Coverplate	9.56	11.21	13.19
Bottom C.P.	9.56	11.21	13.19

Webs	h =	1587.5	w =	14.3	h/w =	111.1	Class 2
Top Coverplate	b =	50.8	t =	19.1	b/t =	2.7	Class 1
Bottom C.P.	b =	50.8	t =	19.1	b/t =	2.7	Class 1

Plastic Moment

Elastic Section Modulus, Zx	64015199	mm^3		
Yield Stress, F_y	230	MPa	Fu =	410 MPa
Yield Moment, M_p	14723	kNm		

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design ***[CSA S6-19 cl.10.10.2.3]***

Overall Moment Resist., M_r 13987 kNm

Shear Resistance ***[CSA S6-19 cl. 10.10.5.1]***

a=	1300	mm	Approximate Information unavailable for actual spacing ***[CSA S6-19 cl. 10.10.6.1]***
Web height, h	1994	mm	
a/h	0.65		
k_v	16.56		
h/w	111		
502√kv/Fy	134.71		
621√kv/Fy	166.64		
F_{cr}	**132.71**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**132.71**	**MPa**	
Area of Web, A_w	28487.85	mm^2	

Shear Resistance, V_r 3592 kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Stringers 610x125 Original Tension Member

Drawing Location (1959)

E57 Plan of Deck Supports

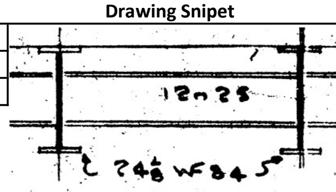
Material Properties: A-7 Steel Reference

F_u =	410	Mpa	***[CSA S6-19 cl. 14.7.4.2]***
F_y =	230	Mpa	***[CSA S6-19 cl. 14.7.4.2]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Ext. Web Perfortion Width	0	in
Rivet dia.	0	in

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	3133	mm
Flange Width =	229	mm
Depth =	612	mm



Member Properties		
Designation	610x125	
b =	229	mm
d =	612	mm
t =	19.6	mm
w =	11.9	mm
S_x =	3220	$x10^3 mm^4$
S_y =	343	$x10^3 mm^4$
I_x =	985	$x10^6 mm^4$
I_Y =	39.3	$x10^6 mm^4$
Z_x =	3670	$x10^3 mm^3$
Z_y =	535	$x10^3 mm^3$
J =	1540	$x10^3 mm^4$
C_w =	3450	$x10^9 mm^6$
A =	15900	mm
RHM*	0	mm
A_{RHM*}=	0	mm^2
A_{net} =	15900	mm^2

Geometry Comformance Checks

10.9.2 **Width to Thickness Ratio**

	Class 1	Class 2	Class 3
Webs	72.53	112.09	125.28
Flange	9.56	11.21	13.19

Webs	h =	572.8	w =	11.9	h/w =	48.1	Class 1
Flange	b =	114.5	t =	19.6	b/t =	5.8	Class 1

Plastic Moment ***[CSA S6-19 cl.10.10.2.3]***

ction Modulus, Zx 3670000 mm^3

Yield Stress, F_y 230 MPa Fu = 410 MPa

Yield Moment, M_p 844 kNm

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design

Overall Moment Resist., M_r **802 kNm**

Shear Resistance ***[CSA S6-19 cl. 10.10.5.1]***

k_v	5.34		***Assumed to be unstiffened, a/h infinite***
h/w	48	≤502√kv/Fy=	76.49
F_{cr}	**132.71**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**132.71**	**MPa**	
Area of Web, A_w	6816.32	mm^2	

Shear Resistance, V_r **859 kN**

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Stringers 610x125 New Tension Member Drawing Location (1982 Rehab)

B-6 Framing Plan

Material Properties: A-242-55 Steel Reference

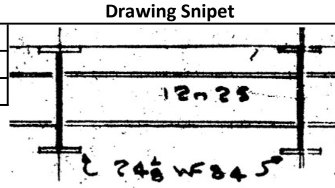
F_u =	480	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	Mpa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	Mpa	***[CSA S6-19 cl. 10.4.2]***

Ext. Web Perfortion Width 0 in

Rivet dia. 0 in

Member Dimensions **Drawing Snipet** **Member Cross-Section**

Length =	3133	mm
Flange Width =	229	mm
Depth =	612	mm



Member Properties		
Designation	610x125	
b =	229	mm
d =	612	mm
t =	19.6	mm
w =	11.9	mm
S_x =	3220	$x10^3mm^4$
S_y =	343	$x10^3mm^4$
I_x =	985	$x10^6mm^4$
I_Y =	39.3	$x10^6mm^4$
Z_x =	3670	$x10^3mm^3$
Z_y =	535	$x10^3mm^3$
J =	1540	$x10^3mm^4$
C_w =	3450	$x10^9mm^6$
A =	15900	mm
RHM*	0	mm
A_{RHM*}=	0	mm^2
A_{net} =	15900	mm^2

Geometry Comformance Checks

10.9.2 Width to Thickness Ratio

	Class 1	Class 2	Class 3
Webs	58.80	90.87	101.56
Flange	7.75	9.09	10.69

Webs	h =	572.8	w =	11.9	h/w =	48.1	Class 1
Flange	b =	114.5	t =	19.6	b/t =	5.8	Class 1

Plastic Moment ***[CSA S6-19 cl.10.10.2.3]***

ction Modulus, Zx 3670000 mm^3

Yield Stress, F_y 350 MPa Fu = 480 MPa

Yield Moment, M_p 1285 kNm

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design

Overall Moment Resist., M_r 1204 kNm

Shear Resistance ***[CSA S6-19 cl. 10.10.5.1]***

k_v 5.34 ***Assumed to be unstiffened, a/h infinite***

h/w 48 ≤502√kv/Fy= 62.01

F_{cr} 201.95 MPa

F_t 0.00 MPa

F_s 201.95 MPa

Area of Web, A_w 6816.32 mm^2

Shear Resistance, V_r 1308 kN

Exhibit E.4

Tower Existing and Rehabilitation Calculation Summary

General Information

Material Specifications

Structural Steel (CSA G40-4 or ASTM A7) - Original Steel

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***
Unit Weight =	77	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
G_s =	77000	MPa	

Structural Steel - 1982 Rehabilitation - Strength not listed on rehabilitation drawings

F_y =	300	MPa	***[CSA S6-19 cl. 14.7.4.2, Table 14.1]***
F_u =	450	MPa	***[CSA S6-19 cl. 14.7.4.2, Table 14.1]***

Reinforced Concrete - Deck

f'_c =	20	MPa	***[CSA S6-19 cl. 14.7.4.4 - unknown concrete strength]***
f_{cr} =	1.79	MPa	***[CSA S6-19 cl. 8.4.1.8.1]***
Unit Weight =	24	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
E_c =	21656	MPa	

[Slab details not provided on original construction drawings - reinforcement unknown]

Asphalt

Unit Weight =	23.5	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Plain Concrete - Sidewalk Deck

Unit Weight =	23.5	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Aluminum

Unit Weight =	27.0	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

General Information

Total Length of Floor Beam	15.0014		***[Considered length from faces of tower columns]***

1.0 Load Combination for Lift Bridge - Bridge Open *CSA S6-19 Table 3.1*

1. SLS Combination 1: Permanent loads consisting of dead loads and superimposed dead loads. Transitory loads consisting of live load (0.9 x CL 625-ONT truck).

2. ULS Combination 1: Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of vehicular live load (1.70 x CL 625-ONT) and pedestrian live load (0.2 x 1.70 x P).

4. ULS Combination 4: Permanent loads consisting of dead and superimposed dead loads. Transitory loads consisting of temperature effects (1.25 x K) and wind (1.4 x W).

Category 1 – Bridge Lifted *CSA S6-19 Table 13.3, 13.4*

1. ULS Combination V1: Permanent loads consisting of dead loads and superimposed dead loads. Operating Impact of 120% applied to the maximum dead load effect in all members that are in motion and to the load effect on a stationary member caused by the moving dead load. Operation of machinery loads of 155% caused by moving of stopping the lift span.

2. ULS Combination V2: Permanent loads consisting of dead loads and superimposed dead loads. Wind Load of 120% with the bridge open in any position. Operating Impact of 120% applied to the maximum dead load effect in all members that are in motion and to the load effect on a stationary member caused by the moving dead load. Operation of machinery loads of 125% caused by moving of stopping the lift span.

3. ULS Combination V3: Permanent loads consisting of dead loads and superimposed dead loads. Wind Load of 150% with the bridge open in any position. Operating Impact of 120% applied to the maximum dead load effect in all members that are in motion and to the load effect on a stationary member caused by the moving dead load.

Category 2 – Bridge Closed, Counterweights Supported

8. **ULS Combination V4:** Permanent loads consisting of dead loads and superimposed dead loads with counterweights supported. Transitory loads consisting of vehicular live load (1.70 x CL 625-ONT) and pedestrian live load (0.2 x 1.70 x P).

Loads

Operation of Machinery Load

1.2 GENERAL DATA

$W_{span} := 1838 tonne$ — Weigth of span

$W_{cwt} := W_{span}$ — Weigth of counterweight (hypothesis)

$W_{sheave} := 50000 lb$ — Weight of sheave (hypothesis)

$W_{trunnion} := 7500 lb$ — Weight of trunnion (hypothesis)

$W_{gear} := 8 \cdot 540 lb$ — Weight of gear sets (per sheave) (hypothesis)

$W_{total} := W_{span} + W_{cwt} + 8 \cdot W_{sheave} + 8 W_{trunnion} + 8 W_{gear} = 8.599 \times 10^{6} \cdot lb$ — Weight to be lifted

		lbs	889.6444	kN
8	50000.00	lbs	133.44666	kN
8	7500.00	lbs	151.9512635	kN
8	8540.00			
		Total x 4 =	1175.042324	kN
			146.8802904	kN

Stress and Force: A20R|B20L North Front Panel 1

Rail Side Columns Front Leg (100) Panel 1 A20R & B20L (ULS 4) Existing		
Axial	ULS Max	-13693
	ULS Min	-13723
IY Bending	ULS Max	722
	ULS Min	0
IZ Bending	ULS Max	1145
	ULS Min	0

Composite Member Properties		
A_{gross} =	216875.0	mm^2
A_{RHM*}=	45483.8	mm^2
A_{net} =	171391.2	mm^2
∑Iyy =	25185.6	$x10^6 mm^4$
∑Izz =	32146.8	$x10^6 mm^4$
ybar=	609.6	mm
zbar=	528.6	mm

Applied Stresses & Forces			
	Formula	Value	Unit
Stress Y =	Iy bending |ULS| * zbar / Iyy	15	MPa
Stress Z =	Iz bending |ULS| * ybar / Izz	22	MPa
Force =	(Stress Y + Stress Z) * A_{net}	6319	kN
Tension Combined Force =	Axial ULS Max + Force	-7374	kN
Compression Combined Force =	Axial ULS Min - Force	-20042	kN

***Calculation process applies to all other members**

Case 0 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12566	-12544	-11767	-11493	-10782	-10584	-10248	-10215	-10020	-12204	-12191	-11317	-10663.1	-10485.7	-10187.3	-10153.88	-9972.13
	ULS Min	-12596	-12555	-11809	-11650	-10919	-10721	-10310	-10248	-10115	-12235	-12201	-11516	-10800.2	-10622.8	-10248.7	-10187.3	-10066.9
IY Bending	ULS Max	0	-54	-51	77	66	105	110	112	112	26	34	71	70.12	108.6	108.63	106.62	105.41
	ULS Min	-54	-78	-76	63	64	66	105	110	55	0	26	36	63.67	63.53	106.62	105.41	67.75
IZ Bending	ULS Max	0	-41	118	437	-43	267	267	-45	227	88	118	147	161.98	150.8	45.06	215.46	215.45
	ULS Min	-41	-47	-6	266	-163	-163	-45	-215	-215	0	88	22	150.78	-268.03	-268.01	45.06	-222.42
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961.3	158961.3	106461.8	106461.8	106461.8
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19625.7	19625.7	17389.3	17389.3	17389.3
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26311.7	26311.7	17178.7	17178.7	17178.7
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	609.6	609.6	609.6	609.6	609.6
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	609.6	609.6	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.135	1.640	1.586	1.608	1.849	2.941	3.489	3.568	3.568	0.541	0.724	1.492	1.968	3.049	3.460	3.396	3.358
	Stress due to bending Z	0.783	0.900	2.238	8.279	3.783	6.193	9.486	7.615	8.060	1.668	2.243	2.795	3.753	6.210	9.511	7.646	7.893
Force (kn) =		329	435	655	1695	895	1452	1381	1191	1238	378	508	735	909	1472	1381	1176	1198
Tension Combined Force (kN) =		-12237	-12109	-11111	-9798	-9887	-9132	-8867	-9024	-8782	-11826	-11682	-10582	-9754	-9014	-8806	-8978	-8774
Compression Combined Force (kN) =		-12924	-12990	-12464	-13344	-11815	-12173	-11691	-11439	-11353	-12613	-12710	-12250	-11710	-12095	-11630	-11363	-11265
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.20	0.20	0.19	0.21	0.18	0.19	0.31	0.31	0.305	0.20	0.20	0.19	0.18	0.19	0.31	0.31	0.30
Case 0 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4062	-4051	-2913	-2589	-2302	-2196	-1994	-1840	-1976	-3740.11	-3721.13	-2513.19	-2217.16	-2094.71	-1847.05	-1664.91	-1754.08
	ULS Min	-4076	-4056	-2931	-2658	-2380	-2274	-2072	-1918	-2006	-3753.35	-3725.79	-2600.54	-2295.28	-2172.83	-1925.17	-1743.03	-1784.79
IY Bending	ULS Max	4	9	12	47	43	43	43	160	156	12.31	15.28	29.76	31.59	41.39	44.53	167.02	168.41
	ULS Min	0	4	-37	-20	28	27	42	42	-166	0	6.02	7.01	31.33	31.57	41.31	44.5	-210.88
IZ Bending	ULS Max	0	-66	-36	282	-25	49	49	95	315	34.22	63.83	99.34	99.62	15.63	29.95	39.18	39.12
	ULS Min	-66	-83	-124	162	-40	-24	-41	-40	95	0	29.32	33.94	15.63	-49.73	-49.73	29.94	-510.08
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.189	0.462	1.902	2.391	2.208	2.179	2.196	8.184	8.463	0.628	0.779	1.518	1.611	2.111	2.271	8.517	10.754
	Stress due to bending Z	1.969	2.474	3.670	8.385	1.194	1.464	1.459	2.821	9.350	1.016	1.896	2.951	2.959	1.477	1.477	1.164	15.152
Force (kn) =		169	229	435	841	266	284	285	859	1391	128	209	349	357	280	293	756	2023
Tension Combined Force (kN) =		-3894	-3822	-2478	-1748	-2037	-1911	-1709	-981	-585	-3612	-3512	-2164	-1860	-1815	-1554	-909	269
Compression Combined Force (kN) =		-4244	-4285	-3366	-3499	-2646	-2558	-2357	-2777	-3397	-3882	-3935	-2949	-2652	-2453	-2218	-2499	-3807
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.21	0.21	0.16	0.17	0.13	0.12	0.11	0.13	0.16	0.19	0.19	0.14	0.13	0.12	0.11	0.12	0.18

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	191.49	191.49	295.14	322.53	404.45	148.96	-302.62	-321.29	-183.08	-200.15	-149.67	-170.54	-216.94	-227.15	-243.33	-267.45	-36.36	-879.85
	ULS Min	191.49	191.49	286.11	305.42	376.41	102.46	-343.9	-366.17	-227.29	-253.97	-194.85	-221.98	-262	-280.24	-288.9	-318.45	-49.52	-890.77
IY Bending	ULS Max	0	0	39.74	41.12	40.4	39.62	3.35	0	5.4	16.24	5.34	20.72	3.25	22.91	4.48	23.79	0	28.68
	ULS Min	0	0	0	0	0	0	-19.25	0	-20.33	0	-19.82	0	-25.3	0	-21	0	0	0
IZ Bending	ULS Max	0	0	0	0.25	0	0	0	0	0.46	1.14	0	0.17	0	0.77	0	2.29	0	0
	ULS Min	0	0	-5.49	-7.78	-34.19	-38.39	-1.2	0	-0.51	0	-0.56	0	-2.92	0	-5.52	0	0	-5.55
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	8	0	8	7	8	9	11	10	9	10	0	10
	Stress Z	0	0	1	1	4	4	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	259	272	319	322	131	0	137	111	134	139	175	155	151	164	0	189
Tension Combined Force (kN) =		191	191	554	595	723	471	-171	-321	-46	-89	-16	-31	-42	-72	-92	-104	-36	-691
Compression Combined Force (kN) =		191	191	27	33	58	-220	-475	-366	-365	-365	-329	-361	-437	-435	-440	-482	-50	-1080
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.12	0.13	0.16	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.06	0.15	0.11	0.11	0.11	0.10	0.11	0.13	0.13	0.14	0.15	0.01	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	234.3	367.42	291.74	316.84	397.19	92.85	-263.54	-255.59	-180.15	-202.52	-147.96	-164.84	-201.44	-232.54	-250.37	-270.2	-664.55	-28.96
	ULS Min	234.3	358.6	290.79	316.07	395.7	88.82	-310.77	-322.39	-234.42	-246.74	-199.48	-210.13	-254.94	-277.73	-301.89	-315.2	-676.77	-42.12
IY Bending	ULS Max	0	0	39.24	39.23	39.53	41.05	0	40.58	15.15	5.51	20.3	5.36	21.72	3.5	23.08	5.14	24.81	0
	ULS Min	0	-26.58	0	0	0	0	-6.32	0	0	-20.38	0	-19.82	0	-25.37	0	-21.15	0	0
IZ Bending	ULS Max	0	0	0	1.18	0	1.74	0	2.41	0.89	0	0.41	0.09	0	0.71	0.65	1.05	0.28	0
	ULS Min	0	-1.8	-1.25	0	-0.79	0	-3.29	0	0	-1.41	0	-0.16	-0.4	0	0	0	-0.53	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	8	14	14	14	14	3	17	6	8	8	8	9	11	10	9	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	145	248	247	248	260	48	277	103	139	137	133	147	172	156	144	156	0
Tension Combined Force (kN) =		234	512	539	564	646	353	-215	21	-77	-63	-11	-31	-55	-61	-94	-126	-509	-29
Compression Combined Force (kN) =		234	214	43	69	147	-171	-359	-599	-338	-386	-337	-343	-401	-449	-458	-459	-833	-42
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.10	0.12	0.12	0.14	0.08	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.11	0.19	0.10	0.12	0.10	0.11	0.12	0.14	0.14	0.14	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	343.18	63.57	744.05	110.08	-518.16	-549.81	-546.2	-539.43	-690.87	-697.3	-618.7	-623.98	-130.88	23.26
	ULS Min	343.18	46.85	744.05	102.21	-543.65	-575.3	-571.69	-564.93	-713.22	-719.66	-641.05	-646.33	-138.55	14.42
IY Bending	ULS Max	519.01	0	23.71	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-471.23	-50.58	0	-15.19	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.79	0	0.06	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.41	-0.45	0	-0.95	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	5	17	9	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		438	336	169	110	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		781	400	913	220	-518	-550	-546	-539	-691	-697	-619	-624	-131	23
Compression Combined Force (kN) =		-95	-289	575	-7	-544	-575	-572	-565	-713	-720	-641	-646	-139	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.20	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	0.00	0.14	0.15	0.15	0.15	0.21	0.22	0.19	0.19	0.44	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	157.17	11.29	212.62	51.43	196.13	-193.52	-197.82	-143.07	-156.93	-175.47	-156.74	-47.74	-130.37	-18.38	29.38
	ULS Min	152.18	-1.99	199.04	8.52	196.13	-216.52	-220.81	-166.06	-179.92	-198.47	-179.73	-70.74	-153.36	-27.21	21
IY Bending	ULS Max	236.86	10.44	16.95	11.76	98.64	0	0	0	0	0	0	0	0	0	0
	ULS Min	-210.37	-19.68	-7.65	-15.93	98.64	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.99	3.5	3.29	5.51	17.11	0	0	0	0	0	0	0	0	0	0
	ULS Min	-5.89	0	0	0	17.11	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		222	146	126	123	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		379	157	339	174	499	-194	-198	-143	-157	-175	-157	-48	-130	-18	29
Compression Combined Force (kN) =		-70	-148	73	-114	-107	-217	-221	-166	-180	-198	-180	-71	-153	-27	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.08	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.04	0.05	0.05	0.05	0.02	0.04	0.09	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	23637.72	23637.72	3442.09	1613.48	1914.49	1619.27	812.24
	ULS Min	0	0	-1012	-10	-12	-10	-542
Shear	Fz Max	9362	9362	1360	2178	2307	2141	1151
	Fz Min	-9288	-9288	-1352	-336	-2235	-321	-361
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.434	0.576	0.171	0.155	0.155	0.155	0.155
		0.258	0.490	0.252	0.521	0.552	0.512	0.501

Case 0 - ULS 4 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-13693	-13667	-13292	-13045	-11280	-11610	-10380	-10347	-10415	-7519	-7505	-6965	-8482	-8621	-9861	-9828	-9752
	ULS Min	-13723	-13678	-13334	-13202	-11417	-11747	-10441	-10380	-10510	-7549	-7515	-7165	-8619	-8758	-9923	-9862	-9847
IY Bending	ULS Max	722	1024	1024	775	110	105	563	563	186	471	609	611	91	96	507	507	123
	ULS Min	0	722	630	-138	-152	-36	-36	-56	-56	0	471	-41	-27	-10	-10	-27	-27
IZ Bending	ULS Max	1145	1468	2576	8638	1760	243	243	-14	501	1161	1523	8077	1905	-10	972	972	-6
	ULS Min	0	1145	1329	2693	-332	-332	-14	-161	-161	0	1161	1419	-10	-678	-678	-59	-59
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	15.160	21.498	21.494	16.277	4.261	2.945	17.930	17.930	5.911	9.896	12.789	12.818	2.556	2.685	16.164	16.164	3.916
	Stress due to bending Z	21.712	27.832	48.849	163.810	40.787	7.696	8.634	5.714	17.788	22.013	28.882	153.159	44.135	15.708	34.481	34.481	2.082
Force (kn) =		6320	8455	12056	30865	7161	1691	2828	2517	2523	5469	7142	28447	7422	2924	5392	5392	639
Tension Combined Force (kN) =		-7373	-5212	-1235	17821	-4119	-9919	-7552	-7830	-7892	-2050	-363	21482	-1059	-5697	-4470	-4436	-9114
Compression Combined Force (kN) =		-20043	-22133	-25390	-44067	-18578	-13439	-13269	-12897	-13033	-13018	-14658	-35612	-16041	-11681	-15315	-15253	-10486
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.32	NA	NA	NA	NA	NA	NA	NA	0.38	NA	NA	NA	NA	NA
		0.31	0.34	0.39	0.68	0.29	0.21	0.36	0.35	0.35	0.20	0.23	0.55	0.25	0.18	0.41	0.41	0.28
Case 0 - ULS 4 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-7140	-7124	-5603	-5346	-3659	-3016	-1906	-1476	-1354	-2784	-2762	-1401	-1415	-981	-999	-721	-1069
	ULS Min	-7154	-7129	-5621	-5415	-3737	-3094	-1984	-1554	-1385	-2797	-2767	-1489	-1493	-1059	-1077	-799	-1100
IY Bending	ULS Max	240	250	338	294	48	47	70	152	140	121	201	203	37	47	73	142	151
	ULS Min	0	240	258	-66	-82	45	44	69	-114	0	111	-22	-16	37	47	73	-156
IZ Bending	ULS Max	467	508	750	3743	611	52	52	-17	406	372	439	3448	681	-47	38	38	-94
	ULS Min	0	467	646	973	-124	-124	-18	-66	-68	0	389	546	-89	-89	-47	-141	-141
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	12.221	12.730	17.235	14.982	4.178	2.397	3.580	7.765	7.143	6.176	10.244	10.340	1.895	2.403	3.732	7.229	7.948
	Stress due to bending Z	13.876	15.082	22.290	111.179	18.155	3.675	1.548	1.969	12.071	11.036	13.054	102.430	20.238	2.631	1.389	4.186	4.188
Force (kn) =		2038	2171	3086	9850	1744	474	400	760	1500	1344	1819	8805	1728	393	400	891	948
Tension Combined Force (kN) =		-5103	-4953	-2517	4504	-1915	-2541	-1505	-716	146	-1440	-943	7404	313	-588	-599	171	-122
Compression Combined Force (kN) =		-9191	-9301	-8707	-15265	-5481	-3568	-2384	-2314	-2885	-4141	-4586	-10293	-3221	-1452	-1477	-1690	-2048
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	0.01	NA	NA	0.34	0.01	NA	NA	0.01	NA
		0.44	0.45	0.42	0.74	0.26	0.17	0.11	0.11	0.13	0.20	0.22	0.50	0.15	0.07	0.07	0.08	0.09

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	766.81	766.81	381.97	394.95	584.6	124.92	1237.2	1137.14	764.86	801.12	787.66	844.41	476.79	422.09	-19.71	-18.71	145.61	-683.36
	ULS Min	-327.85	-327.85	160.46	180.02	142.25	-20.72	-2003.58	-1637.51	-1281.39	-1137.97	-1241.28	-1111.37	-1037.93	-835.97	-576.24	-536.29	-19.09	-839.01
IY Bending	ULS Max	0	0	56.31	55.32	49.49	44.21	14.39	0	17.62	28.08	18.44	39.71	11.2	36.04	7.11	28.49	0	28.08
	ULS Min	0	0	0	0	0	0	-40.31	0	-32.65	-4.72	-31.12	-1.16	-33.05	0	-25.46	0	0	0
IZ Bending	ULS Max	0	0	82.74	112.09	74.42	38.94	98.35	0	91.45	31.84	72.11	4.99	76.05	8.69	77.5	9.78	0	7.35
	ULS Min	0	0	-70.53	-101.62	-109.96	-78.48	-51.66	0	-45.37	-35.35	-21.71	-8.97	-26.67	-12.2	-27.52	-10.38	0	-8.08
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	19	17	15	17	0	14	12	13	17	14	15	11	12	0	10
	Stress Z	0	0	9	12	12	8	11	0	10	4	8	1	9	1	9	1	0	1
Force (kn) =		0	0	513	564	523	429	449	0	385	253	340	283	360	264	311	210	0	190
Tension Combined Force (kN) =		767	767	895	959	1108	554	1686	1137	1150	1054	1127	1127	836	686	292	191	146	-494
Compression Combined Force (kN) =		-328	-328	-352	-384	-381	-450	-2452	-1638	-1666	-1391	-1581	-1394	-1398	-1100	-888	-746	-19	-1029
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.15	0.20	0.21	0.24	0.12	0.41	0.27	0.28	0.25	0.27	0.27	0.20	0.17	0.07	0.05	0.03	NA
		0.01	0.09	0.10	0.11	0.11	0.13	0.76	0.51	0.51	0.43	0.49	0.43	0.43	0.34	0.27	0.23	0.01	0.29

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	730.73	481.01	363.89	377.51	567.63	62.86	1019.97	1154.88	691.49	689.54	755.37	751.24	389.76	467.15	-10.38	-32.16	-501.92	169.48
	ULS Min	-320.48	191.48	162.23	208.04	173.88	-43.39	-1495.59	-1764.47	-1039.61	-1160.38	-1045.24	-1146.51	-794.38	-989.48	-518.16	-589.2	-615.14	-14.78
IY Bending	ULS Max	0	57.87	51.38	48.68	44.74	42.8	6.76	71.84	36.75	18.08	37.99	17.52	34.1	11.05	27.48	7.93	24.27	0
	ULS Min	0	-108.14	0	0	0	0	-16.66	-2.59	-7.92	-31.91	0	-30.81	0	-32.73	0	-25.17	0	0
IZ Bending	ULS Max	0	29.62	34.76	38.79	37.15	34.06	112.49	37.2	16.96	23.15	6.48	14.69	6.16	16.21	6.95	17.48	2.15	0
	ULS Min	0	-52.6	-12.67	-10.24	-10.36	-9.84	-65.48	-38.94	-13.04	-71.29	-1.6	-65.87	-1.96	-68.57	-1.6	-75.68	-9.96	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	31	18	17	16	15	7	30	15	13	16	13	14	14	11	10	9	0
	Stress Z	0	5	4	4	4	4	13	4	2	8	1	7	1	8	1	9	1	0
Force (kn) =		0	670	389	380	352	334	316	553	277	343	267	326	240	344	197	306	169	0
Tension Combined Force (kN) =		731	1151	752	757	919	396	1336	1708	969	1033	1022	1077	630	811	187	274	-332	169
Compression Combined Force (kN) =		-320	-479	-226	-172	-178	-377	-1811	-2317	-1317	-1504	-1312	-1473	-1034	-1333	-715	-895	-785	-15
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.22	0.16	0.17	0.20	0.09	0.32	0.41	0.23	0.25	0.25	0.26	0.15	0.20	0.04	0.07	NA	0.04
		0.01	0.13	0.06	0.05	0.05	0.11	0.56	0.72	0.41	0.46	0.40	0.45	0.32	0.41	0.22	0.28	0.22	0.00

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	411.74	412.19	846.75	171.57	1238.15	1161.92	663.27	711.12	283.96	229.87	-151.21	-117.41	-95.2	23.78
	ULS Min	254.15	-269.61	594.18	-473.4	-2327.48	-2394.38	-1908.53	-1857.86	-1726.98	-1776.51	-1229.17	-1199.84	-179.06	13.74
IY Bending	ULS Max	8154.35	0	26.42	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8895.34	-57.31	0	-16.2	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	146.32	237.21	73.42	268.54	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.61	-113.84	-35.15	-99.3	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	90	19	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	17	6	22	0	0	0	0	0	0	0	0	0	0
Force (kn) =		7765	732	296	511	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8177	1144	1143	682	1238	1162	663	711	284	230	-151	-117	-95	24
Compression Combined Force (kN) =		-7511	-1002	298	-984	-2327	-2394	-1909	-1858	-1727	-1777	-1229	-1200	-179	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.40	0.22	0.25	0.15	0.24	0.22	0.13	0.14	0.06	0.05	NA	NA	NA	0.02
		0.48	0.25	NA	0.27	0.61	0.63	0.50	0.49	0.52	0.53	0.37	0.36	0.57	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	239.8	207.36	296	109.6	136.7	649.21	614.2	408.57	426.5	301.56	283.29	323.26	286.87	47.21	32.23
	ULS Min	-16.68	-231.98	-0.33	-72.41	77.34	-958.89	-960.99	-641.28	-648.17	-564.44	-547.94	-383.05	-443.86	-75.77	19.6
IY Bending	ULS Max	3975.43	15.82	20.29	16.27	115.13	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4319.25	-22.62	-13.62	-18.63	89.41	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	169.13	239.94	97.78	267.73	123.73	0	0	0	0	0	0	0	0	0	0
	ULS Min	-100.57	-120.84	-56.24	-136.93	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	52	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	13	24	10	26	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4355	544	301	560	634	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4595	751	597	669	770	649	614	409	427	302	283	323	287	47	32
Compression Combined Force (kN) =		-4372	-776	-301	-632	-556	-959	-961	-641	-648	-564	-548	-383	-444	-76	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.27	0.18	0.14	0.16	0.06	0.14	0.13	0.09	0.09	0.07	0.06	0.07	0.06	0.04	0.03
		0.34	0.30	0.12	0.24	0.06	0.25	0.25	0.17	0.17	0.15	0.14	0.10	0.12	0.24	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
Members		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	24872.61	24872.61	2280.01	1778.81	1835.11	1742.83	494.91
	ULS Min	0	0	-1093	-10	-12	-17	-481
Shear	Fz Max	9830	9830	946	2391	2405	2302	1116
	Fz Min	-9869	-9869	-988	-262	-2418	-257	-657
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.456	0.606	0.113	0.170	0.149	0.167	0.094
		0.272	0.516	0.183	0.572	0.578	0.551	0.486

Case 0 - ULS V1 D/C		North Tower																	
		Rail Side Columns									HWY Side Columns								
		Front Leg (100-110)									Front Leg (200-209)								
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-14383	-14361	-13554	-13280	-12506	-12310	-11954	-11921	-11731	-14034	-14021	-13118	-12397	-12223	-11904	-11870	-11694
	ULS Min	-14413	-14372	-13596	-13437	-12643	-12447	-12016	-11954	-11826	-14065	-14031	-13317	-12534	-12360	-11965	-11904	-11788
IY Bending	ULS Max	0	-54	-44	84	82	122	140	150	150	26	35	89	88	127	137	142	142
	ULS Min	-54	-78	-75	81	80	80	122	140	3	0	26	37	78	78	127	137	17
IZ Bending	ULS Max	0	-46	119	462	-50	312	312	-53	266	93	125	155	178	178	54	254	254
	ULS Min	-46	-54	-12	267	-190	-190	-53	-251	-251	0	93	-6	169	-313	-313	54	-265
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.131	1.636	1.581	1.763	2.299	3.433	4.467	4.775	4.775	0.550	0.730	1.877	2.484	3.556	4.356	4.526	4.526
	Stress due to bending Z	0.870	1.017	2.251	8.761	4.402	7.222	11.061	8.920	9.446	1.763	2.364	2.943	4.125	7.242	11.091	9.000	9.407
	Force (kn) =	343	455	657	1804	1065	1694	1653	1458	1514	396	530	826	1051	1716	1645	1440	1483
	Tension Combined Force (kN) =	-14040	-13907	-12897	-11477	-11440	-10616	-10301	-10463	-10217	-13638	-13490	-12292	-11346	-10506	-10259	-10430	-10210
	Compression Combined Force (kN) =	-14756	-14826	-14253	-15241	-13708	-14140	-13669	-13412	-13340	-14461	-14561	-14144	-13585	-14076	-13610	-13344	-13272
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.23	0.23	0.22	0.24	0.21	0.22	0.37	0.36	0.36	0.22	0.23	0.22	0.21	0.22	0.37	0.36	0.36

Case 0 - ULS V1 D/C		North Tower																	
		Rail Side Columns									HWY Side Columns								
		Rear Leg (300-310)									Rear Leg (400-409)								
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4265	-4254	-3087	-2764	-2475	-2371	-2164	-2009	-2136	-3938	-3919	-2686	-2387	-2268	-2015	-1829	-1905
	ULS Min	-4278	-4259	-3106	-2833	-2553	-2449	-2243	-2088	-2167	-3952	-3924	-2774	-2466	-2346	-2093	-1907	-1935
IY Bending	ULS Max	5	11	13	55	51	51	53	173	168	12	14	37	39	50	54	181	183
	ULS Min	0	5	-38	-20	34	33	50	51	-173	0	5	6	38	38	50	54	-229
IZ Bending	ULS Max	0	-68	-36	282	-27	53	53	109	331	35	65	98	101	18	33	39	39
	ULS Min	-68	-85	-125	166	-42	-27	-45	-44	109	0	30	34	18	-54	-54	33	-547
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.234	0.538	1.938	2.816	2.621	2.613	2.677	8.820	8.814	0.587	0.739	1.892	1.979	2.541	2.745	9.249	11.669
	Stress due to bending Z	2.013	2.519	3.714	8.379	1.239	1.585	1.579	3.232	9.829	1.041	1.928	2.910	3.013	1.603	1.603	1.159	16.249
	Force (kn) =	175	239	441	874	301	328	332	941	1456	127	208	375	390	324	339	813	2180
	Tension Combined Force (kN) =	-4090	-4015	-2646	-1890	-2173	-2044	-1832	-1068	-681	-3811	-3711	-2312	-1998	-1944	-1675	-1017	275
	Compression Combined Force (kN) =	-4454	-4497	-3547	-3707	-2854	-2777	-2575	-3029	-3623	-4079	-4132	-3149	-2855	-2670	-2432	-2720	-4115
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.22	0.22	0.17	0.18	0.14	0.13	0.12	0.14	0.17	0.20	0.20	0.15	0.14	0.13	0.12	0.13	0.19

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	217.24	217.24	336.06	368.8	465.35	209.45	-341.9	-363.05	-211.75	-230.18	-174.46	-196.85	-252.91	-266.26	-283.03	-295.68	-93.6	-885.93
	ULS Min	217.24	217.24	325.34	348.87	432.18	155.13	-383.2	-408.43	-255.89	-284.56	-219.61	-248.74	-297.9	-320.08	-328.62	-347.36	-106.76	-896.8
IY Bending	ULS Max	0	0	39.89	41.45	40.52	39.13	2.32	0	4.92	17.04	4.9	21.75	2.47	24.36	3.85	25.12	0	29.05
	ULS Min	0	0	0	0	0	0	-20.95	0	-21.93	0	-21.35	0	-27.74	0	-23.23	0	0	0
IZ Bending	ULS Max	0	0	0	0.3	0	0	0	0	0.54	1.13	0	0.24	0	0.89	0	2.66	0	0
	ULS Min	0	0	-6.12	-8.68	-38.52	-43.75	-1.21	0	-0.44	0	-0.62	0	-3.42	0	-5.99	0	0	-5.89
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	9	0	9	7	9	9	12	10	10	10	0	10
	Stress Z	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	261	276	328	330	143	0	148	116	144	146	192	165	167	173	0	192
Tension Combined Force (kN) =		217	217	597	645	793	539	-199	-363	-64	-114	-30	-50	-60	-101	-116	-122	-94	-694
Compression Combined Force (kN) =		217	217	64	73	104	-174	-526	-408	-404	-401	-364	-395	-490	-485	-495	-521	-107	-1089
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.13	0.14	0.17	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.16	0.13	0.12	0.12	0.11	0.12	0.15	0.15	0.15	0.16	0.03	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	260.51	416.38	332.74	363.16	458.25	145.83	-301.79	-289.4	-209.14	-233.1	-173.26	-190.61	-239.28	-269.72	-278.42	-313.91	-645.77	-87.24
	ULS Min	260.51	406.74	331.52	362.12	456.55	141.91	-349.8	-357.97	-264	-277.26	-225.22	-235.88	-293.55	-314.86	-330.67	-358.85	-658.09	-100.41
IY Bending	ULS Max	0	0	39.3	39.3	39.59	40.92	0	42.58	15.88	5.02	21.33	4.91	23.06	2.74	24.37	4.6	24.71	0
	ULS Min	0	-31.45	0	0	0	0	-5.33	0	0	-22	0	-21.36	0	-27.81	0	-23.36	0	0
IZ Bending	ULS Max	0	0	0	1.29	0	1.66	0	2.63	0.91	0	0.47	0	0	0.81	0.72	0.9	0.26	0
	ULS Min	0	-2.04	-1.49	0	-0.89	0	-3.6	0	0	-1.56	0	-0.23	-0.46	0	0	0	-0.55	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	9	14	14	14	14	2	18	7	9	9	9	10	12	10	10	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	171	248	248	249	259	42	291	108	151	144	144	156	188	165	158	155	0
Tension Combined Force (kN) =		261	588	581	611	707	405	-259	1	-101	-83	-29	-47	-84	-82	-114	-155	-491	-87
Compression Combined Force (kN) =		261	235	83	114	207	-117	-392	-649	-372	-428	-369	-380	-449	-503	-496	-517	-813	-100
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.11	0.13	0.13	0.15	0.09	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.03	0.12	0.20	0.11	0.13	0.11	0.12	0.14	0.15	0.15	0.16	0.23	0.03

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	391.66	73.97	866.59	128.56	-599.63	-629.9	-642.77	-637.1	-802.94	-807.72	-729.97	-737.63	-155.88	21.59
	ULS Min	391.66	57.44	866.59	120.21	-625.12	-655.4	-668.26	-662.6	-825.3	-830.07	-752.32	-759.98	-163.55	12.75
IY Bending	ULS Max	584.25	0	30.36	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-503.18	-53.73	0	-14.69	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.03	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.5	-0.56	0	-1.18	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	18	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		487	357	216	106	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		879	431	1083	235	-600	-630	-643	-637	-803	-808	-730	-738	-156	22
Compression Combined Force (kN) =		-96	-300	650	14	-625	-655	-668	-663	-825	-830	-752	-760	-164	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.24	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	NA	0.16	0.17	0.18	0.17	0.25	0.25	0.23	0.23	0.52	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	165.7	12.28	230.34	57.57	212.18	-205.69	-211.31	-158.85	-171.92	-188.5	-169.35	-56.95	-147.17	-22.2	29.21
	ULS Min	159.61	-1.19	215.49	9.83	212.18	-228.69	-234.3	-181.84	-194.91	-211.5	-192.35	-79.94	-170.17	-31.04	20.82
IY Bending	ULS Max	247.82	10.41	17.44	11.83	97.68	0	0	0	0	0	0	0	0	0	0
	ULS Min	-216.91	-19.85	-6.94	-15.76	97.68	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.31	4.1	3.61	6.04	18.09	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7.59	0	0	0	18.09	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		239	148	130	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		405	161	361	180	515	-206	-211	-159	-172	-189	-169	-57	-147	-22	29
Compression Combined Force (kN) =		-79	-149	85	-112	-91	-229	-234	-182	-195	-212	-192	-80	-170	-31	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.09	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.06	0.05	0.02	0.04	0.10	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	28153.35	28153.35	3693.33	1948.72	2314.81	1937.45	814.1
	ULS Min	0	0	-1085	-10	-12	-10	-550
Shear	Fz Max	11169	11169	1468	2626	2773	2538	1275
	Fz Min	-11060	-11060	-1485	-365	-2688	-358	-400
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.517	0.686	0.183	0.187	0.188	0.186	0.155
		0.308	0.584	0.275	0.628	0.663	0.607	0.555

Case 0 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-17782	-17757	-16990	-16666	-14246	-14147	-12593	-12560	-12445	-11413	-11399	-10533	-11431	-11190	-12088	-12055	-11816
	ULS Min	-17812	-17767	-17033	-16823	-14383	-14284	-12655	-12593	-12540	-11443	-11410	-10732	-11568	-11327	-12149	-12088	-11910
IY Bending	ULS Max	128	219	220	251	91	108	197	197	135	0	-41	119	131	133	151	160	160
	ULS Min	0	128	24	46	34	87	108	135	25	-42	-80	-78	79	83	133	151	-29
IZ Bending	ULS Max	1118	1435	2631	8670	1750	306	306	-22	536	1179	1554	8063	1937	27	967	967	-6
	ULS Min	0	1118	1339	2847	-370	-370	-22	-207	-207	0	1179	1480	27	-734	-734	-6	-53
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	2.691	4.600	4.622	5.259	2.557	3.030	6.278	6.278	4.293	0.871	1.677	2.503	3.680	3.743	4.801	5.098	5.098
	Stress due to bending Z	21.195	27.216	49.895	164.413	40.543	8.577	10.856	7.358	19.030	22.358	29.460	152.893	44.874	17.009	34.330	34.330	1.892
Force (kn) =		4094	5453	9344	29080	6851	1845	1824	1452	2483	3981	5337	26634	7718	3299	4166	4198	744
Tension Combined Force (kN) =		-13688	-12304	-7646	12414	-7395	-12302	-10769	-11108	-9962	-7432	-6062	16101	-3713	-7891	-7922	-7857	-11071
Compression Combined Force (kN) =		-21906	-23220	-26376	-45903	-21234	-16130	-14479	-14045	-15023	-15424	-16747	-37366	-19286	-14625	-16315	-16286	-12655
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.22	NA	NA	NA	NA	NA	NA	NA	0.29	NA	NA	NA	NA	NA
		0.34	0.36	0.41	0.71	0.33	0.25	0.39	0.38	0.40	0.24	0.26	0.58	0.30	0.23	0.44	0.44	0.34

Case 0 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6368	-6352	-5079	-4666	-3529	-3320	-2542	-2304	-2177	-2002	-1981	-890	-1390	-1344	-1642	-1532	-1851
	ULS Min	-6381	-6356	-5097	-4735	-3607	-3398	-2620	-2382	-2207	-2015	-1986	-977	-1468	-1422	-1720	-1610	-1881
IY Bending	ULS Max	24	24	149	123	46	51	56	182	167	0	-32	48	53	54	58	179	188
	ULS Min	0	-32	-23	10	-2	45	50	54	-169	-44	-52	-32	38	38	54	58	-231
IZ Bending	ULS Max	413	452	734	3761	614	61	62	-26	555	379	465	3533	705	-57	46	46	-129
	ULS Min	0	413	548	1163	-129	-128	-28	-40	-42	0	391	541	-85	-85	-57	-128	-301
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.210	1.614	7.584	6.247	2.342	2.621	2.834	9.272	8.606	2.257	2.648	2.448	2.682	2.755	2.977	9.145	11.756
	Stress due to bending Z	12.268	13.417	21.791	111.710	18.237	3.796	1.827	1.201	16.481	11.246	13.813	104.950	20.947	2.511	1.682	3.814	8.946
Force (kn) =		1052	1174	2293	9210	1607	501	364	818	1959	1054	1285	8385	1845	411	364	1012	1616
Tension Combined Force (kN) =		-5315	-5178	-2785	4544	-1922	-2819	-2178	-1486	-218	-948	-696	7495	455	-933	-1278	-520	-234
Compression Combined Force (kN) =		-7433	-7530	-7391	-13944	-5214	-3899	-2984	-3199	-4166	-3069	-3271	-9363	-3312	-1833	-2084	-2622	-3498
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	NA	NA	NA	0.34	0.02	NA	NA	NA	NA
		0.36	0.36	0.36	0.67	0.25	0.19	0.14	0.15	0.19	0.15	0.16	0.45	0.16	0.09	0.10	0.13	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	711.74	711.74	437.97	456.71	640.81	253.07	943.93	850.82	585.08	606.32	614.63	653.29	323.05	267.02	-97.3	-101.19	-35.81	-834.72
	ULS Min	-226.54	-226.54	248.1	272.49	261.65	112.19	-1839.91	-1534.11	-1175.27	-1063.67	-1131.05	-1030.45	-981.87	-819.17	-581.19	-552.42	-178.86	-969.09
IY Bending	ULS Max	0	0	54.08	53.9	48.46	42.9	12.33	0	15.72	25.38	16.48	38.61	9.58	36.32	6.11	29.84	0	30.45
	ULS Min	0	0	0	0	0	0	-38.09	0	-31.77	-2.74	-30.21	0	-33.66	0	-26.67	0	0	0
IZ Bending	ULS Max	0	0	68.49	92.34	49.06	28.08	83.4	0	77.51	28.31	61.68	4.33	64.36	7.81	64	9.23	0	4.63
	ULS Min	0	0	-62.88	-90.84	-108.98	-83.46	-45.59	0	-39.76	-29.29	-18.74	-7.74	-23.71	-10.27	-26.05	-8.23	0	-9.23
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	16	0	13	11	13	16	14	15	11	12	0	11
	Stress Z	0	0	7	10	12	9	9	0	9	3	7	1	7	1	7	1	0	1
Force (kn) =		0	0	471	516	515	430	407	0	354	223	315	273	343	262	295	217	0	207
Tension Combined Force (kN) =		712	712	909	973	1155	683	1351	851	939	830	929	927	666	529	198	116	-36	-628
Compression Combined Force (kN) =		-227	-227	-223	-244	-253	-318	-2247	-1534	-1529	-1287	-1446	-1304	-1324	-1082	-876	-769	-179	-1176
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.20	0.21	0.25	0.15	0.33	0.20	0.23	0.20	0.22	0.22	0.16	0.13	0.05	0.03	NA	NA
		0.01	0.06	0.06	0.07	0.07	0.09	0.69	0.47	0.47	0.40	0.45	0.40	0.41	0.33	0.27	0.24	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	721.4	545.82	422.42	441.99	628.24	188.08	778.37	884.16	520.56	510.02	586.88	574.24	250.26	305.32	-84.2	-121.1	-609.18	-24.71
	ULS Min	-179.65	294.87	249.57	296.73	290.75	95.56	-1385.76	-1631.08	-971.23	-1082.09	-963.86	-1059.09	-772.72	-949.86	-527.3	-605.2	-707.65	-184.53
IY Bending	ULS Max	0	38.04	48.56	47.31	44	42.46	4.8	70.43	34.68	16.19	36.91	15.77	34.15	9.6	28.6	7.14	25.82	0
	ULS Min	0	-104.26	0	0	0	0	-15.27	0	-3.61	-31.04	0	-29.83	0	-33.32	0	-26.51	0	0
IZ Bending	ULS Max	0	26.14	29.32	33.71	31.51	30.95	96.18	32.08	14.96	19.19	5.79	12.64	5.19	14.15	6.34	15.62	2.41	0
	ULS Min	0	-44.76	-11.37	-8.32	-9.35	-6.87	-56.37	-33.86	-10.76	-61.76	-1.24	-56.42	-1.89	-58.55	-1.15	-64.25	-8.01	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	30	17	16	15	15	6	29	14	13	15	12	14	14	12	11	9	0
	Stress Z	0	4	3	4	3	3	11	4	2	7	1	6	1	7	1	7	1	0
Force (kn) =		0	635	360	361	336	325	277	534	260	320	258	302	239	330	203	294	176	0
Tension Combined Force (kN) =		721	1181	783	803	964	514	1055	1418	780	830	845	877	489	635	119	173	-434	-25
Compression Combined Force (kN) =		-180	-341	-111	-64	-45	-230	-1663	-2165	-1231	-1402	-1222	-1362	-1011	-1280	-731	-900	-883	-185
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.18	0.21	0.11	0.25	0.34	0.19	0.20	0.20	0.21	0.12	0.15	0.03	0.04	NA	NA
		0.01	0.09	0.03	0.02	0.01	0.07	0.51	0.67	0.38	0.43	0.38	0.42	0.31	0.39	0.23	0.28	0.25	0.05

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	468.97	379.35	978.5	184.87	901	811.48	374.21	419.94	12.88	-38.3	-353.85	-324.41	-128.38	21.7
	ULS Min	333.89	-216.8	762.01	-370.88	-2158.89	-2240.43	-1833.83	-1785.68	-1713.98	-1761.24	-1281	-1255.39	-201.35	11.83
IY Bending	ULS Max	7043.86	0	34.02	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7828.64	-60.01	0	-15.38	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	129.75	203.15	62.93	229.81	0	0	0	0	0	0	0	0	0	0
	ULS Min	-56.19	-97.75	-30.13	-85.49	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	79	20	13	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	15	5	19	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6838	700	335	448	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		7307	1079	1313	633	901	811	374	420	13	-38	-354	-324	-128	22
Compression Combined Force (kN) =		-6504	-916	427	-819	-2159	-2240	-1834	-1786	-1714	-1761	-1281	-1255	-201	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.36	0.21	0.29	0.14	0.17	0.16	0.07	0.08	0.00	NA	NA	NA	NA	0.02
		0.41	0.23	NA	0.23	0.57	0.59	0.48	0.47	0.51	0.53	0.38	0.38	0.65	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	278.06	184.76	359.07	116.74	233.7	474.46	441.39	268.71	275.7	173.52	168.39	227	157.25	24.82	31.07
	ULS Min	59.3	-191.81	100.05	-39.27	179.45	-907.19	-912.06	-634.44	-648.73	-572.05	-547.38	-381.69	-472.38	-81.86	19.05
IY Bending	ULS Max	3478.86	14.83	20.79	15.11	110.3	0	0	0	0	0	0	0	0	0	0
	ULS Min	-3803.72	-22.9	-9.69	-17.69	89.41	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	141.55	206.19	84.31	229.96	103.93	0	0	0	0	0	0	0	0	0	0
	ULS Min	-89.62	-103.06	-47.7	-116.89	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	46	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	11	20	8	23	6	0	0	0	0	0	0	0	0	0	0
Force (kn) =		3798	492	283	493	568	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4076	677	642	610	801	474	441	269	276	174	168	227	157	25	31
Compression Combined Force (kN) =		-3738	-684	-183	-532	-388	-907	-912	-634	-649	-572	-547	-382	-472	-82	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.24	0.16	0.15	0.15	0.07	0.10	0.10	0.06	0.06	0.04	0.04	0.05	0.03	0.02	0.02
		0.29	0.26	0.07	0.20	0.04	0.24	0.24	0.17	0.17	0.15	0.14	0.10	0.12	0.26	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
	Members	40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	29663.68	29663.68	3778.06	2081.32	2183.16	2070.3	963.3
	ULS Min	0	0	-1432	-10	-12	-16	-653
Shear	Fz Max	11647	11647	1461	2799	2873	2732	1515
	Fz Min	-11680	-11680	-1479	-379	-2850	-352	-661
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.544	0.723	0.187	0.199	0.177	0.198	0.183
		0.322	0.611	0.275	0.670	0.687	0.654	0.660

Case 0 - ULS V3 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-16108	-16083	-15650	-15325	-13393	-13760	-12430	-12397	-12489	-9292	-9279	-8717	-10353	-10524	-11858	-11825	-11772
	ULS Min	-16139	-16094	-15693	-15481	-13530	-13898	-12492	-12430	-12584	-9323	-9289	-8916	-10490	-10661	-11920	-11858	-11866
IY Bending	ULS Max	744	1053	1053	862	120	115	618	618	157	526	683	685	98	103	557	557	94
	ULS Min	0	744	634	-158	-172	-38	-38	-37	-37	0	526	-52	-38	-11	-10	-8	-8
IZ Bending	ULS Max	1224	1575	2864	9420	1921	294	294	-21	565	1281	1686	8827	2096	5	1047	1047	-33
	ULS Min	0	1224	1461	3086	-380	-380	-21	-200	-200	0	1281	1595	5	-760	-760	-35	-35
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	15.610	22.103	22.108	18.085	4.825	3.222	19.682	19.682	5.008	11.038	14.345	14.372	2.749	2.883	17.747	17.747	2.981
	Stress due to bending Z	23.211	29.861	54.304	178.628	44.506	8.799	10.434	7.080	20.047	24.283	31.966	167.377	48.559	17.611	37.155	37.155	1.255
Force (kn) =		6654	8906	13096	33715	7842	1911	3206	2849	2667	6054	7937	31150	8156	3258	5845	5845	451
Tension Combined Force (kN) =		-9455	-7177	-2554	18390	-5551	-11850	-9224	-9548	-9822	-3239	-1341	22433	-2197	-7266	-6013	-5980	-11321
Compression Combined Force (kN) =		-22792	-25000	-28789	-49196	-21372	-15808	-15698	-15280	-15252	-15376	-17227	-40067	-18646	-13918	-17764	-17703	-12317
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.33	NA	NA	NA	NA	NA	NA	NA	0.40	NA	NA	NA	NA	NA
		0.35	0.39	0.45	0.76	0.33	0.24	0.42	0.41	0.41	0.24	0.27	0.62	0.29	0.22	0.48	0.48	0.33

Case 0 - ULS V3 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-8548	-8531	-6860	-6440	-4612	-3939	-2772	-2334	-2166	-3699	-3678	-2249	-2248	-1792	-1813	-1528	-1838
	ULS Min	-8561	-8536	-6879	-6508	-4690	-4017	-2850	-2413	-2197	-3712	-3683	-2336	-2326	-1870	-1891	-1606	-1868
IY Bending	ULS Max	255	273	346	302	51	52	70	188	174	143	226	227	40	54	73	177	186
	ULS Min	0	255	282	-66	-83	49	51	68	-163	0	134	-27	-19	40	53	73	-208
IZ Bending	ULS Max	458	500	808	4088	663	73	73	-30	569	417	508	3818	767	-68	52	52	-131
	ULS Min	0	458	613	1248	-143	-143	-31	-52	-54	0	432	601	-88	-88	-68	-131	-293
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	12.994	13.927	17.656	15.386	4.223	2.659	3.580	9.564	8.860	7.316	11.542	11.580	2.037	2.734	3.725	9.028	10.616
	Stress due to bending Z	13.594	14.841	23.986	121.424	19.703	4.235	2.163	1.554	16.887	12.375	15.090	113.414	22.773	2.618	2.011	3.890	8.690
Force (kn) =		2076	2246	3251	10682	1868	538	448	868	2010	1537	2079	9759	1937	418	448	1009	1507
Tension Combined Force (kN) =		-6472	-6285	-3609	4242	-2744	-3400	-2323	-1466	-156	-2162	-1599	7510	-311	-1374	-1365	-520	-330
Compression Combined Force (kN) =		-10637	-10782	-10130	-17190	-6558	-4555	-3298	-3281	-4207	-5250	-5762	-12095	-4263	-2288	-2339	-2615	-3376
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.35	NA	NA	NA	NA	NA
		0.51	0.52	0.49	0.83	0.31	0.22	0.16	0.16	0.19	0.25	0.28	0.59	0.20	0.11	0.11	0.12	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	834.03	834.03	461.53	477.71	685.41	260.18	1267.44	1156.39	785.78	816.96	813.21	867.14	468.92	402.33	-48.99	-51.34	-16.93	-820.25
	ULS Min	-338.81	-338.81	224.19	247.43	211.46	95.46	-2202.04	-1813.39	-1403.62	-1256.91	-1357.61	-1224.54	-1150.98	-941.92	-642.45	-602.42	-192.45	-985.49
IY Bending	ULS Max	0	0	57.62	56.99	50.44	43.86	14.88	0	18.45	29.08	19.4	42.77	11.4	39.23	6.71	30.96	0	30.77
	ULS Min	0	0	0	0	0	0	-42.29	0	-34.15	-6.07	-32.34	-1.02	-35.02	0	-27.4	0	0	0
IZ Bending	ULS Max	0	0	87.05	117.47	71.06	39.11	104.42	0	97	35.22	77.16	5.35	81.12	9.54	81.38	10.86	0	6.76
	ULS Min	0	0	-77.17	-111.5	-126.48	-93.32	-56.69	0	-49.6	-36.78	-23.36	-9.67	-28.95	-12.92	-31.16	-10.81	0	-10.08
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	17	15	18	0	14	12	13	18	15	16	11	13	0	11
	Stress Z	0	0	9	13	14	10	12	0	11	4	9	1	9	1	9	1	0	1
Force (kn) =		0	0	529	584	561	455	473	0	405	262	357	305	382	287	331	228	0	210
Tension Combined Force (kN) =		834	834	991	1062	1246	716	1741	1156	1191	1079	1170	1172	851	689	282	176	-17	-610
Compression Combined Force (kN) =		-339	-339	-305	-337	-350	-360	-2675	-1813	-1809	-1519	-1715	-1529	-1533	-1229	-974	-830	-192	-1196
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.16	0.22	0.23	0.27	0.16	0.42	0.28	0.29	0.26	0.28	0.28	0.20	0.17	0.07	0.04	NA	NA
		0.01	0.09	0.09	0.10	0.10	0.10	0.83	0.56	0.56	0.47	0.53	0.47	0.47	0.38	0.30	0.26	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	835.31	575.71	442.76	459.64	668.22	194.79	1050.38	1179.22	704.47	697.32	778.21	766.72	374.61	450.95	-34.45	-70.99	-599.89	-4.3
	ULS Min	-291	264.47	226.7	278.06	246.36	80.12	-1642.75	-1947.6	-1146.52	-1281.78	-1147.19	-1263.62	-890.51	-1106.74	-575.23	-664.87	-719.89	-200.79
IY Bending	ULS Max	0	55.65	53.21	49.67	45.09	42.85	7.28	77.29	39.35	19.01	40.76	18.51	36.86	11.35	29.59	7.8	26.09	0
	ULS Min	0	-122.22	0	0	0	0	-17.81	-3.66	-8.52	-33.22	0	-31.87	0	-34.57	0	-27.18	0	0
IZ Bending	ULS Max	0	32.83	37	41.84	39.55	38.3	121.11	39.44	18.59	24.39	7.12	15.86	6.54	17.48	7.74	19.43	2.95	0
	ULS Min	0	-55.42	-13.82	-10.69	-11.47	-8.85	-69.57	-42.36	-13.56	-76.8	-1.62	-70.46	-2.25	-73.37	-1.52	-80.4	-9.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	35	18	17	16	15	7	32	16	14	17	13	15	14	12	11	9	0
	Stress Z	0	5	4	5	4	4	14	5	2	9	1	8	1	8	1	9	1	0
Force (kn) =		0	750	404	392	359	342	339	596	298	362	287	342	259	365	213	328	181	0
Tension Combined Force (kN) =		835	1326	847	851	1027	537	1389	1775	1002	1060	1065	1108	634	816	178	257	-419	-4
Compression Combined Force (kN) =		-291	-486	-178	-114	-112	-262	-1982	-2543	-1444	-1644	-1434	-1605	-1150	-1472	-788	-993	-901	-201
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.26	0.19	0.19	0.22	0.12	0.33	0.43	0.24	0.26	0.26	0.27	0.15	0.20	0.04	0.06	NA	NA
		0.01	0.14	0.05	0.03	0.03	0.08	0.61	0.79	0.44	0.51	0.44	0.49	0.35	0.45	0.24	0.31	0.25	0.06

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	485.86	455.15	1000.14	198.1	1280.26	1175.87	633.32	689.13	222.68	159.86	-253.99	-215.15	-120.24	21.81
	ULS Min	317	-285.89	729.53	-494.46	-2538.23	-2632.64	-2120.36	-2061.52	-1930.3	-1988.24	-1407.35	-1373.29	-209.54	11.69
IY Bending	ULS Max	8853.7	0	34.59	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-9658.39	-61.42	0	-15.59	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	161.69	254.06	78.65	287.52	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.74	-122.04	-37.67	-106.55	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	98	20	14	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	8	19	6	23	0	0	0	0	0	0	0	0	0	0
Force (kn) =		8443	785	362	534	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8929	1240	1362	732	1280	1176	633	689	223	160	-254	-215	-120	22
Compression Combined Force (kN) =		-8126	-1070	367	-1029	-2538	-2633	-2120	-2062	-1930	-1988	-1407	-1373	-210	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.44	0.24	0.30	0.16	0.25	0.23	0.12	0.13	0.05	0.03	NA	NA	NA	0.02
		0.52	0.26	NA	0.29	0.67	0.69	0.56	0.54	0.58	0.60	0.42	0.41	0.67	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	305.71	228.05	390.35	131.31	238.49	645.12	605.25	376.4	388.37	264.69	253.52	298.57	234.14	36.77	31.54
	ULS Min	32.27	-242.66	69.15	-63.7	172.09	-1076.2	-1080.82	-746.79	-761.42	-661.52	-635.45	-456.54	-547.15	-94.37	18.61
IY Bending	ULS Max	4347.65	15.96	22.13	16.39	113.78	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4700.1	-23.65	-10.41	-18.18	87.9	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	178.16	257.07	104.84	287.06	133.43	0	0	0	0	0	0	0	0	0	0
	ULS Min	-110.81	-129.48	-60.17	-146.5	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	57	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	14	25	10	28	8	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4709	579	325	587	656	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5015	807	715	719	895	645	605	376	388	265	254	299	234	37	32
Compression Combined Force (kN) =		-4677	-821	-256	-651	-484	-1076	-1081	-747	-761	-662	-635	-457	-547	-94	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.30	0.19	0.17	0.17	0.07	0.14	0.13	0.08	0.08	0.06	0.06	0.07	0.05	0.03	0.03
		0.36	0.32	0.10	0.25	0.05	0.28	0.29	0.20	0.20	0.17	0.17	0.12	0.14	0.30	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
	Members	40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	29960.55	29960.55	3791.43	2096.59	2183.84	2107.49	1000.71
	ULS Min	0	0	-1516	-10	-12	-18	-676
Shear	Fz Max	11694	11694	1455	2818	2874	2781	1568
	Fz Min	-11764	-11764	-1473	-381	-2867	-350	-724
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.550	0.731	0.188	0.201	0.177	0.202	0.190
		0.324	0.615	0.273	0.674	0.688	0.665	0.683

Case 0 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-7681	-7659	-6932	-6658	-6141	-5937	-5660	-5626	-5405	-7280	-7266	-6443	-5984	-5800	-5552	-5518	-5315
	ULS Min	-7711	-7670	-6974	-6815	-6278	-6074	-5721	-5660	-5500	-7310	-7277	-6642	-6121	-5937	-5613	-5552	-5410
IY Bending	ULS Max	0	-62	-82	46	10	41	41	3	247	28	38	40	7	44	44	-3	264
	ULS Min	-62	-88	-86	-13	-12	10	3	-19	-19	0	28	-7	-8	7	-3	-28	-28
IZ Bending	ULS Max	0	-29	119	353	-26	147	147	-21	115	75	101	133	141	77	21	112	112
	ULS Min	-29	-32	18	267	-91	-91	-21	-113	-112	0	75	82	77	-148	-148	21	-107
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.306	1.856	1.802	0.965	0.349	1.164	1.321	0.595	7.854	0.594	0.793	0.829	0.226	1.247	1.416	0.897	8.404
	Stress due to bending Z	0.553	0.614	2.257	6.691	2.115	3.416	5.232	3.992	4.088	1.426	1.912	2.522	3.273	3.420	5.238	3.980	3.980
	Force (kn) =	319	423	696	1312	392	728	698	488	1271	346	464	574	556	742	708	519	1318
	Tension Combined Force (kN) =	-7362	-7236	-6236	-5346	-5749	-5209	-4962	-5138	-4134	-6934	-6803	-5869	-5427	-5058	-4843	-4999	-3996
	Compression Combined Force (kN) =	-8030	-8093	-7670	-8127	-6669	-6802	-6419	-6148	-6771	-7657	-7741	-7217	-6677	-6679	-6322	-6071	-6728
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.12	0.13	0.12	0.13	0.10	0.11	0.17	0.17	0.18	0.12	0.12	0.11	0.10	0.10	0.17	0.16	0.18

Case 0 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4569	-4558	-3463	-3139	-2804	-2690	-2509	-2369	-2589	-4244	-4225	-3053	-2716	-2587	-2362	-2188	-2366
	ULS Min	-4582	-4563	-3481	-3208	-2882	-2768	-2587	-2447	-2619	-4258	-4230	-3141	-2794	-2665	-2440	-2266	-2397
IY Bending	ULS Max	2	6	9	16	13	14	13	156	152	16	19	12	7	11	11	148	148
	ULS Min	0	2	-41	-26	4	3	3	2	-237	0	11	0	1	7	7	7	-245
IZ Bending	ULS Max	0	-65	-39	280	-31	61	61	82	466	35	65	102	105	22	34	89	89
	ULS Min	-65	-82	-132	181	-43	-31	-45	-44	82	0	30	32	22	-62	-62	34	-723
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.096	0.330	2.097	1.303	0.656	0.696	0.667	7.963	12.062	0.833	0.990	0.612	0.362	0.574	0.572	7.571	12.492
	Stress due to bending Z	1.945	2.448	3.906	8.305	1.275	1.803	1.805	2.438	13.831	1.036	1.944	3.025	3.115	1.830	1.830	2.636	21.473
	Force (kn) =	159	217	469	750	151	195	193	812	2022	146	229	284	272	188	187	797	2652
	Tension Combined Force (kN) =	-4410	-4341	-2994	-2389	-2653	-2495	-2316	-1557	-567	-4098	-3996	-2769	-2445	-2399	-2175	-1391	286
	Compression Combined Force (kN) =	-4742	-4779	-3950	-3958	-3032	-2963	-2780	-3259	-4641	-4404	-4459	-3425	-3066	-2852	-2628	-3063	-5049
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.23	0.23	0.19	0.19	0.14	0.14	0.13	0.16	0.21	0.21	0.22	0.17	0.15	0.14	0.13	0.15	0.23

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	148.46	148.46	222.29	233.29	277.71	25.35	-242.05	-252.22	-129.63	-143.37	-104.18	-122.71	-141.67	-146.1	-141.87	-231.83	68.04	-973.88
	ULS Min	148.46	148.46	214	220.94	255.66	-21.02	-283.47	-295.05	-174.4	-194.85	-149.78	-171.98	-187.4	-196.16	-187.9	-279.73	54.88	-984.31
IY Bending	ULS Max	0	0	39.18	40.66	40.09	40	7.54	0	7.47	14.32	7.34	18.57	6.13	19.75	6.72	21.29	0	29.6
	ULS Min	0	0	0	0	0	0	-12.38	0	-14.01	0	-13.61	0	-16.59	0	-12.79	0	0	0
IZ Bending	ULS Max	0	0	0	0	0	0	0	0	0.08	1.31	0	0	0	0.97	0	2.81	0	0
	ULS Min	0	0	-6.45	-14.15	-47.22	-54.05	-1.38	0	-0.9	0	-1.39	-0.07	-3.17	0	-7.04	0	0	-6.33
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	5	0	6	6	6	8	7	8	5	9	0	10
	Stress Z	0	0	1	2	5	6	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	257	282	342	355	86	0	96	99	94	125	117	134	99	148	0	196
Tension Combined Force (kN) =		148	148	480	515	620	380	-156	-252	-34	-45	-10	2	-25	-12	-43	-84	68	-778
Compression Combined Force (kN) =		148	148	-43	-61	-87	-376	-369	-295	-270	-293	-244	-297	-305	-331	-287	-428	55	-1180
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.00	0.03	0.10	0.11	0.14	0.08	NA	NA	NA	NA	NA	0.00	NA	NA	NA	NA	0.01	NA
		NA	NA	0.01	0.02	0.02	0.11	0.11	0.09	0.08	0.09	0.08	0.09	0.09	0.10	0.09	0.13	NA	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	193.04	278.47	215.74	225.75	266.76	-45.81	-194.99	-205.82	-126.47	-143.84	-101.27	-117.98	-119.01	-157.31	-212.61	-173.34	-768.6	113.04
	ULS Min	193.04	270.88	214.68	224.92	264.79	-50.89	-240.88	-270.64	-178.36	-188.54	-150.61	-163.73	-169.48	-203.06	-261.03	-218.83	-780.24	99.87
IY Bending	ULS Max	0	0	39	38.94	39.32	41.44	0	37.2	13.42	7.6	18.07	7.46	18.6	6.38	20.4	7.5	25.86	0
	ULS Min	0	-18.48	0	0	0	0	-11.16	0	0	-14.05	0	-13.59	0	-16.65	0	-12.79	0	0
IZ Bending	ULS Max	0	0	0	1.2	0	2.28	0	2.04	0.87	0	0.42	0.67	0	0.34	0.69	1.7	0.42	0
	ULS Min	0	-1.44	-0.82	0	-1.04	0	-2.79	-0.02	0	-1.07	0	0	-0.41	-0.21	0	0	-0.42	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	5	14	13	14	14	5	16	6	6	8	6	8	7	9	5	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	101	245	246	248	263	80	253	92	96	122	92	126	112	138	89	162	0
Tension Combined Force (kN) =		193	380	461	471	514	218	-115	48	-35	-48	21	-26	7	-45	-74	-84	-606	113
Compression Combined Force (kN) =		193	170	-31	-21	17	-314	-321	-524	-270	-285	-273	-256	-295	-315	-399	-308	-942	100
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.07	0.10	0.10	0.11	0.05	NA	0.01	NA	NA	0.01	NA	0.00	NA	NA	NA	NA	0.02
		NA	NA	0.01	0.01	NA	0.09	0.10	0.16	0.08	0.09	0.08	0.08	0.09	0.10	0.12	0.09	0.26	NA

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	212.46	35.59	414.87	63.2	-302.4	-329.56	-281.62	-279.77	-394.57	-394.92	-311.75	-325.72	-63.37	27.77
	ULS Min	212.46	18.59	414.87	53.58	-327.89	-355.06	-307.12	-305.27	-416.92	-417.28	-334.11	-348.08	-71.04	18.93
IY Bending	ULS Max	343.03	0	5.81	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-371.99	-42.12	0	-16.49	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.98	0	0.07	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.15	-0.15	0	-0.34	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	4	14	2	7	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		328	280	41	118	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		541	315	456	181	-302	-330	-282	-280	-395	-395	-312	-326	-63	28
Compression Combined Force (kN) =		-116	-261	373	-64	-328	-355	-307	-305	-417	-417	-334	-348	-71	19
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.03	0.06	0.10	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.02	0.09	0.09	0.08	0.08	0.12	0.12	0.10	0.10	0.23	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	184.32	14.77	264.36	62.14	295.82	-227.11	-237.05	-188.8	-198.89	-212.62	-192.77	-73.83	-178.65	-29.5	28.78
	ULS Min	177.77	0.26	244.55	5.07	295.82	-250.1	-260.05	-211.79	-221.88	-235.61	-215.76	-96.83	-201.64	-38.34	20.4
IY Bending	ULS Max	267.74	10.14	18.02	11.59	97.4	0	0	0	0	0	0	0	0	0	0
	ULS Min	-231.73	-20.17	-5.48	-15.47	97.4	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.41	1.71	2.35	6.12	23.26	0	0	0	0	0	0	0	0	0	0
	ULS Min	-0.09	0	0	-0.03	23.26	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		244	147	132	120	316	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		428	162	397	182	612	-227	-237	-189	-199	-213	-193	-74	-179	-30	29
Compression Combined Force (kN) =		-66	-146	112	-115	-20	-250	-260	-212	-222	-236	-216	-97	-202	-38	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.10	0.04	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.00	0.07	0.07	0.06	0.06	0.06	0.06	0.03	0.05	0.12	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	10644.97	10644.97	4388.55	1240.61	4225.34	1120.65	847.99
	ULS Min	0	0	-1417	-19	-12	-18	-654
Shear	Fz Max	4268	4268	1915	188	1930	43	1496
	Fz Min	-4245	-4245	-1932	-442	-1848	-255	-496
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.195	0.260	0.218	0.119	0.343	0.107	0.161
		0.118	0.223	0.359	0.106	0.462	0.061	0.651

Case 0 - ULS 4 Lowered D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12697	-12672	-12136	-11907	-10615	-10650	-9869	-9835	-9742	-7981	-7967	-7446	-8282	-8443	-9061	-9028	-9091
	ULS Min	-12727	-12682	-12179	-12064	-10752	-10787	-9930	-9869	-9837	-8011	-7978	-7645	-8419	-8580	-9122	-9061	-9186
IY Bending	ULS Max	289	453	454	369	72	107	117	117	116	652	835	836	62	94	94	88	193
	ULS Min	0	289	255	-26	-23	74	107	100	100	0	652	-85	-88	60	88	61	61
IZ Bending	ULS Max	786	959	1863	5314	1080	232	232	-58	443	820	1032	4804	1213	22	44	174	174
	ULS Min	0	786	1191	1956	-256	-256	-58	-227	-227	0	820	1291	22	-275	-275	44	-39
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	6.072	9.511	9.525	7.755	2.009	3.010	3.737	3.737	3.688	13.692	17.519	17.544	2.483	2.644	3.003	2.802	6.151
	Stress due to bending Z	14.912	18.193	35.321	100.764	25.015	5.940	8.247	8.053	15.718	15.559	19.563	91.099	28.106	6.380	9.773	6.168	6.167
	Force (kn) =	3596	4748	7686	18599	4296	1423	1276	1255	2066	5013	6356	18620	4862	1435	1360	955	1311
	Tension Combined Force (kN) =	-9101	-7924	-4450	6692	-6320	-9227	-8593	-8580	-7676	-2968	-1612	11175	-3420	-7008	-7701	-8073	-7779
	Compression Combined Force (kN) =	-16324	-17430	-19865	-30663	-15048	-12209	-11206	-11124	-11903	-13024	-14334	-26265	-13282	-10015	-10483	-10016	-10497
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.12	NA	NA	NA	NA	NA	NA	NA	0.20	NA	NA	NA	NA	NA
		0.25	0.27	0.31	0.47	0.23	0.19	0.30	0.30	0.32	0.20	0.22	0.41	0.21	0.15	0.28	0.27	0.28

Case 0 - ULS 4 Lowered D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5472	-5457	-4175	-3938	-2658	-2314	-1616	-1334	-1410	-3799	-3779	-2332	-2201	-1753	-1597	-1151	-1194
	ULS Min	-5485	-5462	-4194	-4006	-2736	-2392	-1694	-1412	-1441	-3813	-3783	-2419	-2279	-1831	-1675	-1229	-1225
IY Bending	ULS Max	86	86	172	152	38	40	55	143	146	200	276	277	37	37	50	151	143
	ULS Min	0	85	93	-24	-14	37	39	53	-126	0	198	-41	-44	30	30	50	-152
IZ Bending	ULS Max	335	400	387	3217	497	45	49	80	216	272	356	2956	567	-39	41	41	8
	ULS Min	0	335	168	582	-72	-68	-12	-8	81	0	274	99	-39	-60	-60	8	-343
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	4.395	4.391	8.792	7.750	1.950	2.059	2.791	7.291	7.464	10.199	14.059	14.127	2.219	1.864	2.535	7.719	7.772
	Stress due to bending Z	9.953	11.871	11.487	95.554	14.750	2.026	1.457	2.368	6.431	8.067	10.579	87.795	16.856	1.780	1.780	1.211	10.189
	Force (kn) =	1120	1270	1583	8066	1304	319	332	754	1085	1426	1924	7958	1489	285	337	697	1402
	Tension Combined Force (kN) =	-4352	-4187	-2592	4128	-1354	-1995	-1284	-579	-325	-2373	-1855	5626	-712	-1469	-1260	-454	208
	Compression Combined Force (kN) =	-6605	-6731	-5777	-12072	-4040	-2711	-2026	-2166	-2526	-5239	-5707	-10377	-3769	-2116	-2012	-1927	-2627
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	0.01
		0.32	0.33	0.28	0.58	0.19	0.13	0.10	0.10	0.12	0.25	0.28	0.50	0.18	0.10	0.10	0.09	0.12

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	684.79	684.79	335.1	346.24	419.54	101.09	1217.82	1101.32	699.67	702.4	616	666.3	368.24	433.6	145.73	145.1	214.8	-701.64
	ULS Min	-273.87	-273.87	164.86	220.05	279.1	-93.99	-1929.6	-1606.35	-1177.19	-1051.64	-1022.56	-956.83	-890.82	-835.96	-735.97	-679.42	-49.92	-912.76
IY Bending	ULS Max	0	0	57.25	57.18	53.59	47.28	14.39	0	16.71	26.59	15.91	36.46	11.01	34.84	9.48	31.56	0	29.24
	ULS Min	0	0	0	0	0	0	-38.88	0	-32.11	-3.55	-29.12	0	-32.06	0	-24.21	0	0	0
IZ Bending	ULS Max	0	0	139.74	189.26	142.49	62.81	149.15	0	140.5	38.11	119.59	8.16	127.55	14.02	130.98	14.78	0	13.97
	ULS Min	0	0	-114.69	-165.5	-163.58	-91.84	-65.48	0	-63.89	-44.31	-36.14	-14.97	-42.95	-20.31	-43.3	-18.3	0	-10.61
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	19	16	16	0	13	11	12	15	13	15	10	13	0	10
	Stress Z	0	0	15	20	18	10	17	0	16	5	13	2	14	2	15	2	0	1
	Force (kn) =	0	0	629	725	653	474	531	0	470	259	412	272	446	271	400	245	0	208
	Tension Combined Force (kN) =	685	685	965	1072	1072	575	1749	1101	1170	961	1028	938	815	704	546	390	215	-494
	Compression Combined Force (kN) =	-274	-274	-465	-505	-374	-568	-2461	-1606	-1647	-1310	-1435	-1229	-1337	-1107	-1136	-924	-50	-1120
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.13	0.21	0.23	0.23	0.13	0.42	0.27	0.28	0.23	0.25	0.23	0.20	0.17	0.13	0.09	0.05	NA
		0.01	0.08	0.13	0.14	0.11	0.16	0.76	0.50	0.51	0.40	0.44	0.38	0.41	0.34	0.35	0.28	0.01	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	682.58	441.85	304.83	315.26	380.21	53.23	907.42	969.63	552.33	523.06	550.47	488.57	389.19	305.1	148.82	125.27	-508.38	246.16
	ULS Min	-260.2	214.43	201.39	251.47	335.25	-108.2	-1323.9	-1632.38	-862.36	-1026.09	-803.18	-917.63	-748.87	-851.22	-659.41	-764.5	-653.46	-51.03
IY Bending	ULS Max	0	27.88	47.54	46.48	45.14	44	5.34	62.87	32.07	16.85	32.7	15.06	31.7	11.02	30.21	10.32	24.61	0
	ULS Min	0	-72.22	0	0	0	0	-16.71	0	-4.66	-30.79	0	-28.37	0	-31.61	0	-24.32	0	0
IZ Bending	ULS Max	0	0	52.57	60.03	61.72	53.73	147.17	30.52	17.43	32.45	10.67	24.55	10.29	26.3	11.26	28.93	3.68	0
	ULS Min	0	-36.8	-15.13	-15.11	-17.07	-12.84	-66.36	-34.5	-11.67	-110.64	-2.75	-109.19	-3.06	-114.42	-2.75	-125	-15.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	21	16	16	16	15	7	26	13	13	14	12	13	13	13	10	9	0
	Stress Z	0	4	6	6	7	6	17	4	2	12	1	12	1	13	1	14	2	0
	Force (kn) =	0	450	399	407	402	379	379	485	247	407	239	388	231	420	223	390	182	0
	Tension Combined Force (kN) =	683	892	704	722	782	433	1286	1454	799	930	789	877	621	725	372	515	-326	246
	Compression Combined Force (kN) =	-260	-236	-198	-156	-67	-488	-1703	-2117	-1109	-1433	-1042	-1306	-980	-1271	-883	-1154	-836	-51
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.17	0.15	0.16	0.17	0.09	0.31	0.35	0.19	0.22	0.19	0.21	0.15	0.17	0.09	0.12	NA	0.05
		0.01	0.07	0.06	0.04	0.02	0.14	0.53	0.65	0.34	0.44	0.32	0.40	0.30	0.39	0.27	0.36	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	397.93	350.81	819.01	198.99	687.76	673.49	197.96	203.23	-24.13	-30.2	-133.41	-137.19	-85.66	24.67
	ULS Min	234.9	-310.09	591.36	-65.46	-1746.53	-1744.74	-1279.43	-1279.75	-1336.25	-1331.2	-1071.83	-1086.62	-170.67	14.04
IY Bending	ULS Max	5951.05	0	25.24	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6623	-55.91	0	-15.7	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	244.94	393.96	121.84	446.38	0	0	0	0	0	0	0	0	0	0
	ULS Min	-115.16	-188.51	-58.38	-164.09	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	67	18	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	12	29	10	36	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	6331	956	359	769	0	0	0	0	0	0	0	0	0	0
	Tension Combined Force (kN) =	6729	1306	1178	968	688	673	198	203	-24	-30	-133	-137	-86	25
	Compression Combined Force (kN) =	-6096	-1266	232	-835	-1747	-1745	-1279	-1280	-1336	-1331	-1072	-1087	-171	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.33	0.25	0.26	0.21	0.13	0.13	0.04	0.04	NA	NA	NA	NA	NA	0.02
		0.39	0.31	NA	0.23	0.46	0.46	0.34	0.34	0.40	0.40	0.32	0.33	0.55	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	248.89	230.38	320.38	155.99	168.07	664.5	640.51	387	386.62	198.95	187.38	142.81	95.72	45.18	32.6
	ULS Min	-14.64	-283.9	-13.49	-146.15	70.39	-1004.27	-980.17	-615.57	-632.73	-493.25	-455.39	-203.33	-286.82	-76.9	19.05
IY Bending	ULS Max	4084.36	15.76	22.13	17.51	109.65	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4365.13	-22.1	-14.96	-19.19	91.59	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	281.04	395.18	160.7	443.41	217.67	0	0	0	0	0	0	0	0	0	0
	ULS Min	-166.67	-201.27	-94.97	-228.33	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	53	10	10	9	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	21	39	16	44	13	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	4965	788	414	844	873	0	0	0	0	0	0	0	0	0	0
	Tension Combined Force (kN) =	5214	1018	734	1000	1041	665	641	387	387	199	187	143	96	45	33
	Compression Combined Force (kN) =	-4980	-1071	-428	-990	-803	-1004	-980	-616	-633	-493	-455	-203	-287	-77	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.31	0.25	0.18	0.24	0.09	0.15	0.14	0.08	0.08	0.04	0.04	0.03	0.02	0.04	0.03
		0.38	0.41	0.16	0.38	0.09	0.27	0.26	0.16	0.17	0.13	0.12	0.05	0.08	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
	Members	40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	23270.71	23270.71	2390.57	1606.01	1918.17	1612.95	485.2
	ULS Min	0	0	-874	-10	-12	-22	-455
Shear	Fz Max	9318	9318	1026	2156	2260	2104	999
	Fz Min	-9176	-9176	-1024	-253	-2198	-268	-453
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.427	0.567	0.119	0.154	0.156	0.154	0.092
		0.257	0.487	0.190	0.516	0.541	0.503	0.435

Case 1 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12625	-12603	-11825	-11551	-10838	-10640	-10304	-10270	-10076	-12265	-12251	-11376	-10720	-10543	-10244	-10210	-10029
	ULS Min	-12655	-12614	-11867	-11708	-10975	-10777	-10365	-10304	-10171	-12295	-12262	-11575	-10857	-10680	-10305	-10244	-10124
IY Bending	ULS Max	0	-54	-51	77	66	105	111	113	113	26	34	72	71	109	109	108	107
	ULS Min	-54	-78	-76	64	65	66	105	111	54	0	26	36	64	64	108	107	66
IZ Bending	ULS Max	0	-41	118	437	-43	269	269	-45	228	88	118	148	162	152	45	217	217
	ULS Min	-41	-48	-6	266	-164	-164	-45	-216	-216	0	88	21	152	-270	-269	45	-224
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.135	1.640	1.585	1.614	1.862	2.957	3.521	3.608	3.608	0.541	0.724	1.505	1.985	3.065	3.480	3.428	3.396
	Stress due to bending Z	0.786	0.904	2.238	8.295	3.803	6.227	9.537	7.658	8.106	1.671	2.247	2.800	3.758	6.244	9.563	7.691	7.945
Force (kn) =		329	436	655	1698	901	1460	1390	1199	1247	379	509	738	913	1480	1389	1184	1207
Tension Combined Force (kN) =		-12296	-12167	-11170	-9853	-9938	-9180	-8914	-9071	-8829	-11886	-11742	-10638	-9807	-9063	-8855	-9027	-8821
Compression Combined Force (kN) =		-12984	-13050	-12523	-13406	-11876	-12237	-11755	-11503	-11418	-12674	-12771	-12313	-11770	-12160	-11694	-11428	-11331
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.20	0.20	0.19	0.21	0.18	0.19	0.32	0.31	0.31	0.20	0.20	0.19	0.18	0.19	0.31	0.31	0.30

Case 1 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4069	-4058	-2918	-2595	-2308	-2202	-1999	-1845	-1981	-3747	-3728	-2519	-2223	-2100	-1853	-1670	-1759
	ULS Min	-4082	-4062	-2937	-2664	-2386	-2280	-2078	-1924	-2012	-3760	-3732	-2606	-2301	-2179	-1931	-1748	-1790
IY Bending	ULS Max	4	9	12	47	44	43	43	161	156	12	15	30	32	42	45	167	169
	ULS Min	0	4	-37	-20	28	27	42	42	-166	0	6	7	32	32	42	45	-212
IZ Bending	ULS Max	0	-66	-36	282	-25	49	49	95	315	34	64	99	100	16	30	39	39
	ULS Min	-66	-83	-124	162	-40	-24	-41	-40	95	0	29	34	16	-50	-50	30	-511
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.191	0.465	1.903	2.405	2.221	2.193	2.213	8.204	8.476	0.627	0.778	1.530	1.622	2.125	2.287	8.540	10.786
	Stress due to bending Z	1.971	2.476	3.671	8.384	1.196	1.467	1.463	2.835	9.367	1.017	1.897	2.949	2.961	1.481	1.481	1.164	15.190
Force (kn) =		169	230	435	842	267	286	287	862	1393	128	209	350	358	282	294	758	2028
Tension Combined Force (kN) =		-3900	-3828	-2483	-1753	-2041	-1916	-1712	-984	-588	-3618	-3519	-2169	-1865	-1819	-1558	-913	269
Compression Combined Force (kN) =		-4251	-4292	-3372	-3506	-2653	-2566	-2365	-2785	-3405	-3888	-3941	-2956	-2659	-2460	-2225	-2506	-3818
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.21	0.21	0.16	0.17	0.13	0.12	0.11	0.13	0.16	0.19	0.19	0.14	0.13	0.12	0.11	0.12	0.18

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	192.32	192.32	296.47	324.04	406.44	150.86	-303.89	-322.66	-184.01	-201.13	-150.47	-171.41	-218.1	-228.43	-244.64	-268.4	-38.08	-879.92
	ULS Min	192.32	192.32	287.39	306.84	378.24	104.1	-345.18	-367.55	-228.22	-254.97	-195.65	-222.86	-263.16	-281.55	-290.21	-319.41	-51.24	-890.84
IY Bending	ULS Max	0	0	39.75	41.13	40.4	39.6	3.32	0	5.38	16.26	5.32	20.76	3.23	22.95	4.46	23.83	0	28.69
	ULS Min	0	0	0	0	0	0	-19.31	0	-20.38	0	-19.87	0	-25.38	0	-21.07	0	0	0
IZ Bending	ULS Max	0	0	0	0.25	0	0	0	0	0.46	1.14	0	0.17	0	0.77	0	2.3	0	0
	ULS Min	0	0	-5.51	-7.81	-34.34	-38.57	-1.2	0	-0.5	0	-0.56	0	-2.94	0	-5.54	0	0	-5.57
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	8	0	8	7	8	9	11	10	9	10	0	10
	Stress Z	0	0	1	1	4	4	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	259	272	319	322	132	0	138	111	134	140	176	155	151	164	0	189
Tension Combined Force (kN) =		192	192	556	596	726	473	-172	-323	-46	-90	-16	-32	-42	-73	-93	-104	-38	-691
Compression Combined Force (kN) =		192	192	28	35	59	-218	-477	-368	-366	-366	-330	-363	-439	-437	-442	-484	-51	-1080
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.12	0.13	0.16	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.06	0.15	0.11	0.11	0.11	0.10	0.11	0.14	0.13	0.14	0.15	0.01	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	235.17	369.03	293.09	318.36	399.22	94.48	-264.8	-256.71	-181.1	-203.53	-148.79	-165.7	-202.68	-233.77	-251.31	-271.67	-663.82	-30.7
	ULS Min	235.17	360.18	292.13	317.59	397.72	90.45	-312.05	-323.57	-235.39	-247.75	-200.32	-210.99	-256.21	-278.96	-302.86	-316.67	-676.04	-43.86
IY Bending	ULS Max	0	0	39.24	39.24	39.53	41.04	0	40.64	15.17	5.49	20.34	5.35	21.77	3.48	23.12	5.12	24.81	0
	ULS Min	0	-26.74	0	0	0	0	-6.28	0	0	-20.44	0	-19.87	0	-25.45	0	-21.22	0	0
IZ Bending	ULS Max	0	0	0	1.18	0	1.74	0	2.41	0.89	0	0.41	0.09	0	0.71	0.65	1.04	0.28	0
	ULS Min	0	-1.81	-1.26	0	-0.8	0	-3.3	0	0	-1.41	0	-0.16	-0.4	0	0	0	-0.53	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	8	14	14	14	14	3	17	6	9	8	8	9	11	10	9	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	146	248	247	249	260	48	277	103	140	137	134	147	172	156	144	156	0
Tension Combined Force (kN) =		235	515	541	566	648	354	-217	20	-78	-64	-11	-32	-56	-62	-95	-127	-508	-31
Compression Combined Force (kN) =		235	214	45	70	149	-169	-360	-601	-339	-388	-338	-345	-403	-451	-459	-461	-832	-44
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.10	0.12	0.12	0.14	0.08	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.11	0.19	0.10	0.12	0.10	0.11	0.12	0.14	0.14	0.14	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	344.77	63.9	748.05	110.69	-520.83	-552.44	-549.37	-542.63	-694.52	-700.91	-622.34	-627.67	-131.7	23.21
	ULS Min	344.77	47.2	748.05	102.82	-546.32	-577.93	-574.87	-568.13	-716.88	-723.26	-644.69	-650.03	-139.37	14.37
IY Bending	ULS Max	521.15	0	23.92	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-472.29	-50.69	0	-15.17	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.76	0	0.06	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.41	-0.45	0	-0.96	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	5	17	9	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		440	337	170	109	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		784	401	918	220	-521	-552	-549	-543	-695	-701	-622	-628	-132	23
Compression Combined Force (kN) =		-95	-290	578	-7	-546	-578	-575	-568	-717	-723	-645	-650	-139	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.20	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	0.00	0.14	0.15	0.15	0.15	0.21	0.22	0.19	0.19	0.45	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	157.45	11.32	213.2	51.64	196.68	-193.93	-198.25	-143.58	-157.42	-175.9	-157.14	-48.03	-130.93	-18.5	29.38
	ULS Min	152.42	-1.97	199.57	8.56	196.68	-216.92	-221.25	-166.57	-180.42	-198.9	-180.14	-71.02	-153.93	-27.34	20.99
IY Bending	ULS Max	237.22	10.44	16.97	11.76	98.6	0	0	0	0	0	0	0	0	0	0
	ULS Min	-210.57	-19.68	-7.63	-15.93	98.6	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6	3.52	3.3	5.53	17.14	0	0	0	0	0	0	0	0	0	0
	ULS Min	-5.94	0	0	0	17.14	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		222	146	126	123	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		380	157	340	174	499	-194	-198	-144	-157	-176	-157	-48	-131	-19	29
Compression Combined Force (kN) =		-70	-148	73	-114	-106	-217	-221	-167	-180	-199	-180	-71	-154	-27	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.08	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.04	0.05	0.05	0.05	0.02	0.04	0.09	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	23794.44	23794.44	3450.83	1624.31	1927.54	1630.7	812.32
	ULS Min	0	0	-1015	-10	-12	-10	-542
Shear	Fz Max	9424	9424	1363	2193	2322	2156	1155
	Fz Min	-9348	-9348	-1357	-337	-2250	-323	-362
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.437	0.580	0.171	0.156	0.156	0.156	0.155
		0.260	0.493	0.253	0.525	0.556	0.516	0.503

Case 1 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-13752	-13727	-13350	-13103	-11336	-11667	-10436	-10402	-10471	-7579	-7565	-7025	-8539	-8678	-9918	-9885	-9809
	ULS Min	-13783	-13737	-13392	-13260	-11474	-11804	-10497	-10436	-10565	-7609	-7576	-7224	-8676	-8815	-9979	-9918	-9904
IY Bending	ULS Max	722	1024	1024	776	110	105	564	564	184	471	609	611	92	96	508	508	121
	ULS Min	0	722	630	-137	-151	-35	-35	-54	-54	0	471	-41	-27	-9	-9	-25	-25
IZ Bending	ULS Max	1145	1468	2576	8639	1760	245	245	-15	503	1161	1523	8076	1905	-9	972	972	-7
	ULS Min	0	1145	1329	2693	-333	-333	-15	-162	-162	0	1161	1419	-9	-679	-680	-57	-57
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	15.160	21.498	21.494	16.282	4.244	2.957	17.961	17.961	5.857	9.896	12.790	12.818	2.569	2.698	16.195	16.195	3.863
	Stress due to bending Z	21.709	27.828	48.849	163.826	40.782	7.716	8.685	5.757	17.834	22.016	28.886	153.142	44.140	15.742	34.493	34.493	2.037
Force (kn) =		6319	8454	12056	30869	7157	1697	2837	2525	2522	5470	7143	28444	7425	2931	5396	5396	628
Tension Combined Force (kN) =		-7433	-5272	-1294	17766	-4179	-9970	-7599	-7877	-7948	-2109	-422	21419	-1114	-5746	-4522	-4488	-9181
Compression Combined Force (kN) =		-20102	-22191	-25449	-44129	-18631	-13500	-13334	-12961	-13088	-13078	-14718	-35668	-16101	-11746	-15376	-15314	-10532
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.32	NA	NA	NA	NA	NA	NA	NA	0.38	NA	NA	NA	NA	NA
		0.31	0.34	0.39	0.68	0.29	0.21	0.36	0.35	0.35	0.20	0.23	0.55	0.25	0.18	0.41	0.41	0.28

Case 1 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-7147	-7131	-5608	-5352	-3665	-3021	-1911	-1482	-1359	-2791	-2769	-1407	-1421	-987	-1004	-726	-1074
	ULS Min	-7160	-7136	-5627	-5421	-3743	-3099	-1989	-1560	-1390	-2804	-2773	-1494	-1499	-1065	-1083	-804	-1105
IY Bending	ULS Max	240	250	338	294	48	47	71	153	140	121	201	203	37	47	74	142	152
	ULS Min	0	240	258	-66	-82	45	44	69	-114	0	111	-22	-15	37	47	73	-156
IZ Bending	ULS Max	467	508	750	3743	611	52	52	-17	407	372	440	3448	681	-47	38	38	-95
	ULS Min	0	467	646	973	-124	-124	-18	-66	-68	0	389	546	-89	-89	-47	-141	-141
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	12.223	12.732	17.234	14.981	4.164	2.407	3.596	7.786	7.162	6.175	10.243	10.339	1.906	2.417	3.748	7.253	7.980
	Stress due to bending Z	13.874	15.080	22.290	111.182	18.153	3.677	1.552	1.955	12.088	11.037	13.055	102.428	20.240	2.629	1.393	4.186	4.187
Force (kn) =		2038	2172	3086	9850	1742	475	402	761	1503	1344	1819	8804	1729	394	401	893	950
Tension Combined Force (kN) =		-5109	-4960	-2523	4498	-1922	-2546	-1509	-721	144	-1447	-950	7397	308	-593	-603	167	-124
Compression Combined Force (kN) =		-9198	-9307	-8713	-15271	-5485	-3574	-2391	-2320	-2893	-4148	-4592	-10299	-3228	-1459	-1484	-1697	-2055
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	0.01	NA	NA	0.34	0.01	NA	NA	0.01	NA
		0.45	0.45	0.42	0.74	0.26	0.17	0.11	0.11	0.13	0.20	0.22	0.50	0.15	0.07	0.07	0.08	0.10

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	767.64	767.64	383.29	396.44	586.52	126.81	1235.92	1135.78	763.93	800.13	786.85	843.55	475.63	420.81	-21.02	-19.66	143.89	-683.43
	ULS Min	-327.02	-327.02	161.77	181.51	144.16	-19.01	-2004.85	-1638.9	-1282.31	-1138.98	-1242.08	-1112.25	-1039.1	-837.28	-577.55	-537.26	-20.81	-839.08
IY Bending	ULS Max	0	0	56.32	55.33	49.5	44.2	14.35	0	17.61	28.08	18.43	39.75	11.18	36.09	7.09	28.54	0	28.09
	ULS Min	0	0	0	0	0	0	-40.36	0	-32.71	-4.73	-31.17	-1.13	-33.13	0	-25.54	0	0	0
IZ Bending	ULS Max	0	0	82.72	112.06	74.26	38.87	98.35	0	91.45	31.84	72.1	4.99	76.04	8.69	77.48	9.79	0	7.34
	ULS Min	0	0	-70.54	-101.65	-110.11	-78.66	-51.66	0	-45.37	-35.35	-21.71	-8.97	-26.69	-12.2	-27.54	-10.37	0	-8.09
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	19	17	15	17	0	14	12	13	17	14	15	11	12	0	10
	Stress Z	0	0	9	12	12	8	11	0	10	4	8	1	9	1	9	1	0	1
Force (kn) =		0	0	513	564	523	429	449	0	385	253	340	283	360	264	312	210	0	190
Tension Combined Force (kN) =		768	768	896	960	1110	556	1685	1136	1149	1053	1127	1127	836	685	291	191	144	-494
Compression Combined Force (kN) =		-327	-327	-351	-382	-379	-448	-2454	-1639	-1668	-1392	-1582	-1395	-1399	-1102	-889	-748	-21	-1029
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.15	0.20	0.21	0.24	0.12	0.41	0.27	0.28	0.25	0.27	0.27	0.20	0.16	0.07	0.05	0.03	NA
		0.01	0.09	0.10	0.11	0.11	0.13	0.76	0.51	0.51	0.43	0.49	0.43	0.43	0.34	0.27	0.23	0.01	0.29

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	731.6	482.63	365.24	379.03	569.64	64.48	1018.72	1153.76	690.54	688.53	754.55	750.38	388.53	465.93	-11.33	-33.63	-501.19	167.74
	ULS Min	-319.62	193.07	163.58	209.56	175.9	-41.75	-1496.87	-1765.65	-1040.58	-1161.39	-1046.08	-1147.36	-795.64	-990.71	-519.13	-590.67	-614.42	-16.53
IY Bending	ULS Max	0	57.71	51.38	48.68	44.74	42.79	6.79	71.91	36.78	18.06	38.02	17.5	34.14	11.02	27.52	7.91	24.26	0
	ULS Min	0	-108.3	0	0	0	0	-16.63	-2.57	-7.89	-31.96	0	-30.86	0	-32.81	0	-25.24	0	0
IZ Bending	ULS Max	0	29.62	34.76	38.8	37.15	34.06	112.48	37.21	16.96	23.14	6.48	14.69	6.16	16.22	6.95	17.48	2.15	0
	ULS Min	0	-52.61	-12.68	-10.23	-10.37	-9.84	-65.48	-38.94	-13.04	-71.3	-1.6	-65.87	-1.96	-68.57	-1.6	-75.68	-9.96	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	31	18	17	16	15	7	30	15	13	16	13	14	14	11	11	9	0
	Stress Z	0	5	4	4	4	4	13	4	2	8	1	7	1	8	1	9	1	0
Force (kn) =		0	671	389	380	352	334	315	553	278	344	267	327	240	345	197	307	169	0
Tension Combined Force (kN) =		732	1154	754	759	921	398	1334	1707	968	1032	1022	1077	629	810	186	273	-332	168
Compression Combined Force (kN) =		-320	-478	-225	-170	-176	-375	-1812	-2319	-1318	-1505	-1313	-1474	-1036	-1335	-716	-897	-784	-17
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.16	0.17	0.20	0.09	0.32	0.41	0.23	0.25	0.25	0.26	0.15	0.20	0.04	0.07	NA	0.04
		0.01	0.13	0.06	0.05	0.05	0.11	0.56	0.72	0.41	0.46	0.40	0.45	0.32	0.41	0.22	0.28	0.22	0.00

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	413.33	412.53	850.76	172.18	1235.48	1159.29	660.09	707.92	280.31	226.27	-154.85	-121.11	-96.02	23.72
	ULS Min	255.74	-269.27	598.18	-472.8	-2330.14	-2397.01	-1911.7	-1861.05	-1730.63	-1780.11	-1232.81	-1203.53	-179.88	13.69
IY Bending	ULS Max	8153.17	0	26.64	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8896.4	-57.41	0	-16.18	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	146.31	237.21	73.42	268.54	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.62	-113.84	-35.15	-99.31	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	90	19	11	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	17	6	22	0	0	0	0	0	0	0	0	0	0
Force (kn) =		7766	733	298	511	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8180	1145	1149	683	1235	1159	660	708	280	226	-155	-121	-96	24
Compression Combined Force (kN) =		-7511	-1002	300	-983	-2330	-2397	-1912	-1861	-1731	-1780	-1233	-1204	-180	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.40	0.22	0.25	0.15	0.24	0.22	0.13	0.14	0.06	0.05	NA	NA	NA	0.02
		0.48	0.25	NA	0.27	0.61	0.63	0.50	0.49	0.52	0.53	0.37	0.36	0.58	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	240.08	207.39	296.58	109.81	137.26	648.81	613.77	408.05	426.01	301.13	282.89	322.97	286.31	47.09	32.23
	ULS Min	-16.44	-231.94	0.22	-72.2	77.9	-959.29	-961.43	-641.79	-648.66	-564.87	-548.34	-383.33	-444.42	-75.9	19.6
IY Bending	ULS Max	3975.35	15.81	20.3	16.26	115.1	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4319.44	-22.62	-13.6	-18.62	89.4	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	169.1	239.96	97.79	267.72	123.52	0	0	0	0	0	0	0	0	0	0
	ULS Min	-100.6	-120.83	-56.23	-136.94	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	52	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	13	24	10	26	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4355	544	301	560	633	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4595	751	597	669	770	649	614	408	426	301	283	323	286	47	32
Compression Combined Force (kN) =		-4372	-776	-301	-632	-555	-959	-961	-642	-649	-565	-548	-383	-444	-76	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.27	0.18	0.14	0.16	0.06	0.14	0.13	0.09	0.09	0.07	0.06	0.07	0.06	0.04	0.03
		0.34	0.30	0.12	0.24	0.06	0.25	0.25	0.17	0.17	0.15	0.14	0.10	0.12	0.24	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	25026.27	25026.27	2288.75	1789.65	1846.33	1754.27	495
	ULS Min	0	0	-1096	-10	-12	-17	-483
Shear	Fz Max	9892	9892	949	2405	2420	2317	1120
	Fz Min	-9928	-9928	-992	-263	-2433	-259	-658
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.459	0.610	0.114	0.171	0.150	0.168	0.094
		0.273	0.519	0.184	0.575	0.582	0.554	0.487

Case 1 - ULS V1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-14454	-14432	-13624	-13350	-12573	-12377	-12021	-11988	-11798	-14107	-14093	-13189	-12465	-12291	-11971	-11938	-11762
	ULS Min	-14484	-14443	-13666	-13507	-12710	-12514	-12082	-12021	-11893	-14137	-14103	-13389	-12602	-12428	-12033	-11971	-11856
IY Bending	ULS Max	0	-54	-43	84	83	123	141	151	151	26	35	90	89	127	138	144	144
	ULS Min	-54	-78	-75	82	81	81	123	141	1	0	26	37	78	78	127	138	15
IZ Bending	ULS Max	0	-46	119	463	-51	313	313	-53	268	93	125	155	179	179	54	255	255
	ULS Min	-46	-54	-13	267	-191	-191	-53	-253	-253	0	93	-7	169	-314	-314	54	-267
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.131	1.636	1.581	1.769	2.319	3.452	4.506	4.822	4.822	0.550	0.730	1.892	2.504	3.576	4.393	4.572	4.572
	Stress due to bending Z	0.874	1.022	2.251	8.780	4.426	7.262	11.123	8.972	9.502	1.767	2.369	2.948	4.150	7.283	11.154	9.055	9.470
Force (kn) =		343	455	657	1808	1072	1703	1664	1468	1525	397	531	830	1058	1726	1655	1451	1495
Tension Combined Force (kN) =		-14111	-13977	-12967	-11542	-11501	-10674	-10357	-10519	-10273	-13709	-13562	-12360	-11407	-10565	-10316	-10487	-10267
Compression Combined Force (kN) =		-14828	-14898	-14323	-15315	-13782	-14218	-13746	-13489	-13418	-14534	-14635	-14218	-13660	-14154	-13688	-13422	-13351
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.23	0.23	0.22	0.24	0.21	0.22	0.37	0.36	0.36	0.22	0.23	0.22	0.21	0.22	0.37	0.36	0.36

Case 1 - ULS V1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4273	-4262	-3094	-2771	-2481	-2378	-2171	-2016	-2143	-3946	-3927	-2693	-2394	-2275	-2021	-1836	-1911
	ULS Min	-4286	-4266	-3113	-2839	-2559	-2456	-2249	-2094	-2174	-3959	-3932	-2781	-2472	-2353	-2099	-1914	-1942
IY Bending	ULS Max	5	11	13	56	52	52	53	173	169	11	14	37	39	50	54	182	184
	ULS Min	0	5	-38	-20	34	33	51	52	-173	0	5	6	38	38	50	54	-230
IZ Bending	ULS Max	0	-68	-36	282	-27	54	53	109	332	35	65	98	101	18	33	39	39
	ULS Min	-68	-85	-125	166	-42	-27	-45	-44	109	0	30	34	18	-54	-54	33	-549
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.236	0.541	1.940	2.832	2.638	2.630	2.696	8.844	8.829	0.586	0.737	1.907	1.993	2.558	2.764	9.277	11.707
	Stress due to bending Z	2.015	2.521	3.715	8.379	1.240	1.589	1.584	3.249	9.848	1.042	1.929	2.907	3.015	1.608	1.608	1.160	16.295
Force (kn) =		176	239	442	875	303	329	334	944	1458	127	208	376	391	325	341	815	2186
Tension Combined Force (kN) =		-4097	-4023	-2652	-1895	-2179	-2049	-1837	-1072	-685	-3819	-3719	-2317	-2003	-1949	-1680	-1021	275
Compression Combined Force (kN) =		-4462	-4505	-3554	-3715	-2862	-2786	-2583	-3038	-3632	-4086	-4140	-3157	-2863	-2678	-2441	-2729	-4128
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.22	0.22	0.17	0.18	0.14	0.13	0.12	0.15	0.17	0.20	0.20	0.15	0.14	0.13	0.12	0.13	0.19

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	218.24	218.24	337.66	370.61	467.75	211.73	-343.42	-364.69	-212.86	-231.36	-175.42	-197.88	-254.31	-267.8	-284.6	-296.82	-95.66	-886.01
	ULS Min	218.24	218.24	326.87	350.57	434.37	157.09	-384.73	-410.09	-257	-285.76	-220.57	-249.79	-299.3	-321.64	-330.19	-348.51	-108.83	-896.88
IY Bending	ULS Max	0	0	39.89	41.46	40.52	39.11	2.28	0	4.9	17.07	4.88	21.79	2.44	24.42	3.83	25.17	0	29.06
	ULS Min	0	0	0	0	0	0	-21.01	0	-22	0	-21.41	0	-27.84	0	-23.32	0	0	0
IZ Bending	ULS Max	0	0	0	0.3	0	0	0	0	0.54	1.13	0	0.24	0	0.89	0	2.68	0	0
	ULS Min	0	0	-6.14	-8.72	-38.7	-43.97	-1.21	0	-0.44	0	-0.63	0	-3.44	0	-6.01	0	0	-5.9
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	9	0	9	7	9	9	12	10	10	10	0	10
	Stress Z	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	261	276	328	330	143	0	149	117	145	147	193	166	167	174	0	192
	Tension Combined Force (kN) =	218	218	599	647	796	542	-200	-365	-64	-115	-31	-51	-61	-102	-117	-123	-96	-694
	Compression Combined Force (kN) =	218	218	66	75	106	-173	-528	-410	-406	-402	-365	-397	-492	-487	-498	-522	-109	-1089
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.13	0.14	0.17	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.16	0.13	0.12	0.12	0.11	0.12	0.15	0.15	0.15	0.16	0.03	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	261.55	418.31	334.36	364.99	460.67	147.79	-303.3	-290.75	-210.28	-234.31	-174.25	-191.64	-240.76	-271.2	-279.56	-315.68	-644.89	-89.33
	ULS Min	261.55	408.64	333.13	363.94	458.97	143.87	-351.34	-359.38	-265.17	-278.47	-226.23	-236.91	-295.06	-316.33	-331.83	-360.61	-657.23	-102.5
IY Bending	ULS Max	0	0	39.3	39.3	39.59	40.91	0	42.66	15.91	5.01	21.37	4.89	23.11	2.71	24.43	4.58	24.7	0
	ULS Min	0	-31.64	0	0	0	0	-5.29	0	0	-22.06	0	-21.42	0	-27.91	0	-23.44	0	0
IZ Bending	ULS Max	0	0	0	1.29	0	1.66	0	2.64	0.91	0	0.47	0	0	0.81	0.72	0.9	0.26	0
	ULS Min	0	-2.05	-1.5	0	-0.89	0	-3.61	0	0	-1.57	0	-0.24	-0.46	0	0	0	-0.55	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	9	14	14	14	14	2	18	7	9	9	9	10	12	10	10	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	172	248	248	249	259	42	291	108	151	144	144	156	189	165	159	155	0
	Tension Combined Force (kN) =	262	591	583	613	710	407	-261	0	-102	-83	-30	-47	-85	-82	-114	-157	-490	-89
	Compression Combined Force (kN) =	262	236	85	116	210	-115	-393	-651	-374	-429	-371	-381	-451	-505	-497	-520	-812	-103
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.12	0.13	0.13	0.16	0.09	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.03	0.12	0.20	0.12	0.13	0.11	0.12	0.14	0.16	0.15	0.16	0.23	0.03

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	393.57	74.38	871.4	129.29	-602.83	-633.06	-646.58	-640.94	-807.33	-812.04	-734.33	-742.06	-156.86	21.53
	ULS Min	393.57	57.86	871.4	120.94	-628.32	-658.55	-672.07	-666.44	-829.69	-834.4	-756.69	-764.42	-164.53	12.68
IY Bending	ULS Max	586.81	0	30.62	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-504.46	-53.85	0	-14.67	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.51	-0.56	0	-1.19	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	18	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		489	358	218	106	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		883	433	1089	235	-603	-633	-647	-641	-807	-812	-734	-742	-157	22
Compression Combined Force (kN) =		-96	-300	653	15	-628	-659	-672	-666	-830	-834	-757	-764	-165	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.24	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	NA	0.17	0.17	0.18	0.18	0.25	0.25	0.23	0.23	0.53	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	166.04	12.32	231.04	57.82	212.83	-206.18	-211.83	-159.46	-172.51	-189.02	-169.84	-57.29	-147.85	-22.35	29.2
	ULS Min	159.9	-1.16	216.14	9.88	212.83	-229.17	-234.82	-182.45	-195.5	-212.02	-192.83	-80.28	-170.84	-31.19	20.81
IY Bending	ULS Max	248.25	10.41	17.45	11.83	97.64	0	0	0	0	0	0	0	0	0	0
	ULS Min	-217.15	-19.86	-6.91	-15.76	97.64	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.32	4.13	3.63	6.07	18.13	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7.65	0	0	0	18.13	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		240	148	130	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		406	161	361	180	516	-206	-212	-159	-173	-189	-170	-57	-148	-22	29
Compression Combined Force (kN) =		-80	-150	86	-112	-90	-229	-235	-182	-196	-212	-193	-80	-171	-31	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.09	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.06	0.05	0.02	0.05	0.10	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	28341.42	28341.42	3703.82	1961.72	2330.47	1951.5	814.2
	ULS Min	0	0	-1088	-10	-12	-10	-552
Shear	Fz Max	11243	11243	1472	2644	2791	2556	1280
	Fz Min	-11132	-11132	-1490	-366	-2706	-360	-402
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.520	0.691	0.184	0.188	0.189	0.187	0.155
		0.310	0.588	0.276	0.632	0.668	0.612	0.557

Case 1 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-17853	-17828	-17060	-16736	-14314	-14215	-12660	-12627	-12512	-11485	-11471	-10604	-11500	-11258	-12156	-12122	-11884
	ULS Min	-17883	-17839	-17103	-16893	-14451	-14352	-12721	-12660	-12607	-11515	-11482	-10803	-11637	-11395	-12217	-12156	-11978
IY Bending	ULS Max	128	219	220	251	92	109	198	198	136	0	-41	120	132	134	152	161	161
	ULS Min	0	128	24	46	35	88	109	136	23	-41	-80	-78	80	83	134	152	-31
IZ Bending	ULS Max	1118	1435	2631	8671	1750	308	308	-23	538	1179	1554	8062	1937	28	968	968	-5
	ULS Min	0	1118	1339	2847	-371	-371	-23	-209	-209	0	1179	1480	28	-736	-736	-5	-55
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	2.691	4.600	4.622	5.264	2.572	3.050	6.316	6.316	4.340	0.871	1.677	2.518	3.700	3.763	4.839	5.144	5.144
	Stress due to bending Z	21.192	27.212	49.895	164.432	40.537	8.601	10.918	7.409	19.085	22.362	29.465	152.873	44.881	17.050	34.344	34.344	1.955
Force (kn) =		4093	5452	9344	29085	6853	1852	1835	1461	2494	3982	5337	26633	7722	3308	4171	4204	756
Tension Combined Force (kN) =		-13760	-12376	-7716	12349	-7461	-12363	-10825	-11165	-10018	-7503	-6134	16029	-3777	-7950	-7984	-7919	-11128
Compression Combined Force (kN) =		-21976	-23291	-26446	-45977	-21303	-16204	-14556	-14121	-15101	-15497	-16819	-37436	-19359	-14704	-16389	-16360	-12734
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.22	NA	NA	NA	NA	NA	NA	NA	0.29	NA	NA	NA	NA	NA
		0.34	0.36	0.41	0.71	0.33	0.25	0.39	0.38	0.41	0.24	0.26	0.58	0.30	0.23	0.44	0.44	0.34

Case 1 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6376	-6360	-5086	-4673	-3536	-3327	-2549	-2310	-2183	-2010	-1989	-897	-1396	-1351	-1649	-1538	-1857
	ULS Min	-6389	-6364	-5104	-4741	-3614	-3405	-2627	-2388	-2214	-2023	-1994	-984	-1474	-1429	-1727	-1617	-1887
IY Bending	ULS Max	24	24	149	122	46	52	56	182	168	0	-32	48	53	54	59	180	189
	ULS Min	0	-32	-23	11	-2	45	50	54	-169	-44	-52	-32	38	38	54	59	-231
IZ Bending	ULS Max	413	452	734	3761	614	61	62	-26	556	379	465	3533	705	-57	46	46	-128
	ULS Min	0	413	548	1163	-129	-128	-28	-40	-41	0	391	541	-84	-84	-57	-128	-303
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.212	1.611	7.583	6.246	2.354	2.638	2.853	9.296	8.621	2.259	2.650	2.463	2.697	2.772	2.996	9.172	11.793
	Stress due to bending Z	12.266	13.415	21.791	111.714	18.235	3.798	1.832	1.185	16.502	11.247	13.814	104.948	20.949	2.508	1.687	3.814	8.993
Force (kn) =		1052	1173	2293	9210	1608	502	366	818	1961	1054	1285	8386	1846	412	366	1014	1623
Tension Combined Force (kN) =		-5323	-5186	-2792	4537	-1928	-2825	-2183	-1492	-222	-955	-704	7489	450	-939	-1283	-524	-234
Compression Combined Force (kN) =		-7441	-7537	-7398	-13951	-5221	-3908	-2993	-3206	-4175	-3077	-3279	-9371	-3321	-1841	-2092	-2630	-3510
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	NA	NA	NA	0.34	0.02	NA	NA	NA	NA
		0.36	0.36	0.36	0.68	0.25	0.19	0.14	0.15	0.19	0.15	0.16	0.45	0.16	0.09	0.10	0.13	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	712.74	712.74	439.55	458.5	643.1	255.43	942.4	849.18	583.96	605.14	613.67	652.25	321.65	265.48	-98.87	-102.32	-37.87	-834.81
	ULS Min	-225.53	-225.53	249.68	274.28	263.94	114.24	-1841.44	-1535.77	-1176.38	-1064.88	-1132.01	-1031.51	-983.26	-820.74	-582.76	-553.58	-180.92	-969.17
IY Bending	ULS Max	0	0	54.09	53.91	48.46	42.88	12.29	0	15.7	25.37	16.46	38.65	9.55	36.37	6.09	29.9	0	30.46
	ULS Min	0	0	0	0	0	0	-38.16	0	-31.83	-2.75	-30.27	0	-33.76	0	-26.75	0	0	0
IZ Bending	ULS Max	0	0	68.47	92.3	48.87	27.99	83.4	0	77.51	28.31	61.68	4.33	64.35	7.81	63.98	9.25	0	4.62
	ULS Min	0	0	-62.91	-90.88	-109.16	-83.68	-45.59	0	-39.76	-29.29	-18.74	-7.74	-23.72	-10.27	-26.07	-8.22	0	-9.25
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	16	0	13	11	13	16	14	15	11	12	0	11
	Stress Z	0	0	7	10	12	9	9	0	9	3	7	1	7	1	7	1	0	1
Force (kn) =		0	0	471	516	515	431	407	0	354	223	315	274	343	263	296	217	0	207
Tension Combined Force (kN) =		713	713	911	975	1158	686	1350	849	938	829	929	926	665	528	197	115	-38	-628
Compression Combined Force (kN) =		-226	-226	-221	-242	-251	-316	-2249	-1536	-1531	-1288	-1447	-1305	-1327	-1084	-878	-771	-181	-1176
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.20	0.21	0.25	0.15	0.32	0.20	0.23	0.20	0.22	0.22	0.16	0.13	0.05	0.03	NA	NA
		0.01	0.06	0.06	0.07	0.07	0.09	0.70	0.47	0.47	0.40	0.45	0.40	0.41	0.33	0.27	0.24	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	722.43	547.75	424.04	443.81	630.66	190.04	776.87	882.81	519.42	508.81	585.88	573.21	248.77	303.84	-85.33	-122.87	-608.31	-26.8
	ULS Min	-178.61	296.77	251.19	298.55	293.17	97.52	-1387.3	-1632.49	-972.4	-1083.3	-964.87	-1060.11	-774.24	-951.33	-528.46	-606.96	-706.78	-186.62
IY Bending	ULS Max	0	37.84	48.56	47.32	44	42.45	4.84	70.51	34.71	16.17	36.95	15.75	34.21	9.57	28.65	7.12	25.82	0
	ULS Min	0	-104.45	0	0	0	0	-15.23	0	-3.58	-31.1	0	-29.89	0	-33.41	0	-26.6	0	0
IZ Bending	ULS Max	0	26.14	29.32	33.71	31.51	30.95	96.17	32.09	14.96	19.19	5.79	12.63	5.19	14.15	6.34	15.62	2.41	0
	ULS Min	0	-44.77	-11.37	-8.31	-9.36	-6.87	-56.38	-33.86	-10.76	-61.76	-1.24	-56.42	-1.89	-58.54	-1.15	-64.26	-8.01	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	30	17	16	15	15	6	29	14	13	15	12	14	14	12	11	9	0
	Stress Z	0	4	3	4	3	3	11	4	2	7	1	6	1	7	1	7	1	0
Force (kn) =		0	636	360	361	336	325	277	535	260	321	259	303	239	330	204	295	176	0
Tension Combined Force (kN) =		722	1184	784	805	967	515	1053	1418	780	830	844	876	488	634	119	172	-433	-27
Compression Combined Force (kN) =		-179	-340	-109	-63	-43	-228	-1664	-2167	-1233	-1404	-1223	-1363	-1013	-1282	-732	-902	-882	-187
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.18	0.21	0.11	0.25	0.34	0.19	0.20	0.20	0.21	0.12	0.15	0.03	0.04	NA	NA
		0.01	0.09	0.03	0.02	0.01	0.07	0.51	0.67	0.38	0.43	0.38	0.42	0.31	0.39	0.23	0.28	0.25	0.05

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	470.88	379.75	983.3	185.6	897.8	808.32	370.4	416.1	8.49	-42.62	-358.22	-328.84	-129.36	21.63
	ULS Min	335.8	-216.38	766.81	-370.15	-2162.09	-2243.58	-1837.64	-1789.52	-1718.37	-1765.57	-1285.37	-1259.83	-202.34	11.76
IY Bending	ULS Max	7042.45	0	34.28	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7829.92	-60.14	0	-15.37	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	129.73	203.15	62.93	229.8	0	0	0	0	0	0	0	0	0	0
	ULS Min	-56.21	-97.76	-30.13	-85.49	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	79	20	14	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	15	5	19	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6839	701	337	448	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		7310	1080	1320	633	898	808	370	416	8	-43	-358	-329	-129	22
Compression Combined Force (kN) =		-6503	-917	430	-818	-2162	-2244	-1838	-1790	-1718	-1766	-1285	-1260	-202	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.36	0.21	0.29	0.14	0.17	0.16	0.07	0.08	0.00	NA	NA	NA	NA	0.02
		0.41	0.23	NA	0.23	0.57	0.59	0.48	0.47	0.51	0.53	0.39	0.38	0.65	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	278.39	184.8	359.77	116.99	234.36	473.98	440.86	268.09	275.11	173	167.91	226.66	156.57	24.67	31.06
	ULS Min	59.64	-191.77	100.7	-39.02	180.12	-907.68	-912.59	-635.06	-649.32	-572.57	-547.86	-382.03	-473.05	-82.01	19.04
IY Bending	ULS Max	3478.76	14.83	20.8	15.1	110.27	0	0	0	0	0	0	0	0	0	0
	ULS Min	-3803.96	-22.9	-9.66	-17.68	89.4	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	141.51	206.2	84.32	229.96	103.68	0	0	0	0	0	0	0	0	0	0
	ULS Min	-89.66	-103.04	-47.69	-116.9	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	46	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	11	20	8	23	6	0	0	0	0	0	0	0	0	0	0
Force (kn) =		3798	492	283	493	567	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4076	677	643	610	801	474	441	268	275	173	168	227	157	25	31
Compression Combined Force (kN) =		-3738	-684	-182	-532	-387	-908	-913	-635	-649	-573	-548	-382	-473	-82	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.24	0.16	0.15	0.15	0.07	0.10	0.10	0.06	0.06	0.04	0.04	0.05	0.03	0.02	0.02
		0.29	0.26	0.07	0.20	0.04	0.24	0.24	0.17	0.17	0.15	0.14	0.10	0.12	0.26	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
Members		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	29848.08	29848.08	3788.55	2094.32	2197.23	2084.02	963.39
	ULS Min	0	0	-1435	-10	-12	-16	-655
Shear	Fz Max	11720	11720	1466	2816	2892	2750	1520
	Fz Min	-11751	-11751	-1485	-381	-2868	-353	-663
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.548	0.728	0.188	0.201	0.178	0.200	0.183
		0.324	0.615	0.276	0.674	0.692	0.658	0.662

Case 1 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-16180	-16154	-15720	-15395	-13461	-13828	-12497	-12464	-12556	-9365	-9351	-8788	-10421	-10592	-11926	-11893	-11839
	ULS Min	-16210	-16165	-15763	-15551	-13598	-13965	-12558	-12497	-12651	-9395	-9362	-8988	-10558	-10729	-11987	-11926	-11934
IY Bending	ULS Max	744	1053	1053	862	120	115	619	619	155	526	683	685	99	103	558	558	92
	ULS Min	0	744	635	-157	-171	-37	-37	-35	-35	0	526	-52	-37	-10	-10	-6	-6
IZ Bending	ULS Max	1224	1574	2864	9421	1921	296	296	-22	566	1281	1686	8825	2096	7	1047	1047	-34
	ULS Min	0	1224	1461	3086	-381	-381	-22	-201	-201	0	1281	1596	6	-762	-762	-34	-35
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	15.610	22.103	22.108	18.091	4.806	3.237	19.721	19.721	4.943	11.039	14.345	14.372	2.765	2.898	17.785	17.785	2.917
	Stress due to bending Z	23.208	29.857	54.304	178.648	44.499	8.823	10.496	7.132	20.102	24.287	31.971	167.357	48.565	17.651	37.168	37.168	1.248
	Force (kn) =	6653	8905	13096	33719	7838	1917	3217	2859	2666	6055	7938	31147	8159	3267	5850	5850	443
	Tension Combined Force (kN) =	-9527	-7249	-2624	18325	-5623	-11911	-9280	-9605	-9890	-3310	-1413	22358	-2262	-7326	-6076	-6042	-11396
	Compression Combined Force (kN) =	-22863	-25070	-28859	-49271	-21435	-15882	-15775	-15356	-15317	-15449	-17300	-40134	-18718	-13996	-17838	-17777	-12378
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.33	NA	NA	NA	NA	NA	NA	NA	0.40	NA	NA	NA	NA	NA
		0.35	0.39	0.45	0.76	0.33	0.25	0.42	0.41	0.41	0.24	0.27	0.62	0.29	0.22	0.48	0.48	0.33

Case 1 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-8556	-8539	-6867	-6446	-4619	-3946	-2778	-2341	-2172	-3707	-3686	-2256	-2255	-1799	-1819	-1535	-1844
	ULS Min	-8569	-8544	-6885	-6515	-4697	-4024	-2856	-2419	-2203	-3720	-3691	-2343	-2333	-1877	-1898	-1613	-1874
IY Bending	ULS Max	255	273	346	302	51	52	71	188	174	143	226	227	40	54	73	178	187
	ULS Min	0	255	282	-66	-82	49	51	69	-163	0	134	-27	-19	40	54	73	-209
IZ Bending	ULS Max	458	500	808	4088	663	73	73	-30	569	417	508	3818	767	-68	52	52	-131
	ULS Min	0	458	613	1248	-143	-143	-32	-52	-53	0	432	601	-88	-88	-68	-131	-294
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	12.996	13.929	17.654	15.385	4.207	2.676	3.600	9.588	8.883	7.315	11.540	11.578	2.050	2.751	3.744	9.056	10.654
	Stress due to bending Z	13.592	14.839	23.986	121.429	19.701	4.237	2.168	1.538	16.907	12.376	15.092	113.412	22.775	2.615	2.016	3.889	8.736
	Force (kn) =	2076	2246	3251	10682	1867	540	450	869	2014	1537	2079	9759	1938	419	450	1011	1514
	Tension Combined Force (kN) =	-6480	-6293	-3616	4236	-2752	-3406	-2328	-1472	-159	-2169	-1607	7503	-317	-1380	-1370	-524	-330
	Compression Combined Force (kN) =	-10645	-10790	-10136	-17197	-6563	-4563	-3307	-3288	-4217	-5258	-5770	-12102	-4271	-2296	-2347	-2624	-3388
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.34	NA	NA	NA	NA	NA
		0.52	0.52	0.49	0.83	0.31	0.22	0.16	0.16	0.20	0.25	0.28	0.59	0.20	0.11	0.11	0.13	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	835.04	835.04	463.11	479.5	687.71	262.53	1265.91	1154.75	784.66	815.78	812.25	866.1	467.52	400.79	-50.56	-52.47	-18.99	-820.33
	ULS Min	-337.81	-337.81	225.77	249.22	213.76	97.51	-2203.56	-1815.05	-1404.74	-1258.12	-1358.57	-1225.59	-1152.37	-943.49	-644.02	-603.58	-194.52	-985.57
IY Bending	ULS Max	0	0	57.63	57.01	50.44	43.84	14.84	0	18.43	29.07	19.38	42.81	11.37	39.29	6.69	31.01	0	30.78
	ULS Min	0	0	0	0	0	0	-42.36	0	-34.21	-6.07	-32.4	-0.98	-35.11	0	-27.49	0	0	0
IZ Bending	ULS Max	0	0	87.02	117.44	70.88	39.02	104.42	0	97	35.22	77.16	5.35	81.11	9.54	81.36	10.87	0	6.74
	ULS Min	0	0	-77.19	-111.54	-126.67	-93.53	-56.69	0	-49.6	-36.78	-23.36	-9.67	-28.97	-12.92	-31.18	-10.8	0	-10.09
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	17	15	18	0	14	12	14	18	15	16	11	13	0	11
	Stress Z	0	0	9	13	14	10	12	0	11	4	9	1	9	1	9	1	0	1
	Force (kn) =	0	0	529	585	561	456	474	0	405	262	357	305	383	287	332	228	0	210
	Tension Combined Force (kN) =	835	835	992	1064	1249	718	1740	1155	1190	1078	1170	1171	850	688	281	175	-19	-610
	Compression Combined Force (kN) =	-338	-338	-303	-335	-348	-358	-2677	-1815	-1810	-1520	-1716	-1531	-1535	-1231	-976	-831	-195	-1196
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.16	0.22	0.23	0.27	0.16	0.42	0.28	0.29	0.26	0.28	0.28	0.20	0.17	0.07	0.04	NA	NA
		0.01	0.09	0.09	0.10	0.10	0.10	0.83	0.56	0.56	0.47	0.53	0.47	0.47	0.38	0.30	0.26	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	836.34	577.64	444.38	461.46	670.64	196.74	1048.87	1177.87	703.33	696.1	777.22	765.7	373.13	449.47	-35.59	-72.75	-599.02	-6.39
	ULS Min	-289.96	266.37	228.32	279.88	248.77	82.08	-1644.29	-1949.02	-1147.69	-1283	-1148.2	-1264.65	-892.02	-1108.21	-576.38	-666.63	-719.02	-202.88
IY Bending	ULS Max	0	55.46	53.2	49.67	45.1	42.84	7.32	77.37	39.37	18.99	40.8	18.49	36.91	11.32	29.64	7.78	26.08	0
	ULS Min	0	-122.41	0	0	0	0	-17.77	-3.63	-8.49	-33.28	0	-31.93	0	-34.67	0	-27.27	0	0
IZ Bending	ULS Max	0	32.83	36.99	41.84	39.54	38.3	121.1	39.45	18.59	24.38	7.12	15.86	6.54	17.48	7.75	19.42	2.95	0
	ULS Min	0	-55.43	-13.83	-10.69	-11.47	-8.85	-69.58	-42.36	-13.56	-76.8	-1.62	-70.46	-2.25	-73.37	-1.52	-80.4	-9.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	36	18	17	16	15	7	32	16	14	17	13	15	14	12	11	9	0
	Stress Z	0	5	4	5	4	4	14	5	2	9	1	8	1	8	1	9	1	0
	Force (kn) =	0	751	404	392	359	342	339	596	298	363	287	342	260	366	213	329	181	0
	Tension Combined Force (kN) =	836	1329	849	853	1029	539	1388	1774	1001	1059	1064	1108	633	815	177	256	-418	-6
	Compression Combined Force (kN) =	-290	-485	-176	-112	-110	-260	-1983	-2545	-1446	-1646	-1435	-1607	-1152	-1474	-789	-995	-900	-203
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.26	0.19	0.19	0.23	0.12	0.33	0.43	0.24	0.25	0.26	0.27	0.15	0.20	0.04	0.06	NA	NA
		0.01	0.13	0.05	0.03	0.03	0.07	0.61	0.79	0.45	0.51	0.44	0.49	0.35	0.45	0.24	0.31	0.25	0.06

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	487.77	455.56	1004.95	198.83	1277.06	1172.72	629.51	685.29	218.3	155.54	-258.36	-219.59	-121.23	21.74
	ULS Min	318.91	-285.47	734.33	-493.73	-2541.43	-2635.79	-2124.16	-2065.36	-1934.69	-1992.56	-1411.72	-1377.73	-210.53	11.62
IY Bending	ULS Max	8852.29	0	34.85	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-9659.67	-61.55	0	-15.58	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	161.68	254.05	78.65	287.51	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.75	-122.05	-37.67	-106.56	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	98	20	14	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	8	19	6	23	0	0	0	0	0	0	0	0	0	0
Force (kn) =		8444	785	364	534	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8932	1241	1369	733	1277	1173	630	685	218	156	-258	-220	-121	22
Compression Combined Force (kN) =		-8125	-1071	370	-1028	-2541	-2636	-2124	-2065	-1935	-1993	-1412	-1378	-211	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.44	0.24	0.30	0.16	0.25	0.23	0.12	0.13	0.05	0.03	NA	NA	NA	0.02
		0.52	0.26	NA	0.29	0.67	0.69	0.56	0.54	0.58	0.60	0.42	0.41	0.68	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	306.04	228.1	391.04	131.56	239.15	644.64	604.72	375.79	387.78	264.17	253.03	298.23	233.46	36.62	31.54
	ULS Min	32.6	-242.62	69.81	-63.45	172.76	-1076.68	-1081.34	-747.41	-762.01	-662.04	-635.93	-456.88	-547.82	-94.52	18.61
IY Bending	ULS Max	4347.55	15.96	22.14	16.39	113.74	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4700.34	-23.66	-10.38	-18.17	87.88	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	178.12	257.09	104.85	287.05	133.18	0	0	0	0	0	0	0	0	0	0
	ULS Min	-110.85	-129.46	-60.16	-146.51	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	57	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	14	25	10	28	8	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4709	579	325	587	656	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5015	807	716	719	895	645	605	376	388	264	253	298	233	37	32
Compression Combined Force (kN) =		-4677	-821	-255	-651	-483	-1077	-1081	-747	-762	-662	-636	-457	-548	-95	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.30	0.19	0.17	0.17	0.07	0.14	0.13	0.08	0.08	0.06	0.06	0.07	0.05	0.03	0.03
		0.36	0.32	0.10	0.25	0.05	0.28	0.29	0.20	0.20	0.17	0.17	0.12	0.14	0.30	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	30144.95	30144.95	3801.92	2109.59	2197.91	2121.21	1000.8
	ULS Min	0	0	-1519	-10	-12	-18	-678
Shear	Fz Max	11768	11768	1459	2836	2892	2799	1573
	Fz Min	-11835	-11835	-1478	-382	-2885	-351	-725
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.553	0.735	0.189	0.202	0.178	0.203	0.190
		0.326	0.619	0.274	0.678	0.692	0.670	0.685

Case 1 - ULS V4 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-7703	-7682	-6954	-6680	-6162	-5959	-5681	-5647	-5426	-7303	-7289	-6466	-6005	-5821	-5573	-5540	-5336
	ULS Min	-7734	-7692	-6996	-6837	-6299	-6096	-5742	-5681	-5521	-7333	-7300	-6665	-6142	-5958	-5635	-5573	-5431
IY Bending	ULS Max	0	-62	-82	46	10	42	42	3	246	28	38	40	8	45	45	-2	264
	ULS Min	-62	-88	-86	-13	-12	10	3	-18	-18	0	28	-7	-8	7	-2	-28	-28
IZ Bending	ULS Max	0	-29	119	353	-26	148	148	-21	116	75	101	133	141	78	21	113	113
	ULS Min	-29	-32	18	267	-92	-92	-21	-113	-113	0	75	82	78	-148	-148	21	-108
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.307	1.857	1.804	0.965	0.349	1.167	1.324	0.587	7.846	0.595	0.794	0.830	0.225	1.251	1.419	0.891	8.398
	Stress due to bending Z	0.554	0.616	2.257	6.695	2.123	3.428	5.252	4.008	4.104	1.428	1.914	2.525	3.274	3.433	5.258	3.998	3.997
Force (kn) =		319	424	696	1313	393	730	700	489	1272	347	464	575	556	744	711	521	1320
Tension Combined Force (kN) =		-7384	-7258	-6258	-5367	-5769	-5228	-4981	-5158	-4154	-6956	-6825	-5891	-5449	-5077	-4862	-5019	-4017
Compression Combined Force (kN) =		-8053	-8116	-7692	-8150	-6692	-6826	-6442	-6170	-6793	-7680	-7764	-7240	-6699	-6703	-6345	-6094	-6751
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.12	0.13	0.12	0.13	0.10	0.11	0.17	0.17	0.18	0.12	0.12	0.11	0.10	0.10	0.17	0.16	0.18
Case 1 - ULS V4 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4580	-4568	-3472	-3149	-2813	-2699	-2519	-2378	-2599	-4255	-4236	-3063	-2725	-2596	-2372	-2197	-2376
	ULS Min	-4593	-4573	-3491	-3218	-2891	-2777	-2597	-2456	-2629	-4268	-4240	-3150	-2804	-2674	-2450	-2275	-2407
IY Bending	ULS Max	2	7	9	16	13	14	13	157	153	16	19	12	7	11	11	149	149
	ULS Min	0	2	-41	-26	4	3	3	2	-237	0	11	0	1	7	7	7	-246
IZ Bending	ULS Max	0	-66	-39	280	-31	61	61	82	467	35	66	102	105	22	34	89	89
	ULS Min	-66	-82	-132	181	-43	-31	-46	-44	83	0	30	32	22	-62	-62	34	-726
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.096	0.332	2.100	1.306	0.658	0.698	0.669	7.981	12.101	0.833	0.991	0.612	0.364	0.576	0.574	7.588	12.536
	Stress due to bending Z	1.947	2.449	3.910	8.304	1.277	1.810	1.811	2.449	13.881	1.037	1.946	3.024	3.118	1.837	1.837	2.647	21.559
Force (kn) =		160	217	469	750	151	196	194	814	2029	146	229	284	272	188	188	799	2662
Tension Combined Force (kN) =		-4420	-4351	-3003	-2399	-2662	-2503	-2325	-1564	-570	-4109	-4006	-2779	-2454	-2408	-2183	-1398	286
Compression Combined Force (kN) =		-4752	-4790	-3960	-3968	-3042	-2973	-2790	-3271	-4658	-4414	-4470	-3434	-3075	-2863	-2638	-3074	-5069
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.23	0.23	0.19	0.19	0.15	0.14	0.13	0.16	0.22	0.21	0.22	0.17	0.15	0.14	0.13	0.15	0.23

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	148.97	148.97	223.06	234.13	278.74	26.32	-242.87	-253.06	-130.16	-143.93	-104.65	-123.21	-142.28	-146.77	-142.42	-232.5	67.1	-974.65
	ULS Min	148.97	148.97	214.74	221.73	256.57	-20.29	-284.29	-295.89	-174.94	-195.41	-150.25	-172.48	-188.01	-196.83	-188.45	-280.4	53.94	-985.07
IY Bending	ULS Max	0	0	39.18	40.67	40.09	39.98	7.54	0	7.47	14.33	7.34	18.59	6.13	19.77	6.71	21.31	0	29.62
	ULS Min	0	0	0	0	0	0	-12.39	0	-14.02	0	-13.62	0	-16.61	0	-12.8	0	0	0
IZ Bending	ULS Max	0	0	0	0	0	0	0	0	0.08	1.31	0	0	0	0.98	0	2.83	0	0
	ULS Min	0	0	-6.48	-14.23	-47.47	-54.34	-1.38	0	-0.9	0	-1.4	-0.07	-3.19	0	-7.08	0	0	-6.35
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	5	0	6	6	6	8	7	8	5	9	0	10
	Stress Z	0	0	1	2	5	6	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	257	282	343	355	86	0	96	99	94	125	117	135	99	148	0	196
	Tension Combined Force (kN) =	149	149	480	516	622	382	-157	-253	-34	-45	-11	2	-25	-12	-44	-84	67	-778
	Compression Combined Force (kN) =	149	149	-43	-60	-86	-376	-370	-296	-271	-294	-244	-297	-305	-331	-287	-429	54	-1181
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.00	0.03	0.11	0.11	0.14	0.08	NA	NA	NA	NA	NA	0.00	NA	NA	NA	NA	0.01	NA
		NA	NA	0.01	0.02	0.02	0.11	0.11	0.09	0.08	0.09	0.08	0.09	0.09	0.10	0.09	0.13	NA	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	193.59	279.4	216.52	226.59	267.8	-45.23	-195.73	-206.56	-127.01	-144.41	-101.75	-118.47	-119.63	-157.96	-213.27	-174.08	-768.66	112.37
	ULS Min	193.59	271.81	215.45	225.75	265.82	-50.32	-241.63	-271.43	-178.9	-189.11	-151.09	-164.23	-170.1	-203.72	-261.69	-219.56	-780.3	99.21
IY Bending	ULS Max	0	0	39	38.94	39.33	41.44	0	37.24	13.43	7.6	18.09	7.46	18.62	6.38	20.42	7.5	25.86	0
	ULS Min	0	-18.58	0	0	0	0	-11.17	0	0	-14.06	0	-13.6	0	-16.66	0	-12.8	0	0
IZ Bending	ULS Max	0	0	0	1.21	0	2.28	0	2.04	0.87	0	0.42	0.67	0	0.34	0.7	1.7	0.42	0
	ULS Min	0	-1.44	-0.82	0	-1.04	0	-2.8	-0.02	0	-1.07	0	0	-0.41	-0.21	0	0	-0.41	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	5	14	13	14	14	5	16	6	6	8	6	8	7	9	5	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	102	245	246	248	263	80	254	92	96	122	93	126	112	138	89	162	0
	Tension Combined Force (kN) =	194	381	462	472	516	218	-116	47	-35	-48	20	-26	6	-45	-75	-85	-607	112
	Compression Combined Force (kN) =	194	170	-30	-20	18	-314	-322	-525	-271	-285	-273	-257	-296	-316	-400	-309	-942	99
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.07	0.10	0.10	0.11	0.05	NA	0.01	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	0.02
		NA	NA	0.01	0.01	NA	0.09	0.10	0.16	0.08	0.09	0.08	0.08	0.09	0.10	0.12	0.10	0.26	NA

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	213.06	35.71	416.4	63.46	-303.44	-330.53	-282.79	-281.02	-395.99	-396.24	-313.07	-327.18	-63.68	27.75
	ULS Min	213.06	18.72	416.4	53.82	-328.94	-356.02	-308.29	-306.51	-418.35	-418.6	-335.42	-349.53	-71.35	18.9
IY Bending	ULS Max	343.84	0	5.9	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-372.3	-42.16	0	-16.49	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.97	0	0.07	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.15	-0.15	0	-0.34	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	4	14	2	7	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		328	280	42	118	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		541	316	459	181	-303	-331	-283	-281	-396	-396	-313	-327	-64	28
Compression Combined Force (kN) =		-115	-261	374	-64	-329	-356	-308	-307	-418	-419	-335	-350	-71	19
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.03	0.06	0.10	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.02	0.09	0.09	0.08	0.08	0.13	0.13	0.10	0.10	0.23	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	184.77	14.83	265.33	62.43	297.12	-227.76	-237.79	-189.66	-199.7	-213.32	-193.45	-74.32	-179.57	-29.71	28.77
	ULS Min	178.2	0.3	245.43	5.09	297.12	-250.75	-260.78	-212.65	-222.69	-236.32	-216.44	-97.31	-202.56	-38.55	20.39
IY Bending	ULS Max	268.33	10.14	18.05	11.59	97.36	0	0	0	0	0	0	0	0	0	0
	ULS Min	-232.11	-20.18	-5.44	-15.46	97.36	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.42	1.71	2.36	6.14	23.34	0	0	0	0	0	0	0	0	0	0
	ULS Min	-0.09	0	0	-0.05	23.34	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		245	147	133	120	316	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		429	162	398	183	613	-228	-238	-190	-200	-213	-193	-74	-180	-30	29
Compression Combined Force (kN) =		-66	-147	113	-115	-19	-251	-261	-213	-223	-236	-216	-97	-203	-39	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.10	0.04	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.00	0.07	0.07	0.06	0.06	0.06	0.06	0.03	0.05	0.12	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	10703.48	10703.48	4404.45	1245.8	4254	1127.12	848.34
	ULS Min	0	0	-1423	-19	-12	-18	-655
Shear	Fz Max	4291	4291	1922	187	1943	42	1503
	Fz Min	-4267	-4267	-1941	-443	-1859	-256	-499
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.196	0.261	0.219	0.119	0.345	0.108	0.161
		0.118	0.224	0.360	0.106	0.465	0.061	0.654

Case 1 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12756	-12731	-12195	-11965	-10672	-10706	-9924	-9891	-9798	-8041	-8027	-7505	-8339	-8500	-9118	-9084	-9147
	ULS Min	-12787	-12742	-12237	-12122	-10809	-10843	-9986	-9924	-9893	-8071	-8038	-7704	-8477	-8637	-9179	-9118	-9242
IY Bending	ULS Max	289	453	454	370	72	108	118	118	114	652	835	836	63	95	95	89	191
	ULS Min	0	289	256	-26	-22	74	108	101	101	0	652	-84	-88	60	89	62	62
IZ Bending	ULS Max	786	959	1863	5315	1079	234	234	-59	444	821	1032	4803	1213	23	44	175	175
	ULS Min	0	786	1191	1956	-257	-257	-59	-228	-228	0	821	1291	23	-277	-277	44	-40
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	6.072	9.511	9.525	7.760	2.021	3.026	3.769	3.769	3.633	13.692	17.520	17.544	2.466	2.661	3.022	2.833	6.098
	Stress due to bending Z	14.909	18.189	35.321	100.780	25.010	5.960	8.299	8.096	15.764	15.562	19.567	91.082	28.111	6.414	9.825	6.214	6.212
Force (kn) =		3596	4748	7686	18603	4297	1428	1285	1263	2065	5014	6356	18617	4861	1443	1368	963	1311
Tension Combined Force (kN) =		-9160	-7984	-4509	6637	-6375	-9277	-8640	-8628	-7733	-3027	-1671	11112	-3479	-7058	-7750	-8121	-7837
Compression Combined Force (kN) =		-16383	-17489	-19924	-30725	-15106	-12271	-11270	-11187	-11958	-13085	-14394	-26322	-13337	-10080	-10547	-10081	-10553
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.12	NA	NA	NA	NA	NA	NA	NA	0.20	NA	NA	NA	NA	NA
		0.25	0.27	0.31	0.48	0.23	0.19	0.30	0.30	0.32	0.20	0.22	0.41	0.21	0.16	0.28	0.27	0.28

Case 1 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5478	-5463	-4181	-3943	-2664	-2320	-1622	-1339	-1415	-3806	-3785	-2337	-2207	-1759	-1603	-1157	-1199
	ULS Min	-5492	-5468	-4199	-4012	-2742	-2398	-1700	-1417	-1446	-3819	-3790	-2425	-2285	-1837	-1681	-1235	-1230
IY Bending	ULS Max	86	86	172	152	38	41	55	143	147	200	276	277	37	37	50	152	143
	ULS Min	0	85	93	-24	-14	38	39	53	-126	0	198	-41	-43	30	30	50	-153
IZ Bending	ULS Max	335	400	387	3217	497	45	49	80	217	272	356	2956	568	-39	41	41	8
	ULS Min	0	335	168	582	-72	-68	-12	-8	81	0	274	99	-39	-60	-60	8	-344
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	4.396	4.392	8.791	7.749	1.960	2.073	2.807	7.312	7.484	10.198	14.057	14.125	2.207	1.875	2.551	7.743	7.804
	Stress due to bending Z	9.952	11.870	11.487	95.558	14.748	2.028	1.461	2.382	6.447	8.067	10.580	87.793	16.858	1.784	1.784	1.214	10.227
Force (kn) =		1120	1270	1583	8066	1305	320	333	757	1088	1426	1924	7957	1489	286	339	699	1408
Tension Combined Force (kN) =		-4358	-4194	-2598	4123	-1359	-2000	-1288	-582	-328	-2380	-1862	5620	-718	-1473	-1264	-457	209
Compression Combined Force (kN) =		-6612	-6738	-5783	-12078	-4046	-2718	-2033	-2174	-2534	-5245	-5713	-10382	-3774	-2123	-2019	-1934	-2638
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	0.01
		0.32	0.33	0.28	0.58	0.19	0.13	0.10	0.10	0.12	0.25	0.28	0.50	0.18	0.10	0.10	0.09	0.12

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	685.63	685.63	336.41	347.71	421.45	102.99	1216.55	1099.96	698.74	701.41	615.2	665.43	367.07	432.32	144.42	144.15	213.08	-701.71
	ULS Min	-273.03	-273.03	166.17	221.55	281.01	-92.28	-1930.87	-1607.74	-1178.11	-1052.64	-1023.36	-957.71	-891.98	-837.26	-737.27	-680.38	-51.64	-912.82
IY Bending	ULS Max	0	0	57.25	57.19	53.6	47.26	14.36	0	16.7	26.59	15.89	36.5	10.98	34.89	9.46	31.6	0	29.25
	ULS Min	0	0	0	0	0	0	-38.94	0	-32.16	-3.56	-29.17	0	-32.14	0	-24.29	0	0	0
IZ Bending	ULS Max	0	0	139.72	189.23	142.34	62.74	149.15	0	140.51	38.11	119.59	8.16	127.53	14.03	130.96	14.79	0	13.96
	ULS Min	0	0	-114.71	-165.53	-163.73	-92.02	-65.48	0	-63.88	-44.31	-36.14	-14.97	-42.97	-20.31	-43.32	-18.29	0	-10.62
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	19	16	16	0	13	11	12	15	13	15	10	13	0	10
	Stress Z	0	0	15	20	18	10	17	0	16	5	13	2	14	2	15	2	0	1
	Force (kn) =	0	0	629	725	653	474	532	0	471	259	413	272	447	271	400	245	0	208
Tension Combined Force (kN) =		686	686	966	1073	1075	577	1748	1100	1169	960	1028	938	814	703	545	389	213	-494
Compression Combined Force (kN) =		-273	-273	-463	-504	-372	-566	-2463	-1608	-1649	-1311	-1436	-1230	-1339	-1108	-1138	-926	-52	-1121
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.13	0.21	0.23	0.23	0.13	0.42	0.26	0.28	0.23	0.25	0.23	0.20	0.17	0.13	0.09	0.05	NA
		0.01	0.08	0.13	0.14	0.11	0.16	0.76	0.50	0.51	0.40	0.44	0.38	0.41	0.34	0.35	0.29	0.01	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	683.44	443.46	306.18	316.79	382.23	54.86	906.16	968.51	551.38	522.05	549.65	487.72	387.95	303.87	147.88	123.8	-507.65	244.42
	ULS Min	-259.33	216.02	202.74	253	337.27	-106.56	-1325.18	-1633.56	-863.33	-1027.1	-804.02	-918.48	-750.14	-852.45	-660.38	-765.97	-652.73	-52.77
IY Bending	ULS Max	0	27.76	47.55	46.48	45.14	44	5.38	62.94	32.09	16.83	32.74	15.05	31.75	11	30.25	10.3	24.61	0
	ULS Min	0	-72.38	0	0	0	0	-16.68	0	-4.64	-30.85	0	-28.42	0	-31.7	0	-24.4	0	0
IZ Bending	ULS Max	0	0	52.56	60.03	61.72	53.73	147.16	30.52	17.43	32.45	10.67	24.54	10.28	26.31	11.26	28.93	3.68	0
	ULS Min	0	-36.8	-15.14	-15.1	-17.08	-12.84	-66.37	-34.5	-11.67	-110.65	-2.75	-109.19	-3.06	-114.42	-2.75	-125.01	-15.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	21	16	16	16	15	7	26	13	13	14	12	13	13	13	10	9	0
	Stress Z	0	4	6	6	7	6	17	4	2	12	1	12	1	13	1	14	2	0
	Force (kn) =	0	451	399	407	402	379	379	485	247	408	239	389	232	420	223	390	182	0
Tension Combined Force (kN) =		683	895	705	724	784	434	1285	1454	798	930	789	876	620	724	371	514	-325	244
Compression Combined Force (kN) =		-259	-235	-197	-154	-65	-486	-1704	-2119	-1110	-1435	-1043	-1307	-982	-1273	-884	-1156	-835	-53
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.17	0.15	0.16	0.17	0.09	0.31	0.35	0.19	0.22	0.19	0.21	0.15	0.17	0.09	0.12	NA	0.05
		0.01	0.07	0.06	0.04	0.02	0.14	0.53	0.66	0.34	0.44	0.32	0.40	0.30	0.39	0.27	0.36	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	399.52	351.15	823.01	199.6	685.09	670.86	194.79	200.03	-27.78	-33.8	-137.05	-140.88	-86.48	24.62
	ULS Min	236.49	-309.75	595.37	-64.85	-1749.2	-1747.37	-1282.61	-1282.94	-1339.91	-1334.81	-1075.47	-1090.31	-171.49	13.98
IY Bending	ULS Max	5949.99	0	25.46	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6624.07	-56.02	0	-15.69	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	244.93	393.96	121.84	446.37	0	0	0	0	0	0	0	0	0	0
	ULS Min	-115.17	-188.52	-58.38	-164.1	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	67	18	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	12	29	10	36	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	6332	956	361	769	0	0	0	0	0	0	0	0	0	0
	Tension Combined Force (kN) =	6731	1307	1184	969	685	671	195	200	-28	-34	-137	-141	-86	25
	Compression Combined Force (kN) =	-6095	-1266	235	-834	-1749	-1747	-1283	-1283	-1340	-1335	-1075	-1090	-171	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.33	0.25	0.26	0.21	0.13	0.13	0.04	0.04	NA	NA	NA	NA	NA	0.02
		0.39	0.31	NA	0.23	0.46	0.46	0.34	0.34	0.40	0.40	0.32	0.33	0.55	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	249.17	230.42	320.96	156.19	168.62	664.1	640.08	386.49	386.13	198.51	186.97	142.52	95.16	45.06	32.6
	ULS Min	-14.36	-283.87	-12.94	-145.94	70.95	-1004.68	-980.6	-616.08	-633.23	-493.68	-455.79	-203.62	-287.38	-77.03	19.04
IY Bending	ULS Max	4084.16	15.75	22.14	17.51	109.62	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4365.33	-22.1	-14.94	-19.18	91.55	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	281.01	395.19	160.7	443.4	217.46	0	0	0	0	0	0	0	0	0	0
	ULS Min	-166.7	-201.26	-94.96	-228.33	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	53	10	10	9	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	21	39	16	44	13	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	4965	788	414	844	873	0	0	0	0	0	0	0	0	0	0
	Tension Combined Force (kN) =	5214	1018	735	1000	1041	664	640	386	386	199	187	143	95	45	33
	Compression Combined Force (kN) =	-4980	-1071	-427	-989	-802	-1005	-981	-616	-633	-494	-456	-204	-287	-77	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.31	0.25	0.18	0.24	0.09	0.15	0.14	0.08	0.08	0.04	0.04	0.03	0.02	0.04	0.03
		0.38	0.41	0.16	0.38	0.09	0.27	0.26	0.16	0.17	0.13	0.12	0.05	0.08	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
	Members	40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	23427.43	23427.43	2399.3	1617.2	1931.23	1624.66	485.28
	ULS Min	0	0	-876	-10	-12	-22	-455
Shear	Fz Max	9380	9380	1030	2171	2276	2119	1003
	Fz Min	-9236	-9236	-1028	-254	-2212	-269	-454
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.430	0.571	0.119	0.155	0.157	0.156	0.092
		0.258	0.491	0.191	0.519	0.544	0.507	0.437

Case 2 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12745	-12724	-11943	-11670	-10952	-10754	-10417	-10383	-10189	-12387	-12373	-11496	-10836	-10659	-10358	-10325	-10144
	ULS Min	-12775	-12734	-11986	-11826	-11090	-10891	-10478	-10417	-10284	-12417	-12383	-11695	-10973	-10796	-10420	-10358	-10238
IY Bending	ULS Max	0	-54	-51	77	67	107	113	116	116	26	35	73	72	110	110	110	109
	ULS Min	-54	-78	-76	65	66	67	107	113	50	0	26	36	65	65	110	109	63
IZ Bending	ULS Max	0	-42	118	439	-44	272	272	-46	231	88	119	148	163	154	46	219	219
	ULS Min	-42	-48	-7	266	-166	-166	-46	-218	-218	0	88	19	154	-272	-272	46	-227
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.135	1.640	1.585	1.624	1.888	2.990	3.586	3.687	3.687	0.542	0.725	1.530	2.020	3.099	3.518	3.491	3.473
	Stress due to bending Z	0.792	0.912	2.239	8.328	3.844	6.295	9.641	7.745	8.200	1.677	2.255	2.809	3.769	6.312	9.668	7.783	8.051
Force (kn) =		330	437	655	1706	911	1476	1408	1217	1265	380	511	744	920	1496	1404	1200	1227
Tension Combined Force (kN) =		-12415	-12286	-11288	-9964	-10041	-9278	-9009	-9166	-8923	-12006	-11862	-10752	-9916	-9163	-8954	-9125	-8917
Compression Combined Force (kN) =		-13106	-13172	-12641	-13532	-12001	-12367	-11886	-11634	-11549	-12797	-12894	-12439	-11893	-12292	-11823	-11559	-11465
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.20	0.20	0.20	0.21	0.19	0.19	0.32	0.31	0.31	0.20	0.20	0.19	0.18	0.19	0.32	0.31	0.31

Case 2 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4082	-4071	-2930	-2606	-2319	-2213	-2011	-1857	-1992	-3760	-3741	-2531	-2234	-2112	-1864	-1681	-1769
	ULS Min	-4095	-4076	-2948	-2675	-2397	-2291	-2089	-1935	-2023	-3773	-3746	-2618	-2312	-2190	-1942	-1759	-1800
IY Bending	ULS Max	4	9	12	48	44	44	44	162	157	12	15	30	32	42	45	168	170
	ULS Min	0	4	-37	-20	28	28	43	43	-167	0	6	7	32	32	42	45	-213
IZ Bending	ULS Max	0	-66	-36	282	-25	50	50	96	316	34	64	99	100	16	30	39	39
	ULS Min	-66	-83	-124	162	-40	-25	-42	-41	96	0	29	34	16	-50	-50	30	-514
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.193	0.469	1.906	2.433	2.249	2.222	2.245	8.245	8.501	0.624	0.775	1.555	1.644	2.153	2.319	8.587	10.849
	Stress due to bending Z	1.973	2.479	3.674	8.384	1.199	1.475	1.471	2.863	9.401	1.019	1.899	2.945	2.964	1.490	1.490	1.165	15.269
Force (kn) =		169	230	436	845	269	289	290	867	1398	128	209	351	360	284	297	761	2039
Tension Combined Force (kN) =		-3913	-3841	-2494	-1762	-2050	-1924	-1721	-989	-594	-3632	-3532	-2179	-1874	-1828	-1566	-920	270
Compression Combined Force (kN) =		-4265	-4306	-3384	-3520	-2667	-2580	-2379	-2802	-3420	-3902	-3954	-2969	-2672	-2475	-2239	-2521	-3839
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.21	0.21	0.16	0.17	0.13	0.12	0.11	0.13	0.16	0.19	0.19	0.14	0.13	0.12	0.11	0.12	0.18

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	194.02	194.02	299.17	327.1	410.49	154.7	-306.47	-325.43	-185.89	-203.12	-152.1	-173.15	-220.47	-231.02	-247.29	-270.31	-41.56	-880.06
	ULS Min	194.02	194.02	289.98	309.71	381.94	107.41	-347.76	-370.36	-230.1	-257	-197.28	-224.64	-265.52	-284.19	-292.85	-321.37	-54.73	-890.98
IY Bending	ULS Max	0	0	39.76	41.15	40.41	39.57	3.25	0	5.35	16.31	5.29	20.82	3.18	23.05	4.42	23.92	0	28.71
	ULS Min	0	0	0	0	0	0	-19.42	0	-20.49	0	-19.97	0	-25.55	0	-21.22	0	0	0
IZ Bending	ULS Max	0	0	0	0.25	0	0	0	0	0.47	1.14	0	0.18	0	0.78	0	2.33	0	0
	ULS Min	0	0	-5.55	-7.88	-34.65	-38.93	-1.2	0	-0.5	0	-0.57	0	-2.97	0	-5.58	0	0	-5.59
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	8	0	9	7	8	9	11	10	9	10	0	10
	Stress Z	0	0	1	1	4	4	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	259	272	320	323	133	0	138	112	135	140	177	156	153	165	0	189
	Tension Combined Force (kN) =	194	194	558	600	730	478	-174	-325	-47	-92	-17	-33	-44	-75	-95	-105	-42	-691
	Compression Combined Force (kN) =	194	194	31	37	62	-216	-480	-370	-369	-369	-332	-365	-442	-440	-445	-486	-55	-1080
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.12	0.13	0.16	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.06	0.15	0.11	0.11	0.11	0.10	0.11	0.14	0.14	0.14	0.15	0.02	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	236.92	372.3	295.83	321.45	403.32	97.78	-267.34	-258.99	-183.02	-205.58	-150.47	-167.43	-205.18	-236.25	-253.22	-274.65	-662.35	-34.23
	ULS Min	236.92	363.4	294.85	320.66	401.81	93.76	-314.64	-325.96	-237.35	-249.8	-202.03	-212.72	-258.76	-281.44	-304.82	-319.65	-674.58	-47.39
IY Bending	ULS Max	0	0	39.24	39.24	39.53	41.04	0	40.78	15.22	5.46	20.41	5.32	21.86	3.43	23.21	5.09	24.8	0
	ULS Min	0	-27.07	0	0	0	0	-6.22	0	0	-20.54	0	-19.98	0	-25.61	0	-21.37	0	0
IZ Bending	ULS Max	0	0	0	1.19	0	1.74	0	2.43	0.89	0	0.41	0.08	0	0.72	0.65	1.03	0.28	0
	ULS Min	0	-1.83	-1.28	0	-0.8	0	-3.32	0	0	-1.43	0	-0.16	-0.41	0	0	0	-0.53	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	8	14	14	14	14	3	17	6	9	9	8	9	11	10	9	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	148	248	247	249	260	48	278	104	140	138	134	148	173	157	145	156	0
	Tension Combined Force (kN) =	237	520	543	569	652	358	-220	19	-79	-65	-13	-33	-58	-63	-96	-129	-507	-34
	Compression Combined Force (kN) =	237	216	47	73	153	-166	-362	-604	-341	-390	-340	-347	-406	-455	-462	-465	-830	-47
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.10	0.12	0.12	0.14	0.08	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.11	0.19	0.11	0.12	0.10	0.11	0.13	0.14	0.14	0.14	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	347.99	64.59	756.17	111.92	-526.24	-557.77	-555.8	-549.11	-701.93	-708.21	-629.71	-635.16	-133.36	23.1
	ULS Min	347.99	47.91	756.17	104.05	-551.73	-583.26	-581.3	-574.6	-724.29	-730.56	-652.07	-657.52	-141.03	14.26
IY Bending	ULS Max	525.48	0	24.36	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-474.45	-50.9	0	-15.14	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.71	0	0.06	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.42	-0.46	0	-0.97	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	5	17	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	443	338	173	109	0	0	0	0	0	0	0	0	0	0
	Tension Combined Force (kN) =	791	403	930	221	-526	-558	-556	-549	-702	-708	-630	-635	-133	23
	Compression Combined Force (kN) =	-95	-291	583	-5	-552	-583	-581	-575	-724	-731	-652	-658	-141	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.20	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	0.00	0.15	0.15	0.15	0.15	0.22	0.22	0.20	0.20	0.45	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	158.01	11.39	214.37	52.06	197.79	-194.75	-199.14	-144.62	-158.43	-176.78	-157.96	-48.61	-132.07	-18.76	29.36
	ULS Min	152.9	-1.91	200.66	8.64	197.79	-217.74	-222.13	-167.61	-181.42	-199.77	-180.95	-71.6	-155.07	-27.59	20.98
IY Bending	ULS Max	237.94	10.44	17	11.76	98.54	0	0	0	0	0	0	0	0	0	0
	ULS Min	-210.98	-19.69	-7.58	-15.92	98.54	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.02	3.56	3.32	5.57	17.21	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6.05	0	0	0	17.21	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	223	146	127	123	303	0	0	0	0	0	0	0	0	0	0
	Tension Combined Force (kN) =	381	158	341	175	501	-195	-199	-145	-158	-177	-158	-49	-132	-19	29
	Compression Combined Force (kN) =	-70	-148	74	-114	-105	-218	-222	-168	-181	-200	-181	-72	-155	-28	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.08	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.04	0.05	0.05	0.05	0.02	0.04	0.09	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	24112.02	24112.02	3468.53	1646.27	1954	1653.99	812.48
	ULS Min	0	0	-1020	-10	-12	-10	-542
Shear	Fz Max	9548	9548	1371	2222	2353	2186	1163
	Fz Min	-9469	-9469	-1366	-339	-2280	-325	-365
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.442	0.588	0.172	0.158	0.158	0.158	0.155
		0.263	0.499	0.254	0.532	0.563	0.523	0.506

Case 2 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-16141	-16115	-15436	-15178	-12571	-12489	-10769	-10735	-10628	-8981	-8968	-8151	-9353	-9092	-10209	-10176	-9912
	ULS Min	-16171	-16125	-15478	-15335	-12708	-12626	-10830	-10769	-10723	-9012	-8978	-8350	-9490	-9229	-10270	-10209	-10007
IY Bending	ULS Max	190	315	315	244	86	98	185	185	103	0	-74	127	142	127	133	136	136
	ULS Min	0	190	76	45	30	81	98	103	65	-74	-130	-128	75	79	127	133	-4
IZ Bending	ULS Max	1317	1685	2945	9855	2021	255	255	-9	540	1320	1734	9245	2169	-24	1111	1111	22
	ULS Min	0	1317	1531	3072	-367	-367	-9	-160	-160	0	1320	1621	-24	-754	-755	-90	-90
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	3.994	6.615	6.620	5.129	2.421	2.752	5.889	5.889	3.277	1.550	2.725	2.683	3.977	3.565	4.232	4.328	4.328
	Stress due to bending Z	24.974	31.945	55.851	186.887	46.813	8.493	9.060	5.682	19.164	25.027	32.872	175.316	50.263	17.479	39.431	39.431	3.187
Force (kn) =		4965	6609	10707	32910	7826	1788	1591	1232	2389	4555	6101	30507	8622	3345	4648	4659	800
Tension Combined Force (kN) =		-11176	-9506	-4729	17731	-4745	-10701	-9177	-9504	-8239	-4426	-2867	22357	-731	-5747	-5561	-5517	-9112
Compression Combined Force (kN) =		-21136	-22734	-26185	-48245	-20534	-14413	-12422	-12001	-13112	-13567	-15079	-38857	-18112	-12574	-14919	-14868	-10807
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.32	NA	NA	NA	NA	NA	NA	NA	0.40	NA	NA	NA	NA	NA
		0.33	0.35	0.40	0.75	0.32	0.22	0.33	0.32	0.35	0.21	0.23	0.60	0.28	0.19	0.40	0.40	0.29

Case 2 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5606	-5590	-4414	-4143	-2903	-2669	-1788	-1525	-1383	-759	-737	277	-390	-357	-761	-663	-1078
	ULS Min	-5619	-5594	-4433	-4212	-2981	-2747	-1866	-1603	-1414	-772	-741	190	-468	-435	-840	-741	-1109
IY Bending	ULS Max	28	28	197	160	47	46	58	149	134	0	-49	51	55	49	61	144	154
	ULS Min	0	-45	-36	-5	-19	45	43	56	-119	-67	-79	-48	36	36	48	61	-178
IZ Bending	ULS Max	538	588	861	4277	718	43	44	-9	447	416	493	3984	765	-37	35	35	-48
	ULS Min	0	538	742	1100	-135	-134	-11	-89	-91	0	436	608	-109	-109	-37	-177	-177
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.452	2.273	10.054	8.151	2.402	2.345	2.949	7.622	6.843	3.424	4.016	2.590	2.805	2.493	3.119	7.341	9.097
	Stress due to bending Z	15.969	17.469	25.578	127.031	21.329	3.970	1.299	2.648	13.284	12.365	14.636	118.338	22.722	3.237	1.107	5.270	5.272
Force (kn) =		1360	1541	2782	10555	1853	493	332	802	1571	1233	1456	9442	1993	447	330	985	1122
Tension Combined Force (kN) =		-4246	-4048	-1632	6411	-1050	-2176	-1457	-723	188	474	720	9719	1603	91	-432	322	44
Compression Combined Force (kN) =		-6980	-7136	-7215	-14767	-4834	-3240	-2198	-2404	-2985	-2005	-2198	-9252	-2461	-882	-1170	-1726	-2231
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.29	NA	NA	NA	NA	0.01	0.02	0.03	0.45	0.07	0.00	NA	0.01	0.00
		0.34	0.35	0.35	0.71	0.23	0.15	0.10	0.11	0.14	0.10	0.11	0.45	0.12	0.04	0.06	0.08	0.10

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	769.34	769.34	385.95	399.46	590.39	130.66	1233.35	1133.01	762.05	798.14	785.23	841.8	473.27	418.22	-23.66	-21.57	140.4	-683.57
	ULS Min	-325.32	-325.32	164.44	184.54	148.04	-15.54	-2007.43	-1641.7	-1284.19	-1141.01	-1243.71	-1114.02	-1041.45	-839.92	-580.2	-539.22	-24.3	-839.22
IY Bending	ULS Max	0	0	56.33	55.35	49.5	44.16	14.28	0	17.57	28.07	18.4	39.81	11.12	36.18	7.05	28.63	0	28.11
	ULS Min	0	0	0	0	0	0	-40.47	0	-32.81	-4.74	-31.27	-1.06	-33.29	0	-25.68	0	0	0
IZ Bending	ULS Max	0	0	82.69	112	73.96	38.72	98.35	0	91.46	31.84	72.1	5	76.02	8.7	77.44	9.82	0	7.32
	ULS Min	0	0	-70.58	-101.71	-110.42	-79.02	-51.66	0	-45.36	-35.35	-21.71	-8.97	-26.71	-12.2	-27.58	-10.36	0	-8.12
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	19	17	15	17	0	14	12	13	17	14	15	11	12	0	10
	Stress Z	0	0	9	12	12	9	11	0	10	4	8	1	9	1	9	1	0	1
Force (kn) =		0	0	513	564	524	430	450	0	386	253	341	284	361	265	313	211	0	190
Tension Combined Force (kN) =		769	769	899	963	1114	560	1683	1133	1148	1051	1126	1125	835	683	289	189	140	-493
Compression Combined Force (kN) =		-325	-325	-348	-379	-376	-445	-2457	-1642	-1670	-1394	-1584	-1398	-1403	-1105	-893	-750	-24	-1029
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.15	0.20	0.21	0.24	0.12	0.41	0.27	0.28	0.25	0.27	0.27	0.20	0.16	0.07	0.05	0.03	NA
		0.01	0.09	0.10	0.11	0.11	0.13	0.76	0.51	0.51	0.43	0.49	0.43	0.43	0.34	0.28	0.23	0.01	0.29

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	733.35	485.89	367.97	382.11	573.73	67.79	1016.18	1151.48	688.62	686.48	752.87	748.65	386.02	463.44	-13.24	-36.61	-499.72	164.21
	ULS Min	-317.87	196.28	166.32	212.63	179.99	-38.44	-1499.46	-1768.04	-1042.54	-1163.44	-1047.79	-1149.09	-798.2	-993.19	-521.09	-593.64	-612.96	-20.06
IY Bending	ULS Max	0	57.39	51.37	48.69	44.75	42.78	6.86	72.04	36.83	18.03	38.09	17.47	34.23	10.97	27.61	7.87	24.25	0
	ULS Min	0	-108.62	0	0	0	0	-16.56	-2.52	-7.85	-32.07	0	-30.96	0	-32.97	0	-25.39	0	0
IZ Bending	ULS Max	0	29.61	34.74	38.8	37.14	34.06	112.46	37.23	16.97	23.13	6.48	14.69	6.16	16.22	6.95	17.47	2.15	0
	ULS Min	0	-52.63	-12.69	-10.23	-10.38	-9.84	-65.51	-38.94	-13.03	-71.31	-1.6	-65.88	-1.96	-68.56	-1.6	-75.68	-9.96	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	32	18	17	16	15	7	30	15	13	16	13	14	14	12	11	9	0
	Stress Z	0	5	4	4	4	4	13	4	2	8	1	7	1	8	1	9	1	0
Force (kn) =		0	673	388	380	352	333	315	554	278	345	267	327	241	346	198	308	169	0
Tension Combined Force (kN) =		733	1159	756	762	926	401	1331	1706	967	1031	1020	1076	627	809	185	271	-330	164
Compression Combined Force (kN) =		-318	-476	-222	-167	-172	-372	-1814	-2322	-1321	-1508	-1315	-1476	-1039	-1339	-719	-901	-782	-20
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.17	0.20	0.09	0.32	0.41	0.23	0.25	0.25	0.26	0.15	0.19	0.04	0.07	NA	0.04
		0.01	0.13	0.06	0.05	0.05	0.11	0.56	0.72	0.41	0.46	0.41	0.45	0.32	0.41	0.22	0.28	0.22	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	416.56	413.21	858.87	173.41	1230.07	1153.96	653.66	701.44	272.9	218.97	-162.23	-128.6	-97.69	23.61
	ULS Min	258.96	-268.58	606.3	-471.57	-2335.55	-2402.34	-1918.14	-1867.53	-1738.04	-1787.41	-1240.19	-1211.03	-181.55	13.57
IY Bending	ULS Max	8150.79	0	27.08	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8898.56	-57.62	0	-16.15	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	146.28	237.21	73.42	268.53	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.65	-113.85	-35.15	-99.32	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	90	19	11	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	17	6	22	0	0	0	0	0	0	0	0	0	0
Force (kn) =		7768	734	301	510	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8184	1148	1160	684	1230	1154	654	701	273	219	-162	-129	-98	24
Compression Combined Force (kN) =		-7509	-1003	305	-982	-2336	-2402	-1918	-1868	-1738	-1787	-1240	-1211	-182	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.40	0.22	0.25	0.15	0.24	0.22	0.13	0.13	0.06	0.05	NA	NA	NA	0.02
		0.48	0.25	NA	0.27	0.62	0.63	0.51	0.49	0.52	0.54	0.37	0.36	0.58	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	240.65	207.47	297.76	110.23	138.39	647.99	612.88	407.01	425	300.26	282.07	322.4	285.17	46.83	32.22
	ULS Min	-15.96	-231.86	1.33	-71.78	79.03	-960.11	-962.31	-642.83	-649.67	-565.74	-549.16	-383.91	-445.56	-76.15	19.59
IY Bending	ULS Max	3975.18	15.81	20.31	16.25	115.04	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4319.85	-22.63	-13.55	-18.61	89.38	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	169.04	239.98	97.8	267.71	123.09	0	0	0	0	0	0	0	0	0	0
	ULS Min	-100.67	-120.8	-56.21	-136.95	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	52	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	13	24	10	26	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4355	544	301	559	632	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4596	751	599	670	770	648	613	407	425	300	282	322	285	47	32
Compression Combined Force (kN) =		-4371	-776	-300	-631	-553	-960	-962	-643	-650	-566	-549	-384	-446	-76	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.27	0.18	0.14	0.16	0.06	0.14	0.13	0.09	0.09	0.07	0.06	0.07	0.06	0.04	0.03
		0.34	0.30	0.11	0.24	0.06	0.25	0.25	0.17	0.17	0.15	0.14	0.10	0.12	0.24	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	25337.71	25337.71	2306.45	1811.61	1869.07	1777.44	495.16
	ULS Min	0	0	-1101	-10	-12	-17	-486
Shear	Fz Max	10016	10016	957	2435	2451	2347	1128
	Fz Min	-10049	-10049	-1001	-265	-2462	-261	-661
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.465	0.618	0.114	0.174	0.152	0.170	0.094
		0.277	0.526	0.186	0.582	0.589	0.562	0.491

Case 2 - ULS V1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-14598	-14577	-13766	-13492	-12710	-12514	-12156	-12123	-11934	-14253	-14239	-13333	-12604	-12430	-12109	-12075	-11899
	ULS Min	-14629	-14587	-13808	-13649	-12847	-12651	-12218	-12156	-12029	-14283	-14250	-13533	-12741	-12567	-12170	-12109	-11994
IY Bending	ULS Max	0	-54	-43	85	84	124	144	154	154	26	35	92	91	129	140	146	146
	ULS Min	-54	-78	-75	83	82	82	124	144	-3	0	26	37	80	79	129	140	11
IZ Bending	ULS Max	0	-46	119	465	-51	317	317	-54	271	94	125	156	181	181	55	258	258
	ULS Min	-46	-54	-13	267	-193	-193	-54	-256	-256	0	94	-9	170	-318	-318	55	-270
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.131	1.636	1.581	1.782	2.359	3.491	4.583	4.917	4.917	0.551	0.731	1.923	2.545	3.617	4.469	4.664	4.664
	Stress due to bending Z	0.881	1.031	2.252	8.819	4.475	7.344	11.248	9.076	9.614	1.775	2.378	2.960	4.201	7.365	11.280	9.165	9.597
Force (kn) =		345	457	657	1817	1086	1722	1685	1490	1547	399	533	837	1072	1746	1677	1472	1518
Tension Combined Force (kN) =		-14254	-14120	-13109	-11676	-11624	-10792	-10471	-10633	-10387	-13854	-13706	-12497	-11532	-10684	-10432	-10603	-10381
Compression Combined Force (kN) =		-14973	-15044	-14465	-15466	-13933	-14374	-13903	-13646	-13576	-14682	-14783	-14369	-13813	-14313	-13847	-13581	-13512
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.23	0.23	0.22	0.24	0.22	0.22	0.37	0.37	0.37	0.23	0.23	0.22	0.21	0.22	0.37	0.37	0.36

Case 2 - ULS V1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4289	-4278	-3108	-2784	-2495	-2392	-2185	-2029	-2156	-3962	-3943	-2707	-2408	-2289	-2035	-1849	-1923
	ULS Min	-4302	-4282	-3126	-2853	-2573	-2470	-2263	-2108	-2187	-3975	-3948	-2795	-2486	-2367	-2113	-1927	-1954
IY Bending	ULS Max	5	11	14	56	52	52	54	174	169	11	14	38	40	51	55	183	185
	ULS Min	0	5	-38	-20	34	34	51	53	-174	0	5	6	39	39	51	55	-231
IZ Bending	ULS Max	0	-68	-36	282	-27	54	54	111	333	35	65	98	102	18	34	39	39
	ULS Min	-68	-85	-125	167	-42	-27	-45	-44	110	0	30	34	18	-54	-54	34	-552
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.239	0.546	1.943	2.866	2.670	2.664	2.735	8.893	8.860	0.583	0.734	1.937	2.024	2.592	2.803	9.333	11.783
	Stress due to bending Z	2.018	2.525	3.718	8.378	1.244	1.599	1.594	3.283	9.889	1.044	1.932	2.903	3.019	1.618	1.618	1.161	16.389
Force (kn) =		176	240	442	878	306	333	338	951	1464	127	208	378	394	329	345	819	2200
Tension Combined Force (kN) =		-4113	-4038	-2666	-1906	-2189	-2059	-1847	-1079	-692	-3835	-3735	-2329	-2014	-1960	-1690	-1030	276
Compression Combined Force (kN) =		-4478	-4522	-3568	-3731	-2879	-2803	-2601	-3058	-3650	-4102	-4156	-3173	-2880	-2696	-2458	-2746	-4153
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.22	0.22	0.17	0.18	0.14	0.13	0.12	0.15	0.17	0.20	0.20	0.15	0.14	0.13	0.12	0.13	0.19

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	220.28	220.28	340.9	374.28	472.6	216.34	-346.52	-368.02	-215.12	-233.75	-177.37	-199.98	-257.15	-270.91	-287.77	-299.11	-99.84	-886.17
	ULS Min	220.28	220.28	329.98	354.01	438.81	161.06	-387.82	-413.46	-259.26	-288.2	-222.52	-251.93	-302.13	-324.81	-333.37	-350.86	-113.01	-897.05
IY Bending	ULS Max	0	0	39.91	41.49	40.53	39.07	2.2	0	4.86	17.13	4.85	21.87	2.37	24.53	3.78	25.28	0	29.08
	ULS Min	0	0	0	0	0	0	-21.15	0	-22.12	0	-21.53	0	-28.03	0	-23.49	0	0	0
IZ Bending	ULS Max	0	0	0	0.3	0	0	0	0	0.55	1.13	0	0.25	0	0.9	0	2.71	0	0
	ULS Min	0	0	-6.19	-8.81	-39.07	-44.43	-1.21	0	-0.43	0	-0.63	0	-3.48	0	-6.06	0	0	-5.94
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	9	0	9	7	9	9	12	10	10	11	0	10
	Stress Z	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	261	276	329	330	144	0	150	117	146	147	194	166	169	175	0	192
	Tension Combined Force (kN) =	220	220	602	651	802	547	-202	-368	-66	-117	-32	-53	-63	-105	-119	-124	-100	-694
	Compression Combined Force (kN) =	220	220	69	78	110	-169	-532	-413	-409	-405	-368	-399	-497	-491	-502	-525	-113	-1089
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.13	0.14	0.18	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.16	0.13	0.13	0.12	0.11	0.12	0.15	0.15	0.15	0.16	0.03	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	263.66	422.24	337.64	368.7	465.59	151.75	-306.35	-293.47	-212.59	-236.78	-176.26	-193.72	-243.77	-274.19	-281.85	-319.25	-643.13	-93.57
	ULS Min	263.66	412.5	336.4	367.63	463.87	147.84	-354.45	-362.25	-267.52	-280.93	-228.28	-238.98	-298.13	-319.32	-334.18	-364.18	-655.47	-106.73
IY Bending	ULS Max	0	0	39.3	39.31	39.6	40.9	0	42.82	15.97	4.97	21.45	4.85	23.22	2.65	24.53	4.54	24.69	0
	ULS Min	0	-32.03	0	0	0	0	-5.21	0	0	-22.19	0	-21.54	0	-28.11	0	-23.61	0	0
IZ Bending	ULS Max	0	0	0	1.3	0	1.66	0	2.66	0.91	0	0.48	0	0	0.82	0.73	0.89	0.26	0
	ULS Min	0	-2.07	-1.52	0	-0.9	0	-3.63	0	0	-1.58	0	-0.24	-0.47	0	0	0	-0.55	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	9	14	14	14	14	2	18	7	9	9	9	10	12	10	10	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	175	248	248	249	259	42	292	109	152	145	145	157	190	166	160	155	0
	Tension Combined Force (kN) =	264	597	586	617	715	410	-265	-1	-104	-85	-31	-49	-87	-84	-116	-159	-488	-94
	Compression Combined Force (kN) =	264	238	88	120	215	-111	-396	-655	-376	-433	-373	-384	-455	-510	-500	-524	-811	-107
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.12	0.13	0.13	0.16	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.03	0.12	0.20	0.12	0.13	0.11	0.12	0.14	0.16	0.15	0.16	0.23	0.03

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	397.44	75.2	881.14	130.77	-609.32	-639.45	-654.29	-648.72	-816.22	-820.8	-743.19	-751.05	-158.86	21.39
	ULS Min	397.44	58.71	881.14	122.41	-634.81	-664.95	-679.79	-674.21	-838.57	-843.16	-765.54	-773.41	-166.53	12.55
IY Bending	ULS Max	592.02	0	31.15	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-507.05	-54.1	0	-14.63	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	3.94	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.51	-0.57	0	-1.2	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	18	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		493	360	222	106	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		891	435	1103	237	-609	-639	-654	-649	-816	-821	-743	-751	-159	21
Compression Combined Force (kN) =		-96	-301	659	16	-635	-665	-680	-674	-839	-843	-766	-773	-167	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.24	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	NA	0.17	0.18	0.18	0.18	0.25	0.25	0.23	0.23	0.53	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	166.72	12.4	232.45	58.33	214.17	-207.16	-212.89	-160.71	-173.71	-190.07	-170.82	-57.98	-149.21	-22.66	29.18
	ULS Min	160.48	-1.09	217.44	9.98	214.17	-230.15	-235.88	-183.7	-196.71	-213.06	-193.81	-80.98	-172.21	-31.5	20.8
IY Bending	ULS Max	249.12	10.4	17.49	11.84	97.56	0	0	0	0	0	0	0	0	0	0
	ULS Min	-217.63	-19.87	-6.85	-15.74	97.56	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.35	4.18	3.66	6.11	18.21	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7.78	0	0	0	18.21	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		241	149	131	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		408	161	363	180	517	-207	-213	-161	-174	-190	-171	-58	-149	-23	29
Compression Combined Force (kN) =		-81	-150	87	-112	-89	-230	-236	-184	-197	-213	-194	-81	-172	-32	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.09	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.06	0.05	0.02	0.05	0.10	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	28722.52	28722.52	3725.07	1988.07	2362.22	1979.95	814.4
	ULS Min	0	0	-1094	-10	-12	-10	-556
Shear	Fz Max	11392	11392	1480	2679	2829	2593	1290
	Fz Min	-11277	-11277	-1501	-368	-2742	-363	-405
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.527	0.700	0.185	0.190	0.192	0.190	0.155
		0.314	0.596	0.279	0.641	0.677	0.620	0.561

Case 2 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-17997	-17972	-17202	-16878	-14450	-14352	-12796	-12762	-12648	-11631	-11618	-10748	-11638	-11397	-12293	-12260	-12021
	ULS Min	-18028	-17983	-17245	-17035	-14587	-14489	-12857	-12796	-12743	-11662	-11628	-10947	-11775	-11534	-12355	-12293	-12116
IY Bending	ULS Max	128	219	220	251	93	110	201	201	139	0	-41	121	133	136	154	164	164
	ULS Min	0	128	25	48	36	89	110	139	19	-41	-80	-78	81	85	136	154	-35
IZ Bending	ULS Max	1117	1434	2631	8673	1749	311	311	-23	541	1180	1554	8059	1938	30	969	969	-2
	ULS Min	0	1117	1338	2847	-373	-373	-23	-212	-212	0	1180	1481	30	-739	-740	-2	-59
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	2.691	4.600	4.622	5.277	2.604	3.089	6.393	6.393	4.435	0.870	1.676	2.549	3.741	3.804	4.915	5.236	5.236
	Stress due to bending Z	21.185	27.202	49.896	164.471	40.523	8.650	11.043	7.513	19.197	22.369	29.475	152.831	44.893	17.132	34.370	34.370	2.082
Force (kn) =		4092	5451	9344	29093	6856	1866	1856	1481	2516	3983	5339	26631	7731	3328	4182	4217	779
Tension Combined Force (kN) =		-13905	-12522	-7858	12215	-7595	-12486	-10939	-11282	-10132	-7648	-6279	15883	-3907	-8069	-8111	-8043	-11242
Compression Combined Force (kN) =		-22120	-23434	-26589	-46128	-21443	-16355	-14713	-14276	-15259	-15645	-16967	-37578	-19506	-14862	-16537	-16510	-12895
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.22	NA	NA	NA	NA	NA	NA	NA	0.28	NA	NA	NA	NA	NA
		0.34	0.36	0.41	0.71	0.33	0.25	0.40	0.38	0.41	0.24	0.26	0.58	0.30	0.23	0.44	0.44	0.35

Case 2 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6392	-6376	-5099	-4686	-3549	-3341	-2562	-2323	-2196	-2026	-2005	-911	-1410	-1365	-1662	-1552	-1869
	ULS Min	-6405	-6380	-5118	-4755	-3627	-3419	-2640	-2402	-2227	-2039	-2010	-998	-1488	-1443	-1740	-1630	-1900
IY Bending	ULS Max	24	24	149	122	47	52	57	183	169	0	-32	49	53	55	60	181	190
	ULS Min	0	-31	-23	11	-1	46	51	55	-170	-44	-52	-32	39	39	55	59	-233
IZ Bending	ULS Max	413	452	734	3761	614	61	62	-27	557	379	465	3533	705	-57	46	46	-128
	ULS Min	0	413	548	1163	-129	-128	-28	-39	-40	0	392	541	-84	-84	-57	-128	-306
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.215	1.605	7.580	6.245	2.378	2.672	2.892	9.345	8.652	2.262	2.653	2.493	2.727	2.806	3.035	9.229	11.869
	Stress due to bending Z	12.263	13.411	21.791	111.724	18.232	3.803	1.841	1.151	16.542	11.249	13.817	104.944	20.953	2.502	1.697	3.813	9.087
Force (kn) =		1052	1172	2293	9211	1609	506	370	819	1967	1055	1286	8388	1849	414	369	1018	1636
Tension Combined Force (kN) =		-5339	-5203	-2806	4524	-1940	-2835	-2193	-1504	-229	-971	-719	7477	439	-951	-1293	-533	-233
Compression Combined Force (kN) =		-7457	-7553	-7411	-13966	-5237	-3925	-3010	-3221	-4194	-3094	-3296	-9387	-3337	-1858	-2110	-2648	-3536
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	NA	NA	NA	0.34	0.02	NA	NA	NA	NA
		0.36	0.37	0.36	0.68	0.25	0.19	0.14	0.15	0.19	0.15	0.16	0.45	0.16	0.09	0.10	0.13	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	714.78	714.78	442.75	462.13	647.75	260.19	939.31	845.85	581.7	602.75	611.72	650.15	318.81	262.37	-102.05	-104.62	-42.05	-834.97
	ULS Min	-223.5	-223.5	252.88	277.9	268.59	118.4	-1844.53	-1539.13	-1178.64	-1067.32	-1133.96	-1033.64	-986.09	-823.91	-585.93	-555.93	-185.11	-969.33
IY Bending	ULS Max	0	0	54.1	53.94	48.47	42.84	12.21	0	15.67	25.36	16.43	38.73	9.49	36.49	6.04	30	0	30.49
	ULS Min	0	0	0	0	0	0	-38.29	0	-31.96	-2.76	-30.39	0	-33.95	0	-26.93	0	0	0
IZ Bending	ULS Max	0	0	68.42	92.23	48.51	27.81	83.4	0	77.52	28.31	61.67	4.34	64.32	7.82	63.93	9.28	0	4.59
	ULS Min	0	0	-62.95	-90.95	-109.53	-84.11	-45.59	0	-39.76	-29.29	-18.75	-7.74	-23.75	-10.27	-26.12	-8.2	0	-9.28
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	16	0	13	11	13	16	14	15	11	13	0	11
	Stress Z	0	0	7	10	12	9	9	0	9	3	7	1	7	1	7	1	0	1
	Force (kn) =	0	0	471	516	516	431	408	0	355	223	316	274	344	264	297	218	0	207
	Tension Combined Force (kN) =	715	715	914	978	1164	691	1347	846	937	826	927	924	663	526	195	114	-42	-628
	Compression Combined Force (kN) =	-224	-224	-218	-238	-247	-313	-2253	-1539	-1534	-1291	-1450	-1308	-1331	-1087	-883	-774	-185	-1176
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.20	0.21	0.25	0.15	0.32	0.20	0.23	0.20	0.22	0.22	0.16	0.13	0.05	0.03	NA	NA
		0.01	0.06	0.06	0.07	0.07	0.09	0.70	0.48	0.47	0.40	0.45	0.40	0.41	0.33	0.27	0.24	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	724.54	551.68	427.32	447.5	635.56	194	773.82	880.09	517.11	506.34	583.87	571.13	245.76	300.85	-87.63	-126.44	-606.55	-31.04
	ULS Min	-176.51	300.63	254.47	302.24	298.07	101.49	-1390.41	-1635.36	-974.75	-1085.76	-966.92	-1062.19	-777.31	-954.31	-530.81	-610.53	-705.03	-190.86
IY Bending	ULS Max	0	37.45	48.56	47.32	44	42.44	4.92	70.67	34.77	16.13	37.04	15.72	34.31	9.51	28.75	7.07	25.8	0
	ULS Min	0	-104.84	0	0	0	0	-15.15	0	-3.52	-31.23	0	-30.01	0	-33.61	0	-26.77	0	0
IZ Bending	ULS Max	0	26.13	29.3	33.72	31.5	30.95	96.14	32.11	14.96	19.18	5.8	12.63	5.19	14.16	6.35	15.61	2.41	0
	ULS Min	0	-44.79	-11.39	-8.31	-9.37	-6.87	-56.4	-33.85	-10.75	-61.77	-1.24	-56.43	-1.9	-58.54	-1.15	-64.26	-8.01	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	30	17	16	15	15	6	29	14	13	15	13	14	14	12	11	9	0
	Stress Z	0	4	3	4	3	3	11	4	2	7	1	6	1	7	1	7	1	0
	Force (kn) =	0	639	360	361	336	325	276	536	261	322	259	304	240	332	205	296	175	0
	Tension Combined Force (kN) =	725	1190	788	809	972	519	1050	1416	778	828	843	875	486	633	117	170	-431	-31
	Compression Combined Force (kN) =	-177	-338	-106	-59	-38	-224	-1666	-2171	-1235	-1407	-1226	-1366	-1017	-1286	-735	-907	-881	-191
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.18	0.21	0.11	0.25	0.34	0.19	0.20	0.20	0.21	0.12	0.15	0.03	0.04	NA	NA
		0.01	0.09	0.03	0.02	0.01	0.06	0.52	0.67	0.38	0.43	0.38	0.42	0.31	0.40	0.23	0.28	0.25	0.05

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	474.75	380.57	993.04	187.08	891.31	801.93	362.68	408.33	-0.4	-51.38	-367.07	-337.83	-131.36	21.5
	ULS Min	339.67	-215.53	776.55	-368.68	-2168.58	-2249.98	-1845.36	-1797.29	-1727.26	-1774.33	-1294.22	-1268.82	-204.33	11.63
IY Bending	ULS Max	7039.59	0	34.81	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7832.51	-60.39	0	-15.33	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	129.7	203.14	62.93	229.78	0	0	0	0	0	0	0	0	0	0
	ULS Min	-56.24	-97.76	-30.13	-85.51	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	79	20	14	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	15	5	19	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6841	702	340	448	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		7316	1083	1334	635	891	802	363	408	0	-51	-367	-338	-131	22
Compression Combined Force (kN) =		-6501	-918	436	-816	-2169	-2250	-1845	-1797	-1727	-1774	-1294	-1269	-204	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.36	0.21	0.29	0.14	0.17	0.15	0.07	0.08	NA	NA	NA	NA	NA	0.02
		0.41	0.23	NA	0.23	0.57	0.59	0.49	0.47	0.52	0.53	0.39	0.38	0.66	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	279.07	184.89	361.18	117.5	235.69	472.99	439.8	266.85	273.9	171.95	166.93	225.96	155.21	24.36	31.05
	ULS Min	60.32	-191.68	102.03	-38.51	181.48	-908.66	-913.65	-636.31	-650.52	-573.62	-548.84	-382.73	-474.42	-82.32	19.03
IY Bending	ULS Max	3478.56	14.82	20.82	15.09	110.19	0	0	0	0	0	0	0	0	0	0
	ULS Min	-3804.45	-22.92	-9.6	-17.67	89.37	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	141.44	206.23	84.34	229.94	103.16	0	0	0	0	0	0	0	0	0	0
	ULS Min	-89.74	-103.01	-47.68	-116.91	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	46	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	11	20	8	23	6	0	0	0	0	0	0	0	0	0	0
Force (kn) =		3798	492	283	493	565	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4077	677	644	610	801	473	440	267	274	172	167	226	155	24	31
Compression Combined Force (kN) =		-3737	-684	-181	-531	-384	-909	-914	-636	-651	-574	-549	-383	-474	-82	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.24	0.16	0.16	0.15	0.07	0.10	0.10	0.06	0.06	0.04	0.04	0.05	0.03	0.02	0.02
		0.29	0.26	0.07	0.20	0.04	0.24	0.24	0.17	0.17	0.15	0.14	0.10	0.13	0.26	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
Members		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	30221.8	30221.8	3809.79	2120.67	2225.73	2111.83	963.59
	ULS Min	0	0	-1441	-10	-12	-16	-660
Shear	Fz Max	11870	11870	1474	2851	2929	2786	1530
	Fz Min	-11897	-11897	-1496	-383	-2904	-357	-666
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.555	0.737	0.189	0.203	0.181	0.202	0.183
		0.328	0.622	0.278	0.682	0.701	0.667	0.666

Case 2 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-16324	-16299	-15862	-15537	-13597	-13965	-12632	-12599	-12692	-9511	-9497	-8932	-10560	-10731	-12063	-12030	-11977
	ULS Min	-16354	-16309	-15905	-15693	-13735	-14102	-12694	-12633	-12787	-9541	-9508	-9132	-10697	-10868	-12125	-12064	-12072
IY Bending	ULS Max	744	1053	1053	862	122	116	621	621	151	526	683	685	100	104	561	561	88
	ULS Min	0	744	635	-156	-170	-36	-36	-32	-32	0	526	-50	-36	-8	-8	-3	-3
IZ Bending	ULS Max	1223	1574	2864	9423	1920	299	299	-22	570	1281	1686	8823	2097	9	1048	1048	-31
	ULS Min	0	1223	1460	3086	-383	-383	-22	-204	-204	0	1281	1596	9	-765	-766	-31	-39
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	15.610	22.104	22.108	18.103	4.766	3.269	19.798	19.798	4.811	11.040	14.346	14.373	2.797	2.930	17.861	17.861	2.789
	Stress due to bending Z	23.200	29.847	54.305	178.687	44.485	8.872	10.622	7.236	20.214	24.294	31.980	167.315	48.578	17.734	37.196	37.196	1.375
Force (kn) =		6652	8904	13097	33728	7829	1930	3238	2878	2664	6056	7940	31140	8167	3285	5861	5861	443
Tension Combined Force (kN) =		-9672	-7395	-2766	18191	-5768	-12035	-9394	-9721	-10028	-3455	-1557	22207	-2393	-7446	-6202	-6169	-11534
Compression Combined Force (kN) =		-23006	-25213	-29001	-49421	-21564	-16032	-15932	-15511	-15451	-15597	-17448	-40271	-18863	-14153	-17986	-17925	-12515
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.33	NA	NA	NA	NA	NA	NA	NA	0.40	NA	NA	NA	NA	NA
		0.36	0.39	0.45	0.76	0.33	0.25	0.43	0.42	0.42	0.24	0.27	0.62	0.29	0.22	0.48	0.48	0.34

Case 2 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-8572	-8555	-6880	-6460	-4632	-3959	-2792	-2354	-2185	-3723	-3702	-2270	-2268	-1813	-1833	-1548	-1856
	ULS Min	-8585	-8560	-6899	-6529	-4710	-4038	-2870	-2433	-2216	-3736	-3707	-2357	-2347	-1891	-1911	-1626	-1887
IY Bending	ULS Max	255	273	346	302	51	53	71	189	175	143	226	227	41	55	74	179	188
	ULS Min	0	255	283	-65	-82	50	52	69	-164	0	134	-26	-18	41	54	74	-210
IZ Bending	ULS Max	457	499	808	4088	663	73	73	-31	571	417	508	3818	767	-68	52	52	-131
	ULS Min	0	458	613	1248	-144	-143	-32	-51	-52	0	432	601	-88	-88	-68	-131	-297
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	13.000	13.935	17.651	15.384	4.174	2.710	3.639	9.637	8.930	7.312	11.536	11.574	2.077	2.785	3.783	9.113	10.730
	Stress due to bending Z	13.589	14.836	23.986	121.438	19.697	4.242	2.178	1.504	16.947	12.378	15.094	113.408	22.779	2.609	2.026	3.888	8.830
Force (kn) =		2076	2246	3251	10683	1864	543	454	870	2020	1537	2079	9758	1941	421	454	1015	1527
Tension Combined Force (kN) =		-6496	-6309	-3630	4222	-2768	-3417	-2338	-1485	-165	-2186	-1623	7488	-328	-1392	-1379	-533	-329
Compression Combined Force (kN) =		-10661	-10806	-10150	-17211	-6574	-4580	-3324	-3302	-4236	-5273	-5786	-12115	-4287	-2312	-2365	-2641	-3414
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.34	NA	NA	NA	NA	NA
		0.52	0.52	0.49	0.83	0.31	0.22	0.16	0.16	0.20	0.26	0.28	0.59	0.20	0.11	0.11	0.13	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	837.08	837.08	466.3	483.13	692.35	267.3	1262.82	1151.42	782.41	813.38	810.3	864	464.69	397.68	-53.74	-54.77	-23.17	-820.49
	ULS Min	-335.77	-335.77	228.97	252.85	218.41	101.67	-2206.66	-1818.42	-1406.99	-1260.56	-1360.52	-1227.73	-1155.2	-946.65	-647.2	-605.93	-198.7	-985.73
IY Bending	ULS Max	0	0	57.64	57.03	50.45	43.8	14.76	0	18.39	29.06	19.35	42.89	11.31	39.41	6.64	31.12	0	30.8
	ULS Min	0	0	0	0	0	0	-42.49	0	-34.34	-6.09	-32.53	-0.9	-35.31	0	-27.66	0	0	0
IZ Bending	ULS Max	0	0	86.98	117.36	70.51	38.84	104.42	0	97	35.22	77.16	5.35	81.08	9.55	81.31	10.91	0	6.72
	ULS Min	0	0	-77.24	-111.61	-127.03	-93.97	-56.69	0	-49.59	-36.78	-23.36	-9.67	-29	-12.92	-31.23	-10.78	0	-10.13
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	17	15	18	0	14	12	14	18	15	16	12	13	0	11
	Stress Z	0	0	9	13	14	10	12	0	11	4	9	1	9	1	9	1	0	1
Force (kn) =		0	0	529	585	562	456	474	0	406	262	358	305	384	288	333	229	0	211
Tension Combined Force (kN) =		837	837	996	1068	1255	724	1737	1151	1189	1075	1169	1169	849	686	279	174	-23	-610
Compression Combined Force (kN) =		-336	-336	-300	-332	-344	-355	-2681	-1818	-1813	-1522	-1719	-1533	-1539	-1235	-980	-835	-199	-1196
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.16	0.22	0.23	0.27	0.16	0.42	0.28	0.29	0.26	0.28	0.28	0.20	0.17	0.07	0.04	NA	NA
		0.01	0.09	0.09	0.10	0.10	0.10	0.83	0.56	0.56	0.47	0.53	0.47	0.47	0.38	0.30	0.26	0.06	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	838.45	581.57	447.67	465.15	675.54	200.7	1045.83	1175.15	701.02	693.64	775.21	763.62	370.12	446.48	-37.88	-76.32	-597.25	-10.63
	ULS Min	-287.86	270.23	231.61	283.57	253.68	86.05	-1647.4	-1951.88	-1150.04	-1285.46	-1150.25	-1266.72	-895.09	-1111.2	-578.73	-670.2	-717.27	-207.11
IY Bending	ULS Max	0	55.07	53.19	49.66	45.1	42.83	7.4	77.53	39.43	18.95	40.88	18.46	37.02	11.26	29.75	7.74	26.07	0
	ULS Min	0	-122.8	0	0	0	0	-17.69	-3.58	-8.43	-33.41	0	-32.05	0	-34.86	0	-27.44	0	0
IZ Bending	ULS Max	0	32.82	36.97	41.85	39.54	38.29	121.08	39.46	18.59	24.37	7.12	15.85	6.54	17.49	7.75	19.42	2.95	0
	ULS Min	0	-55.45	-13.85	-10.68	-11.48	-8.85	-69.6	-42.35	-13.55	-76.81	-1.62	-70.47	-2.25	-73.36	-1.52	-80.4	-9.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	36	18	17	16	15	7	32	16	14	17	13	15	15	12	11	9	0
	Stress Z	0	5	4	5	4	4	14	5	2	9	1	8	1	8	1	9	1	0
Force (kn) =		0	753	404	392	359	342	338	597	298	363	287	343	260	367	214	330	181	0
Tension Combined Force (kN) =		838	1335	852	857	1034	543	1384	1772	999	1057	1063	1106	631	813	176	254	-417	-11
Compression Combined Force (kN) =		-288	-483	-173	-108	-105	-256	-1986	-2549	-1448	-1649	-1438	-1610	-1155	-1478	-793	-1000	-898	-207
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.26	0.19	0.19	0.23	0.12	0.33	0.43	0.24	0.25	0.26	0.27	0.15	0.20	0.04	0.06	NA	NA
		0.01	0.13	0.05	0.03	0.03	0.07	0.61	0.79	0.45	0.51	0.44	0.50	0.36	0.46	0.24	0.31	0.25	0.06

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	491.63	456.38	1014.69	200.31	1270.57	1166.32	621.79	677.52	209.41	146.77	-267.21	-228.58	-123.22	21.61
	ULS Min	322.78	-284.63	744.07	-492.25	-2547.92	-2642.19	-2131.88	-2073.13	-1943.58	-2001.32	-1420.57	-1386.72	-212.52	11.49
IY Bending	ULS Max	8849.43	0	35.37	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-9662.26	-61.8	0	-15.54	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	161.65	254.05	78.65	287.5	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.78	-122.06	-37.67	-106.58	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	98	20	14	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	8	19	6	23	0	0	0	0	0	0	0	0	0	0
Force (kn) =		8446	787	368	534	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8938	1243	1382	734	1271	1166	622	678	209	147	-267	-229	-123	22
Compression Combined Force (kN) =		-8123	-1072	376	-1026	-2548	-2642	-2132	-2073	-1944	-2001	-1421	-1387	-213	11
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.44	0.24	0.30	0.16	0.24	0.22	0.12	0.13	0.05	0.03	NA	NA	NA	0.02
		0.52	0.26	NA	0.29	0.67	0.70	0.56	0.55	0.58	0.60	0.43	0.42	0.68	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	306.72	228.19	392.45	132.07	240.49	643.66	603.66	374.54	386.58	263.12	252.05	297.54	232.09	36.31	31.52
	ULS Min	33.28	-242.53	71.14	-62.95	174.12	-1077.67	-1082.4	-748.65	-763.21	-663.09	-636.92	-457.58	-549.19	-94.83	18.59
IY Bending	ULS Max	4347.35	15.95	22.16	16.37	113.66	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4700.83	-23.67	-10.33	-18.16	87.85	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	178.04	257.12	104.87	287.04	132.66	0	0	0	0	0	0	0	0	0	0
	ULS Min	-110.93	-129.43	-60.15	-146.52	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	57	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	14	25	10	28	8	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4709	579	325	587	654	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5016	807	718	719	895	644	604	375	387	263	252	298	232	36	32
Compression Combined Force (kN) =		-4676	-821	-254	-650	-480	-1078	-1082	-749	-763	-663	-637	-458	-549	-95	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.30	0.19	0.17	0.17	0.07	0.14	0.13	0.08	0.08	0.06	0.06	0.07	0.05	0.03	0.03
		0.36	0.32	0.10	0.25	0.05	0.28	0.29	0.20	0.20	0.17	0.17	0.12	0.14	0.30	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	30518.67	30518.67	3823.16	2135.95	2226.41	2149.01	1001
	ULS Min	0	0	-1525	-10	-12	-18	-682
Shear	Fz Max	11917	11917	1468	2871	2930	2835	1583
	Fz Min	-11980	-11980	-1489	-385	-2920	-354	-728
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.560	0.744	0.190	0.205	0.181	0.206	0.191
		0.330	0.627	0.276	0.687	0.701	0.678	0.689

Case 2 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-7749	-7728	-6998	-6725	-6205	-6002	-5724	-5690	-5469	-7350	-7336	-6511	-6049	-5865	-5617	-5583	-5380
	ULS Min	-7780	-7738	-7041	-6881	-6342	-6139	-5785	-5724	-5564	-7380	-7346	-6710	-6186	-6002	-5678	-5617	-5474
IY Bending	ULS Max	0	-62	-82	46	10	42	42	3	246	28	38	40	8	45	45	-2	263
	ULS Min	-62	-89	-86	-13	-12	10	3	-18	-18	0	28	-7	-8	7	-2	-28	-28
IZ Bending	ULS Max	0	-29	119	353	-26	149	149	-21	117	75	101	133	141	79	21	114	114
	ULS Min	-29	-33	18	267	-92	-92	-21	-114	-114	0	75	81	79	-149	-149	21	-109
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.310	1.861	1.807	0.966	0.349	1.173	1.331	0.571	7.828	0.597	0.796	0.831	0.225	1.257	1.427	0.880	8.387
	Stress due to bending Z	0.557	0.619	2.258	6.703	2.138	3.454	5.291	4.040	4.138	1.430	1.917	2.531	3.277	3.459	5.298	4.033	4.033
Force (kn) =		320	425	697	1314	395	736	705	491	1274	347	465	576	557	750	716	523	1322
Tension Combined Force (kN) =		-7429	-7303	-6302	-5410	-5810	-5267	-5019	-5199	-4195	-7002	-6871	-5935	-5492	-5116	-4901	-5060	-4057
Compression Combined Force (kN) =		-8099	-8163	-7738	-8196	-6738	-6875	-6490	-6215	-6838	-7727	-7811	-7286	-6743	-6752	-6394	-6140	-6797
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.13	0.13	0.12	0.13	0.10	0.11	0.17	0.17	0.18	0.12	0.12	0.11	0.10	0.10	0.17	0.17	0.18

Case 2 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4601	-4589	-3492	-3169	-2832	-2718	-2538	-2397	-2619	-4276	-4257	-3083	-2745	-2615	-2391	-2216	-2395
	ULS Min	-4614	-4594	-3511	-3238	-2910	-2796	-2616	-2476	-2650	-4289	-4261	-3170	-2823	-2693	-2469	-2294	-2426
IY Bending	ULS Max	2	7	9	16	13	14	13	157	153	16	19	12	7	11	11	149	149
	ULS Min	0	2	-41	-26	4	3	3	2	-239	0	11	0	1	7	7	7	-248
IZ Bending	ULS Max	0	-66	-39	280	-32	61	61	83	471	35	66	102	105	23	34	90	90
	ULS Min	-66	-83	-132	182	-43	-31	-46	-44	83	0	30	32	23	-62	-62	34	-732
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.098	0.335	2.106	1.312	0.662	0.704	0.675	8.018	12.182	0.833	0.991	0.613	0.366	0.581	0.579	7.620	12.627
	Stress due to bending Z	1.949	2.451	3.916	8.303	1.281	1.823	1.824	2.471	13.984	1.039	1.949	3.023	3.124	1.850	1.850	2.670	21.734
Force (kn) =		160	218	470	751	152	197	195	819	2043	146	230	284	273	190	190	803	2683
Tension Combined Force (kN) =		-4441	-4372	-3022	-2419	-2680	-2521	-2343	-1578	-576	-4129	-4027	-2799	-2472	-2425	-2201	-1412	287
Compression Combined Force (kN) =		-4774	-4812	-3981	-3989	-3062	-2994	-2811	-3295	-4692	-4435	-4491	-3454	-3095	-2883	-2659	-3097	-5109
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.23	0.23	0.19	0.19	0.15	0.14	0.13	0.16	0.22	0.21	0.22	0.17	0.15	0.14	0.13	0.15	0.24

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	150.02	150.02	224.61	235.83	280.82	28.28	-244.53	-254.78	-131.23	-145.06	-105.59	-124.23	-143.5	-148.12	-143.53	-233.87	65.2	-976.22
	ULS Min	150.02	150.02	216.23	223.31	258.44	-18.81	-285.96	-297.61	-176.02	-196.54	-151.19	-173.49	-189.24	-198.18	-189.57	-281.76	52.04	-986.63
IY Bending	ULS Max	0	0	39.18	40.68	40.09	39.95	7.53	0	7.47	14.35	7.34	18.62	6.12	19.82	6.71	21.36	0	29.66
	ULS Min	0	0	0	0	0	0	-12.39	0	-14.03	0	-13.62	0	-16.64	0	-12.82	0	0	0
IZ Bending	ULS Max	0	0	0	0	0	0	0	0	0.08	1.31	0	0	0	0.99	0	2.87	0	0
	ULS Min	0	0	-6.53	-14.4	-47.97	-54.94	-1.39	0	-0.91	0	-1.42	-0.07	-3.23	0	-7.14	0	0	-6.39
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	5	0	6	6	6	8	7	8	5	9	0	10
	Stress Z	0	0	1	2	5	6	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	257	282	344	356	86	0	96	99	94	125	118	135	99	149	0	197
	Tension Combined Force (kN) =	150	150	482	518	625	385	-159	-255	-35	-46	-12	1	-26	-13	-45	-85	65	-780
	Compression Combined Force (kN) =	150	150	-41	-59	-85	-375	-372	-298	-272	-295	-245	-299	-307	-333	-289	-430	52	-1183
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.00	0.03	0.11	0.11	0.14	0.08	NA	NA	NA	NA	NA	0.00	NA	NA	NA	NA	0.01	NA
		NA	NA	0.01	0.02	0.02	0.11	0.11	0.09	0.08	0.09	0.08	0.09	0.09	0.10	0.09	0.13	NA	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	194.71	281.31	218.09	228.28	269.9	-44.06	-197.23	-208.06	-128.12	-145.56	-102.72	-119.48	-120.87	-159.29	-214.61	-175.57	-768.79	111.02
	ULS Min	194.71	273.67	217	227.42	267.9	-49.15	-243.16	-273.02	-180.01	-190.26	-152.05	-165.24	-171.36	-205.05	-263.02	-221.06	-780.43	97.86
IY Bending	ULS Max	0	0	39	38.94	39.33	41.44	0	37.33	13.45	7.6	18.12	7.46	18.66	6.38	20.47	7.5	25.86	0
	ULS Min	0	-18.78	0	0	0	0	-11.18	0	0	-14.07	0	-13.6	0	-16.69	0	-12.81	0	0
IZ Bending	ULS Max	0	0	0	1.21	0	2.29	0	2.05	0.88	0	0.42	0.68	0	0.34	0.7	1.7	0.43	0
	ULS Min	0	-1.45	-0.83	0	-1.05	0	-2.81	-0.02	0	-1.08	0	0	-0.41	-0.21	0	0	-0.41	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	5	14	13	14	14	5	16	6	6	8	6	8	7	9	5	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	103	245	246	248	263	80	254	92	96	122	93	126	113	139	89	162	0
	Tension Combined Force (kN) =	195	384	463	474	518	219	-117	46	-36	-49	20	-27	5	-47	-76	-86	-607	111
	Compression Combined Force (kN) =	195	171	-28	-18	20	-312	-323	-527	-272	-287	-274	-258	-297	-318	-402	-310	-943	98
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.07	0.10	0.10	0.11	0.05	NA	0.01	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	0.02
		NA	NA	0.01	0.01	NA	0.09	0.10	0.16	0.08	0.09	0.08	0.08	0.09	0.10	0.12	0.10	0.26	NA

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	214.29	35.97	419.48	63.99	-305.57	-332.49	-285.17	-283.54	-398.88	-398.92	-315.74	-330.13	-64.31	27.7
	ULS Min	214.29	18.99	419.48	54.3	-331.06	-357.98	-310.67	-309.03	-421.23	-421.27	-338.1	-352.48	-71.98	18.86
IY Bending	ULS Max	345.49	0	6.06	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-372.91	-42.24	0	-16.48	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.95	0	0.07	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.15	-0.15	0	-0.35	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	4	14	2	7	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		329	281	43	118	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		543	316	463	182	-306	-332	-285	-284	-399	-399	-316	-330	-64	28
Compression Combined Force (kN) =		-115	-262	376	-64	-331	-358	-311	-309	-421	-421	-338	-352	-72	19
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.03	0.06	0.10	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.02	0.09	0.09	0.08	0.08	0.13	0.13	0.10	0.11	0.23	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	185.7	14.95	267.3	63.01	299.76	-229.08	-239.28	-191.4	-201.33	-214.76	-194.83	-75.31	-181.43	-30.13	28.75
	ULS Min	179.09	0.39	247.21	5.12	299.76	-252.07	-262.28	-214.4	-224.33	-237.75	-217.82	-98.3	-204.42	-38.97	20.37
IY Bending	ULS Max	269.53	10.13	18.09	11.59	97.27	0	0	0	0	0	0	0	0	0	0
	ULS Min	-232.87	-20.2	-5.36	-15.44	97.27	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.43	1.72	2.38	6.19	23.5	0	0	0	0	0	0	0	0	0	0
	ULS Min	-0.09	0	0	-0.11	23.5	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		246	147	133	120	316	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		431	162	400	183	616	-229	-239	-191	-201	-215	-195	-75	-181	-30	29
Compression Combined Force (kN) =		-66	-147	114	-115	-17	-252	-262	-214	-224	-238	-218	-98	-204	-39	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.10	0.04	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.00	0.07	0.07	0.06	0.06	0.06	0.06	0.03	0.05	0.13	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	10822.04	10822.04	4436.66	1256.3	4312.08	1143.2	849.05
	ULS Min	0	0	-1434	-21	-12	-19	-656
Shear	Fz Max	4337	4337	1938	187	1968	41	1516
	Fz Min	-4312	-4312	-1959	-447	-1883	-258	-503
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.199	0.264	0.220	0.120	0.350	0.109	0.162
		0.119	0.227	0.364	0.107	0.471	0.062	0.660

Case 2 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12877	-12851	-12313	-12084	-10786	-10820	-10037	-10004	-9911	-8163	-8149	-7625	-8455	-8616	-9232	-9199	-9262
	ULS Min	-12907	-12862	-12356	-12240	-10923	-10957	-10099	-10037	-10006	-8193	-8160	-7824	-8592	-8753	-9293	-9232	-9357
IY Bending	ULS Max	289	453	454	370	73	109	120	120	111	652	835	836	64	96	96	91	188
	ULS Min	0	289	256	-24	-21	75	109	103	103	0	652	-83	-87	61	91	65	65
IZ Bending	ULS Max	786	959	1863	5316	1079	237	237	-59	447	821	1032	4801	1214	25	45	178	178
	ULS Min	0	786	1191	1956	-259	-259	-59	-231	-231	0	821	1291	25	-280	-280	45	-43
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	6.072	9.511	9.525	7.770	2.048	3.058	3.833	3.833	3.523	13.693	17.520	17.545	2.432	2.695	3.060	2.897	5.991
	Stress due to bending Z	14.903	18.181	35.322	100.812	24.999	6.001	8.403	8.183	15.858	15.568	19.575	91.047	28.122	6.483	9.930	6.306	6.304
Force (kn) =		3595	4746	7686	18610	4299	1440	1303	1279	2063	5015	6358	18612	4857	1459	1383	980	1309
Tension Combined Force (kN) =		-9282	-8105	-4627	6526	-6486	-9380	-8734	-8724	-7848	-3148	-1792	10987	-3598	-7157	-7849	-8219	-7953
Compression Combined Force (kN) =		-16502	-17608	-20042	-30850	-15222	-12397	-11401	-11316	-12070	-13208	-14518	-26436	-13449	-10212	-10676	-10212	-10666
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.12	NA	NA	NA	NA	NA	NA	NA	0.20	NA	NA	NA	NA	NA
		0.26	0.27	0.31	0.48	0.24	0.19	0.31	0.30	0.32	0.20	0.22	0.41	0.21	0.16	0.29	0.27	0.29

Case 2 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5492	-5477	-4192	-3955	-2675	-2331	-1633	-1350	-1426	-3819	-3798	-2349	-2218	-1770	-1614	-1168	-1210
	ULS Min	-5505	-5481	-4211	-4023	-2753	-2410	-1711	-1428	-1457	-3832	-3803	-2436	-2297	-1849	-1692	-1246	-1240
IY Bending	ULS Max	86	86	172	152	39	41	56	144	148	200	276	277	37	37	51	153	144
	ULS Min	0	85	93	-23	-13	38	40	54	-126	0	198	-40	-43	30	30	51	-154
IZ Bending	ULS Max	335	400	387	3217	496	46	49	81	218	272	356	2955	568	-39	41	41	8
	ULS Min	0	335	167	582	-72	-68	-12	-8	82	0	274	99	-39	-60	-60	8	-347
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	4.399	4.395	8.788	7.748	1.980	2.101	2.839	7.353	7.523	10.195	14.054	14.121	2.182	1.897	2.583	7.790	7.867
	Stress due to bending Z	9.949	11.867	11.487	95.565	14.745	2.032	1.469	2.410	6.481	8.069	10.582	87.789	16.861	1.792	1.793	1.221	10.306
Force (kn) =		1120	1270	1583	8066	1306	323	336	762	1093	1426	1923	7957	1487	288	342	704	1419
Tension Combined Force (kN) =		-4371	-4207	-2609	4112	-1369	-2009	-1296	-588	-333	-2393	-1875	5608	-732	-1482	-1272	-464	209
Compression Combined Force (kN) =		-6625	-6751	-5794	-12090	-4059	-2732	-2047	-2191	-2550	-5258	-5727	-10393	-3783	-2137	-2034	-1949	-2659
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	0.01
		0.32	0.33	0.28	0.59	0.19	0.13	0.10	0.10	0.12	0.25	0.28	0.50	0.18	0.10	0.10	0.09	0.12

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	687.33	687.33	339.08	350.69	425.33	106.83	1213.97	1097.18	696.86	699.42	613.57	663.68	364.71	429.72	141.77	142.24	209.59	-701.85
	ULS Min	-271.33	-271.33	168.84	224.61	284.88	-88.82	-1933.45	-1610.54	-1179.99	-1054.68	-1024.98	-959.48	-894.34	-839.91	-739.92	-682.34	-55.12	-912.96
IY Bending	ULS Max	0	0	57.26	57.21	53.61	47.23	14.29	0	16.67	26.58	15.86	36.56	10.93	34.99	9.42	31.69	0	29.27
	ULS Min	0	0	0	0	0	0	-39.05	0	-32.27	-3.57	-29.27	0	-32.3	0	-24.43	0	0	0
IZ Bending	ULS Max	0	0	139.68	189.17	142.03	62.59	149.15	0	140.51	38.11	119.58	8.16	127.51	14.04	130.92	14.82	0	13.94
	ULS Min	0	0	-114.75	-165.6	-164.04	-92.38	-65.48	0	-63.88	-44.31	-36.14	-14.97	-42.99	-20.31	-43.36	-18.27	0	-10.65
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	19	16	16	0	13	11	12	15	13	15	10	13	0	10
	Stress Z	0	0	15	20	18	10	17	0	16	5	13	2	14	2	15	2	0	1
	Force (kn) =	0	0	629	725	654	475	532	0	471	259	413	273	448	272	401	246	0	208
	Tension Combined Force (kN) =	687	687	968	1076	1079	582	1746	1097	1168	958	1027	936	813	701	543	388	210	-494
	Compression Combined Force (kN) =	-271	-271	-461	-501	-369	-564	-2466	-1611	-1651	-1313	-1438	-1232	-1342	-1112	-1141	-928	-55	-1121
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.13	0.21	0.24	0.24	0.13	0.42	0.26	0.28	0.23	0.25	0.23	0.20	0.17	0.13	0.09	0.05	NA
		0.01	0.08	0.13	0.14	0.11	0.16	0.76	0.50	0.51	0.40	0.44	0.38	0.41	0.34	0.35	0.29	0.02	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	685.19	446.73	308.92	319.88	386.33	58.16	903.62	966.24	549.46	520	547.97	485.99	385.44	301.38	145.97	120.82	-506.18	240.89
	ULS Min	-257.58	219.23	205.47	256.09	341.35	-103.25	-1327.78	-1635.95	-865.29	-1029.15	-805.73	-920.21	-752.69	-854.94	-662.33	-768.94	-651.27	-56.3
IY Bending	ULS Max	0	27.53	47.55	46.48	45.14	43.99	5.44	63.07	32.14	16.8	32.8	15.02	31.84	10.94	30.34	10.26	24.6	0
	ULS Min	0	-72.7	0	0	0	0	-16.62	0	-4.59	-30.95	0	-28.52	0	-31.86	0	-24.54	0	0
IZ Bending	ULS Max	0	0	52.54	60.04	61.71	53.73	147.14	30.54	17.43	32.44	10.67	24.54	10.28	26.31	11.27	28.92	3.68	0
	ULS Min	0	-36.82	-15.15	-15.1	-17.08	-12.84	-66.39	-34.49	-11.66	-110.66	-2.75	-109.2	-3.06	-114.41	-2.75	-125.01	-15.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	21	16	16	16	15	7	26	13	13	14	12	13	13	13	10	9	0
	Stress Z	0	4	6	6	7	6	17	4	2	12	1	12	1	13	1	14	2	0
	Force (kn) =	0	453	399	407	402	379	378	486	247	408	240	389	232	421	224	391	182	0
	Tension Combined Force (kN) =	685	900	708	727	788	437	1282	1452	797	928	788	875	618	723	370	512	-324	241
	Compression Combined Force (kN) =	-258	-234	-194	-151	-61	-483	-1706	-2122	-1113	-1437	-1045	-1310	-985	-1276	-886	-1160	-833	-56
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.18	0.15	0.16	0.17	0.10	0.31	0.35	0.19	0.22	0.19	0.21	0.15	0.17	0.09	0.12	NA	0.05
		0.01	0.07	0.06	0.04	0.02	0.14	0.53	0.66	0.34	0.44	0.32	0.40	0.30	0.39	0.27	0.36	0.23	0.02

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	402.75	351.83	831.13	200.83	679.68	665.53	188.35	193.56	-35.19	-41.1	-144.43	-148.37	-88.14	24.51
	ULS Min	239.71	-309.06	603.48	-63.61	-1754.61	-1752.7	-1289.04	-1289.42	-1347.31	-1342.11	-1082.84	-1097.8	-173.15	13.87
IY Bending	ULS Max	5947.83	0	25.9	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6626.22	-56.23	0	-15.66	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	244.91	393.95	121.84	446.36	0	0	0	0	0	0	0	0	0	0
	ULS Min	-115.2	-188.52	-58.38	-164.12	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	67	18	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	12	29	10	36	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	6334	958	364	769	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		6736	1310	1195	970	680	666	188	194	-35	-41	-144	-148	-88	25
Compression Combined Force (kN) =		-6094	-1267	240	-832	-1755	-1753	-1289	-1289	-1347	-1342	-1083	-1098	-173	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.33	0.25	0.26	0.21	0.13	0.13	0.04	0.04	NA	NA	NA	NA	NA	0.02
		0.39	0.31	NA	0.23	0.46	0.46	0.34	0.34	0.40	0.40	0.32	0.33	0.56	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	249.74	230.49	322.14	156.62	169.76	663.28	639.19	385.45	385.13	197.64	186.15	141.95	94.02	44.8	32.59
	ULS Min	-13.8	-283.79	-11.84	-145.52	72.08	-1005.5	-981.49	-617.12	-634.23	-494.56	-456.61	-204.2	-288.52	-77.28	19.03
IY Bending	ULS Max	4083.76	15.75	22.16	17.49	109.56	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4365.73	-22.12	-14.89	-19.17	91.49	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	280.94	395.22	160.72	443.39	217.03	0	0	0	0	0	0	0	0	0	0
	ULS Min	-166.77	-201.23	-94.94	-228.35	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	53	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	21	39	16	44	13	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	4965	788	414	843	871	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5215	1018	736	1000	1041	663	639	385	385	198	186	142	94	45	33
Compression Combined Force (kN) =		-4979	-1072	-426	-989	-799	-1006	-981	-617	-634	-495	-457	-204	-289	-77	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.31	0.25	0.18	0.24	0.09	0.15	0.14	0.08	0.08	0.04	0.04	0.03	0.02	0.04	0.03
		0.38	0.41	0.16	0.38	0.09	0.27	0.26	0.16	0.17	0.13	0.12	0.05	0.08	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	23745.01	23745.01	2417.01	1639.89	1957.69	1648.37	485.45
	ULS Min	0	0	-881	-10	-12	-22	-455
Shear	Fz Max	9504	9504	1037	2201	2307	2150	1012
	Fz Min	-9357	-9357	-1037	-256	-2242	-272	-456
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.436	0.579	0.120	0.157	0.159	0.158	0.092
		0.262	0.497	0.193	0.527	0.552	0.514	0.440

Case 3 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12309	-12287	-11514	-11240	-10538	-10340	-10007	-9973	-9778	-11944	-11930	-11060	-10416	-10238	-9943	-9909	-9727
	ULS Min	-12339	-12297	-11556	-11397	-10675	-10477	-10068	-10007	-9873	-11974	-11941	-11259	-10553	-10375	-10004	-9943	-9822
IY Bending	ULS Max	0	-54	-52	76	64	102	105	107	107	26	34	68	68	106	106	102	100
	ULS Min	-54	-78	-76	61	62	64	102	105	63	0	26	36	62	62	102	100	75
IZ Bending	ULS Max	0	-41	118	433	-42	261	261	-44	222	87	117	146	161	147	44	210	210
	ULS Min	-41	-47	-5	266	-160	-160	-44	-209	-209	0	87	26	147	-262	-262	44	-216
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.135	1.640	1.586	1.587	1.792	2.871	3.352	3.399	3.399	0.539	0.722	1.437	1.895	2.976	3.378	3.261	3.193
	Stress due to bending Z	0.770	0.884	2.236	8.209	3.697	6.047	9.262	7.430	7.860	1.654	2.225	2.775	3.730	6.063	9.286	7.448	7.666
Force (kn) =		327	433	655	1679	873	1418	1343	1153	1199	376	505	722	894	1437	1348	1140	1156
Tension Combined Force (kN) =		-11982	-11854	-10859	-9561	-9666	-8922	-8664	-8821	-8579	-11568	-11425	-10338	-9522	-8801	-8594	-8769	-8571
Compression Combined Force (kN) =		-12665	-12730	-12211	-13076	-11548	-11895	-11411	-11160	-11071	-12350	-12446	-11981	-11447	-11812	-11352	-11083	-10978
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.20	0.20	0.19	0.20	0.18	0.18	0.31	0.30	0.30	0.19	0.19	0.19	0.18	0.18	0.31	0.30	0.30

Case 3 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4034	-4023	-2888	-2565	-2278	-2171	-1970	-1816	-1953	-3712	-3693	-2488	-2193	-2070	-1823	-1642	-1732
	ULS Min	-4047	-4027	-2907	-2634	-2356	-2249	-2048	-1894	-1983	-3725	-3697	-2576	-2271	-2148	-1901	-1720	-1763
IY Bending	ULS Max	4	9	12	46	42	42	42	159	154	12	15	29	31	40	43	165	166
	ULS Min	0	4	-37	-20	27	26	41	41	-165	0	6	7	30	31	40	43	-208
IZ Bending	ULS Max	0	-66	-36	282	-24	49	49	93	312	34	64	100	99	15	29	39	39
	ULS Min	-66	-83	-123	161	-40	-24	-41	-40	93	0	29	34	15	-49	-49	29	-504
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.183	0.452	1.897	2.331	2.150	2.118	2.127	8.097	8.409	0.633	0.785	1.465	1.565	2.050	2.201	8.417	10.618
	Stress due to bending Z	1.963	2.468	3.665	8.385	1.188	1.446	1.442	2.761	9.278	1.013	1.891	2.958	2.952	1.459	1.459	1.162	14.984
Force (kn) =		168	228	434	837	261	278	279	848	1381	129	209	345	353	274	286	748	1999
Tension Combined Force (kN) =		-3866	-3795	-2454	-1728	-2018	-1893	-1691	-968	-572	-3583	-3484	-2143	-1840	-1796	-1537	-894	267
Compression Combined Force (kN) =		-4215	-4255	-3341	-3470	-2617	-2528	-2327	-2742	-3364	-3853	-3906	-2921	-2624	-2422	-2187	-2468	-3762
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.20	0.21	0.16	0.17	0.12	0.12	0.11	0.13	0.16	0.19	0.19	0.14	0.13	0.12	0.10	0.12	0.17

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	187.86	187.86	289.39	315.99	395.81	140.75	-297.11	-315.37	-179.06	-195.88	-146.2	-166.8	-211.89	-221.61	-237.67	-263.36	-28.91	-879.56
	ULS Min	187.86	187.86	280.57	299.28	368.51	95.38	-338.39	-360.17	-223.28	-249.62	-191.38	-218.18	-256.96	-274.6	-283.24	-314.26	-42.07	-890.48
IY Bending	ULS Max	0	0	39.72	41.07	40.38	39.69	3.5	0	5.47	16.12	5.4	20.58	3.37	22.7	4.57	23.6	0	28.63
	ULS Min	0	0	0	0	0	0	-19.01	0	-20.1	0	-19.6	0	-24.96	0	-20.69	0	0	0
IZ Bending	ULS Max	0	0	0	0.25	0	0	0	0	0.45	1.15	0	0.16	0	0.75	0	2.23	0	0
	ULS Min	0	0	-5.4	-7.63	-33.53	-37.61	-1.2	0	-0.52	0	-0.55	0	-2.85	0	-5.44	0	0	-5.49
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	8	0	8	7	8	9	10	9	9	10	0	10
	Stress Z	0	0	1	1	4	4	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	259	271	317	321	130	0	136	110	133	138	173	154	149	162	0	189
	Tension Combined Force (kN) =	188	188	548	587	713	462	-167	-315	-43	-86	-14	-28	-39	-68	-89	-101	-29	-691
	Compression Combined Force (kN) =	188	188	22	28	51	-226	-468	-360	-359	-360	-324	-357	-430	-428	-432	-477	-42	-1079
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.12	0.13	0.16	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.06	0.14	0.11	0.11	0.11	0.10	0.11	0.13	0.13	0.13	0.15	0.01	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	230.56	360.43	285.89	310.23	388.43	85.79	-258.11	-250.74	-176.03	-198.13	-144.38	-161.14	-196.08	-227.22	-246.28	-263.83	-667.7	-21.41
	ULS Min	230.56	351.72	284.97	309.5	386.97	81.75	-305.22	-317.28	-230.22	-242.36	-195.83	-206.43	-249.48	-272.42	-297.71	-308.84	-679.89	-34.57
IY Bending	ULS Max	0	0	39.23	39.22	39.52	41.07	0	40.29	15.04	5.58	20.16	5.43	21.53	3.61	22.89	5.21	24.83	0
	ULS Min	0	-25.89	0	0	0	0	-6.46	0	0	-20.15	0	-19.61	0	-25.02	0	-20.84	0	0
IZ Bending	ULS Max	0	0	0	1.17	0	1.74	0	2.37	0.89	0	0.4	0.11	0	0.7	0.63	1.06	0.28	0
	ULS Min	0	-1.77	-1.22	0	-0.78	0	-3.25	0	0	-1.39	0	-0.14	-0.39	0	0	0	-0.53	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	8	14	14	14	14	3	17	6	8	8	8	9	10	10	9	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	141	247	247	248	260	49	275	103	138	136	132	145	169	155	142	156	0
	Tension Combined Force (kN) =	231	502	533	558	637	346	-209	24	-73	-60	-8	-29	-51	-58	-91	-122	-512	-21
	Compression Combined Force (kN) =	231	210	38	62	139	-178	-354	-592	-333	-380	-332	-338	-395	-442	-453	-451	-836	-35
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.10	0.12	0.12	0.14	0.08	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.11	0.18	0.10	0.12	0.10	0.10	0.12	0.14	0.14	0.14	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	336.29	62.1	726.7	107.44	-506.6	-538.41	-532.45	-525.58	-675.03	-681.7	-602.93	-607.96	-127.32	23.5
	ULS Min	336.29	45.34	726.7	99.59	-532.09	-563.91	-557.94	-551.08	-697.39	-704.05	-625.28	-630.32	-134.99	14.66
IY Bending	ULS Max	509.74	0	22.77	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-466.61	-50.14	0	-15.25	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.9	0	0.06	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.4	-0.44	0	-0.92	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	5	16	9	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		431	333	162	110	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		767	395	889	217	-507	-538	-532	-526	-675	-682	-603	-608	-127	24
Compression Combined Force (kN) =		-95	-288	565	-10	-532	-564	-558	-551	-697	-704	-625	-630	-135	15
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.19	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	0.00	0.14	0.15	0.15	0.15	0.21	0.21	0.19	0.19	0.43	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	156.04	11.16	210.1	50.53	193.75	-191.77	-195.93	-140.85	-154.79	-173.6	-154.99	-46.51	-127.94	-17.83	29.41
	ULS Min	151.14	-2.11	196.71	8.34	193.75	-214.77	-218.92	-163.84	-177.78	-196.6	-177.98	-69.5	-150.93	-26.67	21.02
IY Bending	ULS Max	235.3	10.45	16.88	11.75	98.78	0	0	0	0	0	0	0	0	0	0
	ULS Min	-209.51	-19.65	-7.75	-15.96	98.78	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.93	3.41	3.23	5.43	16.97	0	0	0	0	0	0	0	0	0	0
	ULS Min	-5.67	0	0	0	16.97	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	7	7	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		220	146	126	123	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		376	157	336	173	496	-192	-196	-141	-155	-174	-155	-47	-128	-18	29
Compression Combined Force (kN) =		-69	-148	71	-114	-109	-215	-219	-164	-178	-197	-178	-70	-151	-27	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.08	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.04	0.05	0.05	0.05	0.02	0.04	0.09	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	22958.77	22958.77	3404.24	1566.54	1857.93	1569.74	811.89
	ULS Min	0	0	-1001	-10	-12	-11	-542
Shear	Fz Max	9096	9096	1344	2115	2240	2077	1133
	Fz Min	-9029	-9029	-1333	-332	-2172	-315	-355
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.421	0.560	0.169	0.150	0.151	0.150	0.155
		0.251	0.476	0.249	0.506	0.536	0.497	0.493

Case 3 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-15818	-15792	-15123	-14865	-12271	-12195	-10478	-10445	-10339	-8623	-8610	-7799	-9020	-8757	-9883	-9850	-9585
	ULS Min	-15848	-15802	-15165	-15022	-12408	-12333	-10540	-10478	-10434	-8654	-8620	-7998	-9157	-8894	-9944	-9883	-9680
IY Bending	ULS Max	199	327	327	252	85	92	191	191	93	0	-75	124	139	124	128	130	130
	ULS Min	0	199	83	40	25	80	92	93	75	-75	-131	-129	72	77	124	128	4
IZ Bending	ULS Max	1323	1692	2954	9883	2029	247	247	-8	537	1323	1738	9282	2175	-30	1109	1109	33
	ULS Min	0	1323	1536	3081	-363	-363	-8	-155	-155	0	1323	1624	-30	-746	-747	-98	-98
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	4.173	6.862	6.866	5.281	2.386	2.578	6.090	6.090	2.968	1.566	2.747	2.705	3.907	3.478	4.071	4.134	4.135
	Stress due to bending Z	25.080	32.082	56.017	187.406	47.006	8.411	8.776	5.487	19.042	25.093	32.961	176.014	50.393	17.293	39.344	39.344	3.477
	Force (kn) =	5014	6675	10777	33025	7851	1747	1583	1232	2343	4569	6120	30631	8632	3302	4622	4629	810
	Tension Combined Force (kN) =	-10804	-9117	-4345	18159	-4419	-10449	-8896	-9212	-7996	-4054	-2490	22832	-388	-5455	-5261	-5221	-8775
	Compression Combined Force (kN) =	-20862	-22477	-25943	-48047	-20259	-14079	-12122	-11711	-12777	-13223	-14740	-38629	-17788	-12196	-14566	-14512	-10490
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.32	NA	NA	NA	NA	NA	NA	NA	0.41	NA	NA	NA	NA	NA
		0.32	0.35	0.40	0.74	0.31	0.22	0.33	0.31	0.34	0.20	0.23	0.60	0.28	0.19	0.39	0.39	0.28

Case 3 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5578	-5562	-4386	-4115	-2866	-2624	-1737	-1471	-1328	-692	-669	338	-333	-300	-708	-611	-1028
	ULS Min	-5592	-5567	-4405	-4184	-2945	-2702	-1815	-1549	-1359	-705	-674	251	-411	-378	-786	-689	-1058
IY Bending	ULS Max	31	31	200	163	46	45	57	147	132	0	-49	50	54	47	60	141	151
	ULS Min	0	-41	-32	-8	-21	44	42	55	-116	-67	-79	-48	35	35	47	59	-173
IZ Bending	ULS Max	539	589	864	4285	720	42	43	-8	440	417	493	3994	766	-36	34	34	-33
	ULS Min	0	539	745	1104	-135	-134	-9	-93	-95	0	436	611	-110	-110	-36	-179	-179
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.596	2.093	10.222	8.297	2.364	2.308	2.903	7.484	6.714	3.434	4.027	2.528	2.754	2.422	3.039	7.185	8.823
	Stress due to bending Z	16.009	17.509	25.667	127.292	21.397	3.967	1.264	2.761	13.082	12.377	14.647	118.632	22.761	3.273	1.068	5.321	5.322
	Force (kn) =	1375	1530	2802	10586	1855	490	325	800	1546	1234	1458	9460	1992	445	321	976	1104
	Tension Combined Force (kN) =	-4204	-4032	-1584	6471	-1011	-2134	-1411	-671	217	543	789	9798	1659	145	-387	366	77
	Compression Combined Force (kN) =	-6966	-7097	-7207	-14770	-4800	-3192	-2140	-2349	-2905	-1939	-2132	-9209	-2403	-822	-1107	-1665	-2163
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.30	NA	NA	NA	NA	0.01	0.02	0.04	0.45	0.08	0.01	NA	0.02	0.00
		0.34	0.34	0.35	0.71	0.23	0.15	0.10	0.11	0.13	0.09	0.10	0.45	0.11	0.04	0.05	0.08	0.10

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	767.73	767.73	379.08	390.24	577.94	120	1233.05	1147.26	762.24	808.61	783.94	852.19	475.57	428.41	-17.23	-16.1	151.06	-680.04
	ULS Min	-326.92	-326.92	157.56	175.31	135.59	-24.83	-2007.74	-1627.35	-1284.06	-1130.44	-1245.03	-1103.59	-1039.18	-829.64	-573.75	-533.67	-13.64	-835.71
IY Bending	ULS Max	0	0	56.24	55.23	49.47	44.27	14.48	0	17.7	28.18	18.53	39.51	11.28	35.84	7.13	28.37	0	28.01
	ULS Min	0	0	0	0	0	0	-40.15	0	-32.54	-4.63	-31.01	-1.36	-32.9	0	-25.39	0	0	0
IZ Bending	ULS Max	0	0	82.84	112.27	75.05	39.2	98.31	0	91.41	31.89	72.13	4.98	76.11	8.67	77.6	9.74	0	7.41
	ULS Min	0	0	-70.43	-101.45	-109.33	-77.78	-51.72	0	-45.41	-35.3	-21.68	-8.97	-26.61	-12.21	-27.41	-10.42	0	-8.01
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	17	0	14	12	13	16	14	15	11	12	0	10
	Stress Z	0	0	9	12	12	8	11	0	10	4	8	1	9	1	9	1	0	1
Force (kn) =		0	0	512	563	522	428	448	0	384	253	339	282	359	263	311	209	0	189
Tension Combined Force (kN) =		768	768	892	954	1100	548	1681	1147	1146	1062	1123	1134	834	691	294	193	151	-491
Compression Combined Force (kN) =		-327	-327	-355	-388	-386	-453	-2455	-1627	-1668	-1384	-1584	-1385	-1398	-1092	-885	-743	-14	-1025
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.15	0.19	0.21	0.24	0.12	0.40	0.28	0.28	0.26	0.27	0.27	0.20	0.17	0.07	0.05	0.03	NA
		0.01	0.09	0.10	0.11	0.11	0.13	0.76	0.50	0.51	0.43	0.49	0.43	0.43	0.34	0.27	0.23	0.00	0.29

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	727.11	475.29	359.19	372.51	561.35	58.46	1024.02	1159.77	694.39	693.38	757.83	754.69	393.13	471.51	-7.34	-27.17	-503.24	174.79
	ULS Min	-324.11	185.87	157.53	203.04	167.6	-47.77	-1491.42	-1759.26	-1036.67	-1156.53	-1042.76	-1143.05	-790.96	-985.12	-515.09	-584.21	-616.46	-9.47
IY Bending	ULS Max	0	58.65	51.38	48.68	44.74	42.81	6.72	71.52	36.7	18.1	37.89	17.54	33.98	11.09	27.35	7.95	24.27	0
	ULS Min	0	-107.36	0	0	0	0	-16.7	-2.72	-7.97	-31.81	0	-30.72	0	-32.55	0	-25.03	0	0
IZ Bending	ULS Max	0	29.8	34.81	38.8	37.19	34.07	112.66	37.08	16.99	23.14	6.48	14.71	6.16	16.22	6.94	17.5	2.15	0
	ULS Min	0	-52.41	-12.63	-10.23	-10.32	-9.82	-65.31	-39.05	-13.01	-71.3	-1.61	-65.85	-1.95	-68.56	-1.6	-75.65	-9.95	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	31	18	17	16	15	7	30	15	13	16	13	14	14	11	10	9	0
	Stress Z	0	5	4	4	4	4	13	4	2	8	1	7	1	8	1	9	1	0
Force (kn) =		0	666	389	380	352	334	316	551	277	343	266	326	239	343	196	305	169	0
Tension Combined Force (kN) =		727	1141	748	752	913	392	1340	1711	972	1036	1024	1080	632	814	189	278	-334	175
Compression Combined Force (kN) =		-324	-480	-231	-177	-184	-381	-1808	-2310	-1314	-1499	-1309	-1469	-1030	-1328	-711	-889	-786	-9
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.22	0.16	0.16	0.20	0.09	0.32	0.41	0.23	0.25	0.25	0.26	0.15	0.20	0.05	0.07	NA	0.04
		0.01	0.13	0.07	0.05	0.05	0.11	0.56	0.71	0.40	0.46	0.40	0.45	0.32	0.41	0.22	0.27	0.22	0.00

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	407.59	412.42	836.78	170.69	1250.75	1162.87	667.18	723.48	297.45	234.02	-146.04	-104.76	-93.12	23.91
	ULS Min	249.99	-269.98	584.2	-475.52	-2314.88	-2393.44	-1904.62	-1845.5	-1713.49	-1772.36	-1224	-1187.18	-176.98	13.87
IY Bending	ULS Max	8182.22	0	25.89	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8917.62	-57.04	0	-16.23	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	146.33	237.22	73.42	268.56	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.6	-113.83	-35.15	-99.28	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	90	19	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	17	6	22	0	0	0	0	0	0	0	0	0	0
Force (kn) =		7783	731	292	511	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8191	1143	1129	682	1251	1163	667	723	297	234	-146	-105	-93	24
Compression Combined Force (kN) =		-7533	-1000	292	-987	-2315	-2393	-1905	-1846	-1713	-1772	-1224	-1187	-177	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.40	0.22	0.25	0.15	0.24	0.22	0.13	0.14	0.07	0.05	NA	NA	NA	0.02
		0.48	0.25	NA	0.28	0.61	0.63	0.50	0.49	0.51	0.53	0.37	0.36	0.57	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	238.1	207.51	292.54	108.54	132.28	652.97	615.04	410.33	430.22	305.5	284.89	324.12	291.62	47.87	32.27
	ULS Min	-18.61	-231.82	-3.63	-73.47	72.92	-955.13	-960.15	-639.52	-644.45	-560.49	-546.34	-382.18	-439.12	-75.11	19.64
IY Bending	ULS Max	3983.79	15.82	20.23	16.29	115.23	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4326.23	-22.59	-13.77	-18.66	89.45	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	169.33	239.92	97.78	267.76	124.16	0	0	0	0	0	0	0	0	0	0
	ULS Min	-100.37	-120.86	-56.23	-136.9	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	52	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	13	24	10	26	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4362	544	300	560	635	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4600	751	593	668	767	653	615	410	430	306	285	324	292	48	32
Compression Combined Force (kN) =		-4381	-775	-304	-633	-562	-955	-960	-640	-644	-560	-546	-382	-439	-75	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.27	0.18	0.14	0.16	0.06	0.14	0.13	0.09	0.09	0.07	0.06	0.07	0.06	0.04	0.03
		0.34	0.30	0.12	0.24	0.06	0.25	0.25	0.17	0.17	0.15	0.14	0.10	0.12	0.24	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	24528.02	24528.02	2220.3	1759.28	1813.43	1719.51	494.75
	ULS Min	0	0	-1072	-10	-12	-17	-469
Shear	Fz Max	9666	9666	916	2364	2361	2271	1087
	Fz Min	-9741	-9741	-957	-255	-2390	-249	-646
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.450	0.598	0.110	0.168	0.147	0.165	0.094
		0.268	0.510	0.178	0.566	0.572	0.543	0.473

Case 3 - ULS V1 D/C		North Tower																	
		Rail Side Columns									HWY Side Columns								
		Front Leg (100-110)									Front Leg (200-209)								
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207	
Axial	ULS Max	-14074	-14053	-13250	-12977	-12213	-12017	-11665	-11631	-11441	-13722	-13708	-12810	-12100	-11926	-11610	-11577	-11399	
	ULS Min	-14104	-14063	-13293	-13134	-12350	-12154	-11726	-11665	-11536	-13752	-13718	-13009	-12238	-12063	-11671	-11610	-11494	
IY Bending	ULS Max	0	-54	-45	83	79	119	135	144	144	26	35	86	85	124	132	136	136	
	ULS Min	-54	-78	-75	78	78	78	119	135	12	0	26	36	75	75	124	132	25	
IZ Bending	ULS Max	0	-45	119	458	-49	304	304	-52	259	92	124	154	173	173	52	247	247	
	ULS Min	-45	-53	-11	266	-186	-186	-52	-245	-245	0	92	-1	168	-305	-305	52	-257	
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462	
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389	
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179	
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554	
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418	
	Stress due to bending Y	1.131	1.636	1.581	1.738	2.214	3.349	4.302	4.572	4.572	0.548	0.728	1.812	2.396	3.469	4.193	4.329	4.329	
	Stress due to bending Z	0.855	0.997	2.249	8.677	4.298	7.047	10.793	8.697	9.206	1.747	2.343	2.918	4.017	7.066	10.822	8.763	9.135	
Force (kn) =		340	451	656	1785	1035	1653	1607	1413	1467	393	526	811	1019	1675	1599	1394	1433	
Tension Combined Force (kN) =		-13734	-13601	-12594	-11192	-11178	-10364	-10058	-10219	-9974	-13328	-13181	-12000	-11081	-10251	-10011	-10183	-9966	
Compression Combined Force (kN) =		-14445	-14514	-13949	-14918	-13385	-13806	-13333	-13077	-13003	-14145	-14245	-13820	-13257	-13737	-13270	-13004	-12927	
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749	
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181	
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	
		0.22	0.22	0.22	0.23	0.21	0.21	0.36	0.35	0.35	0.22	0.22	0.21	0.21	0.21	0.36	0.35	0.35	

Case 3 - ULS V1 D/C		North Tower																	
		Rail Side Columns									HWY Side Columns								
		Rear Leg (300-310)									Rear Leg (400-409)								
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407	
Axial	ULS Max	-4231	-4220	-3058	-2734	-2446	-2342	-2136	-1981	-2109	-3904	-3885	-2657	-2358	-2238	-1986	-1801	-1878	
	ULS Min	-4244	-4224	-3076	-2803	-2524	-2420	-2214	-2059	-2139	-3917	-3890	-2744	-2436	-2316	-2064	-1879	-1909	
IY Bending	ULS Max	4	10	13	54	50	50	51	171	166	12	15	36	38	48	52	179	181	
	ULS Min	0	4	-38	-20	33	32	49	50	-172	0	5	6	37	37	48	52	-226	
IZ Bending	ULS Max	0	-68	-36	282	-27	53	52	106	328	35	65	98	101	17	33	39	39	
	ULS Min	-68	-85	-125	166	-41	-26	-44	-43	106	0	30	34	17	-53	-53	33	-540	
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	
	Stress due to bending Y	0.226	0.526	1.932	2.743	2.551	2.540	2.594	8.715	8.749	0.594	0.746	1.829	1.914	2.468	2.661	9.128	11.506	
	Stress due to bending Z	2.006	2.512	3.708	8.379	1.231	1.564	1.559	3.160	9.742	1.036	1.922	2.919	3.004	1.581	1.581	1.157	16.047	
Force (kn) =		174	237	440	868	295	320	324	927	1444	127	208	371	384	316	331	803	2151	
Tension Combined Force (kN) =		-4057	-3983	-2618	-1866	-2150	-2021	-1811	-1054	-665	-3777	-3677	-2286	-1974	-1922	-1655	-998	273	
Compression Combined Force (kN) =		-4419	-4462	-3517	-3672	-2819	-2740	-2538	-2986	-3583	-4045	-4098	-3115	-2820	-2632	-2395	-2682	-4060	
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610	
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01	
		0.21	0.22	0.17	0.18	0.13	0.13	0.12	0.14	0.17	0.20	0.20	0.15	0.13	0.13	0.11	0.13	0.19	

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	212.88	212.88	329.13	360.95	454.99	199.59	-335.28	-355.94	-206.92	-225.06	-170.29	-192.36	-246.85	-259.61	-276.24	-290.77	-84.66	-885.57
	ULS Min	212.88	212.88	318.7	341.51	422.7	146.63	-376.58	-401.24	-251.08	-279.34	-215.45	-244.17	-291.86	-313.3	-321.83	-342.33	-97.83	-896.45
IY Bending	ULS Max	0	0	39.86	41.39	40.5	39.22	2.5	0	5	16.9	4.97	21.57	2.6	24.11	3.96	24.89	0	28.99
	ULS Min	0	0	0	0	0	0	-20.66	0	-21.66	0	-21.09	0	-27.33	0	-22.86	0	0	0
IZ Bending	ULS Max	0	0	0	0.29	0	0	0	0	0.52	1.13	0	0.23	0	0.87	0	2.6	0	0
	ULS Min	0	0	-6.01	-8.51	-37.73	-42.77	-1.21	0	-0.45	0	-0.61	0	-3.33	0	-5.89	0	0	-5.82
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	9	0	9	7	9	9	11	10	10	10	0	10
	Stress Z	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	261	275	326	328	141	0	146	116	143	145	190	163	164	172	0	191
Tension Combined Force (kN) =		213	213	590	636	781	528	-194	-356	-61	-110	-28	-47	-57	-96	-112	-119	-85	-694
Compression Combined Force (kN) =		213	213	58	66	96	-182	-517	-401	-397	-395	-358	-389	-481	-477	-486	-514	-98	-1088
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.13	0.14	0.17	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.16	0.12	0.12	0.12	0.11	0.12	0.15	0.15	0.15	0.16	0.03	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	256.02	407.99	325.72	355.23	447.73	137.36	-295.28	-283.57	-204.2	-227.83	-168.95	-186.17	-232.85	-263.34	-273.52	-306.27	-649.54	-78.19
	ULS Min	256.02	398.5	324.55	354.23	446.07	133.42	-343.15	-351.84	-258.97	-272	-220.84	-231.44	-286.98	-308.48	-325.64	-351.22	-661.85	-91.35
IY Bending	ULS Max	0	0	39.29	39.29	39.58	40.94	0	42.23	15.76	5.11	21.15	4.98	22.83	2.87	24.15	4.69	24.74	0
	ULS Min	0	-30.61	0	0	0	0	-5.5	0	0	-21.72	0	-21.1	0	-27.39	0	-22.99	0	0
IZ Bending	ULS Max	0	0	0	1.27	0	1.66	0	2.59	0.91	0	0.46	0.01	0	0.79	0.71	0.92	0.26	0
	ULS Min	0	-2	-1.45	0	-0.87	0	-3.55	0	0	-1.54	0	-0.22	-0.45	0	0	0	-0.55	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	9	14	14	14	14	2	18	7	9	9	9	10	11	10	10	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	167	248	248	249	259	43	288	107	149	143	142	154	185	163	156	155	0
Tension Combined Force (kN) =		256	575	574	603	697	396	-252	5	-97	-79	-26	-44	-79	-78	-110	-150	-494	-78
Compression Combined Force (kN) =		256	232	76	106	197	-126	-387	-640	-366	-421	-364	-373	-441	-494	-489	-507	-817	-91
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.11	0.13	0.13	0.15	0.09	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.04	0.12	0.20	0.11	0.13	0.11	0.12	0.14	0.15	0.15	0.16	0.23	0.03

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	383.4	72.21	845.77	125.4	-585.75	-616.23	-626.26	-620.48	-783.94	-788.99	-711.04	-718.41	-151.61	21.88
	ULS Min	383.4	55.63	845.77	117.06	-611.25	-641.72	-651.76	-645.98	-806.3	-811.35	-733.4	-740.77	-159.28	13.03
IY Bending	ULS Max	573.12	0	29.23	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-497.64	-53.19	0	-14.77	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.16	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.49	-0.54	0	-1.14	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	17	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		479	354	208	107	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		862	426	1054	232	-586	-616	-626	-620	-784	-789	-711	-718	-152	22
Compression Combined Force (kN) =		-96	-298	638	10	-611	-642	-652	-646	-806	-811	-733	-741	-159	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.23	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	NA	0.16	0.17	0.17	0.17	0.24	0.24	0.22	0.22	0.51	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	164.25	12.12	227.32	56.49	209.33	-203.59	-209.04	-156.18	-169.34	-186.26	-167.25	-55.46	-144.25	-21.55	29.24
	ULS Min	158.36	-1.34	212.7	9.62	209.33	-226.59	-232.03	-179.17	-192.34	-209.26	-190.25	-78.46	-167.24	-30.39	20.85
IY Bending	ULS Max	245.95	10.41	17.35	11.82	97.85	0	0	0	0	0	0	0	0	0	0
	ULS Min	-215.87	-19.82	-7.06	-15.79	97.85	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.24	4	3.55	5.95	17.93	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7.32	0	0	0	17.93	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		236	148	130	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		400	160	357	179	512	-204	-209	-156	-169	-186	-167	-55	-144	-22	29
Compression Combined Force (kN) =		-78	-149	83	-113	-94	-227	-232	-179	-192	-209	-190	-78	-167	-30	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.09	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.06	0.05	0.02	0.04	0.10	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	27338.62	27338.62	3647.91	1892.39	2246.94	1876.61	813.69
	ULS Min	0	0	-1072	-10	-12	-10	-541
Shear	Fz Max	10850	10850	1449	2551	2693	2461	1254
	Fz Min	-10750	-10750	-1461	-360	-2612	-351	-394
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.502	0.667	0.181	0.181	0.182	0.180	0.155
		0.299	0.568	0.271	0.610	0.644	0.589	0.546

Case 3 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-17571	-17545	-16787	-16462	-14051	-13958	-12406	-12372	-12260	-11173	-11159	-10297	-11208	-10966	-11871	-11838	-11598
	ULS Min	-17601	-17556	-16829	-16619	-14188	-14096	-12467	-12406	-12355	-11203	-11170	-10496	-11345	-11103	-11933	-11871	-11693
IY Bending	ULS Max	136	229	230	257	91	103	204	204	128	0	-42	117	130	131	147	156	156
	ULS Min	0	136	30	42	30	86	103	128	32	-42	-81	-79	78	81	131	147	-24
IZ Bending	ULS Max	1122	1441	2639	8695	1757	301	301	-22	535	1182	1558	8093	1942	23	966	966	-12
	ULS Min	0	1122	1343	2855	-368	-368	-22	-204	-204	0	1182	1482	23	-729	-729	-12	-45
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	2.844	4.811	4.833	5.395	2.542	2.900	6.485	6.485	4.072	0.884	1.696	2.465	3.638	3.686	4.698	4.974	4.974
	Stress due to bending Z	21.283	27.329	50.037	164.876	40.703	8.528	10.669	7.238	18.976	22.419	29.540	153.473	44.991	16.887	34.268	34.268	1.609
Force (kn) =		4135	5508	9404	29183	6874	1817	1826	1461	2454	3994	5354	26726	7730	3270	4148	4178	701
Tension Combined Force (kN) =		-13435	-12037	-7382	12721	-7177	-12142	-10580	-10911	-9806	-7179	-5805	16430	-3478	-7695	-7723	-7660	-10897
Compression Combined Force (kN) =		-21736	-23065	-26233	-45802	-21063	-15912	-14294	-13867	-14808	-15197	-16523	-37222	-19076	-14373	-16081	-16049	-12394
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.23	NA	NA	NA	NA	NA	NA	NA	0.29	NA	NA	NA	NA	NA
		0.34	0.36	0.41	0.71	0.33	0.25	0.38	0.37	0.40	0.24	0.26	0.58	0.30	0.22	0.43	0.43	0.33

Case 3 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6351	-6335	-5061	-4648	-3504	-3289	-2504	-2263	-2135	-1951	-1931	-844	-1347	-1302	-1602	-1493	-1813
	ULS Min	-6365	-6340	-5080	-4717	-3582	-3367	-2582	-2342	-2166	-1965	-1935	-931	-1425	-1380	-1680	-1571	-1844
IY Bending	ULS Max	26	26	151	125	46	51	55	180	165	0	-32	47	52	53	57	177	186
	ULS Min	0	-29	-20	9	-4	44	49	54	-166	-44	-52	-32	37	37	53	57	-227
IZ Bending	ULS Max	414	453	736	3768	616	60	61	-25	550	379	465	3542	706	-56	45	45	-130
	ULS Min	0	414	551	1166	-129	-128	-27	-43	-45	0	392	543	-85	-85	-56	-130	-290
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.335	1.456	7.725	6.372	2.320	2.585	2.812	9.175	8.474	2.267	2.659	2.409	2.652	2.709	2.926	9.037	11.555
	Stress due to bending Z	12.301	13.450	21.868	111.937	18.294	3.796	1.802	1.283	16.327	11.257	13.823	105.201	20.982	2.539	1.654	3.857	8.603
Force (kn) =		1065	1164	2311	9237	1609	498	360	817	1936	1056	1287	8402	1845	410	358	1007	1574
Tension Combined Force (kN) =		-5287	-5172	-2751	4589	-1894	-2790	-2144	-1447	-199	-896	-644	7558	499	-892	-1245	-486	-239
Compression Combined Force (kN) =		-7429	-7504	-7391	-13954	-5191	-3865	-2942	-3158	-4103	-3020	-3222	-9333	-3270	-1789	-2038	-2578	-3418
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	NA	NA	NA	0.35	0.02	NA	NA	NA	NA
		0.36	0.36	0.36	0.68	0.25	0.18	0.14	0.15	0.19	0.15	0.16	0.45	0.16	0.09	0.10	0.12	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	711.29	711.29	433.54	450.46	632.26	245.78	942.27	861.52	584.21	614.21	612.64	661.23	323.73	274.33	-93.24	-97.55	-28.58	-831.78
	ULS Min	-226.99	-226.99	243.67	266.23	253.1	106.12	-1841.58	-1523.34	-1176.19	-1055.72	-1133.07	-1022.48	-981.21	-811.81	-577.11	-548.74	-171.63	-966.16
IY Bending	ULS Max	0	0	54.01	53.81	48.43	42.97	12.46	0	15.82	25.47	16.58	38.39	9.69	36.08	6.16	29.67	0	30.38
	ULS Min	0	0	0	0	0	0	-37.87	0	-31.59	-2.65	-30.04	0	-33.41	0	-26.5	0	0	0
IZ Bending	ULS Max	0	0	68.6	92.53	49.82	28.41	83.37	0	77.47	28.35	61.7	4.31	64.43	7.79	64.12	9.17	0	4.7
	ULS Min	0	0	-62.77	-90.65	-108.21	-82.6	-45.65	0	-39.8	-29.25	-18.72	-7.74	-23.64	-10.28	-25.93	-8.27	0	-9.15
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	16	0	13	11	13	16	14	15	11	12	0	11
	Stress Z	0	0	7	10	12	9	9	0	9	3	7	1	7	1	7	1	0	1
Force (kn) =		0	0	471	516	513	429	405	0	352	224	313	272	341	261	294	216	0	206
Tension Combined Force (kN) =		711	711	904	967	1145	675	1348	862	937	838	926	933	665	535	201	118	-29	-626
Compression Combined Force (kN) =		-227	-227	-227	-250	-260	-323	-2247	-1523	-1529	-1280	-1447	-1294	-1322	-1073	-871	-765	-172	-1172
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.20	0.21	0.25	0.15	0.32	0.21	0.23	0.20	0.22	0.22	0.16	0.13	0.05	0.03	NA	NA
		0.01	0.06	0.07	0.07	0.07	0.09	0.69	0.47	0.47	0.39	0.45	0.40	0.41	0.33	0.27	0.24	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	717	538.51	416.38	435.45	619.86	181.9	783.7	890.02	524.45	514.82	590.21	578.46	254.98	310.87	-80.2	-114.65	-611.4	-17.57
	ULS Min	-184.04	287.7	243.53	290.19	282.37	89.37	-1380.29	-1624.86	-967.28	-1077.29	-960.48	-1054.86	-767.92	-944.3	-523.23	-598.74	-709.85	-177.39
IY Bending	ULS Max	0	38.94	48.56	47.31	43.99	42.48	4.72	70.06	34.6	16.23	36.78	15.81	33.98	9.68	28.42	7.18	25.83	0
	ULS Min	0	-103.35	0	0	0	0	-15.35	0	-3.69	-30.88	0	-29.68	0	-33.05	0	-26.29	0	0
IZ Bending	ULS Max	0	26.3	29.36	33.71	31.54	30.96	96.34	31.97	14.98	19.19	5.78	12.66	5.19	14.15	6.33	15.65	2.41	0
	ULS Min	0	-44.58	-11.32	-8.32	-9.31	-6.86	-56.21	-33.95	-10.74	-61.76	-1.24	-56.4	-1.88	-58.54	-1.15	-64.23	-8.01	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	30	17	16	15	15	6	29	14	13	15	12	14	14	12	11	9	0
	Stress Z	0	4	3	4	3	3	11	4	2	7	1	6	1	7	1	7	1	0
Force (kn) =		0	630	360	361	336	326	278	532	259	319	257	301	238	328	202	293	176	0
Tension Combined Force (kN) =		717	1169	777	797	956	507	1061	1422	784	834	848	880	493	639	122	178	-436	-18
Compression Combined Force (kN) =		-184	-343	-117	-71	-54	-236	-1658	-2157	-1227	-1397	-1218	-1356	-1005	-1272	-725	-892	-886	-177
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.17	0.21	0.11	0.26	0.34	0.19	0.20	0.20	0.21	0.12	0.15	0.03	0.04	NA	NA
		0.01	0.10	0.03	0.02	0.02	0.07	0.51	0.67	0.38	0.43	0.38	0.42	0.31	0.39	0.22	0.27	0.25	0.05

