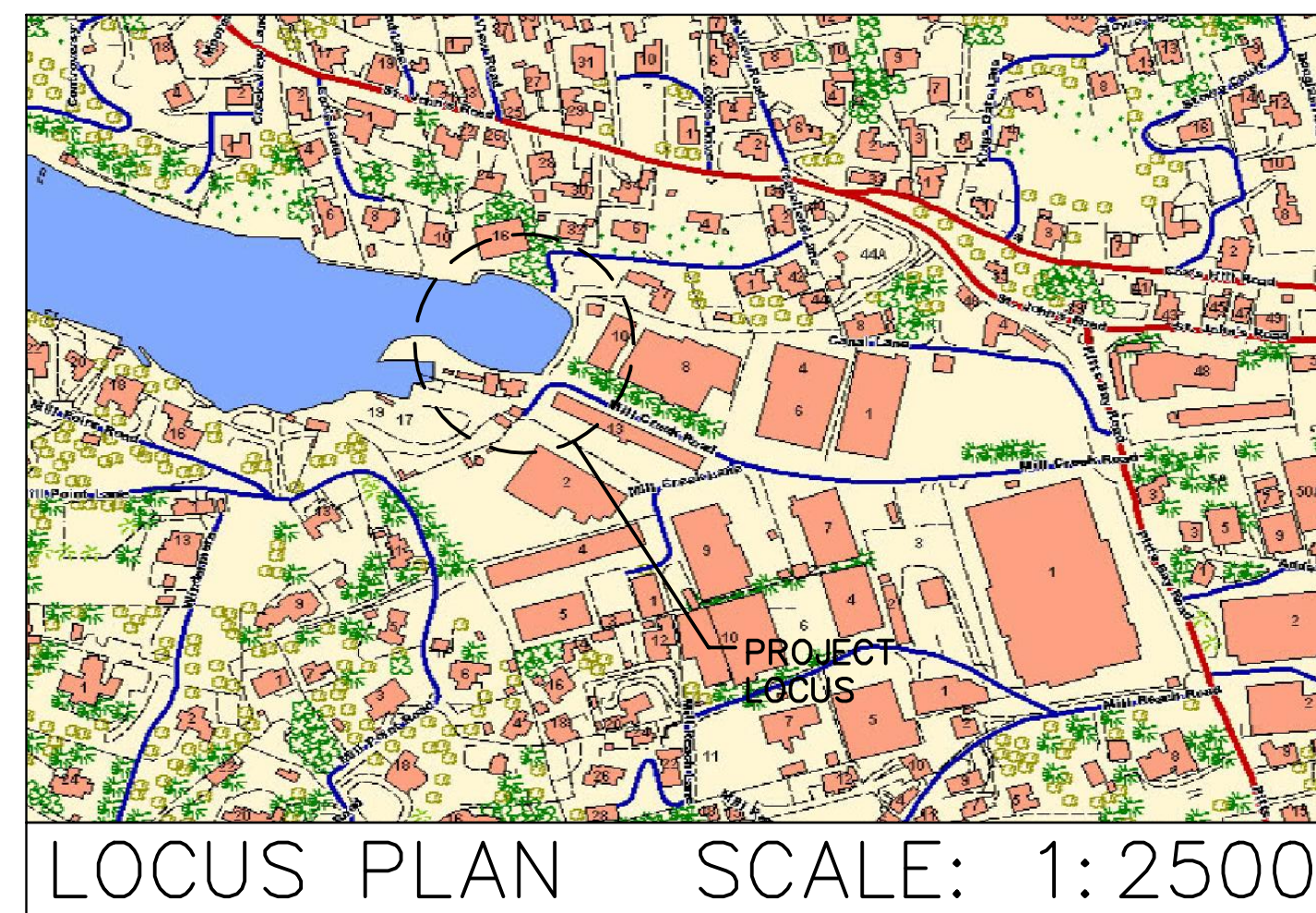


MINISTRY OF WORKS AND ENGINEERING



PEMBROKE CANAL OUTFALL REHABILITATION



LOCUS PLAN SCALE: 1:2500

PROJECT NO. 34-27-10

OCTOBER 2010

DRAWING LIST

S1	GENERAL NOTES
S2	SITE PLAN
S3	GENERAL LAYOUT
S4	PILE PLAN/PRECAST DETAILS
S5	PRECAST DETAILS
S6	PRECAST INSTALLATION
S7	MISCELLANEOUS DETAILS

THE MINISTRY OF
WORKS AND
ENGINEERING

P.O. Box HM525 Hamilton HMCX Bermuda
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OPERATIONS DIVISION
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Structures Section



GENERAL NOTES:

ISSUED FOR: TENDER 10/08/10

AMENDMENTS:

NO:	REVISION	APP	DATE:

SCALE:

SURVEY
PREPARED BY: DATE:

DESIGN
PREPARED BY: DATE:
PEH

CHECKED BY: DATE:
RJT

DRAWING
PREPARED BY: DATE:
JRB

CHECKED BY: DATE:
RJT

APPROVED BY:
RJT

PROJECT NUMBER:
34-27-10

PROJECT NAME:
**PEMBROKE CANAL
OUTFALL REHABILITATION**

**MILL CREEK ROAD
PEMBROKE PARISH**

DRAWING FILE NO:

SHEET TITLE:
TITLE SHEET

SHEET NUMBER: REVISION



VAL/2010/08/10/TITLE SHEET REV.010

1.0 GENERAL NOTES:

- 1.1 ALL DRAWINGS ARE TO BE READ IN CONJUNCTION WITH THE SPECIFICATION DOCUMENT. WHERE A DISCREPANCY BETWEEN THE DRAWINGS AND THE SPECIFICATION IS FOUND THE CONTRACTOR SHALL BRING IT TO THE ENGINEER'S ATTENTION. THE SPECIFICATION DOCUMENT CONTAINS MORE DETAILED REQUIREMENTS BUT THE FOLLOWING NOTES CONTAIN A SUMMARY OF MATERIALS WHICH SHALL BE USED.
- 1.2 DO NOT SCALE DIMENSIONS FROM DRAWINGS. USE ONLY FIGURED DIMENSIONS AND SETTING OUT POINTS. ANY AMBIGUITIES OR DISCREPANCIES SHALL BE REFERRED TO THE ENGINEER FOR CLARIFICATION.
- 1.3 ALL ELEVATIONS SHOWN ARE IN METRES RELATIVE TO ORDNANCE DATUM.
- 1.4 ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED OTHERWISE.
- 1.5 CONTRACTOR TO MAKE GOOD ANY DAMAGES CAUSED ON SITE, REPAIRING TO MATCH EXISTING OR AS APPROVED BY THE ENGINEER.
- 1.6 DESIGN CRITERIA
TRUCK LOADING IS BASED ON BERMUDA EVALUATION LOAD.
MAX AXLE LOADING IS TWO 88 KN AXLES SPACED 1.0M APART.
VEHICLE SURCHARGE LOAD IS 10 KN/M²

2.0 SCOPE OF WORK

- 2.1 THE WORK CONSISTS OF CONSTRUCTION OF A CONCRETE BOX CULVERT COMPLETE WITH PRECAST CONCRETE INLET AND OUTLET STRUCTURES, FLAP GATE AND ALL OTHER NECESSARY COMPONENTS TO PROVIDE A COMPLETE OPERATIONAL SYSTEM.
- 2.2 THE CONTRACTOR SHALL PROVIDE ALL THE NECESSARY MATERIALS TO COMPLETE THE WORKS.
- 2.3 CONTRACTOR SHALL PROVIDE ALL EQUIPMENT, TRUCKING, SUPERVISION AND LABOUR TO TRANSPORT EMPLOYER SUPPLIED MATERIALS TO SITE.
- 3.0 METHOD STATEMENT AND TEMPORARY WORKS
- 3.1 AS SOON AS POSSIBLE FOLLOWING AWARD OF THE CONTRACT AND PRIOR TO COMMENCING ANY WORK ON SITE THE CONTRACTOR SHALL SUBMIT A DETAILED METHOD STATEMENT (SEE SPEC SECTION 01300). METHOD STATEMENT SHALL INCLUDE DESCRIPTION OF SEQUENCE OF WORK.
- 3.2 CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING STABILITY OF WALLS AND EXCAVATIONS AT ALL TIMES.
- 3.3 PROPOSED SEQUENCE OF WORK IS AS FOLLOWS:
 - 1. CONSTRUCT ALL PRECAST UNITS
 - 2. DEMOLISH OUTFALL
 - 3. CHECK CLEARANCE TO INSTALL PILES
 - 4. DRIVE H-PILES
 - 5. INSTALL PRECAST OUTLET AND DOWNSTREAM HEADWALL
 - 6. CAST IN PLACE CONCRETE AROUND OUTSHORE PILES
 - 7. INSTALL NEW FLAPGATE
 - 8. DEMOLISH EXISTING OUTSHORE WALL AND CULVERT SUFFICIENT TO INSTALL NEW CULVERT
 - 9. CONCRETE AROUND PILES AND WALL/BOX CONNECTION
 - 10. COMPLETE STRUCTURE
 - 11. INSTALL GRATING, ETC.
 - 12. PAVING
- 3.4 IT IS CRITICAL TO OVERALL PERFORMANCE THAT ALL PRECAST ELEMENTS ARE TIED TOGETHER. TIES TO PROVIDE MINIMUM CAPACITY OF 350KN (80 KIPS)
- 3.5 CONTRACTOR SHALL MAINTAIN OUTFLOW OF CANAL AND LIMIT ANY TIDAL INFLOW.

4.0 SITE LIMITS AND CONSTRAINTS

- 4.1 SITE LIMITS SHALL BE AS SPECIFIED BY THE ENGINEER.
- 4.2 CONTRACTOR SHALL CONTACT ALL UTILITY COMPANIES TO DETERMINE LOCATION OF ALL UNDERGROUND UTILITIES, PIPES, DRAINS AND DUCTS. CONTRACTOR SHALL REPAIR ANY UNDERGROUND UTILITIES, PIPES, DRAINS AND DUCTS DAMAGED DURING THE COURSE OF THE WORK AT NO ADDITIONAL COST TO THE EMPLOYER.
- 4.3 CONTRACTOR SHALL PROTECT ALL ROAD SURFACES, KERBS, PAVED AREAS, UTILITIES AND SIGNS FROM DAMAGE DURING THE COURSE OF THE WORK. ON COMPLETION OF THE WORK, ALL SUCH AREAS SHALL BE FULLY REINSTATED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER AT NO ADDITIONAL COST TO THE EMPLOYER.
- 4.4 UTILITIES SHALL BE RELOCATED AS REQUIRED.

5.0 EMPLOYER INSPECTIONS

- 5.1 THE EMPLOYER OR HIS REPRESENTATIVE MAY INSPECT THE WORK AND THE CONTRACTOR SHALL PROVIDE REASONABLE ASSISTANCE AS REQUESTED BY THE EMPLOYER.

6.0 EARTHWORKS

- 6.1 CONTRACTOR SHALL BACKFILL ALL STRUCTURES EVENLY. MAX DIFFERENCE IN LEVEL OF SOIL EACH SIDE OF ANY STRUCTURE SHALL NOT EXCEED 500MM.
- 6.2 FINAL PAVING SHOULD BE DELAYED AT LEAST SIX MONTHS TO ALLOW SETTLEMENT OF FILL AROUND STRUCTURE.

7.0 MATERIALS

- 7.1 ALL STEEL H-PILES AND OTHER STEEL SECTIONS SHALL BE GRADE ASTM A572-50 OR EQUAL UNLESS SHOWN OTHERWISE.
- 7.2 PIPES TO BE WEHOLITE PIPE BY KWH PIPE, CLASS 250 TO ASTM F894, OR APPROVED EQUAL.
- 7.3 FLAP GATES TO BE STAINLESS STEEL RATED FOR MINIMUM 5M SEATING HEAD, DESIGNED FOR SIDE-MOUNTING AT 10' FROM HORIZONTAL, COMPLETE WITH WALL THIMBLE, FASTENERS AND RUBBER SEATING FACE.

MATERIALS: GATE: 304SS -PLATE: ASTM A167/A240 TYPE 304/304L
 -STRUCTURAL: ASTM A276 TYPE 304/304L
 FASTENERS: 304SS-ASTM F593 1594 TYPE 304.
 SEALS: RUBBER-NEOPRENE 02000 NON-RECLAIMED.
 THIMBLE: AS PER GATE
 SUBMIT SHOP DRAWINGS IN ACCORDANCE WITH CONTRACT DOCUMENTS

7.4 CONCRETE SHALL BE AS FOLLOWS:

LOCATION	MIN. CHARACTERISTIC STRENGTH	MAX. WATER/CEMENT RATIO	MAX. AGGREGATE SIZE
PILE JACKETS	30MPa (4500psi)	0.4	10mm
OTHER CONCRETE	30MPa (4500psi)	0.45	20mm

- 7.5 CONCRETE MIX DESIGNS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO PLACING ANY CONCRETE. NO ADDITIVES SHALL BE USED WITHOUT THE EXPRESS PRIOR APPROVAL OF THE ENGINEER. NO CONCRETE SHALL BE PLACED UNDERWATER WITHOUT THE PRIOR APPROVAL OF THE ENGINEER.
- 7.6 THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING QUALIFIED PERSONNEL FOR ALL TESTING AND SAMPLING OF CONCRETE AS DESCRIBED IN THE STANDARD SPECIFICATION.
- 7.7 THE CONTRACTOR SHALL GIVE A MINIMUM OF 24 HOURS NOTICE TO THE ENGINEER PRIOR TO POURING ANY CONCRETE.
- 7.8 REINFORCING STEEL SHALL BE HIGH YIELD 410MPA (GRADE 60) DEFORMED BARS, HOT DIP GALVANIZED. ALL CUT ENDS AND OTHER DAMAGED AREAS OF GALVANIZING SHALL BE COATED WITH ZINC RICH PAINT. ZINC RICH PAINT SHALL BE AN ORGANIC ZINC-RICH COATING CONTAINING 95% METALLIC ZINC, BY WEIGHT IN THE DRIED FILM.
- 7.9 CONCRETE COVER TO REINFORCEMENT SHALL BE 75MM MIN. UNLESS NOTED OTHERWISE.
- 7.10 MINIMUM REINFORCEMENT SPLICES SHALL BE AS FOLLOWS:
 - T12 BAR 450MM
 - T16 BAR 600MM
 - T20 BAR 750MM
- 7.11 ALL TIMBER SHALL BE CCA PRESSURE TREATED NO.2 SOUTHERN PINE OR EQUAL. ALL TIMBER HARDWARE SHALL BE STAINLESS STEEL.
- 7.12 ALL DOWELS AND ANCHOR BOLTS SHALL BE EPOXY GROUTED IN POSITION USING HILTI HY-150 ADHESIVE ANCHORAGE SYSTEM FOR ANCHORAGE TO CONCRETE OR EQUAL APPROVED. ALL GROUTING SHALL BE IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS.
- 7.13 ALL HARDWARE SHALL BE STAINLESS STEEL UNLESS SHOWN OTHERWISE.
- 7.14 ALL RAILINGS SHALL BE 38MM INT. DIA. SCHEDULE 40 GALVANIZED PIPE USING GALVANIZED KEEKLAMP FITTINGS.

THE MINISTRY OF WORKS AND ENGINEERING

P.O. Box HM525 Hamilton HMCX Bermuda Phone: (441)295-5151

ENGINEERING and OPERATIONS DIVISION Fax: (441)294-9087

Structures Section



ISSUED FOR: TENDER 10/08/10

AMENDMENTS:

NO:	REVISION	APP	DATE:

SCALE:

SURVEY PREPARED BY: DATE:

DESIGN PREPARED BY: DATE: 10/08/10 CHECKED BY: DATE: 10/08/10

DRAWING PREPARED BY: DATE: 2/26/10 CHECKED BY: DATE: 2/26/10

APPROVED BY: RJT

PROJECT NUMBER: 34-27-10

PROJECT NAME: PEMBROKE CANAL OUTFALL REHABILITATION

MILL CREEK ROAD PEMBROKE PARISH

DRAWING FILE NO:

SHEET TITLE: GENERAL NOTES

SHEET NUMBER: S1 REVISION

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Structures Section



ISSUED FOR: TENDER 10/08/10

AMENDMENTS:

NO:	REVISION	APP	DATE:

SCALE: 1:100

SURVEY
PREPARED BY: DATE:

DESIGN
PREPARED BY: DATE: 2/26/10
CHECKED BY: DATE: 2/26/10
RJT

DRAWING
PREPARED BY: DATE: 2/26/10
CHECKED BY: DATE: 2/26/10
RJT

APPROVED BY:
RJT

PROJECT NUMBER:
34-27-10

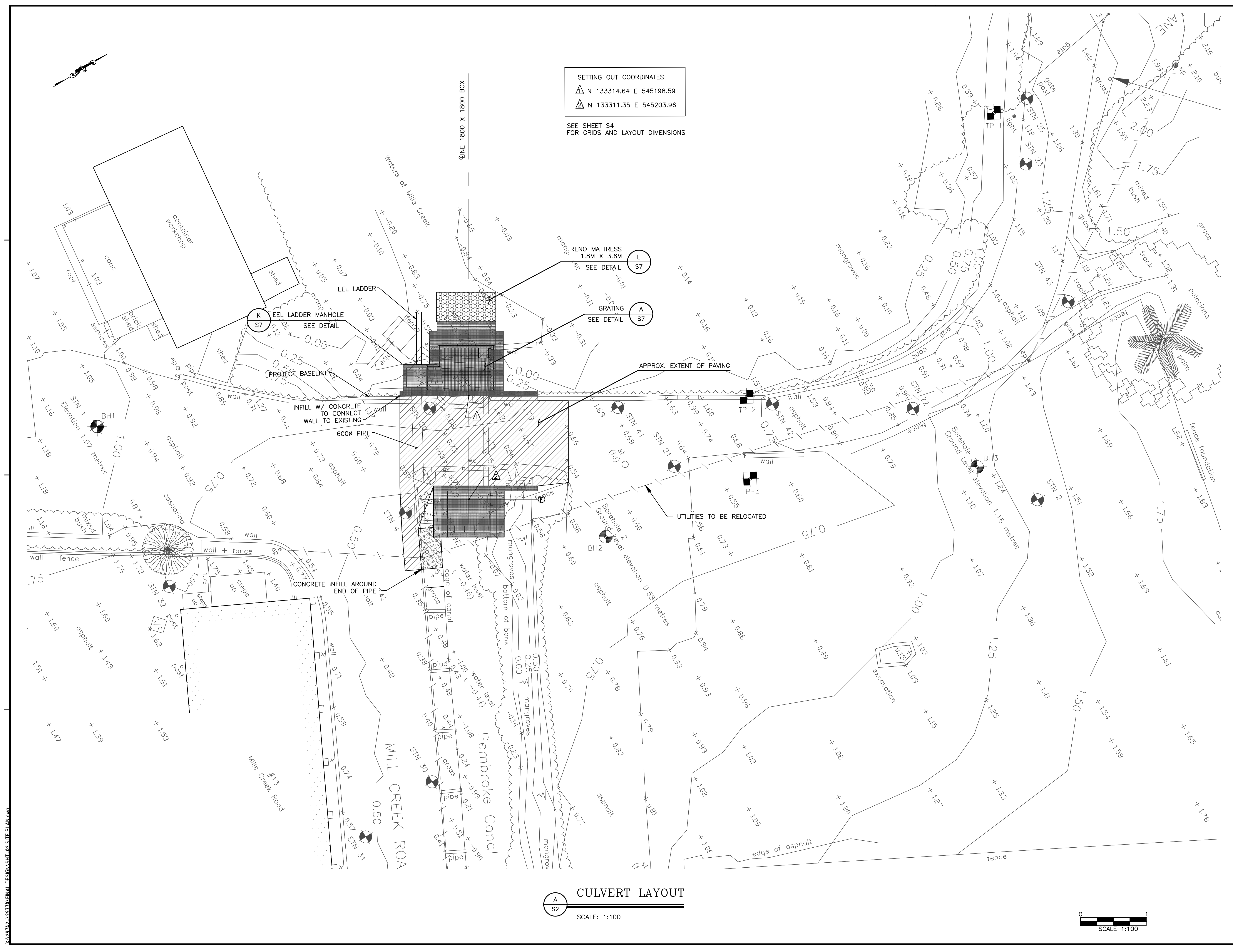
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**PEMBROKE CANAL
OUTFALL REHABILITATION**

MILL CREEK ROAD
PEMBROKE PARISH

DRAWING FILE NO:

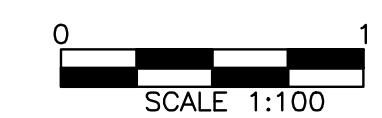
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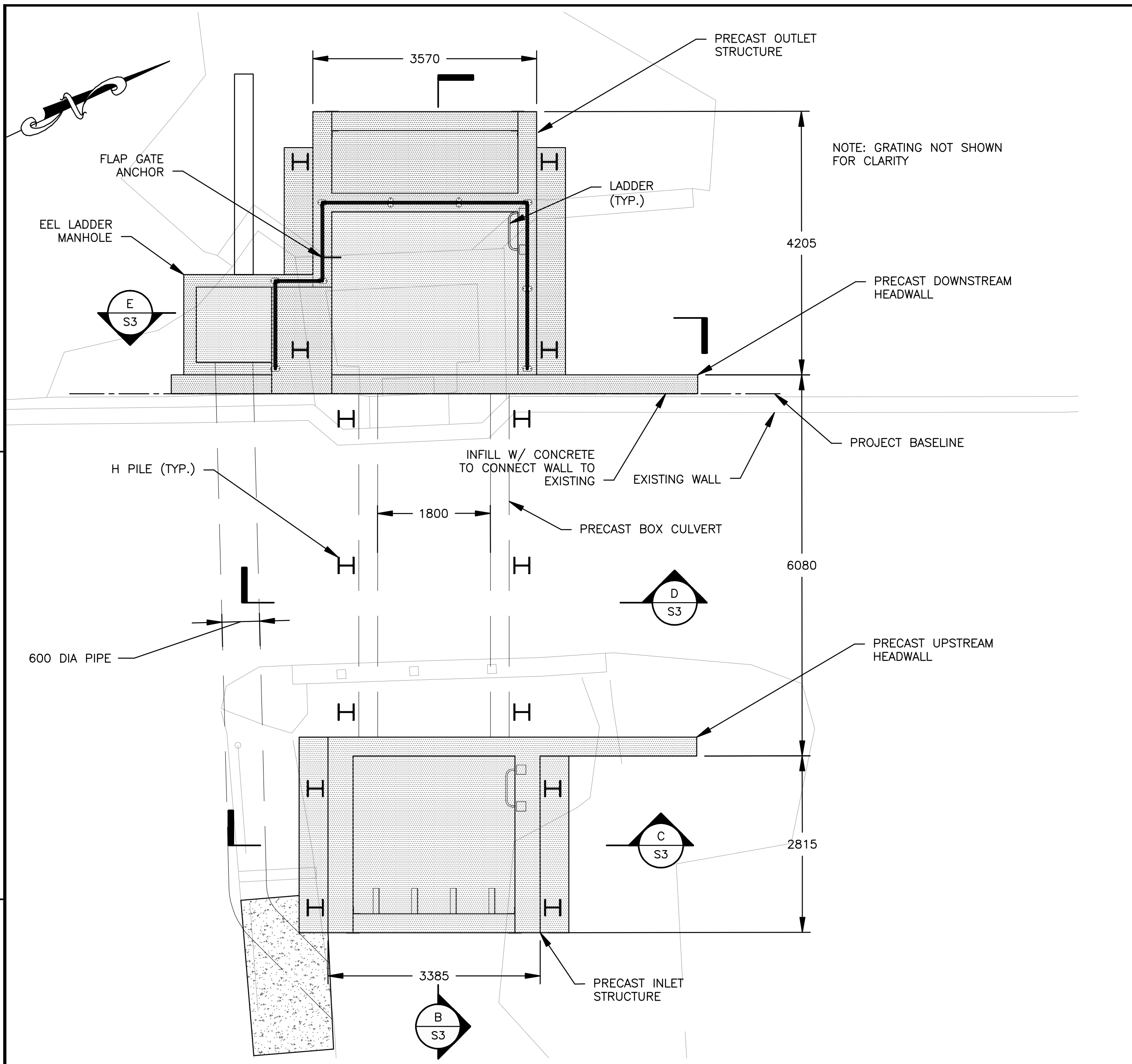
SETTING OUT COORDINATES
 ▲ N 133314.64 E 545198.59
 ▲ N 133311.35 E 545203.96
 SEE SHEET S4
 FOR GRIDS AND LAYOUT DIMENSIONS

CULVERT LAYOUT
 SCALE: 1:100

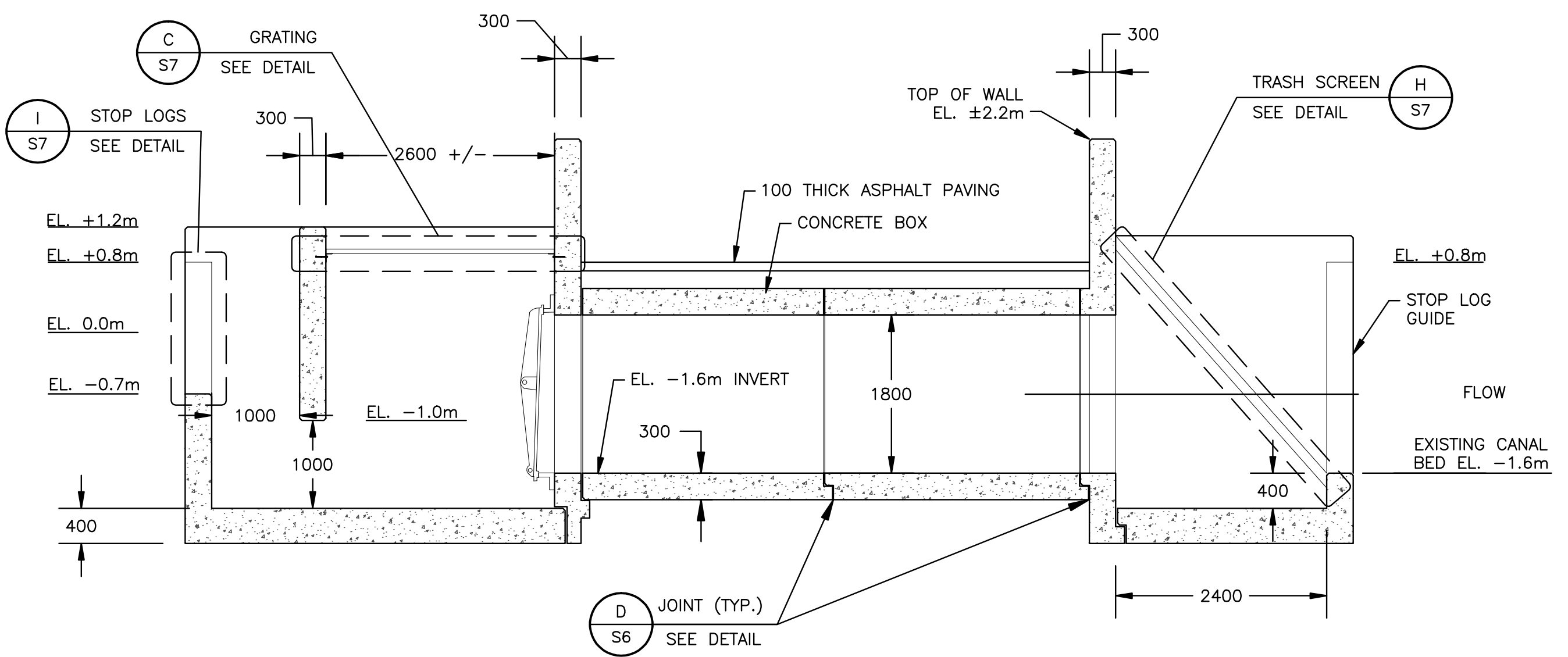


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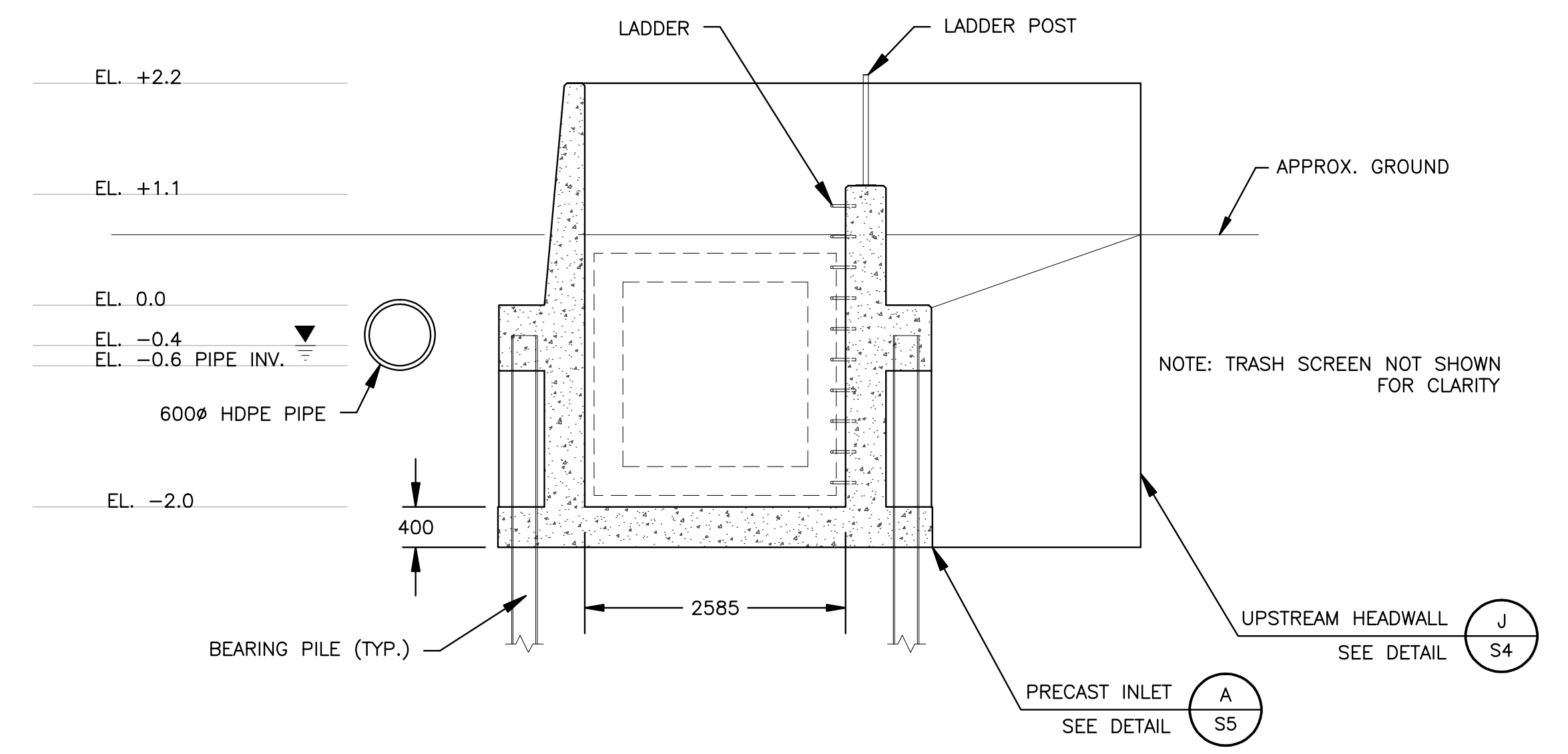
Structures Section



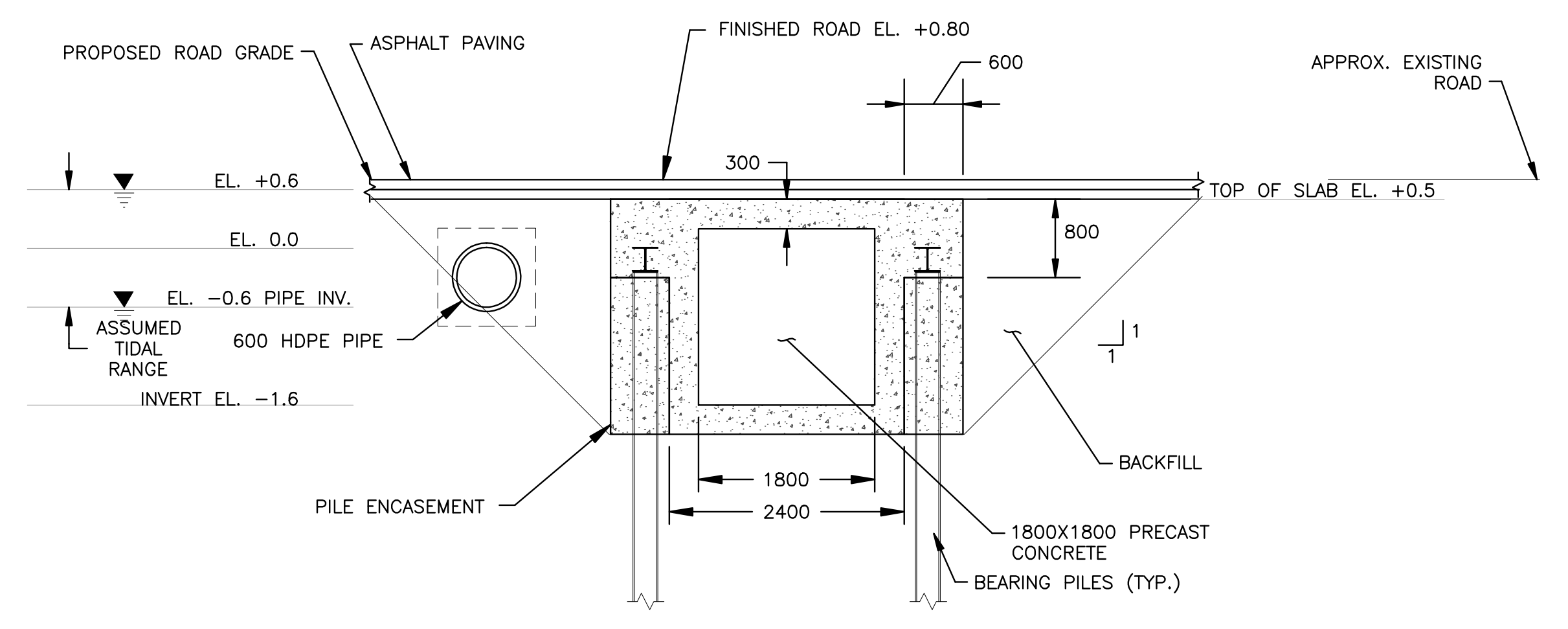
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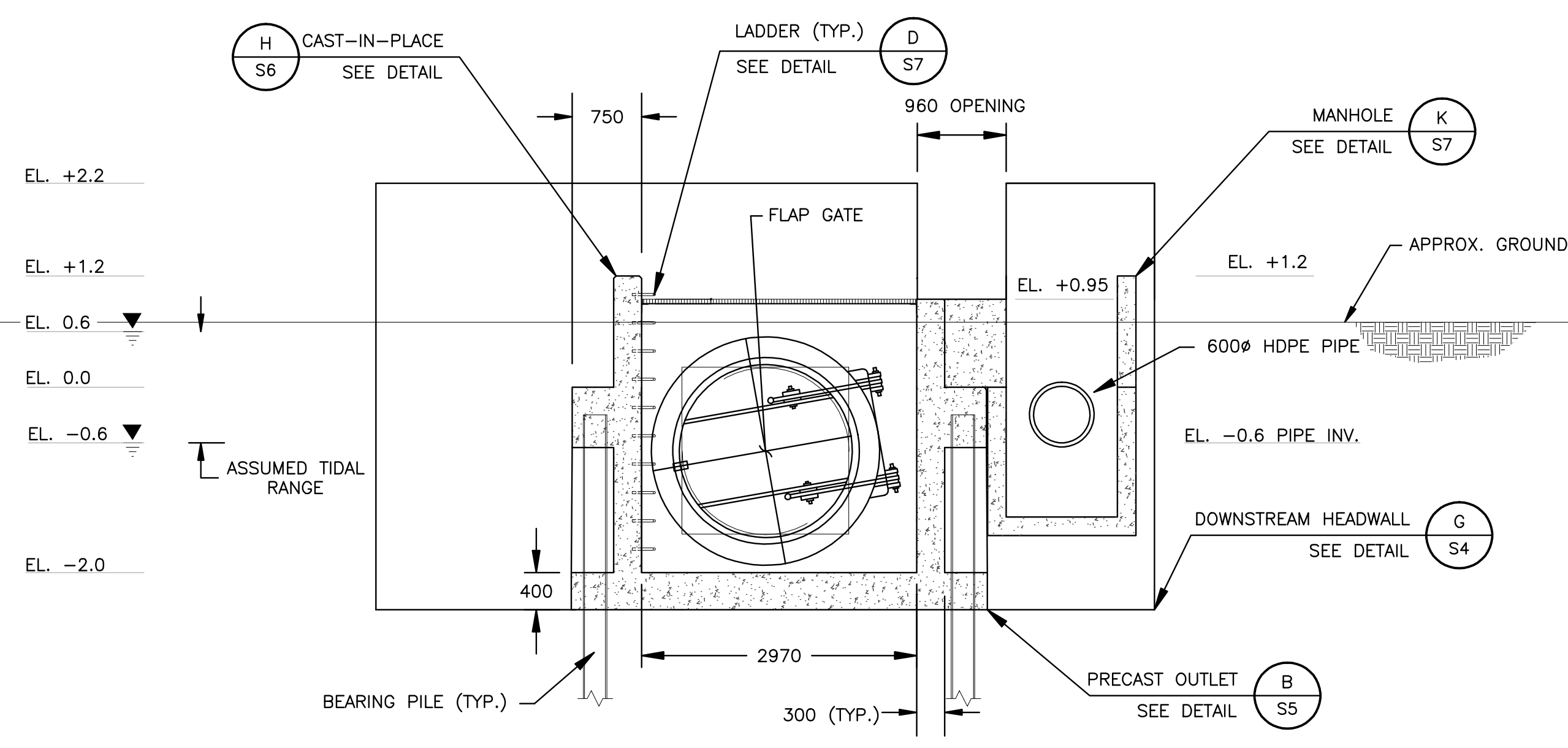
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INLET SECTION
SCALE: 1:50



CULVERT SECTION
SCALE: 1:50



OUTLET SECTION
SCALE: 1:50



ISSUED FOR: TENDER 10/08/10

AMENDMENTS:

NO:	REVISION	APP	DATE:

SINGLE CULVERT RJT 09/01/10

SCALE: 1:50

SURVEY

PREPARED BY: DATE:

DESIGN

PREPARED BY: PEH DATE: 2/26/10

CHECKED BY: RJT DATE: 2/26/10

DRAWING

PREPARED BY: PEH DATE: 2/26/10

CHECKED BY: RJT DATE: 2/26/10

APPROVED BY: RJT

PROJECT NUMBER: 34-27-10

PROJECT NAME:
**PEMBROKE CANAL
OUTFALL REHABILITATION**

**MILL CREEK ROAD
PEMBROKE PARISH**

DRAWING FILE NO:

SHEET TITLE:
GENERAL LAYOUT

SHEET NUMBER: S3	REVISION A
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Structures Section



ISSUED FOR: TENDER 10/08/10

AMENDMENTS:

NO:	REVISION	APP	DATE:

SCALE: VARIES

SURVEY
PREPARED BY: DATE:

DESIGN
PREPARED BY: DATE: 2/26/10
PEH

CHECKED BY: DATE: 2/26/10
RJT

DRAWING
PREPARED BY: DATE: 2/26/10
PEH

CHECKED BY: DATE: 2/26/10
RJT

APPROVED BY: DATE:
RJT

PROJECT NUMBER:
34-27-10

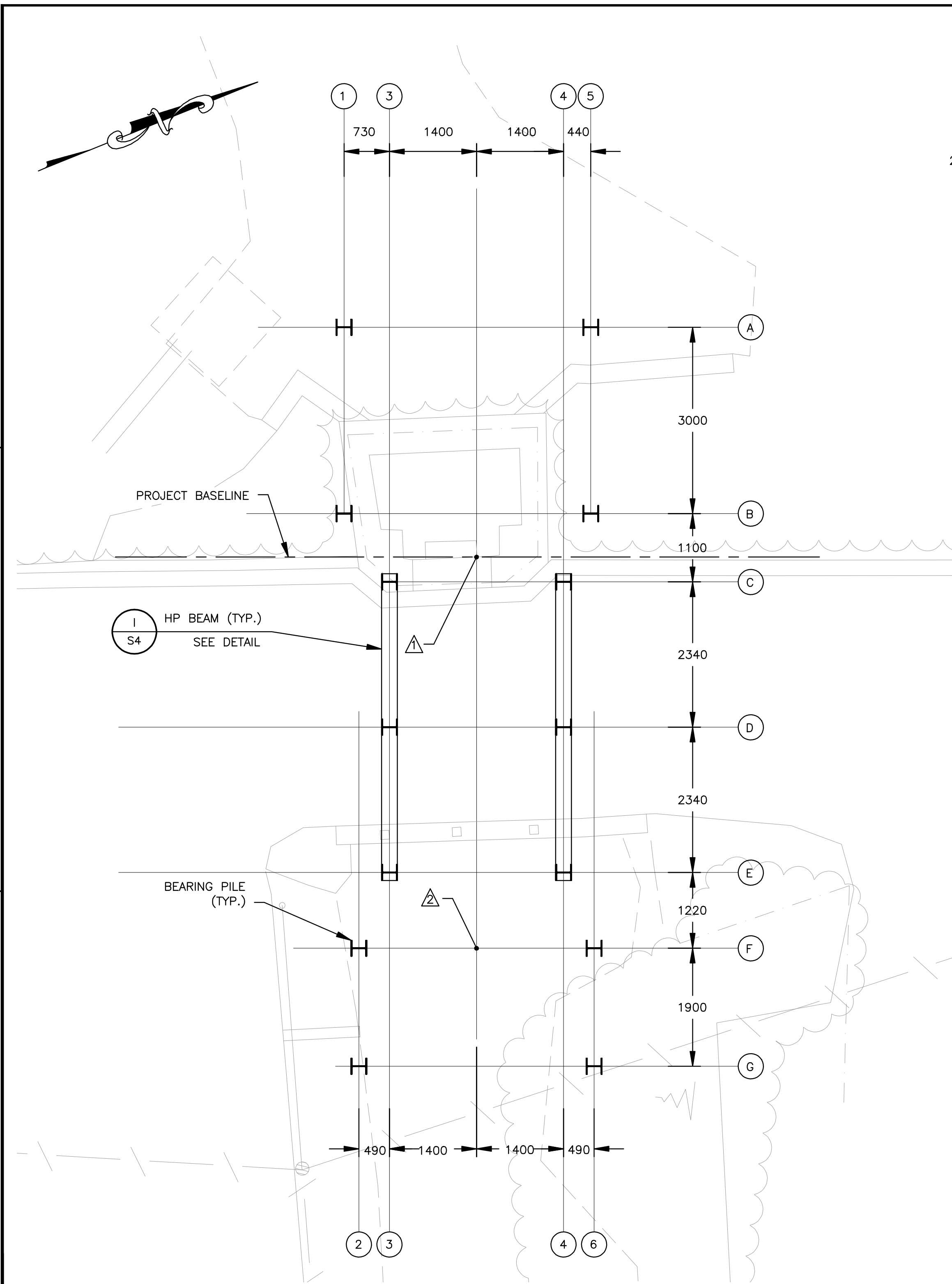
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**PEMBROKE CANAL
OUTFALL REHABILITATION**

MILL CREEK ROAD
PEMBROKE PARISH

DRAWING FILE NO:

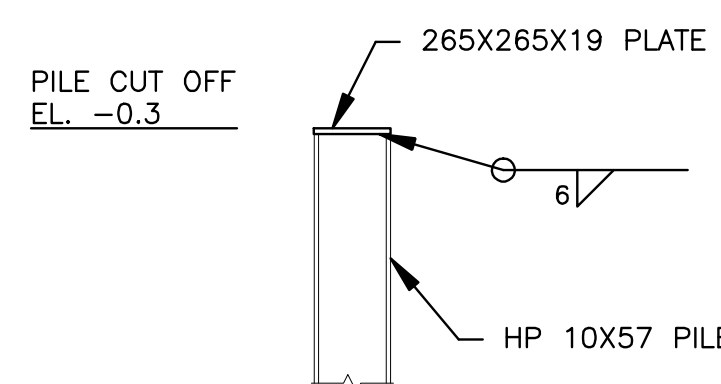
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DETAILS**

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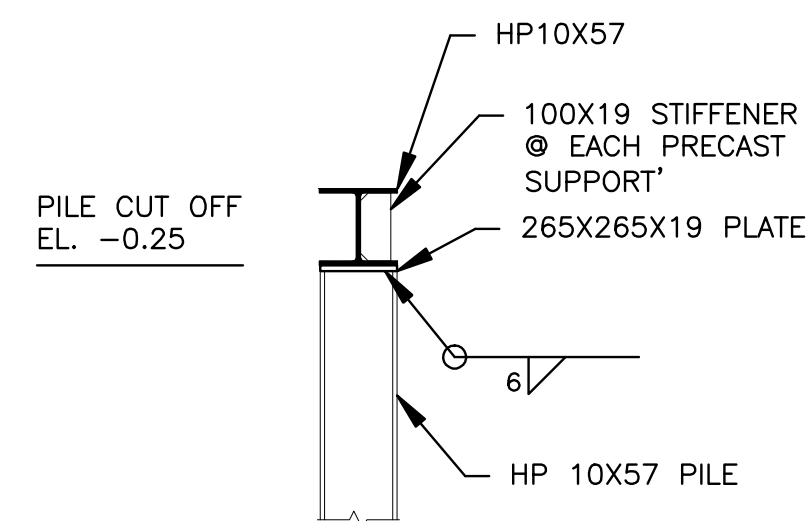


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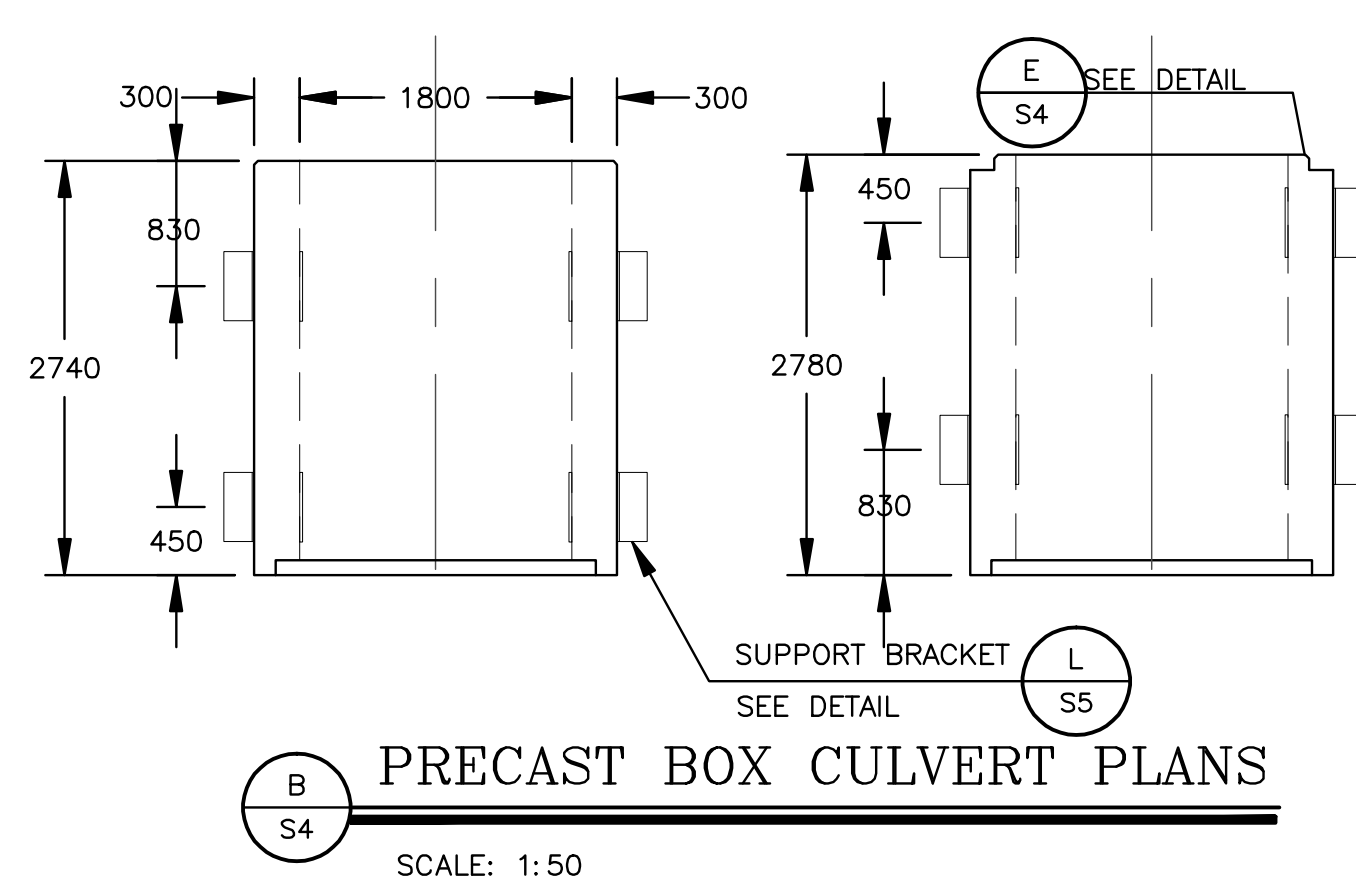
- NOTES:
1. SEE SHEET 2 FOR LAYING OUT COORDINATES
2. ALL BEARING PILES TO BE DRIVEN TO WORKING LOAD= 50 TONS



