



NAV AID CONSTRUCTION

BARKLEY SOUND AND ALBERNI INLET



PROJECT TITLE: AFI26 Barkley Sound and Alberni Inlet Aids to Navigation Project

CONTRACT FOR: Piling Construction Service

DEPARTMENT: Canadian Coast Guard, Maritime and Civil Infrastructure

DATE: August 2017

1.0 OBJECTIVE

The Canadian Coast Guard's objective is to improve the existing aids to navigation in and around the Barkley Sound and Alberni Inlet area. The Work by the Contractor involves the replacement of three (3) navigational aid piling structures and modifications to one (1) existing navigational aid piled structure as stated below.

2.0 BACKGROUND

Canadian Coast Guard (CCG) is a Special Operating Agency of Fisheries and Oceans Canada (DFO). The Oceans Act and the Canada Shipping Act provide the primary legislative basis for Coast Guard programs. The project supports the legislative obligations of the Department, as outlined primarily in Part III of the Oceans Act, Section 41(a), wherein the Minister is mandated to provide services to support the Government of Canada's initiatives through the provision of ships, aircraft, and other marine services for the safe, economical, and efficient movement of ships in Canadian waters.

3.0 SCOPE OF WORK

The CCG has identified three (3) existing pile dolphin aids to navigation sites which require replacement and one (1) which requires modification. The full details of the work planned for each site are identified within the construction drawings provided in the reference documents. The general project activities will include removal and disposal of the existing timber piled structures and constructing new steel piled structures which include: driving new steel piles, welding tabs and ladders, and installing work platforms.

The following information is provided to clarify the requirements.

.1 Location of Work

The locations of the navigational aids which require piling construction services include the following, refer to the attached drawings and site map found in the Appendix.

Sites requiring replacement:

.1 LL 160.0 Franklin River	49° 6' 13.3"N, 124° 49' 15.1"W
.2 LL 161.0 Mactush Creek	49° 6' 34.3"N, 124° 49' 20.8"W
.3 LL 168.1 Sommas River	49° 14' 39.5"N, 124° 49' 27.5"W

Site requiring modification:

.1 LL 163.0 Stamp Narrows	49° 10' 59.9"N, 124° 49' 18"W
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.2 Review of Work

All Work by the Contractor will be reviewed by the CCG Representative for general conformance to the Contract Documents and by a DFO Environmental Monitor for conformance to the Environmental Protection Plan. A CCG representative will be on the pile driving barge during all pile driving activities and at completion of Work.

.3 Reference Documents

- .1 Appendix A – SPECIFICATIONS
- .2 Appendix B – CONSTRUCTION DRAWINGS
- .3 Appendix C – SUMMARY OF SUBMITTALS
- .4 Appendix D – STANDARD PRACTICES FOR PILE DRIVING
- .5 Appendix E – ENVIRONMENTAL MANAGEMENT PLAN
- .6 Appendix F – GEOTECHNICAL REPORT

.4 Requirements

- .1 **LAWFULNESS** – The Contractor must perform all Work in accordance with all applicable laws, acts, legislations, regulations, and agencies. This may include, but not be limited to, the following:
 - .1 Canada Labour Code
 - .2 WorkSafe BC
 - .3 Canadian Environmental Protection Act
 - .4 Canadian Environmental Assessment Act
 - .5 Fisheries Act
 - .6 Species at Risk Act
 - .7 Migratory Birds Convention Act
 - .8 BC Water Act
- .2 **PERFORMANCE** – Perform all Work identified and to the specifications of this SOW and/or supplemental documents.
- .3 **PILE DOLPHIN CONSTRUCTION** – The Contractor is to provide the pile construction services to completely build the 3 structures identified above in accordance to the drawings provided in the Appendix. The Contractor is to completely demolish the 3 existing timber piled sites and build steel piled structures in their place as identified. This Work will include pile driving, welding, installing platforms and ladders, and extracting piles. If a pile is snapped during extraction and cannot be fully extracted, the Contractor must cut off the remaining pile at the sea floor.
- .4 **BIRD NESTS** – Where existing structures having bird nests present, the Contractor must take precautions to not damage the nests and must transfer the nest to the new site under the direction of the CCG Representative.
- .5 **NAVIGATION** – The Contractor must plan and execute all Work in a manner that will not impede navigation.
- .6 **MATERIALS** – The Contractor must provide all construction materials required for the completion of Work unless noted on the construction drawings as supplied by CCG.



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- .7 SALVAGE – The Contractor must remove, transport, and store any items noted on the Construction Drawings to be salvaged to a safe and secure location until collected by the CCG.
 - .8 DISPOSAL – All construction and demolition waste to be disposed of by the Contractor at approved facilities. The Contractor is to provide to CCG waste disposal certificates from an approved facility for the disposal of any hazardous or controlled wastes.
 - .9 SCHEDULE – The Contractor must provide to CCG within 10 days following contract award a written schedule for all Work.
 - .10 CERTIFICATIONS – The Contractor must ensure that all welding performed by the Contractor is performed by a welder certified by the Canadian Welding Bureau (CWB) in the material specified and the method selected. Within 10 days following contract award the Contractor must provide CCG verification of the welder's certification and a description of the method to be used.
 - .11 ENVIRONMENTAL ADHERENCE – The Contractor must adhere to the Environmental Protection Plan (EPP) provided in the reference documents. The supplied EPP addresses additional requirements including mitigation measures and Best Management Practices (BMPs) to be implemented to reduce the risk of negatively impacting the environment due to the Work activities.
 - .12 EERP – The Contractor must provide to CCG an Environmental Emergency Response Plan (EERP) that addresses the procedures to be implemented to mitigate any potential negative impact on the environment (i.e. spill) within 10 days following contract award. The Contractor must designate an environmental lead and ensure that workers are adequately trained to carry out the EERP.
 - .13 HEALTH AND SAFETY – The Contractor is responsible for the health and safety of their workers as it pertains to the Work and to ensure all workers act in accordance with WorkSafe BC regulations.

Refer to the applicable Specifications and Drawings in the Appendix for further details and information related to the Work.

4.0 TRAVEL

The Contractor is responsible for all food, lodging, transportation, and all other travel related expenses incurred for the Contractor's workers as it relates to the Work.

5.0 SUPPORT PROVIDED BY CCG:

- .1 MATERIALS – CCG will provide all materials and items noted on the Construction Drawings as supplied by CCG and will deliver the materials and items to the Contractor's work yard, or a mutually agreed upon alternate location.



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- .2 **SITE LOCATIONS** – The exact locations and orientations of the structures will be identified in the field by CCG and verbally communicated to the Contractor at the time of construction.
 - .3 **CONSTRUCTION WORKERS** – CCG will provide the work crews necessary to perform the installation of materials and items noted on the Construction Drawings as to be installed by CCG.
 - .4 **ENVIRONMENTAL MONITORS** – CCG, or its representatives, will monitor construction activities for conformance to the Environmental Protection Plan provided.
 - .5 **SURVEY** – The CCG will survey in the final coordinates of the built structures and will report any changes to the necessary authorities.
 - .6 **NOTIFICATIONS** – CCG will provide notices to shipping and project update notifications to other governing bodies such as Transport Canada and Nav Canada.

6.0 PROJECT CONSTRAINTS:

It is the responsibility of the Contractor to identify all project constraints as they relate to the scope of the Work. Among the various constraints includes, but not limited to, the following:

- .1 **Site Access** – The site access is limited as the location of the work sites are subjected to tidal fluctuations. The Contractor must familiarize themselves with all site access constraints such as the required draft levels for the tug and the barge to safely navigate to the sites.
- .2 **Site Conditions** – The work sites have conditions which limit site access such as tidal fluctuations, existing concrete, steel, and timber structures, and riprap groynes. Other conditions may exist and should be verified by the Contractor before mobilizing to the sites.
- .3 **Tidal Windows** – Some construction must be coordinated with tidal windows.
- .4 **Current** – The current adjacent to the work sites can be strong which may create added challenges for maintaining a stable working position for the barge. The Contractor is expected to research tidal conditions in this area and be adequately prepared to perform the work.
- .5 **ENVIRONMENTAL** – The EPP addresses project specific activities and procedures to be implemented, to mitigate any potential negative impact on the environment. The Contractor is advised to review the EPP supplied in Appendix C for further requirements.
- .6 **SCHEDULING** – Some site Works may need to be scheduled to avoid conflicts with larger vessel traffic.



Canadian Coast Guard
AFI26 Barkley Sound and Alberni Inlet Aids to
Navigation Project

**SPECIFICATIONS
PILING SERVICES**

APPENDIX A – SPECIFICATIONS



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Part 1 General Instructions

1.1 MINIMUM STANDARDS

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

1.2 DESCRIPTION OF WORK

- .1 Work under this Contract include but is not limited to the provision of all labour, materials not otherwise provided by CCG, and equipment required to:
 - .1 Mobilize to each site identified with a work barge of appropriate size and certification;
 - .2 Remove existing piled dolphin structure and CCG equipment, if applicable;
 - .3 Install new pile dolphin structure, if applicable;
 - .4 Install CCG supplied equipment on this dolphin;
 - .1 8' x 10' Galv. steel platform
 - .2 16' tower and equipment
 - .3 Sections of galvanized steel access ladder
 - .4 Hanging anode assemblies
 - .5 Demobilize.
- .2 The following work will be undertaken by others and must be accommodated during construction
 - .1 Installation of Navigational Light and electrical equipment by Canadian Coast Guard (CCG) Lamproom Staff.
 - .2 Review of works by Environmental Monitor, under separate contract.
 - .3 Observation of construction activities by First Nations Observer, if present.
 - .4 Survey of Navigational Aid by qualified professional surveyor, under separate contract.
- .3 The following items will be supplied by Canadian Coast Guard and are hereby excluded:
 - .1 Aluminium tower
 - .2 Galvanized steel platform and base plate
 - .3 Galvanized steel access ladders
 - .4 Hanging anode assemblies



1.3 SUBMITTALS

- .1 Mandatory submittals and schedule for submission are detailed below and in the Appendix. The following identifies general requirements only; the relevant sections must be consulted for a complete listing of mandatory content.
- .2 Detailed Schedule:
 - .1 Deadline:
 - .1 No later than ten (10) working days following award.
 - .2 Deliverables:
 - .1 The Contractor must furnish a high level schedule outlining the major construction milestones. Schedule must clearly define the anticipated start and finish of the project.
- .3 Proof of Qualifications:
 - .1 Deadline:
 - .1 No later than ten (10) working days following award.
 - .2 Deliverables:
 - .1 Contractor must furnish proof of CWB Div. 3 certification for welder/fabricators.
 - .2 Contractor must furnish proof of vessel registration.
 - .3 Contractor must furnish listing of all subcontractors.
- .4 Construction Plan:
 - .1 Deadline:
 - .1 No later 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, and including:
 - .1 Project specific safety program (Section 013530);
 - .2 Project environmental protection plan (Section 013543);
 - .3 Detailed erection plan (Section 055000);
 - .4 Detailed pile driving plan (Section 316113).

1.4 EXISTING CONDITIONS

- .1 Bidders must make their own estimate of the difficulties associated with all phases of the works,
- .2 The Contractor must include in their costs all expenses related to the difficulties of working at the sites.
- .3 A geotechnical investigation has been completed for the sites and will be provided following Contract Award.



1.5 CONTRACTOR'S ACCESS TO SITE

- .1 Contractor is responsible for all transport of all labour, materials, and equipment to and from the site, including any and all material supplied by Canadian Coast Guard.
- .2 Site is water accessible only.
- .3 The Contractor is responsible for supplying appropriate marine access to support all construction work.
 - .1 Contractor must provide proof of vessel registration in the 'proof of qualifications' submittal.

1.6 COMPLETION, SCHEDULING, AND PLANNING OF WORKS

- .1 Work may commence as early as practical following Canadian Coast Guards acceptance and approval of mandatory submissions.
- .2 Work must be completed no later than **March 1st, 2018**, unless otherwise negotiated and approved in writing.

1.7 COAST GUARD STAGING LOCATION

- .1 Items identified as supplied by Canadian Coast Guard must be collected by the Contractor from the following staging location. Unless otherwise negotiated and approved in writing. The contractor will be responsible for all transportation costs between the project site and the identified Canadian Coast Guard staging area. Material drop off or access to stored goods outside regular operating hours will be at the discretion of Coast Guard and may be subject to cost recovery.
 - .1 Staging Location: CCG Victoria Base – 25 Huron Street, Victoria, BC, V8V 4V9
 - .2 Advise Coast Guard at least five (5) working days prior to pick up;
 - .1 For pick-up, contact: Steve James, (250) 480-2608
 - .2 Hours: Monday through Friday, 8:00AM to 4:00PM.

1.8 TEMPORARY FACILITIES

- .1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.
- .2 Maintain emergency spills kit on-site at all times.

1.9 NOTIFICATIONS

- .1 The Contractor must notify the local Fisheries Officer not less than five (5) days prior to commencement of the work.
- .2 Contractor must notify Canadian Coast Guard, Vessel Traffic Services, and inform them of operations to allow them to issue any necessary notices to shipping prior to commencement of the work.

1.10 FEES, PERMITS, CERTIFICATES AND INFORMATION

- .1 Contractor must provide authorities having jurisdiction with all information requested.



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

1.11 REFERENCE DOCUMENTS

- .1 The most recent publication or edition of any document referenced in this specification should be used unless the referencing clause states that this clause does not apply.

1.12 REQUIRED SUBMISSIONS

- .1 A summary of the minimum mandatory submissions required can be found in the Appendix. This summary is not an exhaustive list of all submissions required for the duration of the project. Additional submissions may be required afterward.



Part 1 General

1.1 GENERAL

- .1 This section specifies the general requirements and procedures for the Contractor's submissions of documents to Canadian Coast Guard for review.
- .2 Do not proceed with the work until submitted documents have been reviewed by Canadian 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 submissions is not relieved by Canadian Coast Guard's review of the submitted documents.
- .5 Notify Canadian 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 Canadian Coast Guard's review of submission, unless Coast Guard gives written acceptance of specific deviations.
- .7 Make any changes to submissions that Canadian Coast Guard may require consistent with Contract Documents and resubmit as directed by Coast Guard.
- .8 Provide Canadian 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 Canadian Coast Guard to review the submission.
- .3 The Contractor's Engineer must stamp and sign any submissions requiring a Professional Engineer's seal certifying their approval of samples, verifications of field measurements, and compliance with Contract Documents.



Part 1 General

1.1 SCOPE OF WORK

- .1 The Contractor must develop, implement and enforce a safety program which addresses all elements of the work.
 - .1 Due to the specific requirements of the project the Contractor is required to include the following as minimum mandatory requirements of their submitted safety program.
 - .1 A safety plan.

1.2 REFERENCES

- .1 Work under this section must be undertaken in strict conformance with all listed references, in the case of any conflict of discrepancy the more stringent requirements will apply.
 - .1 Canada Labour Code Part II, January 2008
 - .2 NRC-CNRC National Building Code of Canada, 2010
 - .3 BC Workers Compensation Act, 2015
 - .4 Any and all other Provincial/Territorial Regulations and Policies; Worker's Compensation Board Policies; Local municipal regulations; pertaining to safety of the contractors workers.

1.3 SUBMITTALS

- .1 Project Specific Safety Plan
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:
 - .1 Safety Plan Documents must include:
 - .1 A listing of all activities specific to the project and their Health and 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.
 - .4 Material Safety Data Sheets for hazardous products to be utilized in the performance of the works.



Part 1 General

1.1 SCOPE OF WORK

- .1 The Contractor must implement and enforce the following procedures throughout the duration of work to mitigate potential negative impacts on the surrounding environment.
- .2 At the Canadian Coast Guards sole discretion an Environmental Monitor may be present during the removal and installation of marine structures and related 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 will apply.
 - .1 Canadian Environmental Protection Act.
 - .2 Environmental Management Plan – To be submitted following contract award
 - .3 Best Management Practices for Pile Driving and Related Operations - BC Marine and Pile Driving Contractors Association March 2003

1.3 SUBMITTALS

- .1 Contractor must 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:
 - .1 Equipment features (age, spill containment);
 - .2 Staging, refueling and cleaning areas;
 - .3 Clean-up and/or containment procedures;
 - .4 Waste disposal methods and sites.

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 Standard mitigation practices and waste management procedures must be followed throughout the construction process; see Appendix B3 and B4.

3.2 Barge Operations

- .1 Ensure no grounding of the vessel. If grounding becomes imperative Contractor must conduct a visual inspection first to ensure no grounding occurs on eel grass.



Part 1 General

1.1 INSPECTION

- .1 Canadian Coast Guard or its representatives along with Environmental Monitors or First Nations Observers must have access to the work at all times. If parts of the work are prepared off site or in a shop, access must be given to such work areas throughout the duration of the project.
- .2 The list below identifies key milestones where the Canadian Coast Guard will require an opportunity to inspect and document the work.
 - .1 Location Verification: The Coast Guard will confirm the correct location for installation upon arrival of the barge at site. The contractor must provide access to the site at all times to CCG site representatives.
 - .2 Installation of the Tower: The Coast Guard must witness the erection of the new nav-aid tower and witness the correct operation of the new light.
- .3 Assistance by Contractor
 - .1 Co-operate with Canadian Coast Guard representatives and provide transportation assistance to work barge.
 - .2 On request of the Canadian Coast Guard or representative furnish for their use such, boats, equipment, labour and materials that would ordinarily form part of the plant as necessary to inspect and supervise the work at all times.
 - .3 Lamproom Staff and Marine Surveyor will provide their own transport to the work barge for the completion of their duties.

1.2 PROCEDURES

- .1 Provide Canadian Coast Guard with advance notice whenever testing or inspection 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.

1.3 REJECTED WORK

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

1.4 ACCEPTANCE OF WORK

- .1 Canadian Coast Guard will make acceptance visits of work executed by the contractor at critical milestones identified.
 - .1 The Contractor must inform the Canadian Coast Guard at least three (3) working days before these inspection visits.



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 Demolition of the existing pile supported reinforced concrete pier.
 - .1 This includes the existing aid to navigation which is not to be disturbed until installation and commissioning of the new tower is complete.
 - .2 Disposal of all waste at a licensed waste disposal facility;
 - .3 Transportation of the old tower, including all lighting and electrical equipment to Victoria CCG base.

1.2 REFERENCES

- .1 Work under this section must 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 2010.
 - .3 BC Workers Compensation Act, 2015
 - .4 CSA-S350-[M1980(R2003)], Code of Practice for Safety in Demolition of Structures.

1.3 SUBMITTALS

- .1 Contractor to provide 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
 - .3 The ultimate disposal location of all waste material and debris.
 - .1 Include documentation detailing regulatory approval for waste disposal facility and transporter.
- .2 Work under this section must not proceed until written approval of the demolition plan had been received from the Coast Guard
- .3 Contactor must submit copies of certified receipts from the disposal sites for all materials removed from the work site upon request.

1.4 EXISTING CONDITIONS

- .1 Existing pile supported reinforced concrete pier is beyond its life expectancy, and signs of failure are present. Contractor must ensure the tower and foundation are dismantled and demolished in a safe manner.



Part 2

Products

2.1

Not Used.

Part 3

Execution

3.1

GENERAL

- .1 Work under this section must be continuous and proceed without interruption unless otherwise approved by Coast Guard, to avoid a hazard to navigation.
- .2 It is preferred that pieces are lifted onto the barge in intact sections to avoid environmental issues.
- .3 Demolition work shall not commence until the new three pile dolphin and aid to navigation are complete and operational.

3.2

PROTECTION

- .1 Implement effective controls to catch/collect all debris during demolition,
- .2 Implement effective controls to prevent injury to workers and mariners.

3.3

PREPARATION

- .1 Ensure all environmental protection/mitigation measures are in place.
- .2 Ensure all items identified for salvage have been safely removed and stored.

3.4

DEMOLITION

- .1 Demolish existing pile supported reinforced concrete pier in its entirety.
- .2 Remove and salvage old frp tower and electrical equipment in their entirety.
- .3 Ensure that demolition does not adversely affect adjacent watercourses, groundwater and wildlife or contribute to excess air and noise pollution.
- .4 Ensure demolition is undertaken safely, If at any period during the demolition the safety of the Contractor's staff cannot be maintained take preventative measures, stop work and immediately notify Coast Guard.



Part 1 General

1.1 SCOPE OF WORK

- .1 Work of this section includes the supply of all labour, material not otherwise provided by CCG, and equipment, necessary to complete the following activities:
 - .1 Installation of pre-fabricated platform, anode assemblies, channel braces, shear plates, and access ladders including field welds as indicated in the attached drawings found in the Appendix.

1.2 REFERENCES

- .1 Work under this section must be undertaken in strict conformance with all listed references, in the case of any conflict or discrepancy the more stringent requirements will apply.
 - .1 Canada Labour Code Part II, 2008
 - .2 NRC-CNRC National Building Code of Canada, 2010
 - .3 BC Workers Compensation Act, 2015
 - .4 CAN/CSA S16 Limit States Design of Steel Structures
 - .5 CAN/CSA W59 Welded Steel Construction
 - .6 CAN/CSA G40.21 Steel channels, angles and plates

1.3 SUBMITTALS

- .1 Contractor must provide an Erection Plan
 - .1 Deadline:
 - .1 With Construction Plan
 - .2 Deliverables:
 - .1 Description of the equipment that will be utilized to install components
 - .2 Description of how the works will be undertaken to mitigate impacts on the surrounding watercourse.

Part 2 Products

2.1 MATERIALS

- .1 Steel sections and plates: to CAN/CSA-G40.20/G40.21, Grade 300W.
- .2 Welding materials: to CSA W59.
- .3 Welding electrodes: to CSA W48.
- .4 Bolts and anchor bolts: to ASTM A307.



2.2 FABRICATION

- .1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.
- .2 Prepare pre-fabricated hot dip galvanized materials prior to welding.
- .3 File or grind exposed field welds smooth and flush.
- .4 Field welds to be cleaned and painted with zinc rich cold galvanizing to ASTM A780M.

Part 3 Execution

3.1 ERECTION

- .1 Do welding work in accordance with CSA W59 unless specified otherwise. All welding must be carried out by a welding shop certified to CWB div. 3 or greater.
- .2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.



Part 1 General

1.1 SCOPE OF WORK

- .1 Work of this section includes the supply of all labour, material not otherwise provided by CCG, and equipment, necessary to complete the following activities:
 - .1 Transportation of the tower and all associated hardware to site from the designated staging area;
 - .2 The installation of the tower as indicated on the attached drawings
 - .3 The transportation and installation of the navigational day-marks
- .2 Work of the section excludes:
 - .1 Supply of the aluminium tower and hardware, by CCG
 - .2 Supply of the navigational day-marks and hardware, by CCG

1.2 REFERENCES

- .1 Work under this section must be undertaken in strict conformance with all listed references, in the case of any conflict or discrepancy the more stringent requirements will apply.
 - .1 Canada Labour Code Part II, 2008
 - .2 NRC-CNRC National Building Code of Canada, 2010
 - .3 BC Workers Compensation Act, 2015

1.3 SUBMITTALS

- .1 No submittals required in this section.

Part 2 Products

2.1 MATERIALS

- .1 For each site the CCG Representative will supply eight (8) structural grade A325 double hex nut hardware, hot dip galvanized, to attach the tower base to the pre-fabricated platform.

Part 3 Execution

3.1 ERECTION

- .1 Bolting the tower to the studs
 - .1 Each stud must have two heavy hex nuts, galvanized.
 - .2 Contractor must tighten the first nut using turn of nut method associated to the size of stud provided. The second nuts must be snug tight to lock into place the two nuts.



Part 1 General

1.1 SCOPE OF WORK

- .1 Work of this section includes the supply of all labour, material, and equipment, necessary to complete the following activities:
 - .1 Installation of a three pile dolphin, as per the attached drawings;

1.2 SUBMITTALS

- .1 Contractor must provide a Pile Driving Plan
 - .1 Deadline:
 - .1 Furnish with Construction Plan (Section 011100)
 - .2 Deliverables:
 - .1 Description list and details of equipment for use in installation of piles. Impact hammers: submit manufacturer's written data as specified. Non-impact methods; submit characteristics to evaluate performance.
 - .2 Description of the methods that will be implemented to stabilize the pile equipment to ensure the proper vertical batter of piles.
 - .3 Describe how the works will be undertaken to mitigate impacts on the surrounding watercourse.

1.3 Quality Assurance

- .1 Coast Guards minimum inspection requirements are detailed below. The contractor must notify Coast Guard of the date and time that the works may be inspected, Notice must be provided no less than seven (7) working days in advance to permit scheduling. All deficiencies in the works identified at the time of inspection must be remedied to the satisfaction of Coast Guard, by the Contractor at their expense. Work must not progress until inspections have been completed and the Contractor has been provided instruction to proceed with the works.
- .2 Coast Guard to confirm the correct pile driving position.
- .3 Coast Guard to witness all pile driving operations.

Part 2 Products

2.1 MATERIALS

- .1 Material requirements, piles as indicated on drawings in the Appendix must meet or exceed:
 - .1 ASTM/ASME A252/SA252 STEEL PILING PIPE GRADE 3
 - .2 CAN/CSA G40.21M Grade 300W
- .2 Supply or fabricate full length piles as indicated and provide equipment to handle full length piles without splicing on site.



- .3 Splice piles only with written approval of Coast Guard.
 - .1 When permitted, provide details for Coast Guard to review.

Part 3 Execution

3.1 PREPARATION

- .1 Protection:
 - .1 Protect adjacent structures, services and work of other sections from hazards due to pile driving operations.
 - .2 Arrange sequencing of pile driving operations and methods to avoid damages to adjacent existing structures.
- .2 Ensure that ground conditions at pile locations are adequate to support pile driving operations.

3.2 INSTALLATION

- .1 Installation of each pile will be subject to Coast Guard approval.
 - .1 Coast Guard will be sole judge of acceptability of each pile with respect to final driving resistance, depth of penetration or other criteria used to determine load capacity.
 - .2 Coast Guard to approve final driving of all piles prior to removal of pile driving rig from site.
- .2 Drive each pile to a final depth of penetration and/or load resistance as indicated in the geotechnical report.

3.3 DRIVING TOLERANCES

- .1 Pile heads to be within 75 mm of locations as indicated.
- .2 Piles not to be more than 2% of length out of vertical alignment.

3.4 FIELD QUALITY CONTROL

- .1 Measurement:
 - .1 Maintain accurate records of driving for each pile, including:
 - .1 Type and make of hammer, stroke or related energy.
 - .2 Other driving equipment including water jet, driving cap, cushion.
 - .3 Pile size and length, location of pile in pile group, location or designation of pile group.
 - .4 Sequence of driving piles in group.
 - .5 Number of blows per metre for entire length of pile.
 - .6 Final tip and cut-off elevations.
 - .7 Other pertinent information such as interruption of continuous driving, pile damage.



