

- NOTES:**
- (A) 600mm X 600mm FLUSH BOTTOM CLOSURE SLUICE GATES.
  - (B) 600mm X 600mm WALL MOUNTED SLUICE GATES.
  - (C) CRANK-OPERATED FLOOR STAND

DESIGNED BY: BG, BEL JOB DATE: 8-11-98  
 DRAWN BY: BEL JOB NUMBER: 800110J  
 CAD DATE: October 06, 1998 4:41:08 p.m.  
 CAD FILE: 800110\Draws\LIFT\_STATION\S1.DWG

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DATE: 10/8/98 REG. NO. 13920

NO.	DATE	BY	REVISION DESCRIPTION

1326 ENERGY PARK DRIVE  
 ST. PAUL, MINNESOTA 55108  
 (612) 644-4389

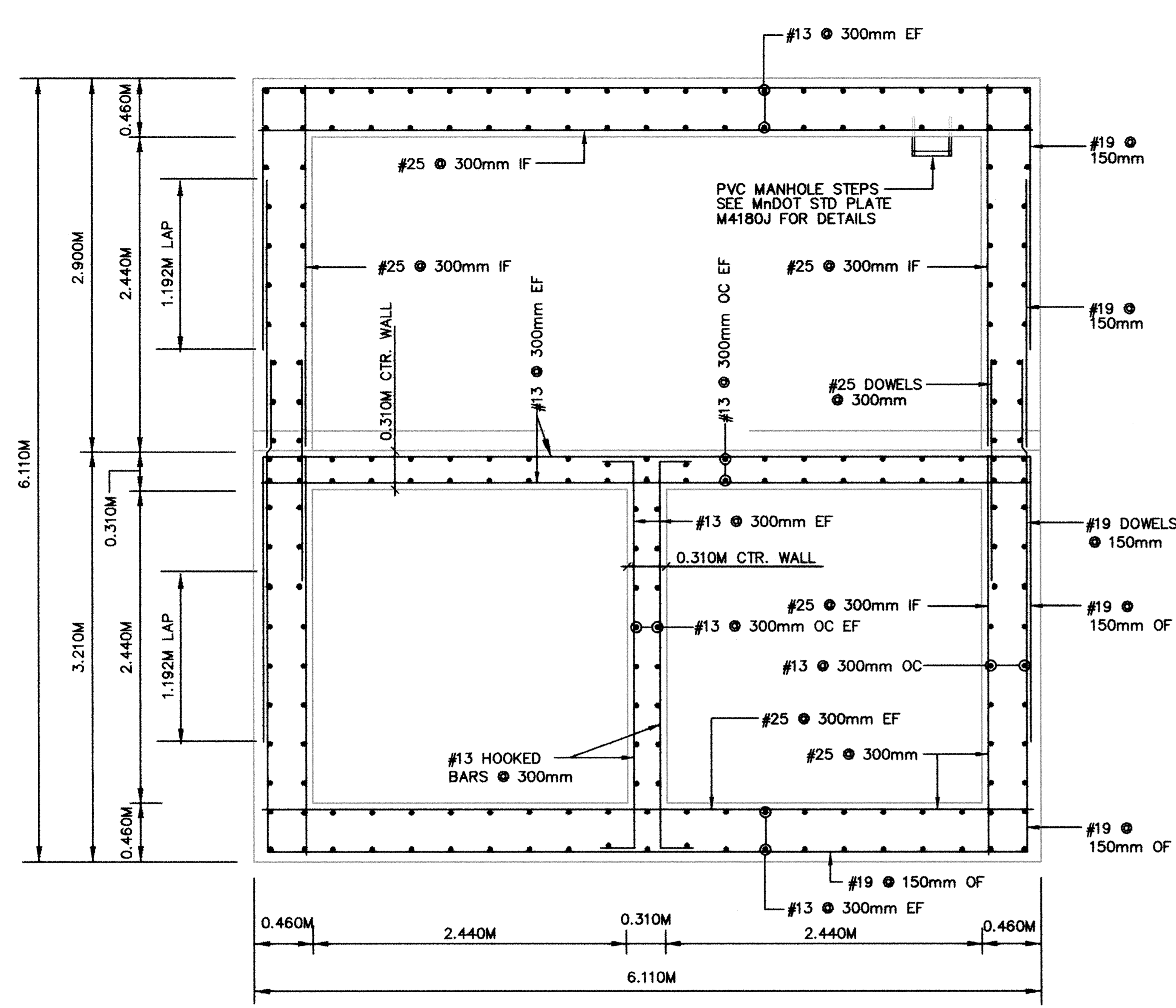
**Howard R. Green Company**  
 CONSULTING ENGINEERS

**CITY OF ELK RIVER**  
 LIFT STATION

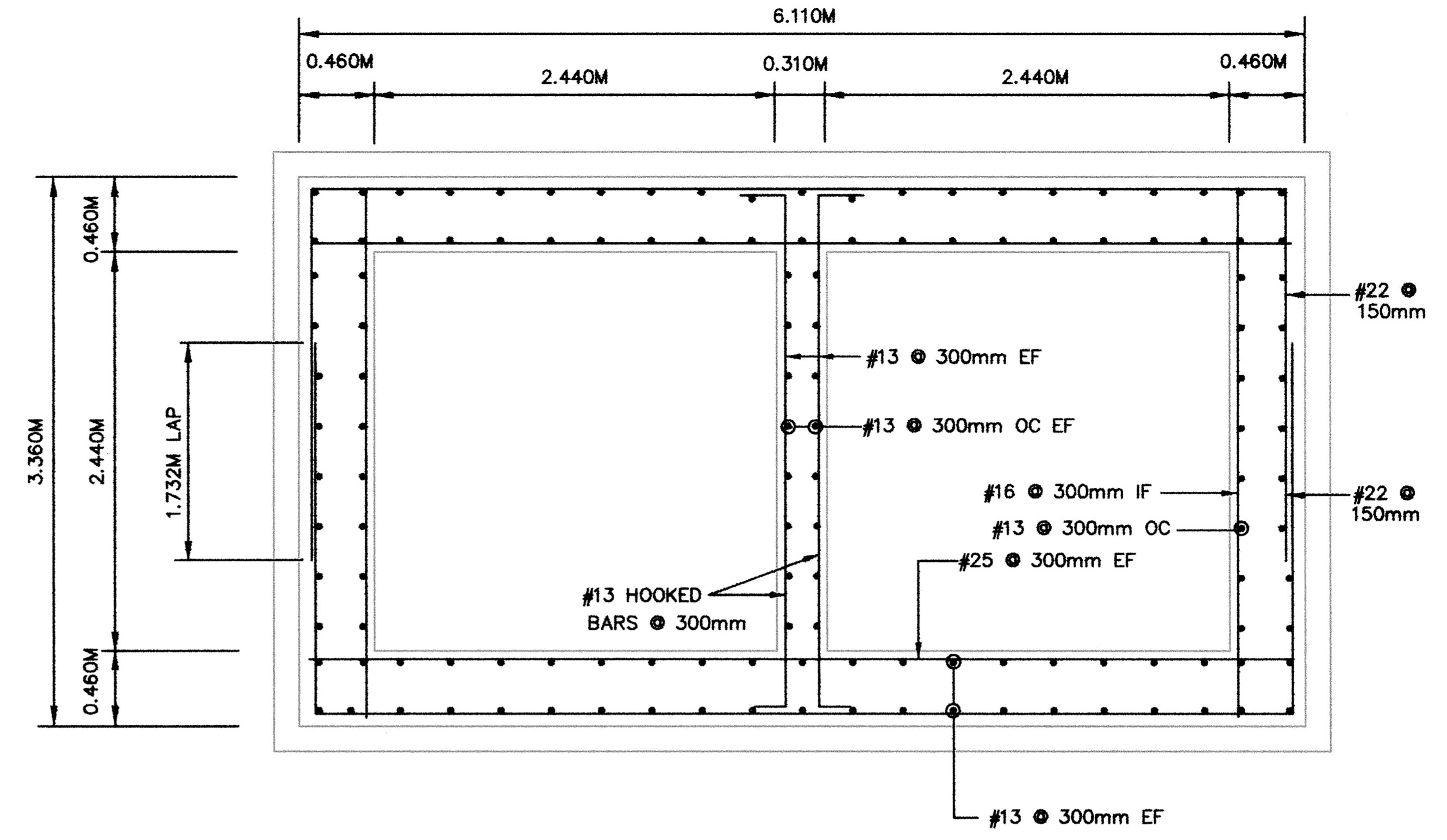
PLAN VIEW AND SECTIONS

SHEET NO.  
**LS1**

LIFT STATION PLAN NUMBER 800110J  
 EASTE1 98



**1** PLAN VIEW  
**EL.271.190**  
 SCALE: 1:25



**2** PLAN VIEW  
**EL.268.290**  
 SCALE: 1:25

DESIGNED BY: SPL,EL,BEL JOB DATE: 8-11-98  
 DRAWN BY: BEL JOB NUMBER 800110J  
 CAD DATE: October 06, 1998 4:42:08 p.m.  
 CAD FILE: 800110j\dwgs\LIFT\_STATION\S3.DWG

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 DATE: 10/6/98 REG. NO. 13970

