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SOW – FOUNDATIONS AND NEW RANGE TOWERS

CONSTRUCTION CONTRACT

Goderich, ON

MARITIME AND CIVIL INFRASTRUCTURE

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Approved by: BY

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SECTION: 011100 GENERAL INSTRUCTIONS

PART 1 - GENERAL

1.1 Minimum Standards

- .1 Perform work in accordance with National Building Code of Canada (NBC) and any other code of provincial, territorial or local application. In the case of any conflict or discrepancy, the more stringent requirements shall apply.
- .1 Meet or exceed requirements of:
 - .1 Contract documents; and
 - .2 Specified standards, codes and referenced documents.

1.2 Description of Work

- .1 Work under this Contract includes but is not limited to the provision of all labour, materials, and equipment required to:
 - .1 Install foundations for two [2] new Aids to Navigation (AtoN) towers;
 - .2 Fabricate and supply two [2] new AtoN towers as per drawings included;
 - .3 Install the new towers including all appurtenances onto their new foundations;
 - .4 Remove and dispose of existing towers and day marks; and
 - .5 Remove existing rear tower's foundation.
- .2 The following work will be undertaken by others and is hereby excluded:
 - .1 Supply of new day marks for installation on the new towers;

1.3 Submittals

- .1 Mandatory submittals and schedule for submission are detailed below and in Appendix B. The following identifies general requirements only. The relevant sections must be consulted for a complete listing of mandatory content.
- .2 Detailed Schedule (Mandatory):
 - .1 Deadline:
 - .1 No later than ten [10] working days following award.
 - .2 Deliverables:



- .1 The contractor shall furnish a high level schedule outlining the major construction milestones. Schedule shall clearly define the anticipated start and finish dates of the project.
- .2 For fieldwork to proceed, all other mandatory submittals must be received and accepted by Coast Guard.
- .3 Proof of Qualifications (Mandatory):
 - .1 Deadline:
 - .1 No later than ten [10] working days following award.
 - .2 Deliverables:
 - .1 The Contractor shall provide the name and contact information for the following project team members:
 - .1 The Project Manager;
 - .2 The Site Forman; and
 - .2 The contractor shall also provide a detailed list of all subcontractors being used to complete the work described herein (Section 011100 – 1.4).
- .4 Construction Plan (Mandatory):
 - .1 Deadline:
 - .1 No less than ten [10] working days prior to mobilization.
 - .2 Deliverables:
 - .1 A Construction Plan of sufficient detail to demonstrate that the Contractor has considered all the challenges of the project and is prepared to undertake the works in a competent and professional manner in accordance with all legislation. The submission shall include:
 - .1 Project Specific Safety Program (Section 013530);
 - .2 Project Environmental Protection Plan (Section 013543);
 - .3 Detailed Demolition Plan (Section 024116);
 - .4 Foundation Construction Plan (Section 033000);
 - .5 Tower Erection Plan (Section 133613); and
 - .6 Excavation Plan (Section 310000).
- .5 As-built and QA/QC (Mandatory):



.1 Deadline:

- .1 No more than twenty eight [28] calendar days after construction.

.2 Deliverables:

- .1 The following documents shall be forwarded upon completion of the contract:

- .1 Set of red-lined as-built drawings (Sections 033000 & 133613);

1.4 Contractor Qualifications

- .1 The work shall be carried out under the supervision and responsibility of a sole specialized Contractor.

- .2 The Contractor must be experienced in the installation of aid to navigation structures or other similar free standing structures.

- .3 The Contractor shall designate the following key project members, including any subcontractors. The project members shall have completed projects of similar scope and complexity to the work described herein.

- .1 Project Manager: Contact information for the main point of contact for the project shall be provided by the contractor.

- .2 Site Forman: Contact information for the main point of contact for the project fieldwork shall be provided by the contractor.

- .3 The contractor shall provide a detailed list of all subcontractors being used to complete the work described herein.

- .4 Requests to amend the project team, following contract award, must be forwarded in writing. Coast Guard reserves the right to reject any proposal to amend the project team.

1.5 Site Location

- .1 Both towers are located at the Compass Minerals Goderich Salt Mine in Goderich, ON:

- .1 LL780 Goderich North Pier Front Range: 43° 44'46.5573"N, 81° 43'50.0367"W

- .2 LL781 Goderich North Pier Rear Range: 43° 44'46.9131"N, 81° 43'41.9948"W

1.6 Existing Conditions

- .1 Photographs of the existing towers have been included in Appendix A: Site Locations and Photographs.

- .2 As the towers are located on a privately owned active mine, Personal Protective Equipment



(PPE) conforming to Compass Minerals' requirements must be worn on site at all times. Please refer to Appendix H for the Compass Minerals policy on PPE.

- .3 Bidders must make their own estimate of the difficulties associated with all phases of the works.
- .4 The contractor must include in their costs all expenses related to the difficulties of working at the sites.
- .5 A geotechnical investigation has been completed for this location. A copy of the findings is provided in Appendix G.

1.7 Contractor's Access to Site

- .1 Contractor is responsible for transportation of all labour, materials and equipment to and from the sites, including any and all material furnished or itemized for salvage by Coast Guard.
- .2 Both sites are accessible by standard vehicle.
- .3 All Site access must be arranged through the proper channels prior to each visit.
 - .1 Because the rear tower is located on Compass Minerals property, access must be granted from Compass Minerals as well as the security gate supervisor. Contact information for each will be forwarded after award.
 - .2 The front tower is located on Port Authority owned land but visitors must be escorted through the Compass Minerals property to gain access. As such, the security supervisor overseeing the facility must be notified prior to any visit.
- .4 Coast Guard must also be notified at least three working days prior to any site access.
- .5 In order to be allowed to work on Compass Minerals property, the contractor's fieldwork crew must first complete a 4 hour orientation session with Compass Minerals personnel. Workers will not be allowed to work on the site until the orientation has been attended.

1.8 Completion, Scheduling and Planning of the Works

- .1 Work may commence as early as practical following Coast Guard's acceptance and approval of mandatory submissions.
- .2 Site work shall not commence without written authorization of Coast Guard Project Authority.
- .3 The front tower will require a temporary aid to replace it during construction. Assume the existing front tower will be used for this purpose. Work shall be scheduled such that the temporary aid is in use for as short a period as possible. All equipment and materials for installing the new front tower and all appurtenances shall be ready for installation activities prior to setting up the



temporary aid.

- .4 Construction work shall be completed no later than March 2, 2019, unless otherwise negotiated and approved in writing.
- .5 Demolition of existing towers shall not commence until the new aids to navigation have been fully commissioned. The Contractor shall allow for up to 3 weeks' time for the commissioning and acceptance of the new range.

1.9 Coast Guard Staging Location

- .1 Items to be supplied by, or salvaged to Coast Guard shall be collected or delivered by the Contractor to the following staging location. The Contractor shall be responsible for all transportation costs between the project site and the identified staging location. Material drop off or access to stored goods outside of regular operating hours shall be at the discretion of Coast Guard and may be subject to cost recovery:

- .1 Staging location:

CCG Base Parry Sound
28 Waubeek St.
Parry Sound, ON P2A 1B9

- .2 Advise Coast Guard at least three (3) working days prior to pick-up/delivery
- .3 Shipping/Receiving hours: Monday through Friday, 9:00AM to 3:00PM

1.10 Temporary Facilities

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Arrange, pay for, and maintain temporary electrical power supply as required for construction, and water supply as required, in accordance with governing regulations and ordinances.
- .3 Maintain emergency spills kit on-site at all times.

1.11 Fees, Permits, Certificates and Information

- .1 Contractor shall provide authorities having jurisdiction with all information requested.
 - .1 Contractor shall provide copies to Coast Guard of any documentation submitted to other authorities related to the work described in this document.
- .2 Contractor shall pay fees and obtain certificates and permits required.
- .3 Contractor shall furnish certificates and permits when requested.



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summary is not an exhaustive list of all submissions required for the duration of the project.

.2 Additional submissions may be required after award.



SECTION: 013300 SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 General

- .1 This section specifies general requirements and procedures for the Contractor's submissions of documents to Coast Guard for review.
- .2 For each phase of the project, work shall not progress until all mandatory submittals required before the start of that phase have been received, reviewed and accepted by Coast Guard.
- .3 Where items or information is not produced in SI Metric units, converted values are acceptable.
- .4 Contractor's responsibility for errors and omissions in submission is not relieved by Coast Guard's review of the submitted documents.
- .5 Notify Coast Guard, in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.
- .6 Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Coast Guard's review of submission, unless Coast Guard gives written acceptance of specific deviations.
- .7 Make any changes to submissions that Coast Guard may require consistent with Contract Documents and resubmit as directed by Coast Guard.
- .8 Provide Coast Guard with a written notice, when resubmitting, of any revisions other than those requested by Coast Guard.

1.2 Submission Requirements

- .1 Coordinate each submission with requirements of work and Contract Documents. Individual submissions will not be reviewed until all related information is available.
- .2 Allow three [3] working days, or as stipulated in the specifications, for Coast Guard to review the submission.
- .3 The Contractor's Engineer shall stamp and sign any submissions requiring a Professional Engineer's seal certifying his approval of samples, verification of field measurements, and compliance with Contract Documents.



SECTION: 013530 HEALTH AND SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 Scope

- .1 The Contractor shall be responsible to develop, implement and enforce a safety program which addresses all elements of the work.

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references, In the case of any conflict or discrepancy the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II - January 2008;
 - .2 NRC-CNRC National Building Code of Canada, 2015;
 - .3 Ontario Occupational Health and Safety Act and Regulations, 2009;
 - .4 Any and all other Provincial/Territorial Regulations and Policies, Worker's Compensation Board Policies or Local municipal regulations pertaining to safety of the contractor's workers.

1.3 Submittals

- .1 Submittals shall be forwarded to Coast Guard in accordance with the provisions of section 013300.
- .2 Project Specific Safety Program
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:
 - .1 Safety Program Document, include:
 - .1 A listing of all activities specific to each phase of the project and their Health & Safety risks or hazards;
 - .2 Detailed descriptions of how the activities are to be carried out as well as methods for mitigating hazards and risks;
 - .3 A listing of personnel responsible for health and safety measures, and Emergency procedures; and
 - .4 Material Safety Data Sheets for hazardous products to be utilized in the execution of the works.



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- .3 Proof that a Notice of Project has been filed with the Ontario Ministry of Labour; and
- .4 Contractor shall submit completed Field Level Hazard Assessment (FLHA) forms to Coast Guard upon request.



SECTION: 013543 ENVIRONMENTAL PROCEDURES

PART 1 - GENERAL

1.1 Scope of Work

- .1 The contractor must implement and enforce the following procedures throughout the duration of the work to mitigate potential negative impacts on the surrounding environment.

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references, In the case of any conflict or discrepancy the more stringent requirements shall apply.
 - .1 Canadian General Standards Board (CGSB)
 - .2 Transportation of Dangerous Goods
 - .3 Canadian Council of Ministers of the Environment (CCME) Documentation
 - .4 Canadian Environmental Protection Act

1.3 Submittals

- .1 Submittals shall be forwarded to Coast Guard in accordance with the provisions of section 013300.
- .2 Contractor shall submit an Environmental Protection Plan
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:
 - .1 Submit a plan addressing procedures to be implemented to mitigate any negative impact on the environment. Detail (if applicable):
 - .1 Equipment features (age, spill containment);
 - .2 Staging, refueling, and cleaning areas;
 - .3 Clean-up and/or containment procedures (including concrete/grout);
 - .4 Waste disposal methods and sites; and
 - .5 Sedimentation control measures.



PART 2 - PRODUCTS

2.1 General

- .1 Avoid use of hazardous products. Use environmentally friendly products where practical.

PART 3 - EXECUTION

3.1 Construction Area

- .1 Confine construction activities to as small an area as practical.
- .2 Establish material storage, cleaning, and refueling areas where impacts to the surrounding environment will be negligible or readily mitigated.

3.2 Stockpiling of materials

- .1 Materials must be stockpiled as far from the shoreline as practical. Tarps must be used to control dust and run-off.
- .2 Stockpiled excavated materials shall be skirted using filter fabric to control run-off of fines during rain and to prevent excavation of soils below stockpiles.

3.3 Disposal of Wastes

- .1 Clean-up the site at the end of each working day.
- .2 All waste material is to be disposed of in a legal manner at a site approved by local authorities. Transporter/hauler must be appropriately licensed.
 - .1 Recycle or reuse materials where possible.
- .3 Fires and burning of rubbish on site not permitted.
- .4 Do not bury rubbish and waste materials on site.

3.4 Clearing and Grubbing

- .1 Only clear vegetation that interferes with construction once approved to do so by Coast Guard.

3.5 Drainage

- .1 Provide temporary drainage and pumping as necessary to keep excavations and site free from water.
 - .1 Suspend works during periods of heavy rainfall and add temporary covers to discourage run-off.
 - .2 Water pumped from excavation shall be adequately treated to ensure that water returning to



the watercourse contains minimal fines. Procedures anticipated for preventing the pumping of fines shall be identified in the environmental protection plan, and may include the following:

- .1 The use of filter bags;
- .2 Straw bale check dams or silt fence;
- .3 Discharge through naturally occurring vegetation.
- .3 The means for controlling silt run-off shall be dependent on the site and the quantity of water pumped, and shall be to the discretion of the CCG site staff.
- .4 Sediment control measures shall be inspected and improved/cleaned/replaced as necessary.

3.6 Pollution Control

- .1 Provide methods, means, and facilities to prevent the contamination of soil, water, and atmosphere from the discharge of pollutants produced by construction operations.
- .2 Vehicles, machinery, and equipment shall be in good repair, equipped with emission controls as applicable and operated within regulatory requirements.
- .3 Abide by local noise by-laws.
- .4 Avoid unnecessary idling of vehicles or heavy machinery.
- .5 Limit use of equipment around the shoreline where possible.
- .6 Implement and maintain dust and particulate control measures in accordance with provincial requirements:
 - .1 All bulk material haul equipment shall be appropriately tarped. Watertight vehicles shall be used to haul wet materials
- .7 Designate a cleaning area for tools to limit water use and runoff. Do not allow deleterious materials to enter waterways. Ensure emptied containers are sealed and stored safely for disposal.
- .8 The contractor shall take all necessary precautions to guard against the release of any noxious substance or pollutant to the environment. In the event of any spill the Contractor shall take immediate action to contain the release and mitigate any impact.
 - .1 Materials and equipment to intercept, contain, and clean-up any spill or other release shall be maintained on site throughout the construction period and must be readily accessible at



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all times.

- .2 Any uncontrolled release of a known contaminant (spills, fire/smoke) shall be reported to appropriate Provincial Authority and Coast Guard. Spills of deleterious substances to be immediately contained and cleaned up in accordance with provincial regulatory requirements.
- .3 Provincial Authority: Ontario Spill Action Centre: 1-800-268-6060

3.7 Traffic

- .1 Minimize soil compaction by driving, parking vehicles, and walking, etc. on existing paved roadways/laneways. If soil is impacted by compaction, compensate by restoring areas with new soil, as required.
- .1 Avoid the use of heavy machinery in areas of sensitive slopes. Avoid using machinery on land during wet weather.



SECTION: 014500 QUALITY CONTROL

PART 1 - GENERAL

1.1 Inspection

- .1 Coast Guard or its representative shall have access to the work at all times. If parts of the work are prepared off-site or in a shop, access shall be given to such work throughout the duration of the project.
- .2 In the event the work must be submitted to special testing, inspection or approvals prescribed by Coast Guard in these specifications or provided for in work-site regulations, the request for inspection must be made without unreasonable delay.
- .3 The below list identifies key milestones where the Coast Guard will require an opportunity to take samples/inspect:
 - .1 Location verification: Coast Guard will confirm correct location for installation upon arrival of the Contractor at the sites. The contractor shall be required to provide access to the site at all times to CCG site staff.
 - .2 Pre-tensioning: Coast Guard shall witness the pre-tensioning of the all-thread rods to the prescribed torque values.
 - .3 Installation of towers: Coast Guard shall witness the erection of the new nav-aid towers and witness the operation of the new lights.

1.2 Procedures

- .1 Provide Coast Guard with advance notice whenever testing is required in accordance with these specifications, so that all parties involved can be present.
- .2 Provide necessary manpower and installations for obtaining and handling samples and material on site.
- .3 Provide access to site if the site is of remote nature whereby the contractor is responsible for providing access to the site

1.3 Rejected Work

- .1 Remove defective work, whether incorporated into the work or not, which has been rejected by Coast Guard as failing to comply with the contract documents. Replace or re-execute in accordance with the Contract Documents.

1.4 Tests and Mixture Formulas



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.1 Supply test reports and required mixture formulas.

1.5 Factory Tests

.1 Submit test certificates as prescribed in the relevant section of the specifications.

1.6 Acceptance of Work

.1 Coast Guard will make acceptance visits of work executed by the Contractor at critical milestones identified in the following sections.

.2 The Contractor shall inform Coast Guard at least three [3] working days before these inspection visits.

.3 All work shall be completed in compliance with the specifications before requesting the visit for inspection. If the work is not completed or deemed non-compliant, the Contractor shall be responsible for all costs incurred for subsequent inspections.



SECTION: 016100 COMMON PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 General

- .1 Secure Coast Guard approval of all products to be incorporated into the works. Work shall not commence until product data and/or samples have received Coast Guard approval.
- .2 Supply and/or fabricate material and equipment of prescribed quality, with performance conforming to established standards.
- .3 Use new material and equipment unless otherwise specified.
- .4 Ensure replacement parts may be readily procured.
- .5 Use products from one manufacturer for material and equipment of same type or classification, unless otherwise specified.

1.2 Manufacturer's Instructions

- .1 Unless otherwise specified, comply with manufacturer's latest printed instructions for materials and installation methods.
- .2 Notify Coast Guard in writing of any conflict between these specifications and manufacturer's instructions; Coast Guard will designate which document is to be followed.

1.3 Compliance

- .1 When material or equipment is specified by standard or performance specifications, upon request of Coast Guard, obtain an independent testing laboratory report from the manufacturer, stating that material or equipment meets or exceeds specified requirements.

1.4 Substitution

- .1 Where specific products have been specified, proposals for substitution may only be submitted after award of contract. Such requests must include statements of respective costs of items originally specified and the proposed substitution.
- .2 No substitutions will be permitted without prior written approval of Coast Guard. Substitutions will be considered by Coast Guard only when:
 - .1 Materials specified in Contract Documents, are not available or,
 - .2 Delivery date of materials selected from those materials specified would unduly delay completion of contract or,



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- .3 Alternative materials to those specified which are brought to the attention of and considered by Coast Guard as equivalent to the material specified will result in a credit to the Contract amount.
 - .3 Should the proposed substitution be accepted either in whole or in part, the Contractor must assume full responsibility and costs when such substitution affects other work on the project including any and all design or drawing changes required as a result of substitution.
- 1.5 Submittals
- .1 Provide product specifications and/or samples upon request from Coast Guard.



SECTION: 024116 DEMOLITION OF STRUCTURES

PART 1 - GENERAL

1.1 Scope of Work

- .1 Work under this section consists of the provision of all labour, materials, and equipment necessary to complete the following activities:
 - .1 Removal and disposal of existing range towers;
 - .2 Removal of existing rear tower foundation to grade; and
 - .3 Disposal of all waste at a licensed waste disposal facility.

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references, in the case of any conflict or discrepancy the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II - January 2008.
 - .2 NRC-CNRC National Building Code of Canada 2015
 - .3 Ontario Occupational Health and Safety Act and Regulations, 2016
 - .4 CSA S350-[M1980 (R1998)], Code of Practice for Safety in Demolition of Structures.

1.3 Submittals

- .1 Submittals shall be forwarded to Coast Guard in accordance with the provisions of section 013300.
- .2 Contractor to provide a Demolition Plan
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:
 - .1 Method of demolition including all associated tasks and schedule;
 - .2 Methods for protecting the site from demolition debris; and
 - .3 The ultimate disposal location of all waste materials and debris.
 - .1 Include documentation detailing regulatory approval for waste disposal facility and transporter.



.3 Work under this section shall not proceed until written approval of the demolition plan has been received from the Coast Guard.

.4 Submit copies of certified receipts from the disposal sites for all material removed from the work site upon request.

1.4 Existing Conditions

.1 Photos of the existing aids to navigation are included in Appendix A.

PART 2 - PRODUCTS

2.1 Not used.

PART 3 - EXECUTION

3.1 General

.1 Work under this section shall be continuous and proceed without interruption unless otherwise approved by Coast Guard.

.2 Towers shall not be felled without the specific authorization of Coast Guard.

.3 Demolition work of the front tower shall not to commence until the Coast Guard has put a temporary aid in place. Contractor shall allow for 2 full days for temporary aid installation.

.4 Demolition work of the rear tower shall not commence until the new rear tower has been fully commissioned by Coast Guard. The Contractor shall allow for two full days after tower erection for commissioning work.

3.2 Protection

.1 Prevent movement, settlement or damage of adjacent structures/vegetation.

.2 Implement effective controls to catch/collect all tower debris during demolition, specifically paint.

.3 Implement effective controls to prevent injury to workers, property, and local traffic.

3.3 Preparation

.1 Erect warning signs and barricades.

.2 Ensure all environmental protection/mitigation measures are in place.

.3 Ensure facilities have been de-energized.

.4 Ensure all items identified for salvage have been removed and stored.

3.4 Demolition



- .1 Demolish existing steel structures in their entirety;
- .2 Demolish existing rear foundation flush to grade. Any concrete piers, anchor bolts or other protruding members shall be cut flush to grade.
- .3 Any anchor bolts or other protruding members on the front foundation shall be cut flush to the top of the foundation.
- .4 Ensure that demolition does not adversely affect adjacent watercourses, groundwater and wildlife, or contribute to excess air and noise pollution.
- .5 Ensure demolition is undertaken safely. If at any period during demolition the safety of the Contractor's staff cannot be maintained take preventative measures, stop work and immediately notify Coast Guard.

3.5 Disposal

- .1 All material for disposal is to be disposed of off-site at a licensed disposal/recycling facility.

3.6 Restoration

- .1 The site in its entirety must be restored to an equal or greater condition after completion of construction.



SECTION: 033000 CONCRETE WORK

PART 1 - GENERAL

1.1 Scope of Work

- .1 Work under this section includes the supply of all labour, material and equipment required to complete the following:
 - .1 Install one [1] reinforced concrete foundation to support the new rear tower as per drawings provided;
 - .2 Install four [4] bollards around the rear tower foundation;
 - .3 Installation of bearing grout between completed foundation and tower base/anchor plate;
 - .4 Installation of bearing grout for the front tower; and
 - .5 Any and all provisions necessary to ensure that the anticipated performance of the placed concrete will be obtained if work is undertaken in cold weather.

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references, In the case of any conflict or discrepancy the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II - January 2008
 - .2 NRC-CNRC National Building Code of Canada 2015
 - .3 Ontario Occupational Health and Safety Act and Regulations
 - .4 ASTM A615-15 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete reinforcement
 - .5 CAN/CSA-A23.1-04 Concrete Materials and Methods of Concrete Construction
 - .6 CAN/CSA A23.2-04 Methods of Test and Standard Practices for Concrete
 - .7 CAN/CSA A23.3-04 Design of Concrete Structures
 - .8 CAN/CSA-G30.18 Billet Steel Bars for Concrete Reinforcement
 - .9 CAN/CSA S269.3 Concrete Formwork

1.3 Performance Requirements

- .1 The foundation shall be designed to perform as reasonably expected for a life of 50 years.



1.4 Submittals

- .1 Submittals shall be forwarded to Coast Guard in accordance with the provisions of section 013300.
- .2 Foundation Construction Plan
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:
 - .1 Contractor shall provide a high level summary of mix properties and admixtures to demonstrate compliance with Coast Guard criteria;
 - .2 Provide MSDS (pre-mixed products only);
 - .3 Concrete Placement Plan identifying the location of the source of ready mix concrete, the haul route and any other relevant information required to demonstrate a plan for getting the concrete into the forms in a timely manner;
 - .4 Finishing procedures;
 - .5 Curing methods and schedule;
 - .6 Strength requirements for structural stability (removal of forms);
 - .7 Clean-up procedures; and
 - .8 Mitigation measures to account for hot or cold temperatures where reasonably anticipated during the construction period.
- .3 As-Built Drawings:
 - .1 Deadline:
 - .1 No later than twenty-eight [28] calendar days after project completion
 - .2 Deliverables:
 - .1 A complete set of as-built drawings detailing any and all amendments or revisions to the previously submitted design drawings or documentation indicating final works are as detailed in design drawings.
 - .2 Provide one [1] electronic copy (.pdf) format or one [1] hard copy.

1.5 Quality Assurance



- .1 Coast Guard's minimum inspection requirements are detailed herein.
- .2 The Contractor shall be responsible to notify Coast Guard of the date and time that the works may be inspected. Notice must be provided no less than five [5] working days in advance to permit scheduling of quality assurance testing.
- .3 All deficiencies in the works identified at the time of inspection shall be remedied to the satisfaction of Coast Guard, at the Contractor's expense. Work shall not progress until inspections have been completed and the Contractor has been provided with written notice to proceed with the works.
 - .1 Upon completion of formwork and placement of reinforcement;
 - .2 During execution of concrete placement;
- .4 The below list identifies key milestones for which Coast Guard will require an opportunity to take samples, inspect, or witness testing:
 - .1 Subgrade verification: Coast Guard will arrange for a Geotechnical Engineer to inspect the sub-grade upon completion of any excavating where a design bearing surface is to be achieved. The Engineer shall indicate in writing that the sub-grade surface conditions are acceptable.
 - .1 The Contractor shall inform Coast Guard no less than five [5] working days prior to beginning any excavation and foundation installation cannot proceed without a Geotechnical Engineer's approval.
 - .2 Concrete testing: Coast Guard will arrange for concrete testing of air, slump and strength during the pour.
 - .1 The Contractor shall inform Coast Guard no less than five [5] working days prior to the day of the pour and be prepared to provide concrete samples. Testing shall consist of, at minimum, a test for slump, air entrainment and strength (4 cylinders: one [1] 7 day, two [2] 28 day and one [1] to verify concrete strength before tower erection).
 - .3 Final completion: The Coast Guard will conduct final inspection upon completion of the tower installation.

PART 2 - PRODUCTS

2.1 General

- .1 All concrete materials shall conform to specifications referenced in CAN/CSA-A23.1-04.

2.2 Formwork



- .1 Formwork shall be in accordance with CAN/CSA S269.3.

2.3 Concrete

- .1 Concrete shall possess the minimum characteristic detailed in the Contract Drawings;
- .2 Concrete supplier shall be a holder of a valid "Certificate of Ready Mixed/Mobile Mix Concrete Production Facilities" as issued by the Ready Mixed Concrete Association of Ontario (RMCAO).
- .3 Concrete mix to be determined by Contractor and shall be indicated on engineering plans.
 - .1 The use of calcium chloride as an admixture is not permitted.

2.4 Bollards

- .1 The bollards are to be comprised of 150mm (6 in) diameter galvanized steel pipe as per foundation drawings in Appendix F.
- .2 The galvanized pipes are to be top filled with concrete to provide a crown. The bollard, including cement and pipe, is to be painted hazard yellow.

PART 3 - EXECUTION

3.1 General

- .1 Concrete must be placed, finished, and cured in accordance with the Contractor's submitted construction plan and the engineered drawings.
 - .1 Ensure that the top of the concrete is no less than 150 mm (6 in) above the surrounding grade, unless otherwise approved in writing.
 - .2 Installation shall be undertaken in accordance with the engineered drawings and accompanying materials as contained in the Contractor's Summary Report.
 - .3 Locations shall be in conformance with positions detailed in Appendix A.
 - .1 A field survey must be arranged by the Contractor and conducted prior to any other fieldwork taking place in order to accurately layout the location of the new rear tower.
 - .2 Installation of the towers and foundations must not disturb the integrity of the existing facilities or the continued operation of the existing light station.

3.2 Preparation

- .1 Preparation shall not commence until bearing surfaces have been inspected by a geotechnical engineer.
- .2 Remove all deleterious material.



.3 Construct forms and reinforcement in accordance with the engineer's specifications.

.4 All exposed 90° edges shall be chamfered.

3.3 Placement

.1 Concrete placement shall not commence until formwork and reinforcement have been inspected by Coast Guard.

.2 Contractor shall place, finish and cure concrete as per CAN CSA A23.1 making all adjustments necessary to account for climatic conditions anticipated during the curing period.

.3 Concrete shall be placed in one continuous pour.

.1 The development of cold joints shall be avoided. Alternately, cold joints must be previously approved in writing by CCG.

.4 Finish exposed concrete surfaces to provide a lightly brushed non-skid surface, unless otherwise specified in the submitted design.

.5 Cut control joints where specified.

.6 Contractor shall provide samples as required during placement operation for the performance of quality assurance testing.

.7 Concrete shall be finished so as to slope gently away from the center of the slab. No water shall pond on the finished surface.

3.4 Curing

.1 Shall be undertaken in accordance with CAN CSA A23.1 and the Contractor's approved construction plan.

.1 Curing regimen employed must take into account local climatic conditions reasonably anticipated to occur during the curing period.

3.5 Grout

.1 Supply and install load bearing grout between the top of each foundation and each tower base.

.1 Edges of grout shall be chamfered.

3.6 Bollards

.1 There shall be one [1] bollard installed at each corner of the foundation.

.2 The bollards are to be installed as specified in the drawing included in Appendix F.

3.7 Inspection



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- .1 Concrete pour(s) to be witnessed by Coast Guard representative. Concrete testing to CAN/CSA-A23.2 by testing laboratory will be arranged by Coast Guard. Contractor shall provide samples as required during concreting operation for test purposes.



SECTION: 133613 FRP TOWERS

PART 1 - GENERAL

1.1 Scope of Work

- .1 Work under this section includes the supply of all labor, material and equipment required to complete the following:
 - .1 Supply and fabricate two [2] new AtoN towers as per included drawings;
 - .2 Transportation of all associated tower accessories to the project site from the designated staging area;
 - .3 Install temporary aid tower at front location;
 - .4 Install the new towers including all appurtenances onto their new foundations;
 - .5 Transportation to site and the installation of the navigational day-marks;
- .2 The following work will be undertaken by others and is hereby excluded:
 - .1 Supply of the navigational day-marks, and lanterns and their associated hardware.

1.2 References

- .1 Canada Labour Code Part II – January 2008
- .2 National Building Code of Canada – 2015
- .3 Ontario Occupational Health and Safety Act and Regulations, 2016
- .4 CAN/CSA S16.1 - Limit States Design of Steel Structures.
- .5 CAN/CSA G164 - Hot Dip Galvanizing of Irregularly Shaped Articles.
- .6 CSA Z259.2.4-15 – Fall Arresters and Vertical Rigid Rails
- .7 ASTM F593 – 17 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
- .8 ASTM F594 -09(2015) Standard Specification for Stainless Steel Nuts
- .9 ASTM A240 / A240M – 17 Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and General Applications



1.3 Submittals

- .1 Submittals shall be forwarded to Coast Guard in accordance with the provisions of section 013300.
- .2 Tower Erection Plan
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:
 - .1 Plan must clearly demonstrate procedures and methods to be employed to:
 - .1 Erect the towers;
 - .2 Monitor that turn of nut has been completed;
 - .3 Field remedies to address any damage to the tower's finish incurred during transportation and erection;
 - .4 CCG reserves the right to request additional documentation verifying the suitability of the proposed layout and equipment anticipated to be employed in the erection of the tower. Certification may include:
 - .1 Crane/helicopter capacity.
- .3 As-Built Drawings:
 - .1 Deadline:
 - .1 No later than twenty-eight [28] calendar days after project completion
 - .2 Deliverables:
 - .1 A complete set of as-built drawings detailing any and all amendments or revisions to the previously submitted design drawings or documentation indicating final works are as detailed in design drawings.
 - .2 Provide one [1] electronic copy (.pdf) format or one [1] hard copy.

1.4 Quality Assurance

- .1 Coast Guard's minimum inspection requirements are detailed below:
 - .1 The Contractor shall be responsible to notify Coast Guard of the date and time that the works may be inspected.
 - .1 Notice must be provided no less than three [5] working days in advance to permit



scheduling of quality assurance testing

- .2 All deficiencies in the works identified at the time of inspection shall be remedied to the satisfaction of Coast Guard, by the Contractor at their expense.
- .3 Work shall not progress until inspections have been completed and the Contractor has been provided with written notice to proceed with the works
- .2 Inspections shall take place during tower erection to confirm that turns of nut procedures are being followed.
- .3 Inspections shall take place upon completion of the work to ensure towers are plumb and that accessories have been installed correctly.

PART 2 - PRODUCTS

2.1 Materials

.1 Fibre Reinforced Plastic (FRP):

- .1 The towers are made of FRP.

.2 Bolts, nuts & washers:

- .1 As specified in tower drawings provided in Appendix E.

.3 Anchor bolts:

- .1 As specified in tower drawings provided in Appendix E.

- .1 Anchor bolts must possess sufficient threaded length above the top of the foundation to allow configuration specified in above mentioned drawings.

.4 Miscellaneous Materials:

.1 Fall arrest system:

- .1 Tylon TSF Cougar Rail safety as indicated on drawings in Appendix E.

PART 3 - EXECUTION

3.1 Fabrication

- .1 Fabrication will be completed by the Contractor and includes all items shown on the tower drawing provided in Appendix E.

3.2 Handling of Material and Transportation

- .1 The Contractor shall take all necessary precautions to avoid damage to the tower members



during transportation, unloading and erection. All components or damaged members shall be replaced to the satisfaction of Coast Guard, at the Contractor's expense.

- .2 It is the Contractor's responsibility to ensure that the tower sections, particularly the joints are protected from ending and alignment damage.
- .3 Installation of the towers and foundations must not disturb the integrity of the existing facilities or the continued operation of the existing light station.

3.3 Site Preparation

- .1 Complete installation of all foundation elements prior to tower erection.

3.4 Temporary Aid Installation

- .1 For bidding purposes, bidders shall assume that the existing front tower will be used as a temporary aid.
- .2 The contractor shall be responsible for lifting the existing tower into place for use as a temporary aid. The tower weighs 6730 lbs [3060 kg]
- .3 Work preparing the foundation for and the installation of the new front tower shall be scheduled such that it progresses with little to no interruption, keeping the temporary aid in service for a minimal amount of time.

3.5 Tower Installation

- .1 Each anchor bolt shall have two [2] HAS steel nuts meeting the requirements of the provided drawings.
 - .1 Contractor shall tighten the first nut using Turn of Nut method associated to the length of bolt provided. The second nuts shall be snug tight to lock into place the two nuts.
- .2 Erect towers in accordance with contractor submitted Tower Erection Plan;
- .3 Grout between tower bases and prepared concrete foundations
- .4 All bolted connections shall be made following the turn of nut procedure.



SECTION: 310000 EARTHWORK

PART 1 - GENERAL

1.1 General

- .1 Work under this section includes the supply of all labour, material and equipment required to complete the following:
 - .1 The excavations for the installation of the rear tower base foundation, including:
 - .1 Stripping and stockpiling of existing topsoil or granular materials to expose subgrade;
 - .2 Backfilling of the excavation, including:
 - .1 Supply of all required materials;
 - .2 Supply of imported granular materials (if necessary); and
 - .3 Placement and/or compaction of granular material.
 - .2 The restoration of all disturbed areas within the work site;

1.2 References

- .1 Work under this section shall be undertaken in strict conformance with all listed references. In the case of any conflict or discrepancy, the more stringent requirements shall apply.
 - .1 Canada Labour Code Part II
 - .2 NRC-CNRC National Building Code of Canada
 - .3 Ontario Occupational Health and Safety Act and Regulations
 - .4 CAN/CSA-A23.1-04 Concrete Materials and Methods of Concrete Construction
 - .5 Any and all other Provincial/Territorial Regulations and Policies; Worker's Compensation Board Policies; Local municipal regulations; pertaining to work of this section.

1.3 Submittals

- .1 Submittals shall be forwarded to Coast Guard in accordance with the provisions of section 013300.
- .2 Excavation Plan
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:



.1 The Excavation Plan shall outline the Contractor's planned excavation and backfill procedures and should detail the following.

- .1 Proposed side slopes and control measures;
- .2 Dewatering measures, if necessary;
- .3 Measures to be taken to prevent exposed soils from freezing;
- .4 Stockpile locations and methods for controlling erosion;
- .5 Backfill equipment types and procedures. Contractor shall provide methods for undertaking backfill placement in cold weather, if reasonably anticipated;
- .6 Include shop drawings of any shoring or bracing required. Drawings must be stamped by a licensed professional engineer;

1.4 Existing Conditions

- .1 A geotechnical investigation has been completed at this site and a copy of the report is included in Appendix G.
- .2 Prior to commencing excavation, document the condition of all existing structures, landscaping, roadways and other adjacent facilities anticipated to be impacted by the work.
- .3 Before commencing work under this section, the Contractor must:
 - .1 Establish the location of all buried services that may interfere with the execution of work; and
 - .2 Hire and arrange for a surveyor to conduct a field survey.
 - .1 The purpose will be to ensure that the new towers are installed in the correct positions and face the required direction.
 - .2 It shall be the contractor's responsibility to establish markers in addition to those provided by the surveyor such that references will not be obstructed or altered by excavation or construction activities and can then be used to accurately verify the proper location of each tower.
- .4 All work of this section shall be witnessed by coast Guard or its representative unless permission is received in writing otherwise.

1.5 Quality Assurance

- .1 Coast Guard's minimum inspection requirements are detailed herein.
- .2 The Contractor shall be responsible to notify Coast Guard of the date and time that the works may be inspected. Notice must be provided no less than five [5] working days in advance to



satisfaction of Coast Guard, at the Contractor's expense. Work shall not progress until inspections have been completed and the Contractor has been provided with written notice to proceed with the works.

- .1 Subgrade verification: Coast Guard will arrange for a Geotechnical Engineer to inspect the sub-grade upon completion of any excavating where a design bearing surface is to be achieved. The Engineer shall indicate in writing that the sub-grade surface conditions are acceptable.
- .1 The Contractor shall inform Coast Guard no less than five [5] working days prior to beginning any excavation and foundation installation cannot proceed without a Geotechnical Engineer's approval.

PART 2 - PRODUCTS

2.1 General

- .1 All materials described in this section shall be supplied by the Contractor.
 - .1 Water shall be free of deleterious materials.
 - .2 Backfill may consist of stockpiled native (excavated) materials and must not be frozen.
 - .3 Granular materials shall be as per approved design drawings.

2.2 Backfill

- .1 Either 19mm [3/4"] clear crush stone (gravel) or granular B per OPSS 1001

PART 3 - EXECUTION

3.1 Site Preparation

- .1 Prior to commencing excavation, document the condition of all existing structures, landscaping, roadways and other adjacent facilities anticipated to be impacted by the work.
- .2 Install any features required to protect existing infrastructure.

3.2 Excavation

- .1 Strip topsoil over areas impacted by new construction and stockpile materials on-site;
- .2 Side slopes must be maintained around the perimeter of the excavation in accordance with provincial legislation;
- .3 Take all reasonable precautions to minimize the disturbance of the existing vegetation;
- .4 Install measures as detailed in Construction Plan to prevent excavation from freezing.



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3.3 Backfill

- .1 Ensure that surrounding soil is unfrozen or take measures to thaw frozen materials;
- .2 Backfill to be placed in uniform lifts to a maximum depth of 0.2 m (8 in) and compacted to 95% SPMDD.

3.4 Restoration

- .1 Restore all disturbed areas within work sites and along haul routes. Fill and grade all ruts. Ensure positive drainage away from completed and existing foundations.
- .2 Excavated materials shall be used given the following priority:
 - .1 Backfill around new foundation;
 - .2 Removed from site.



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APPENDIX A: SITE LOCATIONS AND PHOTOGRAPHS



Figure 1: Project Site
Goderich, ON



Figure 2: Project Site - Compass Minerals Goderich Salt Mine

LL780 Goderich North Pier Front Range: 43° 44'46.5573"N, 81° 43'50.0367"W

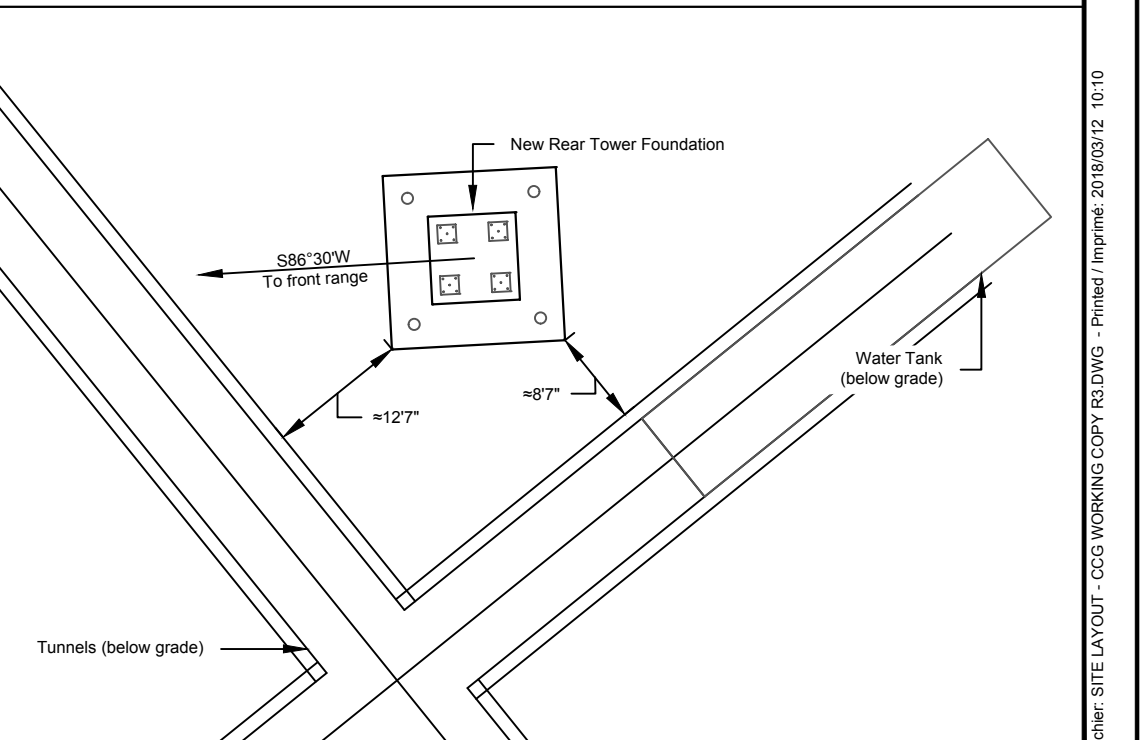
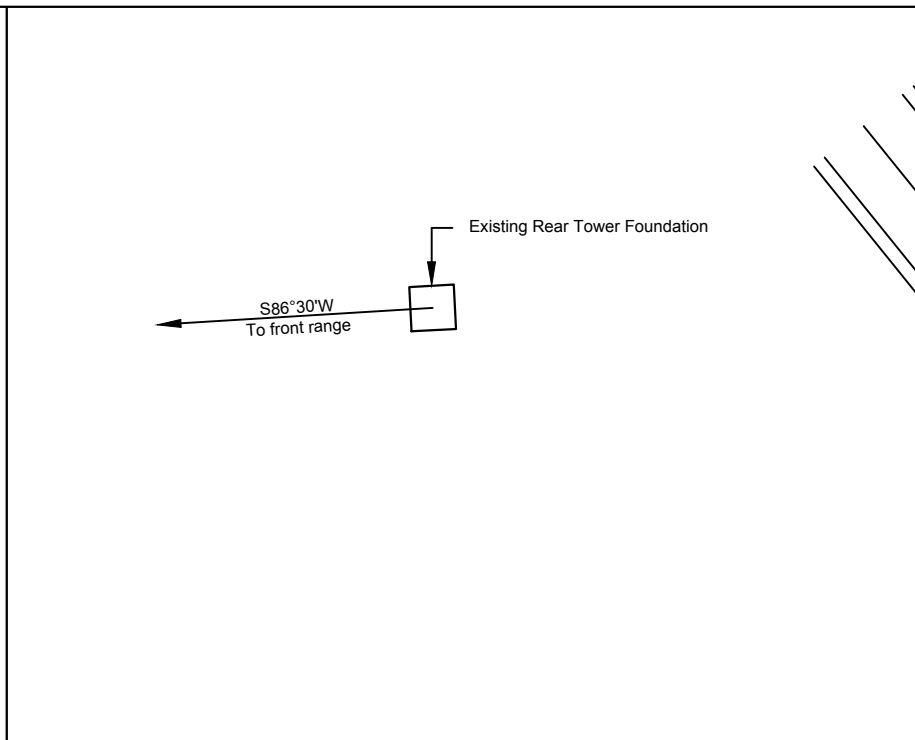
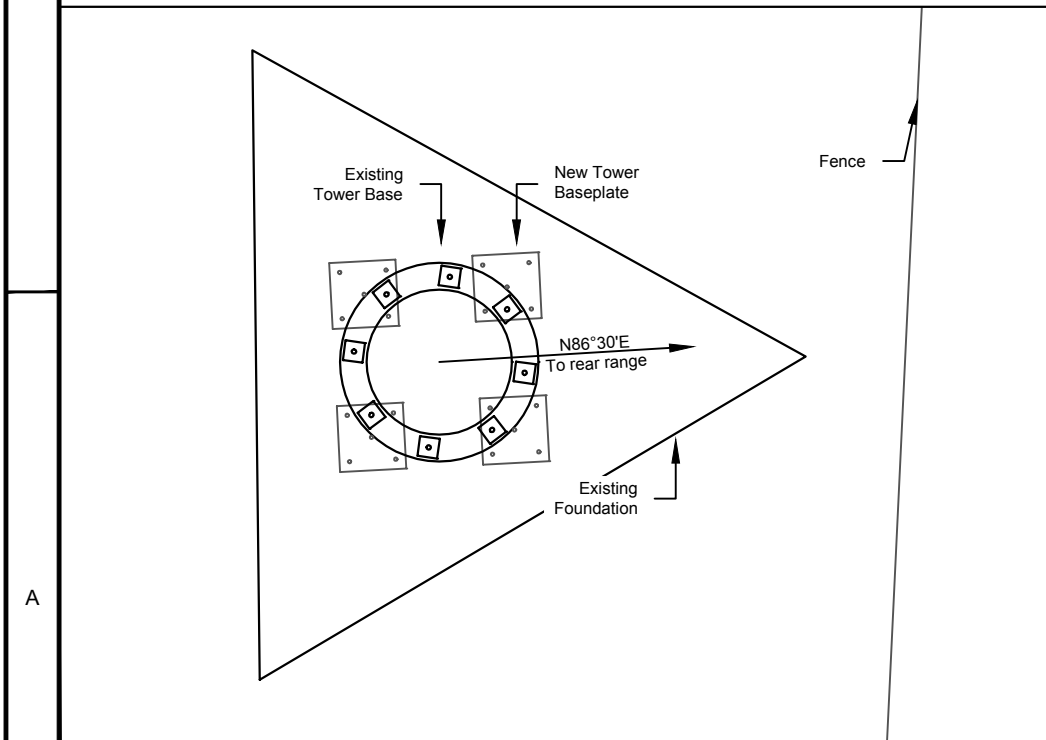
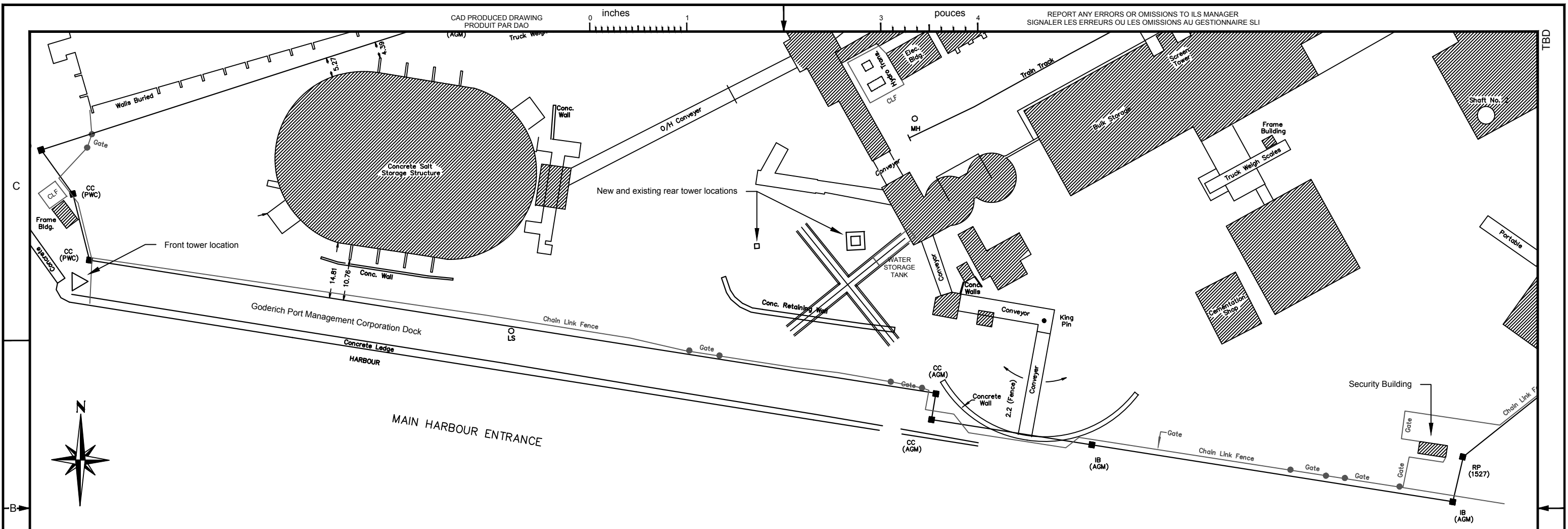
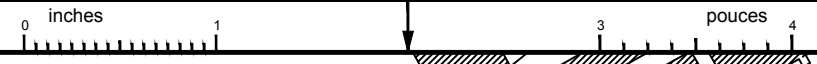
LL781 Goderich North Pier Rear Range: 43° 44'46.9131"N, 81° 43'41.9948"W



Figure 3: LL780 Goderich North Pier Front Range



Figure 4: LL781 Goderich North Pier Rear Range

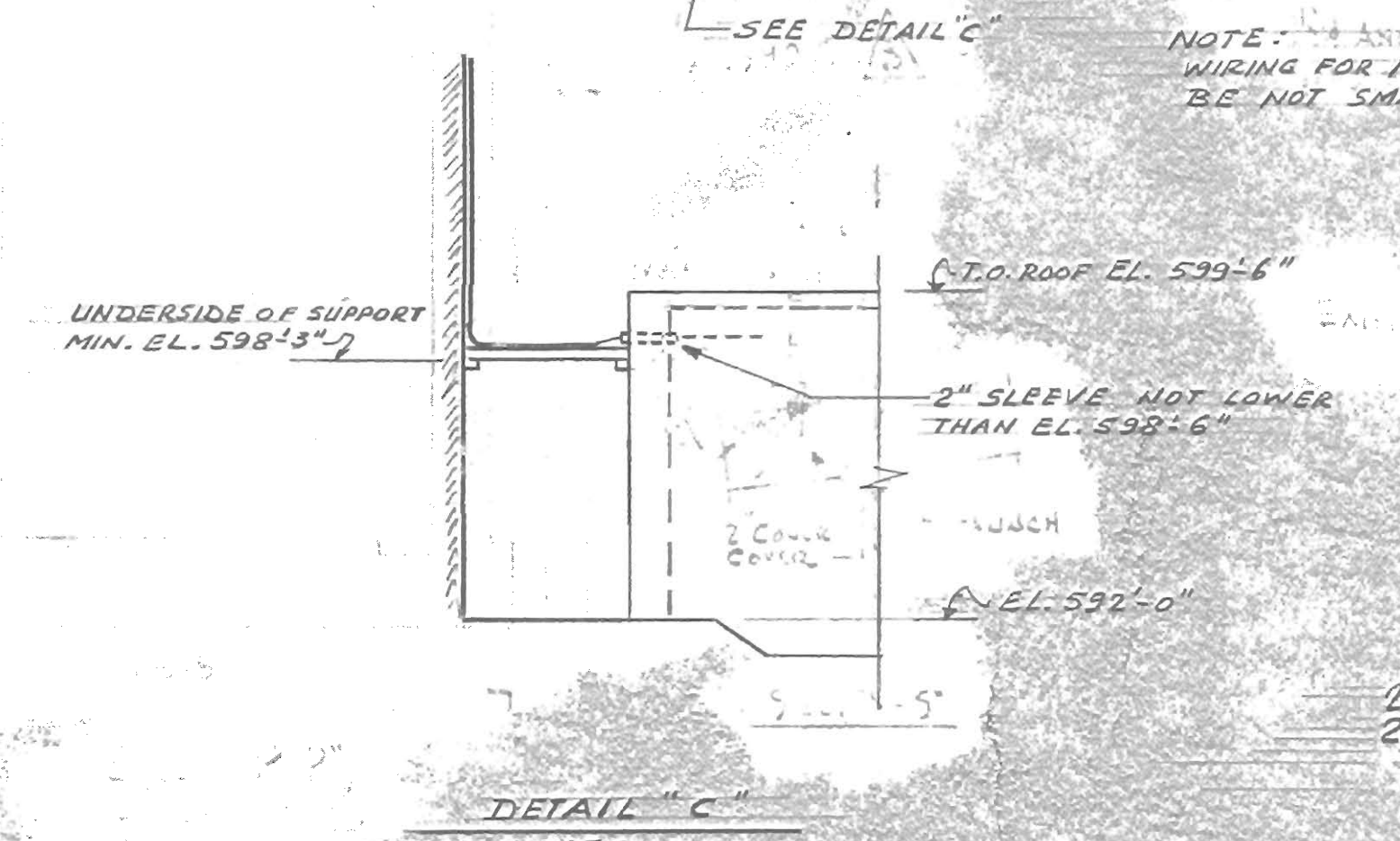
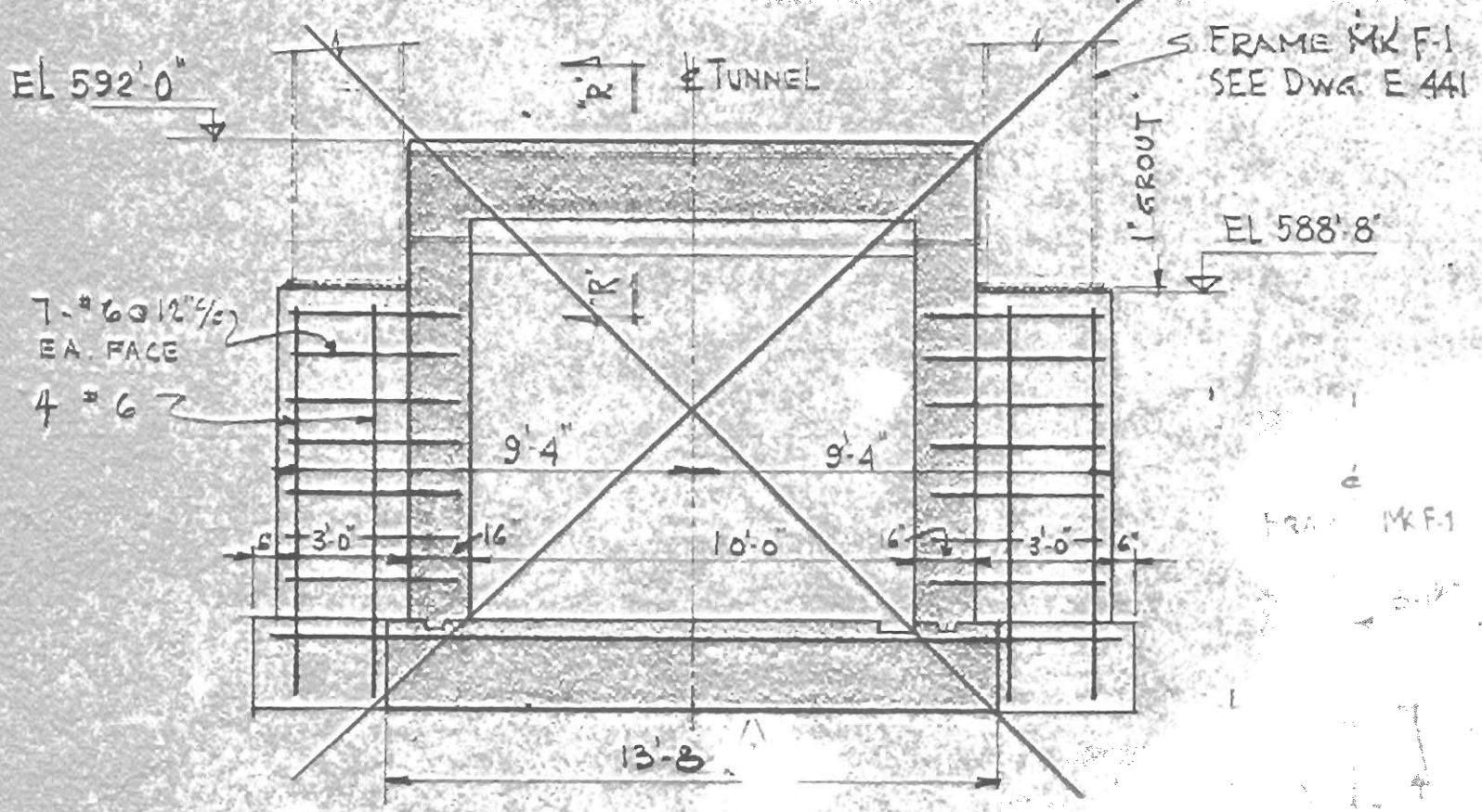
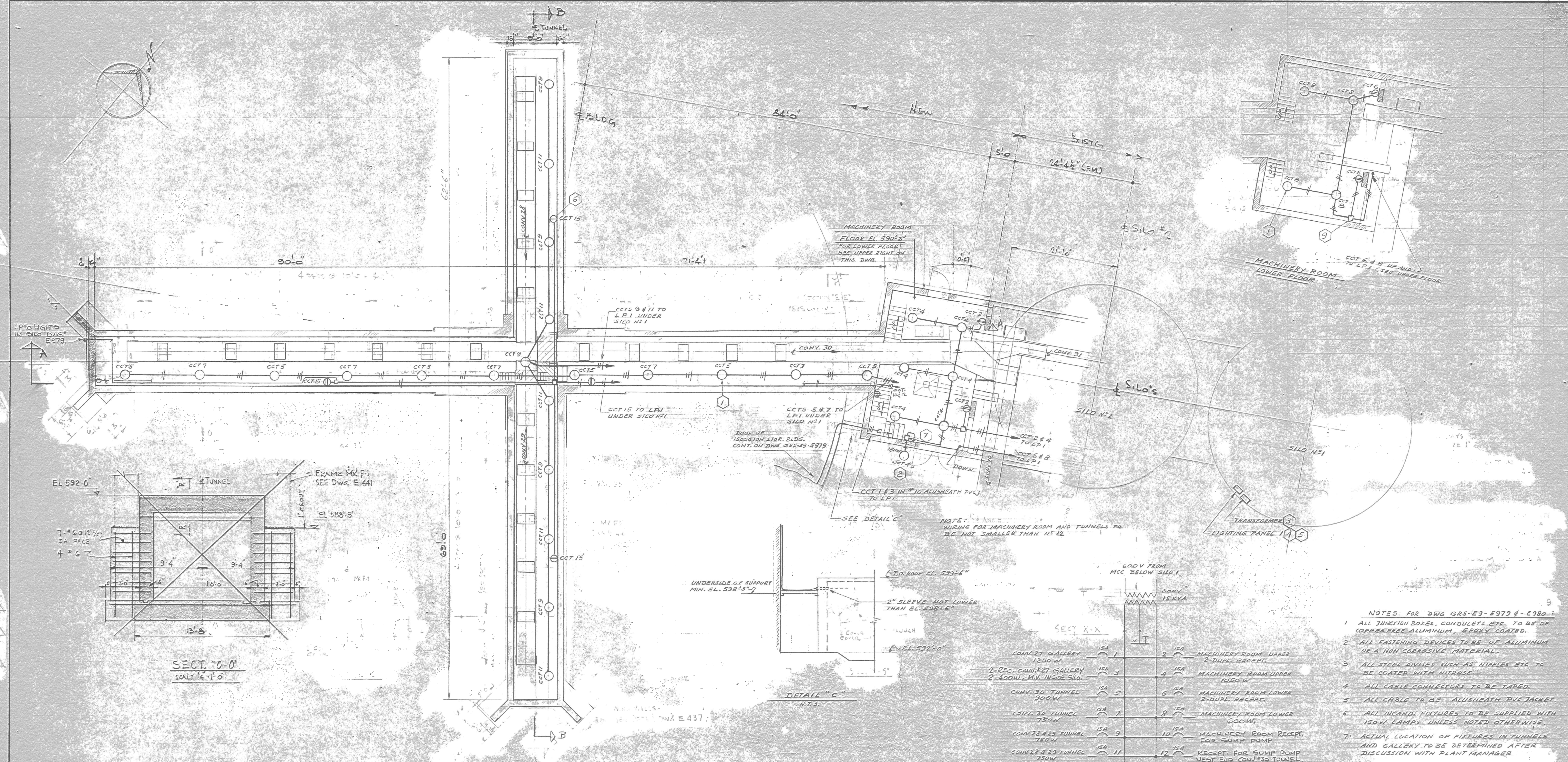


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designed - conception	date	checked - vérifié	date				
drawn - dessiné	date	approved - approuvé	date				
LL	2018-03-12			0	DESCRIPTION	BY	yyyy-mm-dd
CCG ref. no. - no. réf. GCC		scale - échelle		rev	description	by	Date
EWA 8010-20-0378		nts					

Asset - Actif
LL780 GODERICH NORTH PIER FR
LL781 GODERICH NORTH PIER RR

Drawing - Dessin		SITE PLAN GODERICH SALT MINE	
drawing no. - no. dessin	sheet-feuille	rev	
TBD	01/01	0	

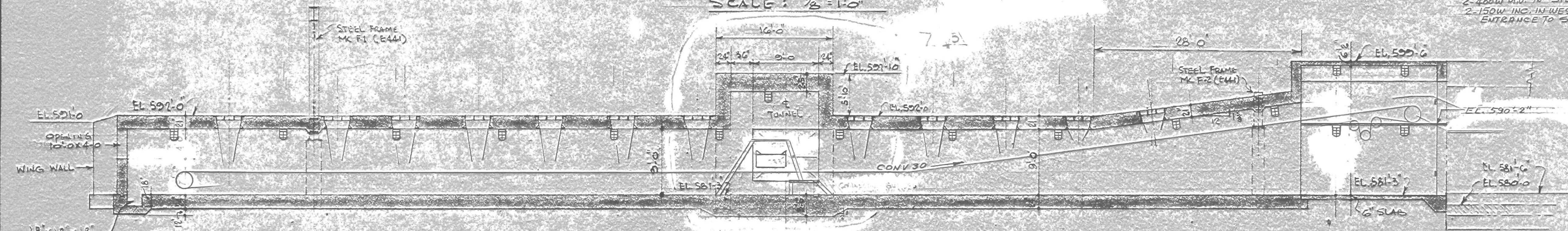


600V FROM MCC BELOW SILO 1

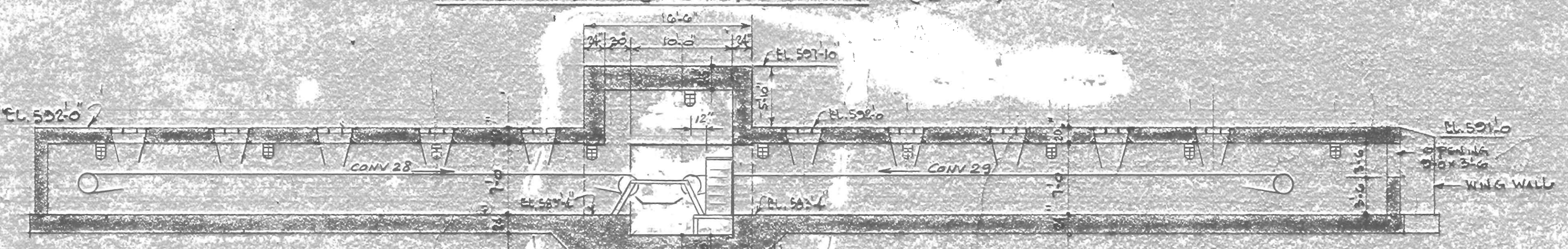
NO.	DESCRIPTION	AMOUNT	REMARKS
1	CONCRETE GALLERY 1200 W	1	15A
2	2-DECK CONVEYER GALLERY 2-ADJUV. M.H. INSIDE SILO	3	15A
3	CONV. 30 TUNNEL 300 W	5	15A
4	CONV. 30 TUNNEL 150 W	7	15A
5	CONV. 28 & 29 TUNNEL 150 W	9	15A
6	CONV. 28 & 29 TUNNEL 75 W	11	15A
7	SPARE	13	15A
8	4 RECEPT IN TUNNEL 2-ADJUV. M.H. INSIDE ENTRANCE TO SILO	15	15A
9	SPARE	16	15A

- NOTES FOR DWG GRS-E9-E979 & E980:
- 1 ALL JUNCTION BOXES, CONDUITS ETC. TO BE OF COPPERFREE ALUMINUM, EPOXY COATED.
 - 2 ALL FASTENING DEVICES TO BE OF ALUMINUM OR A NON CORROSSIVE MATERIAL.
 - 3 ALL STEEL DEVICES SUCH AS NIPPLES ETC. TO BE COATED WITH NITROSE.
 - 4 ALL CABLE CONNECTORS TO BE TAPED.
 - 5 ALL CABLE TO BE ALUSHEATH PVC JACKET.
 - 6 ALL INCANDE. FIXTURES TO BE SUPPLIED WITH 150W LAMPS UNLESS NOTED OTHERWISE.
 - 7 ACTUAL LOCATION OF FIXTURES IN TUNNELS AND GALLERY TO BE DETERMINED AFTER DISCUSSION WITH PLANT MANAGER.