-
- .8 Record elevation taken on adjacent piles before and after driving of each pile.
 - .2 Provide Coast Guard with one copy of record



Canadian Coast Guard
AFI26 Barkley Sound and Alberni Inlet Aids to
Navigation Project

PILING SERVICES

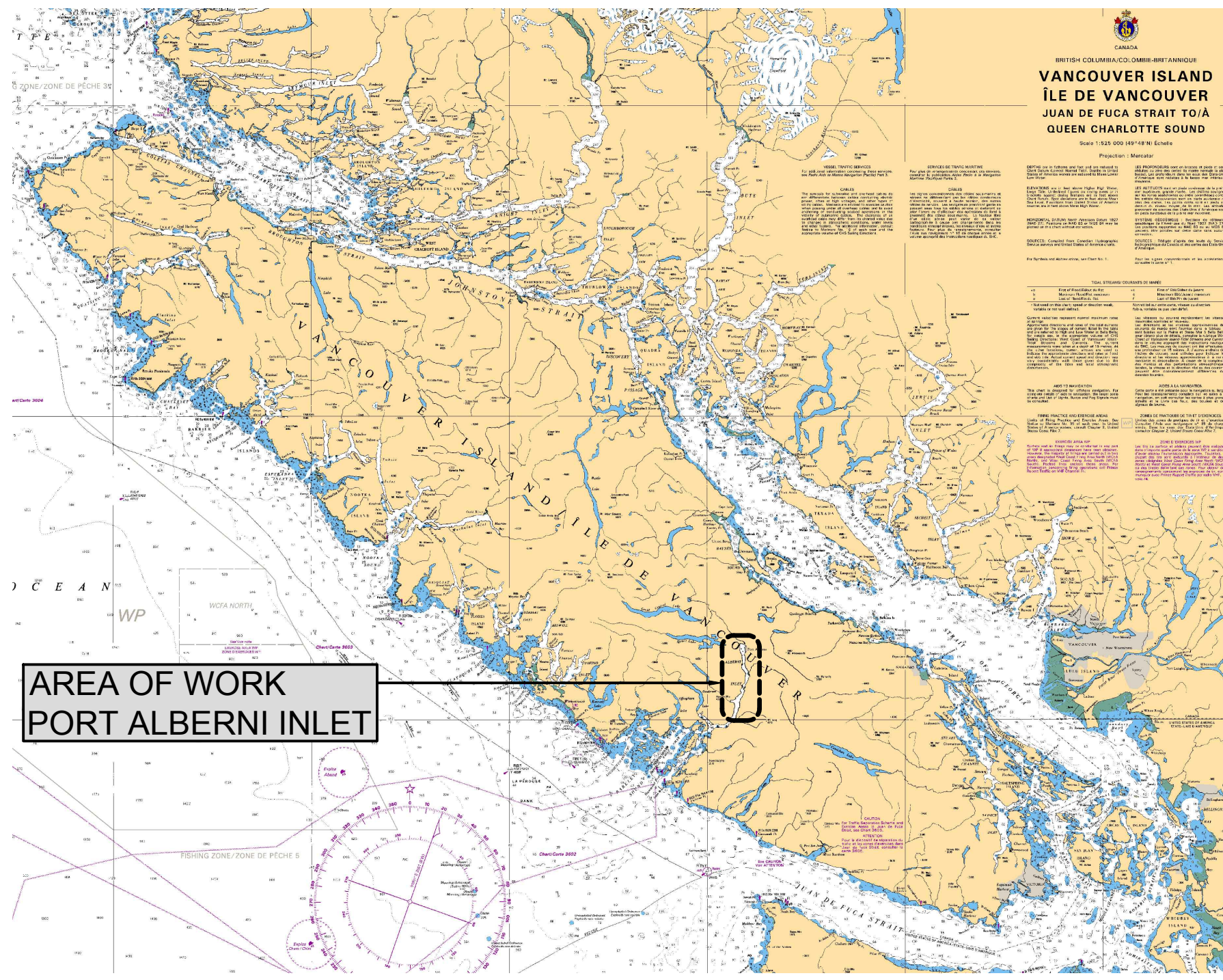


Canadian Coast Guard
AFI26 Barkley Sound and Alberni Inlet Aids to
Navigation Project

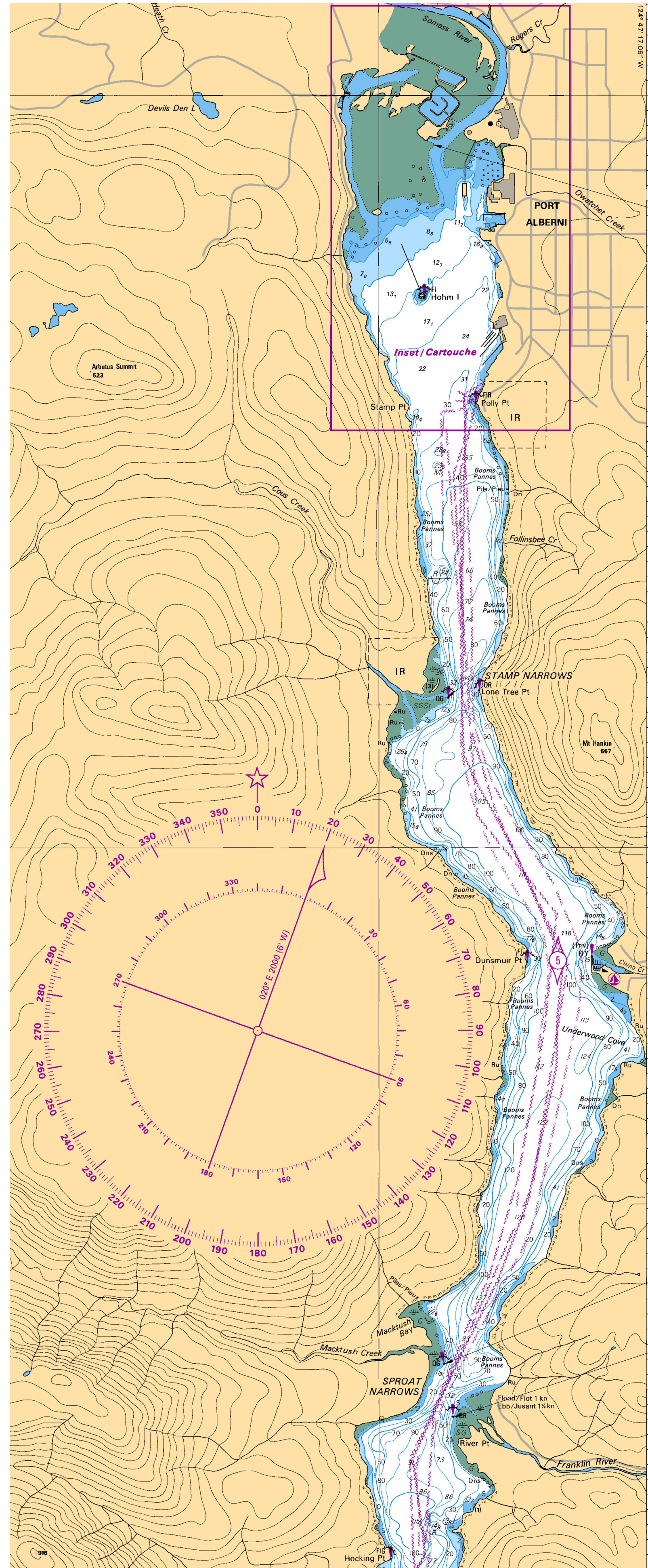
PILING SERVICES

APPENDIX B – DRAWINGS

0 1 2 4 5 6
inches / pouces



CHARTLET 3001 - VANCOUVER ISLAND



LL 168.1 SOMMAS RIVER

LL 163.0 STAMP NARROWS

LL 161.0 MACTUSH CREEK

LL 160.0 FRANKLIN RIVER

A	ISSUE FOR REVIEW	CH	2017-08-03
rev	description	by	date

Asset - Actif
**BARKLEY SOUND, BAMFIELD & PORT ALBERNI
MODIFIED AIDS TO NAVIGATION**

Drawing - Dessin
**PILE SITE CONSTRUCTION MAP
FOR FY 2017-2018**

drawn - dessiné	date
TDK	2017-05-19
designed - conception	date
TDK	2017-05-19
checked - vérifié	date
CH	2017-05-19
approved - approuvé	date
CH	2017-05-19
CCG ref. no. - no. réf. GCC	scale - échelle
-	AS NOTED
drawing no. - no. dessin	sheet/feuille
01	01/01
	rev-rév
	A

D
C
B
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01

6

5

4

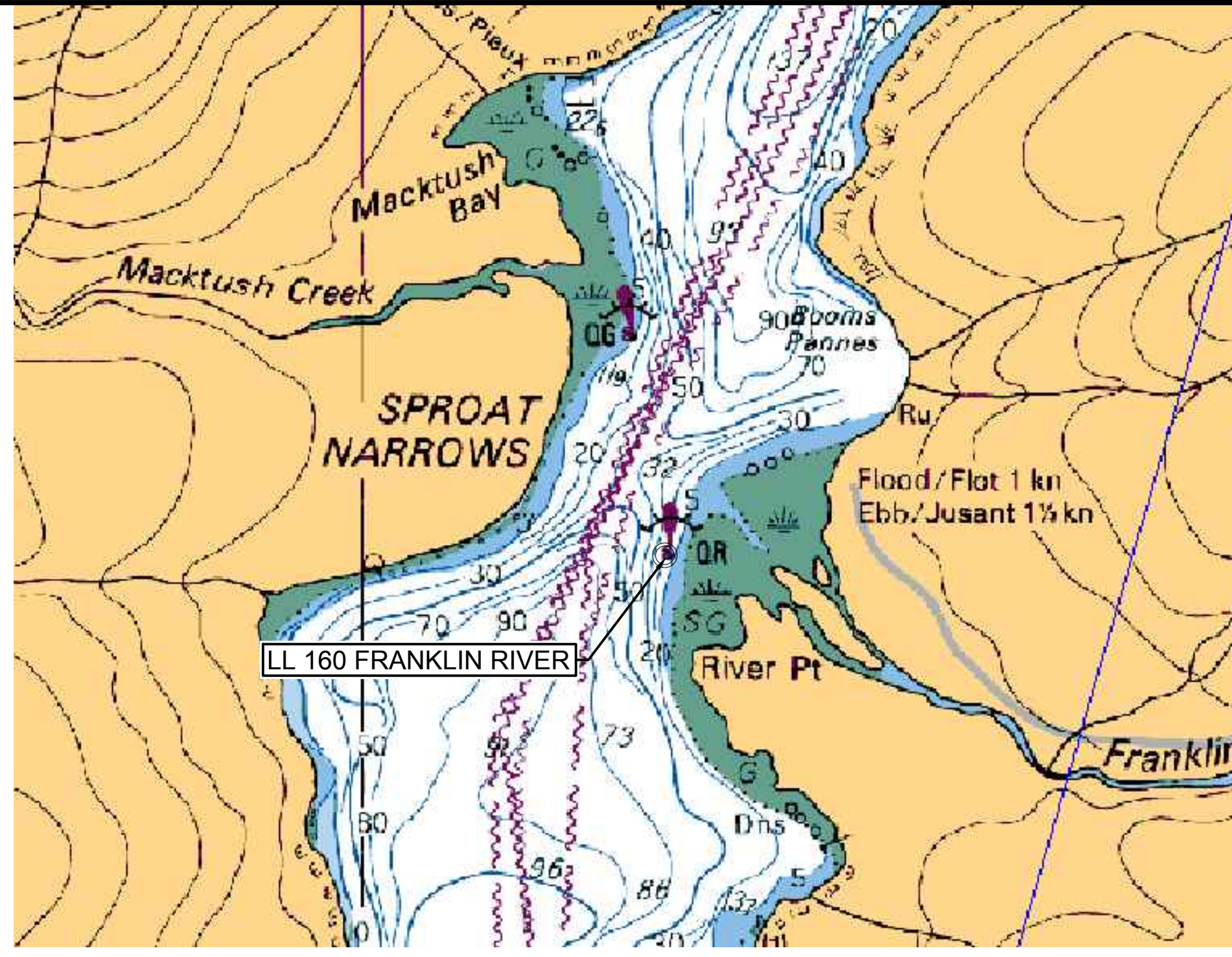
0 1 2 3 4 5 7 8 9 10 11 12 3
millimeters / millimètres

2

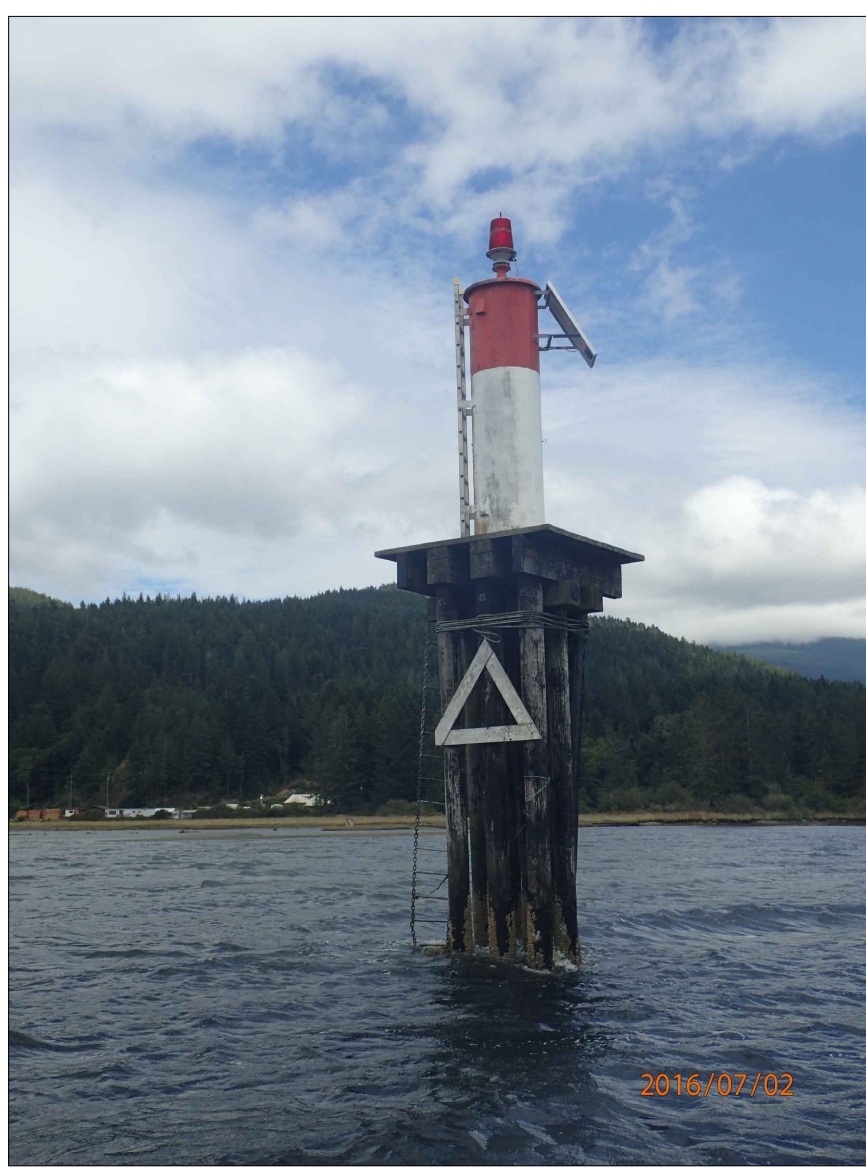
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- GENERAL NOTES**
1. THESE STRUCTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER APPLICABLE CONSTRUCTION DOCUMENTS. DEVIATION OF PROJECT CONSTRUCTION IS NOT ACCEPTABLE UNLESS INSTRUCTED BY THE ENGINEER.
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 3. DO NOT COMMENCE CONSTRUCTION USING THESE DRAWINGS UNLESS NOTED "FOR CONSTRUCTION".
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 8. IT IS THE DISCRETION OF THE ENGINEER TO CONDUCT THE PULL TESTS IF NECESSARY.

