



STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES &
ENVIRONMENTAL CONTROL
DIVISION OF FISH & WILDLIFE
89 Kings Highway
Dover, DE 19901

**CONTRACT DOCUMENTS & TECHNICAL SPECIFICATIONS
ADDENDUM NO. 5**

**DELAWARE BAYSHORE BYWAY
LITTLE CREEK BOARDWALK AND WILDLIFE VIEWING TOWER
CONTRACT NO. FW-2-15**

Project Name: Delaware Bayshore Byway
Little Creek Boardwalk and Wildlife Viewing Tower

Contract No.: FW-2-15

Date of Issue: February 27, 2018

Notice No. 1: Attach this addendum to the Project Manual for this project. It modifies and becomes part of the Bidding Documents. Work or material not specifically mentioned herein is to be as described in the main body of the specifications and as shown on the drawings.

Bids Due: **March 29, 2018, 1:00 PM**

"CONTRACT NO. FW-2-15 - SEALED BID – DO NOT OPEN".
Dept. of Natural Resources & Environmental Control
Division of Fish and Wildlife
89 Kings Highway, Dover DE 19901
Attn: Anthony T. Gonzon Jr., Delaware Bayshore Initiative Coordinator

1. RFI QUESTIONS AND RESPONSES:

Q1. Please confirm that Add Alternate #3 Second Level Railing, includes the entirety of the observation tower 2nd level and that, if the add alternate is not awarded, when the tower construction has been completed that there will be no railing on the 2nd level.

A1. **Add/Alternate #3 is the continuation of the round handrail mounted on metal brackets and attached to the railing posts. The base bid includes the railing as depicted on Sheet A-4 Detail 2 Railing Section Detail along the perimeter of the second level.**

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through Science and Service***

Q2. Detail 17 Typical Boardwalk Framing Section of Plan Sheet S-7 shows the edge of the decking, the outside face of the rail posts and the ends of the girders all lining up, however, detail 11 Typical Boardwalk Framing Segment on the same sheet notes to extend girder 3" beyond edge of boardwalk (minimum). Please clarify if all members are to be flush or not.

A2. All members are to be cut flush.

Q3. Load test for the piles have a maximum of 25 kips allowable, not 40 as per the testing section of the specs. Do we still need load testing, if so compression and tension?

A3. Per T618500 Section D.3.a. Load tests shall be performed for repetitive helical anchors supporting loads greater than or equal to 40 kips.

Load test may be eliminated for helical anchors supporting loads less than 40 kips provided that the installer provides a certification letter indicating that the piles meet the requirements of the drawings.

Q4. Is powder coating acceptable, it is in the national code?

A4. Per T618500 Part C, All helical anchors shall be hot dipped galvanized.

Q5. Assuming everything is U.S. steel?

A5. Please refer to ADDENDUM #4 for information regarding the "Buy America" provision requiring the use of U.S. steel.

Q6. Who is responsible for pile inspection during installation and is it continuous?

A6. The contractor is responsible for keeping accurate field records of installation procedures and results during installation of all helical anchors and shall provide a copy of all the records to the owner within 24 hours of installation.

Q7. Explain the grout column section called out. Some piles don't require grout - only square shaft helicals which should not be acceptable for this application. Grouted columns in high water tables do not work well.

A7. Grout columns is an option, but not a requirement. The contractor is responsible for the design of the helical anchor system from the connection of the supported structure down.

Q8. Is the ground elevation at 4.00?

A8. See Sheet C-8 for approximate field elevations.

Q9. Specs mention using square bar helicals - please see Q7.

A9. Please refer to T618500 Part C.1 Central Steel Shaft. Consists of lead sections, helical extensions and plain extensions. Hot rolled round or round-cornered-square solid steel bars meeting the dimensional and workmanship required of ASTM A29.

Q10. Submittals with pile specs for bid, not signed until project is awarded. (cost to have the engineers sign off)?

A10. Please refer to ADDENDUM #4 for information regarding the submission of qualifications for helical pile design, engineering and installation with your bid.

Q11. Reference is made to plan sheet A-1 Detail 1 Observation Tower First Level Plan: *This detail calls for a bench to be furnished and installed, model 4FB4RP4F by Kay Park Recreation.* This model number does not appear on the manufacturer's site, nor can we locate any 4' long bench with recycled plastic 4x4's manufactured by this company. Please verify/confirm that this model number is correct and/or indicate where this material may be found.

A11. The bench shall be model 4FB4RP by Kay Park Recreation. The reference will be revised and issued with the addendum.

Q12. The provided soils information does not provide enough information to adequately design the helical pile size and anticipated installation depth for each helical pier. Please add a line item to the bid form for additional pile being supplied by contractor (or maybe a how many feet line to clarify what each bidder is estimating in their bid) given the lack of soils information beyond an 8' Depth at HA-1 & HA-4 and a 10' depth at HA-2 & HA-3. Or, do you have an average depth to be used for bidding purposes, e.g. 35' average depth?

A12. Per Technical Specification T-618500 Helical Anchor Foundation, The contractor shall perform all geotechnical and structural design and will install helical anchors that will develop the load capacities required....

The Geotechnical information provided in the report is for information only. If the contractor deems that additional geotechnical information is required it should be included in the Contractor's lump sum Base Bid. No additional payment shall be made.

Q13. Will additional clarifications included with the bid be acceptable?

A13. No

Q14. Will additional days be added to the contract in the event of weather delays?

A14. As per General Requirements (Specifications page 00 81 13-8), if progress of the Work is delayed at any time by changes ordered by the Owner, by labor disputes, fire, unusual delay in deliveries, abnormal adverse weather conditions, unavoidable casualties

or other causes beyond the Contractor's control, the Contract Time shall be extended for such reasonable time as the Owner may determine.

Q15. Section T-618500, (B) Submittals, Paragraph 1., b., is the intent of this section to require a geotechnical engineer to be on-site to supervise the installation of each helical pier permanently incorporated into the project? Please clarify this “engineer supervision” requirement.

A15. As per Specification T-618500 subsection (B) Submittals 1.b, the contractor shall assign an Engineer to supervise the work. (This does not dictate that the Engineer shall be on site). Subsection (B) 1.c The on-site foreman, who shall be in charge of all operations, shall also have experience on at least two projects over the past five years installing helical anchor foundations of similar scope to this project.

Q16. If all or any combination of the alternates is accepted, will additional days be added to the contract to allow for the completion of the add alternate items?

A16. No.

Q17. What third party tests and inspections, if any will be required for this project?

A17. All tests and inspections stated in the contractor documents (including specifications) and any additional tests or inspections required by permitting agencies at the contractor’s expense.

Q18. What mock-ups, if any are required for this project?

A18. Mock-ups are not a requirement of the contract documents.

Q19. Will a waste management coordinator be required for this project?

A19. Yes, see 017419 Construction Waste Management Part 1.4 Quality Assurance.

Q20. The bulk majority of the materials from this project would not be salvageable or recyclable with exception to the steel from the existing observation tower. Will dump tickets from the waste hauling company and the steel recycling facility be acceptable submittals (to be provided as the materials are hauled off-site) indicating where the materials were disposed and the weight of each dump in lieu of a waste management plan?

A20. Per 017419 Construction Waste Management, the contractor shall develop and submit a Waste Management Plan.

Q21. Has the DFW procured all required permits for the project? If not, what permits will the contractor be responsible for and what would the anticipated cost be of any permits that the contractor would be required to obtain?

A21. See Specification 012400 Permits. Part 3.1 for a list of permits that have been secured by the owner. Any additional permits required for the construction of the project shall be responsibility of the contractor. The cost of the Kent County building permit shall be reimbursed to the contractor as a change order to the contract.

Q22. The lead time to fabricate the Observation Tower framing will be fairly significant given the requirements for the required connections, will the NTP be issued based upon coordination with the low bidder to allow for the construction schedule of 140 calendar days to not start until after materials are available for installation? If not, will additional days be provided due to fabrication lead time?

A22. NTP will be provided within 30 days of receipt of the executed contract, bond and all required information as specified in the contract documents. The construction schedule shall start upon receipt of the State Purchase Order and NTP.

Q23. What are the liquidated damages for this project?

A23. None. Liquidated damages will not apply to this project.

Q24. Regarding the pile configuration, including the unbraced length of pile at the tower, has anyone calculated the reactions at the column base we're they attach to the pile cap for the observation tower. This are may require tiebacks for stability.

A24. Per T618500, The contractor is responsible for the design of the helical anchor system from the connection of the supported structure down.

Q25. In Specification Section T-057300 Boardwalk & Viewing Area Railings, in part 2.4 A Composite Boards it states the following: "Composite boards shall be selected from the approved list provided in the Plans and in the color indicated in the Plans." Can you provide the approved list and the required color?

A25. An approved list and color will be added to the plans and included in the addendum.

Q26. At the observation tower on drawing S-6, for the first and second level we need a detail on how to attach the 2x12 flooring joist to the 10x60 beam.

A26. See Note 10 on the Framing Plans for information regarding the connection.

Q27. On drawing S-7 detail 17 and drawings A-3 detail 3, shows a hand rail. Do type of hand rail do we use and what type of clip do we use to support the hand rail. Also will the hand rail be used on the boardwalk?

A27. The handrail shall meet the requirements of the Americans with Disabilities Act. The bracket shall be per the handrail manufacturer's recommendation or a shop drawing shall be submitted for review and approval.

Q28. Are the stair pans 3/16" or 5/8" material - both are shown on drawings?

A28. The stair pans are to be a 3/16" bent plate with closed risers per drawing S-6.

Q29. Are the channels and pans for the stairs core ten steel or galvanized?

A29. The channels and pans are to be CorTen Steel. See Drawing S-3 for Loading and angles of boardwalk.

Q30. Is all of the handrail at stair tower galvanized?

A30. The handrail shall be hot dipped galvanized matching the coatings as specified in T-057300 Part 2.H Coatings.

Q31. Are the brackets attached to bottom of handrail posts shown in 22/S-8 galv. or core ten steel?

A31. The brackets shall be CoreTen Steel.

Q32. Can we substitute rectangular tube steel instead of the double angle shown on type? handrail cut?

A32. The boardwalk and tower railing shown in the plans is a conceptual railing for the project. Per Specification T-057300, the design of the railing system is the responsibility of the Contractor based on the performance requirements in the special provision and the details provided in the plans. The double angle was provided to allow for minor horizontal and vertical adjustments while installing the panels in the field.

Q33. Does the entire new boardwalk get the steel infill panels that are shown on the stair tower?

A33. Yes, a note will be added to the boardwalk typical section on Sheet C-2 to reference Sheet A-4 Detail 2.

Q34. Section 015639- Temporary tree and protection, part 1, 1.2B 2 states “Section 311000 Site Clearing for removing existing trees and shrubs. However, 311000 does not exist in the specs and is not in the table of contents either. Will this section be supplied or omitted? If omitted, what section should this note be corrected to?

A34. Please reference DelDOT Specification Section 201 for Clearing and Grubbing requirements as listed in the Table of Contents.

Q35. The boardwalk will be supported on vertical and battered new construction helical piles. The piles are to support design working compression and tension loads of 20 and 10 kips, respectively. The angle of the battered piles is not provided and needs to be specified by the project engineer, or the horizontal load needs to be specified.

A35. See Drawing S-3 for loading and angles of boardwalk piles.

Q36. The existing boardwalk is supported on timber piles which will be abandoned in place. The timber piles which will interfere with the helical pile installations will be removed.

A36. See Sheet C-7 Note 3. Additionally, see T-618500 Part D Construction Methods 2.h, for additional guidance for substructure obstructions.

Q37. Sheet S-6 states that the loads for the helical piles that will support the isolated pile caps for the observation tower can be found on Sheet S-3. Sheet S-3 was not provided.

A37. See S-3 was included in the original contract documents and is included in the addendum.

Q38. The geotechnical investigation included the advancement of four hand auger borings with DCP tests to depths of 7.7 to 10 feet. Unfortunately, the provided soil explorations are not sufficient for the design of a deep foundation. Additional soil testing is required in order to identify the type and strength of soil below a depth of 10 feet. The additional testing could be performed by advancing soil borings using SPT or Shelby Tube samplers to a depth that is at least 10 feet deeper than the anticipated helical pile bearing depth (i.e. 10 feet of adequate material, plus another 10 feet). Typically, SPT N-values on the order of 10-25 bpf in sandy soils and N-values on the order of 15-30 bpf or unconfined compressive strength values (Qu) on the order of 3,750 to 7,500 psf in clay soils are preferred for providing the necessary end-bearing resistance for helical piles.

A38. Per Technical Specification T-618500 Helical Anchor Foundation, The contractor shall perform all geotechnical and structural design and will install helical anchors that will develop the load capacities required....

The Geotechnical information provided in the report is for information only. If the contractor deems that additional geotechnical information is required it should be included in the Contractor’s lump sum Base Bid. No additional payment shall be made.

Q39. The geotechnical report estimates that a 1.5-inch square bar shaft with three helix plates (diameters of plates not specified), installed to depths of 30 to 40 feet, can achieve an uplift capacity of 20 kips. They do not specify if 20 kips is an allowable or ultimate value. Since the soil explorations were only advanced to a depth of 10 feet, the basis of the helical pile configuration in the report is not known. I highly doubt an engineer will provide you with stamped drawings based on assumed soil conditions. Also, since the helical piles need to resist load reversal (compression and tension forces), hollow round shaft piles should be used to limit the amount of deflection.

A39. Per Technical Specification T-618500 Helical Anchor Foundation, The contractor shall perform all geotechnical and structural design and will install helical anchors that will develop the load capacities required....

The Geotechnical information provided in the report is for information only. If the contractor deems that additional geotechnical information is required it should be included in the Contractor's lump sum Base Bid. No additional payment shall be made.

Q40. Based on the elevations shown on Sheet C-8, it appears the maximum exposed pile length above grade will be on the order of 12 feet. Therefore, considering an axial compression load of 20 kips, an effective unbraced shaft length of 22 feet (12' above grade and 10' to a point of fixity), and a length factor (K) of 0.8, a shaft consisting of at least 4.5-inch diameter Schedule 80 pipe (Supportworks HP450) will likely be required for the boardwalk piles. The elevations should be verified.

A40. Per Technical Specification T-618500 Helical Anchor Foundation, The contractor shall perform all geotechnical and structural design and will install helical anchors that will develop the load capacities required....

The Geotechnical information provided in the report is for information only. If the contractor deems that additional geotechnical information is required it should be included in the Contractor's lump sum Base Bid. No additional payment shall be made. The contractor is responsible to verify field conditions.

Q41. On Drawing A-4, Detail 1 & 3, there is a double line underneath the perimeter channel, what does this double line represent? Does the bottom of 2x2 Wood joist get covered or stay exposed? Please clarify.

A41. Drawing A-4, Details 1 & 3 shall be revised to eliminate the double line. The joist shall be exposed.