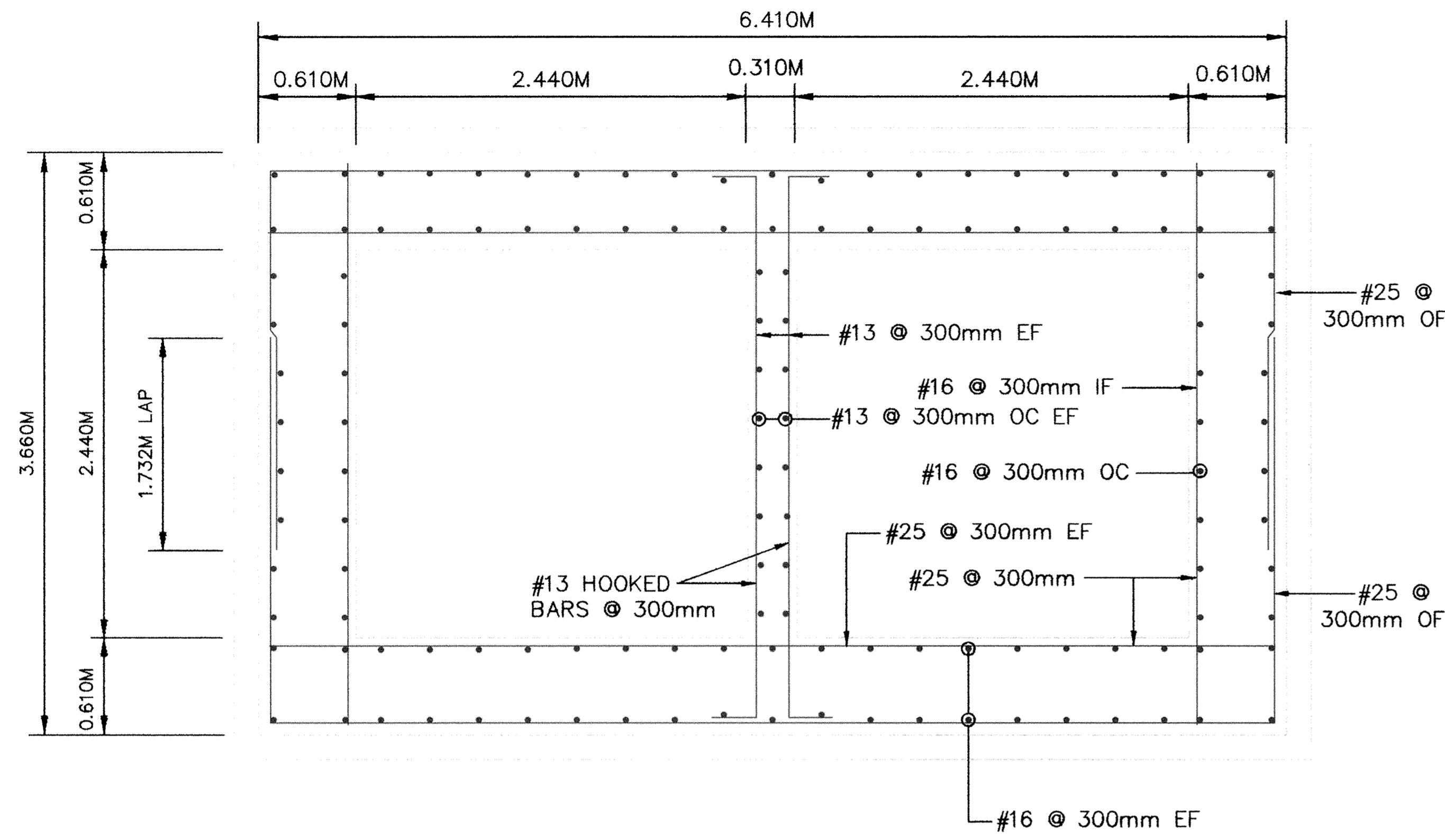
NO.	DATE	BY	REVISION DESCRIPTION

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 (612) 644-4389  
  
**Howard R. Green Company**  
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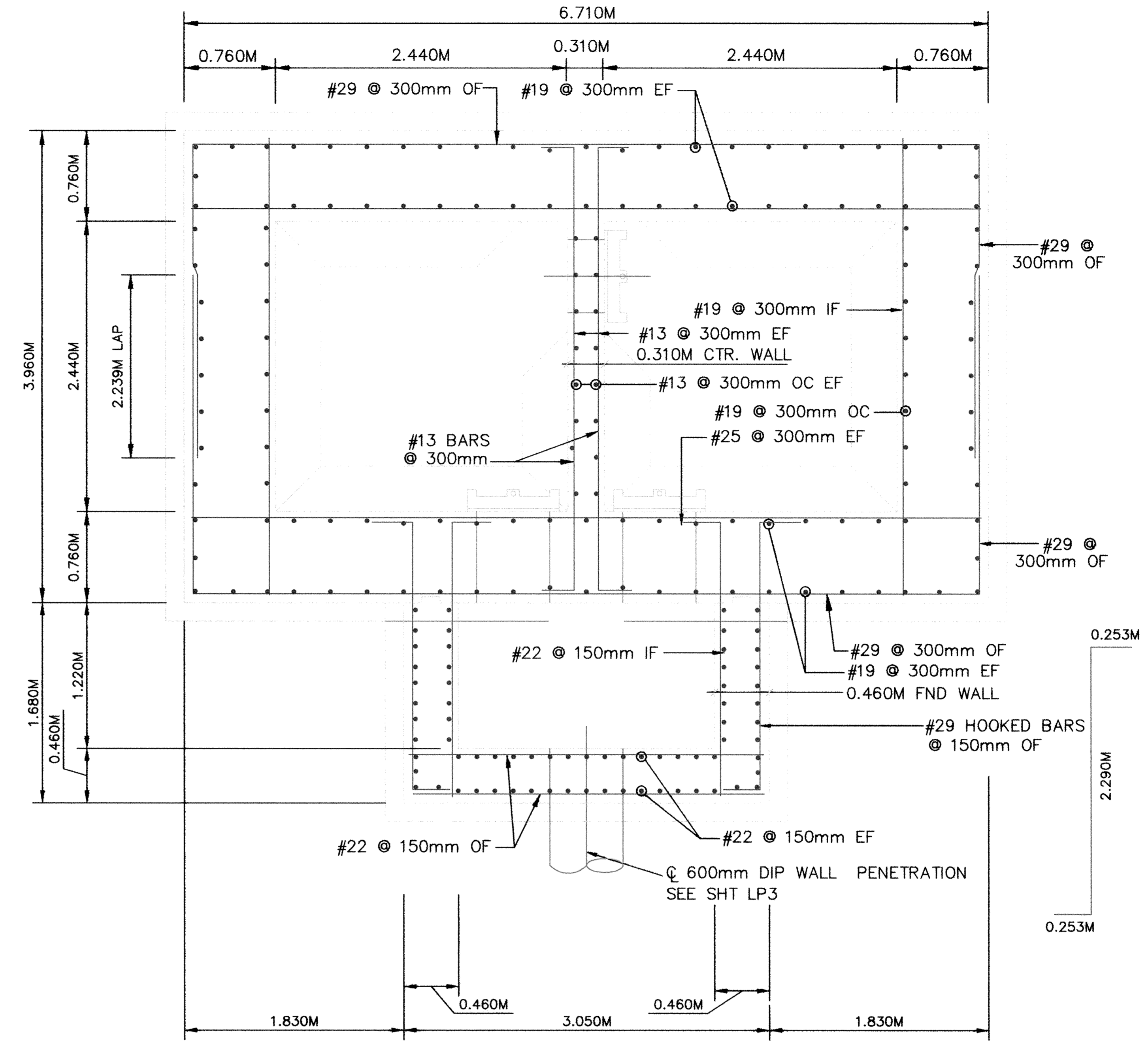
**CITY OF ELK RIVER**  
**LIFT STATION**

**STRUCTURAL PLAN VIEWS AND SECTION**

SHEET NO.  
**LS2**



**3** PLAN VIEW  
EL.264.210  
SCALE: 1:25



**4** PLAN VIEW  
EL.259.520  
SCALE: 1:25



DESIGNED BY: SPL,BL,BEL JOB DATE: 8-11-98  
 DRAWN BY: BEL JOB NUMBER: 800110J  
 CAD DATE: October 06, 1998 4:49:03 p.m.  
 CAD FILE: 800110J\Dwgs\LIFT\_STATION\S3B.DWG

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 DATE: 10/6/98 REG. NO. 13970

NO.	DATE	BY	REVISION DESCRIPTION

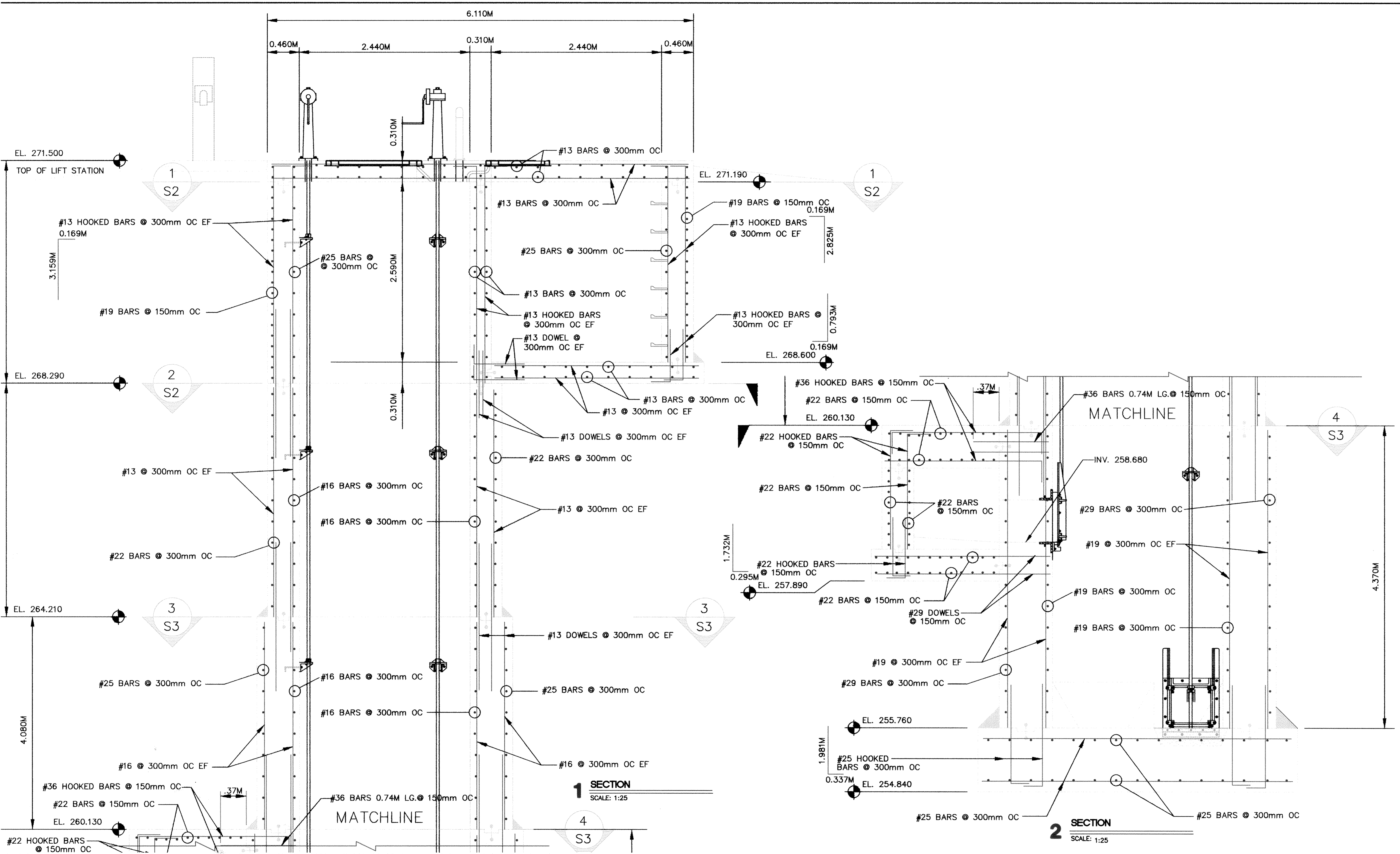
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CITY OF ELK RIVER  
 LIFT STATION

STRUCTURAL PLAN VIEWS

SHEET NO.  
**LS3**



**1 SECTION**  
SCALE: 1:25

**2 SECTION**  
SCALE: 1:25

STRUCTURE.DWG  
 DESIGNED BY: SPL,BL,BEL JOB DATE: 8-11-98  
 RAWN BY: BEL JOB NUMBER 800110J  
 AD DATE: October 06, 1998 4:47:03 p.m.  
 AD FILE: 800110j\dwgs\LIFT\_STATION\S3A.DWG

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 STATE OF MINNESOTA.  
 DATE 10/6/98 REG. NO. 13970

NO.	DATE	BY	REVISION DESCRIPTION

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 CONSULTING ENGINEERS  
 1326 ENERGY PARK DRIVE  
 ST. PAUL, MINNESOTA 55108  
 (612) 644-4389

**CITY OF ELK RIVER**  
**LIFT STATION**

**STRUCTURAL SECTIONAL VIEW**

SHEET NO.  
**LS4**

**STRUCTURAL NOTES**

**GENERAL**

1. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE BEGINNING WORK AND SHALL IMMEDIATELY NOTIFY THE ENGINEER OF ANY DISCREPANCIES.
2. NOTES & DETAILS ON THE PLANS SHALL TAKE PRECEDENCE OVER DETAILS ON THE TYPICAL DETAIL SHEETS.
3. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CONSTRUCTION SPECIFICATIONS.
4. PROVIDE ADEQUATE SHORING OR BRACING DURING CONSTRUCTION TO RESIST FORCES SUCH AS WIND AND UNBALANCED LOADING DUE TO CONSTRUCTION.

**REINFORCED CONCRETE**

1. REINFORCEMENT DETAILS SHALL CONFORM TO THE REQUIREMENTS OF "THE ACI MANUAL OF STANDARD PRACTICE (ACI 315)". SPLICES AND EMBEDMENT LENGTHS NOT GIVEN ON THE CONTRACT DRAWINGS SHALL BE PRESUMED TO BE IN TENSION AND SHALL CONFORM TO THOSE REQUIREMENTS. UNLESS OTHERWISE SHOWN SPLICES SHALL BE CLASS "B" TENSION LAP SPLICES AS DEFINED IN ACI 318M.
2. MINIMUM CLEAR CONCRETE COVER FOR REINFORCING BARS, UNLESS SHOWN OTHERWISE SHALL BE 76mm WHEN CAST AGAINST EARTH AND 51mm WHEN NOT CAST AGAINST EARTH.
3. SPACING OF REINFORCING BARS SHOWN ON THE DRAWINGS SHALL BE A MAXIMUM.
4. EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 19mm BY 19mm UNLESS NOTED OTHERWISE.
5. CONSTRUCTION JOINTS AND REINFORCING STEEL BAR SPLICES SHALL BE WHERE SHOWN ON DRAWINGS. OPTIONAL CONSTRUCTION JOINTS MAY BE PROPOSED BY THE CONTRACTOR SUBJECT TO REVIEW AND APPROVAL BY THE STRUCTURAL ENGINEER.
6. REINFORCING BARS SHALL CONFORM TO THE REQUIREMENTS ASTM A615, GRADE 60.
7. ALL MECHANICAL EQUIPMENT, PIPES & OPENING SIZES AND LOCATIONS SHALL BE VERIFIED PRIOR TO PLACING CONCRETE.
8. ALL JOINTS SHALL HAVE WATERSTOPS WHERE WATERTIGHT INTEGRITY IS REQUIRED.
9. ALL FILL CONCRETE SHALL MEET THE REQUIREMENTS OF MnDOT CLASS 3A GROUT.
10. ALL BENT DOWELS TO STANDARD UNLESS OTHERWISE NOTED.

**STEEL**

1. ALL STRUCTURAL STEEL SHALL BE ASTM A36, UNLESS NOTED OTHERWISE. WELDING ELECTRODES SHALL BE E70 SERIES FOR A36 STEEL.

**ALUMINUM**

1. ALUMINUM STRUCTURAL MEMBERS SHALL BE 6061-T6 ALLOY. ALL WELDING SHALL BE DONE WITH FILLER WIRE 4043.
2. ISOLATE ALL ALUMINUM FABRICATIONS FROM CONTACT WITH CONCRETE WITH 2 HEAVY COATS OF BITUMASTIC.

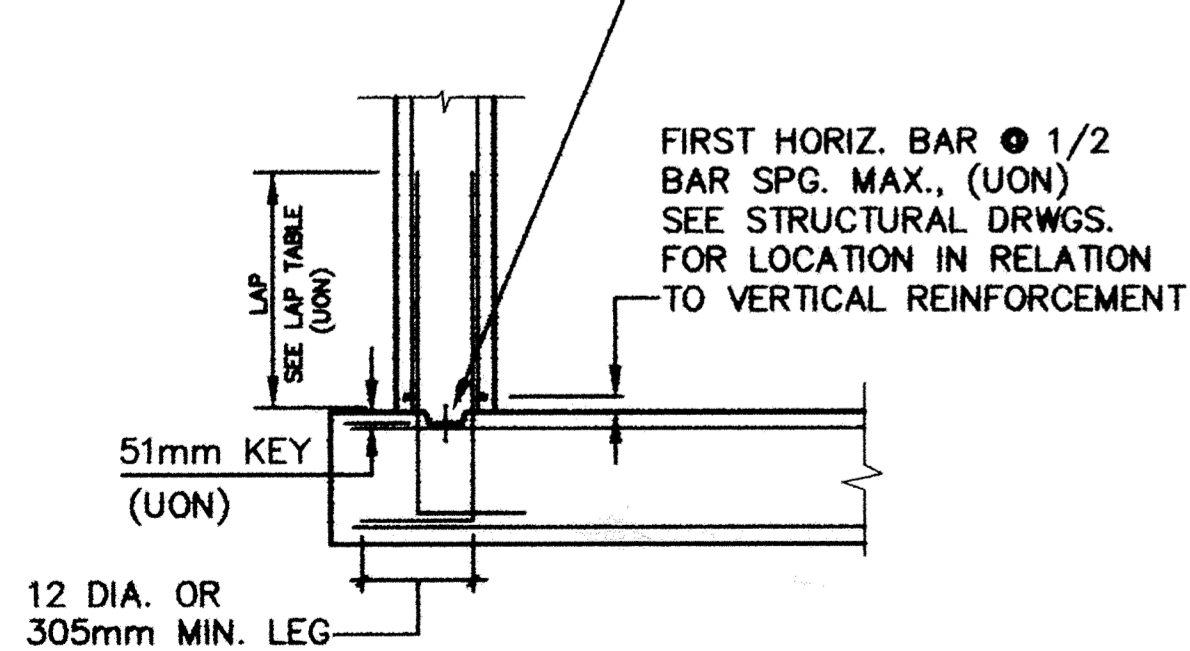
**EARTHWORK / FOUNDATIONS**

1. ALL FOOTINGS SHALL BEAR ON COMPACTED GRANULAR FILL. ALL FOOTINGS ARE DESIGNED USING AN ALLOWABLE SOIL BEARING PRESSURE OF 0.45 MPa (UON). THE SOILS ENGINEER SHALL CONFIRM THESE BEARING VALUES AT THE TIME OF EXCAVATION. ALL BELOW-GRADE WALLS ARE DESIGNED ASSUMING FREE DRAINING GRANULAR BACKFILL WITH AN EQUIVALENT FLUID PRESSURE OF 722 kg/M ABOVE THE WATER TABLE AND 1284 kg/M<sup>3</sup> BELOW THE WATER TABLE (SEE SOILS REPORT).