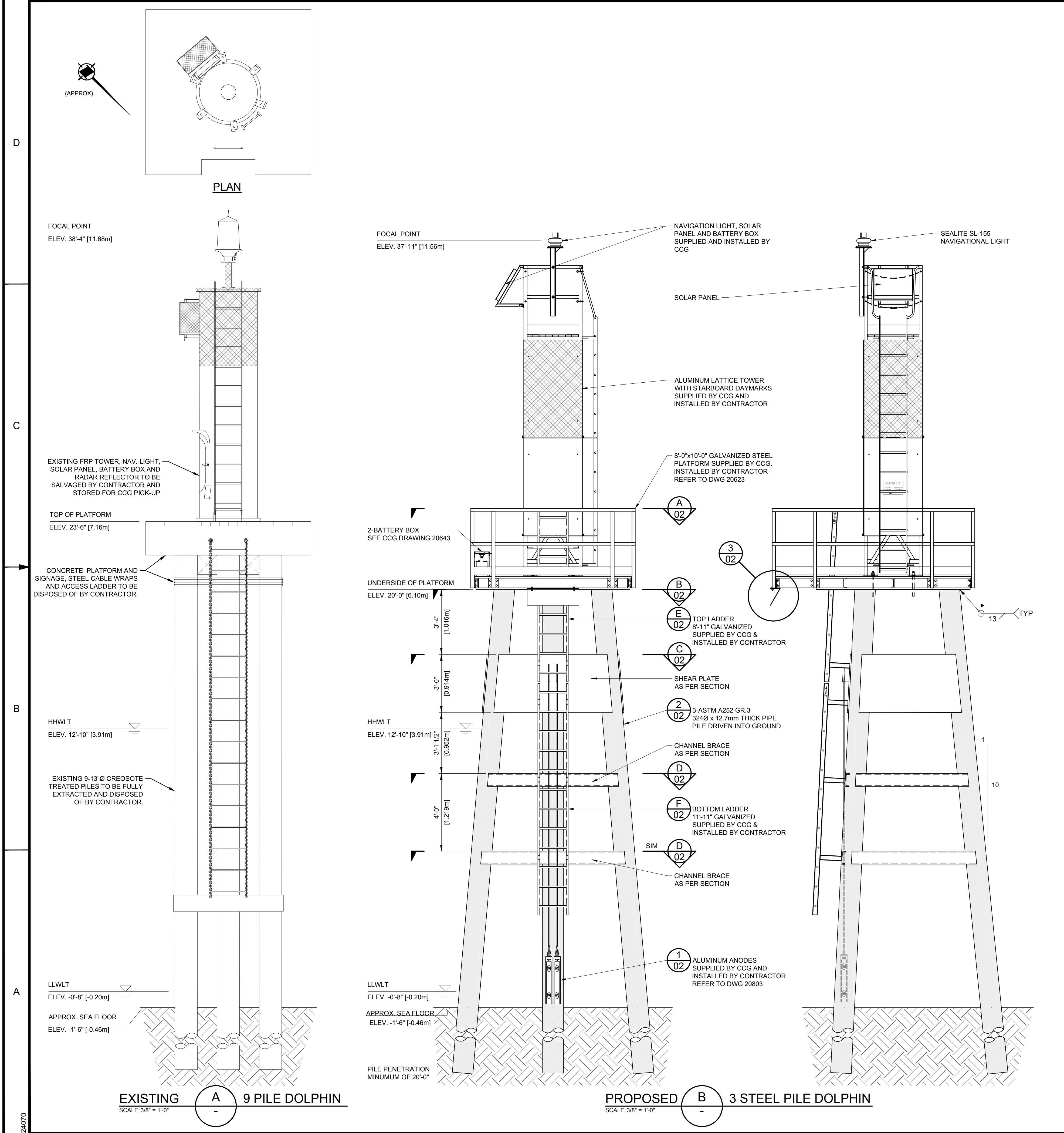
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TOLERANCE FROM SPECIFIED BATTER: 2% OF PILE LENGTH
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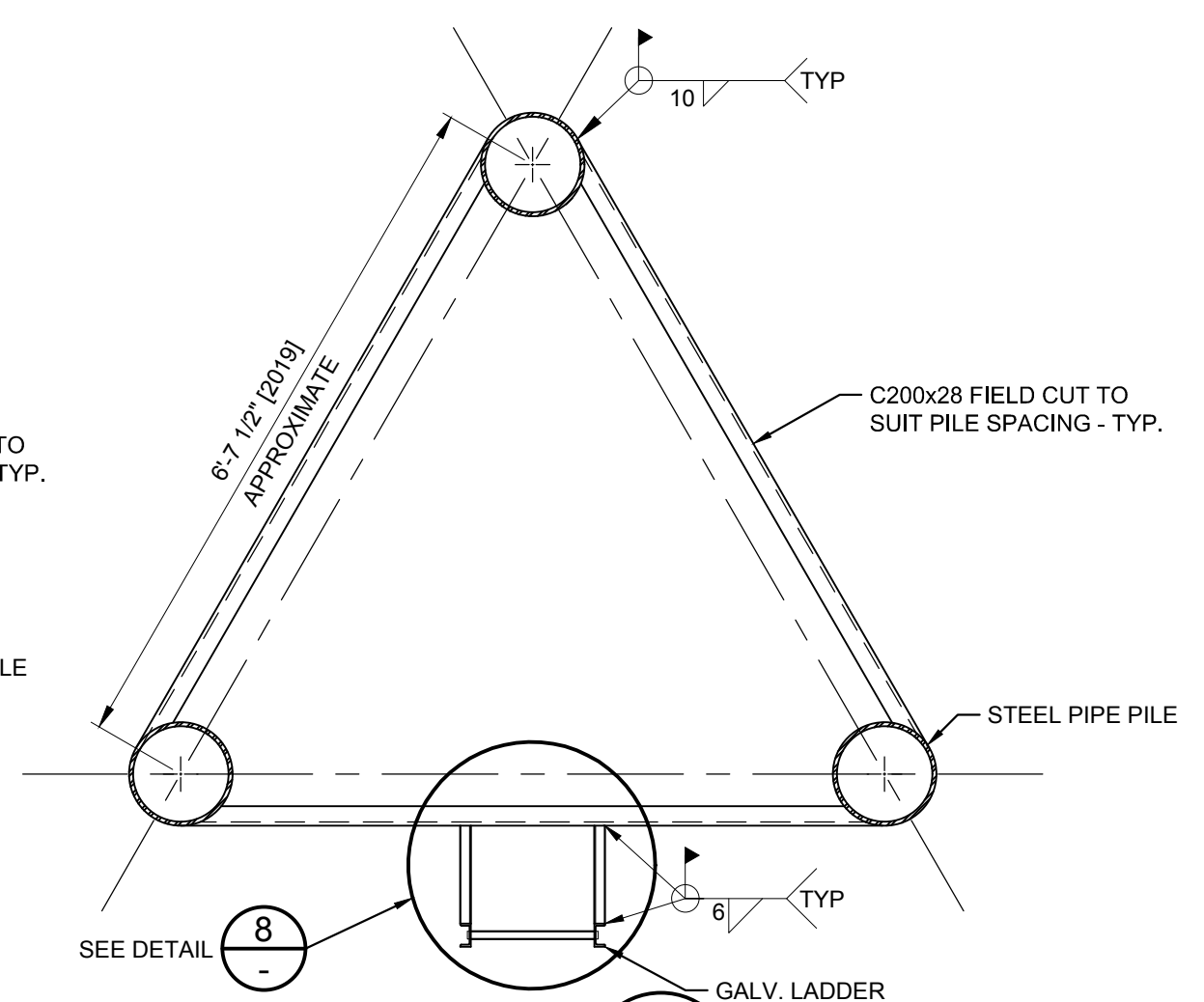
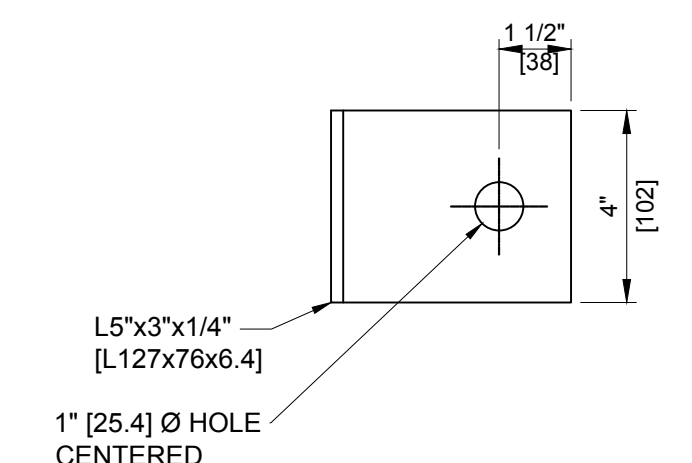
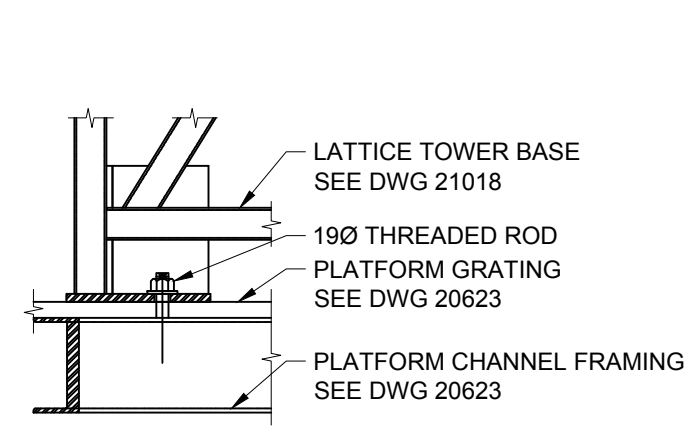
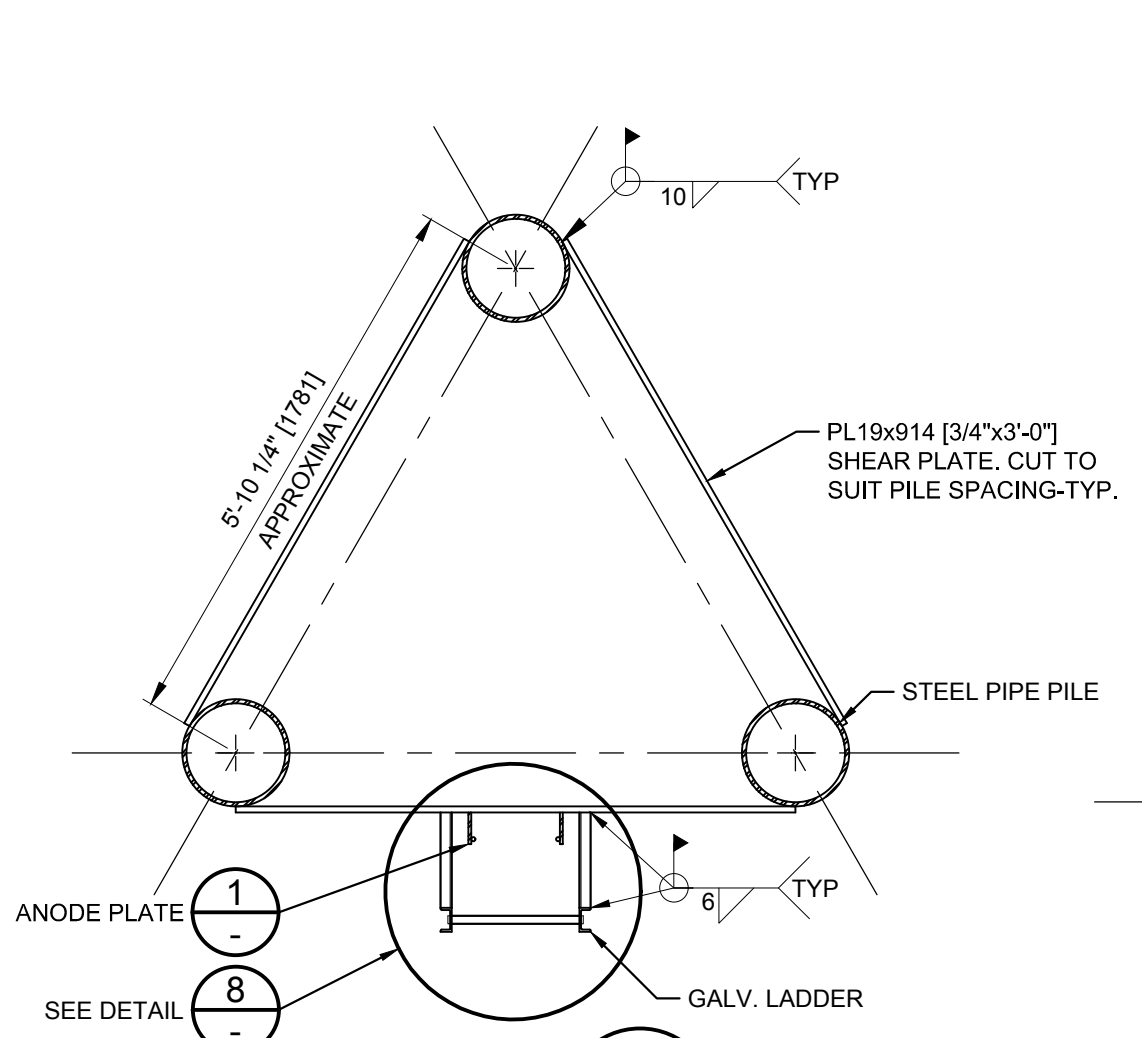
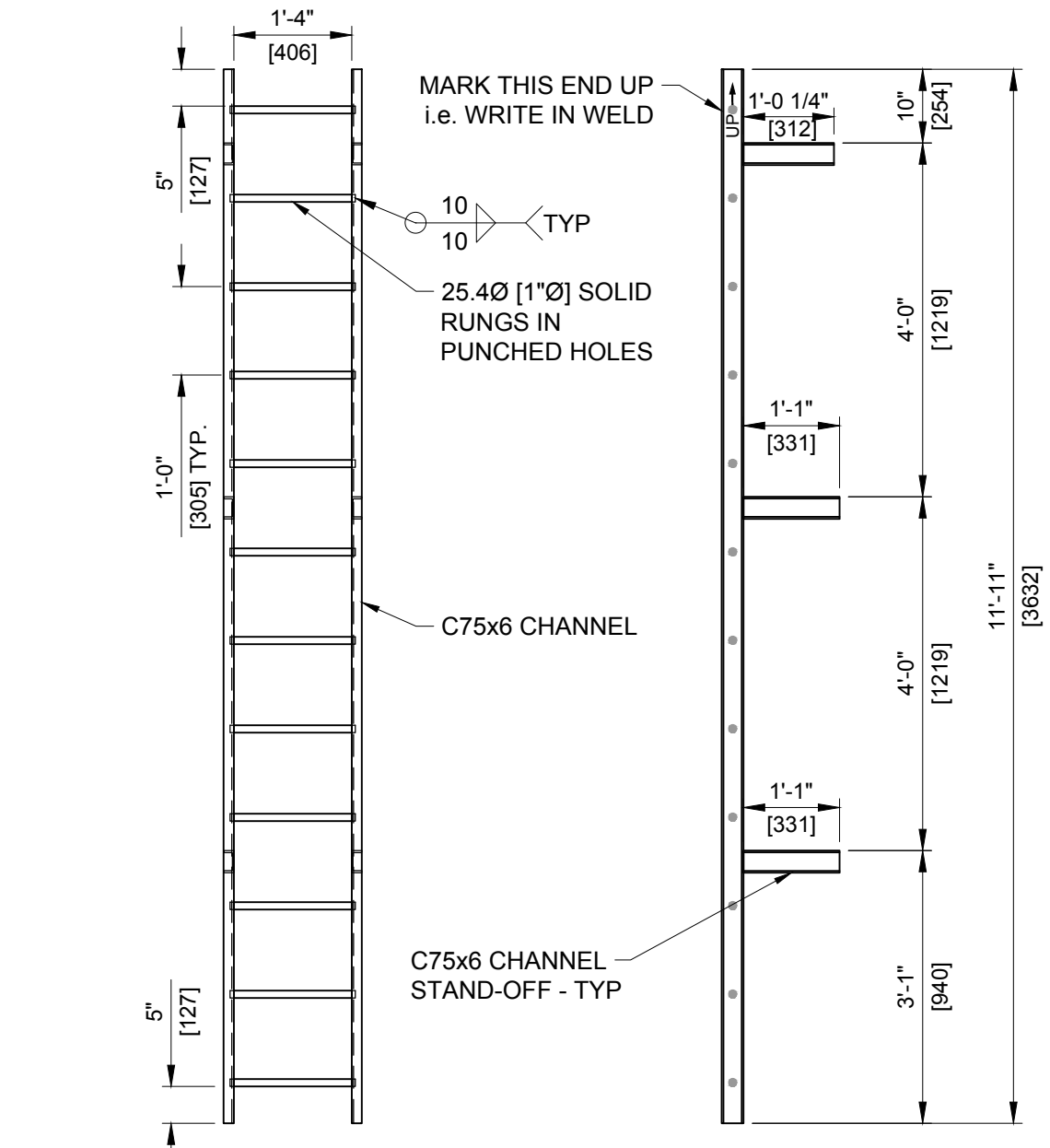
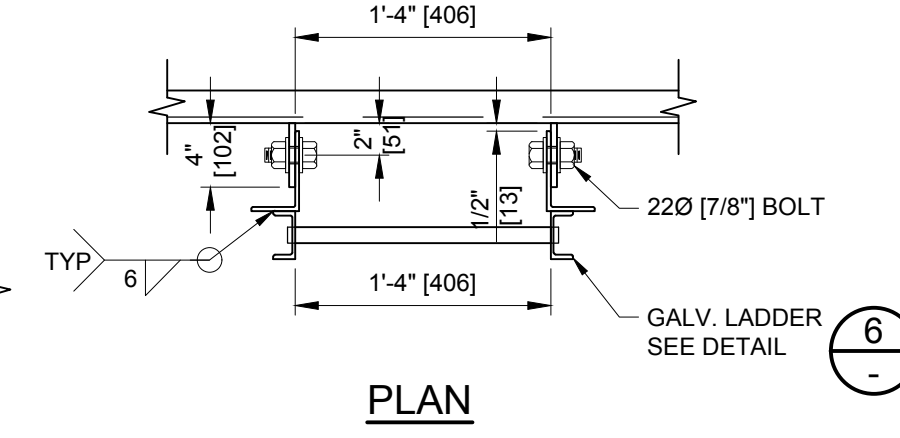
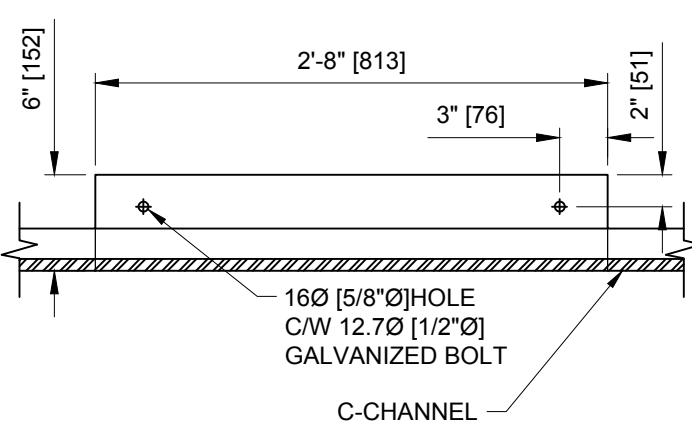
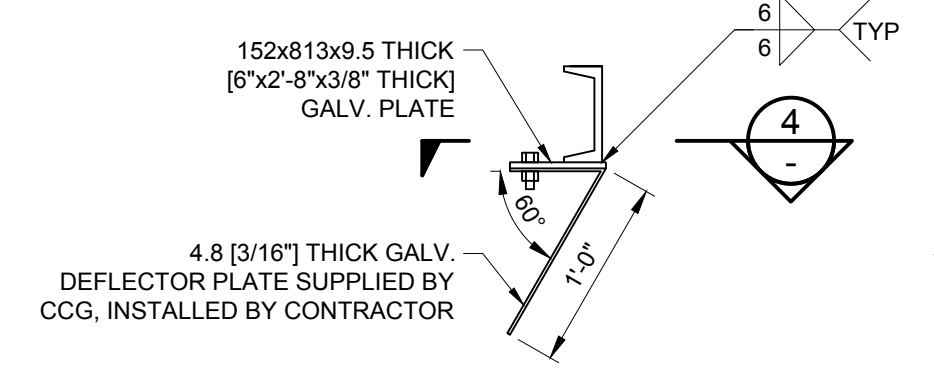
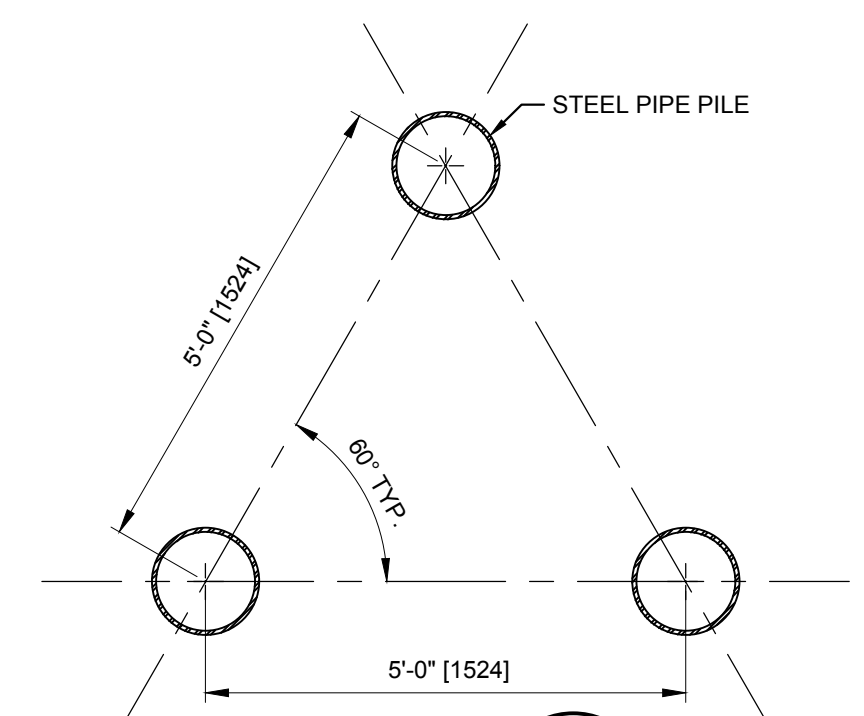
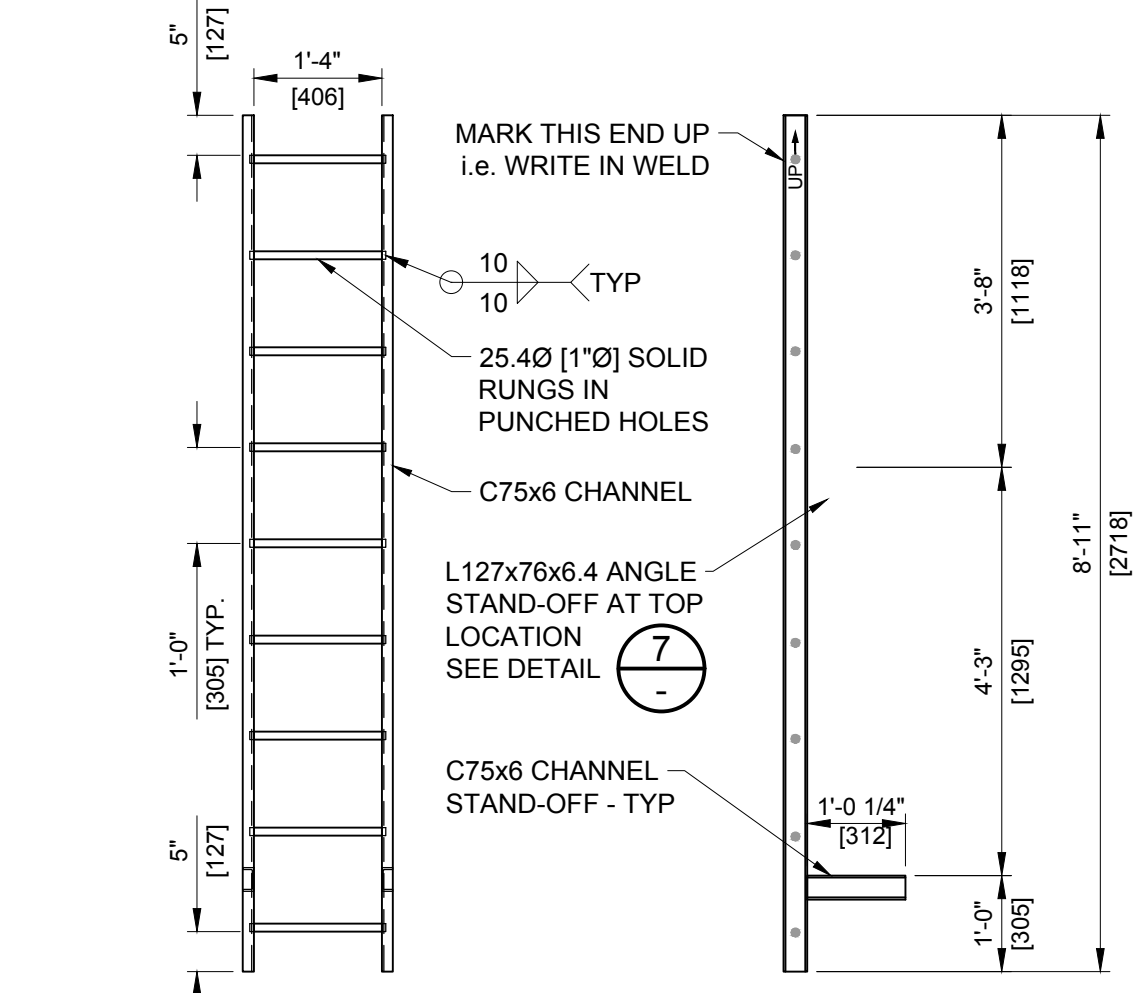
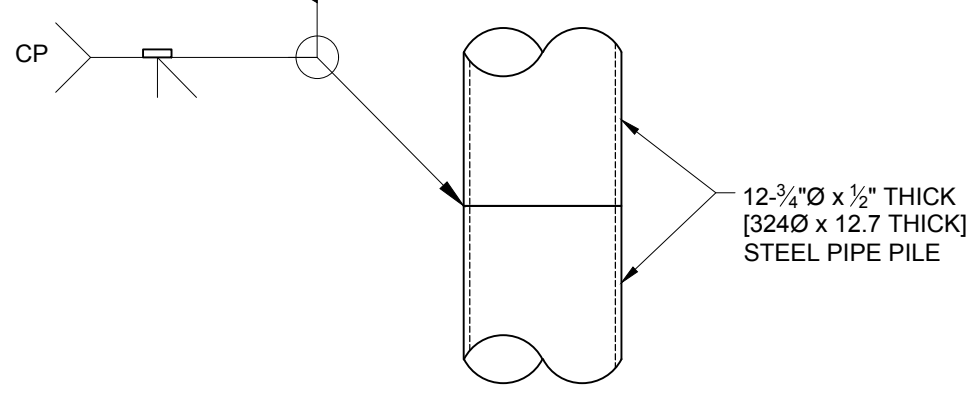
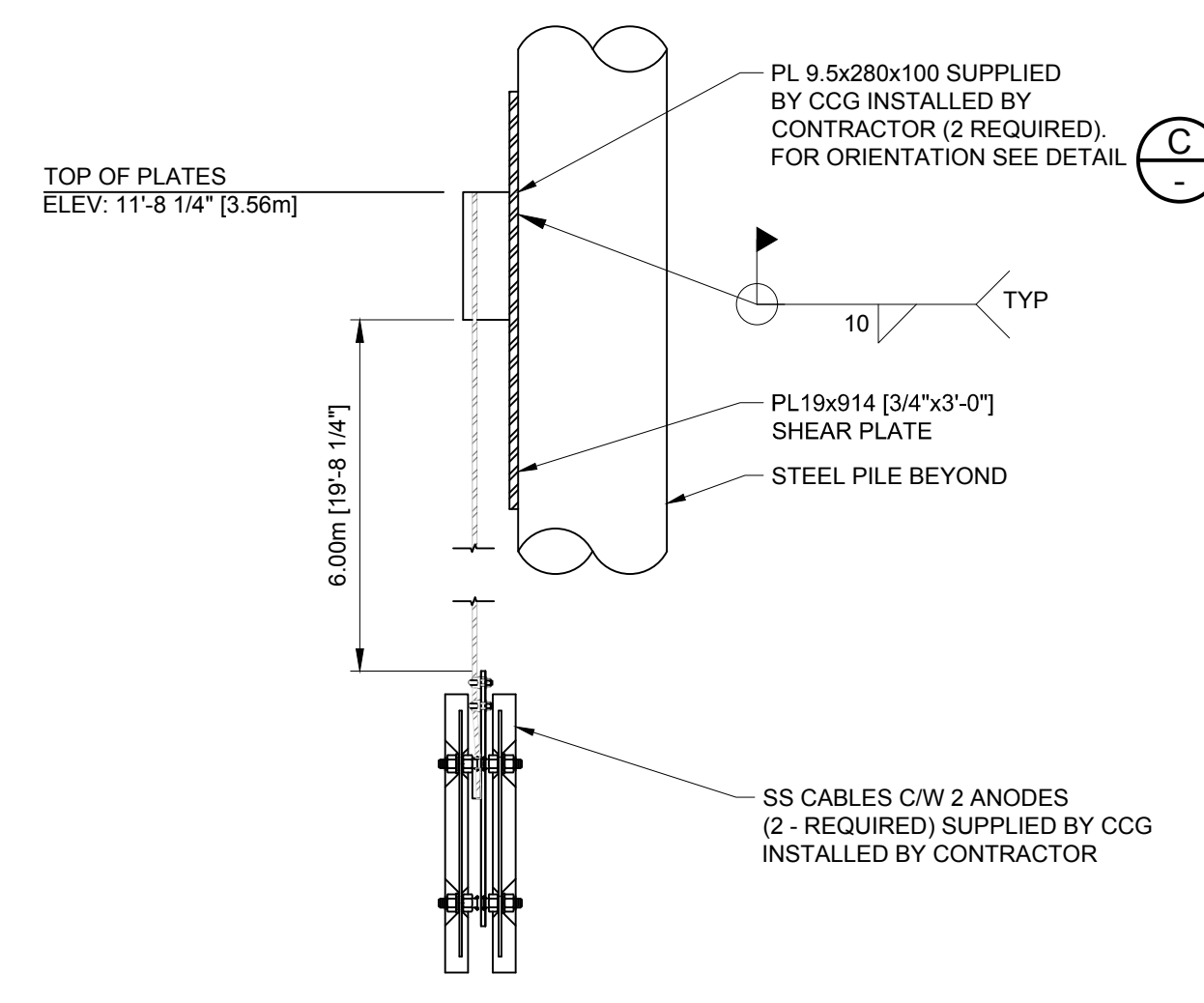
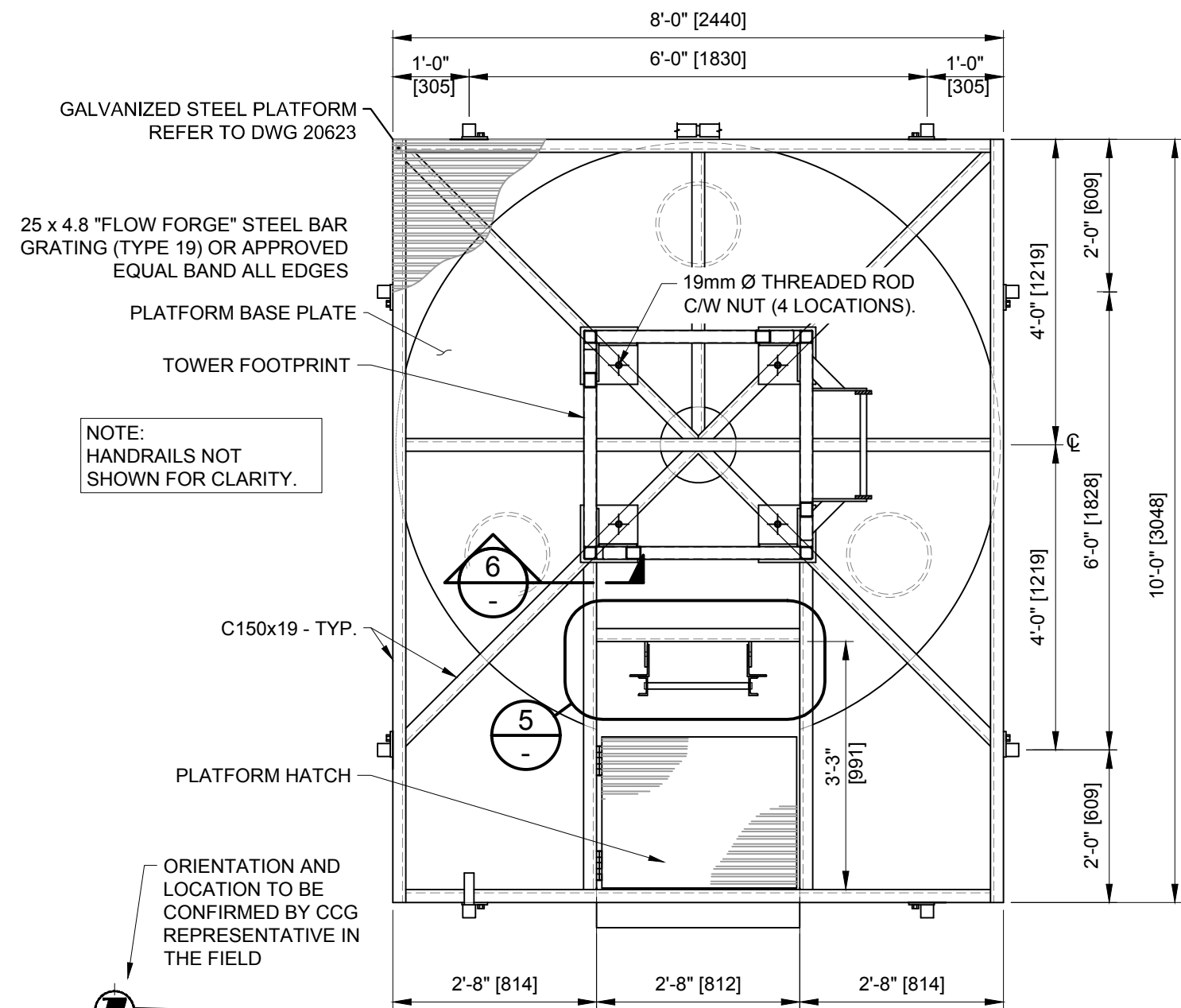
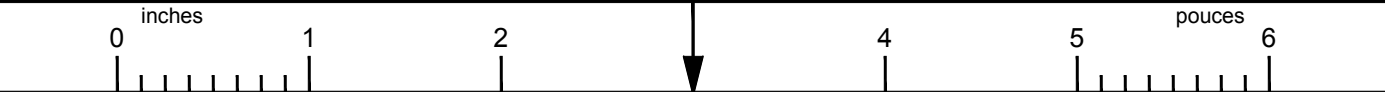
LOCATION CHARTLET (PART OF 3668) - NTS



LL 160 FRANKLIN RIVER - JULY 2016



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rev	description	by	date
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LL 160.0 FRANKLIN RIVER			
FIXED AID TO NAVIGATION			
Drawing - Dessin			
NAV-AID REBUILD			
3 STEEL PILE DOLPHIN			
drawn - dessiné		date	
TDK		2017-07-31	
designed - conception		date	
CH		2017-07-31	
checked - vérifié		date	
CH		2017-07-31	
approved - approuvé		date	
CH		2017-07-31	
CCG ref. no. - no. réf. GCC		scale - échelle	
		AS NOTED	
drawing no. - no. dessin		sheet-feuille	rev-rév
24070		01/02	A



rev	description	by	date
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1		par	

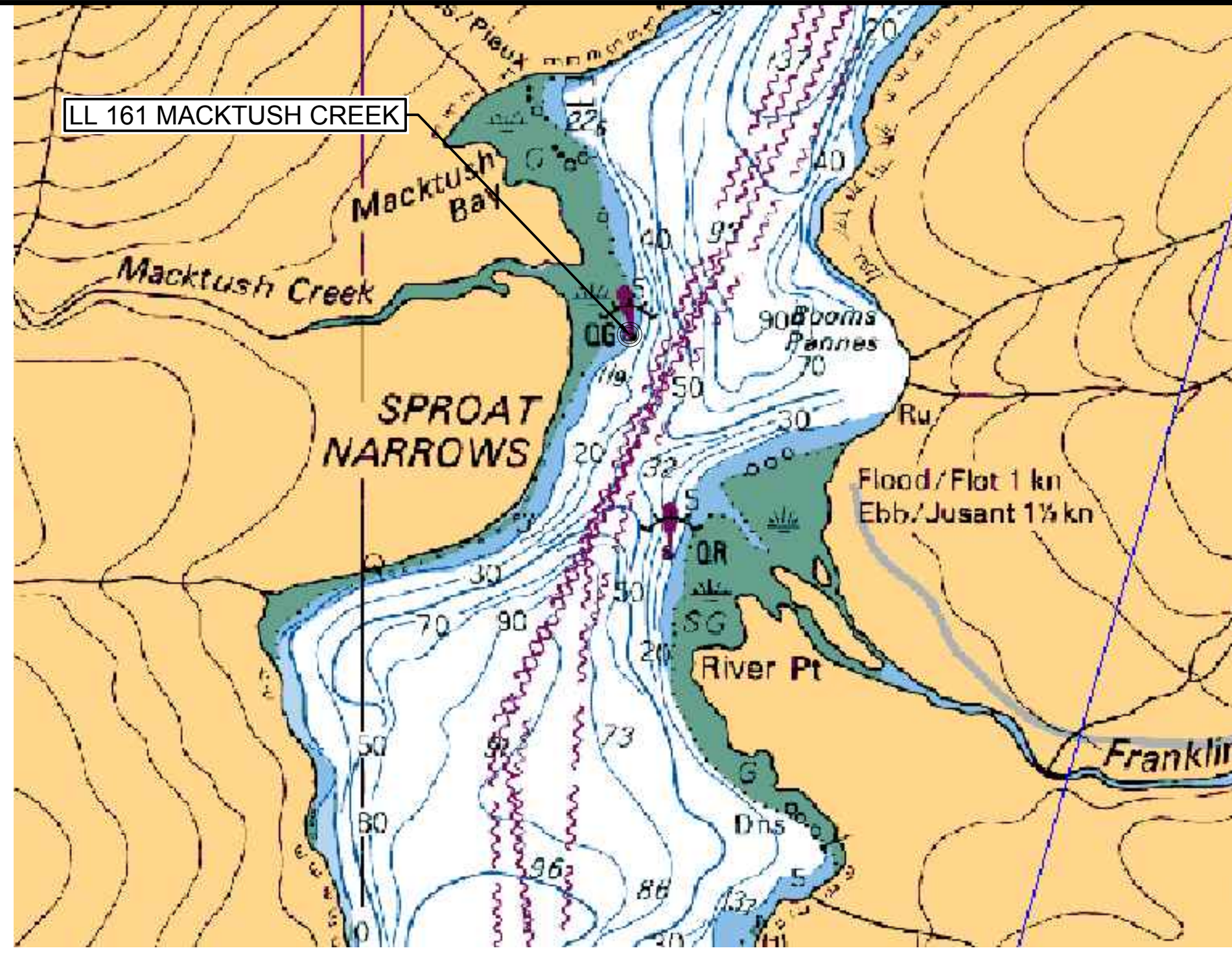
Asset - Actif

**LL 160.0 FRANKLIN RIVER
FIXED AID TO NAVIGATION**

Drawing - Dessin

**NAV-AID REBUILD
3 STEEL PILE DOLPHIN**

drawn - dessiné	date
TDK	2017-07-31
designed - conception	date
CH	2017-07-31
checked - vérifié	date
CH	2017-07-31
approved - approuvé	date
CH	2017-07-31
CCG ref. no. - no. réf. GCC	scale - échelle
-	AS NOTED
drawing no. - no. dessin	sheet/feuille
24070	02/02 A



