CONTRACT DOCUMENTS, SPECIFICATIONS AND CONTRACT DRAWINGS

FOR

BURMASTER TRANSFER FACILITY PROJECT

BKI PROJECT NO: 9344-8660

ADDENDUM NO. 1

DATE ISSUED: March 12, 2025

BID CLOSE DATE: MARCH 27, 2025 at 9:45 AM

BID LOCATION: Council Chambers, Gretna City Hall
740 2nd Street, Gretna, LA 70053

This addendum shall be part of the Contract Documents as provided in the Instruction to Bidders.

The following items are issued to add to, modify, and clarify the Contract Documents. These items shall have full force and effect as the Contract Documents, and the cost involved shall be included in the bid prices.

Acknowledge receipt of the addendum by inserting its number on the Bid Form of the Bid Documents. Failure to do so will subject the bidder to rejection.

This Addendum No. 1 consists of 49 pages including all attachments.

REVISIONS:

1.0 Replace Table of Contents specification pages 2-4 **"Table of Contents"** with **"Table of Contents (Addenda 1)".** See Attachment 1

2.0 In the Invitation to Bid specification page 5, paragraph 7, change "**The work for this project is classified as Category IV, Municipal and Public Works Construction.**" to "**The work for this project is classified as Category II Highway, Street and Bridge Construction and/or Category IV, Municipal and Public Works Construction**".

3.0 Add Technical Specification 16 "**Structural Metals"** (TS-16) See Attachment 2.

4.0 Add Technical Specification 17 "**Steel Sheet Piles"** (TS-17) See Attachment 3

5.0 Remove specification pages 353 - 375 **"Appendix A Gravity Sanitary Sewer System General Standard Notes *1**" from the specification package. There is no sanitary sewer work in this project.

6.0 Remove specification pages 376 - 396 **"Appendix B Sanitary Sewer Force Main System General Standard Notes *1**" from the specification package. There is no sanitary sewer work in this project.

7.0 Add Sheet S-001 Oil Transfer Building (1 Sheet)

8.0 Remove Specification S-001 Water Distribution System, Appendix C&D. City personnel will do this work.

ATTACHMENTS:

1. Table of Contents (Addenda 1) (3 sheets).
2. Bid Form (Addenda 1) (5 Sheets)
3. TS-16 Structural Metals (Addenda 1) (31 sheets)
4. TS-17 Steel Sheet Piling (Addenda 1) (6 sheets)
5. S-001 Oil Transfer Building (Addendum 1) (1 sheet).

BURMASTER TRANSFER FACILITY

FOR THE
CITY OF GRETNA, LOUISIANA

TABLE OF CONTENTS (ADDENDA 1)

LOUISIANA UNIFORM PUBLIC WORK BID FORM

TO: City of Gretna
2nd St. and Huey P. Long Avenue
Gretna, LA 70053
(Owner to provide name and address of owner)

BID FOR: Burmaster Transfer Facility

(*Owner to provide name of project and other identifying information)*

The undersigned bidder hereby declares and represents that she/he; a) has carefully examined and understands the Bidding Documents, b) has not received, relied on, or based his bid on any verbal instructions contrary to the Bidding Documents or any addenda, c) has personally inspected and is familiar with the project site, and hereby proposes to provide all labor, materials, tools, appliances and facilities as required to perform, in a workmanlike manner, all work and services for the construction and completion of the referenced project, all in strict accordance with the Bidding Documents prepared by: Burk Kleinpeter Inc., and dated: February 2025.
(Owner to provide name of entity preparing bidding documents.)

Bidders must acknowledge all addenda. The Bidder acknowledges receipt of the following **ADDENDA:** (Enter the number the Designer has assigned to each of the addenda that the Bidder is acknowledging) _____ .

TOTAL BASE BID: For all work required by the Bidding Documents (including any and all unit prices designated "Base Bid" * but not alternates) the sum of:

_____Dollars ($ _____)

ALTERNATES: For any and all work required by the Bidding Documents for Alternates including any and all unit prices designated as alternates in the unit price description.

Alternate No. 1 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____Dollars ($ _____)

Alternate No. 2 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____Dollars ($ _____)

Alternate No. 3 *(Owner to provide description of alternate and state whether add or deduct)* for the lump sum of:

_____Dollars ($_____)

NAME OF BIDDER: _____

ADDRESS OF BIDDER: _____

_____

LOUISIANA CONTRACTOR'S LICENSE NUMBER: _____

NAME OF AUTHORIZED SIGNATORY OF BIDDER: _____

TITLE OF AUTHORIZED SIGNATORY OF BIDDER: _____

SIGNATURE OF AUTHORIZED SIGNATORY OF BIDDER **: _____

DATE: _____

* The Unit Price Form shall be used if the contract includes unit prices. Otherwise it is not required and need not be included with the form. The number of unit prices that may be included is not limited and additional sheets may be included if needed.

** If someone other than a corporate officer signs for the Bidder/Contractor, a copy of a corporate resolution or other signature authorization shall be required for submission of bid. Failure to include a copy of the appropriate signature authorization, if required, may result in the rejection of the bid unless bidder has complied with La. R.S. 38:2212(B)5.

BID SECURITY in the form of a bid bond, certified check or cashier's check as prescribed by LA RS 38:2218.A is attached to and made a part of this bid.

LOUISIANA UNIFORM PUBLIC WORK BID FORM
UNIT PRICE FORM

TO: City of Gretna
2nd St. and Huey P. Long Avenue
Gretna, LA 70053
(Owner to provide name and address of owner)

BID FOR: Burmaster Transfer Facility
_____
(*Owner to provide name of project and other identifying information)*

UNIT PRICES: This form shall be used for any and all work required by the Bidding Documents and described as unit prices. Amounts shall be stated in figures and only in figures.

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ MOBILIZATION AND DEMOBILIZATION			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
727-01	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ CLEARING AND GRUBBING			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
201-01-00100	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ REMOVAL OF PAVEMENT STRUCTURE			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
202-02-03030	2262.1	SQUARE YARD		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# _REMOVAL OF CONCRETE WALKS AND DRIVES__			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
202-02-06100	106	SQUARE YARDS		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# __REMOVAL OF FENCE_			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
202-02-12000	1144	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ NON -PLASTIC EMBANKMENT(SAND)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
203-04-00200	12,160	CUBIC YARD		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# __EXCAVATION AND EMBANKMENT_			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
203-05-00100	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ ASPHALT CONCRETE			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
502-01-00100	280	TON		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ PAVEMENT PATCHING			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
510-04-00100	4	TONS		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___PORTLAND CEMENT CONCRETE PAVEMENT (9" THICK)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
601-01-00300	5,224	SQUARE YARD		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ STORMDRAIN PIPE ARCH (15" EQUIV. RCPA)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
701-04-01000	380	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ STORMDRAIN PIPE ARCH (18" EQUIV. RCPA)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
701-04-01020	176	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# _CATCH BASINS (CB-01)__			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
702-03-00100	7	EACH		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ CHAIN LINK FENCE (6-FOOT HEIGHT)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
705-06-00300	980	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ CONCRETE WALK (5" THICK)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
706-01-00200	14.8	SQUARE YARD		

Wording for "DESCRIPTION" is to be provided by the Owner.
All quantities are estimated. The contractor will be paid based upon actual quantities as verified by the Owner

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ CONCRETE WALK (6" THICK)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
706-02-00200	229.0	SQUARE YARD		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ CONCRETE CURB			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
707-01-00100	261	LINEAR FOOT		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ PLASTIC PAVEMENT LEGEND & SYMBOLS (ARROW -STRAIGHT)			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
732-04-01020	11	EACH		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ HYDRO-SEEDING			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
739-01-00100	0.14	ACRES		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ STRUCTURAL METALWORK			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
807-04-00100	27,806	POUNDS		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ ELECTRICAL WORK			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
TS-1	1	LUMP SUM		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ GUARD SHACK			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
TS-2	1	EACH		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___ STEEL SHEETPILE			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
TS-17	8008	SQUARE FOOT		

Wording for "DESCRIPTION" is to be provided by Owner.
All quantities are estimates. The contractor will be paid upon actual quantities as verified by the Owner.

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___SINGLE GATES FOR CHAIN LINK FENCE			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
TS-4	2	EACH		

DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___BOLLARDS			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
TS-5	12	EACH		
DESCRIPTION:	☒ Base Bid or ❑ Alt.# ___OIL_ANTIFREEZE SHED			
REF. NO.	QUANTITY:	UNIT OF MEASURE:	UNIT PRICE	UNIT PRICE EXTENSION *(Quantity times Unit Price)*
TS-6	1	EACH		

Wording for "DESCRIPTION" is to be provided by Owner.
All quantities are estimates. The contractor will be paid upon actual quantities as verified by the Owner.

TECHNICAL SPECIFICATIONS

SECTION 16

STRUCTURAL METALS

1.1 DESCRIPTION: (Addenda 1)

Fabricate, transport, and install structural metals.

1.2 MATERIALS:

Conform to section 1013 except as amended herein.

ASTM A325 and A490 have been replaced by ASTM F3125. References to A325 and A490 are to be taken to mean ASTM F3125, Grade A325 and A490 respectively.

Provide AASHTO M270, Grade 50 steel, unless specified otherwise.

Provide high-strength ASTM A325 Type 1 mechanically galvanized fastener assemblies. Do not galvanize ASTM A490 bolts. Use high-strength Type 3 fastener assemblies with weathering steel.

Provide stainless steel anchor bolts, nuts and washers. Comply with 1013.08.4. When galvanized anchor bolts, nuts and washers are specified, hot dip galvanize in accordance with 811.08.1 and ASTM F2329.

1.3 SUBMITTALS:

Comply with Section 801. Furnish working drawings in accordance with 801.05.

1.4 FABRICATION REQUIREMENTS:

1.4.1 Handling and Storing Materials:

Store materials, plain or fabricated, at the shop and project site above ground on platforms, skids, or other supports. Keep materials free from dirt, grease, and other foreign matter and protect from corrosion.

Place and store girders and beams in the upright position. Support long members, such as columns and chords, on skids placed near enough together to prevent damage from deflection.

1.4.2 Shop Requirements:

Use a fabrication shop possessing current AISC Structural Steel, AISC Component, and other certifications as required for the bridge elements being fabricated and type of work specified in the Contract. Provide the Chief Construction Engineer with documentation of all current fabricator

certifications prior to beginning fabrication. Perform fabrication work requiring Departmental inspection at a location within the continental United States. Alternate certifications that exceed the requirements herein may be submitted to the Chief Construction Engineer for acceptance.

Provide sufficient lifting capacity, work space, and equipment to fabricate the required members. The cranes in each working area shall have a combined rated capacity equal to the lifting weight of the heaviest assembly fabricated for shipment unless acceptable alternate lifting and turning facilities are provided. Provide lifting methods which prevent damage or overstress to the material.

Fabricate all elements in shops protected from adverse weather. The Fabrication Engineer may allow limited fabrication and welding outside the shop. Outside assembly of field connections may be allowed with prior approval.

Supply the Fabrication Engineer an office of at least 140 square foot floor space. Provide additional office space as deemed necessary by the engineer. This office shall contain a desk, chair, file cabinet with lock, telephone with dedicated line, electric lights, power outlets, high speed internet connection, shelves, and tables in the quantity required by the engineer. Provide the office with adequate heating, ventilation, air conditioning, and convenient sanitary facilities with running water. Fabricator shall be responsible for paying all utility bills. This office shall be in good condition, located where there is not excessive noise, and restricted for use by Department's inspectors only. Provide convenient and adequate reserved parking space.