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	463.05	379.04	964	183.21	915.76	816.2	382.27	435.28	29.87	-29.39	-344.01	-308.06	-125.37	21.89
	ULS Min	327.97	-218.96	747.5	-373.6	-2144.13	-2235.71	-1825.77	-1770.34	-1696.99	-1752.34	-1271.17	-1239.05	-198.35	12.03
IY Bending	ULS Max	7069.5	0	33.24	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7846.16	-59.63	0	-15.44	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	129.78	203.16	62.93	229.83	0	0	0	0	0	0	0	0	0	0
	ULS Min	-56.16	-97.74	-30.13	-85.46	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	79	19	13	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	15	5	19	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6852	697	329	448	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		7316	1076	1293	632	916	816	382	435	30	-29	-344	-308	-125	22
Compression Combined Force (kN) =		-6524	-916	418	-822	-2144	-2236	-1826	-1770	-1697	-1752	-1271	-1239	-198	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.36	0.21	0.28	0.14	0.18	0.16	0.07	0.08	0.01	NA	NA	NA	NA	0.02
		0.42	0.23	NA	0.23	0.56	0.59	0.48	0.47	0.51	0.52	0.38	0.37	0.64	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	276.18	184.84	355.24	115.53	229.1	478.29	442.76	270.98	279.63	177.54	170.37	228.16	162.15	25.57	31.11
	ULS Min	57.43	-191.74	96.4	-40.48	174.83	-903.37	-910.7	-632.17	-644.8	-568.03	-545.41	-380.53	-467.48	-81.11	19.09
IY Bending	ULS Max	3486.15	14.84	20.72	15.14	110.44	0	0	0	0	0	0	0	0	0	0
	ULS Min	-3809.42	-22.86	-9.85	-17.72	89.46	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	141.77	206.15	84.3	230	104.62	0	0	0	0	0	0	0	0	0	0
	ULS Min	-89.41	-103.09	-47.71	-116.85	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	46	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	11	20	8	23	6	0	0	0	0	0	0	0	0	0	0
Force (kn) =		3803	492	282	493	570	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4080	677	638	609	799	478	443	271	280	178	170	228	162	26	31
Compression Combined Force (kN) =		-3746	-683	-186	-534	-395	-903	-911	-632	-645	-568	-545	-381	-467	-81	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.24	0.16	0.15	0.15	0.07	0.10	0.10	0.06	0.06	0.04	0.04	0.05	0.04	0.02	0.02
		0.29	0.26	0.07	0.20	0.04	0.24	0.24	0.17	0.17	0.15	0.14	0.10	0.12	0.26	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	29140.05	29140.05	3713.91	2048.48	2137.13	2033.32	963.03
	ULS Min	0	0	-1410	-10	-12	-17	-640
Shear	Fz Max	11414	11414	1431	2754	2813	2684	1485
	Fz Min	-11482	-11482	-1446	-372	-2804	-343	-650
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.535	0.711	0.184	0.196	0.173	0.195	0.183
		0.316	0.601	0.268	0.659	0.673	0.642	0.646

Case 3 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-15922	-15896	-15472	-15146	-13223	-13597	-12268	-12235	-12330	-9070	-9057	-8499	-10148	-10318	-11661	-11627	-11573
	ULS Min	-15952	-15907	-15514	-15303	-13360	-13735	-12330	-12269	-12425	-9101	-9067	-8698	-10285	-10455	-11722	-11661	-11668
IY Bending	ULS Max	753	1066	1066	870	120	115	627	627	163	525	682	684	97	102	554	554	98
	ULS Min	0	753	642	-162	-176	-43	-43	-44	-44	0	525	-54	-39	-12	-12	-11	-11
IZ Bending	ULS Max	1230	1582	2873	9451	1929	289	289	-21	565	1285	1691	8864	2103	1	1045	1045	-25
	ULS Min	0	1230	1466	3095	-378	-378	-21	-197	-197	0	1285	1599	1	-755	-756	-41	-41
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	15.802	22.367	22.371	18.262	4.941	3.217	19.983	19.983	5.188	11.023	14.322	14.349	2.713	2.849	17.660	17.660	3.117
	Stress due to bending Z	23.316	29.997	54.482	179.228	44.698	8.765	10.268	6.986	20.040	24.363	32.071	168.079	48.712	17.502	37.092	37.092	1.444
	Force (kn) =	6704	8975	13172	33848	7891	1905	3221	2871	2686	6065	7951	31266	8175	3235	5829	5829	486
	Tension Combined Force (kN) =	-9217	-6922	-2300	18702	-5332	-11693	-9048	-9364	-9644	-3006	-1105	22768	-1974	-7083	-5832	-5799	-11087
	Compression Combined Force (kN) =	-22656	-24882	-28686	-49151	-21250	-15639	-15550	-15140	-15111	-15165	-17019	-39965	-18460	-13690	-17551	-17490	-12153
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.33	NA	NA	NA	NA	NA	NA	NA	0.41	NA	NA	NA	NA	NA
		0.35	0.38	0.44	0.76	0.33	0.24	0.42	0.41	0.41	0.23	0.26	0.62	0.29	0.21	0.47	0.47	0.33

Case 3 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-8536	-8520	-6846	-6425	-4588	-3906	-2731	-2291	-2121	-3644	-3624	-2199	-2202	-1746	-1770	-1487	-1797
	ULS Min	-8549	-8524	-6864	-6494	-4666	-3985	-2809	-2370	-2152	-3658	-3628	-2286	-2280	-1824	-1848	-1565	-1828
IY Bending	ULS Max	258	277	350	305	50	52	70	186	172	143	226	227	39	53	72	175	184
	ULS Min	0	258	286	-68	-85	49	50	68	-160	0	134	-28	-20	39	53	72	-204
IZ Bending	ULS Max	459	501	811	4098	666	72	72	-29	563	417	508	3829	768	-67	51	51	-133
	ULS Min	0	459	617	1251	-143	-143	-31	-55	-57	0	432	604	-89	-89	-67	-133	-280
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	13.152	14.126	17.831	15.541	4.320	2.632	3.575	9.469	8.773	7.303	11.530	11.569	2.006	2.695	3.682	8.923	10.406
	Stress due to bending Z	13.633	14.881	24.082	121.713	19.772	4.238	2.137	1.638	16.715	12.390	15.104	113.725	22.819	2.650	1.981	3.943	8.311
	Force (kn) =	2091	2265	3272	10716	1881	536	446	867	1990	1538	2079	9782	1938	417	442	1005	1461
	Tension Combined Force (kN) =	-6445	-6255	-3573	4291	-2707	-3370	-2285	-1424	-131	-2107	-1544	7584	-264	-1329	-1328	-482	-336
	Compression Combined Force (kN) =	-10641	-10789	-10137	-17210	-6547	-4521	-3255	-3237	-4142	-5195	-5708	-12069	-4218	-2241	-2290	-2569	-3290
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.20	NA	NA	NA	NA	NA	NA	NA	0.35	NA	NA	NA	NA	NA
		0.51	0.52	0.49	0.83	0.31	0.22	0.16	0.15	0.19	0.25	0.28	0.58	0.20	0.11	0.11	0.12	0.15

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	834.56	834.56	457.69	471.83	677.21	253.62	1263.7	1167.99	783.49	825.54	809.68	875.95	468.26	409.81	-45.61	-48.02	-10.12	-816.65
	ULS Min	-338.28	-338.28	220.36	241.55	203.26	90.1	-2205.78	-1801.74	-1405.97	-1248.28	-1361.18	-1215.72	-1151.67	-934.41	-639.05	-599.08	-185.65	-981.91
IY Bending	ULS Max	0	0	57.54	56.89	50.41	43.93	15	0	18.54	29.19	19.5	42.54	11.5	39	6.74	30.8	0	30.69
	ULS Min	0	0	0	0	0	0	-42.09	0	-34	-5.96	-32.2	-1.26	-34.81	0	-27.28	0	0	0
IZ Bending	ULS Max	0	0	87.16	117.68	71.83	39.43	104.37	0	96.95	35.27	77.19	5.33	81.2	9.51	81.5	10.8	0	6.82
	ULS Min	0	0	-77.05	-111.3	-125.72	-92.47	-56.76	0	-49.64	-36.73	-23.33	-9.68	-28.88	-12.93	-31.04	-10.85	0	-10
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	17	15	18	0	14	12	13	18	15	16	11	13	0	11
	Stress Z	0	0	9	13	14	10	12	0	11	4	9	1	9	1	9	1	0	1
Force (kn) =		0	0	529	584	559	454	472	0	404	263	356	303	381	285	331	226	0	210
Tension Combined Force (kN) =		835	835	987	1056	1237	708	1735	1168	1187	1088	1166	1179	849	695	285	178	-10	-607
Compression Combined Force (kN) =		-338	-338	-309	-343	-356	-364	-2677	-1802	-1810	-1511	-1717	-1519	-1533	-1220	-970	-826	-186	-1191
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.16	0.22	0.23	0.27	0.15	0.42	0.28	0.29	0.26	0.28	0.28	0.20	0.17	0.07	0.04	NA	NA
		0.01	0.09	0.09	0.10	0.10	0.10	0.83	0.56	0.56	0.47	0.53	0.47	0.47	0.38	0.30	0.25	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	830.94	568.67	436.98	453.43	660.37	189.18	1055.41	1185.09	708.1	702	781.3	770.89	378.91	456.29	-30.68	-64.83	-601.72	2.36
	ULS Min	-295.37	257.57	220.92	271.85	238.5	74.51	-1637.57	-1941.36	-1142.84	-1277.1	-1144.07	-1259.44	-886.14	-1101.39	-571.39	-658.71	-721.7	-194.12
IY Bending	ULS Max	0	56.58	53.21	49.67	45.09	42.87	7.23	76.91	39.27	19.04	40.63	18.54	36.7	11.42	29.43	7.84	26.1	0
	ULS Min	0	-121.29	0	0	0	0	-17.86	-3.81	-8.59	-33.08	0	-31.75	0	-34.34	0	-26.99	0	0
IZ Bending	ULS Max	0	33.02	37.05	41.84	39.58	38.31	121.3	39.3	18.61	24.38	7.1	15.88	6.54	17.49	7.73	19.45	2.95	0
	ULS Min	0	-55.22	-13.77	-10.69	-11.42	-8.83	-69.38	-42.47	-13.53	-76.8	-1.63	-70.44	-2.24	-73.36	-1.52	-80.37	-9.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	35	18	17	16	15	7	32	16	14	17	13	15	14	12	11	9	0
	Stress Z	0	5	4	5	4	4	14	5	2	9	1	8	1	8	1	9	1	0
Force (kn) =		0	745	404	392	359	342	340	593	297	361	286	341	258	363	212	327	181	0
Tension Combined Force (kN) =		831	1314	841	845	1019	532	1395	1778	1005	1063	1067	1112	637	820	181	262	-421	2
Compression Combined Force (kN) =		-295	-487	-184	-120	-120	-268	-1977	-2535	-1440	-1638	-1430	-1600	-1144	-1465	-783	-986	-902	-194
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.26	0.18	0.18	0.22	0.12	0.34	0.43	0.24	0.26	0.26	0.27	0.15	0.20	0.04	0.06	NA	0.00
		0.01	0.14	0.05	0.03	0.03	0.08	0.61	0.78	0.44	0.50	0.44	0.49	0.35	0.45	0.24	0.30	0.25	0.05

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	480.52	455.21	987.22	196.82	1295.25	1178.35	639.28	704.15	239.17	166.31	-246.42	-199.53	-117.55	21.98
	ULS Min	311.67	-288.15	716.6	-497.06	-2523.24	-2630.16	-2114.4	-2046.5	-1913.81	-1981.79	-1399.78	-1357.67	-206.85	11.86
IY Bending	ULS Max	8884.22	0	33.89	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-9681.67	-61.08	0	-15.64	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	161.71	254.07	78.66	287.54	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.72	-122.03	-37.67	-106.53	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	98	20	13	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	8	19	6	23	0	0	0	0	0	0	0	0	0	0
Force (kn) =		8462	782	357	535	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8942	1238	1344	732	1295	1178	639	704	239	166	-246	-200	-118	22
Compression Combined Force (kN) =		-8150	-1070	360	-1032	-2523	-2630	-2114	-2047	-1914	-1982	-1400	-1358	-207	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.44	0.24	0.29	0.16	0.25	0.23	0.12	0.14	0.05	0.04	NA	NA	NA	0.02
		0.52	0.26	NA	0.29	0.66	0.69	0.56	0.54	0.57	0.59	0.42	0.41	0.66	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	303.72	228.2	386.32	130.06	233.46	649.38	606.39	378.57	392.64	269.15	255.46	299.66	239.53	37.55	31.59
	ULS Min	30.28	-242.52	65.31	-64.95	167.04	-1071.94	-1079.68	-744.62	-757.15	-657.06	-633.51	-455.46	-541.75	-93.59	18.65
IY Bending	ULS Max	4356.65	15.96	22.06	16.42	113.9	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4707.48	-23.61	-10.58	-18.21	87.95	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	178.39	257.04	104.84	287.1	134.01	0	0	0	0	0	0	0	0	0	0
	ULS Min	-110.58	-129.51	-60.17	-146.47	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	57	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	14	25	10	28	8	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4716	578	325	588	658	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5020	806	711	718	892	649	606	379	393	269	255	300	240	38	32
Compression Combined Force (kN) =		-4686	-821	-259	-652	-491	-1072	-1080	-745	-757	-657	-634	-455	-542	-94	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.30	0.19	0.17	0.17	0.07	0.14	0.13	0.08	0.09	0.06	0.06	0.07	0.05	0.03	0.03
		0.36	0.31	0.10	0.25	0.06	0.28	0.28	0.20	0.20	0.17	0.17	0.12	0.14	0.30	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	29505.75	29505.75	3722.59	2069.63	2149.06	2076.13	1000.48
	ULS Min	0	0	-1492	-10	-12	-19	-662
Shear	Fz Max	11484	11484	1421	2781	2819	2740	1535
	Fz Min	-11594	-11594	-1437	-373	-2829	-340	-711
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.541	0.719	0.185	0.198	0.174	0.199	0.190
		0.319	0.606	0.267	0.665	0.677	0.656	0.668

Case 3 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-7583	-7561	-6836	-6563	-6048	-5844	-5568	-5534	-5313	-7181	-7167	-6346	-5890	-5706	-5459	-5426	-5222
	ULS Min	-7613	-7572	-6879	-6719	-6185	-5982	-5629	-5568	-5408	-7211	-7178	-6545	-6027	-5843	-5520	-5459	-5317
IY Bending	ULS Max	0	-62	-82	46	10	41	41	2	248	28	38	39	7	44	44	-3	265
	ULS Min	-62	-88	-86	-13	-12	10	2	-20	-20	0	28	-7	-8	7	-3	-29	-29
IZ Bending	ULS Max	0	-29	119	352	-25	145	145	-20	113	75	101	132	141	76	20	110	110
	ULS Min	-29	-32	18	267	-90	-90	-20	-111	-111	0	75	84	76	-145	-145	20	-105
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.301	1.849	1.795	0.964	0.350	1.152	1.307	0.629	7.891	0.591	0.789	0.826	0.227	1.233	1.400	0.922	8.429
	Stress due to bending Z	0.548	0.607	2.254	6.675	2.082	3.361	5.147	3.924	4.016	1.421	1.906	2.510	3.266	3.365	5.153	3.904	3.903
Force (kn) =		317	421	694	1309	387	717	687	485	1268	345	462	572	555	731	698	514	1313
Tension Combined Force (kN) =		-7266	-7140	-6142	-5253	-5661	-5127	-4880	-5050	-4046	-6836	-6705	-5774	-5335	-4975	-4761	-4912	-3909
Compression Combined Force (kN) =		-7930	-7993	-7573	-8029	-6572	-6699	-6316	-6052	-6676	-7556	-7640	-7117	-6582	-6574	-6218	-5973	-6630
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.12	0.12	0.12	0.12	0.10	0.10	0.17	0.16	0.18	0.12	0.12	0.11	0.10	0.10	0.17	0.16	0.18

Case 3 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4524	-4513	-3420	-3097	-2763	-2649	-2468	-2328	-2546	-4200	-4181	-3011	-2675	-2546	-2321	-2147	-2324
	ULS Min	-4537	-4517	-3439	-3166	-2841	-2727	-2546	-2406	-2576	-4213	-4185	-3098	-2754	-2624	-2400	-2225	-2355
IY Bending	ULS Max	2	6	9	16	13	13	13	155	151	16	19	12	7	11	11	147	147
	ULS Min	0	2	-41	-25	4	3	3	2	-233	0	11	0	1	7	7	7	-241
IZ Bending	ULS Max	0	-65	-39	280	-31	60	60	81	458	35	65	102	104	22	33	87	87
	ULS Min	-65	-82	-131	180	-43	-30	-45	-43	81	0	30	33	22	-61	-61	33	-710
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.093	0.324	2.086	1.292	0.648	0.683	0.654	7.883	11.891	0.831	0.989	0.611	0.356	0.564	0.561	7.502	12.298
	Stress due to bending Z	1.940	2.442	3.892	8.309	1.266	1.775	1.776	2.391	13.611	1.032	1.938	3.028	3.103	1.800	1.800	2.586	21.099
Force (kn) =		159	216	467	750	149	192	190	802	1991	145	229	284	270	185	184	788	2608
Tension Combined Force (kN) =		-4365	-4297	-2953	-2347	-2613	-2457	-2279	-1526	-555	-4054	-3952	-2727	-2405	-2361	-2137	-1359	283
Compression Combined Force (kN) =		-4696	-4733	-3906	-3915	-2990	-2919	-2736	-3208	-4567	-4358	-4414	-3382	-3024	-2809	-2584	-3013	-4962
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.23	0.23	0.19	0.19	0.14	0.14	0.13	0.15	0.21	0.21	0.21	0.16	0.14	0.13	0.12	0.14	0.23

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	146.23	146.23	218.96	229.66	273.25	21.16	-238.49	-248.55	-127.33	-140.97	-102.18	-120.54	-139.06	-143.21	-139.5	-228.91	72.1	-970.54
	ULS Min	146.23	146.23	210.81	217.55	251.68	-24.2	-279.9	-291.38	-172.1	-192.44	-147.77	-169.81	-184.78	-193.26	-185.51	-276.82	58.94	-980.98
IY Bending	ULS Max	0	0	39.17	40.63	40.08	40.06	7.55	0	7.47	14.27	7.34	18.5	6.15	19.65	6.73	21.18	0	29.53
	ULS Min	0	0	0	0	0	0	-12.37	0	-13.99	0	-13.6	0	-16.53	0	-12.74	0	0	0
IZ Bending	ULS Max	0	0	0	0	0	0	0	0	0.08	1.31	0	0	0	0.95	0	2.74	0	0
	ULS Min	0	0	-6.33	-13.8	-46.14	-52.77	-1.37	0	-0.9	0	-1.36	-0.07	-3.09	0	-6.91	0	0	-6.25
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	5	0	6	6	6	8	7	8	5	9	0	10
	Stress Z	0	0	1	1	5	6	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	257	281	340	353	86	0	96	98	94	124	117	134	98	147	0	196
	Tension Combined Force (kN) =	146	146	476	510	613	374	-153	-249	-32	-43	-8	4	-22	-10	-41	-82	72	-775
	Compression Combined Force (kN) =	146	146	-46	-63	-88	-377	-365	-291	-268	-291	-242	-294	-301	-327	-284	-424	59	-1177
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.00	0.03	0.10	0.11	0.13	0.08	NA	NA	NA	NA	NA	0.00	NA	NA	NA	NA	0.02	NA
		NA	NA	0.01	0.02	0.03	0.11	0.11	0.09	0.08	0.09	0.07	0.09	0.09	0.10	0.09	0.13	NA	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	190.65	274.4	212.38	222.13	262.27	-48.33	-191.8	-202.61	-124.1	-141.39	-99.21	-115.82	-116.34	-154.46	-209.75	-170.16	-768.33	115.92
	ULS Min	190.65	266.89	211.37	221.34	260.35	-53.39	-237.62	-267.25	-175.98	-186.08	-148.56	-161.57	-166.8	-200.21	-258.17	-215.64	-779.97	102.76
IY Bending	ULS Max	0	0	39	38.94	39.32	41.45	0	37.03	13.37	7.6	18	7.46	18.51	6.4	20.3	7.5	25.84	0
	ULS Min	0	-18.05	0	0	0	0	-11.15	0	0	-14.03	0	-13.58	0	-16.58	0	-12.75	0	0
IZ Bending	ULS Max	0	0	0	1.19	0	2.26	0	2.02	0.87	0	0.41	0.67	0	0.34	0.68	1.69	0.42	0
	ULS Min	0	-1.42	-0.8	0	-1.01	0	-2.77	-0.03	0	-1.06	0	0	-0.4	-0.2	0	0	-0.42	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	5	14	13	14	14	5	15	6	6	8	6	8	7	8	5	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	99	245	246	248	263	80	252	91	96	122	92	125	112	138	89	162	0
	Tension Combined Force (kN) =	191	373	458	468	510	215	-112	50	-33	-45	22	-23	9	-43	-72	-81	-606	116
	Compression Combined Force (kN) =	191	168	-34	-24	13	-317	-317	-520	-267	-282	-270	-254	-292	-312	-396	-304	-942	103
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.07	0.10	0.10	0.11	0.05	NA	0.01	NA	NA	0.01	NA	0.00	NA	NA	NA	NA	0.02
		NA	NA	0.01	0.01	NA	0.09	0.10	0.16	0.08	0.09	0.08	0.08	0.09	0.10	0.12	0.09	0.26	NA

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	209.84	35.03	408.27	62.08	-297.87	-325.38	-276.53	-274.38	-388.4	-389.21	-306.04	-319.42	-62.02	27.86
	ULS Min	209.84	18	408.27	52.56	-323.36	-350.87	-302.03	-299.87	-410.75	-411.56	-328.39	-341.77	-69.69	19.02
IY Bending	ULS Max	339.51	0	5.46	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-370.69	-41.95	0	-16.52	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	7.01	0	0.07	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.15	-0.14	0	-0.33	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	4	14	2	7	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		327	279	39	118	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		537	314	447	180	-298	-325	-277	-274	-388	-389	-306	-319	-62	28
Compression Combined Force (kN) =		-117	-261	369	-66	-323	-351	-302	-300	-411	-412	-328	-342	-70	19
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.03	0.06	0.10	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.02	0.09	0.09	0.08	0.08	0.12	0.12	0.10	0.10	0.22	NA

		4020	4026	4032	4038	4044												
		Tower - Rear Panel																
		Horizontals					Bracing											
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4		
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut		
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119		
Axial	ULS Max	182.34	14.52	260.16	60.89	290.19	-224.28	-233.86	-185.06	-195.4	-209.55	-189.82	-71.72	-174.66	-28.6	28.83		
	ULS Min	175.87	0.07	240.73	5	290.19	-247.27	-256.85	-208.06	-218.39	-232.55	-212.81	-94.71	-197.65	-37.43	20.44		
IY Bending	ULS Max	265.18	10.16	17.92	11.58	97.58	0	0	0	0	0	0	0	0	0	0		
	ULS Min	-230.11	-20.13	-5.66	-15.51	97.58	0	0	0	0	0	0	0	0	0	0		
IZ Bending	ULS Max	5.39	1.69	2.32	6.02	22.92	0	0	0	0	0	0	0	0	0	0		
	ULS Min	-0.09	0	0	0	22.92	0	0	0	0	0	0	0	0	0	0		
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464		
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040		
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16		
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422		
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108		
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0		
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0		
Force (kn) =		242	146	132	120	316	0	0	0	0	0	0	0	0	0	0		
Tension Combined Force (kN) =		424	161	392	181	606	-224	-234	-185	-195	-210	-190	-72	-175	-29	29		
Compression Combined Force (kN) =		-66	-146	109	-115	-25	-247	-257	-208	-218	-233	-213	-95	-198	-37	20		
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244		
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312		
	Demand/Capacity	0.03	0.04	0.09	0.04	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02		
		0.01	0.06	NA	0.04	0.00	0.07	0.07	0.05	0.06	0.06	0.06	0.02	0.05	0.12	NA		

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	10391.49	10391.49	4319.68	1218.15	4101.16	1095.5	846.48
	ULS Min	0	0	-1393	-16	-12	-17	-650
Shear	Fz Max	4169	4169	1881	190	1876	46	1467
	Fz Min	-4151	-4151	-1894	-434	-1797	-252	-487
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.191	0.253	0.214	0.117	0.333	0.105	0.161
		0.115	0.218	0.351	0.104	0.449	0.060	0.639

Case 3 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12440	-12415	-11884	-11654	-10372	-10405	-9627	-9594	-9500	-7720	-7707	-7189	-8035	-8196	-8816	-8783	-8845
	ULS Min	-12470	-12425	-11926	-11811	-10509	-10543	-9689	-9627	-9595	-7751	-7717	-7388	-8172	-8333	-8878	-8816	-8940
IY Bending	ULS Max	289	453	454	368	70	105	113	113	123	652	835	836	60	92	92	84	200
	ULS Min	0	289	254	-29	-25	72	105	94	94	0	652	-88	-91	58	84	56	56
IZ Bending	ULS Max	787	960	1863	5310	1081	226	226	-57	437	820	1031	4808	1212	18	42	168	168
	ULS Min	0	787	1192	1956	-253	-253	-57	-222	-222	0	820	1290	18	-269	-269	42	-32
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	6.072	9.511	9.524	7.733	1.952	2.939	3.599	3.599	3.923	13.690	17.518	17.542	2.556	2.572	2.920	2.666	6.380
	Stress due to bending Z	14.925	18.209	35.319	100.694	25.040	5.853	8.024	7.867	15.518	15.545	19.546	91.173	28.084	6.234	9.548	5.971	5.969
Force (kn) =		3599	4751	7686	18583	4291	1398	1237	1221	2070	5011	6352	18633	4871	1400	1327	920	1315
Tension Combined Force (kN) =		-8841	-7664	-4198	6929	-6081	-9008	-8390	-8373	-7431	-2710	-1354	11444	-3165	-6796	-7489	-7863	-7531
Compression Combined Force (kN) =		-16069	-17176	-19612	-30394	-14799	-11940	-10926	-10848	-11665	-12761	-14070	-26021	-13043	-9732	-10205	-9736	-10255
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.12	NA	NA	NA	NA	NA	NA	NA	0.20	NA	NA	NA	NA	NA
		0.25	0.27	0.30	0.47	0.23	0.18	0.29	0.29	0.31	0.20	0.22	0.40	0.20	0.15	0.27	0.26	0.28

Case 3 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5443	-5428	-4151	-3913	-2634	-2290	-1592	-1310	-1387	-3771	-3750	-2307	-2177	-1728	-1573	-1128	-1172
	ULS Min	-5457	-5433	-4169	-3982	-2712	-2368	-1670	-1388	-1418	-3784	-3755	-2394	-2255	-1806	-1651	-1206	-1203
IY Bending	ULS Max	86	86	173	152	37	39	53	141	145	200	276	277	36	36	48	149	141
	ULS Min	0	85	92	-25	-15	37	38	51	-125	0	199	-42	-45	28	28	48	-150
IZ Bending	ULS Max	335	400	387	3216	497	45	48	78	214	271	356	2956	567	-39	40	40	8
	ULS Min	0	335	168	582	-72	-68	-11	-7	79	0	274	99	-39	-59	-59	8	-337
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	4.389	4.385	8.797	7.753	1.907	1.998	2.721	7.204	7.381	10.204	14.066	14.134	2.273	1.818	2.465	7.619	7.636
	Stress due to bending Z	9.960	11.878	11.487	95.537	14.756	2.017	1.440	2.307	6.358	8.063	10.574	87.803	16.849	1.762	1.762	1.197	10.021
Force (kn) =		1120	1270	1584	8064	1301	313	325	743	1073	1426	1924	7959	1493	279	330	688	1379
Tension Combined Force (kN) =		-4323	-4159	-2567	4151	-1333	-1976	-1267	-567	-314	-2345	-1826	5652	-684	-1449	-1243	-440	206
Compression Combined Force (kN) =		-6577	-6703	-5753	-12046	-4013	-2681	-1995	-2130	-2490	-5210	-5679	-10353	-3748	-2086	-1981	-1894	-2582
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	0.01
		0.32	0.32	0.28	0.58	0.19	0.13	0.10	0.10	0.12	0.25	0.27	0.50	0.18	0.10	0.09	0.09	0.12

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	681.16	681.16	329.4	339.87	411.26	92.87	1223.34	1107.25	703.69	706.66	619.47	670.04	373.28	439.14	151.39	149.19	222.25	-701.35
	ULS Min	-277.5	-277.5	159.16	213.51	270.82	-101.4	-1924.09	-1600.36	-1173.17	-1047.3	-1019.09	-953.02	-885.78	-830.32	-730.31	-675.23	-42.47	-912.47
IY Bending	ULS Max	0	0	57.23	57.13	53.58	47.35	14.54	0	16.78	26.61	15.97	36.32	11.12	34.64	9.57	31.37	0	29.19
	ULS Min	0	0	0	0	0	0	-38.64	0	-31.88	-3.53	-28.9	0	-31.71	0	-23.9	0	0	0
IZ Bending	ULS Max	0	0	139.82	189.39	143.14	63.42	149.15	0	140.49	38.11	119.59	8.15	127.6	14.01	131.07	14.72	0	14.02
	ULS Min	0	0	-114.61	-165.37	-162.92	-91.07	-65.48	0	-63.9	-44.31	-36.13	-14.98	-42.9	-20.31	-43.21	-18.33	0	-10.55
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	19	16	16	0	13	11	12	15	13	14	10	13	0	10
	Stress Z	0	0	15	20	18	10	17	0	16	5	13	2	14	2	15	2	0	1
Force (kn) =		0	0	629	725	652	473	530	0	469	259	411	271	444	269	398	244	0	207
Tension Combined Force (kN) =		681	681	959	1065	1063	566	1753	1107	1172	966	1030	941	817	708	549	393	222	-494
Compression Combined Force (kN) =		-278	-278	-470	-512	-381	-574	-2454	-1600	-1642	-1306	-1430	-1224	-1330	-1100	-1128	-919	-42	-1120
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.13	0.21	0.23	0.23	0.12	0.42	0.27	0.28	0.23	0.25	0.23	0.20	0.17	0.13	0.09	0.05	NA
		0.01	0.08	0.13	0.15	0.11	0.16	0.76	0.49	0.51	0.40	0.44	0.38	0.41	0.34	0.35	0.28	0.01	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	678.83	434.86	298.98	308.65	371.45	46.17	912.85	974.49	556.44	527.45	554.06	492.28	394.55	310.42	152.9	131.64	-511.52	253.71
	ULS Min	-263.95	207.56	195.54	244.86	326.52	-115.27	-1318.36	-1627.27	-858.16	-1021.71	-799.53	-913.93	-743.4	-845.91	-655.22	-758.14	-656.58	-43.48
IY Bending	ULS Max	0	28.38	47.54	46.47	45.13	44.02	5.2	62.59	31.96	16.91	32.56	15.13	31.51	11.13	30.02	10.39	24.63	0
	ULS Min	0	-71.52	0	0	0	0	-16.85	0	-4.77	-30.56	0	-28.15	0	-31.27	0	-24.02	0	0
IZ Bending	ULS Max	0	0	52.6	60.02	61.73	53.74	147.21	30.48	17.43	32.47	10.67	24.56	10.3	26.29	11.25	28.94	3.68	0
	ULS Min	0	-36.76	-15.09	-15.12	-17.06	-12.84	-66.31	-34.51	-11.68	-110.62	-2.75	-109.18	-3.05	-114.43	-2.75	-124.99	-15.87	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	21	16	16	16	15	7	26	13	13	14	12	13	13	13	10	9	0
	Stress Z	0	4	6	6	7	6	17	4	2	12	1	12	1	13	1	14	2	0
Force (kn) =		0	447	399	407	402	380	380	483	246	406	238	387	230	417	222	388	182	0
Tension Combined Force (kN) =		679	881	698	716	773	426	1293	1457	803	933	792	879	625	728	375	519	-329	254
Compression Combined Force (kN) =		-264	-239	-204	-162	-75	-495	-1698	-2110	-1104	-1427	-1037	-1301	-974	-1263	-877	-1146	-839	-43
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.17	0.15	0.16	0.17	0.09	0.31	0.35	0.19	0.22	0.19	0.21	0.15	0.18	0.09	0.13	NA	0.05
		0.01	0.07	0.06	0.05	0.02	0.14	0.53	0.65	0.34	0.44	0.32	0.40	0.30	0.39	0.27	0.35	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	391.04	349.34	801.66	196.35	699.32	684.89	211.71	217.08	-8.29	-14.59	-117.64	-121.17	-82.11	24.91
	ULS Min	228.01	-311.55	574.01	-68.09	-1734.97	-1733.35	-1265.68	-1265.9	-1320.42	-1315.6	-1056.06	-1070.6	-167.12	14.27
IY Bending	ULS Max	5955.66	0	24.3	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6618.39	-55.47	0	-15.77	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	244.99	393.97	121.84	446.4	0	0	0	0	0	0	0	0	0	0
	ULS Min	-115.11	-188.5	-58.38	-164.06	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	67	18	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	12	29	10	36	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	6328	953	352	770	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		6719	1302	1154	966	699	685	212	217	-8	-15	-118	-121	-82	25
Compression Combined Force (kN) =		-6100	-1264	222	-838	-1735	-1733	-1266	-1266	-1320	-1316	-1056	-1071	-167	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.33	0.25	0.25	0.21	0.13	0.13	0.04	0.04	NA	NA	NA	NA	NA	0.02
		0.39	0.31	NA	0.23	0.46	0.46	0.33	0.33	0.40	0.39	0.32	0.32	0.54	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	247.69	230.22	317.87	155.08	165.65	666.25	642.4	389.22	388.77	200.82	189.13	144.04	98.15	45.73	32.63
	ULS Min	-15.85	-284.06	-15.86	-147.06	67.97	-1002.52	-978.28	-613.35	-630.59	-491.38	-453.64	-202.1	-284.39	-76.36	19.07
IY Bending	ULS Max	4085.22	15.76	22.09	17.54	109.79	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4364.27	-22.07	-15.07	-19.21	91.73	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	281.18	395.12	160.66	443.43	218.59	0	0	0	0	0	0	0	0	0	0
	ULS Min	-166.53	-201.33	-95	-228.31	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	53	10	10	9	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	21	39	16	44	13	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	4965	787	414	844	876	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5213	1017	732	999	1042	666	642	389	389	201	189	144	98	46	33
Compression Combined Force (kN) =		-4981	-1071	-430	-991	-808	-1003	-978	-613	-631	-491	-454	-202	-284	-76	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.31	0.24	0.18	0.24	0.09	0.15	0.14	0.09	0.08	0.04	0.04	0.03	0.02	0.04	0.03
		0.38	0.41	0.16	0.38	0.09	0.26	0.26	0.16	0.17	0.13	0.12	0.05	0.08	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	22591.76	22591.76	2352.71	1557.51	1861.61	1562.26	484.86
	ULS Min	0	0	-863	-10	-12	-22	-455
Shear	Fz Max	9052	9052	1011	2091	2194	2037	982
	Fz Min	-8918	-8918	-1004	-249	-2134	-262	-447
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.415	0.551	0.117	0.149	0.151	0.150	0.092
		0.249	0.474	0.188	0.500	0.525	0.487	0.428

Case 4 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12337	-12315	-11542	-11268	-10565	-10367	-10034	-10000	-9805	-11973	-11959	-11088	-10443	-10266	-9970	-9936	-9754
	ULS Min	-12367	-12326	-11584	-11425	-10702	-10504	-10095	-10034	-9900	-12003	-11970	-11288	-10581	-10403	-10031	-9970	-9849
IY Bending	ULS Max	0	-54	-52	76	64	103	106	107	107	26	34	69	68	106	106	103	101
	ULS Min	-54	-78	-76	61	62	64	103	106	62	0	26	36	62	62	103	101	74
IZ Bending	ULS Max	0	-41	118	433	-42	262	262	-44	222	87	117	146	161	147	44	211	211
	ULS Min	-41	-47	-5	266	-160	-160	-44	-210	-210	0	87	25	147	-262	-262	44	-217
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.135	1.640	1.586	1.589	1.799	2.879	3.367	3.418	3.418	0.539	0.722	1.443	1.903	2.984	3.387	3.276	3.212
	Stress due to bending Z	0.772	0.886	2.236	8.217	3.706	6.064	9.287	7.450	7.883	1.655	2.227	2.777	3.733	6.079	9.311	7.470	7.691
Force (kn) =		327	433	655	1681	875	1422	1347	1157	1203	376	506	723	896	1441	1352	1144	1161
Tension Combined Force (kN) =		-12010	-11882	-10887	-9587	-9690	-8945	-8686	-8843	-8602	-11596	-11453	-10365	-9548	-8825	-8618	-8792	-8593
Compression Combined Force (kN) =		-12694	-12759	-12239	-13105	-11578	-11925	-11442	-11191	-11103	-12379	-12475	-12011	-11476	-11843	-11383	-11114	-11010
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.20	0.20	0.19	0.20	0.18	0.18	0.31	0.30	0.30	0.19	0.19	0.19	0.18	0.18	0.31	0.30	0.30
Case 4 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4037	-4026	-2891	-2568	-2281	-2174	-1973	-1819	-1955	-3715	-3696	-2491	-2195	-2073	-1826	-1644	-1735
	ULS Min	-4050	-4031	-2910	-2636	-2359	-2252	-2051	-1897	-1986	-3728	-3700	-2578	-2274	-2151	-1904	-1722	-1765
IY Bending	ULS Max	4	9	12	46	42	42	42	159	155	12	15	29	31	40	43	165	167
	ULS Min	0	4	-37	-20	27	26	41	41	-165	0	6	7	30	31	40	43	-209
IZ Bending	ULS Max	0	-66	-36	282	-24	49	49	93	313	34	64	100	99	15	30	39	39
	ULS Min	-66	-83	-123	161	-40	-24	-41	-40	93	0	29	34	15	-49	-49	30	-505
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.184	0.453	1.897	2.337	2.156	2.125	2.135	8.107	8.415	0.633	0.784	1.470	1.570	2.057	2.209	8.428	10.633
	Stress due to bending Z	1.964	2.468	3.666	8.385	1.188	1.448	1.444	2.767	9.286	1.013	1.892	2.957	2.953	1.461	1.461	1.162	15.002
Force (kn) =		168	228	434	837	261	279	279	849	1382	129	209	346	353	275	287	749	2002
Tension Combined Force (kN) =		-3869	-3798	-2457	-1730	-2020	-1895	-1693	-970	-573	-3586	-3487	-2145	-1842	-1798	-1539	-895	267
Compression Combined Force (kN) =		-4218	-4259	-3344	-3473	-2620	-2531	-2330	-2746	-3368	-3857	-3909	-2924	-2627	-2425	-2190	-2471	-3767
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.20	0.21	0.16	0.17	0.13	0.12	0.11	0.13	0.16	0.19	0.19	0.14	0.13	0.12	0.10	0.12	0.17

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	188.26	188.26	290.02	316.72	396.77	141.66	-297.72	-316.03	-179.5	-196.35	-146.58	-167.22	-212.45	-222.22	-238.3	-263.82	-29.74	-879.59
	ULS Min	188.26	188.26	281.19	299.96	369.38	96.17	-339	-360.84	-223.72	-250.1	-191.77	-218.6	-257.52	-275.22	-283.86	-314.73	-42.9	-890.51
IY Bending	ULS Max	0	0	39.73	41.08	40.38	39.69	3.48	0	5.46	16.13	5.39	20.59	3.35	22.72	4.56	23.62	0	28.64
	ULS Min	0	0	0	0	0	0	-19.04	0	-20.13	0	-19.63	0	-25	0	-20.73	0	0	0
IZ Bending	ULS Max	0	0	0	0.25	0	0	0	0	0.45	1.15	0	0.16	0	0.75	0	2.24	0	0
	ULS Min	0	0	-5.41	-7.65	-33.61	-37.7	-1.2	0	-0.51	0	-0.55	0	-2.85	0	-5.45	0	0	-5.5
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	8	0	8	7	8	9	10	9	9	10	0	10
	Stress Z	0	0	1	1	4	4	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	259	272	318	321	130	0	136	110	133	139	173	154	149	163	0	189
	Tension Combined Force (kN) =	188	188	549	588	714	463	-168	-316	-43	-86	-14	-29	-39	-68	-89	-101	-30	-691
	Compression Combined Force (kN) =	188	188	22	28	52	-225	-469	-361	-360	-360	-325	-357	-431	-429	-433	-477	-43	-1079
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.12	0.13	0.16	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.06	0.15	0.11	0.11	0.11	0.10	0.11	0.13	0.13	0.13	0.15	0.01	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	230.97	361.2	286.54	310.96	389.4	86.57	-258.71	-251.27	-176.49	-198.61	-144.77	-161.55	-196.67	-227.8	-246.74	-264.54	-667.35	-22.25
	ULS Min	230.97	352.49	285.62	310.23	387.94	82.53	-305.84	-317.85	-230.69	-242.84	-196.23	-206.84	-250.08	-273	-298.17	-309.55	-679.55	-35.41
IY Bending	ULS Max	0	0	39.23	39.23	39.52	41.07	0	40.32	15.05	5.57	20.17	5.42	21.56	3.6	22.91	5.21	24.83	0
	ULS Min	0	-25.96	0	0	0	0	-6.44	0	0	-20.18	0	-19.63	0	-25.06	0	-20.88	0	0
IZ Bending	ULS Max	0	0	0	1.17	0	1.74	0	2.38	0.89	0	0.4	0.11	0	0.7	0.64	1.06	0.28	0
	ULS Min	0	-1.77	-1.22	0	-0.78	0	-3.25	0	0	-1.39	0	-0.15	-0.39	0	0	0	-0.53	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	8	14	14	14	14	3	17	6	8	8	8	9	10	10	9	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	142	247	247	248	260	49	275	103	138	136	132	145	170	155	142	156	0
	Tension Combined Force (kN) =	231	503	534	558	638	347	-210	24	-74	-61	-9	-29	-51	-58	-92	-122	-511	-22
	Compression Combined Force (kN) =	231	211	38	63	140	-177	-355	-593	-333	-381	-332	-339	-396	-443	-453	-452	-835	-35
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.10	0.12	0.12	0.14	0.08	NA	0.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.11	0.18	0.10	0.12	0.10	0.10	0.12	0.14	0.14	0.14	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	337.05	62.26	728.62	107.74	-507.88	-539.67	-533.97	-527.12	-676.79	-683.43	-604.67	-609.74	-127.72	23.48
	ULS Min	337.05	45.51	728.62	99.88	-533.37	-565.17	-559.47	-552.61	-699.14	-705.78	-627.03	-632.09	-135.39	14.63
IY Bending	ULS Max	510.77	0	22.87	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-467.13	-50.19	0	-15.25	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.89	0	0.06	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.4	-0.44	0	-0.92	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	5	16	9	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		432	334	163	110	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		769	396	892	218	-508	-540	-534	-527	-677	-683	-605	-610	-128	23
Compression Combined Force (kN) =		-95	-288	566	-10	-533	-565	-559	-553	-699	-706	-627	-632	-135	15
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.19	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	0.00	0.14	0.15	0.15	0.15	0.21	0.21	0.19	0.19	0.43	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	156.16	11.17	210.38	50.63	194.02	-191.97	-196.14	-141.09	-155.02	-173.81	-155.18	-46.64	-128.21	-17.89	29.4
	ULS Min	151.25	-2.1	196.97	8.36	194.02	-214.96	-219.13	-164.09	-178.02	-196.8	-178.17	-69.64	-151.2	-26.73	21.02
IY Bending	ULS Max	235.48	10.45	16.89	11.75	98.77	0	0	0	0	0	0	0	0	0	0
	ULS Min	-209.6	-19.65	-7.74	-15.95	98.77	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.94	3.42	3.24	5.44	16.98	0	0	0	0	0	0	0	0	0	0
	ULS Min	-5.69	0	0	0	16.98	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	7	7	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		221	146	126	123	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		377	157	336	173	497	-192	-196	-141	-155	-174	-155	-47	-128	-18	29
Compression Combined Force (kN) =		-69	-148	71	-114	-109	-215	-219	-164	-178	-197	-178	-70	-151	-27	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.08	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.04	0.05	0.05	0.05	0.02	0.04	0.09	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	23033.98	23033.98	3408.43	1571.73	1864.19	1575.22	811.93
	ULS Min	0	0	-1003	-10	-12	-11	-542
Shear	Fz Max	9126	9126	1346	2122	2248	2084	1135
	Fz Min	-9058	-9058	-1335	-332	-2179	-316	-356
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.423	0.562	0.169	0.151	0.151	0.151	0.155
		0.251	0.477	0.250	0.508	0.538	0.499	0.494

Case 4 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-15847	-15820	-15151	-14893	-12298	-12223	-10505	-10472	-10366	-8652	-8639	-7827	-9047	-8784	-9910	-9877	-9612
	ULS Min	-15877	-15831	-15193	-15050	-12435	-12360	-10566	-10505	-10461	-8682	-8649	-8026	-9184	-8921	-9972	-9910	-9707
IY Bending	ULS Max	199	327	327	252	85	92	192	192	94	0	-75	124	139	124	128	130	130
	ULS Min	0	199	84	40	25	80	92	94	74	-75	-131	-129	72	77	124	128	3
IZ Bending	ULS Max	1323	1692	2954	9883	2029	248	248	-8	537	1323	1738	9282	2175	-29	1109	1109	32
	ULS Min	0	1323	1535	3081	-363	-363	-8	-155	-155	0	1323	1624	-30	-747	-747	-97	-97
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	4.173	6.862	6.866	5.283	2.393	2.586	6.105	6.105	2.987	1.566	2.747	2.705	3.915	3.486	4.086	4.153	4.153
	Stress due to bending Z	25.079	32.080	56.017	187.413	47.003	8.420	8.800	5.507	19.064	25.095	32.962	176.006	50.396	17.309	39.349	39.349	3.455
Force (kn) =		5013	6674	10778	33027	7852	1750	1587	1236	2348	4569	6120	30629	8633	3306	4624	4631	810
Tension Combined Force (kN) =		-10833	-9146	-4373	18133	-4446	-10473	-8918	-9235	-8019	-4083	-2518	22802	-414	-5479	-5286	-5245	-8802
Compression Combined Force (kN) =		-20890	-22505	-25971	-48077	-20287	-14109	-12153	-11741	-12809	-13252	-14769	-38656	-17817	-12227	-14596	-14541	-10517
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.32	NA	NA	NA	NA	NA	NA	NA	0.41	NA	NA	NA	NA	NA
		0.32	0.35	0.40	0.74	0.31	0.22	0.33	0.32	0.34	0.20	0.23	0.60	0.28	0.19	0.39	0.39	0.28

Case 4 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5582	-5565	-4389	-4118	-2869	-2627	-1739	-1473	-1331	-695	-672	335	-336	-302	-710	-613	-1030
	ULS Min	-5595	-5570	-4408	-4187	-2947	-2705	-1817	-1551	-1362	-708	-677	248	-414	-380	-789	-692	-1061
IY Bending	ULS Max	31	31	200	163	46	45	57	147	132	0	-49	50	54	48	60	141	151
	ULS Min	0	-41	-32	-7	-21	44	42	56	-116	-67	-79	-48	35	35	47	60	-173
IZ Bending	ULS Max	539	589	864	4285	720	42	43	-8	441	417	493	3994	766	-36	35	35	-33
	ULS Min	0	539	745	1104	-135	-134	-10	-93	-94	0	436	611	-110	-110	-36	-179	-179
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.597	2.092	10.221	8.297	2.369	2.313	2.911	7.493	6.723	3.435	4.028	2.534	2.760	2.428	3.047	7.196	8.838
	Stress due to bending Z	16.008	17.509	25.667	127.294	21.396	3.968	1.266	2.754	13.090	12.377	14.647	118.631	22.761	3.272	1.070	5.320	5.322
Force (kn) =		1375	1530	2802	10586	1855	490	326	800	1547	1235	1458	9460	1993	445	321	977	1106
Tension Combined Force (kN) =		-4207	-4035	-1587	6468	-1014	-2137	-1413	-673	216	540	786	9796	1657	143	-389	364	75
Compression Combined Force (kN) =		-6969	-7100	-7210	-14773	-4803	-3196	-2144	-2351	-2908	-1942	-2135	-9212	-2406	-826	-1110	-1669	-2166
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.30	NA	NA	NA	NA	0.01	0.02	0.04	0.45	0.08	0.01	NA	0.02	0.00
		0.34	0.34	0.35	0.72	0.23	0.15	0.10	0.11	0.13	0.09	0.10	0.45	0.11	0.04	0.05	0.08	0.10

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	768.14	768.14	379.71	390.95	578.86	120.91	1232.44	1146.6	761.79	808.14	783.56	851.77	475.01	427.79	-17.86	-16.55	150.24	-680.07
	ULS Min	-326.52	-326.52	158.19	176.02	136.51	-24.01	-2008.35	-1628.01	-1284.5	-1130.92	-1245.41	-1104.01	-1039.74	-830.26	-574.38	-534.14	-14.46	-835.74
IY Bending	ULS Max	0	0	56.24	55.24	49.47	44.26	14.46	0	17.69	28.18	18.53	39.53	11.27	35.87	7.12	28.39	0	28.02
	ULS Min	0	0	0	0	0	0	-40.18	0	-32.56	-4.63	-31.03	-1.35	-32.94	0	-25.43	0	0	0
IZ Bending	ULS Max	0	0	82.83	112.25	74.98	39.17	98.31	0	91.41	31.89	72.13	4.98	76.11	8.67	77.6	9.74	0	7.4
	ULS Min	0	0	-70.44	-101.46	-109.4	-77.87	-51.72	0	-45.41	-35.3	-21.68	-8.97	-26.62	-12.21	-27.42	-10.41	0	-8.02
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	17	0	14	12	13	16	14	15	11	12	0	10
	Stress Z	0	0	9	12	12	8	11	0	10	4	8	1	9	1	9	1	0	1
	Force (kn) =	0	0	512	563	522	428	448	0	384	253	339	282	359	263	311	209	0	189
	Tension Combined Force (kN) =	768	768	892	954	1101	549	1680	1147	1146	1061	1123	1133	834	691	293	193	150	-491
	Compression Combined Force (kN) =	-327	-327	-354	-387	-385	-452	-2456	-1628	-1669	-1384	-1584	-1386	-1399	-1093	-886	-744	-14	-1025
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.15	0.20	0.21	0.24	0.12	0.40	0.28	0.28	0.26	0.27	0.27	0.20	0.17	0.07	0.05	0.03	NA
		0.01	0.09	0.10	0.11	0.11	0.13	0.76	0.50	0.51	0.43	0.49	0.43	0.43	0.34	0.27	0.23	0.00	0.29

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	727.53	476.06	359.84	373.24	562.31	59.25	1023.41	1159.24	693.93	692.9	757.43	754.28	392.54	470.92	-7.8	-27.88	-502.89	173.96
	ULS Min	-323.69	186.63	158.18	203.77	168.57	-46.99	-1492.04	-1759.82	-1037.14	-1157.02	-1043.17	-1143.46	-791.57	-985.71	-515.55	-584.92	-616.12	-10.31
IY Bending	ULS Max	0	58.58	51.38	48.68	44.74	42.81	6.74	71.55	36.71	18.09	37.9	17.53	34	11.08	27.37	7.94	24.27	0
	ULS Min	0	-107.43	0	0	0	0	-16.68	-2.71	-7.96	-31.84	0	-30.74	0	-32.59	0	-25.06	0	0
IZ Bending	ULS Max	0	29.8	34.8	38.8	37.18	34.07	112.65	37.09	16.99	23.13	6.48	14.71	6.16	16.23	6.94	17.5	2.15	0
	ULS Min	0	-52.42	-12.63	-10.23	-10.33	-9.82	-65.31	-39.05	-13.01	-71.3	-1.61	-65.85	-1.95	-68.55	-1.61	-75.65	-9.95	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	31	18	17	16	15	7	30	15	13	16	13	14	14	11	10	9	0
	Stress Z	0	5	4	4	4	4	13	4	2	8	1	7	1	8	1	9	1	0
	Force (kn) =	0	666	389	380	352	334	316	551	277	343	266	326	239	343	196	305	169	0
	Tension Combined Force (kN) =	728	1142	749	753	914	393	1340	1710	971	1036	1024	1080	632	814	189	277	-333	174
	Compression Combined Force (kN) =	-324	-479	-230	-176	-183	-381	-1808	-2311	-1314	-1500	-1309	-1469	-1031	-1329	-712	-890	-786	-10
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.22	0.16	0.16	0.20	0.09	0.32	0.41	0.23	0.25	0.25	0.26	0.15	0.20	0.05	0.07	NA	0.04
		0.01	0.13	0.07	0.05	0.05	0.11	0.56	0.71	0.40	0.46	0.40	0.45	0.32	0.41	0.22	0.27	0.22	0.00

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	408.35	412.58	838.7	170.99	1249.46	1161.61	665.66	721.94	295.7	232.29	-147.79	-106.53	-93.51	23.89
	ULS Min	250.76	-269.81	586.12	-475.23	-2316.16	-2394.7	-1906.14	-1847.03	-1715.25	-1774.09	-1225.75	-1188.95	-177.37	13.85
IY Bending	ULS Max	8181.66	0	25.99	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8918.13	-57.09	0	-16.22	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	146.32	237.22	73.42	268.56	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.61	-113.83	-35.15	-99.28	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	90	19	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	17	6	22	0	0	0	0	0	0	0	0	0	0
Force (kn) =		7784	731	293	511	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8192	1143	1132	682	1249	1162	666	722	296	232	-148	-107	-94	24
Compression Combined Force (kN) =		-7533	-1001	293	-986	-2316	-2395	-1906	-1847	-1715	-1774	-1226	-1189	-177	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.40	0.22	0.25	0.15	0.24	0.22	0.13	0.14	0.06	0.05	NA	NA	NA	0.02
		0.48	0.25	NA	0.28	0.61	0.63	0.50	0.49	0.51	0.53	0.37	0.36	0.57	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	238.23	207.53	292.82	108.64	132.55	652.78	614.83	410.08	429.99	305.3	284.7	323.99	291.35	47.81	32.27
	ULS Min	-18.5	-231.81	-3.37	-73.37	73.19	-955.32	-960.36	-639.77	-644.68	-560.7	-546.54	-382.32	-439.39	-75.17	19.64
IY Bending	ULS Max	3983.75	15.82	20.23	16.29	115.22	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4326.33	-22.59	-13.76	-18.66	89.45	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	169.32	239.93	97.78	267.76	124.06	0	0	0	0	0	0	0	0	0	0
	ULS Min	-100.39	-120.85	-56.23	-136.9	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	52	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	13	24	10	26	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4362	544	300	560	635	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4600	751	593	669	767	653	615	410	430	305	285	324	291	48	32
Compression Combined Force (kN) =		-4381	-775	-304	-633	-562	-955	-960	-640	-645	-561	-547	-382	-439	-75	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.27	0.18	0.14	0.16	0.06	0.14	0.13	0.09	0.09	0.07	0.06	0.07	0.06	0.04	0.03
		0.34	0.30	0.12	0.24	0.06	0.25	0.25	0.17	0.17	0.15	0.14	0.10	0.12	0.24	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
	Members	40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	24601.75	24601.75	2224.5	1764.48	1818.81	1725	494.78
	ULS Min	0	0	-1073	-10	-12	-17	-470
Shear	Fz Max	9695	9695	918	2371	2369	2279	1089
	Fz Min	-9770	-9770	-959	-255	-2397	-250	-646
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.451	0.600	0.110	0.169	0.148	0.165	0.094
		0.269	0.511	0.178	0.567	0.573	0.545	0.474

Case 4 - ULS V1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-14108	-14087	-13284	-13010	-12245	-12049	-11697	-11663	-11473	-13756	-13743	-12844	-12133	-11959	-11643	-11609	-11432
	ULS Min	-14139	-14097	-13327	-13167	-12383	-12186	-11758	-11697	-11568	-13786	-13753	-13044	-12270	-12096	-11704	-11643	-11527
IY Bending	ULS Max	0	-54	-45	83	79	120	136	144	144	26	35	87	86	124	132	137	137
	ULS Min	-54	-78	-75	78	78	78	120	136	11	0	26	36	76	76	124	132	24
IZ Bending	ULS Max	0	-45	119	458	-49	305	305	-52	260	92	124	154	174	174	53	248	248
	ULS Min	-45	-53	-12	266	-186	-186	-52	-246	-246	0	92	-2	168	-306	-306	53	-258
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.131	1.636	1.581	1.740	2.224	3.358	4.321	4.594	4.594	0.548	0.728	1.819	2.406	3.478	4.211	4.351	4.351
	Stress due to bending Z	0.857	0.999	2.249	8.686	4.310	7.066	10.823	8.722	9.233	1.749	2.346	2.921	4.029	7.086	10.852	8.789	9.165
	Force (kn) =	341	452	656	1787	1039	1657	1612	1418	1472	394	527	812	1023	1679	1604	1399	1439
Tension Combined Force (kN) =		-13768	-13635	-12628	-11223	-11207	-10392	-10084	-10246	-10001	-13363	-13216	-12032	-11110	-10279	-10039	-10210	-9993
Compression Combined Force (kN) =		-14479	-14549	-13983	-14954	-13421	-13843	-13370	-13114	-13040	-14180	-14280	-13856	-13293	-13775	-13308	-13041	-12965
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.22	0.23	0.22	0.23	0.21	0.21	0.36	0.35	0.35	0.22	0.22	0.21	0.21	0.21	0.36	0.35	0.35

Case 4 - ULS V1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4235	-4224	-3061	-2738	-2449	-2345	-2139	-1984	-2112	-3908	-3889	-2660	-2361	-2241	-1989	-1804	-1881
	ULS Min	-4248	-4228	-3080	-2806	-2527	-2423	-2217	-2062	-2142	-3921	-3894	-2747	-2439	-2320	-2067	-1882	-1912
IY Bending	ULS Max	4	10	13	54	50	50	51	171	166	12	15	36	38	49	52	179	181
	ULS Min	0	4	-38	-20	33	32	49	50	-172	0	5	6	37	37	48	52	-226
IZ Bending	ULS Max	0	-68	-36	282	-27	53	53	107	328	35	65	98	101	18	33	39	39
	ULS Min	-68	-85	-125	166	-41	-26	-44	-43	107	0	30	34	18	-53	-53	33	-541
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.227	0.527	1.933	2.751	2.559	2.548	2.603	8.727	8.757	0.594	0.745	1.836	1.921	2.476	2.670	9.142	11.524
	Stress due to bending Z	2.007	2.513	3.709	8.379	1.232	1.566	1.561	3.168	9.751	1.037	1.923	2.918	3.005	1.584	1.584	1.158	16.070
	Force (kn) =	174	237	440	869	296	321	325	929	1445	127	208	371	385	317	332	804	2154
Tension Combined Force (kN) =		-4060	-3986	-2621	-1869	-2153	-2024	-1814	-1055	-667	-3781	-3681	-2289	-1977	-1924	-1657	-1000	273
Compression Combined Force (kN) =		-4422	-4466	-3520	-3675	-2823	-2744	-2542	-2991	-3587	-4048	-4102	-3118	-2824	-2637	-2399	-2687	-4066
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.21	0.22	0.17	0.18	0.13	0.13	0.12	0.14	0.17	0.20	0.20	0.15	0.13	0.13	0.11	0.13	0.19

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	213.36	213.36	329.9	361.82	456.13	200.69	-336.01	-356.73	-207.45	-225.63	-170.75	-192.86	-247.53	-260.35	-276.99	-291.32	-85.65	-885.61
	ULS Min	213.36	213.36	319.43	342.32	423.75	147.57	-377.31	-402.03	-251.61	-279.92	-215.91	-244.68	-292.52	-314.05	-322.58	-342.89	-98.82	-896.49
IY Bending	ULS Max	0	0	39.87	41.4	40.5	39.21	2.48	0	4.99	16.92	4.97	21.59	2.59	24.14	3.95	24.91	0	29
	ULS Min	0	0	0	0	0	0	-20.69	0	-21.69	0	-21.12	0	-27.37	0	-22.9	0	0	0
IZ Bending	ULS Max	0	0	0	0.3	0	0	0	0	0.52	1.13	0	0.23	0	0.87	0	2.6	0	0
	ULS Min	0	0	-6.02	-8.53	-37.82	-42.87	-1.21	0	-0.45	0	-0.61	0	-3.34	0	-5.9	0	0	-5.83
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	9	0	9	7	9	9	11	10	10	10	0	10
	Stress Z	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	261	275	327	328	141	0	147	116	143	145	190	164	164	172	0	192
Tension Combined Force (kN) =		213	213	591	637	783	529	-195	-357	-61	-110	-28	-47	-58	-97	-113	-119	-86	-694
Compression Combined Force (kN) =		213	213	59	67	97	-181	-518	-402	-398	-396	-359	-390	-482	-478	-487	-515	-99	-1088
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.13	0.14	0.17	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.16	0.12	0.12	0.12	0.11	0.12	0.15	0.15	0.15	0.16	0.03	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	256.52	408.92	326.5	356.11	448.89	138.3	-296	-284.22	-204.75	-228.41	-169.43	-186.66	-233.56	-264.05	-274.06	-307.11	-649.12	-79.19
	ULS Min	256.52	399.41	325.32	355.11	447.23	134.36	-343.89	-352.52	-259.52	-272.59	-221.33	-231.93	-287.71	-309.19	-326.2	-352.06	-661.43	-92.35
IY Bending	ULS Max	0	0	39.29	39.29	39.58	40.94	0	42.27	15.77	5.1	21.17	4.97	22.86	2.86	24.18	4.68	24.73	0
	ULS Min	0	-30.71	0	0	0	0	-5.48	0	0	-21.75	0	-21.13	0	-27.44	0	-23.03	0	0
IZ Bending	ULS Max	0	0	0	1.27	0	1.66	0	2.6	0.91	0	0.46	0.01	0	0.8	0.71	0.92	0.26	0
	ULS Min	0	-2.01	-1.45	0	-0.87	0	-3.55	0	0	-1.54	0	-0.22	-0.45	0	0	0	-0.55	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	9	14	14	14	14	2	18	7	9	9	9	10	11	10	10	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	167	248	248	249	259	43	288	108	149	143	142	154	186	164	156	155	0
Tension Combined Force (kN) =		257	576	575	604	698	397	-253	4	-97	-80	-26	-44	-79	-78	-110	-151	-494	-79
Compression Combined Force (kN) =		257	232	77	107	198	-125	-387	-641	-367	-421	-364	-374	-442	-495	-490	-508	-817	-92
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.11	0.13	0.13	0.15	0.09	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.04	0.12	0.20	0.11	0.13	0.11	0.12	0.14	0.15	0.15	0.16	0.23	0.03

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	384.31	72.41	848.08	125.75	-587.29	-617.74	-628.09	-622.32	-786.05	-791.07	-713.14	-720.54	-152.09	21.84
	ULS Min	384.31	55.83	848.08	117.41	-612.78	-643.24	-653.59	-647.82	-808.4	-813.42	-735.49	-742.89	-159.76	13
IY Bending	ULS Max	574.35	0	29.36	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-498.26	-53.25	0	-14.76	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.14	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.49	-0.54	0	-1.14	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	17	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		480	354	209	107	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		864	427	1057	232	-587	-618	-628	-622	-786	-791	-713	-721	-152	22
Compression Combined Force (kN) =		-96	-298	639	11	-613	-643	-654	-648	-808	-813	-735	-743	-160	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.23	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	NA	0.16	0.17	0.17	0.17	0.24	0.24	0.22	0.22	0.51	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	164.41	12.14	227.66	56.61	209.64	-203.83	-209.29	-156.48	-169.63	-186.51	-167.49	-55.63	-144.57	-21.62	29.23
	ULS Min	158.5	-1.32	213.01	9.64	209.64	-226.82	-232.28	-179.47	-192.62	-209.5	-190.48	-78.62	-167.57	-30.46	20.85
IY Bending	ULS Max	246.16	10.41	17.36	11.82	97.83	0	0	0	0	0	0	0	0	0	0
	ULS Min	-215.99	-19.83	-7.05	-15.79	97.83	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.25	4.01	3.56	5.96	17.94	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7.35	0	0	0	17.94	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		237	148	130	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		401	160	357	179	513	-204	-209	-156	-170	-187	-167	-56	-145	-22	29
Compression Combined Force (kN) =		-78	-149	83	-113	-93	-227	-232	-179	-193	-210	-190	-79	-168	-30	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.09	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.06	0.05	0.02	0.04	0.10	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	27428.87	27428.87	3652.94	1898.63	2254.45	1883.35	813.73
	ULS Min	0	0	-1073	-10	-12	-10	-542
Shear	Fz Max	10885	10885	1451	2559	2702	2469	1256
	Fz Min	-10784	-10784	-1464	-361	-2620	-352	-394
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.503	0.669	0.181	0.182	0.183	0.180	0.155
		0.300	0.569	0.272	0.612	0.647	0.591	0.547

Case 4 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-17605	-17580	-16820	-16496	-14084	-13991	-12438	-12405	-12292	-11207	-11194	-10331	-11241	-10999	-11904	-11870	-11631
	ULS Min	-17635	-17590	-16863	-16653	-14221	-14128	-12499	-12438	-12387	-11237	-11204	-10530	-11378	-11136	-11965	-11904	-11725
IY Bending	ULS Max	136	229	230	257	91	104	204	204	129	0	-42	118	130	132	148	157	157
	ULS Min	0	136	30	42	30	87	104	129	31	-42	-81	-79	78	82	132	148	-24
IZ Bending	ULS Max	1122	1441	2639	8695	1757	302	302	-22	536	1182	1558	8093	1942	23	966	966	-11
	ULS Min	0	1122	1343	2855	-369	-369	-22	-205	-205	0	1182	1483	23	-730	-730	-11	-46
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	2.845	4.811	4.833	5.398	2.549	2.909	6.504	6.504	4.094	0.884	1.696	2.473	3.648	3.696	4.716	4.996	4.996
	Stress due to bending Z	21.281	27.327	50.037	164.885	40.700	8.540	10.699	7.263	19.003	22.421	29.543	153.463	44.995	16.906	34.274	34.274	1.639
Force (kn) =		4135	5508	9404	29185	6875	1820	1831	1466	2459	3994	5354	26726	7732	3275	4151	4181	706
Tension Combined Force (kN) =		-13470	-12072	-7416	12689	-7209	-12171	-10607	-10939	-9833	-7213	-5840	16395	-3509	-7724	-7753	-7690	-10924
Compression Combined Force (kN) =		-21770	-23098	-26267	-45837	-21096	-15948	-14331	-13904	-14846	-15232	-16558	-37256	-19111	-14411	-16116	-16085	-12432
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.23	NA	NA	NA	NA	NA	NA	NA	0.29	NA	NA	NA	NA	NA
		0.34	0.36	0.41	0.71	0.33	0.25	0.39	0.37	0.40	0.24	0.26	0.58	0.30	0.22	0.43	0.43	0.33

Case 4 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6355	-6339	-5065	-4651	-3507	-3292	-2507	-2267	-2139	-1955	-1935	-847	-1350	-1305	-1605	-1496	-1816
	ULS Min	-6368	-6344	-5083	-4720	-3585	-3370	-2585	-2345	-2169	-1968	-1939	-935	-1428	-1383	-1684	-1574	-1847
IY Bending	ULS Max	26	26	151	125	46	51	55	180	166	0	-32	47	52	53	58	177	186
	ULS Min	0	-29	-20	9	-4	45	49	54	-166	-44	-52	-32	38	37	53	57	-227
IZ Bending	ULS Max	414	453	736	3768	616	60	61	-25	550	379	465	3542	706	-56	45	45	-130
	ULS Min	0	414	551	1166	-129	-128	-27	-43	-44	0	392	543	-85	-85	-56	-130	-290
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.336	1.455	7.725	6.371	2.326	2.593	2.822	9.187	8.481	2.267	2.660	2.416	2.659	2.718	2.935	9.050	11.573
	Stress due to bending Z	12.300	13.449	21.868	111.939	18.293	3.797	1.804	1.275	16.336	11.257	13.823	105.200	20.983	2.538	1.656	3.857	8.626
Force (kn) =		1065	1164	2311	9237	1610	499	361	817	1938	1056	1287	8402	1846	410	358	1008	1577
Tension Combined Force (kN) =		-5290	-5175	-2754	4586	-1897	-2793	-2146	-1450	-201	-899	-648	7555	496	-895	-1247	-489	-239
Compression Combined Force (kN) =		-7433	-7507	-7394	-13957	-5195	-3869	-2946	-3161	-4107	-3024	-3226	-9337	-3274	-1793	-2042	-2582	-3424
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	NA	NA	NA	0.35	0.02	NA	NA	NA	NA
		0.36	0.36	0.36	0.68	0.25	0.18	0.14	0.15	0.19	0.15	0.16	0.45	0.16	0.09	0.10	0.12	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	711.77	711.77	434.3	451.32	633.36	246.91	941.53	860.73	583.68	613.64	612.18	660.74	323.05	273.6	-93.99	-98.09	-29.57	-831.82
	ULS Min	-226.5	-226.5	244.43	267.09	254.2	107.11	-1842.32	-1524.14	-1176.72	-1056.3	-1133.53	-1022.99	-981.88	-812.56	-577.87	-549.3	-172.62	-966.2
IY Bending	ULS Max	0	0	54.01	53.81	48.43	42.96	12.44	0	15.81	25.46	16.57	38.41	9.67	36.11	6.14	29.69	0	30.38
	ULS Min	0	0	0	0	0	0	-37.91	0	-31.62	-2.65	-30.07	0	-33.46	0	-26.54	0	0	0
IZ Bending	ULS Max	0	0	68.59	92.52	49.74	28.37	83.37	0	77.47	28.35	61.7	4.32	64.43	7.79	64.11	9.18	0	4.69
	ULS Min	0	0	-62.78	-90.67	-108.3	-82.7	-45.65	0	-39.8	-29.25	-18.72	-7.74	-23.64	-10.28	-25.94	-8.27	0	-9.16
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	16	0	13	11	13	16	14	15	11	12	0	11
	Stress Z	0	0	7	10	12	9	9	0	9	3	7	1	7	1	7	1	0	1
Force (kn) =		0	0	471	516	513	429	406	0	353	224	314	272	341	261	294	216	0	206
Tension Combined Force (kN) =		712	712	905	967	1147	676	1347	861	936	838	926	933	664	535	200	118	-30	-626
Compression Combined Force (kN) =		-227	-227	-226	-249	-259	-322	-2248	-1524	-1529	-1280	-1447	-1295	-1323	-1074	-872	-765	-173	-1172
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.20	0.21	0.25	0.15	0.32	0.21	0.23	0.20	0.22	0.22	0.16	0.13	0.05	0.03	NA	NA
		0.01	0.06	0.06	0.07	0.07	0.09	0.70	0.47	0.47	0.39	0.45	0.40	0.41	0.33	0.27	0.24	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	717.5	539.44	417.16	436.32	621.03	182.84	782.98	889.38	523.9	514.24	589.73	577.97	254.27	310.17	-80.74	-115.49	-610.98	-18.57
	ULS Min	-183.54	288.61	244.31	291.06	283.53	90.31	-1381.03	-1625.54	-967.83	-1077.87	-960.97	-1055.35	-768.64	-945	-523.78	-599.59	-709.44	-178.39
IY Bending	ULS Max	0	38.85	48.56	47.31	43.99	42.47	4.74	70.1	34.61	16.22	36.8	15.8	34.01	9.66	28.45	7.17	25.83	0
	ULS Min	0	-103.44	0	0	0	0	-15.33	0	-3.68	-30.91	0	-29.71	0	-33.1	0	-26.33	0	0
IZ Bending	ULS Max	0	26.3	29.36	33.71	31.54	30.96	96.33	31.97	14.98	19.19	5.78	12.65	5.19	14.16	6.33	15.64	2.41	0
	ULS Min	0	-44.59	-11.32	-8.32	-9.31	-6.86	-56.21	-33.95	-10.74	-61.76	-1.24	-56.4	-1.88	-58.54	-1.15	-64.23	-8.01	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	30	17	16	15	15	6	29	14	13	15	12	14	14	12	11	9	0
	Stress Z	0	4	3	4	3	3	11	4	2	7	1	6	1	7	1	7	1	0
Force (kn) =		0	631	360	361	336	326	277	532	260	319	258	302	238	328	202	293	176	0
Tension Combined Force (kN) =		718	1170	778	797	957	508	1060	1422	783	834	847	880	492	638	122	178	-435	-19
Compression Combined Force (kN) =		-184	-342	-116	-70	-53	-235	-1658	-2158	-1227	-1397	-1219	-1357	-1006	-1273	-726	-893	-885	-178
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.17	0.21	0.11	0.26	0.34	0.19	0.20	0.20	0.21	0.12	0.15	0.03	0.04	NA	NA
		0.01	0.10	0.03	0.02	0.02	0.07	0.51	0.67	0.38	0.43	0.38	0.42	0.31	0.39	0.22	0.27	0.25	0.05

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	463.96	379.23	966.3	183.56	914.23	814.68	380.44	433.44	27.76	-31.46	-346.11	-310.19	-125.85	21.86
	ULS Min	328.88	-218.76	749.81	-373.25	-2145.66	-2237.22	-1827.6	-1772.18	-1699.1	-1754.41	-1273.26	-1241.18	-198.82	11.99
IY Bending	ULS Max	7068.82	0	33.36	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7846.77	-59.69	0	-15.43	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	129.77	203.16	62.93	229.82	0	0	0	0	0	0	0	0	0	0
	ULS Min	-56.17	-97.74	-30.13	-85.46	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	79	20	13	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	15	5	19	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6853	698	330	448	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		7317	1077	1296	632	914	815	380	433	28	-31	-346	-310	-126	22
Compression Combined Force (kN) =		-6524	-916	420	-822	-2146	-2237	-1828	-1772	-1699	-1754	-1273	-1241	-199	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.36	0.21	0.28	0.14	0.18	0.16	0.07	0.08	0.01	NA	NA	NA	NA	0.02
		0.41	0.23	NA	0.23	0.57	0.59	0.48	0.47	0.51	0.53	0.38	0.37	0.64	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	276.34	184.86	355.58	115.65	229.41	478.05	442.5	270.69	279.34	177.29	170.13	228	161.83	25.5	31.11
	ULS Min	57.59	-191.72	96.71	-40.36	175.16	-903.6	-910.95	-632.47	-645.09	-568.28	-545.64	-380.69	-467.8	-81.18	19.08
IY Bending	ULS Max	3486.1	14.84	20.73	15.14	110.42	0	0	0	0	0	0	0	0	0	0
	ULS Min	-3809.53	-22.87	-9.84	-17.72	89.46	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	141.75	206.16	84.3	230	104.49	0	0	0	0	0	0	0	0	0	0
	ULS Min	-89.42	-103.09	-47.71	-116.86	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	46	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	11	20	8	23	6	0	0	0	0	0	0	0	0	0	0
Force (kn) =		3803	492	282	493	570	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4080	677	638	609	799	478	443	271	279	177	170	228	162	26	31
Compression Combined Force (kN) =		-3746	-684	-186	-533	-394	-904	-911	-632	-645	-568	-546	-381	-468	-81	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.24	0.16	0.15	0.15	0.07	0.10	0.10	0.06	0.06	0.04	0.04	0.05	0.04	0.02	0.02
		0.29	0.26	0.07	0.20	0.04	0.24	0.24	0.17	0.17	0.15	0.14	0.10	0.12	0.26	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	29228.53	29228.53	3718.94	2054.72	2143.88	2039.91	963.08
	ULS Min	0	0	-1412	-10	-12	-17	-641
Shear	Fz Max	11450	11450	1433	2762	2822	2692	1487
	Fz Min	-11516	-11516	-1449	-373	-2813	-344	-650
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.536	0.713	0.185	0.197	0.174	0.195	0.183
		0.317	0.602	0.269	0.661	0.675	0.644	0.647

Case 4 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-15956	-15930	-15505	-15180	-13255	-13630	-12300	-12267	-12362	-9105	-9091	-8533	-10181	-10351	-11693	-11660	-11606
	ULS Min	-15986	-15941	-15548	-15336	-13392	-13767	-12362	-12301	-12457	-9135	-9102	-8732	-10318	-10488	-11755	-11693	-11700
IY Bending	ULS Max	753	1066	1066	870	120	115	628	628	162	525	682	684	97	102	555	555	97
	ULS Min	0	753	643	-161	-176	-43	-43	-43	-43	0	525	-53	-39	-12	-12	-10	-10
IZ Bending	ULS Max	1229	1582	2873	9452	1929	290	290	-21	565	1285	1691	8863	2103	2	1045	1045	-26
	ULS Min	0	1229	1466	3095	-379	-379	-21	-198	-198	0	1285	1599	2	-756	-756	-40	-40
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	15.802	22.367	22.371	18.264	4.931	3.225	20.001	20.001	5.157	11.023	14.322	14.349	2.721	2.857	17.677	17.677	3.087
	Stress due to bending Z	23.315	29.995	54.483	179.237	44.694	8.776	10.298	7.011	20.066	24.365	32.073	168.069	48.715	17.521	37.098	37.098	1.417
	Force (kn) =	6704	8974	13172	33850	7889	1908	3226	2876	2685	6065	7952	31265	8176	3239	5831	5831	480
	Tension Combined Force (kN) =	-9251	-6956	-2333	18670	-5366	-11722	-9075	-9392	-9677	-3040	-1140	22732	-2005	-7112	-5862	-5829	-11126
	Compression Combined Force (kN) =	-22690	-24915	-28720	-49186	-21281	-15675	-15587	-15176	-15142	-15200	-17054	-39997	-18494	-13727	-17586	-17525	-12180
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.33	NA	NA	NA	NA	NA	NA	NA	0.41	NA	NA	NA	NA	NA
		0.35	0.39	0.44	0.76	0.33	0.24	0.42	0.41	0.41	0.24	0.26	0.62	0.29	0.21	0.47	0.47	0.33

Case 4 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-8540	-8523	-6849	-6428	-4591	-3910	-2734	-2295	-2124	-3648	-3627	-2202	-2205	-1749	-1773	-1490	-1800
	ULS Min	-8553	-8528	-6867	-6497	-4669	-3988	-2812	-2373	-2155	-3662	-3632	-2289	-2283	-1827	-1851	-1568	-1831
IY Bending	ULS Max	258	277	350	305	50	52	70	186	172	143	226	227	39	53	72	175	185
	ULS Min	0	258	286	-68	-85	49	50	68	-160	0	134	-27	-20	39	53	72	-204
IZ Bending	ULS Max	459	501	811	4098	666	72	72	-29	563	417	509	3829	768	-67	51	51	-133
	ULS Min	0	459	617	1251	-144	-143	-31	-55	-57	0	432	604	-89	-89	-67	-133	-281
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	13.153	14.128	17.830	15.541	4.313	2.641	3.584	9.481	8.784	7.302	11.529	11.568	2.012	2.703	3.692	8.937	10.424
	Stress due to bending Z	13.632	14.880	24.082	121.716	19.771	4.239	2.139	1.630	16.725	12.390	15.105	113.724	22.820	2.649	1.984	3.943	8.334
	Force (kn) =	2091	2265	3272	10716	1880	537	447	868	1992	1538	2079	9782	1939	418	443	1006	1465
	Tension Combined Force (kN) =	-6449	-6258	-3576	4288	-2711	-3373	-2287	-1427	-133	-2111	-1548	7580	-266	-1332	-1330	-484	-336
	Compression Combined Force (kN) =	-10644	-10793	-10140	-17213	-6549	-4525	-3259	-3240	-4147	-5199	-5712	-12072	-4222	-2245	-2295	-2574	-3296
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.20	NA	NA	NA	NA	NA	NA	NA	0.35	NA	NA	NA	NA	NA
		0.52	0.52	0.49	0.83	0.31	0.22	0.16	0.15	0.19	0.25	0.28	0.58	0.20	0.11	0.11	0.12	0.15

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	835.04	835.04	458.45	472.69	678.31	254.74	1262.97	1167.2	782.95	824.97	809.22	875.45	467.59	409.07	-46.36	-48.56	-11.11	-816.69
	ULS Min	-337.8	-337.8	221.11	242.41	204.36	91.09	-2206.52	-1802.53	-1406.5	-1248.86	-1361.64	-1216.22	-1152.34	-935.16	-639.81	-599.64	-186.64	-981.95
IY Bending	ULS Max	0	0	57.54	56.9	50.41	43.92	14.98	0	18.53	29.18	19.49	42.56	11.49	39.02	6.73	30.82	0	30.69
	ULS Min	0	0	0	0	0	0	-42.12	0	-34.03	-5.96	-32.23	-1.24	-34.86	0	-27.32	0	0	0
IZ Bending	ULS Max	0	0	87.15	117.66	71.74	39.38	104.37	0	96.95	35.27	77.19	5.33	81.19	9.52	81.49	10.81	0	6.81
	ULS Min	0	0	-77.07	-111.32	-125.81	-92.58	-56.76	0	-49.64	-36.73	-23.33	-9.68	-28.89	-12.93	-31.05	-10.85	0	-10
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	17	15	18	0	14	12	13	18	15	16	11	13	0	11
	Stress Z	0	0	9	13	14	10	12	0	11	4	9	1	9	1	9	1	0	1
Force (kn) =		0	0	529	584	560	454	472	0	404	262	356	303	381	285	331	227	0	210
Tension Combined Force (kN) =		835	835	987	1057	1238	709	1735	1167	1187	1087	1165	1179	849	694	285	178	-11	-607
Compression Combined Force (kN) =		-338	-338	-308	-342	-355	-363	-2678	-1803	-1811	-1511	-1718	-1519	-1533	-1221	-971	-826	-187	-1192
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.16	0.22	0.23	0.27	0.16	0.42	0.28	0.29	0.26	0.28	0.28	0.20	0.17	0.07	0.04	NA	NA
		0.01	0.09	0.09	0.10	0.10	0.10	0.83	0.56	0.56	0.47	0.53	0.47	0.47	0.38	0.30	0.25	0.05	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	831.44	569.6	437.75	454.31	661.53	190.11	1054.69	1184.44	707.56	701.41	780.82	770.4	378.2	455.59	-31.22	-65.67	-601.3	1.36
	ULS Min	-294.87	258.48	221.69	272.73	239.66	75.45	-1638.31	-1942.04	-1143.39	-1277.68	-1144.56	-1259.93	-886.87	-1102.09	-571.95	-659.55	-721.29	-195.13
IY Bending	ULS Max	0	56.48	53.21	49.67	45.09	42.86	7.24	76.95	39.29	19.03	40.65	18.53	36.73	11.4	29.45	7.83	26.09	0
	ULS Min	0	-121.38	0	0	0	0	-17.85	-3.79	-8.58	-33.11	0	-31.78	0	-34.39	0	-27.03	0	0
IZ Bending	ULS Max	0	33.02	37.04	41.84	39.58	38.31	121.29	39.3	18.62	24.38	7.1	15.88	6.54	17.49	7.73	19.45	2.95	0
	ULS Min	0	-55.22	-13.78	-10.69	-11.42	-8.83	-69.39	-42.47	-13.53	-76.81	-1.63	-70.44	-2.24	-73.36	-1.52	-80.37	-9.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	35	18	17	16	15	7	32	16	14	17	13	15	14	12	11	9	0
	Stress Z	0	5	4	5	4	4	14	5	2	9	1	8	1	8	1	9	1	0
Force (kn) =		0	745	404	392	359	342	340	594	298	361	286	341	258	364	212	327	181	0
Tension Combined Force (kN) =		831	1315	842	846	1020	532	1394	1778	1005	1063	1067	1111	637	819	181	261	-421	1
Compression Combined Force (kN) =		-295	-487	-183	-119	-119	-267	-1978	-2536	-1441	-1639	-1430	-1601	-1145	-1466	-784	-987	-902	-195
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.26	0.18	0.18	0.22	0.12	0.34	0.43	0.24	0.26	0.26	0.27	0.15	0.20	0.04	0.06	NA	0.00
		0.01	0.14	0.05	0.03	0.03	0.08	0.61	0.78	0.44	0.50	0.44	0.49	0.35	0.45	0.24	0.30	0.25	0.05

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	481.43	455.4	989.52	197.17	1293.71	1176.84	637.45	702.31	237.06	164.23	-248.52	-201.66	-118.02	21.95
	ULS Min	312.58	-287.95	718.91	-496.71	-2524.78	-2631.67	-2116.23	-2048.34	-1915.92	-1983.86	-1401.88	-1359.8	-207.33	11.83
IY Bending	ULS Max	8883.54	0	34.02	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-9682.29	-61.14	0	-15.63	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	161.7	254.06	78.66	287.53	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.72	-122.03	-37.67	-106.53	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	98	20	13	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	8	19	6	23	0	0	0	0	0	0	0	0	0	0
Force (kn) =		8462	783	358	535	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8944	1238	1348	732	1294	1177	637	702	237	164	-249	-202	-118	22
Compression Combined Force (kN) =		-8150	-1071	361	-1031	-2525	-2632	-2116	-2048	-1916	-1984	-1402	-1360	-207	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.44	0.24	0.29	0.16	0.25	0.23	0.12	0.13	0.05	0.04	NA	NA	NA	0.02
		0.52	0.26	NA	0.29	0.67	0.69	0.56	0.54	0.57	0.59	0.42	0.41	0.67	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	303.88	228.22	386.65	130.18	233.77	649.15	606.14	378.28	392.35	268.9	255.22	299.49	239.21	37.47	31.58
	ULS Min	30.44	-242.5	65.62	-64.83	167.36	-1072.17	-1079.93	-744.92	-757.44	-657.31	-633.74	-455.62	-542.08	-93.67	18.65
IY Bending	ULS Max	4356.61	15.96	22.06	16.42	113.89	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4707.59	-23.62	-10.57	-18.21	87.94	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	178.37	257.05	104.84	287.09	133.89	0	0	0	0	0	0	0	0	0	0
	ULS Min	-110.6	-129.5	-60.17	-146.47	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	57	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	14	25	10	28	8	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4716	578	325	588	658	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5020	807	711	718	892	649	606	378	392	269	255	299	239	37	32
Compression Combined Force (kN) =		-4686	-821	-259	-652	-491	-1072	-1080	-745	-757	-657	-634	-456	-542	-94	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.30	0.19	0.17	0.17	0.07	0.14	0.13	0.08	0.09	0.06	0.06	0.07	0.05	0.03	0.03
		0.36	0.31	0.10	0.25	0.05	0.28	0.28	0.20	0.20	0.17	0.17	0.12	0.14	0.30	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	29594.23	29594.23	3727.63	2075.87	2155.52	2082.71	1000.53
	ULS Min	0	0	-1494	-10	-12	-18	-663
Shear	Fz Max	11519	11519	1424	2790	2828	2749	1538
	Fz Min	-11628	-11628	-1439	-374	-2837	-341	-712
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.543	0.722	0.185	0.199	0.175	0.199	0.190
		0.320	0.608	0.267	0.667	0.679	0.658	0.669

Case 4 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-7594	-7572	-6847	-6573	-6058	-5855	-5578	-5544	-5323	-7192	-7178	-6357	-5900	-5716	-5469	-5436	-5232
	ULS Min	-7624	-7583	-6889	-6730	-6195	-5992	-5639	-5578	-5418	-7222	-7189	-6556	-6037	-5853	-5531	-5469	-5327
IY Bending	ULS Max	0	-62	-82	46	10	41	41	2	248	28	38	39	7	44	44	-3	265
	ULS Min	-62	-88	-86	-13	-12	10	2	-20	-20	0	28	-7	-8	7	-3	-29	-29
IZ Bending	ULS Max	0	-29	119	352	-25	145	145	-21	113	75	101	132	141	76	20	110	110
	ULS Min	-29	-32	18	267	-90	-90	-21	-111	-111	0	75	84	76	-145	-145	20	-105
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.301	1.850	1.796	0.964	0.350	1.153	1.309	0.625	7.887	0.591	0.790	0.826	0.227	1.235	1.402	0.919	8.426
	Stress due to bending Z	0.549	0.607	2.255	6.677	2.086	3.367	5.157	3.931	4.024	1.421	1.907	2.512	3.267	3.371	5.162	3.912	3.912
	Force (kn) =	317	421	694	1310	387	718	688	485	1268	345	462	572	555	732	699	514	1314
	Tension Combined Force (kN) =	-7277	-7151	-6152	-5264	-5671	-5136	-4889	-5059	-4055	-6847	-6716	-5785	-5345	-4984	-4770	-4922	-3919
	Compression Combined Force (kN) =	-7941	-8004	-7583	-8040	-6582	-6710	-6328	-6063	-6686	-7567	-7651	-7128	-6593	-6585	-6230	-5984	-6641
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.12	0.12	0.12	0.12	0.10	0.10	0.17	0.16	0.18	0.12	0.12	0.11	0.10	0.10	0.17	0.16	0.18

Case 4 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4529	-4518	-3425	-3102	-2767	-2653	-2473	-2332	-2550	-4205	-4186	-3016	-2680	-2550	-2326	-2152	-2329
	ULS Min	-4542	-4522	-3443	-3170	-2846	-2732	-2551	-2410	-2581	-4218	-4190	-3103	-2758	-2628	-2404	-2230	-2359
IY Bending	ULS Max	2	6	9	16	13	13	13	155	151	16	19	12	7	11	11	147	147
	ULS Min	0	2	-41	-25	4	3	3	2	-234	0	11	0	1	7	7	7	-242
IZ Bending	ULS Max	0	-65	-39	280	-31	60	60	81	459	35	65	102	105	22	33	87	87
	ULS Min	-65	-82	-131	180	-43	-30	-45	-43	81	0	30	33	22	-61	-61	33	-712
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.093	0.325	2.087	1.293	0.649	0.684	0.655	7.891	11.910	0.832	0.989	0.611	0.357	0.565	0.562	7.509	12.320
	Stress due to bending Z	1.941	2.443	3.894	8.308	1.267	1.778	1.780	2.397	13.635	1.033	1.939	3.027	3.104	1.804	1.804	2.592	21.141
	Force (kn) =	159	216	467	750	150	192	190	803	1994	146	229	284	270	185	185	789	2612
	Tension Combined Force (kN) =	-4370	-4302	-2958	-2352	-2618	-2461	-2283	-1529	-556	-4059	-3957	-2731	-2410	-2365	-2141	-1363	284
	Compression Combined Force (kN) =	-4701	-4739	-3910	-3920	-2995	-2924	-2741	-3214	-4576	-4363	-4419	-3387	-3028	-2813	-2589	-3018	-4972
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.23	0.23	0.19	0.19	0.14	0.14	0.13	0.15	0.21	0.21	0.21	0.16	0.14	0.13	0.12	0.14	0.23

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	146.47	146.47	219.32	230.06	273.75	21.63	-238.88	-248.96	-127.58	-141.23	-102.4	-120.78	-139.35	-143.53	-139.76	-229.23	71.65	-970.91
	ULS Min	146.47	146.47	211.16	217.93	252.12	-23.85	-280.3	-291.78	-172.35	-192.71	-147.99	-170.05	-185.07	-193.58	-185.77	-277.14	58.49	-981.35
IY Bending	ULS Max	0	0	39.17	40.63	40.08	40.05	7.55	0	7.47	14.27	7.34	18.51	6.15	19.66	6.73	21.19	0	29.54
	ULS Min	0	0	0	0	0	0	-12.37	0	-13.99	0	-13.6	0	-16.54	0	-12.75	0	0	0
IZ Bending	ULS Max	0	0	0	0	0	0	0	0	0.08	1.31	0	0	0	0.95	0	2.75	0	0
	ULS Min	0	0	-6.34	-13.84	-46.26	-52.91	-1.37	0	-0.9	0	-1.36	-0.07	-3.1	0	-6.93	0	0	-6.26
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	5	0	6	6	6	8	7	8	5	9	0	10
	Stress Z	0	0	1	1	5	6	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	257	281	340	353	86	0	96	98	94	124	117	134	98	147	0	196
	Tension Combined Force (kN) =	146	146	476	511	614	375	-153	-249	-32	-43	-9	4	-23	-10	-42	-82	72	-775
	Compression Combined Force (kN) =	146	146	-46	-63	-88	-377	-366	-292	-268	-291	-242	-294	-302	-327	-284	-424	58	-1177
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.00	0.03	0.10	0.11	0.13	0.08	NA	NA	NA	NA	NA	0.00	NA	NA	NA	NA	0.02	NA
		NA	NA	0.01	0.02	0.03	0.11	0.11	0.09	0.08	0.09	0.07	0.09	0.09	0.10	0.09	0.13	NA	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	190.91	274.85	212.76	222.53	262.77	-48.05	-192.15	-202.97	-124.36	-141.66	-99.44	-116.06	-116.64	-154.78	-210.07	-170.51	-768.36	115.6
	ULS Min	190.91	267.33	211.73	221.73	260.84	-53.11	-237.98	-267.62	-176.25	-186.35	-148.78	-161.81	-167.1	-200.52	-258.49	-215.99	-780	102.44
IY Bending	ULS Max	0	0	39	38.94	39.32	41.45	0	37.05	13.37	7.6	18	7.46	18.52	6.4	20.31	7.5	25.84	0
	ULS Min	0	-18.1	0	0	0	0	-11.15	0	0	-14.03	0	-13.58	0	-16.59	0	-12.76	0	0
IZ Bending	ULS Max	0	0	0	1.19	0	2.26	0	2.02	0.87	0	0.41	0.67	0	0.34	0.68	1.69	0.42	0
	ULS Min	0	-1.42	-0.8	0	-1.02	0	-2.77	-0.03	0	-1.06	0	0	-0.4	-0.2	0	0	-0.42	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	5	14	13	14	14	5	15	6	6	8	6	8	7	8	5	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	99	245	246	248	263	80	252	91	96	122	92	125	112	138	89	162	0
	Tension Combined Force (kN) =	191	374	458	468	510	215	-112	49	-33	-46	22	-24	8	-43	-72	-82	-606	116
	Compression Combined Force (kN) =	191	168	-33	-24	13	-316	-318	-520	-268	-282	-270	-254	-292	-313	-396	-305	-942	102
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.07	0.10	0.10	0.11	0.05	NA	0.01	NA	NA	0.01	NA	0.00	NA	NA	NA	NA	0.02
		NA	NA	0.01	0.01	NA	0.09	0.10	0.16	0.08	0.09	0.08	0.08	0.09	0.10	0.12	0.09	0.26	NA

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	210.13	35.09	409	62.21	-298.37	-325.84	-277.1	-274.98	-389.08	-389.84	-306.67	-320.11	-62.17	27.85
	ULS Min	210.13	18.07	409	52.67	-323.86	-351.34	-302.59	-300.47	-411.44	-412.19	-329.03	-342.47	-69.84	19.01
IY Bending	ULS Max	339.9	0	5.5	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-370.83	-41.97	0	-16.52	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	7.01	0	0.07	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.15	-0.14	0	-0.33	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	4	14	2	7	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		327	279	39	118	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		538	314	448	180	-298	-326	-277	-275	-389	-390	-307	-320	-62	28
Compression Combined Force (kN) =		-117	-261	370	-65	-324	-351	-303	-300	-411	-412	-329	-342	-70	19
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.03	0.06	0.10	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.02	0.09	0.09	0.08	0.08	0.12	0.12	0.10	0.10	0.22	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	182.56	14.55	260.63	61.03	290.82	-224.59	-234.21	-185.48	-195.78	-209.89	-190.15	-71.95	-175.1	-28.7	28.82
	ULS Min	176.08	0.09	241.15	5.01	290.82	-247.59	-257.21	-208.47	-218.78	-232.89	-213.14	-94.95	-198.09	-37.53	20.44
IY Bending	ULS Max	265.46	10.16	17.93	11.59	97.56	0	0	0	0	0	0	0	0	0	0
	ULS Min	-230.29	-20.14	-5.64	-15.5	97.56	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.39	1.69	2.32	6.03	22.96	0	0	0	0	0	0	0	0	0	0
	ULS Min	-0.09	0	0	0	22.96	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		242	147	132	120	316	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		425	161	392	181	607	-225	-234	-185	-196	-210	-190	-72	-175	-29	29
Compression Combined Force (kN) =		-66	-146	109	-115	-25	-248	-257	-208	-219	-233	-213	-95	-198	-38	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.09	0.04	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.00	0.07	0.07	0.06	0.06	0.06	0.06	0.03	0.05	0.12	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
Members		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	10419.57	10419.57	4327.31	1220.64	4114.92	1098.29	846.64
	ULS Min	0	0	-1396	-16	-12	-17	-651
Shear	Fz Max	4180	4180	1885	189	1882	46	1471
	Fz Min	-4161	-4161	-1898	-435	-1802	-252	-488
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.191	0.254	0.215	0.117	0.334	0.105	0.161
		0.115	0.219	0.352	0.104	0.450	0.060	0.640

Case 4 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-12468	-12443	-11912	-11682	-10399	-10432	-9654	-9621	-9527	-7749	-7736	-7218	-8063	-8223	-8844	-8810	-8873
	ULS Min	-12499	-12454	-11954	-11839	-10536	-10570	-9715	-9654	-9622	-7779	-7746	-7417	-8200	-8360	-8905	-8844	-8967
IY Bending	ULS Max	289	453	454	369	70	105	113	113	122	652	835	836	61	92	92	84	199
	ULS Min	0	289	254	-28	-25	72	105	95	95	0	652	-87	-91	58	84	57	57
IZ Bending	ULS Max	787	960	1863	5310	1081	227	227	-57	438	820	1031	4808	1212	18	42	169	169
	ULS Min	0	787	1192	1956	-253	-253	-57	-222	-222	0	820	1290	18	-270	-270	42	-33
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	6.072	9.511	9.524	7.735	1.958	2.947	3.615	3.615	3.897	13.690	17.518	17.542	2.548	2.580	2.929	2.681	6.355
	Stress due to bending Z	14.923	18.208	35.319	100.702	25.037	5.863	8.049	7.888	15.540	15.546	19.548	91.165	28.086	6.250	9.573	5.993	5.991
Force (kn) =		3598	4751	7686	18585	4291	1400	1242	1225	2069	5011	6353	18631	4870	1404	1331	923	1314
Tension Combined Force (kN) =		-8870	-7692	-4226	6903	-6107	-9032	-8412	-8396	-7458	-2738	-1383	11414	-3193	-6819	-7513	-7887	-7558
Compression Combined Force (kN) =		-16097	-17204	-19640	-30424	-14827	-11970	-10957	-10879	-11691	-12790	-14099	-26048	-13069	-9764	-10236	-9767	-10282
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.12	NA	NA	NA	NA	NA	NA	NA	0.20	NA	NA	NA	NA	NA
		0.25	0.27	0.30	0.47	0.23	0.19	0.29	0.29	0.31	0.20	0.22	0.40	0.20	0.15	0.28	0.26	0.28

Case 4 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5447	-5432	-4153	-3916	-2637	-2292	-1595	-1312	-1389	-3774	-3753	-2310	-2180	-1731	-1576	-1130	-1175
	ULS Min	-5460	-5436	-4172	-3984	-2715	-2370	-1673	-1390	-1420	-3787	-3758	-2397	-2258	-1809	-1654	-1209	-1205
IY Bending	ULS Max	86	86	173	152	37	39	54	141	145	200	276	277	36	36	48	150	141
	ULS Min	0	85	93	-25	-15	37	38	51	-125	0	199	-42	-44	28	28	48	-150
IZ Bending	ULS Max	335	400	387	3216	497	45	49	78	214	271	356	2956	567	-39	40	40	8
	ULS Min	0	335	168	582	-72	-68	-11	-7	79	0	274	99	-39	-59	-59	8	-338
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	4.389	4.386	8.797	7.753	1.911	2.005	2.729	7.214	7.390	10.204	14.065	14.133	2.267	1.823	2.473	7.630	7.651
	Stress due to bending Z	9.959	11.877	11.487	95.539	14.756	2.018	1.442	2.314	6.366	8.064	10.575	87.802	16.850	1.764	1.764	1.198	10.039
Force (kn) =		1120	1270	1584	8065	1301	314	326	744	1074	1426	1924	7959	1493	280	331	689	1381
Tension Combined Force (kN) =		-4326	-4162	-2570	4149	-1335	-1978	-1269	-568	-315	-2348	-1829	5649	-687	-1451	-1245	-441	207
Compression Combined Force (kN) =		-6580	-6706	-5756	-12049	-4016	-2684	-1998	-2134	-2494	-5213	-5682	-10356	-3750	-2089	-1985	-1898	-2587
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	0.01
		0.32	0.32	0.28	0.58	0.19	0.13	0.10	0.10	0.12	0.25	0.27	0.50	0.18	0.10	0.09	0.09	0.12

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	681.57	681.57	330.03	340.58	412.18	93.78	1222.73	1106.59	703.25	706.19	619.09	669.62	372.73	438.52	150.76	148.74	221.42	-701.38
	ULS Min	-277.1	-277.1	159.79	214.23	271.73	-100.58	-1924.7	-1601.02	-1173.62	-1047.78	-1019.47	-953.45	-886.34	-830.94	-730.93	-675.7	-43.3	-912.5
IY Bending	ULS Max	0	0	57.23	57.13	53.58	47.34	14.52	0	16.77	26.61	15.96	36.33	11.11	34.66	9.56	31.39	0	29.2
	ULS Min	0	0	0	0	0	0	-38.67	0	-31.91	-3.53	-28.92	0	-31.75	0	-23.94	0	0	0
IZ Bending	ULS Max	0	0	139.81	189.38	143.07	63.34	149.15	0	140.49	38.11	119.59	8.15	127.59	14.01	131.06	14.73	0	14.01
	ULS Min	0	0	-114.62	-165.39	-162.99	-91.15	-65.48	0	-63.9	-44.31	-36.13	-14.98	-42.91	-20.31	-43.22	-18.33	0	-10.55
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	19	16	16	0	13	11	12	15	13	14	10	13	0	10
	Stress Z	0	0	15	20	18	10	17	0	16	5	13	2	14	2	15	2	0	1
	Force (kn) =	0	0	629	725	652	473	530	0	469	259	411	271	444	269	398	244	0	208
Tension Combined Force (kN) =		682	682	959	1066	1064	567	1753	1107	1172	965	1030	941	817	708	549	393	221	-494
Compression Combined Force (kN) =		-277	-277	-470	-511	-380	-574	-2455	-1601	-1642	-1307	-1430	-1224	-1331	-1100	-1129	-920	-43	-1120
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.13	0.21	0.23	0.23	0.12	0.42	0.27	0.28	0.23	0.25	0.23	0.20	0.17	0.13	0.09	0.05	NA
		0.01	0.08	0.13	0.15	0.11	0.16	0.76	0.50	0.51	0.40	0.44	0.38	0.41	0.34	0.35	0.28	0.01	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	679.24	435.64	299.63	309.38	372.42	46.96	912.25	973.95	555.99	526.97	553.66	491.87	393.95	309.83	152.45	130.94	-511.18	252.88
	ULS Min	-263.53	208.32	196.19	245.59	327.49	-114.49	-1318.98	-1627.83	-858.63	-1022.19	-799.93	-914.34	-744.01	-846.5	-655.69	-758.84	-656.24	-44.32
IY Bending	ULS Max	0	28.32	47.54	46.47	45.13	44.02	5.22	62.62	31.97	16.91	32.57	15.12	31.53	11.12	30.04	10.38	24.63	0
	ULS Min	0	-71.6	0	0	0	0	-16.84	0	-4.75	-30.59	0	-28.17	0	-31.3	0	-24.05	0	0
IZ Bending	ULS Max	0	0	52.6	60.02	61.73	53.74	147.21	30.49	17.43	32.47	10.67	24.56	10.29	26.29	11.25	28.94	3.68	0
	ULS Min	0	-36.77	-15.1	-15.11	-17.06	-12.84	-66.32	-34.5	-11.68	-110.63	-2.75	-109.18	-3.05	-114.43	-2.75	-125	-15.87	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	21	16	16	16	15	7	26	13	13	14	12	13	13	13	10	9	0
	Stress Z	0	4	6	6	7	6	17	4	2	12	1	12	1	13	1	14	2	0
	Force (kn) =	0	447	399	407	402	380	380	483	246	406	238	387	230	417	222	388	182	0
Tension Combined Force (kN) =		679	883	699	716	774	426	1292	1457	802	933	792	879	624	727	375	519	-329	253
Compression Combined Force (kN) =		-264	-239	-203	-161	-74	-494	-1699	-2111	-1105	-1428	-1038	-1301	-974	-1264	-878	-1147	-839	-44
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.17	0.15	0.16	0.17	0.09	0.31	0.35	0.19	0.22	0.19	0.21	0.15	0.18	0.09	0.12	NA	0.05
		0.01	0.07	0.06	0.05	0.02	0.14	0.53	0.65	0.34	0.44	0.32	0.40	0.30	0.39	0.27	0.35	0.23	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	391.81	349.51	803.58	196.65	698.04	683.63	210.19	215.55	-10.05	-16.32	-119.39	-122.95	-82.5	24.88
	ULS Min	228.77	-311.39	575.93	-67.8	-1736.25	-1734.61	-1267.2	-1267.43	-1322.17	-1317.33	-1057.8	-1072.38	-167.51	14.25
IY Bending	ULS Max	5955.15	0	24.4	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6618.9	-55.52	0	-15.76	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	244.99	393.97	121.84	446.4	0	0	0	0	0	0	0	0	0	0
	ULS Min	-115.12	-188.5	-58.38	-164.07	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	67	18	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	12	29	10	36	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	6328	953	353	770	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		6720	1303	1157	966	698	684	210	216	-10	-16	-119	-123	-83	25
Compression Combined Force (kN) =		-6099	-1264	223	-837	-1736	-1735	-1267	-1267	-1322	-1317	-1058	-1072	-168	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.33	0.25	0.25	0.21	0.13	0.13	0.04	0.04	NA	NA	NA	NA	NA	0.02
		0.39	0.31	NA	0.23	0.46	0.46	0.33	0.33	0.40	0.39	0.32	0.32	0.54	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	247.82	230.24	318.15	155.18	165.92	666.06	642.2	388.98	388.53	200.61	188.93	143.91	97.88	45.67	32.63
	ULS Min	-15.71	-284.04	-15.6	-146.96	68.24	-1002.72	-978.49	-613.6	-630.83	-491.59	-453.83	-202.24	-284.66	-76.42	19.07
IY Bending	ULS Max	4085.13	15.76	22.1	17.54	109.77	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4364.36	-22.08	-15.05	-19.21	91.71	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	281.17	395.13	160.67	443.43	218.48	0	0	0	0	0	0	0	0	0	0
	ULS Min	-166.55	-201.32	-94.99	-228.31	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	53	10	10	9	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	21	39	16	44	13	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	4965	787	414	844	876	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5213	1018	732	999	1042	666	642	389	389	201	189	144	98	46	33
Compression Combined Force (kN) =		-4981	-1071	-429	-991	-808	-1003	-978	-614	-631	-492	-454	-202	-285	-76	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.31	0.24	0.18	0.24	0.09	0.15	0.14	0.09	0.08	0.04	0.04	0.03	0.02	0.04	0.03
		0.38	0.41	0.16	0.38	0.09	0.26	0.26	0.16	0.17	0.13	0.12	0.05	0.08	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	22666.97	22666.97	2356.91	1562.88	1867.88	1567.87	484.89
	ULS Min	0	0	-864	-10	-12	-22	-455
Shear	Fz Max	9082	9082	1012	2098	2201	2045	984
	Fz Min	-8946	-8946	-1007	-250	-2141	-263	-448
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.416	0.553	0.117	0.150	0.152	0.150	0.092
		0.250	0.475	0.188	0.502	0.527	0.489	0.428

Case 5 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-13153	-13131	-12344	-12071	-11339	-11141	-10799	-10766	-10573	-12800	-12786	-11903	-11227	-11051	-10746	-10713	-10533
	ULS Min	-13183	-13142	-12387	-12227	-11476	-11279	-10861	-10799	-10667	-12830	-12797	-12102	-11364	-11188	-10808	-10746	-10627
IY Bending	ULS Max	0	-54	-49	79	70	110	119	124	124	26	35	77	76	115	116	117	117
	ULS Min	-54	-78	-76	69	70	70	110	119	39	0	26	36	68	68	115	116	51
IZ Bending	ULS Max	0	-43	118	445	-45	282	282	-47	240	90	120	150	164	160	48	228	228
	ULS Min	-43	-49	-8	266	-172	-172	-47	-227	-227	0	90	13	160	-283	-282	48	-237
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.134	1.640	1.585	1.658	1.978	3.101	3.804	3.955	3.955	0.544	0.727	1.617	2.136	3.215	3.706	3.733	3.733
	Stress due to bending Z	0.811	0.938	2.241	8.438	3.982	6.526	9.996	8.040	8.517	1.698	2.282	2.842	3.804	6.545	10.024	8.096	8.411
Force (kn) =		333	442	656	1730	947	1530	1469	1277	1328	384	516	764	944	1551	1462	1259	1293
Tension Combined Force (kN) =		-12820	-12689	-11688	-10340	-10392	-9611	-9330	-9489	-9245	-12415	-12270	-11139	-10283	-9500	-9285	-9453	-9240
Compression Combined Force (kN) =		-13517	-13584	-13043	-13958	-12423	-12809	-12330	-12076	-11995	-13214	-13312	-12866	-12309	-12740	-12269	-12006	-11920
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.21	0.21	0.20	0.22	0.19	0.20	0.33	0.32	0.32	0.20	0.21	0.20	0.19	0.20	0.33	0.32	0.32

Case 5 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4127	-4116	-2969	-2645	-2358	-2252	-2049	-1894	-2029	-3805	-3786	-2570	-2273	-2151	-1902	-1718	-1804
	ULS Min	-4141	-4121	-2987	-2714	-2436	-2330	-2127	-1973	-2059	-3818	-3791	-2657	-2351	-2229	-1980	-1797	-1835
IY Bending	ULS Max	4	10	12	50	46	45	46	164	160	12	15	32	34	44	48	172	173
	ULS Min	0	4	-38	-20	30	29	45	45	-168	0	6	7	34	34	44	48	-217
IZ Bending	ULS Max	0	-67	-36	282	-25	51	50	100	320	35	64	99	100	16	31	39	39
	ULS Min	-67	-84	-124	163	-41	-25	-42	-41	100	0	30	34	16	-51	-51	31	-523
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.203	0.485	1.914	2.528	2.342	2.318	2.356	8.383	8.587	0.615	0.766	1.639	1.721	2.249	2.430	8.747	11.065
	Stress due to bending Z	1.983	2.488	3.682	8.384	1.210	1.502	1.498	2.959	9.515	1.025	1.907	2.933	2.976	1.518	1.518	1.168	15.535
Force (kn) =		171	232	437	852	277	298	301	886	1413	128	209	357	367	294	308	774	2077
Tension Combined Force (kN) =		-3957	-3884	-2532	-1793	-2080	-1954	-1748	-1009	-615	-3677	-3577	-2213	-1906	-1857	-1594	-944	273
Compression Combined Force (kN) =		-4311	-4353	-3424	-3566	-2713	-2629	-2428	-2858	-3473	-3946	-4000	-3014	-2718	-2524	-2288	-2571	-3912
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.21	0.21	0.17	0.17	0.13	0.13	0.12	0.14	0.16	0.19	0.19	0.15	0.13	0.12	0.11	0.12	0.18

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	199.77	199.77	308.33	337.46	424.19	167.73	-315.21	-334.82	-192.27	-209.89	-157.61	-179.08	-228.47	-239.81	-256.26	-276.8	-53.37	-880.53
	ULS Min	199.77	199.77	298.76	319.44	394.48	118.64	-356.5	-379.86	-236.46	-263.89	-202.78	-230.67	-273.51	-293.14	-301.83	-328.01	-66.53	-891.44
IY Bending	ULS Max	0	0	39.79	41.23	40.44	39.46	3.02	0	5.24	16.5	5.2	21.05	3	23.38	4.28	24.22	0	28.78
	ULS Min	0	0	0	0	0	0	-19.8	0	-20.85	0	-20.31	0	-26.09	0	-21.71	0	0	0
IZ Bending	ULS Max	0	0	0	0.26	0	0	0	0	0.48	1.14	0	0.19	0	0.81	0	2.41	0	0
	ULS Min	0	0	-5.7	-8.11	-35.69	-40.19	-1.2	0	-0.48	0	-0.58	0	-3.09	0	-5.71	0	0	-5.69
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	8	0	9	7	8	9	11	10	9	10	0	10
	Stress Z	0	0	1	1	4	4	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	260	273	322	325	135	0	141	113	137	142	181	158	156	167	0	190
Tension Combined Force (kN) =		200	200	568	611	746	492	-180	-335	-51	-97	-20	-37	-48	-81	-100	-110	-53	-691
Compression Combined Force (kN) =		200	200	39	46	72	-206	-492	-380	-377	-377	-340	-372	-454	-452	-458	-495	-67	-1081
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.12	0.13	0.16	0.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.06	0.15	0.12	0.12	0.12	0.10	0.11	0.14	0.14	0.14	0.15	0.02	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	242.86	383.38	305.1	331.94	417.21	108.97	-275.95	-266.69	-189.55	-212.54	-156.15	-173.3	-213.68	-244.69	-259.7	-284.75	-657.37	-46.19
	ULS Min	242.86	374.29	304.06	331.08	415.66	104.98	-323.43	-334.06	-244.01	-256.74	-207.81	-218.58	-267.44	-289.87	-311.45	-329.73	-669.62	-59.36
IY Bending	ULS Max	0	0	39.26	39.25	39.55	41.01	0	41.23	15.39	5.35	20.64	5.22	22.16	3.25	23.5	4.97	24.76	0
	ULS Min	0	-28.17	0	0	0	0	-6	0	0	-20.91	0	-20.32	0	-26.16	0	-21.86	0	0
IZ Bending	ULS Max	0	0	0	1.21	0	1.74	0	2.48	0.9	0	0.43	0.06	0	0.74	0.67	1.01	0.28	0
	ULS Min	0	-1.88	-1.33	0	-0.83	0	-3.39	0	0	-1.46	0	-0.18	-0.42	0	0	0	-0.52	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	8	14	14	14	14	3	17	6	9	9	8	9	11	10	9	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	154	248	248	249	260	46	281	105	143	139	137	150	177	159	149	155	0
Tension Combined Force (kN) =		243	537	553	580	666	369	-230	15	-85	-70	-17	-37	-64	-68	-101	-136	-502	-46
Compression Combined Force (kN) =		243	221	56	84	167	-155	-370	-615	-349	-400	-347	-355	-417	-467	-470	-478	-825	-59
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.10	0.12	0.13	0.15	0.08	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.04	0.11	0.19	0.11	0.12	0.11	0.11	0.13	0.14	0.14	0.15	0.23	0.02

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	358.92	66.91	783.68	116.11	-544.57	-575.84	-577.61	-571.07	-727.04	-732.95	-654.72	-660.56	-138.99	22.72
	ULS Min	358.92	50.31	783.68	108.22	-570.07	-601.33	-603.1	-596.57	-749.39	-755.31	-677.07	-682.91	-146.66	13.88
IY Bending	ULS Max	540.18	0	25.86	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-481.76	-51.6	0	-15.03	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.54	0	0.06	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.44	-0.49	0	-1.02	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	5	17	10	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		454	343	184	108	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		813	410	968	225	-545	-576	-578	-571	-727	-733	-655	-661	-139	23
Compression Combined Force (kN) =		-95	-293	600	0	-570	-601	-603	-597	-749	-755	-677	-683	-147	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.21	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	0.00	0.15	0.16	0.16	0.16	0.22	0.23	0.20	0.20	0.47	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	159.93	11.6	218.36	53.5	201.55	-197.52	-202.14	-148.14	-161.82	-179.74	-160.74	-50.57	-135.93	-19.62	29.32
	ULS Min	154.55	-1.72	204.35	8.93	201.55	-220.51	-225.13	-171.13	-184.82	-202.73	-183.73	-73.56	-158.93	-28.45	20.94
IY Bending	ULS Max	240.41	10.43	17.11	11.78	98.31	0	0	0	0	0	0	0	0	0	0
	ULS Min	-212.34	-19.73	-7.42	-15.88	98.31	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.11	3.7	3.4	5.69	17.43	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6.4	0	0	0	17.43	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		227	147	128	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		387	158	346	176	504	-198	-202	-148	-162	-180	-161	-51	-136	-20	29
Compression Combined Force (kN) =		-72	-149	77	-114	-101	-221	-225	-171	-185	-203	-184	-74	-159	-28	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.08	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.05	0.05	0.02	0.04	0.09	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	25188.56	25188.56	3528.55	1720.71	2043.68	1734.83	813.03
	ULS Min	0	0	-1037	-10	-12	-10	-542
Shear	Fz Max	9970	9970	1395	2322	2458	2289	1190
	Fz Min	-9879	-9879	-1396	-345	-2380	-335	-373
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.462	0.614	0.175	0.165	0.166	0.166	0.155
		0.275	0.521	0.259	0.556	0.588	0.548	0.518

Case 5 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-16663	-16636	-15954	-15696	-13071	-12997	-11271	-11237	-11134	-9479	-9466	-8641	-9831	-9570	-10687	-10653	-10391
	ULS Min	-16693	-16647	-15996	-15853	-13208	-13134	-11332	-11271	-11229	-9510	-9476	-8841	-9968	-9707	-10748	-10687	-10486
IY Bending	ULS Max	199	327	327	255	92	100	205	205	111	0	-74	133	148	132	142	147	147
	ULS Min	0	199	87	48	33	87	100	111	50	-74	-131	-129	79	83	132	142	-20
IZ Bending	ULS Max	1320	1689	2954	9895	2025	268	268	-12	555	1326	1741	9269	2178	-17	1113	1113	12
	ULS Min	0	1320	1533	3082	-375	-375	-12	-172	-172	0	1326	1627	-17	-767	-767	-80	-80
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	4.174	6.862	6.866	5.352	2.572	2.808	6.542	6.542	3.524	1.561	2.743	2.782	4.147	3.717	4.516	4.674	4.674
	Stress due to bending Z	25.039	32.027	56.022	187.635	46.926	8.696	9.509	6.097	19.698	25.138	33.017	175.770	50.467	17.775	39.503	39.503	2.829
Force (kn) =		5007	6665	10779	33076	7868	1829	1709	1346	2472	4576	6129	30602	8682	3416	4686	4703	799
Tension Combined Force (kN) =		-11656	-9971	-5175	17380	-5203	-11168	-9562	-9892	-8662	-4903	-3337	21961	-1149	-6153	-6000	-5950	-9592
Compression Combined Force (kN) =		-21700	-23312	-26775	-48929	-21077	-14963	-13041	-12616	-13701	-14085	-15605	-39443	-18650	-13123	-15434	-15390	-11284
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.31	NA	NA	NA	NA	NA	NA	NA	0.39	NA	NA	NA	NA	NA
		0.34	0.36	0.41	0.76	0.33	0.23	0.35	0.34	0.37	0.22	0.24	0.61	0.29	0.20	0.42	0.41	0.30

Case 5 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5672	-5655	-4467	-4196	-2946	-2705	-1816	-1549	-1404	-785	-763	256	-413	-381	-787	-688	-1100
	ULS Min	-5685	-5660	-4485	-4265	-3024	-2783	-1894	-1627	-1435	-798	-767	169	-491	-459	-865	-766	-1131
IY Bending	ULS Max	32	32	200	163	49	48	61	152	137	0	-50	53	57	51	64	147	158
	ULS Min	0	-40	-32	-4	-17	48	46	60	-119	-68	-79	-49	38	38	51	64	-182
IZ Bending	ULS Max	538	589	864	4287	720	44	44	-10	448	417	494	3993	767	-38	36	36	-51
	ULS Min	0	538	745	1104	-136	-135	-11	-86	-88	0	436	611	-109	-109	-38	-179	-179
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.616	2.059	10.204	8.288	2.506	2.449	3.132	7.770	6.988	3.452	4.045	2.703	2.932	2.621	3.268	7.515	9.270
	Stress due to bending Z	15.989	17.489	25.667	127.347	21.375	3.996	1.320	2.563	13.320	12.389	14.662	118.607	22.784	3.241	1.127	5.314	5.316
Force (kn) =		1375	1526	2801	10590	1865	503	348	807	1586	1237	1461	9471	2008	458	343	1002	1139
Tension Combined Force (kN) =		-4297	-4129	-1666	6394	-1081	-2202	-1468	-742	181	452	698	9728	1595	77	-443	314	39
Compression Combined Force (kN) =		-7060	-7186	-7286	-14854	-4889	-3287	-2241	-2434	-3021	-2035	-2228	-9302	-2499	-917	-1208	-1768	-2269
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.29	NA	NA	NA	NA	0.01	0.02	0.03	0.45	0.07	0.00	NA	0.01	0.00
		0.34	0.35	0.35	0.72	0.23	0.16	0.11	0.12	0.14	0.10	0.11	0.45	0.12	0.04	0.06	0.08	0.11

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	779.65	779.65	397.79	411.45	605.14	146.99	1214.94	1127.8	749.02	794.6	772.53	839.91	458.98	410.2	-35.82	-29.53	126.6	-681.01
	ULS Min	-315.01	-315.01	176.28	196.52	162.79	-0.5	-2025.85	-1647.04	-1297.24	-1144.7	-1256.42	-1116.08	-1055.73	-848.18	-592.35	-547.42	-38.1	-836.67
IY Bending	ULS Max	0	0	56.3	55.39	49.52	44.03	14	0	17.48	28.11	18.33	39.99	10.91	36.52	6.84	28.99	0	28.16
	ULS Min	0	0	0	0	0	0	-40.94	0	-33.28	-4.7	-31.72	-0.89	-34.03	0	-26.41	0	0	0
IZ Bending	ULS Max	0	0	82.57	111.83	72.89	38.15	98.31	0	91.44	31.9	72.12	5.01	75.94	8.73	77.33	9.91	0	7.25
	ULS Min	0	0	-70.7	-101.88	-111.48	-80.32	-51.72	0	-45.38	-35.3	-21.69	-8.98	-26.79	-12.21	-27.69	-10.3	0	-8.2
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	19	17	15	17	0	14	12	13	17	14	15	11	12	0	10
	Stress Z	0	0	9	12	12	9	11	0	10	4	8	1	9	1	9	1	0	1
Force (kn) =		0	0	512	564	526	431	453	0	389	253	344	285	366	267	317	213	0	191
Tension Combined Force (kN) =		780	780	910	975	1131	578	1668	1128	1138	1047	1116	1125	825	678	282	184	127	-490
Compression Combined Force (kN) =		-315	-315	-336	-367	-363	-432	-2479	-1647	-1686	-1397	-1600	-1401	-1422	-1115	-910	-761	-38	-1027
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.15	0.20	0.21	0.25	0.13	0.40	0.27	0.27	0.25	0.27	0.27	0.20	0.16	0.07	0.04	0.03	NA
		0.01	0.09	0.10	0.11	0.10	0.12	0.77	0.51	0.52	0.43	0.49	0.43	0.44	0.34	0.28	0.23	0.01	0.29

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	739.42	498.24	378.4	394.09	590.03	81.64	1006.18	1143.82	680.88	678.97	746.05	742.52	375.53	454.03	-20.76	-48.09	-492.91	150.01
	ULS Min	-311.8	208.43	176.74	224.62	196.29	-24.53	-1509.62	-1776.04	-1050.46	-1170.92	-1054.75	-1155.2	-808.92	-1002.58	-528.83	-605.1	-606.19	-34.26
IY Bending	ULS Max	0	56.37	51.32	48.71	44.77	42.75	7.18	72.46	37.04	17.87	38.37	17.32	34.6	10.74	27.96	7.71	24.2	0
	ULS Min	0	-109.64	0	0	0	0	-16.24	-2.41	-7.63	-32.57	0	-31.44	0	-33.7	0	-26.04	0	0
IZ Bending	ULS Max	0	29.74	34.69	38.83	37.15	34.07	112.52	37.19	17.02	23.07	6.49	14.67	6.16	16.27	6.97	17.47	2.16	0
	ULS Min	0	-52.53	-12.74	-10.2	-10.38	-9.82	-65.45	-39.02	-12.99	-71.37	-1.61	-65.89	-1.98	-68.52	-1.61	-75.69	-9.95	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	32	18	17	16	15	7	30	15	14	16	13	14	14	12	11	9	0
	Stress Z	0	5	4	4	4	4	13	4	2	8	1	7	1	8	1	9	1	0
Force (kn) =		0	678	388	380	352	333	313	557	280	348	269	330	243	350	200	312	169	0
Tension Combined Force (kN) =		739	1176	766	774	942	415	1319	1701	960	1027	1015	1073	619	804	180	264	-324	150
Compression Combined Force (kN) =		-312	-469	-211	-155	-156	-358	-1823	-2333	-1330	-1519	-1324	-1486	-1052	-1353	-729	-917	-775	-34
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.17	0.21	0.09	0.32	0.41	0.23	0.25	0.24	0.26	0.15	0.19	0.04	0.06	NA	0.03
		0.01	0.13	0.06	0.04	0.04	0.10	0.56	0.72	0.41	0.47	0.41	0.46	0.32	0.42	0.22	0.28	0.22	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	430.22	417.23	893.76	179.36	1212.77	1125.45	622.02	677.99	245.44	182.77	-197.84	-157.35	-104.79	23.14
	ULS Min	272.62	-265.02	641.19	-466.89	-2352.85	-2430.86	-1949.78	-1890.98	-1765.5	-1823.62	-1275.79	-1239.77	-188.65	13.1
IY Bending	ULS Max	8165.5	0	28.98	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8932.77	-58.51	0	-16.01	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	146.16	237.18	73.42	268.47	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.77	-113.88	-35.15	-99.38	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	90	19	11	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	17	6	22	0	0	0	0	0	0	0	0	0	0
Force (kn) =		7795	740	314	509	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8225	1157	1208	689	1213	1125	622	678	245	183	-198	-157	-105	23
Compression Combined Force (kN) =		-7522	-1005	327	-976	-2353	-2431	-1950	-1891	-1766	-1824	-1276	-1240	-189	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.40	0.22	0.26	0.15	0.23	0.22	0.12	0.13	0.05	0.04	NA	NA	NA	0.02
		0.48	0.25	NA	0.27	0.62	0.64	0.51	0.50	0.53	0.55	0.38	0.37	0.61	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	242.07	208.04	300.8	111.52	140.22	647.23	608.84	403.03	423.18	299.37	279.14	320.07	283.62	46.09	32.19
	ULS Min	-15.2	-231.3	4.15	-70.5	80.86	-960.87	-966.36	-646.81	-651.48	-566.63	-552.09	-386.24	-447.12	-76.9	19.56
IY Bending	ULS Max	3982.61	15.79	20.35	16.2	114.79	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4329.07	-22.67	-13.44	-18.58	89.29	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	168.88	240.11	97.88	267.68	121.14	0	0	0	0	0	0	0	0	0	0
	ULS Min	-100.83	-120.68	-56.13	-136.98	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	52	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	13	24	10	26	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4362	545	301	559	626	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4604	753	602	671	766	647	609	403	423	299	279	320	284	46	32
Compression Combined Force (kN) =		-4377	-776	-297	-630	-545	-961	-966	-647	-651	-567	-552	-386	-447	-77	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.28	0.18	0.14	0.16	0.06	0.14	0.13	0.09	0.09	0.07	0.06	0.07	0.06	0.04	0.03
		0.34	0.30	0.11	0.24	0.06	0.25	0.25	0.17	0.17	0.15	0.15	0.10	0.12	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	26714.54	26714.54	2344.62	1913.45	1973.07	1882.2	495.89
	ULS Min	0	0	-1107	-10	-12	-17	-493
Shear	Fz Max	10539	10539	967	2570	2579	2484	1144
	Fz Min	-10591	-10591	-1020	-268	-2598	-268	-663
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.490	0.651	0.116	0.183	0.160	0.180	0.094
		0.292	0.554	0.189	0.615	0.622	0.594	0.498

Case 5 - ULS V1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-15088	-15066	-14247	-13974	-13174	-12979	-12616	-12582	-12394	-14749	-14735	-13822	-13074	-12901	-12574	-12541	-12366
	ULS Min	-15118	-15077	-14290	-14130	-13311	-13116	-12677	-12616	-12489	-14779	-14746	-14021	-13211	-13038	-12636	-12574	-12461
IY Bending	ULS Max	0	-54	-41	88	89	129	152	164	164	26	35	97	96	134	148	156	156
	ULS Min	-54	-78	-75	87	86	85	129	152	-17	0	26	37	83	83	134	148	-3
IZ Bending	ULS Max	0	-48	119	472	-53	329	329	-56	282	95	127	158	189	189	58	269	269
	ULS Min	-48	-56	-15	267	-200	-200	-56	-266	-266	0	95	-17	171	-330	-330	58	-283
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.130	1.635	1.580	1.845	2.493	3.624	4.845	5.239	5.239	0.554	0.734	2.027	2.685	3.756	4.727	4.976	4.976
	Stress due to bending Z	0.905	1.063	2.255	8.952	4.640	7.621	11.673	9.430	9.994	1.800	2.411	2.999	4.373	7.644	11.708	9.541	10.029
Force (kn) =		349	462	657	1850	1134	1788	1758	1562	1622	403	539	861	1122	1812	1750	1545	1597
Tension Combined Force (kN) =		-14739	-14604	-13590	-12123	-12040	-11191	-10857	-11021	-10773	-14345	-14196	-12960	-11952	-11089	-10825	-10995	-10769
Compression Combined Force (kN) =		-15467	-15539	-14947	-15981	-14445	-14903	-14435	-14177	-14111	-15182	-15285	-14882	-14333	-14850	-14385	-14120	-14058
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.24	0.24	0.23	0.25	0.22	0.23	0.39	0.38	0.38	0.23	0.24	0.23	0.22	0.23	0.39	0.38	0.38

Case 5 - ULS V1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4343	-4332	-3154	-2831	-2541	-2439	-2230	-2075	-2200	-4016	-3997	-2755	-2454	-2336	-2080	-1893	-1965
	ULS Min	-4356	-4337	-3173	-2900	-2619	-2517	-2308	-2153	-2231	-4030	-4002	-2842	-2532	-2414	-2159	-1972	-1996
IY Bending	ULS Max	5	11	14	58	55	55	56	178	173	11	14	40	42	53	58	187	189
	ULS Min	0	5	-38	-21	36	35	54	55	-176	0	5	6	41	40	53	58	-236
IZ Bending	ULS Max	0	-68	-36	282	-28	55	55	114	338	35	65	97	102	19	35	39	39
	ULS Min	-68	-85	-126	168	-42	-27	-46	-45	114	0	30	34	19	-56	-56	35	-563
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.251	0.566	1.953	2.981	2.782	2.780	2.868	9.059	8.963	0.573	0.724	2.038	2.127	2.707	2.935	9.525	12.042
	Stress due to bending Z	2.030	2.537	3.728	8.378	1.256	1.631	1.626	3.398	10.027	1.051	1.941	2.889	3.033	1.652	1.652	1.165	16.709
Force (kn) =		178	242	444	887	315	344	351	973	1483	127	208	385	403	340	358	835	2245
Tension Combined Force (kN) =		-4165	-4090	-2711	-1944	-2226	-2095	-1879	-1102	-717	-3890	-3789	-2370	-2051	-1995	-1722	-1059	280
Compression Combined Force (kN) =		-4534	-4579	-3616	-3786	-2934	-2862	-2659	-3125	-3713	-4156	-4210	-3227	-2935	-2754	-2517	-2806	-4240
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.22	0.22	0.18	0.18	0.14	0.14	0.13	0.15	0.17	0.20	0.20	0.16	0.14	0.13	0.12	0.13	0.20

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	227.18	227.18	351.89	386.72	489.04	231.98	-357.01	-379.29	-222.77	-241.87	-183.98	-207.1	-266.75	-281.46	-298.54	-306.9	-114.02	-886.74
	ULS Min	227.18	227.18	340.51	365.69	453.86	174.53	-398.32	-424.86	-266.89	-296.46	-229.12	-259.16	-311.71	-335.55	-344.14	-358.82	-127.18	-897.6
IY Bending	ULS Max	0	0	39.95	41.58	40.57	38.93	1.92	0	4.73	17.35	4.73	22.14	2.16	24.93	3.61	25.64	0	29.17
	ULS Min	0	0	0	0	0	0	-21.6	0	-22.55	0	-21.95	0	-28.69	0	-24.08	0	0	0
IZ Bending	ULS Max	0	0	0	0.31	0	0	0	0	0.57	1.12	0	0.27	0	0.94	0	2.81	0	0
	ULS Min	0	0	-6.36	-9.08	-40.32	-45.99	-1.21	0	-0.41	0	-0.65	0	-3.62	0	-6.22	0	0	-6.05
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	13	9	0	9	7	9	9	12	10	10	11	0	10
	Stress Z	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	262	277	332	333	147	0	152	119	149	149	199	169	173	177	0	193
	Tension Combined Force (kN) =	227	227	614	664	821	565	-210	-379	-70	-123	-35	-58	-68	-112	-126	-130	-114	-694
	Compression Combined Force (kN) =	227	227	79	88	122	-158	-546	-425	-419	-415	-378	-408	-511	-505	-517	-536	-127	-1091
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.13	0.15	0.18	0.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.05	0.17	0.13	0.13	0.13	0.12	0.13	0.16	0.16	0.16	0.17	0.04	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	270.79	435.53	348.77	381.28	482.27	165.18	-316.68	-302.71	-220.41	-245.13	-183.08	-200.77	-253.96	-284.31	-289.62	-331.37	-637.14	-107.93
	ULS Min	270.79	425.58	347.46	380.13	480.49	161.3	-364.99	-371.98	-275.51	-289.27	-235.22	-246.02	-308.54	-329.43	-342.14	-376.28	-649.52	-121.09
IY Bending	ULS Max	0	0	39.32	39.33	39.61	40.87	0	43.36	16.17	4.84	21.73	4.73	23.58	2.45	24.88	4.4	24.65	0
	ULS Min	0	-33.36	0	0	0	0	-4.94	0	0	-22.63	0	-21.96	0	-28.77	0	-24.2	0	0
IZ Bending	ULS Max	0	0	0	1.33	0	1.65	0	2.72	0.92	0	0.5	0	0	0.85	0.75	0.87	0.26	0
	ULS Min	0	-2.14	-1.58	0	-0.93	0	-3.72	0	0	-1.62	0	-0.26	-0.48	0	0	0	-0.54	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	10	14	14	14	14	2	18	7	9	9	9	10	12	10	10	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	182	249	248	249	259	40	296	110	155	147	148	159	195	168	164	155	0
	Tension Combined Force (kN) =	271	617	597	630	732	424	-277	-7	-110	-90	-36	-53	-95	-90	-121	-167	-482	-108
	Compression Combined Force (kN) =	271	244	99	132	231	-97	-405	-668	-386	-444	-382	-394	-468	-524	-511	-540	-804	-121
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.12	0.13	0.14	0.16	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.03	0.13	0.21	0.12	0.14	0.12	0.12	0.14	0.16	0.16	0.17	0.23	0.03

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	410.55	77.99	914.15	135.79	-631.32	-661.14	-680.46	-675.07	-846.35	-850.5	-773.19	-781.52	-165.62	20.94
	ULS Min	410.55	61.58	914.15	127.41	-656.82	-686.63	-705.95	-700.56	-868.7	-872.85	-795.55	-803.88	-173.29	12.1
IY Bending	ULS Max	609.65	0	32.94	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-515.82	-54.95	0	-14.5	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	3.73	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.54	-0.6	0	-1.26	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	18	13	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		507	366	235	105	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		917	444	1149	241	-631	-661	-680	-675	-846	-851	-773	-782	-166	21
Compression Combined Force (kN) =		-96	-304	680	22	-657	-687	-706	-701	-869	-873	-796	-804	-173	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.05	0.09	0.25	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.08	NA	NA	0.17	0.18	0.19	0.18	0.26	0.26	0.24	0.24	0.56	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	169.01	12.65	237.23	60.05	218.69	-210.49	-216.49	-164.93	-177.79	-193.63	-174.15	-60.33	-153.85	-23.69	29.14
	ULS Min	162.46	-0.87	221.87	10.32	218.69	-233.48	-239.48	-187.93	-200.78	-216.62	-197.15	-83.33	-176.84	-32.53	20.75
IY Bending	ULS Max	252.08	10.39	17.62	11.86	97.28	0	0	0	0	0	0	0	0	0	0
	ULS Min	-219.27	-19.92	-6.66	-15.7	97.28	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.46	4.35	3.75	6.26	18.48	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8.2	0	0	0	18.48	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		246	149	132	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		415	162	369	182	522	-210	-216	-165	-178	-194	-174	-60	-154	-24	29
Compression Combined Force (kN) =		-83	-150	90	-112	-84	-233	-239	-188	-201	-217	-197	-83	-177	-33	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.09	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.06	0.05	0.02	0.05	0.10	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	30014.37	30014.37	3797.09	2077.39	2469.84	2076.42	815.06
	ULS Min	0	0	-1114	-10	-12	-10	-570
Shear	Fz Max	11898	11898	1510	2798	2955	2719	1323
	Fz Min	-11770	-11770	-1538	-376	-2862	-375	-418
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.551	0.732	0.188	0.199	0.200	0.199	0.155
		0.328	0.622	0.285	0.670	0.707	0.651	0.576

Case 5 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-18584	-18559	-17783	-17459	-15012	-14920	-13357	-13323	-13213	-12200	-12186	-11308	-12182	-11941	-12836	-12802	-12565
	ULS Min	-18614	-18570	-17826	-17616	-15149	-15057	-13418	-13357	-13308	-12230	-12197	-11507	-12319	-12078	-12897	-12836	-12660
IY Bending	ULS Max	136	229	230	261	98	113	221	221	149	0	-42	128	140	142	164	176	176
	ULS Min	0	136	34	52	40	94	113	149	3	-42	-81	-79	86	89	142	164	-52
IZ Bending	ULS Max	1120	1438	2639	8709	1753	325	325	-27	557	1185	1561	8078	1946	38	971	971	10
	ULS Min	0	1120	1340	2855	-383	-383	-27	-225	-225	0	1185	1487	38	-754	-754	10	-71
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	2.846	4.811	4.834	5.480	2.764	3.176	7.028	7.028	4.739	0.878	1.691	2.681	3.927	3.973	5.232	5.621	5.622
	Stress due to bending Z	21.233	27.263	50.043	165.150	40.607	8.870	11.549	7.970	19.764	22.472	29.608	153.180	45.080	17.465	34.459	34.459	2.504
Force (kn) =		4127	5497	9405	29245	6894	1915	1978	1597	2609	4002	5364	26713	7790	3408	4226	4267	865
Tension Combined Force (kN) =		-14457	-13062	-8378	11785	-8118	-13006	-11379	-11727	-10605	-8198	-6822	15405	-4392	-8533	-8610	-8535	-11700
Compression Combined Force (kN) =		-22741	-24067	-27231	-46860	-22043	-16972	-15396	-14954	-15917	-16232	-17561	-38220	-20109	-15486	-17123	-17103	-13525
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	NA	NA	NA	0.28	NA	NA	NA	NA	NA
		0.35	0.37	0.42	0.72	0.34	0.26	0.41	0.40	0.43	0.25	0.27	0.59	0.31	0.24	0.46	0.46	0.36

Case 5 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6463	-6447	-5158	-4745	-3599	-3386	-2599	-2357	-2227	-2064	-2043	-942	-1443	-1399	-1697	-1585	-1900
	ULS Min	-6477	-6452	-5177	-4813	-3677	-3464	-2677	-2435	-2257	-2077	-2048	-1029	-1521	-1477	-1775	-1663	-1930
IY Bending	ULS Max	27	27	151	125	49	55	61	187	172	0	-33	51	56	58	63	185	194
	ULS Min	0	-28	-20	13	1	48	54	59	-170	-45	-53	-33	41	41	57	63	-237
IZ Bending	ULS Max	413	452	736	3771	615	62	63	-27	559	379	466	3541	707	-58	47	47	-130
	ULS Min	0	413	550	1166	-130	-129	-29	-35	-37	0	392	543	-84	-84	-58	-130	-312
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.359	1.416	7.705	6.362	2.492	2.825	3.087	9.519	8.764	2.288	2.681	2.618	2.865	2.949	3.201	9.433	12.091
	Stress due to bending Z	12.277	13.425	21.867	112.003	18.268	3.830	1.869	1.046	16.612	11.271	13.841	105.171	21.011	2.501	1.724	3.850	9.265
Force (kn) =		1065	1159	2309	9241	1621	520	387	825	1981	1059	1290	8416	1864	425	385	1037	1667
Tension Combined Force (kN) =		-5399	-5289	-2849	4497	-1978	-2866	-2212	-1533	-245	-1005	-753	7474	421	-974	-1312	-548	-232
Compression Combined Force (kN) =		-7541	-7611	-7485	-14055	-5298	-3984	-3064	-3260	-4239	-3135	-3338	-9445	-3385	-1903	-2159	-2701	-3598
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.21	NA	NA	NA	NA	NA	NA	NA	0.34	0.02	NA	NA	NA	NA
		0.36	0.37	0.36	0.68	0.25	0.19	0.15	0.16	0.20	0.15	0.16	0.46	0.16	0.09	0.10	0.13	0.17

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	725.59	725.59	456	475.92	664.89	279.25	920.54	838.17	568.35	597.4	598.95	646.5	303.83	252.49	-115.54	-113.67	-57.93	-832.94
	ULS Min	-212.69	-212.69	266.13	291.69	285.73	134.63	-1863.32	-1546.97	-1192	-1072.84	-1146.74	-1037.47	-1001.07	-834.06	-599.43	-565.23	-200.98	-967.31
IY Bending	ULS Max	0	0	54.09	53.99	48.5	42.69	11.88	0	15.55	25.38	16.33	38.96	9.25	36.89	5.81	30.42	0	30.55
	ULS Min	0	0	0	0	0	0	-38.82	0	-32.49	-2.74	-30.89	0	-34.78	0	-27.72	0	0	0
IZ Bending	ULS Max	0	0	68.28	92.01	47.24	27.15	83.36	0	77.51	28.35	61.69	4.35	64.23	7.86	63.79	9.39	0	4.51
	ULS Min	0	0	-63.1	-91.17	-110.8	-85.65	-45.65	0	-39.76	-29.24	-18.73	-7.74	-23.85	-10.28	-26.26	-8.13	0	-9.38
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	16	0	14	11	13	16	14	15	12	13	0	11
	Stress Z	0	0	7	10	12	9	9	0	9	3	7	1	7	1	7	1	0	1
	Force (kn) =	0	0	471	516	518	433	412	0	359	223	319	276	350	266	302	221	0	208
	Tension Combined Force (kN) =	726	726	927	992	1183	713	1332	838	927	821	918	922	654	519	186	108	-58	-625
	Compression Combined Force (kN) =	-213	-213	-205	-225	-233	-299	-2275	-1547	-1551	-1296	-1466	-1313	-1351	-1100	-901	-786	-201	-1175
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.20	0.22	0.26	0.16	0.32	0.20	0.22	0.20	0.22	0.22	0.16	0.12	0.04	0.03	NA	NA
		0.01	0.06	0.06	0.06	0.07	0.09	0.70	0.48	0.48	0.40	0.45	0.40	0.42	0.34	0.28	0.24	0.06	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	731.77	566.05	439.44	461.35	654.29	209.71	762.3	870.88	508.24	497.52	576.08	563.87	233.86	289.9	-96.3	-139.75	-599	-47.31
	ULS Min	-169.27	314.78	266.59	316.09	316.79	117.26	-1402.14	-1645	-983.82	-1094.56	-974.87	-1069.44	-789.47	-965.24	-539.72	-623.81	-697.53	-207.13
IY Bending	ULS Max	0	36.2	48.59	47.35	44.03	42.4	5.28	71.18	35.01	15.96	37.35	15.55	34.73	9.25	29.16	6.89	25.75	0
	ULS Min	0	-106.09	0	0	0	0	-14.8	0	-3.28	-31.78	0	-30.54	0	-34.43	0	-27.5	0	0
IZ Bending	ULS Max	0	26.23	29.25	33.75	31.5	30.95	96.17	32.09	15.01	19.11	5.81	12.61	5.2	14.21	6.37	15.61	2.41	0
	ULS Min	0	-44.72	-11.45	-8.28	-9.38	-6.85	-56.38	-33.92	-10.71	-61.84	-1.24	-56.44	-1.92	-58.49	-1.15	-64.27	-8	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	31	17	16	15	15	6	30	15	13	16	13	14	14	12	11	9	0
	Stress Z	0	4	3	4	3	3	11	4	2	7	1	6	1	7	1	7	1	0
	Force (kn) =	0	645	360	361	336	325	274	539	262	325	261	307	243	337	207	301	175	0
	Tension Combined Force (kN) =	732	1211	800	823	991	535	1036	1410	770	823	837	871	476	627	111	161	-424	-47
	Compression Combined Force (kN) =	-169	-330	-94	-45	-20	-208	-1676	-2184	-1246	-1420	-1236	-1377	-1032	-1302	-747	-925	-873	-207
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.24	0.17	0.18	0.22	0.12	0.25	0.34	0.19	0.20	0.20	0.21	0.11	0.15	0.03	0.04	NA	NA
		0.01	0.09	0.03	0.01	0.01	0.06	0.52	0.68	0.38	0.44	0.38	0.42	0.32	0.40	0.23	0.28	0.24	0.06

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	490.2	384.81	1032.38	193.61	870.19	771.29	328.08	380.69	-32.54	-90.9	-406.16	-371.18	-139.37	20.96
	ULS Min	355.12	-213.01	815.89	-363.24	-2189.7	-2280.62	-1879.96	-1824.93	-1759.4	-1813.85	-1333.32	-1302.16	-212.35	11.09
IY Bending	ULS Max	7049.43	0	36.95	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7864.34	-61.39	0	-15.17	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	129.57	203.11	62.93	229.72	0	0	0	0	0	0	0	0	0	0
	ULS Min	-56.37	-97.8	-30.13	-85.58	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	80	20	15	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	15	5	19	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6866	709	356	446	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		7356	1094	1388	640	870	771	328	381	-33	-91	-406	-371	-139	21
Compression Combined Force (kN) =		-6511	-922	460	-810	-2190	-2281	-1880	-1825	-1759	-1814	-1333	-1302	-212	11
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.36	0.21	0.30	0.14	0.17	0.15	0.06	0.07	NA	NA	NA	NA	NA	0.02
		0.41	0.23	NA	0.23	0.58	0.60	0.50	0.48	0.53	0.54	0.40	0.39	0.68	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	280.94	185.47	365.15	119.09	238.46	471.39	435.31	262.23	271.18	170.17	163.47	223.29	152.55	23.43	31.01
	ULS Min	62.19	-191.11	105.74	-36.92	184.36	-910.26	-918.15	-640.93	-653.25	-575.4	-552.31	-385.4	-477.07	-83.25	18.99
IY Bending	ULS Max	3484.73	14.8	20.87	15.04	109.9	0	0	0	0	0	0	0	0	0	0
	ULS Min	-3812.82	-22.96	-9.45	-17.63	89.26	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	141.22	206.37	84.42	229.9	101	0	0	0	0	0	0	0	0	0	0
	ULS Min	-89.95	-102.87	-47.59	-116.95	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	46	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	11	20	8	23	6	0	0	0	0	0	0	0	0	0	0
Force (kn) =		3803	493	284	492	559	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4084	678	649	611	797	471	435	262	271	170	163	223	153	23	31
Compression Combined Force (kN) =		-3741	-684	-178	-529	-374	-910	-918	-641	-653	-575	-552	-385	-477	-83	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.24	0.16	0.16	0.15	0.07	0.10	0.10	0.06	0.06	0.04	0.04	0.05	0.03	0.02	0.02
		0.29	0.26	0.07	0.20	0.04	0.24	0.24	0.17	0.17	0.15	0.15	0.10	0.13	0.27	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	31763.88	31763.88	3863.09	2233.49	2337.25	2228.55	964.4
	ULS Min	0	0	-1453	-10	-12	-16	-670
Shear	Fz Max	12462	12462	1492	3002	3075	2939	1553
	Fz Min	-12501	-12501	-1523	-388	-3055	-366	-671
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.583	0.775	0.192	0.214	0.190	0.213	0.184
		0.344	0.654	0.283	0.718	0.736	0.703	0.676

Case 5 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-19366	-19340	-18576	-18240	-15384	-15318	-13455	-13422	-13331	-11470	-11456	-10588	-11871	-11613	-12814	-12781	-12528
	ULS Min	-19396	-19350	-18619	-18396	-15521	-15455	-13517	-13455	-13426	-11500	-11467	-10787	-12008	-11750	-12876	-12814	-12622
IY Bending	ULS Max	183	306	307	304	101	108	236	236	143	0	-59	135	150	143	167	180	180
	ULS Min	0	183	53	42	27	96	108	143	10	-59	-109	-107	85	90	143	167	-61
IZ Bending	ULS Max	1412	1811	3269	10767	2205	322	322	-19	624	1457	1920	10103	2389	-1	1199	1199	-16
	ULS Min	0	1412	1679	3502	-427	-427	-19	-213	-213	0	1457	1819	-1	-858	-858	-56	-56
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	3.839	6.422	6.436	6.386	2.834	3.039	7.521	7.521	4.549	1.236	2.296	2.825	4.211	4.003	5.307	5.719	5.719
	Stress due to bending Z	26.772	34.351	61.990	204.175	51.076	9.896	11.438	7.546	22.152	27.635	36.401	191.581	55.349	19.868	42.549	42.549	1.998
Force (kn) =		5246	6988	11728	36088	8570	2056	2018	1604	2843	4948	6632	33319	9468	3795	5095	5139	822
Tension Combined Force (kN) =		-14119	-12352	-6849	17849	-6814	-13262	-11437	-11818	-10488	-6522	-4824	22731	-2403	-7819	-7719	-7642	-11706
Compression Combined Force (kN) =		-24642	-26338	-30347	-54484	-24091	-17511	-15535	-15060	-16268	-16448	-18099	-44107	-21476	-15545	-17970	-17953	-13444
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.32	NA	NA	NA	NA	NA	NA	NA	0.41	NA	NA	NA	NA	NA
		0.38	0.41	0.47	0.84	0.37	0.27	0.42	0.41	0.44	0.25	0.28	0.68	0.33	0.24	0.48	0.48	0.36

Case 5 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6983	-6966	-5650	-5214	-3855	-3614	-2682	-2419	-2226	-1565	-1544	-480	-1182	-1156	-1592	-1500	-1877
	ULS Min	-6996	-6971	-5668	-5283	-3933	-3692	-2760	-2497	-2257	-1579	-1549	-568	-1260	-1235	-1670	-1578	-1908
IY Bending	ULS Max	32	32	198	161	52	55	61	188	171	0	-42	54	59	59	64	184	194
	ULS Min	0	-38	-28	1	-13	51	53	59	-169	-59	-69	-42	41	41	58	64	-237
IZ Bending	ULS Max	534	586	929	4671	779	64	65	-23	614	465	566	4402	859	-58	50	50	-172
	ULS Min	0	534	719	1387	-155	-154	-24	-73	-75	0	483	670	-110	-110	-58	-172	-248
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.633	1.916	10.120	8.214	2.641	2.813	3.121	9.595	8.717	3.001	3.530	2.744	3.030	2.986	3.248	9.365	12.071
	Stress due to bending Z	15.856	17.418	27.604	138.752	23.151	4.582	1.924	2.174	18.246	13.825	16.815	130.745	25.503	3.268	1.736	5.098	7.374
Force (kn) =		1365	1510	2945	11475	2014	577	394	919	2105	1314	1588	10422	2228	488	389	1129	1518
Tension Combined Force (kN) =		-5617	-5456	-2704	6260	-1841	-3036	-2288	-1500	-121	-252	44	9942	1046	-668	-1203	-371	-359
Compression Combined Force (kN) =		-8362	-8480	-8614	-16757	-5947	-4269	-3154	-3416	-4362	-2892	-3138	-10990	-3487	-1723	-2060	-2707	-3426
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.29	NA	NA	NA	NA	NA	NA	0.00	0.46	0.05	NA	NA	NA	NA
		0.40	0.41	0.42	0.81	0.28	0.20	0.15	0.16	0.20	0.14	0.15	0.53	0.17	0.08	0.10	0.13	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	848.86	848.86	480.15	497.29	709.85	287.08	1241.98	1144.64	767.63	808.73	795.99	861.21	448.36	387.96	-67.91	-64.14	-39.47	-817.81
	ULS Min	-323.99	-323.99	242.81	267.01	235.9	119.3	-2227.52	-1825.36	-1421.79	-1265.4	-1374.85	-1230.71	-1171.52	-956.66	-661.37	-615.57	-215	-983.06
IY Bending	ULS Max	0	0	57.62	57.08	50.48	43.65	14.42	0	18.27	29.1	19.25	43.11	11.06	39.81	6.39	31.55	0	30.86
	ULS Min	0	0	0	0	0	0	-43.04	0	-34.89	-6.05	-33.05	-0.68	-36.17	0	-28.51	0	0	0
IZ Bending	ULS Max	0	0	86.84	117.16	69.24	38.16	104.37	0	96.99	35.27	77.18	5.37	80.99	9.58	81.18	11.02	0	6.63
	ULS Min	0	0	-77.38	-111.82	-128.31	-95.52	-56.76	0	-49.61	-36.72	-23.35	-9.68	-29.09	-12.93	-31.37	-10.71	0	-10.23
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	17	15	18	0	15	12	14	18	15	17	12	13	0	11
	Stress Z	0	0	9	13	14	10	12	0	11	4	9	1	9	1	9	1	0	1
Force (kn) =		0	0	529	584	565	458	478	0	410	262	362	307	390	291	339	232	0	211
Tension Combined Force (kN) =		849	849	1009	1082	1275	746	1720	1145	1178	1071	1158	1168	838	679	271	168	-39	-607
Compression Combined Force (kN) =		-324	-324	-286	-317	-329	-339	-2706	-1825	-1832	-1527	-1737	-1538	-1561	-1247	-1000	-847	-215	-1194
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.17	0.22	0.24	0.28	0.16	0.41	0.28	0.28	0.26	0.28	0.28	0.20	0.16	0.07	0.04	NA	NA
		0.01	0.09	0.08	0.09	0.09	0.10	0.84	0.56	0.56	0.47	0.53	0.47	0.48	0.38	0.31	0.26	0.06	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	845.71	596.21	460.03	479.33	694.79	216.99	1034	1165.95	691.89	684.7	767.17	756.3	357.79	435.32	-46.78	-89.93	-589.32	-27.38
	ULS Min	-280.6	284.65	243.97	297.75	272.92	102.39	-1659.42	-1961.5	-1159.38	-1294.37	-1158.45	-1274.02	-907.7	-1122.33	-587.89	-683.77	-709.38	-223.87
IY Bending	ULS Max	0	53.83	53.14	49.59	45.13	42.79	7.78	78.04	39.68	18.77	41.21	18.28	37.45	10.99	30.16	7.55	26.01	0
	ULS Min	0	-124.03	0	0	0	0	-17.31	-3.43	-8.18	-33.99	0	-32.61	0	-35.72	0	-28.2	0	0
IZ Bending	ULS Max	0	32.96	36.92	41.88	39.54	38.31	121.13	39.43	18.64	24.3	7.14	15.83	6.55	17.54	7.77	19.41	2.96	0
	ULS Min	0	-55.35	-13.91	-10.65	-11.48	-8.83	-69.55	-42.44	-13.5	-76.89	-1.63	-70.48	-2.27	-73.31	-1.52	-80.41	-9.85	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	36	18	17	16	15	7	33	17	14	17	14	16	15	13	12	9	0
	Stress Z	0	5	4	5	4	4	14	5	2	9	1	8	1	8	1	9	1	0
Force (kn) =		0	760	404	391	359	342	336	601	300	368	290	347	263	373	217	335	180	0
Tension Combined Force (kN) =		846	1356	864	871	1054	559	1370	1767	992	1052	1057	1103	621	808	170	245	-409	-27
Compression Combined Force (kN) =		-281	-475	-160	-93	-86	-239	-1995	-2562	-1460	-1662	-1448	-1621	-1171	-1495	-804	-1019	-889	-224
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.26	0.19	0.19	0.23	0.12	0.33	0.43	0.24	0.25	0.25	0.27	0.15	0.19	0.04	0.06	NA	NA
		0.01	0.13	0.05	0.03	0.02	0.07	0.62	0.79	0.45	0.51	0.45	0.50	0.36	0.46	0.25	0.31	0.25	0.06

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	507.67	460.98	1055.6	207.21	1249.68	1133.44	585.08	649.57	176.76	104.8	-308.58	-262.64	-131.55	21.05
	ULS Min	338.82	-282.19	784.99	-486.71	-2568.81	-2675.07	-2168.59	-2101.08	-1976.22	-2043.3	-1461.93	-1420.78	-220.86	10.93
IY Bending	ULS Max	8864.15	0	37.6	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-9699.85	-62.84	0	-15.38	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	161.5	254.02	78.65	287.43	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.92	-122.09	-37.67	-106.65	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	98	21	15	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	8	19	6	23	0	0	0	0	0	0	0	0	0	0
Force (kn) =		8476	794	383	533	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8983	1255	1439	740	1250	1133	585	650	177	105	-309	-263	-132	21
Compression Combined Force (kN) =		-8137	-1076	402	-1019	-2569	-2675	-2169	-2101	-1976	-2043	-1462	-1421	-221	11
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.44	0.24	0.31	0.16	0.24	0.22	0.11	0.12	0.04	0.02	NA	NA	NA	0.02
		0.52	0.27	NA	0.28	0.68	0.70	0.57	0.55	0.59	0.61	0.44	0.43	0.71	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	308.48	228.83	396.22	133.62	242.82	642.48	598.94	369.82	384.19	261.79	248.56	294.79	229.93	35.41	31.49
	ULS Min	35.04	-241.89	74.64	-61.39	176.57	-1078.84	-1087.13	-753.37	-765.6	-664.42	-640.41	-460.33	-551.35	-95.73	18.56
IY Bending	ULS Max	4355.24	15.93	22.21	16.32	113.37	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4710.88	-23.71	-10.18	-18.12	87.75	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	177.84	257.27	104.96	287	130.39	0	0	0	0	0	0	0	0	0	0
	ULS Min	-111.13	-129.29	-60.05	-146.56	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	57	11	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	14	25	10	28	8	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4716	579	326	587	647	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5025	808	722	720	890	642	599	370	384	262	249	295	230	35	31
Compression Combined Force (kN) =		-4681	-821	-251	-648	-471	-1079	-1087	-753	-766	-664	-640	-460	-551	-96	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.30	0.19	0.17	0.17	0.07	0.14	0.13	0.08	0.08	0.06	0.05	0.06	0.05	0.03	0.03
		0.36	0.32	0.10	0.25	0.05	0.28	0.29	0.20	0.20	0.18	0.17	0.12	0.15	0.31	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	32129.58	32129.58	3871.77	2254.64	2341.66	2271.35	1001.85
	ULS Min	0	0	-1535	-10	-12	-18	-691
Shear	Fz Max	12532	12532	1482	3029	3080	2995	1604
	Fz Min	-12613	-12613	-1513	-389	-3079	-363	-732
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.590	0.783	0.192	0.216	0.190	0.218	0.191
		0.347	0.660	0.281	0.725	0.737	0.717	0.698

Case 5 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-7905	-7883	-7150	-6876	-6352	-6149	-5870	-5836	-5615	-7507	-7493	-6665	-6198	-6014	-5764	-5730	-5527
	ULS Min	-7935	-7894	-7192	-7033	-6489	-6286	-5931	-5870	-5710	-7537	-7504	-6864	-6335	-6151	-5825	-5764	-5621
IY Bending	ULS Max	0	-63	-82	46	11	42	42	5	244	29	38	40	8	46	46	-1	262
	ULS Min	-63	-89	-87	-13	-12	11	5	-16	-16	0	29	-7	-8	8	-1	-26	-26
IZ Bending	ULS Max	0	-30	119	355	-27	153	153	-22	120	76	102	134	142	81	22	117	117
	ULS Min	-30	-33	17	267	-95	-95	-22	-117	-117	0	76	78	81	-153	-153	22	-113
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.318	1.871	1.818	0.967	0.348	1.192	1.353	0.518	7.770	0.602	0.801	0.837	0.222	1.279	1.452	0.840	8.348
	Stress due to bending Z	0.565	0.631	2.262	6.729	2.190	3.542	5.425	4.149	4.253	1.439	1.927	2.550	3.287	3.547	5.432	4.155	4.155
Force (kn) =		323	429	699	1319	403	752	722	497	1280	350	468	581	558	767	733	532	1331
Tension Combined Force (kN) =		-7582	-7454	-6450	-5557	-5949	-5397	-5148	-5339	-4335	-7157	-7026	-6084	-5640	-5247	-5031	-5199	-4196
Compression Combined Force (kN) =		-8258	-8322	-7891	-8352	-6893	-7039	-6653	-6367	-6990	-7887	-7972	-7445	-6893	-6918	-6558	-6296	-6952
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.13	0.13	0.12	0.13	0.11	0.11	0.18	0.17	0.19	0.12	0.12	0.12	0.11	0.11	0.18	0.17	0.19

Case 5 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4672	-4661	-3560	-3237	-2896	-2783	-2602	-2463	-2687	-4347	-4328	-3150	-2809	-2680	-2455	-2280	-2462
	ULS Min	-4685	-4666	-3578	-3305	-2974	-2861	-2681	-2541	-2718	-4360	-4332	-3238	-2887	-2758	-2534	-2358	-2493
IY Bending	ULS Max	2	7	10	17	13	14	14	160	156	16	19	12	7	12	12	152	151
	ULS Min	0	2	-42	-26	4	4	3	2	-244	0	11	0	2	7	8	8	-254
IZ Bending	ULS Max	0	-66	-39	279	-32	63	63	86	482	35	66	102	106	23	35	93	92
	ULS Min	-66	-83	-133	184	-44	-32	-47	-45	86	0	30	32	23	-64	-64	35	-752
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.103	0.344	2.124	1.330	0.675	0.724	0.695	8.145	12.453	0.835	0.993	0.615	0.375	0.598	0.595	7.731	12.934
	Stress due to bending Z	1.958	2.460	3.938	8.297	1.296	1.868	1.869	2.546	14.332	1.046	1.958	3.018	3.144	1.897	1.897	2.748	22.326
Force (kn) =		161	219	473	752	154	202	200	835	2091	147	230	284	275	195	195	818	2753
Tension Combined Force (kN) =		-4511	-4442	-3086	-2485	-2742	-2581	-2402	-1628	-596	-4200	-4097	-2867	-2534	-2485	-2261	-1462	291
Compression Combined Force (kN) =		-4846	-4885	-4052	-4057	-3128	-3064	-2881	-3375	-4809	-4507	-4563	-3521	-3162	-2953	-2728	-3176	-5246
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.23	0.24	0.20	0.20	0.15	0.15	0.14	0.16	0.22	0.22	0.22	0.17	0.15	0.14	0.13	0.15	0.24

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	153.55	153.55	229.9	241.6	287.89	34.93	-250.18	-260.59	-134.88	-148.87	-108.77	-127.67	-147.64	-152.71	-147.28	-238.5	58.77	-981.52
	ULS Min	153.55	153.55	221.3	228.69	264.75	-13.77	-291.61	-303.43	-179.67	-200.36	-154.39	-176.93	-193.4	-202.78	-193.36	-286.39	45.6	-991.9
IY Bending	ULS Max	0	0	39.18	40.73	40.1	39.86	7.52	0	7.47	14.44	7.35	18.74	6.09	19.99	6.68	21.54	0	29.77
	ULS Min	0	0	0	0	0	0	-12.42	0	-14.06	0	-13.65	0	-16.73	0	-12.88	0	0	0
IZ Bending	ULS Max	0	0	0	0	0	0	0	0	0.08	1.32	0	0	0	1.03	0	2.98	0	0
	ULS Min	0	0	-6.73	-14.96	-49.69	-56.97	-1.4	0	-0.91	0	-1.48	-0.06	-3.36	0	-7.35	0	0	-6.53
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	5	0	6	6	6	8	7	8	5	9	0	10
	Stress Z	0	0	1	2	5	6	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	258	284	347	360	86	0	96	99	94	126	118	136	100	150	0	198
Tension Combined Force (kN) =		154	154	488	525	635	395	-164	-261	-39	-50	-14	-2	-29	-17	-47	-88	59	-784
Compression Combined Force (kN) =		154	154	-37	-55	-82	-374	-378	-303	-276	-300	-249	-303	-312	-339	-293	-436	46	-1189
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.00	0.03	0.11	0.11	0.14	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01	NA
		NA	NA	0.01	0.02	0.02	0.11	0.12	0.09	0.08	0.09	0.08	0.09	0.10	0.10	0.09	0.13	NA	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	198.5	287.76	223.41	234.03	277.02	-40.07	-202.29	-213.15	-131.87	-149.45	-105.99	-122.9	-125.11	-163.8	-219.14	-180.61	-769.21	106.44
	ULS Min	198.5	280.01	222.26	233.1	274.94	-45.19	-248.33	-278.4	-183.77	-194.16	-155.32	-168.68	-175.6	-209.58	-267.55	-226.11	-780.85	93.28
IY Bending	ULS Max	0	0	39	38.94	39.33	41.43	0	37.6	13.53	7.6	18.23	7.47	18.8	6.35	20.62	7.51	25.88	0
	ULS Min	0	-19.46	0	0	0	0	-11.2	0	0	-14.11	0	-13.62	0	-16.79	0	-12.87	0	0
IZ Bending	ULS Max	0	0	0	1.24	0	2.31	0	2.09	0.88	0	0.43	0.68	0	0.34	0.72	1.71	0.43	0
	ULS Min	0	-1.49	-0.86	0	-1.09	0	-2.86	-0.01	0	-1.09	0	0	-0.42	-0.23	0	0	-0.4	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	6	14	13	14	14	5	16	6	6	8	6	8	7	9	5	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	106	245	246	248	263	80	256	92	97	123	93	127	113	140	90	162	0
Tension Combined Force (kN) =		199	394	469	480	525	223	-122	43	-39	-53	17	-30	2	-50	-79	-91	-607	106
Compression Combined Force (kN) =		199	174	-23	-13	27	-309	-329	-535	-276	-291	-278	-261	-303	-323	-407	-316	-943	93
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.08	0.10	0.10	0.11	0.05	NA	0.01	NA	NA	0.00	NA	0.00	NA	NA	NA	NA	0.02
		NA	NA	0.01	0.00	NA	0.09	0.10	0.17	0.09	0.09	0.09	0.08	0.09	0.10	0.13	0.10	0.26	NA

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	218.45	36.85	429.95	65.76	-312.75	-339.12	-293.24	-292.09	-408.66	-407.99	-324.8	-340.13	-66.45	27.56
	ULS Min	218.45	19.92	429.95	55.92	-338.25	-364.62	-318.74	-317.58	-431.02	-430.34	-347.15	-362.48	-74.12	18.72
IY Bending	ULS Max	351.08	0	6.63	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-374.98	-42.51	0	-16.44	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.89	0	0.07	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.16	-0.16	0	-0.37	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	4	14	3	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		330	282	47	118	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		549	319	477	183	-313	-339	-293	-292	-409	-408	-325	-340	-66	28
Compression Combined Force (kN) =		-112	-262	383	-62	-338	-365	-319	-318	-431	-430	-347	-362	-74	19
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.03	0.06	0.10	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.02	0.09	0.10	0.08	0.08	0.13	0.13	0.10	0.11	0.24	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	188.83	15.35	273.97	64.99	308.69	-233.56	-244.34	-197.32	-206.88	-219.61	-199.5	-78.66	-187.75	-31.57	28.68
	ULS Min	182.09	0.69	253.26	5.23	308.69	-256.55	-267.34	-220.31	-229.87	-242.6	-222.49	-101.65	-210.74	-40.41	20.3
IY Bending	ULS Max	273.59	10.11	18.26	11.6	96.98	0	0	0	0	0	0	0	0	0	0
	ULS Min	-235.44	-20.27	-5.09	-15.38	96.98	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.48	1.75	2.44	6.34	24.05	0	0	0	0	0	0	0	0	0	0
	ULS Min	-0.1	0	0	-0.29	24.05	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		249	148	134	120	317	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		438	163	408	185	626	-234	-244	-197	-207	-220	-200	-79	-188	-32	29
Compression Combined Force (kN) =		-67	-147	119	-115	-8	-257	-267	-220	-230	-243	-222	-102	-211	-40	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.10	0.04	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.00	0.07	0.07	0.06	0.06	0.06	0.06	0.03	0.06	0.13	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	11223.95	11223.95	4545.87	1291.92	4508.98	1197.71	851.46
	ULS Min	0	0	-1472	-26	-12	-24	-673
Shear	Fz Max	4494	4494	1991	184	2054	35	1561
	Fz Min	-4462	-4462	-2020	-459	-1964	-264	-519
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.206	0.274	0.226	0.124	0.366	0.115	0.162
		0.124	0.235	0.375	0.110	0.491	0.063	0.680

Case 5 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-13285	-13259	-12714	-12485	-11172	-11207	-10420	-10386	-10295	-8576	-8563	-8032	-8847	-9008	-9620	-9587	-9651
	ULS Min	-13315	-13270	-12757	-12641	-11309	-11344	-10481	-10420	-10390	-8607	-8573	-8231	-8984	-9146	-9681	-9620	-9746
IY Bending	ULS Max	289	453	454	372	76	113	127	127	112	652	835	836	67	100	100	98	177
	ULS Min	0	289	258	-20	-17	78	113	112	99	0	652	-79	-82	64	98	73	73
IZ Bending	ULS Max	785	957	1863	5322	1077	247	247	-61	456	822	1034	4795	1215	31	47	187	186
	ULS Min	0	785	1189	1956	-265	-265	-61	-239	-239	0	822	1293	31	-290	-290	47	-53
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	6.073	9.511	9.525	7.804	2.137	3.169	4.051	4.051	3.557	13.695	17.522	17.547	2.316	2.811	3.191	3.111	5.628
	Stress due to bending Z	14.883	18.155	35.324	100.923	24.960	6.138	8.757	8.478	16.174	15.589	19.603	90.929	28.158	6.716	10.286	6.619	6.617
Force (kn) =		3592	4742	7687	18635	4307	1480	1364	1334	2101	5019	6363	18592	4844	1514	1435	1036	1304
Tension Combined Force (kN) =		-9693	-8517	-5027	6150	-6865	-9728	-9056	-9052	-8195	-3557	-2200	10560	-4003	-7494	-8185	-8551	-8348
Compression Combined Force (kN) =		-16906	-18011	-20444	-31276	-15617	-12824	-11845	-11754	-12491	-13626	-14936	-26823	-13828	-10660	-11116	-10656	-11050
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.11	NA	NA	NA	NA	NA	NA	NA	0.19	NA	NA	NA	NA	NA
		0.26	0.28	0.32	0.48	0.24	0.20	0.32	0.32	0.34	0.21	0.23	0.41	0.21	0.16	0.30	0.29	0.30

Case 5 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5537	-5522	-4231	-3993	-2713	-2371	-1671	-1388	-1463	-3864	-3844	-2389	-2257	-1810	-1652	-1205	-1244
	ULS Min	-5550	-5527	-4250	-4062	-2792	-2449	-1749	-1466	-1494	-3878	-3848	-2476	-2335	-1888	-1730	-1283	-1275
IY Bending	ULS Max	86	86	172	152	40	43	58	147	150	200	275	277	39	39	53	156	148
	ULS Min	0	85	93	-21	-11	39	42	56	-128	0	198	-38	-41	32	32	53	-159
IZ Bending	ULS Max	335	399	387	3218	496	47	50	84	222	272	357	2955	568	-38	42	42	8
	ULS Min	0	335	167	582	-73	-69	-13	-9	85	0	275	99	-38	-61	-61	8	-356
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	4.409	4.405	8.780	7.744	2.049	2.198	2.950	7.491	7.655	10.187	14.042	14.110	2.096	1.971	2.694	7.949	8.083
	Stress due to bending Z	9.940	11.857	11.486	95.592	14.735	2.046	1.496	2.505	6.596	8.075	10.590	87.778	16.873	1.821	1.821	1.244	10.572
Force (kn) =		1120	1270	1582	8068	1310	331	347	780	1113	1426	1923	7955	1481	296	353	718	1457
Tension Combined Force (kN) =		-4416	-4252	-2649	4075	-1403	-2039	-1324	-608	-350	-2439	-1920	5567	-776	-1514	-1299	-487	212
Compression Combined Force (kN) =		-6670	-6796	-5832	-12130	-4102	-2780	-2096	-2247	-2606	-5303	-5771	-10431	-3816	-2184	-2082	-2001	-2732
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.19	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	0.01
		0.32	0.33	0.28	0.59	0.20	0.13	0.10	0.11	0.12	0.26	0.28	0.50	0.18	0.10	0.10	0.10	0.13

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	693.08	693.08	348.11	360.79	438.46	119.86	1205.23	1087.79	690.48	692.65	608.07	657.75	356.7	420.93	132.8	135.75	197.79	-702.32
	ULS Min	-265.58	-265.58	177.88	234.98	298.01	-77.07	-1942.2	-1620.05	-1186.35	-1061.56	-1030.48	-965.52	-902.33	-848.86	-748.9	-688.98	-66.93	-913.42
IY Bending	ULS Max	0	0	57.29	57.28	53.63	47.11	14.06	0	16.56	26.54	15.76	36.8	10.75	35.32	9.28	31.99	0	29.34
	ULS Min	0	0	0	0	0	0	-39.43	0	-32.63	-3.6	-29.61	0	-32.85	0	-24.92	0	0	0
IZ Bending	ULS Max	0	0	139.55	188.96	140.99	62.08	149.15	0	140.53	38.11	119.58	8.18	127.43	14.06	130.79	14.9	0	13.86
	ULS Min	0	0	-114.88	-165.8	-165.08	-93.61	-65.48	0	-63.86	-44.31	-36.15	-14.95	-43.07	-20.31	-43.49	-18.21	0	-10.74
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	19	16	16	0	14	11	12	15	14	15	10	13	0	10
	Stress Z	0	0	15	20	18	10	17	0	16	5	13	2	14	2	15	2	0	1
Force (kn) =		0	0	629	725	656	476	535	0	474	258	415	274	451	274	404	248	0	208
Tension Combined Force (kN) =		693	693	977	1086	1095	596	1740	1088	1164	951	1024	932	808	695	537	384	198	-494
Compression Combined Force (kN) =		-266	-266	-451	-490	-358	-553	-2477	-1620	-1660	-1320	-1446	-1240	-1354	-1123	-1153	-937	-67	-1122
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.21	0.24	0.24	0.13	0.42	0.26	0.28	0.23	0.25	0.22	0.19	0.17	0.13	0.09	0.04	NA
		0.01	0.07	0.13	0.14	0.10	0.16	0.77	0.50	0.51	0.41	0.45	0.38	0.42	0.35	0.36	0.29	0.02	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	691.14	457.81	318.19	330.36	400.23	69.36	895.01	958.54	542.93	513.04	542.28	480.12	376.95	292.94	139.49	110.72	-501.19	228.93
	ULS Min	-251.64	230.13	214.75	266.57	355.2	-92.03	-1336.57	-1644.05	-871.95	-1036.1	-811.51	-926.08	-761.36	-863.36	-668.97	-779.03	-646.31	-68.27
IY Bending	ULS Max	0	26.73	47.56	46.5	45.16	43.96	5.67	63.52	32.31	16.69	33.03	14.92	32.14	10.77	30.63	10.15	24.56	0
	ULS Min	0	-73.81	0	0	0	0	-16.39	0	-4.42	-31.32	0	-28.87	0	-32.41	0	-25.03	0	0
IZ Bending	ULS Max	0	0	52.49	60.05	61.69	53.73	147.07	30.59	17.44	32.4	10.67	24.52	10.29	26.33	11.28	28.91	3.68	0
	ULS Min	0	-36.87	-15.21	-15.08	-17.11	-12.83	-66.45	-34.48	-11.65	-110.69	-2.75	-109.22	-3.08	-114.4	-2.75	-125.03	-15.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	21	16	16	16	15	7	26	13	13	14	12	13	14	13	10	9	0
	Stress Z	0	4	6	6	7	6	17	4	2	12	1	12	1	13	1	14	2	0
Force (kn) =		0	459	399	407	402	379	377	489	249	411	241	392	234	425	226	395	182	0
Tension Combined Force (kN) =		691	917	717	738	802	448	1272	1447	791	924	783	872	611	718	366	505	-319	229
Compression Combined Force (kN) =		-252	-229	-184	-141	-47	-471	-1713	-2133	-1120	-1447	-1053	-1318	-996	-1288	-895	-1174	-828	-68
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.18	0.16	0.16	0.18	0.10	0.31	0.35	0.19	0.22	0.19	0.21	0.15	0.17	0.09	0.12	NA	0.05
		0.01	0.06	0.05	0.04	0.01	0.14	0.53	0.66	0.35	0.45	0.32	0.41	0.31	0.40	0.28	0.36	0.23	0.02

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	413.67	354.15	858.64	205.02	661.35	647.47	166.55	171.59	-60.3	-65.85	-169.43	-173.77	-93.78	24.13
	ULS Min	250.64	-306.74	631	-59.43	-1772.94	-1770.77	-1310.84	-1311.38	-1372.42	-1366.85	-1107.85	-1123.2	-178.79	13.5
IY Bending	ULS Max	5940.51	0	27.39	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6633.54	-56.93	0	-15.55	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	244.82	393.93	121.84	446.32	0	0	0	0	0	0	0	0	0	0
	ULS Min	-115.28	-188.55	-58.39	-164.17	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	67	19	11	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	12	29	10	36	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6339	962	374	768	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		6753	1316	1233	973	661	647	167	172	-60	-66	-169	-174	-94	24
Compression Combined Force (kN) =		-6089	-1269	257	-827	-1773	-1771	-1311	-1311	-1372	-1367	-1108	-1123	-179	14
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.33	0.25	0.27	0.21	0.13	0.12	0.03	0.03	NA	NA	NA	NA	NA	0.02
		0.39	0.31	NA	0.23	0.47	0.47	0.35	0.35	0.41	0.41	0.33	0.34	0.57	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	251.65	230.75	326.13	158.05	173.59	660.5	636.2	381.93	381.73	194.68	183.38	139.99	90.15	43.94	32.55
	ULS Min	-11.88	-283.54	-8.08	-144.09	75.91	-1008.27	-984.49	-620.64	-637.63	-497.52	-459.39	-206.16	-292.38	-78.14	18.99
IY Bending	ULS Max	4082.39	15.73	22.22	17.45	109.34	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4367.1	-22.15	-14.73	-19.13	91.26	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	280.72	395.31	160.77	443.35	215.57	0	0	0	0	0	0	0	0	0	0
	ULS Min	-166.99	-201.14	-94.89	-228.38	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	53	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	21	39	16	44	13	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4965	788	415	843	867	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5217	1019	741	1001	1040	661	636	382	382	195	183	140	90	44	33
Compression Combined Force (kN) =		-4977	-1072	-423	-987	-791	-1008	-984	-621	-638	-498	-459	-206	-292	-78	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.31	0.25	0.18	0.24	0.09	0.14	0.14	0.08	0.08	0.04	0.04	0.03	0.02	0.04	0.03
		0.38	0.41	0.16	0.38	0.09	0.27	0.26	0.16	0.17	0.13	0.12	0.05	0.08	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	24821.55	24821.55	2477.03	1716.79	2047.37	1728.76	486
	ULS Min	0	0	-898	-10	-12	-22	-455
Shear	Fz Max	9926	9926	1061	2303	2412	2256	1039
	Fz Min	-9767	-9767	-1068	-262	-2343	-281	-465
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.456	0.605	0.123	0.164	0.166	0.166	0.092
		0.273	0.519	0.198	0.551	0.577	0.540	0.452

Case 7 - ULS 1 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-13720	-13698	-12902	-12628	-11876	-11679	-11331	-11298	-11106	-13374	-13360	-12468	-11772	-11597	-11285	-11252	-11073
	ULS Min	-13750	-13709	-12944	-12785	-12013	-11816	-11393	-11331	-11201	-13404	-13371	-12667	-11909	-11734	-11347	-11285	-11168
IY Bending	ULS Max	0	-54	-47	81	75	116	129	136	136	26	35	83	82	120	126	129	129
	ULS Min	-54	-78	-75	75	75	75	116	129	22	0	26	37	73	73	120	126	36
IZ Bending	ULS Max	0	-44	118	453	-48	296	296	-50	252	91	122	152	168	168	51	240	240
	ULS Min	-44	-51	-10	266	-180	-180	-50	-238	-238	0	91	4	166	-296	-296	51	-251
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.133	1.639	1.585	1.705	2.119	3.255	4.107	4.328	4.328	0.548	0.730	1.738	2.297	3.375	4.004	4.095	4.095
	Stress due to bending Z	0.839	0.975	2.245	8.592	4.173	6.847	10.487	8.450	8.957	1.728	2.320	2.887	3.899	6.869	10.519	8.531	8.911
Force (kn) =		338	448	656	1765	1000	1606	1554	1360	1414	390	523	793	985	1628	1546	1344	1385
Tension Combined Force (kN) =		-13382	-13250	-12245	-10863	-10876	-10073	-9777	-9937	-9692	-12984	-12838	-11676	-10787	-9968	-9739	-9908	-9689
Compression Combined Force (kN) =		-14088	-14157	-13601	-14550	-13014	-13422	-12946	-12691	-12615	-13794	-13894	-13460	-12894	-13362	-12893	-12630	-12553
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.22	0.22	0.21	0.23	0.20	0.21	0.35	0.34	0.34	0.21	0.21	0.21	0.20	0.21	0.35	0.34	0.34
Case 7 - ULS 1 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4190	-4179	-3022	-2699	-2411	-2307	-2102	-1947	-2080	-3868	-3849	-2625	-2327	-2206	-1955	-1770	-1853
	ULS Min	-4203	-4183	-3041	-2768	-2489	-2385	-2180	-2025	-2110	-3881	-3854	-2712	-2405	-2284	-2033	-1848	-1883
IY Bending	ULS Max	4	10	13	52	48	48	49	168	163	12	15	34	36	47	51	176	178
	ULS Min	0	4	-38	-20	31	31	47	48	-171	0	5	6	36	36	47	51	-223
IZ Bending	ULS Max	0	-67	-36	282	-26	52	52	104	326	35	65	98	101	17	32	39	39
	ULS Min	-67	-84	-124	164	-41	-26	-44	-43	104	0	30	34	17	-52	-52	32	-535
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.217	0.508	1.926	2.662	2.471	2.453	2.509	8.575	8.706	0.603	0.754	1.756	1.840	2.383	2.583	8.969	11.365
	Stress due to bending Z	1.996	2.502	3.694	8.383	1.224	1.540	1.535	3.091	9.674	1.033	1.917	2.916	2.992	1.557	1.557	1.172	15.905
Force (kn) =		173	235	439	862	288	312	316	911	1435	128	209	365	377	308	323	792	2129
Tension Combined Force (kN) =		-4017	-3944	-2584	-1837	-2122	-1995	-1786	-1036	-645	-3740	-3640	-2260	-1949	-1898	-1631	-978	276
Compression Combined Force (kN) =		-4376	-4418	-3480	-3630	-2777	-2696	-2496	-2936	-3545	-4009	-4062	-3077	-2782	-2592	-2356	-2640	-4013
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.21	0.21	0.17	0.18	0.13	0.13	0.12	0.14	0.16	0.19	0.20	0.15	0.13	0.12	0.11	0.13	0.19

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	207.77	207.77	321.06	351.87	443.22	185.84	-327.36	-347.88	-201.14	-219.29	-165.26	-187.33	-239.6	-252.03	-268.73	-285.81	-69.78	-881.18
	ULS Min	207.77	207.77	310.96	332.96	411.9	134.24	-368.66	-393.07	-245.3	-273.46	-210.42	-239.05	-284.61	-305.58	-314.31	-337.23	-82.95	-892.08
IY Bending	ULS Max	0	0	39.84	41.33	40.48	39.3	2.7	0	5.09	16.75	5.06	21.37	2.75	23.83	4.09	24.64	0	28.88
	ULS Min	0	0	0	0	0	0	-20.33	0	-21.35	0	-20.79	0	-26.85	0	-22.4	0	0	0
IZ Bending	ULS Max	0	0	0	0.27	0	0	0	0	0.51	1.13	0	0.21	0	0.85	0	2.53	0	0
	ULS Min	0	0	-5.89	-8.42	-37.14	-41.99	-1.2	0	-0.46	0	-0.61	0	-3.25	0	-5.9	0	0	-5.82
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	8	0	9	7	9	9	11	10	9	10	0	10
	Stress Z	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	260	275	325	327	139	0	144	115	141	144	186	162	161	170	0	191
	Tension Combined Force (kN) =	208	208	581	626	768	513	-189	-348	-57	-105	-25	-43	-53	-91	-108	-116	-70	-690
	Compression Combined Force (kN) =	208	208	51	58	87	-193	-507	-393	-390	-388	-351	-383	-471	-467	-475	-507	-83	-1083
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.13	0.14	0.17	0.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.06	0.16	0.12	0.12	0.12	0.11	0.12	0.15	0.14	0.15	0.16	0.02	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	251.12	398.78	317.99	346.51	436.53	124.52	-287.92	-277.39	-198.61	-222.22	-164.05	-181.46	-225.49	-256.42	-268.7	-298.79	-650.43	-62.83
	ULS Min	251.12	389.43	316.87	345.56	434.9	120.58	-335.64	-345.32	-253.26	-266.4	-215.85	-226.74	-279.49	-301.58	-320.68	-343.75	-662.73	-75.99
IY Bending	ULS Max	0	0	39.27	39.28	39.57	40.96	0	41.86	15.62	5.2	20.96	5.07	22.58	3.02	23.91	4.81	24.71	0
	ULS Min	0	-29.7	0	0	0	0	-5.69	0	0	-21.42	0	-20.8	0	-26.93	0	-22.54	0	0
IZ Bending	ULS Max	0	0	0	1.25	0	1.73	0	2.55	0.9	0	0.45	0.03	0	0.77	0.7	0.98	0.29	0
	ULS Min	0	-1.95	-1.4	0	-0.86	0	-3.49	0	0	-1.51	0	-0.21	-0.44	0	0	0	-0.52	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	9	14	14	14	14	2	17	7	9	9	9	9	11	10	9	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	162	248	248	249	259	45	286	106	147	142	140	152	182	162	153	155	0
	Tension Combined Force (kN) =	251	561	566	594	685	384	-243	8	-92	-76	-23	-41	-73	-74	-107	-146	-495	-63
	Compression Combined Force (kN) =	251	228	69	98	186	-139	-380	-631	-360	-413	-357	-367	-432	-484	-482	-497	-818	-76
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.11	0.12	0.13	0.15	0.08	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.04	0.12	0.20	0.11	0.13	0.11	0.11	0.13	0.15	0.15	0.15	0.23	0.02

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	374.1	70.14	821.92	121.92	-570.05	-600.95	-607.91	-601.59	-761.94	-767.35	-689.47	-695.85	-146.82	22.2
	ULS Min	374.1	53.64	821.92	114.01	-595.55	-626.44	-633.41	-627.09	-784.29	-789.7	-711.83	-718.2	-154.49	13.36
IY Bending	ULS Max	560.61	0	27.93	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-491.93	-52.58	0	-14.89	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.3	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.47	-0.52	0	-1.09	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	17	11	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		470	350	199	108	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		844	420	1021	230	-570	-601	-608	-602	-762	-767	-689	-696	-147	22
Compression Combined Force (kN) =		-95	-296	623	6	-596	-626	-633	-627	-784	-790	-712	-718	-154	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.22	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	NA	0.16	0.17	0.17	0.17	0.23	0.24	0.21	0.22	0.50	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	162.59	11.9	223.9	55.49	206.79	-201.38	-206.3	-153.04	-166.55	-183.86	-164.59	-53.29	-141.3	-20.81	29.27
	ULS Min	156.85	-1.46	209.48	9.32	206.79	-224.37	-229.29	-176.03	-189.54	-206.85	-187.59	-76.28	-164.29	-29.65	20.88
IY Bending	ULS Max	243.83	10.42	17.26	11.8	97.99	0	0	0	0	0	0	0	0	0	0
	ULS Min	-214.25	-19.79	-7.2	-15.82	97.99	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.23	3.9	3.52	5.87	17.74	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6.9	0	0	0	17.74	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		232	148	129	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		395	159	353	178	510	-201	-206	-153	-167	-184	-165	-53	-141	-21	29
Compression Combined Force (kN) =		-75	-149	81	-113	-96	-224	-229	-176	-190	-207	-188	-76	-164	-30	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.08	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.05	0.05	0.02	0.04	0.10	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	26684.77	26684.77	3611.97	1824.16	2168.32	1847.19	813.8
	ULS Min	0	0	-1061	-10	-12	-10	-543
Shear	Fz Max	10556	10556	1429	2460	2605	2432	1229
	Fz Min	-10449	-10449	-1439	-354	-2520	-348	-385
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.490	0.651	0.179	0.175	0.176	0.177	0.155
		0.291	0.552	0.267	0.589	0.623	0.582	0.535

Case 7 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-17229	-17203	-16511	-16254	-13609	-13535	-11802	-11769	-11667	-10054	-10040	-9207	-10375	-10115	-11226	-11193	-10932
	ULS Min	-17259	-17213	-16554	-16410	-13746	-13672	-11864	-11802	-11762	-10084	-10051	-9406	-10512	-10252	-11287	-11226	-11026
IY Bending	ULS Max	199	327	327	257	96	106	215	215	122	0	-74	138	153	138	151	158	158
	ULS Min	0	199	89	54	39	91	106	122	34	-74	-131	-129	83	88	138	151	-35
IZ Bending	ULS Max	1319	1687	2955	9903	2023	282	282	-15	568	1327	1743	9261	2180	-8	1116	1116	-2
	ULS Min	0	1319	1531	3082	-384	-384	-15	-183	-183	0	1327	1629	-9	-781	-781	-68	-67
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	4.174	6.862	6.867	5.400	2.696	2.963	6.845	6.845	3.897	1.557	2.739	2.902	4.309	3.877	4.815	5.036	5.036
	Stress due to bending Z	25.011	31.991	56.026	187.789	46.873	8.887	10.001	6.507	20.139	25.168	33.055	175.608	50.517	18.098	39.610	39.610	2.395
	Force (kn) =	5002	6659	10779	33111	7880	1884	1793	1421	2559	4580	6135	30595	8715	3493	4730	4753	791
	Tension Combined Force (kN) =	-12227	-10544	-5732	16857	-5729	-11651	-10009	-10348	-9109	-5473	-3905	21388	-1660	-6622	-6496	-6439	-10140
	Compression Combined Force (kN) =	-22262	-23873	-27333	-49521	-21625	-15556	-13657	-13224	-14321	-14664	-16185	-40001	-19227	-13745	-16017	-15979	-11817
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.30	NA	NA	NA	NA	NA	NA	NA	0.38	NA	NA	NA	NA	NA
		0.34	0.37	0.42	0.77	0.33	0.24	0.37	0.36	0.39	0.23	0.25	0.62	0.30	0.21	0.43	0.43	0.32

Case 7 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5735	-5718	-4521	-4250	-2999	-2760	-1869	-1601	-1455	-848	-825	202	-467	-436	-839	-739	-1148
	ULS Min	-5748	-5723	-4539	-4318	-3077	-2838	-1947	-1680	-1486	-861	-830	114	-545	-514	-918	-817	-1179
IY Bending	ULS Max	32	32	200	162	51	50	64	156	141	0	-50	55	60	54	67	152	162
	ULS Min	0	-40	-31	-1	-15	50	49	63	-122	-68	-80	-49	40	40	54	67	-188
IZ Bending	ULS Max	538	588	864	4288	719	45	46	-11	454	417	494	3992	768	-39	37	37	-64
	ULS Min	0	538	744	1104	-136	-135	-12	-82	-84	0	437	611	-108	-108	-39	-179	-179
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.630	2.037	10.192	8.283	2.602	2.560	3.285	7.962	7.171	3.464	4.058	2.820	3.051	2.755	3.422	7.737	9.570
	Stress due to bending Z	15.976	17.475	25.666	127.384	21.361	4.016	1.357	2.431	13.479	12.397	14.673	118.591	22.801	3.220	1.166	5.310	5.312
	Force (kn) =	1375	1523	2800	10592	1871	513	362	811	1612	1238	1462	9479	2018	466	358	1019	1162
	Tension Combined Force (kN) =	-4360	-4195	-1721	6343	-1128	-2246	-1506	-790	157	391	637	9681	1552	31	-481	279	14
	Compression Combined Force (kN) =	-7122	-7246	-7339	-14911	-4948	-3351	-2309	-2491	-3098	-2099	-2292	-9365	-2563	-980	-1276	-1836	-2341
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.29	NA	NA	NA	NA	0.01	0.02	0.03	0.44	0.07	0.00	NA	0.01	0.00
		0.34	0.35	0.36	0.72	0.24	0.16	0.11	0.12	0.14	0.10	0.11	0.45	0.12	0.05	0.06	0.09	0.11

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	787.64	787.64	410.35	425.69	623.39	165.09	1202.8	1114.75	740.16	785.2	764.88	831.66	447.86	397.99	-48.29	-38.55	110.19	-681.66
	ULS Min	-307.01	-307.01	188.83	210.76	181.03	15.83	-2038.01	-1660.25	-1306.08	-1154.27	-1264.07	-1124.47	-1066.83	-860.62	-604.83	-556.64	-54.51	-837.31
IY Bending	ULS Max	0	0	56.35	55.49	49.56	43.87	13.68	0	17.33	28.06	18.19	40.31	10.67	36.97	6.64	29.41	0	28.26
	ULS Min	0	0	0	0	0	0	-41.47	0	-33.78	-4.74	-32.2	-0.57	-34.79	0	-27.1	0	0	0
IZ Bending	ULS Max	0	0	82.39	111.54	71.45	37.44	98.3	0	91.47	31.9	72.11	5.03	75.83	8.77	77.15	10.04	0	7.14
	ULS Min	0	0	-70.88	-102.17	-112.93	-82.03	-51.72	0	-45.36	-35.3	-21.7	-8.98	-26.9	-12.21	-27.87	-10.22	0	-8.33
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	19	17	15	17	0	14	12	13	17	14	15	11	12	0	10
	Stress Z	0	0	9	12	12	9	11	0	10	4	8	1	9	1	9	1	0	1
Force (kn) =		0	0	512	564	529	434	457	0	393	252	347	287	371	270	322	216	0	191
Tension Combined Force (kN) =		788	788	923	989	1153	599	1659	1115	1133	1038	1112	1119	819	668	273	177	110	-490
Compression Combined Force (kN) =		-307	-307	-323	-353	-348	-418	-2495	-1660	-1699	-1407	-1611	-1411	-1438	-1131	-927	-773	-55	-1029
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.15	0.20	0.22	0.25	0.13	0.40	0.27	0.27	0.25	0.27	0.27	0.20	0.16	0.07	0.04	0.02	NA
		0.01	0.09	0.09	0.10	0.10	0.12	0.77	0.51	0.52	0.43	0.50	0.43	0.44	0.35	0.29	0.24	0.02	0.29

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	747.68	513.63	391.29	408.58	609.28	97.2	994.21	1133.12	671.81	669.3	738.15	734.36	363.72	442.3	-29.77	-62.13	-485.98	133.38
	ULS Min	-303.54	223.58	189.63	239.1	215.53	-8.94	-1521.84	-1787.3	-1059.71	-1180.58	-1062.79	-1163.36	-820.97	-1014.29	-538.06	-619.12	-599.3	-50.89
IY Bending	ULS Max	0	54.84	51.28	48.73	44.79	42.71	7.49	73.09	37.27	17.72	38.69	17.18	35.02	10.5	28.37	7.54	24.15	0
	ULS Min	0	-111.17	0	0	0	0	-15.93	-2.2	-7.4	-33.07	0	-31.92	0	-34.47	0	-26.72	0	0
IZ Bending	ULS Max	0	29.71	34.62	38.85	37.12	34.06	112.42	37.26	17.03	23.02	6.51	14.65	6.17	16.3	7	17.45	2.16	0
	ULS Min	0	-52.6	-12.81	-10.18	-10.41	-9.82	-65.55	-39	-12.97	-71.42	-1.61	-65.91	-2	-68.49	-1.61	-75.71	-9.94	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	32	18	17	16	15	7	30	16	14	16	13	15	14	12	11	8	0
	Stress Z	0	5	4	4	4	4	13	4	2	8	1	7	1	8	1	9	1	0
Force (kn) =		0	686	388	380	352	333	311	561	281	351	272	334	246	356	203	317	169	0
Tension Combined Force (kN) =		748	1200	779	789	961	430	1305	1694	953	1021	1010	1068	610	798	173	254	-317	133
Compression Combined Force (kN) =		-304	-463	-198	-141	-136	-342	-1832	-2349	-1341	-1532	-1334	-1497	-1067	-1370	-741	-936	-768	-51
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.17	0.21	0.09	0.31	0.41	0.23	0.25	0.24	0.26	0.15	0.19	0.04	0.06	NA	0.03
		0.01	0.13	0.06	0.04	0.04	0.10	0.57	0.73	0.41	0.47	0.41	0.46	0.33	0.42	0.23	0.29	0.21	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	445.4	420.45	932	185.17	1187.29	1100.33	591.71	647.47	210.55	148.37	-232.59	-192.64	-112.62	22.61
	ULS Min	287.81	-261.69	679.43	-461.1	-2378.33	-2455.97	-1980.09	-1921.51	-1800.39	-1858.01	-1310.55	-1275.06	-196.48	12.57
IY Bending	ULS Max	8154.28	0	31.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8942.94	-59.49	0	-15.86	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	146.04	237.15	73.42	268.41	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.89	-113.92	-35.15	-99.45	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	91	19	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	17	6	22	0	0	0	0	0	0	0	0	0	0
Force (kn) =		7803	747	329	508	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8248	1167	1261	693	1187	1100	592	647	211	148	-233	-193	-113	23
Compression Combined Force (kN) =		-7515	-1008	350	-969	-2378	-2456	-1980	-1922	-1800	-1858	-1311	-1275	-196	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.41	0.22	0.28	0.15	0.23	0.21	0.11	0.12	0.05	0.03	NA	NA	NA	0.02
		0.48	0.25	NA	0.27	0.63	0.65	0.52	0.51	0.54	0.56	0.39	0.38	0.63	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	244.73	208.39	306.34	113.51	145.55	643.37	604.67	398.14	418.46	295.25	275.29	317.34	278.25	44.9	32.13
	ULS Min	-12.9	-230.94	9.37	-68.5	86.19	-964.73	-970.52	-651.71	-656.21	-570.75	-555.95	-388.96	-452.48	-78.09	19.5
IY Bending	ULS Max	3981.82	15.77	20.44	16.15	114.49	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4330.97	-22.72	-13.22	-18.53	89.18	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	168.57	240.23	97.95	267.63	119.12	0	0	0	0	0	0	0	0	0	0
	ULS Min	-101.14	-120.55	-56.06	-137.03	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	52	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	13	24	10	26	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4362	545	302	559	620	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4607	753	608	672	765	643	605	398	418	295	275	317	278	45	32
Compression Combined Force (kN) =		-4375	-776	-293	-627	-533	-965	-971	-652	-656	-571	-556	-389	-452	-78	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.28	0.18	0.15	0.16	0.06	0.14	0.13	0.09	0.09	0.06	0.06	0.07	0.06	0.04	0.03
		0.34	0.30	0.11	0.24	0.06	0.25	0.26	0.17	0.17	0.15	0.15	0.10	0.12	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	28181.72	28181.72	2428.04	2016.9	2080.19	1991.36	496.66
	ULS Min	0	0	-1131	-10	-12	-16	-510
Shear	Fz Max	11125	11125	1001	2709	2726	2626	1182
	Fz Min	-11161	-11161	-1063	-277	-2738	-281	-675
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.517	0.687	0.120	0.193	0.169	0.191	0.095
		0.307	0.584	0.197	0.648	0.655	0.628	0.515

Case 7 - ULS V1 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-15768	-15746	-14916	-14643	-13819	-13624	-13254	-13220	-13034	-15438	-15424	-14500	-13727	-13556	-13221	-13188	-13015
	ULS Min	-15798	-15757	-14959	-14799	-13956	-13761	-13315	-13254	-13129	-15468	-15435	-14700	-13864	-13693	-13283	-13221	-13110
IY Bending	ULS Max	0	-54	-38	95	95	136	164	179	179	27	35	103	103	141	160	170	170
	ULS Min	-54	-78	-75	90	91	91	136	164	-37	0	27	37	89	88	141	160	-22
IZ Bending	ULS Max	0	-49	119	482	-56	346	346	-59	297	97	130	161	199	199	61	284	284
	ULS Min	-49	-58	-17	267	-210	-210	-59	-280	-280	0	97	-27	174	-347	-347	61	-300
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.129	1.635	1.580	1.985	2.681	3.810	5.208	5.686	5.686	0.558	0.737	2.172	2.878	3.948	5.085	5.411	5.411
	Stress due to bending Z	0.938	1.107	2.260	9.136	4.870	8.007	12.264	9.921	10.522	1.836	2.456	3.052	4.612	8.032	12.302	10.062	10.629
Force (kn) =		354	470	658	1906	1200	1878	1860	1662	1726	410	547	895	1191	1904	1851	1647	1708
Tension Combined Force (kN) =		-15414	-15276	-14258	-12736	-12618	-11746	-11394	-11559	-11309	-15028	-14877	-13605	-12537	-11651	-11370	-11541	-11307
Compression Combined Force (kN) =		-16152	-16227	-15617	-16705	-15156	-15640	-15175	-14915	-14855	-15878	-15982	-15595	-15055	-15597	-15134	-14869	-14817
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.25	0.25	0.24	0.26	0.23	0.24	0.41	0.40	0.40	0.25	0.25	0.24	0.23	0.24	0.41	0.40	0.40

Case 7 - ULS V1 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4418	-4407	-3219	-2896	-2605	-2504	-2294	-2138	-2261	-4092	-4073	-2821	-2519	-2401	-2144	-1955	-2023
	ULS Min	-4431	-4412	-3238	-2964	-2683	-2582	-2372	-2216	-2292	-4105	-4077	-2908	-2597	-2480	-2222	-2033	-2054
IY Bending	ULS Max	5	12	14	62	58	58	60	182	177	11	14	43	45	56	61	192	194
	ULS Min	0	5	-39	-21	38	37	57	59	-179	0	4	5	43	43	56	61	-243
IZ Bending	ULS Max	0	-69	-36	282	-29	56	56	120	344	36	66	97	103	20	36	39	39
	ULS Min	-69	-86	-126	169	-43	-28	-48	-47	120	0	31	34	20	-57	-57	36	-577
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.267	0.593	1.967	3.140	2.936	2.941	3.052	9.289	9.106	0.558	0.709	2.179	2.269	2.868	3.120	9.791	12.402
	Stress due to bending Z	2.046	2.553	3.742	8.377	1.274	1.677	1.671	3.557	10.218	1.060	1.953	2.869	3.052	1.699	1.699	1.169	17.153
Force (kn) =		181	246	446	899	329	361	369	1003	1509	126	208	394	415	357	376	856	2308
Tension Combined Force (kN) =		-4238	-4161	-2773	-1996	-2276	-2144	-1925	-1135	-752	-3965	-3865	-2426	-2103	-2045	-1768	-1100	284
Compression Combined Force (kN) =		-4612	-4657	-3683	-3864	-3012	-2943	-2741	-3219	-3801	-4231	-4285	-3302	-3012	-2836	-2598	-2889	-4361
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.22	0.23	0.18	0.19	0.14	0.14	0.13	0.15	0.18	0.20	0.21	0.16	0.14	0.14	0.12	0.14	0.20

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	236.77	236.77	367.16	404	511.88	254.21	-371.59	-394.95	-233.41	-253.15	-193.17	-216.99	-280.11	-296.11	-313.51	-317.71	-133.71	-887.52
	ULS Min	236.77	236.77	355.15	381.92	474.77	193.26	-412.9	-440.72	-277.51	-307.95	-238.3	-269.22	-325.04	-350.48	-359.12	-369.89	-146.87	-898.38
IY Bending	ULS Max	0	0	40	41.7	40.61	38.74	1.53	0	4.55	17.65	4.56	22.53	1.86	25.47	3.38	26.14	0	29.29
	ULS Min	0	0	0	0	0	0	-22.24	0	-23.16	0	-22.52	0	-29.6	0	-24.9	0	0	0
IZ Bending	ULS Max	0	0	0	0.33	0	0	0	0	0.6	1.12	0	0.3	0	0.98	0	2.96	0	0
	ULS Min	0	0	-6.6	-9.46	-42.06	-48.15	-1.21	0	-0.39	0	-0.68	0	-3.81	0	-6.44	0	0	-6.2
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	13	9	0	10	7	9	9	12	11	10	11	0	10
	Stress Z	0	0	1	1	5	5	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	263	279	335	336	152	0	157	121	152	152	206	173	179	181	0	194
	Tension Combined Force (kN) =	237	237	630	683	847	590	-220	-395	-77	-133	-41	-65	-74	-123	-135	-137	-134	-694
	Compression Combined Force (kN) =	237	237	92	103	139	-142	-564	-441	-434	-428	-391	-421	-531	-523	-538	-551	-147	-1092
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.05	0.14	0.15	0.19	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.04	0.17	0.14	0.13	0.13	0.12	0.13	0.16	0.16	0.17	0.17	0.04	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	280.7	454.01	364.24	398.77	505.45	183.84	-331.04	-315.56	-231.29	-256.74	-192.56	-210.56	-268.14	-298.39	-300.43	-348.22	-628.83	-127.89
	ULS Min	280.7	443.75	362.83	397.51	503.59	180.02	-379.65	-385.49	-286.61	-300.86	-244.87	-255.81	-323	-343.48	-353.21	-393.1	-641.25	-141.05
IY Bending	ULS Max	0	0	39.34	39.35	39.63	40.82	0	44.11	16.44	4.66	22.11	4.55	24.09	2.16	25.37	4.21	24.59	0
	ULS Min	0	-35.19	0	0	0	0	-4.57	0	0	-23.24	0	-22.54	0	-29.69	0	-25.02	0	0
IZ Bending	ULS Max	0	0	0	1.37	0	1.65	0	2.81	0.93	0	0.52	0	0	0.88	0.78	0.84	0.27	0
	ULS Min	0	-2.22	-1.67	0	-0.97	0	-3.83	0	0	-1.68	0	-0.29	-0.51	0	0	0	-0.54	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	10	14	14	14	14	2	18	7	10	9	9	10	12	11	10	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	192	249	248	249	258	38	301	112	159	149	152	163	201	172	169	154	0
	Tension Combined Force (kN) =	281	646	613	647	755	442	-293	-14	-119	-98	-43	-59	-105	-97	-129	-179	-474	-128
	Compression Combined Force (kN) =	281	252	114	149	254	-78	-417	-687	-399	-460	-394	-408	-486	-544	-525	-563	-796	-141
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.13	0.13	0.14	0.17	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.02	0.13	0.21	0.12	0.14	0.12	0.13	0.15	0.17	0.16	0.17	0.22	0.04

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	428.77	81.86	960.04	142.77	-661.9	-691.27	-716.82	-711.7	-888.22	-891.77	-814.9	-823.87	-175.01	20.32
	ULS Min	428.77	65.58	960.04	134.36	-687.39	-716.77	-742.32	-737.19	-910.58	-914.13	-837.25	-846.23	-182.68	11.48
IY Bending	ULS Max	634.17	0	35.43	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-528.02	-56.13	0	-14.33	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	3.45	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.58	-0.64	0	-1.35	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	18	14	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		525	373	252	104	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		954	455	1212	247	-662	-691	-717	-712	-888	-892	-815	-824	-175	20
Compression Combined Force (kN) =		-97	-308	708	30	-687	-717	-742	-737	-911	-914	-837	-846	-183	11
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.05	0.09	0.27	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.08	NA	NA	0.18	0.19	0.20	0.19	0.27	0.27	0.25	0.25	0.59	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	172.21	13.01	243.88	62.45	224.97	-215.12	-221.49	-170.81	-183.46	-198.57	-178.78	-63.6	-160.29	-25.13	29.07
	ULS Min	165.21	-0.56	228.02	10.79	224.97	-238.11	-244.48	-193.8	-206.45	-221.56	-201.77	-86.59	-183.28	-33.97	20.68
IY Bending	ULS Max	256.19	10.38	17.8	11.89	96.9	0	0	0	0	0	0	0	0	0	0
	ULS Min	-221.56	-19.99	-6.39	-15.63	96.9	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.6	4.58	3.89	6.48	18.86	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8.8	0	0	0	18.86	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		252	150	133	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		424	163	377	184	528	-215	-221	-171	-183	-199	-179	-64	-160	-25	29
Compression Combined Force (kN) =		-87	-151	95	-111	-78	-238	-244	-194	-206	-222	-202	-87	-183	-34	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.09	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.06	0.05	0.02	0.05	0.11	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	31809.82	31809.82	3897.19	2201.53	2619.41	2210.49	815.98
	ULS Min	0	0	-1143	-10	-12	-10	-590
Shear	Fz Max	12601	12601	1551	2965	3131	2895	1369
	Fz Min	-12454	-12454	-1589	-386	-3031	-390	-437
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.584	0.776	0.193	0.211	0.212	0.212	0.155
		0.347	0.659	0.295	0.709	0.749	0.693	0.596

Case 7 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-19264	-19239	-18452	-18128	-15657	-15566	-13995	-13962	-13853	-12889	-12875	-11987	-12835	-12596	-13483	-13449	-13214
	ULS Min	-19294	-19250	-18495	-18285	-15794	-15703	-14056	-13995	-13948	-12919	-12886	-12186	-12972	-12733	-13544	-13483	-13309
IY Bending	ULS Max	136	229	230	264	104	120	232	232	163	0	-42	135	147	148	176	190	190
	ULS Min	0	136	37	59	47	100	120	163	-17	-42	-80	-78	91	95	148	176	-71
IZ Bending	ULS Max	1118	1435	2639	8719	1750	342	342	-30	572	1187	1564	8068	1948	48	975	975	25
	ULS Min	0	1118	1337	2856	-393	-393	-30	-238	-238	0	1187	1490	48	-771	-771	25	-87
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	2.846	4.812	4.834	5.537	2.913	3.361	7.391	7.391	5.186	0.874	1.687	2.825	4.120	4.166	5.591	6.056	6.056
	Stress due to bending Z	21.200	27.220	50.048	165.336	40.543	9.100	12.140	8.462	20.292	22.508	29.654	152.985	45.140	17.853	34.587	34.587	3.103
Force (kn) =		4121	5490	9406	29286	6908	1981	2079	1688	2712	4007	5372	26705	7831	3500	4277	4327	975
Tension Combined Force (kN) =		-15143	-13749	-9046	11158	-8749	-13585	-11916	-12274	-11141	-8882	-7504	14718	-5005	-9096	-9205	-9122	-12239
Compression Combined Force (kN) =		-23416	-24740	-27901	-47571	-22702	-17684	-16136	-15683	-16661	-16927	-18258	-38890	-20803	-16233	-17822	-17810	-14284
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.20	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	NA
		0.36	0.38	0.43	0.74	0.35	0.27	0.43	0.42	0.45	0.26	0.28	0.60	0.32	0.25	0.48	0.48	0.38

Case 7 - ULS V2 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6539	-6523	-5223	-4809	-3663	-3451	-2662	-2420	-2288	-2139	-2118	-1008	-1508	-1465	-1760	-1647	-1958
	ULS Min	-6552	-6527	-5241	-4878	-3741	-3529	-2740	-2499	-2319	-2152	-2123	-1095	-1586	-1543	-1838	-1725	-1989
IY Bending	ULS Max	27	27	151	125	51	59	64	191	176	0	-33	54	59	61	66	190	199
	ULS Min	0	-27	-19	16	4	50	57	62	-173	-45	-53	-33	43	43	61	66	-244
IZ Bending	ULS Max	413	451	736	3772	614	64	64	-29	566	380	466	3540	708	-60	48	48	-130
	ULS Min	0	413	550	1166	-131	-130	-30	-30	-31	0	393	543	-83	-83	-60	-129	-327
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.375	1.389	7.690	6.355	2.606	2.986	3.271	9.749	8.985	2.303	2.696	2.759	3.008	3.109	3.385	9.699	12.451
	Stress due to bending Z	12.261	13.409	21.866	112.047	18.251	3.854	1.914	0.886	16.803	11.281	13.854	105.151	21.030	2.475	1.771	3.845	9.709
Force (kn) =		1065	1155	2308	9244	1628	534	405	830	2013	1061	1292	8425	1877	436	403	1057	1730
Tension Combined Force (kN) =		-5474	-5367	-2915	4435	-2035	-2917	-2257	-1590	-275	-1078	-826	7417	369	-1029	-1357	-590	-228
Compression Combined Force (kN) =		-7616	-7683	-7549	-14123	-5370	-4063	-3145	-3329	-4332	-3213	-3415	-9520	-3462	-1979	-2241	-2783	-3719
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.20	NA	NA	NA	NA	NA	NA	NA	0.34	0.02	NA	NA	NA	NA
		0.37	0.37	0.37	0.68	0.26	0.19	0.15	0.16	0.20	0.16	0.17	0.46	0.17	0.09	0.11	0.13	0.17

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	735.18	735.18	471.06	493	686.79	301.71	905.96	822.51	557.71	586.12	589.77	636.6	290.47	237.83	-130.51	-124.49	-77.63	-833.72
	ULS Min	-203.09	-203.09	281.19	308.77	307.5	153.35	-1877.91	-1562.82	-1202.62	-1084.33	-1155.92	-1047.53	-1014.39	-848.98	-614.4	-576.3	-220.68	-968.08
IY Bending	ULS Max	0	0	54.14	54.11	48.55	42.5	11.49	0	15.37	25.62	16.17	39.34	8.95	37.44	5.57	30.92	0	30.67
	ULS Min	0	0	0	0	0	0	-39.46	0	-33.09	-2.79	-31.47	0	-35.69	0	-28.54	0	0	0
IZ Bending	ULS Max	0	0	68.06	91.67	45.5	26.3	83.36	0	77.54	28.36	61.68	4.38	64.09	7.9	63.57	9.53	0	4.38
	ULS Min	0	0	-63.31	-91.52	-112.54	-87.69	-45.65	0	-39.74	-29.24	-18.75	-7.75	-23.98	-10.28	-26.49	-8.03	0	-9.54
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	16	0	14	11	13	16	15	16	12	13	0	11
	Stress Z	0	0	7	10	12	9	9	0	9	3	7	1	7	1	7	1	0	1
Force (kn) =		0	0	471	516	522	436	416	0	363	225	323	278	356	270	307	225	0	209
Tension Combined Force (kN) =		735	735	942	1009	1209	738	1322	823	920	811	913	915	646	508	176	100	-78	-625
Compression Combined Force (kN) =		-203	-203	-189	-208	-215	-283	-2294	-1563	-1565	-1309	-1479	-1326	-1370	-1119	-921	-801	-221	-1177
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.21	0.22	0.26	0.16	0.32	0.20	0.22	0.20	0.22	0.22	0.16	0.12	0.04	0.02	NA	NA
		0.01	0.06	0.05	0.06	0.06	0.08	0.71	0.48	0.48	0.40	0.46	0.41	0.42	0.34	0.28	0.25	0.06	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	741.68	584.53	454.91	478.73	677.38	228.38	747.93	858.04	497.36	485.92	566.6	554.07	219.69	275.82	-107.1	-156.6	-590.69	-67.27
	ULS Min	-159.36	332.95	282.06	333.46	339.89	135.97	-1416.79	-1658.51	-994.92	-1106.14	-984.52	-1079.22	-803.93	-979.3	-550.79	-640.63	-689.26	-227.09
IY Bending	ULS Max	0	34.36	48.61	47.37	44.05	42.35	5.65	71.94	35.29	15.78	37.74	15.38	35.23	8.96	29.65	6.69	25.69	0
	ULS Min	0	-107.93	0	0	0	0	-14.43	0	-3	-32.39	0	-31.12	0	-35.35	0	-28.32	0	0
IZ Bending	ULS Max	0	26.19	29.18	33.78	31.47	30.95	96.05	32.18	15.03	19.05	5.84	12.58	5.21	14.24	6.4	15.58	2.41	0
	ULS Min	0	-44.81	-11.54	-8.25	-9.42	-6.85	-56.49	-33.9	-10.69	-61.9	-1.24	-56.47	-1.94	-58.46	-1.15	-64.3	-7.99	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	31	17	16	15	15	6	30	15	13	16	13	15	15	12	12	9	0
	Stress Z	0	4	3	4	3	3	11	4	2	7	1	6	1	7	1	7	1	0
Force (kn) =		0	655	360	362	336	325	271	544	264	330	264	311	246	343	211	307	175	0
Tension Combined Force (kN) =		742	1240	815	840	1014	553	1019	1402	762	816	831	865	466	619	104	150	-416	-67
Compression Combined Force (kN) =		-159	-322	-78	-28	3	-189	-1688	-2203	-1259	-1436	-1248	-1390	-1050	-1323	-761	-947	-864	-227
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.24	0.18	0.18	0.22	0.12	0.25	0.34	0.18	0.20	0.20	0.21	0.11	0.15	0.02	0.04	NA	NA
		0.00	0.09	0.02	0.01	NA	0.05	0.52	0.68	0.39	0.44	0.38	0.43	0.32	0.41	0.23	0.29	0.24	0.06

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	508.42	388.68	1078.27	200.58	839.61	741.15	291.71	344.07	-74.42	-132.17	-447.87	-413.53	-148.77	20.33
	ULS Min	373.34	-209.01	861.77	-356.3	-2220.28	-2310.75	-1916.33	-1861.55	-1801.27	-1855.12	-1375.02	-1344.51	-221.75	10.47
IY Bending	ULS Max	7035.96	0	39.44	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7876.54	-62.57	0	-15	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	129.43	203.08	62.93	229.65	0	0	0	0	0	0	0	0	0	0
	ULS Min	-56.51	-97.84	-30.13	-85.67	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	80	20	16	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	15	5	19	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6876	717	373	445	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		7384	1105	1452	646	840	741	292	344	-74	-132	-448	-414	-149	20
Compression Combined Force (kN) =		-6502	-926	488	-801	-2220	-2311	-1916	-1862	-1801	-1855	-1375	-1345	-222	10
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.36	0.21	0.32	0.14	0.16	0.14	0.06	0.07	NA	NA	NA	NA	NA	0.02
		0.41	0.23	NA	0.22	0.59	0.61	0.50	0.49	0.54	0.56	0.41	0.40	0.71	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	284.14	185.89	371.8	121.49	244.74	466.76	430.31	256.35	265.51	165.23	158.84	220.02	146.11	21.99	30.94
	ULS Min	65.25	-190.68	112	-34.52	190.76	-914.89	-923.14	-646.8	-658.92	-580.34	-556.93	-388.66	-483.52	-84.69	18.92
IY Bending	ULS Max	3483.78	14.78	20.97	14.97	109.55	0	0	0	0	0	0	0	0	0	0
	ULS Min	-3815.1	-23.03	-9.18	-17.56	89.13	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	140.85	206.52	84.51	229.84	98.57	0	0	0	0	0	0	0	0	0	0
	ULS Min	-90.32	-102.72	-47.5	-117.01	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	46	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	11	20	8	23	6	0	0	0	0	0	0	0	0	0	0
Force (kn) =		3803	494	284	492	551	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4087	679	656	613	796	467	430	256	266	165	159	220	146	22	31
Compression Combined Force (kN) =		-3738	-684	-172	-526	-360	-915	-923	-647	-659	-580	-557	-389	-484	-85	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.24	0.16	0.16	0.15	0.07	0.10	0.09	0.06	0.06	0.04	0.03	0.05	0.03	0.02	0.02
		0.29	0.26	0.07	0.20	0.04	0.24	0.24	0.17	0.17	0.15	0.15	0.10	0.13	0.27	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	33524.5	33524.5	3963.19	2357.63	2471.54	2359.55	965.33
	ULS Min	0	0	-1481	-10	-12	-15	-689
Shear	Fz Max	13165	13165	1533	3168	3250	3110	1599
	Fz Min	-13186	-13186	-1574	-398	-3223	-381	-685
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.615	0.817	0.197	0.226	0.200	0.226	0.184
		0.363	0.690	0.292	0.758	0.778	0.744	0.696

Case 7 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-20046	-20020	-19245	-18908	-16028	-15963	-14094	-14060	-13971	-12159	-12145	-11267	-12524	-12268	-13461	-13428	-13176
	ULS Min	-20076	-20030	-19288	-19065	-16166	-16101	-14155	-14094	-14066	-12189	-12156	-11466	-12661	-12405	-13523	-13461	-13271
IY Bending	ULS Max	183	306	307	307	106	115	248	248	157	0	-59	141	157	149	178	193	193
	ULS Min	0	183	55	49	33	101	115	157	-9	-59	-109	-107	91	95	150	178	-80
IZ Bending	ULS Max	1410	1809	3269	10777	2202	339	339	-22	639	1459	1922	10093	2392	9	1203	1203	-33
	ULS Min	0	1410	1676	3503	-437	-437	-22	-226	-226	0	1459	1821	9	-874	-874	-42	-42
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	3.839	6.422	6.436	6.443	2.983	3.224	7.885	7.885	4.996	1.231	2.292	2.969	4.405	4.196	5.665	6.153	6.153
	Stress due to bending Z	26.739	34.307	61.994	204.360	51.013	10.125	12.028	8.037	22.680	27.670	36.447	191.386	55.409	20.256	42.678	42.678	1.477
Force (kn) =		5241	6981	11728	36130	8583	2122	2120	1695	2946	4954	6640	33311	9508	3887	5147	5199	812
Tension Combined Force (kN) =		-14805	-13039	-7517	17221	-7445	-13841	-11974	-12365	-11024	-7206	-5506	22044	-3016	-8381	-8315	-8229	-12364
Compression Combined Force (kN) =		-25317	-27011	-31016	-55195	-24749	-18223	-16275	-15789	-17012	-17143	-18796	-44777	-22169	-16292	-18669	-18660	-14084
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.31	NA	NA	NA	NA	NA	NA	NA	0.39	NA	NA	NA	NA	NA
		0.39	0.42	0.48	0.85	0.38	0.28	0.44	0.42	0.46	0.27	0.29	0.69	0.34	0.25	0.50	0.50	0.38

Case 7 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-7058	-7041	-5715	-5279	-3919	-3679	-2746	-2482	-2288	-1641	-1620	-546	-1246	-1222	-1656	-1562	-1935
	ULS Min	-7071	-7046	-5733	-5348	-3997	-3757	-2824	-2560	-2318	-1654	-1624	-633	-1324	-1300	-1734	-1640	-1966
IY Bending	ULS Max	32	32	198	161	54	58	65	193	175	0	-43	57	62	62	67	189	200
	ULS Min	0	-37	-28	5	-10	53	56	63	-172	-59	-70	-43	43	43	61	67	-244
IZ Bending	ULS Max	533	586	929	4673	779	65	66	-24	621	466	567	4401	859	-60	51	51	-172
	ULS Min	0	533	719	1387	-156	-155	-26	-68	-70	0	483	670	-109	-109	-60	-171	-263
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.649	1.889	10.106	8.207	2.756	2.975	3.305	9.824	8.938	3.015	3.545	2.884	3.172	3.146	3.433	9.630	12.431
	Stress due to bending Z	15.840	17.402	27.604	138.797	23.134	4.605	1.969	2.015	18.437	13.835	16.827	130.725	25.522	3.243	1.783	5.093	7.818
Force (kn) =		1365	1506	2944	11478	2021	592	412	924	2137	1316	1591	10432	2240	499	407	1150	1581
Tension Combined Force (kN) =		-5693	-5535	-2770	6199	-1897	-3087	-2334	-1558	-150	-325	-29	9886	994	-723	-1248	-412	-354
Compression Combined Force (kN) =		-8437	-8552	-8677	-16825	-6018	-4349	-3235	-3485	-4456	-2969	-3215	-11065	-3565	-1799	-2141	-2789	-3547
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.28	NA	NA	NA	NA	NA	NA	NA	0.45	0.05	NA	NA	NA	NA
		0.41	0.41	0.42	0.81	0.29	0.21	0.15	0.17	0.21	0.14	0.16	0.54	0.17	0.09	0.10	0.13	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	858.46	858.46	495.22	514.37	731.74	309.54	1227.4	1128.98	756.99	797.45	786.8	851.32	435	373.3	-82.88	-74.96	-59.17	-818.6
	ULS Min	-314.39	-314.39	257.88	284.09	257.79	138.9	-2242.11	-1841.21	-1432.4	-1276.89	-1384.02	-1240.77	-1184.85	-971.58	-676.34	-626.64	-234.7	-983.83
IY Bending	ULS Max	0	0	57.67	57.2	50.52	43.46	14.04	0	18.09	29.04	19.09	43.5	10.76	40.35	6.16	32.05	0	30.98
	ULS Min	0	0	0	0	0	0	-43.68	0	-35.49	-6.1	-33.63	-0.3	-37.09	0	-29.33	0	0	0
IZ Bending	ULS Max	0	0	86.62	116.81	67.5	37.31	104.37	0	97.02	35.28	77.17	5.4	80.85	9.63	80.96	11.16	0	6.5
	ULS Min	0	0	-77.6	-112.17	-130.04	-97.57	-56.76	0	-49.58	-36.72	-23.36	-9.68	-29.23	-12.93	-31.59	-10.61	0	-10.38
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	18	15	18	0	15	12	14	18	15	17	12	13	0	11
	Stress Z	0	0	9	13	14	11	12	0	11	4	9	1	9	1	9	1	0	1
Force (kn) =		0	0	529	585	568	461	482	0	414	261	366	310	396	294	344	235	0	212
Tension Combined Force (kN) =		858	858	1024	1099	1300	771	1710	1129	1171	1059	1152	1161	831	668	261	160	-59	-607
Compression Combined Force (kN) =		-314	-314	-271	-300	-311	-322	-2724	-1841	-1846	-1538	-1750	-1550	-1580	-1266	-1020	-862	-235	-1196
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.17	0.22	0.24	0.28	0.17	0.41	0.27	0.28	0.25	0.28	0.28	0.20	0.16	0.06	0.04	NA	NA
		0.01	0.09	0.08	0.09	0.09	0.09	0.84	0.57	0.57	0.47	0.54	0.48	0.49	0.39	0.31	0.27	0.07	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	855.62	614.69	475.5	496.71	717.89	235.66	1019.64	1153.1	681.01	673.09	757.69	746.5	343.62	421.25	-57.58	-106.77	-581	-47.34
	ULS Min	-270.69	302.82	259.44	315.13	296.02	121.11	-1674.08	-1975.01	-1170.48	-1305.95	-1168.1	-1283.81	-922.16	-1136.38	-598.96	-700.59	-701.11	-243.82
IY Bending	ULS Max	0	52	53.09	49.54	45.15	42.74	8.15	78.79	39.96	18.59	41.59	18.11	37.95	10.7	30.65	7.35	25.95	0
	ULS Min	0	-125.87	0	0	0	0	-16.94	-3.18	-7.9	-34.6	0	-33.19	0	-36.64	0	-29.02	0	0
IZ Bending	ULS Max	0	32.91	36.85	41.91	39.51	38.3	121.01	39.51	18.66	24.24	7.16	15.8	6.56	17.57	7.8	19.39	2.96	0
	ULS Min	0	-55.44	-14	-10.62	-11.53	-8.82	-69.67	-42.42	-13.48	-76.95	-1.63	-70.51	-2.29	-73.28	-1.53	-80.44	-9.84	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	37	18	17	16	15	7	33	17	14	17	14	16	15	13	12	9	0
	Stress Z	0	5	4	5	4	4	14	5	2	9	1	8	1	8	1	9	1	0
Force (kn) =		0	770	403	391	359	341	333	606	302	372	292	351	267	379	220	341	180	0
Tension Combined Force (kN) =		856	1384	879	888	1077	577	1353	1759	983	1045	1050	1097	610	800	162	234	-401	-47
Compression Combined Force (kN) =		-271	-467	-144	-76	-63	-220	-2007	-2581	-1473	-1678	-1460	-1634	-1189	-1515	-819	-1041	-881	-244
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.27	0.19	0.19	0.24	0.13	0.33	0.42	0.24	0.25	0.25	0.26	0.15	0.19	0.04	0.06	NA	NA
		0.01	0.13	0.04	0.02	0.02	0.06	0.62	0.80	0.45	0.52	0.45	0.50	0.37	0.47	0.25	0.32	0.25	0.07

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	525.89	464.85	1101.49	214.19	1219.1	1103.31	548.72	612.94	134.89	63.53	-350.28	-304.99	-140.95	20.43
	ULS Min	357.04	-278.2	830.87	-479.76	-2599.39	-2705.2	-2204.96	-2137.71	-2018.1	-2084.57	-1503.64	-1463.13	-230.25	10.3
IY Bending	ULS Max	8850.68	0	40.09	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-9712.05	-64.01	0	-15.2	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	161.37	253.99	78.65	287.36	0	0	0	0	0	0	0	0	0	0
	ULS Min	-71.06	-122.13	-37.67	-106.74	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	98	21	16	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	8	19	6	23	0	0	0	0	0	0	0	0	0	0
Force (kn) =		8485	802	401	531	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		9011	1267	1503	746	1219	1103	549	613	135	64	-350	-305	-141	20
Compression Combined Force (kN) =		-8128	-1080	430	-1011	-2599	-2705	-2205	-2138	-2018	-2085	-1504	-1463	-230	10
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.44	0.24	0.33	0.16	0.23	0.21	0.11	0.12	0.03	0.01	NA	NA	NA	0.02
		0.52	0.27	NA	0.28	0.68	0.71	0.58	0.56	0.60	0.62	0.45	0.44	0.74	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	311.68	229.25	402.87	136.02	249.1	637.86	593.94	363.95	378.52	256.85	243.93	291.52	223.49	33.97	31.42
	ULS Min	38.24	-241.46	80.91	-59	182.97	-1083.46	-1092.12	-759.25	-771.27	-669.37	-645.04	-463.59	-557.79	-97.17	18.49
IY Bending	ULS Max	4354.29	15.9	22.31	16.25	113.01	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4713.16	-23.78	-9.92	-18.05	87.62	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	177.47	257.42	105.05	286.94	127.97	0	0	0	0	0	0	0	0	0	0
	ULS Min	-111.5	-129.14	-59.97	-146.63	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	57	11	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	14	25	10	28	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4716	580	327	586	640	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5028	809	730	722	889	638	594	364	379	257	244	292	223	34	31
Compression Combined Force (kN) =		-4678	-821	-246	-645	-457	-1083	-1092	-759	-771	-669	-645	-464	-558	-97	18
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.30	0.19	0.18	0.17	0.07	0.14	0.13	0.08	0.08	0.06	0.05	0.06	0.05	0.03	0.03
		0.36	0.32	0.09	0.25	0.05	0.29	0.29	0.20	0.20	0.18	0.17	0.12	0.15	0.31	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	33890.19	33890.19	3971.88	2378.78	2475.94	2402.35	1002.77
	ULS Min	0	0	-1563	-10	-12	-17	-711
Shear	Fz Max	13235	13235	1523	3195	3256	3166	1650
	Fz Min	-13297	-13297	-1565	-399	-3247	-378	-747
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.622	0.826	0.197	0.228	0.201	0.230	0.191
		0.366	0.696	0.290	0.764	0.779	0.758	0.718

Case 7 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-8121	-8099	-7360	-7086	-6556	-6354	-6072	-6039	-5817	-7726	-7712	-6879	-6404	-6221	-5968	-5935	-5731
	ULS Min	-8151	-8110	-7402	-7243	-6694	-6491	-6134	-6072	-5912	-7756	-7723	-7078	-6541	-6358	-6030	-5968	-5826
IY Bending	ULS Max	0	-63	-82	46	11	43	43	6	241	29	39	40	8	47	47	1	260
	ULS Min	-63	-90	-87	-13	-12	11	6	-14	-14	0	29	-7	-8	8	1	-25	-25
IZ Bending	ULS Max	0	-30	120	357	-28	158	158	-23	124	77	102	136	143	84	23	122	122
	ULS Min	-30	-34	17	267	-98	-98	-23	-121	-121	0	77	73	84	-158	-158	23	-119
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.330	1.886	1.832	0.968	0.346	1.219	1.383	0.444	7.690	0.609	0.809	0.845	0.231	1.309	1.486	0.785	8.293
	Stress due to bending Z	0.576	0.647	2.268	6.765	2.262	3.663	5.611	4.300	4.412	1.452	1.941	2.577	3.302	3.669	5.620	4.323	4.323
	Force (kn) =	327	434	703	1325	415	776	745	505	1288	353	471	586	562	791	756	544	1343
	Tension Combined Force (kN) =	-7794	-7665	-6657	-5761	-6142	-5578	-5328	-5534	-4529	-7373	-7241	-6292	-5843	-5430	-5212	-5391	-4388
	Compression Combined Force (kN) =	-8478	-8544	-8105	-8568	-7108	-7267	-6878	-6577	-7200	-8110	-8194	-7664	-7103	-7150	-6786	-6512	-7169
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.13	0.13	0.13	0.13	0.11	0.11	0.18	0.18	0.19	0.13	0.13	0.12	0.11	0.11	0.18	0.18	0.19

Case 7 - ULS V4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4771	-4760	-3653	-3330	-2986	-2873	-2693	-2553	-2782	-4446	-4427	-3244	-2899	-2770	-2545	-2369	-2555
	ULS Min	-4785	-4765	-3672	-3399	-3064	-2951	-2771	-2631	-2813	-4459	-4431	-3331	-2977	-2848	-2624	-2448	-2585
IY Bending	ULS Max	2	7	10	17	14	15	14	163	159	16	20	12	8	12	12	155	154
	ULS Min	0	2	-42	-27	4	4	3	2	-252	0	11	0	2	8	8	8	-262
IZ Bending	ULS Max	0	-66	-40	279	-33	65	65	89	499	36	66	101	107	25	37	96	96
	ULS Min	-66	-83	-134	187	-44	-33	-48	-47	89	0	30	32	25	-66	-66	37	-779
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.110	0.358	2.150	1.355	0.692	0.752	0.722	8.321	12.830	0.838	0.996	0.617	0.388	0.620	0.618	7.885	13.360
	Stress due to bending Z	1.970	2.472	3.969	8.290	1.315	1.930	1.932	2.650	14.816	1.055	1.972	3.011	3.172	1.962	1.962	2.856	23.149
	Force (kn) =	162	221	478	753	157	209	207	857	2158	148	232	283	278	202	201	839	2851
	Tension Combined Force (kN) =	-4609	-4539	-3176	-2577	-2829	-2664	-2485	-1697	-624	-4298	-4195	-2960	-2621	-2568	-2344	-1531	296
	Compression Combined Force (kN) =	-4947	-4986	-4150	-4152	-3221	-3161	-2978	-3488	-4971	-4607	-4663	-3614	-3255	-3050	-2825	-3286	-5436
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.24	0.24	0.20	0.20	0.15	0.15	0.14	0.17	0.23	0.22	0.23	0.17	0.16	0.15	0.13	0.16	0.25

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	158.47	158.47	237.24	249.61	297.71	44.17	-258.02	-268.67	-139.94	-154.18	-113.19	-132.46	-153.4	-159.09	-152.51	-244.94	49.82	-988.89
	ULS Min	158.47	158.47	228.33	236.16	273.51	-6.78	-299.47	-311.52	-184.75	-205.67	-158.83	-181.7	-199.18	-209.16	-198.62	-292.81	36.65	-999.22
IY Bending	ULS Max	0	0	39.18	40.8	40.12	39.73	7.49	0	7.47	14.55	7.35	18.91	6.05	20.21	6.65	21.77	0	29.94
	ULS Min	0	0	0	0	0	0	-12.46	0	-14.11	0	-13.68	0	-16.87	0	-12.98	0	0	0
IZ Bending	ULS Max	0	0	0	0	0	0	0	0	0.07	1.33	0	0	0	1.08	0	3.14	0	0
	ULS Min	0	0	-7	-15.73	-52.07	-59.8	-1.41	0	-0.92	0	-1.56	-0.06	-3.54	0	-7.64	0	0	-6.71
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	5	0	6	6	6	8	7	8	5	9	0	11
	Stress Z	0	0	1	2	6	6	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	258	285	352	364	86	0	96	100	95	127	120	138	101	152	0	199
	Tension Combined Force (kN) =	158	158	496	535	650	409	-172	-269	-44	-54	-19	-5	-34	-21	-52	-93	50	-790
	Compression Combined Force (kN) =	158	158	-30	-49	-78	-371	-386	-312	-281	-306	-253	-309	-319	-347	-300	-445	37	-1198
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.00	0.03	0.11	0.12	0.14	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01	NA
		NA	NA	0.01	0.01	0.02	0.11	0.12	0.10	0.09	0.09	0.08	0.10	0.10	0.11	0.09	0.14	NA	0.34

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	203.77	296.73	230.8	242.02	286.91	-34.54	-209.33	-220.22	-137.08	-154.85	-110.54	-127.64	-130.99	-170.06	-225.44	-187.62	-769.8	100.08
	ULS Min	203.77	288.81	229.56	241	284.73	-39.69	-255.52	-285.88	-189	-199.58	-159.85	-173.45	-181.51	-215.86	-273.85	-233.14	-781.44	86.92
IY Bending	ULS Max	0	0	39	38.94	39.33	41.41	0	37.99	13.63	7.6	18.39	7.47	19	6.32	20.84	7.51	25.91	0
	ULS Min	0	-20.41	0	0	0	0	-11.24	0	0	-14.16	0	-13.66	0	-16.93	0	-12.94	0	0
IZ Bending	ULS Max	0	0	0	1.27	0	2.35	0	2.13	0.89	0	0.44	0.69	0	0.35	0.75	1.73	0.45	0
	ULS Min	0	-1.54	-0.91	0	-1.14	0	-2.92	0	0	-1.12	0	0	-0.44	-0.25	0	0	-0.39	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	6	14	13	14	14	5	16	6	6	8	6	8	7	9	5	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	112	245	246	248	263	81	259	93	97	124	93	128	114	141	90	162	0
	Tension Combined Force (kN) =	204	408	476	488	535	229	-129	39	-44	-58	14	-35	-3	-56	-84	-98	-607	100
	Compression Combined Force (kN) =	204	177	-16	-5	37	-303	-336	-545	-282	-297	-284	-266	-310	-330	-415	-323	-944	87
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.08	0.10	0.11	0.12	0.05	NA	0.01	NA	NA	0.00	NA	NA	NA	NA	NA	NA	0.02
		NA	NA	0.00	0.00	NA	0.09	0.10	0.17	0.09	0.09	0.09	0.08	0.10	0.10	0.13	0.10	0.26	NA

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	224.22	38.08	444.5	68.23	-322.74	-348.34	-304.45	-303.97	-422.26	-420.59	-337.38	-354.03	-69.42	27.36
	ULS Min	224.22	21.21	444.5	58.18	-348.24	-373.84	-329.95	-329.47	-444.61	-442.94	-359.74	-376.38	-77.09	18.52
IY Bending	ULS Max	358.84	0	7.41	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-377.86	-42.88	0	-16.39	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.81	0	0.07	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.17	-0.17	0	-0.39	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	4	14	3	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		332	285	53	117	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		556	323	497	185	-323	-348	-304	-304	-422	-421	-337	-354	-69	27
Compression Combined Force (kN) =		-108	-264	392	-59	-348	-374	-330	-329	-445	-443	-360	-376	-77	19
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.03	0.06	0.11	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	0.02	0.09	0.10	0.09	0.09	0.13	0.13	0.11	0.11	0.25	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	193.19	15.9	283.23	67.74	321.09	-239.79	-251.38	-205.55	-214.58	-226.36	-205.99	-83.32	-196.54	-33.57	28.58
	ULS Min	186.26	1.11	261.67	5.38	321.09	-262.78	-274.37	-228.54	-237.57	-249.35	-228.98	-106.31	-219.53	-42.41	20.2
IY Bending	ULS Max	279.24	10.08	18.48	11.61	96.57	0	0	0	0	0	0	0	0	0	0
	ULS Min	-239.02	-20.36	-4.71	-15.29	96.57	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.54	1.79	2.51	6.57	24.81	0	0	0	0	0	0	0	0	0	0
	ULS Min	-0.11	0	0	-0.54	24.81	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		254	148	136	120	318	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		447	164	419	187	639	-240	-251	-206	-215	-226	-206	-83	-197	-34	29
Compression Combined Force (kN) =		-68	-147	126	-114	3	-263	-274	-229	-238	-249	-229	-106	-220	-42	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.10	0.05	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	NA	0.07	0.07	0.06	0.06	0.07	0.06	0.03	0.06	0.14	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	11782.53	11782.53	4697.64	1365.46	4782.62	1273.46	854.8
	ULS Min	0	0	-1525	-32	-12	-30	-700
Shear	Fz Max	4712	4712	2065	180	2173	28	1624
	Fz Min	-4670	-4670	-2104	-475	-2076	-272	-541
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.216	0.287	0.233	0.131	0.388	0.122	0.163
		0.130	0.246	0.391	0.114	0.520	0.065	0.707

Case 7 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-13851	-13826	-13272	-13042	-11709	-11745	-10952	-10918	-10828	-9151	-9137	-8598	-9391	-9554	-10159	-10126	-10192
	ULS Min	-13881	-13836	-13314	-13199	-11847	-11882	-11013	-10952	-10923	-9181	-9148	-8797	-9528	-9691	-10221	-10159	-10287
IY Bending	ULS Max	289	453	454	374	81	118	137	137	123	653	835	836	71	106	107	107	161
	ULS Min	0	289	260	-15	-11	83	118	123	83	0	653	-73	-77	69	106	84	84
IZ Bending	ULS Max	783	955	1863	5330	1075	261	261	-64	468	824	1036	4787	1217	39	50	199	199
	ULS Min	0	783	1187	1957	-273	-273	-64	-250	-250	0	824	1295	39	-304	-304	50	-67
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	6.073	9.512	9.525	7.852	2.262	3.324	4.354	4.354	3.929	13.699	17.525	17.550	2.154	2.971	3.410	3.410	5.124
	Stress due to bending Z	14.856	18.118	35.328	101.077	24.907	6.330	9.249	8.887	16.615	15.619	19.641	90.766	28.207	7.039	10.782	7.054	7.052
Force (kn) =		3587	4736	7688	18669	4319	1535	1448	1410	2187	5025	6370	18565	4826	1591	1511	1114	1296
Tension Combined Force (kN) =		-10264	-9090	-5584	5627	-7391	-10210	-9503	-9508	-8641	-4126	-2767	9967	-4565	-7963	-8648	-9012	-8896
Compression Combined Force (kN) =		-17468	-18572	-21002	-31868	-16165	-13417	-12461	-12361	-13110	-14206	-15518	-27361	-14354	-11282	-11731	-11273	-11583
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.10	NA	NA	NA	NA	NA	NA	NA	0.18	NA	NA	NA	NA	NA
		0.27	0.29	0.32	0.49	0.25	0.21	0.34	0.33	0.35	0.22	0.24	0.42	0.22	0.17	0.32	0.30	0.31

Case 7 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5599	-5585	-4285	-4047	-2767	-2425	-1724	-1441	-1514	-3927	-3906	-2443	-2311	-1864	-1705	-1256	-1293
	ULS Min	-5613	-5589	-4304	-4116	-2845	-2503	-1802	-1519	-1545	-3940	-3911	-2531	-2389	-1942	-1783	-1334	-1324
IY Bending	ULS Max	87	87	172	152	42	46	61	151	154	200	275	276	41	41	56	160	152
	ULS Min	0	86	94	-19	-9	41	44	59	-131	0	198	-36	-39	35	35	56	-164
IZ Bending	ULS Max	334	399	387	3219	496	48	52	89	227	272	357	2954	569	-37	43	43	8
	ULS Min	0	334	167	582	-74	-70	-14	-10	90	0	275	99	-37	-63	-63	9	-368
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	4.422	4.418	8.768	7.739	2.145	2.332	3.104	7.683	7.839	10.174	14.027	14.094	2.077	2.074	2.848	8.171	8.383
	Stress due to bending Z	9.926	11.843	11.486	95.629	14.721	2.066	1.534	2.638	6.755	8.083	10.600	87.761	16.889	1.860	1.860	1.276	10.942
Force (kn) =		1120	1270	1581	8071	1317	343	362	806	1139	1425	1923	7952	1481	307	368	738	1509
Tension Combined Force (kN) =		-4479	-4315	-2704	4023	-1450	-2082	-1362	-635	-375	-2502	-1984	5509	-830	-1557	-1337	-519	216
Compression Combined Force (kN) =		-6733	-6859	-5885	-12187	-4162	-2846	-2164	-2325	-2684	-5366	-5834	-10483	-3870	-2250	-2150	-2072	-2832
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.18	NA	NA	NA	NA	NA	NA	NA	0.25	NA	NA	NA	NA	0.01
		0.33	0.33	0.28	0.59	0.20	0.14	0.10	0.11	0.12	0.26	0.28	0.51	0.18	0.11	0.10	0.10	0.13

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	701.08	701.08	360.67	374.82	456.71	137.97	1193.08	1074.74	681.61	683.26	600.41	649.51	345.58	408.72	120.33	126.74	181.37	-702.97
	ULS Min	-257.59	-257.59	190.43	249.38	316.26	-60.74	-1954.36	-1633.26	-1195.2	-1071.14	-1038.13	-973.9	-913.44	-861.3	-761.38	-698.2	-83.34	-914.07
IY Bending	ULS Max	0	0	57.34	57.39	53.67	46.95	13.74	0	16.41	26.5	15.63	37.12	10.51	35.77	9.08	32.41	0	29.44
	ULS Min	0	0	0	0	0	0	-39.96	0	-33.13	-3.65	-30.09	0	-33.61	0	-25.61	0	0	0
IZ Bending	ULS Max	0	0	139.37	188.67	139.54	61.38	149.15	0	140.55	38.11	119.57	8.2	127.31	14.1	130.61	15.02	0	13.76
	ULS Min	0	0	-115.06	-166.09	-166.52	-95.31	-65.48	0	-63.84	-44.31	-36.16	-14.93	-43.19	-20.31	-43.68	-18.13	0	-10.87
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	19	16	17	0	14	11	13	15	14	15	11	14	0	10
	Stress Z	0	0	15	20	18	10	17	0	16	5	13	2	14	2	15	2	0	1
Force (kn) =		0	0	629	725	659	479	539	0	477	258	419	276	456	277	409	250	0	209
Tension Combined Force (kN) =		701	701	990	1100	1116	617	1732	1075	1159	941	1019	926	802	686	529	377	181	-494
Compression Combined Force (kN) =		-258	-258	-439	-476	-343	-539	-2493	-1633	-1672	-1329	-1457	-1250	-1370	-1138	-1170	-949	-83	-1123
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.22	0.24	0.24	0.13	0.42	0.26	0.28	0.23	0.25	0.22	0.19	0.17	0.13	0.09	0.04	NA
		0.01	0.07	0.13	0.14	0.10	0.15	0.77	0.51	0.52	0.41	0.45	0.39	0.42	0.35	0.36	0.29	0.02	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	699.39	473.21	331.08	344.93	419.55	84.91	883.04	947.83	533.87	503.37	534.38	471.95	365.14	281.22	130.48	96.68	-494.26	212.29
	ULS Min	-243.38	245.27	227.64	281.14	374.45	-76.44	-1348.78	-1655.31	-881.2	-1045.75	-819.55	-934.23	-773.42	-875.08	-678.19	-793.05	-639.42	-84.9
IY Bending	ULS Max	0	25.63	47.58	46.52	45.18	43.91	5.98	64.15	32.53	16.54	33.36	14.77	32.56	10.53	31.04	9.99	24.51	0
	ULS Min	0	-75.34	0	0	0	0	-16.08	0	-4.19	-31.82	0	-29.35	0	-33.18	0	-25.71	0	0
IZ Bending	ULS Max	0	0	52.41	60.07	61.67	53.72	146.98	30.66	17.44	32.35	10.67	24.5	10.29	26.36	11.31	28.89	3.69	0
	ULS Min	0	-36.95	-15.28	-15.06	-17.14	-12.83	-66.55	-34.46	-11.64	-110.74	-2.75	-109.24	-3.1	-114.37	-2.75	-125.05	-15.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	22	16	16	16	15	7	27	14	13	14	12	14	14	13	11	9	0
	Stress Z	0	4	6	6	7	6	17	4	2	12	1	12	1	13	1	14	2	0
Force (kn) =		0	467	399	407	402	379	374	493	250	414	243	395	237	430	229	399	182	0
Tension Combined Force (kN) =		699	941	730	752	822	464	1257	1441	784	918	778	867	602	711	359	496	-313	212
Compression Combined Force (kN) =		-243	-222	-172	-126	-28	-455	-1723	-2148	-1131	-1460	-1063	-1329	-1011	-1305	-907	-1192	-821	-85
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.18	0.16	0.16	0.18	0.10	0.30	0.35	0.19	0.22	0.19	0.21	0.15	0.17	0.09	0.12	NA	0.05
		0.01	0.06	0.05	0.04	0.01	0.13	0.53	0.66	0.35	0.45	0.33	0.41	0.31	0.40	0.28	0.37	0.23	0.02

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	428.86	357.38	896.88	210.83	635.86	622.35	136.24	141.07	-95.2	-100.24	-204.19	-209.06	-101.61	23.61
	ULS Min	265.82	-303.51	669.24	-53.62	-1798.43	-1795.88	-1341.15	-1341.91	-1407.32	-1401.25	-1142.6	-1158.49	-186.62	12.97
IY Bending	ULS Max	5930.35	0	29.46	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6643.7	-57.91	0	-15.4	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	244.71	393.91	121.84	446.26	0	0	0	0	0	0	0	0	0	0
	ULS Min	-115.4	-188.58	-58.39	-164.24	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	67	19	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	12	29	10	36	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	6347	969	389	767	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		6776	1326	1286	978	636	622	136	141	-95	-100	-204	-209	-102	24
Compression Combined Force (kN) =		-6081	-1272	280	-820	-1798	-1796	-1341	-1342	-1407	-1401	-1143	-1158	-187	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.33	0.25	0.28	0.21	0.12	0.12	0.03	0.03	NA	NA	NA	NA	NA	0.02
		0.39	0.31	NA	0.23	0.47	0.47	0.35	0.35	0.42	0.42	0.34	0.35	0.60	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	254.32	231.1	331.67	160.05	178.92	656.65	632.03	377.03	377.01	190.56	179.52	137.26	84.79	42.75	32.49
	ULS Min	-9.22	-283.18	-2.86	-142.09	81.24	-1012.13	-988.65	-625.54	-642.35	-501.64	-463.24	-208.88	-297.75	-79.34	18.93
IY Bending	ULS Max	4080.49	15.71	22.3	17.4	109.05	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4369	-22.21	-14.51	-19.08	91.12	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	280.42	395.43	160.84	443.3	213.55	0	0	0	0	0	0	0	0	0	0
	ULS Min	-167.3	-201.02	-94.82	-228.44	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	53	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	21	39	16	44	12	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	4965	789	416	843	861	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5220	1020	747	1003	1040	657	632	377	377	191	180	137	85	43	32
Compression Combined Force (kN) =		-4974	-1072	-418	-985	-779	-1012	-989	-626	-642	-502	-463	-209	-298	-79	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.31	0.25	0.18	0.24	0.08	0.14	0.14	0.08	0.08	0.04	0.04	0.03	0.02	0.03	0.03
		0.38	0.41	0.16	0.38	0.09	0.27	0.26	0.17	0.17	0.13	0.12	0.06	0.08	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
	Members	40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	26317.76	26317.76	2560.45	1823.67	2172.01	1840.48	486.77
	ULS Min	0	0	-922	-10	-12	-21	-465
Shear	Fz Max	10512	10512	1095	2446	2558	2402	1077
	Fz Min	-10337	-10337	-1111	-271	-2483	-294	-477
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.483	0.642	0.127	0.175	0.176	0.176	0.093
		0.290	0.550	0.206	0.585	0.612	0.575	0.469

Case 8 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-13685	-13663	-12867	-12594	-11843	-11646	-11298	-11265	-11073	-13339	-13325	-12433	-11738	-11563	-11252	-11219	-11040
	ULS Min	-13715	-13674	-12910	-12750	-11980	-11783	-11360	-11298	-11168	-13369	-13336	-12633	-11875	-11700	-11314	-11252	-11135
IY Bending	ULS Max	0	-54	-47	81	75	116	128	135	135	26	35	82	81	120	125	128	128
	ULS Min	-54	-78	-76	74	75	75	116	128	23	0	26	37	72	72	120	125	36
IZ Bending	ULS Max	0	-44	118	453	-48	295	295	-50	252	91	122	152	168	168	51	240	240
	ULS Min	-44	-51	-10	266	-180	-180	-50	-237	-237	0	91	5	166	-296	-296	51	-250
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.133	1.639	1.585	1.702	2.109	3.246	4.088	4.305	4.305	0.547	0.730	1.730	2.287	3.365	3.986	4.073	4.073
	Stress due to bending Z	0.837	0.973	2.245	8.582	4.161	6.828	10.457	8.424	8.930	1.726	2.317	2.884	3.887	6.849	10.489	8.504	8.880
	Force (kn) =	338	448	656	1763	997	1601	1549	1355	1409	390	522	791	981	1624	1541	1339	1379
	Tension Combined Force (kN) =	-13347	-13215	-12211	-10831	-10846	-10045	-9750	-9910	-9664	-12949	-12803	-11643	-10757	-9939	-9711	-9880	-9661
	Compression Combined Force (kN) =	-14053	-14121	-13566	-14513	-12977	-13385	-12908	-12654	-12577	-13759	-13858	-13423	-12857	-13324	-12855	-12591	-12514
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.22	0.22	0.21	0.22	0.20	0.21	0.35	0.34	0.34	0.21	0.21	0.21	0.20	0.21	0.35	0.34	0.34

Case 8 - ULS 1 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4186	-4175	-3019	-2696	-2408	-2303	-2099	-1944	-2077	-3864	-3845	-2622	-2323	-2203	-1951	-1767	-1850
	ULS Min	-4199	-4180	-3038	-2764	-2486	-2381	-2177	-2022	-2107	-3877	-3850	-2709	-2402	-2281	-2030	-1845	-1880
IY Bending	ULS Max	4	10	13	52	48	48	49	168	163	12	15	34	36	47	50	176	177
	ULS Min	0	4	-38	-20	31	31	47	48	-171	0	5	6	36	36	46	50	-222
IZ Bending	ULS Max	0	-67	-36	282	-26	52	52	104	325	35	65	98	101	17	32	39	39
	ULS Min	-67	-84	-124	164	-41	-26	-44	-42	104	0	30	34	17	-52	-52	32	-535
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.216	0.507	1.925	2.653	2.463	2.445	2.499	8.563	8.699	0.604	0.755	1.749	1.833	2.374	2.574	8.955	11.346
	Stress due to bending Z	1.995	2.501	3.693	8.383	1.223	1.538	1.533	3.083	9.665	1.033	1.917	2.918	2.991	1.555	1.555	1.172	15.882
	Force (kn) =	173	235	439	862	288	311	315	909	1434	128	209	364	377	307	322	791	2126
	Tension Combined Force (kN) =	-4013	-3940	-2580	-1834	-2120	-1992	-1784	-1034	-643	-3736	-3636	-2257	-1947	-1896	-1629	-976	276
	Compression Combined Force (kN) =	-4372	-4414	-3476	-3626	-2773	-2692	-2491	-2931	-3541	-4005	-4058	-3073	-2778	-2588	-2352	-2636	-4006
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.21	0.21	0.17	0.18	0.13	0.13	0.12	0.14	0.16	0.19	0.20	0.15	0.13	0.12	0.11	0.13	0.19

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	207.28	207.28	320.27	350.98	442.05	184.72	-326.61	-347.07	-200.59	-218.71	-164.79	-186.82	-238.91	-251.27	-267.96	-285.26	-68.77	-881.14
	ULS Min	207.28	207.28	310.2	332.13	410.83	133.28	-367.91	-392.26	-244.76	-272.87	-209.95	-238.53	-283.93	-304.81	-313.54	-336.66	-81.94	-892.04
IY Bending	ULS Max	0	0	39.83	41.32	40.47	39.31	2.72	0	5.1	16.73	5.07	21.35	2.77	23.8	4.1	24.61	0	28.87
	ULS Min	0	0	0	0	0	0	-20.3	0	-21.32	0	-20.76	0	-26.81	0	-22.35	0	0	0
IZ Bending	ULS Max	0	0	0	0.27	0	0	0	0	0.51	1.13	0	0.21	0	0.84	0	2.53	0	0
	ULS Min	0	0	-5.88	-8.4	-37.05	-41.88	-1.2	0	-0.46	0	-0.6	0	-3.24	0	-5.89	0	0	-5.81
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	8	0	9	7	9	9	11	10	9	10	0	10
	Stress Z	0	0	1	1	4	5	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	260	274	325	327	138	0	144	114	140	144	186	161	161	170	0	191
	Tension Combined Force (kN) =	207	207	581	625	767	512	-188	-347	-57	-104	-24	-43	-53	-90	-107	-115	-69	-690
	Compression Combined Force (kN) =	207	207	50	58	86	-194	-506	-392	-389	-387	-350	-382	-470	-466	-474	-506	-82	-1083
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.04	0.13	0.14	0.17	0.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.06	0.16	0.12	0.12	0.12	0.11	0.12	0.14	0.14	0.15	0.16	0.02	0.30

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	250.61	397.83	317.2	345.61	435.34	123.57	-287.18	-276.73	-198.05	-221.62	-163.56	-180.96	-224.76	-255.7	-268.15	-297.93	-650.86	-61.8
	ULS Min	250.61	388.5	316.08	344.67	433.72	119.62	-334.89	-344.63	-252.69	-265.8	-215.36	-226.23	-278.74	-300.86	-320.11	-342.88	-663.15	-74.96
IY Bending	ULS Max	0	0	39.27	39.27	39.56	40.97	0	41.82	15.6	5.21	20.94	5.08	22.55	3.03	23.89	4.82	24.72	0
	ULS Min	0	-29.61	0	0	0	0	-5.71	0	0	-21.38	0	-20.78	0	-26.89	0	-22.49	0	0
IZ Bending	ULS Max	0	0	0	1.25	0	1.73	0	2.55	0.9	0	0.45	0.03	0	0.77	0.69	0.98	0.29	0
	ULS Min	0	-1.95	-1.4	0	-0.86	0	-3.48	0	0	-1.5	0	-0.2	-0.44	0	0	0	-0.52	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	9	14	14	14	14	2	17	7	9	9	9	9	11	10	9	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	161	248	248	249	259	45	285	106	146	141	140	152	182	162	153	155	0
	Tension Combined Force (kN) =	251	559	565	593	684	383	-243	9	-92	-75	-22	-41	-73	-74	-107	-145	-496	-62
	Compression Combined Force (kN) =	251	227	68	97	185	-140	-380	-630	-359	-412	-357	-366	-431	-483	-482	-496	-818	-75
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.11	0.12	0.13	0.15	0.08	NA	0.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.04	0.12	0.19	0.11	0.13	0.11	0.11	0.13	0.15	0.15	0.15	0.23	0.02

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	373.17	69.94	819.57	121.56	-568.48	-599.4	-606.05	-599.71	-759.79	-765.23	-687.33	-693.67	-146.34	22.23
	ULS Min	373.17	53.43	819.57	113.65	-593.98	-624.9	-631.54	-625.21	-782.14	-787.58	-709.69	-716.03	-154.01	13.39
IY Bending	ULS Max	559.35	0	27.8	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-491.3	-52.52	0	-14.9	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	4.32	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.47	-0.52	0	-1.09	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	17	11	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		469	349	198	108	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		842	419	1018	229	-568	-599	-606	-600	-760	-765	-687	-694	-146	22
Compression Combined Force (kN) =		-95	-296	622	6	-594	-625	-632	-625	-782	-788	-710	-716	-154	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.04	0.08	0.22	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	NA	0.16	0.16	0.17	0.16	0.23	0.24	0.21	0.21	0.49	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	162.43	11.88	223.56	55.37	206.46	-201.14	-206.04	-152.73	-166.26	-183.61	-164.36	-53.12	-140.97	-20.74	29.27
	ULS Min	156.71	-1.48	209.16	9.29	206.46	-224.13	-229.04	-175.73	-189.25	-206.6	-187.35	-76.11	-163.96	-29.58	20.89
IY Bending	ULS Max	243.62	10.42	17.25	11.8	98.01	0	0	0	0	0	0	0	0	0	0
	ULS Min	-214.13	-19.78	-7.21	-15.83	98.01	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.22	3.89	3.51	5.86	17.72	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6.87	0	0	0	17.72	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		232	147	129	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		394	159	352	178	509	-201	-206	-153	-166	-184	-164	-53	-141	-21	29
Compression Combined Force (kN) =		-75	-149	80	-113	-96	-224	-229	-176	-189	-207	-187	-76	-164	-30	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.02	0.04	0.08	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.05	0.05	0.02	0.04	0.09	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	26592.6	26592.6	3606.83	1817.78	2160.65	1840.27	813.76
	ULS Min	0	0	-1059	-10	-12	-10	-542
Shear	Fz Max	10520	10520	1427	2452	2596	2423	1226
	Fz Min	-10414	-10414	-1437	-353	-2512	-347	-385
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.488	0.648	0.179	0.174	0.175	0.176	0.155
		0.290	0.550	0.267	0.587	0.621	0.580	0.534

Case 8 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-17194	-17168	-16477	-16219	-13576	-13502	-11770	-11736	-11635	-10018	-10005	-9172	-10342	-10082	-11193	-11159	-10898
	ULS Min	-17225	-17179	-16519	-16376	-13713	-13639	-11831	-11770	-11729	-10048	-10015	-9371	-10479	-10219	-11254	-11193	-10993
IY Bending	ULS Max	199	327	327	257	96	105	214	214	122	0	-74	138	153	138	151	157	157
	ULS Min	0	199	89	53	38	91	105	122	35	-74	-131	-129	83	88	138	151	-34
IZ Bending	ULS Max	1319	1687	2954	9902	2023	281	281	-15	567	1327	1743	9261	2180	-9	1116	1116	-1
	ULS Min	0	1319	1531	3082	-383	-383	-15	-183	-183	0	1327	1629	-9	-780	-780	-68	-68
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	4.174	6.862	6.867	5.397	2.688	2.953	6.826	6.826	3.874	1.557	2.740	2.895	4.298	3.867	4.796	5.013	5.014
	Stress due to bending Z	25.013	31.993	56.026	187.780	46.876	8.875	9.971	6.482	20.112	25.166	33.053	175.618	50.514	18.078	39.603	39.603	2.422
Force (kn) =		5002	6659	10779	33109	7879	1880	1788	1417	2554	4580	6134	30596	8713	3488	4727	4750	792
Tension Combined Force (kN) =		-12192	-10508	-5697	16890	-5697	-11622	-9981	-10319	-9081	-5438	-3870	21423	-1629	-6593	-6466	-6409	-10107
Compression Combined Force (kN) =		-22227	-23838	-27298	-49485	-21592	-15519	-13619	-13187	-14283	-14629	-16150	-39967	-19192	-13707	-15981	-15943	-11785
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.30	NA	NA	NA	NA	NA	NA	NA	0.38	NA	NA	NA	NA	NA
		0.34	0.37	0.42	0.77	0.33	0.24	0.37	0.35	0.38	0.23	0.25	0.62	0.30	0.21	0.43	0.43	0.32

Case 8 - ULS 4 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5731	-5714	-4517	-4246	-2996	-2756	-1865	-1598	-1452	-844	-822	205	-464	-432	-836	-736	-1145
	ULS Min	-5744	-5719	-4536	-4315	-3074	-2834	-1943	-1676	-1483	-857	-826	118	-542	-510	-914	-814	-1176
IY Bending	ULS Max	32	32	200	162	51	50	64	156	140	0	-50	55	60	54	67	151	162
	ULS Min	0	-40	-31	-1	-15	50	48	63	-122	-68	-80	-49	40	40	53	67	-187
IZ Bending	ULS Max	538	588	864	4288	719	45	46	-11	453	417	494	3992	768	-39	37	37	-63
	ULS Min	0	538	744	1104	-136	-135	-12	-82	-84	0	437	611	-108	-108	-39	-179	-179
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.629	2.038	10.193	8.283	2.596	2.552	3.276	7.950	7.160	3.464	4.057	2.812	3.043	2.746	3.413	7.723	9.551
	Stress due to bending Z	15.976	17.476	25.666	127.382	21.362	4.015	1.355	2.439	13.469	12.396	14.672	118.592	22.800	3.221	1.164	5.311	5.312
Force (kn) =		1375	1524	2800	10592	1871	513	362	811	1611	1238	1462	9479	2018	466	357	1018	1160
Tension Combined Force (kN) =		-4356	-4191	-1718	6346	-1125	-2244	-1504	-787	158	394	641	9684	1554	34	-479	282	15
Compression Combined Force (kN) =		-7118	-7242	-7336	-14907	-4945	-3347	-2305	-2487	-3094	-2095	-2288	-9361	-2559	-976	-1272	-1832	-2336
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.29	NA	NA	NA	NA	0.01	0.02	0.03	0.44	0.07	0.00	NA	0.01	0.00
		0.34	0.35	0.36	0.72	0.24	0.16	0.11	0.12	0.14	0.10	0.11	0.45	0.12	0.05	0.06	0.09	0.11

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	787.15	787.15	409.58	424.81	622.26	163.98	1203.54	1115.56	740.7	785.78	765.35	832.17	448.54	398.74	-47.52	-37.99	111.2	-681.62
	ULS Min	-307.51	-307.51	188.06	209.88	179.91	14.82	-2037.26	-1659.44	-1305.54	-1153.69	-1263.6	-1123.95	-1066.15	-859.85	-604.06	-556.07	-53.5	-837.27
IY Bending	ULS Max	0	0	56.35	55.48	49.56	43.88	13.7	0	17.34	28.06	18.2	40.29	10.68	36.95	6.65	29.38	0	28.25
	ULS Min	0	0	0	0	0	0	-41.44	0	-33.75	-4.74	-32.17	-0.59	-34.75	0	-27.05	0	0	0
IZ Bending	ULS Max	0	0	82.4	111.56	71.54	37.49	98.3	0	91.46	31.9	72.11	5.03	75.84	8.76	77.16	10.03	0	7.15
	ULS Min	0	0	-70.87	-102.15	-112.84	-81.92	-51.72	0	-45.36	-35.3	-21.7	-8.98	-26.89	-12.21	-27.86	-10.22	0	-8.32
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	19	17	15	17	0	14	12	13	17	14	15	11	12	0	10
	Stress Z	0	0	9	12	12	9	11	0	10	4	8	1	9	1	9	1	0	1
Force (kn) =		0	0	512	564	529	433	456	0	392	252	347	287	371	270	321	216	0	191
Tension Combined Force (kN) =		787	787	922	988	1151	597	1660	1116	1133	1038	1112	1119	819	669	274	178	111	-490
Compression Combined Force (kN) =		-308	-308	-324	-354	-349	-419	-2494	-1659	-1698	-1406	-1610	-1411	-1437	-1130	-925	-772	-54	-1029
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.15	0.20	0.22	0.25	0.13	0.40	0.27	0.27	0.25	0.27	0.27	0.20	0.16	0.07	0.04	0.02	NA
		0.01	0.09	0.09	0.10	0.10	0.12	0.77	0.51	0.52	0.43	0.50	0.43	0.44	0.35	0.29	0.24	0.01	0.29

