

|                |       |
|----------------|-------|
| FIELD BOOK NO. | Z0A01 |
|----------------|-------|

GENERAL NOTES FOR STRUCTURES

CONCRETE

- DESIGN SHALL CONFORM TO THE LATEST BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI-318) WITH SPECIAL REQUIREMENTS OF ENVIRONMENTAL ENGINEERING CONCRETE STRUCTURES (ACI-350).
- ALL REINFORCING BARS SHALL CONFORM TO ASTM A-615, GRADE 60. ARRANGEMENT AND DETAILS OF REINFORCING STEEL, INCLUDING BAR SUPPORTS AND SPACERS, SHALL BE IN ACCORDANCE WITH THE LATEST ACI DETAILING MANUAL, UNLESS OTHERWISE NOTED.
- ALL SLAB AND BEAM REINFORCEMENT SHALL HAVE A MINIMUM EXTENSION INTO THE SUPPORT IN ACCORDANCE WITH THE LATEST ACI CODE. IF SUCH EXTENSION IS NOT POSSIBLE, BARS SHALL TERMINATE IN STANDARD HOOKS.
- HORIZONTAL WALL REINFORCEMENT AND TEMPERATURE REINFORCEMENT SHALL LAP A MINIMUM OF 1.7Ld AT SPLICES. WALL DOWELS AND WALL BAR EXTENSIONS AND ALL STRESS SPLICES SHALL LAP A MINIMUM OF 1.7 Ld, UNLESS OTHERWISE NOTED.
- WALL OR COLUMNS SHALL HAVE DOWELS FROM FOUNDATIONS OR CONSTRUCTION BELOW OF SAME SIZE AND SPACING AS WALL OR COLUMN VERTICAL STEEL. SEE FOOTING SCHEDULE.
- UNLESS OTHERWISE NOTED ON THE DRAWINGS, CONCRETE COMPRESSIVE STRENGTH AT 28 DAYS SHALL NOT BE LESS THAN THE FOLLOWING:
  - STRUCTURAL MEMBERS, FOUNDATIONS, WALLS AND SUSPENDED SLABS --- 4000 PSI
  - SLABS ON GRADE----- 4000 PSI
  - LEAN CONCRETE CLASS B----- 1500 PSI
  - GROUT FILL CLASS H----- 3000 PSI
- UNLESS OTHERWISE SHOWN, THE COVER FOR REINFORCING STEEL SHALL BE AS FOLLOWS:
  - SLABS
    - TOP AND BOTTOM OF FORMED SLABS----- 2"
    - TOP OF WALK AND DRIVEWAY SLABS----- 2"
    - SURFACES IN CONTACT WITH LIQUID----- 2"
    - BOTTOM OF SLABS ON FILL OR SOIL----- 3"
  - FOOTINGS:
    - TOP AND SIDES----- 2 1/2"
    - BOTTOM----- 3"
  - WALLS:
    - LESS THAN 12" THICK----- 1 1/2"
    - 12" OR OVER IN THICKNESS WITH POURS LESS THAN 10 FEET HIGH----- 2"
    - 12" OR OVER IN THICKNESS WITH POURS MORE THAN 10 FEET HIGH----- 2 1/2"
  - BEAMS AND GIRDERS:
    - COVER AT TOP, BOTTOM OR SIDES OF LONGITUDINAL REINF----- 2"
  - COLUMNS:
    - COVER FOR VERTICAL BARS----- 2"
- HORIZONTAL AND VERTICAL CONSTRUCTION JOINTS SHOWN OR NOTED ON THE PLANS ARE RECOMMENDED. ANY DEVIATION FROM THOSE SHOWN SHALL HAVE APPROVAL OF THE ENGINEER.
- ANY STOP IN FRAMED CONCRETE WORK MUST BE MADE IN THE CENTER OF THE SPAN AND INCORPORATE AN APPROVED KEYWAY. REINFORCEMENT SHALL EXTEND THROUGH THESE JOINTS IF REQUIRED FOR CONTINUITY.
- USE TYPE "C2" JOINT FOR ALL CONSTRUCTION JOINTS IN WALLS AND SLABS BELOW GRADE AND WALLS WHICH SEPARATE AREAS OF SOIL OR LIQUID FROM PERMANENTLY DRY AREAS SUCH AS TUNNELS, GALLERIES, BASEMENT ROOMS, ETC. USE TYPE "C1" JOINT AT ALL OTHER CONSTRUCTION JOINTS, UNLESS OTHERWISE NOTED ON DRAWINGS.
- CONCRETE WALLS AND PARTITIONS SHALL BE POURED IN MAXIMUM LENGTHS OF 40 FEET BETWEEN VERTICAL CONSTRUCTION JOINTS.
- ALL CONCRETE SLABS OVER 8" IN THICKNESS, REINFORCED WITH BARS, AND POURED AGAINST SOIL SHALL BE POURED IN A STRIP PATTERN OF 40 FEET OR LESS IN EACH DIRECTION.
- ALL EXPOSED EDGES OF BEAMS, COLUMNS, SLABS AND WALLS SHALL BE CHAMFERED 3/4" UNLESS MASONRY OR OTHER MEMBERS ARE ERECTED FLUSH WITH THEM.
- REFER TO ARCHITECTURAL, PROCESS, MECHANICAL AND ELECTRICAL DRAWINGS FOR ALL SLEEVES, PIPES, CONDUITS AND MISCELLANEOUS ANCHORING DEVICES TO BE INCORPORATED IN THE CONSTRUCTION

STRUCTURAL STEEL

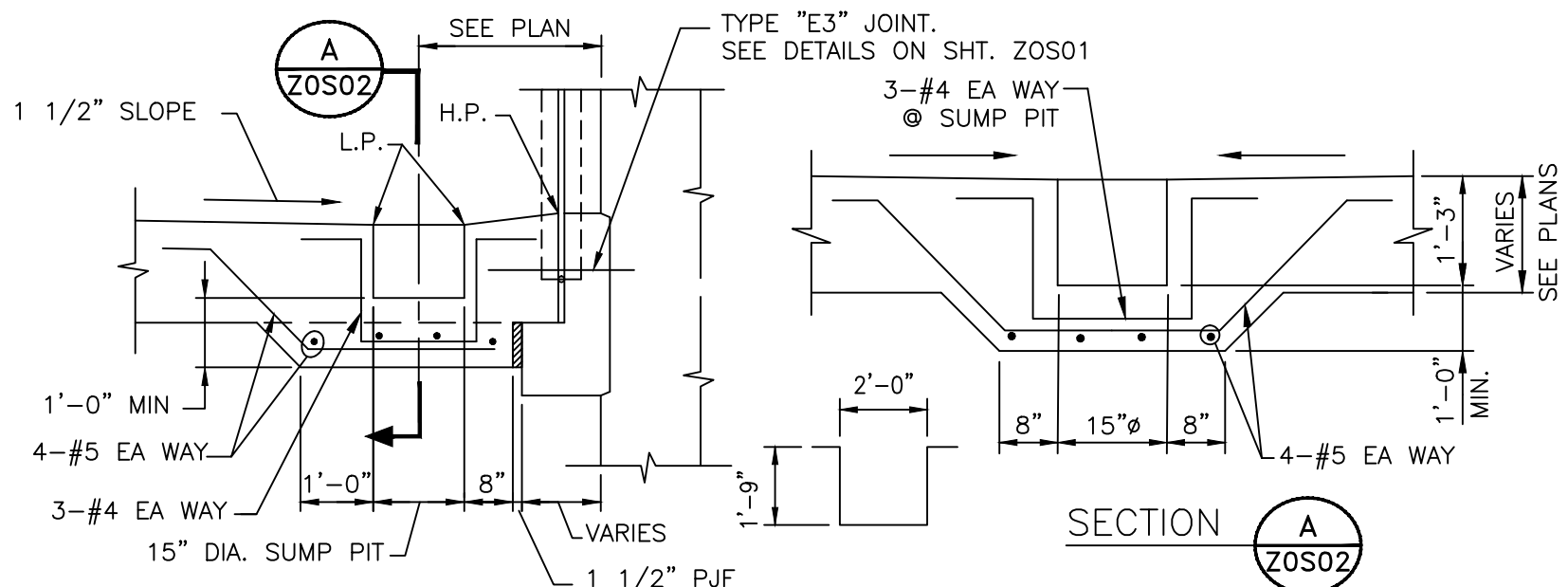
- STRUCTURAL STEEL SHALL CONFORM TO THE LATEST AISC "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS". ALL STRUCTURAL STEEL SHALL BE ASTM A36.
- ELEVATIONS OF STEEL BEAMS SHOWN ON FRAMING PLANS REFER TO TOP OF FLANGE, UNLESS OTHERWISE NOTED.
- ALL BOLTED CONNECTIONS SHALL BE MADE WITH 3/4" DIAMETER ASTM A-325 BOLTS EXCEPT AS OTHERWISE SHOWN OR NOTED. ALL CONNECTIONS SHALL BE CAPABLE OF SUPPORTING ONE HALF THE MAXIMUM ALLOWABLE UNIFORM LOAD FOR INDICATED BEAM SIZE AND SPAN IN AISC MANUAL OF STEEL CONSTRUCTION, EXCEPT AS OTHERWISE NOTED.
- FIELD CONNECTIONS SHALL BE BOLTED, EXCEPT AS OTHERWISE SHOWN OR NOTED.
- ALL WELDING SHALL CONFORM TO THE LATEST SPECIFICATION OF THE AMERICAN WELDING SOCIETY. ALL WELDED CONNECTIONS SHALL BE MADE WITH AWS A5.1 OR A5.5 E70 XX ELECTRODE.
- ANCHOR BOLTS AND MISC EMBEDDED STEEL-----ASTM A36.  
ANCHOR BOLTS WHICH ARE SUBMERGED, LOCATED ABOVE A LIQUID SURFACE, OR ARE IN A CORROSIVE ATMOSPHERE-----316 SS.
- ALL EQUIPMENT ANCHOR BOLT DIMENSIONS AND LOCATIONS SHALL BE VERIFIED FROM CERTIFIED VENDOR DRAWINGS, PRIOR TO CONSTRUCTION.

FOUNDATIONS

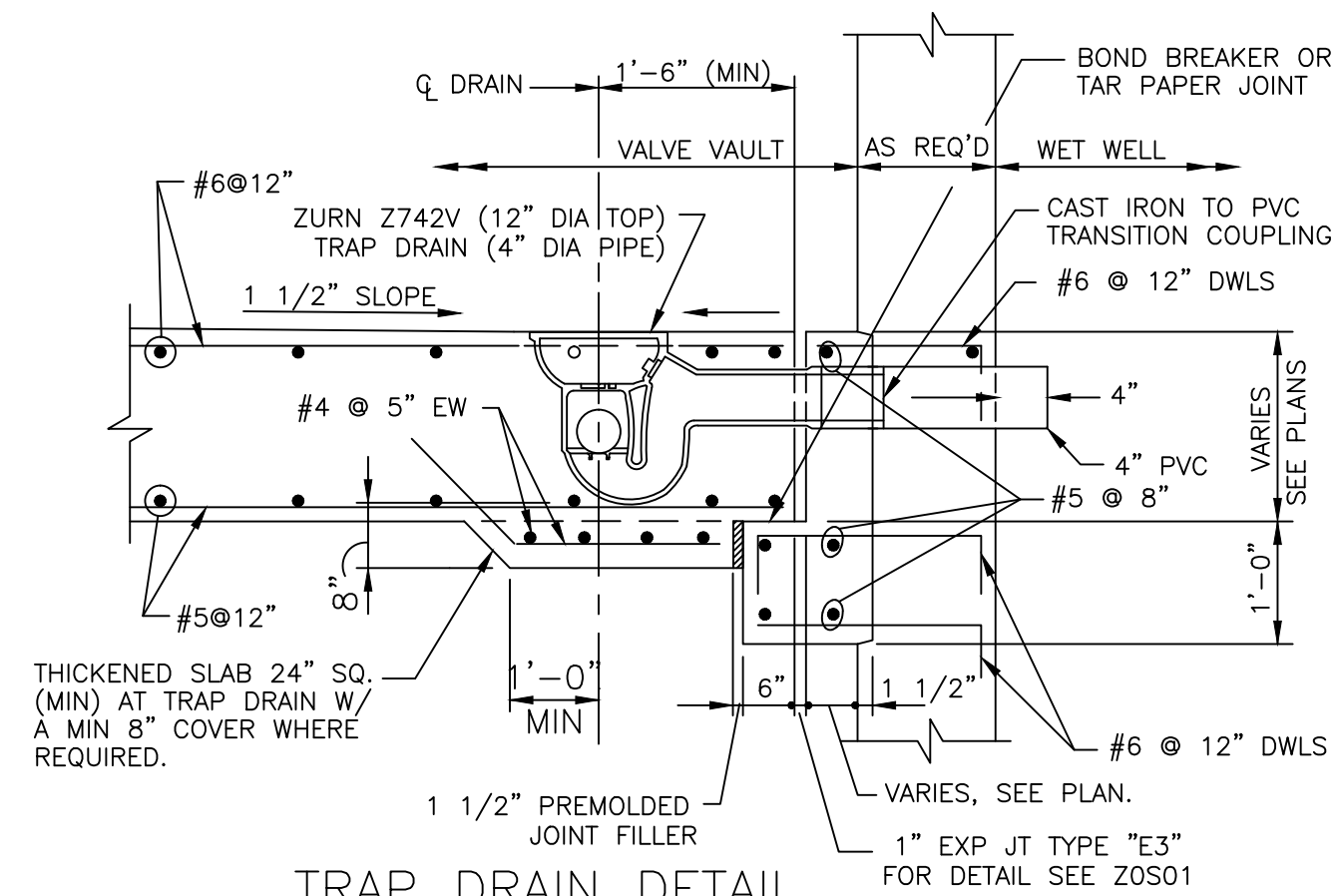
- ALLOWABLE SOIL BEARING PRESSURE, EXCAVATION AND BACKFILL FOR FOUNDATIONS AND STRUCTURES SHALL BE AS RECOMMENDED IN THE GEOTECHNICAL REPORT.
- ALL EXCAVATIONS SHALL BE CARRIED OUT IN THE DRY, AND PROVISIONS SHALL BE MADE TO PREVENT THE BOTTOM OF ALL EXCAVATIONS FROM FREEZING OR FLOODING AT ALL TIMES.
- ALL FOUNDATIONS SHALL BE CONSTRUCTED IN EXCAVATIONS FREE OF STANDING WATER.
- BACKFILL MATERIAL, PLACING AND COMPACTION OF BACKFILL SHALL BE IN ACCORDANCE WITH THE DRAWINGS, AND THE CONTRACT SPECIFICATIONS.