- 2. SPECIFICATIONS:** The following specifications have been revised:
- a. T-618500 HELICAL ANCHOR FOUNDATION**

- 3. DRAWINGS:** The following drawings have been revised:
- a. Sheet C-2 CONSTRUCTION PLAN BASE BID**
 - b. Sheet A-1 OBSERVATION TOWER PLAN**
 - c. Sheet A-2 OBSERVATION TOWER ELEVATIONS**
 - d. Sheet A-3 STAIR PLAN & SECTIONS**
 - e. Sheet A-4 RAILING ELEVATIONS & DETAILS**
 - f. Sheet S-2 STRUCTURAL GENERAL NOTES**
 - g. Sheet S-3 STRUCTURAL SCHEDULES**
 - h. Sheet S-6 OBSERVATION TOWER PLANS**
 - i. Sheet S-7 OBSERVATION TOWER SECTIONS**

4. ADDITIONAL INFORMATION:

- 1. The Period for Questions ended on Wednesday, March 21. No additional questions will be addressed.

ALL OTHER TERMS AND CONDITIONS REMAIN THE SAME.

IF YOU HAVE ANY QUESTIONS, PLEASE CONTACT:

Anthony Gonzon (anthony.gonzon@state.de.us)

Attachments: None.

T-618500
HELICAL ANCHOR FOUNDATION

(A) GENERAL - Work under these items consists of furnishing all materials for and installing helical anchors according to the specifications contained herein, including the installation of all necessary connections to the supported structures. The terms “anchor” and “pile” are used interchangeably in these Contract Documents.

The Contractor shall be responsible for the design of the helical anchor system from the connection to the supported structure down. Design elements shall include the connection to the supported structure, vertical piles, battered piles, and bracing of the pile free length above grade. The Contractor shall select the helical anchor type, size, installation means and methods, and means and methods of connecting the helical anchor caps to the supported structures. The Contractor shall perform all geotechnical and structural design and will install helical anchors that will develop the load capacities required in accordance with the latest edition of the International Building Code (IBC); anticipated loads are shown on the plans. The helical anchors shall be designed with a minimum Factor of Safety equal to 2.0 for bearing capacity.

(B) SUBMITTALS –Verification of the following requirements, certifications and documents shall be submitted with the bid package for review and approval.

1. Qualifications.

- a. The Contractor shall have experience designing and installing helical anchors with similar site access, loading, and subsurface conditions. The Contractor shall submit descriptions of projects completed including construction and structural details and point of contact information for at least three previous successful projects utilizing helical anchor foundations of similar scope to this project completed in the last five years.
- b. The Contractor shall assign an Engineer to supervise the work with experience on at least two projects of similar scope to this project completed over the past five years. The Engineer shall be licensed to practice engineering in the State of Delaware. The Contractor shall not use a manufacturer’s representatives to satisfy the supervising Engineer requirement of this section. A manufacturer’s representative, shall be on-site during installation of at least the first helical anchor.
- c. The on-site foreman, who will be in charge full time of all operations, shall also have experience on at least two projects over the past five years installing helical anchor foundations of similar scope to this project.

- d. The helical anchors shall be designed by a licensed Professional Engineer, Licensed in the State of Delaware, with experience in the design of at least three successfully completed helical anchor foundation projects over the past five years. The helical anchors designer may be either an employee of the Contractor or a separate Consultant designer meeting the stated experience requirements.
- e. The Contractor shall submit the completed project reference list and personnel list with resumes. The project reference list shall include a brief project description with the owner's name and current phone number. The personnel list shall identify the supervising project Engineer, Registered Professional Engineer, and on-site foremen to be assigned to the project. The personnel list shall contain a summary of each individual's experience and be sufficiently complete for the Engineer to determine whether each individual satisfies the required qualifications. Additional time required due to incomplete or unacceptable submittals will not be cause for time extension or impact or delay claims. All costs and delays associated with incomplete or unacceptable submittals shall be borne by the Contractor.

2. Working Drawing Submittals.

- a. The Contractor shall submit complete engineering calculations and Shop Drawings for review and approval. The calculations and drawings shall be signed and sealed by a Registered Professional Engineer licensed in the State of Delaware. Calculations shall include an evaluation of the stability of the pile free length above grade and design of bracing if required.
- b. Provide shop drawings indicating product components and accessories, and indicating the following:
 - 1) Helical screw anchor number.
 - 2) Location and pattern by assigned identification number.
 - 3) Helical screw anchors design load.
 - 4) Type and size of central steel shaft.
 - 5) Helix configuration (number, vertical spacing, and diameter of helix plates).
 - 6) Required minimum effective installation torque.
 - 7) Displacement plates/ centralizers and their location.
 - 8) Minimum overall length.
 - 9) Inclination of helical screw anchors.
 - 10) Grout column length.
 - 11) Minimum cased length.
 - 12) Grout column diameter(s).
 - 13) Cutoff elevation.
 - 14) Details of the attachment to the supported structure.
 - 15) Details of bracing of the pile free length as required by design.

- c. General notes for constructing and installing the structures with a helical anchor foundation including construction sequencing, acceptance criteria, or other special construction requirements.
- d. Within twenty four (24) hours after installation of each helical anchor, submit to Engineer the installation record(s). See Construction Methods 3.b for required information.

3. Construction Submittal.

- a. The Contractor shall prepare and submit for review and approval a detailed step-by-step description of the proposed helical anchor installation procedure, including personnel, and equipment to assure quality control. This step-by-step procedure shall be indicated on the working drawings in sufficient detail to allow the Engineer to monitor construction and quality.

4. Quality Assurance/Control Submittals.

- a. Certified test reports showing compliance with specified characteristics and physical properties.
- b. Manufacturer's certificate that products meet or exceed specified requirements.
- c. Mill test reports.
- d. Accurately record the type, size and actual locations of helical screw anchors, torque installation records on all helical screw anchors and torque monitoring calibration data.

5. Final Location Drawings.

- a. Within thirty (30) days after completion of required work, the Contractor shall submit an accurate print or prints showing the locations and top and bottom elevations of all installed helical anchors.
- b. Within thirty (30) days after completion of required work, the Contractor shall submit as-built drawings, including installation records. Provide revised design calculations signed by the approved Licensed Professional Engineer for all design changes made during the construction and installation of the helical anchors.

(C) MATERIALS - All materials for this work shall be new and without defect. Defective materials shall be removed from the jobsite at no additional cost. All helical anchors shall be hot dipped galvanized for corrosion protection.

1. Central Steel Shaft:

- a. Consists of lead sections, helical extensions and plain extensions. Hot rolled round or round-cornered-square solid steel bars meeting dimensional and workmanship requirements of ASTM A29. The bar shall be either modified medium carbon steel grade with a minimum yield strength of 70 ksi, or high strength low alloy, low to medium carbon steel grade with a minimum yield strength of 90 ksi.

2. Helix Bearing Plate:

- a. Hot rolled carbon steel sheet, strip or plate formed on matching metal dies to true helical shape and uniform pitch. Bearing plate material shall conform to the following ASTM specifications:
 - 1) ASTM A572, or ASTM A1018 or ASTM A656 with minimum yield strength of 50 ksi. Plate thickness $\frac{3}{8}$ -inch.
 - 2) ASTM A656 or ASTM A1018 with minimum yield strength of 80 ksi. Plate thickness $\frac{3}{8}$ -inch.
 - 3) ASTM S656 or ASTM A1018 with minimum yield strength of 80 ksi. Plate thickness $\frac{1}{2}$ -inch.
 - 4) ASTM A36, or ASTM A572, or ASTM A1018 or ASTM A656 depending on helix diameter, per the minimum yield strength requirement cited above. Plate thickness $\frac{3}{8}$ -inch.

3. Bolts:

- a. The size and shape of bolts used to connect the central steel shaft section together shall conform to the following ASTM specification:
 - 1) $\frac{3}{4}$ -inch diameter bolt per ASTM A320 Grade L7.
 - 2) $\frac{7}{8}$ -inch diameter bolt per ASTM A193 Grade B7.
 - 3) $1\frac{1}{8}$ -inch diameter bolt per ASTM A193 Grade B7.
 - 4) $1\frac{1}{4}$ -inch diameter bolt per ASTM A 193 Grade B7.
 - 5) $\frac{3}{4}$ -inch diameter bolts (3 per coupling) per SAE J429 Grade 5.

4. Couplings shall be formed as integral part of the plain and helical extension material.

5. Fabricate displacement plates from steel or other material that will not affect the structural integrity of the central steel shaft or grout column. Do not use wood for this purpose.

6. For structural steel plates and shape for helical screw anchors top attachments, conform to ASTM A36 or ASTM A572, Grade 50 (Grade 345).
7. Steel casing shall conform to requirements of ASTM A53 Type E or S Grade B, ASTM A252 Grade 2, ASTM A500 Grade B or ASTM A618.
8. Corrosion Protection shall be provided in accordance with helical screw anchor manufacturer's recommendations. Above ground portions of the piles shall be hot dip galvanized per ASTM A123 and A153.

(D) CONSTRUCTION METHODS - The following minimum procedures shall be performed.

Work shall not be started, nor materials ordered until the Engineer's written approval of the Contractor's experience qualifications is given. The Engineer may suspend work if the Contractor uses non-approved personnel. If work is suspended, the Contractor shall be fully liable for all resulting costs and no adjustment in contract time or cost will result from the suspension.

The Contractor shall visit the site to assess the site geometry, equipment access conditions, and location of existing structures and utilities. The Contractor is responsible for field location and verifying the locations of all utilities shown on the plans prior to starting work.

All helical anchor material shall be handled and transported carefully to prevent any deformation or damage. Care should be taken to prevent the accumulation of dirt, mud or other foreign matter on the steel materials. Such accumulation shall be completely removed prior to the installation.

1. General:

- a. Comply with the instructions and recommendations of the power installed helical screw anchors manufacturer.
- b. Verify that site conditions are acceptable and installation of power installed helical screw anchors are in accordance with all pertinent codes and regulations regarding such items as underground obstructions, right-of-way limitations, utilities, etc.
- c. The helical screw anchors installation technique shall be consistent with the geotechnical, site access, logistical, environmental and load carrying conditions of the project.

- d. Installation equipment shall be rotary type, hydraulic power driven torque motor with clockwise and counterclockwise rotation capabilities.
 - e. Utilize a torque motor capable of continuous adjustment to number of revolutions per minute (RPM) during installation and with a torque capacity 15% greater than the torsional strength rating of the central steel shaft to be installed. Do not use percussion drilling equipment.
 - f. Utilize equipment capable of applying adequate downward pressure and torque simultaneously to suit project soil conditions and load requirements, and capable of continuous position adjustment to maintain proper helical screw anchors alignment.
 - g. A calibrated torque indicator shall be used during helical screw anchors installation. The torque indicator may be an integral part of the installation equipment or mounted inline with the installation tooling.
2. Installation:
- a. Engage and advance helical screw anchors into soil in a smooth, continuous manner at a rate of 5-20 RPM. Provide extension sections to obtain the required minimum overall length and installation torque as shown on the shop drawings. Connect sections together using coupling bolt and nut tightened to torque of 40 ft-lb or as specified in approved shop drawings.
 - b. Apply sufficient down pressure to uniformly advance the helical screw anchor a minimum of 80% of the distance equal to the pitch of the helix plate per revolution. Adjust rate of rotation and magnitude of down pressure for different soil conditions and depths.
 - c. Position a lead displacement plate of appropriate diameter on the central steel shaft at the location necessary to install the grout column as shown on the shop drawings. Do not position the lead displacement plate closer than 12 inches above the top helix plate. Position additional lead displacement plates or extension displacement plates no more than 7 feet apart. Displacement plates shall permit the free flow of grout without misalignment of the central steel shaft.
 - d. If required, install casing in segments corresponding to the section of the central steel shaft. Advance casing into the soil by direct connection with lead and extension displacement plates. Fill each casing segment with grout immediately after placement.
 - e. Satisfy the minimum installation torque and minimum overall length criteria as shown on the shop drawings prior to terminating the helical screw anchors. The

torque as measured during the installation shall not exceed the torsional strength rating of the central steel shaft.

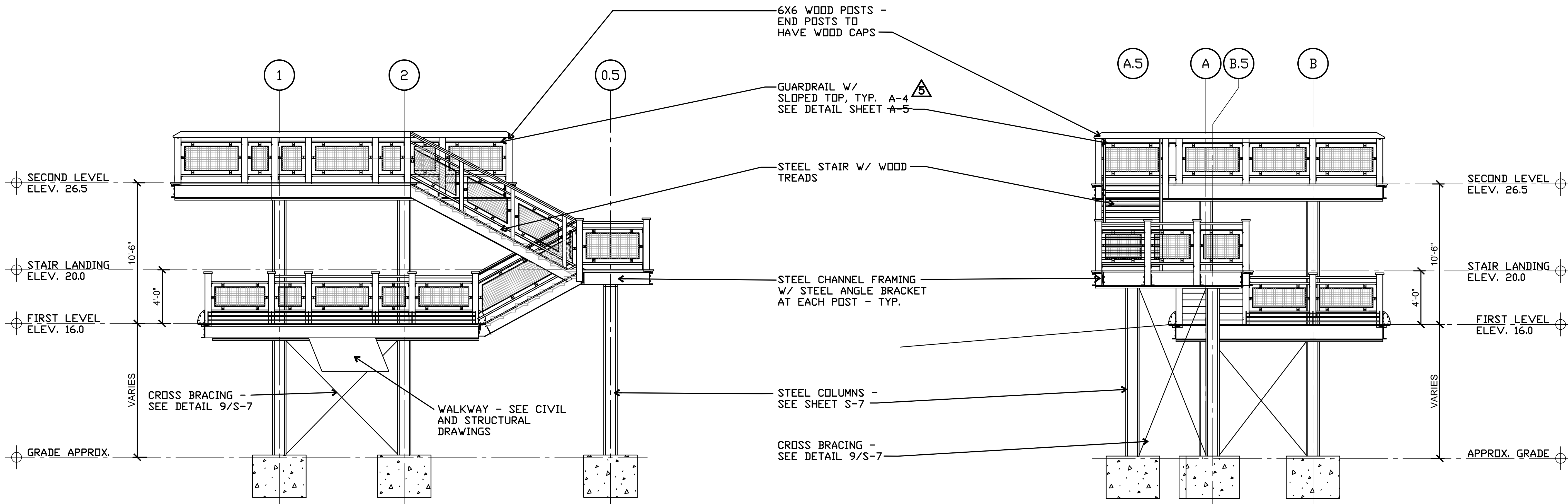
- f. The uppermost helix shall be installed at least three diameters into competent load-bearing soil.
 - g. Center-to-center spacing of adjacent piles shall be greater than or equal to five diameters of the largest helix.
 - h. If the helical screw anchors is refused or deflected by a subsurface obstruction, Contractor shall terminate the installation and remove the pile. Remove the obstruction, if feasible, and reinstall the helical screw anchors. If not feasible to remove the obstruction, install the helical screw anchor at an adjacent location, subject to review and acceptance by the Professional Engineer that was responsible for the helical screw anchor system design, and approved by the Engineer.
 - i. Install helical screw anchors to the following allowable tolerances:
 - a. Centerline of piling shall not be more than 3 inches from the indicated plan location.
 - b. Pile plumbness shall be within 2 degrees of design alignment.
 - c. Top elevation of pile shall be within +1 inch to -2 inches of the design vertical elevation.
 - d. Centerline of central steel shaft shall not be more than $\frac{3}{4}$ inch from the centerline of the pile.
3. Testing:
- a. Perform helical screw anchors load test in accordance with ASTM D1143 Quick Procedure. Load tests shall be performed for representative helical anchors supporting loads greater than or equal to 40 kips. At least one helical anchor shall be load tested in each area of uniform subsoil conditions.
 - b. Site Test Records: Provide the Engineer copies of field test reports within 24 hours after completion of the load tests. Include, at a minimum, the following information.
 - 1) Name of project and Contractor.
 - 2) Name of Contractor's supervisor during installation.
 - 3) Name of third party test agency, if applicable.
 - 4) Date, time and duration of test.
 - 5) Location of helical screw anchors by assigned identification number.
 - 6) Type of test (i.e., tension or compression).
 - 7) Description of calibrated testing equipment and test setup.