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	747.17	512.69	390.5	407.68	608.09	96.24	994.95	1133.78	672.37	669.89	738.64	734.86	364.45	443.02	-29.21	-61.26	-486.41	134.4
	ULS Min	-304.05	222.64	188.84	238.21	214.35	-9.9	-1521.09	-1786.61	-1059.14	-1179.98	-1062.29	-1162.85	-820.23	-1013.57	-537.49	-618.26	-599.73	-49.86
IY Bending	ULS Max	0	54.93	51.29	48.73	44.79	42.71	7.47	73.05	37.26	17.73	38.67	17.19	34.99	10.51	28.34	7.55	24.15	0
	ULS Min	0	-111.08	0	0	0	0	-15.95	-2.21	-7.42	-33.04	0	-31.89	0	-34.42	0	-26.68	0	0
IZ Bending	ULS Max	0	29.71	34.62	38.85	37.13	34.06	112.43	37.25	17.03	23.02	6.51	14.65	6.17	16.3	7	17.46	2.16	0
	ULS Min	0	-52.6	-12.81	-10.18	-10.41	-9.82	-65.54	-39	-12.97	-71.42	-1.61	-65.91	-1.99	-68.49	-1.61	-75.71	-9.94	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	32	18	17	16	15	7	30	16	14	16	13	15	14	12	11	8	0
	Stress Z	0	5	4	4	4	4	13	4	2	8	1	7	1	8	1	9	1	0
Force (kn) =		0	686	388	380	352	333	311	561	281	351	271	334	246	355	203	316	169	0
Tension Combined Force (kN) =		747	1198	778	788	960	429	1306	1695	953	1021	1010	1068	611	798	174	255	-318	134
Compression Combined Force (kN) =		-304	-463	-199	-142	-138	-343	-1832	-2348	-1340	-1531	-1334	-1496	-1066	-1369	-740	-935	-768	-50
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.23	0.17	0.17	0.21	0.09	0.31	0.41	0.23	0.25	0.24	0.26	0.15	0.19	0.04	0.06	NA	0.03
		0.01	0.13	0.06	0.04	0.04	0.10	0.57	0.73	0.41	0.47	0.41	0.46	0.33	0.42	0.23	0.29	0.22	0.01

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	444.47	420.26	929.65	184.81	1188.86	1101.88	593.58	649.35	212.7	150.49	-230.45	-190.47	-112.13	22.65
	ULS Min	286.87	-261.89	677.07	-461.46	-2376.76	-2454.43	-1978.22	-1919.63	-1798.25	-1855.89	-1308.41	-1272.89	-195.99	12.61
IY Bending	ULS Max	8154.97	0	30.93	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8942.31	-59.43	0	-15.87	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	146.05	237.16	73.42	268.42	0	0	0	0	0	0	0	0	0	0
	ULS Min	-70.88	-113.92	-35.15	-99.45	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	91	19	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	17	6	22	0	0	0	0	0	0	0	0	0	0
Force (kn) =		7802	746	328	508	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		8247	1167	1258	693	1189	1102	594	649	213	150	-230	-190	-112	23
Compression Combined Force (kN) =		-7515	-1008	349	-970	-2377	-2454	-1978	-1920	-1798	-1856	-1308	-1273	-196	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.41	0.22	0.28	0.15	0.23	0.21	0.11	0.12	0.05	0.03	NA	NA	NA	0.02
		0.48	0.25	NA	0.27	0.63	0.65	0.52	0.51	0.54	0.56	0.39	0.38	0.63	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	244.56	208.37	305.99	113.39	145.22	643.61	604.93	398.44	418.75	295.5	275.52	317.51	278.58	44.97	32.13
	ULS Min	-13.05	-230.97	9.05	-68.62	85.86	-964.49	-970.27	-651.41	-655.92	-570.5	-555.71	-388.79	-452.15	-78.02	19.51
IY Bending	ULS Max	3981.87	15.77	20.43	16.15	114.51	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4330.85	-22.72	-13.23	-18.53	89.18	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	168.59	240.22	97.95	267.63	119.24	0	0	0	0	0	0	0	0	0	0
	ULS Min	-101.12	-120.56	-56.06	-137.03	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	52	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	13	24	10	26	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4362	545	302	559	620	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4607	753	608	672	765	644	605	398	419	296	276	318	279	45	32
Compression Combined Force (kN) =		-4375	-776	-293	-627	-534	-964	-970	-651	-656	-571	-556	-389	-452	-78	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.28	0.18	0.15	0.16	0.06	0.14	0.13	0.09	0.09	0.06	0.06	0.07	0.06	0.04	0.03
		0.34	0.30	0.11	0.24	0.06	0.25	0.26	0.17	0.17	0.15	0.15	0.10	0.12	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder	Front Transverse Sheave Girder	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		End	Middle					
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	28091.35	28091.35	2422.9	2010.53	2073.59	1984.64	496.61
	ULS Min	0	0	-1130	-10	-12	-16	-509
Shear	Fz Max	11089	11089	999	2700	2717	2618	1180
	Fz Min	-11126	-11126	-1060	-276	-2730	-280	-675
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.516	0.685	0.120	0.193	0.168	0.190	0.095
		0.306	0.582	0.197	0.646	0.653	0.626	0.514

Case 8 - ULS V1 D/C		North Tower																	
		Rail Side Columns									HWY Side Columns								
		Front Leg (100-110)									Front Leg (200-209)								
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-15726	-15704	-14875	-14601	-13779	-13584	-13214	-13181	-12995	-15396	-15382	-14459	-13687	-13515	-13182	-13148	-12975
	ULS Min	-15756	-15715	-14917	-14758	-13916	-13722	-13276	-13214	-13090	-15426	-15392	-14658	-13824	-13652	-13243	-13182	-13070
IY Bending	ULS Max	0	-54	-38	94	95	135	163	178	178	27	35	103	102	140	159	169	169
	ULS Min	-54	-78	-75	89	91	90	135	163	-36	0	27	37	88	88	140	159	-21
IZ Bending	ULS Max	0	-49	119	481	-56	345	345	-59	296	97	129	161	198	198	61	283	283
	ULS Min	-49	-58	-17	267	-210	-210	-59	-279	-279	0	97	-27	174	-346	-346	61	-298
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.129	1.635	1.580	1.976	2.669	3.798	5.186	5.658	5.658	0.557	0.737	2.163	2.866	3.936	5.063	5.384	5.384
	Stress due to bending Z	0.936	1.104	2.259	9.125	4.855	7.983	12.227	9.891	10.490	1.834	2.454	3.049	4.597	8.009	12.265	10.030	10.592
Force (kn) =		354	469	658	1903	1196	1873	1854	1655	1719	410	547	893	1186	1899	1845	1641	1701
Tension Combined Force (kN) =		-15372	-15235	-14217	-12699	-12583	-11712	-11361	-11526	-11276	-14986	-14835	-13565	-12501	-11617	-11337	-11507	-11274
Compression Combined Force (kN) =		-16110	-16184	-15575	-16661	-15112	-15594	-15130	-14870	-14809	-15836	-15939	-15551	-15011	-15551	-15088	-14823	-14771
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.25	0.25	0.24	0.26	0.23	0.24	0.41	0.40	0.40	0.24	0.25	0.24	0.23	0.24	0.41	0.40	0.40

Case 8 - ULS V1 D/C		North Tower																	
		Rail Side Columns									HWY Side Columns								
		Rear Leg (300-310)									Rear Leg (400-409)								
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4414	-4402	-3215	-2892	-2601	-2500	-2290	-2134	-2257	-4087	-4068	-2816	-2515	-2397	-2140	-1952	-2019
	ULS Min	-4427	-4407	-3234	-2960	-2679	-2578	-2368	-2212	-2288	-4100	-4073	-2904	-2593	-2476	-2218	-2030	-2050
IY Bending	ULS Max	5	12	14	61	57	57	60	182	177	11	14	43	44	56	61	192	194
	ULS Min	0	5	-39	-21	38	37	57	58	-178	0	4	5	43	43	56	61	-243
IZ Bending	ULS Max	0	-69	-36	282	-28	56	56	119	344	36	66	97	103	20	36	39	39
	ULS Min	-69	-86	-126	169	-43	-28	-48	-47	119	0	31	34	20	-57	-57	36	-577
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.266	0.591	1.966	3.131	2.927	2.932	3.040	9.275	9.097	0.559	0.710	2.170	2.260	2.858	3.109	9.775	12.379
	Stress due to bending Z	2.045	2.552	3.742	8.377	1.273	1.674	1.668	3.547	10.206	1.060	1.952	2.870	3.051	1.696	1.696	1.169	17.125
Force (kn) =		180	245	446	898	328	360	368	1001	1507	126	208	394	415	356	375	854	2304
Tension Combined Force (kN) =		-4233	-4157	-2769	-1993	-2273	-2141	-1922	-1133	-750	-3961	-3860	-2423	-2100	-2042	-1765	-1097	284
Compression Combined Force (kN) =		-4607	-4652	-3679	-3859	-3007	-2938	-2736	-3213	-3795	-4227	-4280	-3297	-3008	-2831	-2593	-2884	-4354
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.22	0.23	0.18	0.19	0.14	0.14	0.13	0.15	0.18	0.20	0.21	0.16	0.14	0.14	0.12	0.14	0.20

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	236.18	236.18	366.22	402.94	510.48	252.83	-370.69	-393.98	-232.76	-252.45	-192.6	-216.38	-279.28	-295.21	-312.58	-317.05	-132.5	-887.47
	ULS Min	236.18	236.18	354.25	380.92	473.48	192.1	-412.01	-439.74	-276.85	-307.24	-237.73	-268.6	-324.22	-349.56	-358.19	-369.21	-145.66	-898.33
IY Bending	ULS Max	0	0	40	41.69	40.61	38.75	1.56	0	4.56	17.63	4.57	22.51	1.88	25.44	3.39	26.11	0	29.28
	ULS Min	0	0	0	0	0	0	-22.2	0	-23.12	0	-22.48	0	-29.55	0	-24.85	0	0	0
IZ Bending	ULS Max	0	0	0	0.33	0	0	0	0	0.6	1.12	0	0.29	0	0.98	0	2.95	0	0
	ULS Min	0	0	-6.59	-9.44	-41.95	-48.01	-1.21	0	-0.39	0	-0.68	0	-3.8	0	-6.42	0	0	-6.19
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	13	9	0	10	7	9	9	12	11	10	11	0	10
	Stress Z	0	0	1	1	5	5	0	0	0	0	0	0	0	0	1	0	0	1
Force (kn) =		0	0	263	279	335	335	151	0	156	120	152	152	205	173	178	181	0	194
Tension Combined Force (kN) =		236	236	629	682	846	588	-219	-394	-76	-132	-40	-65	-74	-123	-134	-136	-133	-694
Compression Combined Force (kN) =		236	236	92	102	138	-143	-563	-440	-433	-428	-390	-420	-529	-522	-537	-550	-146	-1092
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.05	0.14	0.15	0.18	0.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.04	0.17	0.14	0.13	0.13	0.12	0.13	0.16	0.16	0.17	0.17	0.04	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	280.09	452.87	363.29	397.69	504.02	182.69	-330.16	-314.77	-230.62	-256.02	-191.98	-209.96	-267.26	-297.52	-299.76	-347.18	-629.34	-126.66
	ULS Min	280.09	442.63	361.88	396.44	502.17	178.86	-378.75	-384.66	-285.93	-300.14	-244.28	-255.2	-322.11	-342.62	-352.53	-392.07	-641.76	-139.82
IY Bending	ULS Max	0	0	39.34	39.35	39.63	40.82	0	44.07	16.43	4.67	22.09	4.57	24.05	2.18	25.34	4.22	24.6	0
	ULS Min	0	-35.08	0	0	0	0	-4.59	0	0	-23.2	0	-22.5	0	-29.64	0	-24.97	0	0
IZ Bending	ULS Max	0	0	0	1.37	0	1.65	0	2.8	0.93	0	0.52	0	0	0.88	0.78	0.84	0.27	0
	ULS Min	0	-2.22	-1.67	0	-0.97	0	-3.83	0	0	-1.68	0	-0.29	-0.51	0	0	0	-0.54	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	10	14	14	14	14	2	18	7	10	9	9	10	12	11	10	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		0	191	249	248	249	258	38	301	112	159	149	152	162	201	172	169	154	0
Tension Combined Force (kN) =		280	644	612	646	753	441	-292	-14	-119	-97	-43	-58	-105	-97	-128	-178	-475	-127
Compression Combined Force (kN) =		280	252	113	148	253	-79	-417	-686	-398	-459	-394	-407	-484	-543	-524	-561	-796	-140
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.13	0.13	0.14	0.16	0.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		NA	NA	NA	NA	NA	0.02	0.13	0.21	0.12	0.14	0.12	0.13	0.15	0.17	0.16	0.17	0.22	0.04

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	427.65	81.62	957.21	142.34	-660.02	-689.42	-714.58	-709.44	-885.65	-889.23	-812.33	-821.26	-174.43	20.35
	ULS Min	427.65	65.33	957.21	133.93	-685.51	-714.91	-740.08	-734.94	-908	-911.59	-834.68	-843.62	-182.1	11.51
IY Bending	ULS Max	632.66	0	35.27	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-527.27	-56.06	0	-14.34	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	3.46	0	0.05	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.57	-0.64	0	-1.34	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	6	18	14	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		524	373	251	104	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		952	455	1208	246	-660	-689	-715	-709	-886	-889	-812	-821	-174	20
Compression Combined Force (kN) =		-97	-308	706	30	-686	-715	-740	-735	-908	-912	-835	-844	-182	12
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.05	0.09	0.26	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.08	NA	NA	0.18	0.19	0.20	0.19	0.27	0.27	0.25	0.25	0.58	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	172.01	12.99	243.47	62.3	224.58	-214.83	-221.18	-170.44	-183.11	-198.26	-178.5	-63.4	-159.89	-25.04	29.07
	ULS Min	165.04	-0.58	227.65	10.77	224.58	-237.82	-244.17	-193.44	-206.1	-221.26	-201.49	-86.39	-182.88	-33.88	20.69
IY Bending	ULS Max	255.93	10.38	17.79	11.88	96.93	0	0	0	0	0	0	0	0	0	0
	ULS Min	-221.42	-19.98	-6.41	-15.64	96.93	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.59	4.57	3.88	6.46	18.83	0	0	0	0	0	0	0	0	0	0
	ULS Min	-8.76	0	0	0	18.83	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		252	150	133	122	303	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		424	163	377	184	528	-215	-221	-170	-183	-198	-179	-63	-160	-25	29
Compression Combined Force (kN) =		-87	-151	94	-111	-78	-238	-244	-193	-206	-221	-201	-86	-183	-34	21
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.09	0.04	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	0.01	0.06	0.06	0.05	0.05	0.06	0.05	0.02	0.05	0.11	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
Members		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	31699.22	31699.22	3891.03	2193.89	2610.2	2202.23	815.92
	ULS Min	0	0	-1141	-10	-12	-10	-589
Shear	Fz Max	12558	12558	1548	2954	3120	2884	1366
	Fz Min	-12411	-12411	-1586	-386	-3020	-389	-436
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.582	0.773	0.193	0.210	0.212	0.211	0.155
		0.346	0.657	0.294	0.707	0.746	0.690	0.595

Case 8 - ULS V2 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-19222	-19197	-18411	-18087	-15617	-15526	-13956	-13922	-13814	-12847	-12833	-11945	-12795	-12555	-13443	-13409	-13174
	ULS Min	-19252	-19208	-18454	-18243	-15754	-15663	-14017	-13956	-13909	-12877	-12844	-12144	-12932	-12692	-13504	-13443	-13269
IY Bending	ULS Max	136	229	230	264	103	119	231	231	162	0	-42	134	146	148	175	189	189
	ULS Min	0	136	37	58	46	99	119	162	-16	-42	-80	-78	91	94	148	175	-70
IZ Bending	ULS Max	1118	1436	2639	8718	1750	341	341	-30	571	1187	1564	8068	1948	48	974	974	24
	ULS Min	0	1118	1337	2856	-392	-392	-30	-238	-238	0	1187	1489	48	-770	-770	24	-86
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	2.846	4.812	4.834	5.534	2.904	3.349	7.369	7.369	5.159	0.874	1.687	2.817	4.109	4.154	5.569	6.029	6.029
	Stress due to bending Z	21.202	27.222	50.048	165.324	40.547	9.086	12.103	8.432	20.260	22.505	29.651	152.997	45.136	17.829	34.579	34.579	3.066
Force (kn) =		4122	5490	9406	29284	6907	1977	2073	1682	2706	4007	5371	26705	7828	3494	4274	4323	968
Tension Combined Force (kN) =		-15101	-13707	-9005	11197	-8710	-13549	-11883	-12240	-11108	-8840	-7462	14760	-4967	-9061	-9169	-9086	-12206
Compression Combined Force (kN) =		-23374	-24698	-27860	-47527	-22661	-17640	-16090	-15638	-16615	-16884	-18215	-38849	-20760	-16187	-17778	-17766	-14237
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.20	NA	NA	NA	NA	NA	NA	NA	0.26	NA	NA	NA	NA	NA
		0.36	0.38	0.43	0.74	0.35	0.27	0.43	0.42	0.45	0.26	0.28	0.60	0.32	0.25	0.48	0.48	0.38

Case 8 - ULS V2 D/C		**North Tower**																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-6534	-6518	-5219	-4805	-3659	-3447	-2658	-2417	-2284	-2134	-2114	-1004	-1504	-1461	-1756	-1643	-1954
	ULS Min	-6547	-6523	-5237	-4874	-3737	-3525	-2736	-2495	-2315	-2147	-2118	-1091	-1582	-1539	-1834	-1722	-1985
IY Bending	ULS Max	27	27	151	125	51	58	64	191	176	0	-33	54	59	61	66	190	199
	ULS Min	0	-27	-19	16	3	50	57	62	-173	-45	-53	-33	43	43	60	66	-244
IZ Bending	ULS Max	413	451	736	3772	614	64	64	-29	565	380	466	3540	708	-60	48	48	-130
	ULS Min	0	413	550	1166	-131	-130	-30	-30	-32	0	393	543	-83	-83	-60	-129	-326
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.374	1.391	7.691	6.355	2.599	2.977	3.260	9.735	8.971	2.302	2.695	2.750	2.999	3.099	3.374	9.682	12.429
	Stress due to bending Z	12.262	13.410	21.866	112.045	18.252	3.852	1.911	0.896	16.791	11.280	13.853	105.152	21.029	2.476	1.769	3.845	9.681
Force (kn) =		1065	1156	2308	9244	1628	533	404	830	2011	1060	1292	8425	1876	435	402	1056	1726
Tension Combined Force (kN) =		-5469	-5362	-2911	4439	-2031	-2914	-2255	-1587	-273	-1074	-822	7421	372	-1026	-1355	-587	-228
Compression Combined Force (kN) =		-7612	-7678	-7545	-14118	-5365	-4058	-3140	-3325	-4326	-3208	-3410	-9516	-3458	-1974	-2236	-2778	-3711
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.20	NA	NA	NA	NA	NA	NA	NA	0.34	0.02	NA	NA	NA	NA
		0.37	0.37	0.37	0.68	0.26	0.19	0.15	0.16	0.20	0.16	0.17	0.46	0.17	0.09	0.11	0.13	0.17

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
Top Down Defined		Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
Element #		1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	734.59	734.59	470.14	491.95	685.44	300.33	906.86	823.47	558.37	586.82	590.33	637.21	291.3	238.73	-129.58	-123.82	-76.41	-833.68
	ULS Min	-203.68	-203.68	280.27	307.72	306.21	152.2	-1877.01	-1561.84	-1201.96	-1083.62	-1155.35	-1046.91	-1013.57	-848.06	-613.48	-575.62	-219.46	-968.03
IY Bending	ULS Max	0	0	54.14	54.11	48.54	42.51	11.52	0	15.38	25.6	16.18	39.32	8.97	37.4	5.59	30.89	0	30.66
	ULS Min	0	0	0	0	0	0	-39.42	0	-33.05	-2.79	-31.43	0	-35.63	0	-28.49	0	0	0
IZ Bending	ULS Max	0	0	68.07	91.69	45.61	26.35	83.36	0	77.54	28.36	61.68	4.38	64.1	7.9	63.59	9.53	0	4.39
	ULS Min	0	0	-63.3	-91.49	-112.43	-87.57	-45.65	0	-39.74	-29.24	-18.74	-7.75	-23.98	-10.28	-26.47	-8.04	0	-9.53
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	19	19	17	15	16	0	14	11	13	16	15	16	12	13	0	11
	Stress Z	0	0	7	10	12	9	9	0	9	3	7	1	7	1	7	1	0	1
Force (kn) =		0	0	471	516	522	436	416	0	362	225	323	278	355	270	306	225	0	209
Tension Combined Force (kN) =		735	735	941	1008	1207	736	1323	823	921	812	913	915	647	508	177	101	-76	-625
Compression Combined Force (kN) =		-204	-204	-190	-209	-216	-284	-2293	-1562	-1564	-1308	-1478	-1325	-1369	-1118	-920	-800	-219	-1177
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.21	0.22	0.26	0.16	0.32	0.20	0.22	0.20	0.22	0.22	0.16	0.12	0.04	0.02	NA	NA
		0.01	0.06	0.05	0.06	0.06	0.08	0.71	0.48	0.48	0.40	0.46	0.41	0.42	0.34	0.28	0.25	0.06	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
Element #		2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	741.07	583.39	453.95	477.66	675.96	227.23	748.82	858.83	498.03	486.63	567.18	554.68	220.56	276.69	-106.44	-155.56	-591.2	-66.04
	ULS Min	-159.97	331.83	281.1	332.39	338.46	134.82	-1415.89	-1657.68	-994.24	-1105.43	-983.92	-1078.62	-803.04	-978.43	-550.11	-639.59	-689.77	-225.86
IY Bending	ULS Max	0	34.48	48.61	47.37	44.05	42.35	5.62	71.89	35.27	15.79	37.71	15.39	35.2	8.98	29.62	6.71	25.69	0
	ULS Min	0	-107.82	0	0	0	0	-14.45	0	-3.02	-32.35	0	-31.08	0	-35.29	0	-28.27	0	0
IZ Bending	ULS Max	0	26.19	29.18	33.78	31.47	30.95	96.06	32.17	15.03	19.06	5.83	12.58	5.21	14.24	6.4	15.59	2.41	0
	ULS Min	0	-44.8	-11.54	-8.25	-9.41	-6.85	-56.48	-33.9	-10.69	-61.89	-1.24	-56.47	-1.94	-58.46	-1.15	-64.3	-7.99	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	31	17	16	15	15	6	30	15	13	16	13	15	15	12	12	9	0
	Stress Z	0	4	3	4	3	3	11	4	2	7	1	6	1	7	1	7	1	0
Force (kn) =		0	655	360	362	336	325	271	544	264	329	264	311	246	343	210	306	175	0
Tension Combined Force (kN) =		741	1238	814	839	1012	552	1020	1403	762	816	831	866	466	620	104	151	-416	-66
Compression Combined Force (kN) =		-160	-323	-79	-29	2	-190	-1687	-2202	-1258	-1435	-1248	-1390	-1049	-1321	-761	-946	-865	-226
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.24	0.18	0.18	0.22	0.12	0.25	0.34	0.18	0.20	0.20	0.21	0.11	0.15	0.03	0.04	NA	NA
		0.00	0.09	0.02	0.01	NA	0.05	0.52	0.68	0.39	0.44	0.38	0.43	0.32	0.41	0.23	0.29	0.24	0.06

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	507.3	388.45	1075.44	200.15	841.5	743.01	293.95	346.32	-71.84	-129.63	-445.3	-410.92	-148.19	20.37
	ULS Min	372.22	-209.26	858.95	-356.72	-2218.39	-2308.9	-1914.09	-1859.3	-1798.69	-1852.58	-1372.45	-1341.9	-221.17	10.5
IY Bending	ULS Max	7036.79	0	39.28	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-7875.79	-62.49	0	-15.01	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	129.44	203.08	62.93	229.66	0	0	0	0	0	0	0	0	0	0
	ULS Min	-56.5	-97.84	-30.13	-85.66	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	80	20	16	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	7	15	5	19	0	0	0	0	0	0	0	0	0	0
Force (kn) =		6875	716	372	445	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		7382	1104	1448	645	842	743	294	346	-72	-130	-445	-411	-148	20
Compression Combined Force (kN) =		-6503	-925	487	-802	-2218	-2309	-1914	-1859	-1799	-1853	-1372	-1342	-221	11
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.36	0.21	0.32	0.14	0.16	0.14	0.06	0.07	NA	NA	NA	NA	NA	0.02
		0.41	0.23	NA	0.22	0.58	0.61	0.50	0.49	0.54	0.55	0.41	0.40	0.71	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	283.94	185.86	371.39	121.34	244.35	467.05	430.62	256.72	265.86	165.53	159.12	220.23	146.51	22.08	30.95
	ULS Min	65.08	-190.71	111.61	-34.67	190.37	-914.61	-922.84	-646.44	-658.57	-580.04	-556.65	-388.46	-483.12	-84.6	18.92
IY Bending	ULS Max	3483.84	14.78	20.97	14.97	109.57	0	0	0	0	0	0	0	0	0	0
	ULS Min	-3814.96	-23.02	-9.2	-17.57	89.14	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	140.88	206.51	84.5	229.84	98.72	0	0	0	0	0	0	0	0	0	0
	ULS Min	-90.3	-102.73	-47.51	-117.01	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	46	10	9	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	11	20	8	23	6	0	0	0	0	0	0	0	0	0	0
Force (kn) =		3803	493	284	492	552	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		4087	679	656	613	796	467	431	257	266	166	159	220	147	22	31
Compression Combined Force (kN) =		-3738	-684	-173	-526	-361	-915	-923	-646	-659	-580	-557	-388	-483	-85	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.24	0.16	0.16	0.15	0.07	0.10	0.09	0.06	0.06	0.04	0.03	0.05	0.03	0.02	0.02
		0.29	0.26	0.07	0.20	0.04	0.24	0.24	0.17	0.17	0.15	0.15	0.10	0.13	0.27	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	33416.06	33416.06	3957.02	2349.98	2463.26	2351.48	965.27
	ULS Min	0	0	-1480	-10	-12	-15	-688
Shear	Fz Max	13122	13122	1530	3158	3239	3099	1596
	Fz Min	-13143	-13143	-1571	-397	-3213	-380	-684
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.613	0.815	0.196	0.225	0.200	0.225	0.184
		0.362	0.687	0.292	0.756	0.775	0.741	0.695

Case 8 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-20004	-19978	-19204	-18867	-15989	-15924	-14054	-14021	-13932	-12117	-12103	-11225	-12484	-12227	-13421	-13388	-13137
	ULS Min	-20034	-19989	-19247	-19024	-16126	-16061	-14116	-14054	-14026	-12147	-12114	-11424	-12621	-12364	-13483	-13421	-13231
IY Bending	ULS Max	183	306	307	307	106	114	247	247	156	0	-59	141	156	149	177	192	192
	ULS Min	0	183	55	48	33	101	114	156	-8	-59	-109	-107	90	95	149	177	-79
IZ Bending	ULS Max	1410	1809	3269	10776	2202	338	338	-22	638	1459	1922	10093	2391	9	1202	1202	-32
	ULS Min	0	1410	1676	3503	-436	-436	-22	-226	-226	0	1459	1821	9	-873	-873	-43	-43
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	3.839	6.422	6.436	6.439	2.974	3.213	7.863	7.863	4.968	1.232	2.293	2.960	4.393	4.184	5.643	6.126	6.126
	Stress due to bending Z	26.741	34.310	61.994	204.349	51.016	10.111	11.992	8.007	22.648	27.668	36.444	191.398	55.405	20.232	42.670	42.670	1.509
Force (kn) =		5241	6981	11728	36127	8582	2118	2114	1690	2940	4953	6639	33311	9506	3881	5143	5195	813
Tension Combined Force (kN) =		-14763	-12997	-7476	17260	-7406	-13806	-11940	-12331	-10991	-7163	-5464	22086	-2978	-8346	-8278	-8193	-12324
Compression Combined Force (kN) =		-25275	-26970	-30975	-55151	-24708	-18179	-16229	-15744	-16966	-17100	-18753	-44736	-22127	-16246	-18626	-18616	-14044
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.31	NA	NA	NA	NA	NA	NA	NA	0.39	NA	NA	NA	NA	NA
		0.39	0.42	0.48	0.85	0.38	0.28	0.44	0.42	0.46	0.26	0.29	0.69	0.34	0.25	0.50	0.50	0.38

Case 8 - ULS V3 D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-7054	-7036	-5711	-5275	-3915	-3675	-2742	-2478	-2284	-1636	-1615	-542	-1242	-1218	-1652	-1558	-1931
	ULS Min	-7067	-7041	-5729	-5344	-3993	-3753	-2820	-2557	-2315	-1649	-1620	-629	-1320	-1296	-1730	-1636	-1962
IY Bending	ULS Max	32	32	198	161	54	58	65	192	175	0	-43	56	62	62	67	189	199
	ULS Min	0	-37	-28	4	-10	53	56	63	-171	-59	-69	-43	43	43	61	67	-243
IZ Bending	ULS Max	533	586	929	4673	779	65	66	-24	620	466	566	4401	859	-60	51	51	-172
	ULS Min	0	533	719	1387	-156	-155	-26	-68	-70	0	483	670	-109	-109	-60	-171	-262
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	1.648	1.891	10.107	8.207	2.749	2.965	3.294	9.810	8.924	3.014	3.544	2.876	3.164	3.136	3.421	9.614	12.409
	Stress due to bending Z	15.841	17.403	27.604	138.794	23.135	4.603	1.966	2.024	18.425	13.834	16.827	130.727	25.521	3.244	1.780	5.094	7.791
Force (kn) =		1365	1506	2944	11477	2021	591	411	924	2135	1315	1590	10431	2240	498	406	1148	1577
Tension Combined Force (kN) =		-5688	-5530	-2766	6202	-1894	-3084	-2331	-1554	-148	-321	-25	9889	997	-720	-1246	-410	-354
Compression Combined Force (kN) =		-8432	-8547	-8673	-16821	-6014	-4344	-3230	-3481	-4450	-2965	-3210	-11060	-3560	-1794	-2136	-2784	-3539
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.28	NA	NA	NA	NA	NA	NA	NA	0.45	0.05	NA	NA	NA	NA
		0.41	0.41	0.42	0.81	0.29	0.21	0.15	0.17	0.21	0.14	0.16	0.54	0.17	0.09	0.10	0.13	0.16

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	857.86	857.86	494.29	513.32	730.39	308.16	1228.3	1129.94	757.65	798.15	787.37	851.93	435.83	374.21	-81.96	-74.29	-57.96	-818.55
	ULS Min	-314.98	-314.98	256.95	283.04	256.45	137.69	-2241.21	-1840.24	-1431.75	-1276.18	-1383.46	-1240.15	-1184.03	-970.66	-675.42	-625.95	-233.48	-983.79
IY Bending	ULS Max	0	0	57.67	57.19	50.52	43.47	14.06	0	18.1	29.05	19.1	43.47	10.78	40.32	6.17	32.02	0	30.97
	ULS Min	0	0	0	0	0	0	-43.64	0	-35.46	-6.1	-33.59	-0.32	-37.03	0	-29.28	0	0	0
IZ Bending	ULS Max	0	0	86.63	116.83	67.61	37.37	104.37	0	97.02	35.28	77.17	5.4	80.86	9.63	80.97	11.15	0	6.51
	ULS Min	0	0	-77.58	-112.14	-129.94	-97.44	-56.76	0	-49.58	-36.72	-23.36	-9.68	-29.22	-12.93	-31.58	-10.62	0	-10.37
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	18	15	18	0	15	12	14	18	15	17	12	13	0	11
	Stress Z	0	0	9	13	14	11	12	0	11	4	9	1	9	1	9	1	0	1
Force (kn) =		0	0	529	584	568	461	482	0	414	262	365	309	395	294	343	235	0	212
Tension Combined Force (kN) =		858	858	1023	1098	1299	769	1710	1130	1172	1060	1153	1161	831	668	261	161	-58	-607
Compression Combined Force (kN) =		-315	-315	-272	-301	-312	-323	-2723	-1840	-1846	-1538	-1749	-1550	-1579	-1265	-1019	-861	-233	-1196
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.17	0.22	0.24	0.28	0.17	0.41	0.27	0.28	0.26	0.28	0.28	0.20	0.16	0.06	0.04	NA	NA
		0.01	0.09	0.08	0.09	0.09	0.09	0.84	0.57	0.57	0.47	0.54	0.48	0.49	0.39	0.31	0.27	0.07	0.33

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	855.01	613.55	474.55	495.64	716.47	234.51	1020.53	1153.9	681.68	673.81	758.28	747.11	344.49	422.11	-56.91	-105.74	-581.51	-46.11
	ULS Min	-271.3	301.7	258.49	314.06	294.6	119.95	-1673.17	-1974.18	-1169.8	-1305.24	-1167.51	-1283.2	-921.27	-1135.52	-598.27	-699.56	-701.62	-242.59
IY Bending	ULS Max	0	52.11	53.1	49.54	45.15	42.75	8.13	78.75	39.94	18.6	41.57	18.12	37.92	10.72	30.62	7.36	25.95	0
	ULS Min	0	-125.76	0	0	0	0	-16.96	-3.2	-7.92	-34.56	0	-33.15	0	-36.59	0	-28.97	0	0
IZ Bending	ULS Max	0	32.92	36.85	41.91	39.51	38.3	121.02	39.51	18.66	24.24	7.16	15.81	6.56	17.57	7.8	19.39	2.96	0
	ULS Min	0	-55.43	-13.99	-10.63	-11.52	-8.82	-69.66	-42.42	-13.48	-76.94	-1.63	-70.51	-2.29	-73.28	-1.53	-80.44	-9.84	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	37	18	17	16	15	7	33	17	14	17	14	16	15	13	12	9	0
	Stress Z	0	5	4	5	4	4	14	5	2	9	1	8	1	8	1	9	1	0
Force (kn) =		0	769	403	391	359	342	333	606	302	371	292	350	266	378	220	340	180	0
Tension Combined Force (kN) =		855	1383	878	887	1075	576	1354	1759	984	1045	1050	1097	611	801	163	235	-402	-46
Compression Combined Force (kN) =		-271	-467	-145	-77	-64	-222	-2006	-2580	-1472	-1677	-1460	-1634	-1188	-1514	-818	-1040	-881	-243
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.27	0.19	0.19	0.24	0.13	0.33	0.42	0.24	0.25	0.25	0.26	0.15	0.19	0.04	0.06	NA	NA
		0.01	0.13	0.04	0.02	0.02	0.06	0.62	0.80	0.45	0.52	0.45	0.50	0.37	0.47	0.25	0.32	0.25	0.07

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	524.77	464.61	1098.66	213.76	1220.98	1105.16	550.96	615.2	137.47	66.07	-347.71	-302.38	-140.37	20.46
	ULS Min	355.92	-278.44	828.05	-480.19	-2597.5	-2703.35	-2202.72	-2135.45	-2015.52	-2082.03	-1501.07	-1460.53	-229.67	10.34
IY Bending	ULS Max	8851.51	0	39.94	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-9711.3	-63.94	0	-15.21	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	161.37	253.99	78.65	287.37	0	0	0	0	0	0	0	0	0	0
	ULS Min	-71.05	-122.13	-37.67	-106.73	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	98	21	16	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	8	19	6	23	0	0	0	0	0	0	0	0	0	0
Force (kn) =		8484	801	400	531	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		9009	1266	1499	745	1221	1105	551	615	137	66	-348	-302	-140	20
Compression Combined Force (kN) =		-8128	-1080	428	-1012	-2598	-2703	-2203	-2135	-2016	-2082	-1501	-1461	-230	10
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.44	0.24	0.33	0.16	0.23	0.21	0.11	0.12	0.03	0.01	NA	NA	NA	0.02
		0.52	0.27	NA	0.28	0.68	0.71	0.58	0.56	0.60	0.62	0.45	0.44	0.74	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	311.48	229.22	402.46	135.87	248.71	638.14	594.25	364.31	378.87	257.15	244.21	291.72	223.89	34.06	31.42
	ULS Min	38.04	-241.49	80.52	-59.14	182.57	-1083.18	-1091.82	-758.88	-770.92	-669.06	-644.75	-463.39	-557.4	-97.08	18.49
IY Bending	ULS Max	4354.35	15.9	22.3	16.26	113.04	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4713.02	-23.77	-9.93	-18.06	87.62	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	177.5	257.41	105.04	286.94	128.12	0	0	0	0	0	0	0	0	0	0
	ULS Min	-111.47	-129.15	-59.97	-146.62	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	57	11	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	14	25	10	28	7	0	0	0	0	0	0	0	0	0	0
Force (kn) =		4716	580	327	586	640	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5028	809	729	722	889	638	594	364	379	257	244	292	224	34	31
Compression Combined Force (kN) =		-4678	-821	-246	-645	-458	-1083	-1092	-759	-771	-669	-645	-463	-557	-97	18
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.30	0.19	0.18	0.17	0.07	0.14	0.13	0.08	0.08	0.06	0.05	0.06	0.05	0.03	0.03
		0.36	0.32	0.09	0.25	0.05	0.29	0.29	0.20	0.20	0.18	0.17	0.12	0.15	0.31	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
Members		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	33781.75	33781.75	3965.71	2371.13	2467.67	2394.28	1002.72
	ULS Min	0	0	-1562	-10	-12	-17	-710
Shear	Fz Max	13192	13192	1521	3185	3245	3156	1647
	Fz Min	-13255	-13255	-1562	-399	-3237	-378	-746
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.620	0.824	0.197	0.227	0.200	0.229	0.191
		0.365	0.693	0.290	0.762	0.776	0.755	0.717

Case 8 - ULS V4 D/C		North Tower																	
		Rail Side Columns									HWY Side Columns								
		Front Leg (100-110)									Front Leg (200-209)								
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-8108	-8086	-7347	-7074	-6544	-6341	-6060	-6026	-5805	-7713	-7699	-6866	-6391	-6209	-5956	-5922	-5718
	ULS Min	-8138	-8096	-7389	-7230	-6681	-6478	-6121	-6060	-5899	-7743	-7710	-7065	-6529	-6346	-6017	-5956	-5813
IY Bending	ULS Max	0	-63	-82	46	11	43	43	6	242	29	39	40	8	47	47	0	260
	ULS Min	-63	-90	-87	-13	-12	11	6	-14	-14	0	29	-7	-8	8	0	-25	-25
IZ Bending	ULS Max	0	-30	120	357	-28	158	158	-23	124	77	102	136	142	84	23	122	122
	ULS Min	-30	-34	17	267	-97	-97	-23	-121	-121	0	77	74	84	-158	-158	23	-119
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	1.329	1.885	1.832	0.968	0.346	1.217	1.381	0.449	7.695	0.609	0.809	0.844	0.230	1.307	1.484	0.789	8.297
	Stress due to bending Z	0.575	0.646	2.268	6.763	2.258	3.656	5.600	4.291	4.402	1.451	1.940	2.575	3.301	3.662	5.608	4.313	4.313
	Force (kn) =	326	434	703	1325	414	775	743	505	1288	353	471	586	561	790	755	543	1342
	Tension Combined Force (kN) =	-7781	-7652	-6644	-5749	-6130	-5567	-5317	-5522	-4517	-7360	-7228	-6279	-5830	-5419	-5201	-5379	-4376
	Compression Combined Force (kN) =	-8464	-8530	-8092	-8555	-7095	-7253	-6864	-6564	-7187	-8096	-8181	-7651	-7090	-7136	-6772	-6499	-7156
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
		0.13	0.13	0.13	0.13	0.11	0.11	0.18	0.18	0.19	0.13	0.13	0.12	0.11	0.11	0.18	0.17	0.19

Case 8 - ULS V4 D/C		North Tower																	
		Rail Side Columns									HWY Side Columns								
		Rear Leg (300-310)									Rear Leg (400-409)								
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-4765	-4754	-3648	-3325	-2980	-2867	-2687	-2548	-2776	-4439	-4421	-3238	-2893	-2764	-2540	-2364	-2549
	ULS Min	-4779	-4759	-3666	-3393	-3058	-2946	-2765	-2626	-2807	-4453	-4425	-3325	-2971	-2843	-2618	-2442	-2580
IY Bending	ULS Max	2	7	10	17	14	15	14	163	159	16	20	12	8	12	12	154	154
	ULS Min	0	2	-42	-27	4	4	3	2	-251	0	11	0	2	8	8	8	-261
IZ Bending	ULS Max	0	-66	-40	279	-33	65	65	89	498	35	66	101	107	25	36	96	96
	ULS Min	-66	-83	-134	187	-44	-33	-48	-47	89	0	30	32	25	-66	-66	36	-778
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	0.109	0.357	2.148	1.354	0.691	0.750	0.720	8.310	12.807	0.838	0.996	0.617	0.387	0.619	0.617	7.875	13.334
	Stress due to bending Z	1.969	2.472	3.967	8.290	1.314	1.926	1.928	2.643	14.786	1.054	1.971	3.011	3.171	1.958	1.958	2.850	23.099
	Force (kn) =	162	221	477	753	157	209	207	855	2154	148	232	283	278	201	201	837	2845
	Tension Combined Force (kN) =	-4603	-4533	-3170	-2572	-2824	-2659	-2480	-1692	-622	-4292	-4189	-2955	-2615	-2563	-2339	-1526	296
	Compression Combined Force (kN) =	-4941	-4980	-4144	-4146	-3215	-3155	-2972	-3481	-4961	-4600	-4657	-3609	-3249	-3044	-2819	-3279	-5424
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01
		0.24	0.24	0.20	0.20	0.15	0.15	0.14	0.17	0.23	0.22	0.23	0.17	0.16	0.15	0.13	0.16	0.25

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	Horizontal 4 (AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	158.17	158.17	236.78	249.11	297.1	43.6	-257.54	-268.17	-139.63	-153.85	-112.92	-132.17	-153.05	-158.7	-152.19	-244.54	50.37	-988.43
	ULS Min	158.17	158.17	227.9	235.7	272.97	-7.21	-298.99	-311.02	-184.44	-205.34	-158.56	-181.4	-198.83	-208.77	-198.3	-292.41	37.21	-998.77
IY Bending	ULS Max	0	0	39.18	40.8	40.12	39.73	7.49	0	7.47	14.54	7.35	18.9	6.05	20.2	6.65	21.76	0	29.93
	ULS Min	0	0	0	0	0	0	-12.45	0	-14.11	0	-13.68	0	-16.86	0	-12.97	0	0	0
IZ Bending	ULS Max	0	0	0	0	0	0	0	0	0.07	1.33	0	0	0	1.08	0	3.13	0	0
	ULS Min	0	0	-6.98	-15.69	-51.92	-59.63	-1.41	0	-0.92	0	-1.55	-0.06	-3.52	0	-7.62	0	0	-6.7
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	14	14	14	14	5	0	6	6	6	8	7	8	5	9	0	11
	Stress Z	0	0	1	2	6	6	0	0	0	0	0	0	0	0	1	0	0	1
	Force (kn) =	0	0	258	285	352	364	86	0	96	100	95	127	120	138	101	152	0	199
	Tension Combined Force (kN) =	158	158	495	535	649	408	-171	-268	-43	-54	-18	-5	-33	-21	-51	-93	50	-790
	Compression Combined Force (kN) =	158	158	-30	-50	-79	-371	-385	-311	-281	-305	-253	-308	-318	-346	-299	-444	37	-1198
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.00	0.03	0.11	0.12	0.14	0.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.01	NA
		NA	NA	0.01	0.01	0.02	0.11	0.12	0.10	0.09	0.09	0.08	0.09	0.10	0.11	0.09	0.14	NA	0.34

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
								Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	Horizontal 4 (AD54)	Horizontal 5 (A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	203.45	296.18	230.35	241.52	286.3	-34.88	-208.9	-219.79	-136.76	-154.52	-110.26	-127.35	-130.62	-169.68	-225.05	-187.19	-769.77	100.47
	ULS Min	203.45	288.27	229.11	240.51	284.13	-40.03	-255.08	-285.42	-188.68	-199.24	-159.57	-173.16	-181.14	-215.48	-273.46	-232.71	-781.41	87.31
IY Bending	ULS Max	0	0	39	38.94	39.33	41.42	0	37.96	13.62	7.6	18.38	7.47	18.99	6.32	20.82	7.51	25.91	0
	ULS Min	0	-20.35	0	0	0	0	-11.24	0	0	-14.15	0	-13.65	0	-16.92	0	-12.94	0	0
IZ Bending	ULS Max	0	0	0	1.27	0	2.34	0	2.13	0.88	0	0.44	0.69	0	0.35	0.75	1.73	0.45	0
	ULS Min	0	-1.53	-0.9	0	-1.14	0	-2.91	0	0	-1.12	0	0	-0.44	-0.25	0	0	-0.39	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	6	14	13	14	14	5	16	6	6	8	6	8	7	9	5	9	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	0	111	245	246	248	263	81	259	93	97	124	93	128	114	141	90	162	0
	Tension Combined Force (kN) =	203	407	476	487	534	228	-128	39	-44	-57	14	-34	-2	-55	-84	-97	-607	100
	Compression Combined Force (kN) =	203	177	-16	-5	36	-303	-336	-544	-282	-296	-284	-266	-309	-330	-415	-323	-944	87
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.01	0.08	0.10	0.11	0.12	0.05	NA	0.01	NA	NA	0.00	NA	NA	NA	NA	NA	NA	0.02
		NA	NA	0.00	0.00	NA	0.09	0.10	0.17	0.09	0.09	0.09	0.08	0.10	0.10	0.13	0.10	0.26	NA

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	223.87	38	443.6	68.08	-322.13	-347.78	-303.76	-303.24	-421.42	-419.81	-336.61	-353.17	-69.24	27.38
	ULS Min	223.87	21.13	443.6	58.04	-347.62	-373.27	-329.26	-328.74	-443.78	-442.17	-358.96	-375.52	-76.91	18.54
IY Bending	ULS Max	358.36	0	7.36	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-377.68	-42.86	0	-16.39	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	6.82	0	0.07	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	0.17	-0.17	0	-0.39	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	4	14	3	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Force (kn) =		332	285	52	117	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		556	323	496	185	-322	-348	-304	-303	-421	-420	-337	-353	-69	27
Compression Combined Force (kN) =		-108	-264	391	-59	-348	-373	-329	-329	-444	-442	-359	-376	-77	19
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.03	0.06	0.11	0.04	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.07	NA	0.02	0.09	0.10	0.09	0.09	0.13	0.13	0.11	0.11	0.25	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	192.92	15.87	282.66	67.57	320.33	-239.4	-250.95	-205.04	-214.11	-225.95	-205.59	-83.03	-195.99	-33.45	28.59
	ULS Min	186.01	1.08	261.15	5.37	320.33	-262.4	-273.94	-228.03	-237.1	-248.94	-228.58	-106.02	-218.99	-42.28	20.2
IY Bending	ULS Max	278.89	10.08	18.47	11.61	96.6	0	0	0	0	0	0	0	0	0	0
	ULS Min	-238.8	-20.35	-4.74	-15.3	96.6	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	5.54	1.79	2.51	6.55	24.76	0	0	0	0	0	0	0	0	0	0
	ULS Min	-0.11	0	0	-0.52	24.76	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	3	9	8	7	5	0	0	0	0	0	0	0	0	0	0
	Stress Z	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Force (kn) =		254	148	136	120	318	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		447	164	419	187	638	-239	-251	-205	-214	-226	-206	-83	-196	-33	29
Compression Combined Force (kN) =		-68	-147	125	-114	2	-262	-274	-228	-237	-249	-229	-106	-219	-42	20
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.03	0.04	0.10	0.05	0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.02
		0.01	0.06	NA	0.04	NA	0.07	0.07	0.06	0.06	0.07	0.06	0.03	0.06	0.14	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
Members		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	11748.12	11748.12	4688.29	1360.84	4765.77	1268.79	854.59
	ULS Min	0	0	-1522	-32	-12	-30	-699
Shear	Fz Max	4698	4698	2060	180	2165	28	1621
	Fz Min	-4657	-4657	-2099	-474	-2070	-271	-539
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.216	0.286	0.233	0.130	0.387	0.122	0.163
		0.129	0.246	0.390	0.113	0.518	0.065	0.706

Case 8 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Front Leg (100-110)									Front Leg (200-209)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		A20R & B20L				A34R&L	A39R&L	A39R&L	D39R&L	C39R&L	A20R & B20L			A34R&L	A39R&L	A39R&L	D39R&L	C39R&L
		100	101	102	103	104	105	106	107	108	200	201	202	203	204	205	206	207
Axial	ULS Max	-13816	-13791	-13237	-13008	-11676	-11712	-10919	-10885	-10796	-9115	-9102	-8563	-9357	-9520	-10126	-10093	-10159
	ULS Min	-13846	-13802	-13280	-13164	-11813	-11849	-10980	-10919	-10890	-9146	-9112	-8762	-9495	-9657	-10187	-10126	-10254
IY Bending	ULS Max	289	453	454	374	80	118	136	136	123	653	835	836	71	105	106	106	162
	ULS Min	0	289	260	-15	-12	83	118	123	84	0	653	-74	-77	68	106	84	84
IZ Bending	ULS Max	784	956	1863	5330	1075	260	260	-63	467	824	1036	4787	1217	39	50	198	198
	ULS Min	0	784	1187	1957	-273	-273	-63	-250	-250	0	824	1295	39	-303	-303	50	-66
Section Properties	Area =	171391	171391	171391	171391	158961	158961	106462	106462	106462	171391	171391	171391	158961	158961	106462	106462	106462
	Iy =	25186	25186	25186	25186	19626	19626	17389	17389	17389	25186	25186	25186	19626	19626	17389	17389	17389
	Iz =	32147	32147	32147	32147	26312	26312	17179	17179	17179	32147	32147	32147	26312	26312	17179	17179	17179
	Y1	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Y2	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610	610
	Z1	529	529	529	529	551	551	554	554	554	529	529	529	551	551	554	554	554
	Z2	443	443	443	443	421	421	418	418	418	443	443	443	421	421	418	418	418
	Stress due to bending Y	6.073	9.512	9.525	7.849	2.254	3.314	4.336	4.336	3.906	13.698	17.525	17.550	2.164	2.961	3.391	3.391	5.155
	Stress due to bending Z	14.858	18.120	35.328	101.068	24.910	6.318	9.219	8.862	16.587	15.617	19.638	90.777	28.204	7.019	10.751	7.027	7.025
Force (kn) =		3587	4736	7688	18667	4318	1531	1443	1405	2182	5024	6369	18566	4827	1586	1506	1109	1297
Tension Combined Force (kN) =		-10229	-9055	-5550	5659	-7358	-10181	-9476	-9480	-8614	-4091	-2732	10003	-4530	-7934	-8620	-8983	-8862
Compression Combined Force (kN) =		-17434	-18537	-20967	-31832	-16132	-13380	-12423	-12324	-13072	-14170	-15482	-27328	-14322	-11244	-11693	-11235	-11550
ULS Capacity	Tension (kN)	55942	55942	55942	55942	51885	51885	34749	34749	34749	55942	55942	55942	51885	51885	34749	34749	34749
	Compression (kN)	64662	64662	64662	64662	64662	64662	37181	37181	37181	64662	64662	64662	64662	64662	37181	37181	37181
	Demand/Capacity	NA	NA	NA	0.10	NA	NA	NA	NA	NA	NA	NA	0.18	NA	NA	NA	NA	NA
		0.27	0.29	0.32	0.49	0.25	0.21	0.33	0.33	0.35	0.22	0.24	0.42	0.22	0.17	0.31	0.30	0.31

Case 8 - ULS 4 Lowered D/C		North Tower																
		Rail Side Columns									HWY Side Columns							
		Rear Leg (300-310)									Rear Leg (400-409)							
		Panel 1				Panel 2	Panel 3	Panel 4	Panel 5	Panel 6	Panel 1			Panel 2	Panel 3	Panel 4	Panel 5	Panel 6
		300	301	302	303	304	305	306	307	308	400	401	402	403	404	405	406	407
Axial	ULS Max	-5596	-5581	-4282	-4044	-2763	-2422	-1721	-1437	-1511	-3923	-3902	-2440	-2308	-1861	-1701	-1253	-1290
	ULS Min	-5609	-5585	-4300	-4113	-2842	-2500	-1799	-1515	-1542	-3936	-3907	-2527	-2386	-1939	-1779	-1331	-1321
IY Bending	ULS Max	87	87	172	152	42	46	61	150	153	200	275	276	41	41	56	160	152
	ULS Min	0	86	94	-19	-9	41	44	58	-130	0	198	-36	-39	35	35	56	-164
IZ Bending	ULS Max	334	399	387	3219	496	48	52	89	227	272	357	2955	569	-37	43	43	8
	ULS Min	0	334	167	582	-74	-70	-14	-10	89	0	275	99	-37	-63	-63	9	-368
Section Properties	Area =	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076	78076
	Iy =	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343	8343
	Iz =	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468	13468
	Y1	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Y2	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400	400
	Z1	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Z2	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425	425
	Stress due to bending Y	4.421	4.418	8.768	7.739	2.139	2.324	3.094	7.671	7.827	10.175	14.028	14.095	2.070	2.067	2.838	8.157	8.364
	Stress due to bending Z	9.927	11.844	11.486	95.627	14.721	2.064	1.531	2.630	6.745	8.083	10.599	87.762	16.888	1.857	1.858	1.274	10.919
Force (kn) =		1120	1270	1581	8070	1316	343	361	804	1138	1426	1923	7953	1480	306	367	736	1506
Tension Combined Force (kN) =		-4475	-4311	-2700	4026	-1447	-2079	-1359	-633	-373	-2498	-1980	5513	-827	-1555	-1335	-517	216
Compression Combined Force (kN) =		-6729	-6855	-5882	-12183	-4158	-2842	-2160	-2320	-2679	-5362	-5830	-10480	-3866	-2246	-2146	-2068	-2826
ULS Capacity	Tension (kN)	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768	21768
	Compression (kN)	20662	20662	20662	20662	20936	20936	20936	20936	21610	20662	20662	20662	20936	20936	20936	20936	21610
	Demand/Capacity	NA	NA	NA	0.18	NA	NA	NA	NA	NA	NA	NA	0.25	NA	NA	NA	NA	0.01
		0.33	0.33	0.28	0.59	0.20	0.14	0.10	0.11	0.12	0.26	0.28	0.51	0.18	0.11	0.10	0.10	0.13

		1000	1003	1012	1018	1024	1030	1100	1103	1105	1108	1111	1114	1117	1120	1123	1126	1129	1130
		Tower - West Panel																	
		Horizontals						Bracing											
						Horizontal 4		Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
	Top Down Defined	Jacking Girder (A15)	Horizontal 1 (A75)	Horizontal 2 (C54)	Horizontal 3 (C54)	(AC54)	Horizontal 5 (B81)	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front
	Element #	1000	1001-1006	1007-1012	1013-1018	1019-1024	1025-1030	1100-1102	1103-1104	1105-1107	1108-1110	1111-1113	1114-1116	1117-1119	1120-1122	1123-1125	1126-1128	1129	1130-1131
Axial	ULS Max	700.58	700.58	359.9	373.96	455.58	136.85	1193.83	1075.54	682.16	683.83	600.88	650.02	346.26	409.47	121.1	127.29	182.38	-702.93
	ULS Min	-258.08	-258.08	189.66	248.5	315.14	-61.74	-1953.61	-1632.44	-1194.65	-1070.55	-1037.66	-973.38	-912.75	-860.53	-760.61	-697.63	-82.33	-914.03
IY Bending	ULS Max	0	0	57.34	57.38	53.67	46.96	13.76	0	16.42	26.5	15.63	37.1	10.52	35.74	9.1	32.38	0	29.43
	ULS Min	0	0	0	0	0	0	-39.93	0	-33.1	-3.65	-30.06	0	-33.56	0	-25.57	0	0	0
IZ Bending	ULS Max	0	0	139.38	188.69	139.63	61.42	149.15	0	140.55	38.11	119.57	8.2	127.32	14.1	130.62	15.02	0	13.76
	ULS Min	0	0	-115.05	-166.08	-166.44	-95.21	-65.48	0	-63.84	-44.31	-36.15	-14.93	-43.18	-20.31	-43.67	-18.14	0	-10.86
Section Properties	Area =	110495.33	18369	18029	18029	18028.76	18028.76	16109	16109	16109	16109	16109	16109	16109	16109	16109	16109	17745	17745
	Iy =	60028.90917	1371	1150	1150	1149.89	1149.89	956	956	956	956	956	956	956	956	956	956	1133	1133
	Iz =	15720.96114	3229	2885	2885	2884.72	2884.72	2766	2766	2766	2766	2766	2766	2766	2766	2766	2766	3055	3055
	Y	400.05	398	398	398	398.47	398.47	398	398	398	398	398	398	398	398	398	398	398	398
	Z	871.9163982	311	311	311	311.15	311.15	311	311	311	311	311	311	311	311	311	311	311	311
	Stress Y	0	0	20	20	19	16	17	0	14	11	13	15	14	15	11	13	0	10
	Stress Z	0	0	15	20	18	10	17	0	16	5	13	2	14	2	15	2	0	1
	Force (kn) =	0	0	629	725	659	479	538	0	477	258	418	276	456	277	408	250	0	209
Tension Combined Force (kN) =		701	701	989	1099	1115	615	1732	1076	1159	942	1019	926	802	686	529	378	182	-494
Compression Combined Force (kN) =		-258	-258	-440	-477	-344	-540	-2492	-1632	-1672	-1329	-1456	-1250	-1369	-1137	-1169	-948	-82	-1123
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4573.86	4573.86	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3485.52	3485.52	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.14	0.22	0.24	0.24	0.13	0.42	0.26	0.28	0.23	0.25	0.22	0.19	0.17	0.13	0.09	0.04	NA
		0.01	0.07	0.13	0.14	0.10	0.16	0.77	0.50	0.51	0.41	0.45	0.38	0.42	0.35	0.36	0.29	0.02	0.31

		2000	2001	2003	2005	2007	2009	2100	2102	2105	2108	2111	2114	2117	2120	2123	2126	2129	2131
		Tower - East Panel																	
		Horizontals						Bracing											
						Horizontal 4	Horizontal 5	Panel 1		Panel 2		Panel 3		Panel 4		Panel 5		Panel 6	
		Jacking Girder (A15)	Horizontal 1 (B57)	Horizontal 2 (D54)	Horizontal 3 (D54)	(AD54)	(A81)	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear	Rear to Front	Front to Rear
	Element #	2000	2001-2002	2003-2004	2005-2006	2007-2008	2009-2010	2100-2101	2102-2104	2105-2107	2108-2110	2111-2113	2114-2116	2117-2119	2120-2122	2123-2125	2126-2128	2129-2130	2131
Axial	ULS Max	698.89	472.26	330.29	344.03	418.36	83.95	883.78	948.49	534.43	503.96	534.87	472.46	365.86	281.94	131.04	97.55	-494.69	213.32
	ULS Min	-243.89	244.33	226.85	280.24	373.26	-77.4	-1348.03	-1654.61	-880.63	-1045.16	-819.06	-933.73	-772.67	-874.35	-677.63	-792.18	-639.85	-83.87
IY Bending	ULS Max	0	25.69	47.58	46.52	45.18	43.92	5.96	64.11	32.52	16.55	33.34	14.78	32.53	10.55	31.02	10	24.52	0
	ULS Min	0	-75.24	0	0	0	0	-16.1	0	-4.21	-31.79	0	-29.32	0	-33.14	0	-25.67	0	0
IZ Bending	ULS Max	0	0	52.42	60.07	61.67	53.73	146.98	30.66	17.44	32.36	10.67	24.5	10.29	26.36	11.31	28.89	3.69	0
	ULS Min	0	-36.94	-15.28	-15.06	-17.14	-12.83	-66.54	-34.46	-11.64	-110.74	-2.75	-109.24	-3.1	-114.37	-2.75	-125.05	-15.86	0
Section Properties	Area =	110495.33	18369.14	18028.764	18028.764	18028.764	18028.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	16108.764	17744.62	17744.62
	Iy =	60028.90917	1371.016958	1149.890539	1149.890539	1149.890539	1149.890539	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	956.0877582	1133.054448	1133.054448
	Iz =	15720.96114	3228.542896	2884.721681	2884.721681	2884.721681	2884.721681	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	2766.183805	3055.225131	3055.225131
	Y	400.05	398.1875	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465	398.465
	Z	871.9163982	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15	311.15
	Stress Y	0	22	16	16	16	15	7	27	14	13	14	12	14	14	13	11	9	0
	Stress Z	0	4	6	6	7	6	17	4	2	12	1	12	1	13	1	14	2	0
	Force (kn) =	0	467	399	407	402	379	374	493	250	414	243	395	237	430	229	399	182	0
Tension Combined Force (kN) =		699	939	729	751	821	463	1258	1441	784	918	778	867	603	712	360	496	-313	213
Compression Combined Force (kN) =		-244	-222	-172	-127	-29	-456	-1722	-2147	-1131	-1459	-1062	-1329	-1010	-1304	-906	-1191	-822	-84
ULS Capacity	Tension (kN)	36066	5121	4574	4574	4574	4574	4154	4154	4154	4154	4154	4154	4154	4154	4154	4154	4653	4653
	Compression (kN)	33409	3596	3486	3486	3486	3486	3234	3234	3247	3247	3247	3247	3247	3247	3247	3247	3572	3572
	Demand/Capacity	0.02	0.18	0.16	0.16	0.18	0.10	0.30	0.35	0.19	0.22	0.19	0.21	0.15	0.17	0.09	0.12	NA	0.05
		0.01	0.06	0.05	0.04	0.01	0.13	0.53	0.66	0.35	0.45	0.33	0.41	0.31	0.40	0.28	0.37	0.23	0.02

		3014	3016	3018	3020										
		Tower - Front Panel													
		Horizontals				Bracing									
						Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1 (A61)	Horizontal 2 (D47)	Horizontal 3 (B54)	Horizontal 4 (C47)	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		3014-3015	3016-3017	3018-3019	3020-3021	3101	3100	3103	3102	3105	3104	3107	3106	3108	3109
Axial	ULS Max	427.92	357.18	894.53	210.47	637.43	623.9	138.11	142.95	-93.05	-98.12	-202.05	-206.88	-101.12	23.64
	ULS Min	264.89	-303.71	666.88	-53.98	-1796.86	-1794.34	-1339.28	-1340.03	-1405.17	-1399.13	-1140.46	-1156.31	-186.14	13.01
IY Bending	ULS Max	5930.98	0	29.33	0	0	0	0	0	0	0	0	0	0	0
	ULS Min	-6643.08	-57.85	0	-15.41	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	244.71	393.91	121.84	446.26	0	0	0	0	0	0	0	0	0	0
	ULS Min	-115.39	-188.58	-58.39	-164.23	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	79622	20305	18029	18029	20305	20305	20305	20305	18029	18029	18029	18029	4464	4464
	Iy =	47799	1389	1150	1150	1389	1389	1389	1389	1150	1150	1150	1150	1201	1201
	Iz =	17961	4258	3809	3809	4258	4258	4258	4258	3809	3809	3809	3809	16	16
	Y	484	454	454	454	454	454	454	454	454	454	454	454	108	108
	Z	911	311	311	311	311	311	311	311	311	311	311	311	452	452
	Stress Y	67	19	12	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	12	29	10	36	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	6346	968	388	767	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		6774	1326	1283	977	637	624	138	143	-93	-98	-202	-207	-101	24
Compression Combined Force (kN) =		-6082	-1272	279	-821	-1797	-1794	-1339	-1340	-1405	-1399	-1140	-1156	-186	13
ULS Capacity	Tension (kN)	20353	5212	4574	4574	5212	5212	5212	5212	4574	4574	4574	4574	1244	1244
	Compression (kN)	15721	4051	2975	3585	3795	3795	3795	3795	3338	3338	3338	3338	312	312
	Demand/Capacity	0.33	0.25	0.28	0.21	0.12	0.12	0.03	0.03	NA	NA	NA	NA	NA	0.02
		0.39	0.31	NA	0.23	0.47	0.47	0.35	0.35	0.42	0.42	0.34	0.35	0.60	NA

		4020	4026	4032	4038	4044										
		Tower - Rear Panel														
		Horizontals					Bracing									
							Panel 2		Panel 3		Panel 4		Panel 5		Panel 2	Panel 4
		Horizontal 1	Horizontal 2	Horizontal 3	Horizontal 4	Horizontal 5	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Rail to Centre	Hwy to Centre	Vertical Strut	Vertical Strut
		4020-4025	4026-4031	4032-4037	4038-4043	4044-4048	4101	4100	4103	4102	4105	4104	4107	4106	4118	4119
Axial	ULS Max	254.15	231.08	331.32	159.92	178.59	656.88	632.29	377.34	377.3	190.81	179.76	137.43	85.12	42.82	32.49
	ULS Min	-9.38	-283.21	-3.18	-142.21	80.91	-1011.89	-988.39	-625.24	-642.06	-501.38	-463.01	-208.71	-297.42	-79.26	18.94
IY Bending	ULS Max	4080.6	15.72	22.3	17.4	109.06	0	0	0	0	0	0	0	0	0	0
	ULS Min	-4368.89	-22.21	-14.52	-19.08	91.13	0	0	0	0	0	0	0	0	0	0
IZ Bending	ULS Max	280.44	395.42	160.83	443.3	213.67	0	0	0	0	0	0	0	0	0	0
	ULS Min	-167.28	-201.03	-94.83	-228.43	0	0	0	0	0	0	0	0	0	0	0
Section Properties	Area =	66952	16109	16109	16109	46331	20933	20933	20933	20933	20933	20933	20933	20933	4464	4464
	Iy =	35125	956	956	956	7552	1150	1150	1150	1150	1150	1150	1150	1150	1040	1040
	Iz =	11877	3145	3145	3145	7947	3291	3291	3291	3291	3291	3291	3291	3291	16	16
	Y	424	424	424	424	424	424	424	424	424	424	424	424	424	108	422
	Z	908	311	311	311	464	311	311	311	311	311	311	311	311	422	108
	Stress Y	53	10	10	8	6	0	0	0	0	0	0	0	0	0	0
	Stress Z	21	39	16	44	12	0	0	0	0	0	0	0	0	0	0
	Force (kn) =	4965	789	416	843	861	0	0	0	0	0	0	0	0	0	0
Tension Combined Force (kN) =		5219	1020	747	1003	1040	657	632	377	377	191	180	137	85	43	32
Compression Combined Force (kN) =		-4975	-1072	-419	-985	-780	-1012	-988	-625	-642	-501	-463	-209	-297	-79	19
ULS Capacity	Tension (kN)	16740	4154	4154	4154	12235	4574	4574	4574	4574	4574	4574	4574	4574	1244	1244
	Compression (kN)	12994	2606	2606	2606	8926	3790	3790	3790	3790	3790	3790	3790	3790	312	312
	Demand/Capacity	0.31	0.25	0.18	0.24	0.08	0.14	0.14	0.08	0.08	0.04	0.04	0.03	0.02	0.03	0.03
		0.38	0.41	0.16	0.38	0.09	0.27	0.26	0.16	0.17	0.13	0.12	0.06	0.08	0.25	NA

		Sheave Transverse			Longitudinl Girders			
		40000	40004	50000	30000	32000	34000	36000
		Front Transverse Sheave Girder End	Front Transverse Sheave Girder Middle	Back Transverse Sheave Girder	G1	G2/3	G4	G6
Members		40000-40003 & 40014-40017	40004-40013	50000-50017	30000to30028	32000to32059	34000to34029	36000to36034
IY Bending	ULS Max	26225.59	26225.59	2555.31	1817.09	2164.34	1833.6	486.72
	ULS Min	0	0	-921	-10	-12	-21	-464
Shear	Fz Max	10476	10476	1093	2437	2549	2393	1075
	Fz Min	-10302	-10302	-1108	-271	-2474	-293	-476
Capacity	Mry =	54493	41010	20151	10441	12329	10441	5254
	Shear	36305	19118	5389	4180	4180	4180	2297
ULS Capacity	Demand/Capacity	0.481	0.639	0.127	0.174	0.176	0.176	0.093
		0.289	0.548	0.206	0.583	0.610	0.573	0.468

Max D/C 0.58

0 - ULS 1

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.20	0.00	0.20	0.00	0.21	0.00	0.19
Panel 2	NA	0.18	NA	0.18	NA	0.13	NA	0.13
Panel 3	NA	0.19	NA	0.19	NA	0.12	NA	0.12
Panel 4	NA	0.31	NA	0.31	NA	0.11	NA	0.11
Panel 5	NA	0.31	NA	0.30	NA	0.13	NA	0.12
Panel 6 (Top)	NA	0.30	NA	0.30	NA	0.16	0.01	0.18

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.10	NA
		2	0.12	NA	0.12	NA
		3	0.13	NA	0.12	NA
		4	0.16	NA	0.14	NA
		5	0.10	0.06	0.08	0.05
Bracing	Panel 1	Front to Rear	NA	0.15	0.01	0.19
		Rear to Front	NA	0.11	NA	0.11
	Panel 2	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.11	NA	0.10
	Panel 3	Front to Rear	NA	0.10	NA	0.11
		Rear to Front	NA	0.11	NA	0.10
	Panel 4	Front to Rear	NA	0.13	NA	0.14
		Rear to Front	NA	0.13	NA	0.12
	Panel 5	Front to Rear	NA	0.14	NA	0.14
		Rear to Front	NA	0.15	NA	0.14
	Panel 6	Front to Rear	NA	0.01	NA	0.01
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.20	NA	0.08	NA
		4	0.05	0.00	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.14	NA	0.06
		Hwy to Centre	NA	0.15	NA	0.06
	Panel 3	Rail to Centre	NA	0.15	NA	0.04
		Hwy to Centre	NA	0.15	NA	0.05
	Panel 4	Rail to Centre	NA	0.21	NA	0.05
		Hwy to Centre	NA	0.22	NA	0.05
	Panel 5	Rail to Centre	NA	0.19	NA	0.02
		Hwy to Centre	NA	0.19	NA	0.04
	Panel 2	Vertical	NA	0.44	NA	0.09
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.58	0.49
Back Transverse Sheave Girder	0.17	0.25
G1	0.15	0.52
G2/G3	0.16	0.55
G4	0.16	0.51
G6	0.15	0.50

Max D/C 0.76

0 - ULS 4

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.32	0.68	0.38	0.55	0.21	0.74	0.34	0.50
Panel 2	NA	0.29	NA	0.25	NA	0.26	0.01	0.15
Panel 3	NA	0.21	NA	0.18	NA	0.17	NA	0.07
Panel 4	NA	0.36	NA	0.41	NA	0.11	NA	0.07
Panel 5	NA	0.35	NA	0.41	NA	0.11	0.01	0.08
Panel 6 (Top)	NA	0.35	NA	0.28	0.01	0.13	NA	0.09

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.15	0.09	0.22	0.13
		2	0.20	0.10	0.16	0.06
		3	0.21	0.11	0.17	0.05
		4	0.24	0.11	0.20	0.05
		5	0.12	0.13	0.09	0.11
Bracing	Panel 1	Front to Rear	0.41	0.76	0.41	0.72
		Rear to Front	0.27	0.51	0.32	0.56
	Panel 2	Front to Rear	0.28	0.51	0.25	0.46
		Rear to Front	0.25	0.43	0.23	0.41
	Panel 3	Front to Rear	0.27	0.49	0.26	0.45
		Rear to Front	0.27	0.43	0.25	0.40
	Panel 4	Front to Rear	0.20	0.43	0.20	0.41
		Rear to Front	0.17	0.34	0.15	0.32
	Panel 5	Front to Rear	0.07	0.27	0.07	0.28
		Rear to Front	0.05	0.23	0.04	0.22
	Panel 6	Front to Rear	0.03	0.01	0.04	0.00
		Rear to Front	NA	0.29	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.40	0.48	0.27	0.34
		2	0.22	0.25	0.18	0.30
		3	0.25	NA	0.14	0.12
		4	0.15	0.27	0.16	0.24
		5	-	-	0.06	0.06
Bracing	Panel 2	Rail to Centre	0.24	0.61	0.14	0.25
		Hwy to Centre	0.22	0.63	0.13	0.25
	Panel 3	Rail to Centre	0.13	0.50	0.09	0.17
		Hwy to Centre	0.14	0.49	0.09	0.17
	Panel 4	Rail to Centre	0.06	0.52	0.07	0.15
		Hwy to Centre	0.05	0.53	0.06	0.14
	Panel 5	Rail to Centre	NA	0.37	0.07	0.10
		Hwy to Centre	NA	0.36	0.06	0.12
	Panel 2	Vertical	NA	0.57	0.04	0.24
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.61	0.52
Back Transverse Sheave Girder	0.11	0.18
G1	0.17	0.57
G2/G3	0.15	0.58
G4	0.17	0.55
G6	0.09	0.49

					Max D/C		0.69
0 - ULS V1								

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.24	0.00	0.23	0.00	0.22	0.00	0.20
Panel 2	NA	0.21	NA	0.21	NA	0.14	NA	0.14
Panel 3	NA	0.22	NA	0.22	NA	0.13	NA	0.13
Panel 4	NA	0.37	NA	0.37	NA	0.12	NA	0.12
Panel 5	NA	0.36	NA	0.36	NA	0.14	NA	0.13
Panel 6 (Top)	NA	0.36	NA	0.36	NA	0.17	0.01	0.19

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.11	NA
		2	0.13	NA	0.13	NA
		3	0.14	NA	0.13	NA
		4	0.17	NA	0.15	NA
		5	0.12	0.05	0.09	0.03
Bracing	Panel 1	Front to Rear	NA	0.16	0.00	0.20
		Rear to Front	NA	0.13	NA	0.12
	Panel 2	Front to Rear	NA	0.12	NA	0.13
		Rear to Front	NA	0.12	NA	0.11
	Panel 3	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.12	NA	0.11
	Panel 4	Front to Rear	NA	0.15	NA	0.15
		Rear to Front	NA	0.15	NA	0.14
	Panel 5	Front to Rear	NA	0.15	NA	0.16
		Rear to Front	NA	0.16	NA	0.15
	Panel 6	Front to Rear	NA	0.03	NA	0.03
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.24	NA	0.09	NA
		4	0.05	NA	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.16	NA	0.06
		Hwy to Centre	NA	0.17	NA	0.06
	Panel 3	Rail to Centre	NA	0.18	NA	0.05
		Hwy to Centre	NA	0.17	NA	0.05
	Panel 4	Rail to Centre	NA	0.25	NA	0.06
		Hwy to Centre	NA	0.25	NA	0.05
	Panel 5	Rail to Centre	NA	0.23	NA	0.02
		Hwy to Centre	NA	0.23	NA	0.04
	Panel 2	Vertical	NA	0.52	NA	0.10
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.69	0.58
Back Transverse Sheave Girder	0.18	0.28
G1	0.19	0.63
G2/G3	0.19	0.66
G4	0.19	0.61
G6	0.15	0.56

Max D/C 0.72

0 - ULS V2

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.22	0.71	0.29	0.58	0.21	0.67	0.34	0.45
Panel 2	NA	0.33	NA	0.30	NA	0.25	0.02	0.16
Panel 3	NA	0.25	NA	0.23	NA	0.19	NA	0.09
Panel 4	NA	0.39	NA	0.44	NA	0.14	NA	0.10
Panel 5	NA	0.38	NA	0.44	NA	0.15	NA	0.13
Panel 6 (Top)	NA	0.40	NA	0.34	NA	0.19	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.14	0.06	0.23	0.09
		2	0.20	0.06	0.17	0.03
		3	0.21	0.07	0.18	0.02
		4	0.25	0.07	0.21	0.01
		5	0.15	0.09	0.11	0.07
Bracing	Panel 1	Front to Rear	0.33	0.69	0.34	0.67
		Rear to Front	0.20	0.47	0.25	0.51
	Panel 2	Front to Rear	0.23	0.47	0.20	0.43
		Rear to Front	0.20	0.40	0.19	0.38
	Panel 3	Front to Rear	0.22	0.45	0.21	0.42
		Rear to Front	0.22	0.40	0.20	0.38
	Panel 4	Front to Rear	0.16	0.41	0.15	0.39
		Rear to Front	0.13	0.33	0.12	0.31
	Panel 5	Front to Rear	0.05	0.27	0.04	0.28
		Rear to Front	0.03	0.24	0.03	0.23
	Panel 6	Front to Rear	NA	0.05	NA	0.05
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.36	0.41	0.24	0.29
		2	0.21	0.23	0.16	0.26
		3	0.29	NA	0.15	0.07
		4	0.14	0.23	0.15	0.20
		5	-	-	0.07	0.04
Bracing	Panel 2	Rail to Centre	0.17	0.57	0.10	0.24
		Hwy to Centre	0.16	0.59	0.10	0.24
	Panel 3	Rail to Centre	0.07	0.48	0.06	0.17
		Hwy to Centre	0.08	0.47	0.06	0.17
	Panel 4	Rail to Centre	0.00	0.51	0.04	0.15
		Hwy to Centre	NA	0.53	0.04	0.14
	Panel 5	Rail to Centre	NA	0.38	0.05	0.10
		Hwy to Centre	NA	0.38	0.03	0.12
	Panel 2	Vertical	NA	0.65	0.02	0.26
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.72	0.61
Back Transverse Sheave Girder	0.19	0.27
G1	0.20	0.67
G2/G3	0.18	0.69
G4	0.20	0.65
G6	0.18	0.66

Max D/C 0.83

0 - ULS V3

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.33	0.76	0.40	0.62	0.19	0.83	0.35	0.59
Panel 2	NA	0.33	NA	0.29	NA	0.31	NA	0.20
Panel 3	NA	0.24	NA	0.22	NA	0.22	NA	0.11
Panel 4	NA	0.42	NA	0.48	NA	0.16	NA	0.11
Panel 5	NA	0.41	NA	0.48	NA	0.16	NA	0.12
Panel 6 (Top)	NA	0.41	NA	0.33	NA	0.19	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.16	0.09	0.26	0.14
		2	0.22	0.09	0.19	0.05
		3	0.23	0.10	0.19	0.03
		4	0.27	0.10	0.22	0.03
		5	0.16	0.10	0.12	0.08
Bracing	Panel 1	Front to Rear	0.42	0.83	0.43	0.79
		Rear to Front	0.28	0.56	0.33	0.61
	Panel 2	Front to Rear	0.29	0.56	0.26	0.51
		Rear to Front	0.26	0.47	0.24	0.44
	Panel 3	Front to Rear	0.28	0.53	0.27	0.49
		Rear to Front	0.28	0.47	0.26	0.44
	Panel 4	Front to Rear	0.20	0.47	0.20	0.45
		Rear to Front	0.17	0.38	0.15	0.35
	Panel 5	Front to Rear	0.07	0.30	0.06	0.31
		Rear to Front	0.04	0.26	0.04	0.24
	Panel 6	Front to Rear	NA	0.05	NA	0.06
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.44	0.52	0.30	0.36
		2	0.24	0.26	0.19	0.32
		3	0.30	NA	0.17	0.10
		4	0.16	0.29	0.17	0.25
		5	-	-	0.07	0.05
Bracing	Panel 2	Rail to Centre	0.25	0.67	0.14	0.28
		Hwy to Centre	0.23	0.69	0.13	0.29
	Panel 3	Rail to Centre	0.12	0.56	0.08	0.20
		Hwy to Centre	0.13	0.54	0.08	0.20
	Panel 4	Rail to Centre	0.05	0.58	0.06	0.17
		Hwy to Centre	0.03	0.60	0.06	0.17
	Panel 5	Rail to Centre	NA	0.42	0.07	0.12
		Hwy to Centre	NA	0.41	0.05	0.14
	Panel 2	Vertical	NA	0.67	0.03	0.30
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.73	0.62
Back Transverse Sheave Girder	0.19	0.27
G1	0.20	0.67
G2/G3	0.18	0.69
G4	0.20	0.67
G6	0.19	0.68

Max D/C 0.65

0 - ULS V4

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.13	0.00	0.12	0.00	0.23	0.00	0.22
Panel 2	NA	0.10	NA	0.10	NA	0.14	NA	0.15
Panel 3	NA	0.11	NA	0.10	NA	0.14	NA	0.14
Panel 4	NA	0.17	NA	0.17	NA	0.13	NA	0.13
Panel 5	NA	0.17	NA	0.16	NA	0.16	NA	0.15
Panel 6 (Top)	NA	0.18	NA	0.18	NA	0.21	0.01	0.23

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals	Jacking Girder		0.00	NA	0.01	NA
	1		0.03	NA	0.07	NA
	2		0.10	0.01	0.10	0.01
	3		0.11	0.02	0.10	0.01
	4		0.14	0.02	0.11	NA
	5		0.08	0.11	0.05	0.09
Bracing	Panel 1	Front to Rear	NA	0.11	0.01	0.16
		Rear to Front	NA	0.09	NA	0.10
	Panel 2	Front to Rear	NA	0.08	NA	0.09
		Rear to Front	NA	0.09	NA	0.08
	Panel 3	Front to Rear	NA	0.08	NA	0.08
		Rear to Front	0.00	0.09	0.01	0.08
	Panel 4	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.10	0.00	0.09
	Panel 5	Front to Rear	NA	0.09	NA	0.09
		Rear to Front	NA	0.13	NA	0.12
	Panel 6	Front to Rear	0.01	NA	0.02	NA
		Rear to Front	NA	0.33	NA	0.26

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals	1		0.03	0.01	0.03	0.01
	2		0.06	0.06	0.04	0.06
	3		0.10	NA	0.10	NA
	4		0.04	0.02	0.04	0.04
	5		-	-	0.05	0.00
Bracing	Panel 2	Rail to Centre	NA	0.09	NA	0.07
		Hwy to Centre	NA	0.09	NA	0.07
	Panel 3	Rail to Centre	NA	0.08	NA	0.06
		Hwy to Centre	NA	0.08	NA	0.06
	Panel 4	Rail to Centre	NA	0.12	NA	0.06
		Hwy to Centre	NA	0.12	NA	0.06
	Panel 5	Rail to Centre	NA	0.10	NA	0.03
		Hwy to Centre	NA	0.10	NA	0.05
	Panel 2	Vertical	NA	0.23	NA	0.12
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.26	0.22
Back Transverse Sheave Girder	0.22	0.36
G1	0.12	0.11
G2/G3	0.34	0.46
G4	0.11	0.06
G6	0.16	0.65

Max D/C 0.76

0 - ULS 4 Lowered

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.12	0.47	0.20	0.41	0.19	0.58	0.26	0.50
Panel 2	NA	0.23	NA	0.21	NA	0.19	NA	0.18
Panel 3	NA	0.19	NA	0.15	NA	0.13	NA	0.10
Panel 4	NA	0.30	NA	0.28	NA	0.10	NA	0.10
Panel 5	NA	0.30	NA	0.27	NA	0.10	NA	0.09
Panel 6 (Top)	NA	0.32	NA	0.28	NA	0.12	0.01	0.12

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.13	0.08	0.17	0.07
		2	0.21	0.13	0.15	0.06
		3	0.23	0.14	0.16	0.04
		4	0.23	0.11	0.17	0.02
		5	0.13	0.16	0.09	0.14
Bracing	Panel 1	Front to Rear	0.42	0.76	0.35	0.65
		Rear to Front	0.27	0.50	0.31	0.53
	Panel 2	Front to Rear	0.28	0.51	0.22	0.44
		Rear to Front	0.23	0.40	0.19	0.34
	Panel 3	Front to Rear	0.25	0.44	0.21	0.40
		Rear to Front	0.23	0.38	0.19	0.32
	Panel 4	Front to Rear	0.20	0.41	0.17	0.39
		Rear to Front	0.17	0.34	0.15	0.30
	Panel 5	Front to Rear	0.13	0.35	0.12	0.36
		Rear to Front	0.09	0.28	0.09	0.27
	Panel 6	Front to Rear	0.05	0.01	0.05	0.01
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.33	0.39	0.31	0.38
		2	0.25	0.31	0.25	0.41
		3	0.26	NA	0.18	0.16
		4	0.21	0.23	0.24	0.38
		5	-	-	0.09	0.09
Bracing	Panel 2	Rail to Centre	0.13	0.46	0.15	0.27
		Hwy to Centre	0.13	0.46	0.14	0.26
	Panel 3	Rail to Centre	0.04	0.34	0.08	0.16
		Hwy to Centre	0.04	0.34	0.08	0.17
	Panel 4	Rail to Centre	NA	0.40	0.04	0.13
		Hwy to Centre	NA	0.40	0.04	0.12
	Panel 5	Rail to Centre	NA	0.32	0.03	0.05
		Hwy to Centre	NA	0.33	0.02	0.08
	Panel 2	Vertical	NA	0.55	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.57	0.49
Back Transverse Sheave Girder	0.12	0.19
G1	0.15	0.52
G2/G3	0.16	0.54
G4	0.15	0.50
G6	0.09	0.44

Max D/C 0.58

1 - ULS 1

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.21	0.00	0.20	0.00	0.21	0.00	0.19
Panel 2	NA	0.18	NA	0.18	NA	0.13	NA	0.13
Panel 3	NA	0.19	NA	0.19	NA	0.12	NA	0.12
Panel 4	NA	0.32	NA	0.31	NA	0.11	NA	0.11
Panel 5	NA	0.31	NA	0.31	NA	0.13	NA	0.12
Panel 6 (Top)	NA	0.31	NA	0.30	NA	0.16	0.01	0.18

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.10	NA
		2	0.12	NA	0.12	NA
		3	0.13	NA	0.12	NA
		4	0.16	NA	0.14	NA
		5	0.10	0.06	0.08	0.05
Bracing	Panel 1	Front to Rear	NA	0.15	0.00	0.19
		Rear to Front	NA	0.11	NA	0.11
	Panel 2	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.11	NA	0.10
	Panel 3	Front to Rear	NA	0.10	NA	0.11
		Rear to Front	NA	0.11	NA	0.10
	Panel 4	Front to Rear	NA	0.14	NA	0.14
		Rear to Front	NA	0.13	NA	0.12
	Panel 5	Front to Rear	NA	0.14	NA	0.14
		Rear to Front	NA	0.15	NA	0.14
	Panel 6	Front to Rear	NA	0.01	NA	0.01
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.20	NA	0.08	NA
		4	0.05	0.00	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.14	NA	0.06
		Hwy to Centre	NA	0.15	NA	0.06
	Panel 3	Rail to Centre	NA	0.15	NA	0.04
		Hwy to Centre	NA	0.15	NA	0.05
	Panel 4	Rail to Centre	NA	0.21	NA	0.05
		Hwy to Centre	NA	0.22	NA	0.05
	Panel 5	Rail to Centre	NA	0.19	NA	0.02
		Hwy to Centre	NA	0.19	NA	0.04
	Panel 2	Vertical	NA	0.45	NA	0.09
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.58	0.49
Back Transverse Sheave Girder	0.17	0.25
G1	0.16	0.52
G2/G3	0.16	0.56
G4	0.16	0.52
G6	0.15	0.50

Max D/C 0.76

1 - ULS 4

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.32	0.68	0.38	0.55	0.21	0.74	0.34	0.50
Panel 2	NA	0.29	NA	0.25	NA	0.26	0.01	0.15
Panel 3	NA	0.21	NA	0.18	NA	0.17	NA	0.07
Panel 4	NA	0.36	NA	0.41	NA	0.11	NA	0.07
Panel 5	NA	0.35	NA	0.41	NA	0.11	0.01	0.08
Panel 6 (Top)	NA	0.35	NA	0.28	0.01	0.13	NA	0.10

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.15	0.09	0.23	0.13
		2	0.20	0.10	0.16	0.06
		3	0.21	0.11	0.17	0.05
		4	0.24	0.11	0.20	0.05
		5	0.12	0.13	0.09	0.11
Bracing	Panel 1	Front to Rear	0.41	0.76	0.41	0.72
		Rear to Front	0.27	0.51	0.32	0.56
	Panel 2	Front to Rear	0.28	0.51	0.25	0.46
		Rear to Front	0.25	0.43	0.23	0.41
	Panel 3	Front to Rear	0.27	0.49	0.26	0.45
		Rear to Front	0.27	0.43	0.25	0.40
	Panel 4	Front to Rear	0.20	0.43	0.20	0.41
		Rear to Front	0.16	0.34	0.15	0.32
	Panel 5	Front to Rear	0.07	0.27	0.07	0.28
		Rear to Front	0.05	0.23	0.04	0.22
	Panel 6	Front to Rear	0.03	0.01	0.04	0.00
		Rear to Front	NA	0.29	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.40	0.48	0.27	0.34
		2	0.22	0.25	0.18	0.30
		3	0.25	NA	0.14	0.12
		4	0.15	0.27	0.16	0.24
		5	-	-	0.06	0.06
Bracing	Panel 2	Rail to Centre	0.24	0.61	0.14	0.25
		Hwy to Centre	0.22	0.63	0.13	0.25
	Panel 3	Rail to Centre	0.13	0.50	0.09	0.17
		Hwy to Centre	0.14	0.49	0.09	0.17
	Panel 4	Rail to Centre	0.06	0.52	0.07	0.15
		Hwy to Centre	0.05	0.53	0.06	0.14
	Panel 5	Rail to Centre	NA	0.37	0.07	0.10
		Hwy to Centre	NA	0.36	0.06	0.12
	Panel 2	Vertical	NA	0.58	0.04	0.24
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.61	0.52
Back Transverse Sheave Girder	0.11	0.18
G1	0.17	0.58
G2/G3	0.15	0.58
G4	0.17	0.55
G6	0.09	0.49

Max D/C 0.69

1 - ULS V1

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.24	0.00	0.23	0.00	0.22	0.00	0.20
Panel 2	NA	0.21	NA	0.21	NA	0.14	NA	0.14
Panel 3	NA	0.22	NA	0.22	NA	0.13	NA	0.13
Panel 4	NA	0.37	NA	0.37	NA	0.12	NA	0.12
Panel 5	NA	0.36	NA	0.36	NA	0.15	NA	0.13
Panel 6 (Top)	NA	0.36	NA	0.36	NA	0.17	0.01	0.19

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.12	NA
		2	0.13	NA	0.13	NA
		3	0.14	NA	0.13	NA
		4	0.17	NA	0.16	NA
		5	0.12	0.05	0.09	0.03
Bracing	Panel 1	Front to Rear	NA	0.16	0.00	0.20
		Rear to Front	NA	0.13	NA	0.12
	Panel 2	Front to Rear	NA	0.12	NA	0.13
		Rear to Front	NA	0.12	NA	0.12
	Panel 3	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.12	NA	0.11
	Panel 4	Front to Rear	NA	0.15	NA	0.16
		Rear to Front	NA	0.15	NA	0.14
	Panel 5	Front to Rear	NA	0.15	NA	0.16
		Rear to Front	NA	0.16	NA	0.15
	Panel 6	Front to Rear	NA	0.03	NA	0.03
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.24	NA	0.09	NA
		4	0.05	NA	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.17	NA	0.06
		Hwy to Centre	NA	0.17	NA	0.06
	Panel 3	Rail to Centre	NA	0.18	NA	0.05
		Hwy to Centre	NA	0.18	NA	0.05
	Panel 4	Rail to Centre	NA	0.25	NA	0.06
		Hwy to Centre	NA	0.25	NA	0.05
	Panel 5	Rail to Centre	NA	0.23	NA	0.02
		Hwy to Centre	NA	0.23	NA	0.05
	Panel 2	Vertical	NA	0.53	NA	0.10
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.69	0.59
Back Transverse Sheave Girder	0.18	0.28
G1	0.19	0.63
G2/G3	0.19	0.67
G4	0.19	0.61
G6	0.15	0.56

Max D/C 0.73

1 - ULS V2

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.22	0.71	0.29	0.58	0.21	0.68	0.34	0.45
Panel 2	NA	0.33	NA	0.30	NA	0.25	0.02	0.16
Panel 3	NA	0.25	NA	0.23	NA	0.19	NA	0.09
Panel 4	NA	0.39	NA	0.44	NA	0.14	NA	0.10
Panel 5	NA	0.38	NA	0.44	NA	0.15	NA	0.13
Panel 6 (Top)	NA	0.41	NA	0.34	NA	0.19	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.14	0.06	0.23	0.09
		2	0.20	0.06	0.17	0.03
		3	0.21	0.07	0.18	0.02
		4	0.25	0.07	0.21	0.01
		5	0.15	0.09	0.11	0.07
Bracing	Panel 1	Front to Rear	0.32	0.70	0.34	0.67
		Rear to Front	0.20	0.47	0.25	0.51
	Panel 2	Front to Rear	0.23	0.47	0.20	0.43
		Rear to Front	0.20	0.40	0.19	0.38
	Panel 3	Front to Rear	0.22	0.45	0.21	0.42
		Rear to Front	0.22	0.40	0.20	0.38
	Panel 4	Front to Rear	0.16	0.41	0.15	0.39
		Rear to Front	0.13	0.33	0.12	0.31
	Panel 5	Front to Rear	0.05	0.27	0.04	0.28
		Rear to Front	0.03	0.24	0.03	0.23
	Panel 6	Front to Rear	NA	0.05	NA	0.05
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.36	0.41	0.24	0.29
		2	0.21	0.23	0.16	0.26
		3	0.29	NA	0.15	0.07
		4	0.14	0.23	0.15	0.20
		5	-	-	0.07	0.04
Bracing	Panel 2	Rail to Centre	0.17	0.57	0.10	0.24
		Hwy to Centre	0.16	0.59	0.10	0.24
	Panel 3	Rail to Centre	0.07	0.48	0.06	0.17
		Hwy to Centre	0.08	0.47	0.06	0.17
	Panel 4	Rail to Centre	0.00	0.51	0.04	0.15
		Hwy to Centre	NA	0.53	0.04	0.14
	Panel 5	Rail to Centre	NA	0.39	0.05	0.10
		Hwy to Centre	NA	0.38	0.03	0.12
	Panel 2	Vertical	NA	0.65	0.02	0.26
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.73	0.61
Back Transverse Sheave Girder	0.19	0.28
G1	0.20	0.67
G2/G3	0.18	0.69
G4	0.20	0.66
G6	0.18	0.66

Max D/C 0.83

1 - ULS V3

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.33	0.76	0.40	0.62	0.19	0.83	0.34	0.59
Panel 2	NA	0.33	NA	0.29	NA	0.31	NA	0.20
Panel 3	NA	0.25	NA	0.22	NA	0.22	NA	0.11
Panel 4	NA	0.42	NA	0.48	NA	0.16	NA	0.11
Panel 5	NA	0.41	NA	0.48	NA	0.16	NA	0.13
Panel 6 (Top)	NA	0.41	NA	0.33	NA	0.20	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.16	0.09	0.26	0.13
		2	0.22	0.09	0.19	0.05
		3	0.23	0.10	0.19	0.03
		4	0.27	0.10	0.23	0.03
		5	0.16	0.10	0.12	0.07
Bracing	Panel 1	Front to Rear	0.42	0.83	0.43	0.79
		Rear to Front	0.28	0.56	0.33	0.61
	Panel 2	Front to Rear	0.29	0.56	0.25	0.51
		Rear to Front	0.26	0.47	0.24	0.45
	Panel 3	Front to Rear	0.28	0.53	0.27	0.49
		Rear to Front	0.28	0.47	0.26	0.44
	Panel 4	Front to Rear	0.20	0.47	0.20	0.45
		Rear to Front	0.17	0.38	0.15	0.35
	Panel 5	Front to Rear	0.07	0.30	0.06	0.31
		Rear to Front	0.04	0.26	0.04	0.24
	Panel 6	Front to Rear	NA	0.05	NA	0.06
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.44	0.52	0.30	0.36
		2	0.24	0.26	0.19	0.32
		3	0.30	NA	0.17	0.10
		4	0.16	0.29	0.17	0.25
		5	-	-	0.07	0.05
Bracing	Panel 2	Rail to Centre	0.25	0.67	0.14	0.28
		Hwy to Centre	0.23	0.69	0.13	0.29
	Panel 3	Rail to Centre	0.12	0.56	0.08	0.20
		Hwy to Centre	0.13	0.54	0.08	0.20
	Panel 4	Rail to Centre	0.05	0.58	0.06	0.17
		Hwy to Centre	0.03	0.60	0.06	0.17
	Panel 5	Rail to Centre	NA	0.42	0.07	0.12
		Hwy to Centre	NA	0.41	0.05	0.14
	Panel 2	Vertical	NA	0.68	0.03	0.30
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.74	0.62
Back Transverse Sheave Girder	0.19	0.27
G1	0.20	0.68
G2/G3	0.18	0.69
G4	0.20	0.67
G6	0.19	0.68

Max D/C 0.65

1 - ULS V4

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.13	0.00	0.12	0.00	0.23	0.00	0.22
Panel 2	NA	0.10	NA	0.10	NA	0.15	NA	0.15
Panel 3	NA	0.11	NA	0.10	NA	0.14	NA	0.14
Panel 4	NA	0.17	NA	0.17	NA	0.13	NA	0.13
Panel 5	NA	0.17	NA	0.16	NA	0.16	NA	0.15
Panel 6 (Top)	NA	0.18	NA	0.18	NA	0.22	0.01	0.23

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.00	NA	0.01	NA
		1	0.03	NA	0.07	NA
		2	0.11	0.01	0.10	0.01
		3	0.11	0.02	0.10	0.01
		4	0.14	0.02	0.11	NA
		5	0.08	0.11	0.05	0.09
Bracing	Panel 1	Front to Rear	NA	0.11	0.01	0.16
		Rear to Front	NA	0.09	NA	0.10
	Panel 2	Front to Rear	NA	0.08	NA	0.09
		Rear to Front	NA	0.09	NA	0.08
	Panel 3	Front to Rear	NA	0.08	NA	0.08
		Rear to Front	0.00	0.09	0.00	0.08
	Panel 4	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.10	0.00	0.09
	Panel 5	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.13	NA	0.12
	Panel 6	Front to Rear	0.01	NA	0.02	NA
		Rear to Front	NA	0.33	NA	0.26

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.03	0.01	0.03	0.01
		2	0.06	0.06	0.04	0.06
		3	0.10	NA	0.10	NA
		4	0.04	0.02	0.04	0.04
		5	-	-	0.05	0.00
Bracing	Panel 2	Rail to Centre	NA	0.09	NA	0.07
		Hwy to Centre	NA	0.09	NA	0.07
	Panel 3	Rail to Centre	NA	0.08	NA	0.06
		Hwy to Centre	NA	0.08	NA	0.06
	Panel 4	Rail to Centre	NA	0.13	NA	0.06
		Hwy to Centre	NA	0.13	NA	0.06
	Panel 5	Rail to Centre	NA	0.10	NA	0.03
		Hwy to Centre	NA	0.10	NA	0.05
	Panel 2	Vertical	NA	0.23	NA	0.12
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.26	0.22
Back Transverse Sheave Girder	0.22	0.36
G1	0.12	0.11
G2/G3	0.35	0.46
G4	0.11	0.06
G6	0.16	0.65

Max D/C 0.76

1 - ULS 4 Lowered

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.12	0.48	0.20	0.41	0.19	0.58	0.26	0.50
Panel 2	NA	0.23	NA	0.21	NA	0.19	NA	0.18
Panel 3	NA	0.19	NA	0.16	NA	0.13	NA	0.10
Panel 4	NA	0.30	NA	0.28	NA	0.10	NA	0.10
Panel 5	NA	0.30	NA	0.27	NA	0.10	NA	0.09
Panel 6 (Top)	NA	0.32	NA	0.28	NA	0.12	0.01	0.12

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.13	0.08	0.17	0.07
		2	0.21	0.13	0.15	0.06
		3	0.23	0.14	0.16	0.04
		4	0.23	0.11	0.17	0.02
		5	0.13	0.16	0.09	0.14
Bracing	Panel 1	Front to Rear	0.42	0.76	0.35	0.66
		Rear to Front	0.26	0.50	0.31	0.53
	Panel 2	Front to Rear	0.28	0.51	0.22	0.44
		Rear to Front	0.23	0.40	0.19	0.34
	Panel 3	Front to Rear	0.25	0.44	0.21	0.40
		Rear to Front	0.23	0.38	0.19	0.32
	Panel 4	Front to Rear	0.20	0.41	0.17	0.39
		Rear to Front	0.17	0.34	0.15	0.30
	Panel 5	Front to Rear	0.13	0.35	0.12	0.36
		Rear to Front	0.09	0.29	0.09	0.27
	Panel 6	Front to Rear	0.05	0.01	0.05	0.01
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.33	0.39	0.31	0.38
		2	0.25	0.31	0.25	0.41
		3	0.26	NA	0.18	0.16
		4	0.21	0.23	0.24	0.38
		5	-	-	0.09	0.09
Bracing	Panel 2	Rail to Centre	0.13	0.46	0.15	0.27
		Hwy to Centre	0.13	0.46	0.14	0.26
	Panel 3	Rail to Centre	0.04	0.34	0.08	0.16
		Hwy to Centre	0.04	0.34	0.08	0.17
	Panel 4	Rail to Centre	NA	0.40	0.04	0.13
		Hwy to Centre	NA	0.40	0.04	0.12
	Panel 5	Rail to Centre	NA	0.32	0.03	0.05
		Hwy to Centre	NA	0.33	0.02	0.08
	Panel 2	Vertical	NA	0.55	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.57	0.49
Back Transverse Sheave Girder	0.12	0.19
G1	0.15	0.52
G2/G3	0.16	0.54
G4	0.16	0.51
G6	0.09	0.44

Max D/C 0.59

2 - ULS 1

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.21	0.00	0.20	0.00	0.21	0.00	0.19
Panel 2	NA	0.19	NA	0.18	NA	0.13	NA	0.13
Panel 3	NA	0.19	NA	0.19	NA	0.12	NA	0.12
Panel 4	NA	0.32	NA	0.32	NA	0.11	NA	0.11
Panel 5	NA	0.31	NA	0.31	NA	0.13	NA	0.12
Panel 6 (Top)	NA	0.31	NA	0.31	NA	0.16	0.01	0.18

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.10	NA
		2	0.12	NA	0.12	NA
		3	0.13	NA	0.12	NA
		4	0.16	NA	0.14	NA
		5	0.10	0.06	0.08	0.05
Bracing	Panel 1	Front to Rear	NA	0.15	0.00	0.19
		Rear to Front	NA	0.11	NA	0.11
	Panel 2	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.11	NA	0.11
	Panel 3	Front to Rear	NA	0.10	NA	0.11
		Rear to Front	NA	0.11	NA	0.10
	Panel 4	Front to Rear	NA	0.14	NA	0.14
		Rear to Front	NA	0.14	NA	0.13
	Panel 5	Front to Rear	NA	0.14	NA	0.14
		Rear to Front	NA	0.15	NA	0.14
	Panel 6	Front to Rear	NA	0.02	NA	0.01
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.20	NA	0.08	NA
		4	0.05	0.00	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.15	NA	0.06
		Hwy to Centre	NA	0.15	NA	0.06
	Panel 3	Rail to Centre	NA	0.15	NA	0.04
		Hwy to Centre	NA	0.15	NA	0.05
	Panel 4	Rail to Centre	NA	0.22	NA	0.05
		Hwy to Centre	NA	0.22	NA	0.05
	Panel 5	Rail to Centre	NA	0.20	NA	0.02
		Hwy to Centre	NA	0.20	NA	0.04
	Panel 2	Vertical	NA	0.45	NA	0.09
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.59	0.50
Back Transverse Sheave Girder	0.17	0.25
G1	0.16	0.53
G2/G3	0.16	0.56
G4	0.16	0.52
G6	0.15	0.51

Max D/C 0.76

2 - ULS 4

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.32	0.75	0.40	0.60	0.29	0.71	0.45	0.45
Panel 2	NA	0.32	NA	0.28	NA	0.23	0.07	0.12
Panel 3	NA	0.22	NA	0.19	NA	0.15	0.00	0.04
Panel 4	NA	0.33	NA	0.40	NA	0.10	NA	0.06
Panel 5	NA	0.32	NA	0.40	NA	0.11	0.01	0.08
Panel 6 (Top)	NA	0.35	NA	0.29	0.01	0.14	0.00	0.10

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.15	0.09	0.23	0.13
		2	0.20	0.10	0.17	0.06
		3	0.21	0.11	0.17	0.05
		4	0.24	0.11	0.20	0.05
		5	0.12	0.13	0.09	0.11
Bracing	Panel 1	Front to Rear	0.41	0.76	0.41	0.72
		Rear to Front	0.27	0.51	0.32	0.56
	Panel 2	Front to Rear	0.28	0.51	0.25	0.46
		Rear to Front	0.25	0.43	0.23	0.41
	Panel 3	Front to Rear	0.27	0.49	0.26	0.45
		Rear to Front	0.27	0.43	0.25	0.41
	Panel 4	Front to Rear	0.20	0.43	0.19	0.41
		Rear to Front	0.16	0.34	0.15	0.32
	Panel 5	Front to Rear	0.07	0.28	0.07	0.28
		Rear to Front	0.05	0.23	0.04	0.22
	Panel 6	Front to Rear	0.03	0.01	0.04	0.01
		Rear to Front	NA	0.29	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.40	0.48	0.27	0.34
		2	0.22	0.25	0.18	0.30
		3	0.25	NA	0.14	0.11
		4	0.15	0.27	0.16	0.24
		5	-	-	0.06	0.06
Bracing	Panel 2	Rail to Centre	0.24	0.62	0.14	0.25
		Hwy to Centre	0.22	0.63	0.13	0.25
	Panel 3	Rail to Centre	0.13	0.51	0.09	0.17
		Hwy to Centre	0.13	0.49	0.09	0.17
	Panel 4	Rail to Centre	0.06	0.52	0.07	0.15
		Hwy to Centre	0.05	0.54	0.06	0.14
	Panel 5	Rail to Centre	NA	0.37	0.07	0.10
		Hwy to Centre	NA	0.36	0.06	0.12
	Panel 2	Vertical	NA	0.58	0.04	0.24
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.62	0.53
Back Transverse Sheave Girder	0.11	0.19
G1	0.17	0.58
G2/G3	0.15	0.59
G4	0.17	0.56
G6	0.09	0.49

Max D/C 0.70

2 - ULS V1								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.24	0.00	0.23	0.00	0.22	0.00	0.20
Panel 2	NA	0.22	NA	0.21	NA	0.14	NA	0.14
Panel 3	NA	0.22	NA	0.22	NA	0.13	NA	0.13
Panel 4	NA	0.37	NA	0.37	NA	0.12	NA	0.12
Panel 5	NA	0.37	NA	0.37	NA	0.15	NA	0.13
Panel 6 (Top)	NA	0.37	NA	0.36	NA	0.17	0.01	0.19

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals	Jacking Girder		0.01	NA	0.01	NA
	1		0.04	NA	0.12	NA
	2		0.13	NA	0.13	NA
	3		0.14	NA	0.13	NA
	4		0.18	NA	0.16	NA
	5		0.12	0.05	0.09	0.03
Bracing	Panel 1	Front to Rear	NA	0.16	NA	0.20
		Rear to Front	NA	0.13	NA	0.12
	Panel 2	Front to Rear	NA	0.13	NA	0.13
		Rear to Front	NA	0.12	NA	0.12
	Panel 3	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.12	NA	0.11
	Panel 4	Front to Rear	NA	0.15	NA	0.16
		Rear to Front	NA	0.15	NA	0.14
	Panel 5	Front to Rear	NA	0.15	NA	0.16
		Rear to Front	NA	0.16	NA	0.15
	Panel 6	Front to Rear	NA	0.03	NA	0.03
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals	1		0.04	0.01	0.02	0.01
	2		0.08	0.07	0.04	0.06
	3		0.24	NA	0.09	NA
	4		0.05	NA	0.04	0.04
	5		-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.17	NA	0.06
		Hwy to Centre	NA	0.18	NA	0.06
	Panel 3	Rail to Centre	NA	0.18	NA	0.05
		Hwy to Centre	NA	0.18	NA	0.05
	Panel 4	Rail to Centre	NA	0.25	NA	0.06
		Hwy to Centre	NA	0.25	NA	0.05
	Panel 5	Rail to Centre	NA	0.23	NA	0.02
		Hwy to Centre	NA	0.23	NA	0.05
	Panel 2	Vertical	NA	0.53	NA	0.10
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.70	0.60
Back Transverse Sheave Girder	0.18	0.28
G1	0.19	0.64
G2/G3	0.19	0.68
G4	0.19	0.62
G6	0.15	0.56

Max D/C 0.74

2 - ULS V2								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.22	0.71	0.28	0.58	0.21	0.68	0.34	0.45
Panel 2	NA	0.33	NA	0.30	NA	0.25	0.02	0.16
Panel 3	NA	0.25	NA	0.23	NA	0.19	NA	0.09
Panel 4	NA	0.40	NA	0.44	NA	0.14	NA	0.10
Panel 5	NA	0.38	NA	0.44	NA	0.15	NA	0.13
Panel 6 (Top)	NA	0.41	NA	0.35	NA	0.19	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals	Jacking Girder		0.02	0.01	0.02	0.01
	1		0.14	0.06	0.23	0.09
	2		0.20	0.06	0.17	0.03
	3		0.21	0.07	0.18	0.02
	4		0.25	0.07	0.21	0.01
	5		0.15	0.09	0.11	0.06
Bracing	Panel 1	Front to Rear	0.32	0.70	0.34	0.67
		Rear to Front	0.20	0.48	0.25	0.52
	Panel 2	Front to Rear	0.23	0.47	0.20	0.43
		Rear to Front	0.20	0.40	0.19	0.38
	Panel 3	Front to Rear	0.22	0.45	0.21	0.42
		Rear to Front	0.22	0.40	0.20	0.38
	Panel 4	Front to Rear	0.16	0.41	0.15	0.40
		Rear to Front	0.13	0.33	0.12	0.31
	Panel 5	Front to Rear	0.05	0.27	0.04	0.28
		Rear to Front	0.03	0.24	0.03	0.23
	Panel 6	Front to Rear	NA	0.05	NA	0.05
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals	1		0.36	0.41	0.24	0.29
	2		0.21	0.23	0.16	0.26
	3		0.29	NA	0.16	0.07
	4		0.14	0.23	0.15	0.20
	5		-	-	0.07	0.04
Bracing	Panel 2	Rail to Centre	0.17	0.57	0.10	0.24
		Hwy to Centre	0.15	0.59	0.10	0.24
	Panel 3	Rail to Centre	0.07	0.49	0.06	0.17
		Hwy to Centre	0.08	0.47	0.06	0.17
	Panel 4	Rail to Centre	NA	0.52	0.04	0.15
		Hwy to Centre	NA	0.53	0.04	0.14
	Panel 5	Rail to Centre	NA	0.39	0.05	0.10
		Hwy to Centre	NA	0.38	0.03	0.13
	Panel 2	Vertical	NA	0.66	0.02	0.26
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.74	0.62
Back Transverse Sheave Girder	0.19	0.28
G1	0.20	0.68
G2/G3	0.18	0.70
G4	0.20	0.67
G6	0.18	0.67

Max D/C 0.83

2 - ULS V3

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.33	0.76	0.40	0.62	0.19	0.83	0.34	0.59
Panel 2	NA	0.33	NA	0.29	NA	0.31	NA	0.20
Panel 3	NA	0.25	NA	0.22	NA	0.22	NA	0.11
Panel 4	NA	0.43	NA	0.48	NA	0.16	NA	0.11
Panel 5	NA	0.42	NA	0.48	NA	0.16	NA	0.13
Panel 6 (Top)	NA	0.42	NA	0.34	NA	0.20	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.16	0.09	0.26	0.13
		2	0.22	0.09	0.19	0.05
		3	0.23	0.10	0.19	0.03
		4	0.27	0.10	0.23	0.03
		5	0.16	0.10	0.12	0.07
Bracing	Panel 1	Front to Rear	0.42	0.83	0.43	0.79
		Rear to Front	0.28	0.56	0.33	0.61
	Panel 2	Front to Rear	0.29	0.56	0.25	0.51
		Rear to Front	0.26	0.47	0.24	0.45
	Panel 3	Front to Rear	0.28	0.53	0.27	0.50
		Rear to Front	0.28	0.47	0.26	0.44
	Panel 4	Front to Rear	0.20	0.47	0.20	0.46
		Rear to Front	0.17	0.38	0.15	0.36
	Panel 5	Front to Rear	0.07	0.30	0.06	0.31
		Rear to Front	0.04	0.26	0.04	0.24
	Panel 6	Front to Rear	NA	0.06	NA	0.06
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.44	0.52	0.30	0.36
		2	0.24	0.26	0.19	0.32
		3	0.30	NA	0.17	0.10
		4	0.16	0.29	0.17	0.25
		5	-	-	0.07	0.05
Bracing	Panel 2	Rail to Centre	0.24	0.67	0.14	0.28
		Hwy to Centre	0.22	0.70	0.13	0.29
	Panel 3	Rail to Centre	0.12	0.56	0.08	0.20
		Hwy to Centre	0.13	0.55	0.08	0.20
	Panel 4	Rail to Centre	0.05	0.58	0.06	0.17
		Hwy to Centre	0.03	0.60	0.06	0.17
	Panel 5	Rail to Centre	NA	0.43	0.07	0.12
		Hwy to Centre	NA	0.42	0.05	0.14
	Panel 2	Vertical	NA	0.68	0.03	0.30
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.74	0.63
Back Transverse Sheave Girder	0.19	0.28
G1	0.20	0.69
G2/G3	0.18	0.70
G4	0.21	0.68
G6	0.19	0.69

Max D/C 0.66

2 - ULS V4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.13	0.00	0.12	0.00	0.23	0.00	0.22
Panel 2	NA	0.10	NA	0.10	NA	0.15	NA	0.15
Panel 3	NA	0.11	NA	0.10	NA	0.14	NA	0.14
Panel 4	NA	0.17	NA	0.17	NA	0.13	NA	0.13
Panel 5	NA	0.17	NA	0.17	NA	0.16	NA	0.15
Panel 6 (Top)	NA	0.18	NA	0.18	NA	0.22	0.01	0.24

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.00	NA	0.01	NA
		1	0.03	NA	0.07	NA
		2	0.11	0.01	0.10	0.01
		3	0.11	0.02	0.10	0.01
		4	0.14	0.02	0.11	NA
		5	0.08	0.11	0.05	0.09
Bracing	Panel 1	Front to Rear	NA	0.11	0.01	0.16
		Rear to Front	NA	0.09	NA	0.10
	Panel 2	Front to Rear	NA	0.08	NA	0.09
		Rear to Front	NA	0.09	NA	0.08
	Panel 3	Front to Rear	NA	0.08	NA	0.08
		Rear to Front	0.00	0.09	0.00	0.08
	Panel 4	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.10	0.00	0.09
	Panel 5	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.13	NA	0.12
	Panel 6	Front to Rear	0.01	NA	0.02	NA
		Rear to Front	NA	0.33	NA	0.26

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.03	0.01	0.03	0.01
		2	0.06	0.06	0.04	0.06
		3	0.10	NA	0.10	NA
		4	0.04	0.02	0.04	0.04
		5	-	-	0.05	0.00
Bracing	Panel 2	Rail to Centre	NA	0.09	NA	0.07
		Hwy to Centre	NA	0.09	NA	0.07
	Panel 3	Rail to Centre	NA	0.08	NA	0.06
		Hwy to Centre	NA	0.08	NA	0.06
	Panel 4	Rail to Centre	NA	0.13	NA	0.06
		Hwy to Centre	NA	0.13	NA	0.06
	Panel 5	Rail to Centre	NA	0.10	NA	0.03
		Hwy to Centre	NA	0.11	NA	0.05
	Panel 2	Vertical	NA	0.23	NA	0.13
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.26	0.23
Back Transverse Sheave Girder	0.22	0.36
G1	0.12	0.11
G2/G3	0.35	0.47
G4	0.11	0.06
G6	0.16	0.66

Max D/C 0.76

2 - ULS 4 Lowered

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.12	0.48	0.20	0.41	0.19	0.59	0.26	0.50
Panel 2	NA	0.24	NA	0.21	NA	0.19	NA	0.18
Panel 3	NA	0.19	NA	0.16	NA	0.13	NA	0.10
Panel 4	NA	0.31	NA	0.29	NA	0.10	NA	0.10
Panel 5	NA	0.30	NA	0.27	NA	0.10	NA	0.09
Panel 6 (Top)	NA	0.32	NA	0.29	NA	0.12	0.01	0.12

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.13	0.08	0.18	0.07
		2	0.21	0.13	0.15	0.06
		3	0.24	0.14	0.16	0.04
		4	0.24	0.11	0.17	0.02
		5	0.13	0.16	0.10	0.14
Bracing	Panel 1	Front to Rear	0.42	0.76	0.35	0.66
		Rear to Front	0.26	0.50	0.31	0.53
	Panel 2	Front to Rear	0.28	0.51	0.22	0.44
		Rear to Front	0.23	0.40	0.19	0.34
	Panel 3	Front to Rear	0.25	0.44	0.21	0.40
		Rear to Front	0.23	0.38	0.19	0.32
	Panel 4	Front to Rear	0.20	0.41	0.17	0.39
		Rear to Front	0.17	0.34	0.15	0.30
	Panel 5	Front to Rear	0.13	0.35	0.12	0.36
		Rear to Front	0.09	0.29	0.09	0.27
	Panel 6	Front to Rear	0.05	0.02	0.05	0.02
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.33	0.39	0.31	0.38
		2	0.25	0.31	0.25	0.41
		3	0.26	NA	0.18	0.16
		4	0.21	0.23	0.24	0.38
		5	-	-	0.09	0.09
Bracing	Panel 2	Rail to Centre	0.13	0.46	0.15	0.27
		Hwy to Centre	0.13	0.46	0.14	0.26
	Panel 3	Rail to Centre	0.04	0.34	0.08	0.16
		Hwy to Centre	0.04	0.34	0.08	0.17
	Panel 4	Rail to Centre	NA	0.40	0.04	0.13
		Hwy to Centre	NA	0.40	0.04	0.12
	Panel 5	Rail to Centre	NA	0.32	0.03	0.05
		Hwy to Centre	NA	0.33	0.02	0.08
	Panel 2	Vertical	NA	0.56	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.58	0.50
Back Transverse Sheave Girder	0.12	0.19
G1	0.16	0.53
G2/G3	0.16	0.55
G4	0.16	0.51
G6	0.09	0.44

Max D/C 0.56

3 - ULS 1								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.20	0.00	0.19	0.00	0.21	0.00	0.19
Panel 2	NA	0.18	NA	0.18	NA	0.12	NA	0.13
Panel 3	NA	0.18	NA	0.18	NA	0.12	NA	0.12
Panel 4	NA	0.31	NA	0.31	NA	0.11	NA	0.10
Panel 5	NA	0.30	NA	0.30	NA	0.13	NA	0.12
Panel 6 (Top)	NA	0.30	NA	0.30	NA	0.16	0.01	0.17

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals	Jacking Girder		0.01	NA	0.01	NA
	1		0.04	NA	0.10	NA
	2		0.12	NA	0.12	NA
	3		0.13	NA	0.12	NA
	4		0.16	NA	0.14	NA
	5		0.10	0.06	0.08	0.05
Bracing	Panel 1	Front to Rear	NA	0.14	0.01	0.18
		Rear to Front	NA	0.11	NA	0.11
	Panel 2	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.11	NA	0.10
	Panel 3	Front to Rear	NA	0.10	NA	0.10
		Rear to Front	NA	0.11	NA	0.10
	Panel 4	Front to Rear	NA	0.13	NA	0.14
		Rear to Front	NA	0.13	NA	0.12
	Panel 5	Front to Rear	NA	0.13	NA	0.14
		Rear to Front	NA	0.15	NA	0.14
	Panel 6	Front to Rear	NA	0.01	NA	0.01
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals	1		0.04	0.01	0.02	0.01
	2		0.08	0.07	0.04	0.06
	3		0.19	NA	0.08	NA
	4		0.05	0.00	0.04	0.04
	5		-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.14	NA	0.06
		Hwy to Centre	NA	0.15	NA	0.06
	Panel 3	Rail to Centre	NA	0.15	NA	0.04
		Hwy to Centre	NA	0.15	NA	0.05
	Panel 4	Rail to Centre	NA	0.21	NA	0.05
		Hwy to Centre	NA	0.21	NA	0.05
	Panel 5	Rail to Centre	NA	0.19	NA	0.02
		Hwy to Centre	NA	0.19	NA	0.04
	Panel 2	Vertical	NA	0.43	NA	0.09
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.56	0.48
Back Transverse Sheave Girder	0.17	0.25
G1	0.15	0.51
G2/G3	0.15	0.54
G4	0.15	0.50
G6	0.15	0.49

Max D/C 0.76

3 - ULS 4

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.32	0.74	0.41	0.60	0.30	0.71	0.45	0.45
Panel 2	NA	0.31	NA	0.28	NA	0.23	0.08	0.11
Panel 3	NA	0.22	NA	0.19	NA	0.15	0.01	0.04
Panel 4	NA	0.33	NA	0.39	NA	0.10	NA	0.05
Panel 5	NA	0.31	NA	0.39	NA	0.11	0.02	0.08
Panel 6 (Top)	NA	0.34	NA	0.28	0.01	0.13	0.00	0.10

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.15	0.09	0.22	0.13
		2	0.19	0.10	0.16	0.07
		3	0.21	0.11	0.16	0.05
		4	0.24	0.11	0.20	0.05
		5	0.12	0.13	0.09	0.11
Bracing	Panel 1	Front to Rear	0.40	0.76	0.41	0.71
		Rear to Front	0.28	0.50	0.32	0.56
	Panel 2	Front to Rear	0.28	0.51	0.25	0.46
		Rear to Front	0.26	0.43	0.23	0.40
	Panel 3	Front to Rear	0.27	0.49	0.26	0.45
		Rear to Front	0.27	0.43	0.25	0.40
	Panel 4	Front to Rear	0.20	0.43	0.20	0.41
		Rear to Front	0.17	0.34	0.15	0.32
	Panel 5	Front to Rear	0.07	0.27	0.07	0.27
		Rear to Front	0.05	0.23	0.05	0.22
	Panel 6	Front to Rear	0.03	0.00	0.04	0.00
		Rear to Front	NA	0.29	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.40	0.48	0.27	0.34
		2	0.22	0.25	0.18	0.30
		3	0.25	NA	0.14	0.12
		4	0.15	0.28	0.16	0.24
		5	-	-	0.06	0.06
Bracing	Panel 2	Rail to Centre	0.24	0.61	0.14	0.25
		Hwy to Centre	0.22	0.63	0.13	0.25
	Panel 3	Rail to Centre	0.13	0.50	0.09	0.17
		Hwy to Centre	0.14	0.49	0.09	0.17
	Panel 4	Rail to Centre	0.07	0.51	0.07	0.15
		Hwy to Centre	0.05	0.53	0.06	0.14
	Panel 5	Rail to Centre	NA	0.37	0.07	0.10
		Hwy to Centre	NA	0.36	0.06	0.12
	Panel 2	Vertical	NA	0.57	0.04	0.24
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.60	0.51
Back Transverse Sheave Girder	0.11	0.18
G1	0.17	0.57
G2/G3	0.15	0.57
G4	0.16	0.54
G6	0.09	0.47

Max D/C 0.67

3 - ULS V1

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.23	0.00	0.22	0.00	0.22	0.00	0.20
Panel 2	NA	0.21	NA	0.21	NA	0.13	NA	0.13
Panel 3	NA	0.21	NA	0.21	NA	0.13	NA	0.13
Panel 4	NA	0.36	NA	0.36	NA	0.12	NA	0.11
Panel 5	NA	0.35	NA	0.35	NA	0.14	NA	0.13
Panel 6 (Top)	NA	0.35	NA	0.35	NA	0.17	0.01	0.19

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.11	NA
		2	0.13	NA	0.13	NA
		3	0.14	NA	0.13	NA
		4	0.17	NA	0.15	NA
		5	0.12	0.05	0.09	0.04
Bracing	Panel 1	Front to Rear	NA	0.16	0.00	0.20
		Rear to Front	NA	0.12	NA	0.12
	Panel 2	Front to Rear	NA	0.12	NA	0.13
		Rear to Front	NA	0.12	NA	0.11
	Panel 3	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.12	NA	0.11
	Panel 4	Front to Rear	NA	0.15	NA	0.15
		Rear to Front	NA	0.15	NA	0.14
	Panel 5	Front to Rear	NA	0.15	NA	0.16
		Rear to Front	NA	0.16	NA	0.15
	Panel 6	Front to Rear	NA	0.03	NA	0.03
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.23	NA	0.09	NA
		4	0.05	NA	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.16	NA	0.06
		Hwy to Centre	NA	0.17	NA	0.06
	Panel 3	Rail to Centre	NA	0.17	NA	0.05
		Hwy to Centre	NA	0.17	NA	0.05
	Panel 4	Rail to Centre	NA	0.24	NA	0.06
		Hwy to Centre	NA	0.24	NA	0.05
	Panel 5	Rail to Centre	NA	0.22	NA	0.02
		Hwy to Centre	NA	0.22	NA	0.04
	Panel 2	Vertical	NA	0.51	NA	0.10
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.67	0.57
Back Transverse Sheave Girder	0.18	0.27
G1	0.18	0.61
G2/G3	0.18	0.64
G4	0.18	0.59
G6	0.15	0.55

Max D/C 0.71

3 - ULS V2

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.23	0.71	0.29	0.58	0.21	0.68	0.35	0.45
Panel 2	NA	0.33	NA	0.30	NA	0.25	0.02	0.16
Panel 3	NA	0.25	NA	0.22	NA	0.18	NA	0.09
Panel 4	NA	0.38	NA	0.43	NA	0.14	NA	0.10
Panel 5	NA	0.37	NA	0.43	NA	0.15	NA	0.12
Panel 6 (Top)	NA	0.40	NA	0.33	NA	0.19	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.14	0.06	0.23	0.10
		2	0.20	0.07	0.17	0.03
		3	0.21	0.07	0.17	0.02
		4	0.25	0.07	0.21	0.02
		5	0.15	0.09	0.11	0.07
Bracing	Panel 1	Front to Rear	0.32	0.69	0.34	0.67
		Rear to Front	0.21	0.47	0.26	0.51
	Panel 2	Front to Rear	0.23	0.47	0.20	0.43
		Rear to Front	0.20	0.39	0.19	0.38
	Panel 3	Front to Rear	0.22	0.45	0.21	0.42
		Rear to Front	0.22	0.40	0.20	0.38
	Panel 4	Front to Rear	0.16	0.41	0.15	0.39
		Rear to Front	0.13	0.33	0.12	0.31
	Panel 5	Front to Rear	0.05	0.27	0.04	0.27
		Rear to Front	0.03	0.24	0.03	0.22
	Panel 6	Front to Rear	NA	0.05	NA	0.05
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.36	0.42	0.24	0.29
		2	0.21	0.23	0.16	0.26
		3	0.28	NA	0.15	0.07
		4	0.14	0.23	0.15	0.20
		5	-	-	0.07	0.04
Bracing	Panel 2	Rail to Centre	0.18	0.56	0.10	0.24
		Hwy to Centre	0.16	0.59	0.10	0.24
	Panel 3	Rail to Centre	0.07	0.48	0.06	0.17
		Hwy to Centre	0.08	0.47	0.06	0.17
	Panel 4	Rail to Centre	0.01	0.51	0.04	0.15
		Hwy to Centre	NA	0.52	0.04	0.14
	Panel 5	Rail to Centre	NA	0.38	0.05	0.10
		Hwy to Centre	NA	0.37	0.04	0.12
	Panel 2	Vertical	NA	0.64	0.02	0.26
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.71	0.60
Back Transverse Sheave Girder	0.18	0.27
G1	0.20	0.66
G2/G3	0.17	0.67
G4	0.19	0.64
G6	0.18	0.65

Max D/C 0.83

3 - ULS V3

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.33	0.76	0.41	0.62	0.20	0.83	0.35	0.58
Panel 2	NA	0.33	NA	0.29	NA	0.31	NA	0.20
Panel 3	NA	0.24	NA	0.21	NA	0.22	NA	0.11
Panel 4	NA	0.42	NA	0.47	NA	0.16	NA	0.11
Panel 5	NA	0.41	NA	0.47	NA	0.15	NA	0.12
Panel 6 (Top)	NA	0.41	NA	0.33	NA	0.19	NA	0.15

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.16	0.09	0.26	0.14
		2	0.22	0.09	0.18	0.05
		3	0.23	0.10	0.18	0.03
		4	0.27	0.10	0.22	0.03
		5	0.15	0.10	0.12	0.08
Bracing	Panel 1	Front to Rear	0.42	0.83	0.43	0.78
		Rear to Front	0.28	0.56	0.34	0.61
	Panel 2	Front to Rear	0.29	0.56	0.26	0.50
		Rear to Front	0.26	0.47	0.24	0.44
	Panel 3	Front to Rear	0.28	0.53	0.27	0.49
		Rear to Front	0.28	0.47	0.26	0.44
	Panel 4	Front to Rear	0.20	0.47	0.20	0.45
		Rear to Front	0.17	0.38	0.15	0.35
	Panel 5	Front to Rear	0.07	0.30	0.06	0.30
		Rear to Front	0.04	0.25	0.04	0.24
	Panel 6	Front to Rear	NA	0.05	0.00	0.05
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.44	0.52	0.30	0.36
		2	0.24	0.26	0.19	0.31
		3	0.29	NA	0.17	0.10
		4	0.16	0.29	0.17	0.25
		5	-	-	0.07	0.06
Bracing	Panel 2	Rail to Centre	0.25	0.66	0.14	0.28
		Hwy to Centre	0.23	0.69	0.13	0.28
	Panel 3	Rail to Centre	0.12	0.56	0.08	0.20
		Hwy to Centre	0.14	0.54	0.09	0.20
	Panel 4	Rail to Centre	0.05	0.57	0.06	0.17
		Hwy to Centre	0.04	0.59	0.06	0.17
	Panel 5	Rail to Centre	NA	0.42	0.07	0.12
		Hwy to Centre	NA	0.41	0.05	0.14
	Panel 2	Vertical	NA	0.66	0.03	0.30
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.72	0.61
Back Transverse Sheave Girder	0.18	0.27
G1	0.20	0.67
G2/G3	0.17	0.68
G4	0.20	0.66
G6	0.19	0.67

Max D/C 0.64

3 - ULS V4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.12	0.00	0.12	0.00	0.23	0.00	0.21
Panel 2	NA	0.10	NA	0.10	NA	0.14	NA	0.14
Panel 3	NA	0.10	NA	0.10	NA	0.14	NA	0.13
Panel 4	NA	0.17	NA	0.17	NA	0.13	NA	0.12
Panel 5	NA	0.16	NA	0.16	NA	0.15	NA	0.14
Panel 6 (Top)	NA	0.18	NA	0.18	NA	0.21	0.01	0.23

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.00	NA	0.01	NA
		1	0.03	NA	0.07	NA
		2	0.10	0.01	0.10	0.01
		3	0.11	0.02	0.10	0.01
		4	0.13	0.03	0.11	NA
		5	0.08	0.11	0.05	0.09
Bracing	Panel 1	Front to Rear	NA	0.11	0.01	0.16
		Rear to Front	NA	0.09	NA	0.10
	Panel 2	Front to Rear	NA	0.08	NA	0.09
		Rear to Front	NA	0.09	NA	0.08
	Panel 3	Front to Rear	NA	0.07	NA	0.08
		Rear to Front	0.00	0.09	0.01	0.08
	Panel 4	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.10	0.00	0.09
	Panel 5	Front to Rear	NA	0.09	NA	0.09
		Rear to Front	NA	0.13	NA	0.12
	Panel 6	Front to Rear	0.02	NA	0.02	NA
		Rear to Front	NA	0.33	NA	0.26

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.03	0.01	0.03	0.01
		2	0.06	0.06	0.04	0.06
		3	0.10	NA	0.09	NA
		4	0.04	0.02	0.04	0.04
		5	-	-	0.05	0.00
Bracing	Panel 2	Rail to Centre	NA	0.09	NA	0.07
		Hwy to Centre	NA	0.09	NA	0.07
	Panel 3	Rail to Centre	NA	0.08	NA	0.05
		Hwy to Centre	NA	0.08	NA	0.06
	Panel 4	Rail to Centre	NA	0.12	NA	0.06
		Hwy to Centre	NA	0.12	NA	0.06
	Panel 5	Rail to Centre	NA	0.10	NA	0.02
		Hwy to Centre	NA	0.10	NA	0.05
	Panel 2	Vertical	NA	0.22	NA	0.12
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.25	0.22
Back Transverse Sheave Girder	0.21	0.35
G1	0.12	0.10
G2/G3	0.33	0.45
G4	0.10	0.06
G6	0.16	0.64

Max D/C 0.76

3 - ULS 4 Lowered								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.12	0.47	0.20	0.40	0.19	0.58	0.26	0.50
Panel 2	NA	0.23	NA	0.20	NA	0.19	NA	0.18
Panel 3	NA	0.18	NA	0.15	NA	0.13	NA	0.10
Panel 4	NA	0.29	NA	0.27	NA	0.10	NA	0.09
Panel 5	NA	0.29	NA	0.26	NA	0.10	NA	0.09
Panel 6 (Top)	NA	0.31	NA	0.28	NA	0.12	0.01	0.12

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.13	0.08	0.17	0.07
		2	0.21	0.13	0.15	0.06
		3	0.23	0.15	0.16	0.05
		4	0.23	0.11	0.17	0.02
		5	0.12	0.16	0.09	0.14
Bracing	Panel 1	Front to Rear	0.42	0.76	0.35	0.65
		Rear to Front	0.27	0.49	0.31	0.53
	Panel 2	Front to Rear	0.28	0.51	0.22	0.44
		Rear to Front	0.23	0.40	0.19	0.34
	Panel 3	Front to Rear	0.25	0.44	0.21	0.40
		Rear to Front	0.23	0.38	0.19	0.32
	Panel 4	Front to Rear	0.20	0.41	0.18	0.39
		Rear to Front	0.17	0.34	0.15	0.30
	Panel 5	Front to Rear	0.13	0.35	0.13	0.35
		Rear to Front	0.09	0.28	0.09	0.27
	Panel 6	Front to Rear	0.05	0.01	0.05	0.01
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.33	0.39	0.31	0.38
		2	0.25	0.31	0.24	0.41
		3	0.25	NA	0.18	0.16
		4	0.21	0.23	0.24	0.38
		5	-	-	0.09	0.09
Bracing	Panel 2	Rail to Centre	0.13	0.46	0.15	0.26
		Hwy to Centre	0.13	0.46	0.14	0.26
	Panel 3	Rail to Centre	0.04	0.33	0.09	0.16
		Hwy to Centre	0.04	0.33	0.08	0.17
	Panel 4	Rail to Centre	NA	0.40	0.04	0.13
		Hwy to Centre	NA	0.39	0.04	0.12
	Panel 5	Rail to Centre	NA	0.32	0.03	0.05
		Hwy to Centre	NA	0.32	0.02	0.08
	Panel 2	Vertical	NA	0.54	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.55	0.47
Back Transverse Sheave Girder	0.12	0.19
G1	0.15	0.50
G2/G3	0.15	0.52
G4	0.15	0.49
G6	0.09	0.43

Max D/C 0.56

4 - ULS 1									
		Front Columns				Rear Columns			
		Rail		Hwy		Rail		Hwy	
		Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)		0.00	0.20	0.00	0.19	0.00	0.21	0.00	0.19
Panel 2		NA	0.18	NA	0.18	NA	0.13	NA	0.13
Panel 3		NA	0.18	NA	0.18	NA	0.12	NA	0.12
Panel 4		NA	0.31	NA	0.31	NA	0.11	NA	0.10
Panel 5		NA	0.30	NA	0.30	NA	0.13	NA	0.12
Panel 6 (Top)		NA	0.30	NA	0.30	NA	0.16	0.01	0.17

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.10	NA
		2	0.12	NA	0.12	NA
		3	0.13	NA	0.12	NA
		4	0.16	NA	0.14	NA
		5	0.10	0.06	0.08	0.05
Bracing	Panel 1	Front to Rear	NA	0.15	0.01	0.18
		Rear to Front	NA	0.11	NA	0.11
	Panel 2	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.11	NA	0.10
	Panel 3	Front to Rear	NA	0.10	NA	0.10
		Rear to Front	NA	0.11	NA	0.10
	Panel 4	Front to Rear	NA	0.13	NA	0.14
		Rear to Front	NA	0.13	NA	0.12
	Panel 5	Front to Rear	NA	0.13	NA	0.14
		Rear to Front	NA	0.15	NA	0.14
	Panel 6	Front to Rear	NA	0.01	NA	0.01
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.19	NA	0.08	NA
		4	0.05	0.00	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.14	NA	0.06
		Hwy to Centre	NA	0.15	NA	0.06
	Panel 3	Rail to Centre	NA	0.15	NA	0.04
		Hwy to Centre	NA	0.15	NA	0.05
	Panel 4	Rail to Centre	NA	0.21	NA	0.05
		Hwy to Centre	NA	0.21	NA	0.05
	Panel 5	Rail to Centre	NA	0.19	NA	0.02
		Hwy to Centre	NA	0.19	NA	0.04
	Panel 2	Vertical	NA	0.43	NA	0.09
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.56	0.48
Back Transverse Sheave Girder	0.17	0.25
G1	0.15	0.51
G2/G3	0.15	0.54
G4	0.15	0.50
G6	0.15	0.49

Max D/C 0.76

4 - ULS 4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.32	0.74	0.41	0.60	0.30	0.72	0.45	0.45
Panel 2	NA	0.31	NA	0.28	NA	0.23	0.08	0.11
Panel 3	NA	0.22	NA	0.19	NA	0.15	0.01	0.04
Panel 4	NA	0.33	NA	0.39	NA	0.10	NA	0.05
Panel 5	NA	0.32	NA	0.39	NA	0.11	0.02	0.08
Panel 6 (Top)	NA	0.34	NA	0.28	0.01	0.13	0.00	0.10

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.15	0.09	0.22	0.13
		2	0.20	0.10	0.16	0.07
		3	0.21	0.11	0.16	0.05
		4	0.24	0.11	0.20	0.05
		5	0.12	0.13	0.09	0.11
Bracing	Panel 1	Front to Rear	0.40	0.76	0.41	0.71
		Rear to Front	0.28	0.50	0.32	0.56
	Panel 2	Front to Rear	0.28	0.51	0.25	0.46
		Rear to Front	0.26	0.43	0.23	0.40
	Panel 3	Front to Rear	0.27	0.49	0.26	0.45
		Rear to Front	0.27	0.43	0.25	0.40
	Panel 4	Front to Rear	0.20	0.43	0.20	0.41
		Rear to Front	0.17	0.34	0.15	0.32
	Panel 5	Front to Rear	0.07	0.27	0.07	0.27
		Rear to Front	0.05	0.23	0.05	0.22
	Panel 6	Front to Rear	0.03	0.00	0.04	0.00
		Rear to Front	NA	0.29	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.40	0.48	0.27	0.34
		2	0.22	0.25	0.18	0.30
		3	0.25	NA	0.14	0.12
		4	0.15	0.28	0.16	0.24
		5	-	-	0.06	0.06
Bracing	Panel 2	Rail to Centre	0.24	0.61	0.14	0.25
		Hwy to Centre	0.22	0.63	0.13	0.25
	Panel 3	Rail to Centre	0.13	0.50	0.09	0.17
		Hwy to Centre	0.14	0.49	0.09	0.17
	Panel 4	Rail to Centre	0.06	0.51	0.07	0.15
		Hwy to Centre	0.05	0.53	0.06	0.14
	Panel 5	Rail to Centre	NA	0.37	0.07	0.10
		Hwy to Centre	NA	0.36	0.06	0.12
	Panel 2	Vertical	NA	0.57	0.04	0.24
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.60	0.51
Back Transverse Sheave Girder	0.11	0.18
G1	0.17	0.57
G2/G3	0.15	0.57
G4	0.17	0.55
G6	0.09	0.47

Max D/C 0.67

4 - ULS V1								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.23	0.00	0.22	0.00	0.22	0.00	0.20
Panel 2	NA	0.21	NA	0.21	NA	0.13	NA	0.13
Panel 3	NA	0.21	NA	0.21	NA	0.13	NA	0.13
Panel 4	NA	0.36	NA	0.36	NA	0.12	NA	0.11
Panel 5	NA	0.35	NA	0.35	NA	0.14	NA	0.13
Panel 6 (Top)	NA	0.35	NA	0.35	NA	0.17	0.01	0.19

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals	Jacking Girder		0.01	NA	0.01	NA
	1		0.04	NA	0.11	NA
	2		0.13	NA	0.13	NA
	3		0.14	NA	0.13	NA
	4		0.17	NA	0.15	NA
	5		0.12	0.05	0.09	0.04
Bracing	Panel 1	Front to Rear	NA	0.16	0.00	0.20
		Rear to Front	NA	0.12	NA	0.12
	Panel 2	Front to Rear	NA	0.12	NA	0.13
		Rear to Front	NA	0.12	NA	0.11
	Panel 3	Front to Rear	NA	0.11	NA	0.12
		Rear to Front	NA	0.12	NA	0.11
	Panel 4	Front to Rear	NA	0.15	NA	0.15
		Rear to Front	NA	0.15	NA	0.14
	Panel 5	Front to Rear	NA	0.15	NA	0.16
		Rear to Front	NA	0.16	NA	0.15
	Panel 6	Front to Rear	NA	0.03	NA	0.03
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals	1		0.04	0.01	0.02	0.01
	2		0.08	0.07	0.04	0.06
	3		0.23	NA	0.09	NA
	4		0.05	NA	0.04	0.04
	5		-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.16	NA	0.06
		Hwy to Centre	NA	0.17	NA	0.06
	Panel 3	Rail to Centre	NA	0.17	NA	0.05
		Hwy to Centre	NA	0.17	NA	0.05
	Panel 4	Rail to Centre	NA	0.24	NA	0.06
		Hwy to Centre	NA	0.24	NA	0.05
	Panel 5	Rail to Centre	NA	0.22	NA	0.02
		Hwy to Centre	NA	0.22	NA	0.04
	Panel 2	Vertical	NA	0.51	NA	0.10
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.67	0.57
Back Transverse Sheave Girder	0.18	0.27
G1	0.18	0.61
G2/G3	0.18	0.65
G4	0.18	0.59
G6	0.15	0.55

Max D/C 0.71

4 - ULS V2

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.23	0.71	0.29	0.58	0.21	0.68	0.35	0.45
Panel 2	NA	0.33	NA	0.30	NA	0.25	0.02	0.16
Panel 3	NA	0.25	NA	0.22	NA	0.18	NA	0.09
Panel 4	NA	0.39	NA	0.43	NA	0.14	NA	0.10
Panel 5	NA	0.37	NA	0.43	NA	0.15	NA	0.12
Panel 6 (Top)	NA	0.40	NA	0.33	NA	0.19	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.14	0.06	0.23	0.10
		2	0.20	0.06	0.17	0.03
		3	0.21	0.07	0.17	0.02
		4	0.25	0.07	0.21	0.02
		5	0.15	0.09	0.11	0.07
Bracing	Panel 1	Front to Rear	0.32	0.70	0.34	0.67
		Rear to Front	0.21	0.47	0.26	0.51
	Panel 2	Front to Rear	0.23	0.47	0.20	0.43
		Rear to Front	0.20	0.39	0.19	0.38
	Panel 3	Front to Rear	0.22	0.45	0.21	0.42
		Rear to Front	0.22	0.40	0.20	0.38
	Panel 4	Front to Rear	0.16	0.41	0.15	0.39
		Rear to Front	0.13	0.33	0.12	0.31
	Panel 5	Front to Rear	0.05	0.27	0.04	0.27
		Rear to Front	0.03	0.24	0.03	0.22
	Panel 6	Front to Rear	NA	0.05	NA	0.05
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.36	0.41	0.24	0.29
		2	0.21	0.23	0.16	0.26
		3	0.28	NA	0.15	0.07
		4	0.14	0.23	0.15	0.20
		5	-	-	0.07	0.04
Bracing	Panel 2	Rail to Centre	0.18	0.57	0.10	0.24
		Hwy to Centre	0.16	0.59	0.10	0.24
	Panel 3	Rail to Centre	0.07	0.48	0.06	0.17
		Hwy to Centre	0.08	0.47	0.06	0.17
	Panel 4	Rail to Centre	0.01	0.51	0.04	0.15
		Hwy to Centre	NA	0.53	0.04	0.14
	Panel 5	Rail to Centre	NA	0.38	0.05	0.10
		Hwy to Centre	NA	0.37	0.04	0.12
	Panel 2	Vertical	NA	0.64	0.02	0.26
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.71	0.60
Back Transverse Sheave Girder	0.18	0.27
G1	0.20	0.66
G2/G3	0.17	0.68
G4	0.20	0.64
G6	0.18	0.65

Max D/C 0.83

4 - ULS V3

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.33	0.76	0.41	0.62	0.20	0.83	0.35	0.58
Panel 2	NA	0.33	NA	0.29	NA	0.31	NA	0.20
Panel 3	NA	0.24	NA	0.21	NA	0.22	NA	0.11
Panel 4	NA	0.42	NA	0.47	NA	0.16	NA	0.11
Panel 5	NA	0.41	NA	0.47	NA	0.15	NA	0.12
Panel 6 (Top)	NA	0.41	NA	0.33	NA	0.19	NA	0.15

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.16	0.09	0.26	0.14
		2	0.22	0.09	0.18	0.05
		3	0.23	0.10	0.18	0.03
		4	0.27	0.10	0.22	0.03
		5	0.16	0.10	0.12	0.08
Bracing	Panel 1	Front to Rear	0.42	0.83	0.43	0.78
		Rear to Front	0.28	0.56	0.34	0.61
	Panel 2	Front to Rear	0.29	0.56	0.26	0.50
		Rear to Front	0.26	0.47	0.24	0.44
	Panel 3	Front to Rear	0.28	0.53	0.27	0.49
		Rear to Front	0.28	0.47	0.26	0.44
	Panel 4	Front to Rear	0.20	0.47	0.20	0.45
		Rear to Front	0.17	0.38	0.15	0.35
	Panel 5	Front to Rear	0.07	0.30	0.06	0.30
		Rear to Front	0.04	0.25	0.04	0.24
	Panel 6	Front to Rear	NA	0.05	0.00	0.05
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.44	0.52	0.30	0.36
		2	0.24	0.26	0.19	0.31
		3	0.29	NA	0.17	0.10
		4	0.16	0.29	0.17	0.25
		5	-	-	0.07	0.05
Bracing	Panel 2	Rail to Centre	0.25	0.67	0.14	0.28
		Hwy to Centre	0.23	0.69	0.13	0.28
	Panel 3	Rail to Centre	0.12	0.56	0.08	0.20
		Hwy to Centre	0.13	0.54	0.09	0.20
	Panel 4	Rail to Centre	0.05	0.57	0.06	0.17
		Hwy to Centre	0.04	0.59	0.06	0.17
	Panel 5	Rail to Centre	NA	0.42	0.07	0.12
		Hwy to Centre	NA	0.41	0.05	0.14
	Panel 2	Vertical	NA	0.67	0.03	0.30
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.72	0.61
Back Transverse Sheave Girder	0.18	0.27
G1	0.20	0.67
G2/G3	0.17	0.68
G4	0.20	0.66
G6	0.19	0.67

Max D/C 0.64

4 - ULS V4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.12	0.00	0.12	0.00	0.23	0.00	0.21
Panel 2	NA	0.10	NA	0.10	NA	0.14	NA	0.14
Panel 3	NA	0.10	NA	0.10	NA	0.14	NA	0.13
Panel 4	NA	0.17	NA	0.17	NA	0.13	NA	0.12
Panel 5	NA	0.16	NA	0.16	NA	0.15	NA	0.14
Panel 6 (Top)	NA	0.18	NA	0.18	NA	0.21	0.01	0.23

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals	Jacking Girder		0.00	NA	0.01	NA
	1		0.03	NA	0.07	NA
	2		0.10	0.01	0.10	0.01
	3		0.11	0.02	0.10	0.01
	4		0.13	0.03	0.11	NA
	5		0.08	0.11	0.05	0.09
Bracing	Panel 1	Front to Rear	NA	0.11	0.01	0.16
		Rear to Front	NA	0.09	NA	0.10
	Panel 2	Front to Rear	NA	0.08	NA	0.09
		Rear to Front	NA	0.09	NA	0.08
	Panel 3	Front to Rear	NA	0.07	NA	0.08
		Rear to Front	0.00	0.09	0.01	0.08
	Panel 4	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.10	0.00	0.09
	Panel 5	Front to Rear	NA	0.09	NA	0.09
		Rear to Front	NA	0.13	NA	0.12
	Panel 6	Front to Rear	0.02	NA	0.02	NA
		Rear to Front	NA	0.33	NA	0.26

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals	1		0.03	0.01	0.03	0.01
	2		0.06	0.06	0.04	0.06
	3		0.10	NA	0.09	NA
	4		0.04	0.02	0.04	0.04
	5		-	-	0.05	0.00
Bracing	Panel 2	Rail to Centre	NA	0.09	NA	0.07
		Hwy to Centre	NA	0.09	NA	0.07
	Panel 3	Rail to Centre	NA	0.08	NA	0.06
		Hwy to Centre	NA	0.08	NA	0.06
	Panel 4	Rail to Centre	NA	0.12	NA	0.06
		Hwy to Centre	NA	0.12	NA	0.06
	Panel 5	Rail to Centre	NA	0.10	NA	0.03
		Hwy to Centre	NA	0.10	NA	0.05
	Panel 2	Vertical	NA	0.22	NA	0.12
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.25	0.22
Back Transverse Sheave Girder	0.21	0.35
G1	0.12	0.10
G2/G3	0.33	0.45
G4	0.11	0.06
G6	0.16	0.64

Max D/C 0.76

4 - ULS 4 Lowered

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.12	0.47	0.20	0.40	0.19	0.58	0.26	0.50
Panel 2	NA	0.23	NA	0.20	NA	0.19	NA	0.18
Panel 3	NA	0.19	NA	0.15	NA	0.13	NA	0.10
Panel 4	NA	0.29	NA	0.28	NA	0.10	NA	0.09
Panel 5	NA	0.29	NA	0.26	NA	0.10	NA	0.09
Panel 6 (Top)	NA	0.31	NA	0.28	NA	0.12	0.01	0.12

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.13	0.08	0.17	0.07
		2	0.21	0.13	0.15	0.06
		3	0.23	0.15	0.16	0.05
		4	0.23	0.11	0.17	0.02
		5	0.12	0.16	0.09	0.14
Bracing	Panel 1	Front to Rear	0.42	0.76	0.35	0.65
		Rear to Front	0.27	0.50	0.31	0.53
	Panel 2	Front to Rear	0.28	0.51	0.22	0.44
		Rear to Front	0.23	0.40	0.19	0.34
	Panel 3	Front to Rear	0.25	0.44	0.21	0.40
		Rear to Front	0.23	0.38	0.19	0.32
	Panel 4	Front to Rear	0.20	0.41	0.18	0.39
		Rear to Front	0.17	0.34	0.15	0.30
	Panel 5	Front to Rear	0.13	0.35	0.12	0.35
		Rear to Front	0.09	0.28	0.09	0.27
	Panel 6	Front to Rear	0.05	0.01	0.05	0.01
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.33	0.39	0.31	0.38
		2	0.25	0.31	0.24	0.41
		3	0.25	NA	0.18	0.16
		4	0.21	0.23	0.24	0.38
		5	-	-	0.09	0.09
Bracing	Panel 2	Rail to Centre	0.13	0.46	0.15	0.26
		Hwy to Centre	0.13	0.46	0.14	0.26
	Panel 3	Rail to Centre	0.04	0.33	0.09	0.16
		Hwy to Centre	0.04	0.33	0.08	0.17
	Panel 4	Rail to Centre	NA	0.40	0.04	0.13
		Hwy to Centre	NA	0.39	0.04	0.12
	Panel 5	Rail to Centre	NA	0.32	0.03	0.05
		Hwy to Centre	NA	0.32	0.02	0.08
	Panel 2	Vertical	NA	0.54	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.55	0.48
Back Transverse Sheave Girder	0.12	0.19
G1	0.15	0.50
G2/G3	0.15	0.53
G4	0.15	0.49
G6	0.09	0.43

Max D/C 0.61

5 - ULS 1								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.22	0.00	0.21	0.00	0.21	0.00	0.19
Panel 2	NA	0.19	NA	0.19	NA	0.13	NA	0.13
Panel 3	NA	0.20	NA	0.20	NA	0.13	NA	0.12
Panel 4	NA	0.33	NA	0.33	NA	0.12	NA	0.11
Panel 5	NA	0.32	NA	0.32	NA	0.14	NA	0.12
Panel 6 (Top)	NA	0.32	NA	0.32	NA	0.16	0.01	0.18

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.10	NA
		2	0.12	NA	0.12	NA
		3	0.13	NA	0.13	NA
		4	0.16	NA	0.15	NA
		5	0.11	0.06	0.08	0.04
Bracing	Panel 1	Front to Rear	NA	0.15	0.00	0.19
		Rear to Front	NA	0.12	NA	0.11
	Panel 2	Front to Rear	NA	0.12	NA	0.12
		Rear to Front	NA	0.12	NA	0.11
	Panel 3	Front to Rear	NA	0.10	NA	0.11
		Rear to Front	NA	0.11	NA	0.11
	Panel 4	Front to Rear	NA	0.14	NA	0.14
		Rear to Front	NA	0.14	NA	0.13
	Panel 5	Front to Rear	NA	0.14	NA	0.15
		Rear to Front	NA	0.15	NA	0.14
	Panel 6	Front to Rear	NA	0.02	NA	0.02
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.21	NA	0.08	NA
		4	0.05	0.00	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.15	NA	0.06
		Hwy to Centre	NA	0.16	NA	0.06
	Panel 3	Rail to Centre	NA	0.16	NA	0.05
		Hwy to Centre	NA	0.16	NA	0.05
	Panel 4	Rail to Centre	NA	0.22	NA	0.05
		Hwy to Centre	NA	0.23	NA	0.05
	Panel 5	Rail to Centre	NA	0.20	NA	0.02
		Hwy to Centre	NA	0.20	NA	0.04
	Panel 2	Vertical	NA	0.47	NA	0.09
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.61	0.52
Back Transverse Sheave Girder	0.18	0.26
G1	0.16	0.56
G2/G3	0.17	0.59
G4	0.17	0.55
G6	0.15	0.52

Max D/C 0.77

5 - ULS 4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.31	0.76	0.39	0.61	0.29	0.72	0.45	0.45
Panel 2	NA	0.33	NA	0.29	NA	0.23	0.07	0.12
Panel 3	NA	0.23	NA	0.20	NA	0.16	0.00	0.04
Panel 4	NA	0.35	NA	0.42	NA	0.11	NA	0.06
Panel 5	NA	0.34	NA	0.41	NA	0.12	0.01	0.08
Panel 6 (Top)	NA	0.37	NA	0.30	0.01	0.14	0.00	0.11

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.15	0.09	0.23	0.13
		2	0.20	0.10	0.17	0.06
		3	0.21	0.11	0.17	0.04
		4	0.25	0.10	0.21	0.04
		5	0.13	0.12	0.09	0.10
Bracing	Panel 1	Front to Rear	0.40	0.77	0.41	0.72
		Rear to Front	0.27	0.51	0.32	0.56
	Panel 2	Front to Rear	0.27	0.52	0.25	0.47
		Rear to Front	0.25	0.43	0.23	0.41
	Panel 3	Front to Rear	0.27	0.49	0.26	0.46
		Rear to Front	0.27	0.43	0.24	0.41
	Panel 4	Front to Rear	0.20	0.44	0.19	0.42
		Rear to Front	0.16	0.34	0.15	0.32
	Panel 5	Front to Rear	0.07	0.28	0.06	0.28
		Rear to Front	0.04	0.23	0.04	0.22
	Panel 6	Front to Rear	0.03	0.01	0.03	0.01
		Rear to Front	NA	0.29	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.40	0.48	0.28	0.34
		2	0.22	0.25	0.18	0.30
		3	0.26	NA	0.14	0.11
		4	0.15	0.27	0.16	0.24
		5	-	-	0.06	0.06
Bracing	Panel 2	Rail to Centre	0.23	0.62	0.14	0.25
		Hwy to Centre	0.22	0.64	0.13	0.25
	Panel 3	Rail to Centre	0.12	0.51	0.09	0.17
		Hwy to Centre	0.13	0.50	0.09	0.17
	Panel 4	Rail to Centre	0.05	0.53	0.07	0.15
		Hwy to Centre	0.04	0.55	0.06	0.15
	Panel 5	Rail to Centre	NA	0.38	0.07	0.10
		Hwy to Centre	NA	0.37	0.06	0.12
	Panel 2	Vertical	NA	0.61	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.65	0.55
Back Transverse Sheave Girder	0.12	0.19
G1	0.18	0.61
G2/G3	0.16	0.62
G4	0.18	0.59
G6	0.09	0.50

Max D/C 0.73

5 - ULS V1

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.25	0.00	0.24	0.00	0.22	0.00	0.20
Panel 2	NA	0.22	NA	0.22	NA	0.14	NA	0.14
Panel 3	NA	0.23	NA	0.23	NA	0.14	NA	0.13
Panel 4	NA	0.39	NA	0.39	NA	0.13	NA	0.12
Panel 5	NA	0.38	NA	0.38	NA	0.15	NA	0.13
Panel 6 (Top)	NA	0.38	NA	0.38	NA	0.17	0.01	0.20

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.12	NA
		2	0.13	NA	0.13	NA
		3	0.15	NA	0.14	NA
		4	0.18	NA	0.16	NA
		5	0.12	0.05	0.09	0.03
Bracing	Panel 1	Front to Rear	NA	0.17	NA	0.21
		Rear to Front	NA	0.13	NA	0.13
	Panel 2	Front to Rear	NA	0.13	NA	0.14
		Rear to Front	NA	0.13	NA	0.12
	Panel 3	Front to Rear	NA	0.12	NA	0.12
		Rear to Front	NA	0.13	NA	0.12
	Panel 4	Front to Rear	NA	0.16	NA	0.16
		Rear to Front	NA	0.16	NA	0.14
	Panel 5	Front to Rear	NA	0.16	NA	0.17
		Rear to Front	NA	0.17	NA	0.16
	Panel 6	Front to Rear	NA	0.04	NA	0.03
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.05	0.01	0.02	0.01
		2	0.09	0.08	0.04	0.06
		3	0.25	NA	0.09	NA
		4	0.05	NA	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.17	NA	0.06
		Hwy to Centre	NA	0.18	NA	0.06
	Panel 3	Rail to Centre	NA	0.19	NA	0.05
		Hwy to Centre	NA	0.18	NA	0.05
	Panel 4	Rail to Centre	NA	0.26	NA	0.06
		Hwy to Centre	NA	0.26	NA	0.05
	Panel 5	Rail to Centre	NA	0.24	NA	0.02
		Hwy to Centre	NA	0.24	NA	0.05
	Panel 2	Vertical	NA	0.56	NA	0.10
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.73	0.62
Back Transverse Sheave Girder	0.19	0.29
G1	0.20	0.67
G2/G3	0.20	0.71
G4	0.20	0.65
G6	0.16	0.58

Max D/C 0.77

5 - ULS V2

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.21	0.72	0.28	0.59	0.21	0.68	0.34	0.46
Panel 2	NA	0.34	NA	0.31	NA	0.25	0.02	0.16
Panel 3	NA	0.26	NA	0.24	NA	0.19	NA	0.09
Panel 4	NA	0.41	NA	0.46	NA	0.15	NA	0.10
Panel 5	NA	0.40	NA	0.46	NA	0.16	NA	0.13
Panel 6 (Top)	NA	0.43	NA	0.36	NA	0.20	NA	0.17

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.14	0.06	0.24	0.09
		2	0.20	0.06	0.17	0.03
		3	0.22	0.06	0.18	0.01
		4	0.26	0.07	0.22	0.01
		5	0.16	0.09	0.12	0.06
Bracing	Panel 1	Front to Rear	0.32	0.70	0.34	0.68
		Rear to Front	0.20	0.48	0.25	0.52
	Panel 2	Front to Rear	0.22	0.48	0.20	0.44
		Rear to Front	0.20	0.40	0.19	0.38
	Panel 3	Front to Rear	0.22	0.45	0.21	0.42
		Rear to Front	0.22	0.40	0.20	0.38
	Panel 4	Front to Rear	0.16	0.42	0.15	0.40
		Rear to Front	0.12	0.34	0.11	0.32
	Panel 5	Front to Rear	0.04	0.28	0.04	0.28
		Rear to Front	0.03	0.24	0.03	0.23
	Panel 6	Front to Rear	NA	0.06	NA	0.06
		Rear to Front	NA	0.33	NA	0.24

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.36	0.41	0.24	0.29
		2	0.21	0.23	0.16	0.26
		3	0.30	NA	0.16	0.07
		4	0.14	0.23	0.15	0.20
		5	-	-	0.07	0.04
Bracing	Panel 2	Rail to Centre	0.17	0.58	0.10	0.24
		Hwy to Centre	0.15	0.60	0.10	0.24
	Panel 3	Rail to Centre	0.06	0.50	0.06	0.17
		Hwy to Centre	0.07	0.48	0.06	0.17
	Panel 4	Rail to Centre	NA	0.53	0.04	0.15
		Hwy to Centre	NA	0.54	0.04	0.15
	Panel 5	Rail to Centre	NA	0.40	0.05	0.10
		Hwy to Centre	NA	0.39	0.03	0.13
	Panel 2	Vertical	NA	0.68	0.02	0.27
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.77	0.65
Back Transverse Sheave Girder	0.19	0.28
G1	0.21	0.72
G2/G3	0.19	0.74
G4	0.21	0.70
G6	0.18	0.68

Max D/C 0.84

5 - ULS V3								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.32	0.84	0.41	0.68	0.29	0.81	0.46	0.53
Panel 2	NA	0.37	NA	0.33	NA	0.28	0.05	0.17
Panel 3	NA	0.27	NA	0.24	NA	0.20	NA	0.08
Panel 4	NA	0.42	NA	0.48	NA	0.15	NA	0.10
Panel 5	NA	0.41	NA	0.48	NA	0.16	NA	0.13
Panel 6 (Top)	NA	0.44	NA	0.36	NA	0.20	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.17	0.09	0.26	0.13
		2	0.22	0.08	0.19	0.05
		3	0.24	0.09	0.19	0.03
		4	0.28	0.09	0.23	0.02
		5	0.16	0.10	0.12	0.07
Bracing	Panel 1	Front to Rear	0.41	0.84	0.43	0.79
		Rear to Front	0.28	0.56	0.33	0.62
	Panel 2	Front to Rear	0.28	0.56	0.25	0.51
		Rear to Front	0.26	0.47	0.24	0.45
	Panel 3	Front to Rear	0.28	0.53	0.27	0.50
		Rear to Front	0.28	0.47	0.25	0.45
	Panel 4	Front to Rear	0.20	0.48	0.19	0.46
		Rear to Front	0.16	0.38	0.15	0.36
	Panel 5	Front to Rear	0.07	0.31	0.06	0.31
		Rear to Front	0.04	0.26	0.04	0.25
	Panel 6	Front to Rear	NA	0.06	NA	0.06
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.44	0.52	0.30	0.36
		2	0.24	0.27	0.19	0.32
		3	0.31	NA	0.17	0.10
		4	0.16	0.28	0.17	0.25
		5	-	-	0.07	0.05
Bracing	Panel 2	Rail to Centre	0.24	0.68	0.14	0.28
		Hwy to Centre	0.22	0.70	0.13	0.29
	Panel 3	Rail to Centre	0.11	0.57	0.08	0.20
		Hwy to Centre	0.12	0.55	0.08	0.20
	Panel 4	Rail to Centre	0.04	0.59	0.06	0.18
		Hwy to Centre	0.02	0.61	0.05	0.17
	Panel 5	Rail to Centre	NA	0.44	0.06	0.12
		Hwy to Centre	NA	0.43	0.05	0.15
	Panel 2	Vertical	NA	0.71	0.03	0.31
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.78	0.66
Back Transverse Sheave Girder	0.19	0.28
G1	0.22	0.72
G2/G3	0.19	0.74
G4	0.22	0.72
G6	0.19	0.70

Max D/C 0.68

5 - ULS V4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.13	0.00	0.12	0.00	0.24	0.00	0.22
Panel 2	NA	0.11	NA	0.11	NA	0.15	NA	0.15
Panel 3	NA	0.11	NA	0.11	NA	0.15	NA	0.14
Panel 4	NA	0.18	NA	0.18	NA	0.14	NA	0.13
Panel 5	NA	0.17	NA	0.17	NA	0.16	NA	0.15
Panel 6 (Top)	NA	0.19	NA	0.19	NA	0.22	0.01	0.24

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals	Jacking Girder		0.00	NA	0.01	NA
	1		0.03	NA	0.08	NA
	2		0.11	0.01	0.10	0.01
	3		0.11	0.02	0.10	0.00
	4		0.14	0.02	0.11	NA
	5		0.09	0.11	0.05	0.09
Bracing	Panel 1	Front to Rear	NA	0.12	0.01	0.17
		Rear to Front	NA	0.09	NA	0.10
	Panel 2	Front to Rear	NA	0.08	NA	0.09
		Rear to Front	NA	0.09	NA	0.09
	Panel 3	Front to Rear	NA	0.08	NA	0.08
		Rear to Front	NA	0.09	0.00	0.09
	Panel 4	Front to Rear	NA	0.10	NA	0.10
		Rear to Front	NA	0.10	0.00	0.09
	Panel 5	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.13	NA	0.13
	Panel 6	Front to Rear	0.01	NA	0.02	NA
		Rear to Front	NA	0.33	NA	0.26

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals	1		0.03	0.01	0.03	0.01
	2		0.06	0.06	0.04	0.06
	3		0.10	NA	0.10	NA
	4		0.04	0.02	0.04	0.04
	5		-	-	0.05	0.00
Bracing	Panel 2	Rail to Centre	NA	0.09	NA	0.07
		Hwy to Centre	NA	0.10	NA	0.07
	Panel 3	Rail to Centre	NA	0.08	NA	0.06
		Hwy to Centre	NA	0.08	NA	0.06
	Panel 4	Rail to Centre	NA	0.13	NA	0.06
		Hwy to Centre	NA	0.13	NA	0.06
	Panel 5	Rail to Centre	NA	0.10	NA	0.03
		Hwy to Centre	NA	0.11	NA	0.06
	Panel 2	Vertical	NA	0.24	NA	0.13
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.27	0.24
Back Transverse Sheave Girder	0.23	0.37
G1	0.12	0.11
G2/G3	0.37	0.49
G4	0.11	0.06
G6	0.16	0.68

Max D/C 0.77

5 - ULS 4 Lowered

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.11	0.48	0.19	0.41	0.19	0.59	0.26	0.50
Panel 2	NA	0.24	NA	0.21	NA	0.20	NA	0.18
Panel 3	NA	0.20	NA	0.16	NA	0.13	NA	0.10
Panel 4	NA	0.32	NA	0.30	NA	0.10	NA	0.10
Panel 5	NA	0.32	NA	0.29	NA	0.11	NA	0.10
Panel 6 (Top)	NA	0.34	NA	0.30	NA	0.12	0.01	0.13

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.14	0.07	0.18	0.06
		2	0.21	0.13	0.16	0.05
		3	0.24	0.14	0.16	0.04
		4	0.24	0.10	0.18	0.01
		5	0.13	0.16	0.10	0.14
Bracing	Panel 1	Front to Rear	0.42	0.77	0.35	0.66
		Rear to Front	0.26	0.50	0.31	0.53
	Panel 2	Front to Rear	0.28	0.51	0.22	0.45
		Rear to Front	0.23	0.41	0.19	0.35
	Panel 3	Front to Rear	0.25	0.45	0.21	0.41
		Rear to Front	0.22	0.38	0.19	0.32
	Panel 4	Front to Rear	0.19	0.42	0.17	0.40
		Rear to Front	0.17	0.35	0.15	0.31
	Panel 5	Front to Rear	0.13	0.36	0.12	0.36
		Rear to Front	0.09	0.29	0.09	0.28
	Panel 6	Front to Rear	0.04	0.02	0.05	0.02
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.33	0.39	0.31	0.38
		2	0.25	0.31	0.25	0.41
		3	0.27	NA	0.18	0.16
		4	0.21	0.23	0.24	0.38
		5	-	-	0.09	0.09
Bracing	Panel 2	Rail to Centre	0.13	0.47	0.14	0.27
		Hwy to Centre	0.12	0.47	0.14	0.26
	Panel 3	Rail to Centre	0.03	0.35	0.08	0.16
		Hwy to Centre	0.03	0.35	0.08	0.17
	Panel 4	Rail to Centre	NA	0.41	0.04	0.13
		Hwy to Centre	NA	0.41	0.04	0.12
	Panel 5	Rail to Centre	NA	0.33	0.03	0.05
		Hwy to Centre	NA	0.34	0.02	0.08
	Panel 2	Vertical	NA	0.57	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.61	0.52
Back Transverse Sheave Girder	0.12	0.20
G1	0.16	0.55
G2/G3	0.17	0.58
G4	0.17	0.54
G6	0.09	0.45

Max D/C 0.65

7 - ULS 1

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.23	0.00	0.21	0.00	0.21	0.00	0.20
Panel 2	NA	0.20	NA	0.20	NA	0.13	NA	0.13
Panel 3	NA	0.21	NA	0.21	NA	0.13	NA	0.12
Panel 4	NA	0.35	NA	0.35	NA	0.12	NA	0.11
Panel 5	NA	0.34	NA	0.34	NA	0.14	NA	0.13
Panel 6 (Top)	NA	0.34	NA	0.34	NA	0.16	0.01	0.19

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.11	NA
		2	0.13	NA	0.12	NA
		3	0.14	NA	0.13	NA
		4	0.17	NA	0.15	NA
		5	0.11	0.06	0.08	0.04
Bracing	Panel 1	Front to Rear	NA	0.16	0.00	0.20
		Rear to Front	NA	0.12	NA	0.12
	Panel 2	Front to Rear	NA	0.12	NA	0.13
		Rear to Front	NA	0.12	NA	0.11
	Panel 3	Front to Rear	NA	0.11	NA	0.11
		Rear to Front	NA	0.12	NA	0.11
	Panel 4	Front to Rear	NA	0.15	NA	0.15
		Rear to Front	NA	0.14	NA	0.13
	Panel 5	Front to Rear	NA	0.15	NA	0.15
		Rear to Front	NA	0.16	NA	0.15
	Panel 6	Front to Rear	NA	0.02	NA	0.02
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.22	NA	0.08	NA
		4	0.05	NA	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.16	NA	0.06
		Hwy to Centre	NA	0.17	NA	0.06
	Panel 3	Rail to Centre	NA	0.17	NA	0.05
		Hwy to Centre	NA	0.17	NA	0.05
	Panel 4	Rail to Centre	NA	0.23	NA	0.05
		Hwy to Centre	NA	0.24	NA	0.05
	Panel 5	Rail to Centre	NA	0.21	NA	0.02
		Hwy to Centre	NA	0.22	NA	0.04
	Panel 2	Vertical	NA	0.50	NA	0.10
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.65	0.55
Back Transverse Sheave Girder	0.18	0.27
G1	0.17	0.59
G2/G3	0.18	0.62
G4	0.18	0.58
G6	0.15	0.53

Max D/C 0.77

7 - ULS 4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.30	0.77	0.38	0.62	0.29	0.72	0.44	0.45
Panel 2	NA	0.33	NA	0.30	NA	0.24	0.07	0.12
Panel 3	NA	0.24	NA	0.21	NA	0.16	0.00	0.05
Panel 4	NA	0.37	NA	0.43	NA	0.11	NA	0.06
Panel 5	NA	0.36	NA	0.43	NA	0.12	0.01	0.09
Panel 6 (Top)	NA	0.39	NA	0.32	0.01	0.14	0.00	0.11

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.15	0.09	0.23	0.13
		2	0.20	0.09	0.17	0.06
		3	0.22	0.10	0.17	0.04
		4	0.25	0.10	0.21	0.04
		5	0.13	0.12	0.09	0.10
Bracing	Panel 1	Front to Rear	0.40	0.77	0.41	0.73
		Rear to Front	0.27	0.51	0.31	0.57
	Panel 2	Front to Rear	0.27	0.52	0.25	0.47
		Rear to Front	0.25	0.43	0.23	0.41
	Panel 3	Front to Rear	0.27	0.50	0.26	0.46
		Rear to Front	0.27	0.43	0.24	0.41
	Panel 4	Front to Rear	0.20	0.44	0.19	0.42
		Rear to Front	0.16	0.35	0.15	0.33
	Panel 5	Front to Rear	0.07	0.29	0.06	0.29
		Rear to Front	0.04	0.24	0.04	0.23
	Panel 6	Front to Rear	0.02	0.02	0.03	0.01
		Rear to Front	NA	0.29	NA	0.21

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.41	0.48	0.28	0.34
		2	0.22	0.25	0.18	0.30
		3	0.28	NA	0.15	0.11
		4	0.15	0.27	0.16	0.24
		5	-	-	0.06	0.06
Bracing	Panel 2	Rail to Centre	0.23	0.63	0.14	0.25
		Hwy to Centre	0.21	0.65	0.13	0.26
	Panel 3	Rail to Centre	0.11	0.52	0.09	0.17
		Hwy to Centre	0.12	0.51	0.09	0.17
	Panel 4	Rail to Centre	0.05	0.54	0.06	0.15
		Hwy to Centre	0.03	0.56	0.06	0.15
	Panel 5	Rail to Centre	NA	0.39	0.07	0.10
		Hwy to Centre	NA	0.38	0.06	0.12
	Panel 2	Vertical	NA	0.63	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.69	0.58
Back Transverse Sheave Girder	0.12	0.20
G1	0.19	0.65
G2/G3	0.17	0.66
G4	0.19	0.63
G6	0.09	0.51

Max D/C 0.78

7 - ULS V1								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.26	0.00	0.25	0.00	0.23	0.00	0.21
Panel 2	NA	0.23	NA	0.23	NA	0.14	NA	0.14
Panel 3	NA	0.24	NA	0.24	NA	0.14	NA	0.14
Panel 4	NA	0.41	NA	0.41	NA	0.13	NA	0.12
Panel 5	NA	0.40	NA	0.40	NA	0.15	NA	0.14
Panel 6 (Top)	NA	0.40	NA	0.40	NA	0.18	0.01	0.20

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.05	NA	0.13	NA
		2	0.14	NA	0.13	NA
		3	0.15	NA	0.14	NA
		4	0.19	NA	0.17	NA
		5	0.13	0.04	0.10	0.02
Bracing	Panel 1	Front to Rear	NA	0.17	NA	0.21
		Rear to Front	NA	0.14	NA	0.13
	Panel 2	Front to Rear	NA	0.13	NA	0.14
		Rear to Front	NA	0.13	NA	0.12
	Panel 3	Front to Rear	NA	0.12	NA	0.13
		Rear to Front	NA	0.13	NA	0.12
	Panel 4	Front to Rear	NA	0.16	NA	0.17
		Rear to Front	NA	0.16	NA	0.15
	Panel 5	Front to Rear	NA	0.17	NA	0.17
		Rear to Front	NA	0.17	NA	0.16
	Panel 6	Front to Rear	NA	0.04	NA	0.04
		Rear to Front	NA	0.31	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.05	0.01	0.03	0.01
		2	0.09	0.08	0.04	0.06
		3	0.27	NA	0.09	NA
		4	0.05	NA	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.18	NA	0.06
		Hwy to Centre	NA	0.19	NA	0.06
	Panel 3	Rail to Centre	NA	0.20	NA	0.05
		Hwy to Centre	NA	0.19	NA	0.05
	Panel 4	Rail to Centre	NA	0.27	NA	0.06
		Hwy to Centre	NA	0.27	NA	0.05
	Panel 5	Rail to Centre	NA	0.25	NA	0.02
		Hwy to Centre	NA	0.25	NA	0.05
	Panel 2	Vertical	NA	0.59	NA	0.11
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.78	0.66
Back Transverse Sheave Girder	0.19	0.29
G1	0.21	0.71
G2/G3	0.21	0.75
G4	0.21	0.69
G6	0.16	0.60

Max D/C 0.82

7 - ULS V2								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.20	0.74	0.26	0.60	0.20	0.68	0.34	0.46
Panel 2	NA	0.35	NA	0.32	NA	0.26	0.02	0.17
Panel 3	NA	0.27	NA	0.25	NA	0.19	NA	0.09
Panel 4	NA	0.43	NA	0.48	NA	0.15	NA	0.11
Panel 5	NA	0.42	NA	0.48	NA	0.16	NA	0.13
Panel 6 (Top)	NA	0.45	NA	0.38	NA	0.20	NA	0.17

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.00
		1	0.14	0.06	0.24	0.09
		2	0.21	0.05	0.18	0.02
		3	0.22	0.06	0.18	0.01
		4	0.26	0.06	0.22	NA
		5	0.16	0.08	0.12	0.05
Bracing	Panel 1	Front to Rear	0.32	0.71	0.34	0.68
		Rear to Front	0.20	0.48	0.25	0.52
	Panel 2	Front to Rear	0.22	0.48	0.20	0.44
		Rear to Front	0.20	0.40	0.18	0.39
	Panel 3	Front to Rear	0.22	0.46	0.21	0.43
		Rear to Front	0.22	0.41	0.20	0.38
	Panel 4	Front to Rear	0.16	0.42	0.15	0.41
		Rear to Front	0.12	0.34	0.11	0.32
	Panel 5	Front to Rear	0.04	0.28	0.04	0.29
		Rear to Front	0.02	0.25	0.02	0.23
	Panel 6	Front to Rear	NA	0.06	NA	0.06
		Rear to Front	NA	0.33	NA	0.24

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.36	0.41	0.24	0.29
		2	0.21	0.23	0.16	0.26
		3	0.32	NA	0.16	0.07
		4	0.14	0.22	0.15	0.20
		5	-	-	0.07	0.04
Bracing	Panel 2	Rail to Centre	0.16	0.59	0.10	0.24
		Hwy to Centre	0.14	0.61	0.09	0.24
	Panel 3	Rail to Centre	0.06	0.50	0.06	0.17
		Hwy to Centre	0.07	0.49	0.06	0.17
	Panel 4	Rail to Centre	NA	0.54	0.04	0.15
		Hwy to Centre	NA	0.56	0.03	0.15
	Panel 5	Rail to Centre	NA	0.41	0.05	0.10
		Hwy to Centre	NA	0.40	0.03	0.13
	Panel 2	Vertical	NA	0.71	0.02	0.27
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.82	0.69
Back Transverse Sheave Girder	0.20	0.29
G1	0.23	0.76
G2/G3	0.20	0.78
G4	0.23	0.74
G6	0.18	0.70

Max D/C 0.85

7 - ULS V3								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.31	0.85	0.39	0.69	0.28	0.81	0.45	0.54
Panel 2	NA	0.38	NA	0.34	NA	0.29	0.05	0.17
Panel 3	NA	0.28	NA	0.25	NA	0.21	NA	0.09
Panel 4	NA	0.44	NA	0.50	NA	0.15	NA	0.10
Panel 5	NA	0.42	NA	0.50	NA	0.17	NA	0.13
Panel 6 (Top)	NA	0.46	NA	0.38	NA	0.21	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.17	0.09	0.27	0.13
		2	0.22	0.08	0.19	0.04
		3	0.24	0.09	0.19	0.02
		4	0.28	0.09	0.24	0.02
		5	0.17	0.09	0.13	0.06
Bracing	Panel 1	Front to Rear	0.41	0.84	0.42	0.80
		Rear to Front	0.27	0.57	0.33	0.62
	Panel 2	Front to Rear	0.28	0.57	0.25	0.52
		Rear to Front	0.25	0.47	0.24	0.45
	Panel 3	Front to Rear	0.28	0.54	0.26	0.50
		Rear to Front	0.28	0.48	0.25	0.45
	Panel 4	Front to Rear	0.20	0.49	0.19	0.47
		Rear to Front	0.16	0.39	0.15	0.37
	Panel 5	Front to Rear	0.06	0.31	0.06	0.32
		Rear to Front	0.04	0.27	0.04	0.25
	Panel 6	Front to Rear	NA	0.07	NA	0.07
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.44	0.52	0.30	0.36
		2	0.24	0.27	0.19	0.32
		3	0.33	NA	0.18	0.09
		4	0.16	0.28	0.17	0.25
		5	-	-	0.07	0.05
Bracing	Panel 2	Rail to Centre	0.23	0.68	0.14	0.29
		Hwy to Centre	0.21	0.71	0.13	0.29
	Panel 3	Rail to Centre	0.11	0.58	0.08	0.20
		Hwy to Centre	0.12	0.56	0.08	0.20
	Panel 4	Rail to Centre	0.03	0.60	0.06	0.18
		Hwy to Centre	0.01	0.62	0.05	0.17
	Panel 5	Rail to Centre	NA	0.45	0.06	0.12
		Hwy to Centre	NA	0.44	0.05	0.15
	Panel 2	Vertical	NA	0.74	0.03	0.31
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.83	0.70
Back Transverse Sheave Girder	0.20	0.29
G1	0.23	0.76
G2/G3	0.20	0.78
G4	0.23	0.76
G6	0.19	0.72

Max D/C 0.71

7 - ULS V4

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.13	0.00	0.13	0.00	0.24	0.00	0.23
Panel 2	NA	0.11	NA	0.11	NA	0.15	NA	0.16
Panel 3	NA	0.11	NA	0.11	NA	0.15	NA	0.15
Panel 4	NA	0.18	NA	0.18	NA	0.14	NA	0.13
Panel 5	NA	0.18	NA	0.18	NA	0.17	NA	0.16
Panel 6 (Top)	NA	0.19	NA	0.19	NA	0.23	0.01	0.25

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.00	NA	0.01	NA
		1	0.03	NA	0.08	NA
		2	0.11	0.01	0.10	0.00
		3	0.12	0.01	0.11	0.00
		4	0.14	0.02	0.12	NA
		5	0.09	0.11	0.05	0.09
Bracing	Panel 1	Front to Rear	NA	0.12	0.01	0.17
		Rear to Front	NA	0.10	NA	0.10
	Panel 2	Front to Rear	NA	0.09	NA	0.09
		Rear to Front	NA	0.09	NA	0.09
	Panel 3	Front to Rear	NA	0.08	NA	0.08
		Rear to Front	NA	0.10	0.00	0.09
	Panel 4	Front to Rear	NA	0.10	NA	0.10
		Rear to Front	NA	0.11	NA	0.10
	Panel 5	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.14	NA	0.13
	Panel 6	Front to Rear	0.01	NA	0.02	NA
		Rear to Front	NA	0.34	NA	0.26

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.03	0.01	0.03	0.01
		2	0.06	0.07	0.04	0.06
		3	0.11	NA	0.10	NA
		4	0.04	0.02	0.05	0.04
		5	-	-	0.05	NA
Bracing	Panel 2	Rail to Centre	NA	0.09	NA	0.07
		Hwy to Centre	NA	0.10	NA	0.07
	Panel 3	Rail to Centre	NA	0.09	NA	0.06
		Hwy to Centre	NA	0.09	NA	0.06
	Panel 4	Rail to Centre	NA	0.13	NA	0.07
		Hwy to Centre	NA	0.13	NA	0.06
	Panel 5	Rail to Centre	NA	0.11	NA	0.03
		Hwy to Centre	NA	0.11	NA	0.06
	Panel 2	Vertical	NA	0.25	NA	0.14
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.29	0.25
Back Transverse Sheave Girder	0.23	0.39
G1	0.13	0.11
G2/G3	0.39	0.52
G4	0.12	0.07
G6	0.16	0.71

Max D/C 0.77

7 - ULS 4 Lowered

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.10	0.49	0.18	0.42	0.18	0.59	0.25	0.51
Panel 2	NA	0.25	NA	0.22	NA	0.20	NA	0.18
Panel 3	NA	0.21	NA	0.17	NA	0.14	NA	0.11
Panel 4	NA	0.34	NA	0.32	NA	0.10	NA	0.10
Panel 5	NA	0.33	NA	0.30	NA	0.11	NA	0.10
Panel 6 (Top)	NA	0.35	NA	0.31	NA	0.12	0.01	0.13

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.14	0.07	0.18	0.06
		2	0.22	0.13	0.16	0.05
		3	0.24	0.14	0.16	0.04
		4	0.24	0.10	0.18	0.01
		5	0.13	0.15	0.10	0.13
Bracing	Panel 1	Front to Rear	0.42	0.77	0.35	0.66
		Rear to Front	0.26	0.51	0.30	0.53
	Panel 2	Front to Rear	0.28	0.52	0.22	0.45
		Rear to Front	0.23	0.41	0.19	0.35
	Panel 3	Front to Rear	0.25	0.45	0.21	0.41
		Rear to Front	0.22	0.39	0.19	0.33
	Panel 4	Front to Rear	0.19	0.42	0.17	0.40
		Rear to Front	0.17	0.35	0.15	0.31
	Panel 5	Front to Rear	0.13	0.36	0.12	0.37
		Rear to Front	0.09	0.29	0.09	0.28
	Panel 6	Front to Rear	0.04	0.02	0.05	0.02
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.33	0.39	0.31	0.38
		2	0.25	0.31	0.25	0.41
		3	0.28	NA	0.18	0.16
		4	0.21	0.23	0.24	0.38
		5	-	-	0.08	0.09
Bracing	Panel 2	Rail to Centre	0.12	0.47	0.14	0.27
		Hwy to Centre	0.12	0.47	0.14	0.26
	Panel 3	Rail to Centre	0.03	0.35	0.08	0.17
		Hwy to Centre	0.03	0.35	0.08	0.17
	Panel 4	Rail to Centre	NA	0.42	0.04	0.13
		Hwy to Centre	NA	0.42	0.04	0.12
	Panel 5	Rail to Centre	NA	0.34	0.03	0.06
		Hwy to Centre	NA	0.35	0.02	0.08
	Panel 2	Vertical	NA	0.60	0.03	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.64	0.55
Back Transverse Sheave Girder	0.13	0.21
G1	0.17	0.59
G2/G3	0.18	0.61
G4	0.18	0.57
G6	0.09	0.47

Max D/C 0.65

8 - ULS 1								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.22	0.00	0.21	0.00	0.21	0.00	0.20
Panel 2	NA	0.20	NA	0.20	NA	0.13	NA	0.13
Panel 3	NA	0.21	NA	0.21	NA	0.13	NA	0.12
Panel 4	NA	0.35	NA	0.35	NA	0.12	NA	0.11
Panel 5	NA	0.34	NA	0.34	NA	0.14	NA	0.13
Panel 6 (Top)	NA	0.34	NA	0.34	NA	0.16	0.01	0.19

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.04	NA	0.11	NA
		2	0.13	NA	0.12	NA
		3	0.14	NA	0.13	NA
		4	0.17	NA	0.15	NA
		5	0.11	0.06	0.08	0.04
Bracing	Panel 1	Front to Rear	NA	0.16	0.00	0.19
		Rear to Front	NA	0.12	NA	0.12
	Panel 2	Front to Rear	NA	0.12	NA	0.13
		Rear to Front	NA	0.12	NA	0.11
	Panel 3	Front to Rear	NA	0.11	NA	0.11
		Rear to Front	NA	0.12	NA	0.11
	Panel 4	Front to Rear	NA	0.14	NA	0.15
		Rear to Front	NA	0.14	NA	0.13
	Panel 5	Front to Rear	NA	0.15	NA	0.15
		Rear to Front	NA	0.16	NA	0.15
	Panel 6	Front to Rear	NA	0.02	NA	0.02
		Rear to Front	NA	0.30	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.04	0.01	0.02	0.01
		2	0.08	0.07	0.04	0.06
		3	0.22	NA	0.08	NA
		4	0.05	NA	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.16	NA	0.06
		Hwy to Centre	NA	0.16	NA	0.06
	Panel 3	Rail to Centre	NA	0.17	NA	0.05
		Hwy to Centre	NA	0.16	NA	0.05
	Panel 4	Rail to Centre	NA	0.23	NA	0.05
		Hwy to Centre	NA	0.24	NA	0.05
	Panel 5	Rail to Centre	NA	0.21	NA	0.02
		Hwy to Centre	NA	0.21	NA	0.04
	Panel 2	Vertical	NA	0.49	NA	0.09
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.65	0.55
Back Transverse Sheave Girder	0.18	0.27
G1	0.17	0.59
G2/G3	0.18	0.62
G4	0.18	0.58
G6	0.15	0.53

Max D/C 0.77

8 - ULS 4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.30	0.77	0.38	0.62	0.29	0.72	0.44	0.45
Panel 2	NA	0.33	NA	0.30	NA	0.24	0.07	0.12
Panel 3	NA	0.24	NA	0.21	NA	0.16	0.00	0.05
Panel 4	NA	0.37	NA	0.43	NA	0.11	NA	0.06
Panel 5	NA	0.35	NA	0.43	NA	0.12	0.01	0.09
Panel 6 (Top)	NA	0.38	NA	0.32	0.01	0.14	0.00	0.11

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.15	0.09	0.23	0.13
		2	0.20	0.09	0.17	0.06
		3	0.22	0.10	0.17	0.04
		4	0.25	0.10	0.21	0.04
		5	0.13	0.12	0.09	0.10
Bracing	Panel 1	Front to Rear	0.40	0.77	0.41	0.73
		Rear to Front	0.27	0.51	0.31	0.57
	Panel 2	Front to Rear	0.27	0.52	0.25	0.47
		Rear to Front	0.25	0.43	0.23	0.41
	Panel 3	Front to Rear	0.27	0.50	0.26	0.46
		Rear to Front	0.27	0.43	0.24	0.41
	Panel 4	Front to Rear	0.20	0.44	0.19	0.42
		Rear to Front	0.16	0.35	0.15	0.33
	Panel 5	Front to Rear	0.07	0.29	0.06	0.29
		Rear to Front	0.04	0.24	0.04	0.23
	Panel 6	Front to Rear	0.02	0.01	0.03	0.01
		Rear to Front	NA	0.29	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.41	0.48	0.28	0.34
		2	0.22	0.25	0.18	0.30
		3	0.28	NA	0.15	0.11
		4	0.15	0.27	0.16	0.24
		5	-	-	0.06	0.06
Bracing	Panel 2	Rail to Centre	0.23	0.63	0.14	0.25
		Hwy to Centre	0.21	0.65	0.13	0.26
	Panel 3	Rail to Centre	0.11	0.52	0.09	0.17
		Hwy to Centre	0.12	0.51	0.09	0.17
	Panel 4	Rail to Centre	0.05	0.54	0.06	0.15
		Hwy to Centre	0.03	0.56	0.06	0.15
	Panel 5	Rail to Centre	NA	0.39	0.07	0.10
		Hwy to Centre	NA	0.38	0.06	0.12
	Panel 2	Vertical	NA	0.63	0.04	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.68	0.58
Back Transverse Sheave Girder	0.12	0.20
G1	0.19	0.65
G2/G3	0.17	0.65
G4	0.19	0.63
G6	0.09	0.51

Max D/C 0.77

8 - ULS V1

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.26	0.00	0.25	0.00	0.23	0.00	0.21
Panel 2	NA	0.23	NA	0.23	NA	0.14	NA	0.14
Panel 3	NA	0.24	NA	0.24	NA	0.14	NA	0.14
Panel 4	NA	0.41	NA	0.41	NA	0.13	NA	0.12
Panel 5	NA	0.40	NA	0.40	NA	0.15	NA	0.14
Panel 6 (Top)	NA	0.40	NA	0.40	NA	0.18	0.01	0.20

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.01	NA	0.01	NA
		1	0.05	NA	0.13	NA
		2	0.14	NA	0.13	NA
		3	0.15	NA	0.14	NA
		4	0.18	NA	0.16	NA
		5	0.13	0.04	0.10	0.02
Bracing	Panel 1	Front to Rear	NA	0.17	NA	0.21
		Rear to Front	NA	0.14	NA	0.13
	Panel 2	Front to Rear	NA	0.13	NA	0.14
		Rear to Front	NA	0.13	NA	0.12
	Panel 3	Front to Rear	NA	0.12	NA	0.13
		Rear to Front	NA	0.13	NA	0.12
	Panel 4	Front to Rear	NA	0.16	NA	0.17
		Rear to Front	NA	0.16	NA	0.15
	Panel 5	Front to Rear	NA	0.17	NA	0.17
		Rear to Front	NA	0.17	NA	0.16
	Panel 6	Front to Rear	NA	0.04	NA	0.04
		Rear to Front	NA	0.31	NA	0.22

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.05	0.01	0.03	0.01
		2	0.09	0.08	0.04	0.06
		3	0.26	NA	0.09	NA
		4	0.05	NA	0.04	0.04
		5	-	-	0.04	0.01
Bracing	Panel 2	Rail to Centre	NA	0.18	NA	0.06
		Hwy to Centre	NA	0.19	NA	0.06
	Panel 3	Rail to Centre	NA	0.20	NA	0.05
		Hwy to Centre	NA	0.19	NA	0.05
	Panel 4	Rail to Centre	NA	0.27	NA	0.06
		Hwy to Centre	NA	0.27	NA	0.05
	Panel 5	Rail to Centre	NA	0.25	NA	0.02
		Hwy to Centre	NA	0.25	NA	0.05
	Panel 2	Vertical	NA	0.58	NA	0.11
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.77	0.66
Back Transverse Sheave Girder	0.19	0.29
G1	0.21	0.71
G2/G3	0.21	0.75
G4	0.21	0.69
G6	0.16	0.59

Max D/C 0.81

8 - ULS V2								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.20	0.74	0.26	0.60	0.20	0.68	0.34	0.46
Panel 2	NA	0.35	NA	0.32	NA	0.26	0.02	0.17
Panel 3	NA	0.27	NA	0.25	NA	0.19	NA	0.09
Panel 4	NA	0.43	NA	0.48	NA	0.15	NA	0.11
Panel 5	NA	0.42	NA	0.48	NA	0.16	NA	0.13
Panel 6 (Top)	NA	0.45	NA	0.38	NA	0.20	NA	0.17

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.00
		1	0.14	0.06	0.24	0.09
		2	0.21	0.05	0.18	0.02
		3	0.22	0.06	0.18	0.01
		4	0.26	0.06	0.22	NA
		5	0.16	0.08	0.12	0.05
Bracing	Panel 1	Front to Rear	0.32	0.71	0.34	0.68
		Rear to Front	0.20	0.48	0.25	0.52
	Panel 2	Front to Rear	0.22	0.48	0.20	0.44
		Rear to Front	0.20	0.40	0.18	0.39
	Panel 3	Front to Rear	0.22	0.46	0.21	0.43
		Rear to Front	0.22	0.41	0.20	0.38
	Panel 4	Front to Rear	0.16	0.42	0.15	0.41
		Rear to Front	0.12	0.34	0.11	0.32
	Panel 5	Front to Rear	0.04	0.28	0.04	0.29
		Rear to Front	0.02	0.25	0.03	0.23
	Panel 6	Front to Rear	NA	0.06	NA	0.06
		Rear to Front	NA	0.33	NA	0.24

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.36	0.41	0.24	0.29
		2	0.21	0.23	0.16	0.26
		3	0.32	NA	0.16	0.07
		4	0.14	0.22	0.15	0.20
		5	-	-	0.07	0.04
Bracing	Panel 2	Rail to Centre	0.16	0.58	0.10	0.24
		Hwy to Centre	0.14	0.61	0.09	0.24
	Panel 3	Rail to Centre	0.06	0.50	0.06	0.17
		Hwy to Centre	0.07	0.49	0.06	0.17
	Panel 4	Rail to Centre	NA	0.54	0.04	0.15
		Hwy to Centre	NA	0.55	0.03	0.15
	Panel 5	Rail to Centre	NA	0.41	0.05	0.10
		Hwy to Centre	NA	0.40	0.03	0.13
	Panel 2	Vertical	NA	0.71	0.02	0.27
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.81	0.69
Back Transverse Sheave Girder	0.20	0.29
G1	0.23	0.76
G2/G3	0.20	0.78
G4	0.23	0.74
G6	0.18	0.69

Max D/C 0.85

8 - ULS V3								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.31	0.85	0.39	0.69	0.28	0.81	0.45	0.54
Panel 2	NA	0.38	NA	0.34	NA	0.29	0.05	0.17
Panel 3	NA	0.28	NA	0.25	NA	0.21	NA	0.09
Panel 4	NA	0.44	NA	0.50	NA	0.15	NA	0.10
Panel 5	NA	0.42	NA	0.50	NA	0.17	NA	0.13
Panel 6 (Top)	NA	0.46	NA	0.38	NA	0.21	NA	0.16

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.17	0.09	0.27	0.13
		2	0.22	0.08	0.19	0.04
		3	0.24	0.09	0.19	0.02
		4	0.28	0.09	0.24	0.02
		5	0.17	0.09	0.13	0.06
Bracing	Panel 1	Front to Rear	0.41	0.84	0.42	0.80
		Rear to Front	0.27	0.57	0.33	0.62
	Panel 2	Front to Rear	0.28	0.57	0.25	0.52
		Rear to Front	0.26	0.47	0.24	0.45
	Panel 3	Front to Rear	0.28	0.54	0.26	0.50
		Rear to Front	0.28	0.48	0.25	0.45
	Panel 4	Front to Rear	0.20	0.49	0.19	0.47
		Rear to Front	0.16	0.39	0.15	0.37
	Panel 5	Front to Rear	0.06	0.31	0.06	0.32
		Rear to Front	0.04	0.27	0.04	0.25
	Panel 6	Front to Rear	NA	0.07	NA	0.07
		Rear to Front	NA	0.33	NA	0.25

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.44	0.52	0.30	0.36
		2	0.24	0.27	0.19	0.32
		3	0.33	NA	0.18	0.09
		4	0.16	0.28	0.17	0.25
		5	-	-	0.07	0.05
Bracing	Panel 2	Rail to Centre	0.23	0.68	0.14	0.29
		Hwy to Centre	0.21	0.71	0.13	0.29
	Panel 3	Rail to Centre	0.11	0.58	0.08	0.20
		Hwy to Centre	0.12	0.56	0.08	0.20
	Panel 4	Rail to Centre	0.03	0.60	0.06	0.18
		Hwy to Centre	0.01	0.62	0.05	0.17
	Panel 5	Rail to Centre	NA	0.45	0.06	0.12
		Hwy to Centre	NA	0.44	0.05	0.15
	Panel 2	Vertical	NA	0.74	0.03	0.31
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.82	0.69
Back Transverse Sheave Girder	0.20	0.29
G1	0.23	0.76
G2/G3	0.20	0.78
G4	0.23	0.76
G6	0.19	0.72

Max D/C 0.71

8 - ULS V4								
	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.00	0.13	0.00	0.13	0.00	0.24	0.00	0.23
Panel 2	NA	0.11	NA	0.11	NA	0.15	NA	0.16
Panel 3	NA	0.11	NA	0.11	NA	0.15	NA	0.15
Panel 4	NA	0.18	NA	0.18	NA	0.14	NA	0.13
Panel 5	NA	0.18	NA	0.17	NA	0.17	NA	0.16
Panel 6 (Top)	NA	0.19	NA	0.19	NA	0.23	0.01	0.25

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.00	NA	0.01	NA
		1	0.03	NA	0.08	NA
		2	0.11	0.01	0.10	0.00
		3	0.12	0.01	0.11	0.00
		4	0.14	0.02	0.12	NA
		5	0.09	0.11	0.05	0.09
Bracing	Panel 1	Front to Rear	NA	0.12	0.01	0.17
		Rear to Front	NA	0.10	NA	0.10
	Panel 2	Front to Rear	NA	0.09	NA	0.09
		Rear to Front	NA	0.09	NA	0.09
	Panel 3	Front to Rear	NA	0.08	NA	0.08
		Rear to Front	NA	0.09	0.00	0.09
	Panel 4	Front to Rear	NA	0.10	NA	0.10
		Rear to Front	NA	0.11	NA	0.10
	Panel 5	Front to Rear	NA	0.09	NA	0.10
		Rear to Front	NA	0.14	NA	0.13
	Panel 6	Front to Rear	0.01	NA	0.02	NA
		Rear to Front	NA	0.34	NA	0.26

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.03	0.01	0.03	0.01
		2	0.06	0.07	0.04	0.06
		3	0.11	NA	0.10	NA
		4	0.04	0.02	0.05	0.04
		5	-	-	0.05	NA
Bracing	Panel 2	Rail to Centre	NA	0.09	NA	0.07
		Hwy to Centre	NA	0.10	NA	0.07
	Panel 3	Rail to Centre	NA	0.09	NA	0.06
		Hwy to Centre	NA	0.09	NA	0.06
	Panel 4	Rail to Centre	NA	0.13	NA	0.07
		Hwy to Centre	NA	0.13	NA	0.06
	Panel 5	Rail to Centre	NA	0.11	NA	0.03
		Hwy to Centre	NA	0.11	NA	0.06
	Panel 2	Vertical	NA	0.25	NA	0.14
	Panel 4	Vertical	0.02	NA	0.02	NA

	Moment	Shear
Front Transverse Sheave Girder	0.29	0.25
Back Transverse Sheave Girder	0.23	0.39
G1	0.13	0.11
G2/G3	0.39	0.52
G4	0.12	0.06
G6	0.16	0.71

Max D/C 0.77

8 - ULS 4 Lowered

	Front Columns				Rear Columns			
	Rail		Hwy		Rail		Hwy	
	Tension	Compression	Tension	Compression	Tension	Compression	Tension	Compression
Panel 1 (Bottom)	0.10	0.49	0.18	0.42	0.18	0.59	0.25	0.51
Panel 2	NA	0.25	NA	0.22	NA	0.20	NA	0.18
Panel 3	NA	0.21	NA	0.17	NA	0.14	NA	0.11
Panel 4	NA	0.33	NA	0.31	NA	0.10	NA	0.10
Panel 5	NA	0.33	NA	0.30	NA	0.11	NA	0.10
Panel 6 (Top)	NA	0.35	NA	0.31	NA	0.12	0.01	0.13

			West Panel		East Panel	
			Tension	Compression	Tension	Compression
Horizontals		Jacking Girder	0.02	0.01	0.02	0.01
		1	0.14	0.07	0.18	0.06
		2	0.22	0.13	0.16	0.05
		3	0.24	0.14	0.16	0.04
		4	0.24	0.10	0.18	0.01
		5	0.13	0.16	0.10	0.13
Bracing	Panel 1	Front to Rear	0.42	0.77	0.35	0.66
		Rear to Front	0.26	0.50	0.30	0.53
	Panel 2	Front to Rear	0.28	0.51	0.22	0.45
		Rear to Front	0.23	0.41	0.19	0.35
	Panel 3	Front to Rear	0.25	0.45	0.21	0.41
		Rear to Front	0.22	0.38	0.19	0.33
	Panel 4	Front to Rear	0.19	0.42	0.17	0.40
		Rear to Front	0.17	0.35	0.15	0.31
	Panel 5	Front to Rear	0.13	0.36	0.12	0.37
		Rear to Front	0.09	0.29	0.09	0.28
	Panel 6	Front to Rear	0.04	0.02	0.05	0.02
		Rear to Front	NA	0.31	NA	0.23

			Front Panel		Rear Panel	
			Tension	Compression	Tension	Compression
Horizontals		1	0.33	0.39	0.31	0.38
		2	0.25	0.31	0.25	0.41
		3	0.28	NA	0.18	0.16
		4	0.21	0.23	0.24	0.38
		5	-	-	0.08	0.09
Bracing	Panel 2	Rail to Centre	0.12	0.47	0.14	0.27
		Hwy to Centre	0.12	0.47	0.14	0.26
	Panel 3	Rail to Centre	0.03	0.35	0.08	0.16
		Hwy to Centre	0.03	0.35	0.08	0.17
	Panel 4	Rail to Centre	NA	0.42	0.04	0.13
		Hwy to Centre	NA	0.42	0.04	0.12
	Panel 5	Rail to Centre	NA	0.34	0.03	0.06
		Hwy to Centre	NA	0.35	0.02	0.08
	Panel 2	Vertical	NA	0.60	0.03	0.25
	Panel 4	Vertical	0.02	NA	0.03	NA

	Moment	Shear
Front Transverse Sheave Girder	0.64	0.55
Back Transverse Sheave Girder	0.13	0.21
G1	0.17	0.58
G2/G3	0.18	0.61
G4	0.18	0.57
G6	0.09	0.47

TOWER SPAN

Sheave Floor Girder - End — Tension & Compression Member — Drawing Location (1959): ***E5, 50*** Sheave Floor Girder - Top

Material Properties: A-242-55 Steel — Reference

F_u =	480	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

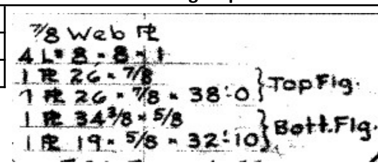
Member	**Top Angle**	**Bottom Angles**	**Centre Web**	**Top Plate**
Quantity	**2**	**2**	**1**	**1**
Dimensions (in)	8x8x1	8x8x1	180x1 5/8"	26x7/8

Ext. Web Perfortion Width	0	in
Rivet dia.	1	in

Member Dimensions

Length =	15900	mm
Width =	660	mm
Depth =	4607	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

	Angles Top	**Angles Bot.**			**Top Plate**	
Designation	8x8x1	8x8x1		Designation	26x7/8	
Qty =	2	2	mm	Qty =	1	
b =	203.2	203.2	mm	t =	22	mm
d =	203.2	203.2	mm	b =	660	mm
t =	25.4	25.4	mm	z Bar =	4596	mm
A =	9670	9670	mm^2	A =	14677	mm^2
z =	60.1	60.1	mm	RHM*	6	
y =	60.1	60.1	mm	RHM Area =	3387	mm^2
Z bar	4525	60.1	mm			
I_y =	36.9	36.9	$x10^6mm^4$			
I_z =	36.9	36.9	$x10^6mm^4$			
A_{angle} =	19340	19340	mm^2			
RHM*	4	4	mm			
RHM Area =	5161	5161	mm^2			

Web		
Designation =	180x1 5/8"	
Qty =	1	
w =	41.3	mm
h =	4584.7	mm
h_{eff} =	4584.7	mm
A =	189233.5	mm^2
A_{eff} =	189233.5	mm^2
z Bar =	2303.5	mm
RHM*	4	
RHM Area =	4193.5	mm^2

RHM* = Rivet Holes/Member

Section Calculations

Location	Angles Top	Angles Bot.	Web	Top Plate	
Designation	8x8x1	8x8x1	180x1 5/8"	26x7/8	
Qty=	2	2	1	1	
Iy =	73.8	73.8	331465.7	0.6	$x10^6mm^4$
Iz =	73.8	73.8	26.9	533.4	$x10^6mm^4$
A =	19340	19340	189233.5	14677.4	mm^2
dz =	2084.2	2380.3	136.9	2155.4	mm^2
dy =	80.7	80.7	0.0	0.0	mm
Iyy =	84086	109649	335013.4	68189.9	$x10^6mm^4$
Izz =	199.9	199.9	26.9	533.4	$x10^6mm^4$

Composite Member Properties

A_{gross} =	242591	mm^2
A_{RHM*}=	17903	mm2
A_{net} =	224688	mm^2
∑Iyy =	596938.6	$x10^6mm^4$
∑Izz =	960.0	$x10^6mm^4$
Zbar=	2440	mm
ybar=	330	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Geometry Comformance Checks

Width to Thickness Ratio								*[CSA S6-19 cl. 10.9.2]*
Flanges Class 3 Limit =			b/t<= 670/(SQRT(fy) =		35.8			*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =			h/w<= 670/(SQRT(fy) =		35.8			*[CSA S6-19 cl. 10.9.2.1]*
Webs	h =	4178.3	w =	41.3	h/w =	101.2	NG	
Class 4 web	h/w<=150							
Flange	b =	660.4	t =	22.2	b/t =	29.7	OK	

Moment Resistance *[CSA S6-19 cl.10.10.3.3]*

Yeilding Moment, M_y

Elastic Section Modulus, Sx	244608481	mm^3
Yield Moment, M_y	85613	kNm
0.67M_y	**57361**	**kNm**

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design *[CSA S6-19 cl.10.10.2.3]*

Overall Moment Resist., M_r **54493** **kNm** *[Stiffened plate girder with longitudinal stiffeners]* *[CSA S6-19 cl.10.10.3.3]*

Shear Resistance *[CSA S6-19 cl. 10.10.5.1]*

Spacing of Tranverse Stiffn, a	1810	mm
Web height, h	4585	mm
a/h	0.39	
k_v	38.27	
h/w	101	
502√kv/Fy	166.00	
621√kv/Fy	205.35	
F_{cr}	**201.95**	**MPa**
F_t	**0.00**	**MPa**
F_s	**201.95**	**MPa**
Area of Web, A_w	189233	mm^2
Shear Resistance, V_r	**36305**	**kN**

TOWER SPAN

Sheave Floor Girder - Middle Tension & Compression Member Drawing Location (1959)

E5, 50 Sheave Floor Girder - Top

Material Properties: A-242-55 Steel Reference

F_u =	480	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

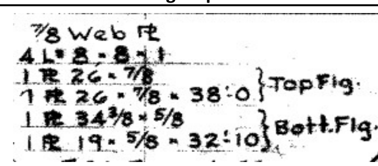
Member	**Top Angle**	**Bottom Angles**	**Centre Web**	**Top Plate**
Quantity	**2**	**2**	**1**	**2**
Dimensions (in)	8x8x1	8x8x1	180x7/8	26x7/8

Ext. Web Perfortion Width	0	in
Rivet dia.	1	in

Member Dimensions

Length =	15900	mm
Width =	660	mm
Depth =	4629	mm

Drawing Snipet



Member Cross-Section

Individual Member Properties

	Angle Top	Angle Bot.			Top Plate 1	Top Plate 2	
Designation	8x8x1	8x8x1		Designation	26x7/8	26x7/8	
Qty =	2	2	mm	Qty =	1	1	
b =	203.2	203.2	mm	t =	22	22	mm
d =	203.2	203.2	mm	b =	660	660	mm
t =	25.4	25.4	mm	z Bar =	4618	4596	mm
A =	9670	9670	mm^2	A =	14677	14677	mm^2
z =	60.1	60.1	mm	RHM*	6	6	
y =	60.1	60.1	mm	RHM Area =	3387	3387	mm^2
Z bar	4547	82.3	mm				
I_y =	36.9	36.9	$x10^6mm^4$				
I_z =	36.9	36.9	$x10^6mm^4$				
A_{angle} =	19340	19340	mm^2				
RHM*	4	4					
RHM Area =	5161	5161	mm^2				

	Web	
Designation =	180x7/8	
Qty =	1	
w =	22.2	mm
h =	4584.7	mm
h_{eff} =	4584.7	mm
A =	101895.0	mm^2
A_{eff} =	101895.0	mm^2
z Bar =	2314.6	mm
RHM*	4	
RHM Area =	2258.1	mm^2

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

Location	Angle Top	Angle Bot.	Web	Top Plate 1	Top Plate 2	
Designation	8x8x1	8x8x1	180x7/8	26x7/8	26x7/8	
Qty=	2	2	1	1	1	
Iy =	73.8	73.8	178481.5	0.6	0.6	$x10^6mm^4$
Iz =	73.8	73.8	4.2	533.4	533.4	$x10^6mm^4$
A =	19340	19340	101895.0	14677.4	14677.4	mm^2
dz =	1836.3	2628.2	396.0	1907.5	1885.2	mm^2
dy =	71.2	71.2	0.0	0.0	0.0	mm
Iyy =	65285	133668	194459.9	53403.3	52166.1	$x10^6mm^4$
Izz =	171.9	171.9	4.2	533.4	533.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	169930	mm^2
A_{RHM*}=	19355	mm^2
A_{net} =	150575	mm^2
∑Iyy =	498982.5	$x10^6mm^4$
∑Izz =	1414.8	$x10^6mm^4$
Zbar=	2711	mm
ybar=	330	mm

Geometry Comformance Checks

Width to Thickness Ratio								***[CSA S6-19 cl. 10.9.2]***
Flanges Class 3 Limit =			b/t<= 670/(SQRT(fy) =		35.8			***[CSA S6-19 cl. 10.9.2.1]***
Webs in Axial Compression; Class 3 Limit =			h/w<= 670/(SQRT(fy) =		35.8			***[CSA S6-19 cl. 10.9.2.1]***
Webs	h =	4178.3	w =	22.2	h/w =	188.0	NG	
Class 4 web	h/w<=150							
Flange	b =	660.4	t =	22.2	b/t =	29.7	OK	

Moment Resistance ***[CSA S6-19 cl.10.10.3.3]***

Yeilding Moment, M_y

Elastic Section Modulus, Sx	184087619	mm^3
Yield Moment, M_y	64431	kNm
$0.67M_y$	**43169**	**kNm**

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design ***[CSA S6-19 cl.10.10.2.3]***

Overall Moment Resist., M_r **41010 kNm** ***[Stiffened plate girder with longitudinal stiffeners]*** ***[CSA S6-19 cl.10.10.3.3]***

Shear Resistance ***[CSA S6-19 cl. 10.10.5.1]***

Spacing of Tranverse Stiffn, a	1810	mm
Web height, h	4585	mm
a/h	0.39	
k_v	38.27	
h/w	188	
502√kv/Fy	166.00	
621√kv/Fy	205.35	
F_{cr}	**178.53**	**MPa**
F_t	**18.97**	**MPa**
F_s	**197.50**	**MPa**
Area of Web, A_w	101895	mm^2
Shear Resistance, V_r	**19,118**	**kN**

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

A44R/B44L N. Tower (Rear Columns Panel 1)

	Drawing Location (1959)
E5	North Tower Elevations
44A	Column A44/B44
38	A38R/A38L/B38R/B38L
33A/B	A33R/A33L/B33R/B33L
29A/B	A29R/A29L/B29L/C29

Material Properties: A-7 Steel

			Reference
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

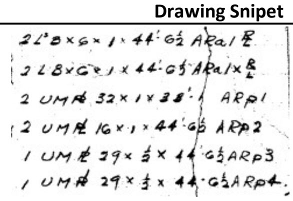
Member	Angle	Web	Flange	Internal Plates
Quantity	**4**	**2**	**2**	**2**
Dimensions (in)	8x6x1	32x1	29x1/2	16x1

Flange Perfortion Width	14	in
Rivet dia.	1	in

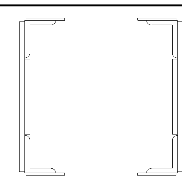
Member Dimensions

Length =	9804.4	mm
Width =	800	mm
Depth =	851	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

Web			Top & Bottom Plate		
Designation	32x1		Designation	29x1/2	
Qty =	2		Qty =	2	
w =	25.4	mm	t =	12.7	mm
h =	812.8	mm	b =	736.6	mm
A =	41290.24	mm^2	b_{eff} =	381	mm
y Bar =	406.4	mm	A =	18709.64	mm^2
z Bar =	0	mm	A_{eff} =	9677.4	mm^2
RHM*	7		y Bar =	0	mm
RHM Area =	9032.2	mm	z Bar =	419.1	mm
			RHM*	2	
			RHM Area =	1290.3	mm

Angle			Extra Plate		
Designation	8x6x1		Designation	16x1	
Qty =	4		Qty =	2	
b =	203.2	mm	w =	25.4	mm
d =	152.4	mm	h =	406.4	mm
t =	25.4	mm	A =	20645.12	mm^2
A =	8390	mm^2	y Bar =	203.2	mm
y =	67.4	mm	z Bar =	0	mm
x =	41.9	mm	RHM*	7	
I_y =	33.5	$x10^6mm^4$	RHM Area =	9032.2	mm
I_z =	16	$x10^6mm^4$			
A_{angle} =	33560	mm^2			
RHM*	3				
RHM Area =	7741.9	mm			

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN
JOB NO.	60637587
CALCULATION NO.	
ORIGINATOR BY	KG
DATE	30-Nov-20
CHECKED BY	RA
DATE	16-Dec-20

Section Calculations

	Angle	Web	T&B Plate	Extra Plate	
Designation	8x6x1	32x1	29x1/2	16x1	
Qty=	4	2	2	2	
Iy =	134.0	2273.2	0.1	284.1	$x10^6mm^4$
Iz =	64	2.2	29.3	1.1	$x10^6mm^4$
A =	33560.0	41290.2	9677.4	20645.1	mm^2
dz =	345.4	0	412.8	0	mm^2
dy =	332.75	387.4	279.4	362.0	mm
Iyy =	4136.6	2273.2	1648.8	284.1	$x10^6mm^4$
Izz =	3779.8	6197.4	784.7	2705.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	105173	mm^2
A_{RHM*}=	27096.7	mm^2
A_{net} =	78076	mm^2
∑Iyy =	8342.7	$x10^6mm^4$
∑Izz =	13467.8	$x10^6mm^4$
ybar=	400	mm
zbar=	425	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	9804.4	mm	kyLy/ry =	34.8	< 120 therefore OK
Lz =	9804.4	mm	kzLz/rz =	27.4	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Flanges of box girder sections: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	406.4	w =	25.4	h/w =	16.0	OK
Flange	b =	431.8	t =	12.7	b/t =	34.0	OK
Flange Perforated	b =	76.2	t =	12.7	b/t =	6.0	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	105173	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	281.6	mm	
rz =	357.8	mm	
λy =	0.376		
λz =	0.296		
Cry =	20662	kN	
Crz =	21170	kN	
Cr Min =	20662	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	22980	kN
b)	Tr =	$\phi_u A_n F_u$	25609	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	21768	kN
		Tr Min =	21768	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

A44R/B44L N. Tower (Rear Columns Panel 2-5)

Drawing Location (1959)

E5	North Tower Elevations
44A	Column A44/B44
38	A38R/A38L/B38R/B38L
33A/B	A33R/A33L/B33R/B33L
29A/B	A29R/A29L/B29L/C29

Material Properties: A-7 Steel

			Reference
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

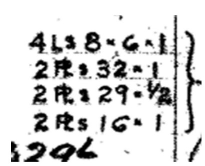
Member	**Angle**	**Web**	**Flange**	**Internal Plates**
Quantity	**4**	**2**	**2**	**2**
Dimensions (in)	8x6x1	32x1	29x1/2	16x1

Flange Perfortion Width	14	in
Rivet dia.	1	in

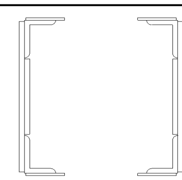
Member Dimensions

Length =	8769.35	mm
Width =	800	mm
Depth =	851	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

Web		
Designation	32x1	
Qty =	2	
w =	25.4	mm
h =	812.8	mm
A =	41290.24	mm^2
y Bar =	406.4	mm
z Bar =	0	mm
RHM*	7	
RHM Area =	9032.2	mm

Top & Bottom Plate		
Designation	29x1/2	
Qty =	2	
t =	12.7	mm
b =	736.6	mm
b_{eff} =	381	mm
A =	18709.64	mm^2
A_{eff} =	9677.4	mm^2
y Bar =	0	mm
z Bar =	419.1	mm
RHM*	2	
RHM Area =	1290.3	mm

Angle		
Designation	8x6x1	
Qty =	4	
b =	203.2	mm
d =	152.4	mm
t =	25.4	mm
A =	8390	mm^2
y =	67.4	mm
x =	41.9	mm
I_y =	33.5	$x10^6mm^4$
I_z =	16	$x10^6mm^4$
A_{angle} =	33560	mm^2
RHM*	3	
RHM Area =	7741.9	mm

Extra Plate		
Designation	16x1	
Qty =	2	
w =	25.4	mm
h =	406.4	mm
A =	20645.12	mm^2
y Bar =	203.2	mm
z Bar =	0	mm
RHM*	7	
RHM Area =	9032.2	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	T&B Plate	Extra Plate	
Designation	8x6x1	32x1	29x1/2	16x1	
Qty=	4	2	2	2	
Iy =	134.0	2273.2	0.1	284.1	$x10^6mm^4$
Iz =	64	2.2	29.3	1.1	$x10^6mm^4$
A =	33560.0	41290.2	9677.4	20645.1	mm^2
dz =	345.4	0	412.8	0	mm^2
dy =	332.75	387.4	279.4	362.0	mm
Iyy =	4136.6	2273.2	1648.8	284.1	$x10^6mm^4$
Izz =	3779.8	6197.4	784.7	2705.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	105173	mm^2
A_{RHM*}=	27096.7	mm^2
A_{net} =	78076	mm^2
∑Iyy =	8342.7	$x10^6mm^4$
∑Izz =	13467.8	$x10^6mm^4$
ybar=	400	mm
zbar=	425	mm

Geometry Comformance Checks

Slenderness Ratio ***[CSA S6-19 cl. 10.9.1.3]***

Member Classification = Primary Compression Member

Ly =	8769.35	mm	kyLy/ry =	31.1	< 120 therefore OK
Lz =	8769.35	mm	kzLz/rz =	24.5	< 120 therefore OK

Width to Thickness Ratio ***[CSA S6-19 cl. 10.9.2]***

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	406.4	w =	25.4	h/w =	16.0	OK
Flange	b =	431.8	t =	12.7	b/t =	34.0	OK
Flange Perforated	b =	76.2	t =	12.7	b/t =	6.0	OK

Axial Compression Resistance ***[CSA S6-19 cl. 10.9.3.1]***

Φs =	0.9	*[CSA S6-19 cl. 10.5.7]*
A =	105173	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	281.6	mm
rz =	357.8	mm
λy =	0.336	
λz =	0.265	
Cry =	20936	kN
Crz =	21322	kN
Cr Min =	20936	kN

Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	22980	kN
b)	Tr =	$\phi_u A_n F_u$	25609	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	21768	kN
		Tr Min =	21768	kN

AECOM Imagine it. Delivered.				
JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

TOWER SPAN

A44R/B44L N. Tower (Rear Columns Panel 6)

	Drawing Location (1959)
E5	North Tower Elevations
44A	Column A44/B44
38	A38R/A38L/B38R/B38L
33A/B	A33R/A33L/B33R/B33L
29A/B	A29R/A29L/B29L/C29

Material Properties: A-7 Steel

			Reference
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

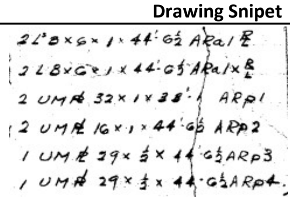
Member	Angle	Web	Flange	Internal Plates
Quantity	**4**	**2**	**2**	**2**
Dimensions (in)	8x6x1	32x1	29x1/2	16x1

Flange Perfortion Width	14	in
Rivet dia.	1	in

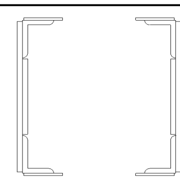
Member Dimensions

Length =	4679.95	mm
Width =	800	mm
Depth =	851	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

Web			Top & Bottom Plate		
Designation	32x1		Designation	29x1/2	
Qty =	2		Qty =	2	
w =	25.4	mm	t =	12.7	mm
h =	812.8	mm	b =	736.6	mm
A =	41290.24	mm^2	b_{eff} =	381	mm
y Bar =	406.4	mm	A =	18709.64	mm^2
z Bar =	0	mm	A_{eff} =	9677.4	mm^2
RHM*	7		y Bar =	0	mm
RHM Area =	9032.2	mm	z Bar =	419.1	mm
			RHM*	2	
			RHM Area =	1290.3	mm

Angle			Extra Plate		
Designation	8x6x1		Designation	16x1	
Qty =	4		Qty =	2	
b =	203.2	mm	w =	25.4	mm
d =	152.4	mm	h =	406.4	mm
t =	25.4	mm	A =	20645.12	mm^2
A =	8390	mm^2	y Bar =	203.2	mm
y =	67.4	mm	z Bar =	0	mm
x =	41.9	mm	RHM*	7	
I_y =	33.5	$x10^6mm^4$	RHM Area =	9032.2	mm
I_z =	16	$x10^6mm^4$			
A_{angle} =	33560	mm^2			
RHM*	3				
RHM Area =	7741.9	mm			

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	T&B Plate	Extra Plate	
Designation	8x6x1	32x1	29x1/2	16x1	
Qty=	4	2	2	2	
Iy =	134.0	2273.2	0.1	284.1	$x10^6mm^4$
Iz =	64	2.2	29.3	1.1	$x10^6mm^4$
A =	33560.0	41290.2	9677.4	20645.1	mm^2
dz =	345.4	0	412.8	0	mm^2
dy =	332.75	387.4	279.4	362.0	mm
Iyy =	4136.6	2273.2	1648.8	284.1	$x10^6mm^4$
Izz =	3779.8	6197.4	784.7	2705.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	105173	mm^2
A_{RHM*}=	27097	mm^2
A_{net} =	78076	mm^2
∑Iyy =	8342.7	$x10^6mm^4$
∑Izz =	13467.8	$x10^6mm^4$
ybar=	400	mm
zbar=	425	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	4679.95	mm	kyLy/ry =	16.6	< 120 therefore OK
Lz =	4679.95	mm	kzLz/rz =	13.1	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	406.4	w =	25.4	h/w =	16.0	OK
Flange	b =	431.8	t =	12.7	b/t =	34.0	OK
Flange Perforated	b =	76.2	t =	12.7	b/t =	6.0	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9	*[CSA S6-19 cl. 10.5.7]*
A =	105173	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	281.6	mm
rz =	357.8	mm
λy =	0.179	
λz =	0.141	
Cry =	21610	kN
Crz =	21686	kN
Cr Min =	21610	kN

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	22980	kN
b)	Tr =	$\phi_u A_n F_u$	25609	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	21768	kN
		Tr Min =	21768	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

A20R/B20L N. Tower (North Front - Panel 1)

	Drawing Location (1959)
E5	North Tower Elevations
20A/B	A20R/B20L/C20L/D20

Material Properties: A-242-55 Steel Reference

F_u =	480	MPa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	350	MPa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	MPa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

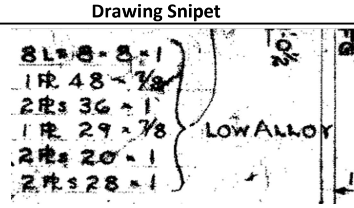
Member	**Angle**	**Web**	**Flange Top**	**Flange Bottom**	**Extra internal plate**	**Extra external**
Quantity	**8**	**2**	**1**	**1**	**2**	**2**
Dimensions (in)	8x8x1	36x1	48x7/8	29x7/8	28x1	20x1
Flange Perfortion Width			10	12	in	

Rivet dia. # ###### in

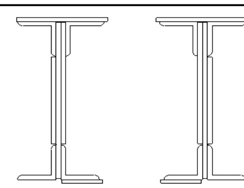
Member Dimensions

Length =	9804.4	mm
Width =	1219	mm
Depth =	972	mm

Drawing Snipet



Member Cross-Section



JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Individual Member Properties

Web			Top Plate			Top Angles (outer)		
Designation	36x1		Designation	48x7/8		Designation	8x8x1	
Qty =	2		Qty =	1		Qty =	2	
w =	25.4	mm	t =	22.225	mm	b =	203.2	mm
h =	914.4	mm	b =	1219.2	mm	d =	203.2	mm
A =	46451.52	mm^2	b_{eff} =	965.2	mm	t =	25.4	mm
y Bar =	387.35	mm	A =	27096.72	mm^2	A =	9680	mm^2
z Bar =	485.78	mm	A_{eff} =	21451.57	mm^2	y =	460.15	mm
RHM*	8		y Bar =	368.3	mm	z =	889.23	mm
RHM Area =	10322.6	mm	z Bar =	960.4	mm	I_y =	36.9	$x10^6mm^4$
			RHM*	8		I_z =	36.9	$x10^6mm^4$
			RHM Area =	4516.1	mm	A_{angle} =	19360	mm^2
						RHM*	4	
						RHM Area =	5161.3	mm

Bottom Angles (inner)			Bottom Plate			Extra Internal Plates		
Designation	8x8x1		Designation	29x7/8		Designation	28x1	
Qty =	2		Qty =	1		Qty =	2	
b =	203.2	mm	t =	22.225	mm	w =	25.4	mm
d =	203.2	mm	b =	736.6	mm	h =	711.2	mm
t =	25.4	mm	b_{eff} =	431.8	mm	A =	36128.96	mm^2
A =	9680	mm^2	A =	16370.935	mm^2	y Bar =	361.95	mm
y =	314.55	mm	A_{eff} =	9596.755	mm^2	z Bar =	587.38	mm
z =	82.33	mm	y Bar =	260.35	mm	RHM*	4	
I_y =	36.9	$x10^6mm^4$	z Bar =	11.11	mm	RHM Area =	5161.3	mm
I_z =	36.9	$x10^6mm^4$	RHM*	4				
A_{angle} =	19360	mm^2	RHM Area =	2258.1	mm			
RHM*	4							
RHM Area =	5161.3	mm						

Extra External Plates			Top Angles (inner)			Bottom Angles (outer)		
Designation	20x1		Designation	8x8x1		Designation	8x8x1	
Qty =	2		Qty =	2		Qty =	2	
w =	25.4	mm	b =	203.2	mm	b =	203.2	mm
h =	508	mm	d =	203.2	mm	d =	203.2	mm
A =	25806.4	mm^2	t =	25.4	mm	t =	25.4	mm
y Bar =	412.75	mm	A =	9680	mm^2	A =	9680	mm^2
z Bar =	485.78	mm	y =	289.15	mm	y =	460.15	mm
RHM*	2		z =	889.23	mm	z =	82.33	mm
RHM Area =	2580.6	mm	I_y =	36.9	$x10^6mm^4$	I_y =	36.9	$x10^6mm^4$
			I_z =	36.9	$x10^6mm^4$	I_z =	36.9	$x10^6mm^4$
			A_{angle} =	19360	mm^2	A_{angle} =	19360	mm^2
			RHM*	4		RHM*	4	
			RHM Area =	5161.3	mm	RHM Area =	5161.3	mm

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle (top/Out)	Angle (bottom) In	Web	Top Plate	Bottom Plate	Extra Int. Pl	Extra Ext Pl	
Designation	8x8x1	8x8x1	36x1	48x7/8	29x7/8	28x1	20x1	
Qty=	2	2	2	1	1	2	2	
Iy =	73.8	73.8	3236.6	0.9	0.4	1522.9	555.0	$x10^6mm^4$
Iz =	73.8	73.8	2.5	416.3	37.3	1.9	1.4	$x10^6mm^4$
A =	19360.0	19360.0	46451.5	21451.6	9596.8	36129.0	25806.4	mm^2
dz =	360.6	446.3	43	431.8	517.53	58.7	42.9	mm
dy =	460.2	314.6	387	368.3	260.35	362.0	412.8	mm
Iyy =	2590.9	3930.4	3322.0	4000.4	2570.8	1647.5	602.4	$x10^6mm^4$
Izz =	4173.0	1989.3	6972.1	3326.1	687.8	4735.1	4397.8	$x10^6mm^4$

	Angle top/In	Bot Angle Out	
Designation	8x8x1	8x8x1	
Qty=	2	2	
Iy =	73.8	73.8	$x10^6mm^4$
Iz =	73.8	73.8	$x10^6mm^4$
A =	19360	19360	mm^2
dz =	360.6	446.3	mm
dy =	289.2	460.2	mm
Iyy =	2590.9	3930.4	$x10^6mm^4$
Izz =	1692.4	4173.0	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	216875.0	mm^2
A_{RHM*}=	45483.8	mm^2
A_{net} =	171391	mm^2
∑Iyy =	25185.6	$x10^6mm^4$
∑Izz =	32146.8	$x10^6mm^4$
ybar=	610	mm
zbar=	529	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	9804.4	mm	kyLy/ry =	28.8	< 120 therefore OK
Lz =	9804.4	mm	kzLz/rz =	25.5	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	508	w =	25.4	h/w =	20.0	OK
Flange	b =	406.4	t =	22.2	b/t =	18.3	OK
Flange Perforated	b =	558.8	t =	22.2	b/t =	25.1	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	216875	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	340.8	mm	
rz =	385.0	mm	
λy =	0.383		
λz =	0.339		
Cry =	64662	kN	
Crz =	65634	kN	
Cr Min =	64662	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	72111	kN
b)	Tr =	$\phi_u A_n F_u$	65814	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	55942	kN
		Tr Min =	55942	kN

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

A34R/B34L N. Tower (North - Panel 2-3)

Drawing Location (1959)	
E5	North Tower Elevations
34A/B	Column A34R/L and B34R/L

Material Properties: A-242-55 Steel Reference

F_u =	480	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Angle**	**Web**	**Flange Top**	**Flange Bottom**	**Extra internal plate**	**Extra external**
Quantity	**4**	**2**	**1**	**1**	**2**	**2**
mensions (in)	8x8x1	36x1	48x7/8	29x7/8	28x1	20x1

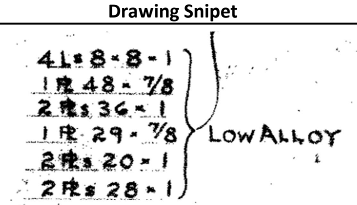
Flange Perfortion Width 0 12 in

Rivet dia. 1 in

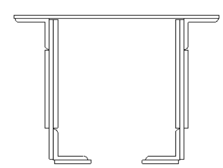
Member Dimensions

Length =	8769.35	mm
Width =	1219	mm
Depth =	972	mm

Drawing Snipet



Member Cross-Section



JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Individual Member Properties

Web		
Designation	36x1	
Qty =	2	
w =	25.4	mm
h =	914.4	mm
A =	46451.52	mm^2
y Bar =	387	mm
z Bar =	486	mm
RHM*	6	
RHM Area =	7742	mm

Top Plate		
Designation	48x7/8	
Qty =	1	
t =	22.23	mm
b =	1219.2	mm
b_{eff} =	1219.2	mm
A =	27097	mm^2
A_{eff} =	27097	mm^2
y Bar =	0	mm
z Bar =	960	mm
RHM*	8	
RHM Area =	4516.1	mm

Top Angles		
Designation	8x8x1	
Qty =	2	
b =	203.2	mm
d =	203.2	mm
t =	25.4	mm
A =	9680	mm^2
y =	460	mm
z =	889	mm
I_y =	36.9	$x10^6 mm^4$
I_z =	36.9	$x10^6 mm^4$
A_{angle} =	19360	mm^2
RHM*	4	
RHM Area =	5161.3	mm

Bottom Angles		
Designation	8x8x1	
Qty =	2	
b =	203.2	mm
d =	203.2	mm
t =	25.4	mm
A =	9680	mm^2
y =	314.55	mm
z =	82.33	mm
I_y =	36.9	$x10^6 mm^4$
I_z =	36.9	$x10^6 mm^4$
A_{angle} =	19360	mm^2
RHM*	4	
RHM Area =	5161.3	mm

Bottom Plate		
Designation	29x7/8	
Qty =	1	
t =	22.225	mm
b =	736.6	mm
b_{eff} =	431.8	mm
A =	16370.935	mm^2
A_{eff} =	9596.755	mm^2
y Bar =	260.35	mm
z Bar =	11.11	mm
RHM*	4	
RHM Area =	2258.1	mm

Extra Internal Plates		
Designation	28x1	
Qty =	2	
w =	25.4	mm
h =	711.2	mm
A =	36128.96	mm^2
y Bar =	361.95	mm
z Bar =	587.38	mm
RHM*	4	
RHM Area =	5161.3	mm

Extra External Plates		
Designation	20x1	
Qty =	2	
w =	25.4	mm
h =	508	mm
A =	25806.4	mm^2
y Bar =	412.75	mm
z Bar =	485.78	mm
RHM*	2	
RHM Area =	2580.6	mm

RHM* = Rivet Holes/Member

	JOB TITLE	BCLB DECK PRE-DESIGN		
AECOM Imagine it. Delivered.	JOB NO.	60637587	CALCULATION NO.	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle (top)	Angle (bottom)	Web	Top Plate	Bottom Plate	Extra Int. Pl	Extra Ext Pl	
Designation	8x8x1	8x8x1	36x1	48x7/8	29x7/8	28x1	20x1	
Qty=	2	2	2	1	1	2	2	
Iy =	73.8	73.8	3236.6	1.1	0.4	1522.9	555.0	$x10^6mm^4$
Iz =	73.8	73.8	2.5	3356.5	37.3	1.9	1.4	$x10^6mm^4$
A =	19360.0	19360.0	46451.5	27096.7	9596.8	36129.0	25806.4	mm^2
dz =	338.3	468.6	65	409.5	539.83	36.4	65.2	mm
dy =	460.2	314.6	387	0.0	260.35	362.0	412.8	mm
Iyy =	2289.3	4325.2	3433.9	4544.9	2797.0	1570.8	664.6	$x10^6mm^4$
Izz =	4173.0	1989.3	6972.1	3356.5	687.8	4735.1	4397.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	183800.0	mm^2
A_{RHM*}=	24838.7	mm^2
A_{net} =	158961	mm^2
∑Iyy =	19625.7	$x10^6mm^4$
∑Izz =	26311.7	$x10^6mm^4$
ybar=	610	mm
zbar=	551	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	8769.35	mm	kyLy/ry =	26.8	< 120 therefore OK
Lz =	8769.35	mm	kzLz/rz =	23.2	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	508	w =	25.4	h/w =	20.0	OK
Flange	b =	711.2	t =	22.2	b/t =	32.0	OK
Flange Perforated	b =	25.4	t =	22.2	b/t =	1.1	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	183800	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	326.8	mm	
rz =	378.4	mm	
λy =	0.357		
λz =	0.309		
Cry =	55300	kN	
Crz =	56113	kN	
Cr Min =	55300	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	61114	kN
b)	Tr =	$\phi_u A_n F_u$	61041	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	51885	kN
		Tr Min =	51885	kN

TOWER SPAN

D39RL & A39R|L N. Tower (North Front 456)

	Drawing Location (1959)
E5	North Tower Elevations
39A	Column A39R/L and B39R/L
39B	Column D39R/L

Material Properties: A-242-55 Steel Reference

F_u =	480	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	Angle	Web	Flange Top	Flange Bottom
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	8x8x1	36x1	48x7/8	29x7/8

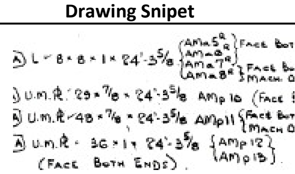
Flange Perfortion Width 0 12 in

Rivet dia. 1 in

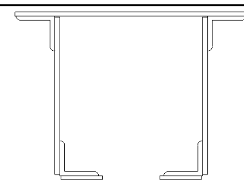
Member Dimensions

Length =	8769.35	mm
Width =	1219	mm
Depth =	972	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

Web		
Designation	36x1	
Qty =	2	
w =	25.4	mm
h =	914.4	mm
A =	46451.52	mm^2
y Bar =	387.35	mm
z Bar =	485.78	mm
RHM*	6	
RHM Area =	7741.9	mm

Top Plate		
Designation	48x7/8	
Qty =	1	
t =	22.225	mm
b =	1219.2	mm
b_{eff} =	1219.2	mm
A =	27096.72	mm^2
A_{eff} =	27096.72	mm^2
y Bar =	304.8	mm
z Bar =	960.44	mm
RHM*	5	
RHM Area =	2822.6	mm

Top Angles		
Designation	8x8x1	
Qty =	2	
b =	203.2	mm
d =	203.2	mm
t =	25.4	mm
A =	9680	mm^2
y =	460.15	mm
z =	889.23	mm
I_y =	36.9	$x10^6mm^4$
I_z =	36.9	$x10^6mm^4$
A_{angle} =	19360	mm^2
RHM*	4	
RHM Area =	5161.3	mm

Bottom Angles		
Designation	8x8x1	
Qty =	2	
b =	203.2	mm
d =	203.2	mm
t =	25.4	mm
A =	9680	mm^2
y =	314.55	mm
z =	82.33	mm
I_y =	36.9	$x10^6mm^4$
I_z =	36.9	$x10^6mm^4$
A_{angle} =	19360	mm^2
RHM*	4	
RHM Area =	5161.3	mm

Bottom Plate		
Designation	29x7/8	
Qty =	1	
t =	22.225	mm
b =	736.6	mm
b_{eff} =	431.8	mm
A =	16370.935	mm^2
A_{eff} =	9596.755	mm^2
y Bar =	260.35	mm
z Bar =	11.11	mm
RHM*	4	
RHM Area =	2258.1	mm

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle (top)	Angle (bottom)	Web	Top Plate	Bottom Plate	
Designation	8x8x1	8x8x1	36x1	48x7/8	29x7/8	
Qty=	2	2	2	1	1	
Iy =	73.8	73.8	3236.6	1.1	0.4	$x10^6mm^4$
Iz =	73.8	73.8	2.5	839.1	37.3	$x10^6mm^4$
A =	19360.0	19360.0	46451.5	27096.7	9596.8	mm^2
dz =	335.3	471.6	68	406.5	542.82	mm
dy =	460.2	314.6	387	304.8	260.35	mm
Iyy =	2250.2	4379.8	3452.4	4478.6	2828.2	$x10^6mm^4$
Izz =	4173.0	1989.3	6972.1	3356.5	687.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	121865.0	mm^2
A_{RHM*}=	15403.2	mm^2
A_{net} =	106462	mm^2
∑Iyy =	17389.3	$x10^6mm^4$
∑Izz =	17178.7	$x10^6mm^4$
ybar=	610	mm
zbar=	554	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	8769.35	mm	kyLy/ry =	23.2	< 120 therefore OK
Lz =	8769.35	mm	kzLz/rz =	23.4	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	508	w =	25.4	h/w =	20.0	OK
Flange	b =	762.0	t =	22.2	b/t =	34.3	OK
Flange Perforated	b =	25.4	t =	22.2	b/t =	1.1	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9	*[CSA S6-19 cl. 10.5.7]*
A =	121865	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	377.7	mm
rz =	375.5	mm
λy =	0.309	
λz =	0.311	
Cry =	37200	kN
Crz =	37181	kN
Cr Min =	37181	kN

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	40520	kN
b)	Tr =	$\phi_u A_n F_u$	40881	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	34749	kN
		Tr Min =	34749	kN

TOWER SPAN

C39R/L N. Tower (North Panel 6)

Drawing Location (1959)	
E5	North Tower Elevations
39C	Column C39R/L

Material Properties: A-242-55 Steel Reference

F_u =	480	MPa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	350	MPa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	MPa	*[CSA S6-19 cl. 10.4.2]*

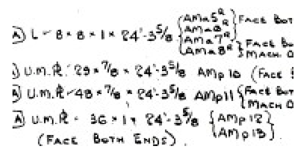
Built up Section Components

Member	Angle	Web	Flange Top	Flange Bottom	
Quantity	**4**	**2**	**1**	**1**	
Dimensions (in)	8x8x1	36x1	48x7/8	29x7/8	
Flange Perfortion Width			0	12	in
Rivet dia.	1	in			

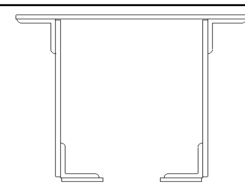
Member Dimensions

Length =	2730.5	mm
Width =	1219	mm
Depth =	972	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

Web		
Designation	36x1	
Qty =	2	
w =	25.4	mm
h =	914.4	mm
A =	46451.52	mm^2
y Bar =	387.35	mm
z Bar =	485.78	mm
RHM*	6	
RHM Area =	7741.9	mm

Top Plate		
Designation	48x7/8	
Qty =	1	
t =	22.225	mm
b =	1219.2	mm
b_{eff} =	1219.2	mm
A =	27096.72	mm^2
A_{eff} =	27096.72	mm^2
y Bar =	304.8	mm
z Bar =	960.44	mm
RHM*	5	
RHM Area =	2822.6	mm

Top Angles		
Designation	8x8x1	
Qty =	2	
b =	203.2	mm
d =	203.2	mm
t =	25.4	mm
A =	9680	mm^2
y =	460.15	mm
z =	889.23	mm
I_y =	36.9	$x10^6mm^4$
I_z =	36.9	$x10^6mm^4$
A_{angle} =	19360	mm^2
RHM*	4	
RHM Area =	5161.3	mm

Bottom Angles		
Designation	8x8x1	
Qty =	2	
b =	203.2	mm
d =	203.2	mm
t =	25.4	mm
A =	9680	mm^2
y =	314.55	mm
z =	82.33	mm
I_y =	36.9	$x10^6mm^4$
I_z =	36.9	$x10^6mm^4$
A_{angle} =	19360	mm^2
RHM*	4	
RHM Area =	5161.3	mm

Bottom Plate		
Designation	29x7/8	
Qty =	1	
t =	22.225	mm
b =	736.6	mm
b_{eff} =	431.8	mm
A =	16370.935	mm^2
A_{eff} =	9596.755	mm^2
y Bar =	260.35	mm
z Bar =	11.11	mm
RHM*	4	
RHM Area =	2258.1	mm

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.			
JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle (top)	Angle (bottom)	Web	Top Plate	Bottom Plate	
Designation	8x8x1	8x8x1	36x1	48x7/8	29x7/8	
Qty=	2	2	2	1	1	
Iy =	73.8	73.8	3236.6	1.1	0.4	$x10^6mm^4$
Iz =	73.8	73.8	2.5	839.1	37.3	$x10^6mm^4$
A =	19360.0	19360.0	46451.5	27096.7	9596.8	mm^2
dz =	335.3	471.6	68	406.5	542.82	mm
dy =	460.2	314.6	387	304.8	260.35	mm
Iyy =	2250.2	4379.8	3452.4	4478.6	2828.2	$x10^6mm^4$
Izz =	4173.0	1989.3	6972.1	3356.5	687.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	121865.0	mm^2
A_{RHM*}=	15403.2	mm^2
A_{net} =	106462	mm^2
∑Iyy =	17389.3	$x10^6mm^4$
∑Izz =	17178.7	$x10^6mm^4$
ybar=	610	mm
zbar=	554	mm

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	2730.5	mm	kyLy/ry =	7.2	< 120 therefore OK
Lz =	2730.5	mm	kzLz/rz =	7.3	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	508	w =	25.4	h/w =	20.0	OK
Flange	b =	762.0	t =	22.2	b/t =	34.3	OK
Flange Perforated	b =	25.4	t =	22.2	b/t =	1.1	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs = 0.9 *[CSA S6-19 cl. 10.5.7]*

A =	121865	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	377.7	mm
rz =	375.5	mm
λy =	0.096	
λz =	0.097	
Cry =	38334	kN
Crz =	38333	kN
Cr Min =	38333	kN

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	40520	kN
b)	Tr =	$\phi_u A_n F_u$	40881	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	34749	kN
		Tr Min =	34749	kN

AECOM Imagine it. Delivered.				
	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

Jacking Girder — Tension & Compression Member — Drawing Location (1959) Jacking Girder

Material Properties: A-242-55 Steel — Reference — ***E7, 15*** A15

F_u =	480	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	350	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Angles**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	8x6x1	71x3/4	30x3/4	30x3/4

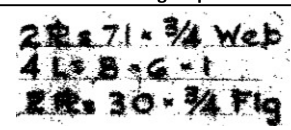
Ext. Web Perfortion Width 15 in

Rivet dia. 1 in

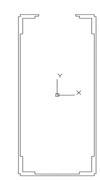
Member Dimensions

Length =	9690	mm
Width =	800	mm
Depth =	1851	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

	Top Angles	Bottom Angles			**Top Plate**	**Bottom Plate**	
Designation	8x6x1	8x6x1		Designation	30x3/4	30x3/4	
Qty =	2	2	mm	Qty =	1	1	
b =	152	152	mm	t =	19.05	19.05	mm
d =	203	203	mm	b =	762	762	mm
t =	25.4	25.4	mm^2	b_{eff} =	381	762	mm
A =	8390	8390	mm	z Bar =	1841.501	9.525	mm
z =	67.4	67.4	mm	A =	14516.10	14516.10	mm^2
y =	41.9	41.9	mm	A_{eff}=	7258.05	14516.10	mm^2
Z bar	1760	91.21	mm	RHM*	2	2	
I_y =	33.5	33.5	$x10^6 mm^4$	RHM Area =	967.7	967.7	mm^2
I_z =	16	16	$x10^6 mm^4$				
A_{angle} =	16780	16780	mm^2				
RHM*	3	3	mm				
RHM Area =	3871	3871	mm^2				

Web		
Designation =	71x3/4	
Qty =	2	
w =	19.05	mm
h =	1803.4	mm
A =	68709.54	mm^2
z Bar =	926	mm
RHM*	4	
RHM Area =	3871.0	mm^2

RHM* = Rivet Holes/Member

Section Calculations

	Top Angles	Bottom Angles	Web	Top Plate	Bot Plate	
Designation	8x6x1	8x6x1	71x3/4	30x3/4	30x3/4	
Qty=	2	2	2	1	1	
Iy =	67.0	67.0	18621.7	0.2	0.4	$x10^6mm^4$
Iz =	32	32	2.1	21.9	702.4	$x10^6mm^4$
A =	16780	16780	68709.5	7258.1	14516.1	mm^2
dz =	887.9	780.7	53.6	969.6	862.4	mm^2
dy =	339	339	390.5	285.8	0.0	mm
Iyy =	13295.6	10294.4	18819.1	6823.5	10796.3	$x10^6mm^4$
Izz =	1961.5	1961.5	10481.0	614.6	702.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	124044	mm^2
A_{RHM*}=	13548	mm2
A_{net} =	110495	mm^2
∑Iyy =	60028.9	$x10^6mm^4$
∑Izz =	15721.0	$x10^6mm^4$
ybar=	400	mm
Zbar=	872	mm

Geometry Comformance Checks

**member designed for jacking of towers, service loading inconsequential*

Slenderness Ratio ***[CSA S6-19 cl. 10.9.1.3]***

Member Classification = Primary Compression Member

Ly =	9690.1	mm	kyLy/ry =	13.1	< 120 therefore OK
Lz =	9690.1	mm	kzLz/rz =	25.7	< 120 therefore OK

Width to Thickness Ratio ***[CSA S6-19 cl. 10.9.2]***

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	35.8	***[CSA S6-19 cl. 10.9.2.1]***
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	35.8	***[CSA S6-19 cl. 10.9.2.1]***
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	44.9	***[CSA S6-19 cl. 10.9.2.1]***

Webs	h =	1397.4	w =	19.1	h/w =	73.4	NG
Flange	b =	458.0	t =	19.1	b/t =	24.0	OK
Flange Perforated	b =	77.0	t =	19.1	b/t =	4.0	OK

Axial Compression Resistance ***[CSA S6-19 cl. 10.9.3.1]***

Φs =	0.9		***[CSA S6-19 cl. 10.5.7]***
A =	110495	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	737.1	mm	
rz =	377.2	mm	
λy =	0.175		
λz =	0.342		
Cry =	34565	kN	
Crz =	33409	kN	
Cr Min =	33409	kN	

Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95	***[CSA S6-19 cl. 10.5.7]***
Tension	Φu =	0.8	***[CSA S6-19 cl. 10.5.7]***

a)	Tr =	$\phi_s A_g F_y$	41245	kN
b)	Tr =	$\phi_u A_n F_u$	42430	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	36066	kN
		Tr Min =	36066	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
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TOWER SPAN

Sides Hor Strut 1 — Tension & Compression Member — Drawing Location (1959)

Side Horizontal Struts

Material Properties: A-7 Steel — Reference — ***E5 & 57*** B57 — ***E5 & 75*** A75

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

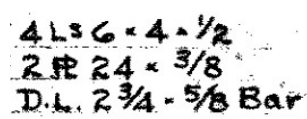
Built up Section Components

Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	6x4x1/2	24x3/8
Flange Perfortion Width	0	in
Rivet dia.	1	in

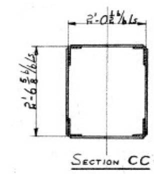
Member Dimensions

Length =	9754	mm
Width =	796	mm
Depth =	622	mm

Drawing Snipet

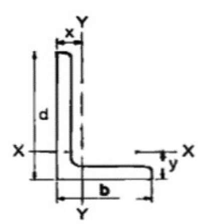


Member Cross-Section



Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	6x4x1/2	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	152	mm
A =	11612.88	mm^2	t =	12.7	mm
z Bar =	311.15	mm	A =	3060	mm^2
y Bar =	4.7625	mm	z =	25.2	mm
RHM*	6		y =	50.2	mm
RHM Area =	2903.2	mm	I_y =	2.64	$x10^6 mm^4$
			I_z =	7.2	$x10^6 mm^4$
			A_{angle} =	12240	mm^2
			RHM*	2	
			RHM Area =	2580.6	mm



RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

Section Calculations

	Angle	Web	
Designation	6x4x1/2	24x3/8	
Qty=	4	2	
I_y =	10.6	359.6	$x10^6mm^4$
I_z =	28.8	0.1	$x10^6mm^4$
A =	12240.0	11612.9	mm^2
dy =	338.5	393.43	mm^2
dz =	286	0.0	mm
Iyy =	1011.4	359.6	$x10^6mm^4$
Izz =	1431.0	1797.6	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	23853	mm^2
A_{RHM*}=	5484	mm2
A_{net} =	18369	mm^2
∑Iyy =	1371.0	$x10^6mm^4$
∑Izz =	3228.5	$x10^6mm^4$
ybar=	398	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	9754	mm	kyLy/ry =	35.7	< 120 therefore OK
Lz =	9753.6	mm	kzLz/rz =	23.3	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange angle leg	b =	152.0	t =	12.7	b/t =	12.0	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	18369	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	273.2	mm	
rz =	419.2	mm	
λy =	0.385		
λz =	0.251		
Cry =	3596	kN	
Crz =	3734	kN	
Cr Min =	3596	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	5212	kN
b)	Tr =	$\phi_u A_n F_u$	6025	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5121	kN
		Tr Min =	5121	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

Sides Hor Strut 2,3,4,5 — Tension & Compression Member — Drawing Location (1959)

E5, E7, 54 C54, AC54, AD54, D54

E5, E7, 81 A81, B81

Material Properties: A-7 Steel

			Reference
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

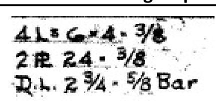
Member	Angle	Web
Quantity	**4**	**2**
Dimensions (in)	6x4x3/8	24x3/8

Flange Perfortion Width	0	in
Rivet dia.	1	in

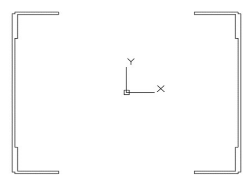
Member Dimensions

Length =	9754	mm
Width =	797	mm
Depth =	622	mm

Drawing Snipet

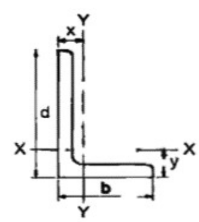


Member Cross-Section



Individual Member Properties

Web			Angle		
Designation	24x3/8		Designation	6x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	152	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	2330	mm^2
y Bar =	4.76	mm	z =	24.1	mm
RHM*	2		y =	49.1	mm
RHM Area =	967.7	mm	I_y =	5.58	$x10^6mm^4$
			I_z =	2.06	$x10^6mm^4$
			A_{angle} =	9320	mm^2
			RHM*	2	
			RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	Web	
Designation	6x4x3/8	24x3/8	
Qty=	4	2	
I_y =	22.3	359.6	$x10^6mm^4$
I_z =	8.24	0.1	$x10^6mm^4$
A =	9320.0	11612.9	mm^2
dy =	339.8	394	mm^2
dz =	287	0.0	mm
Iyy =	790.3	359.6	$x10^6mm^4$
Izz =	1084.6	1800.1	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	20933	mm^2
A_{RHM*}=	2904	mm2
A_{net} =	18029	mm^2
∑Iyy =	1149.9	$x10^6mm^4$
∑Izz =	2884.7	$x10^6mm^4$
ybar=	398	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	9753.6	mm	kyLy/ry =	38.6	< 120 therefore OK
Lz =	9753.6	mm	kzLz/rz =	24.4	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	142.5	t =	9.5	b/t =	14.9	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	18029	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	252.5	mm	
rz =	400.0	mm	
λy =	0.417		
λz =	0.263		
Cry =	3486	kN	
Crz =	3656	kN	
Cr Min =	3486	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4574	kN
b)	Tr =	$\phi_u A_n F_u$	5913	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5026	kN
		Tr Min =	4574	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

South EW + N E Side Bracing 1

Drawing Location (1959)
Side Diagonals
Bottom Sections

Material Properties: A-7 Steel Reference

F_u =	410	MPa	*[CISC 6-7, 11TH Edition, 2016]*	***E5 & 68***	A68,B68,C68 & D68
F_y =	230	MPa	*[CISC 6-7, 11TH Edition, 2016]*		
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*		
E =	200000	MPa	*[CSA S6-19 cl. 10.4.2]*		

Built up Section Components

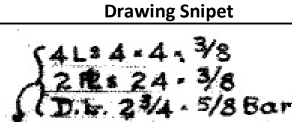
Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	4x4x3/8	24x3/8

Flange Perfortion Width	0	in
Rivet dia.	1	in

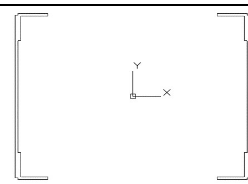
Member Dimensions

Length =	6915	mm
Width =	797	mm
Depth =	622	mm

Drawing Snipet

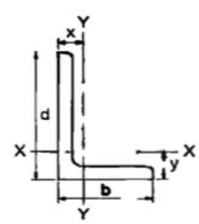


Member Cross-Section



Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	4x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	102	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	1850	mm^2
y Bar =	4.8	mm	z =	29	mm
RHM*	2		y =	29	mm
RHM Area =	967.7	mm	I_y =	1.84	$x10^6mm^4$
			I_z =	1.84	$x10^6mm^4$
			A_{angle} =	7400	mm^2
			RHM*	2	
			RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	
Designation	4x4x3/8	24x3/8	
Qty=	4	2	
I_y =	7.4	359.6	$x10^6 mm^4$
I_z =	7.36	0.1	$x10^6 mm^4$
A =	7400.0	11612.9	mm^2
dy =	359.9	394	mm^2
dz =	282	0.0	mm
Iyy =	596.5	359.6	$x10^6 mm^4$
Izz =	966.1	1800.1	$x10^6 mm^4$

Composite Member Properties		
A_{gross} =	19013	mm^2
A_{RHM*}=	2904	mm2
A_{net} =	16109	mm^2
∑Iyy =	956.1	$x10^6 mm^4$
∑Izz =	2766.2	$x10^6 mm^4$
ybar=	398	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	6915.15	mm	kyLy/ry =	28.4	< 120 therefore OK
Lz =	6915.15	mm	kzLz/rz =	16.7	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy)) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy)) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	102.0	t =	9.5	b/t =	10.7	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	16109	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	243.6	mm	
rz =	414.4	mm	
λy =	0.306		
λz =	0.180		
Cry =	3234	kN	
Crz =	3310	kN	
Cr Min =	3234	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4154	kN
b)	Tr =	$\phi_u A_n F_u$	5284	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4491	kN
		Tr Min =	4154	kN

TOWER SPAN

NS Bracing 6

Drawing Location (1959)

Material Properties: A-7 Steel

			Reference		
					Side Diagonals
					Bottom Sections
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***	***E5 & 79***	A79,B79 & C79
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***		Top Sections
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***	***E5 & B94***	B94
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***	***E5 & D81***	D81

Built up Section Components

Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	4x4x1/2	24x3/8

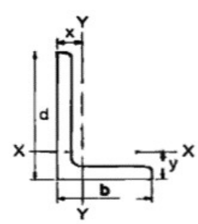
Flange Perfortion Width	0	in
Rivet dia.	1	in

Member Dimensions | **Drawing Snipet** | **Member Cross-Section**

Length =	6915	mm
Width =	797	mm
Depth =	622	mm

Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	4x4x1/2	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	102	mm
A =	11612.88	mm^2	t =	12.7	mm
z Bar =	311.15	mm	A =	2420	mm^2
y Bar =	4.76	mm	z =	30.2	mm
RHM*	2		y =	30.2	mm
RHM Area =	967.7	mm	I_y =	2.34	$x10^6mm^4$
			I_z =	2.34	$x10^6mm^4$
			A_{angle} =	9680	mm^2
			RHM*	2	
			RHM Area =	2580.6	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	Web	
Designation	4x4x1/2	24x3/8	
Qty=	4	2	
I_y =	9.36	359.6	$x10^6mm^4$
I_z =	9.36	0.1	$x10^6mm^4$
A =	9680.0	11612.9	mm^2
dy =	358.7	394	mm^2
dz =	281	0.0	mm
Iyy =	773.4	359.6	$x10^6mm^4$
Izz =	1255.1	1800.1	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	21293	mm^2
A_{RHM*}=	3548	mm2
A_{net} =	17745	mm^2
∑Iyy =	1133.1	$x10^6mm^4$
∑Izz =	3055.2	$x10^6mm^4$
ybar=	398	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	6915	mm	kyLy/ry =	27.4	< 120 therefore OK
Lz =	6915	mm	kzLz/rz =	16.7	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 200/(SQRT(fy) =	13.2	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	102.0	t =	12.7	b/t =	8.0	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	17745	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	252.7	mm	
rz =	414.9	mm	
λy =	0.295		
λz =	0.180		
Cry =	3572	kN	
Crz =	3646	kN	
Cr Min =	3572	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4653	kN
b)	Tr =	$\phi_u A_n F_u$	5820	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4947	kN
		Tr Min =	4653	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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ORIGINATOR BY	KG	DATE	30-Nov-20
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TOWER SPAN

Side Diagonals Panels 2,3,4,5

Drawing Location (1959)

E5 & 45 Side Diagonals (A45, B45 & C45)

E5 & 54 (A54)

Material Properties: A-7 Steel Reference

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	4x4x3/8	24x3/8

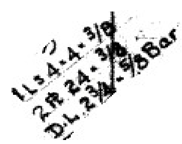
Flange Perfortion Width 0 in

Rivet dia. 1 in

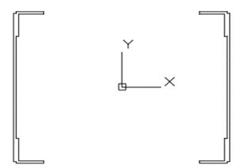
Member Dimensions

Length =	6560	mm
Width =	797	mm
Depth =	622	mm

Drawing Snipet

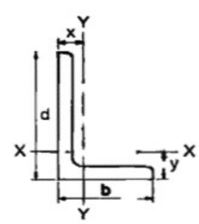


Member Cross-Section



Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	4x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	102	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	1850	mm^2
y Bar =	4.76	mm	z =	29	mm
RHM*	2		y =	29	mm
RHM Area =	967.7	mm	I_y =	1.84	$x10^6 mm^4$
			I_z =	1.84	$x10^6 mm^4$
			A_{angle} =	7400	mm^2
			RHM*	2	
			RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN	
	JOB NO.	60637587	CALCULATION NO.
	ORIGINATOR BY	KG	DATE 30-Nov-20
	CHECKED BY	RA	DATE 16-Dec-20

Section Calculations

	Angle	Web	
Designation	4x4x3/8	24x3/8	
Qty=	4	2	
I_y =	7.4	359.6	$x10^6mm^4$
I_z =	7.36	0.1	$x10^6mm^4$
A =	7400.0	11612.9	mm^2
dy =	359.9	394	mm^2
dz =	282	0.0	mm
Iyy =	596.5	359.6	$x10^6mm^4$
Izz =	966.1	1800.1	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	19013	mm^2
A_{RHM*}=	2904	mm^2
A_{net} =	16109	mm^2
∑Iyy =	956.1	$x10^6mm^4$
∑Izz =	2766.2	$x10^6mm^4$
ybar=	398	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	6559.55	mm	kyLy/ry =	26.9	< 120 therefore OK
Lz =	6559.55	mm	kzLz/rz =	15.8	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	102.0	t =	9.5	b/t =	10.7	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	16109	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	243.6	mm	
rz =	414.4	mm	
λy =	0.291		
λz =	0.171		
Cry =	3247	kN	
Crz =	3313	kN	
Cr Min =	3247	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4154	kN
b)	Tr =	$\phi_u A_n F_u$	5284	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4491	kN
		Tr Min =	4154	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

LIFT SPAN

Front Hor Strut 1 Tension & Compression Member Drawing Location (1959)

Portal Strut

Material Properties: A-7 Steel Reference ***E7, 61*** A61

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

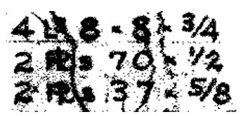
Member	**Angles**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	8x8x3/4	70x1/2	37x5/8	37x5/8

Ext. Web Perfortion Width	14	in
Rivet dia.	1	in

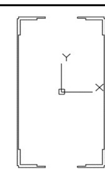
Member Dimensions

Length =	15900	mm
Width =	968	mm
Depth =	1822	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

	Top Angles	Bottom Angles	
Designation	8x8x3/4	8x8x3/4	
Qty =	2	2	mm
b =	203	203	mm
d =	203	203	mm
t =	19.0	19.0	mm^2
A =	7360	7360	mm
z =	57.8	57.8	mm
y =	57.8	57.8	mm
Z bar	1749	73.675	mm
I_y =	28.9	28.9	$x10^6mm^4$
I_z =	28.9	28.9	$x10^6mm^4$
A_{angle} =	14720	14720	mm^2
RHM*	4	4	mm
RHM Area =	3861	3861	mm^2

	Top Plate	Bottom Plate	
Designation	37x5/8	37x5/8	
Qty =	1	1	
t =	15.88	15.88	mm
b =	939.8	939.8	mm
b_{eff}=	584.2	584.2	
z Bar =	1814.51	7.94	mm
A =	14919.33	14919.33	mm^2
A_{eff}=	9274.18	9274.18	mm^2
RHM*	4	4	
RHM Area =	1612.9	1612.9	mm^2

Web		
Location	**Exterior**	
Designation =	70x1/2	
Qty =	2	
w =	12.7	mm
h =	1778	mm
A =	45161.2	mm^2
z Bar =	911	mm
RHM*	4	
RHM Area =	2580.6	mm^2

RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Top Angles	Bottom Angles	Web	Top Plate	Bot Plate	
Designation	8x8x3/4	8x8x3/4	70x1/2	37x5/8	37x5/8	
Qty=	2	2	2	1	1	
Iy =	57.80	57.80	11897.3	0.3	0.3	$x10^6mm^4$
Iz =	57.8	57.8	0.6	274.5	274.5	$x10^6mm^4$
A =	14720	14720	45161.2	9274.2	9274.2	mm^2
dz =	837.6	837.6	0.0	903.3	903.3	mm^2
dy =	414	414	477.8	323.9	323.9	mm
Iyy =	10383.7	10383.7	11897.3	7567.4	7567.4	$x10^6mm^4$
Izz =	2577.0	2577.0	10312.3	1247.2	1247.2	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	93150	mm^2
A_{RHM*}=	13528	mm2
A_{net} =	79622	mm^2
∑Iyy =	47799.5	$x10^6mm^4$
∑Izz =	17960.6	$x10^6mm^4$
ybar=	484	mm
Zbar=	911	mm