SEAL

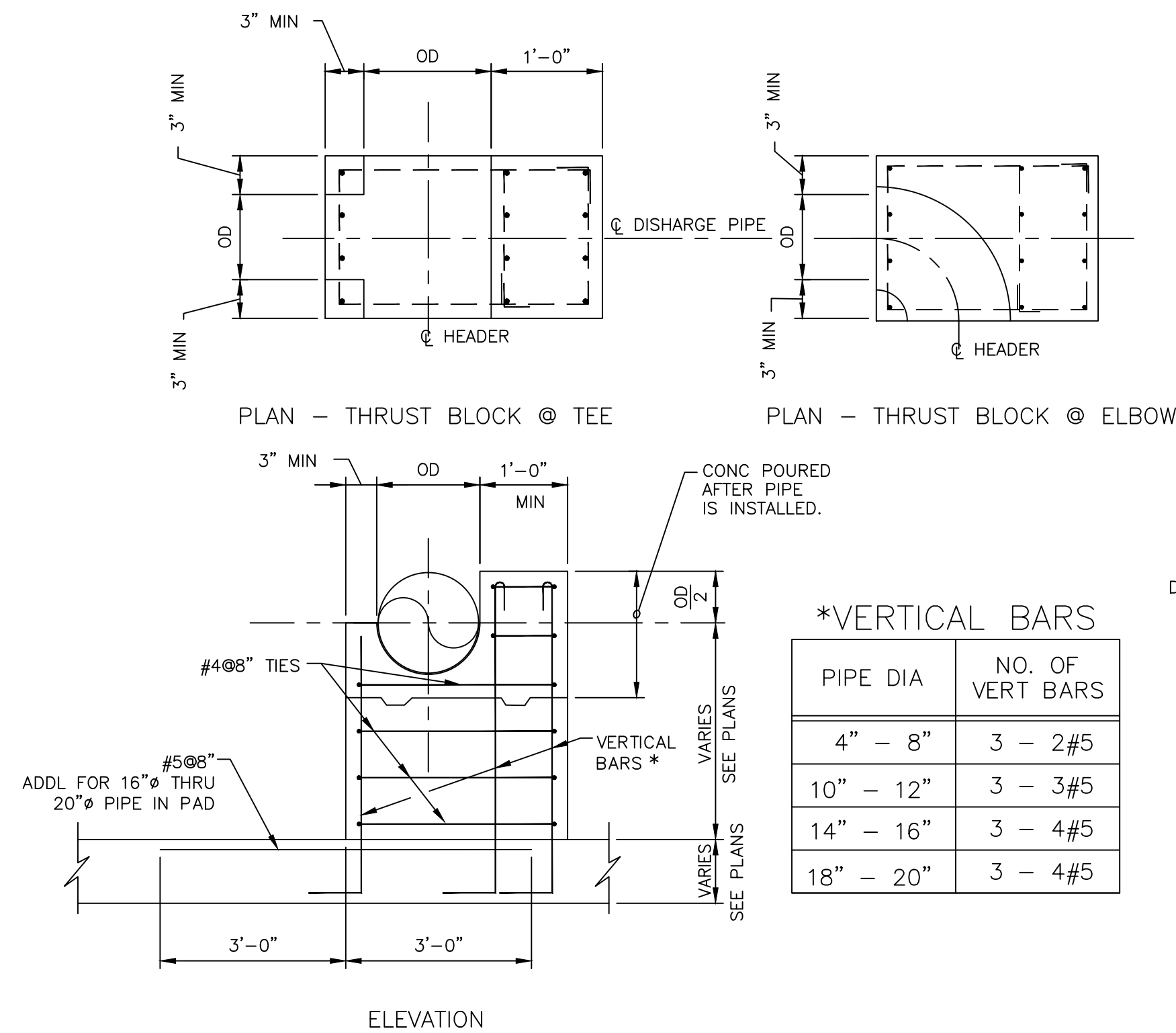
CADD DWG. FILE NO. :  
ZOS02.DWG (Scale: 1=96)



TYPICAL SUMP PIT DETAIL



TRAP DRAIN DETAIL

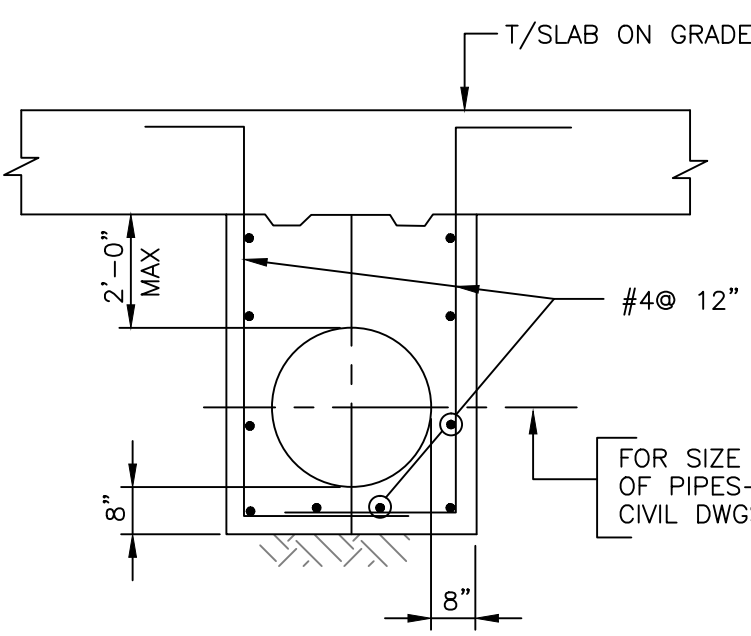


DESIGN ENGINEER TO REVISE DETAIL FOR SPECIFIC PROJECT REQUIREMENTS. DELETE UNECESSARY INFORMATION.

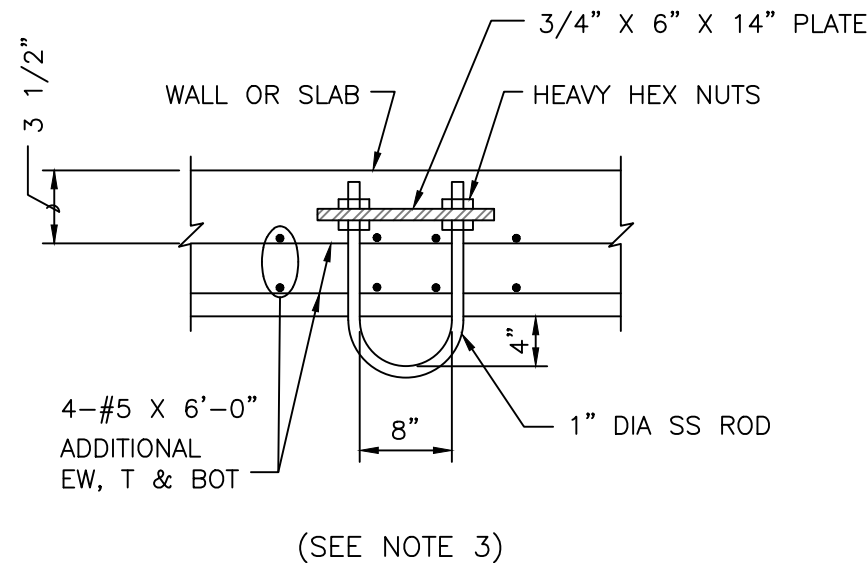
TYPICAL THRUST BLOCK DETAILS

ABBREVIATIONS

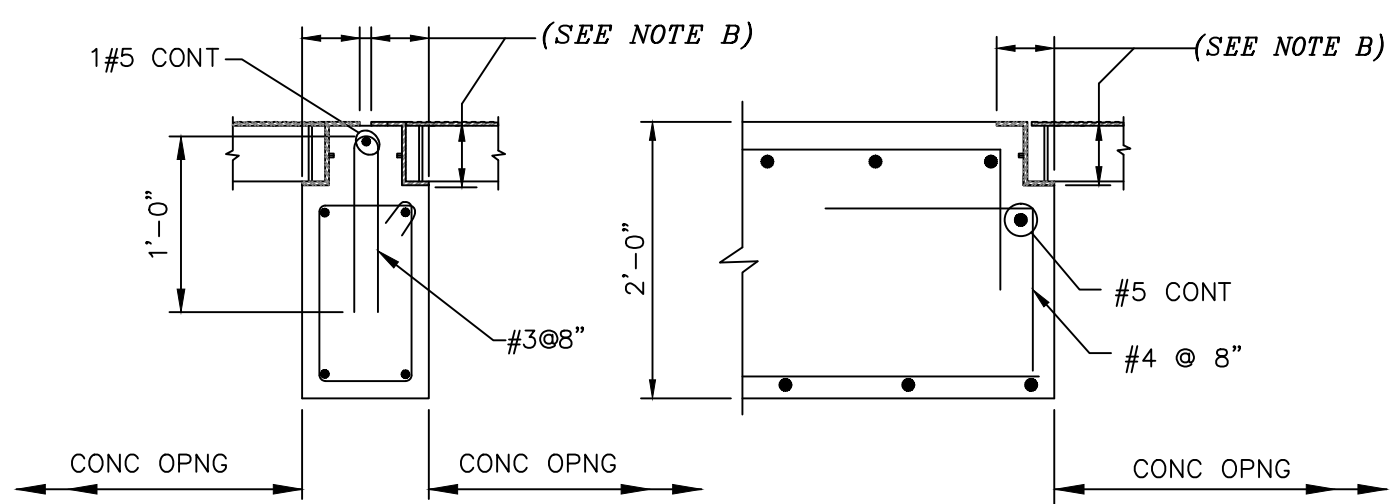
|       |       |               |       |       |                    |       |       |                        |
|-------|-------|---------------|-------|-------|--------------------|-------|-------|------------------------|
| ADDL  | ----- | ADDITIONAL    | EF    | ----- | EACH FACE          | R     | ----- | RADIUS                 |
| ALT   | ----- | ALTERNATE     | EW    | ----- | EACH WAY           | REINF | ----- | REINFORCEMENT          |
| &     | ----- | AND           | EL    | ----- | ELEVATION          | REQD  | ----- | REQUIRED               |
| ARCH  | ----- | ARCHITECTURAL | EXP   | ----- | EXPANSION          | SCHED | ----- | SCHEDULE               |
| @     | ----- | AT            | EXT   | ----- | EXTERIOR           | SECT  | ----- | SECTION                |
| BM    | ----- | BEAM          | FTG   | ----- | FOOTING            | SPECS | ----- | SPECIFICATIONS         |
| BOT   | ----- | BOTTOM        | H.P.  | ----- | HIGH POINT         | SS    | ----- | STAINLESS STEEL        |
| B/-   | ----- | BOTTOM OF     | HORIZ | ----- | HORIZONTAL         | STD   | ----- | STANDARD               |
| BLDG  | ----- | BUILDING      | I.F.  | ----- | INSIDE FACE        | STIRR | ----- | STIRRUP                |
| C/C   | ----- | CENTER LINE   | INT   | ----- | INTERIOR           | SYMM  | ----- | SYMMETRICAL            |
| CLR   | ----- | CLEAR(ANCE)   | L.P.  | ----- | LOW POINT          | T     | ----- | TOP                    |
| COL   | ----- | COLUMN        | MH    | ----- | MANHOLE            | T/    | ----- | TOP OF                 |
| CONC  | ----- | CONCRETE      | MAX   | ----- | MAXIMUM            | TYP   | ----- | TYPICAL                |
| CONST | ----- | CONSTRUCTION  | MISC  | ----- | MISCELLANEOUS      | UON   | ----- | UNLESS OTHERWISE NOTED |
| CONT  | ----- | CONTINUOUS    | MIN   | ----- | MINIMUM            | VAR   | ----- | VARIES                 |
| DET   | ----- | DETAIL        | #     | ----- | NUMBER             | VERT  | ----- | VERTICAL               |
| DIA   | ----- | DIAMETER      | OC    | ----- | ON CENTER          | WWF   | ----- | WELDED WIRE FABRIC     |
| Ø     | ----- | DIAMETER      | OPNG  | ----- | OPENING            | W/    | ----- | WITH                   |
| DWG   | ----- | DRAWING       | OA    | ----- | OVERALL            |       |       |                        |
| DWL   | ----- | DOWEL         | PVC   | ----- | POLYVINYL CHLORIDE |       |       |                        |



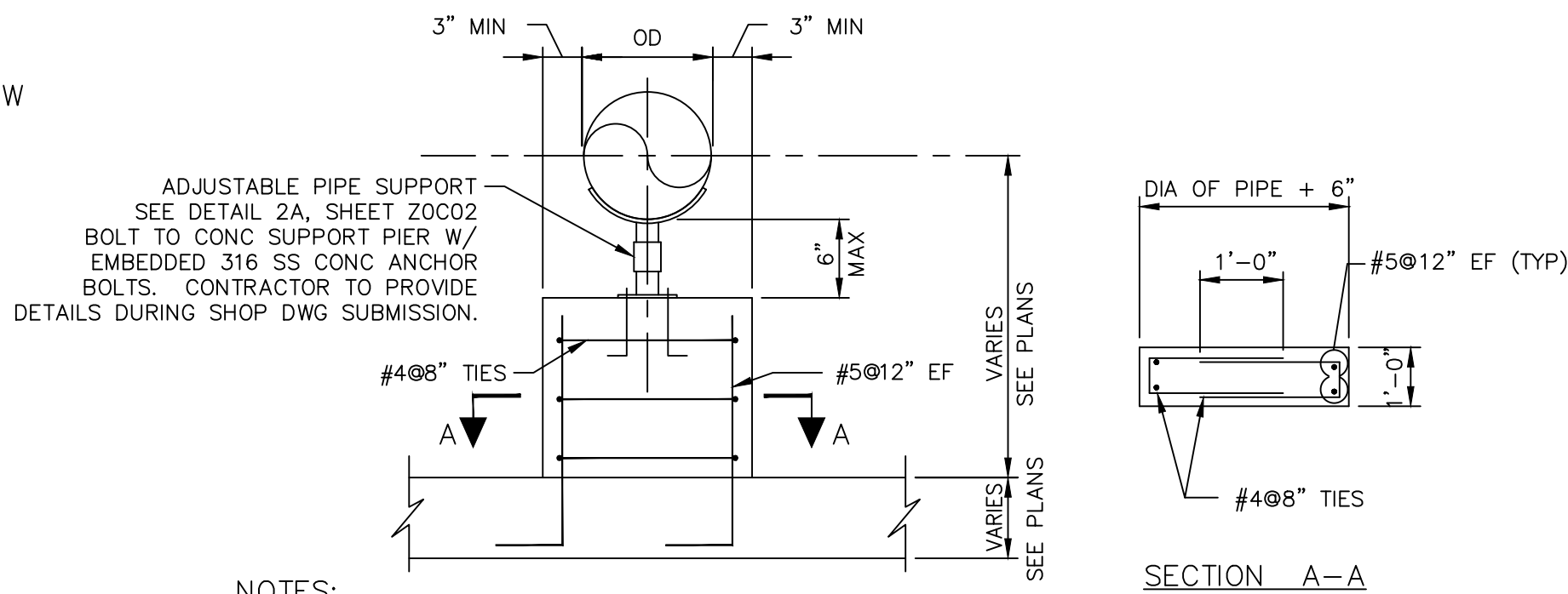
SLAB CONNECTED  
PIPE ENCASEMENT DETAILS



TYPICAL WALL AND SLAB  
LIFTING HOOK



TYPICAL HATCH FRAME SECTIONS



NOTES:

- CONCRETE SUPPORT PIER IS NOT A THRUST BLOCK AND IS NOT INTENDED TO REPLACE THRUST BLOCK PROVIDED AT OTHER LOCATIONS.
- PLACE SUPPORT PIER APPROX 9" TO 24" FROM CHECK VALVE, SEE CIVIL DRAWINGS. DO NOT PLACE SUPPORT PIER ON TOP OF EXPANSION JOINT.
- DESIGN ENGINEER TO PROVIDE CONCRETE PIPE SUPPORT PIER FOR ALL VALVES 14" AND LARGER. REVISE AS NECESSARY; DELETE WHEN NOT REQUIRED.