- 8) Actual helical screw anchor type and configuration, including lead section, number and type of extension sections.
- 9) Steps and duration of each load increment.
- 10) Cumulative pile-head movement at each load step.
- 11) Comments pertaining to interruptions, obstructions or other relevant information.
- 12) Signed by third party test agency representative, registered Professional Engineer or as required by local jurisdiction.

4. Protection:

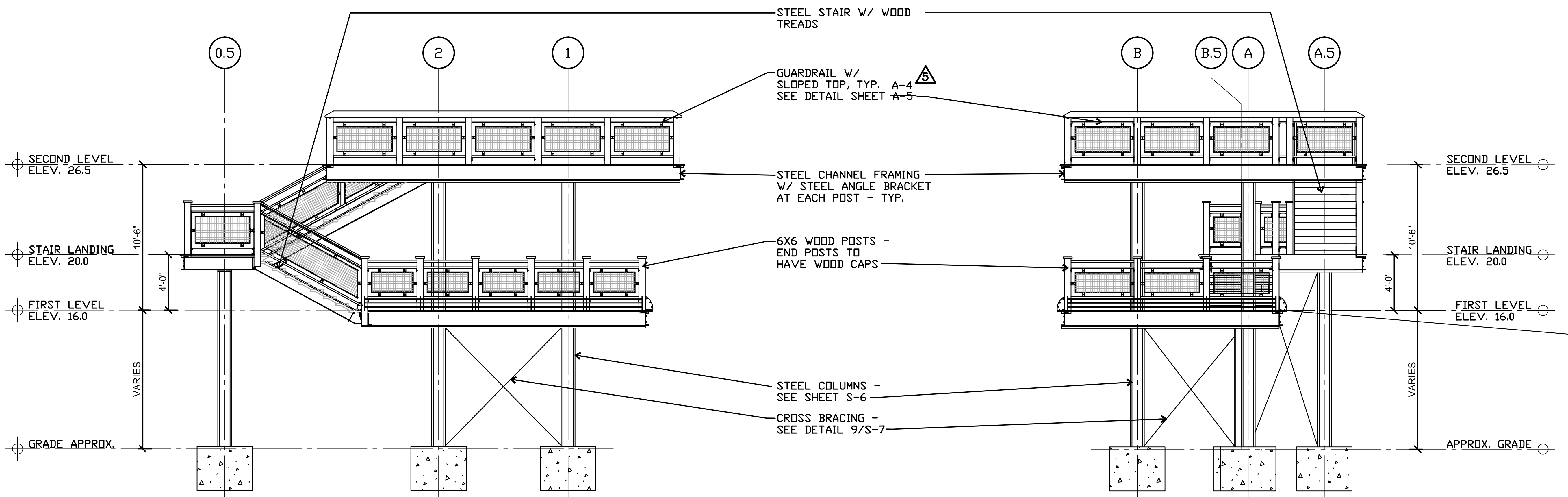
- a. Protect installed work from damage due to subsequent construction activity on the site.

END OF SECTION T-618500



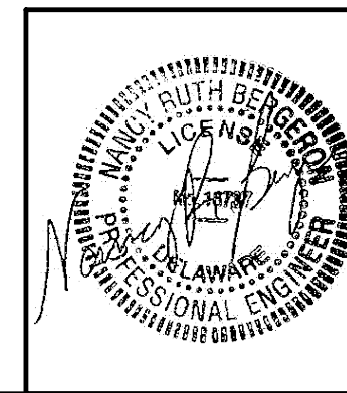
1 West Elevation
1/4"=1'-0"

2 South Elevation
1/4"=1'-0"

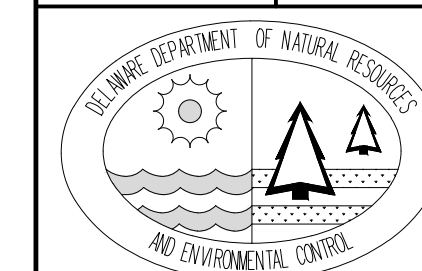


3 East Elevation
1/4"=1'-0"

4 North Elevation
1/4"=1'-0"



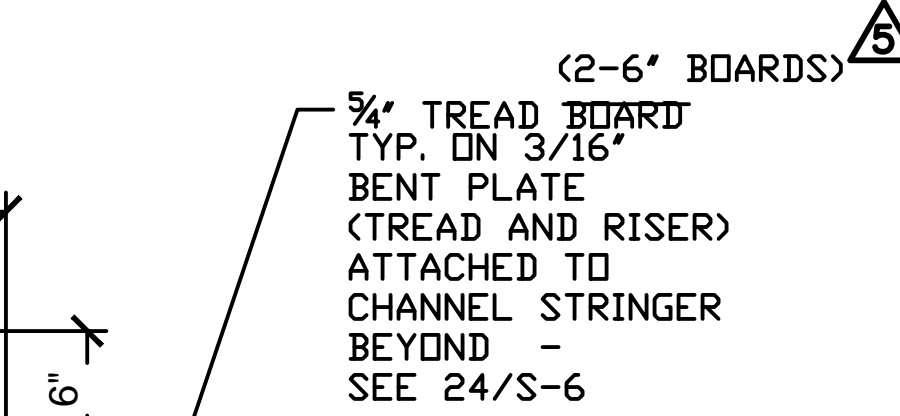
DELAWARE BAYSHORE BYWAY LITTLE CREEK BOARDWALK AND WILDLIFE OBSERVATION TOWER OBSERVATION TOWER ELEVATIONS



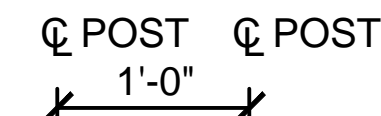
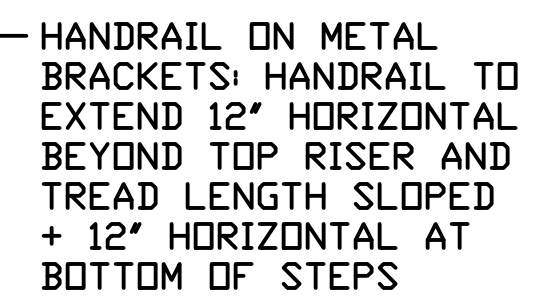
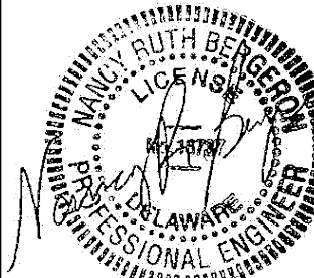
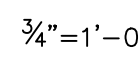
DESIGNED BY:	RKK
DRAWN BY:	RKK
BUILDING NO.:	N/A
DATE:	DECEMBER 1, 2017
SCALE:	AS NOTED
SHEET NO.:	A-2
DFW PROJECT #:	FW-2-15
CONTRACT #:	FW-2-15

DATE:	DESCRIPTION:	BY:
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7/14/2017	50% SUBMITTAL
11/2/2017	ISSUED FOR PERMIT
12/1/2017	ISSUED FOR BID
3/21/2018	APPENDUM #5



$$1 \cancel{\frac{1}{2}}'' = 1' - 0''$$

$$1\frac{1}{2}'' = 1'-0''$$

$$1'' = 1' - 0''$$

$$1/2'' = 1' - 0''$$


RKK

RKK

N/A

DECEMBER 1, 2017

AS NOTED

A 2

PROJECT #:

FW-2-15

FW-2-15

[illegible]

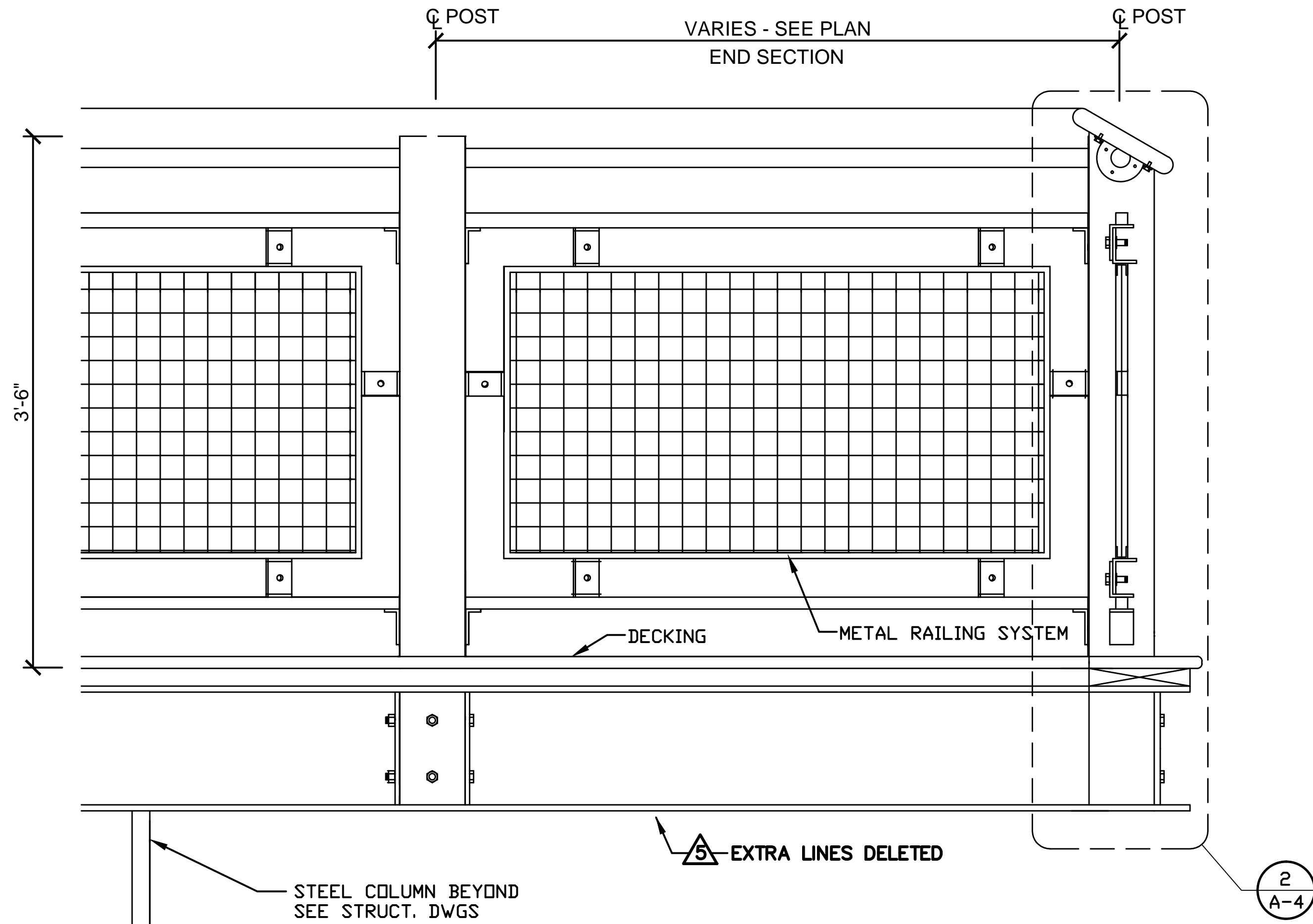
7/14/2017	50% SUBMITTAL
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7/14/2017	50% SUBMITTAL
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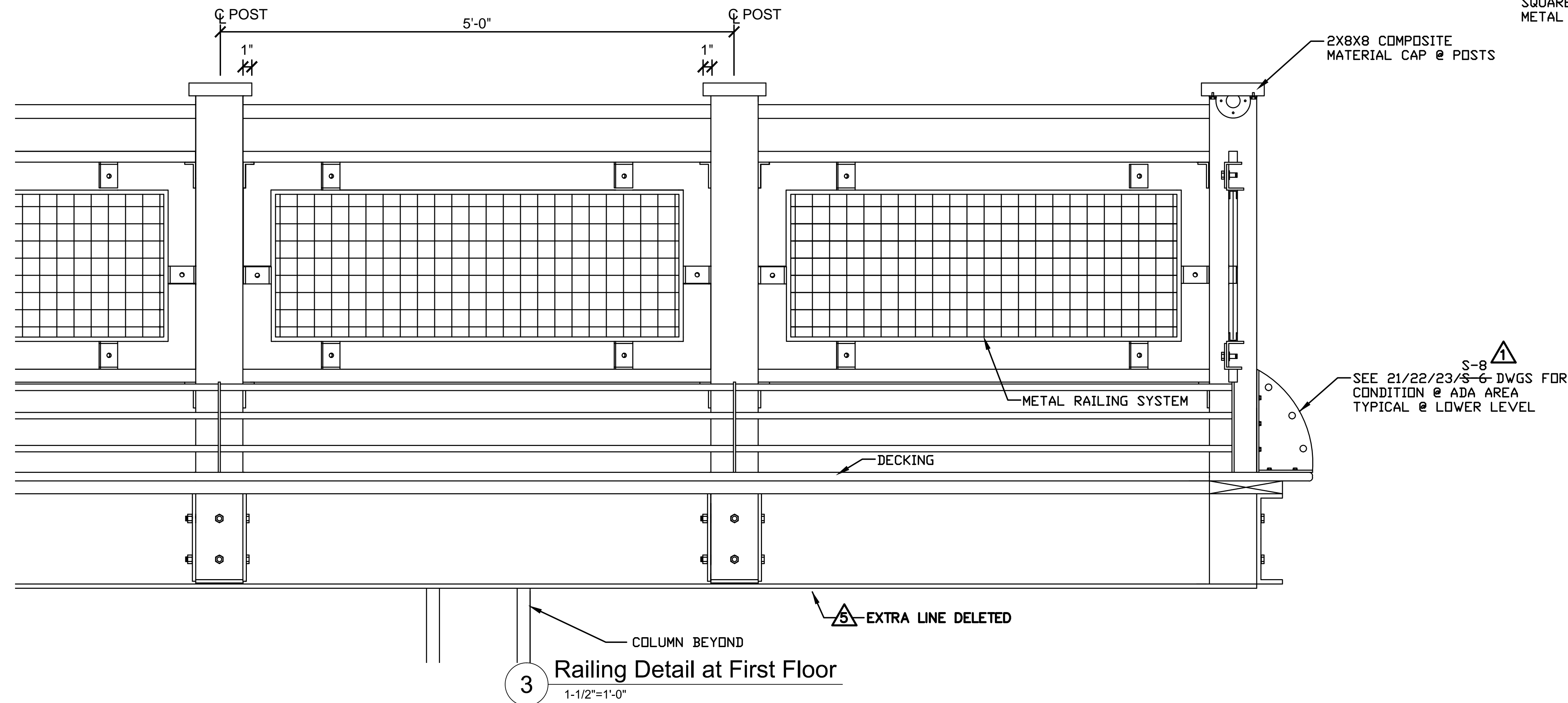
7/14/2017	50% SUBMITTAL
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7/14/2017	50% SUBMITTAL
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11/28/2017 3:54 PM \\barsv05\2015\15010_dnrctf\TASK 3 - Little Creek Observation Tower\Architectural\ACAD\Plans\15101-AP-A4.dwg