LOCATION CHARTLET (PART OF 3668) - NTS

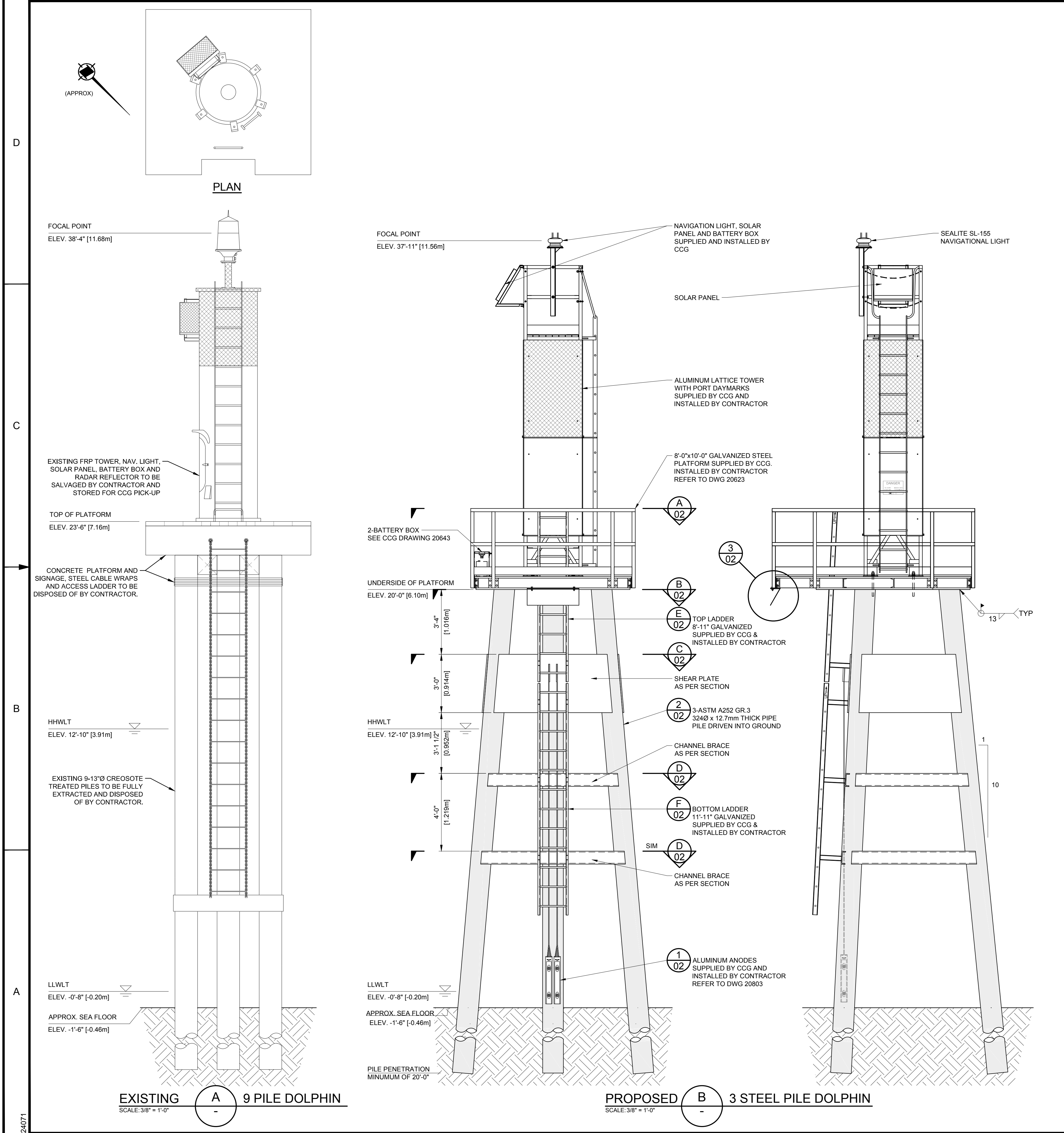
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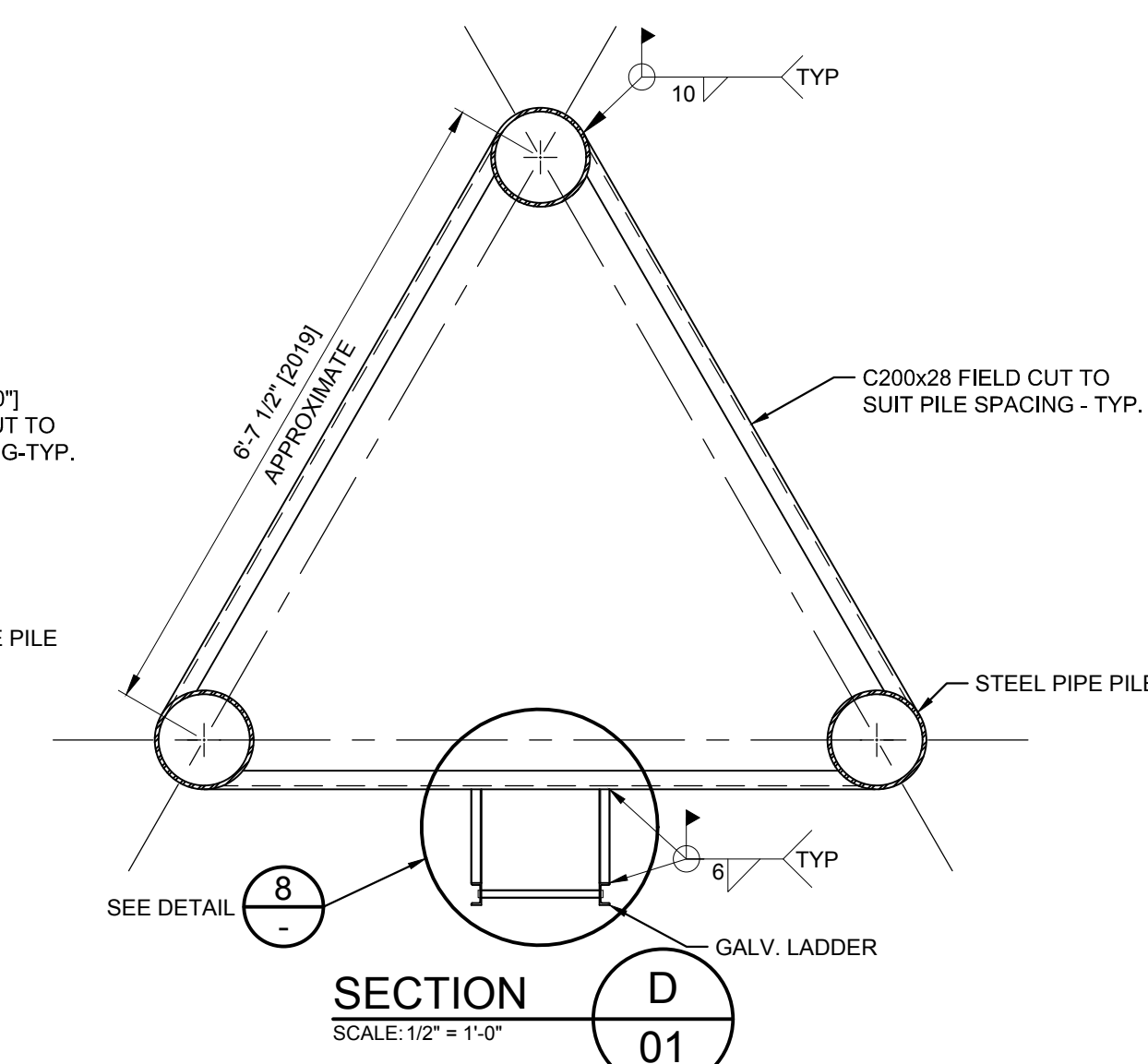
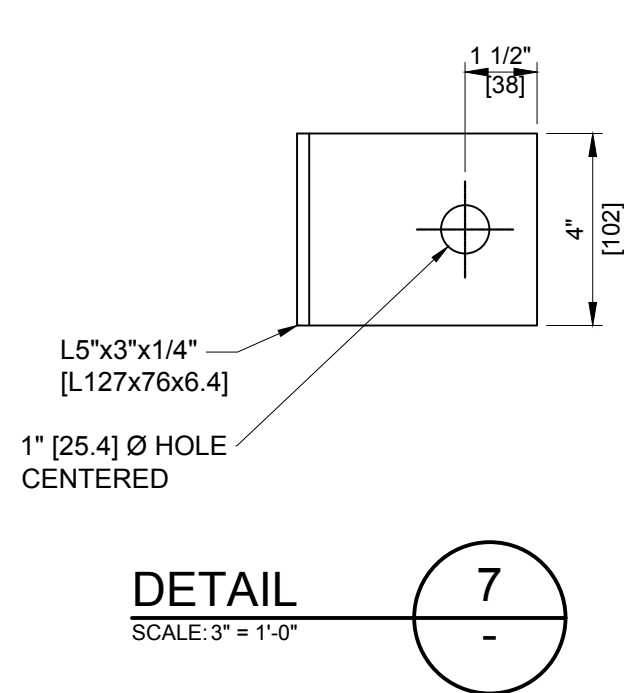
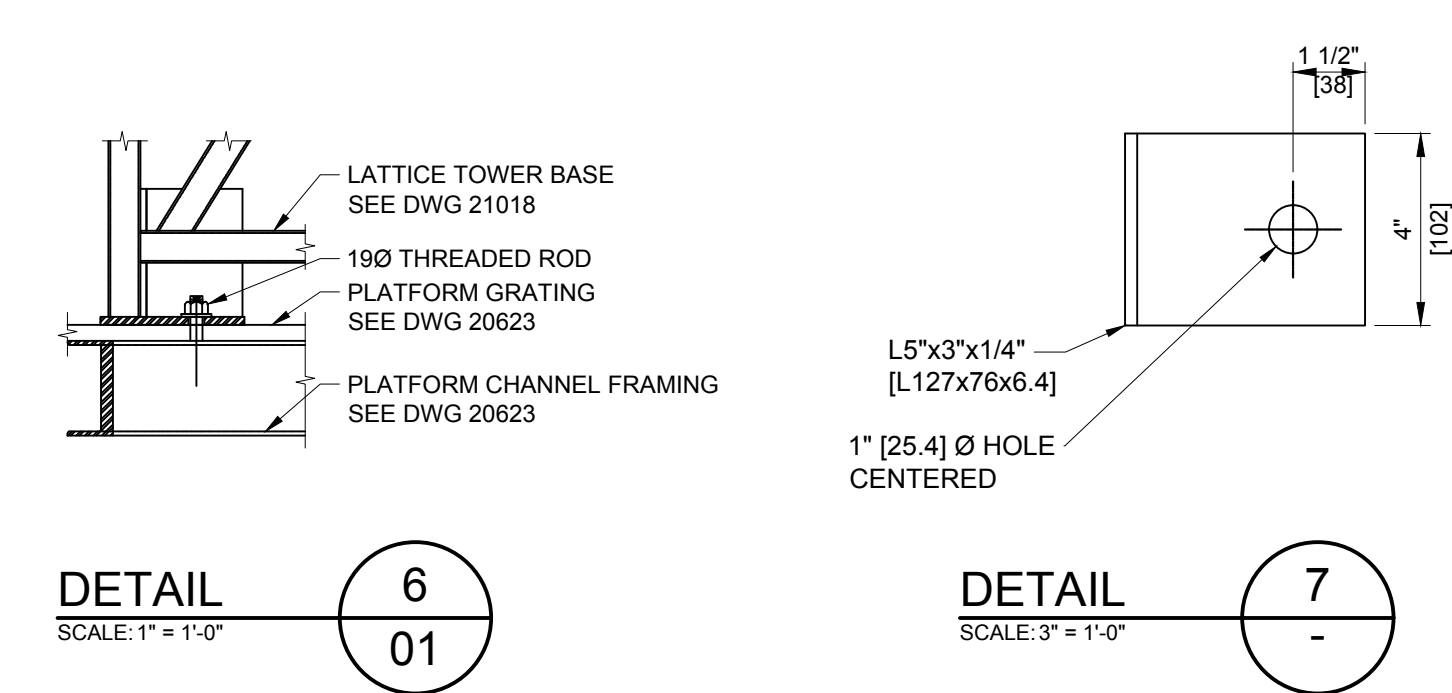
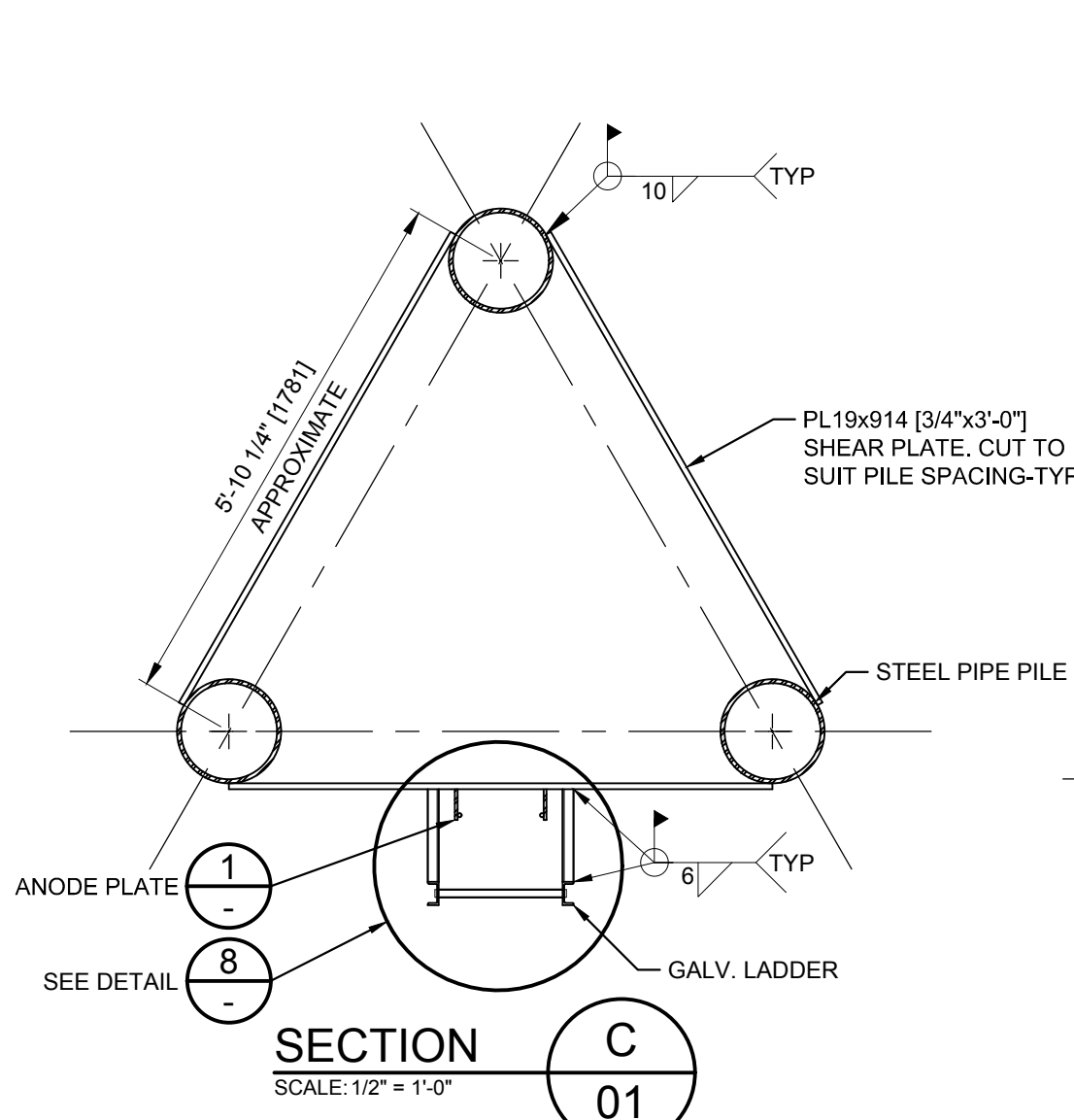
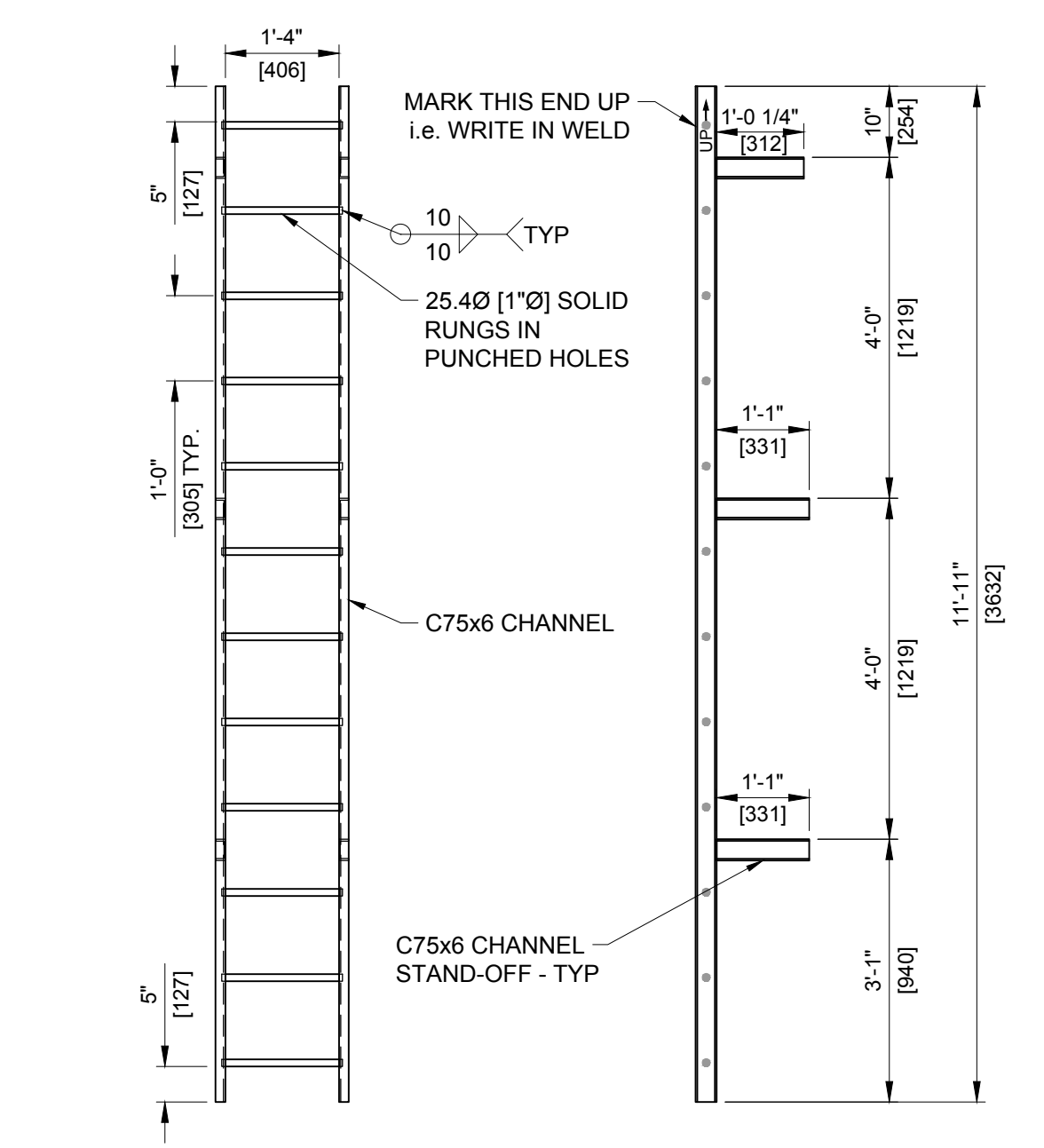
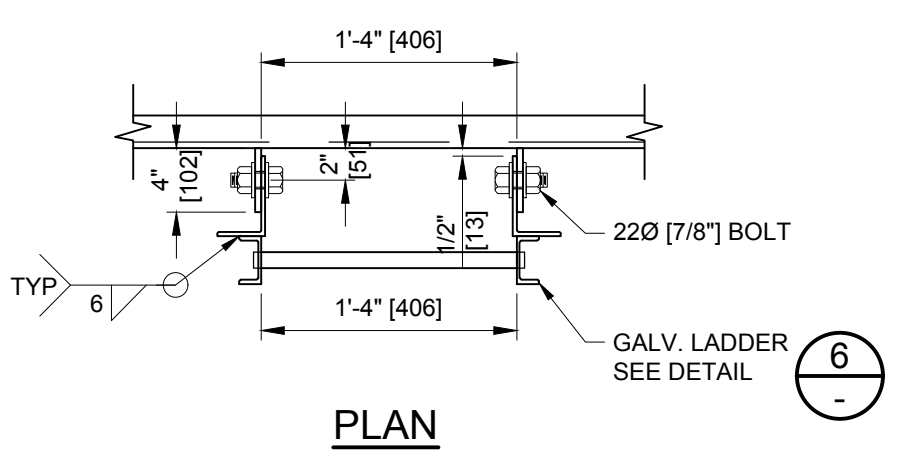
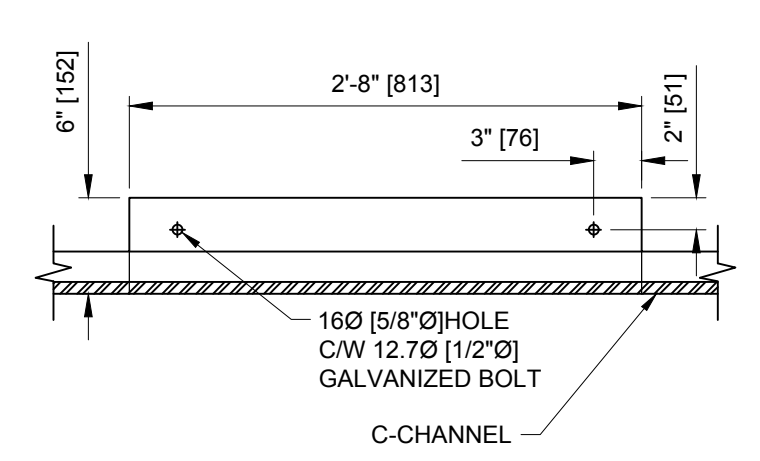
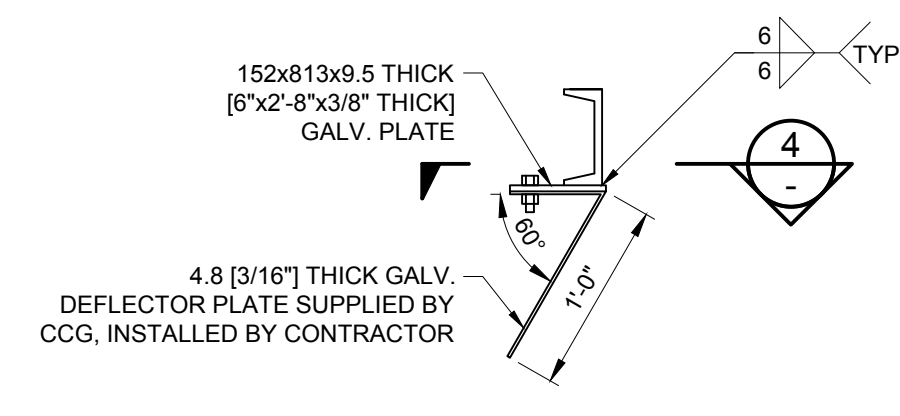
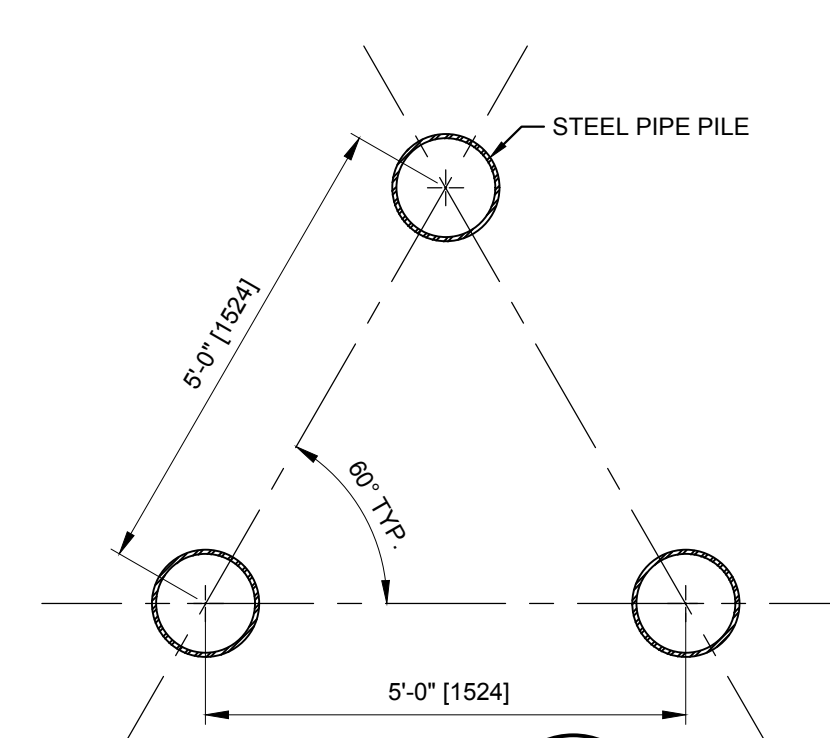
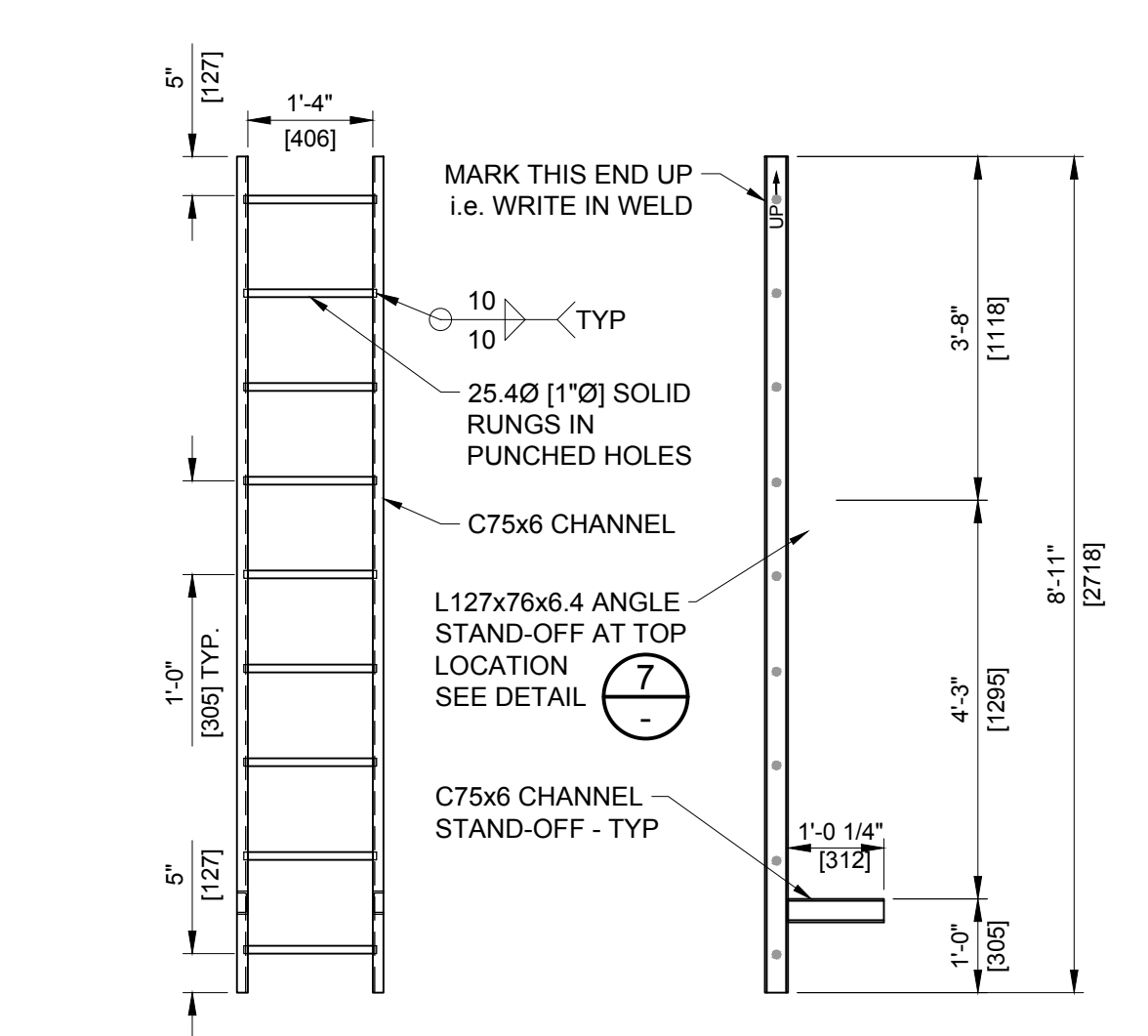
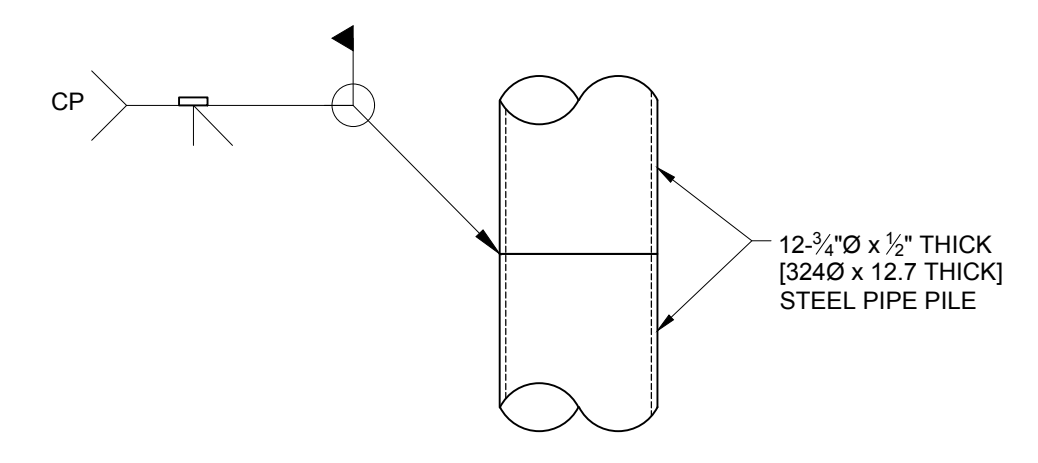
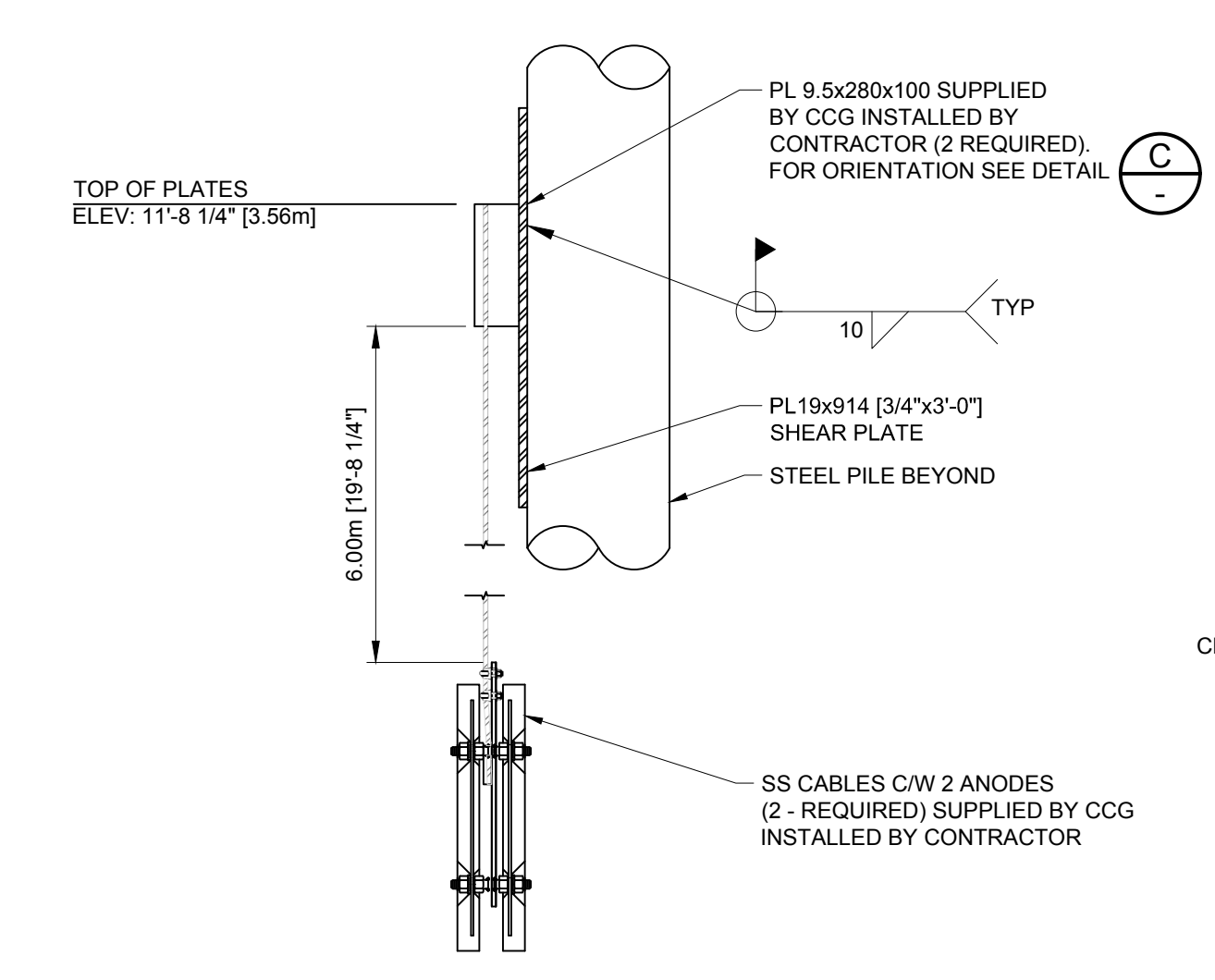
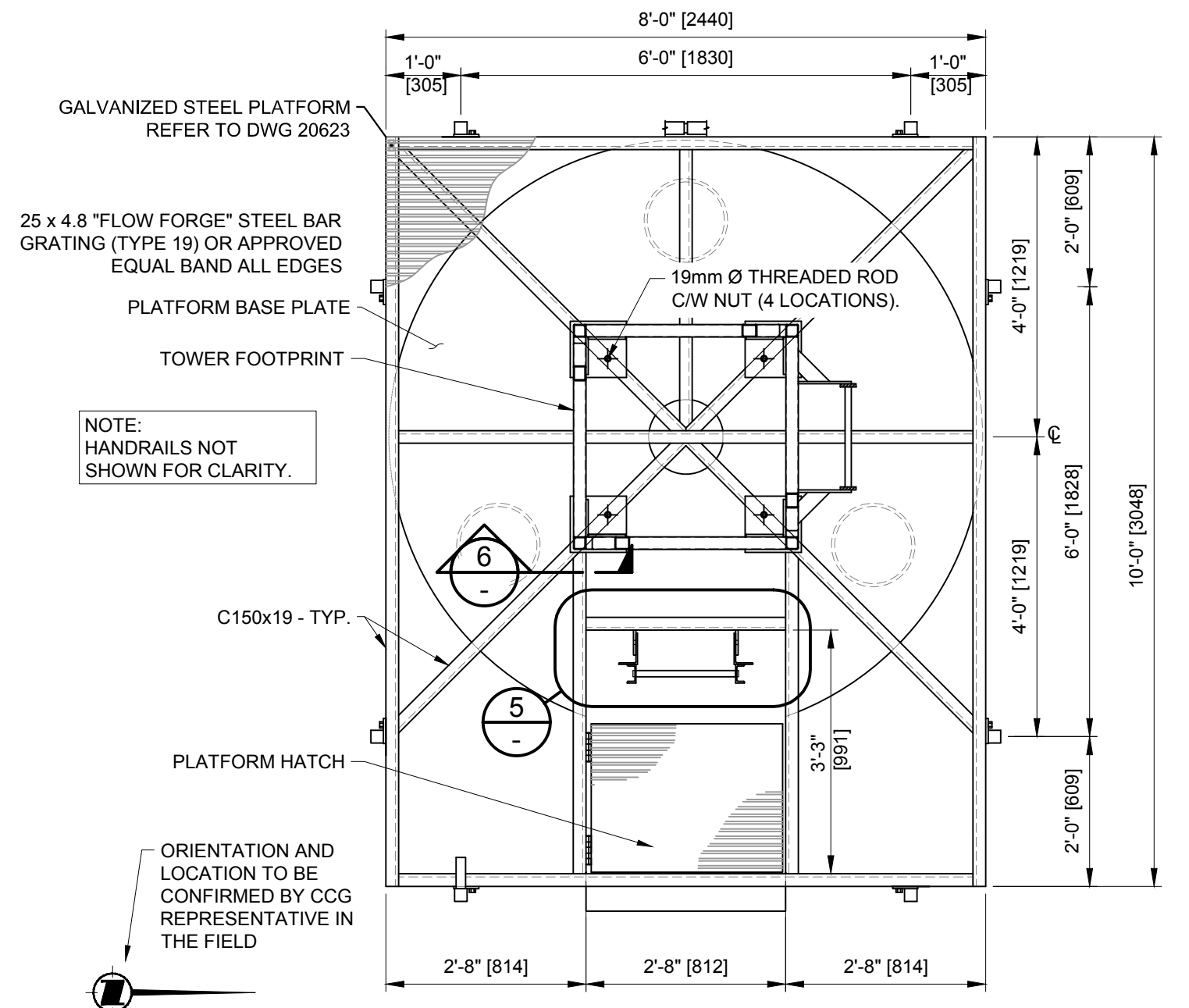
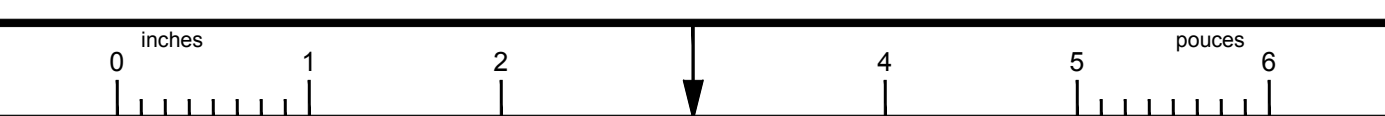
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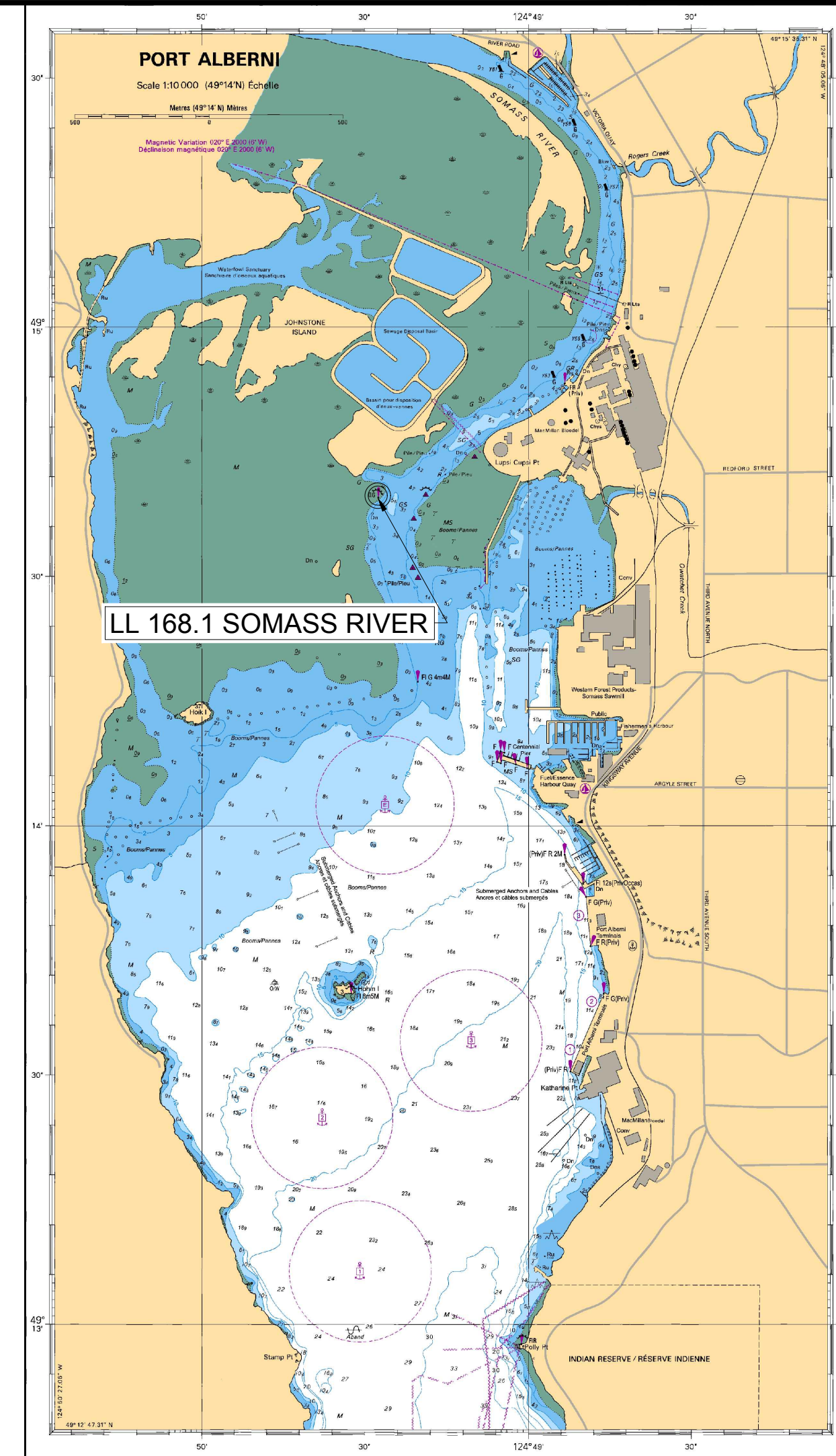
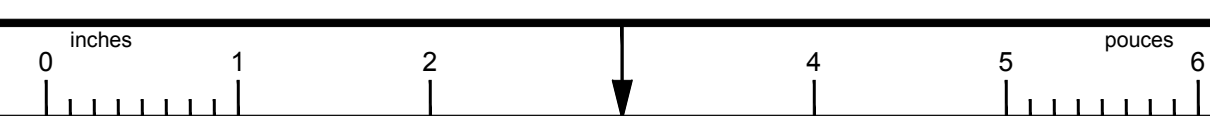
LL 161 MACKTUSH CREEK - JULY 2016