TYPICAL CONC PIPE SUPPORT PIER DETAIL

NOTES TO DESIGN ENGINEER:

- THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER SUBMERSIBLE LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS. IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.
- DESIGN ENGINEER TO VERIFY SIZE AND LOCATION OF THE ACCESS HATCH OPENINGS PER SELECTED HATCH AND PUMP MANUFACTURERS' REQUIREMENTS. WHEN GRATED HATCH COVERS ARE USED, CONSULT DETAIL ON SHEET ZS01 FOR FRAME DIMENSIONS. WHEN PURCHASED HATCH COVERS ARE USED CONSULT HATCH MANUFACTURER'S DRAWINGS FOR DOOR FRAME DETAILS.
- DIMENSIONS AND REINFORCING NOT PROVIDED ARE TO BE DETERMINED BY THE DESIGN ENGINEER PER APPLICABLE SITE REQUIREMENTS.
- DETAILS SHOWN ON THIS DRAWING ARE TYPICAL DETAILS AND SHALL BE USED WHOLLY OR IN PART WHERE THEY APPLY EXCEPT WHERE MODIFIED BY DETAILED DRAWINGS & SPECIFICATIONS.
- THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.
- THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL, THE ENGINEERING DESIGN MANUAL, AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.
- THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.

NOTES:

- CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE ACCESS HATCH OPENINGS PER SELECT HATCH AND PUMP MANUFACTURERS' REQUIREMENTS.
- DETAILS SHOWN ON THIS DRAWING ARE TYPICAL DETAILS AND SHALL BE USED WHOLLY OR IN PART WHERE THEY APPLY EXCEPT WHERE MODIFIED BY DETAILED DRAWINGS & SPECIFICATIONS.
- PLACE LIFTING HOOK IN SLAB AND WALLS AT LOCATIONS SHOWN ON PLANS. PLACE IN WALLS AT 7'-0" ABOVE FLOOR SLABS.

STRUCTURAL  
STANDARD DETAILS, GENERAL NOTES,  
AND ABBREVIATIONS

PROJECT NO.  
R-0267-02-2

TITLE  
CITY OF HOUSTON  
DESIGN GUIDELINE DRAWINGS  
FOR SUBMERSIBLE LIFT STATIONS

CITY OF HOUSTON  
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP

APPROVALS

WATER DESIGN  
TRAFFIC AND SIGNAL DESIGN

STORM SEWER DESIGN  
STREET, BRIDGE & R.O.W.

WASTEWATER DESIGN  
CONSTRUCTION

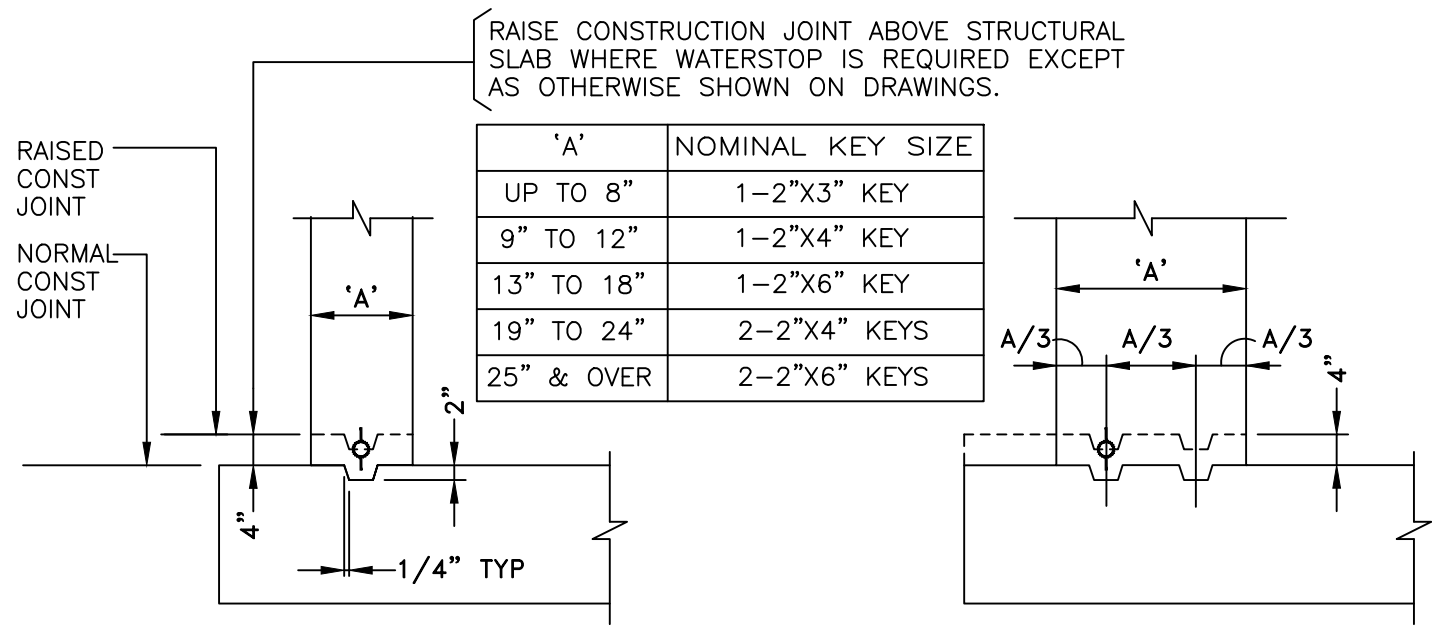
OTHER REVIEWS

PLANNING AND DEVELOPMENT

CITY ENGINEER  
DATE

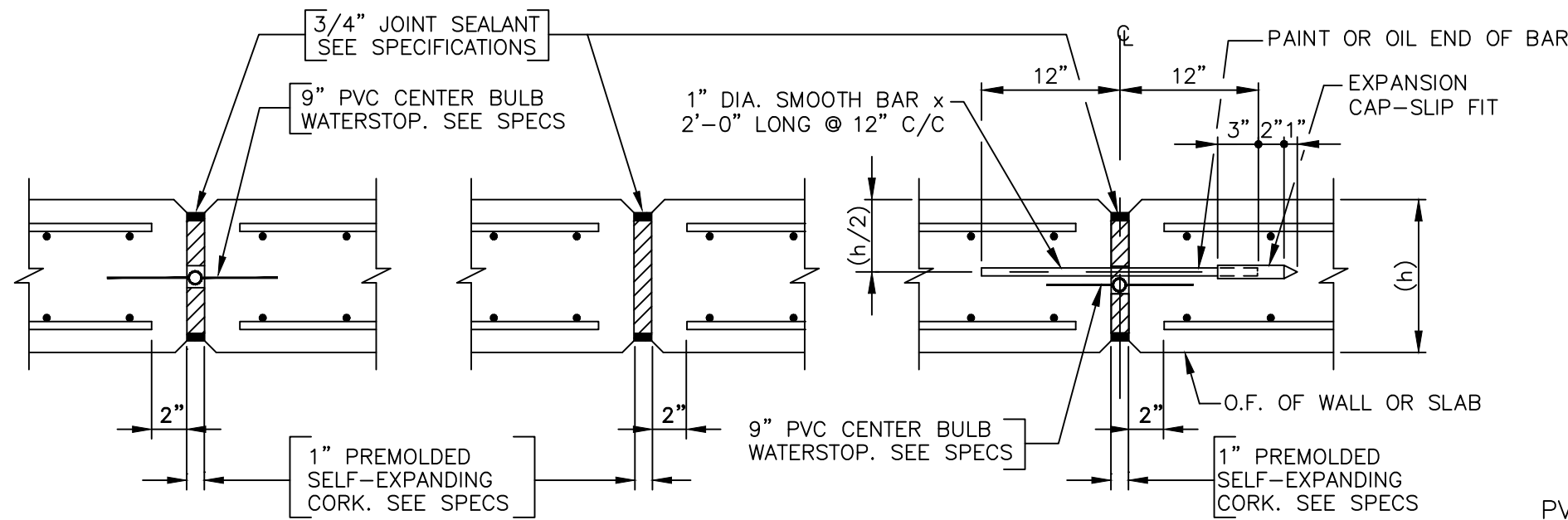
SCALE: NONE  
DESIGNED BY:  
SUBMITTED: DRAWN BY:  
DATE: NOVEMBER, 1996 SHEET NO. OF SHEETS  
SURVEY BY: DWG. NO.  
FIELD BOOK NO. ZOS02





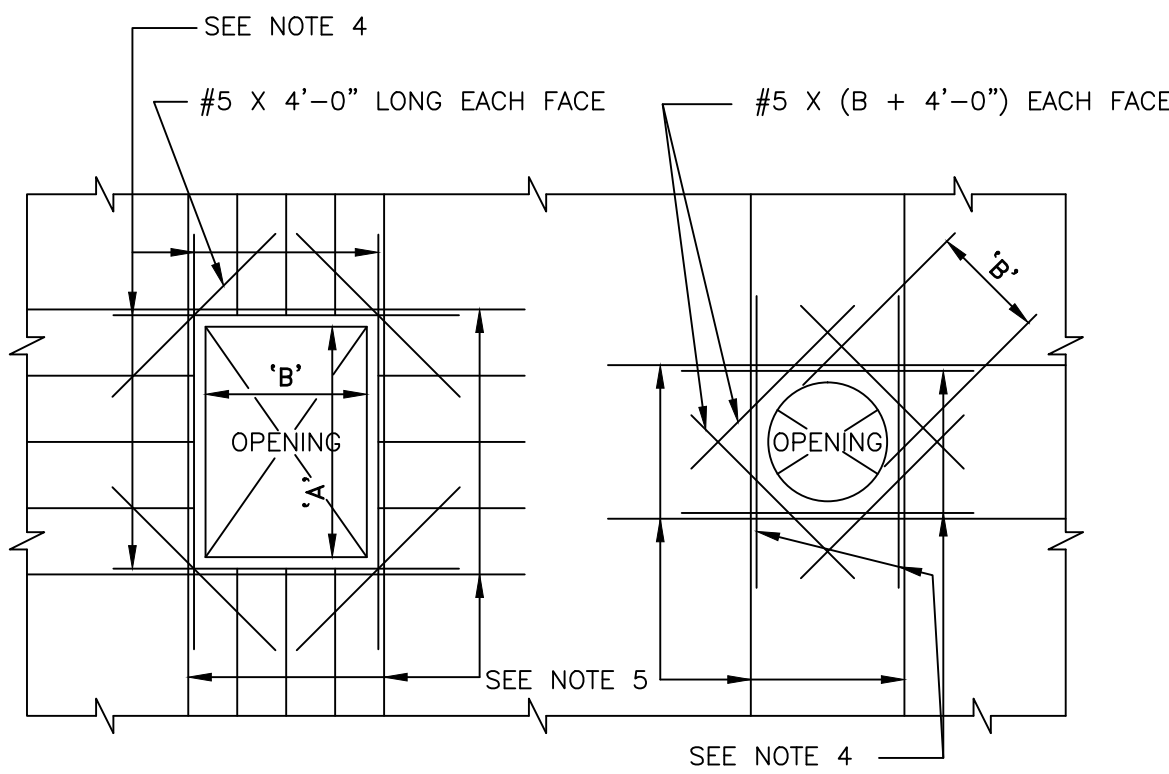
DESIGN ENGINEER TO REVISE DETAIL FOR SPECIFIC PROJECT REQUIREMENTS. DELETE UNECESSARY INFORMATION.

CONSTRUCTION JOINT KEY DETAILS

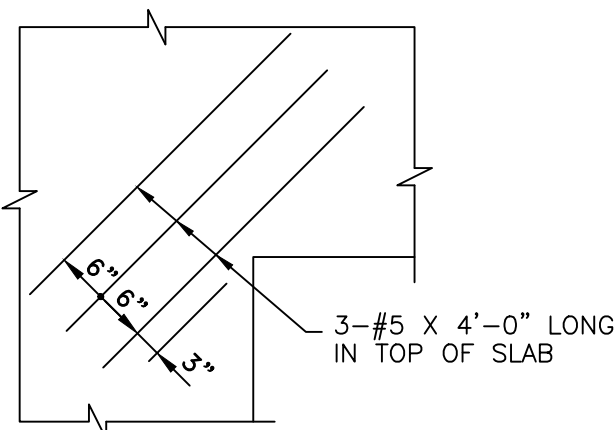


TYPE "E1" TYPE "E2" TYPE "E3"