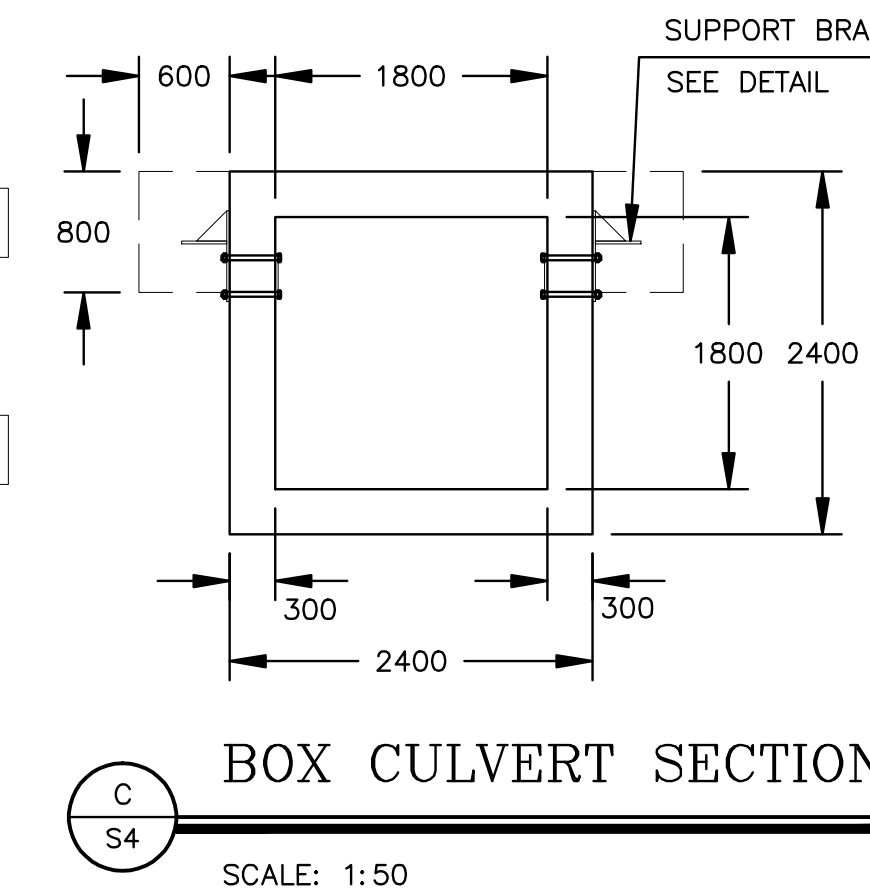
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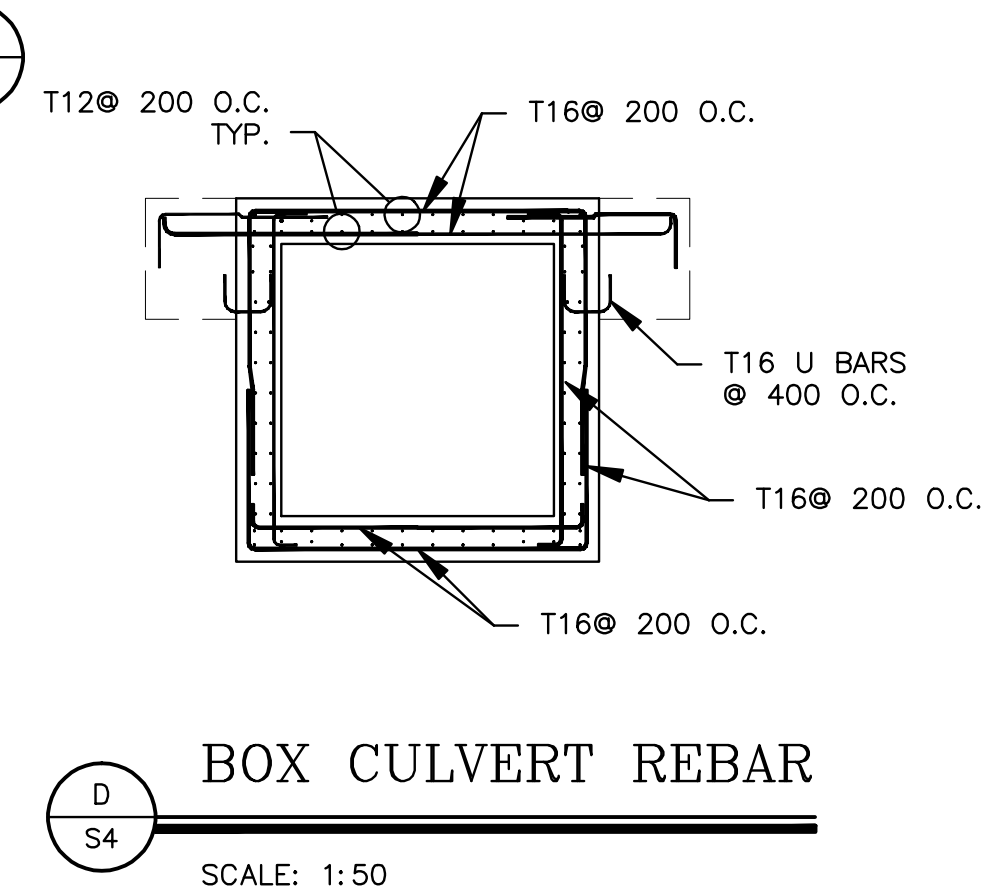
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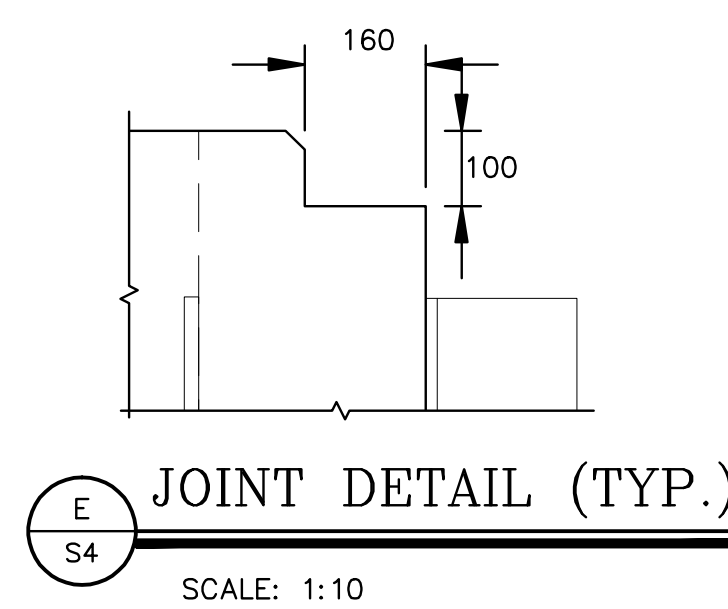
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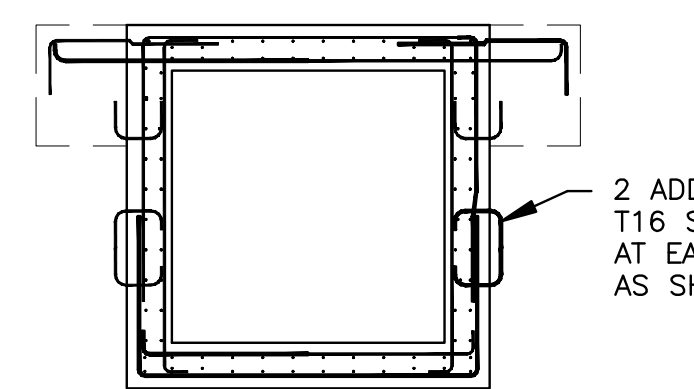
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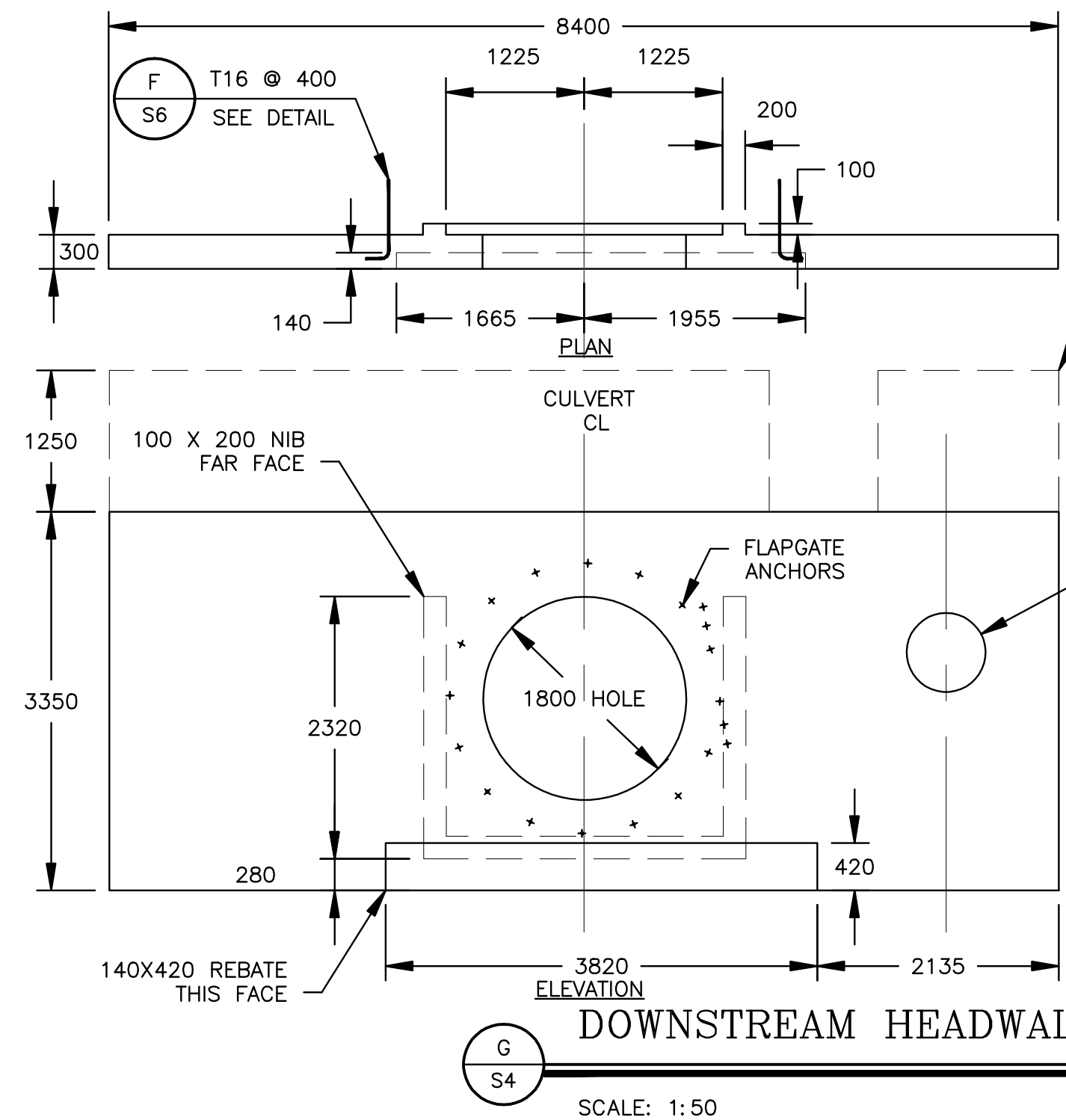
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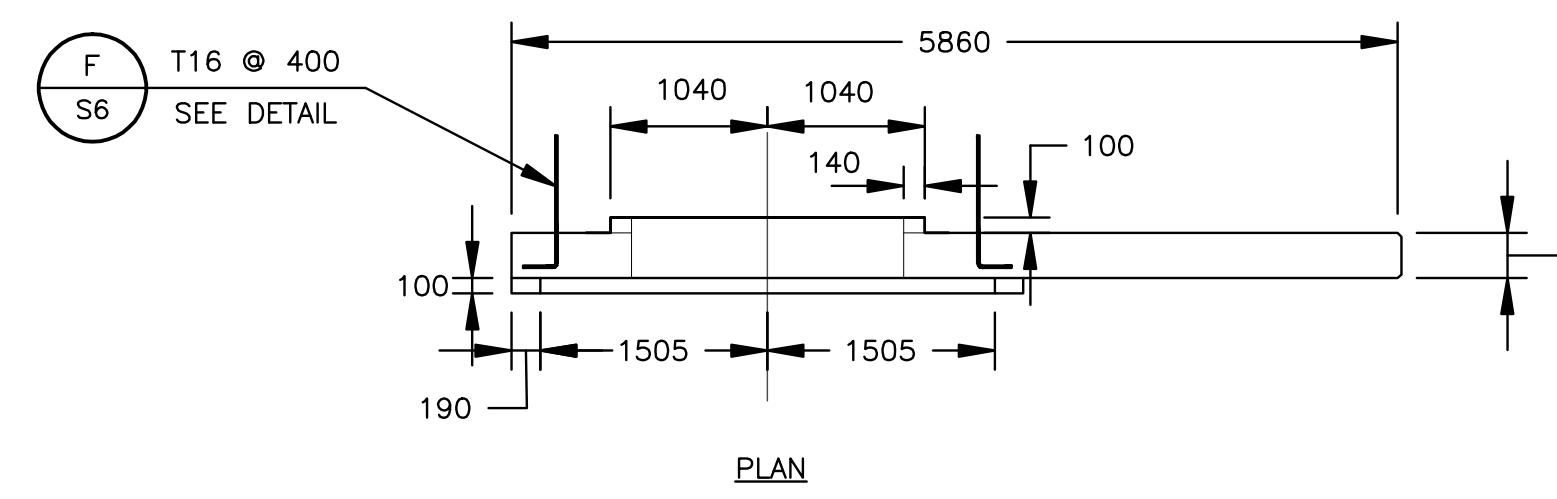
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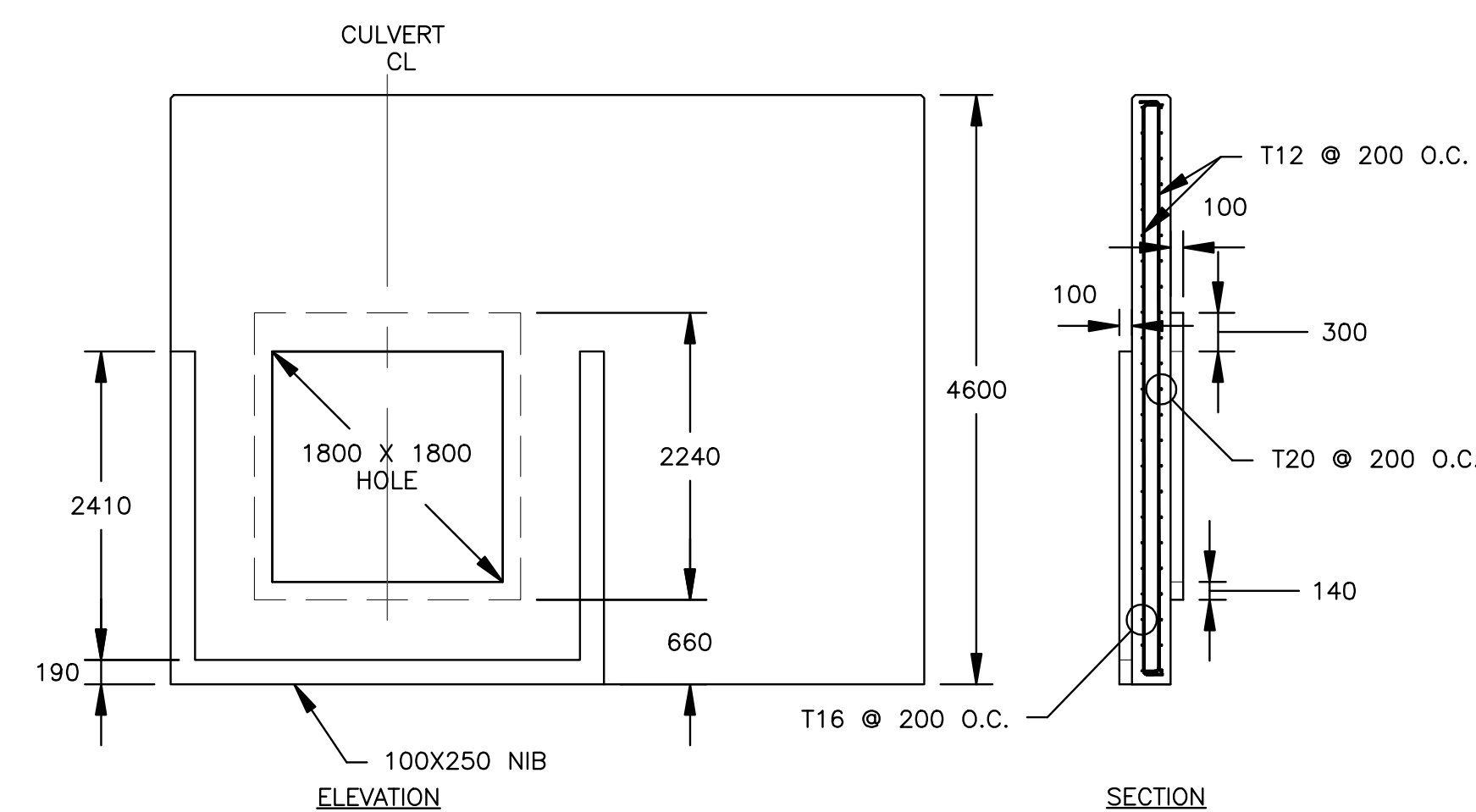
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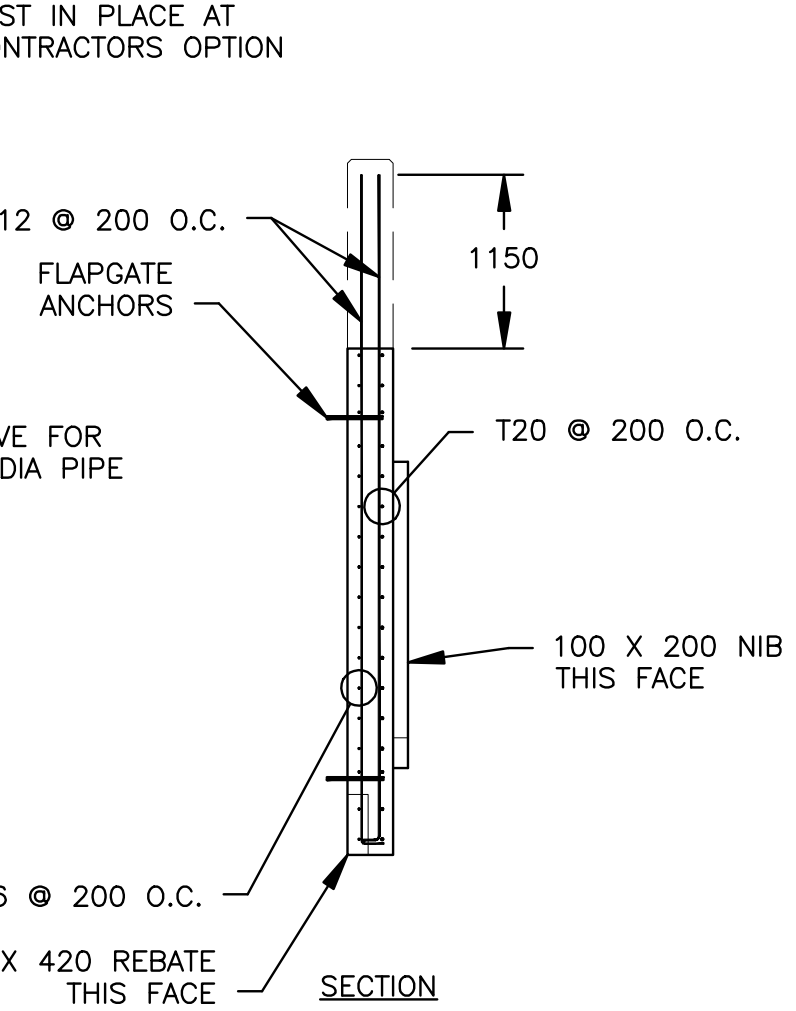
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DOWNSTREAM HEADWALL
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F
UPSTREAM HEADWALL PLAN
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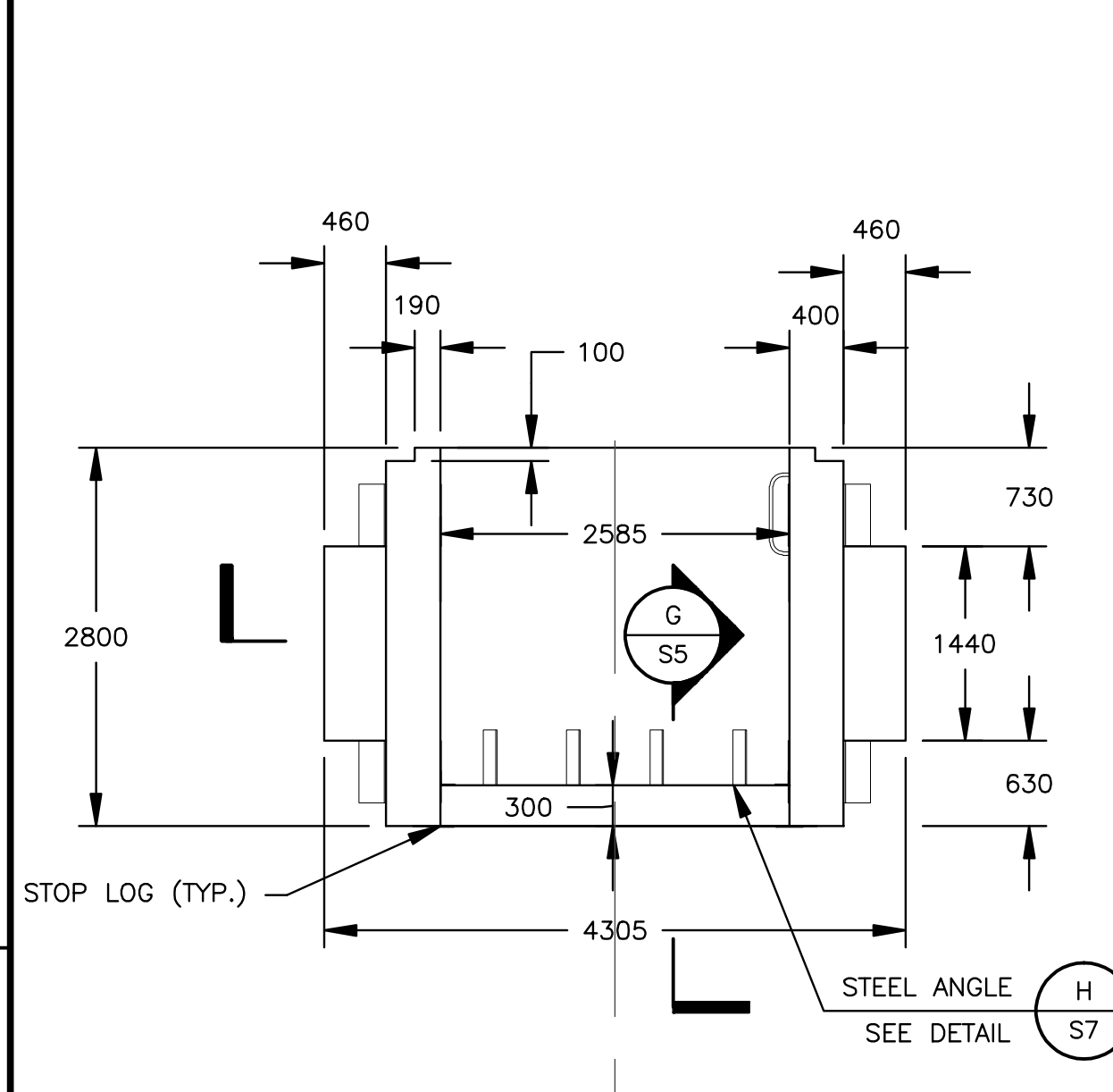
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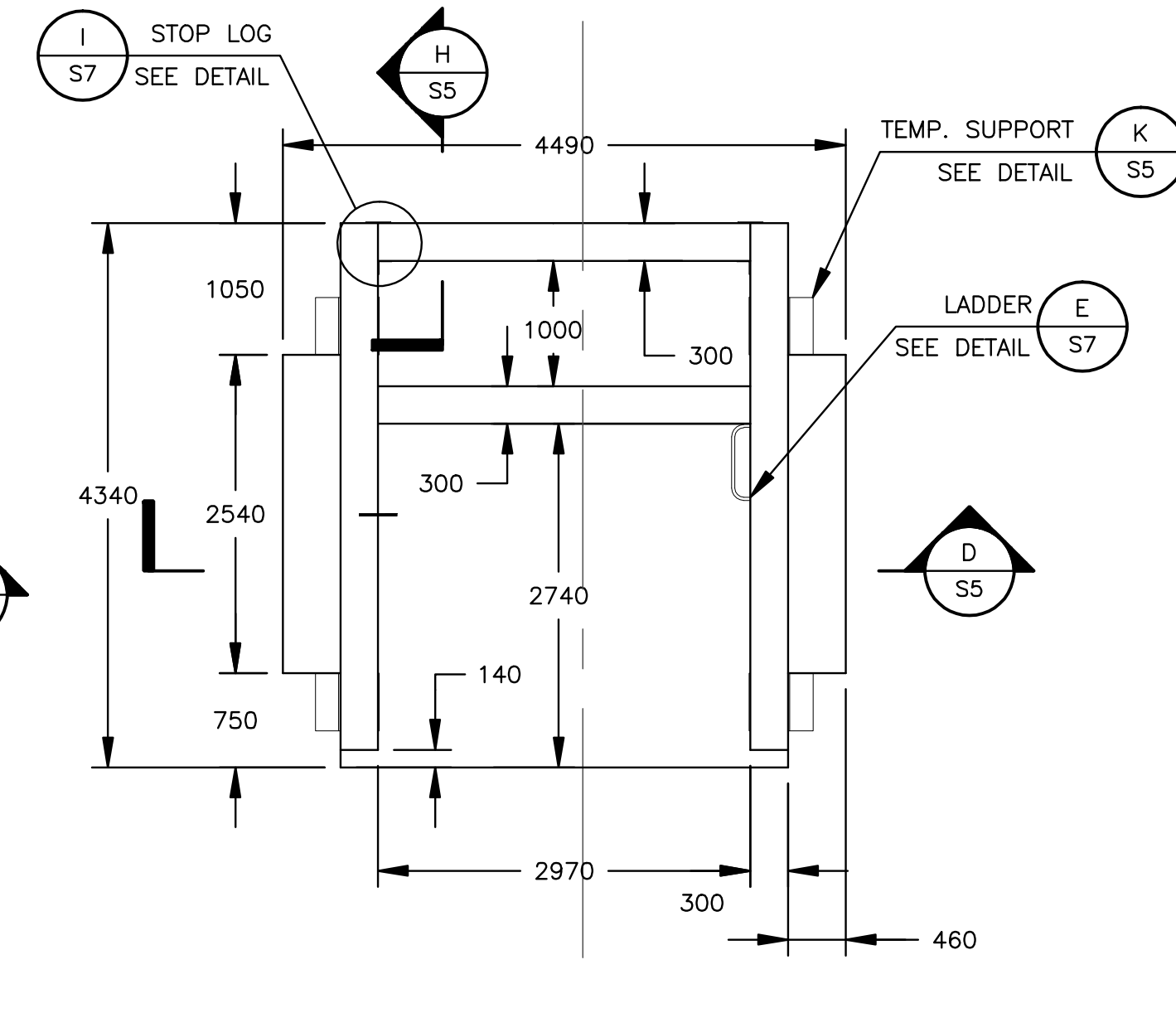
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SECTION
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- NOTES:
1. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LIFTING DETAILS.
2. CONTRACTOR SHALL PROVIDE SUITABLE LIFTING POINTS.