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rev	description	by	date
Asset - Actif			
LL 161.0 MACKTUSH CREEK			
FIXED AID TO NAVIGATION			
Drawing - Dessin			
NAV-AID REBUILD			
3 STEEL PILE DOLPHIN			
drawn - dessiné		date	
TDK		2017-07-31	
designed - conception		date	
CH		2017-07-31	
checked - vérifié		date	
CH		2017-07-31	
approved - approuvé		date	
CH		2017-07-31	
CCG ref. no. - no. réf. GCC		scale - échelle	
		AS NOTED	
drawing no. - no. dessin		sheet/feuille	rev-rév
24071		01/02	A





A	ISSUED FOR REVIEW	CH	2017-07-29
rev	description	by	date
Asset - Actif			
LL 161.0 MACKTUSH CREEK			
FIXED AID TO NAVIGATION			
Drawing - Dessin			
NAV-AID REBUILD			
3 STEEL PILE DOLPHIN			
drawn - dessiné			date
TDK			2017-07-31
designed - conception			date
CH			2017-07-31
checked - vérifié			date
CH			2017-07-31
approved - approuvé			date
CH			2017-07-31
CCG ref. no. - no. réf. GCC			scale - échelle
-			AS NOTED
drawing no. - no. dessin			sheet/feuille rev-rév
24071			02/02 A



LOCATION CHARTLET (PART OF 3668) - NTS



LL 168.1 SOMASS RIVER

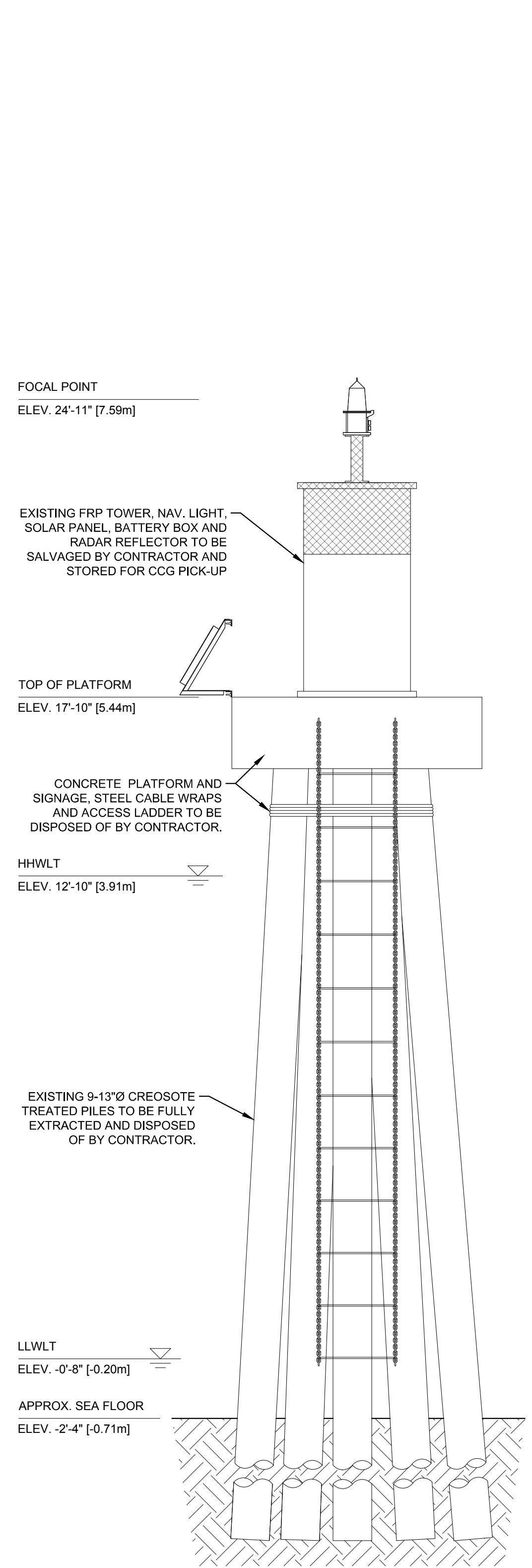
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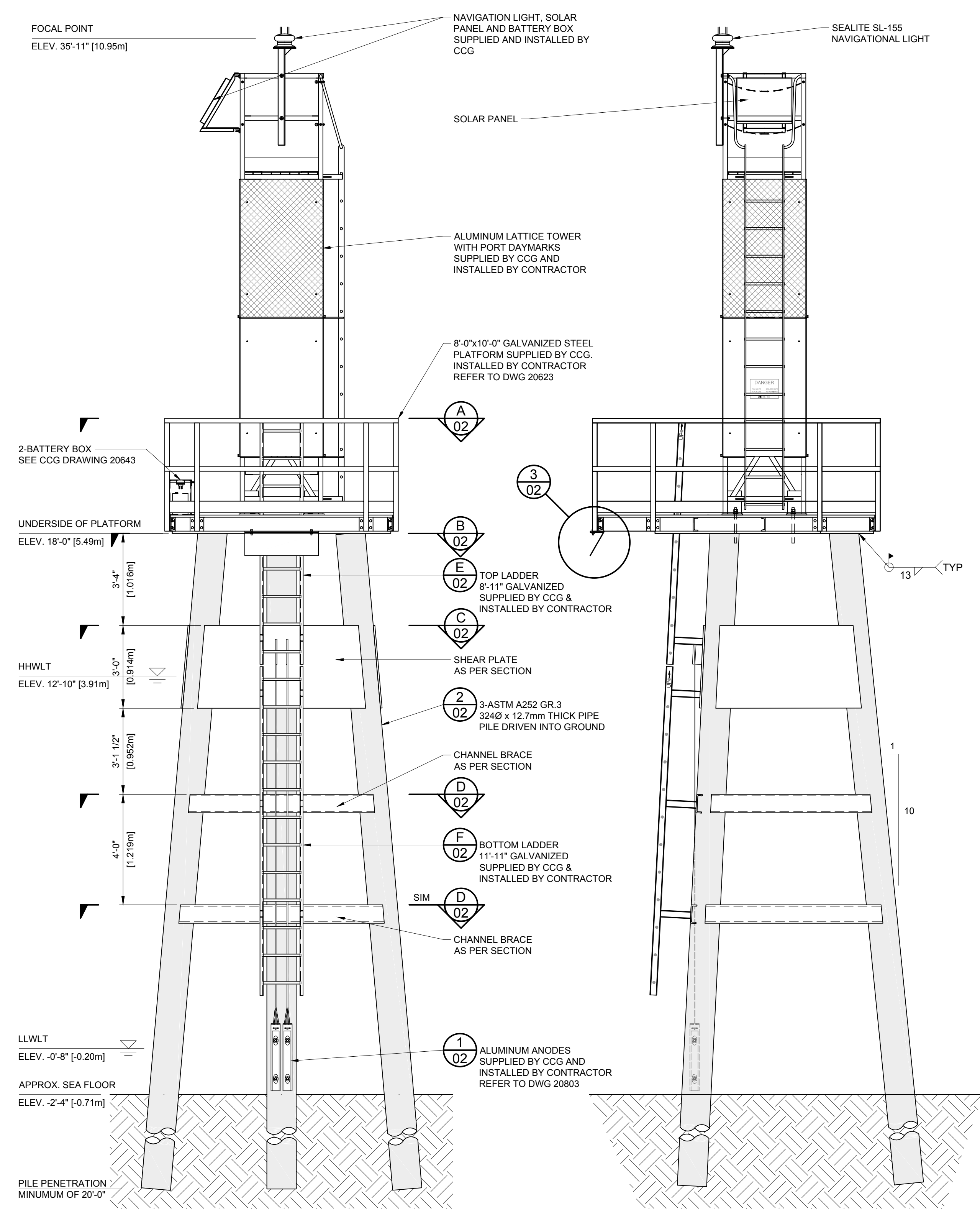
STEEL PIPE PILE NOTES

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D
C
B
A



EXISTING **A** 9 PILE DOLPHIN
 SCALE: 3/8" = 1'-0"



PROPOSED **B** 3 STEEL PILE DOLPHIN
 SCALE: 3/8" = 1'-0"