SEE STRUCT. DRWGS. FOR REINF. SIZE, SPACING AND LOCATION.

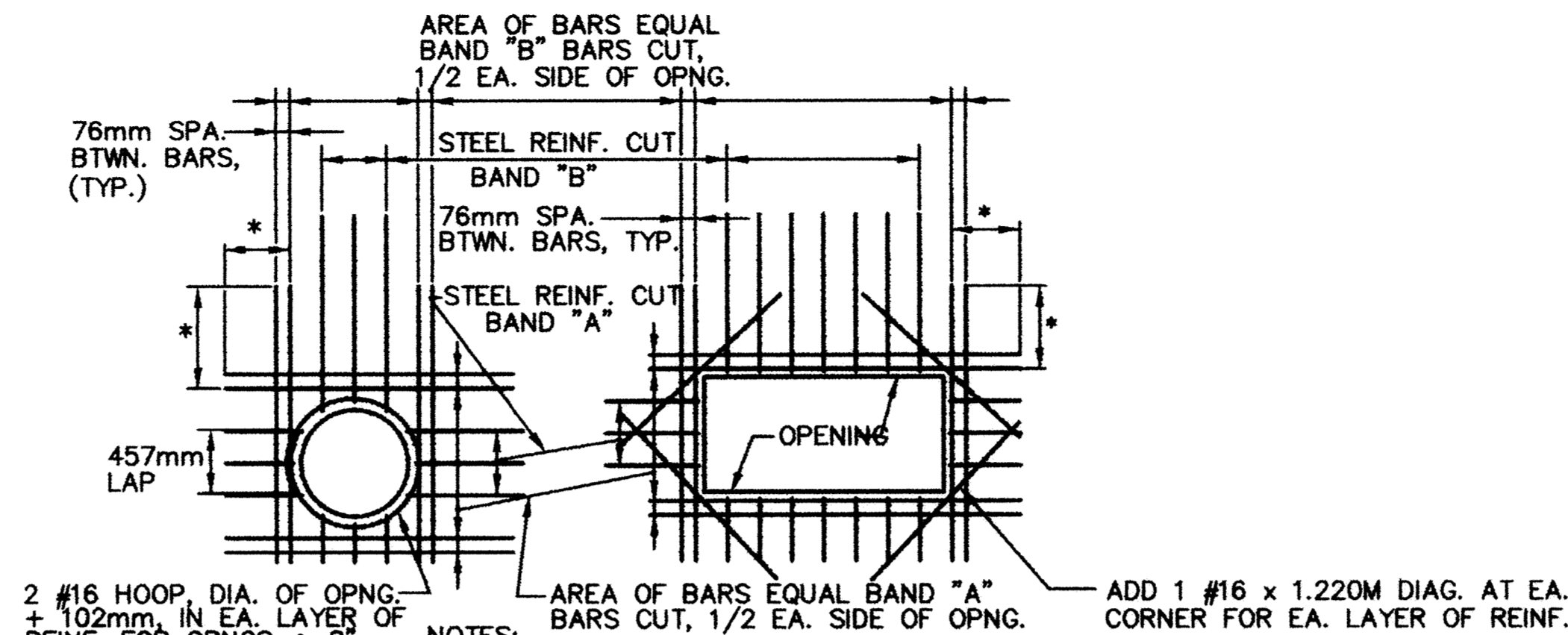
PREPARE JOINT FACE AS BONDED JOINT.

152mm CENTER BULB WATERSTOP (UON) SECURELY TIE WATERSTOP, BOTH ENDS, TO REINF. - TIES SHALL NOT EXCEED 305mm O.C., EACH SIDE.



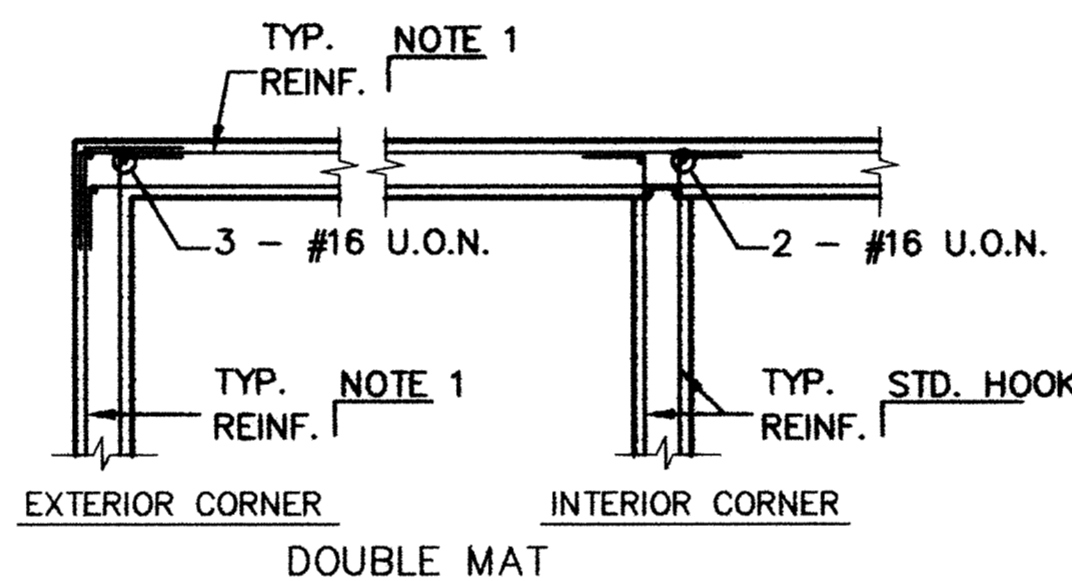
**4 FIXED WALL TO BASE SLAB CONSTRUCTION JOINT**

SCALE: NONE



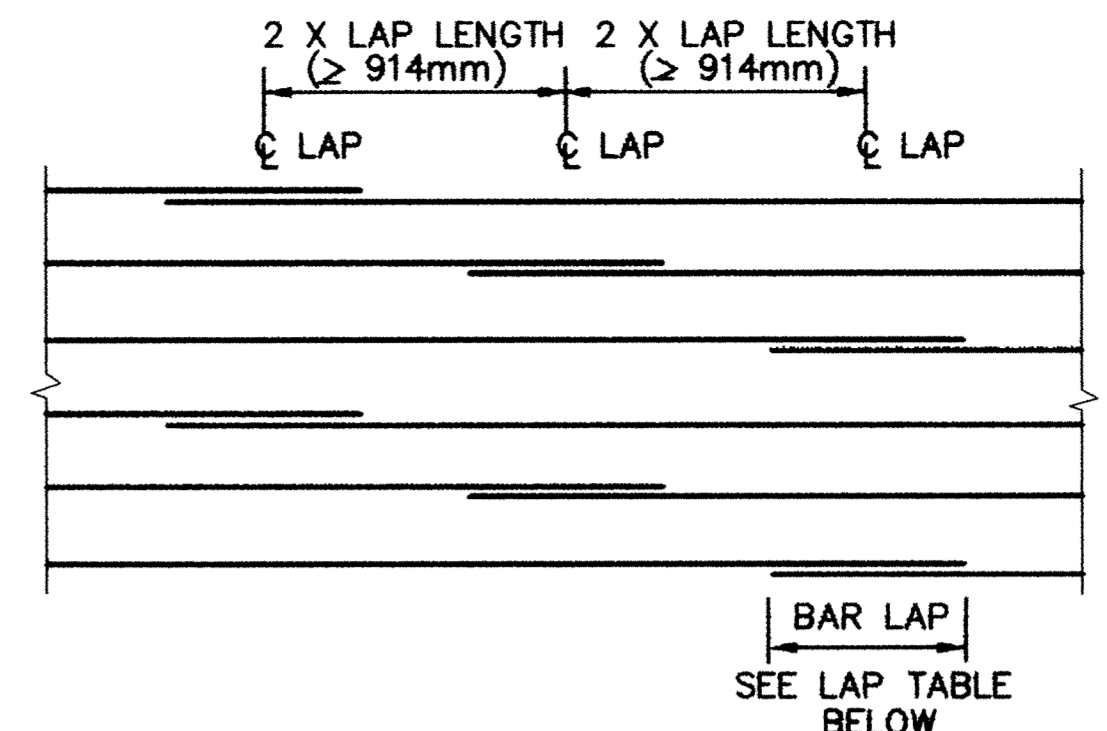
**1 OPENING REINFORCING DETAIL**

SCALE: NONE



**3 CONCRETE WALL CORNER DETAIL**

SCALE: NONE



**2 HORIZONTAL STAGGERED BAR LAP DETAIL**

SCALE: NONE

BAR SIZE	MINIMUM BAR LAP LENGTH	
	TOP BARS	OTHER BARS
#10	593mm	456mm
#13	793mm	610mm
#16	992mm	763mm
#19	1192mm	917mm
#22	1732mm	1332mm
#25	1981mm	1524mm
#29	2239mm	1722mm

**NOTES:**

1. LAPS SHOWN ARE BASED ON  $f'_c = 28 \text{ MPa}$ , NORMAL WEIGHT CONCRETE, LAP CLASS B AND UNCOATED REINFORCEMENT WITH COVER  $\geq 51\text{mm}$  AND CLEAR BAR SPACING  $> 102\text{mm}$  O.C. FOR ALL OTHER CONDITIONS, PROVIDE BAR LAP LENGTH AS REQUIRED BY A.C.I. 318M-95.
2. TOP BARS REFERED TO IN THE TABLE ABOVE ARE HORIZONTAL BARS WITH  $\geq 311\text{mm}$  OF CONCRETE CAST BELOW THE BAR. HORIZ. BARS IN WALLS SHALL REQUIRE LAPS AS INDICATED FOR TOP BARS.
3. ALL BAR LAPS SHALL BE CONTACT SPLICES UNLESS OTHERWISE NOTED.
4. USE LAP LENGTH FOR THE SMALLER BAR WHEN LAPPING DIFFERENT SIZE BARS.
5. ALL REINFORCING BAR LAP LENGTHS SHALL BE AS SHOWN IN THE TABLE ABOVE UNLESS OTHERWISE NOTED.

DESIGNED BY: SPL,BL,BEL JOB DATE: 8-11-98  
 DRAWN BY: BEL JOB NUMBER: 8001104  
 CAD DATE: October 02, 1998 10:25:38 a.m.  
 CAD FILE: 8001104\Drawgs\LIFT\_STATION\S4.DWG

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 DATE: 10/9/98 REG. NO.: 13970