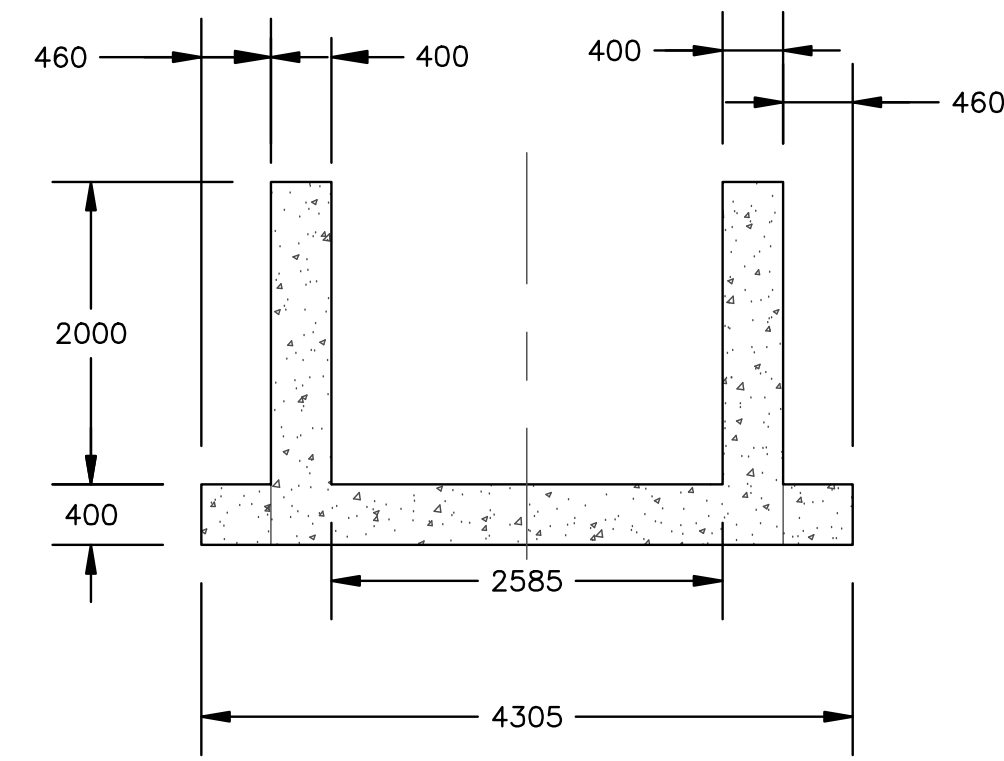
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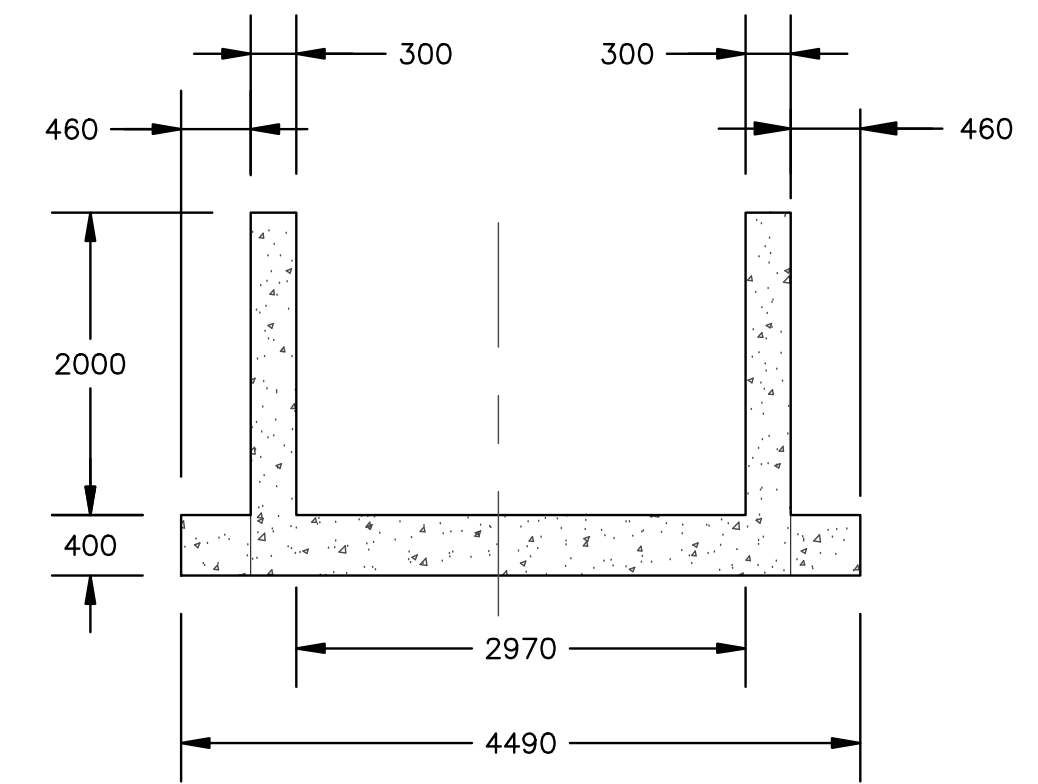
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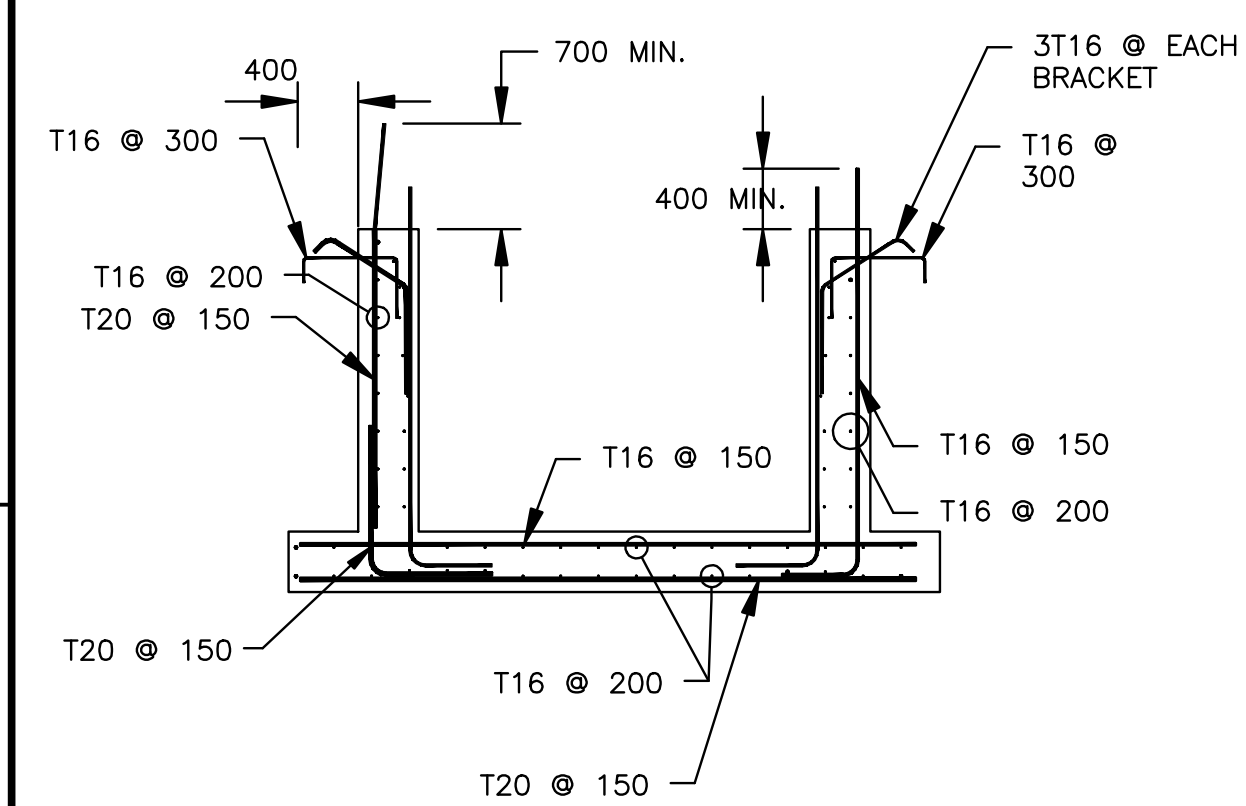
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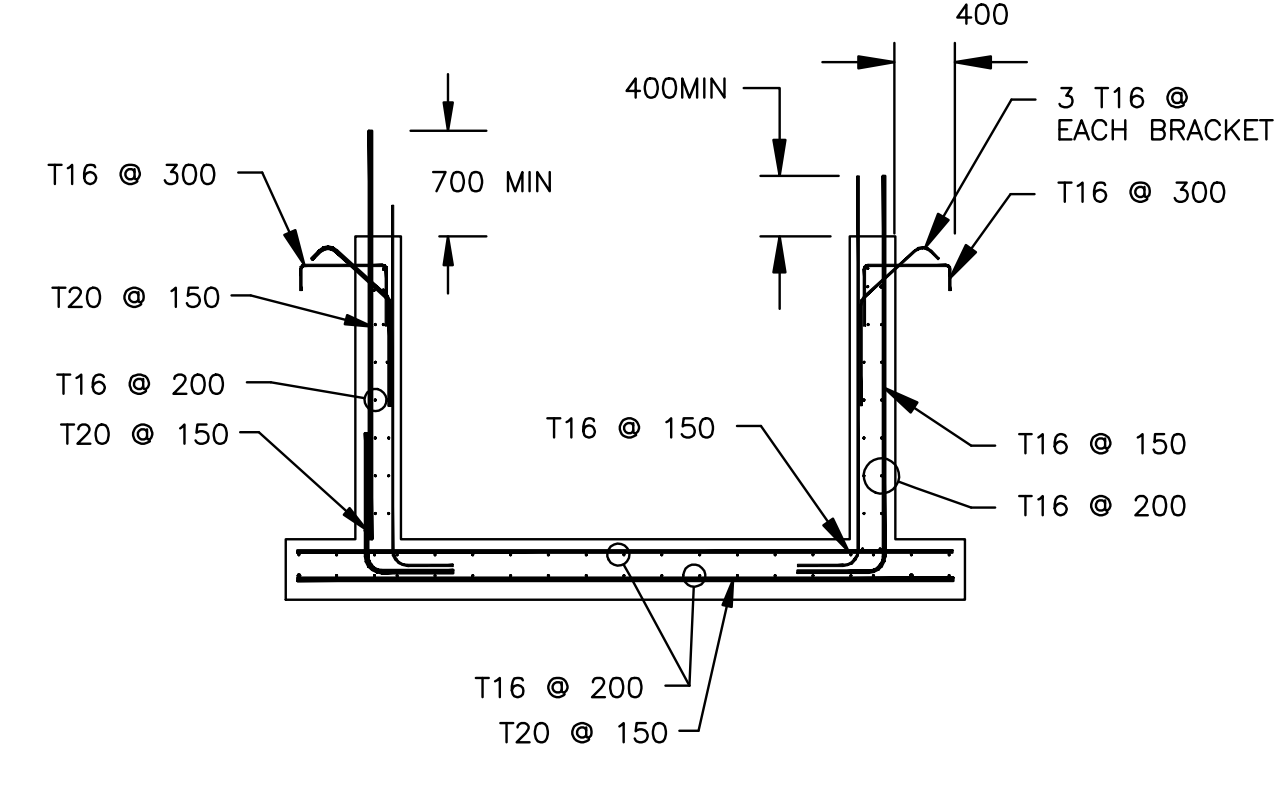
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SCALE: 1:50



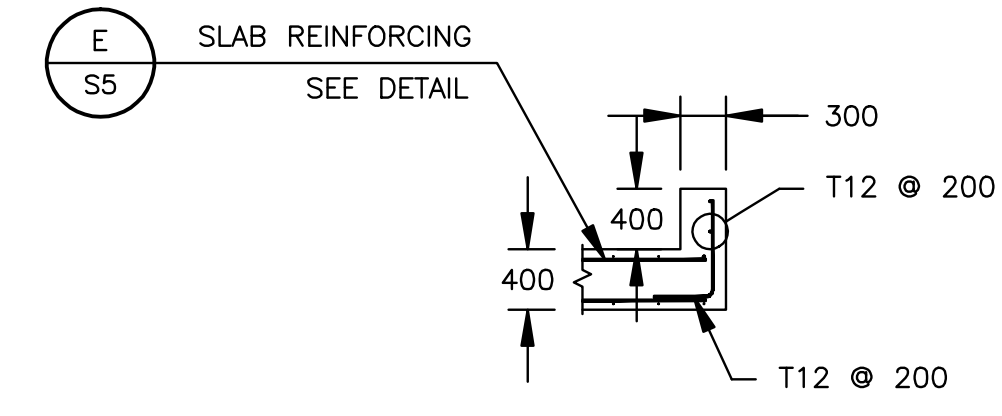
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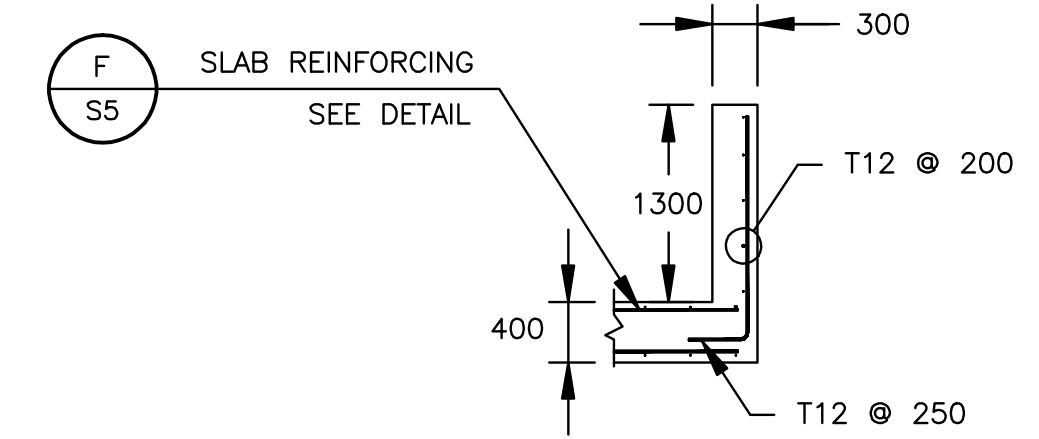
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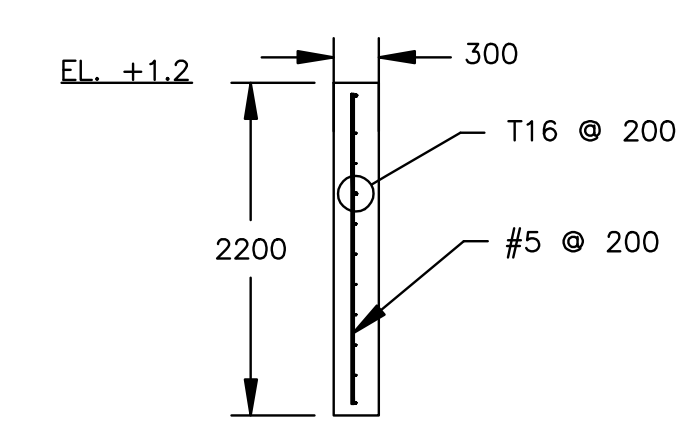
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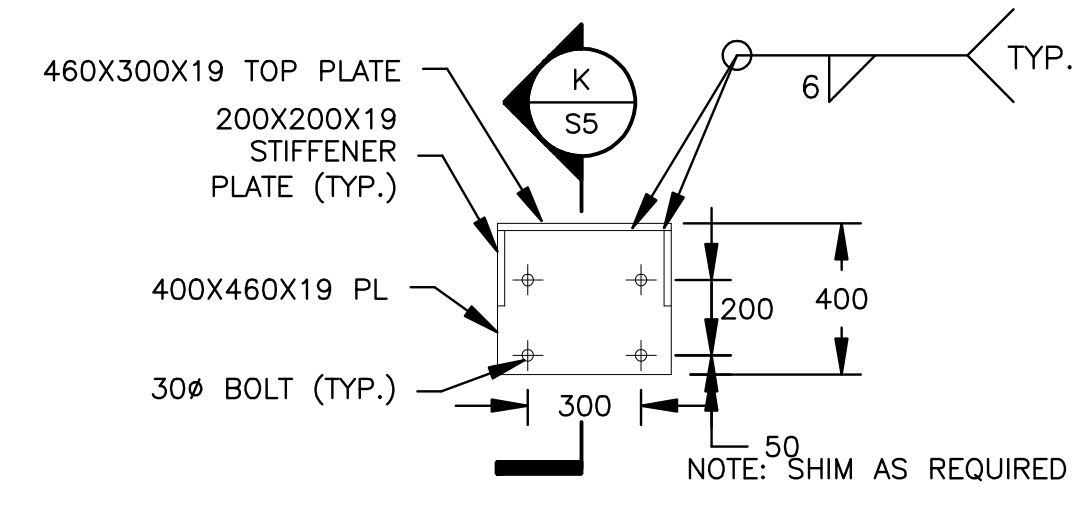
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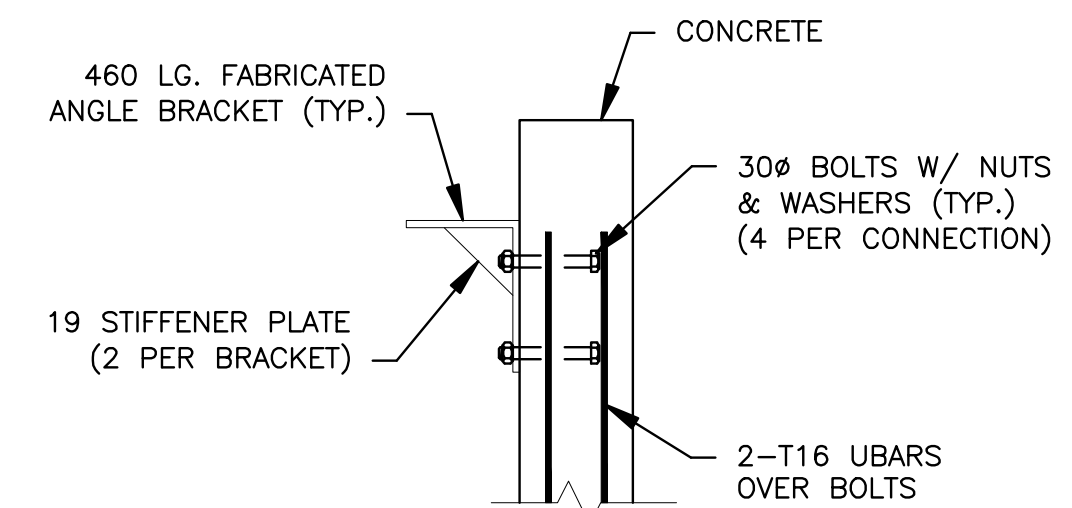
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SCALE: 1:50



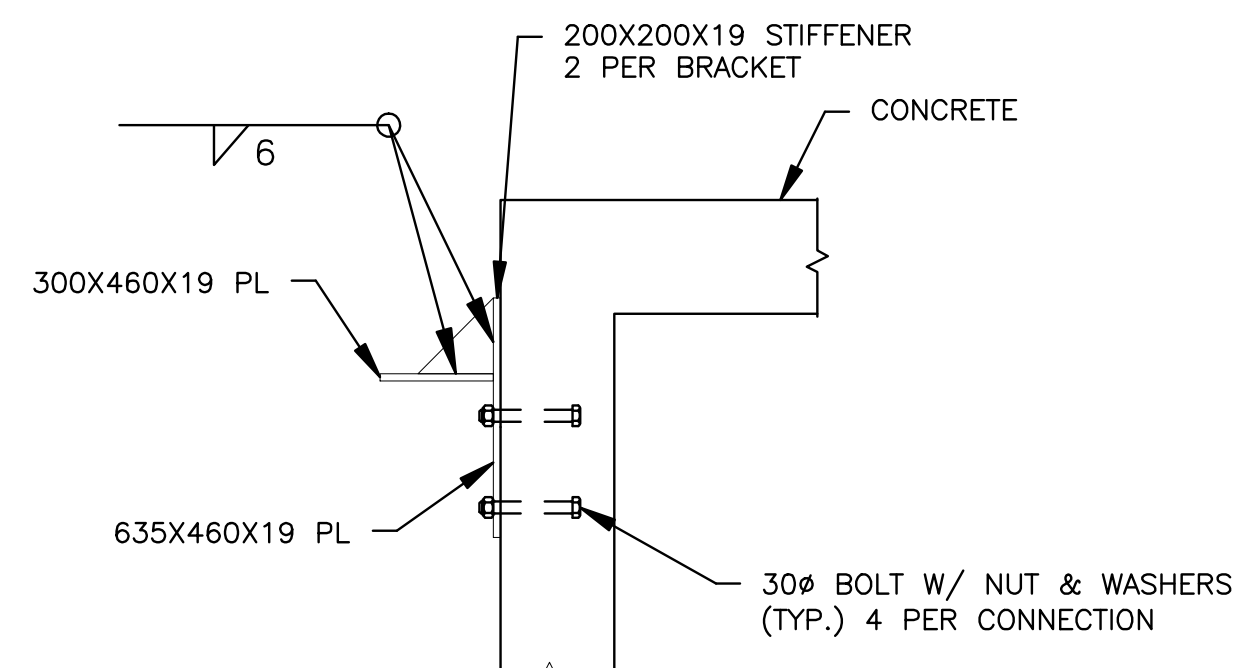
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S5
SCALE: 1:20



J
S5
SCALE: 1:20



K
S5
SCALE: 1:20



L
S5
SCALE: 1:20

NOTES:
1. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL LIFTING DETAILS.
2. CONTRACTOR SHALL PROVIDE SUITABLE LIFTING POINTS.