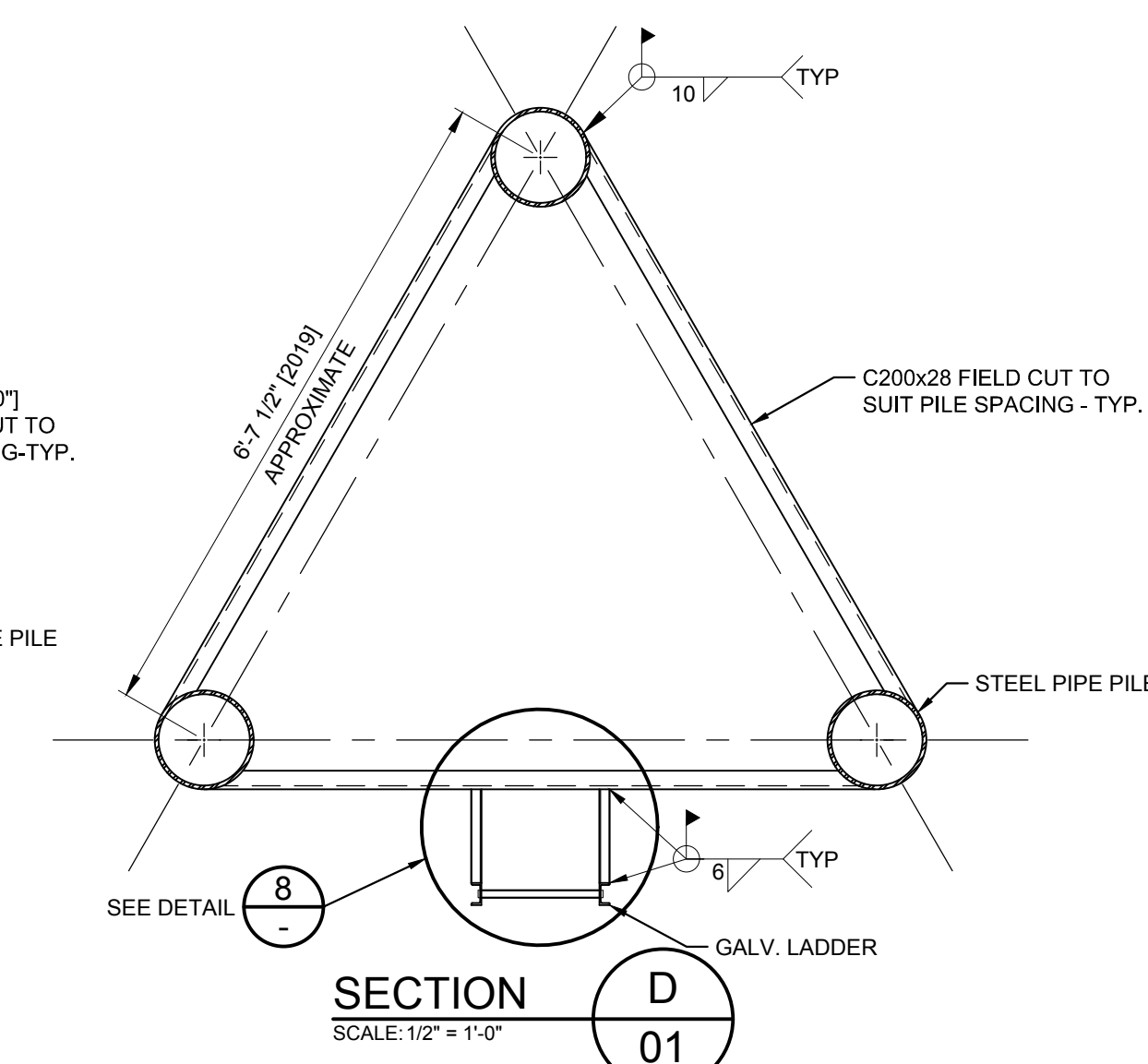
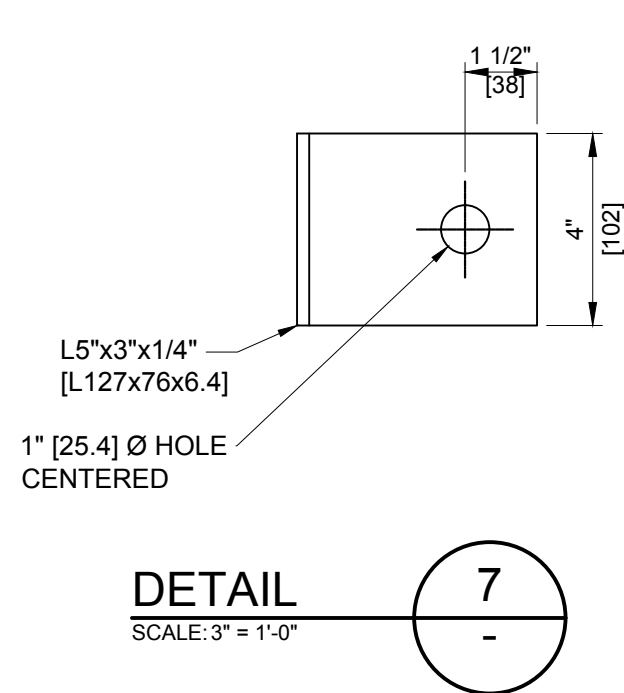
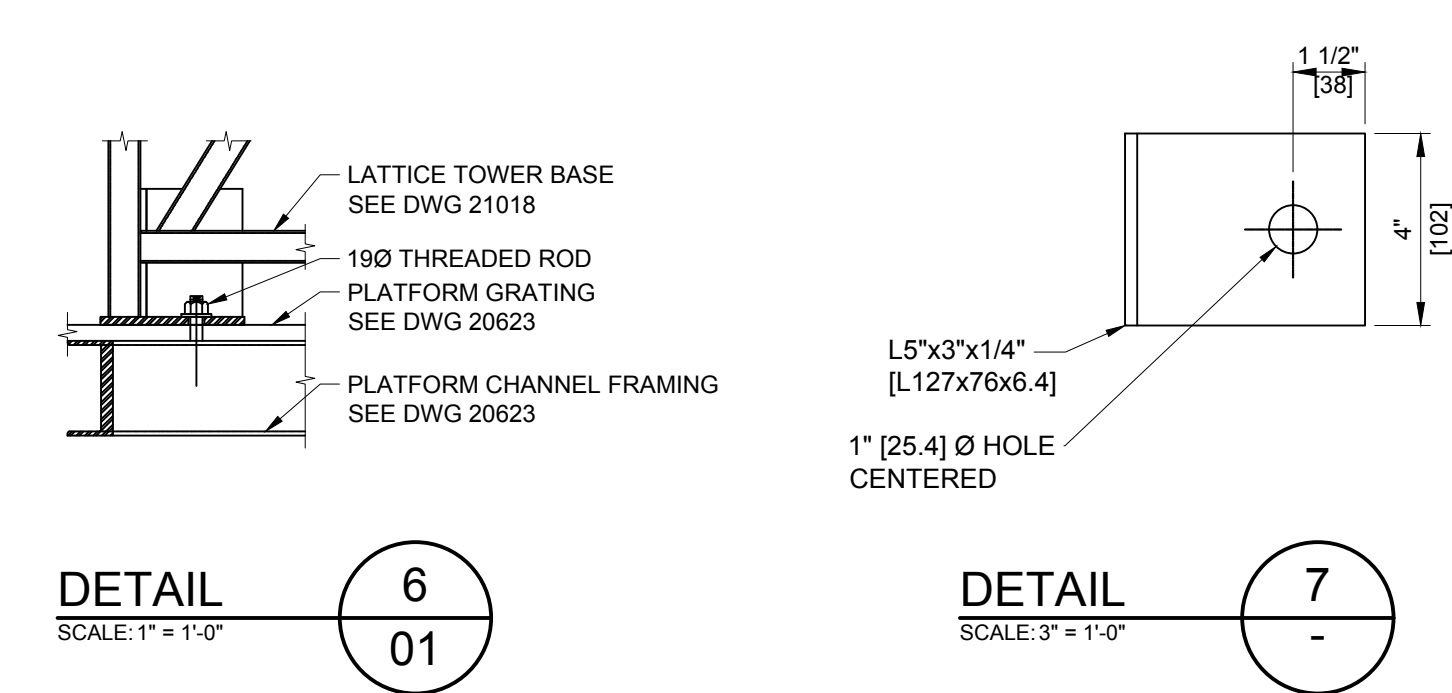
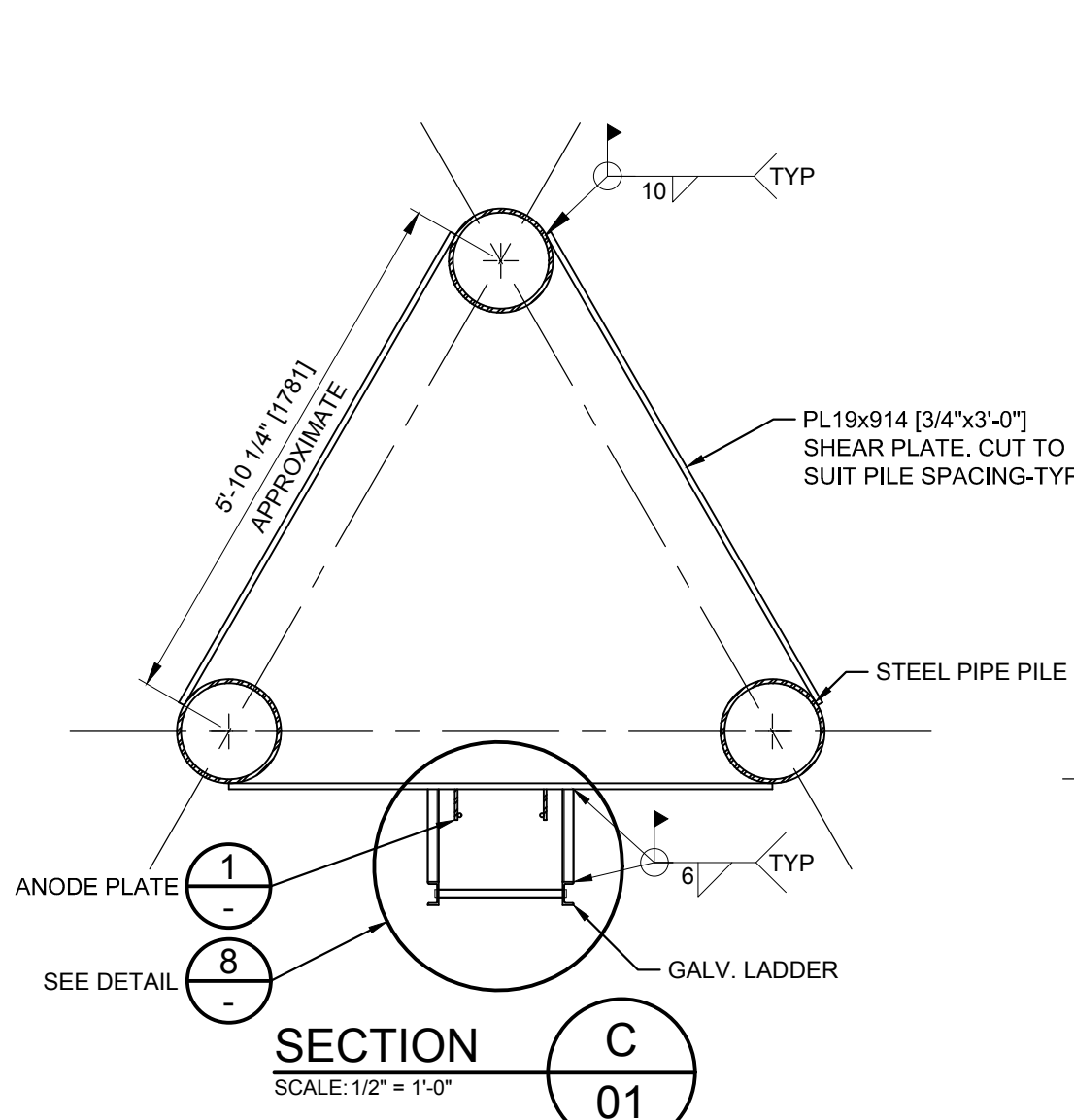
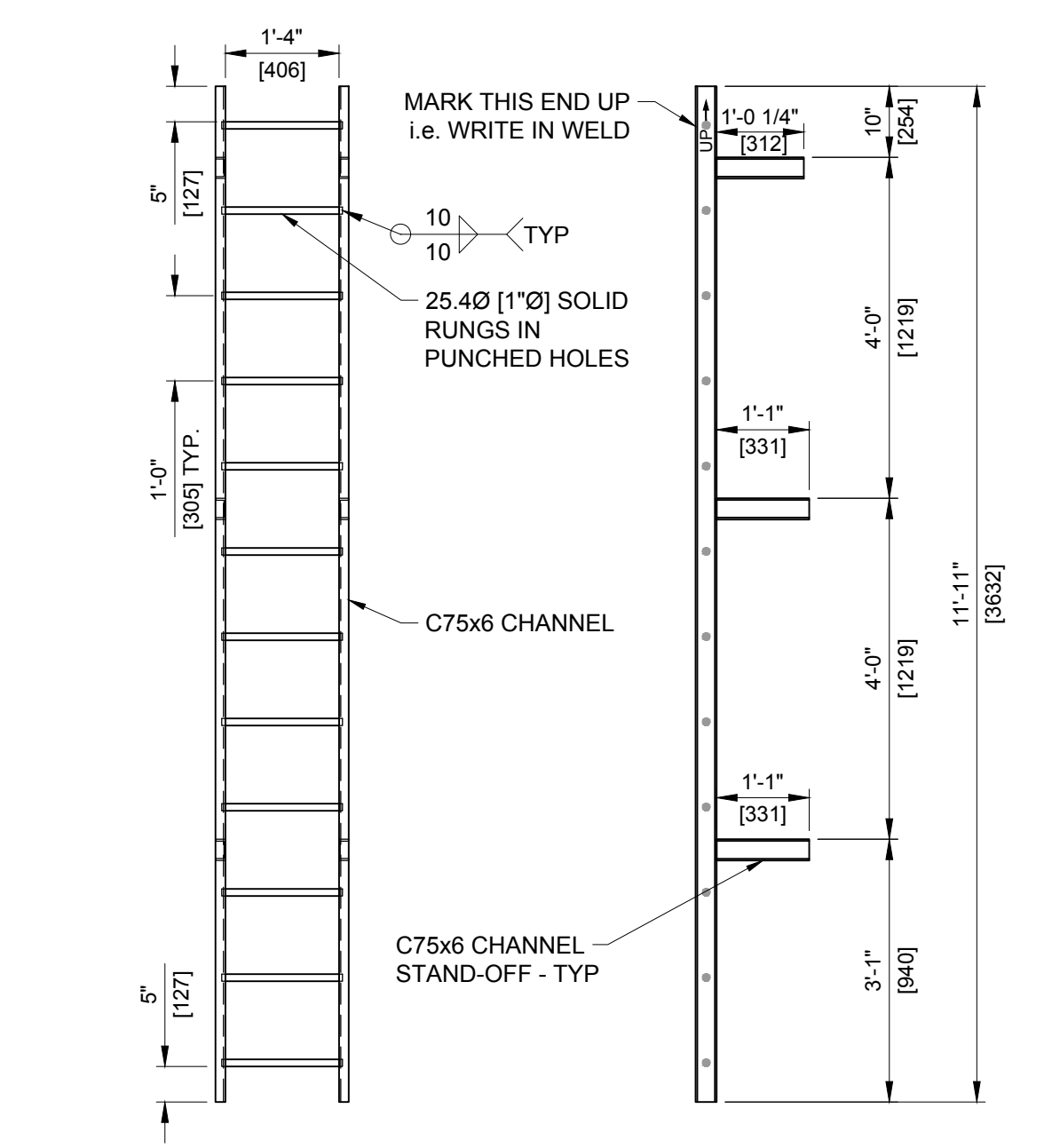
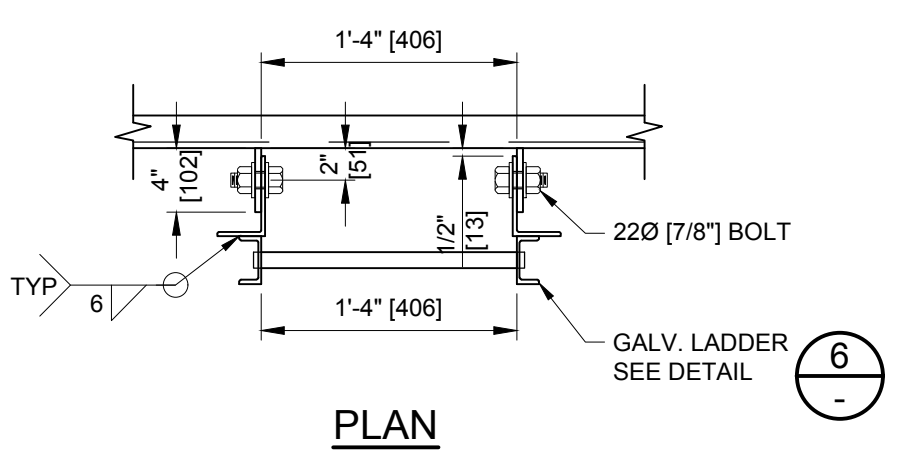
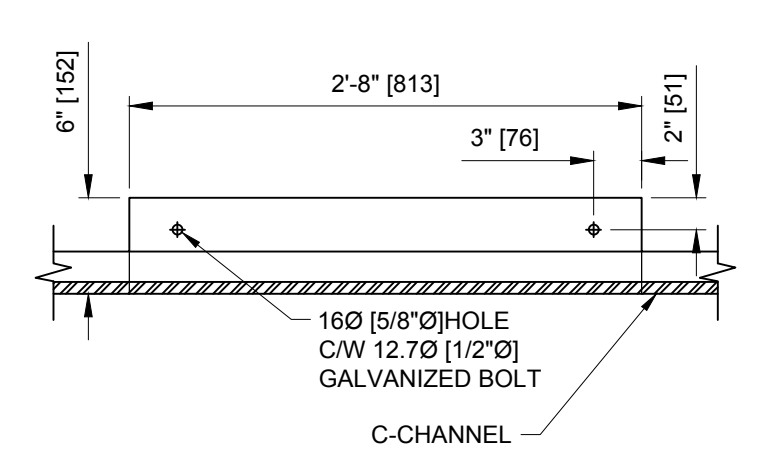
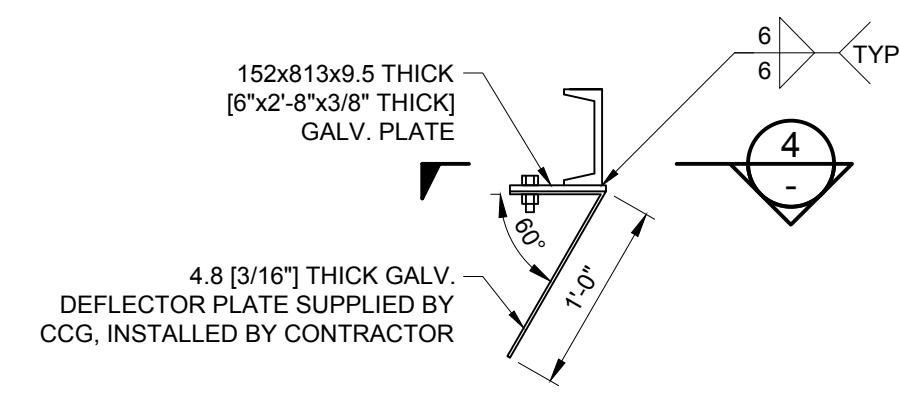
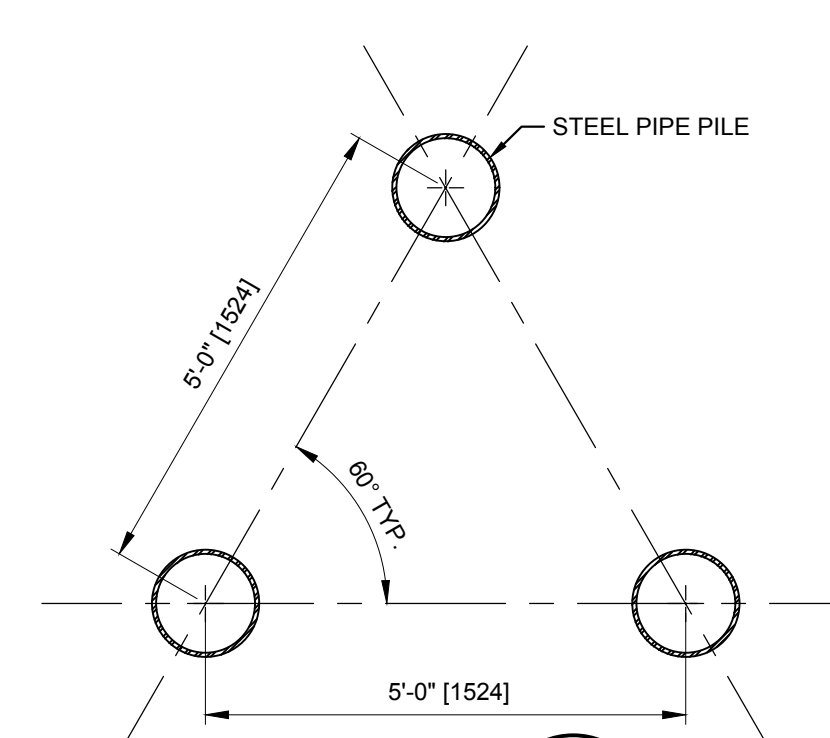
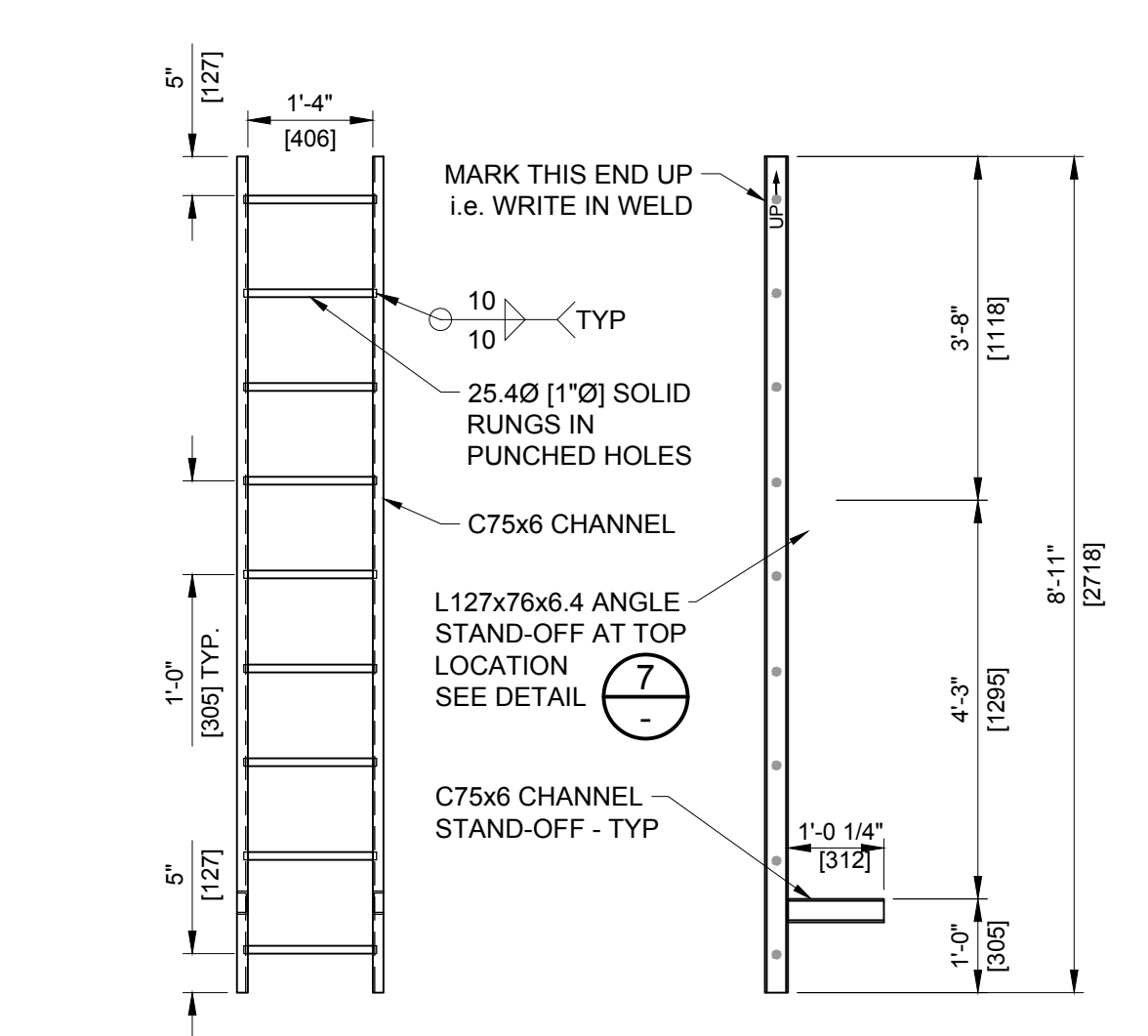
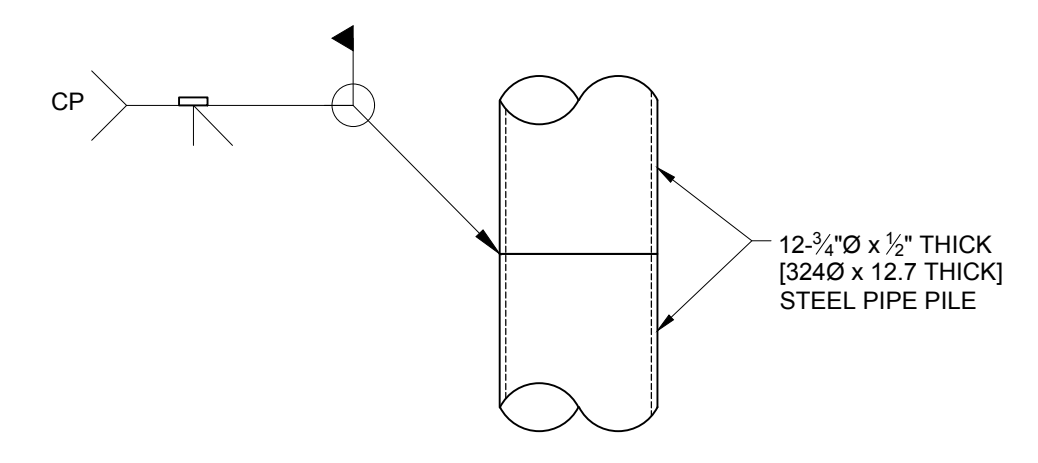
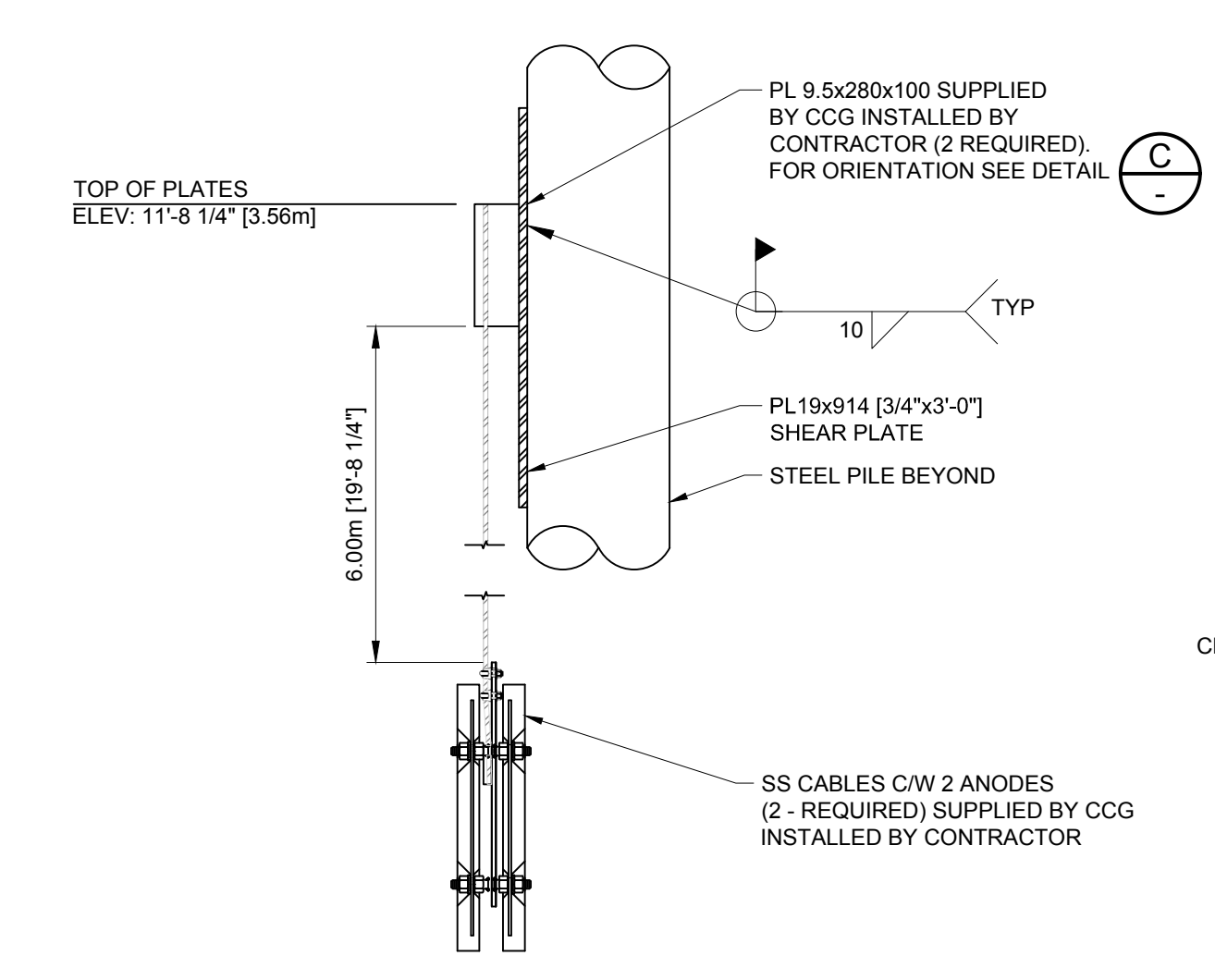
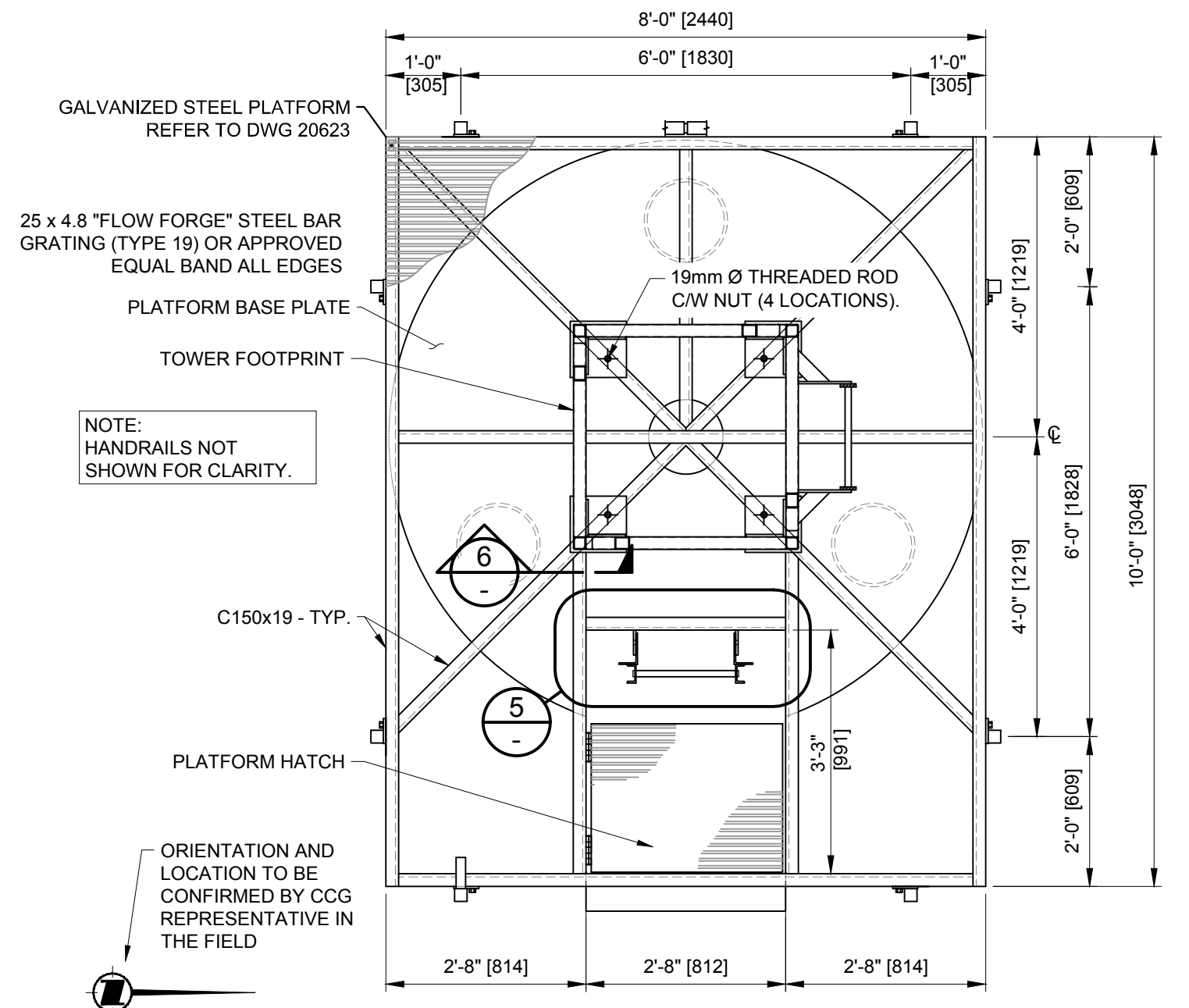
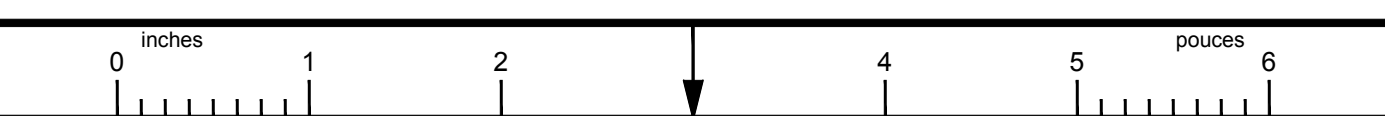
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Drawing - Dessin			
NAV-AID REBUILD 3 STEEL PILE DOLPHIN			
drawn - dessiné		date	
TDK		2017-07-31	
designed - conception		date	
CH		2017-07-31	
checked - vérifié		date	
CH		2017-07-31	
approved - approuvé		date	
CH		2017-07-31	
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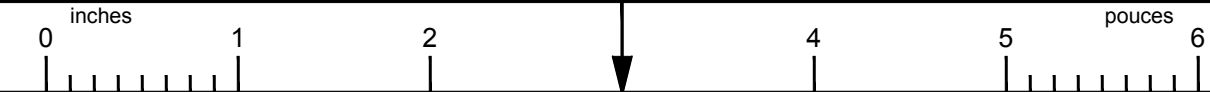
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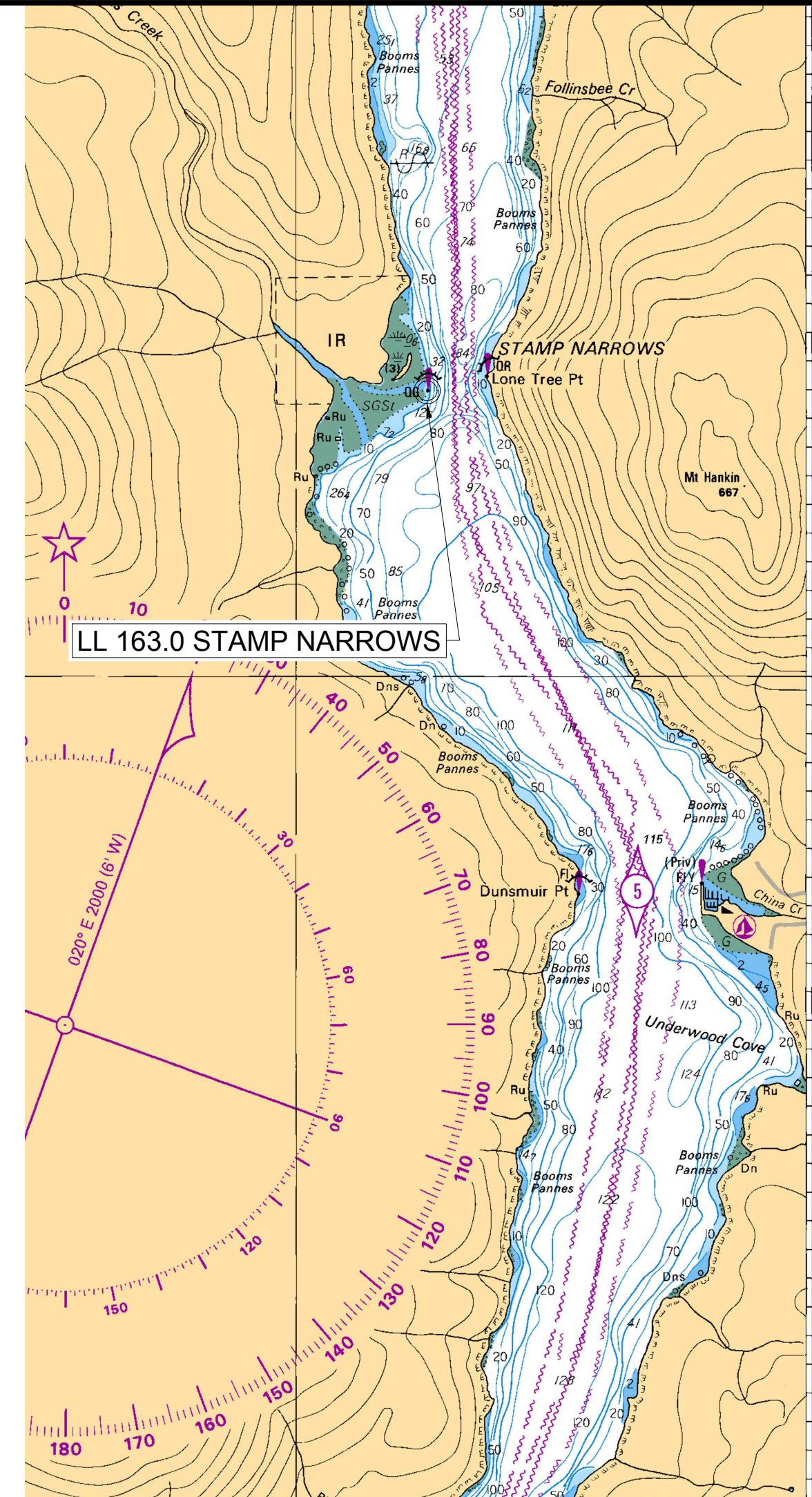
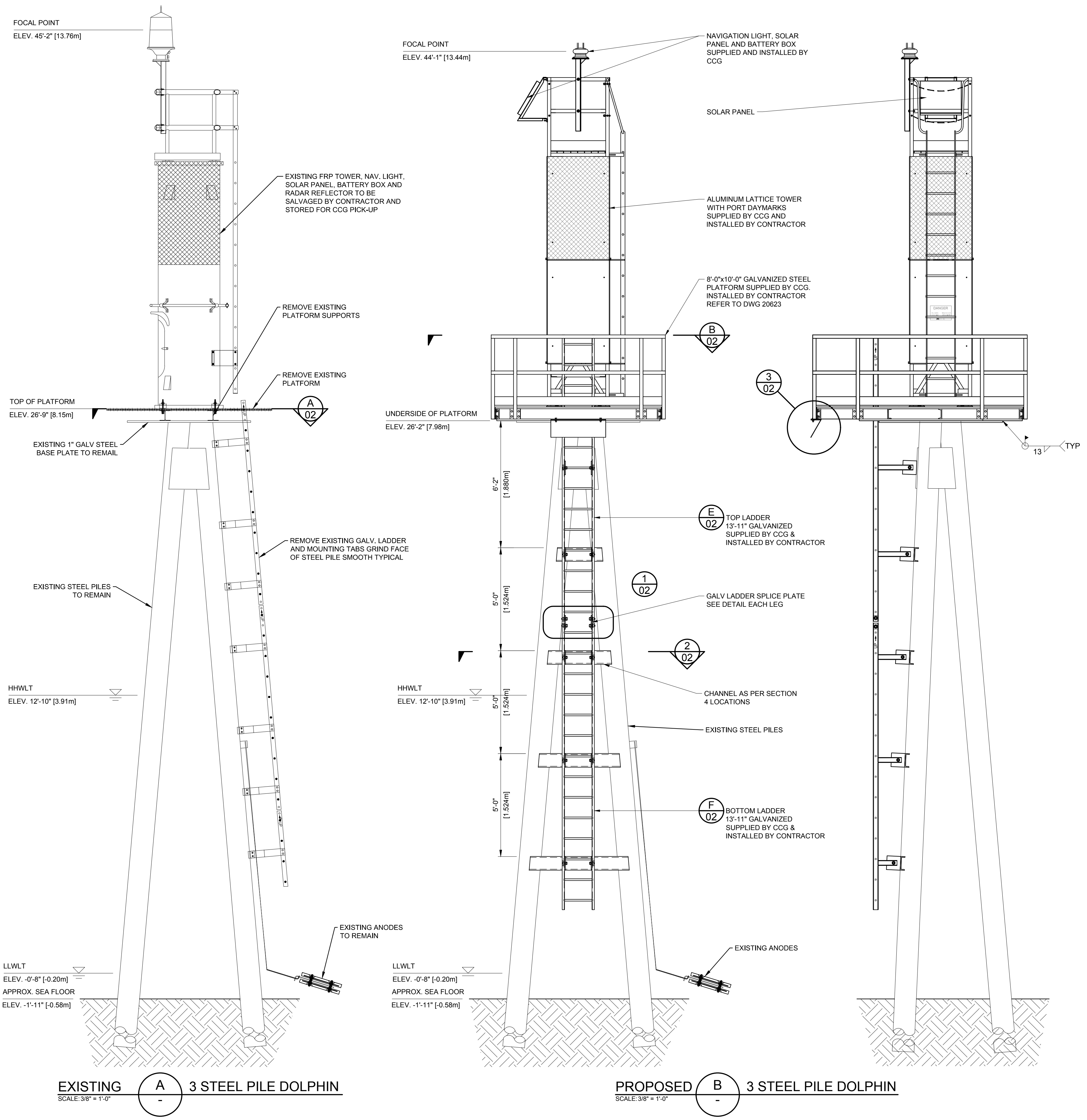
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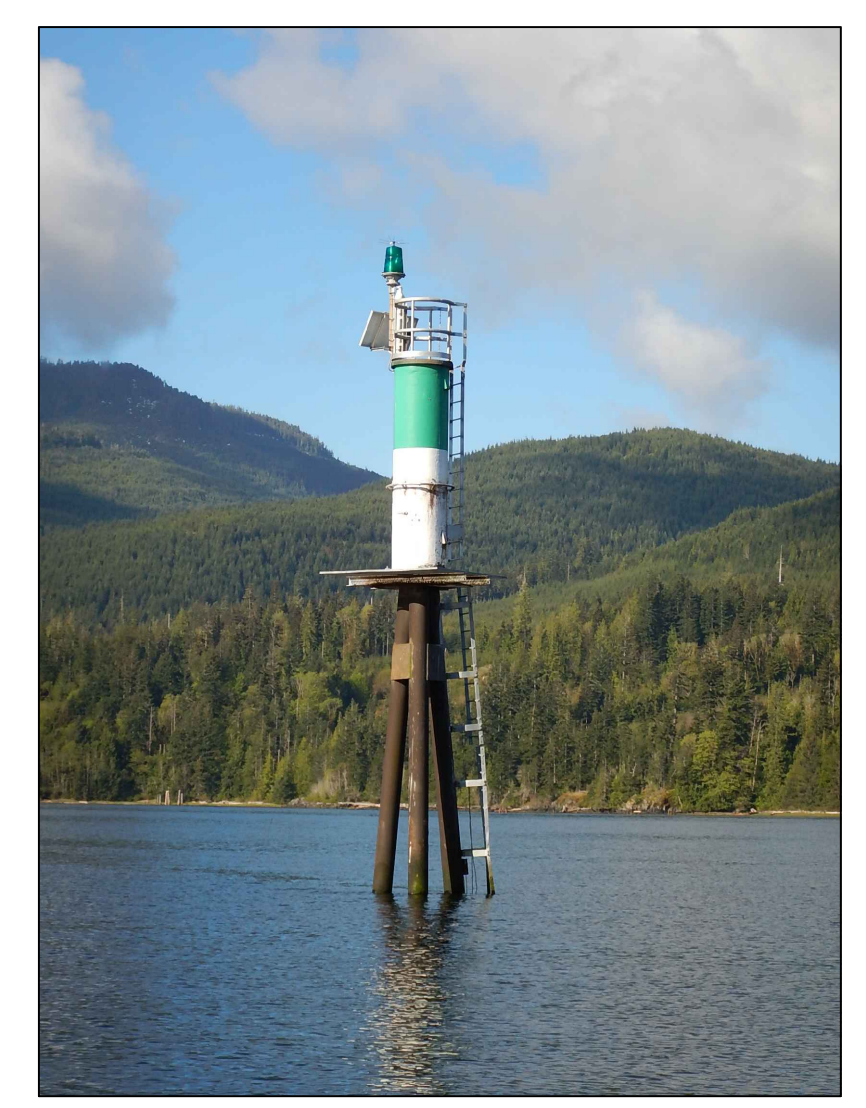
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designed - conception			date
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LOCATION CHARTLET (PART OF 3668) - NTS