1.4.3 Inspection:

Inspection may be conducted before, during, and after fabrication. Materials and workmanship which are in the process of being fabricated and found to contain defects or have been subjected to damaging fabrication procedures will be rejected while still in process. The inspector has the right to require testing of materials and/or workmanship, even if materials and/or workmanship are in excess of code requirements.

If defects in materials or workmanship are found by additional testing required by the inspector, the additional test will be at no additional cost to the Department. If no defects are found, the Department will compensate the contractor for the additional testing.

Furnish equipment, certified technicians, and required materials for all required testing of materials and workmanship.

1.4.3.1 Mill Inspection:

Structural metals will be inspected as deemed necessary by the engineer. Prior to fabrication, submit for review to the Chief Construction Engineer two copies of Material Test Reports and a notarized "Fabricator's Material Statement and Certificate of Compliance" which verifies compliance and traceability. When appropriate, a Buy America statement shall be included on the "Fabricator's Material Statement and Certificate of Compliance."

1.4.3.2 Shop Inspection:

Provide the engineer free and safe access at all times to all portions of shops where work is being done. Present a schedule of fabrication including shop location and contact information to the Chief Construction Engineer at least 30 days in advance ofcommencing work. Maintain an updated 30-day look ahead schedule.

Provide a Quality Assurance Program which ensures the products conform to the requirements of the contract and all applicable codes. Provide inspectors meeting the requirements specified in the latest edition of ANSI/AASHTO/AWS D1.5 as appropriate. The fabricator's inspection shall be an independent and separate function from all other functions.

The Department retains the right to exercise oversight and require changes to the contractor's Quality Assurance Program. The Department retains the right to inspect all fabrication, pre-assembly, castings, and other metal items. The Department's inspection does not relieve the contractor of responsibility to perform Quality Control.

1.4.3.3 Field Inspection

Structural metals will be inspected as deemed necessary by the engineer to verify conformance with the plans, specifications, and working drawings. Fabricated members having field work performed that does not conform to the plans, specifications, or previously reviewed and accepted working drawings will be subject to rejection.

1.4.4 Marking:

Provide temporary markings on each member piece to provide material traceability throughout fabrication. When galvanizing is specified, use a felt tip paint marker that will not be visible through orbleed through galvanizing coating.

Provide permanent piece markings immediately upon start of fabrication at one location for each member. Accomplish steel die stamping with low-stress steel stamps having a minimum face character radius of 0.010 inch and a maximum impression depth of 0.010 inch. Impressions shall not be placed within 1 inch of plate edge.

In case of doubt as to the grade of metal being used, samples will be taken and tested as directed by the Department's inspector.

1.4.5 Straightening, Cambering, and Curving Materials and Members:

1.4.5.1 Straightening Material:

Prior to fabrication, rolled material shall be straight. If straightening is necessary, permission from the Fabrication Engineer is required.

Sharp kinks and bends will be cause for rejection of the material.

Heat straighten AASHTO M270, Grades HPS 70W and HPS 100W steels under rigidly controlled procedures. Each application requires permission from the Fabrication Engineer. Do not allow the maximum temperature of the steel to exceed 1100°F. If using normalizing, complete

straightening of steel plates before normalizing operations begin for tension member material.

For all other steels with specified yield points less than 70,000 psi, the temperature of heating area shall not exceed 1200°F as controlled by pyrometers or temperature-indicating crayons.

1.4.5.2 Straightening of Members:

Do not use artificial cooling method unless permitted by the Fabrication Engineer.

1.4.5.3 Camber for Welded Plate Girders and Rolled Beams:

Camber members before heat curving.

Camber welded plate girders by cutting camber into webs.

Camber rolled beams using either heat methods or cold bending methods. Submit methods and procedures to the Fabrication Engineer for review. Show accepted details and procedures on submitted shop drawings. When using heat, the temperature of heating area shall not exceed 1100°F as controlled by pyrometers or temperature-indicating crayons. After cambering, allow the beam to air cool. Do not quench.

Camber members in accordance with the plans.

1.4.5.4 Curving Welded Plate Girders and Rolled Beams:

1.4.5.4.1 Materials:

Do not heat curve steels that are manufactured to a specified yield point greater than 70,000 psi. Heat curving will not be permitted for those portions of girders where span base line radius of curvature is 200 feet or less.

1.4.5.4.2 Type of Heating:

Beams and girders may be curved by either continuous or V-type heating, as permitted by the Fabrication Engineer and shall be in accordance with the latest version of the *AASHTO LRFD Bridge Construction Specifications*.

1.4.6 Finish:

Neatly finish all edges in accordance with the latest version of the *AASHTO LRFD Bridge Construction Specifications*. Neat finish is defined as a surface without irregularities such as burrs, sharp edges, slag, and voids.

1.4.6.1 Facing of Bearing Surfaces:

The surface finish of bearings, base plates, and other bearing surfaces that are to come in contact with each other or with concrete shall comply with the surface finish of Table 807-1 and

ANSI B 46.1, Surface Roughness, Waviness, and Lay, Part 1.

Table 807-1
Bearing Surface Finish

Surface	Surface Finish, μ in
Steel slabs	2000
Heavy plates in contact in shoes to be welded	1000
Milled ends of compression members, milled or ground ends of stiffeners and fillers	500
Bridge rollers and rockers	250
Pins and pin holes	125
Sliding bearings	125
All other surfaces	500

1.4.6.2 Abutting Joints:

Abutting joints in compression members, girder flanges, and tension members shall be faced and brought to an even bearing when specified. When joints are not faced, the opening shall not exceed 1/4 inch.

1.4.7 Bolt Holes:

Provide bolt holes with dimensions conforming to Table 807-2.

Drill holes full-size, or subsize, and ream holes. Subsize holes by subdrilling or subpunching.

Thermal forming of holes will not bepermitted.

After holes are finalized, remove burrs and shavings. The member shall be free from twists, bends, and other deformation. Submit proposed repair procedures to the Fabrication Engineer for review. Initiate repairs upon acceptance of submitted repair procedure.

1.4.7.1 Forming Holes:

Provide standard holes and oversize holes that are cylindrical and perpendicular to the component. Provide slotted hole edges that are perpendicular to the component.

In material composed of five or less plates and having a total thickness of 5/8 inch or less, form holes by drilling full-size, or subsizing and reaming.

In material composed of more than five plates or having a total thickness of greater than 5/8 inch, form holes by subsizing and reaming, or drill full-size while components are assembled and held in proper position.

In milled-to-bear connections, assemble connection components and hold in proper bearing position while either reaming subsize holes to full-size or drilling full-size holes.

In connections which are not milled-to-bear, use any of the following methods to finalize holes:

1. Assemble connection components and hold in proper position while either reaming subsize holes to full-size or drilling full-size holes.
2. Use a secured steel template to drill full-size holes.
3. Use numerically-controlled drilling to drill full-size holes.

Connection plates and splice plates may be used as templates for one time use. Use bushings in templates for multiple use.

Provide subsize holes having a diameter 3/16 inch smaller than the nominal bolt diameter. Diameter of the die shall not exceed diameter of the punch by more than 1/16 inch. Provide clean cut holes without leaving torn or ragged edges.

1.4.7.2 Use of Oversize and Slotted Holes:

When specified or approved, oversize, short-slotted, and long-slotted holes may be used with high strength bolts having a nominal diameter of 5/8 inch and larger except as follows:

1. Oversize holes may be used in all plies of friction-type connections. Hardened washers shall be installed over exposed oversize holes.
2. Short-slotted holes may be used in all plies of friction-type or bearing-type connections. In friction-type connections, short-slotted holes may be oriented without regard to direction of loading. In bearing-type connections, the long dimension of short-slotted holes shall be transverse to the direction of loading. Install hardened washers over exposed short-slotted holes.
3. Long-slotted holes may be used in only one of the connected parts of either a friction-type or bearing-type connection at an individual faying surface. In friction-type connections, long-slotted holes may be oriented without regard to direction of loading. In bearing-type connections, the long dimension of the long-slotted holes shall be transverse to the direction of loading.
4. Install structural plate washers or continuous bars not less than 5/16 inch thick over long slots that are in the outer plies of joints. These washers or bars shall have a size sufficient to completely cover the slot after installation. If requiring hardened washers, place them over the plate washers or bars.
5. When oversize or slotted holes are used, the distances between edges of adjacent holes or edges of holes and edges of members shall not be less than that permitted with standard size holes.

Table 807-2
Bolt Hole Dimensions

Bolt Diameter, d (inch)	Standard Hole Diameter (inch)	Oversize Hole Dimension (inch)	Short-Slotted Hole Dimensions		Long-Slotted Hole Dimensions	
			Width (inch)	Length (inch)	Width (inch)	Length (inch)
1/2	9/16	N/A	N/A	N/A	N/A	N/A
5/8	11/16	13/16	11/16	7/8	11/16	1 9/16
3/4	13/16	15/16	13/16	1	13/16	1 7/8
7/8	15/16	1 1/16	15/16	1 1/8	15/16	2 3/16
1	1 1/16	1 1/4	1 1/16	1 5/16	1 1/16	2 1/2
≥1 1/8	d + 1/16	d + 5/16	d + 1/16	d + 3/8	d + 1/16	2.5d

1.4.7.3 Accuracy of Forming and Location:

Poor matching of holes and holes that are not perpendicular to the component will be rejected.

1. Subsize Holes:

Accurately locate holes such that after assembly, and before any reaming is done, a cylindrical pin with diameter 1/8 inch smaller than the nominal size of the hole may be entered perpendicular to the face of the member, without drifting, in at least 75 percent of the contiguous holes in the same plane. Failure of a hole to pass a pin with diameter 3/16 inch smaller than the nominal size of the hole will be cause for rejection.

2. Full-Size Holes:

Accurately locate holes such that after assembly 85 percent of the holes in any contiguous group show no offset greater than 1/32 inch between adjacent thicknesses of metal.

1.4.8 Shop Assembly:

Use Full or Progressive Assembly methods unless otherwise specified.

Place milled-to-bear ends of members in full bearing prior to drilling or reaming holes for connection.

When full-size holes are formed prior to assembly, assemble components, and verify and document that assemblies conform to plans and shop drawings, including camber, alignment, accuracy of holes, and fit of milled joints.

When holes are to be formed or finalized in assembled components, assemble components, and verify and document that assemblies conform to plans and shop drawings, including camber, alignment, accuracy of holes, and fit of milled joints prior to finalizing holes.

Submit documentation verifying assembly conformance to the Fabrication Engineer for review.

Upon acceptance the assembly may be dismantled.

Match-mark assembled components in accordance with 807.04.4 and submit a diagram showing such marks to the Fabrication Engineer for record.

1.4.8.1 Full Girder or Truss Assembly:

Assemble all members of each continuous beam line, plate girder, truss, arch rib, bent, tower face, or rigid frame at one time.

1.4.8.2 Progressive Girder or Truss Assembly:

Progressive Girder Assembly consists of initially assembling at least three contiguous shop sections of each continuous beam line, plate girder, or arch rib.