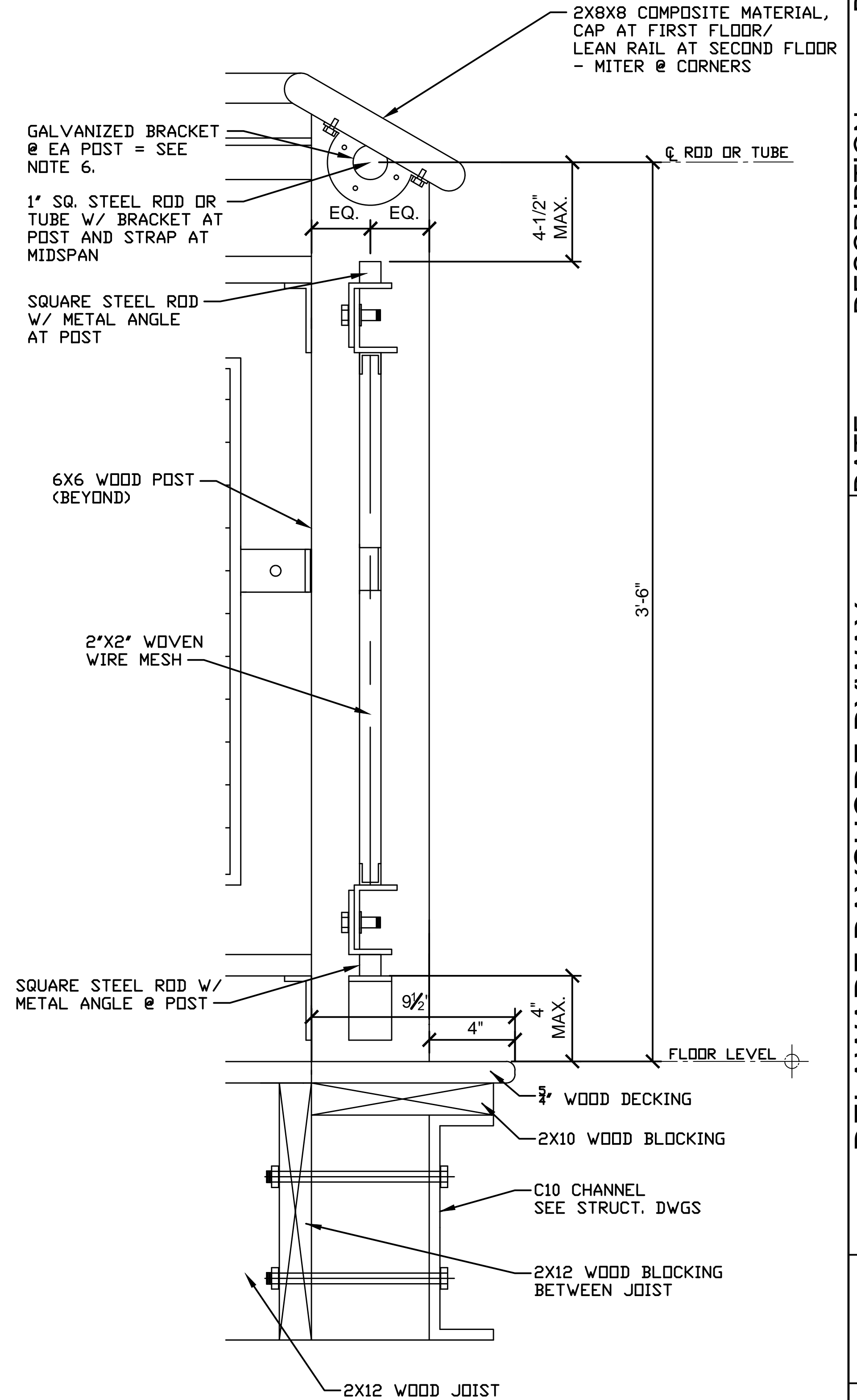
1 Railing Elevation Detail
1-1/2"=1'-0"



3 Railing Detail at First Floor
1-1/2"=1'-0"

RAILING NOTES:

1. SEE SPECIAL PROVISIONS FOR RAILING DELEGATED DESIGN REQUIREMENTS.
2. SET RAILING POSTS PLUMB THROUGHOUT, INCLUDING RAMPED SECTIONS OF THE BOARDWALK WHERE THE WALKING SURFACE IS NOT LEVEL. FABRICATE INFILL PANELS AND POST CONNECTIONS TO ACCOMMODATE GRADE.
3. RAILING POST CONNECTION CONFIGURATIONS FOR WHICH A DETAIL HAS NOT BEEN PROVIDED SHALL BE SECURELY BRACED AND CONNECTED USING METHODS SIMILAR TO THOSE SHOWN HERE. CONNECTIONS SHALL INCLUDE BEARING PLATES TO PROVIDE A LARGE BEARING AREA UNDER THE BOLT HEADS AND TENSION HOLDDOWNS TO TRANSMIT PRYING FORCES INTO THE JOISTS / BLOCKING THROUGH SHEAR IN THE FASTENERS. IN NO CASE SHALL RAILING POSTS BE CONNECTED ONLY TO THE RIM JOIST.
4. THE RAILING SHALL NOT ALLOW PASSAGE OF A 4" SPHERE AT ANY POINT.
5. HANDRAILS ARE REQUIRED FOR THE FULL LENGTH OF THE BOARDWALK AND AT STAIRWAY AND SHALL RETURN TO THE RAILING AT EACH END. HANDRAILS ON THE SECOND LEVEL ARE ADD/ALTERNATE NO. 3.
6. GALVANIZED STEEL BRACKETS SHALL BE PROVIDED AT POSTS TO RESTRICT LATERAL MOVEMENT OF THE 1 1/2" DIA. STEEL ROD OR TUBE. INTERMEDIATE STEEL STRAPS SHALL BE PROVIDED AT MIDSPAN OF THE STEEL ROD OR TUBE WHEREVER THE COMPOSITE TOP RAIL IS PRESENT. THE BRACKETS SHALL BE ATTACHED TO THE POSTS. THE COMPOSITE TOP RAIL SHALL BE ATTACHED TO THE BRACKETS AND INTERMEDIATE STRAPS.
7. ALL STEEL COMPONENTS SHALL BE HOT DIP GALVANIZED.



2 Railing Section Detail
3"=1'-0"



SIGNAGE TO BE BOLTED TO POST W/ GALVANIZED SCREW AND WASHERS TYP. (4) EA. SIGN

6"X6" Accessible Sign
@ Entrance at Lower Level

4 3"=1'-0"

DATE:		DESCRIPTION:		BY:	
7/14/2017	50% SUBMITTAL	11/2/2017	ISSUED FOR PERMIT		
12/1/2017	ISSUED FOR BID	3/9/2018	ADDENDUM #1		
3/21/2018	ADDENDUM #5				
DELaware BAYSHORE BYWAY LITTLE CREEK BOARDWALK AND WILDLIFE OBSERVATION TOWER					
RAILING ELEVATIONS & DETAILS					
DESIGNED BY: RKK					
DRAWN BY: RKK					
BUILDING NO.: N/A					
DATE: DECEMBER 1, 2017					
SCALE: AS NOTED					
SHEET NO.: A-4					
DFW PROJECT #: FW-2-15					
CONTRACT #: FW-2-15					

OVERALL PROJECT REQUIREMENTS	
NOTES	
1	ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH ALL DRAWINGS AND SPECIFICATIONS CONTAINED HEREIN.
2	ALL WORK RELATED TO THE STAGING, CONSTRUCTION PRACTICES, AND SAFETY OF THE PROJECTS WORKERS AND PROPERTY SHALL BE CONSIDERED MEANS AND METHODS AND SHALL BE COMPLETED BY THE CONTRACTOR IN ACCORDANCE WITH STANDARD INDUSTRY PRACTICE AND ALL CODES AND STANDARDS. VISITS TO THE SITE MADE BY THE ENGINEER ARE FOR THE REVIEW OF THE STRUCTURAL WORK FOR GENERAL CONFORMANCE WITH THE DRAWINGS AND SPECIFICATIONS AND ARE NOT FOR THE REVIEW OF CONTRACTOR RESPONSIBILITIES, INCLUDING BUT NOT LIMITED TO PROJECT SAFETY AND MEANS AND METHODS OF CONSTRUCTION.
3	ALL DRAWINGS HAVE BEEN PREPARED IN ACCORDANCE WITH THE 2015 INTERNATIONAL BUILDING CODE, AS WELL AS ALL REFERENCED STANDARDS CONTAINED THEREIN.
4	EVALUATION AND COMPLIANCE WITH LOADING RESTRICTIONS FOR MEANS AND METHODS OF CONSTRUCTION AS WELL AS STAGING FOR OTHER TRADES ARE THE RESPONSIBILITY OF THE CONTRACTOR.
5	ALL WORK SHALL BE INSPECTED IN ACCORDANCE WITH CHAPTER 17 OF THE REFERENCED BUILDING CODE. SUBMIT ALL REPORTS TO THE ENGINEER OF RECORD FOR REVIEW. AT THE COMPLETION OF THE PROJECT, THE SPECIAL INSPECTION REPORT SHALL BE COMPLETED, SIGNED BY THE SPECIAL INSPECTOR, AND SUBMITTED TO THE ENGINEER OF RECORD FOR RECORD PURPOSES.
6	SCALING OF DRAWINGS TO DETERMINE DIMENSIONS OF ELEMENTS IS NOT PERMITTED.
7	STRUCTURAL DRAWINGS SHALL NOT BE REPRODUCED TO CREATE SHOP DRAWINGS OR SHORING DOCUMENTATION WITHOUT THE EXPRESS WRITTEN CONSENT OF MACINTOSH ENGINEERING.
8	ALL HORIZONTAL AND VERTICAL DIMENSIONS CONTAINED ON THE STRUCTURAL DRAWINGS WERE DEVELOPED BY OTHER DISCIPLINES FOR THE PURPOSE OF THIS PROJECT. ANY DIMENSIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS SHOULD BE COORDINATED WITH THE OTHER DISCIPLINE DRAWINGS.
9	THE STRUCTURAL DOCUMENTS ARE TO BE USED IN COORDINATION WITH THE ARCHITECTURAL, MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS AND SPECIFICATIONS AS WELL AS THOSE OF ALL OTHER DISCIPLINES. ANY DISCREPANCIES SHOULD BE BROUGHT TO THE ATTENTION OF THE DESIGN TEAM PRIOR TO THE COMMENCEMENT OF WORK.
10	ALL REQUESTED CHANGES IN WORK BY THE CONTRACTOR ARE SUBJECT TO THE APPROVAL OF THE DESIGN TEAM AND OWNER AND ARE CONSIDERED TO BE COMPLETED AT NO ADDITIONAL COST UNLESS SPECIFICALLY APPROVED. APPROVAL OF REQUESTED CHANGES DOES NOT CONSTITUTE APPROVAL OF AN INCREASE IN PROJECT COSTS.

SHOP DRAWING REQUIREMENTS	
NOTES	
1	SHOP DRAWINGS SHALL BE SUBMITTED FOR THE FOLLOWING ITEMS FOR THIS THE PROJECT:
1.1	CONCRETE MIX DESIGNS INCLUDING ALL LABORATORY TESTING, MATERIALS, ETC.
1.2	REINFORCING SHOP DRAWINGS
1.3	ANCHOR BOLT AND CONCRETE EMBEDDED ASSEMBLIES
1.4	STEEL FRAMING
1.5	HELICAL PILE ANCHORS

FOUNDATIONS	
NOTES	
1	PERFORM ALL FOUNDATION PREPARATION, EXCAVATION, PLACEMENT OF STRUCTURAL FILL AND / OR SOIL IMPROVEMENT WORK IN STRICT ACCORDANCE WITH THE GEOTECHNIAL EVALUATION AS PREPARED BY GEO-TECHNOLOGY ASSOCIATES (PROJECT NO. 170072, DATED FEBRUARY 28, 2017)
2	BOTTOM OF ALL FOOTINGS SUBJECTED TO FREEZE THAW CONDITIONS SHALL BE A MINIMUM 32 INCHES BELOW FINISH GRADE OR TOP OF SLAB ELEVATION WHICHEVER IS LOWER.
3	ALL STEEL HELICAL PILES SHALL BE AS SPECIFIED IN THE GEOTECHNICAL REPORT AND SHALL BE CAPABLE OF SAFELY SUPPORTING LOADS SHOWN ON DRAWING S-3.
4	PILING CONTRACTOR SHALL HAVE A MINIMUM OF 5 YEARS OF EXPERIENCE INSTALLING AND MONITORING THE SPECIFIED PILE TYPE.