PLAN VIEW
SCALE: 1/8" = 1'-0"



LONGITUDINAL SECTION 'A-A' (1/8" = 1'-0")



SECTION 'B-B'

MICROFILMED

REVISED AS-BUILT	JAN 12-70
NO. REVISIONS	DATE APPROVED

DOMTAR Domtar Limited
CENTRAL ENGINEERING DEPT. MONTREAL, QUE.

PLANT: 5150 SALT DIV. GODERICH, ONT.
15,000 TON SURFACE STORAGE BLDG.
CONCRETE TUNNEL LIGHTING LAYOUT

4	2P-FOR PLANT RECORDS	JAN 12-70	
3	2P-ONT. DEPT OF MINES FOR APPROVAL	JUN 17 1969	
2	2P-38 W-10-W.G.M. FOR CONSTRUCTION	JUNE 1969	
1	TENDERED TO B.C. 10 W.G.M. 1/2" X 3/4" 10" FILE	MAY 23 1969	

GRS-E9-E986	BILL OF MATERIAL
GRS-E9-E979	CONCRETE GALLERY LIGHTING
DWG. NO.	REFERENCE

REV. NO.	ISSUED TO	DATE	APPROVED
NO.	NO.	NO.	NO.

SCALE: 1/8" = 1'-0"	APPROVED
DATE: MAY 11 1969	PLANT CODE: GRS E9
CHKD.:	DRAWN: H. SPITZ
	APP. NO.:



APPENDIX B: SUMMARY OF SUBMITTALS

Following Contract Award

Deadline	Submission Description	Reference Section(s)
10 working days following award	Detailed schedule	011100 – 1.3.2
	Proof of Qualifications	011100 – 1.3.3
10 working days prior to mobilization	Construction Plan	
	a) Project Specific Safety Program	013530 – 1.3.2
	b) Project Environmental Protection Plan	013543 – 1.3.2
	c) Detailed Demolition Plan	024116 – 1.3.2
	d) Foundation construction Plan	033000 – 1.4.2
	e) Tower Erection Plan	133613 – 1.3.2
	f) Excavation Plan	310000 – 1.3.2
28 calendar days after construction		011100 – 1.3.5
	As-built and QA/QC documents	033000 – 1.3.3
		133613 – 1.3.3
Upon request of Coast Guard	Completed Field Level Hazard Assessment (FLHA) forms	013530 – 1.3.3
	Product specifications and/or samples	016100 – 1.5
	Copies of certified receipts from the disposal sites	024116 – 1.3.4



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APPENDIX C: SUMMARY OF WORK REQUIRED



SUMMARY OF WORK REQUIRED

ITEMS	LAND OWNER	DESCRIPTION	SERVICE REQUIRED
FRONT TOWERS	Goderich Port Authority	Existing: 20 ft Claymar Tower	<p>Reposition tower for use as temporary aid</p> <p>After CCG commissioning of new tower complete: Remove temporary tower and all appurtenances, Salvage existing light and batteries to CCG, Properly dispose of all other materials.</p>
		New: 25 ft FRP Tower	Supply and install new tower as per drawings provided, Allow 2 days for CCG commissioning
REAR TOWERS	Compass Minerals	New: 50 ft FRP Tower	<p>Install new foundation, Supply and install new tower as per drawings provided, Allow 2 days for CCG commissioning</p>
		Existing: 50 ft Steel Tower	<p>After CCG commissioning is complete: Remove tower and all appurtenances, Remove existing foundation to grade, Salvage existing light and batteries to CCG, Properly dispose of all other materials.</p>



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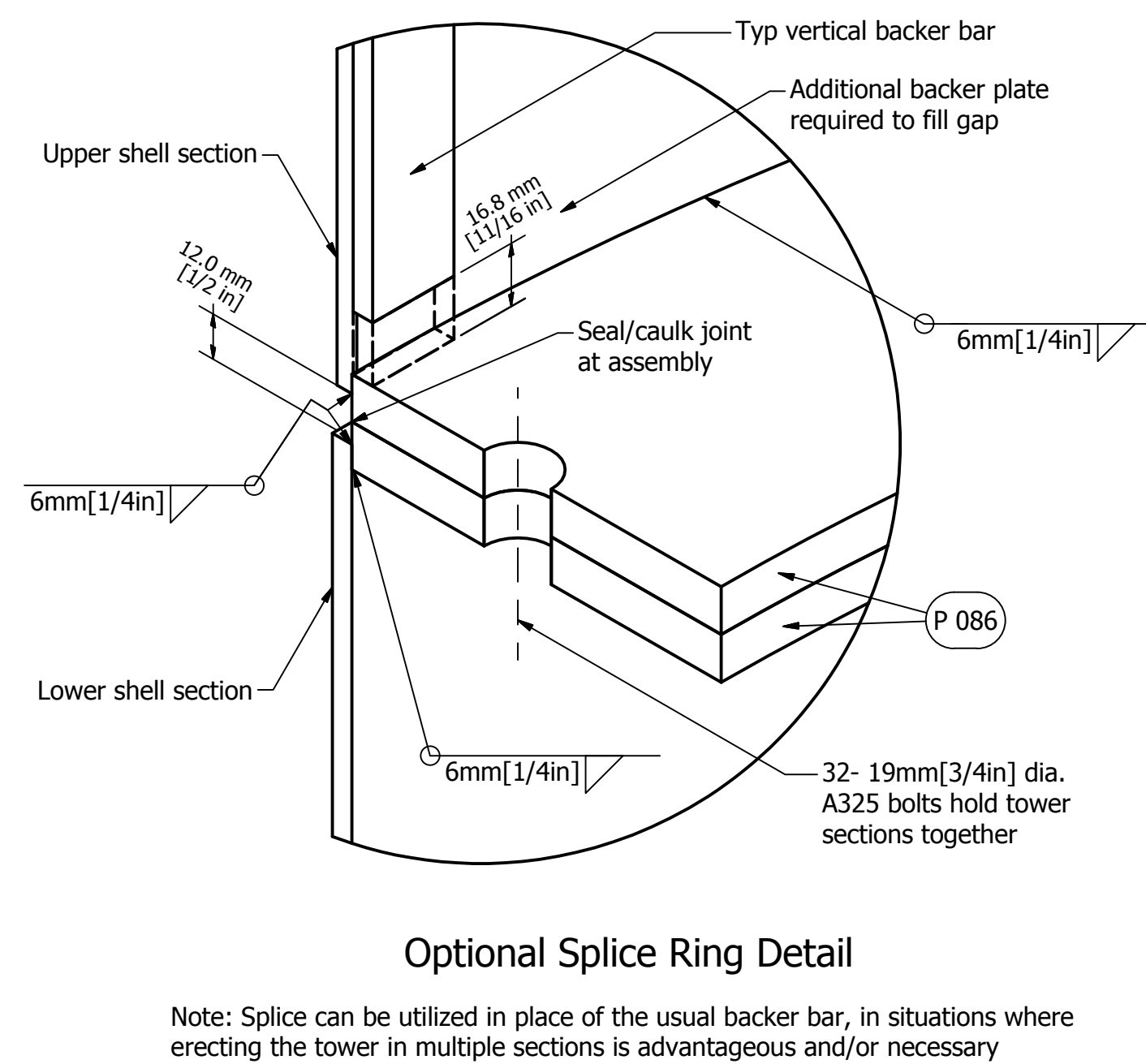
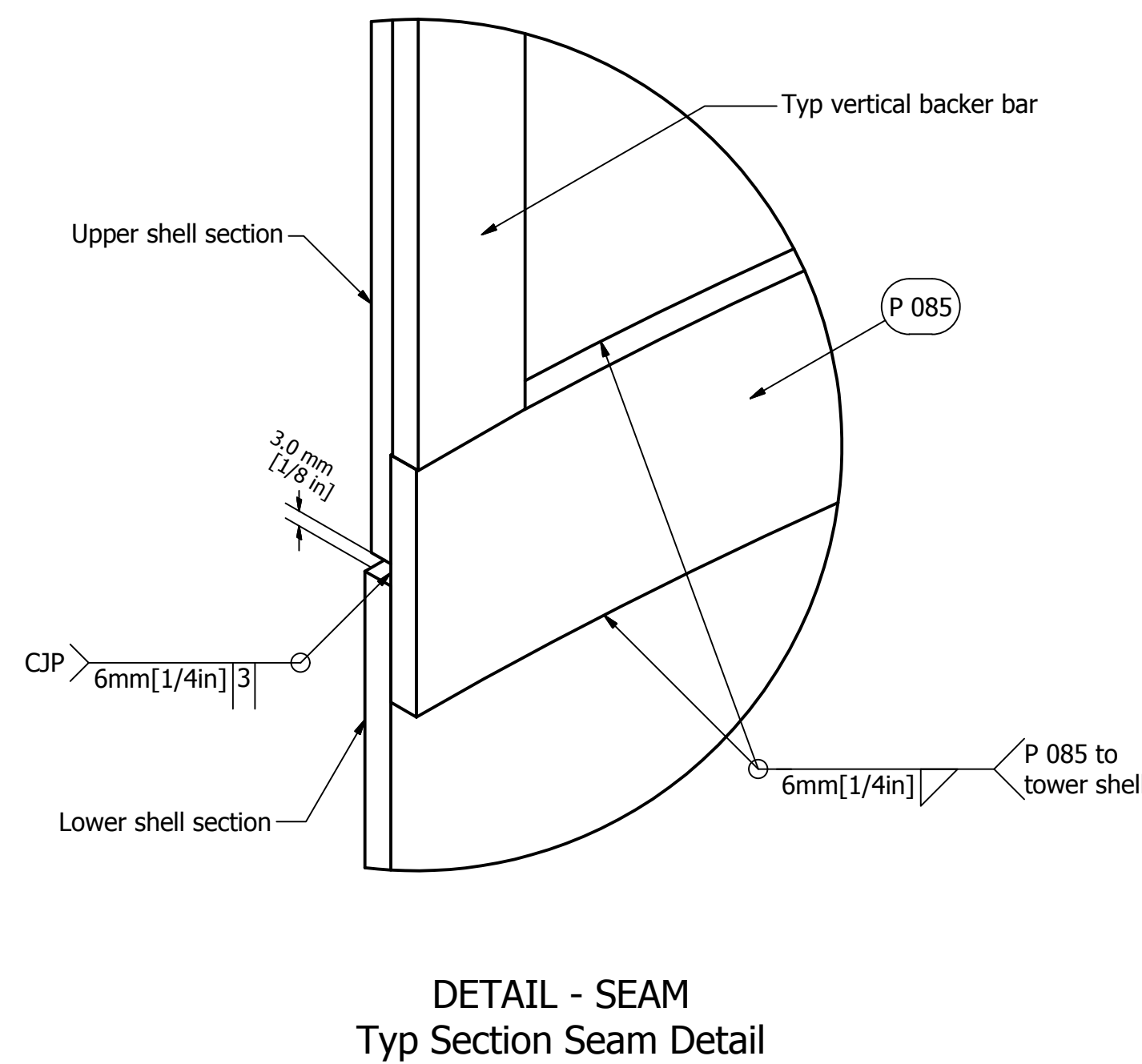
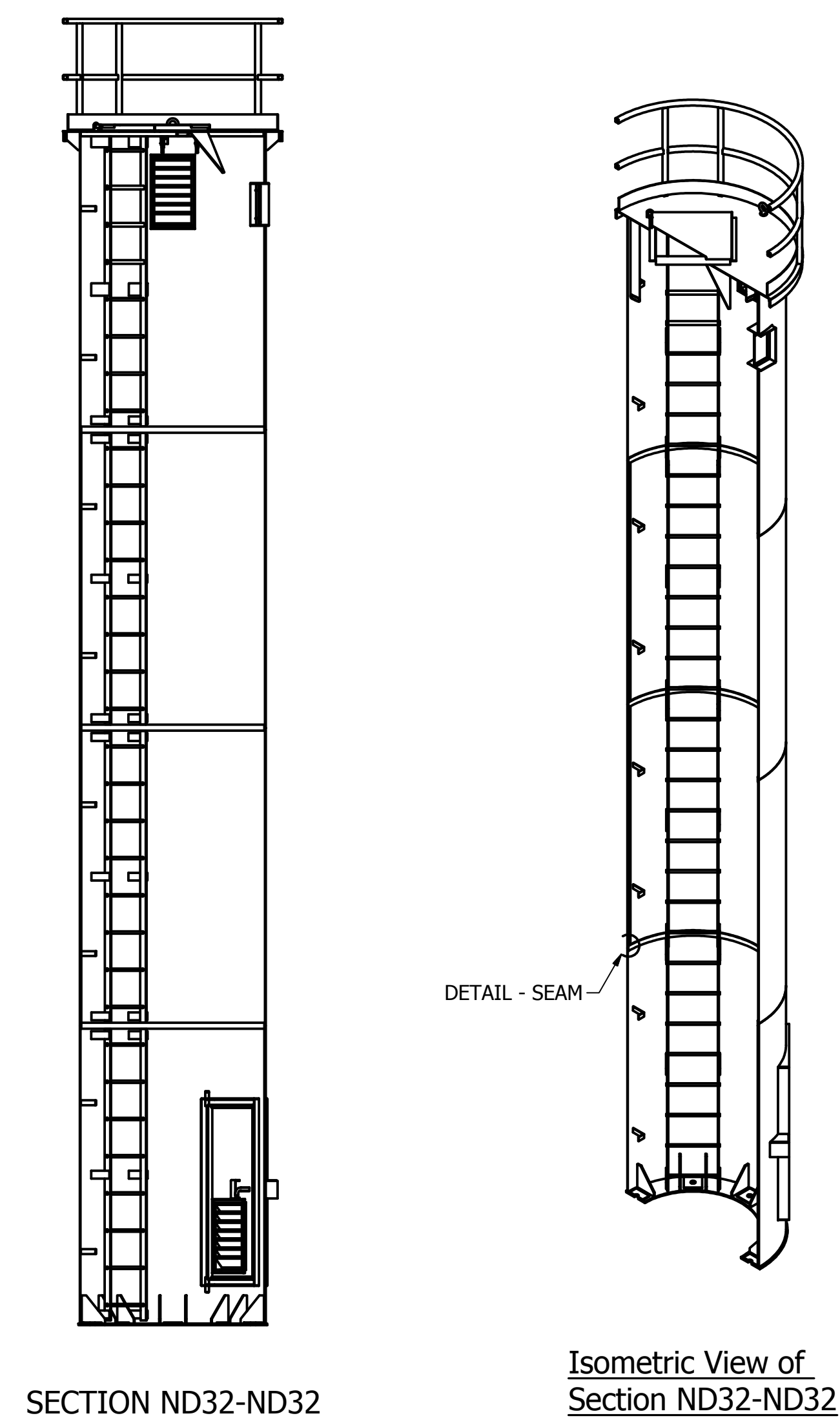
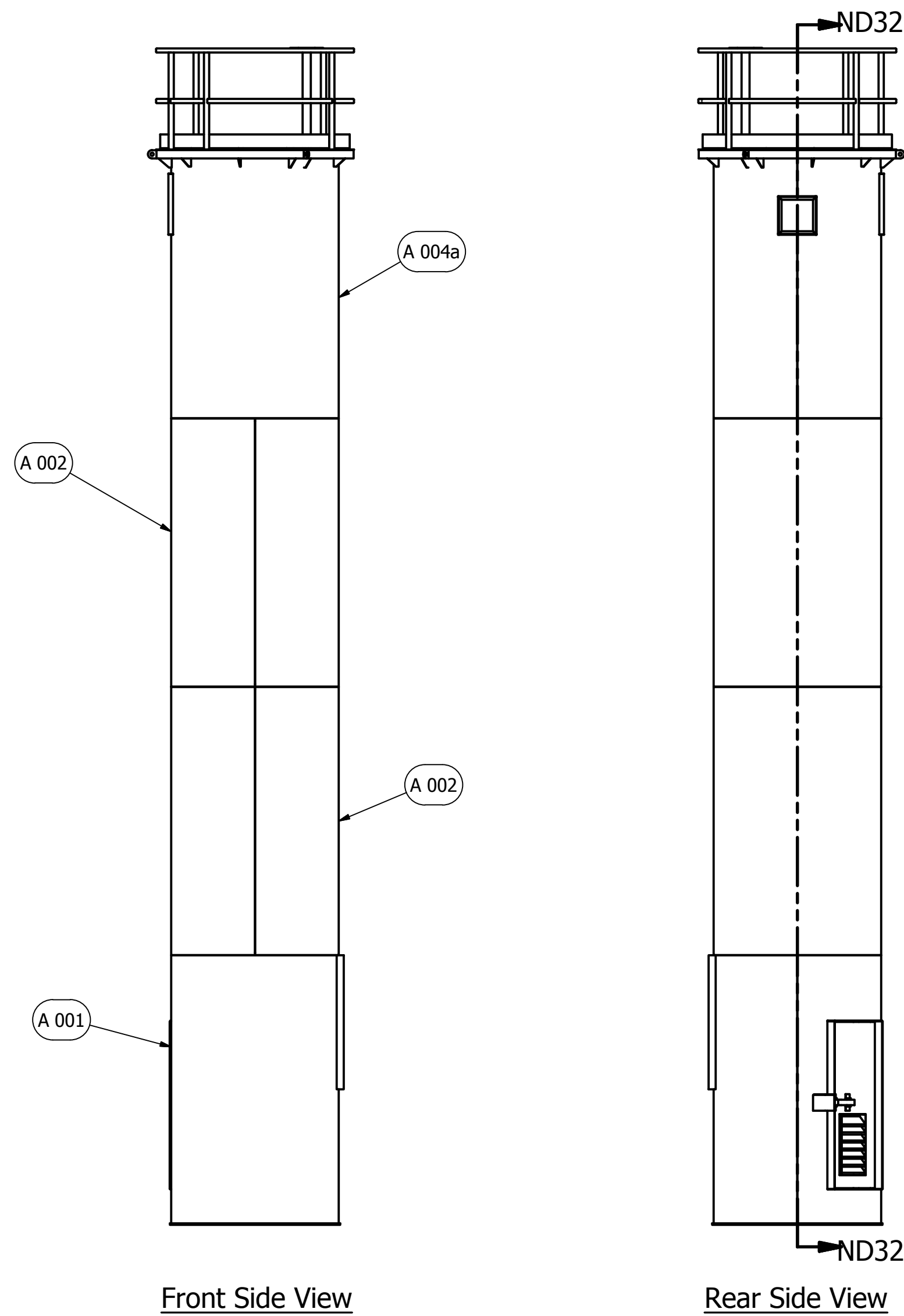
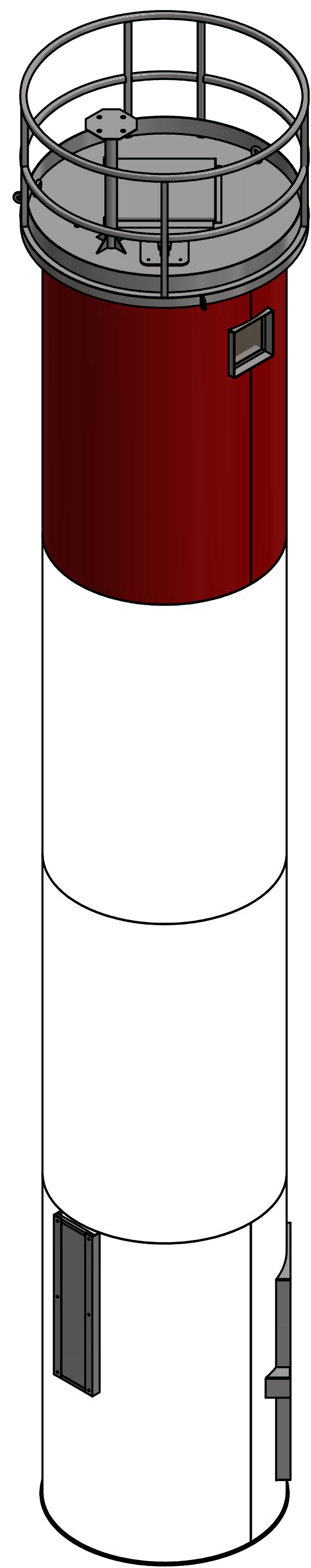
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APPENDIX D: EXISTING TOWER DRAWINGS

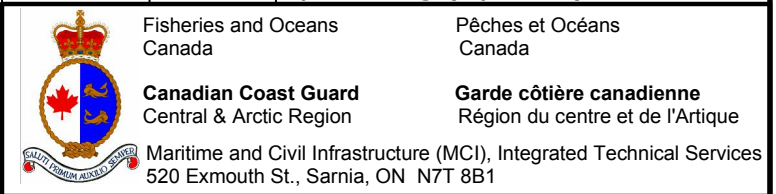
Canadian Coast Guard 32' Claymar Tower



Notes:

- Design Location - Great Lakes, Ontario shore line, from Cornwall to Thunder Bay. Wind design loads include allowance for wind speed up on hill top location (Maximum hill height = 45m).
- Design shall be in accordance with the National Building Code of Canada. (NBC 2005), NBC 1995 Structural Commentaries (wind) and CSA S16-01.
- All work to comply with CSA S16-01, NBC 2005 & Canada Labour Code.
- Materials**
 - Structural Shapes - CSA G40.21M, Grade 300W.
 - HSS - CSA G40.21M, Grade 350W, CL. C.
 - Plates & Bar - CSA G40.21M Grade 300W.
- Welding**
 - Electrodes - E49XX (E70XX).
 - All connections shall be fully welded U.N.O.
 - Fabricator must be certified by CWB to CSA standard W47.1, division 1 or 2.1
 - Shall be in accordance with CSA S16-01, W47 & W59, latest version.
 - Remove all weld splatter, sharp edges & corners
 - Provide 6x50mm [1/4x2in] Backer Bar on all tower fabricated seams, weld 100% inside.
- Galvanization**
 - Tower to be hot dip galvanized
 - Hot dip galvanizing shall conform to CAN/CSA-G164
- Bolts**
 - Structural Bolts - ASTM A325 U.N.O.
- Paint**
 - Primer - CAN/CGSB-1.40 ALKYD Type.
 - Paint - CAN/CGSB-1.60 ALKYD Enamel or High Build Mastic Epoxy or Polyurethane.
 - Apply in accordance with CGSB 85-GP-14M.
- Fall Protection**
 - Supply and install DBI-SALA "LAD-SAF" system in accordance with manufacturer's instructions.
 - Installation must allow for simultaneous use by two personnel.
 - D-Ring Anchorage - DBI SALA D-Ring Anchorage Connector, Stainless Steel D-Ring, Stainless Steel Anchorage Plate with 9/16in Dia. mounting holes.
 - 9.5mm [3/8 in] doubler Plate to be installed as shown.
- Manufacturing Tolerance**
 - Maximum out of roundness of 1% on diameter, $D_{max} - D_{min} = 0.6in$.

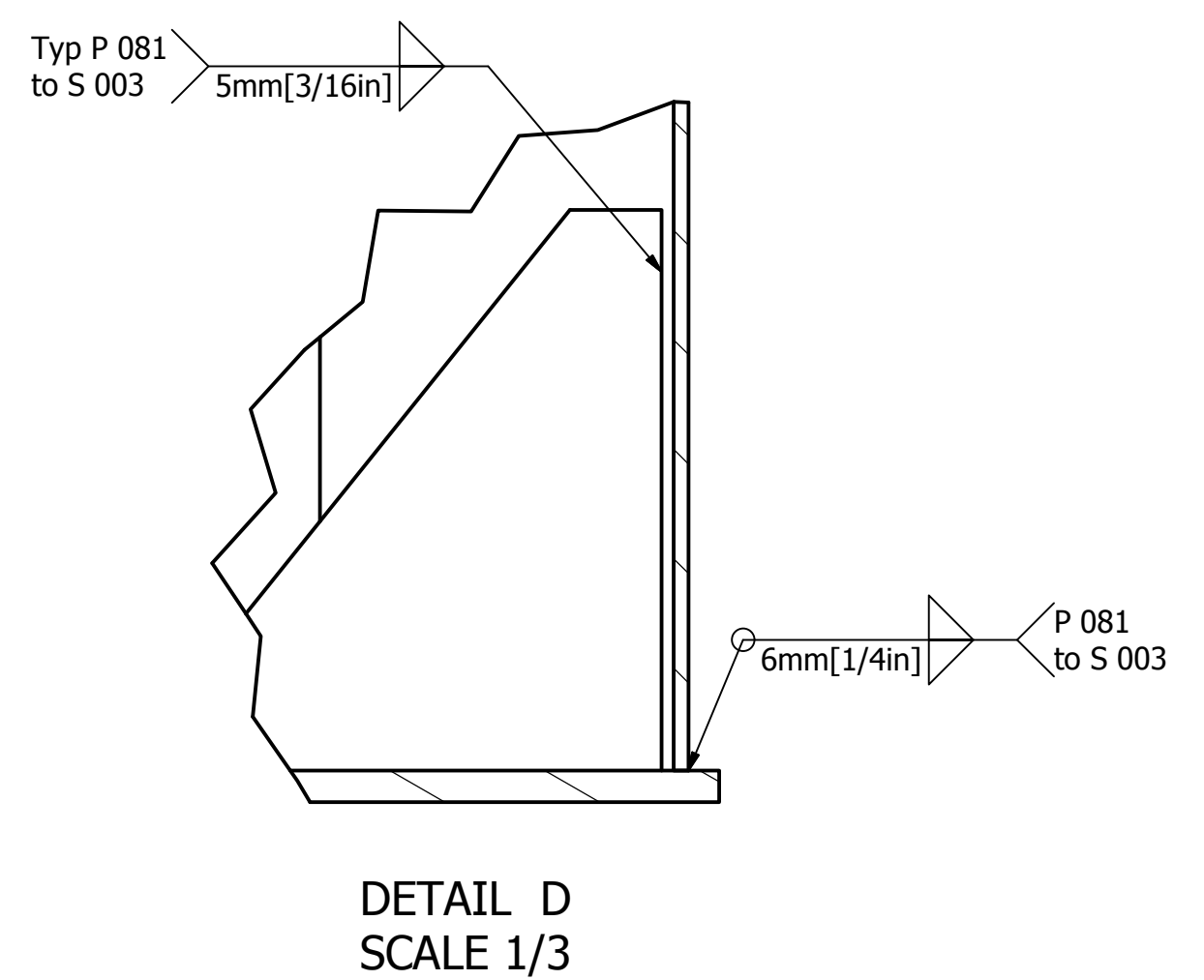
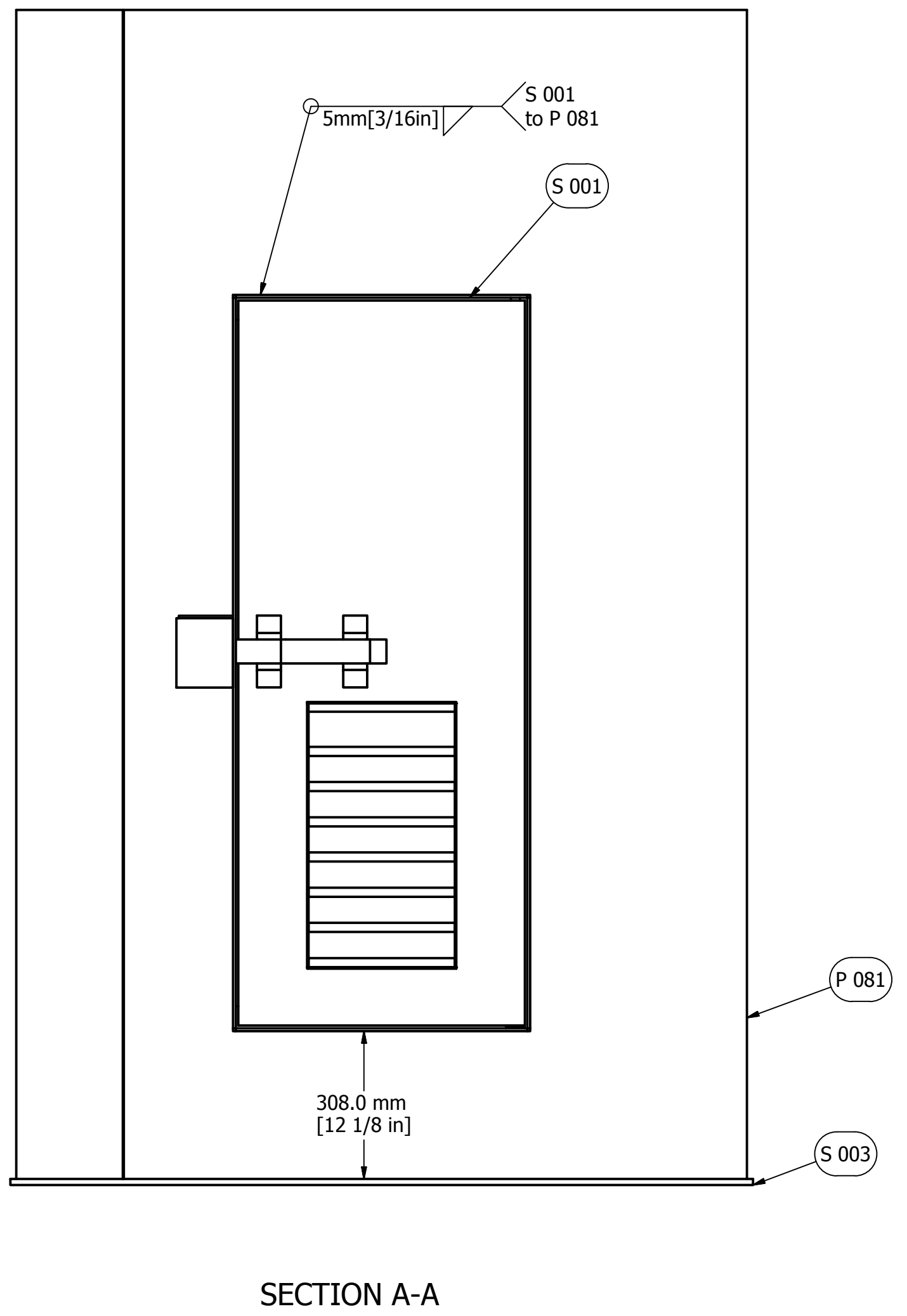
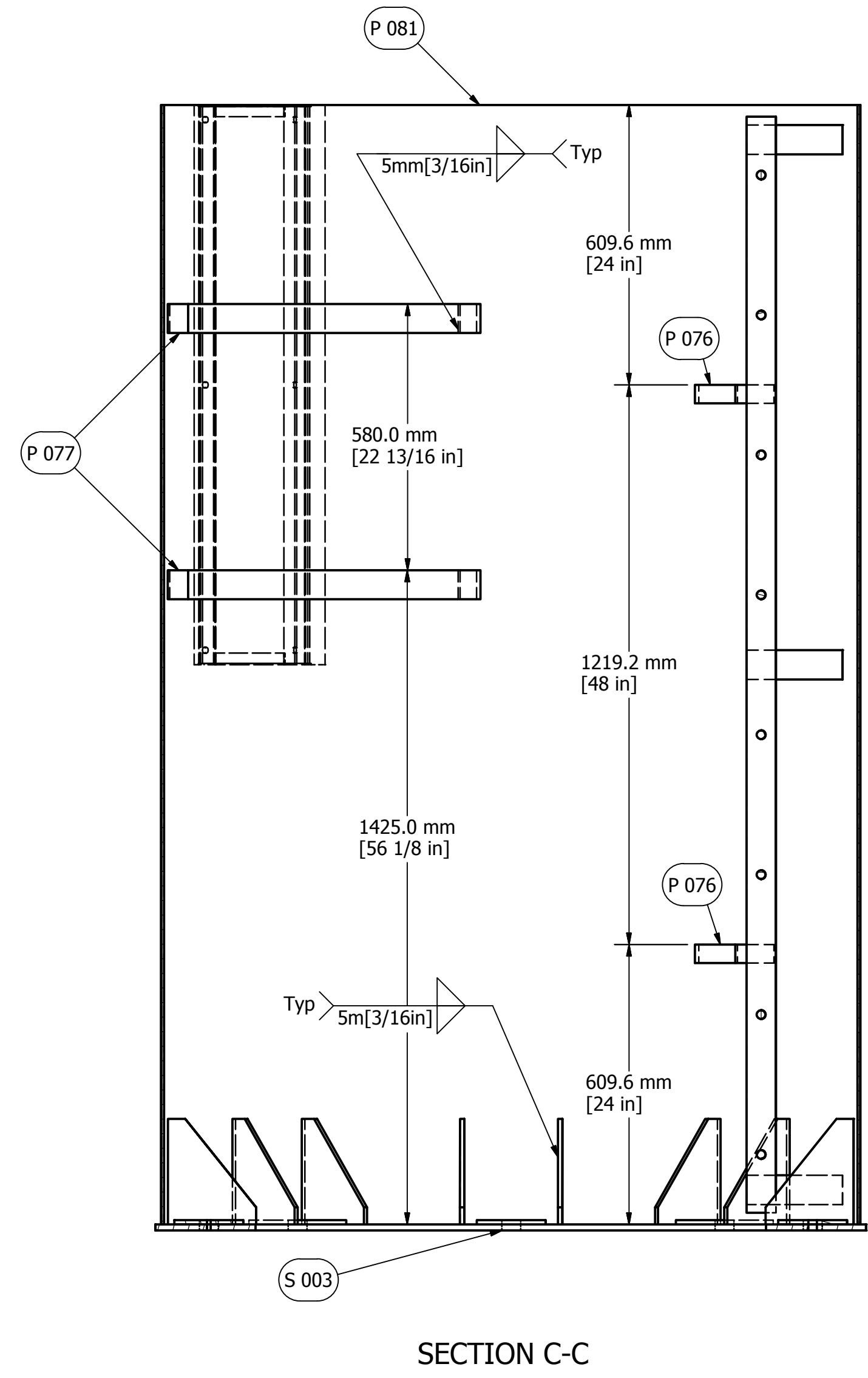
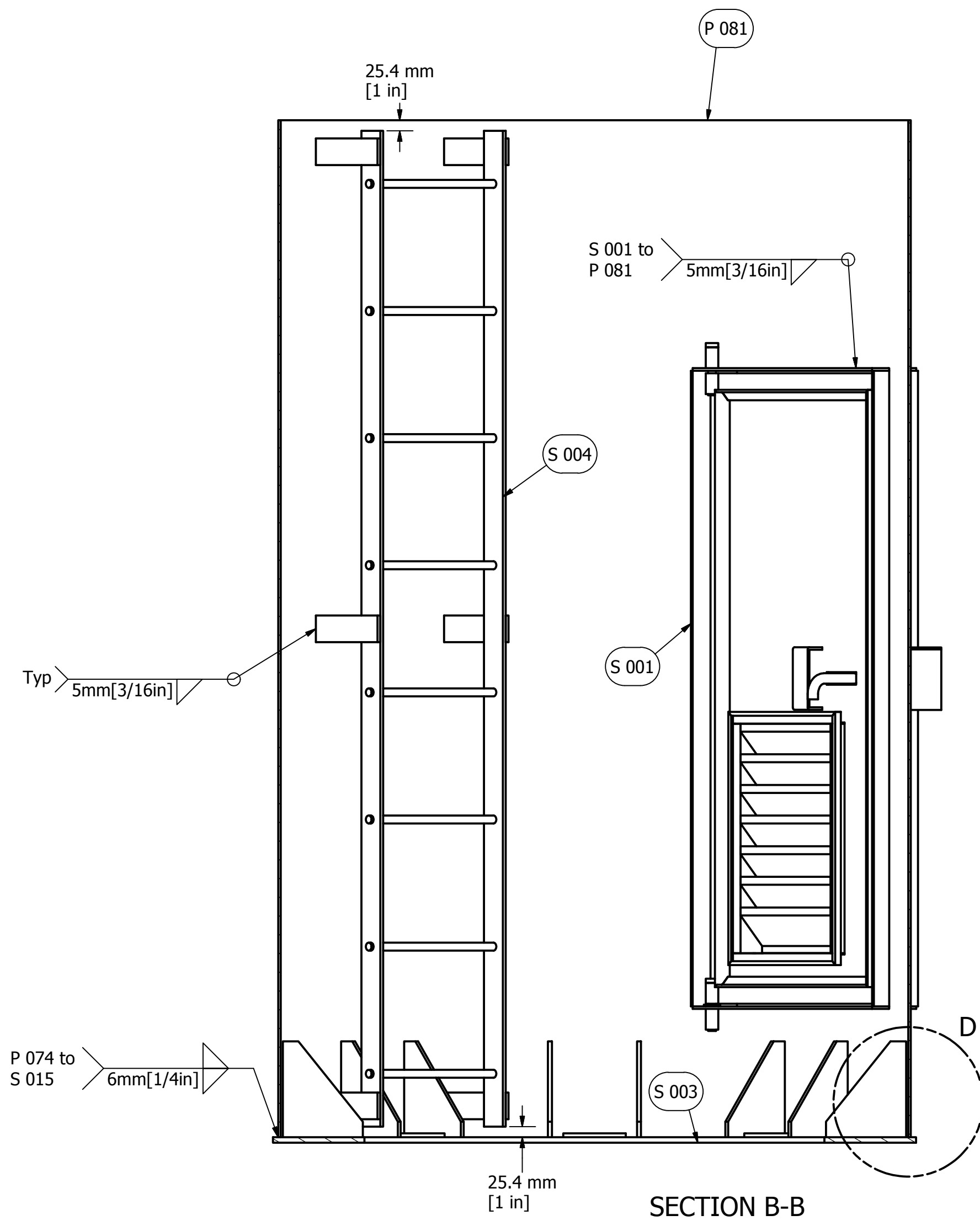
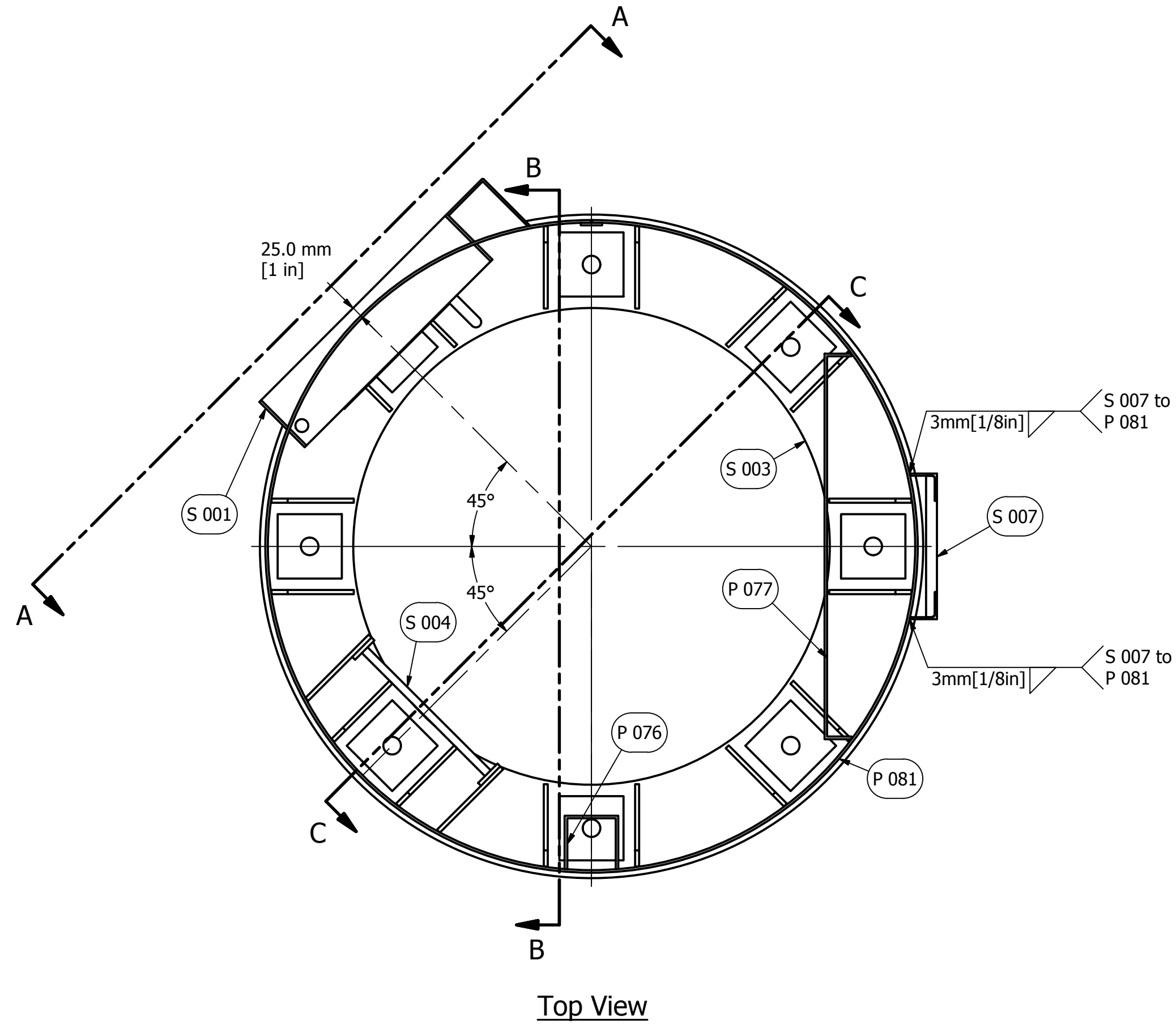
PARTS LIST		
ITEM	QTY	DESCRIPTION
A 001	1	Bottom Assembly
A 002	2	8' Middle Assembly
A 004a	1	Top Assembly
P 085	3	Backer Bar
P 086	6	Splice Ring (Optional)



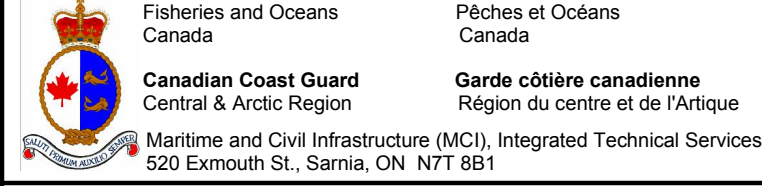
Cover Page

FILE No.	06044	SCALE:	N.T.S.	DWG No.	1 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
0	N/A	DRAWING INITIATED	A.W.	A.W.	
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.	

All Dimensions in mm unless otherwise noted.

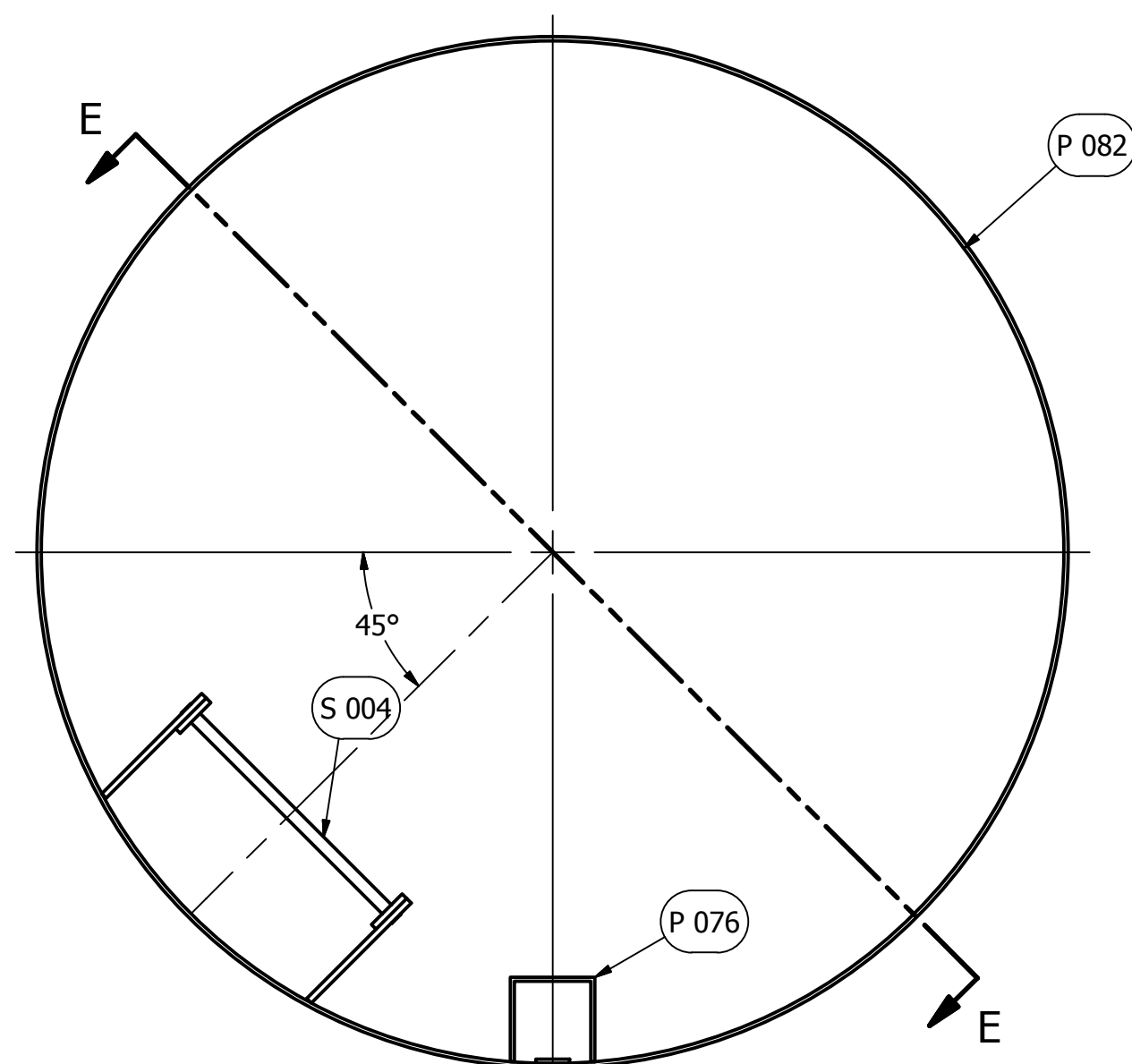


PARTS LIST		
ITEM	QTY	DESCRIPTION
P 076	2	Cable Guide
P 077	2	Electrical Panel Bracket
P 081	1	Bottom Tower Shell
S 001	1	Door Assembly
S 003	1	Base Ring Assembly
S 004	1	Interior Ladder
S 007	1	Sign Assembly

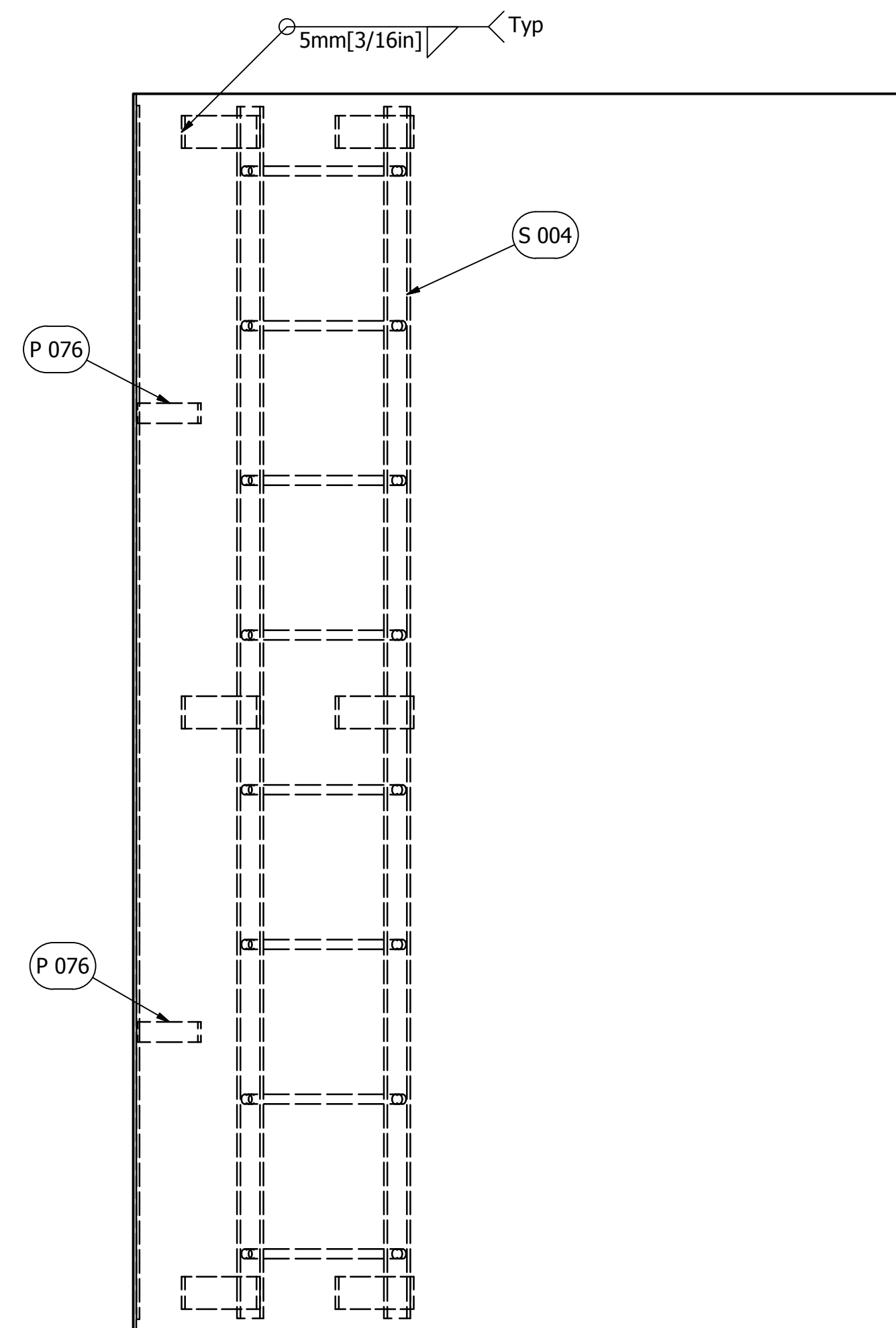


A 001				
Bottom Assembly				
FILE No. 06044	SCALE: N.T.S. DWG No. 2 of 22			
Rv.	DATE	DESCRIPTION	DRAWN	APP'D
0	N/A	DRAWING INITIATED	A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.