LL 163.0 STAMP NARROWS

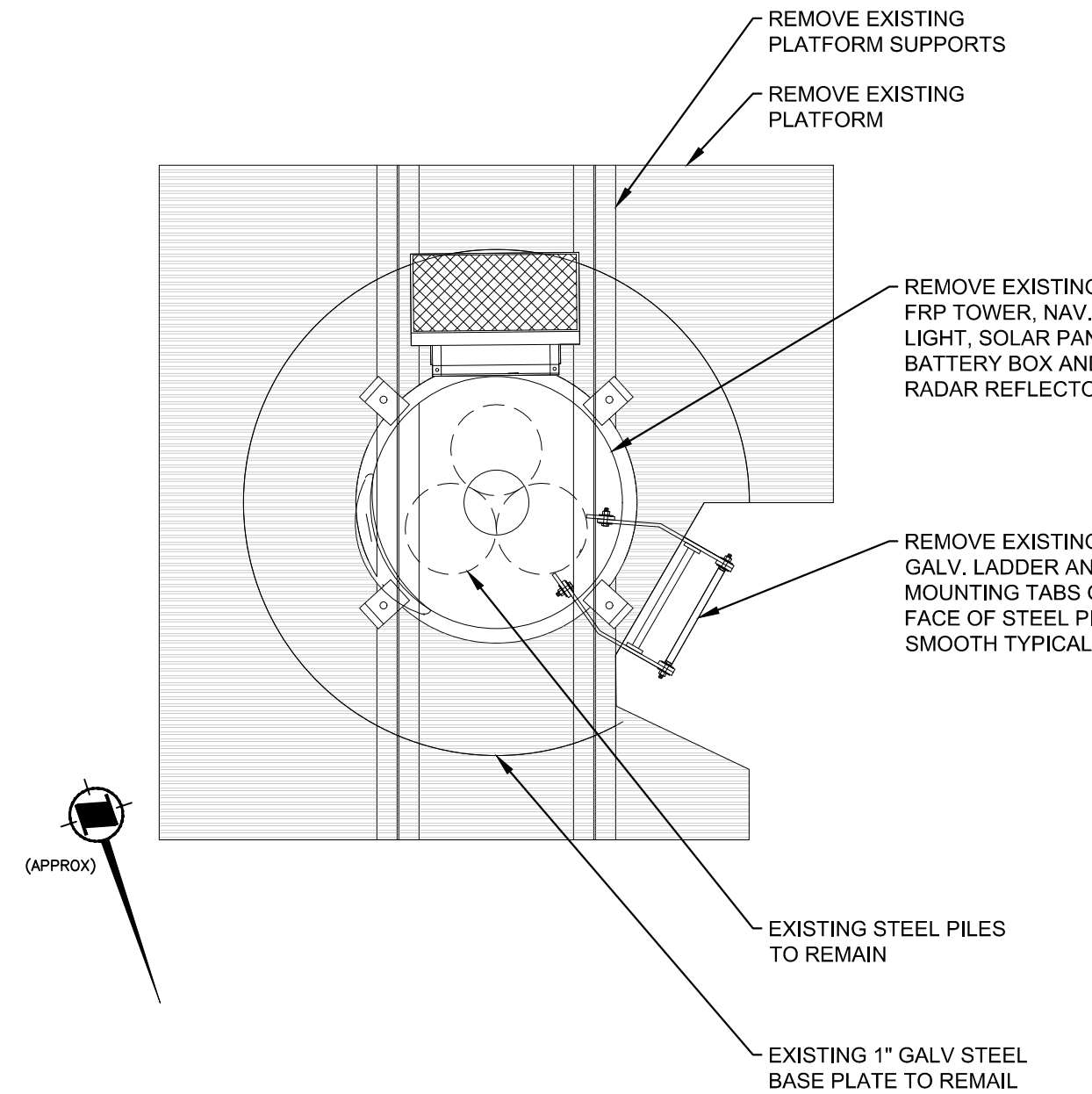
GENERAL NOTES

1. THESE STRUCTURAL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH ALL OTHER APPLICABLE CONSTRUCTION DOCUMENTS. DEVIATION OF PROJECT CONSTRUCTION IS NOT ACCEPTABLE UNLESS INSTRUCTED BY THE ENGINEER.
2. ALL INFORMATION CONCERNING EXISTING SITE CONDITIONS HAVE BEEN TAKEN FROM ORIGINAL DRAWINGS AND SITE MEASUREMENTS. SHOULD INFORMATION OR SITE CONDITIONS DIFFER SIGNIFICANTLY FROM THAT SHOWN, ADVISE CCG ENGINEERING.
3. DO NOT COMMENCE CONSTRUCTION USING THESE DRAWINGS UNLESS NOTED "FOR CONSTRUCTION".
4. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE NATIONAL BUILDING CODE 2010 AND REFERENCED STANDARDS THEREIN.
5. DRAWINGS SHOW COMPLETED STRUCTURES ONLY. CONTRACTOR IS RESPONSIBLE TO PROVIDE TEMPORARY STRUCTURES AND BRACING FOR CONSTRUCTION LOADING CONDITIONS AND STABILITY OF THE STRUCTURE DURING CONSTRUCTION. CONSTRUCTION LOADS SHALL NOT EXCEED THE DESIGN LOADS.
6. IT IS THE DISCRETION OF THE ENGINEER TO CONDUCT INSPECTIONS OR ACCEPT PHOTOS OF REINFORCING PRIOR TO THE PLACEMENT OF CONCRETE.
7. THREADROD EPOXY INSTALLATION IS TO BE HILTI HY-100 U.N.O. OR ENGINEERING APPROVED ALTERNATE.
8. IT IS THE DISCRETION OF THE ENGINEER TO CONDUCT THE PULL TESTS IF NECESSARY.

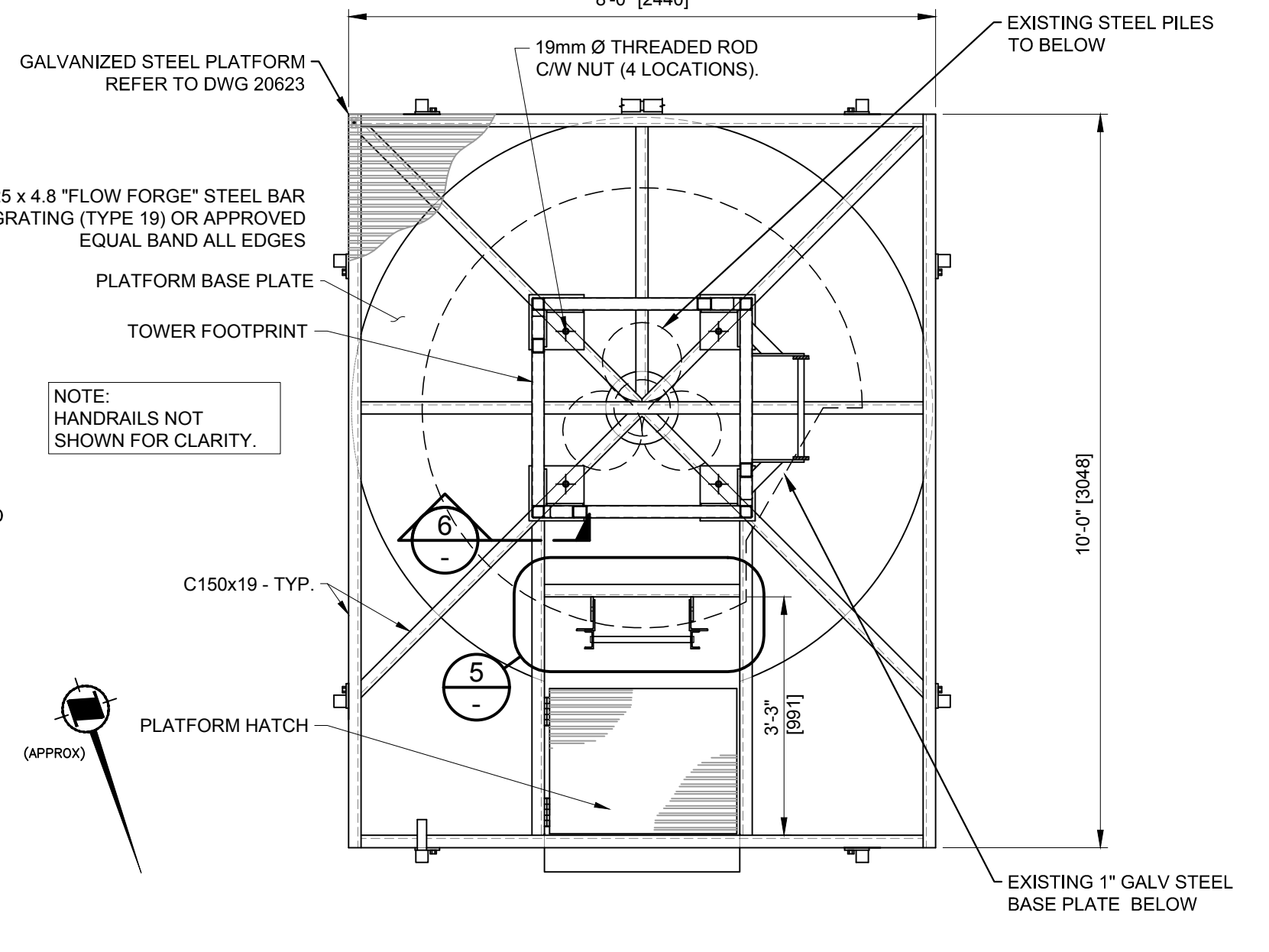
STEEL PIPE PILE NOTES

1. TOLERANCES:
 OUT OF POSITION: ± 50mm
 TOLERANCE FROM SPECIFIED BATTER: 2% OF PILE LENGTH
2. THE CONTRACTOR IS RESPONSIBLE FOR SHORING AND UNDERPINNING. DOCUMENTS RELATING TO THIS WORK SHALL BE SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF BRITISH COLUMBIA.
3. DRIVEN PILES SHALL CONFORM TO ASTM A252 SEAMLESS STEEL PIPE, GRADE 2.
4. PILES TO BE TEMPORARILY CAPPED AFTER DRIVING FOR SAFETY REASONS.
5. PILES TO BE ACCURATELY LOCATED ON THE POSITIONS AS SHOWN ON THE DRAWINGS.
6. PILES SHALL BE DRIVEN TO PENETRATION RESISTANCE CRITERIA GIVEN IN THE GEOTECHNICAL REPORT.
7. PILES SHALL BE INSTALLED IN SUFFICIENT LENGTHS TO ENSURE THAT ANY PORTIONS OF PILES DAMAGED DURING DRIVING DO NOT REMAIN IN THE WORK.
8. ANY PILE DAMAGED SO AS TO BE UNFIT FOR THE USE OF WHICH IS INTENDED AND ANY PILE WHICH CAN NOT BE BROUGHT WITHIN SPECIFIED TOLERANCE WILL BE REJECTED. A REJECTED PILE SHALL BE RETRACTED AND REPLACED WITH A NEW PILE. ALL COSTS ASSOCIATED WITH REJECTED PILES SHALL BE FOR THE CONTRACTORS ACCOUNT.

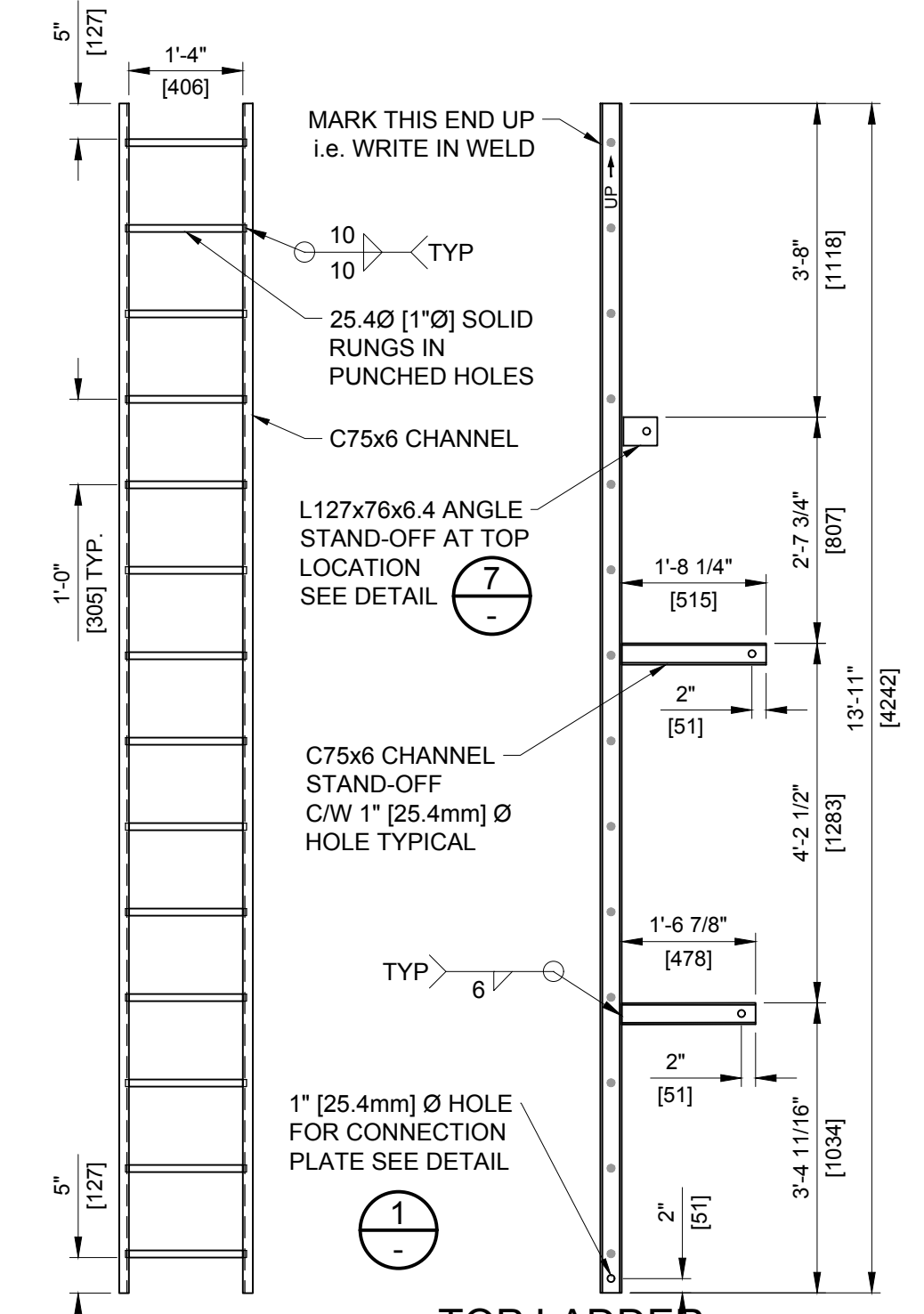
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Drawing - Dessin			
NAV-AID REBUILD			
3 STEEL PILE DOLPHIN			
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TDK			2017-08-01
designed - conception			date
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checked - vérifié			date
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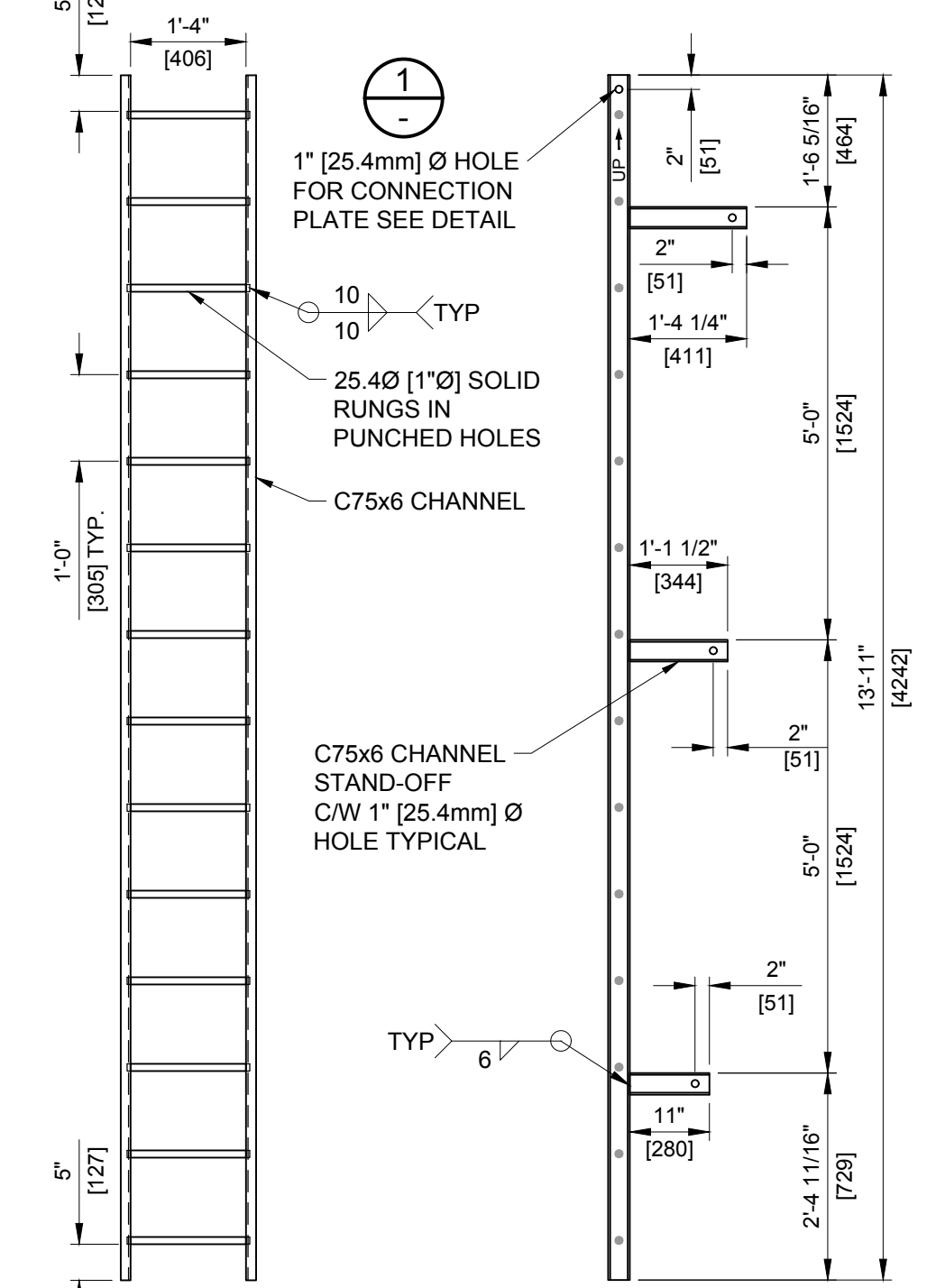
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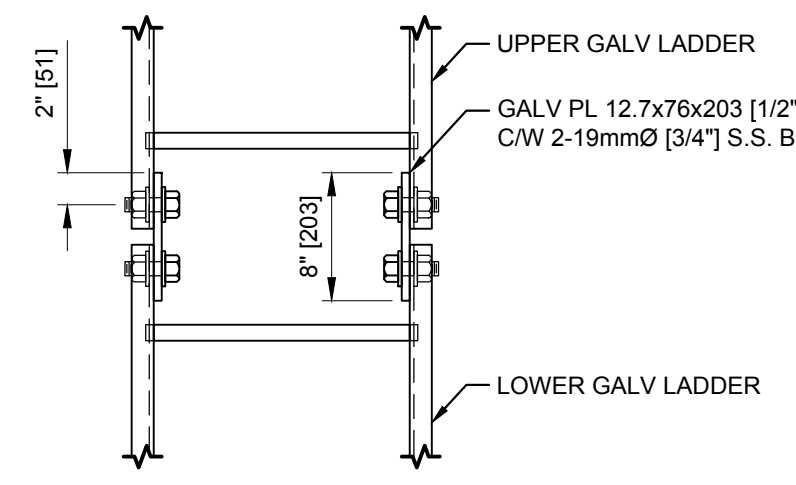
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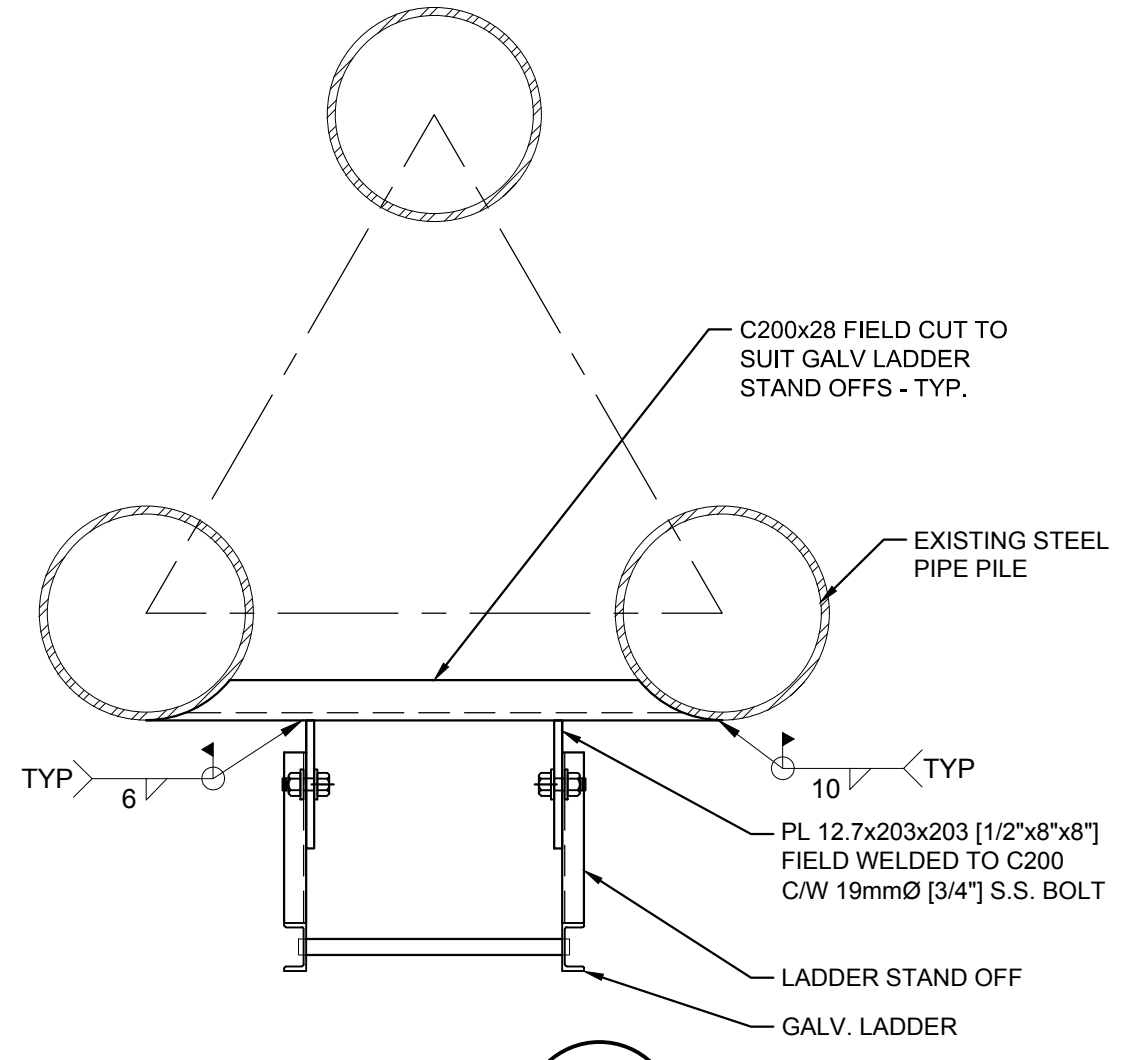
**DETAIL E TOP LADDER 13'-11\"/>
 SCALE: 1/2" = 1'-0"**