ISSUED FOR: TENDER 10/08/10

AMENDMENTS:

NO:	REVISION	APP	DATE:

SCALE: VARIES

SURVEY
PREPARED BY: DATE:

DESIGN
PREPARED BY: PEH DATE: 2/26/10
CHECKED BY: RJT DATE: 2/26/10

DRAWING
PREPARED BY: PEH DATE: 2/26/10
CHECKED BY: RJT DATE: 2/26/10

APPROVED BY: RJT

PROJECT NUMBER: 34-27-10

PROJECT NAME: PEMBROKE CANAL
OUTFALL REHABILITATION

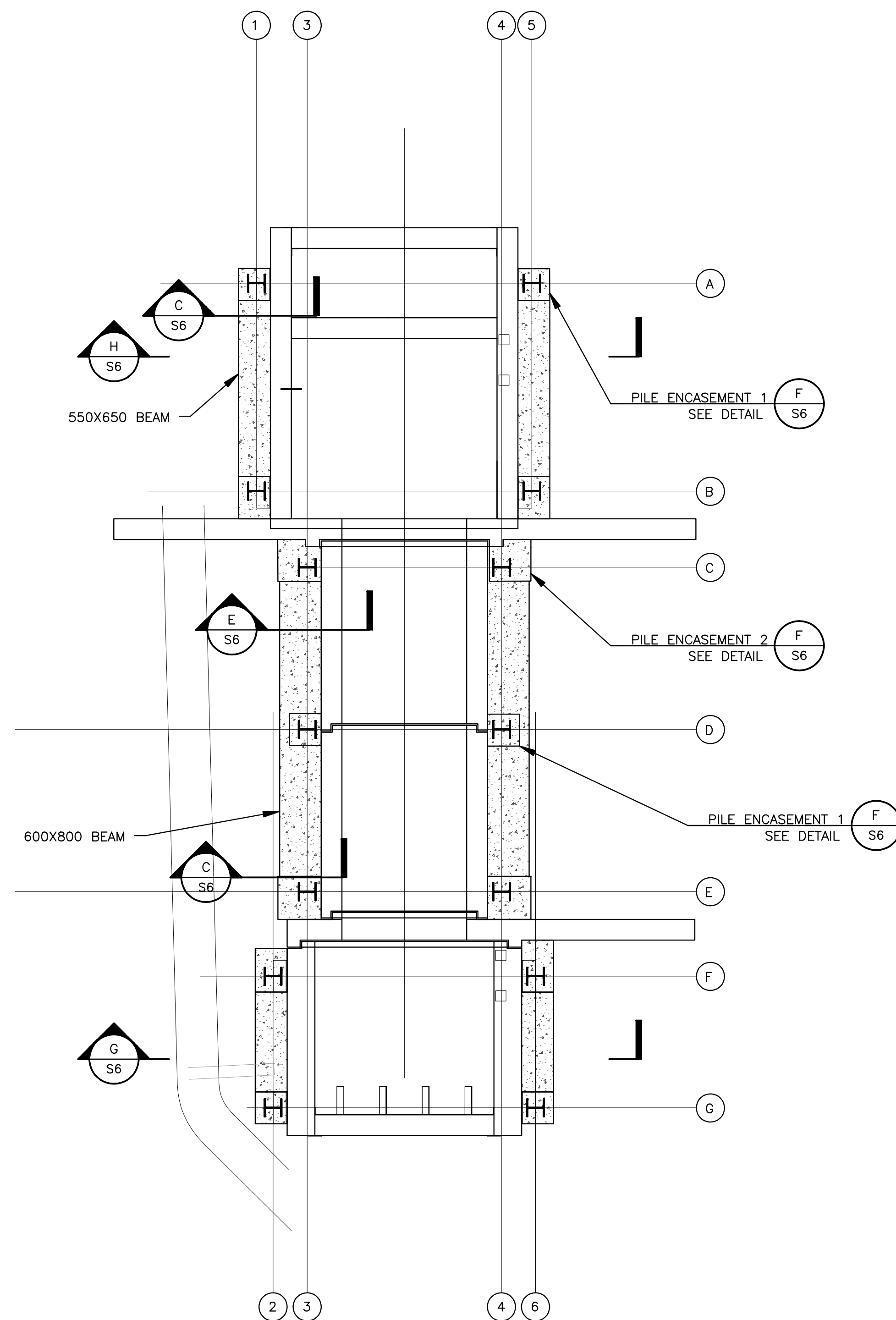
MILL CREEK ROAD
PEMBROKE PARISH

DRAWING FILE NO:

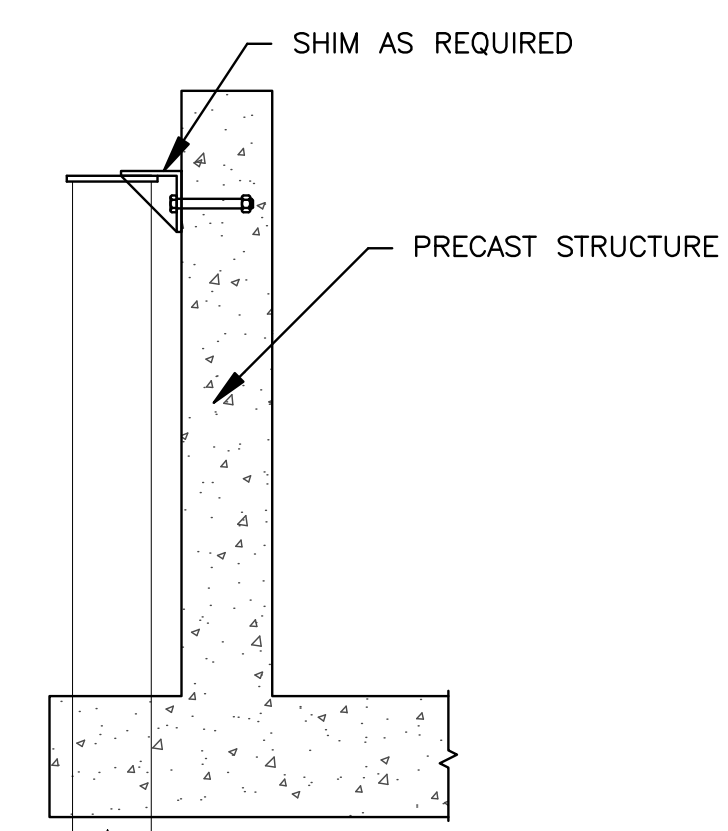
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SHEET NUMBER: S5 REVISION

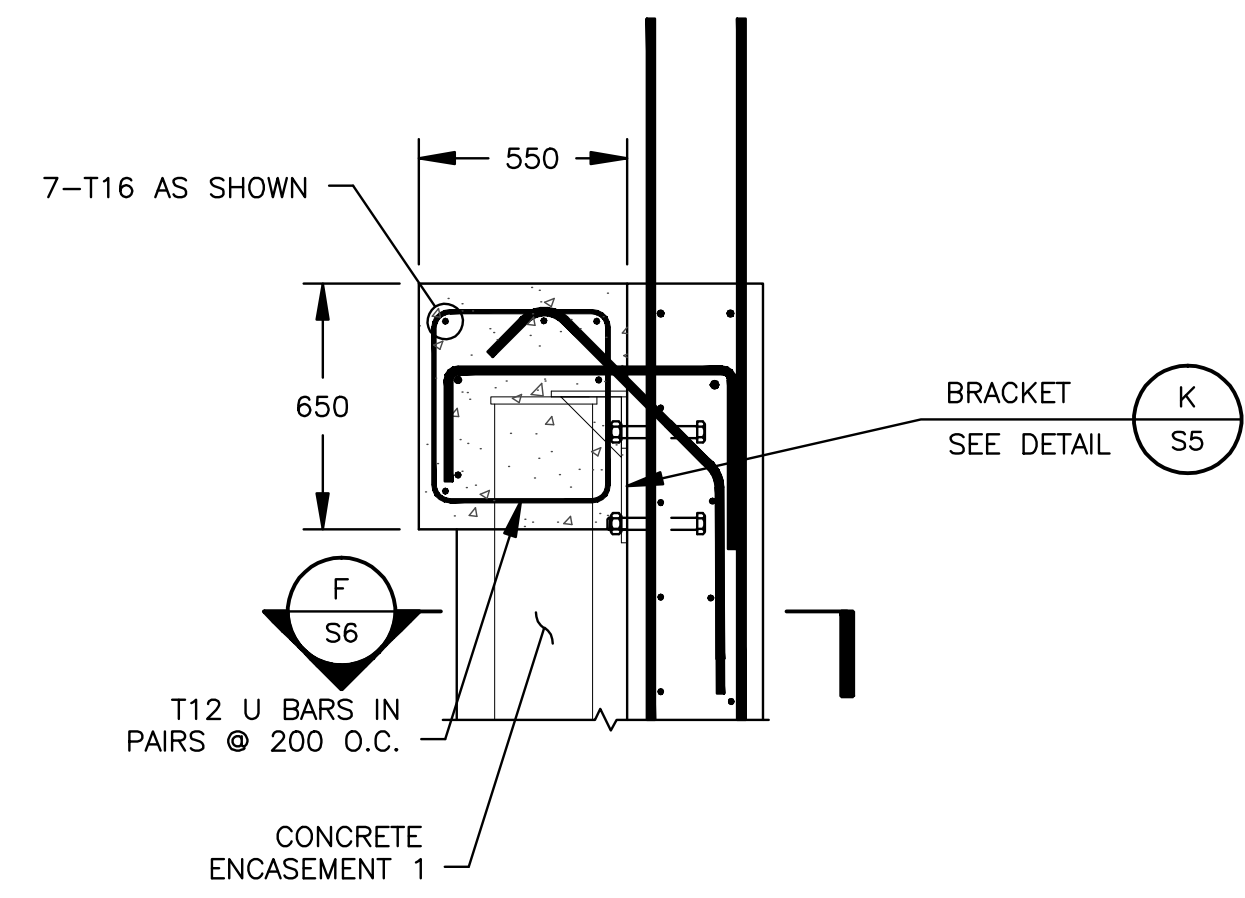
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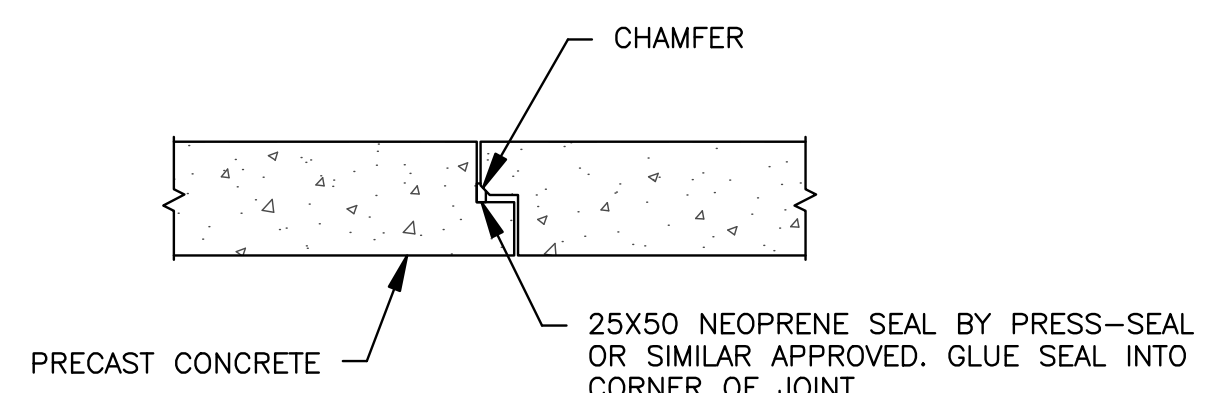
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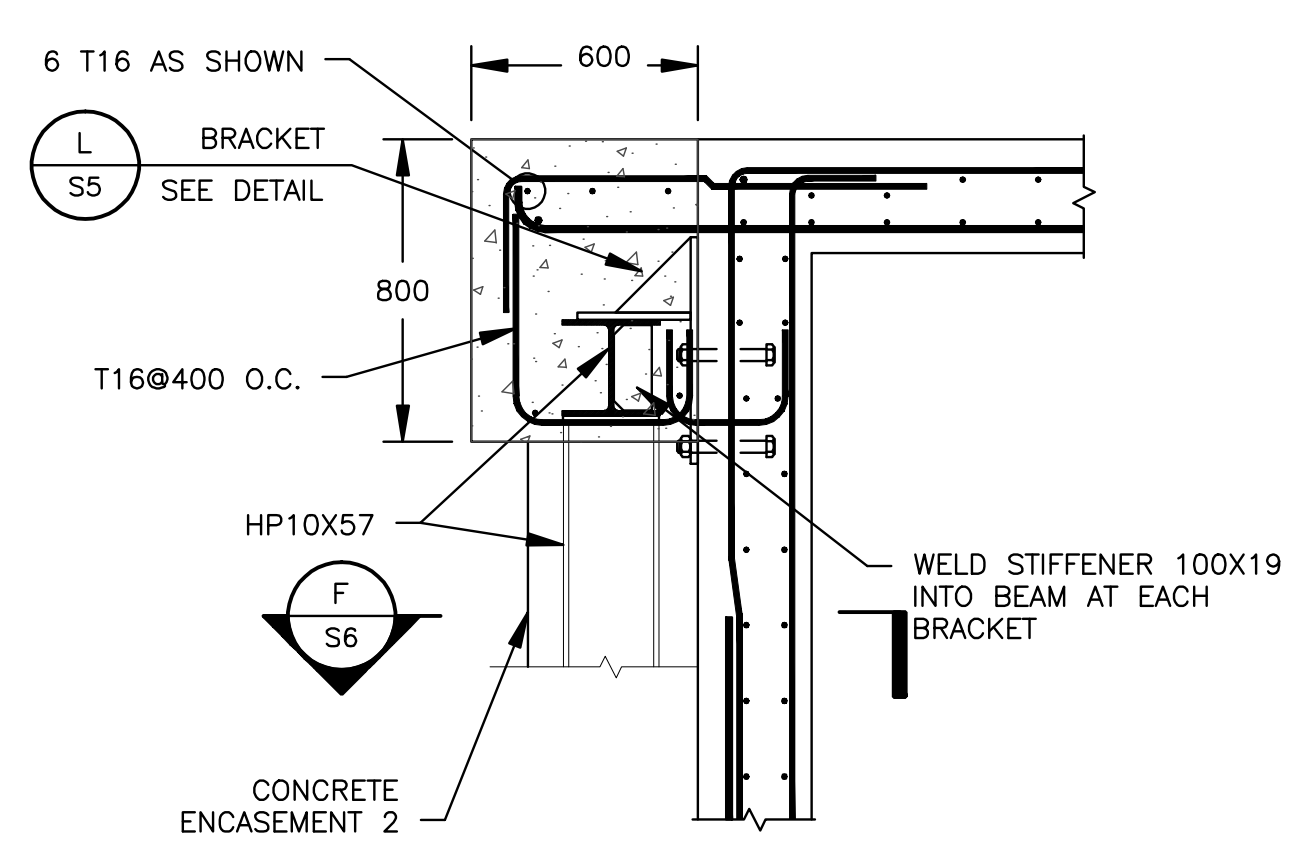
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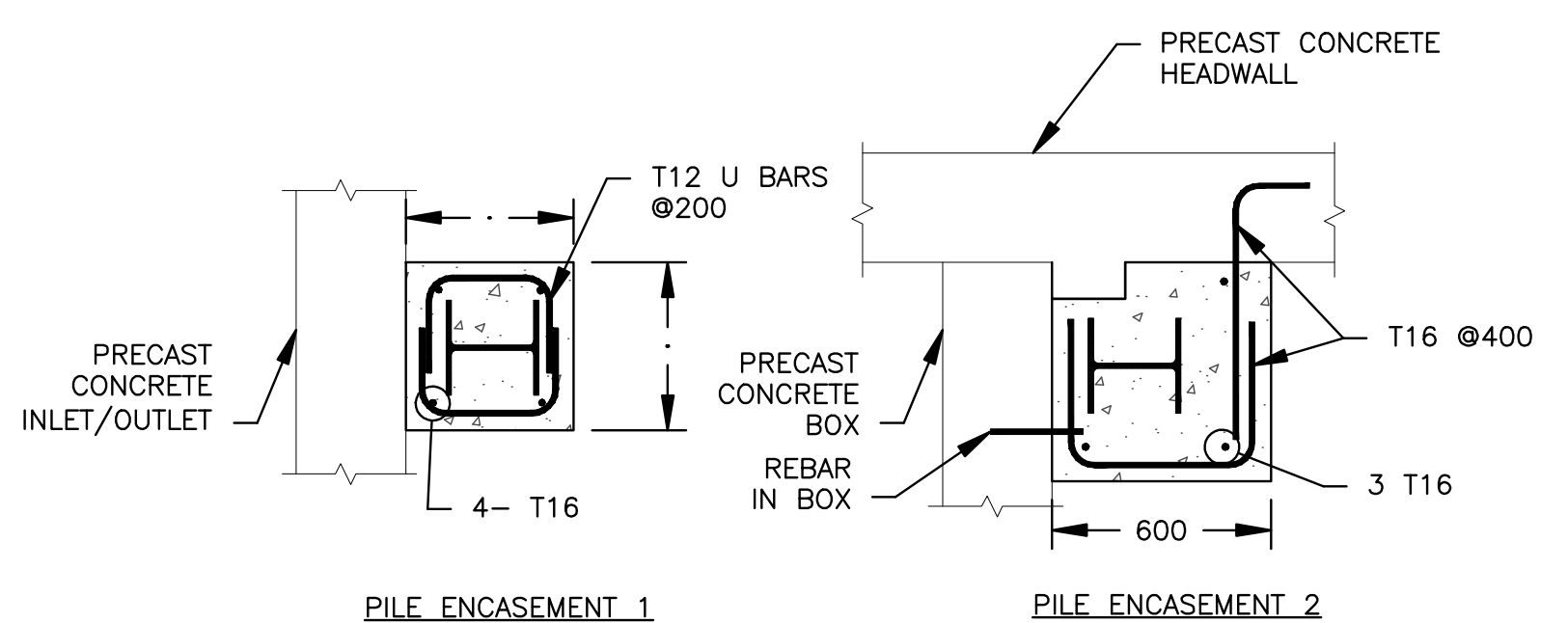
PILE CAP REINFORCEMENT (TYP.)
SCALE: 1:20



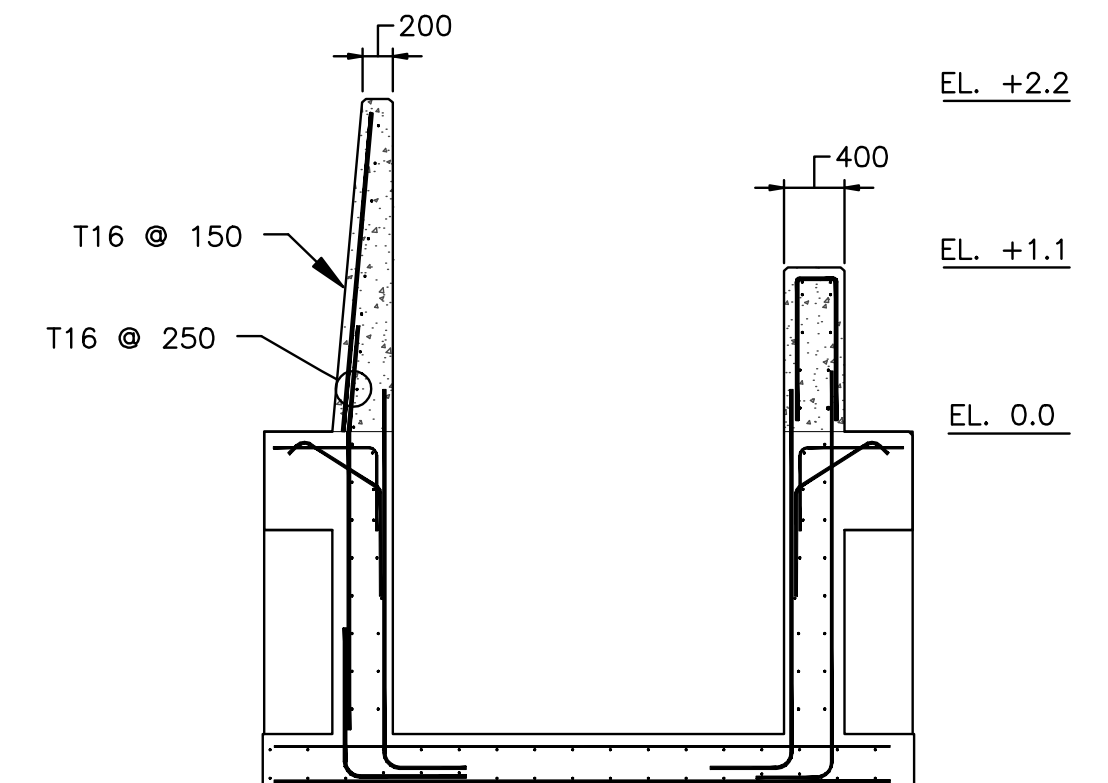
JOINT DETAIL
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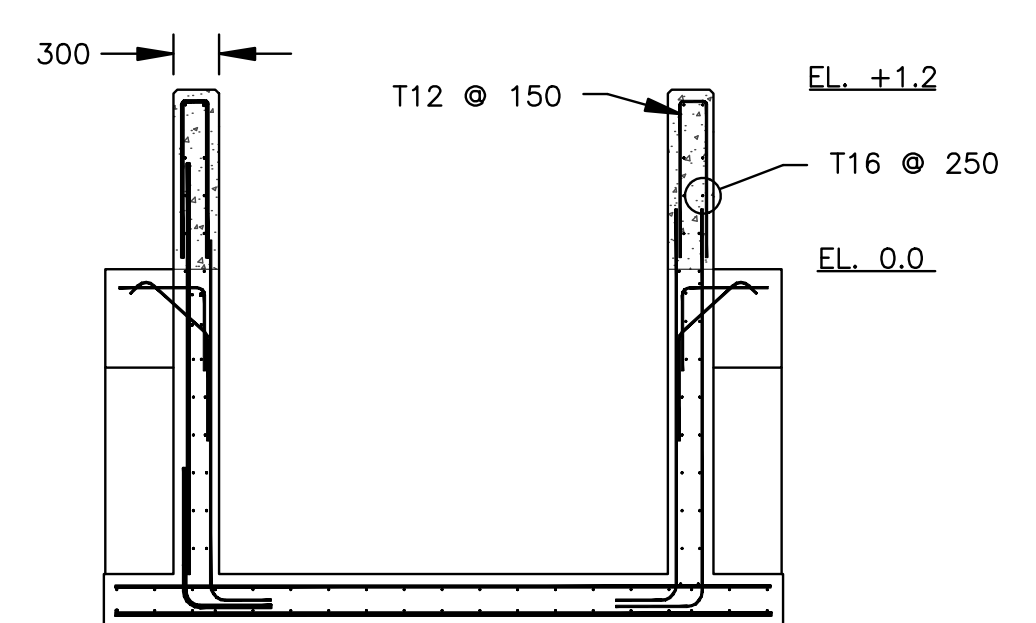
BOX SUPPORT
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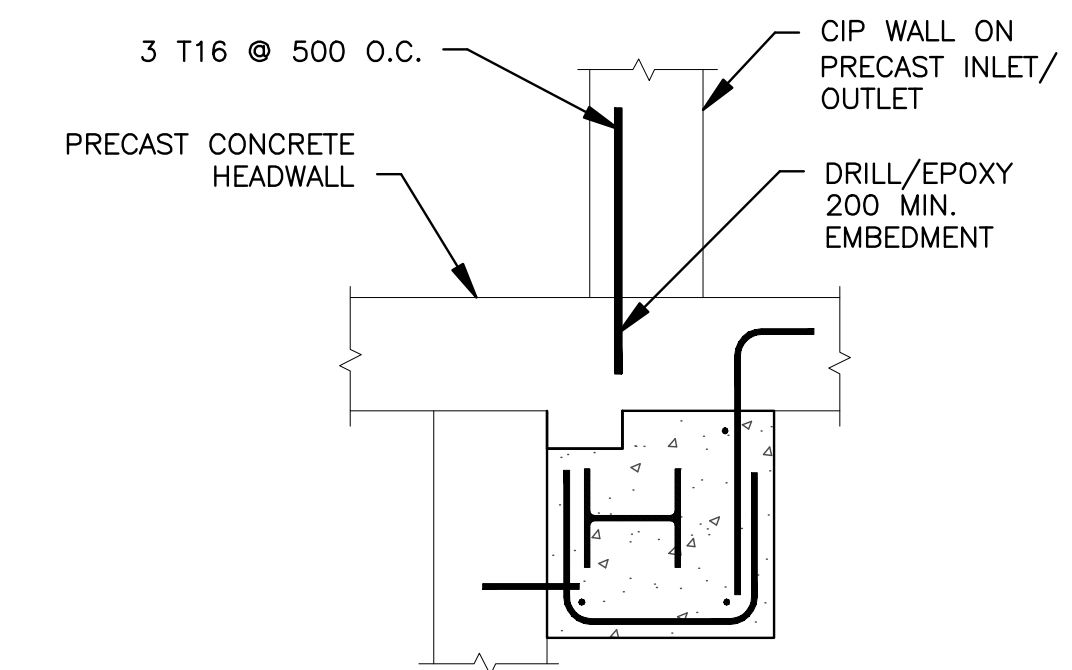
PILE ENCASEMENT DETAILS
SCALE: 1:20