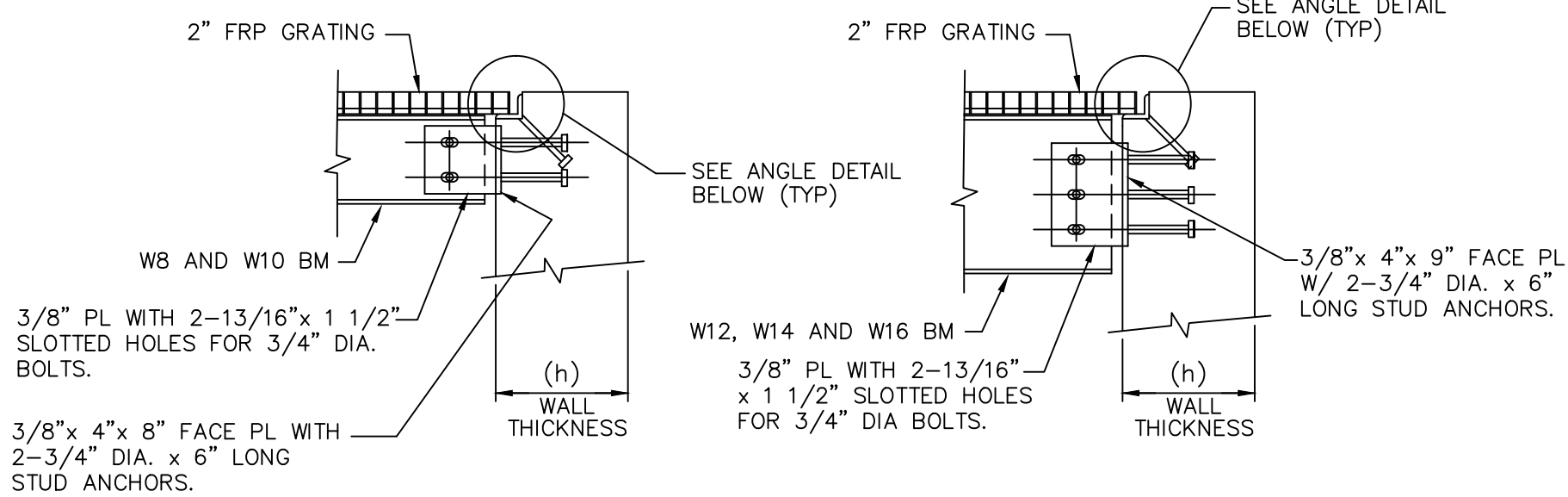
EXPANSION JOINTS



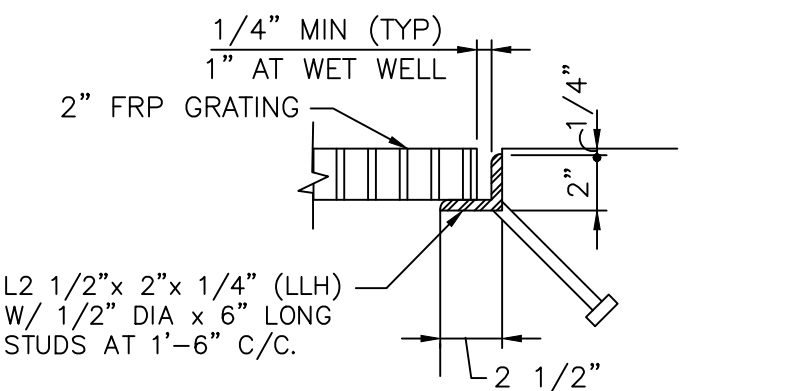
ADDITIONAL REINFORCING STEEL AT OPENINGS IN WALLS AND SLABS



SLAB DETAIL AT RE - ENTRANT CORNER

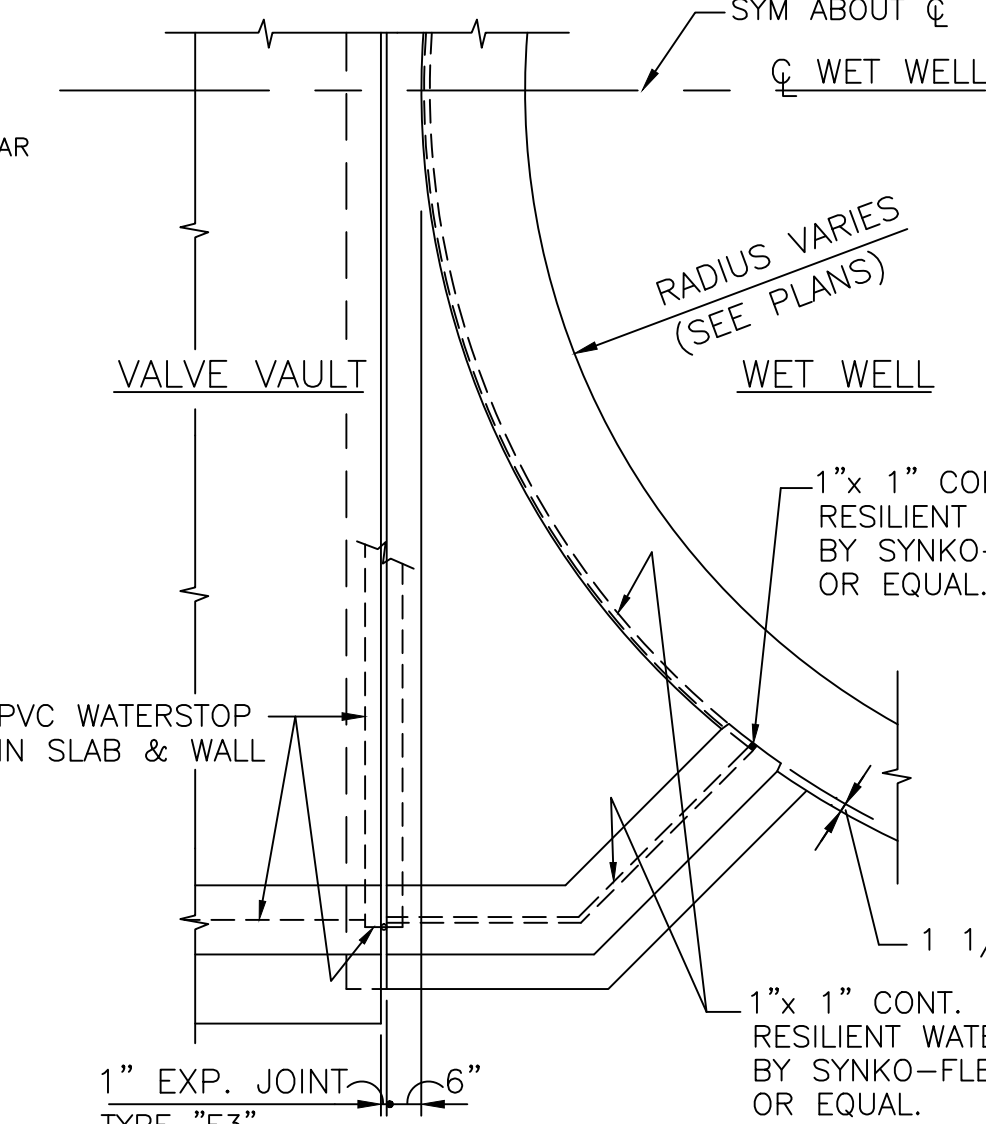
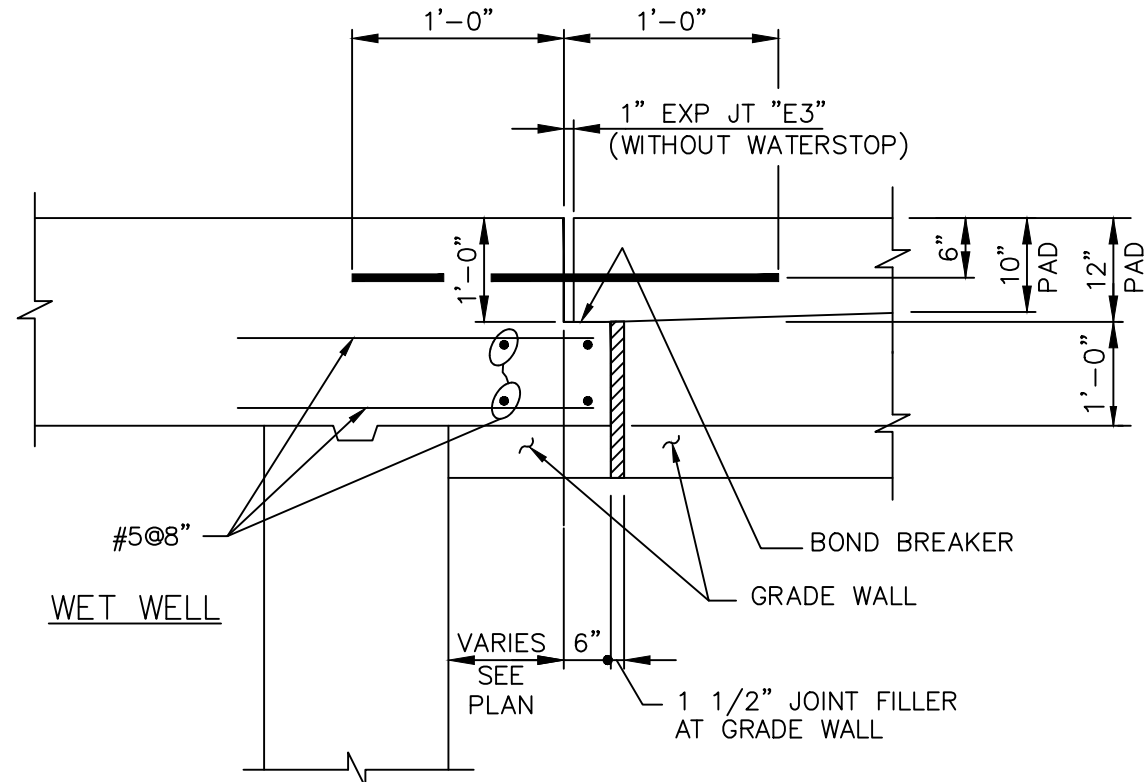


TYPICAL BEAM CONNECTION TO CONCRETE WALL



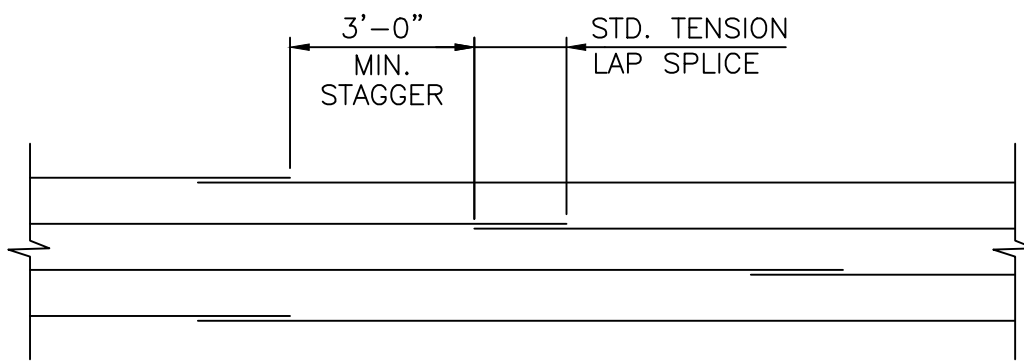
TYPICAL ANGLE DETAIL

TYPICAL EXPANSION JOINT (BETWEEN WET WELL AND VALVE PAD)

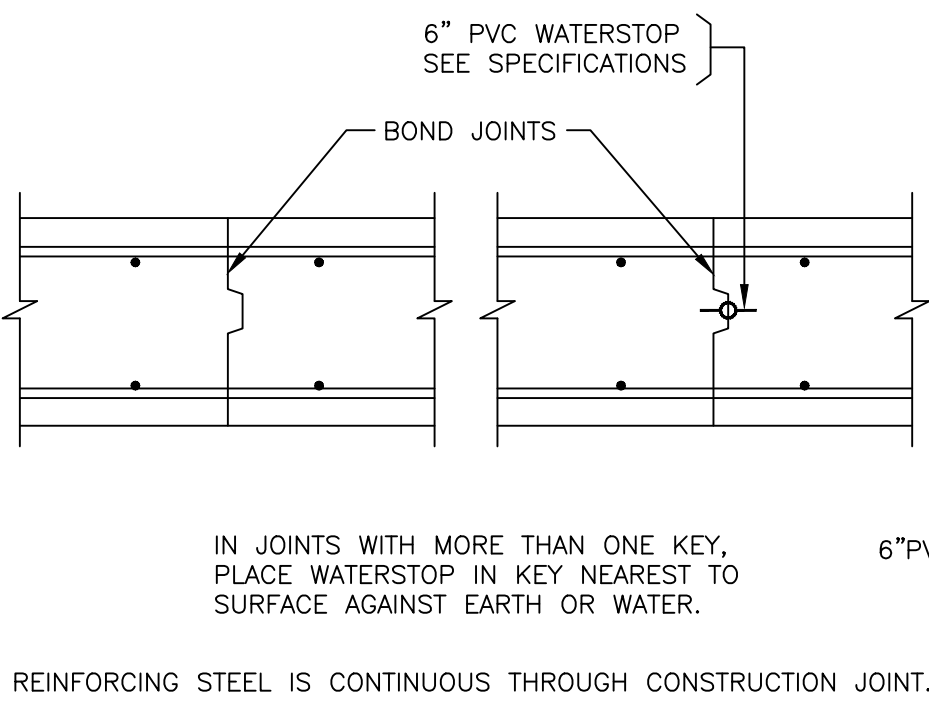


PARTIAL PLAN JOINT BETWEEN WET WELL & VAULT

TYP. BEAM CONNECTION TO CONCRETE WALL



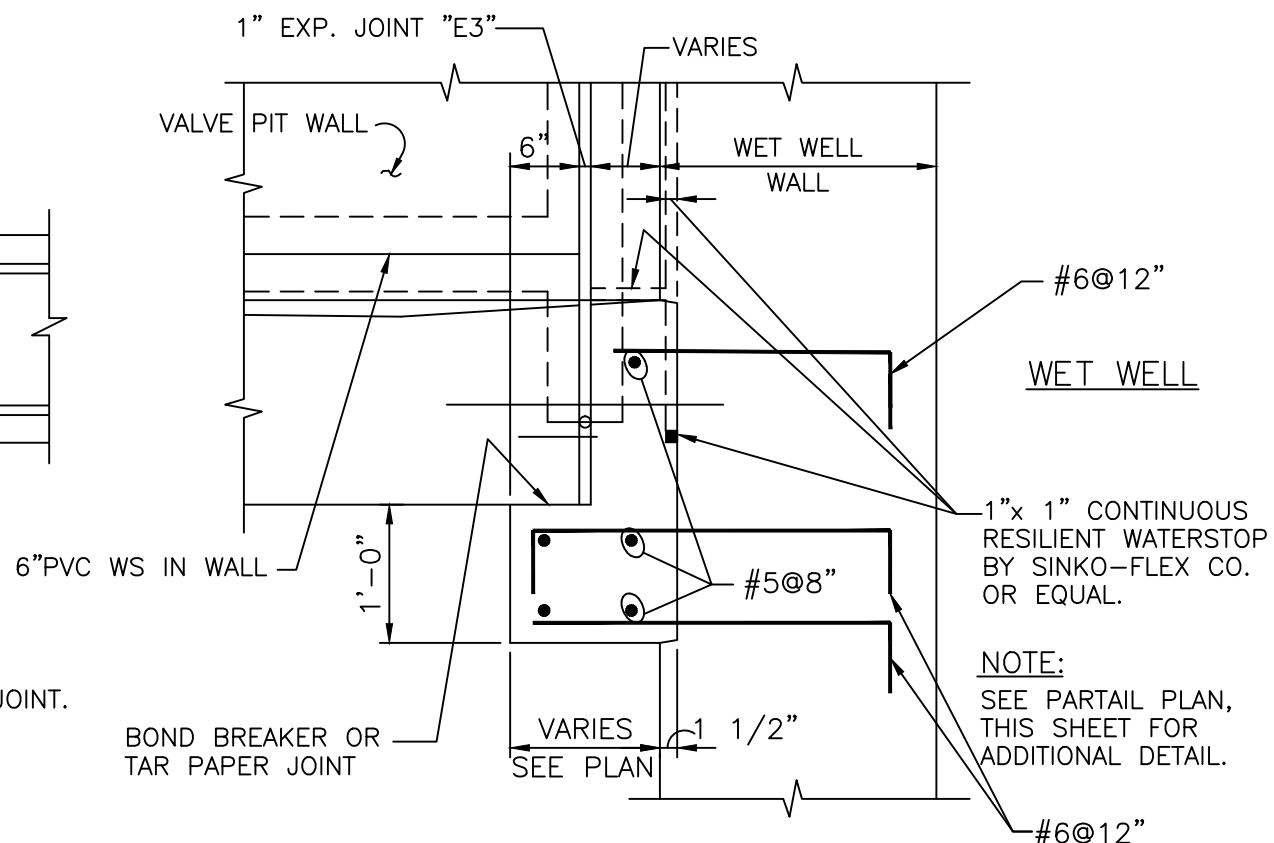
SPLICE LAYOUT FOR HOOP BARS (WET WELL WALL)