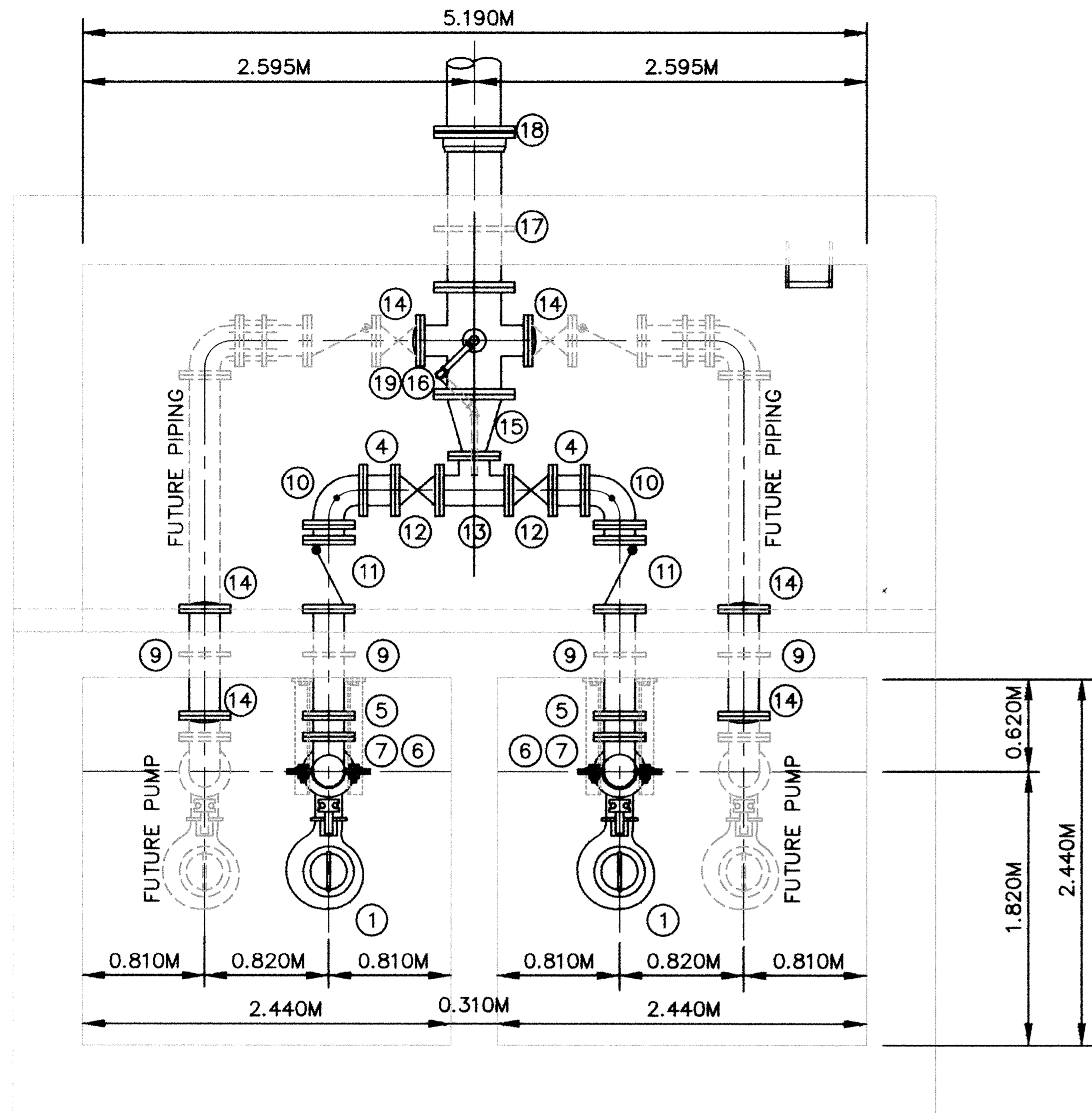
NO.	DATE	BY	REVISION DESCRIPTION

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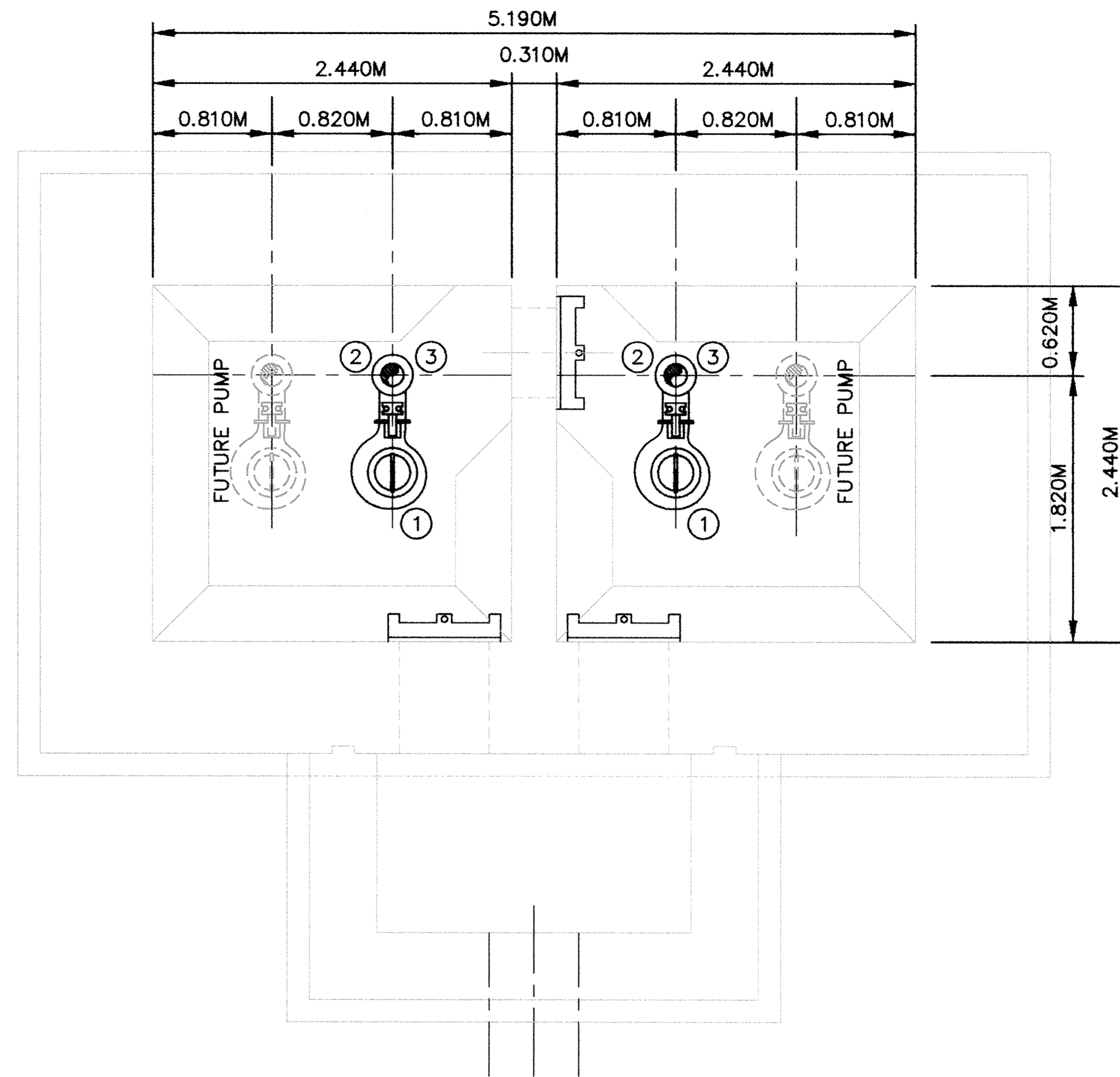
**CITY OF ELK RIVER  
 LIFT STATION**

**STRUCTURAL NOTES**

SHEET NO.  
**LS5**



**1** PIPING PLAN VIEW  
EL.271.190  
SCALE: 1:25



**2** PIPING PLAN VIEW  
EL.259.520  
SCALE: 1:25



**PPE INDEX**

- ① SUBMERSIBLE WASTEWATER PUMP (TYP)
- ② 150mm 90° DISCHARGE CONNECTION
- ③ 200mm x 150mm REDUCER
- ④ 200mm DIP DISCHARGE
- ⑤ WALL PIPE SUPPORT (2 EACH PIPE DISCHARGE)  
SEE DETAIL P3
- ⑥ 200mm UNI-FLANGE ADAPTOR OR 200mm FCA
- ⑦ 200mm 90° BEND
- ⑧ 200mm SPOOL
- ⑨ 200mm WALL SLEEVE (FLG-FLG) (4 REQUIRED)
- ⑩ 200mm 90° BEND WITH 13mm TAPPED SS BALL VALVE AND THREADED NIPPLE WITH CAP
- ⑪ 200mm SWING CHECK VALVE
- ⑫ 200mm GATE VALVE WITH HANDWHEEL OPERATOR
- ⑬ 200mm X 200mm X 200mm TEE
- ⑭ 200mm BLIND FLANGE
- ⑮ 350mm X 200mm REDUCER
- ⑯ 350mm X 200mm CROSS
- ⑰ 350mm WALL SLEEVE (FLANGED-MECHANICAL JOINT)
- ⑱ 350mm DIP FORCEMAIN (SEE FORCEMAIN SHT.)
- ⑲ SEWAGE COMBINATION AIR VALVE HARD PIPED TO TO DRAIN. CONTRACTOR TO SECURE PIPING WITH HANGERS.

DESIGNED BY: **RG,BEL,KN** JOB DATE: **8-11-98**  
 DRAWN BY: **BEL** JOB NUMBER: **800110J**  
 UD DATE: **October 06, 1998 3:50:42 p.m.**  
 UD FILE: **800110\Drawgs\LIFT\_STATION\P1.DWG**

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 DATE: **10/9/98** REG. NO.: **25198**

NO.	DATE	BY	REVISION DESCRIPTION

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 1326 ENERGY PARK DRIVE  
ST. PAUL, MINNESOTA 55108  
(612) 644-4389