Geometry Comformance Checks

Slenderness Ratio ***[CSA S6-19 cl. 10.9.1.3]***

Member Classification = Primary Compression Member

Ly =	15900.4	mm	kyLy/ry =	20.5	< 120 therefore OK
Lz =	15900.4	mm	kzLz/rz =	33.5	< 120 therefore OK

Width to Thickness Ratio ***[CSA S6-19 cl. 10.9.2]***

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2	***[CSA S6-19 cl. 10.9.2.1]***
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	***[CSA S6-19 cl. 10.9.2.1]***
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4	***[CSA S6-19 cl. 10.9.2.1]***

Webs	h =	1372	w =	12.7	h/w =	108.0	NG
Flange	b =	533.8	t =	15.9	b/t =	33.6	OK
Flange Perforated	b =	178.2	t =	15.9	b/t =	11.2	OK

Axial Compression Resistance ***[CSA S6-19 cl. 10.9.3.1]***

Φs =	0.9		***[CSA S6-19 cl. 10.5.7]***
A =	79622	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	774.8	mm	
rz =	474.9	mm	
λy =	0.222		
λz =	0.361		
Cry =	16268	kN	
Crz =	15721	kN	
Cr Min =	15721	kN	

Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95	***[CSA S6-19 cl. 10.5.7]***
Tension	Φu =	0.8	***[CSA S6-19 cl. 10.5.7]***

a)	Tr =	$\phi_s A_g F_y$	20353	kN
b)	Tr =	$\phi_u A_n F_u$	26116	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	22198	kN
		Tr Min =	20353	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

Front Hor Strut 2 — Tension & Compression Member — Drawing Location (1959)

Side Horizontal Struts

Material Properties: A-7 Steel — Reference — ***E5 & 47*** D47

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

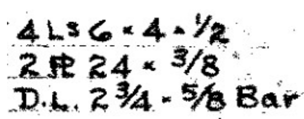
Built up Section Components

Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	6x4x1/2	24x3/8
Flange Perfortion Width	0	in
Rivet dia.	1	in

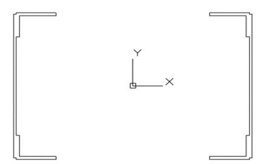
Member Dimensions

Length =	7950	mm
Width =	908	mm
Depth =	622	mm

Drawing Snipet



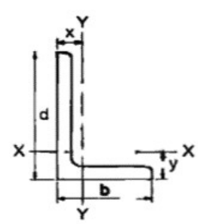
Member Cross-Section



Individual Member Properties

Web		
Designation	24x3/8	
Qty =	2	
w =	9.525	mm
h =	609.6	mm
A =	11612.88	mm^2
z Bar =	311.15	mm
y Bar =	4.76	mm
RHM*	2	
RHM Area =	967.7	mm

Angle		
Designation	6x4x1/2	
Qty =	4	
b =	102	mm
d =	152	mm
t =	12.7	mm
A =	3060	mm^2
z =	25.2	mm
y =	50.2	mm
I_y =	7.2	$x10^6 mm^4$
I_z =	2.64	$x10^6 mm^4$
A_{angle} =	12240	mm^2
RHM*	2	
RHM Area =	2580.6	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	Web	
Designation	6x4x1/2	24x3/8	
Qty=	4	2	
I_y =	28.8	359.6	$x10^6mm^4$
I_z =	10.56	0.1	$x10^6mm^4$
A =	12240.0	11612.9	mm^2
dy =	394.3	449	mm^2
dz =	286	0.0	mm
Iyy =	1029.6	359.6	$x10^6mm^4$
Izz =	1913.5	2344.0	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	23853	mm^2
A_{RHM*}=	3548	mm2
A_{net} =	20305	mm^2
∑Iyy =	1389.3	$x10^6mm^4$
∑Izz =	4257.5	$x10^6mm^4$
ybar=	454	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	7950	mm	kyLy/ry =	30.4	< 120 therefore OK
Lz =	7950.2	mm	kzLz/rz =	17.4	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	152.0	t =	12.7	b/t =	12.0	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	20305	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	261.6	mm	
rz =	457.9	mm	
λy =	0.328		
λz =	0.187		
Cry =	4051	kN	
Crz =	4168	kN	
Cr Min =	4051	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	5212	kN
b)	Tr =	$\phi_u A_n F_u$	6660	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5661	kN
		Tr Min =	5212	kN

AECOM Imagine it. Delivered.				
	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

Front Hor Strut 3 Tension & Compression Member Drawing Location (1959)

E5, E7, 54 B54

Material Properties: A-7 Steel Reference

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

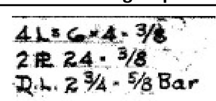
Built up Section Components

Member	**Angle**	**Web**	
Quantity	**4**	**2**	
Dimensions (in)	6x4x3/8	24x3/8	
Flange Perfortion Width		0	in
Rivet dia.		1	in

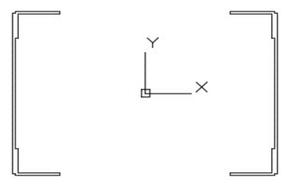
Member Dimensions

Length =	15900	mm
Width =	908	mm
Depth =	622	mm

Drawing Snipet

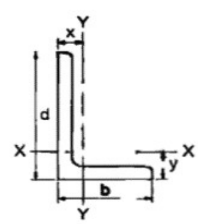


Member Cross-Section



Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	6x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	152	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	2330	mm^2
y Bar =	4.76	mm	z =	24.1	mm
RHM*	2		y =	49.1	mm
RHM Area =	967.7	mm	I_y =	5.58	$x10^6 mm^4$
			I_z =	2.06	$x10^6 mm^4$
			A_{angle} =	9320	mm^2
			RHM*	2	
			RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	
Designation	6x4x3/8	24x3/8	
Qty=	4	2	
I_y =	22.3	359.6	$x10^6mm^4$
I_z =	8.24	0.1	$x10^6mm^4$
A =	9320.0	11612.9	mm^2
dy =	395.4	449	mm^2
dz =	287	0.0	mm
Iyy =	790.3	359.6	$x10^6mm^4$
Izz =	1465.3	2344.0	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	20933	mm^2
A_{RHM*}=	2904	mm2
A_{net} =	18029	mm^2
∑Iyy =	1149.9	$x10^6mm^4$
∑Izz =	3809.3	$x10^6mm^4$
ybar=	454	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	15900	mm	kyLy/ry =	63.0	< 120 therefore OK
Lz =	15900.4	mm	kzLz/rz =	34.6	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	142.5	t =	9.5	b/t =	14.9	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	18029	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	252.5	mm	
rz =	459.7	mm	
λy =	0.680		
λz =	0.373		
Cry =	2975	kN	
Crz =	3545	kN	
Cr Min =	2975	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4574	kN
b)	Tr =	$\phi_u A_n F_u$	5913	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5026	kN
		Tr Min =	4574	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

Front Hor Strut 4 Tension & Compression Member Drawing Location (1959)

E5, E7, 47 C47

Material Properties: A-7 Steel Reference

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

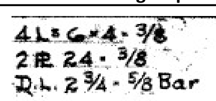
Built up Section Components

Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	6x4x3/8	24x3/8
Flange Perfortion Width	0	in
Rivet dia.	1	in

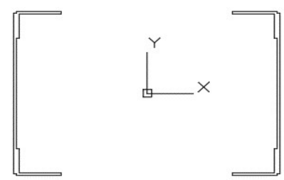
Member Dimensions

Length =	7950	mm
Width =	908	mm
Depth =	622	mm

Drawing Snipet

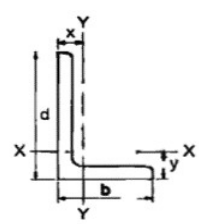


Member Cross-Section



Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	6x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	152	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	2330	mm^2
y Bar =	4.76	mm	z =	24.1	mm
RHM*	2		y =	49.1	mm
RHM Area =	967.7	mm	I_y =	5.58	$x10^6mm^4$
			I_z =	2.06	$x10^6mm^4$
			A_{angle} =	9320	mm^2
			RHM*	2	
			RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	Web	
Designation	6x4x3/8	24x3/8	
Qty=	4	2	
I_y =	22.3	359.6	$x10^6mm^4$
I_z =	8.24	0.1	$x10^6mm^4$
A =	9320.0	11612.9	mm^2
dy =	395.4	449	mm^2
dz =	287	0.0	mm
Iyy =	790.3	359.6	$x10^6mm^4$
Izz =	1465.3	2344.0	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	20933	mm^2
A_{RHM*}=	2904	mm2
A_{net} =	18029	mm^2
∑Iyy =	1149.9	$x10^6mm^4$
∑Izz =	3809.3	$x10^6mm^4$
ybar=	454	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	7950	mm	kyLy/ry =	31.5	< 120 therefore OK
Lz =	7950.2	mm	kzLz/rz =	17.3	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	142.5	t =	9.5	b/t =	14.9	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	18029	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	252.5	mm	
rz =	459.7	mm	
λy =	0.340		
λz =	0.187		
Cry =	3585	kN	
Crz =	3701	kN	
Cr Min =	3585	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4574	kN
b)	Tr =	$\phi_u A_n F_u$	5913	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5026	kN
		Tr Min =	4574	kN

TOWER SPAN

Front Diagonals Panel 2,3

Tension & Compression Member

Drawing Location (1959)

E5 & 43 Front Diagonals - Lower Section (A43 & B43)

Material Properties: A-7 Steel

			Reference
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

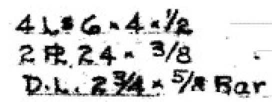
Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	6x4x1/2	24x3/8

Flange Perfortion Width	0	in
Rivet dia.	1	in

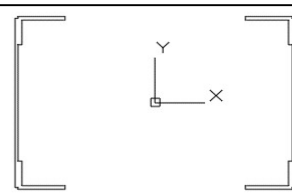
Member Dimensions

Length =	11836	mm
Width =	908	mm
Depth =	622	mm

Drawing Snipet

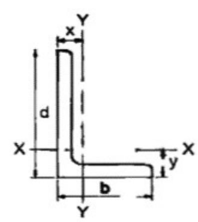


Member Cross-Section



Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	6x4x1/2	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	152	mm
A =	11612.88	mm^2	t =	12.7	mm
z Bar =	311.15	mm	A =	3060	mm^2
y Bar =	4.76	mm	z =	25.2	mm
RHM*	2		y =	50.2	mm
RHM Area =	967.7	mm	I_y =	7.2	$x10^6 mm^4$
			I_z =	2.64	$x10^6 mm^4$
			A_{angle} =	12240	mm^2
			RHM*	2	
			RHM Area =	2580.6	mm



RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	Web	
Designation	6x4x1/2	24x3/8	
Qty=	4	2	
I_y =	28.8	359.6	$x10^6mm^4$
I_z =	10.56	0.1	$x10^6mm^4$
A =	12240.0	11612.9	mm^2
dy =	394.3	449	mm^2
dz =	286	0.0	mm
Iyy =	1029.6	359.6	$x10^6mm^4$
Izz =	1913.5	2344.0	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	23853	mm^2
A_{RHM*}=	3548	mm2
A_{net} =	20305	mm^2
∑Iyy =	1389.3	$x10^6mm^4$
∑Izz =	4257.5	$x10^6mm^4$
ybar=	454	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	11836.4	mm	kyLy/ry =	45.3	< 120 therefore OK
Lz =	11836.4	mm	kzLz/rz =	25.8	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	152.0	t =	12.7	b/t =	12.0	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	20305	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	261.6	mm	
rz =	457.9	mm	
λy =	0.488		
λz =	0.279		
Cry =	3795	kN	
Crz =	4103	kN	
Cr Min =	3795	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	5212	kN
b)	Tr =	$\phi_u A_n F_u$	6660	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5661	kN
		Tr Min =	5212	kN

AECOM Imagine it. Delivered.	JOB TITLE	BCLB DECK PRE-DESIGN		
	JOB NO.	60637587	CALCULATION NO.	
	ORIGINATOR BY	KG	DATE	30-Nov-20
	CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

Front Diagonals Panel 4,5 | Tension & Compression Member | Drawing Location (1959)

E5 & 43 Top Section

Front Diagonals C43 & D43

Material Properties: A-7 Steel | Reference

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

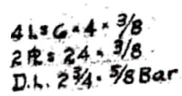
Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	6x4x3/8	24x3/8

Flange Perfortion Width	0	in
Rivet dia.	1	in

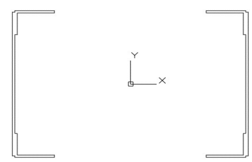
Member Dimensions

Length =	11836	mm
Width =	908	mm
Depth =	622	mm

Drawing Snipet

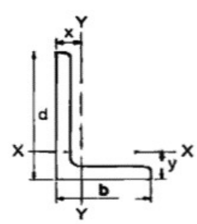


Member Cross-Section



Individual Member Properties

Web			Angle		
Designation	24x3/8		Designation	6x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	152	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	2330	mm^2
y Bar =	4.7625	mm	z =	24.1	mm
RHM*	2		y =	49.1	mm
RHM Area =	967.7	mm	I_y =	5.58	$x10^6 mm^4$
			I_z =	2.06	$x10^6 mm^4$
			A_{angle} =	9320	mm^2
			RHM*	2	
			RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	Web	
Designation	6x4x3/8	24x3/8	
Qty=	4	2	
I_y =	22.3	359.6	$x10^6mm^4$
I_z =	8.24	0.1	$x10^6mm^4$
A =	9320.0	11612.9	mm^2
dy =	395.4	449	mm^2
dz =	287	0.0	mm
Iyy =	790.3	359.6	$x10^6mm^4$
Izz =	1465.3	2344.0	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	20933	mm^2
A_{RHM*}=	2904	mm2
A_{net} =	18029	mm^2
∑Iyy =	1149.9	$x10^6mm^4$
∑Izz =	3809.3	$x10^6mm^4$
ybar=	454	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	11836.4	mm	kyLy/ry =	46.9	< 120 therefore OK
Lz =	11836.4	mm	kzLz/rz =	25.8	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	142.5	t =	9.5	b/t =	14.9	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	18029	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	252.5	mm	
rz =	459.7	mm	
λy =	0.506		
λz =	0.278		
Cry =	3338	kN	
Crz =	3644	kN	
Cr Min =	3338	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4574	kN
b)	Tr =	$\phi_u A_n F_u$	5913	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5026	kN
		Tr Min =	4574	kN

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

FrontBottom VerticalStrut(C94) Tension & Compression Member Drawing Location (1959)

E5, E7 & 45 Top Section

Material Properties: A-7 Steel Reference Vertical Struts

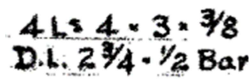
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***	C94
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***	
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***	
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***	

Built up Section Components

Member	**Angle**
Quantity	**4**
Dimensions (in)	4x3x3/8
Flange Perfortion Width	0 in
Rivet dia.	1 in

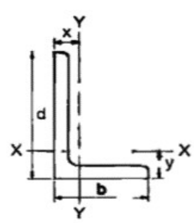
Member Dimensions | **Drawing Snipet** | **Member Cross-Section**

Length =	8769	mm
Width =	216	mm
Depth =	905	mm



Individual Member Properties

Angle		
Designation	4x3x3/8	
Qty =	4	
b =	76.2	mm
d =	102	mm
t =	9.53	mm
A =	1600	mm^2
z =	19.8	mm
y =	32.7	mm
I_y =	0.8	$x10^6 mm^4$
I_z =	1.67	$x10^6 mm^4$
A_{angle} =	6400	mm^2
RHM*	2	
RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	
Designation	4x3x3/8	
Qty=	4	
I_y =	3.2	$x10^6mm^4$
I_z =	6.68	$x10^6mm^4$
A =	6400.0	mm^2
dy =	39.1	mm
dz =	433	mm
Iyy =	1201.1	$x10^6mm^4$
Izz =	16.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	6400	mm^2
A_{RHM*}=	1936	mm2
A_{net} =	4464	mm^2
∑Iyy =	1201.1	$x10^6mm^4$
∑Izz =	16.4	$x10^6mm^4$
ybar=	108	mm
zbar=	452	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Secondary Bracing Compression Member

Ly =	8769.35 mm	kyLy/ry =	16.9	< 160 therefore OK
Lz =	8769.35 mm	kzLz/rz =	144.5	< 160 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 200/(SQRT(fy) =	13.2	*[CSA S6-19 cl. 10.9.2.1]*
Legs of angle supported; Class 3 Limit =	h/w<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Angle Web	h =	67	w =	9.5	h/w =	7.0	OK
Angle Flange	b =	92.5	t =	9.5	b/t =	9.7	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9	*[CSA S6-19 cl. 10.5.7]*
A =	4464 mm^2	
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	518.7 mm	
rz =	60.7 mm	
λy =	0.182	
λz =	1.560	
Cry =	917 kN	
Crz =	312 kN	
Cr Min =	312 kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	1398 kN
b)	Tr =	$\phi_u A_n F_u$	1464 kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	1244 kN
		Tr Min =	1244 kN

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

TOWER SPAN

Front Top Vertical Struts (E45) Tension & Compression Member

Drawing Location (1959)
E5, E7 & 45 Top Section
Vertical Struts
E45

Material Properties: A-7 Steel Reference

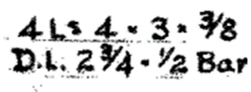
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

Member	**Angle**
Quantity	**4**
Dimensions (in)	4x3x3/8
Flange Perfortion Width	0 in
Rivet dia.	1 in

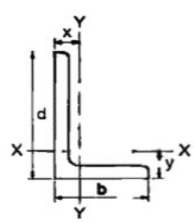
Member Dimensions | **Drawing Snipet** | **Member Cross-Section**

Length =	8769	mm
Width =	216	mm
Depth =	905	mm



Individual Member Properties

Angle		
Designation	4x3x3/8	
Qty =	4	
b =	76.2	mm
d =	102	mm
t =	9.53	mm
A =	1600	mm^2
z =	19.8	mm
y =	32.7	mm
I_y =	0.8	$x10^6mm^4$
I_z =	1.67	$x10^6mm^4$
A_{angle} =	6400	mm^2
RHM*	2	
RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	
Designation	4x3x3/8	
Qty=	4	
I_y =	3.2	$x10^6mm^4$
I_z =	6.68	$x10^6mm^4$
A =	6400	mm^2
dy =	39.1	mm
dz =	433	mm
Iyy =	1201.1	$x10^6mm^4$
Izz =	16.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	6400	mm^2
A_{RHM*}=	1936	mm2
A_{net} =	4464	mm^2
∑Iyy =	1201.1	$x10^6mm^4$
∑Izz =	16.4	$x10^6mm^4$
ybar=	108	mm
zbar=	452	mm

Geometry Comformance Checks

Slenderness Ratio ***[CSA S6-19 cl. 10.9.1.3]***

Member Classification = Secondary Bracing Compression Member

Ly =	8769.35	mm	kyLy/ry =	16.9	< 160 therefore OK
Lz =	8769.35	mm	kzLz/rz =	144.5	< 160 therefore OK

Width to Thickness Ratio ***[CSA S6-19 cl. 10.9.2]***

Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 200/(SQRT(fy) =	13.2	***[CSA S6-19 cl. 10.9.2.1]***
Legs of angle supported; Class 3 Limit =	h/w<= 250/(SQRT(fy) =	16.5	***[CSA S6-19 cl. 10.9.2.1]***

Angle Web	h =	67	w =	9.5	h/w =	7.0	OK
Angle Flange	b =	92.5	t =	9.5	b/t =	9.7	OK

Axial Compression Resistance ***[CSA S6-19 cl. 10.9.3.1]***

Φs =	0.9		***[CSA S6-19 cl. 10.5.7]***
A =	4464	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	518.7	mm	
rz =	60.7	mm	
λy =	0.182		
λz =	1.560		
Cry =	917	kN	
Crz =	312	kN	
Cr Min =	312	kN	

Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95	***[CSA S6-19 cl. 10.5.7]***
Tension	Φu =	0.8	***[CSA S6-19 cl. 10.5.7]***

a)	Tr =	$\phi_s A_g F_y$	1398	kN
b)	Tr =	$\phi_u A_n F_u$	1464	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	1244	kN
		Tr Min =	1244	kN

JOB TITLE	BCLB DECK PRE-DESIGN			
JOB NO.	60637587	CALCULATION NO.		
ORIGINATOR BY	KG	DATE	30-Nov-20	
CHECKED BY	RA	DATE	16-Dec-20	

TOWER SPAN

Rear Face Horizontal 1 Tension & Compression Member Drawing Location (1959)

Portal Strut

Material Properties: A-7 Steel Reference ***E7, 57*** A57

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

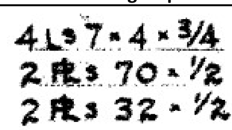
Member	**Angles**	**Exterior Web**	**Top Plate**	**Bottom Plate**
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	7x4x3/4	70x1/2	32x1/2	32x1/2

Ext. Web Perfortion Width	14	in
Rivet dia.	1	in

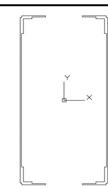
Member Dimensions

Length =	15900	mm
Width =	848	mm
Depth =	1816	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

	Top Angles	Bottom Angles	
Designation	7x4x3/4	7x4x3/4	
Qty =	2	2	
b =	102	102	mm
d =	178	178	mm
t =	19.0	19.0	mm^2
A =	4960	4960	mm
z =	63.7	63.7	mm
y =	25.7	25.7	mm
Z bar	76	76	mm
I_y =	15.8	15.8	$x10^6mm^4$
I_z =	3.8	3.8	$x10^6mm^4$
A_{angle} =	9920	9920	mm^2
RHM*	3	3	mm
RHM Area =	2896	2896	mm^2

	Top Plate	Bottom Plate	
Designation	32x1/2	32x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	812.8	812.8	mm
b_{eff}=	457.2	457.2	mm
z Bar =	1809.75	6.35	mm
A =	10322.56	10322.56	mm^2
A_{eff}=	5806.44	5806.44	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

	Web	
Designation =	70x1/2	
Qty =	2	
w =	12.7	mm
h =	1778	mm
A =	45161.2	mm^2
z Bar =	908	mm
RHM*	4	
RHM Area =	2580.6	mm^2

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Top Angles	Bottom Angles	Web	Top Plate	Bot Plate	
Designation	7x4x3/4	7x4x3/4	70x1/2	32x1/2	32x1/2	
Qty=	2	2	2	1	1	
Iy =	31.6	31.6	11897.3	0.1	0.1	$x10^6 mm^4$
Iz =	7.6	7.6	0.6	25.3	25.3	$x10^6 mm^4$
A =	9920	9920	45161.2	5806.4	5806.4	mm^2
dz =	831.7	831.7	0.0	901.7	901.7	mm^2
dy =	385	385	417.5	292.1	292.1	mm
Iyy =	6892.7	6892.7	11897.3	4721.1	4721.1	$x10^6 mm^4$
Izz =	1481.5	1481.5	7873.0	520.7	520.7	$x10^6 mm^4$

Composite Member Properties		
A_{gross} =	76614	mm^2
A_{RHM*}=	9662	mm2
A_{net} =	66952	mm^2
∑Iyy =	35124.9	$x10^6 mm^4$
∑Izz =	11877.4	$x10^6 mm^4$
ybar=	424	mm
Zbar=	908	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	15900.4	mm	kyLy/ry =	22.0	< 120 therefore OK
Lz =	15900.4	mm	kzLz/rz =	37.8	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	1422	w =	12.7	h/w =	112.0	NG
Flange	b =	608.8	t =	12.7	b/t =	47.9	NG
Flange Perforated	b =	253.2	t =	12.7	b/t =	19.9	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	66952	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	724.3	mm	
rz =	421.2	mm	
λy =	0.237		
λz =	0.407		
Cry =	13645	kN	
Crz =	12994	kN	
Cr Min =	12994	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	16740	kN
b)	Tr =	$\phi_u A_n F_u$	21960	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	18666	kN
		Tr Min =	16740	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
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TOWER SPAN

Rear Face Hor Strut 2,4

Drawing Location (1959)
E5 & 47 Mid-Section Struts
(AA47,A47R)

Material Properties: A-7 Steel Reference

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

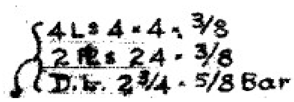
Built up Section Components

Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	4x4x3/8	24x3/8
Flange Perfortion Width	0	in
Rivet dia.	1	in

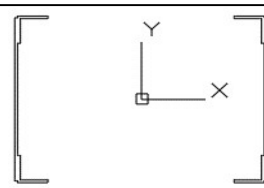
Member Dimensions

Length =	7950	mm
Width =	848	mm
Depth =	622	mm

Drawing Snipet

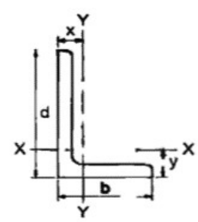


Member Cross-Section



Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	4x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	102	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	1850	mm^2
y Bar =	4.76	mm	z =	29	mm
RHM*	2		y =	29	mm
RHM Area =	967.7	mm	I_y =	1.84	$x10^6 mm^4$
			I_z =	1.84	$x10^6 mm^4$
			A_{angle} =	7400	mm^2
			RHM*	2	
			RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	Web	
Designation	4x4x3/8	24x3/8	
Qty=	4	2	
I_y =	7.4	359.6	$x10^6mm^4$
I_z =	7.36	0.1	$x10^6mm^4$
A =	7400.0	11612.9	mm^2
dy =	385.3	419	mm^2
dz =	282	0.0	mm
Iyy =	596.5	359.6	$x10^6mm^4$
Izz =	1105.9	2039.5	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	19013	mm^2
A_{RHM*}=	2904	mm2
A_{net} =	16109	mm^2
∑Iyy =	956.1	$x10^6mm^4$
∑Izz =	3145.4	$x10^6mm^4$
ybar=	424	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio ***[CSA S6-19 cl. 10.9.1.3]***

Member Classification = Primary Compression Member

Ly =	7950.2	mm	kyLy/ry =	32.6	< 120 therefore OK
Lz =	7950.2	mm	kzLz/rz =	18.0	< 120 therefore OK

Width to Thickness Ratio ***[CSA S6-19 cl. 10.9.2]***

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	***[CSA S6-19 cl. 10.9.2.1]***
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	***[CSA S6-19 cl. 10.9.2.1]***

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	102.0	t =	9.5	b/t =	10.7	OK

Axial Compression Resistance ***[CSA S6-19 cl. 10.9.3.1]***

Φs = 0.9 ***[CSA S6-19 cl. 10.5.7]***

A =	16109	mm^2
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	243.6	mm
rz =	441.9	mm
λy =	0.352	
λz =	0.194	
Cry =	3190	kN
Crz =	3304	kN
Cr Min =	3190	kN

Axial Tensile Resistance ***[CSA S6-19 cl. 10.8.2]***

Tension	Φs =	0.95	***[CSA S6-19 cl. 10.5.7]***
Tension	Φu =	0.8	***[CSA S6-19 cl. 10.5.7]***

a)	Tr =	$\phi_s A_g F_y$	4154	kN
b)	Tr =	$\phi_u A_n F_u$	5284	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4491	kN
		Tr Min =	4154	kN

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TOWER SPAN

Rear Face Hor Strut 3

Drawing Location (1959)
E5 & 47 Mid-Section Struts (B47)

Material Properties: A-7 Steel Reference

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

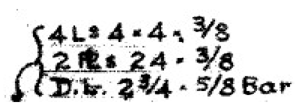
Built up Section Components

Member	**Angle**	**Web**
Quantity	**4**	**2**
Dimensions (in)	4x4x3/8	24x3/8
Flange Perfortion Width	0	in
Rivet dia.	1	in

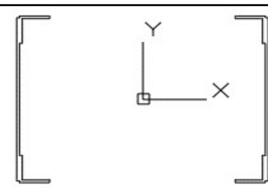
Member Dimensions

Length =	15900	mm
Width =	848	mm
Depth =	622	mm

Drawing Snipet

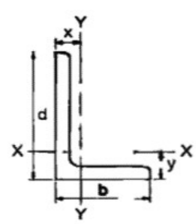


Member Cross-Section



Individual Member Properties

Web			**Angle**		
Designation	24x3/8		Designation	4x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	102	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	1850	mm^2
y Bar =	4.76	mm	z =	29	mm
RHM*	2		y =	29	mm
RHM Area =	967.7	mm	I_y =	1.84	$x10^6mm^4$
			I_z =	1.84	$x10^6mm^4$
			A_{angle} =	7400	mm^2
			RHM*	2	
			RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
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Section Calculations

	Angle	Web	
Designation	4x4x3/8	24x3/8	
Qty=	4	2	
I_y =	7.4	359.6	$x10^6mm^4$
I_z =	7.36	0.1	$x10^6mm^4$
A =	7400.0	11612.9	mm^2
dy =	385.3	419	mm^2
dz =	282	0.0	mm
Iyy =	596.5	359.6	$x10^6mm^4$
Izz =	1105.9	2039.5	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	19013	mm^2
A_{RHM*}=	2904	mm2
A_{net} =	16109	mm^2
∑Iyy =	956.1	$x10^6mm^4$
∑Izz =	3145.4	$x10^6mm^4$
ybar=	424	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	15900.4	mm	kyLy/ry =	65.3	< 120 therefore OK
Lz =	15900.4	mm	kzLz/rz =	36.0	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	102.0	t =	9.5	b/t =	10.7	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	16109	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	243.6	mm	
rz =	441.9	mm	
λy =	0.705		
λz =	0.388		
Cry =	2606	kN	
Crz =	3150	kN	
Cr Min =	2606	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4154	kN
b)	Tr =	$\phi_u A_n F_u$	5284	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	4491	kN
		Tr Min =	4154	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
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TOWER SPAN

Rear Strut 5 — Tension & Compression Member — Drawing Location (1959): Portal Strut

Material Properties: A-7 Steel — Reference — ***E7, 81*** C81

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

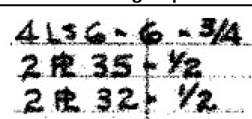
Member	Angles	Exterior Web	Top Plate	Bottom Plate
Quantity	**4**	**2**	**1**	**1**
Dimensions (in)	6x6x3/4	35x1/2	32x1/2	32x1/2

Ext. Web Perfortion Width	14	in
Rivet dia.	1	in

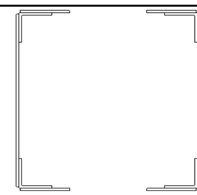
Member Dimensions

Length =	15900	mm
Width =	848	mm
Depth =	927	mm

Drawing Snipet



Member Cross-Section



Individual Member Properties

	Top Angles	Bottom Angles	
Designation	6x6x3/4	6x6x3/4	
Qty =	2	2	
b =	152	152	mm
d =	152	152	mm
t =	19.0	19.0	mm^2
A =	5450	5450	mm
z =	45	45	mm
y =	45	45	mm
Z bar	869	57.7	mm
I_y =	11.6	11.6	$x10^6mm^4$
I_z =	11.6	11.6	$x10^6mm^4$
A_{angle} =	10900	10900	mm^2
RHM*	3	3	mm
RHM Area =	2896	2896	mm^2

	Top Plate	Bottom Plate	
Designation	32x1/2	32x1/2	
Qty =	1	1	
t =	12.7	12.7	mm
b =	812.8	812.8	mm
b_{eff}=	457.2	457.2	mm
z Bar =	920.75	6.35	mm
A =	10322.56	10322.56	mm^2
A_{eff}=	5806.44	5806.44	mm^2
RHM*	2	2	
RHM Area =	645.2	645.2	mm^2

	Web	
Designation =	35x1/2	
Qty =	2	
w =	12.7	mm
h =	889	mm
A =	22580.6	mm^2
z Bar =	464	mm
RHM*	4	
RHM Area =	2580.6	mm^2

RHM* = Rivet Holes/Member

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
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Section Calculations

	Top Angles	Bottom Angles	Web	Top Plate	Bot Plate	
Designation	6x6x3/4	6x6x3/4	35x1/2	32x1/2	32x1/2	
Qty=	2	2	2	1	1	
Iy =	23.2	23.2	1487.2	0.1	0.1	$x10^6mm^4$
Iz =	23.2	23.2	0.3	25.3	25.3	$x10^6mm^4$
A =	10900	10900	22580.6	5806.4	5806.4	mm^2
dz =	405.9	405.9	0.0	457.2	457.2	mm^2
dy =	366	366	417.5	292.1	292.1	mm
Iyy =	1818.6	1818.6	1487.2	1213.8	1213.8	$x10^6mm^4$
Izz =	1484.6	1484.6	3936.5	520.7	520.7	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	55993	mm^2
A_{RHM*}=	9662	mm2
A_{net} =	46331	mm^2
∑Iyy =	7551.9	$x10^6mm^4$
∑Izz =	7947.1	$x10^6mm^4$
ybar=	424	mm
Zbar=	464	mm

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
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Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	15900.4 mm	kyLy/ry =	39.4	< 120 therefore OK
Lz =	15900.4 mm	kzLz/rz =	38.4	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Flanges of Rectangular HSS: Class 3 Limit =	b/t<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Webs in Axial Compression; Class 3 Limit =	h/w<= 670/(SQRT(fy) =	44.2	*[CSA S6-19 cl. 10.9.2.1]*
Flange as Perforated Cover Plate Class 3 Limit :	h/w<= 840/SQRT(fy) =	55.4	*[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	585	w =	12.7	h/w =	46.1	NG
Flange	b =	508.8	t =	12.7	b/t =	40.1	OK
Flange Perforated	b =	153.2	t =	12.7	b/t =	12.1	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	46331	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	403.7	mm	
rz =	414.2	mm	
λy =	0.425		
λz =	0.414		
Cry =	8926	kN	
Crz =	8967	kN	
Cr Min =	8926	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	12235	kN
b)	Tr =	$\phi_u A_n F_u$	15197	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	12917	kN
		Tr Min =	12235	kN

TOWER SPAN

Rear Diagonal All 2,3,4,5 — Tension & Compression Member

Drawing Location (1959)
E5 & 37 — Mid-Section Rear Diagonals A37, B37 and C37

Material Properties: A-7 Steel — Reference

F_u =	410	MPa	*[CISC 6-7, 11TH Edition, 2016]*
F_y =	230	MPa	*[CISC 6-7, 11TH Edition, 2016]*
ϕ_s =	0.95		*[CSA S6-19 cl. 10.5.7]*
E =	200000	MPa	*[CSA S6-19 cl. 10.4.2]*

Built up Section Components

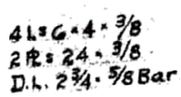
Member	Angle	Web
Quantity	**4**	**2**
Dimensions (in)	6x4x3/8	24x3/8

Flange Perfortion Width	0	in
Rivet dia.	1	in

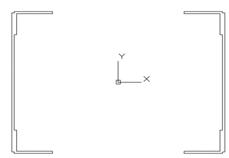
Member Dimensions

Length =	11836	mm
Width =	848	mm
Depth =	622	mm

Drawing Snipet

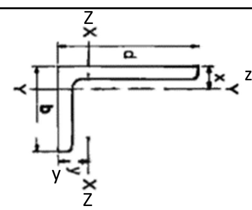


Member Cross-Section



Individual Member Properties

Web			Angle		
Designation	24x3/8		Designation	6x4x3/8	
Qty =	2		Qty =	4	
w =	9.525	mm	b =	102	mm
h =	609.6	mm	d =	152	mm
A =	11612.88	mm^2	t =	9.53	mm
z Bar =	311.15	mm	A =	2330	mm^2
y Bar =	4.76	mm	z =	24.1	mm
RHM*	0		y =	49.1	mm
RHM Area =	0.0	mm	I_y =	5.58	$x10^6mm^4$
			I_z =	2.06	$x10^6mm^4$
			A_{angle} =	9320	mm^2
			RHM*	0	
			RHM Area =	0.0	mm



RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
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Section Calculations

	Angle	Web	
Designation	6x4x3/8	24x3/8	
Qty=	4	2	
I_y =	22.3	359.6	$x10^6mm^4$
I_z =	8.24	0.1	$x10^6mm^4$
A =	9320.0	11612.9	mm^2
dy =	365.2	419.1	mm^2
dz =	287	0.0	mm
Iyy =	790.3	359.6	$x10^6mm^4$
Izz =	1251.5	2039.8	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	20933	mm^2
A_{RHM*}=	0	mm^2
A_{net} =	20933	mm^2
∑Iyy =	1149.9	$x10^6mm^4$
∑Izz =	3291.3	$x10^6mm^4$
ybar=	424	mm
zbar=	311	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Primary Compression Member

Ly =	11836	mm	kyLy/ry =	50.5	< 120 therefore OK
Lz =	11836.4	mm	kzLz/rz =	29.9	< 120 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Webs in Axial Compression; Class 3 Limit = h/w<= 670/(SQRT(fy) = 44.2 *[CSA S6-19 cl. 10.9.2.1]*

Outstanging leg of pair of angles: Class 3 Limit = b/t<= 250/(SQRT(fy) = 16.5 *[CSA S6-19 cl. 10.9.2.1]*

Webs	h =	405.6	w =	9.5	h/w =	42.6	OK
Flange	b =	152.0	t =	9.5	b/t =	15.9	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	20933	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	234.4	mm	
rz =	396.5	mm	
λy =	0.545		
λz =	0.322		
Cry =	3790	kN	
Crz =	4184	kN	
Cr Min =	3790	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	4574	kN
b)	Tr =	$\phi_u A_n F_u$	6866	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	5836	kN
		Tr Min =	4574	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

Rear Bottom Vertical Strut(B61) Tension & Compression Member

Drawing Location (1959)
Bottom Section
Vertical Struts

Material Properties: A-7 Steel Reference

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***	***E5 & 61***	B61
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***		
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***		
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***		

Built up Section Components

Member	**Angle**	**Web**
Quantity	**4**	**0**
Dimensions (in)	4x3x3/8	0

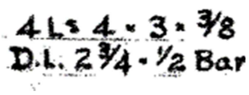
Flange Perfortion Width 0 in

Rivet dia. 1 in

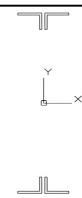
Member Dimensions

Length =	8769	mm
Width =	216	mm
Depth =	845	mm

Drawing Snipet

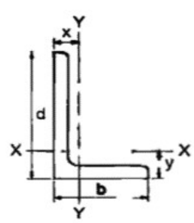


Member Cross-Section



Individual Member Properties

Angle		
Designation	4x3x3/8	
Qty =	4	
b =	76.2	mm
d =	102	mm
t =	9.53	mm
A =	1600	mm^2
z =	19.8	mm
y =	32.7	mm
I_y =	0.8	$x10^6mm^4$
I_z =	1.67	$x10^6mm^4$
A_{angle} =	6400	mm^2
RHM*	2	
RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

Section Calculations

	Angle	
Designation	4x3x3/8	
Qty=	4	
I_y =	3.2	$x10^6mm^4$
I_z =	6.68	$x10^6mm^4$
A =	6400.0	mm^2
dy =	39.1	mm
dz =	402	mm
Iyy =	1039.9	$x10^6mm^4$
Izz =	16.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	6400	mm^2
A_{RHM*}=	1936	mm2
A_{net} =	4464	mm^2
∑Iyy =	1039.9	$x10^6mm^4$
∑Izz =	16.4	$x10^6mm^4$
ybar=	108	mm
zbar=	422	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Secondary Bracing Compression Member

Ly =	8769.35	mm	kyLy/ry =	18.2	< 160 therefore OK
Lz =	8769.35	mm	kzLz/rz =	144.5	< 160 therefore OK

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 200/(SQRT(fy) =	13.2	*[CSA S6-19 cl. 10.9.2.1]*
Legs of angle supported; Class 3 Limit =	h/w<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Angle Web	h =	67	w =	9.5	h/w =	7.0	OK
Angle Flange	b =	92.5	t =	9.5	b/t =	9.7	OK

10.9.3 Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9		*[CSA S6-19 cl. 10.5.7]*
A =	4464	mm^2	
n =	1.34		
Ky =	1.00		
Kz =	1.00		
ry =	482.7	mm	
rz =	60.7	mm	
λy =	0.196		
λz =	1.560		
Cry =	915	kN	
Crz =	312	kN	
Cr Min =	312	kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	1398	kN
b)	Tr =	$\phi_u A_n F_u$	1464	kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	1244	kN
		Tr Min =	1244	kN

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

TOWER SPAN

Rear Top Vertical Struts (D45) Tension & Compression Member

Drawing Location (1959)
E5, E7 & 45 Top Section
Vertical Struts
D45

Material Properties: A-7 Steel

			Reference
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***

Built up Section Components

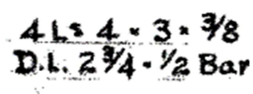
Member	**Angle**
Quantity	**4**
Dimensions (in)	4x3x3/8

Flange Perfortion Width 0 in
Rivet dia. 1 in

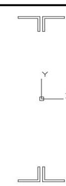
Member Dimensions

Length =	8769	mm
Width =	216	mm
Depth =	845	mm

Drawing Snipet

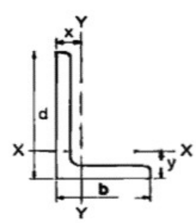


Member Cross-Section



Individual Member Properties

Angle		
Designation	4x3x3/8	
Qty =	4	
b =	76.2	mm
d =	102	mm
t =	9.53	mm
A =	1600	mm^2
z =	19.8	mm
y =	32.7	mm
I_y =	0.8	$x10^6mm^4$
I_z =	1.67	$x10^6mm^4$
A_{angle} =	6400	mm^2
RHM*	2	
RHM Area =	1936.5	mm



RHM* = Rivet Holes/Member

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Calculations

	Angle	
Designation	4x3x3/8	
Qty=	4	
I_y =	3.2	$x10^6mm^4$
I_z =	6.68	$x10^6mm^4$
A =	6400.0	mm^2
dy =	39.1	mm
dz =	402	mm
Iyy =	1039.9	$x10^6mm^4$
Izz =	16.4	$x10^6mm^4$

Composite Member Properties		
A_{gross} =	6400	mm^2
A_{RHM*}=	1936	mm^2
A_{net} =	4464	mm^2
∑Iyy =	1039.9	$x10^6mm^4$
∑Izz =	16.4	$x10^6mm^4$
zbar=	422	mm
ybar=	108	mm

Geometry Comformance Checks

Slenderness Ratio *[CSA S6-19 cl. 10.9.1.3]*

Member Classification = Secondary Bracing Compression Member

Ly =	8769.350 mm	kyLy/ry =	18.2	< 160 therefore OK	
Lz =	8769.350 mm	kzLz/rz =	144.5	< 160 therefore OK	

Width to Thickness Ratio *[CSA S6-19 cl. 10.9.2]*

Outstanging leg of pair of angles: Class 3 Limit =	b/t<= 200/(SQRT(fy) =	13.2	*[CSA S6-19 cl. 10.9.2.1]*
Legs of angle supported; Class 3 Limit =	h/w<= 250/(SQRT(fy) =	16.5	*[CSA S6-19 cl. 10.9.2.1]*

Angle Web	h =	67	w =	9.5	h/w =	7.0	OK
Angle Flange	b =	92.5	t =	9.5	b/t =	9.7	OK

Axial Compression Resistance *[CSA S6-19 cl. 10.9.3.1]*

Φs =	0.9	*[CSA S6-19 cl. 10.5.7]*
A =	4464 mm^2	
n =	1.34	
Ky =	1.00	
Kz =	1.00	
ry =	482.7 mm	
rz =	60.7 mm	
λy =	0.196	
λz =	1.560	
Cry =	915 kN	
Crz =	312 kN	
Cr Min =	312 kN	

Axial Tensile Resistance *[CSA S6-19 cl. 10.8.2]*

Tension	Φs =	0.95	*[CSA S6-19 cl. 10.5.7]*
Tension	Φu =	0.8	*[CSA S6-19 cl. 10.5.7]*

a)	Tr =	$\phi_s A_g F_y$	1398 kN
b)	Tr =	$\phi_u A_n F_u$	1464 kN
c)	Tr =	$0.85\phi_u A_{ne} F_u$	1244 kN
		Tr Min =	1244 kN

Section Properties

TOWER SPAN

Girder G1 (A30|B30)

Material Properties: A-7 Steel			Reference	Drawing Location (1959)
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***	E5, E9 & 30 Top Section
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***	
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***	
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***	

Components	**Web**	**Top L's**	**Bottom L's**
Specified Size	**84 1/2x3/4**	L203x152x19	L203x152x19
No.	1	2	2
Height (mm)	2146	19	19.0
Width (mm)	19	152	152
I_x (mm^4)	15695856181	26200000	26200000
I_y (mm^4)	1236500	12700000	12700000
A_g (mm^2)	40887	12820	12820
y top or bot (mm)	1073.15	65.1	2081
x (mm)	161.525	112.4	112.4
Trans. I_x (mm^4)	15695856181	1.308E+10	13079632768
Trans. I_y (mm^4)	1236499.997	56338065.3	56338065.31

y top & bottom	1073.15	mm	
x	161.525	mm	
Total A_g	66527	mm^2	
Total I_x (mm^4)	41855121717	mm^4	***[Holes not removed when calculating I_x]***
Trans I_y (mm^4)	113912631	mm^4	***[Holes not removed when calculating I_y]***
r_x	793	mm	
r_y	41	mm	
Y_c	718	mm	
X_c	140	mm	
Z_x	47785352	mm^3	
Z_y	4645743	mm^3	
S_x	39002117	mm^3	
S_y	705232	mm^3	
J	8018000	mm^4	
d1	2146	mm	
c_w	1.20784E+14	mm^6	***[Angle leg in web not included in calculation - I-beam]***

ULS Girder Resistance

Class of Section

Width-to-Thickness Ratio Limits in Comp. *[CSA S6-19 cl. 10.9.2]*

Flange - Angle leg			*[CSA S6-19 cl. 10.9.2.1]*
Flange Class 1	9.56	$b/t \le 145/\sqrt{(F_y)}$	
Flange Class 2	11.21	$b/t \le 170/\sqrt{(F_y)}$	
Flange Class 3	13.19	$b/t \le 200/\sqrt{(F_y)}$	
Web			*[CSA S6-19 cl. 10.9.2.1]*
Web Class 1	72.53	$h/w \le 1100/\sqrt{(F_y)}$	
Web Class 2	112.09	$h/w \le 1700/\sqrt{(F_y)}$	
Web Class 3	125.28	$h/w \le 1900/\sqrt{(F_y)}$	

Width-to-Thickness Ratios of Girder

Flange		
Angle leg flange, b	152	mm
Thickness of flange, t	19	mm
b/t	8	
Web		
Clear depth of web, h	1740	mm
Thickness of web, w	19.05	mm
h/w	91	

Class of Section

Flange Class:	1
Web Class:	2

Moment Resistance *[CSA S6-19 cl.10.10.2.2]*

Member assumed to be half length of floor slab unsupported due to concrete support on back of tower

Plastic/Yeild Moment, M_p/M_y

Elastic Section Modulus, Sx	39002117	mm^3			
Plastic Section Modulus, Zx	47785352	mm^3			
Yield Stress, F_y	230	MPa	Fu =	410	MPa
Yield Moment, M_y	8970	kNm			
Plastic Moment, M_p	10991	kNm			
Class 1/2, Mp	10991	kNm			

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design *[CSA S6-19 cl.10.10.2.3]*

Overall Moment Resist., M_r **10441 kNm**

Shear Resistance *[CSA S6-19 cl. 10.10.5.1]*

Spacing of Tranverse Stiffn, a	1461	mm
Web height, h	1740	mm
a/h	0.84	
k_v	11.58	
h/w	91	
502√kv/Fy	112.65	
621√kv/Fy	139.35	
F_{cr}	**132.71**	**MPa**
F_t	**0.00**	**MPa**
F_s	**132.71**	**MPa**
Area of Web, A_w	33152.72	mm^2

Shear Resistance, V_r **4180 kN**

Section Properties

TOWER SPAN

Girder G2|3 (A36|B36|C36|D36)

Material Properties: A-7 Steel — Reference — Drawing Location (1959)

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***	E5, E9 & 36 Top Section
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***	
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***	
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***	

Components	**Web**	**Top L's**	**Bottom L's**
Specified Size	**84 1/2x3/4**	L203x203x22	L203x203x22
No.	1	2	2
Height (mm)	2146	22.2	22.2
Width (mm)	19	203	203
I_x (mm^4)	15695856181	33000000	33000000
I_y (mm^4)	1236500	33000000	33000000
A_g (mm^2)	40887	17000	17000
y top or bot (mm)	1073.15	58.9	2087
x (mm)	212.525	144.1	144.1
Trans. I_x (mm^4)	15695856181	1.7554E+10	17553952063
Trans. I_y (mm^4)	1236500	145593671	145593671

y top & bottom	1073.15	mm	
x	212.53	mm	
Total A_g	74887	mm^2	
Total I_x (mm^4)	50803760306	mm^4	***[Holes not removed when calculating I_x]***
Trans I_y (mm^4)	292423841	mm^4	***[Holes not removed when calculating I_y]***
r_x	824	mm	
r_y	62	mm	
Y_c	753	mm	
X_c	179	mm	
Z_x	56423450	mm^3	
Z_y	6697094	mm^3	
S_x	47340782	mm^3	
S_y	1375950	mm^3	
J	10546000	mm^4	
d1	2146	mm	
c_w	3.20488E+14	mm^6	***[Angle leg in web not included in calculation - I-beam]***

ULS Girder Resistance

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2]***

Flange - Angle leg			***[CSA S6-19 cl. 10.9.2.1]***
Flange Class 1	9.56	$b/t \le 145/\sqrt{(F_y)}$	
Flange Class 2	11.21	$b/t \le 170/\sqrt{(F_y)}$	
Flange Class 3	13.19	$b/t \le 200/\sqrt{(F_y)}$	
Web			***[CSA S6-19 cl. 10.9.2.1]***
Web Class 1	72.53	$h/w \le 1100/\sqrt{(F_y)}$	
Web Class 2	112.09	$h/w \le 1700/\sqrt{(F_y)}$	
Web Class 3	125.28	$h/w \le 1900/\sqrt{(F_y)}$	

Width-to-Thickness Ratios of Girder

Flange		
Angle leg flange, b	203	mm
Thickness of flange, t	22	mm
b/t	9	
Web		
Clear depth of web, h	1740	mm
Thickness of web, w	19.05	mm
h/w	91	

Class of Section

Flange Class:	1
Web Class:	2

Moment Resistance *[CSA S6-19 cl.10.10.2.2]*

Member assumed to be half length of floor slab unsupported due to concrete support on back of tower

Plastic/Yeild Moment, M_p/M_y

Elastic Section Modulus, Sx	47340782	mm^3			
Plastic Section Modulus, Zx	56423450	mm^3			
Yield Stress, F_y	230	MPa	Fu =	410	MPa
Yield Moment, M_y	10888	kNm			
Plastic Moment, M_p	12977	kNm			
Class 1/2, Mp	12977	kNm			

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design *[CSA S6-19 cl.10.10.2.3]*

Overall Moment Resist., M_r 12329 kNm

Shear Resistance *[CSA S6-19 cl. 10.10.5.1]*

Spacing of Tranverse Stiffn, a	1532	mm
Web height, h	1740	mm
a/h	0.88	
k_v	10.89	
h/w	91	
502√kv/Fy	109.25	
621√kv/Fy	135.15	
F_{cr}	**132.71**	**MPa**
F_t	**0.00**	**MPa**
F_s	**132.71**	**MPa**
Area of Web, A_w	33152.72	mm^2

Shear Resistance, V_r 4180 kN

Section Properties

TOWER SPAN

Girder G4 (A41|B41)

Material Properties: A-7 Steel

			Reference	Drawing Location (1959)
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***	E5, E9 & 41 Top Section
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***	
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***	
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***	

Components	**Web**	**Top L's**	**Bottom L's**
Specified Size	**84 1/2x3/4**	L203x152x19	L203x152x19
No.	1	2	2
Height (mm)	2146	19	19.0
Width (mm)	19	152	152
I_x (mm^4)	15695856181	26200000	26200000
I_y (mm^4)	1236500	12700000	12700000
A_g (mm^2)	40887	12820	12820
y top or bot (mm)	1073.15	65.1	2081
x (mm)	161.525	112.4	112.4
Trans. I_x (mm^4)	15695856181	1.308E+10	13079632768
Trans. I_y (mm^4)	1236499.997	56338065.3	56338065.31

y top & bottom	1073.15	mm	
x	161.53	mm	
Total A_g	66527	mm^2	
Total I_x (mm^4)	41855121717	mm^4	***[Holes not removed when calculating I_x]***
Trans I_y (mm^4)	113912631	mm^4	***[Holes not removed when calculating I_y]***
r_x	793	mm	
r_y	41	mm	
Y_c	718	mm	
X_c	140	mm	
Z_x	47785352	mm^3	
Z_y	4645743	mm^3	
S_x	39002117	mm^3	
S_y	705232	mm^3	
J	8018000	mm^4	
d1	2146	mm	
c_w	1.20784E+14	mm^6	***[Angle leg in web not included in calculation - I-beam]***

ULS Girder Resistance

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2]***

Flange - Angle leg ***[CSA S6-19 cl. 10.9.2.1]***

Flange Class 1	9.56	b/t ≤ 145/√(F_y)
Flange Class 2	11.21	b/t ≤ 170/√(F_y)
Flange Class 3	13.19	b/t ≤ 200/√(F_y)

Web ***[CSA S6-19 cl. 10.9.2.1]***

Web Class 1	72.53	h/w ≤ 1100/√(F_y)
Web Class 2	112.09	h/w ≤ 1700/√(F_y)
Web Class 3	125.28	h/w ≤ 1900/√(F_y)

Width-to-Thickness Ratios of Girder

Flange

Angle leg flange, b	152	mm
Thickness of flange, t	19	mm
b/t	8	

Web

Clear depth of web, h	1740	mm
Thickness of web, w	19.05	mm
h/w	91	

Class of Section

Flange Class:	1
Web Class:	2

Moment Resistance *[CSA S6-19 cl.10.10.2.2]*

Member assumed to be half length of floor slab unsupported due to concrete support on back of tower

Plastic/Yeild Moment, M_p/M_y

Elastic Section Modulus, Sx	39002117	mm^3			
Plastic Section Modulus, Zx	47785352	mm^3			
Yield Stress, F_y	230	MPa	Fu =	410	MPa
Yield Moment, M_y	8970	kNm			
Plastic Moment, M_p	10991	kNm			
Class 1/2, Mp	10991	kNm			

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design *[CSA S6-19 cl.10.10.2.3]*

Overall Moment Resist., M_r **10441 kNm**

Shear Resistance *[CSA S6-19 cl. 10.10.5.1]*

Spacing of Tranverse Stiffn, a	1549	mm
Web height, h	1740	mm
a/h	0.89	
k_v	10.74	
h/w	91	
502√kv/Fy	108.46	
621√kv/Fy	134.17	
F_{cr}	**132.71**	**MPa**
F_t	**0.00**	**MPa**
F_s	**132.71**	**MPa**
Area of Web, A_w	33152.715	mm^2

Shear Resistance, V_r **4180 kN**

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Properties

TOWER SPAN

Girder G6|FG6 (A64|A65|B64|B65)

Material Properties: A-7 Steel

			Reference	Drawing Location (1959)
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***	E5, E9, 64 & 65 Top Section
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***	
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***	
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***	

Components	**Web**	**Top L's**	**Bottom L's**
Specified Size	83 1/2x1/2	L152x152x13	L152x152x13
No.	1	2	2
Height (mm)	2121	12.7	12.7
Width (mm)	13	152	152
I_x (mm^4)	10096783668	8220000	8220000
I_y (mm^4)	362035	8220000	8220000
A_g (mm^2)	26935	7420	7420
y top or bot (mm)	1060.45	42.7	2078
x (mm)	158.35	109.3	109.3
Trans. I_x (mm^4)	10096783668	7702187764	7702187764
Trans. I_y (mm^4)	362035	34291796.6	34291797

y top & bottom	1060.45	mm	
x	158.35	mm	
Total A_g	41775	mm^2	
Total I_x (mm^4)	25501159195	mm^4	***[Holes not removed when calculating I_x]***
Trans I_y (mm^4)	68945628	mm^4	***[Holes not removed when calculating I_y]***
r_x	781	mm	
r_y	41	mm	
Y_c	703	mm	
X_c	139	mm	
Z_x	29385248	mm^3	
Z_y	2900859	mm^3	
S_x	24047489	mm^3	
S_y	435400	mm^3	
J	2244139	mm^4	
d1	2121	mm	
c_w	7.47068E+13	mm^6	***[Angle leg in web not included in calculation - I-beam]***

ULS Girder Resistance

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2]***

Flange - Angle leg			***[CSA S6-19 cl. 10.9.2.1]***
Flange Class 1	9.56	$b/t \le 145/\sqrt{(F_y)}$	
Flange Class 2	11.21	$b/t \le 170/\sqrt{(F_y)}$	
Flange Class 3	13.19	$b/t \le 200/\sqrt{(F_y)}$	
Web			***[CSA S6-19 cl. 10.9.2.1]***
Web Class 1	72.53	$h/w \le 1100/\sqrt{(F_y)}$	
Web Class 2	112.09	$h/w \le 1700/\sqrt{(F_y)}$	
Web Class 3	125.28	$h/w \le 1900/\sqrt{(F_y)}$	

Width-to-Thickness Ratios of Girder

Flange		
Angle leg flange, b	152	mm
Thickness of flange, t	13	mm
b/t	12	
Web		
Clear depth of web, h	1817	mm
Thickness of web, w	12.70	mm
h/w	143	

Class of Section

Flange Class:	3
Web Class:	4

Moment Resistance *[CSA S6-19 cl.10.10.3.2]*

Class 4 Web *[CSA S6-19 cl.10.10.4.4]*

h/w	143	≤150	OK	
2dc/w	141.0629921	>	$1900/\sqrt{(F_y)}$	***Moment resistance needs to be reduced***

Plastic/Yeild Moment, M_p/M_y

Elastic Section Modulus, Sx	24047489	mm^3			
Plastic Section Modulus, Zx	29385248	mm^3			
Yield Stress, F_y	230	MPa	Fu =	410	MPa
Yield Moment, M_y	5531	kNm			
Plastic Moment, M_p	6759	kNm			
Class 3/4, My	5531	kNm			

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design *[CSA S6-19 cl.10.10.2.3]*

Overall Moment Resist., M_r	**5254**	**kNm**		
Reduced Mr	**5254**	**kNm**	*Girder with no longitudinal stiffeners*	*[CSA S6-19 cl.10.10.4.4]*

Shear Resistance *[CSA S6-19 cl. 10.10.5.1]*

Spacing of Tranverse Stiffn, a	1803	mm
Web height, h	1715	mm
a/h	1.05	
k_v	8.96	
h/w	143	
502√kv/Fy	99.07	
621√kv/Fy	122.55	
F_{cr}	**78.77**	**MPa**
F_t	**32.24**	**MPa**
F_s	**111.01**	**MPa**
Area of Web, A_w	21779.23	mm^2
Shear Resistance, V_r	**2297**	**kN**

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	KG	DATE	30-Nov-20
CHECKED BY	RA	DATE	16-Dec-20

Section Properties

TOWER SPAN

Girder G6|FG6 (A64|A65|B64|B65)

Material Properties: A-7 Steel			Reference	Drawing Location (1959)
F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***	E5, E9& 42 Top Section
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***	
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***	
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***	

Components	**Web**	**T. Plate**	**B. Plate**	**Top L's**	**Bottom L's**
Specified Size	-	-	-	L203x152x16	L203x152x16
No.	1	1	1	2	2
Height (mm)	3366	12.7	12.7	15.9	15.9
Width (mm)	13	508	508	203	203
I_x (mm^4)	40343285123	86715	86715	10900000	10900000
I_y (mm^4)	574486	138743809	138743809	22500000	22500000
A_g (mm^2)	42742	6452	6452	10780	10780
y top or bot (mm)	1695.45	6.35	3384.55	51.2	3340
x (mm)	254	254	254	183.65	183.65
Trans. I_x (mm^4)	40343285123	1.8407E+10	18406880933	2.917E+10	29166155914
Trans. I_y (mm^4)	574486	138743809	138743809	98351541	98351541

y top & bottom	1695.45	mm	
x	254	mm	
Total A_g	77205	mm^2	
Total I_x (mm^4)	1.35489E+11	mm^4	
Trans I_y (mm^4)	474765184	mm^4	
r_x	1325	mm	
r_y	78	mm	
Y_c	1195	mm	
X_c	180	mm	
Z_x	92226245	mm^3	
Z_y	6938088	mm^3	
S_x	79913509	mm^3	
S_y	1869154	mm^3	
J	2991663	mm^4	***[Angles not included in calculation - I-beam]***
d1	3378.2	mm	
c_w	7.91688E+14	mm^6	***[Angles not included in calculation - I-beam]***

ULS Girder Resistance

Class of Section

Width-to-Thickness Ratio Limits in Comp. *[CSA S6-19 cl. 10.9.2]*

Flange		*[CSA S6-19 cl. 10.9.2.1]*
Flange Class 1	9.56	
Flange Class 2	11.21	
Flange Class 3	13.19	
Web		*[CSA S6-19 cl. 10.9.2.1]*
Web Class 1	72.53	
Web Class 2	112.09	
Web Class 3	125.28	

Width-to-Thickness Ratios of Girder

Flange		
Half width of flange, b	51	mm
Thickness of flange, t	13	mm
b/t	4	
Web		
Clear depth of web, h	1289	mm
Thickness of web, w	12.70	mm
h/w	102	

Class of Section

Flange Class:	1
Web Class:	2

Moment Resistance *[CSA S6-19 cl.10.10.2.2]*

Plastic/Yeild Moment, M_p/M_y

Elastic Section Modulus, Sx	79913509	mm^3			
Plastic Section Modulus, Zx	92226245	mm^3			
Yield Stress, F_y	230	MPa	Fu =	410	Mpa
Yield Moment, M_y	18380	kNm			
Plastic Moment, M_p	21212	kNm			
Class 1/2, Mp	21212	kNm			

Critical Elastic Moment, M_u - Assumed not Governing - To Be Confirmed in Preliminary Design *[CSA S6-19 cl.10.10.2.3]*

Overall Moment Resist., M_r	**20151**	**kNm**	
Shear Resistance			***[CSA S6-19 cl. 10.10.5.1]***
Spacing of Tranverse Stiffn, a	1207	mm	***[Spacing on railway side of floor beam]***
Web height, h	3366	mm	***[Used reduced web height at south abutment per original drawings]***
a/h	0.36		
k_v	45.55		
h/w	102		
502√kv/Fy	223.40		
621√kv/Fy	276.36		
F_{cr}	**132.71**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**132.71**	**MPa**	
Area of Web, A_w	42741.9	mm^2	
Shear Resistance, V_r	**5389**	**kN**	

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Exhibit E.5

Approach Span, Tower Span and Floor Beam Evaluation

JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

General Information

Material Specifications

Structural Steel (CSA G40-4 or ASTM A7) - Original Steel

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***
Unit Weight =	77	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
G_s =	77000	MPa	

Structural Steel - 1982 Rehabilitation - Strength Listed on 1982 Drawings

F_y =	350	MPa	***[Per 1982 rehabilitation drawings]***
F_u =	450	MPa	***[CSA S6-19 cl. 14.7.4.2, Table 14.1]***

Reinforced Concrete - Deck

f'_c =	20	MPa	***[CSA S6-19 cl. 14.7.4.4 - unknown concrete strength]***
f_{cr} =	1.79	MPa	***[CSA S6-19 cl. 8.4.1.8.1]***
Unit Weight =	24	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
E_c =	21656	MPa	

[Slab details not provided on original construction drawings - reinforcement unknown]

Asphalt

Unit Weight =	23.5	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Plain Concrete - Sidewalk Deck

Unit Weight =	23.5	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Aluminum

Unit Weight =	27.0	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Bridge Specifications

Span Length, L:	12.5984	m	***[According to Original Drawings]***
Roadway Width:	13.5636	m	***[According to 1982 Rehab Drawings]***
Tot. Deck Slab Width:	14.25	m	
West Exterior Cantilever L:	0	m	***[On west side, slab ends before girder flange edge]***
East Exterior Cantilever L:	0.2794	m	***[According to 1982 Rehab Drawings]***
No. of Design Lanes:	4		***[CSA S6-19 cl. 3.8.2, Table 3.5]***
Number of Girders:	8		
Original Girder Spacing:	1.931		***[According to Original Drawings]***
Rehabilitated Girder Spacing	2.057		***[According to 1982 Rehab Drawings]***
Orig. Girder Type (Imperial):	W33x130		***[According to Original Drawings]***
Orig. Girder Type (Metric):	W840x193		***[CISC 6-38, 11TH Edition, 2016]***
Wide. Girder Type (Imperial):	W36x160		***[According to 1982 Rehab Drawings]***
Wide. Girder Type (Metric):	W920x238		***[CISC 6-38, 11TH Edition, 2016]***
Diaphragm Spacing (m):	3.1496		

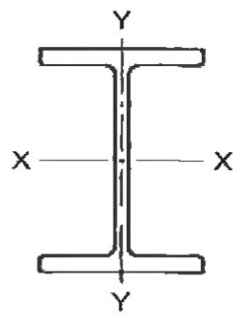
Section Properties

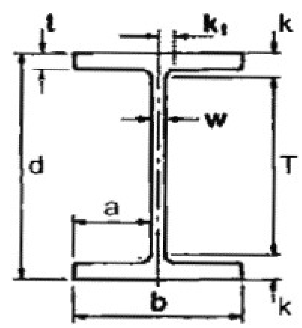
Non-Composite Bare Steel Girder

Longitudinal Stringer (W840 x 193) - Original Bridge

All data from CISC 11th Edition - 6-38, 3-39

Depth, d	840	mm
Flange width	292	mm
Flange thickness, t	21.7	mm
Web thickness, w	14.70	mm
Dead Load	1.9	kN/m
Area	24700	mm^2
Ix	2780000000	mm^4
Sx	6630000.00	mm^3
rx	336	mm
Zx	7620000	mm^3
Iy	90300000	mm^4
Sy	618000	mm^3
ry	60.5	mm
Zy	971000	mm^3
J	3050000	mm^4
Cw	1.51E+13	mm^6





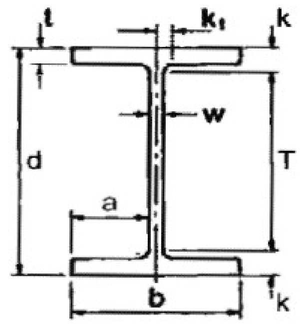
Section Properties

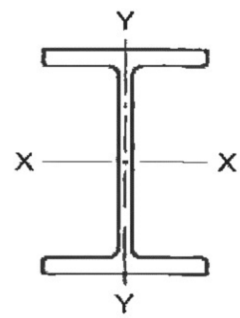
Non-Composite Bare Steel Girder

Longitudinal Stringer (W920x238) - Rehabilitated Bridge

All data from CISC 11th Edition - 6-38, 3-39

Depth, d	915	mm
Flange width	305	mm
Flange thickness, t	25.9	mm
Web thickness, w	16.50	mm
Dead Load	2.33	kN/m
Area	30300	mm^2
Ix	4060000000	mm^4
Sx	8870000.00	mm^3
rx	366	mm
Zx	10200000	mm^3
Iy	123000000	mm^4
Sy	806000	mm^3
ry	63.7	mm
Zy	1270000	mm^3
J	5100000	mm^4
Cw	2.43E+13	mm^6





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JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Load Combinations (Original)

Load factors

Load factors from CSA S6-19 cl. 3.5, Table 3.1, 3.2 & 3.3

ULS 1 MAX		ULS 9	
Factory-produced component	1.10	Factory-produced component	1.35
Cast-in-place component	1.20	Cast-in-place component	1.35
Wearing surfaces	1.50	Wearing surfaces	1.35
Live Load (Vehicle)	1.70		
Load Load (Pedestrian)	1.70		

**Results taken from grillage model created in Midas Civil*

Moment

Relative Span Distance		0L	0.1L	0.2L	0.3L	0.4L	0.5L
Absolute Span Distance		0.00 m	1.26 m	2.52 m	3.78 m	5.04 m	6.30 m
SLS	**Max.**	**0 kNm**	**314 kNm**	**530 kNm**	**662 kNm**	**735 kNm**	**753 kNm**
ULS	**ULS Max Env.**	**0 kNm**	**563 kNm**	**946 kNm**	**1180 kNm**	**1312 kNm**	**1360 kNm**

**Most critical girder was west exterior girder*

Shear

Relative Span Distance		0L
Absolute Span Distance		0.00 m
SLS	**Max.**	**278 kN**
ULS	**ULS Max Env.**	**480 kN**

**Max shear occurs at support, 0L*

Maximum SLS DL Reaction:	90 kNm
Maximum SLS TL Reaction:	333 kN
Maximum ULS DL Reaction:	111 kN
Maximum ULS TL Reaction:	575 kN

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JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

SLS Girder Resistance (Original)

*Calculated conservatively not accounting for composite properties

Control of Permanent Deflections *[CSA S6-19 Cl. 10.11.4]*

Max. SLS Moment	753	kNm
Section Modulus, S	6630000	mm^3
Stress in Flange	**114**	**MPa**
Stress Limit (0.9F_y)	**207**	**MPa**
Demand/Capacity	**0.55**	

Bearing Evaluation

Bearing Plan Width	203	
Bearing Plan Length	305	
Bearing Thickness	61	
Maximum SLS DL Reaction	110	kN
Maximum SLS TL Reaction	383	kN
Maximum ULS DL Reaction	136	kN
Maximum ULS TL Reaction	650	kN
Maximum SLS DL Pressure	1.78	Mpa
Maximum SLS TL Pressure	6.19	Mpa
Maximum ULS DL Pressure	2.20	Mpa
Maximum ULS TL Pressure	10.50	Mpa
Maximum SLS DL Limit	4.50	
Maximum SLS TL Limit	7.00	
Maximum ULS DL Limit	7.00	
Maximum ULS TL Limit	10.00	
SLS DL Demand/Capacity	0.39	
SLS TL Demand/Capacity	0.88	
ULS DL Demand/Capacity	0.31	
ULS TL Demand/Capacity	**1.05**	Minor exceedance

ULS Girder Resistance (Original)

*Assumed that girder section does not act compositely with the deck, shear studs are not shown in existing drawings

Original Girder Section: W840x193

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2.1, Table 10.3]***

Flange		
Flange Class 1	9.56	
Flange Class 2	11.21	
Flange Class 3	13.19	
Web		
Web Class 1	72.53	
Web Class 2	112.09	
Web Class 3	125.28	

Width-to-Thickness Ratios of Girder

Flange		
Half width of flange, b	146	mm
Thickness of flange, t	22	mm
b/t	7	
Web		
Clear depth of web, h	796.6	mm
Thickness of web, w	14.70	mm
h/w	54	

Class of Section

Flange Class:	1
Web Class:	1

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Moment Resistance of Laterally Unbraced Members (Section Classes 1 & 2) - CSA S6-19 cl. 10.10.2.3

Unbraced Length, L	3149.6	mm	***[Distance between diaphragms]***

Plastic Moment, M_p

Plastic Section Modulus, Z	7620000	mm^3
Yield Stress, F_y	230	MPa
Plastic Moment, M_p	1752.6	kNm
$0.67M_p$	**1174.242**	**kNm**

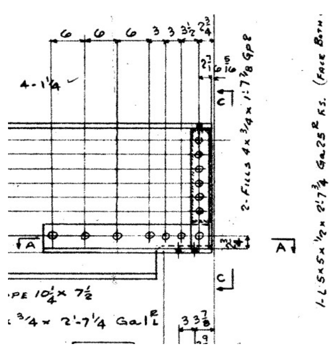
Critical Elastic Moment, M_u

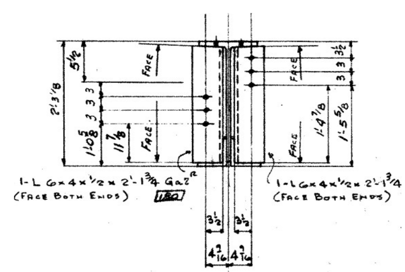
M_{max}	1360	kNm
M_a	1180	
M_b	1246	kNm
M_c	1312	
ω_2 Coefficient	1.08	
Unbraced Length, L	3149.6	mm
E_s	200000	MPa
I_y	90300000	mm^4
G_s	77000	MPa
J	3050000	mm^4
C_w	1.51E+13	mm^6
M_u	**8272**	**kNm**

Overall Moment Resist., M_r	**1665**	**kNm**
Max ULS Factored Moment	**1360**	**kNm**
Demand/Capacity	**0.82**	

Shear Resistance - CSA S6-19 cl. 10.10.5.1

Spacing of Tranverse Stiffn, a	12598	mm	***[Unstiffened web]***
Web height, h	645.575	mm	***[Used reduced web height at south abutment per original drawings]***
a/h	20		
k_v	5.35		
h/w	54		
502√kv/Fy	76.57		
621√kv/Fy	94.72		
F_{cr}	**132.71**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**132.71**	**MPa**	
Area of Web, A_w	7591.962	mm^2	





Shear Resistance, V_r	**957**	**kN**
Max ULS Factored Shear	**480**	**kN**
Demand/Capacity	**0.50**	

Bearing Resistance - Abutment End

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{be}	0.75		
w	11.76	mm	***[20% reduction due to corrosion]***
N	200	mm	***[Bearing plate width similar to flange width]***
t	21.7	mm	
Bearing Resistance, Br per b)i)	**582**	**kN**	
Bearing Resistance, Br per b)ii)	**422**	**kN**	
Bearing Resistance, Br	**422**	**kN**	
Maximum Reaction	**575**	**kN**	
Demand/Capacity (Web Alone)	**1.36**		

Bearing Resistance of Stiffener - CSA S6-19 cl. 10.10.8.2

Stiffener Type	5x5x1/2	(Angle)	***[Imperial]***
	127x127x13	(Angle)	***[Metric]***
Number of Stiffeners	2		

Bearing Stiffener Dimensions

Width of Stiffener (Parallel Leg)	63.5	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of perpen. Leg
ickness of Stiffener (Parallel Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	
Width of Stiffeners (Perpen Leg)	63.5	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of perpen. Leg
Thickness of Stiffener	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	

Bearing Resist. of Stiffeners

Area of Stiffener	1451.61	mm^2
Bearing Resist. of Stiffeners	901	kN

Overall Bearing Resistance (Web Resistance + Stiffener Resistance)

Total Bearing Resistance	**1324**	**kN**
Maximum Reaction	**575**	**kN**
Demand/Capacity	**0.43**	

Compressive Resistance - CSA S6-19 cl. 10.10.8.3

Girder Web Thickness	11.76	mm	
Web Height	796.6	mm	
Width of Stiffener (Perpen. Leg)	63.5	mm	*(Standard Angle)*
ickness of Stiffener (Perpen. Leg)	12.7	mm	*(Standard Angle)*
Width of Stiffener (Parallel Leg)	63.5	mm	*(Standard Angle)*
ickness of Stiffener (Parallel Leg)	12.7	mm	*(Standard Angle)*
Column Web Width, 12 x w	141.12	mm	*(Both sides)*

JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Column Section Properties - X-X Axis (Parallel to Girder Longitudinal Axis)

Element	b	h	Number	A	y	Ay	$y\text{-}y_0$	$A(y\text{-}y_0)$
Stiffener 1 - Perpendicular Leg	12.7	50.8	**1**	645	25.4	1.64E+04	-44	-28374
Stiffener 1 - Parallel Leg	63.5	12.7	**1**	806	57.2	4.61E+04	-12	-9863
Web	282.2	11.8	**1**	3319	69.4	2.30E+05	0	0
Stiffener 2 - Parallel Leg	63.5	12.7	**1**	806	81.6	6.58E+04	12	9863
Stiffener 2 - Perpendicular Leg	12.7	50.8	**1**	645	113.4	7.31E+04	44	28374
				Σ = 6222		**4.32E+05**		

Element	I_0	$A(y\text{-}y_0)^2$	I_x
Stiffener 1 - Perpendicular Leg	1.39E+05	1.25E+06	1.4E+06
Stiffener 1 - Parallel Leg	1.08E+04	1.21E+05	1.3E+05
Web	3.83E+04	0.00E+00	3.8E+04
Stiffener 2 - Parallel Leg	1.08E+04	1.21E+05	1.3E+05
Stiffener 2 - Perpendicular Leg	1.39E+05	1.25E+06	1.4E+06
			Σ = 3074454

Y_0	69.38

Column Section Properties - Y-Y Axis (Perpendicular to Girder Longitudinal Axis)

Element	b	h	Number	A	x	Ax	$x\text{-}x_0$	$A(x\text{-}x_0)$
Stiffener 1 - Perpendicular Leg	50.8	12.7	**1**	645	134.8	8.69E+04	3	2062
Stiffener 1 - Parallel Leg	12.7	63.5	**1**	806	109.4	8.82E+04	-22	-17906
Web	11.8	282.2	**1**	3319	141.1	4.68E+05	10	31687
Stiffener 2 - Parallel Leg	12.7	63.5	**1**	806	109.4	8.82E+04	-22	-17906
Stiffener 2 - Perpendicular Leg	50.8	12.7	**1**	645	134.8	8.69E+04	3	2062
				Σ = 6222		**8.19E+05**		

X_0	131.57

Element	I_0	$A(x\text{-}x_0)^2$	I_y
Stiffener 1 - Perpendicular Leg	8.67E+03	6.59E+03	1.5E+04
Stiffener 1 - Parallel Leg	2.71E+05	3.98E+05	6.7E+05
Web	2.20E+07	3.03E+05	2.2E+07
Stiffener 2 - Parallel Leg	2.71E+05	3.98E+05	6.7E+05
Stiffener 2 - Perpendicular Leg	8.67E+03	6.59E+03	1.5E+04
			Σ = 23703552

FL. Buckling Resistance about X-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	597.45	mm
Radius of Gyration about X, r_x	22.23	mm
Specified Min. Yield Stress, F_y	230	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.203	
Resistance Factor	0.9	
Web-Stiffener Col Area	6222	mm^2
n	1.34	
Compressive Resistance, C_r	**1275**	**kN**

FL. Buckling Resistance about Y-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	597.45	mm
Radius of Gyration about Y, r_y	61.72	mm
Specified Min. Yield Stress, F_y	230	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.073	
Resistance Factor	0.9	
Web-Stiffener Col Area	6222	mm^2
n	1.34	
Compressive Resistance, C_r	**1287**	**kN**

Overall Compressive Resistance, C_r	**1275**	**kN**
Maximum Factored Reaction	**575**	**kN**
Demand/Capacity	**0.45**	

JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Bearing Resistance - Rear Floor Beam End

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{be}	0.75		
w	11.76	mm	***[20% reduction due to corrosion]***
N	254	mm	***[Half of top flange width of floor beam per original drawings]***
t	19	mm	***[Thickness of bottom angles per original drawings]***
Bearing Resistance, Br per b)i)	**691**	**kN**	
Bearing Resistance, Br per b)ii)	**422**	**kN**	
Bearing Resistance, Br	**422**	**kN**	
Maximum Reaction	**575**	**kN**	
Demand/Capacity (Web Alone)	**1.36**		

Bearing Resistance of Stiffener - CSA S6-19 cl. 10.10.8.2

Stiffener Type	6x4x1/2	(Angle)	***[Imperial]***
	152x102x13	(Angle)	***[Metric]***
Number of Stiffeners	2		

Bearing Stiffener Dimensions

Width of Stiffener (Parallel Leg)	51	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of parallel leg
ıickness of Stiffener (Parallel Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	
Width of Stiffeners (Perpen Leg)	69.325	mm	***[Smaller of Flange width minus web thickness***	50% reduction of perpen. Leg
Thickness of Stiffener	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	

Bearing Resist. of Stiffeners

Area of Stiffener	1366.8375	mm^2
Bearing Resist. of Stiffeners	849	kN

Overall Bearing Resistance (Web Resistance + Stiffener Resistance)

Total Bearing Resistance	**1271**	**kN**
Maximum Reaction	**575**	**kN**
Demand/Capacity	**0.45**	

Compressive Resistance - CSA S6-19 cl. 10.10.8.3

Girder Web Thickness	11.76	mm	
Web Height	645.575	mm	
Width of Stiffener (Perpen. Leg)	69.325	mm	*(Standard Angle)*
ıickness of Stiffener (Perpen. Leg)	12.7	mm	*(Standard Angle)*
Width of Stiffener (Parallel Leg)	51	mm	*(Standard Angle)*
ıickness of Stiffener (Parallel Leg)	12.7	mm	*(Standard Angle)*
Column Web Width, 12 x w	141.12	mm	*(Both sides)*

Column Section Properties - X-X Axis (Parallel to Girder Longitudinal Axis)

Element	*b*	*h*	*Number*	*A*	*y*	*Ay*	*y-y₀*	*A(y-y₀)*
Stiffener 1 - Perpendicular Leg	12.7	56.6	**1**	719	28.3	2.04E+04	-47	-33722
Stiffener 1 - Parallel Leg	51.0	12.7	**1**	648	63.0	4.08E+04	-12	-7921
Web	141.1	11.8	**1**	1660	75.2	1.25E+05	0	0
Stiffener 2 - Parallel Leg	51.0	12.7	**1**	648	87.4	5.66E+04	12	7921
Stiffener 2 - Perpendicular Leg	12.7	56.6	**1**	719	122.1	8.78E+04	47	33722
				Σ = 4393		**3.30E+05**		

Element	I_0	$A(y-y_0)^2$	I_x
Stiffener 1 - Perpendicular Leg	1.92E+05	1.58E+06	1.8E+06
Stiffener 1 - Parallel Leg	8.71E+03	9.69E+04	1.1E+05
Web	1.91E+04	0.00E+00	1.9E+04
Stiffener 2 - Parallel Leg	8.71E+03	9.69E+04	1.1E+05
Stiffener 2 - Perpendicular Leg	1.92E+05	1.58E+06	1.8E+06
			Σ = 3777232

Y_0	**75.21**

Column Section Properties - Y-Y Axis (Perpendicular to Girder Longitudinal Axis)

Element	*b*	*h*	*Number*	*A*	*x*	*Ax*	$x-x_0$	$A(x-x_0)$
Stiffener 1 - Perpendicular Leg	56.6	12.7	**1**	719	134.8	9.69E+04	30	21504
Stiffener 1 - Parallel Leg	12.7	51.0	**1**	648	115.6	7.49E+04	11	6964
Web	11.8	141.1	**1**	1660	70.6	1.17E+05	-34	-56936
Stiffener 2 - Parallel Leg	12.7	51.0	**1**	648	115.6	7.49E+04	11	6964
Stiffener 2 - Perpendicular Leg	56.6	12.7	**1**	719	134.8	9.69E+04	30	21504
				Σ = 4393		**4.61E+05**		

X_0	**104.87**

Element	I_0	$A(x-x_0)^2$	I_y
Stiffener 1 - Perpendicular Leg	9.67E+03	6.43E+05	6.5E+05
Stiffener 1 - Parallel Leg	1.40E+05	7.49E+04	2.2E+05
Web	2.75E+06	1.95E+06	4.7E+06
Stiffener 2 - Parallel Leg	1.40E+05	7.49E+04	2.2E+05
Stiffener 2 - Perpendicular Leg	9.67E+03	6.43E+05	6.5E+05
			Σ = 6443426

FL. Buckling Resistance about X-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	484.18125	mm
Radius of Gyration about X, r_x	29.32	mm
Specified Min. Yield Stress, F_y	230	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.125	
Resistance Factor	0.9	
Web-Stiffener Col Area	4393	mm^2
n	1.34	
Compressive Resistance, C_r	**907**	**kN**

FL. Buckling Resistance about Y-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	484.18125	mm
Radius of Gyration about Y, r_y	38.30	mm
Specified Min. Yield Stress, F_y	230	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.096	
Resistance Factor	0.9	
Web-Stiffener Col Area	4393	mm^2
n	1.34	
Compressive Resistance, C_r	**908**	**kN**
Overall Compressive Resistance, C_r	**907**	**kN**
Maximum Factored Reaction	**575**	**kN**
Demand/Capacity	**0.63**	

Final Bearing Resistance:	**907**	**kN**
Maximum Factored Reaction:	**575**	**kN**
Utilization (Demand/Capacity):	**0.63**	

Load Combinations (Rehabilitated)

Load factors

Load factors from CSA S6-19 cl. 3.5, Table 3.1, 3.2 & 3.3

SLS	
Factory-produced component	1.00
Cast-in-place component	1.00
Wearing surfaces	1.00
Live Load (Vehicle)	0.90

FLS	
Factory-produced component	1.00
Cast-in-place component	1.00
Wearing surfaces	1.00
Live Load (Vehicle)	1.00

ULS 1 MAX	
Factory-produced component	1.10
Cast-in-place component	1.20
Wearing surfaces	1.50
Live Load (Vehicle)	1.70
Load Load (Pedestrian)	1.70

ULS 9	
Factory-produced component	1.35
Cast-in-place component	1.35
Wearing surfaces	1.35

**Results from grillage model created in Midas Civil*

Moment

Relative Span Distance		0L	0.1L	0.2L	0.3L	0.4L	0.5L
Absolute Span Distance		0.00 m	1.26 m	2.52 m	3.78 m	5.04 m	6.30 m
SLS	**Max.**	**0 kNm**	**431 kNm**	**675 kNm**	**833 kNm**	**925 kNm**	**950 kNm**
ULS	**ULS Max Env.**	**0 kNm**	**731 kNm**	**1126 kNm**	**1376 kNm**	**1522 kNm**	**1559 kNm**

**Critical girder is 2nd interior girder from east*

Shear

Relative Span Distance		0L
Absolute Span Distance		0.00 m
SLS	**Max.**	**344 kN**
ULS	**ULS Max Env.**	**582 kN**

**Maximum shear is at location of support*

Maximum SLS DL Reaction:	110 kN
Maximum SLS TL Reaction:	383 kN
Maximum ULS DL Reaction:	136 kN
Maximum ULS TL Reaction:	650 kN

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JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

SLS Girder Resistance (Rehabilitated)

*Calculated conservatively not accounting for composite properties

Control of Permanent Deflections *[CSA S6-19 Cl. 10.11.4]*

Max. SLS Moment	950	kNm
Section Modulus, S	8870000	mm^3
Stress in Flange	**107**	**MPa**
Stress Limit (0.9F_y)	**315**	**MPa**
Demand/Capacity	**0.34**	

ULS Girder Resistance (Rehabilitated)

*Assumed that girder section does not act compositely with the deck, shear studs are not shown in existing drawings

Original Girder Section: W920x238

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2.1, Table 10.3]***

Flange		
Flange Class 1	7.75	
Flange Class 2	9.09	
Flange Class 3	10.69	
Web		
Web Class 1	58.80	
Web Class 2	90.87	
Web Class 3	101.56	

Width-to-Thickness Ratios of Girder

Flange		
Half width of flange, b	153	mm
Thickness of flange, t	26	mm
b/t	6	
Web		
Clear depth of web, h	863.2	mm
Thickness of web, w	16.50	mm
h/w	52	

Class of Section

Flange Class:	1
Web Class:	1

Moment Resistance of Laterally Unbraced Members (Section Classes 1 & 2) - CSA S6-19 cl. 10.10.2.3

Unbraced Length, L 3149.6 mm ***[Distance between diaphragms]***

Plastic Moment, M_p

Plastic Section Modulus, Z	10200000	mm^3
Yield Stress, F_y	350	MPa
Plastic Moment, M_p	3570	kNm
$0.67M_p$	**2391.9**	**kNm**

AECOM Imagine it. Delivered.			
JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
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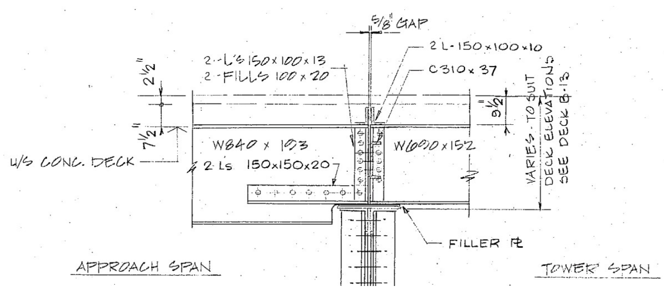
Critical Elastic Moment, M_u

M_{max}	1559.00	kNm
M_a	1376.00	
M_b	1449.00	kNm
M_c	1522.00	
ω_2 Coefficient	1.07	
Unbraced Length, L	3149.6	mm
E_s	200000	MPa
I_y	123000000	mm^4
G_s	77000	MPa
J	5100000	mm^4
C_w	2.43E+13	mm^6
M_u	**12103**	**kNm**

Overall Moment Resist., M_r	**3392**	**kNm**
Max ULS Factored Moment	**1559**	**kNm**
Demand/Capacity	**0.46**	

Shear Resistance - CSA S6-19 cl. 10.10.5.1

Spacing of Tranverse Stiffn, a	12598	mm	***[Unstiffened web]***
Web height, h	637.175	mm	***[Used reduced web height at south abutment per original drawings]***
a/h	20		
k_v	5.35		
h/w	52		
502√kv/Fy	62.07		
621√kv/Fy	76.78		
F_{cr}	**201.95**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**201.95**	**MPa**	
Area of Web, A_w	8410.71	mm^2	



Shear Resistance, V_r	**1614**	**kN**
Max ULS Factored Shear	**582**	**kN**
Demand/Capacity	**0.36**	

JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Bearing Resistance - Abutment End

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{be}	0.75		
w	13.20	mm	***[20% reduction due to corrosion]***
N	200	mm	***[Bearing plate width similar to flange width]***
t	26	mm	
Bearing Resistance, Br per b)i)	**1052**	**kN**	
Bearing Resistance, Br per b)ii)	**656**	**kN**	
Bearing Resistance, Br	**656**	**kN**	
Maximum Reaction	**650**	**kN**	
Demand/Capacity (Web Alone)	**0.99**		

Bearing Resistance of Stiffener - CSA S6-19 cl. 10.10.8.2

Stiffener Type	5x5x1/2	(Angle)	***[Imperial]***
	127x127x13	(Angle)	***[Metric]***
Number of Stiffeners	2		

Bearing Stiffener Dimensions

Width of Stiffener (Parallel Leg)	63.5	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of parallel leg
ıickness of Stiffener (Parallel Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	
Width of Stiffeners (Perpen Leg)	63.5	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of perpen. Leg
Thickness of Stiffener	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	

Bearing Resist. of Stiffeners

Area of Stiffener	1451.61	mm^2
Bearing Resist. of Stiffeners	1372	kN

Overall Bearing Resistance (Web Resistance + Stiffener Resistance)

Total Bearing Resistance	**2028**	**kN**
Maximum Reaction	**650**	**kN**
Demand/Capacity	**0.32**	

Compressive Resistance - CSA S6-19 cl. 10.10.8.3

Girder Web Thickness	13.20	mm	
Web Height	863.2	mm	
Width of Stiffener (Perpen. Leg)	63.5	mm	*(Standard Angle)*
ıickness of Stiffener (Perpen. Leg)	12.7	mm	*(Standard Angle)*
Width of Stiffener (Parallel Leg)	63.5	mm	*(Standard Angle)*
ıickness of Stiffener (Parallel Leg)	12.7	mm	*(Standard Angle)*
Column Web Width, 12 x w	158.4	mm	*(Both sides)*
Horiz. Distance to Centroid of L	36.4	mm	***[CISC 6-70, 11TH Edition, 2016 (y distance)]***

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Column Section Properties - X-X Axis (Parallel to Girder Longitudinal Axis)

Element	b	h	Number	A	y	Ay	$y-y_0$	$A(y-y_0)$
Stiffener 1 - Perpendicular Leg	12.7	50.8	1	645	25.4	1.64E+04	-45	-28839
Stiffener 1 - Parallel Leg	63.5	12.7	1	806	57.2	4.61E+04	-13	-10444
Web	316.8	13.2	1	4182	70.1	2.93E+05	0	0
Stiffener 2 - Parallel Leg	63.5	12.7	1	806	83.1	6.70E+04	13	10444
Stiffener 2 - Perpendicular Leg	12.7	50.8	1	645	114.8	7.41E+04	45	28839
				Σ = 7085		**4.97E+05**		

Element	I_0	$A(y-y_0)^2$	I_x
Stiffener 1 - Perpendicular Leg	1.39E+05	1.29E+06	1.4E+06
Stiffener 1 - Parallel Leg	1.08E+04	1.35E+05	1.5E+05
Web	6.07E+04	0.00E+00	6.1E+04
Stiffener 2 - Parallel Leg	1.08E+04	1.35E+05	1.5E+05
Stiffener 2 - Perpendicular Leg	1.39E+05	1.29E+06	1.4E+06
			Σ = 3208548

Y_0	70.10

Column Section Properties - Y-Y Axis (Perpendicular to Girder Longitudinal Axis)

Element	b	h	Number	A	x	Ax	$x-x_0$	$A(x-x_0)$
Stiffener 1 - Perpendicular Leg	50.8	12.7	1	645	188.5	1.22E+05	24	15173
Stiffener 1 - Parallel Leg	12.7	63.5	1	806	163.1	1.31E+05	-2	-1517
Web	13.2	316.8	1	4182	158.4	6.62E+05	-7	-27312
Stiffener 2 - Parallel Leg	12.7	63.5	1	806	163.1	1.31E+05	-2	-1517
Stiffener 2 - Perpendicular Leg	50.8	12.7	1	645	188.5	1.22E+05	24	15173
				Σ = 7085		**1.17E+06**		

X_0	164.93

Element	I_0	$A(x-x_0)^2$	I_y
Stiffener 1 - Perpendicular Leg	8.67E+03	3.57E+05	3.7E+05
Stiffener 1 - Parallel Leg	2.71E+05	2.85E+03	2.7E+05
Web	3.50E+07	1.78E+05	3.5E+07
Stiffener 2 - Parallel Leg	2.71E+05	2.85E+03	2.7E+05
Stiffener 2 - Perpendicular Leg	8.67E+03	3.57E+05	3.7E+05
			Σ = 36431352

FL. Buckling Resistance about X-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	647.4	mm
Radius of Gyration about X, r_x	21.28	mm
Specified Min. Yield Stress, F_y	350	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.284	
Resistance Factor	0.9	
Web-Stiffener Col Area	7085	mm^2
n	1.34	
Compressive Resistance, C_r	**2177**	**kN**

FL. Buckling Resistance about Y-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	647.4	mm
Radius of Gyration about Y, r_y	71.71	mm
Specified Min. Yield Stress, F_y	350	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.084	
Resistance Factor	0.9	
Web-Stiffener Col Area	7085	mm^2
n	1.34	
Compressive Resistance, C_r	**2230**	**kN**

Overall Compressive Resistance, C_r	**2177**	**kN**
Maximum Factored Reaction	**650**	**kN**
Demand/Capacity	**0.30**	

Bearing Resistance - Rear Floor Beam End

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{be}	0.75		
w	13.20	mm	***[20% reduction due to corrosion]***
N	254	mm	***[Half of top flange width of floor beam per original drawings]***
t	19	mm	***[Thickness of bottom angles per original drawings]***
Bearing Resistance, Br per b)i)	**1239**	**kN**	
Bearing Resistance, Br per b)ii)	**656**	**kN**	
Bearing Resistance, Br	**656**	**kN**	
Maximum Reaction	**650**	**kN**	
Demand/Capacity (Web Alone)	**0.99**		

Bearing Resistance of Stiffener - CSA S6-19 cl. 10.10.8.2

Stiffener Type	6x4x1/2	(Angle)	***[Imperial]***	
	152x102x13	(Angle)	***[Metric]***	
Number of Stiffeners	2			

Bearing Stiffener Dimensions

Width of Stiffener (Parallel Leg)	51	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of parallel leg
ıickness of Stiffener (Parallel Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	
Width of Stiffeners (Perpen Leg)	72.125	mm	***[Smaller of Flange width minus web thickness ar***	50% reduction of perpen. Leg
Thickness of Stiffener	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	

Bearing Resist. of Stiffeners

Area of Stiffener	1402.3975	mm^2
Bearing Resist. of Stiffeners	1325	kN

Overall Bearing Resistance (Web Resistance + Stiffener Resistance)

Total Bearing Resistance	**1981**	**kN**
Maximum Reaction	**650**	**kN**
Demand/Capacity	**0.33**	

Compressive Resistance - CSA S6-19 cl. 10.10.8.3

Girder Web Thickness	13.20	mm	
Web Height	637.175	mm	
Width of Stiffener (Perpen. Leg)	72.125	mm	*(Standard Angle)*
ıickness of Stiffener (Perpen. Leg)	12.7	mm	*(Standard Angle)*
Width of Stiffener (Parallel Leg)	51	mm	*(Standard Angle)*
ıickness of Stiffener (Parallel Leg)	12.7	mm	*(Standard Angle)*
Column Web Width, 12 x w	158.4	mm	*(Both sides)*

Column Section Properties - X-X Axis (Parallel to Girder Longitudinal Axis)

Element	b	h	Number	A	y	Ay	$y\text{-}y_0$	$A(y\text{-}y_0)$
Stiffener 1 - Perpendicular Leg	12.7	59.4	1	755	29.7	2.24E+04	-49	-36990
Stiffener 1 - Parallel Leg	51.0	12.7	1	648	65.8	4.26E+04	-13	-8388
Web	158.4	13.2	1	2091	78.7	1.65E+05	0	0
Stiffener 2 - Parallel Leg	51.0	12.7	1	648	91.7	5.94E+04	13	8388
Stiffener 2 - Perpendicular Leg	12.7	59.4	1	755	127.7	9.64E+04	49	36990
				Σ = 4896		**3.85E+05**		

Element	I_0	$A(y\text{-}y_0)^2$	I_x
Stiffener 1 - Perpendicular Leg	2.22E+05	1.81E+06	2.0E+06
Stiffener 1 - Parallel Leg	8.71E+03	1.09E+05	1.2E+05
Web	3.04E+04	0.00E+00	3.0E+04
Stiffener 2 - Parallel Leg	8.71E+03	1.09E+05	1.2E+05
Stiffener 2 - Perpendicular Leg	2.22E+05	1.81E+06	2.0E+06
			Σ = 4335100

Y_0	**78.73**

Column Section Properties - Y-Y Axis (Perpendicular to Girder Longitudinal Axis)

Element	b	h	Number	A	x	Ax	$x\text{-}x_0$	$A(x\text{-}x_0)$
Stiffener 1 - Perpendicular Leg	59.4	12.7	1	755	152.1	1.15E+05	36	27305
Stiffener 1 - Parallel Leg	12.7	51.0	1	648	132.9	8.61E+04	17	11031
Web	13.2	158.4	1	2091	79.2	1.66E+05	-37	-76672
Stiffener 2 - Parallel Leg	12.7	51.0	1	648	132.9	8.61E+04	17	11031
Stiffener 2 - Perpendicular Leg	59.4	12.7	1	755	152.1	1.15E+05	36	27305
				Σ = 4896		**5.67E+05**		

X_0	**115.87**

Element	I_0	$A(x\text{-}x_0)^2$	I_y
Stiffener 1 - Perpendicular Leg	1.01E+04	9.88E+05	1.0E+06
Stiffener 1 - Parallel Leg	1.40E+05	1.88E+05	3.3E+05
Web	4.37E+06	2.81E+06	7.2E+06
Stiffener 2 - Parallel Leg	1.40E+05	1.88E+05	3.3E+05
Stiffener 2 - Perpendicular Leg	1.01E+04	9.88E+05	1.0E+06
			Σ = 9835907

FL. Buckling Resistance about X-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	477.88125	mm
Radius of Gyration about X, r_x	29.76	mm
Specified Min. Yield Stress, F_y	350	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.150	
Resistance Factor	0.9	
Web-Stiffener Col Area	4896	mm^2
n	1.34	
Compressive Resistance, C_r	**1535**	**kN**

FL. Buckling Resistance about Y-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	477.88125	mm
Radius of Gyration about Y, r_y	44.82	mm
Specified Min. Yield Stress, F_y	350	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.099	
Resistance Factor	0.9	
Web-Stiffener Col Area	4896	mm^2
n	1.34	
Compressive Resistance, C_r	**1540**	**kN**
Overall Compressive Resistance, C_r	**1535**	**kN**
Maximum Factored Reaction	**650**	**kN**
Demand/Capacity	**0.42**	

Final Bearing Resistance:	**1535**	**kN**
Maximum Factored Reaction:	**650**	**kN**
Utilization (Demand/Capacity):	**0.42**	

JOB TITLE	BCLB DECK PRE-DESIGN - Approach Span (12.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

RESULT SUMMARY

**Calculated conservatively without including contribution of slab to resistance (assumed non-composite)*

Original Girder	
ULS	
M_f/M_r	**0.82**
V_f/V_r	**0.50**
B_f/B_r	**0.63**
SLS	
Demand/Stress Limit	**0.55**
Rehabilitated Girder	
ULS	
M_f/M_r	**0.46**
V_f/V_r	**0.36**
B_f/B_r	**0.42**
SLS	
Demand/Stress Limit	**0.34**

General Information

Material Specifications

Structural Steel (CSA G40-4 or ASTM A7) - Original Steel

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***
Unit Weight =	77	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
G_s =	77000	MPa	

Structural Steel - 1982 Rehabilitation - Strength from 1982 Rehabiliation Drawings

F_y =	350	MPa	***[1982 Rehabilitation Drawings]***
F_u =	450	MPa	***[CSA S6-19 cl. 14.7.4.2, Table 14.1]***

Reinforced Concrete - Deck

f'_c =	20	MPa	***[CSA S6-19 cl. 14.7.4.4 - unknown concrete strength]***
f_{cr} =	1.79	MPa	***[CSA S6-19 cl. 8.4.1.8.1]***
Unit Weight =	24	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
E_c =	21656	MPa	

[Slab details not provided on original construction drawings - reinforcement unknown]

Asphalt

Unit Weight =	23.5	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Plain Concrete - Sidewalk Deck

Unit Weight =	23.5	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Aluminum

Unit Weight =	27.0	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Bridge Specifications

Span Length, L:	9.7000	m	***[According to Original Drawings]***
Roadway Width:	13.5636	m	***[According to 1982 Rehab Drawings]***
Tot. Deck Slab Width:	13.6	m	
West Exterior Cantilever L:	0	m	***[On west side, slab ends before girder flange edge]***
East Exterior Cantilever L:	0.6096	m	***[According to 1982 Rehab Drawings]***
No. of Design Lanes:	4		***[CSA S6-19 cl. 3.8.2, Table 3.5]***
Number of Girders:	8		
Original Girder Spacing:	1.931	m	***[According to Original Drawings]***
Int. Rehab. Girder Spacing	2.057	m	***[According to 1982 Rehab Drawings]***
Ext. Rehab. Girder Spacing	1.524	m	***[According to 1982 Rehab Drawings]***
Orig. Girder Type (Imperial):	W27x102		***[According to Original Drawings]***
Orig. Girder Type (Metric):	W690x152		***[CISC 6-38, 11TH Edition, 2016]***
Wide. Girder Type (Imperial):	W27x102		***[According to 1982 Rehab Drawings]***
Wide. Girder Type (Metric):	W690x152		***[CISC 6-38, 11TH Edition, 2016]***
Diaphragm Spacing (m):	3.2306		

JOB TITLE	BCLB DECK PRE-DESIGN - Tower Span Evaluation (10.6m)		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

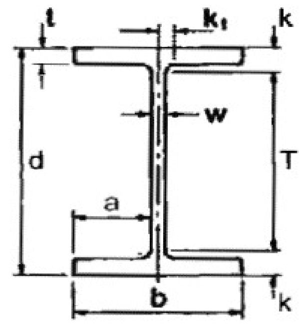
Section Properties

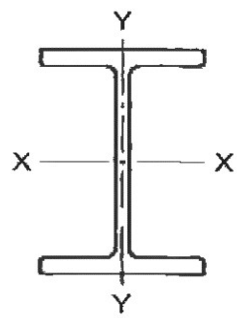
Non-Composite Bare Steel Girder

Longitudinal Stringer (W690x152) - Original Bridge

All data from CISC 11th Edition - 6-38, 3-39

Depth, d	688	mm
Flange width	254	mm
Flange thickness, t	21.1	mm
Web thickness, w	13.10	mm
Dead Load	1.49	kN/m
Area	19400	mm^2
Ix	1510000000	mm^4
Sx	4380000.00	mm^3
rx	279	mm
Zx	5000000	mm^3
Iy	57800000	mm^4
Sy	455000	mm^3
ry	54.6	mm
Zy	710000	mm^3
J	2200000	mm^4
Cw	6.42E+12	mm^6





Load Combinations (Original)

Load factors

Load factors from CSA S6-19 cl. 3.5, Table 3.1, 3.2 & 3.3

SLS	
Factory-produced component	1.00
Cast-in-place component	1.00
Wearing surfaces	1.00
Live Load (Vehicle)	0.90

FLS	
Factory-produced component	1.00
Cast-in-place component	1.00
Wearing surfaces	1.00
Live Load (Vehicle)	1.00

ULS 1 MAX	
Factory-produced component	1.10
Cast-in-place component	1.20
Wearing surfaces	1.50
Live Load (Vehicle)	1.70
Load Load (Pedestrian)	1.70

ULS 9	
Factory-produced component	1.35
Cast-in-place component	1.35
Wearing surfaces	1.35

**Results taken from grillage model created in Midas Civil*

Moment

Relative Span Distance		0L	0.1L	0.2L	0.3L	0.4L	0.5L
Absolute Span Distance		0.00 m	0.97 m	1.94 m	2.91 m	3.88 m	4.85 m
SLS	**Max.**	**0 kNm**	**233 kNm**	**388 kNm**	**476 kNm**	**523 kNm**	**543 kNm**
ULS	**ULS Max Env.**	**0 kNm**	**371 kNm**	**640 kNm**	**825 kNm**	**918 kNm**	**944 kNm**

**Taken from envelope of maximums*

Shear

Relative Span Distance		0L	**Maximum shear is at location of support, 0L*
Absolute Span Distance		0.00 m	
SLS	**Max.**	**264 kN**	*At location of front floor beam*
ULS	**ULS Max Env.**	**464 kN**	*At location of front floor beam*

ULS Girder Resistance (Original)

*Assumed that girder section does not act compositely with the deck, shear studs are not shown in existing drawings

Original Girder Section: W690x152

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2.1, Table 10.3]***

Flange		
Flange Class 1	9.56	
Flange Class 2	11.21	
Flange Class 3	13.19	
Web		
Web Class 1	72.53	
Web Class 2	112.09	
Web Class 3	125.28	

Width-to-Thickness Ratios of Girder

Flange		
Half width of flange, b	127	mm
Thickness of flange, t	21	mm
b/t	6	
Web		
Clear depth of web, h	645.8	mm
Thickness of web, w	13.10	mm
h/w	49	

Class of Section

Flange Class:	1
Web Class:	1

Moment Resistance of Laterally Unbraced Members (Section Classes 1 & 2) - CSA S6-19 cl. 10.10.2.3

Unbraced Length, L	3149.6	mm	***[Distance between diaphragms]***

Plastic Moment, M_p

Plastic Section Modulus, Z	5000000	mm^3
Unbraced Length, L	3149.6	mm
E_s	200000	MPa
I_y	57800000	mm^4
G_s	77000	MPa
J	2200000	mm^4
C_w	6.42E+12	mm^6
M_u	**4392**	**kNm**

Overall Moment Resist., M_r	**1093**	**kNm**
Max ULS Factored Moment	**944**	**kNm**
Demand/Capacity	**0.86**	

Shear Resistance - CSA S6-19 cl. 10.10.5.1

Spacing of Tranverse Stiffn, a	9700	mm	*[Unstiffened web]*
Web height, h	646.775	mm	*[Used reduced web height at south abutment per original drawings]*
a/h	15		
k_v	5.36		
h/w	49		
502√kv/Fy	76.62		
621√kv/Fy	94.78		
F_{cr}	**132.71**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**132.71**	**MPa**	
Area of Web, A_w	6778.202	mm^2	
Shear Resistance, V_r	**855**	**kN**	
Max ULS Factored Shear	**464**	**kN**	
Demand/Capacity	**0.54**		

Bearing Resistance - Front Floor Beam End

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{be}	0.75		
w	10.48	mm	***[20% reduction due to corrosion]***
N	254	mm	***[Bearing plate width similar to flange width]***
t	21	mm	
Bearing Resistance, Br per b)i)	**612**	**kN**	
Bearing Resistance, Br per b)ii)	**335**	**kN**	
Bearing Resistance, Br	**335**	**kN**	
Maximum Reaction	**802**	**kN**	
Demand/Capacity (Web Alone)	**2.39**		

Bearing Resistance of Stiffener - CSA S6-19 cl. 10.10.8.2

Stiffener Type	4x4x1/2	(Angle)	***[Imperial]***
	102x102x13	(Angle)	***[Metric]***
Number of Stiffeners	2		

Bearing Stiffener Dimensions

Width of Stiffener (Parallel Leg)	61.2	mm	***[CISC 6-70, 11TH Edition, 2016]***	40% reduction of parallel leg
ıickness of Stiffener (Parallel Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	
Width of Stiffeners (Perpen Leg)	61.2	mm	***[CISC 6-70, 11TH Edition, 2016]***	40% reduction of perpen. leg
ıickness of Stiffener (Perpen Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	

Bearing Resist. of Stiffeners

Area of Stiffener	1393.19	mm^2
Bearing Resist. of Stiffeners	865	kN

Overall Bearing Resistance (Web Resistance + Stiffener Resistance)

Total Bearing Resistance	**1200**	**kN**
Maximum Reaction	**802**	**kN**
Demand/Capacity	**0.67**	

Compressive Resistance - CSA S6-19 cl. 10.10.8.3

Girder Web Thickness	10.48	mm	
Web Height	645.8	mm	
Width of Stiffener (Perpen. Leg)	61.2	mm	*(Standard Angle)*
ıickness of Stiffener (Perpen. Leg)	12.7	mm	*(Standard Angle)*
Width of Stiffener (Parallel Leg)	61.2	mm	*(Standard Angle)*
ıickness of Stiffener (Parallel Leg)	12.7	mm	*(Standard Angle)*
Column Web Width, 12 x w	125.76	mm	*(Both sides)*

Column Section Properties - X-X Axis (Parallel to Girder Longitudinal Axis)

Element	b	h	Number	A	y	Ay	$y-y_0$	$A(y-y_0)$
Stiffener 1 - Perpendicular Leg	12.7	48.5	**1**	616	24.3	1.49E+04	-42	-25987
Stiffener 1 - Parallel Leg	61.2	12.7	**1**	777	54.9	4.26E+04	-12	-9008
Web	251.5	10.5	**1**	2636	66.4	1.75E+05	0	0
Stiffener 2 - Parallel Leg	61.2	12.7	**1**	777	78.0	6.06E+04	12	9008
Stiffener 2 - Perpendicular Leg	12.7	48.5	**1**	616	108.6	6.69E+04	42	25987
				Σ = 5422		**3.60E+05**		

Element	I_0	$A(y-y_0)^2$	I_x
Stiffener 1 - Perpendicular Leg	1.21E+05	1.10E+06	1.2E+06
Stiffener 1 - Parallel Leg	1.04E+04	1.04E+05	1.1E+05
Web	2.41E+04	0.00E+00	2.4E+04
Stiffener 2 - Parallel Leg	1.04E+04	1.04E+05	1.1E+05
Stiffener 2 - Perpendicular Leg	1.21E+05	1.10E+06	1.2E+06
			Σ = 2688085

Y_0	**66.44**

Column Section Properties - Y-Y Axis (Perpendicular to Girder Longitudinal Axis)

Element	b	h	Number	A	x	Ax	$x-x_0$	$A(x-x_0)$
Stiffener 1 - Perpendicular Leg	48.5	12.7	**1**	616	119.4	7.36E+04	4	2381
Stiffener 1 - Parallel Leg	12.7	61.2	**1**	777	95.2	7.40E+04	-20	-15844
Web	10.5	251.5	**1**	2636	125.8	3.31E+05	10	26926
Stiffener 2 - Parallel Leg	12.7	61.2	**1**	777	95.2	7.40E+04	-20	-15844
Stiffener 2 - Perpendicular Leg	48.5	12.7	**1**	616	119.4	7.36E+04	4	2381
				Σ = 5422		**6.27E+05**		

X_0	**115.54**

Element	I_0	$A(x-x_0)^2$	I_y
Stiffener 1 - Perpendicular Leg	8.28E+03	9.20E+03	1.7E+04
Stiffener 1 - Parallel Leg	2.43E+05	3.23E+05	5.7E+05
Web	1.39E+07	2.75E+05	1.4E+07
Stiffener 2 - Parallel Leg	2.43E+05	3.23E+05	5.7E+05
Stiffener 2 - Perpendicular Leg	8.28E+03	9.20E+03	1.7E+04
			Σ = 15337405

FL. Buckling Resistance about X-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	484.35	mm
Radius of Gyration about X, r_x	22.27	mm
Specified Min. Yield Stress, F_y	230	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.164	
Resistance Factor	0.9	
Web-Stiffener Col Area	5422	mm^2
n	1.34	
Compressive Resistance, C_r	**1116**	**kN**

FL. Buckling Resistance about Y-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	484.35	mm
Radius of Gyration about Y, r_y	53.18	mm
Specified Min. Yield Stress, F_y	230	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.069	
Resistance Factor	0.9	
Web-Stiffener Col Area	5422	mm^2
n	1.34	
Compressive Resistance, C_r	**1122**	**kN**

Overall Compressive Resistance, C_r	**1116**	**kN**
Maximum Factored Reaction	**802**	**kN**
Demand/Capacity	**0.72**	

Bearing Resistance - Rear Floor Beam End

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{be}	0.75		
w	10.48	mm	***[20% reduction due to corrosion]***
N	254	mm	***[Bearing plate width similar to flange width]***
t	19	mm	***[Thickness of bottom angles per original drawings]***
Bearing Resistance, Br per b)i)	**612**	**kN**	
Bearing Resistance, Br per b)ii)	**335**	**kN**	
Bearing Resistance, Br	**335**	**kN**	
Maximum Reaction	**802**	**kN**	
Demand/Capacity (Web Alone)	**2.39**		

Bearing Resistance of Stiffener - CSA S6-19 cl. 10.10.8.2

Stiffener Type	6x4x1/2	(Angle)	***[Imperial]***
	152x102x13	(Angle)	***[Metric]***
Number of Stiffeners	2		

Bearing Stiffener Dimensions

Width of Stiffener (Parallel Leg)	61.2	mm	***[CISC 6-70, 11TH Edition, 2016]***	40% reduction of parallel leg
ickness of Stiffener (Parallel Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	
Width of Stiffeners (Perpen Leg)	72.27	mm	***[Smaller of Flange width minus web thickness***	40% reduction of perpen. leg
Thickness of Stiffener	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	

Bearing Resist. of Stiffeners

Area of Stiffener	1533.779	mm^2
Bearing Resist. of Stiffeners	952	kN

Overall Bearing Resistance (Web Resistance + Stiffener Resistance)

Total Bearing Resistance	**1288**	**kN**
Maximum Reaction	**802**	**kN**
Demand/Capacity	**0.62**	

Compressive Resistance - CSA S6-19 cl. 10.10.8.3

Girder Web Thickness	10.48	mm	
Web Height	646.775	mm	
Width of Stiffener (Perpen. Leg)	72.27	mm	*(Standard Angle)*
ıickness of Stiffener (Perpen. Leg)	12.7	mm	*(Standard Angle)*
Width of Stiffener (Parallel Leg)	61.2	mm	*(Standard Angle)*
ıickness of Stiffener (Parallel Leg)	12.7	mm	*(Standard Angle)*
Column Web Width, 12 x w	125.76	mm	*(Both sides)*

Column Section Properties - X-X Axis (Parallel to Girder Longitudinal Axis)

Element	*b*	*h*	*Number*	*A*	*y*	*Ay*	$y\text{-}y_0$	$A(y\text{-}y_0)$
Stiffener 1 - Perpendicular Leg	12.7	59.6	**1**	757	29.8	2.25E+04	-48	-36106
Stiffener 1 - Parallel Leg	61.2	12.7	**1**	777	65.9	5.12E+04	-12	-9008
Web	125.8	10.5	**1**	1318	77.5	1.02E+05	0	0
Stiffener 2 - Parallel Leg	61.2	12.7	**1**	777	89.1	6.93E+04	12	9008
Stiffener 2 - Perpendicular Leg	12.7	59.6	**1**	757	125.2	9.47E+04	48	36106
				Σ = 4386		**3.40E+05**		

Element	I_0	$A(y\text{-}y_0)^2$	I_x
Stiffener 1 - Perpendicular Leg	2.24E+05	1.72E+06	1.9E+06
Stiffener 1 - Parallel Leg	1.04E+04	1.04E+05	1.1E+05
Web	1.21E+04	0.00E+00	1.2E+04
Stiffener 2 - Parallel Leg	1.04E+04	1.04E+05	1.1E+05
Stiffener 2 - Perpendicular Leg	2.24E+05	1.72E+06	1.9E+06
			Σ = 4135508

Y_0	**77.51**

Column Section Properties - Y-Y Axis (Perpendicular to Girder Longitudinal Axis)

Element	*b*	*h*	*Number*	*A*	*x*	*Ax*	$x\text{-}x_0$	$A(x\text{-}x_0)$
Stiffener 1 - Perpendicular Leg	59.6	12.7	**1**	757	119.4	9.03E+04	26	19356
Stiffener 1 - Parallel Leg	12.7	61.2	**1**	777	95.2	7.40E+04	1	1037
Web	10.5	125.8	**1**	1318	62.9	8.29E+04	-31	-40785
Stiffener 2 - Parallel Leg	12.7	61.2	**1**	777	95.2	7.40E+04	1	1037
Stiffener 2 - Perpendicular Leg	59.6	12.7	**1**	757	119.4	9.03E+04	26	19356
				Σ = 4386		**4.11E+05**		

X_0	**93.83**

Element	I_0	$A(x\text{-}x_0)^2$	I_y
Stiffener 1 - Perpendicular Leg	1.02E+04	4.95E+05	5.1E+05
Stiffener 1 - Parallel Leg	2.43E+05	1.38E+03	2.4E+05
Web	1.74E+06	1.26E+06	3.0E+06
Stiffener 2 - Parallel Leg	2.43E+05	1.38E+03	2.4E+05
Stiffener 2 - Perpendicular Leg	1.02E+04	4.95E+05	5.1E+05
			Σ = 4497846

FL. Buckling Resistance about X-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	485.08125	mm
Radius of Gyration about X, r_x	30.71	mm
Specified Min. Yield Stress, F_y	230	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.119	
Resistance Factor	0.9	
Web-Stiffener Col Area	4386	mm^2
n	1.34	
Compressive Resistance, C_r	**906**	**kN**

FL. Buckling Resistance about Y-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	485.08125	mm
Radius of Gyration about Y, r_y	32.03	mm
Specified Min. Yield Stress, F_y	230	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.114	
Resistance Factor	0.9	
Web-Stiffener Col Area	4386	mm^2
n	1.34	
Compressive Resistance, C_r	**906**	**kN**

Final Bearing Resistance:	**906**	**kN**
Maximum Factored Reaction:	**802**	**kN**
Utilization (Demand/Capacity):	**0.89**	

Overall Compressive Resistance, C_r	**906**	**kN**
Maximum Factored Reaction	**802**	**kN**
Demand/Capacity	**0.89**	

**Reaction taken at front floor beam location - girder continuous*

SLS Girder Resistance (Original)

*Calculated conservatively not accounting for composite properties

Control of Permanent Deflections *[CSA S6-19 Cl. 10.11.4]*

Max. SLS Moment	543	kNm
Section Modulus, S	4380000	mm^3
Stress in Flange	**124**	**MPa**
Stress Limit (0.9F_y)	**207**	**MPa**
Demand/Capacity	**0.60**	

JOB TITLE	BCLB DECK PRE-DESIGN - Tower Span Evaluation (10.6m)		
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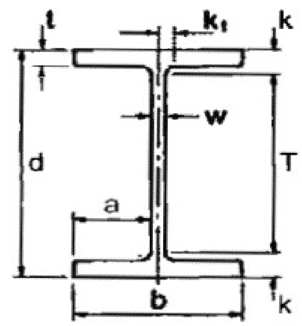
Section Properties

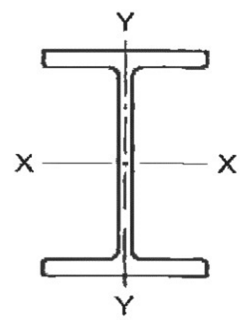
Non-Composite Bare Steel Girder

Longitudinal Stringer (W690x152) - Rehabilitation Bridge

All data from CISC 11th Edition - 6-38, 3-39

Depth, d	688	mm
Flange width	254	mm
Flange thickness, t	21.1	mm
Web thickness, w	13.10	mm
Dead Load	1.49	kN/m
Area	19400	mm^2
Ix	1510000000	mm^4
Sx	4380000.00	mm^3
rx	279	mm
Zx	5000000	mm^3
Iy	57800000	mm^4
Sy	455000	mm^3
ry	54.6	mm
Zy	710000	mm^3
J	2200000	mm^4
Cw	6.42E+12	mm^6





JOB TITLE	BCLB DECK PRE-DESIGN - Tower Span Evaluation (10.6m)		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Load Combinations (Rehabilitated)

Load factors

Load factors from CSA S6-19 cl. 3.5, Table 3.1, 3.2 & 3.3

SLS		FLS	
Factory-produced component	1.00	Factory-produced component	1.00
Cast-in-place component	1.00	Cast-in-place component	1.00
Wearing surfaces	1.00	Wearing surfaces	1.00
Live Load (Vehicle)	0.90	Live Load (Vehicle)	1.00

ULS 1 MAX		ULS 9	
Factory-produced component	1.10	Factory-produced component	1.35
Cast-in-place component	1.20	Cast-in-place component	1.35
Wearing surfaces	1.50	Wearing surfaces	1.35
Live Load (Vehicle)	1.70		
Load Load (Pedestrian)	1.70		

**Results taken from grillage model created in Midas Civil*

Moment

Relative Span Distance		0L	0.1L	0.2L	0.3L	0.4L	0.5L
Absolute Span Distance		0.00 m	0.97 m	1.94 m	2.91 m	3.88 m	4.85 m
SLS	**Max.**	**0 kNm**	**275 kNm**	**410 kNm**	**488 kNm**	**536 kNm**	**560 kNm**
ULS	**ULS Max Env.**	**0 kNm**	**481 kNm**	**707 kNm**	**834 kNm**	**914 kNm**	**956 kNm**

**Critical girder is 2nd interior from east*

Shear

Relative Span Distance		0L
Absolute Span Distance		0.00 m
SLS	**Max.**	**294 kN**
ULS	**ULS Max Env.**	**514 kN**

**Maximum shear occurs at location of support, 0L*

ULS Girder Resistance (Rehabilitated)

*Assumed that girder section does not act compositely with the deck, shear studs are not shown in existing drawings

Original Girder Section: W690x152

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2.1, Table 10.3]***

Flange		
Flange Class 1	7.75	
Flange Class 2	9.09	
Flange Class 3	10.69	
Web		
Web Class 1	58.80	
Web Class 2	90.87	
Web Class 3	101.56	

Width-to-Thickness Ratios of Girder

Flange		
Half width of flange, b	127	mm
Thickness of flange, t	21	mm
b/t	6	
Web		
Clear depth of web, h	645.8	mm
Thickness of web, w	13.10	mm
h/w	49	
Class of Section		
Flange Class:	1	
Web Class:	1	

Moment Resistance of Laterally Unbraced Members (Section Classes 1 & 2) - CSA S6-19 cl. 10.10.2.3

Unbraced Length, L	3149.6	mm	***[Distance between diaphragms]***
Plastic Moment, M_p			
Plastic Section Modulus, Z	5000000	mm^3	
Unbraced Length, L	3149.6	mm	
E_s	200000	MPa	
I_y	57800000	mm^4	
G_s	77000	MPa	
J	2200000	mm^4	
C_w	6.42E+12	mm^6	
M_u	**4433**	**kNm**	
Overall Moment Resist., M_r	**1663**	**kNm**	
Max ULS Factored Moment	**956**	**kNm**	
Demand/Capacity	**0.58**		

Shear Resistance - CSA S6-19 cl. 10.10.5.1

Spacing of Tranverse Stiffn, a	9700	mm	***[Unstiffened web]***
Web height, h	646.775	mm	***[Used reduced web height at south abutment per original drawings]***
a/h	15		
k_v	5.36		
h/w	49		
502√kv/Fy	62.11		
621√kv/Fy	76.83		
F_{cr}	**201.95**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**201.95**	**MPa**	
Area of Web, A_w	6778.202	mm^2	
Shear Resistance, V_r	**1300**	**kN**	
Max ULS Factored Shear	**514**	**kN**	
Demand/Capacity	**0.40**		

Bearing Resistance - Front Floor Beam End

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{be}	0.75		
w	10.48	mm	***[20% reduction due to corrosion]***
N	200	mm	***[Bearing plate width similar to flange width]***
t	21	mm	
Bearing Resistance, Br per b)i)	**782**	**kN**	
Bearing Resistance, Br per b)ii)	**414**	**kN**	
Bearing Resistance, Br	**414**	**kN**	
Maximum Reaction	**889**	**kN**	
Demand/Capacity (Web Alone)	**2.15**		

Bearing Resistance of Stiffener - CSA S6-19 cl. 10.10.8.2

Stiffener Type	4x4x1/2	(Angle)	***[Imperial]***
	102x102x13	(Angle)	***[Metric]***
Number of Stiffeners	2		

Bearing Stiffener Dimensions

Width of Stiffener (Parallel Leg)	51	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of parallel leg
ıickness of Stiffener (Parallel Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	
Width of Stiffeners (Perpen Leg)	51	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of perpen. leg
Thickness of Stiffener	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	

Bearing Resist. of Stiffeners

Area of Stiffener	1134.11	mm^2
Bearing Resist. of Stiffeners	1072	kN

Overall Bearing Resistance (Web Resistance + Stiffener Resistance)

Total Bearing Resistance	**1485**	**kN**
Maximum Reaction	**889**	**kN**
Demand/Capacity	**0.60**	

Compressive Resistance - CSA S6-19 cl. 10.10.8.3

Girder Web Thickness	10.48	mm	
Web Height	645.8	mm	
Width of Stiffener (Perpen. Leg)	51	mm	*(Standard Angle)*
ıickness of Stiffener (Perpen. Leg)	12.7	mm	*(Standard Angle)*
Width of Stiffener (Parallel Leg)	51	mm	*(Standard Angle)*
ıickness of Stiffener (Parallel Leg)	12.7	mm	*(Standard Angle)*
Column Web Width, 12 x w	125.76	mm	*(Both sides)*
Horiz. Distance to Centroid of L	0	mm	***[CISC 6-70, 11TH Edition, 2016 (y distance)]***

Column Section Properties - X-X Axis (Parallel to Girder Longitudinal Axis)

Element	*b*	*h*	*Number*	*A*	*y*	*Ay*	*y-y₀*	*A(y-y₀)*
Stiffener 1 - Perpendicular Leg	12.7	38.3	**1**	486	19.2	9.31E+03	-37	-18041
Stiffener 1 - Parallel Leg	51.0	12.7	**1**	648	44.7	2.89E+04	-12	-7507
Web	251.5	10.5	**1**	2636	56.2	1.48E+05	0	0
Stiffener 2 - Parallel Leg	51.0	12.7	**1**	648	67.8	4.39E+04	12	7507
Stiffener 2 - Perpendicular Leg	12.7	38.3	**1**	486	93.3	4.54E+04	37	18041
				Σ = 4904		**2.76E+05**		

Element	I_0	$A(y-y_0)^2$	I_x
Stiffener 1 - Perpendicular Leg	5.95E+04	6.69E+05	7.3E+05
Stiffener 1 - Parallel Leg	8.71E+03	8.70E+04	9.6E+04
Web	2.41E+04	0.00E+00	2.4E+04
Stiffener 2 - Parallel Leg	8.71E+03	8.70E+04	9.6E+04
Stiffener 2 - Perpendicular Leg	5.95E+04	6.69E+05	7.3E+05
			Σ = 1672741

Y_0	**56.24**

Column Section Properties - Y-Y Axis (Perpendicular to Girder Longitudinal Axis)

Element	*b*	*h*	*Number*	*A*	*x*	*Ax*	$x-x_0$	$A(x-x_0)$
Stiffener 1 - Perpendicular Leg	38.3	12.7	**1**	486	119.4	5.81E+04	2	800
Stiffener 1 - Parallel Leg	12.7	51.0	**1**	648	100.3	6.49E+04	-18	-11338
Web	10.5	251.5	**1**	2636	125.8	3.31E+05	8	21075
Stiffener 2 - Parallel Leg	12.7	51.0	**1**	648	100.3	6.49E+04	-18	-11338
Stiffener 2 - Perpendicular Leg	38.3	12.7	**1**	486	119.4	5.81E+04	2	800
				Σ = 4904		**5.78E+05**		

X_0	**117.76**

Element	I_0	$A(x-x_0)^2$	I_y
Stiffener 1 - Perpendicular Leg	6.54E+03	1.32E+03	7.9E+03
Stiffener 1 - Parallel Leg	1.40E+05	1.98E+05	3.4E+05
Web	1.39E+07	1.69E+05	1.4E+07
Stiffener 2 - Parallel Leg	1.40E+05	1.98E+05	3.4E+05
Stiffener 2 - Perpendicular Leg	6.54E+03	1.32E+03	7.9E+03
			Σ = 14758167

FL. Buckling Resistance about X-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	484.35	mm
Radius of Gyration about X, r_x	18.47	mm
Specified Min. Yield Stress, F_y	350	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.244	
Resistance Factor	0.9	
Web-Stiffener Col Area	4904	mm^2
n	1.34	
Compressive Resistance, C_r	**1519**	**kN**

FL. Buckling Resistance about Y-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	484.35	mm
Radius of Gyration about Y, r_y	54.86	mm
Specified Min. Yield Stress, F_y	350	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.082	
Resistance Factor	0.9	
Web-Stiffener Col Area	4904	mm^2
n	1.34	
Compressive Resistance, C_r	**1543**	**kN**

Overall Compressive Resistance, C_r	**1519**	**kN**
Maximum Factored Reaction	**889**	**kN**
Demand/Capacity	**0.59**	

Bearing Resistance - Rear Floor Beam End

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{be}	0.75		
w	10.48	mm	***[20% reduction due to corrosion]***
N	200	mm	***[Bearing plate width similar to flange width]***
t	19	mm	***[Thickness of bottom angles per original drawings]***
Bearing Resistance, Br per b)i)	**782**	**kN**	
Bearing Resistance, Br per b)ii)	**414**	**kN**	
Bearing Resistance, Br	**414**	**kN**	
Maximum Reaction	**889**	**kN**	
Demand/Capacity (Web Alone)	**2.15**		

Bearing Resistance of Stiffener - CSA S6-19 cl. 10.10.8.2

Stiffener Type	6x4x1/2	(Angle)	***[Imperial]***
	152x102x13	(Angle)	***[Metric]***
Number of Stiffeners	2		

Bearing Stiffener Dimensions

Width of Stiffener (Parallel Leg)	51	mm	***[CISC 6-70, 11TH Edition, 2016]***	50% reduction of parallel leg
ıickness of Stiffener (Parallel Leg)	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	
Width of Stiffeners (Perpen Leg)	60.225	mm	***[Smaller of Flange width minus web thickness a***	50% reduction of perpen. leg
Thickness of Stiffener	12.7	mm	***[CISC 6-70, 11TH Edition, 2016]***	

Bearing Resist. of Stiffeners

Area of Stiffener	1251.2675	mm^2
Bearing Resist. of Stiffeners	1182	kN

Overall Bearing Resistance (Web Resistance + Stiffener Resistance)

Total Bearing Resistance	**1596**	**kN**
Maximum Reaction	**889**	**kN**
Demand/Capacity	**0.56**	

Compressive Resistance - CSA S6-19 cl. 10.10.8.3

Girder Web Thickness	10.48	mm	
Web Height	646.775	mm	
Width of Stiffener (Perpen. Leg)	60.225	mm	*(Standard Angle)*
ıickness of Stiffener (Perpen. Leg)	12.7	mm	*(Standard Angle)*
Width of Stiffener (Parallel Leg)	51	mm	*(Standard Angle)*
ıickness of Stiffener (Parallel Leg)	12.7	mm	*(Standard Angle)*
Column Web Width, 12 x w	125.76	mm	*(Both sides)*

Column Section Properties - X-X Axis (Parallel to Girder Longitudinal Axis)

Element	*b*	*h*	*Number*	*A*	*y*	*Ay*	*y-y₀*	*A(y-y₀)*
Stiffener 1 - Perpendicular Leg	12.7	47.5	1	604	23.8	1.43E+04	-42	-25170
Stiffener 1 - Parallel Leg	51.0	12.7	1	648	53.9	3.49E+04	-12	-7507
Web	125.8	10.5	1	1318	65.5	8.63E+04	0	0
Stiffener 2 - Parallel Leg	51.0	12.7	1	648	77.1	4.99E+04	12	7507
Stiffener 2 - Perpendicular Leg	12.7	47.5	1	604	107.2	6.47E+04	42	25170
				Σ = 3820		**2.50E+05**		

Element	I_0	$A(y-y_0)^2$	I_x
Stiffener 1 - Perpendicular Leg	1.14E+05	1.05E+06	1.2E+06
Stiffener 1 - Parallel Leg	8.71E+03	8.70E+04	9.6E+04
Web	1.21E+04	0.00E+00	1.2E+04
Stiffener 2 - Parallel Leg	8.71E+03	8.70E+04	9.6E+04
Stiffener 2 - Perpendicular Leg	1.14E+05	1.05E+06	1.2E+06
			Σ = 2530015

Y_0	65.47

Column Section Properties - Y-Y Axis (Perpendicular to Girder Longitudinal Axis)

Element	*b*	*h*	*Number*	*A*	*x*	*Ax*	$x-x_0$	$A(x-x_0)$
Stiffener 1 - Perpendicular Leg	47.5	12.7	1	604	119.4	7.21E+04	26	15689
Stiffener 1 - Parallel Leg	12.7	51.0	1	648	100.3	6.49E+04	7	4433
Web	10.5	125.8	1	1318	62.9	8.29E+04	-31	-40245
Stiffener 2 - Parallel Leg	12.7	51.0	1	648	100.3	6.49E+04	7	4433
Stiffener 2 - Perpendicular Leg	47.5	12.7	1	604	119.4	7.21E+04	26	15689
				Σ = 3820		**3.57E+05**		

X_0	93.42

Element	I_0	$A(x-x_0)^2$	I_y
Stiffener 1 - Perpendicular Leg	8.11E+03	4.08E+05	4.2E+05
Stiffener 1 - Parallel Leg	1.40E+05	3.03E+04	1.7E+05
Web	1.74E+06	1.23E+06	3.0E+06
Stiffener 2 - Parallel Leg	1.40E+05	3.03E+04	1.7E+05
Stiffener 2 - Perpendicular Leg	8.11E+03	4.08E+05	4.2E+05
			Σ = 4139290

FL. Buckling Resistance about X-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	485.08125	mm
Radius of Gyration about X, r_x	25.73	mm
Specified Min. Yield Stress, F_y	350	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.176	
Resistance Factor	0.9	
Web-Stiffener Col Area	3820	mm^2
n	1.34	
Compressive Resistance, C_r	**1195**	**kN**

FL. Buckling Resistance about Y-Axis

Effective Length Factor, K	0.7	
Length of Comp. Column, 0.75L	485.08125	mm
Radius of Gyration about Y, r_y	32.92	mm
Specified Min. Yield Stress, F_y	350	MPa
Modulus of Elasticity, E_s	200000	MPa
λ	0.137	
Resistance Factor	0.9	
Web-Stiffener Col Area	3820	mm^2
n	1.34	
Compressive Resistance, C_r	**1199**	**kN**

Final Bearing Resistance:	**1195**	**kN**
Maximum Factored Reaction:	**889**	**kN**
Utilization (Demand/Capacity):	**0.74**	

Overall Compressive Resistance, C_r	**1195**	**kN**
Maximum Factored Reaction	**889**	**kN**
Demand/Capacity	**0.74**	

**Reaction taken at front floor beam location - girder continuous*

JOB TITLE	BCLB DECK PRE-DESIGN - Tower Span Evaluation (10.6m)		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

SLS Girder Resistance (Rehabilitated)

*Calculated conservatively not accounting for composite properties

Control of Permanent Deflections *[CSA S6-19 Cl. 10.11.4]*

Max. SLS Moment	560	kNm
Section Modulus, S	4380000	mm^3
Stress in Flange	**128**	**MPa**
Stress Limit (0.9F_y)	**315**	**MPa**
Demand/Capacity	**0.41**	

RESULT SUMMARY

**Calculated conservatively without including contribution of slab to resistance (assumed non-composite)*

Original Girder

ULS	
M_f/M_r	**0.86**
V_f/V_r	**0.54**
B_f/B_r	**0.89**
SLS	
Demand/Stress Limit	**0.60**

Rehabilitated Girder

ULS	
M_f/M_r	**0.58**
V_f/V_r	**0.40**
B_f/B_r	**0.74**
SLS	
Demand/Stress Limit	**0.41**

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK PRE-DESIGN - Floor Beam Evaluation		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

General Information

Material Specifications

Structural Steel (CSA G40-4 or ASTM A7) - Original Steel

F_u =	410	MPa	***[CISC 6-7, 11TH Edition, 2016]***
F_y =	230	MPa	***[CISC 6-7, 11TH Edition, 2016]***
ϕ_s =	0.95		***[CSA S6-19 cl. 10.5.7]***
E =	200000	MPa	***[CSA S6-19 cl. 10.4.2]***
Unit Weight =	77	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
G_s =	77000	MPa	

Structural Steel - 1982 Rehabilitation - Strength not listed on rehabilitation drawings

F_y =	300	MPa	***[CSA S6-19 cl. 14.7.4.2, Table 14.1]***
F_u =	450	MPa	***[CSA S6-19 cl. 14.7.4.2, Table 14.1]***

Reinforced Concrete - Deck

f'_c =	20	MPa	***[CSA S6-19 cl. 14.7.4.4 - unknown concrete strength]***
f_{cr} =	1.79	MPa	***[CSA S6-19 cl. 8.4.1.8.1]***
Unit Weight =	24	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***
E_c =	21656	MPa	

[Slab details not provided on original construction drawings - reinforcement unknown]

Asphalt

Unit Weight =	23.5	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Plain Concrete - Sidewalk Deck

Unit Weight =	23.5	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

Aluminum

Unit Weight =	27.0	kN/m^3	***[CSA S6-19 cl. 3.6, Table 3.4]***

General Information

Total Length of Floor Beam	15.0014	***[Considered length from faces of tower columns]***

JOB TITLE	BCLB DECK PRE-DESIGN - Floor Beam Evaluation		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Section Properties

Non-Composite Built-Up Floor Beam

Section Properties have been reduced

Data for angles sections from CISC 11th Edition - 6-68, 6-69

Components	**Web**	**T. Plate**	**B. Plate**	**Top L's**	**Bottom L's**
Specified Size	-	-	-	L203x203x13	L203x203x13
No.	1	1	1	2	2
Height (mm)	1803	6.35	6.35	12.7	12.7
Width (mm)	19	508	508	203	203
I_x (mm^4)	9310862860	10839	10839	20200000	20200000
I_y (mm^4)	1038953	69371904	69371904	20200000	20200000
A_g (mm^2)	34355	3226	3226	10000	10000
y top or bot (mm)	908.05	3.175	1812.925	61.85	1755
x (mm)	254	254	254	188.975	188.975
x2 (mm)	0	0	0	319.025	319.025
Trans. I_x (mm^4)	9310862860	2641291898	2641291898	7200944400	7209408900
Trans. I_y (mm^4)	1038952.66	69371904.27	69371904.3	41341253.1	41341253.13
Trans. I_{y-2} (mm^4)	0	0	0	41341253.1	41341253.13

y top & bottom	908.05	mm	
x	254	mm	
Total A_g	60806	mm^2	
Total I_x (mm^4)	29003799956	mm^4	
Trans I_y (mm^4)	305147774	mm^4	
r_x	691	mm	
r_y	71	mm	
Y_c	623	mm	
X_c	176	mm	
Z_x	37864619	mm^3	
Z_y	5341175	mm^3	
S_x	31940752	mm^3	
S_y	1201369	mm^3	
J	4242526	mm^4	***[Angles not included in calculation - I-beam]***
d1	1809.75	mm	
c_w	1.13603E+14	mm^6	***[Angles not included in calculation - I-beam]***

ULS Girder Resistance

Maximum Factored Model Response (Midas)

***Considered interior railway support**

Maximum Moment, $M_{fmax(+)}$	3745	kNm
Maximum Moment, $M_{fmax(-)}$	3362	kNm
Maximum Shear, V_{fmax}	1894	kNm

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2.1, Table 10.3]***

Flange	
Flange Class 1	9.56
Flange Class 2	11.21
Flange Class 3	13.19

Web	
Web Class 1	72.53
Web Class 2	112.09
Web Class 3	125.28

Width-to-Thickness Ratios of Girder

Flange		
Half width of flange, b	254	mm
Thickness of flange, t	21	mm
b/t	12	

Web		
Clear depth of web, h	1803	mm
Thickness of web, w	19.05	mm
h/w	95	

Class of Section

Flange Class:	3
Web Class:	2

Moment Resistance of Laterally Unbraced Members (Section Class 3) - CSA S6-19 cl. 10.10.2.3

In positive moment region, assumed that girder spacing is unbraced length for flange

Unbraced Length, L	2000	mm
Plastic Moment, M_p		
Elastic Section Modulus, Sx	31940752	mm^3
Yield Stress, F_y	230	MPa
Yield Moment, M_y	7346.372986	kNm
$0.67M_y$	**4922.0699**	**kNm**
Critical Elastic Moment, M_u		
M_{max}	3745	Relative value
M_a	3160	Relative value
M_b	3261	Relative value
M_c	3361	Relative value
ω_2 Coefficient	1.14	
Unbraced Length, L	2000	mm
E_s	200000	MPa
I_y	305147774	mm^4
G_s	77000	MPa
J	4242526	mm^4
C_w	1.13603E+14	mm^6
M_u	**104768**	**kNm**
Overall Moment Resist., M_r	**6979**	**kNm**
Max ULS Factored Moment	**3745**	**kNm**
Demand/Capacity	**0.54**	

Shear Resistance - CSA S6-19 cl. 10.10.5.1

Spacing of Tranverse Stiffn, a	1220	mm	***[Spacing on railway side of floor beam]***
Web height, h	1803	mm	***[Used reduced web height at south abutment per original drawings]***
a/h	1		
k_v	15.67		
h/w	95		
502√kv/Fy	131.02		
621√kv/Fy	162.08		
F_{cr}	**132.71**	**MPa**	
F_t	**0.00**	**MPa**	
F_s	**132.71**	**MPa**	
Area of Web, A_w	34354.77	mm^2	
Shear Resistance, V_r	**4331**	**kN**	
Max ULS Factored Shear	**1894**	**kN**	
Demand/Capacity	**0.44**		

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8

Bearing Resistance of Web - CSA S6-19 cl. 10.10.8.1

ϕ_{bi}	0.8		
w	19.05	mm	
N	400	mm	***[Bearing plate similar dimensions to the support]***
t	6.35	mm	
Bearing Resistance, Br per a)i)	2142	kN	*[a) equations used since support location is 2.951 from column face,*
Bearing Resistance, Br per a)ii)	2855	kN	*longer than approx 1.85 m depth of floor beam]*
Web Bearing Resistance, Br	**2142**	**kN**	

JOB TITLE	BCLB DECK PRE-DESIGN - Floor Beam Evaluation		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Section Properties

Non-Composite Built-Up Floor Beam

Section Properties have been reduced

Data for angles sections from CISC 11th Edition - 6-68, 6-69

Components	Web	T. Plate	B. Plate	Top L's	Bottom L's
Specified Size	-	-	-	L203x203x13	L203x203x13
No.	1	1	1	2	2
Height (mm)	1803	11.43	11.43	12.7	12.7
Width (mm)	13	508	508	203	203
I_x (mm^4)	6207241907	63215	63215	20200000	20200000
I_y (mm^4)	307838	124869428	124869428	20200000	20200000
A_g (mm^2)	22903	5806	5806	10000	10000
y top or bot (mm)	913.13	5.715	1820.545	66.93	1760
x (mm)	254	254	254	192.15	192.15
x2 (mm)	0	0	0	315.85	315.85
Trans. I_x (mm^4)	6207241907	4781097421	4781097421	7180744400	7189208900
Trans. I_y (mm^4)	307837.8252	124869428	124869428	39327112.5	39327112.5
Trans. I_{y-2} (mm^4)	0	0	0	39327112.5	39327112.5

y top & bottom	913.13	mm	
x	254	mm	
Total A_g	54516	mm^2	
Total I_x (mm^4)	30139390049	mm^4	
Trans I_y (mm^4)	407355143	mm^4	
r_x	744	mm	
r_y	86	mm	
Y_c	682	mm	
X_c	155	mm	
Z_x	37164482	mm^3	
Z_y	4228263	mm^3	
S_x	33006680	mm^3	
S_y	1603760	mm^3	
J	1737072	mm^4	***[Angles not included in calculation - I-beam]***
d1	1814.83	mm	
c_w	2.05635E+14	mm^6	***[Angles not included in calculation - I-beam]***

ULS Girder Resistance

Maximum Factored Model Response (Midas)

Maximum Moment, $M_{fmax(+)}$	3140	kNm
Maximum Moment, $M_{fmax(-)}$	2555	kNm
Maximum Shear, V_{fmax}	1486	kNm

Class of Section

Width-to-Thickness Ratio Limits in Comp. ***[CSA S6-19 cl. 10.9.2.1, Table 10.3]***

Flange	
Flange Class 1	9.56
Flange Class 2	11.21
Flange Class 3	13.19
Web	
Web Class 1	72.53
Web Class 2	112.09
Web Class 3	125.28

Width-to-Thickness Ratios of Girder

Flange		
Half width of flange, b	254	mm
Thickness of flange, t	21	mm
b/t	12	
Web		
Clear depth of web, h	1803	mm
Thickness of web, w	12.70	mm
h/w	142	

Class of Section

Flange Class:	3
Web Class:	3

Moment Resistance of Laterally Unbraced Members (Section Classes 3) - CSA S6-19 cl. 10.10.2.3

In negative moment region, assumed that floor beam acts as as laterally unbraced from intermediate support to column

Unbraced Length, L	2000	mm
Plastic Moment, M_p		
Elastic Section Modulus, Sx	33006680	mm^3
Yield Stress, F_y	230	MPa
Yield Moment, M_y	7591.536486	kNm
$0.67M_p$	**5086.329445**	**kNm**
Critical Elastic Moment, M_u		
M_{max}	2751	kNm
M_a	2549	kNm
M_b	2618	kNm
M_c	2685	kNm
ω_2 Coefficient	1.05	
Unbraced Length, L	2000	mm
E_s	200000	MPa
I_y	407355143	mm^4
G_s	77000	MPa
J	1737072	mm^4
C_w	2.05635E+14	mm^6
M_u	**149697**	**kNm**
Overall Moment Resist., M_r	**7212**	**kNm**
Max ULS Factored Moment	**3140**	**kNm**
Demand/Capacity	**0.44**	

Shear Resistance - CSA S6-19 cl. 10.10.5.1

Spacing of Tranverse Stiffn, a	1220	mm	***[Spacing on railway side of floor beam]***
Web height, h	1803	mm	***[Used reduced web height at south abutment per original drawings]***
a/h	1		
k_v	15.67		
h/w	142		
502√kv/Fy	131.02		
621√kv/Fy	162.08		
F_{cr}	**122.60**	**MPa**	
F_t	**7.31**	**MPa**	
F_s	**129.91**	**MPa**	
Area of Web, A_w	22903.18	mm^2	
Shear Resistance, V_r	**2827**	**kN**	
Max ULS Factored Shear	**1486**	**kN**	
Demand/Capacity	**0.53**		

Imagine it.
Delivered.

Exhibit E.6

Lift Span Existing Evaluation 3D Model

Exhibit B.6.1. Bridge Lowered Structural Evaluation

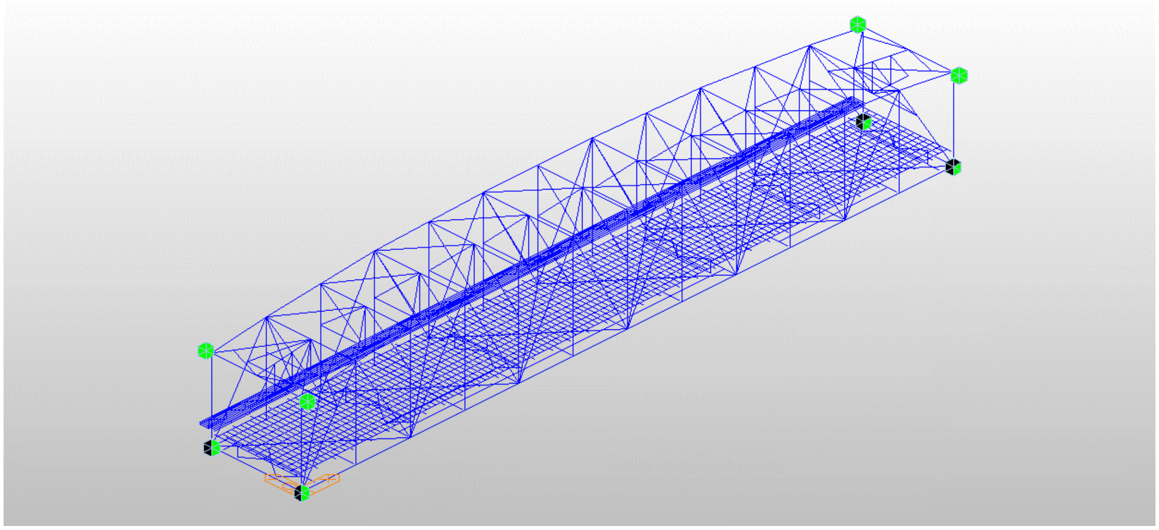


Figure 1 2D Frame Model with Supports

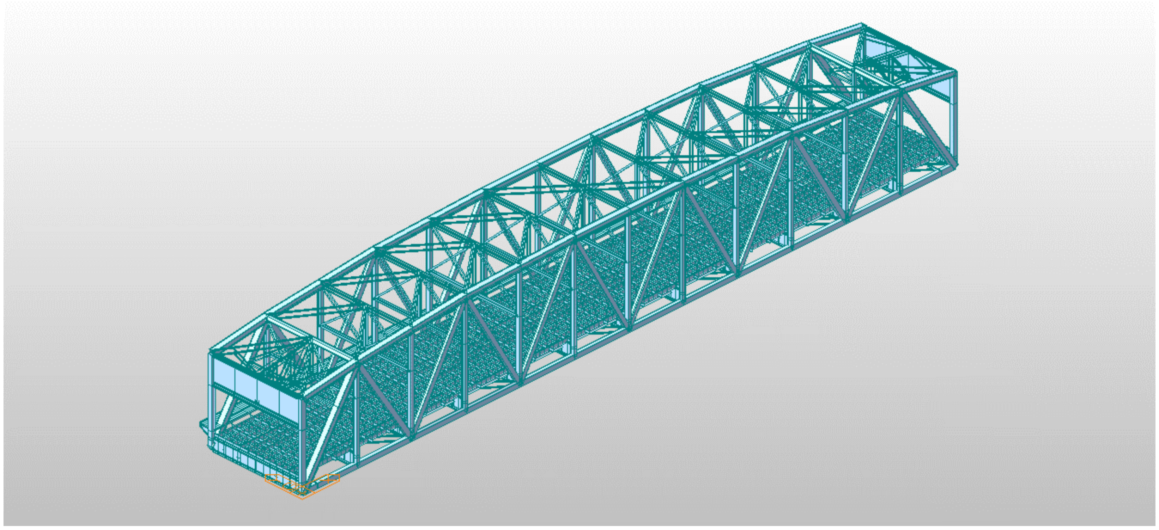


Figure 2 3D Frame Model

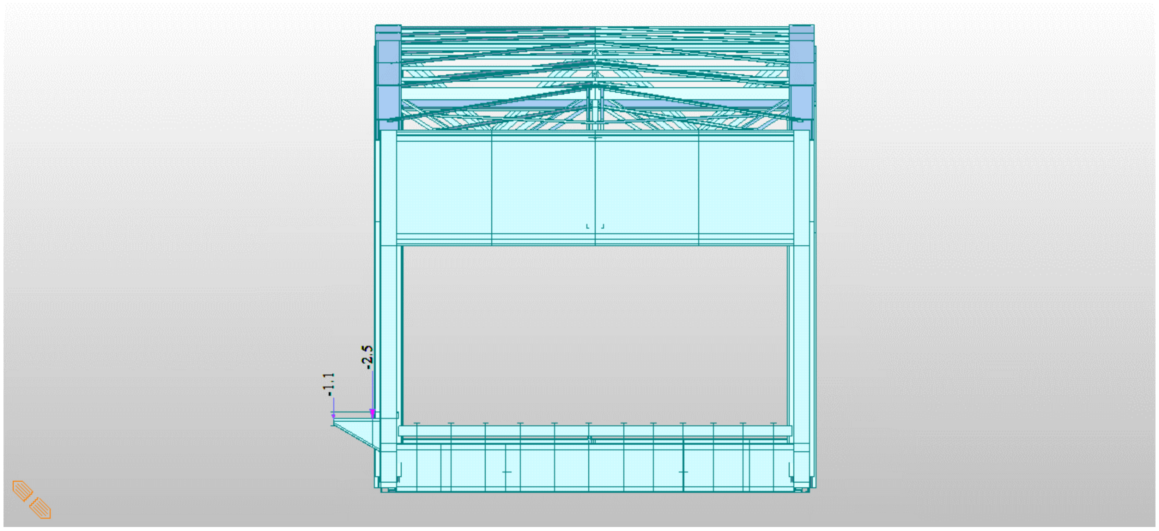


Figure 3 Wind Load Vertical Sidewalk

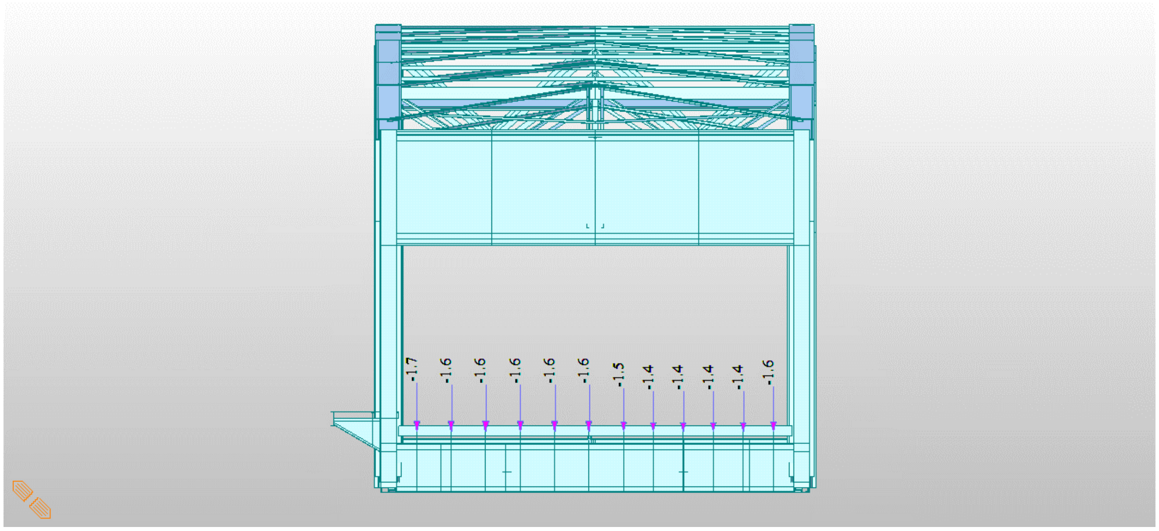


Figure 4 Wind Load Vertical Stringer

*Wind for calculations taken as 85% as per CHBDC S6-19 13.6.4.6

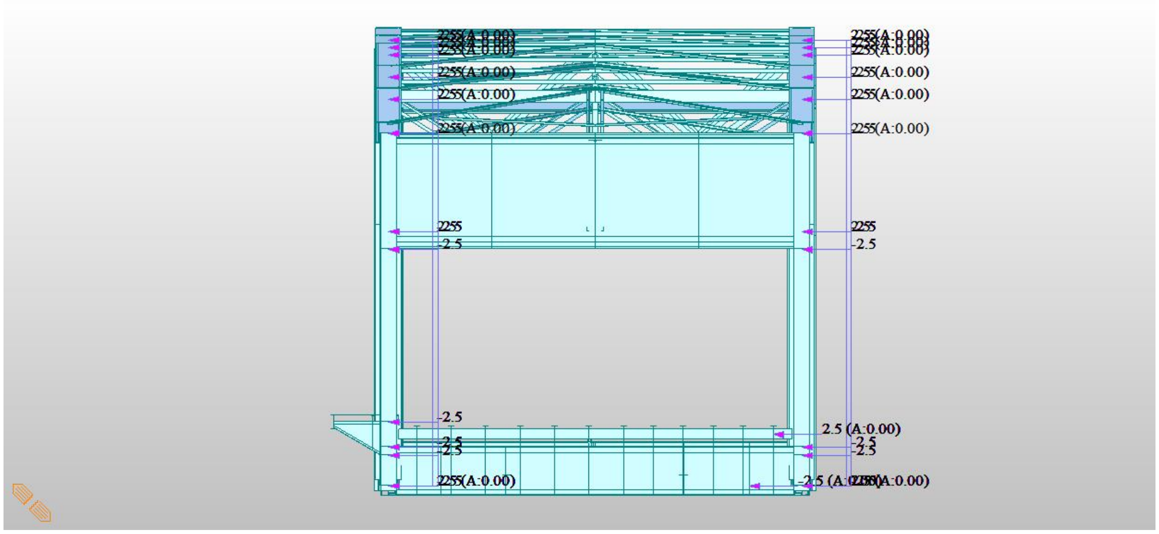


Figure 5 Wind Load Horizontal 1 (East to West)

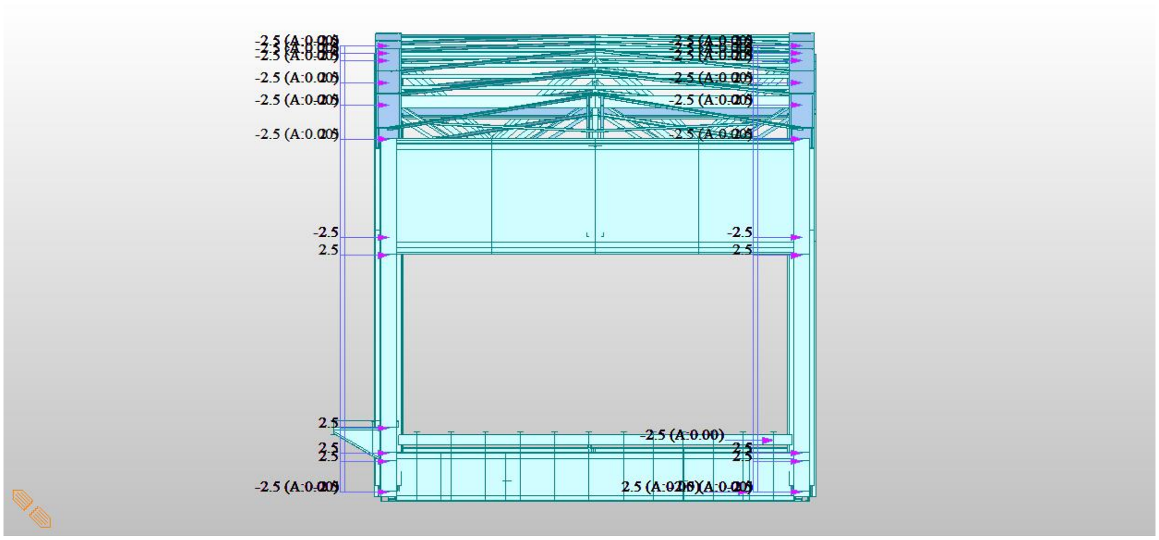


Figure 6 Wind Load Horizontal 2 (West to East)

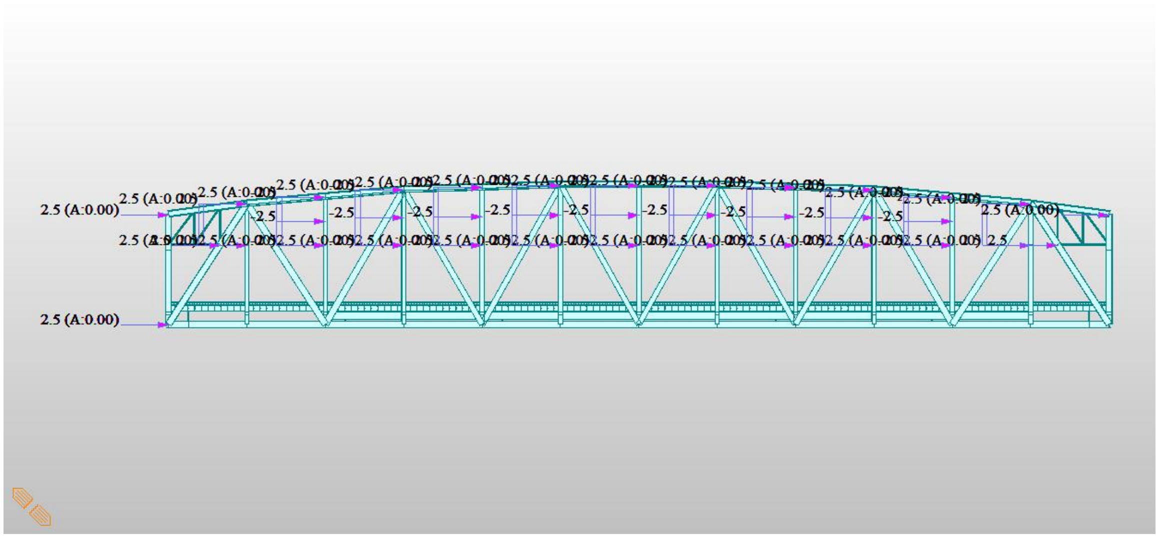


Figure 7 Wind Load Longitudinal 1 (South to North)

*Load factored up by 25% when considered to result in the longitudinal load equal to 50% of total transverse wind as per CHBDC S6-19 13.6.4.4

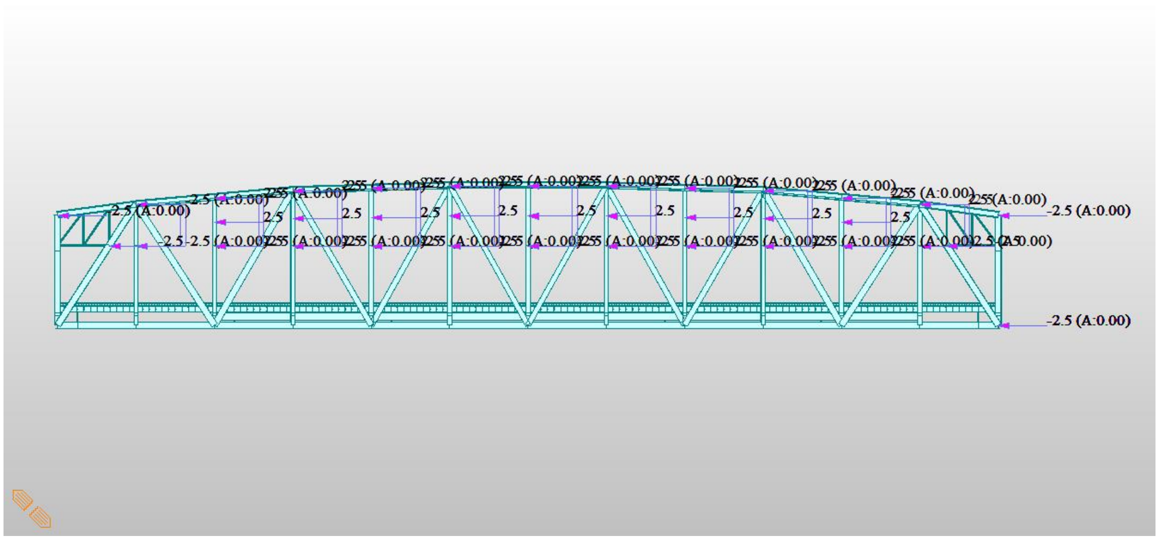


Figure 8 Wind Load Longitudinal 2 (North to South)

*Load factored up by 25% when considered to result in the longitudinal load equal to 50% of total transverse wind as per CHBDC S6-19 13.6.4.4

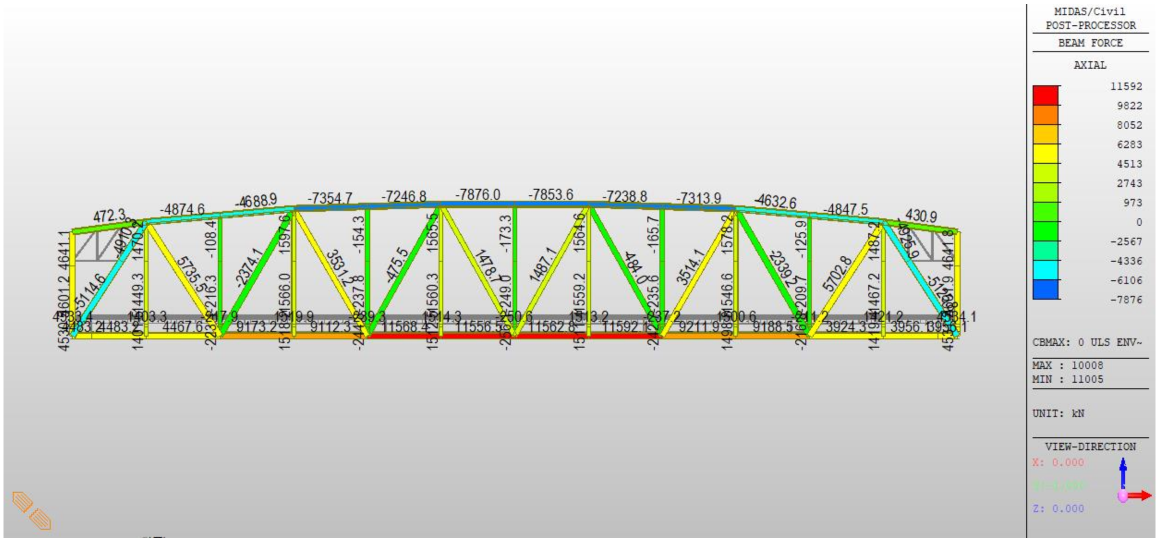


Figure 9 Railway Truss – Case 0 (Existing) Envelope Axial Max (kN)

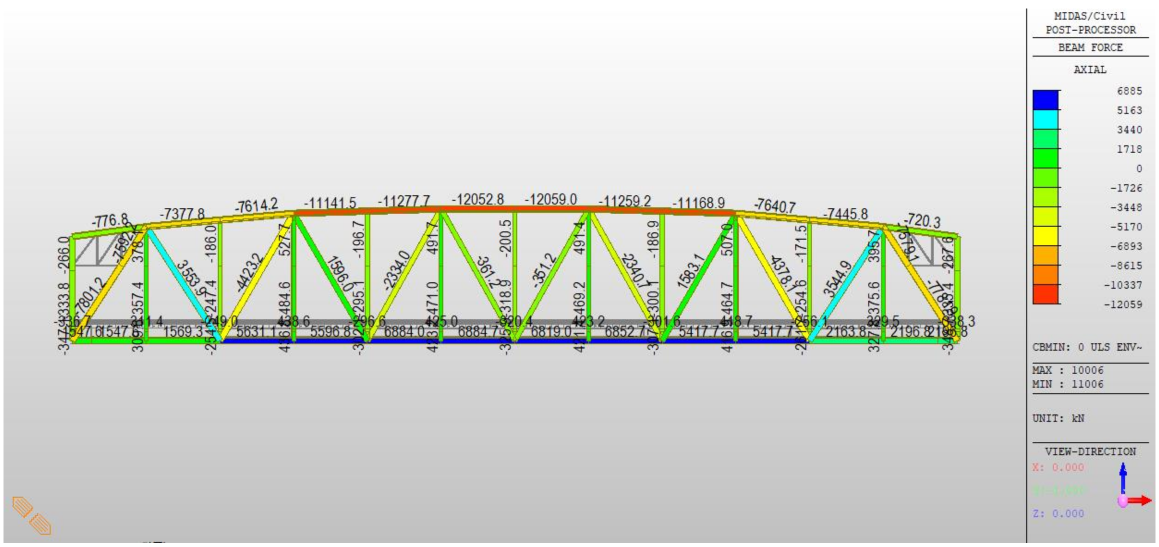


Figure 10 Railway Truss – Case 0 (Existing) Envelope Axial Min (kN)

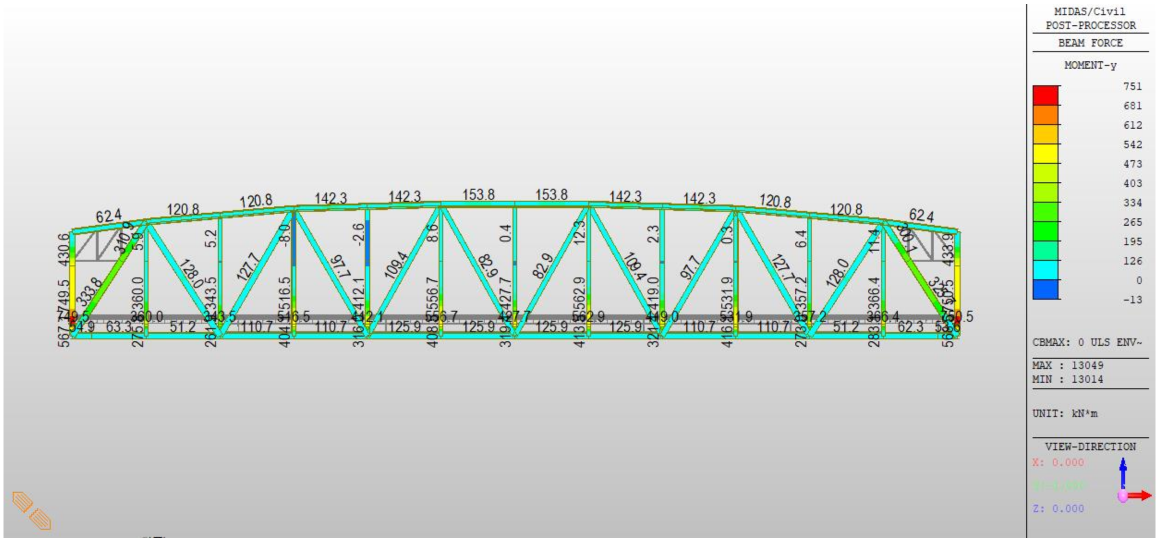


Figure 11 Railway Truss – Case 0 (Existing) Envelope M_y Max (kN/m)

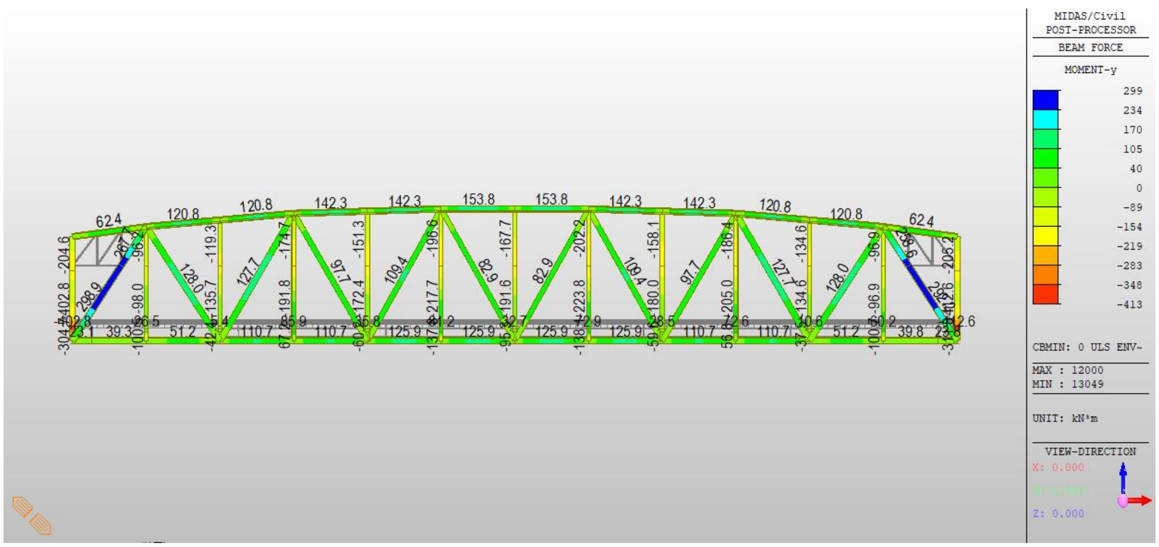


Figure 12 Railway Truss – Case 0 (Existing) Envelope M_y Min (kN/m)

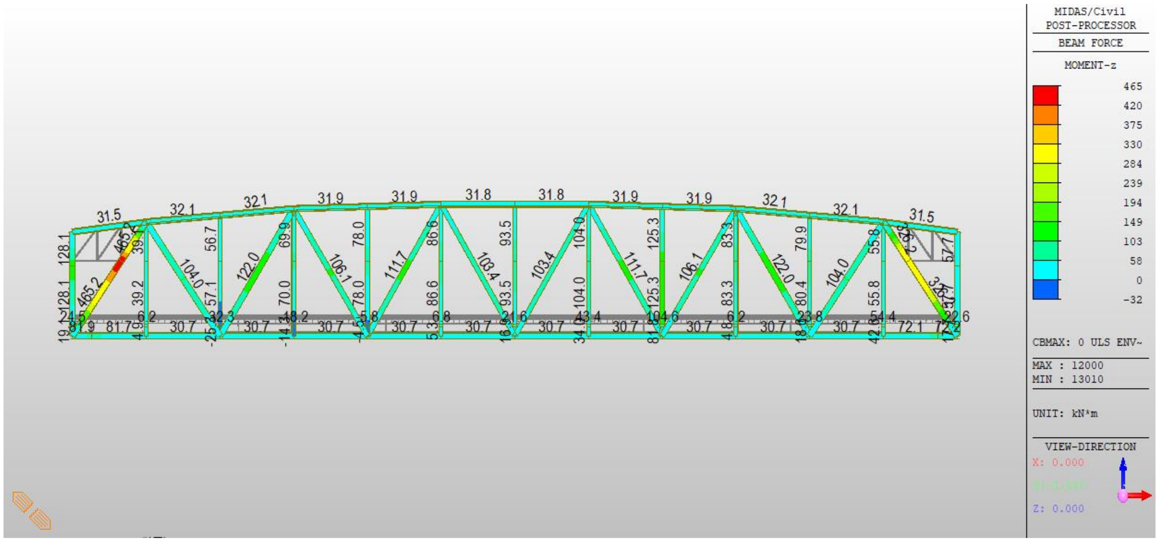


Figure 13 Railway Truss – Case 0 (Existing) Envelope M_z Max (kN/m)

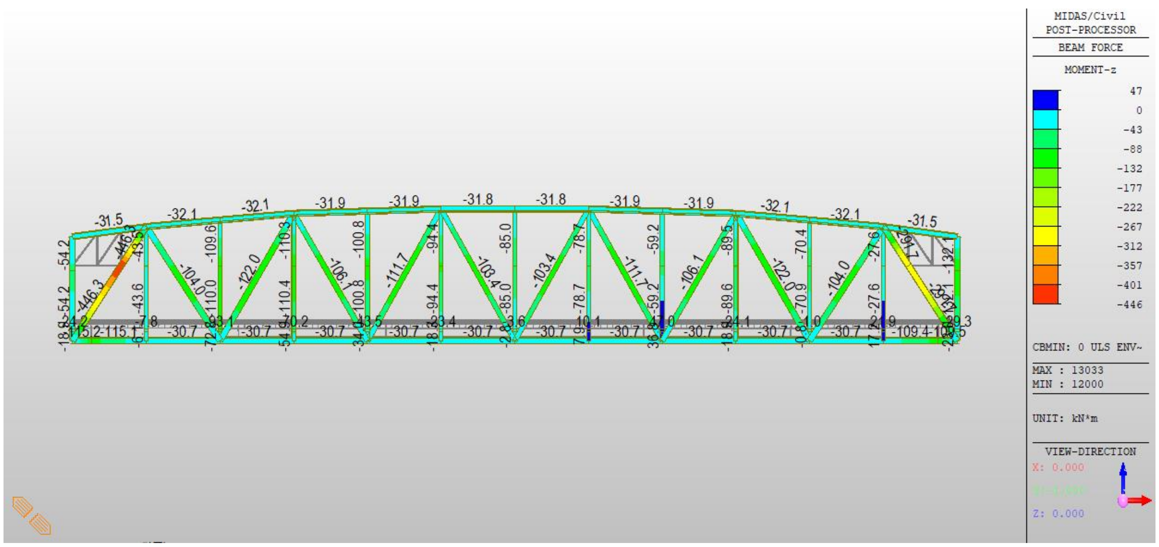


Figure 14 Railway Truss – Case 0 (Existing) Envelope M_z Min (kN/m)

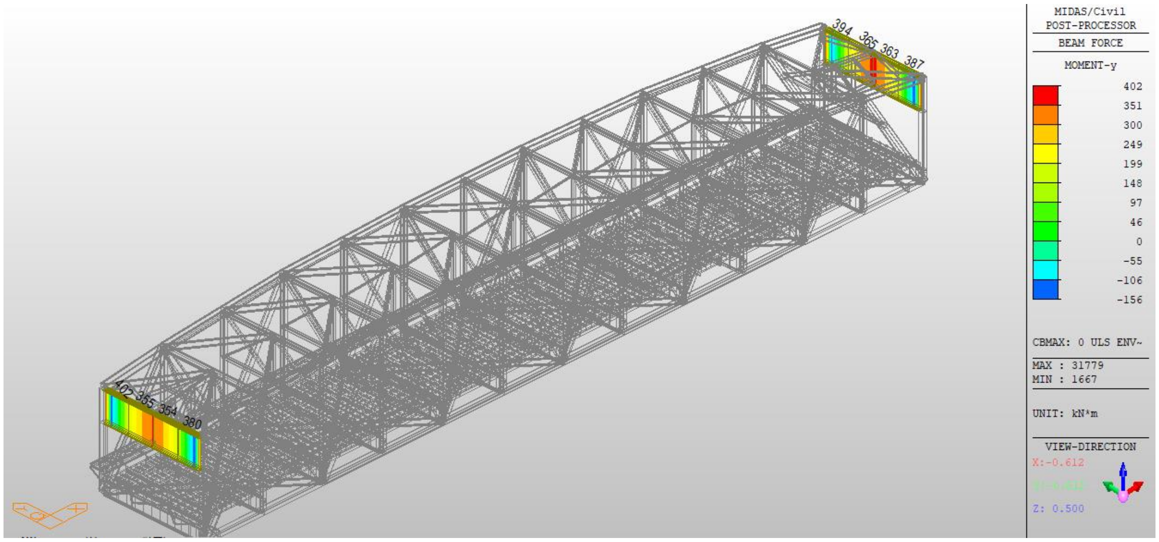


Figure 15 Lift Girder – Case 0 (Existing) Envelope M_y Max (kN/m)

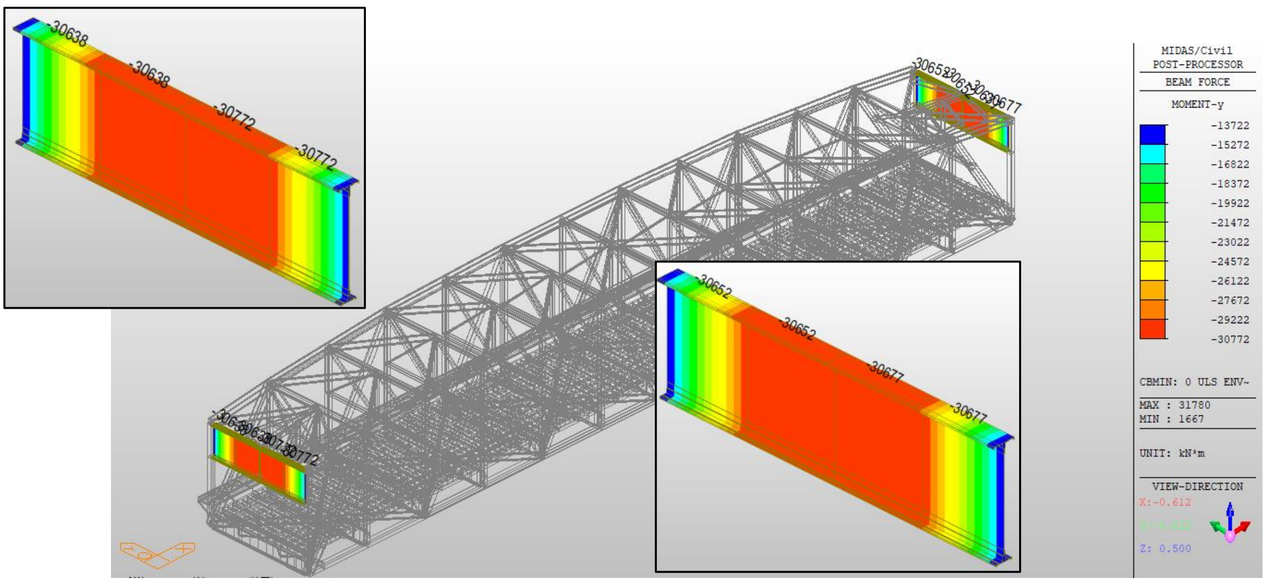


Figure 16 Lift Girder – Case 0 (Existing) Envelope M_y Min (kN/m)

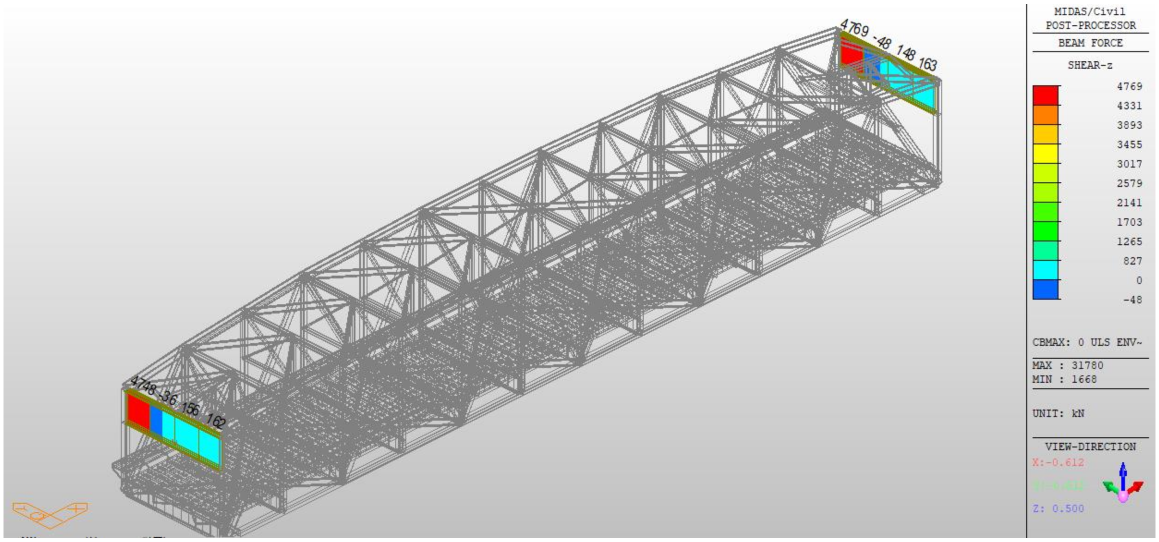


Figure 17 Lift Girder - Case 0 (Existing) Envelope F_z Max (kN)

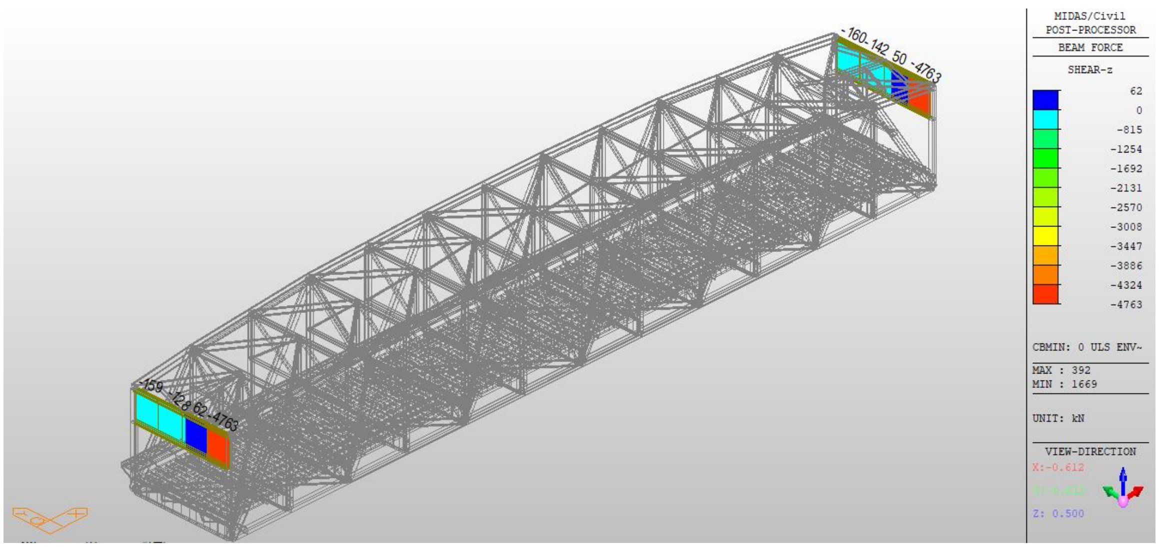


Figure 18 Lift Girder – Case 0 (Existing) Envelope F_z Min (kN)

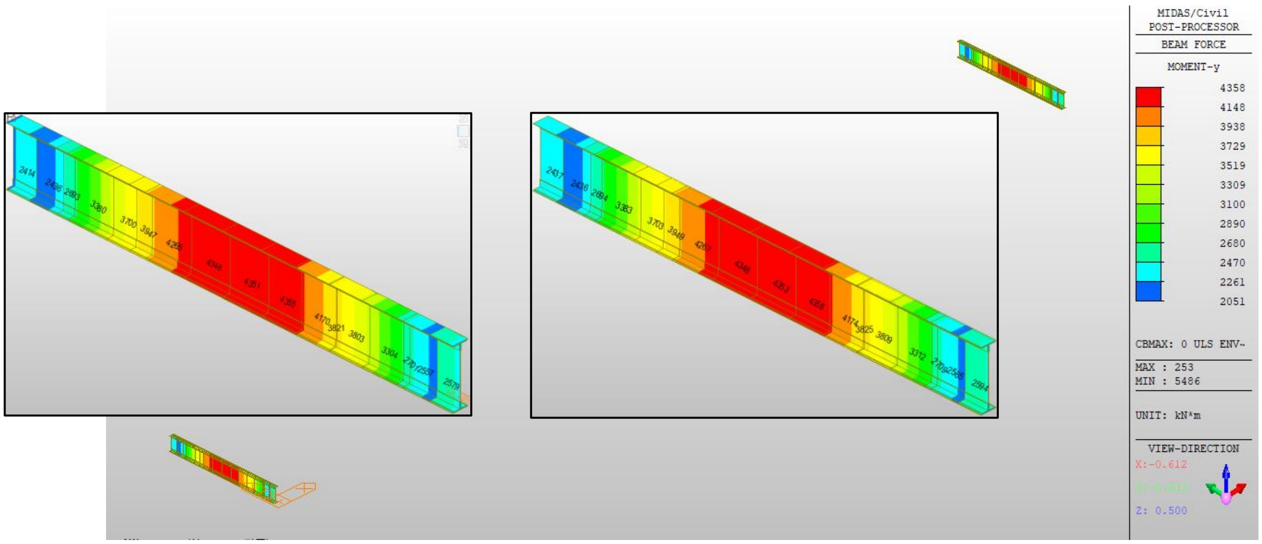


Figure 19 End Floor Beam – Case 0 (Existing) Envelope M_y Max (kN/m)

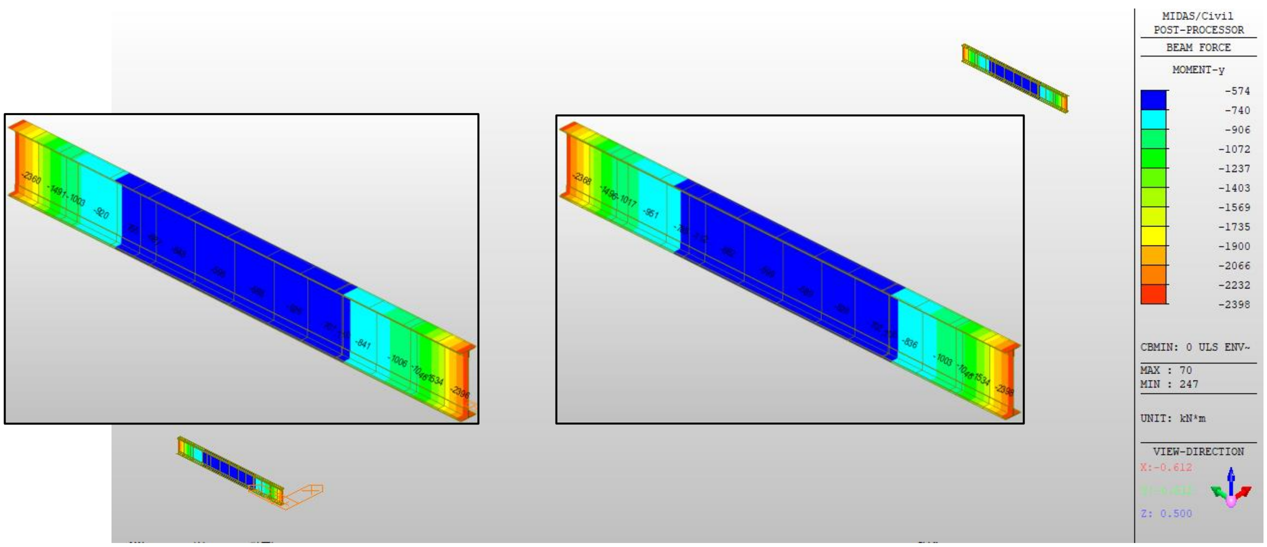


Figure 20 End Floor Beam – Case 0 (Existing) Envelope M_y Min (kN/m)

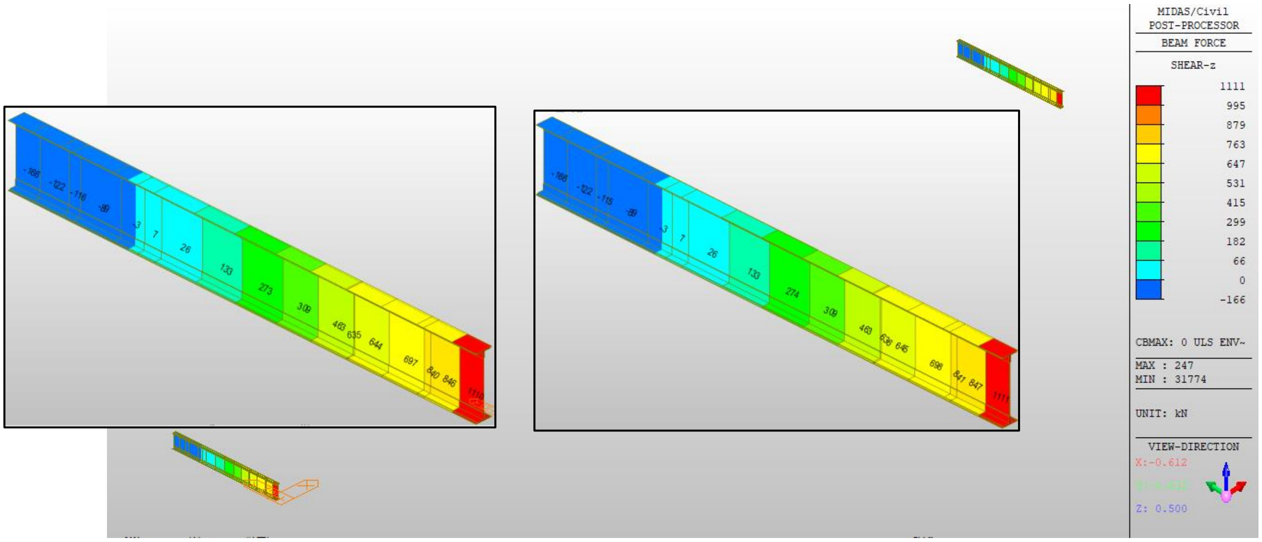


Figure 21 End Floor Beam – Case 0 (Existing) Envelope F_z Max (kN)

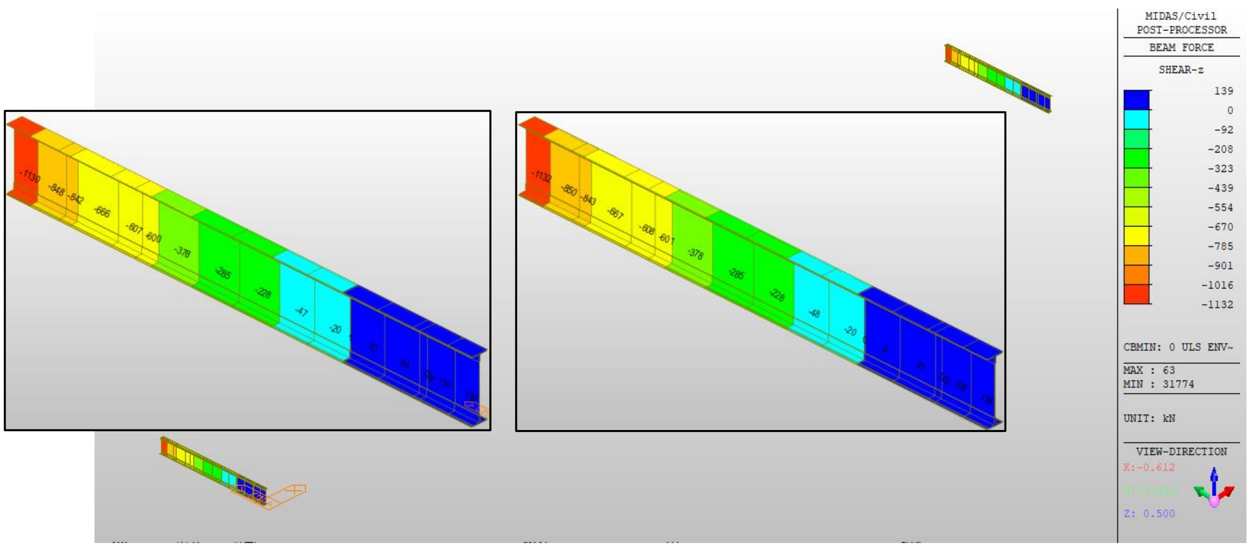


Figure 22 End Floor Beam – Case 0 (Existing) Envelope F_z Min (kN)

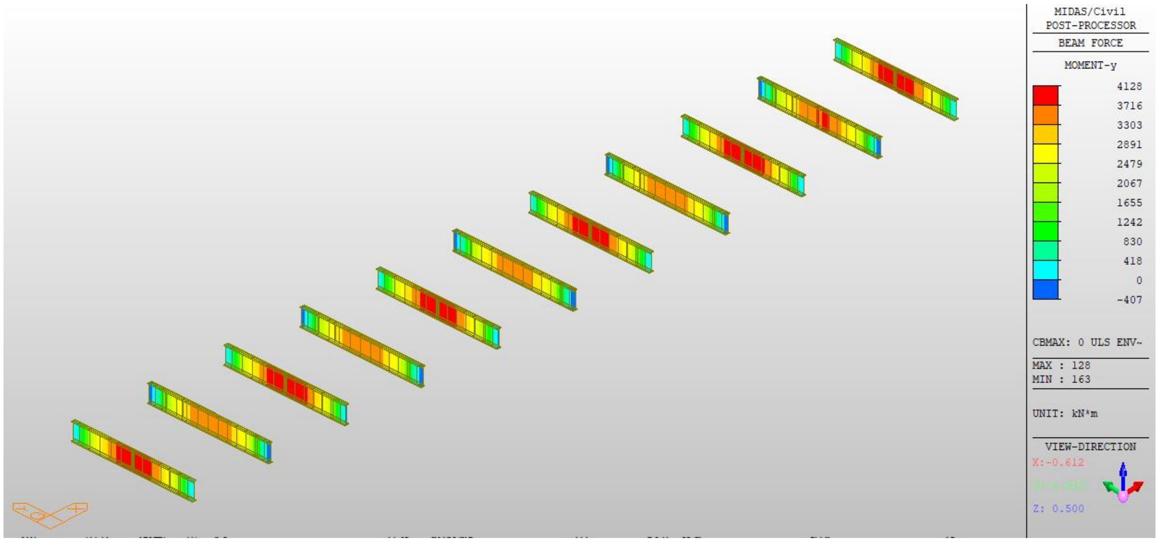


Figure 23 Intermediate Floor Beam – Case 0 (Existing) Envelope M_y Max (kN/m)

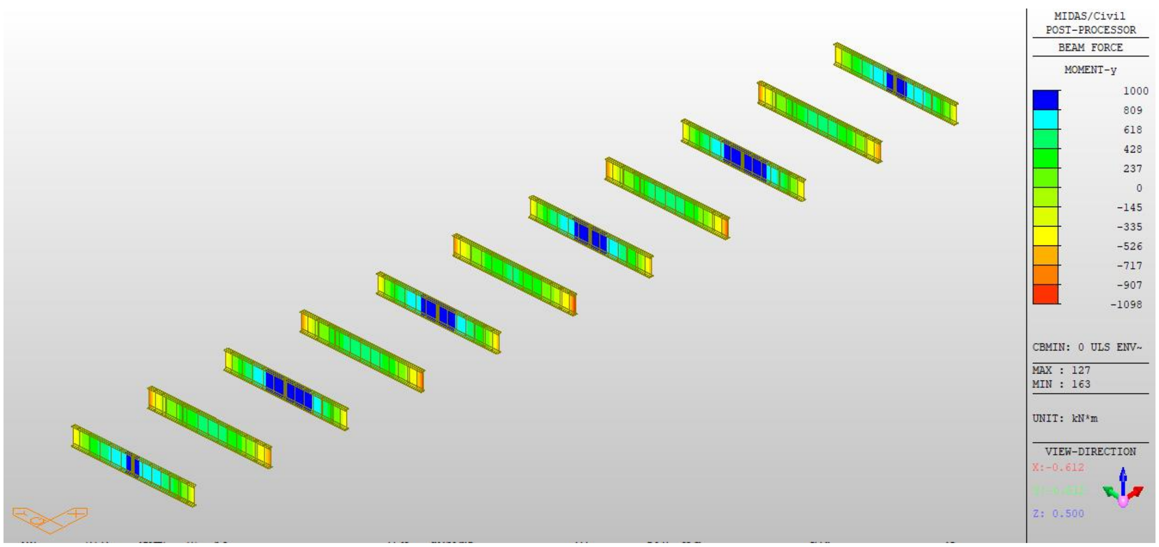


Figure 24 Intermediate Floor Beam – Case 0 (Existing) Envelope M_y Min (kN/m)

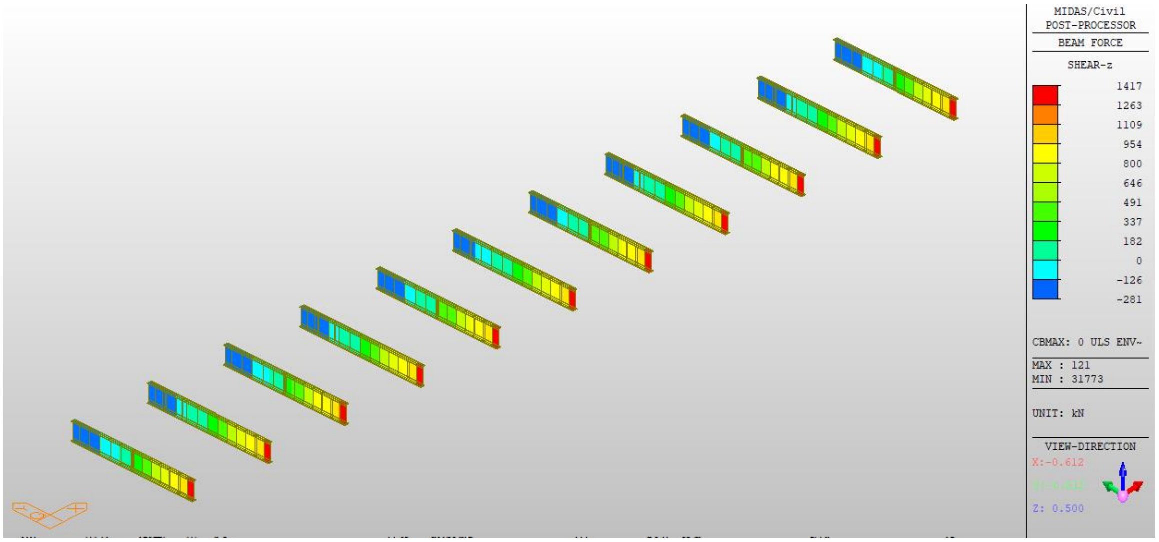


Figure 25 Intermediate Floor Beam – Case 0 (Existing) Envelope F_z Max (kN)

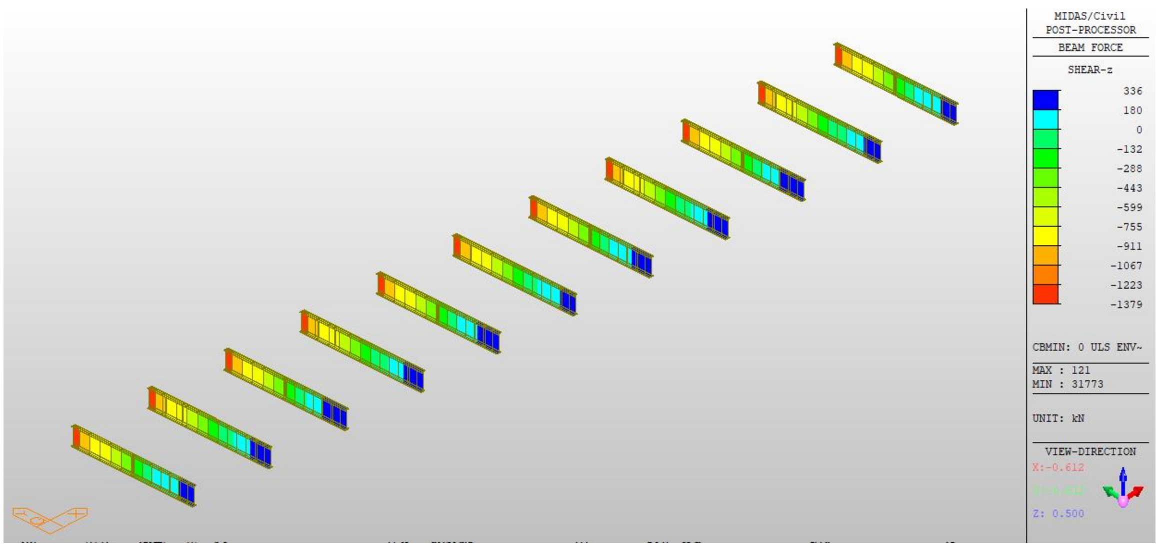


Figure 26 Intermediate Floor Beam – Case 0 (Existing) Envelope F_z Min (kN)

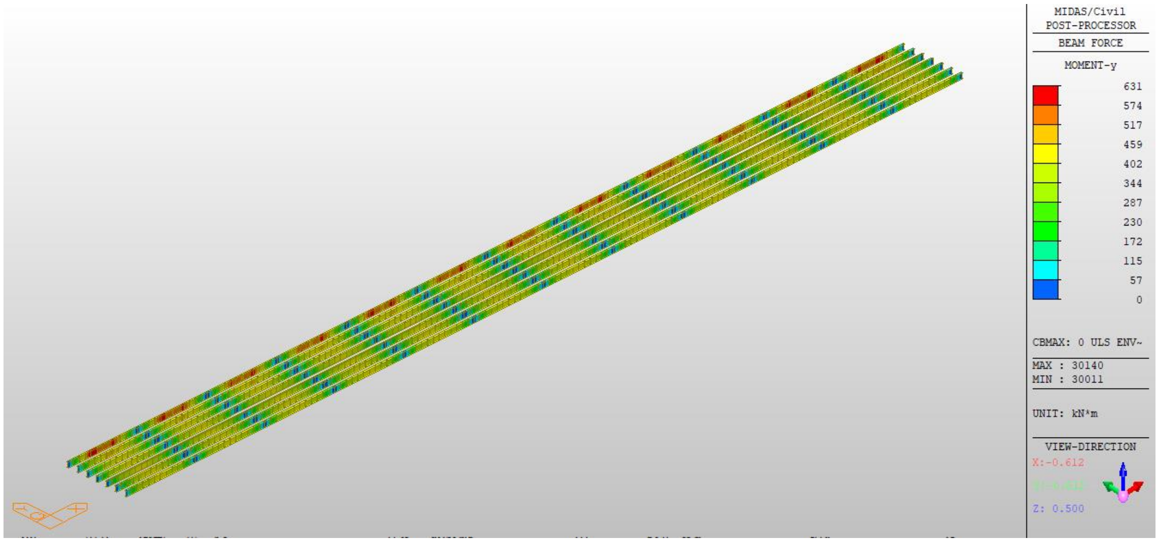


Figure 27 1959 Stringer – Case 0 (Existing) Envelope M_y Max (kN/m)

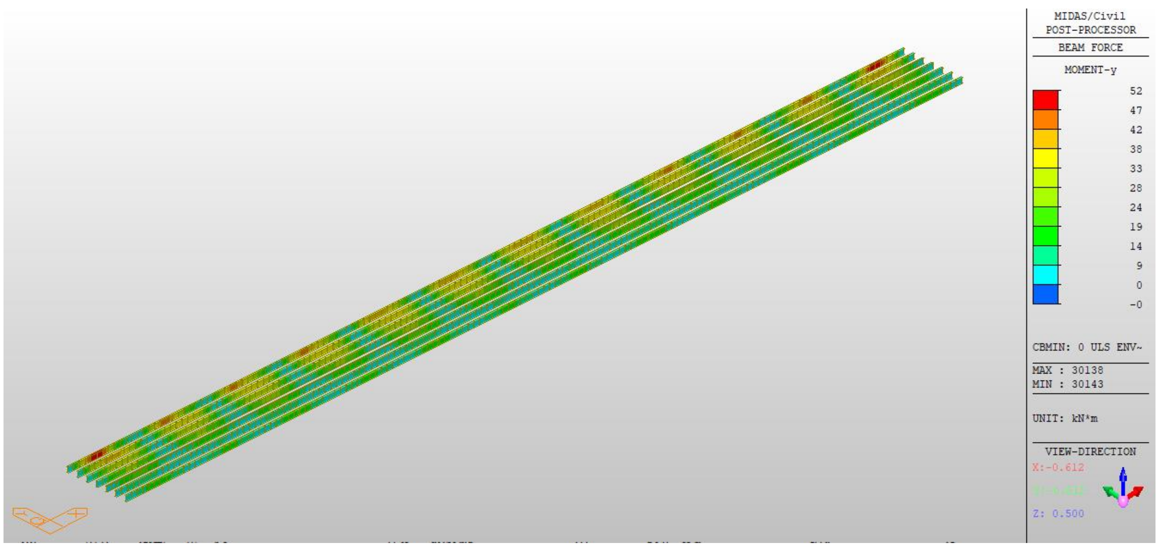


Figure 28 1959 Stringer – Case 0 (Existing) Envelope M_y Min (kN/m)

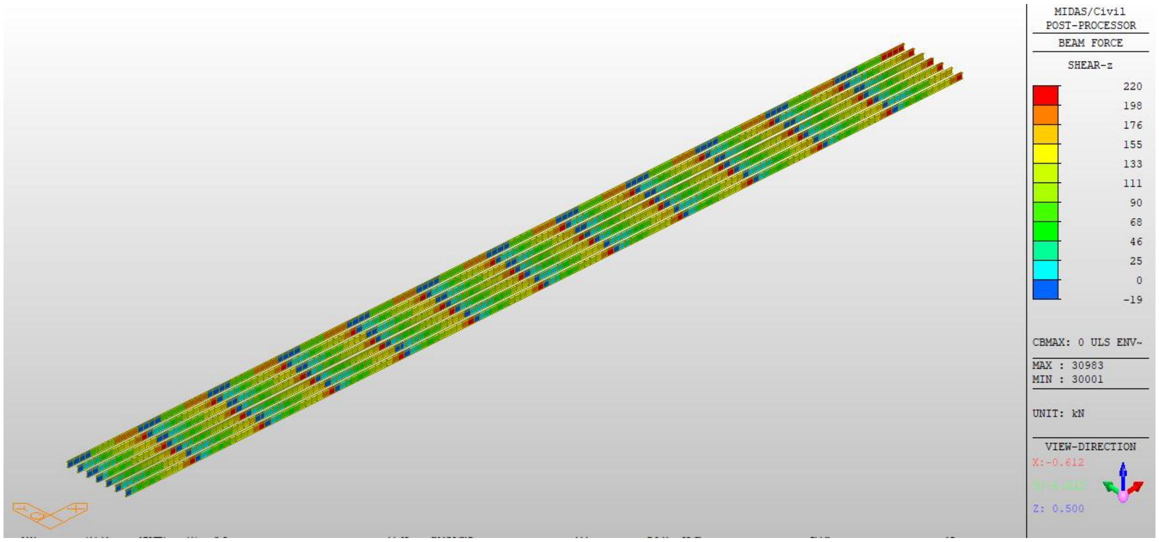


Figure 29 1959 Stringer – Case 0 (Existing) Envelope F_z Max (kN)

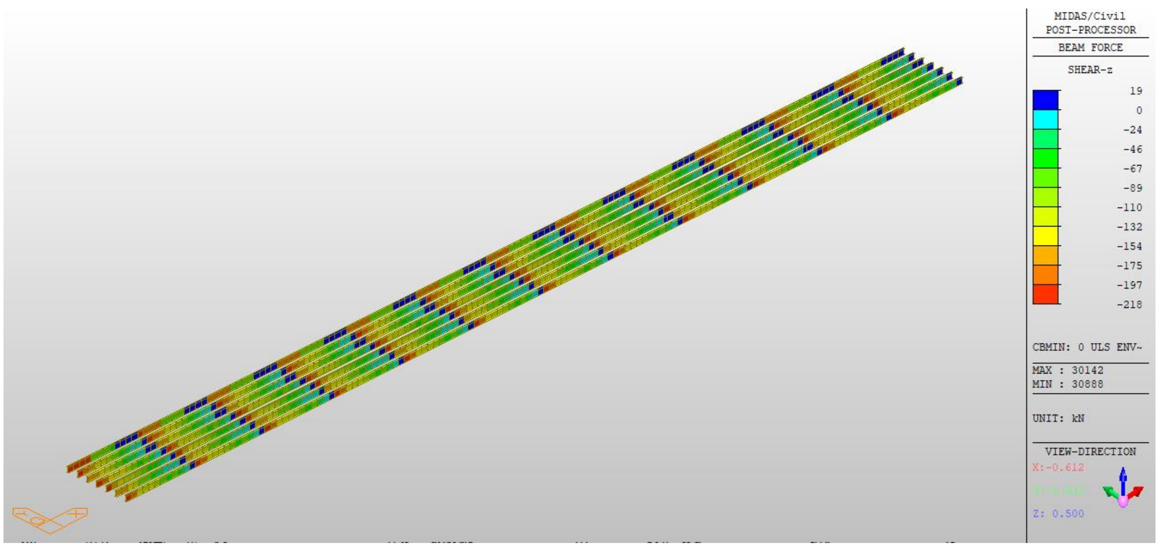


Figure 30 1959 Stringer – Case 0 (Existing) Envelope F_z Max (kN)

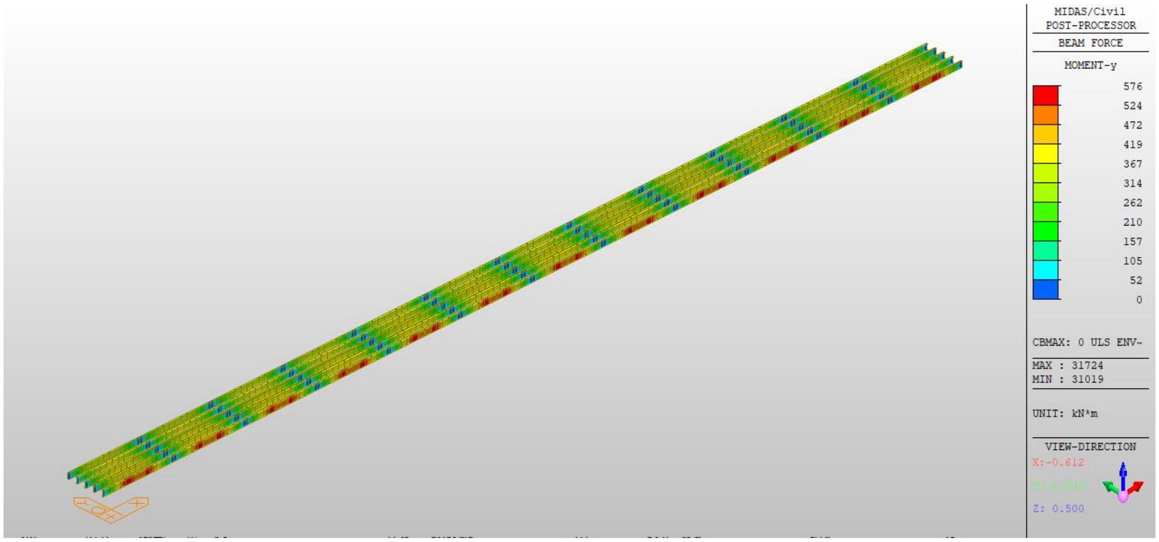


Figure 31 1982 Stringer – Case 0 (Existing) Envelope M_y Max (kN/m)

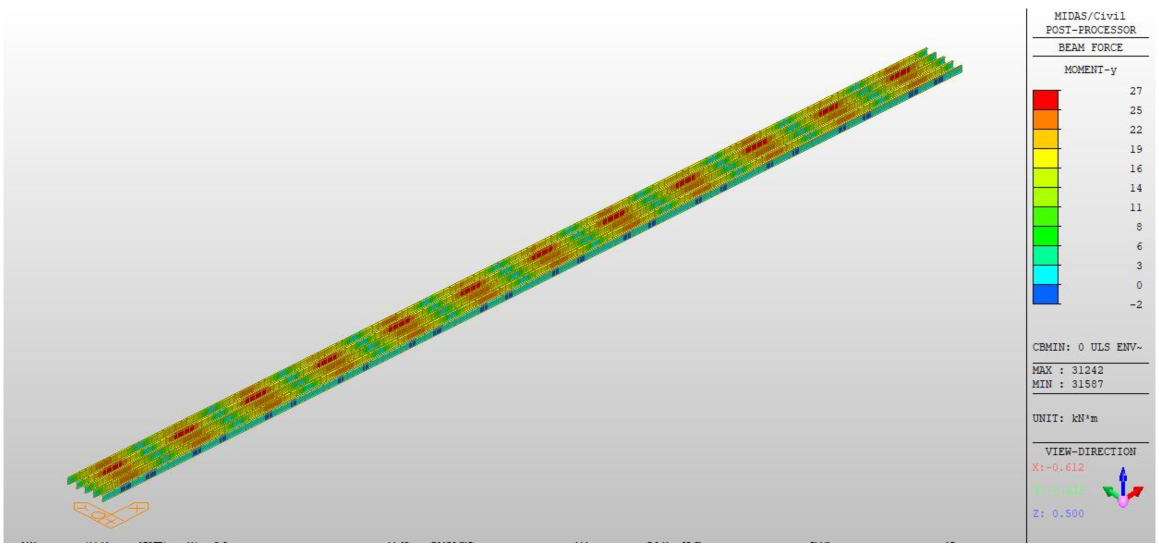


Figure 32 1982 Stringer – Case 0 (Existing) Envelope M_y Min (kN/m)

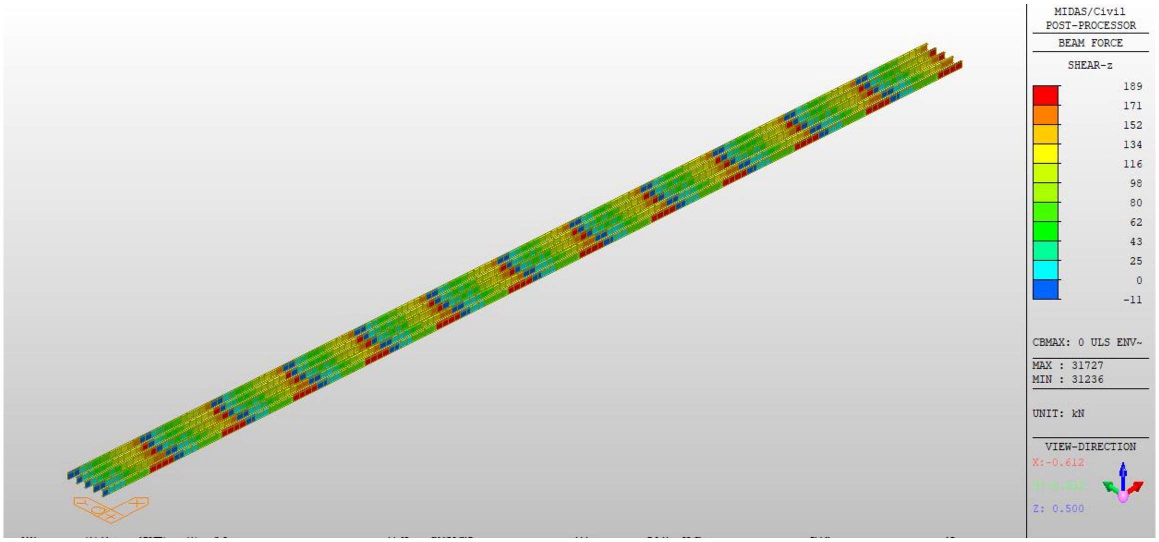


Figure 33 1982 Stringer – Case 0 (Existing) Envelope F_z Max (kN)

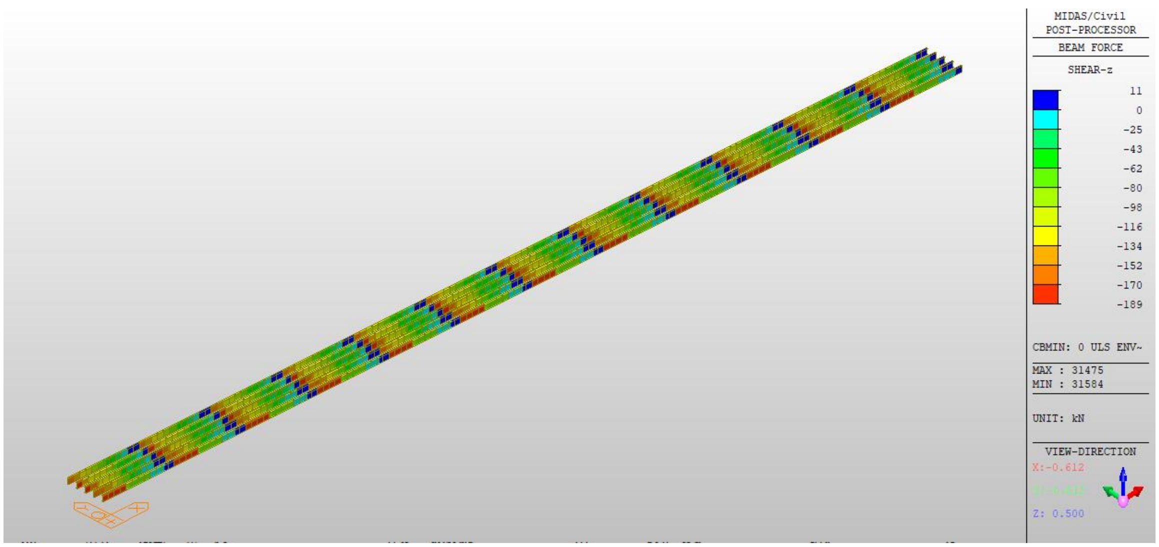


Figure 34 1982 Stringer – Case 0 (Existing) Envelope F_z Min (kN)

Exhibit B.6.2. Bridge Raised with Transverse Wind Evaluation

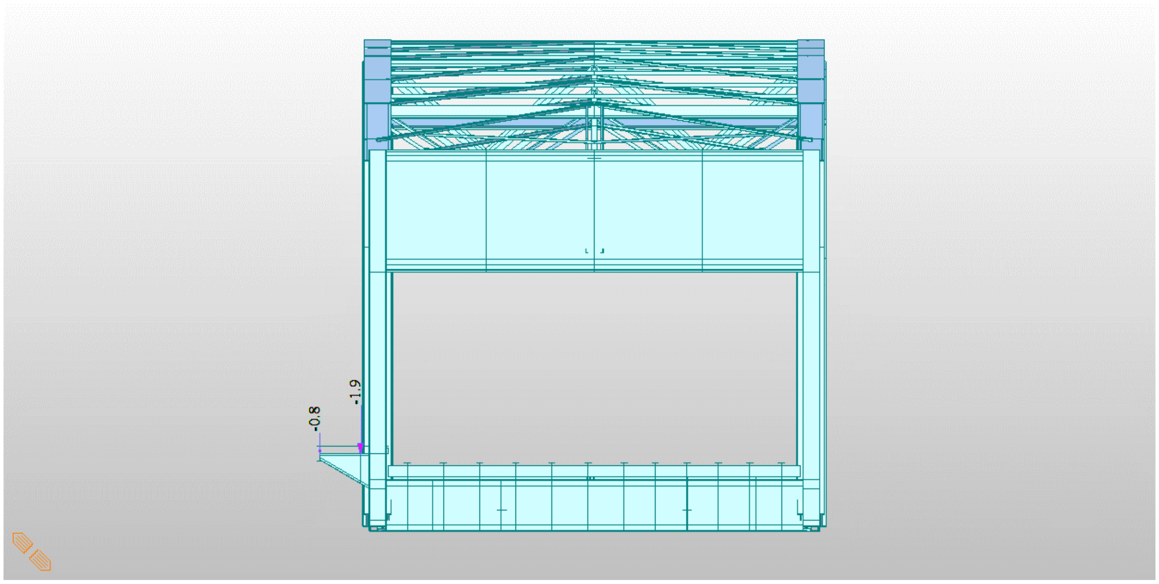


Figure 35 Wind Load Vertical Sidewalk

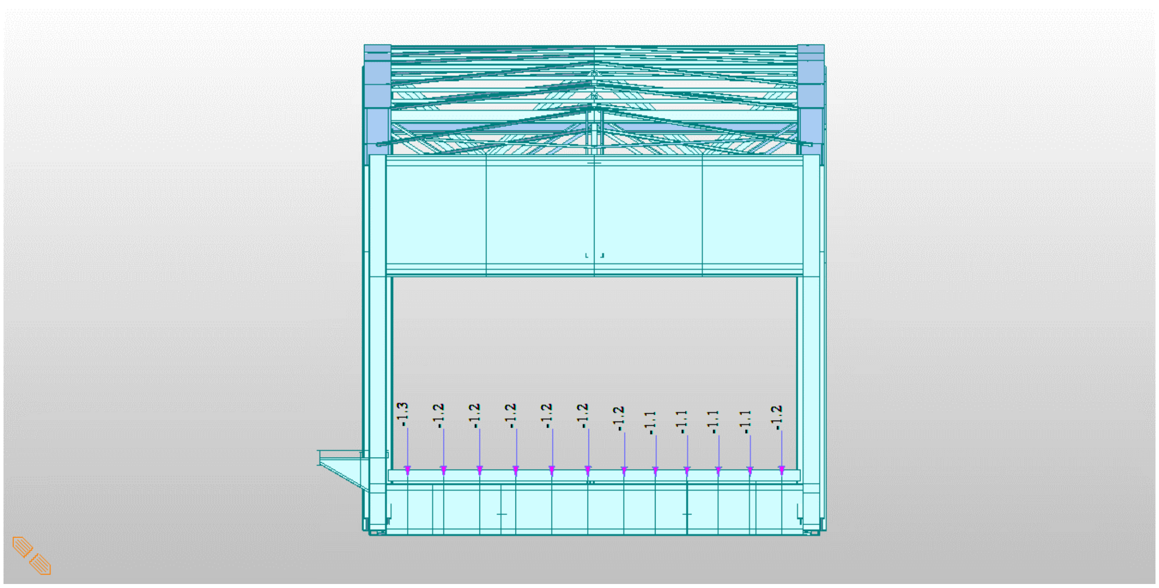


Figure 36 Wind Load Vertical Stringers

*Wind for calculations taken as 85% as per CHBDC S6-19 13.6.4.6

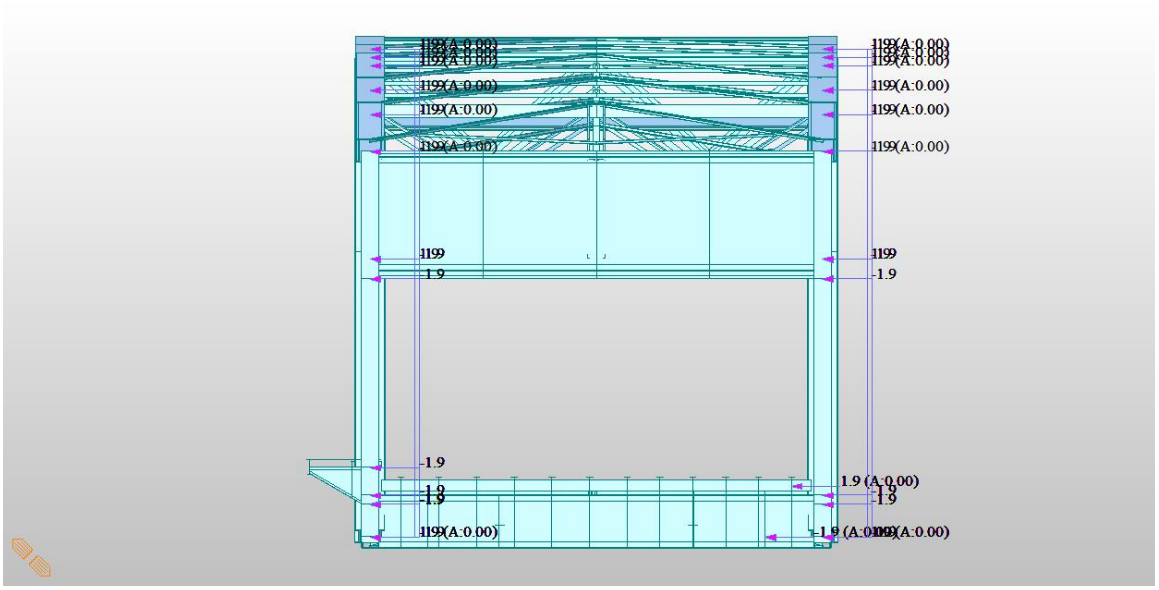


Figure 37 Wind Load Horizontal 1 (East to West)

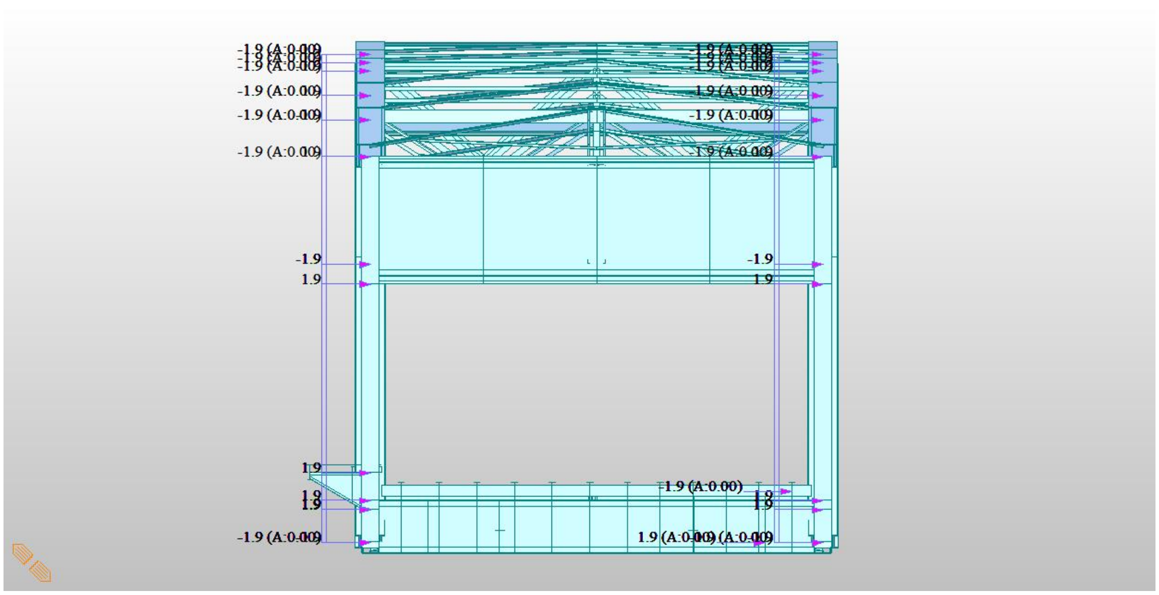


Figure 38 Wind Load Horizontal 2 (West to East)

Exhibit B.6.3. Bridge Raised with Longitudinal Wind Evaluation

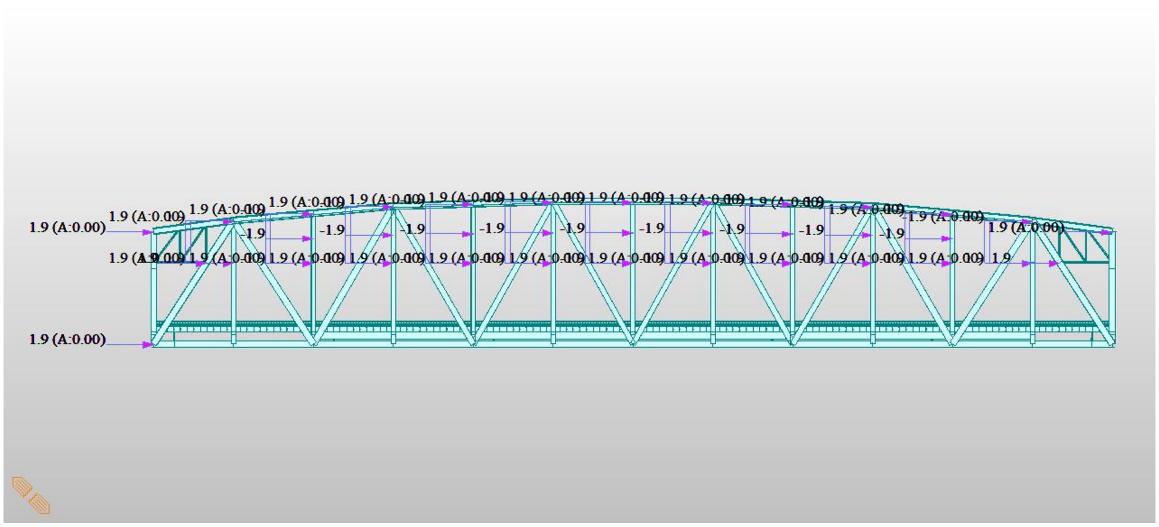


Figure 39 Wind Load Longitudinal 1 (South to North)

*Load factored up by 25% when considered to result in the longitudinal load equal to 50% of total transverse wind as per CHBDC S6-19 13.6.4.4

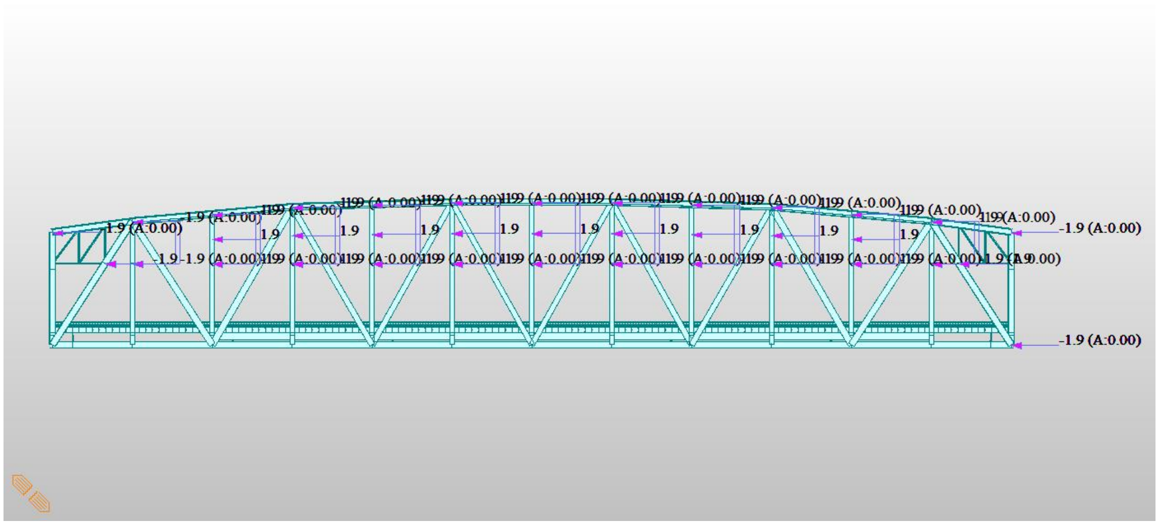


Figure 40 Wind Load Longitudinal 2 (North to South)

*Load factored up by 25% when considered to result in the longitudinal load equal to 50% of total transverse wind as per CHBDC S6-19 13.6.4.4