STEEL	
NOTES	
1	ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH THE LATEST AISC CODE. ALL STRUCTURAL STEEL SHALL BE ASTM A588 GRADE 50 WEATHERING STEEL, CORTEN OR EQUAL TO BE APPROVED BY THE OWNER AND ENGINEER.
2	ORIENT ALL MILL CAMBER UPWARD DURING FABRICATION AND ERECTION.
3	ALL BOLTS USED FOR THE ANCHORAGE TO CONCRETE AS SPECIFIED ON THE DRAWINGS SHALL CONFORM TO ASTM F1554.
4	ALL CONNECTIONS SHALL BE BOLTED WITH A MINIMUM OF 3/4" A325N HIGH STRENGTH BOLTS OR WELDED AS DESIGNED BY THE STEEL FABRICATOR.
5	PROVIDE FULL DEPTH DOUBLE ANGLE CONNECTIONS ON ALL GIRDER AND BEAM CONNECTIONS TO COLUMNS. BOLTS SHALL BE AT 3-INCH O/C VERT.
6	FABRICATOR SHALL ADHERE TO ALL OSHA FEDERAL REGISTER STANDARDS SECTION 1926.777 WITH REGARD TO CONNECTION DESIGN.
7	ALL TENSION CONTROLLED BOLTS SHALL CONFORM TO THE REQUIREMENTS OF ASTM F1852 AND F2280.
8	ALL BRACE CONNECTIONS SHALL BE BOLTED WITH A MINIMUM OF 3/4 DIAMETER A325-SC HIGH STRENGTH BOLTS OR WELDED.
9	ALL STEEL WELDING RODS SHALL BE E70XX FOR STEEL CONNECTIONS
10	SUBMIT ALL STEEL SHOP DRAWINGS FOR REVIEW PRIOR TO ANY FABRICATION. SUBMIT CALCULATIONS FOR ALL BRACE CONNECTIONS TO COLUMNS (CALCULATIONS NEED NOT BE SIGNED AND SEALED)
CONCRETE	
NOTES	

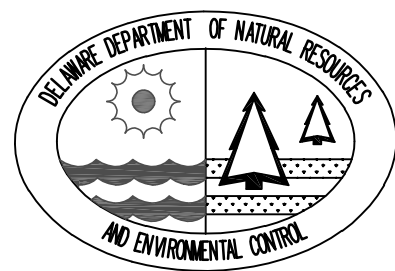
1	ALL CONCRETE SHALL BE READY-MIX AND PROPORTIONED ON THE BASIS OF LABORATORY TRIAL MIXTURE OR FIELD TEST DATA OR BOTH ACCORDING TO ACI301. DESIGN MIXTURES SHALL MEET THE REQUIREMENTS BELOW:
1.1	FOOTINGS AND FOUNDATION WALLS
	COMPRESSIVE STRENGTH OF 4500 PSI AT 28 DAYS MINIMUM.
	EXPOSURE CATEGORY: F2
2	ALL CONCRETE EXPOSED TO EXTERIOR CONDITIONS SHALL HAVE CHARACTERISTICS IN ACCORDANCE WITH ACI BUILDING CODE (ACI 318) AND THE 2015 INTERNATIONAL BUILDING CODE
3	CONTRACTOR IS RESPONSIBLE FOR THE PREPARATION OF DESIGN MIXTURES FOR EACH APPLICATION/LOCATION USED IN CONSTRUCTION AS NOTED ABOVE AND ON THE DRAWINGS.
4	ALL CONCRETE WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE LATEST EDITIONS OF THE ACI BUILDING CODE (ACI 318), THE ACI DETAILING MANUAL (SP-66), AND THE SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS (ACI 301).
5	ALL REINFORCING STEEL SHALL BE MANUFACTURED FROM HIGH STRENGTH BILLET STEEL CONFORMING TO ASTM DESIGNATION A615 GRADE 60. LAP ALL BARS MINIMUM 48 BAR DIAMETERS UNLESS OTHERWISE NOTED.
6	CONCRETE SHALL ACHIEVE A MINIMUM OF 70 PERCENT OF THE DESIGN STRENGTH PRIOR TO STEEL ERECTION. WRITTEN CONFIRMATION OF THIS STRENGTH SHOULD BE SUBMITTED TO THE ENGINEER OF RECORD PRIOR TO THE COMMENCEMENT OF STEEL ERECTION.
7	SHOP DRAWINGS FOR CONCRETE MIX DESIGNS SHALL INCLUDE THE FOLLOWING INFORMATION:
7.1	MIXTURE IDENTIFICATION BY APPLICATION/LOCATION
7.2	SPECIFIED COMPRESSIVE STRENGTH, f'c, THAT IS APPLICABLE FOR THE APPLICATION
7.3	SPECIFIED EXPOSURE CLASS
7.4	DOCUMENTATION OF STRENGTH TEST RECORDS OF SIMILAR CLASS OF CONCRETE USED TO ESTABLISH STANDARD DEVIATION IN ACCORDANCE WITH ACI 318, WHEN TEST RECORDS EXIST
7.5	REQUIRED AVERAGE COMPRESSIVE STRENGTH, f'CR, FOR EACH CLASS OF CONCRETE
7.6	DOCUMENTATION OF REQUIRED AVERAGE COMPRESSIVE STRENGTH, f'CR, USED AS THE BASIS FOR SELECTION OF CONCRETE PROPORTIONS
7.7	INTENDED PLACEMENT METHOD
7.8	SLUMP OR SLUMP FLOW
7.9	AIR CONTENT
7.10	DRY AND WET DENSITY
7.11	W/C RATIO
7.12	DOCUMENTATION SUPPORTING OTHER SPECIFIED REQUIREMENTS OF CONCRETE MIXTURES
7.13	NOMINAL MAXIMUM AGGREGATE SIZE OR SIZE NUMBER
7.14	TYPE AND INFORMATION ABOUT THE INGREDIENT MATERIALS PROPOSED FOR USE.
8	CONCRETE TESTING SHALL CONFORM TO THE FOLLOWING:
8.1	SAMPLES SHALL BE TAKEN AT LEAST ONCE PER DAY AND ONCE FOR EACH 50cy OR 5000sf OF PLACED CONCRETE
8.2	TAKE SLUMP, AIR, TEMPERATURE FOR EACH CONCRETE CYLINDER SET TAKEN
8.3	CYLINDER TESTS SHALL BE AS FOLLOWS:
8.3.1	TEST ONE SET OF TWO CYLINDERS AT 7 DAYS
8.3.2	TEST ONE SET OF TWO CYLINDERS AT 28 DAYS
8.3.3	TEST ONE SET OF TWO CYLINDERS AT 56 DAYS

TIMBER	
NOTES	
1	ALL STRUCTURAL TIMBER FRAMING, WALLS, BLOCKING, ETC SHALL BE HEM FIR #2 MINIMUM, STRESS GRADE LUMBER OR APPROVED EQUAL.
2	ALL STRUCTURAL TIMBER FRAMING SHALL HAVE THE FOLLOWING MINIMUM ALLOWABLE PROPERTIES - Fb = 850 PSI, Fv = 150 PSI, E = 1,300,000 PSI
3	ALL STRUCTURAL TIMBER MUST BE STAMPED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF TIMBER CONSTRUCTION'S "CONSTRUCTION MANUAL".
4	ALL STRUCTURAL TIMBER MUST BE STAMPED IN ACCORDANCE WITH THE AMERICAN INSTITUTE OF TIMBER CONSTRUCTION'S "CONSTRUCTION MANUAL".
5	ALL TIMBER AND TIMBER CONSTRUCTION SHALL COMPLY WITH LATEST EDITIONS OF THE FOLLOWING STANDARDS:
5.1	AMERICAN INSTITUTE OF TIMBER CONSTRUCTION: TIMBER CONSTRUCTION MANUAL.
5.2	NATIONAL FOREST PRODUCTS ASSOCIATION: NATIONAL DESIGN SPECIFICATION FOR WOOD CONSTRUCTION.
5.3	AMERICAN WOOD-PRESERVERS ASSOCIATION STANDARDS.
5.4	NATIONAL LUMBER MANUFACTURERS ASSOCIATION: NATIONAL DESIGN SPECIFICATION FOR STRESS-GRADE LUMBER AND ITS FASTENINGS.
6	ALL TIMBER CONNECTIONS SHALL BE MADE USING PREFABRICATED CONNECTORS. TOE-NAILING IS NOT PERMITTED AS THE FINAL CONNECTION UNLESS OTHERWISE APPROVED BY THE ENGINEER. SUBMIT MANUFACTURER'S DATA FOR REVIEW. FASTENERS SHALL BE AS MANUFACTURED BY SIMPSON STRONGTIE OR APPROVED EQUAL.
7	PROVIDE MINIMUM CONTINUOUS SOLID BLOCKING OR CROSS-BRIDGING LINES AT 8'-0" O/C MAX SPACING FOR ALL WOOD JOISTS AND WOOD RAFTERS
8	PROVIDE A MINIMUM OF ONE LINE OF BLOCKING OR CROSS BRIDGING FOR ALL SPANS.
9	TREATED LUMBER SHALL BE AS FOLLOWS: UC3B ABOVE GROUND EXPOSED; BOARDWALK RAILING AND DECKING. TOWER RAILING DECKING FRAMING SINCE ALL OF THIS IS OFF THE GROUND AND WILL NOT CONTACT THE GROUND. UC4A GROUND CONTACT GENERAL USE: BOARDWALK FRAMING UC4B GROUND CONTACT HEAVY DUTY, PIER CAPS AND ABUTMENT SILL PLATE
10	COMPOSITE LUMBER SHALL BE AS FOLLOWS: - COMPOSITE BOARDS SHALL BE SELECTED FROM THE FOLLOWING: - BEDFORD TECHNOLOGIES FIBERFORCE, WORTHINGTON, MN - RENEW PLASTICS TRIMAX STRUCTURAL LUMBER, LUXEMBURG, WI - TANGENT TECHNOLOGIES, LLC, PLASTIC STRUCTURAL LUMBER, AURORA, IL - COMPOSITE BOARDS TO BE IN WEATHERED WOOD COLOR. CONTRACTOR TO SUBMIT SAMPLE FOR REVIEW BY OWHER AND APPROVAL - COMPOSITE BOARDS SHALL BE USED FOR RAILING TOP RAIL. SEE PLANS FOR DETAILS

5

DELAWARE'S BAYSHORE BYWAY
LITTLE CREEK BOARDWALK AND
WILDLIFE OBSERVATION TOWER

STRUCTURAL GENERAL NOTES



DESIGNED BY:	P2STRENG
DRAWN BY:	P2STRENG
BUILDING NO.:	N/A
DATE:	DECEMBER 1, 2017
SCALE:	
SHEET NO.:	S-2
DFW PROJECT #:	FW-2-15
CONTRACT #:	FW-2-15

DATE:	DESCRIPTION:	BY:
7.14.2017 50% SUBMITTAL	PJP	
11.2.2017 ISSUED FOR PERMIT		
12.1.2017 ISSUED FOR BID		
3.9.2018 ADDENDUM #1		
3.21.2018 ADDENDUM #5		

DESIGN LOAD SCHEDULE (ALL LOADS SHOWN ARE IN POUNDS PER SQ. FT.)					
AREA COMPONENT	BOARDWALK	OBS. TOWER			
WOOD FRAMING	5	5			
DECKING	5	5			
STEEL & JOIST	.	10			
TOTAL DEAD LOAD	10	20			
TOTAL LIVE LOAD	100	100			
TOTAL LOAD	110	120			

LATERAL LOAD DESIGN SCHEDULE			
2015 INTERNATIONAL BUILDING CODE			
WIND LOAD			
ITEM	SYMBOL	VALUE	REFERENCE
BASIC ULTIMATE WIND SPEED	V_{BULT}	120 mph	FIGURE 1609
BASIC ALLOWABLE WIND SPEED	V_{BALL}	90 mph	FIGURE 1609
RISK CATEGORY		III	TABLE 1604.5
WIND EXPOSURE CATEGORY	-	D	SECTION 1609.4
INTERNAL PRESSURE COEFF.	GCPI	---	FIGURE 6-5 (ASCE 7)
SEISMIC LOAD			
ITEM	SYMBOL	VALUE	REFERENCE
SITE CLASS	-	D	SECTION 1615.1
MAPPED SPECTRAL RESPONSE ACCELERATION	S_s	0.129	FIGURE 1615(1)
MAPPED SPECTRAL RESPONSE ACCELERATION (1-SECOND RESPONSE)	S_1	0.050	FIGURE 1615(2)
DESIGN SPECTRAL RESPONSE ACCELERATION	S_{DS}	0.138	SECTION 1615.1.3
DESIGN SPECTRAL RESPONSE ACCELERATION (1-SECOND RESPONSE)	S_{D1}	0.080	SECTION 1615.1.3
RISK CATEGORY	-	III	SECTION 1616.2
SEISMIC DESIGN CATEGORY	-	B	TABLE 1616.3
SEISMIC IMPORTANCE FACTOR	I_E	1.25	TABLE 1604.5
DESIGN BASE SHEAR	-	2.5 kips	SECTION 1617.4
ANALYSIS PROCEDURE	-	EQUIVALENT LATERAL FORCE	SECTION 1617
BASIC STRUCTURAL SYSTEM	-	STEEL FRAME SYSTEM	TABLE 1617.6.2
BASIC SEISMIC-FORCE-RESISTING SYSTEM	-	CENTRICALLY BRACED FRAME	TABLE 1617.6.2
SEISMIC RESPONSE COEF.	C_s	0.057	TABLE 1617.6.2
RESPONSE MOD. FACTOR	R	3	TABLE 1617.6.2

SNOW LOAD DESIGN SCHEDULE			
2015 INTERNATIONAL BUILDING CODE			
ITEM	SYMBOL	VALUE	REFERENCE
GROUND SNOW LOAD	P_g	25	FIGURE 1608.2
SNOW EXPOSURE FACTOR	C_e	1.0	TABLE 7.2 (ASCE-7)
SNOW LOAD IMPORTANCE FACTOR	I	1.1	TABLE 7.4 (ASCE-7)
THERMAL FACTOR	C_t	1.2	TABLE 7.3 (ASCE-7)
FLAT-ROOF SNOW LOAD	P_f	25	SECTION 7.3 (ASCE-7)

COLUMN SCHEDULE				
MARK	SIZE	BASE PLATE (A36)	A.B. (F1554)	NOTES
SC1	W10X39	1-1/4"x16"x1'-4"	(4) 1"Ø (G50)	
-	-	-	-	
-	-	-	-	
-	-	-	-	

TOWER AND BOARDWALK DECK CONSTRUCTION SCHEDULE						
TYPE	SECTION	CONCRETE (UNIT WEIGHT)	DECK	REINFORCING	ADDITIONAL NOTES	DESCRIPTION
S1			4 x 8 SOUTHERN YELLOW PINE WOOD DECKING (PRESSURE TREATED)			SLAB TYPE "DK1" 4 x 6 SOUTHERN YELLOW PINE WOOD DECKING (PRESSURE TREATED)


PILE DESIGN LOADS KIPS/PILE (SERVICE)			
CONDITION	ABUTMENT	BOARDWALK	VIEWING AREA
VERTICAL PILE - COMPRESSION	8.2	6.5	25
VERTICAL PILE - TENSION (DUE TO UPLIFT)	—	4.5	20
BATTERED PILE - TENSION OR COMPRESSION	—	8.9	15 (HORIZ.)

NOTE: 1. BATTERED PILE LOADS HAVE BEEN RESOLVED TO ACT ALONG THE SHAFT OF THE PILE AT 1V:1H BATTER. LATERAL PILE LOADS ACT AT THE PILE CAP ELEVATION.