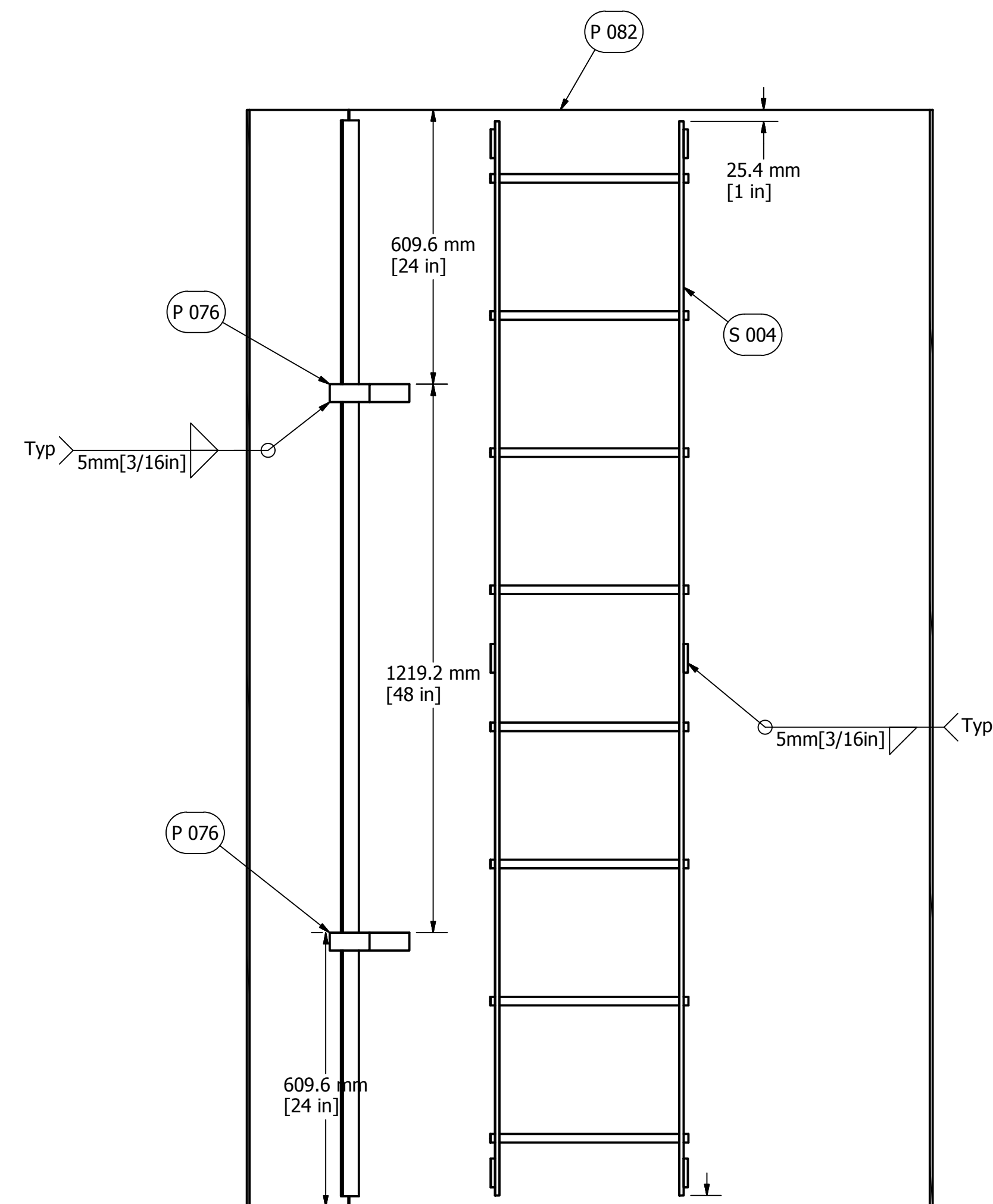
All Dimensions in mm unless otherwise noted.



Top View

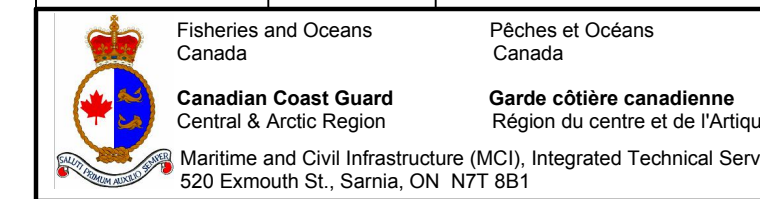


Right Side View



SECTION E-E

PARTS LIST		
ITEM	QTY	DESCRIPTION
P 076	2	Cable Guide
P 082	1	8' Middle Tower Shell
S 004	1	Interior Ladder

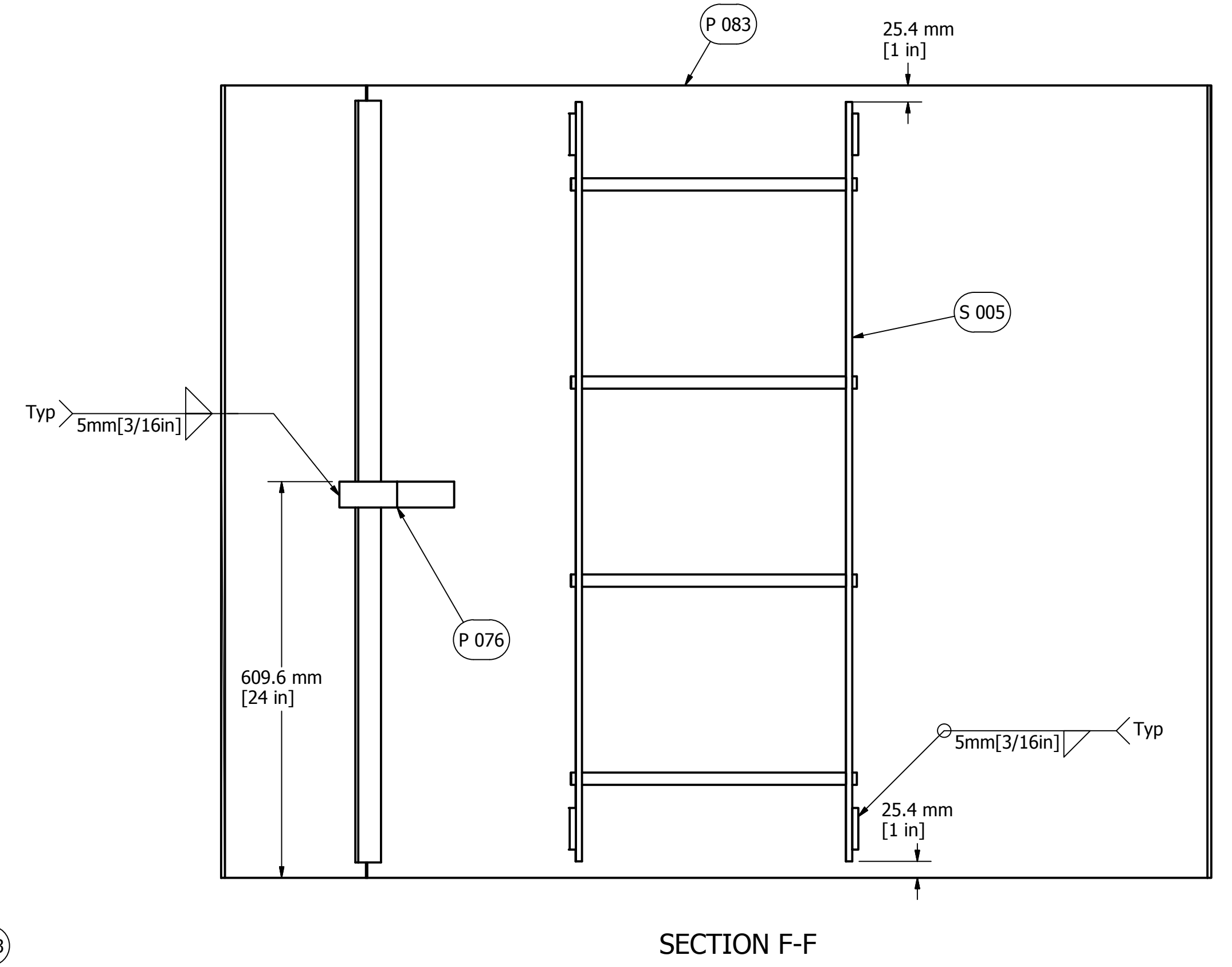
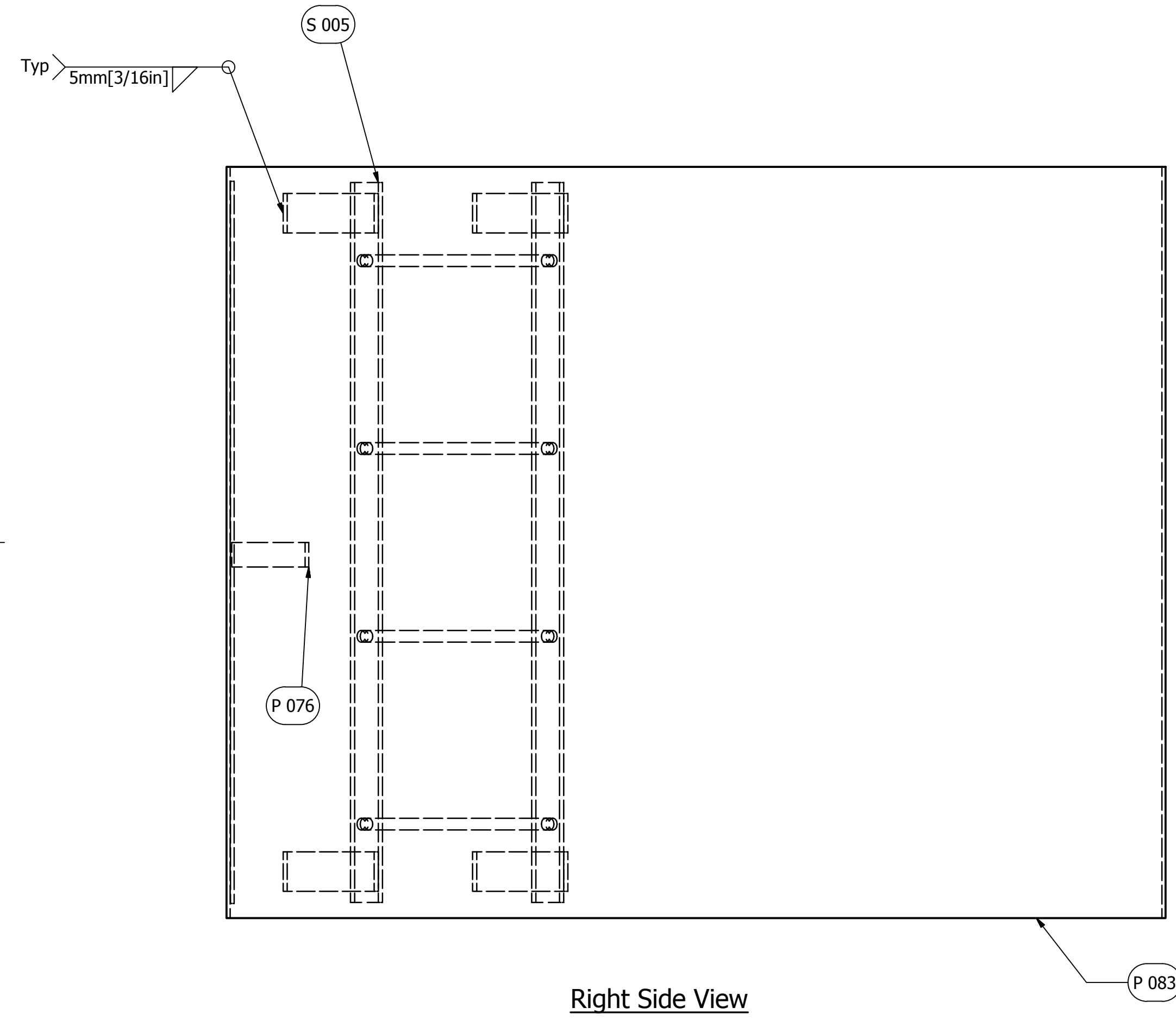
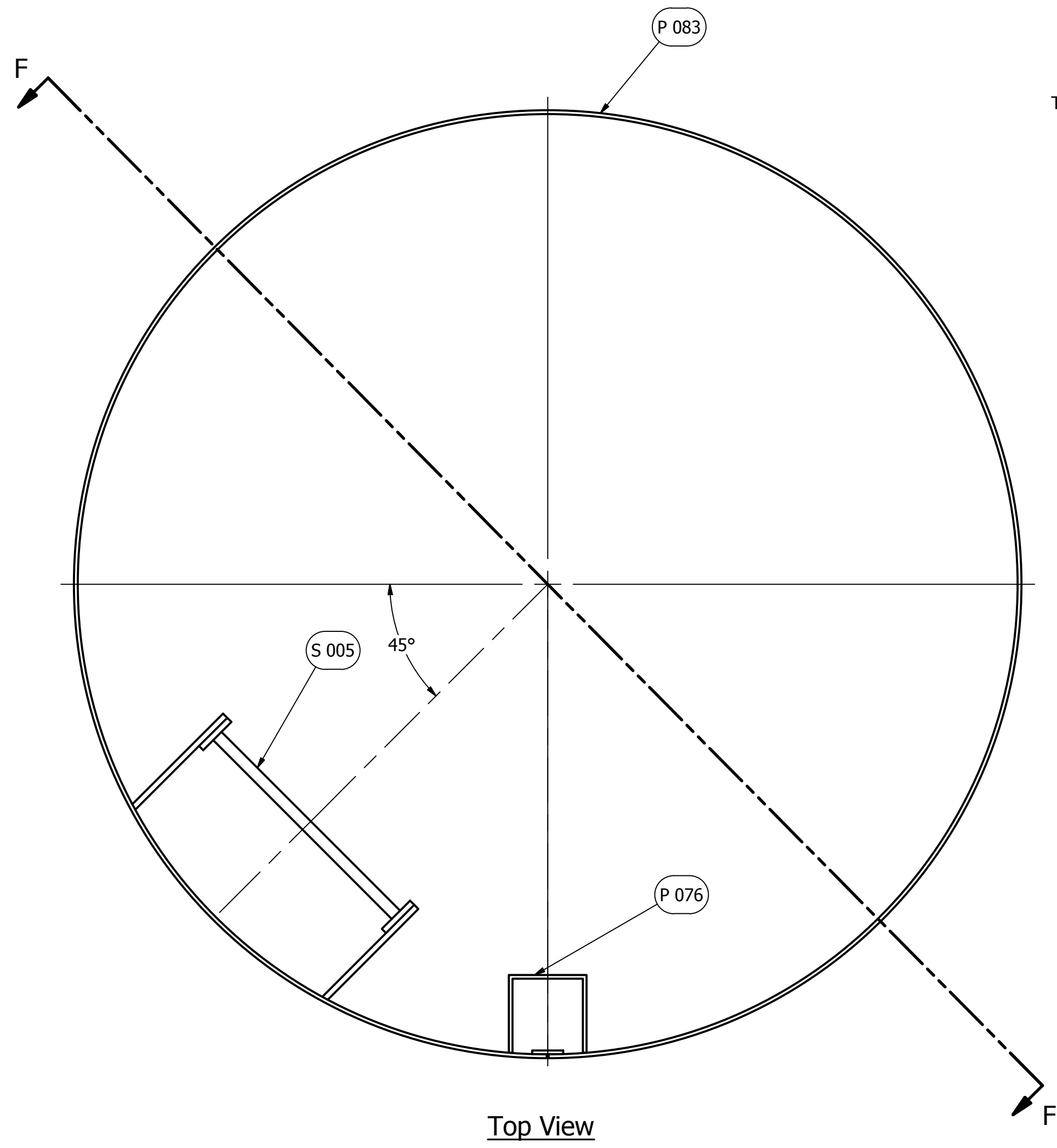


A 002
8' Middle Assembly

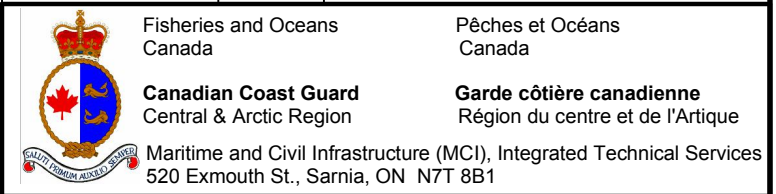
FILE No. 06044 SCALE: N.T.S. DWG No. 3 of 22

Rv.	DATE	DESCRIPTION	DRAWN	APP'D
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1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.

All Dimensions in mm unless otherwise noted.



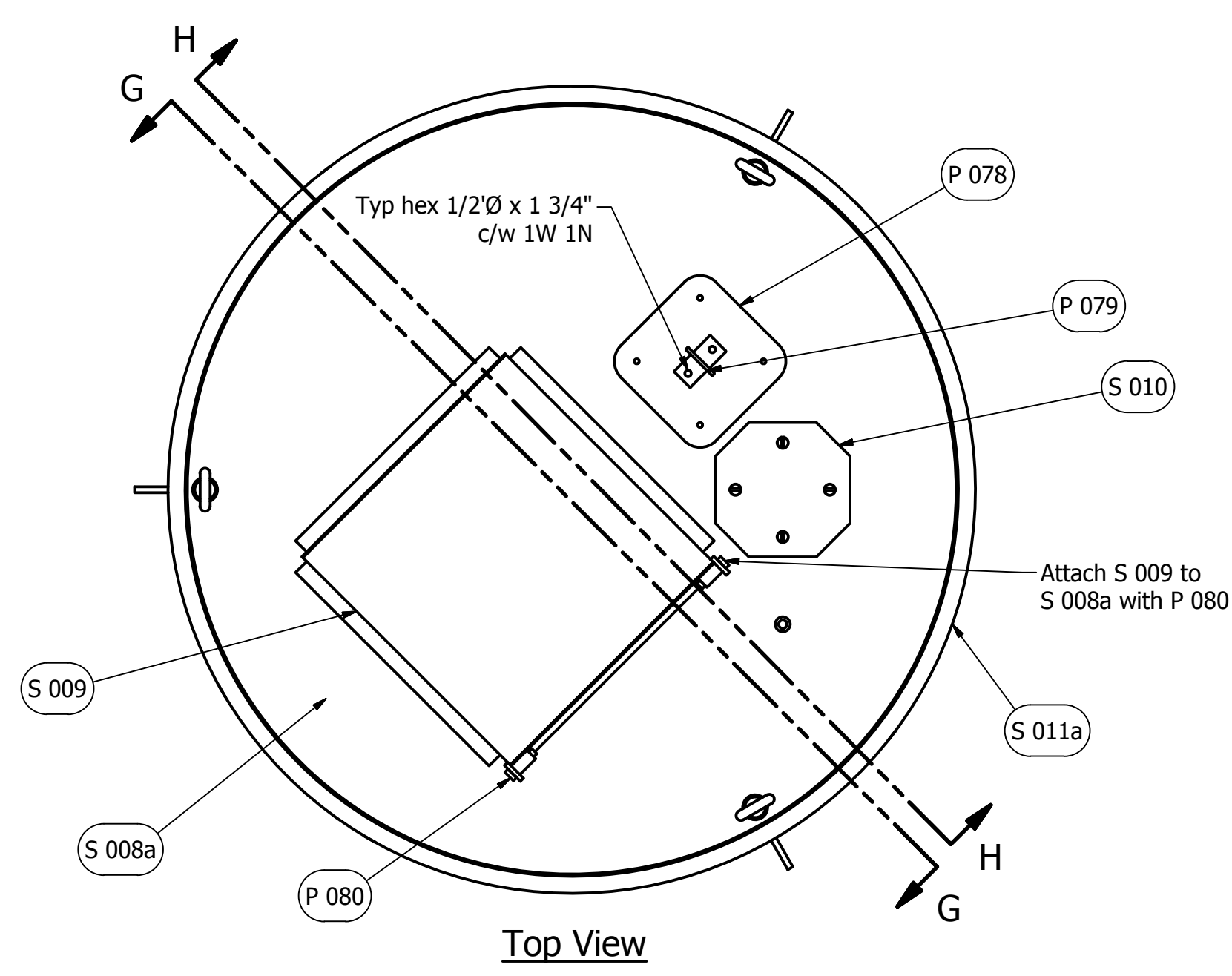
PARTS LIST		
ITEM	QTY	DESCRIPTION
P 076	1	Cable Guide
P 083	1	4' Middle Tower Shell
S 005	1	4' Interior Ladder



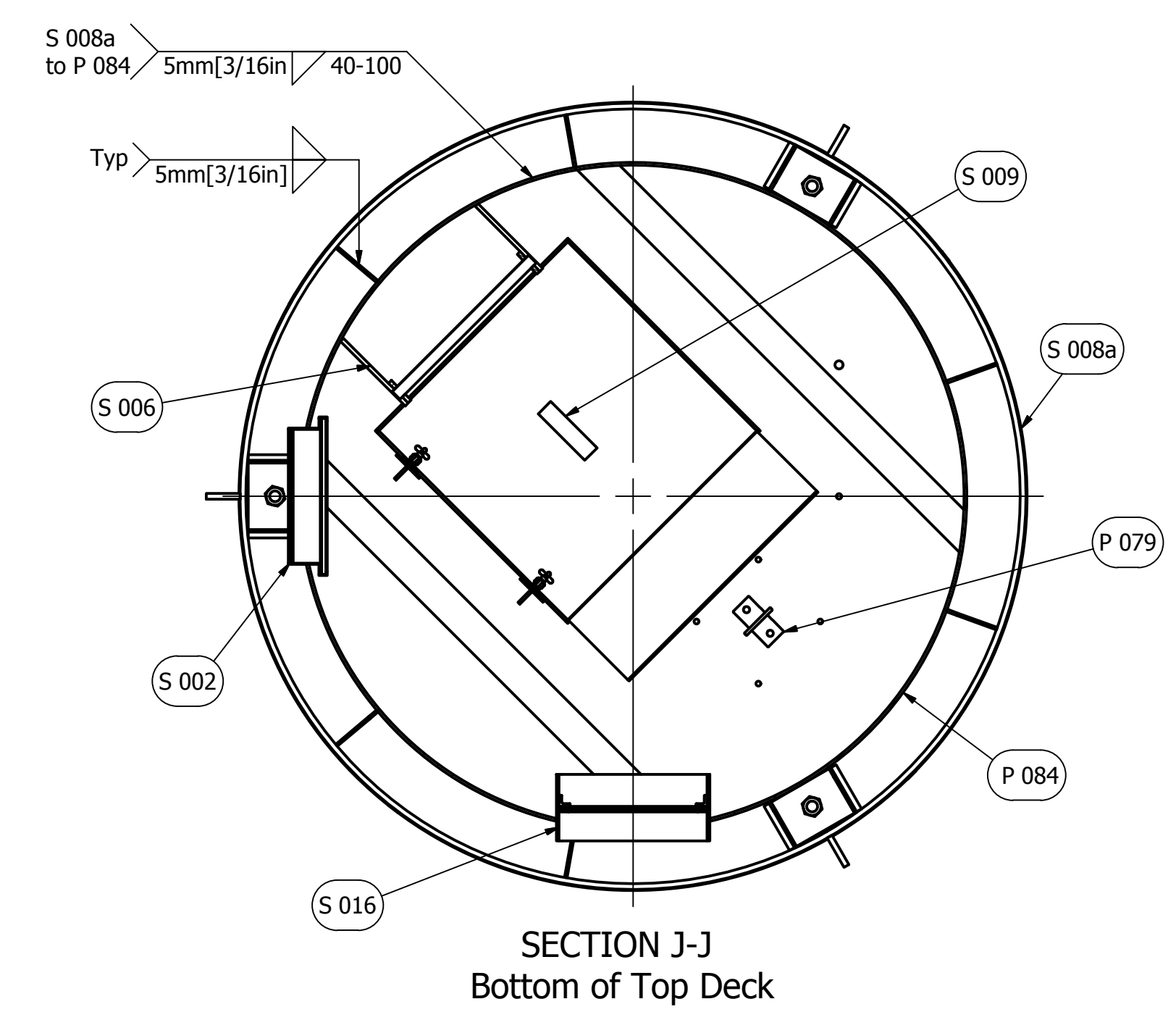
A 003
4' Middle Assembly

FILE No.	06044	SCALE:	N.T.S.	DWG No.	4 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
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1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.I.	B.Y.	

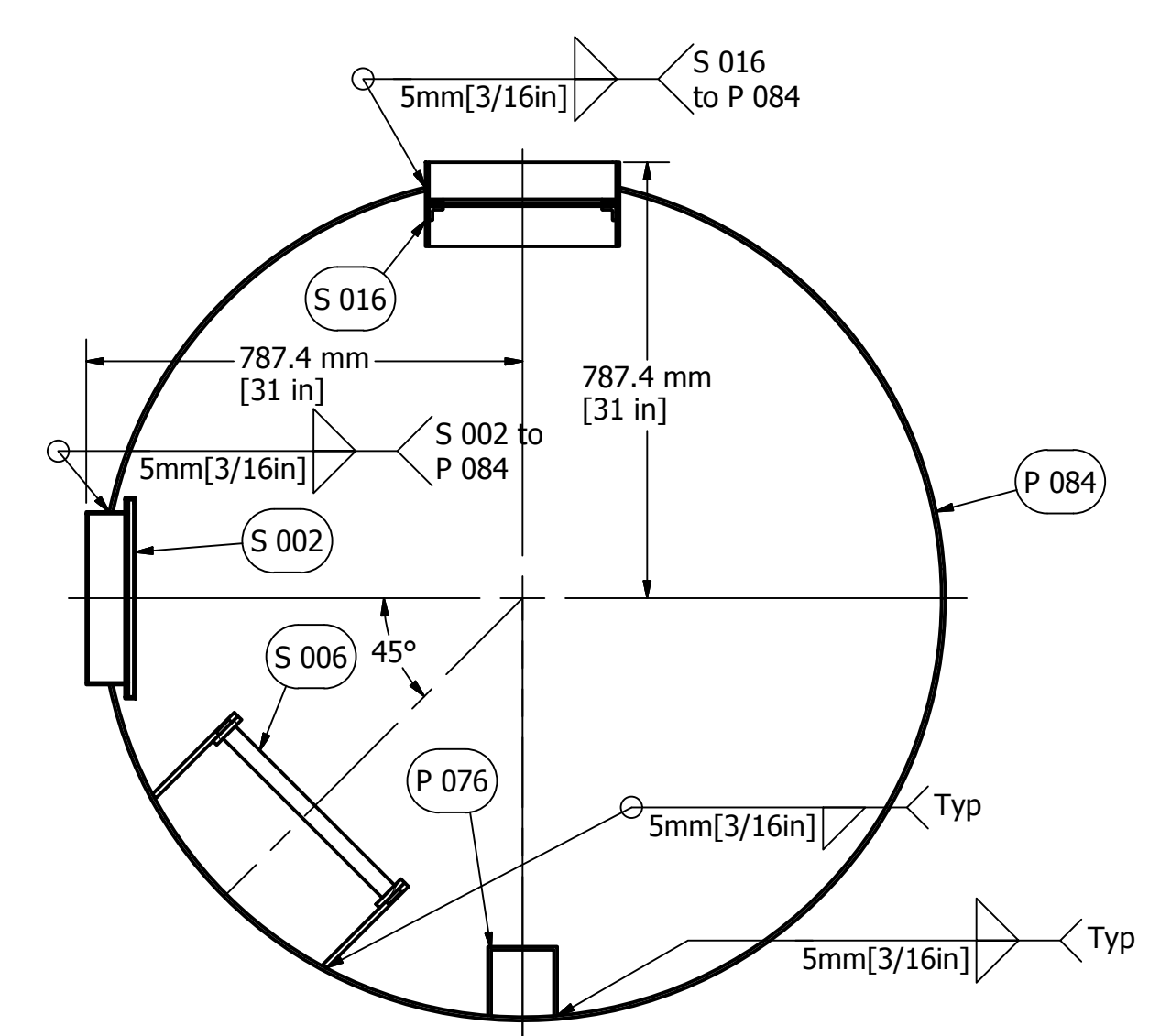
All Dimensions in mm unless otherwise noted.



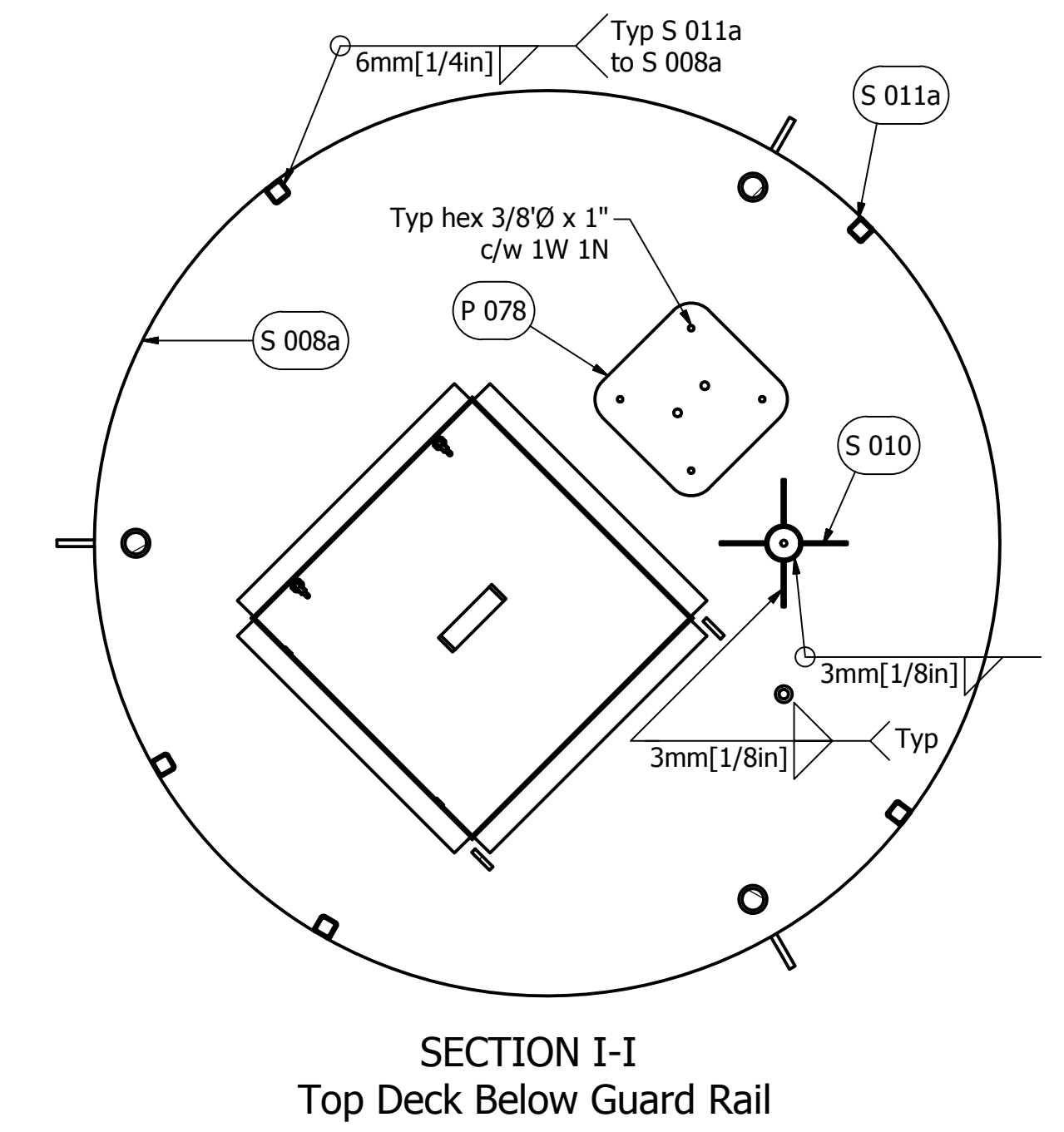
Top View



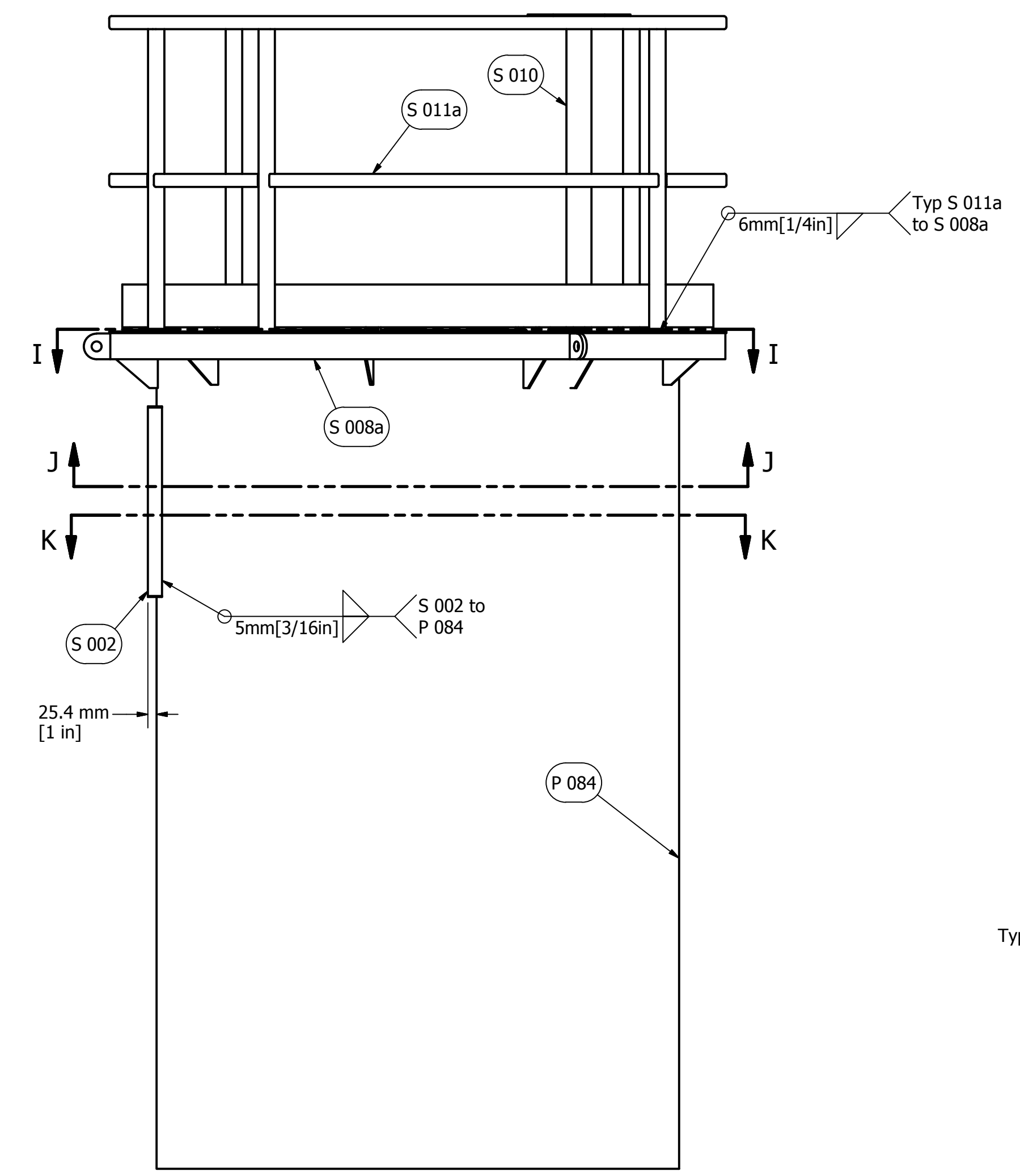
SECTION J-J
Bottom of Top Deck



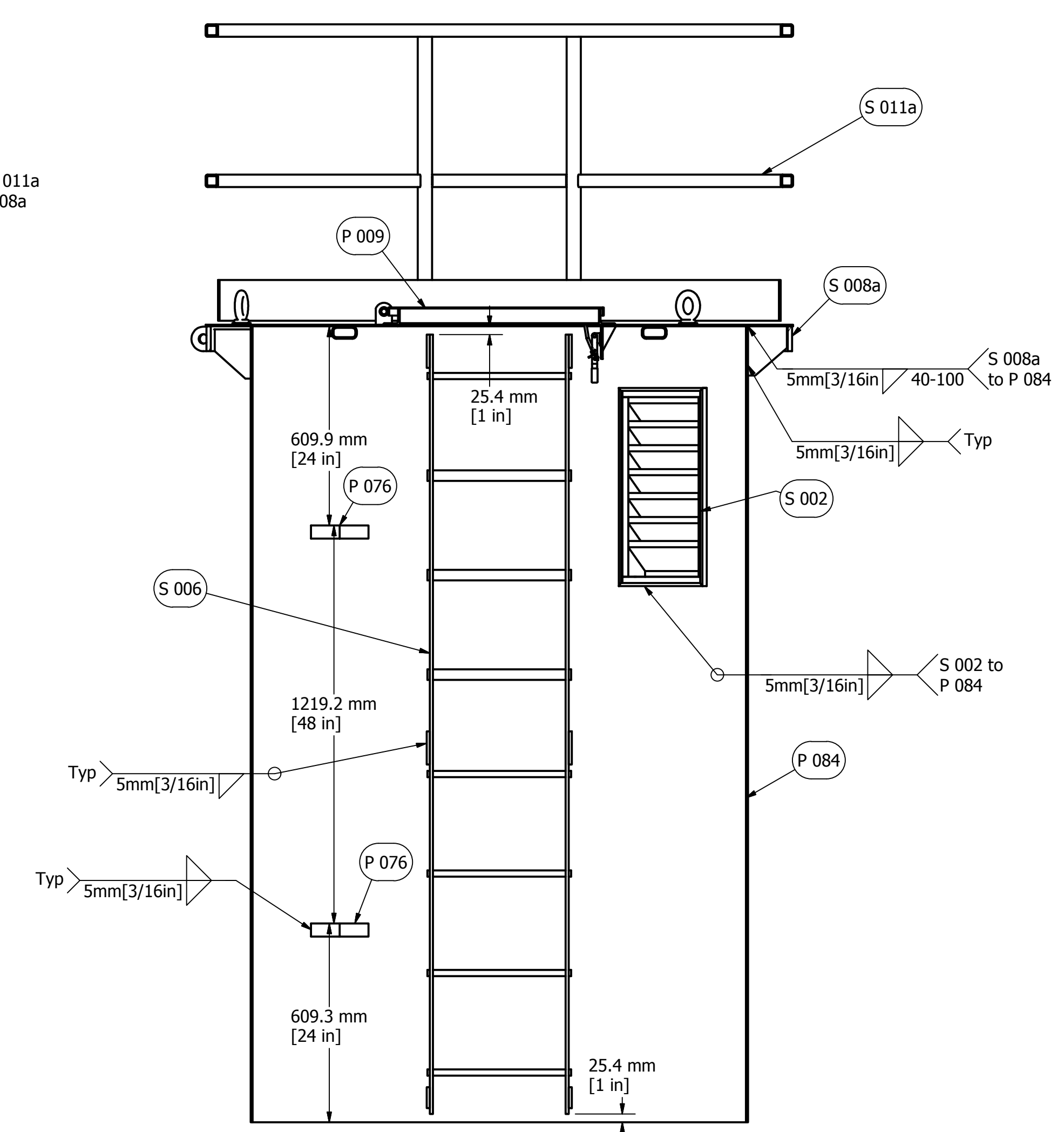
SECTION K-K
Through Window and Vent Looking to Base



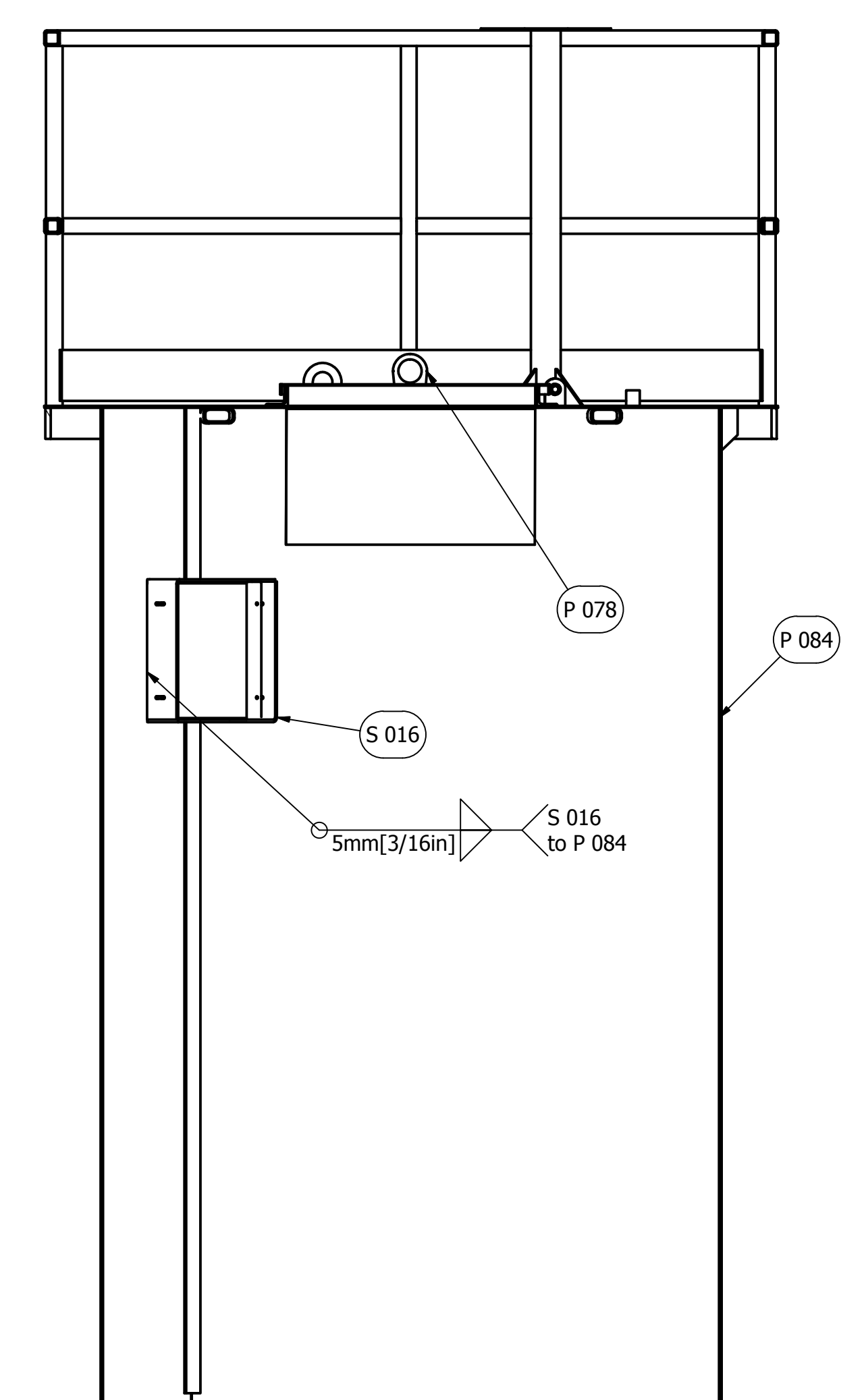
SECTION I-I
Top Deck Below Guard Rail



Front View

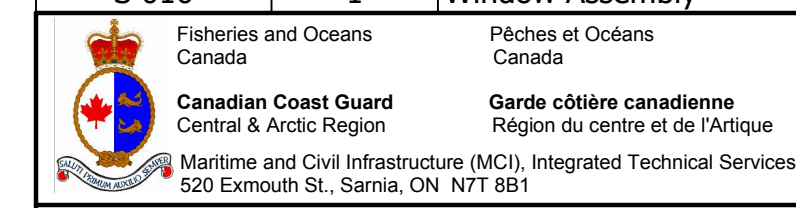


SECTION G-G



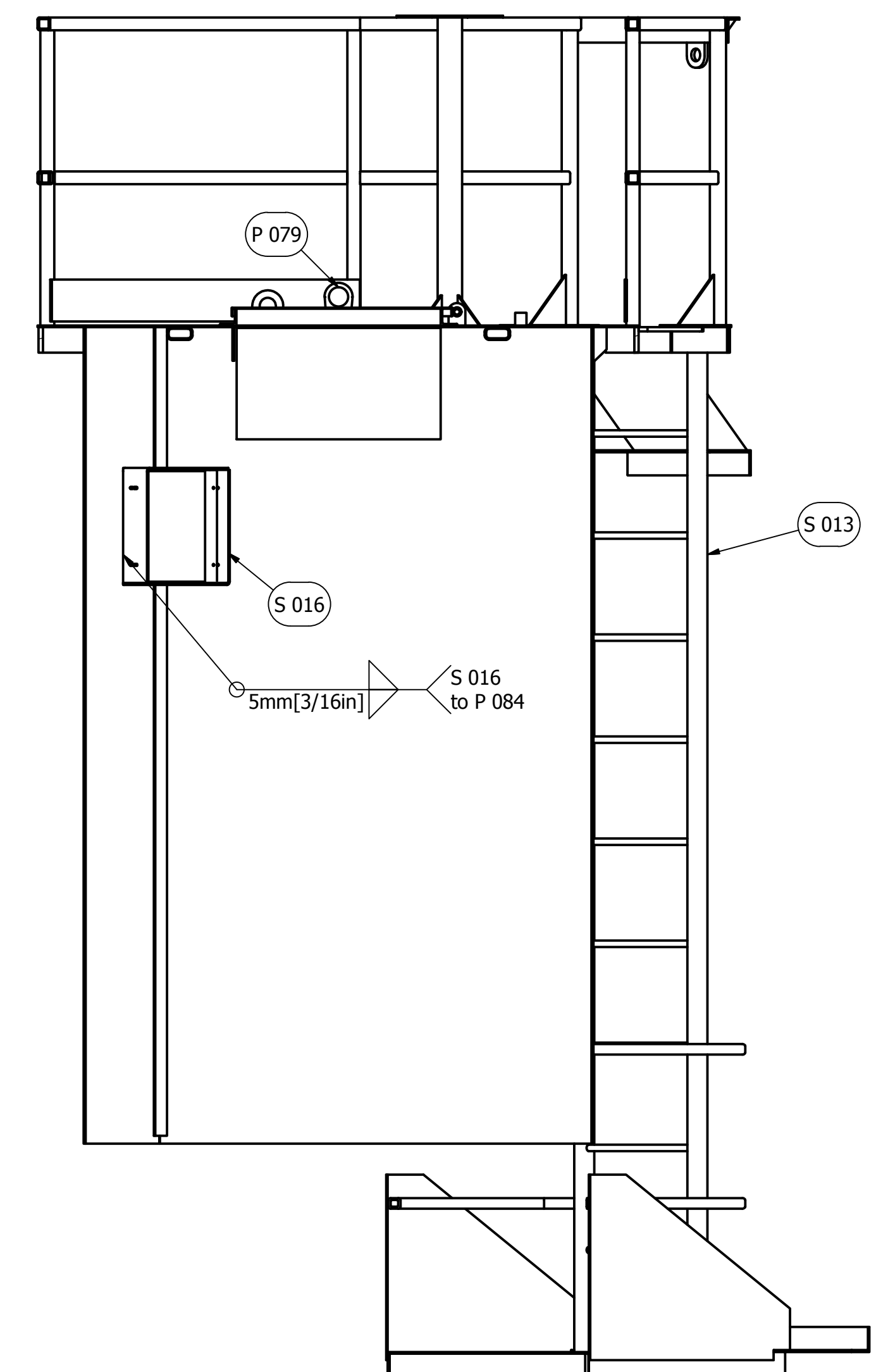
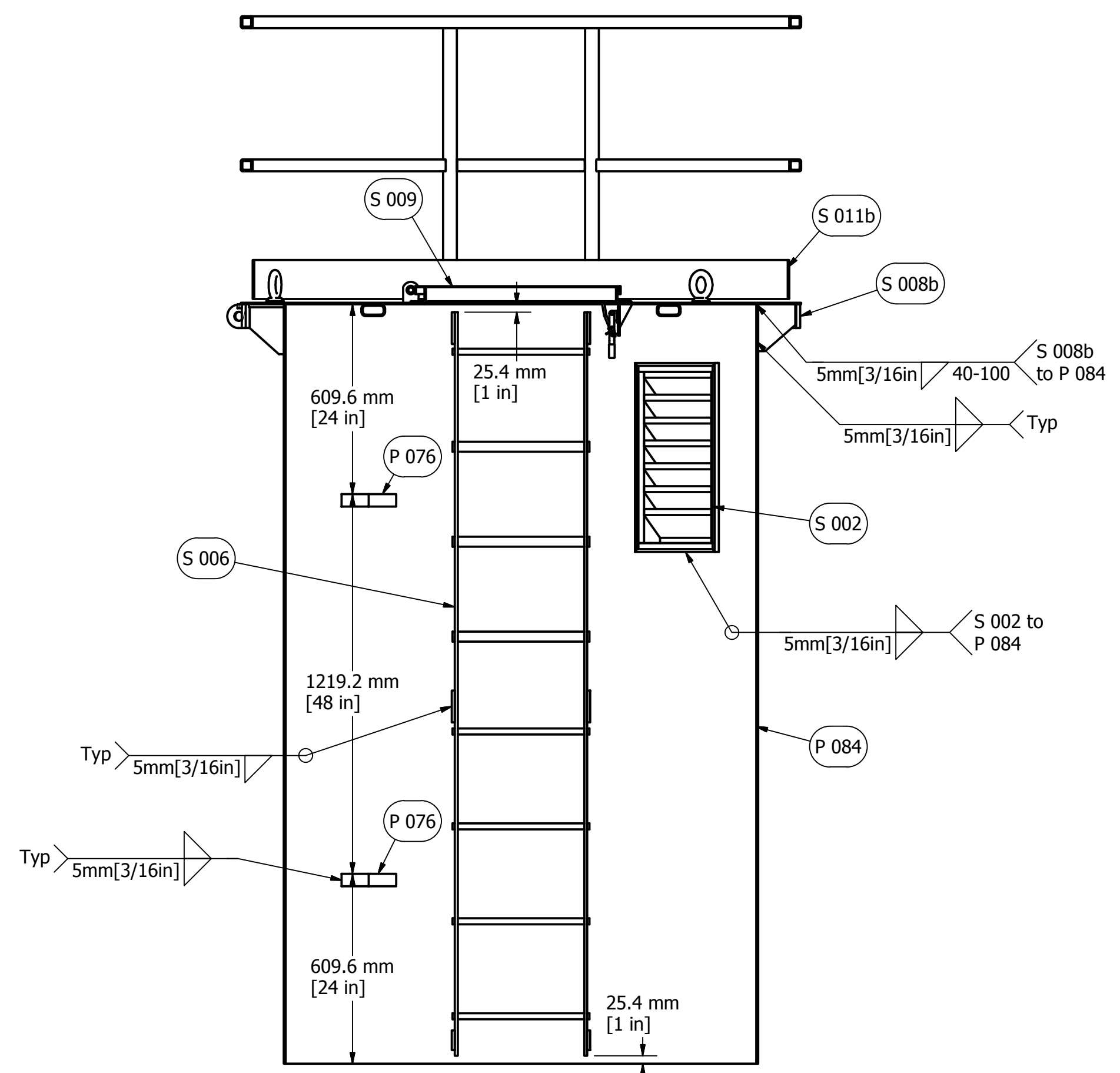
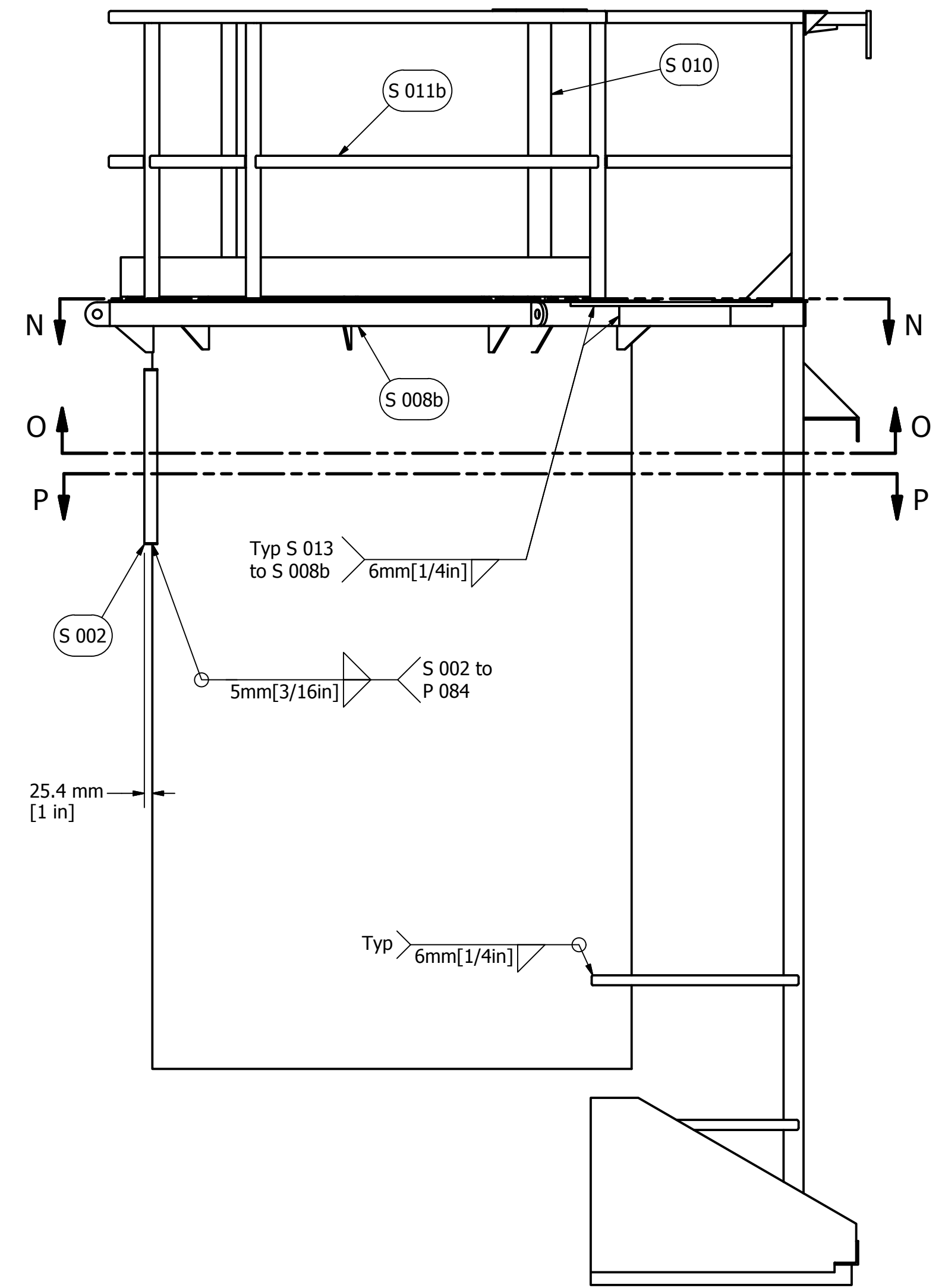
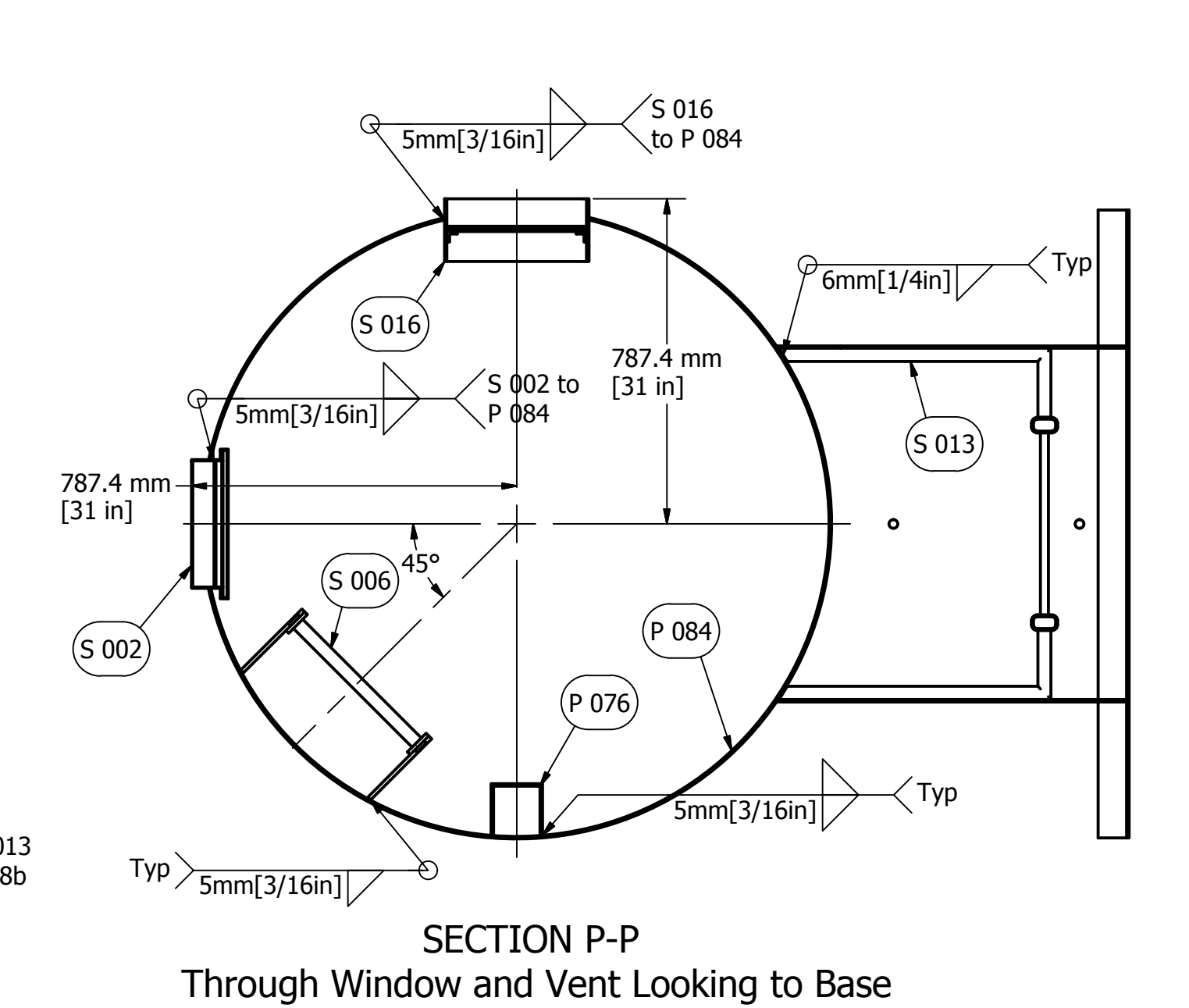
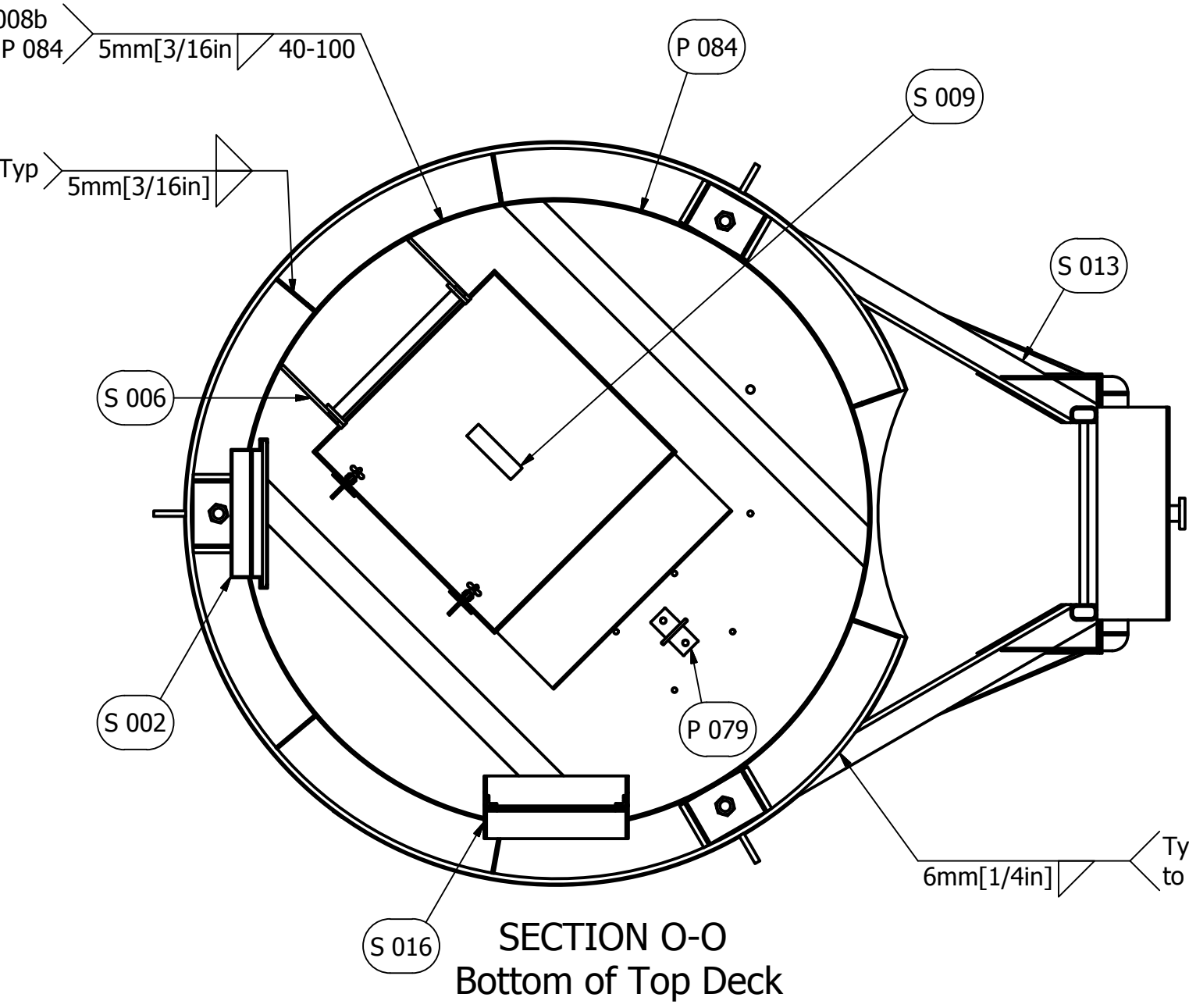
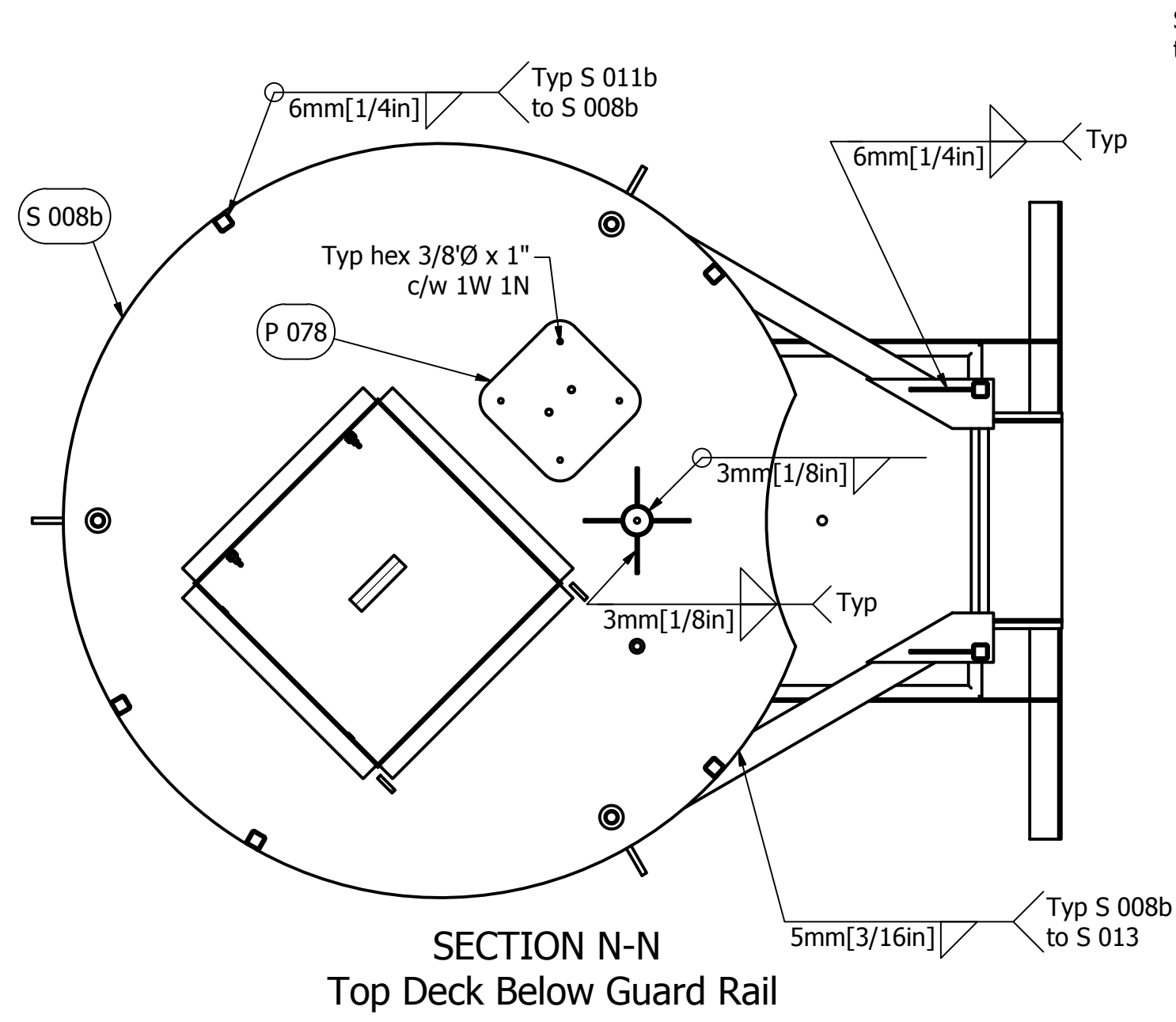
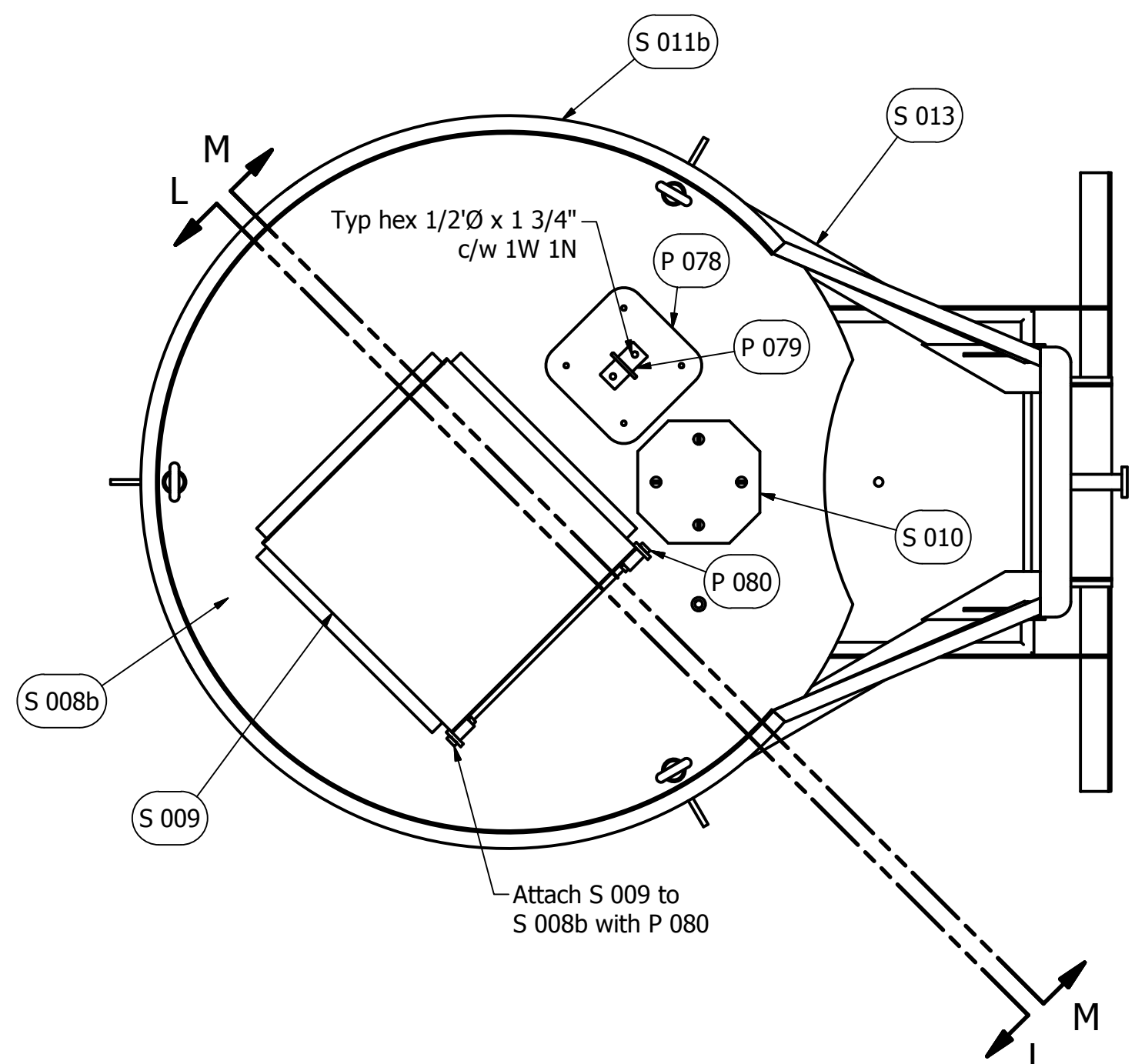
SECTION H-H