Progressive Truss Assembly consists of initially assembling at least three contiguous panels for each truss, bent, tower face, or rigid frame, but no less than the number of panels associated with three contiguous chord lengths.

For both cases, successive assemblies consist of at least one section or panel of the previous assembly (repositioned, if necessary, and adequately pinned to assure accurate alignment) plus two or more sections or panels added at the advancing end. In the case of structures longer than 150 feet, each assembly shall be at least 150 feet long regardless of the length of individual continuous panels or sections. At the option of the fabricator, sequence of assembly may start from any location in the structure and proceed in one or both directions so long as the preceding requirements are satisfied.

Assemblies consisting of less than three shop sections or panels require approval of the engineer.

1.4.8.3 Full Chord Assembly:

Assemble with geometric angles at the joints the full length of each chord of each truss or open spandrel arch, or each leg of each bent or tower. Ream web member connections using steel templates set at geometric (not cambered) angular relation to the chord line.

Mill or scribe at least one end of each web member normal to the longitudinal axis of the member. Accurately locate the templates at both ends of the member from one of the milled ends or scribed lines.

1.4.8.4 Progressive Chord Assembly:

Assemble contiguous chord members in the manner specified for Full Chord Assembly and in the number and length specified for Progressive Girder or Truss Assembly.

1.4.8.5 Special Girder Assembly:

Assemble rolled beams or plate girders in pairs when they are part of a simply supported span having horizontal curvature, skew, or superelevation. Assemble with floor system, lateral bracing, and cross frames on blocking, with the proper camber and relative elevation, and provide proper fittings of all parts during field erection.

1.4.8.6 Special Full Structure Assembly:

Assemble the entire structure, including the floor system, for structures having curved girders or skews when in combination with grade or camber.

1.4.8.7 Bearing Assembly:

Completely assemble bearing components, check accuracy of fit, and match-mark for shipping.

1.4.9 Plate Cut Edges:

1.4.9.1 Edge Planing:

Sheared edges of plates more than 5/8 inch thick and carrying calculated stress shall be planed, milled, ground or thermal cut to remove a minimum of 1/4 inch. Radius reentrant corners to 3/4 inch minimum before cutting.

1.4.9.2 Visual Inspection and Repair:

Visually inspect and repair plate cut edges in accordance with the latest edition of *ANSI/AASHTO/AWS D1.5 Bridge Welding Code*.

1.4.10 Shop Welding:

Comply with Section 809.

1.4.11 End Connection Angles:

Construct floor beams, stringers, and girders having end connection angles to specified length (+0, −1/16 inch) between heels of connection angles. If continuity is required, end connections shall be faced. Thickness of connection angles shall not be less than 3/8 inch or less than plan thickness after facing.

1.4.12 Lacing Bars:

Ends of lacing bars shall be neatly rounded.

1.4.13 Direction of Rolling and Stress:

Cut and fabricate steel plates and splice plates for primary members so that the direction of rolling is parallel to the direction of the main tensile and compressive stresses.

1.4.14 Bent Plates:

Cold-bending of fracture-critical steels and fracture-critical members is prohibited.

Bend plates at right angles to the direction of rolling for unwelded, cold- bent, load-carrying members. Cold-bent ribs for orthotropic-deck bridges may be bent in the direction of rolling, if permitted.

Bending shall be such that no cracking of the plate occurs. Minimum bend radii, measured to the concave face of the metal, are shown in Table 807-3.

Table 807-3
Steel Plate Minimum Cold Bending Inside Radius

Plate Thickness, t (inch)	M270 Grades 36, 50, 50S, 50W, HPS 50W, and HPS 70W Minimum Bend Radius
Up to 0.50	2.0 t
Over 0.50 to 1.00	2.5 t
Over 1.00 to 1.50	3.0 t
Over 1.50 to 2.50	3.5 t
Over 2.50 to 4.00	4.0 t

For grades not included in Table 807-3, follow minimum bend radii specified in the latest *AASHTO LRFD Bridge Construction Specifications* or larger radii if recommended by the plate producer.

If shorter radii are required, hot bend plates at a temperature no greater than 1100°F. Hot-bent plates shall conform to the requirements for cold-bent plates.

Before bending, round off plate edges to a radius of 1/16 inch throughout the portion of the plate to be bent.

1.4.15 Stiffeners:

Clip lower inside corner of transverse stiffeners at least 1.5 inch, and terminate longitudinal stiffeners at least 1.0 inch short of transverse stiffeners to facilitate drainage.

Bearing stiffeners of girders and stiffeners intended as supports for concentrated loads shall have full bearing (either milled, ground, or welded, as specified) on the flanges. Stiffeners not intended to support concentrated loads shall have a tight fit unless otherwise shown on the plans.

Do not weld transversely across tension flanges of beams or girders unless shown on the plans.

1.4.16 Eyebars:

Fabrication shall comply with the latest *AASHTO LRFD Bridge Construction Specifications*. No welding is allowed on eye bars or to secure adjacent eye bars.

1.4.17 Stress Relieving:

When specified, stress-relieve members in accordance with AWS.

1.4.18 Pins and Rollers:

Pins and rollers shall be accurately turned to specified dimensions and shall be straight, smooth, and free from flaws. Finish in accordance with Table 807-1.

Forge and anneal pins and rollers more than 9 inches in diameter. Pins and rollers 9 inches or less in diameter may be either forged and annealed or cold- finished carbon-steel shafting.

In pins larger than 9 inches in diameter, bore a hole not less than 2 inches in diameter full length along the axis after the forging has been allowed to cool to a temperature below the critical range under suitable conditions to prevent damage by too rapid cooling and before being annealed.

1.4.19 Boring Pin Holes:

Bore pin holes true to specified diameter, smooth and straight, at right angles with the axis of the member and parallel with each other. Produce the final surface by a finishing cut. Finish in accordance with Table 807-1.

Pin hole diameter shall not exceed pin diameter by more than 0.020 inch for pin diameters of 5 inches or less, and 0.03125 inch for larger pins.

The distance outside-to-outside of end holes in tension members and inside-to-inside of end holes in compression members shall not vary from that specified more than 0.03125 inch. Bore holes in built-up members after the member has been assembled.

1.4.20 Screw Threads:

Threads for bolts and pins for structural steel construction shall comply with the *Unified Standard Series UNC/ANSI B1.1*, Class 2A for external threads and Class 2B for internal threads. Pin ends having a diameter of 1.375 inch or more shall be threaded six threads per inch.

1.4.21 Pilot and Driving Nuts:

Furnish two pilot nuts and two driving nuts for each size pin.

1.4.22 Marking and Shipping:

Adhere to 105.12 when shipping material.

Paint or mark each member with an erection mark for identification in accordance with 807.04.4. Furnish an erection diagram with erection marks shown thereon. Members weighing more than three tons shall have weights marked thereon. A list and description of packaged materials shall be plainly marked on the outside of each shipping container.

Load, transport, and erect structural members in accordance with the accepted transportation and erection plan. Transport girders and beams in the upright position. Prevent excessive stress and deformation in members.

Ship pins, small parts, and packages of bolts, washers, and nuts in boxes, crates, kegs, or barrels, but the gross weight of any package shall not exceed 300 pounds.

Submit for record to the engineer as many copies of material orders, shipping statements and erection diagrams as directed. Show weights of individual members on the statements.

1.4.23 Bridge Deck Joints:

Pair joint assemblies and fit before shipping. Plates, angles, or other structural shapes shall be accurately fabricated at the shop to conform to the specifications. Provide surfaces in the finished plane that are true and free of warping. Galvanize after fabrication unless otherwise specified.

1.4.24 Shear Connectors:

Shear connectors may be either 3/4 inch or 7/8 inch diameter. Comply with the requirements of Section 7, Stud Welding of the latest edition of *ANSI/AASHTO/AWS/D1.5 Bridge Welding Code*.

When shear connectors are applied on painted surfaces, remove paint from surfaces to receive shear connectors to provide a clean circular area having twice the shear stud diameter. Clean circular areas in accordance with AWS prior to attachment. Do not remove paint within 2 inches of edge of the flange.

1.4.25 Shop Painting:

Comply with Section 811.

1.5 ASSEMBLY AND ERECTION:

Follow the accepted erection plan. Accurately assemble parts and follow all match-marks. Do not use tools that will damage or distort members. Clean bearing surfaces and permanent contact surfaces before members are assembled.

Install splices and field connections with at least 50 percent of the holes filled with bolts (either erection or untorqued permanent bolts) and cylindrical erection pins. Fill at least 10 percent of the holes with cylindrical erection pins for fit-up and alignment. Splices and connections carrying traffic during erection shall have at least 75 percent of the holes filled. Main member splices shall have all holes filled with bolts and cylindrical erection pins (half bolts and half pins) for fit-up and alignment.

Unless erected by the cantilever method, erect truss spans on blocking to give the trusses proper camber. Leave blocking in place until tension chord splices and all other truss connections are pinned and bolted. Tighten permanent bolts in splices of butt joints of compression members after the structure is in final position.

Use erection bolts of the same nominal diameter as permanent bolts and cylindrical erection pins with a 1/32 inch larger diameter. Drift holes into position during erection without enlarging holes or distorting metal.

Perform permanent bolting in accordance with 807.05.2.

1.5.1 Bolts:

1.5.1.1 High-Strength Bolts:

Assemble structural joints using ASTM A325 or A490 high-strength steel bolts tightened to the specified tension.

All bolts, nuts, washers, and direct tension indicator devices within a connection shall be of the same respective type and manufacturer.

Marking of bolts, nuts, and washers shall comply with Figure 807-1.

Figure 807-1
Markings

Type	A325 Assembly		A490 Assembly	
	Bolt	A563 Nut	Bolt	A563 Nut
1	 XYZ = Manufacturer Mark	 Grade Mark DH or 2H*		 Grade Mark DH or 2H*
3	 Note Mandatory Underline	 Grade Mark DH3	 Note Mandatory Underline	 Grade Mark DH3

*Grade 2H, plain finish, per ASTM A194 (A194 M).

ASTM A325 and A490 bolts shall have the heads marked “A325 or A490” and shall also be marked identifying the manufacturer. Type 3 bolts shall have the “A325” and “A490” underlined.

ASTM A563 nuts shall be marked identifying manufacturer. Type 1 nuts shall be marked with the grade symbol “DH” or “2H.” Type 3 nuts shall be marked with the grade symbol “DH3.” Nuts may be washer faced or doubled chamfered.

Washers shall be marked identifying the manufacturer. Type 3 washers shall be marked with the symbol “3.”

Determine bolt length by adding to the grip the following lengths and rounding up as specified herein. The grip is the total thickness of all connected material, including filler plates. Provide bolt length resulting in no less than two threads extending beyond the nut after final tensioning.

Add length from Table 807-4. Add 5/32 inch for each hardened flat washer. Add 5/16 inch for each beveled washer. Add length required for other devices such as DTIs, structural plate washers, continuous bars, etc. Round up to nearest 1/4 inch for bolt lengths less than 4 inches. Round up to nearest 1/2 inch for bolt lengths of 4 inch and greater.

The values in Table 807-4 are taken from the Research Council on Structural Connections as values that provide appropriate allowances for manufacturing tolerances and sufficient thread engagement with an installed heavy-hex nut.