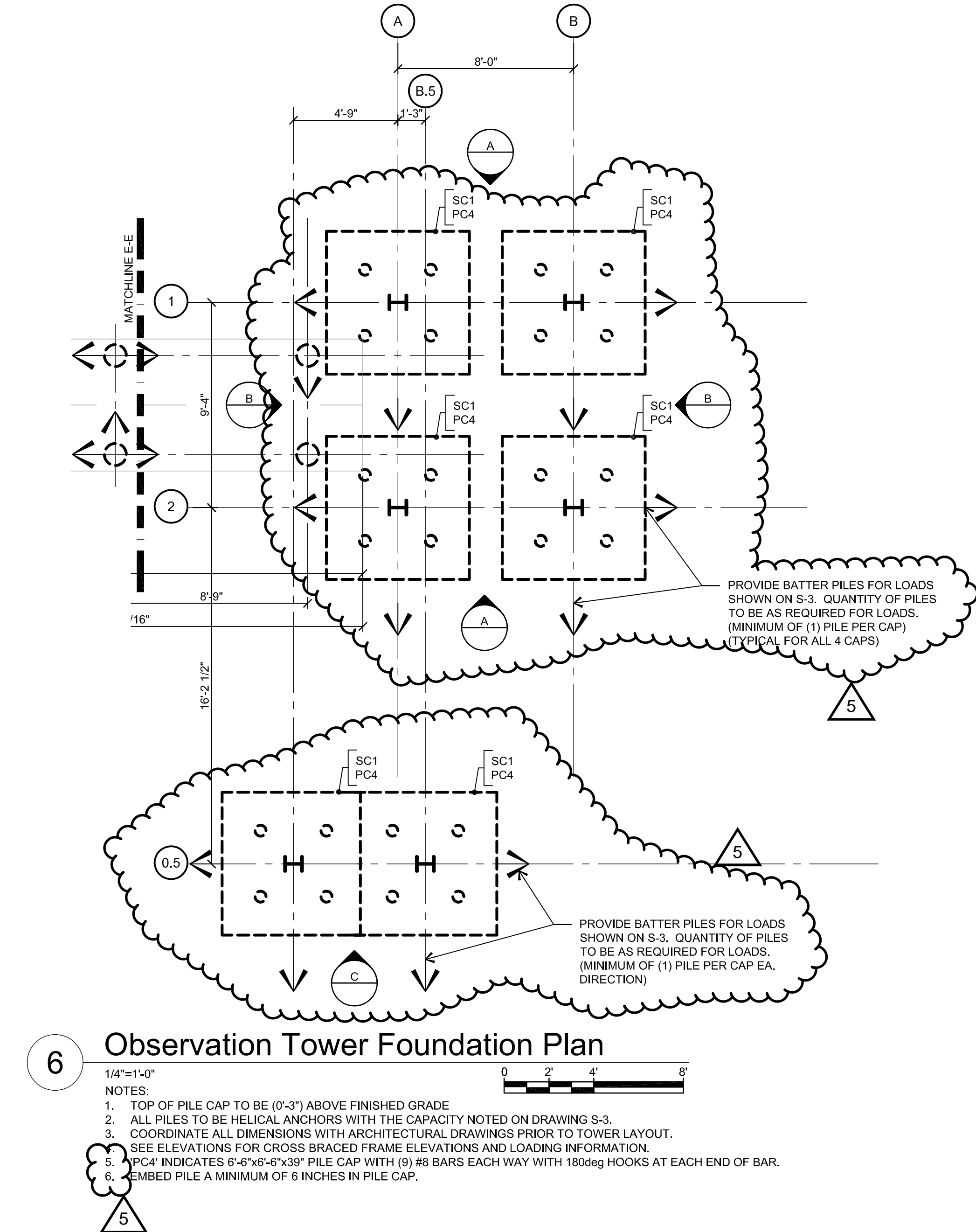
2. ALL LOADS SHOWN ARE SERVICE LEVEL LOADS.

3. LOADS FOR BATTERED PILES AT OBSERVATION ARE HORIZONTAL FORCES. (NOT RESOLVED AT PILE BATTER)



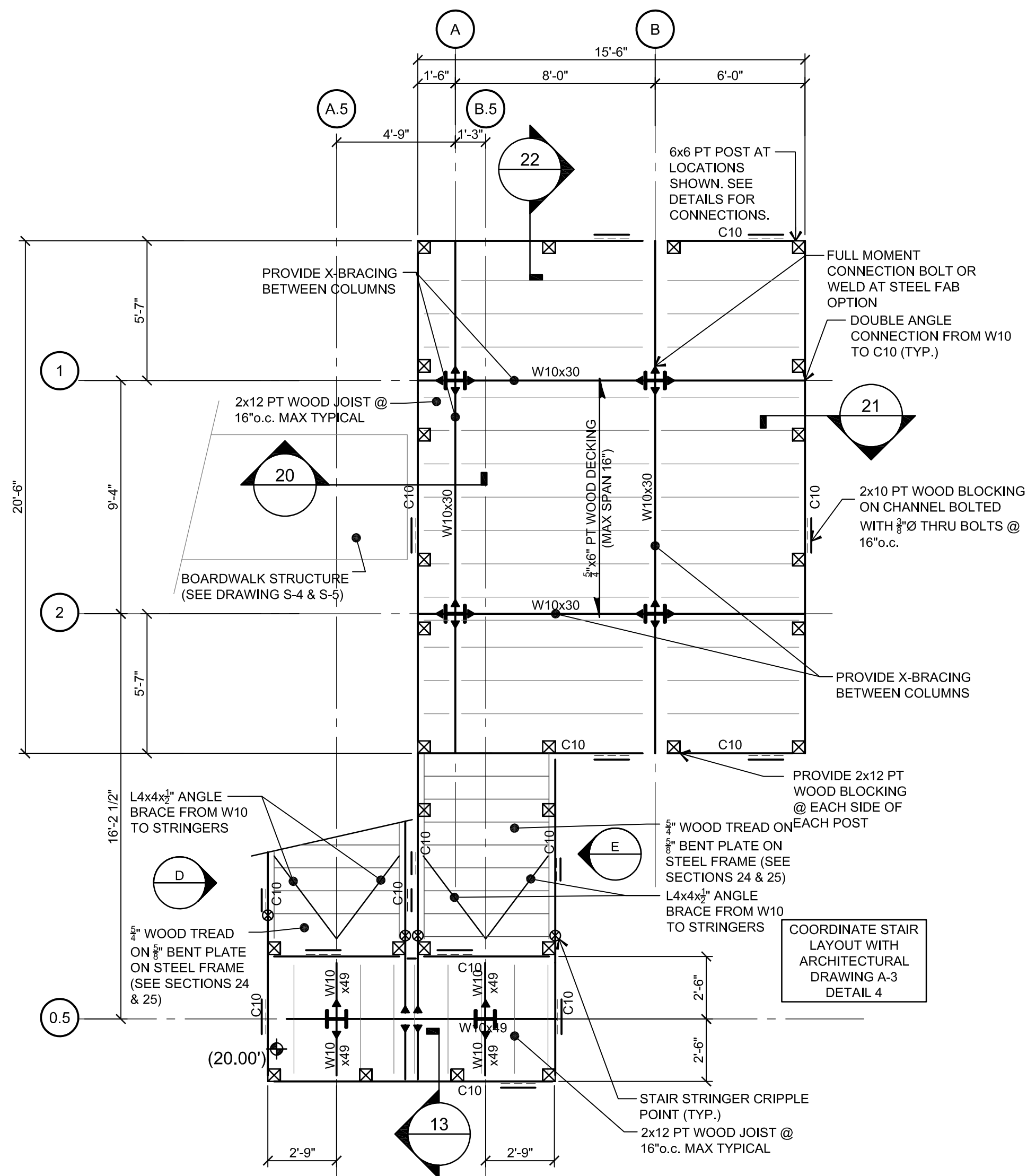
	DESIGNED BY: P2STRENG	
	DRAWN BY: P2STRENG	
	BUILDING NO.: N/A	
	DATE: DECEMBER 1, 2017	
SCALE: 		DESCRIPTION:
SHEET NO.: <h1>S-3</h1>		DATE: 7.14.2017 50% SUBMITTAL
DFW PROJECT #: FW-2-15		BY: PJP
CONTRACT #: FW-2-15		DATE: 11.2.2017 ISSUED FOR PERMIT 12.1.2017 ISSUED FOR BID
DELWARE'S BAYSHORE BYWAY LITTLE CREEK BOARDWALK AND WILDLIFE OBSERVATION TOWER		
STRUCTURAL SCHEDULES		

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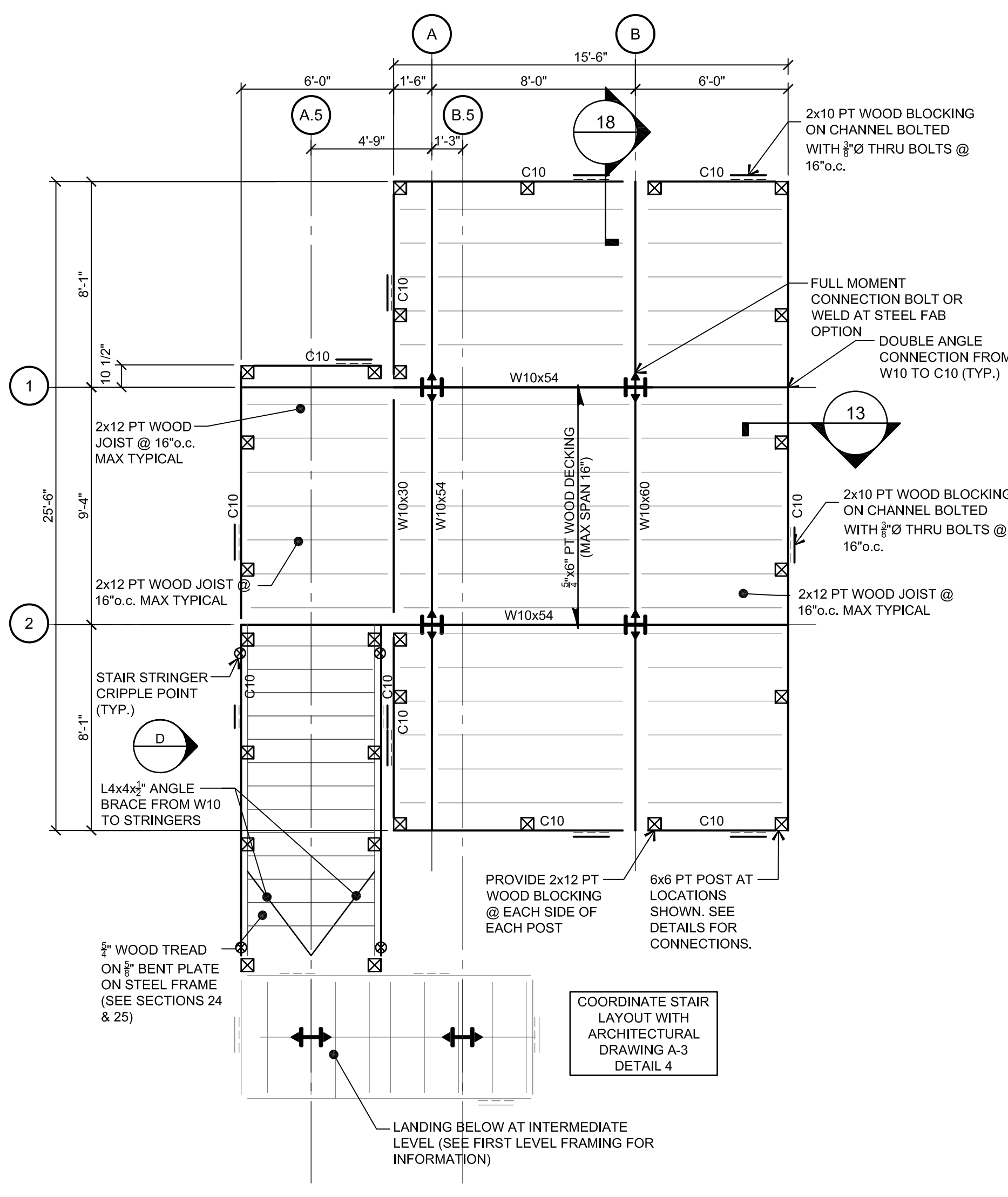
6 Observation Tower Foundation Plan

- 1/4"=1'-0"
- NOTES:
1. TOP OF PILE CAP TO BE (0'-3") ABOVE FINISHED GRADE
 2. ALL PILES TO BE HELICAL ANCHORS WITH THE CAPACITY NOTED ON DRAWING S-3.
 3. COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO TOWER LAYOUT.
 4. SEE ELEVATIONS FOR CROSS BRACED FRAME ELEVATIONS AND LOADING INFORMATION.
 5. SC1 PC4 INDICATES 6'-6"x6'-6"x39" PILE CAP WITH (9) #8 BARS EACH WAY WITH 180deg HOOKS AT EACH END OF BAR.
 6. EMBED PILE A MINIMUM OF 6 INCHES IN PILE CAP.



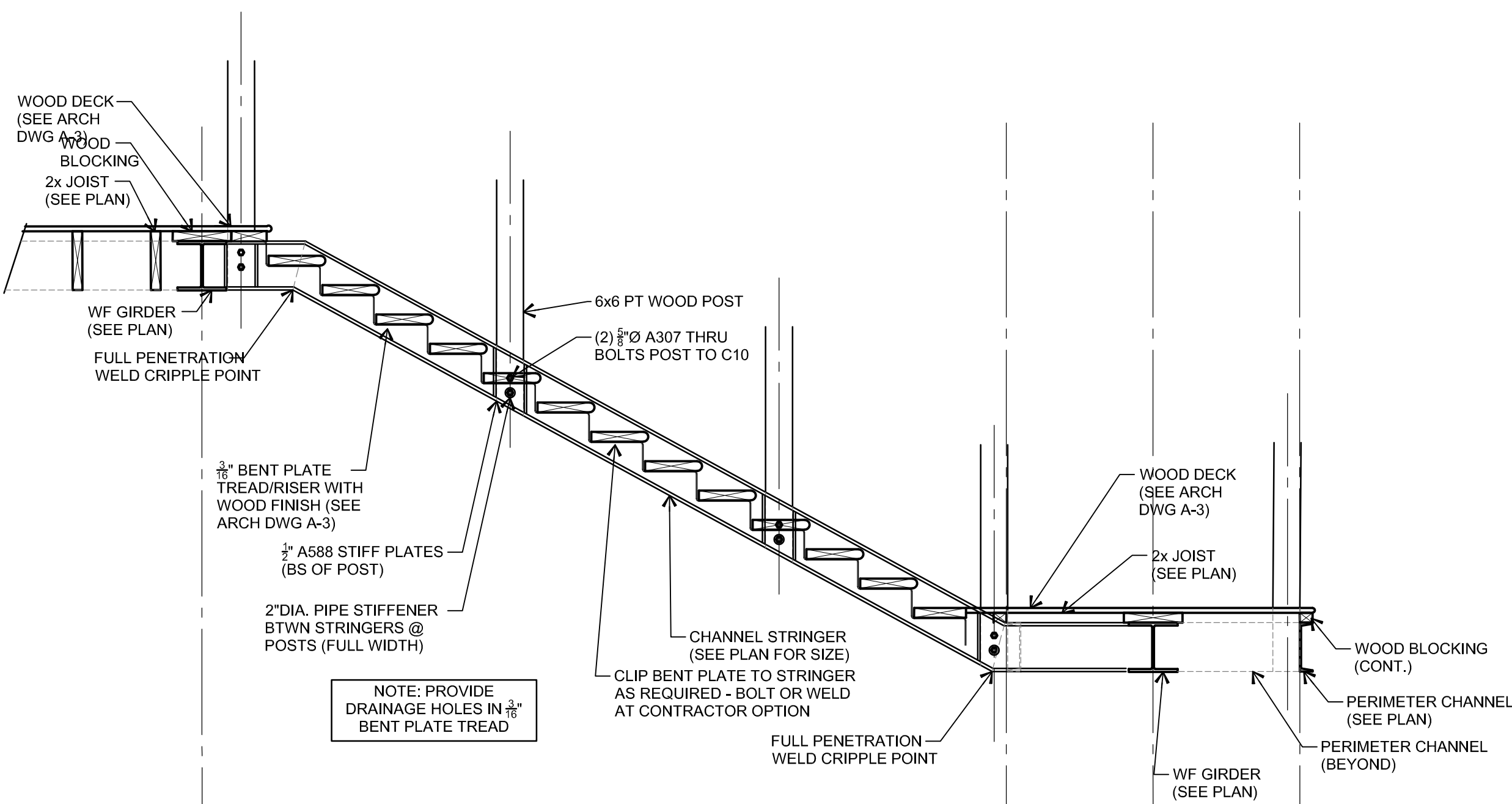
7 Observation Tower First Level Framing Plan