PARTS LIST		
ITEM	QTY	DESCRIPTION
P 076	2	Cable Guide
P 078	1	Doublers Plate
P 079	2	D-Ring
P 080	2	Hatch Hinge Pin
P 084	1	Top Tower Shell
S 002	1	Vent Assembly
S 006	1	Top Interior Ladder
S 008a	1	Top Deck
S 009	1	Hatch Assembly
S 010	1	Light Standard Assembly
S 011a	1	Railing Assembly
S 016	1	Window Assembly



A 004a Top Assembly				
FILE No. 06044	SCALE: N.T.S. DWG No. 5 of 22			
Rv.	DATE	DESCRIPTION	DRAWN	APP'D
0	N/A	DRAWING INITIATED	A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.

All Dimensions in mm unless otherwise noted.



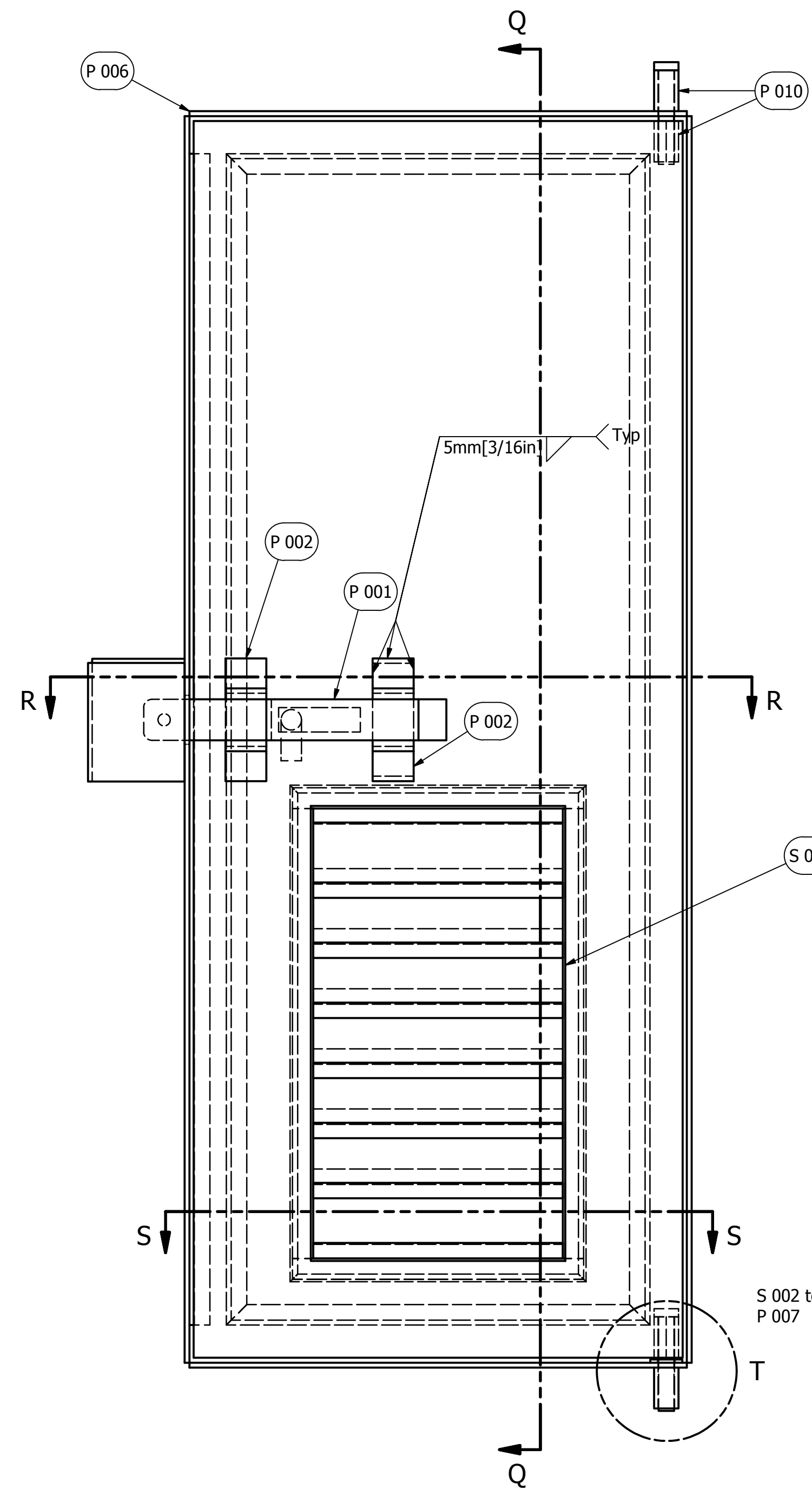
PARTS LIST		
ITEM	QTY	DESCRIPTION
P 076	2	Cable Guide
P 078	1	Doubler Plate
P 079	2	D-Ring
P 080	2	Hatch Hinge Pin
P 084	1	Top Tower Shell
S 002	1	Vent Assembly
S 006	1	Top Interior Ladder
S 008b	1	Top Deck with Daymark
S 009	1	Hatch Assembly
S 010	1	Light Standard Assembly
S 011b	1	Railing Assembly with Daymark
S 013	1	External Ladder
S 016	1	Window Assembly

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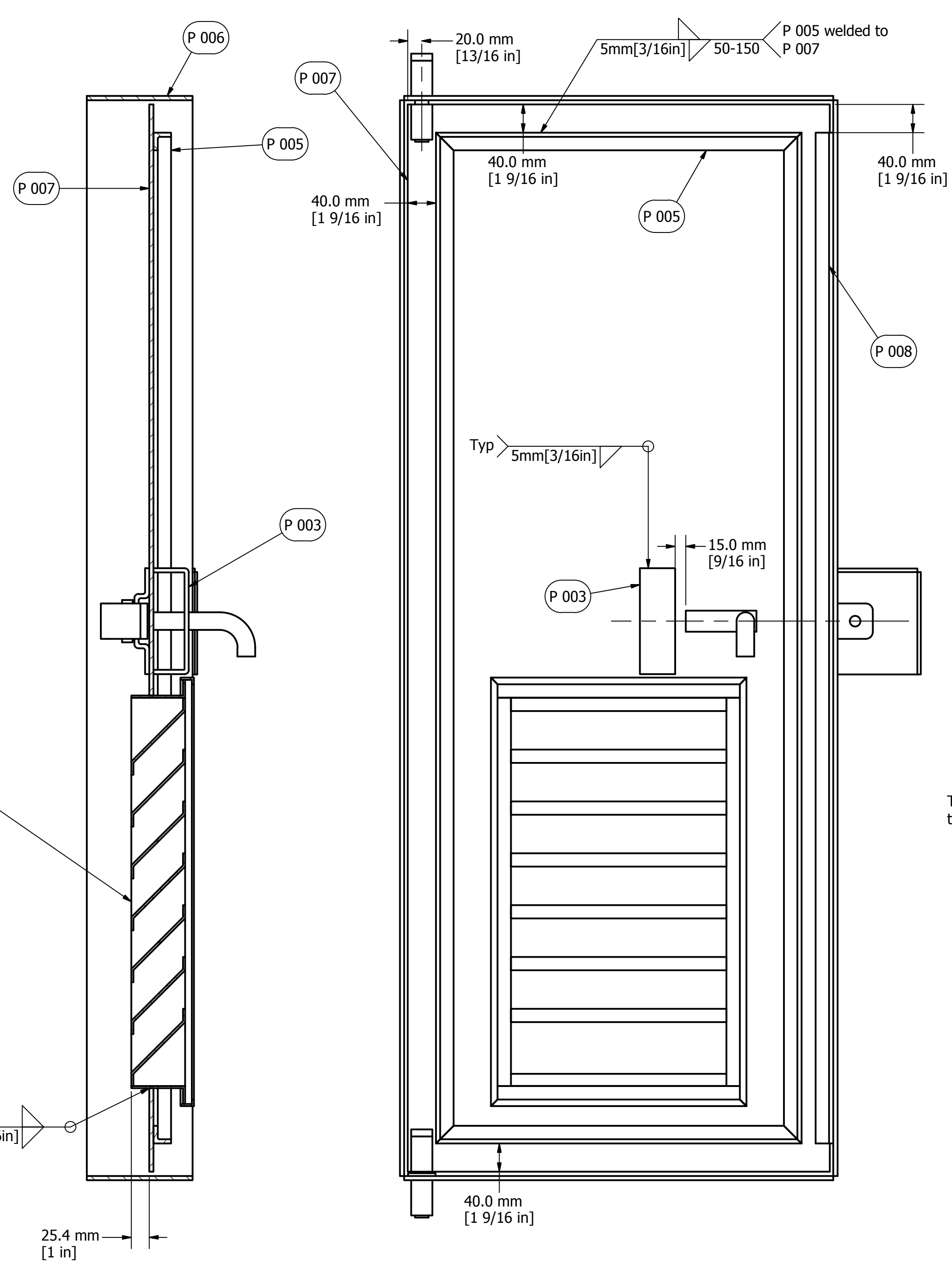
A 004b
 Top Assembly with Daymark

FILE No.	06044	SCALE:	N.T.S.	DWG No.	6 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
0	N/A	DRAWING INITIATED	A.W.	A.W.	
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.	

All Dimensions in mm unless otherwise noted.

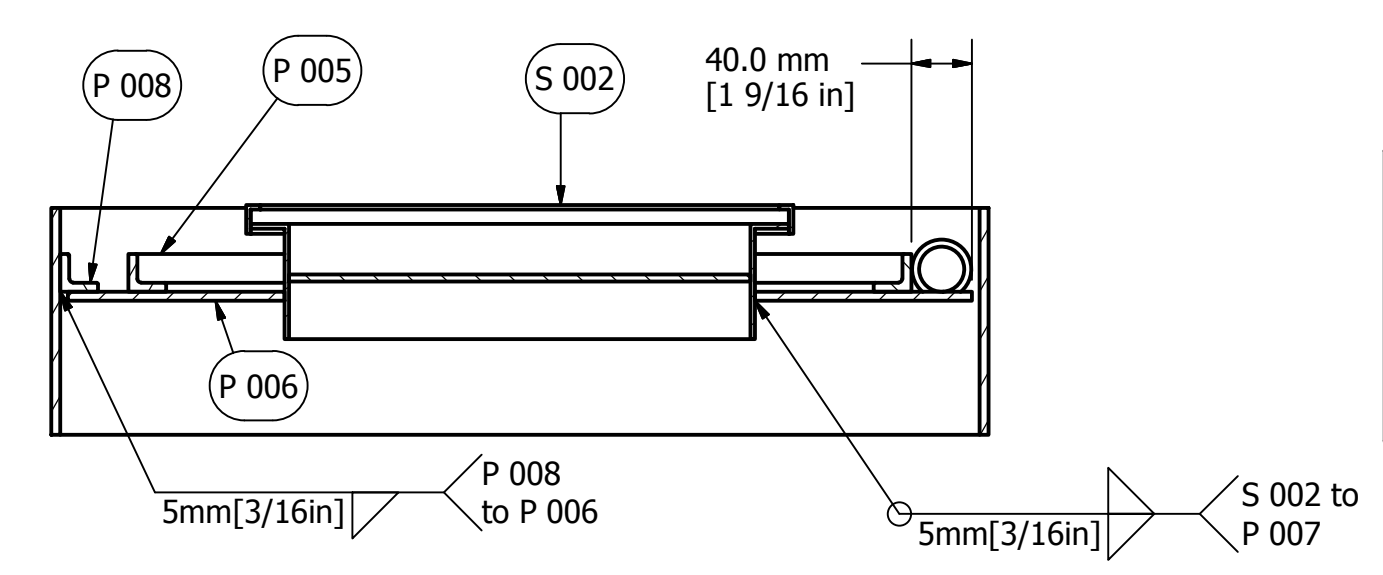


Front View

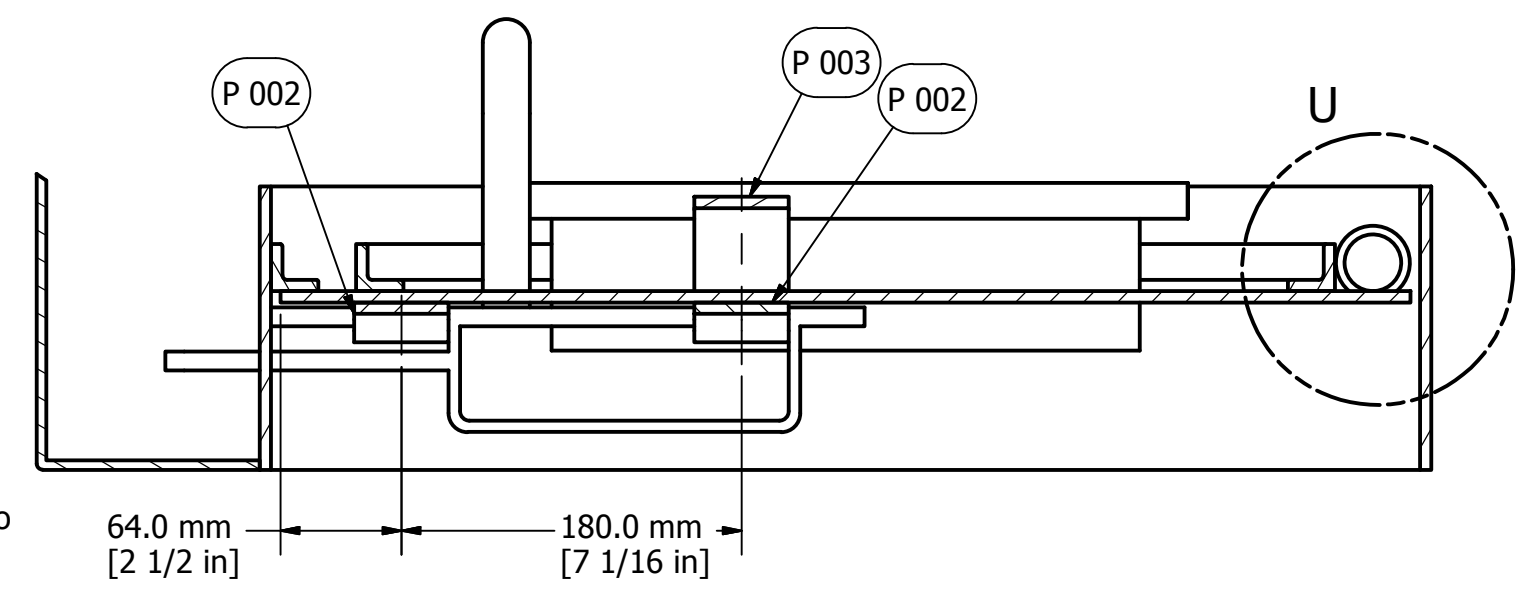


Rear View

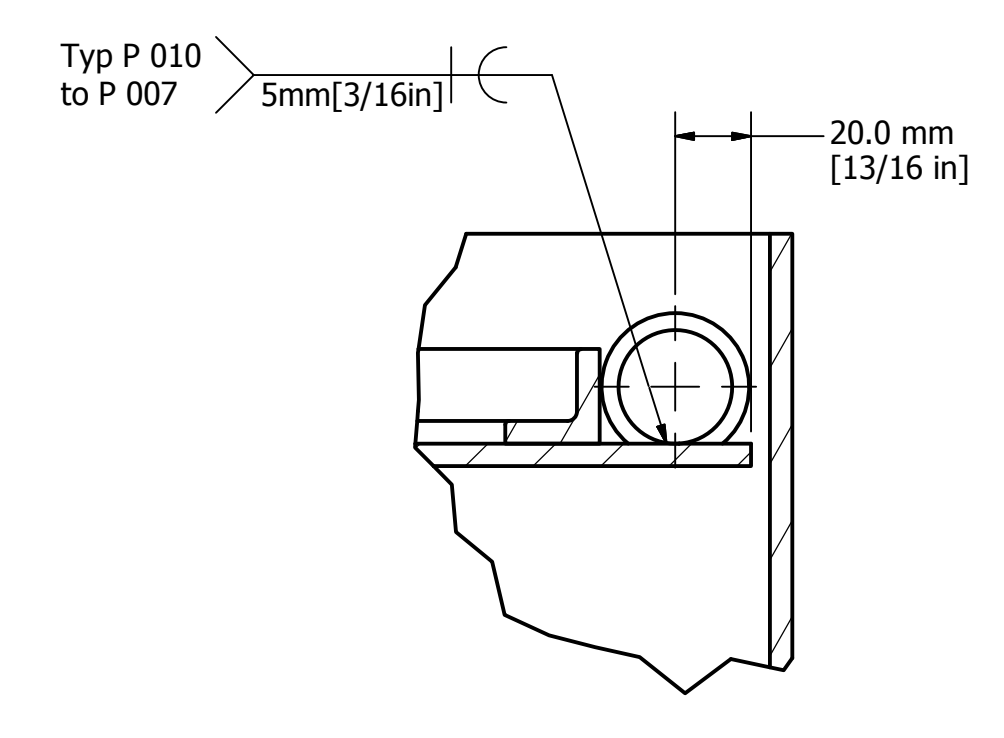
SECTION Q-Q



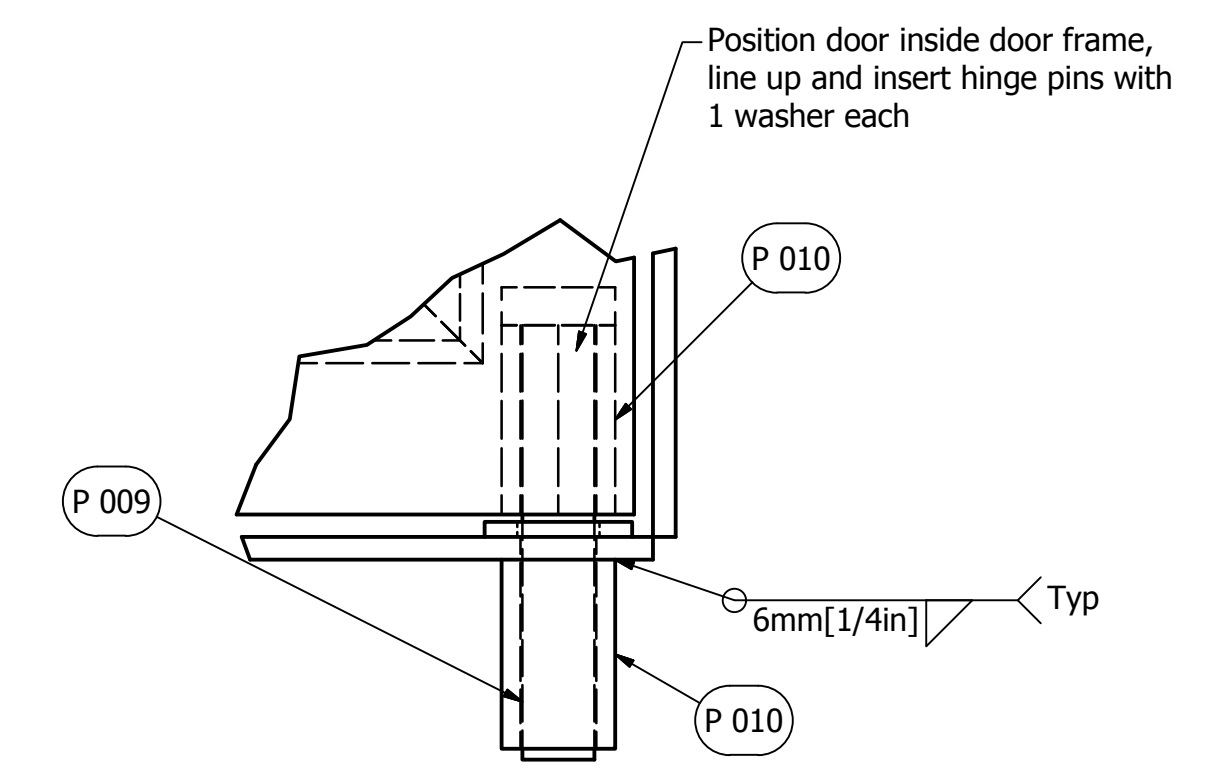
SECTION S-S



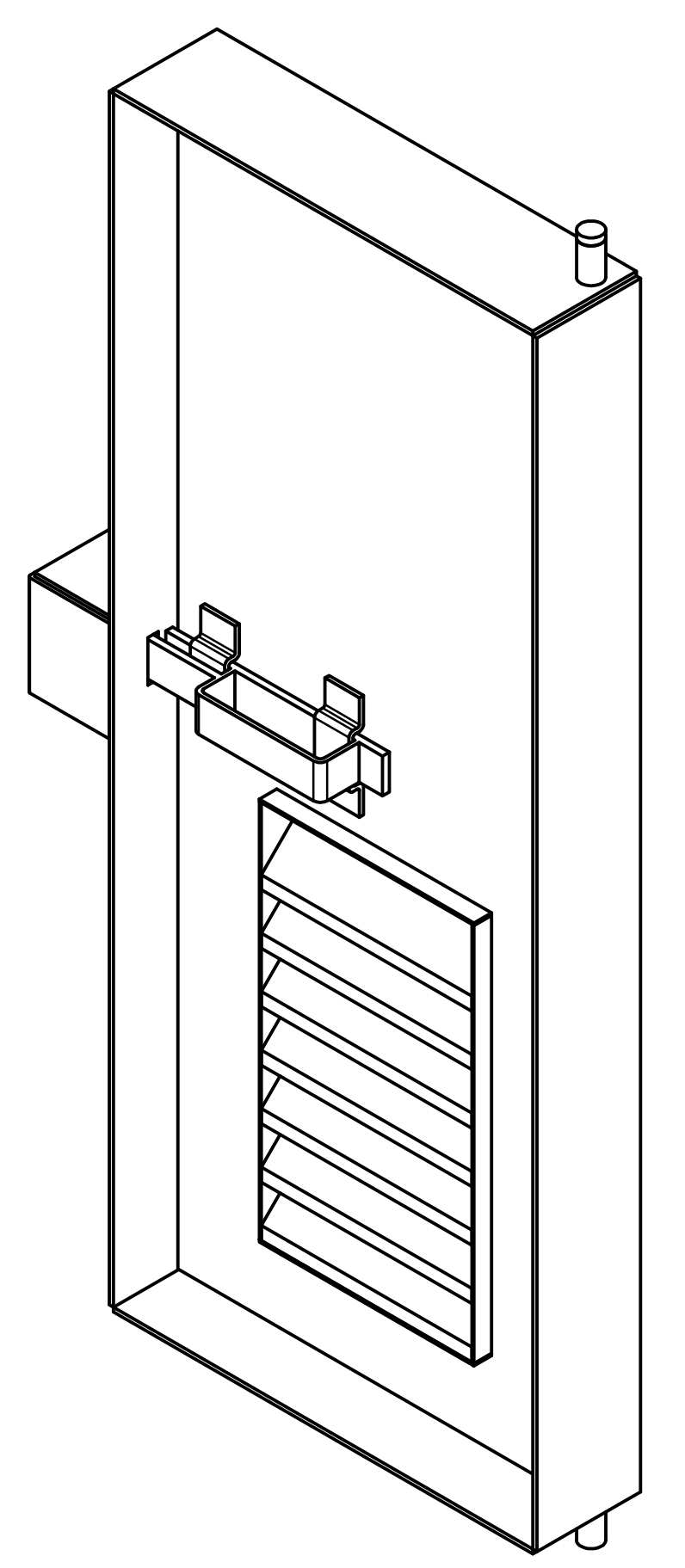
SECTION R-R



DETAIL U



DETAIL T
Bottom Door Hinge Detail (Similar to Top)



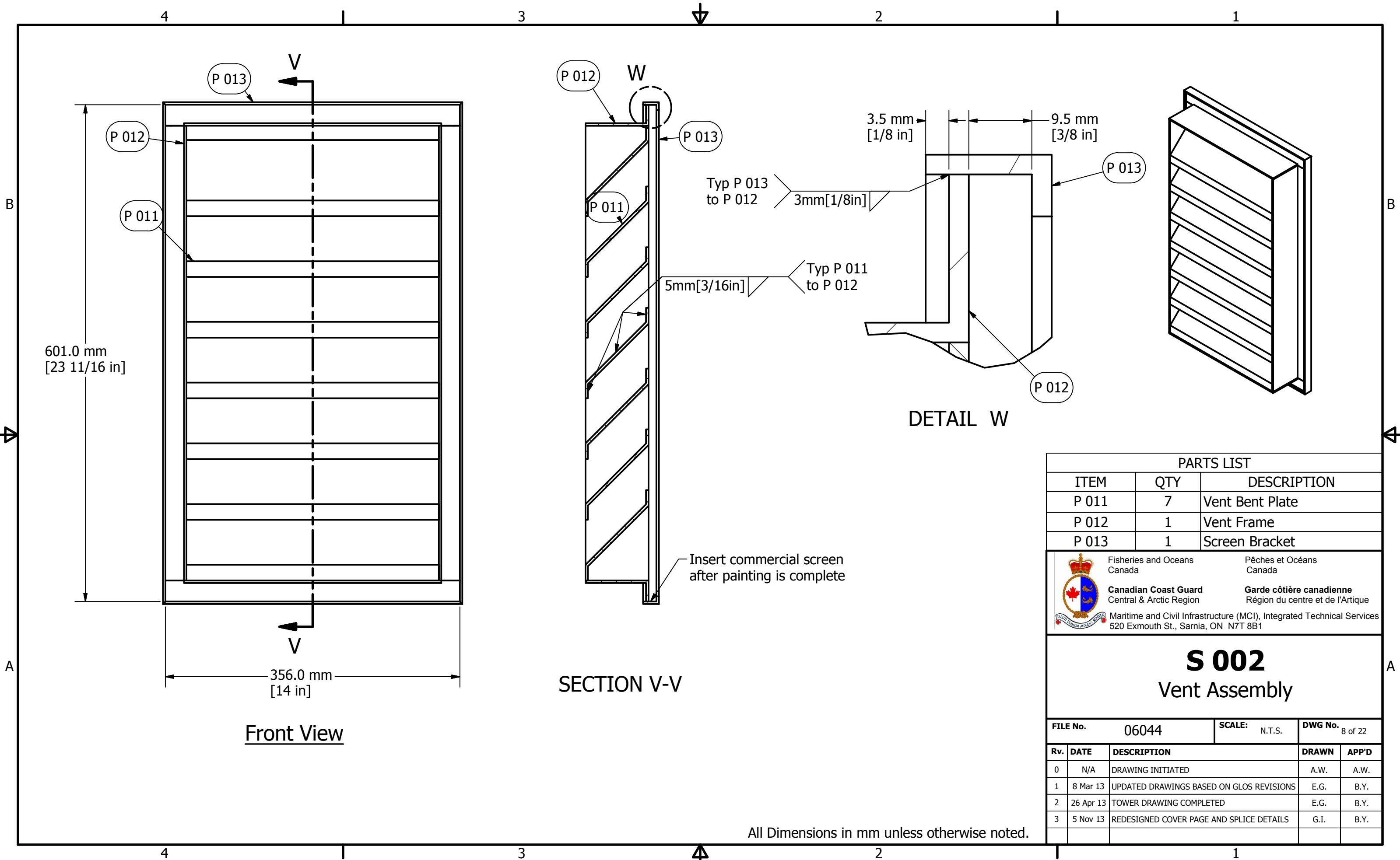
Top Right Isometric View

PARTS LIST		
ITEM	QTY	DESCRIPTION
P 001	1	Slide Handle
P 002	2	Slide Handle Bracket
P 004	1	Handle Cover
P 005	1	Door L Bracing
P 006	1	Door Frame
P 007	1	Door Panel
P 009	2	Door Hinge Pin
P 010	4	Door Hinge
S 002	1	Vent Assembly
27	1	

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S 001 Door Assembly				
FILE No.	06044	SCALE:	N.T.S.	
DWG No.	7 of 22			
Rv.	DATE	DESCRIPTION	DRAWN	APP'D
0	N/A	DRAWING INITIATED	A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.

All Dimensions in mm unless otherwise noted.



601.0 mm
[23 11/16 in]

356.0 mm
[14 in]


Front View

SECTION V-V

DETAIL W

Insert commercial screen
after painting is complete

PARTS LIST		
ITEM	QTY	DESCRIPTION
P 011	7	Vent Bent Plate
P 012	1	Vent Frame
P 013	1	Screen Bracket

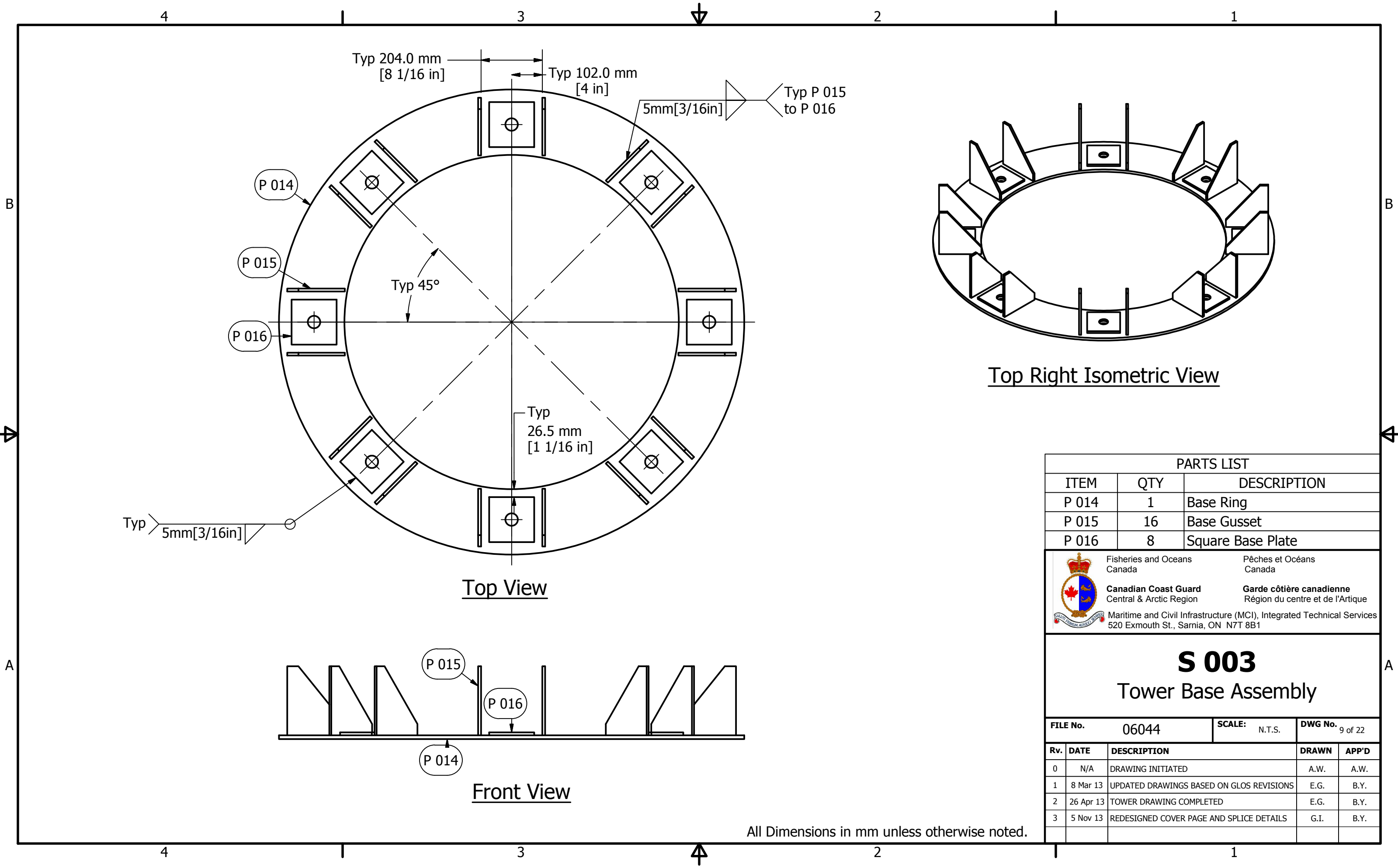
	Fisheries and Oceans Canada	Pêches et Océans Canada
	Canadian Coast Guard Central & Arctic Region	Garde côtière canadienne Région du centre et de l'Arctique
	Maritime and Civil Infrastructure (MCI), Integrated Technical Services 520 Exmouth St., Sarnia, ON N7T 8B1	

S 002

Vent Assembly

FILE No. 06044		SCALE: N.T.S.	DWG No. 8 of 22	
Rv.	DATE	DESCRIPTION	DRAWN	APP'D
0	N/A	DRAWING INITIATED	A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.I.	B.Y.

All Dimensions in mm unless otherwise noted.




Top Right Isometric View

Top View

Front View

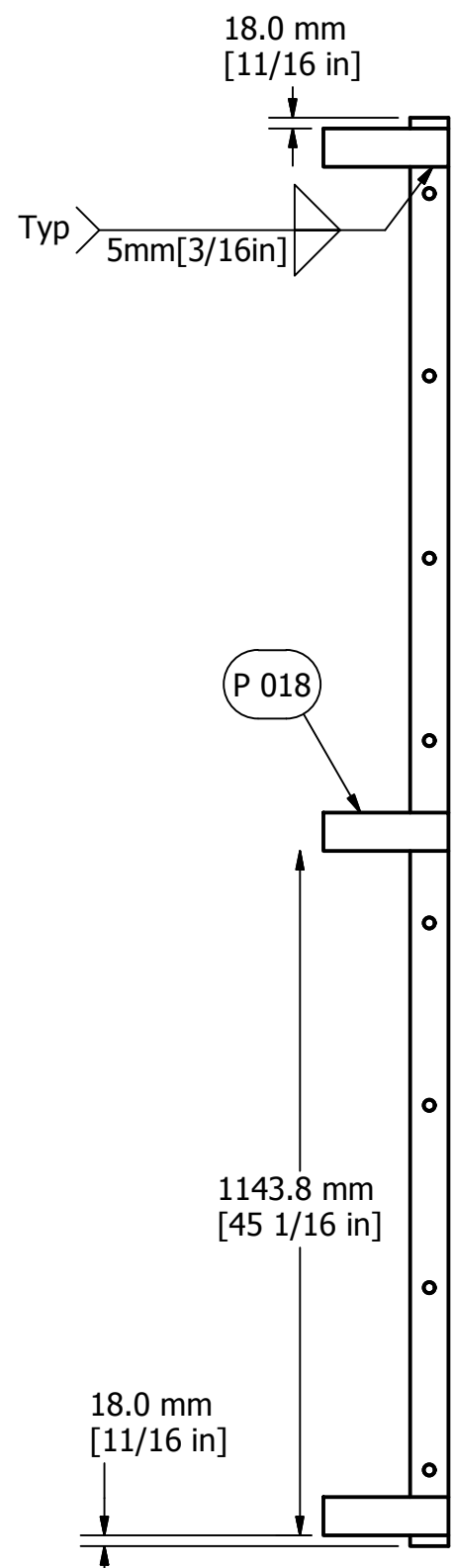
PARTS LIST				
ITEM	QTY	DESCRIPTION		
P 014	1	Base Ring		
P 015	16	Base Gusset		
P 016	8	Square Base Plate		

	Fisheries and Oceans Canada	Pêches et Océans Canada
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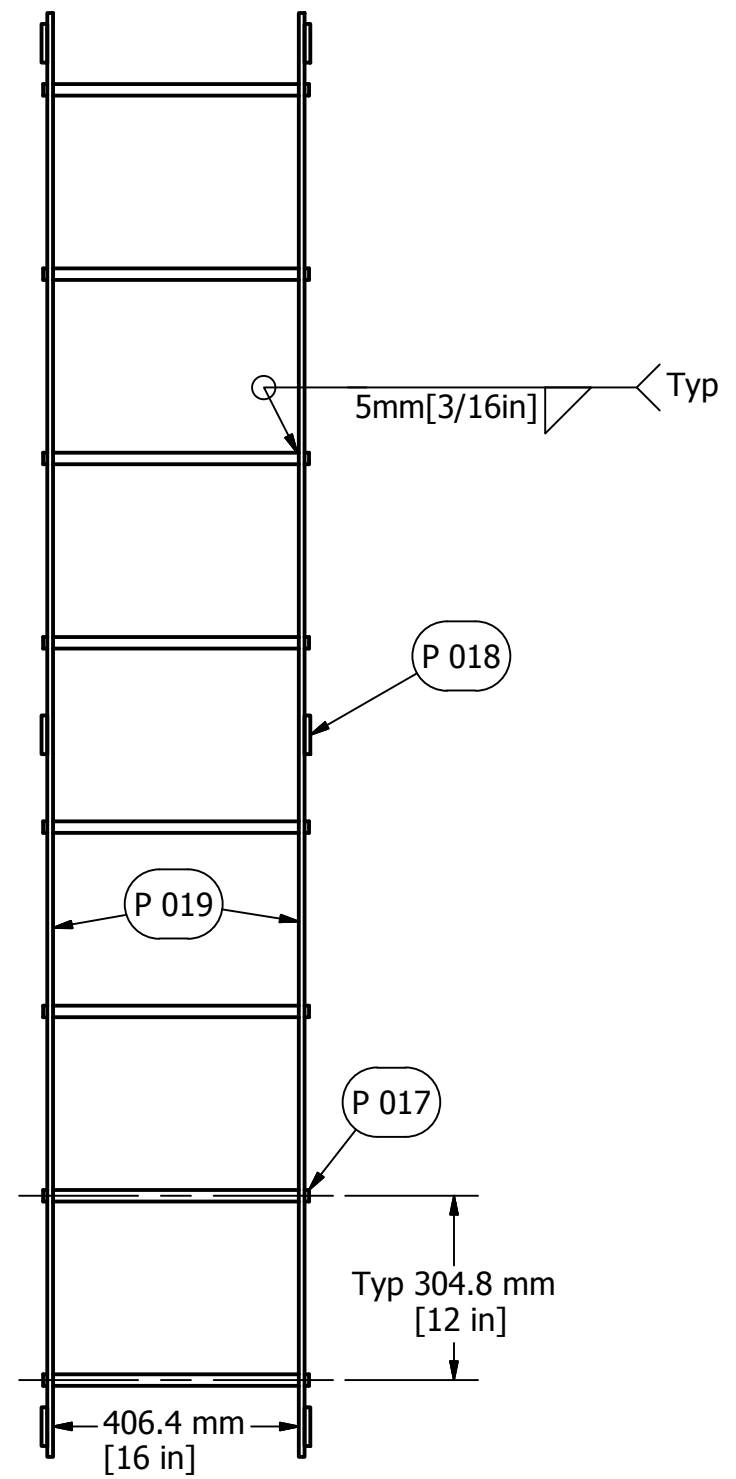
S 003	
Tower Base Assembly	

FILE No.	06044	SCALE:	N.T.S.	DWG No.	9 of 22
Rv.	DATE	DESCRIPTION		DRAWN	APP'D
0	N/A	DRAWING INITIATED		A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS		E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED		E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS		G.I.	B.Y.

All Dimensions in mm unless otherwise noted.




Left Side View



Front View

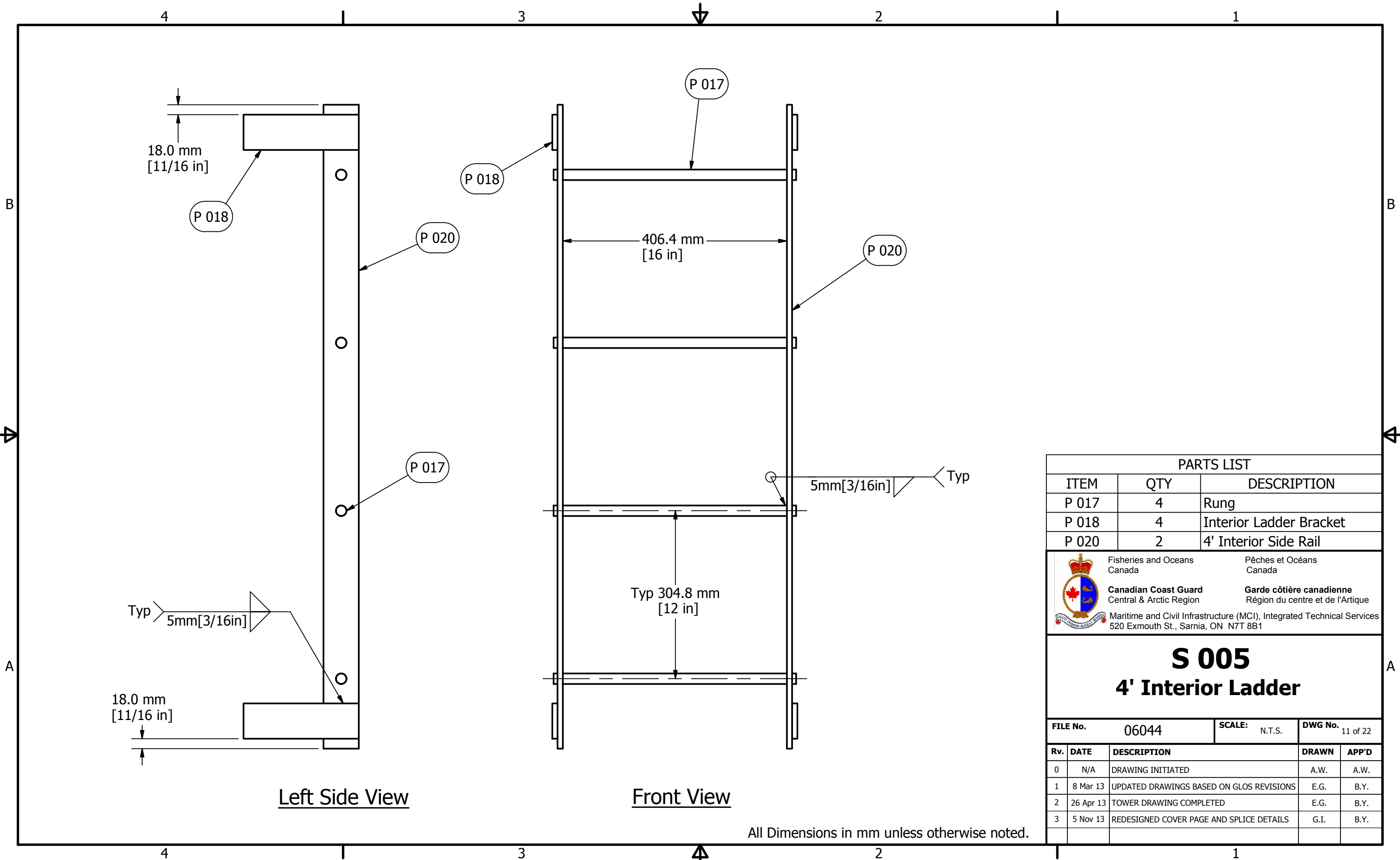
All Dimensions in mm unless otherwise noted.

PARTS LIST				
ITEM	QTY	DESCRIPTION		
P 017	8	Ladder Rung		
P 018	6	Interior Ladder Bracket		
P 019	2	Interior Side Rail		


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S 004	
Interior Ladder	

FILE No.	06044	SCALE:	N.T.S.	DWG No.	10 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
0	N/A	DRAWING INITIATED	A.W.	A.W.	
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.I.	B.Y.	



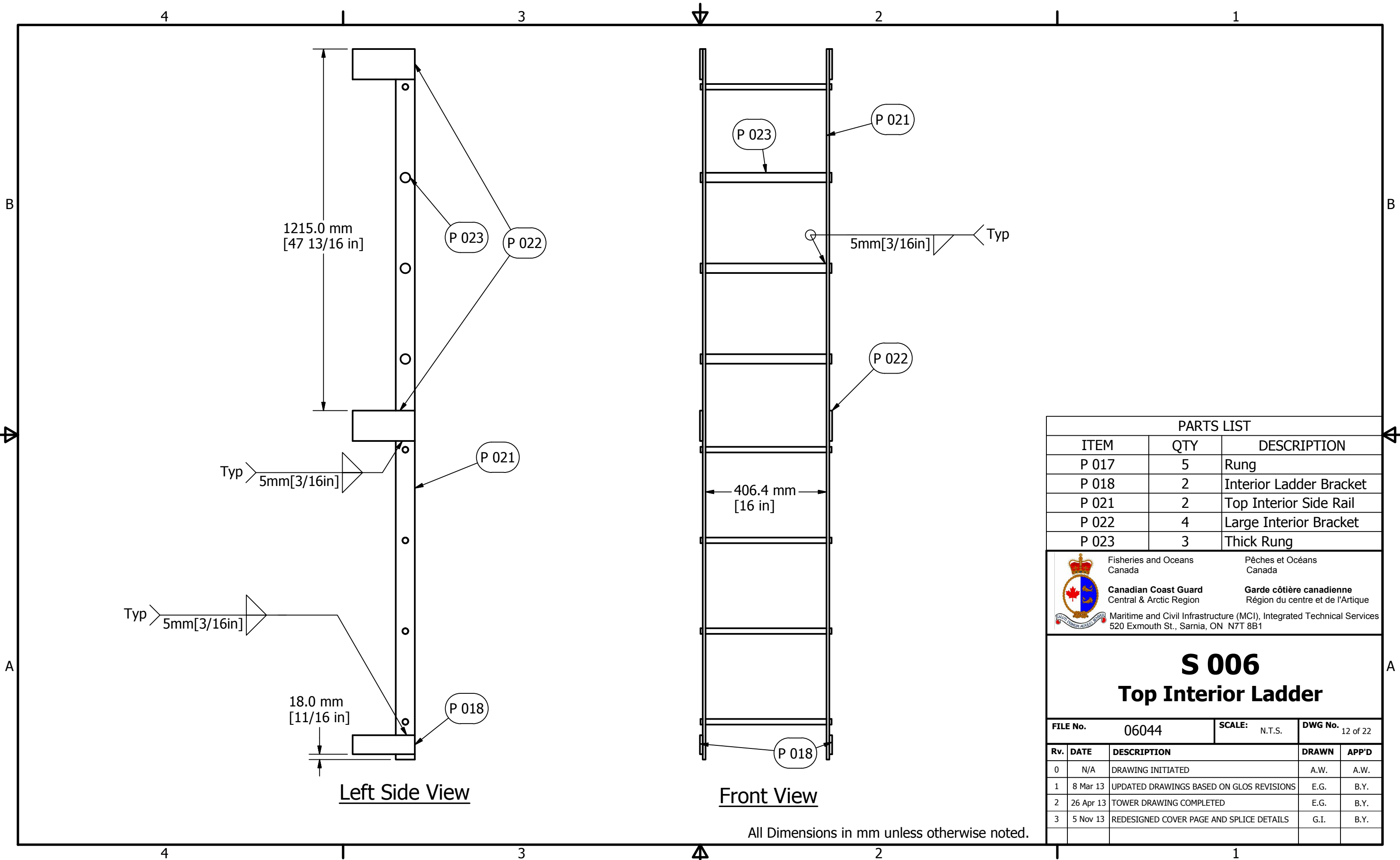
PARTS LIST				
ITEM	QTY	DESCRIPTION		
P 017	4	Rung		
P 018	4	Interior Ladder Bracket		
P 020	2	4' Interior Side Rail		

	Fisheries and Oceans Canada	Pêches et Océans Canada
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S 005	
4' Interior Ladder	

FILE No.	06044	SCALE:	N.T.S.	DWG No.	11 of 22
Rv.	DATE	DESCRIPTION		DRAWN	APP'D
0	N/A	DRAWING INITIATED		A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS		E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED		E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS		G.I.	B.Y.