TYPE C1

TYPE C2

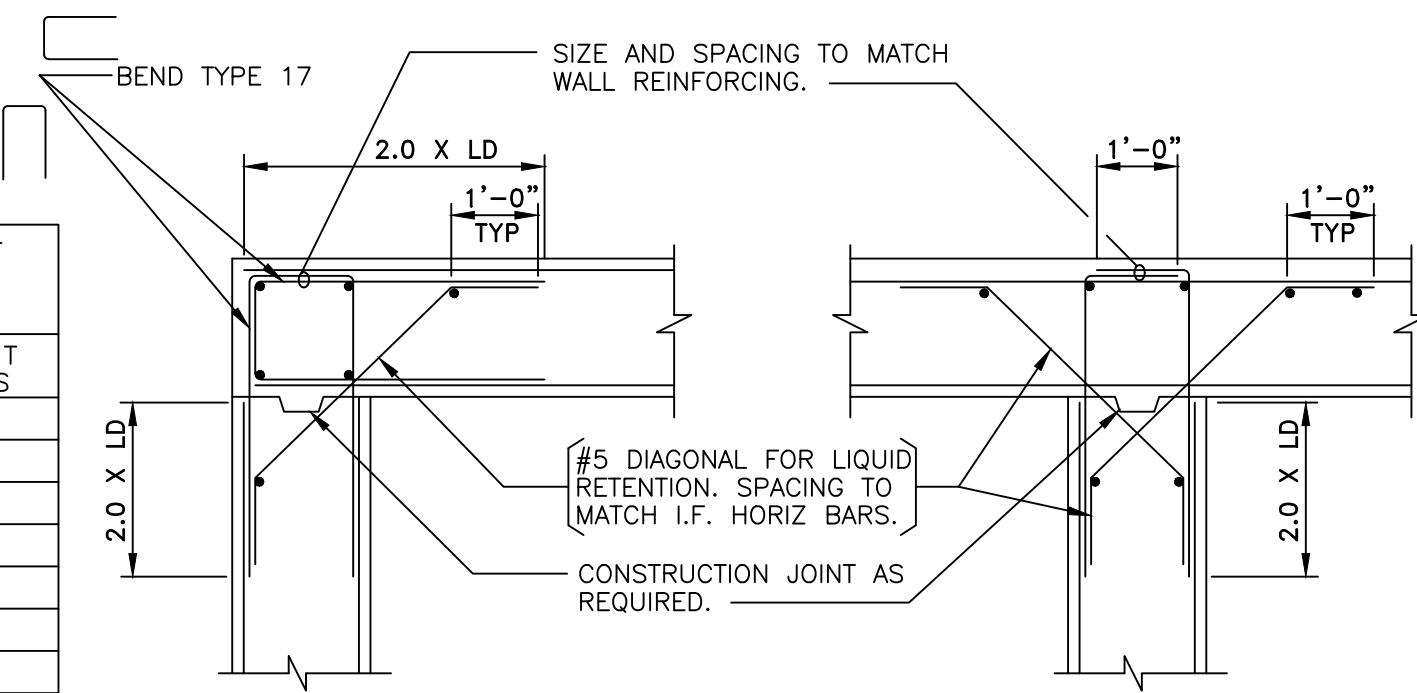
CONSTRUCTION JOINTS



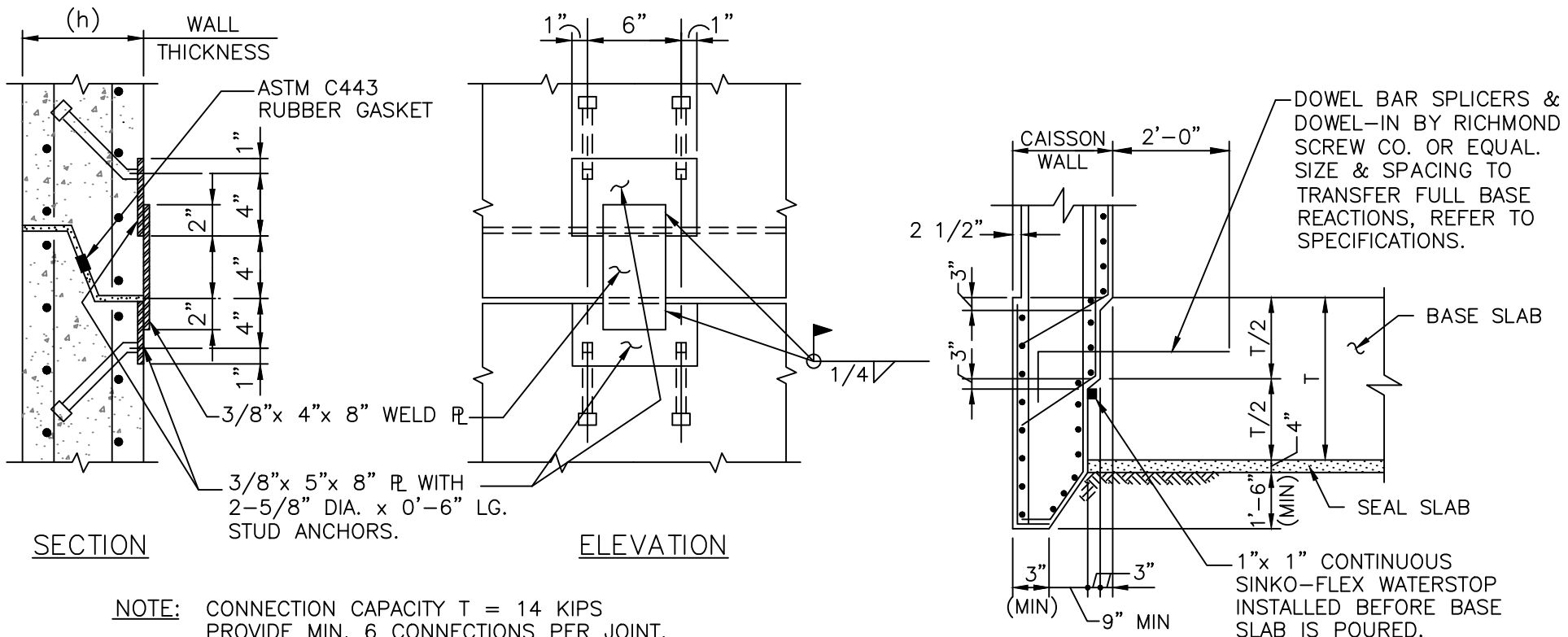
SECTION

JOINT BETWEEN WET WELL & VAULT FLOOR

| BAR SIZE | TENSION DEVELOPMENT LENGTH "LD" INCHES |
|----------|----------------------------------------|
| 3        | 12                                     |
| 4        | 12                                     |
| 5        | 15                                     |
| 6        | 19                                     |
| 7        | 26                                     |
| 8        | 35                                     |
| 9        | 44                                     |
| 10       | 56                                     |
| 11       | 68                                     |



TYPICAL DETAILS OF WALL REINFORCEMENT



PRECAST UNITS CONNECTION DETAILS CAISSON CONSTRUCTION METHOD

CAISSON METHOD TYP BASE DETAIL (FOR PC AND CIP WET WELL)

NOTES TO DESIGN ENGINEER:

- A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER SUBMERSIBLE LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS. IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.
- B. DETAILS SHOWN ON THIS DRAWING ARE TYPICAL DETAILS AND SHALL BE USED WHOLLY OR IN PART WHERE THEY APPLY EXCEPT WHERE MODIFIED BY DETAILED DRAWINGS & SPECIFICATIONS.
- C. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.
- D. THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL, THE ENGINEERING DESIGN MANUAL, AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.
- E. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.

NOTES:

1. CONTRACTOR TO CONFIRM SIZE AND LOCATION OF THE ACCESS HATCH OPENINGS PER SELECT HATCH AND PUMP MANUFACTURER'S REQUIREMENTS.
2. DIMENSIONS NOTED ARE RELATIVE TO THE PUMP SIZE AND MANUFACTURER SELECTED. CONTRACTOR SHALL VERIFY.
3. DETAILS SHOWN ON THIS DRAWING ARE TYPICAL DETAILS AND SHALL BE USED WHOLLY OR IN PART WHERE THEY APPLY EXCEPT WHERE MODIFIED BY DETAILED DRAWINGS & SPECIFICATIONS.
4. PROVIDE 2-#6 X (B+4'-0") ADDITIONAL REBARS @ TOP AND BOTTOM AND 2-#6 X (A+4'-0") ADDITIONAL REBARS AT EACH SIDE OF OPENING IN WALLS ONLY.
5. PROVIDE ADDL BARS EQUAL TO ONE-HALF OF BARS INTERRUPTED AT EACH SIDE OF OPENING AT 3" C/C. THESE BARS SHALL BE ORIGINAL SIZES AND LENGTHS AS THOSE OF THE INTERRUPTED BARS. (TYPICAL FOR OPENINGS IN SLABS AND PRESSURE WALLS.)

STRUCTURAL STANDARD DETAILS

|                          |                                                                                               |
|--------------------------|-----------------------------------------------------------------------------------------------|
| PROJECT NO.              | R-0267-02-2                                                                                   |
| TITLE                    | CITY OF HOUSTON<br>DESIGN GUIDELINE DRAWINGS<br>FOR SUBMERSIBLE LIFT STATIONS                 |
| CITY OF HOUSTON          | DEPARTMENT OF PUBLIC WORKS AND ENGINEERING<br>ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP |
| APPROVALS                |                                                                                               |
| WATER DESIGN             | TRAFFIC AND SIGNAL DESIGN                                                                     |
| STORM SEWER DESIGN       | STREET, BRIDGE & R.O.W.                                                                       |
| WASTEWATER DESIGN        | CONSTRUCTION                                                                                  |
| OTHER REVIEWS            |                                                                                               |
| PLANNING AND DEVELOPMENT |                                                                                               |
| CITY ENGINEER            | DATE                                                                                          |
| SCALE: NONE              | DESIGNED BY:                                                                                  |
| SUBMITTED:               | DRAWN BY:                                                                                     |
| DATE: JANUARY, 1996      | SHEET NO. OF SHEETS                                                                           |
| SURVEY BY:               | DWG. NO.                                                                                      |
| FIELD BOOK NO.           | Z0S01                                                                                         |

CITY OF HOUSTON

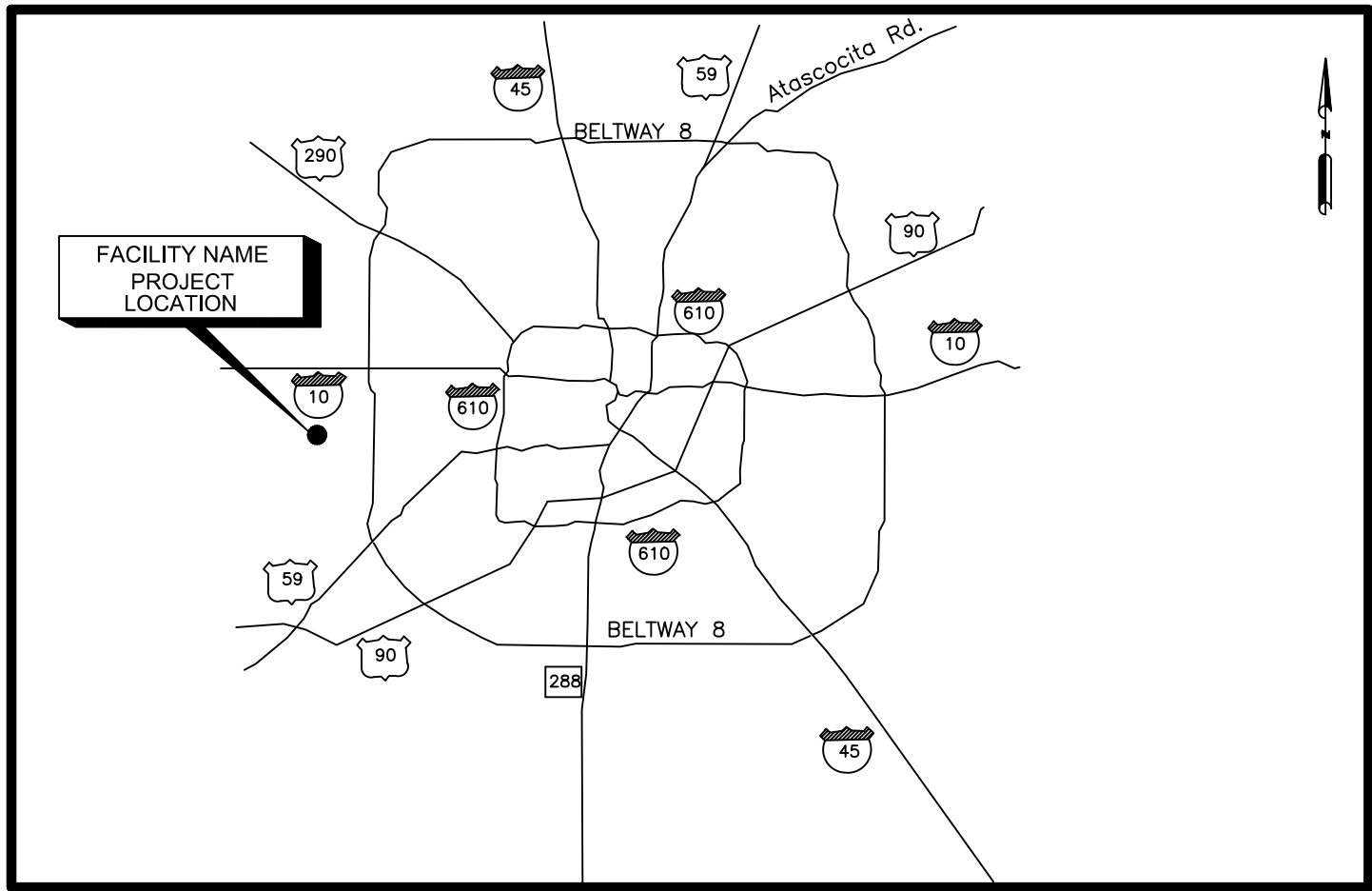
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

ENGINEERING AND CONSTRUCTION DIVISION

WBS PROJECT TITLE

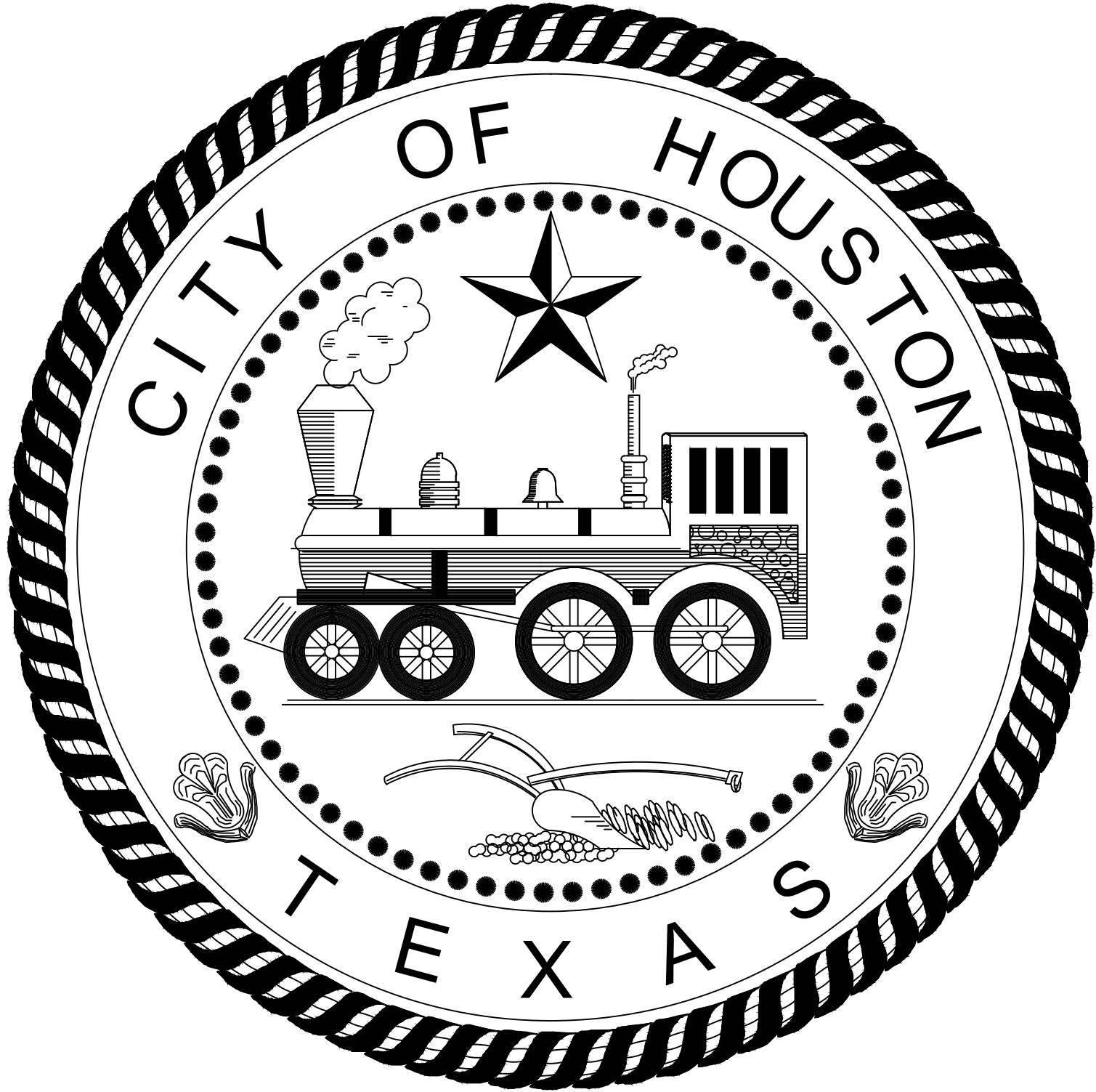
FACILITY NAME (FN ###)