- 1/4"=1'-0"
- NOTES:
1. TOP OF WOOD DECKING TO BE ELEVATION (16.00')
 2. ALL WOOD JOISTS TO BE PRESSURE TREATED LUMBER.
 3. 'C10' INDICATES C10x15.3 UNLESS NOTED OTHERWISE.
 4. ALL STEEL TO BE ASTM A588 CORTEN 'WEATHERING STEEL'
 5. TOP OF STEEL TO BE (-0'-2 1/2") BELOW TOP OF DECKING ELEVATION UNLESS NOTED OTHERWISE.
 6. COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO TOWER LAYOUT.
 7. PROVIDE PRESSURE TREATED WOOD PLATE ON ALL STEEL MEMBERS. BOLT WOOD PLATE TO STEEL WITH GALVANIZED 3/4" DIAMETER BOLTS @ 24"o.c.
 8. ALL CONNECTIONS TO BE BOLTED WITH GALVANIZED BOLTS.
 9. PROVIDE FULL MOMENT CONNECTION BETWEEN W10 MEMBERS AND COLUMNS IN ALL DIRECTIONS. CONNECTION TO DEVELOP FULL CAPACITY OF THE BEAM FLANGES IN ADDITION TO THE FULL DEPTH SHEAR CONNECTION.
 10. PROVIDE TOP FLANGE JOIST HANGERS AT ALL BEAMS AND CHANNELS SUPPORTING 2x MEMBERS.
 11. PROVIDE 2x12 WOOD BLOCKING AROUND ALL POSTS FOR DECK SUPPORT.
 12. 'PT' INDICATES PRESSURE TREATED LUMBER
 13. SEE ARCH DRAWING A-3 FOR WOOD TREAD AND DECKING INFORMATION.



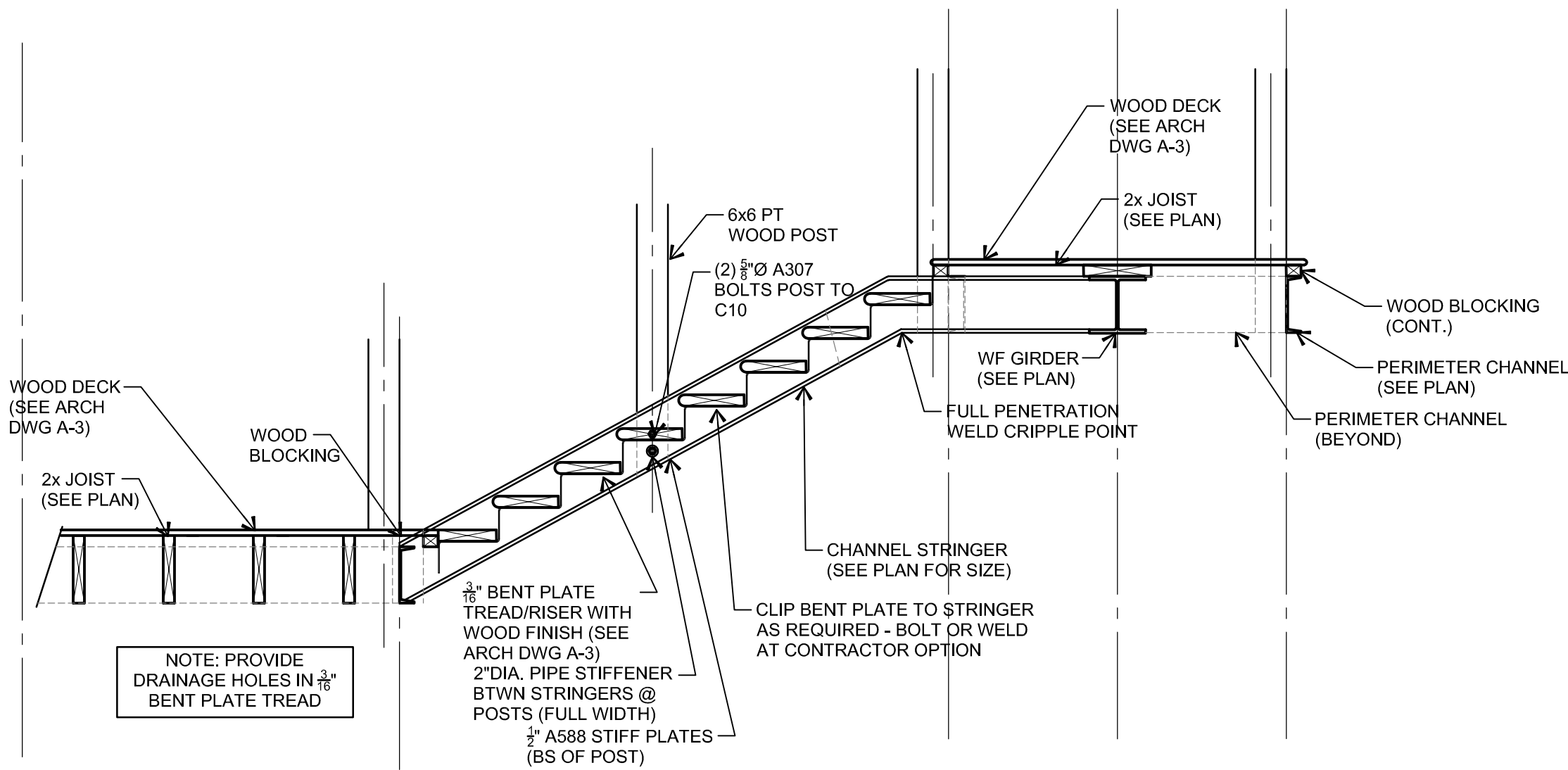
8 Observation Tower Second Level Framing Plan

- 1/4"=1'-0"
- NOTES:
1. TOP OF WOOD DECKING TO BE ELEVATION (26.50')
 2. ALL WOOD JOISTS TO BE PRESSURE TREATED LUMBER.
 3. 'C10' INDICATES C10x15.3 UNLESS NOTED OTHERWISE.
 4. ALL STEEL TO BE ASTM A588 CORTEN 'WEATHERING STEEL'
 5. TOP OF STEEL TO BE (-0'-2 1/2") BELOW TOP OF DECKING ELEVATION UNLESS NOTED OTHERWISE.
 6. COORDINATE ALL DIMENSIONS WITH ARCHITECTURAL DRAWINGS PRIOR TO TOWER LAYOUT.
 7. PROVIDE PRESSURE TREATED WOOD PLATE ON ALL STEEL MEMBERS. BOLT WOOD PLATE TO STEEL WITH GALVANIZED 3/4" DIAMETER BOLTS @ 24"o.c.
 8. ALL CONNECTIONS TO BE BOLTED WITH GALVANIZED BOLTS.
 9. PROVIDE FULL MOMENT CONNECTION BETWEEN W10 MEMBERS AND COLUMNS IN ALL DIRECTIONS. CONNECTION TO DEVELOP FULL CAPACITY OF THE BEAM FLANGES IN ADDITION TO THE FULL DEPTH SHEAR CONNECTION.
 10. PROVIDE TOP FLANGE JOIST HANGERS AT ALL BEAMS AND CHANNELS SUPPORTING 2x MEMBERS.
 11. PROVIDE 2x12 WOOD BLOCKING AROUND ALL POSTS FOR DECK SUPPORT.



24 Stair Elevation - Elevation 'D'

- 1/2"=1'-0"
- NOTES:
1. COORDINATE ALL FINISHES, PROFILES, ETC WITH ARCHITECTURAL DRAWINGS (DRAWING A-3)

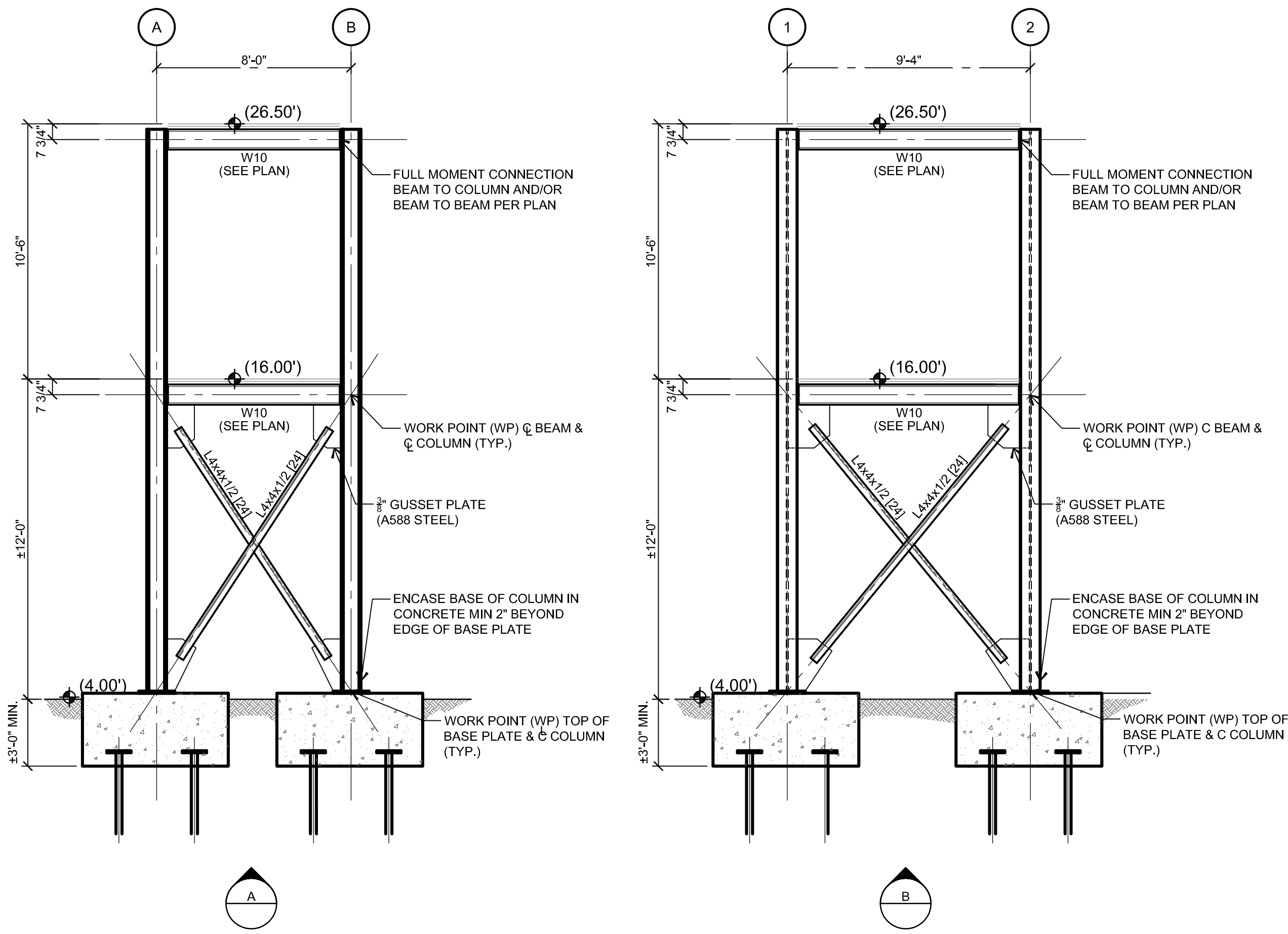


25 Stair Elevation - Elevation 'E'

- 1/2"=1'-0"
- NOTES:
1. COORDINATE ALL FINISHES, PROFILES, ETC WITH ARCHITECTURAL DRAWINGS (DRAWING A-3)

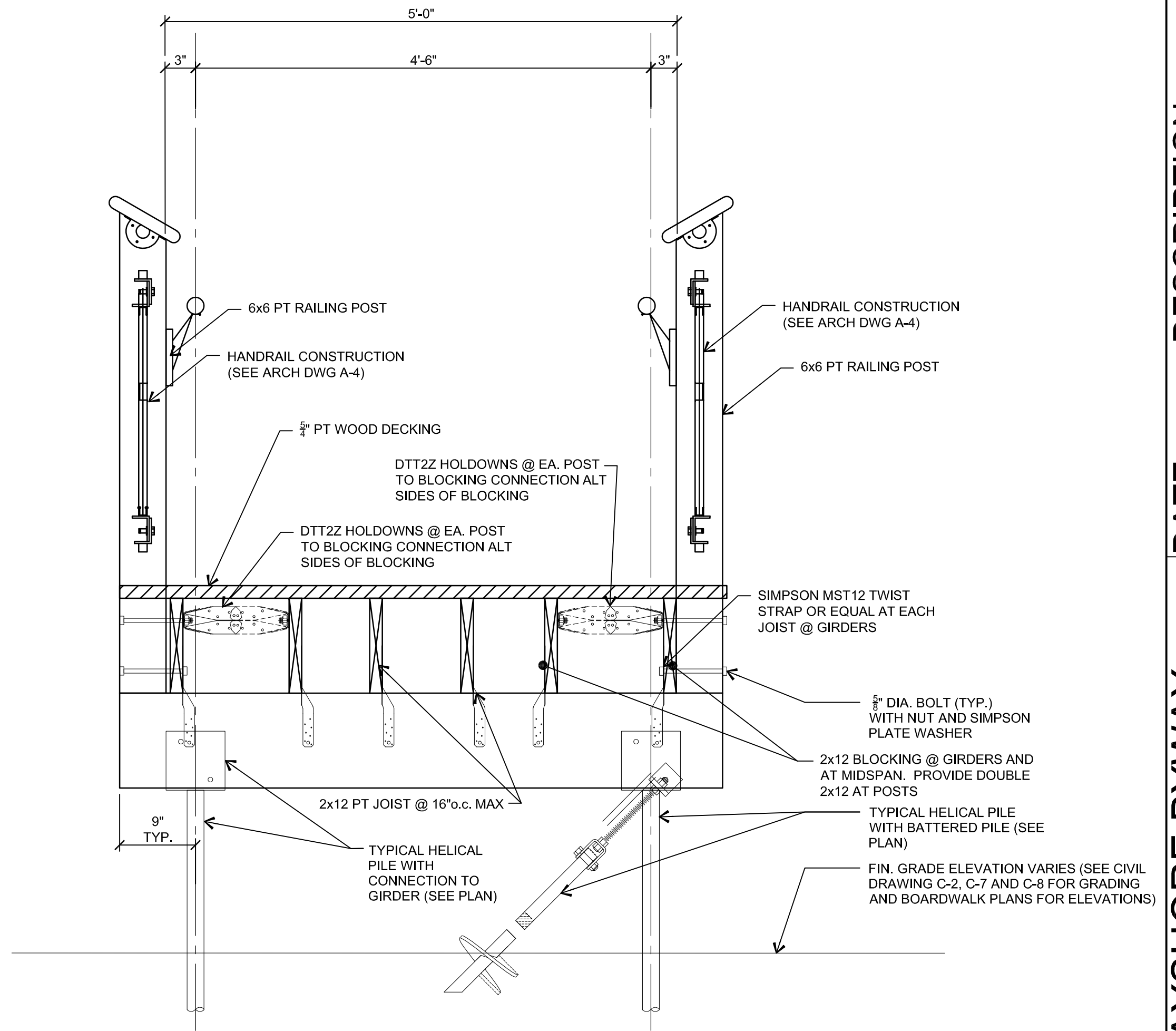
BY:	PJP
DATE:	7.14.2017 50% SUBMITTAL 11.2.2017 ISSUED FOR PERMIT 12.1.2017 ISSUED FOR BID
DESCRIPTION:	DELAWARE'S BAYSHORE BYWAY LITTLE CREEK BOARDWALK AND WILDLIFE OBSERVATION TOWER
OBSERVATION TOWER PLANS	