PRECAST INLET REINFORCING
SCALE: 1:50



PRECAST OUTLET REINFORCING
SCALE: 1:50



TIE BAR
SCALE: 1:20

ISSUED FOR: TENDER 10/08/10

AMENDMENTS:

NO:	REVISION	APP	DATE:

SCALE: VARIES

SURVEY
PREPARED BY: DATE:

DESIGN
PREPARED BY: PEH DATE: 2/26/10
CHECKED BY: RJT DATE: 2/26/10

DRAWING
PREPARED BY: PEH DATE: 2/26/10
CHECKED BY: RJT DATE: 2/26/10

APPROVED BY: RJT

PROJECT NUMBER:
34-27-10

PROJECT NAME:
**PEMBROKE CANAL
OUTFALL REHABILITATION**

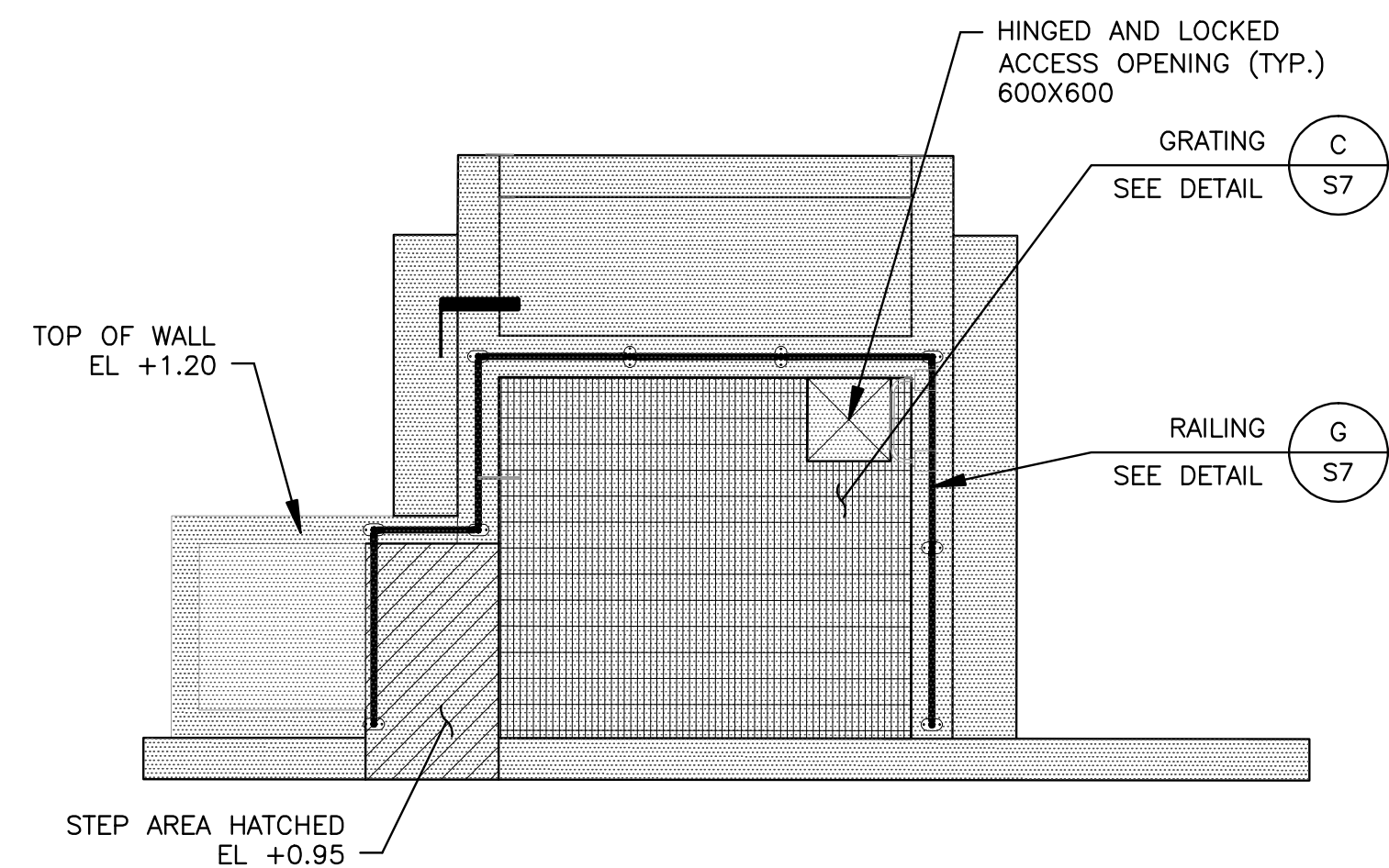
**MILL CREEK ROAD
PEMBROKE PARISH**

DRAWING FILE NO:

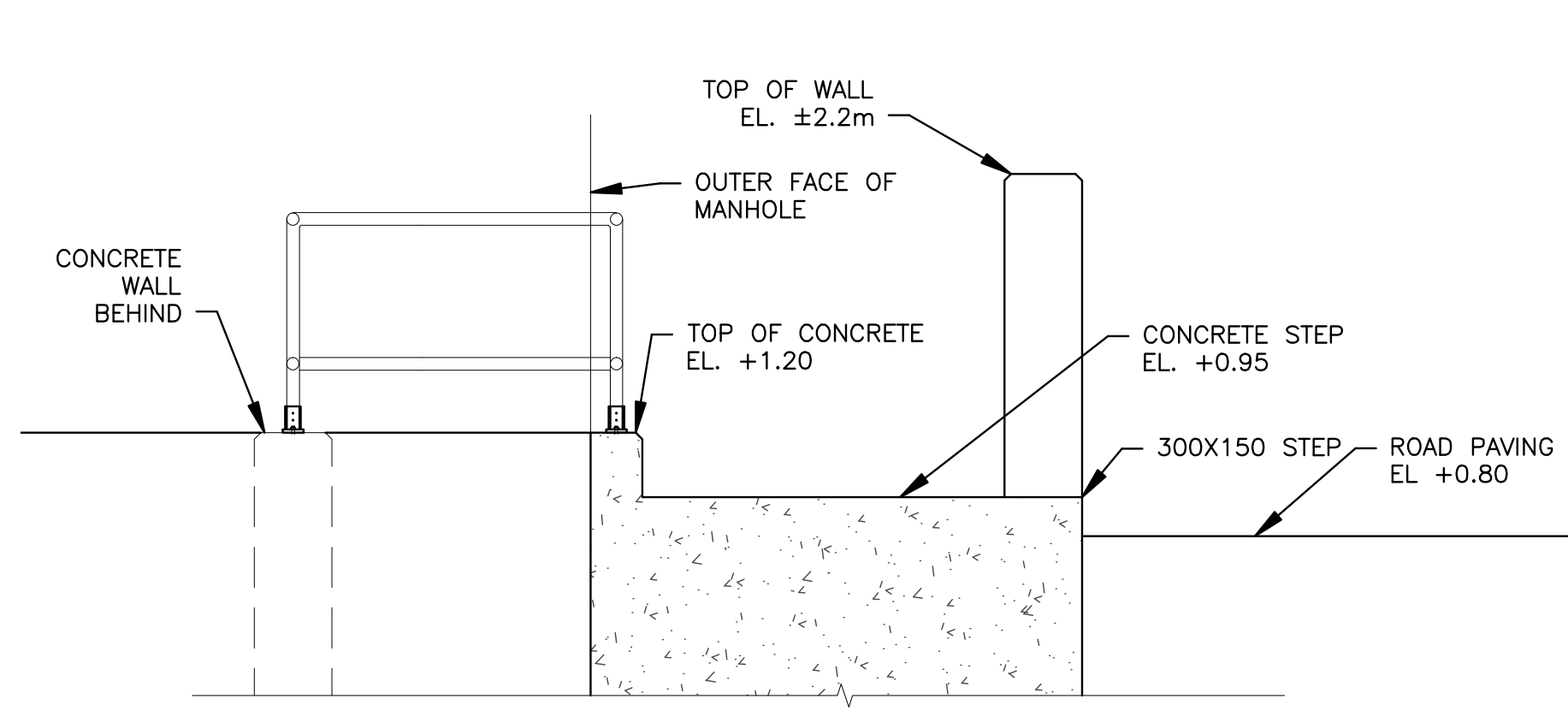
SHEET TITLE:
PRECAST INSTALLATION

SHEET NUMBER: **S6** REVISION:

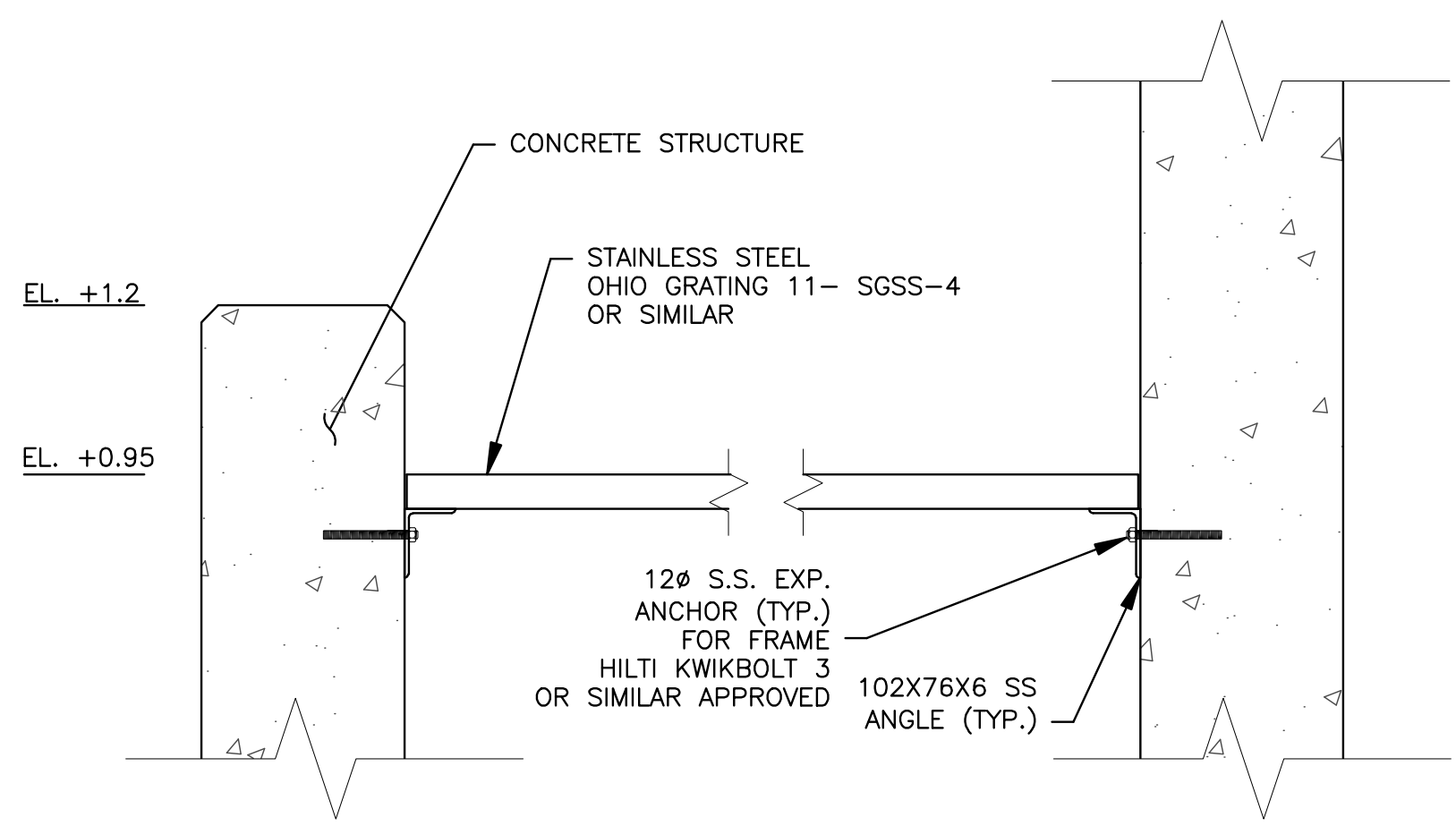
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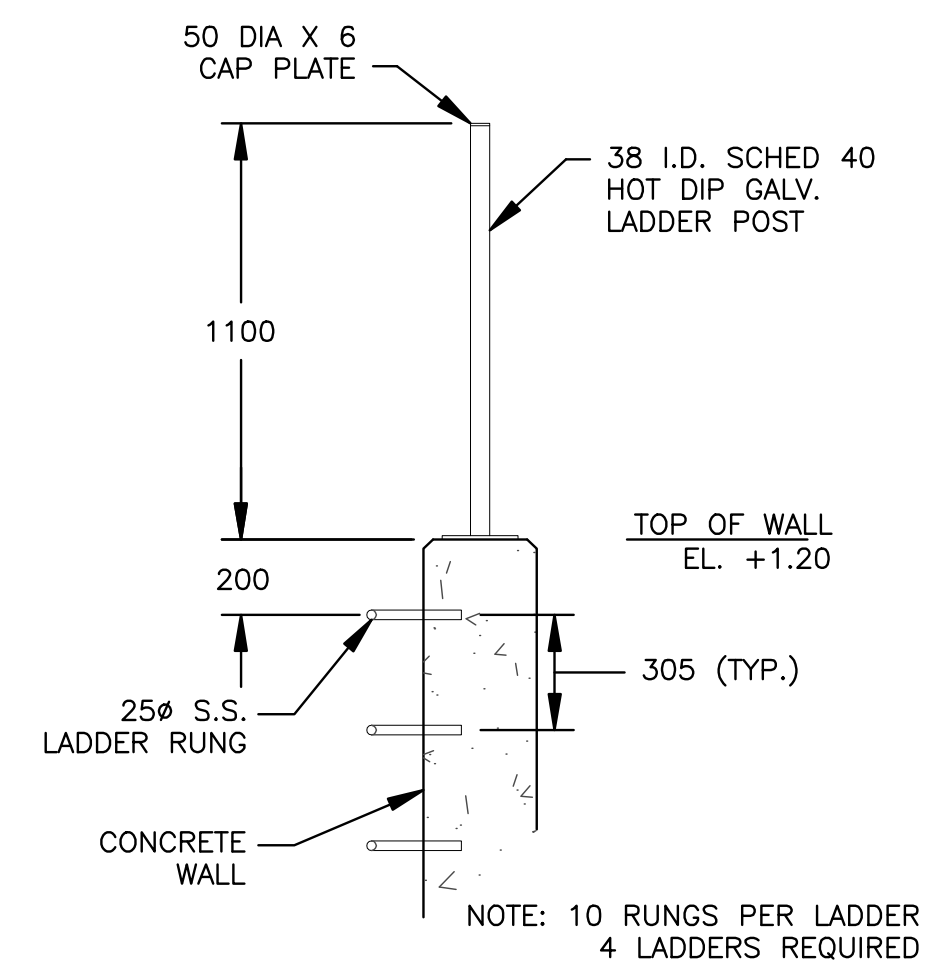
DECKING PLAN
SCALE: 1:50