Table 807-4
Bolt Length Determination

Bolt Diameter (inch)	* Length to Add to Grip (inch)
1/2	11/16
5/8	7/8
3/4	1
7/8	1 1/8
1	1 1/4
1 1/8	1 1/2
1 1/4	1 5/8
1 3/8	1 3/4
1 1/2	1 7/8

* Does not include length required for washers, DTIs, etc. See specifications.

1.5.1.2 Turned Bolts:

Turned bolts shall be in accordance with Section 821.07.12 for mechanical applications. For other applications, turned bolts shall be in accordance with the following unless otherwise specified. Provide single self-locking nuts or double nuts.

The surface of the body of turned bolts shall meet the ANSI B 46.1 roughness rating value of 125 inch. Heads and nuts shall be hexagonal with standard dimensions for bolts of the specified nominal size or the next larger nominal size. Diameter of threads shall be equal to the body of the bolt or the nominal diameter of the bolt. Carefully ream holes for turned bolts and furnish specified bolts to provide for a light driving fit. Threads shall be entirely outside of holes. Provide a washer under the nut.

1.5.1.3 Ribbed Bolts:

Ribbed bolts shall be unfinished and comply with ASTM A307, Grade A.

Provide single self-locking nuts or double nuts.

The body of ribbed bolts shall be an approved form with continuous longitudinal ribs. The diameter of the body measured on a circle through the points of the ribs shall be 5/64 inch greater than the nominal diameter of the specified bolt.

Furnish ribbed bolts with round heads complying with ANSI B18.5. Nuts shall be hexagonal and either recessed or with a washer of suitable thickness. Ribbed bolts shall make a driving fit with the holes. Hardness of the ribs shall be such that the ribs do not permit the bolts to turn in the holes during tightening. If the bolt twists before drawing tight, carefully ream the hole and use an oversized bolt.

1.5.2 Bolted Connections:

A fastener or fastener assembly is composed of bolt, nut, washers, and, if applicable, a direct tension indicator (DTI) device. Use new and unused fastener assemblies in installation and testing.

1.5.2.1 Rotational Capacity Testing:

Rotational capacity tests are required and shall be performed on all Type 1, Type 3, and galvanized (after galvanizing) fastener assemblies by the manufacturer or distributor prior to shipping and by the contractor at the jobsite prior to installation. For installations utilizing DTIs, the requirement for rotational capacity testing by the contractor at the job site is dependent on results obtained during DTI Pre-Installation Verification.

Perform Rotational Capacity Test as specified herein. Test all combinations of bolt production lot, nut lot, and flat hardened washer lot used as an assembly representative of the surface and lubrication condition at time of installation. Do not use DTIs in the test assemblies. Flat hardened washers are required as part of the test even if not required as part of the installation fastener assembly. Assign a rotational capacity lot number to each combination of lots tested.

The minimum frequency of testing shall be two fastener assemblies per rotational capacity lot. Fastener assembly components shall be new and unused prior to testing and discarded after testing.

Use a dial type torque wrench. No multipliers will be allowed.

Install fasteners such that 3 to 5 full threads of the bolt are located between the bearing surfaces of the bolt head and nut. Restrain the bolt head from turning during nut rotation.

Test fastener assemblies in a Skidmore-Wilhelm Calibrator or an acceptable equivalent tension measuring device using Method 1. For fastener assemblies too short to be tested in a tension measuring device, use Method 2. Minimum Required Tension (MRT) used for testing fastener assemblies is provided in Table 807-5 and is based on 70 percent of the specified minimum strength of bolts.

1.5.2.1.1 Method 1:

1. Tension fastener assembly to Initial Tension in accordance with Table 807-5. Mark the position of the nut with respect to the bolt for reference.

Table 807-5
Rotational Capacity Testing

ASTM A325 Bolts			
Bolt Diameter (inch)	Initial Tension (kip)[1]	MRT (kip)	115% x MRT (kip)
1/2	1	12	14
5/8	2	19	22
3/4	3	28	32
7/8	4	39	45
1	5	51	59
1 1/8	6	56	64
1 1/4	7	71	82
1 3/8	9	85	98
1 1/2	10	103	118
ASTM A490 Bolts			
Bolt Diameter (inch)	Initial Tension (kip)[1]	MRT (kip)	115% x MRT (kip)
1/2	2	15	17
5/8	2	24	28
3/4	4	35	40
7/8	5	49	56
1	6	64	74
1 1/8	8	80	92

$1\frac{1}{4}$	10	102	117
$1\frac{3}{8}$	12	121	139
$1\frac{1}{2}$	15	148	170

2. Approximately 10 percent of MRT.
3. Tension fastener assembly until the Test Rotation in Table 807-6 is reached and record the measured torque and tension.

Table 807-6
Test Rotation from Initial Tension

Test Rotation	Bolt Length
240° ($\frac{2}{3}$ turn)	≤4 diameters
360° (1 turn)	>4 diameters and ≤8 diameters
480° ($1\frac{1}{3}$ turn)	>8 diameters and ≤12 diameters
420° ($1\frac{1}{6}$ turn)	>12 diameters (A490 Only)

4. The measured torque value shall not exceed the following:

Where: P = measured bolt tension, pound D = bolt diameter, feet

5. The measured tension reached at the Test Rotation shall be equal to or greater than 115 percent of MRT in accordance with Table 807-5.

1.5.2.1.2 Method 2:

Bolts that are too short to test in a tension measuring device may be tested in a steel joint. The hole in the joint shall have the nominal diameter of the bolt hole in the work.

1. Determine the Initial Torque by tensioning a bolt of the minimum length accepted in the tension measuring device to Initial Tension in accordance with Table 807-5 and record the torque measured. Use the measured torque as the Initial Torque.
2. Tension the short fastener assembly to the Initial Torque in the steel joint. Mark the position of the nut with respect to the bolt for reference.
3. Tension the short fastener assembly until the Test Rotation in Table 807-6 is reached and record the measured torque.
4. The measured torque reached at the Test Rotation shall not exceed the following:

Where: P = 115 percent of MRT, pound (refer to Table 807-5) D = bolt diameter, feet

1.5.2.1.3 Acceptance Criteria:

The fastener assembly will be considered non-conforming if any of the following occur:

1. Inability to install the assembly to the nut rotation in Method 1 or 2 as applicable.
2. Exceeding the torque limit in Method 1 or 2 as applicable.
3. Inability to meet tension requirement in Method 1. Inability to remove the nut after reaching the Test Rotation.
4. Shear failure of bolt or nut threads as determined by visual examination following removal.
5. Torsional or torsional/tension failure of the bolt. Expect elongation of the bolt in the threads between the bearing face of the nut and the bolt head at Test Rotation; do not classify such elongation as a failure.

1.5.2.2 Submittals:

Prior to final installation, submit for record the following to the Project Engineer:

1. Mill Test Report for all mill steel used in the manufacture of the bolts, nuts, washers, and DTI devices. Reports shall include the place where the material was melted and manufactured.
2. Manufacturer's Report providing the following:
   a. Lot number of each item tested
   b. Rotational capacity lot number
   c. Rotational capacity tests results
   d. Certification that all items are in compliance with project and ASTM specifications
   e. Location of manufacture of fastener assembly components.
3. Coating Report containing the type, thickness, location of application, and compliance with the appropriate specifications.
4. Installer's Report providing the following:
   a. Lot number of each item tested
   b. Rotational capacity lot number
   c. Rotational capacity tests results
   d. Installation Test in accordance with 807.05.2.5.

1.5.2.3 Shipping Fasteners:

Permanently mark all containers with the manufacturer lot number and the rotational capacity lot number such that identification will be possible at any stage prior to installation.

1.5.2.4 Bolted Parts:

Surfaces of bolted parts in contact with the bolt head or nut shall not have a slope of more than 1:20 with respect to a plane normal to bolt axis. Bolted parts shall fit solidly together when assembled and shall not be separated by gaskets or other compressible material**.**

Clean and prepare faying surfaces as follows:

1. When steel is specified to be painted, apply SSPC-SP10 Near-White Blast Cleaning

and apply an inorganic zinc primer all in accordance with Section 811. Provide a Class B slip coefficient of 0.50 minimum.

2. When steel is specified to be unpainted, apply SSPC-SP6 Commercial Blast Clean in accordance with Section 811. Provide a Class B slip coefficient of 0.50 minimum.
3. When galvanized steel is specified, after galvanizing and prior to assembly, abrade contact surfaces within joints by wire brushing or light blasting. Provide a Class C slip coefficient of 0.33 minimum. Do not produce a break or discontinuity in the zinc surface. Wire brushing shall be a light application of manual brushing that marks or scores the surface but removes relatively little of the zinc coating. Blasting shall be a light brush-off treatment which will produce a dull gray appearance. ASTM A490 bolts shall not be galvanized. When ASTM A490 bolts are specified to connect galvanized parts, bolts shall be painted to prevent electrolytic action.
4. When metallic thermal spray coatings are specified, conform to 811.06.6.2.

1.5.2.5 Installation and Inspection:

Use Direct Tension Indicator Method, in accordance with 807.05.2.5.1, unless otherwise authorized in writing by the Bridge Engineer.

Install fastener assemblies of the size and quality specified in properly aligned holes. Install a hardened washer directly under nut or bolt head, whichever is the element turned in tightening. Use two hardened washers with ASTM A490 bolts.

A flat washer may be used when the abutment surface adjacent to the bolt head or nut does not have a slope of more than 1:20 with respect to a plane normal to bolt axis. If an outer face of the bolted part has a slope of more than 1:20 with respect to a plane normal to the bolt axis, use a smooth beveled washer to compensate for lack of parallelism.

Do not reuse or re-torque ASTM A325 or ASTM A490 bolts. Retightening previously tightened bolts which have been loosened by tightening adjacent bolts will not be considered as reuse or re-torque.

Protect fasteners from dirt and moisture at the jobsite. Reject fasteners contaminated with dirt and moisture. Only take as many fasteners as are anticipated to be installed and tightened during a work shift from protected storage. Return unused fasteners to protected storage at the end of the shift. Do not clean fasteners of lubricant that is present in as-delivered condition.
Provide a tension measuring device at all jobsites when high strength bolts are being installed and tensioned. Use the device to perform testing, validate installation procedures, train installers, and calibrate wrenches.

Impact wrenches, if used, shall be of adequate capacity and sufficiently supplied with air to perform the required tensioning of each bolt in approximately 10 seconds.

Minimum Required Tension (MRT) for fasteners is provided in Table 807-7 and is based on 70 percent of the specified minimum strength of bolts. All tests shall demonstrate that the tension measuring device indicates a tension not less than 105 percent of MRT.

Before installation of fasteners in the work, the engineer will inspect the marking, surface condition, and storage of bolts, nuts, washers, DTIs, and the faying surfaces of joints for compliance with the specifications.

The engineer will inspect testing procedures and/or calibration to confirm that the selected procedure is properly used, the fastener assemblies match those to be used on the project, and the specified tensions are provided. The engineer will inspect the installation of fasteners in the work to assure that the specified tensions are provided and that the selected procedure is routinely properly applied.