Exhibit E.7

South Tower Existing Evaluation 3D Model

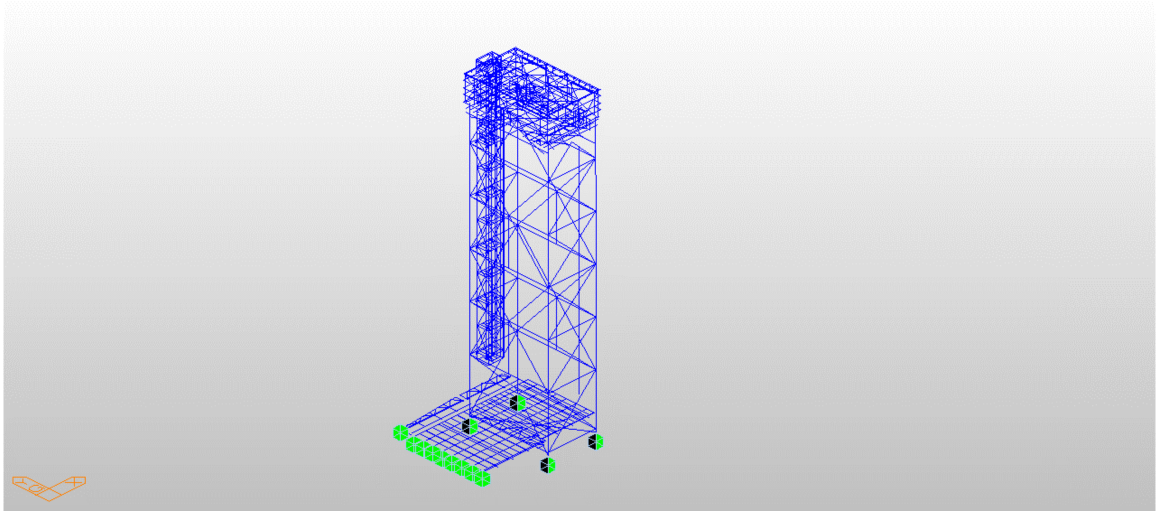


Figure 1 2D Frame Model with Supports

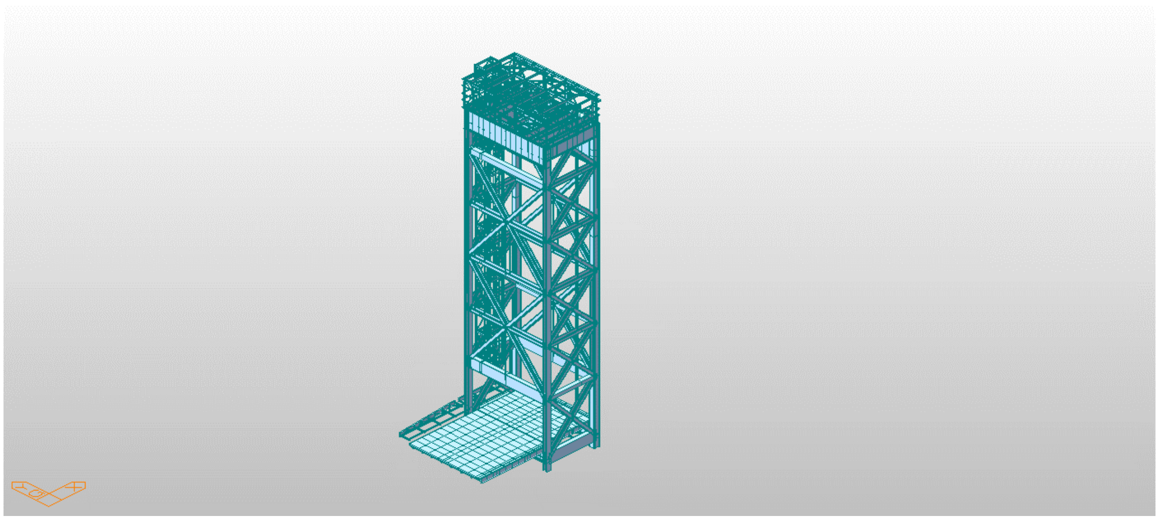


Figure 2 3D Frame Model

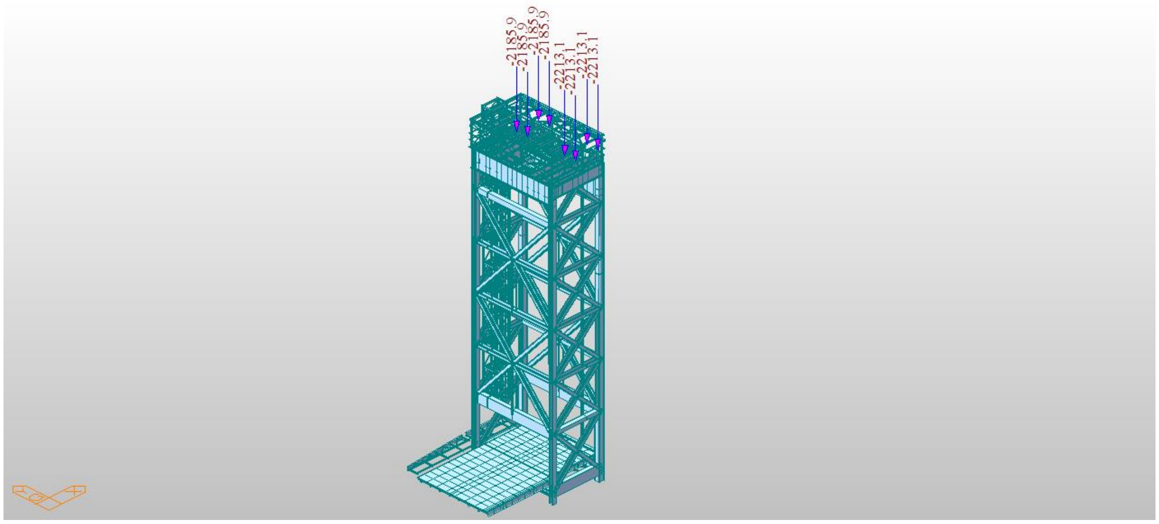


Figure 3 Bridge Weight – Case 0 (Existing) Loading

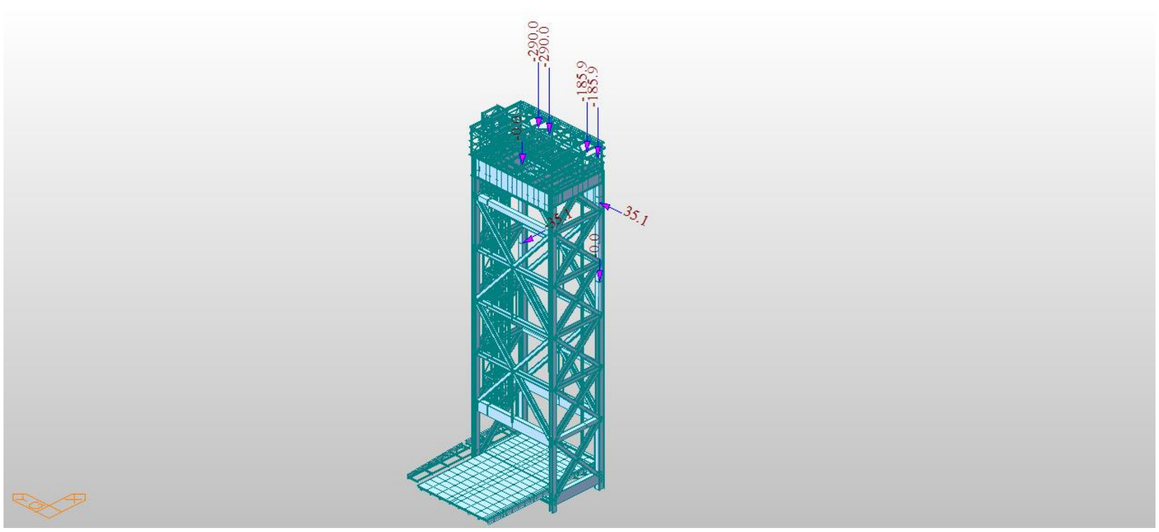


Figure 4 Wind Load Vertical – Bridge

*Wind for calculations taken as 85% as per CHBDC S6-19 13.6.4.6

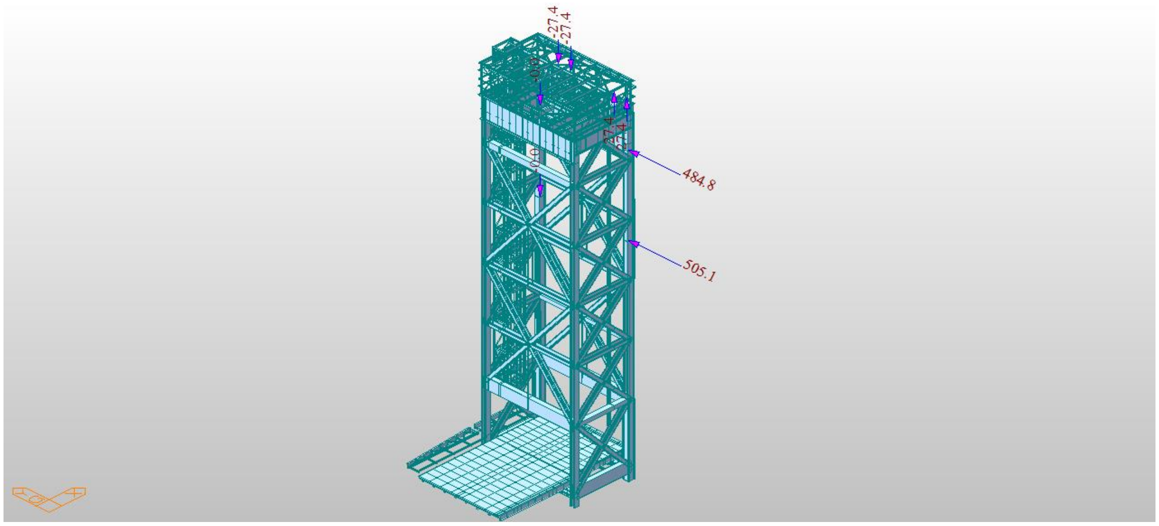


Figure 5 Wind Load Horizontal 1 (East to West) – Bridge

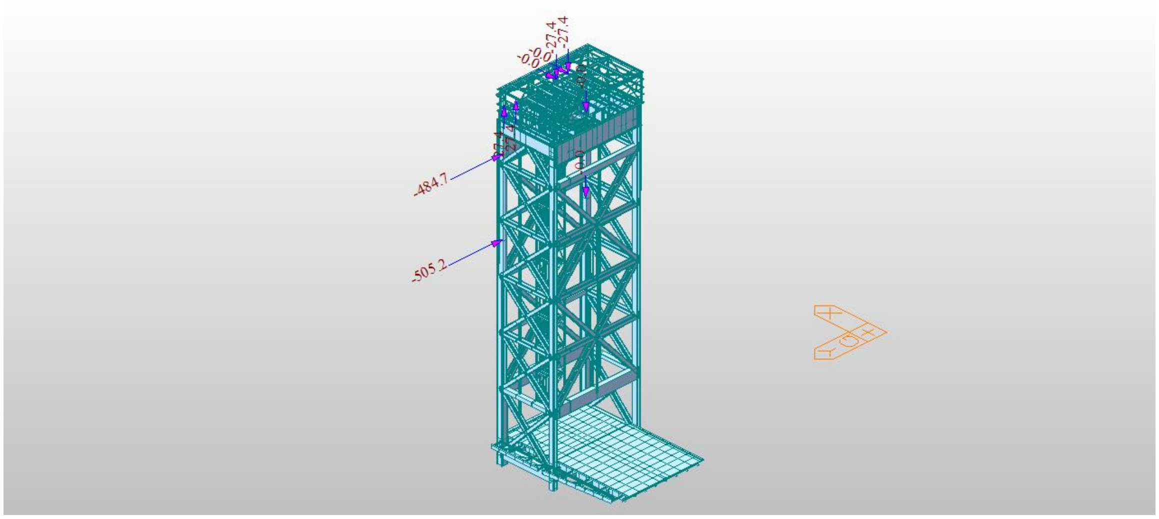


Figure 6 Wind Load Horizontal 2 (West to East) - Bridge

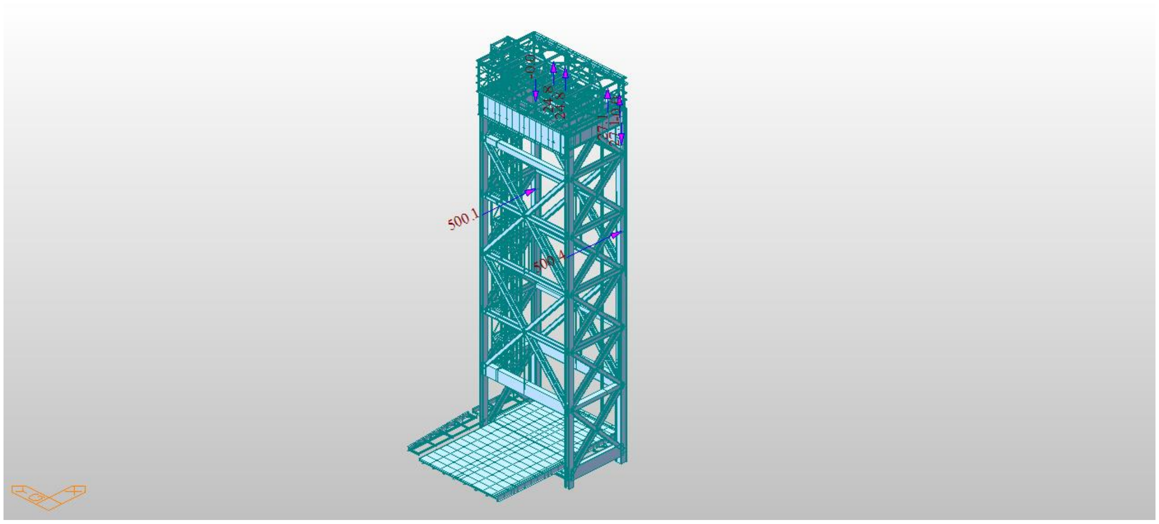


Figure 7 Wind Load Longitudinal 1 (South to North) – Bridge

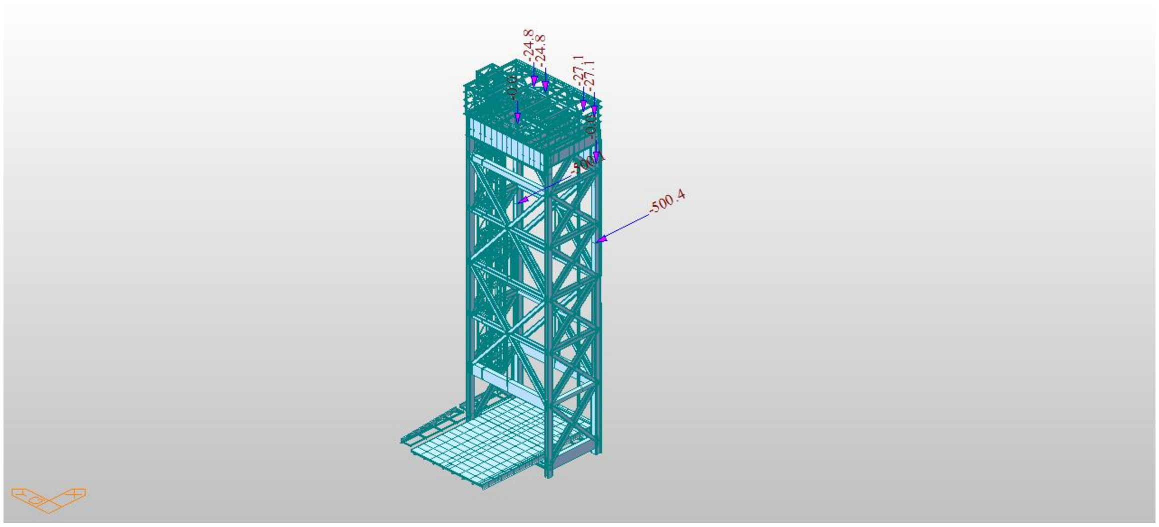


Figure 8 Wind Load Longitudinal 2 (North to South) – Bridge

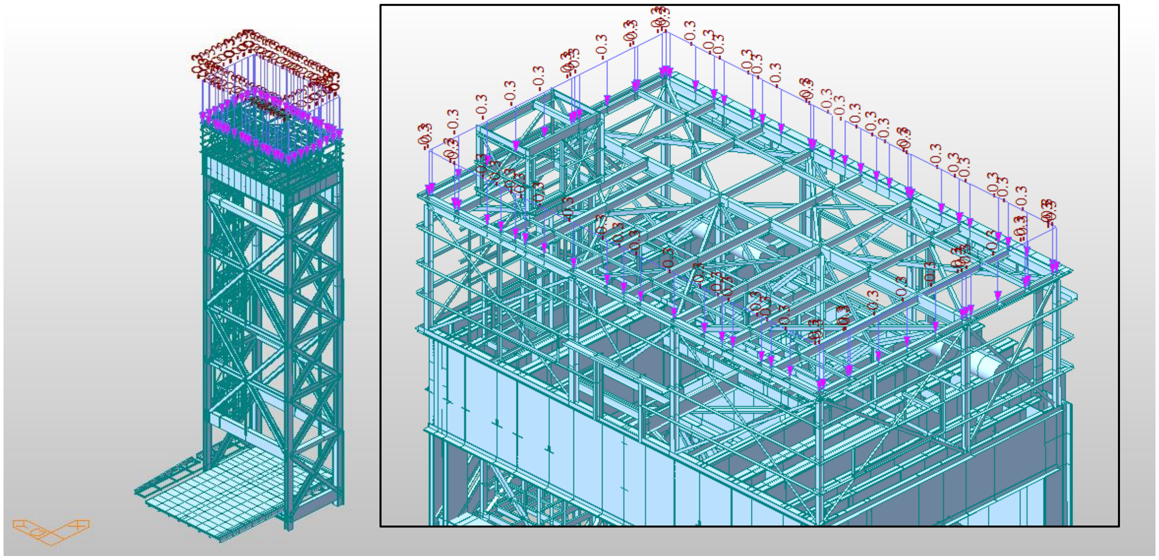


Figure 9 Wind Load Vertical Tower

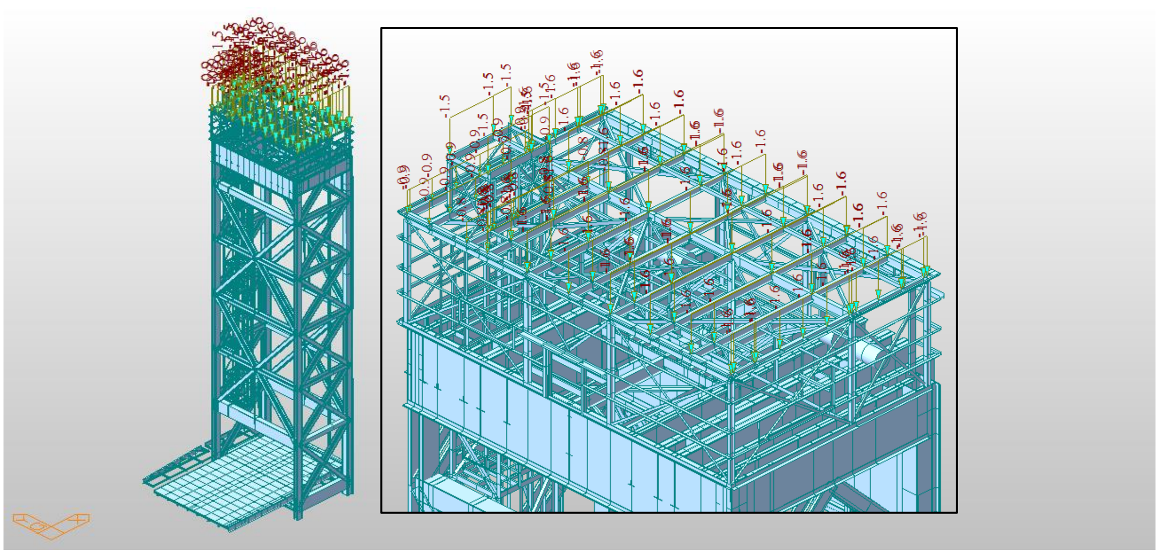


Figure 10 Wind Load Vertical Tower Floor Loads

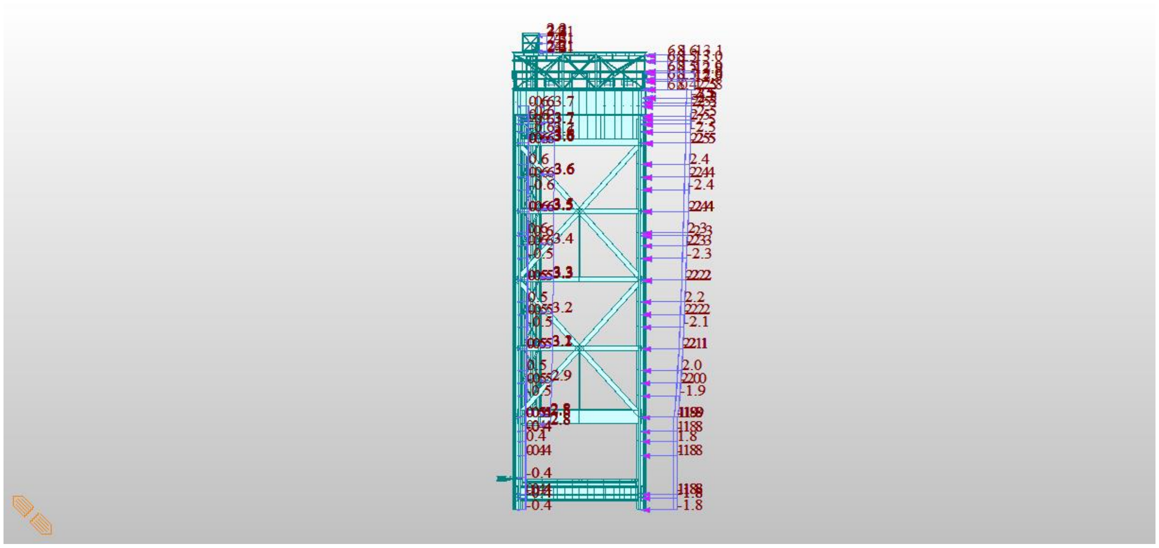


Figure 11 Wind Load Horizontal 1 (East to West) – Tower

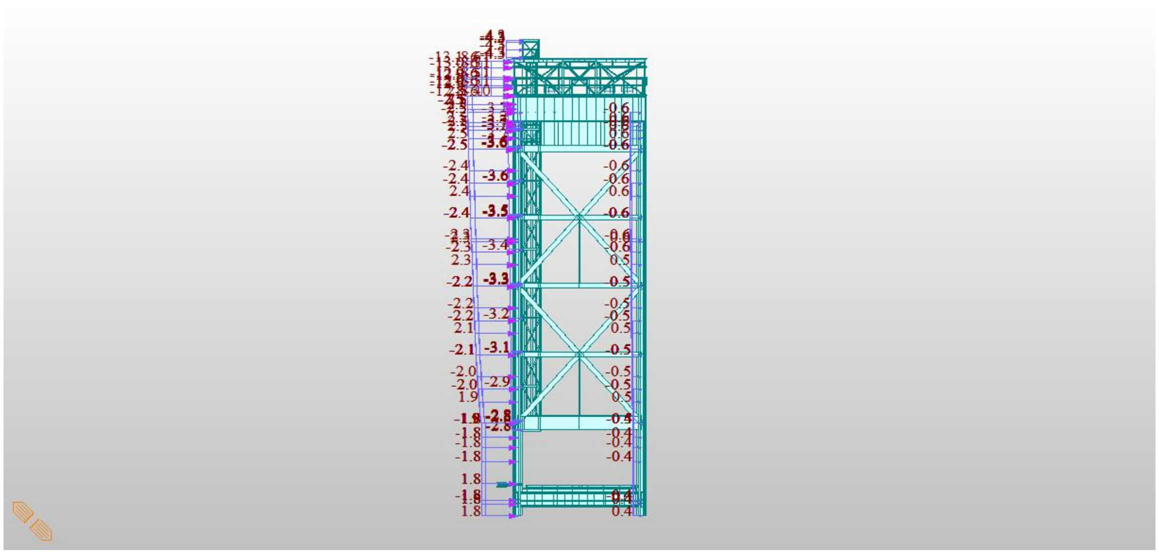


Figure 12 Wind Load Horizontal 2 (West to East) – Tower

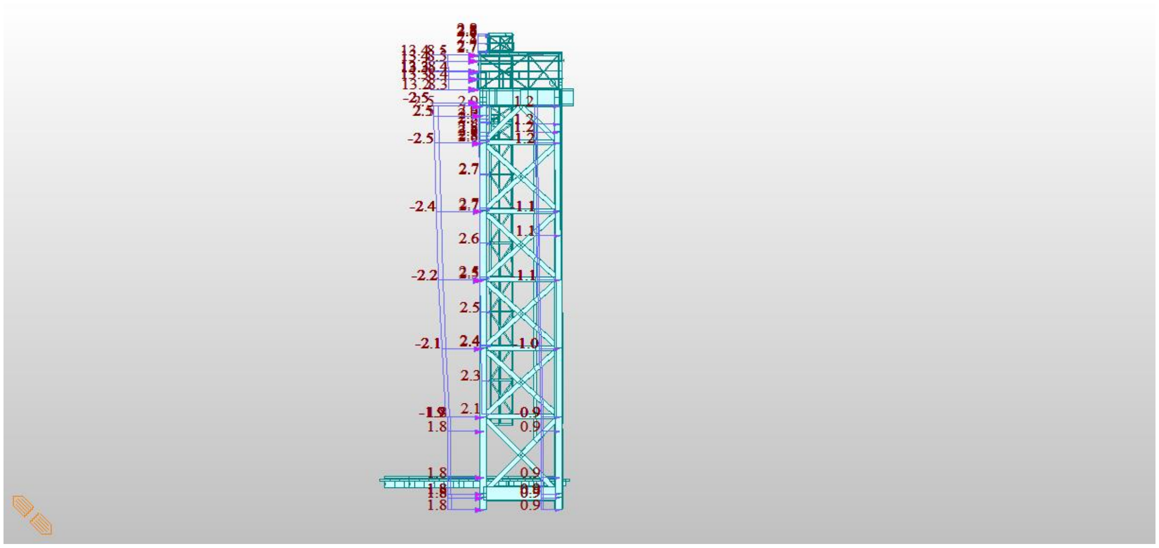


Figure 13 Wind Load Longitudinal 1 (South to North) – Tower

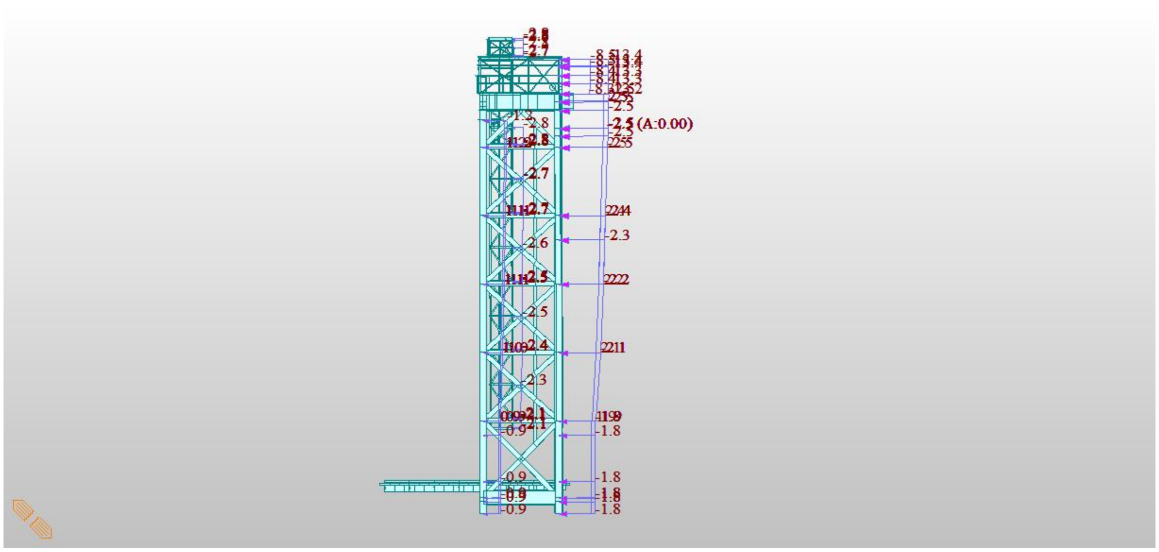


Figure 14 Wind Load Longitudinal 2 (North to South) – Tower

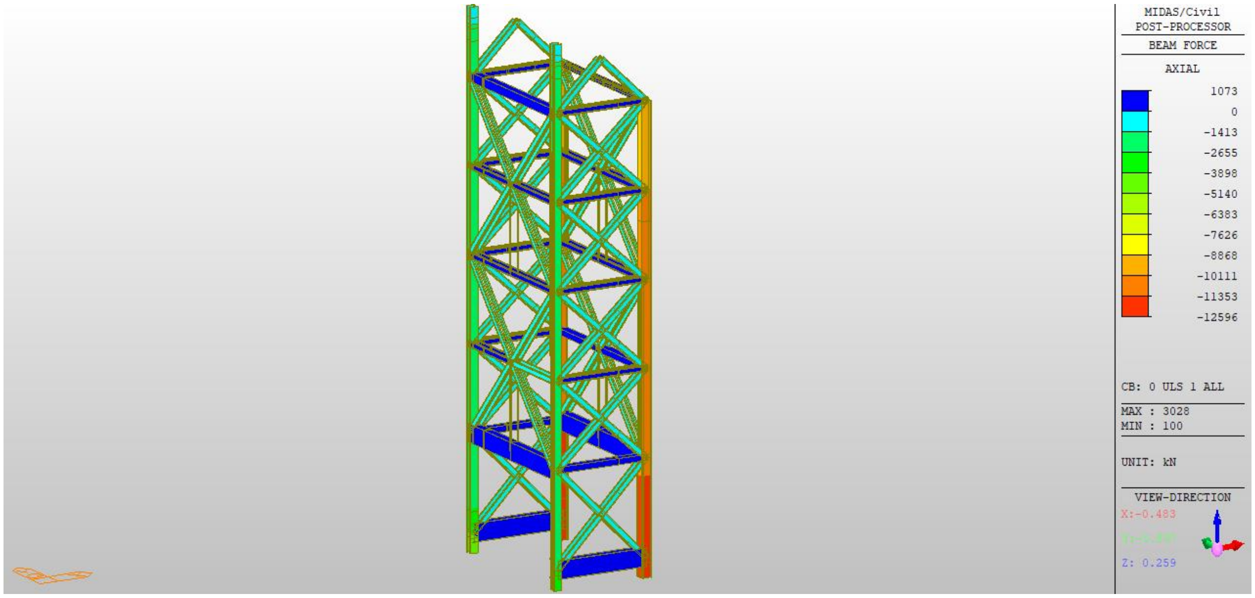


Figure 15 Case 0 ULS 1 Axial

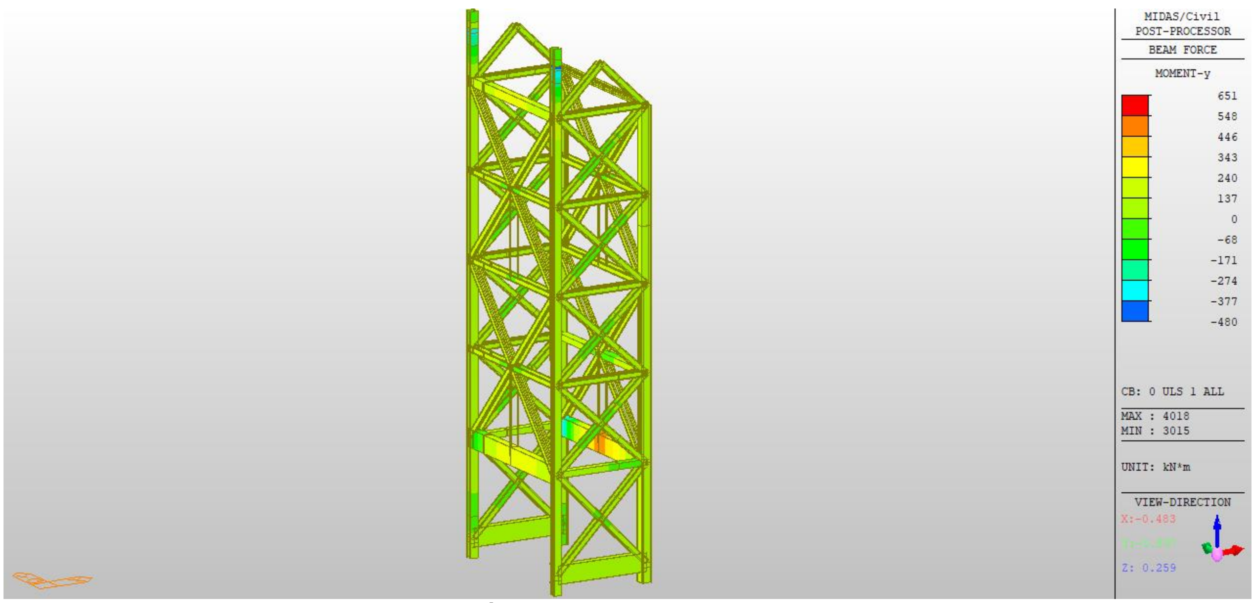


Figure 16 Case 0 ULS 1 MY

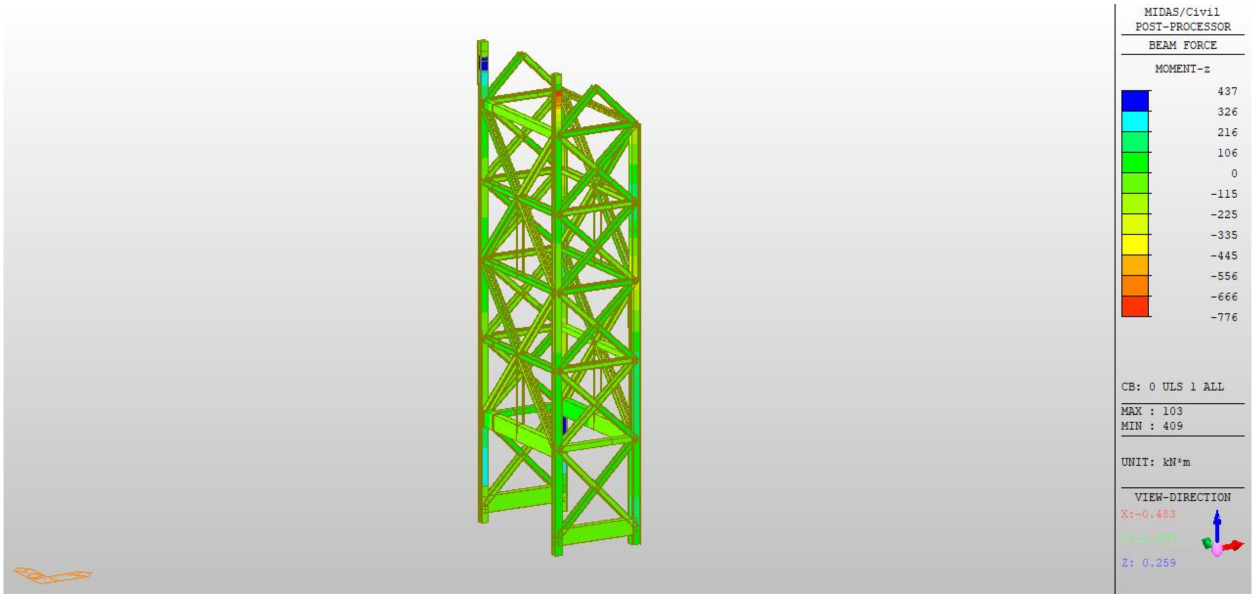


Figure 17 Case 0 ULS 1 MZ

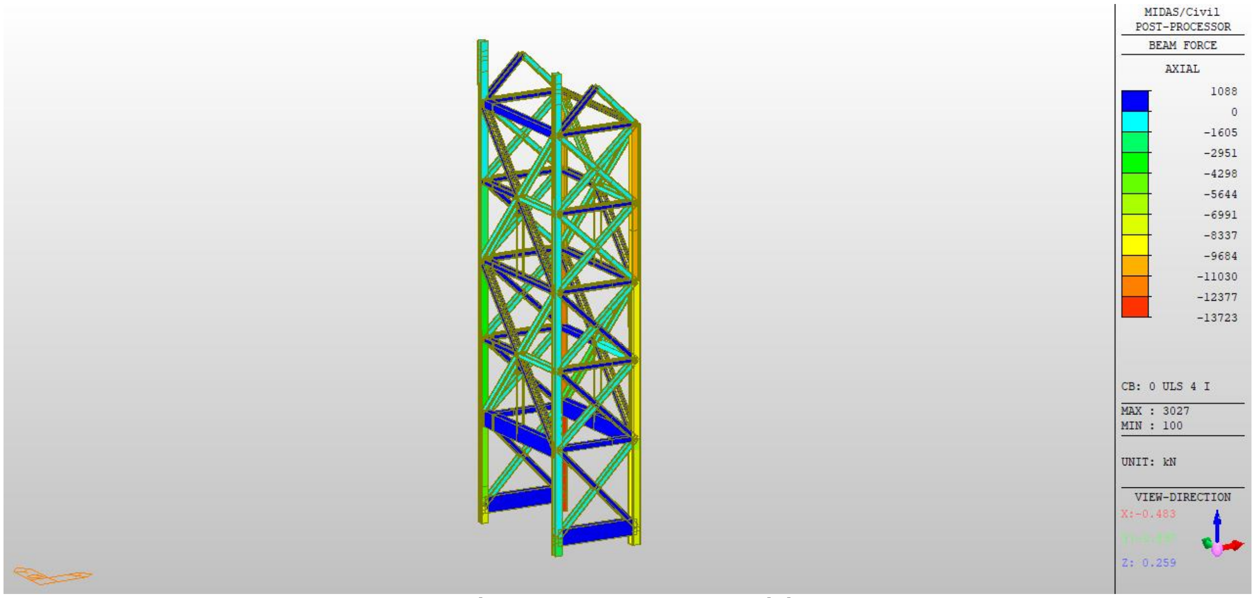


Figure 18 Case 0 ULS 4 Axial

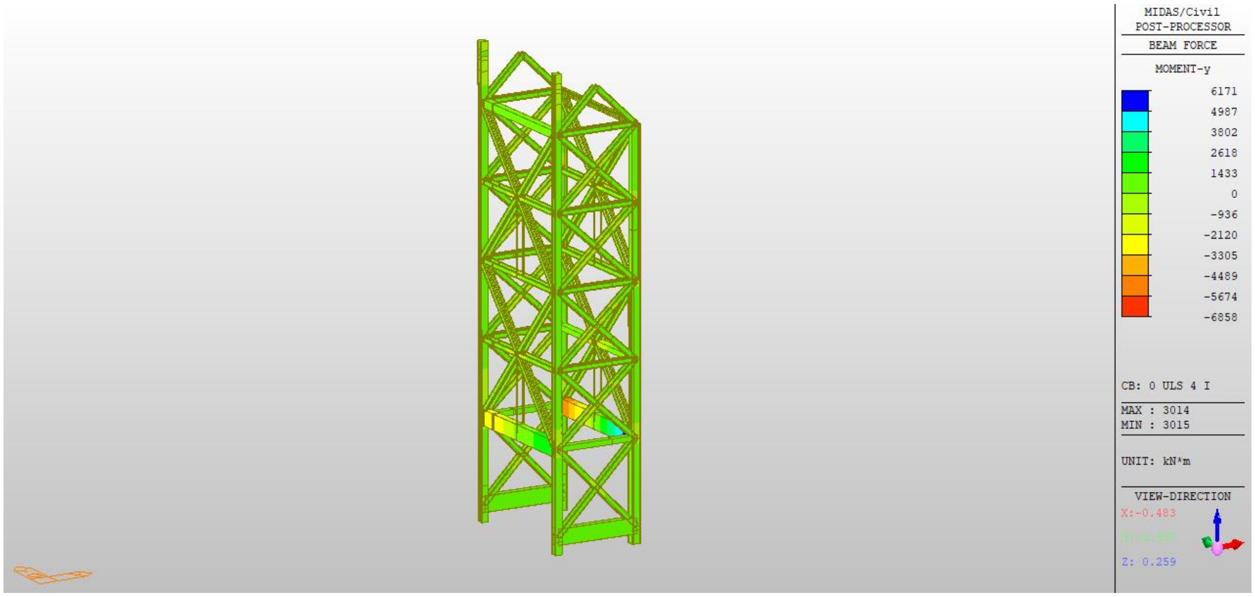


Figure 19 Case 0 ULS 4 MY

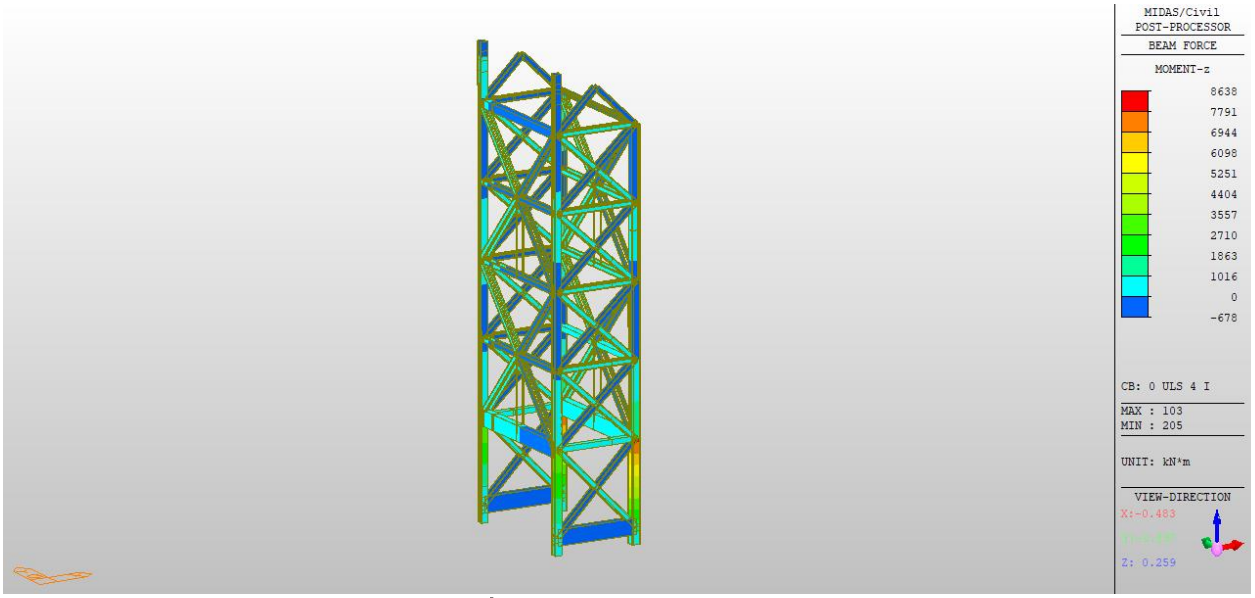


Figure 20 Case 0 ULS 4 MZ

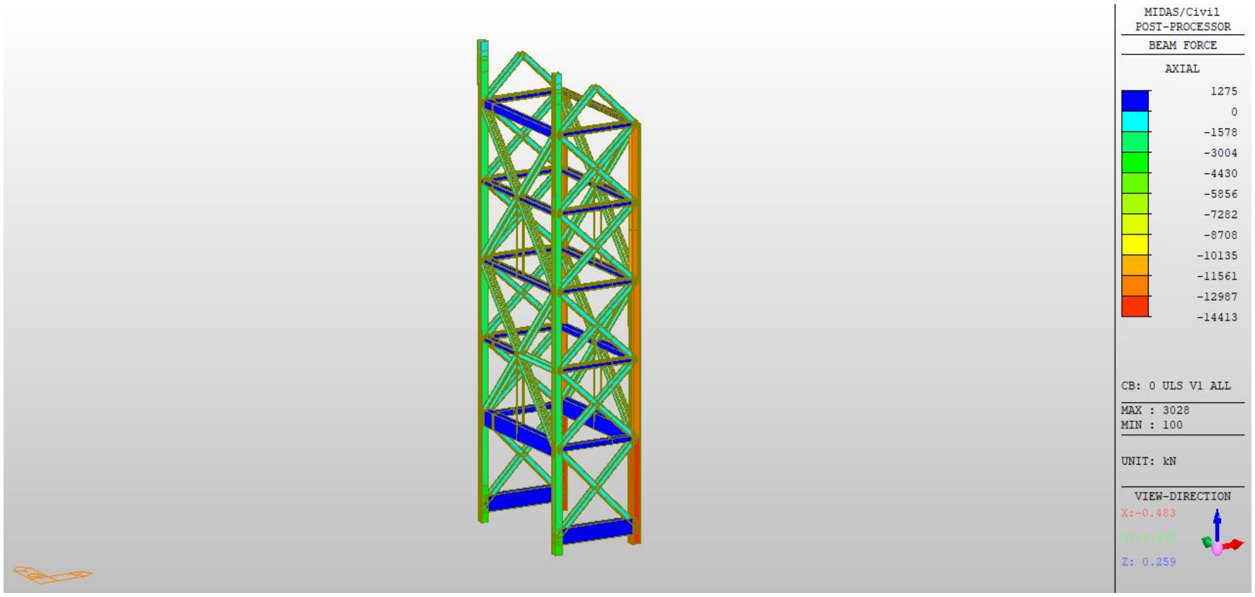


Figure 21 Case 0 ULS V1 Axial

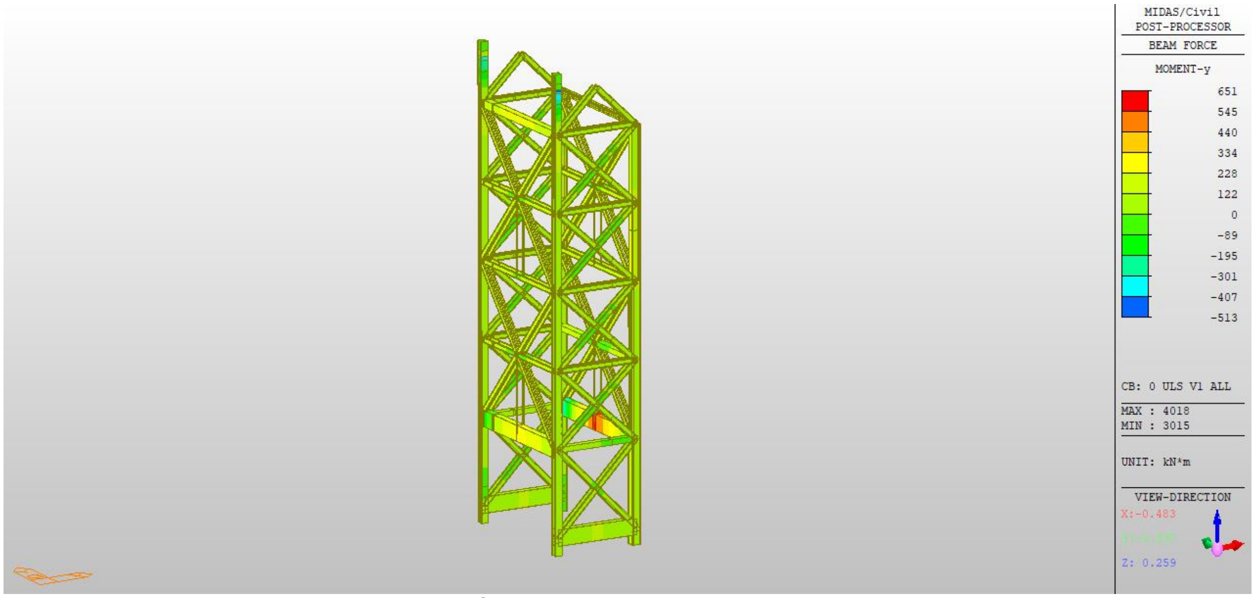


Figure 22 Case 0 ULS V1 MY

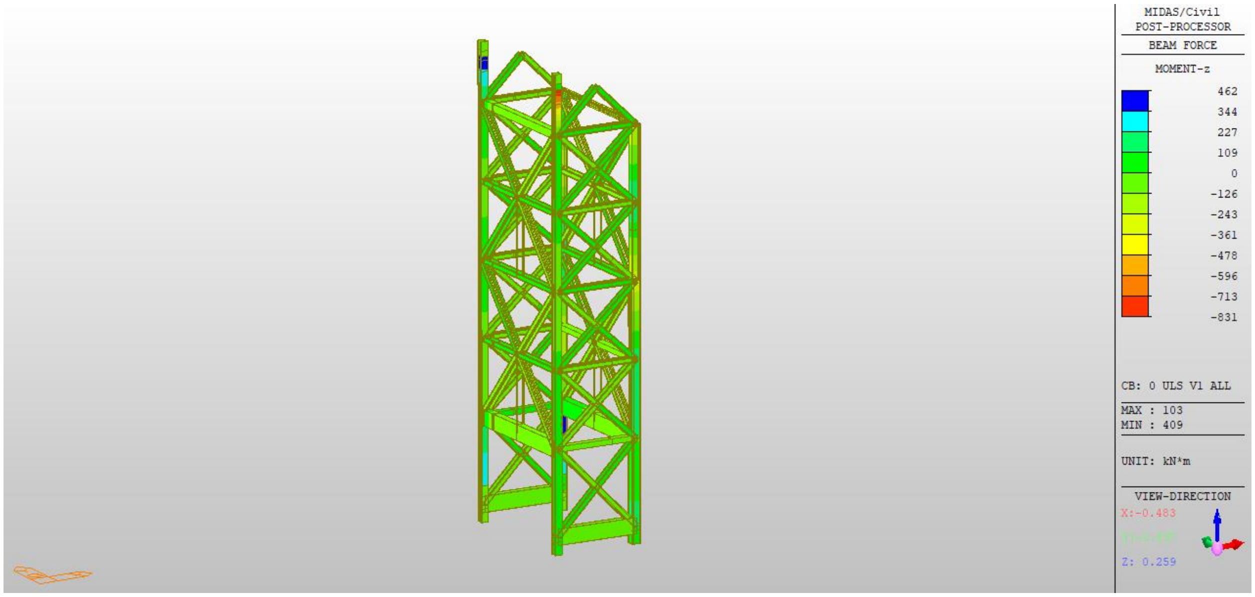


Figure 23 Case 0 ULS V1 MZ

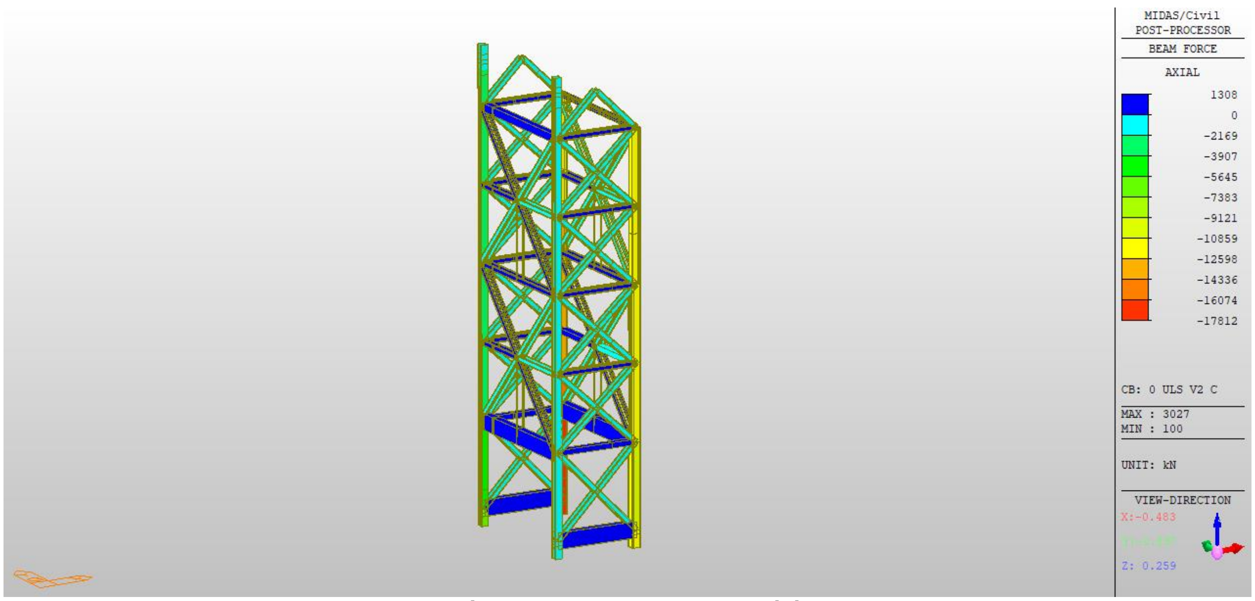


Figure 24 Case 0 ULS V2 Axial

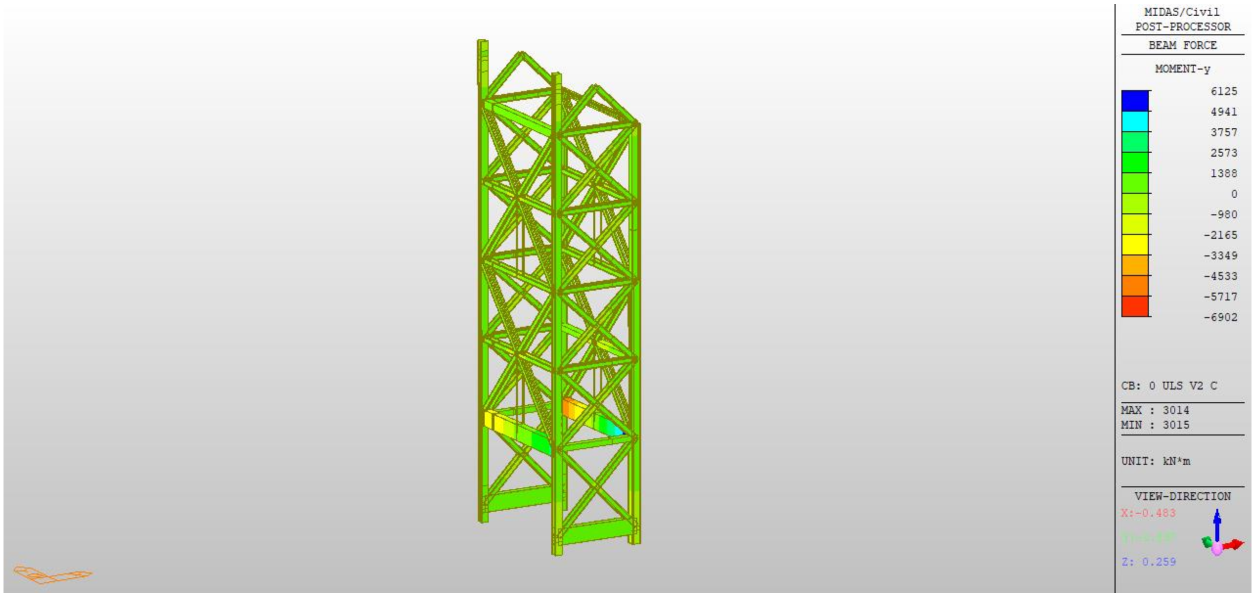


Figure 25 Case 0 ULS V2 MY

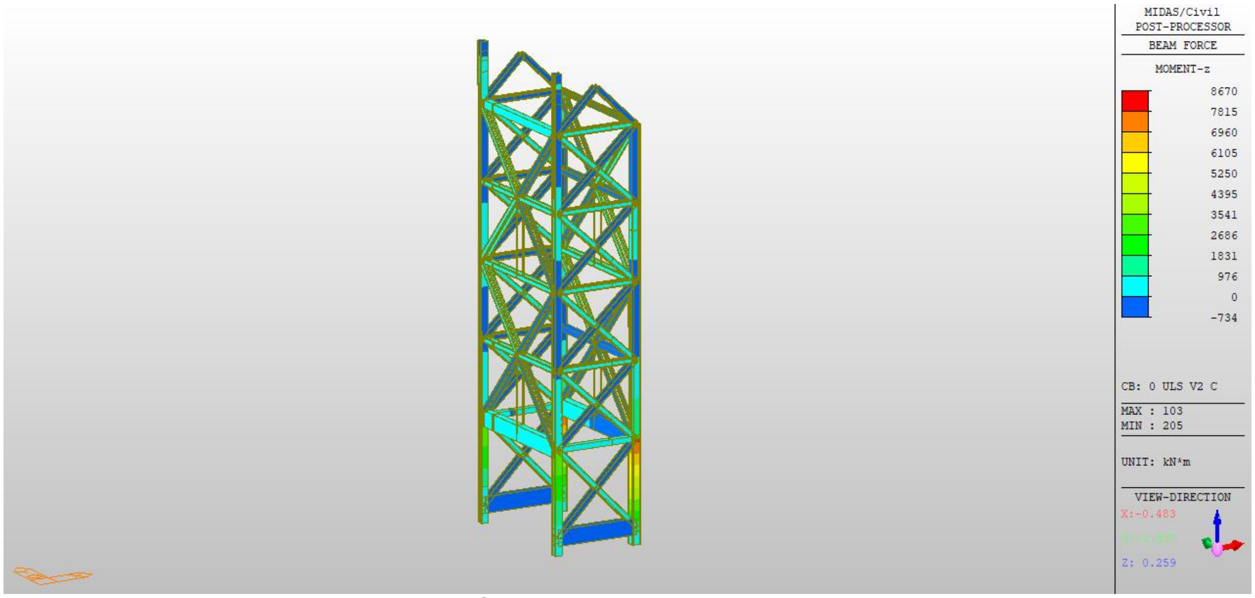


Figure 26 Case 0 ULS V2 MZ

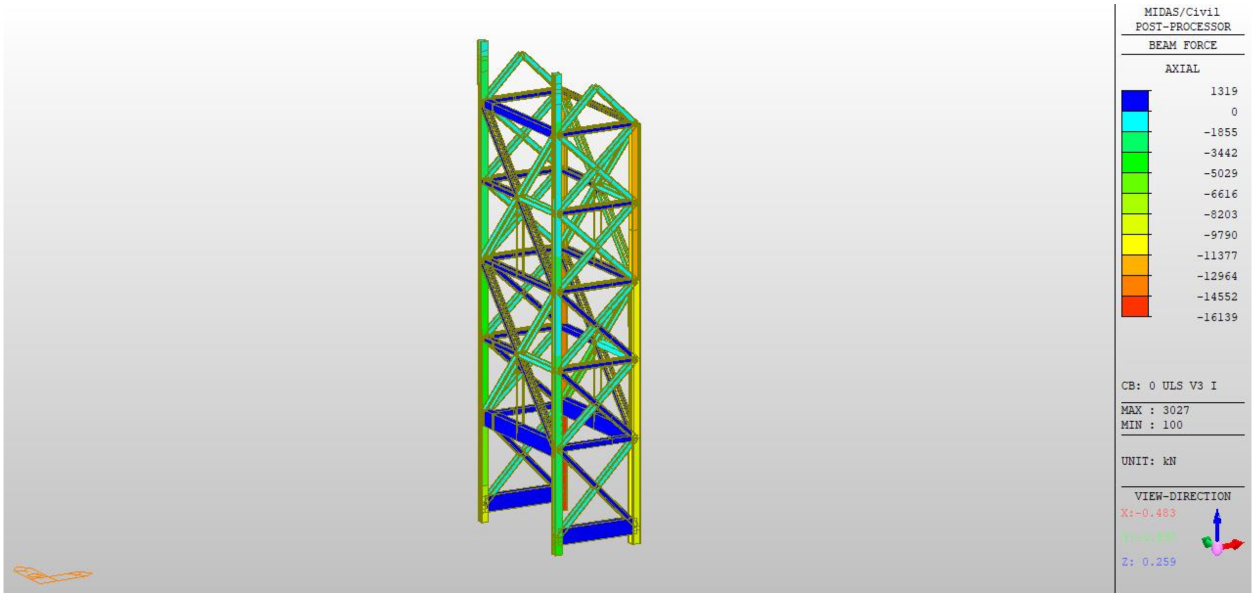


Figure 27 Case 0 ULS V3 Axial

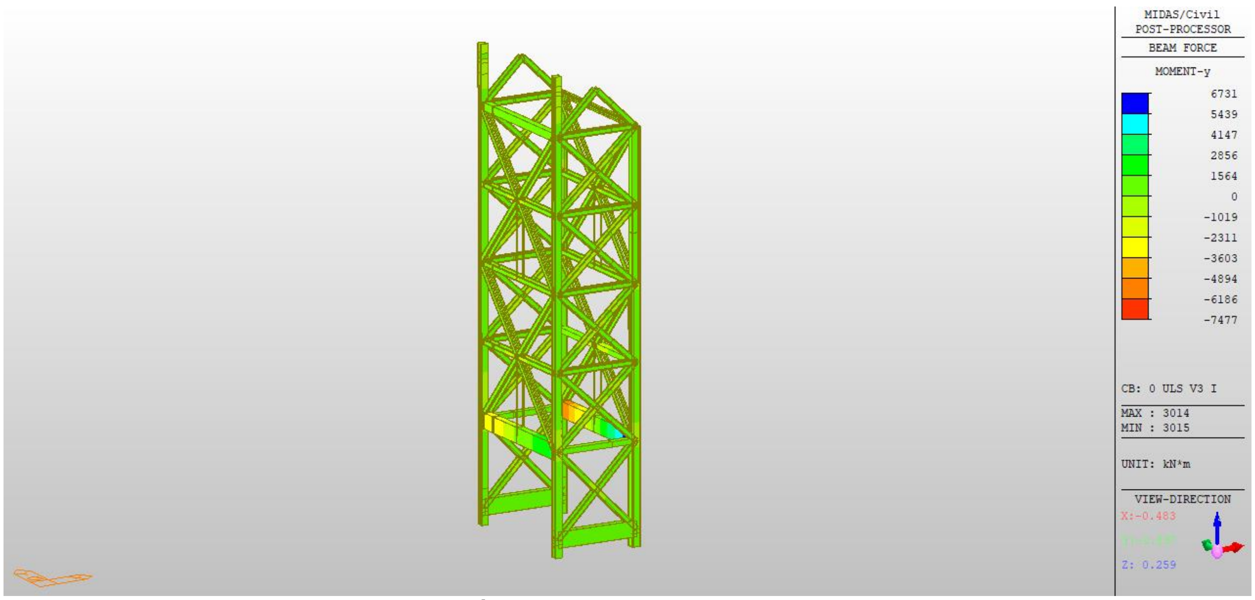


Figure 28 Case 0 ULS V3 MY

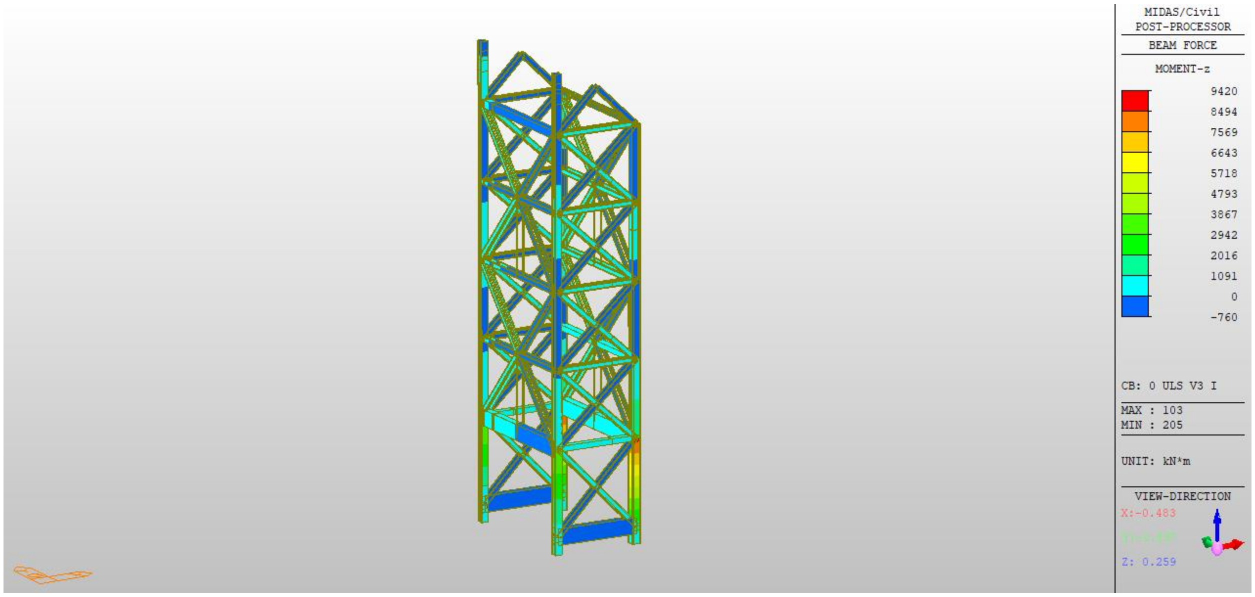


Figure 29 Case 0 ULS V3 MZ

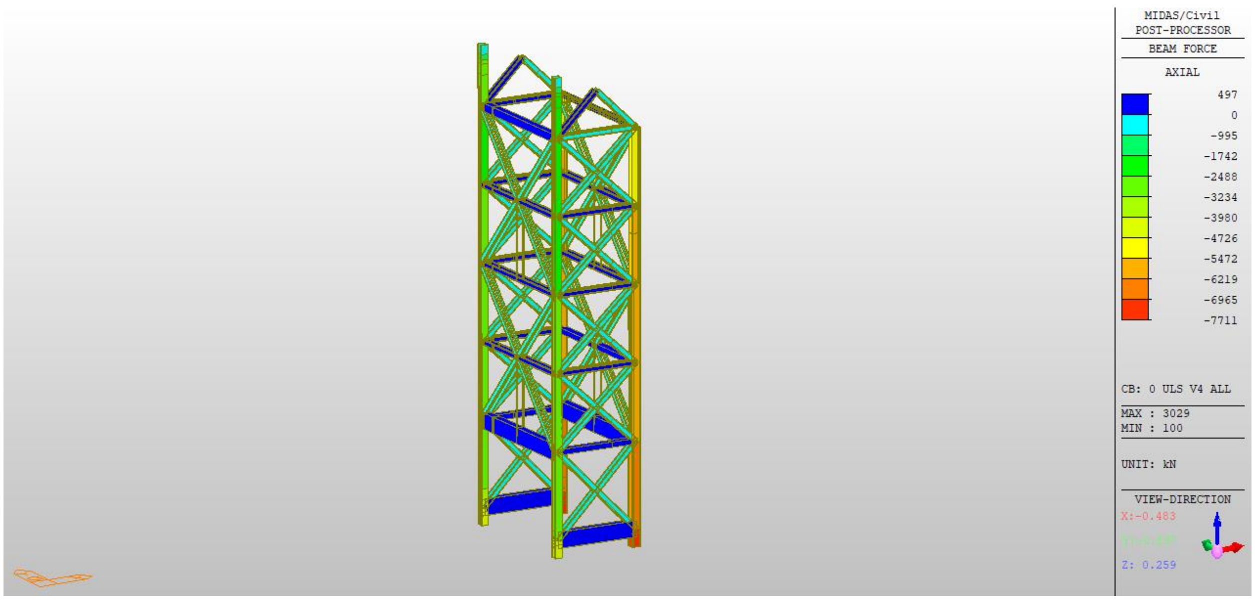


Figure 30 Case 0 ULS V4 Axial

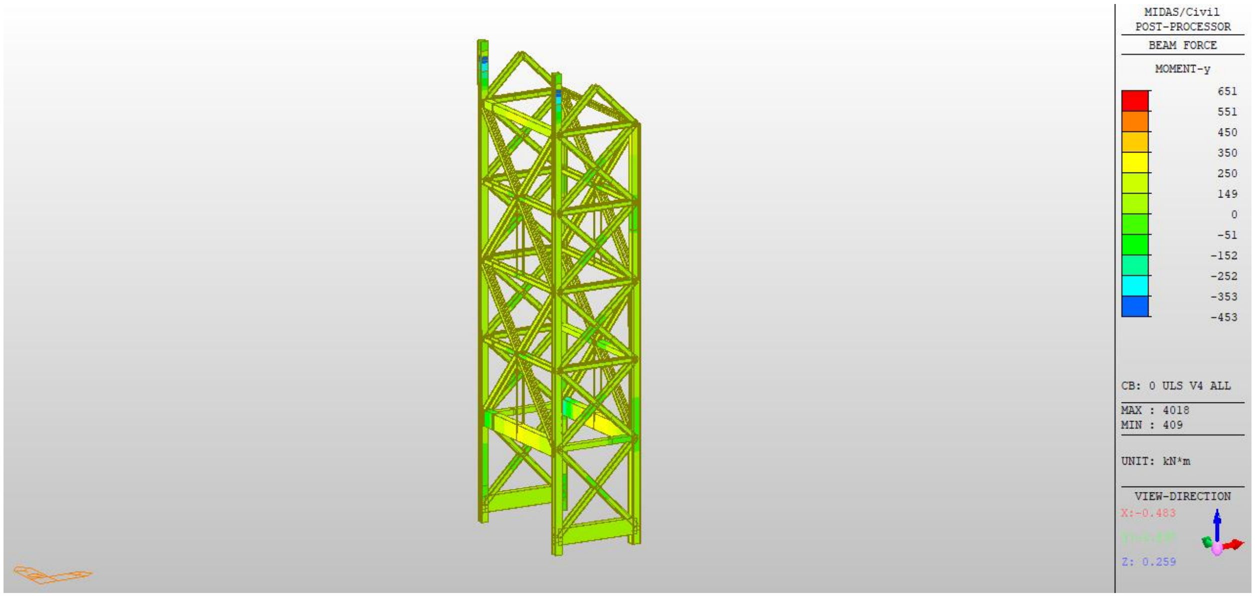


Figure 31 Case 0 ULS V4 MY

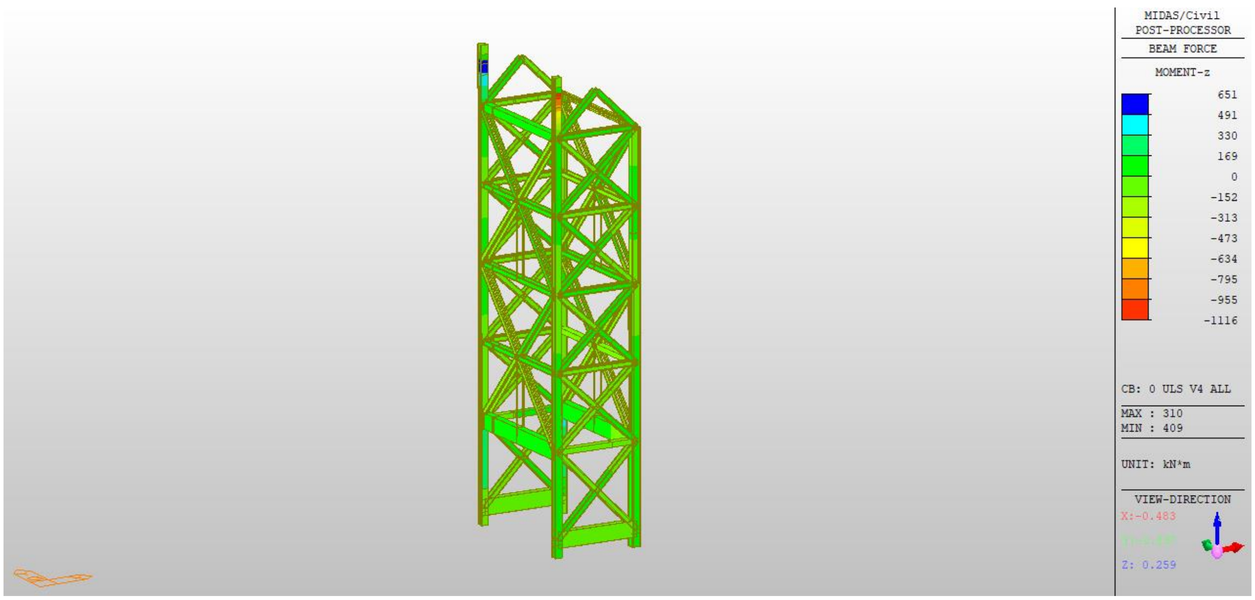


Figure 32 Case 0 ULS V4 MZ

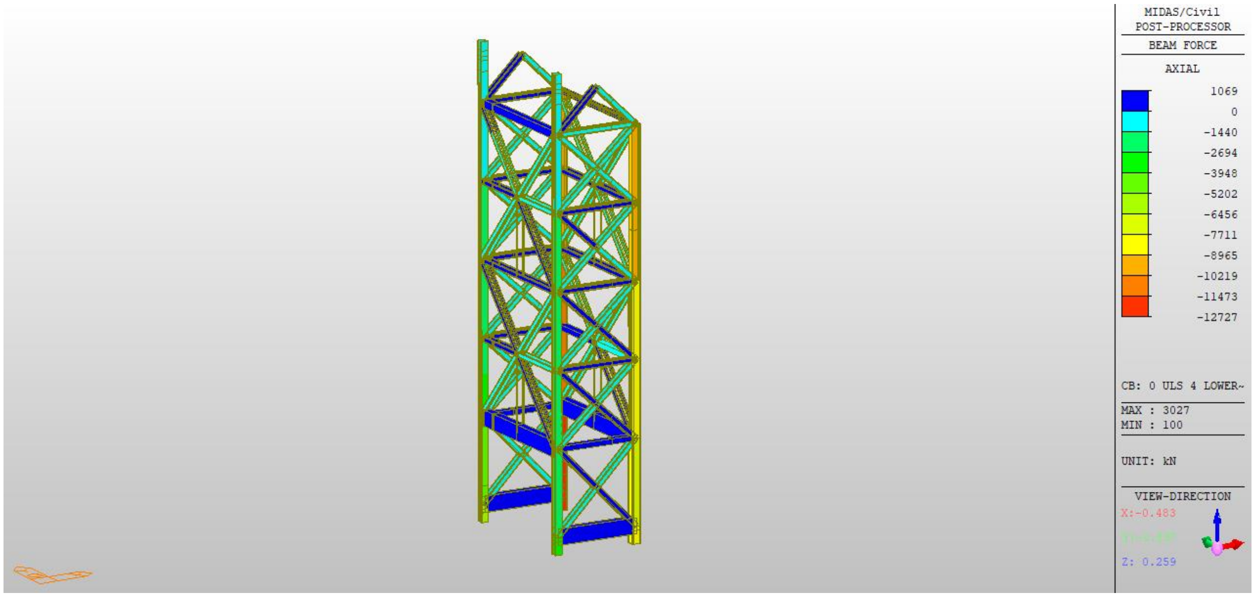


Figure 33 Case 0 ULS 4 Lowered Axial

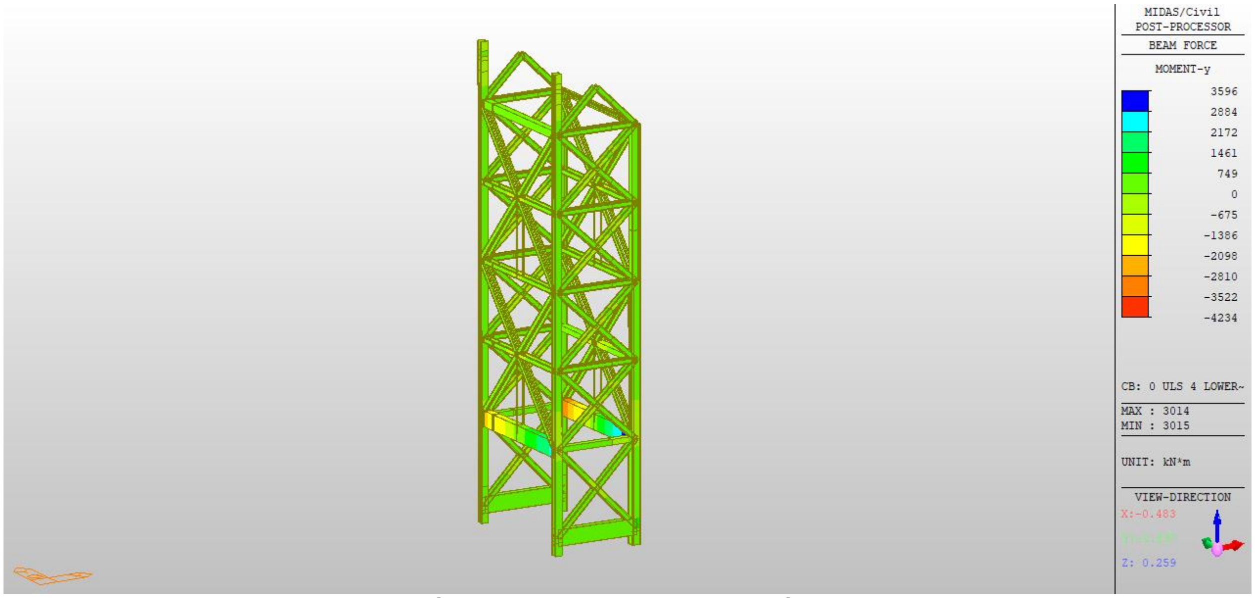


Figure 34 Case 0 ULS 4 Lowered MY

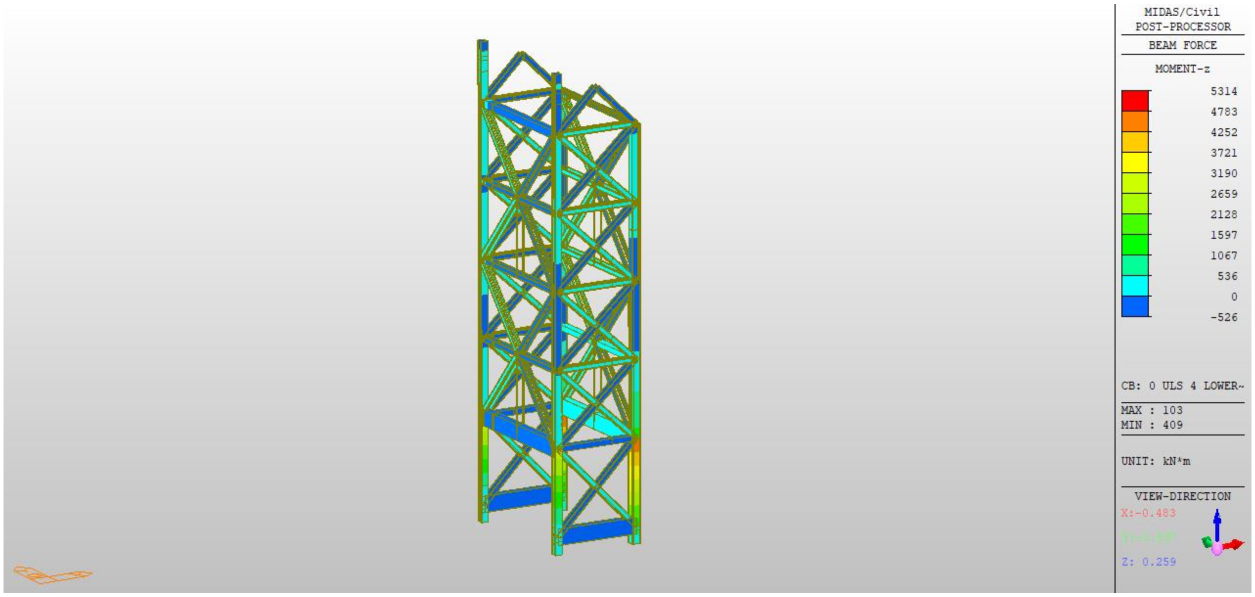


Figure 35 Case 0 ULS 4 Lowered MZ

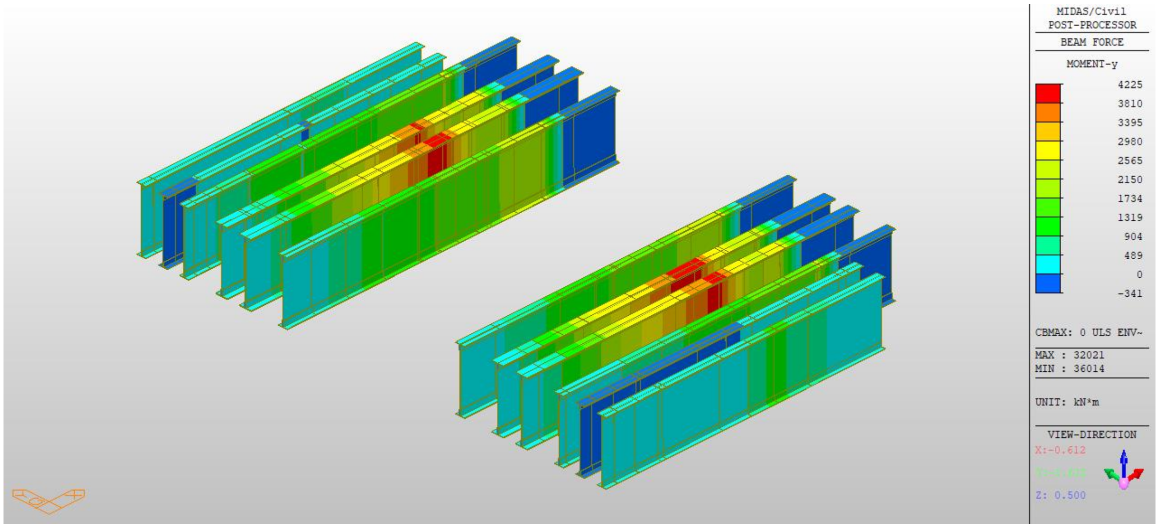


Figure 36 G1 G2 G3 G4 G6 Beam - Case 0 (Existing) M_y Max (kN/m)

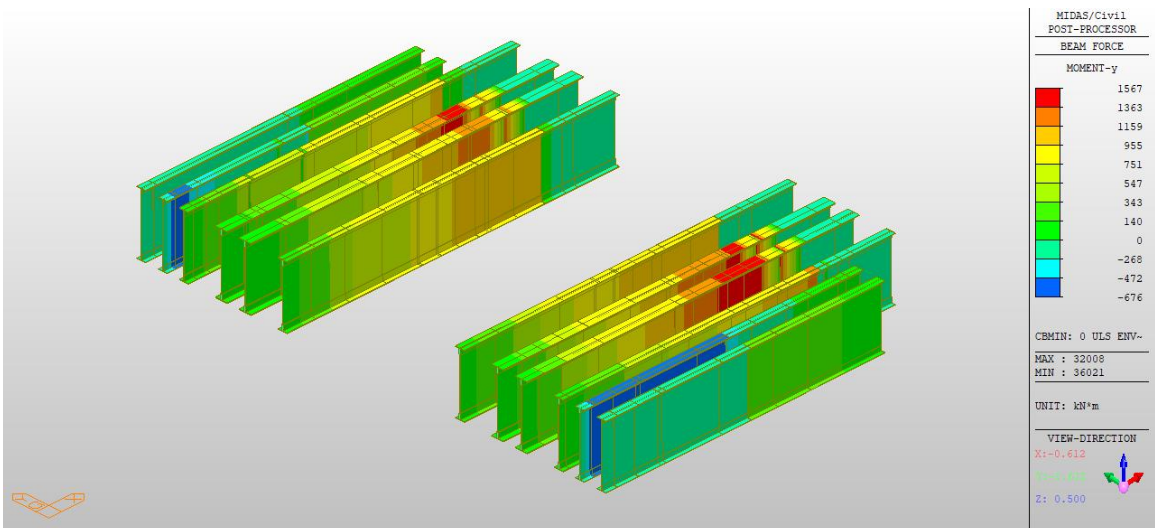


Figure 37 G1 G2 G3 G4 G6 Beam - Case 0 (Existing) M_y Min (kN/m)

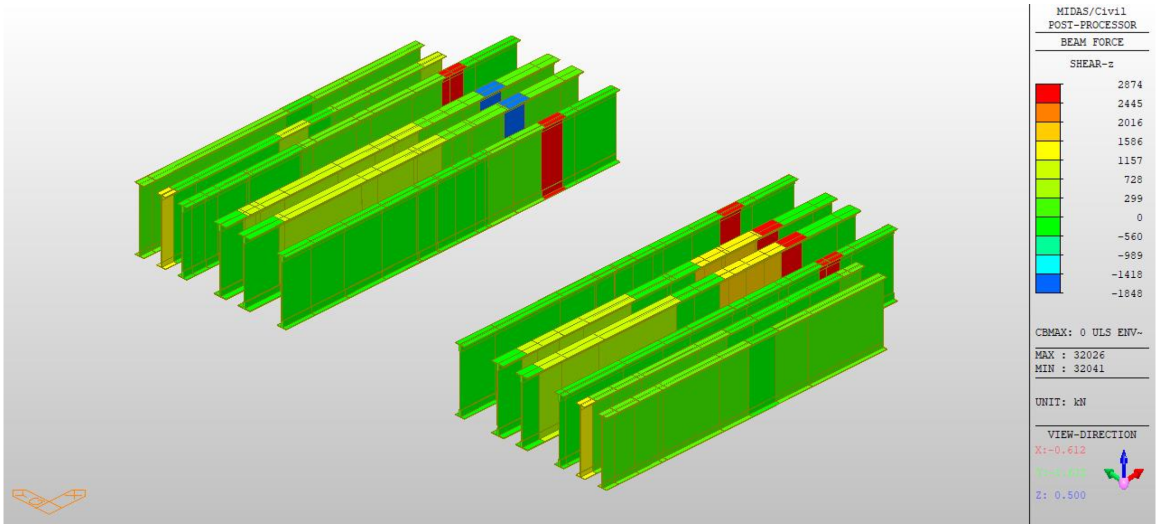


Figure 38 G1 G2 G3 G4 G6 Beam - Case 0 (Existing) F_z Max (kN)

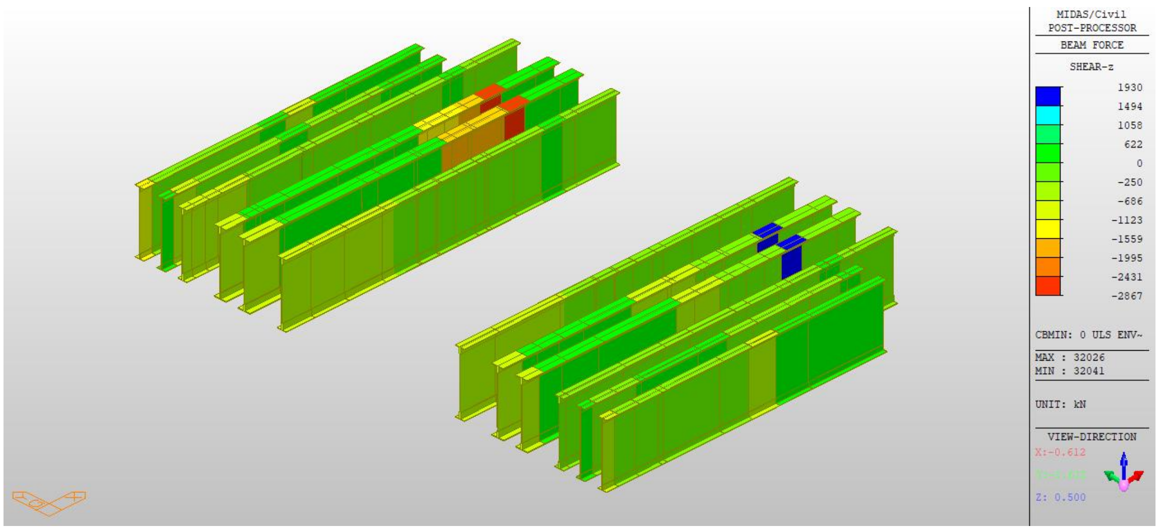


Figure 39 G1 G2 G3 G4 G6 Beam - Case 0 (Existing) F_z Min (kN)

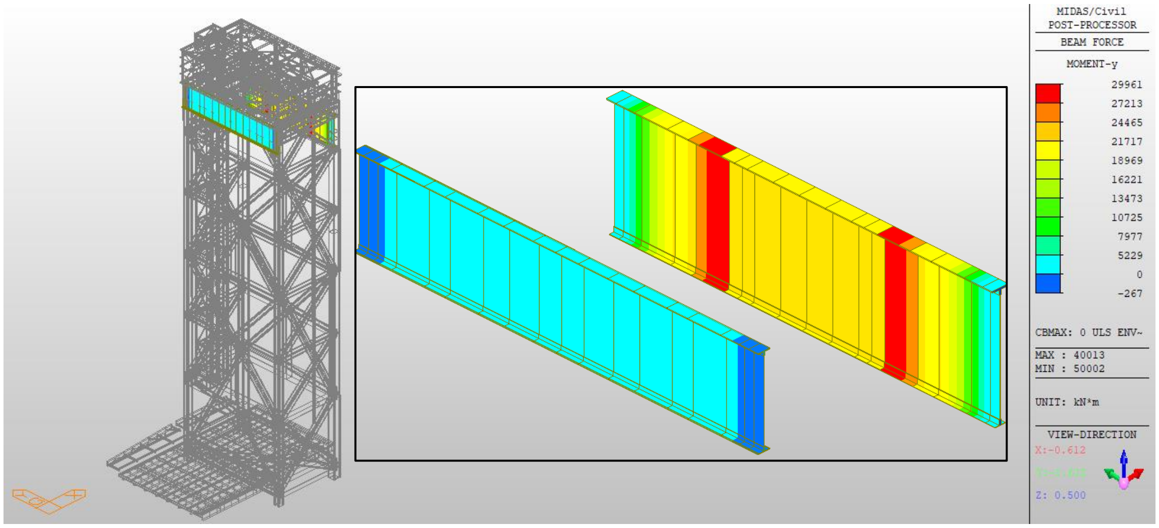


Figure 40 G7 and G8 Beam - Case 0 (Existing) M_y Max (kN/m)

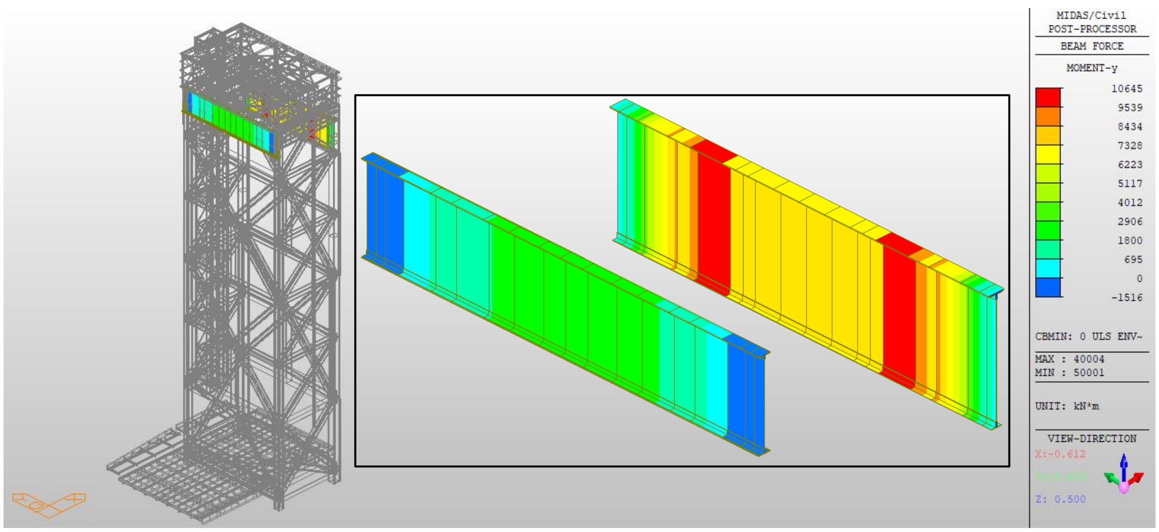


Figure 41 G7 and G8 Beam - Case 0 (Existing) M_y Min (kN/m)

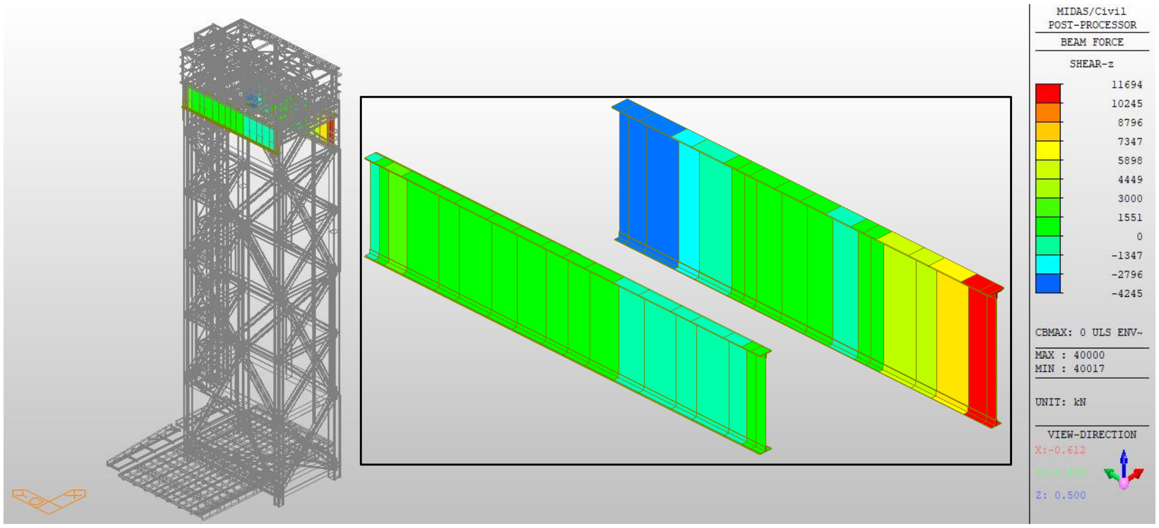


Figure 42 G7 and G8 Beam - Case 0 (Existing) F_z Max (kN)

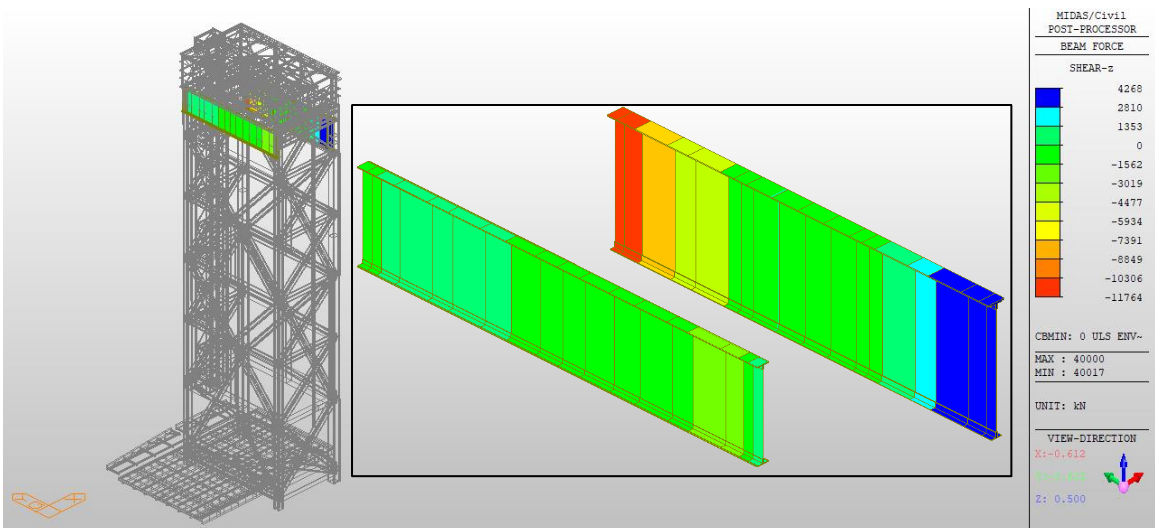


Figure 43 G7 and G8 Beam - Case 0 (Existing) F_z Min (kN)

Exhibit E.8

Approach Span and Tower Span Existing Evaluation 3D Model

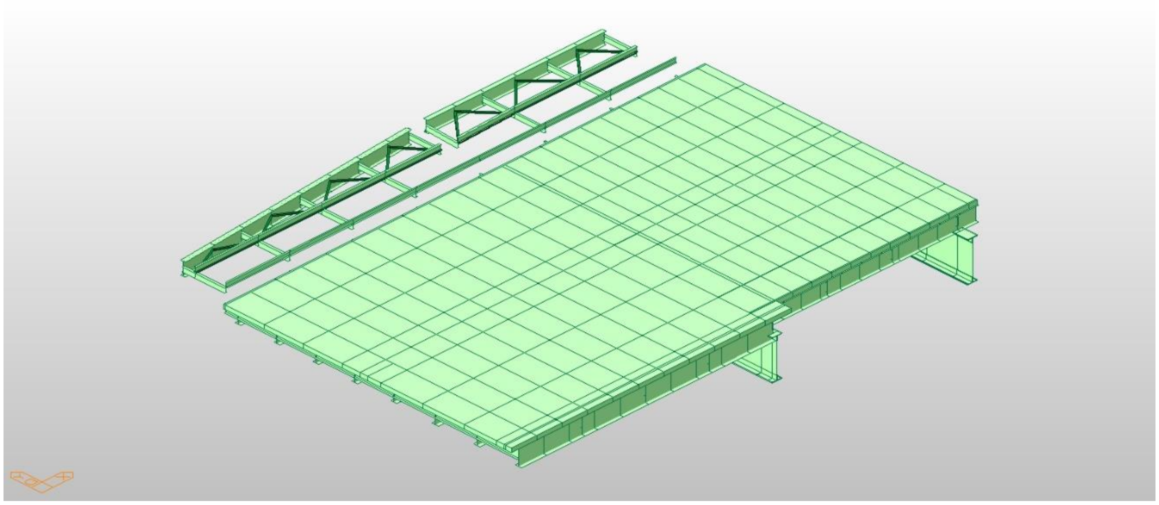


Figure 1 Approach and Tower Spans at South Tower (Similar at North Tower)

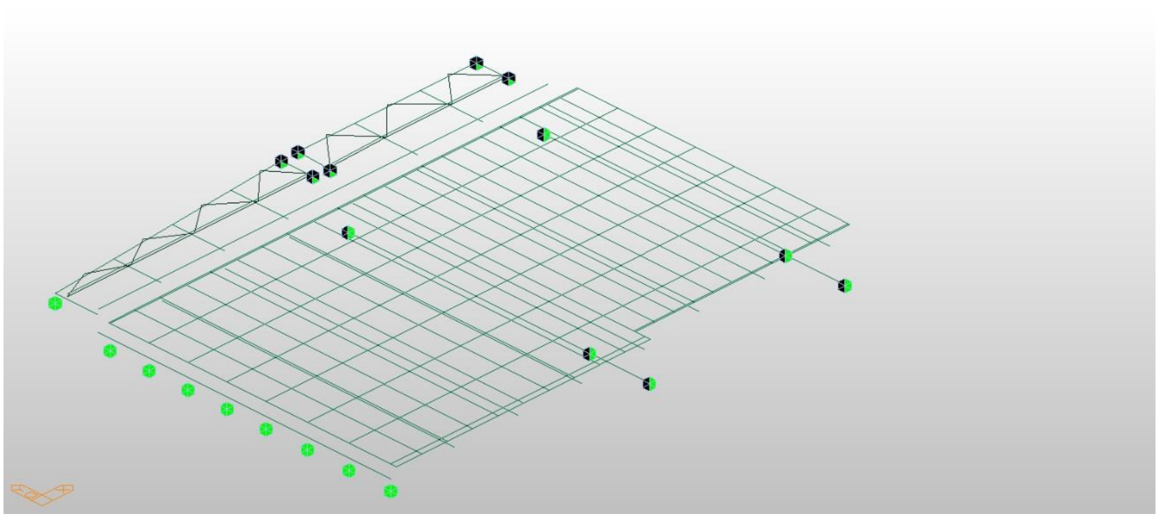


Figure 2 Approach and Tower Support Conditions (Similar at North Tower)

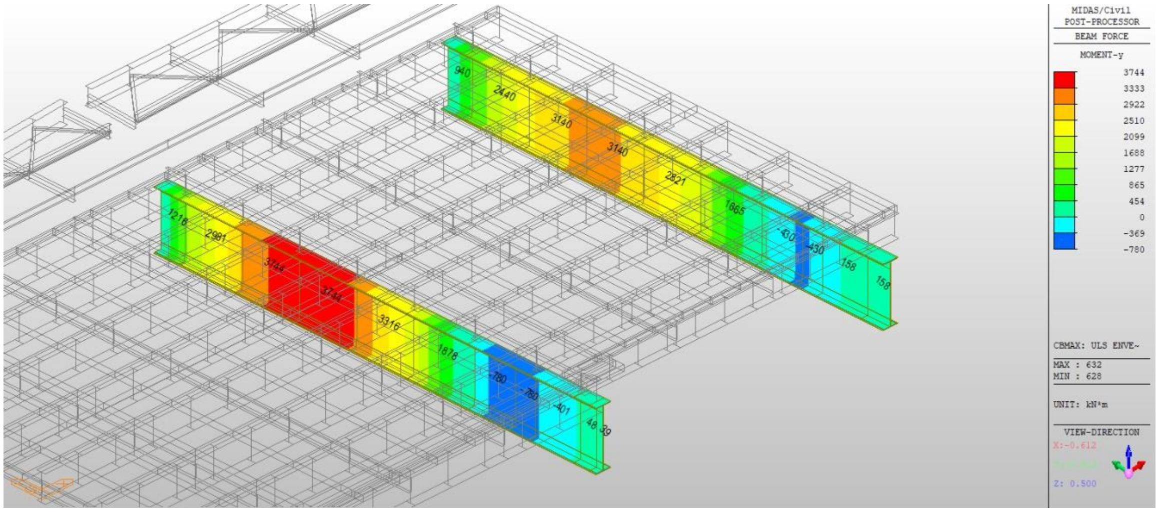


Figure 3 Maximum ULS Moment for Floor Beams

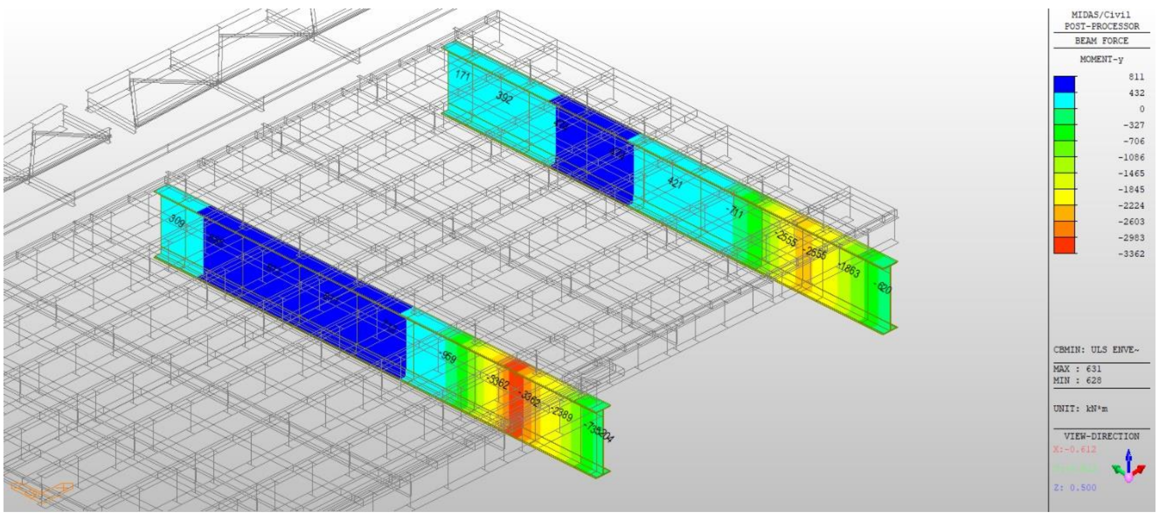


Figure 4 Minimum ULS Moment for Floor Beams

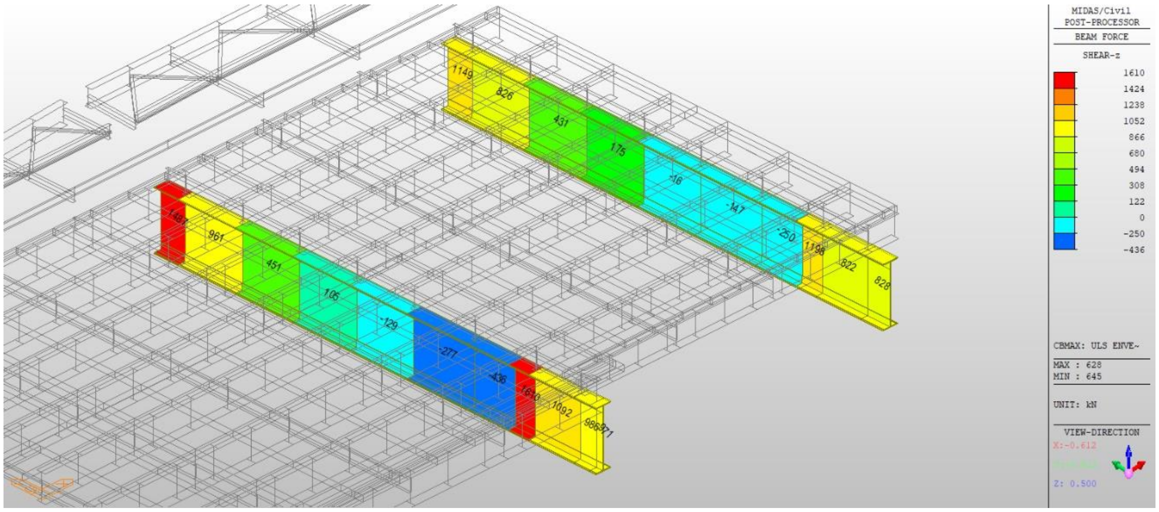


Figure 5 Maximum ULS Shear for Floor Beams

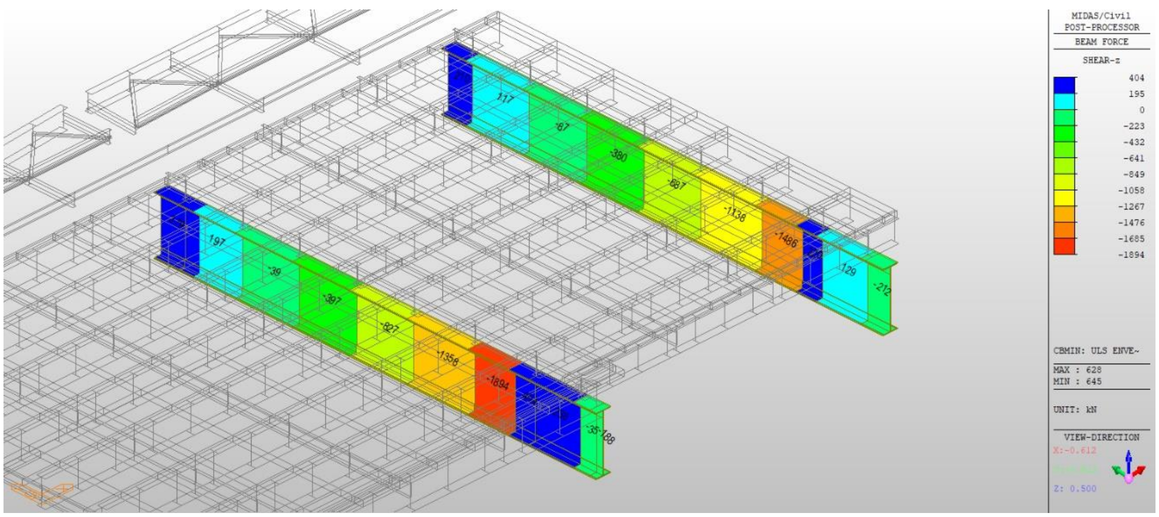


Figure 6 Minimum ULS Shear for Floor Beams

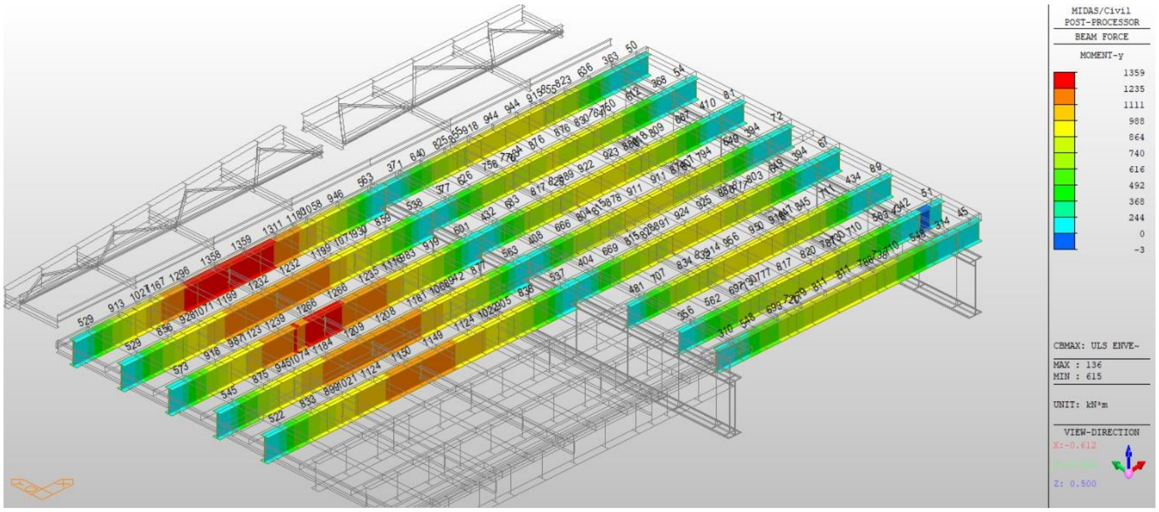


Figure 7 Maximum ULS Moment for Stringers from 1959

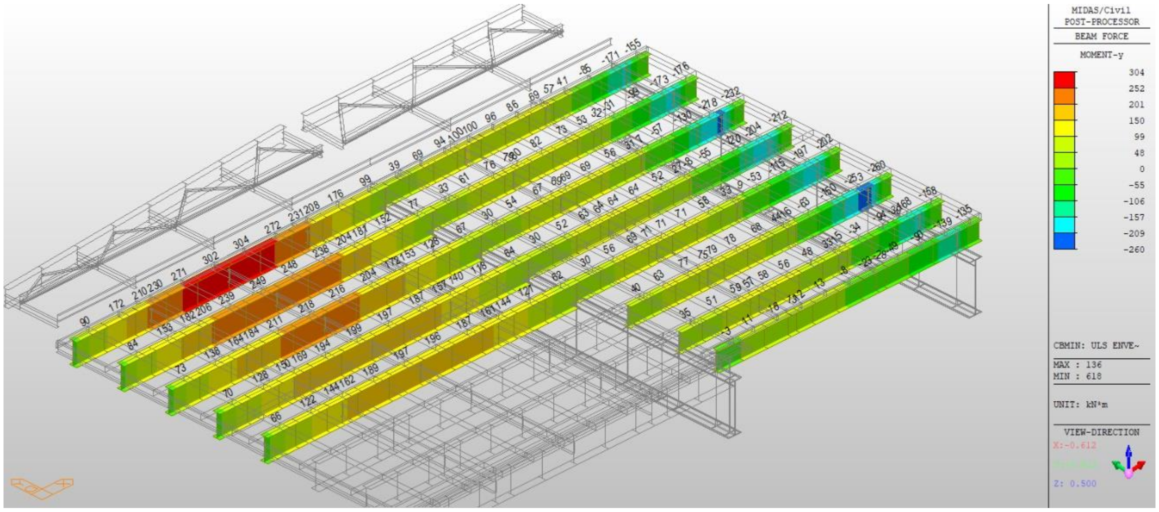


Figure 8 Minimum ULS Moment for Stringers from 1959

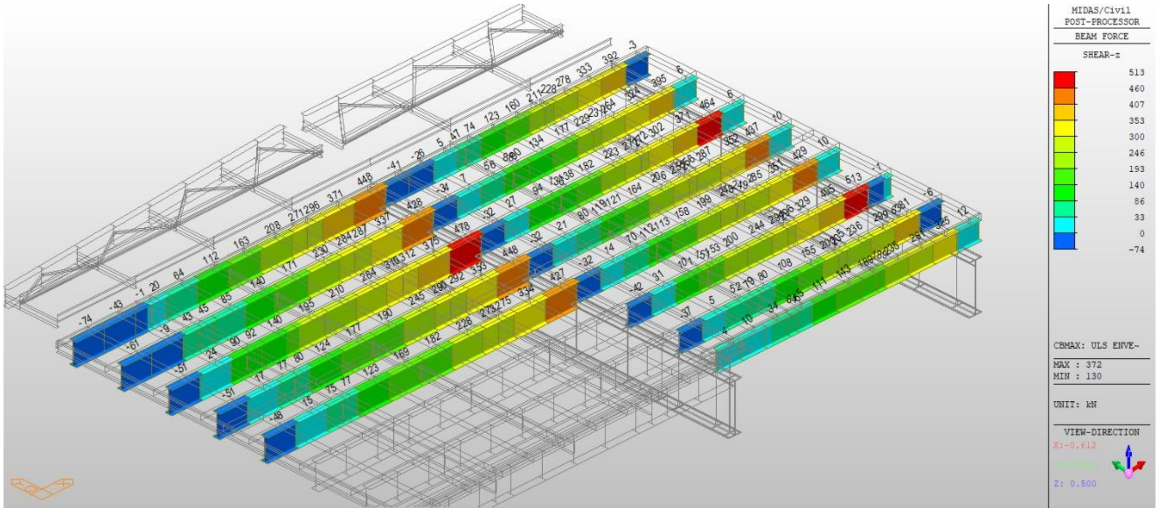


Figure 9 Maximum ULS Shear for Stringers from 1959

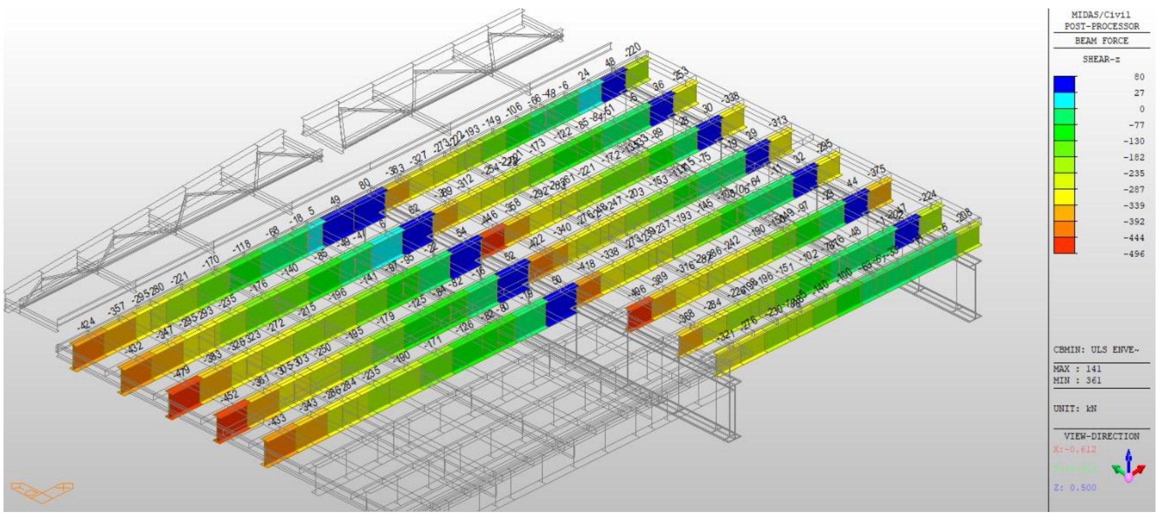


Figure 10 Minimum ULS Shear for Stringers from 1959

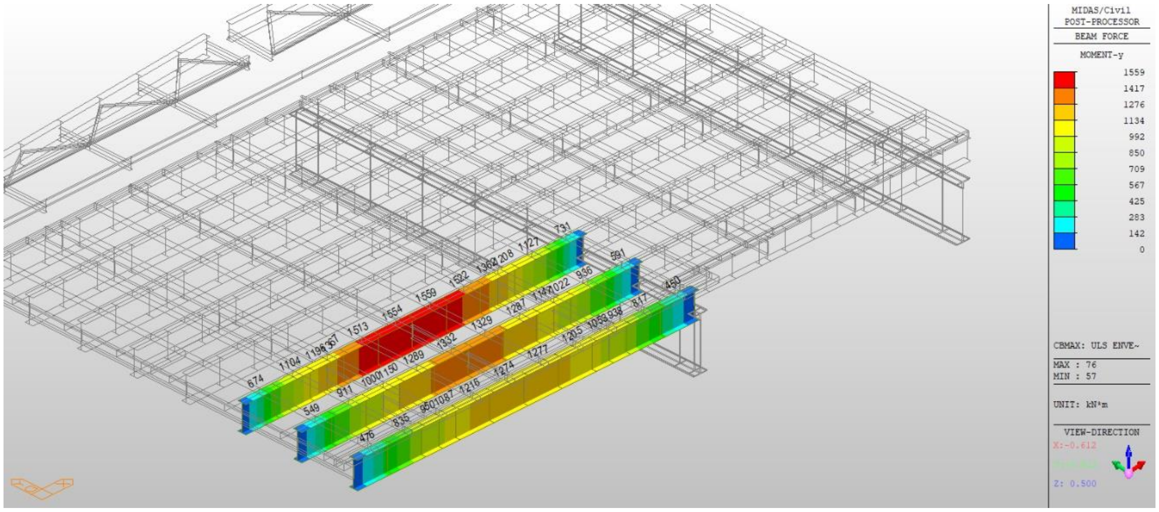


Figure 11 Maximum ULS Moment for Stringers from 1982

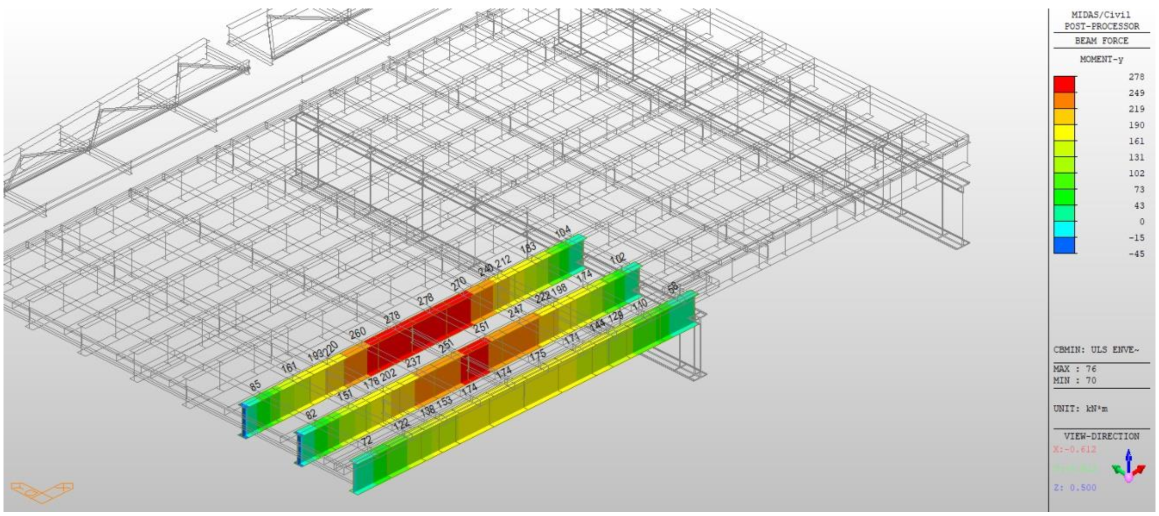


Figure 12 Minimum ULS Moment for Stringers from 1982

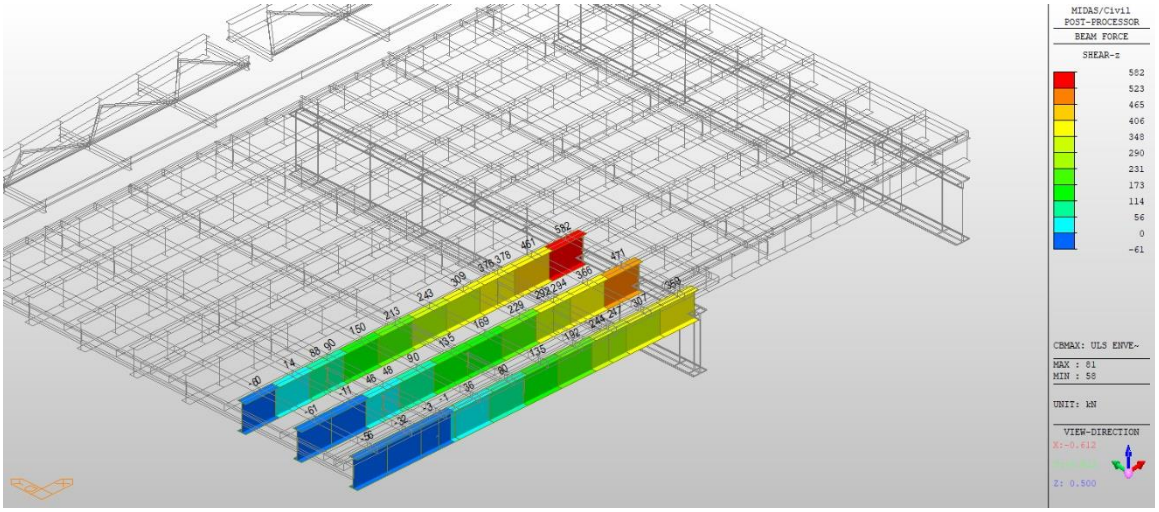


Figure 13 Maximum ULS Shear for Stringers from 1982

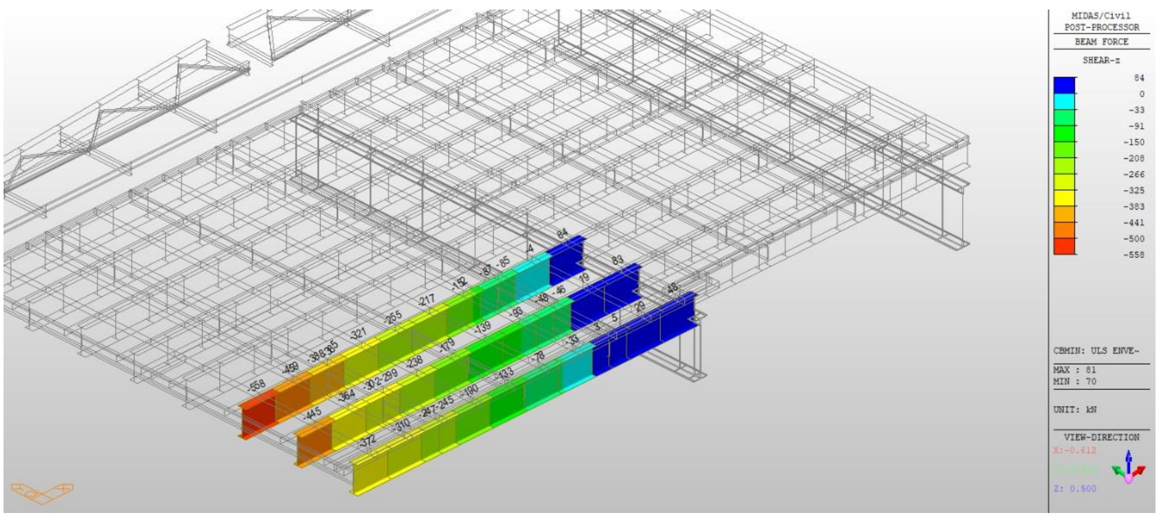


Figure 14 Minimum ULS Shear for Stringers from 1982

Exhibit E.9

Mechanical Component Existing Calculation Summary

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Motor Sizing Calculation

Original Weight

1877 tonnes

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1.0 GENERAL INFORMATION

1.1 CONSTANTS

$\mu_{stat\_roller} := 0.004$ — Static coefficient of friction for roller bearing

$\mu_{dyn\_roller} := 0.003$ — Static coefficient of friction for roller bearing

Ref.: S6-14 Table 13.10

$Acc_{time} := 10s$ — Maximum time available to reach full lifting speed

$Brake_{time} := 10s$ — Maximum time available to stop the bridge from the maximum speed

Ref. S6-14 article 13.7.14.8.4

$P_{wind} := 0.12kPa$ — Wind pressure

$P_{ice} := 0.12kPa$ — Ice load per unit area

Ref.: S6-14 article 13.7.14.7.4

$Start_{overload} := 1.25$

$Acc_{overload} := 1.5$

$Cons_{overload} := 1$

Ref.: S6-14 Table 13.14 — Allowable torque overloads

$\eta_{bearings} := 0.98$

$\eta_{sheaves} := \eta_{bearings}{}^2 = 0.96$

$\eta_{gears} := 0.96^2$

$\eta_{reducer} := 0.94$

Ref. S6-14
(article 13.7.19.4 & 13.7.19.6.1) and
Machinery Handbook — Components efficiencies

1.2 GENERAL DATA

$W_{span} := 1877tonne$ — Weigth of span

$W_{cwt} := W_{span}$ — Weigth of counterweight (hypothesis)

$W_{sheave} := 50000lb$ — Weight of sheave (hypothesis)

$W_{trunnion} := 7500lb$ — Weight of trunnion (hypothesis)

$W_{gear} := 8 \cdot 540lb$ — Weight of gear sets (per sheave) (hypothesis)

$W_{total} := W_{span} + W_{cwt} + 8 \cdot W_{sheave} + 8W_{trunnion} + 8W_{gear} = 8.771 \times 10^6 \cdot lb$ — Weight to be lifted

$r_{rb} := 12in$ — Radius of roller bearings

$r_s := \dfrac{180in}{2}$ — Radius of sheave

$S_{speed} := 1\dfrac{ft}{s}$ — Maximum lifting speed of span

$D_{rope} := 2.25in$ — Diameter of main counterweight ropes

$IMB_{South} := 7450lbf$ Seated imbalance, north tower

$IMB_{North} := 6296lbf$ Seated imbalance, south tower

$L_{open} := 370ft$ Length of span (open deck - approximative)

$W_{open} := 50ft$ Width of span (open deck - approximative)

$L_{closed} := 370ft$ Length of span (close deck - approximative)

$W_{closed} := 10ft$ Width of span (close deck - approximative)

2.0 CALCULATION OF LOADS

2.1 FRICTION LOAD - ROLLER BEARINGS OF COUNTERWEIGHT SHEAVES

$$F_{friction\_stat} := \frac{W_{total} \cdot r_{rb} \cdot \mu_{stat\_roller} \cdot g}{r_s} = 20.808 \cdot kN$$

$$F_{friction\_dyn} := \frac{W_{total} \cdot r_{rb} \cdot \mu_{dyn\_roller} \cdot g}{r_s} = 15.606 \cdot kN$$

2.2 INERTIA

$$A_{acc} := \frac{S_{speed}}{Acc_{time}} = 0.1 \cdot \frac{ft}{s^2}$$

$$A_{brake} := \frac{S_{speed}}{Brake_{time}} = 0.1 \cdot \frac{ft}{s^2}$$

$$F_{acc} := 1.25 W_{total} \cdot A_{acc} = 151.574 \cdot kN$$

$$F_{braking} := 1.25 W_{total} \cdot A_{brake} = 151.574 \cdot kN$$

2.3 ROPE BENDING

$$F_{bend} := \frac{W_{total}}{2} \cdot 0.3 \frac{D_{rope}}{2 \cdot r_s} \cdot g = 73.151 \cdot kN$$

Ref. CSA S6-14 article 13.7.20.17

2.4 UNBALANCED CONDITIONS

$$F_{balance} := IMB_{North} + IMB_{South} = 61.145 \cdot kN$$

2.5 WIND LOADING

$$F_{wind} := \left(L_{open} \cdot W_{open} \cdot 0.85 + L_{closed} \cdot W_{closed}\right) \cdot P_{wind} = 216.557 \cdot kN$$

2.6 ICE LOADING (WORST CASE SCENARIO - BRIDGE IS NOT OPENED DURING WINTER)

$$F_{ice} := \left(L_{open} \cdot W_{open} \cdot 0.85 + L_{closed} \cdot W_{closed}\right) \cdot P_{ice} = 216.557 \cdot kN$$

3.0 LOAD CASES

Case 1: Starting Load

$$F_{starting\_lc1} := F_{friction\_stat} + F_{acc} + F_{bend} + F_{balance} + F_{wind} + F_{ice} = 739.792 \cdot kN$$

Case 2: Accelerating Load

$$F_{acc\_lc2} := F_{friction\_dyn} + F_{acc} + F_{bend} + F_{balance} + F_{wind} = 518.034 \cdot kN$$

Case 3: Constant Velocity

$$F_{cons\_lc3} := F_{friction\_dyn} + F_{bend} + F_{balance} + F_{wind} = 366.459 \cdot kN$$

Case 4: Braking Load

$$F_{braking\_lc4} := F_{friction\_dyn} + F_{braking} + F_{bend} + F_{balance} + F_{wind} = 518.034 \cdot kN$$

4.0 MOTOR SELECTION

4.1 GOVERNING FORCE FOR MOTOR SELECTION

$$F_{motor.lc1} := \frac{F_{starting\_lc1}}{Start_{overload}} = 591.834 \cdot kN$$

$$F_{motor.lc2} := \frac{F_{acc\_lc2}}{Acc_{overload}} = 345.356 \cdot kN$$

$$F_{motor.lc3} := \frac{F_{cons\_lc3}}{Cons_{overload}} = 366.459 \cdot kN$$

$$F_{motor.lc4} := \frac{F_{braking\_lc4}}{Acc_{overload}} = 345.356 \cdot kN$$

$$F_{motor} := \max\left(F_{motor.lc1}, F_{motor.lc2}, F_{motor.lc3}, F_{motor.lc4}\right) = 591.834 \cdot kN$$

4.2 MOTOR POWER REQUIRED (per tower)

$$\eta_{lift} := \eta_{sheaves} \cdot \eta_{gears} \cdot \eta_{reducer} = 0.832$$

Efficiency of system

$$Hp_{motor} := \frac{F_{motor} \cdot S_{speed}}{\eta_{lift} \cdot 2} = 145 \cdot hp$$

Required power of motor in worst case scenario (wind + ice load)

Current HP of motors is 150 HP.

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Main Counterweight Rope Capacity Calculations

Original Weight

1877 tonnes

1.0 GENERAL INFORMATION

1.1 GENERAL DATA

$W_{span} := 1877\text{tonne}$ — Weigth of span and deck

$D := 177.75\text{in}$ — Tread diameter of sheave rope grooves

$d := 2.25\text{in}$ — Diameter of main counterweight ropes

$d_w := \frac{d}{16} = 0.141 \cdot \text{in}$ Ref.: AASHTO Article 6.8.3.3.4 — Diameter of the outer wires in the wire rope

$E_w := 30 \times 10^6 \text{psi}$ — Tensile modulus of elasticity of the steel wire

$A_{rope} := 0.4 \cdot d^2 = 2.025 \cdot \text{in}^2$ Ref.: S6-14 Table 13.20 — Effective cross sectional are of the ropes (approx.)

$N_{rope} := 80$ — Number of ropes

1.2 ALLOWABLE STRESSES

Ref.: AASHTO Article 6.6.5 & CHBDC article 13.7.20.18

$P_{ult} := 420000\text{lbf}$ — Minimum ultimate tensile strength of rope (ref. BLB 2002 Main CW Wire Rope Replacement)

$\sigma_{ult} := \frac{P_{ult}}{A_{rope}} = 1430 \cdot \text{MPa}$ — Allowable tensile load

$\sigma_{allowable} := 0.222 \cdot \sigma_{ult} = 317 \cdot \text{MPa}$ — Maximum allowable tensile stress (for combined effect of bending and direct load)

2.0 STRESSES CALCULATIONS

Ref.: AASHTO Article 6.8.3.3.4 & CHBDC article 13.7.20.18

$\sigma_b := E_w \cdot \frac{d_w}{D} = 163.641 \cdot \text{MPa}$ — Maximum bending stress

$P := \frac{W_{span} \cdot g}{80} = 230.089 \cdot \text{kN}$ — Direct load (per rope)

$P_{ol} := \frac{518.034\ \text{kN}}{80} = 6.475 \cdot \text{kN}$ — Operating loads (per rope) (value from motor sizing calculation)

$\sigma_r := \frac{P}{A_{rope}} + \sigma_b + \frac{P_{ol}}{A_{rope}} = 344.715 \cdot \text{MPa}$ — Maximum total stress (per rope)

$SF := \frac{\sigma_r}{\sigma_{allowable}} \cdot 100\% = 108.584 \cdot \%$ — Value of over stress

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Trunnion Bearing Capacity

Original Weight

1877

1.0 GENERAL INFORMATION

1.1 GENERAL DATA

$D_b := 21.625\text{in}$ — Diameter of Shaft at Section B (bore diameter)

$r_s := \dfrac{180\text{in}}{2} = 90\cdot\text{in}$ — Radius of sheave

$S_{speed} := 1\dfrac{\text{ft}}{\text{s}}$ — Maximum lifting speed of span

$rpm_{bearing} := \dfrac{S_{speed}\cdot 60\text{s}}{2\pi\cdot r_s} = 1.273$ — Rotation speed of trunnion bearing (approximative)

Assume a large rolling element bearing, as per AASHTO C6.7.7.2.4

C6.7.7.2.4

Large rolling element bearings generally have a bore larger than 4 in., and a rotational speed less than 5 rpm.

It is necessary to work closely with bearing manufacturers on the large rolling element bearings. The specific operating parameters may necessitate special lubricating or other requirements, especially in applications such as a bascule trunnion bearing whose inner race operates at less than one quarter revolution each cycle.

$Span_w := 1877\text{tonne}$ — Weight of span and new deck (to be confirmed)

$Cwt := Span_w$ — Weight of Counterweights (hypothesis)

$W := \dfrac{(Span_w + Cwt)}{16} = 235\cdot\text{tonne}$ — Weight on Trunnion Shaft

1.2 ALLOWABLE STRESSES

Ref.: AASHTO article 6.7.7.2.4

$C_{or} := 4586124\text{lb}$ — Basic static radial load rating of the bearing

$n_s := 5$ — Design factor

$P_{cor} := \dfrac{C_{or}}{5} = 917225\cdot\text{lb}$ — Factor radial design resistance

$X_o := 1$ — Static axial load factor

$Y_o := 2$ — Static radial load factor

$F_{oxy} := X_o \cdot W + 0.15 \cdot Y_o \cdot W = 672437 \cdot lb$

$Verification := if(F_{oxy} \le P_{cor}, \text{"OK"}, \text{"NOT ACCEPTABLE"}) = \text{"OK"}$

AECOM

Calculations

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Fatigue Check of Trunnion Shaft

Original Weight

1877 tonnes

Critical Sections:

A - Maximum bending moment, torsional moment, and stress concentration of keyway

B - Bending moment, torsional moment, and stress concentrations of fillet

Shaft Dimensions and other Variables

Enter information in Yellow boxes:

Results are in Blue boxes

Sections AB & B Diameters — Section AB is middle of turnnion shaft Section B is at fillet

$D_{ab} := 24\text{in}$ — Diameter of Shaft at Section AB

$D_b := 22.084\text{in}$ — Diameter of Shaft at Section B

$r_f := .625$ — Fillet Radius in inches, but do not use dimension

$Span_w := 4138\text{kip}$ — Weight of Span

$Cwt := Span_w$ — Weight of Counterweights (hypothesis)

$W_1 := \dfrac{(Span_w + Cwt)}{8} = 1035 \cdot \text{kip}$ — Weight on Trunnion Shaft

$\sigma ut := 75\text{ksi}$ — Ultimate Tensile Strength of Shaft Material (ASTM A235 Class E)

$\sigma y := 37.500\text{ksi}$ — Yield Strenght for material

Distance from bearings to area of concern:

$l_s := 13\text{in} + 13\text{in} + 27.5\text{in} = 53.5 \cdot \text{in}$ — Length of Shaft Between Bearing Centers

$l_a := \dfrac{l_s}{2}$ — Distance to Center of Shaft from center of Bearing

$l_b := 13\text{in}$ — Distance from Center of Bearing to fillet

$c_{fr} := .004$ — Coefficient of friction for Bronze on Steel (Greased)

Torque on Shaft Due to Friction

$T_{fr} := W_l \cdot D_b \cdot c_{fr}$ $\qquad$ $T_{fr} = 635.382\,J \cdot 16.250$

Find Endurance Limit:

σe = α σut * (Cd*Cs*Ck*Ct*Cm)

$\alpha := .5$

From CSA Section 13.7.3.5.4 Endurance Limit

$Cr := 0.814$

$Cm := 1$

$Cs := 1.459$ $\qquad$ $4.51 \cdot (75)^{-0.265} = 1.436$

$Ct := 1$

Size Factor; $\qquad$ $Cd = (D/7.6)^{-0.113}$

$$Cd_{ab} := \left[\left(\frac{D_{ab}}{7.6mm}\right)^{-.113}\right] \qquad Cd_{ab} = 0.609$$

$$Cd_b := \left[\left(\frac{D_b}{7.6mm}\right)^{-.113}\right] \qquad Cd_b = 0.615$$

$\sigma e_a := \alpha \cdot \sigma ut \cdot (Cd_{ab} \cdot Cr \cdot Ct \cdot Cs \cdot Cm)$ $\qquad$ $\sigma e_a = 27.135 \cdot ksi$

$\sigma e_b := \alpha \cdot \sigma ut \cdot (Cd_b \cdot Cr \cdot Ct \cdot Cs \cdot Cm)$ $\qquad$ $\sigma e_b = 27.392 \cdot ksi$

Find - Bending Moments at each Section:

Section A -

Bending moment due to weight on Shaft

$M_a := W_l \cdot l_a$ $\qquad$ $M_a = 2.306 \times 10^3 \cdot ft \cdot kip$

Section B -

Bending moment due to weight on Shaft

$M_b := W_l \cdot l_b$ $\qquad$ $M_b = 1.121 \times 10^3 \cdot ft \cdot kip$

Find Stress Concentration Factors:

$\nu := .049$

$$q := \frac{1}{\left[1 + \left(\frac{\nu}{r_f^{.5}}\right)\right]} \qquad q = 0.942$$

$Kt_a := 1$ $\qquad$ For Sled-run keyway; Use 1 if no Keyway

$Kf_a := 1 + q \cdot (Kt_a - 1)$ $\qquad$ $Kf_a = 1$

$K\tau_a := 1$ $\qquad$ For Sled-run keyway; Use 1 if no Keyway

$Kf\tau_a := 1 + q \cdot (K\tau_a - 1)$ $\qquad$ $Kf\tau_a = 1$

2.22

$Kt_b := 2.02$

$Kf_b := 1 + q \cdot (Kt_b - 1)$ $\qquad$ $Kf_b = 1.96$ $\qquad$ From AASHTO Section 6.7.3.2

$K\tau_b := 1.61$ $\qquad$ 1.61

$Kf\tau_b := 1 + q \cdot (K\tau_b - 1)$ $\qquad$ $Kf\tau_b = 1.574$

Find Stress Concentration Factors (v.2):

$r_{f.} := .625$ Fillet Radius

From Peterson's Stress Concentration Factors, 2nd Ed. 1997, Chapter 3: Shoulder fillet in bar of circular cross section

$$t := \frac{D_{ab} - 22.084in}{2in} = 0.958$$ Fillet Height

$D := 24$ $\frac{t}{r_f} = 1.533$

Bending Factor

$$C1b := 0.947 + 1.206\sqrt{\frac{t}{r_f}} - 0.131\cdot\frac{t}{r_f} = 2.239$$

$$C2b := 0.022 - 3.405\sqrt{\frac{t}{r_f}} + 0.915\cdot\frac{t}{r_f} = -2.791$$

$$C3b := 0.869 + 1.777\sqrt{\frac{t}{r_f}} - 0.555\cdot\frac{t}{r_f} = 2.218$$

$$C4b := -0.810 + 0.422\sqrt{\frac{t}{r_f}} - 0.260\cdot\frac{t}{r_f} = -0.686$$

$$Kt_b := C1b + C2b\cdot\left(\frac{2t}{D}\right) + C3b\cdot\left[\left(\frac{2t}{D}\right)^2\right] + C4b\cdot\left[\left(\frac{2t}{D}\right)^3\right]$$

$Kf_b := 1 + q\cdot(Kt_b - 1)$ $Kf_b = 1.97$

Torsional Factor

$$C1 := 0.905 + 0.783\sqrt{\frac{t}{r_f}} - 0.075\cdot\frac{t}{r_f} = 1.759$$

$$C2 := -0.437 - 1.969\sqrt{\frac{t}{r_f}} - 0.553\cdot\frac{t}{r_f} = -3.722$$

$$C3 := 1.557 + 1.073\sqrt{\frac{t}{r_f}} - 0.578\cdot\frac{t}{r_f} = 1.999$$

$$C4 := -1.061 + 0.171\sqrt{\frac{t}{r_f}} + 0.086\cdot\frac{t}{r_f} = -0.717$$

$$K\tau_b := C1 + C2\cdot\left(\frac{2t}{D}\right) + C3\cdot\left[\left(\frac{2t}{D}\right)^2\right] + C4\cdot\left[\left(\frac{2t}{D}\right)^3\right] = 1.475$$

$Kf\tau_b := 1 + q\cdot(K\tau_b - 1)$ $Kf\tau_b = 1.447$

Find Number of Cycles at Each Section

Section A:

$$T_r := \frac{T_{fr}}{1ft \cdot kip} \qquad T_r = 7.615 \qquad \sigma y_a := \frac{\sigma y}{1psi} \qquad \sigma y_a = 3.75 \times 10^4$$

$$AL_{ab} := \left[\frac{32}{\left(\pi \cdot D_{ab}{}^3\right)}\right] \cdot \left[\frac{\left(Kt_a \cdot M_a\right)}{\sigma e_a}\right] + \frac{\left(\sqrt{3} \cdot Kf\tau_a \cdot T_r\right)}{\left(2 \cdot \sigma y_a\right)}$$

$$AL_{ab} = 0.752$$

$$Check_{SectionAB} := if\left(AL_{ab} \le .8, \text{"Infinite"}, \text{"Finite"}\right) = \text{"Infinite"}$$

$$\sigma x_a := \left[\frac{\left(32 \cdot M_a\right)}{\pi \cdot D_{ab}{}^3}\right] \cdot Kf_a \qquad \sigma x_a = 20.39 \cdot ksi$$

$$\tau y_a := \left[\frac{\left(16 \cdot T_{fr}\right)}{\left(\pi \cdot D_{ab}{}^3\right)}\right] \cdot Kf_a \qquad \tau y_a = 0.034 \cdot ksi$$

$$\tau m_a := \left[\left(\frac{\sigma x_a}{2}\right)^2 + \tau y_a{}^2\right]^{.5} \qquad \tau m_a = 10.195 \cdot ksi$$

τma = Max Torsional Stress

$$\sigma max_a := \left(\frac{\sigma x_a}{2}\right) + \tau m_a$$

$$\sigma min_a := -\left(\frac{\sigma x_a}{2}\right) - \tau m_a \qquad \sigma r_a := \frac{\left(\sigma max_a - \sigma min_a\right)}{2} \qquad \sigma r_a = 20.39 \cdot ksi \qquad \sigma e_a = 27.135 \cdot ksi$$

Find Number of Cycles:

$$A_a := \frac{(.9 \cdot \sigma y)^2}{\sigma e_a} \qquad B_a := \left(\frac{-1}{3}\right) \cdot \log\left(\frac{.9 \cdot \sigma y}{\sigma e_a}\right)$$

$$N_a := \left(\frac{\sigma r_a}{A_a}\right)^{\frac{1}{B_a}} \qquad N_a = 8.512 \times 10^9$$

Section B:

$$AL_b := \left[\frac{32}{\left(\pi\cdot D_b^{\,3}\right)}\right]\cdot\left[\frac{\left(Kt_b\cdot M_b\right)}{\sigma e_b}\right] + \frac{\left(\sqrt{3}\cdot Kf\tau_b\cdot T_r\right)}{\left(2\cdot\sigma y_a\right)}$$

$$AL_b = 0.943$$

$$Check_{SectionB} := \text{if}\left(AL_b \le .8, \text{"Infinite"}, \text{"Finite"}\right) = \text{"Finite"}$$

$$\sigma x_b := \left[\frac{\left(32\cdot M_b\right)}{\pi\cdot D_b^{\,3}}\right]\cdot Kf_b \qquad \sigma x_b = 25.058\cdot ksi$$

$$\tau y_b := \left[\frac{\left(16\cdot T_{fr}\right)}{\left(\pi\cdot D_b^{\,3}\right)}\right]\cdot Kf_a \qquad \tau y_b = 0.043\cdot ksi$$

$$\tau m_b := \left[\left(\frac{\sigma x_b}{2}\right)^2 + \tau y_b^{\,2}\right]^{.5} \qquad \tau m_b = 12.529\cdot ksi$$

τmb = Max Torsional Stress

$$\sigma max_b := \left(\frac{\sigma x_b}{2}\right) + \tau m_b$$

$$\sigma min_b := -\left(\frac{\sigma x_b}{2}\right) - \tau m_b \qquad \sigma r_b := \frac{\left(\sigma max_b - \sigma min_b\right)}{2} \qquad \sigma r_b = 25.058\cdot ksi \qquad \sigma e_b = 27.392\cdot ksi$$

Find Number of Cycles:

$$A_b := \frac{(.9\cdot\sigma y)^2}{\sigma e_b} \qquad B_b := \left(\frac{-1}{3}\right)\cdot\log\left(\frac{.9\cdot\sigma y}{\sigma e_b}\right)$$

$$N_b := \left(\frac{\sigma r_b}{A_b}\right)^{\frac{1}{B_b}} \qquad N_b = 1.905\times 10^7$$

Remaining Life:

$\text{lifting} := 100\text{ft}$

$r_s := \frac{180\text{in}}{2} = 90 \cdot \text{in}$

$\frac{\text{lifting}}{2r_s \cdot \pi} = 2.122$

$\frac{N_b}{2.122 \cdot 2 \cdot 3300} = 1.36 \times 10^3$

Calculations

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Motor Sizing Calculation

Aecom Weight (Current Weight)

1776 tonnes

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1.0 GENERAL INFORMATION

1.1 CONSTANTS

$\mu_{stat\_roller} := 0.004$

Ref.: S6-14 Table 13.10

Static coefficient of friction for roller bearing

$\mu_{dyn\_roller} := 0.003$

Static coefficient of friction for roller bearing

$Acc_{time} := 10s$

Ref. S6-14 article 13.7.14.8.4

Maximum time available to reach full lifting speed

$Brake_{time} := 10s$

Maximum time available to stop the bridge from the maximum speed

$P_{wind} := 0.12kPa$

Ref.: S6-14 article 13.7.14.7.4

Wind pressure

$P_{ice} := 0.12kPa$

Ice load per unit area

$Start_{overload} := 1.25$

$Acc_{overload} := 1.5$

Ref.: S6-14 Table 13.14

Allowable torque overloads

$Cons_{overload} := 1$

$\eta_{bearings} := 0.98$

$\eta_{sheaves} := \eta_{bearings}{}^{2} = 0.96$

Ref. S6-14
(article 13.7.19.4 & 13.7.19.6.1) and
Machinery Handbook

Components efficiencies

$\eta_{gears} := 0.96^{2}$

$\eta_{reducer} := 0.94$

1.2 GENERAL DATA

$W_{span} := 1776tonne$

Weigth of span

$W_{cwt} := W_{span}$

Weigth of counterweight (hypothesis)

$W_{sheave} := 50000lb$

Weight of sheave (hypothesis)

$W_{trunnion} := 7500lb$

Weight of trunnion (hypothesis)

$W_{gear} := 8 \cdot 540lb$

Weight of gear sets (per sheave) (hypothesis)

$W_{total} := W_{span} + W_{cwt} + 8 \cdot W_{sheave} + 8W_{trunnion} + 8W_{gear} = 8.325 \times 10^{6} \cdot lb$

Weight to be lifted

$r_{rb} := 12in$

Radius of roller bearings

$r_{s} := \dfrac{180in}{2}$

Radius of sheave

$S_{speed} := 1\dfrac{ft}{s}$

Maximum lifting speed of span

$D_{rope} := 2.25in$

Diameter of main counterweight ropes

$IMB_{South} := 7450lbf$ Seated imbalance, north tower

$IMB_{North} := 6296lbf$ Seated imbalance, south tower

$L_{open} := 370ft$ Length of span (open deck - approximative)

$W_{open} := 50ft$ Width of span (open deck - approximative)

$L_{closed} := 370ft$ Length of span (close deck - approximative)

$W_{closed} := 10ft$ Width of span (close deck - approximative)

2.0 CALCULATION OF LOADS

2.1 FRICTION LOAD - ROLLER BEARINGS OF COUNTERWEIGHT SHEAVES

$$F_{friction\_stat} := \frac{W_{total} \cdot r_{rb} \cdot \mu_{stat\_roller} \cdot g}{r_s} = 19.751 \cdot kN$$

$$F_{friction\_dyn} := \frac{W_{total} \cdot r_{rb} \cdot \mu_{dyn\_roller} \cdot g}{r_s} = 14.813 \cdot kN$$

2.2 INERTIA

$$A_{acc} := \frac{S_{speed}}{Acc_{time}} = 0.1 \cdot \frac{ft}{s^2}$$

$$A_{brake} := \frac{S_{speed}}{Brake_{time}} = 0.1 \cdot \frac{ft}{s^2}$$

$$F_{acc} := 1.25 W_{total} \cdot A_{acc} = 143.878 \cdot kN$$

$$F_{braking} := 1.25 W_{total} \cdot A_{brake} = 143.878 \cdot kN$$

2.3 ROPE BENDING

$$F_{bend} := \frac{W_{total}}{2} \cdot 0.3 \frac{D_{rope}}{2 \cdot r_s} \cdot g = 69.437 \cdot kN$$

Ref. CSA S6-14 article 13.7.20.17

2.4 UNBALANCED CONDITIONS

$$F_{balance} := IMB_{North} + IMB_{South} = 61.145 \cdot kN$$

2.5 WIND LOADING

$$F_{wind} := \left(L_{open} \cdot W_{open} \cdot 0.85 + L_{closed} \cdot W_{closed}\right) \cdot P_{wind} = 216.557 \cdot kN$$

2.6 ICE LOADING (WORST CASE SCENARIO - BRIDGE IS NOT OPENED DURING WINTER)

$$F_{ice} := \left(L_{open} \cdot W_{open} \cdot 0.85 + L_{closed} \cdot W_{closed}\right) \cdot P_{ice} = 216.557 \cdot kN$$

3.0 LOAD CASES

Case 1: Starting Load

$$F_{starting\_lc1} := F_{friction\_stat} + F_{acc} + F_{bend} + F_{balance} + F_{wind} + F_{ice} = 727.325 \cdot kN$$

Case 2: Accelerating Load

$$F_{acc\_lc2} := F_{friction\_dyn} + F_{acc} + F_{bend} + F_{balance} + F_{wind} = 505.831 \cdot kN$$

Case 3: Constant Velocity

$$F_{cons\_lc3} := F_{friction\_dyn} + F_{bend} + F_{balance} + F_{wind} = 361.953 \cdot kN$$

Case 4: Braking Load

$$F_{braking\_lc4} := F_{friction\_dyn} + F_{braking} + F_{bend} + F_{balance} + F_{wind} = 505.831 \cdot kN$$

4.0 MOTOR SELECTION

4.1 GOVERNING FORCE FOR MOTOR SELECTION

$$F_{motor.lc1} := \frac{F_{starting\_lc1}}{Start_{overload}} = 581.86 \cdot kN$$

$$F_{motor.lc2} := \frac{F_{acc\_lc2}}{Acc_{overload}} = 337.22 \cdot kN$$

$$F_{motor.lc3} := \frac{F_{cons\_lc3}}{Cons_{overload}} = 361.953 \cdot kN$$

$$F_{motor.lc4} := \frac{F_{braking\_lc4}}{Acc_{overload}} = 337.22 \cdot kN$$

$$F_{motor} := \max\left(F_{motor.lc1}, F_{motor.lc2}, F_{motor.lc3}, F_{motor.lc4}\right) = 581.86 \cdot kN$$

4.2 MOTOR POWER REQUIRED (per tower)

$$\eta_{lift} := \eta_{sheaves} \cdot \eta_{gears} \cdot \eta_{reducer} = 0.832$$

Efficiency of system

$$Hp_{motor} := \frac{F_{motor} \cdot S_{speed}}{\eta_{lift} \cdot 2} = 143 \cdot hp$$

Required power of motor in worst case scenario (wind + ice load)

Current HP of motors is 150 HP.

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Main Counterweight Rope Capacity Calculations

AECOM Weigth (Current Weight)

1776 tonnes

1.0 GENERAL INFORMATION

1.1 GENERAL DATA

$W_{span} := 1776\text{tonne}$ — Weigth of span and deck

$D := 177.75\text{in}$ — Tread diameter of sheave rope grooves

$d := 2.25\text{in}$ — Diameter of main counterweight ropes

$d_w := \frac{d}{16} = 0.141 \cdot \text{in}$ Ref.: AASHTO Article 6.8.3.3.4 — Diameter of the outer wires in the wire rope

$E_w := 30 \times 10^6 \text{psi}$ — Tensile modulus of elasticity of the steel wire

$A_{rope} := 0.4 \cdot d^2 = 2.025 \cdot \text{in}^2$ Ref.: S6-14 Table 13.20 — Effective cross sectional are of the ropes (approx.)

$N_{rope} := 80$ — Number of ropes

1.2 ALLOWABLE STRESSES

Ref.: AASHTO Article 6.6.5 & CHBDC article 13.7.20.18

$P_{ult} := 420000\text{lbf}$ — Minimum ultimate tensile strength of rope (ref. BLB 2002 Main CW Wire Rope Replacement)

$\sigma_{ult} := \frac{P_{ult}}{A_{rope}} = 1430 \cdot \text{MPa}$ — Allowable tensile load

$\sigma_{allowable} := 0.222 \cdot \sigma_{ult} = 317 \cdot \text{MPa}$ — Maximum allowable tensile stress (for combined effect of bending and direct load)

2.0 STRESSES CALCULATIONS

Ref.: AASHTO Article 6.8.3.3.4 & CHBDC article 13.7.20.18

$\sigma_b := E_w \cdot \frac{d_w}{D} = 163.641 \cdot \text{MPa}$ — Maximum bending stress

$P := \frac{W_{span} \cdot g}{80} = 217.708 \cdot \text{kN}$ — Direct load (per rope)

$P_{ol} := \frac{581.86\ \text{kN}}{80} = 7.273 \cdot \text{kN}$ — Operating loads (per rope) (value from motor sizing calculation)

$\sigma_r := \frac{P}{A_{rope}} + \sigma_b + \frac{P_{ol}}{A_{rope}} = 335.849 \cdot \text{MPa}$ — Maximum total stress (per rope)

$SF := \frac{\sigma_r}{\sigma_{allowable}} \cdot 100\% = 105.791 \cdot \%$ — Value of over stress

Calculations

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Trunnion Shaft Bearing Capacity

1.0 GENERAL INFORMATION

1.1 GENERAL DATA

$D_b := 21.250in$ — Diameter of Shaft at Section B (bore diameter)

$r_s := \frac{180in}{2} = 90 \cdot in$ — Radius of sheave

$S_{speed} := 1 \frac{ft}{s}$ — Maximum lifting speed of span

$rpm_{bearing} := \frac{S_{speed} \cdot 60s}{2\pi \cdot r_s} = 1.273$ — Rotation speed of trunnion bearing (approximative)

Assume a large rolling element bearing, as per AASHTO C6.7.7.2.4

C6.7.7.2.4

Large rolling element bearings generally have a bore larger than 4 in., and a rotational speed less than 5 rpm. It is necessary to work closely with bearing manufacturers on the large rolling element bearings. The specific operating parameters may necessitate special lubricating or other requirements, especially in applications such as a bascule trunnion bearing whose inner race operates at less than one quarter revolution each cycle.

$Span_w := 1776tonne$ — Weight of span and new deck

$Cwt := Span_w$ — Weight of Counterweights (hypothesis)

$W := \frac{(Span_w + Cwt)}{16} = 222 \cdot tonne$ — Weight on Trunnion Shaft

1.2 ALLOWABLE STRESSES

Ref.: AASHTO article 6.7.7.2.4

$C_{or} := 4586124lb$ — Basic static radial load rating of the bearing (hypothesis)

$n_s := 5$ — Design factor

$P_{cor} := \frac{C_{or}}{5} = 917225 \cdot lb$ — Factor radial design resistance

$X_o := 1$ — Static axial load factor (hypothesis)

$Y_o := 2$ — Static radial load factor (hypothesis)

$F_{oxy} := X_o \cdot W + 0.15 \cdot Y_o \cdot W = 636254 \cdot lb$

$Verification := if(F_{oxy} \le P_{cor}, \text{"OK"}, \text{"NOT ACCEPTABLE"}) = \text{"OK"}$

Calculations

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Fatigue Check of Trunnion Shaft

Critical Sections:

A - Maximum bending moment, torsional moment, and stress concentration of keyway

B - Bending moment, torsional moment, and stress concentrations of fillet

Shaft Dimensions and other Variables

Enter information in Yellow boxes:

Results are in Blue boxes

Sections AB & B Diameters — Section AB is middle of turnnion shaft Section B is at fillet

$D_{ab} := 24in$ — Diameter of Shaft at Section AB

$D_b := 22.084in$ — Diameter of Shaft at Section B

$r_f := .625$ — Fillet Radius in inches, but do not use dimension

$Span_w := 3915kip$ — Weight of Span

$Cwt := Span_w$ — Weight of Counterweights (hypothesis)

$W_l := \frac{(Span_w + Cwt)}{8} = 979 \cdot kip$ — Weight on Trunnion Shaft

$\sigma ut := 75ksi$ — Ultimate Tensile Strength of Shaft Material (ASTM A235 Class E)

$\sigma y := 37.500ksi$ — Yield Strenght for material

Distance from bearings to area of concern:

$l_s := 13in + 13in + 27.5in = 53.5 \cdot in$ — Length of Shaft Between Bearing Centers

$l_a := \frac{l_s}{2}$ — Distance to Center of Shaft from center of Bearing

$l_b := 13in$ — Distance from Center of Bearing to fillet

$c_{fr} := .004$ — Coefficient of friction for Bronze on Steel (Greased)

Torque on Shaft Due to Friction

$T_{fr} := W_l \cdot D_b \cdot c_{fr}$ $\qquad T_{fr} = 601.141\,J \cdot 16.250$

Find Endurance Limit:

σe = α σut * (Cd*Cs*Ck*Ct*Cm)

$\alpha := .5$

From CSA Section 13.7.3.5.4 Endurance Limit

$Cr := 0.814$

$Cm := 1$

$Cs := 1.459$ $\qquad 4.51 \cdot (75)^{-0.265} = 1.436$

$Ct := 1$

Size Factor; $\qquad$ Cd = (D/7.6)$^{-0.113}$

$$Cd_{ab} := \left[\left(\frac{D_{ab}}{7.6mm}\right)^{-.113}\right] \qquad Cd_{ab} = 0.609$$

$$Cd_b := \left[\left(\frac{D_b}{7.6mm}\right)^{-.113}\right] \qquad Cd_b = 0.615$$

$$\sigma e_a := \alpha \cdot \sigma ut \cdot \left(Cd_{ab} \cdot Cr \cdot Ct \cdot Cs \cdot Cm\right) \qquad \sigma e_a = 27.135 \cdot ksi$$

$$\sigma e_b := \alpha \cdot \sigma ut \cdot \left(Cd_b \cdot Cr \cdot Ct \cdot Cs \cdot Cm\right) \qquad \sigma e_b = 27.392 \cdot ksi$$

Find - Bending Moments at each Section:

Section A -

Bending moment due to weight on Shaft

$M_a := W_l \cdot l_a$ $\quad\quad M_a = 2.182 \times 10^3 \cdot ft \cdot kip$

Section B -

Bending moment due to weight on Shaft

$M_b := W_l \cdot l_b$ $\quad\quad M_b = 1.06 \times 10^3 \cdot ft \cdot kip$

Find Stress Concentration Factors:

$\nu := .049$

$$q := \frac{1}{\left[1 + \left(\frac{\nu}{r_f^{.5}}\right)\right]} \quad q = 0.942$$

$Kt_a := 1$ For Sled-run keyway; Use 1 if no Keyway

$Kf_a := 1 + q \cdot (Kt_a - 1)$ $\quad Kf_a = 1$

$K\tau_a := 1$ For Sled-run keyway; Use 1 if no Keyway

$Kf\tau_a := 1 + q \cdot (K\tau_a - 1)$ $\quad Kf\tau_a = 1$

2.22

$Kt_b := 2.02$

$Kf_b := 1 + q \cdot (Kt_b - 1)$ $\quad Kf_b = 1.96$ From AASHTO Section 6.7.3.2

$K\tau_b := 1.61$ 1.61

$Kf\tau_b := 1 + q \cdot (K\tau_b - 1)$ $\quad Kf\tau_b = 1.574$

Find Stress Concentration Factors (v.2):

$r_{f.} := .625$ Fillet Radius

From Peterson's Stress Concentration Factors, 2nd Ed. 1997, Chapter 3: Shoulder fillet in bar of circular cross section

$$t := \frac{D_{ab} - 22.084\text{in}}{2\text{in}} = 0.958$$ Fillet Height

$D := 24$ $\qquad \frac{t}{r_f} = 1.533$

Bending Factor

$$C1b := 0.947 + 1.206\sqrt{\frac{t}{r_f}} - 0.131\cdot\frac{t}{r_f} = 2.239$$

$$C2b := 0.022 - 3.405\sqrt{\frac{t}{r_f}} + 0.915\cdot\frac{t}{r_f} = -2.791$$

$$C3b := 0.869 + 1.777\sqrt{\frac{t}{r_f}} - 0.555\cdot\frac{t}{r_f} = 2.218$$

$$C4b := -0.810 + 0.422\sqrt{\frac{t}{r_f}} - 0.260\cdot\frac{t}{r_f} = -0.686$$

$$Kt_b := C1b + C2b\cdot\left(\frac{2t}{D}\right) + C3b\cdot\left[\left(\frac{2t}{D}\right)^2\right] + C4b\cdot\left[\left(\frac{2t}{D}\right)^3\right]$$

$Kf_b := 1 + q\cdot(Kt_b - 1)$ $\qquad Kf_b = 1.97$

Torsional Factor

$$C1 := 0.905 + 0.783\sqrt{\frac{t}{r_f}} - 0.075\cdot\frac{t}{r_f} = 1.759$$

$$C2 := -0.437 - 1.969\sqrt{\frac{t}{r_f}} - 0.553\cdot\frac{t}{r_f} = -3.722$$

$$C3 := 1.557 + 1.073\sqrt{\frac{t}{r_f}} - 0.578\cdot\frac{t}{r_f} = 1.999$$

$$C4 := -1.061 + 0.171\sqrt{\frac{t}{r_f}} + 0.086\cdot\frac{t}{r_f} = -0.717$$

$$K\tau_b := C1 + C2\cdot\left(\frac{2t}{D}\right) + C3\cdot\left[\left(\frac{2t}{D}\right)^2\right] + C4\cdot\left[\left(\frac{2t}{D}\right)^3\right] = 1.475$$

$Kf\tau_b := 1 + q\cdot(K\tau_b - 1)$ $\qquad Kf\tau_b = 1.447$

Find Number of Cycles at Each Section

Section A:

$T_r := \frac{T_{fr}}{1ft \cdot kip}$ $T_r = 7.205$ $\sigma y_a := \frac{\sigma y}{1psi}$ $\sigma y_a = 3.75 \times 10^4$

$$AL_{ab} := \left[\frac{32}{\left(\pi \cdot D_{ab}^3\right)}\right] \cdot \left[\frac{\left(Kt_a \cdot M_a\right)}{\sigma e_a}\right] + \frac{\left(\sqrt{3} \cdot Kf\tau_a \cdot T_r\right)}{\left(2 \cdot \sigma y_a\right)}$$

$AL_{ab} = 0.711$

$Check_{SectionAB} := if\left(AL_{ab} \le .8, \text{"Infinite"}, \text{"Finite"}\right) = \text{"Infinite"}$

$\sigma x_a := \left[\frac{(32 \cdot M_a)}{\pi \cdot D_{ab}^3}\right] \cdot Kf_a$ $\sigma x_a = 19.291 \cdot ksi$

$\tau y_a := \left[\frac{(16 \cdot T_{fr})}{\left(\pi \cdot D_{ab}^3\right)}\right] \cdot Kf_a$ $\tau y_a = 0.032 \cdot ksi$

$\tau m_a := \left[\left(\frac{\sigma x_a}{2}\right)^2 + \tau y_a^2\right]^{.5}$ $\tau m_a = 9.646 \cdot ksi$ τma = Max Torsional Stress

$\sigma max_a := \left(\frac{\sigma x_a}{2}\right) + \tau m_a$

$\sigma min_a := -\left(\frac{\sigma x_a}{2}\right) - \tau m_a$ $\sigma r_a := \frac{\left(\sigma max_a - \sigma min_a\right)}{2}$ $\sigma r_a = 19.291 \cdot ksi$ $\sigma e_a = 27.135 \cdot ksi$

Find Number of Cycles:

$A_a := \frac{(.9 \cdot \sigma y)^2}{\sigma e_a}$ $B_a := \left(\frac{-1}{3}\right) \cdot \log\left(\frac{.9 \cdot \sigma y}{\sigma e_a}\right)$

$N_a := \left(\frac{\sigma r_a}{A_a}\right)^{\frac{1}{B_a}}$ $N_a = 4.919 \times 10^{10}$

Section B:

$$AL_b := \left[\frac{32}{\left(\pi \cdot D_b^{\ 3}\right)}\right] \cdot \left[\frac{\left(Kt_b \cdot M_b\right)}{\sigma e_b}\right] + \frac{\left(\sqrt{3} \cdot Kf\tau_b \cdot T_r\right)}{\left(2 \cdot \sigma y_a\right)}$$

$$AL_b = 0.892$$

$$Check_{SectionB} := \text{if}\left(AL_b \le .8, \text{"Infinite"}, \text{"Finite"}\right) = \text{"Finite"}$$

$$\sigma x_b := \left[\frac{\left(32 \cdot M_b\right)}{\pi \cdot D_b^{\ 3}}\right] \cdot Kf_b \qquad \sigma x_b = 23.707 \cdot ksi$$

$$\tau y_b := \left[\frac{\left(16 \cdot T_{fr}\right)}{\left(\pi \cdot D_b^{\ 3}\right)}\right] \cdot Kf_a \qquad \tau y_b = 0.041 \cdot ksi$$

$$\tau m_b := \left[\left(\frac{\sigma x_b}{2}\right)^2 + \tau y_b^{\ 2}\right]^{.5} \qquad \tau m_b = 11.854 \cdot ksi$$

τmb = Max Torsional Stress

$$\sigma max_b := \left(\frac{\sigma x_b}{2}\right) + \tau m_b$$

$$\sigma min_b := -\left(\frac{\sigma x_b}{2}\right) - \tau m_b \qquad \sigma r_b := \frac{\left(\sigma max_b - \sigma min_b\right)}{2} \qquad \sigma r_b = 23.707 \cdot ksi \qquad \sigma e_b = 27.392 \cdot ksi$$

Find Number of Cycles:

$$A_b := \frac{(.9 \cdot \sigma y)^2}{\sigma e_b} \qquad B_b := \left(\frac{-1}{3}\right) \cdot \log\left(\frac{.9 \cdot \sigma y}{\sigma e_b}\right)$$

$$N_b := \left(\frac{\sigma r_b}{A_b}\right)^{\frac{1}{B_b}} \qquad N_b = 1.191 \times 10^8$$

Remaining Life:

$lifting := 100ft$

$r_s := \frac{180in}{2} = 90 \cdot in$

$\frac{lifting}{2r_s \cdot \pi} = 2.122$

$\frac{N_b}{2.122 \cdot 2 \cdot 3300} = 8.505 \times 10^3$

Exhibit E.10

Lift Span Rehabilitation Options 3D Model

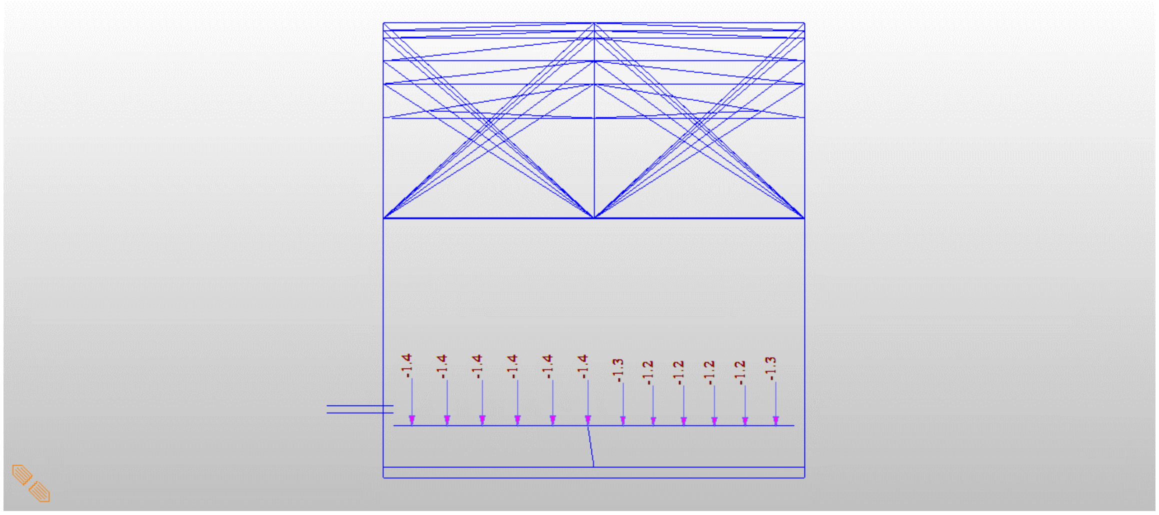

Figure 1 Wind Vert Stringer 1 ULS

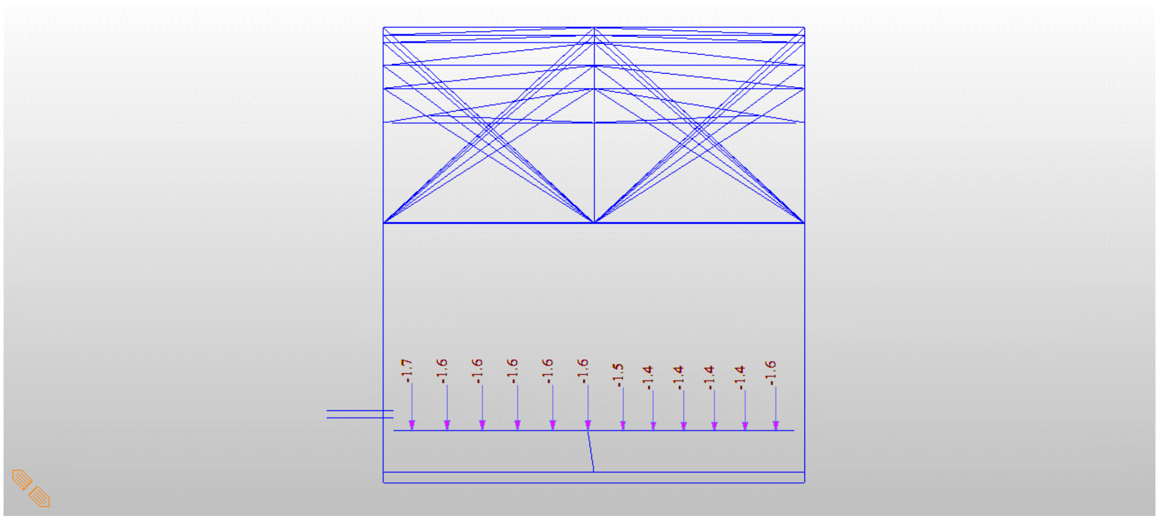

Figure 2 Wind Vert Stringer Case 2 ULS

Exhibit C.1.1. Rehabilitation Case 1 Evaluation

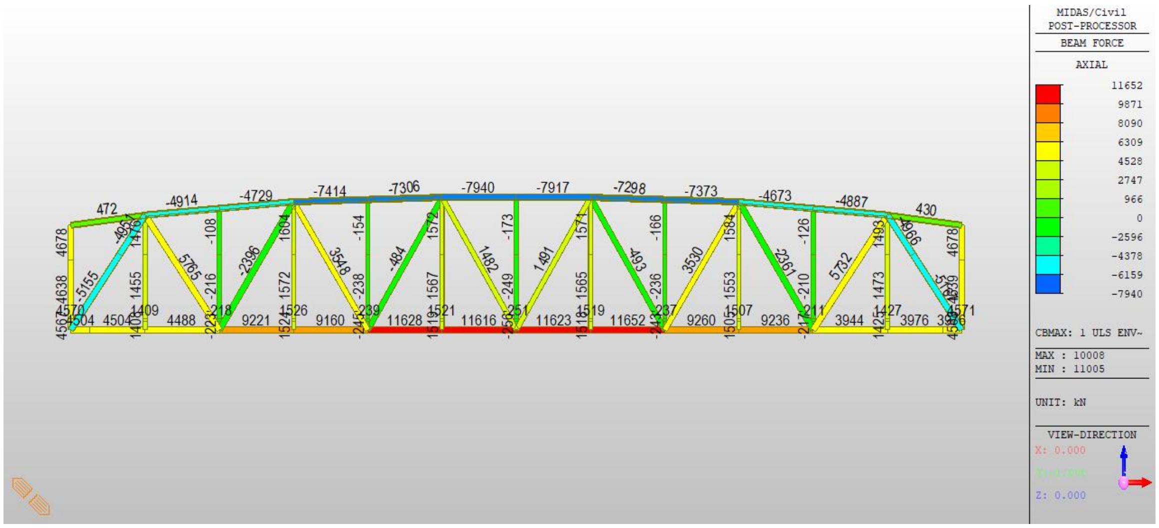

Figure 3 Railway Truss Case 1 ULS Axial Max

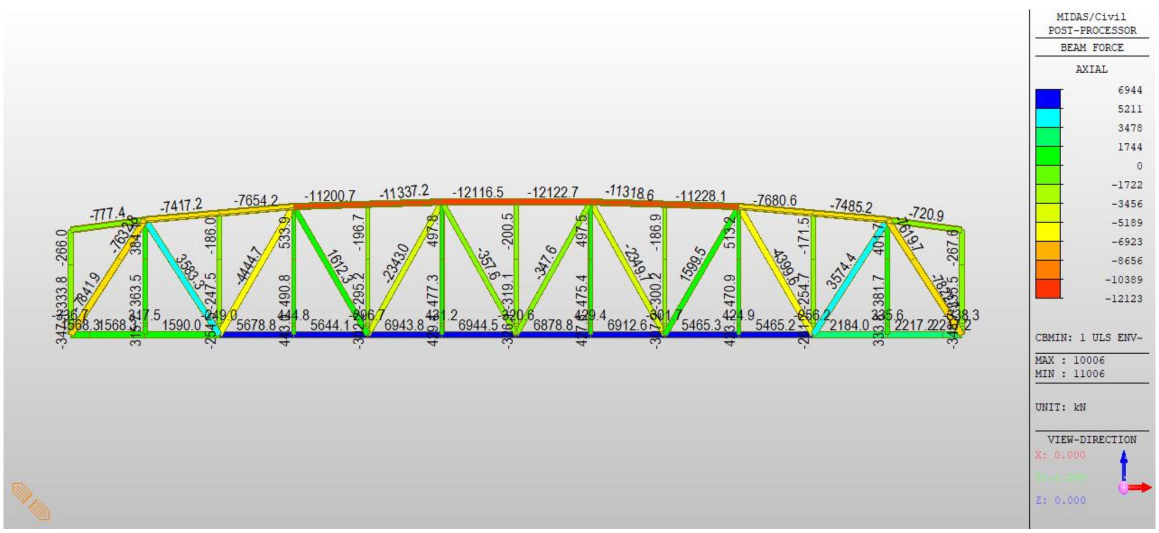

Figure 4 Railway Truss Case 1 ULS Axial Min

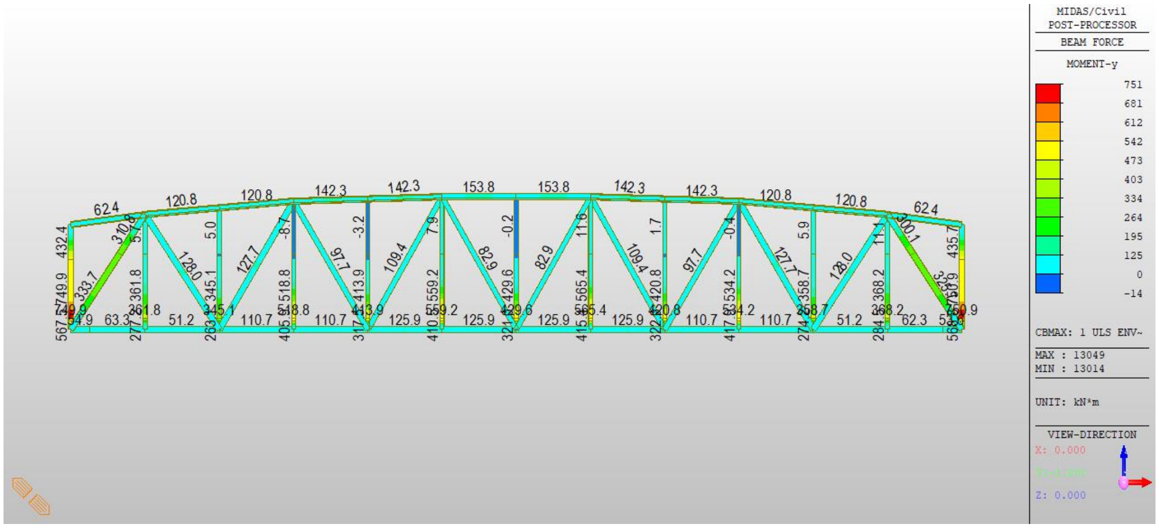

Figure 5 Railway Truss Case 1 ULS M_y Max

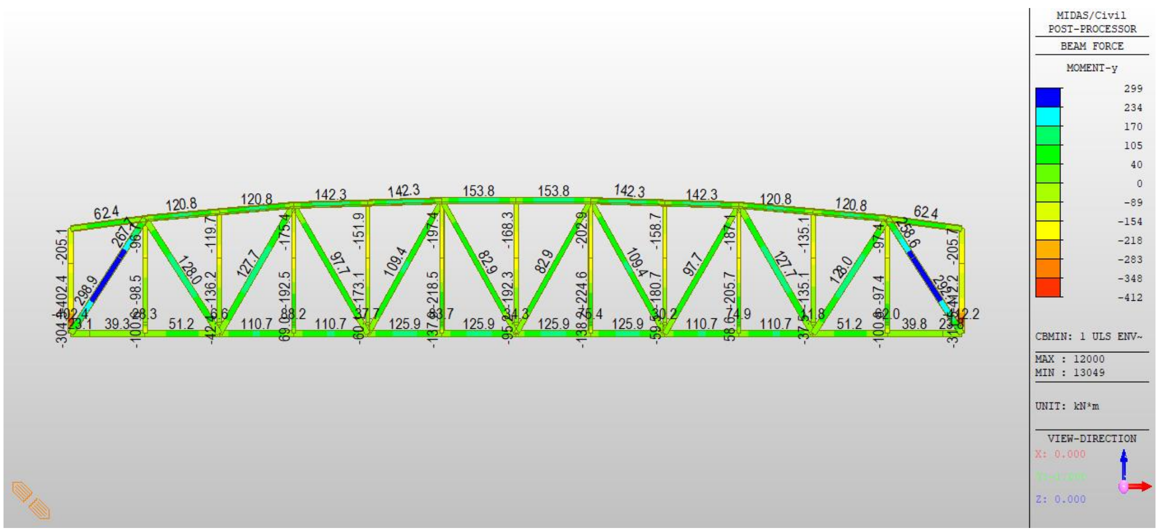

Figure 6 Railway Truss Case 1 ULS M_y Min

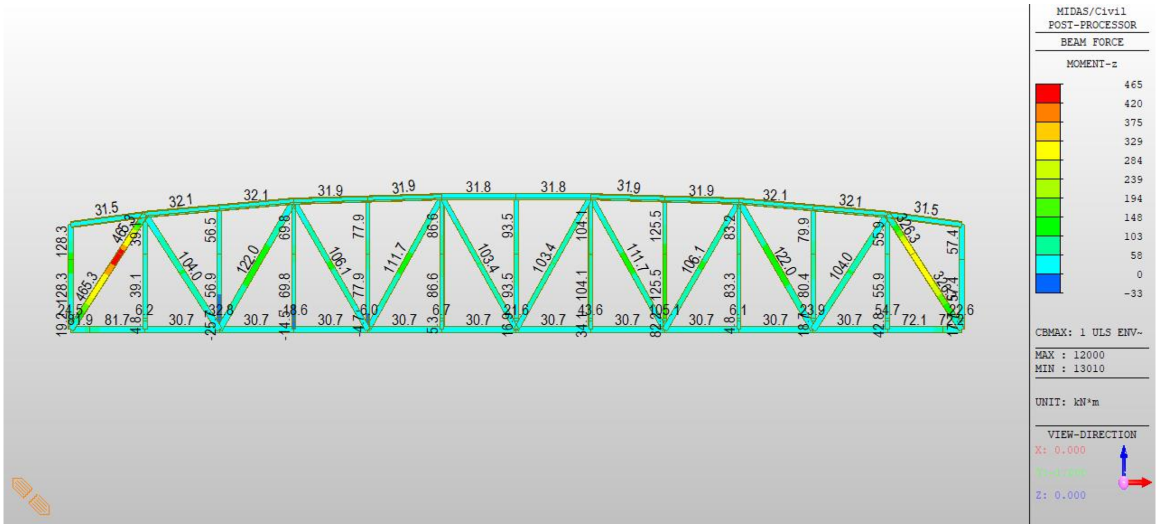

Figure 7 Railway Truss Case 1 ULS M_z Max

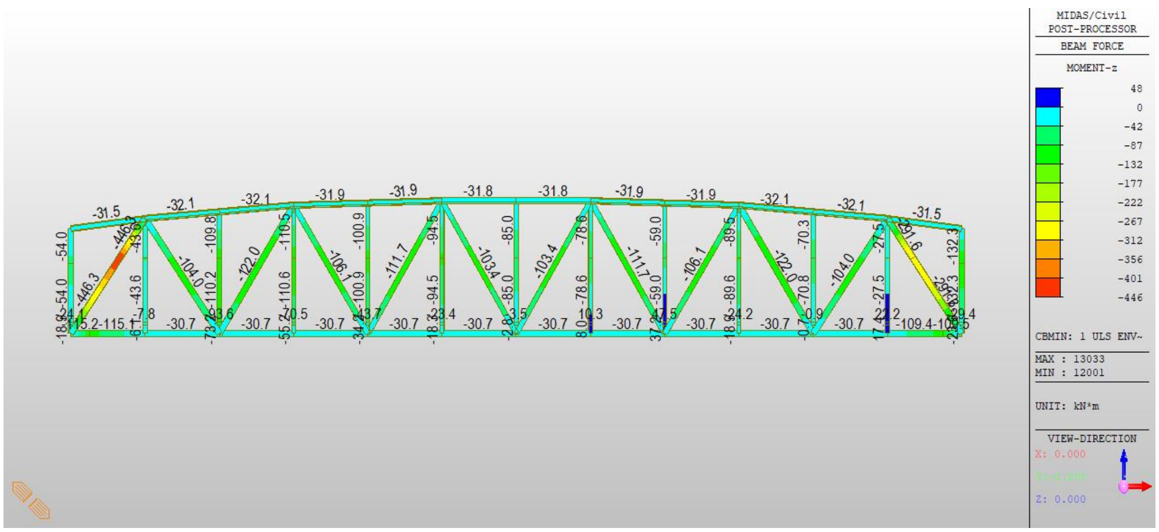

Figure 8 Railway Truss Case 1 ULS M_z Min

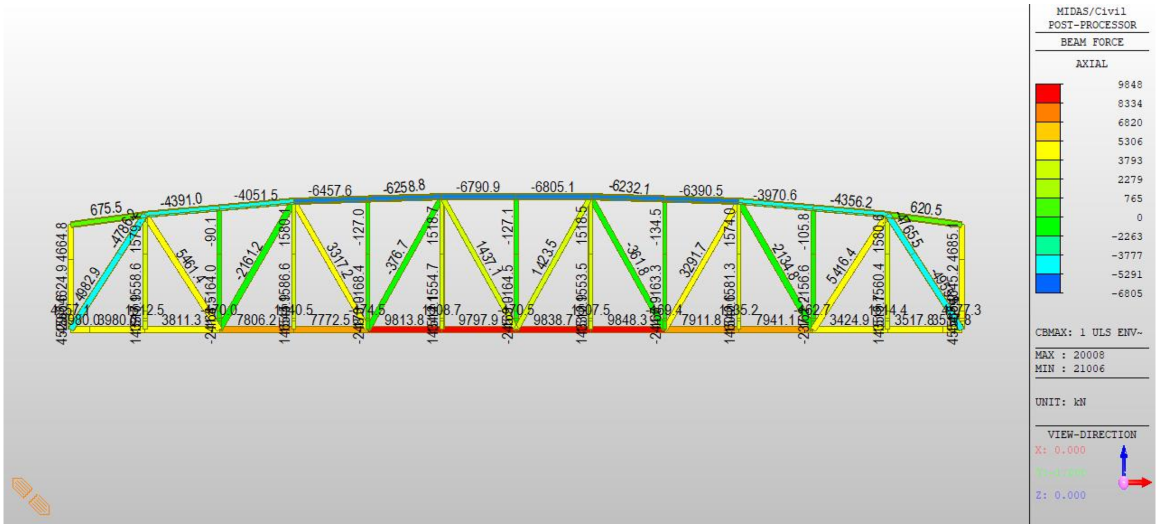

Figure 9 Highway Truss Case 1 ULS Axial Max

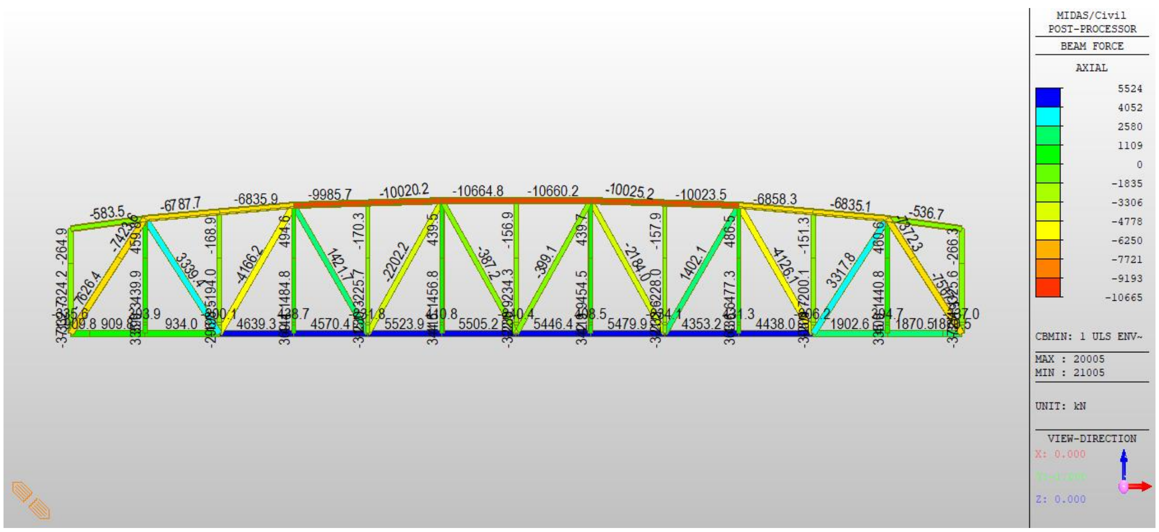

Figure 10 Highway Truss Case 1 ULS Axial Min

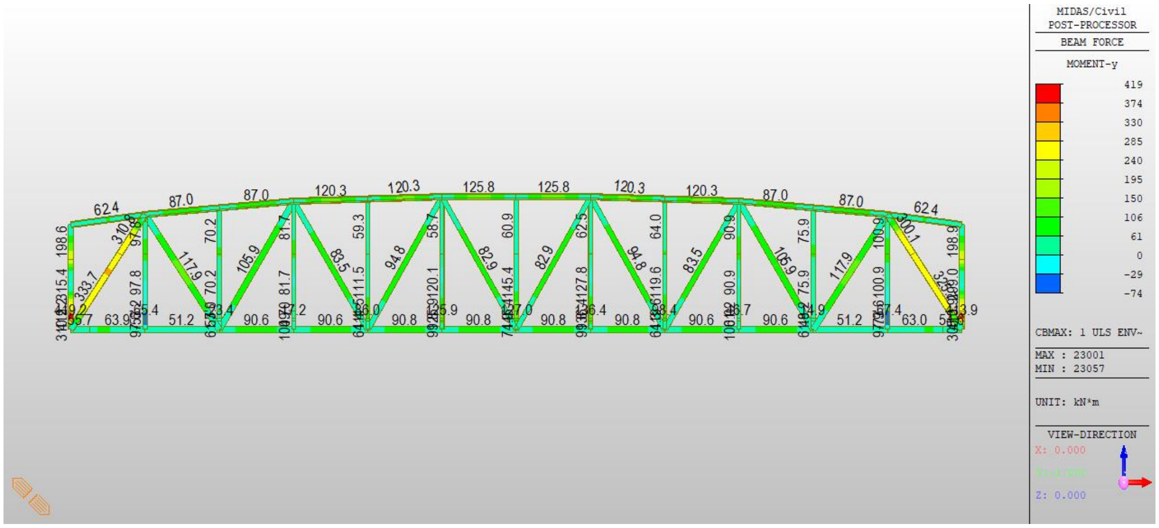

Figure 11 Highway Truss Case 1 ULS M_y Max

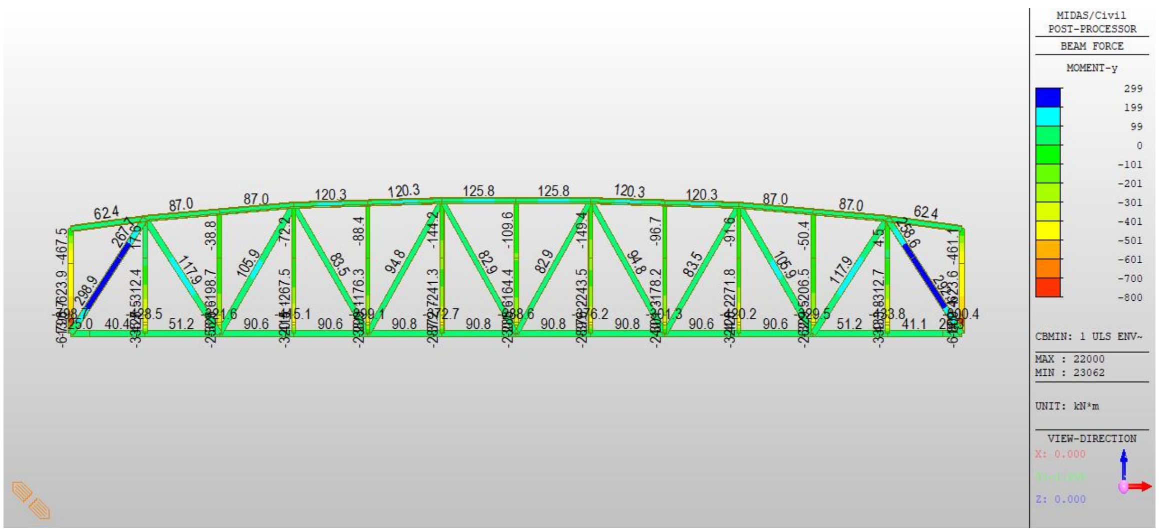

Figure 12 Highway Truss Case 1 ULS M_y Min

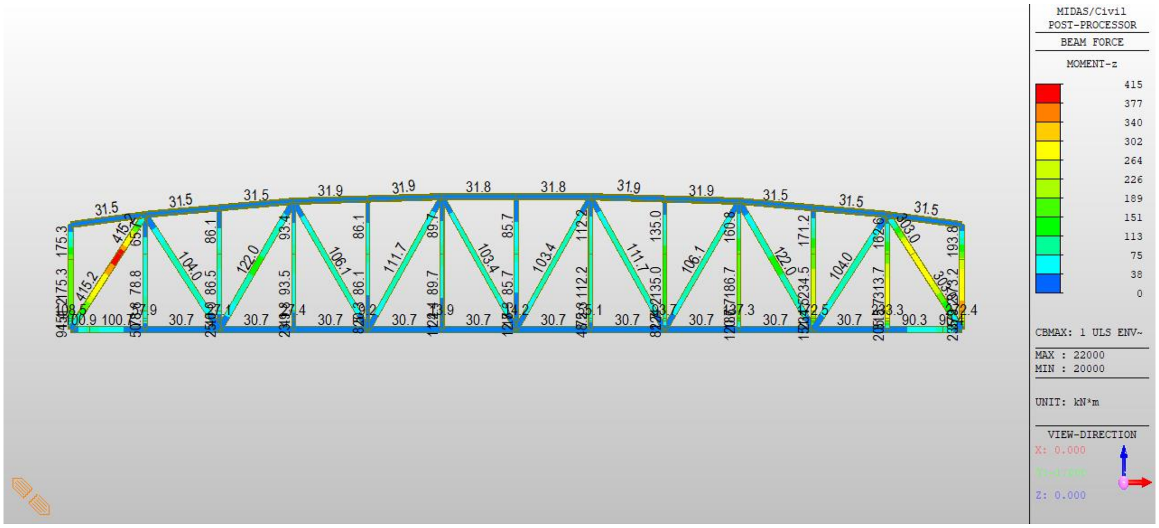

Figure 13 Highway Truss Case 1 ULS M_z Max

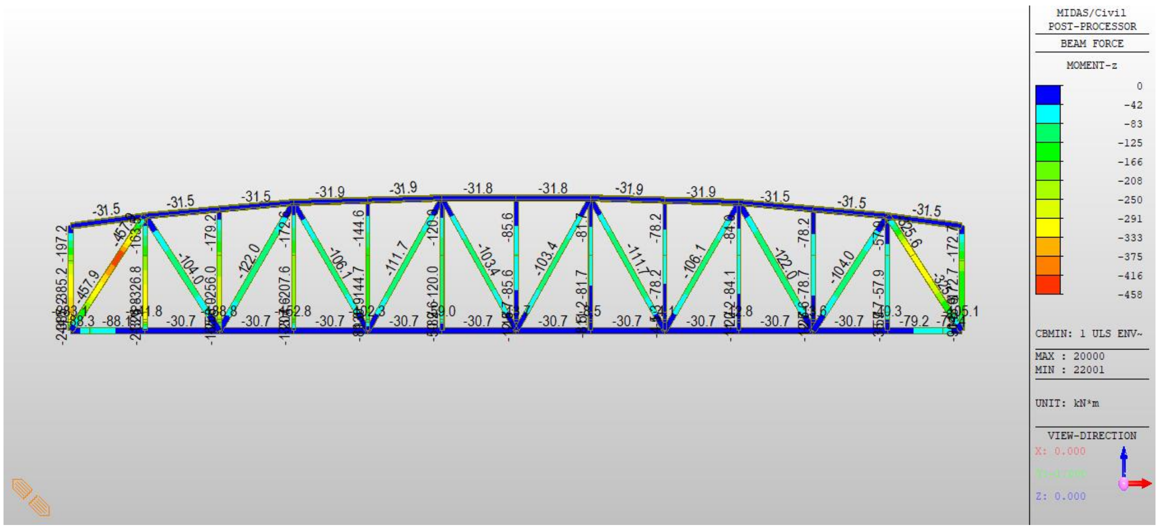

Figure 14 Highway Truss Case 1 ULS M_z Min

Figure 15 Lift Girder Case 1 ULS M_y Max

Figure 16 Lift Girder Case 1 ULS M_y Min

Figure 17 Lift Girder Case 1 ULS F_z Max

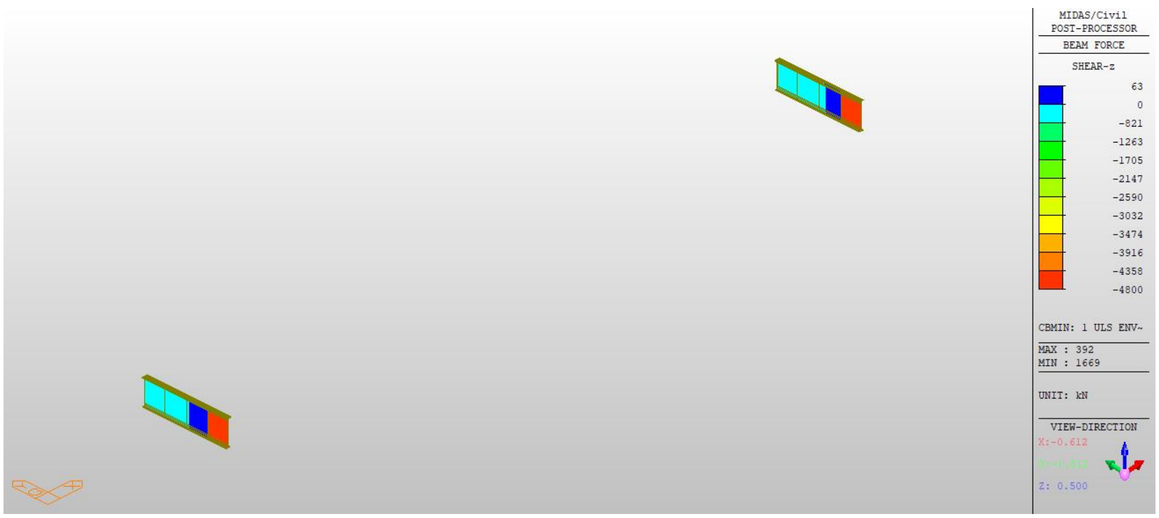

Figure 18 Lift Girder Case 1 ULS F_z Min

Figure 19 End Floor Beam Case 1 ULS M_y Max

Figure 20 End Floor Beam Case 1 ULS M_y Min

Figure 21 End Floor Beam Case 1 ULS F_z Max

Figure 22 End Floor Beam Case 1 ULS F_z Min

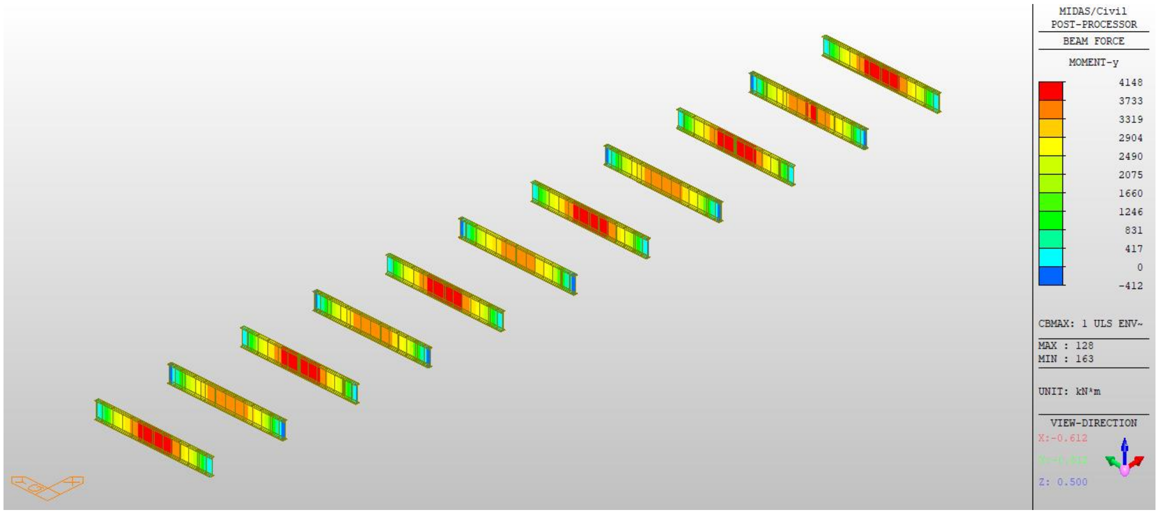

Figure 23 Interior Floor Beam Case 1 ULS M_y Max

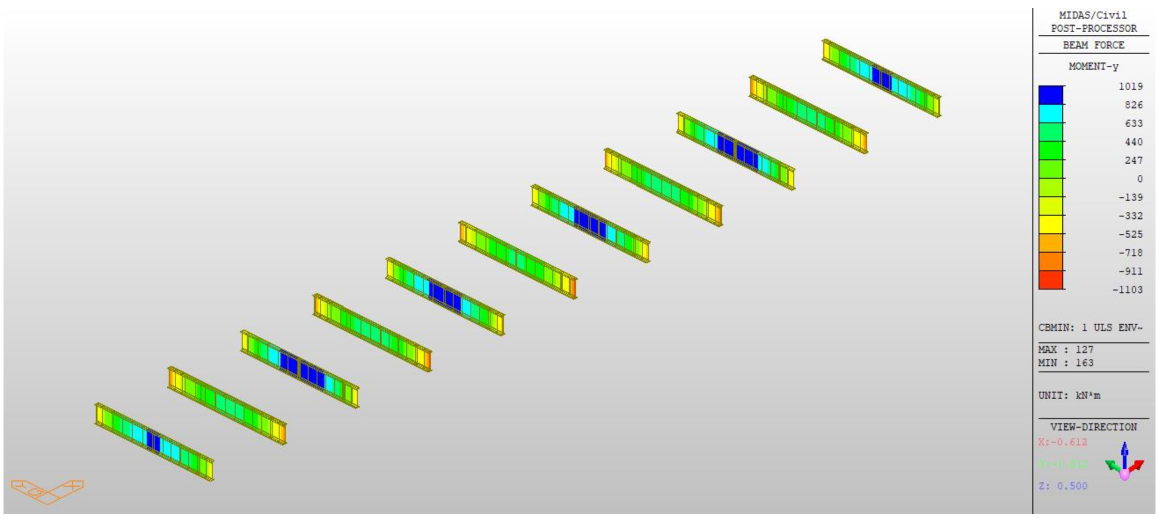

Figure 24 Interior Floor Beam Case 1 ULS M_y Min

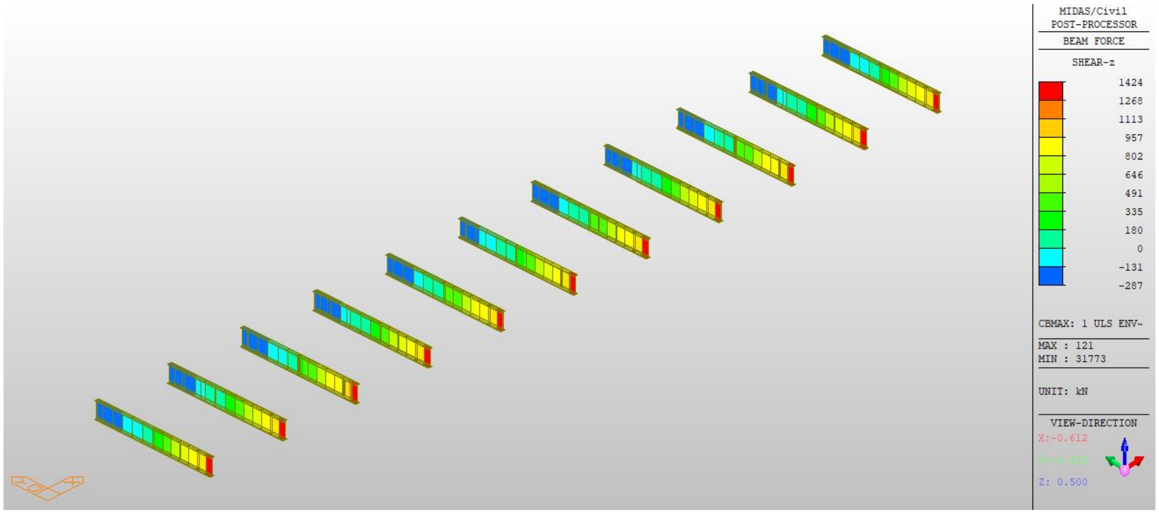

Figure 25 Interior Floor Beam Case 1 ULS F_z Max

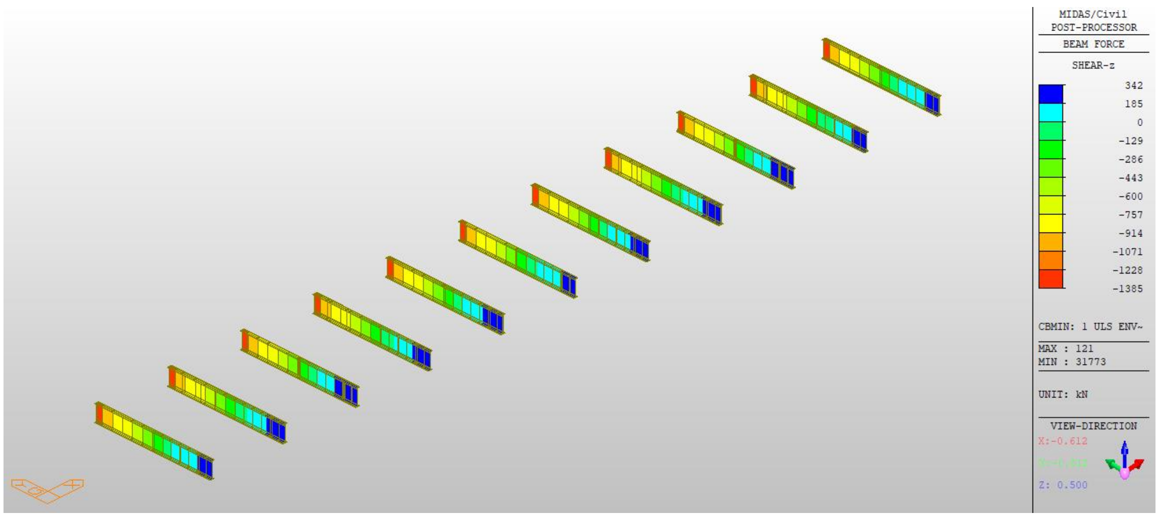

Figure 26 Interior Floor Beam Case 1 ULS F_z Min

Exhibit C.1.2. Rehabilitation Case 2 Evaluation

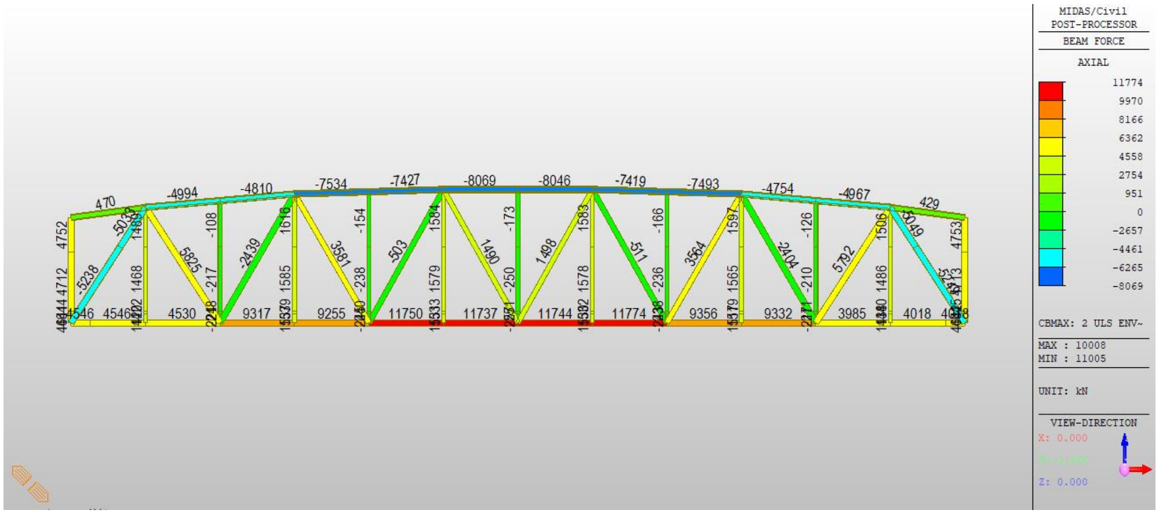

Figure 27 Railway Truss Case 2 ULS Axial Max

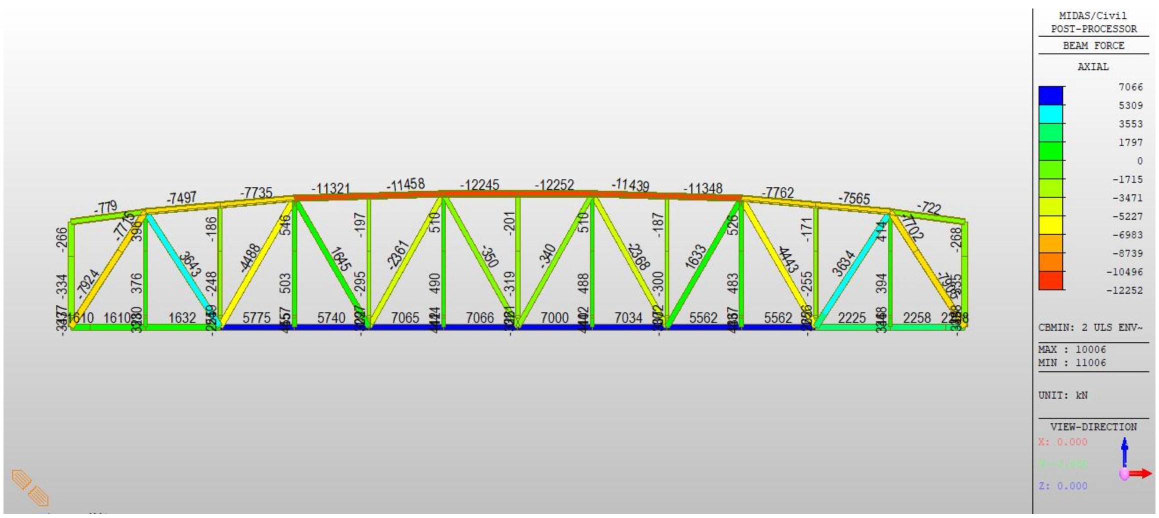

Figure 28 Railway Truss Case 2 ULS Axial Min

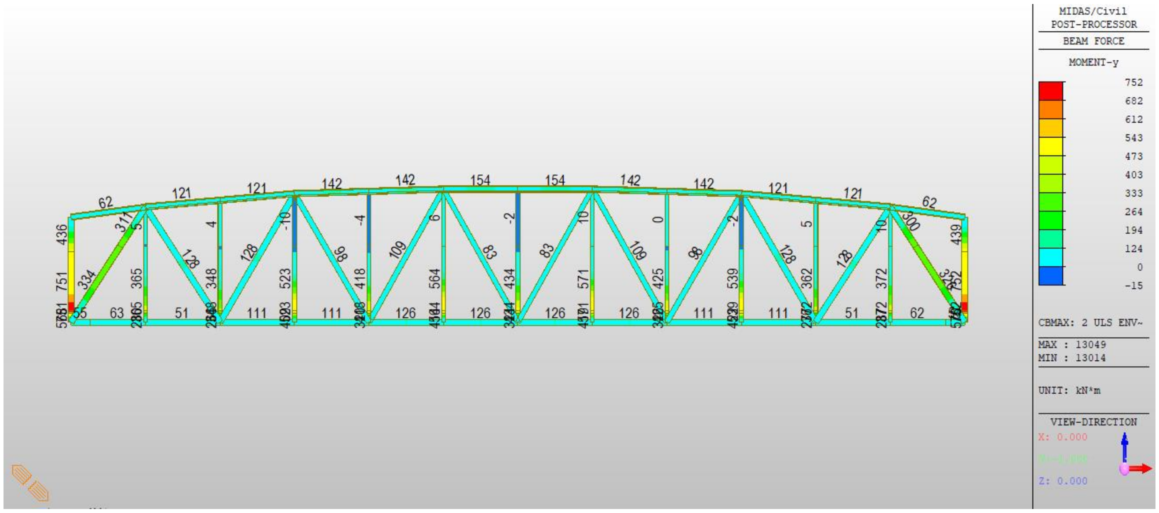

Figure 29 Railway Truss Case 2 ULS M_y Max

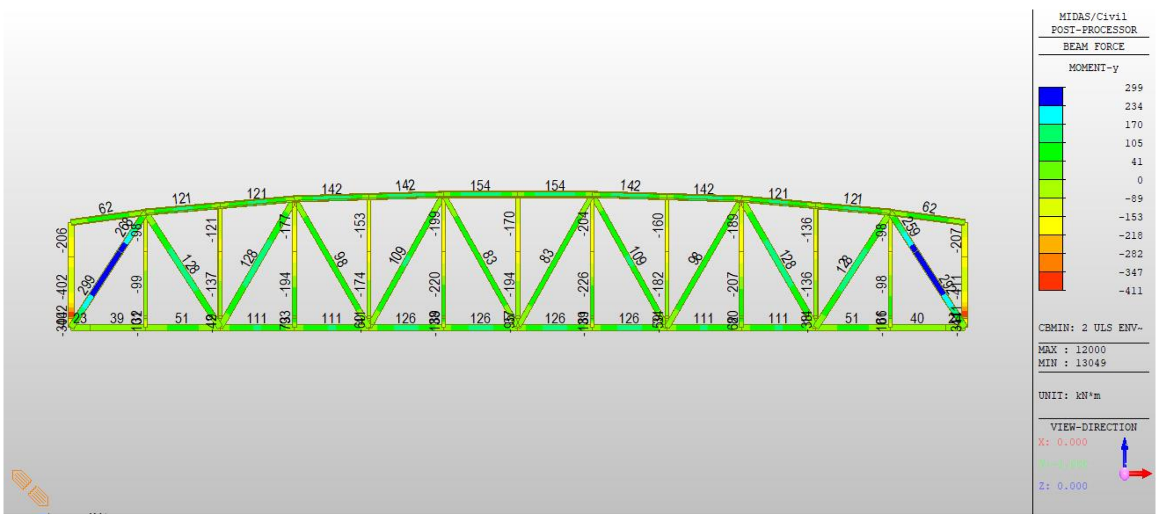

Figure 30 Railway Truss Case 2 ULS M_y Min

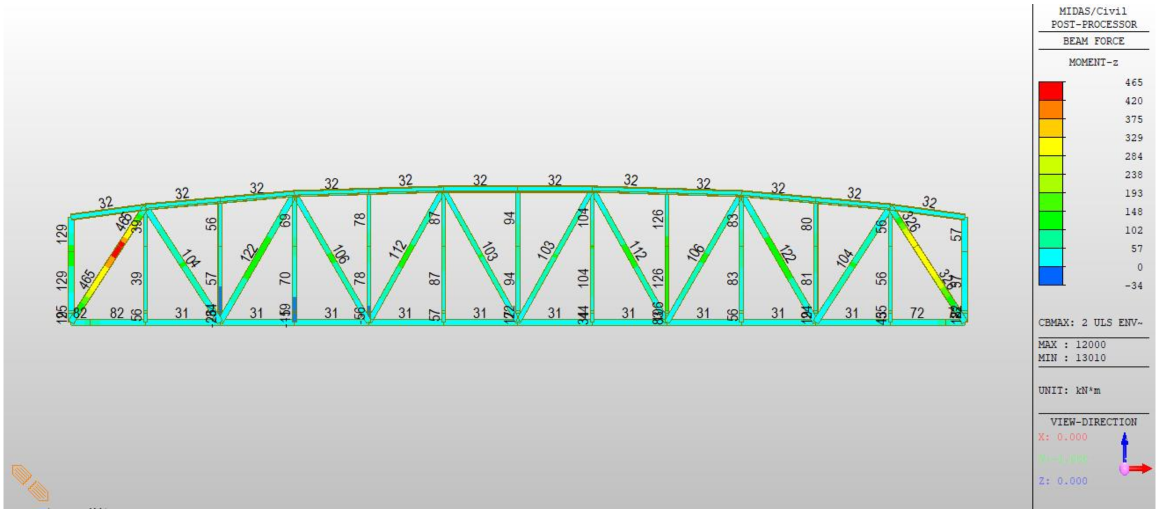

Figure 31 Railway Truss Case 2 ULS M_z Max

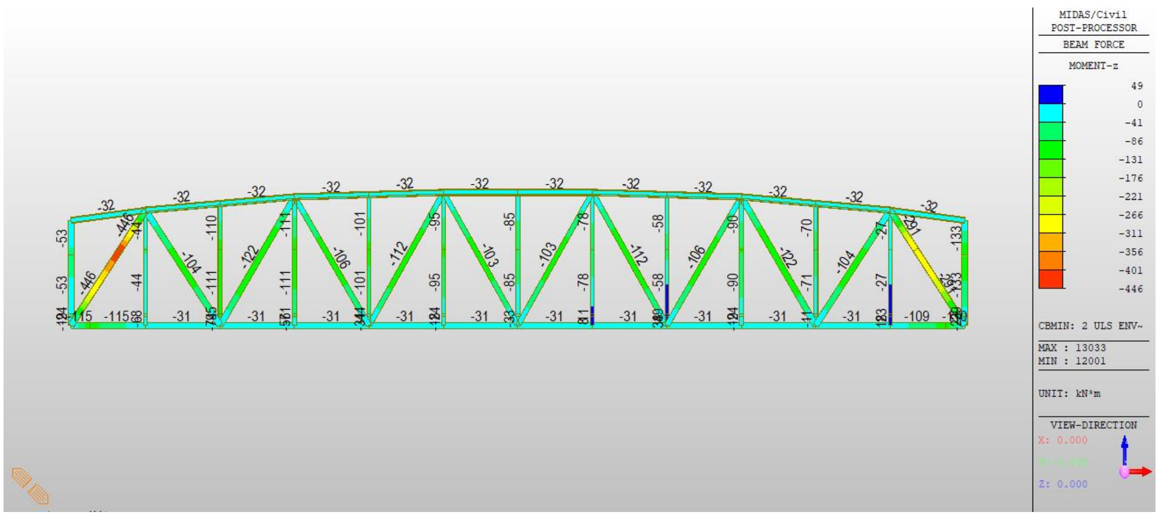

Figure 32 Railway Truss Case 2 ULS M_z Min

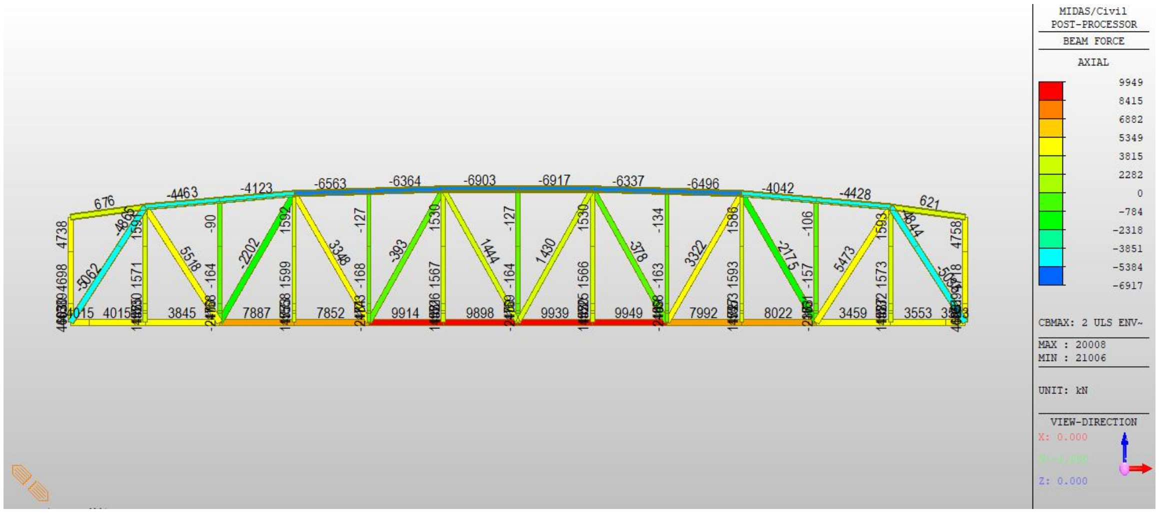

Figure 33 Highway Truss Case 2 ULS Axial Max

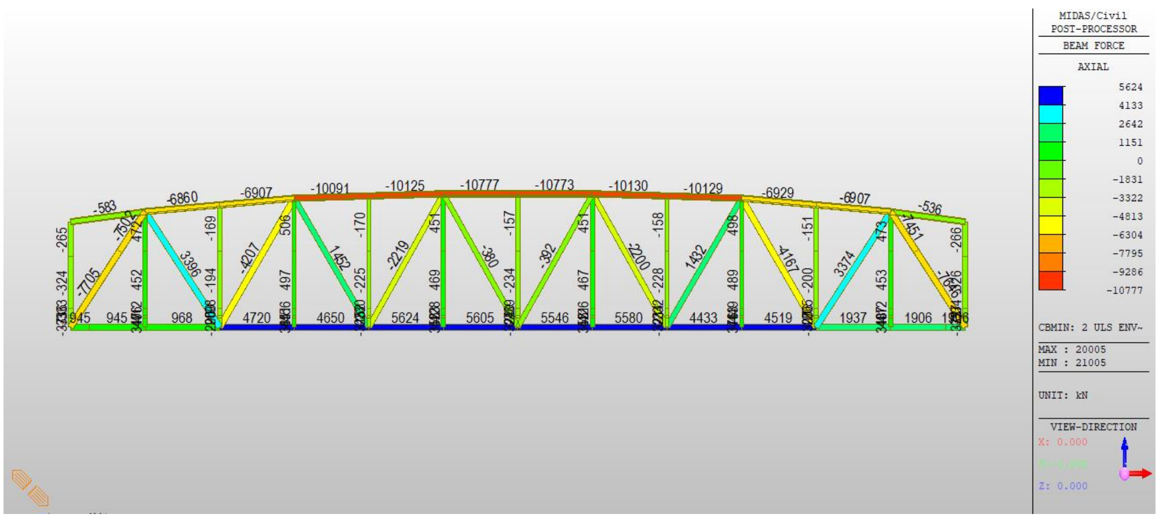

Figure 34 Highway Truss Case 2 ULS Axial Min

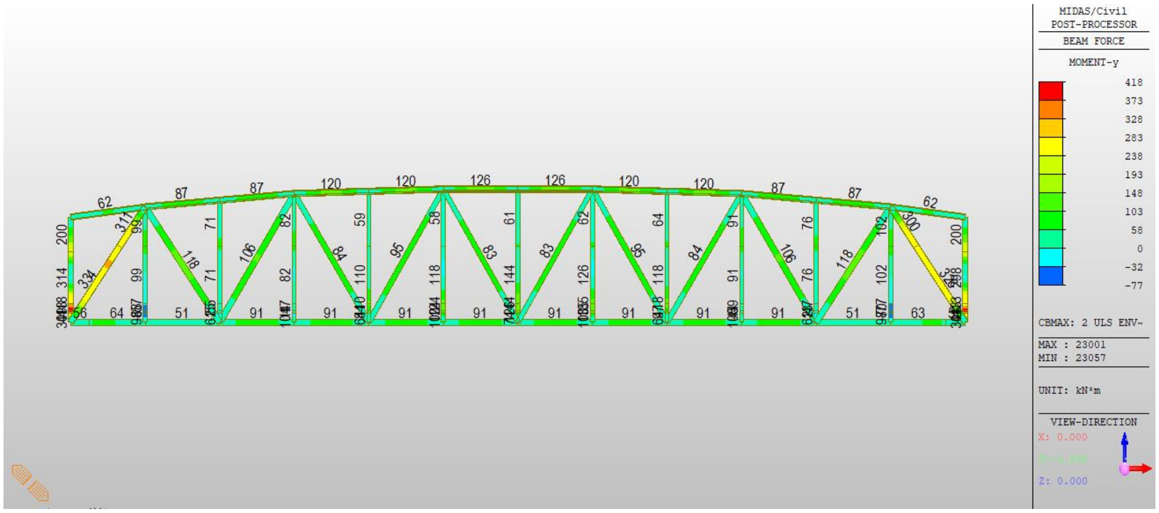

Figure 35 Highway Truss Case 2 ULS M_y Max

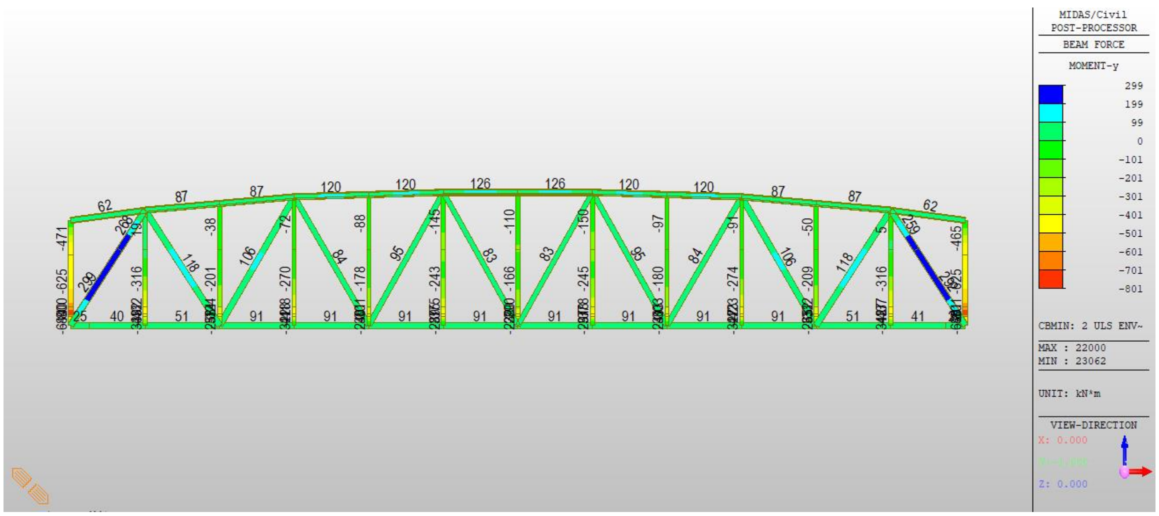

Figure 36 Highway Truss Case 2 ULS M_y Min

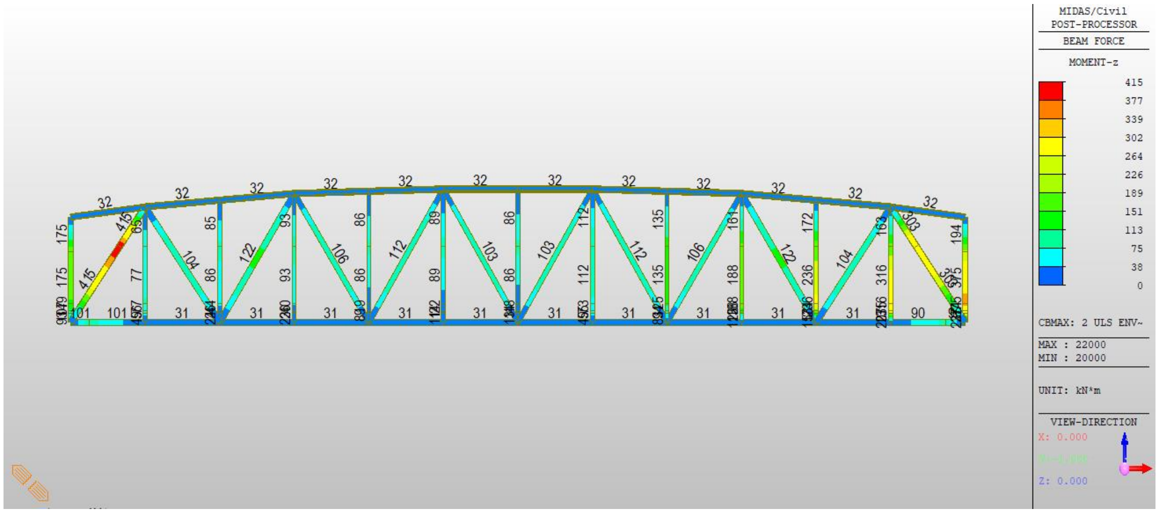

Figure 37 Highway Truss Case 2 ULS M_z Max

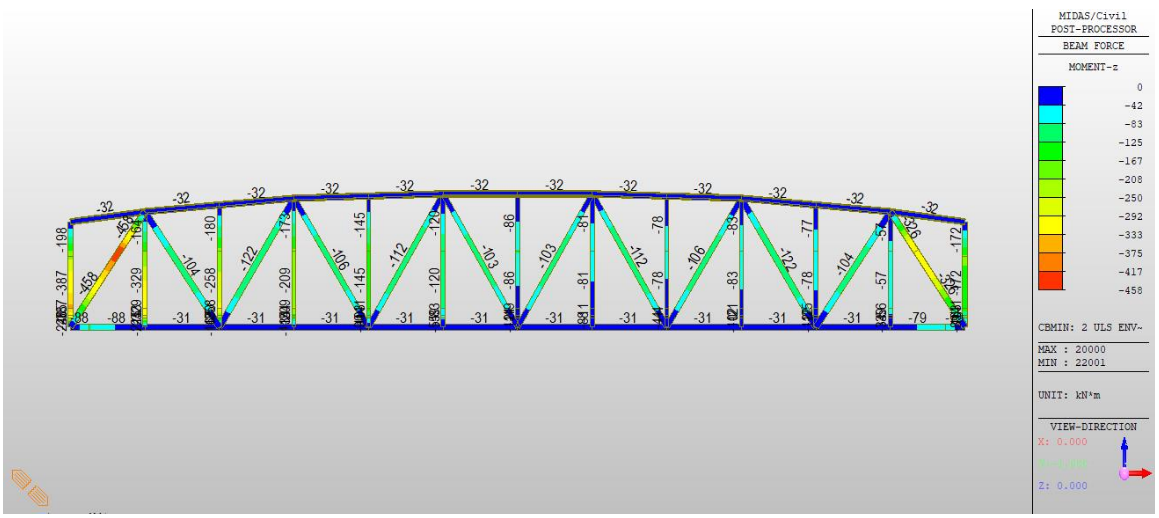

Figure 38 Highway Truss Case 2 ULS M_z Min

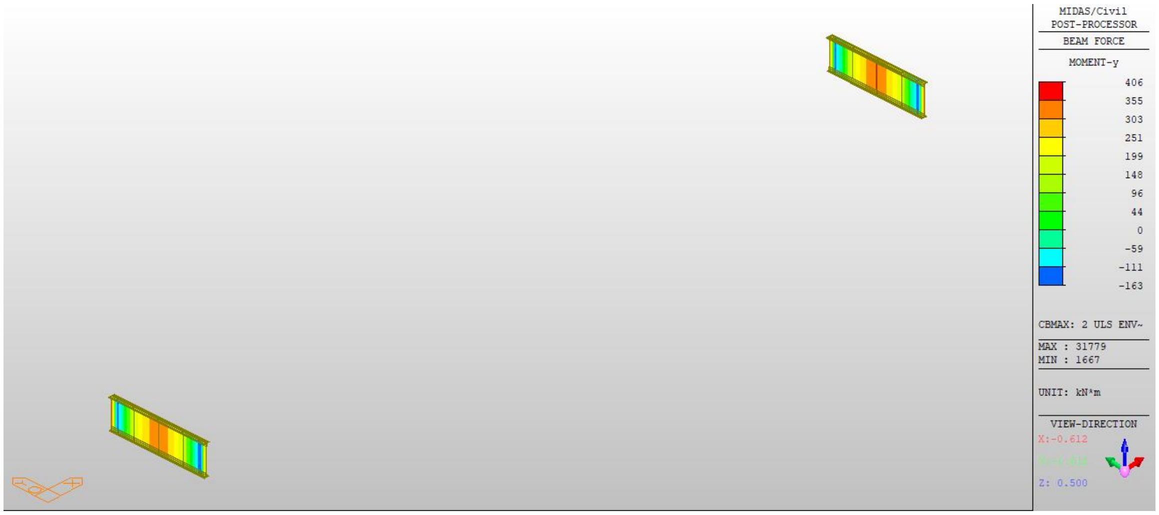

Figure 39 Lift Girder Case 2 ULS M_y Max

Figure 40 Lift Girder Case 2 ULS M_y Min

Figure 41 Lift Girder Case 2 ULS F_z Max

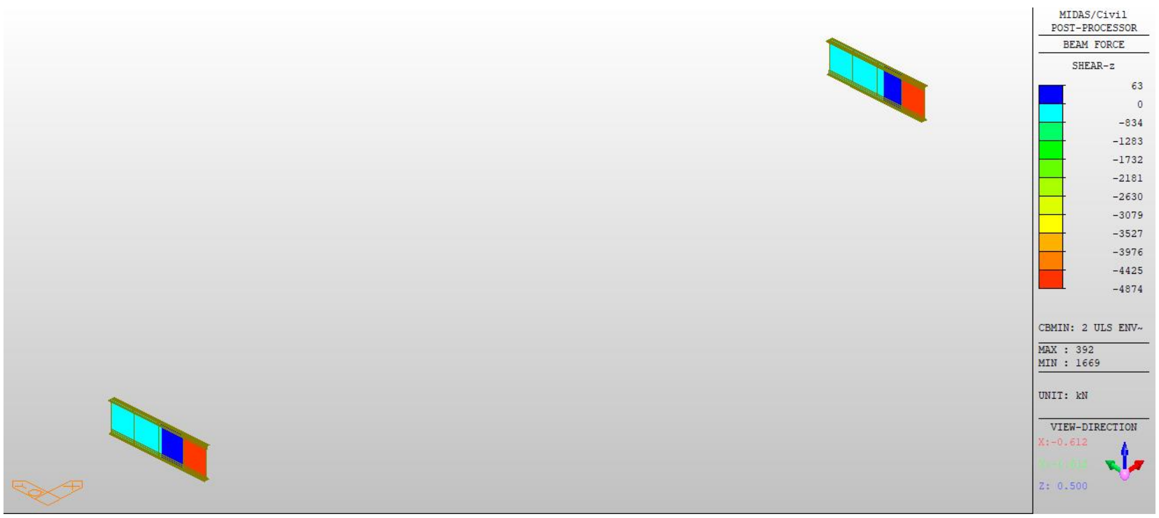

Figure 42 Lift Girder Case 2 ULS F_z Min

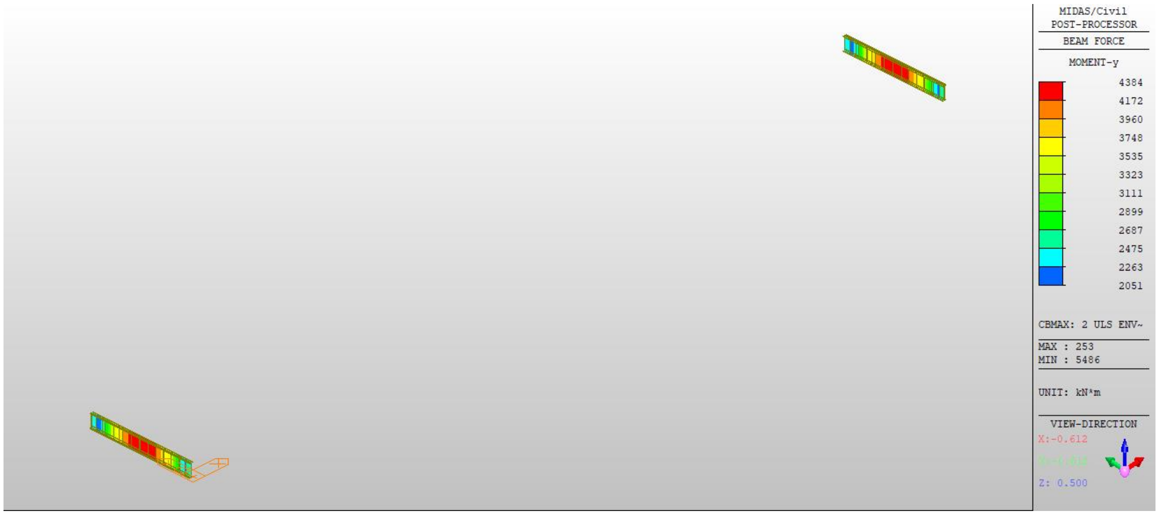

Figure 43 End Floor Beam Case 2 ULS M_y Max

Figure 44 End Floor Beam Case 2 ULS M_y Min

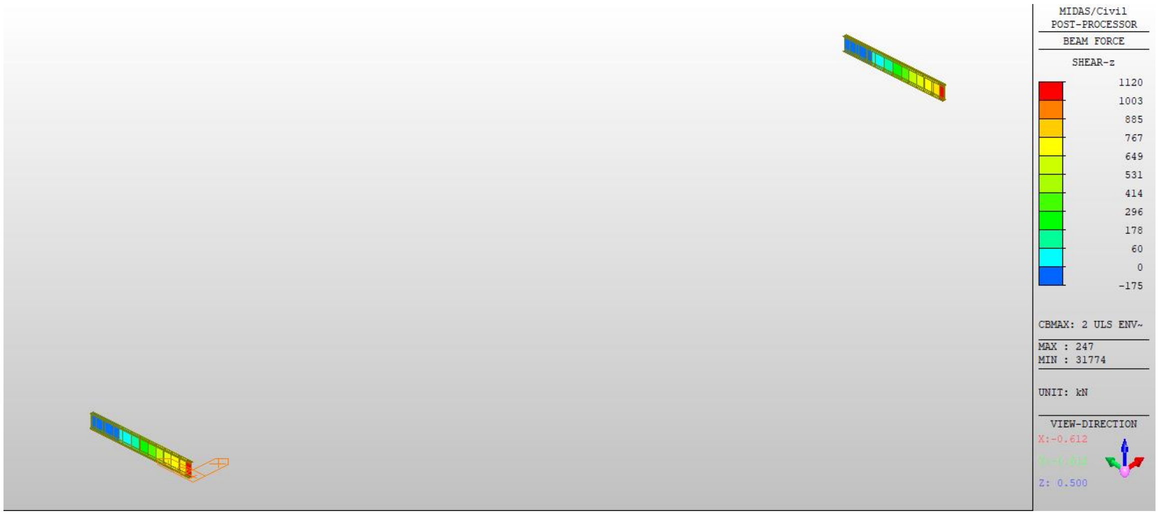

Figure 45 End Floor Beam Case 2 ULS F_z Max

Figure 46 End Floor Beam Case 2 ULS F_z Min

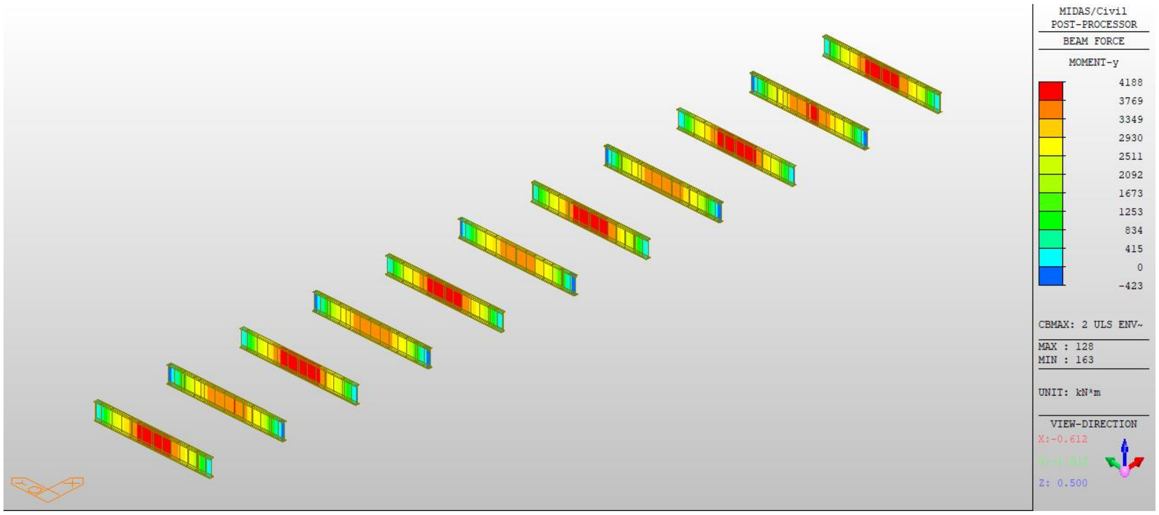

Figure 47 Interior Floor Beam Case 2 ULS M_y Max

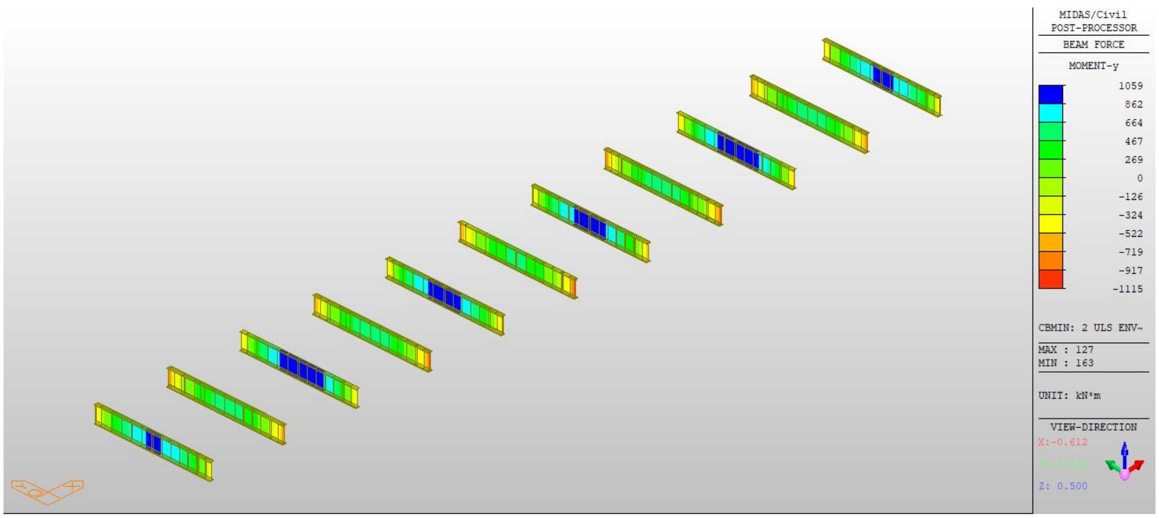

Figure 48 Interior Floor Beam Case 2 ULS M_y Min

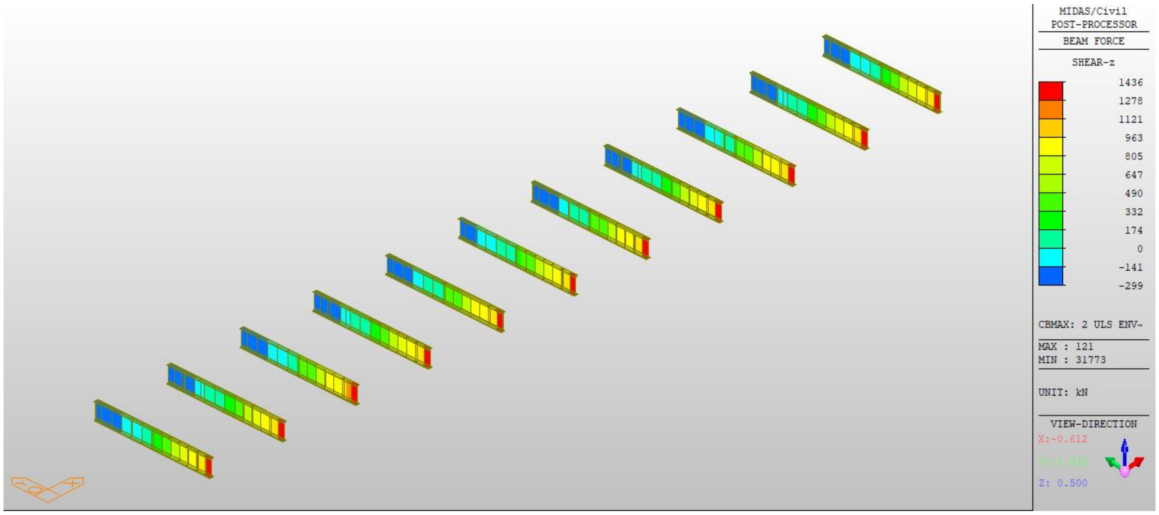

Figure 49 Interior Floor Beam Case 2 ULS F_z Max

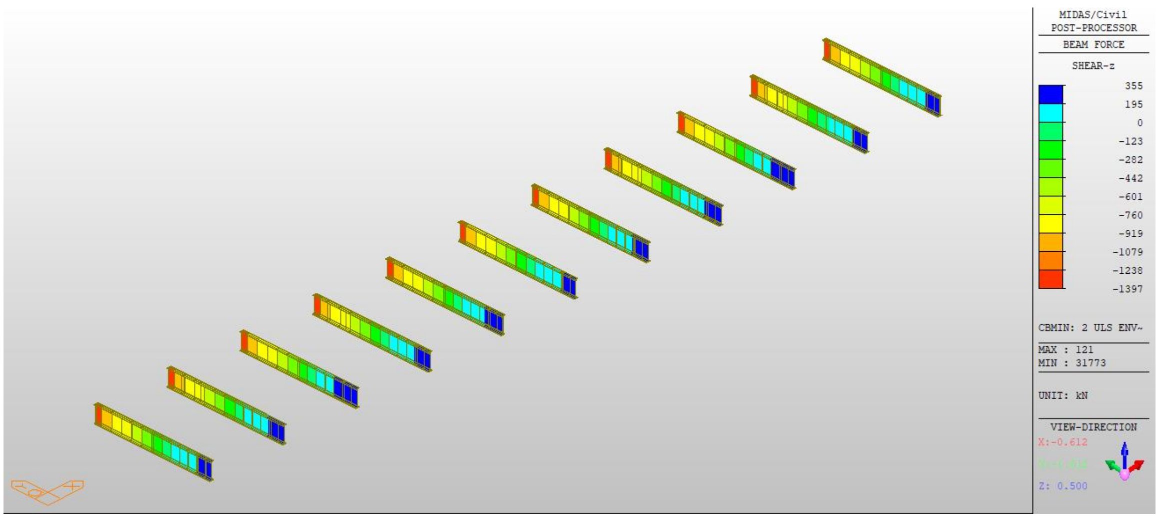

Figure 50 Interior Floor Beam Case 2 ULS F_z Min

Exhibit C.1.3. Rehabilitation Case 3 Evaluation

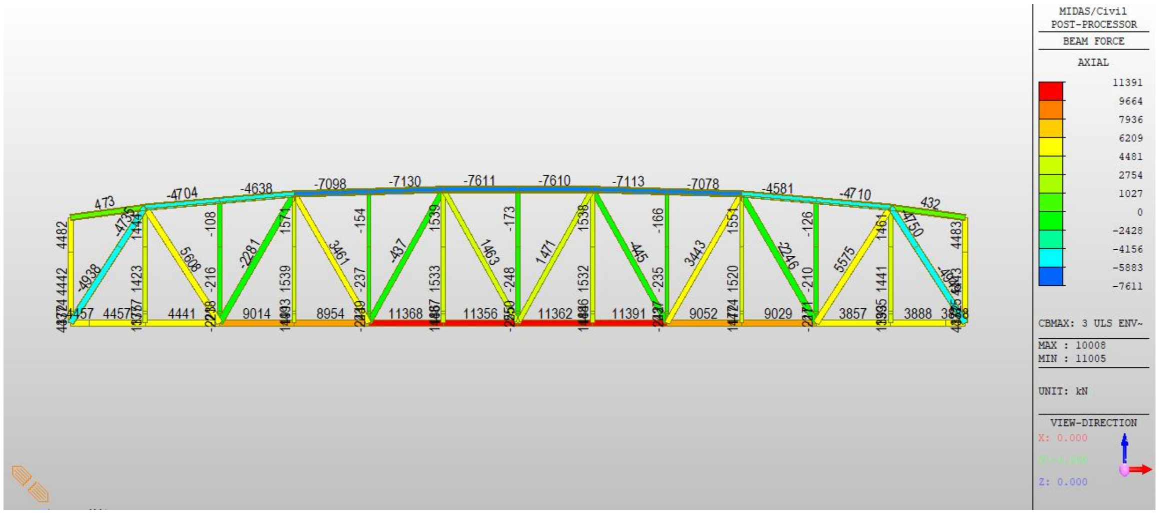

Figure 51 Railway Truss Case 3 ULS Axial Max

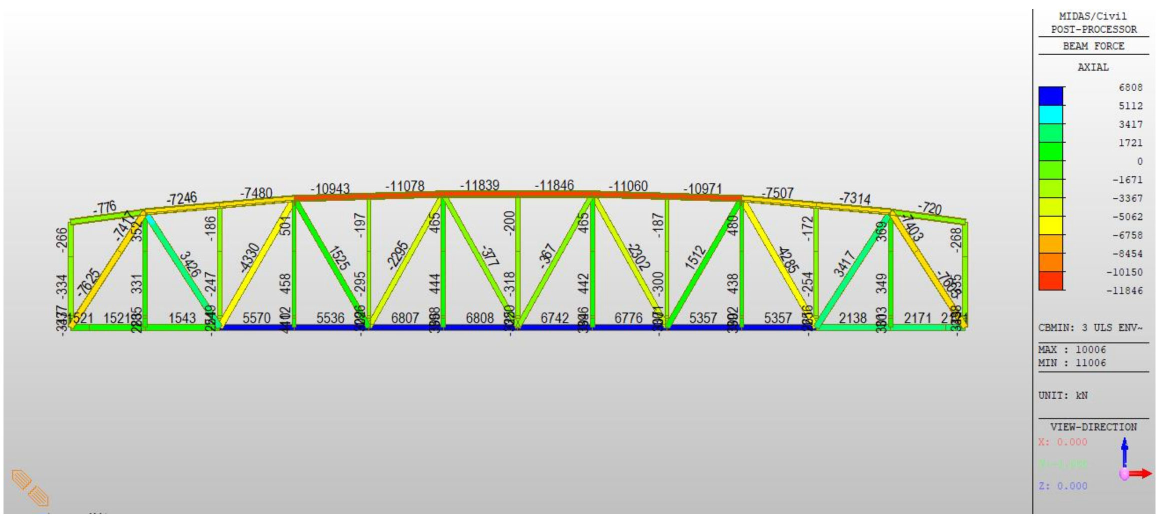

Figure 52 Railway Truss Case 3 ULS Axial Min

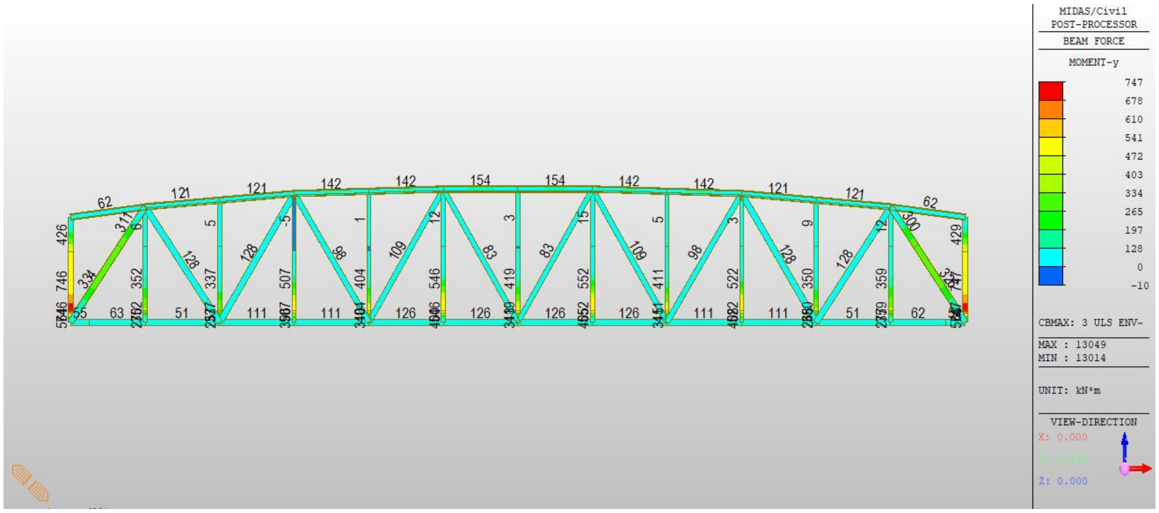

Figure 53 Railway Truss Case 3 ULS M_y Max

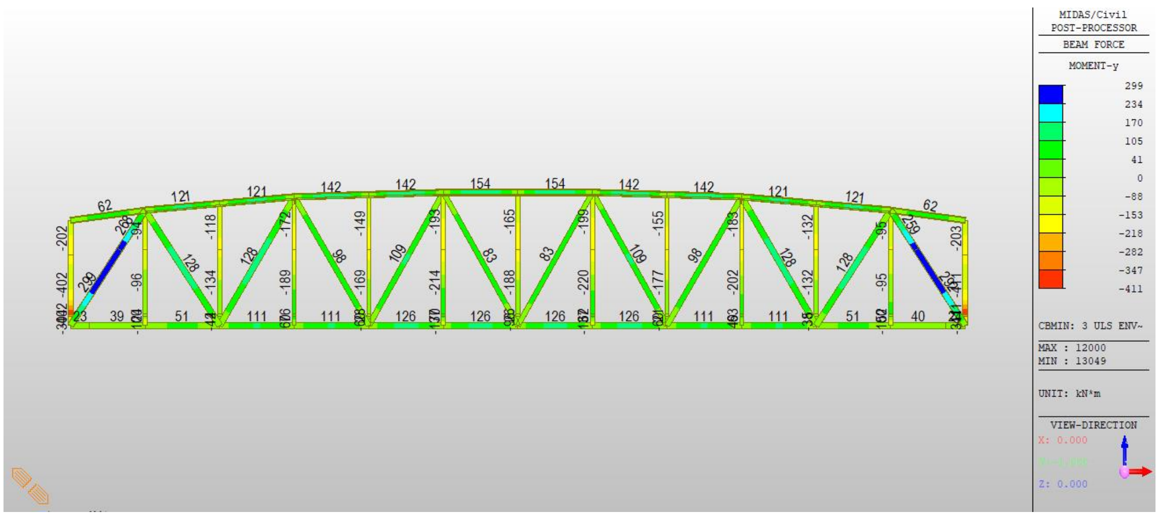

Figure 54 Railway Truss Case 3 ULS M_y Min

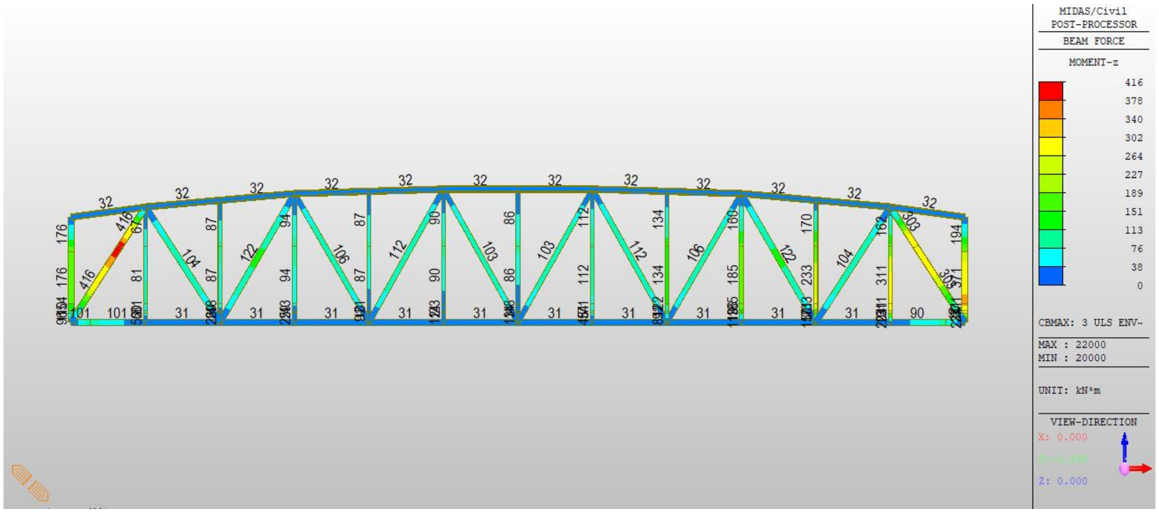

Figure 55 Railway Truss Case 3 ULS M_z Max

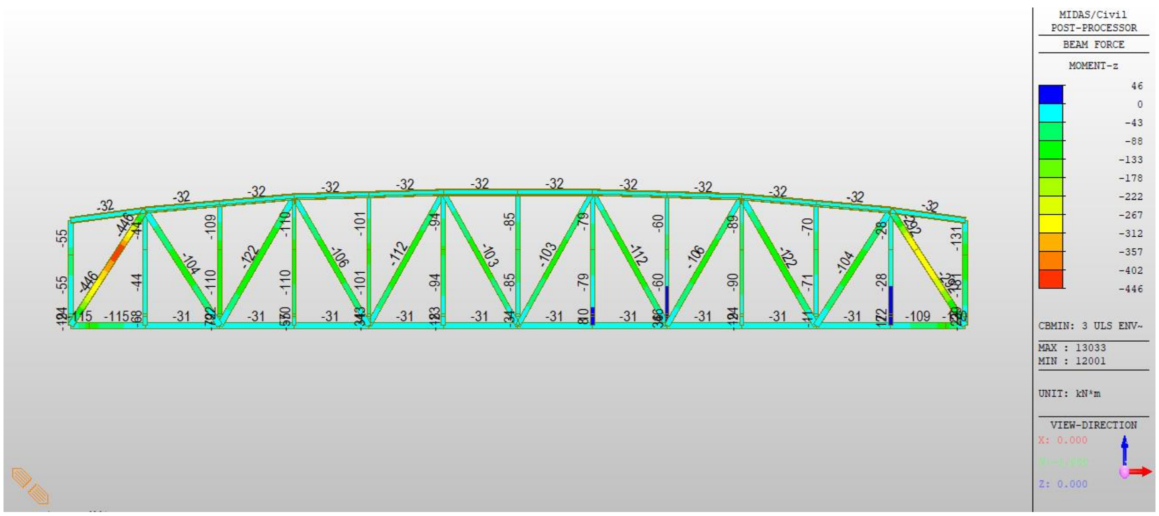

Figure 56 Railway Truss Case 3 ULS M_z Min

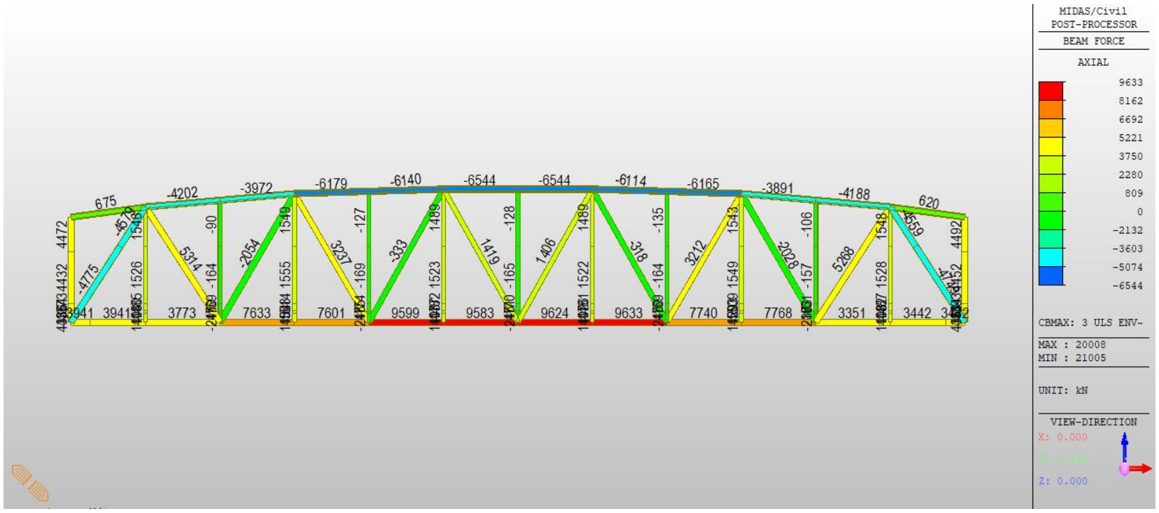

Figure 57 Highway Truss Case 3 ULS Axial Max

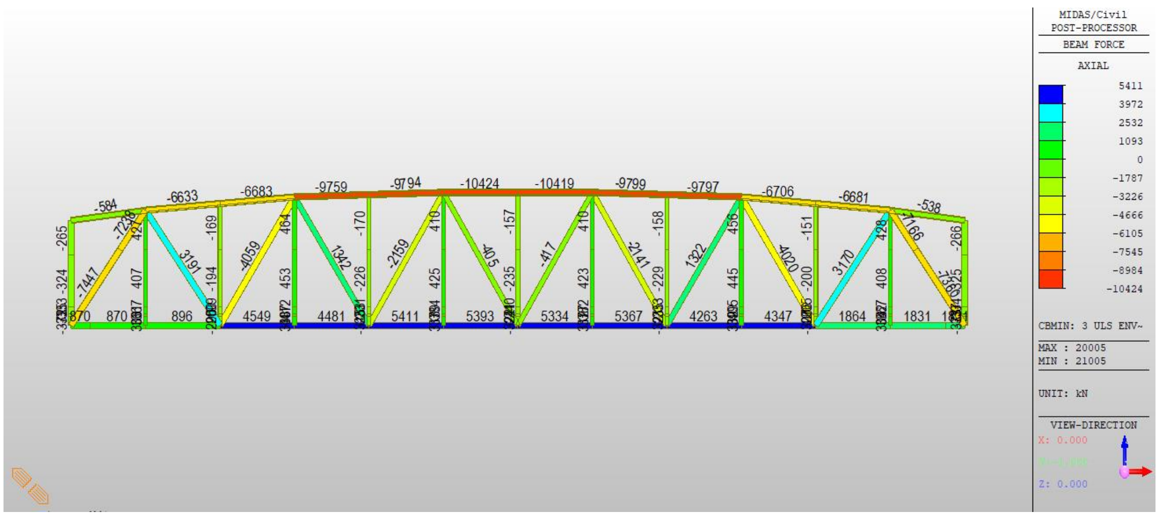

Figure 58 Highway Truss Case 3 ULS Axial Min

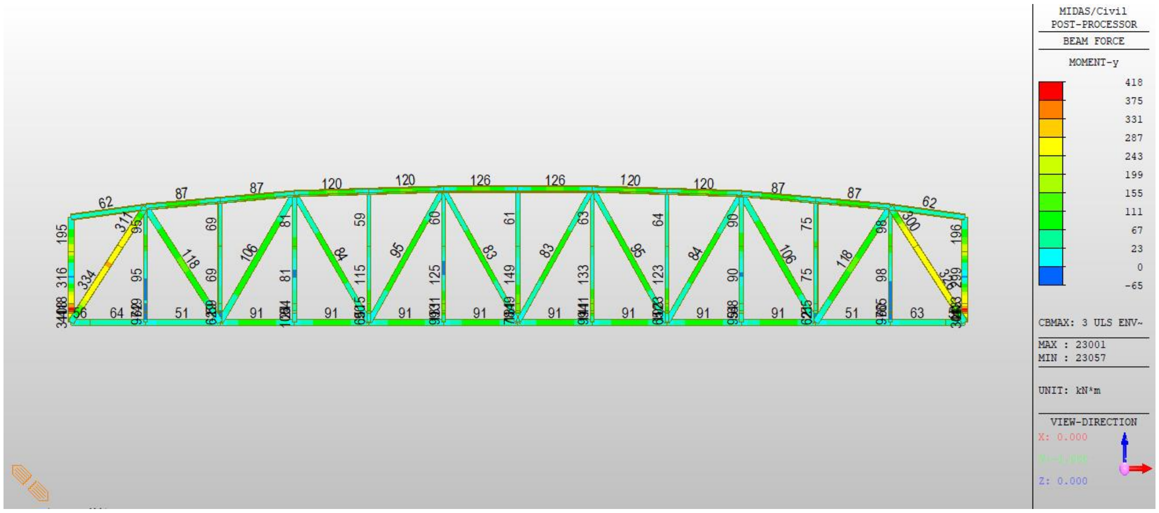

Figure 59 Highway Truss Case 3 ULS M_y Max

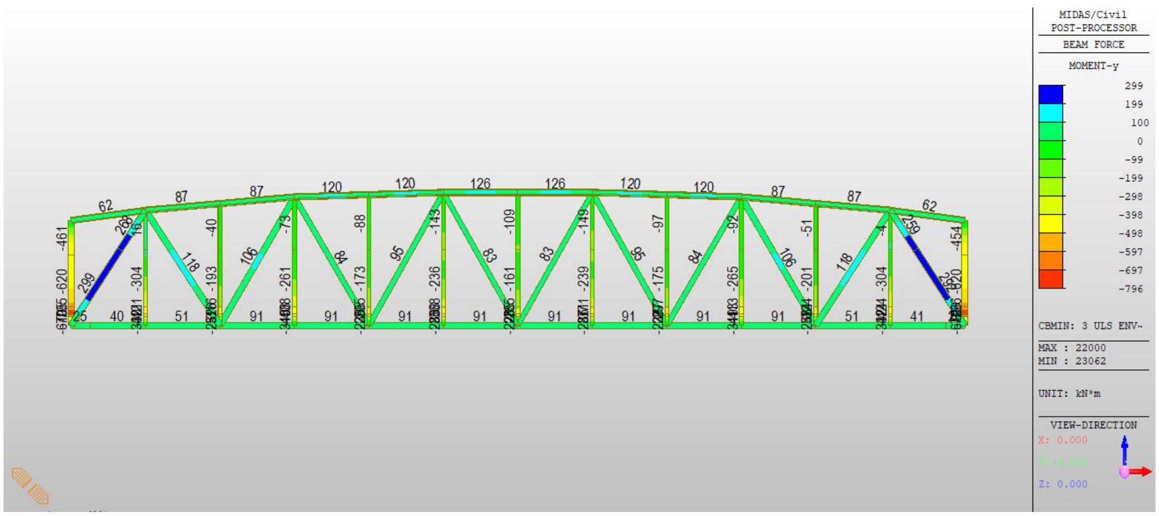

Figure 60 Highway Truss Case 3 ULS M_y Min

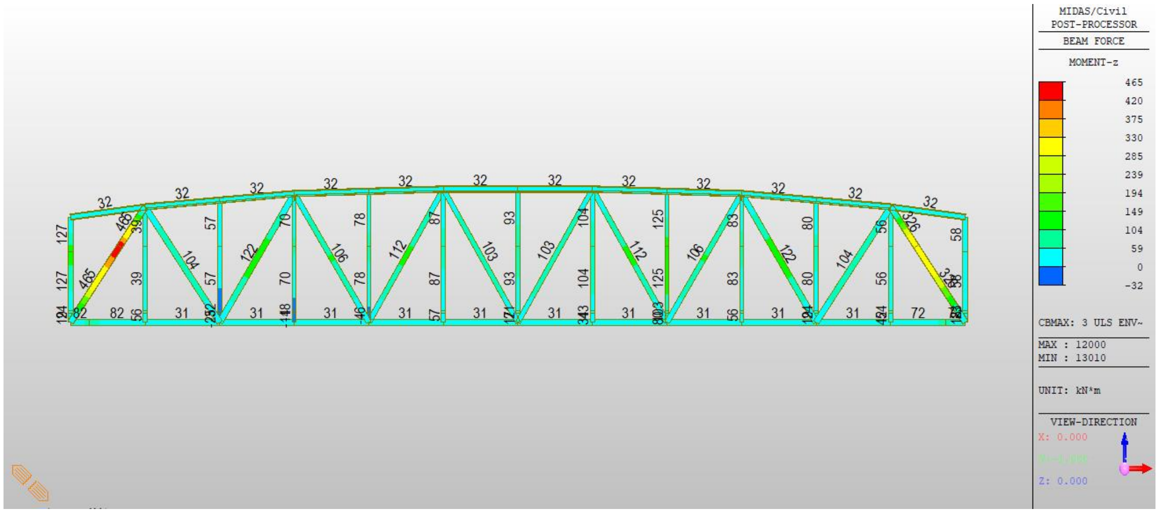

Figure 61 Highway Truss Case 3 ULS M_z Max

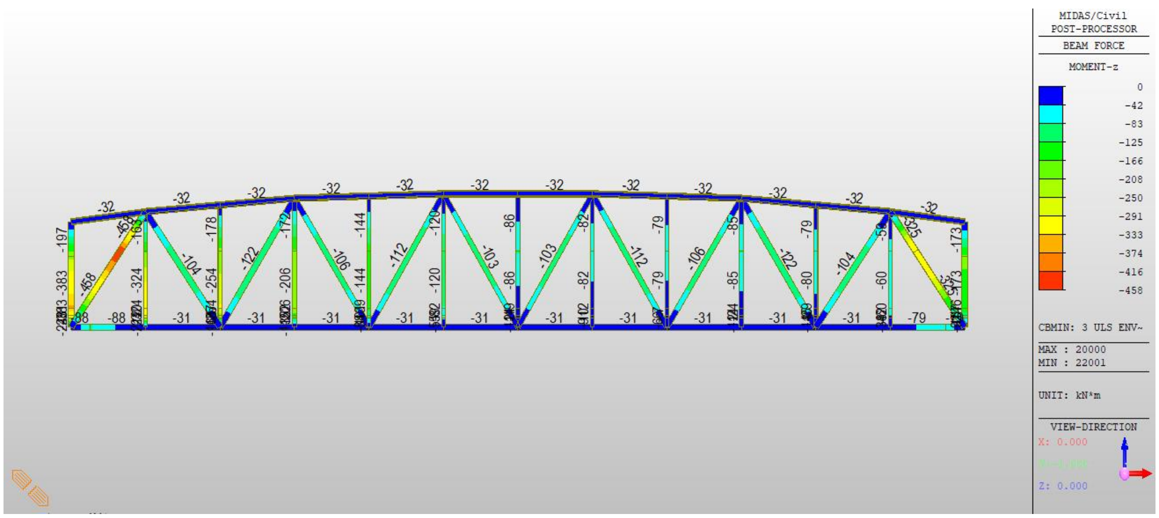

Figure 62 Highway Truss Case 3 ULS M_z Min

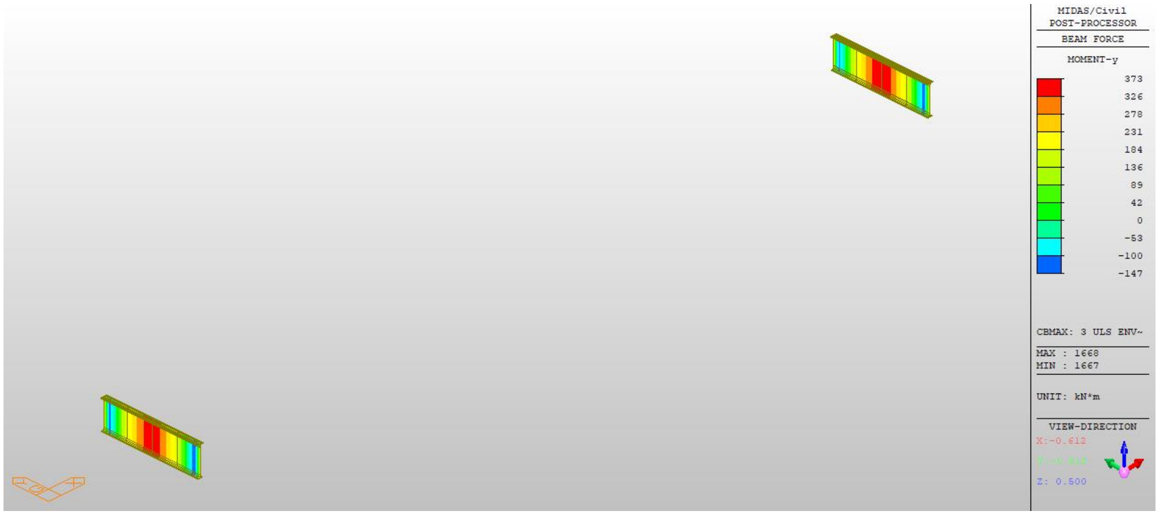

Figure 63 Lift Girder 3 ULS M_y Max

Figure 64 Lift Girder Case 3 ULS M_y Min

Figure 65 Lift Girder Case 3 ULS F_z Max

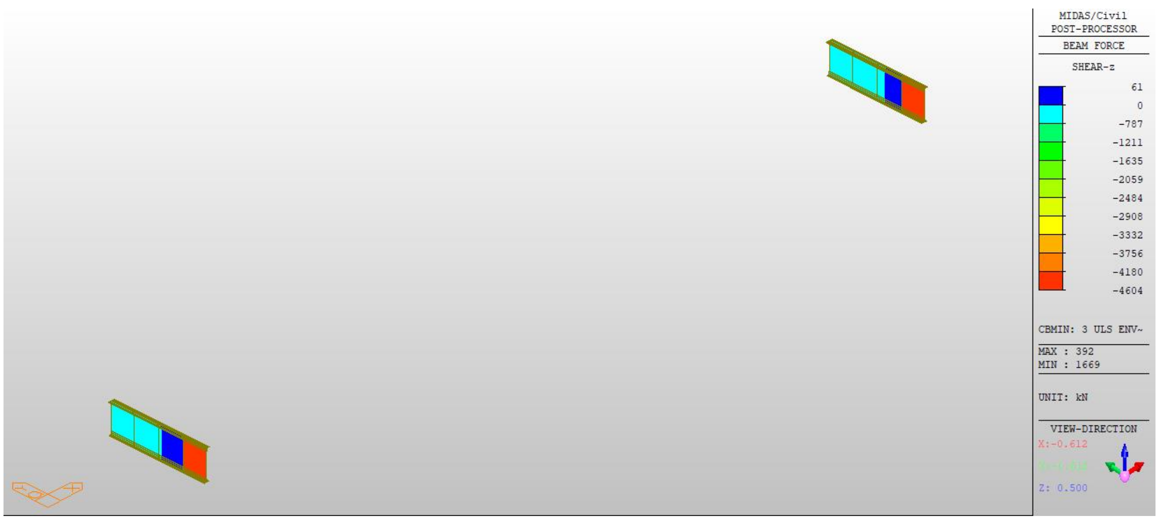

Figure 66 Lift Girder Case 3 ULS F_z Min

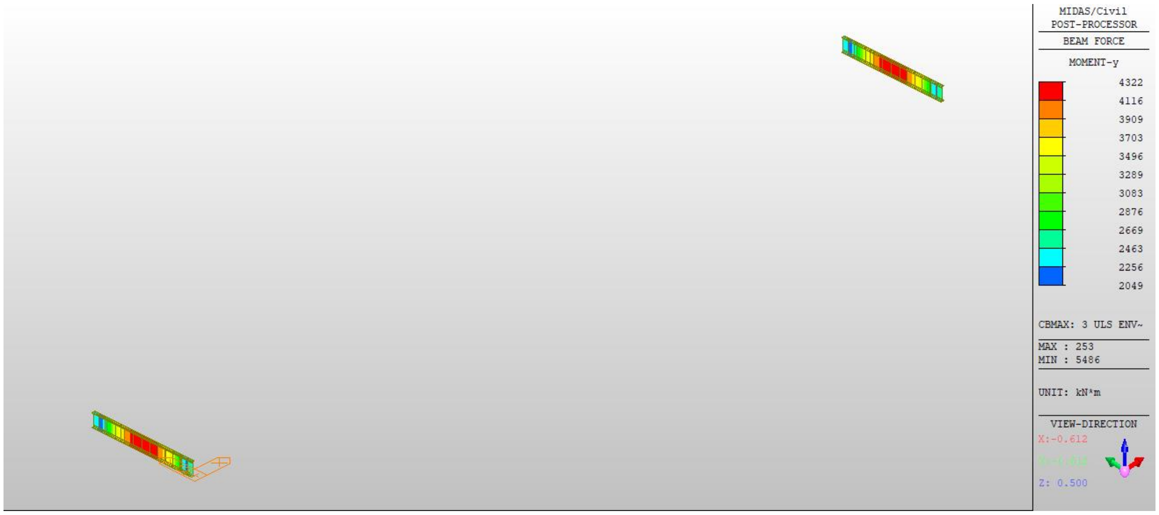

Figure 67 End Floor Beam Case 3 ULS M_y Max

Figure 68 End Floor Beam Case 3 ULS M_y Min

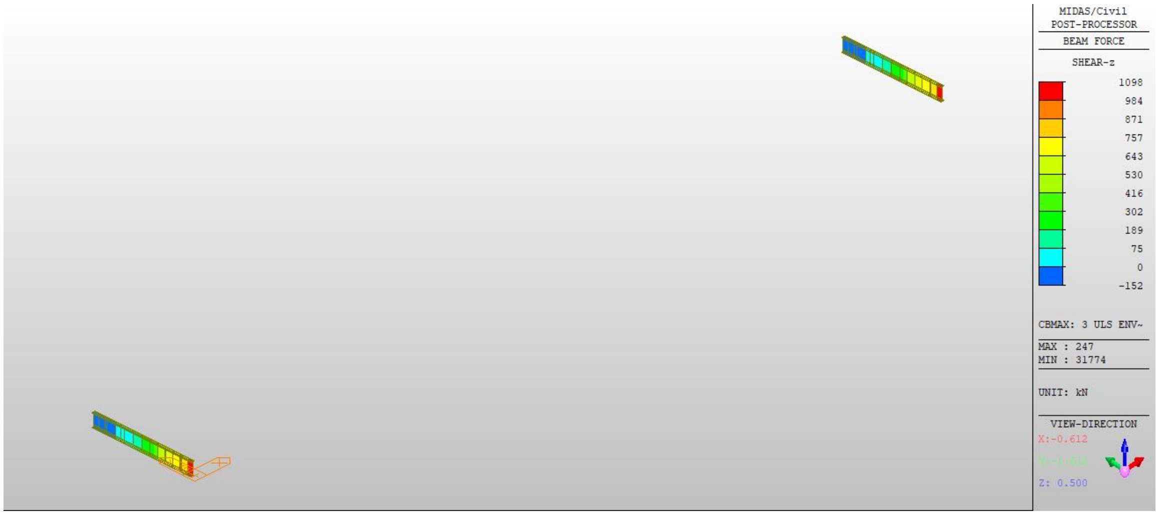

Figure 69 End Floor Beam Case 3 ULS F_z Max

Figure 70 End Floor Beam Case 3 ULS F_z Min

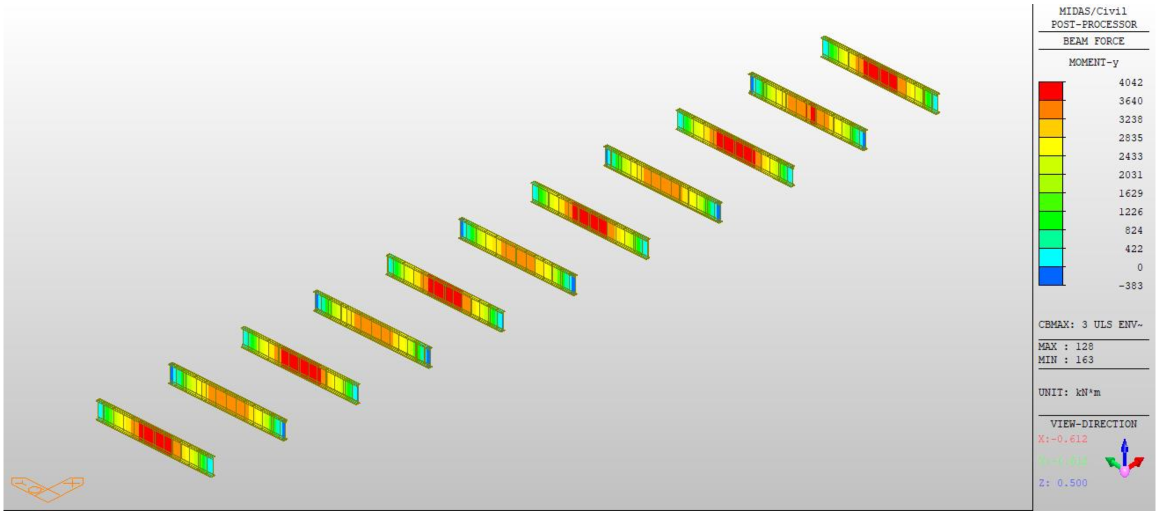

Figure 71 Interior Floor Beam Case 3 ULS M_y Max

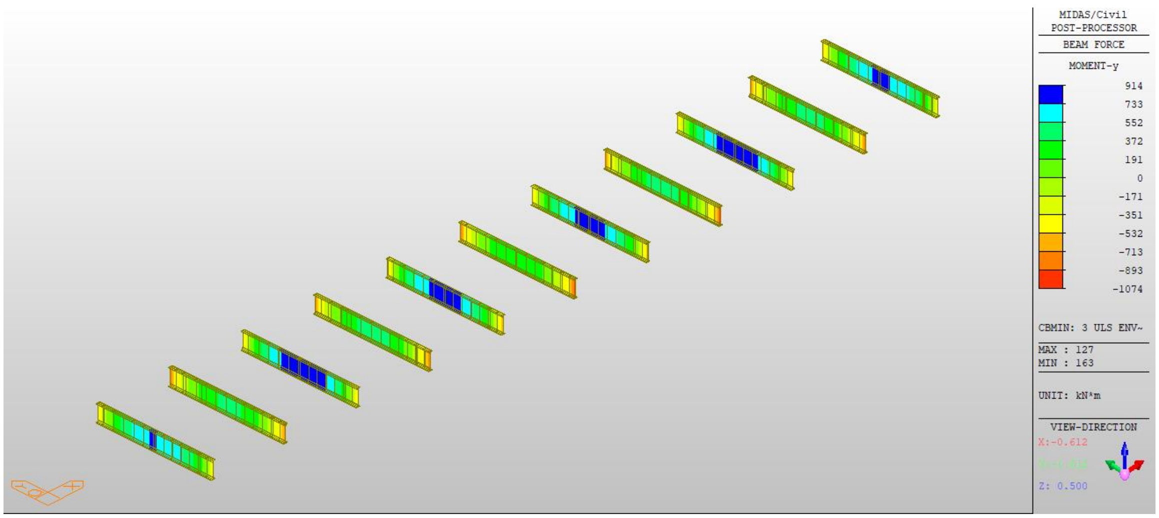

Figure 72 Interior Floor Beam Case 3 ULS M_y Min

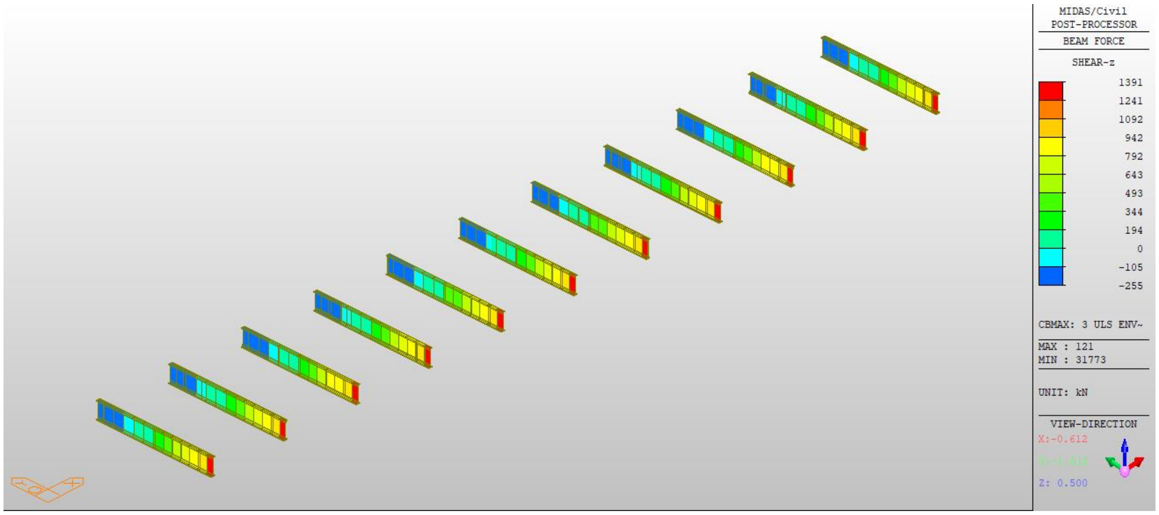

Figure 73 Interior Floor Beam Case 3 ULS F_z Max

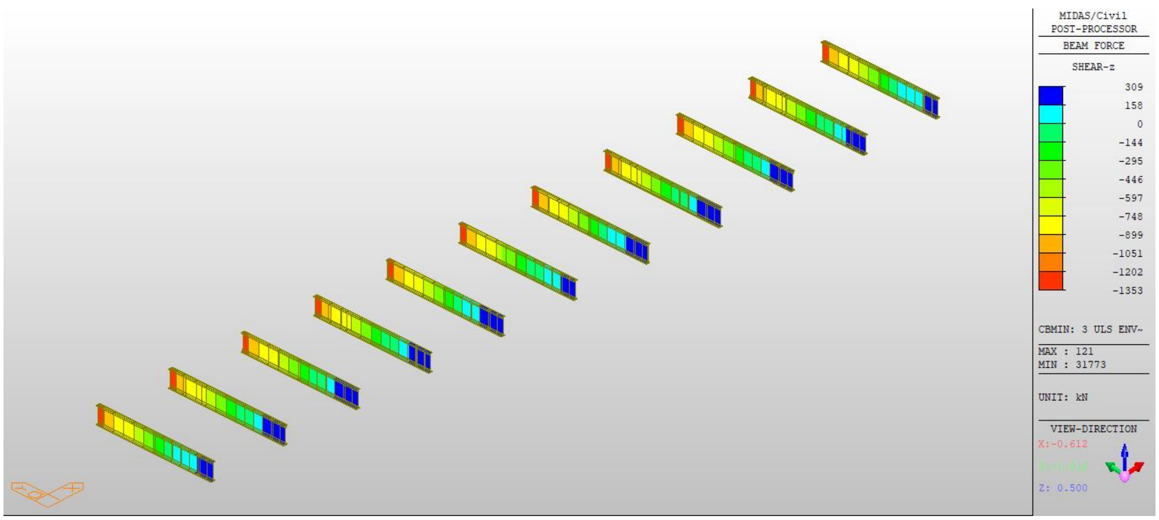

Figure 74 Interior Floor Beam Case 3 ULS F_z Min

Exhibit C.1.4. Rehabilitation Case 4 Evaluation

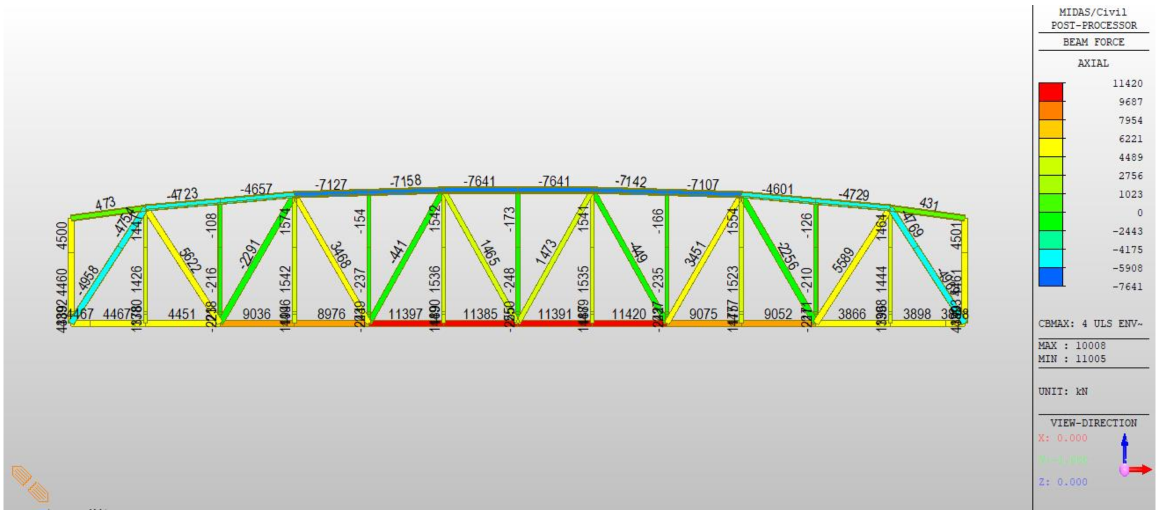

Figure 75 Railway Truss Case 4 ULS Axial Max

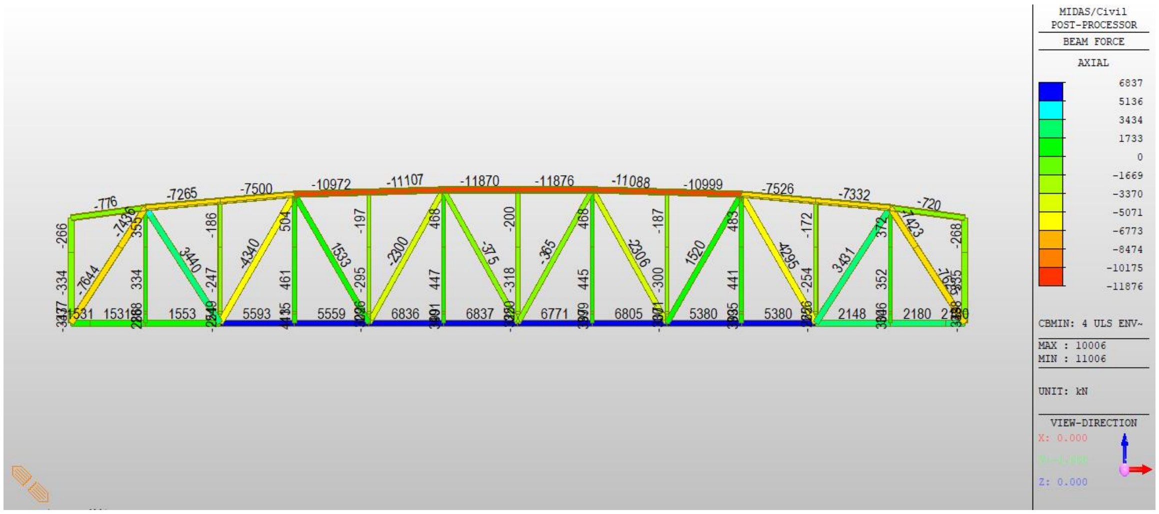

Figure 76 Railway Truss Case 4 ULS Axial Min

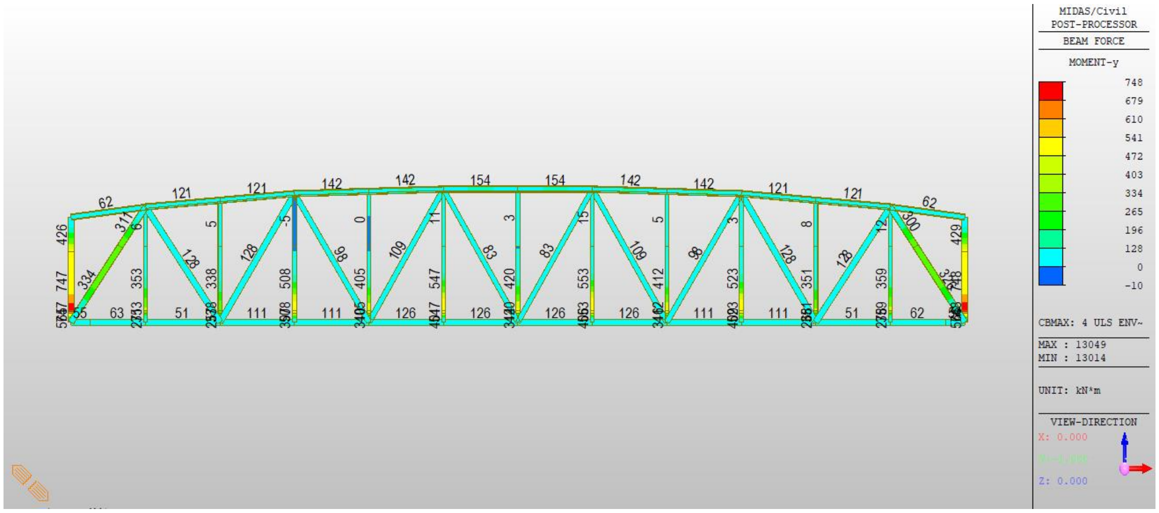

Figure 77 Railway Truss Case 4 ULS M_y Max

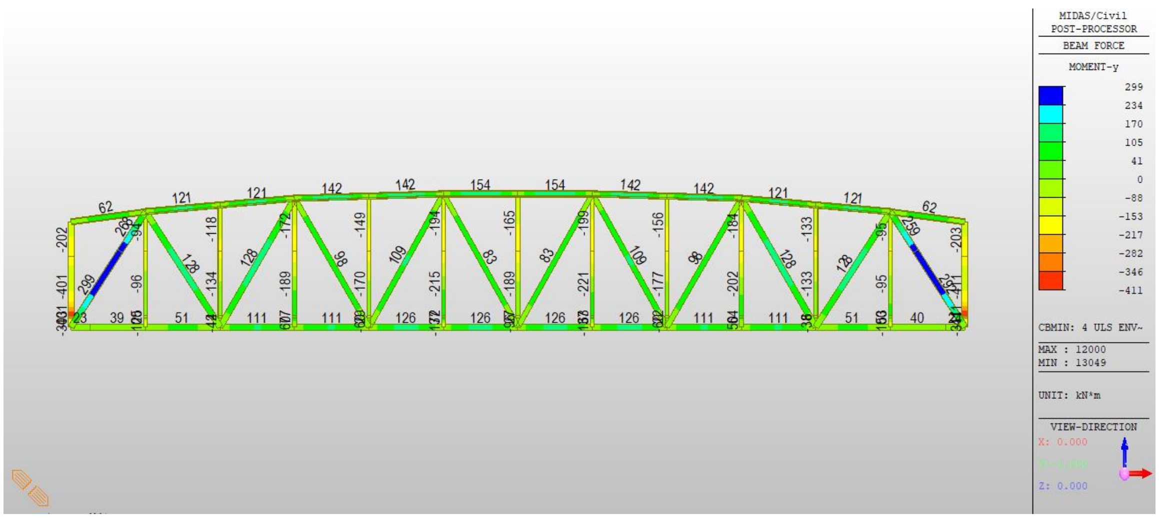

Figure 78 Railway Truss Case 4 ULS M_y Min

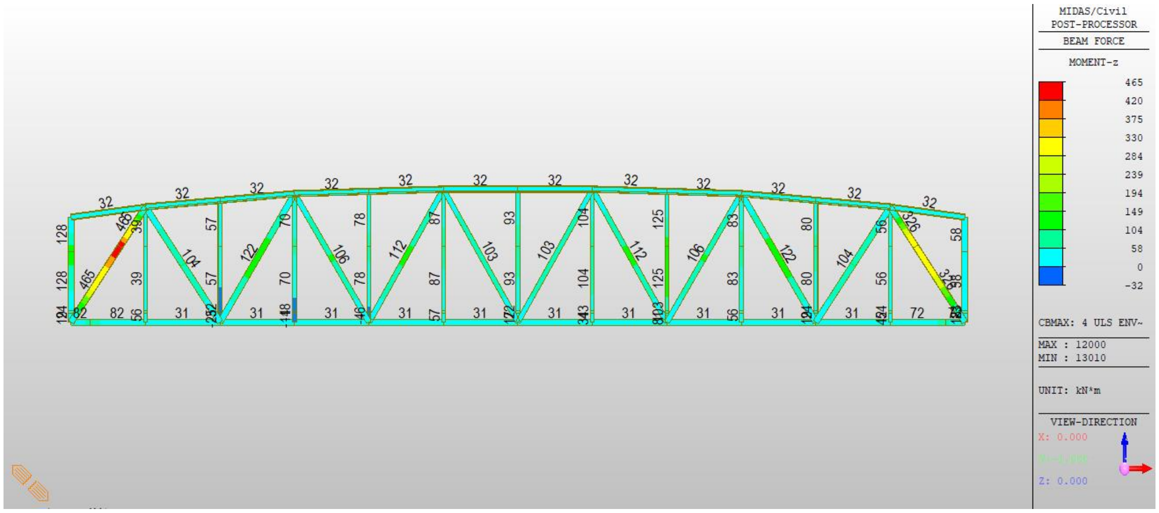

Figure 79 Railway Truss Case 4 ULS M_z Max

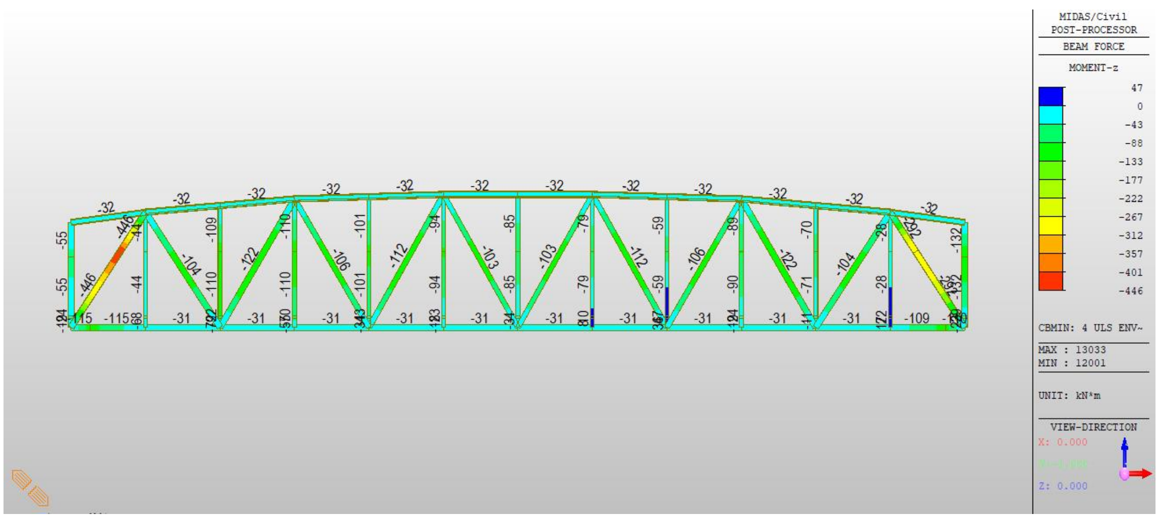

Figure 80 Railway Truss Case 4 ULS M_z Min

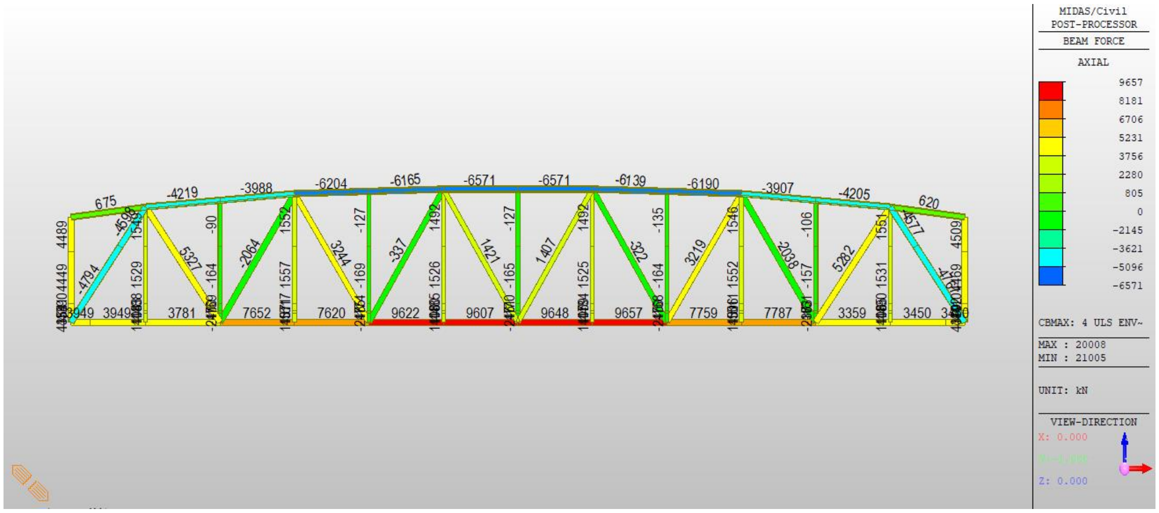

Figure 81 Highway Truss Case 4 ULS Axial Max

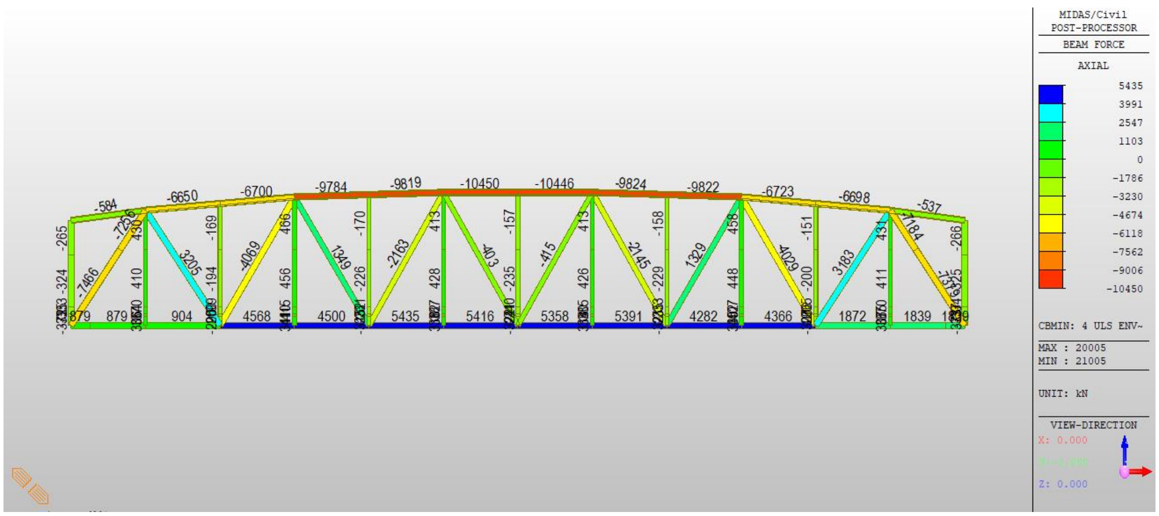

Figure 82 Highway Truss Case 4 ULS Axial Min

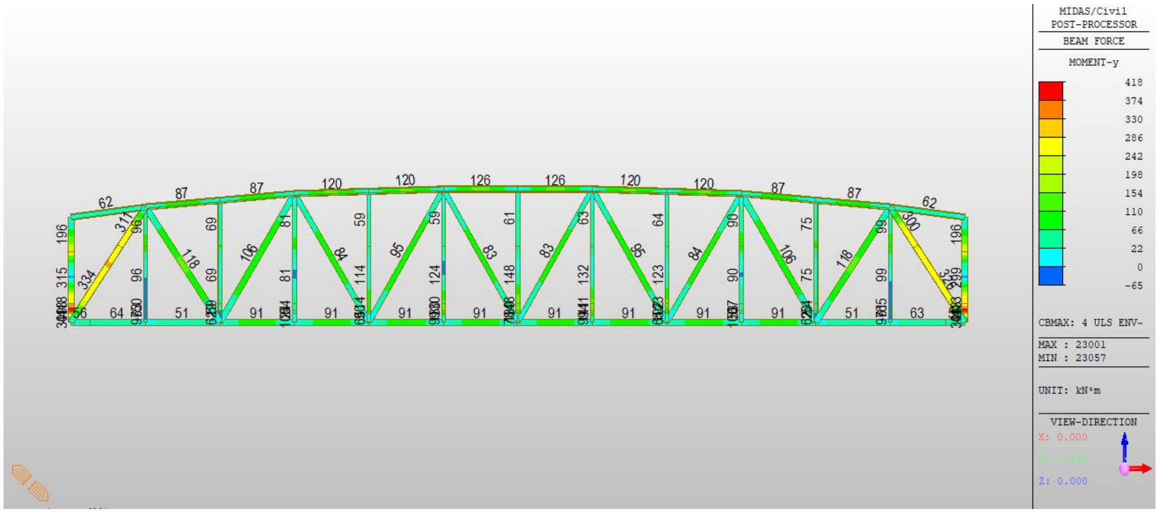

Figure 83 Highway Truss Case 4 ULS M_y Max

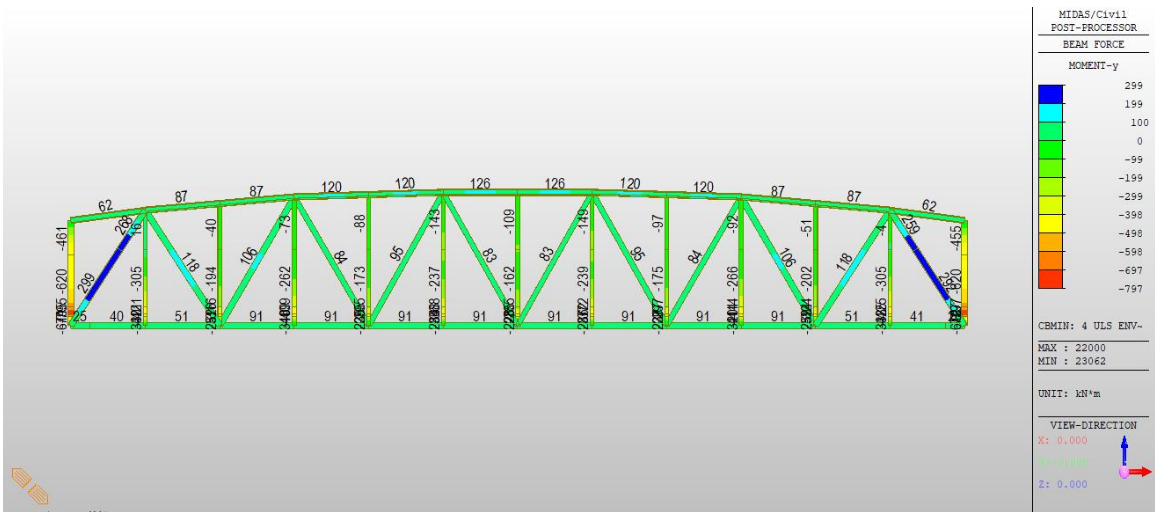

Figure 84 Highway Truss Case 4 ULS M_y Min

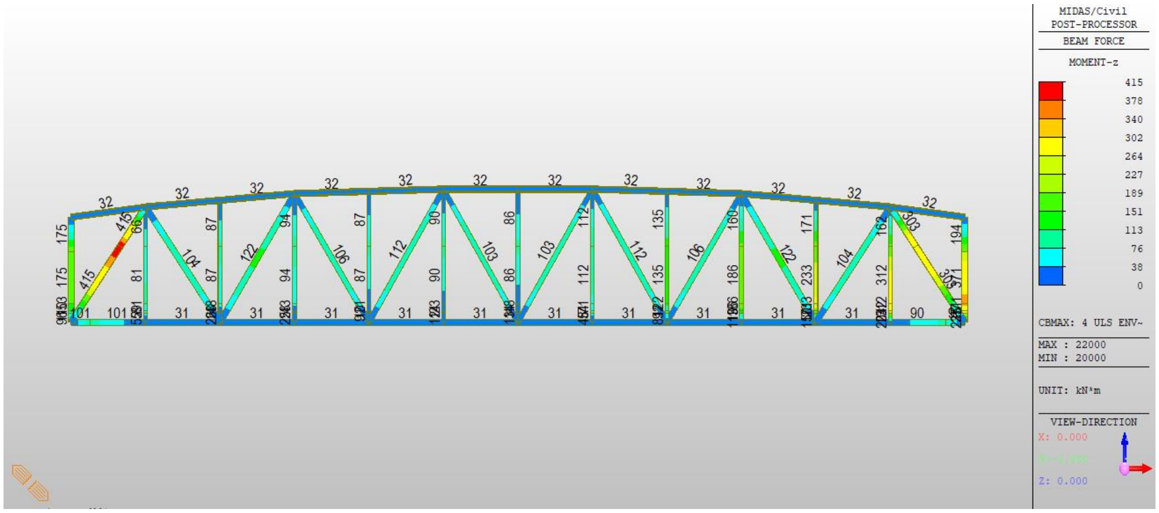

Figure 85 Highway Truss Case 4 ULS M_z Max

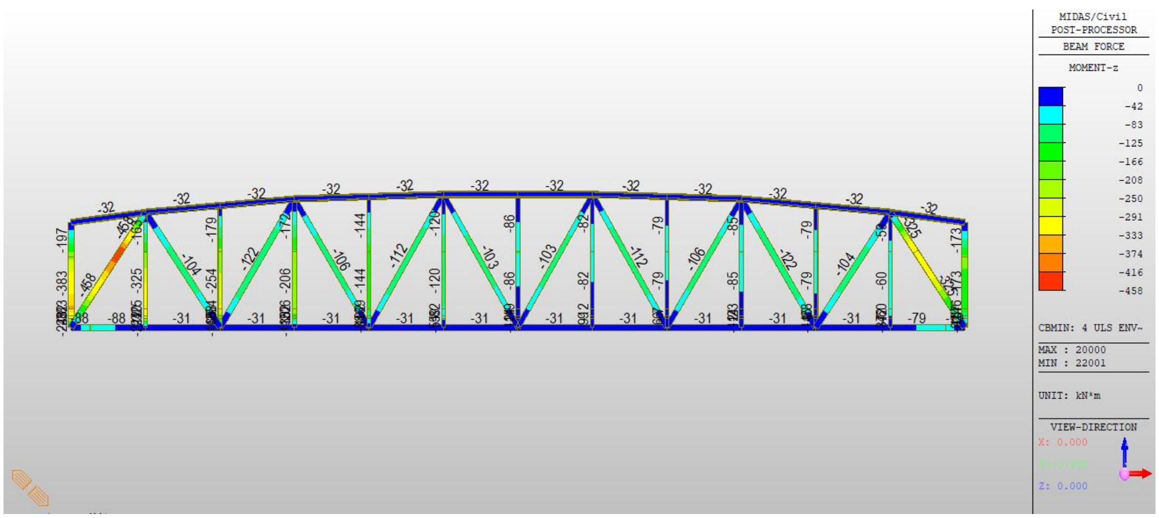

Figure 86 Highway Truss Case 4 ULS M_z Min

Figure 87 Lift Girder Case 4 ULS M_y Max

Figure 88 Lift Girder Case 4 ULS M_y Min

Figure 89 Lift Girder Case 4 ULS F_z Max

Figure 90 Lift Girder Case 4 ULS F_z Min

Figure 91 End Floor Beam Case 4 ULS M_y Max

Figure 92 End Floor Beam Case 4 ULS M_y Min

Figure 93 End Floor Beam Case 4 ULS F_z Max

Figure 94 End Floor Beam Case 4 ULS F_z Min

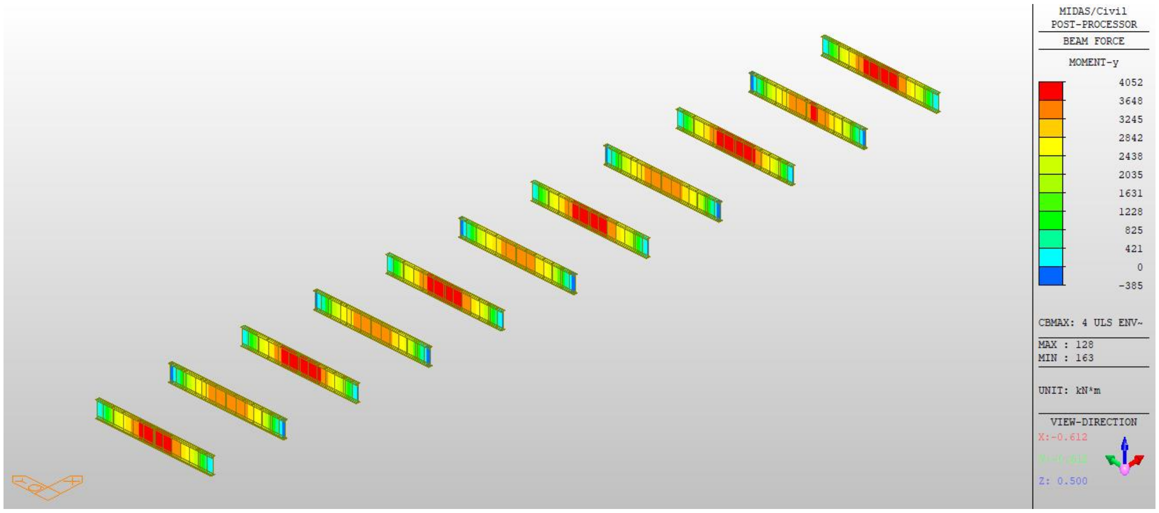

Figure 95 Interior Floor Beam Case 4 ULS M_y Max

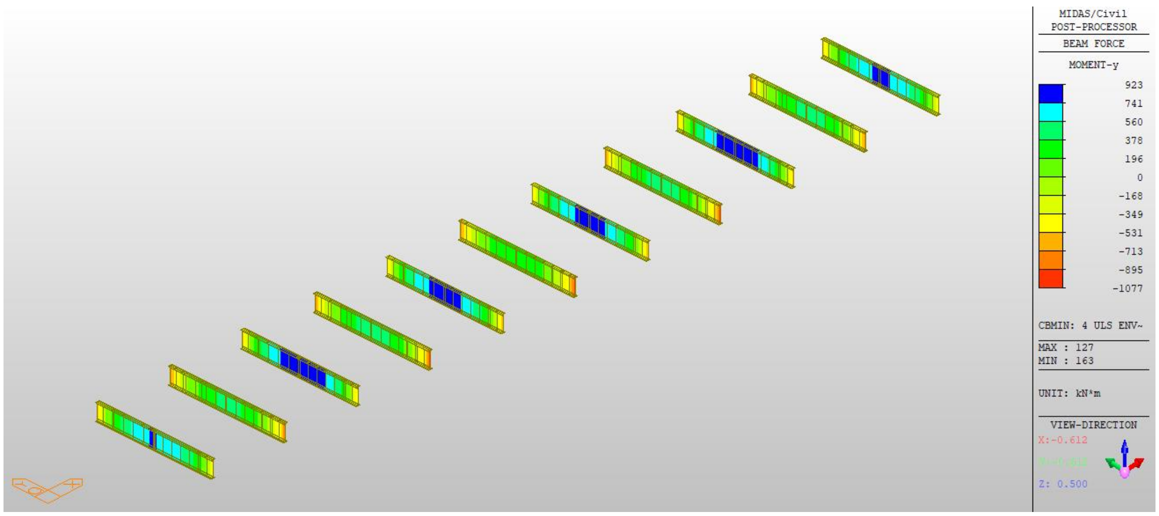

Figure 96 Interior Floor Beam Case 4 ULS M_y Min

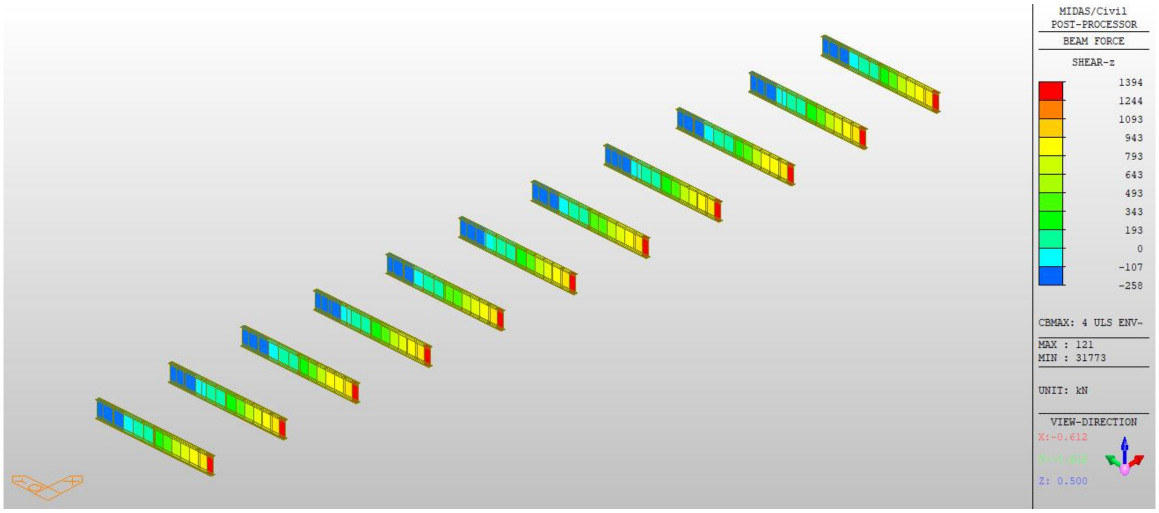

Figure 97 Interior Floor Beam Case 4 ULS F_z Max

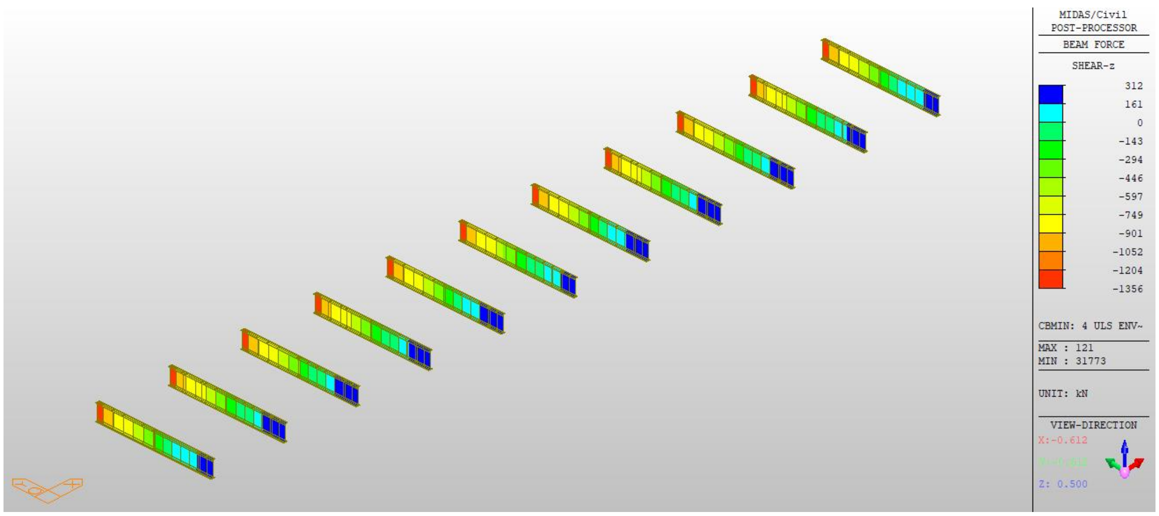

Figure 98 Interior Floor Beam Case 4 ULS F_z Min

Exhibit C.1.5. Rehabilitation Case 5 Evaluation

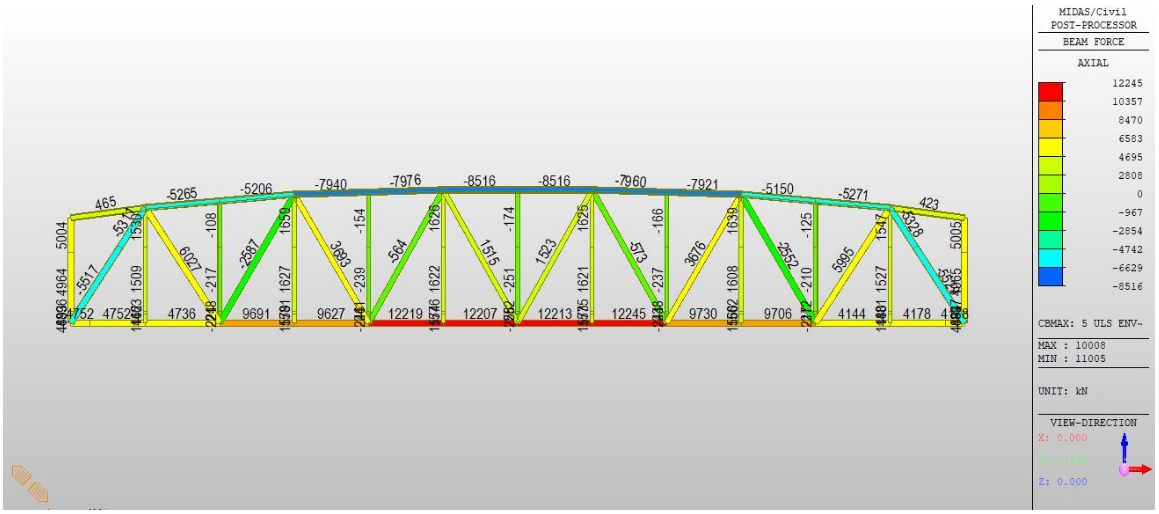

Figure 99 Railway Truss Case 5 ULS Axial Max

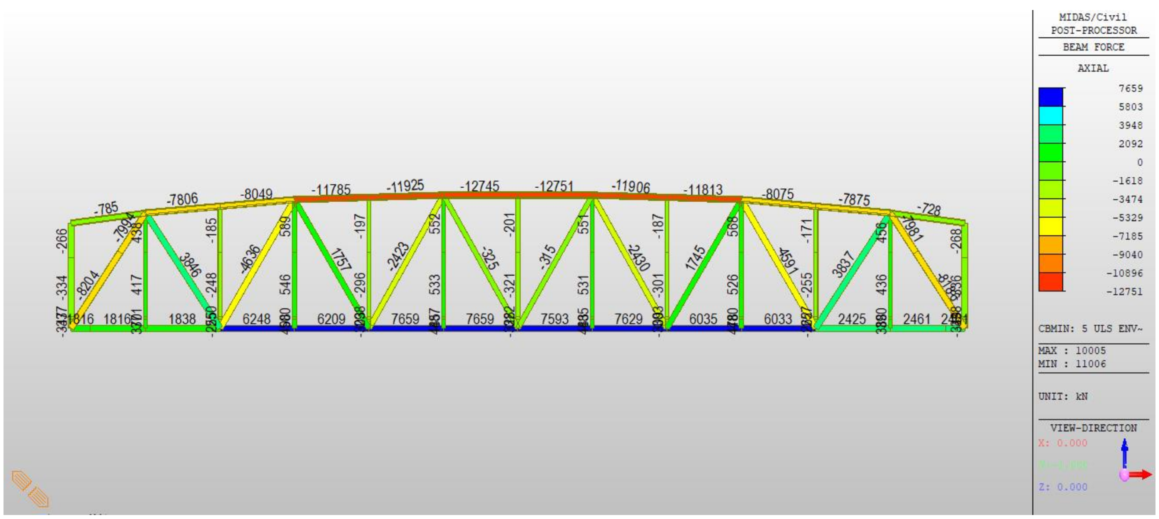

Figure 100 Railway Truss Case 5 ULS Axial Min

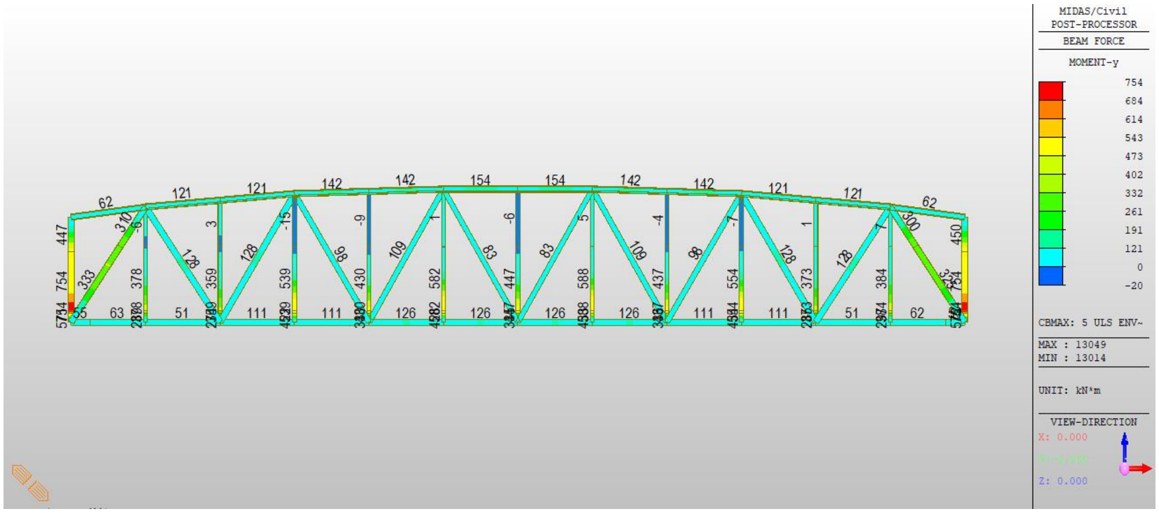

Figure 101 Railway Truss Case 5 ULS M_y Max

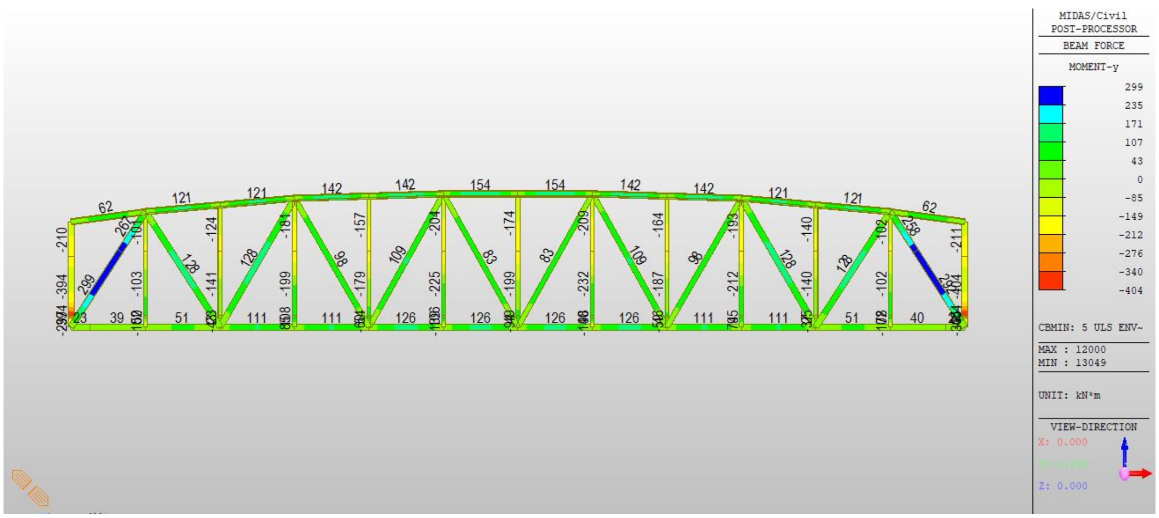

Figure 102 Railway Truss Case 5 ULS M_y Min

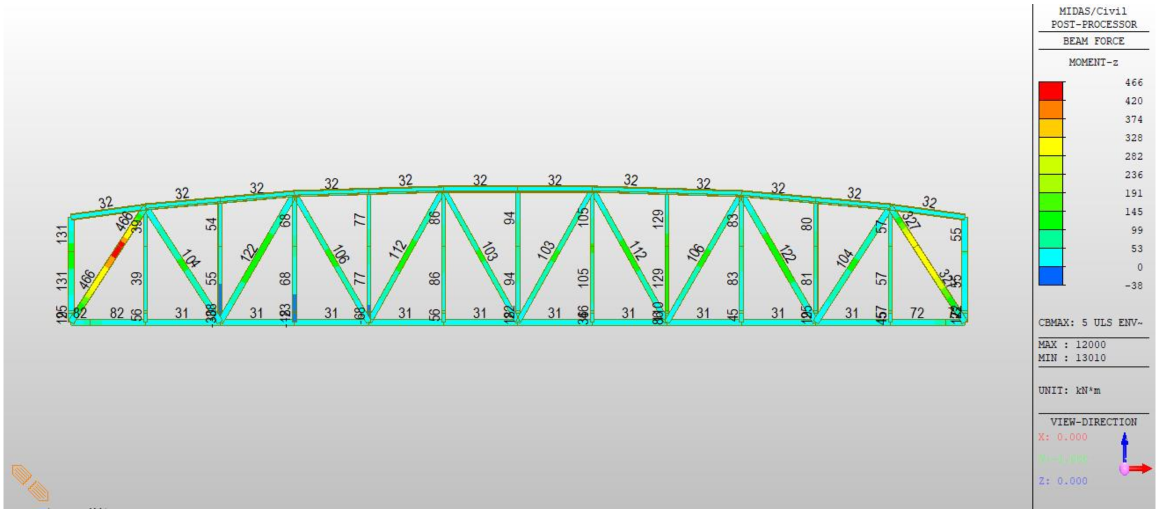

Figure 103 Railway Truss Case 5 ULS M_z Max

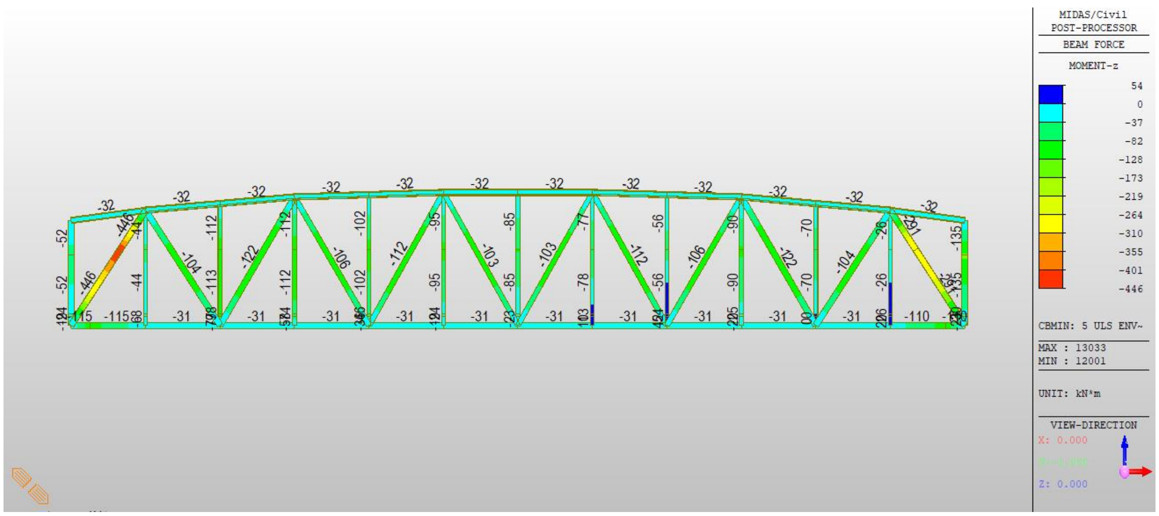

Figure 104 Railway Truss Case 5 ULS M_z Min

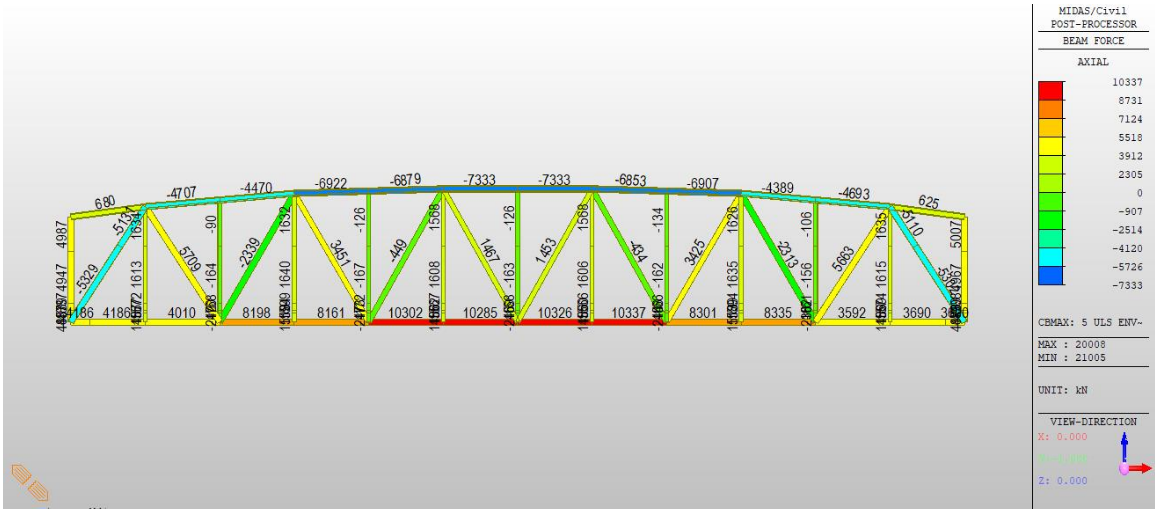

Figure 105 Highway Truss Case 5 ULS Axial Max

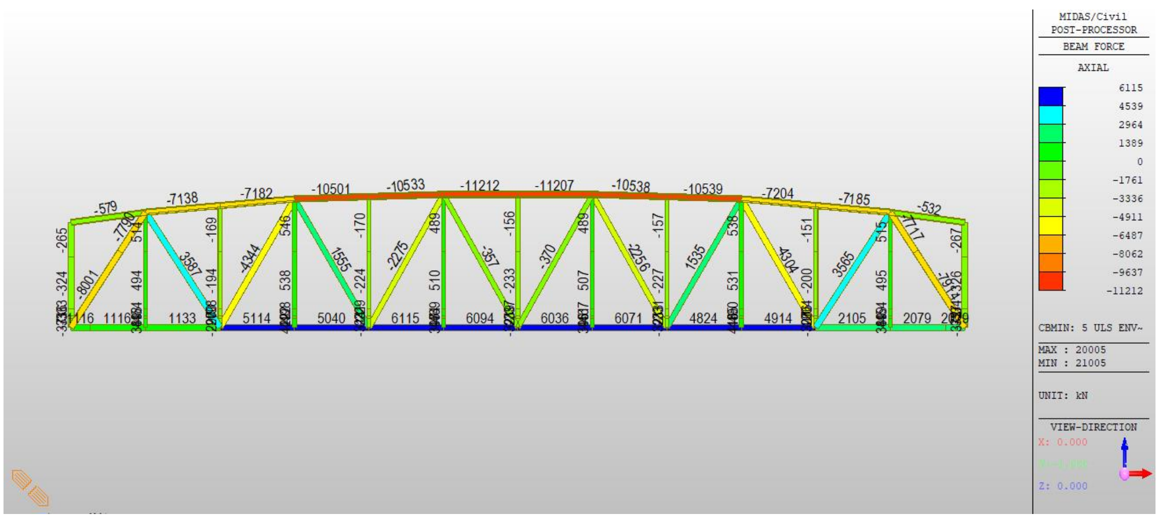

Figure 106 Highway Truss Case 5 ULS Axial Min

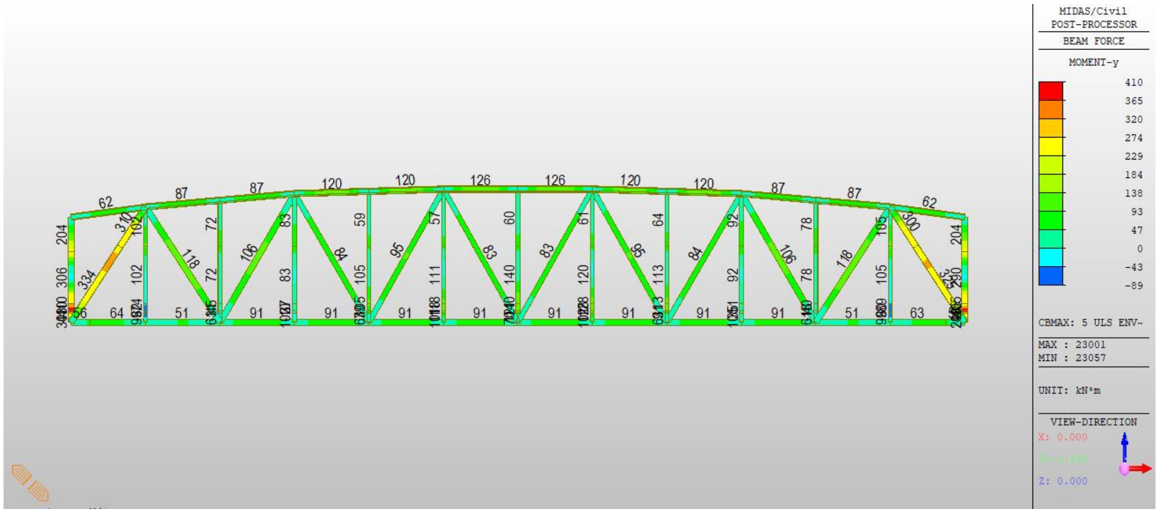

Figure 107 Highway Truss Case 5 ULS M_y Max

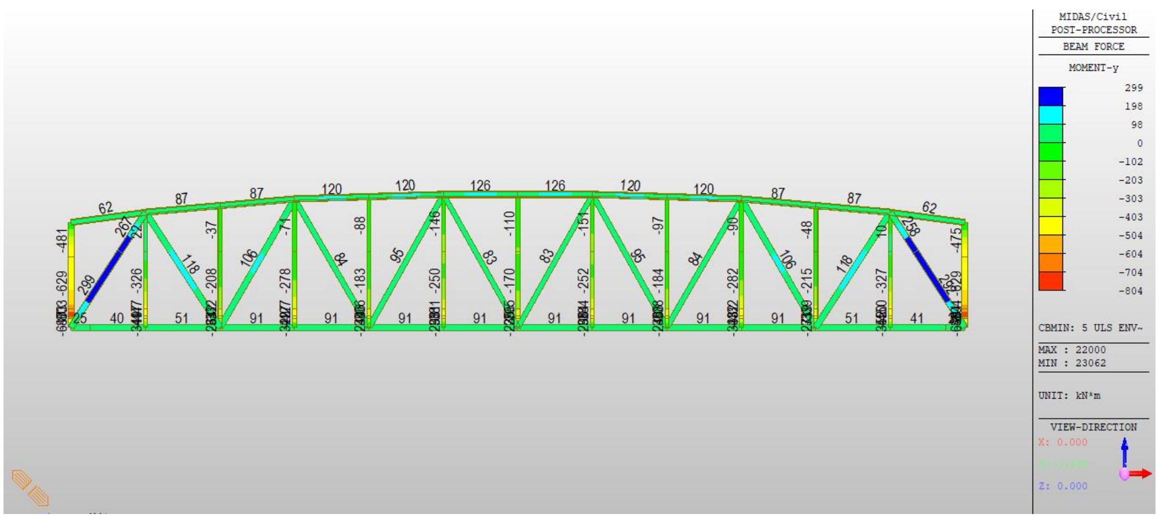

Figure 108 Highway Truss Case 5 ULS M_y Min

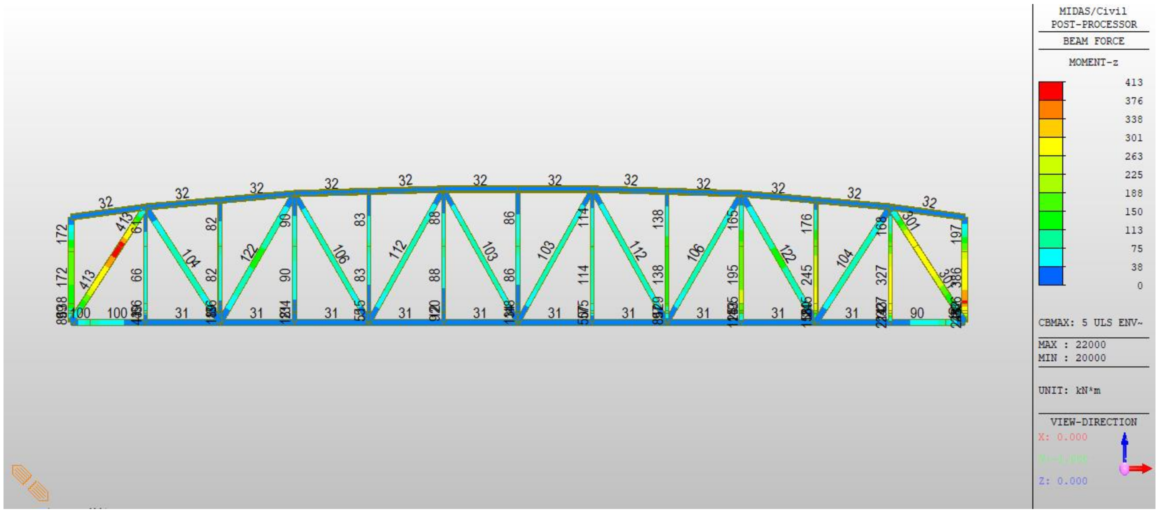

Figure 109 Highway Truss Case 5 ULS M_z Max

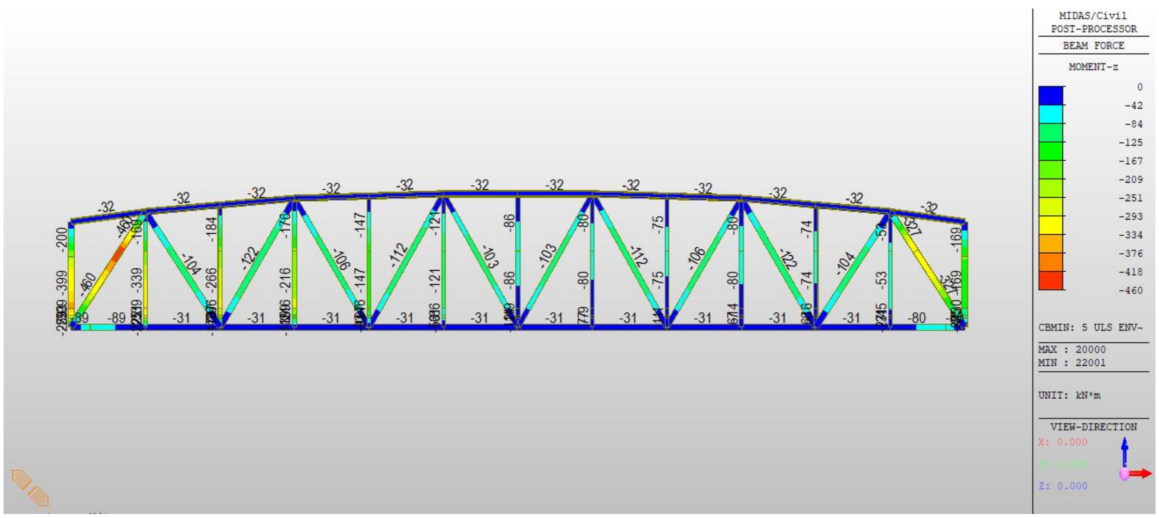

Figure 110 Highway Truss Case 5 ULS M_z Min

Figure 111 Lift Girder Case 5 ULS M_y Max

Figure 112 Lift Girder Case 5 ULS M_y Min

Figure 113 Lift Girder Case 5 ULS F_z Max

Figure 114 Lift Girder Case 5 ULS F_z Min

Figure 115 End Floor Beam Case 5 ULS M_y Max

Figure 116 End Floor Beam Case 5 ULS M_y Min

Figure 117 End Floor Beam Case 5 ULS F_z Max

Figure 118 End Floor Beam Case 5 ULS F_z Min

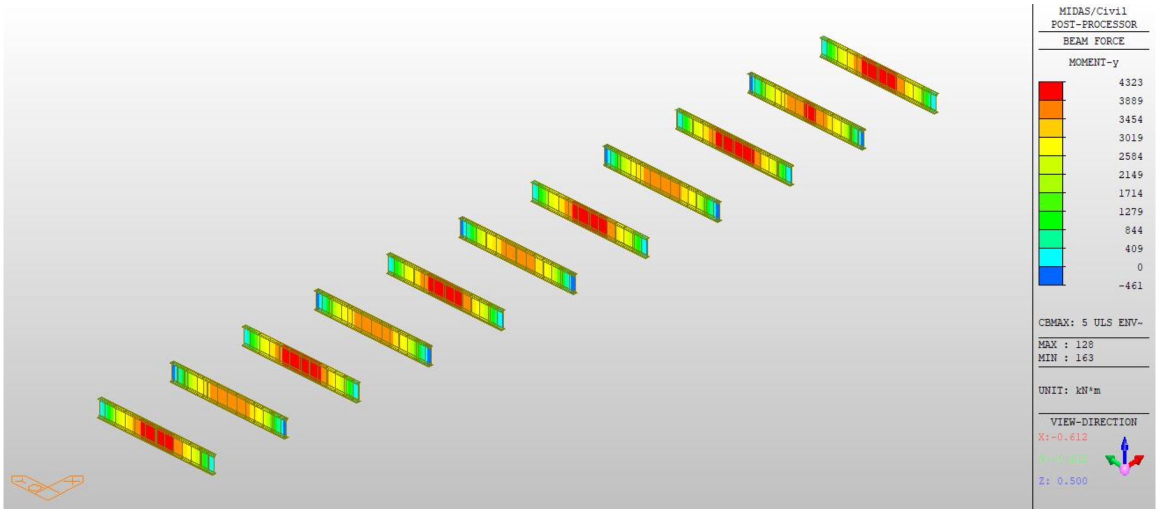

Figure 119 Interior Floor Beam Case 5 ULS M_y Max

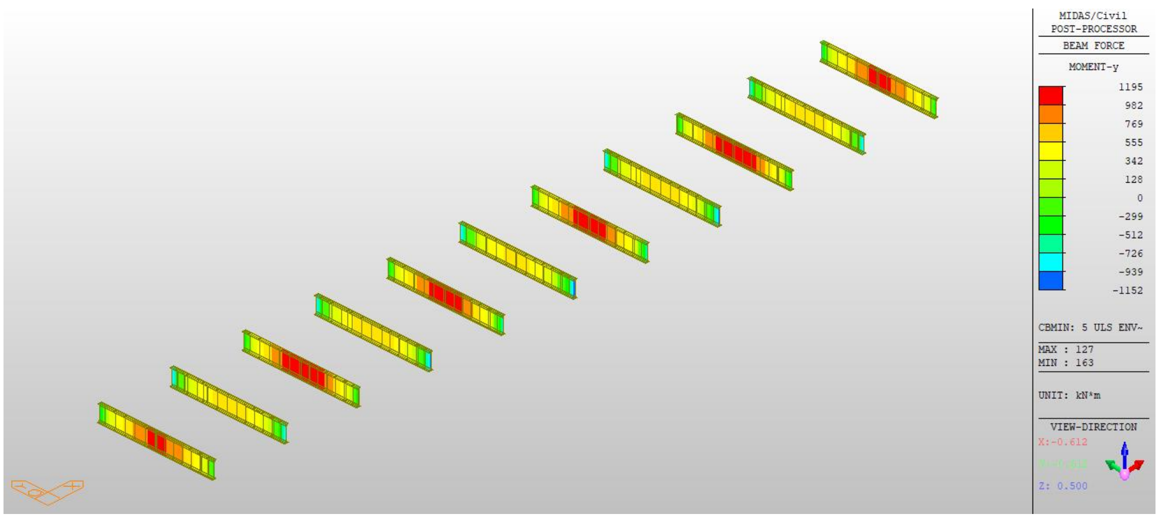

Figure 120 Interior Floor Beam Case 5 ULS M_y Min

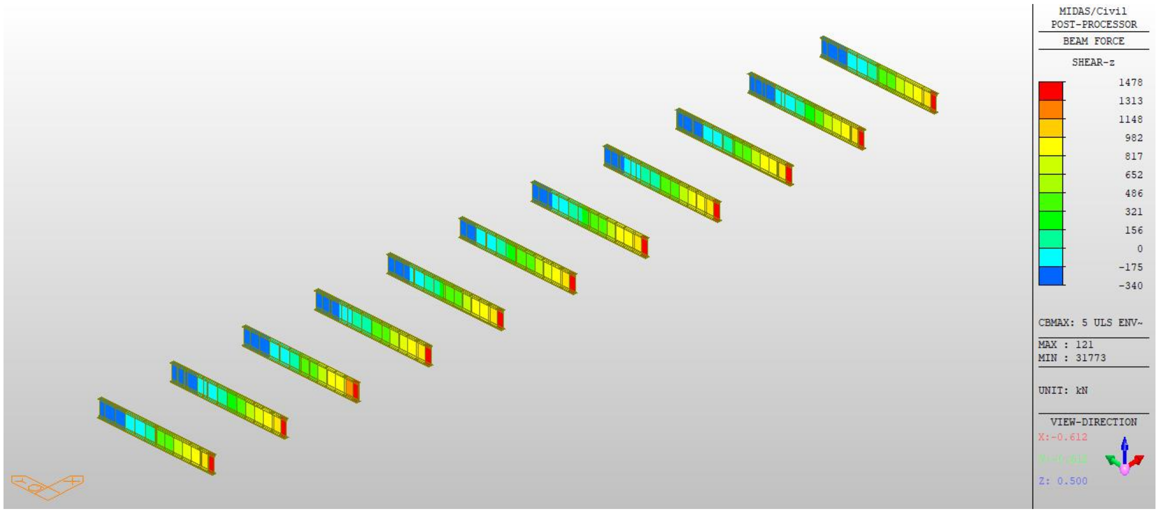

Figure 121 Interior Floor Beam Case 5 ULS F_z Max

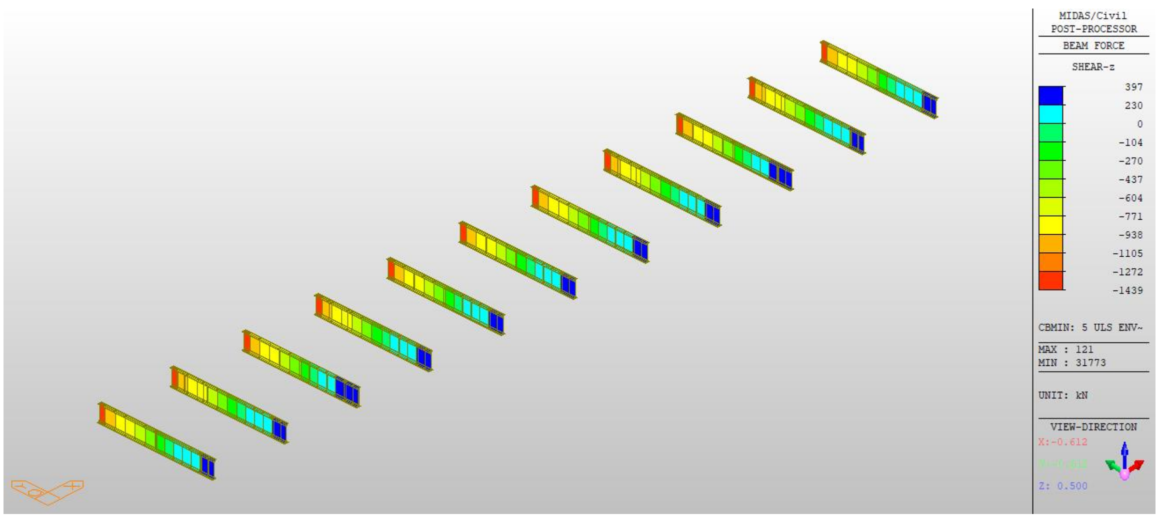

Figure 122 Interior Floor Beam Case 5 ULS F_z Min

Exhibit C.1.6. Rehabilitation Case 6 Evaluation

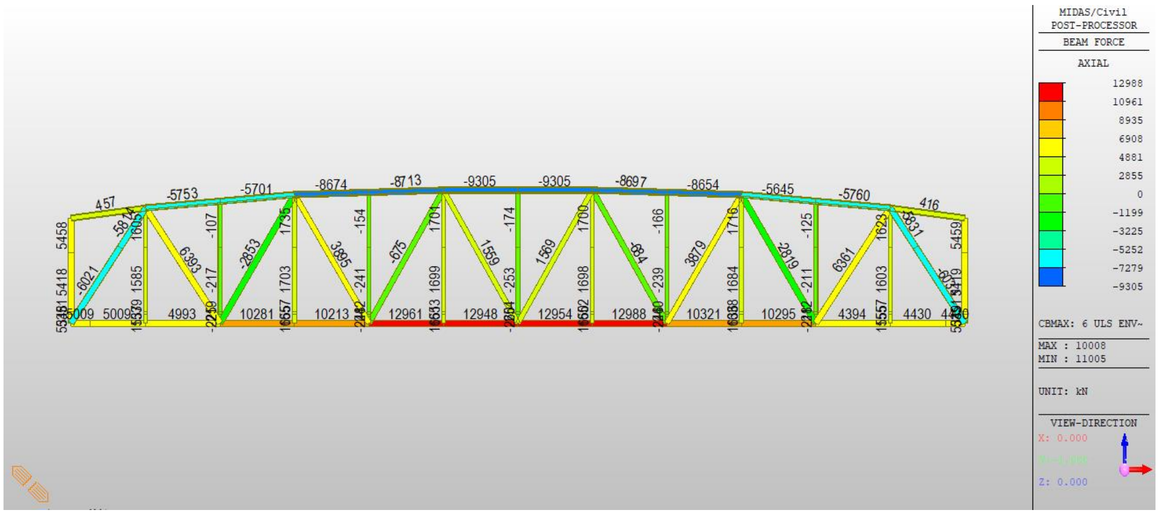

Figure 123 Railway Truss Case 6 ULS Axial Max

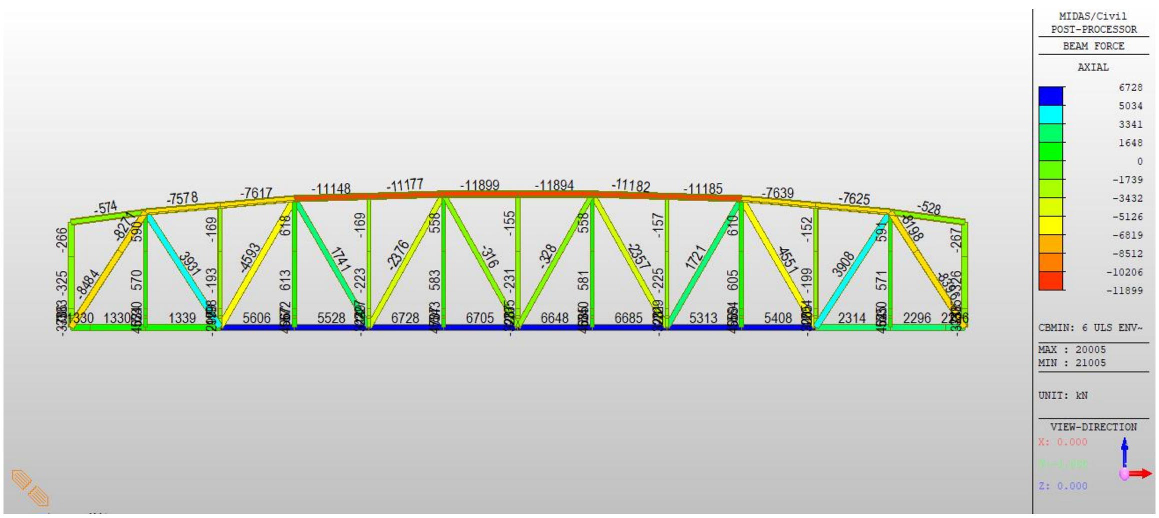

Figure 124 Railway Truss Case 6 ULS Axial Min

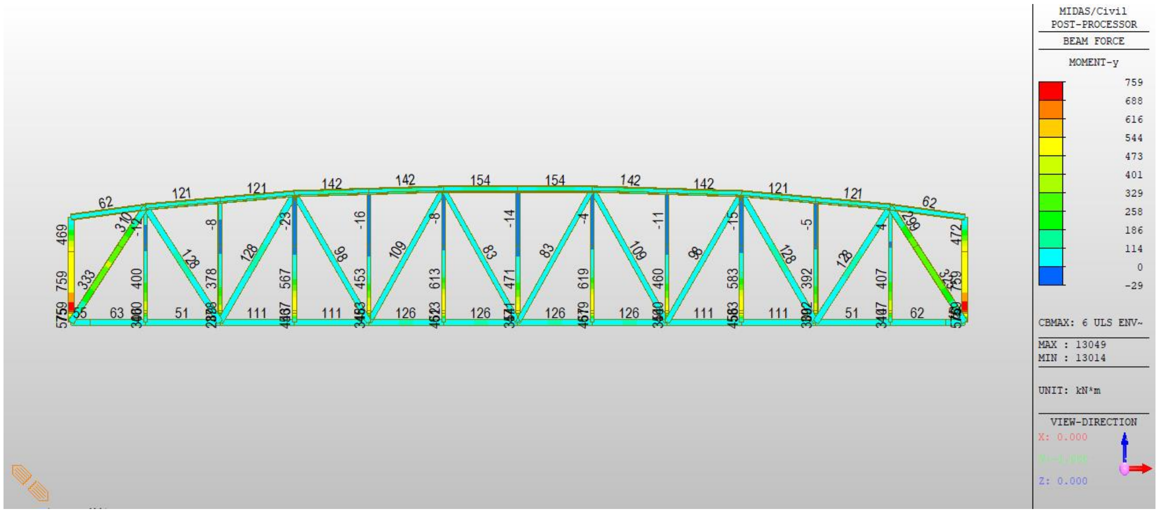

Figure 125 Railway Truss Case 6 ULS M_y Max

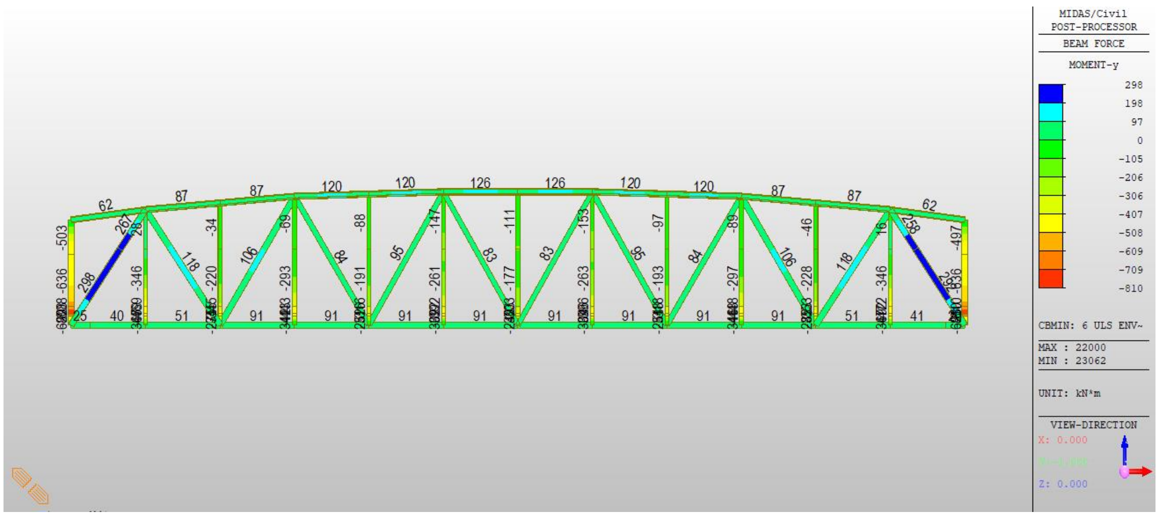

Figure 126 Railway Truss Case 6 ULS M_y Min

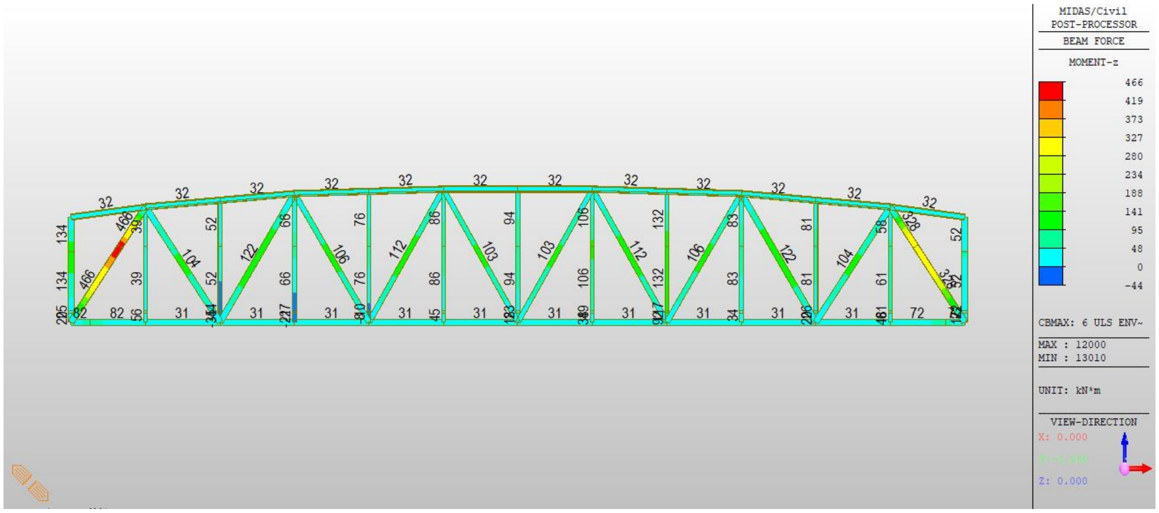

Figure 127 Railway Truss Case 6 ULS M_z Max

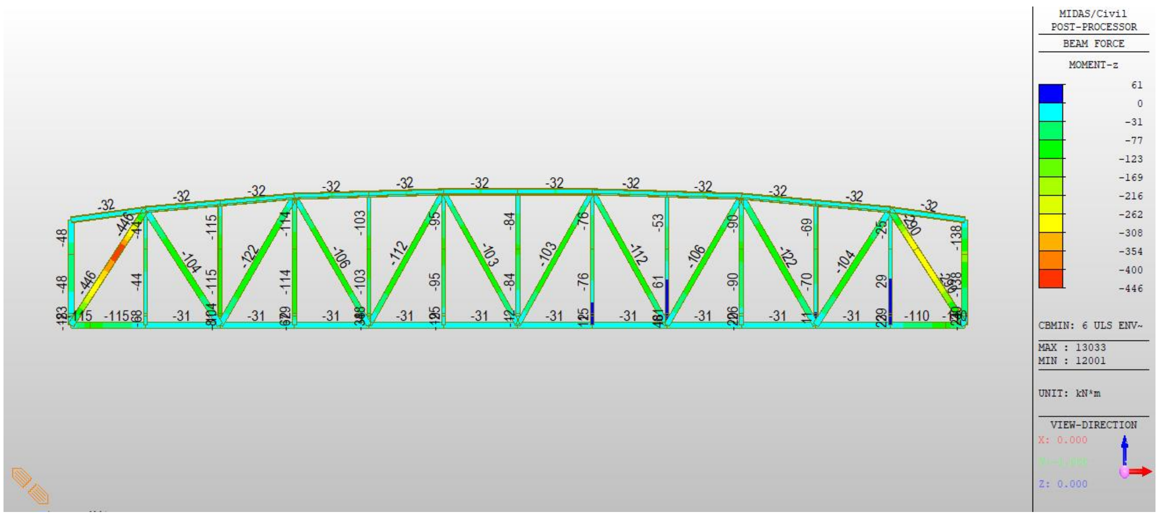

Figure 128 Railway Truss Case 6 ULS M_z Min

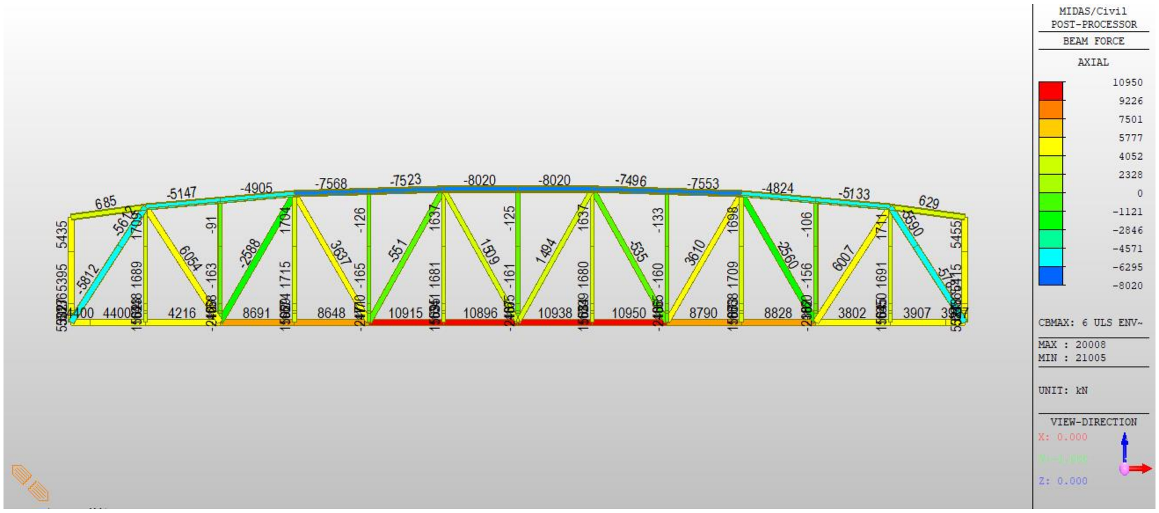

Figure 129 Highway Truss Case 6 ULS Axial Max

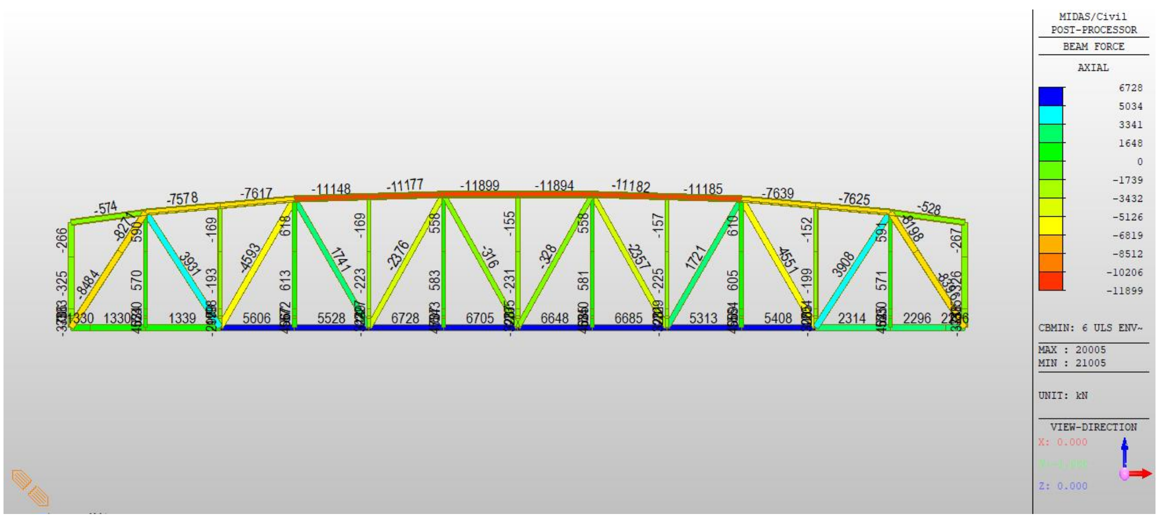

Figure 130 Highway Truss Case 6 ULS Axial Min

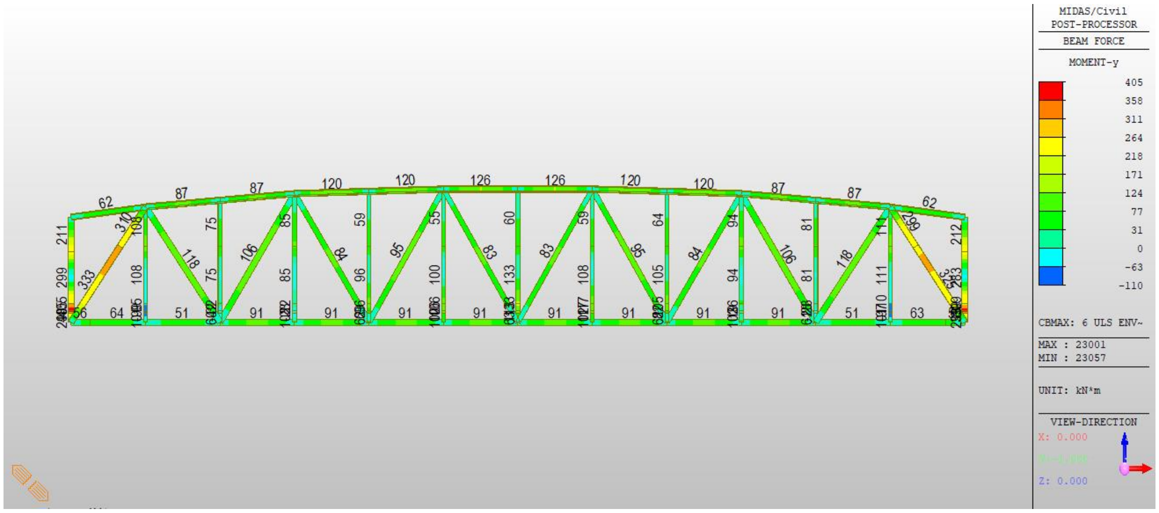

Figure 131 Highway Truss Case 6 ULS M_y Max

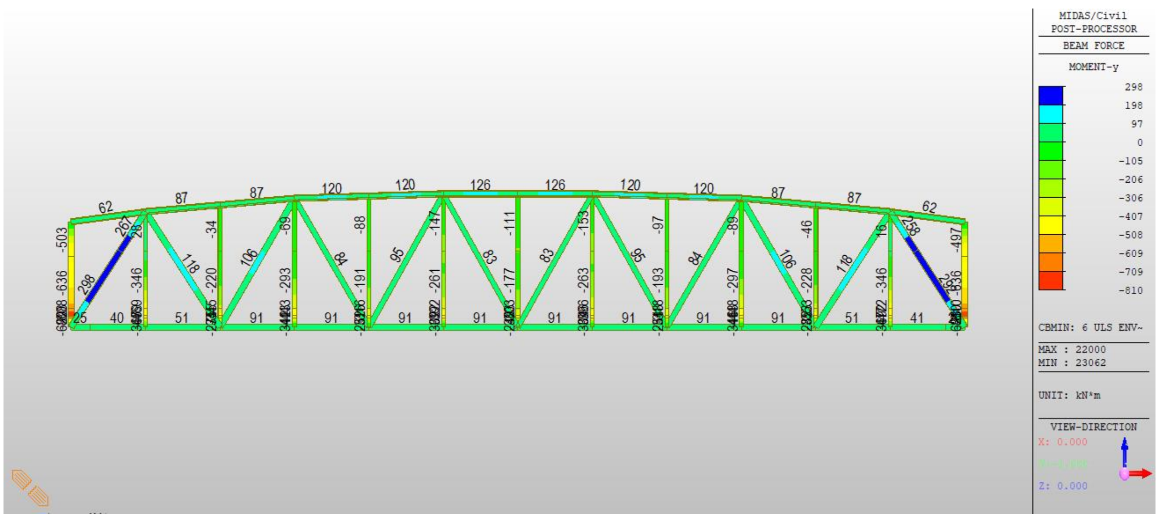

Figure 132 Highway Truss Case 6 ULS M_y Min

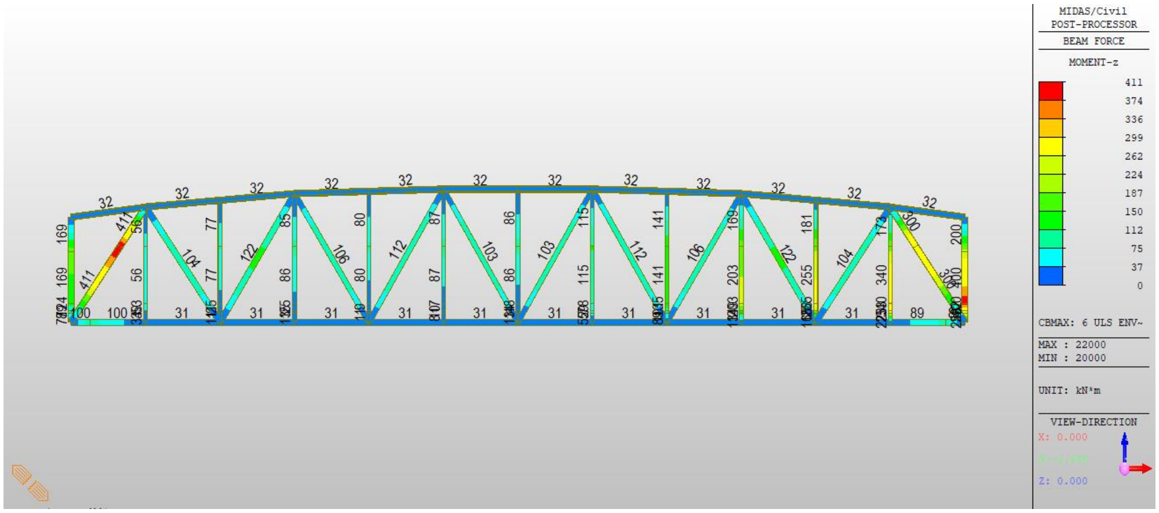

Figure 133 Highway Truss Case 6 ULS M_z Max

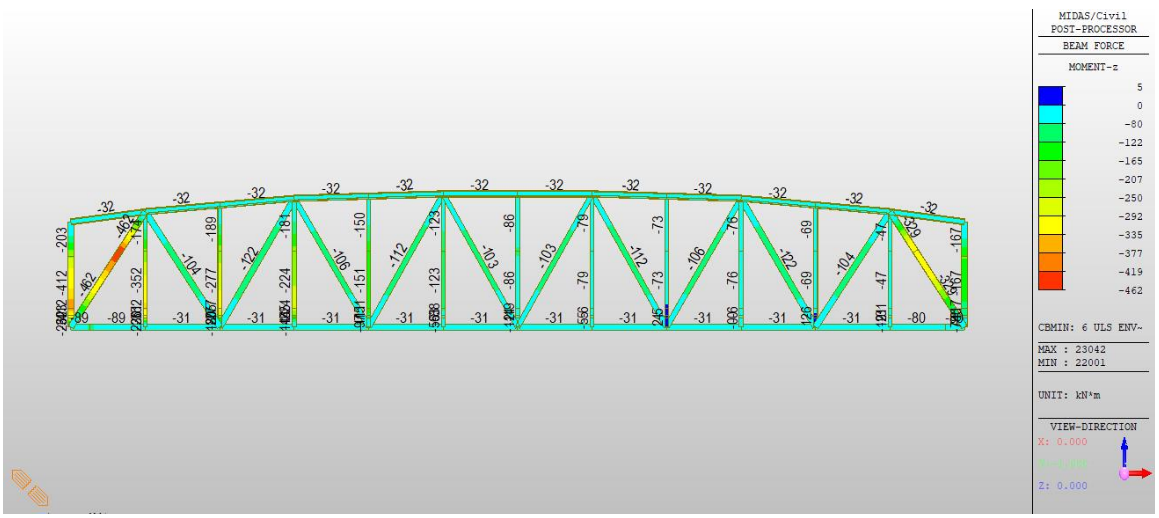

Figure 134 Highway Truss Case 6 ULS M_z Min

Figure 135 Lift Girder Case 6 ULS M_y Max

Figure 136 Lift Girder Case 6 ULS M_y Min

Figure 137 Lift Girder Case 6 ULS F_z Max

Figure 138 Lift Girder Case 6 ULS F_z Min

Figure 139 End Floor Beam Case 6 ULS M_y Max

Figure 140 End Floor Beam Case 6 ULS M_y Min

Figure 141 End Floor Beam Case 6 ULS F_z Max

Figure 142 End Floor Beam Case 6 ULS F_z Min

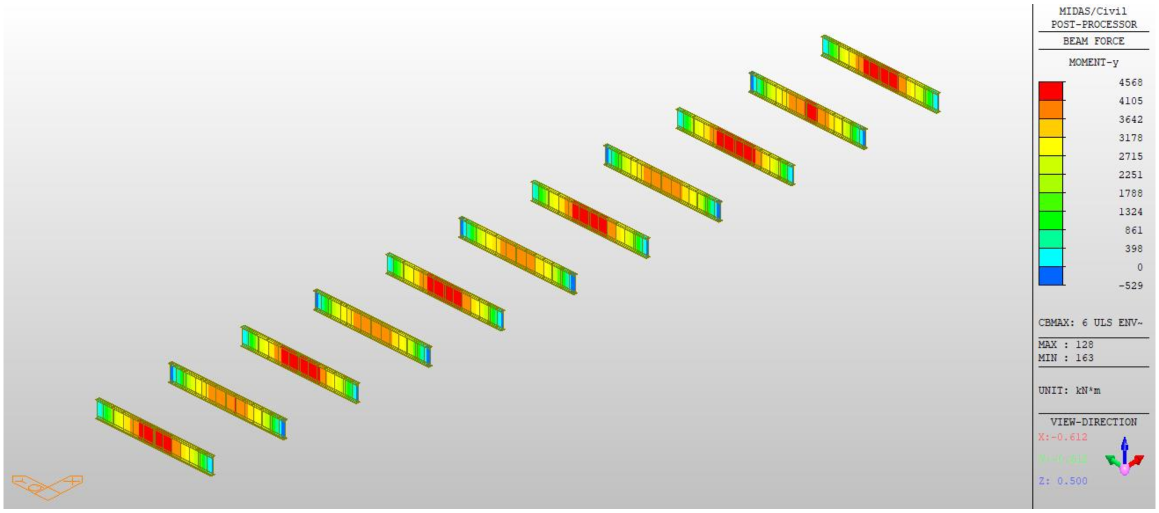

Figure 143 Interior Floor Beam Case 6 ULS M_y Max

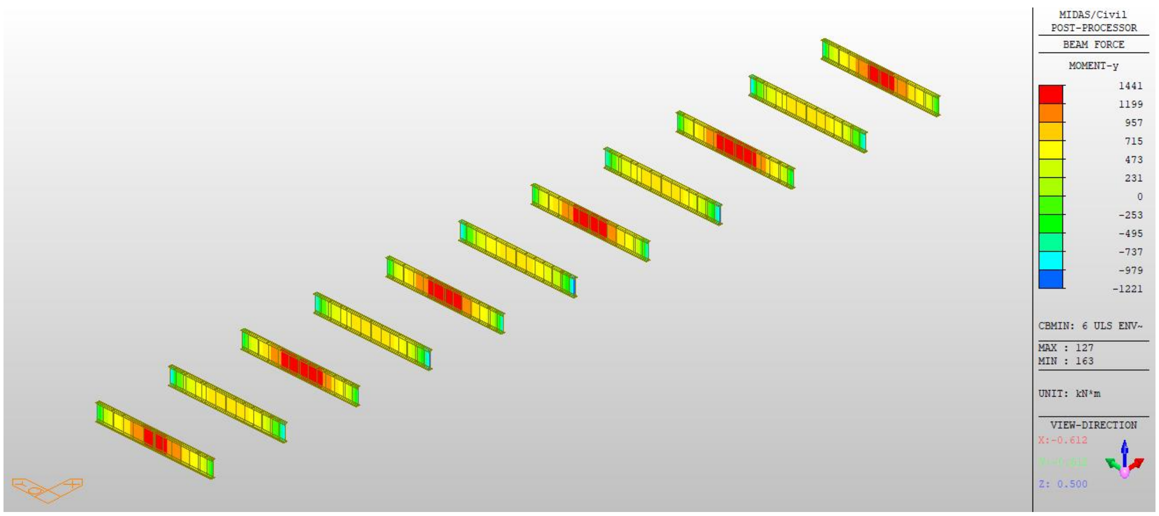

Figure 144 Interior Floor Beam Case 6 ULS M_y Min

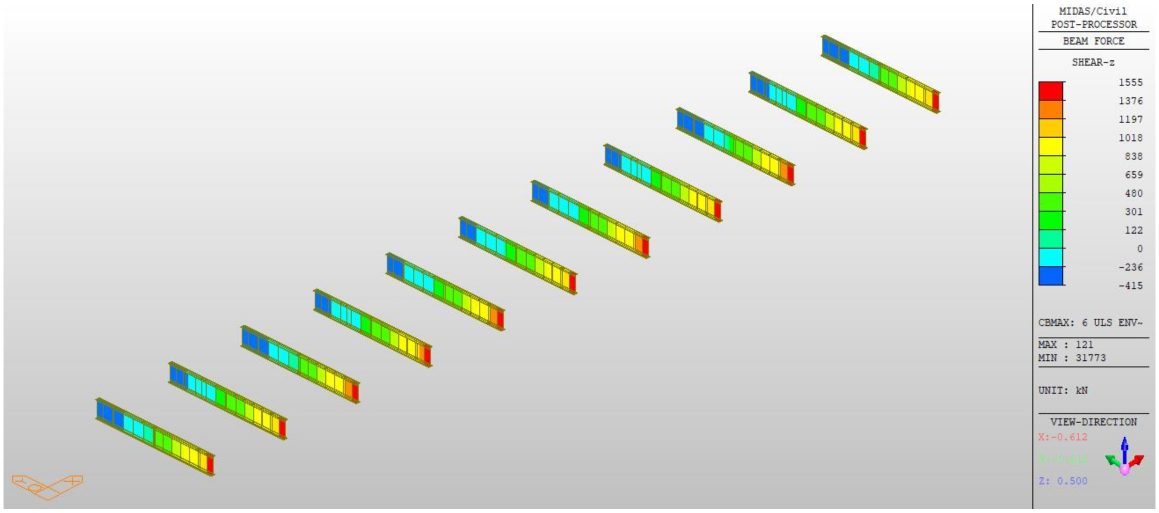

Figure 145 Interior Floor Beam Case 6 ULS F_z Max

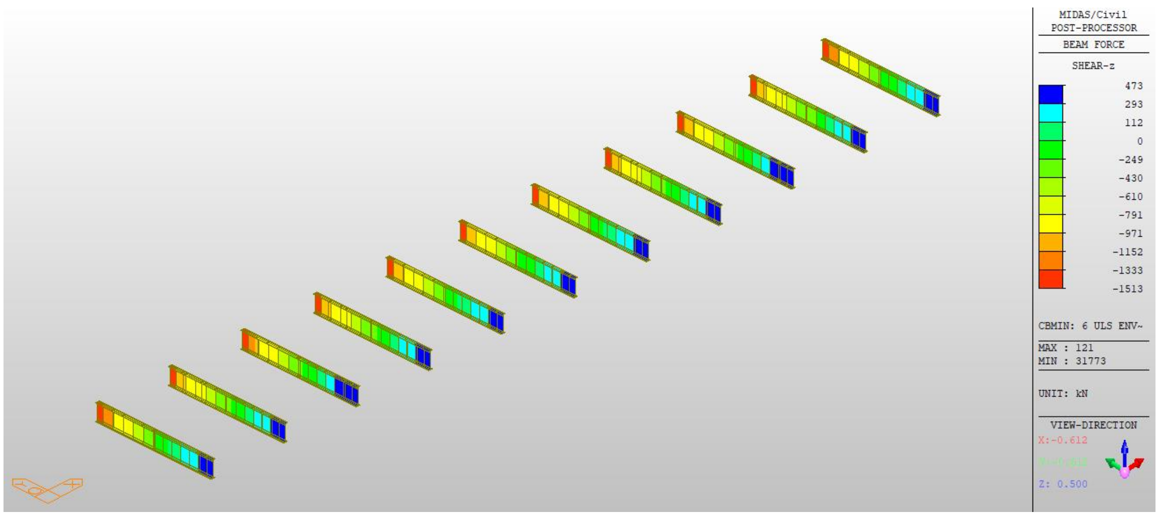

Figure 146 Interior Floor Beam Case 6 ULS F_z Min

Exhibit C.1.7. Rehabilitation Case 7 Evaluation

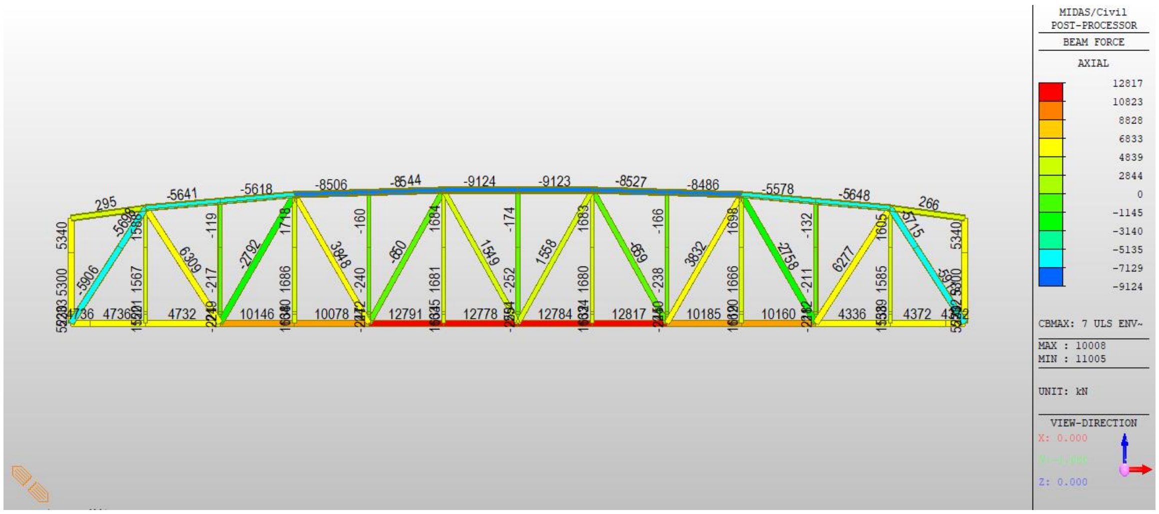

Figure 147 Railway Truss Case 7 ULS Axial Max

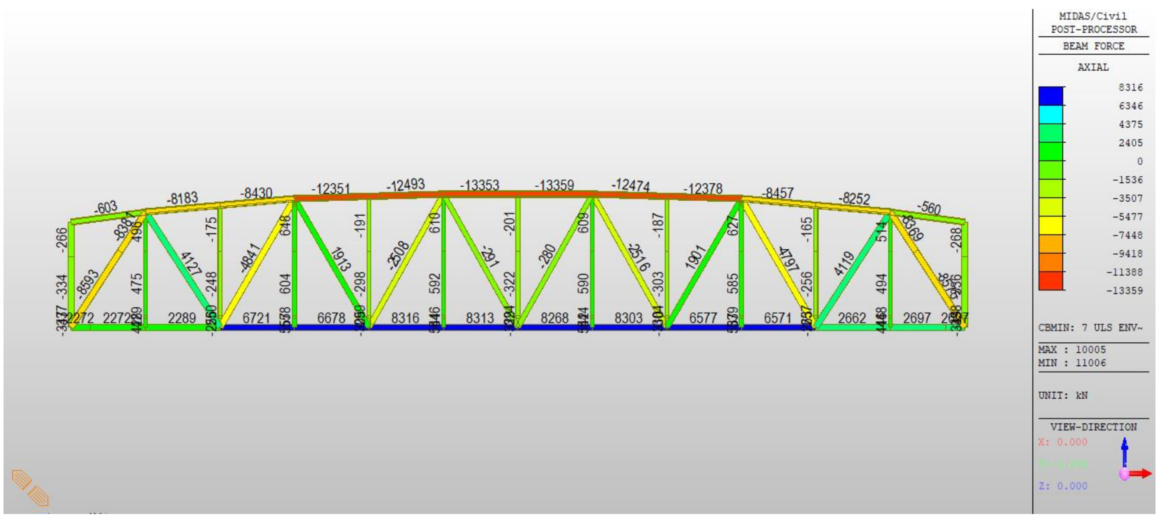

Figure 148 Railway Truss Case 7 ULS Axial Min

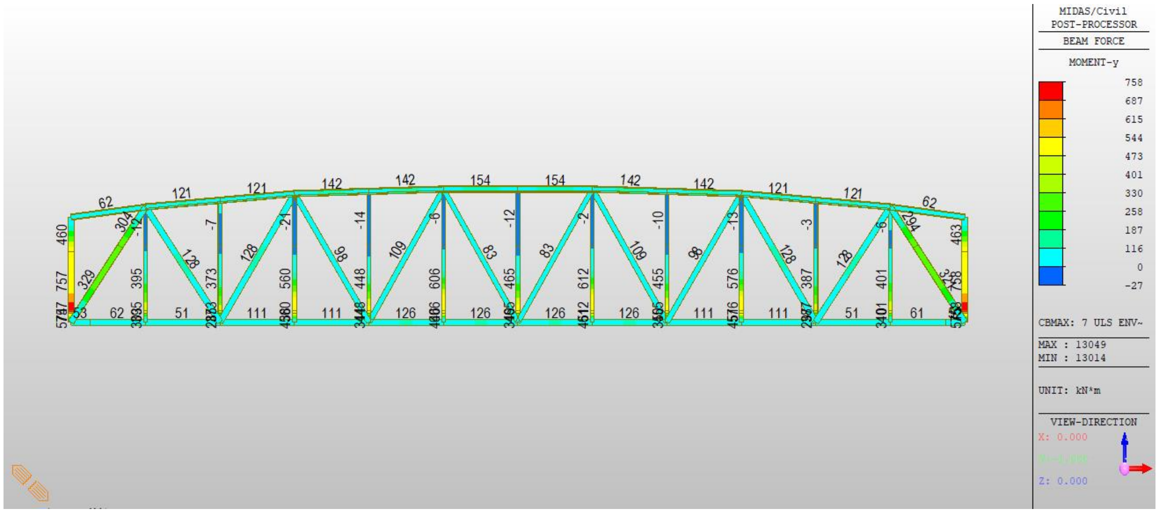

Figure 149 Railway Truss Case 7 ULS M_y Max

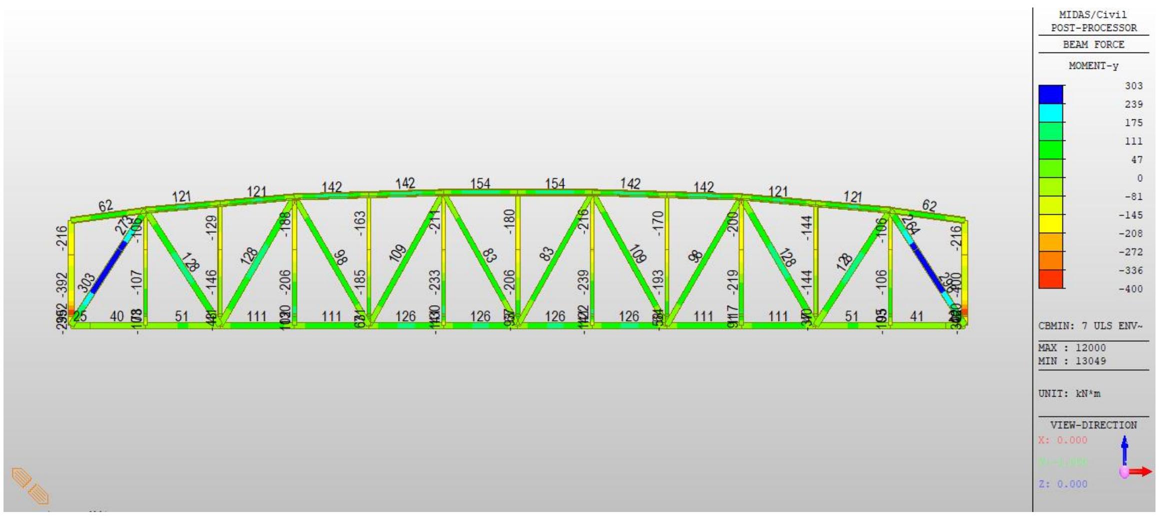

Figure 150 Railway Truss Case 7 ULS M_y Min

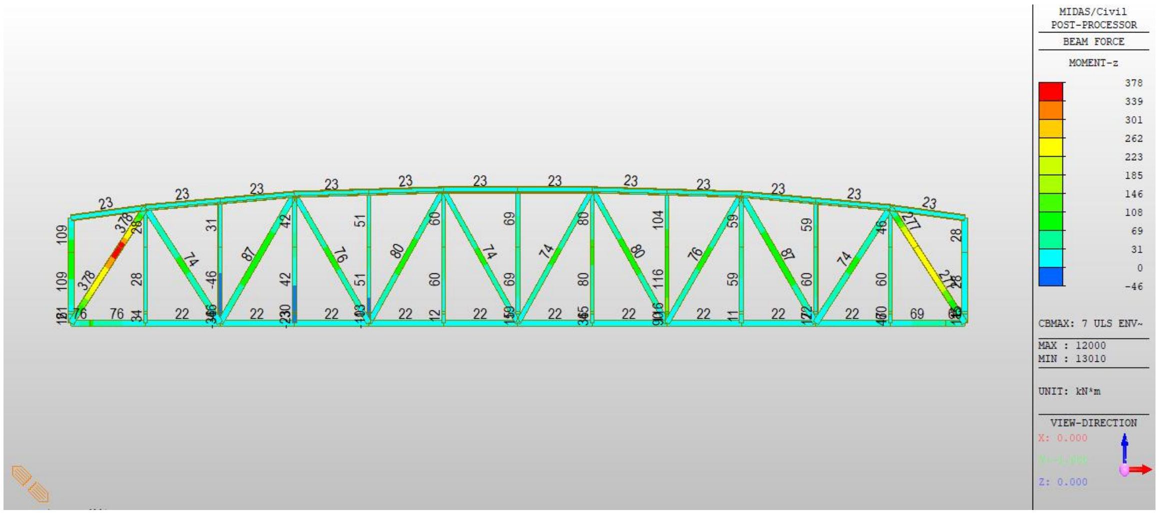

Figure 151 Railway Truss Case 7 ULS M_z Max

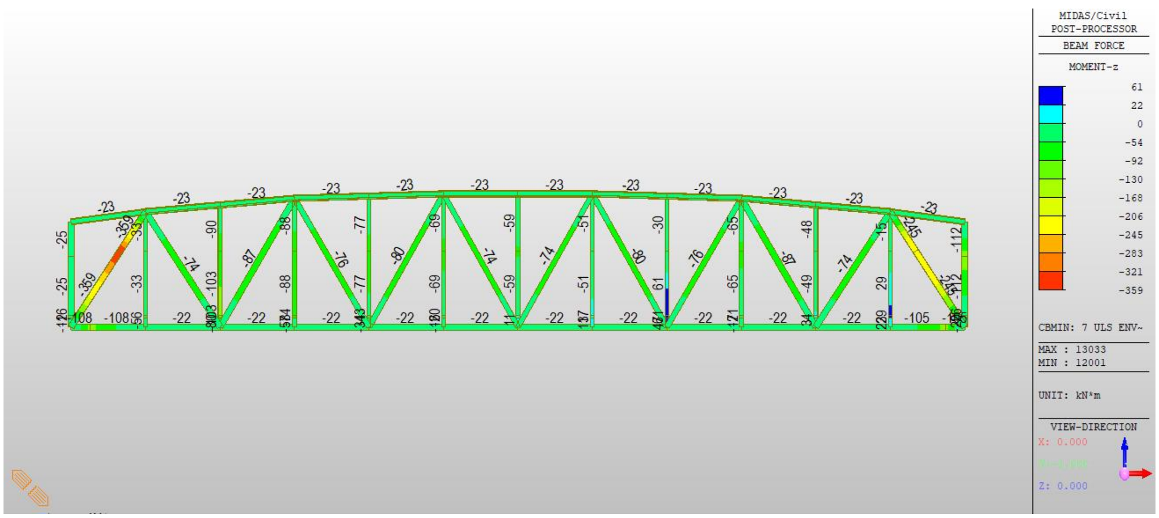

Figure 152 Railway Truss Case 7 ULS M_z Min

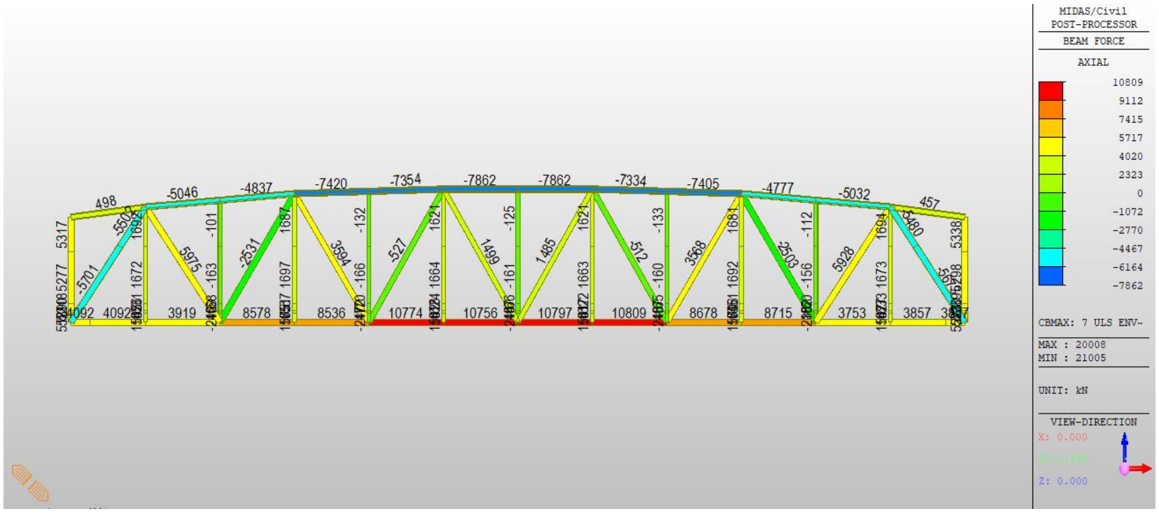

Figure 153 Highway Truss Case 7 ULS Axial Max

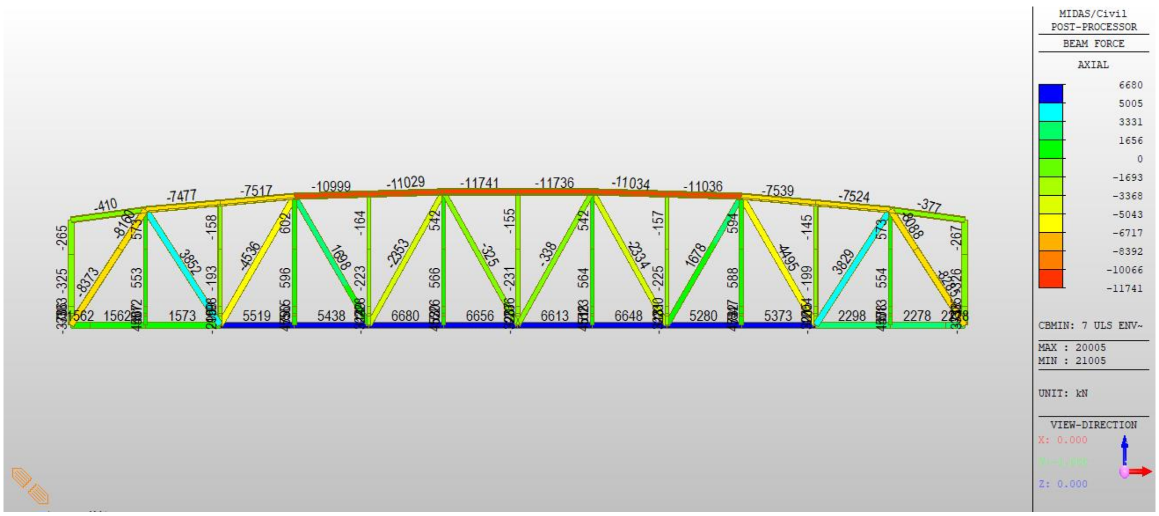

Figure 154 Highway Truss Case 7 ULS Axial Min

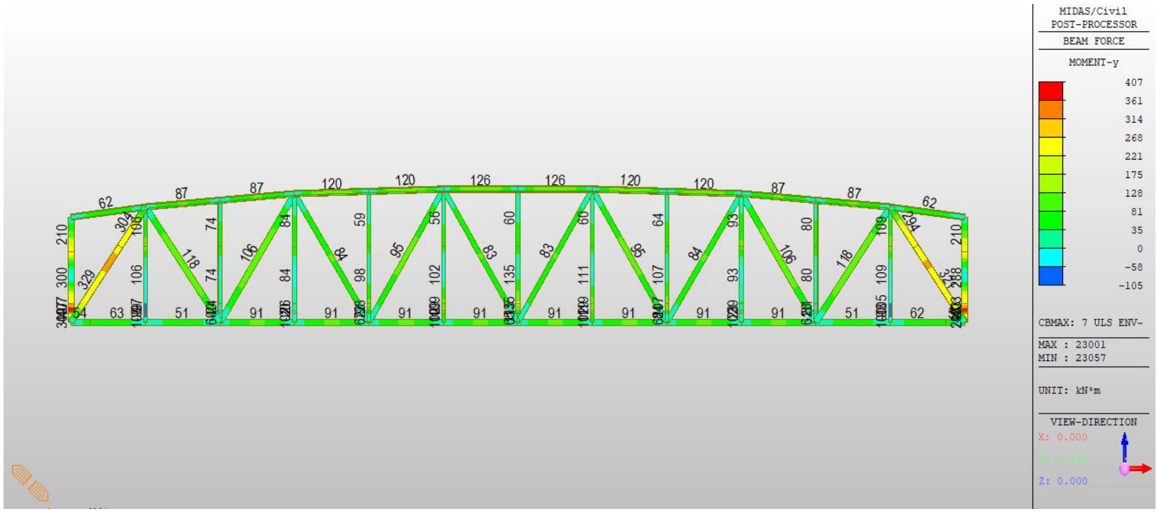

Figure 155 Highway Truss Case 7 ULS M_y Max

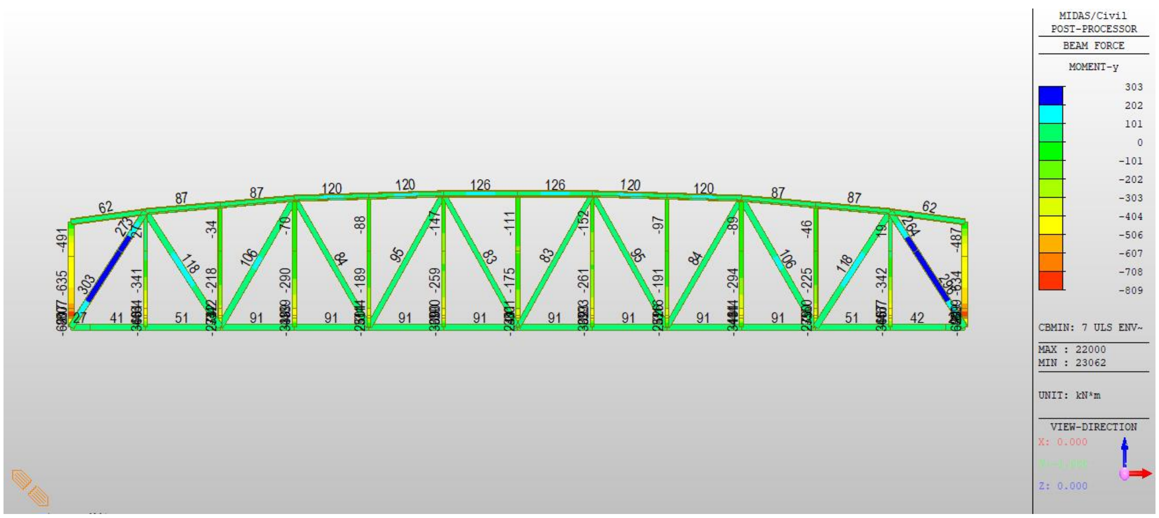

Figure 156 Highway Truss Case 7 ULS M_y Min

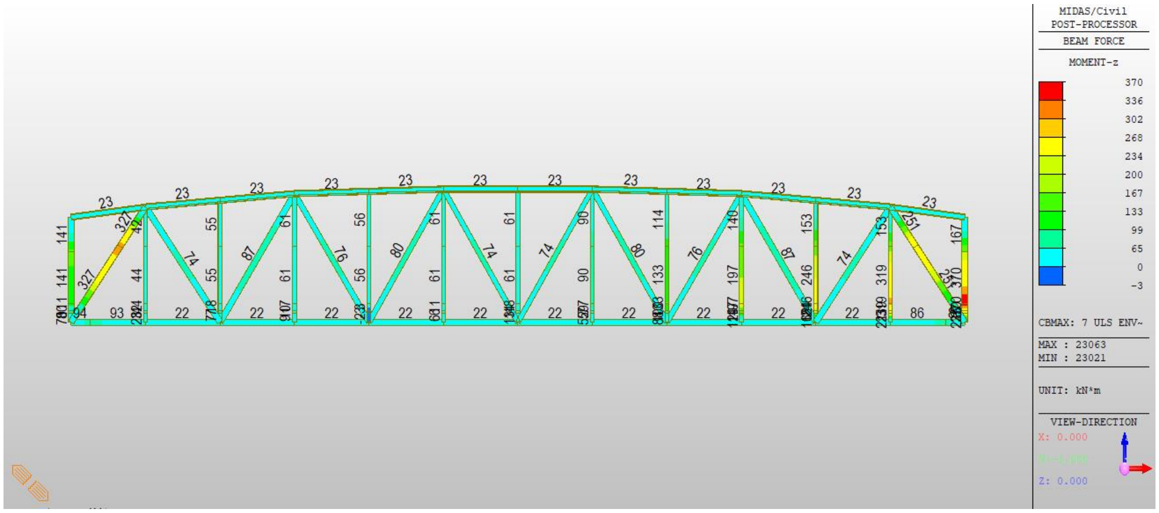

Figure 157 Highway Truss Case 7 ULS M_z Max

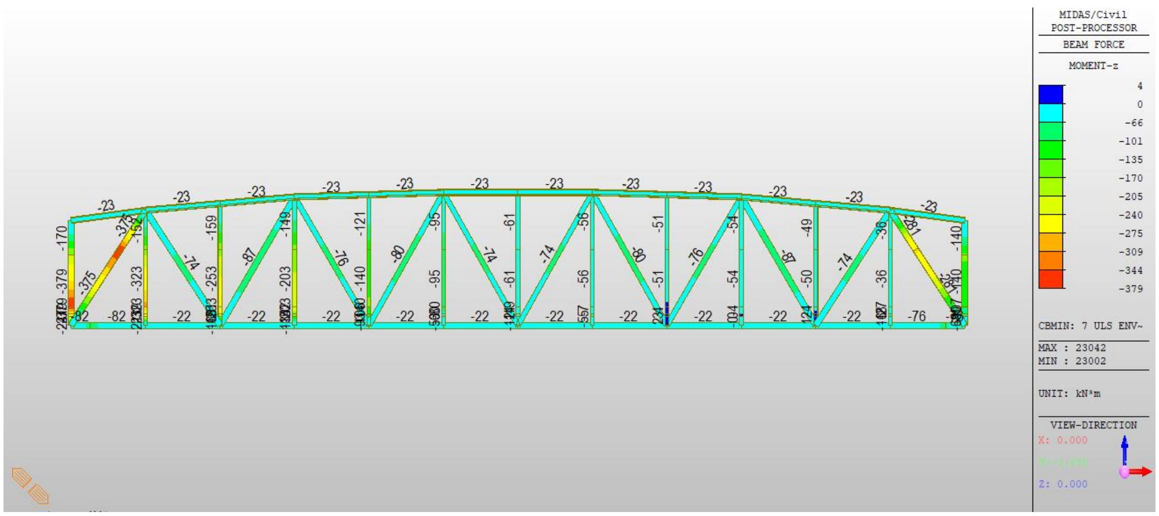

Figure 158 Highway Truss Case 7 ULS M_z Min

Figure 159 Lift Girder Case 7 ULS M_y Max

Figure 160 Lift Girder Case 7 ULS M_y Min

Figure 161 Lift Girder Case 7 ULS F_z Max

Figure 162 Lift Girder Case 7 ULS F_z Min

Figure 163 End Floor Beam Case 7 ULS M_y Max

Figure 164 End Floor Beam Case 7 ULS M_y Min

Figure 165 End Floor Beam Case 7 ULS F_z Max

Figure 166 End Floor Beam Case 7 ULS F_z Min

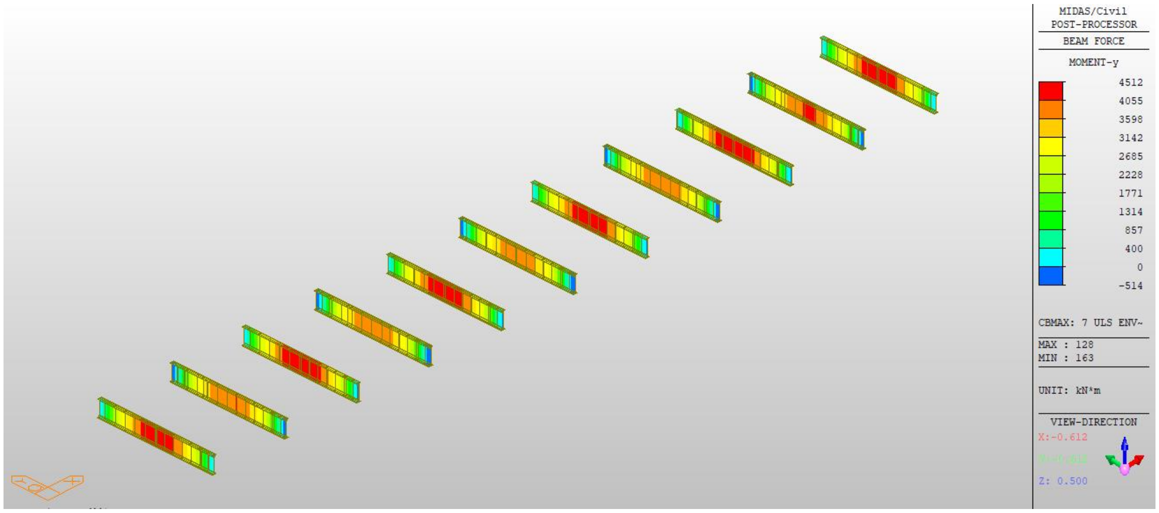

Figure 167 Interior Floor Beam Case 7 ULS M_y Max

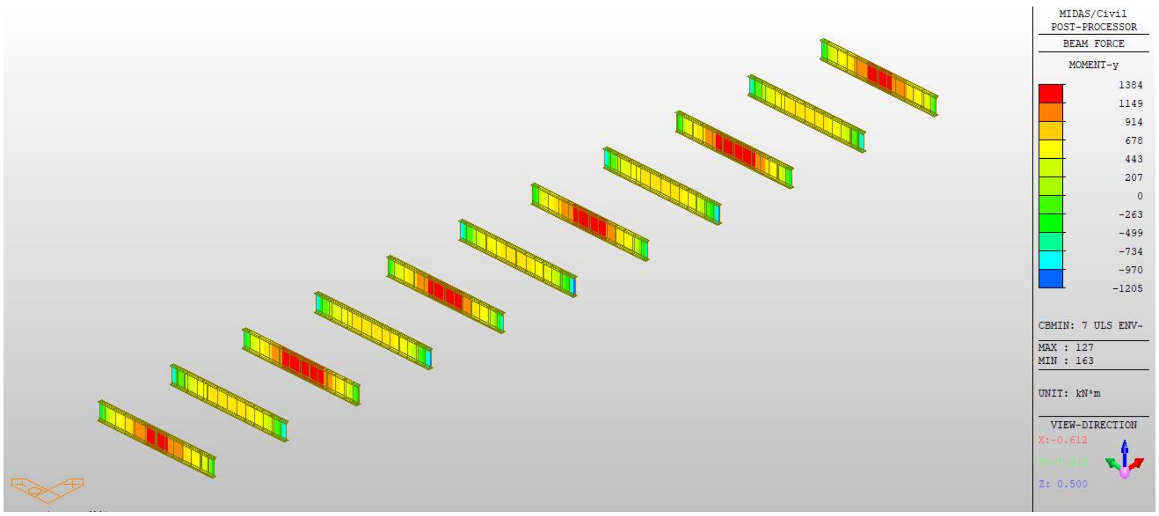

Figure 168 Interior Floor Beam Case 7 ULS M_y Min

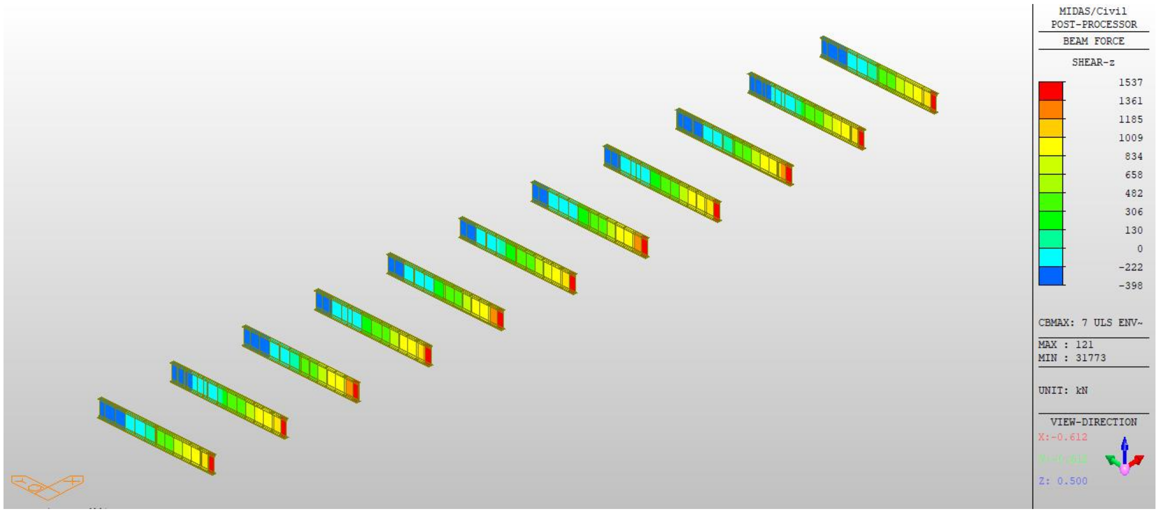

Figure 169 Interior Floor Beam Case 7 ULS F_z Max

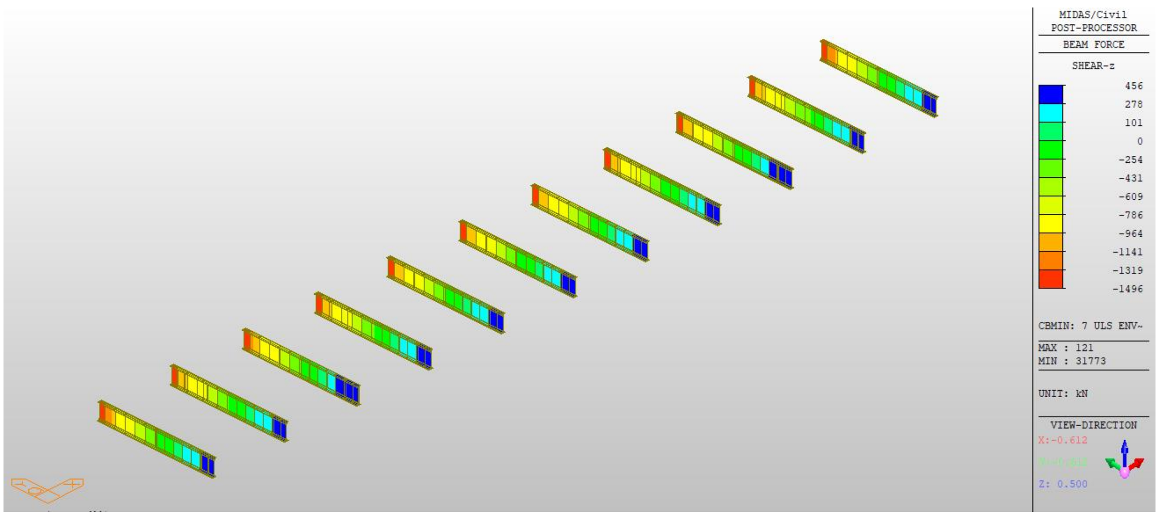

Figure 170 Interior Floor Beam Case 7 ULS F_z Min

Exhibit C.1.8. Rehabilitation Case 8 Evaluation

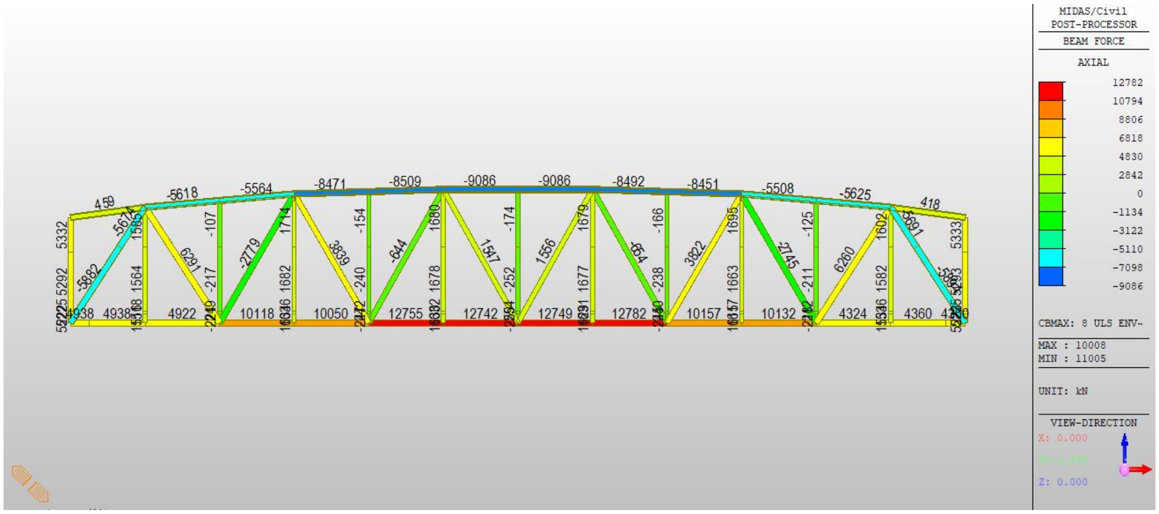

Figure 171 Railway Truss Case 8 ULS Axial Max

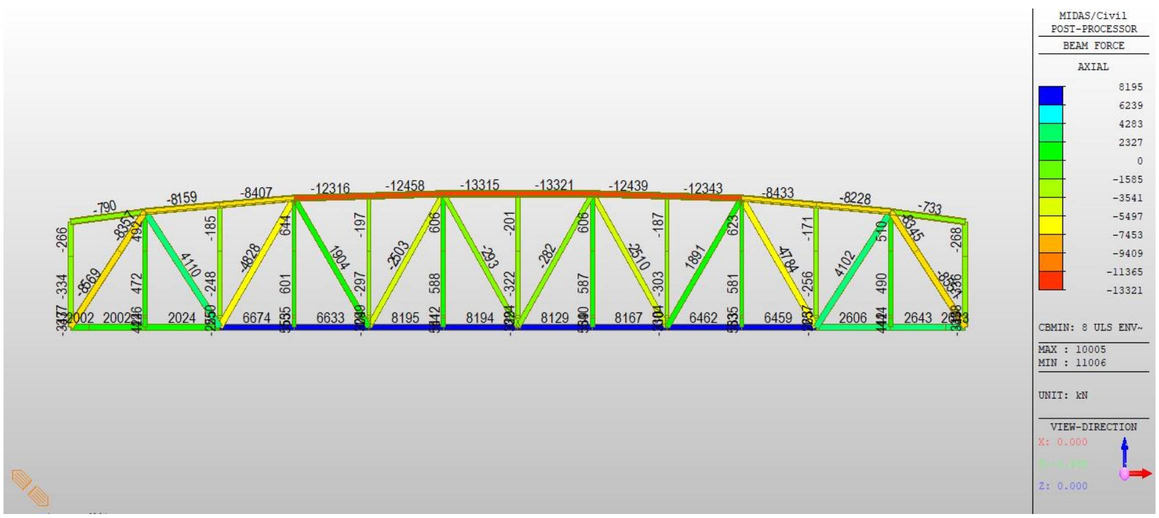

Figure 172 Railway Truss Case 8 ULS Axial Min

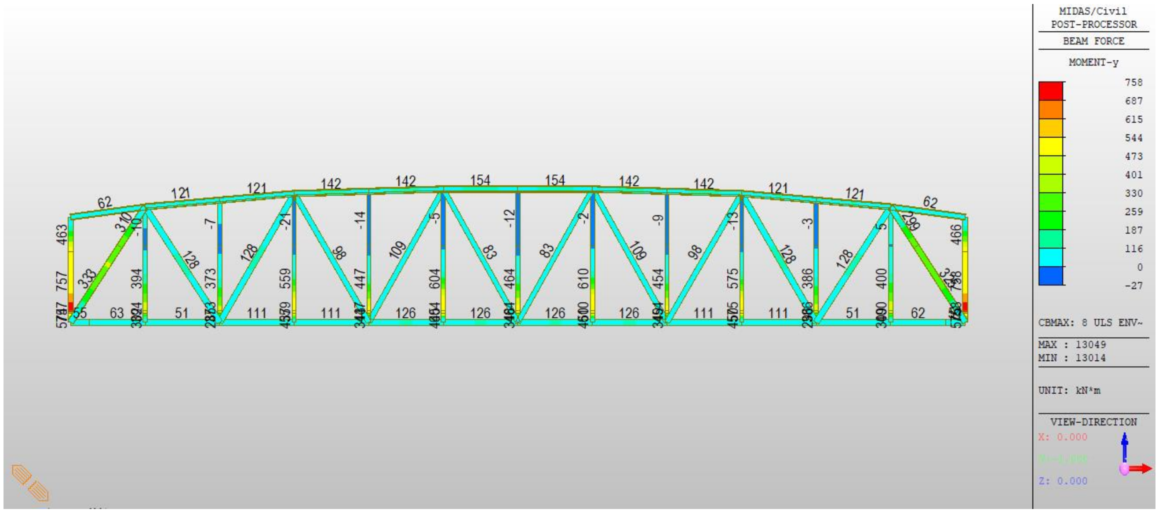

Figure 173 Railway Truss Case 8 ULS M_y Max

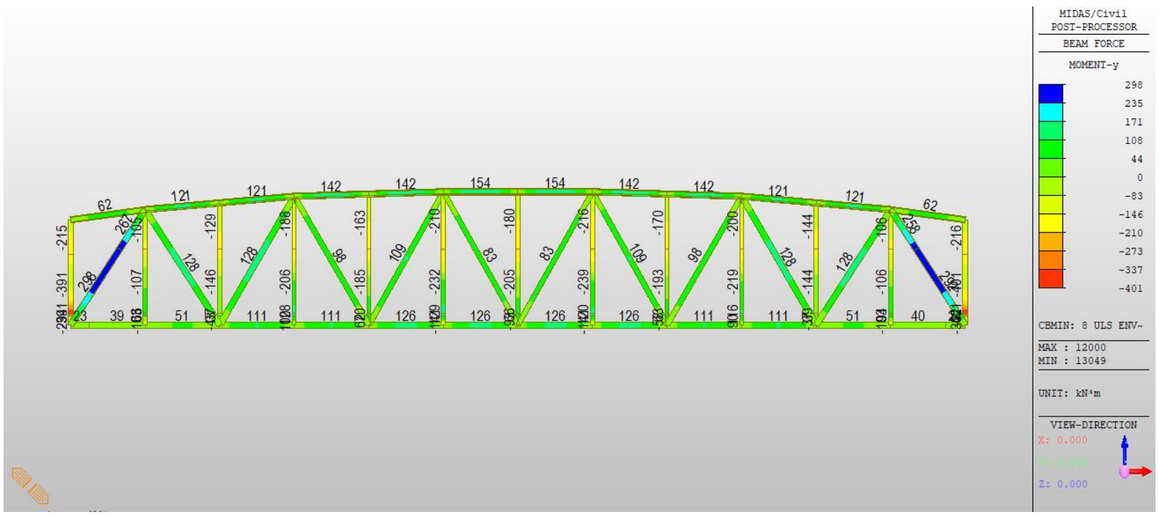

Figure 174 Railway Truss Case 8 ULS M_y Min

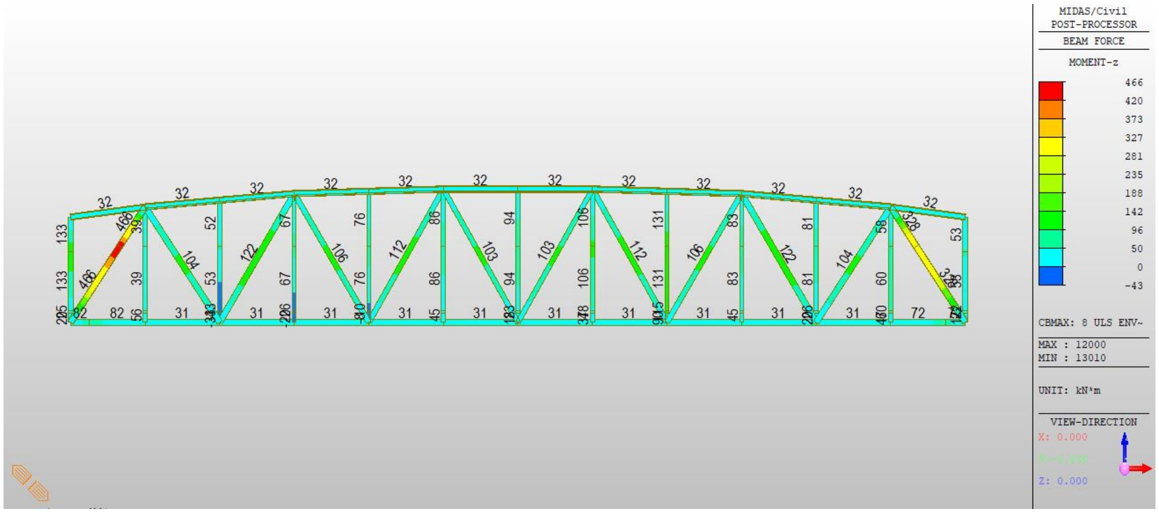

Figure 175 Railway Truss Case 8 ULS M_z Max

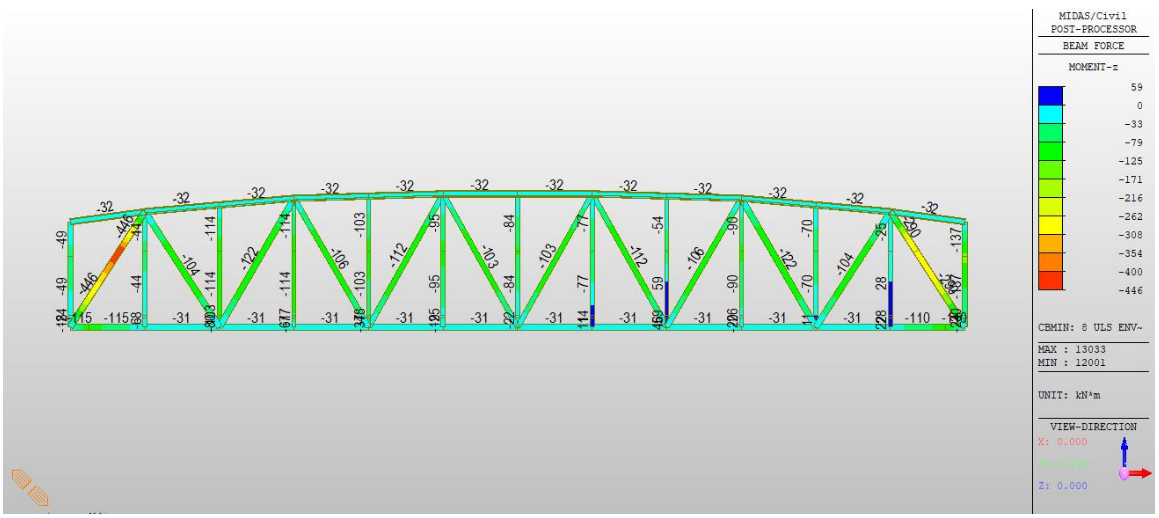

Figure 176 Railway Truss Case 8 ULS M_z Min

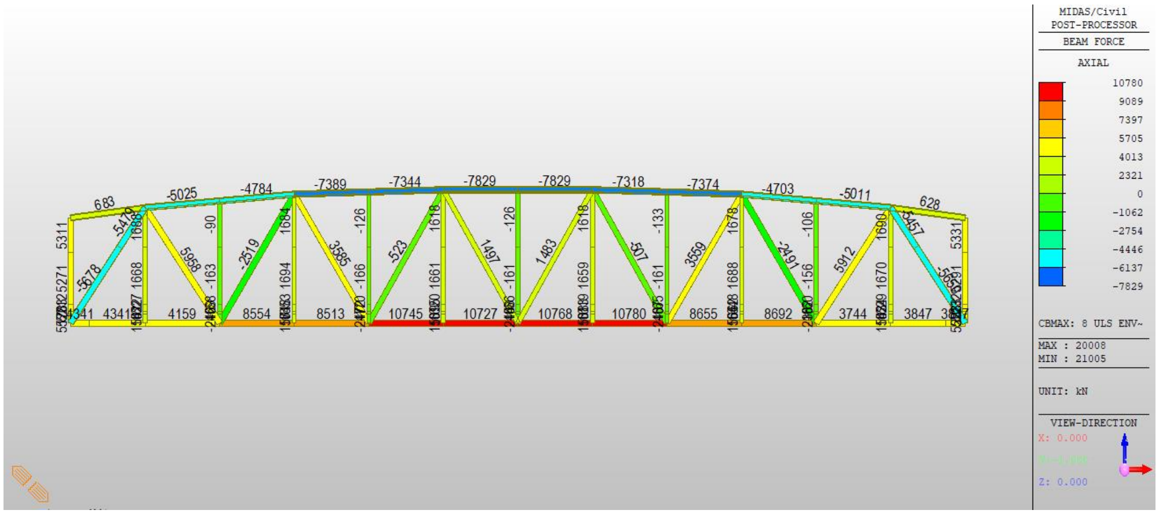

Figure 177 Highway Truss Case 8 ULS Axial Max

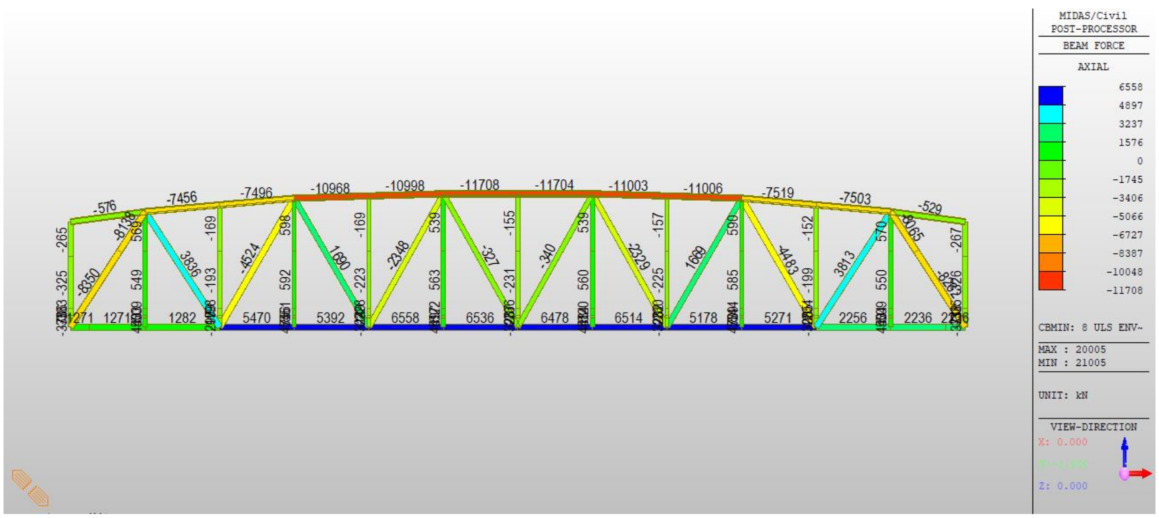

Figure 178 Highway Truss Case 8 ULS Axial Min

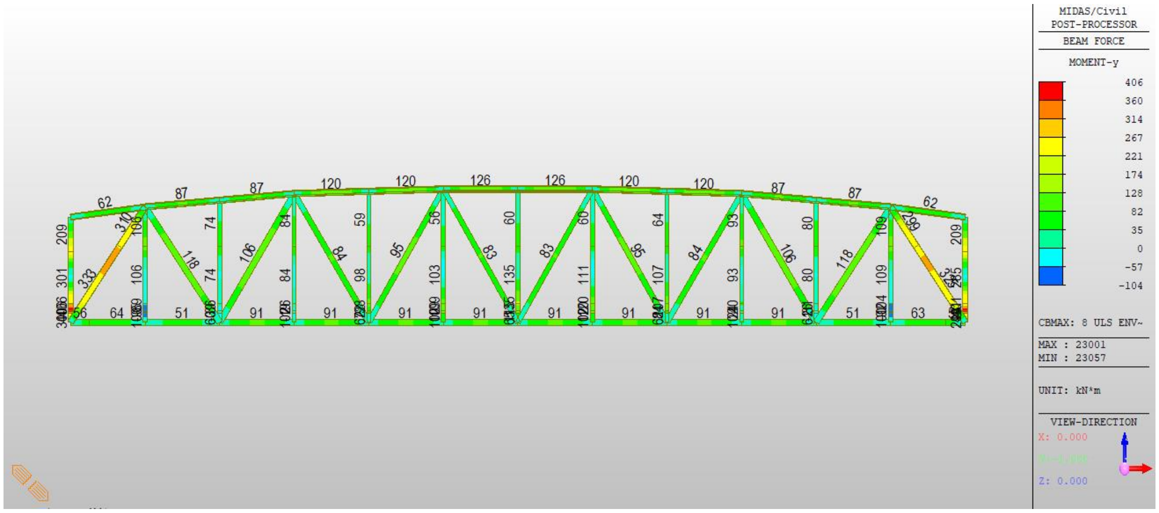

Figure 179 Highway Truss Case 8 ULS M_y Max

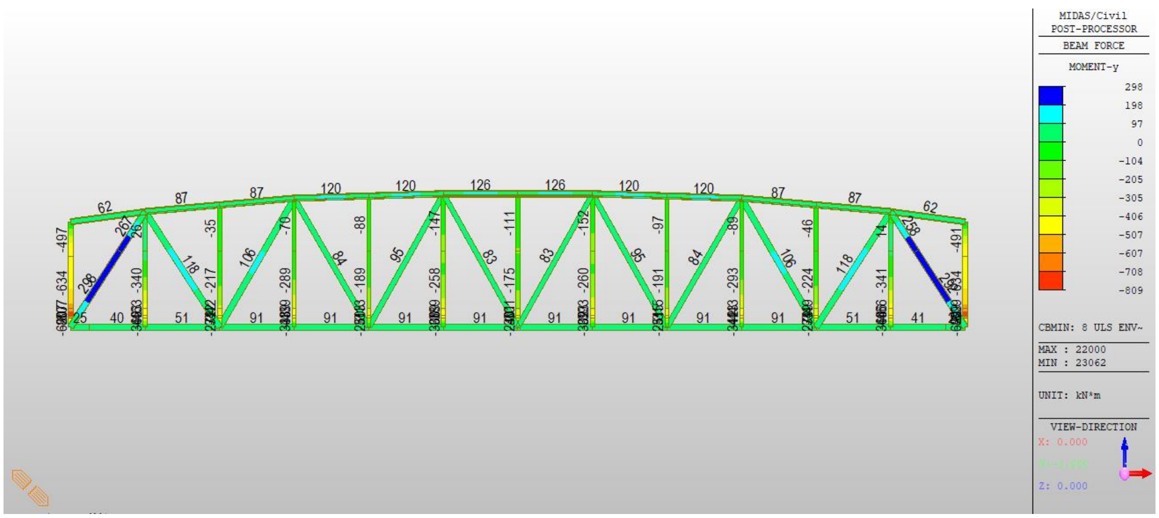

Figure 180 Highway Truss Case 8 ULS M_y Min

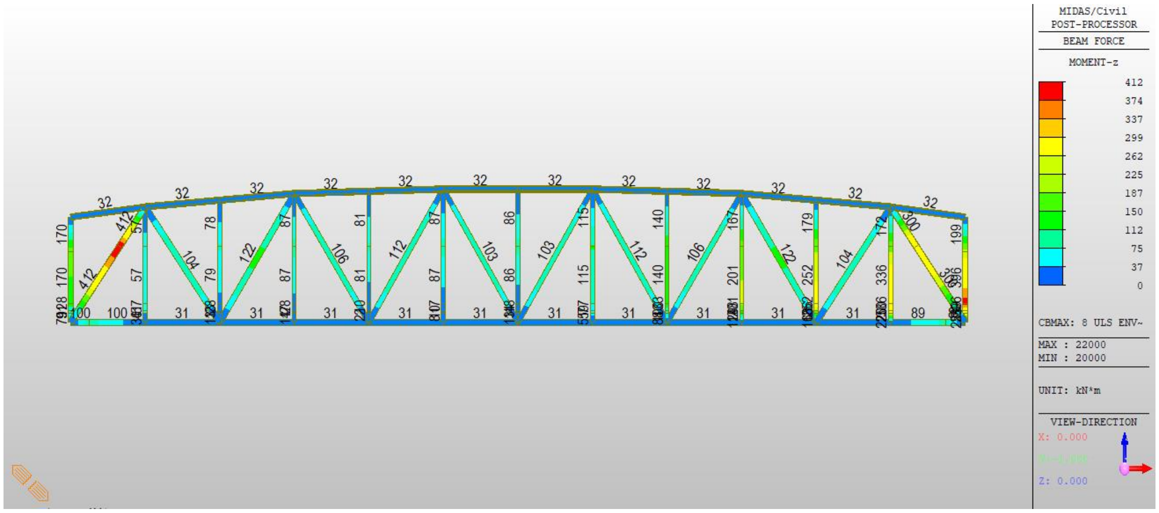

Figure 181 Highway Truss Case 8 ULS M_z Max

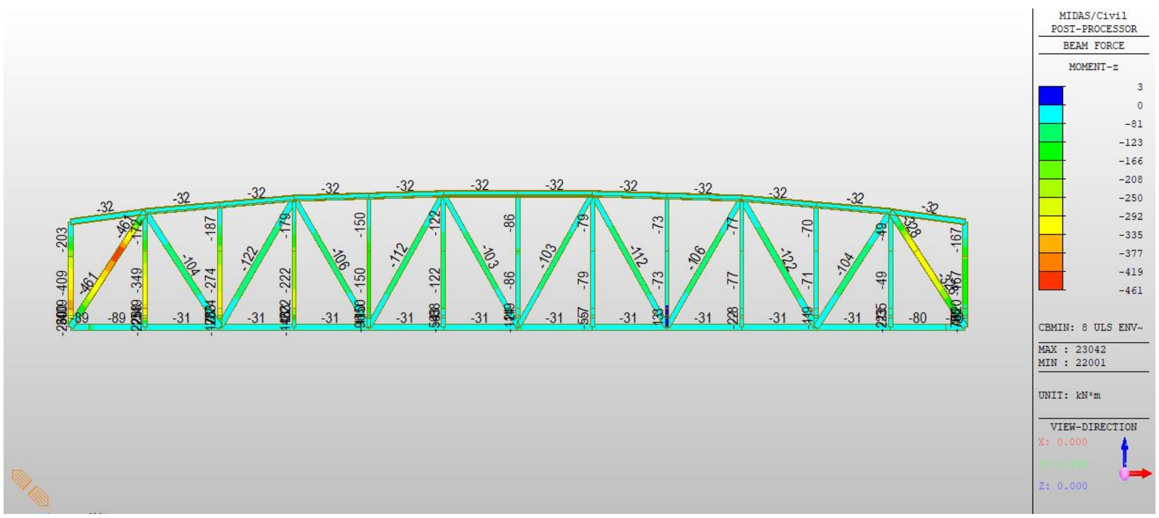

Figure 182 Highway Truss Case 8 ULS M_z Min

Figure 183 Lift Girder Case 8 ULS M_y Max

Figure 184 Lift Girder Case 8 ULS M_y Min

Figure 185 Lift Girder Case 8 ULS F_z Max

Figure 186 Lift Girder Case 8 ULS F_z Min

Figure 187 End Floor Beam Case 8 ULS M_y Max

Figure 188 End Floor Beam Case 8 ULS M_y Min

Figure 189 End Floor Beam Case 8 ULS F_z Max

Figure 190 End Floor Beam Case 8 ULS F_z Min

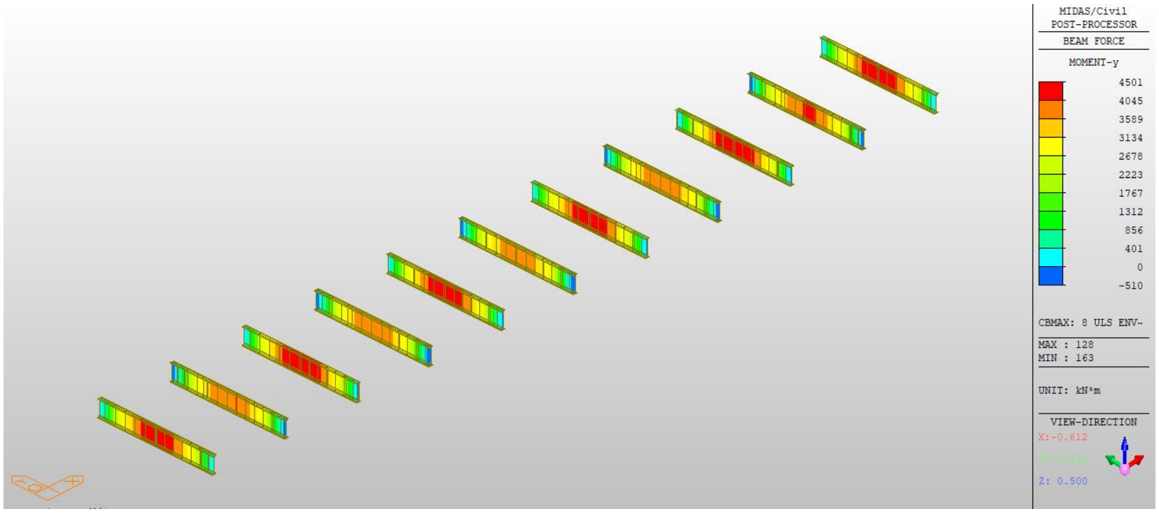

Figure 191 Interior Floor Beam Case 8 ULS M_y Max

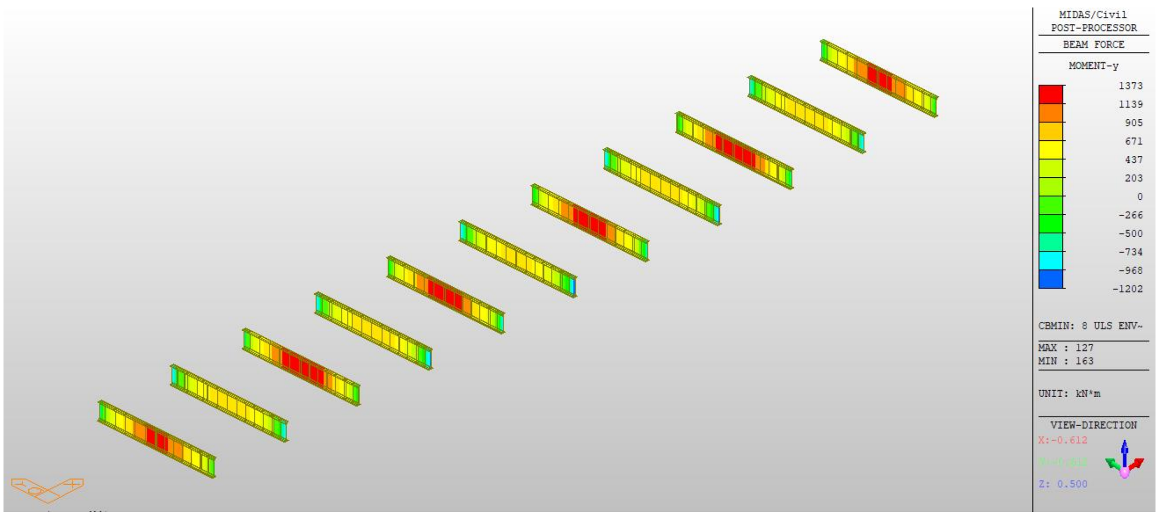

Figure 192 Interior Floor Beam Case 8 ULS M_y Min

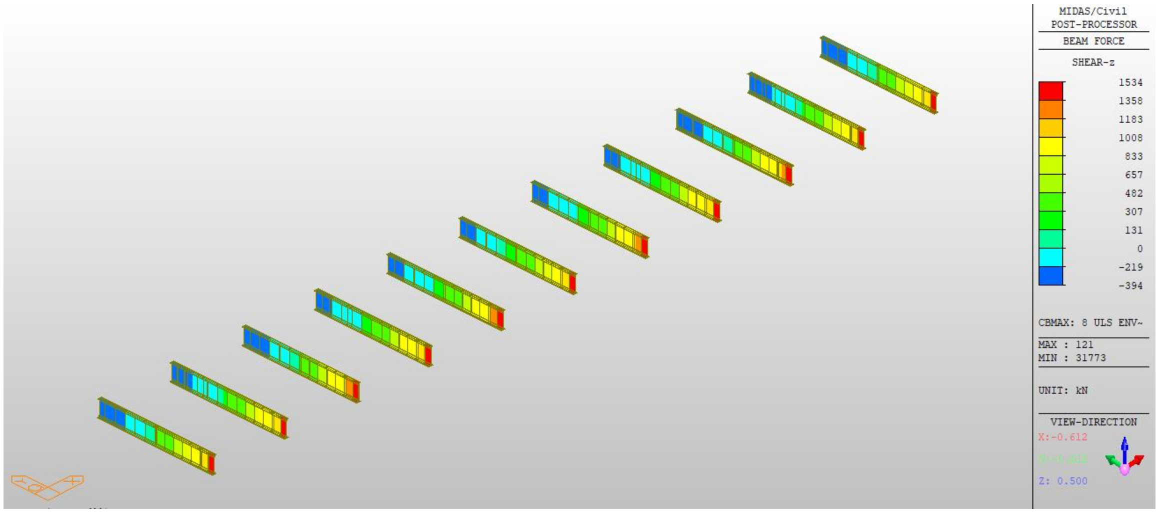

Figure 193 Interior Floor Beam Case 8 ULS F_z Max

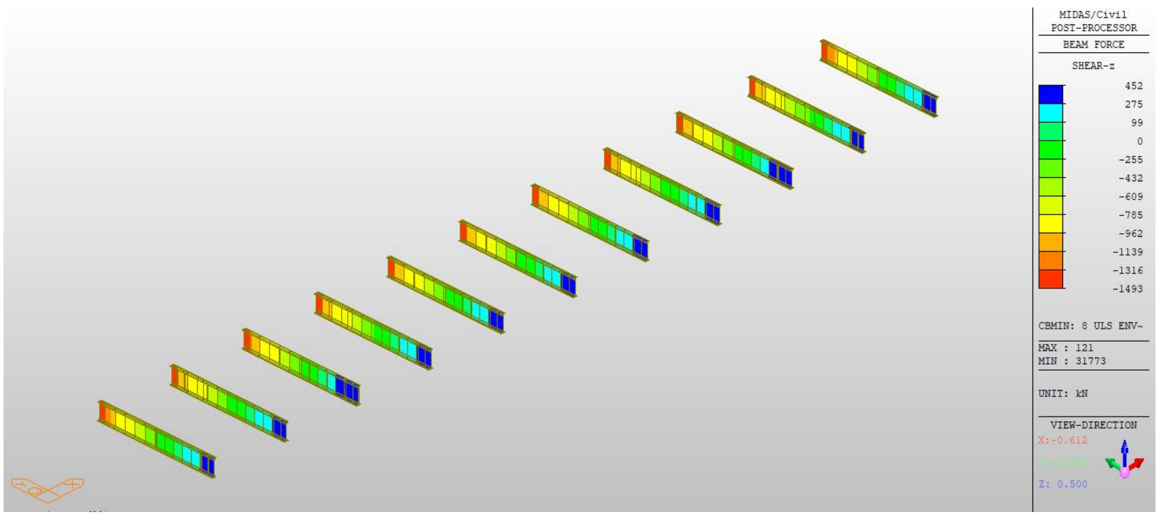

Figure 194 Interior Floor Beam Case 8 ULS F_z Min

Exhibit C.1.9 Rehabilitation Case 9 Evaluation

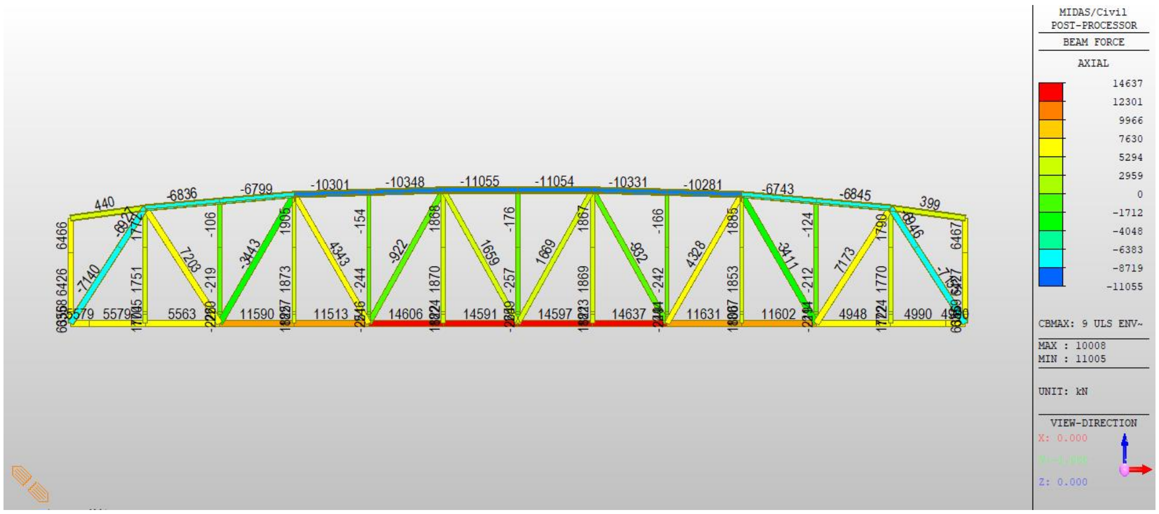

Figure 195 Railway Truss Case 9 ULS Axial Max

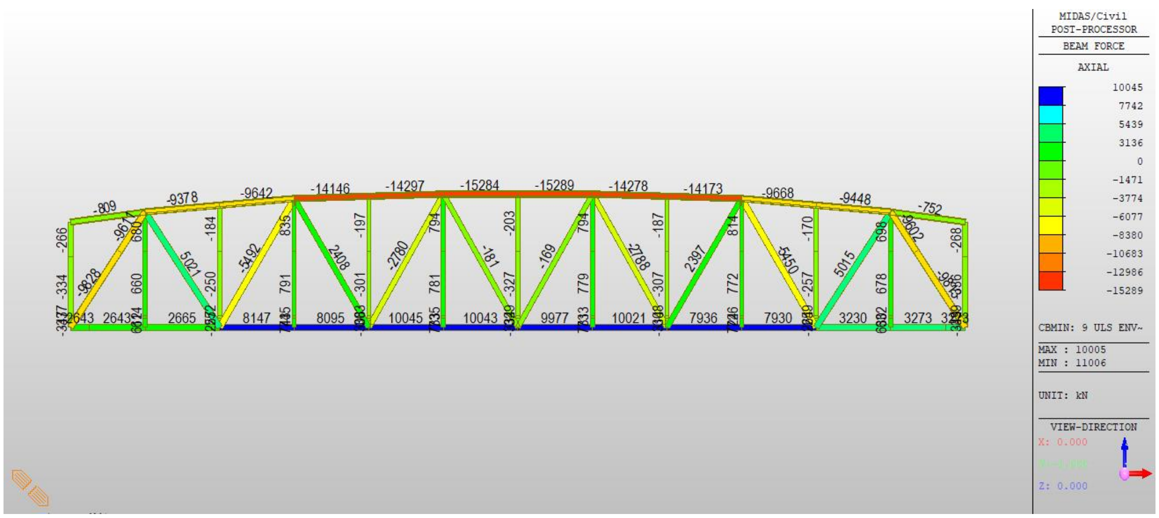

Figure 196 Railway Truss Case 9 ULS Axial Min

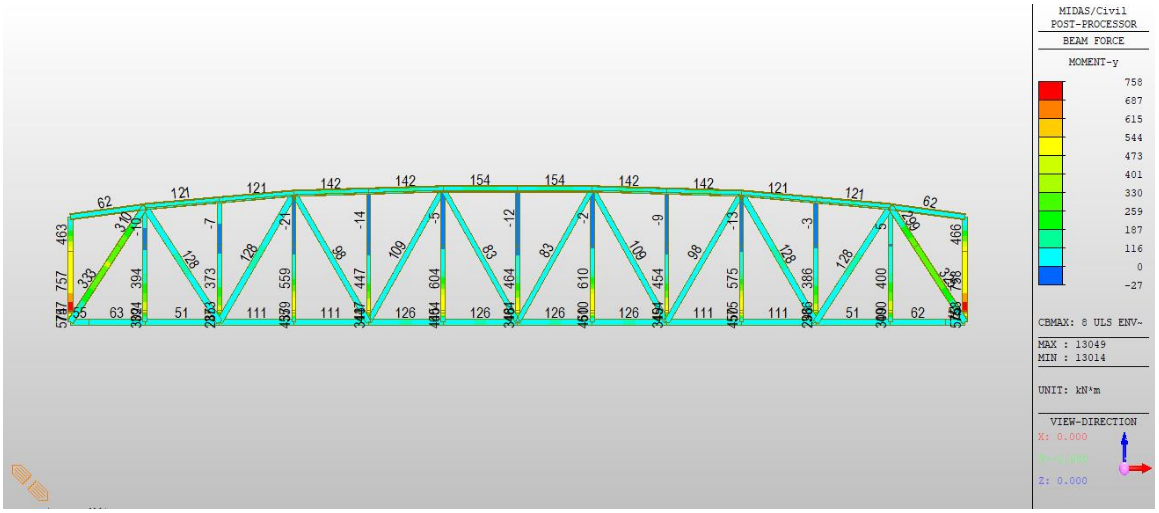

Figure 197 Railway Truss Case 9 ULS M_y Max

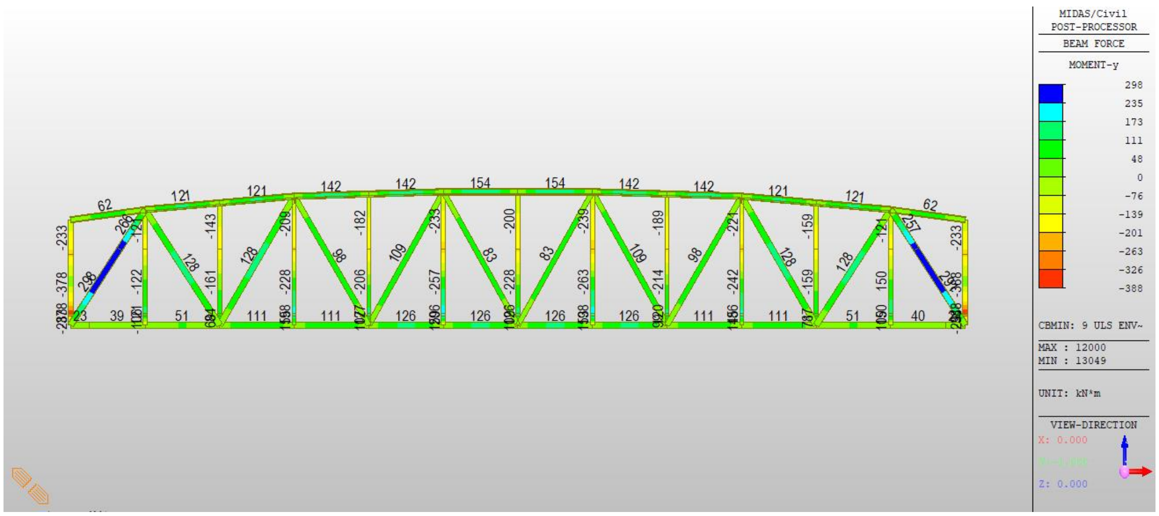

Figure 198 Railway Truss Case 9 ULS M_y Min

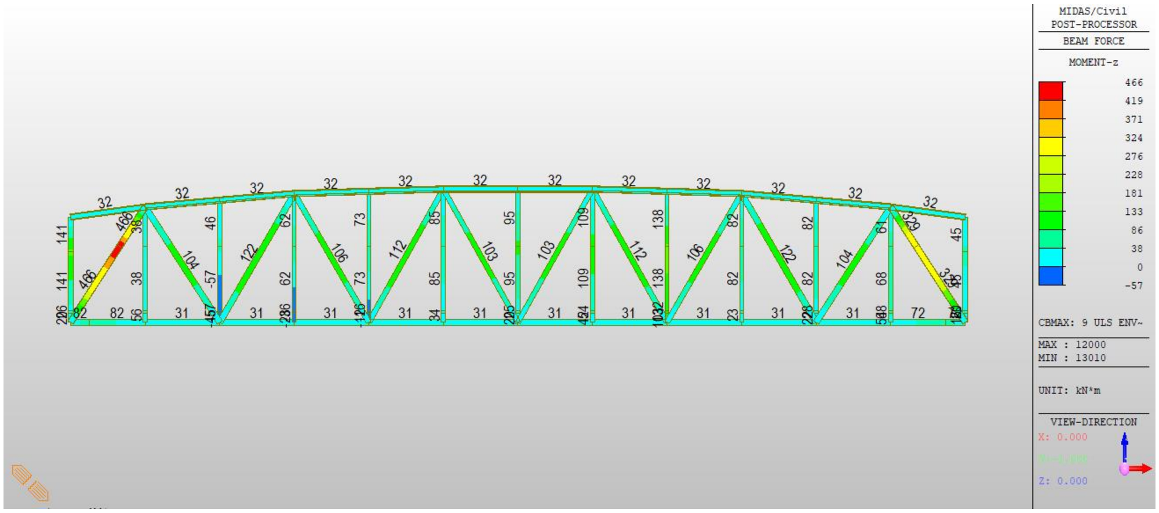

Figure 199 Railway Truss Case 9 ULS M_z Max

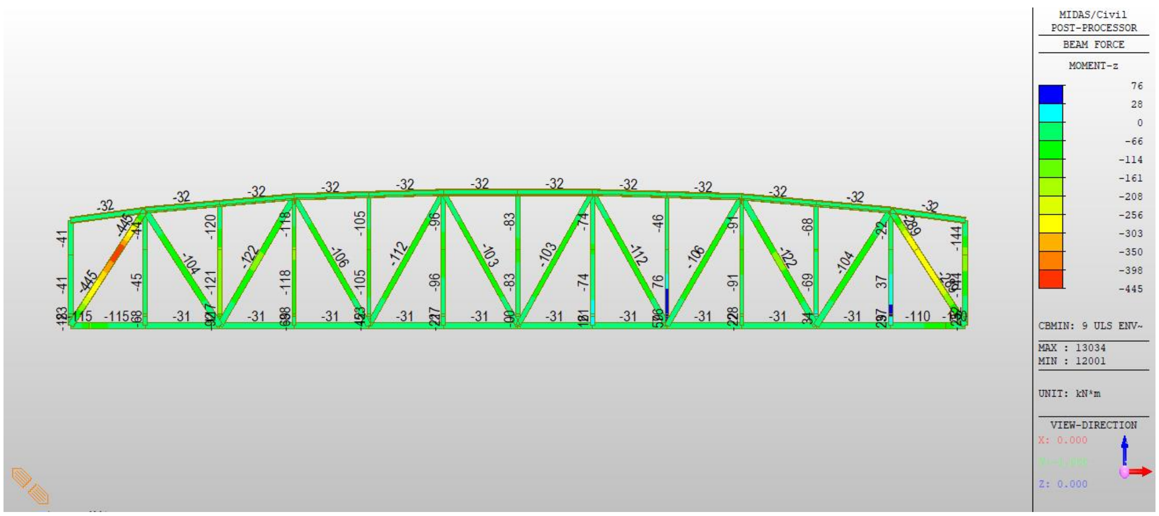

Figure 200 Railway Truss Case 9 ULS M_z Min

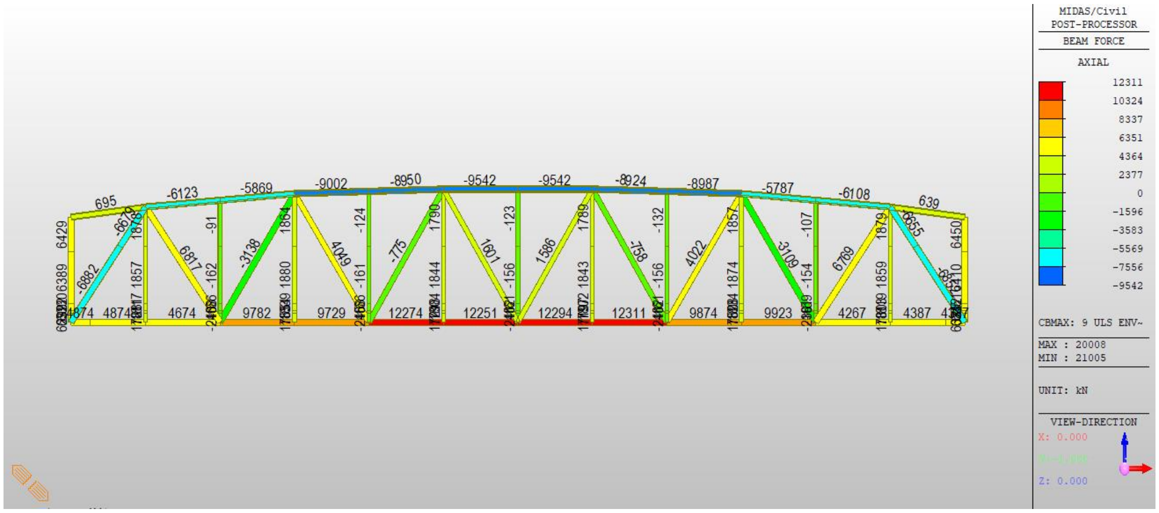

Figure 201 Highway Truss Case 9 ULS Axial Max

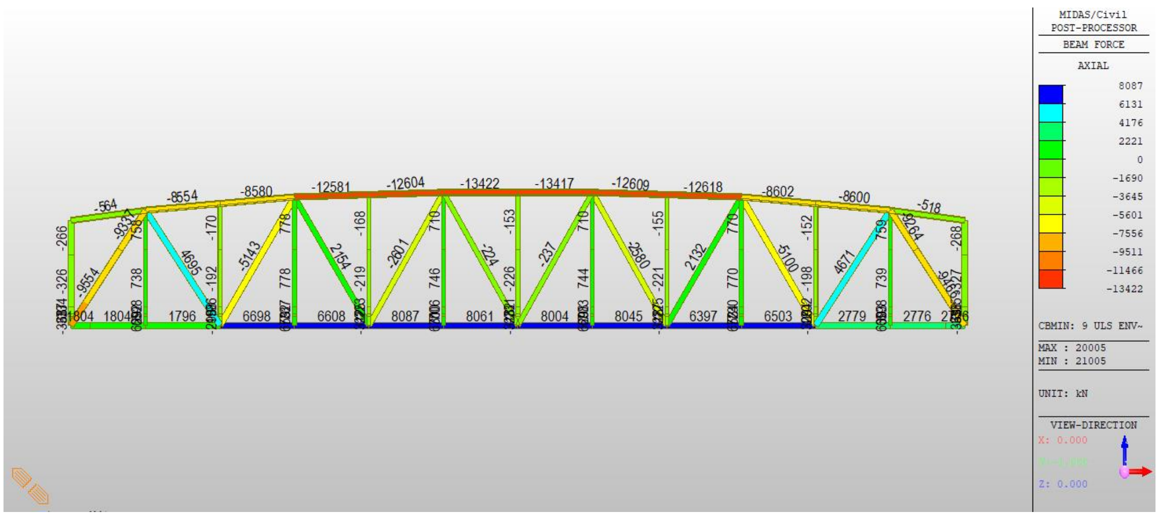

Figure 202 Highway Truss Case 9 ULS Axial Min

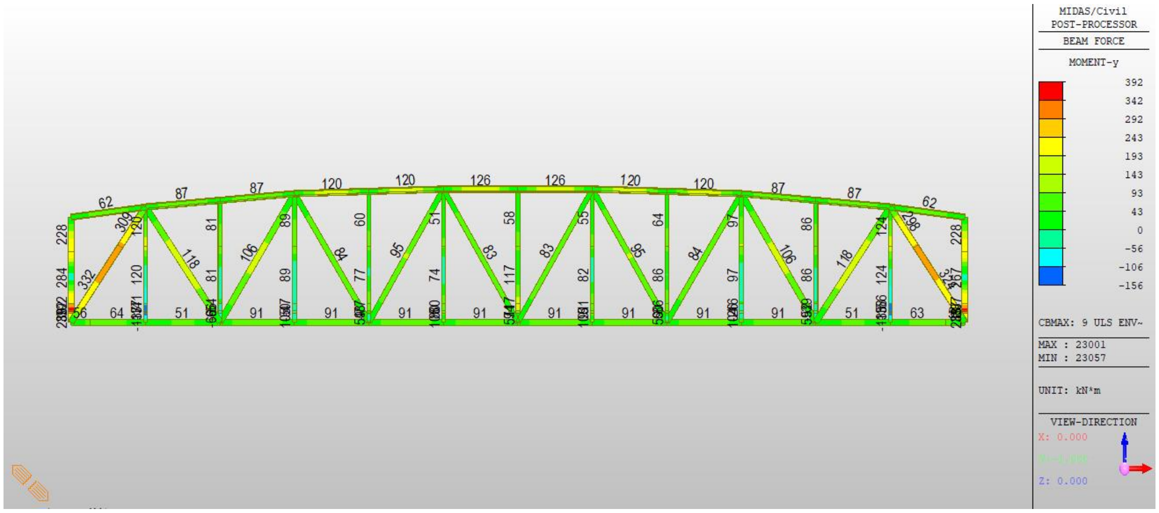

Figure 203 Highway Truss Case 9 ULS M_y Max

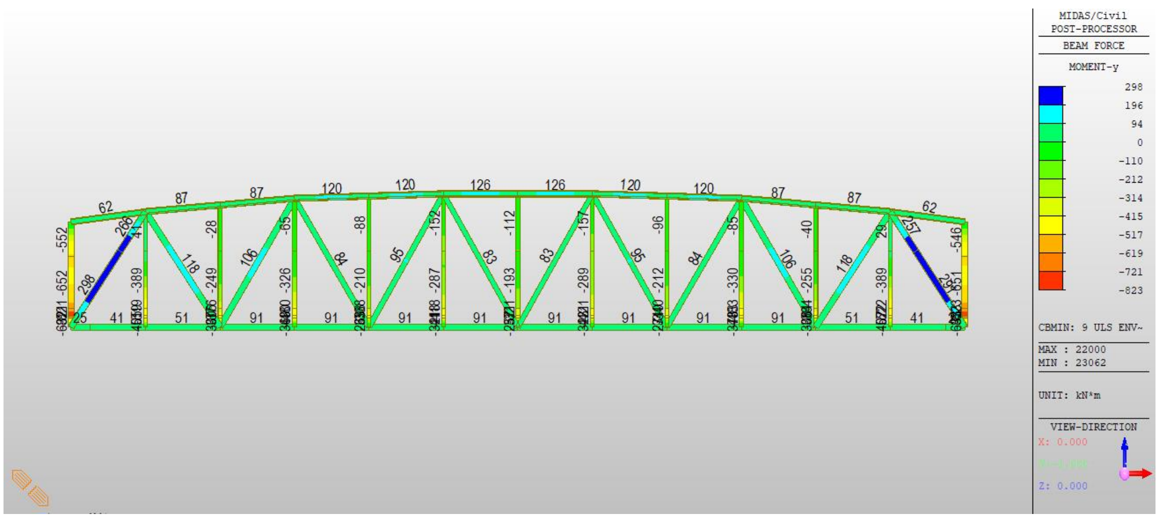

Figure 204 Highway Truss Case 9 ULS M_y Min

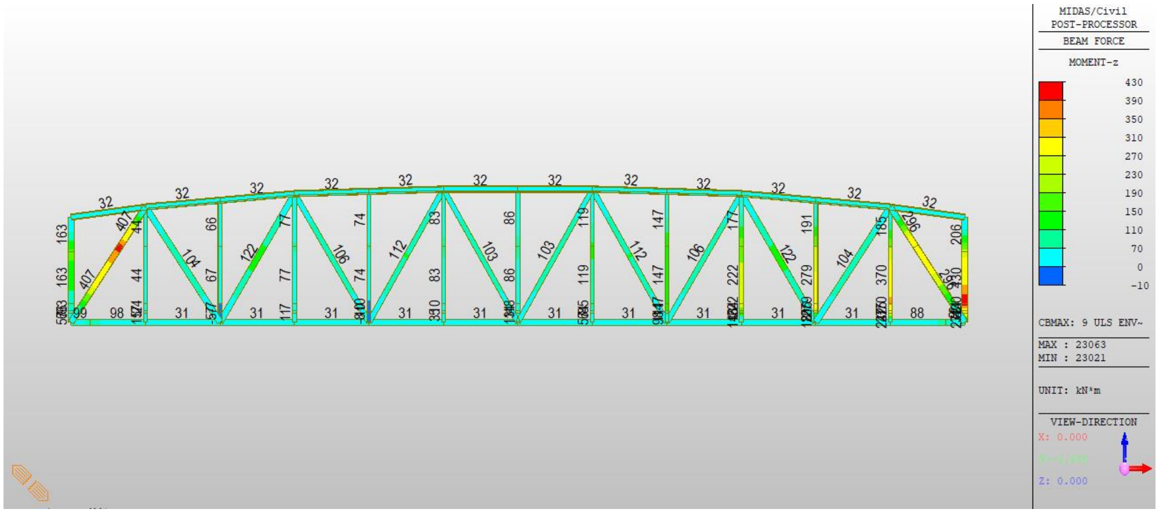

Figure 205 Highway Truss Case 9 ULS M_z Max

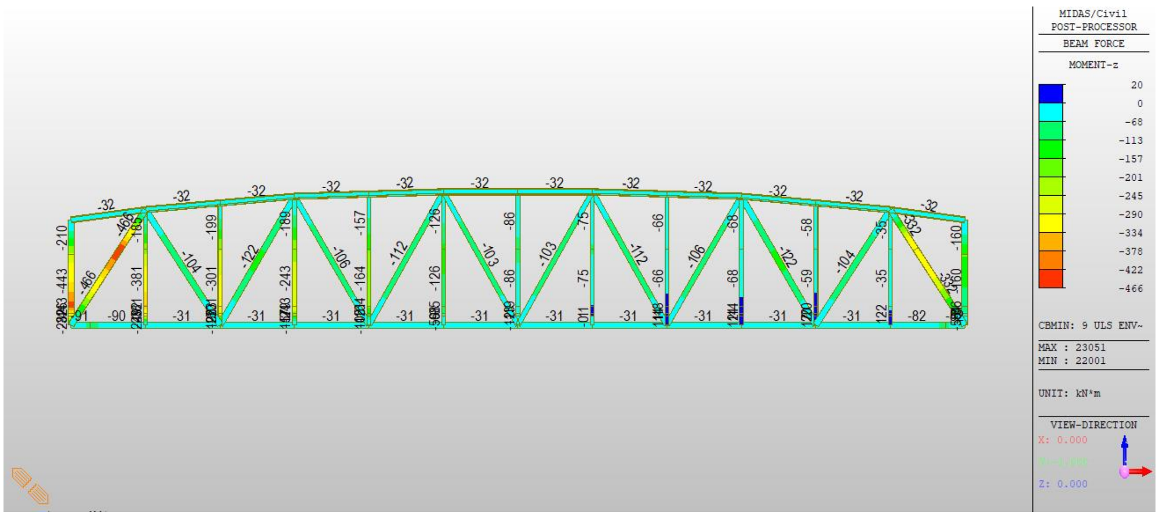

Figure 206 Highway Truss Case 9 ULS M_z Min

Figure 207 Lift Girder Case 9 ULS M_y Max

Figure 208 Lift Girder Case 9 ULS M_y Min

Figure 209 Lift Girder Case 9 ULS F_z Max

Figure 210 Lift Girder Case 9 ULS F_z Min

Figure 211 End Floor Beam Case 9 ULS M_y Max

Figure 212 End Floor Beam Case 9 ULS M_y Min

Figure 213 End Floor Beam Case 9 ULS F_z Max

Figure 214 End Floor Beam Case 9 ULS F_z Min

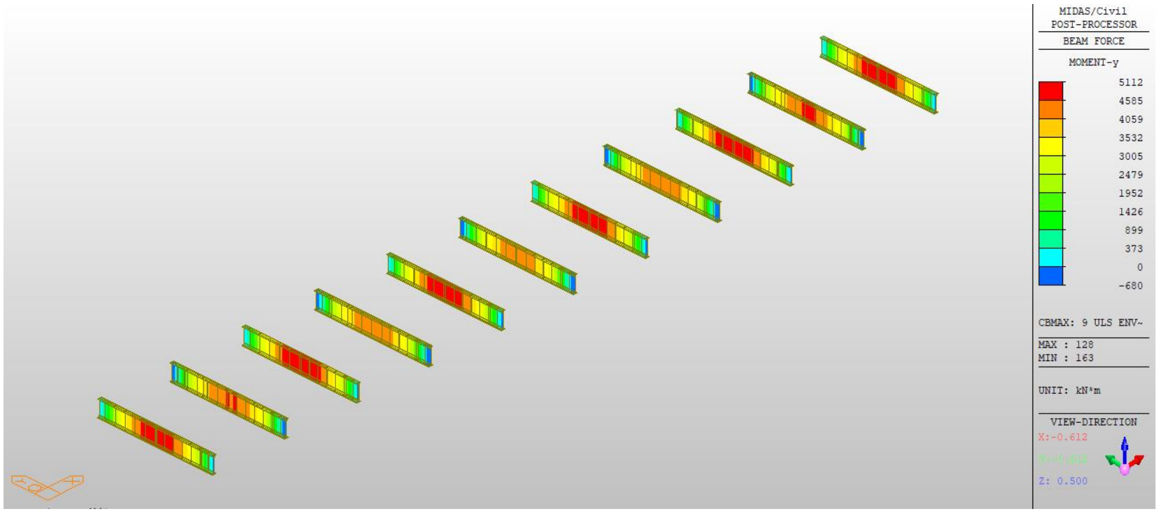

Figure 215 Interior Floor Beam Case 9 ULS M_y Max

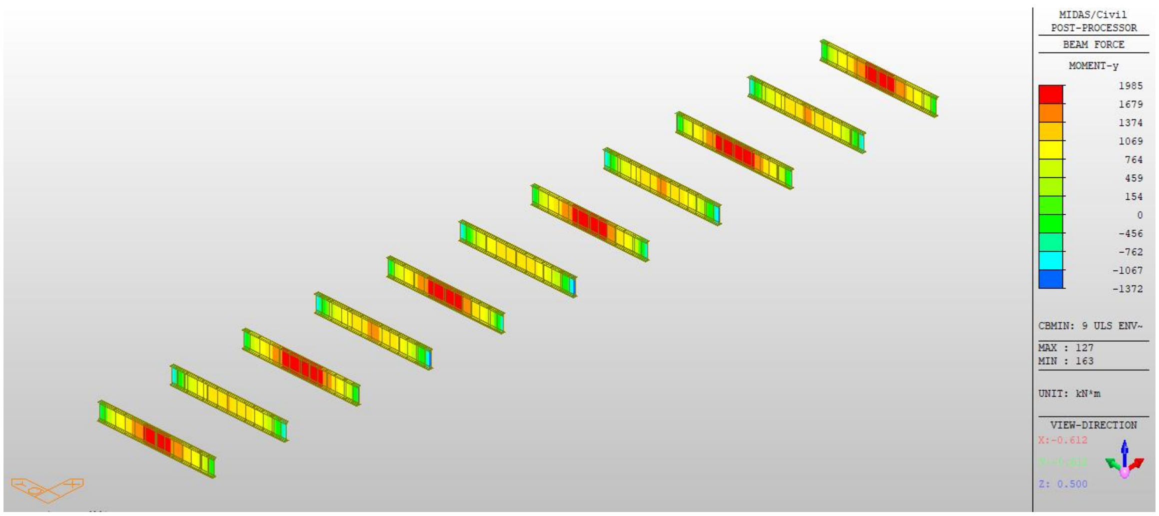

Figure 216 Interior Floor Beam Case 9 ULS M_y Min

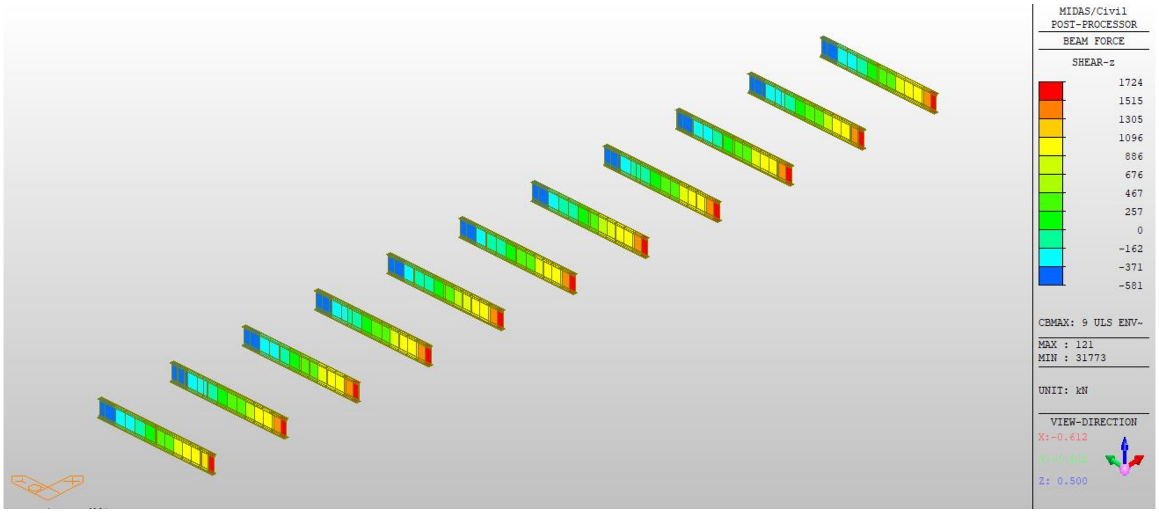

Figure 217 Interior Floor Beam Case 9 ULS F_z Max

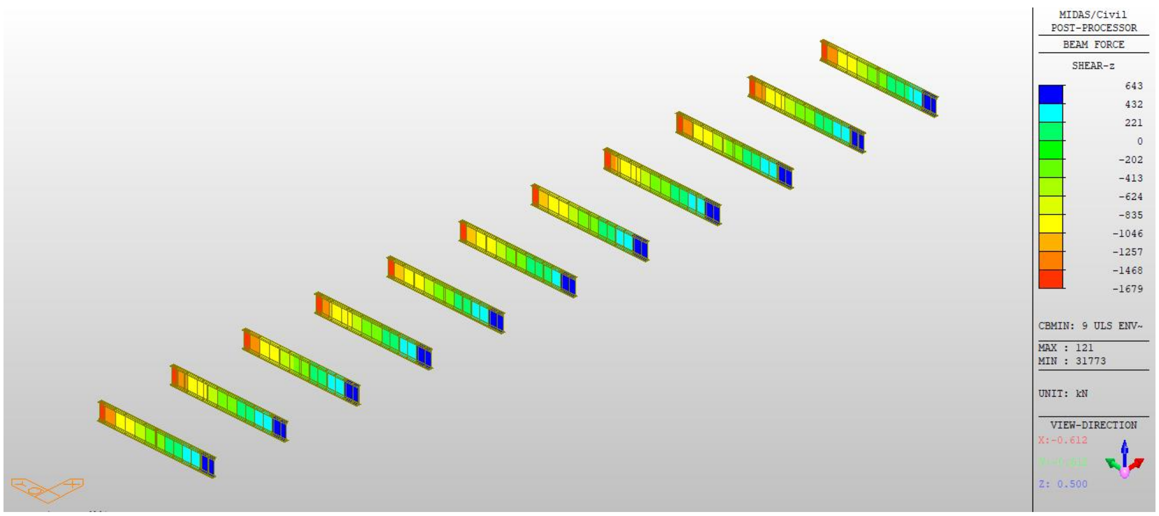

Figure 218 Interior Floor Beam Case 9 ULS F_z Min

Exhibit E.11

Concept Design Stringer Calculations and Models

AECOM Imagine it. Delivered.

JOB TITLE	BCLB DECK Concept Design Stringer Calculations		
JOB NO.	60637587	CALCULATION NO.	
ORIGINATOR BY	RA	DATE	31-May-21
CHECKED BY	KG	DATE	8-Jun-21

Bridge Length Between End Floor Beams = 112776 mm
Entire Bridge Length = 115776 mm
Original Grating Width = 14785 mm
Proposed Grating Width = 14380 mm
Stringer Length = 9.398 m

*Half Filled Grating is Based on Light Weight Concrete with Matacyrl Surface Coating

Riveted Grating Properties			Half Filled Grating Properties		
Designation:	R/W-24-4		Designation:	R/R-L 10-3.33X4	
Grating Depth:	5.50	in	Grating Depth:	5+3/16	in
Grating Weight:	138.7	kg/m2	Grating Weight:	201.5	kg/m2
Stringer Spacing	940	mm	Stringer Spacing	1565	mm
Stringers/ Span	16		Stringers/ Span	10	

Decking Option	Stringer Designation	Stringer Weight	Stringer Moment	Grating Moment	MF Truck	VF Truck	Stringer ULS 1 MF	Stringer ULS 1 VF
		kN/m	kNm	kNm	kNm	kN	kNm	kN
Rivetted Grating	W610X82	0.808	8.9	14.1	201.0	102.0	367	184.2
	W530x74	0.733	8.1	14.1	201.0	102.0	366	183.8
	W530x66	0.645	7.1	14.1	201.0	102.0	365	183.3
Half Filled Grating	W610X101	0.997	11.0	34.1	295.0	141.0	555	260.8
	W610X92	0.91	10.0	34.1	295.0	141.0	554	260.4
	W610X82	0.808	8.9	34.1	295.0	141.0	552	259.9

Φ =	0.95	
Fy =	350	mpa

Steel Section Properties Taken from Steel Handbook									
	Weight	Ix	Sx	Z	d	b	t	w	h	a
Rolled Section	kN/m	mm^4	mm^3	mm^3	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)
W610X125	1.230	985	3220	3670	612	229	19.6	11.9	572.8	3133
W610X113	1.110	875	2880	3290	608	228	17.3	11.2	573.4	3133
W610X101	0.997	764	2530	2900	603	228	14.9	10.5	573.2	3133
W610X92	0.910	651	2160	2530	603	179	15.0	10.9	573.0	3133
W610X82	0.808	565	1880	2210	599	178	12.8	10	573.4	3133
W530x74	0.733	411	1550	1810	529	166	13.6	9.7	501.8	3133
W530x66	0.645	351	1340	1560	525	165	11.4	8.9	502.2	3133

	Flange					Web				
Rolled Section	b/t	Class 1	Class 2	Class 3	Class	h/w	Class 1	Class 2	Class 3	Class
W610X125	5.8	7.8	9.1	10.7	Class 1	48.1	58.8	90.9	101.6	Class 1
W610X113	6.6	7.8	9.1	10.7	Class 1	51.2	58.8	90.9	101.6	Class 1
W610X101	7.7	7.8	9.1	10.7	Class 1	54.6	58.8	90.9	101.6	Class 1
W610X92	6.0	7.8	9.1	10.7	Class 1	52.6	58.8	90.9	101.6	Class 1
W610X82	7.0	7.8	9.1	10.7	Class 1	57.3	58.8	90.9	101.6	Class 1
W530x74	6.1	7.8	9.1	10.7	Class 1	51.7	58.8	90.9	101.6	Class 1
W530x66	7.2	7.8	9.1	10.7	Class 1	56.4	58.8	90.9	101.6	Class 1

Moment Calcs as per: CHBDC 10.10.2.2
Shear Calcs as per: CHBDC 10.10.5.1

Rolled Section	Moment Resistance	Shear Resistance
	kN*m	kN
W610X125	1220	1307.7
W610X113	1094	1232.1
W610X101	964	1154.7
W610X92	841	1198.3
W610X82	735	1100.1
W530x74	602	933.8
W530x66	519	857.5

Decking Option	Stringer Designation	Stringer MR	Stringer MF	Stringer Vr	Stringer VF	Stringer MR Utilization	Stringer VR Utilization
		kNm	kNm	kN	kN	Percent	Percent
Riveted Grating	W610X82	735	367.0	1100.1	184.2	50%	17%
	W530x74	602	366.1	933.8	183.8	61%	20%
	W530x66	519	365.1	857.5	183.3	70%	21%
Half Filled Grating	W610X101	964	554.6	1154.7	260.8	58%	23%
	W610X92	841	553.5	1198.3	260.4	66%	22%
	W610X82	735	552.3	1100.1	259.9	75%	24%

Decking Option	Stringer Designation	Stringer Bridge Weight	Stringer Weight	Grating	Stringer + Grating Weight	Pre Design Stringer + Grating Weight	Stringer + Grating Weight
		kN	kN/m2	kN/m2	kN/m2	kN/m2	kN
Riveted Grating	W610X82	1458.0	0.899	1.360	2.26	2.24	3867
	W530x74	1322.6	0.816	1.360	2.18		3724
	W530x66	1163.8	0.718	1.360	2.08		3557
Half Filled Grating	W610X101	1124.4	0.693	1.976	2.67	2.79	4569
	W610X92	1026.3	0.633	1.976	2.61		4466
	W610X82	911.2	0.562	1.976	2.54		4344

Decking Option	Stringer Designation	Unit Weights	Total Deck Weight	Total Change	Total Change	Total Change	Total Bridge weight
		kn/m2	kN	kN	kg	tonne	tonne
Existing Grating	W610X125	2.00	3421	0	0	0	1785
Riveted Grating	W610X82	2.26	3867	446	45495	45	1830
Half Filled	W610X92	2.61	4466	1045	106527	107	1891