All Dimensions in mm unless otherwise noted.



PARTS LIST		
ITEM	QTY	DESCRIPTION
P 017	5	Rung
P 018	2	Interior Ladder Bracket
P 021	2	Top Interior Side Rail
P 022	4	Large Interior Bracket
P 023	3	Thick Rung

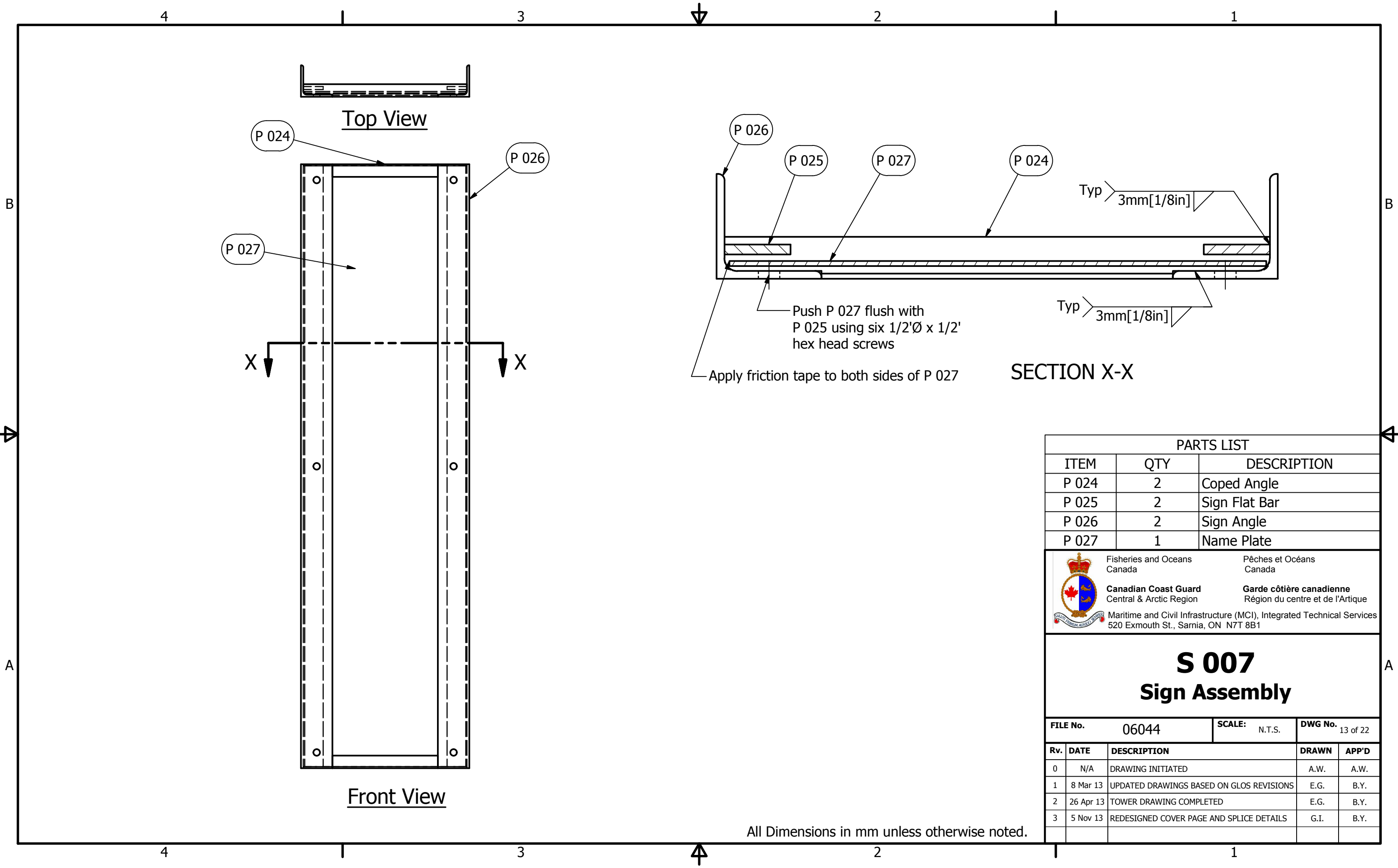

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S 006


Top Interior Ladder

FILE No.	06044	SCALE:	N.T.S.	DWG No.	12 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
0	N/A	DRAWING INITIATED	A.W.	A.W.	
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.I.	B.Y.	

All Dimensions in mm unless otherwise noted.



PARTS LIST		
ITEM	QTY	DESCRIPTION
P 024	2	Coped Angle
P 025	2	Sign Flat Bar
P 026	2	Sign Angle
P 027	1	Name Plate


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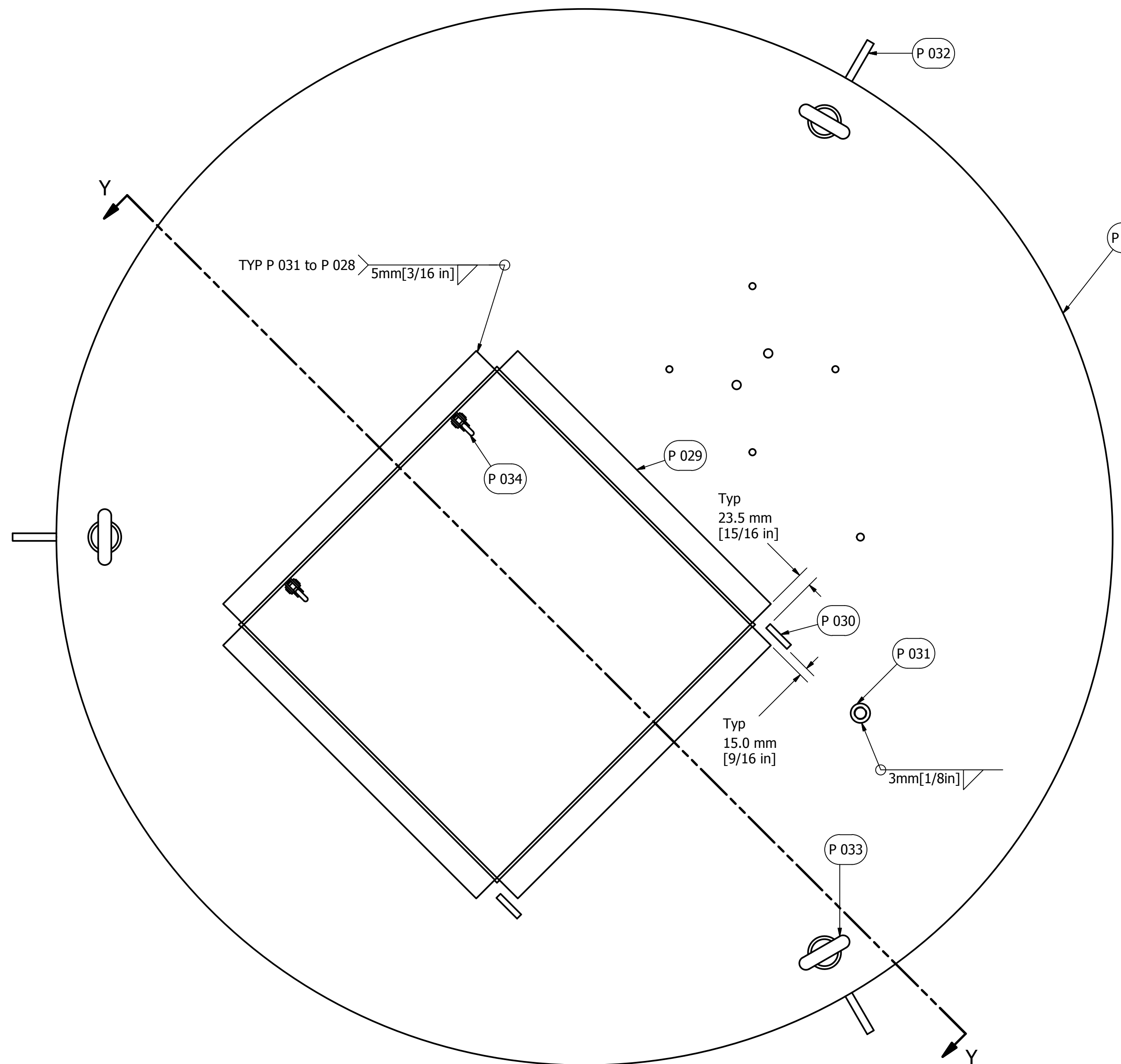
S 007

Sign Assembly

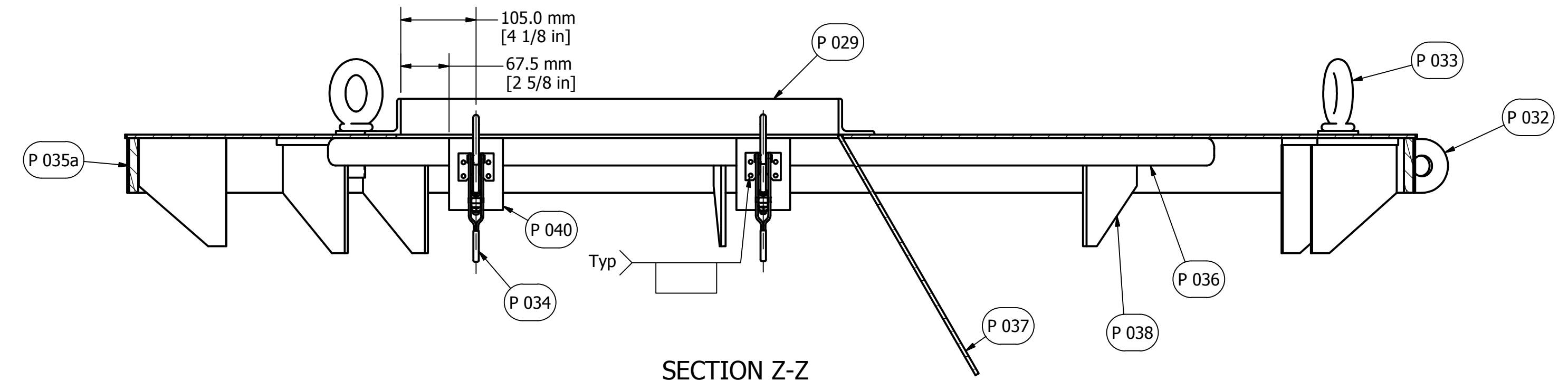
FILE No. 06044 SCALE: N.T.S. DWG No. 13 of 22

Rv.	DATE	DESCRIPTION	DRAWN	APP'D
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1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.I.	B.Y.

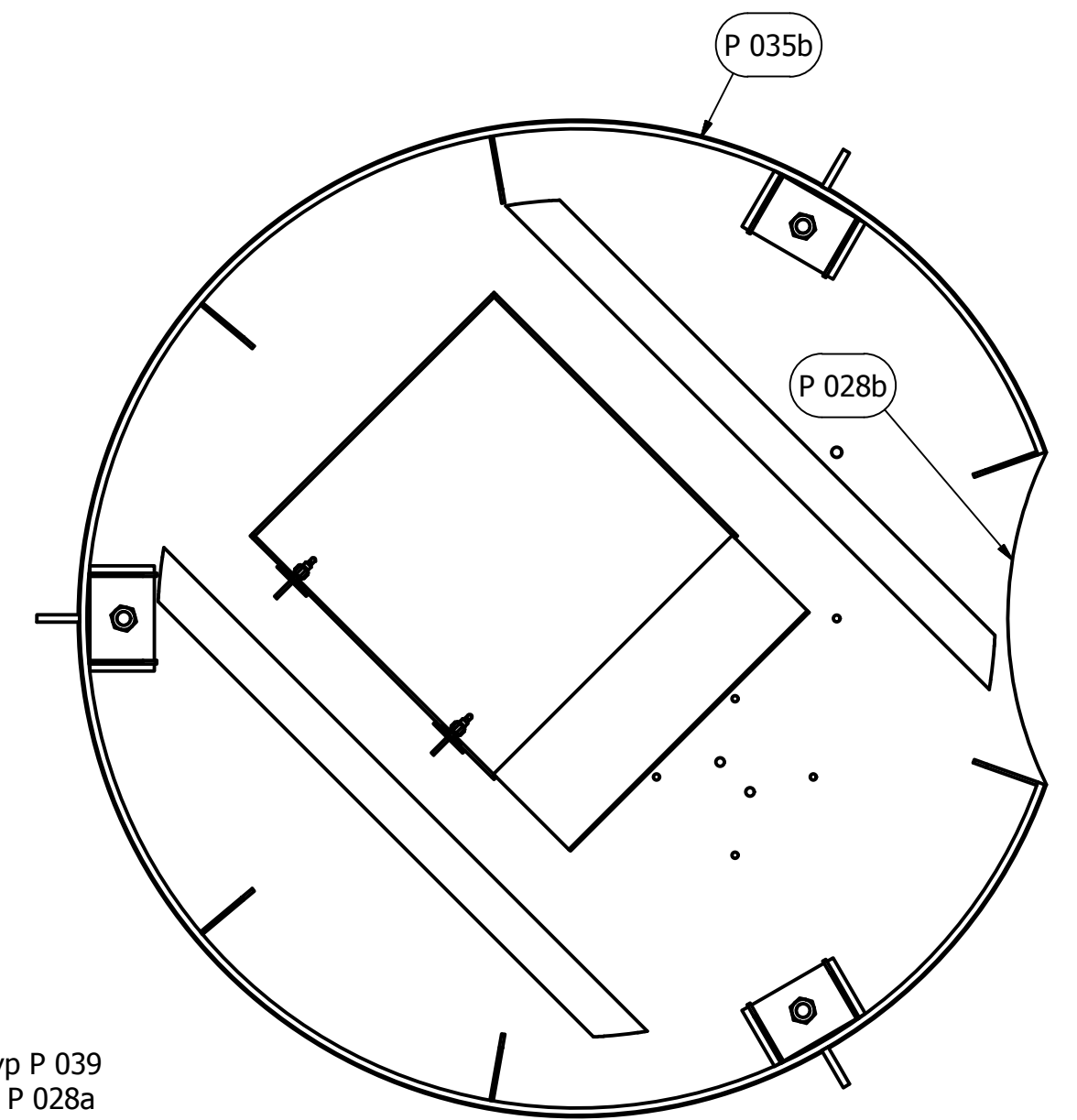
All Dimensions in mm unless otherwise noted.



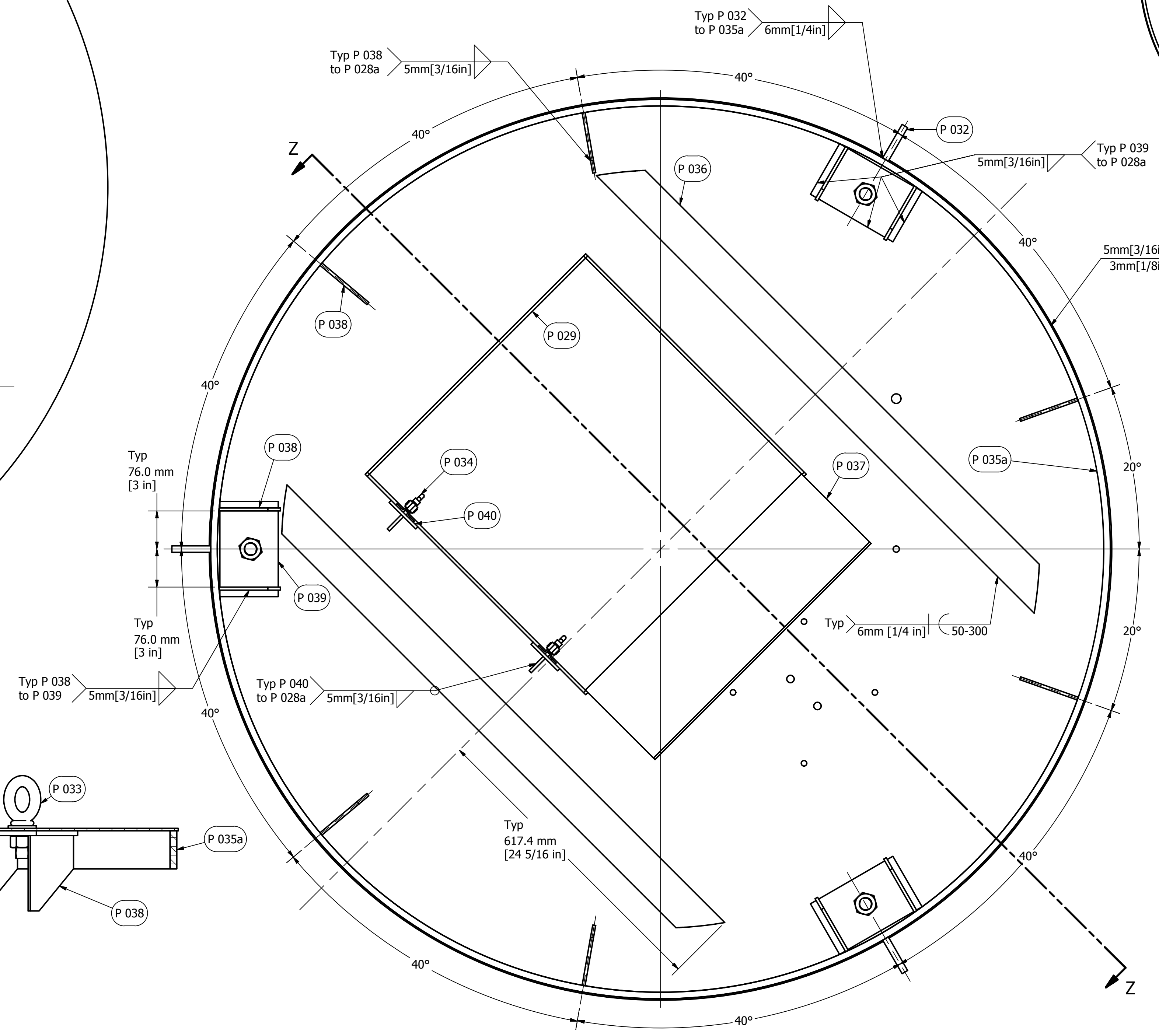
S 008a Top View



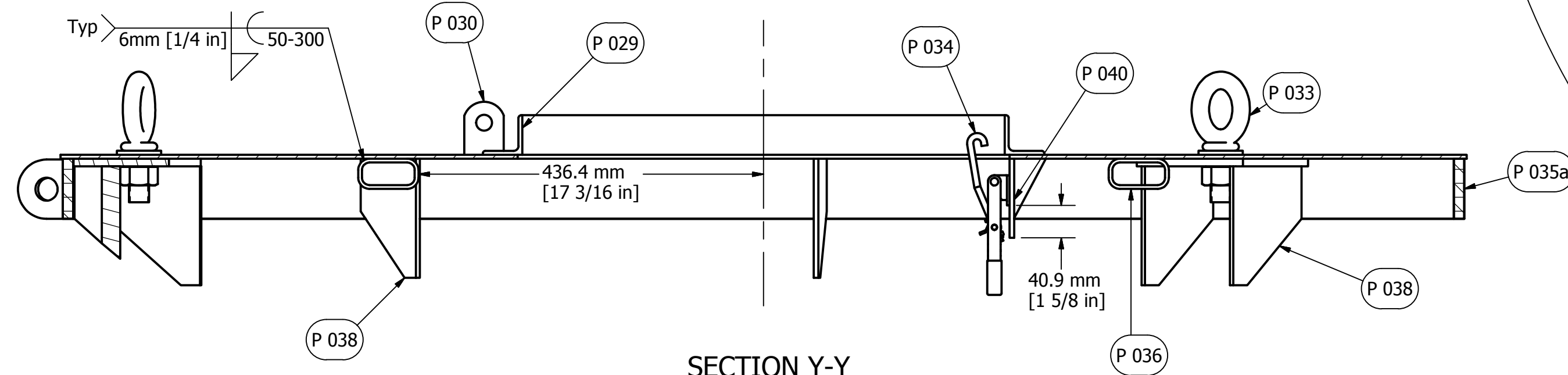
SECTION Z-Z



S 008b Bottom View



S 008a Bottom View



SECTION Y-Y

Note: To make S 008b swap out P 028a for P 028b and P 035a for P 035b

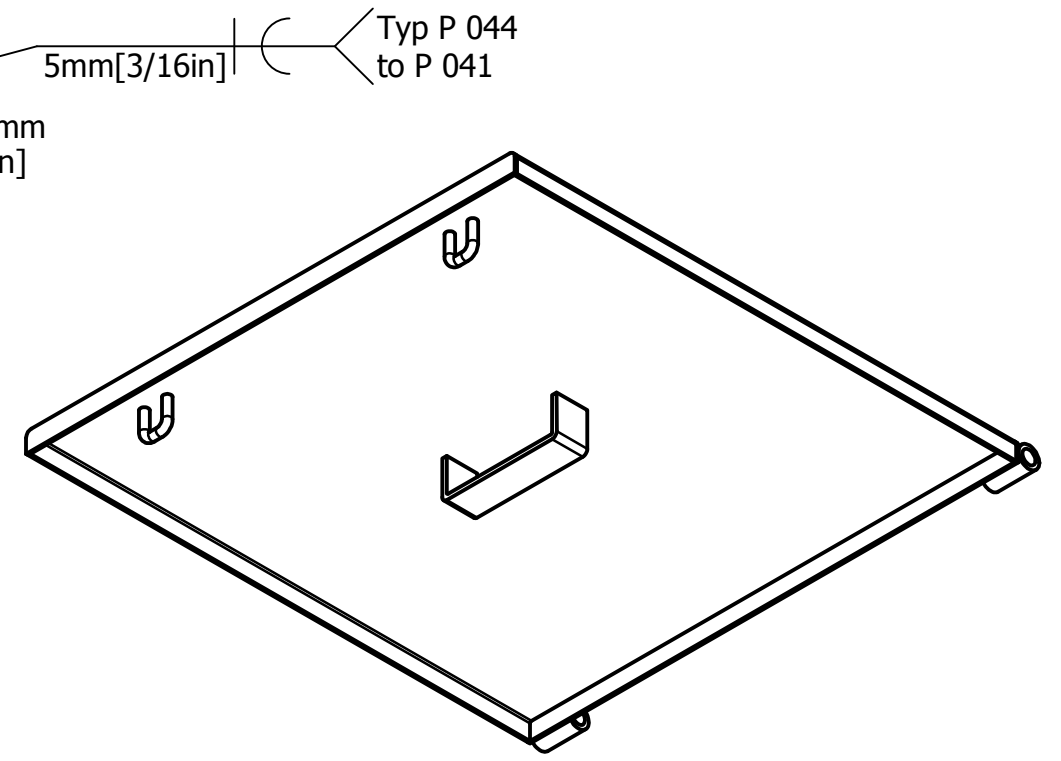
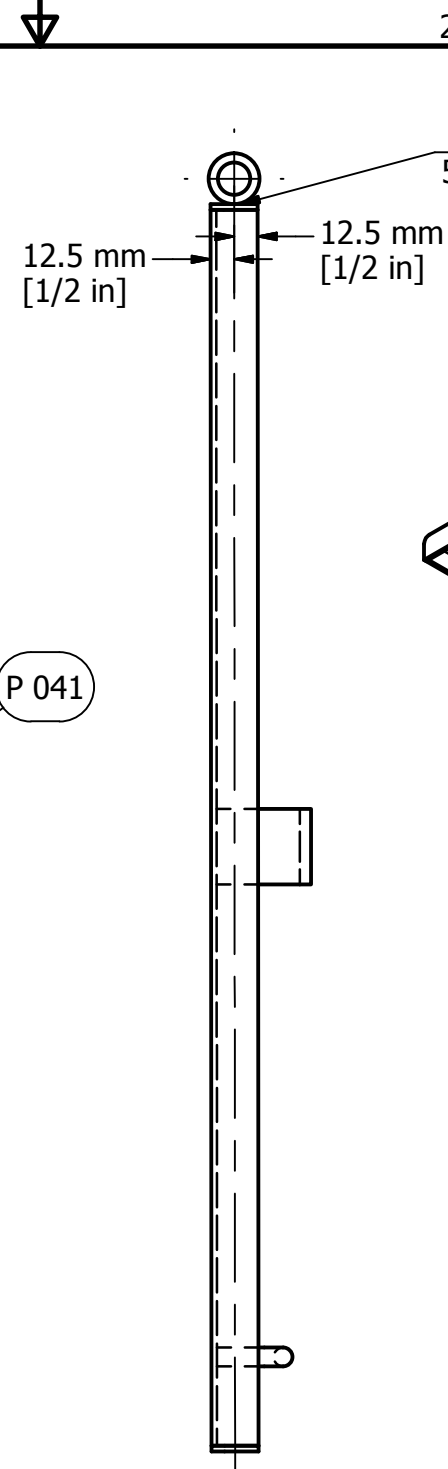
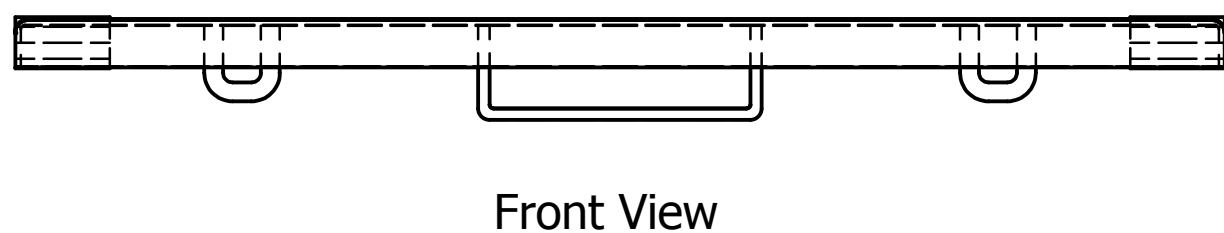
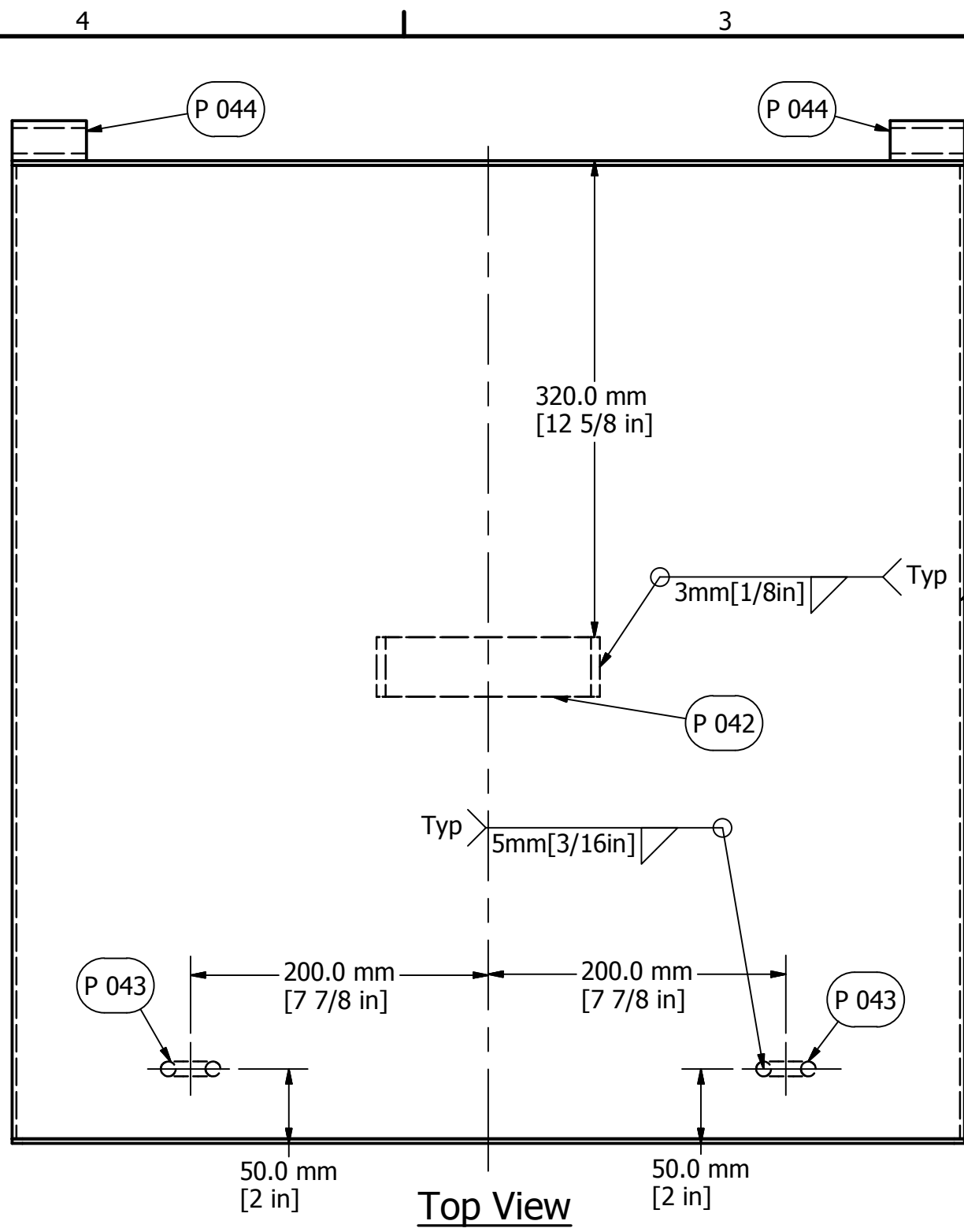
PARTS LIST		
ITEM	QTY	DESCRIPTION
P 028a	1	Top Deck Floor
P 028b	1	Top Deck Floor with Daymark
P 029	1	Hatch Frame
P 030	2	Hatch Hinge
P 031	1	Pipe Coupling
P 032	3	Outer Lifting Ring
P 033	3	Lifting Eye
P 034	2	Hatch Clamp
P 035a	1	Top Deck Ring
P 035b	1	Top Deck Ring with Daymark
P 036	2	Top Deck Brace
P 037	1	Deflector Plate
P 038	12	Top Deck Gusset
P 039	3	Lifting Eye Plate
P 040	2	Clamp Support

Fisheries and Oceans Canada
 Canadian Coast Guard Central & Arctic Region
 Pêches et Océans Canada
 Garde côtière canadienne Région du centre et de l'Arctique
 Maritime and Civil Infrastructure (MCI), Integrated Technical Services
 525 Esplanade St. - Steppe, CN N7T 8B1

S 008a/S008b
 Top Deck/Top Deck With Daymark

FILE No.	06044	SCALE:	N.T.S.	DWG No.:	14 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
0	N/A	DRAWING INITIATED	A.W.	A.W.	
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.	

All Dimensions in mm unless otherwise noted.



Bottom Right Isometric View

PARTS LIST		
ITEM	QTY	DESCRIPTION
P 041	1	Hatch Cover
P 042	1	Hatch Handle
P 043	2	Clamp Clip
P 044	2	Hatch Hinge

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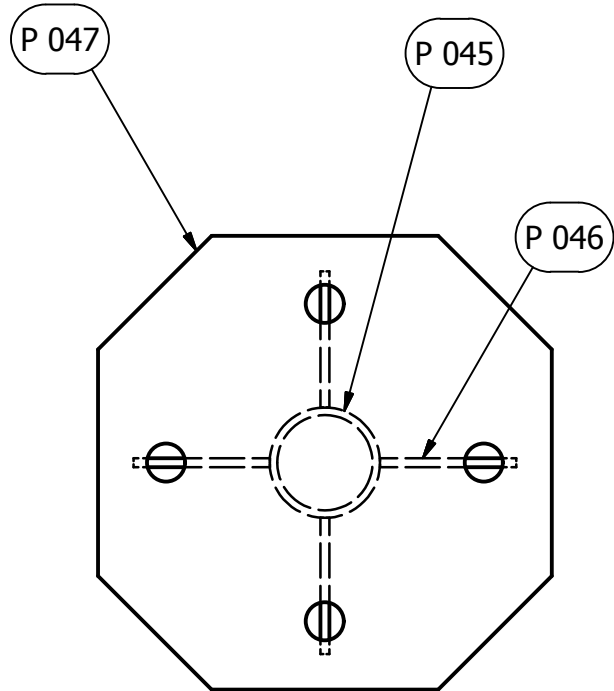
S 009

Hatch Assembly

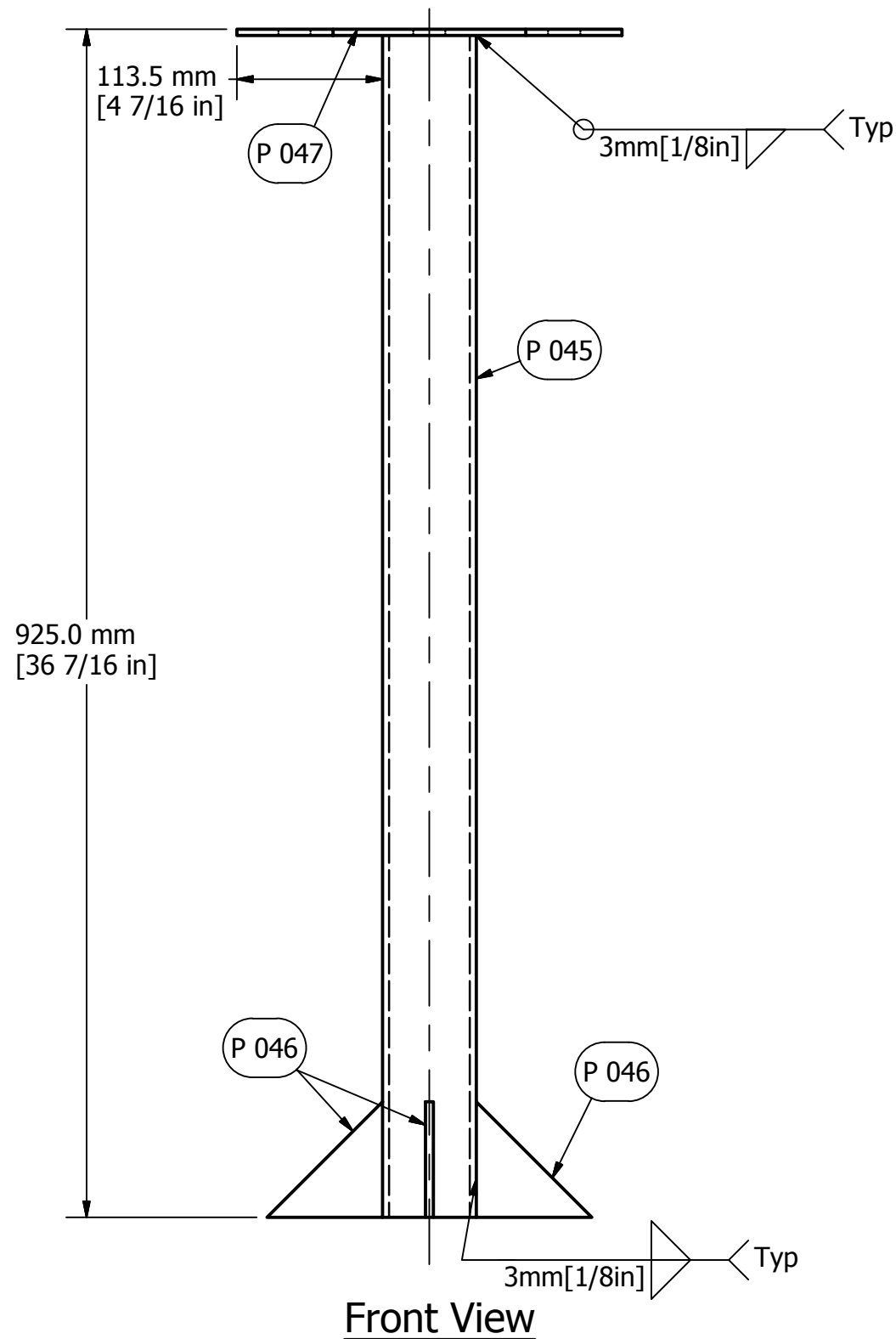
FILE No. 06044 SCALE: N.T.S. DWG No. 15 of 22

Rv.	DATE	DESCRIPTION	DRAWN	APP'D
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1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.I.	B.Y.

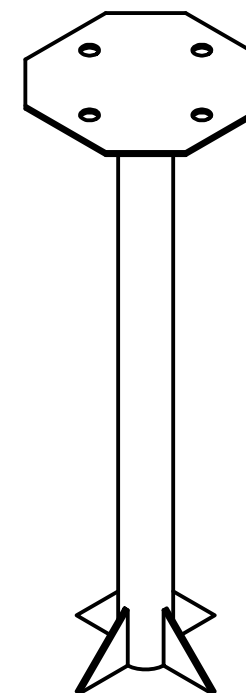
All Dimensions in mm unless otherwise noted.



Top View




Front View



Top Left Isometric View

PARTS LIST

ITEM	QTY	DESCRIPTION
P 045	1	Light Standard Tube
P 046	4	Light Standard Gusset
P 047	1	Light Standard Top Plate

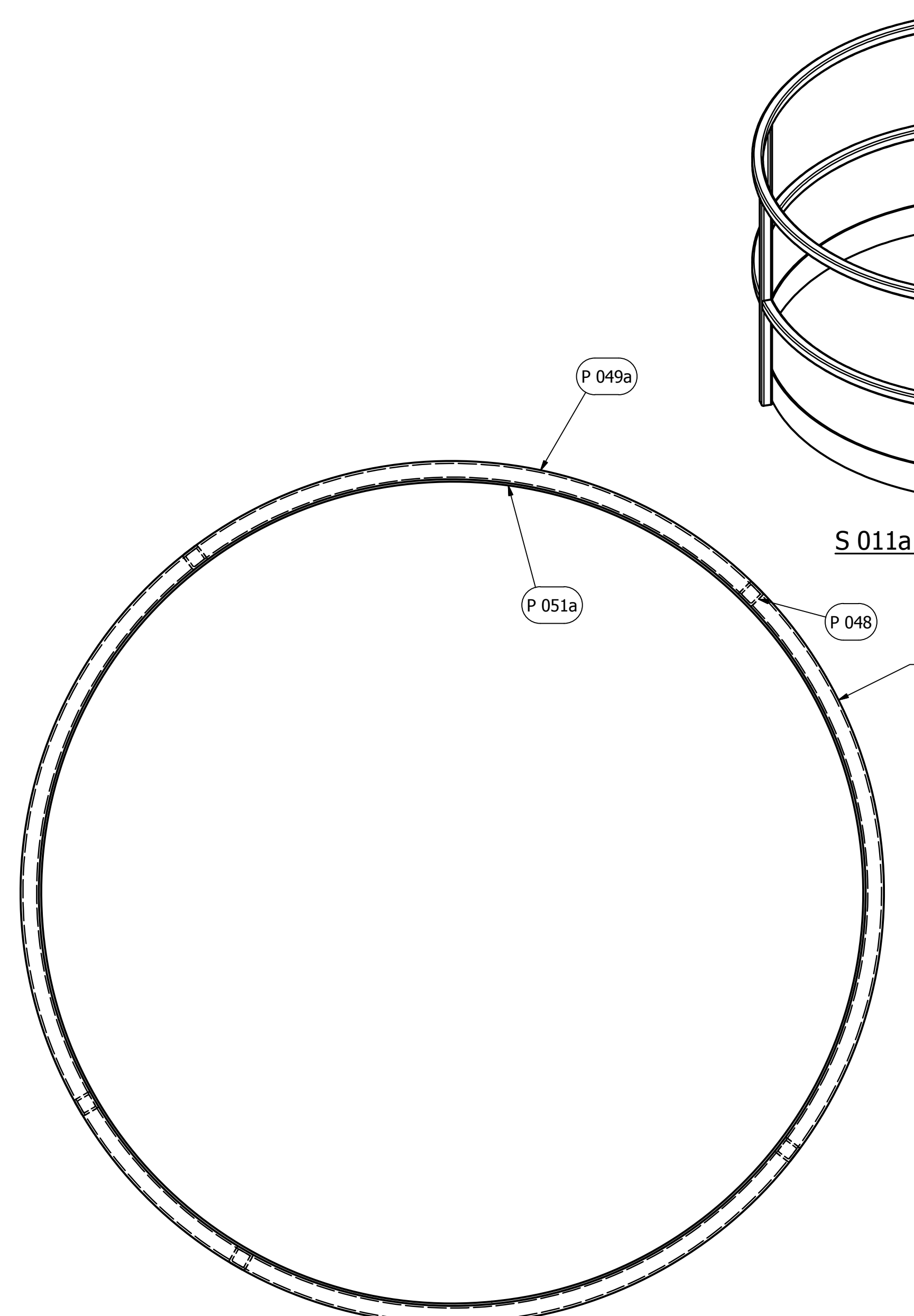
	Fisheries and Oceans Canada	Pêches et Océans Canada
	Canadian Coast Guard Central & Arctic Region	Garde côtière canadienne Région du centre et de l'Arctique
	Maritime and Civil Infrastructure (MCI), Integrated Technical Services 520 Exmouth St., Sarnia, ON N7T 8B1	

S 010
Light Standard Assembly

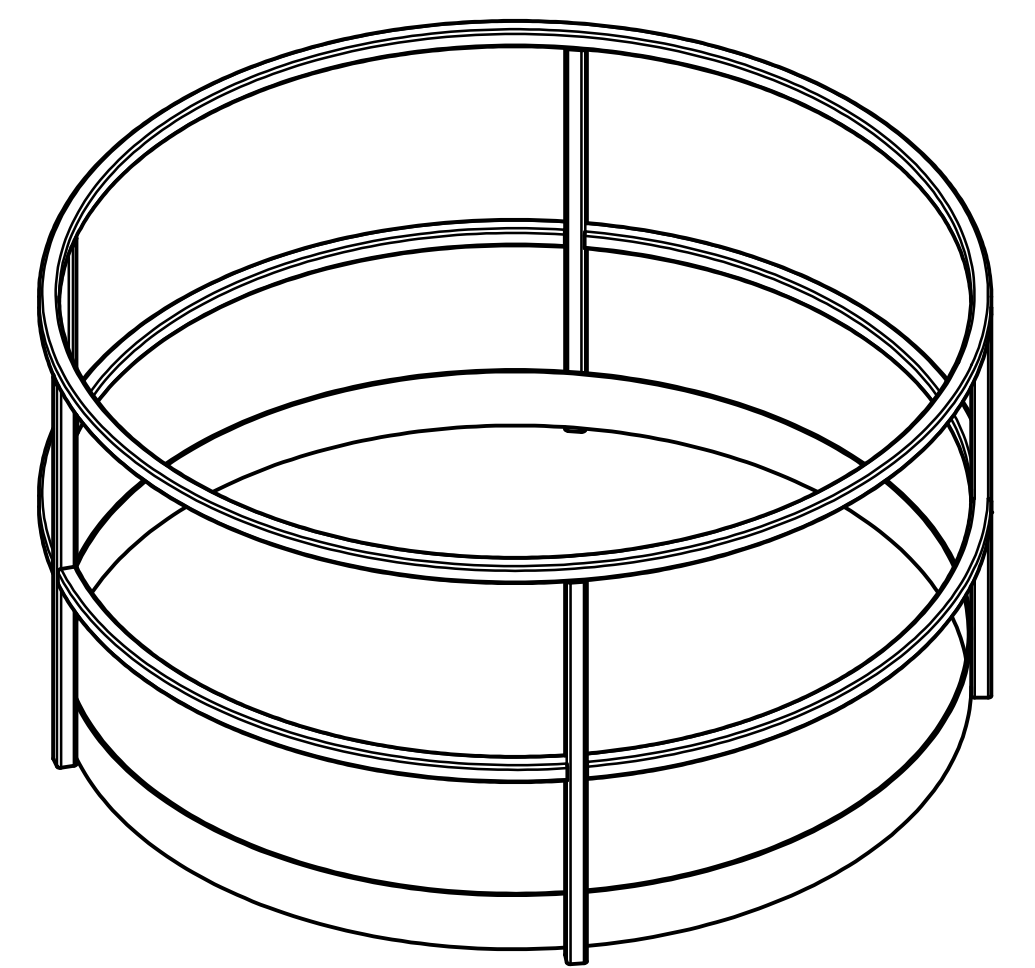
FILE No.	06044	SCALE:	N.T.S.	DWG No.	16 of 22
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Rv.	DATE	DESCRIPTION	DRAWN	APP'D
0	N/A	DRAWING INITIATED	A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.I.	B.Y.

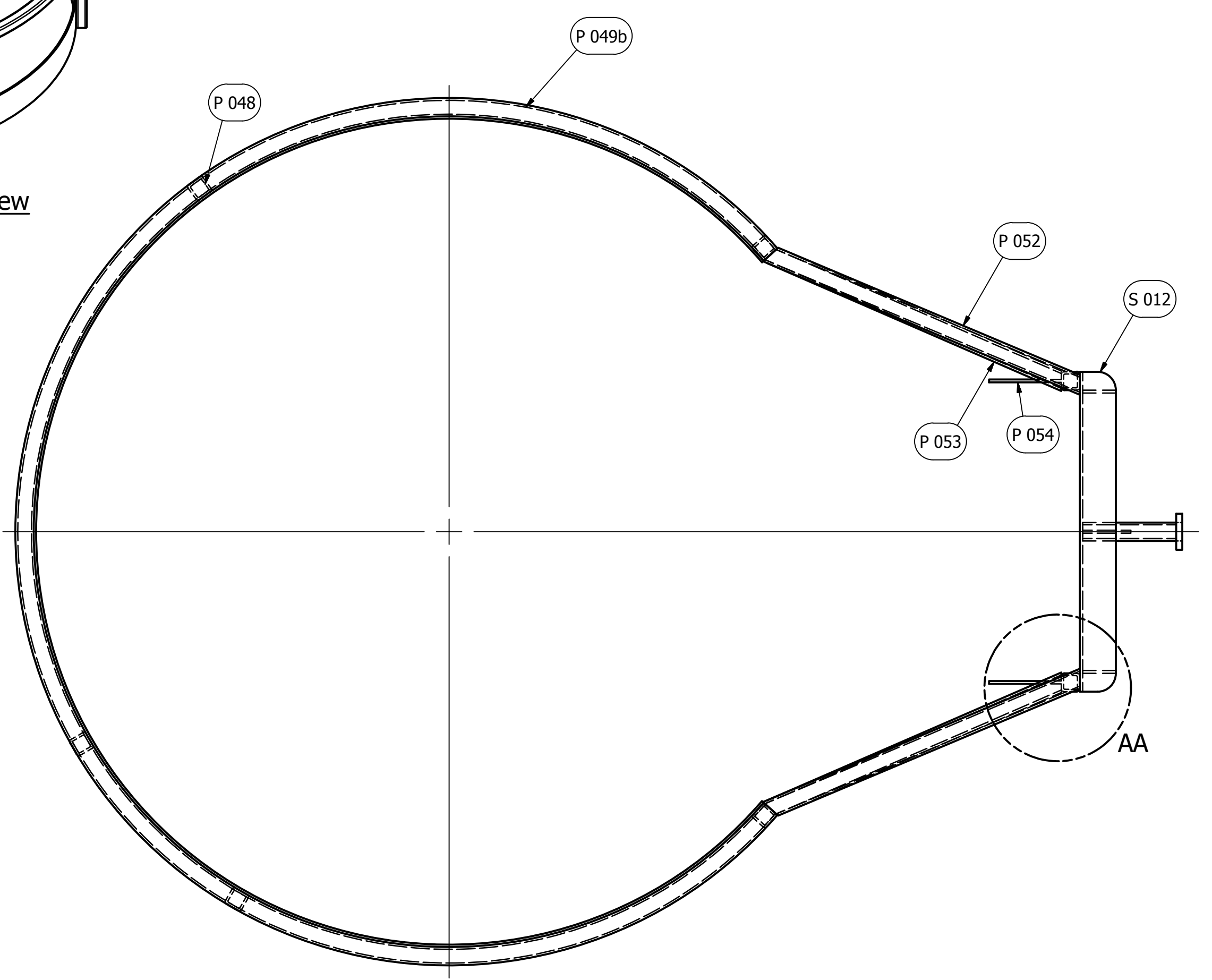
All Dimensions in mm unless otherwise noted.