Table 807-7
Installation and Inspection Tension Values

ASTM A325 Bolts				
Bolt Diameter, (inch)	MRT (kip)	10% x MRT (kip)	105% x MRT (kip)	110% x MRT (kip)
1/2	12	1	13	13
5/8	19	2	20	21
3/4	28	3	29	31
7/8	39	4	41	43
1	51	5	54	56
1 1/8	56	6	59	62
1 1/4	71	7	75	78
1 3/8	85	9	89	94
1 1/2	103	10	108	113
ASTM A490 Bolts				
Bolt Diameter, (inch)	MRT (kip)	10% x MRT (kip)	105% x MRT (kip)	110% x MRT (kip)
1/2	15	2	16	17
5/8	24	2	25	26
3/4	35	4	37	39
7/8	49	5	51	54
1	64	6	67	70
1 1/8	80	8	84	88
1 1/4	102	10	107	112
1 3/8	121	12	127	133
1 1/2	148	15	155	163

1.5.2.5.1 Direct Tension Indicator (DTI) Method:

Do not allow the turning element to be in contact with the DTI. Give special attention to proper installation of flat hardened washers when DTIs are used with bolts installed in oversize or slotted holes.

Use a 0.005 inch tapered feeler gauge for measuring DTI compression in the spaces between the DTI protrusions. A feeler gauge refusal is defined as the inability to touch the bolt shank with the feeler gauge.

1. DTI Method Pre-installation Verification:

Use a Skidmore-Wilhelm Calibrator or equivalent tension measuring device. Use a special flat insert in place of a bolt head holding insert to provide a DTI bearing surface. Perform at least three field verification tests as specified herein. A fastener assembly verification lot consists of each combination of bolt production lot, nut lot, washer lot, DTI lot, and DTI position relative to the turned element (bolt head or nut) to be used on the project. Test each fastener assembly verification lot with DTIs and flat hardened washers arranged as those in the actual connections to be tensioned. Restrain the element intended to be stationary (bolt head or nut) from rotation. Assign a verification lot number to each fastener assembly verification lot tested.

Use rigid spacers if required so that at least three and preferably no more than five threads are located between the bearing face of the nut and the bolt head. If the bolt is too short to be tested in the tension measuring device, use a similar bolt of adequate length in place of the short bolt.

Tension the fastener to a verification tension of 105 percent of MRT in accordance with Table 807-7. If an impact wrench is used, the tension developed using the impact wrench shall be no more than two-thirds of the verification tension. Use a manual wrench to complete tensioning. Record the number of refusals of a 0.005 inch feeler gauge in the spaces between the DTI protrusions. Reject the DTI lot if the number of refusals for any DTI tested exceeds the Maximum Number of Refusals shown in Table 807-8.

Further tension the fastener until a 0.005 inch feeler gauge is refused in all DTI spaces and a visible gap exists in at least one space between the protrusions. Record tension at this condition and remove fastener assembly from the tension measuring device.

For production bolts too short to be tested in the tension measuring device, additionally assemble the short fastener assembly with an unused DTI from the same lot in a connection of steel plates of equivalent thickness to the work and tension short fastener until a 0.005 inch feeler gauge is refused in all DTI spaces and a visible gap exists in at least one space between the protrusions. Remove short fastener assembly.

The fastener assembly verification lot is accepted if none of the following occur.

1. Inability to compress DTI protrusions to have a 0.005 inch feeler gauge refused in all DTI spaces and a visible gap existing in at least one space between the protrusions.
2. Inability to remove the nut when removing the production fastener assembly from the

tension measuring device or from the steel plate connection.

3. Shear failure of threads in production bolt or nut as determined by visual examination following removal.
4. Torsional or torsional/tension failure of the production bolt. Elongation of the bolt in the threads between the bearing face of the nut and the bolt head is acceptable.

For an unaccepted fastener assembly verification lot, perform field Rotational Capacity Test in accordance with 807.05.2.1 to determine acceptance of the bolt, nut and hardened washer lot.

Accept the DTI lot if the recorded tension during the DTI pre-installation verification method at one visible gap is less than 95 percent of the average tension recorded at Test Rotation in the field Rotational Capacity Test.

Table 807-8
DTI Verification Test

A325 Bolts		
Bolt Diameter (inch)	DTI Spaces	Verification Test Maximum Number of Refusals
1/2	4	1
5/8	4	1
3/4	5	2
7/8	5	2
1	6	2
1 1/8	6	2
1 1/4	7	3
1 3/8	7	3
1 1/2	8	3
A490 Bolts		
Bolt Diameter (inch)	DTI Spaces	Verification Test Maximum Number of Refusals
1/2	5	2
5/8	5	2
3/4	6	2
7/8	6	2
1	7	3
1 1/8	7	3
1 1/4	8	3
1 3/8	8	3
1 1/2	9	4

2. DTI Method Installation:

Install fasteners in all holes of the connection and bring to snug condition. Snug condition is defined as the fastener tension that exists when all joint material plies are in firm contact and DTI protrusions are partially compressed with a visible gap greater than 0.005 inch in all spaces. If a DTI exhibits a refusal of the 0.005 inch feeler gauge, remove the fastener, install a new unused DTI, and bring the fastener to snug condition.

Further tension all fasteners, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tensioned fasteners. Proper tensioning of fasteners may require more than a single cycle of systematic partial tensioning prior to final tensioning. Final tensioning is defined as compression of the DTI protrusions resulting in having the minimum number of refusals in accordance with Table 807-9 and having at least one visible gap. If a DTI does not conform to these specifications, remove the fastener assembly, install a new fastener assembly, and bring the fastener to specified final tensioning.

3. DTI Method Inspection:

Visually inspect all DTIs in the connection to verify protrusions are deformed to approximate final position and that a visible gap remains. If a DTI exhibits no visible gap, remove the fastener assembly, install a new fastener assembly, and bring the fastener to specified final tensioning.

Use the specified 0.005 inch feeler gauge on at least 10 percent of the fasteners in a connection, but not less than two fasteners, and verify that the number of refusals conforms to Table 807-9. If the number of refusals on any inspected DTI does not conform to Table 807-9, all DTIs in the connection will be inspected with the 0.005 inch feeler gauge, and any fasteners not sufficiently tensioned shall be further tensioned and re-inspected for visible gap and number of refusals of the 0.005 inch feeler gauge.

If all inspected DTIs conform to the specifications, the connection will be accepted. Should inspection reveal excessive tension (no visible gap) or inadequate tension (less than minimum required refusals of the 0.005 inch feeler gauge), adjust installation procedures to meet specifications.

Table 807-9
DTI Inspection

A325 Bolts		
Bolt Diameter (inch)	DTI Spaces	Installation Minimum Number of Refusals
1/2	4	2
5/8	4	2
3/4	5	3
7/8	5	3
1	6	3
1 1/8	6	3
1 1/4	7	4
1 3/8	7	4
1 1/2	8	4
A490 Bolts		
Bolt Diameter (inch)	DTI Spaces	Installation Minimum Number of Refusals
1/2	5	3
5/8	5	3
3/4	6	3
7/8	6	3
1	7	4
1 1/8	7	4
1 1/4	8	4
1 3/8	8	4
1 1/2	9	5

1.5.2.5.2 Turn-of-Nut Method:

1. Turn-of-Nut Method Pre-installation Verification:

Test a representative sample of not less than three fastener assemblies for each bolt diameter, length, type, and grade used in the work using a tension measuring device. The test assembly shall include flat hardened washers arranged as those in the actual connections to be tensioned. Demonstrate in all tests that the method for estimating the snug condition and controlling the turns from snug condition given in Table 807-10 develops a tension not less than 105 percent of MRT in Table 807-7. Follow the tension measuring device procedures for fastener assembly installation during testing.

2. Turn-of-Nut Method Installation:

Install fasteners in all holes of the connection and bring to snug condition. Snug condition is defined as the fastener tension that exists when all joint material plies are in firm contact. This

may be attained by a few impacts of an impact wrench or the full effort of a worker using an ordinary spud wrench. Temporarily match mark bolt, nut, and bolted part. Tension all fasteners progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tensioned fasteners in accordance with the rotations specified in Table 807-10.

The rotations specified in Table 807-10 are relative to the bolt, regardless of the element (nut or bolt) being turned. The rotations specified are applicable only to connections in which all material within the grip of the bolt is steel.

For fasteners installed by 1/2 turn and less, tolerance for the specified rotation is minus 0 degrees, plus 30 degrees. For fasteners installed by 2/3 turn and more, tolerance for the specified rotation is minus 0 degrees, plus 45 degrees.

When bolt length exceeds 12 bolt diameters, determine required rotation by testing in a suitable tension device simulating actual conditions.

Table 807-10
Nut Rotation from Snug Condition

	Disposition of Outer Faces of Bolted Parts		
Bolt Length (Measured from underside of head to extreme end of point)	Both faces normal to bolt axis	One face normal to bolt axis and other face sloped not more than 1:20 (bevel washer not used)	Both faces sloped not more than 1:20 from normal to bolt axis (bevel washers not used)
≤ 4 diameters	1/3-turn	1/2-turn	2/3-turn
> 4 diameters and ≤ 8 diameters	1/2-turn	2/3-turn	5/6-turn
> 8 diameters and ≤ 12 diameters	2/3-turn	5/6-turn	1 turn

3. Turn-of-Nut Method Inspection:

Calibrate a manual job inspection torque wrench in a tension measuring device. Install five fastener assemblies of each bolt diameter, length, type, and grade to be used in the work in the tension measuring device and tension to 10 percent of MRT shown in Table 807-7. Further tension the fastener assemblies to MRT with the job inspection torque wrench and record the respective torque value. For the five torque values corresponding to MRT, discard the low and high values and average the remaining three values to determine the Job Inspection Torque.

Inspect fasteners by applying the job inspection torque wrench to at least 10 percent of the fasteners, but not less than two fasteners, selected by the engineer at random in each

connection. If no bolt or nut is turned by application of the Job Inspection Torque, the connection will be accepted as properly tensioned. If a bolt or nut is turned by the application of less than the Job Inspection Torque, either apply the Job Inspection Torque to all fasteners in the connection, or re-tension all fasteners in the connection using the original installation method and in accordance with the specified tension. Repeat the inspection process until the connection is accepted.

1.5.2.5.3 Calibrated Wrench Method:

Only use Calibrated Wrench Tightening when required by the plans or directed by the engineer. This specification does not recognize standard torques determined from tables or from formulas, which are assumed to relate torque to tension.

1. Calibrated Wrench Method Pre-Installation Verification:

Set wrenches to provide a tension not less than 105 percent of and not greater than 110 percent of MRT in Table 807-7. Calibrate the installation procedures at least once each working day for each bolt diameter, length, and grade using the following:

a. The length of air hose that will be used during installation and the fastener assemblies that are being installed in the work.
b. Accomplish calibration in a tension measuring device capable of indicating bolt tension. Tension three fasteners of the diameter, length, type, grade and washer orientation as those being installed in the work.
c. Recalibrate wrenches when significant differences are noted in the surface condition of the bolts, nuts, bolt/nut threads, or washers.

2. Calibrated Wrench Method Installation:

Install fasteners in all holes of the connection and bring to snug condition. Snug condition is defined as the fastener tension that exists when all joint material plies are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of a worker using an ordinary spud wrench. Further tension the connection using the calibrated wrench. Tension all fasteners, progressing systematically from the most rigid part of the connection to the free edges in a manner that will minimize relaxation of previously tightened fasteners. Return the wrench to touch up previously tensioned fasteners which may have been relaxed as a result of the subsequent tensioning of adjacent fasteners until all fasteners are tensioned to the specified value.