Appendix D.11 Concept Design Stringer Models

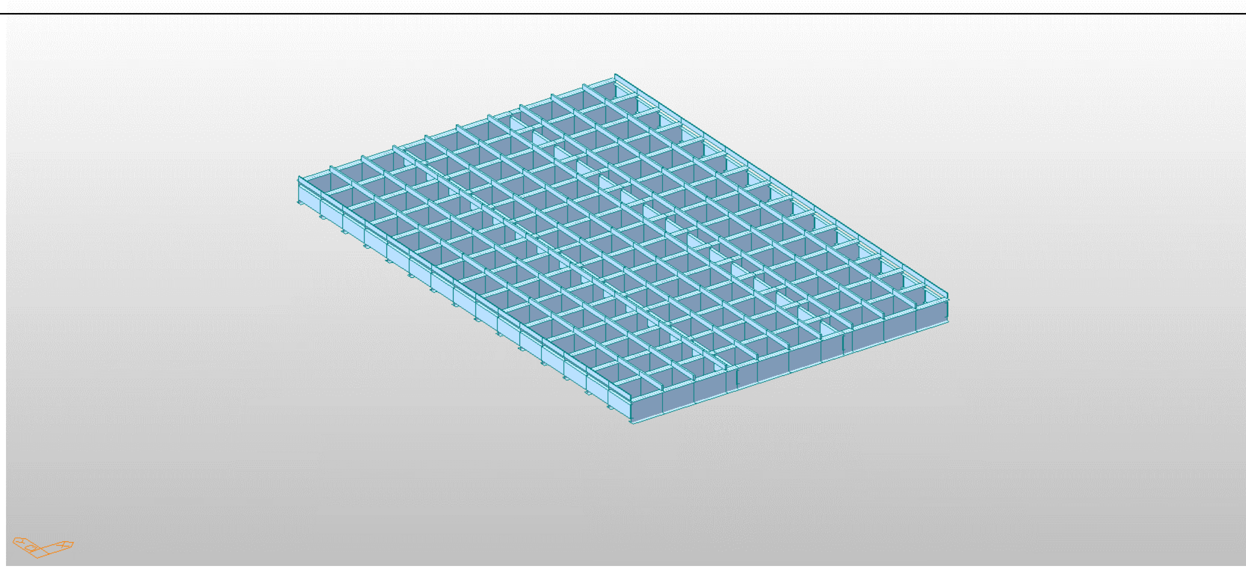

Figure 1 Grating Overview Model

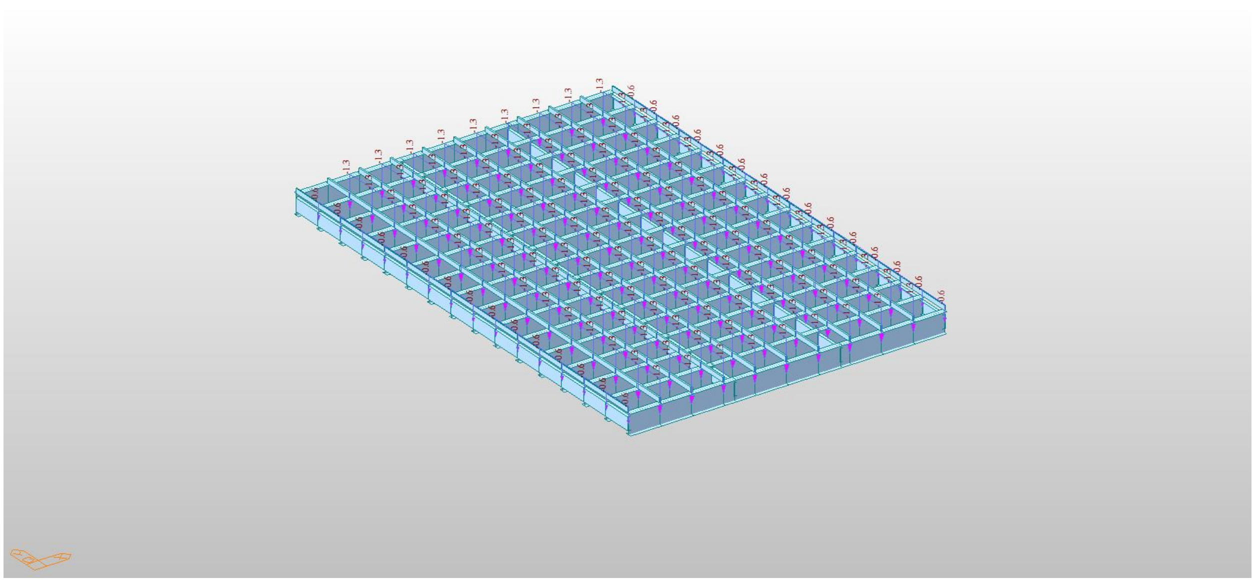

Figure 2 Grating Weight per 1/10th of Span

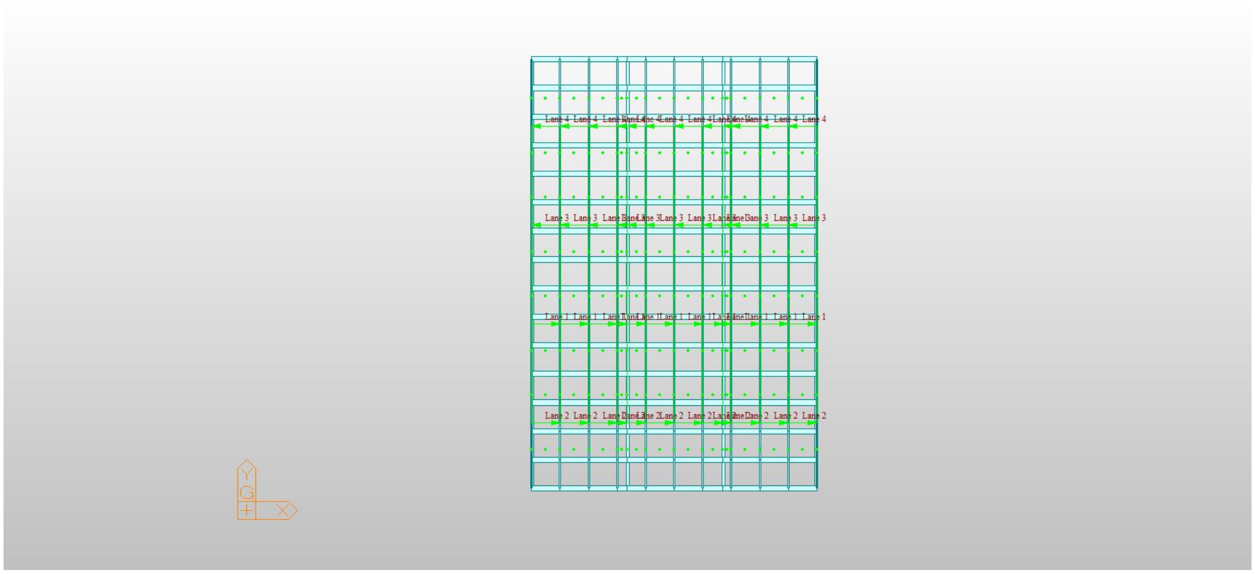

Figure 3 Grating Traffic Lanes

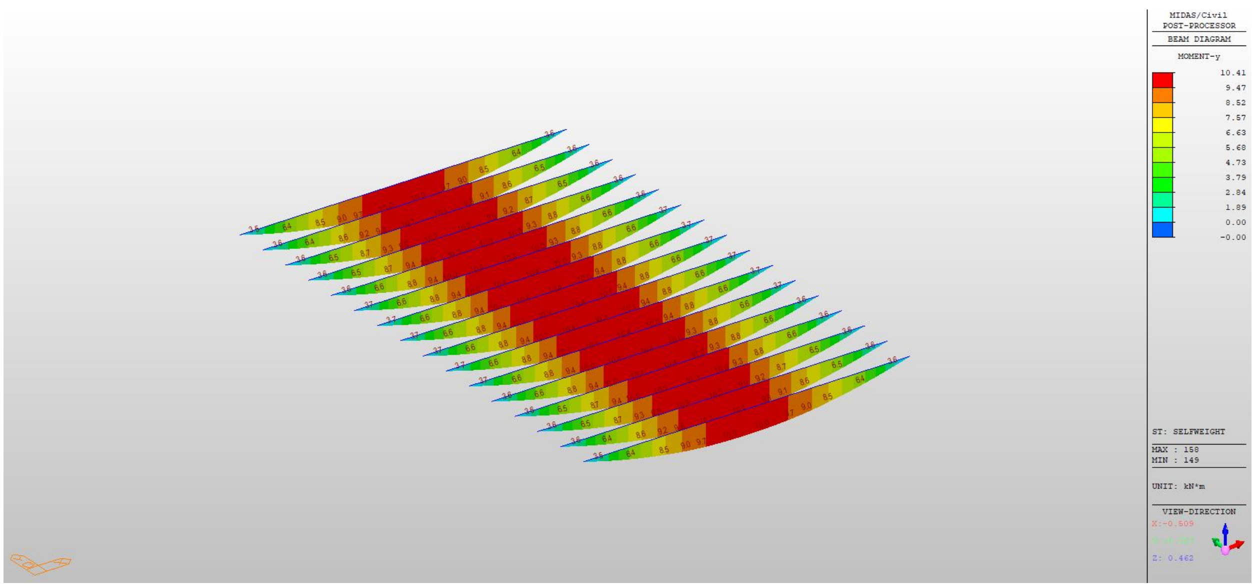

Figure 4 Girder Self Weight Bending Moment

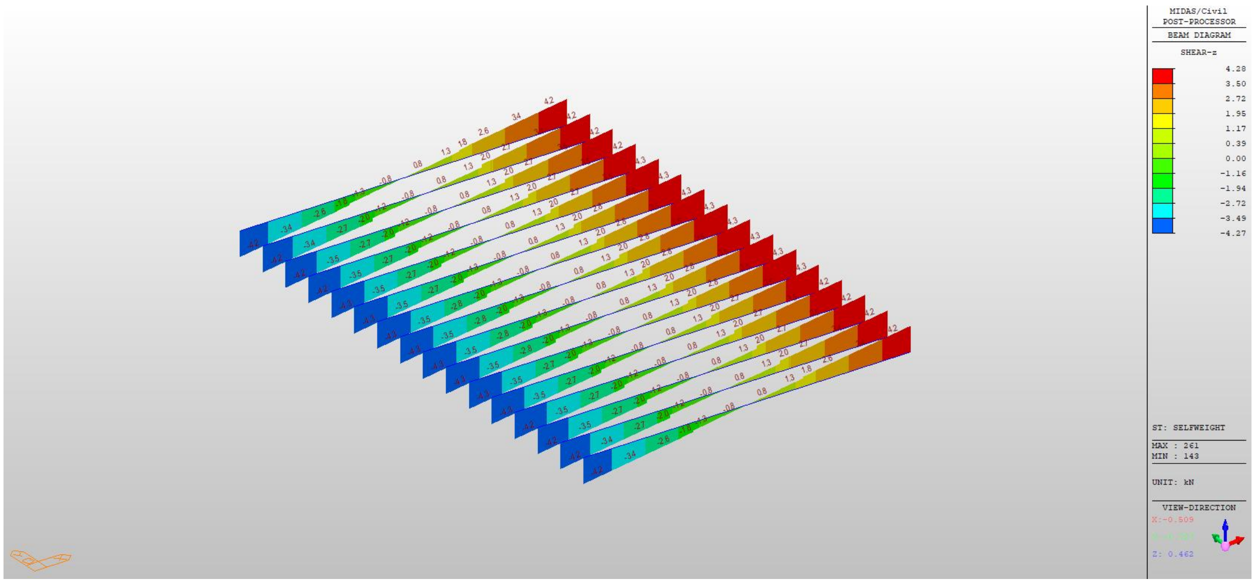

Figure 5 Girder Self Weight Shear

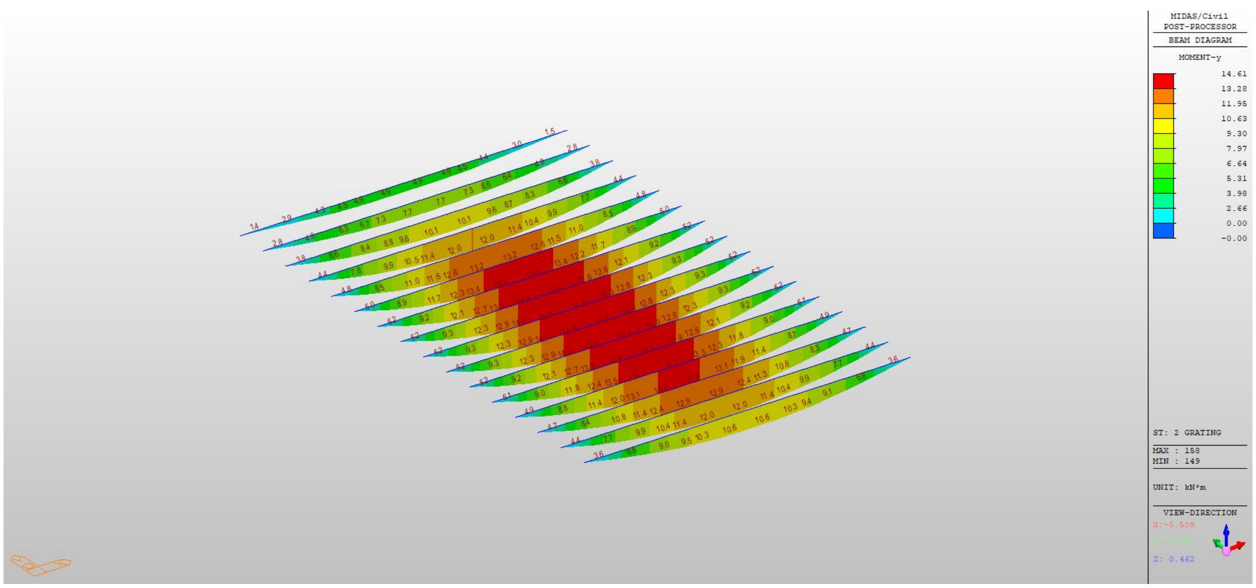

Figure 6 Grating Moment

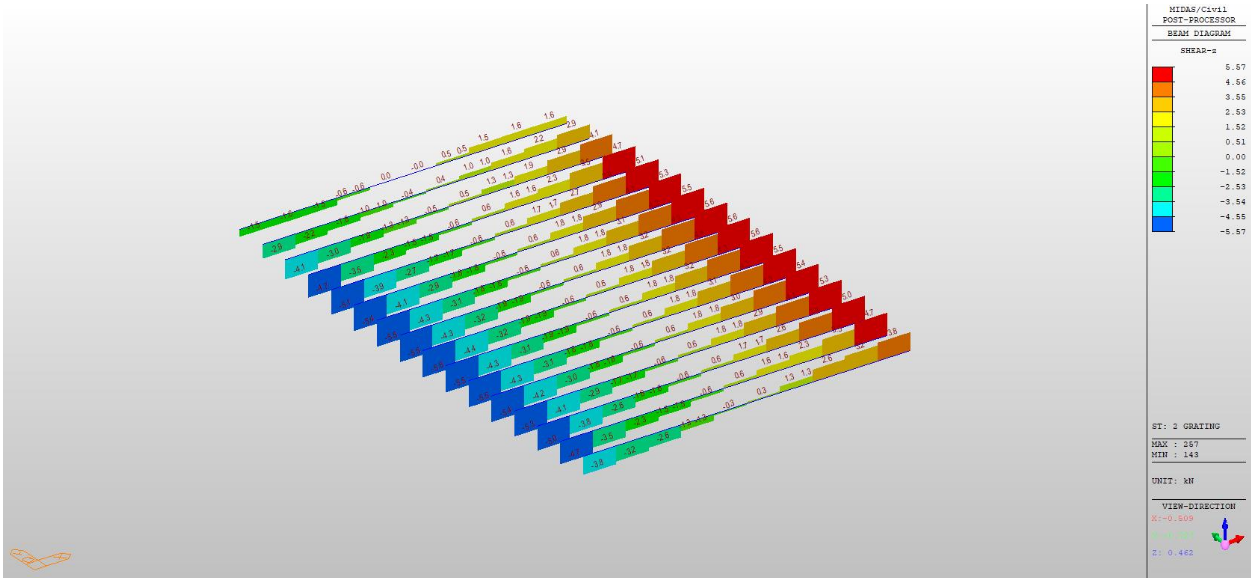

Figure 7 Grating Shear

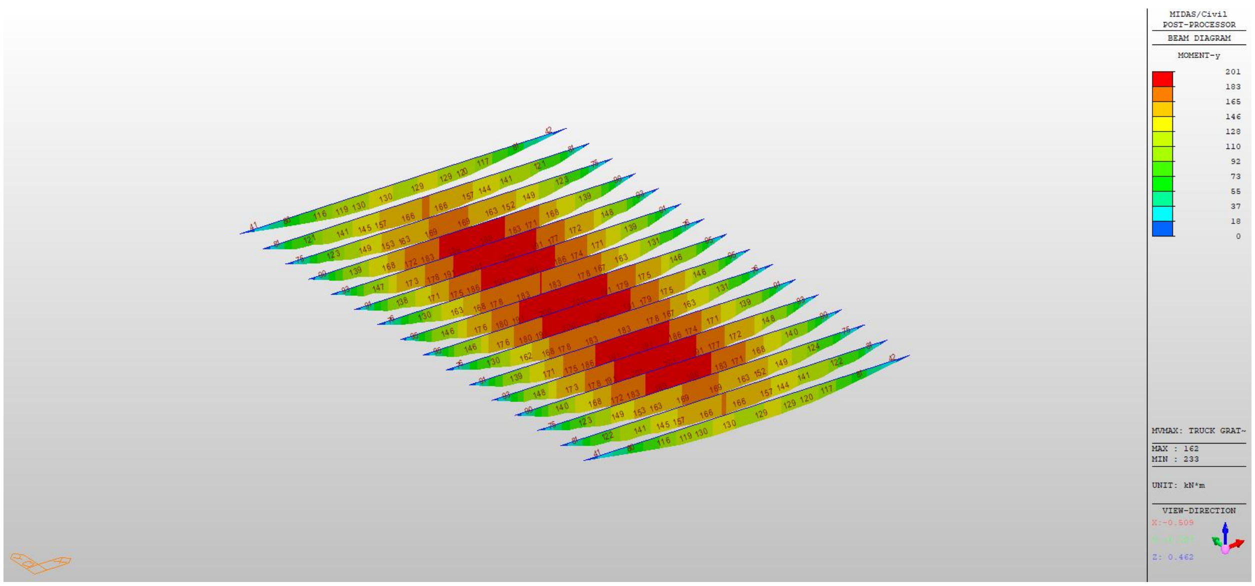

Figure 8 Grating Live Load Moment

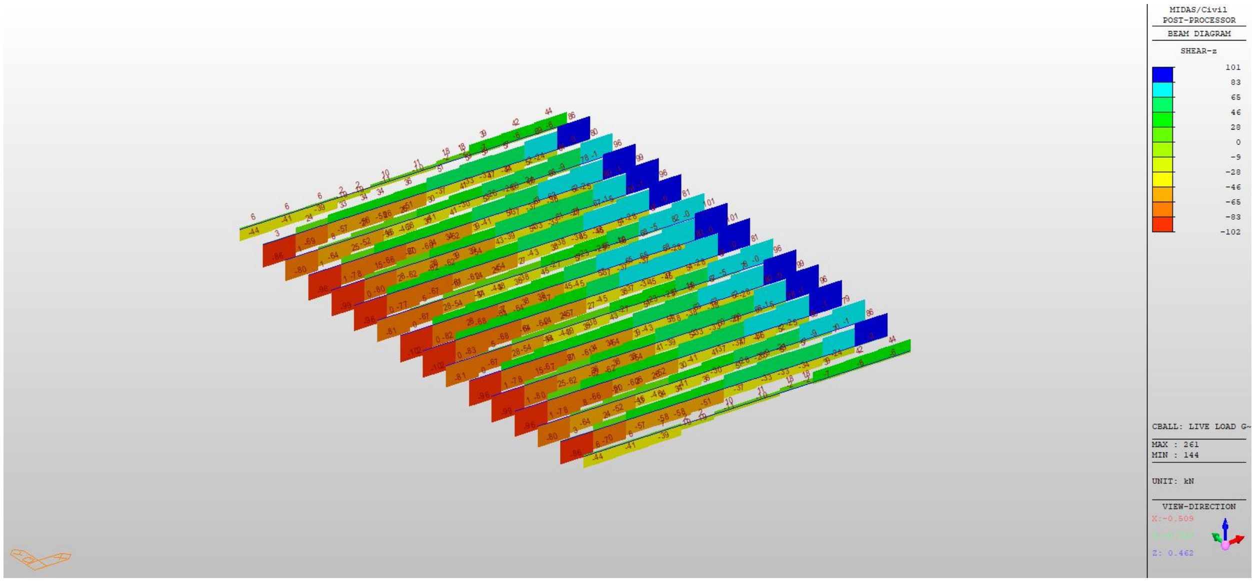

Figure 9 Grating Live Load Shear

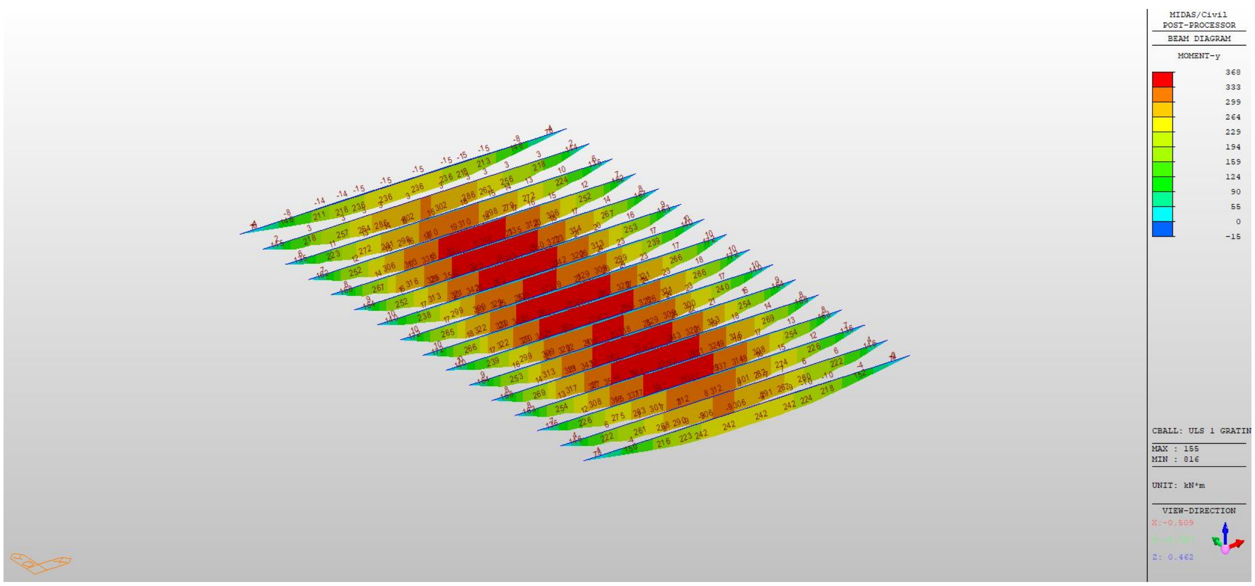

Figure 10 Grating ULS 1 Moment

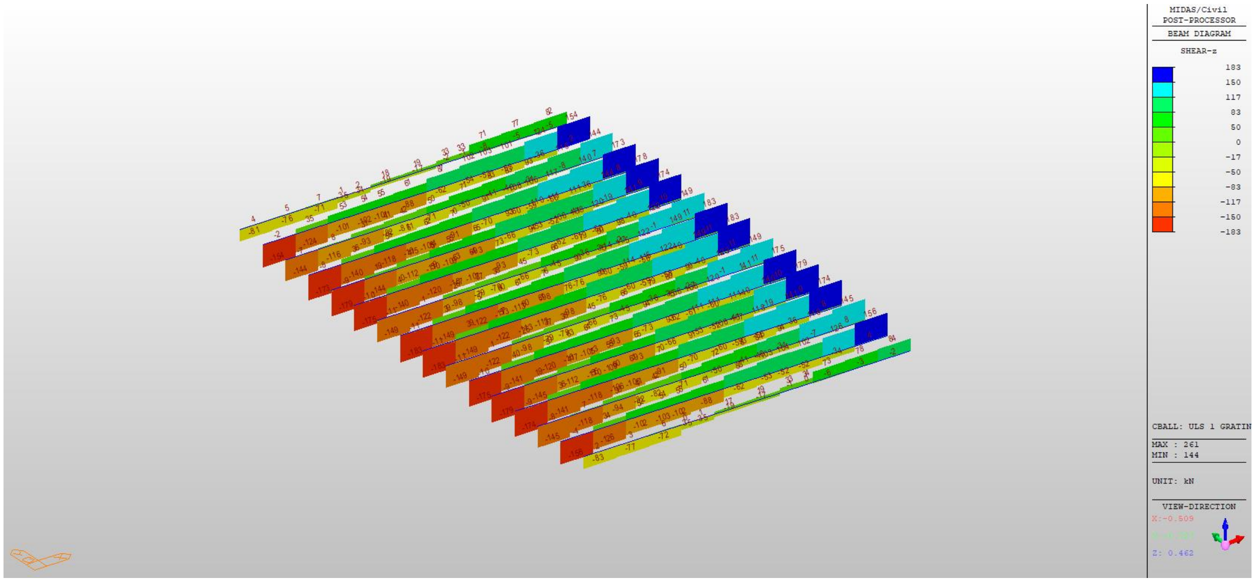

Figure 11 Grating ULS 1 Shear

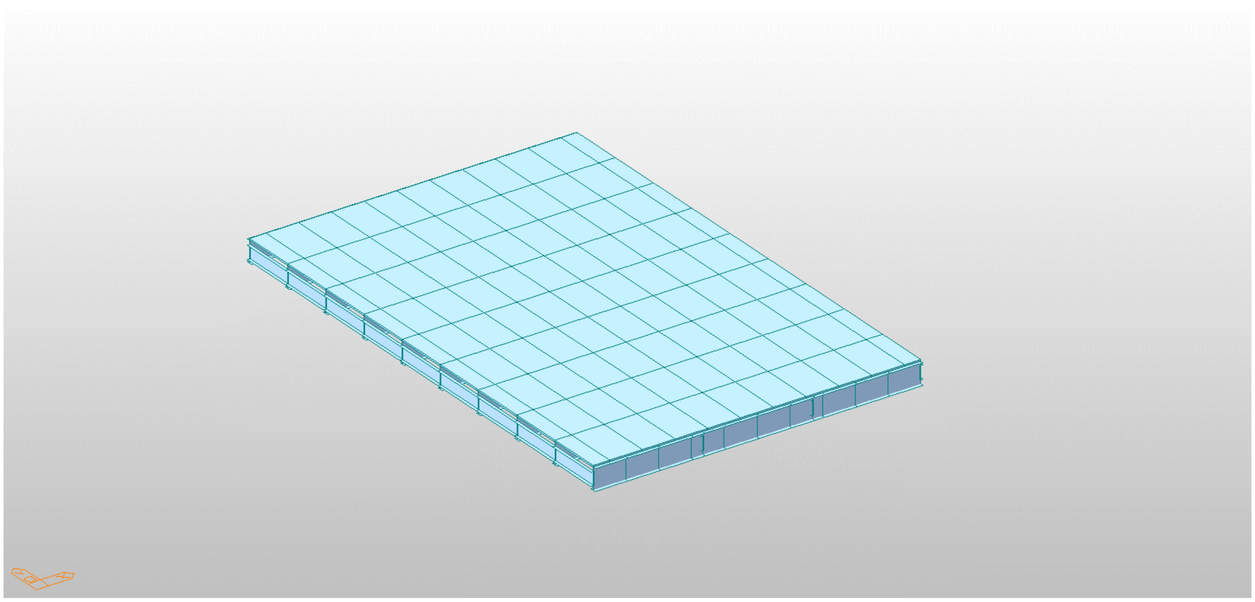

Figure 12 Half Filled Overview Model

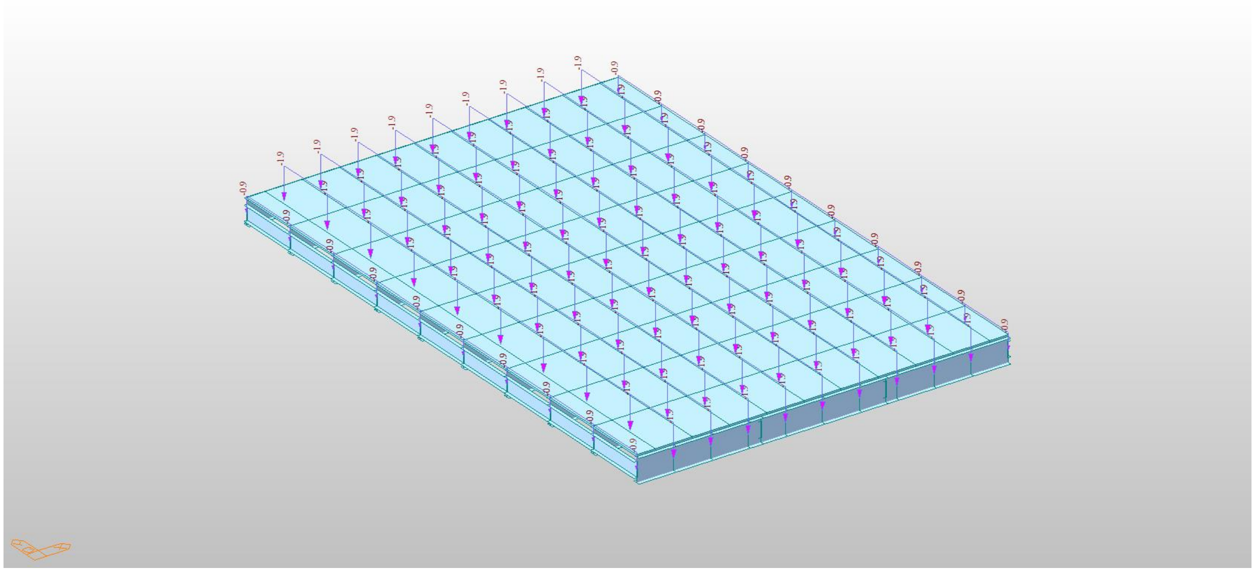

Figure 13 Half Filled Grating Weight per 1/10th Percent Span

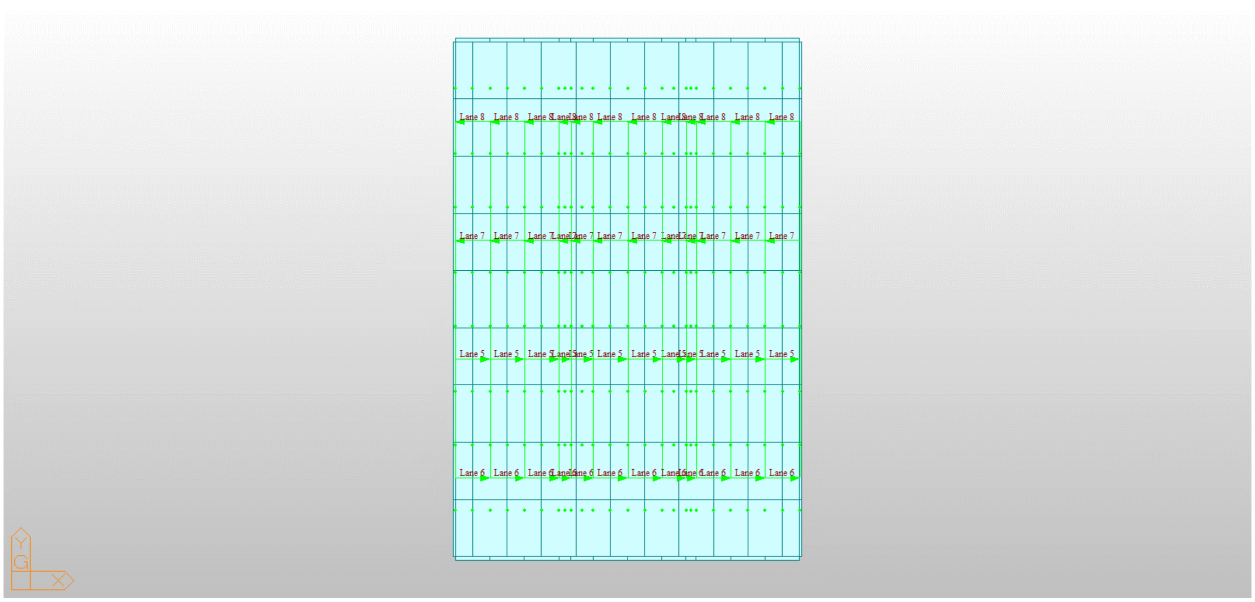

Figure 14 Half Filled Grating Traffic Lanes

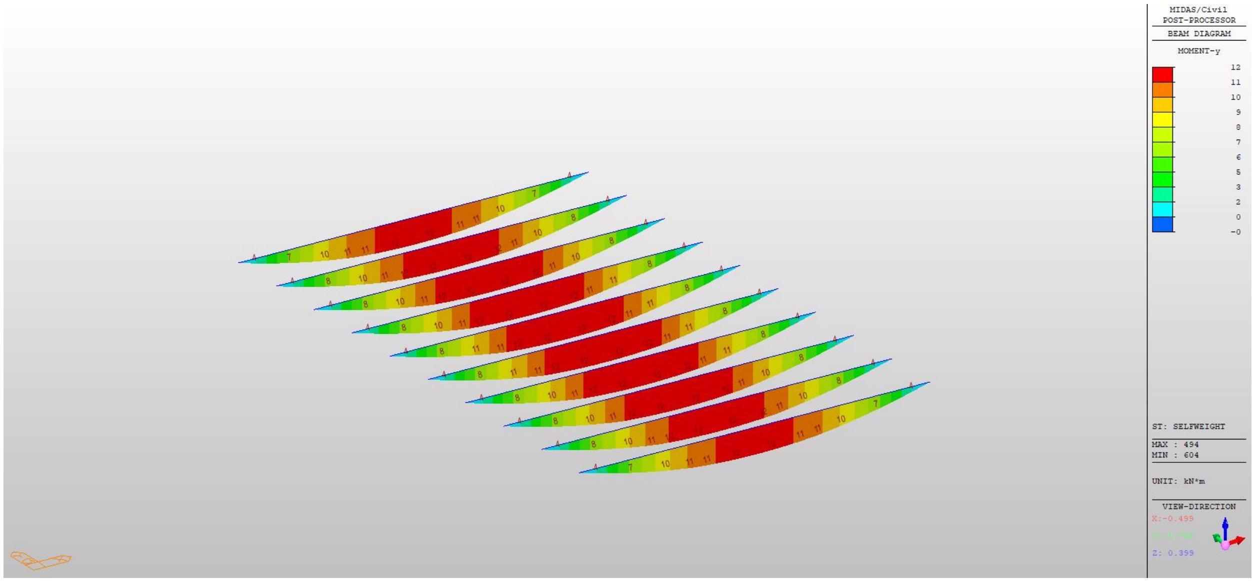

Figure 15 Half Filled Grating - Girder Bending Moment

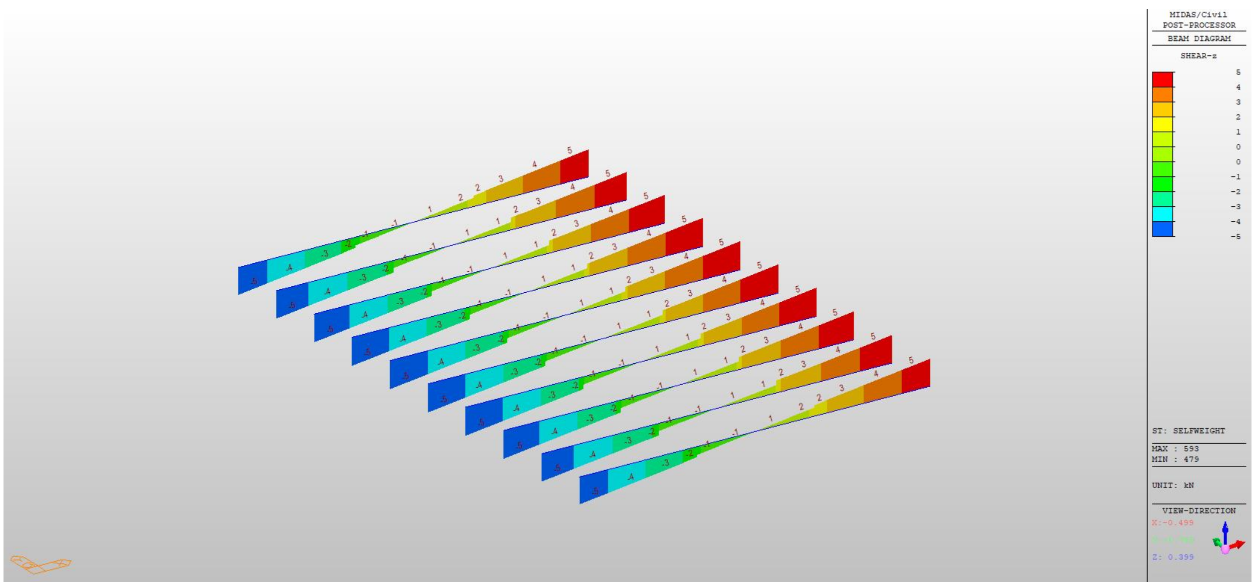

Figure 16 Half Filled Grating - Girder Shear

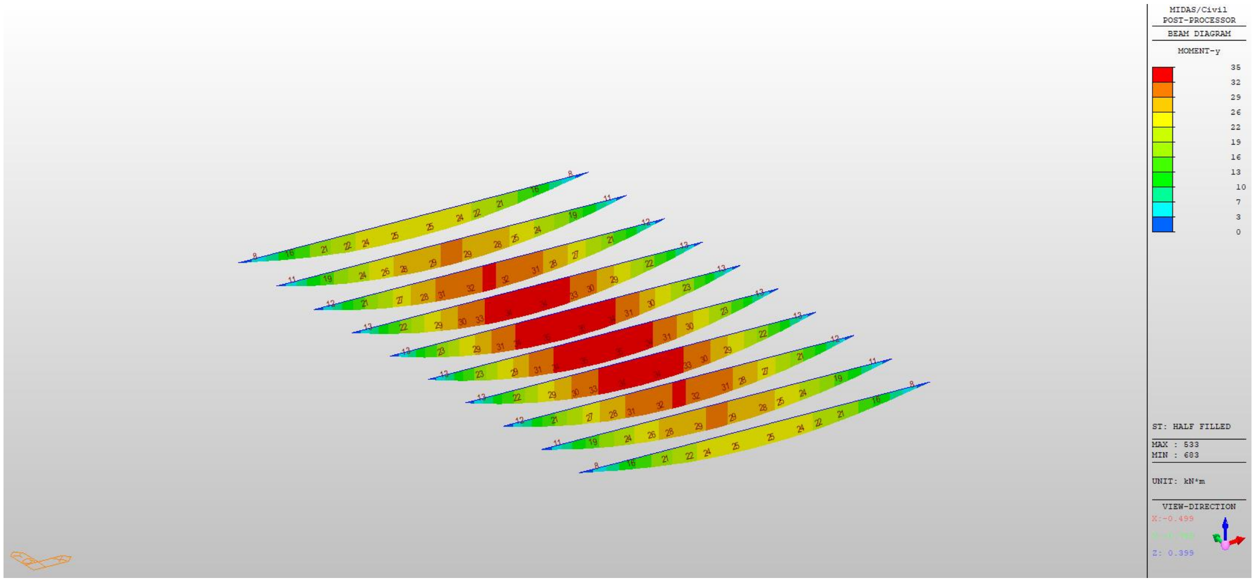

Figure 17 Half Filled Grating Bending Moment

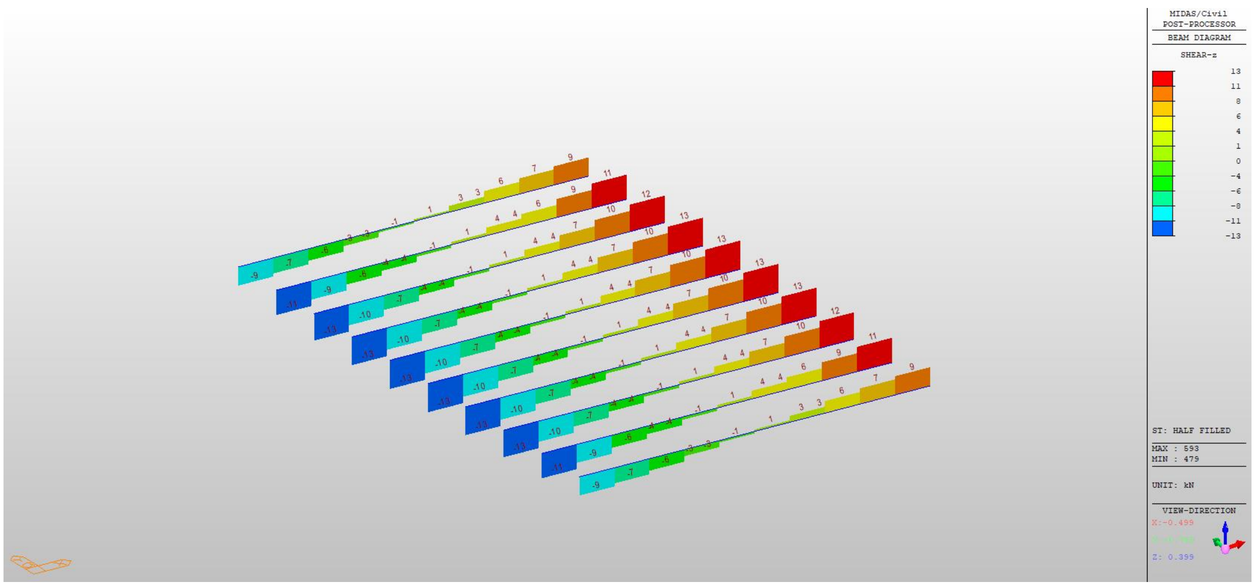

Figure 18 Half Filled Grating Shear

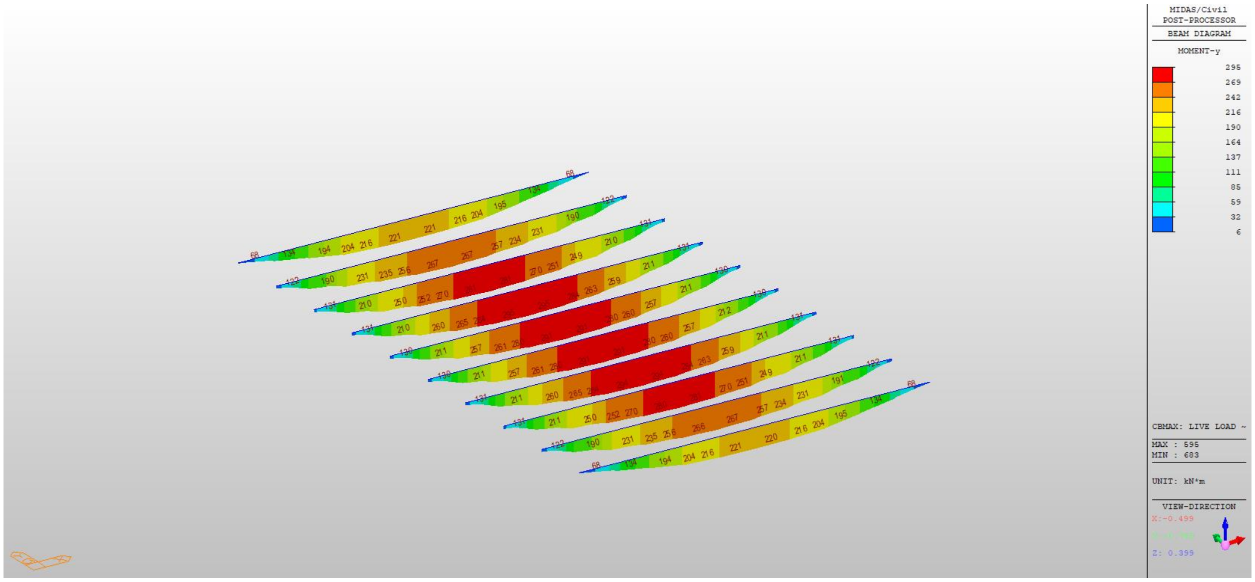

Figure 19 Half Filled Grating Live Load Bending Moment

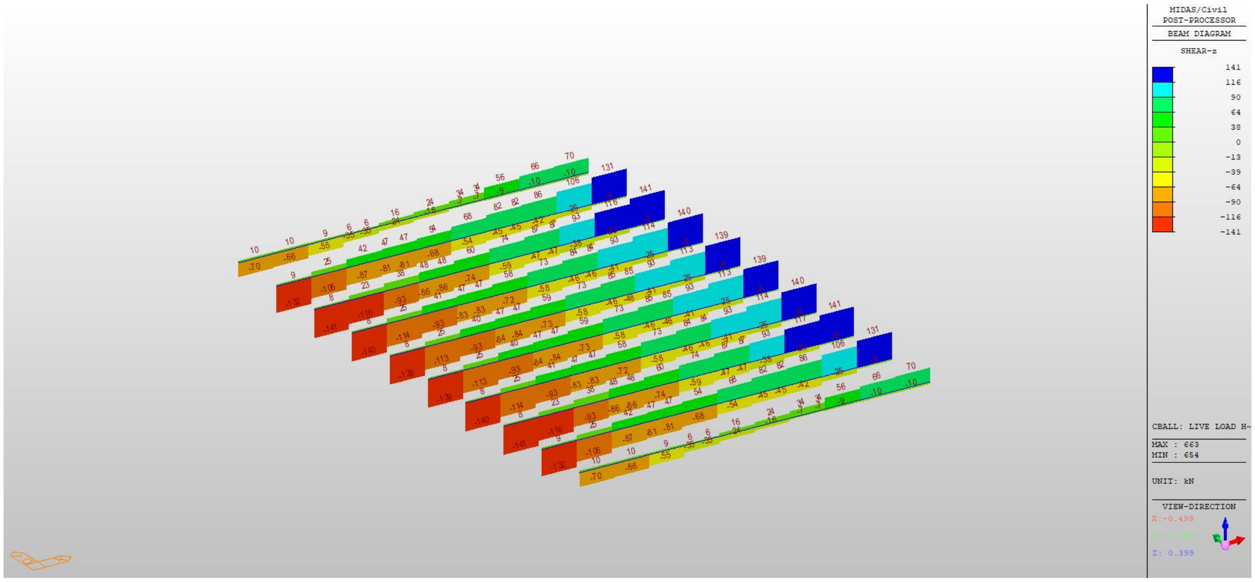

Figure 20 Half Filled Grating Live Load Shear

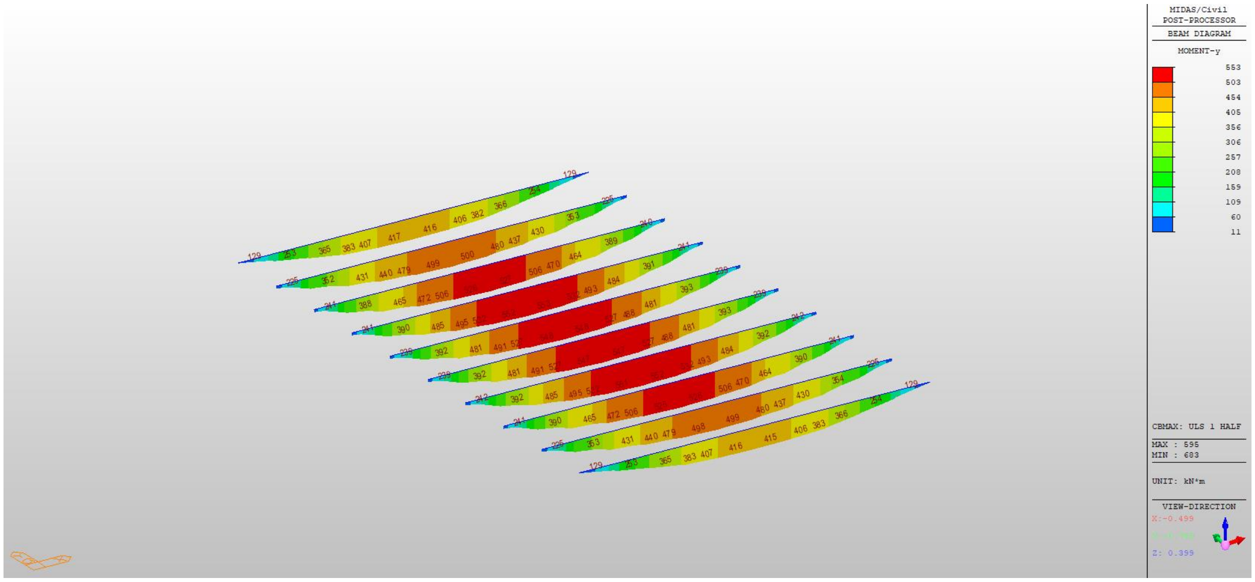

Figure 21 Half Filled Grating ULS 1 Bending Moment

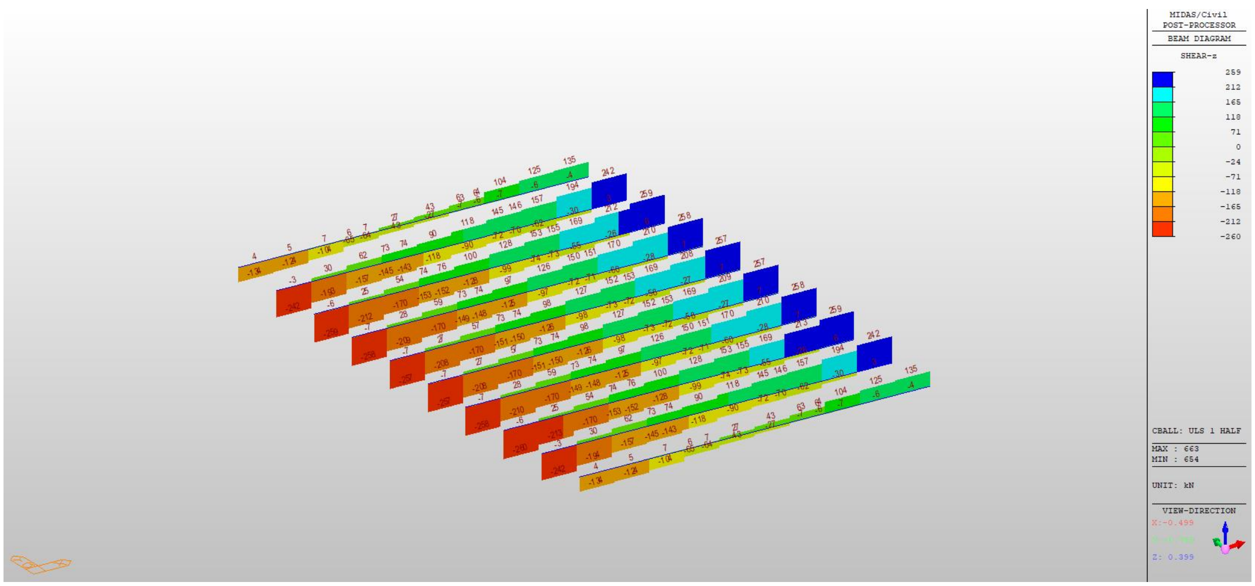

Figure 22 Half Filled Grating ULS 1 Shear

Exhibit E.12

South Tower Rehabilitation Evaluation 3D Model

Exhibit C.2.1. Bridge Weight - Rehabilitation Case Evaluation

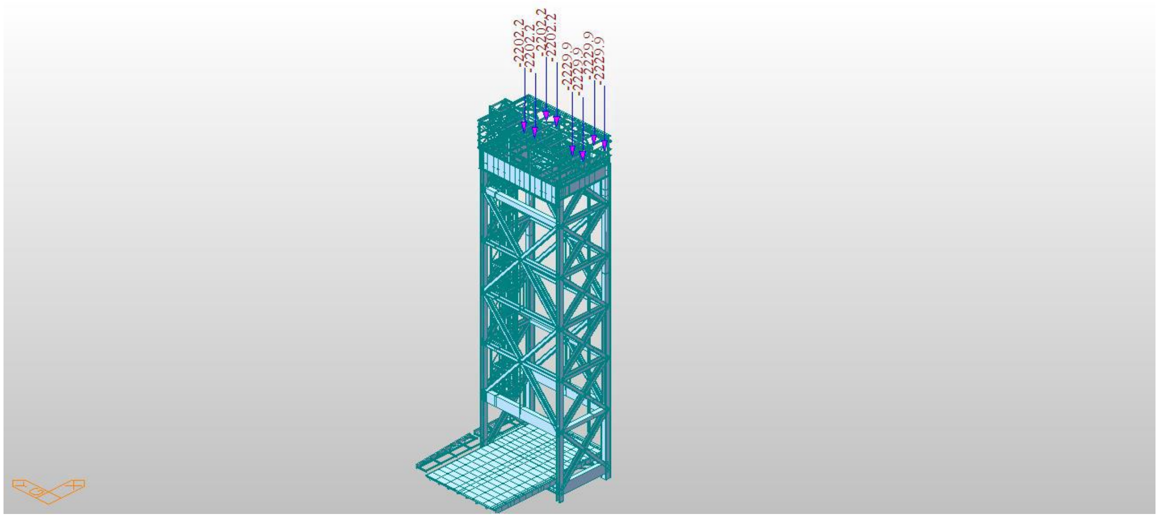

Figure 1 Bridge Weight - Case 1

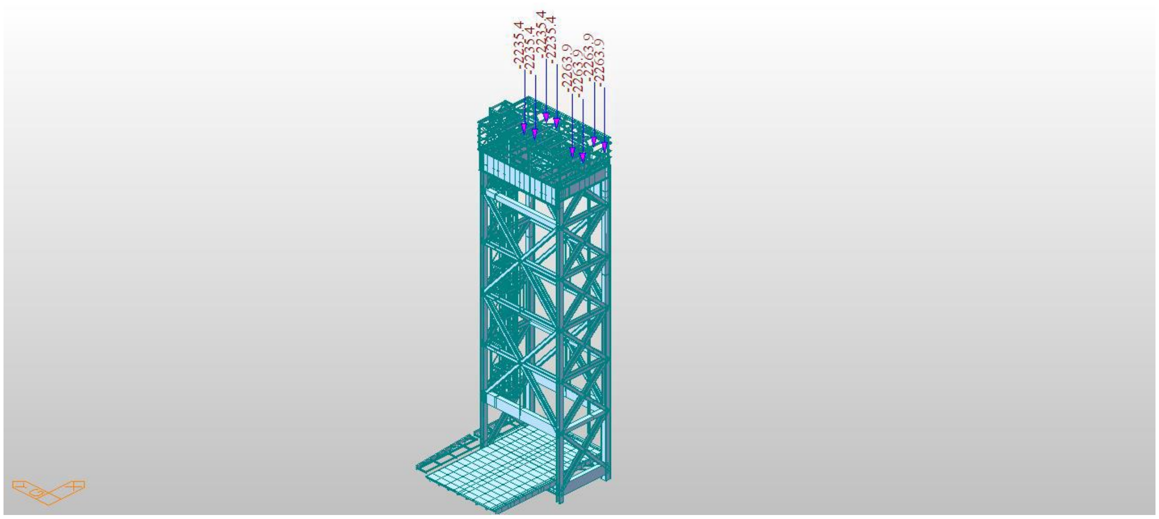

Figure 2 Bridge Weight - Case 2

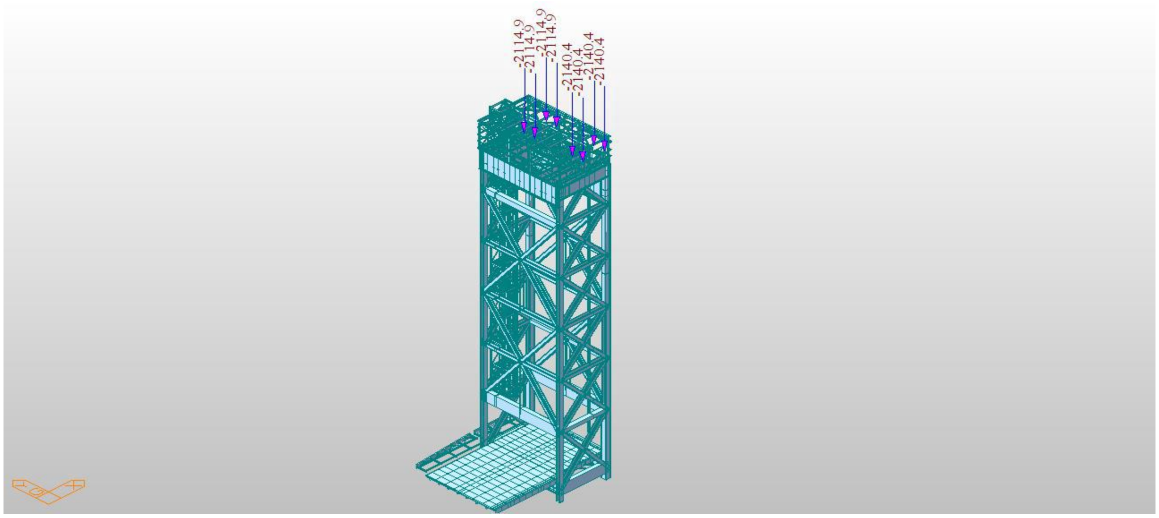

Figure 3 Bridge Weight - Case 3

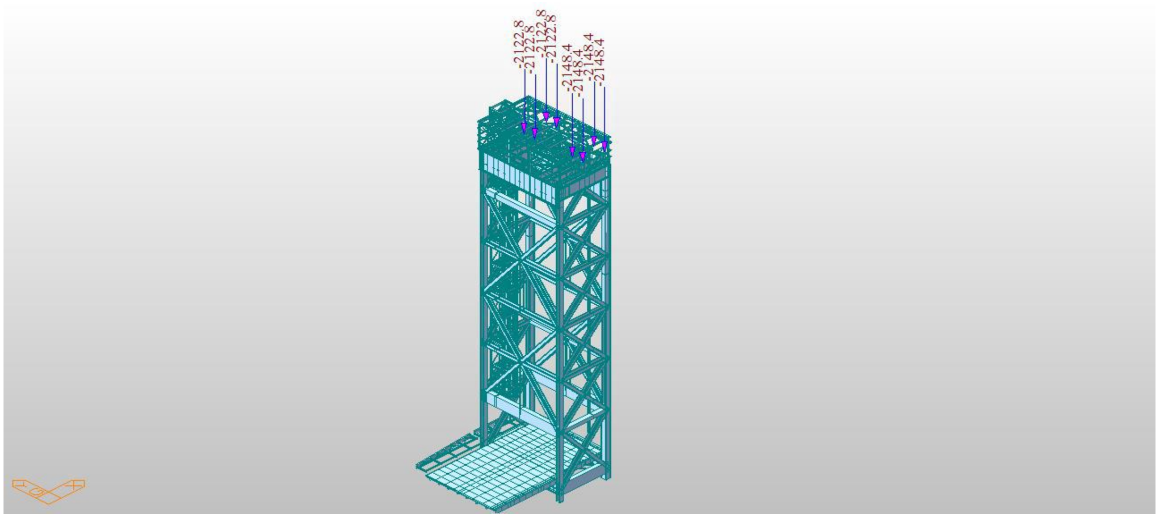

Figure 4 Bridge Weight - Case 4

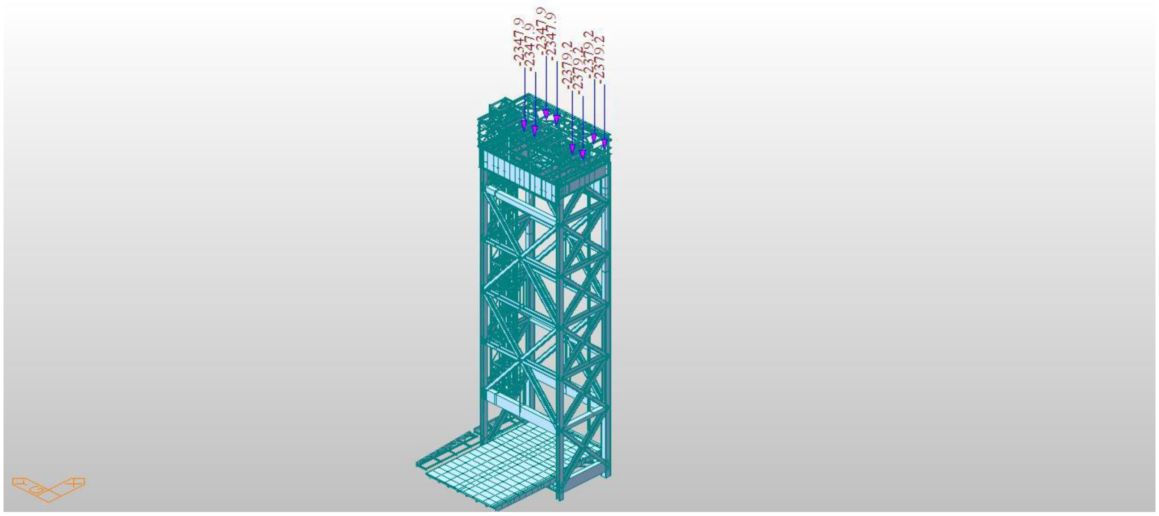

Figure 5 Bridge Weight - Case 5

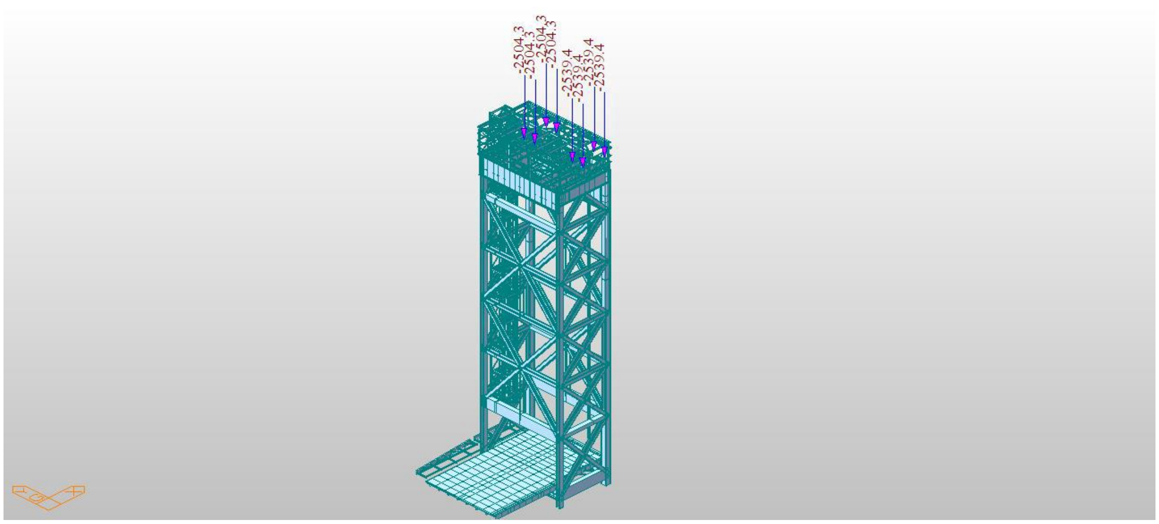

Figure 6 Bridge Weight - Case 7

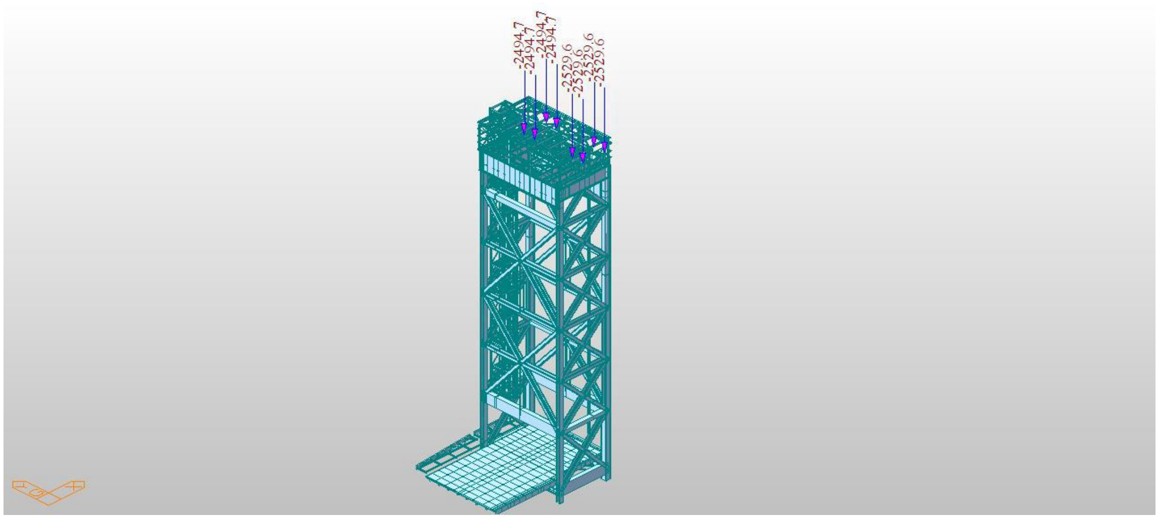

Figure 7 Bridge Weight - Case 8

Exhibit C.2.2. Rehabilitation Case 1

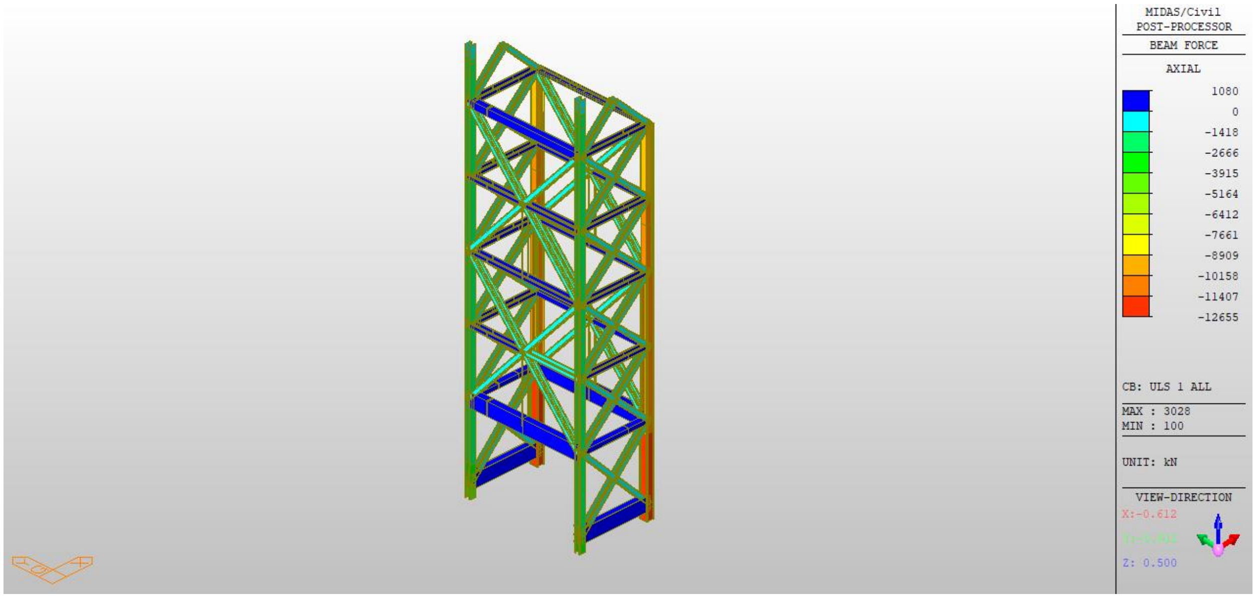

Figure 8 Case 1 ULS 1 Axial

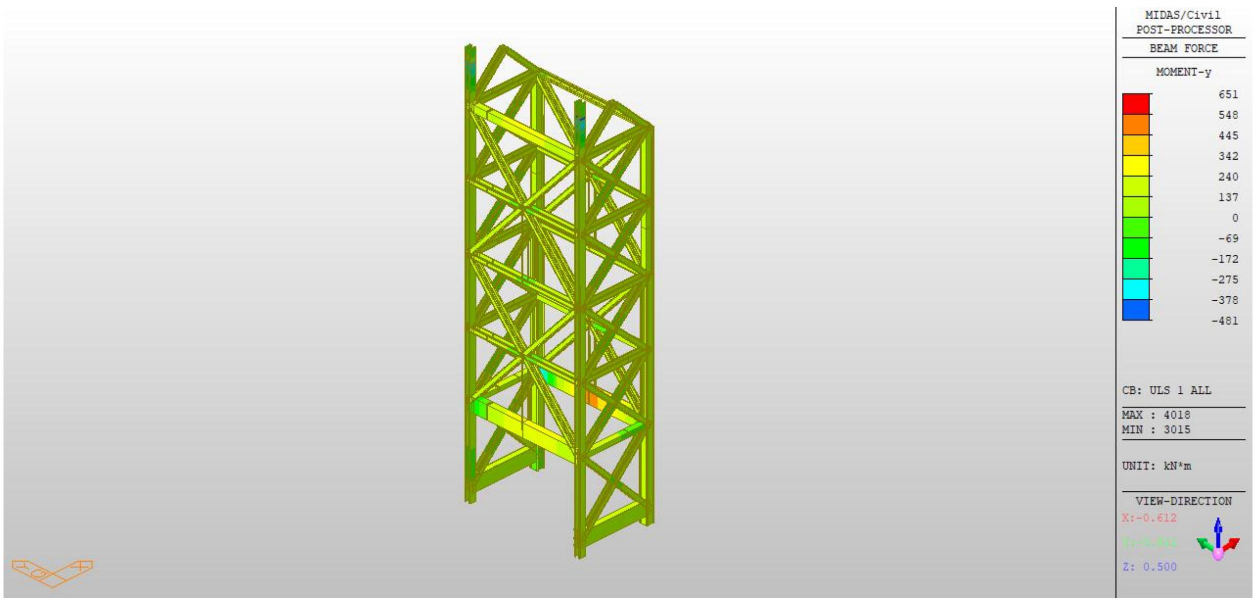

Figure 9 Case 1 ULS 1 MY

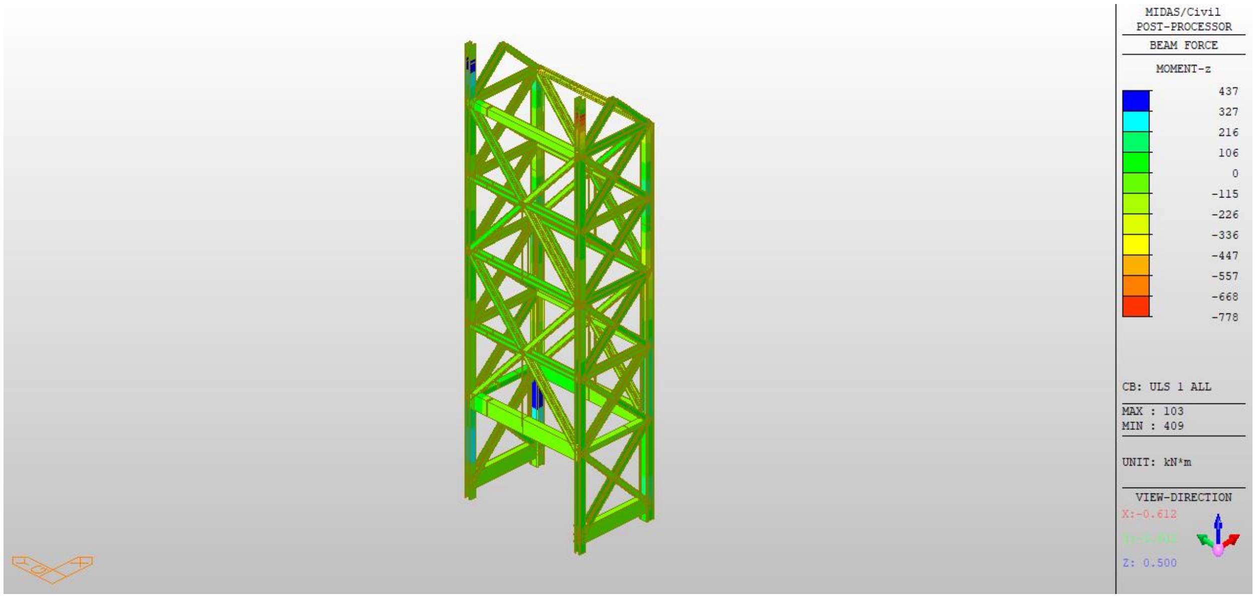

Figure 10 Case 1 ULS 1 MZ

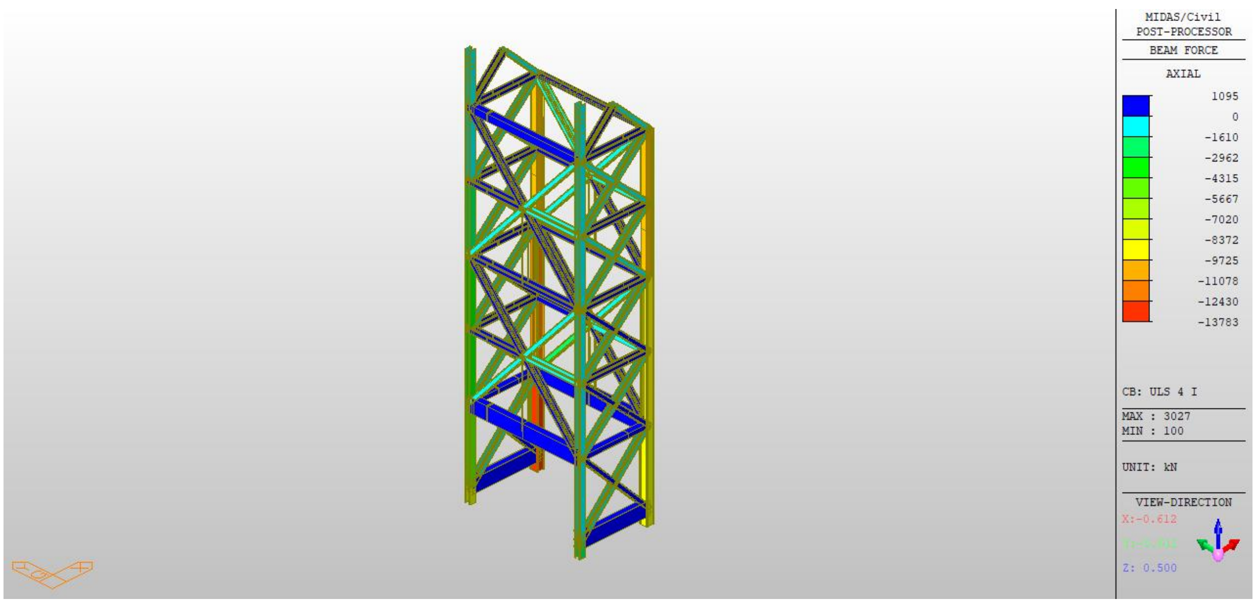

Figure 11 Case 1 ULS 4 Axial

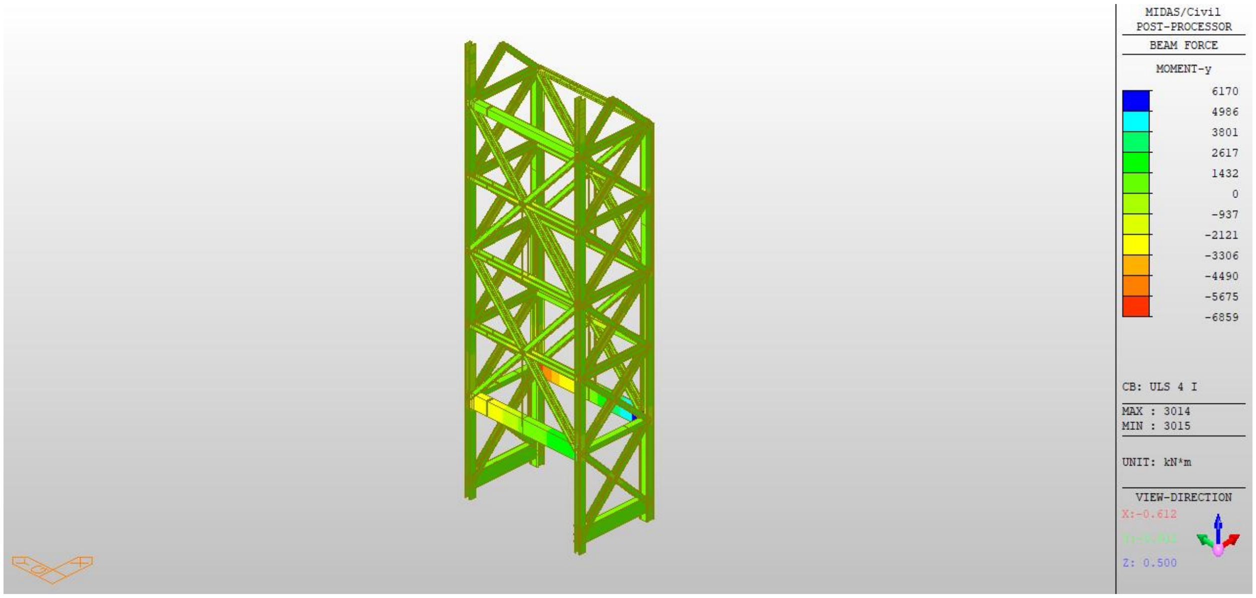

Figure 12 Case 1 ULS 4 MY

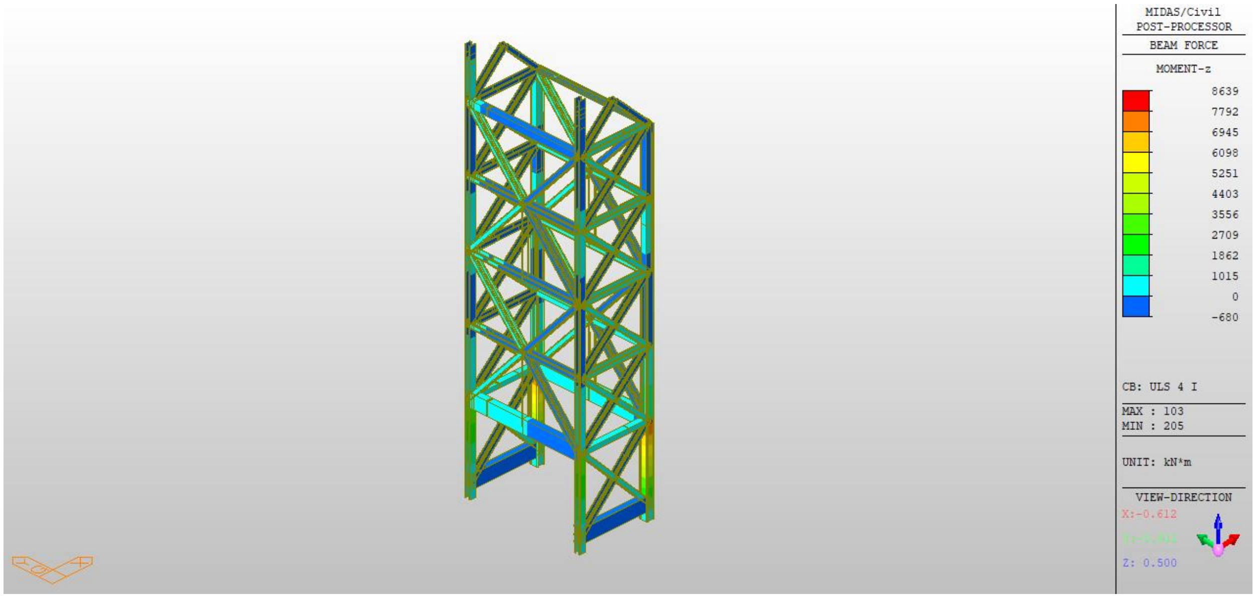

Figure 13 Case 1 ULS 4 MZ

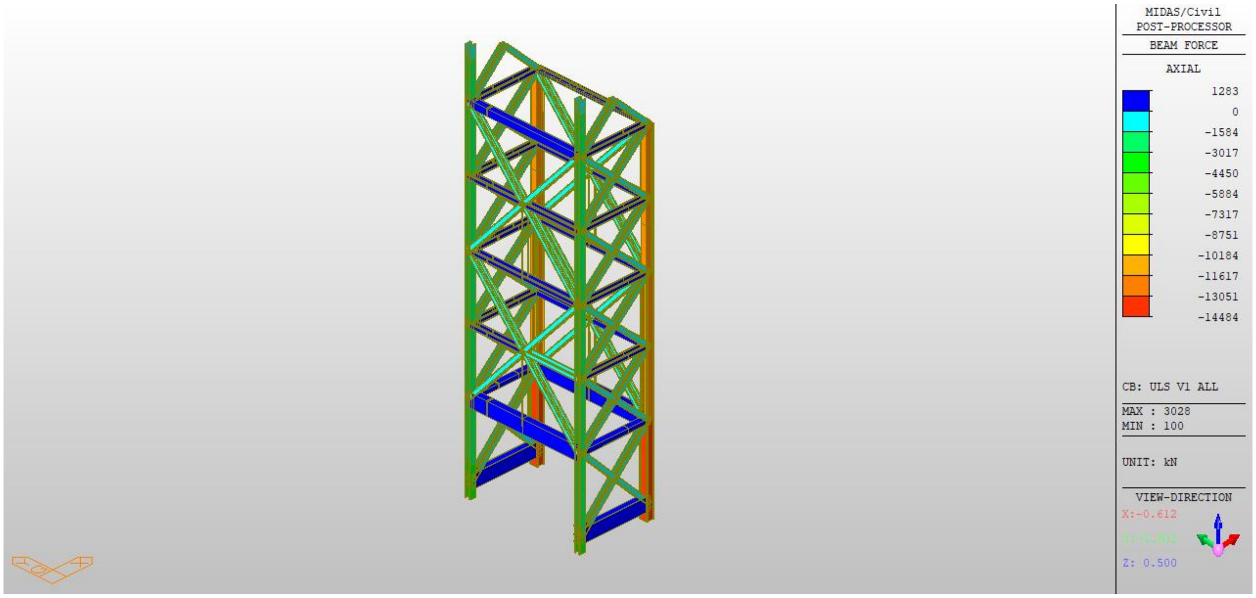

Figure 14 Case 1 ULS V1 Axial

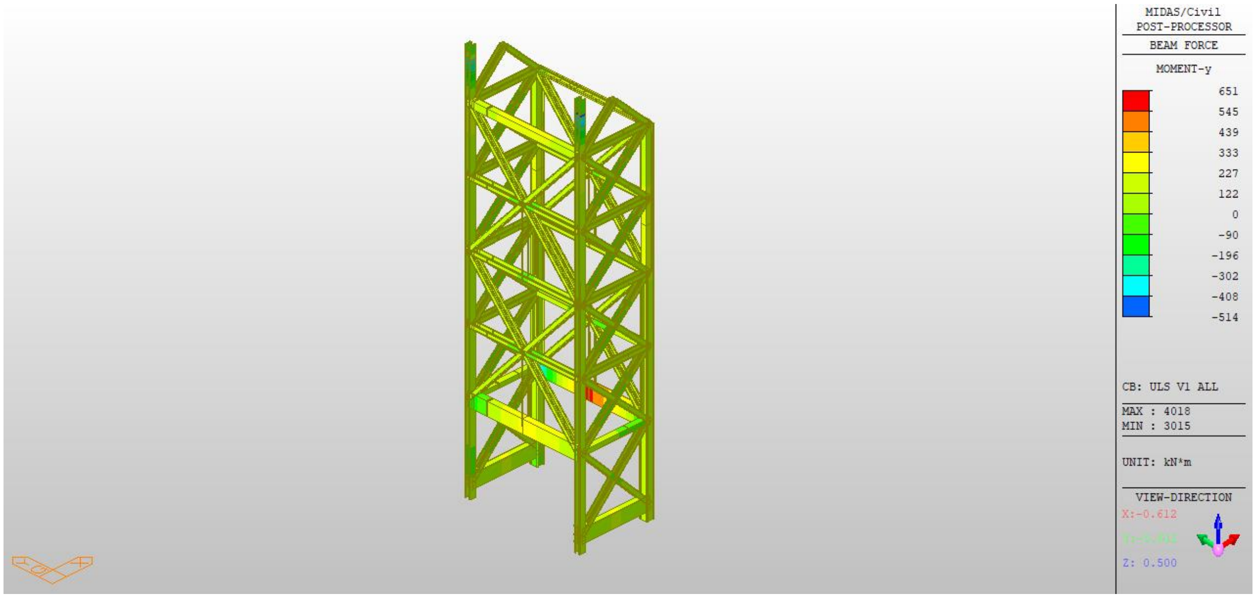

Figure 15 Case 1 ULS V1 MY

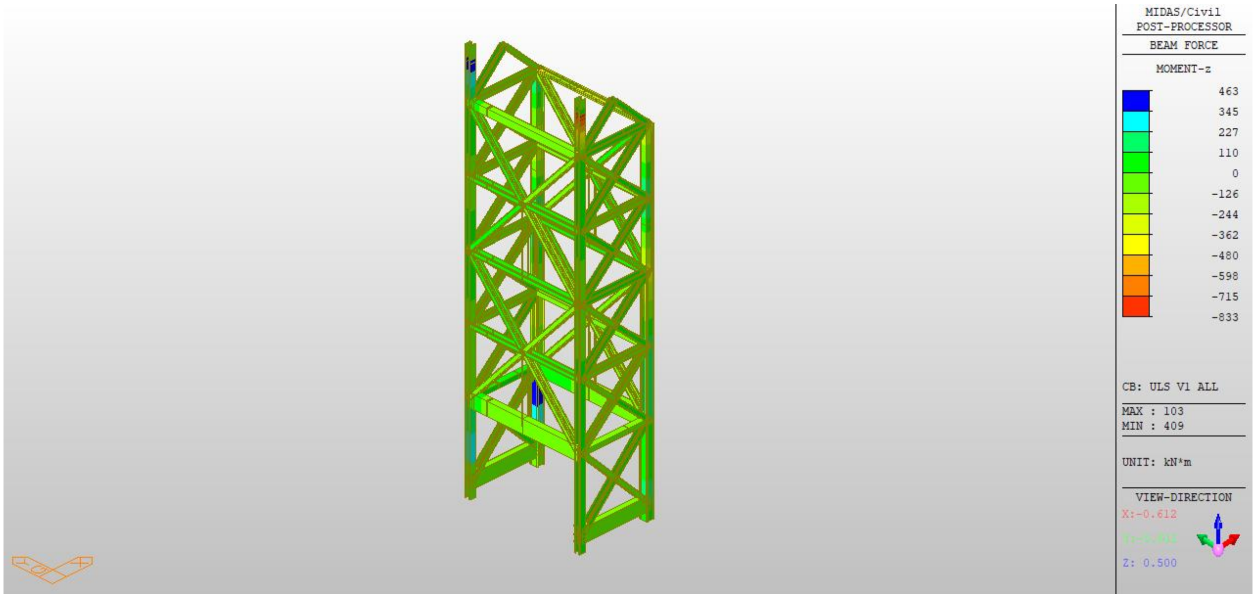

Figure 16 Case 1 ULS V1 MZ

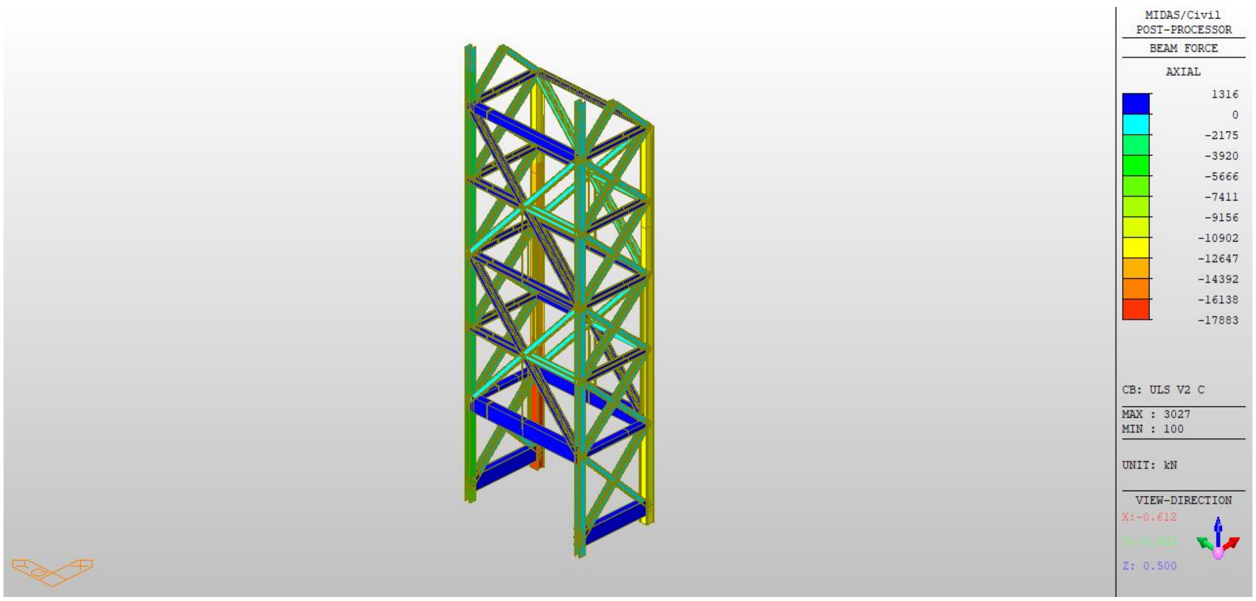

Figure 17 Case 1 ULS V2 Axial

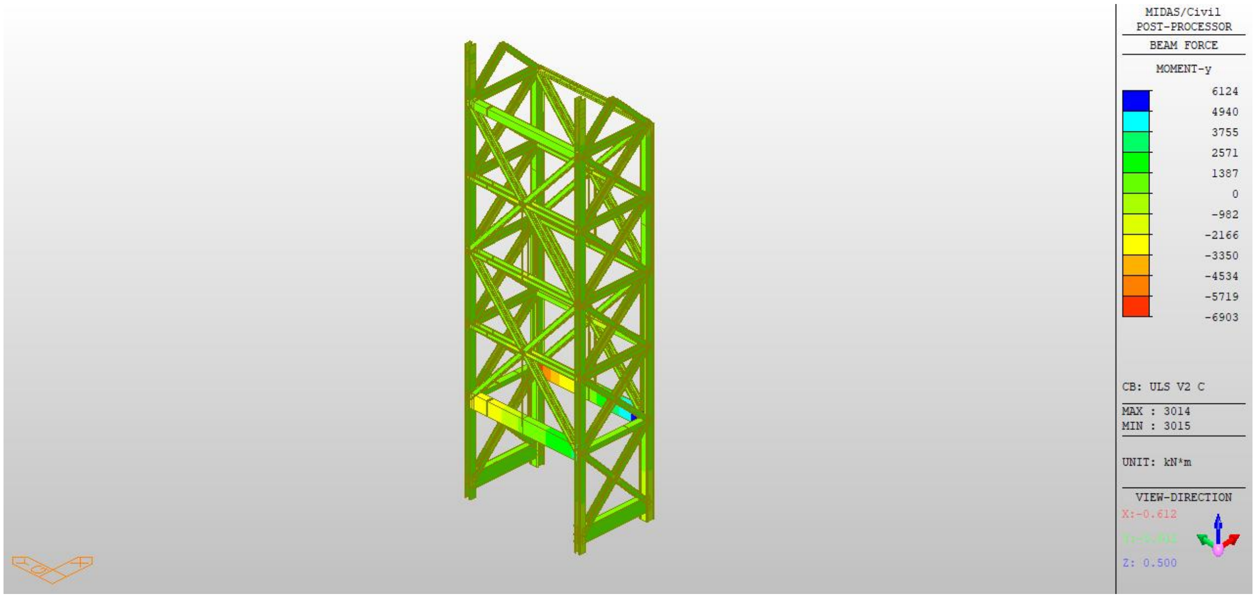

Figure 18 Case 1 ULS V2 MY

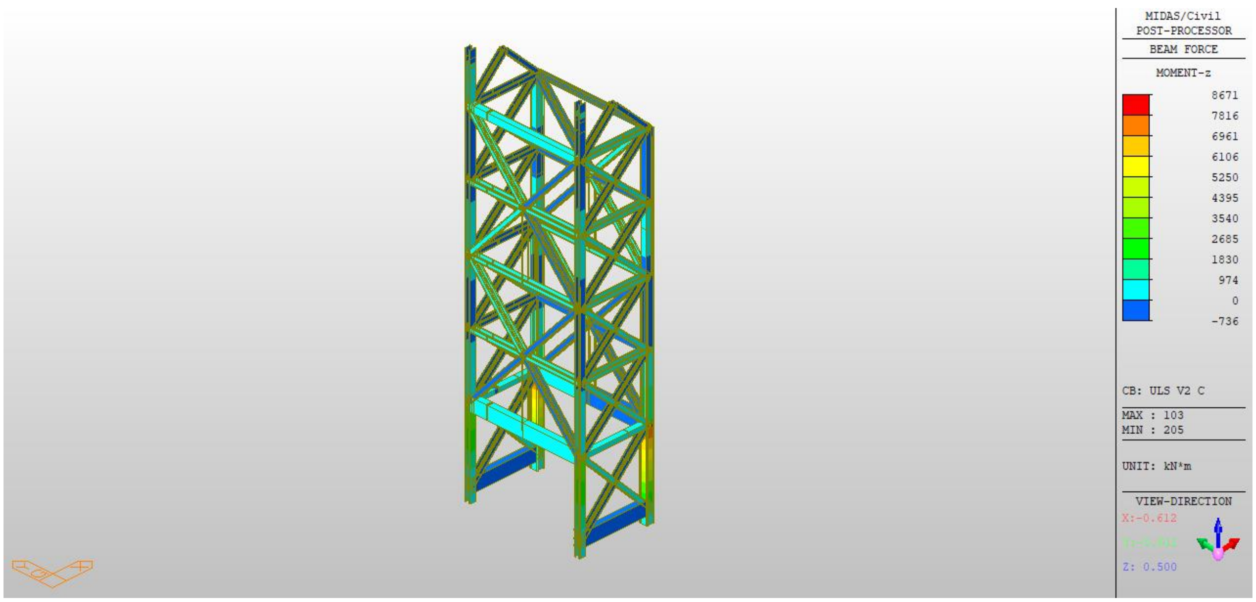

Figure 19 Case 1 ULS V2 MZ

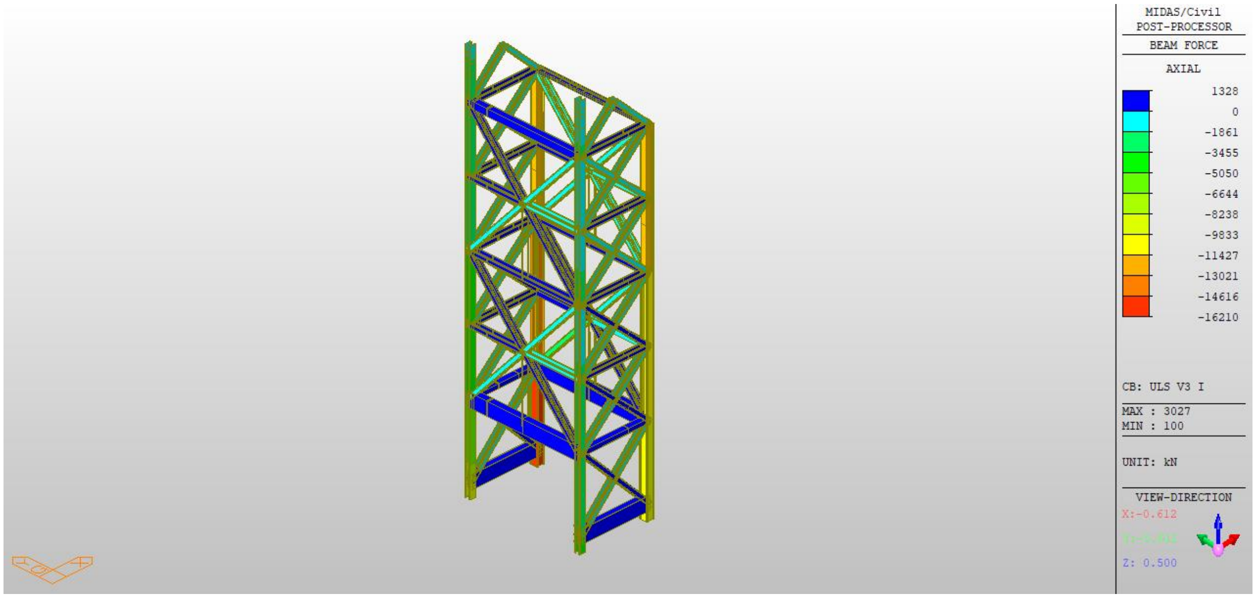

Figure 20 Case 1 ULS V3 Axial

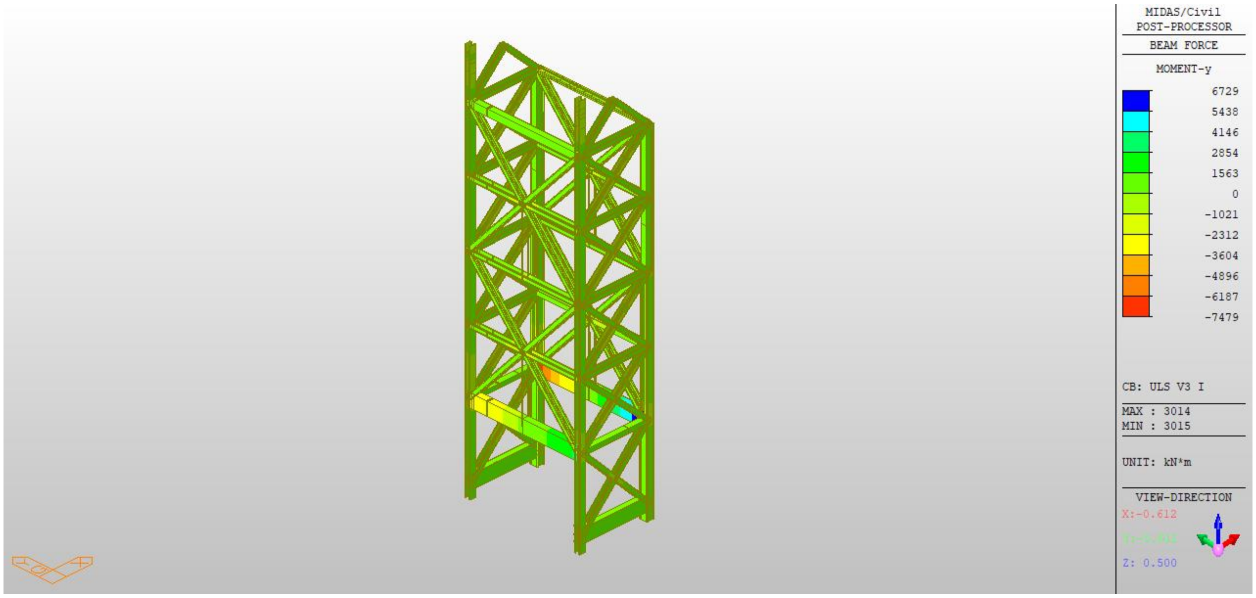

Figure 21 Case 1 ULS V3 MY

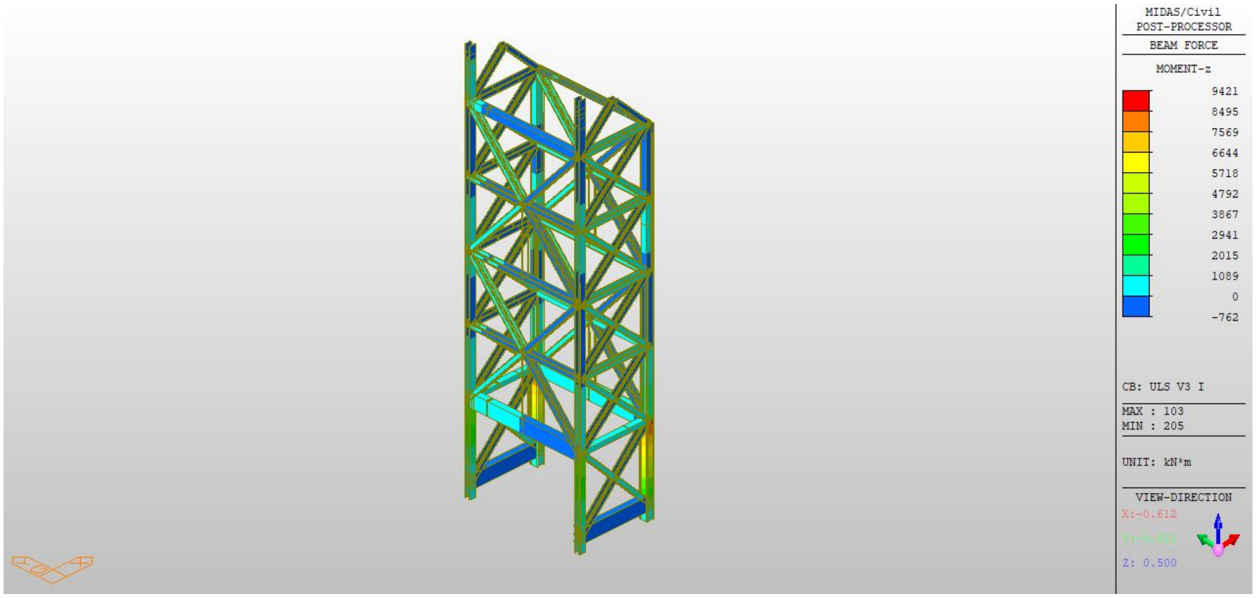

Figure 22 Case 1 ULS V3 MZ

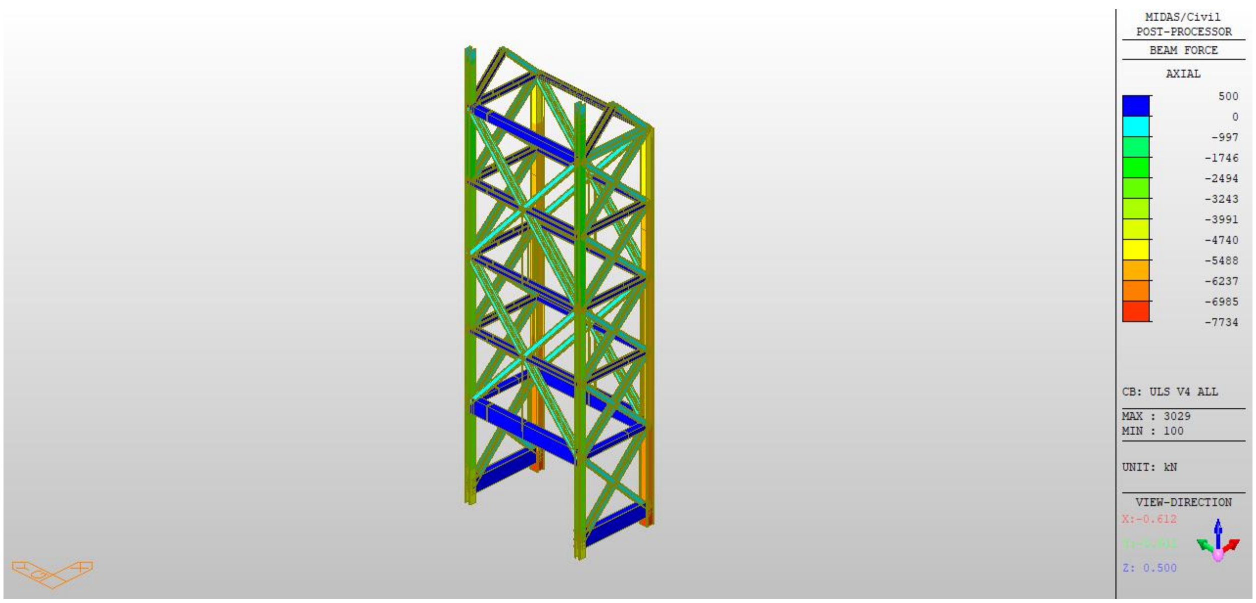

Figure 23 Case 1 ULS V4 Axial

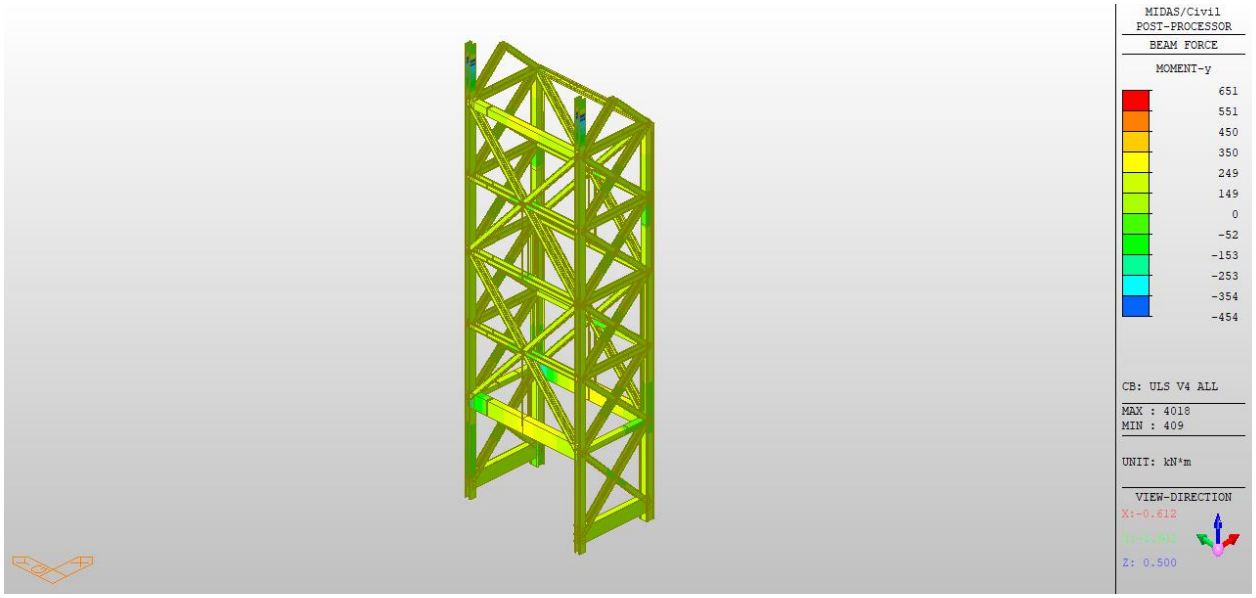

Figure 24 Case 1 ULS V4 MY

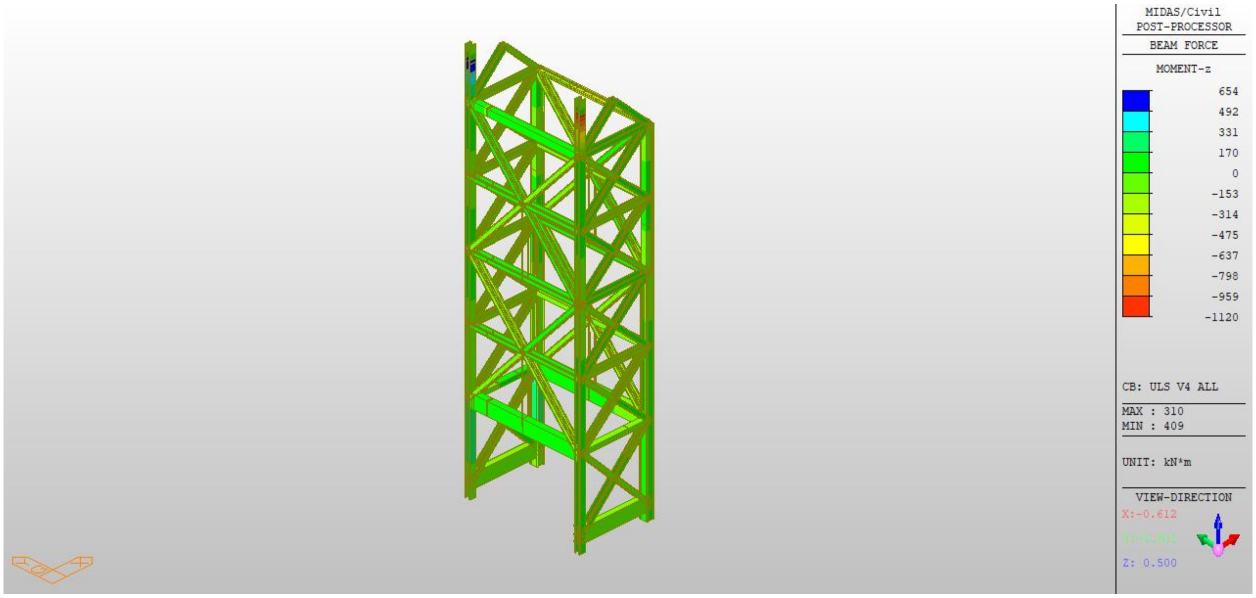

Figure 25 Case 1 ULS V4 MZ

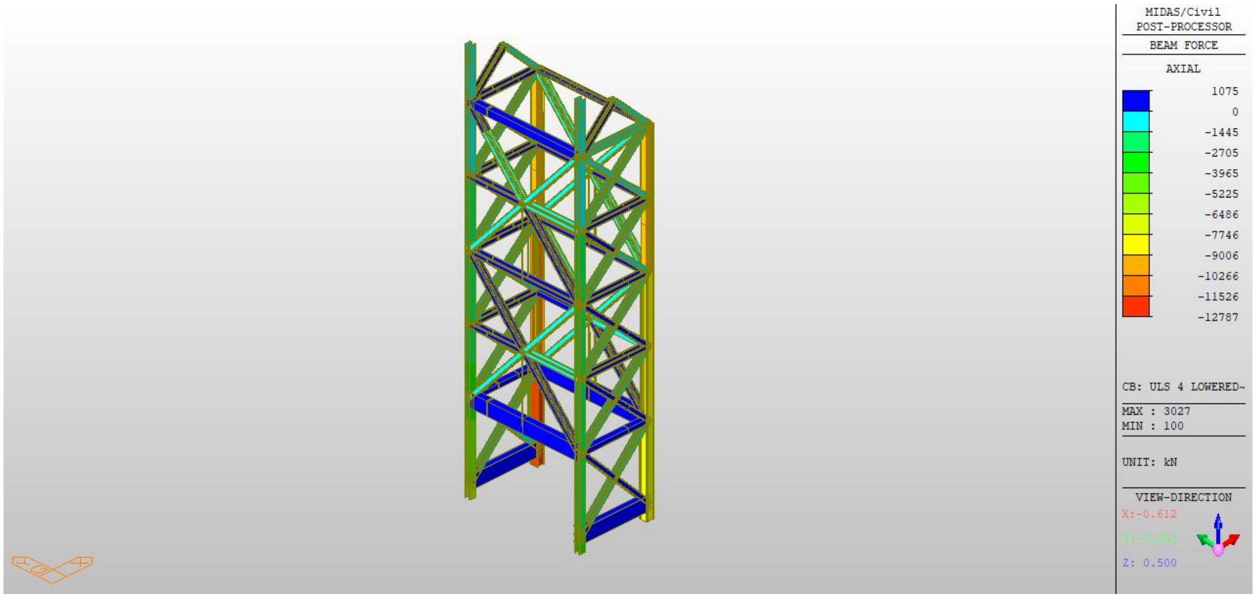

Figure 26 Case 1 ULS 4 Lowered Axial

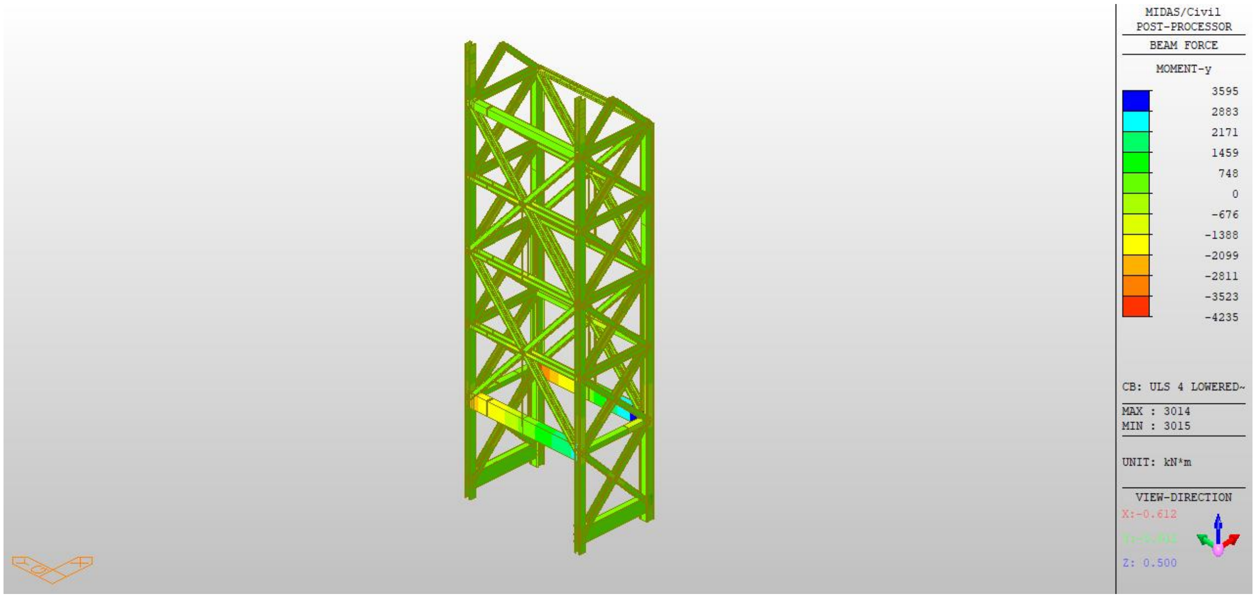

Figure 27 Case 1 ULS 4 Lowered MY

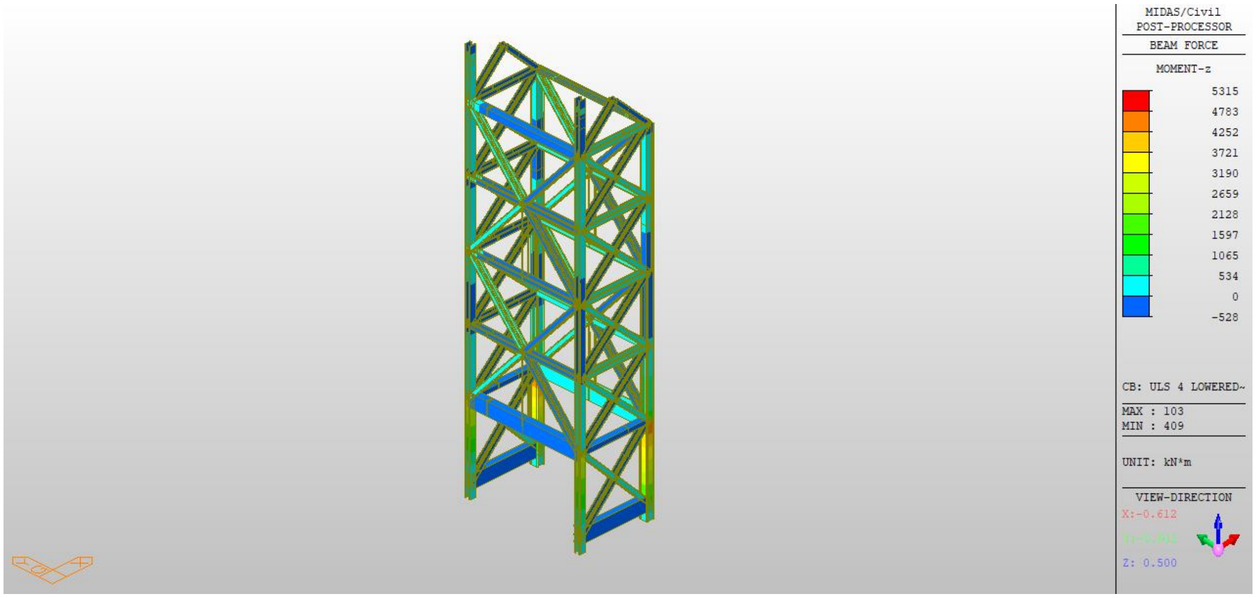

Figure 28 Case 1 ULS 4 Lowered MZ

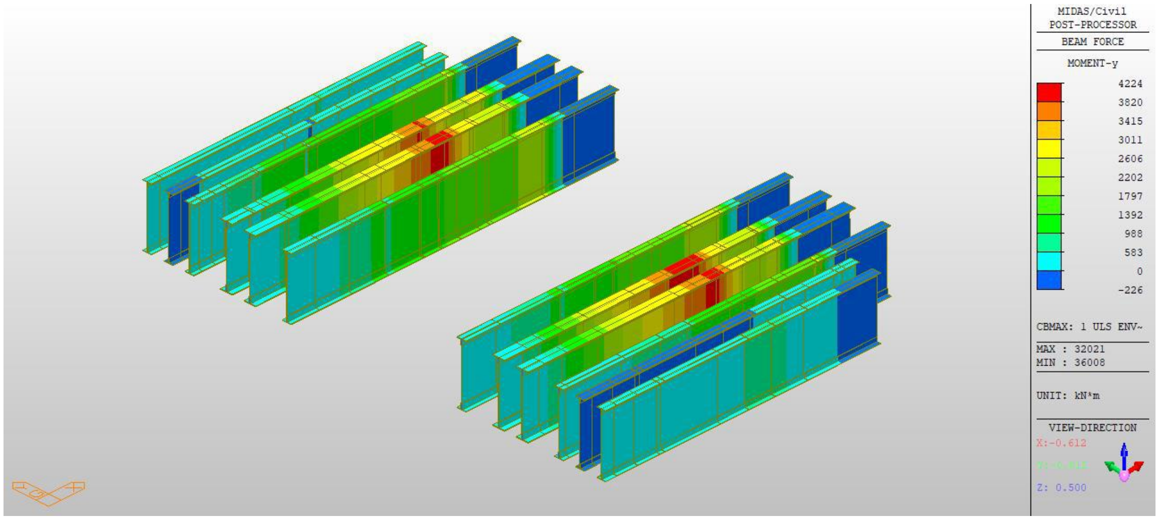

Figure 29 Girders G1 G2 G3 G4 G6 - Case 1 ULS M_y Max

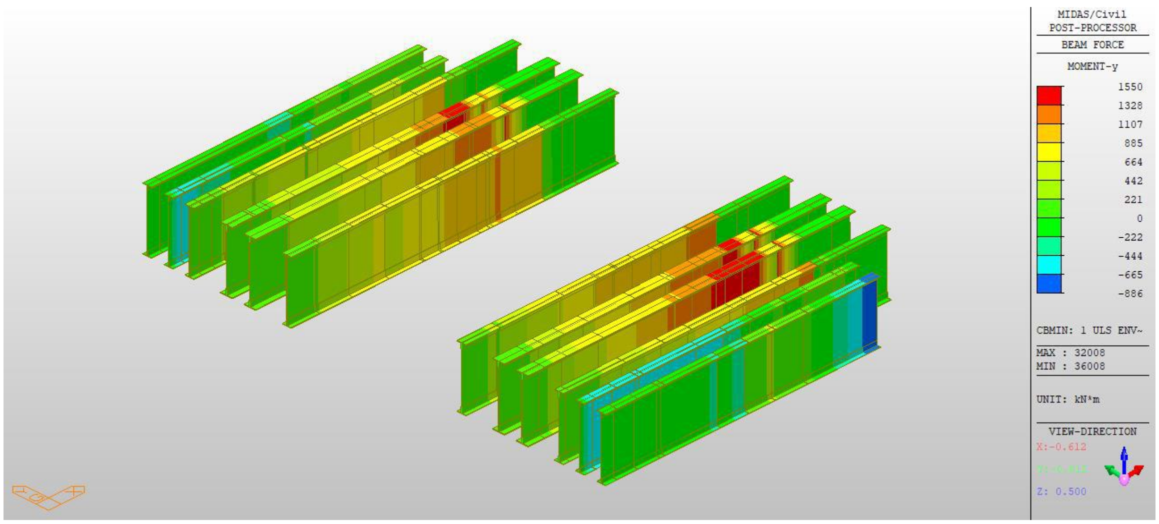

Figure 30 Girders G1 G2 G3 G4 G6 - Case 1 ULS M_y Min

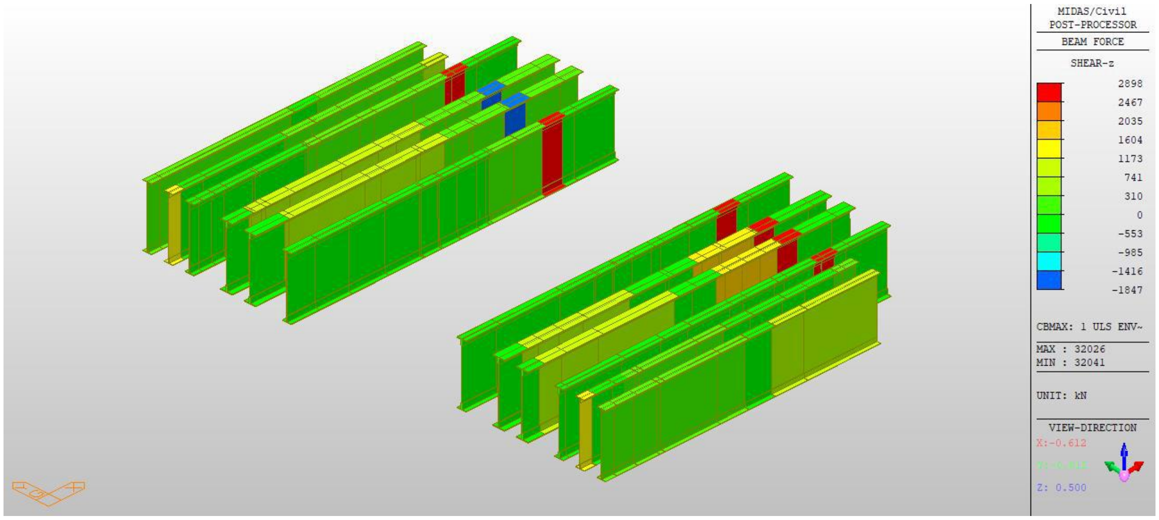

Figure 31 Girders G1 G2 G3 G4 G6 - Case 1 ULS F_z Max

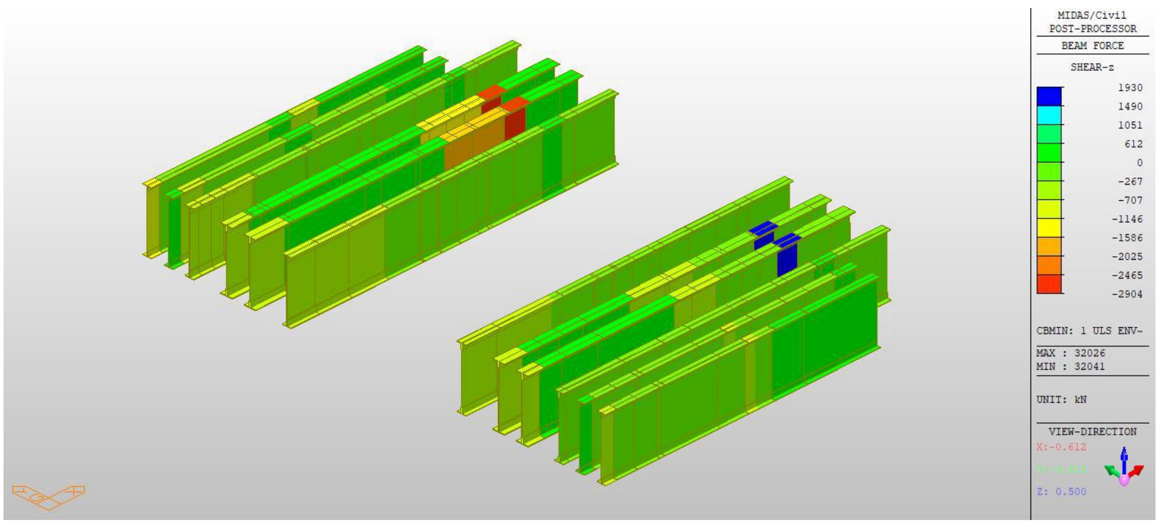

Figure 32 Girders G1 G2 G3 G4 G6 - Case 1 ULS F_z Min

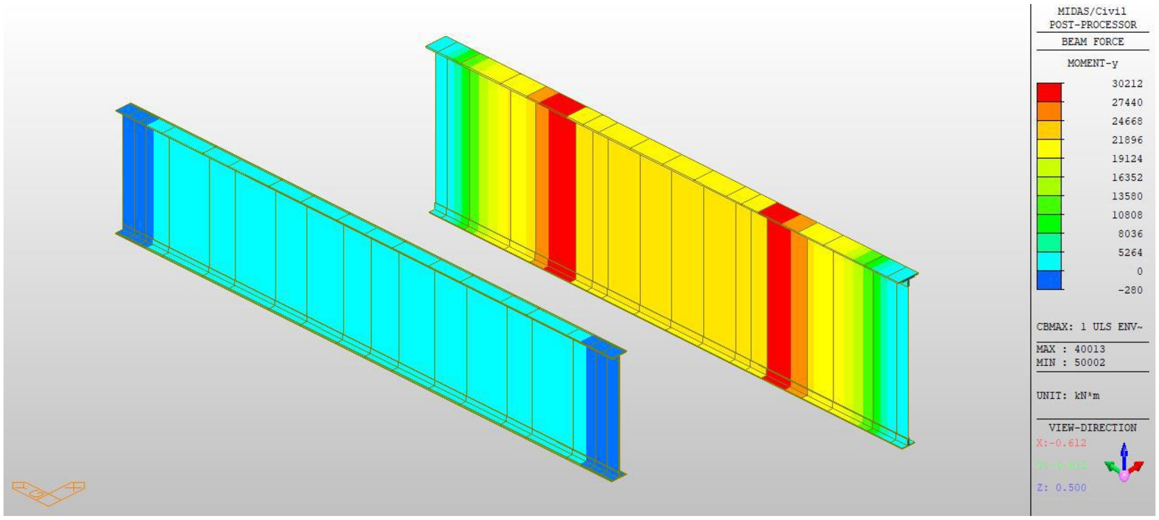

Figure 33 Girders G7 and G8 - Case 1 ULS M_y Max

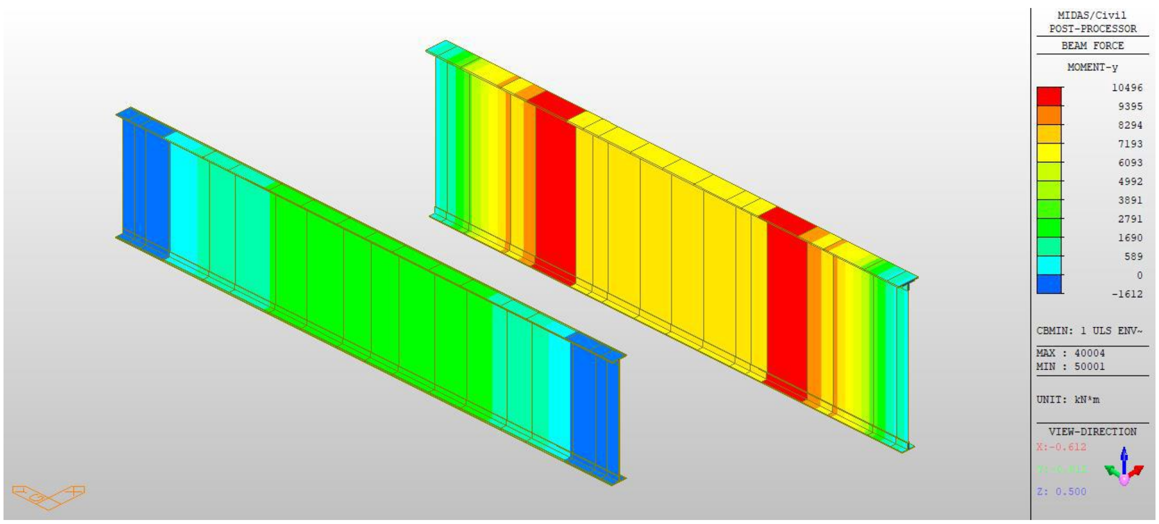

Figure 34 Girders G7 and G8 - Case 1 ULS M_y Min

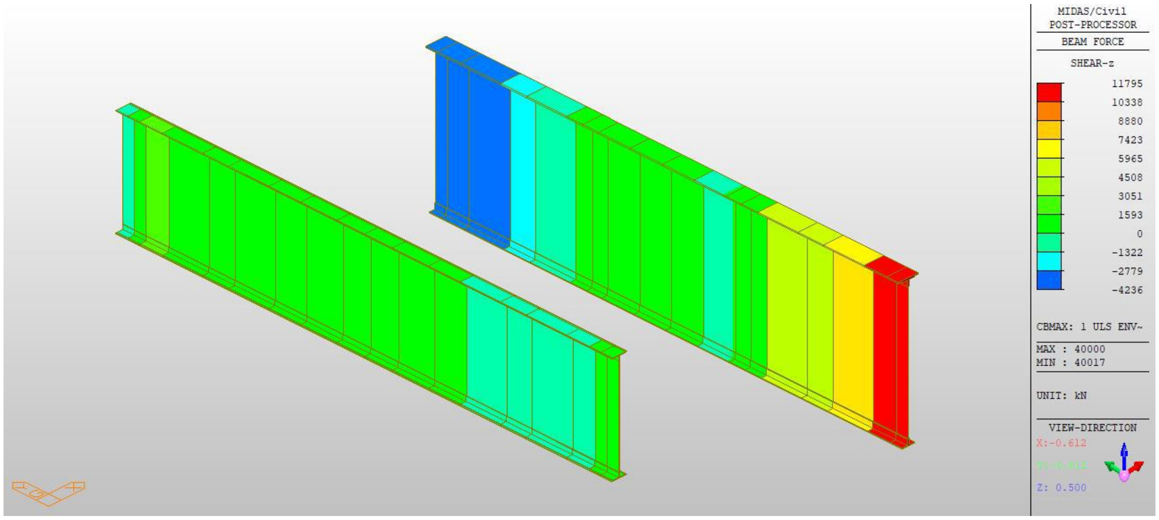

Figure 35 Girders G7 and G8 - Case 1 ULS F_z Max

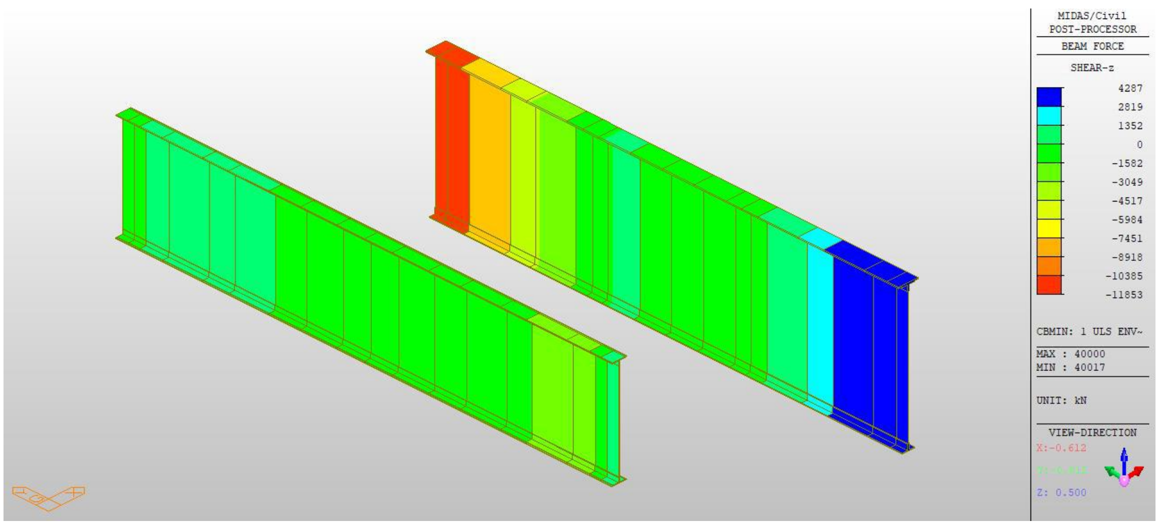

Figure 36 Girders G7 and G8 - Case 1 ULS F_z Min

Exhibit C.2.3. Rehabilitation Case 2

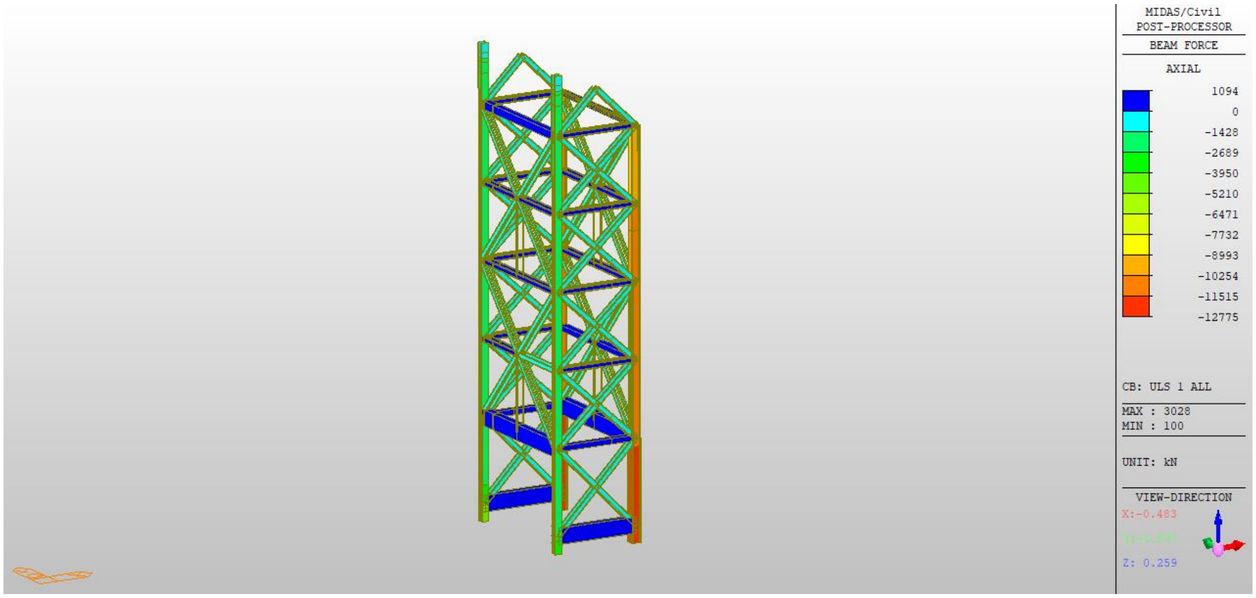

Figure 37 Case 2 ULS 1 Axial

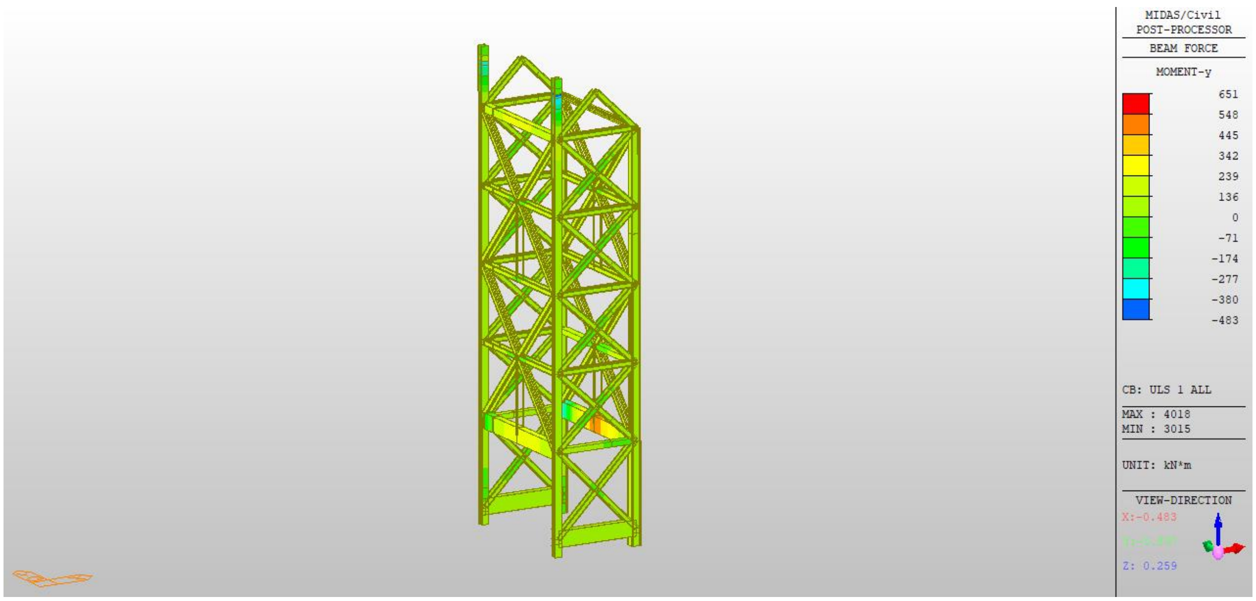

Figure 38 Case 2 ULS 1 MY

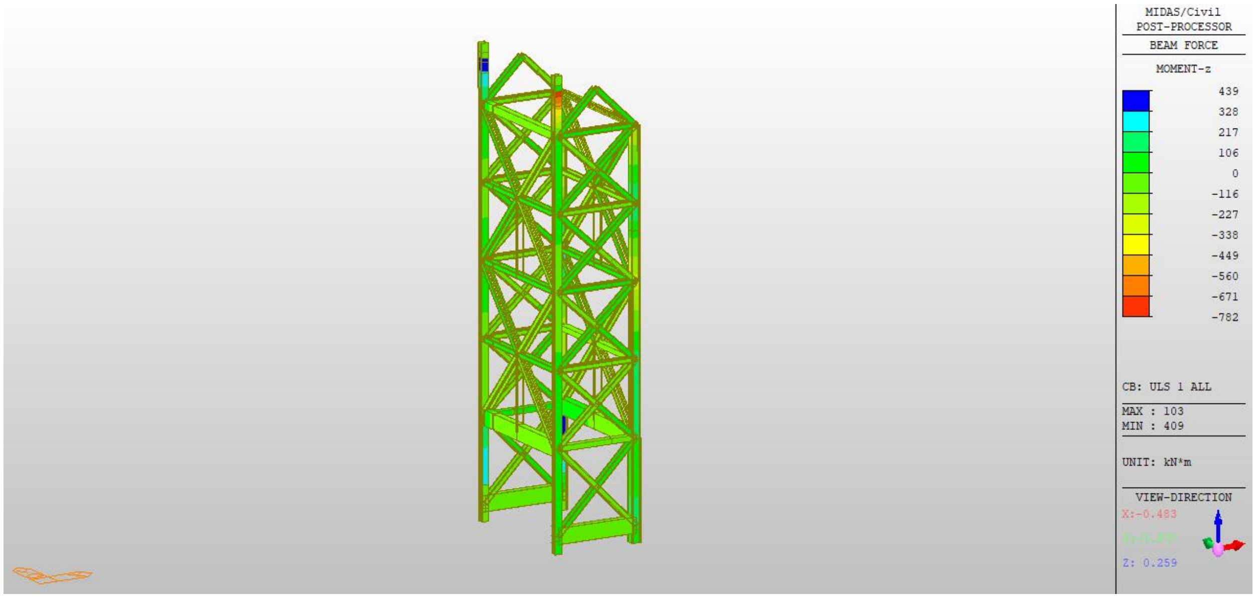

Figure 39 Case 2 ULS 1 MZ

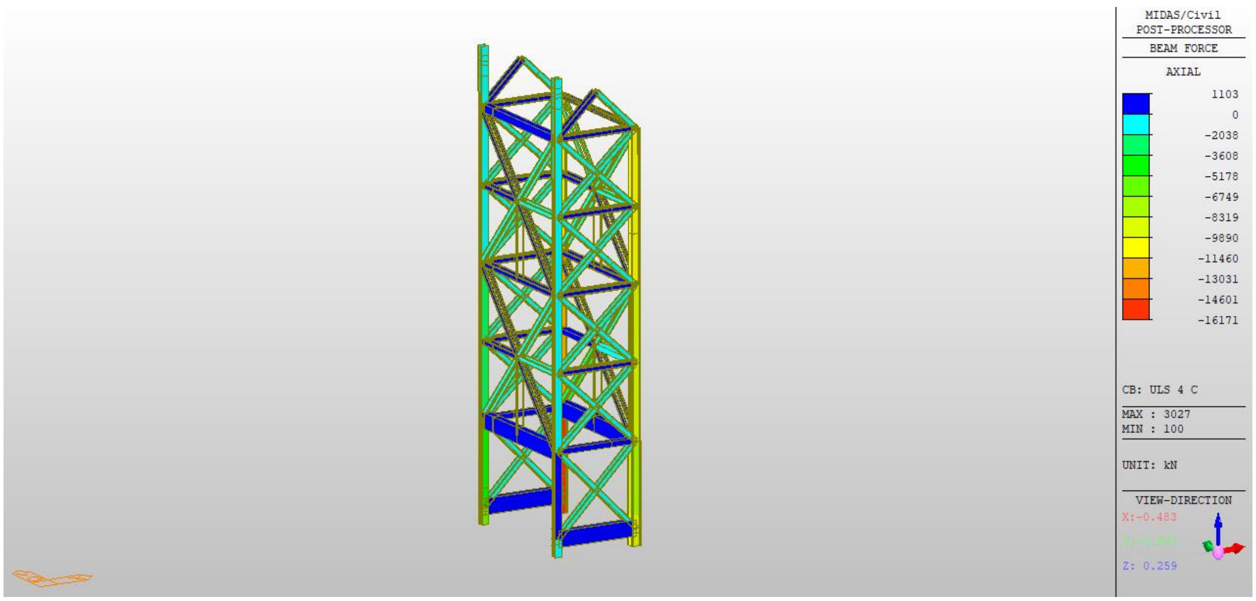

Figure 40 Case 2 ULS 4 Axial

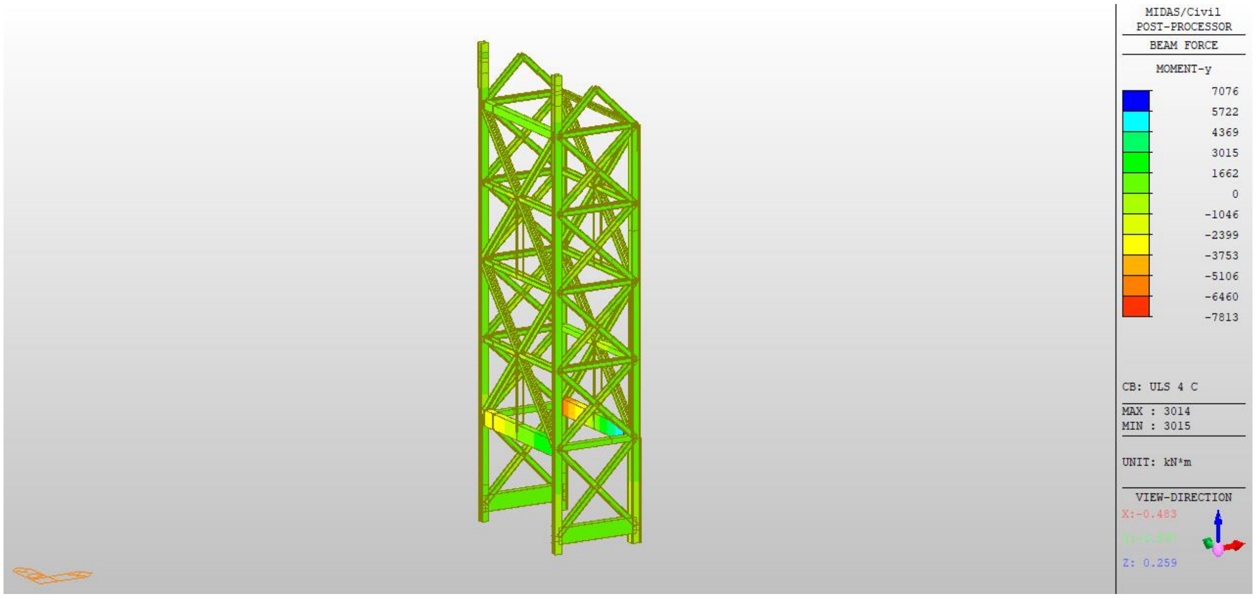

Figure 41 Case 2 ULS 4 MY

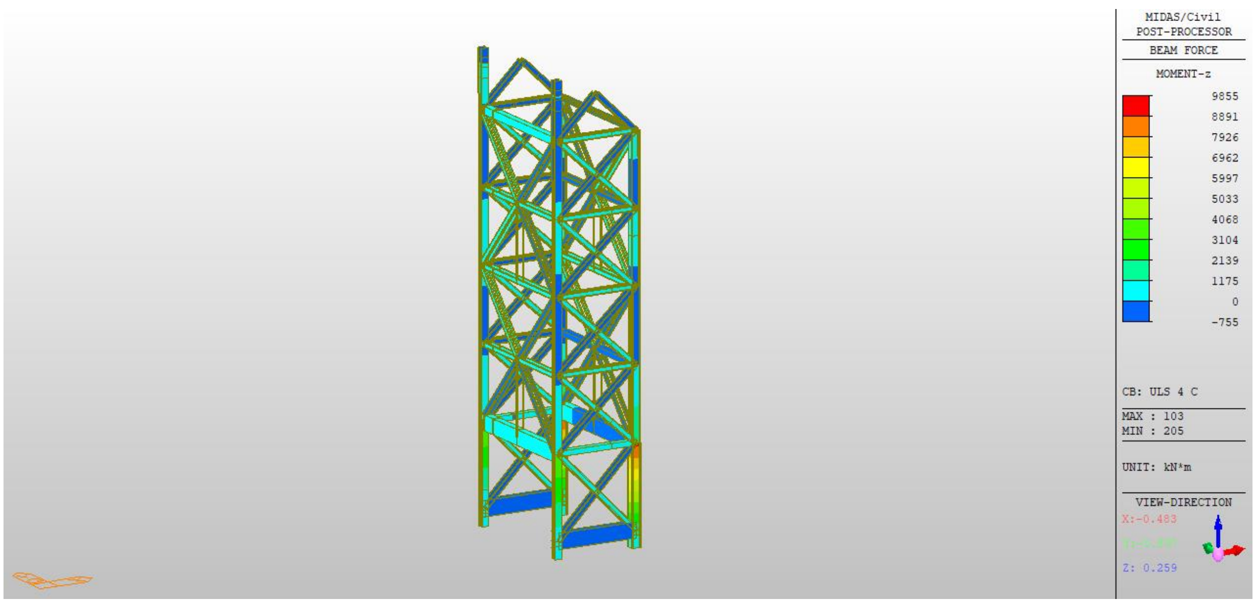

Figure 42 Case 2 ULS 4 MZ

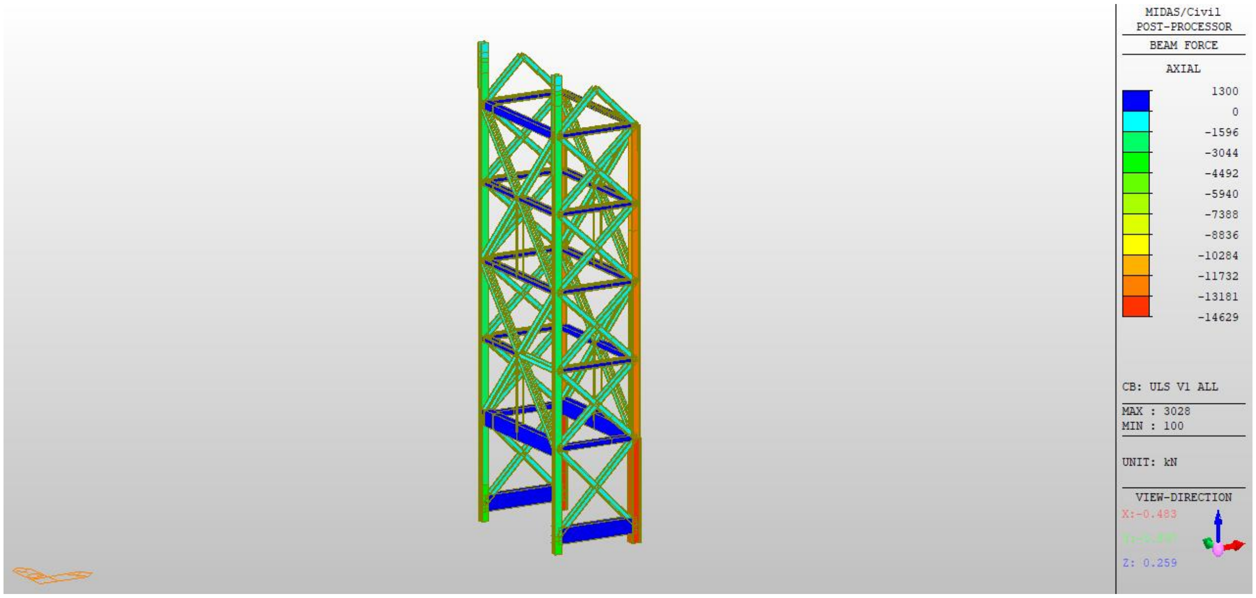

Figure 43 Case 2 ULS V1 Axial

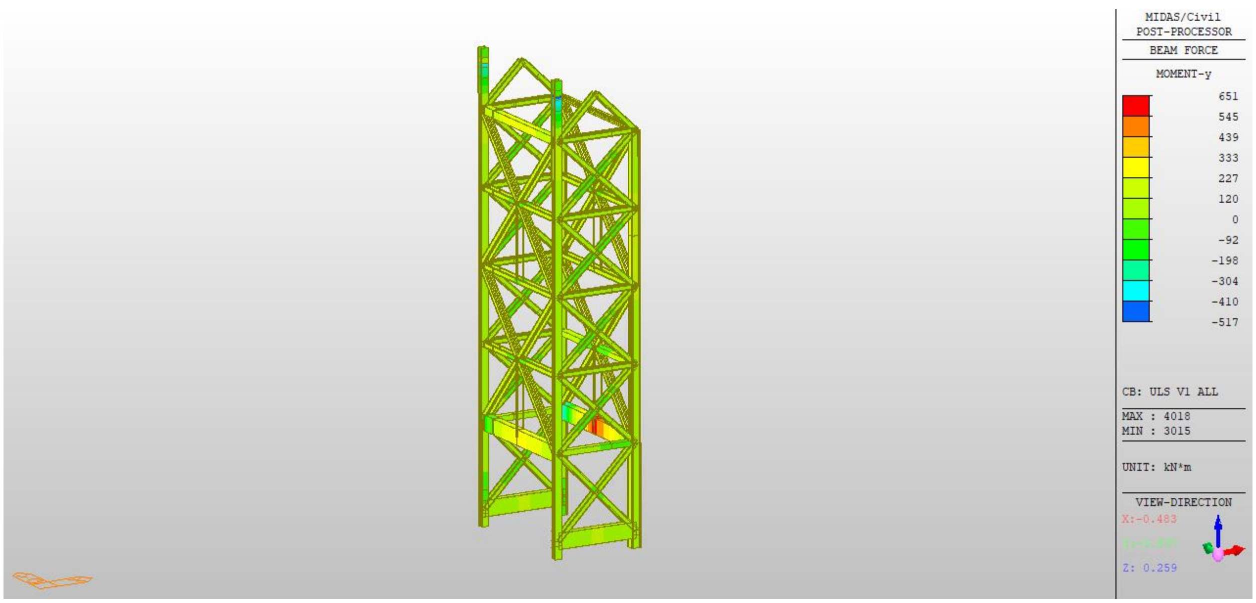

Figure 44 Case 2 ULS V1 MY

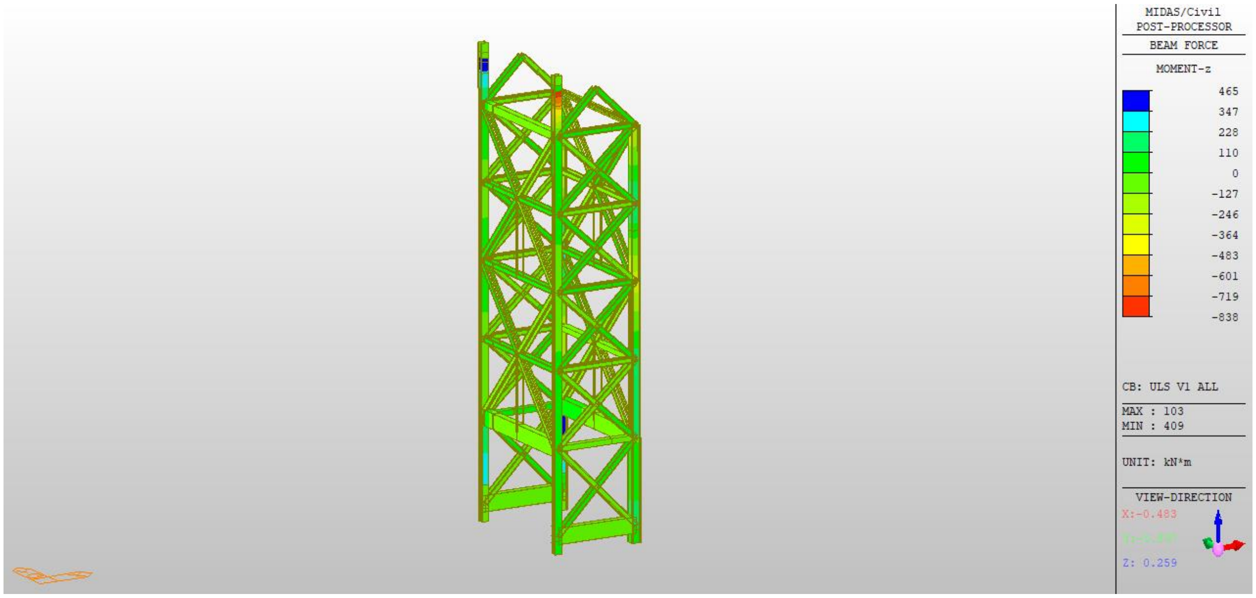

Figure 45 Case 2 ULS V1 MZ

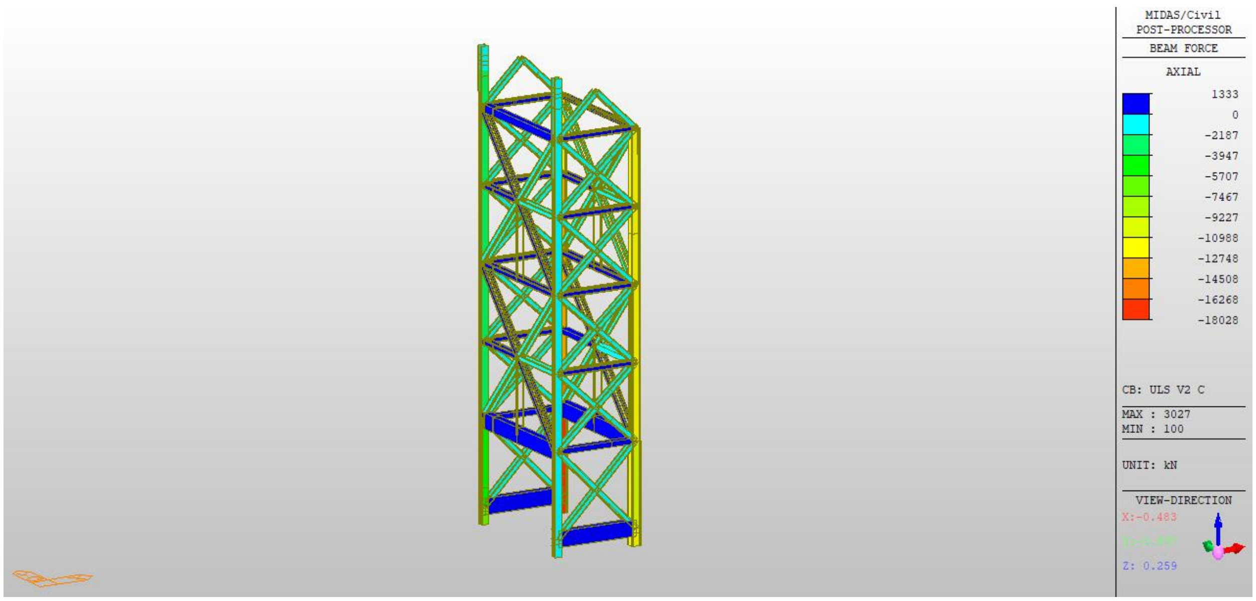

Figure 46 Case 2 ULS V2 Axial

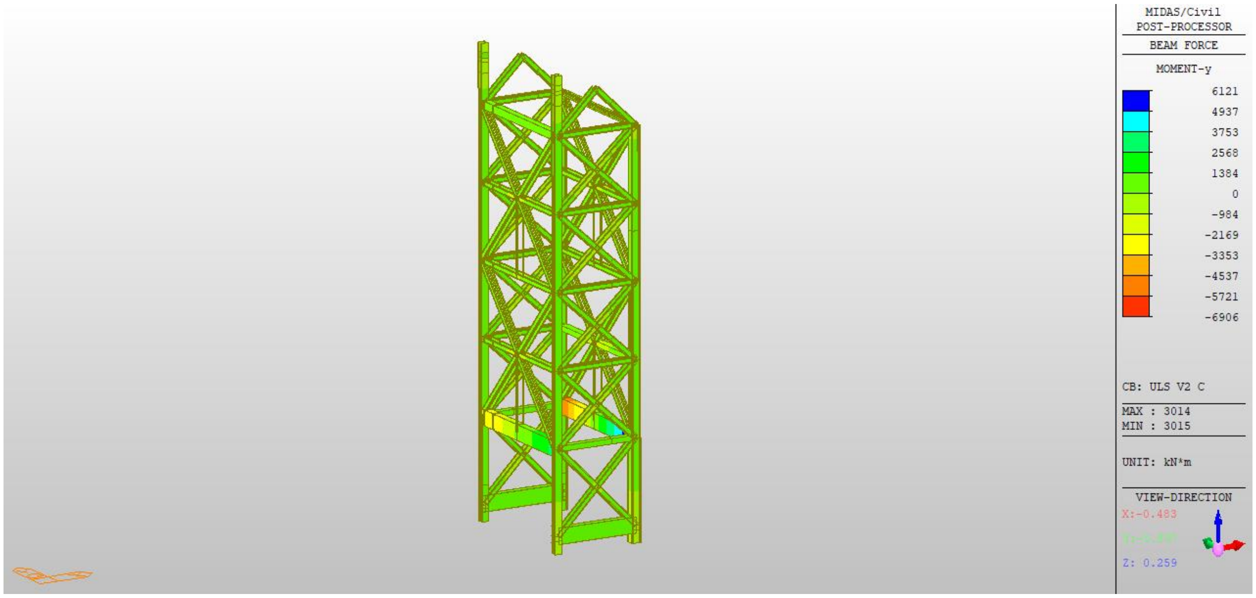

Figure 47 Case 2 ULS V2 MY

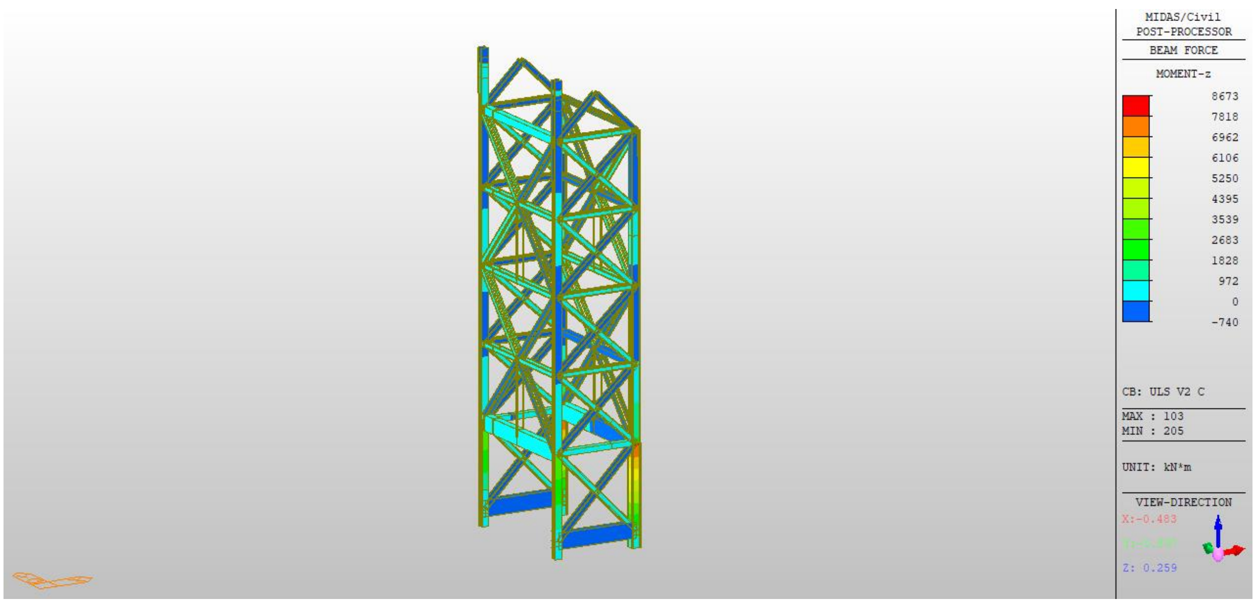

Figure 48 Case 2 ULS V2 MZ

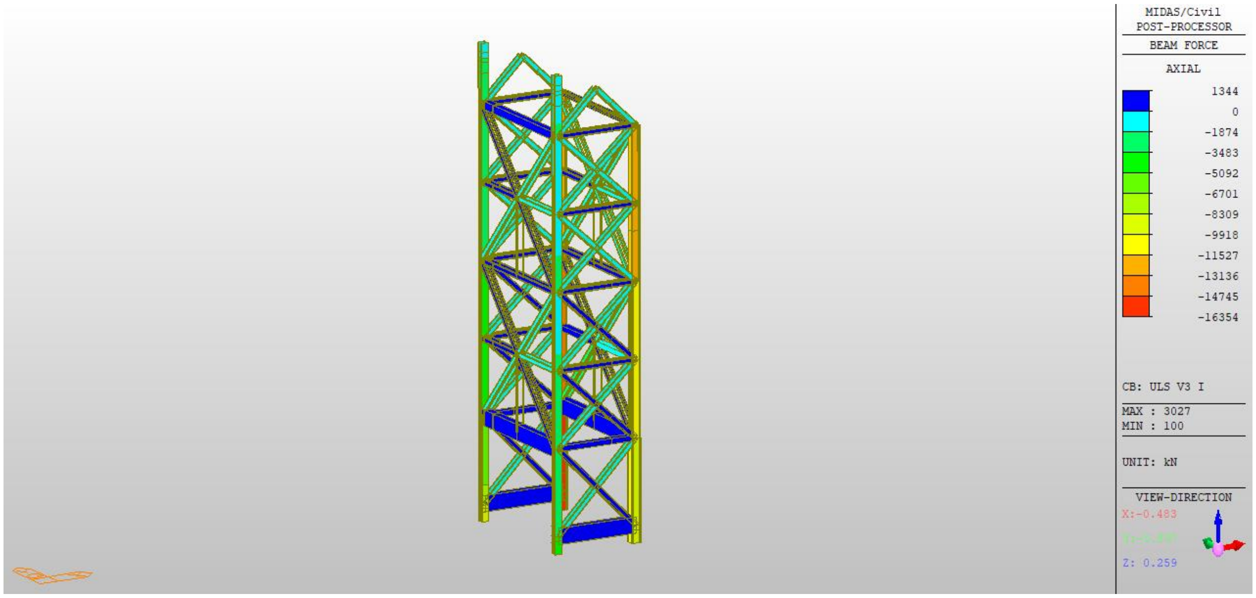

Figure 49 Case 2 ULS V3 Axial

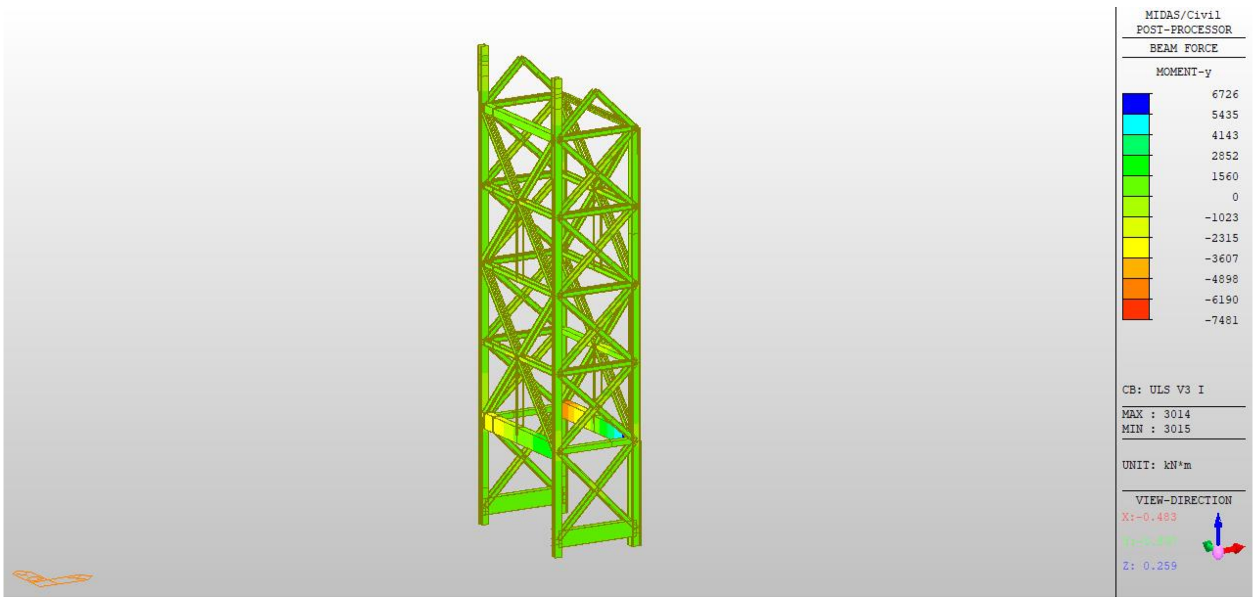

Figure 50 Case 2 ULS V3 MY

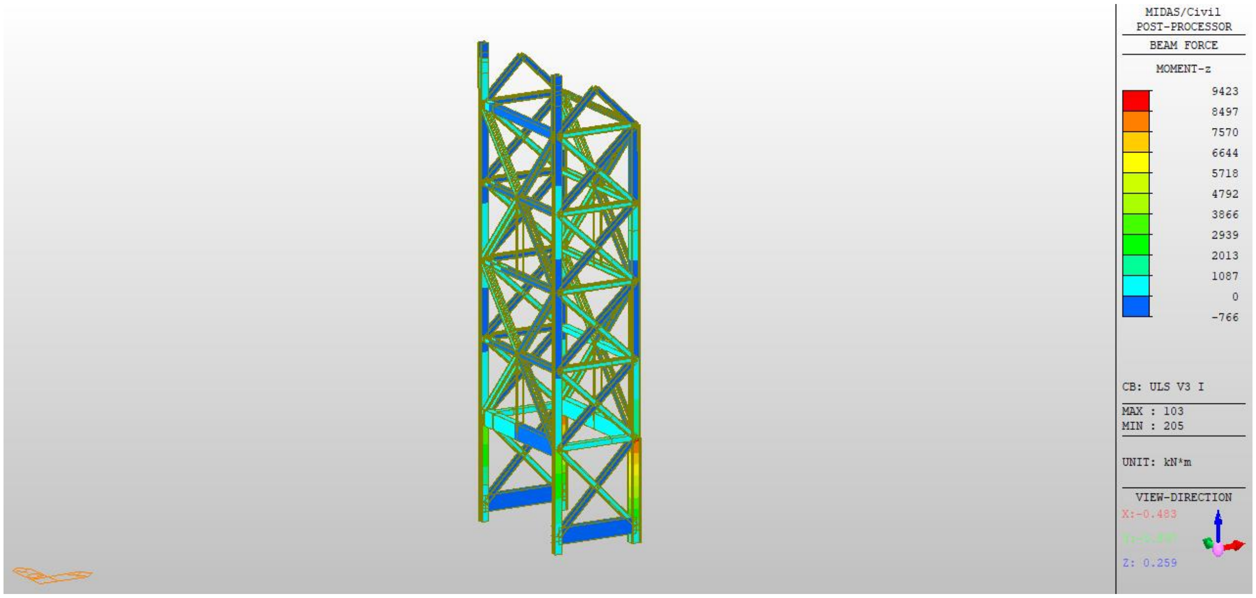

Figure 51 Case 2 ULS V3 MZ

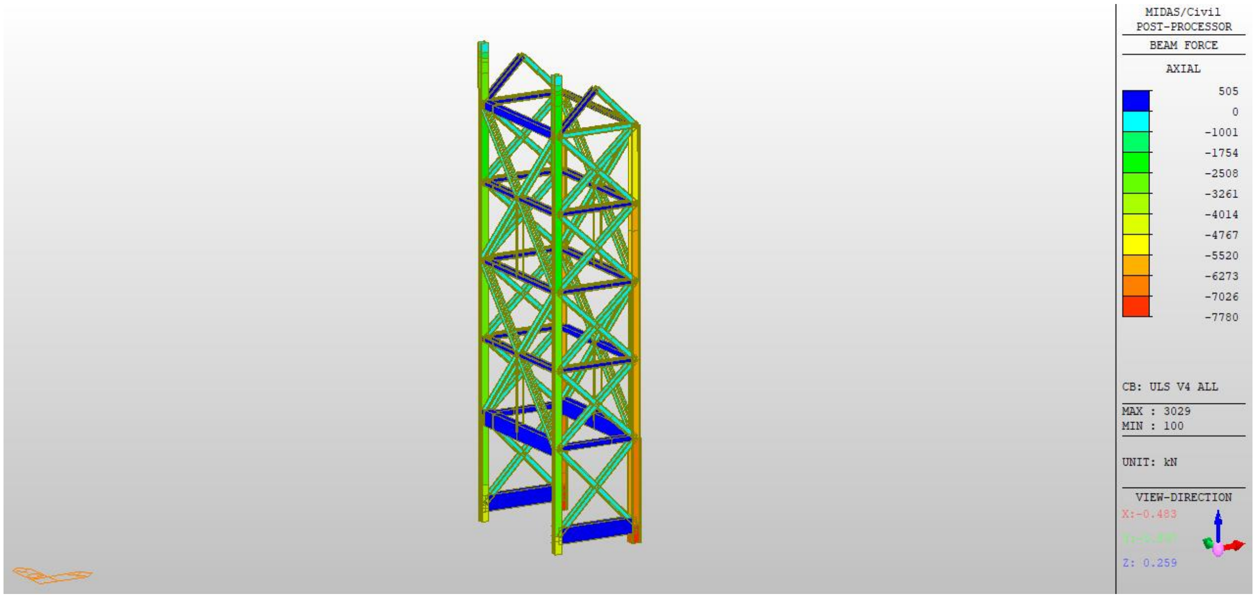

Figure 52 Case 2 ULS V4 Axial

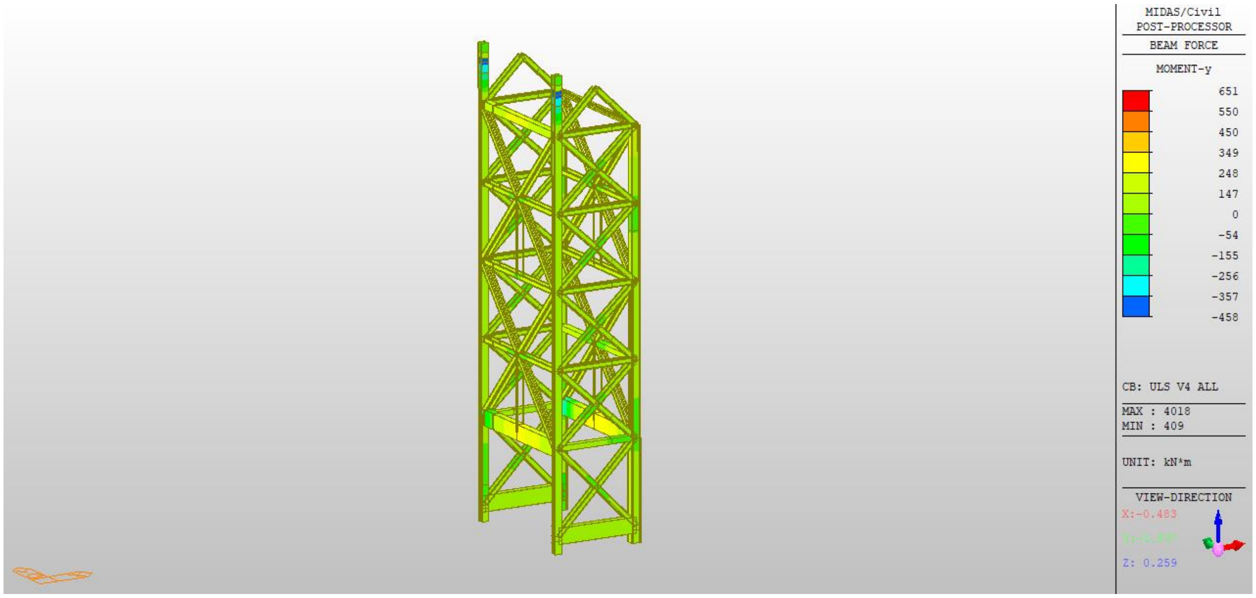

Figure 53 Case 2 ULS V4 MY

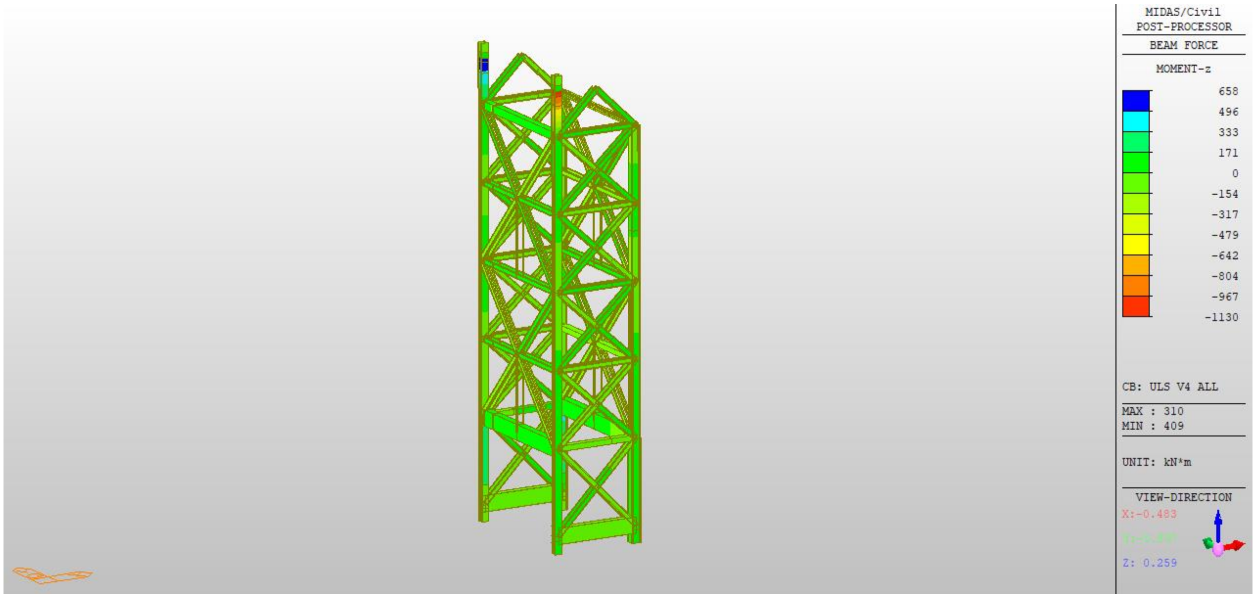

Figure 54 Case 2 ULS V4 MZ

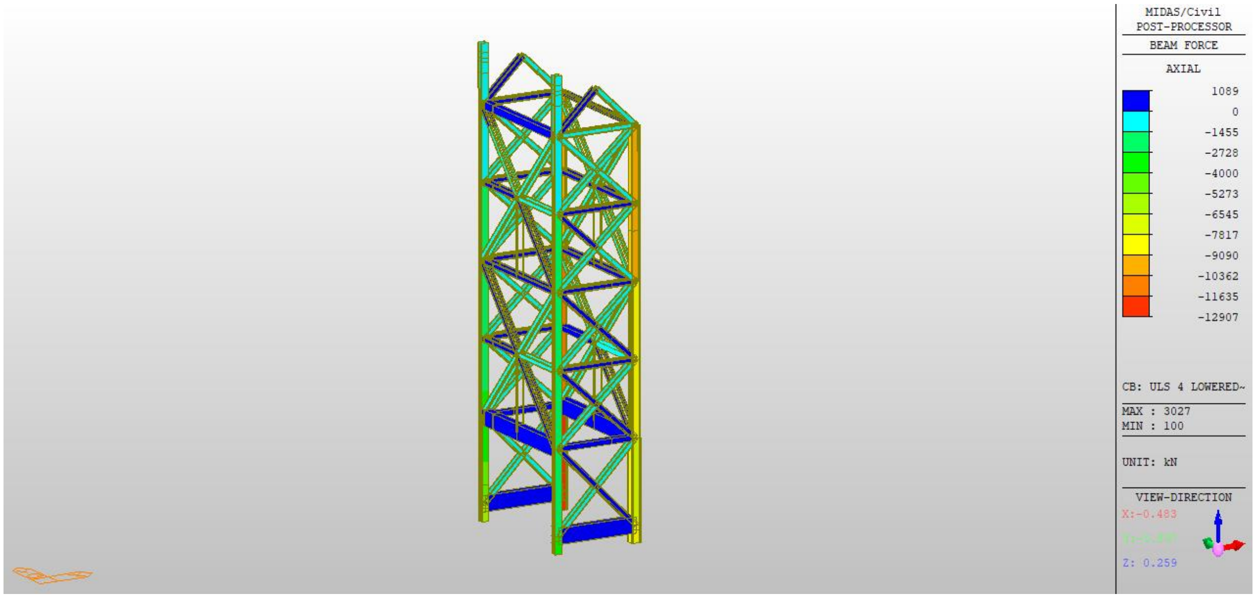

Figure 55 Case 2 ULS 4 Lowered Axial

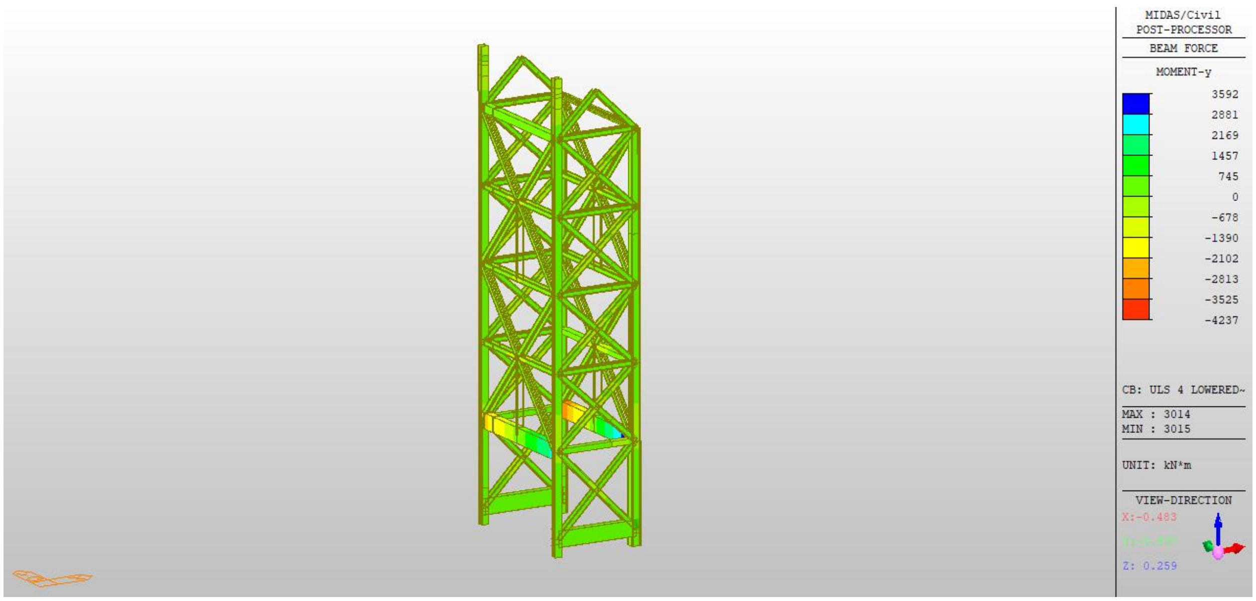

Figure 56 Case 2 ULS 4 Lowered MY

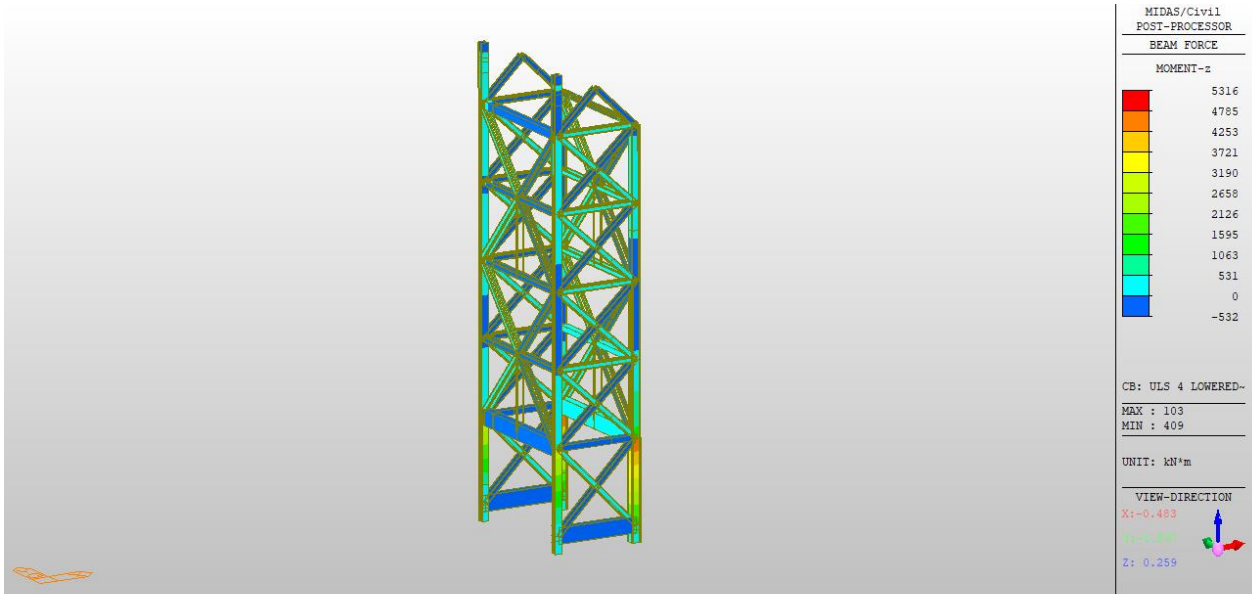

Figure 57 Case 2 ULS 4 Lowered MZ

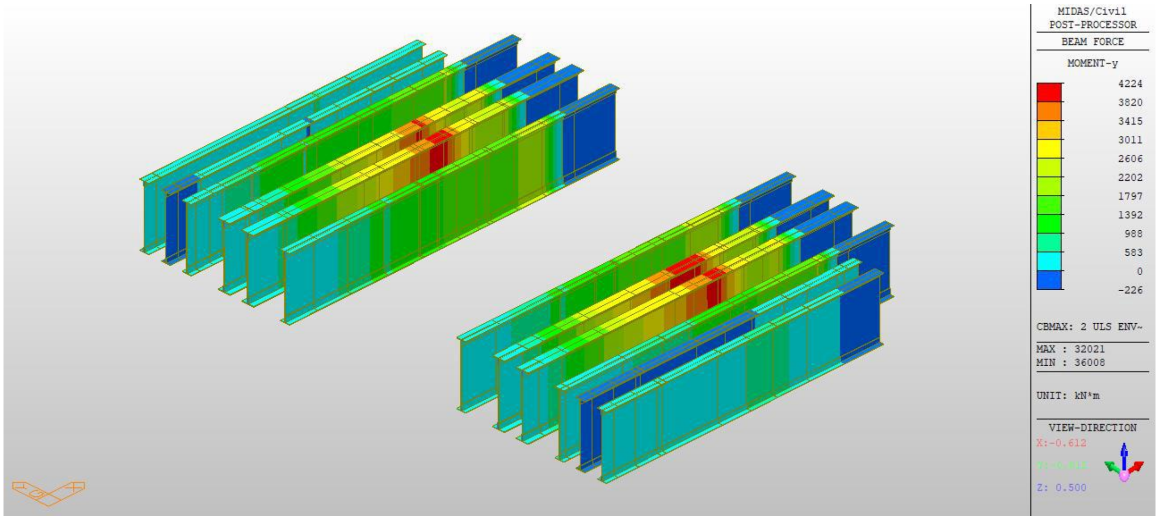

Figure 58 Girders G1 G2 G3 G4 G6 - Case 2 ULS M_y Max

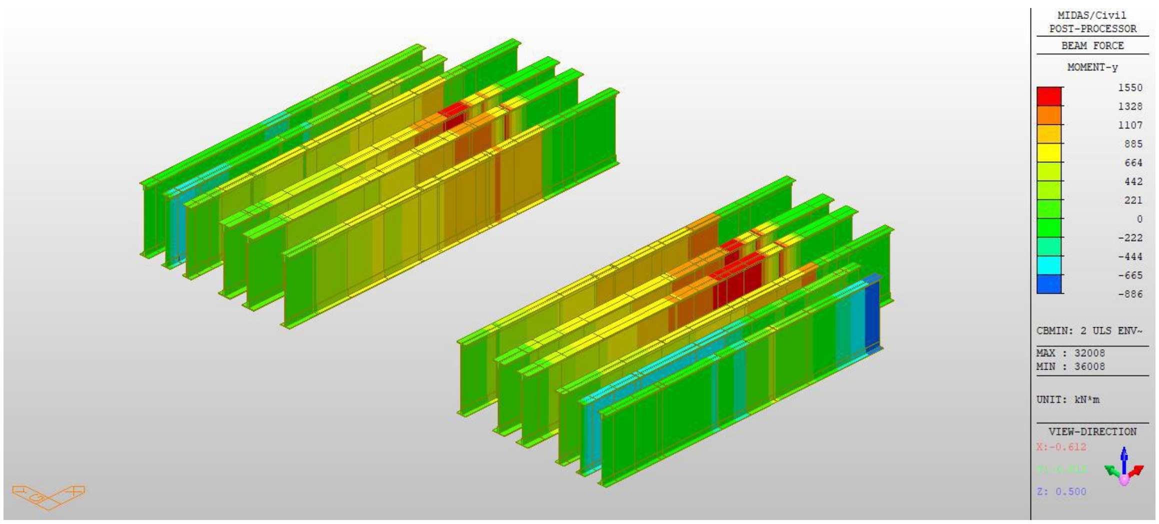

Figure 59 Girders G1 G2 G3 G4 G6 - Case 2 ULS M_y Min

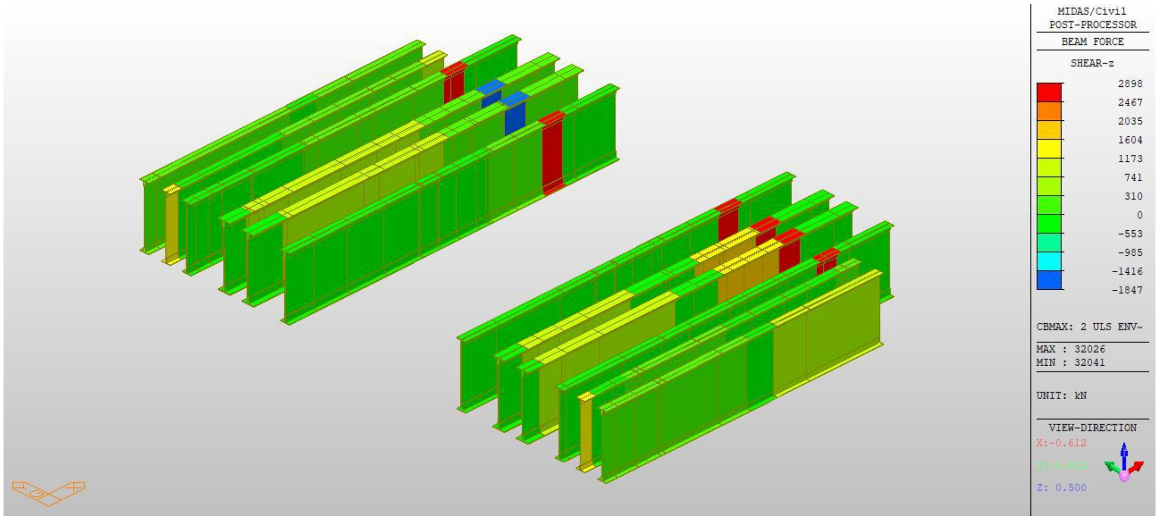

Figure 60 Girders G1 G2 G3 G4 G6 - Case 2 ULS F_z Max

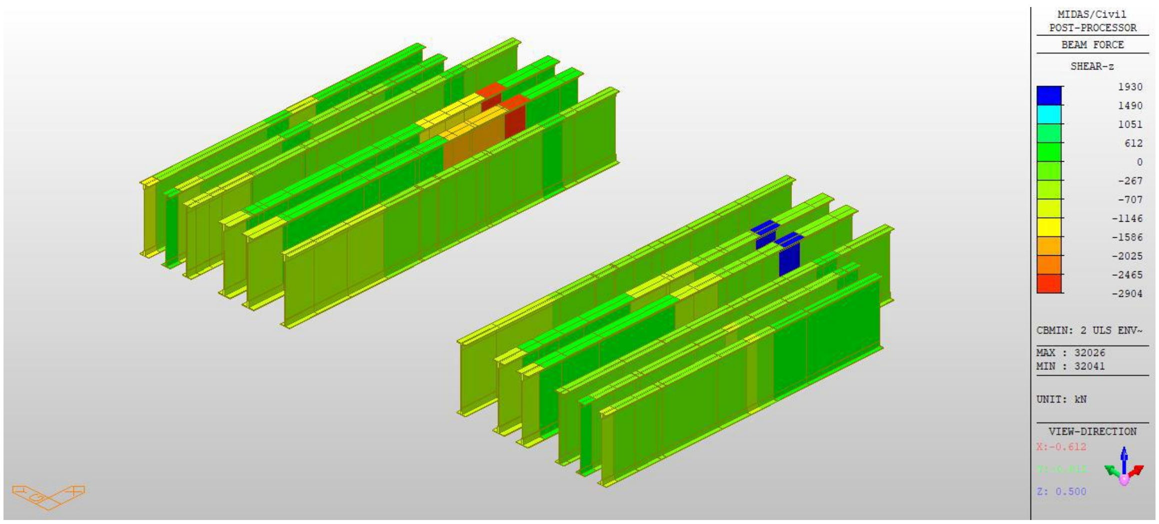

Figure 61 Girders G1 G2 G3 G4 G6 - Case 2 ULS F_z Min

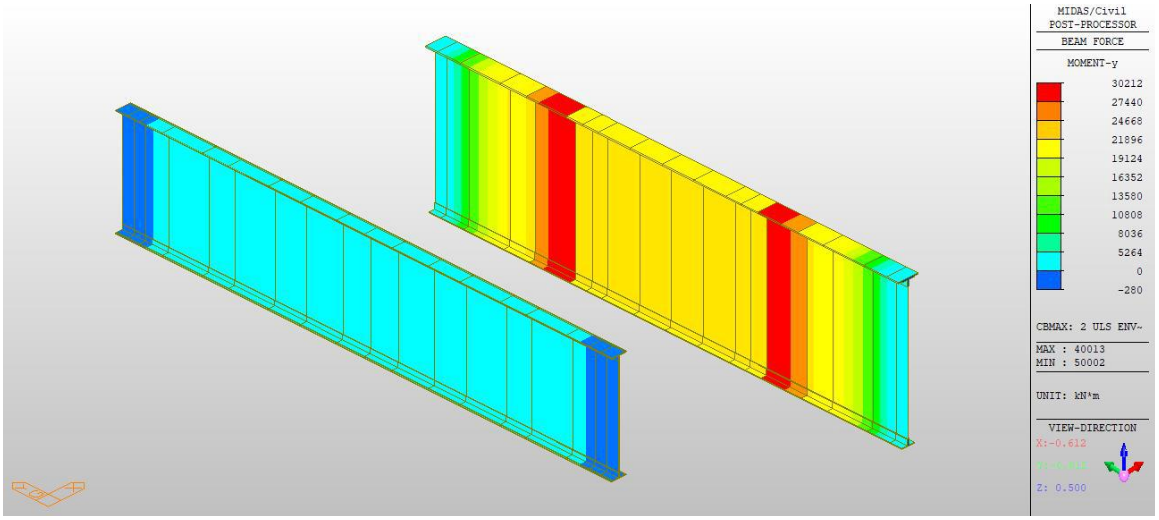

Figure 62 **Girders G7 and G8 - Case 2 ULS M_y Max**

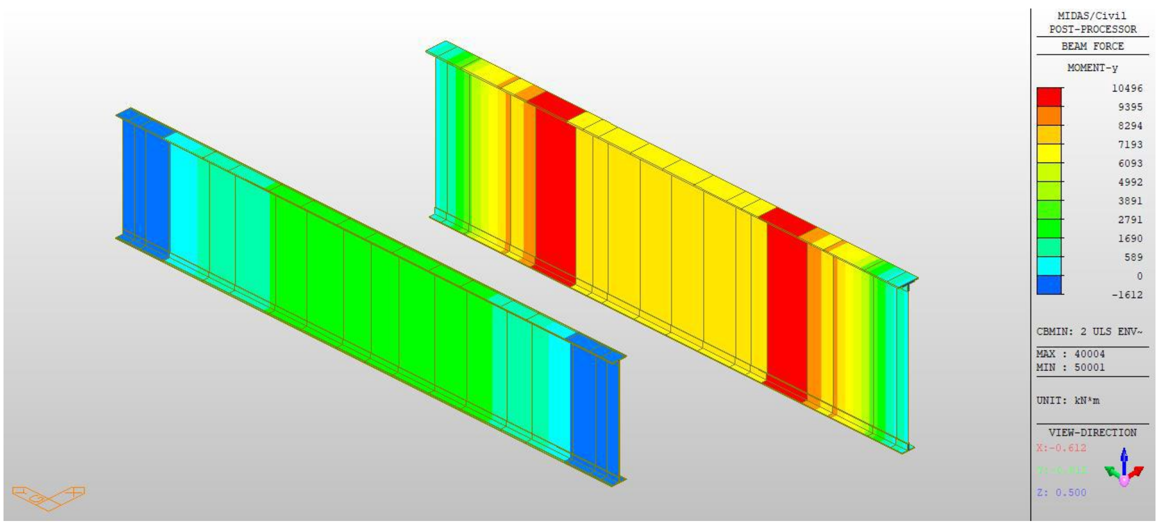

Figure 63 **Girders G7 and G8 - Case 2 ULS M_y Min**

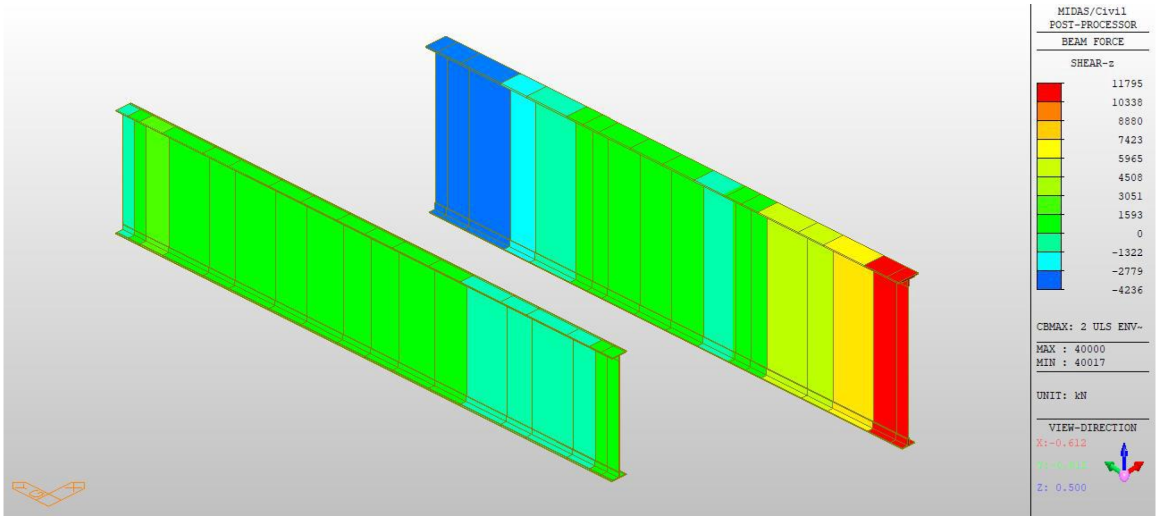

Figure 64 Girders G7 and G8 - Case 2 ULS F_z Max

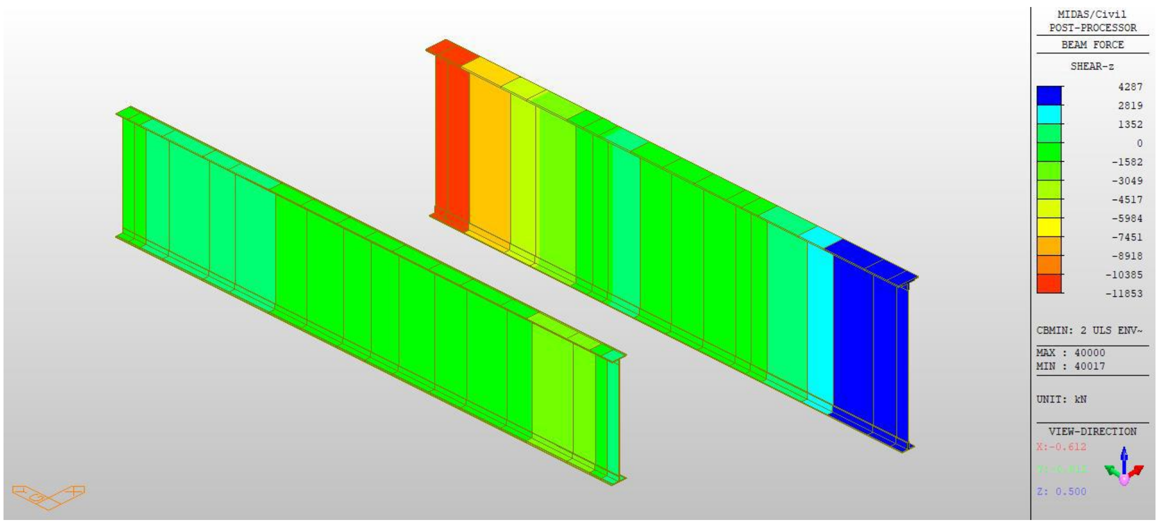

Figure 65 Girders G7 and G8 - Case 2 ULS F_z Min

Exhibit C.2.4. Rehabilitation Case 3

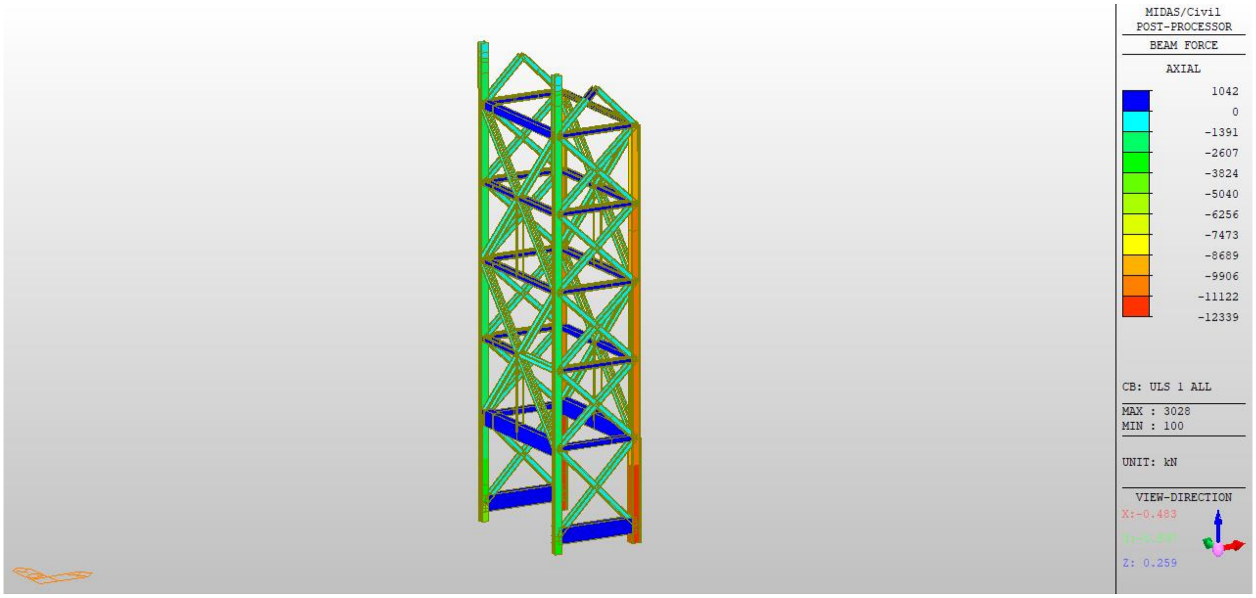

Figure 66 Case 3 ULS 1 Axial

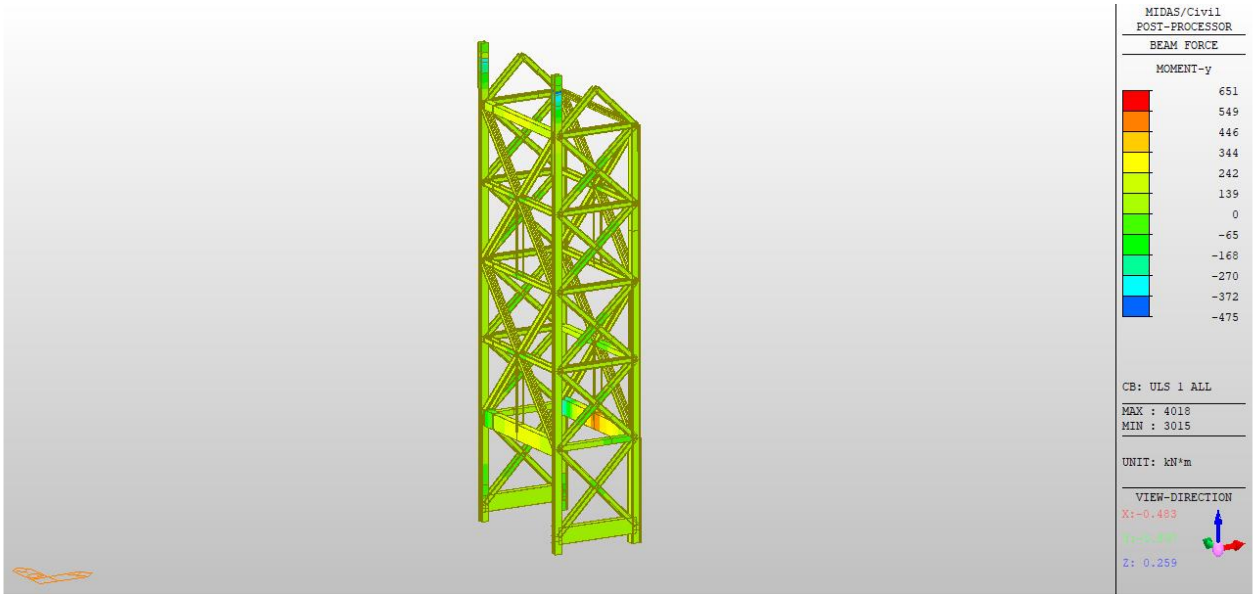

Figure 67 Case 3 ULS 1 MY

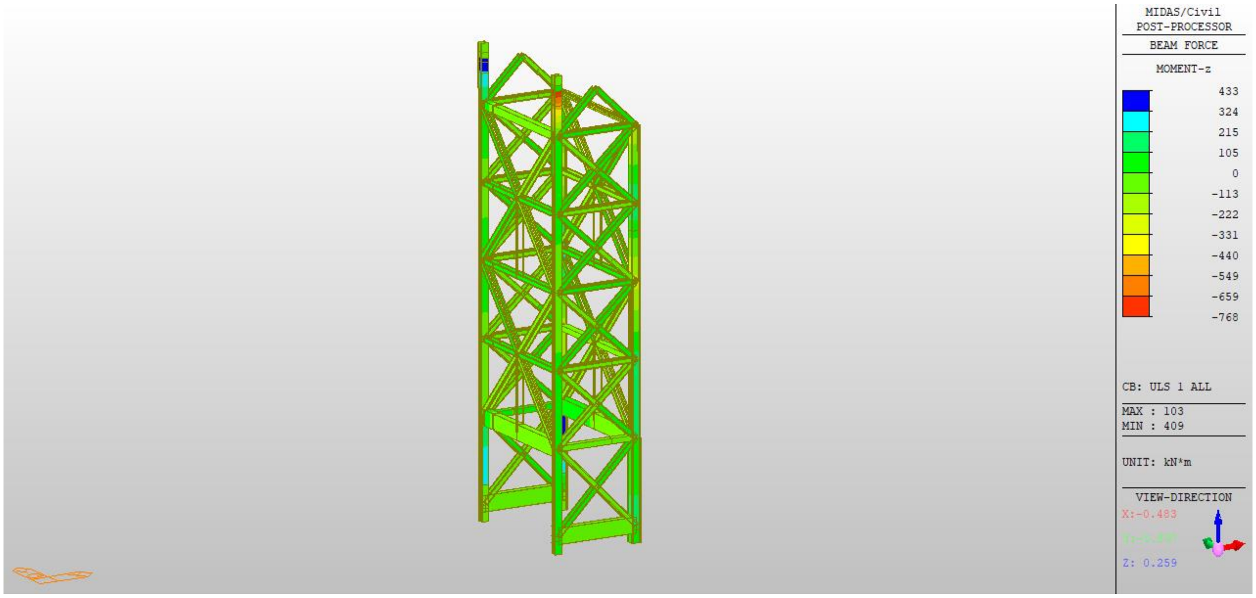

Figure 68 Case 3 ULS 1 MZ

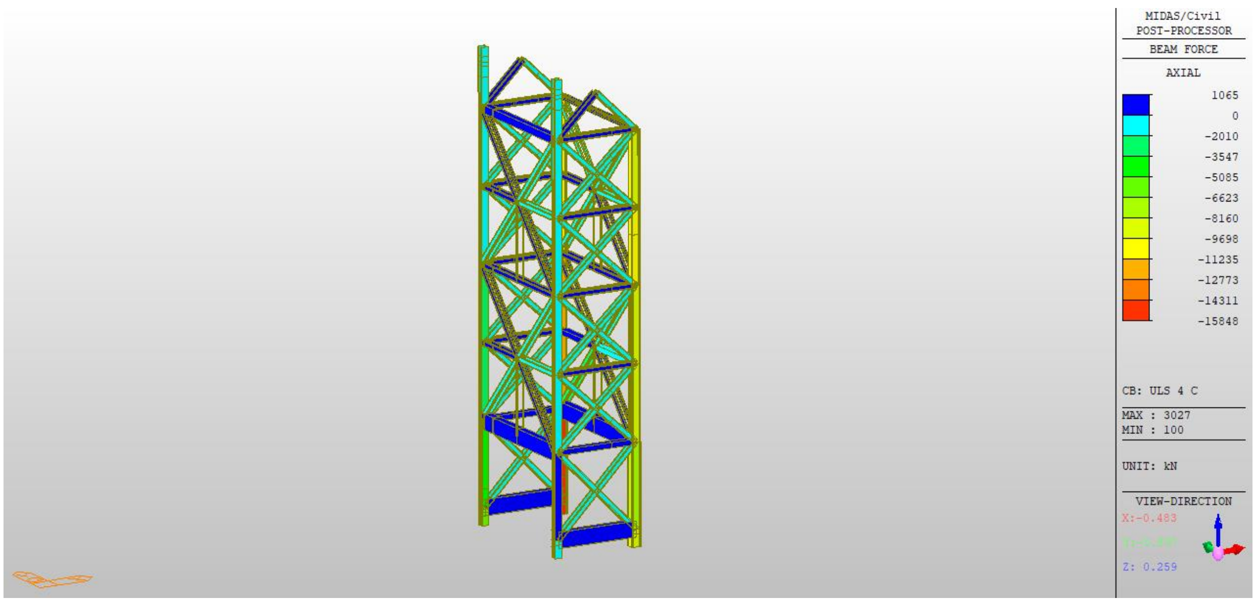

Figure 69 Case 3 ULS 4 Axial

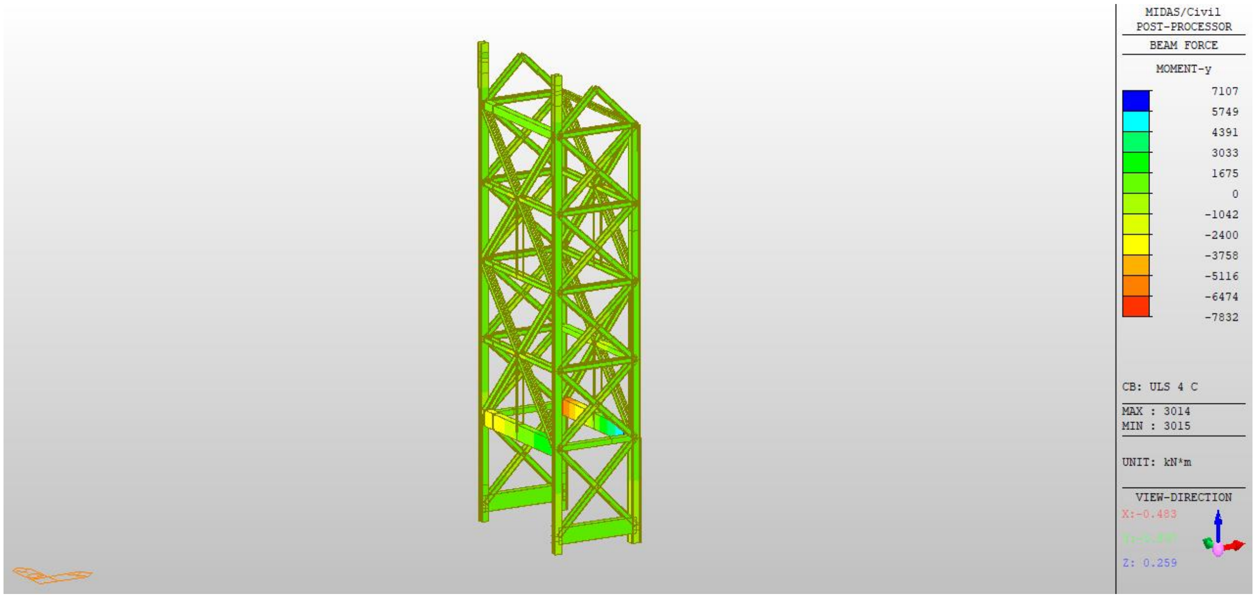

Figure 70 Case 3 ULS 4 MY

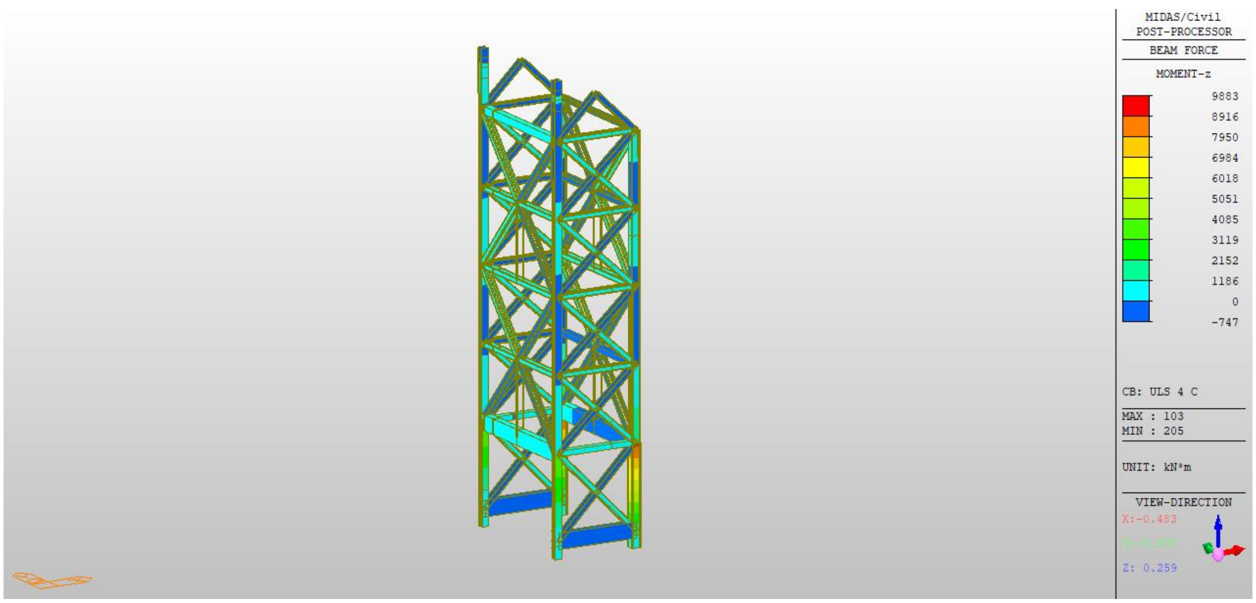

Figure 71 Case 3 ULS 4 MZ

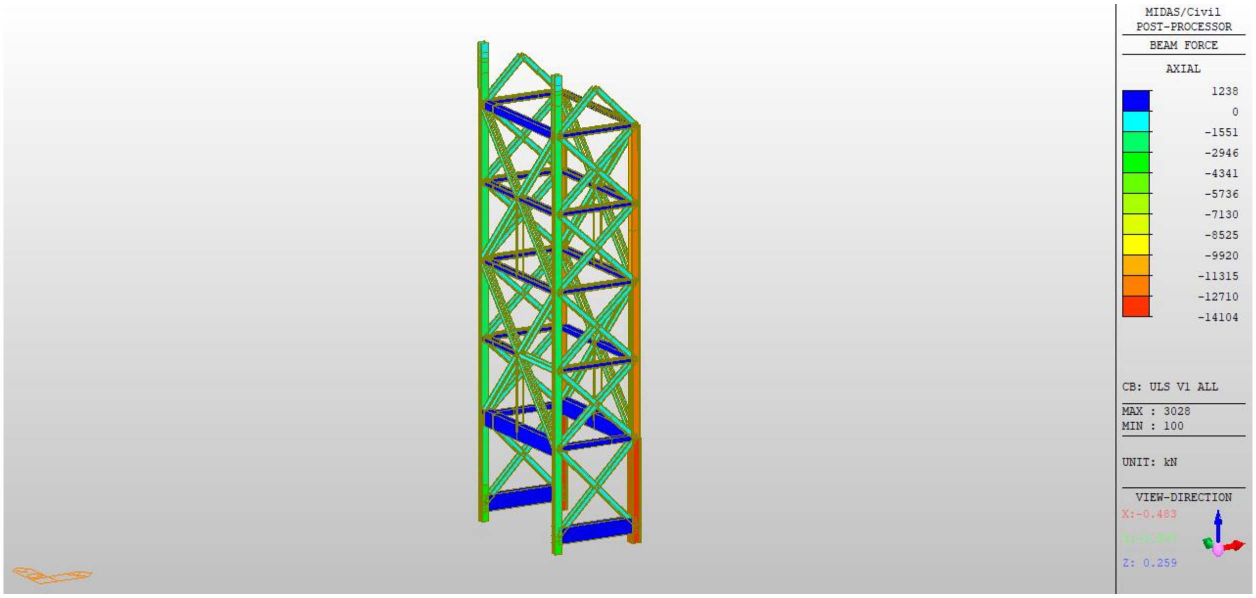

Figure 72 Case 3 ULS V1 Axial

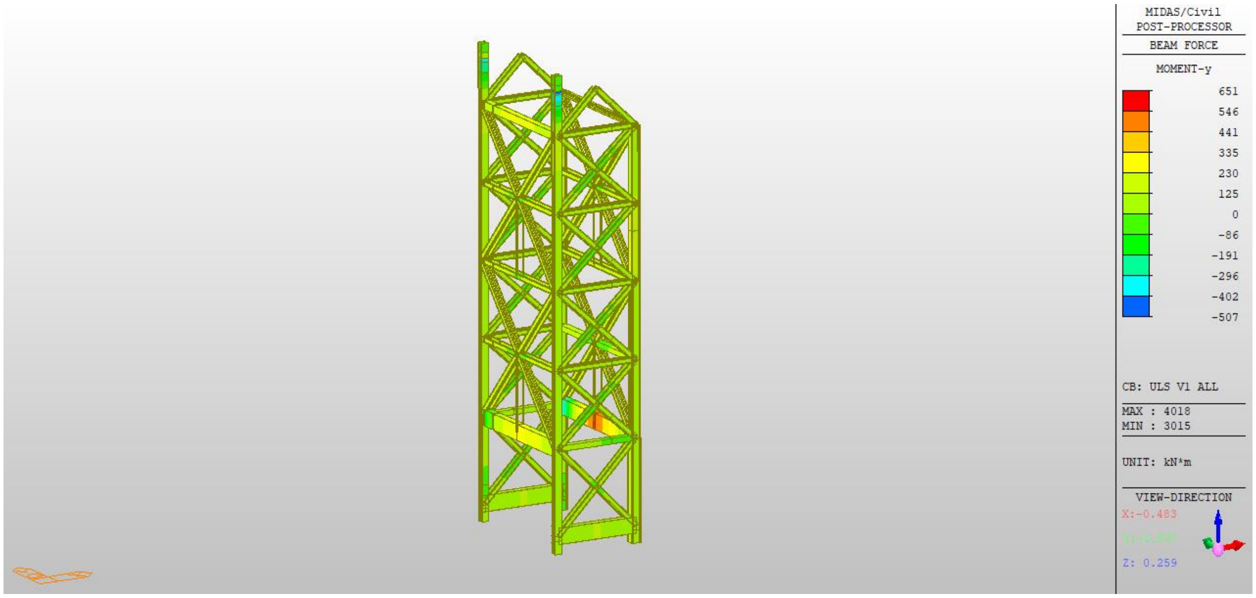

Figure 73 Case 3 ULS V1 MY

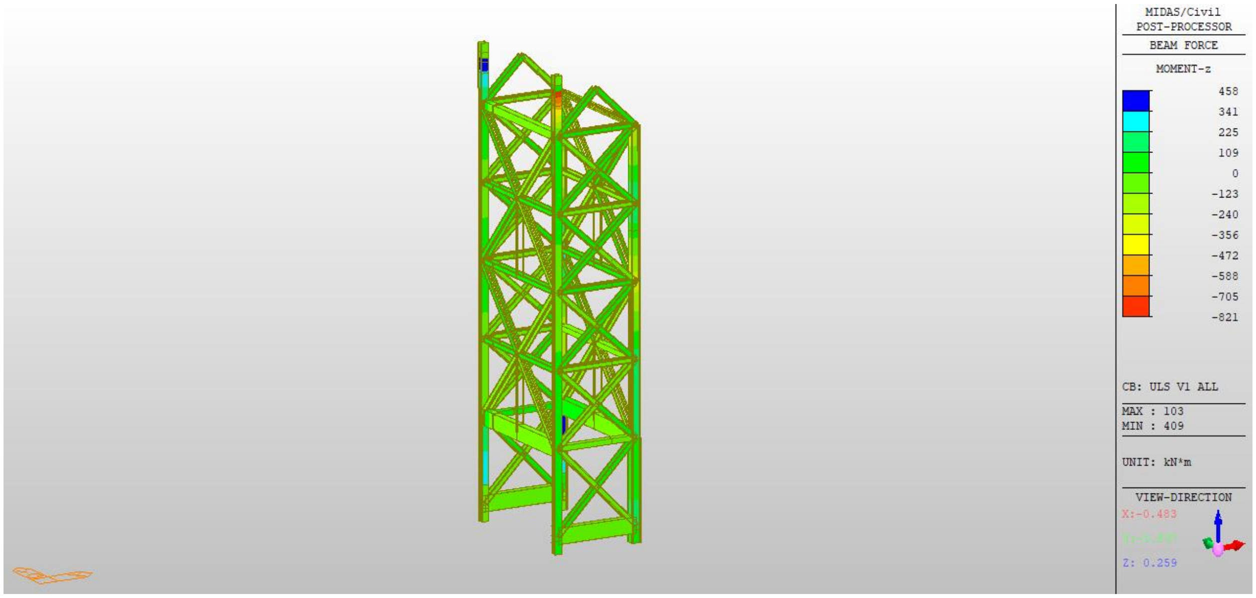

Figure 74 Case 3 ULS V1 MZ

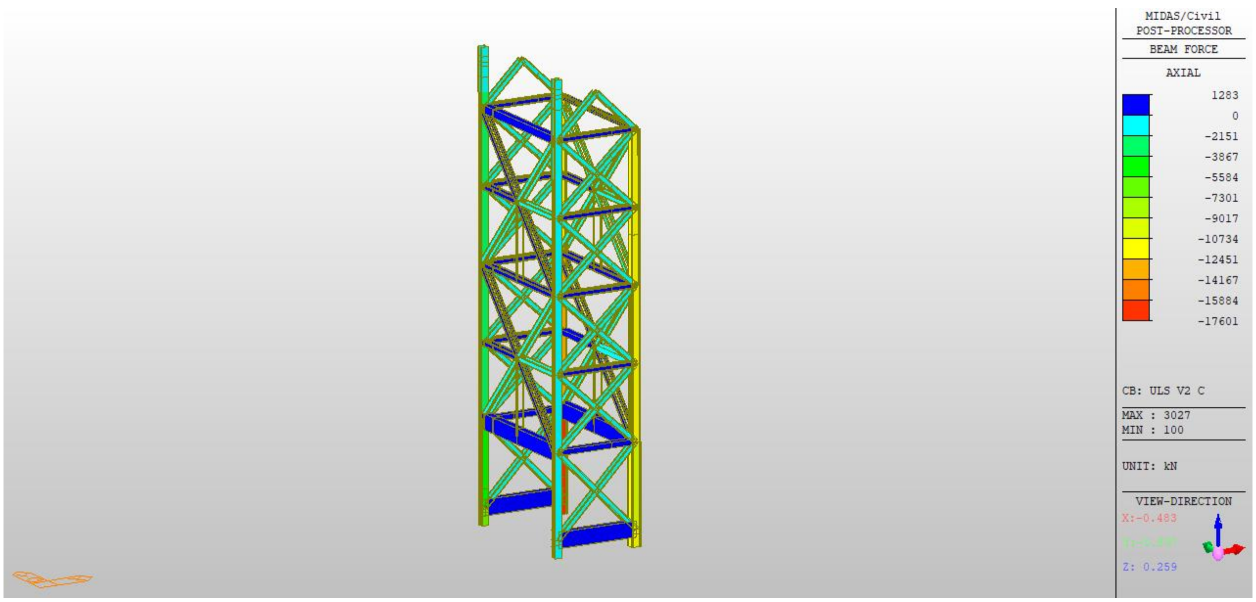

Figure 75 Case 3 ULS V2 Axial

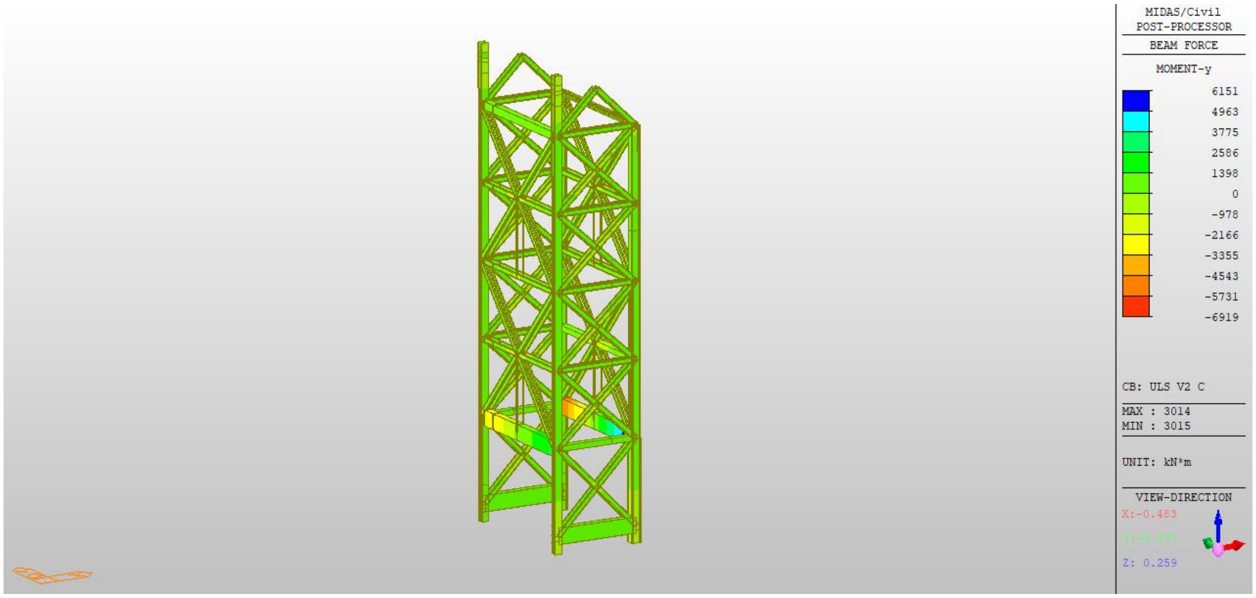

Figure 76 Case 3 ULS V2 MY

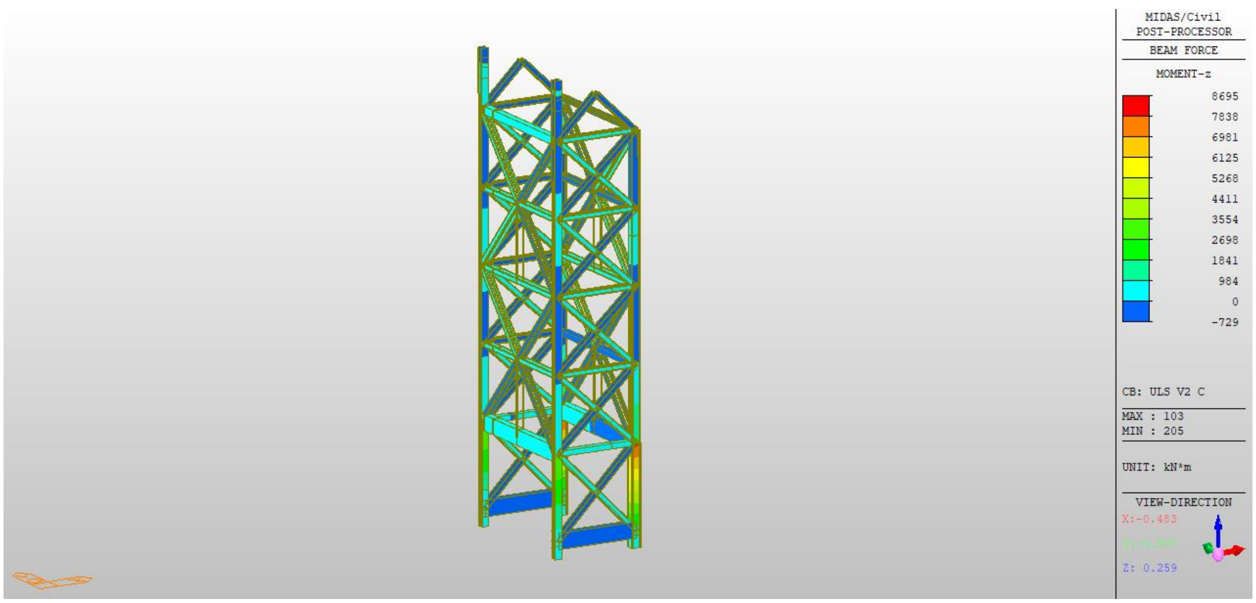

Figure 77 Case 3 ULS V2 MZ

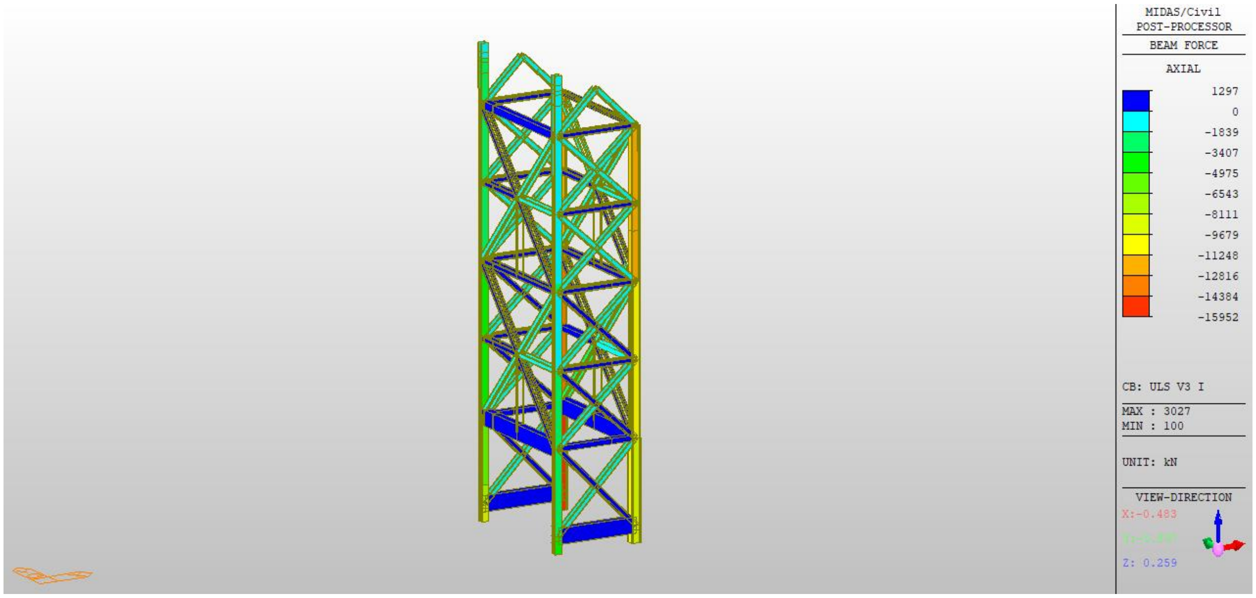

Figure 78 Case 3 ULS V3 Axial

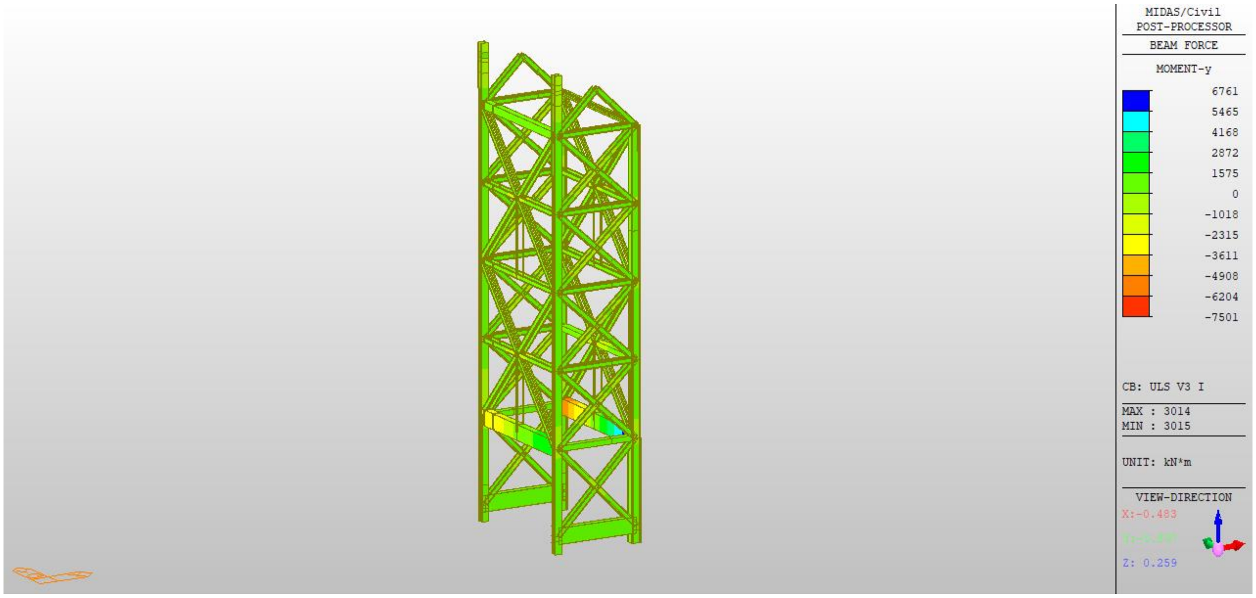

Figure 79 Case 3 ULS V3 MY

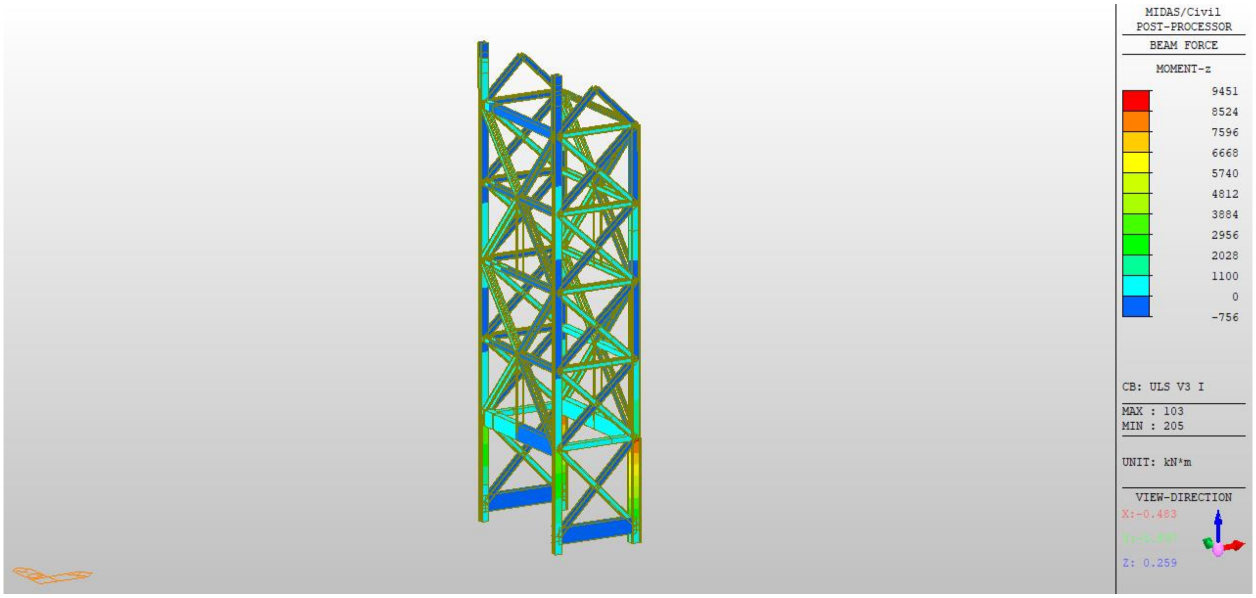

Figure 80 Case 3 ULS V3 MZ

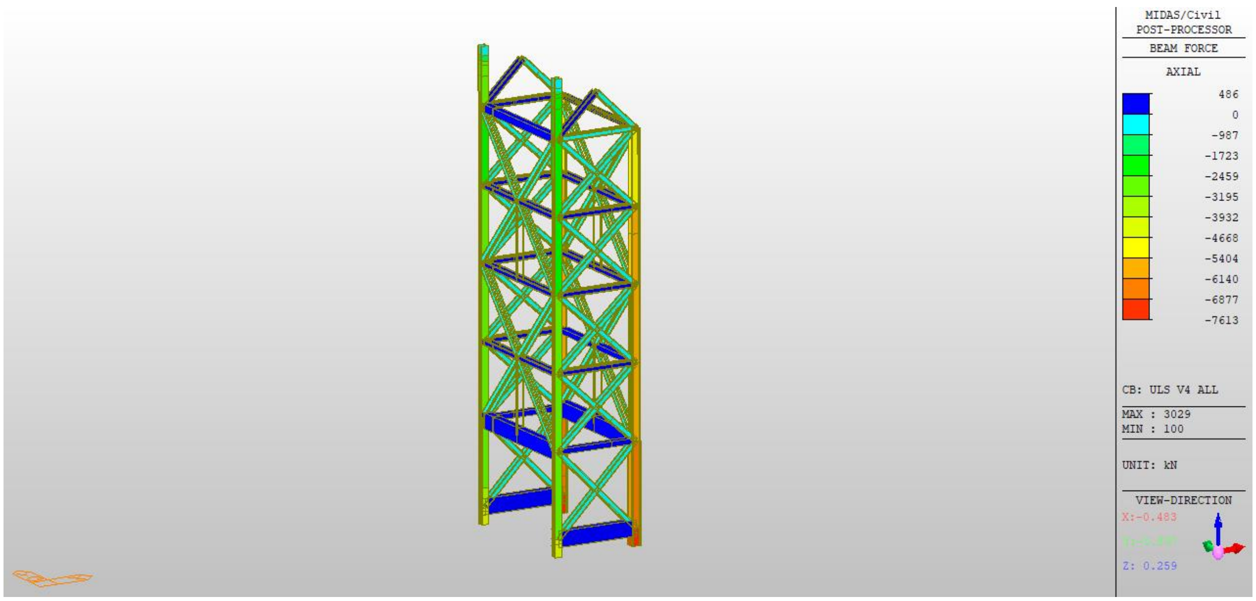

Figure 81 Case 3 ULS V4 Axial

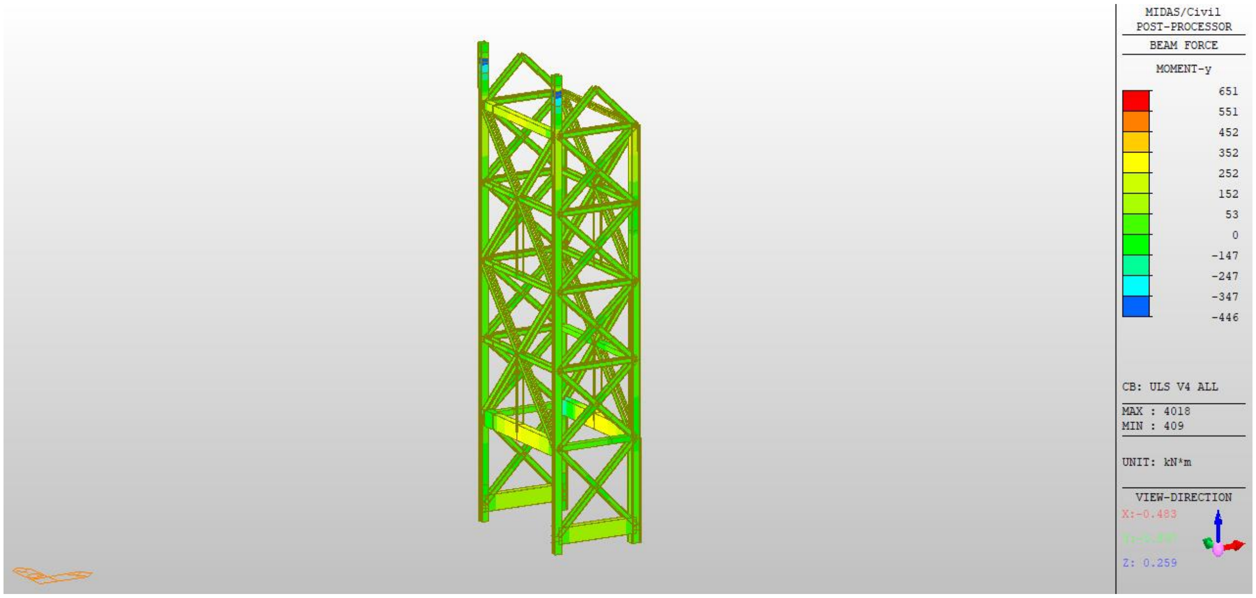

Figure 82 Case 3 ULS V4 MY

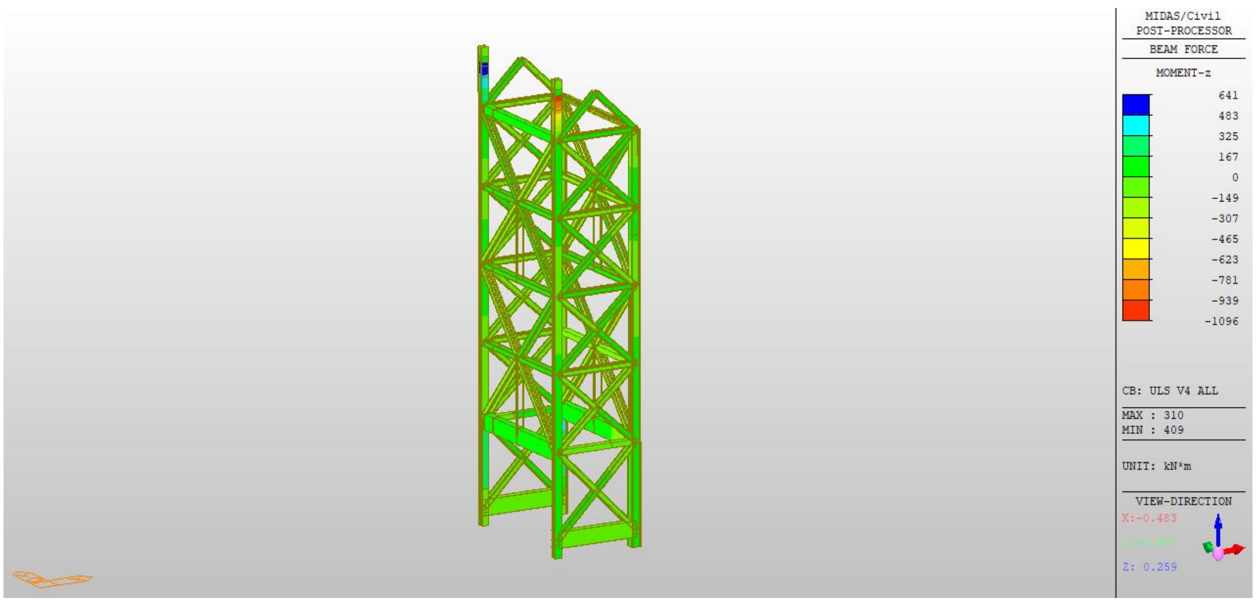

Figure 83 Case 3 ULS V4 MZ

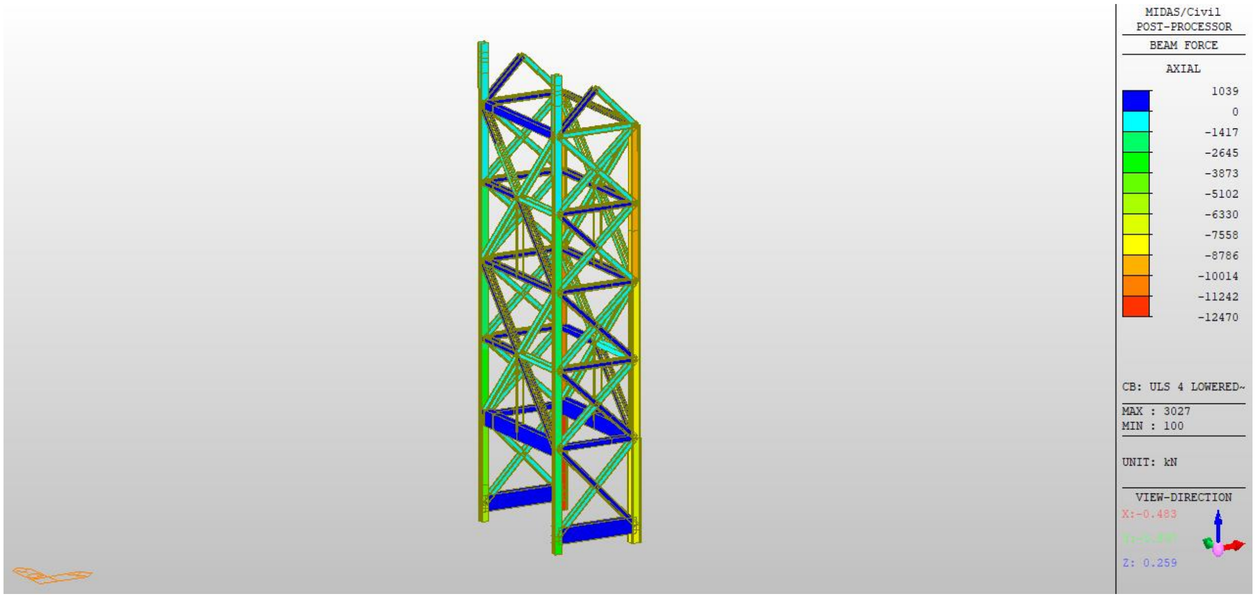

Figure 84 Case 3 ULS 4 Lowered Axial

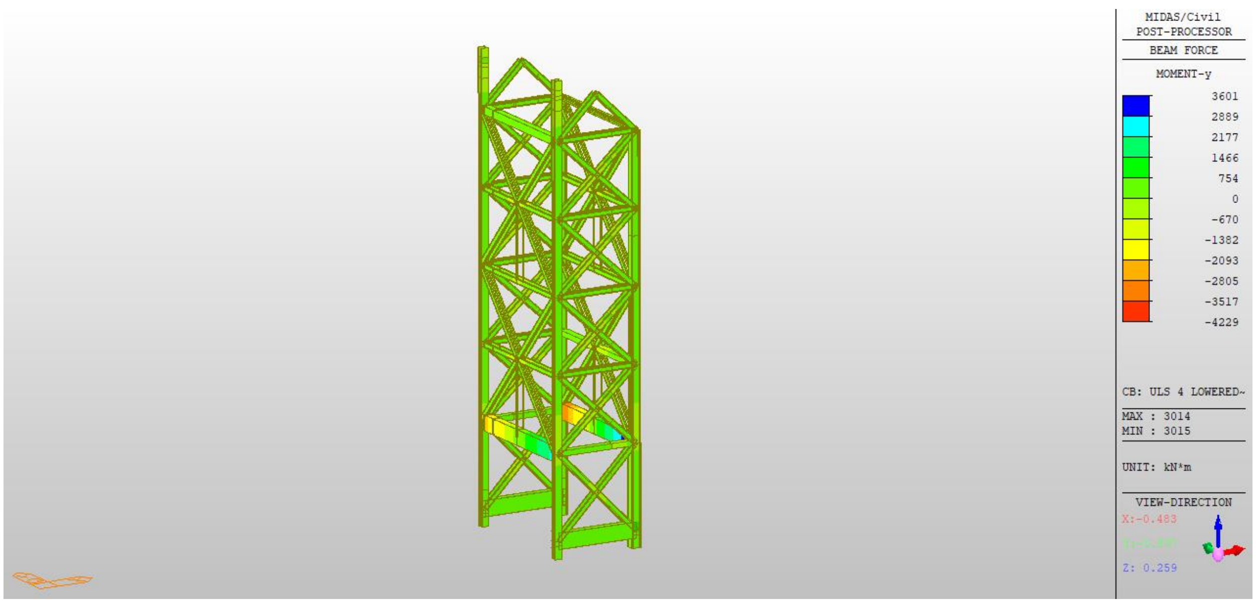

Figure 85 Case 3 ULS 4 Lowered MY

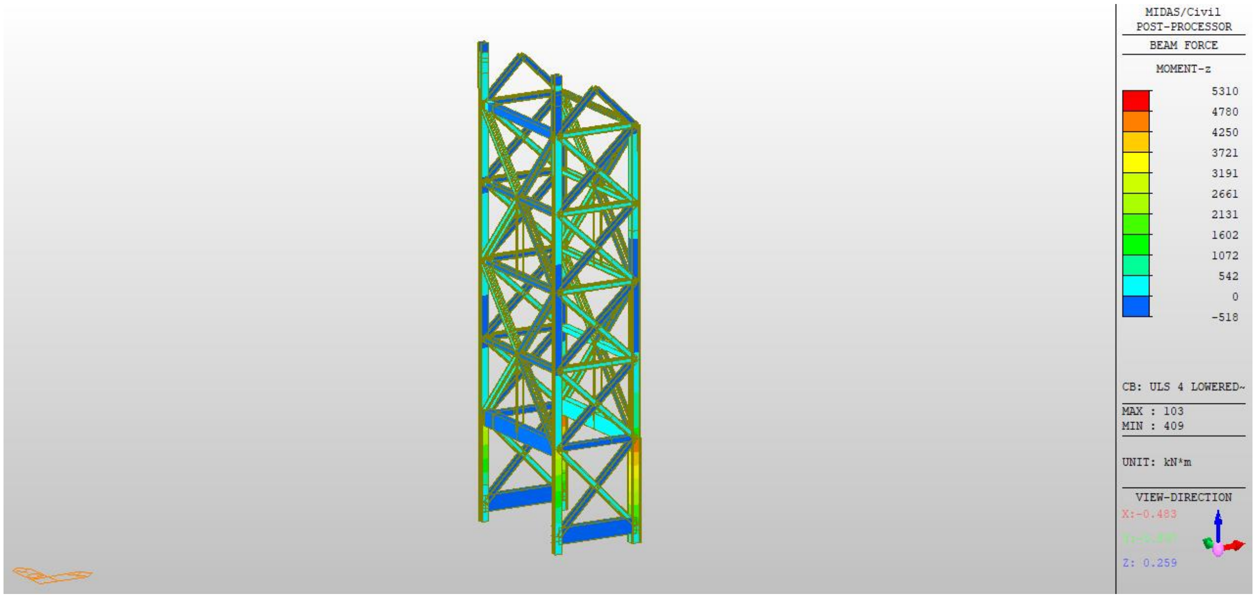

Figure 86 Case 3 ULS 4 Lowered MZ

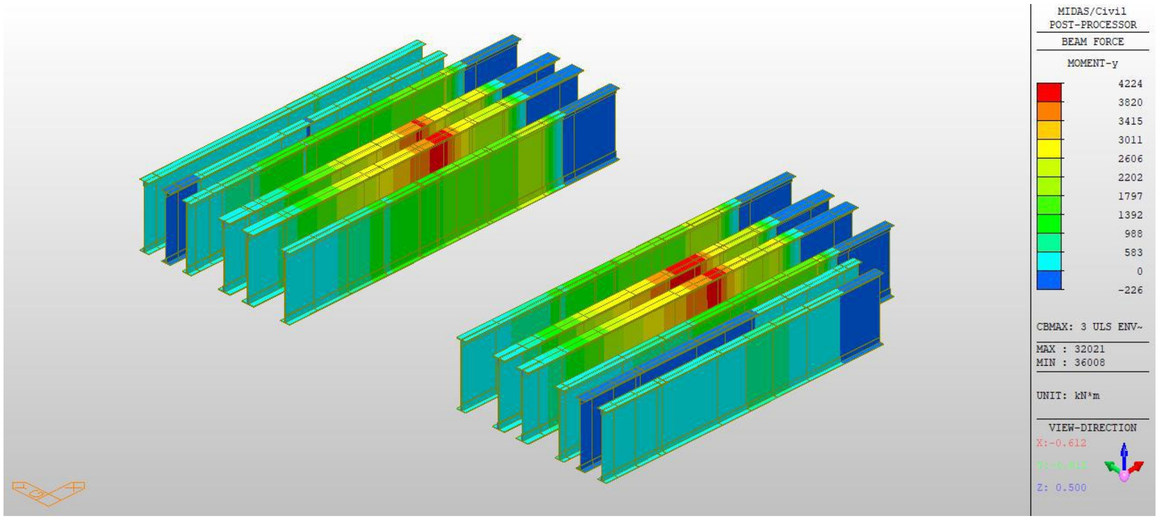

Figure 87 Girders G1 G2 G3 G4 G6 - Case 3 ULS M_y Max

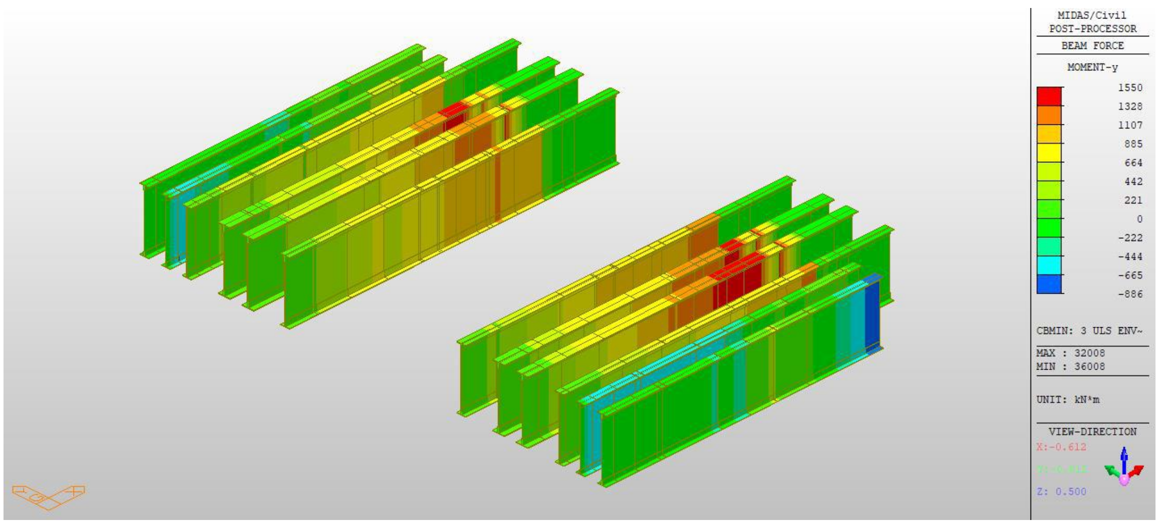

Figure 88 Girders G1 G2 G3 G4 G6 - Case 3 ULS M_y Min

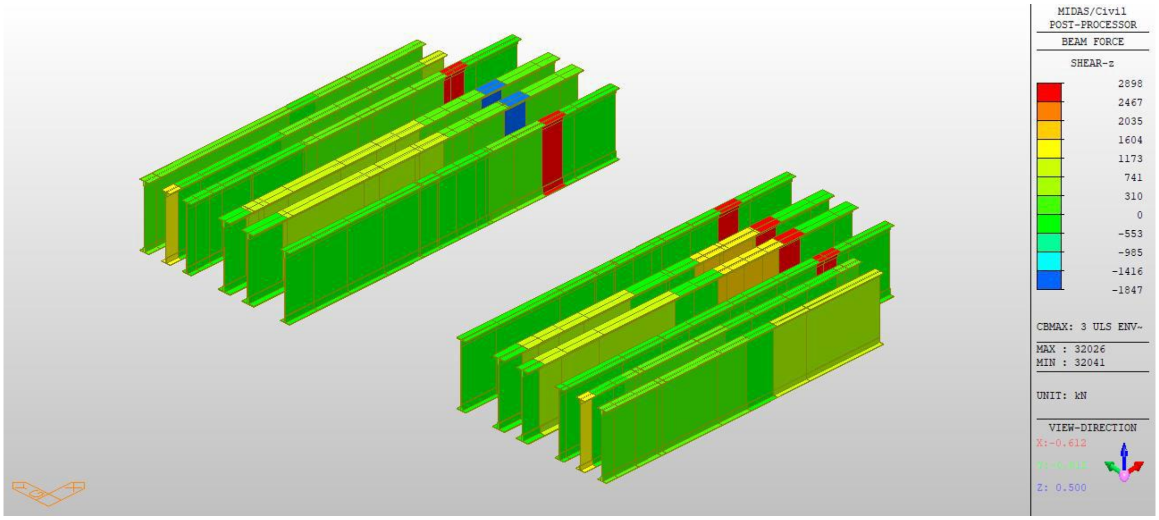

Figure 89 Girders G1 G2 G3 G4 G6 - Case 3 ULS F_z Max

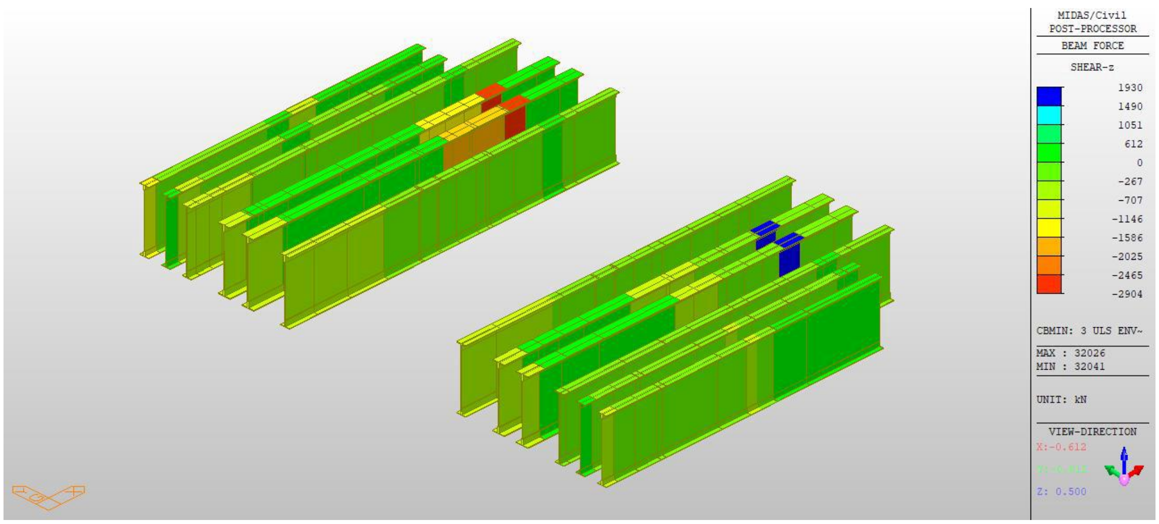

Figure 90 Girders G1 G2 G3 G4 G6 - Case 3 ULS F_z Min

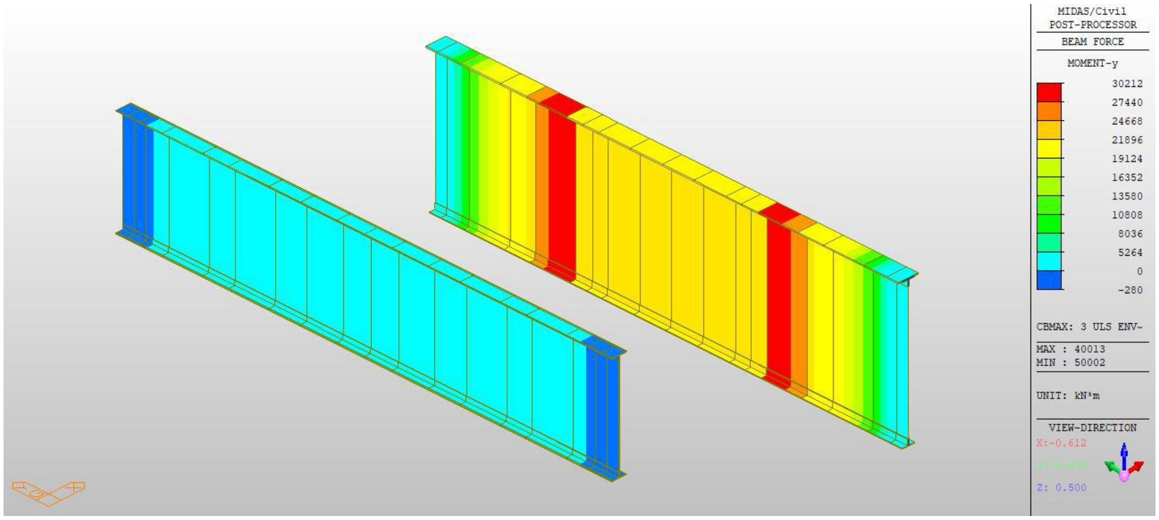

Figure 91 Girders G7 and Girders G7 3 ULS M_y Max

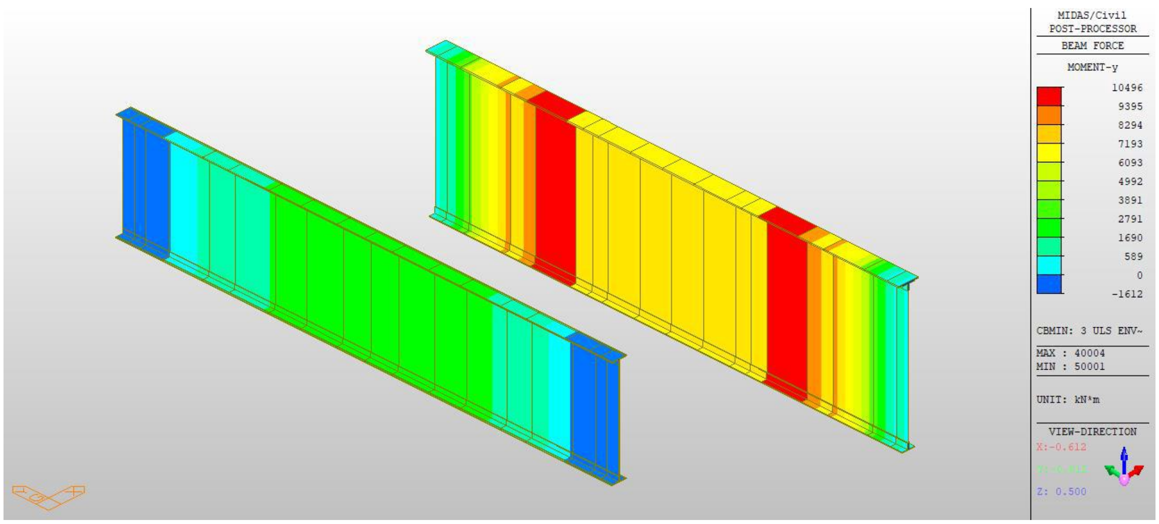

Figure 92 Girders G7 and Girders G7 3 ULS M_y Min

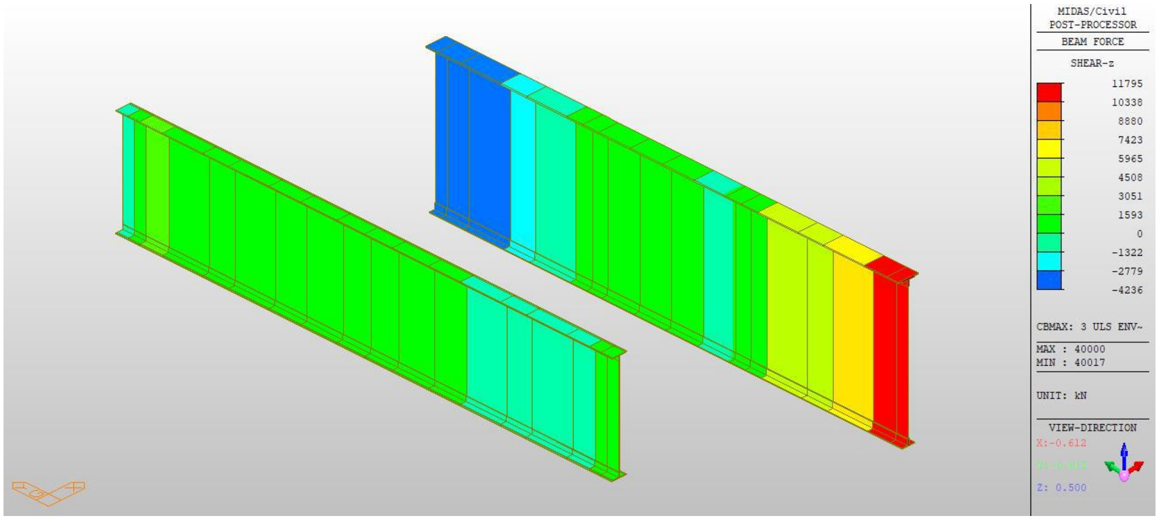

Figure 93 Girders G7 and Girders G7 3 ULS F_z Max

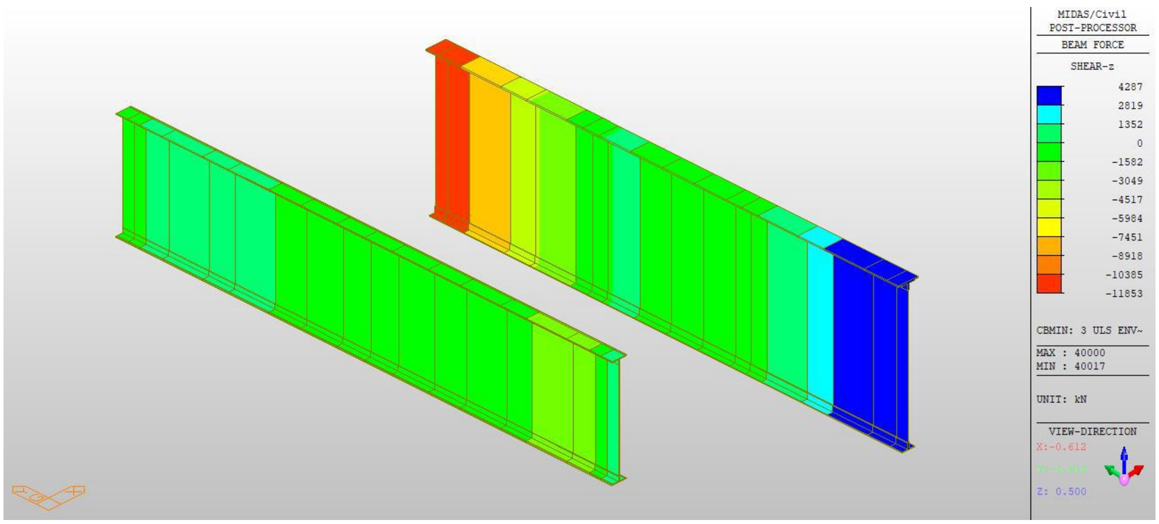

Figure 94 Girders G7 and Girders G7 3 ULS F_z Min

Exhibit C.2.5. Rehabilitation Case 4

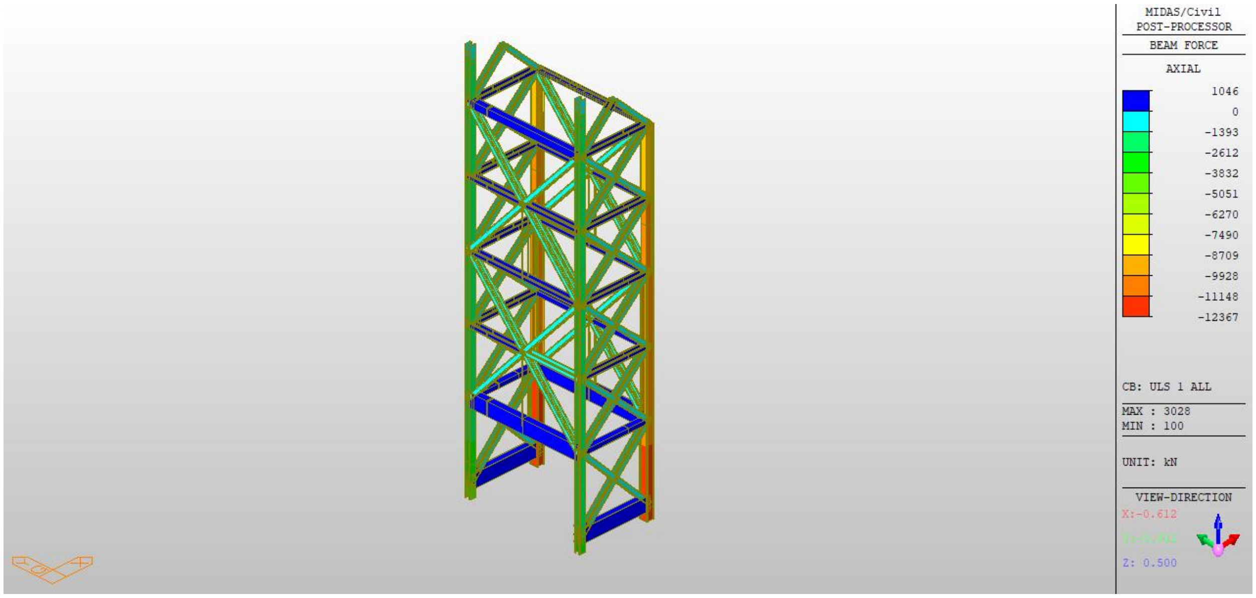

Figure 95 Case 4 ULS 1 Axial

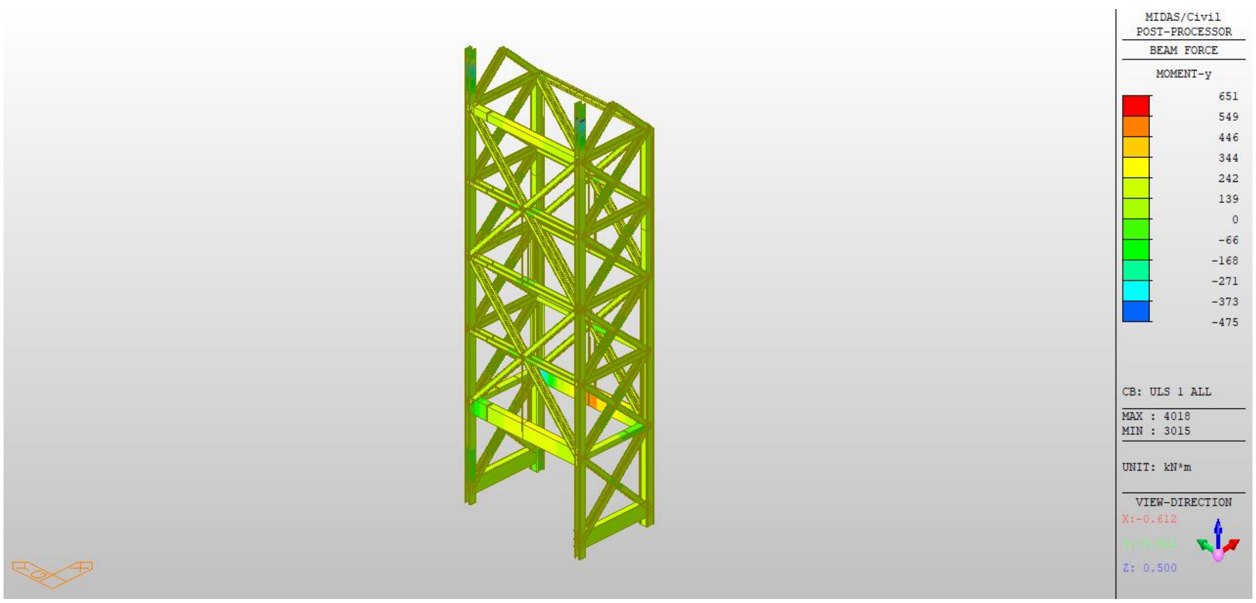

Figure 96 Case 4 ULS 1 MY

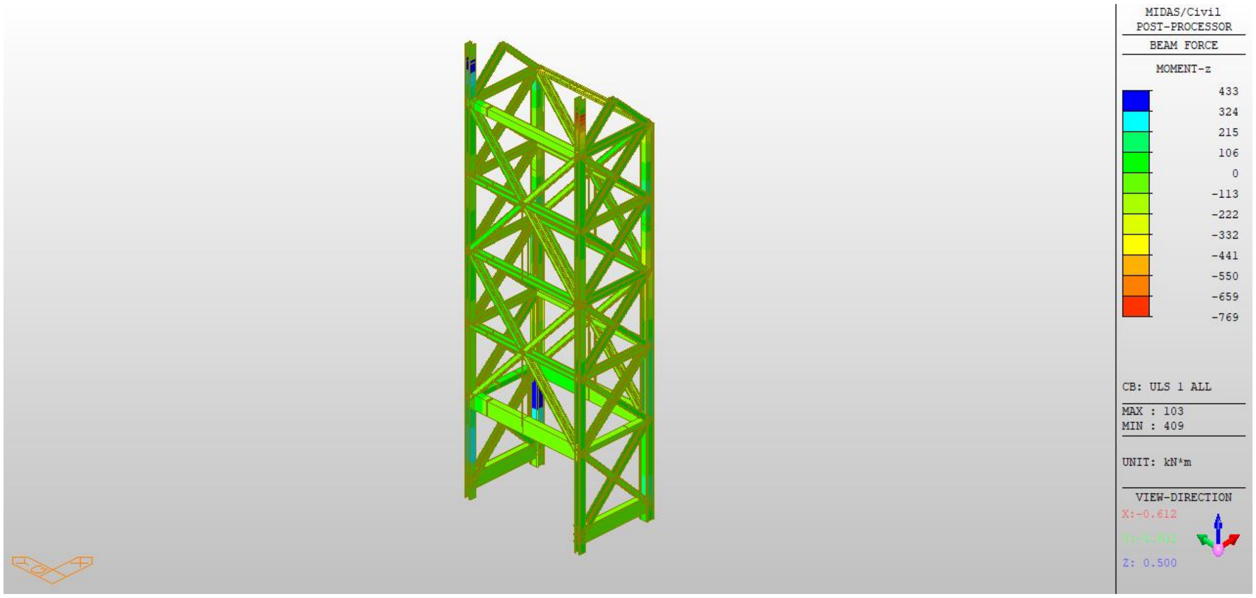

Figure 97 Case 4 ULS 1 MZ

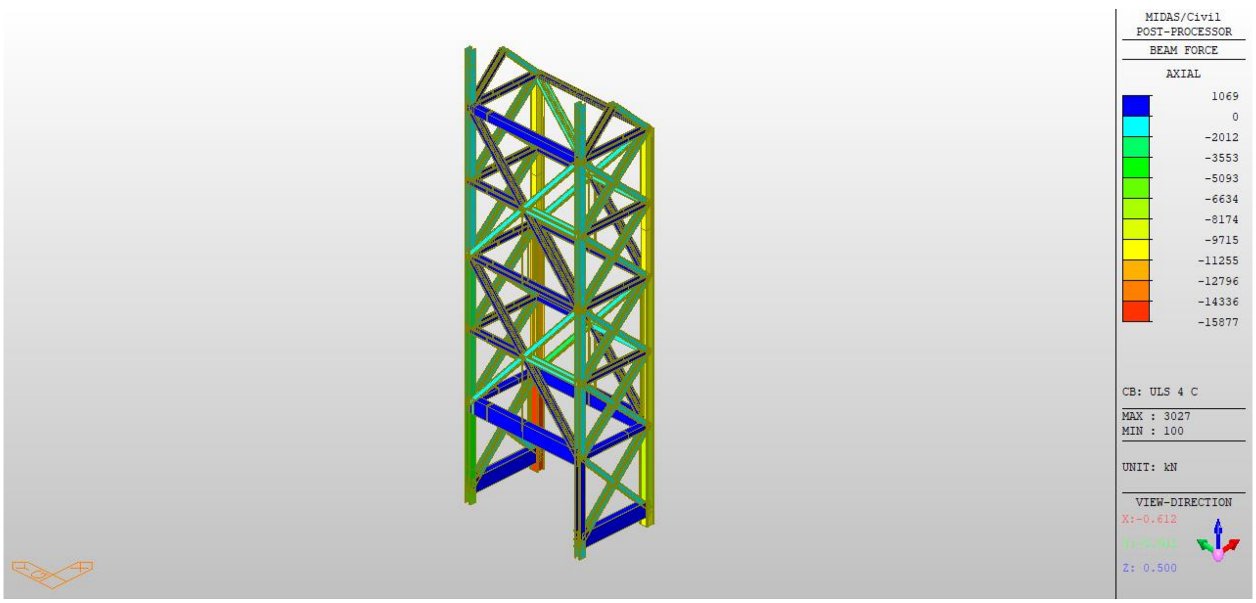

Figure 98 Case 4 ULS 4 Axial

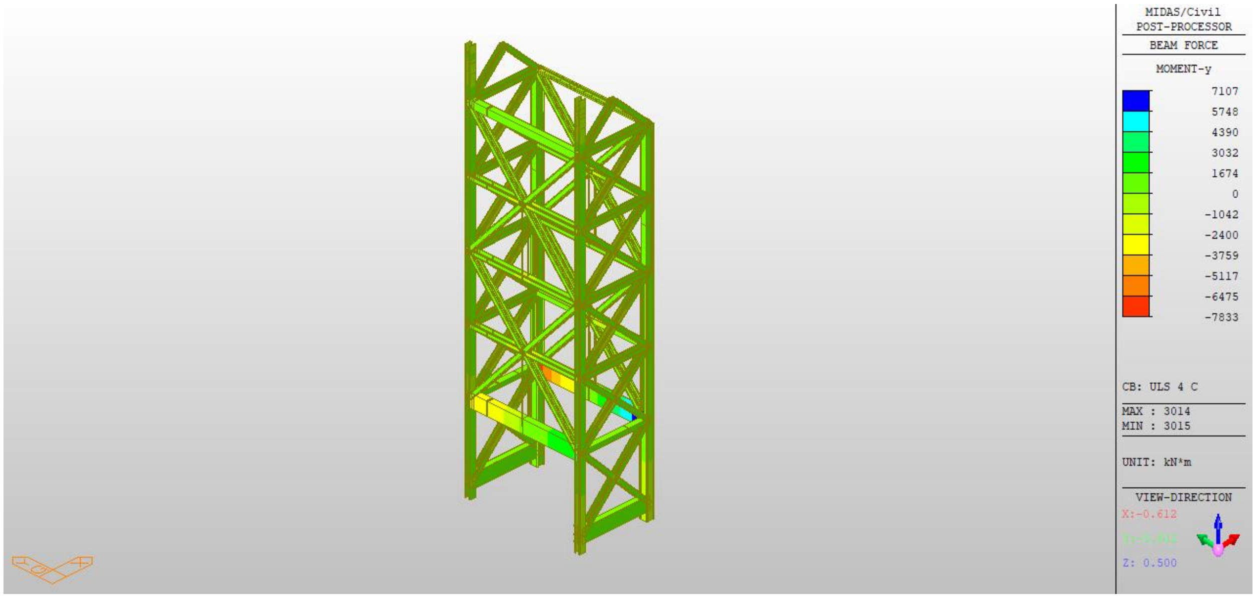

Figure 99 Case 4 ULS 4 MY

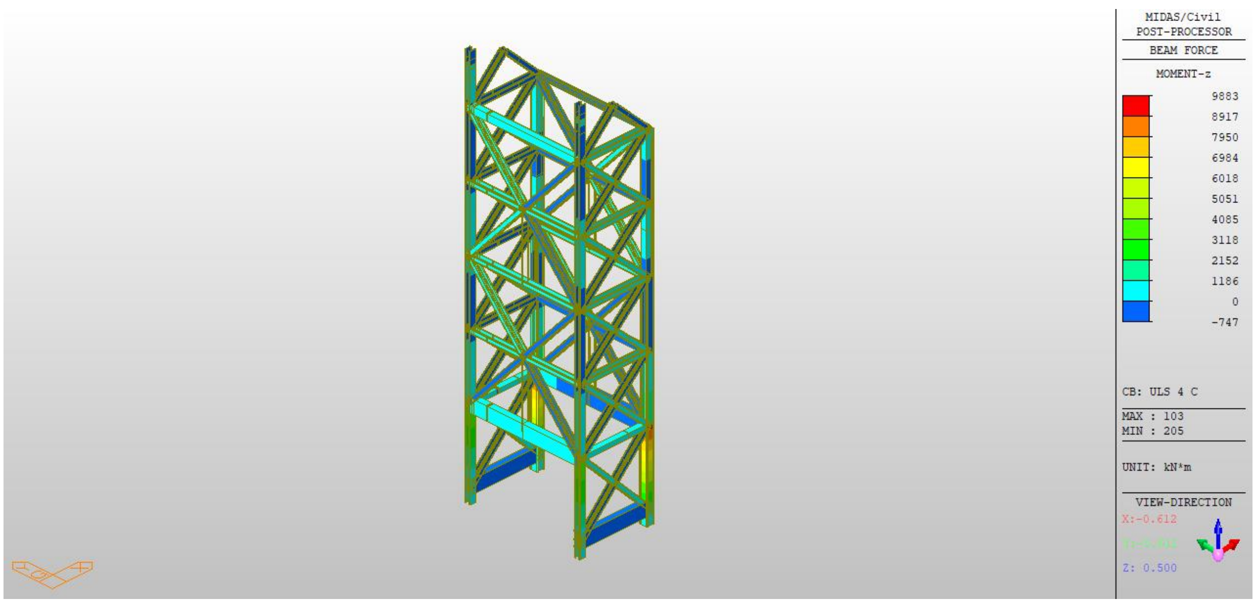

Figure 100 Case 4 ULS 4 MZ

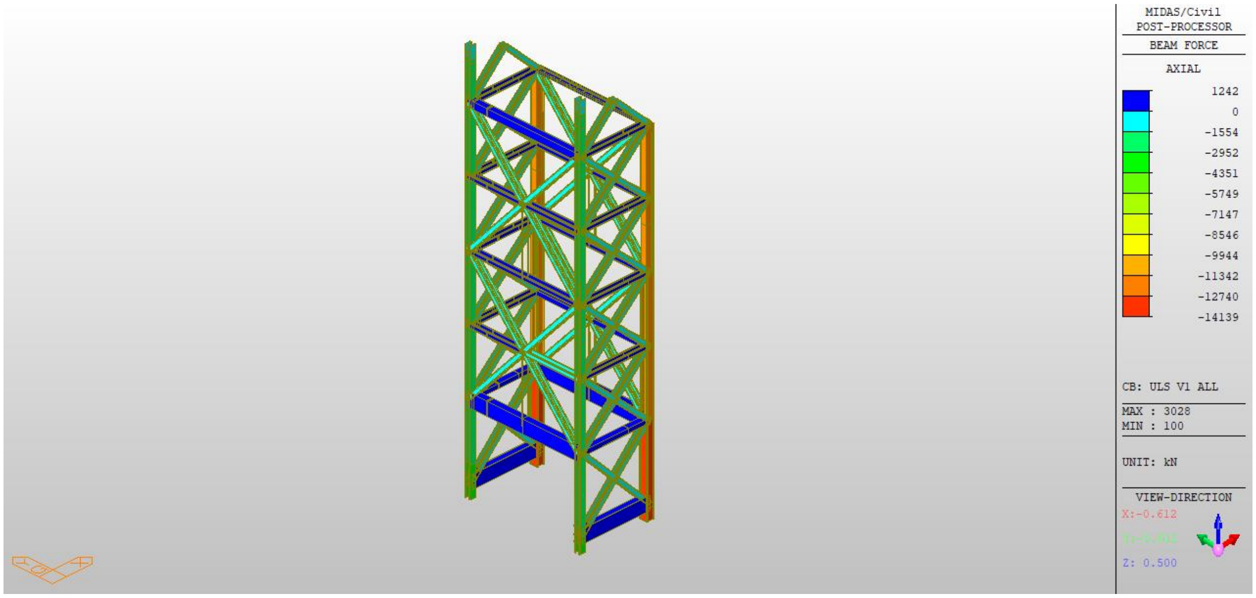

Figure 101 Case 4 ULS V1 Axial

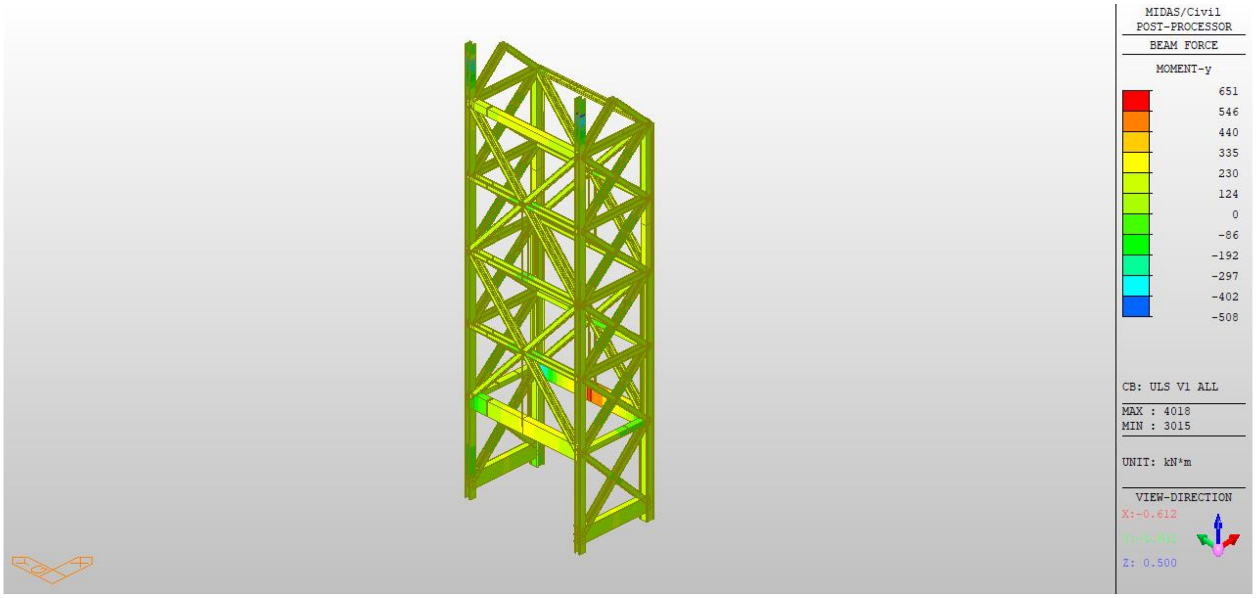

Figure 102 Case 4 ULS V1 MY

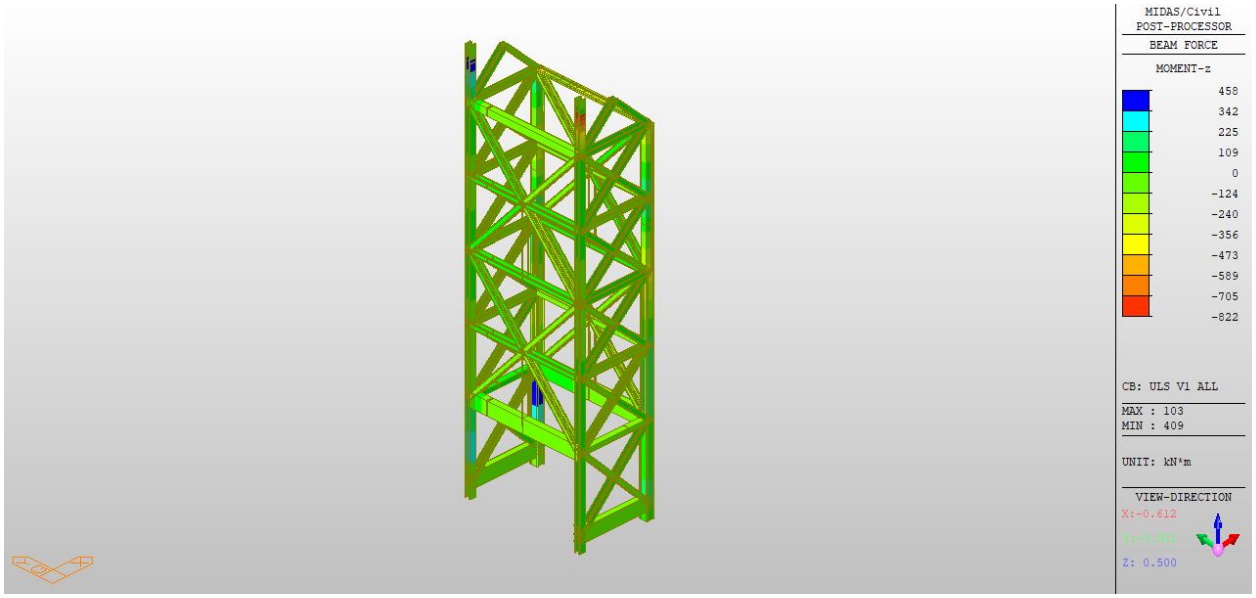

Figure 103 Case 4 ULS V1 MZ

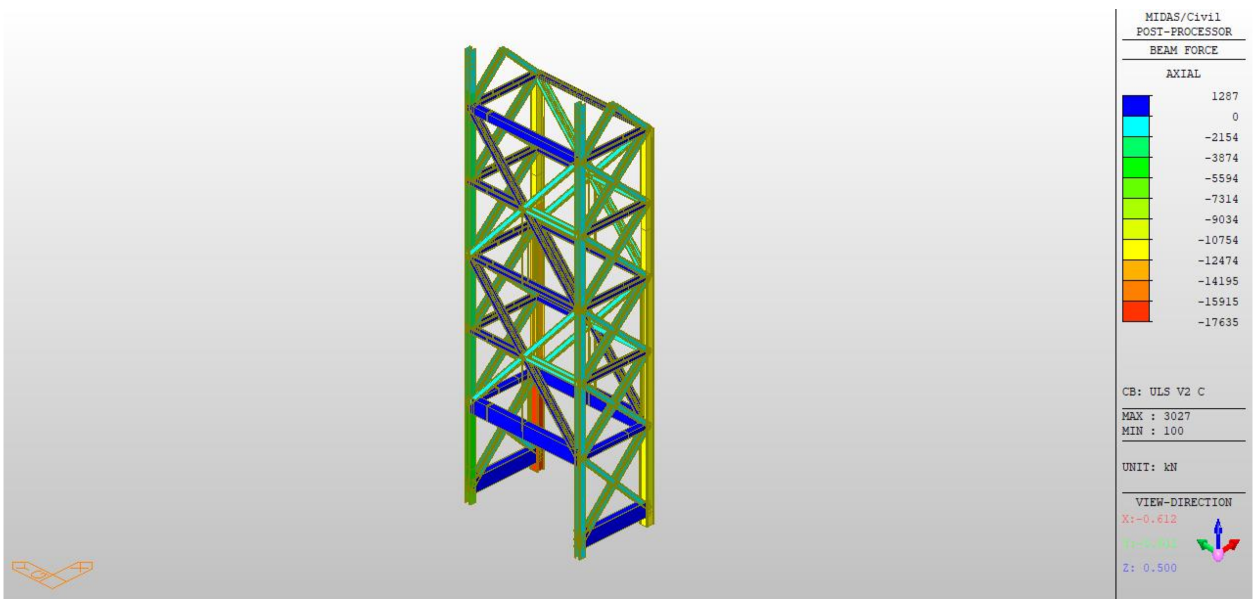

Figure 104 Case 4 ULS V2 Axial

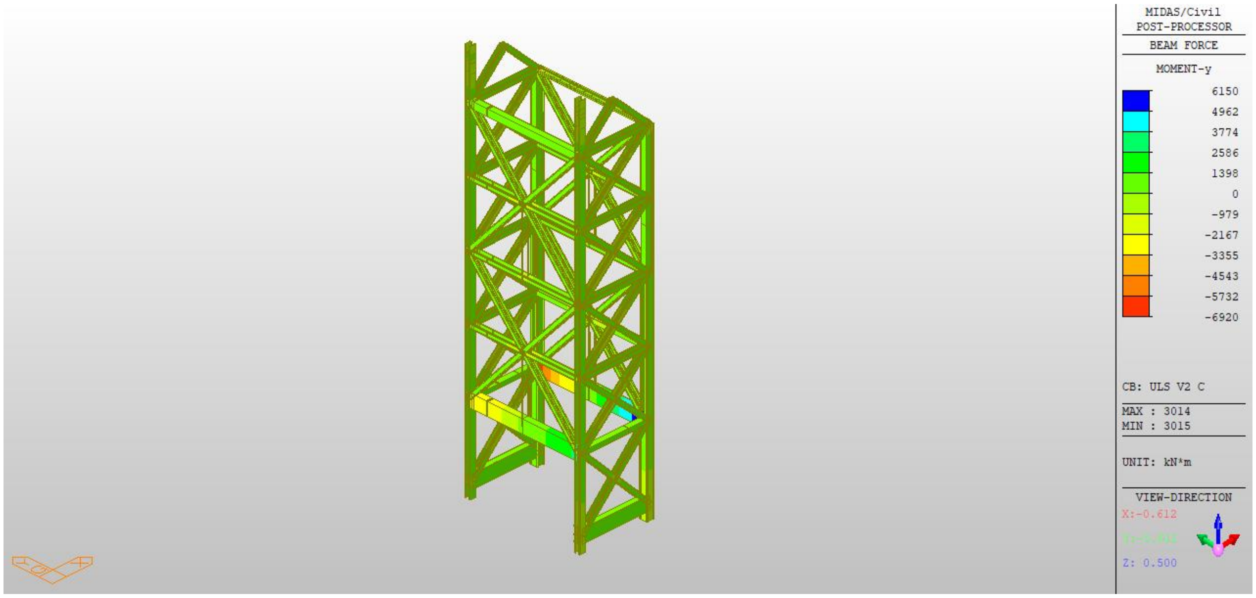

Figure 105 Case 4 ULS V2 MY

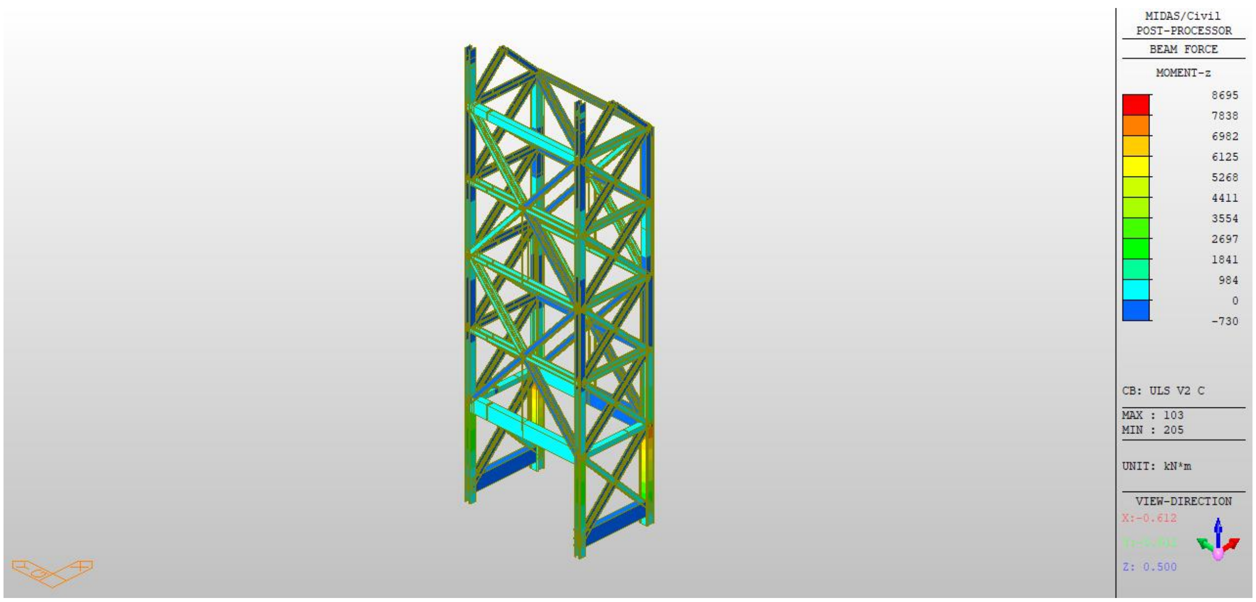

Figure 106 Case 4 ULS V2 MZ

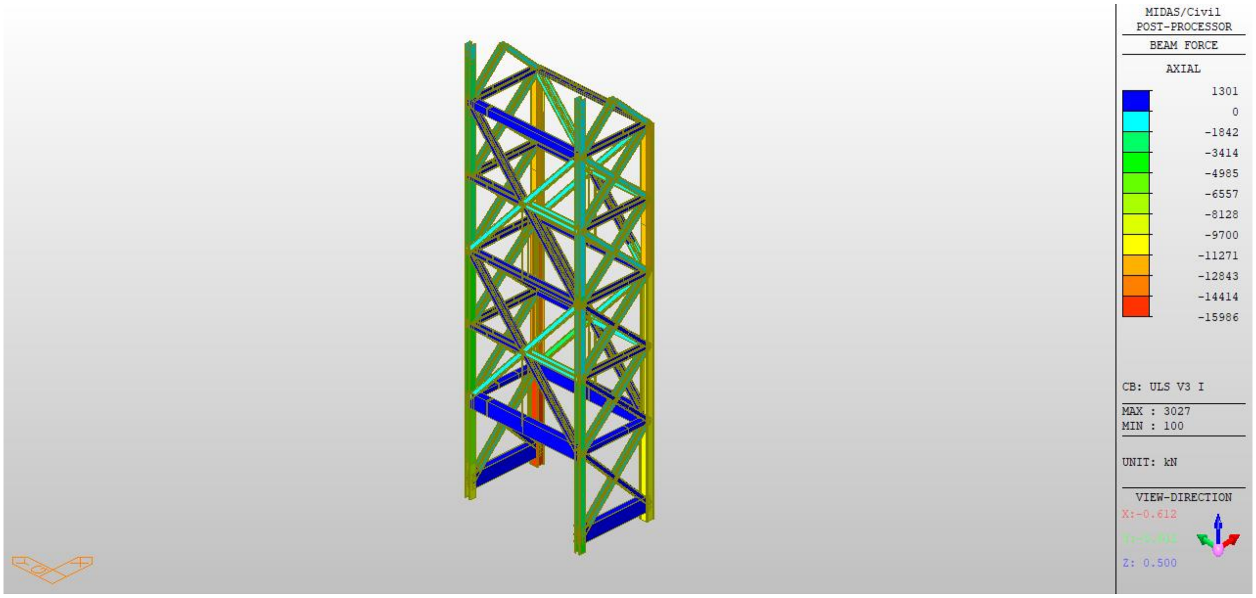

Figure 107 Case 4 ULS V3 Axial

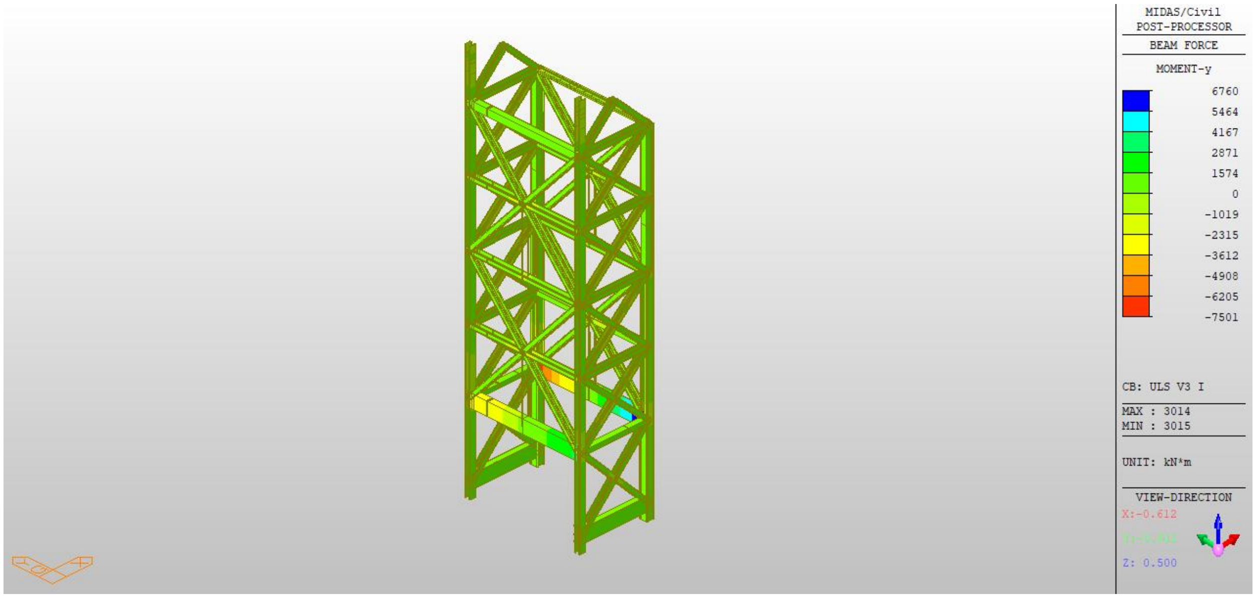

Figure 108 Case 4 ULS V3 MY

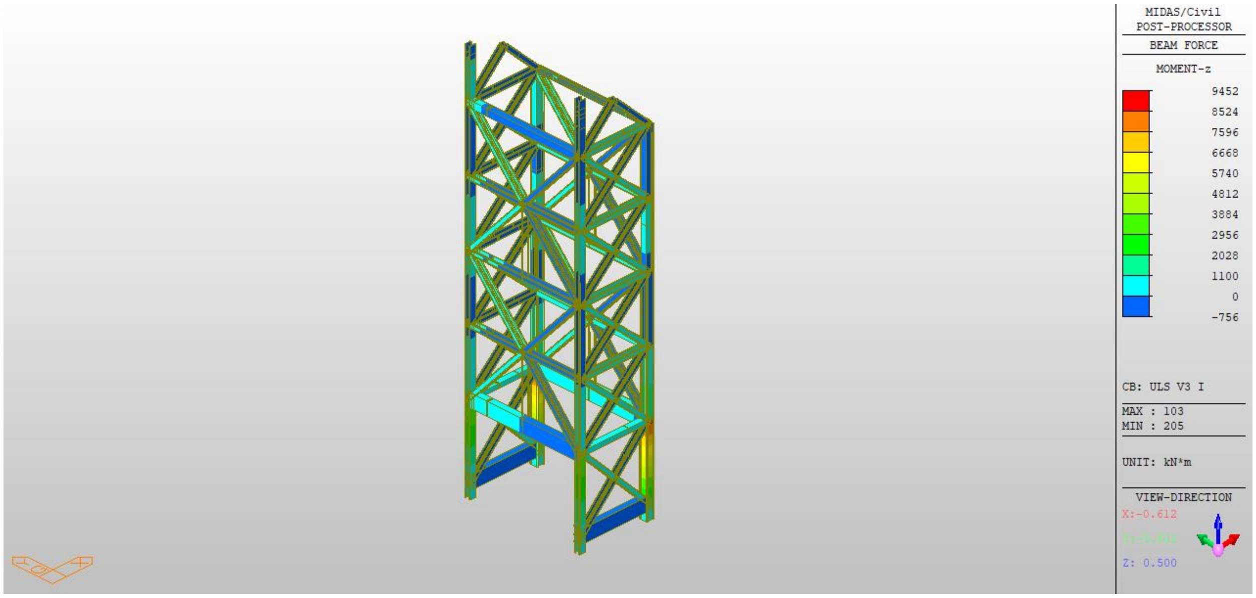

Figure 109 Case 4 ULS V3 MZ

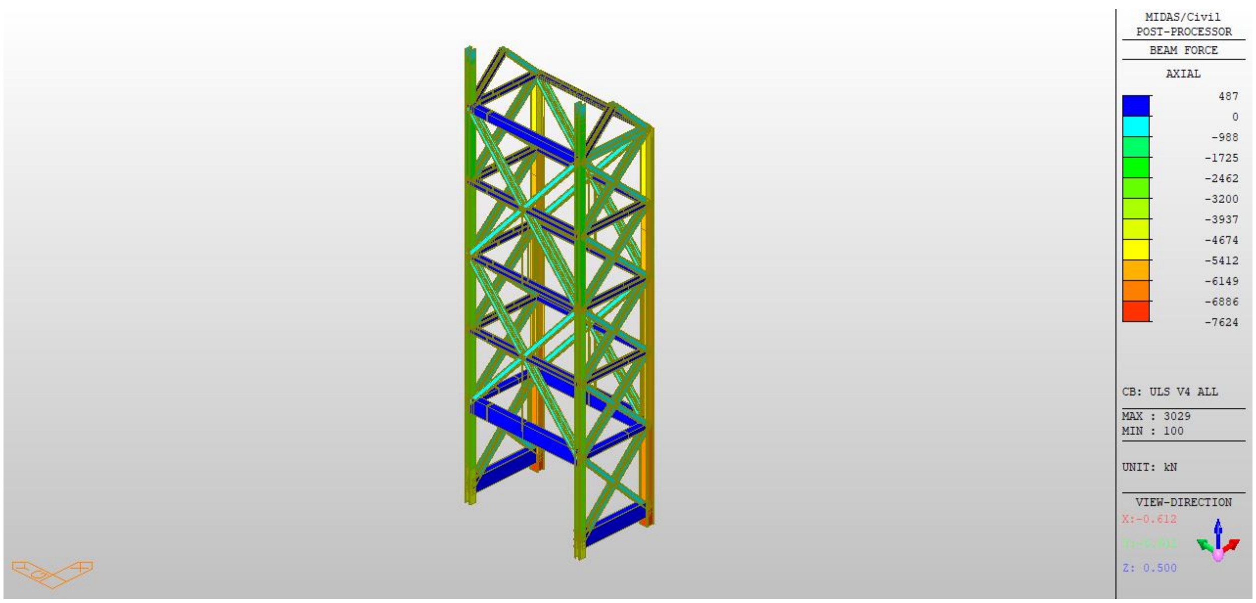

Figure 110 Case 4 ULS V4 Axial

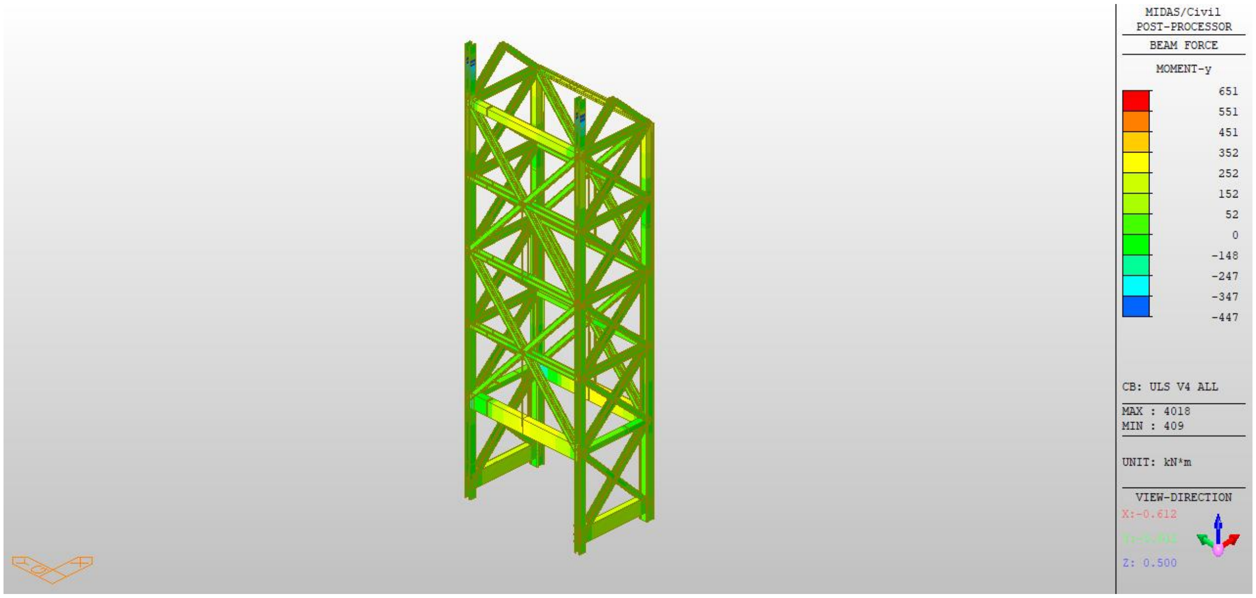

Figure 111 Case 4 ULS V4 MY

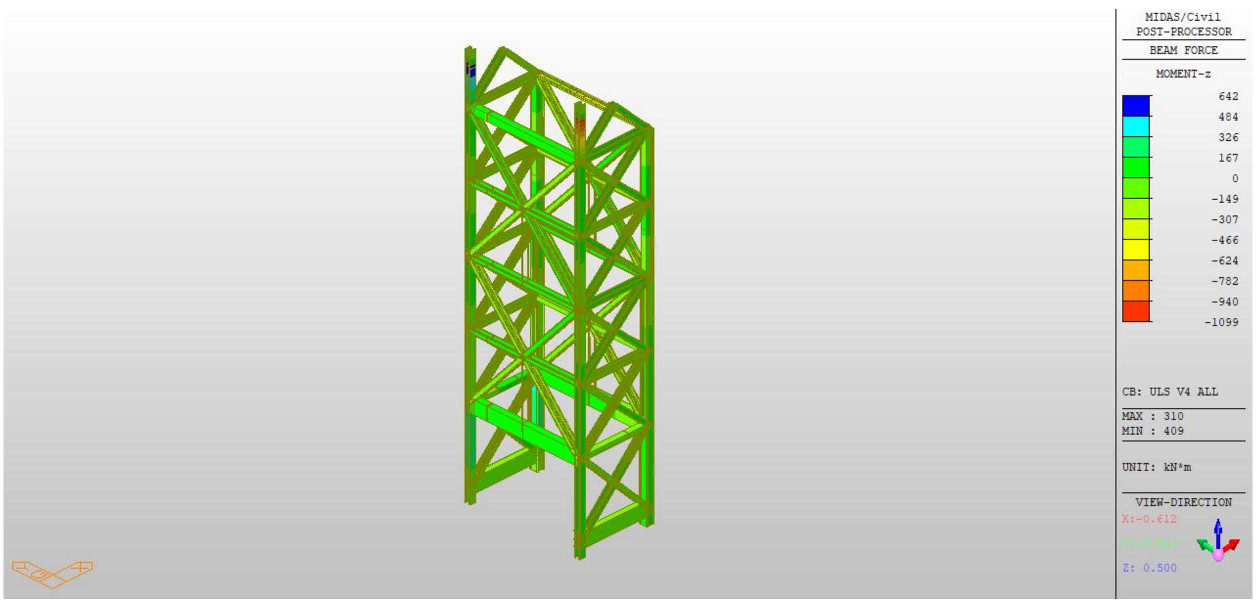

Figure 112 Case 4 ULS V4 MZ

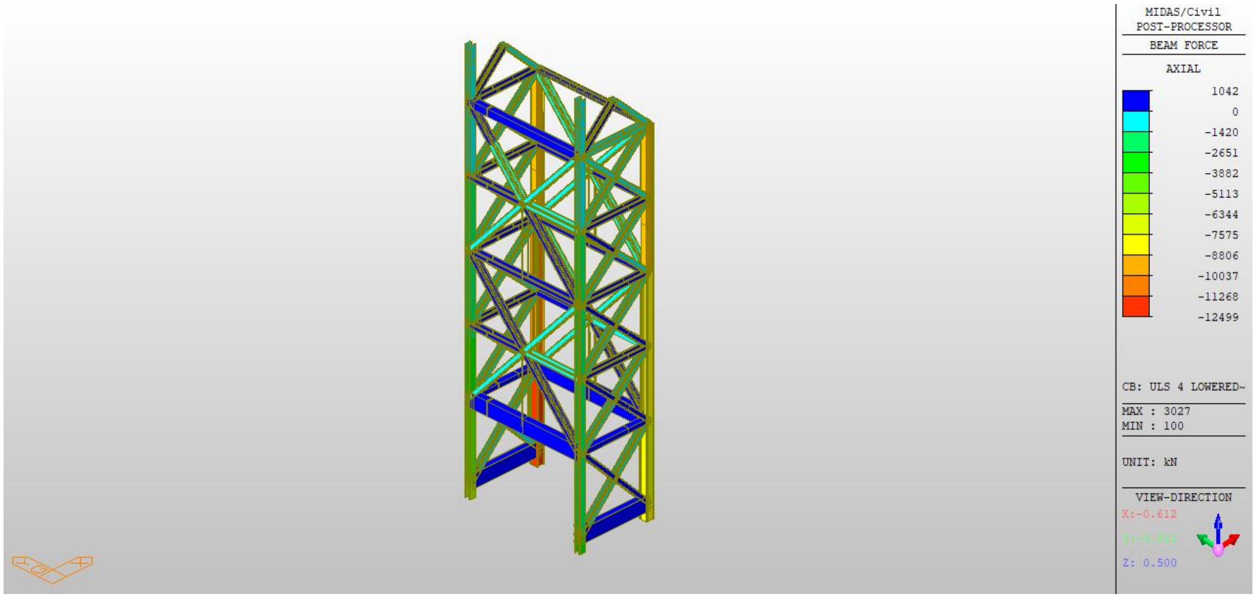

Figure 113 Case 4 ULS 4 Lowered Axial

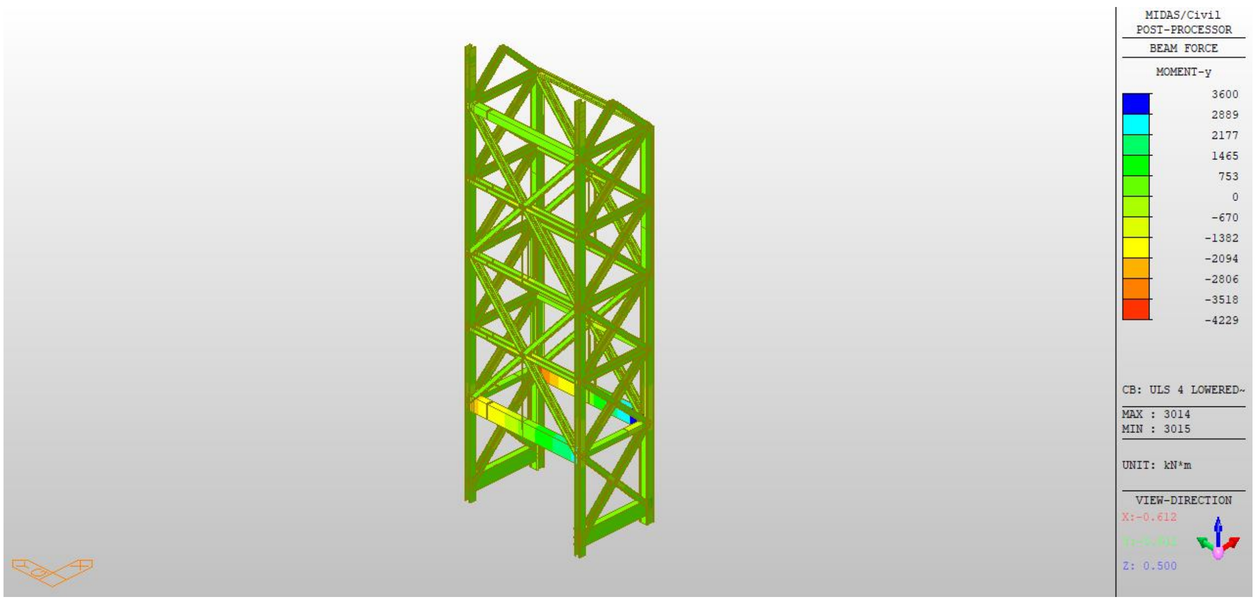

Figure 114 Case 4 ULS 4 Lowered MY

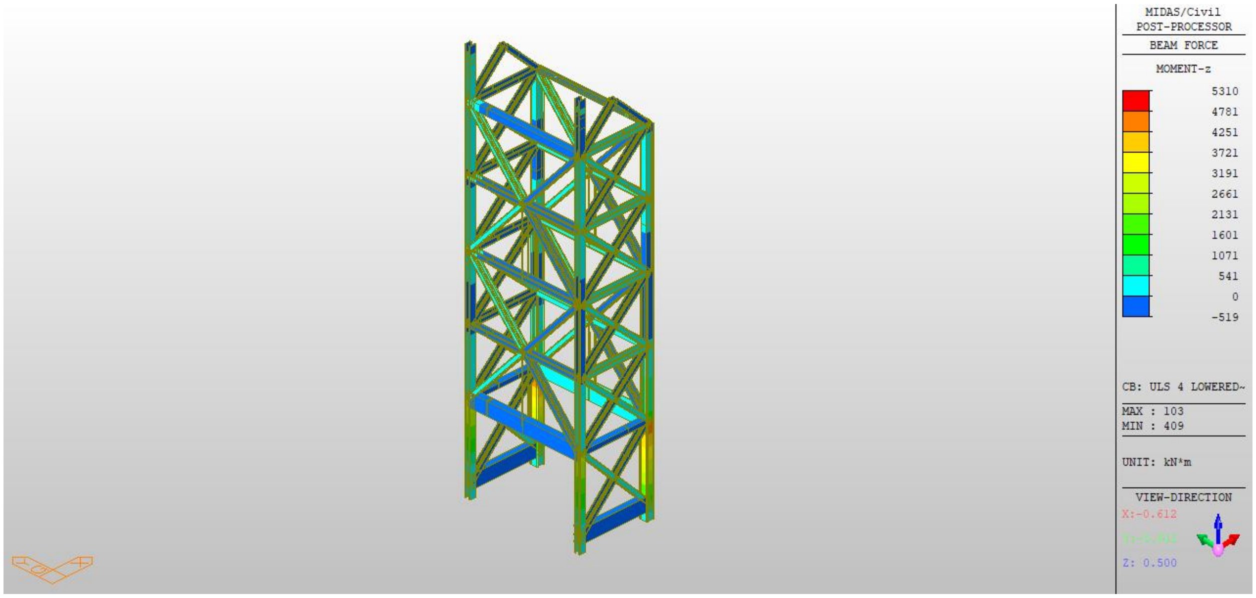

Figure 115 Case 4 ULS 4 Lowered MZ

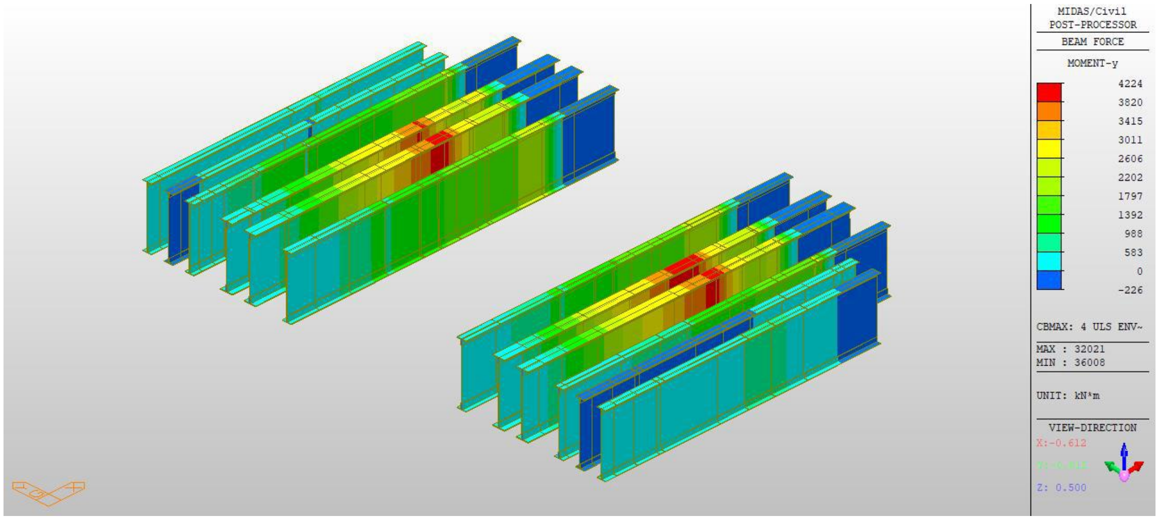

Figure 116 Girders G1 G2 G3 G4 G6 - Case 4 ULS M_y Max

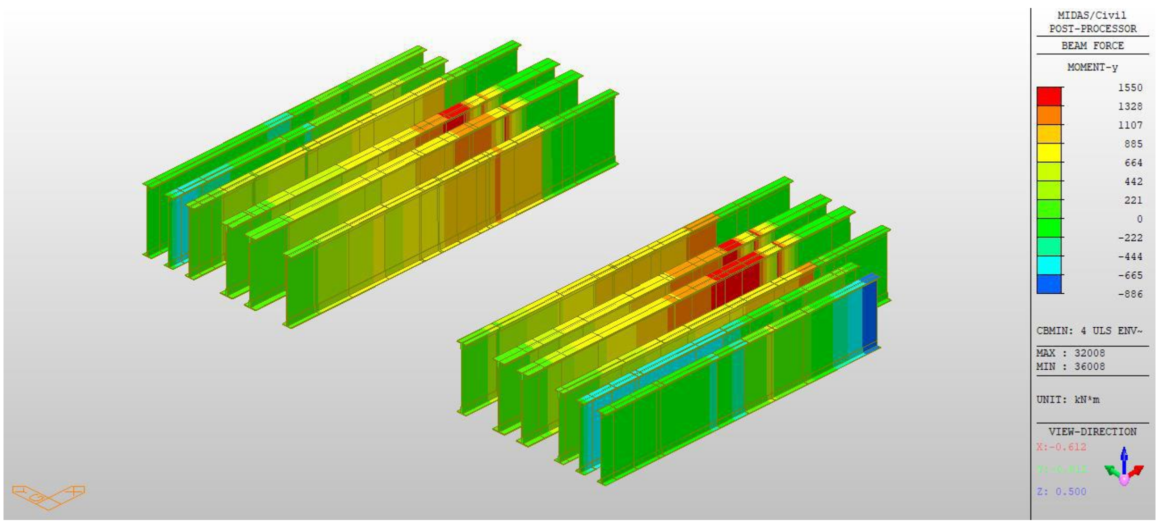

Figure 117 Girders G1 G2 G3 G4 G6 - Case 4 ULS M_y Min

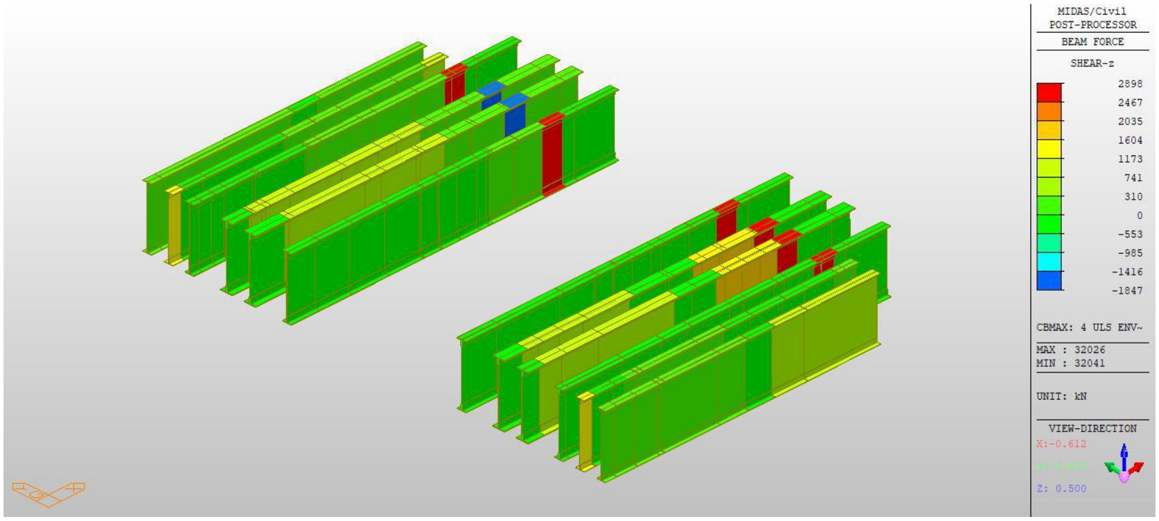

Figure 118 Girders G1 G2 G3 G4 G6 - Case 4 ULS F_z Max

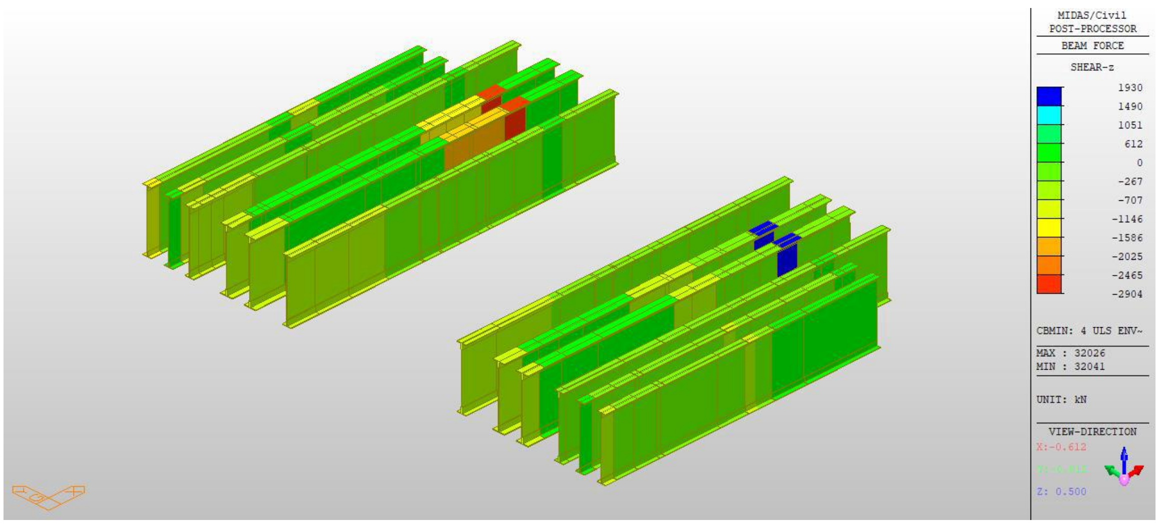

Figure 119 Girders G1 G2 G3 G4 G6 - Case 4 ULS F_z Min

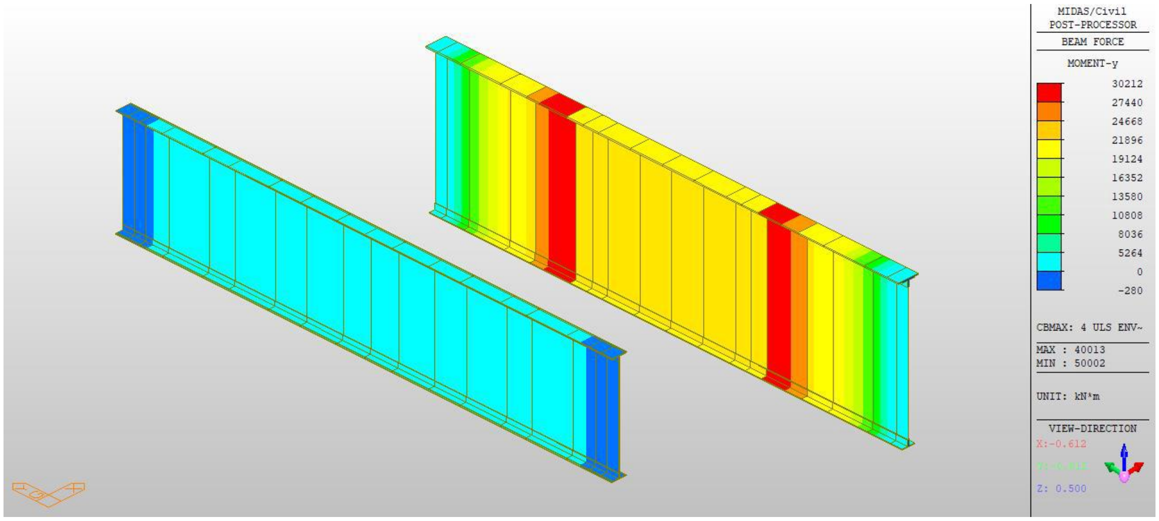

Figure 120 Girders G7 and G8 - Case 4 ULS M_y Max

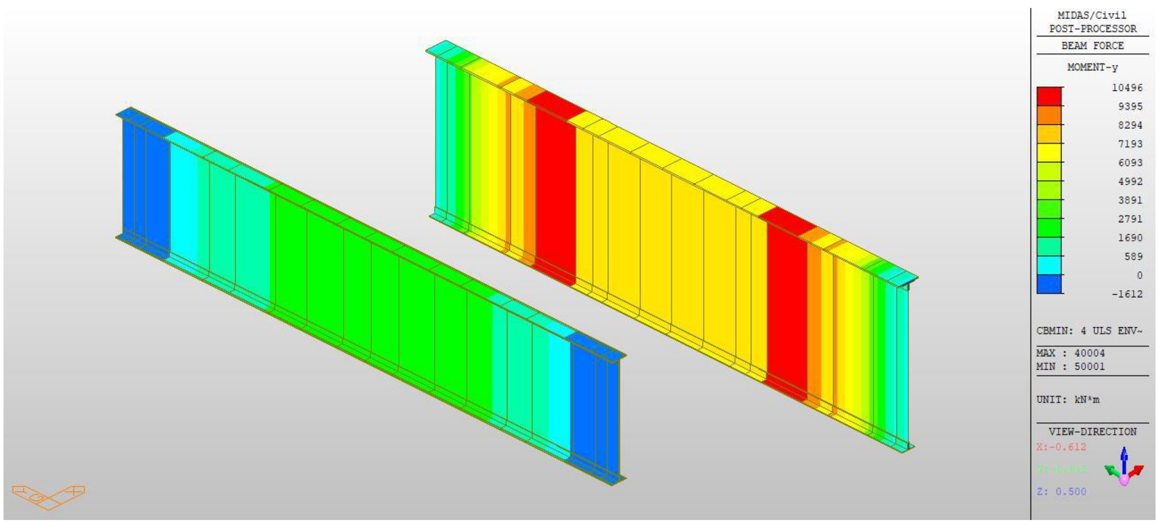

Figure 121 Girders G7 and G8 - Case 4 ULS M_y Min

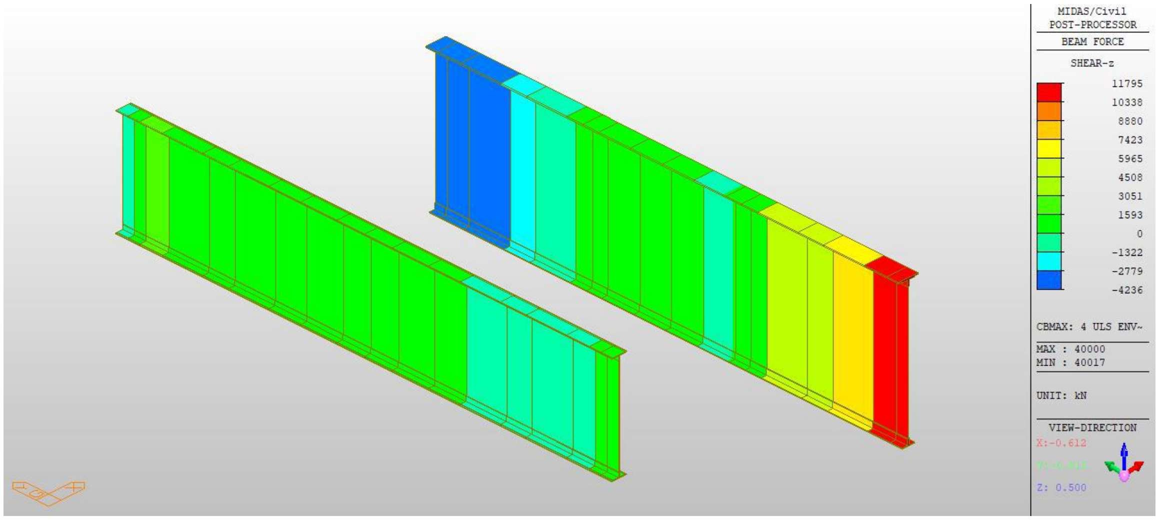

Figure 122 Girders G7 and G8 - Case 4 ULS F_z Max

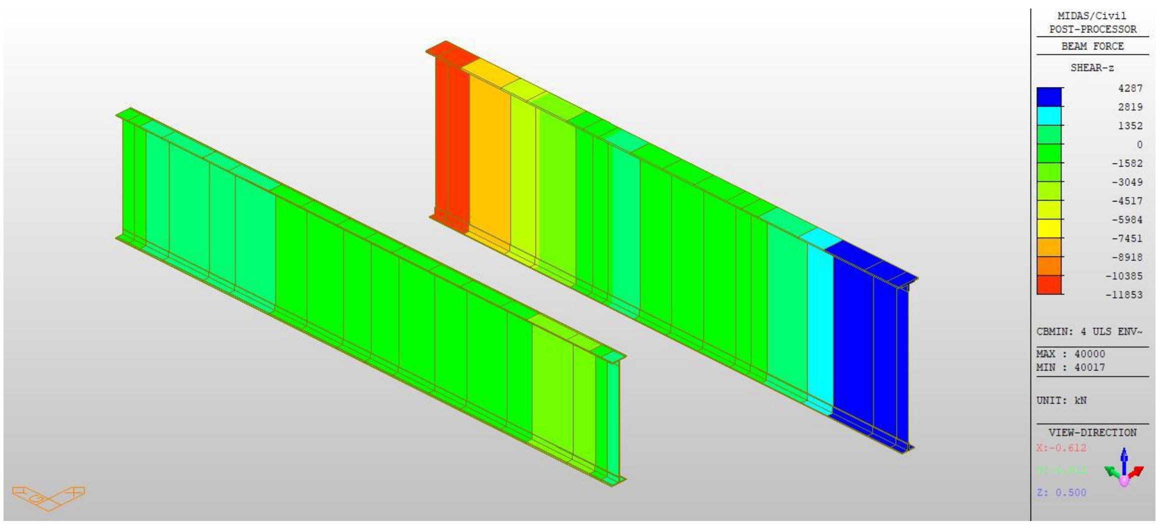

Figure 123 Girders G7 and G8 - Case 4 ULS F_z Min

Exhibit C.2.6. Rehabilitation Case 5

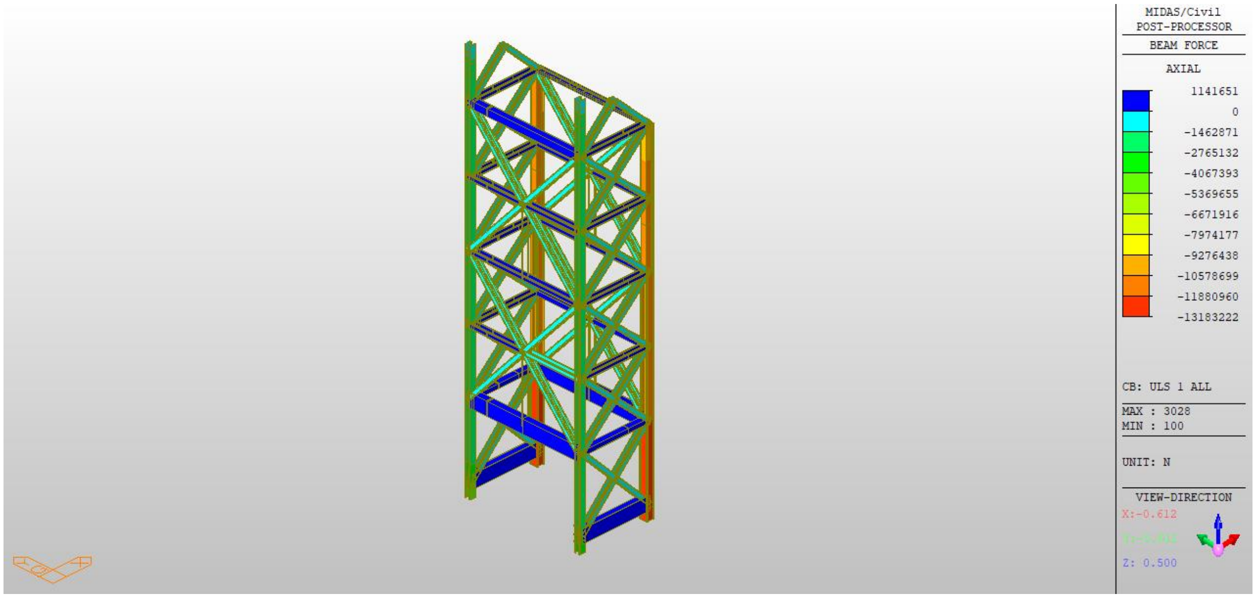

Figure 124 Case 5 ULS 1 Axial

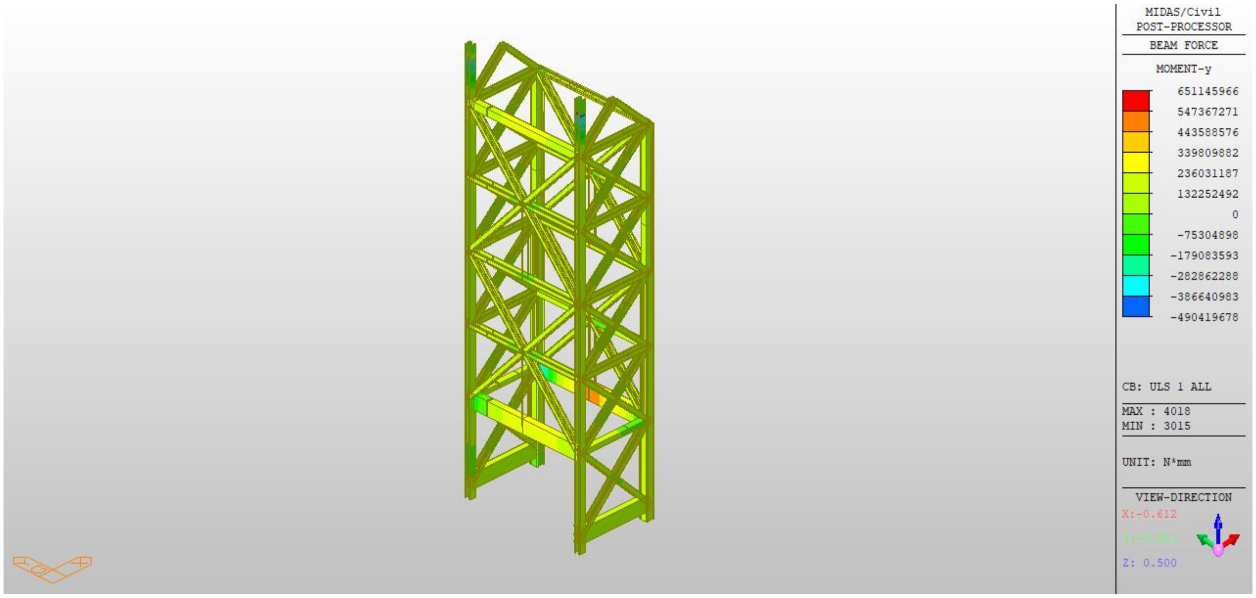

Figure 125 Case 5 ULS 1 MY

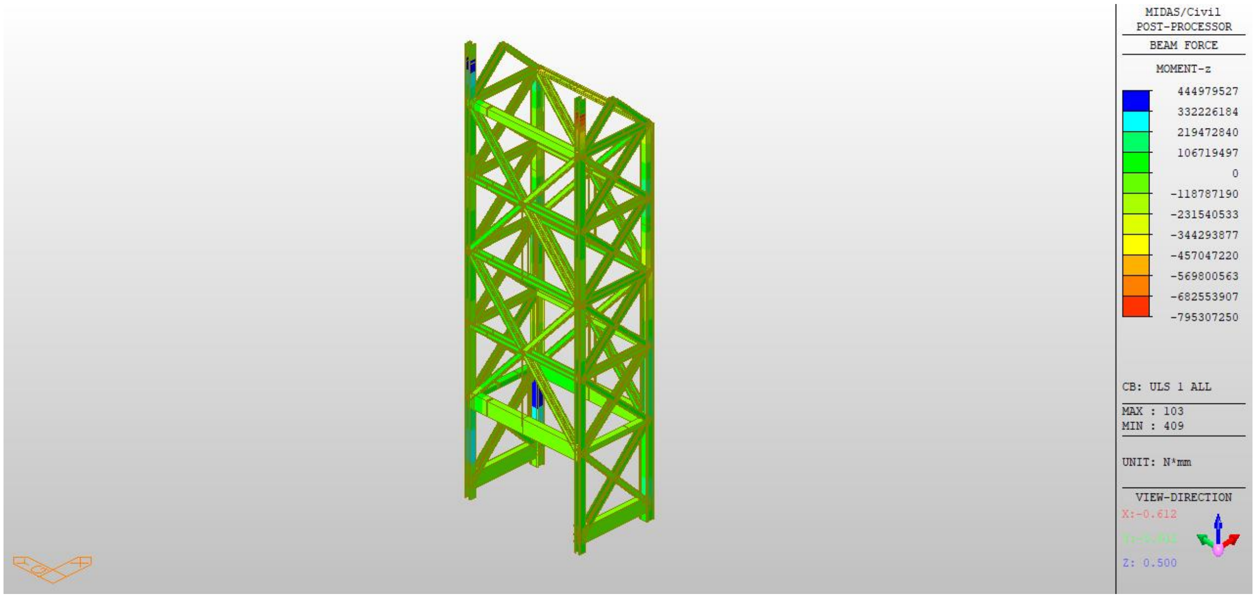

Figure 126 Case 5 ULS 1 MZ

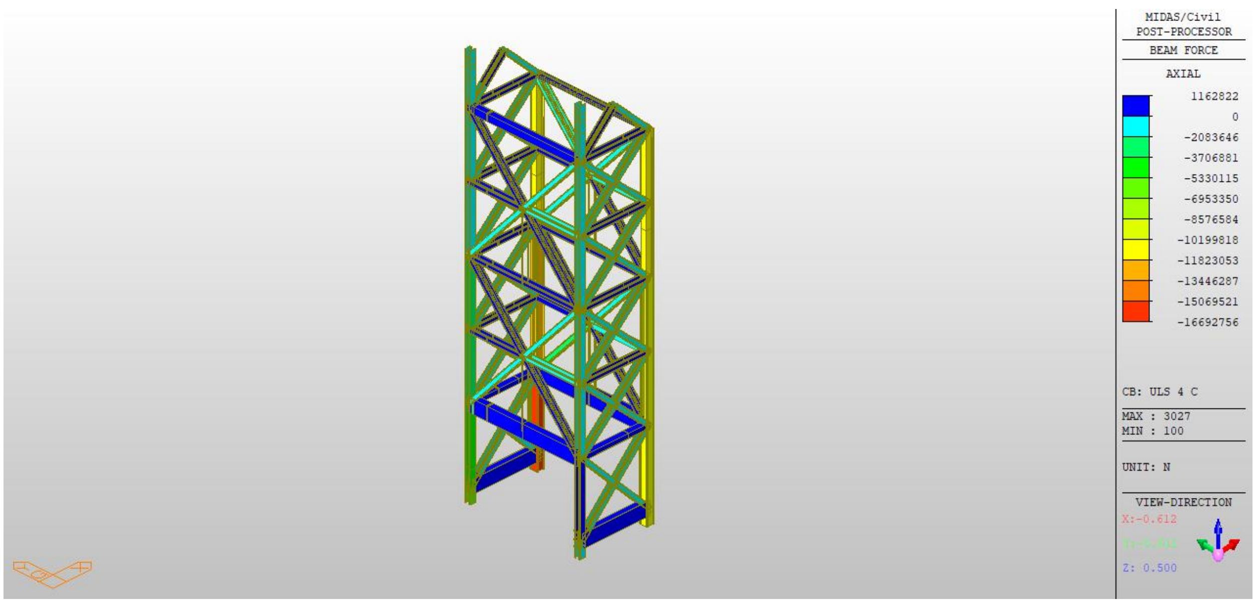

Figure 127 Case 5 ULS 4 Axial

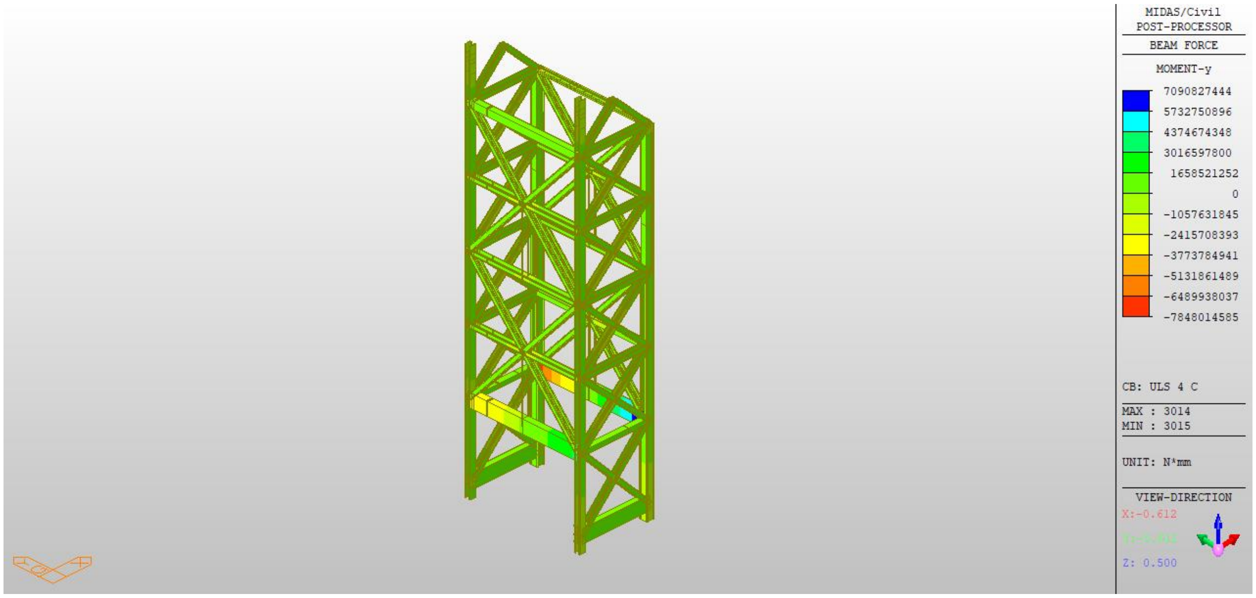

Figure 128 Case 5 ULS 4 MY

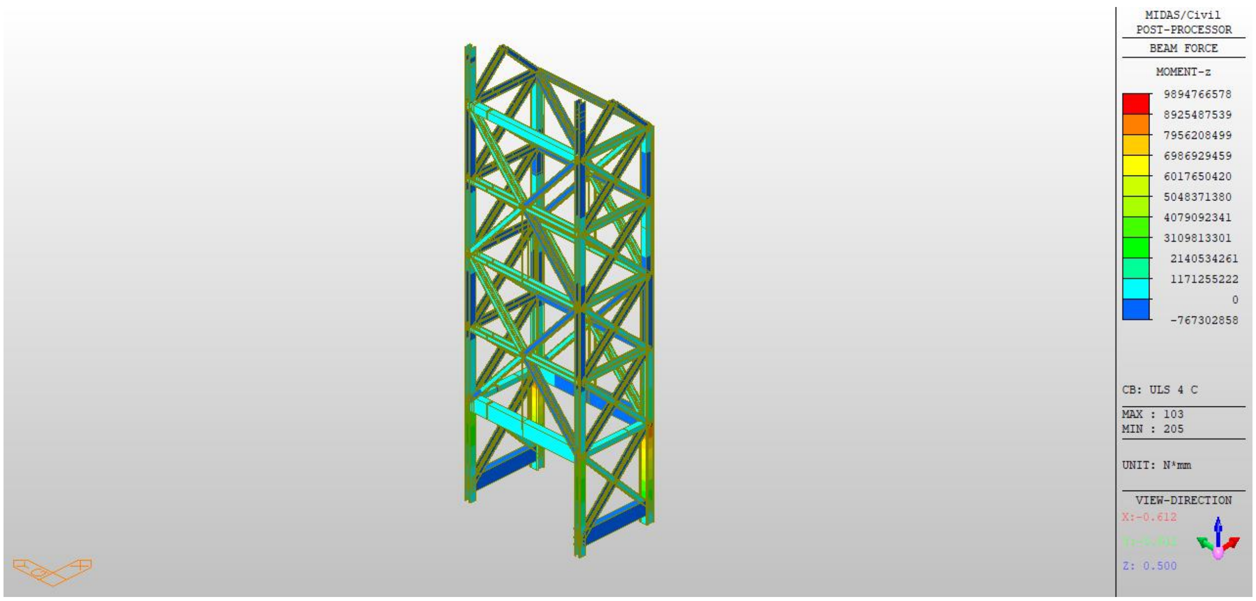

Figure 129 Case 5 ULS 4 MZ

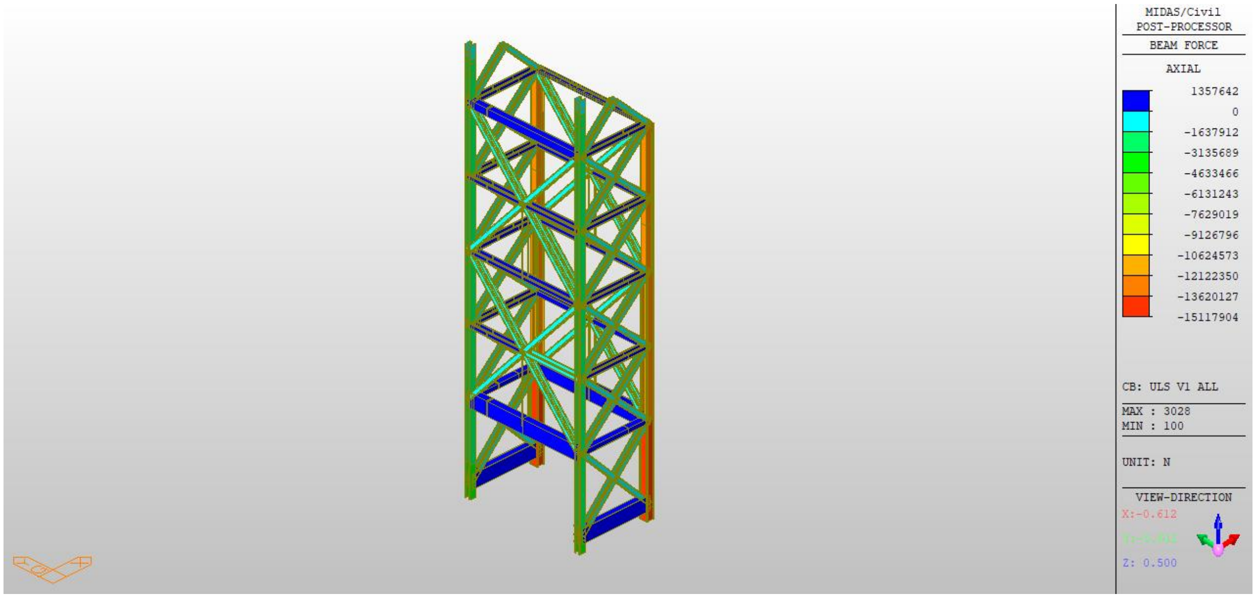

Figure 130 Case 5 ULS V1 Axial

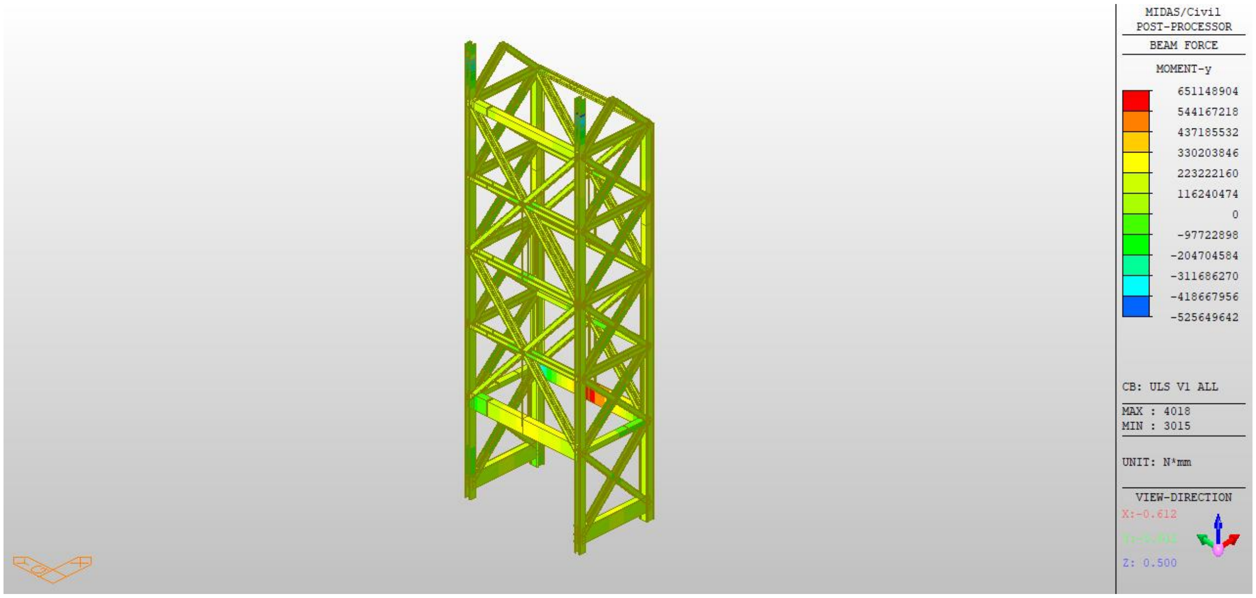

Figure 131 Case 5 ULS V1 MY

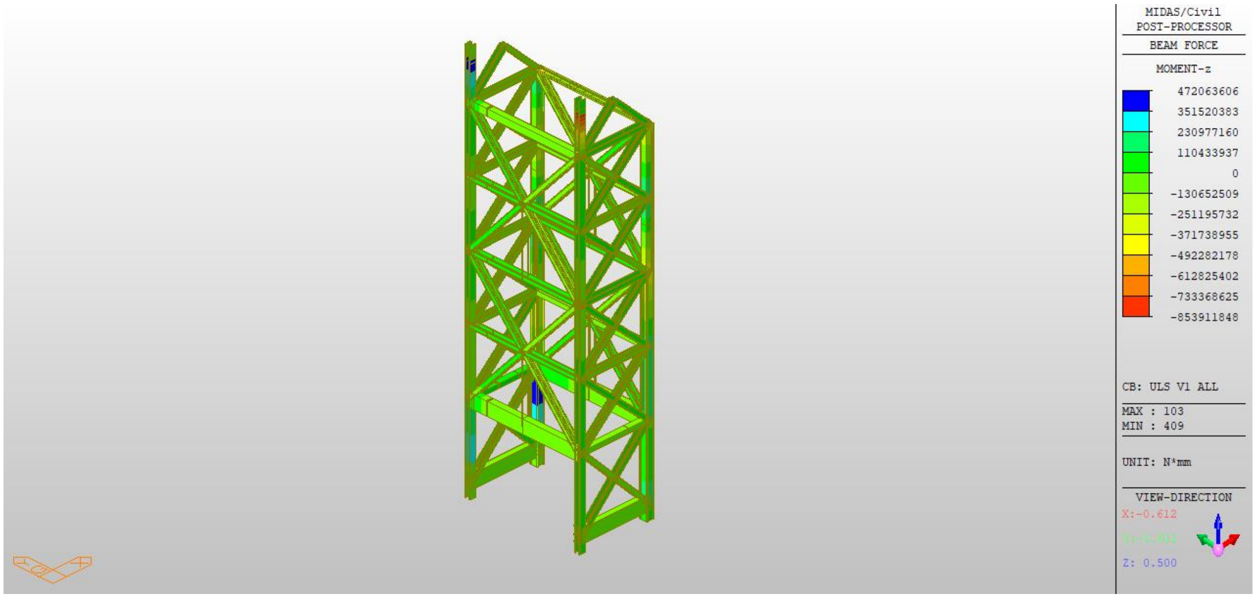

Figure 132 Case 5 ULS V1 MZ

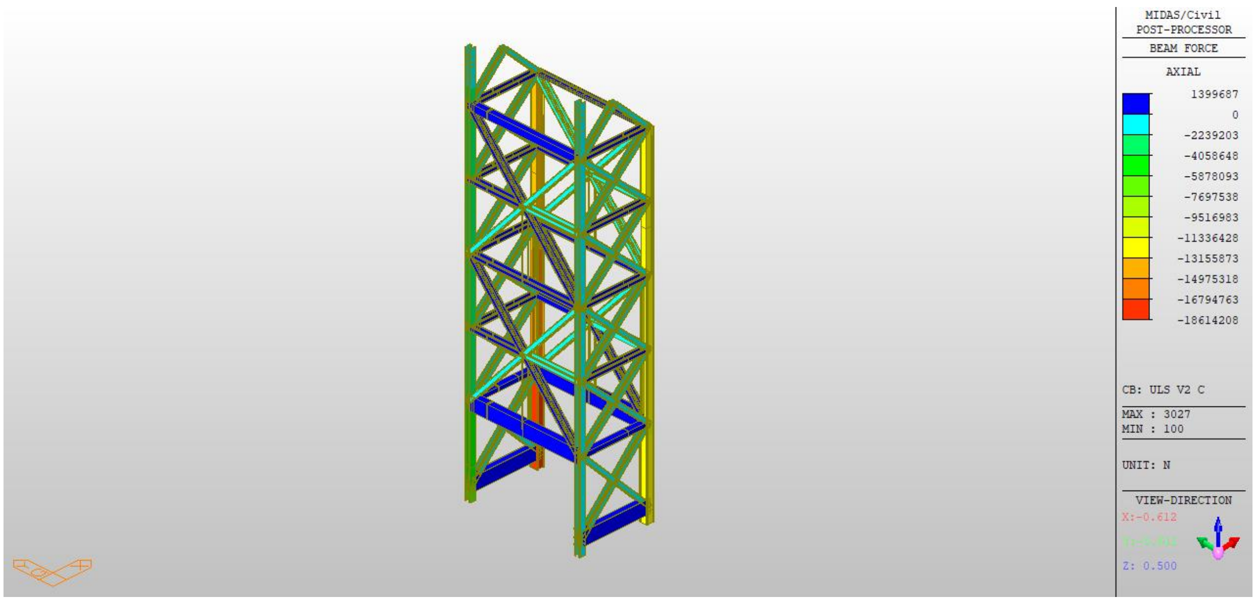

Figure 133 Case 5 ULS V2 Axial

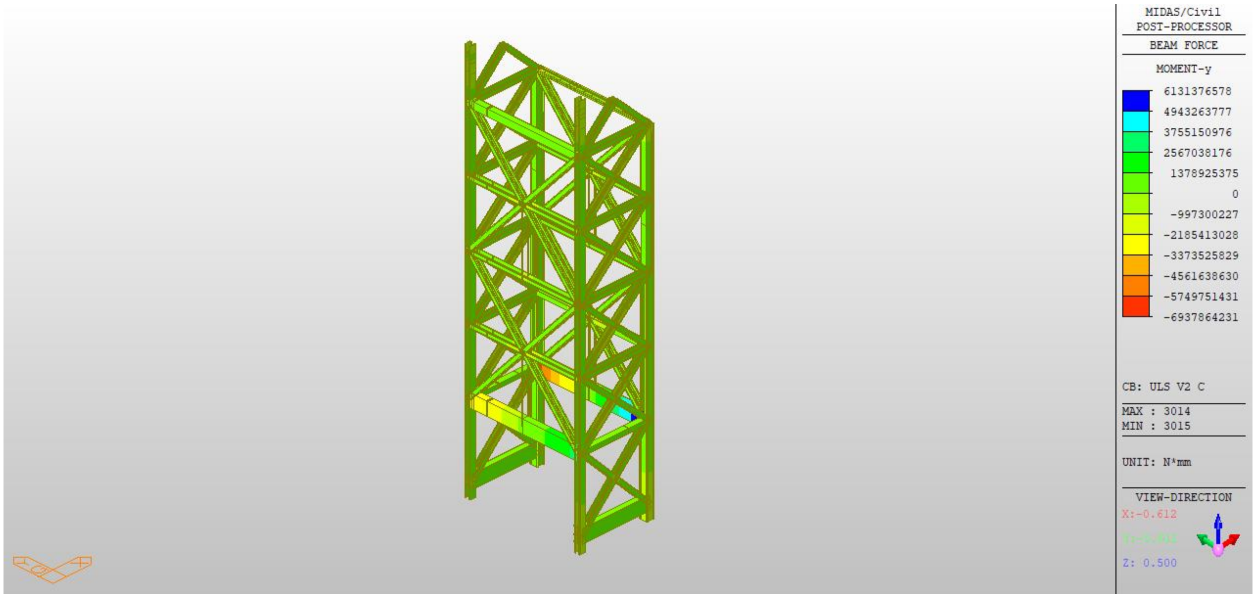

Figure 134 Case 5 ULS V2 MY

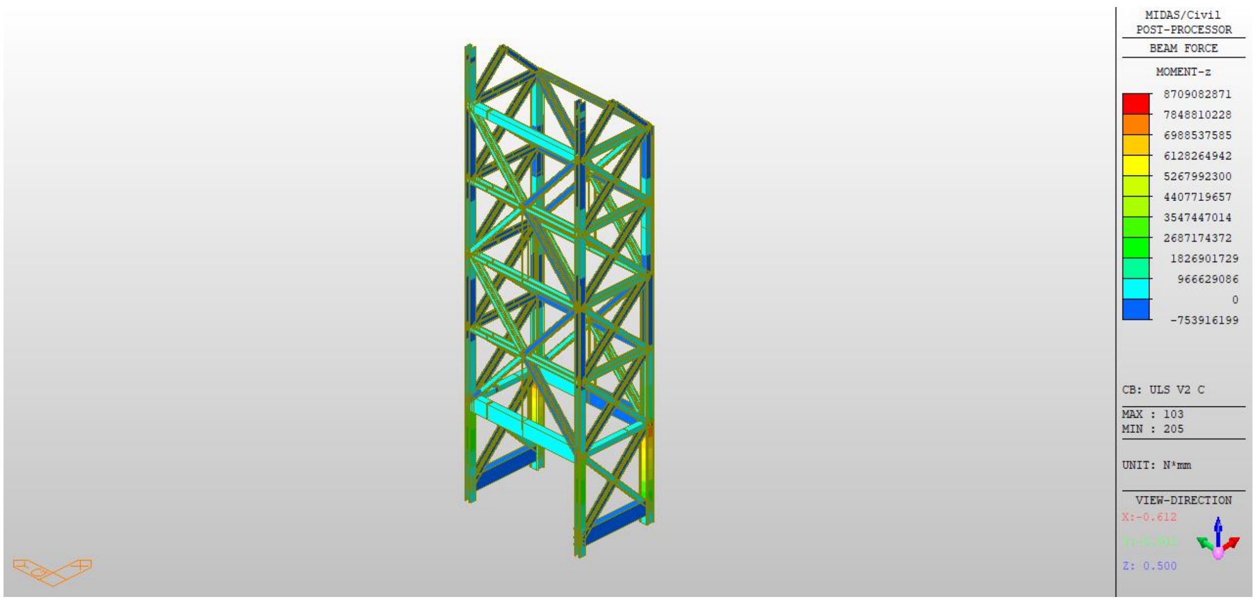

Figure 135 Case 5 ULS V2 MZ

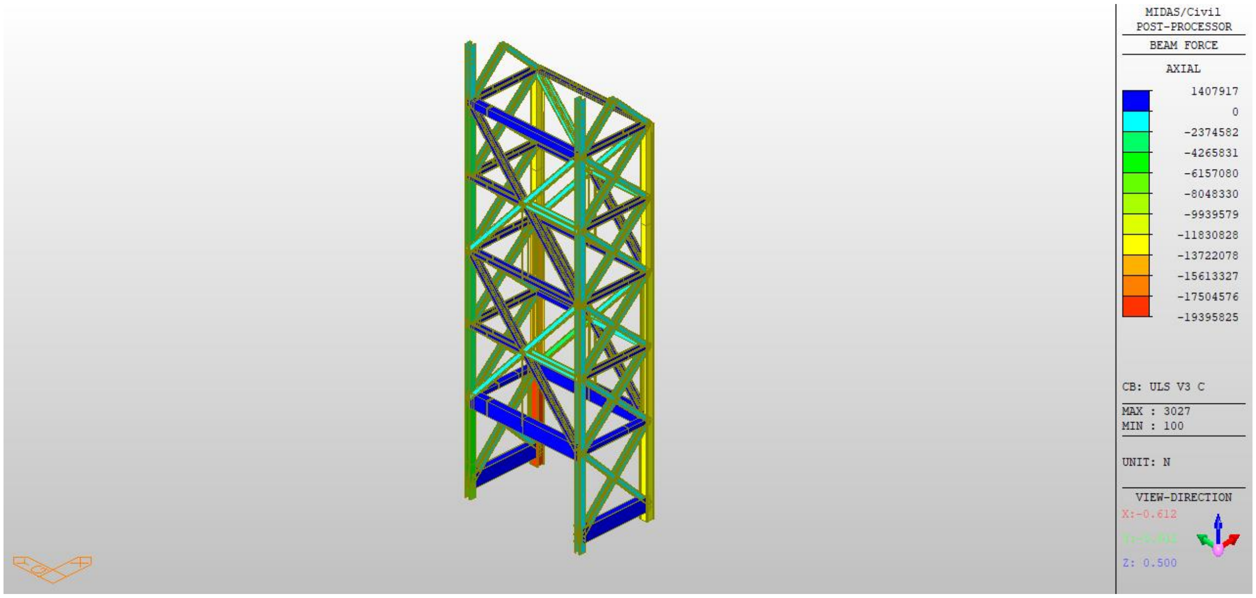

Figure 136 Case 5 ULS V3 Axial

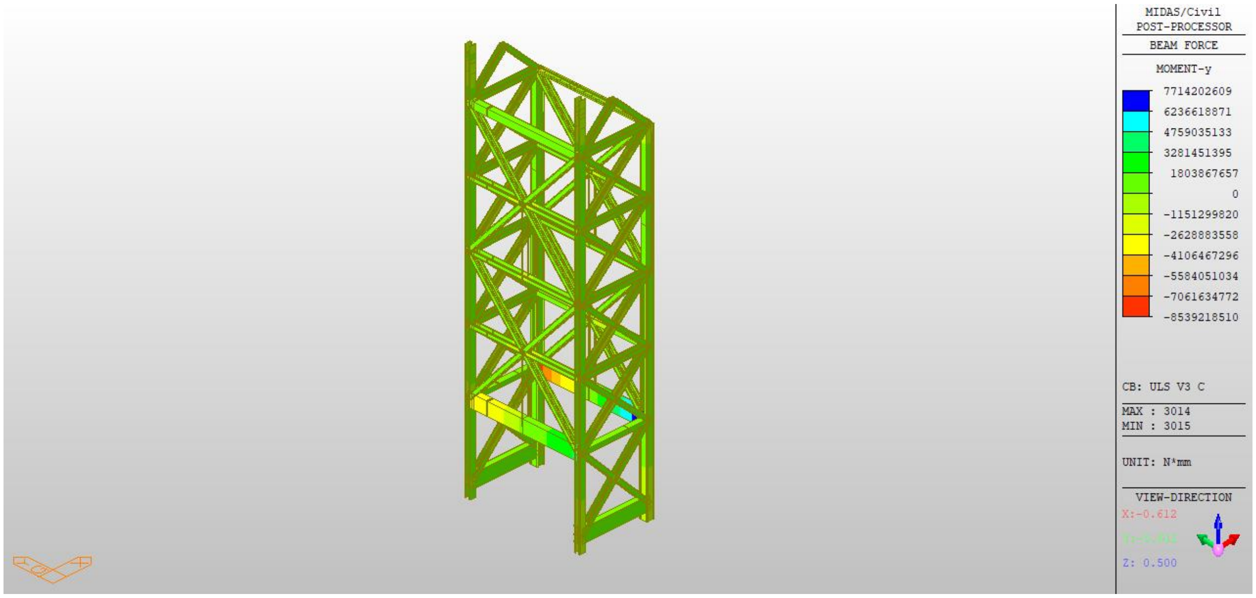

Figure 137 Case 5 ULS V3 MY

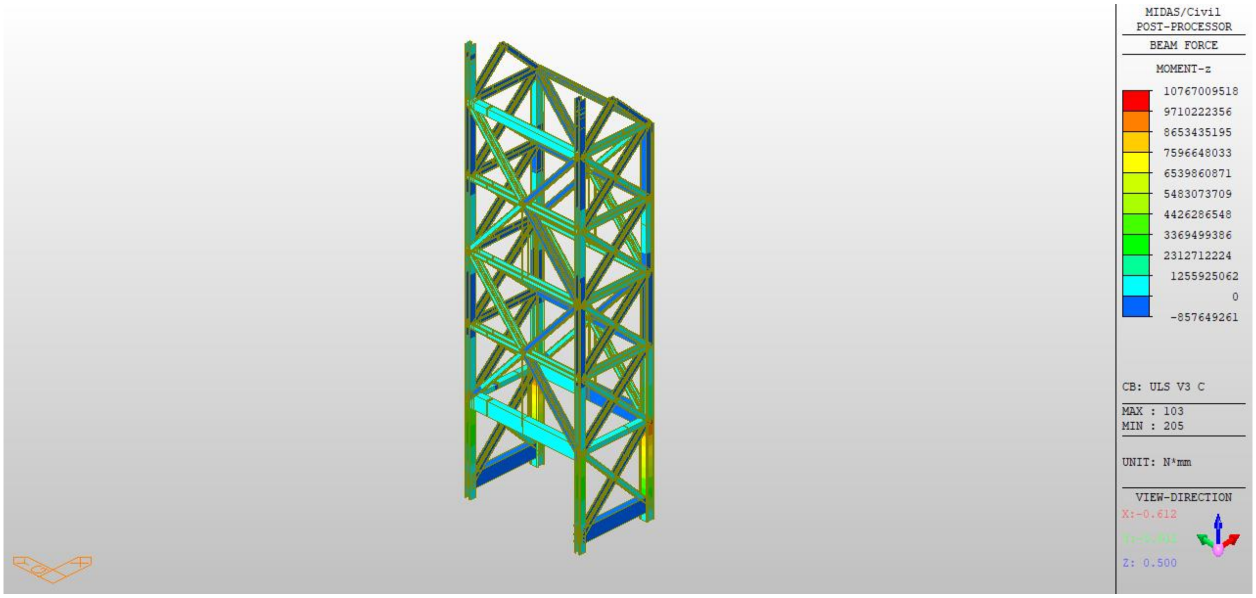

Figure 138 Case 5 ULS V3 MZ

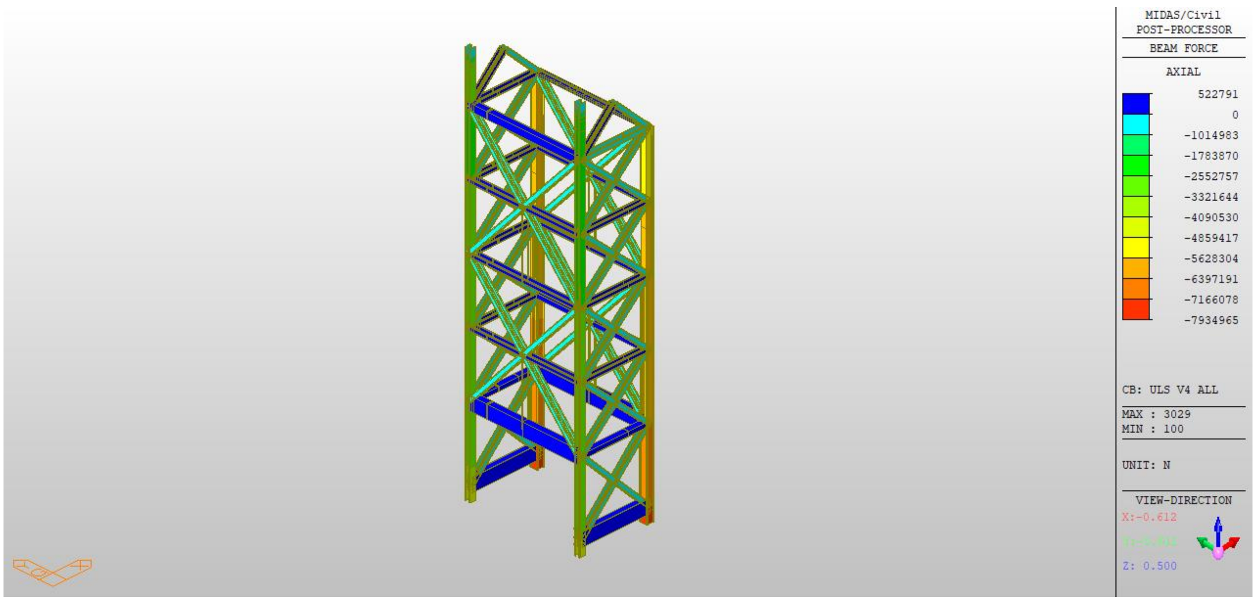

Figure 139 Case 5 ULS V4 Axial

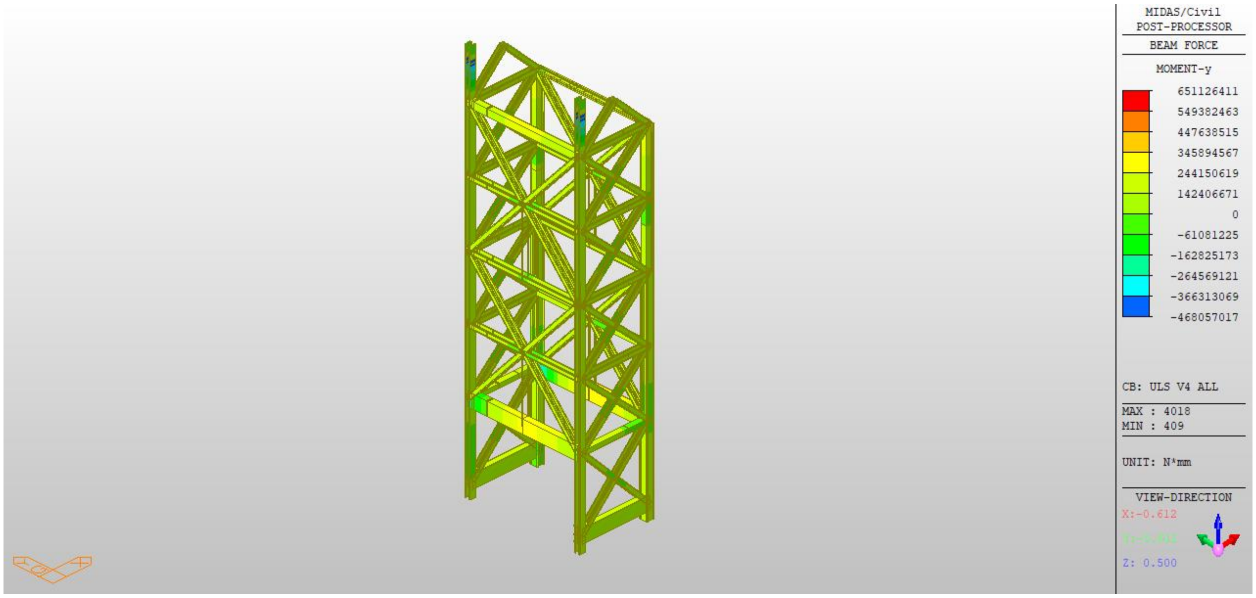

Figure 140 Case 5 ULS V4 MY

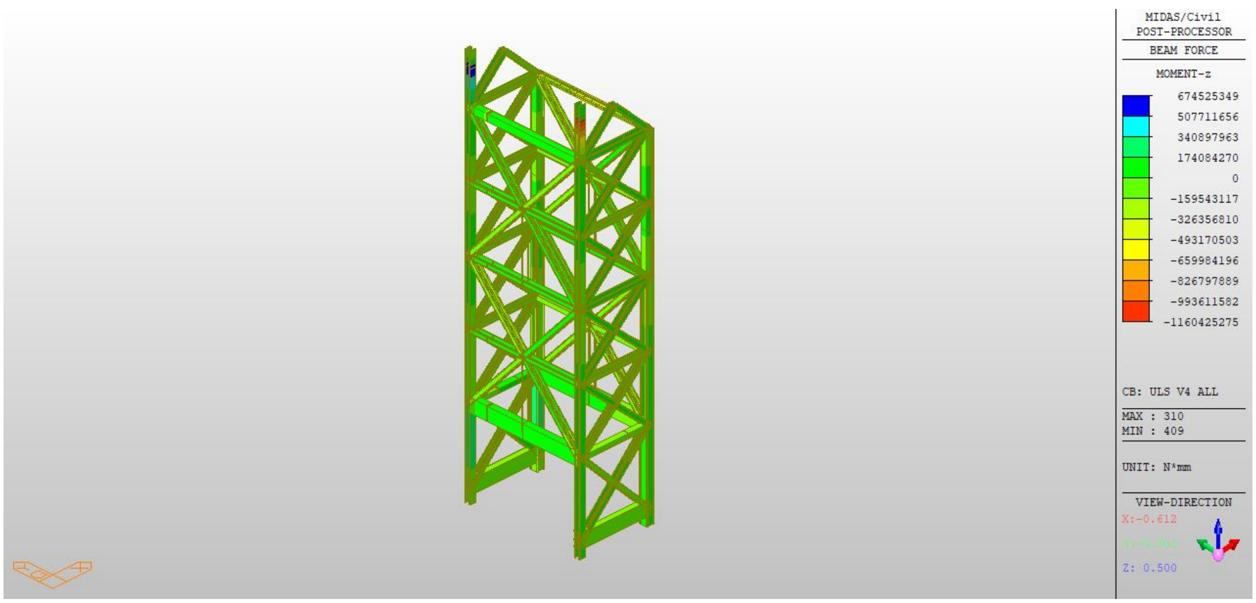

Figure 141 Case 5 ULS V4 MZ

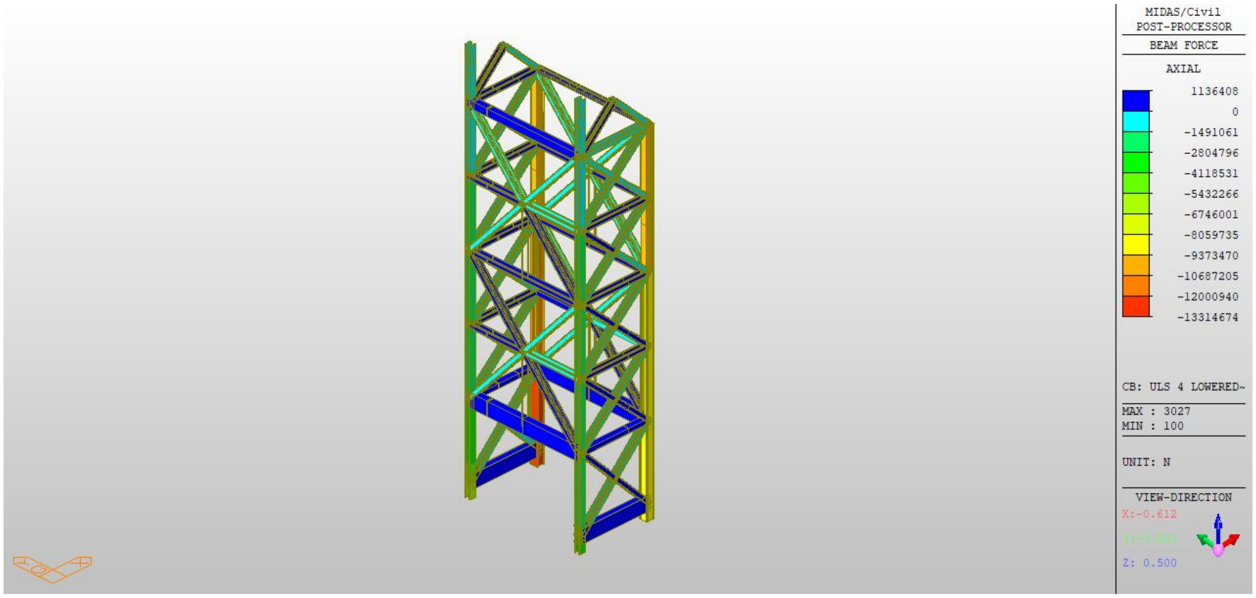

Figure 142 Case 5 ULS 4 Lowered Axial

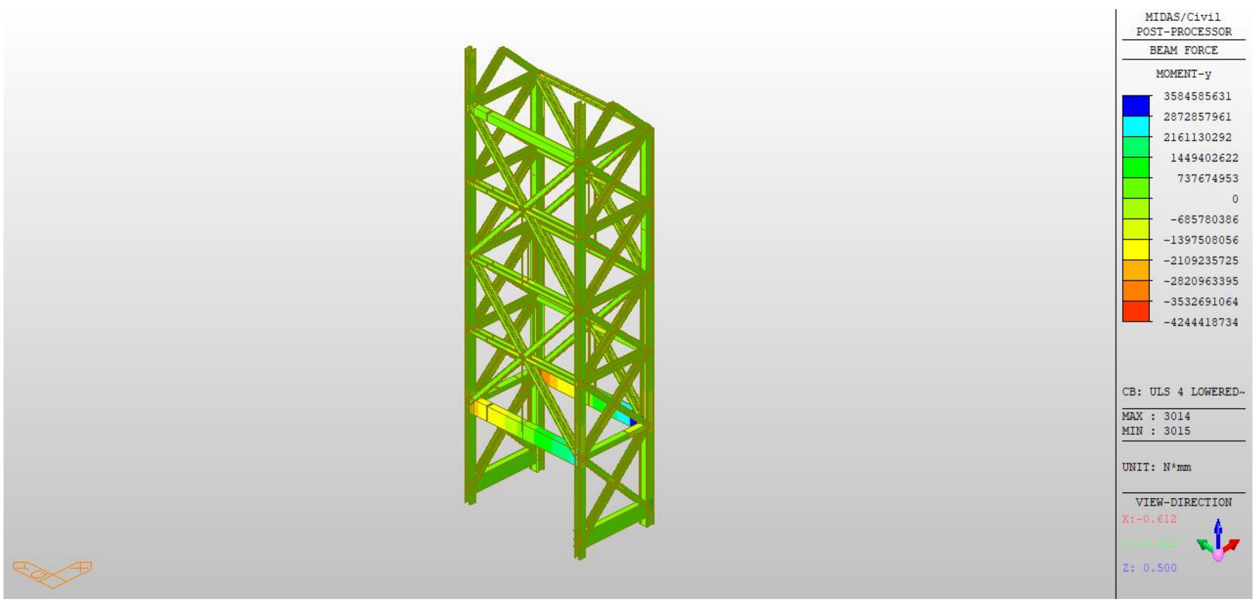

Figure 143 Case 5 ULS 4 Lowered MY

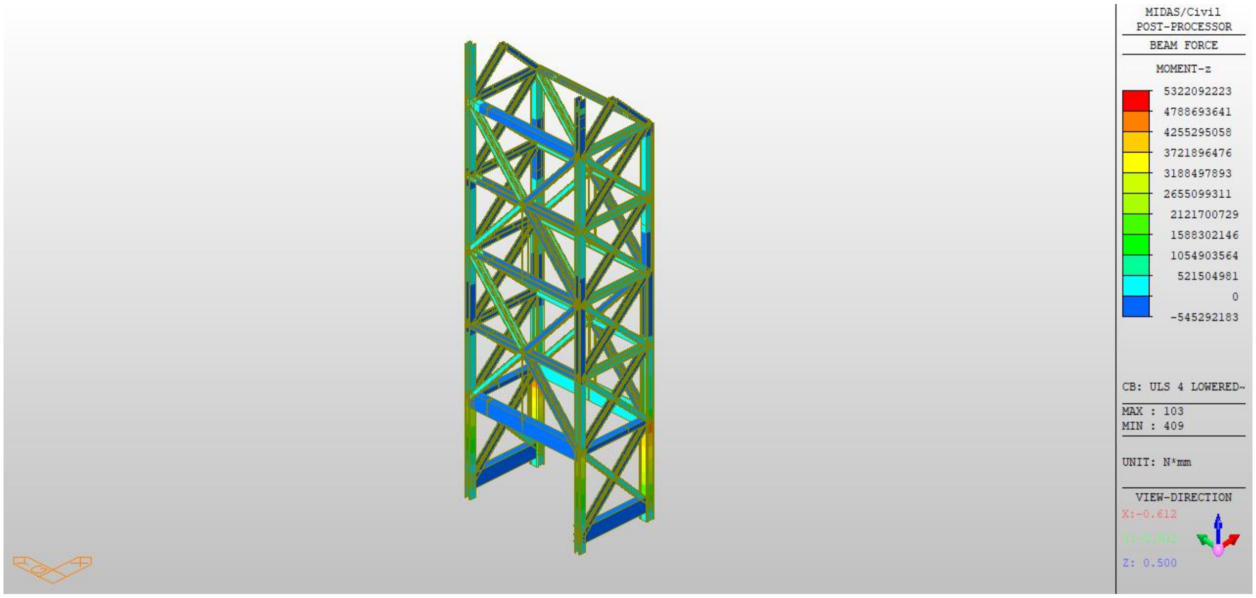

Figure 144 Case 5 ULS 4 Lowered MZ

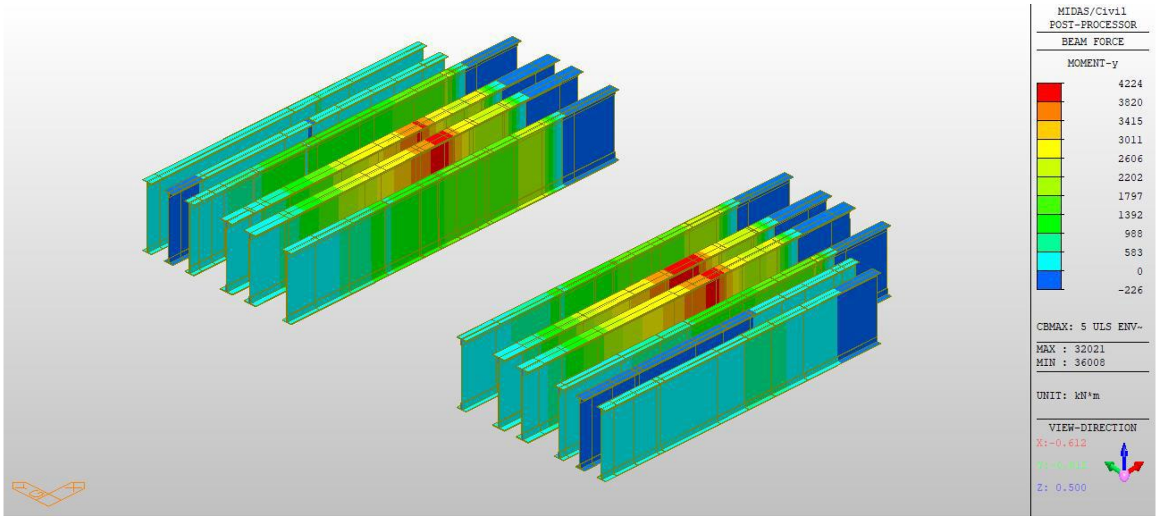

Figure 145 Girders G1 G2 G3 G4 G6 - Case 5 ULS M_y Max

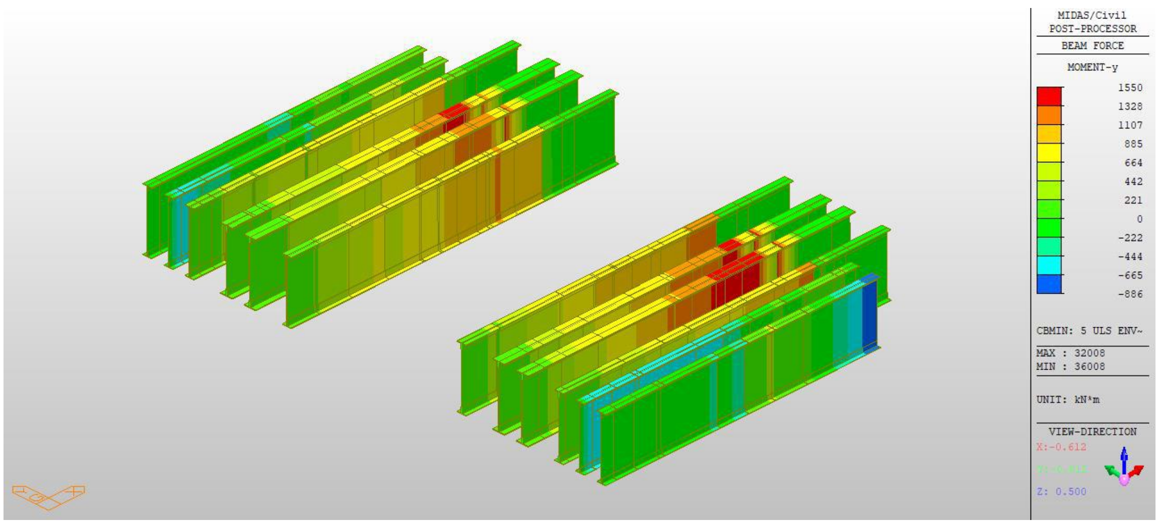

Figure 146 Girders G1 G2 G3 G4 G6 - Case 5 ULS M_y Min

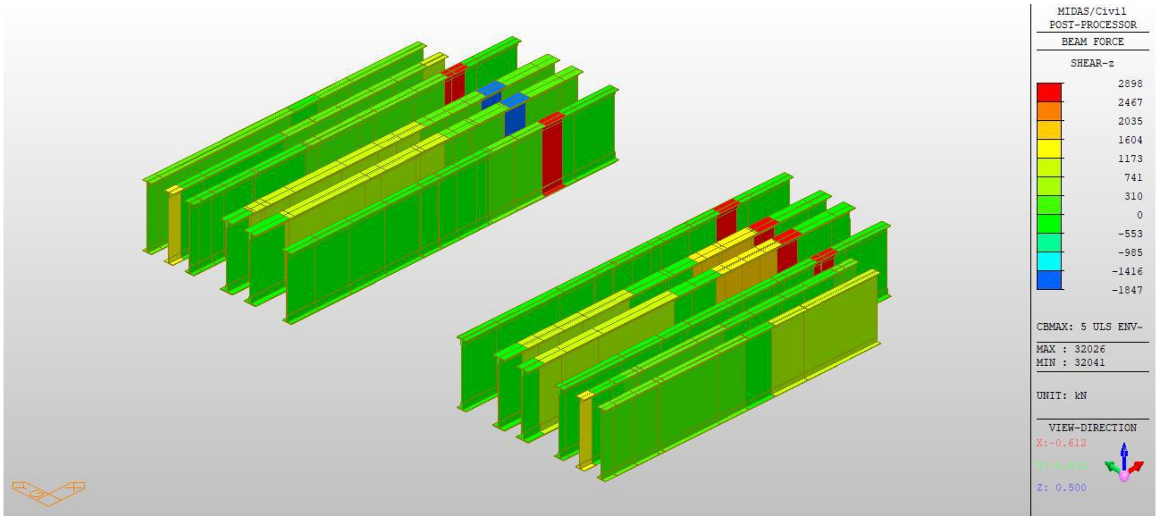

Figure 147 Girders G1 G2 G3 G4 G6 - Case 5 ULS F_z Max

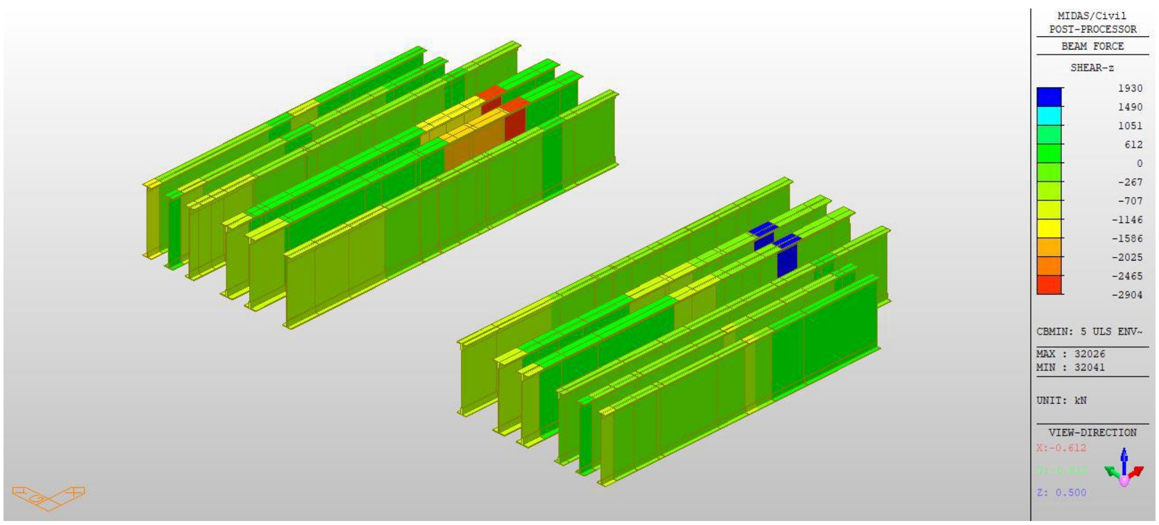

Figure 148 Girders G1 G2 G3 G4 G6 - Case 5 ULS F_z Min

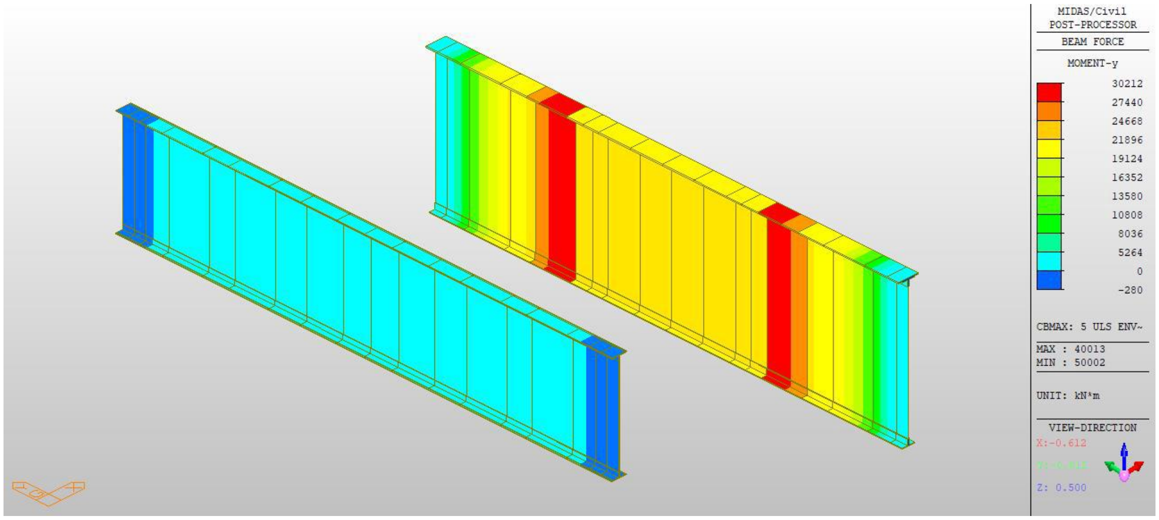

Figure 149 Girders G7 and G8 - Case 5 ULS M_y Max

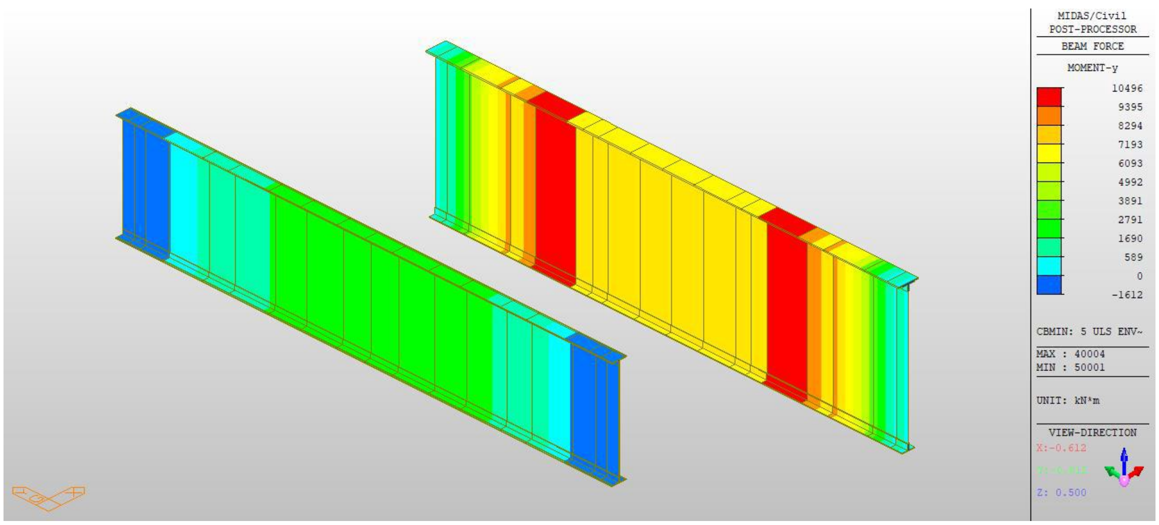

Figure 150 Girders G7 and G8 - Case 5 ULS M_y Min

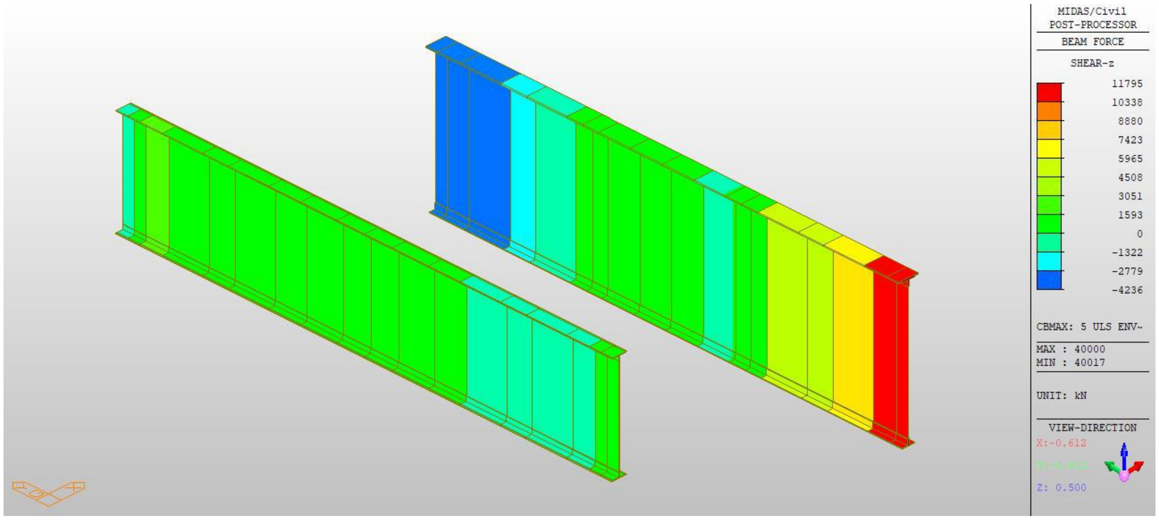

Figure 151 Girders G7 and G8 - Case 5 ULS F_z Max

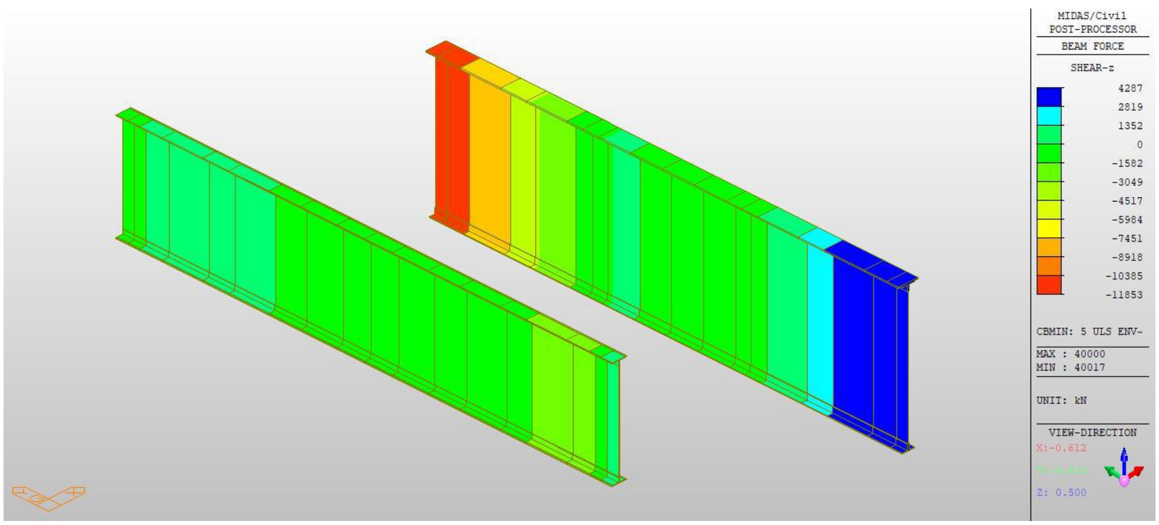

Figure 152 Girders G7 and G8 - Case 5 ULS F_z Min

Exhibit C.2.7. Rehabilitation Case 7

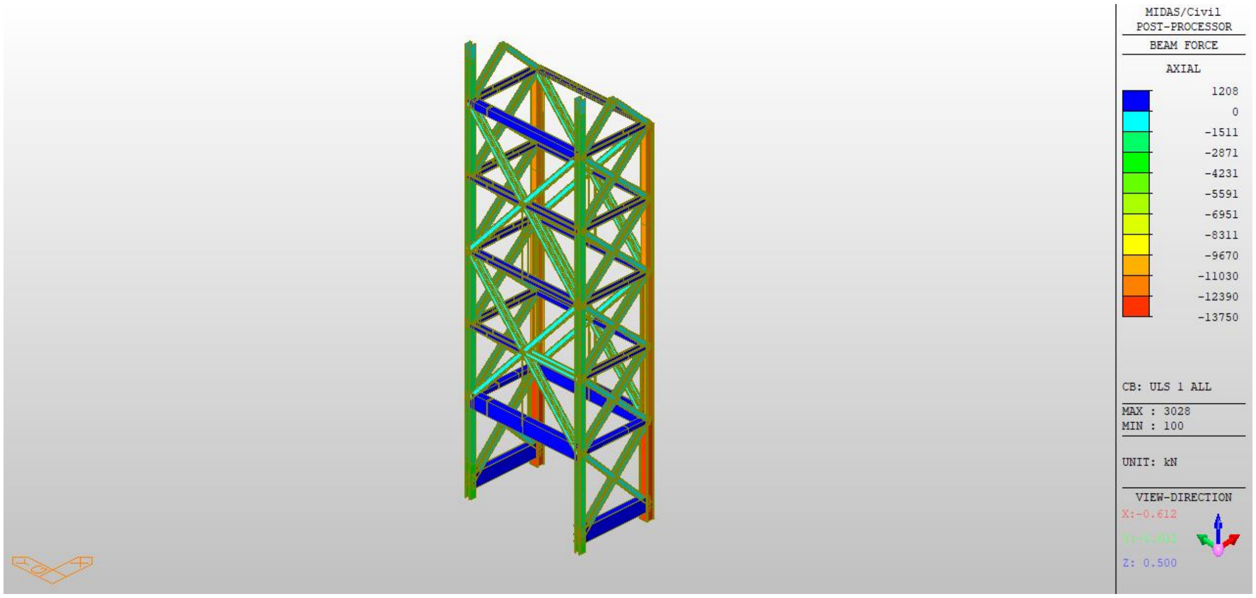

Figure 153 Case 7 ULS 1 Axial

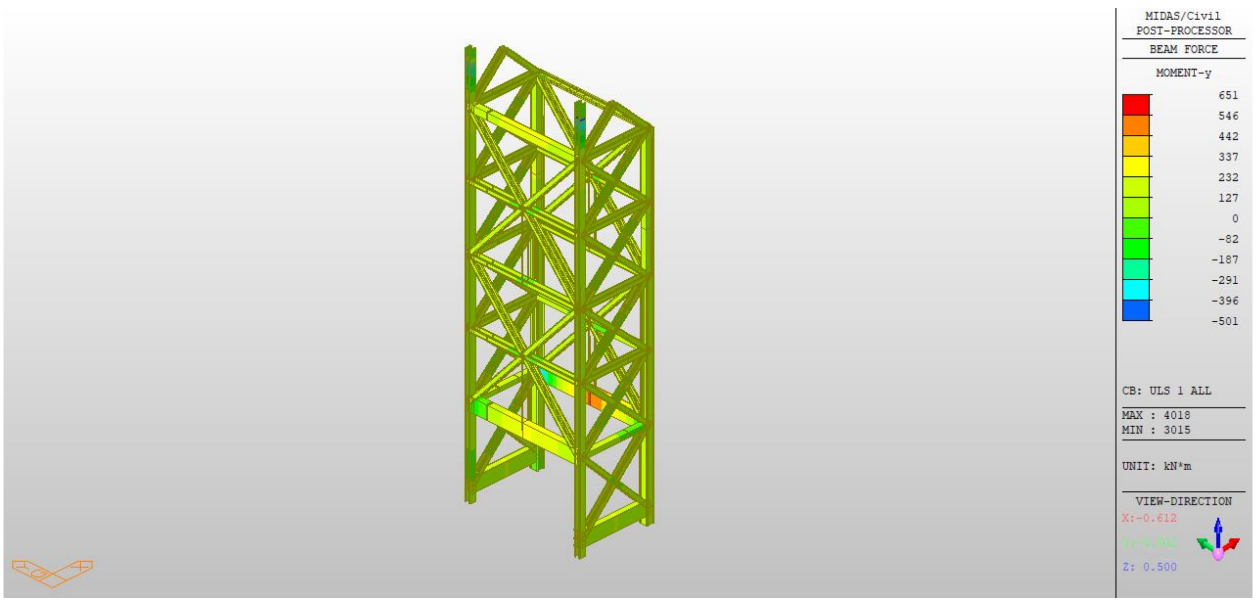

Figure 154 Case 7 ULS 1 MY

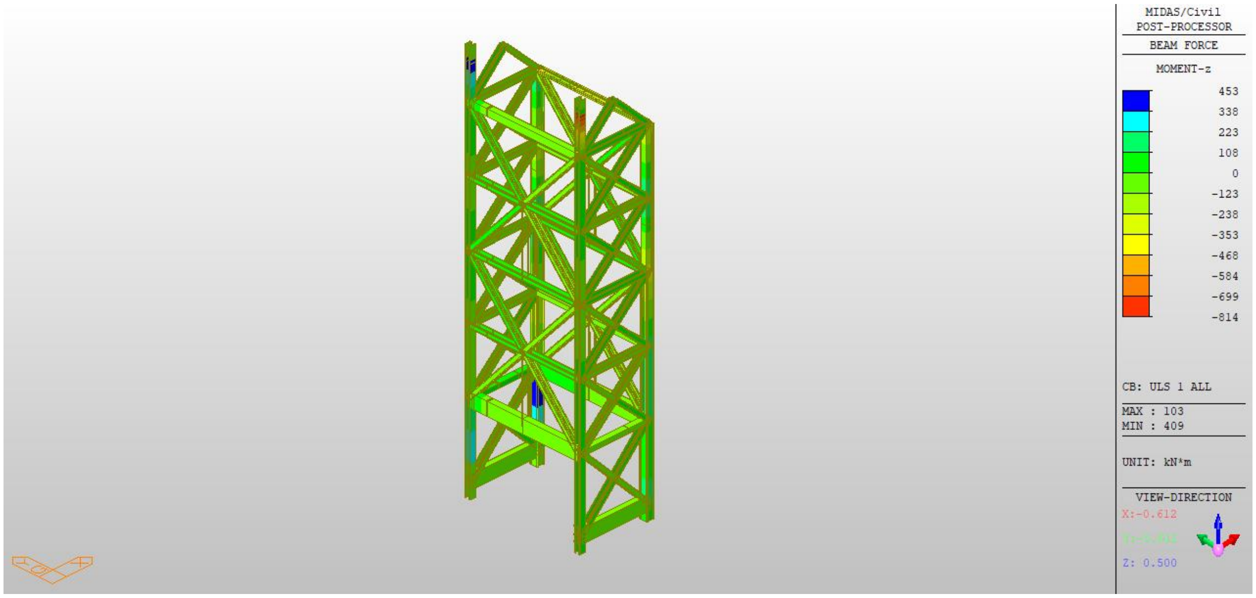

Figure 155 Case 7 ULS 1 MZ

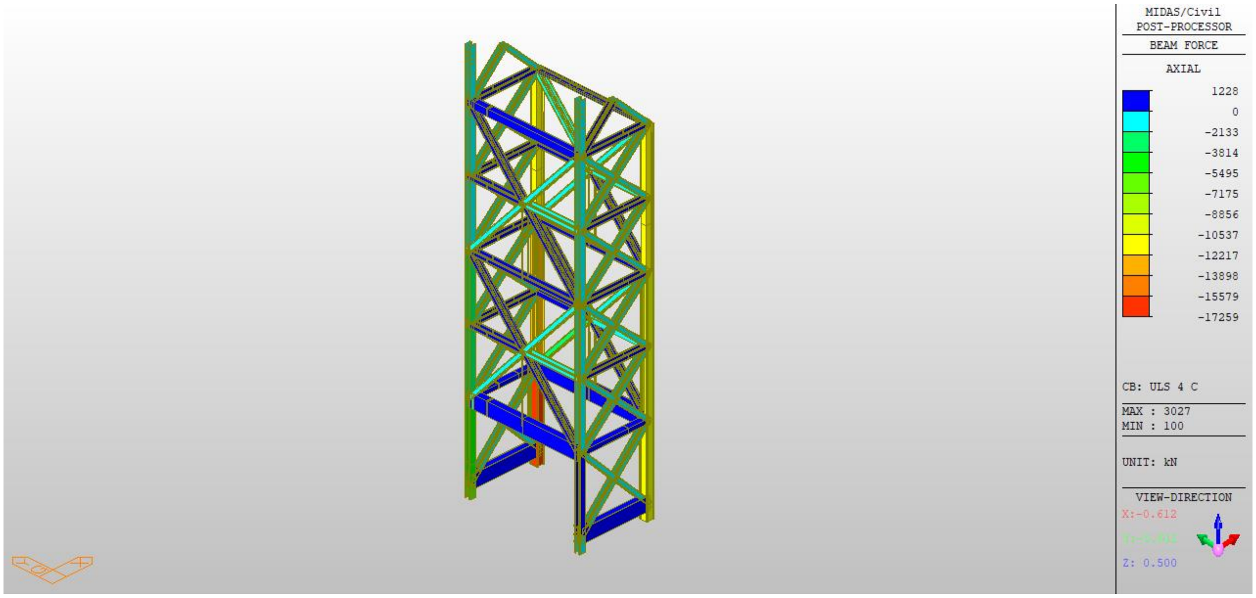

Figure 156 Case 7 ULS 4 Axial

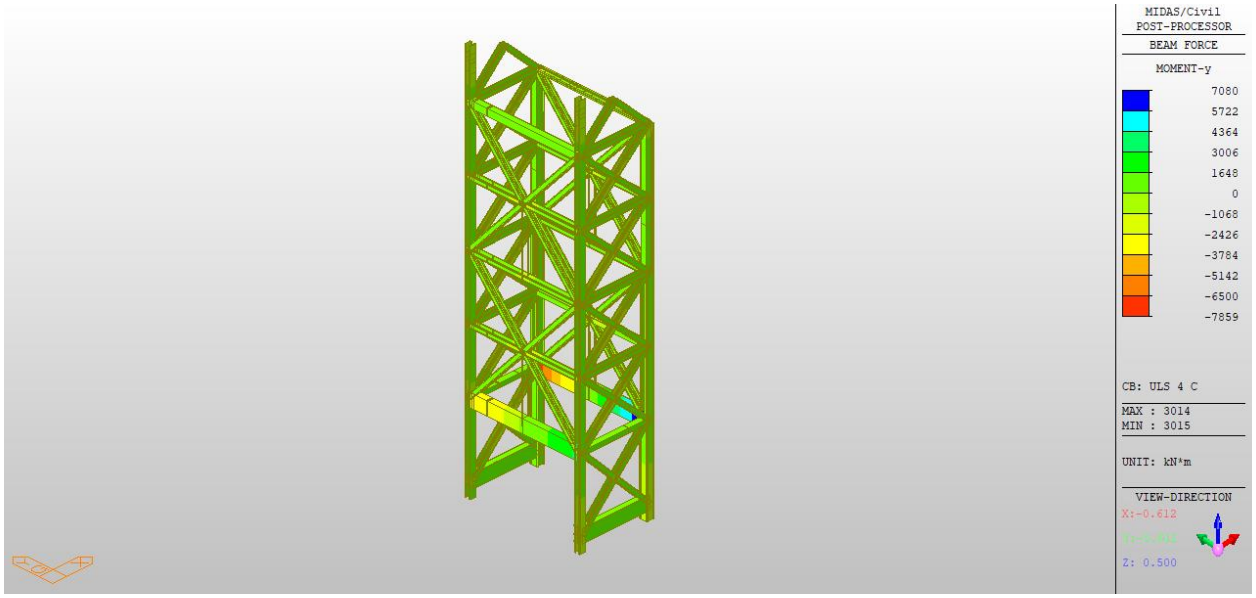

Figure 157 Case 7 ULS 4 MY

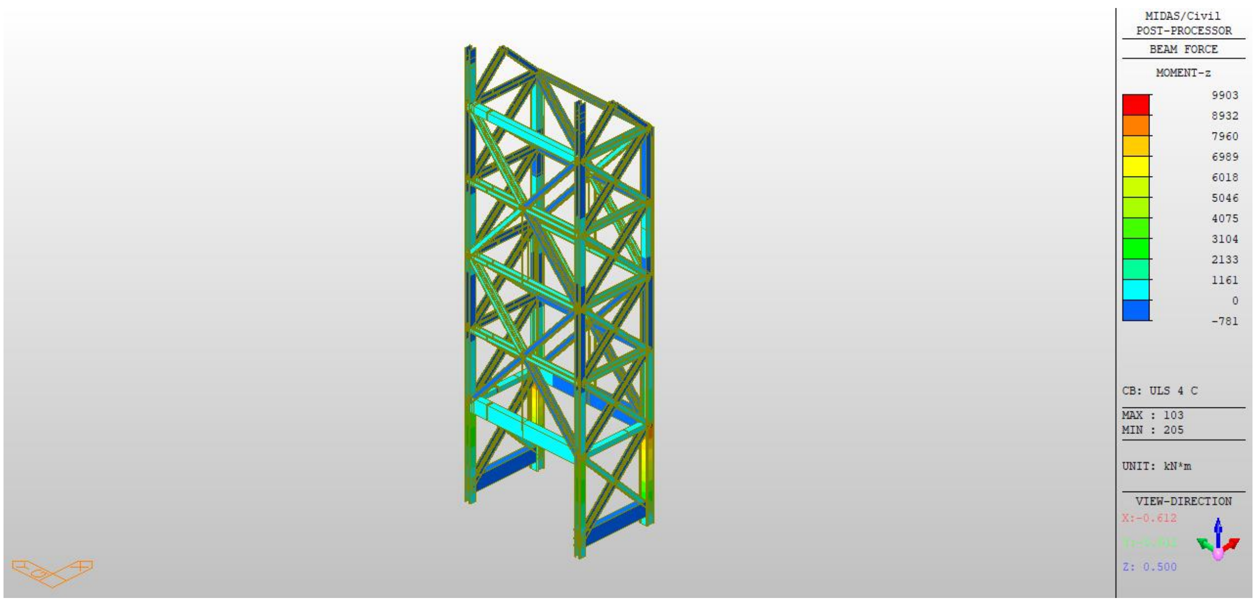

Figure 158 Case 7 ULS 4 MZ

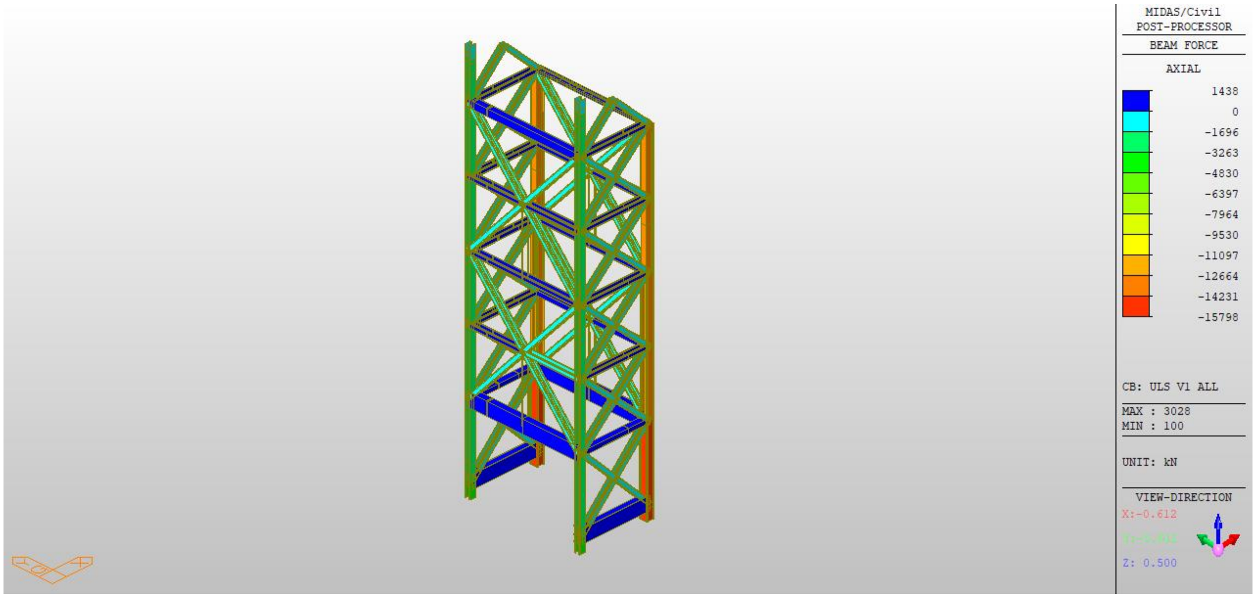

Figure 159 Case 7 ULS V1 Axial

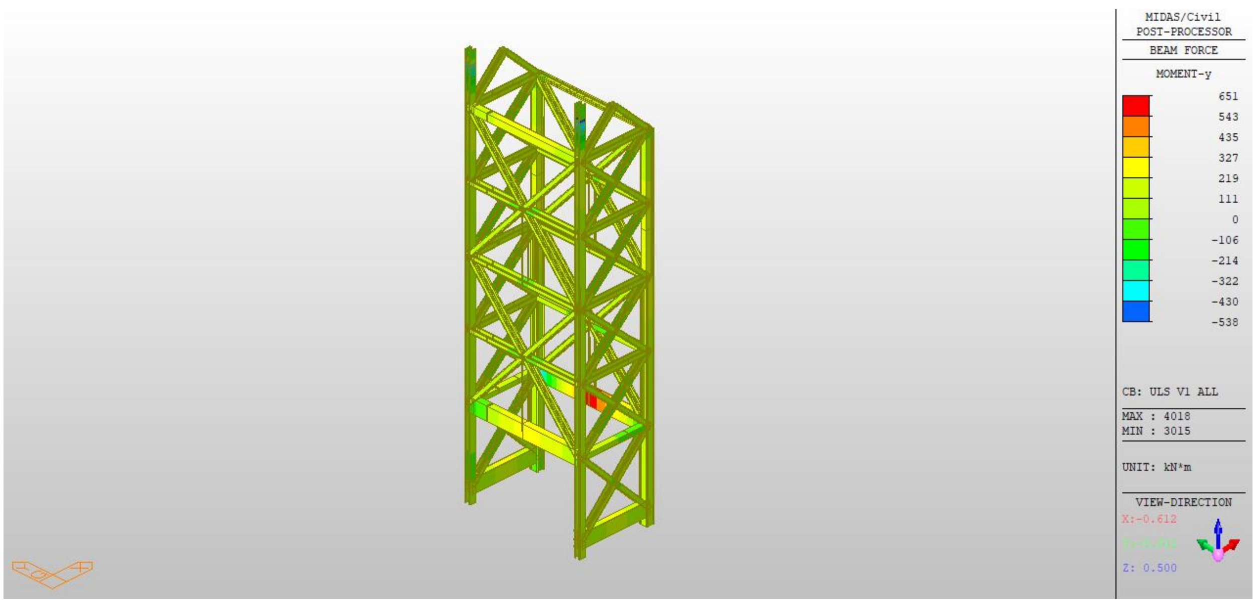

Figure 160 Case 7 ULS V1 MY

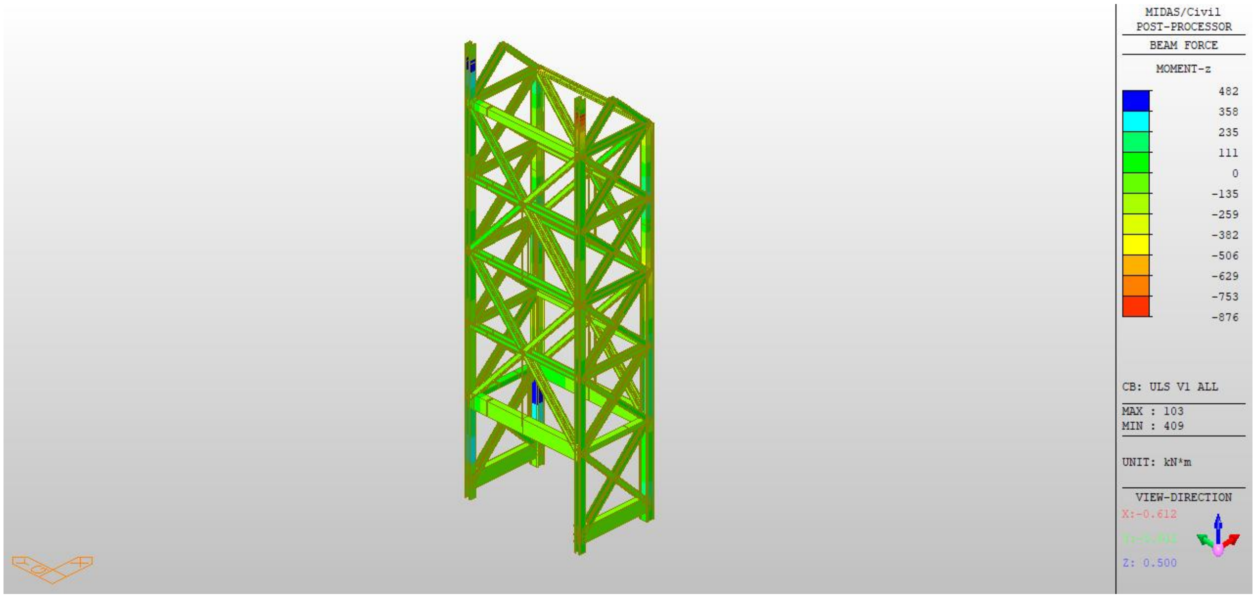

Figure 161 Case 7 ULS V1 MZ

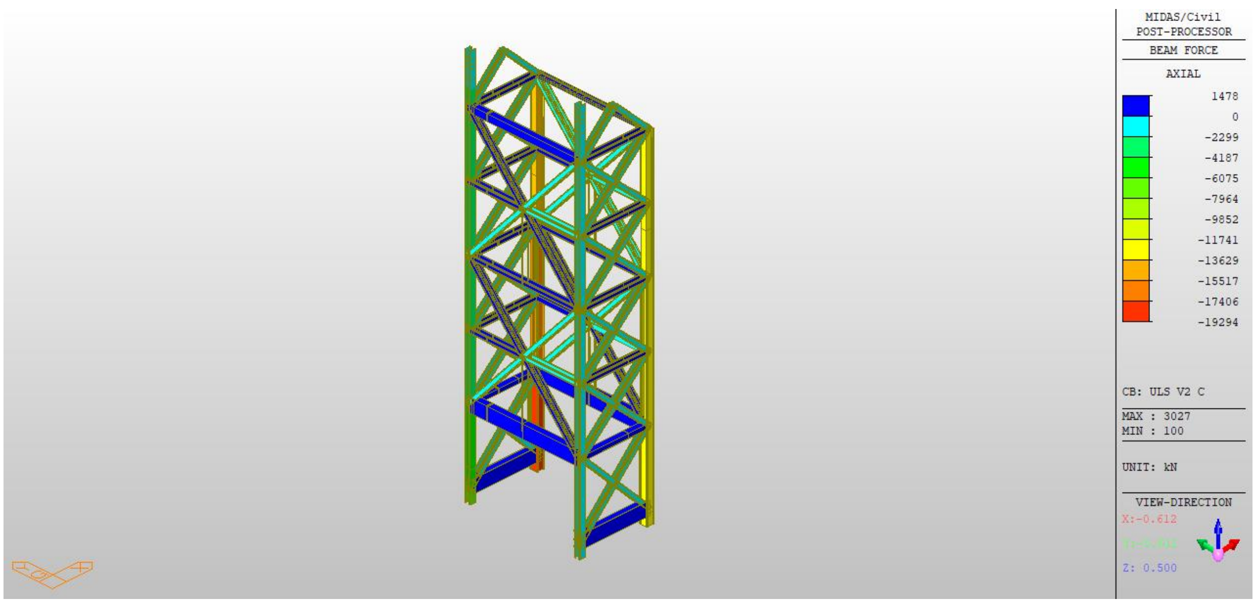

Figure 162 Case 7 ULS V2 Axial

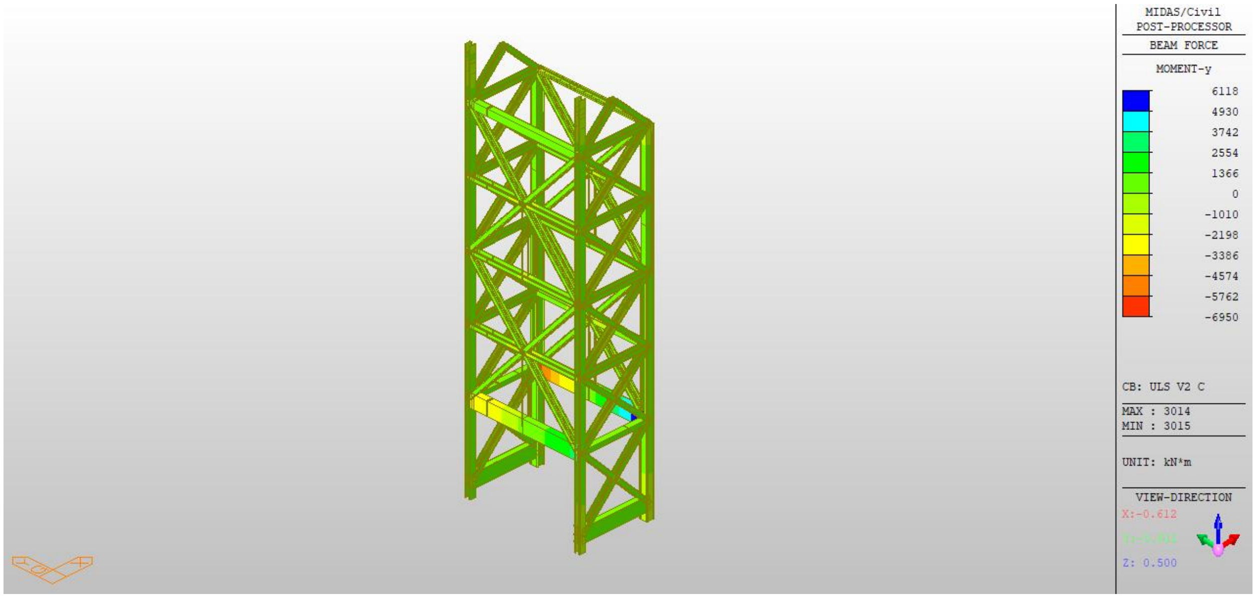

Figure 163 Case 7 ULS V2 MY

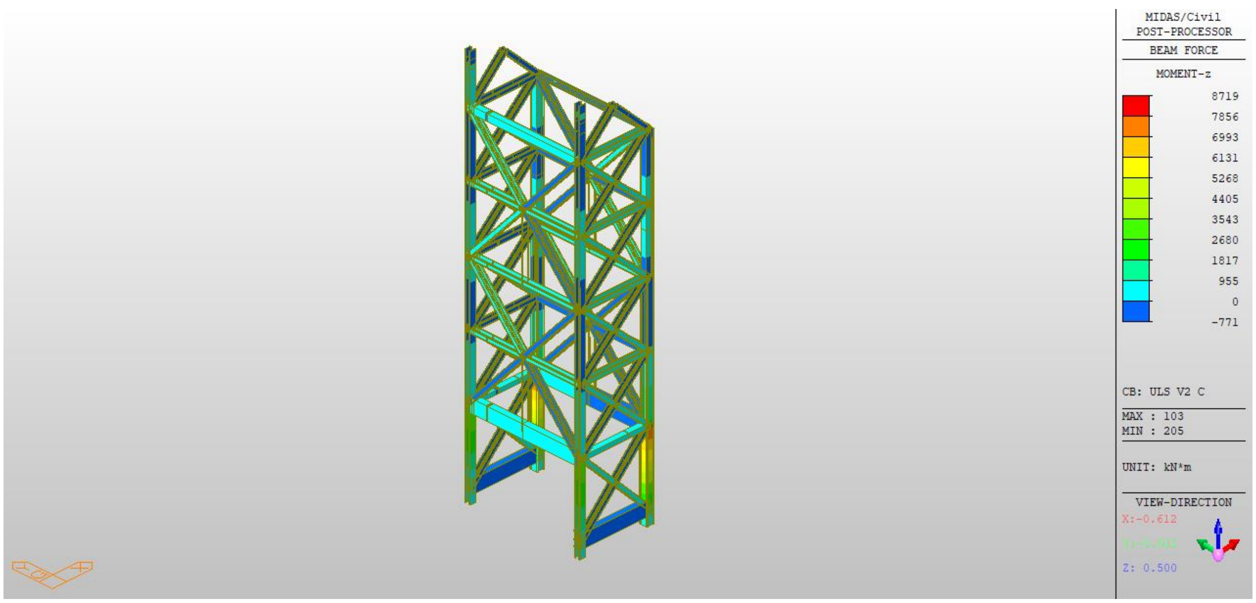

Figure 164 Case 7 ULS V2 MZ

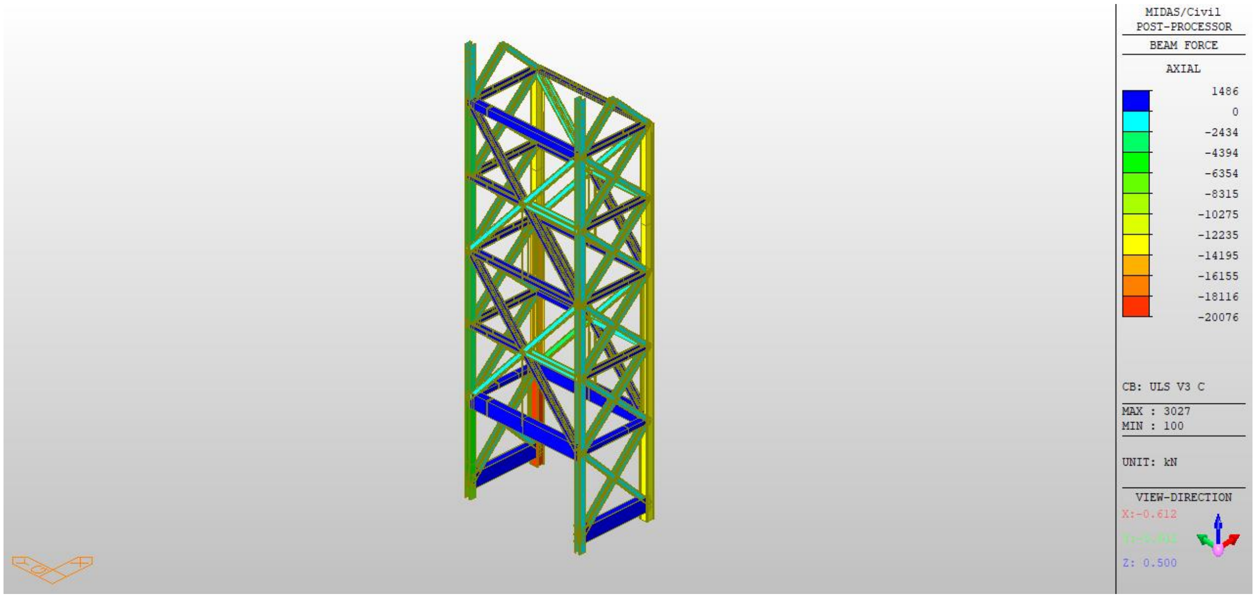

Figure 165 Case 7 ULS V3 Axial

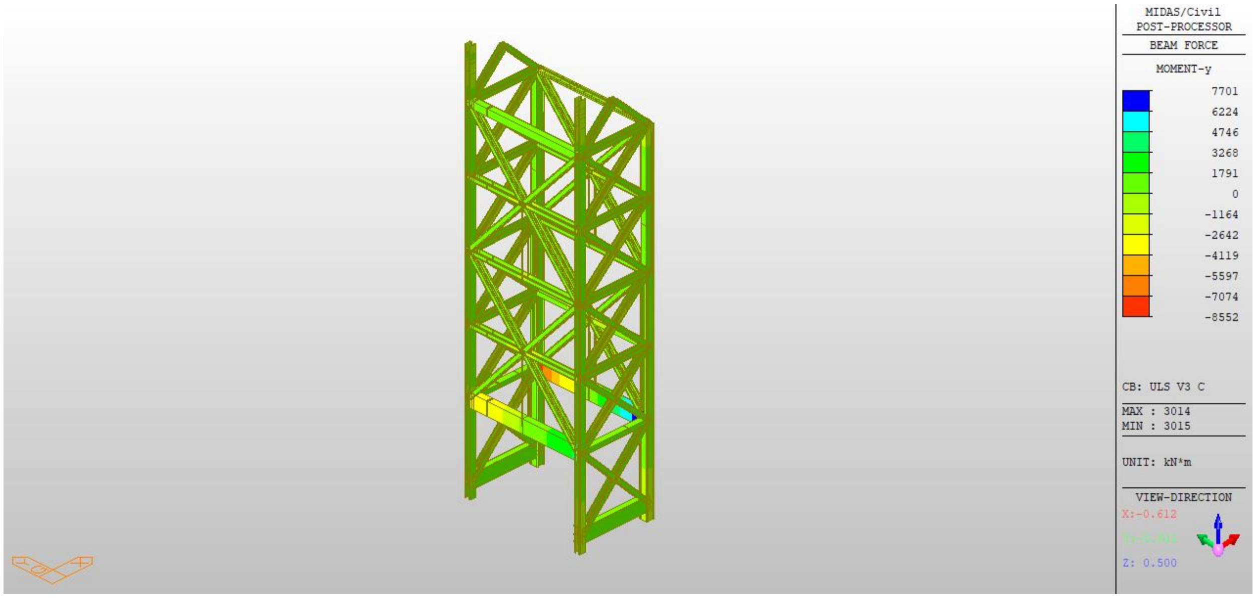

Figure 166 Case 7 ULS V3 MY

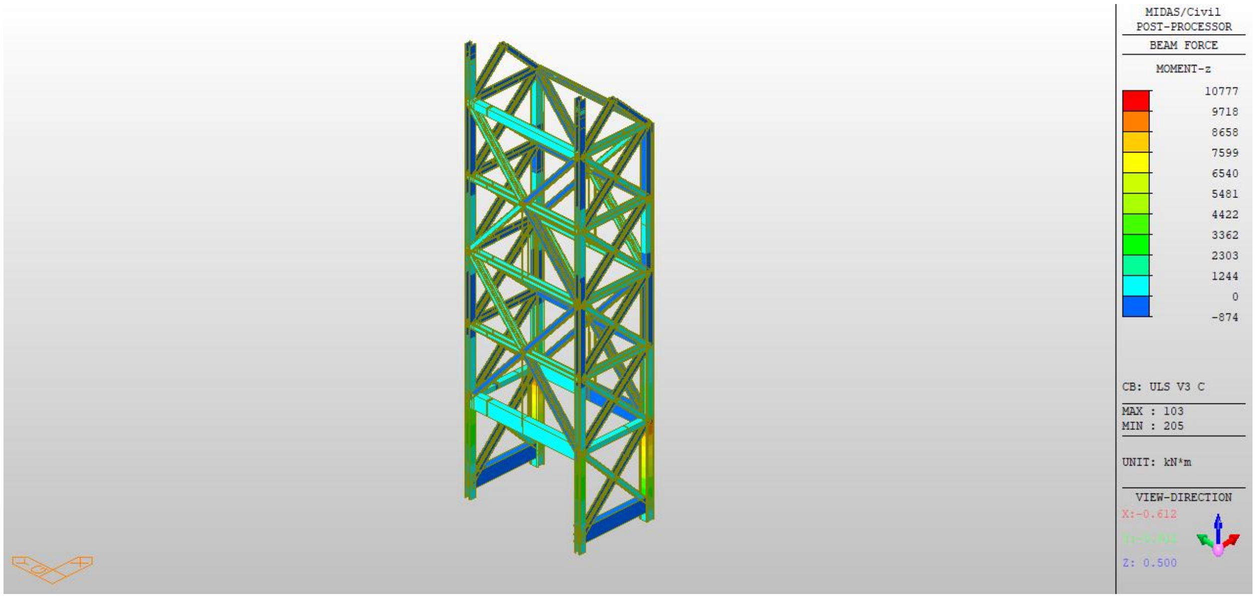

Figure 167 Case 7 ULS V3 MZ

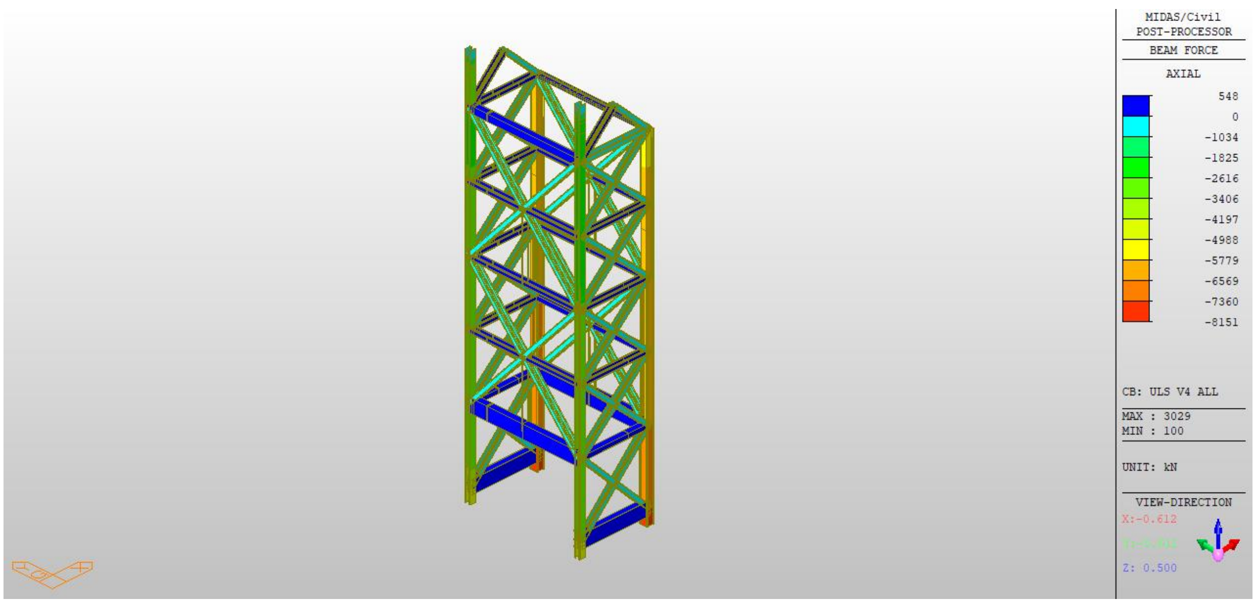

Figure 168 Case 7 ULS V4 Axial

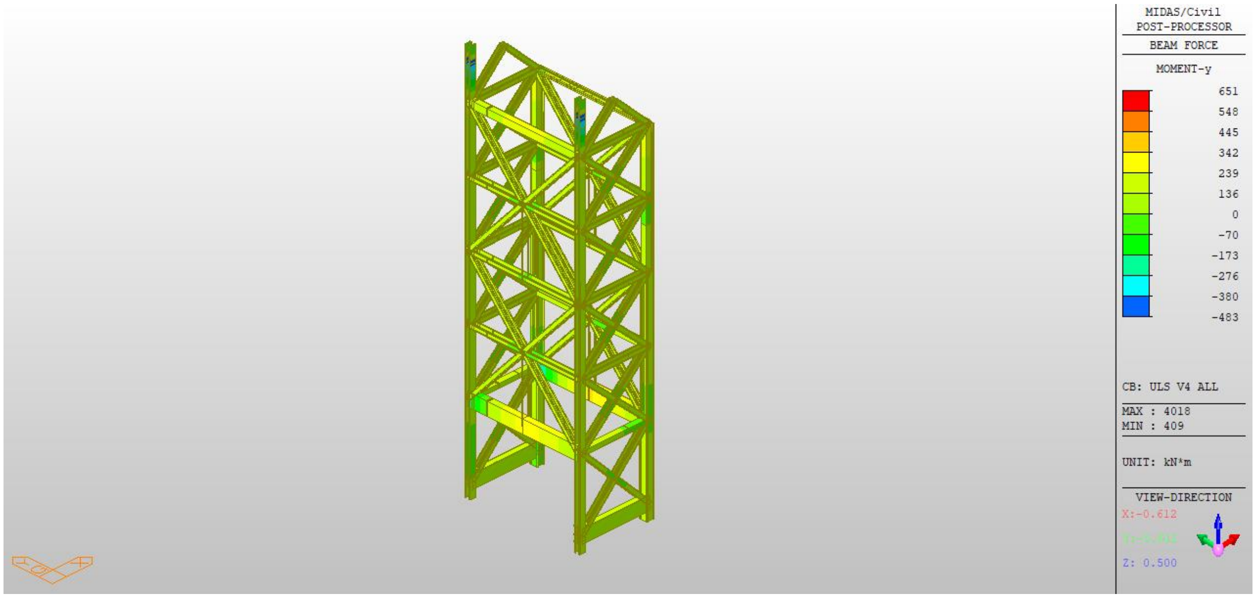

Figure 169 Case 7 ULS V4 MY

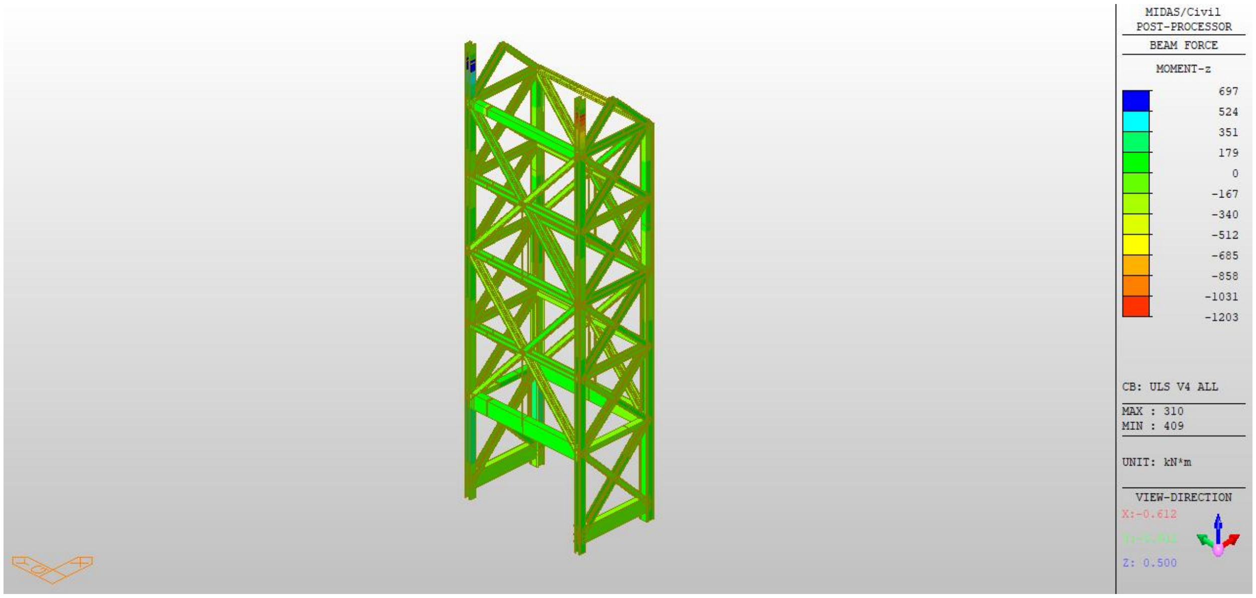

Figure 170 Case 7 ULS V4 MZ

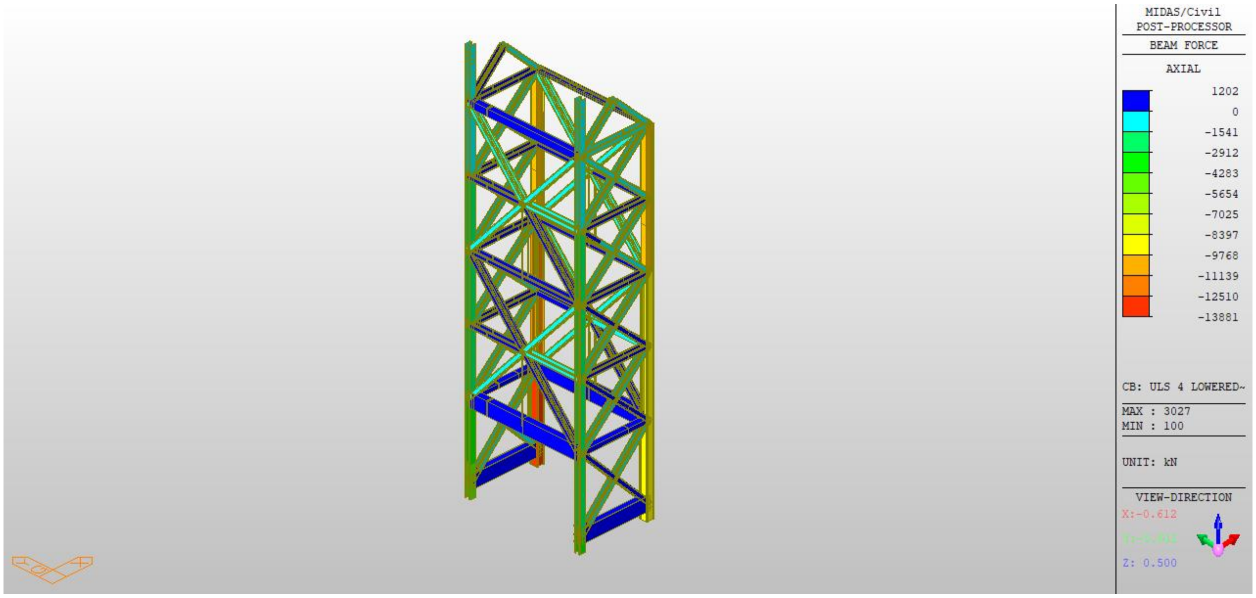

Figure 171 Case 7 ULS 4 Lowered Axial

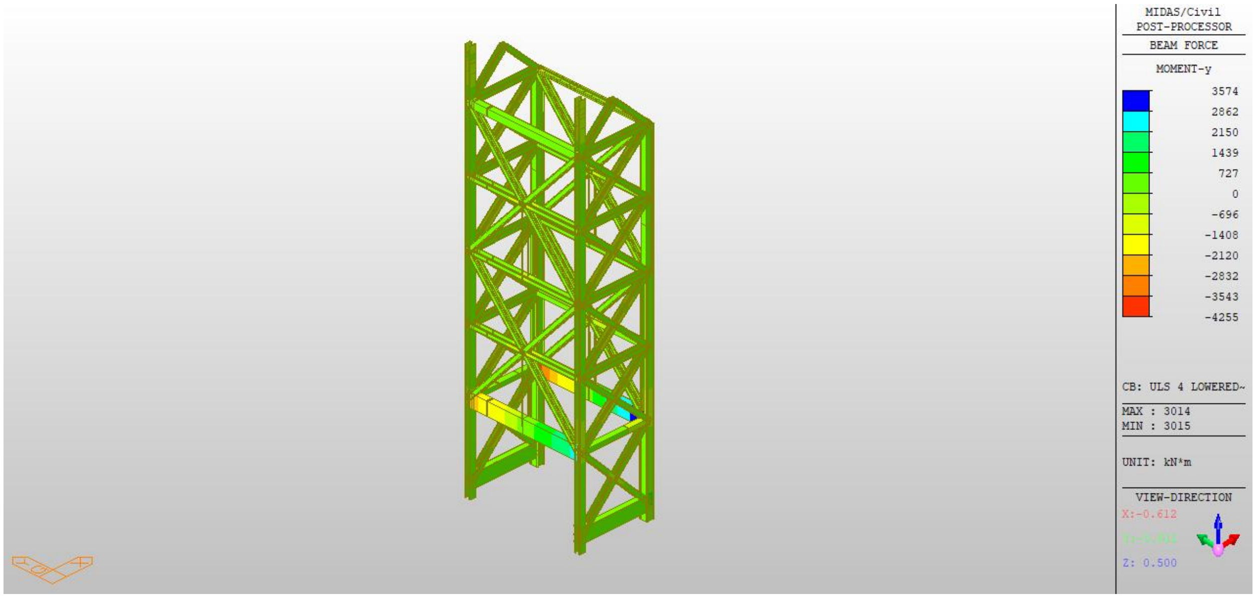

Figure 172 Case 7 ULS 4 Lowered MY

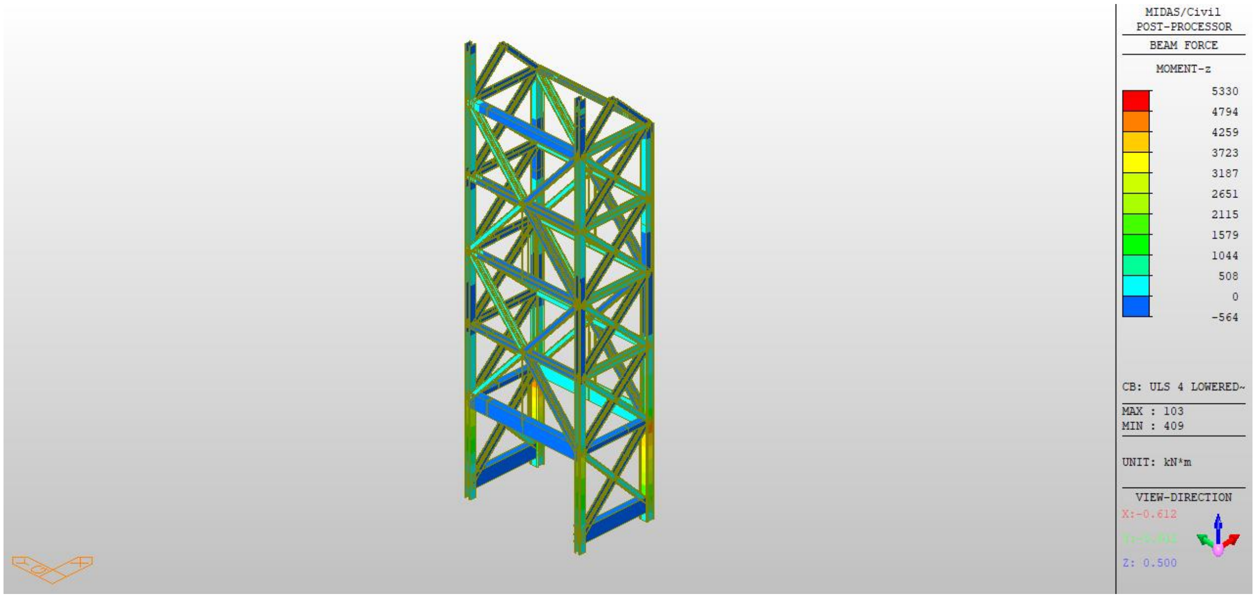

Figure 173 Case 7 ULS 4 Lowered MZ

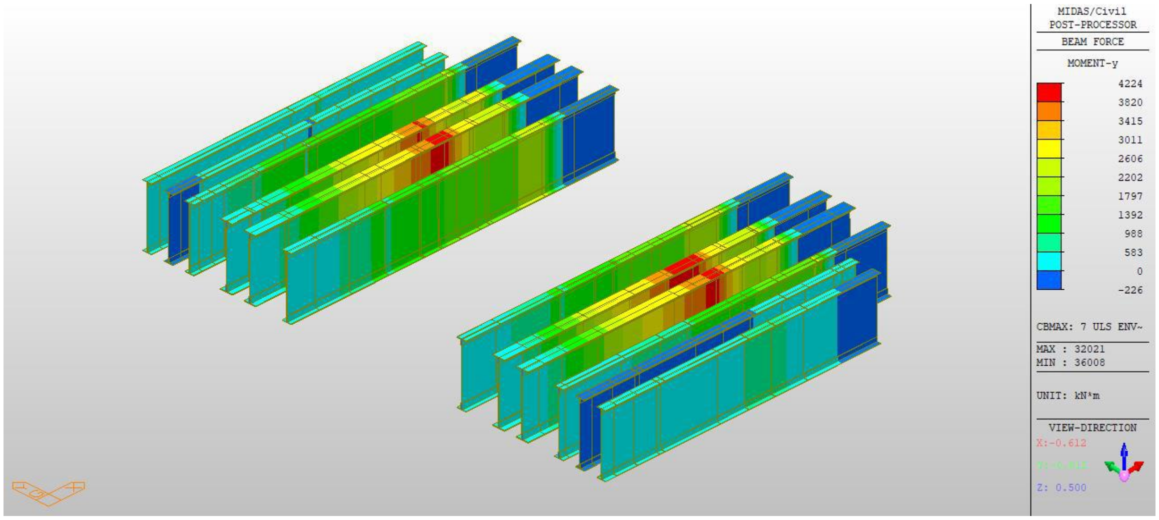

Figure 174 Girders G1 G2 G3 G4 G6 - Case 7 ULS M_y Max

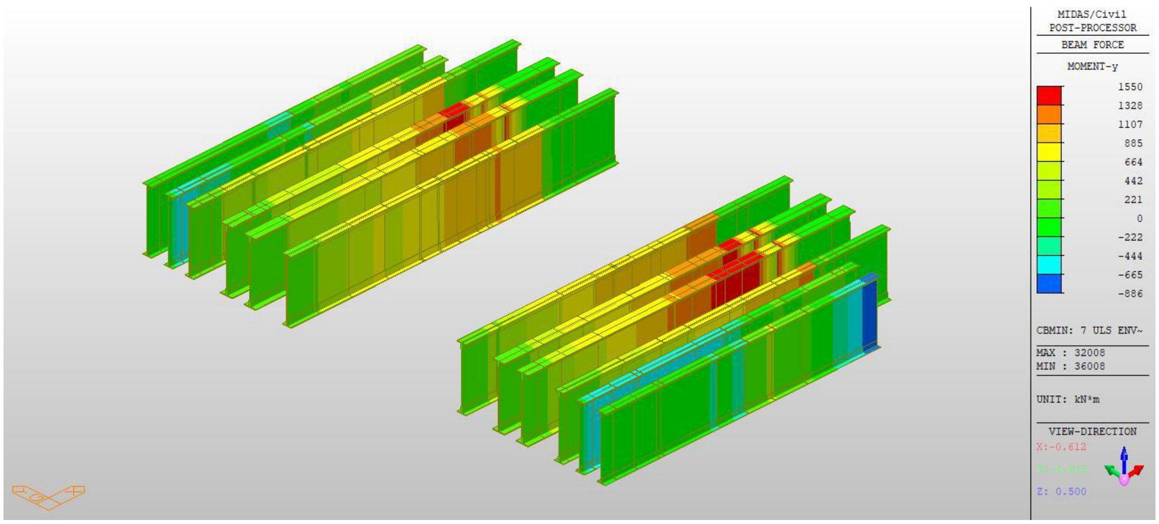

Figure 175 Girders G1 G2 G3 G4 G6 - Case 7 ULS M_y Min

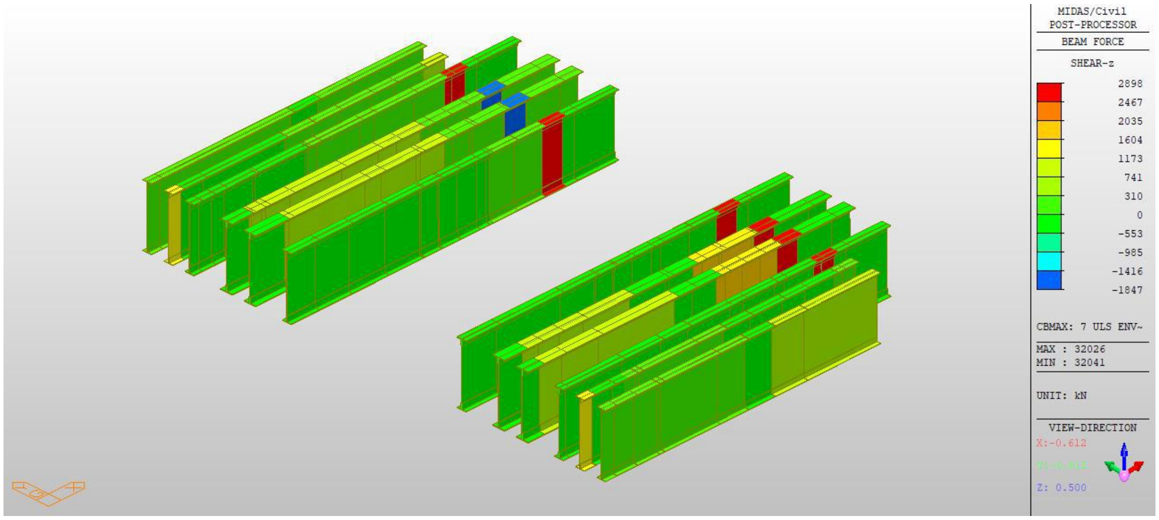

Figure 176 Girders G1 G2 G3 G4 G6 - Case 7 ULS F_z Max

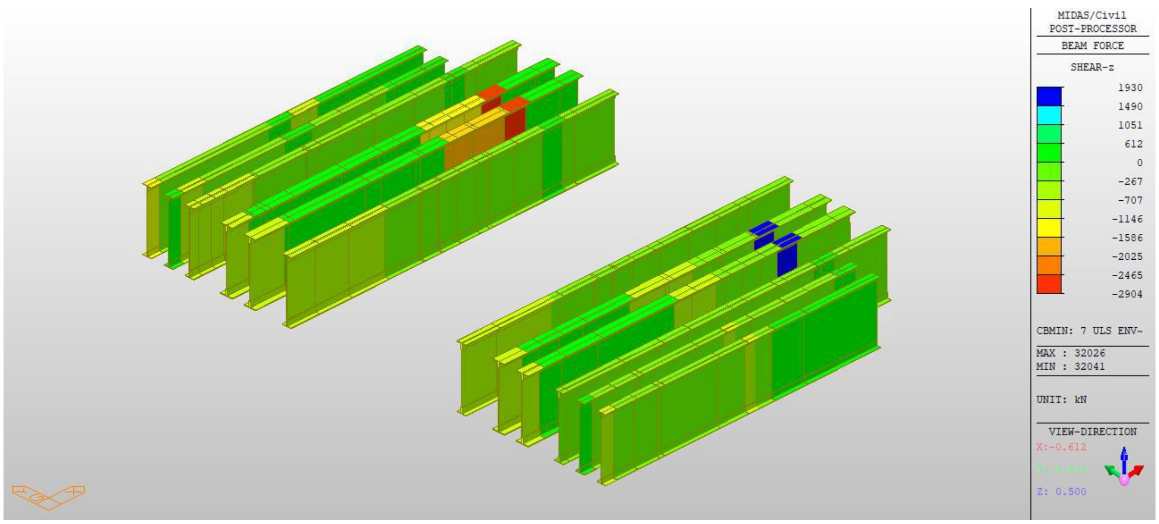

Figure 177 Girders G1 G2 G3 G4 G6 - Case 7 ULS F_z Min

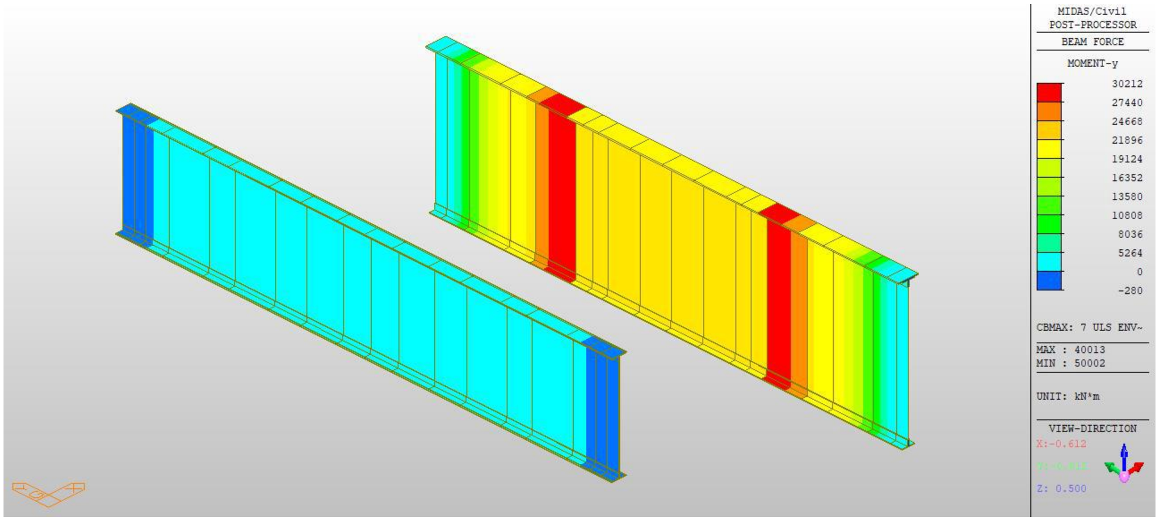

Figure 178 Girders G7 and G8 - Case 7 ULS M_y Max

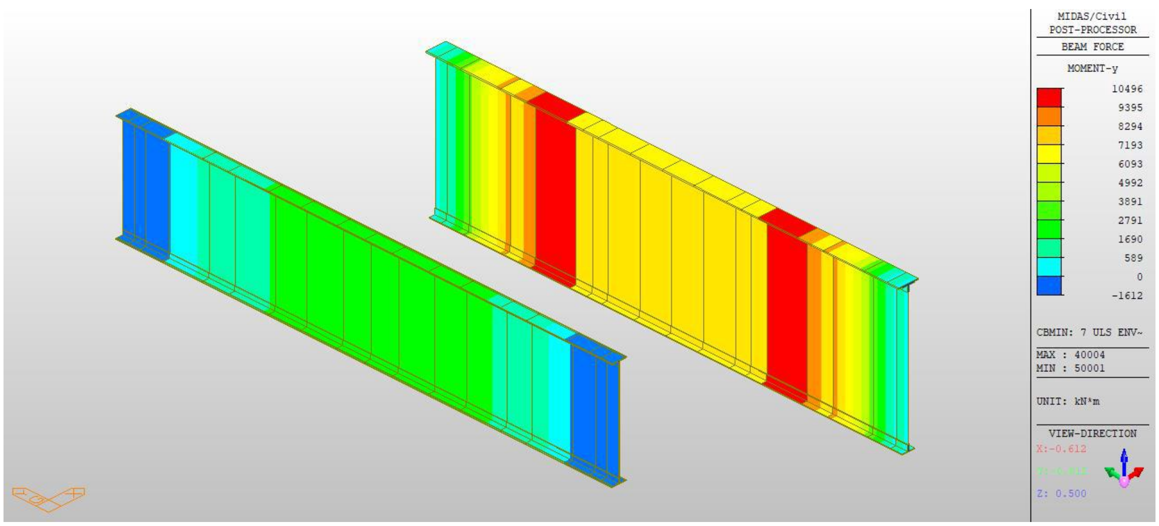

Figure 179 Girders G7 and G8 - Case 7 ULS M_y Min

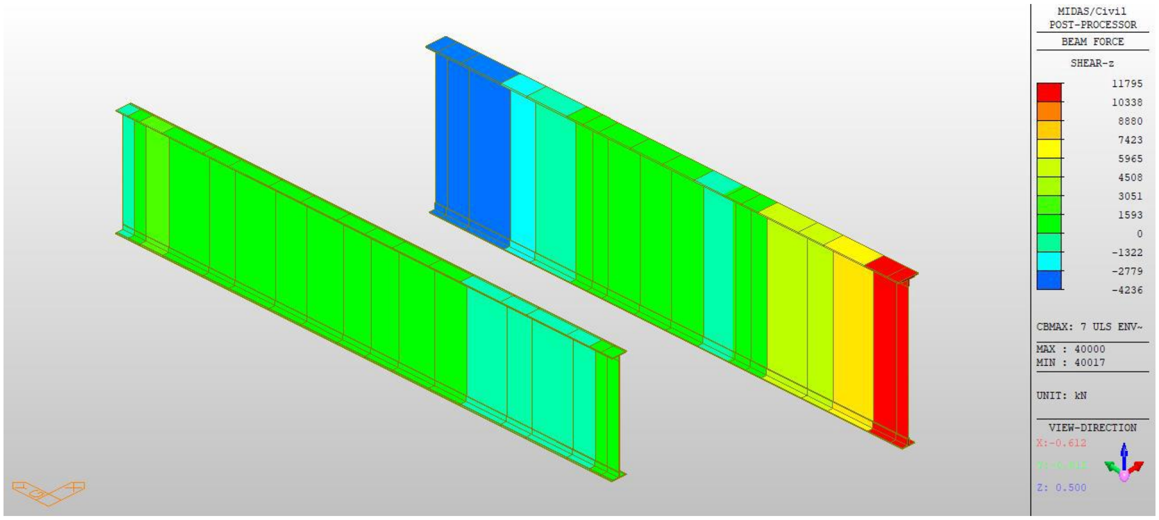

Figure 180 Girders G7 and G8 - Case 7 ULS F_z Max

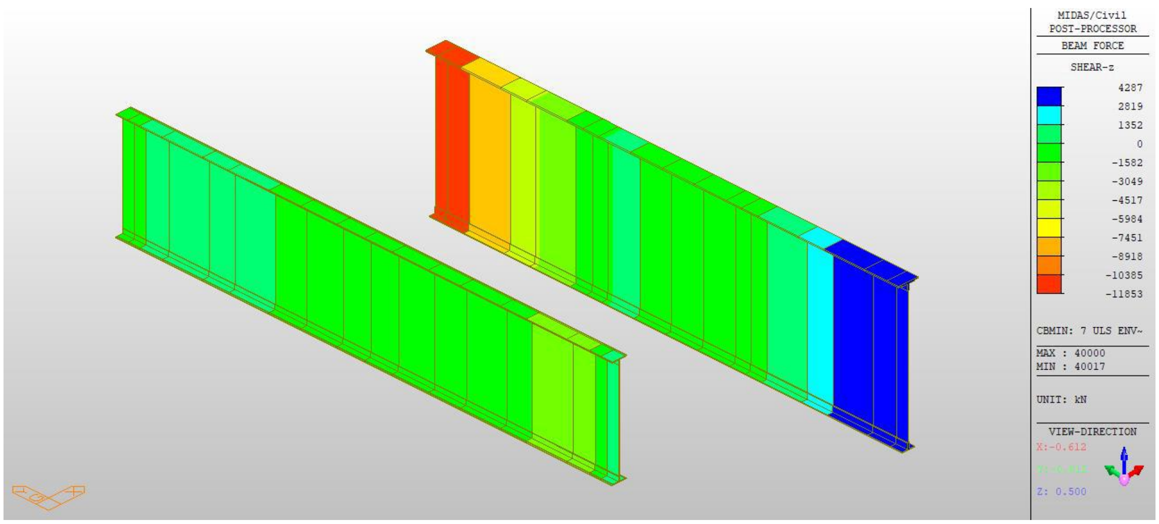

Figure 181 Girders G7 and G8 - Case 7 ULS F_z Min

Exhibit C.2.8. Rehabilitation Case 8

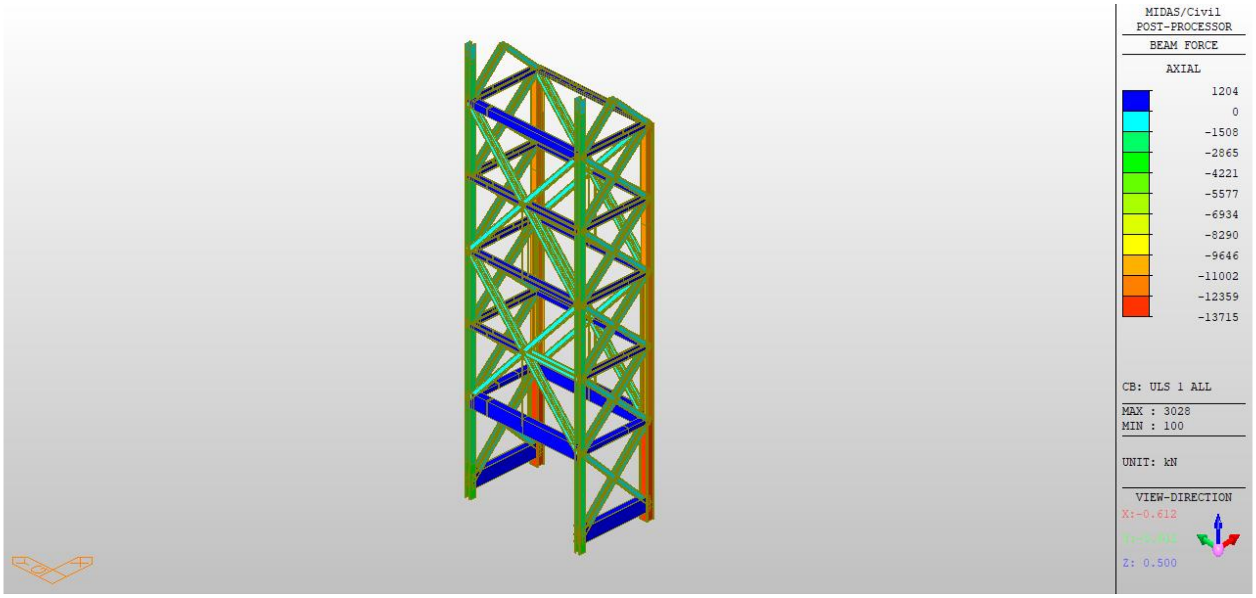

Figure 182 Case 8 ULS 1 Axial

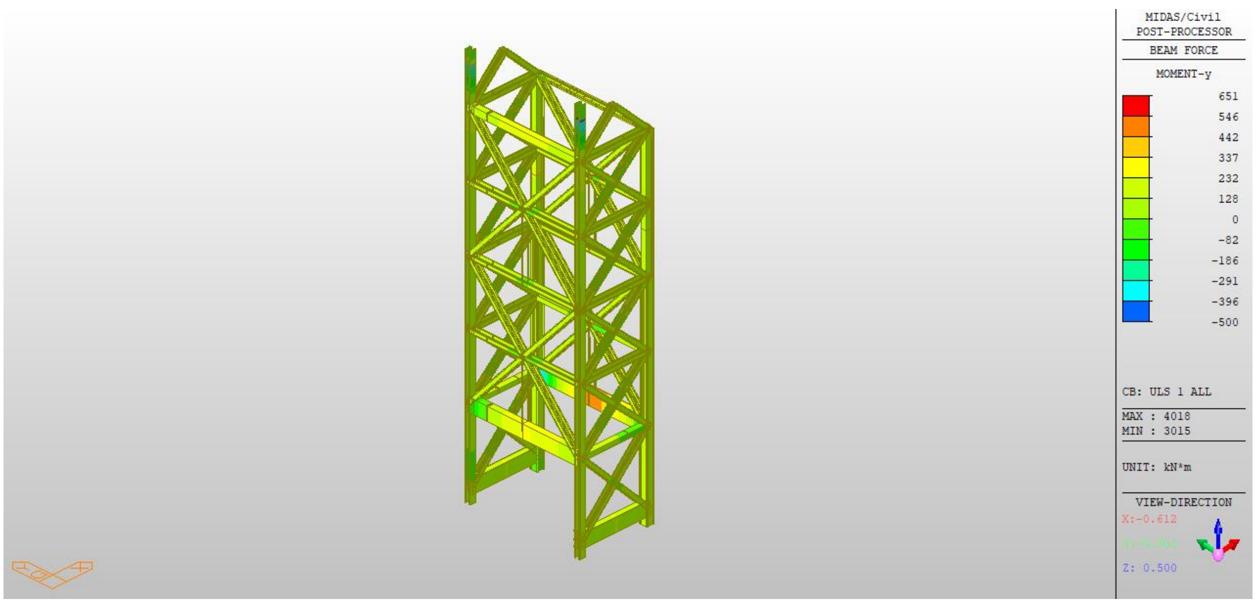

Figure 183 Case 8 ULS 1 MY

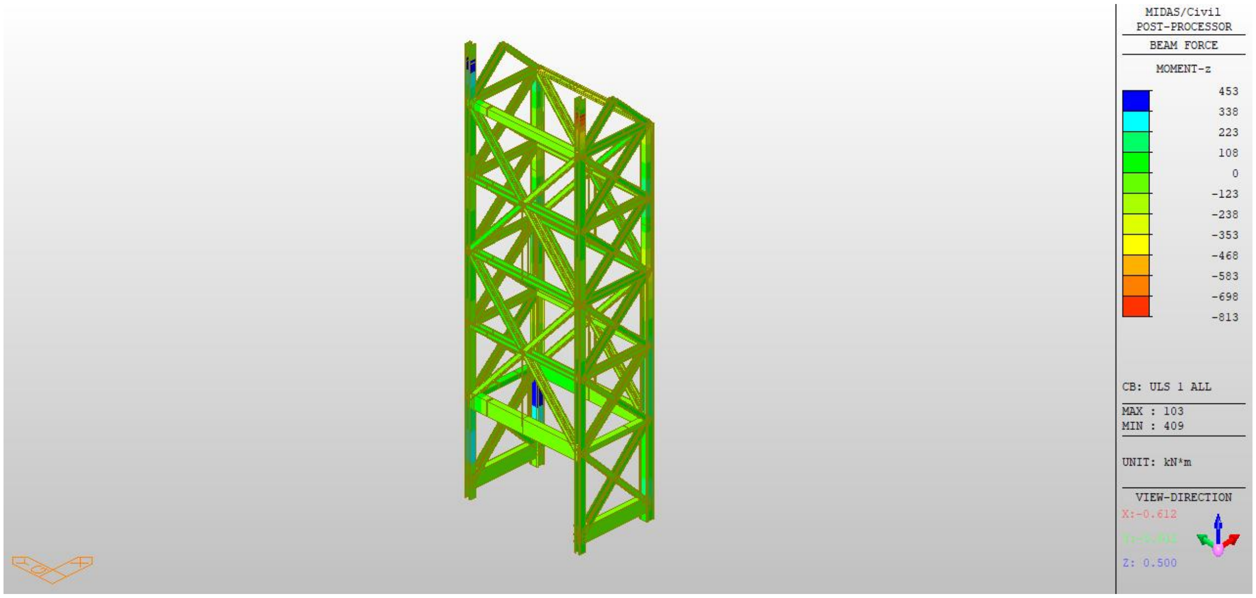

Figure 184 Case 8 ULS 1 MZ

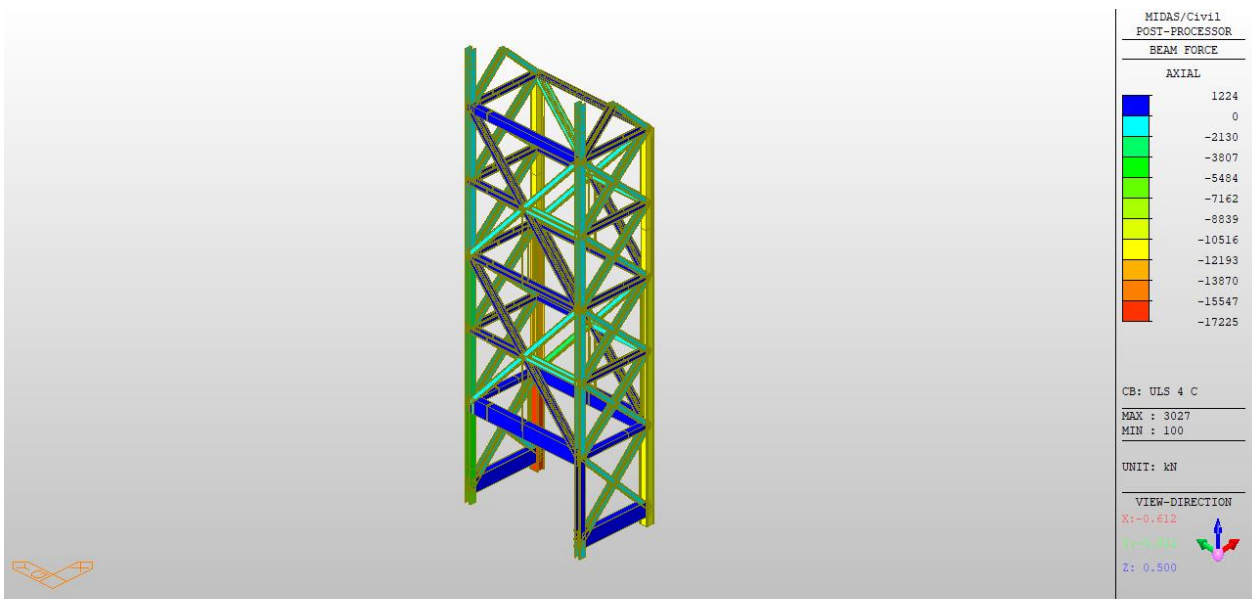

Figure 185 Case 8 ULS 4 Axial

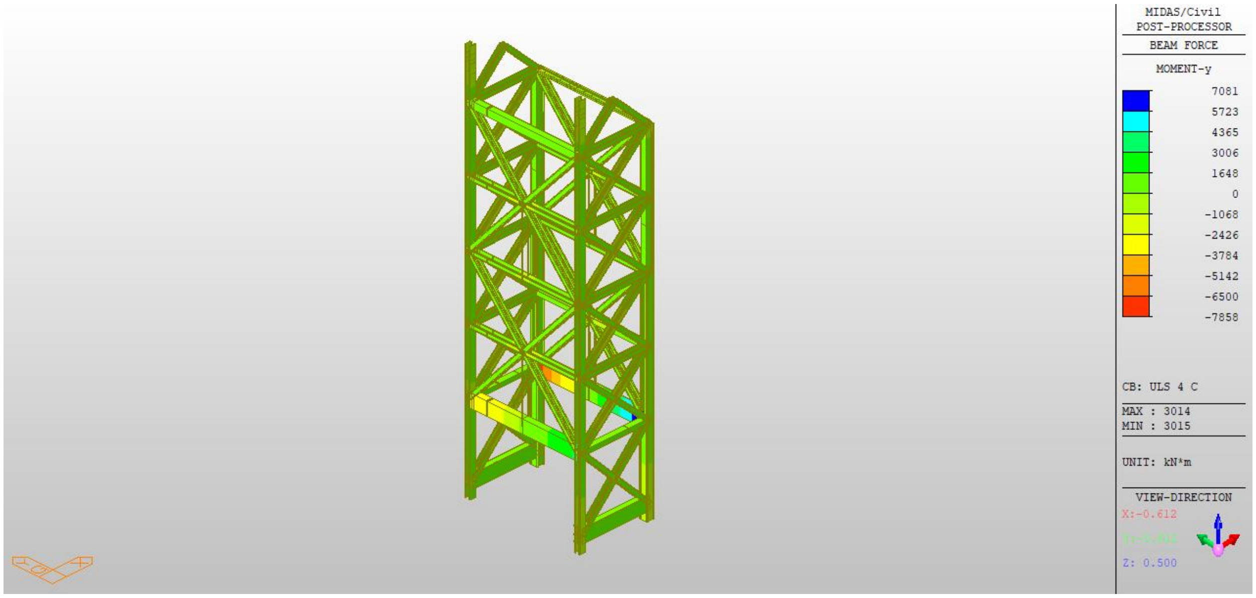

Figure 186 Case 8 ULS 4 MY

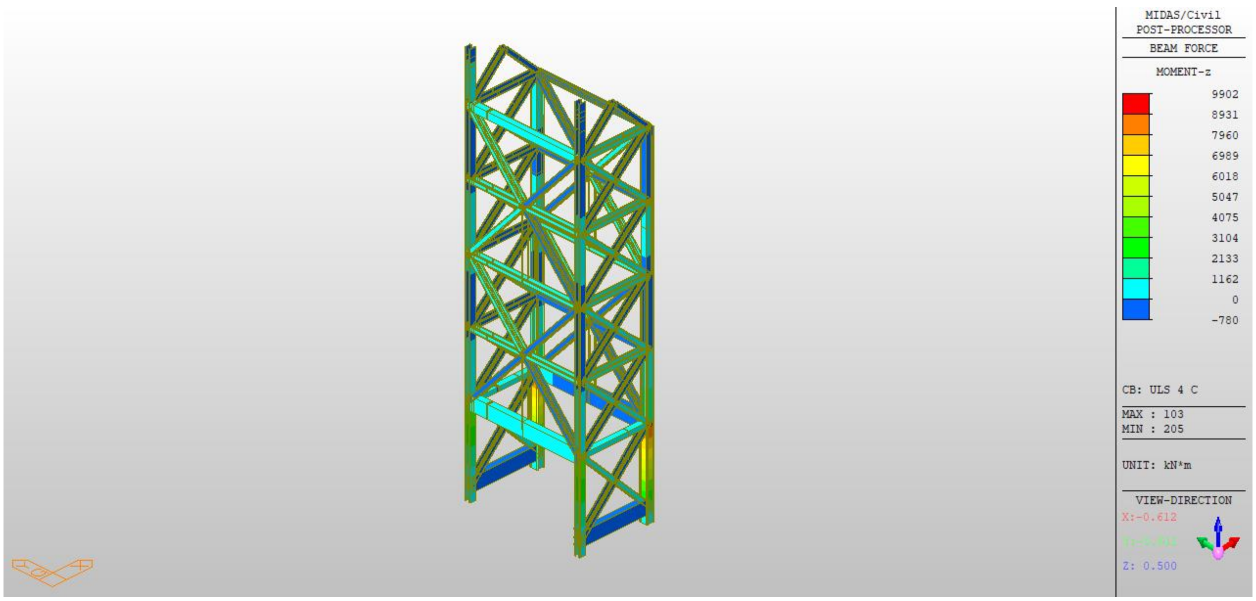

Figure 187 Case 8 ULS 4 MZ

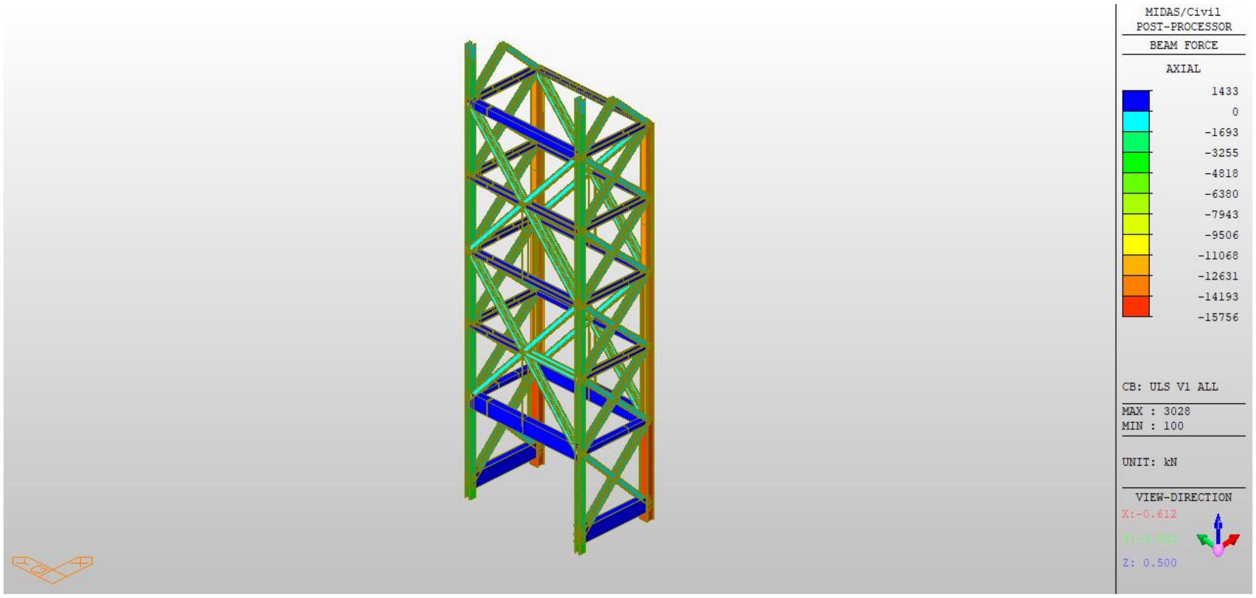

Figure 188 Case 8 ULS V1 Axial

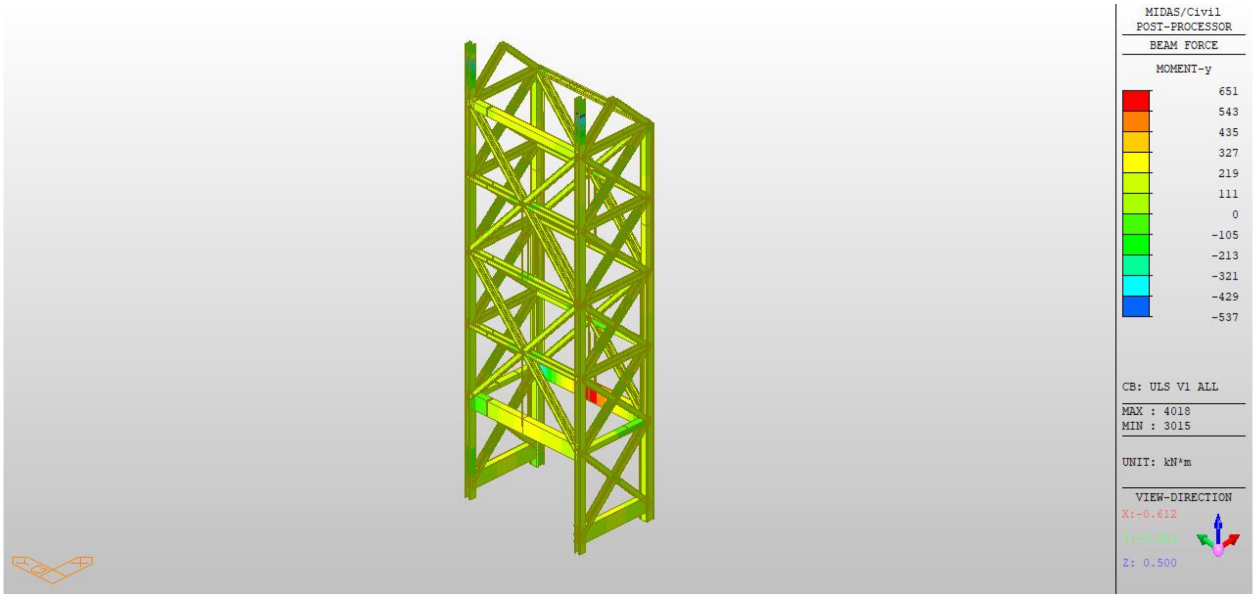

Figure 189 Case 8 ULS V1 MY

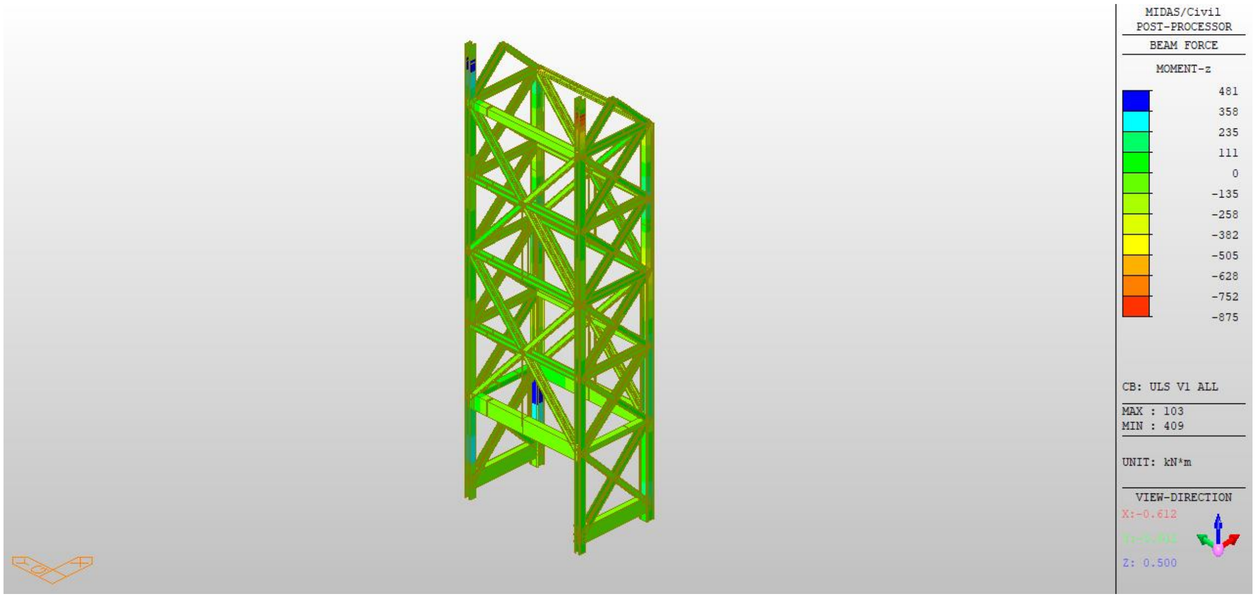

Figure 190 Case 8 ULS V1 MZ

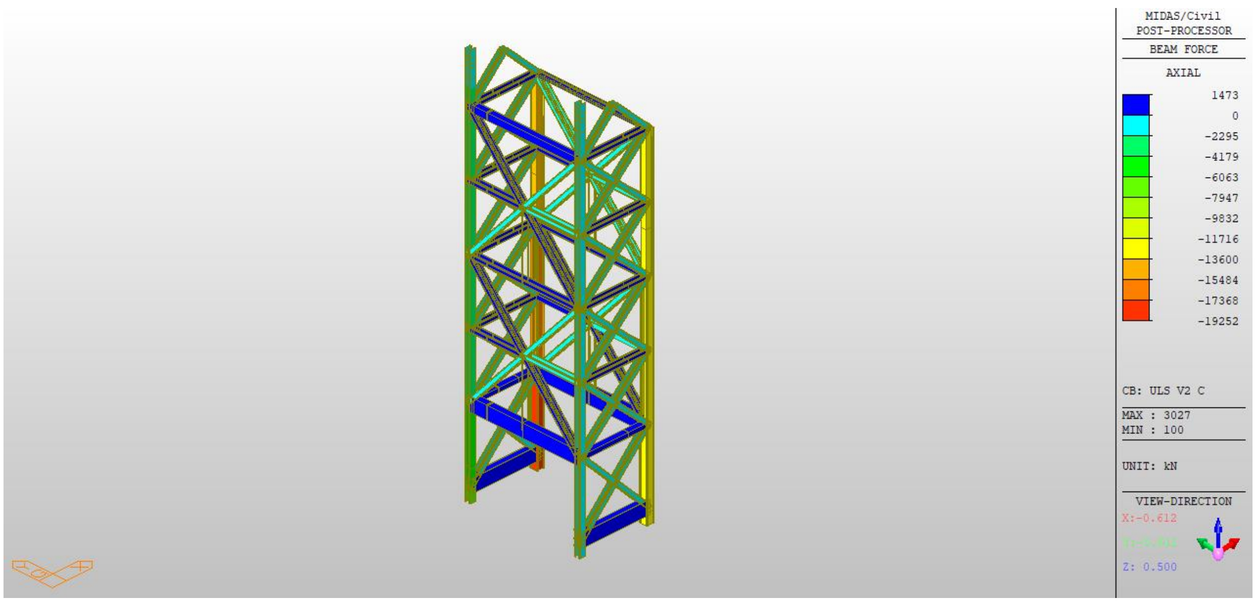

Figure 191 Case 8 ULS V2 Axial

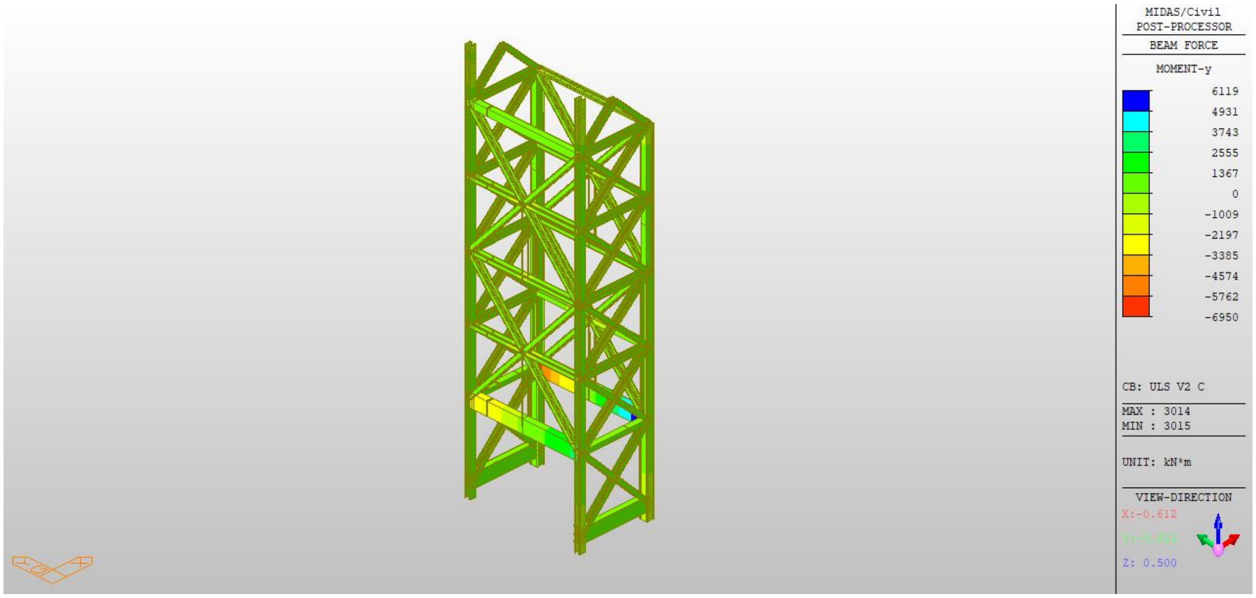

Figure 192 Case 8 ULS V2 MY

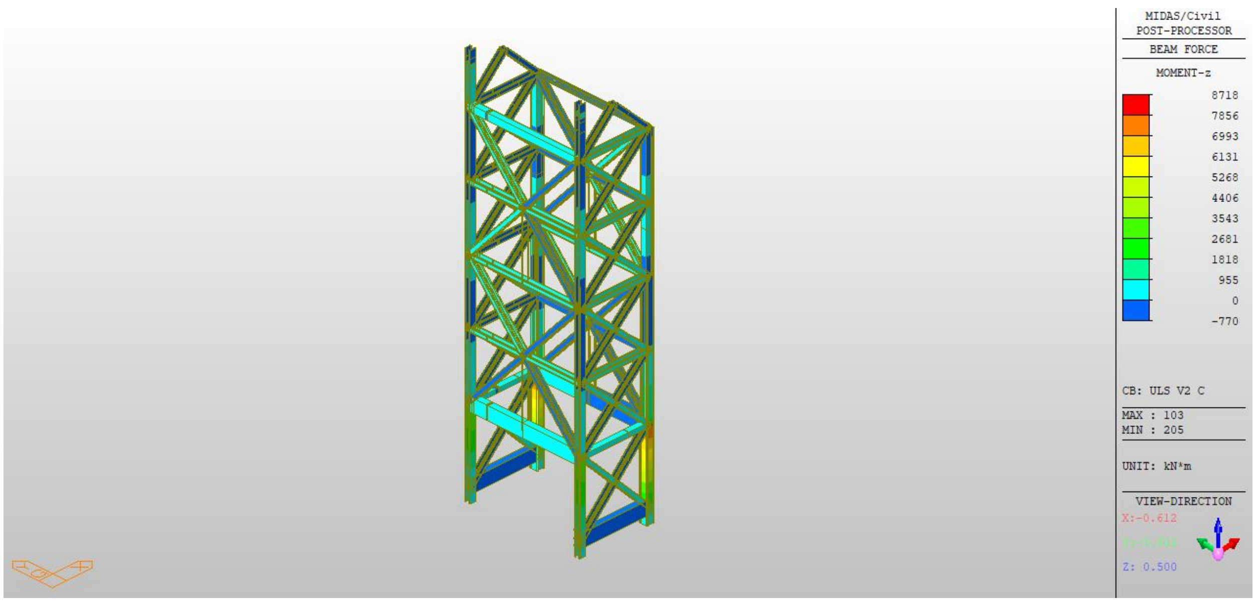

Figure 193 Case 8 ULS V2 MZ

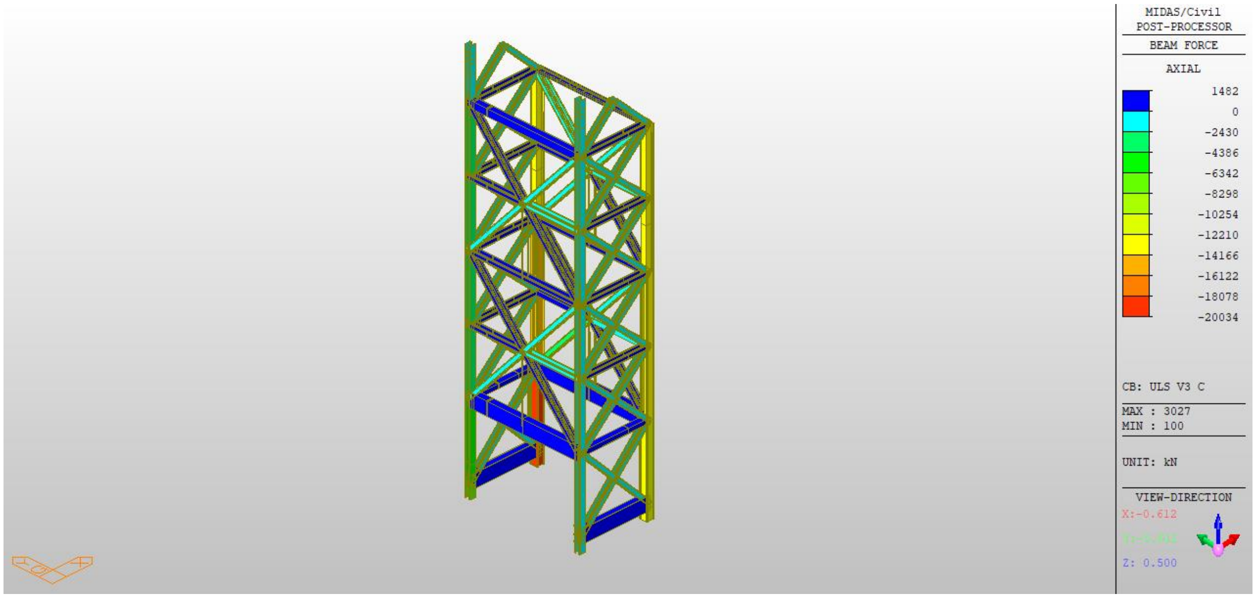

Figure 194 Case 8 ULS V3 Axial

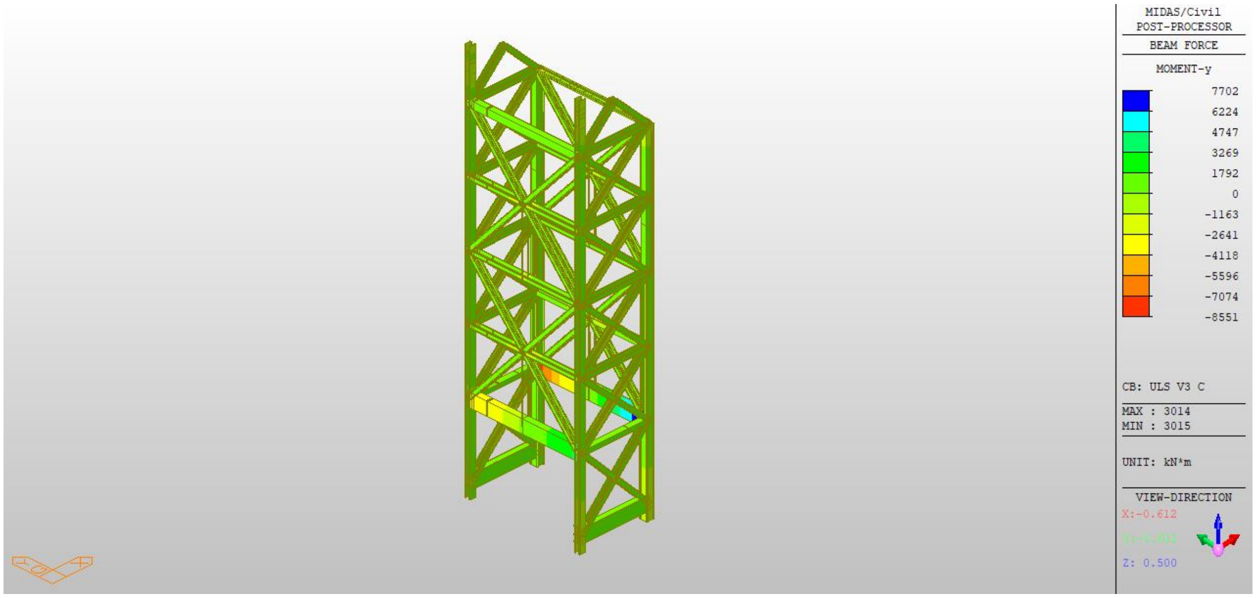

Figure 195 Case 8 ULS V3 MY

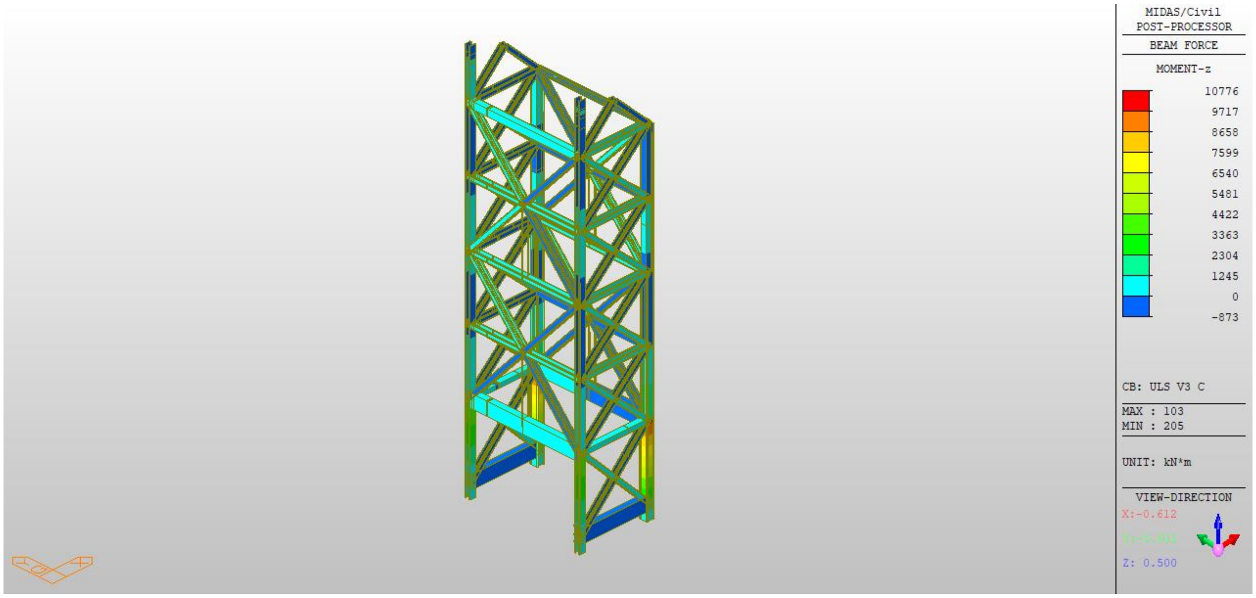

Figure 196 Case 8 ULS V3 MZ

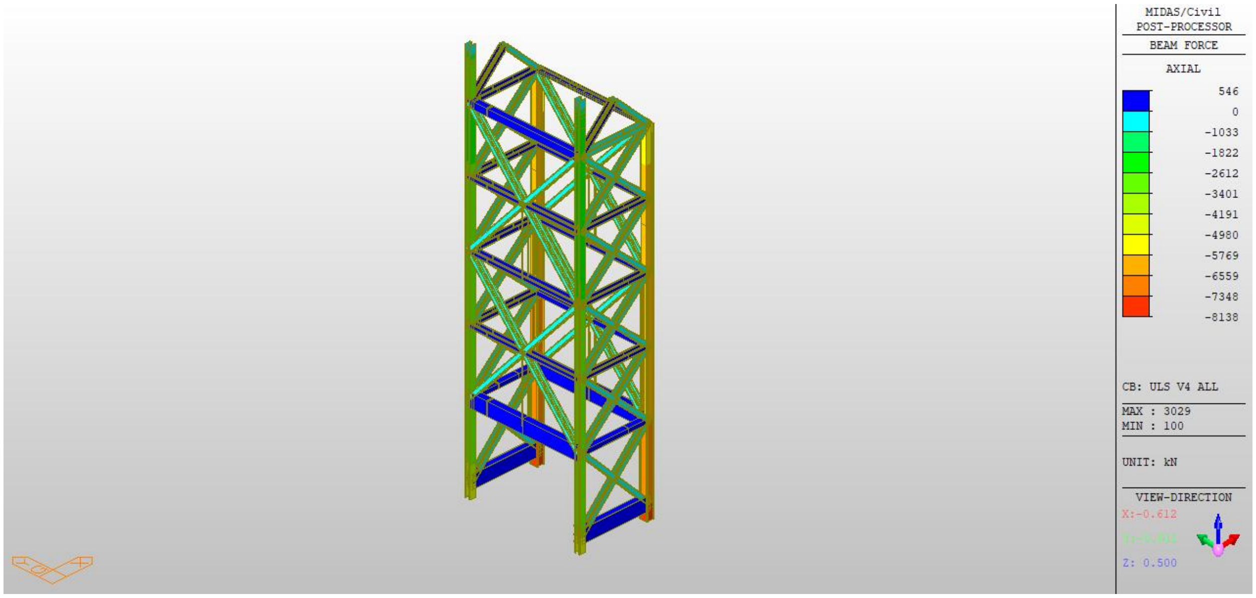

Figure 197 Case 8 ULS V4 Axial

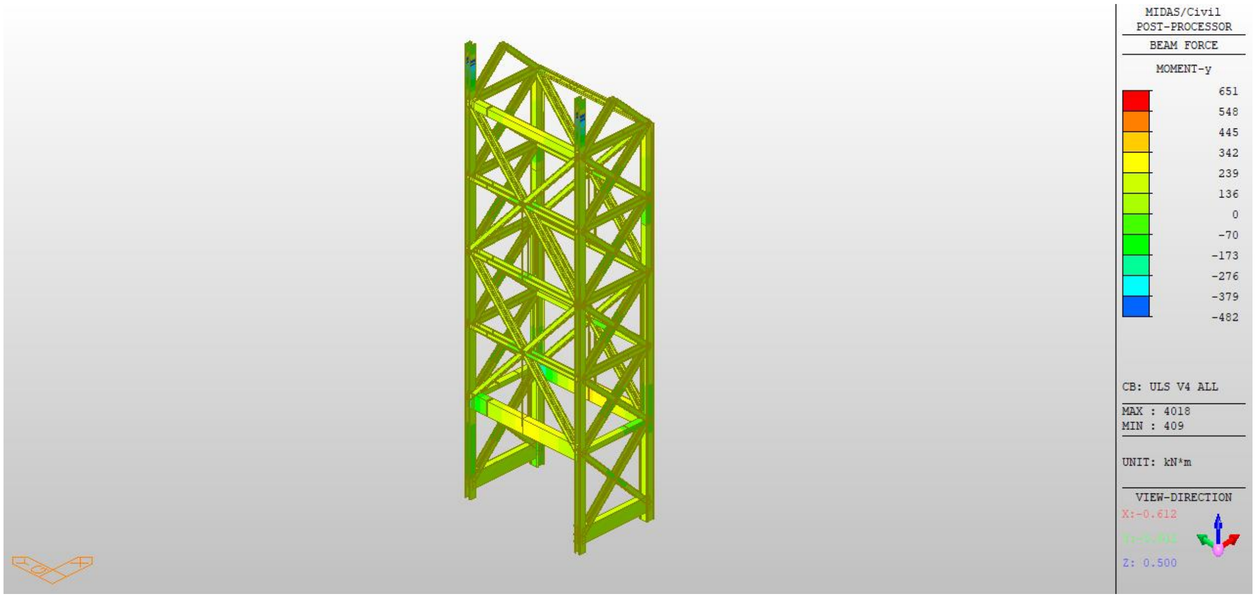

Figure 198 Case 8 ULS V4 MY

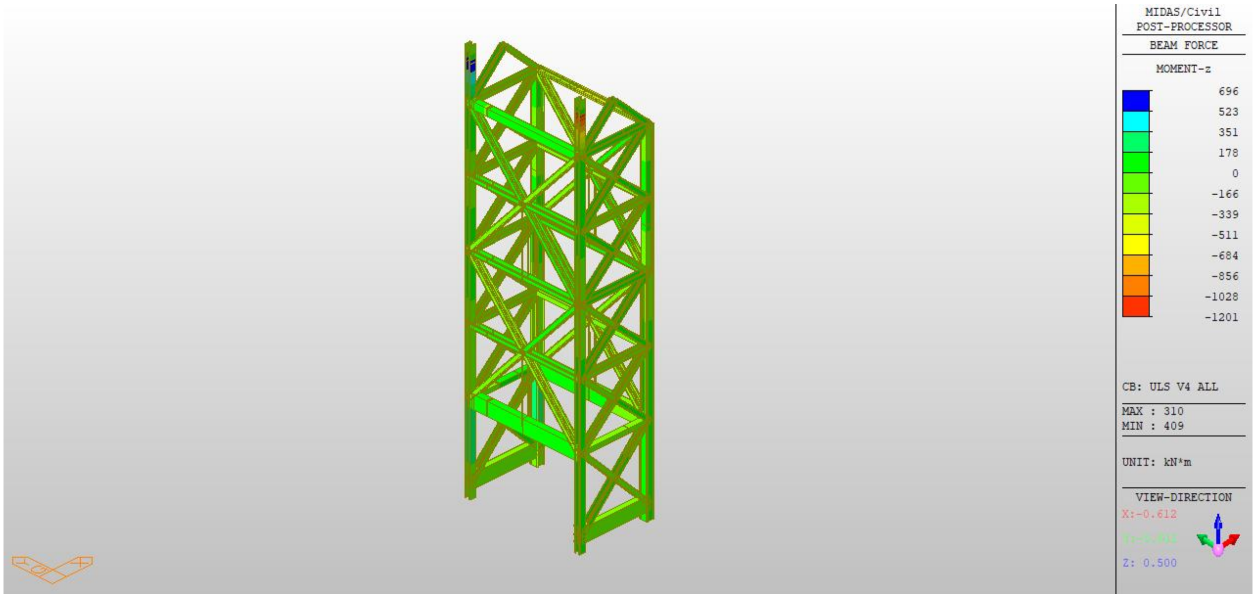

Figure 199 Case 8 ULS V4 MZ

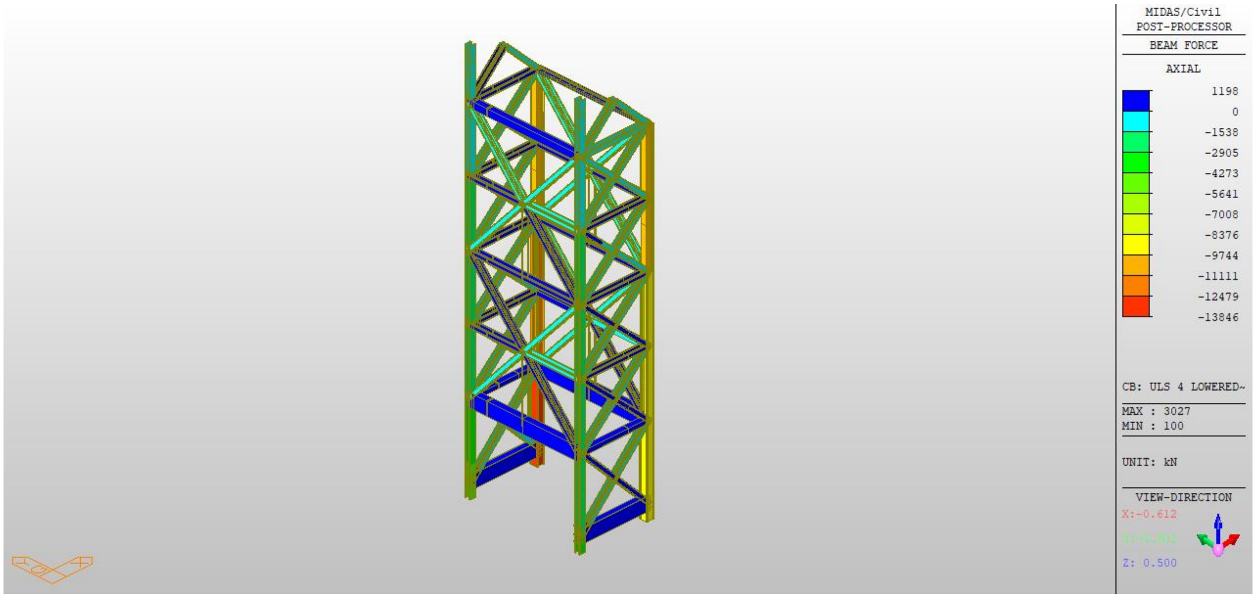

Figure 200 Case 8 ULS 4 Lowered Axial

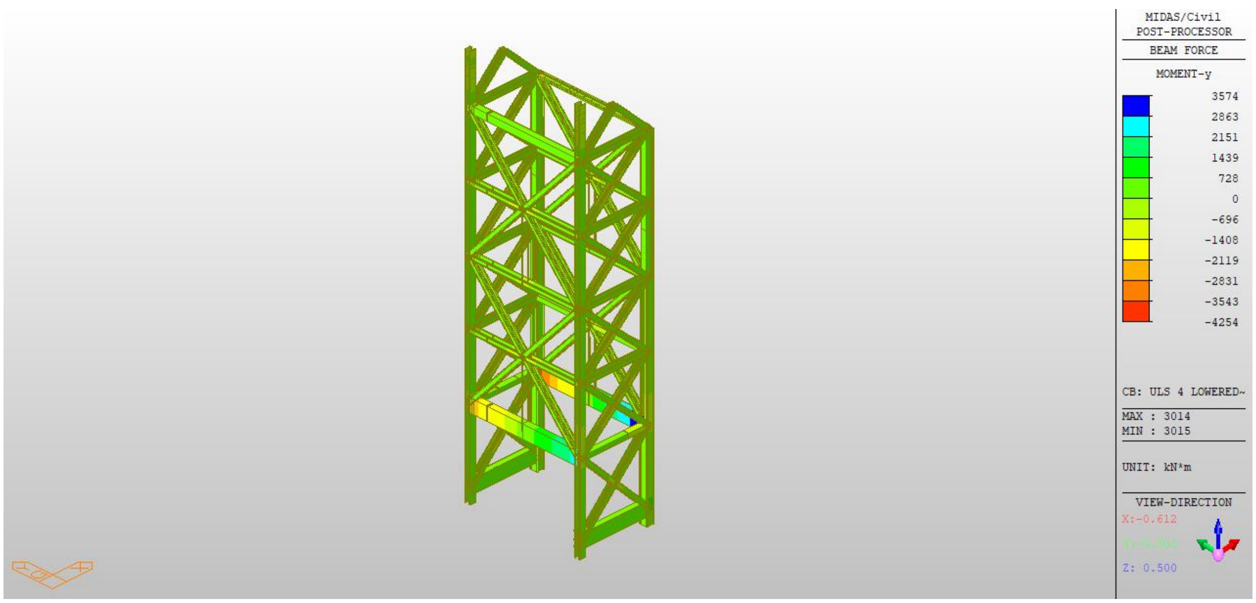

Figure 201 Case 8 ULS 4 Lowered MY

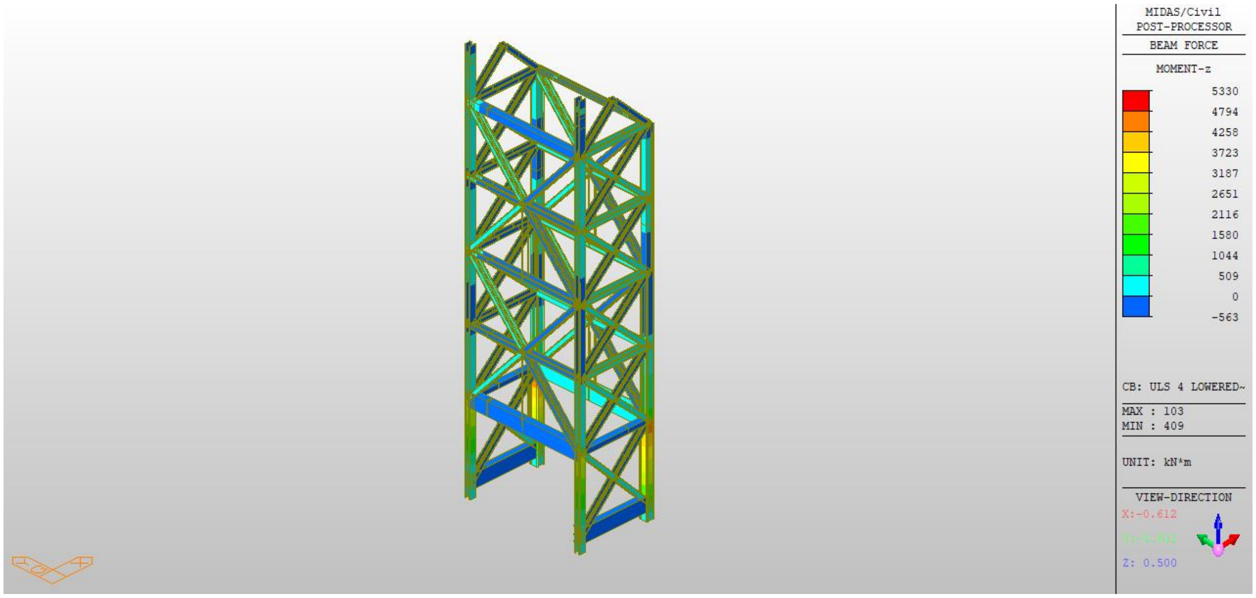

Figure 202 Case 8 ULS 4 Lowered MZ

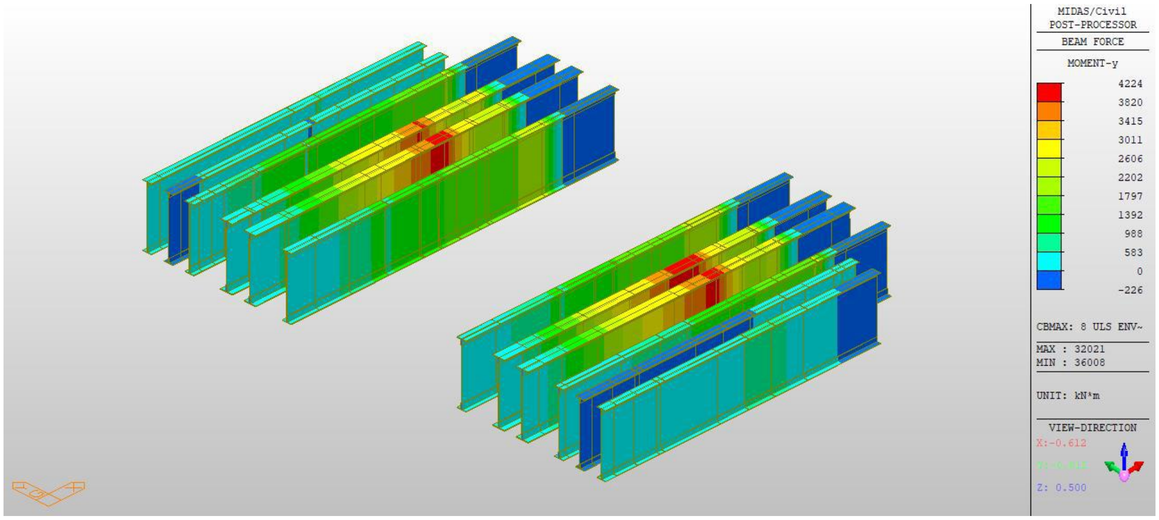

Figure 203 Girders G1 G2 G3 G4 G6 - Case 8 ULS M_y Max

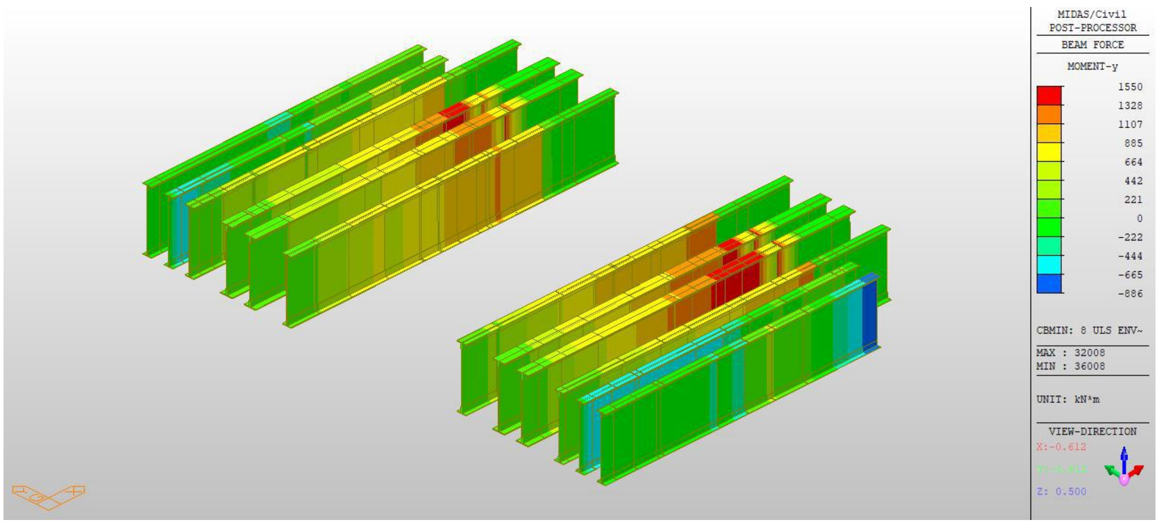

Figure 204 Girders G1 G2 G3 G4 G6 - Case 8 ULS M_y Min

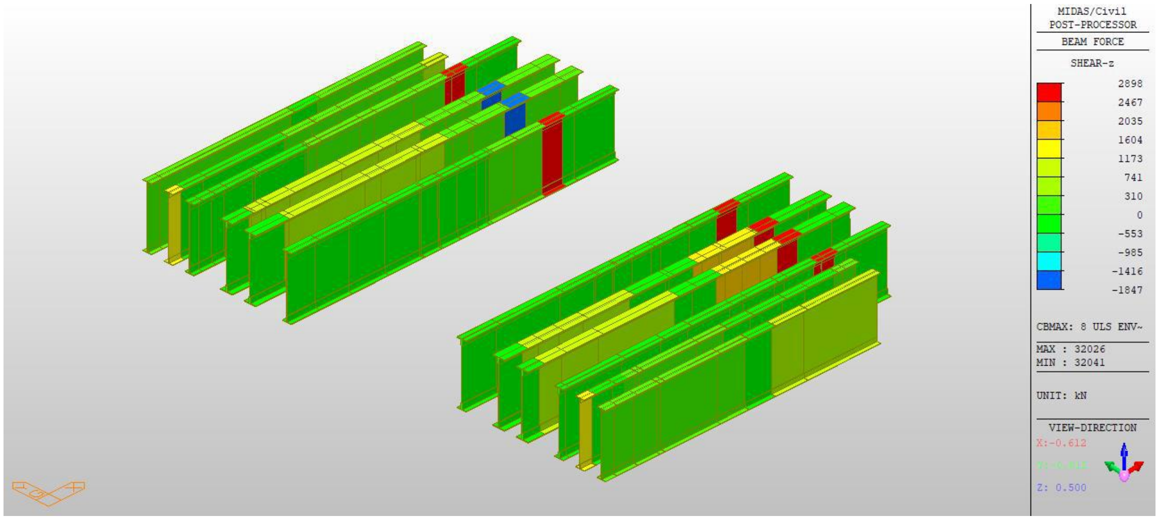

Figure 205 Girders G1 G2 G3 G4 G6 - Case 8 ULS F_z Max

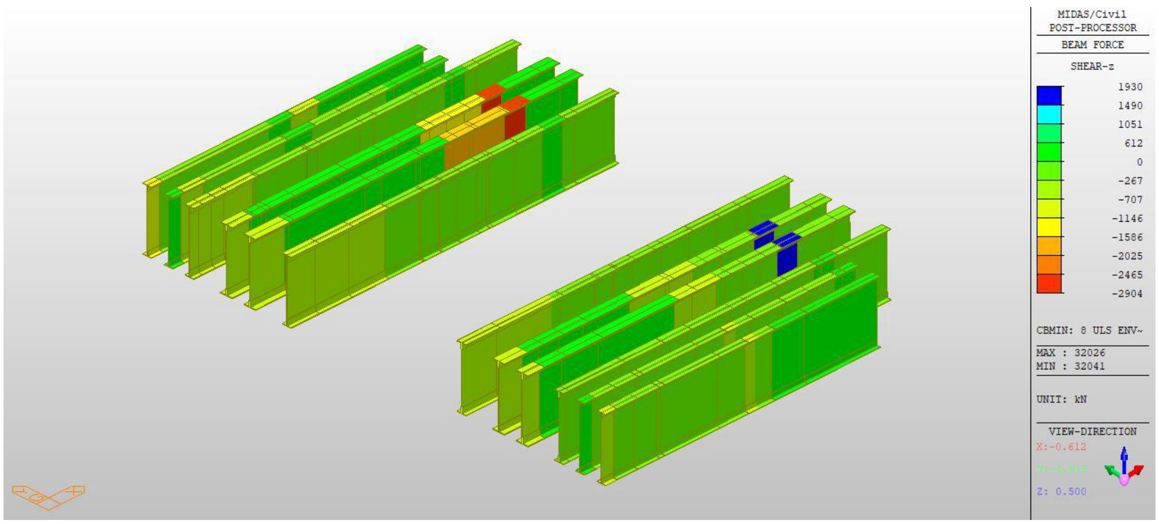

Figure 206 Girders G1 G2 G3 G4 G6 - Case 8 ULS F_z Min

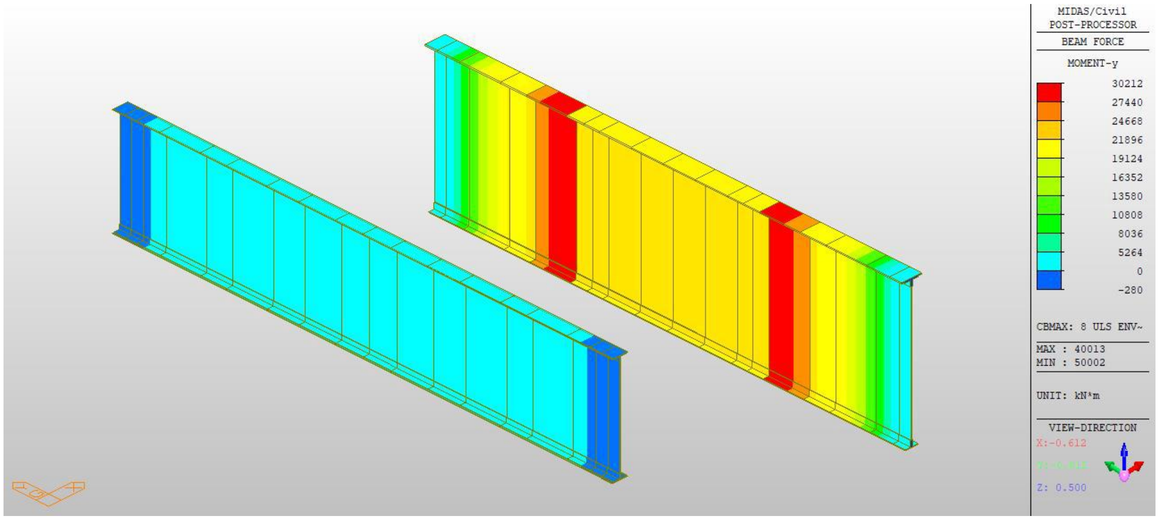

Figure 207 Girders G7 and G8 - Case 8 ULS M_y Max

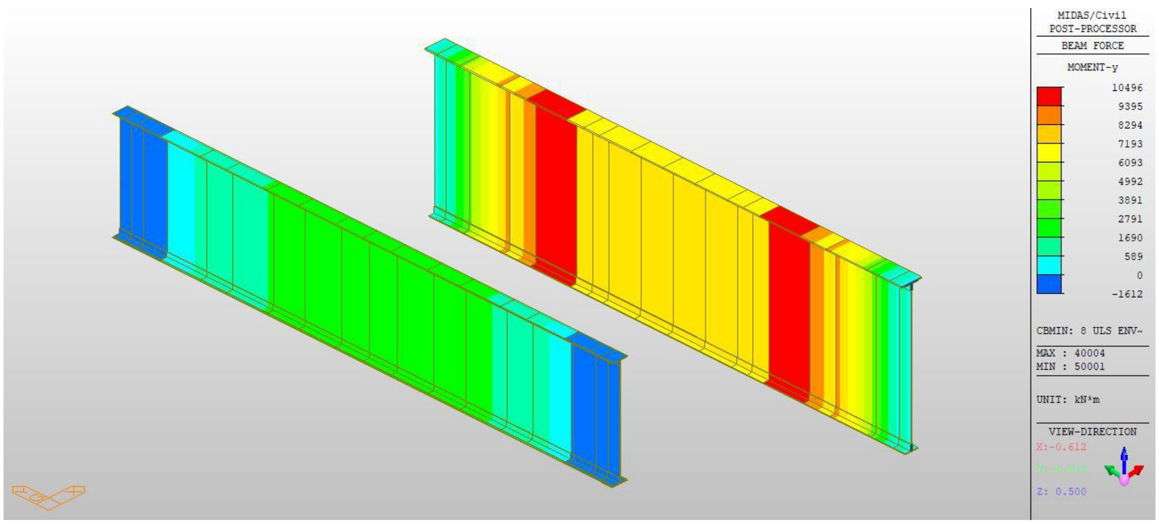

Figure 208 Girders G7 and G8 - Case 8 ULS M_y Min

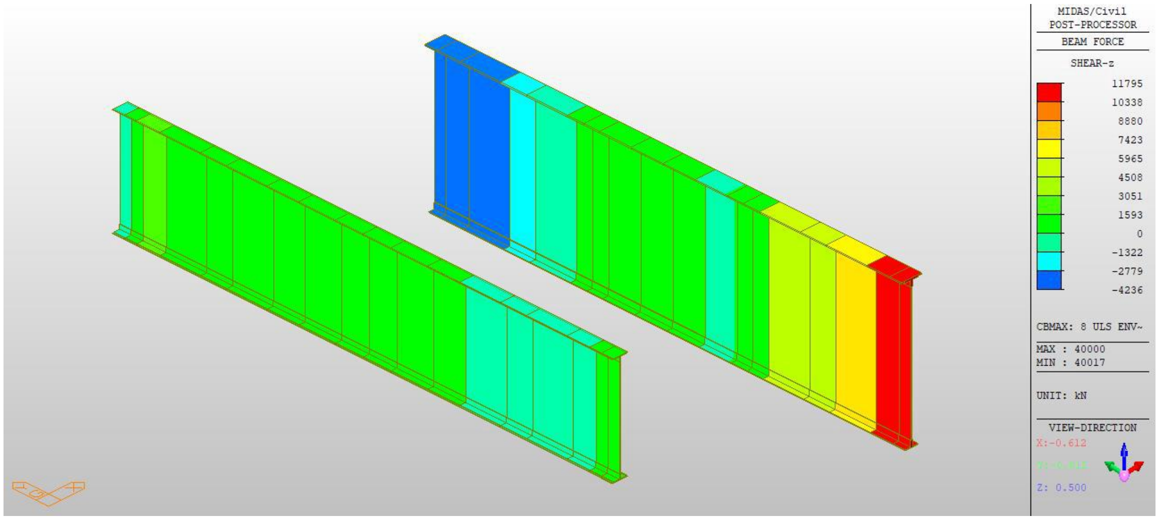

Figure 209 Girders G7 and G8 - Case 8 ULS F_z Max

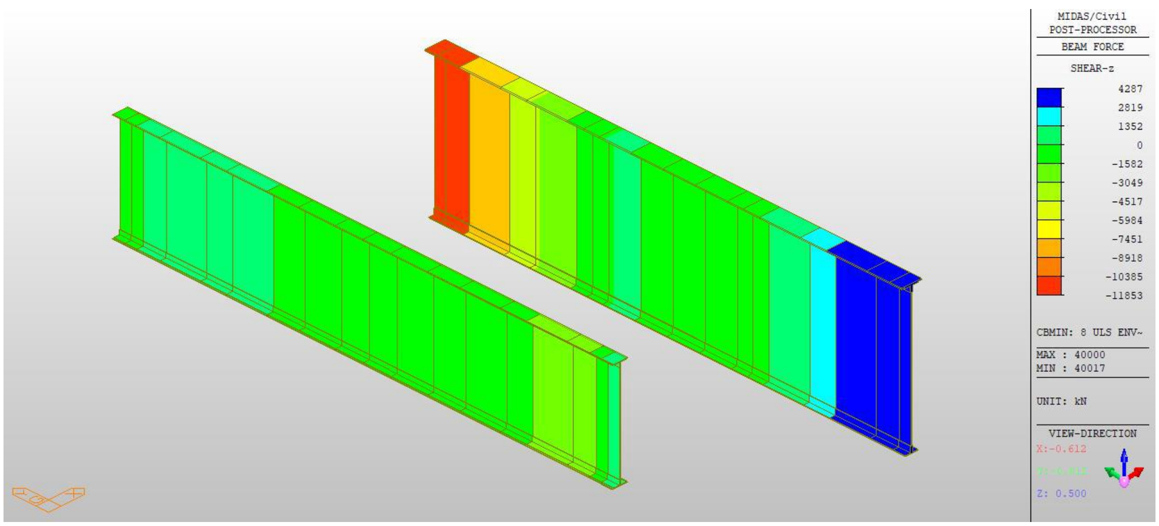

Figure 210 Girders G7 and G8 - Case 8 ULS F_z Min

AECOM Imagine it. Delivered.

Exhibit E.13

Approach Span and Tower Span Rehabilitation 3D Model

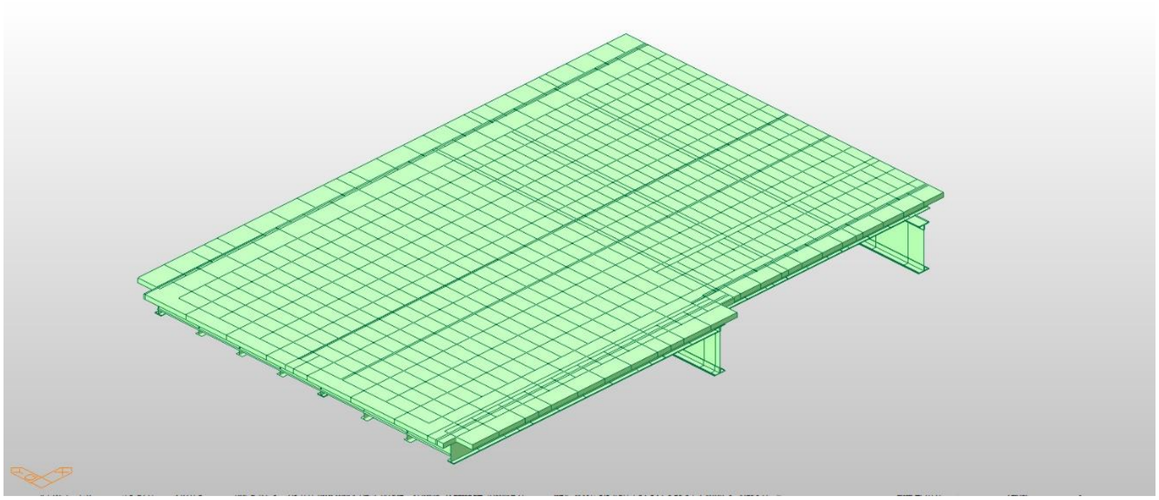

Figure 1 Approach and Tower spans at South Tower for 225mm Concrete and 90 mm Asphalt (Similar to North Tower)

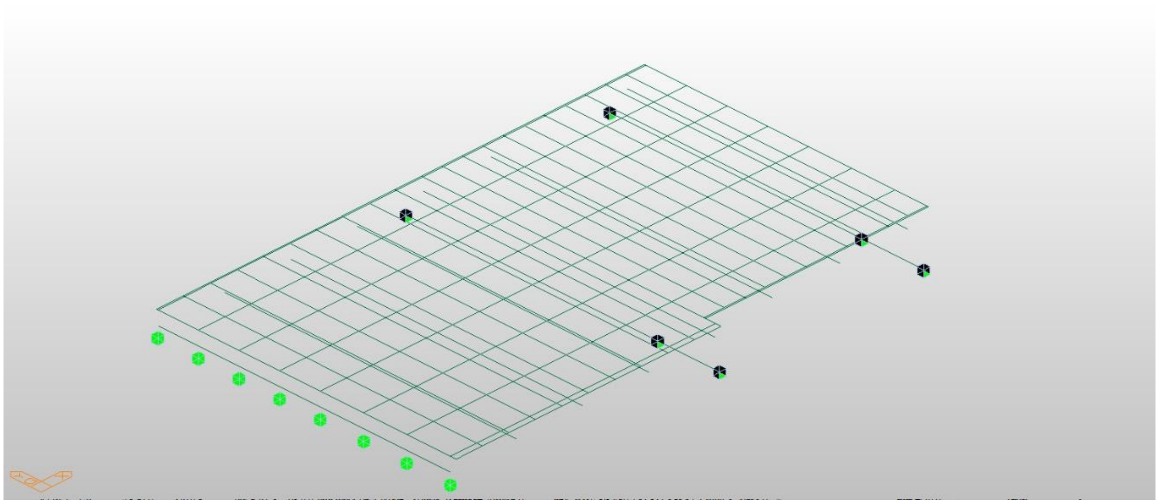

Figure 2 Approach and Tower support conditions for 225mm Concrete and 90mm Asphalt (Similar to North Tower)

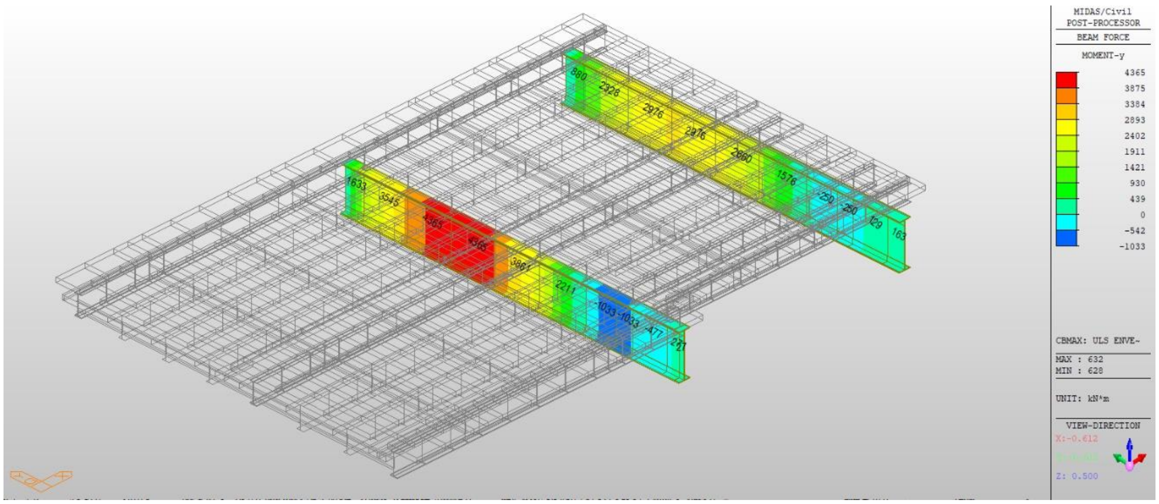

Figure 3 Maximum ULS Moment for Floor Beams

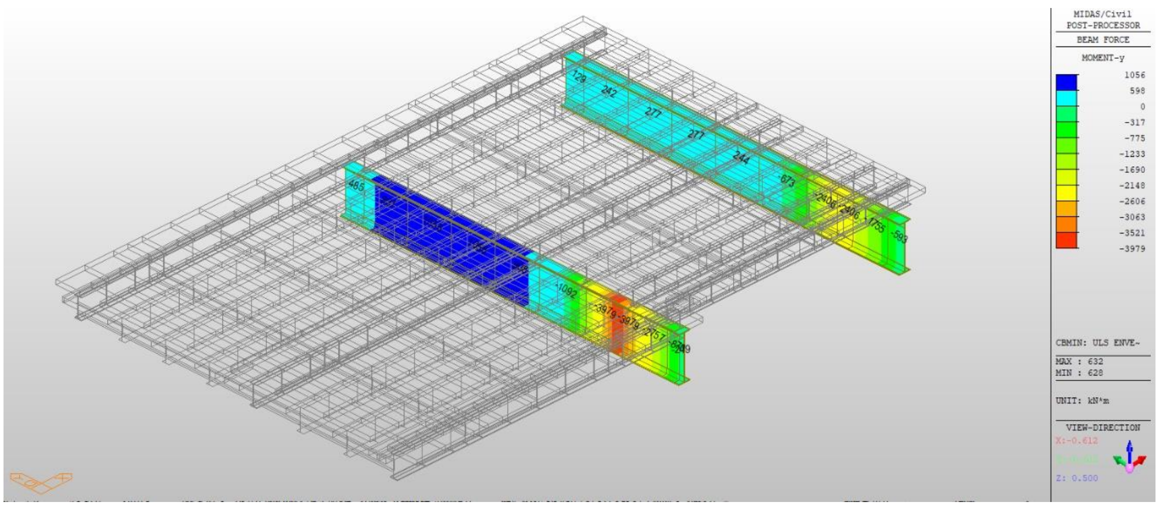

Figure 4 Minimum ULS Moment for Floor Beams

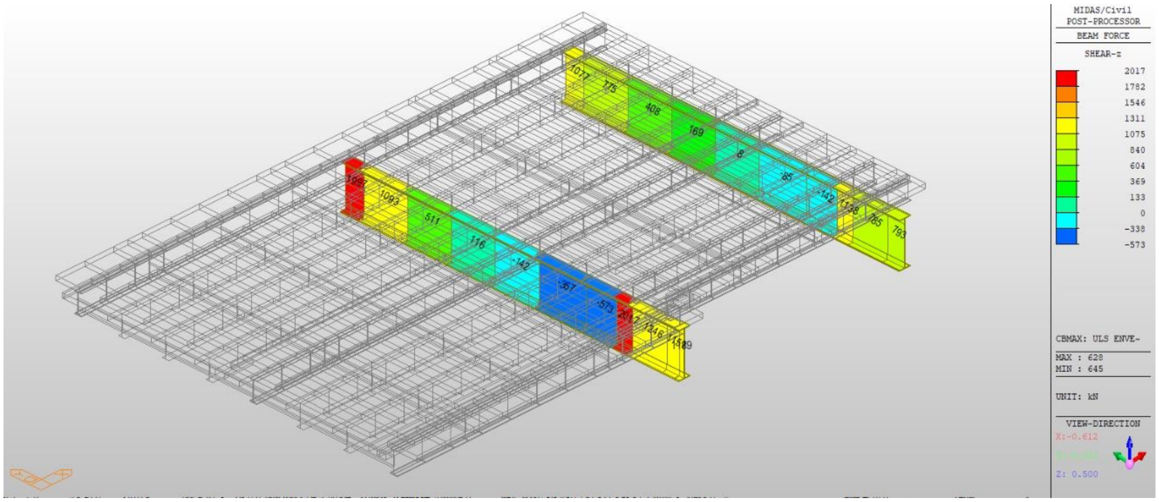

Figure 5 Maximum ULS Shear for Floor Beams

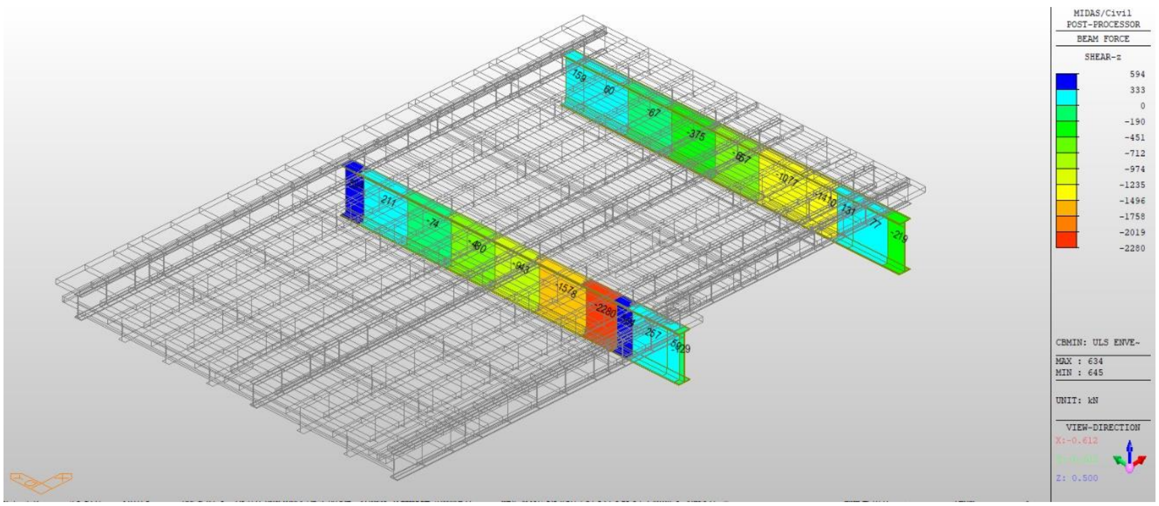

Figure 6 Minimum ULS Shear for Floor Beams

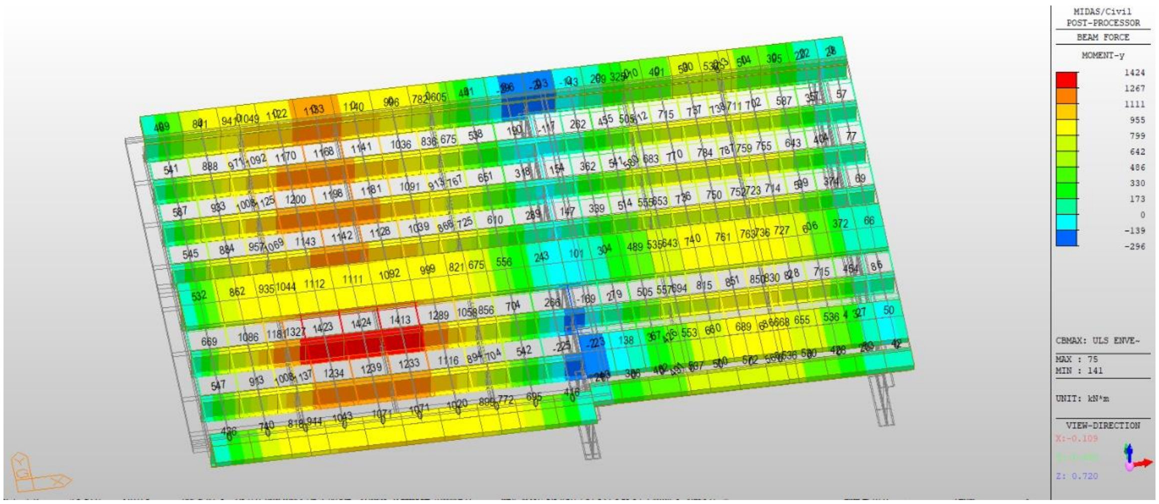

Figure 7 Maximum ULS Moment for Stringers

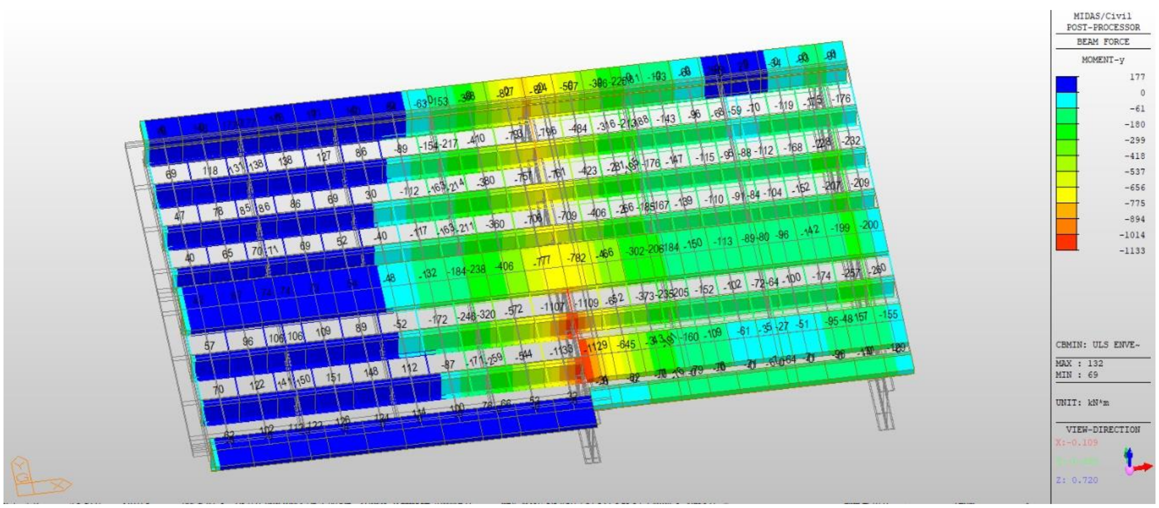

Figure 8 Minimum ULS Moment for Stringers

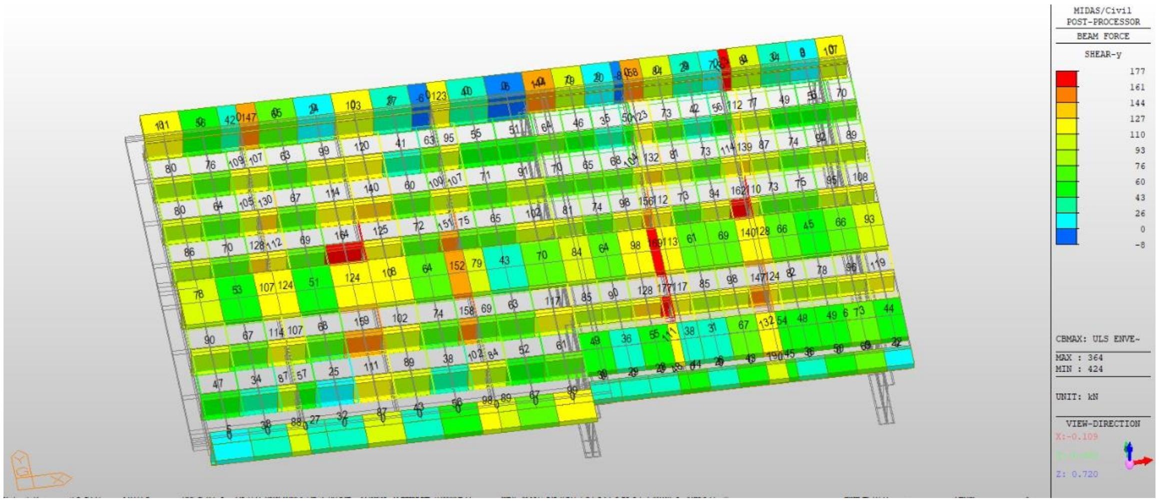

Figure 9 Maximum ULS Shear for Stringers

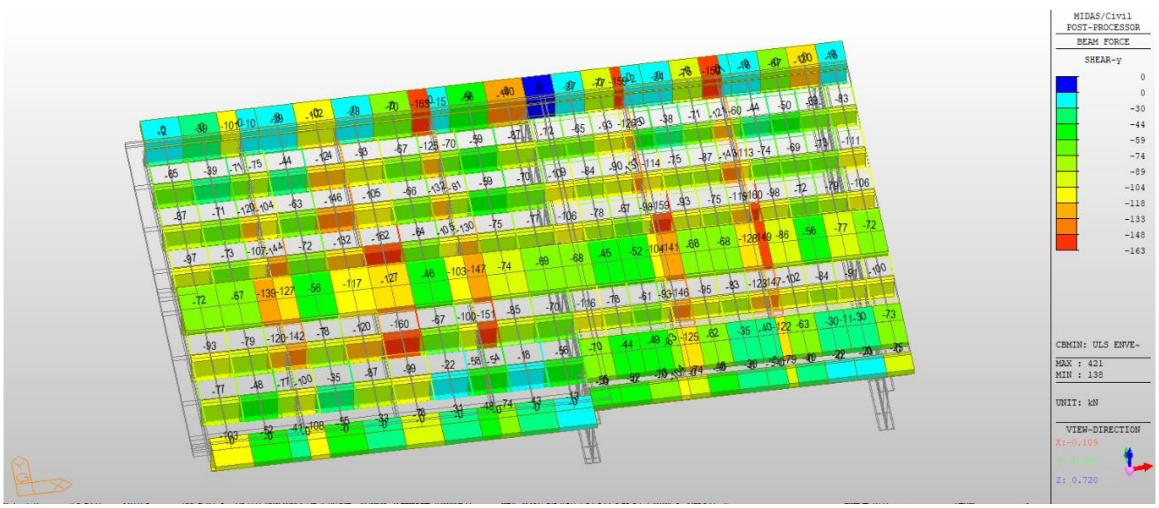

Figure 10 Minimum ULS Shear for Stringers

Exhibit E.14

225 mm Composite Slab Calculation

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JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

General Information

Material Specifications

Reinforced Concrete (Cast-in-Place Slab)

28-day Compressive Strength, f'_c	30	***[CSA S6-19 cl. 14.7.4.4 - unknown concrete strength]***
Cracking Stress, f_{cr}	2	***[CSA S6-19 cl. 8.4.1.8.1]***
Unit Density, $\gamma_{concrete}$ (kg/m^3)	2400	***[CSA S6-19 cl. 3.6, Table 3.4]***
Modulus of Elasticity, E_c	24870	
Unit Weight (kN/m^3)	24	
Yield Stress of Rebar, $f_{y\ rebar}$	400	
α_1	0.805	
β_1	0.895	
φ_c	0.75	

Steel (Girders) - Original Girders

Yield Stress, $F_{y\ girder}$	230	***[CISC 6-7, 11TH Edition, 2016]***
Ultimate Stress, $f_{u\ girder}$	410	***[CISC 6-7, 11TH Edition, 2016]***
Unit Density, γ_{steel} (kg/m3)	77000	
Modulus of Elasticity, E_s	200000	
Unit Weight (kN/m^3)	77	***[CSA S6-19 cl. 3.6, Table 3.4]***
φ_s	0.9	***[CSA S6-19 cl. 10.5.7]***

Composite Properties

$b_{v/w}$	n	$3n$
1000	8.04	24.1

Asphalt Wearing Surface

Unit Weight (kN/m^3)	23.5	***[CSA S6-19 cl. 3.6, Table 3.4]***

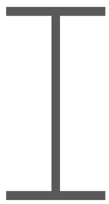
Concrete Overlay (Plain Concrete)

Unit Weight (kN/m^3)	23.5	***[CSA S6-19 cl. 3.6, Table 3.4]***

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Section Properties

Non-Composite, Bare Steel Girder



Girder at Rear Floor Beam Connection

	A	y	Ay	Ay^2	I_o
	mm^2	mm	mm^3	mm^4	mm^4
d	5,359	11	56,542	596,515	198,838
e	8,460	344	2.9E+06	1.0E+09	2.9E+08
f	5,359	677	3.6E+06	2.5E+09	2.0E+05
∑	**19,179**	**1,032**	**6.6E+06**	**3.5E+09**	**2.9E+08**

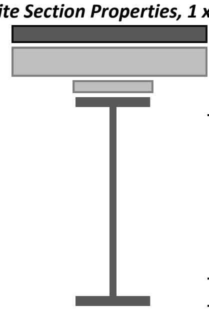
I_x (mm^4)	y_{top} (mm)	344	S_{top} (mm)	4.3E+06
1.5E+09	y_{bot}	344	S_{bot} (mm)	4.3E+06

a – reinforced concrete deck slab
b – top reinforcing steel bars
c – bottom steel reinforcing bars
d – girder top flanges
e – girder web
f – girder bottom flange

	Width	Thick.		Width	Thick.
Top	254 mm	21 mm	**Bottom**	254 mm	21 mm

	Height	Thick.
Web	646 mm	13 mm

Composite Section Properties, 1 x n



Girder at Rear Floor Beam Connection

	A	y	Ay	Ay^2	I_o
	mm^2	mm	mm^3	mm^4	mm^4
a	38,386	113	4,318,473	4.858E+08	1.62E+08
b	2,058	75	154,350	1.158E+07	0
c	1,372	175	240,100	4.202E+07	0
d	5,359	236	1,262,407	2.974E+08	198,838
e	8,460	569	4.8E+06	2.7E+09	2.9E+08
f	5,359	902	4.8E+06	4.4E+09	2.0E+05
∑	**60,995**	**2,070**	**1.6E+07**	**7.9E+09**	**4.6E+08**

I_x (mm^4)	y_{top} (mm)	256	$S_{n, top}$	1.7E+07
4.394E+09	y_{bot} (mm)	432	$S_{n, bot}$	1.0E+07

a – reinforced concrete deck slab
b – top reinforcing steel bars
c – bottom steel reinforcing bars
d – girder top flanges
e – girder web
f – girder bottom flange

	Width	Thick.		Width	Thick.
Top	254 mm	21 mm	**Bottom**	254 mm	21 mm

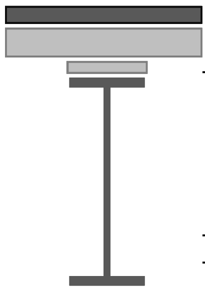
	Height	Thick.
Web	646 mm	13 mm

Modular Ratio, *n*	8.04
Slab Thickness	225 mm
Slab Width	1,372 mm
Slab Width / n	171 mm
Top Reinforcing Bars Area	300 mm²
Top Reinforcing Bars Spacing	200 mm
Top Reinforcing Bar Diameter	20 mm
Cover to Top Reinforcing Bars	65 mm
Top Transverse Bar Diameter	0 mm
Bottom Reinforcing Bars Area	200 mm²
Bottom Reinforcing Bars Spacing	200 mm
Bottom Reinforcing Bar Diameter	20 mm
Cover to Bottom Reinforcing Bars	40 mm
Bottom Transverse Bar Diameter	0 mm

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Composite Section Properties, 3 x n

Girder at Rear Floor Beam Connection



	A	y	Ay	Ay^2	I_o
	mm^2	mm	mm^3	mm^4	mm^4
a	12,795	113	1,439,491	1.619E+08	5.40E+07
b	2,058	75	154,350	1.158E+07	0
c	1,372	175	240,100	4.202E+07	0
d	5,359	236	1,262,407	2.974E+08	198,838
e	8,460	569	4.8E+06	2.7E+09	2.9E+08
f	5,359	902	4.8E+06	4.4E+09	2.0E+05
∑	**35,404**	**2,070**	**1.3E+07**	**7.6E+09**	**3.5E+08**

I_x (mm^4)				
3.376E+09	y_{top} (mm)	***360***	$S_{3n, top}$	***9.4E+06***
	y_{bot} (mm)	***328***	$S_{3n, bot}$	***1.0E+07***

a – reinforced concrete deck slab
b – top reinforcing steel bars
c – bottom steel reinforcing bars
d – girder top flanges
e – girder web
f – girder bottom flange

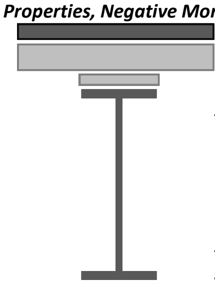
	Width	Thick.		Width	Thick.
Top	254 mm	21 mm	**Bottom**	254 mm	21 mm

	Height	Thick.
Web	646 mm	13 mm

Modular Ratio, 3*n*	24.13
Slab Thickness	225 mm
Slab Width	1,372 mm
Slab Width / 3n	57 mm
Top Reinforcing Bars Area	300 mm²
Top Reinforcing Bars Spacing	200 mm
Top Reinforcing Bar Diameter	20 mm
Cover to Top Reinforcing Bars	65 mm
Top Transverse Bar Diameter	0 mm
Bottom Reinforcing Bars Area	200 mm²
Bottom Reinforcing Bars Spacing	200 mm
Bottom Reinforcing Bar Diameter	20 mm
Cover to Bottom Reinforcing Bars	40 mm
Bottom Transverse Bar Diameter	0 mm

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

Section Properties, Negative Moment Region



Girder at Rear Floor Beam Connection

	A	y	Ay	Ay^2	I_o
	mm^2	mm	mm^3	mm^4	mm^4
b	2,058	75	154,350	1.158E+07	0
c	2,058	175	360,150	6.303E+07	0
d	5,359	236	1,262,407	2.974E+08	1.99E+05
e	8,460	569	4.8E+06	2.7E+09	2.9E+08
f	5,359	902	4.8E+06	4.4E+09	2.0E+05
∑	**23,295**	**1,957**	**1.1E+07**	**7.5E+09**	**2.9E+08**

I_x (mm^4)	***y(mm)***	***491***	***S_{top}***	***8.2E+06***
2.165E+09	***y_{gtop} (mm)***	***266***	***S_{bot}***	***5.1E+06***
	y_{bot} (mm)	***422***	***S_{bar}***	***5.9E+06***

a – reinforced concrete deck slab
b – top reinforcing steel bars
c – bottom steel reinforcing bars
d – girder top flanges
e – girder web
f – girder bottom flange

	Width	Thick.		Width	Thick.
Top	254 mm	21 mm	**Bottom**	254 mm	21 mm

	Height	Thick.
Web	646 mm	13 mm

Slab Thickness	225 mm
Slab Width	1,372 mm
Top Reinforcing Bars Area	300 mm²
Top Reinforcing Bars Spacing	200 mm
Top Reinforcing Bar Diameter	20 mm
Cover to Top Reinforcing Bars	65 mm
Top Transverse Bar Diameter	0 mm
Bottom Reinforcing Bars Area	300 mm²
Bottom Reinforcing Bars Spacing	200 mm
Bottom Reinforcing Bar Diameter	20 mm
Cover to Bottom Reinforcing Bars	40 mm
Bottom Transverse Bar Diameter	0 mm

JOB TITLE	BCLB DECK PRE-DESIGN		
JOB NO.	60637587	CALCULATION NO.	
DESIGNED BY		DATE	
ORIGINATOR BY	TK	DATE	30-Nov-20
CHECKED BY	KG	DATE	16-Dec-20

ULS Girder Resistance

Width to Thickness Ratios ***[CSA S6-19 cl. 10.9.2.1]***

Flange Class Limits

Max b/t for Class 1	9.56
Max b/t for Class 2	11.21
Max b/t for Class 3	13.19

Web Class Limits

Max h/w for Class 1	72.53
Max h/w for Class 2	112.09
Max h/w for Class 3	125.28

Negative Moment Resistance at ULS

Negative Moment Region @ Pier

Unsupported Length, m	3230	*Distance between diaphragms on tower span side (longer)*

Girder Type # 5

Bottom Flange Class

Half of Width of Flange, b	127
Thickness of Flange, t	21.1
Width-to-Thickness Ratio, b/t	6.0
Flange Class	1

Web Class

Web Height	645.8
Thickness of Web, w	13.1
Width-to-Thickness Ratio, $2d_c/w$	49.30
Web Class	1

Overall Section Class 1

Moment resistance is calculated as a class 1 section [10.11.5.3]. Girder is considered unbraced against lateral torsional buckling between floor beam and nearest line of intermediate diaphragm.

Lateral Torsional Buckling Resistance ***[CSA S6-19 cl. 10.10.2.3]***

Depth of Web, *clear h*	646 mm
Web Thickness, *w*	13 mm
Width of Top Flange, b_{top}	254 mm
Depth of Top Flange	21 mm
Width of Bottom Flange, b_{bot}	254 mm
Depth of Bottom Flange	21 mm
Depth of Web, *h'*	667 mm
Moment of Inertia, I_y	5.77E+07 mm4
Moment of Inertia, I_{yc}	2.88E+07 mm4
Torsion Constant, *J*	2.09E+06 mm4
Warping Constant, C_w	6.41E+12 mm6

Calculating B1 and B2 Terms

Calculating *B1* Term

Section Symmetry Type	Doubly-symmetric
Coefficient of Monosymmetry, β_x	**0.00**
B1 Term	**0.00**

Calculating *B2* Term

Shear Modulus, G_s	77,000 MPa
Modulus of Elasticity, E_s	200,000 MPa
B2 Term	**7.53**

Calculating Critical Elastic Moment, M_u

Maximum Moment in Unbr. Seg., M_{max}	1,140 kN·m	
Minimum Moment in Unbr. Seg., M_{min}	155 kN·m	
1 / 4 Pt. Moment in Unbr. Seg., M_a	401 kN·m	
1 / 2 Pt. Moment in Unbr. Seg., M_b	648 kN·m	
3 / 4 Pt. Moment in Unbr. Seg., M_c	894 kN·m	
Coefficient for Incr. Moment Res., ω_2	1.605	
Critical Elastic Moment, M_u	6,217 kN·m	

Composite Moment Resistance ***[CSA S6-19 cl. 10.10.2.3]***

Section Modulus, S_{bot}	5,123,825 mm3	
Yield Strength of Structural Steel, F_y	230 MPa	
0.67 x Moment M_p , based on F_y	790 kN·m	
Resisting Moment M_r , based on M_p	1,219 kN·m	

Factored Moment ULS Moment

Mf	1,140 kN·m	*2nd Girder from East at Location of Rear Floor Beam*
Utilization of Section	0.94	

Shear Resistance

Shear Resistance of Girder	855 kN	*Resistance calculated for existing girders in Tower Span Evaluation*
Maximum Factored Shear Force in Model	655 kN	*At location of front floor beam*
Utilization of Section	0.77	

Exhibit E.15

Mechanical Component Rehabilitation Calculation Summary

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Motor Sizing Calculation

Riveted Steel Deck

1830 tonnes

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1.0 GENERAL INFORMATION

1.1 CONSTANTS

$\mu_{stat\_roller} := 0.004$ Static coefficient of friction for roller bearing

Ref.: S6-14 Table 13.10

$\mu_{dyn\_roller} := 0.003$ Static coefficient of friction for roller bearing

$Acc_{time} := 10s$ Maximum time available to reach full lifting speed

Ref. S6-14 article 13.7.14.8.4

$Brake_{time} := 10s$ Maximum time available to stop the bridge from the maximum speed

$P_{wind} := 0.12kPa$ Wind pressure

Ref.: S6-14 article 13.7.14.7.4

$P_{ice} := 0.12kPa$ Ice load per unit area

$Start_{overload} := 1.25$

$Acc_{overload} := 1.5$ Ref.: S6-14 Table 13.14 Allowable torque overloads

$Cons_{overload} := 1$

$\eta_{bearings} := 0.98$

$\eta_{sheaves} := \eta_{bearings}{}^2 = 0.96$

Ref. S6-14
(article 13.7.19.4 & 13.7.19.6.1) and
Machinery Handbook

Components efficiencies

$\eta_{gears} := 0.96^2$

$\eta_{reducer} := 0.94$

1.2 GENERAL DATA

$W_{span} := 1830tonne$ Weigth of span

$W_{cwt} := W_{span}$ Weigth of counterweight (hypothesis)

$W_{sheave} := 50000lb$ Weight of sheave (hypothesis)

$W_{trunnion} := 7500lb$ Weight of trunnion (hypothesis)

$W_{gear} := 8 \cdot 540lb$ Weight of gear sets (per sheave) (hypothesis)

$W_{total} := W_{span} + W_{cwt} + 8 \cdot W_{sheave} + 8W_{trunnion} + 8W_{gear} = 8.563 \times 10^6 \cdot lb$ Weight to be lifted

$r_{rb} := 12in$ Radius of roller bearings

$r_s := \frac{180in}{2}$ Radius of sheave

$S_{speed} := 1\frac{ft}{s}$ Maximum lifting speed of span

$D_{rope} := 2.25in$ Diameter of main counterweight ropes

$IMB_{South} := 7450lbf$ Seated imbalance, north tower

$IMB_{North} := 6296lbf$ Seated imbalance, south tower

$L_{open} := 0ft$ Length of span (open deck - approximative)

$W_{open} := 0ft$ Width of span (open deck - approximative)

$L_{closed} := 370ft$ Length of span (close deck - approximative)

$W_{closed} := 60ft$ Width of span (close deck - approximative)