WBS NO. R-#####-####-4



LOCATION MAP

NOT TO SCALE  
(KEY MAP ###X)



MAYOR  
ANNISE D. PARKER

CONTROLLER  
RONALD C. GREEN

DISTRICT  
COUNCIL MEMBERS

BRENDA STARDIG  
DISTRICT A

DWIGHT BOYKINS  
DISTRICT D

OLIVER PENNINGTON  
DISTRICT G

JERRY DAVIS  
DISTRICT B

DAVE MARTIN  
DISTRICT E

EDWARD GONZALEZ  
DISTRICT H

MIKE LASTER  
DISTRICT J

LARRY GREEN  
DISTRICT K

ELLEN R. COHEN  
DISTRICT C

RICHARD NGUYEN  
DISTRICT F

ROBERT GALLEGOS  
DISTRICT I

COUNCIL MEMBERS  
AT-LARGE

STEPHEN C. COSTELLO  
POSITION 1

MICHAEL KUBOSH  
POSITION 3

DAVID ROBINSON  
POSITION 2

C.O. BRADFORD  
POSITION 4

JACK CHRISTIE  
POSITION 5

ENGINEERING FIRM NAME & LOGO

Street Address  
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Houston, TX #####  
Tel: 713-###-####  
Fax: 713-###-####  
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ENGINEER OF  
RECORD SEAL

SURVEYED BY: SURVEY FIRM NAME  
FB NO. X-###

WATER

TRAFFIC AND TRANSPORTATION

WASTEWATER

PARKS & RECREATION

STORM WATER

WASTEWATER OPERATIONS

STREET & BRIDGE

ASSISTANT DIRECTOR

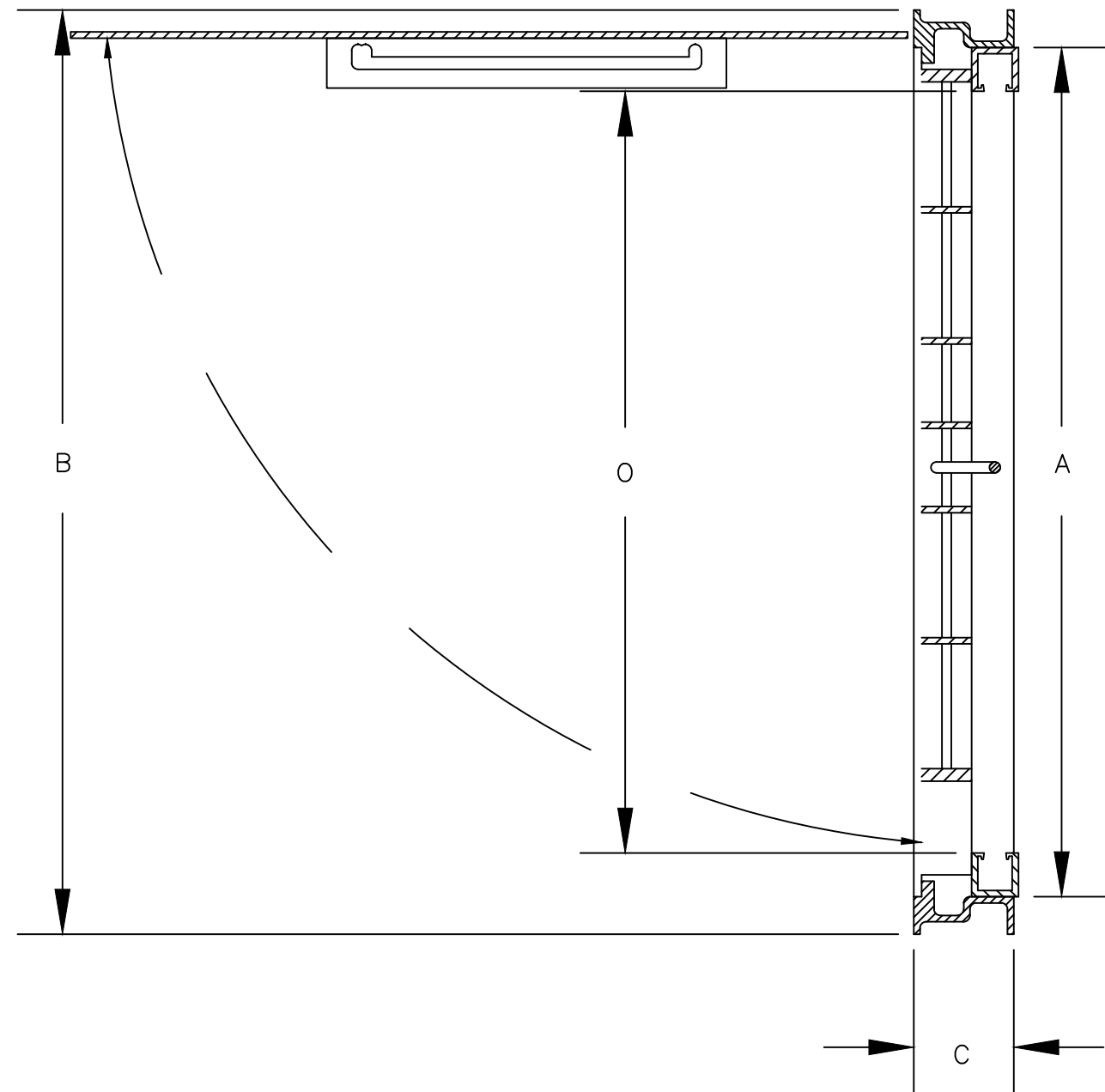
CONSTRUCTION

CITY ENGINEER      DATE

DIRECTOR OF PUBLIC      DATE  
WORKS AND ENGINEERING

SHEET NO.    X    OF    XXX SHEETS

ZOG01



Technical drawing of a circular manhole cover. The drawing shows the cover with a dashed line indicating the opening. Labels point to the ANCHOR PLATES, LIFTING HANDLE, and PADLOCK BAR. Dimensions are provided: 48" OPENING (width), 71" OPENING (height), and 77" OVERALL (TYP) (overall diameter).

NOTE:  
1. ALL HATCH COVERS MUST HAVE A RECESSED MECHANISM FOR A PADLOCK

RECESSED TYPE LOCK BOX

PRIMER REQUIRED

CONCRETE APPLICATION

71" OPENING

SECTION

1/4" (7 MM) THICK DIAMOND PATTERN ALUM. COVER PLATE

S.STL. & ALUM. POSITIVE LOCKING HOLD OPEN ARM

T-316 STAINLESS STEEL HINGES WITH TAMPER PROOF FASTENERS

OMIT ANCHOR PLATES FOR FIBERGLASS APPLICATION

(COVER SHOWN IN OPEN POSITION)

| STANDARD SIZES |           |                    |                    |                    |                     |
|----------------|-----------|--------------------|--------------------|--------------------|---------------------|
| QTY.           | MODEL NO. | A DIM. INCHES (MM) | B DIM. INCHES (MM) | C DIM. INCHES (MM) | UNIT WT. LBS. (KG.) |
| 1              | R1R72     | 48 (1219)          | 71 (1803)          | 77 (1956)          | 175 (79)            |

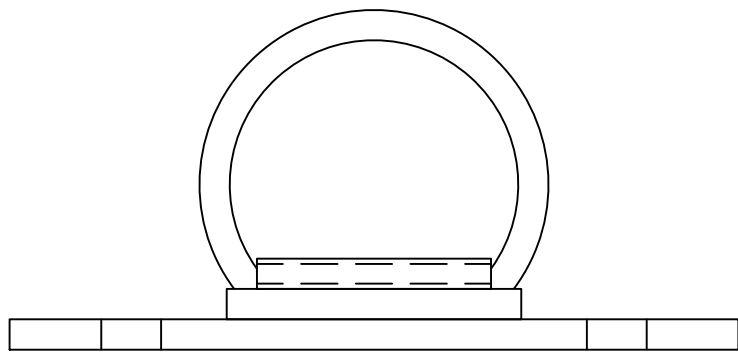
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| REV. NO. | DESCRIPTION | APP'D | DATE |



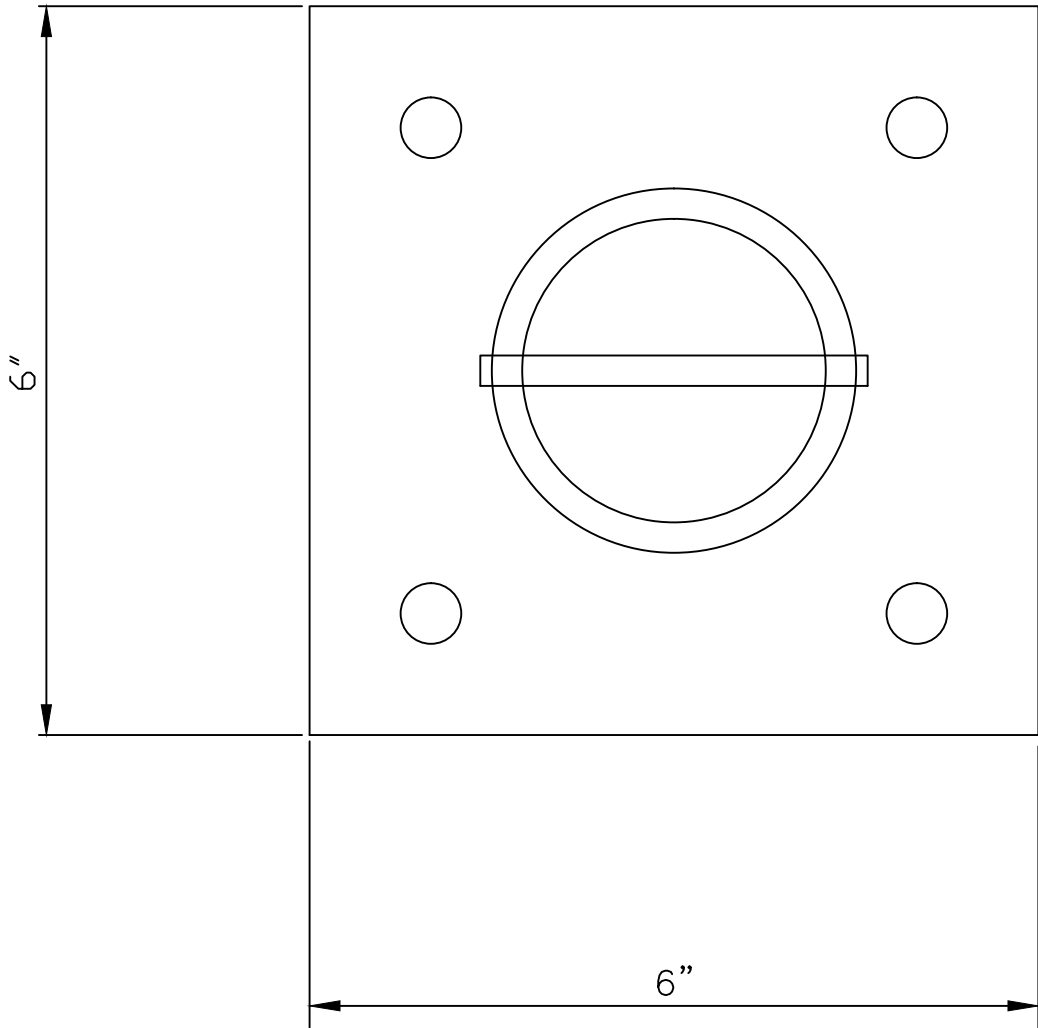
3" DROP FORGED "D" RING

2" DIAMETER STEEL  
PLATE 1/8" THICKNESS

2 1/2" DIAMETER STEEL  
PLATE 3/16" THICKNESS



SIDE VIEW



PLAN VIEW

CB SERIES FALL PROTECTION CB-1B BOLT  
ANCHORED



NOTES:

- STEEL BASE PLATE SHALL BE 1/4" HOT ROLLED STEEL PLATE THAT MEETS ASTM A-570 SPECIFICATIONS.
- 2 1/2" DIAMETER STEEL PLATE, 3/16" THICK ATTACHED TO BASE PLATE USING 1/4" FILLET WELD.
- 2" DIAMETER FORMED STEEL PLATE, 1/8" THICK USED TO ATTACHED "D" RING TO THE 2 1/2" DIAMETER STEEL PLATE USING A 1/6" FILLET WELD.
- BASE PLATE CAN BE BOLTED TO CONCRETE, STEEL, OR WOOD AS NEEDED PER APPLICATION.
- ANCHOR BOLTS SHALL BE 1/2" DIAMETER ANCHOR BOLTS.
- ANCHOR BOLTS SHALL SUSTAIN A MINIMUM ULTIMATE PULL-OUT LOAD OF AT LEAST 6,000 POUNDS.
- WELDING SHALL BE PERFORMED BY A CERIFIED WELDER USING E-70XX ROD OR WIRE FEED.

SEAL

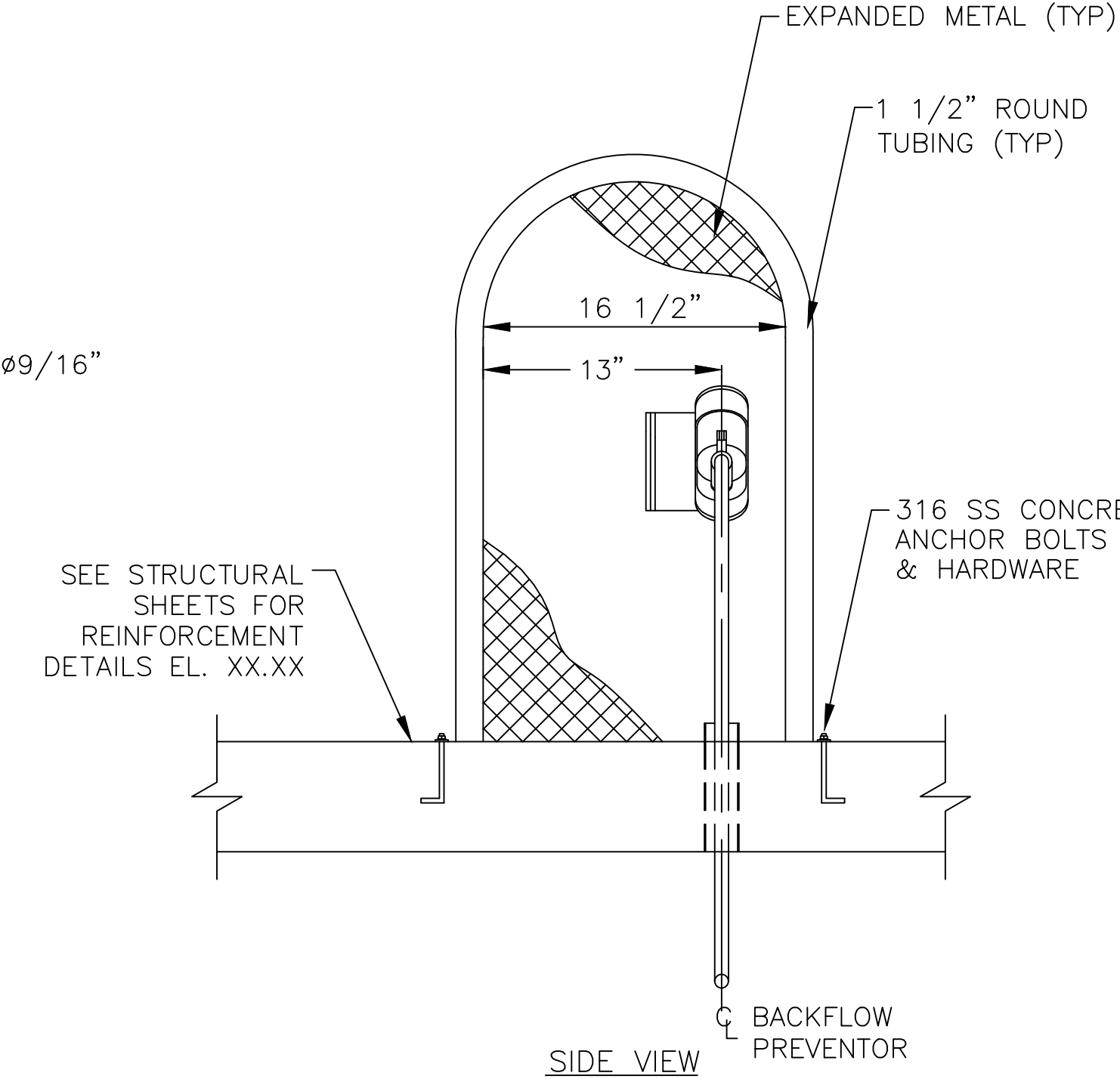
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ZOC08.DWG (Scale: 1=8)