**CITY OF ELK RIVER**  
LIFT STATION

PLAN VIEWS

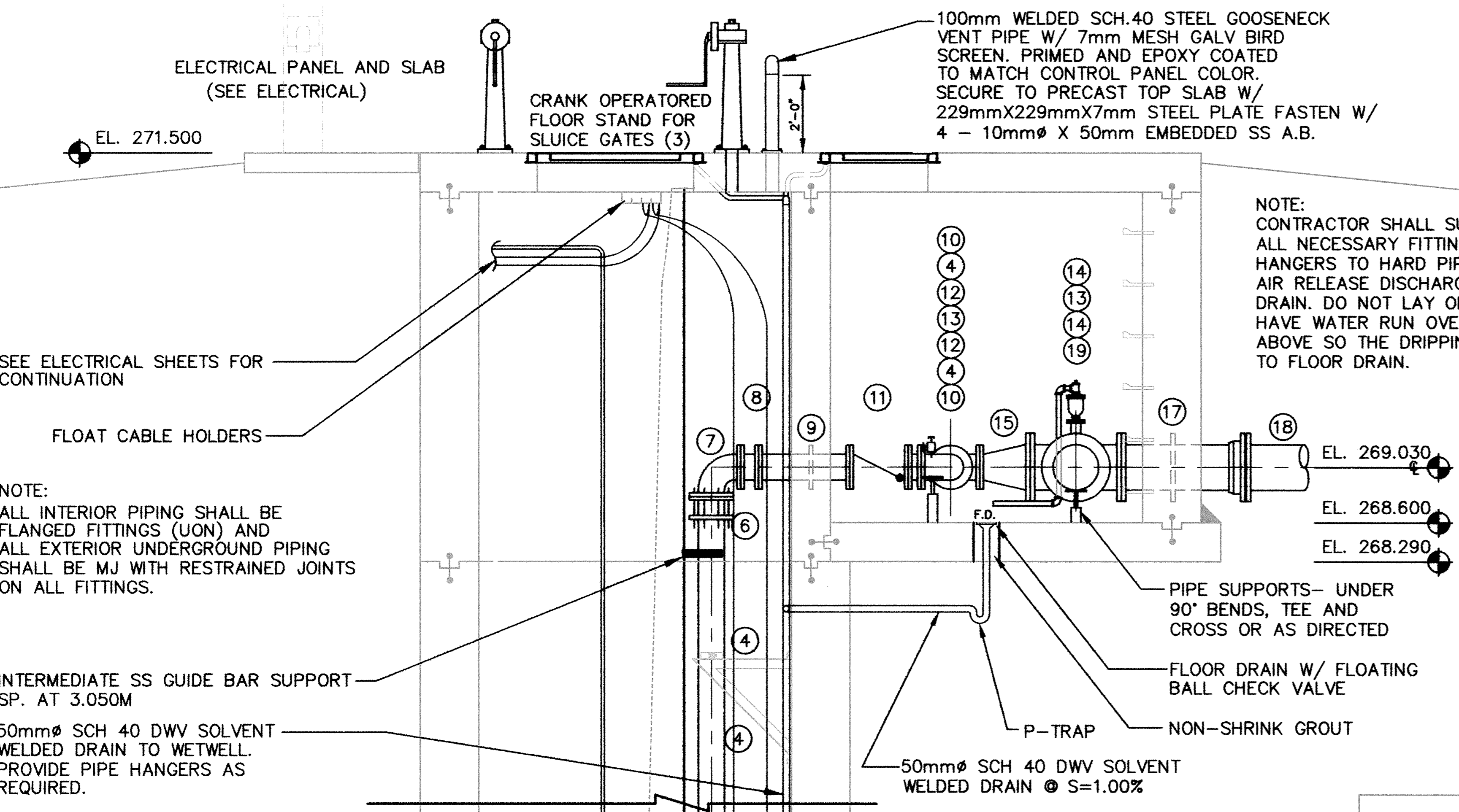
SHEET NO.  
**LP1**

**PIPE INDEX**

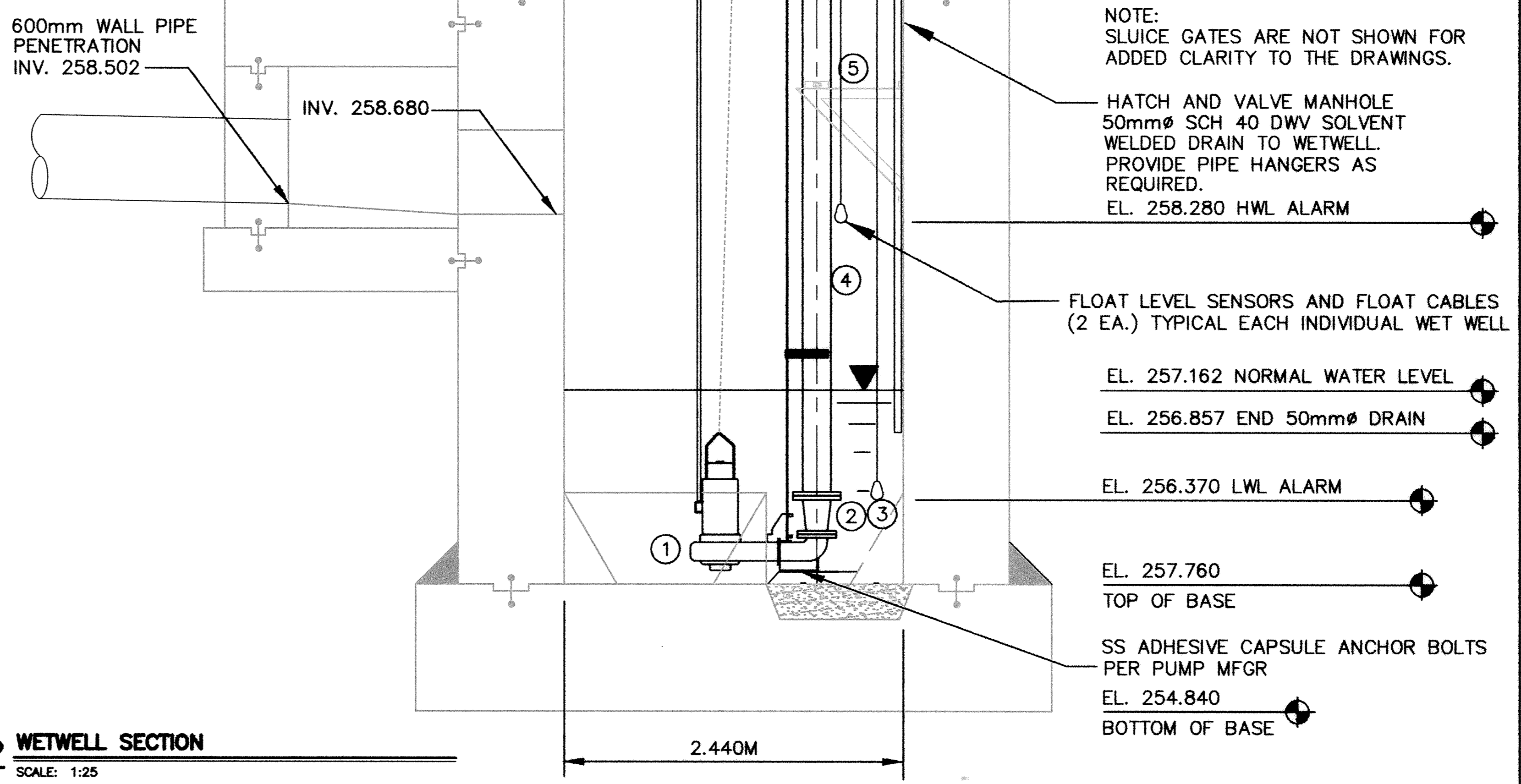
- ① SUBMERSIBLE WASTEWATER PUMP (TYP)
- ② 150mm 90° DISCHARGE CONNECTION
- ③ 200mm x 150mm REDUCER
- ④ 200mm DIP DISCHARGE
- ⑤ WALL PIPE SUPPORT (2 EACH PIPE DISCHARGE) SEE DETAIL P3
- ⑥ 200mm UNI-FLANGE ADAPTOR OR 200mm FCA
- ⑦ 200mm 90° BEND
- ⑧ 200mm SPOOL
- ⑨ 200mm WALL SLEEVE (FLG-FLG) (4 REQUIRED)
- ⑩ 200mm 90° BEND WITH 13mm TAPPED SS BALL VALVE AND THREADED NIPPLE WITH CAP
- ⑪ 200mm SWING CHECK VALVE
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- ⑰ 350mm WALL SLEEVE (FLANGED-MECHANICAL JOINT)
- ⑱ 350mm DIP FORCEMAIN (SEE FORCEMAIN SHT.)
- ⑲ SEWAGE COMBINATION AIR VALVE HARD PIPED TO TO DRAIN. CONTRACTOR TO SECURE PIPING WITH HANGERS.

100mm WELDED SCH.40 STEEL GOOSENECK VENT PIPE W/ 7mm MESH GALV BIRD SCREEN. PRIMED AND EPOXY COATED TO MATCH CONTROL PANEL COLOR. SECURE TO PRECAST TOP SLAB W/ 4 - 10mmØ X 50mm EMBEDDED SS A.B.

NOTE:  
CONTRACTOR SHALL SUPPLY ALL NECESSARY FITTINGS AND HANGERS TO HARD PIPE THE AIR RELEASE DISCHARGE TO THE DRAIN. DO NOT LAY ON FLOOR OR HAVE WATER RUN OVER FLOOR. PLACE ABOVE SO THE DRIPPINGS GO DIRECTLY TO FLOOR DRAIN.



**1 TOP OF WETWELL AND VALVE STRUCTURE SECTION**  
SCALE: 1:25



**2 WETWELL SECTION**  
SCALE: 1:25

DESIGNED BY: **EG.BELKN** JOB DATE: **8-11-98**  
 DRAWN BY: **BEL** JOB NUMBER: **800110J**  
 CAD DATE: **October 06, 1998 4:18:50 p.m.**  
 CAD FILE: **800110\dwg\LIFT\_STATION\P1A.DWG**

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 DATE: **10/8/98** REG. NO. **25188**

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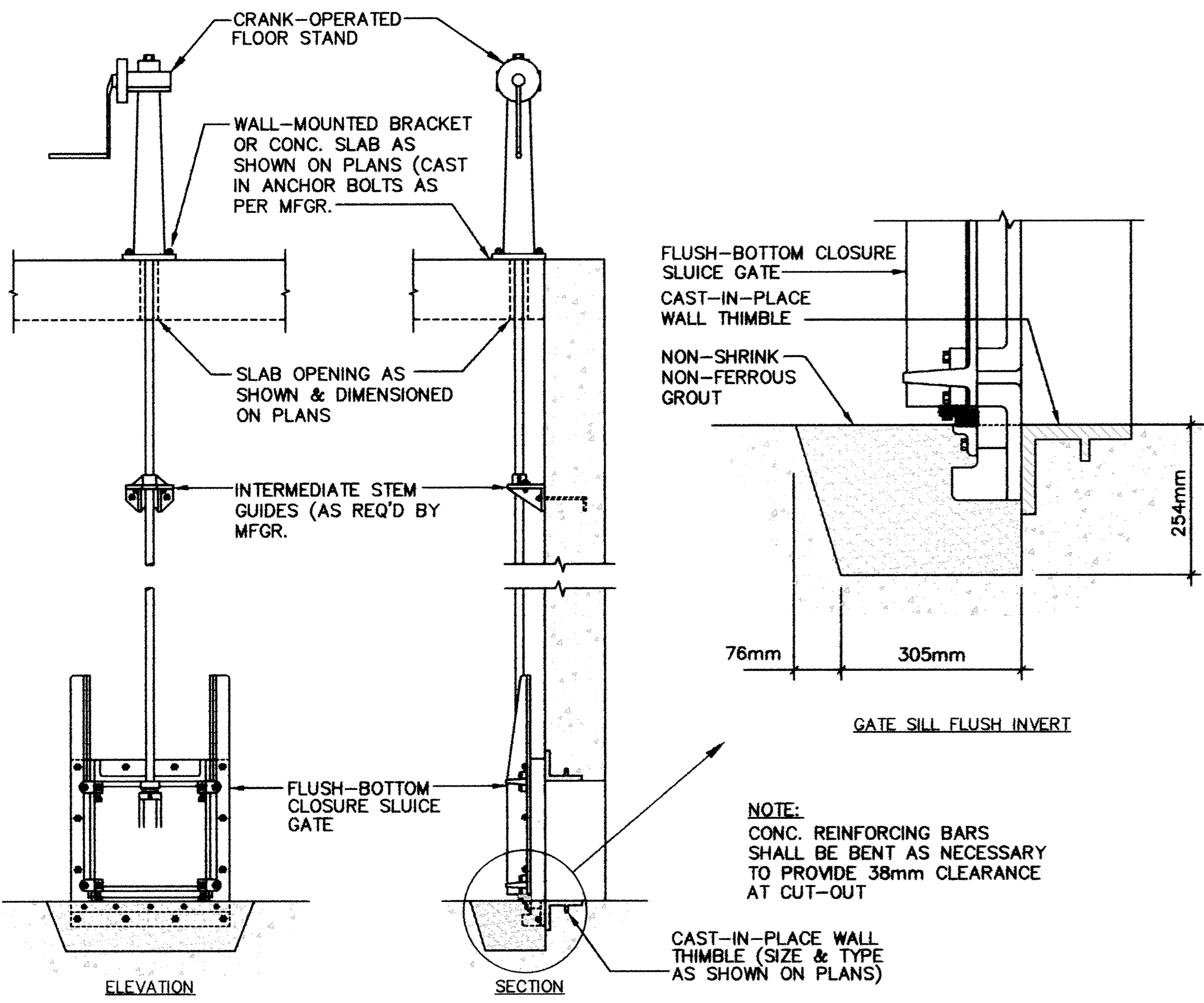
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**CITY OF ELK RIVER**  
LIFT STATION

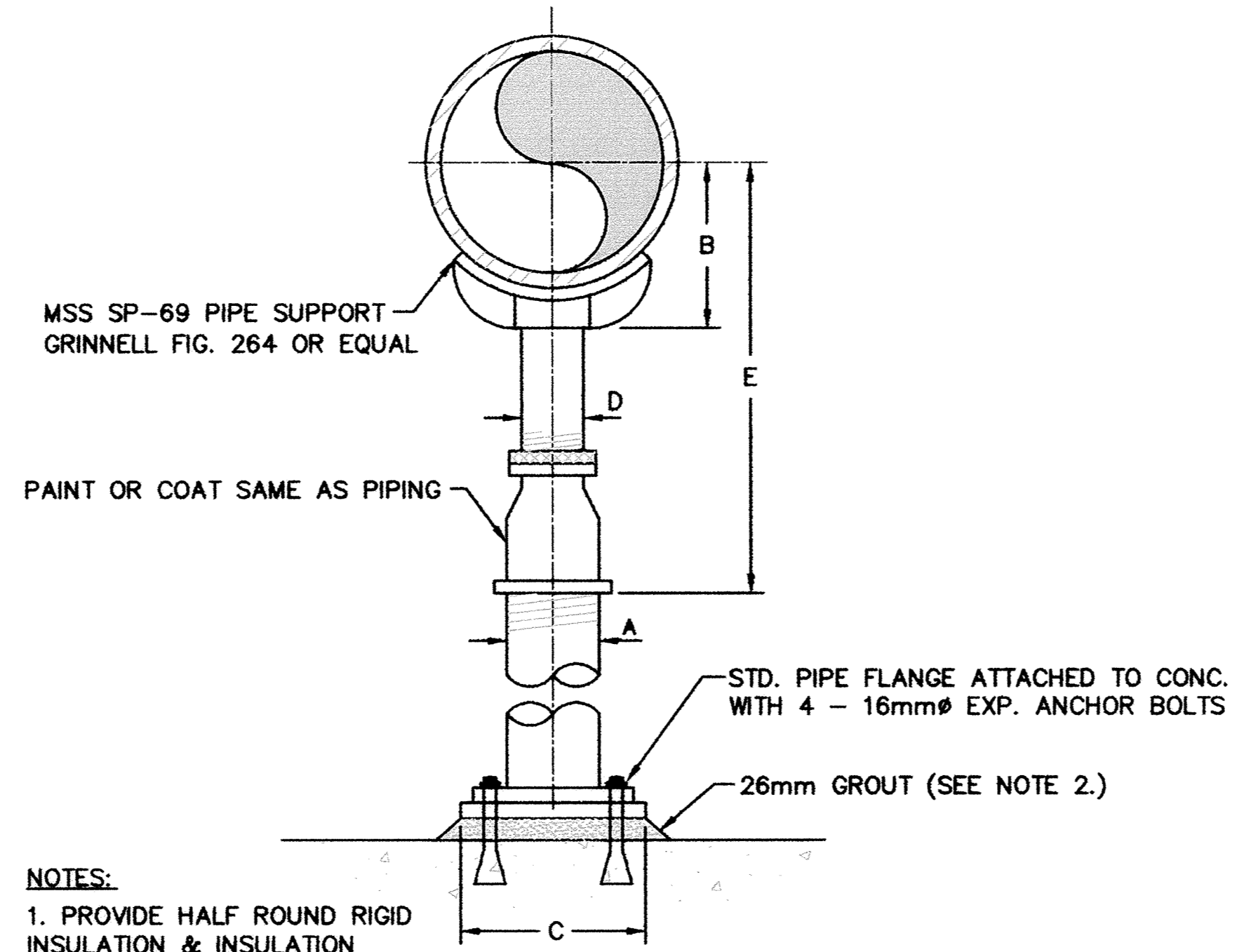
**STRUCTURAL SECTIONS**

SHEET NO.  
**LP2**



**1 SLUICE GATE DETAIL**  
NO SCALE

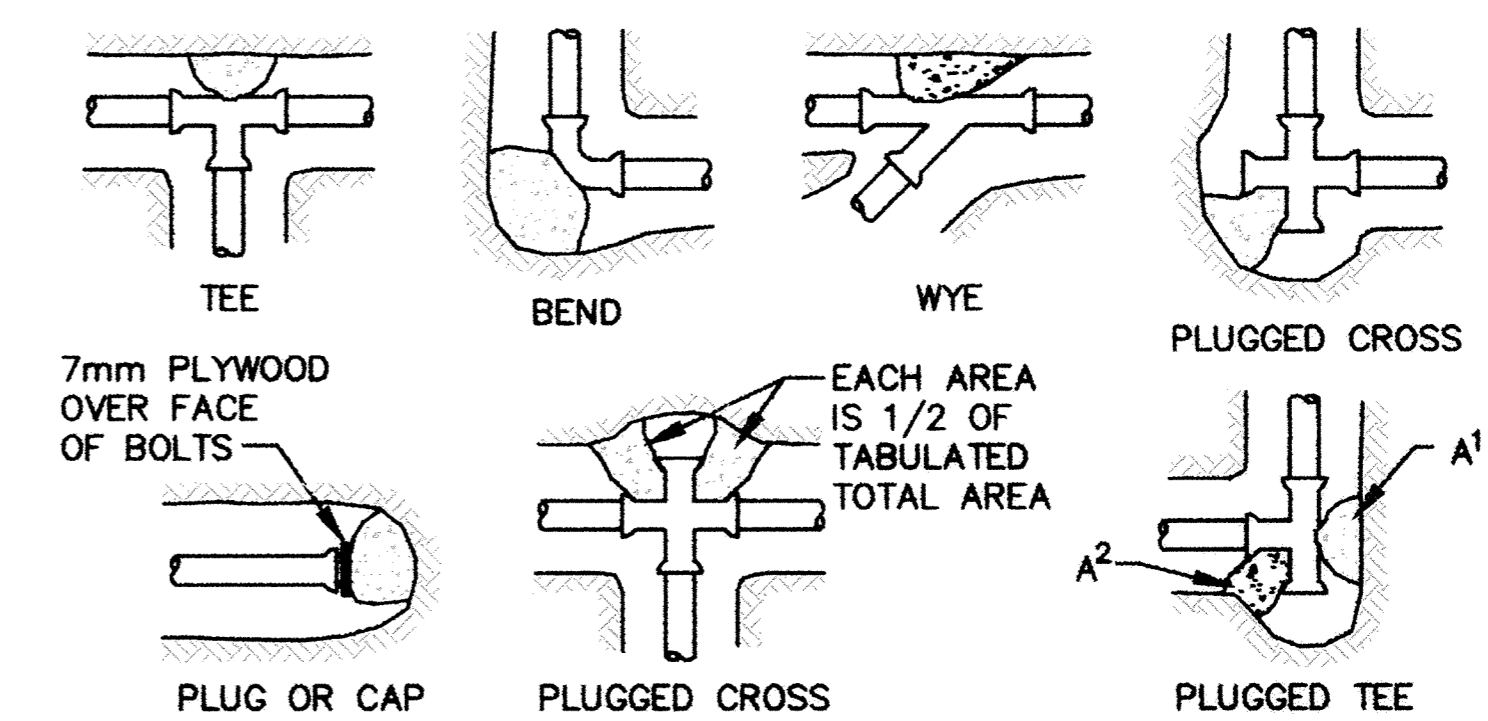
**NOTE:**  
CONC. REINFORCING BARS SHALL BE BENT AS NECESSARY TO PROVIDE 38mm CLEARANCE AT CUT-OUT