2.0 CALCULATION OF LOADS

2.1 FRICTION LOAD - ROLLER BEARINGS OF COUNTERWEIGHT SHEAVES

$$F_{friction\_stat} := \frac{W_{total} \cdot r_{rb} \cdot \mu_{stat\_roller} \cdot g}{r_s} = 20.316 \cdot kN$$

$$F_{friction\_dyn} := \frac{W_{total} \cdot r_{rb} \cdot \mu_{dyn\_roller} \cdot g}{r_s} = 15.237 \cdot kN$$

2.2 INERTIA

$$A_{acc} := \frac{S_{speed}}{Acc_{time}} = 0.1 \cdot \frac{ft}{s^2}$$

$$A_{brake} := \frac{S_{speed}}{Brake_{time}} = 0.1 \cdot \frac{ft}{s^2}$$

$$F_{acc} := 1.25 W_{total} \cdot A_{acc} = 147.993 \cdot kN$$

$$F_{braking} := 1.25 W_{total} \cdot A_{brake} = 147.993 \cdot kN$$

2.3 ROPE BENDING

$$F_{bend} := \frac{W_{total}}{2} \cdot 0.3 \frac{D_{rope}}{2 \cdot r_s} \cdot g = 71.423 \cdot kN$$

Ref. CSA S6-14 article 13.7.20.17

2.4 UNBALANCED CONDITIONS

$$F_{balance} := IMB_{North} + IMB_{South} = 61.145 \cdot kN$$

2.5 WIND LOADING

$$F_{wind} := \left(L_{open} \cdot W_{open} \cdot 0.85 + L_{closed} \cdot W_{closed}\right) \cdot P_{wind} = 247.494 \cdot kN$$

2.6 ICE LOADING (WORST CASE SCENARIO - BRIDGE IS NOT OPENED DURING WINTER)

$$F_{ice} := \left(L_{open} \cdot W_{open} \cdot 0.85 + L_{closed} \cdot W_{closed}\right) \cdot P_{ice} = 247.494 \cdot kN$$

3.0 LOAD CASES

Case 1: Starting Load

$$F_{starting\_lc1} := F_{friction\_stat} + F_{acc} + F_{bend} + F_{balance} + F_{wind} + F_{ice} = 795.864 \cdot kN$$

Case 2: Accelerating Load

$$F_{acc\_lc2} := F_{friction\_dyn} + F_{acc} + F_{bend} + F_{balance} + F_{wind} = 543.292 \cdot kN$$

Case 3: Constant Velocity

$$F_{cons\_lc3} := F_{friction\_dyn} + F_{bend} + F_{balance} + F_{wind} = 395.299 \cdot kN$$

Case 4: Braking Load

$$F_{braking\_lc4} := F_{friction\_dyn} + F_{braking} + F_{bend} + F_{balance} + F_{wind} = 543.292 \cdot kN$$

4.0 MOTOR SELECTION

4.1 GOVERNING FORCE FOR MOTOR SELECTION

$$F_{motor.lc1} := \frac{F_{starting\_lc1}}{Start_{overload}} = 636.692 \cdot kN$$

$$F_{motor.lc2} := \frac{F_{acc\_lc2}}{Acc_{overload}} = 362.194 \cdot kN$$

$$F_{motor.lc3} := \frac{F_{cons\_lc3}}{Cons_{overload}} = 395.299 \cdot kN$$

$$F_{motor.lc4} := \frac{F_{braking\_lc4}}{Acc_{overload}} = 362.194 \cdot kN$$

$$F_{motor} := \max\left(F_{motor.lc1}, F_{motor.lc2}, F_{motor.lc3}, F_{motor.lc4}\right) = 636.692 \cdot kN$$

4.2 MOTOR POWER REQUIRED (per tower)

$$\eta_{lift} := \eta_{sheaves} \cdot \eta_{gears} \cdot \eta_{reducer} = 0.832$$

Efficiency of system

$$Hp_{motor} := \frac{F_{motor} \cdot S_{speed}}{\eta_{lift} \cdot 2} = 156 \cdot hp$$

Required power of motor in worst case scenario (wind + ice load)

Current HP of motors is 150 HP.

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Motor Sizing Calculation

Half-Filled Deck (No overlay)

1891 tonnes

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4.2 MOTOR POWER REQUIRED 7

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1.0 GENERAL INFORMATION

1.1 CONSTANTS

$\mu_{stat\_roller} := 0.004$ — Static coefficient of friction for roller bearing

Ref.: S6-14 Table 13.10

$\mu_{dyn\_roller} := 0.003$ — Static coefficient of friction for roller bearing

$Acc_{time} := 10s$ — Maximum time available to reach full lifting speed

Ref. S6-14 article 13.7.14.8.4

$Brake_{time} := 10s$ — Maximum time available to stop the bridge from the maximum speed

$P_{wind} := 0.12kPa$ — Wind pressure

Ref.: S6-14 article 13.7.14.7.4

$P_{ice} := 0.12kPa$ — Ice load per unit area

$Start_{overload} := 1.25$

$Acc_{overload} := 1.5$ — Ref.: S6-14 Table 13.14 — Allowable torque overloads

$Cons_{overload} := 1$

$\eta_{bearings} := 0.98$

$\eta_{sheaves} := \eta_{bearings}^{2} = 0.96$

Ref. S6-14
(article 13.7.19.4 & 13.7.19.6.1) and
Machinery Handbook

Components efficiencies

$\eta_{gears} := 0.96^{2}$

$\eta_{reducer} := 0.94$

1.2 GENERAL DATA

$W_{span} := 1891tonne$ — Weigth of span

$W_{cwt} := W_{span}$ — Weigth of counterweight (hypothesis)

$W_{sheave} := 50000lb$ — Weight of sheave (hypothesis)

$W_{trunnion} := 7500lb$ — Weight of trunnion (hypothesis)

$W_{gear} := 8 \cdot 540lb$ — Weight of gear sets (per sheave) (hypothesis)

$W_{total} := W_{span} + W_{cwt} + 8 \cdot W_{sheave} + 8W_{trunnion} + 8W_{gear} = 8.832 \times 10^{6} \cdot lb$ — Weight to be lifted

$r_{rb} := 12in$ — Radius of roller bearings

$r_{s} := \dfrac{180in}{2}$ — Radius of sheave

$S_{speed} := 1\dfrac{ft}{s}$ — Maximum lifting speed of span

$D_{rope} := 2.25in$ — Diameter of main counterweight ropes

$IMB_{South} := 7450lbf$ Seated imbalance, north tower

$IMB_{North} := 6296lbf$ Seated imbalance, south tower

$L_{open} := 0ft$ Length of span (open deck - approximative)

$W_{open} := 0ft$ Width of span (open deck - approximative)

$L_{closed} := 370ft$ Length of span (close deck - approximative)

$W_{closed} := 60ft$ Width of span (close deck - approximative)

2.0 CALCULATION OF LOADS

2.1 FRICTION LOAD - ROLLER BEARINGS OF COUNTERWEIGHT SHEAVES

$$F_{friction\_stat} := \frac{W_{total} \cdot r_{rb} \cdot \mu_{stat\_roller} \cdot g}{r_s} = 20.954 \cdot kN$$

$$F_{friction\_dyn} := \frac{W_{total} \cdot r_{rb} \cdot \mu_{dyn\_roller} \cdot g}{r_s} = 15.715 \cdot kN$$

2.2 INERTIA

$$A_{acc} := \frac{S_{speed}}{Acc_{time}} = 0.1 \cdot \frac{ft}{s^2}$$

$$A_{brake} := \frac{S_{speed}}{Brake_{time}} = 0.1 \cdot \frac{ft}{s^2}$$

$$F_{acc} := 1.25 W_{total} \cdot A_{acc} = 152.641 \cdot kN$$

$$F_{braking} := 1.25 W_{total} \cdot A_{brake} = 152.641 \cdot kN$$

2.3 ROPE BENDING

$$F_{bend} := \frac{W_{total}}{2} \cdot 0.3 \frac{D_{rope}}{2 \cdot r_s} \cdot g = 73.666 \cdot kN$$

Ref. CSA S6-14 article 13.7.20.17

2.4 UNBALANCED CONDITIONS

$$F_{balance} := IMB_{North} + IMB_{South} = 61.145 \cdot kN$$

2.5 WIND LOADING

$$F_{wind} := \left(L_{open} \cdot W_{open} \cdot 0.85 + L_{closed} \cdot W_{closed}\right) \cdot P_{wind} = 247.494 \cdot kN$$

2.6 ICE LOADING (WORST CASE SCENARIO - BRIDGE IS NOT OPENED DURING WINTER)

$$F_{ice} := \left(L_{open} \cdot W_{open} \cdot 0.85 + L_{closed} \cdot W_{closed}\right) \cdot P_{ice} = 247.494 \cdot kN$$

3.0 LOAD CASES

Case 1: Starting Load

$$F_{starting\_lc1} := F_{friction\_stat} + F_{acc} + F_{bend} + F_{balance} + F_{wind} + F_{ice} = 803.394 \cdot kN$$

Case 2: Accelerating Load

$$F_{acc\_lc2} := F_{friction\_dyn} + F_{acc} + F_{bend} + F_{balance} + F_{wind} = 550.662 \cdot kN$$

Case 3: Constant Velocity

$$F_{cons\_lc3} := F_{friction\_dyn} + F_{bend} + F_{balance} + F_{wind} = 398.021 \cdot kN$$

Case 4: Braking Load

$$F_{braking\_lc4} := F_{friction\_dyn} + F_{braking} + F_{bend} + F_{balance} + F_{wind} = 550.662 \cdot kN$$

4.0 MOTOR SELECTION

4.1 GOVERNING FORCE FOR MOTOR SELECTION

$$F_{motor.lc1} := \frac{F_{starting\_lc1}}{Start_{overload}} = 642.715 \cdot kN$$

$$F_{motor.lc2} := \frac{F_{acc\_lc2}}{Acc_{overload}} = 367.108 \cdot kN$$

$$F_{motor.lc3} := \frac{F_{cons\_lc3}}{Cons_{overload}} = 398.021 \cdot kN$$

$$F_{motor.lc4} := \frac{F_{braking\_lc4}}{Acc_{overload}} = 367.108 \cdot kN$$

$$F_{motor} := \max\left(F_{motor.lc1}, F_{motor.lc2}, F_{motor.lc3}, F_{motor.lc4}\right) = 642.715 \cdot kN$$

4.2 MOTOR POWER REQUIRED (per tower)

$$\eta_{lift} := \eta_{sheaves} \cdot \eta_{gears} \cdot \eta_{reducer} = 0.832$$

Efficiency of system

$$Hp_{motor} := \frac{F_{motor} \cdot S_{speed}}{\eta_{lift} \cdot 2} = 158 \cdot hp$$

Required power of motor in worst case scenario (wind + ice load)

Current HP of motors is 150 HP.

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Main Counterweight Rope Capacity Calculations

Riveted Steel Deck

1830 tonnes

1.0 GENERAL INFORMATION

1.1 GENERAL DATA

$W_{span} := 1830tonne$ — Weigth of span and deck

$D := 177.75in$ — Tread diameter of sheave rope grooves

$d := 2.25in$ — Diameter of main counterweight ropes

$d_w := \frac{d}{16} = 0.141 \cdot in$ Ref.: AASHTO Article 6.8.3.3.4 — Diameter of the outer wires in the wire rope

$E_w := 30 \times 10^6 psi$ — Tensile modulus of elasticity of the steel wire

$A_{rope} := 0.4 \cdot d^2 = 2.025\ in^2$ Ref.: S6-14 Table 13.20 — Effective cross sectional are of the ropes (approx.)

$N_{rope} := 80$ — Number of ropes

1.2 ALLOWABLE STRESSES

Ref.: AASHTO Article 6.6.5 & CHBDC article 13.7.20.18

$P_{ult} := 420000lbf$ — Minimum ultimate tensile strength of rope (ref. BLB 2002 Main CW Wire Rope Replacement)

$\sigma_{ult} := \frac{P_{ult}}{A_{rope}} = 1430 \cdot MPa$ — Allowable tensile load

$\sigma_{allowable} := 0.222 \cdot \sigma_{ult} = 317 \cdot MPa$ — Maximum allowable tensile stress (for combined effect of bending and direct load)

2.0 STRESSES CALCULATIONS

Ref.: AASHTO Article 6.8.3.3.4 & CHBDC article 13.7.20.18

$\sigma_b := E_w \cdot \frac{d_w}{D} = 163.641 \cdot MPa$ — Maximum bending stress

$P := \frac{W_{span} \cdot g}{80} = 224.327 \cdot kN$ — Direct load (per rope)

$P_{ol} := \frac{636.297\ kN}{80} = 8.734 \cdot kN$ — Operating loads (per rope) (value from motor sizing calculation)

$\sigma_r := \frac{P}{A_{rope}} + \sigma_b + \frac{P_{ol}}{A_{rope}} = 342.034 \cdot MPa$ — Maximum total stress (per rope)

$SF := \frac{\sigma_r}{\sigma_{allowable}} \cdot 100\% = 107.739 \cdot \%$ — Value of over stress

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Main Counterweight Rope Capacity Calculations

Half-Filled (No overlay)

1891 tonnes

1.0 GENERAL INFORMATION

1.1 GENERAL DATA

$W_{span} := 1891 tonne$ — Weigth of span and deck

$D := 177.75 in$ — Tread diameter of sheave rope grooves

$d := 2.25 in$ — Diameter of main counterweight ropes

$d_w := \frac{d}{16} = 0.141 \cdot in$ Ref.: AASHTO Article 6.8.3.3.4 — Diameter of the outer wires in the wire rope

$E_w := 30 \times 10^6 psi$ — Tensile modulus of elasticity of the steel wire

$A_{rope} := 0.4 \cdot d^2 = 2.025 \cdot in^2$ Ref.: S6-14 Table 13.20 — Effective cross sectional are of the ropes (approx.)

$N_{rope} := 80$ — Number of ropes

1.2 ALLOWABLE STRESSES

Ref.: AASHTO Article 6.6.5 & CHBDC article 13.7.20.18

$P_{ult} := 420000 lbf$ — Minimum ultimate tensile strength of rope (ref. BLB 2002 Main CW Wire Rope Replacement)

$\sigma_{ult} := \frac{P_{ult}}{A_{rope}} = 1430 \cdot MPa$ — Allowable tensile load

$\sigma_{allowable} := 0.222 \cdot \sigma_{ult} = 317 \cdot MPa$ — Maximum allowable tensile stress (for combined effect of bending and direct load)

2.0 STRESSES CALCULATIONS

Ref.: AASHTO Article 6.8.3.3.4 & CHBDC article 13.7.20.18

$\sigma_b := E_w \cdot \frac{d_w}{D} = 163.641 \cdot MPa$ — Maximum bending stress

$P := \frac{W_{span} \cdot g}{80} = 231.805 \cdot kN$ — Direct load (per rope)

$P_{ol} := \frac{645.48\ kN}{80} = 8.734 \cdot kN$ — Operating loads (per rope) (value from motor sizing calculation)

$\sigma_r := \frac{P}{A_{rope}} + \sigma_b + \frac{P_{ol}}{A_{rope}} = 347.758 \cdot MPa$ — Maximum total stress (per rope)

$SF := \frac{\sigma_r}{\sigma_{allowable}} \cdot 100\% = 109.542 \cdot \%$ — Value of over stress

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Trunnion Shaft Bearing Capacity

Rivetted Steel Deck

1830 tonnes

1.0 GENERAL INFORMATION

1.1 GENERAL DATA

$D_b := 21.625\text{in}$ — Diameter of Shaft at Section B (bore diameter)

$r_s := \dfrac{180\text{in}}{2} = 90\cdot\text{in}$ — Radius of sheave

$S_{speed} := 1\dfrac{\text{ft}}{\text{s}}$ — Maximum lifting speed of span

$rpm_{bearing} := \dfrac{S_{speed}\cdot 60\text{s}}{2\pi\cdot r_s} = 1.273$ — Rotation speed of trunnion bearing (approximative)

Assume a large rolling element bearing, as per AASHTO C6.7.7.2.4

C6.7.7.2.4

Large rolling element bearings generally have a bore larger than 4 in., and a rotational speed less than 5 rpm.

It is necessary to work closely with bearing manufacturers on the large rolling element bearings. The specific operating parameters may necessitate special lubricating or other requirements, especially in applications such as a bascule trunnion bearing whose inner race operates at less than one quarter revolution each cycle.

$Span_w := 1830\text{tonne}$ — Weight of span and new deck

$Cwt := Span_w$ — Weight of Counterweights (hypothesis)

$W := \dfrac{(Span_w + Cwt)}{16} = 229\cdot\text{tonne}$ — Weight on Trunnion Shaft

1.2 ALLOWABLE STRESSES

Ref.: AASHTO article 6.7.7.2.4

$C_{or} := 4586124\text{lb}$ — Basic static radial load rating of the bearing (hypothesis)

$n_s := 5$ — Design factor

$P_{cor} := \dfrac{C_{or}}{5} = 917225\cdot\text{lb}$ — Factor radial design resistance

$X_o := 1$ — Static axial load factor (hypothesis)

$Y_o := 2$ — Static radial load factor (hypothesis)

$F_{oxy} := X_o \cdot W + 0.15 \cdot Y_o \cdot W = 655600 \cdot lb$

$\text{Verification} := \text{if}\left(F_{oxy} \le P_{cor}, \text{"OK"}, \text{"NOT ACCEPTABLE"}\right) = \text{"OK"}$

Calculations

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Trunnion Shaft Bearing Capacity

Half-filled Deck

1891 tonnes

1.0 GENERAL INFORMATION

1.1 GENERAL DATA

$D_b := 21.625in$ — Diameter of Shaft at Section B (bore diameter)

$r_s := \frac{180in}{2} = 90 \cdot in$ — Radius of sheave

$S_{speed} := 1\frac{ft}{s}$ — Maximum lifting speed of span

$rpm_{bearing} := \frac{S_{speed} \cdot 60s}{2\pi \cdot r_s} = 1.273$ — Rotation speed of trunnion bearing (approximative)

Assume a large rolling element bearing, as per AASHTO C6.7.7.2.4

C6.7.7.2.4

Large rolling element bearings generally have a bore larger than 4 in., and a rotational speed less than 5 rpm.

It is necessary to work closely with bearing manufacturers on the large rolling element bearings. The specific operating parameters may necessitate special lubricating or other requirements, especially in applications such as a bascule trunnion bearing whose inner race operates at less than one quarter revolution each cycle.

$Span_w := 1891tonne$ — Weight of span and new deck

$Cwt := Span_w$ — Weight of Counterweights (hypothesis)

$W := \frac{(Span_w + Cwt)}{16} = 236 \cdot tonne$ — Weight on Trunnion Shaft

1.2 ALLOWABLE STRESSES

Ref.: AASHTO article 6.7.7.2.4

$C_{or} := 4586124lb$ — Basic static radial load rating of the bearing (hypothesis)

$n_s := 5$ — Design factor

$P_{cor} := \frac{C_{or}}{5} = 917225 \cdot lb$ — Factor radial design resistance

$X_o := 1$ — Static axial load factor (hypothesis)

$Y_o := 2$ — Static radial load factor (hypothesis)

$$F_{oxy} := X_o \cdot W + 0.15 \cdot Y_o \cdot W = 677453 \cdot lb$$

$$\text{Verification} := \text{if}\left(F_{oxy} \le P_{cor}, \text{"OK"}, \text{"NOT ACCEPTABLE"}\right) = \text{"OK"}$$

Calculations

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Fatigue Check of Trunnion Shaft

Riveted Steel Deck

1830 tonnes

Critical Sections:

A - Maximum bending moment, torsional moment, and stress concentration of keyway

B - Bending moment, torsional moment, and stress concentrations of fillet

Shaft Dimensions and other Variables

Enter information in Yellow boxes:

Results are in Blue boxes

Sections AB & B Diameters — Section AB is middle of turnnion shaft Section B is at fillet

$D_{ab} := 24\text{in}$ — Diameter of Shaft at Section AB

$D_b := 22.084\text{in}$ — Diameter of Shaft at Section B

$r_f := .625$ — Fillet Radius in inches, but do not use dimension

$\text{Span}_w := 1830\text{kip}$ — Weight of Span

$\text{Cwt} := \text{Span}_w$ — Weight of Counterweights (hypothesis)

$W_l := \frac{(\text{Span}_w + \text{Cwt})}{8} = 458 \cdot \text{kip}$ — Weight on Trunnion Shaft

$\sigma ut := 75\text{ksi}$ — Ultimate Tensile Strength of Shaft Material (ASTM A235 Class E)

$\sigma y := 37.500\text{ksi}$ — Yield Strenght for material

Distance from bearings to area of concern:

$l_s := 13\text{in} + 13\text{in} + 27.5\text{in} = 53.5 \cdot \text{in}$ — Length of Shaft Between Bearing Centers

$l_a := \frac{l_s}{2}$ — Distance to Center of Shaft from center of Bearing

$l_b := 13\text{in}$ — Distance from Center of Bearing to fillet

$c_{fr} := .004$ — Coefficient of friction for Bronze on Steel (Greased)

Torque on Shaft Due to Friction

$T_{fr} := W_l \cdot D_b \cdot c_{fr}$ $\qquad T_{fr} = 280.993\, J \cdot 16.250$

Find Endurance Limit:

σe = α σut * (Cd*Cs*Ck*Ct*Cm)

$\alpha := .5$

From CSA Section 13.7.3.5.4 Endurance Limit

$Cr := 0.814$

$Cm := 1$

$Cs := 1.459 \qquad 4.51 \cdot (75)^{-0.265} = 1.436$

$Ct := 1$

Size Factor; Cd = $(D/7.6)^{-0.113}$

$$Cd_{ab} := \left[\left(\frac{D_{ab}}{7.6mm}\right)^{-.113}\right] \qquad Cd_{ab} = 0.609$$

$$Cd_b := \left[\left(\frac{D_b}{7.6mm}\right)^{-.113}\right] \qquad Cd_b = 0.615$$

$$\sigma e_a := \alpha \cdot \sigma ut \cdot \left(Cd_{ab} \cdot Cr \cdot Ct \cdot Cs \cdot Cm\right) \qquad \sigma e_a = 27.135 \cdot ksi$$

$$\sigma e_b := \alpha \cdot \sigma ut \cdot \left(Cd_b \cdot Cr \cdot Ct \cdot Cs \cdot Cm\right) \qquad \sigma e_b = 27.392 \cdot ksi$$

Find - Bending Moments at each Section:

Section A -

Bending moment due to weight on Shaft

$M_a := W_l \cdot l_a$ $\qquad M_a = 1.02 \times 10^3 \cdot ft \cdot kip$

Section B -

Bending moment due to weight on Shaft

$M_b := W_l \cdot l_b$ $\qquad M_b = 495.625 \cdot ft \cdot kip$

Find Stress Concentration Factors:

$\nu := .049$

$$q := \frac{1}{\left[1 + \left(\frac{\nu}{r_f^{.5}}\right)\right]} \qquad q = 0.942$$

$Kt_a := 1$

For Sled-run keyway; Use 1 if no Keyway

$Kf_a := 1 + q \cdot (Kt_a - 1) \qquad Kf_a = 1$

$K\tau_a := 1$

For Sled-run keyway; Use 1 if no Keyway

$Kf\tau_a := 1 + q \cdot (K\tau_a - 1) \qquad Kf\tau_a = 1$

2.22

$Kt_b := 2.02$

$Kf_b := 1 + q \cdot (Kt_b - 1) \qquad Kf_b = 1.96$

From AASHTO Section 6.7.3.2

$K\tau_b := 1.61$

1.61

$Kf\tau_b := 1 + q \cdot (K\tau_b - 1) \qquad Kf\tau_b = 1.574$

Find Stress Concentration Factors (v.2):

$r_{f.} := .625$ Fillet Radius

From Peterson's Stress Concentration Factors, 2nd Ed. 1997, Chapter 3: Shoulder fillet in bar of circular cross section

$t := \dfrac{D_{ab} - 22.084in}{2in} = 0.958$ Fillet Height

$D := 24$ $\qquad \dfrac{t}{r_f} = 1.533$

Bending Factor

$$C1b := 0.947 + 1.206\sqrt{\frac{t}{r_f}} - 0.131\cdot\frac{t}{r_f} = 2.239$$

$$C2b := 0.022 - 3.405\sqrt{\frac{t}{r_f}} + 0.915\cdot\frac{t}{r_f} = -2.791$$

$$C3b := 0.869 + 1.777\sqrt{\frac{t}{r_f}} - 0.555\cdot\frac{t}{r_f} = 2.218$$

$$C4b := -0.810 + 0.422\sqrt{\frac{t}{r_f}} - 0.260\cdot\frac{t}{r_f} = -0.686$$

$$Kt_b := C1b + C2b\cdot\left(\frac{2t}{D}\right) + C3b\cdot\left[\left(\frac{2t}{D}\right)^2\right] + C4b\cdot\left[\left(\frac{2t}{D}\right)^3\right]$$

$Kf_b := 1 + q\cdot(Kt_b - 1) \qquad Kf_b = 1.97$

Torsional Factor

$$C1 := 0.905 + 0.783\sqrt{\frac{t}{r_f}} - 0.075\cdot\frac{t}{r_f} = 1.759$$

$$C2 := -0.437 - 1.969\sqrt{\frac{t}{r_f}} - 0.553\cdot\frac{t}{r_f} = -3.722$$

$$C3 := 1.557 + 1.073\sqrt{\frac{t}{r_f}} - 0.578\cdot\frac{t}{r_f} = 1.999$$

$$C4 := -1.061 + 0.171\sqrt{\frac{t}{r_f}} + 0.086\cdot\frac{t}{r_f} = -0.717$$

$$K\tau_b := C1 + C2\cdot\left(\frac{2t}{D}\right) + C3\cdot\left[\left(\frac{2t}{D}\right)^2\right] + C4\cdot\left[\left(\frac{2t}{D}\right)^3\right] = 1.475$$

$Kf\tau_b := 1 + q\cdot(K\tau_b - 1) \qquad Kf\tau_b = 1.447$

Find Number of Cycles at Each Section

Section A:

$T_r := \frac{T_{fr}}{1ft \cdot kip}$ $T_r = 3.368$ $\sigma y_a := \frac{\sigma y}{1psi}$ $\sigma y_a = 3.75 \times 10^4$

$$AL_{ab} := \left[\frac{32}{\left(\pi \cdot D_{ab}{}^3\right)}\right] \cdot \left[\frac{\left(Kt_a \cdot M_a\right)}{\sigma e_a}\right] + \frac{\left(\sqrt{3} \cdot Kf\tau_a \cdot T_r\right)}{\left(2 \cdot \sigma y_a\right)}$$

$AL_{ab} = 0.332$

$Check_{SectionAB} := if\left(AL_{ab} \le .8, \text{"Infinite"}, \text{"Finite"}\right) = \text{"Infinite"}$

$\sigma x_a := \left[\frac{\left(32 \cdot M_a\right)}{\pi \cdot D_{ab}{}^3}\right] \cdot Kf_a$ $\sigma x_a = 9.017 \cdot ksi$

$\tau y_a := \left[\frac{\left(16 \cdot T_{fr}\right)}{\left(\pi \cdot D_{ab}{}^3\right)}\right] \cdot Kf_a$ $\tau y_a = 0.015 \cdot ksi$

$\tau m_a := \left[\left(\frac{\sigma x_a}{2}\right)^2 + \tau y_a{}^2\right]^{.5}$ $\tau m_a = 4.509 \cdot ksi$ τma = Max Torsional Stress

$\sigma max_a := \left(\frac{\sigma x_a}{2}\right) + \tau m_a$

$\sigma min_a := -\left(\frac{\sigma x_a}{2}\right) - \tau m_a$ $\sigma r_a := \frac{\left(\sigma max_a - \sigma min_a\right)}{2}$ $\sigma r_a = 9.017 \cdot ksi$ $\sigma e_a = 27.135 \cdot ksi$

Find Number of Cycles:

$A_a := \frac{(.9 \cdot \sigma y)^2}{\sigma e_a}$ $B_a := \left(\frac{-1}{3}\right) \cdot \log\left(\frac{.9 \cdot \sigma y}{\sigma e_a}\right)$

$N_a := \left(\frac{\sigma r_a}{A_a}\right)^{\frac{1}{B_a}}$ $N_a = 1.413 \times 10^{21}$

Section B:

$$AL_b := \left[\frac{32}{\left(\pi \cdot D_b{}^3\right)}\right] \cdot \left[\frac{\left(Kt_b \cdot M_b\right)}{\sigma e_b}\right] + \frac{\left(\sqrt{3} \cdot Kf\tau_b \cdot T_r\right)}{\left(2 \cdot \sigma y_a\right)}$$

$$AL_b = 0.417$$

$$Check_{SectionB} := \text{if}\left(AL_b \le .8\text{ , "Infinite" , "Finite" }\right) = \text{"Infinite"}$$

$$\sigma x_b := \left[\frac{\left(32 \cdot M_b\right)}{\pi \cdot D_b{}^3}\right] \cdot Kf_b \qquad \sigma x_b = 11.082 \cdot ksi$$

$$\tau y_b := \left[\frac{\left(16 \cdot T_{fr}\right)}{\left(\pi \cdot D_b{}^3\right)}\right] \cdot Kf_a \qquad \tau y_b = 0.019 \cdot ksi$$

$$\tau m_b := \left[\left(\frac{\sigma x_b}{2}\right)^2 + \tau y_b{}^2\right]^{.5} \qquad \tau m_b = 5.541 \cdot ksi$$

τmb = Max Torsional Stress

$$\sigma max_b := \left(\frac{\sigma x_b}{2}\right) + \tau m_b$$

$$\sigma min_b := -\left(\frac{\sigma x_b}{2}\right) - \tau m_b \qquad \sigma r_b := \frac{\left(\sigma max_b - \sigma min_b\right)}{2} \qquad \sigma r_b = 11.082 \cdot ksi \qquad \sigma e_b = 27.392 \cdot ksi$$

Find Number of Cycles:

$$A_b := \frac{(.9 \cdot \sigma y)^2}{\sigma e_b} \qquad B_b := \left(\frac{-1}{3}\right) \cdot \log\left(\frac{.9 \cdot \sigma y}{\sigma e_b}\right)$$

$$N_b := \left(\frac{\sigma r_b}{A_b}\right)^{\frac{1}{B_b}} \qquad N_b = 1.013 \times 10^{19}$$

Remaining Life:

$\text{lifting} := 100\text{ft}$

$r_s := \dfrac{180\text{in}}{2} = 90 \cdot \text{in}$

$\dfrac{\text{lifting}}{2 r_s \cdot \pi} = 2.122$

$\dfrac{N_b}{2.122 \cdot 2 \cdot 3300} = 7.23 \times 10^{14}$

Calculations

Burlington Canal Lift Bridge
Pre-Design and Concept Design

Fatigue Check of Trunnion Shaft

Half-filled Deck

1891 tonnes

Critical Sections:

A - Maximum bending moment, torsional moment, and stress concentration of keyway

B - Bending moment, torsional moment, and stress concentrations of fillet

Shaft Dimensions and other Variables

Enter information in Yellow boxes:

Results are in Blue boxes

Sections AB & B Diameters — Section AB is middle of turnnion shaft Section B is at fillet

$D_{ab} := 24in$ — Diameter of Shaft at Section AB

$D_b := 22.084in$ — Diameter of Shaft at Section B

$r_f := .625$ — Fillet Radius in inches, but do not use dimension

$Span_w := 1891kip$ — Weight of Span

$Cwt := Span_w$ — Weight of Counterweights (hypothesis)

$W_1 := \frac{(Span_w + Cwt)}{8} = 473 \cdot kip$ — Weight on Trunnion Shaft

$\sigma ut := 75ksi$ — Ultimate Tensile Strength of Shaft Material (ASTM A235 Class E)

$\sigma y := 37.500ksi$ — Yield Strenght for material

Distance from bearings to area of concern:

$l_s := 13in + 13in + 27.5in = 53.5 \cdot in$ — Length of Shaft Between Bearing Centers

$l_a := \frac{l_s}{2}$ — Distance to Center of Shaft from center of Bearing

$l_b := 13in$ — Distance from Center of Bearing to fillet

$c_{fr} := .004$ — Coefficient of friction for Bronze on Steel (Greased)

Torque on Shaft Due to Friction

$T_{fr} := W_l \cdot D_b \cdot c_{fr}$ $\quad T_{fr} = 290.359\ J \cdot 16.250$

Find Endurance Limit:

σe = α σut * (Cd*Cs*Ck*Ct*Cm)

$\alpha := .5$

From CSA Section 13.7.3.5.4 Endurance Limit

$Cr := 0.814$

$Cm := 1$

$Cs := 1.459 \qquad 4.51 \cdot (75)^{-0.265} = 1.436$

$Ct := 1$

Size Factor; Cd = (D/7.6)$^{-0.113}$

$$Cd_{ab} := \left[\left(\frac{D_{ab}}{7.6mm}\right)^{-.113}\right] \qquad Cd_{ab} = 0.609$$

$$Cd_b := \left[\left(\frac{D_b}{7.6mm}\right)^{-.113}\right] \qquad Cd_b = 0.615$$

$$\sigma e_a := \alpha \cdot \sigma ut \cdot (Cd_{ab} \cdot Cr \cdot Ct \cdot Cs \cdot Cm) \qquad \sigma e_a = 27.135 \cdot ksi$$

$$\sigma e_b := \alpha \cdot \sigma ut \cdot (Cd_b \cdot Cr \cdot Ct \cdot Cs \cdot Cm) \qquad \sigma e_b = 27.392 \cdot ksi$$

Find - Bending Moments at each Section:

Section A -

Bending moment due to weight on Shaft

$M_a := W_l \cdot l_a$ $\qquad M_a = 1.054 \times 10^3 \cdot ft \cdot kip$

Section B -

Bending moment due to weight on Shaft

$M_b := W_l \cdot l_b$ $\qquad M_b = 512.146 \cdot ft \cdot kip$

Find Stress Concentration Factors:

$\nu := .049$

$$q := \frac{1}{\left[1 + \left(\frac{\nu}{r_f^{.5}}\right)\right]} \qquad q = 0.942$$

$Kt_a := 1$ For Sled-run keyway; Use 1 if no Keyway

$Kf_a := 1 + q \cdot (Kt_a - 1)$ $\qquad Kf_a = 1$

$K\tau_a := 1$ For Sled-run keyway; Use 1 if no Keyway

$Kf\tau_a := 1 + q \cdot (K\tau_a - 1)$ $\qquad Kf\tau_a = 1$

2.22

$Kt_b := 2.02$

$Kf_b := 1 + q \cdot (Kt_b - 1)$ $\qquad Kf_b = 1.96$ From AASHTO Section 6.7.3.2

$K\tau_b := 1.61$ 1.61

$Kf\tau_b := 1 + q \cdot (K\tau_b - 1)$ $\qquad Kf\tau_b = 1.574$

Find Stress Concentration Factors (v.2):

From Peterson's Stress Concentration Factors, 2nd Ed. 1997, Chapter 3: Shoulder fillet in bar of circular cross section

$r_{f.} := .625$ Fillet Radius

$t := \dfrac{D_{ab} - 22.084in}{2in} = 0.958$ Fillet Height

$D := 24$ $\quad \dfrac{t}{r_f} = 1.533$

Bending Factor

$C1b := 0.947 + 1.206\sqrt{\dfrac{t}{r_f}} - 0.131\cdot\dfrac{t}{r_f} = 2.239$

$C2b := 0.022 - 3.405\sqrt{\dfrac{t}{r_f}} + 0.915\cdot\dfrac{t}{r_f} = -2.791$

$C3b := 0.869 + 1.777\sqrt{\dfrac{t}{r_f}} - 0.555\cdot\dfrac{t}{r_f} = 2.218$

$C4b := -0.810 + 0.422\sqrt{\dfrac{t}{r_f}} - 0.260\cdot\dfrac{t}{r_f} = -0.686$

$Kt_b := C1b + C2b\cdot\left(\dfrac{2t}{D}\right) + C3b\cdot\left[\left(\dfrac{2t}{D}\right)^2\right] + C4b\cdot\left[\left(\dfrac{2t}{D}\right)^3\right]$

$Kf_b := 1 + q\cdot\left(Kt_b - 1\right) \quad Kf_b = 1.97$

Torsional Factor

$C1 := 0.905 + 0.783\sqrt{\dfrac{t}{r_f}} - 0.075\cdot\dfrac{t}{r_f} = 1.759$

$C2 := -0.437 - 1.969\sqrt{\dfrac{t}{r_f}} - 0.553\cdot\dfrac{t}{r_f} = -3.722$

$C3 := 1.557 + 1.073\sqrt{\dfrac{t}{r_f}} - 0.578\cdot\dfrac{t}{r_f} = 1.999$

$C4 := -1.061 + 0.171\sqrt{\dfrac{t}{r_f}} + 0.086\cdot\dfrac{t}{r_f} = -0.717$

$K\tau_b := C1 + C2\cdot\left(\dfrac{2t}{D}\right) + C3\cdot\left[\left(\dfrac{2t}{D}\right)^2\right] + C4\cdot\left[\left(\dfrac{2t}{D}\right)^3\right] = 1.475$

$Kf\tau_b := 1 + q\cdot\left(K\tau_b - 1\right) \quad Kf\tau_b = 1.447$

Find Number of Cycles at Each Section

Section A:

$$T_r := \frac{T_{fr}}{1ft \cdot kip} \qquad T_r = 3.48 \qquad \sigma y_a := \frac{\sigma y}{1psi} \qquad \sigma y_a = 3.75 \times 10^4$$

$$AL_{ab} := \left[\frac{32}{\left(\pi \cdot D_{ab}^{\;3}\right)}\right] \cdot \left[\frac{\left(Kt_a \cdot M_a\right)}{\sigma e_a}\right] + \frac{\left(\sqrt{3} \cdot Kf\tau_a \cdot T_r\right)}{\left(2 \cdot \sigma y_a\right)}$$

$$AL_{ab} = 0.343$$

$Check_{SectionAB}$:= if$\left(AL_{ab} \le .8\right.$, "Infinite" , "Finite" $\left.\right)$ = "Infinite"

$$\sigma x_a := \left[\frac{\left(32 \cdot M_a\right)}{\pi \cdot D_{ab}^{\;3}}\right] \cdot Kf_a \qquad \sigma x_a = 9.318 \cdot ksi$$

$$\tau y_a := \left[\frac{\left(16 \cdot T_{fr}\right)}{\left(\pi \cdot D_{ab}^{\;3}\right)}\right] \cdot Kf_a \qquad \tau y_a = 0.015 \cdot ksi$$

$$\tau m_a := \left[\left(\frac{\sigma x_a}{2}\right)^2 + \tau y_a^{\;2}\right]^{.5} \qquad \tau m_a = 4.659 \cdot ksi$$

τma = Max Torsional Stress

$$\sigma max_a := \left(\frac{\sigma x_a}{2}\right) + \tau m_a$$

$$\sigma min_a := -\left(\frac{\sigma x_a}{2}\right) - \tau m_a \qquad \sigma r_a := \frac{\left(\sigma max_a - \sigma min_a\right)}{2} \qquad \sigma r_a = 9.318 \cdot ksi \qquad \sigma e_a = 27.135 \cdot ksi$$

Find Number of Cycles:

$$A_a := \frac{(.9 \cdot \sigma y)^2}{\sigma e_a} \qquad B_a := \left(\frac{-1}{3}\right) \cdot \log\left(\frac{.9 \cdot \sigma y}{\sigma e_a}\right)$$

$$N_a := \left(\frac{\sigma r_a}{A_a}\right)^{\frac{1}{B_a}} \qquad N_a = 5.004 \times 10^{20}$$

Section B:

$$AL_b := \left[\frac{32}{\left(\pi \cdot D_b^{\,3}\right)}\right] \cdot \left[\frac{\left(Kt_b \cdot M_b\right)}{\sigma e_b}\right] + \frac{\left(\sqrt{3} \cdot Kf\tau_b \cdot T_r\right)}{\left(2 \cdot \sigma y_a\right)}$$

$$AL_b = 0.431$$

$$Check_{SectionB} := \text{if}\left(AL_b \le .8\,, \text{"Infinite"}\,, \text{"Finite"}\right) = \text{"Infinite"}$$

$$\sigma x_b := \left[\frac{\left(32 \cdot M_b\right)}{\pi \cdot D_b^{\,3}}\right] \cdot Kf_b \qquad \sigma x_b = 11.451 \cdot ksi$$

$$\tau y_b := \left[\frac{\left(16 \cdot T_{fr}\right)}{\left(\pi \cdot D_b^{\,3}\right)}\right] \cdot Kf_a \qquad \tau y_b = 0.02 \cdot ksi$$

$$\tau m_b := \left[\left(\frac{\sigma x_b}{2}\right)^2 + \tau y_b^{\,2}\right]^{.5} \qquad \tau m_b = 5.725 \cdot ksi$$

τmb = Max Torsional Stress

$$\sigma max_b := \left(\frac{\sigma x_b}{2}\right) + \tau m_b$$

$$\sigma min_b := -\left(\frac{\sigma x_b}{2}\right) - \tau m_b \qquad \sigma r_b := \frac{\left(\sigma max_b - \sigma min_b\right)}{2} \qquad \sigma r_b = 11.451 \cdot ksi \qquad \sigma e_b = 27.392 \cdot ksi$$

Find Number of Cycles:

$$A_b := \frac{(.9 \cdot \sigma y)^2}{\sigma e_b} \qquad B_b := \left(\frac{-1}{3}\right) \cdot \log\left(\frac{.9 \cdot \sigma y}{\sigma e_b}\right)$$

$$N_b := \left(\frac{\sigma r_b}{A_b}\right)^{\frac{1}{B_b}} \qquad N_b = 3.421 \times 10^{18}$$

Remaining Life:

$$lifting := 100ft$$

$$r_s := \frac{180in}{2} = 90 \cdot in$$

$$\frac{lifting}{2r_s \cdot \pi} = 2.122$$

$$\frac{N_b}{2.122 \cdot 2 \cdot 3300} = 2.443 \times 10^{14}$$

Appendix F

Steel Carbon Testing

Cambridge materials testing limited

1177 Franklin Boulevard,
Cambridge, Ontario N1R 7W4
Tel: (519) 621-6600 Fax: (519) 621-6082
www.cambridgematerials.com

Report for: Bridge Check Canada
200 Viceroy Road, Unit 4
VAUGHAN, Ontario
L4K 3N8

Laboratory No. **868103–21**

Report Date: August 06, 2021
Received Date: August 03, 2021

Attention: Savio DeSouza

Specimen: Burlington Canal Lift Bridge - Approach Span, Project # BCC21047

CHEMICAL ANALYSIS TEST REPORT

Carbon Equivalent	0.31	%	Nickel	0.03	%
Total Carbon	0.21	%	Molybdenum	< 0.01	%
Manganese	0.53	%	Vanadium	< 0.01	%
Chromium	0.02	%	Copper	0.09	%

The carbon equivalent was calculated in accordance with the formula from ASM Metals Handbook Volume 1, Tenth Edition, page 604 (International Institute of Welding).

Chemical analysis performed according to ASTM E1019-18, ASTM E1097-12(Reapproved 2017) (modified) and ASTM E1479-16.

Cambridge Materials Testing Limited

Per Nicholas Wolfenberg
Nicholas Wolfenberg *Authorized By*

Per Chantal Plouffe
Chantal Plouffe *Technician*

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