COHSTD.BDR

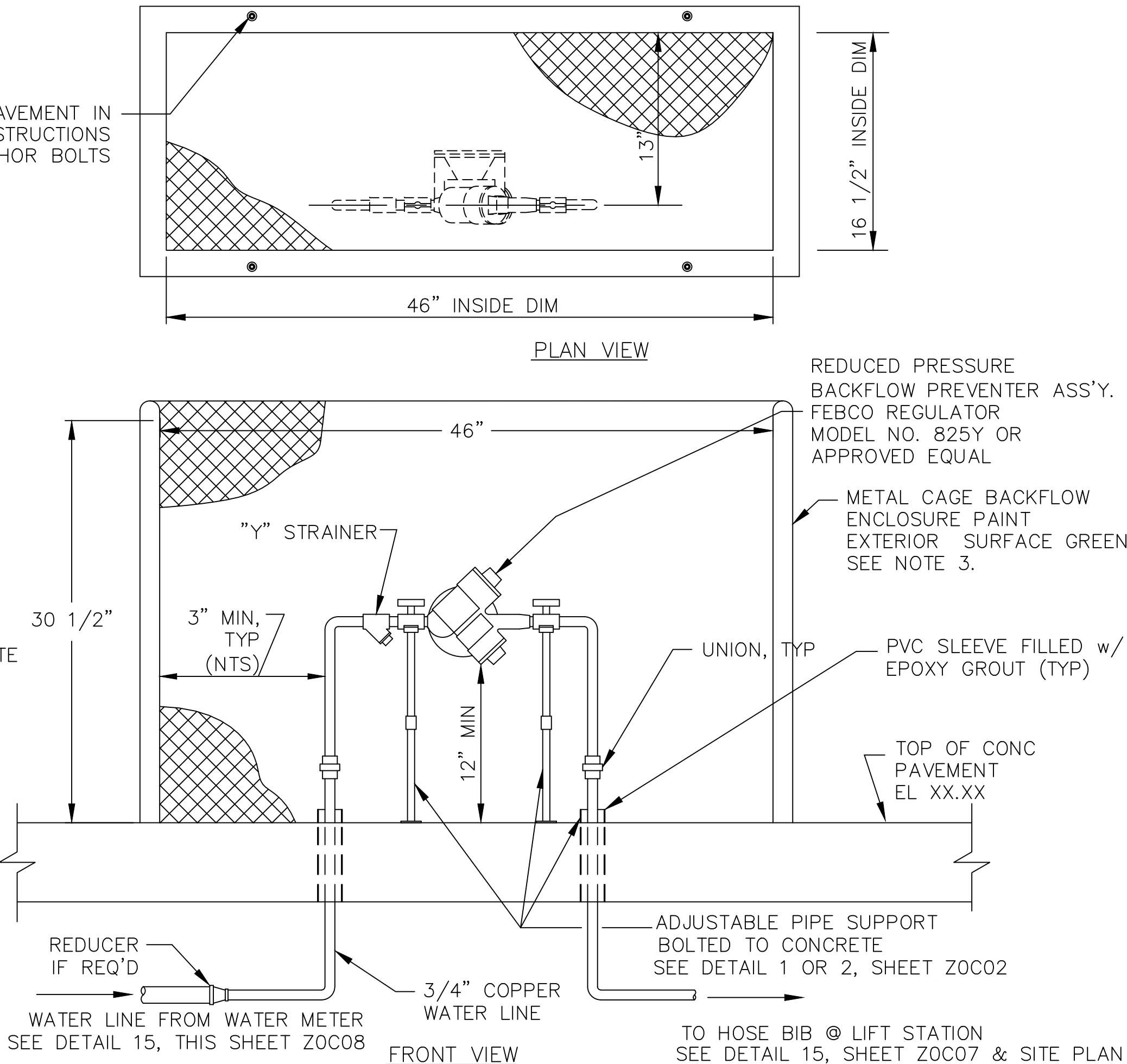
0 1 2 3

ORIGINAL SCALE IN INCHES  
FOR REDUCED PLANS

ANCHOR ENCLOSURE TO PAVEMENT IN  
ACCORDANCE WITH MFG'S INSTRUCTIONS  
USING TYPE 316 SS CONC ANCHOR BOLTS



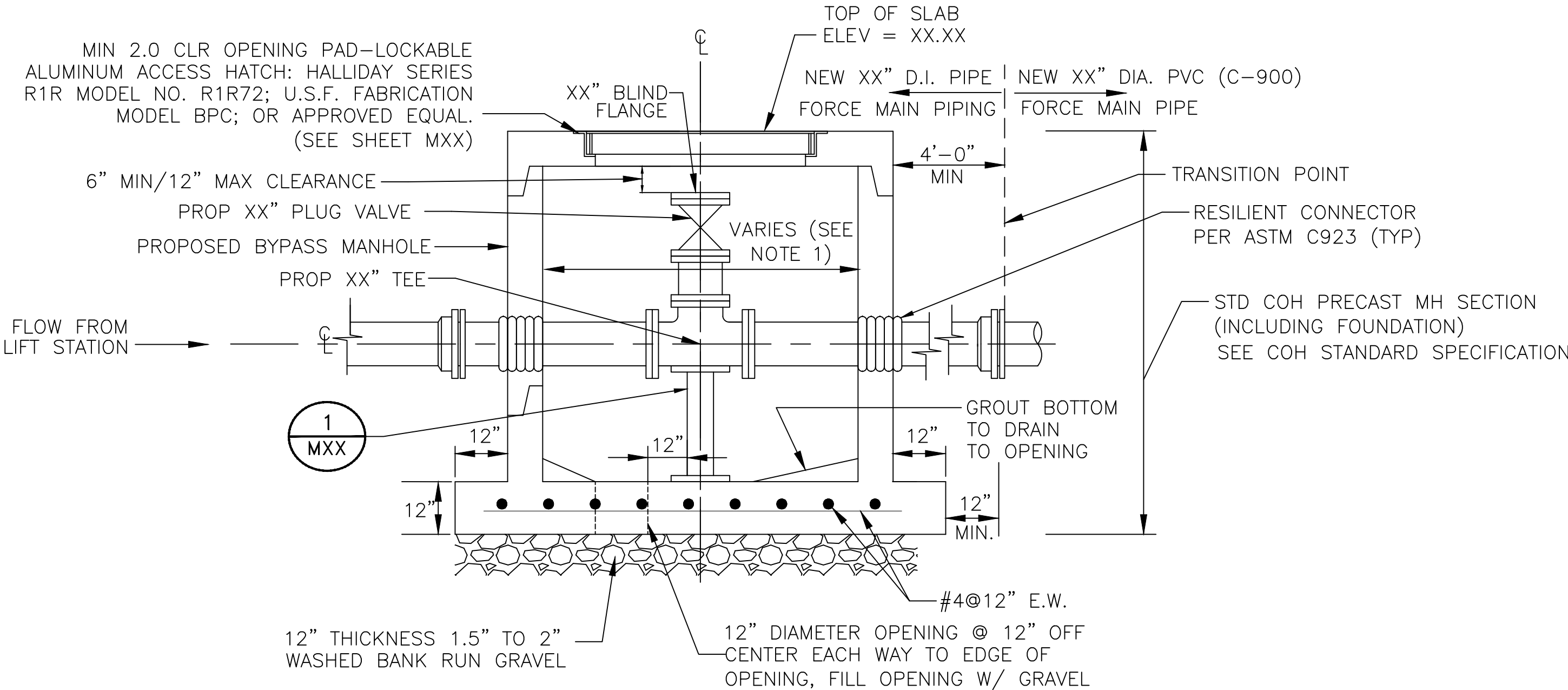
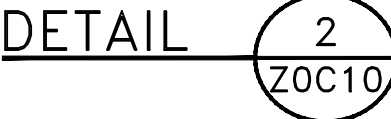
SIDE VIEW



PLAN VIEW

FRONT VIEW

REDUCED PRESSURE BACKFLOW PREVENTOR INSTALLATION



BYPASS MANHOLE



SCALE: 1/2"=1'

|          |             |       |      |
|----------|-------------|-------|------|
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|          |             |       |      |
|          |             |       |      |
| REV. NO. | DESCRIPTION | APP'D | DATE |

NOTES TO DESIGN ENGINEER:

- A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER SUBMERSIBLE LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS. IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.
- B. THE DESIGN ENGINEER SHALL DETERMINE SIZE OF WATER SERVICE LINES, METER, AND BACKFLOW PREVENTER PER SPECIFIC SITE REQUIREMENTS.
- C. DESIGN ENGINEER TO REVISE NOTE NO. 2 TO CONTRACTOR BY SELECTING THE APPROPRIATE COLOR OF FENCING AND SLATS. DO NOT LEAVE SELECTIONS IN "ITALIC" TEXT. SELECTION OF COLOR TO BE DETERMINED DURING PROJECT REVIEW.
- D. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.
- E. THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL, THE ENGINEERING DESIGN MANUAL, AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.
- F. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.

NOTE:

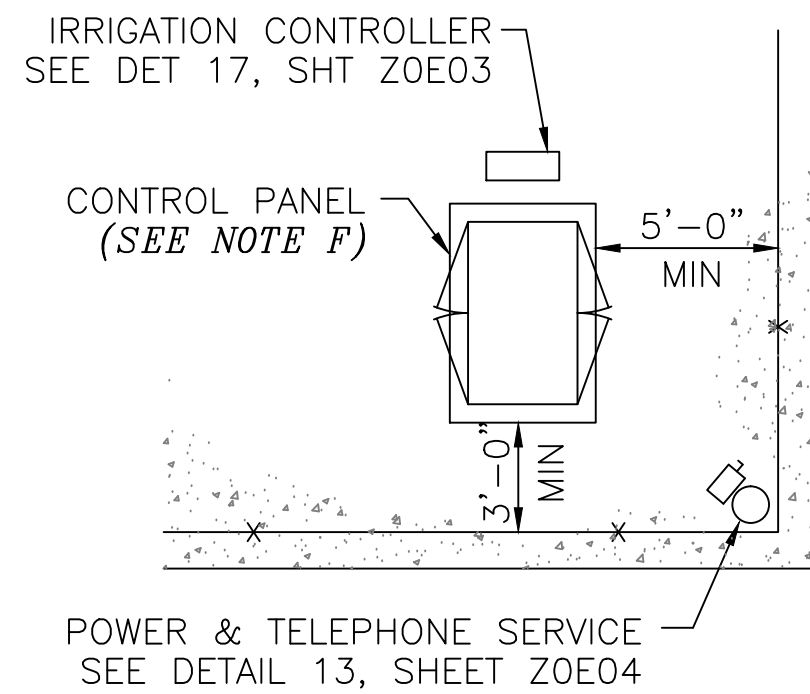
1. VERIFY BYPASS MANHOLE DIAMETER WITH COH PM. MINIMUM DIAMETER SIZE EQUAL TO 6 FEET.

TYPICAL SITE DETAILS

|                                                                                                                  |                |                                                                               |           |
|------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------|-----------|
| PROJECT NO.                                                                                                      |                | R-0267-02-2                                                                   |           |
| TITLE                                                                                                            |                | CITY OF HOUSTON<br>DESIGN GUIDELINE DRAWINGS<br>FOR SUBMERSIBLE LIFT STATIONS |           |
| CITY OF HOUSTON<br>DEPARTMENT OF PUBLIC WORKS AND ENGINEERING<br>ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP |                |                                                                               |           |
| APPROVALS                                                                                                        |                |                                                                               |           |
| WATER DESIGN                                                                                                     |                | TRAFFIC AND SIGNAL DESIGN                                                     |           |
| STORM SEWER DESIGN                                                                                               |                | STREET, BRIDGE & R.O.W.                                                       |           |
| WASTEWATER DESIGN                                                                                                |                | CONSTRUCTION                                                                  |           |
| OTHER REVIEWS                                                                                                    |                |                                                                               |           |
| PLANNING AND DEVELOPMENT                                                                                         |                |                                                                               |           |
| CITY ENGINEER                                                                                                    |                | DATE                                                                          |           |
| SCALE:                                                                                                           | NONE           | DESIGNED BY:                                                                  |           |
| SUBMITTED:                                                                                                       |                | DRAWN BY:                                                                     |           |
| DATE:                                                                                                            | DECEMBER, 1996 | SHEET NO.                                                                     | OF SHEETS |
| SURVEY BY:                                                                                                       |                | DWG. NO.                                                                      |           |
| FIELD BOOK NO.                                                                                                   |                | ZOC10                                                                         |           |

| PUMP<br>STATION<br>DESCRIPTION | INDIVIDUAL<br>PUMP CAPACITY<br>IN GPM |      | LIFT STATION FIRM<br>DESIGN CAPACITY<br>IN GPM |        | WET WELL<br>DIAMETER | MIN<br>DESIRED<br>SITE SIZE |
|--------------------------------|---------------------------------------|------|------------------------------------------------|--------|----------------------|-----------------------------|
|                                | FROM                                  | TO   | FROM                                           | TO     |                      |                             |
| 2 PUMP                         | 0                                     | 199  | 0                                              | 199    | 6'-0"                | 55'x55'                     |
| 2 PUMP                         | 200                                   | 499  | 200                                            | 499    | 8'-0"                | 55'x55'                     |
| 2 PUMP                         | 500                                   | 999  | 500                                            | 999    | 10'-0"               | 70'x70'                     |
| 3 PUMP                         | 250                                   | 500  | 500                                            | 999    | 10'-0"               | 70'x70'                     |
| 3 PUMP                         | 500                                   | 999  | 1000                                           | 1998   | 12'-0"               | 75'x75'                     |
| 3 PUMP                         | 1000                                  | 1399 | 2000                                           | 2798   | 14'-0"               | 75'x75'                     |
| 3 PUMP                         | 1400                                  | 1999 | 2800                                           | 3998   | 16.5'-0"             | 75'x75'                     |
| 3 PUMP                         | 2000                                  | 3499 | 4000                                           | 7198   | 21'-0"               | 85'x85'                     |
| 4 PUMP                         | 800                                   | 3499 | 2400                                           | 10,497 | 21'-0"               | 85'x85'                     |
| 5 PUMP                         | 2500                                  | 3999 | 7500                                           | 15,996 | 25'-0"               | 85'x85'                     |
| 6 PUMP                         | 3000                                  | 5299 | 15,000                                         | 21,196 | 28'-0"               | 90'x90'                     |