**NOTES:**  
1. PROVIDE HALF ROUND RIGID INSULATION & INSULATION PROTECTION SHIELD, SIMILAR TO GRINNELL-FIG. 167 OR ELCEN FIG. 219, WHEN PIPING IS INSULATED  
2. PROVIDE NEOPRENE WAFFLE ISOLATION PAD SIMILAR TO MASON TYPE "W" OR KORFUND KORPAD 40, UNDER SUPPORT FOOT WHEN PIPING IS ISOLATED OR SUPPORT IS ADJACENT TO EQUIPMENT  
3. FOR BASE, HEIGHT, & FLANGE DIMENSIONS, SEE TABLE AT RIGHT.

PIPE SIZE (mm)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	
					MIN	MAX
100	75	105	229	65	235	356
150	75	140	229	65	267	387
200	75	175	229	65	300	419
250	75	210	229	65	343	464
300	75	250	229	65	381	502
350	100	275	280	75	413	527

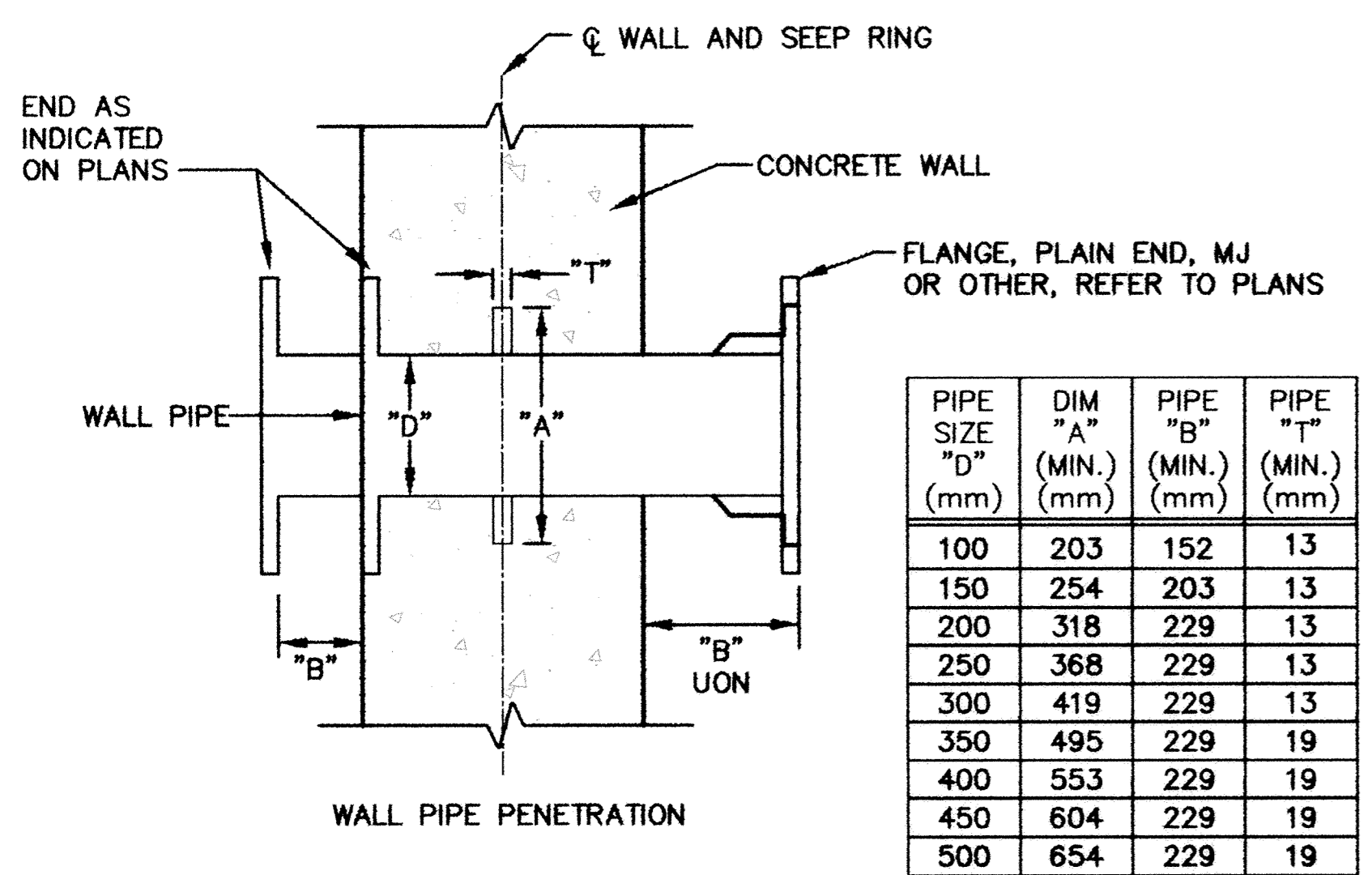
**2 PIPE SUPPORT**  
NO SCALE



NOMINAL FITTING SIZE (INCHES)	TEE, WYE, PLUG OR CAP	90° BEND, PLUGGED CROSS	TEE PLUGGED ON RUN		45° BEND	22 1/2° BEND	11 1/4° BEND
			A1	A2			
100	1.0	1.4	1.9	1.4	1.0	---	---
150	2.1	3.0	4.3	3.0	1.6	1.0	---
200	3.8	5.3	7.6	5.4	2.9	1.5	1.0
250	5.9	8.4	11.8	8.4	4.6	2.6	1.2
300	8.5	12.0	17.0	12.0	6.6	3.4	1.7
350	11.5	16.3	23.0	16.3	8.9	4.6	2.3
400	15.0	21.3	30.0	21.3	11.6	6.0	3.0
450	19.0	27.0	38.0	27.0	14.6	7.6	3.8
500	23.5	33.3	47.0	33.3	18.1	9.4	4.7
600	34.0	48.0	68.0	48.0	26.2	13.6	6.8

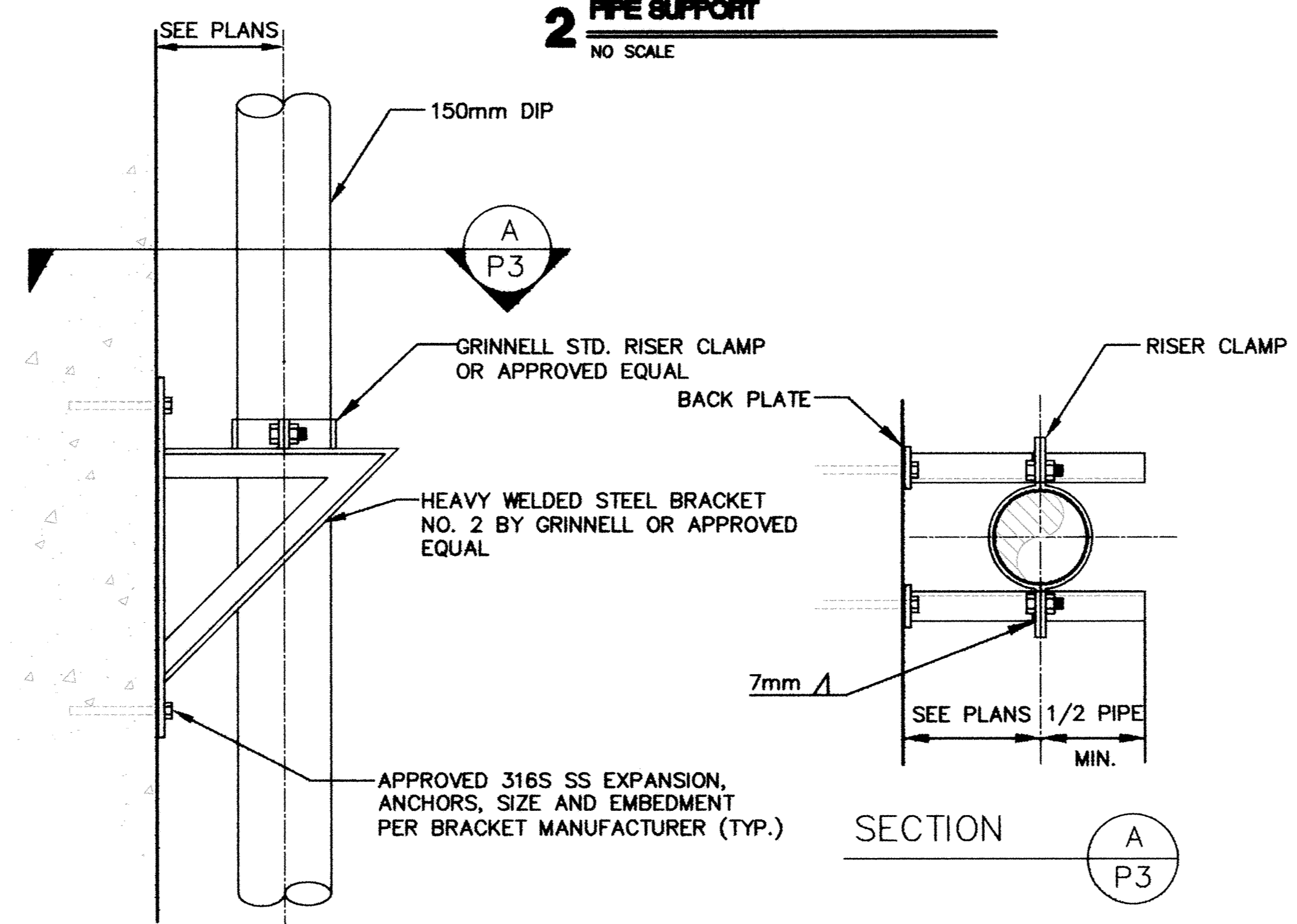
**NOTE**  
1. CONCRETE THRUST BLOCKING TO BE POURED AGAINST UNDISTURBED EARTH.  
2. KEEP CONCRETE CLEAR OF JOINT AND ACCESSORIES.  
3. IF NOT SHOWN ON PLANS, REQUIRED BEARING AREAS AT FITTING SHALL BE AS INDICATED ABOVE, ADJUSTED IF NECESSARY, TO CONFORM TO THE TEST PRESSURE(S) AND ALLOWABLE SOIL BEARING STRESS(ES).  
4. BEARING AREAS AND SPECIAL BLOCKING DETAILS SHOWN ON PLANS TAKE PRECEDENCE OVER BEARING AREAS AND BLOCKING DETAILS SHOWN IN THIS STANDARD DETAIL.  
5. ABOVE BEARING AREAS BASED ON TEST PRESSURE OF 1.04 MPa AND AN ALLOWABLE SOIL BEARING STRESS OF 828 Pa PER SQUARE FOOT. TO COMPUTE BEARING AREAS FOR DIFFERENT TEST PRESSURES AND SOIL BEARING STRESSES, USE THE FOLLOWING EQUATION: BEARING AREA = (TEST PRESSURE/150) X (908kg/SOIL BEARING STRESS) X (TABLE VALUE).