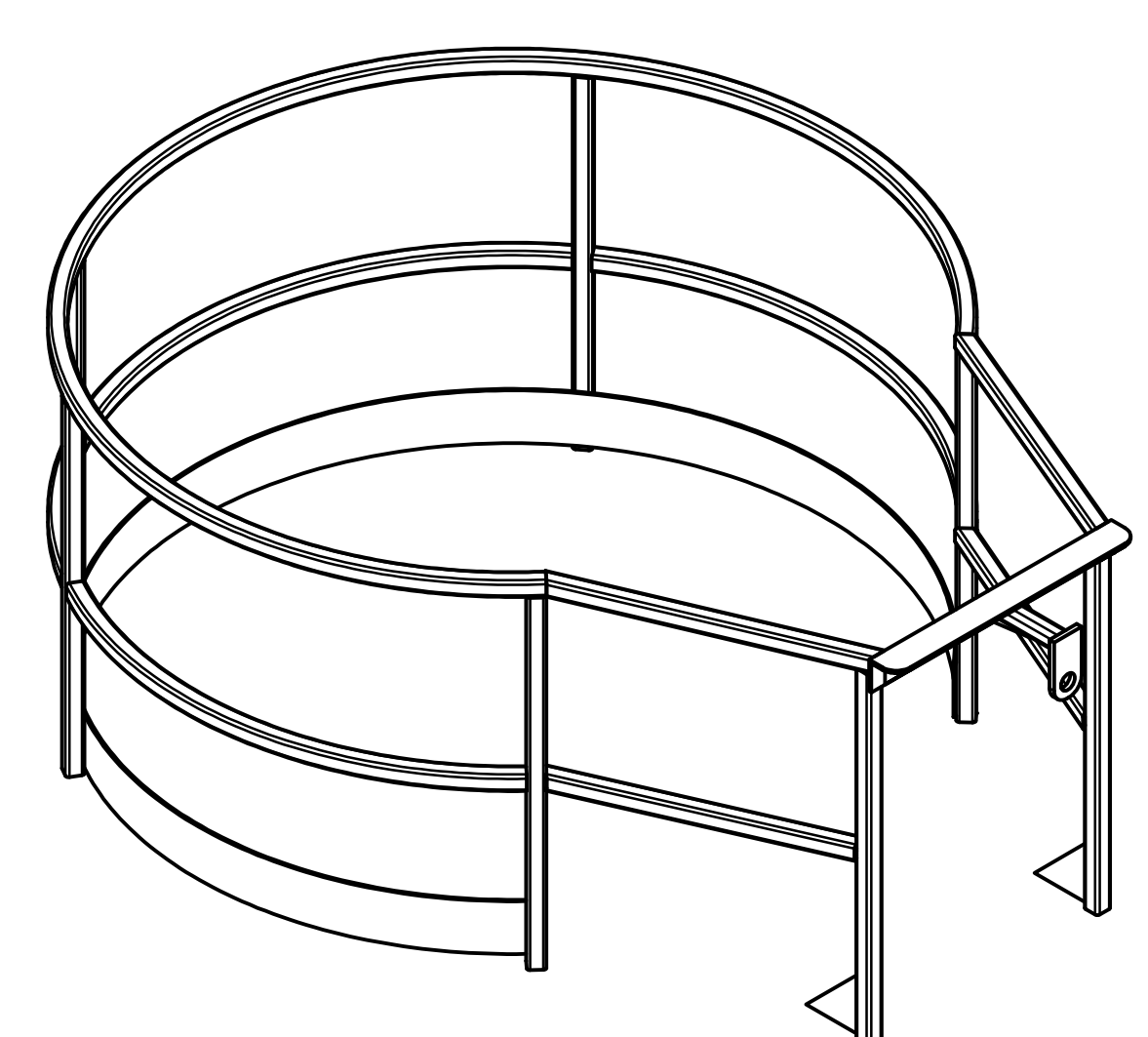
S 011a Top View



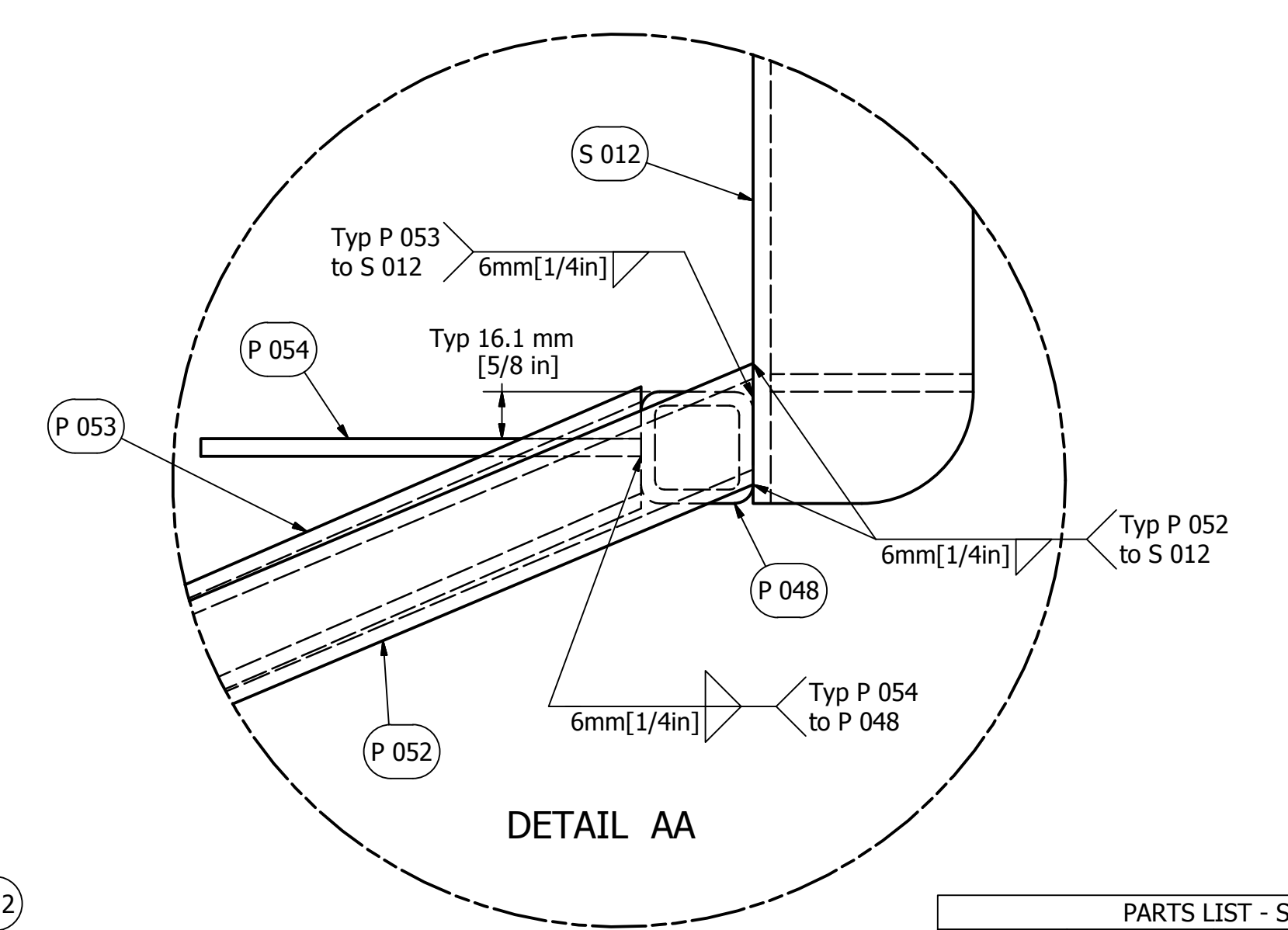
S 011a Top Right Isometric View



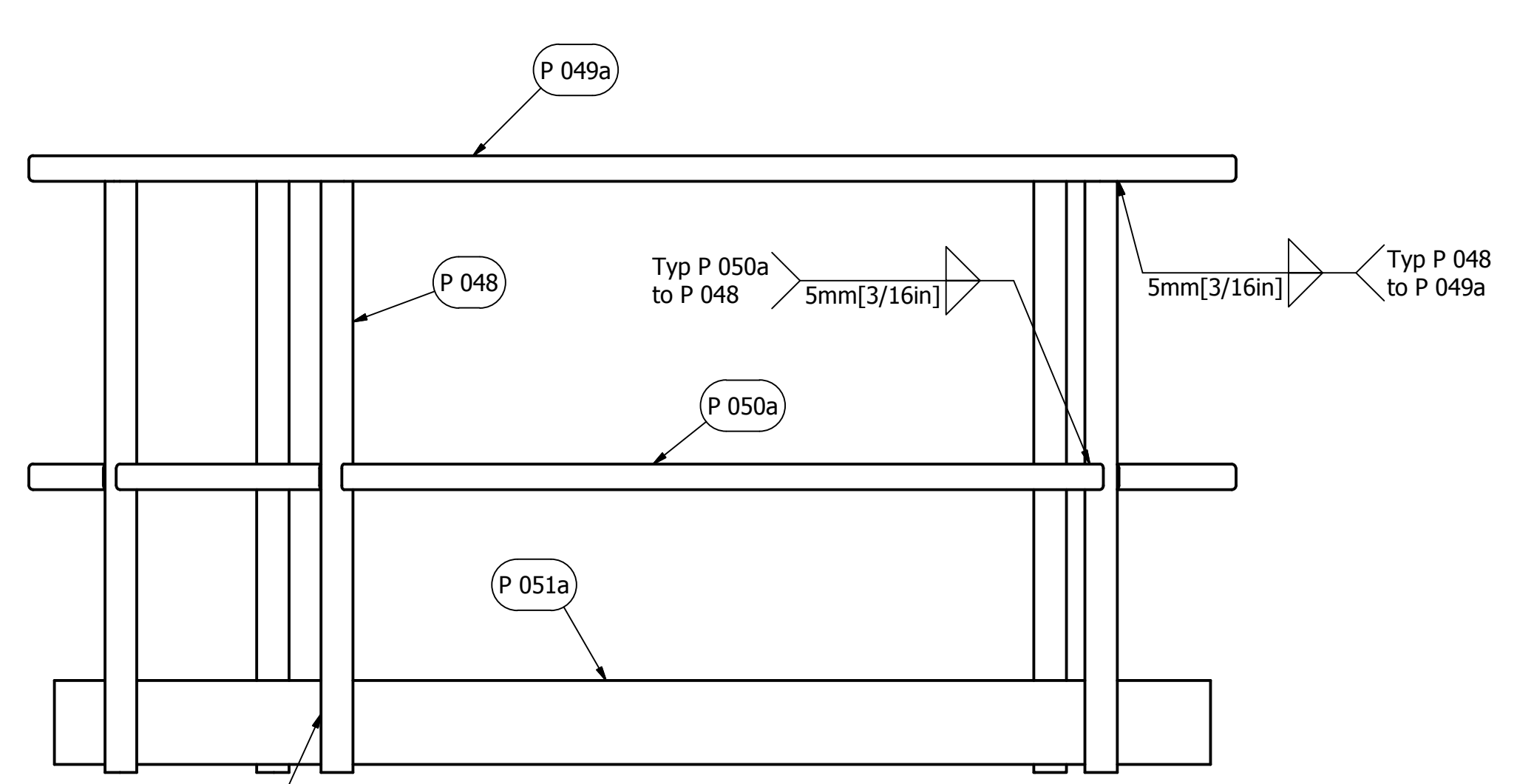
S 011b Top View



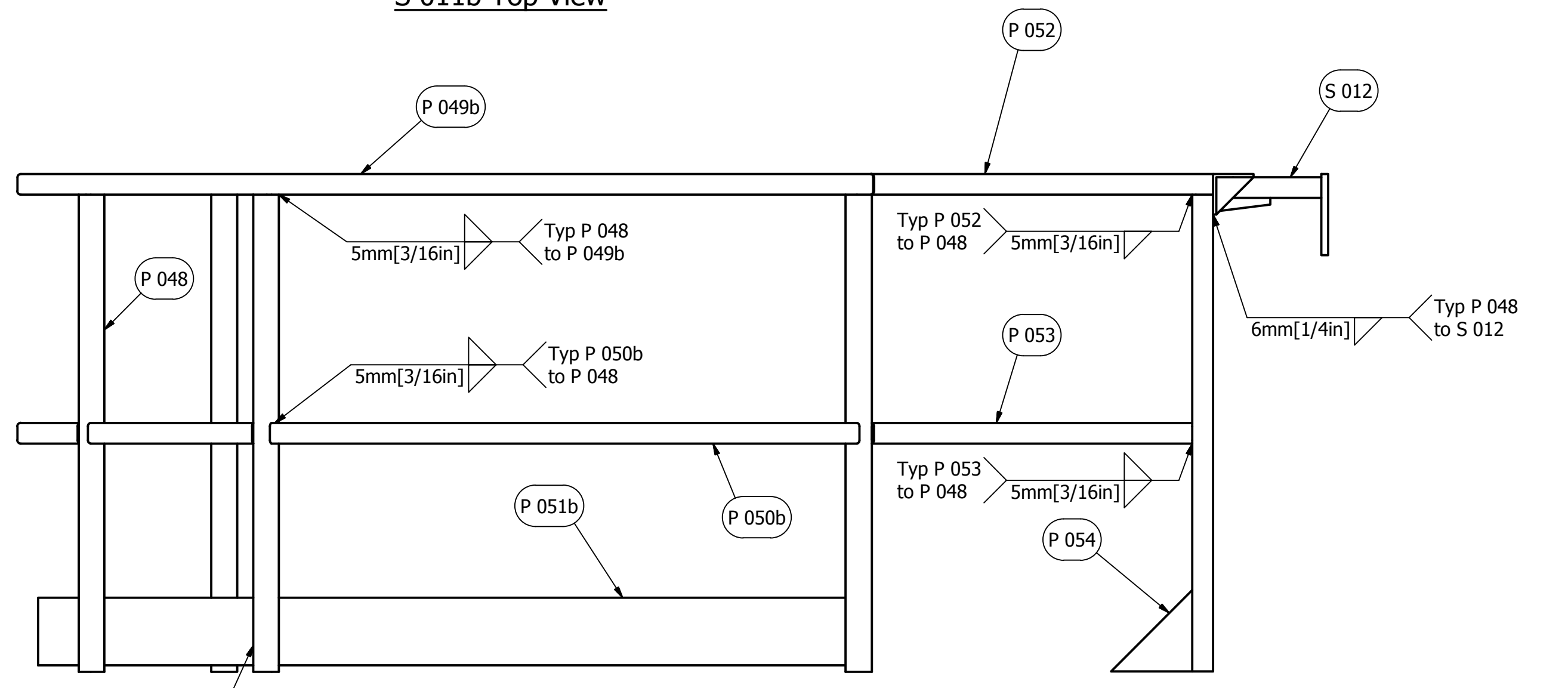
S 011b Top Right Isometric View



DETAIL AA



S 011a Front View



S 011b Front View

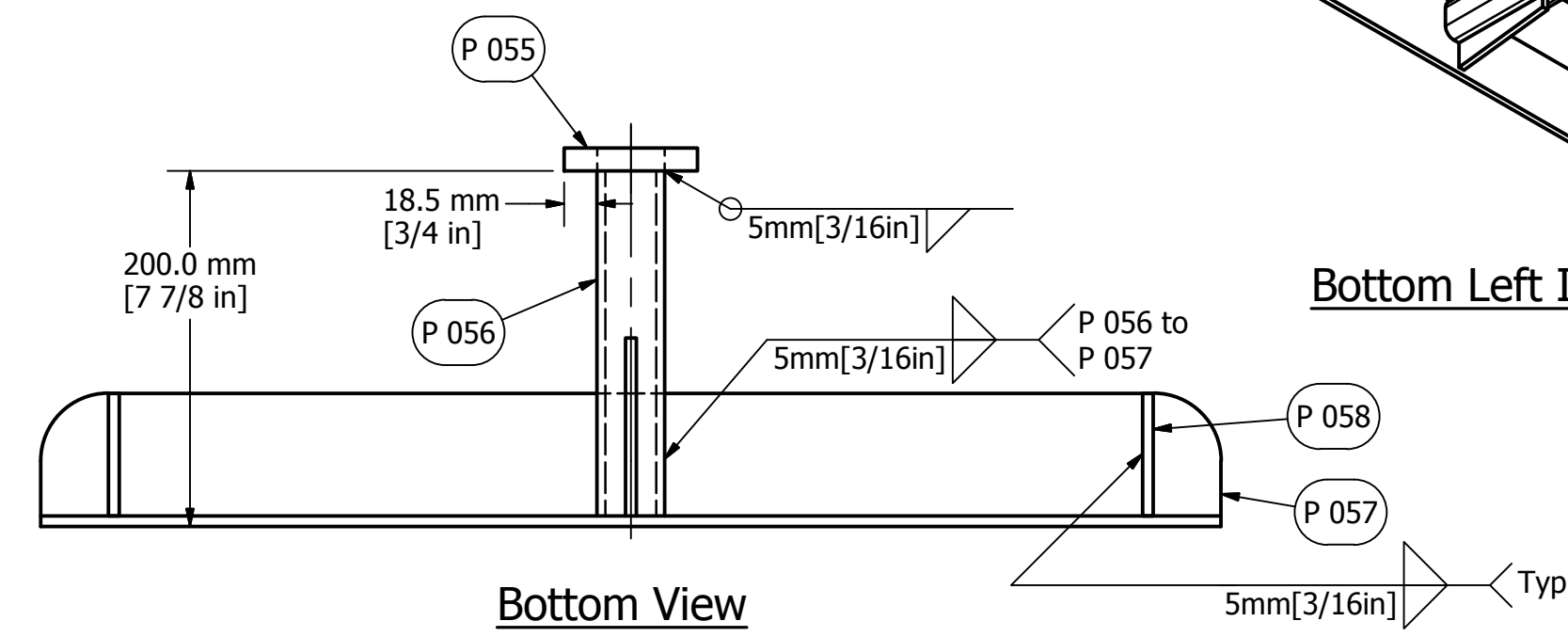
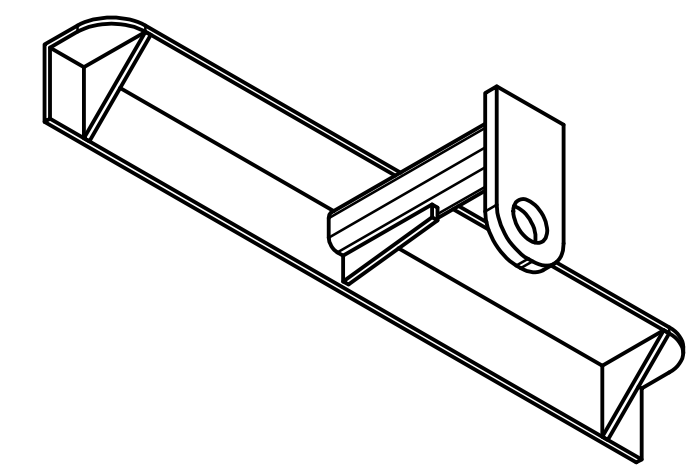
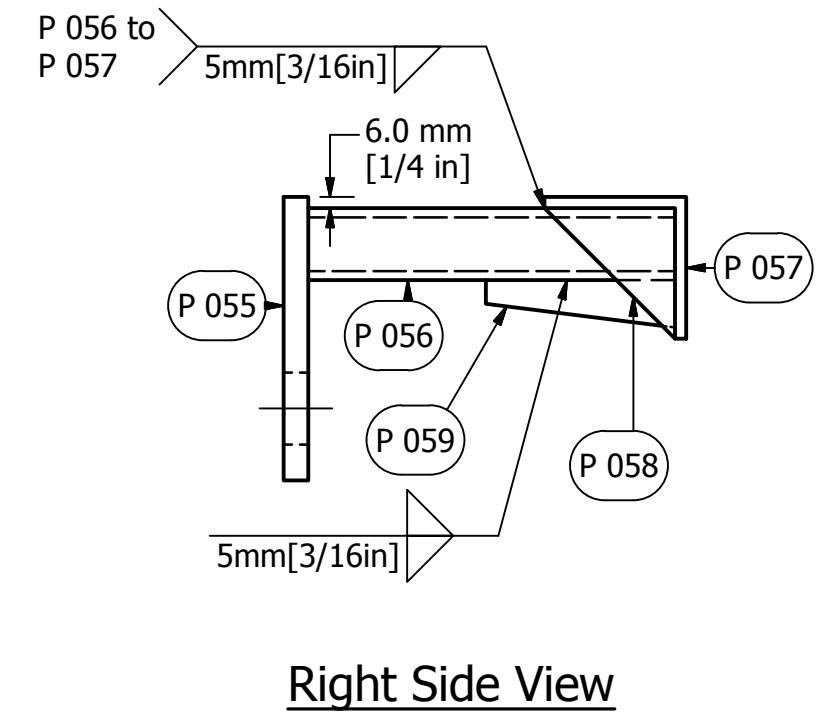
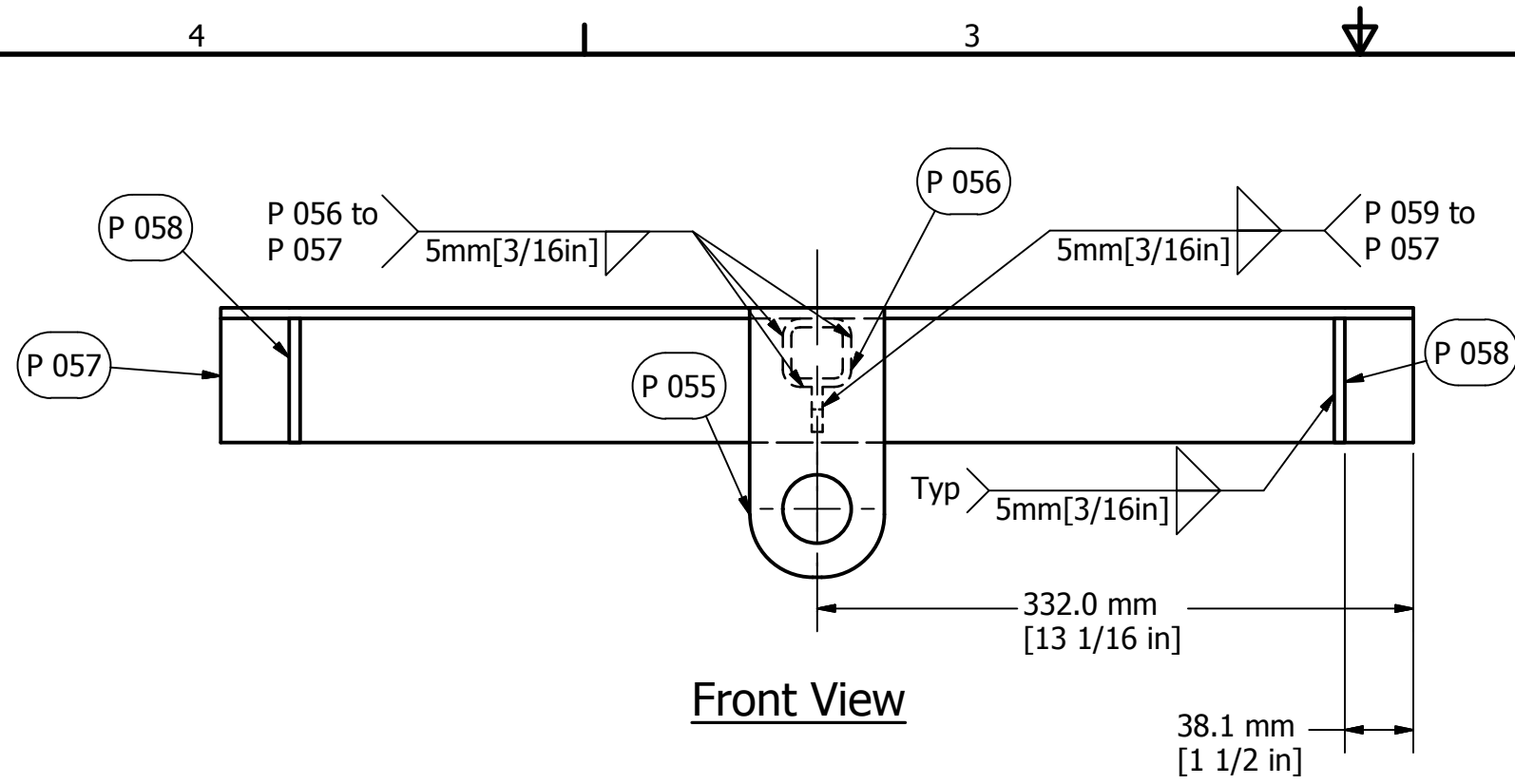
PARTS LIST - S 011a		
ITEM	QTY	DESCRIPTION
P 048	5	Rail Post
P 049a	1	Top Rail
P 050a	1	Middle Rail
P 051a	1	Kick Plate
PARTS LIST - S 011b		
ITEM	QTY	DESCRIPTION
P 048	7	Rail Post
P 049b	1	Top Rail Daymark
P 050b	1	Middle Rail Daymark
P 051b	1	Kick Plate Daymark
P 052	2	Top Angled Rail
P 053	2	Middle Angled Rail
P 054	2	Rail Gusset
S 012	1	Lifting Assembly

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S 011a/S 011b
 Top Railing/Top Railing with Daymark

FILE No.	06044	SCALE:	N.T.S.	DWG No.:	17 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
0	N/A	DRAWING INITIATED	A.W.	A.W.	
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.	

All Dimensions in mm unless otherwise noted.



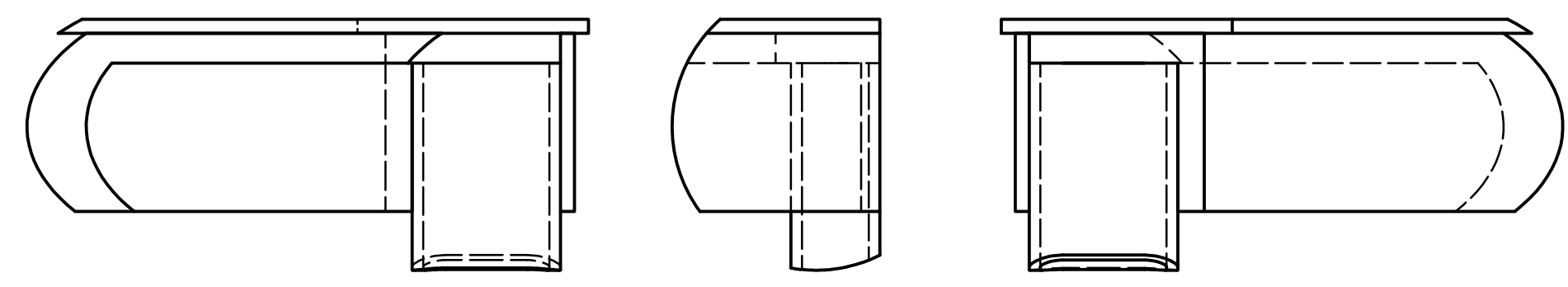
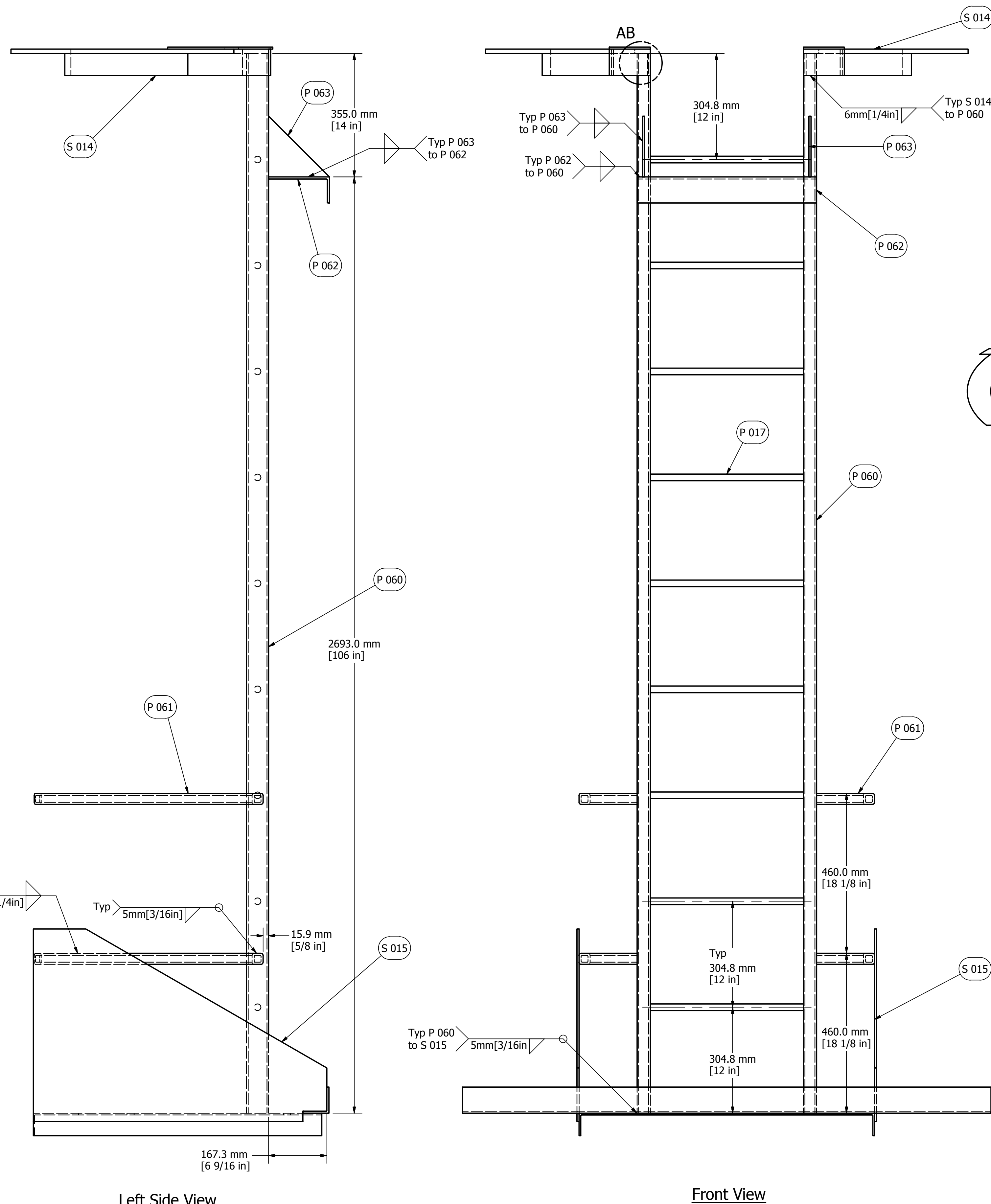
PARTS LIST				
ITEM	QTY	DESCRIPTION		
P 055	1	Lift Arm Bracket		
P 056	1	Lift Arm Tube		
P 057	1	Lift Arm Angle		
P 058	2	Lift Arm Gusset		
P 059	1	Lift Arm Secondary Gusset		

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S 012	
Lifting Assembly	

FILE No.	06044	SCALE:	N.T.S.	DWG No.	18 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
0	N/A	DRAWING INITIATED	A.W.	A.W.	
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.I.	B.Y.	

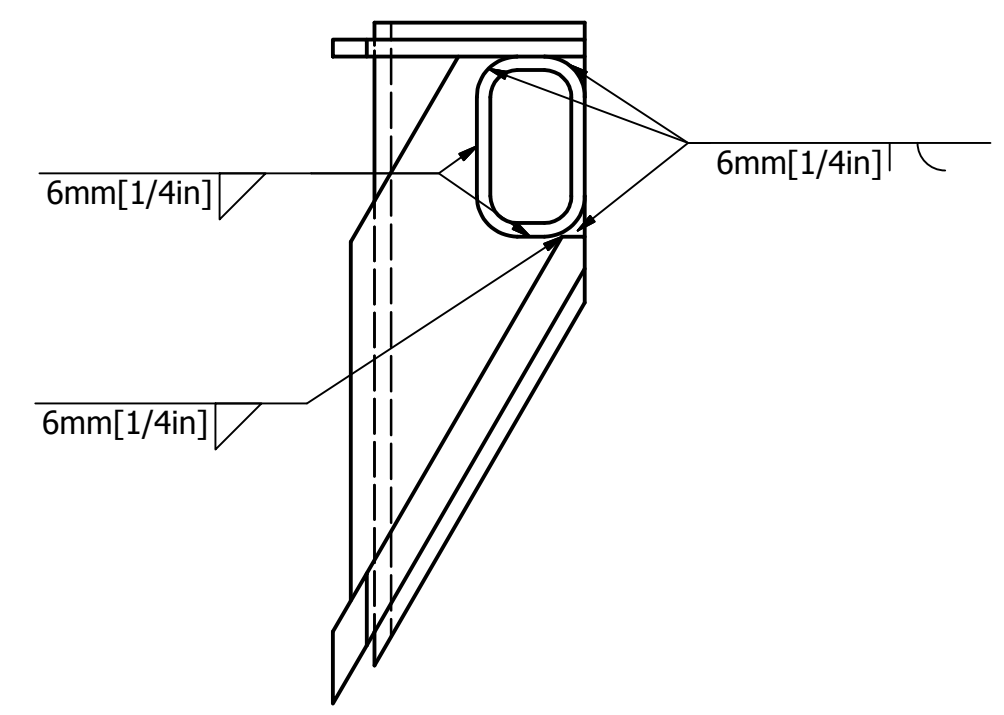
All Dimensions in mm unless otherwise noted.



Left Side View

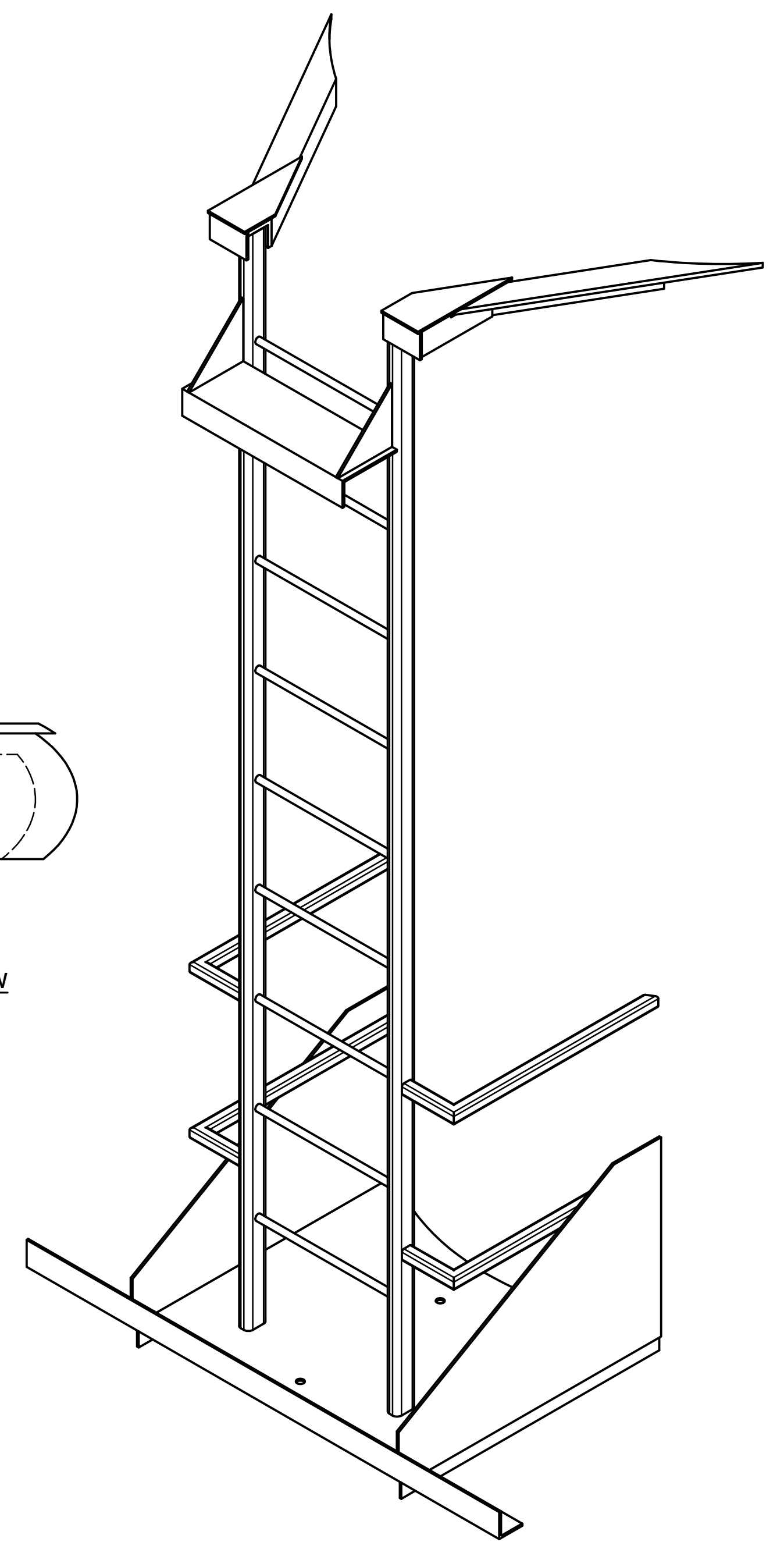
DETAIL AB
Front View

Right Side View



Bottom View

P 060 to S 014 Weld Details



Top Right Isometric View

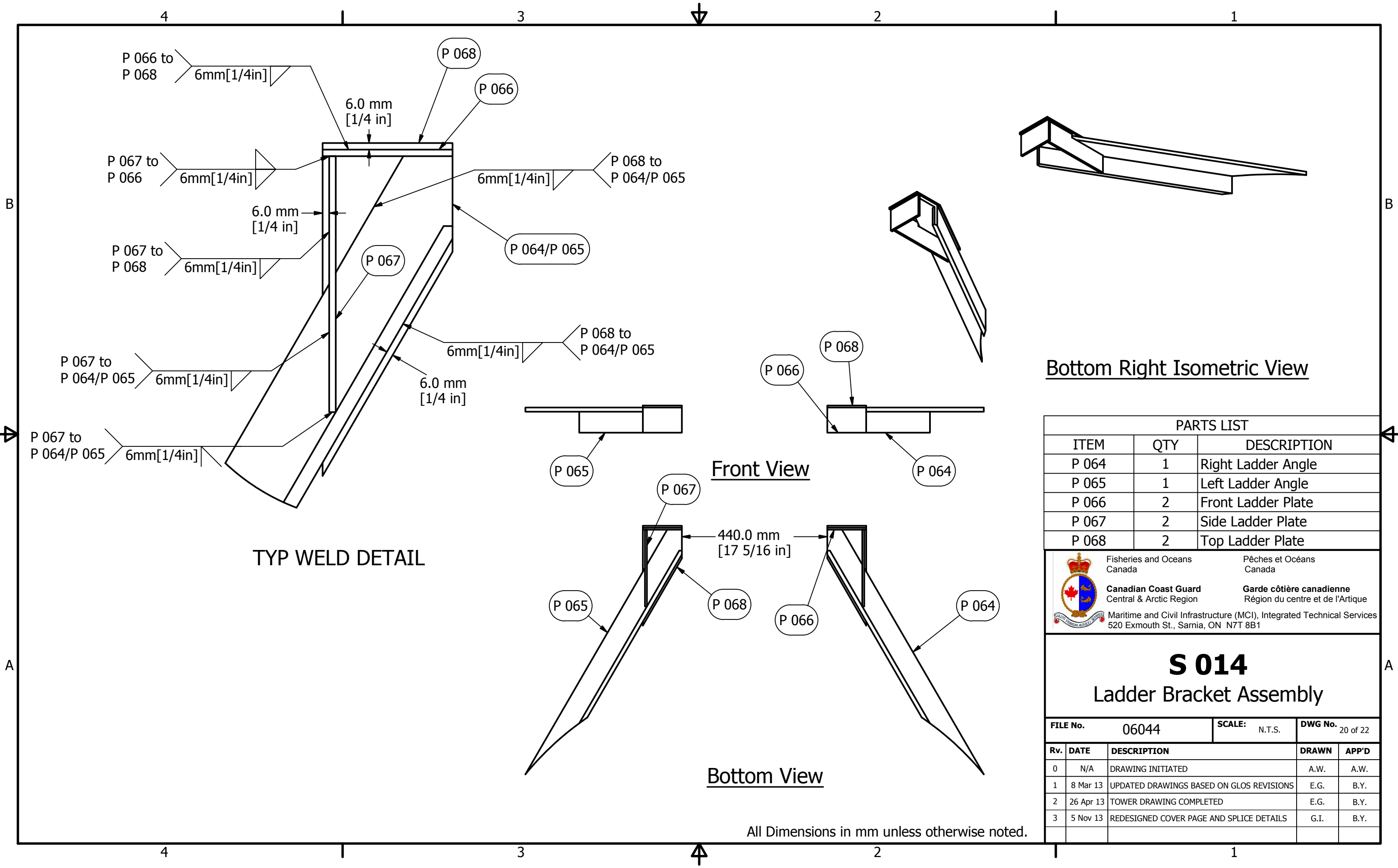
PARTS LIST		
ITEM	QTY	DESCRIPTION
P 017	9	Ladder Rung
P 060	2	Exterior Side Rail
P 061	4	Exterior Ladder Bracket
P 062	1	Mount Angle
P 063	2	Mount Gusset
S 014	1	Ladder Bracket Assembly
S 015	1	Ladder Platform Assembly

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S 013
External Ladder


FILE No.	06044	SCALE:	N.T.S.	DWG No.	19 of 22
Rv.	DATE	DESCRIPTION	DRAWN	APP'D	
0	N/A	DRAWING INITIATED	A.W.	A.W.	
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS	E.G.	B.Y.	
2	26 Apr 13	TOWER DRAWING COMPLETED	E.G.	B.Y.	
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS	G.L.	B.Y.	

All Dimensions in mm unless otherwise noted.



Bottom Right Isometric View

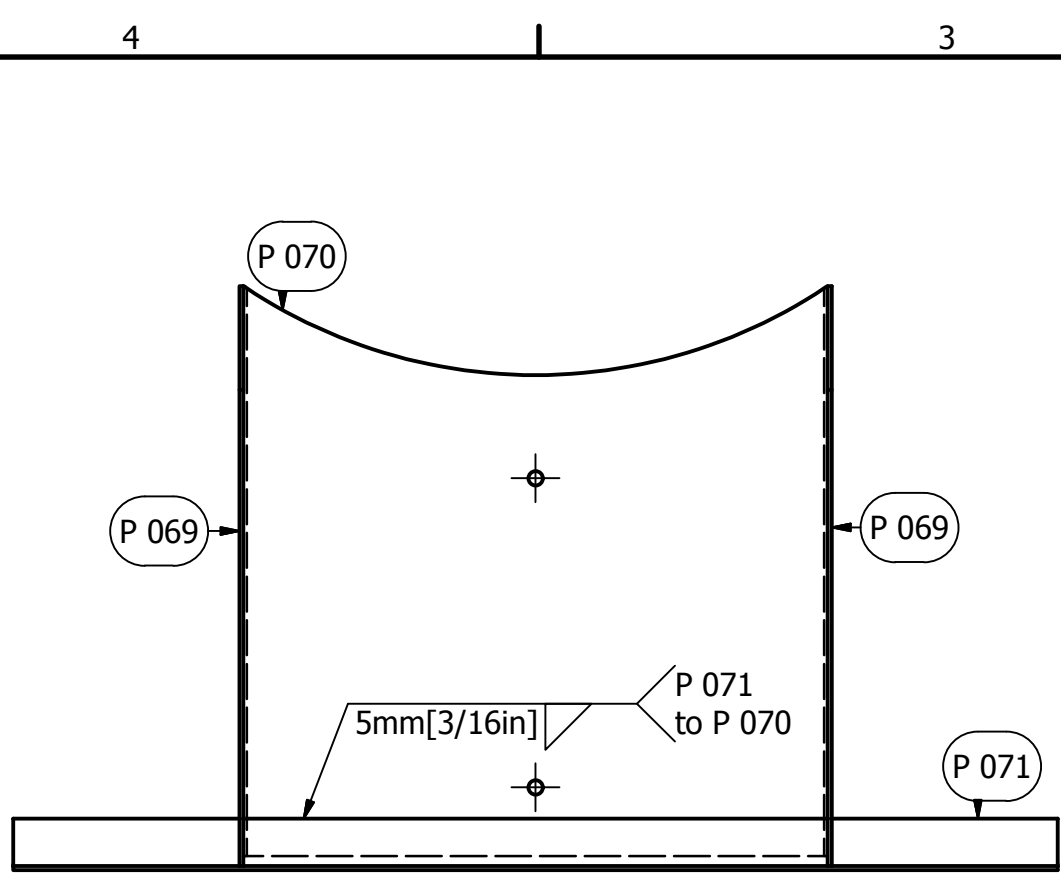
PARTS LIST		
ITEM	QTY	DESCRIPTION
P 064	1	Right Ladder Angle
P 065	1	Left Ladder Angle
P 066	2	Front Ladder Plate
P 067	2	Side Ladder Plate
P 068	2	Top Ladder Plate


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 520 Exmouth St., Sarnia, ON N7T 8B1

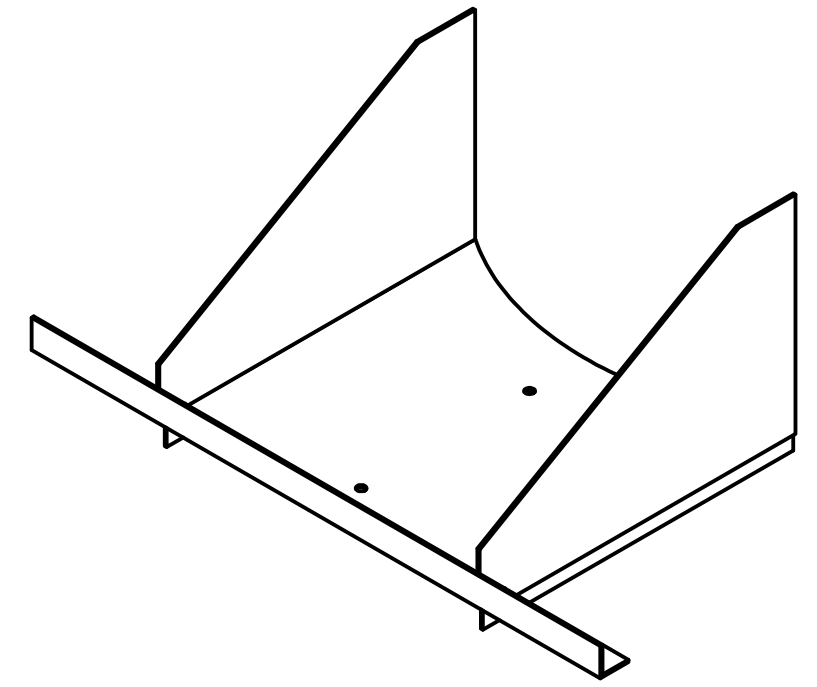
S 014
Ladder Bracket Assembly

FILE No.	06044	SCALE:	N.T.S.	DWG No.	20 of 22
Rv.	DATE	DESCRIPTION		DRAWN	APP'D
0	N/A	DRAWING INITIATED		A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS		E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED		E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS		G.I.	B.Y.

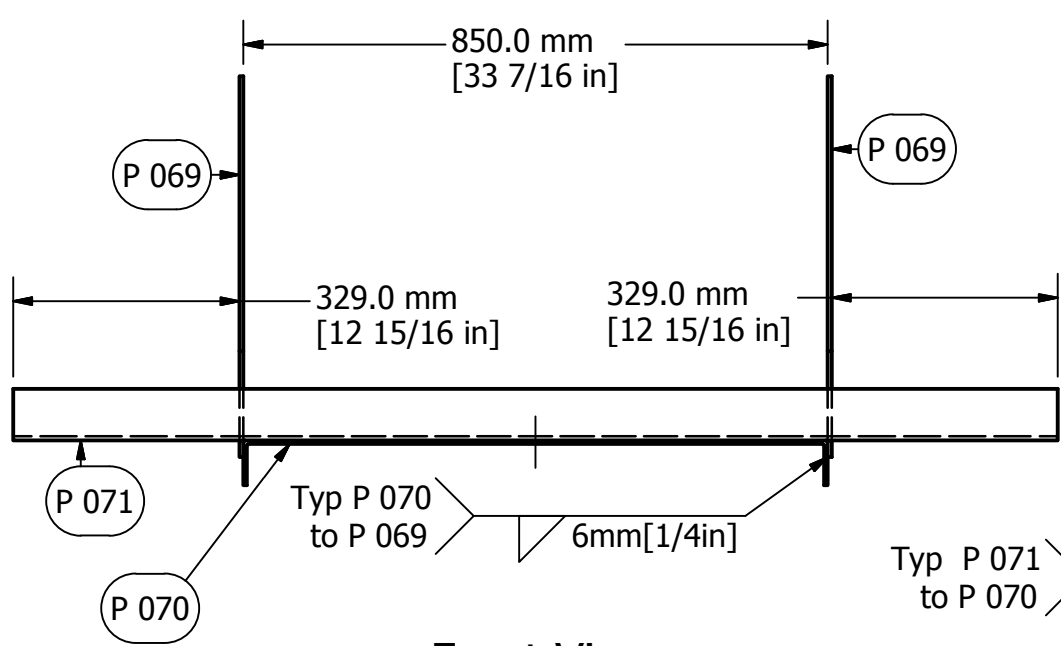
All Dimensions in mm unless otherwise noted.



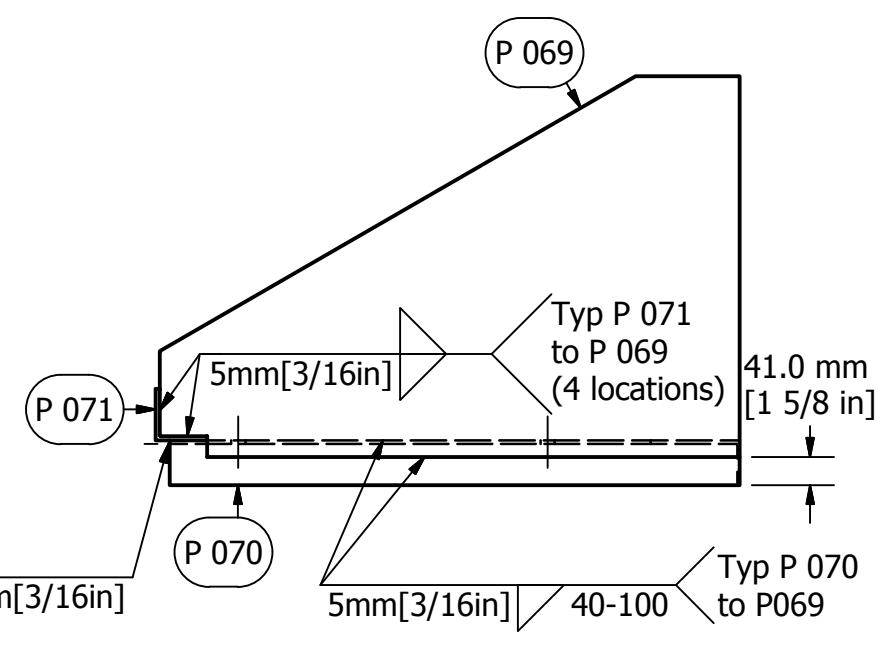
Top View



Top Right Isometric View




Front View



Right Side View

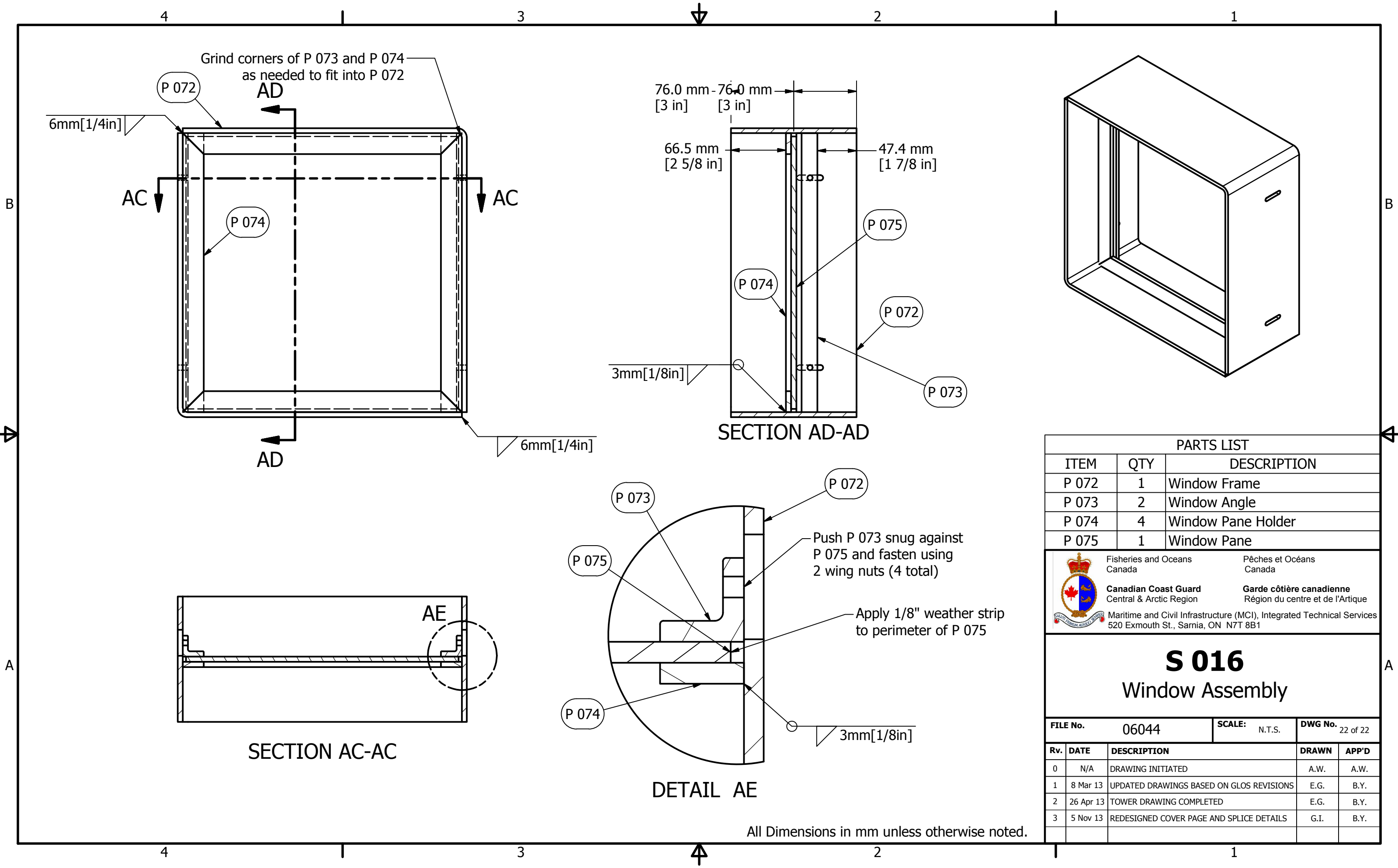
All Dimensions in mm unless otherwise noted.

PARTS LIST				
ITEM	QTY	DESCRIPTION		
P 069	2	Gusset Kick Plate		
P 070	1	Ladder Platform		
P 071	1	Ladder Platform Angle		


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S 015	
Ladder Platform Assembly	

FILE No.	06044	SCALE:	N.T.S.	DWG No.	21 of 22
Rv.	DATE	DESCRIPTION		DRAWN	APP'D
0	N/A	DRAWING INITIATED		A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS		E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED		E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS		G.I.	B.Y.



PARTS LIST				
ITEM	QTY	DESCRIPTION		
P 072	1	Window Frame		
P 073	2	Window Angle		
P 074	4	Window Pane Holder		
P 075	1	Window Pane		

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S 016	
Window Assembly	

FILE No.	06044	SCALE:	N.T.S.	DWG No.	22 of 22
Rv.	DATE	DESCRIPTION		DRAWN	APP'D
0	N/A	DRAWING INITIATED		A.W.	A.W.
1	8 Mar 13	UPDATED DRAWINGS BASED ON GLOS REVISIONS		E.G.	B.Y.
2	26 Apr 13	TOWER DRAWING COMPLETED		E.G.	B.Y.
3	5 Nov 13	REDESIGNED COVER PAGE AND SPLICE DETAILS		G.I.	B.Y.

All Dimensions in mm unless otherwise noted.

Pêches et Océans Canada
 Garde côtière Canada
 101 Boul. Champblain (dépt 18)
 Québec (Québec) G1K 7Y7

MRK	QTY	DESCRIPTION	WEIGHT
MQE	QTÉ	DESCRIPTION	MASSE
M001	16	ANCHORS/ANCRAGES 25#	70.4
B005	4	BASE ASS./ASS. BASE	215.2
V010	4	L-76x76x9.5x3038	139.2
V012	4	L-76x76x9.5x3038	134.4
V013	4	L-89x89x9.5x3038	158.4
V015	4	L-102x102x12.7x3038	240.0
V016	4	L-127x127x15.9x1514	240.0
X022	72	L-76x76x7.9x1450	914.4
X023	3	FB-6.4x51x1525	12.0
X027	3	L-76x76x7.9x1525	40.2
H029	24	L-76x76x7.9x925	194.4
H030	8	L-76x76x7.9x925	64.8
H031	1	L-127x127x7.9x1049	16.6
H032	3	L-127x127x7.9x1049	49.8
P033	1	L-76x76x7.9x949	5.2
P034	1	L-76x76x7.9x1199	11.3
P035	1	L-76x76x7.9x1500	14.1
P036	1	L-76x76x7.9x2132	20.1
P045	1	L-76x76x7.9x909	8.6
P046	1	L-152x89x7.9x644	9.7
P047	1	L-76x76x7.9x909	8.6
P048	1	L-76x76x7.9x1033	9.7
P049	2	L-76x76x7.9x755	14.2
P050	1	L-51x51x6.4x1082	5.3
P051	1	L-51x51x6.4x1082	5.3
P052	1	L-51x51x6.4x644	3.2
P053	1	L-102x76x7.9x1499	16.6
P054	1	L-51x51x6.4x1179	5.8
P056	1	FB-6.4x102x2122	11.1
P057	2	FB-6.4x102x1179	12.4
P058	1	FB-6.4x102x539	2.8
P059	1	FB-6.4x51x2122	5.6
P060	1	FB-6.4x51x1179	3.1
P061	1	FB-6.4x51x644	1.7
P062	1	FB-6.4x51x539	1.4
P069	2	FB-9.5x127x270	4.2
P070	2	L-51x51x6.4x1139	11.2
P071	1	L-51x51x6.4x385	1.9
P072	3	L-51x51x6.4x385	5.7
P073	1	L-76x76x7.9x385	3.6
P074	1	PL-3.2x170x330	1.4
P075	2	PL-6.35x385x419	16.6
P076	1	PL-6.4x400x565	11.7
P077	1	PL-4.8x356#	3.9
P078	2	FB-6.4x64x64	0.4
R079	2	W-150x22x1952	90.0
E081	8	FB-6.4x51x259	7.2
E082	8	FB-6.4x51x508	10.4
M083	8	FB-6.4x51x377	8.0
E084	1	FB-6.4x51x315	0.8
E086	8	FB-6.4x51x259	5.6
E087	1	LADDER/ÉCHELLEx2915	31.7
E088	3	LADDER/ÉCHELLEx3035	96.9
E089	1	LADDER/ÉCHELLEx1511	16.1
P090	1	GRATING/CAIL. 548x1173	28.8
P091	1	GRATING/CAIL. 608x2110	57.5
E096	1	L-127x89x7.9x414	10.9
M100	16	FB-9.5x152x446	72.0
M101	6	FB-9.5x254x335	39.6
M102	7	FB-9.5x305x510	95.2
M103	32	FB-9.5x305x600	454.4
M104	8	FB-9.5x305x600	113.6
M105	8	FB-9.5x305x600	113.6
M106	8	FB-9.5x305x600	113.6
M108	1	PL-9.5x415x662	18.0
M119	1	FB-6.4x51x370	1.3
M120	1	GATE/BARRIÈRE	11.8
M121	1	PIN/TIGE 12.7x370	0.2
M122	1	SPRING/RESSORT	0.05
E123	10	FB-9.5x51x390	-
E124	8	FIXATION POUR BOITE	-
E125	2	FIXATION POUR CAPTEUR	-
A5	5	D-RING "SALA" #2101630	2.5
B5	1	LATCH/DOUET "STANLEY" #76-3827	0.25
	4	S.S. BOLTS/BOLONS INOXYDABLES 3/16" X 3/4" WITH/AVEC NUTS & WASH./ECROUS & ROND.	-
	552	BOLTS/BOLONS 3/4" X 2"	150.2
	446	BOLTS/BOLONS 3/4" X 2 1/4"	129.0
	75	BOLTS/BOLONS 3/4" X 2 1/2"	22.8
	2	BOLTS/BOLONS 3/4" X 2 3/4"	0.6
	1075	LOCK W./R. DE BLOCAGE 3/4"	31.9
	38	R. FILLS/ESPACEURS 3/4" X 9.5	3.6
	2	R. FILLS/ESPACEURS 3/4" X 7.9	0.2
	141	BOLTS/BOLONS 1/2" X 1 1/2"	12.7
	32	BOLTS/BOLONS 1/2" X 1 3/4"	3.1
	5	BOLTS/BOLONS 1/2" X 2"	0.5
	3	BOLTS/BOLONS 1/2" X 2 3/4"	0.4
	181	LOCK W./R. DE BLOCAGE 1/2"	1.7
	4	R. FILLS/ESPACEURS 1/2" X 7.9	0.2
	20	CLIPS/ATTACHES TYPE "D-19"	0.5
	20	BOLTS/BOLONS 5/16" X 2 1/2"	0.5
TOTAL WEIGHT / MASSE TOTALE :			4430.9 kg

NOTES

- CAPACITÉ DE LA STRUCTURE AUX POINTS D'ANCRAGE = 18 KN
- ANNEAU DE SÉCURITÉ "D-RING":
 - CAPACITÉ MAXIMALE = 140 kg.
 - HAUTEUR DE CHÛTE LIBRE MAXIMALE = 1.8m.
 - JAMAIS PLUS D'UN SYSTÈME DE PROTECTION PERSONNEL À LA FOIS
- L'ÉCHELLE DOIT ÊTRE MUNIE D'UN RAIL DE SÉCURITÉ "DBI-SALA LAD-SAF" (OU UN ÉQUIVALENT APPROUVÉ PAR LA GCC) AVEC TOUTE LA QUINCAILLERIE REQUISE POUR SON INSTALLATION.
- NUANCE D'ACIER:
 - TOUS LES ÉLÉMENTS 300 Mpa SAUF LES ÉLÉMENTS SUIVANTS:
 - LES CORNIÈRES: 350 Mpa
 - LES PROFILÉS W: 350 Mpa
- TOUS LES BOULONS SELON ASTM A-325, TYPE 1.
- TOUTES LES RONDELLES DE BLOCAGE SELON ASME B18.2.1
- TOUS LES ESPACEURS ANNULAIRES SELON ANSI B18.22.1
- LONGUEUR DES BOULONS:
 - 2" LG POUR BOULON 3/4", S.I.C.
 - 1 1/2" LG POUR BOULON 1/2", S.I.C.
- TOUTES LES QUANTITÉS DE BOULON INCLUENT UN SURPLUS DE 5 %.