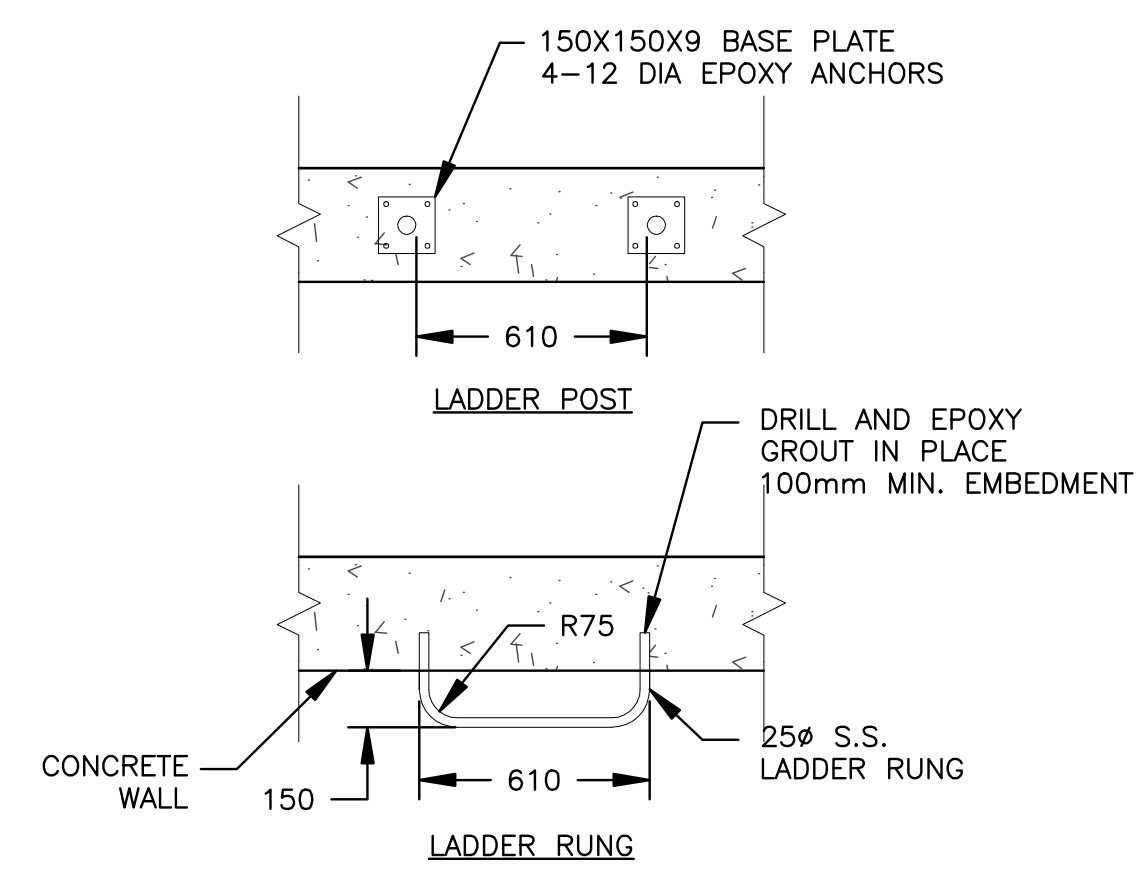
CONCRETE STEPS
SCALE: 1:25



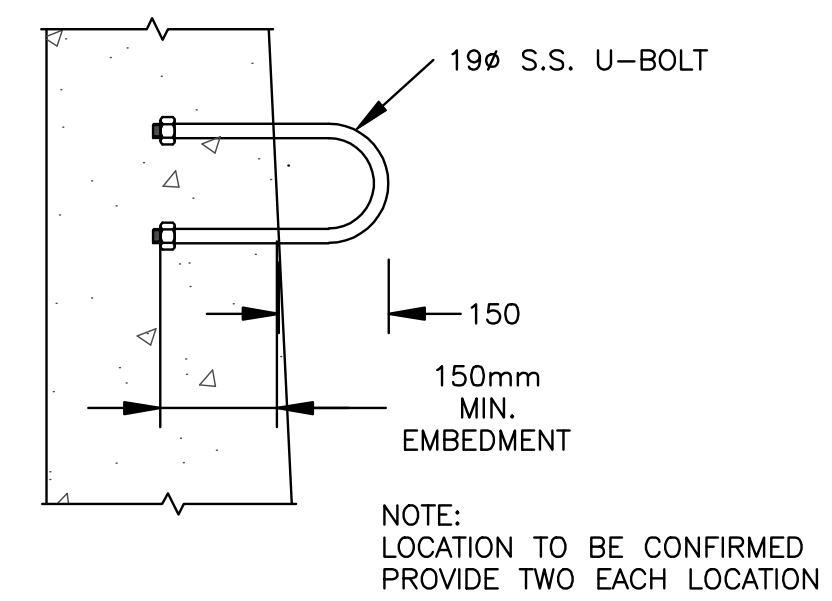
GRATING DETAIL
SCALE: 1:10



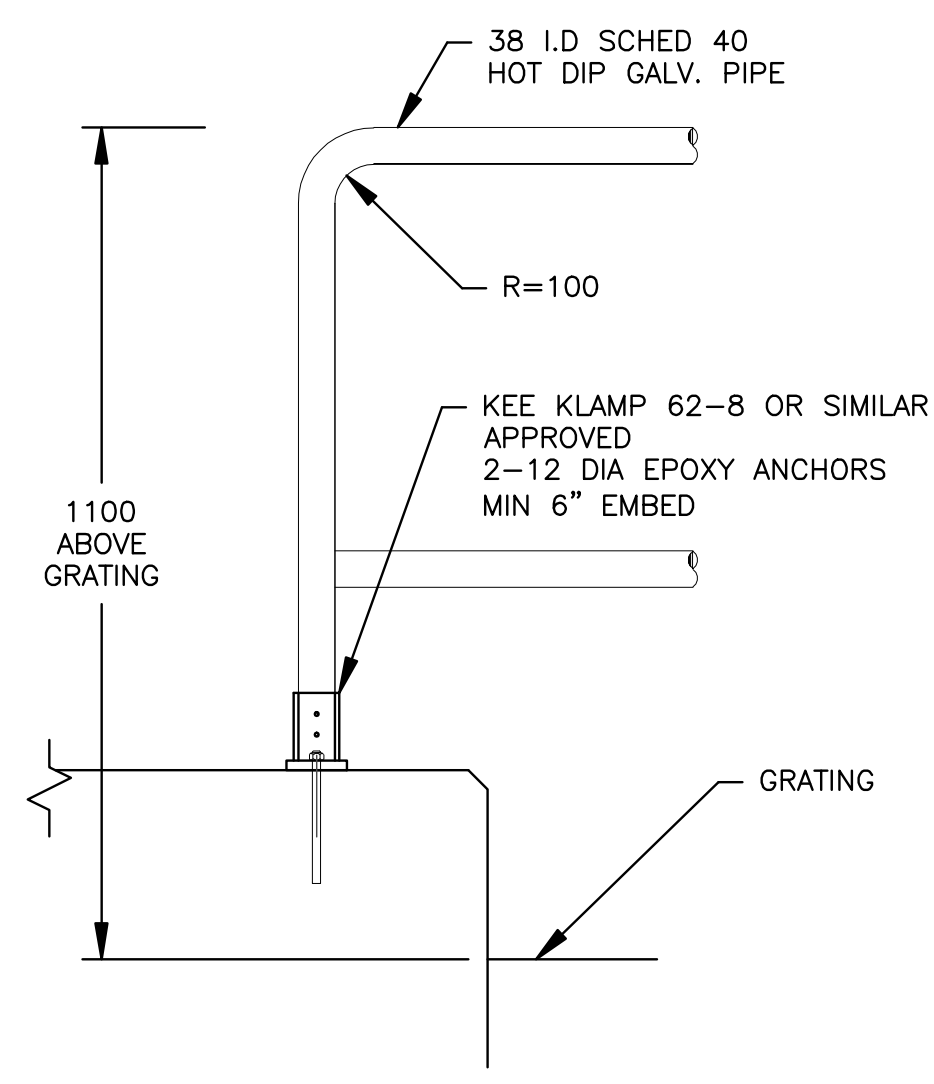
LADDER-SECTION
SCALE: 1:20



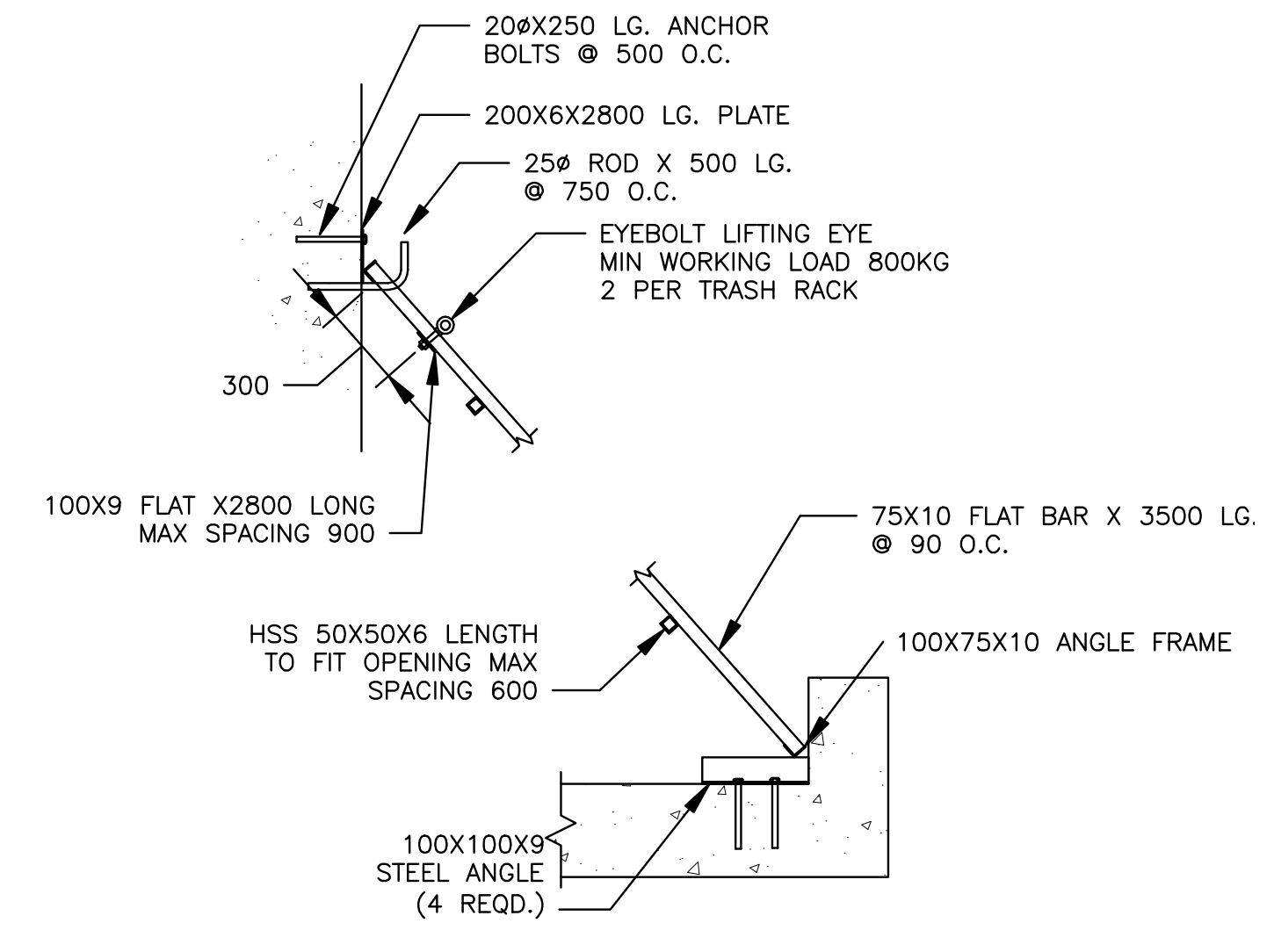
LADDER PLAN
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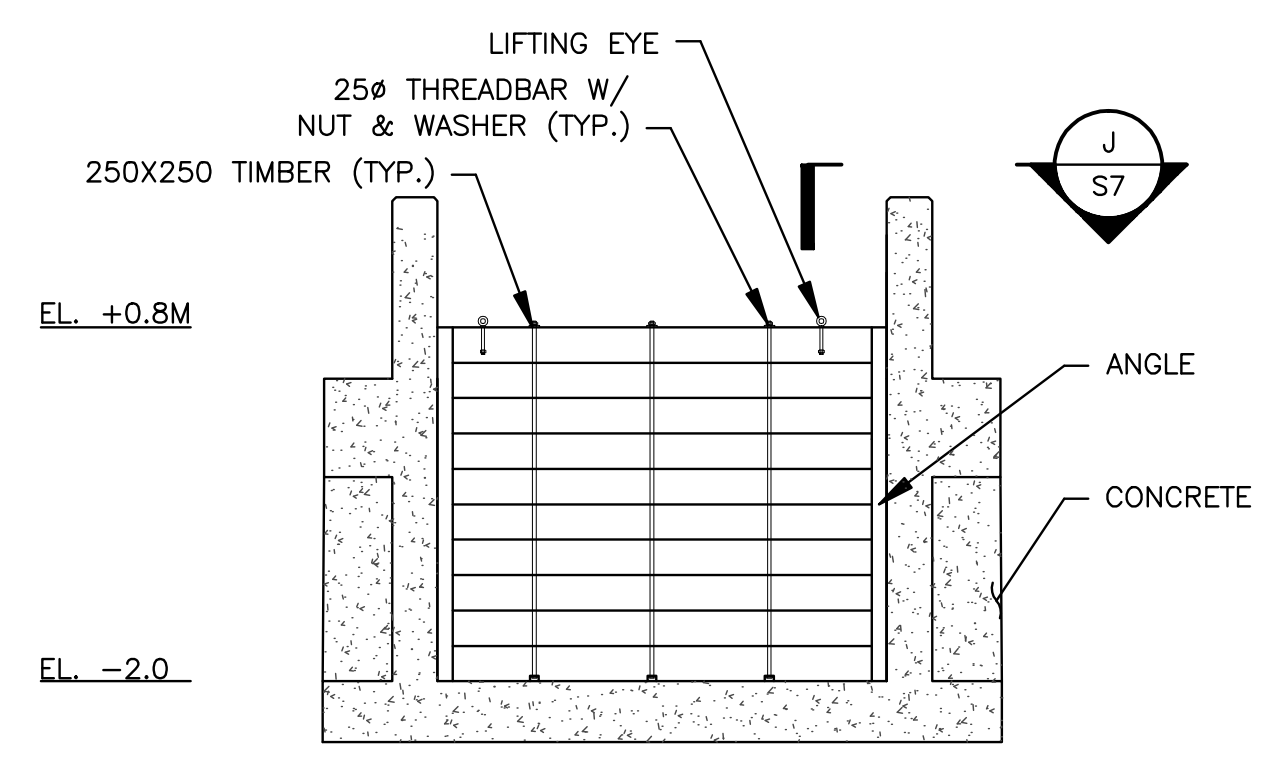
FLAP GATE LOCK
SCALE: 1:10



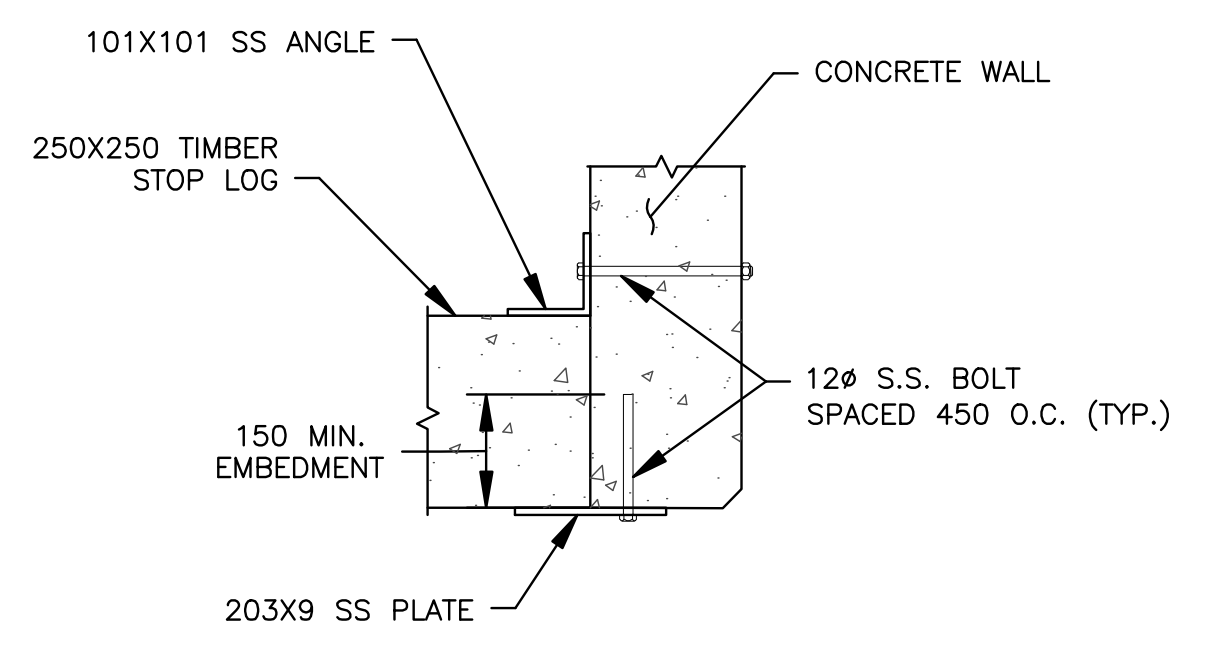
RAILING
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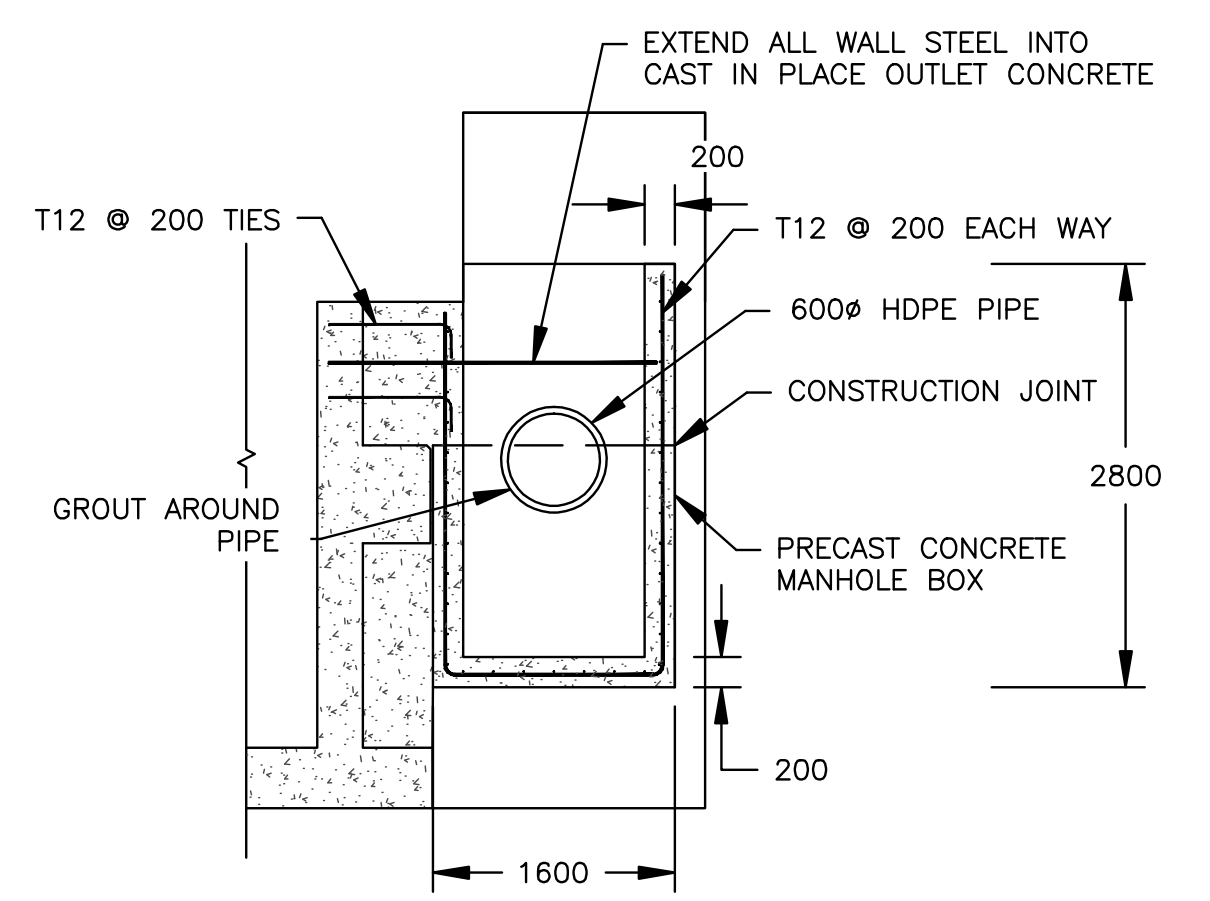
TRASH SCREEN
SCALE: 1:25



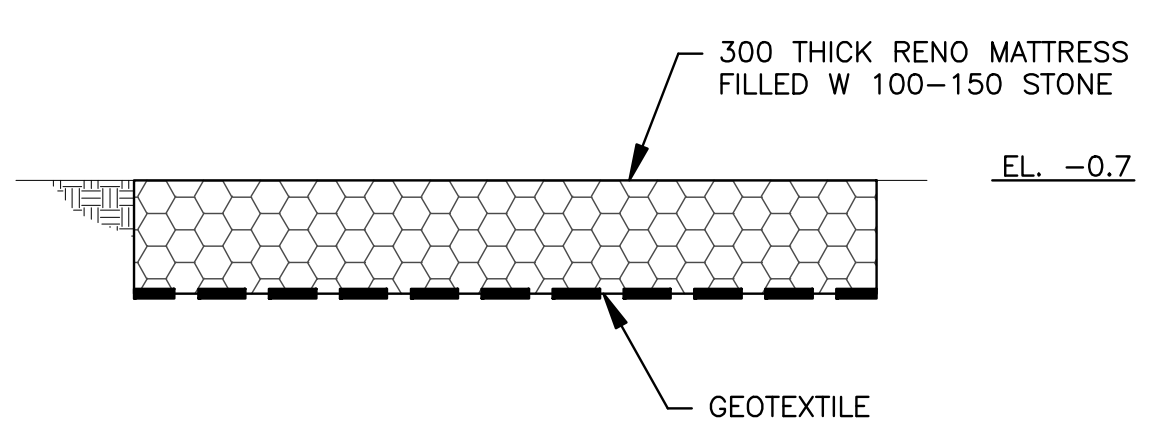
STOP LOG ELEVATION
SCALE: 1:50



STOP LOG DETAIL
SCALE: 1:10



CONCRETE MANHOLE
SCALE: 1:50



RENO MATTRESS
SCALE: 1:20

ISSUED FOR: TENDER 10/08/10

AMENDMENTS:

REVISION	APP	DATE:

SCALE: VARIES

SURVEY
PREPARED BY: DATE:

DESIGN
PREPARED BY: PEH DATE: 2/26/10
CHECKED BY: RJT DATE: 2/26/10

DRAWING
PREPARED BY: PEH DATE: 2/26/10
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PROJECT NUMBER:
34-27-10

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OUTFALL REHABILITATION**

**MILL CREEK ROAD
PEMBROKE PARISH**

DRAWING FILE NO:

SHEET TITLE:
MISCELLANEOUS DETAILS

SHEET NUMBER: S7 REVISION: 1