**4 WALL PENETRATIONS**  
NO SCALE

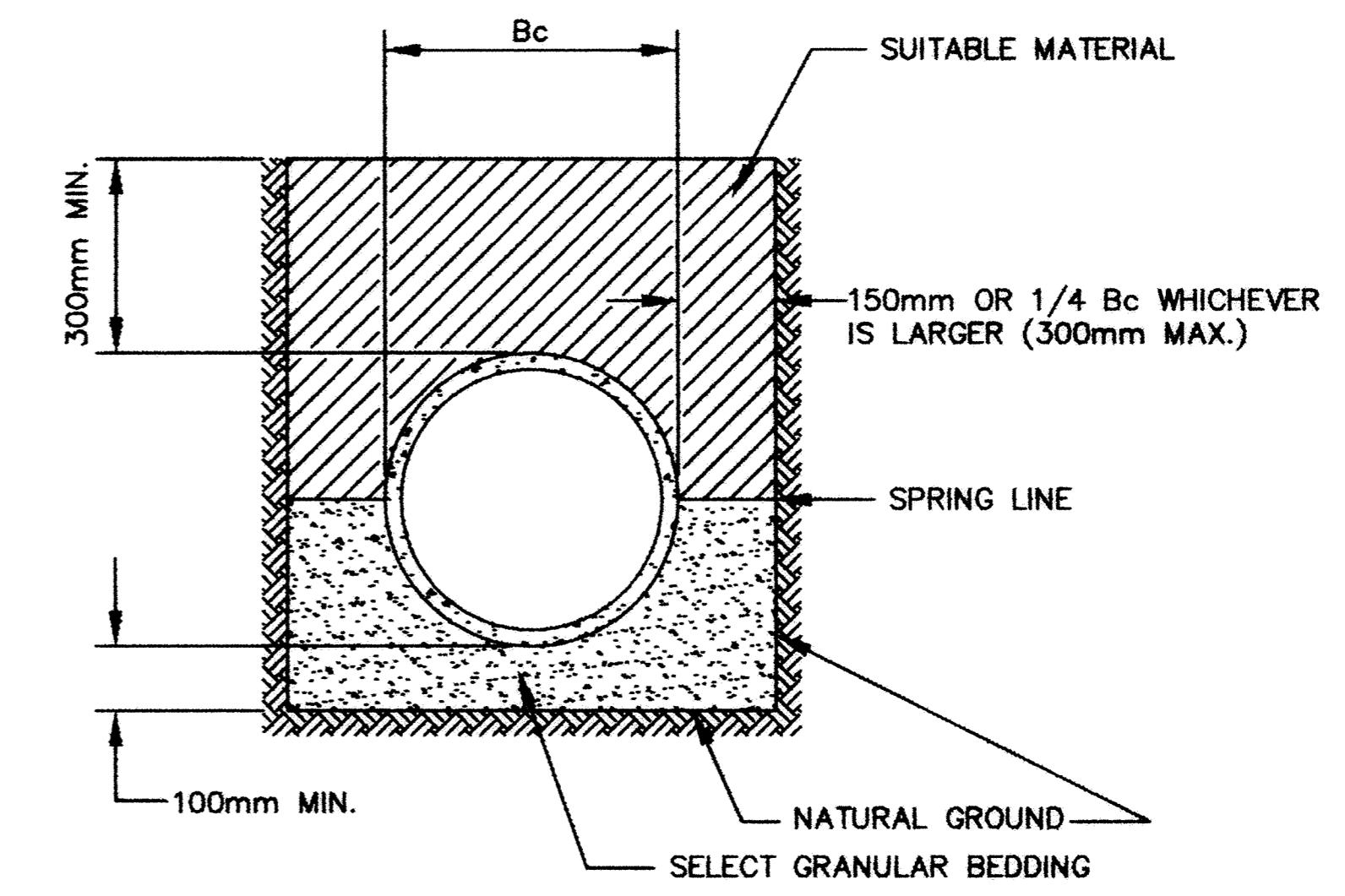


PIPE SIZE "D" (mm)	DIM "A" (MIN.) (mm)	PIPE "B" (MIN.) (mm)	PIPE "T" (MIN.) (mm)
100	203	152	13
150	254	203	13
200	318	229	13
250	368	229	13
300	419	229	13
350	495	229	19
400	553	229	19
450	604	229	19
500	654	229	19

**3 WALL PENETRATIONS**  
NO SCALE



**5 WALL PIPE SUPPORT**  
NO SCALE



**6 PIPE BEDDING**  
NO SCALE

DESIGNED BY: **KNR/BEL** JOB DATE: **8-11-98**  
DRAWN BY: **REL** JOB NUMBER: **800110J**  
AD DATE: **October 06, 1998 4:30:34 p.m.**  
AD FILE: **800110j\Drawgs\LIFT\_STATION\S2.DWG**

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.  
DATE: **10/8/98** REG. NO.: **25189**

NO.	DATE	BY	REVISION DESCRIPTION

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ST. PAUL, MINNESOTA 55108  
(612) 644-4389  
**Howard R. Green Company**  
CONSULTING ENGINEERS

**CITY OF ELK RIVER**  
**LIFT STATION**

**DETAILS**

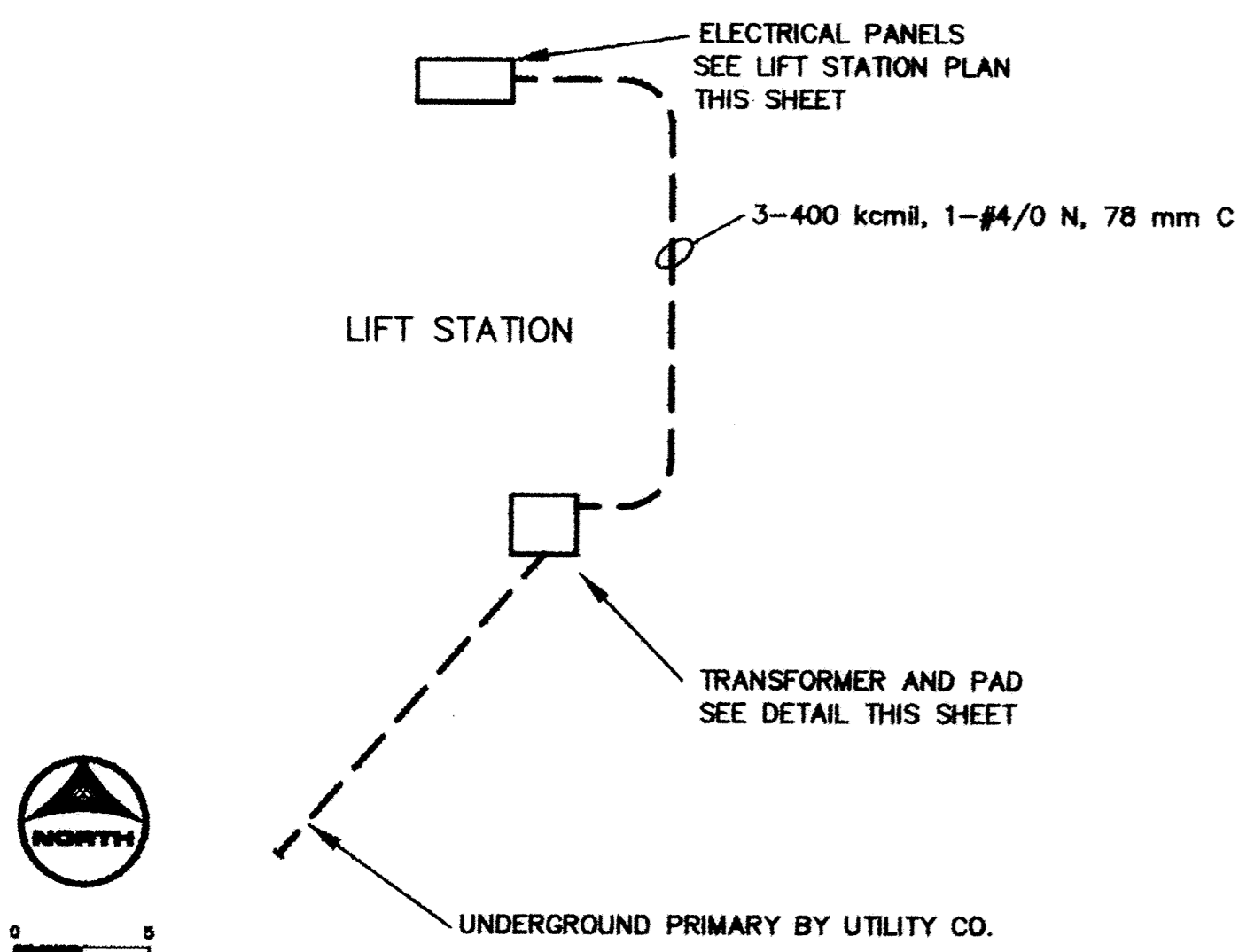
SHEET NO.  
**LP3**

DRAWING NUMBER EASTEL 98 170



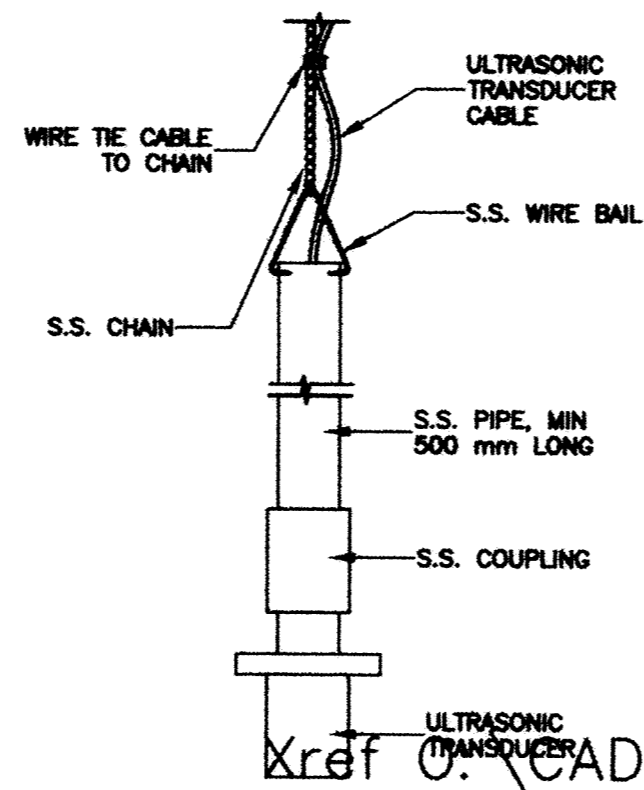
**NOTES**

- CLASS 1, DIVISION 1, GROUP D HAZARDOUS AREA EXISTS INSIDE THE WET WELL AND WITHIN A 1 M RADIUS OF VENT OPENING
- CLASS 1, DIVISION 2, GROUP D HAZARDOUS AREA EXISTS 1 M HORIZONTALLY FROM THE PERIMETER OF AND 500 mm ABOVE THE HATCH, AND WITHIN A 1.5 M RADIUS OF VENT OPENING
- ELECTRICAL UTILITY: ELK RIVER MUNICIPAL UTILITIES, CONTACT: GLEN SUNDEEN 612-441-2212
- MINIMUM BURIAL DEPTH OF UNDERGROUND CONDUITS/CIRCUITS: 0.75 M BELOW FINISHED GRADE.
- GENERATOR INLET: CROUSE HINDS TYPE AR2042 S-22 WITH ANGLE ADAPTER.