3. Calibrated Wrench Method Inspection:

Perform Calibrated Wrench Method Inspection in accordance with Turn- of-Nut Method Inspection of 807.05.2.5.2.

1.5.3 Falsework:

Design falsework in accordance with Section 817.

1.5.4 Straightening Bent Material:

Submit for review and acceptance; repair procedures for corrective action. Straighten plates, angles, other shapes and built-up members using methods that will not produce fracture or other damage. Straighten distorted members by mechanical means or by supervised application of a limited amount of localized heat. In no case shall the temperature of the steel exceed 1100°F (590°C).

Following the corrective action, carefully inspect the surface of the metal for evidence of fracture or other damage.

1.5.5 Installing Pin Connections:

Use pilot and driving nuts to install pins when required at no additional cost to the Department. Drive pins so that members will be in full bearing with the pins. Tighten pin nuts and burr threads at face of nut to restrain nut.

1.5.6 Field Welding:

Field welding is not allowed on structures unless specifically shown on the plans. When shown, comply with Section 809.

1.5.7 Misfits:

Correction of minor misfits may be expected. Minor reaming will be considered a legitimate part of erection. Use a reaming tool no larger than the bolt hole diameter. Ream no more than 5 percent of the holes in the connection.

Immediately report any error in fabrication or deformation which prevents proper assembly and fitting of parts. Submit corrective measures to the engineer for review and acceptance. Make all corrections in the presence of the Department's inspector. All corrections and replacements shall be at no additional cost to the Department.

1.5.8 Field Painting:

Comply with Section 811.

1.6 PROVISIONS FOR STRUCTURE TYPES:

1.6.1 Orthotropic-Deck Bridges:

1.6.1.1 Protection of Deck Plate after Blasting:

If blasting is used to prepare the deck plate to receive a wearing surface, apply a protective coating to the plate immediately after cleaning.

1.6.1.2 Dimensional Tolerance Limits:

Apply dimensional tolerance limits for orthotropic-deck bridge members to each completed but unloaded member in accordance with the latest *AASHTO LRFD Bridge Construction Specifications*.

1.6.2 Weathering Steel:

When weathering steel is specified the following additional requirements apply.

1.6.2.1 High-Strength Fastener Assemblies:

Use Type 3 fastener assemblies.

1.6.2.2 Flange Drip Plate near Bents:

Provide lowerflange drip plates on the exterior girders at plan locations to prevent staining of concrete from runoff.

1.6.2.3 Paint Portions of Structural Metalwork near Bents:

Clean, paint, and caulk in accordance with Section 811. Color paint topcoat in accordance with 811.03. Use flat paint topcoat finish.

Clean, paint and caulk structural metalwork near bents for a distance of 1.5 times the steel member depth but no less than 10 feet measured from each bent centerline.

1.6.2.4 Clean Non-painted Exposed Surfaces:

Clean all exposed surfaces of all grease, oil, paint, or other soilage. Blast clean outside surfaces of exterior girders and the bottom surface of the bottom flange of all girders, either before or after erection, to SSPC-SP 6 in accordance with Section 811. Keep cleaned surfaces free of grease, oil, markings, paint, or other soilage.

1.6.2.5 Caulk Non-painted Steel Details:

Caulk non-painted steel details in accordance with 811.06.5.6. Color caulk to match weathering steel in accordance with 811.03.

1.6.2.6 Restore Concrete Finish:

Restore all stained concrete surfaces to the required finish at the time of final acceptance.

1.6.3 Anchor Bolts:

Anchor bolts are devices used to transfer load to a concrete element. Loads may be tension, shear, or a combination. Layout anchor bolt locations in accordance with the plans. Submit placement procedures to the engineer for review. The submittal shall include procedures for installation and grouting.

1.6.3.1 Placement:

Anchor bolts placed in fresh concrete shall be held in position and alignment. Consolidate concrete thoroughly around anchor bolts.

Use blockouts to place anchor bolts in hardened concrete. Use a non- shrink grout from the AML consistent with the specific design requirements. Size the blockouts in accordance with grout manufacturer's recommendations.

Mechanical or epoxy anchor bolt systems may only be used when specified on the plans. Install anchor bolt systems in accordance with manufacturer's recommendations.

Coring to place anchor bolts in hardened concrete is not allowed.

1.6.3.2 Erection and Assembly:

Verify the location and alignment of the anchor bolt pattern. Replace bent or misaligned anchor bolts designed for tension, such as curved girders, tower bents, overhead sign support systems, high mast light poles, etc. Set bolts properly at initial casting and construct system without damaging the bolts.

Overhead sign supports and high mast light pole bolt patterns require preloading by a specified tightening procedure in accordance with 807.06.3.5.1.

1.6.3.3 Quality Control:

Provide anchor bolts in compliance with the plans (size and grade, bolt material and coating, projection length, bolt pattern and orientation, etc.). Corresponding holes between the base plate and top template plate shall be aligned within 1/8 inch. Individual bolts shall not be out of plumb more than 1/8 inch per 3 feet. Straightening misaligned bolts by bending is prohibited. The Engineer of Record must approve any corrective measure for misaligned bolts. Do not use bolts or nuts with damaged threads that require more than minimal effort by one worker using only a spud wrench to turn the nut. Make the engineer aware of damaged threads and correct to the satisfaction of the engineer.

1.6.3.4 Lubrication:

Clean threads of all foreign matter and lubricate with beeswax immediately prior to placement and tightening of nuts. If delayed more than 24 hours after being lubricated, repeat cleaning and lubricating procedure.

1.6.3.5 Tightening Procedures:

Tighten anchor bolts using procedures specified on the plans or as directed by the Engineer of Record.

1.6.3.5.1 Overhead Sign and Light Supports:

Install the bottom nut and washers on each anchor bolt. Level the top template by adjusting the bottom nuts so that the template rests on each washer and the distance between the top of the support surface and the bottom face of the nut is approximately 1/2 inch. Remove the template, lubricate the bearing surfaces of the bottom nuts and washers with beeswax, and erect and plumb the structure. Adjust the bottom nuts so that each is bearing on the washer against the base plate. With all cantilever elements removed and with the plumbed structure supported, lubricate the bearing surfaces of the top nuts and washers, install the washers and top nuts, and turn them onto the bolts so that each top nut is hand-tight against the washer.

Using a wrench, turn the bottom nuts up in the sequence specified below to a snug condition. Snug condition is defined as the full effort of a worker on a 12-inch wrench. Using the same sequence, turn the top nuts down to the same snug condition.

Induce a preload into the bolt using a turn-of-nut method. Tighten each top nut in the specified sequence 30 degrees past snug condition. Repeat this process of tightening each top nut an additional 30 degrees down until each top nut has been tightened 60 degrees past snug tight.

Bolt tightening sequence shall be as follows. For an eight-bolt pattern, number the bolts 1 through 8 in clockwise order viewed from above, beginning with bolt 1 on the side away from the heaviest cantilever element. The tightening sequence shall be 1, 5, 2, 6, 8, 4, 7, and 3. For a six-bolt pattern, number the bolts 1 through 6 in clockwise order viewed from above, beginning with bolt 1 on the side away from the heaviest cantilever element. The tightening sequence shall be 1, 4, 2, 5, 6, and 3. Use a similartechnique for other bolt patterns.

1.7 MEASUREMENT:

Structural metalwork will be measured per lump sum. No weight measurement of structural metals will be made. Estimated weights of structural metalwork shown on the plans are approximate and for information only. It is the contractor's responsibility to determine the correct weight of each grade of metal furnished. No adjustment in contract price will be made due to discrepancies in the estimated weights shown on the plans. Shop bills will not be required.

1.8 PAYMENT:

Payment for the completed and accepted items will be made at the contract lump sum price, which includes furnishing, fabricating, cleaning, applying coatings, erecting, temporary works, materials, labor, equipment, and all work necessary to complete the item.

Partial payments for stockpile of raw materials and fabrication costs will be allowed in accordance with Section 109.

When the engineer orders changes in the work which vary the weight of metal to be furnished, unit prices will be established by dividing the contract lump sum amount by the estimated weight shown on the plans. Compensation will be in accordance with 109.04.

Changes ordered by the engineer in the grade of steel to be furnished, which result in additional cost to the contractor, will be compensated for in accordance with 109.04.

Changes in the grade or quantity of steel which result from contractor adjustments in plate dimensions for efficiency in fabrication shall be at no additional cost to the Department.

Payment will be made under:

Item No.	Pay Item	Pay Unit
807-04-00100	Structural Metalwork	POUNDS

TECHNICAL SPECIFICATIONS

SECTION 17

STEEL SHEET PILING

1.0 GENERAL: (Addenda 1)

1.1 SCOPE OF WORK:

The work covered by this section consists of furnishing all plant, labor and materials and performing all operations in connection with the installation of all Contractor furnished permanent sheet piling in accordance with these specifications and applicable contract drawings for Wingwalls,

1.2 APPLICABLE PUBLICATIONS:

A. The following American Society for Testing and Materials (ASTM) Standards of the issues listed below and referred to thereafter by basic designation only form a part of this specification to the extent indicated by the references thereto:

1. A36-91 Structural Steel
2. A572-Grade 50 Steel Sheet Piling
3. A325-916 High-Strength Bolts for Structural Steel Joints

1.3 QUALITY ASSURANCEE:

A. The Contractor shall ensure all required material have tests and analyses performed and certified by manufacturer and / or approved laboratory to demonstrate that the materials are in conformity with the specifications.

B. If additional tests are required, Contractor shall ensure they are conducted in the presence of the Owner's Representative.

C. The Contractor shall furnish specimens and samples for additional independent tests and analyses upon request by the Engineer. Specimen and samples shall be properly labeled and prepared for shipment.

1.4 SUBMITTALS:

A. Submit all Shop Drawings in accordance with SECTION - 01340.

B. Submit descriptions of sheet piling driving equipment, shop drawings, test procedures, test reports and certificates, sheet piling driving records and other submittals to the Engineer for approval.

1.5 MEASUREMENT

A. Steel Sheet Pile for Wingwalls

1. Measurement for Steel Sheet Pile Wingwalls shall be made under the bid item “STEEL SHEET PILE PERMANENT” per Square Foot. Measurement of the

work shall include all the labor, material, and equipment to furnish and completely install the fully coated PZ or Approved-Equal steel sheet pile walls as indicated on the contract drawings. No Measurement shall be made for the material and additional clips/connections at connections between sheet pile walls. Measurement shall be made by the plan dimensions of the sheet pile walls installed, length times depth. No measurement shall be made for the corrugations of the sheet pile wall.

B. Temporary Cofferdam

1. Measurement for shall be made under the bid item "STEEL SHEETPILE" per Lump-Sum. Measurement of the work shall include all the labor, material, and equipment to furnish and completely install the uncoated PZ or Approved-Equal steel sheet pile walls, including all associated anchoring system: steel waler framing and all accessories as required by Contractor to completely execute the construction. No direct measurement for coating of the applicable sheets shall be made here, measurement shall be included under SECTION 09910 PAINTING. No other measurement shall be made for the material and additional clips/connections at connections between sheet pile walls or to adjacent structure. No other measurement shall be made for cutting off sheet pile walls.