REVISION

Revisión	Description	Par/By	Date
1	M122 ADDED/M122 AJOUTÉ	M.V.	2006.03.13

Revisión	Description	Par/By	Date
1	M122 ADDED/M122 AJOUTÉ	M.V.	2006.03.13

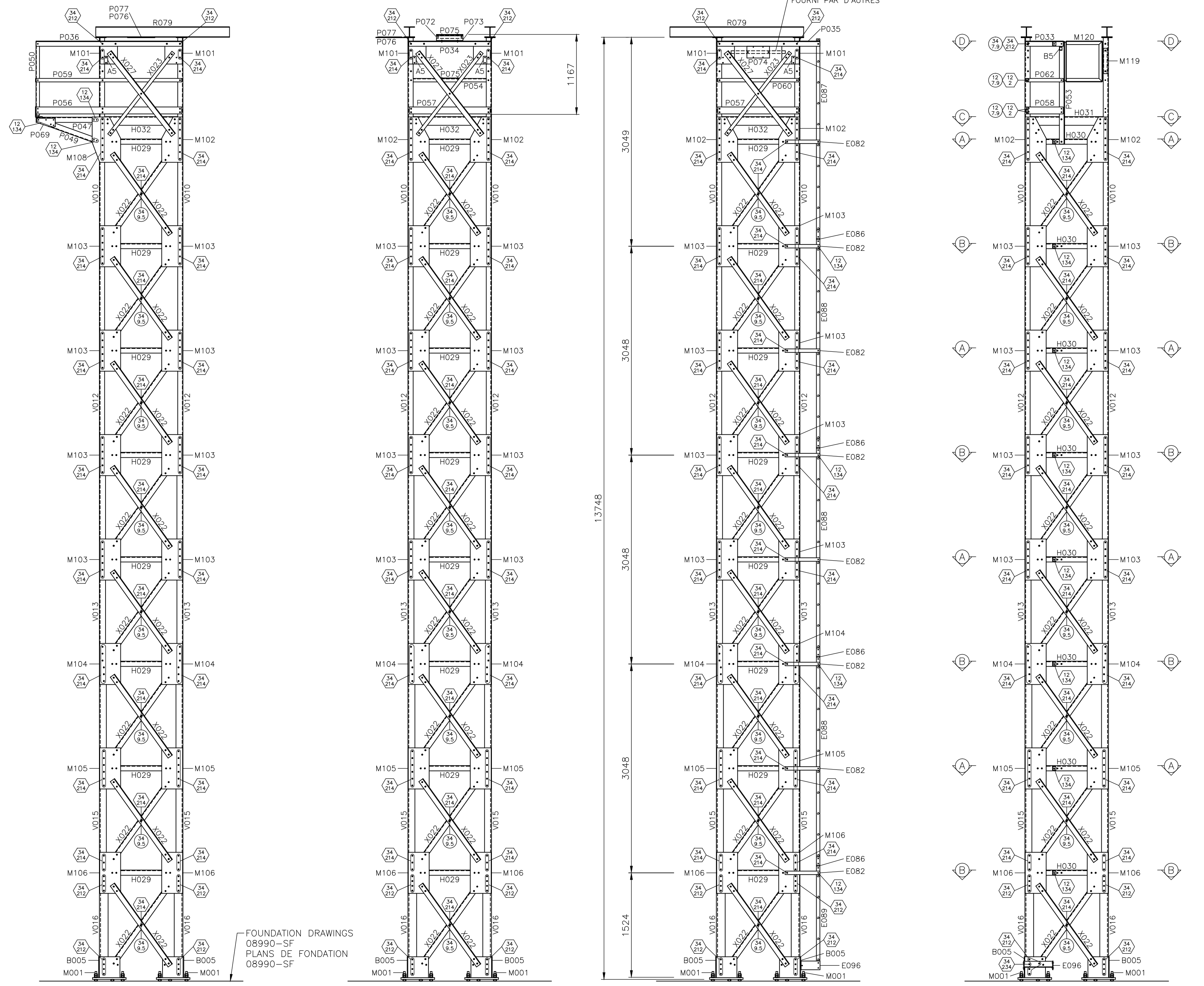
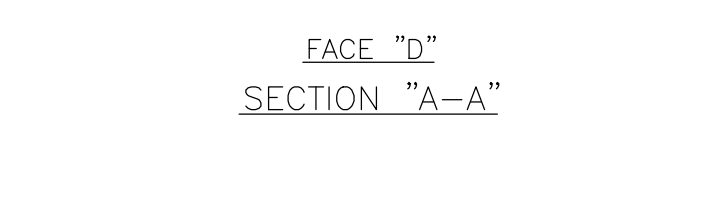
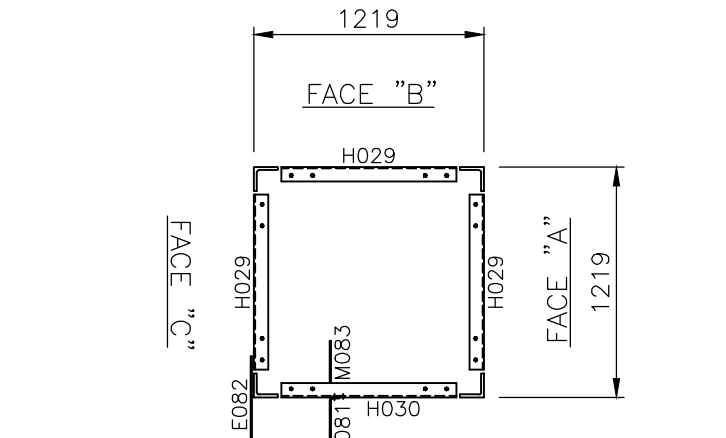
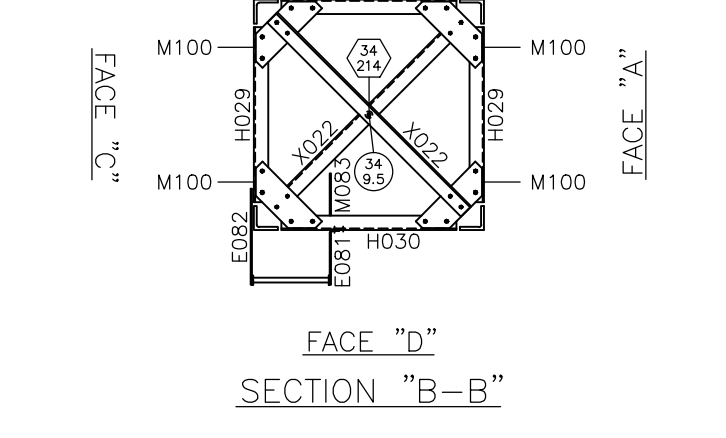
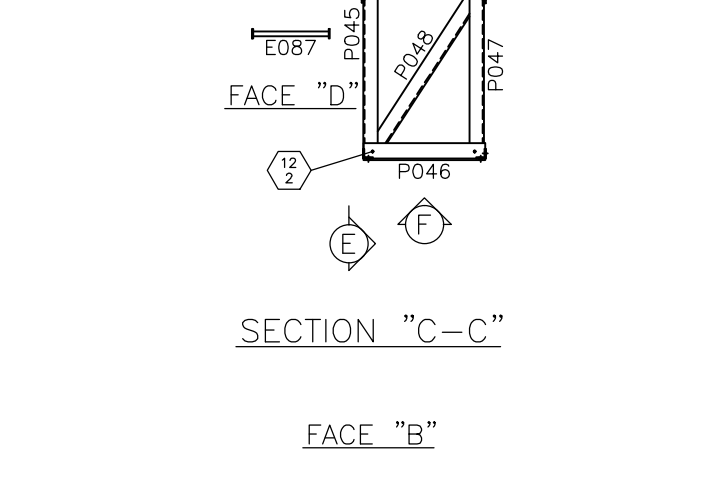
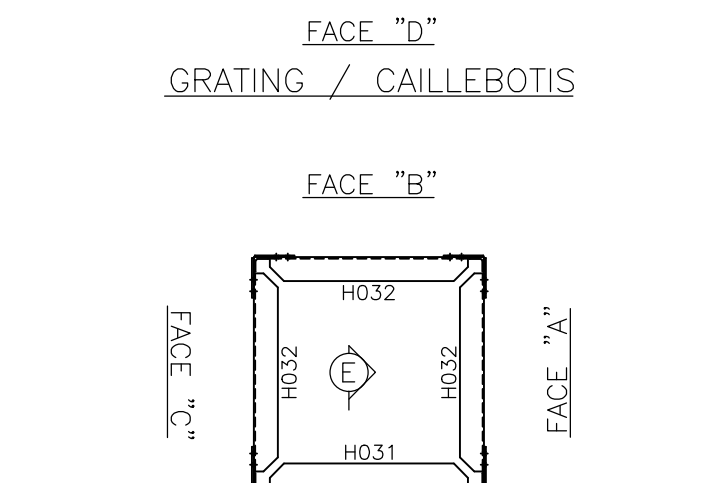
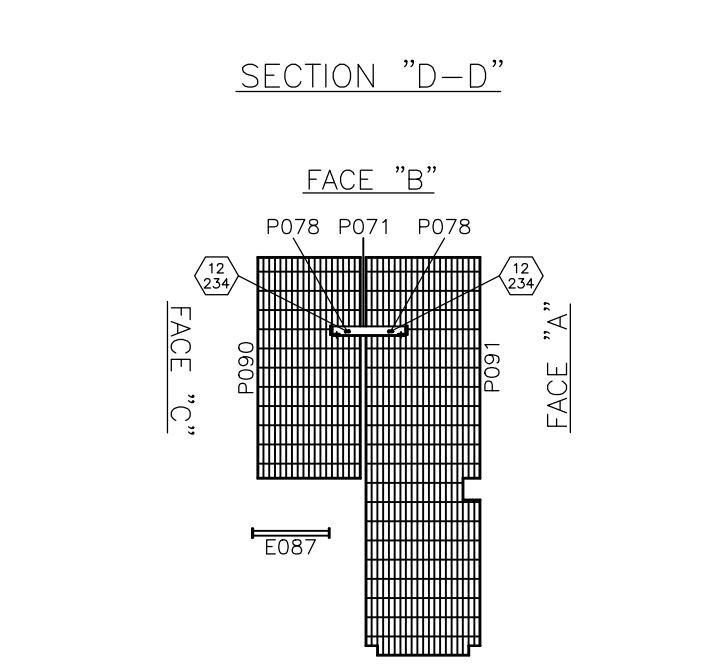
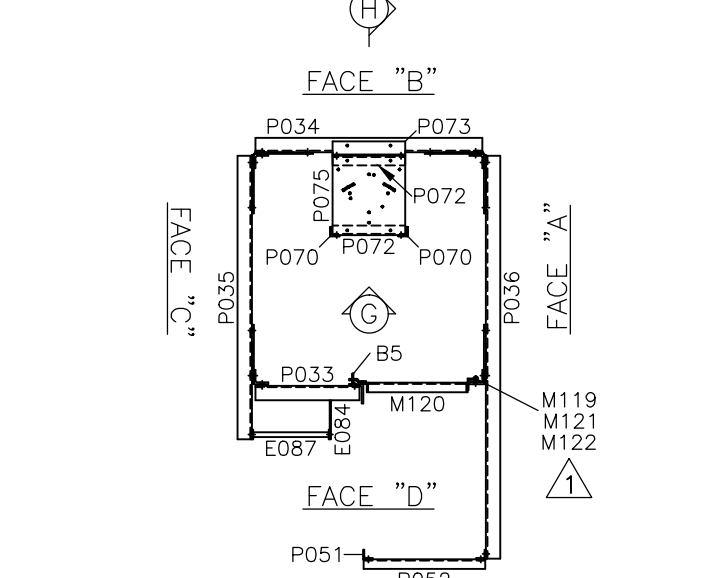
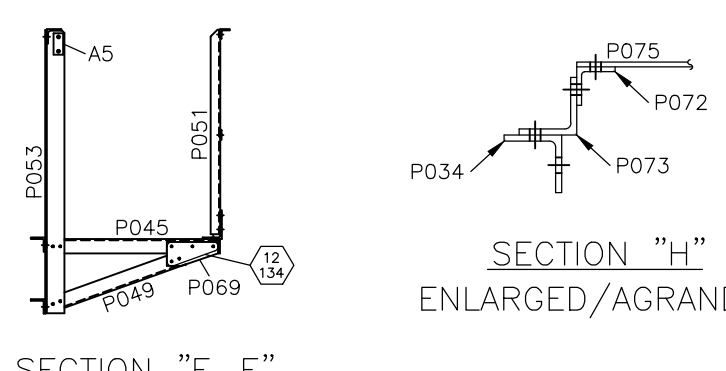
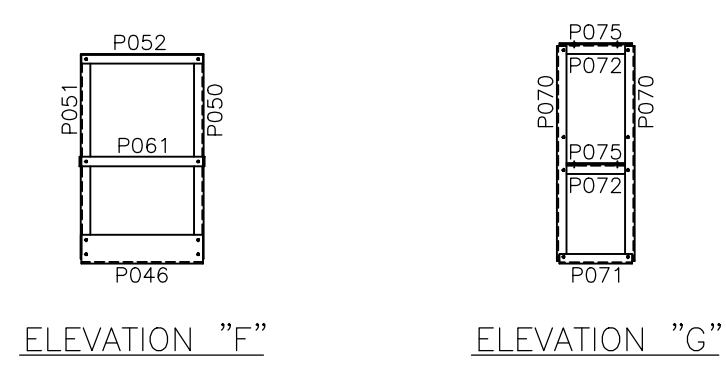
A: Numéro du détail
B: Feuille sur laquelle le détail est référencé
C: Feuille sur laquelle le détail est dessiné

Toute modification doit être rapportée à:
 Garde côtière, Région Laurentienne
 Services Techniques
 Systèmes électroniques et informatiques
 Informations Techniques et Graphiques

Dossier:
Titre: TOUR D'ACIER À CLAIRE-VOIE
 TOUR DE 3.05m (10'1") @ 24.42m (80'1")
Dessin:
 TOUR DE 13.75m (45'1")
 PLAN DE MONTAGE

Conçu par: P-C.GAGNON, ing. 2003/05/30
Dessiné par: MICHEL VACHON 2006/02/06
Vérifié par: MICHEL VACHON 2006/02/06
Approuvé par:

No. dossier: 08990
Echelle: 1 = 40
No. dessin: SM-08



FACE "A" FACE "B" FACE "C" FACE "D"

FOUNDATION DRAWINGS
 08990-SF
 PLANS DE FONDATION
 08990-SF



Fisheries and Oceans
Canada

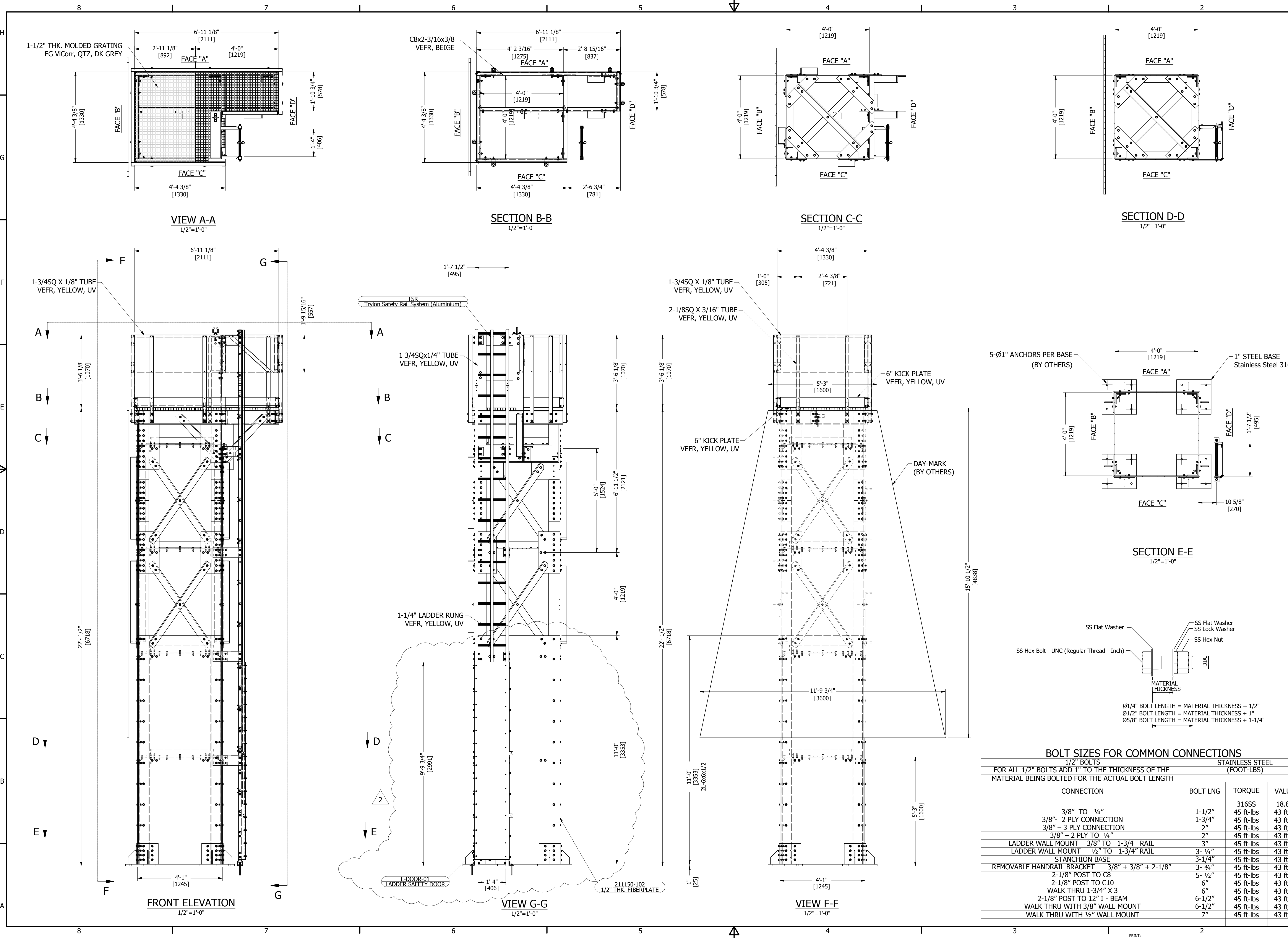
Pêches et Océans
Canada

Canadian
Coast Guard

Garde côtière
canadienne



APPENDIX E: NEW TOWER DRAWINGS



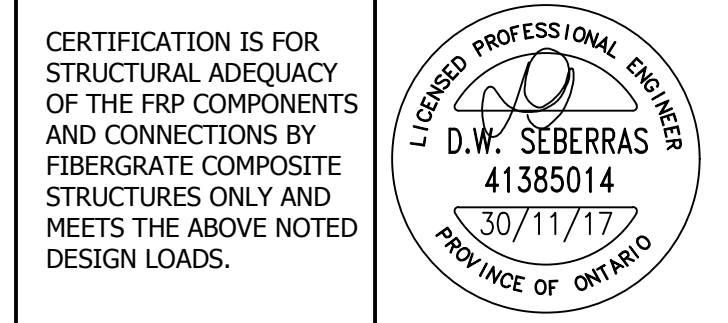
NOTES:

PLATFORM DESIGN NOTES:

- Live Load: 100 psf (4.8 kPa)
Concentrated: N/A
- Minimum Structural Safety Factors - Live Loads
- Bending Stress: 3.0
- Shear Stress: 3.0
- Bearing Stress: 3.0
- Allowable Deflections:
- Grating, L/D > Ratio 180
- Structural Shapes, L/D > Ratio 180
- Loads on Guards and Handrails as per The National Building Code of Canada 2015, Section 4.1.3.14:
(1) The minimum specified horizontal load applied outward at the minimum required height of every guard shall be 0.75 kN/m or a concentrated load of 1.0 kN applied at any point so as to produce the most critical effect, whichever governs.
(2) The minimum specified horizontal load applied inward at the minimum required height of every guard shall be half that specified in Sentence (1).
(3) Individual elements within the guard, including solid panels and pickets, shall be designed for a load of 0.5 kN applied over an area of 100 mm by 100 mm located at any point in the element or elements so as to produce the most critical effect.
(4) The loads required in Sentence (3) need not be considered to act simultaneously with the loads provided for in Sentences (1), (2) and (6).
(5) The minimum specified load applied vertically at the top of every required guard shall be 1.5 kN/m and need not be considered to act simultaneously with the horizontal load provided for in Sentence (1).
(6) Handrails and their supports shall be designed and constructed to withstand the following loads, which need not be considered to act simultaneously:
(a) a concentrated load not less than 0.9 kN applied at any point and in any direction for all handrails, and
(b) a uniform load not less than 0.7 kN/m applied in any direction to handrails not located within dwelling units.
- Loads on Ladders as per Ontario Ministry of Labour, Engineering Data Sheet 2.04 & OSHA Reg 31:
- Live load of 1.1 kN applied between any two consecutive attachments
- Safety factor of 4:1 applied to components for normal usage

STRUCTURAL DESIGN NOTES:

- Design Conforms to CSA-537-13
- Wind load (NBC 2015)
- 4 (LSO) = 0.55 kPa
- Location: Gooderich, Ontario
- Capacity of the structure at anchor points = 18 kN
- Security D-rings with 18 kN workload limit.
- Ladder shall be equipped with Trylon Safetyrail or approved equivalent.



CERTIFICATION IS FOR STRUCTURAL ADEQUACY OF THE FRP COMPONENTS AND CONNECTIONS BY FIBERGRATE COMPOSITE STRUCTURES ONLY AND MEETS THE ABOVE NOTED DESIGN LOADS.

GENERAL NOTES:

- All Grating Hold Down Clips to be 316 S.S., 4-6 H.D.C.'s per grating piece.
- All cut Edges to be Resin Sealed prior to shipping.
- Some field fabrication may be required, all field cut edges to be Sealed using supplied seal kits. Cut Gratings may have open stub bars.
- Span for Square Mesh Grating is Bi-Directional.
- All Anchor Bolts to be provided by Others. Anchors to be installed as per manufacturer's specifications.
- All FRP members shall be fabricated by Fibergrate into subassemblies to facilitate field erection. The FRP walkways, handrails, stringers shall be shop fabricated and shop assembled into the largest practical size suitable for transportation as determined by FIBERGRATE.
- It shall be the Customer's responsibility to assure proper fit-up of FRP assemblies. This includes VERIFICATION of AS-BUILT CONDITIONS. In case of concrete misalignment, incorrectly placed or missing embeds, the Customer shall modify the FRP subassemblies and/or provide the required anchorages.
- Cutting, fitting, and placement: perform cutting, drilling, and fitting required for installation of FRP fabrications. See FRP fabrication accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- All dimensions to be verified by the Customer.

THE UNDERSIGNED HAS REVIEWED AND TAKES RESPONSIBILITY FOR THIS DESIGN, AND HAS THE QUALIFICATIONS AND MEETS THE REQUIREMENTS SET OUT IN THE ONTARIO BUILDING CODE TO BE A DESIGNER.

QUALIFICATION INFORMATION
REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIV. C.3.2.5.1 OF THE BUILDING CODE
NAME: D.W. SEBERRAS
SIGNATURE: [Signature]
BOCN: [Blank]

REGISTRATION INFORMATION
REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIV. C.3.2.5.1 OF THE BUILDING CODE
NAME: SEBERRAS PROFESSIONAL SERVICES LIMITED
BOCN: 30361

2	ANTI-CLIMBING PLATES/DOOR ADDED TO THE 1/2" ELEVATION	11/27/2017	AP	SO	JB
1	REVISED AS PER COMMENTS	5/29/2017	AP	SO	JB
0	ISSUED FOR APPROVAL	MAR. 31.17	AP	SO	JB
REV	DESCRIPTION	DATE	DRAWN	DESIGN	CHK

SCALE VERIFICATION:

BAR ON ORIGINAL SIZE DRAWING IS 1" LONG, IF NOT 1" LONG ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

SCALE	DESCRIPTION
1/2" = 1'-0"	FRONT ELEVATION
1/2" = 1'-0"	VIEW A-A
1/2" = 1'-0"	SECTION B-B
1/2" = 1'-0"	SECTION C-C
1/2" = 1'-0"	SECTION D-D
1/2" = 1'-0"	SECTION E-E
1/2" = 1'-0"	VIEW G-G
1/2" = 1'-0"	VIEW F-F

BOLT SIZES FOR COMMON CONNECTIONS

FOR ALL 1/2" BOLTS ADD 1" TO THE THICKNESS OF THE MATERIAL BEING BOLTED FOR THE ACTUAL BOLT LENGTH

CONNECTION	STAINLESS STEEL (FOOT-LBS)	
	BOLT LNG	TORQUE VALUES
3/8" TO 1/4"	1-1/2"	316SS 45 ft-lbs 18.8SS 43 ft-lbs
3/8" - 2 PLY CONNECTION	1-3/4"	45 ft-lbs 43 ft-lbs
3/8" - 3 PLY CONNECTION	2"	45 ft-lbs 43 ft-lbs
3/8" - 2 PLY TO 1/4"	2"	45 ft-lbs 43 ft-lbs
LADDER WALL MOUNT 3/8" TO 1-3/4" RAIL	3"	45 ft-lbs 43 ft-lbs
LADDER WALL MOUNT 1/2" TO 1-3/4" RAIL	3-1/4"	45 ft-lbs 43 ft-lbs
STANCHION BASE	3-1/4"	45 ft-lbs 43 ft-lbs
REMOVABLE HANDRAIL BRACKET 3/8" + 3/8" + 2-1/8"	3-3/4"	45 ft-lbs 43 ft-lbs
2-1/8" POST TO C8	5-1/2"	45 ft-lbs 43 ft-lbs
WALK THRU 1-3/4" X 3	6"	45 ft-lbs 43 ft-lbs
2-1/8" POST TO 12" I-BEAM	6-1/2"	45 ft-lbs 43 ft-lbs
WALK THRU WITH 3/8" WALL MOUNT	6-1/2"	45 ft-lbs 43 ft-lbs
WALK THRU WITH 1/2" WALL MOUNT	7"	45 ft-lbs 43 ft-lbs

Ø1/4" BOLT LENGTH = MATERIAL THICKNESS + 1/2"
 Ø1/2" BOLT LENGTH = MATERIAL THICKNESS + 1"
 Ø5/8" BOLT LENGTH = MATERIAL THICKNESS + 1-1/4"

SCALE VERIFICATION:

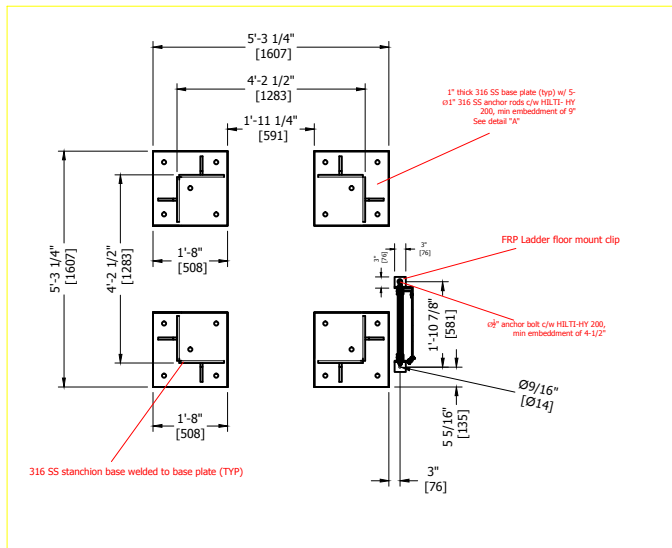
BAR ON ORIGINAL SIZE DRAWING IS 1" LONG, IF NOT 1" LONG ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

PATTERNS: MOLDED 1-1/2" SQ MESH, GRIT VICORR, DK GRAY
 MATERIALS: VEFR, YELLOW, UV
 SS 316
 9/16

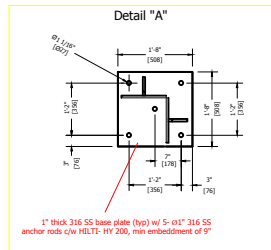
CUSTOMER: CANADIAN COAST GUARD
 PROJECT NAME & ADDRESS: CANADIAN COAST GUARD TOWER 55' FRP TOWER 520 EXMOUTH STREET, SARNIA, ON N7T 8B1
 DATE: 27/01/2017
 SCALE: 1/2" = 1'-0"
 SHEET NO: 405238
 DRAWING NO: FG-02

25' TALL TOWER

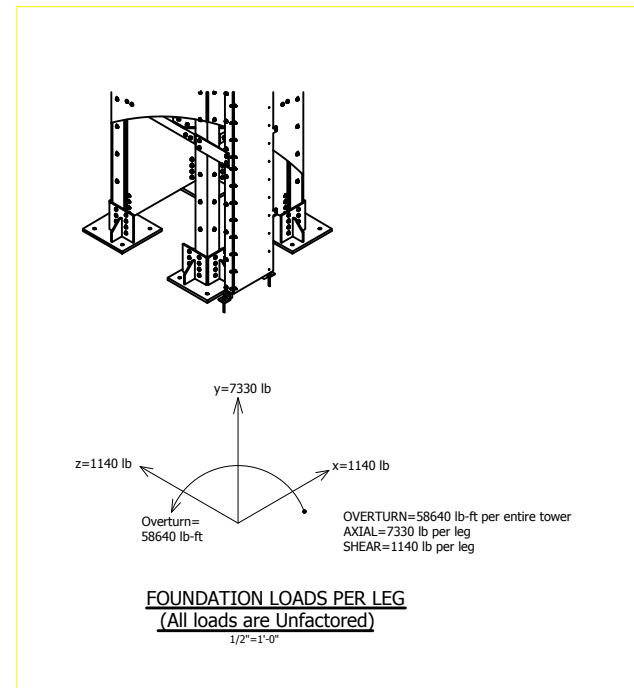
BASEPLATE FOOTPRINT

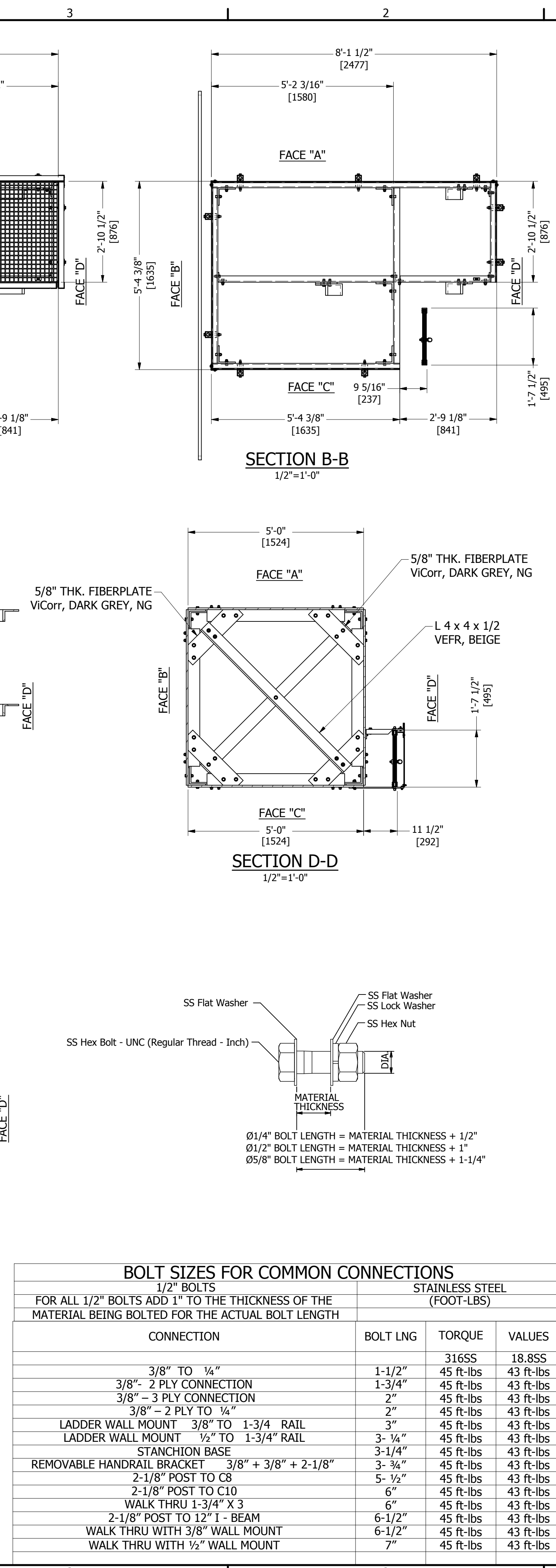
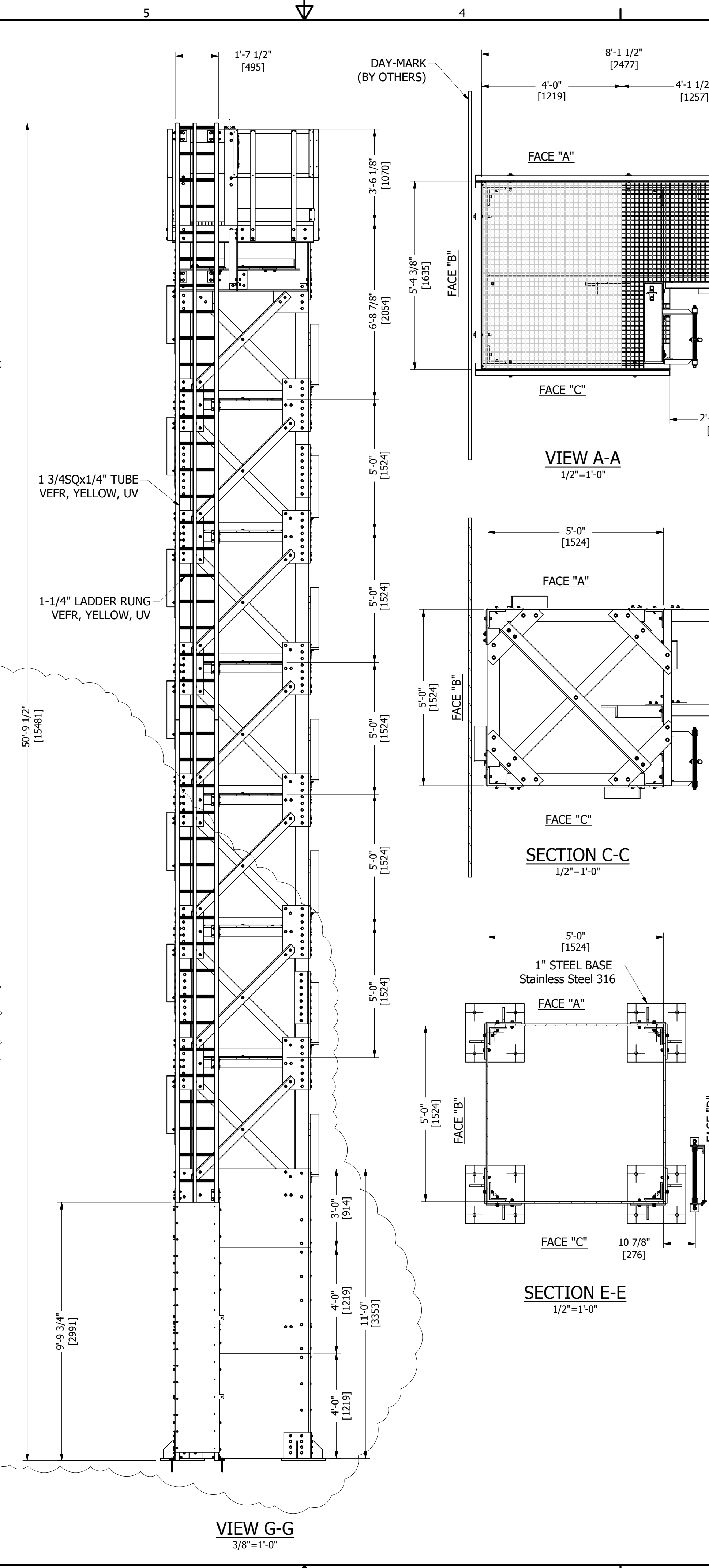
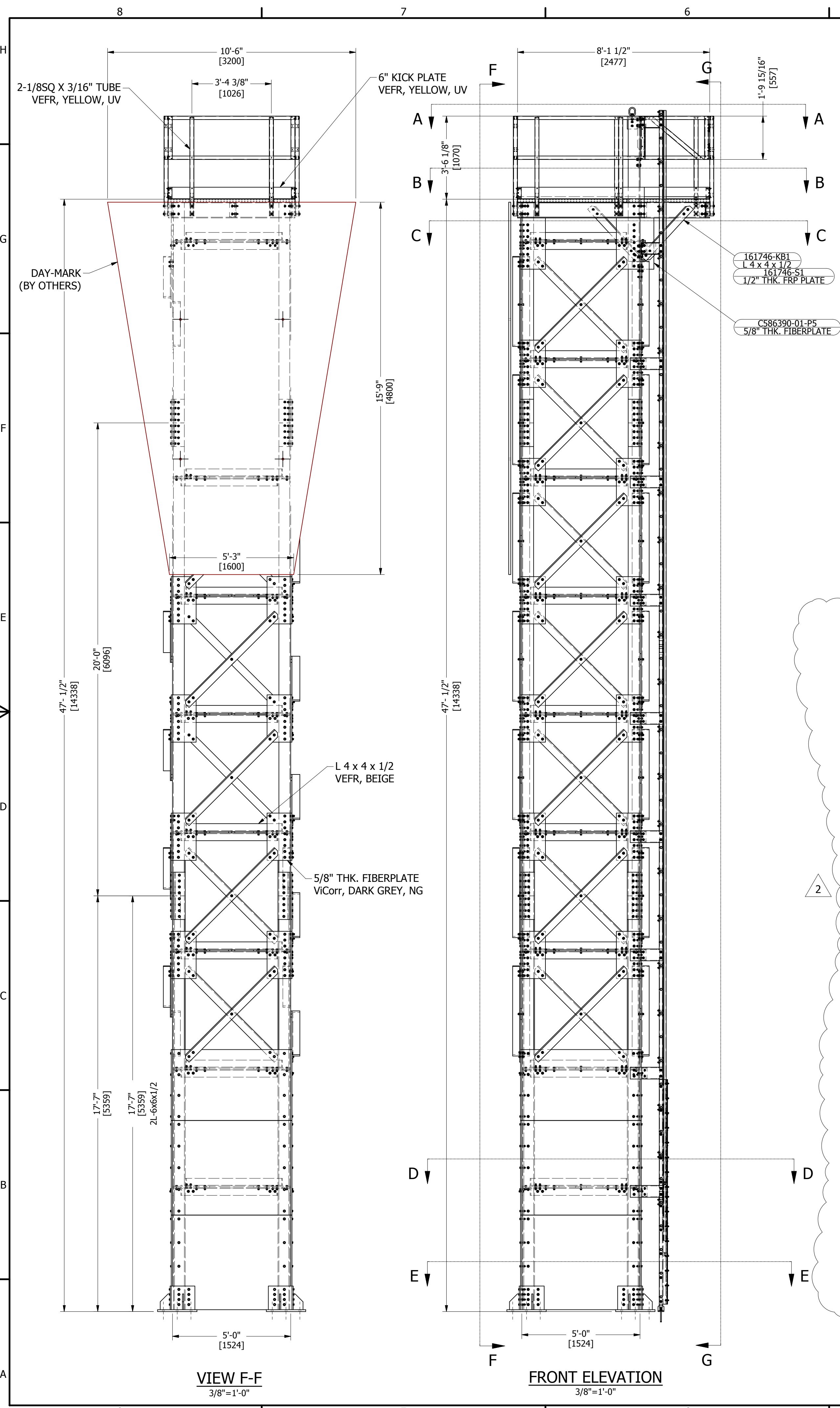


BASE PLATE DETAILS (TYP)



FOUNDATION LOADS
 (All loads are Unfactored)





BOLT SIZES FOR COMMON CONNECTIONS			
1/2" BOLTS			
FOR ALL 1/2" BOLTS ADD 1" TO THE THICKNESS OF THE MATERIAL BEING BOLTED FOR THE ACTUAL BOLT LENGTH			
CONNECTION	BOLT LNG	TORQUE	VALUES
		316SS	18.8SS
3/8" TO 1/4"	1-1/2"	45 ft-lbs	43 ft-lbs
3/8" - 2 PLY CONNECTION	1-3/4"	45 ft-lbs	43 ft-lbs
3/8" - 3 PLY CONNECTION	2"	45 ft-lbs	43 ft-lbs
3/8" - 2 PLY TO 1/4"	2"	45 ft-lbs	43 ft-lbs
LADDER WALL MOUNT 3/8" TO 1-3/4" RAIL	3"	45 ft-lbs	43 ft-lbs
LADDER WALL MOUNT 1/2" TO 1-3/4" RAIL	3-1/4"	45 ft-lbs	43 ft-lbs
STANCHION BASE	3-1/4"	45 ft-lbs	43 ft-lbs
REMOVABLE HANDRAIL BRACKET 3/8" + 3/8" + 2-1/8"	3-3/4"	45 ft-lbs	43 ft-lbs
2-1/8" POST TO C8	5-1/2"	45 ft-lbs	43 ft-lbs
WALK THRU 1-3/4" X 3	6"	45 ft-lbs	43 ft-lbs
2-1/8" POST TO 12" I-BEAM	6-1/2"	45 ft-lbs	43 ft-lbs
WALK THRU WITH 3/8" WALL MOUNT	6-1/2"	45 ft-lbs	43 ft-lbs
WALK THRU WITH 1/2" WALL MOUNT	7"	45 ft-lbs	43 ft-lbs

NOTES:

PLATFORM DESIGN NOTES:

- Live Load: 100 psf (4.8 kPa) Concentrated: N/A
- Minimum Structural Safety Factors - Live Loads
 - Bending Stress: 3.0
 - Shear Stress: 3.0
 - Bearing Stress: 3.0
- Allowable Deflections:
 - Grating, L/D > Ratio 180
 - Structural Shapes, L/D > Ratio 180
- Loads on Guards and Handrails as per The National Building Code of Canada 2015, Section 3.1.3.14.
 - (1) The minimum specified horizontal load applied outward at the minimum required height of every guard shall be 0.75 kN/m or a concentrated load of 1.0 kN applied at any point so as to produce the most critical effect, whichever governs.
 - (2) The minimum specified horizontal load applied inward at the minimum required height of every guard shall be half that specified in Sentence (1).
 - (3) Individual elements within the guard, including solid panels and pickets, shall be designed for a load of 0.5 kN applied over an area of 100 mm by 100 mm located at any point in the element or elements so as to produce the most critical effect.
 - (4) The loads required in Sentence (3) need not be considered to act simultaneously with the loads provided for in Sentences (1), (2) and (3).
 - (5) The minimum specified load applied vertically at the top of every required guard shall be 1.5 kN/m and need not be considered to act simultaneously with the horizontal load provided for in Sentence (1).
 - (6) Handrails and their supports shall be designed and constructed to withstand the following loads, which need not be considered to act simultaneously:
 - (a) a concentrated load not less than 0.9 kN applied at any point and in any direction for all handrails, and
 - (b) a uniform load not less than 0.7 kN/m applied in any direction to handrails not located within dwelling units.
- Loads on Ladders as per Ontario Ministry of Labour, Engineering Data Sheet 2.04 & OSHA Reg 31:
 - Live load of 1.1 kN applied between any two consecutive attachments
 - Safety factor of 4:1 applied to components for normal usage

STRUCTURAL DESIGN NOTES:

- Design Conforms to CSA-537-13
- Wind load (NBC 2015)
 - 4 (US) = 0.5 kN
 - Location: Gooderich, Ontario
- Capacity of the structure at anchor points = 18 kN
 - Security D-rings with 18 kN workload limit.
 - Ladder shall be equipped with Trylon Safetyrail or approved equivalent.

CERTIFICATION IS FOR STRUCTURAL ADEQUACY OF THE FRP COMPONENTS AND CONNECTIONS BY FIBERGRATE COMPOSITE STRUCTURES ONLY AND MEETS THE ABOVE NOTED DESIGN LOADS.

GENERAL NOTES:

- All Grating Hold Down Clips to be 316 S.S., 4-6 H.D.C.'s per grating piece.
- All cut Edges to be Resin Sealed prior to shipping.
- Some field fabrication may be required, all field cut edges to be Sealed using supplied seal kits. Cut Grating may have open stub bars.
- Span for Square Mesh Grating is Bi-Directional.
- All Anchor Bolts to be provided by Others. Anchors to be installed as per manufacturer's specifications.
- All FRP members shall be fabricated by Fibergate into subassemblies to facilitate field erection. The FRP walkways, handrails, stringers shall be shop fabricated and shop assembled into the largest practical size suitable for transportation as determined by FIBERGRATE.
- It shall be the Customer's responsibility to assure proper fit-up of FRP assemblies. This includes VERIFICATION of AS-BUILT CONDITIONS. In case of concrete misalignment, incorrectly placed or missing embeds, the Customer shall modify the FRP subassemblies and/or provide the required anchorages.
- Cutting, fitting, and placement: perform cutting, drilling, and fitting required for installation of FRP fabrications. See FRP fabrication accuracy in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- All dimensions to be verified by the Customer.

THE UNDERSIGNED HAS REVIEWED AND TAKES RESPONSIBILITY FOR THE DESIGN AND VERIFICATION OF AS-BUILT CONDITIONS. IN CASE OF CONCRETE MISALIGNMENT, INCORRECTLY PLACED OR MISSING EMBEDS, THE CUSTOMER SHALL MODIFY THE FRP SUBASSEMBLIES AND/OR PROVIDE THE REQUIRED ANCHORAGES.

QUALIFICATION INFORMATION
 REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIV. C.3.2.5.1 OF THE BUILDING CODE TO BE A DESIGNER.
 DAVID SEBERRAS
 NAME: DAVID SEBERRAS
 SIGNATURE: [Signature]
 BCIN: 41385014
 REQUIRED UNLESS DESIGN IS EXEMPT UNDER DIV. C.3.2.5.1 OF THE BUILDING CODE
 SEBERRAS PROFESSIONAL SERVICES LIMITED, 30361
 NAME: SEBERRAS PROFESSIONAL SERVICES LIMITED, 30361
 BCIN: SEBERRAS PROFESSIONAL SERVICES LIMITED, 30361

SCALE VERIFICATION:
 BAR ON ORIGINAL SIZE DRAWING IS 1" LONG, IF NOT 1" LONG ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

REVISIONS:

REV	DESCRIPTION	DATE	DRAWN	CHECK	
2	TOWER INCREASED TO 50' ANTI-CLIMBING PLATES/DOOR ADDED TO THE 10' ELEVATION	11/27/2017	AP	SO	JB
1	REVISION AS PER COMMENTS	5/29/2017	AP	SO	JB
0	ISSUED FOR APPROVAL	MAR. 31.17	AP	SO	JB

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1	REVISION AS PER COMMENTS	5/29/2017	AP	SO	JB
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REVISIONS:

REV	DESCRIPTION	DATE	DRAWN	CHECK	
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1	REVISION AS PER COMMENTS	5/29/2017	AP	SO	JB
0	ISSUED FOR APPROVAL	MAR. 31.17	AP	SO	JB

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1	REVISION AS PER COMMENTS	5/29/2017	AP	SO	JB
0	ISSUED FOR APPROVAL	MAR. 31.17	AP	SO	JB

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REVISIONS:

REV	DESCRIPTION	DATE	DRAWN	CHECK	
2	TOWER INCREASED TO 50' ANTI-CLIMBING PLATES/DOOR ADDED TO THE 10' ELEVATION	11/27/2017	AP	SO	JB
1	REVISION AS PER COMMENTS	5/29/2017	AP	SO	JB
0	ISSUED FOR APPROVAL	MAR. 31.17	AP	SO	JB

SCALE VERIFICATION:
 BAR ON ORIGINAL SIZE DRAWING IS 1" LONG, IF NOT 1" LONG ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

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REVISIONS:

REV	DESCRIPTION	DATE	DRAWN	CHECK
2	TOWER INCREASE			



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canadian
Coast Guard

Garde côtière
canadienne



APPENDIX F: NEW FOUNDATION DRAWINGS

REFERENCE DOCUMENTS

- R1. CANADIAN COAST GUARD TOWER, 50' FRP TOWER, JOB NO. 405328, FG-01 SH1 NO 1 & 2 - REV. 2 11/27/2017, BY FIBERGRATE.
 - R2. CANADIAN COAST GUARD TOWER, 25' FRP TOWER, JOB NO. 405328, FG-02 SH1 NO 1 & 2 - REV. 2 11/27/2017, BY FIBERGRATE.
- NOTE: R1 AND R2 ABOVE WERE PROVIDED BY FISHERIES AND OCEANS CANADA, REF PROJECT# EWA 0010-20-0378.

GENERAL NOTES

1. CONCRETE DESIGN TO CSA A23.1-14, DESIGN OF CONCRETE STRUCTURES, BASED ON LOADS PROVIDED BY TOWER MANUFACTURER (FIBERGRATE).
2. READ THESE DRAWINGS IN CONJUNCTION WITH ALL RELATED TOWER DRAWINGS.
3. THE CONTRACTOR SHALL CHECK AND VERIFY ALL CONDITIONS AND MEASUREMENTS AT THE SITE AND REPORT TO THE ENGINEER ANY DISCREPANCIES OR UNSATISFACTORY CONDITIONS WHICH MAY ADVERSELY AFFECT THE PROPER COMPLETION OF THE JOB BEFORE PROCEEDING WITH THE WORK.
4. CONTRACTOR TO CONFIRM EXACT LOCATION AND ORIENTATION OF TOWERS BEFORE COMMENCING FOUNDATION WORK, CONFIRM WITH CANADIAN COAST GUARD.
5. DO NOT SCALE DRAWINGS.
6. ALL DIMENSIONS ON DRAWINGS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
7. DELIVER, HANDLE AND STORE MATERIALS TO AVOID DAMAGE IN ANY MANNER.
8. MAINTAIN A SET OF DRAWINGS ON SITE & UPDATE WEEKLY WITH CONSTRUCTION RECORD INFORMATION.

MATERIALS

UNLESS NOTED OTHERWISE ON THE DRAWINGS THE FOLLOWING MATERIALS SHALL BE USED FOR CONSTRUCTION:

1. CONCRETE: 35MPa - 56 DAY COMPRESSIVE STRENGTH TO CSA A23.1 EXPOSURE CATEGORY C-1
2. REINFORCING STEEL: 5 - 8% AIR ENTRAINMENT, 20 MAX. AGGREGATE SIZE CARBON STEEL BARS TO CSA G30.18 - GRADE 400R, GRADE 400W (WHERE WELDING REQUIRED)
3. ADHESIVE ANCHORING: ADHESIVE ANCHORING SYSTEM SHALL BE HILTI HIT-HY 200 (OR APPROVED EQUIVALENT). ANCHOR RODS SHALL BE HILTI STANDARD 316 STAINLESS STEEL HAS ROD MATERIAL, TO THE REQUIREMENTS OF ASTM F 993 (CONDITION CWCW1). HAS STEEL NUT MATERIAL SHALL MEET THE REQUIREMENTS OF ASTM F 594. STAINLESS STEEL WASHERS SHALL MEET THE DIMENSIONAL REQUIREMENTS OF ANSI B18.22.1 TYPE A PLAIN AND THE REQUIREMENTS OF ASTM A240.
4. GROUT: SIKKA M-BED STANDARD OR EQUIVALENT

DESIGN LOADS:

1 FRONT RANGE TOWER (25' TOWER)
 AXIAL LOADS: 32.61 kN (7,330 lb) PER LEG
 SHEAR LOADS: 5.07 kN (1,140 lb) PER LEG
 OVERTURNING MOMENT: 79.51 kN-m (58,640 lb-ft) PER ENTIRE TOWER

1 REAR RANGE TOWER (50' TOWER)
 AXIAL LOADS: 143.23 kN (32,200 lb) PER LEG
 SHEAR LOADS: 13.34 kN (3,000 lb) PER LEG
 OVERTURNING MOMENT: 436.57 kN-m (322,000 lb-ft) PER ENTIRE TOWER

1 LOADS PROVIDED BY TOWER MANUFACTURER, BASED ON CLIMATIC DATA FROM GODERICH AND 4.8 kPa ON PLATFORMS.

THE FOUNDATIONS HAVE BEEN CONFIRMED WITH WATER TABLE AT SURFACE LEVEL (WORST CASE-EXTREME EVENT).

CAST-IN-PLACE CONCRETE

1. CONCRETE MATERIAL AND METHODS OF CONCRETE CONSTRUCTION SHALL CONFORM TO CSA-A23.1.
2. THE CLEAR DISTANCE BETWEEN REINFORCING STEEL AND SURFACE OF FORMWORK SHALL BE 75mm TYPICAL.
3. REINFORCING IS TO BE GENERALLY DETAILED IN ACCORDANCE WITH R.S.I.C. MANUAL OF STANDARD PRACTICE (LATEST EDITION).
4. CONCRETE TESTING SHALL CONFORM TO CSA A23.1 AND A23.2.
5. NO CUTTING OR DRILLING IN HARDENED CONCRETE IS PERMITTED WITHOUT WRITTEN AUTHORIZATION FROM THE ENGINEER.
6. GROUT UNDERSIDE OF TOWER BASE PLATE WITH NON-SHRINK GROUT.
7. ANCHOR RODS AND TEMPLATES SHALL BE FABRICATED AND INSTALLED IN ACCORDANCE WITH DETAILS ON DRAWINGS.
8. ALL REINFORCING STEEL SHALL BE INSPECTED BY ENGINEER PRIOR TO POURING CONCRETE.
9. DETAILS FOR GRADE 400R REINFORCING SHALL BE AS FOLLOWS:

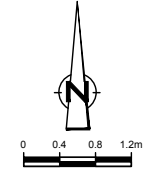
REBAR SIZE	STRAIGHT EMBEDMENT LENGTH	EMBEDMENT LENGTH WITH STD HOOK	COMPRESSION LAP LENGTH	TENSION LAP LENGTH CLASS B
10M	300	225	300	380
15M	440	320	440	570
20M	580	390	590	750
25M	900	605	730	1170

NOTE:
 BASED ON STANDARD WEIGHT CONCRETE WITH $f_c > 25$ MPa AND BLACK STEEL. FOR TOP BARS, MULTIPLY LAP LENGTHS BY 1.3.
 HORIZONTAL BARS ALONG A VERTICAL FACE SHALL BE CONSIDERED AS TOP BARS.

10. CONCRETE MUST ACHIEVE 80% OF 28 DAY STRENGTH PRIOR TO INSTALLATION OF TOWER.

FOUNDATION:

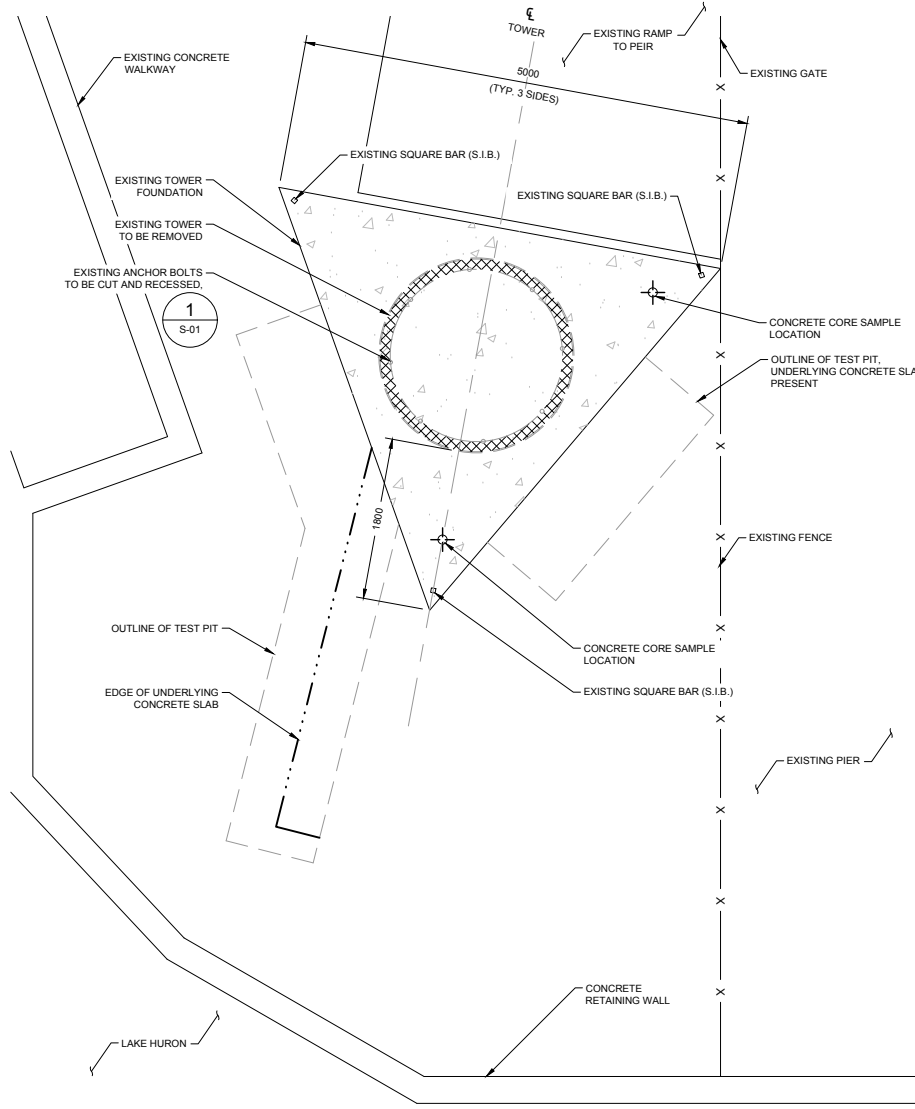
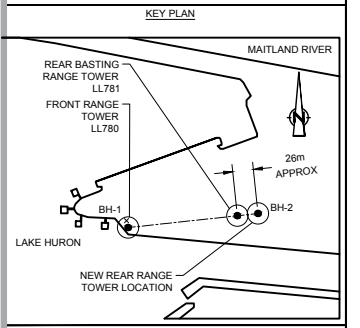
1. GEOTECHNICAL REPORT 11149756-A1, DATED OCT 17, 2017 BY GHD.
2. NET SOIL BEARING RESISTANCE:
 - 2.1. 50 kPa SLS & 75 kPa ULS (FRONT RANGE TOWER) PER DISCUSSION WITH GEOTECHNICAL ENGINEER.
 - 2.2. 100 kPa SLS & 150 kPa ULS (REAR RANGE TOWER) PER GEOTECH REPORT.
3. SUBGRADE AND ADEQUACY OF SOILS AT FOUNDATION DEPTH FOR REAR RANGE TOWER TO BE CONFIRMED ON SITE BY A QUALIFIED GEOTECHNICAL ENGINEER.
4. MAINTAIN UNSUPPORTED SIDES OF EXCAVATION ONLY IF SAFE INCLINATION OF THE SIDES OF THE EXCAVATION IS PROVIDED IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEER'S RECOMMENDATIONS AND PROVINCIAL REGULATIONS.
5. PROTECT SOIL FROM FREEZING ADJACENT TO AND BELOW ALL FOUNDATIONS.
6. SOFT AREAS UNCOVERED ON EXCAVATION SHALL BE SUB EXCAVATED TO SUITABLE MATERIAL AND FILLED AS DIRECTED BY GEOTECHNICAL ENGINEER.