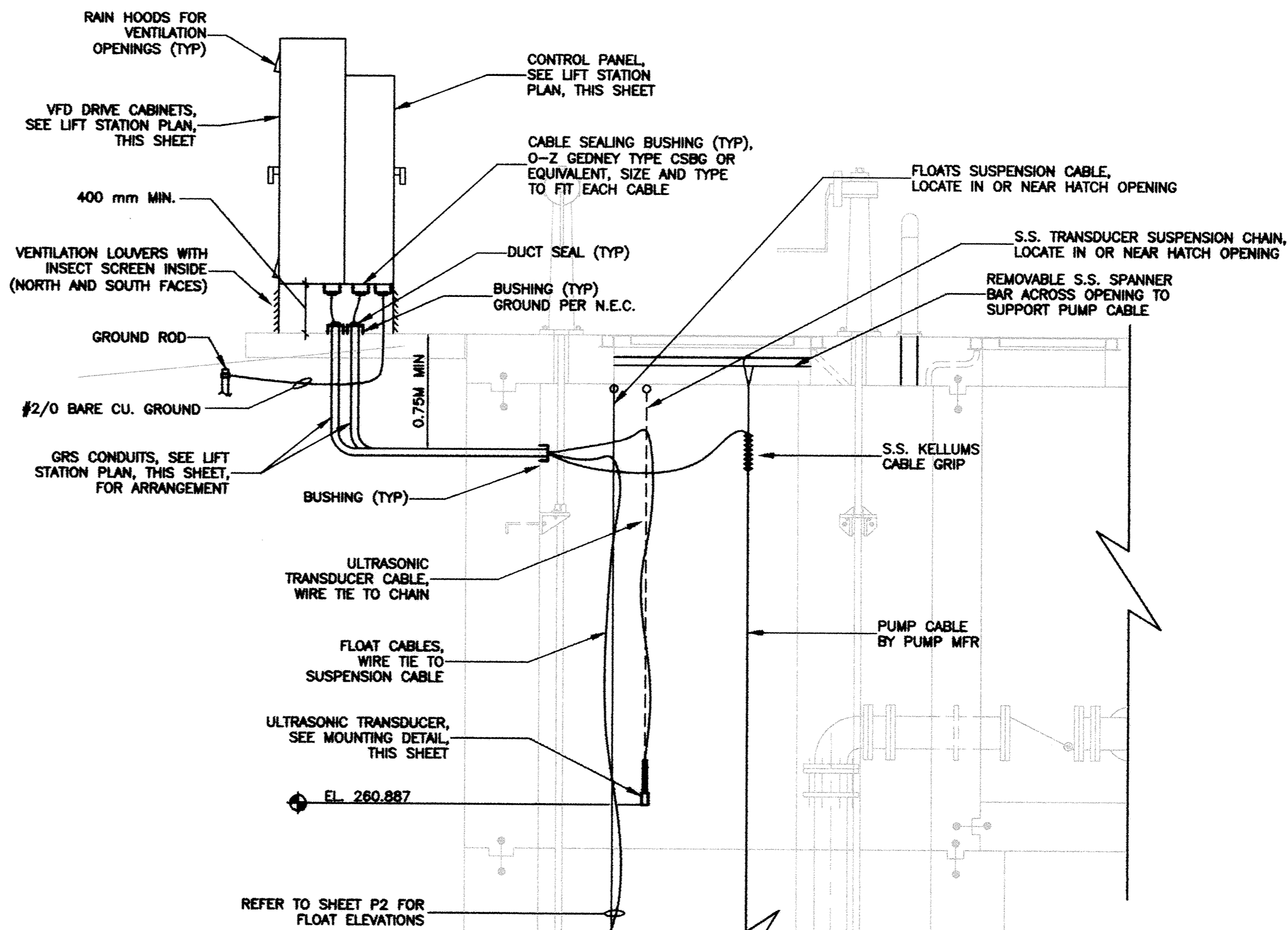
**1 ELECTRICAL SITE PLAN**

SCALE: 1:500



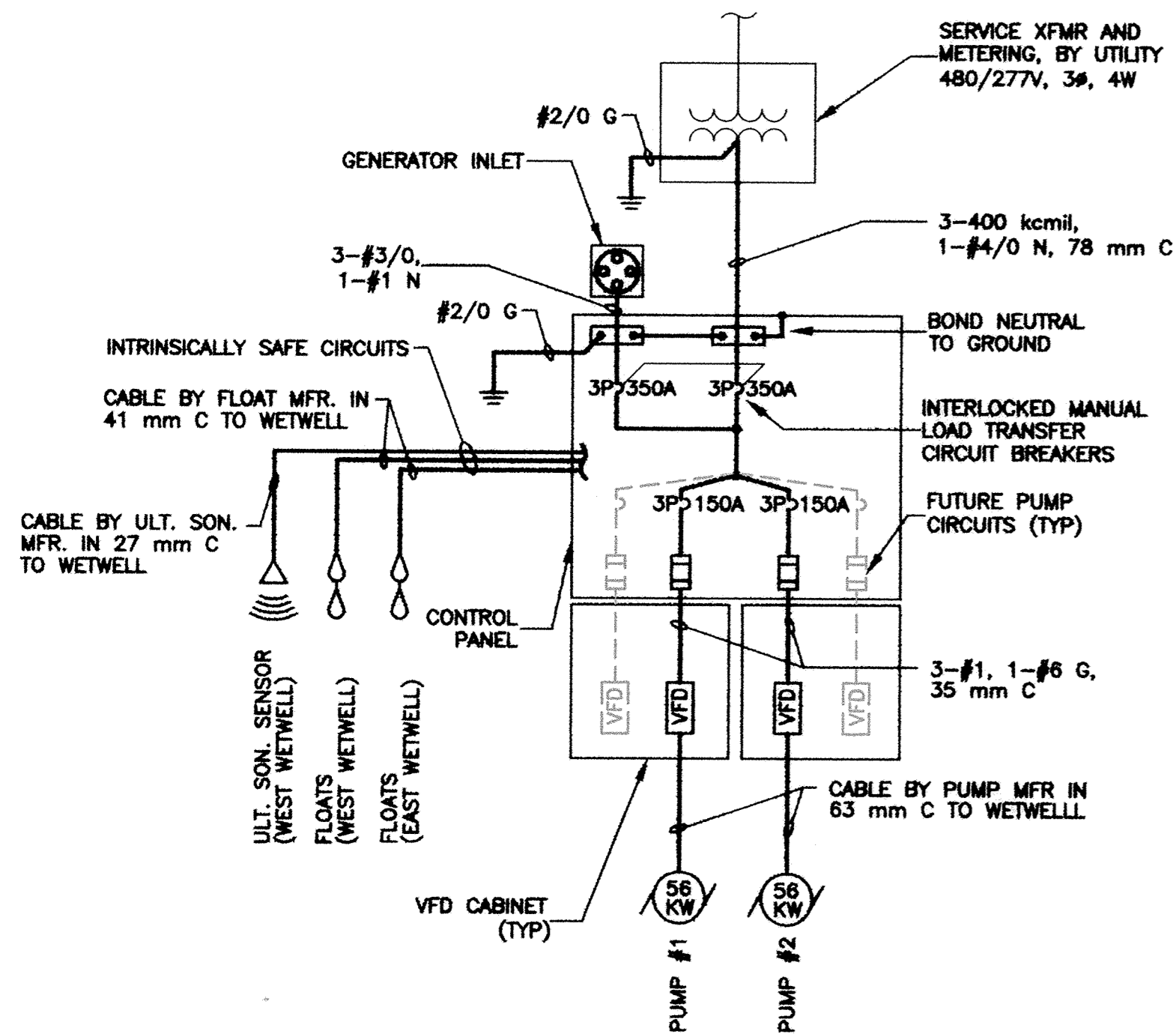
**6 TRANSDUCER MOUNTING DETAIL**

SCALE: NTS



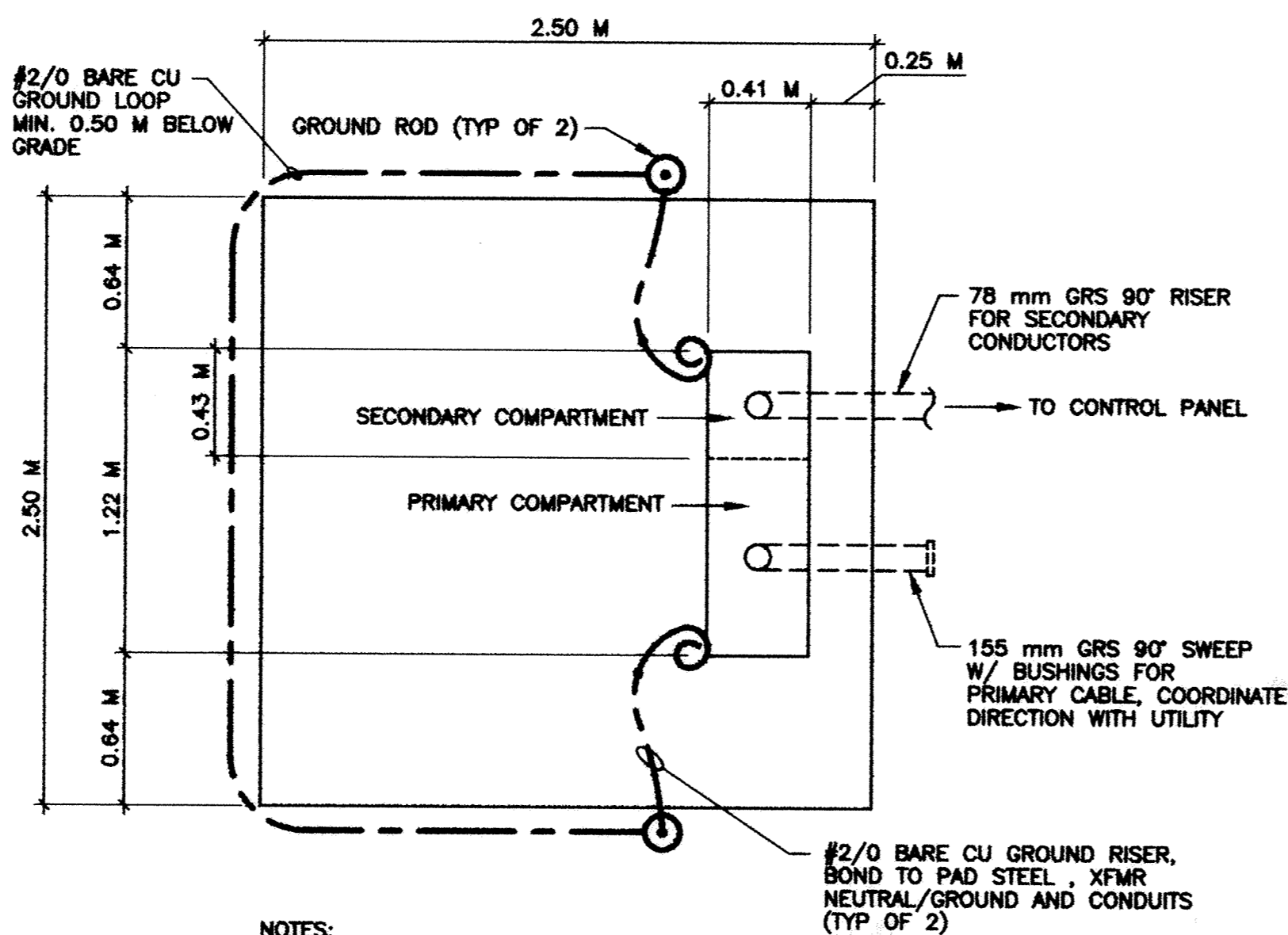
**2 LIFT STATION SECTION (TYP)**

SCALE: NTS



**5 ONE-LINE DIAGRAM**

SCALE: NTS

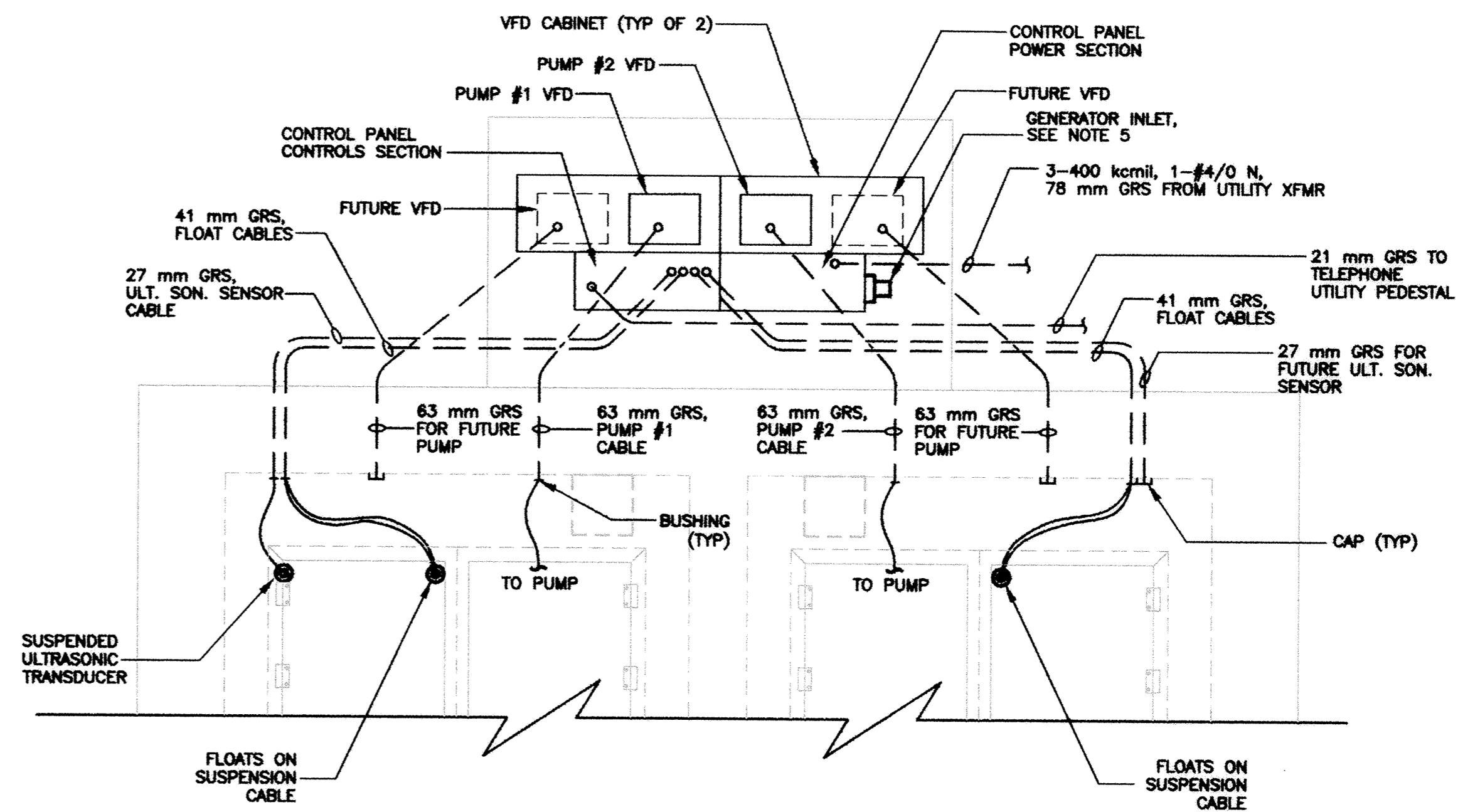


**NOTES**

- CONTRACTOR SHALL PROVIDE CONCRETE PAD, GROUNDING EQUIPMENT AND CONDUIT, UTILITY SHALL PROVIDE AND SET TRANSFORMER.
- CONTRACTOR SHALL PROVIDE SECONDARY CONDUCTORS, UTILITY SHALL PROVIDE PRIMARY CABLE AND TERMINATIONS OF ALL CONDUCTORS.
- PAD TO BE 0.15 M THICK OF 28,000 KPA CONCRETE. PROVIDE 15M REINFORCING AT 0.02 M O.C. EACH WAY.
- COORDINATE ALL ELECTRICAL SERVICE INSTALLATION WITH UTILITY.

**4 TRANSFORMER PAD DETAIL**

SCALE: NTS



**3 LIFT STATION PLAN**

SCALE: 1:50

DESIGNED BY: SRJ JOB DATE: JULY 1998  
 DRAWN BY: CMB JOB NUMBER: 800110  
 CAD DATE: October 14, 1998 4:15:50 p.m.  
 CAD FILE: 800110j\dwg\LIFT\_STATION\E\LE1.DWG

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.  
 DATE: \_\_\_\_\_ REG. NO. \_\_\_\_\_

NO.	DATE	BY	REVISION DESCRIPTION

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 ST. PAUL, MINNESOTA 55108  
 (612) 644-4389  
**Howard R. Green Company**  
 CONSULTING ENGINEERS

**CITY OF ELK RIVER**  
**LIFT STATION**

**ELECTRICAL**

SHEET NO.  
**LE1**