1.6 PAYMENT:

A. Steel Sheet Pile for Wingwalls

1. Payment for Steel Sheet Piling shall be made under the bid item "STEEL SHEET PILE PERMANENT" per Square Foot of installed sheet pile wall to the elevations as indicated on the contract drawings. Payment shall include all of the costs: labor, material and equipment to furnish and install the work as shown on the contract drawings. Payment of the work shall include all the labor, material, and equipment to furnish and completely install the fully coated PZ or Approved-Equal steel sheet pile walls as indicated on the contract drawings. No direct payment for coating of the applicable sheets shall be made here, the cost of coating of applicable sheet piles shall be included under SECTION 09910 PAINTING. No payment shall be made for the material and additional clips/connections at connections between sheet pile walls or to adjacent structure. No payment shall be made for cutting off sheet pile walls not driven to grade nor the Stay-In-Place piece to be cut underwater. Payment shall be made by the plan dimensions of the sheet pile walls installed: length times depth. No payment shall be made for the corrugations of the sheet pile wall.

2.0 PRODUCTS:

2.1 MATERIALS:

A. Steel for sheet piling shall conform to the requirements of ASTM A572 Gr 50, Sheet piling, including special fabrication sections, shall be of the type and dimension indicated on the drawings, and of a design such that when in place, they will be continuously interlocked throughout their entire length.

B. All sheet piling shall be provided with standard pulling holes located approximately four (4) inches below the top of the pile, unless otherwise shown or directed.

C. Piling shall have the properties equivalent to those listed in the following table, as indicated on the contract drawings or Approved-Equal:

PROPERTIES OF SECTIONS

Type of Web Section	Nominal Thickness of wall (inches)	Section Modulus (in. 3/ft of wall)	Moment of Inertia (in 4/ft of wall)	Nominal Section Depth (in.)	Theoretical Driving Height (in.)
PZ 22	.375	18.1	84.4	9	22
PSA 23	.375	2.4	4.13	-	16
PZ 27	.375	31.0	187.3	12.1	18.0
PZ 35	.500	48.5	361.2	14.9	22.64

D. All sheet piling shall be shall be provided in full lengths.

E. Rolled corners, formed with sheet piling, shall be of the types and dimensions shown on the drawings. Any proposed variations from the details shown on the drawings shall be submitted to the Engineer for approval. The sheet pile types shall be as required for the corners being manufactured and shall conform to the requirements of ASTM A572 Gr. 50 and other requirements stated herein for piling.

F. Fabricated Sections shall conform to the requirements stated herein, the details shown on the drawings and the piling manufacturer's recommendations for fabricated section. Steel plates and angles used to fabricate the special sections shall conform to ASTM A36. A special fabrication will be required to tie directly into the existing sheetpile. Field verification is required to determine the exact tie in joint type. This wall provides vital flood protection and must be made continuously as indicated on the drawings.

3.0 EXECUTION:

3.1 INSTALLATION:

A. No work shall begin until the sheet pile layout and concrete monolith layouts are approved.

3.2 PLACING:

A. Any excavation required within the area where sheet pilings are to be installed shall be completed prior to placing sheet pilings.

B. Pilings shall be carefully located as shown on the drawings. Pilings shall be placed as true to line as possible.

C. Suitable temporary wales, templates, or guide structures shall be provided to ensure the piles are placed and driven to the correct alignment. Piles shall be placed in a

plumb position with each pile interlocked with adjoining piles for its entire length, so as to form a continuous diaphragm throughout the length of each run of piling wall. Interlocks shall be properly engaged.

3.3 DRIVING:

A. All piles shall be driven to the depths shown on the drawings and shall extend to the cut-off elevation indicated. A tolerance of 1/2 inches above or below the cut-off elevation for permanent piles will be permitted.

B. Pilings shall be driven by approved methods so as not to subject the pilings to damage and to insure proper interlocking throughout their lengths.

C. Pile hammers shall be maintained in proper alignment during driving operations by use of leads or guides attached to the hammer.

D. A protecting cap shall be employed in driving, when required, to prevent damage to the tops of pilings. Pilings damaged during driving or driven out of interlock shall be removed and replaced.

E. All piles shall be driven without the aid of a water jet.

F. Adequate precautions shall be taken to ensure that piles are driven plumb. Sheet piling shall not be driven more than 1/4 inch per foot out of plumb in the plane of the wall nor more than 1/8 inch per foot out of plumb perpendicular to the plane of the wall. If at any time the forward or leading edge of the piling wall is found to be out of plumb more than 1/4 inch per foot in the plane of the wall or 1/8 inch per foot perpendicular to the wall, the assembled piling shall be driven to the required depth and tapered pilings shall be provided and driven to interlock with the out of plumb leading edge. The maximum permissible taper for any tapered piling shall be 1/4 inch per foot of length.

G. Unless specifically indicated otherwise, each run of piling wall shall be driven to grade progressively from the start and pilings in each run shall be driven alternately in increments of depth to the required depth or elevation. On each day of sheet pile driving, the Contractor shall stab only the number of piles that can be driven to grade by the end of each working day, except that the last two piles may remain tapered up to receive the next day's piles.

H. No pile shall be driven to a lower elevation than those behind it in the same run except when the piles behind it cannot be driven deeper or in areas where there will be wall penetrations or obstructions encountered. In this case, piling will be allowed to remain above final grade until the obstruction is removed or the penetration is completed. Alternately, if it is determined that an obstruction cannot be removed, the Contractor shall make such changes in design alignment of the pile structure as may be deemed necessary by the Engineer to insure the adequacy and stability of the structure.

I. If the piling next to the one being driven tends to follow below final grade, it may be pinned to the next adjacent piling. The Contractor is advised that buried stumps or similar debris may be encountered periodically on any sheet pile wall alignment and

appropriate consideration should be given to hard driving conditions, should they occur.

J. Piles shall not be driven within 100 feet of concrete less than 7 days old nor within 30 feet of concrete less than 28 days old.

3.4 EMERGENCY LOCKING SYSTEM ON PILE DRIVING HEAD:

A. All pile driving equipment shall be equipped so as to prevent piles from falling when a single or multiple power failure occurs after the pile driving head is attached to the pile. The jaws of vibratory hammers shall be equipped with devices such that upon loss of hydraulic pressure, the jaws will not release the pile.

3.5 CUTTING OFF AND SPLICING:

A. Piles extending above grade in excess of the specified tolerances, and which cannot be driven deeper, with the approval of the Engineer, shall be cut off to the required grade.

B. The Contractor shall trim the tops of the piles excessively battered during driving, when directed to do so, at no cost to the Owner.

C. Piles driven below the elevations indicated and those reduced due to damaged heads, shall be extended to the required elevation by welding an additional length. All additional lengths shall be as directed and at the Contractor's expense.

D. All splicing if required shall consist of an approved butt joint with a weld that fully penetrates the pile web.

E. Welded extensions shall be a minimum of six (6) inches in length.

F. Piles adjoining spliced piles shall be full length unless otherwise approved. When piles are to be driven in sections and spliced together, they shall be delivered to the site in full sections and cut for splicing only after delivery.

G. Ends of pilings to be spliced together with concentric alignment of the interlocks so that there are no discontinuities, dips, or camber at the abutting interlocks.

H. Spliced pilings shall be free sliding and able to obtain the maximum swing with contiguous pilings.

I. The Contractor may cut holes in piles for bolts, rods, drains, or utilities at locations and of sizes shown on the drawings or as directed. All cutting shall be done in a neat and good workmanship manner. Bolt holes in steel piling shall be drilled or may be burned or reamed by approved methods which will not damage the remaining metal. Holes, other than bolt holes, shall be reasonably smooth and of the proper size for rods or other inserted items.

3.6 INSPECTION OF DRIVEN PILES:

A. The Contractor shall inspect the interlocked joints of driven pilings extending above the ground. Pilings found to be damaged or driven out of interlock shall be removed and replaced at the Contractor's Expense.

3.7 PULLING AND REDRIVING:

A. The Contractor may be required to pull selected piles after driving, for test and inspection, to determine the condition of piles that warrant inspection. Any pile so pulled and found to be damaged to the extent that its usefulness in the structure is impaired, shall be removed from the work and replaced by a newly driven pile. Piles that are pulled and found to be in satisfactory condition may be redriven.

3.8 VOID BACKFILL:

A. Where voids adjacent to the steel piling are induced by pile driving operations or where foundation piles are removed, the Contractor shall pump out all rain water and backfill with a cement-sand-bentonite slurry. The mixture shall be pumped using a tremie pipe so all water is displaced by the slurry. The slurry shall consist of two parts bentonite, three parts sand, and one part cement, with a water ratio that will produce a slurry liquid enough to thoroughly fill the voids but have no less than a 12.0 lb. per gallon density. The sand portion of the slurry shall meet the following gradation.

SAND GRADATION

U.S. STANDARD SIEVE SIZE	REQUIRE % PASSING BY WEIGHT
3/8 inch	100
No. 4	100 - 90
No. 200	20 - 0

3.9 PAINTING:

A. All exposed permanent steel sheet pile above Elevation (-) 10.0 and not embedded in concrete shall receive a coal tar epoxy coating as indicated in Section 09910.

B. Interlocking grooves of the sheet piling shall not be painted.

C. All unpainted portions of the piling which are to be embedded in concrete shall be free from surface contaminants such as oil, loose particles, or other conditions which would prohibit bonding between concrete and steel sheet.

4.0 MEASUREMENT:

Steel Sheet Pile will be measured per Square Foot. Estimated square footage of steel sheet pile shown on the plans are approximate and for information only. It is the contractor's responsibility to determine the correct square footage

4.1 PAYMENT:

Payment for the completed and accepted items will be made at the contract square footage, which includes furnishing, fabricating, cleaning, applying coatings, erecting, temporary works, materials, labor, equipment, and all work necessary to complete the item.

Partial payments for stockpile of raw materials and fabrication costs will be allowed in accordance with Section 109.

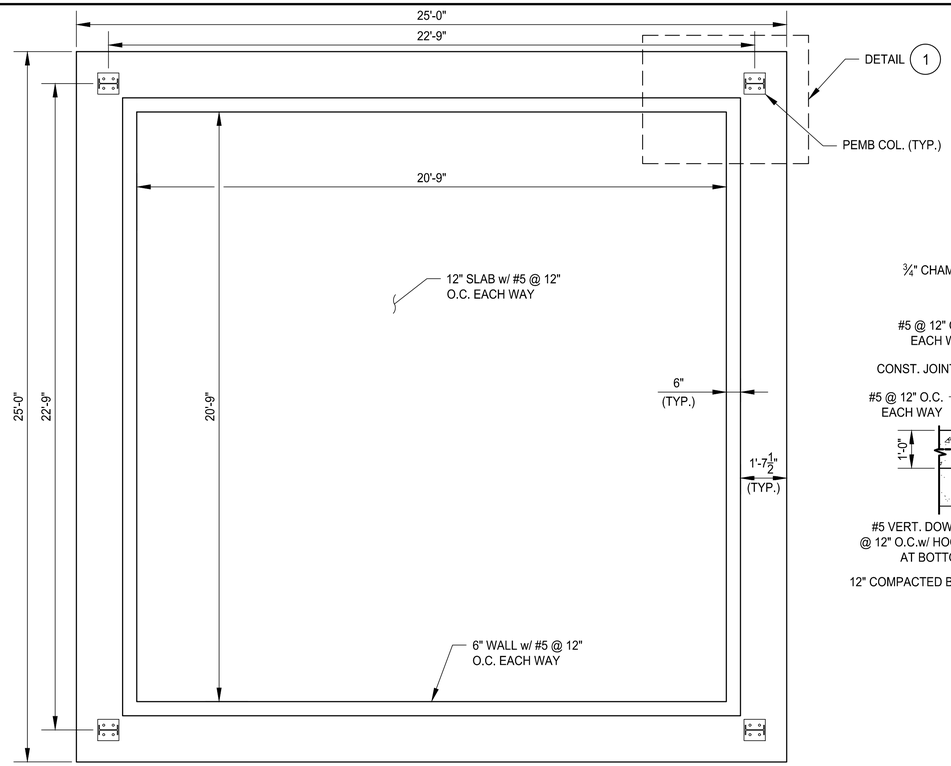
When the engineer orders changes in the work which vary the square footage of steel sheet pileto be furnished, unit prices will be established. Compensation will be in accordance with 109.04.