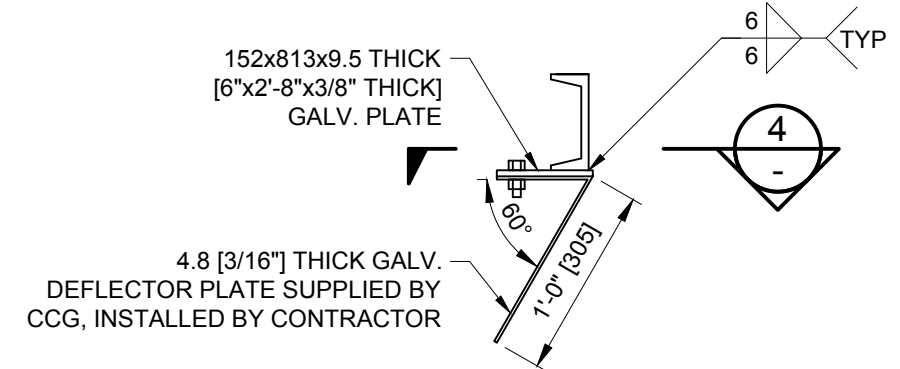
**DETAIL F BOTTOM LADDER 13'-11\"/>
 SCALE: 1/2" = 1'-0"**



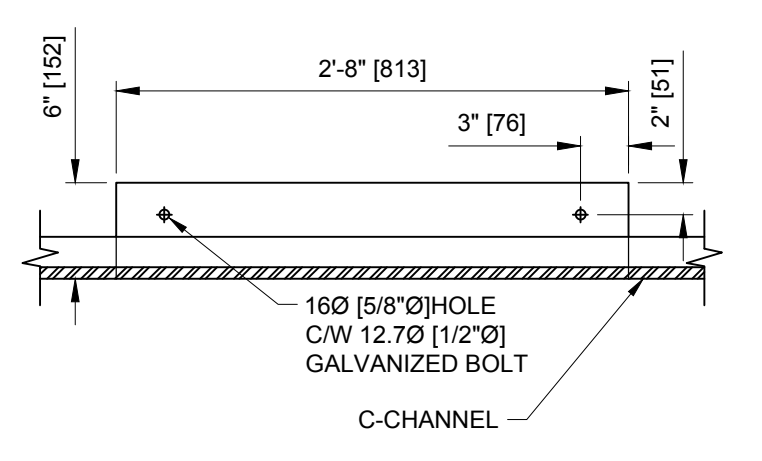
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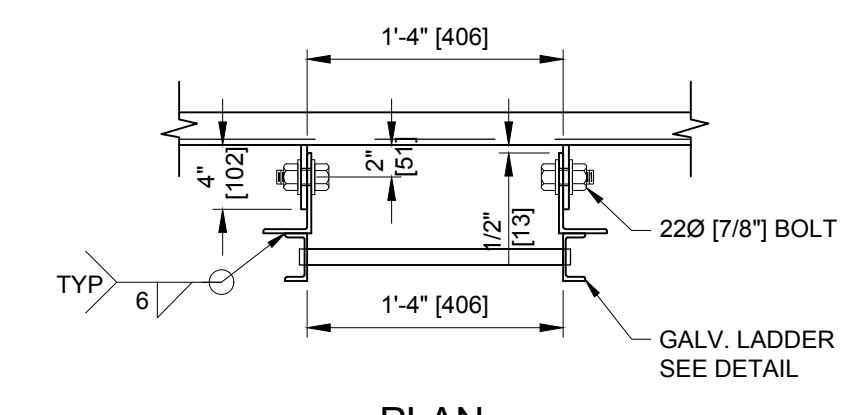
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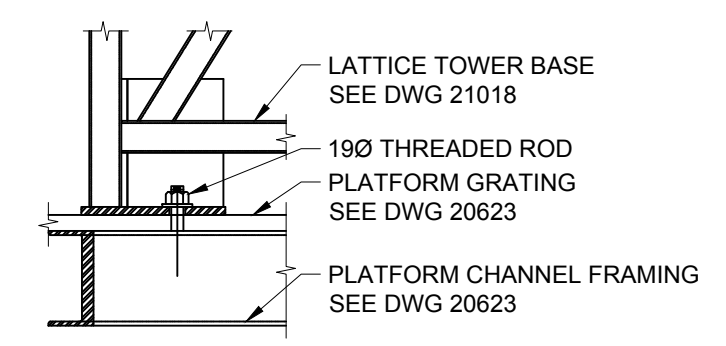
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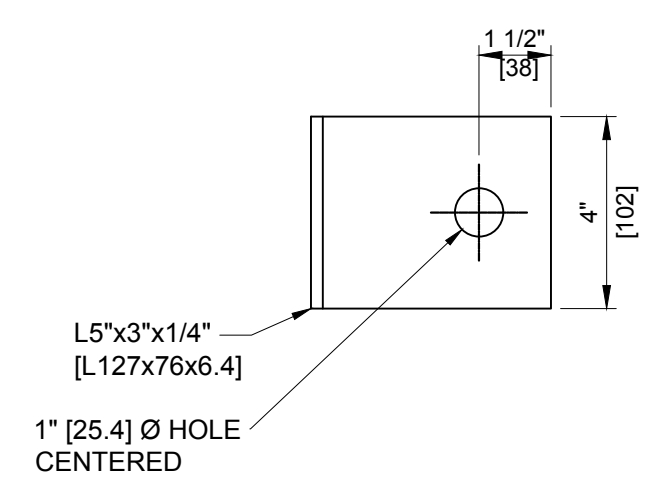
DETAIL 4
 SCALE: 1" = 1'-0"
 4 -



DETAIL 5
 SCALE: 1" = 1'-0"
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DETAIL 6
 SCALE: 1" = 1'-0"
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DETAIL 7
 SCALE: 3" = 1'-0"
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NAV-AID REBUILD
3 STEEL PILE DOLPHIN

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designed - conception	date
CH	2017-08-01
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APPENDIX C – SUMMARY OF SUBMITTALS

Following Contract Award	
Submission Description	Section(s)
Deadline: 10 working days following award	
Detailed schedule:	011100
Proof of qualifications:	
a) Proof of CWB Div. 3 Certification	011100
b) Proof of Vessel Registration	011100
Deadline: 10 working days prior to mobilization	
Construction Plan;	
a) Project specific safety plan	013530
b) Project environmental protection plan	013543
c) Detailed erection plan	055000
d) Detailed pile driving plan	316113
Deadline: 21 calendar days following acceptance of the works	
Waste disposal receipts	024116



Canadian Coast Guard
AFI26 Barkley Sound and Alberni Inlet Aids to
Navigation Project

PILING SERVICES

APPENDIX D – Standard Practices For Pile Driving



DFO Best Management Practices for Pile Driving and Related Operations

This document is intended to provide guidance to industry contractors and their clients regarding the protection of fish and fish habitat during pile driving operations in the South Coast Area. The notification form attached to this document must be submitted to the Central Nanaimo office (250-756-7325) no less than 5 working days prior to the commencement of any pile driving works.

Most types of pile driving will result in a level of underwater noise that will at least cause changes to fish behavior. While extensive data on pile driving impacts is not yet available, it is apparent that driving of steel pipe piles with large, high energy hammers can produce underwater sound levels capable of killing fish. Sublethal injuries may also occur, resulting in reduced survival or delayed mortality. Even when sound levels are not high enough to kill or injure fish, the underwater noise caused by pile driving may cause behavioral changes such as avoidance of preferred habitat, changes to migration, reduced feeding, or reduced schooling that in turn can result in increased predation. Although beyond the scope of this BMP, underwater noise may also impact other aquatic organisms such as invertebrates, diving birds, and marine mammals.

The *Fisheries Act* prohibits the harmful alteration, disruption or destruction of fish habitat (Section 35) and the destruction of fish (i.e., killing of fish) by means other than fishing (Section 32). Without implementation of appropriate mitigation measures, certain pile driving activities can harm fish habitat and kill fish. It is the responsibility of the proponent and contractors to ensure that appropriate mitigation measures are employed and that their project does not contravene the *Fisheries Act*.

Standard BMP's applicable to all pile driving works/undertakings within the marine environment

1. Project proponents and their contractors must ensure that the pile driving project does not adversely affect fish habitat. For example, where the pile driving project is intended to provide support for proposed docks/floats, an assessment of the marine environment that is located underneath these structures must be undertaken. Projects that include docks or floats may result in adverse shading impacts on marine fish habitat if they are poorly located over eelgrass or other marine vegetation.
2. With respect to existing piles that are redundant and have been treated with creosote or other preservatives or coatings, every effort must be made to extract the entire length of the pile from the ground or seabed. Methods such as pile vibrating, jetting or other appropriate technique must be utilized to remove the pile intact. Where it is not technically feasible to remove the pile intact or where the pile has broken off, every effort must be made to remove the stub in a way that is consistent with safety and the conservation of fish and fish habitat. All debris from pile removal must be disposed of at an appropriate upland disposal site in accordance with all applicable legislation, guidelines and BMP's.
3. New timber piles will comply with the DFO document "Guidelines to Protect Fish and Fish Habitat from Treated Wood Used in Aquatic Environments in the Pacific Region" (<http://www.dfo-mpo.gc.ca/Library/245973.pdf>).
4. Re-used pilings will not normally be subject to any additional treatments. However, pilings with excessive creosote must be avoided. Freshly treated creosote pilings must stand (weather) in an appropriate upland storage area for a minimum period of 45 days prior to installation. Piles with creosote may not be an appropriate for use in some areas or situations. DFO may require the use of concrete or steel piles in sensitive areas, or may require that creosote piles be covered or wrapped to provide a barrier between the creosote and non-target organisms that attach to the pile (i.e. herring spawn).
5. Creosote timber piles must be protected with rub strips wherever contact with docks or vessels is expected.
6. Contractors must position their vessels and water borne equipment associated with pile driving activities in a manner that will prevent damage to fish habitat (e.g. eelgrass, kelp beds, shellfish beds, salt marshes, etc.). In the event that fish habitat is damaged, the incident must be reported to DFO and appropriate remedial actions should be taken under the direction of DFO.
7. When cleaning out pipe piles (i.e., air lifting), sediment contained in the pipe will be pumped to the surface and processed through an approved containment system and disposed of at an approved landfill site.
8. Pipe piles must be capped or otherwise treated to prevent birds from being trapped inside the piles.
9. All equipment will be maintained in good proper running order to prevent leaking or spilling of potentially hazardous or toxic products. This includes, but is not limited to, hydraulic fluid, diesel, gasoline and other petroleum products.



10. All hydrocarbon products (fuel, oil, hydraulic fuel, lubricants), fueling equipment, and deleterious substances must be stored and handled in accordance with all applicable legislation, guidelines and BMP's. An appropriate spill prevention, containment and cleanup contingency plan for hydrocarbon products and any other deleterious substances that may be used or transported to the project site, must be in place prior to work commencing on the project to ensure that spills are contained and prevented from entering the marine environment.
11. Contractors will have emergency spill equipment available whenever working near or on the water. The emergency spill equipment should be appropriate for the specific operation (e.g., pouring concrete, refueling, etc.) and environmental conditions (e.g., marine, riverine, etc.) and equipment operators should be trained in their deployment and use.
12. All work areas must be adequately contained to prevent the release of demolition and construction debris and materials and any deleterious substances to the marine environment. All construction/demolition debris must be contained, collected and disposed of in an appropriate upland facility in accordance with existing legislation, guidelines and best management practices. Demolition operations should be monitored to determine whether the works are resulting in any adverse effects on fish or fish habitat. Any adverse effects should be reported to DFO.
13. Uncured concrete, cement, mortars and other Portland cement or lime-containing construction materials are considered deleterious substances. The proponent and all contractors must ensure that all work involving the use of concrete, cement, mortars, and other Portland cement or lime-containing construction materials must be conducted so as to ensure that sediments, debris, concrete, and concrete fines are not deposited, either directly or indirectly into any aquatic environment (e.g. any ditch, watercourse, wetland, ravine, storm sewer system, or the sea, including foreshore). Any water contacting uncured or partly cured concrete or Portland cement or lime-containing construction materials, such as the water that may be used for exposed aggregate wash-off, wet curing, equipment washing, etc., must be prevented from entering, directly or indirectly into a watercourse or a storm collection system, unless this water has been tested (to an accuracy of within +/- 0.2 pH units) and found to have a pH of between 6.5 and 9.0 pH units and a turbidity of less than 25 nephelometric turbidity units (NTU). The proponent and all contractors must ensure that suitable containment and treatment facilities are provided at the project site for the wash-down water from concrete delivery trucks, concrete pumping equipment, concrete mixing equipment, and other tools and equipment as required.
14. Wherever concrete work is proposed in or near aquatic areas, the work must be monitored by a qualified environmental consultant to ensure that all applicable BMP's are followed and the habitat provisions of the *Fisheries Act* are upheld.
15. If concrete is being placed with a concrete pump, all hose and pipe connections must be sealed and locked properly to ensure the lines will not leak or uncouple. Contractors/crews must ensure that concrete forms are not filled to overflowing.
16. All concrete forms will be constructed in a manner that will prevent fresh concrete or cement-laden water from leaking into the surrounding water.
17. All work must be undertaken and completed in such a manner as to prevent the discharge or introduction, either direct or indirect, of soils, sediment or sediment-laden water, turbid water or any other deleterious substances into the marine environment.
18. Without restricting the generality of the foregoing paragraph, with respect to the discharge or introduction of sediment, sediment-laden water, and turbid water into the marine environment, the following criteria must be complied with:

Total Suspended Solids (TSS):

- TSS should not exceed 25 mg/L

Turbidity:

Turbidity should not exceed 2 nephelometric units (NTU) when background is less than 8 NTU.

- Turbidity should not exceed 8 NTU when background is between 8 and 80 NTU.
- Turbidity should not exceed background by more than 10% when background is greater than or equal to 80 NTU.
- "Background" is defined as the level at an appropriate adjacent reference site, that is satisfactory to DFO, and is affected neither by works or activities associated with the project or the works site, nor by sediment-laden water,



- induced suspended sediments, or induced turbidity resulting from works or activities associated with the project or the work site.
- Should the project result in TSS or NTU levels in excess of the criteria outlined above, then those works and activities that might be contributing to these conditions must be halted until measures that will ensure compliance with the criteria outlined above are put in place.
- Where the suspended solids and turbidity criteria outlined above cannot be practicably achieved, work areas and those works and activities that might be contributing to these conditions must be contained and isolated from tidal and flowing waters such that fish are prevented from accessing the work areas, and sediments, sediment-laden water, and turbid water are contained and prevented from leaving the work areas.

Timing Windows

Timing windows are a very effective BMP with respect to mitigating possible adverse effects on fish. Timing windows are intended to ensure that a project is scheduled during periods of reduced marine sensitivity. Although fish are always present in most BC waters, there are certain periods when nearshore areas are heavily utilized by fish. For example, herring move into shallow coastal areas to spawn in late winter or early spring, and high numbers of juvenile salmon migrate along coastal shorelines in the spring and early summer. Where works are proposed close to a river mouth or estuary, project proponents/contractors should also consider the timing of adult salmon migration to ensure conflicts are avoided. Site specific timing windows may be required if a project is proposed near an estuary or mouth of a fish stream.

19. The preferred timing window (time of reduced sensitivity) for pile driving activities is from July 1st to February 15th. Further restrictions may apply during the fall and winter if the project has the potential to effect adult salmon migration.

Special BMP's for pile driving projects that may create high underwater sound

Some types of pile driving are expected to result in sound levels that require special mitigation. For example, installation of steel piles by means of a drop, diesel, or air hammer are expected to produce high sound pressure levels capable of injuring or killing fish. Accordingly, project proponents and their contractors/consultants are responsible to ensure that pile driving associated with the project does not result in underwater noise or increases in underwater peak pressures that would adversely affect fish. Increase in underwater peak pressures in excess of 30 kilopascals (kPa) are likely to adversely effect fish.

20. Any proposed pile driving activity that may result in pressure effects of greater than 30 kPa (e.g. steel piles and power hammer) must incorporate mitigation measures specifically intended to prevent increases in underwater peak pressures in excess of 30 kPa anywhere greater than 1 metre from the pile being driven from adversely affecting fish. Mitigatory measures that might be appropriate include:
- The use of smaller diameter pipe pile.
 - The use of a vibrating hammer or non-power drop hammer.
 - Scheduling the works outside of periods of heightened sensitivity with respect to fish (e.g., periods of juvenile salmon seaward migration, periods of adult salmon upstream migration to local watercourses; periods of herring spawning)
 - The deployment of netting, or "silt curtains" to isolate the work area and prevent fish from entering any area where the pile driving shock wave might exceed 30 kPa.
 - The deployment of a "bubble curtain" of sufficient design to surround the entire length of each pile being driven and attenuate shock waves radiating out from the pile so that overpressures outside the bubble curtain do not exceed 30 kPa.
21. To ensure that mitigation measures are effective, a hydrophone can be deployed to measure in-water pressure changes resulting from pile driving, monitor the effectiveness of mitigatory measures in use (e.g., isolation curtains, bubble curtains), and to determine the need for further mitigatory measures
22. The deployment of a hydrophone to measure in-water pressure changes resulting from pile driving. Hydrophone measurements should be carried out over the entire course of pile driving, particularly during driving to resistance or seating in bedrock. Hydrophone measurements should include depth profiles taken at a range of distances radiating out from the pile being driven. Each hydrophone depth profile should include measurements taken near the water surface, near the seabed, and at mid water column. The range of distances for hydrophone depth profiles should include a depth profile within 2 metres of



the pile. The continual monitoring of shock wave pressure during pile driving is necessary to monitor the effectiveness of mitigatory measures in use (e.g., isolation curtains, bubble curtains), and to determine the need for further mitigatory measures.

23. Any proposed pile driving activity that may result in pressure effects of greater than 30 kPa (e.g. steel piles and power hammer) must be monitored by an appropriately qualified professional who is familiar with pile driving activities (including the potential affects on fish and the measures required to mitigate these affects) to ensure that effective measures are applied to mitigate adverse affects to fish and that all activities are conducted in accordance with the Fisheries Act. Monitoring must utilize hydrophones operated by appropriately qualified professionals. Pressure levels should be recorded at a range of depths throughout the water column and at varying distances and directions from the driven pile. Monitoring should be carried out throughout the pile driving from beginning to end for various piles and soil conditions and particularly during periods of heavy pile driving or pile refusal.
24. The hydrophone monitoring may be discontinued if the experience with the first 4 or 5 piles shows that the particular pile installation method in use does not result in overpressure of 30 kiloPascals (kPa), when readings are taken 1 metre from the pile being driven, and there have not been any observations of distressed or injured fish. This would only be applicable in situations where future pile driving associated with the project will use the same equipment, methods, type of piles, size of piles and the substrate that the piles are being driven into has the same characteristics as the substrate the test piles were driven into.
25. All work must be suspended and further mitigation measures need to be employed to reduce the pressure wave (e.g. bubble curtain) if pile driving activities result in hydrophone readings in excess of 30 kPa, measured 1 metre or further from the pile being driven or should there be any sign of dead or injured fish within the work area. DFO must be consulted prior to proceeding with pile driving activities.
26. Where pile driving is to occur in intertidal or shallow subtidal areas, it should be conducted during times of low water.
27. Vibratory hammer must be used wherever feasible, particularly when driving steel piles.

Project Monitoring:

28. The project must be appropriately monitored for adverse effects on fish and fish habitat by an appropriately qualified environmental monitor (EM) provided by the project proponents at their own expense. In addition, the EM must ensure that contractors/workers understand the conditions in this BMP document. The EM must have experience and knowledge in local marine biology, pile driving techniques and methods to mitigation any adverse impacts to fish and fish habitat.
29. Project proponents must empower the EM in writing to suspend works that may be harmful to fish or fish habitat, or to direct work so that it is compliant with the Fisheries Act and all other applicable legislation, guidelines and BMP's including this document.
30. The EM must be on site at all times during the course of the project whenever there is the potential for adverse effects or fish or fish habitat.
31. Upon completion of the project, the EM must provide DFO with a monitoring report summarizing the project and describing any environmental issues that arose during the project. Monitoring results should be forwarded to the appropriate contact at DFO's Oceans, Habitat and Enhancement Branch.
32. The monitoring reports should include:
 - Location of the works.
 - Contact information for the owner, contractor and monitor.
 - Documentation of any adverse effects on water quality (including suspended sediment, turbidity, pH, hydrocarbons etc) or other fish habitat impacts.
 - Suspended sediment, turbidity, pH, and hydrophone readings.
 - Distance the reading was taken from the pile or mitigation measure.
 - Depth the reading was taken.
 - Description of any pile driving activity that resulted in hydrophone readings in excess of 30 kPa.



- Description of mitigation measures applied.
- Documentation of any observations of distressed, injured or killed fish.
- Photographs.

33. If contractors are working and a herring (or other fish) spawning occurs or if they become aware of any negative impacts to fish or fish habitat, the work will be suspended until the appropriate DFO contact has been notified and has provided direction.

Prior to the commencement of any pile driving activity it is requested that, the proponent with advice from a Qualified Environmental Professional submit DFOs Project Notification and Review Application Form found at the website <http://www.pac.dfo-mpo.gc.ca/habitat/index-eng.htm> to referralsnanaimo@dfo-mpo.gc.ca. The proponent must indicate either “Notification to DFO”, “Request a Project Review” or “Request a Fisheries Act Authorization” by way of submission of this form. If project proponents, QEP or consultants have indicated “Notification to DFO”, this indicates that they understand the conditions of this BMP document and agree to comply with all conditions. DFO does not formally respond to Notifications. Notifications are subject to monitoring and auditing by DFO.

The conditions of this BMP document notwithstanding, DFO may at any time and at their sole discretion, direct the project proponents and their agents/contractors/workers to suspend or alter the project, or to implement mitigation measures that avoid adverse impacts to fish or fish habitat.

This BMP document is valid only with respect to the mandate of DFO pursuant to the Fisheries Act, and for no other purposes. It does not purport to release the project proponent from any obligation to obtain permission from or to comply with the requirements of any other regulatory agencies. Any works seaward of higher high water (HHW) might be subject to review by the Canadian Coast Guard (CCG) Navigable Waters Protection Division pursuant to the Navigable Waters Project Act. Any works seaward of HHW may also be of interest to Land & Water BC as the provincial government has jurisdiction over the seabed of inland waters.





Canadian Coast Guard
AFI26 Barkley Sound and Alberni Inlet Aids to
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**APPENDIX E – Environmental Management Plan (To be provided
following Contract Award)**



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**APPENDIX F – Geotechnical Report (To be provided following
Contract Award)**