1/20/2017 8:11:33 AM
C:\Users\p2streng\AppData\Local\Temp\Temp1_SampleDrawings.zip\border_cc.dwg



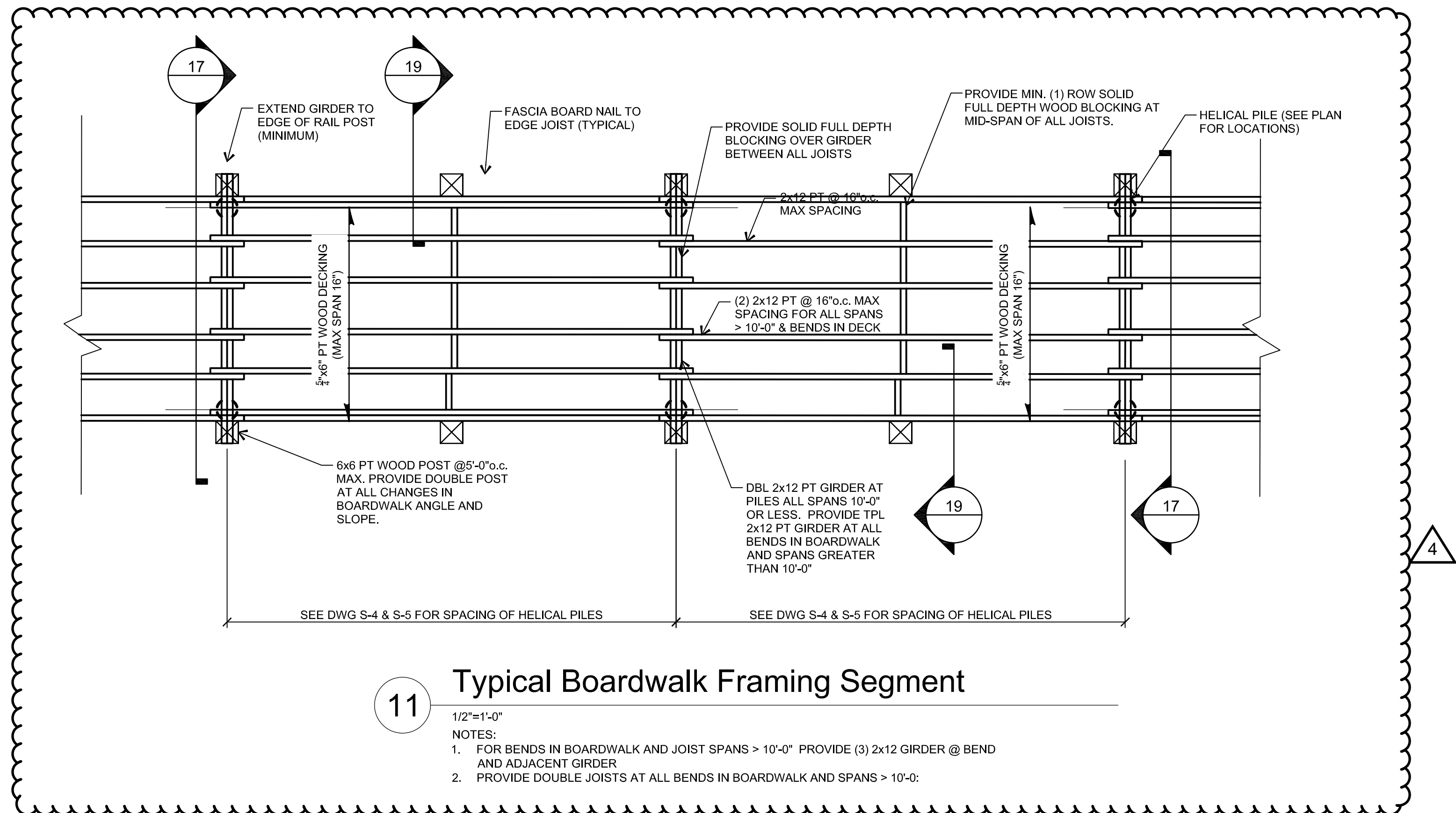
9 Observation Tower Bracing Elevations

- 1/4"=1'-0"
- NOTES:
- COORDINATE ALL DIMENSIONS WITH PLANS
 - SEE PLAN FOR ALL BEAM AND COLUMN SIZES.
 - [...] INDICATES TENSION AND/OR COMPRESSION BRACE FORCE IN KIPS. $\frac{1}{3}$ STRESS INCREASE IS NOT PERMITTED.
 - ALL BOLTS TO BE SLIP CRITICAL BOLTS UNLESS NOTED OTHERWISE.
 - SEE PLAN FOR COLUMN ORIENTATION
 - ALL STEEL TO BE ASTM A588 WEATHERING STEEL.
 - ALL BOLTS TO BE GALVANIZED TENSION CONTROLLED BOLTS.
 - GRADE TO SLOPE AWAY FROM TOP OF FOUNDATIONS MAX 3:1 SLOPE.



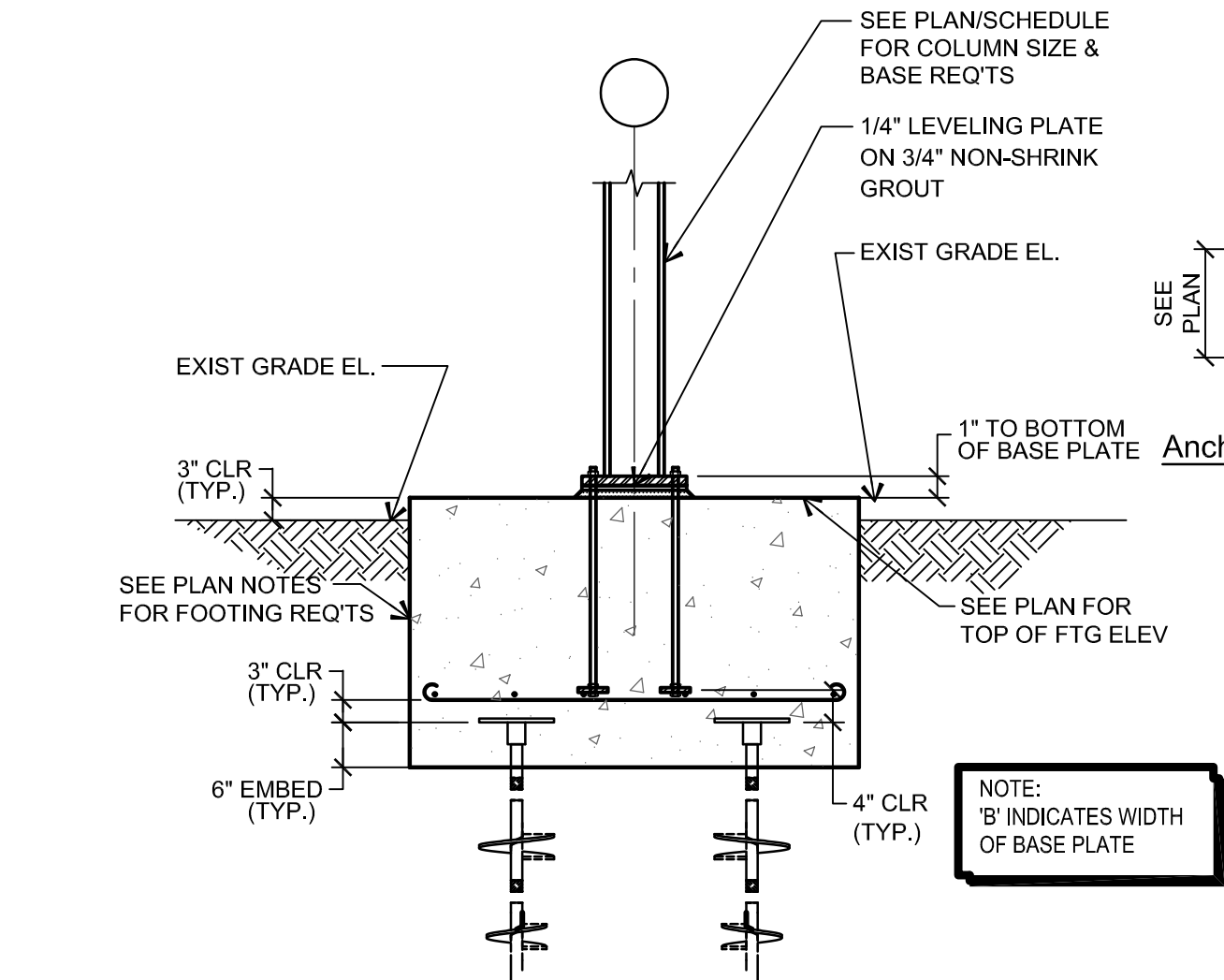
17 Typical Boardwalk Framing Section

- 1"=1'-0"
- NOTES:
- COORDINATE ALL RAILING FINISHES, PROFILES, ETC WITH ARCHITECTURAL DRAWINGS (DRAWING A-4)

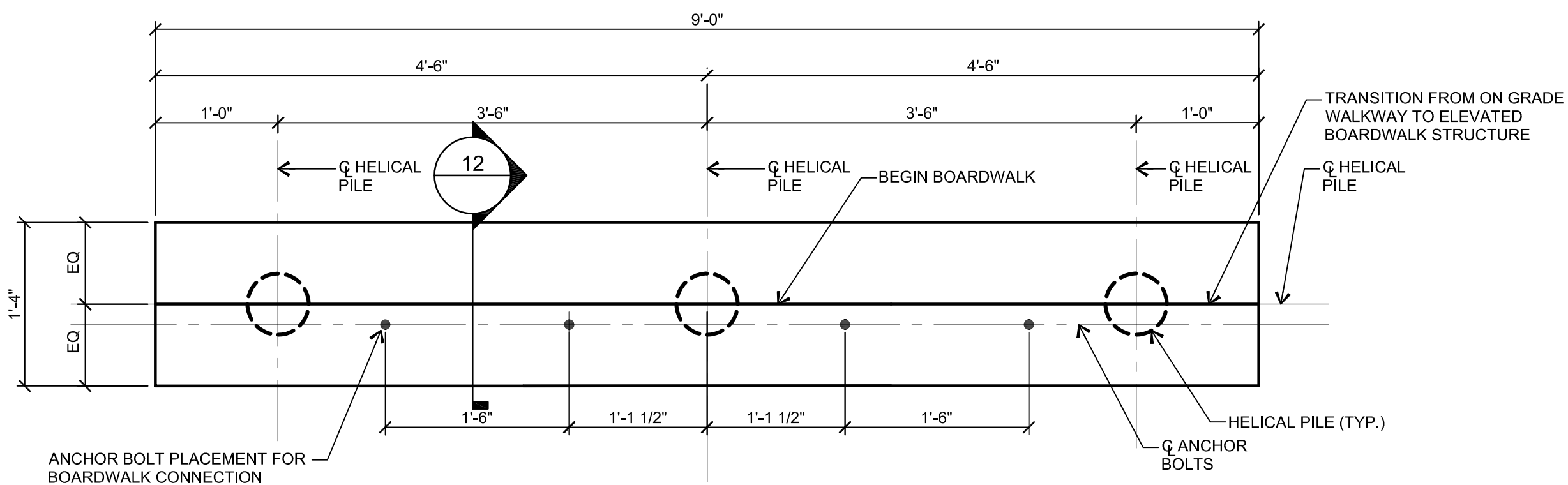


11 Typical Boardwalk Framing Segment

- 1/2"=1'-0"
- NOTES:
- FOR BENDS IN BOARDWALK AND JOIST SPANS > 10'-0" PROVIDE (3) 2x12 GIRDER @ BEND AND ADJACENT GIRDER
 - PROVIDE DOUBLE JOISTS AT ALL BENDS IN BOARDWALK AND SPANS > 10'-0"



26 Typical Column & Pile Cap Foundation Detail

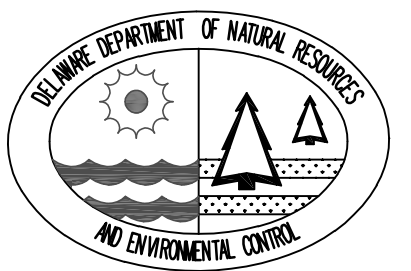


10 Enlarged End Abutment at Approach Boardwalk



DELAWARE'S BAYSHORE BYWAY
LITTLE CREEK BOARDWALK AND
WILDLIFE OBSERVATION TOWER

OBSERVATION TOWER SECTIONS



DESIGNED BY:

P2STRENG

DRAWN BY:

P2STRENG

BUILDING NO.:

N/A

DATE:

DECEMBER 1, 2017

SCALE:

SHEET NO.:

S-7

DFW PROJECT #:

FW-2-15

CONTRACT #:

FW-2-15

DATE: DESCRIPTION: BY:

PJP

7.14.2017 50% SUBMITTAL

11.2.2017 ISSUED FOR PERMIT

12.1.2017 ISSUED FOR BID

3.9.2018 ADDENDUM #1

3.21.2018 ADDENDUM #5