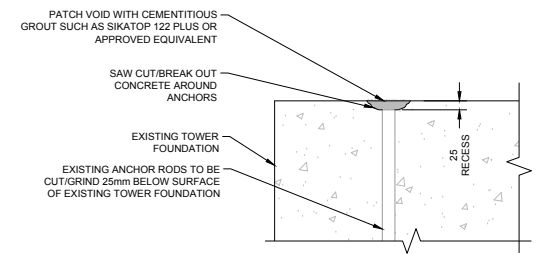
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 651 Colby Drive
 Waterloo Ontario N2V 1C2 Canada
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INSIDE VIEW OF EXISTING TOWER



DETAIL 1 ANCHOR ROD DECOMMISSION
 1:10 S-01

Client
FISHERIES AND OCEANS CANADA
CANADIAN COAST GUARD
GODERICH, ONTARIO

Project
COMPASS MINERALS
GODERICH SALT MINE
NAVIGATION TOWER FOUNDATIONS

No.	Issue	Drawn	Approved	Date
2	ISSUED FOR CONSTRUCTION	BH	TM	FEB 21-18
1	ISSUED FOR REVIEW	BH	TM	FEB 9-18

Drawn	B. HEANEY	Designer	O. VELASQUEZ
Drafting Check	J. SPENLER	Design Check	M. MITROVICH
Project Manager	T. MORRISON	Date	FEB 20, 2018
Original Size	Bar is 20mm on original size drawing		
ANSI D	0 20mm		

Project No. 11155797-01

Title
STRUCTURAL NOTES, EXISTING SITE PLAN, FRONT RANGE TOWER DETAILS

Sheet No.
S-01
 Sheet 1 of 2



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Client
**FISHERIES AND OCEANS CANADA,
 CANADIAN COAST GUARD
 GODERICH, ONTARIO**
 Project
**COMPASS MINERALS
 GODERICH SALT MINE
 NAVIGATION TOWER FOUNDATIONS**

No.	Issue	Drawn	Approved	Date
2	ISSUED FOR CONSTRUCTION	BH	TM	FEB 21-18
1	ISSUED FOR REVIEW	BH	TM	FEB 9-18

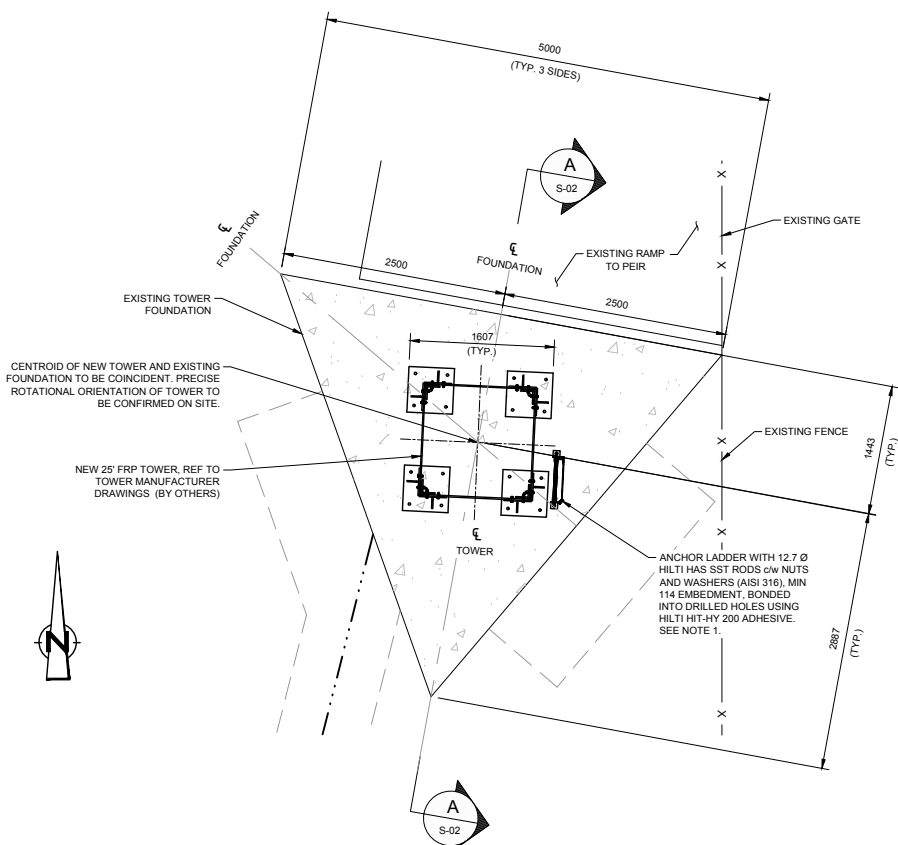
Drawn	B. HEANEY	Designer	O. VELASQUEZ
Drafting Check	J. SPENLER	Design Check	M. MITROVICH
Project Manager	T. MORRISON	Date	FEB 20, 2018

This document shall not be used for construction unless signed and sealed for construction.
 Scale 1:40
 Original Size
ANSI D
 Bar is 20mm on original size drawing
 0 20mm

Project No. 11155797-01
 Title
PLANS, SECTIONS AND DETAIL

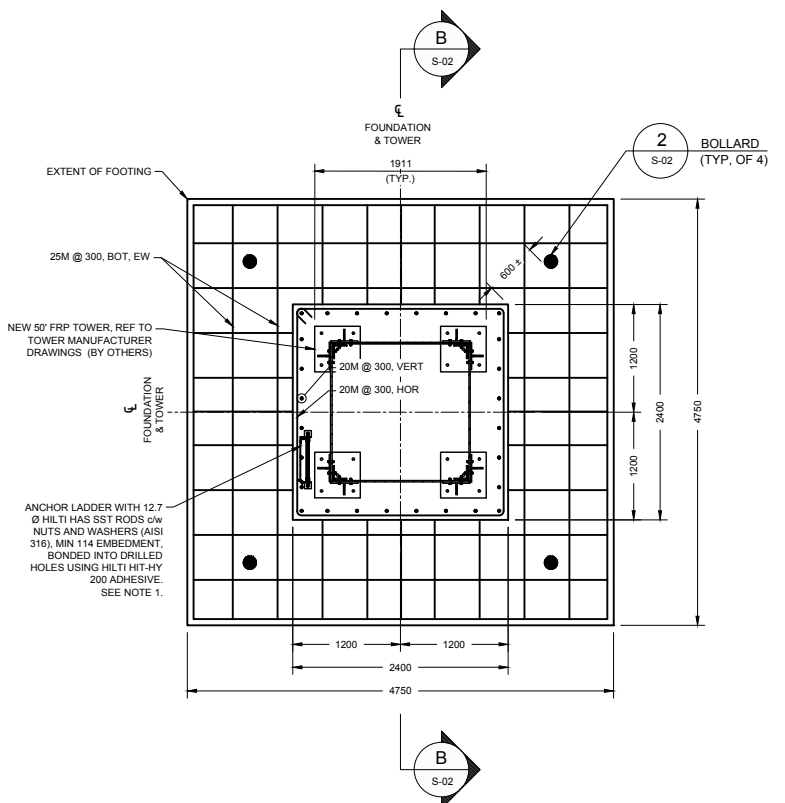
Sheet No.
S-02

Sheet 2 of 2

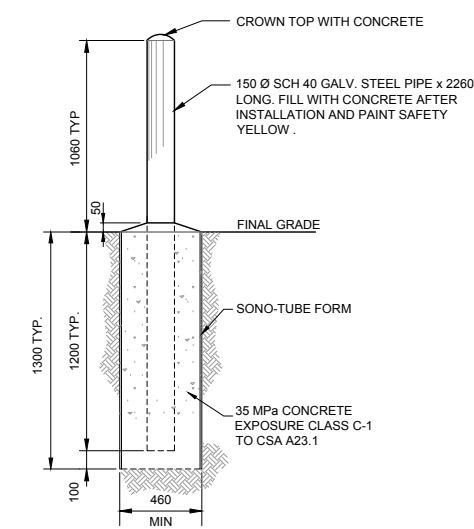


PLAN - FRONT RANGE TOWER
 1:40
 LOCATION: 43° 44' 46.5573" N
 81° 43' 50.0367" W

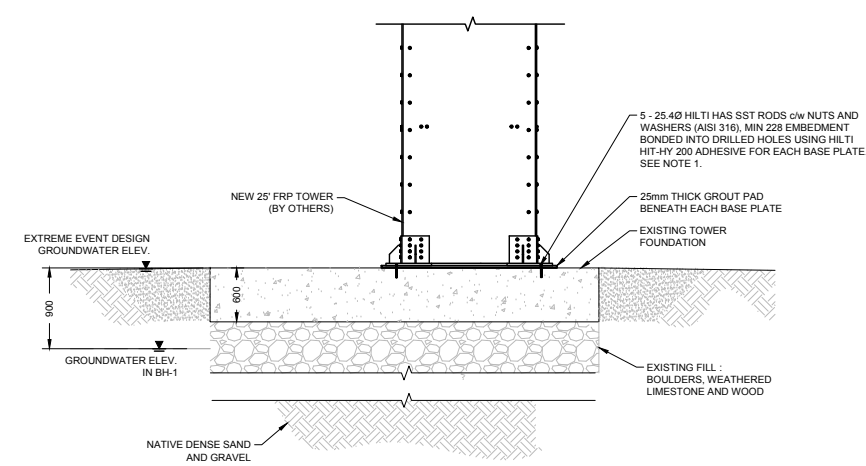
NOTE:
 1. ALL TOWER AND LADDER ANCHORS DESIGNED BY TOWER FABRICATOR, SUPPLIED AND INSTALLED BY CONTRACTOR



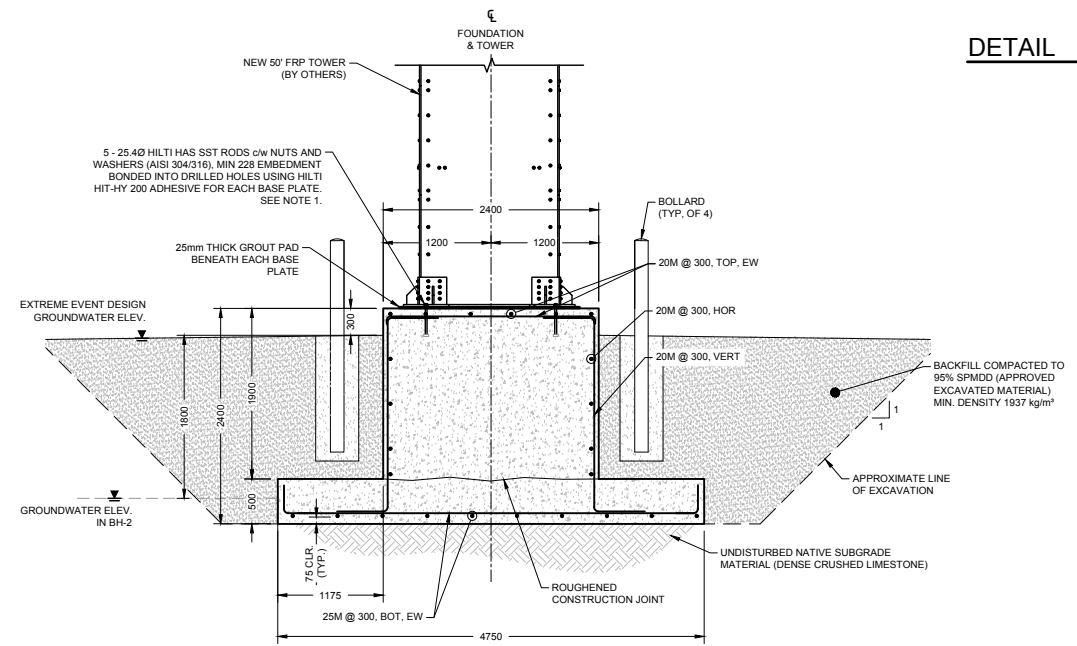
PLAN - REAR RANGE TOWER
 1:40
 LOCATION AND DIRECTION ORIENTATION TO BE PROVIDED BY CANADIAN COAST GUARD



DETAIL 2 BOLLARD
 S-02



SECTION A
 1:40
 S-02



SECTION B
 1:40
 S-02



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canadian
Coast Guard

Garde côtière
canadienne



APPENDIX G: GEOTECHNICAL INVESTIGATION



October 17, 2017

Reference No. 11149756-A1

Laurence Long, EIT
Project Engineer
Maritime and Civil Infrastructure
Canadian Coast Guard
Fisheries and Oceans Canada
520 Exmouth Street
Sarnia, Ontario N7T 8B1

Laurence.Long@dfo-mpo.gc.ca

Dear Mr. Long:

**Re: Geotechnical Investigation
Replacement of Navigation Towers
North Harbour Road, Goderich, Ontario**

1. Introduction

GHD was retained by the Canadian Coast Guard (CCG) department of Fisheries and Oceans Canada to conduct a geotechnical investigation for the replacement of the two existing navigation towers located at the Goderich Harbour pier on Lake Huron. The front range tower is located at the west end of the pier and the rear range tower is located east of the front range tower, on lands owned by Compass Minerals, at 300 North Harbour Road, in Goderich, Ontario. The location of the towers is shown on Figure 1. This work was authorized by CCG through e-mail communication dated August 22, 2017, in response to GHD Proposal # 11103720-PW-163 dated August 18, 2017 (Proposal).

CCG intends to replace the two existing towers with new structures. The front tower will be 7.6 meter (m) [25 feet (ft.)] high, and the rear tower will be 13.7 m (45 ft.) high. Due to space restrictions, the new front tower will be reconstructed at its current location. The new rear tower will be constructed 26 m to the east of the existing rear range tower.

The purpose of the proposed geotechnical investigation was to evaluate the subsurface soil and groundwater conditions at the location of the proposed towers, and based on the results and findings, provide geotechnical recommendations to aid in the design, installation and construction of the proposed replacement tower foundations.

This letter summarizes the results of our field investigations, associated laboratory testing, subsurface conditions, and recommendations for the foundation design and construction of the proposed navigation towers.



2. Field Investigation Activities and Subsurface Conditions

2.1 Field Investigation

The scope of work (SOW) comprised of advancing two boreholes, BH-1 and BH-2, each to a depth of 9.8 m below the existing ground surface (bgs). The boreholes were located at the proposed tower locations as requested by CCG. The boreholes were drilled using the services of a Ministry of Environment and Climate Change (MOECC) approved drilling subcontractor under the full time supervision of GHD qualified field personnel. Prior to commencement of field drilling activities, GHD arranged underground locates through Ontario One call and a private utility locating service, to ensure the borehole locations were free from underground utilities.

A Site Specific Health and Safety Plan (HASP) was also prepared/approved prior to commencement of field drilling activities. The HASP and utility locate documents were reviewed and discussed by the GHD field personnel and the drilling crew at the time of borehole drilling. GHD and the drilling subcontractor field staff attended a safety orientation session at the Compass Minerals facility.

The boreholes were advanced by London Soil Test on September 19, 2017, using a rubber track-mounted drill rig equipped with solid stem augers under full time supervision of GHD field personnel. Representative disturbed samples of the strata penetrated were obtained during drilling at 0.75 m depth intervals throughout the drilling depths, utilizing a 50 mm diameter split-barrel sampler, advanced by dropping a 63.5 kg hammer from a height of 760 mm in accordance with the standard penetration test method (ASTM D1586). The results of the Standard Penetration Tests (SPT) are reported as 'N' values at the corresponding depths on the borehole logs presented in Attachment A.

Groundwater observations were made in the boreholes as drilling progressed and upon completion. Results of groundwater observations are noted on their respective borehole logs.

The geotechnical laboratory testing program consisted of moisture content tests on all recovered soil samples. The results of the laboratory moisture content are recorded at their corresponding depths on the attached borehole logs. Two samples (one from each of borehole) were also analyzed for corrosivity testing, comprising chlorides, sulphates, sulphides, resistivity, pH and Redox potential (oxygen reduction potential). These samples were submitted under chain of custody to ALS Laboratories (ALS) in Waterloo, an MOECC approved analytical testing laboratory. The test results are discussed in Section 3, and the detailed laboratory analytical reports are presented in Attachment B.

2.2 Subsurface Soil and Groundwater Conditions

2.2.1 Upper Fill- Front Range Tower- Borehole 1

Difficult drilling conditions were encountered at the location of the front range tower. The first four borehole attempts encountered auger refusal on suspected large limestone armour rock, which is located below the surficial sand and gravel. On the fifth attempt, the borehole was able to penetrate the limestone boulders. These five borehole locations were all located about 3 m to the north of the existing tower, at



locations about 2 m apart. The limestone boulders continued to a depth of 3.6 m bgs, and are underlain by wood (likely oak) timbers that continued to a depth of 7.3 m bgs. Samples of the timbers were obtained through standard penetration testing.

2.2.2 Upper Fill- Rear Range Tower- Borehole 2

BH-2 was located 26 m to the east of the rear range tower. This borehole was installed close to an existing underground tunnel. Drawings for the existing tunnel were provided to GHD by CCG. This tunnel is shown to be approximately 3.3 m deep in this area. However, the proposed tower location is not directly above the tunnel. BH-2 encountered yard fill consisting of sand and gravel, which extends to a depth of 2.1 m bgs. This sand and gravel fill is underlain by crushed angular limestone gravel or cobbles which continues to a depth of 3.6 m bgs. The SPT 'N' values recorded in the sand and gravel and crushed angular limestone gravel fill deposits range from 12 to split spoon refusal, indicating generally compact to very dense conditions.

The moisture content of the sand and gravel fill samples ranged from 4 to 7 percent in the upper 2.1 m bgs, indicating moist conditions, and 16 percent below 2.1 m bgs, indicating saturated conditions.

2.2.3 Native Sand Deposits

The existing fill encountered in boreholes BH-1 and BH-2 is underlain by possible native/ native sand deposits, which extend to the termination depths of the boreholes. The native sand deposits in BH-1 are overlain by of a 300 mm thick rounded gravel layer, underlain by sand with some gravel. The possible native deposits in BH-2 comprise of sand, some gravel extending to borehole termination depth of 9.8 m bgs. The sand deposits in BH-2 were noted to contain embedded gravelly lenses at 6.4 m depth bgs.

The SPT 'N' values recorded in the native/possible native sand deposits range from 11 to 49, indicating compact to dense conditions. One SPT 'N' value in BH-2 hit refusal to penetration, likely due to a gravelly layer. Moisture contents from the sand deposits ranged from 12 to 31 percent, indicating saturated conditions.

2.2.4 Groundwater/ Lake Huron Water Levels

Groundwater levels in the boreholes were consistent with the adjacent Lake Huron water levels. The groundwater level in BH-1 was 0.9 m bgs upon drilling completion, and the lake level was noted to be 1.1 m bgs. The groundwater level in BH-2 was 1.8 m bgs at the completion of drilling, and the lake level was noted at 2.1 m bgs at the edge of the pier, approximately 40 m to the south of BH-2. The groundwater levels would be expected to fluctuate and match closely with the lake water levels.

3. New Tower Foundation Recommendations

As per the information provided by CCG, the front and rear range towers will be demolished and replaced with new free standing towers, similar in style and height as with the existing towers. The front range



tower will be constructed at the location of the existing tower, and will be a 7.6 m high steel lattice structure. The rear range tower will be constructed at a distance of about 26 m east of the existing rear range tower, and will comprise of a 13.7 m high steel lattice structure.

3.1 Front Range Tower

Based on our field observations, the front range tower is supported on a concrete footing that is triangular in shape at the ground surface. Existing foundation drawings are not available for either existing towers. The subsurface conditions at BH-1 are not conducive to the construction of a new foundation for the proposed tower. GHD understands that the proposed tower will be constructed at the same location as the existing tower, and will have a similar size base and height. Excavations for replacement of this foundation would require removal of the existing concrete foundation, the buried limestone armour stone boulders, and an underlying timber structure, to a depth of about 7.6 m bgs. The oak timbers encountered at BH_1 may be part of a timber crib type foundation for this tower. Due to the existing subsurface conditions, consideration should be given to re-using the existing concrete foundation. GHD did not investigate the dimensions or conditions of this existing foundation, but we could perform surface size measurements, and coring of the concrete to confirm its competency. GHD can provide recommendations for this investigative work if considered appropriate. Alternatively, consideration could be given to installing steel piles for foundation support, however, these piles would have to contend with the buried armour stone boulders and timber structure. If piles could be installed, they should be driven into the native dense sand deposits. GHD can provide further recommendations for a piled foundation if required.

3.2 Rear Range Tower

The rear range tower will require the construction of a new foundation, due to the location shift of this tower. The upper sand and gravel fill material encountered in BH-2 to a depth of 2.1 m bgs is considered unsuitable for foundation support. The most economical option for this tower would be to use a mass concrete foundation, constructed on top of the dense crushed angular limestone at a depth of 2.1 m bgs. This would allow for a conventional open cut excavation, and would avoid major excavation below the groundwater table. For this option, the foundation should be designed for a soil bearing resistance of 100 KPa under serviceability limits states (SLS) design, corresponding to 150 kPa under ultimate limit states (ULS) design. The recommended SLS values correspond to an expected settlement of 25 mm. As the crushed limestone is likely a placed material during previous harbour construction, the construction of the foundation on the crushed limestone material will require verification at the time of foundation excavation, to ensure that competent conditions are present across the entire footprint of the new tower foundation. Suitable dewatering techniques should be employed, to remove groundwater in the excavation if present. For this option, it is envisioned that sump pumping from within the excavation should be adequate. However, more extensive dewatering may be required, if the groundwater level is higher than expected, due to rising lake levels or wet seasonal conditions.

Alternatives are available for deep foundation construction for this tower foundation, however, given the relatively small size and expected loads for this tower, deep foundations are likely not economical. Such



deep foundation options would be driven steel piles, or helical piers. Helical piers may have difficulty penetrating the upper fill soils. Deep foundations must bear into the competent native sand soils. We would be pleased to provide options for deep foundations if warranted. If helical piers are considered, we recommend contacting a specialist contractor, for their advice on helical pier capacities, and their opinion of their use in these subsurface conditions. We would be pleased to assist the specialist contractor as necessary.

3.3 Soil Analytical Testing – Corrosion Potential

In order to evaluate soil corrosivity, a soil sample from each borehole was submitted for corrosivity testing. These samples were taken from the native sand soils, at a depth of 7.6 to 9.0 m bgs from BH-1, and at 3.8 m to 4.4 m bgs from BH-2. The results of the testing are summarized below. Based on these samples, the sand soils would be considered corrosive to deep foundation systems such as steel piles, or helical piers. Deep foundation systems must therefore be designed with suitable corrosion resistance.

Table 3.1 Summary of Soil Corrosivity Results

Borehole/ Sample ID	Sample Depth and Soil Type (m bgs)	Parameters					Total Points	Corrosivity Potential ⁽¹⁾
		Resistivity (ohm.cm)	pH	Redox Potential (mV)	Moisture (%)	Sulphides ⁽²⁾ (mg/kg)		
BH-1 (SS-11 & SS-12)	7.6 to 9.0 m, Sand, saturated	194	8.39	93	19.0	1.2	19	Corrosive
BH-2 (SS-6)	3.8 to 4.4 m, Sand, saturated	348	9.15	112	13.4	37	18.5	Corrosive

Note:

1. Soil test evaluation carried out using AWWA C105/A21.5-10. A score of ten points or more indicates the soil is corrosive to ductile iron pipes; protection needed.
2. Sulphide values less than the reported detection limit (RDL) are considered as “trace” (score of 2) and sulphides contents in excess of the RDL are considered as “Positive” (score of 3.5).
3. Wet soil conditions having poor drainage have a value of 2 points.

The analysis for soil corrosivity was conducted on a system of assigning points based on the results of the chemical tests, as described in Table A.1 of the American Water Works Association (AWWA) publication ANSI/AWWA C105/A21.5-10. Based on the AWWA publication points system, a soil that has a total score of 10 or greater is considered to be corrosive to ductile iron pipe. Soils with a resistivity value of less than 3000 ohm-cm are also considered corrosive.

The ANSI/AWWA rating System uses soil resistivity, pH value, redox potential, sulphide content and drainage conditions as the main indicators of soil aggressiveness. In this procedure, a point system is used to evaluate the corrosivity of the tested soil. Points are assigned to each indicator in accordance with its anticipated contribution to the total corrosion potential of the soil as determined by laboratory testing and visual examination of the soil. Detailed analytical test results are provided in Attachment B.



3.3.1 Sulphate and Chlorides

The potential for sulphate attack on construction concrete (class of exposure) is determined using Table 3 provided in CSA A23.1-14.

Table 3 of the Canadian Standards Association (CSA) document A23.1-14/A23.2-14 'Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete' classifies the degree of exposure into the following three classes:

Table 3.2 Construction Concrete Degree (Class) of Exposure

Degree (Class) of Exposure	Water Soluble SO ₄ in Soil Sample (%)
Very Severe (S-1)	>2.0
Severe (S-2)	0.20 - 2.0
Moderate (S-3)	0.10 - 0.20

Reference: Table 3, Page 136 CSA A23.1-14/A23.2-14

A review of the test results shows that the sulphate concentrations in the two tested soil samples were 1.2 mg/kg for BH-1 and 37 mg/kg for BH-2. These convert to 0.00012 percent and 0.0037 percent, and therefore no special concreting requirements for sulphate exposure are required.

The chloride results for BH-1 was 2600 micrograms per gram (or 2600 ppm), and the result for BH-2 was 218 micrograms per gram (or 218 ppm). These are considered to be elevated chloride levels, and may be due to the presence of the existing salt mine. Such elevated chloride levels will require the use of chloride resistant concrete for protection to the concrete and/or buried steel.

3.4 Seismic Site Class

Based on the information of the subsurface conditions at the Project location, and our experience with the local subsurface conditions, a Seismic Site Class 'D' can conservatively be used for design purposes. We can provide further information on seismic site class, if required.

3.5 Construction Monitoring

The foundation construction activities must be monitored and inspected by qualified geotechnical personnel to ensure that the subsurface conditions are consistent with those encountered in the boreholes. The on-Site review and approval of foundation soil is an integral part of the geotechnical design function and is required by Section 4.2.2.2 of the 2012 Ontario Building Code.

4. Limitations

This report is intended solely for the Canadian Coast Guard (Client) and other parties explicitly identified in the report, and prohibited for use by others without GHD's prior written consent. This report is considered



GHD's professional work product and shall remain the sole property of GHD. Any unauthorized reuse, redistribution of or reliance on the report shall be at the Client and recipient's sole risk, without liability to GHD. Client shall defend, indemnify and hold GHD harmless from any liability arising from or related to Client's unauthorized distribution of the report. No portion of this report may be used as a separate entity; it is to be read in its entirety and shall include all supporting drawings and appendices.

The recommendations made in this report are in accordance with our present understanding of the project, the current site use, ground surface elevations and conditions, and are based on the work scope approved by the Client and described in the report. The services were performed in a manner consistent with that level of care and skill ordinarily exercised by members of geotechnical engineering professions currently practicing under similar conditions in the same locality. No other representations, and no warranties or representations of any kind, either expressed or implied, are made. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

All details of design and construction are rarely known at the time of completion of a geotechnical study. The recommendations and comments made in the study report are based on our subsurface investigation and resulting understanding of the project, as defined at the time of the study. We should be retained to review our recommendations when the drawings and specifications are complete. Without this review, GHD will not be liable for any misunderstanding of our recommendations or their application and adaptation into the final design.

By issuing this report, GHD is the geotechnical engineer of record. It is recommended that GHD be retained during construction of all foundations and earthwork operations to confirm the conditions of the subsoil are actually similar to those observed during our study. The intent of this requirement is to verify that conditions encountered during construction are consistent with the findings in the report and that inherent knowledge developed as part of our study is correctly carried forward to the construction phases.

It is important to emphasize that a soil investigation is, in fact, a random sampling of a site and the comments included in this report are based on the results obtained at two test locations (BH-1 and BH-2) only. The subsurface conditions confirmed at two test locations may vary at other locations. The subsurface conditions can also be significantly modified by the construction activities on site (i.e., excavation, dewatering and drainage, blasting, pile driving, etc.). These conditions can also be modified by exposure of soils or bedrock to humidity, dry periods or frost. Soil and groundwater conditions between and beyond the test locations may differ both horizontally and vertically from those encountered at the test locations and conditions may become apparent during construction which could not be detected or anticipated at the time of our investigation. Should any conditions at the site be encountered which differ from those found at the test locations, we request that we be notified immediately in order to permit a reassessment of our recommendations. If changed conditions are identified during construction, no matter how minor, the recommendations in this report shall be considered invalid until sufficient review and written assessment of said conditions by GHD is completed



We trust that this report meets with your approval and present requirements. Please do not hesitate to contact us, should any questions arise.

Sincerely,

GHD

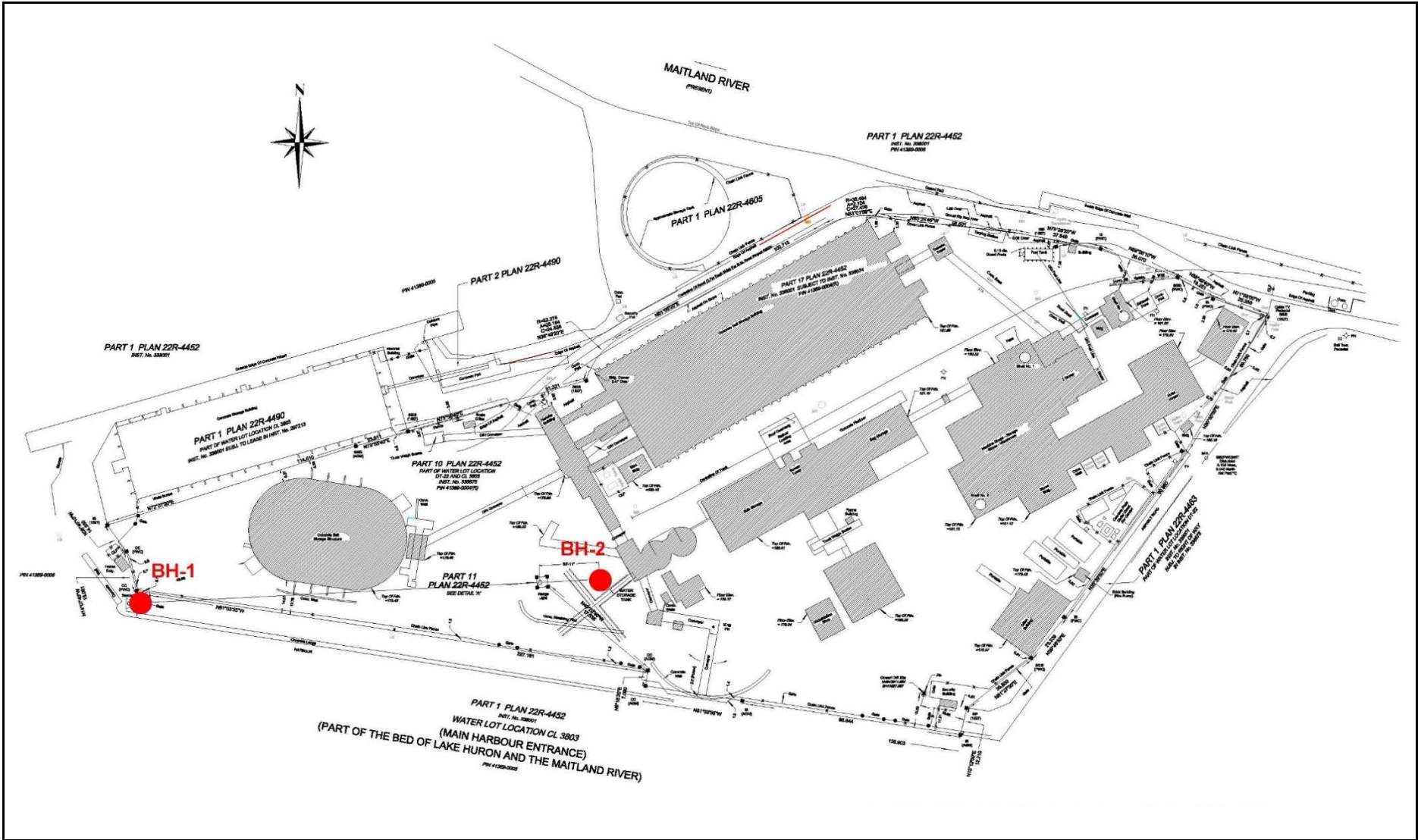


Bruce Polan, M.A.Sc., P.Eng.
Associate, Geotechnical Group

Abdul Hafeez Khan, P.Eng.
Geotechnical Engineer

BP/AK/cd/1

Encl. Figure 1: Borehole Location Plan
Attachment A: Borehole Log and Stratigraphy Legend Sheet
Attachment B: Soil Corrosivity Analytical Test Report



FISHERIES AND OCEANS CANADA
 GEOTECHNICAL INVESTIGATION - REPLACEMENT OF NAVIGATION TOWERS
 NORTH HARBOUR ROAD, GODERICH, ONTARIO
 BOREHOLE LOCATION PLAN

PROJECT NO.
 11149756-A1
 DATE

17-Oct-17
 FIGURE NO. 1

Attachment A
Borehole Log and Stratigraphy Legend Sheet



BOREHOLE No.: BH-2
ELEVATION: N/M m

BOREHOLE REPORT

Page: 1 of 1

CLIENT: Canadian Coast Guard, Department fo Fisheries and Oceans Canada

PROJECT: Geotechnical Investigation - Replacement of Navigation Towers

LOCATION: 300 Harbour Road West, Goderich, Ontario

DESCRIBED BY: M. MacEwen CHECKED BY: Bruce Polan

DATE (START): 20 September 2017 DATE (FINISH): 20 September 2017

LEGEND

- ☒ SS - SPLIT SPOON
- ☒ ST - SHELBY TUBE
- ☒ VA - VANE SHEAR
- ☒ RC - ROCK CORE
- ▼ - WATER LEVEL

Depth	Elevation (m) BGS	Stratigraphy	DESCRIPTION OF SOIL AND BEDROCK	State	Type and Number	Recovery	Moisture Content	Blows per 6 in. / 15 cm or RQD	Penetration Index	Shear test (Cu) Sensitivity (S)		△ Field	
										○ Water content (%)	□ Lab		
0	N/M		GROUND SURFACE			%	%		N	10 20 30 40 50 60 70 80 90			
1			YARD FILL : SAND and GRAVEL - brown, moist	☒	SS-1	70	5	8-12-17-15	29	○	●		
2					☒	SS-2	50	4	9-7-5	12	○	●	
3	1.0				☒	SS-3	30	7	4-37-50/50	R	○	●	
4				becoming wet									
5	1.80				☒	SS-4	40	16	9-31-49	80	○	●	
6	2.10			grey/brown, crushed, saturated (angular limestone)									
7					☒	SS-5	30	16	40-20-9	29	○	●	
8					☒	SS-6	40	15	10-9-8	17	○	●	
9	3.0			POSSIBLE NATIVE : SAND - grey, compact, medium to coarse-grained, some gravel, saturated									
10					☒	SS-7	50	14	6-5-6	11	○	●	
11	3.60				☒	SS-8	60	--	6-7-8	15	○	●	
12	4.0				☒	SS-9	50	18	4-5-6-11	11	○	●	
13				gravelly lenses									
14	6.40			☒	SS-10	50	12	10-11-25-23	36	○	●		
15	6.80		becoming dense										
16	7.0			☒	SS-11	75	21	19-50/75	R	○	●		
17	7.50		becoming very dense, fine to medium-grained										
18	8.0			☒	SS-12	50	15	10-11-15	26	○	●		
19	8.30		becoming compact										
20	8.30			☒	SS-13	10	23	6-9-14	23	○	●		
21	9.0												
22	9.8		End Borehole at 9.8 m bgs. Borehole collapsed to 3.0 m bgs, and groundwater at 1.8 m bgs. Lake water level within lake at 44 m south of tower is 2.1 m bgs. Borehole backfilled with bentonite hole plug.										
23	9.80		N/M - denotes "Not Measured"										
24	10.0		bgs - refers to "below ground surface"										
25			50/50 - refers to 50 blows per 100 mm sampler penetration										
26			R - denotes "split spoon refusal"										
27	11.0												
28													
29	12.0												
30													
31	13.0												
32													
33													
34													
35													
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44													
45													

SOIL LOG WITH GRAPH 11149756-A1 BH LOGS - UPDATED OCT 6-2017.GPJ INSPEC_SOL.GDT 16/10/17



Notes on Borehole and Test Pit Reports

Soil description :

Each subsurface stratum is described using the following terminology. The relative density of granular soils is determined by the Standard Penetration Index ("N" value), while the consistency of clayey soils is measured by the value of undrained shear strength (Cu).

Classification (Unified system)			
Clay	< 0.002 mm		
Silt	0.002 to 0.075 mm		
Sand	0.075 to 4.75 mm	fine	0.075 to 0.425 mm
		medium	0.425 to 2.0 mm
		coarse	2.0 to 4.75 mm
Gravel	4.75 to 75 mm	fine	4.75 to 19 mm
		coarse	19 to 75 mm
Cobbles	75 to 300 mm		
Boulders	>300 mm		

Terminology	
"trace"	1-10%
"some"	10-20%
adjective (silty, sandy)	20-35%
"and"	35-50%

Relative density of granular soils	Standard penetration index "N" value (BLOWS/ft – 300 mm)
Very loose	0-4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

Consistency of cohesive soils	Undrained shear strength (Cu)	
	(P.S.F)	(kPa)
Very soft	<250	<12
Soft	250-500	12-25
Firm	500-1000	25-50
Stiff	1000-2000	50-100
Very stiff	2000-4000	100-200
Hard	>4000	>200

Rock quality designation	
"RQD" (%) Value	Quality
<25	Very poor
25-50	Poor
50-75	Fair
75-90	Good
>90	Excellent

STRATIGRAPHIC LEGEND			
Sand	Gravel	Cobbles & boulders	Bedrock
Silt	Clay	Organic soil	Fill

Samples:

Type and Number

The type of sample recovered is shown on the log by the abbreviation listed hereafter. The numbering of samples is sequential for each type of sample.

SS: Split spoon	ST: Shelby tube	AG: Auger
SSE, GSE, AGE: Environmental sampling	PS: Piston sample (Osterberg)	RC: Rock core
		GS: Grab sample

Recovery

The recovery, shown as a percentage, is the ratio of length of the sample obtained to the distance the sampler was driven/pushed into the soil

RQD

The "Rock Quality Designation" or "RQD" value, expressed as percentage, is the ratio of the total length of all core fragments of 4 inches (10 cm) or more to the total length of the run.

IN-SITU TESTS:

N: Standard penetration index	N _c : Dynamic cone penetration index	k: Permeability
R: Refusal to penetration	Cu: Undrained shear strength	ABS: Absorption (Packer test)
	Pr: Pressure meter	

LABORATORY TESTS:

I _p : Plasticity index	H: Hydrometer analysis	A: Atterberg limits	C: Consolidation	O.V.: Organic vapor
W _l : Liquid limit	GSA: Grain size analysis	w: Water content	CS: Swedish fall cone	
W _p : Plastic limit		y: Unit weight	CHEM: Chemical analysis	

Attachment B

Soil Corrosivity Analytical Test Report



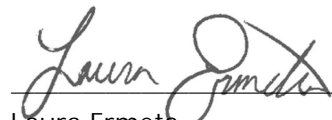
GHD Limited (Waterloo)
ATTN: JENNIFER BALKWILL
651 COLBY DRIVE
WATERLOO ON N2V 1C2

Date Received: 21-SEP-17
Report Date: 29-SEP-17 09:58 (MT)
Version: FINAL

Client Phone: 519-884-0510

Certificate of Analysis

Lab Work Order #: L1994982
Project P.O. #: 73509101
Job Reference: 11149756-A1
C of C Numbers:
Legal Site Desc:



Laura Ermeta
Account Manager

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 60 Northland Road, Unit 1, Waterloo, ON N2V 2B8 Canada | Phone: +1 519 886 6910 | Fax: +1 519 886 9047
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample Details/Parameters	Result	Qualifier*	D.L.	Units	Extracted	Analyzed	Batch
L1994982-1 BH2-SS6 (12.5 FT-14.5 FT) Sampled By: CLIENT on 20-SEP-17 @ 18:00 Matrix: SOIL							
Physical Tests							
Conductivity	2.87		0.0040	mS/cm		27-SEP-17	R3839100
% Moisture	13.4		0.10	%	26-SEP-17	26-SEP-17	R3838792
pH	9.15		0.10	pH units		26-SEP-17	R3838265
Redox Potential	112		-1000	mV		27-SEP-17	R3839252
Resistivity	348		1.0	ohm*cm		27-SEP-17	
Leachable Anions & Nutrients							
Chloride	218		5.0	ug/g	27-SEP-17	27-SEP-17	R3840547
Anions and Nutrients							
Sulphate	9250		20	mg/kg	26-SEP-17	27-SEP-17	R3840547
Inorganic Parameters							
Acid Volatile Sulphides	37	DLHC	20	mg/kg	28-SEP-17	28-SEP-17	R3839727
L1994982-2 BH1-MIX OF SS11 & SS12 (25 FT-29.5 FT) Sampled By: CLIENT on 20-SEP-17 @ 13:00 Matrix: SOIL							
Physical Tests							
Conductivity	5.15		0.0040	mS/cm		27-SEP-17	R3839100
% Moisture	19.0		0.10	%	26-SEP-17	26-SEP-17	R3838792
pH	8.39		0.10	pH units		26-SEP-17	R3838265
Redox Potential	93.0		-1000	mV		27-SEP-17	R3839252
Resistivity	194		1.0	ohm*cm		27-SEP-17	
Leachable Anions & Nutrients							
Chloride	2600	DLHC	50	ug/g	27-SEP-17	27-SEP-17	R3840547
Anions and Nutrients							
Sulphate	163		20	mg/kg	26-SEP-17	27-SEP-17	R3840547
Inorganic Parameters							
Acid Volatile Sulphides	1.2	DLHC	1.0	mg/kg	28-SEP-17	28-SEP-17	R3839727

* Refer to Referenced Information for Qualifiers (if any) and Methodology.

Reference Information

Sample Parameter Qualifier key listed:

Qualifier	Description
DLHC	Detection Limit Raised: Dilution required due to high concentration of test analyte(s).

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
CL-R511-WT	Soil	Chloride-O.Reg 153/04 (July 2011)	EPA 300.0
5 grams of dried soil is mixed with 10 grams of distilled water for a minimum of 30 minutes. The extract is filtered and analyzed by ion chromatography.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
EC-WT	Soil	Conductivity (EC)	MOEE E3138
A representative subsample is tumbled with de-ionized (DI) water. The ratio of water to soil is 2:1 v/w. After tumbling the sample is then analyzed by a conductivity meter.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
MOISTURE-WT	Soil	% Moisture	Gravimetric: Oven Dried
PH-WT	Soil	pH	MOEE E3137A
A minimum 10g portion of the sample is extracted with 20mL of 0.01M calcium chloride solution by shaking for at least 30 minutes. The aqueous layer is separated from the soil and then analyzed using a pH meter and electrode.			
Analysis conducted in accordance with the Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act (July 1, 2011).			
REDOX-POTENTIAL-WT	Soil	Redox Potential	APHA 2580
This analysis is carried out in accordance with the procedure described in the "APHA" method 2580 "Oxidation-Reduction Potential" 2012. Samples are extracted at a fixed ratio with DI water. Results are reported as observed oxidation-reduction potential of the platinum metal-reference electrode employed, in mV.			
RESISTIVITY-CALC-WT	Soil	Resistivity Calculation	APHA 2510 B
Resistivity are calculated based on the conductivity using APHA 2510B where Conductivity is the inverse of Resistivity.			
RESISTIVITY-CALC-WT	Soil	Resistivity Calculation	MOECC E3138
Resistivity are calculated based on the conductivity using APHA 2510B where Conductivity is the inverse of Resistivity.			
SO4-WT	Soil	Sulphate	EPA 300.0
5 grams of soil is mixed with 50 mL of distilled water for a minimum of 30 minutes. The extract is filtered and analyzed by ion chromatography.			
SULPHIDE-WT	Soil	Sulphide, Acid Volatile	APHA 4500S2J
This analysis is carried out in accordance with the method described in APHA 4500 S2-J. Hydrochloric acid is added to sediment samples within a purge and trap system. The evolved hydrogen sulphide (H2S) is carried into a basic solution by inert gas. The acid volatile sulfide is then determined colourimetrically.			

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
WT	ALS ENVIRONMENTAL - WATERLOO, ONTARIO, CANADA

Chain of Custody Numbers:

Reference Information

GLOSSARY OF REPORT TERMS

Surrogates are compounds that are similar in behaviour to target analyte(s), but that do not normally occur in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery. In reports that display the D.L. column, laboratory objectives for surrogates are listed there.

mg/kg - milligrams per kilogram based on dry weight of sample

mg/kg wwt - milligrams per kilogram based on wet weight of sample

mg/kg lwt - milligrams per kilogram based on lipid weight of sample

mg/L - unit of concentration based on volume, parts per million.

< - Less than.

D.L. - The reporting limit.

N/A - Result not available. Refer to qualifier code and definition for explanation.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.



Quality Control Report

Workorder: L1994982

Report Date: 29-SEP-17

Page 1 of 3

Client: GHD Limited (Waterloo)
 651 COLBY DRIVE
 WATERLOO ON N2V 1C2

Contact: JENNIFER BALKWILL

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
CL-R511-WT	Soil							
Batch	R3840547							
WG2625959-3	CRM	AN-CRM-WT						
Chloride			90.8		%		70-130	27-SEP-17
WG2625959-4	DUP	L1994982-1						
Chloride		218	211		ug/g	3.1	30	27-SEP-17
WG2625959-2	LCS							
Chloride			96.9		%		80-120	27-SEP-17
WG2625959-1	MB							
Chloride			<5.0		ug/g		5	27-SEP-17
EC-WT	Soil							
Batch	R3839100							
WG2625953-4	DUP	WG2625953-3						
Conductivity		0.625	0.623		mS/cm	0.3	20	27-SEP-17
WG2626212-1	LCS							
Conductivity			99.6		%		90-110	27-SEP-17
WG2625953-1	MB							
Conductivity			<0.0040		mS/cm		0.004	27-SEP-17
MOISTURE-WT	Soil							
Batch	R3838792							
WG2625090-3	DUP	L1994835-10						
% Moisture		4.62	5.08		%	9.3	20	26-SEP-17
WG2625090-2	LCS							
% Moisture			99.8		%		90-110	26-SEP-17
WG2625090-1	MB							
% Moisture			<0.10		%		0.1	26-SEP-17
PH-WT	Soil							
Batch	R3838265							
WG2624424-1	DUP	L1990493-1						
pH		12.90	12.89	J	pH units	0.01	0.3	26-SEP-17
WG2624963-2	LCS							
pH			6.96		pH units		6.9-7.1	26-SEP-17
REDOX-POTENTIAL-WT	Soil							
Batch	R3839252							
WG2625411-1	DUP	L1994982-1						
Redox Potential		112	114		mV	1.8	25	27-SEP-17
SO4-WT	Soil							



Quality Control Report

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Client: GHD Limited (Waterloo)
651 COLBY DRIVE
WATERLOO ON N2V 1C2

Contact: JENNIFER BALKWILL

Test	Matrix	Reference	Result	Qualifier	Units	RPD	Limit	Analyzed
SO4-WT	Soil							
Batch	R3840547							
WG2625329-4	CRM	AN-CRM-WT						
Sulphate			121.5		%		60-140	27-SEP-17
WG2625329-5	DUP	L1994982-1						
Sulphate		9250	9330		mg/kg	0.8	30	27-SEP-17
WG2625329-2	LCS							
Sulphate			98.0		%		80-120	27-SEP-17
WG2625329-1	MB							
Sulphate			<20		mg/kg		20	27-SEP-17
SULPHIDE-WT	Soil							
Batch	R3839727							
WG2626975-3	DUP	L1994982-1						
Acid Volatile Sulphides		37	32		mg/kg	15	30	28-SEP-17
WG2626975-2	LCS							
Acid Volatile Sulphides			96.1		%		70-130	28-SEP-17
WG2626975-1	MB							
Acid Volatile Sulphides			<0.20		mg/kg		0.2	28-SEP-17

Quality Control Report

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Client: GHD Limited (Waterloo)
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WATERLOO ON N2V 1C2
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Legend:

Limit ALS Control Limit (Data Quality Objectives)
DUP Duplicate
RPD Relative Percent Difference
N/A Not Available
LCS Laboratory Control Sample
SRM Standard Reference Material
MS Matrix Spike
MSD Matrix Spike Duplicate
ADE Average Desorption Efficiency
MB Method Blank
IRM Internal Reference Material
CRM Certified Reference Material
CCV Continuing Calibration Verification
CVS Calibration Verification Standard
LCSD Laboratory Control Sample Duplicate

Sample Parameter Qualifier Definitions:

Qualifier	Description
J	Duplicate results and limits are expressed in terms of absolute difference.

Hold Time Exceedances:

All test results reported with this submission were conducted within ALS recommended hold times.

ALS recommended hold times may vary by province. They are assigned to meet known provincial and/or federal government requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by the US EPA, APHA Standard Methods, or Environment Canada (where available). For more information, please contact ALS.

The ALS Quality Control Report is provided to ALS clients upon request. ALS includes comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against pre-determined data quality objectives to provide confidence in the accuracy of associated test results.

Please note that this report may contain QC results from anonymous Sample Duplicates and Matrix Spikes that do not originate from this Work Order.



Report To Contact and company name below will appear on the final report		Report Format / Distribution			Select Service Level Below - Please confirm all E&P TATs with your AM - surcharges will apply												
Company: GHD LIMITED Acct# 13791		Select Report Format: <input checked="" type="checkbox"/> PDF <input checked="" type="checkbox"/> EXCEL <input checked="" type="checkbox"/> EDD (DIGITAL)			Regular [R] <input checked="" type="checkbox"/> Standard TAT if received by 3 pm - business days - no surcharges apply												
Contact: Jennifer Balkwill		Quality Control (QC) Report with Report <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO			PRIORITY (Business Days)	4 day [P4] <input type="checkbox"/>				EMERGENCY	1 Business day [E1] <input type="checkbox"/>						
Phone: 519-884-0510		<input type="checkbox"/> Compare Results to Criteria on Report - provide details below if box checked				3 day [P3] <input type="checkbox"/>					Same Day, Weekend or Statutory holiday [E0] <input type="checkbox"/>						
Company address below will appear on the final report		Select Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Date and Time Required for all E&P TATs:												
Street: 651 Colby Drive		Email 1 or Fax Jennifer.Balkwill@ghd.com			For tests that can not be performed according to the service level selected, you will be contacted.												
City/Province: Waterloo / Ontario		Email 2 Bruce.Polan@ghd.com			Analysis Request												
Postal Code: N2V 1C2		Email 3															
Invoice To Same as Report To <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		Invoice Distribution			Indicate Filtered (F), Preserved (P) or Filtered and Preserved (F/P) below												
Copy of Invoice with Report <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		Select Invoice Distribution: <input checked="" type="checkbox"/> EMAIL <input type="checkbox"/> MAIL <input type="checkbox"/> FAX			Corrosivity Package												
Company: GHD LIMITED		Email 1 or Fax Jennifer.Balkwill@ghd.com															
Contact: Jennifer Balkwill		Email 2															
Project Information		Oil and Gas Required Fields (client use)															
ALS Quote#:		AFE/Cost Center:	PO#:														
Job #: 11149758-A1		Major/Minor Code:	Routing Code:														
PO / AFE:		Requisitioner:															
LSD:		Location:															
ALS Lab Work Order # (lab use only) L1994982 AR		ALS Contact: L. ERMETA	Sampler:														
ALS Sample # (lab use only)	Sample Identification and/or Coordinates (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)													Sample Type
	BH8 - SS6 (12.5'-14.5')		9/20/17	6pm													
	BH1 - mix of SS11 & SS12 (25'-29.5')		9/20/17	1pm													
Drinking Water (DW) Samples¹ (client use)		Special Instructions / Specify Criteria to add on report by clicking on the drop-down list below (electronic COC only)			SAMPLE CONDITION AS RECEIVED (lab use only)												
Are samples taken from a Regulated DW System? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO					Frozen <input type="checkbox"/> SIF Observations Yes <input type="checkbox"/> No <input type="checkbox"/>												
Are samples for human drinking water use? <input type="checkbox"/> YES <input type="checkbox"/> NO					Ice Packs <input type="checkbox"/> Ice Cubes <input type="checkbox"/> Custody seal intact Yes <input type="checkbox"/> No <input type="checkbox"/>												
					Cooling Initiated <input type="checkbox"/>												
					INITIAL COOLER TEMPERATURES °C				FINAL COOLER TEMPERATURES °C								
									3.1								
SHIPMENT RELEASE (client use)		INITIAL SHIPMENT RECEPTION (lab use only)			FINAL SHIPMENT RECEPTION (lab use only)												
Released by:	Date:	Time:	Received by:	Date:	Time:	Received by:	Date:	Time:									
						8/1	21-Sept-17	12:10									



Fisheries and Oceans
Canada

Pêches et Océans
Canada

Canadian
Coast Guard

Garde côtière
canadienne



APPENDIX H: COMPASS MINERALS POLICY ON PPE

	Personal Protective Equipment	Operating Policy P 05
		Page 1 of 4

Purpose & Scope: To ensure that all people on the Goderich Mine Site wear the appropriate personal protective equipment.

Personal Protective Equipment (PPE)

- a) Is worn by a worker to minimize exposure to specific occupational hazards.
- b) It is only one element in our complete safety program, which uses a variety of techniques to maintain a safe and healthy work environment.
- c) It does not reduce or eliminate the hazard itself but reduces the risk to the worker.
- d) Is used to protect workers from hazards that cannot be controlled by other means. For example engineering or administrative measures fail to fully protect the worker.
- e) Has been designed to help protect almost every part of a workers body.
- f) Is designed for specific protection under particular conditions and should not be used for other purposes.
- g) The benefits can only be obtained when it is used and worn properly.
- h) It is each worker's responsibility to use PPE that is approved by the company.
- i) Company-issued apparel, device or article will not be defamed in any way. All stickers, comments, etc must have management approval.
- j) PPE is your last line of defence. b

1. Head Protection (wearing a hat is the best way to protect your head)

- a) Must be Class G: General Usage (non-conducting offering minimal protection against electrical shock).
- b) Must fit securely on the head.
- c) Must be worn with the "bill" forward and suspension in proper position.
- d) Retro-reflective material must be applied on the front and back of head gear as well as both sides to provide 360° reflectivity. Retro-reflective material should also be applied to ear muffs to ensure that the tape on the sides of the head gear cannot be obscured.
- e) Replace headwear that has been struck, even if no damage is visible.
- f) Remove and destroy any headwear if its protective abilities are in doubt.
- g) Inspect and replace a shell that shows signs of wear. i.e. deep gouges, hairline cracks,
- h) Do not paint the shell.
- i) Ensure that the suspension is in good condition. Inspect closely for cracked or torn adjustment slots, frayed material or other signs of wear.
- j) Do not put anything between the suspension and the shell.
- k) No modifications allowed to hat or cap lamp/cord holder.
- l) Hair longer than 4" shall be suitably confined to prevent entanglement with any machinery.
- m) An approved hard hat is to be worn at all times except in the following areas. Marked PPE free zones, Lunch Rooms, Stores, Training Room, Office Buildings, Cagetender, Trench and Mill Operators Station, all vehicles with enclosed cabs.
- n) Chin straps are available to prevent hat from falling under some circumstances.

2. Eye & Face Protection (safeguards against flying objects debris and splashes)

- a) Must be CSA approved glasses.
- b) Individuals with prescription glasses must wear side shields or prescription safety glasses.

- c) Ensure your glasses fit properly.
- d) Keep clean, in a dry place when not in use.
- e) Replace scratched, pitted, broken, bent or ill fitting glasses.
- f) Ensure appropriate protection for task being performed and surrounding work environment such as:
 - i. Welding Welding Helmet
 - ii. Cutting Eye cup or monoframe cutting goggles
 - iii. Grinding Full face shield or goggles
 - iv. Sandblasting Hood
 - v. Shotcreting Hood
 - vi. Sunshine CSA approved sunglasses
- g) Full-face protection may also be required.
- h) Safety glasses must be worn at all times except in the following areas: Marked PPE free zones, Lunch Rooms, Stores, Training Room Office Buildings, Cagetender, Trench and Mill Operators Station.

3. Foot Protection (protect your feet from a variety of work related hazards)

- a) Safety footwear must be worn at all times.
- b) Must have an integrated metatarsal guard and be ANSI or CSA Grade 1 approved (has green patch plus white and orange high voltage patch) and kept in good condition i.e. holes, worn sole, laced, open cracks
- c) Must be a minimum 6" high.
- d) Rubber CSA approved boots/galoshes may be obtained for specific tasks ie. Dealing with liquids.
- e) Do not alter/modify safety footwear.
- f) All footwear must be worn properly at all times. This includes the proper tying up of boot laces as designed by the manufacturer.

4. Hearing Protection (prevention of permanent hearing loss)

Refer to OP 205 "Occupational Noise Exposure"

People must wear a hearing protector when the area has been posted a mandatory area or if the noise or sound level at the workplace exceeds 85 decibels over an 8-hour period. Equipment and or areas that are above 85 decibels (dB) have been posted at the mine site.

- a) Hearing protection is part of your PPE and should be carried at all times.
- b) Ear plugs or muffs are supplied at the stores area.
- c) An earmuff is made to fit snugly over the entire ear.
- d) Earplugs must fit snugly in your ear canal. (Replace as necessary)

5. Body Protection

Protective clothing is designed to give workers limited body protection.

- a) All Underground personnel, including contractors, working at our site must wear Class 3 work wear with 50mm reflective material on their outer clothing.

- b) All Surface personnel working at our site must wear Class 3 work wear while working in a PPE required zone.
- c) All Contractors working in a PPE required work zone must wear Class 3 work wear. Exceptions for contractors, approved by Management only, will be made for those working during daylight hours only on Surface.
- d) Rain gear can be obtained if necessary.
- e) Insulated coveralls are available for work performed in a cold climate.
- f) Loose clothing, adornments and hair shall be suitably confined to prevent entanglement with any machinery, device or thing in the workplace.

6. Hand and Arm Protection

Most effective way to prevent hand injuries is to wear the proper gloves selected on the basis of the hazards involved in performing the task.

- a) Personal Protective Equipment (PPE) for the hands come in many forms, each designed to protect against certain hazards, and it is the responsibility of both workers and supervisors, through the risk assessment process, to ensure that adequate hand protection is used in the workplace.
- b) Welders gloves must be worn when welding and some “hot work” applications.
- c) Electricians must wear at a minimum, rubber gloves. Electrician’s working on or around voltages greater than 150 volts but less than 750 volts shall wear class “O” rubber gloves. Electricians working on or around voltages greater than 750 volts shall wear Class 2 rubber gloves, and approved face shield, second layer consisting of 28Cal Jacket and Bibs to be worn over FR rated coveralls.
- d) Rubber sleeves may also be added for full arm protection.
- e) Employees handling siding must use cut resistant gloves.
- f) Suitable gloves must be worn when handling materials that are sharp or jagged.
- g) Rubber, neoprene or synthetic gloves shall be worn when using chemicals, and where there may be skin contact. Review the appropriate Safety Data Sheet for instructions.

7. Respiratory Protection

Respiratory protection must be worn in areas where there is a gas/vapour toxic or a level of hazardous air contaminants. Advice and guidance on the proper selection, care, and use of respirators may be obtained from any member of the safety department. Respiratory protection requirements are as follows:

a) Training

Employees will be trained in proper fit testing and the use of different type of respirators (i.e.: N95-NIOSH) and Self Contained Breathing Apparatus (SCBA), if & when a person is required to work in any area that has a lack of oxygen, regulated toxic or hazardous air contaminants or the presence of a noxious gas as recommended by WHMIS and the appropriate SDS requirements.

b) Medical Assessment

Assurance that all employees who are potential Respirator/SCBA users are physically capable of wearing these units without endangering their health shall complete a Respirator Medical Evaluation Questionnaire annually and have it evaluated by a doctor.

c) **Facial Hair**

Respiratory protection cannot be issued to individuals with interfering conditions, including facial hair. Interfering conditions affect the seal of the respirator and adversely affect performance.

NOTE: Our Respiratory Protection does NOT apply to nuisance/dust “comfort” mask

8. Fall Protection

Refer to OP 199 “Fall Protection”

Fall protection is supplied and must be used, where a worker is exposed to a hazard of falling.

9. Cap Lamps

- a) Everyone must have a working cap lamp with them before going underground. Cap lamps are to be turned on and within “arm’s length” at all times. They should be inspected and charged daily.
- b) Corded cap lamps must be worn on a belt (as per manufacturer’s instructions) and turned on at all times. The belt used for cap lamps can be any belt; however, Compass Minerals will only supply a miner’s belt.
- c) As per Regulation 854, Section 69 (2) and (4), Compass Minerals must inspect all cap lamps monthly to ensure it is capable of providing a peak illuminance of at least 1500 lux at 1.2 meters from the light source and recorded.
- d) Only company supplied cap lamps are allowed at Goderich Mine as a system is in place to meet the regulations. All other cap lamps are prohibited.

10. Personal Lock and Tag

Refer to OP 127 “Lockout and Tagout”

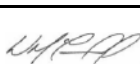

An approved, keyed padlock will be issued to individual employees for lockout purposes. Each personal lock must have a unique key and must be clearly identified with the employee's name. **Personal locks with key, tags, pouch and clasp** are part of your Personal Protective Equipment. They must not be used for any other purpose than locking out equipment and must be on your person at all times when not being used to lock out equipment.

Note:

Should questions arise as to what PPE is needed during use of a particular chemical, consult the WHMIS Program and the SDS for the specific chemical.

The main administration building, offices, the wicket-dry area, and the parking lot area between the main office, lab, and the wicket buildings may not require PPE. Common sense will prevail.

Employees violating this procedure will be subject to discipline in accordance with current company policy up to and including termination.

J.H. & S.C. Review		Final Review				
				<i>Signatures on File</i>		
Mgmt. Rep	Union Rep	Process/Surface Supt.	Production Supt.	Maintenance Supt.	Engineering Manager	Mine Manager
Revised by Safety Department – June 22 , 2017						