Changes ordered by the engineer in the grade of steel to be furnished, which result in additional cost to the contractor, will be compensated for in accordance with 109.04.

Changes in the grade or quantity of steel which result from contractor adjustments in plate dimensions for efficiency in fabrication shall be at no additional cost to the Department.

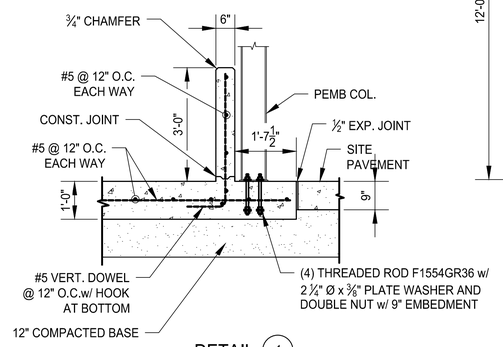
Payment will be made under:

Item No.	Pay Item	Pay Unit
TS-17	Steel Sheet Pile	Square Foot



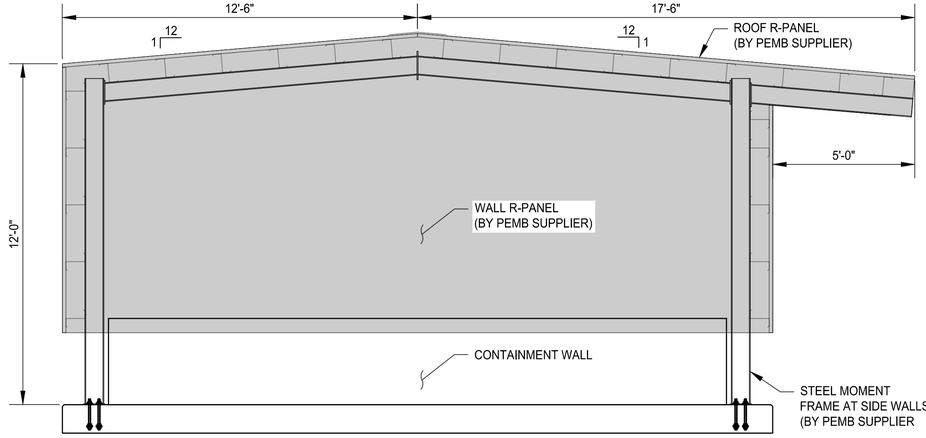
FOUNDATION PLAN

SCALE: ⅜"=1'-0"



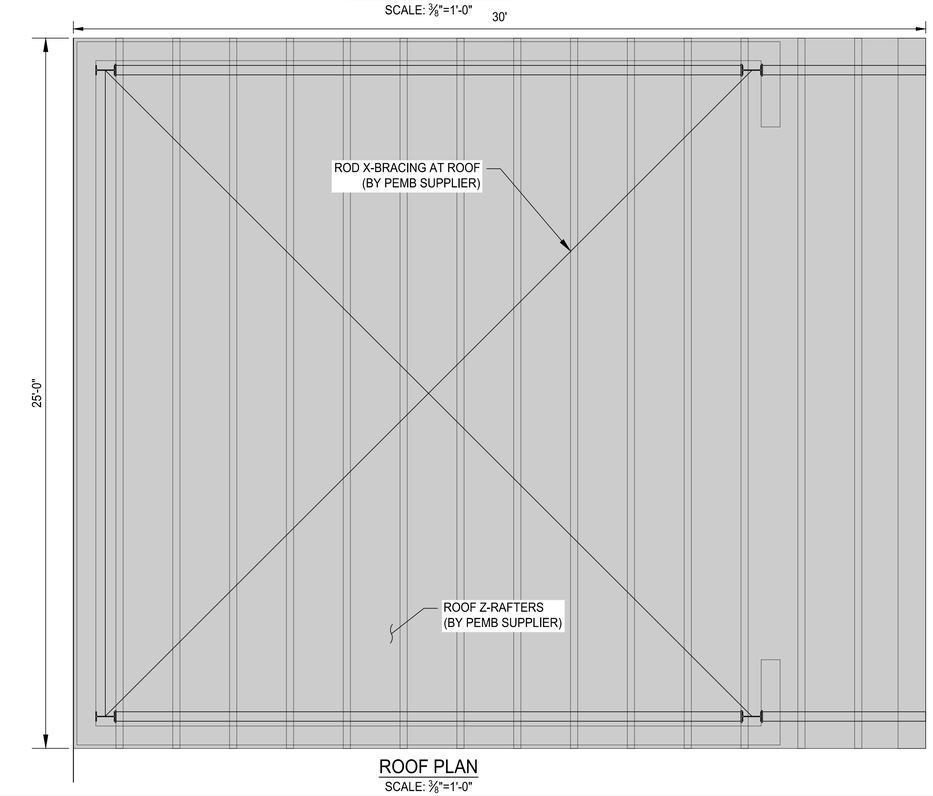
DETAIL 1

SCALE: ½"=1'-0"



SIDE ELEVATION

SCALE: ⅜"=1'-0"

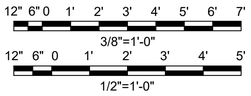


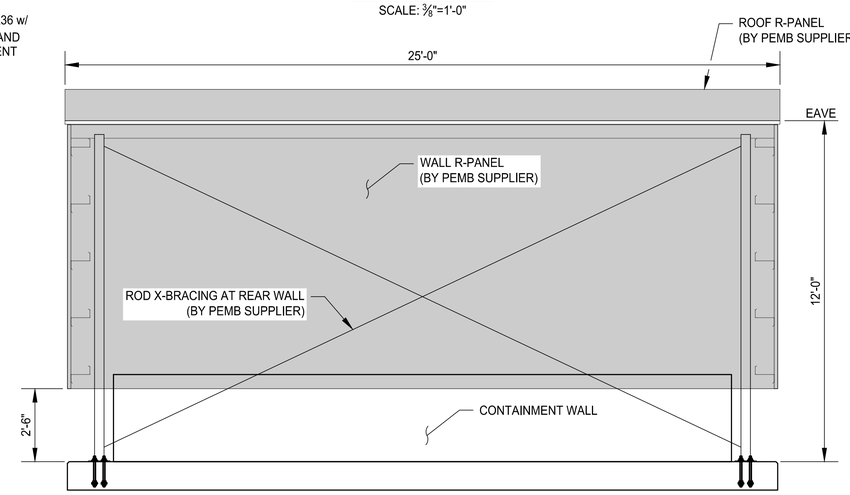
ROOF PLAN

SCALE: ⅜"=1'-0"

NOTE:

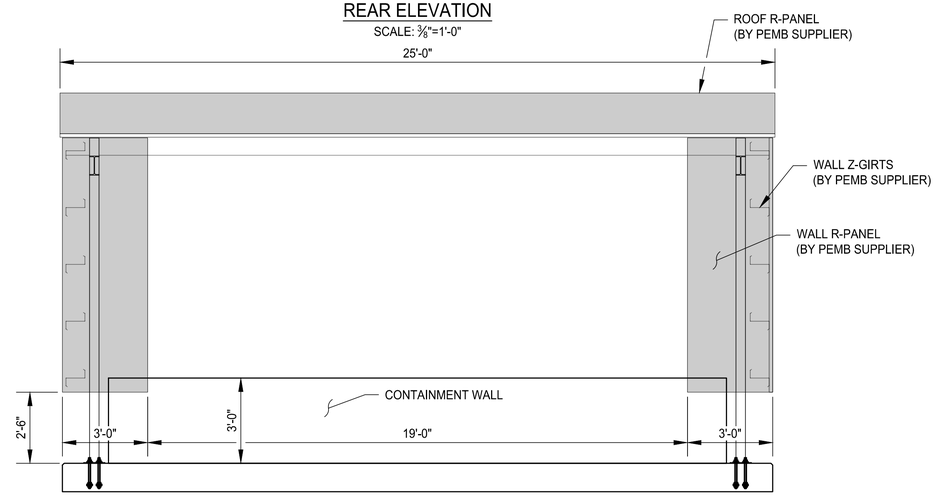
1. ALL CONCRETE COMPRESSIVE STRENGTH 4000 PSI.
2. ALL REINFORCEMENT AGIS GIZ60.
3. ALL ANCHOR THREADED RODS F1554GR36.
4. ALL STRUCTURAL STEEL AND ANCHOR COMPONENTS MUST BE HOT DIP GALVANIZED.
5. THE PRE-ENGINEERED METAL BUILDING (PEMB) MUST BE DESIGNED FOR 140 MPH WIND.
6. THE PEMB SUPPLIER MUST SUBMIT DESIGN CALCULATIONS STAMPED BY A LOUISIANA PROFESSIONAL ENGINEER FOR THE PROJECT ENGINEER TO REVIEW AND APPROVE PRIOR TO START OF FABRICATION.
7. THE DESIGN OF ALL PRIMARY AND SECONDARY STEEL COMPONENTS INCLUDING GIRTS, PURLINS, CLADDING, FLASHING, CONNECTIONS, AND OTHER BUILDING COMPONENTS MUST MEET ALL BUILDING CODE REQUIREMENTS.





REAR ELEVATION

SCALE: ⅜"=1'-0"



FRONT ELEVATION

SCALE: ⅜"=1'-0"

S-001
SHEET NUMBER

NO.	DATE	REVISION DESCRIPTION	BY

STATE OF LOUISIANA
RENE A. CHOPIN, III
REG. No. 25174
REGISTERED PROFESSIONAL ENGINEER IN CIVIL ENGINEERING

BURK-KLEINPETER, INC.
ENGINEERING · PLANNING · ENVIRONMENTAL
BKIUSA.COM

DESIGNED	DETAILED	DATE	March, 2025
TJK	SG	SHEET	1 OF 1
CHECKED	CHECKED		
RCIII	TJK		

BKI # : 9344-8660

CLIENT PROJECT NO. : XXXXXXXX

CITY OF GRETNA
BURMASTER TRANSFER FACILITY

OIL RECEIVING BUILDING

CITY OF GRETNA 1913 LOUISIANA

3/12/2025

P:\9XXX\93448660 BURMASTER TRANSFER FACILITY\02_DESIGN\02 CIVIL\01 DRAWING'S\S-001_OIL RECIEVING BUILDING_01