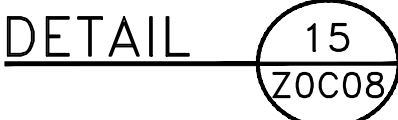
- A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER SUBMERSIBLE LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS.  
IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.
- B. DESIGN ENGINEER SHALL VERIFY THAT THE MINIMUM DESIRED SITE SIZE WILL BE SUFFICIENT TO ALLOW FOR LANDSCAPING.
- C. SPECIFY NATIVE, LOW MAINTENANCE LANDSCAPING OUTSIDE OF THE PAVED, FENCED AREA IN ACCORDANCE WITH THE CURRENT CITY OF HOUSTON ORDINANCE 100-100-001. PROVIDE LANDSCAPING ON SIDES AND IN REAR OF SITE AS REQUIRED FOR NEIGHBORHOOD. DESIGN ENGINEER TO SPECIFY IRRIGATION SYSTEM FOR LANDSCAPING INCLUDING ELECTRIC VALVES AND IRRIGATION CONTROLLER.
- D. THE DESIGN ENGINEER SHALL SPECIFY PROTECTIVE BOLLARDS AT HOSE BIBB, BACKFLOW PREVENTOR, AND WET WELL VENTING LOCATIONS.
- E. DESIGN ENGINEER SHALL ADOPT THE GENERAL SITE LAYOUT AS SHOWN TO HIS/HER SPECIFIC PROJECT. DO NOT ROTATE LIFT STATION UNLESS SPECIFIC SITE CONSTRAINTS REQUIRE. PLACE 90 DEGREE TURN IN FORCE MAIN RATHER THAN INCOMING SEWER.
- F. LOCATE THE CONTROL BUILDING OR PANEL IN THE SOUTHEAST CORNER OF THE STATION SITE, WHERE POSSIBLE. MAINTAIN CLEARANCES AROUND CONTROL PANEL AND OTHER ELECTRICAL EQUIPMENT IN ACCORDANCE WITH NEC 93 (110-16).
- G. LOCATE THE WET WELL VENTING ON THE NORTHWEST SIDE OF THE WET WELL, WHERE POSSIBLE. POSITION VENT TO AVOID CONFLICT WITH HOIST FOR PUMP REMOVAL.
- H. LOCATE ELECTRICAL JUNCTION BOXES AWAY FROM WET WELL VENT IN A SOUTHEASTERLY DIRECTION. POSITION JUNCTION BOXES TO AVOID CONFLICT WITH HOIST FOR PUMP REMOVAL.
- I. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.
- J. THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DRAWINGS.
- K. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.



THIS DRAWING IS AN EXAMPLE ONLY  
AND  
IS NOT TO BE INCLUDED IN A PROJECT DRAWING PACKAGE

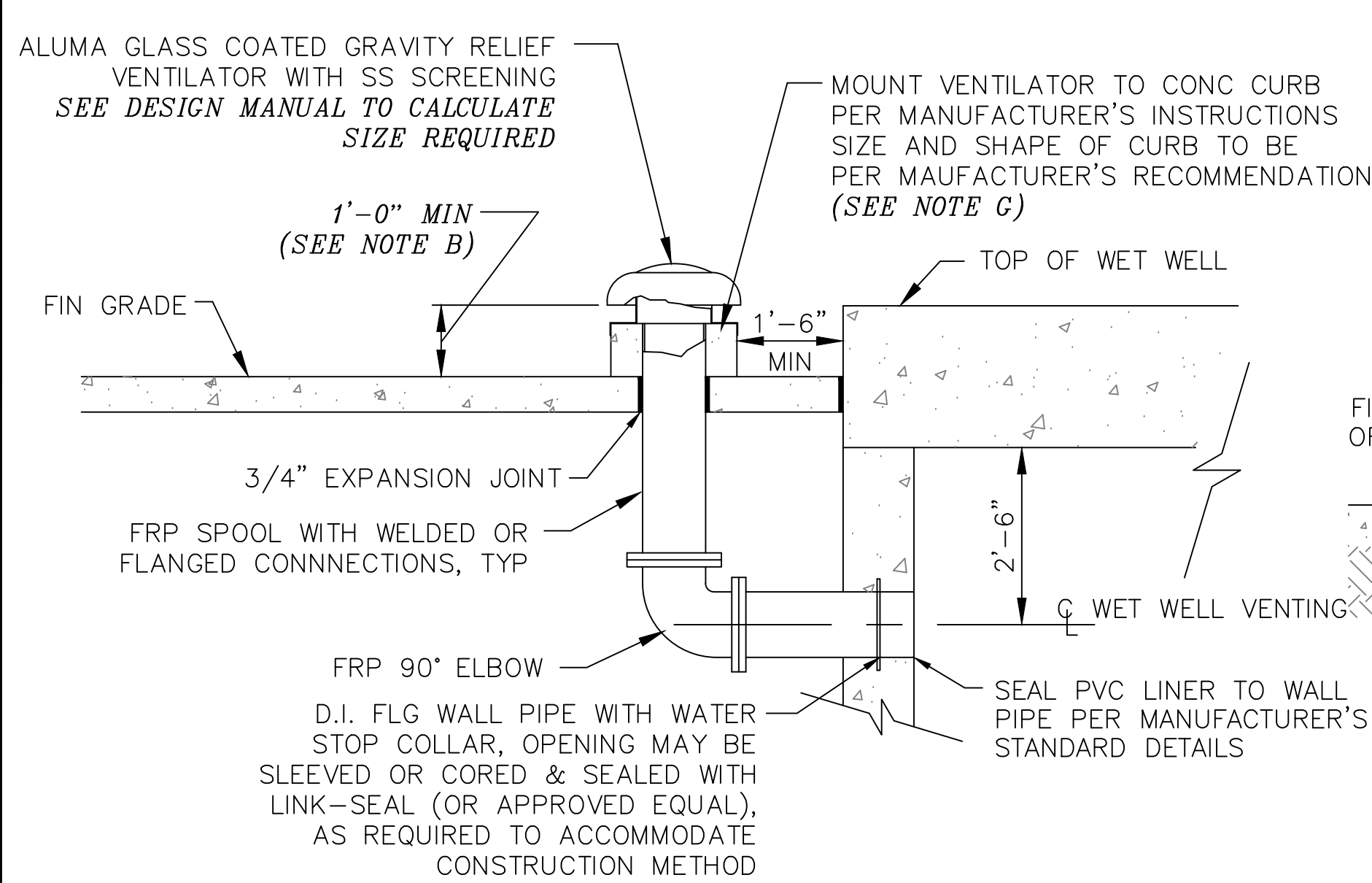
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Z0C09.DWG (Scale: 1=64)

|                          |              |           |
|--------------------------|--------------|-----------|
| OTHER REVIEWS            |              |           |
| PLANNING AND DEVELOPMENT |              |           |
|                          |              |           |
| CITY ENGINEER            | DATE         |           |
| SCALE: 3/16" = 1'-0"     | DESIGNED BY: |           |
| SUBMITTED:               | DRAWN BY:    |           |
| DATE: DECEMBER, 1996     | SHEET NO.    | OF SHEETS |
| SURVEY BY:               | DWG. NO.     |           |
| FIELD BOOK NO.           | Z0C09        |           |



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| REV. NO. | DESCRIPTION | APP'D | DATE |

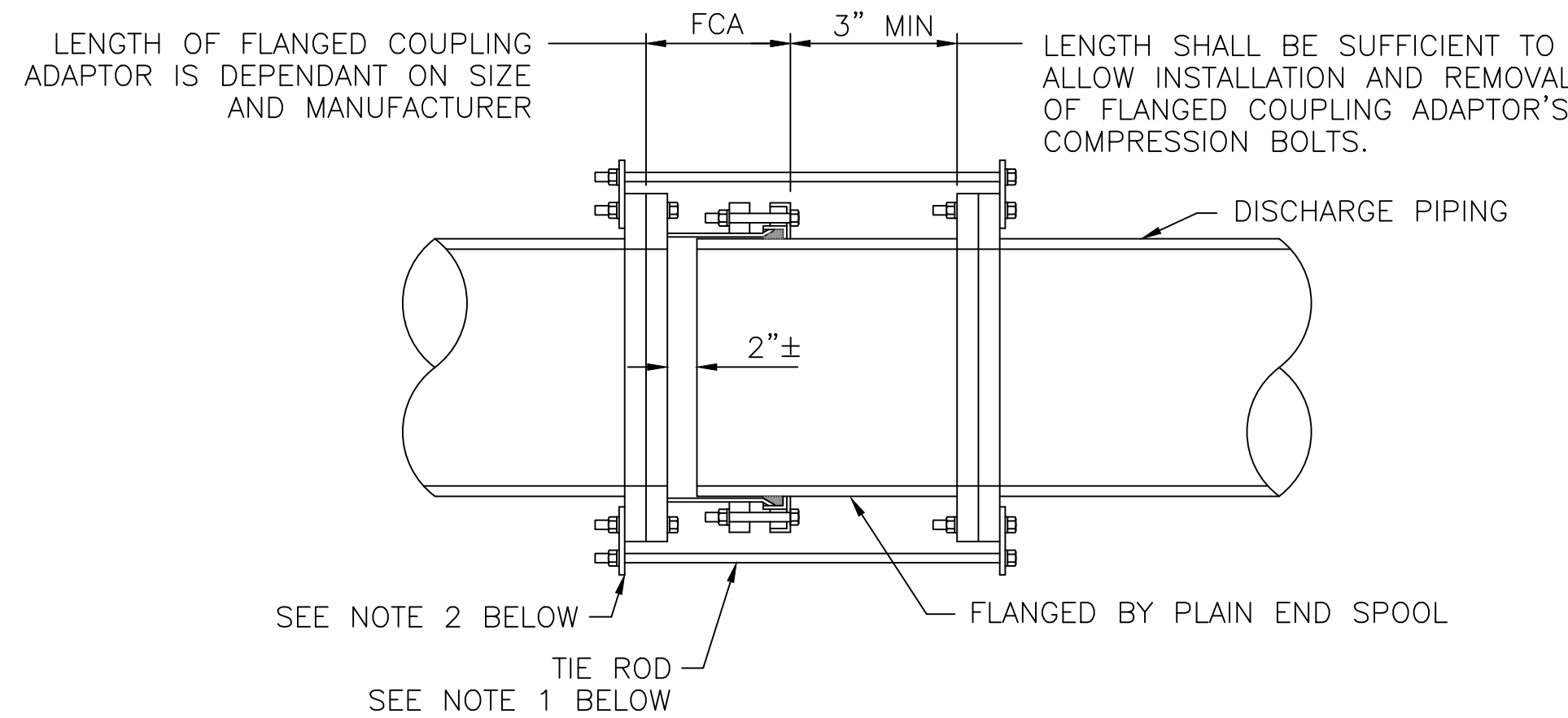




NOTE:  
FOR HIGH PROFILE VENTING  
SEE DETAIL 1 ON SHEET  
ZOC02. SEE NOTE C.

TYPICAL LOW PROFILE (PREFERRED)  
WET WELL VENTING INSTALLATION

DETAIL 1A  
ZOC07

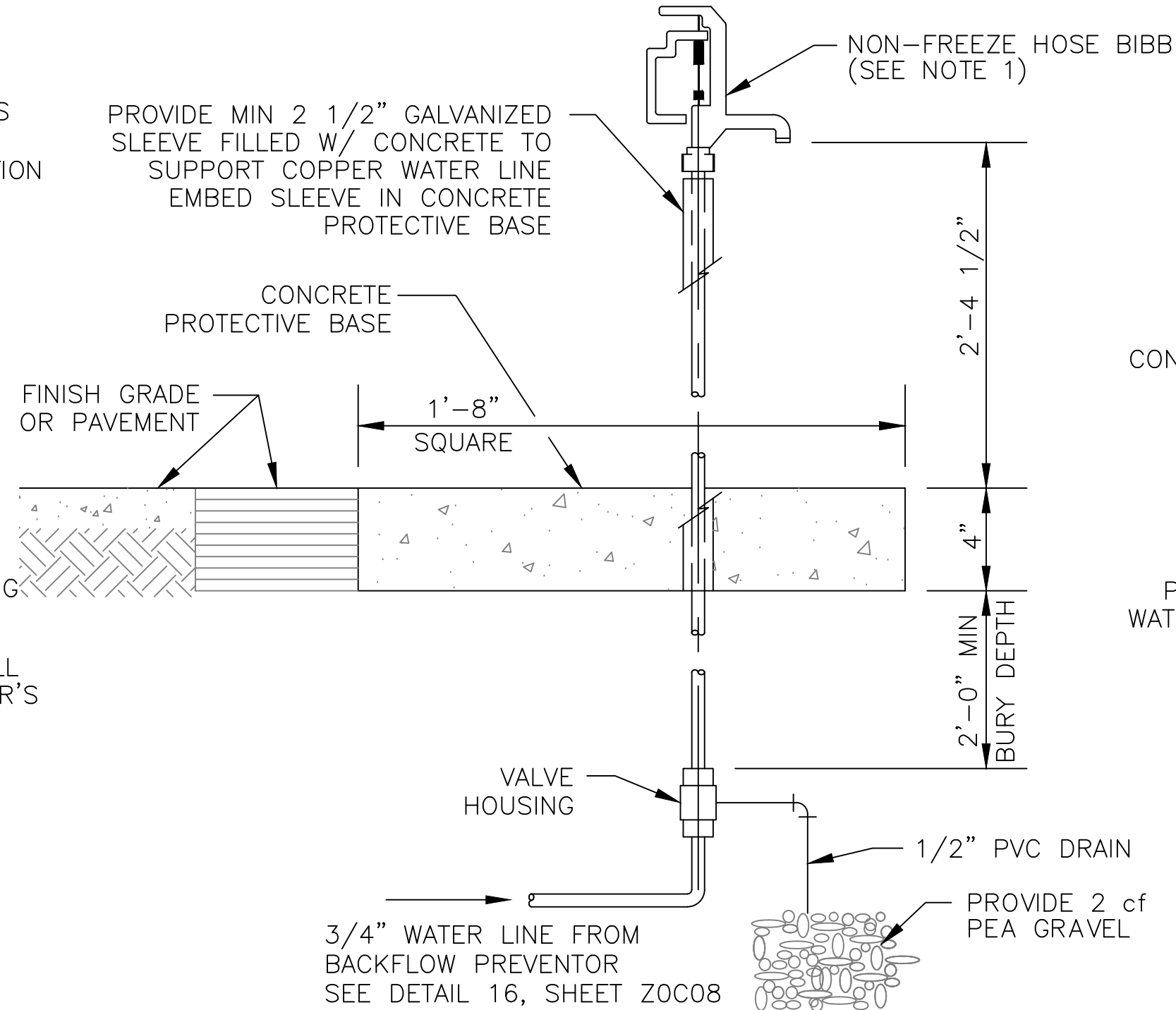


NOTES:

1. PROVIDE A NUMBER OF TIE RODS EQUAL TO 1/2 THE NUMBER OF FLANGE BOLTS. EVENLY SPACE INSTALLATION OF TIE RODS. DIAMETER OF TIE RODS TO BE EQUAL TO THE DIAMETER OF FLANGE BOLTS. LENGTH OF TIE RODS TO BE DETERMINED BY CONTRACTOR BASED ON SIZE AND MANUFACTURER OF FLANGED COUPLING ADAPTOR AND FINAL LENGTH OF SPOOL PIECE.
2. PROVIDE 316 SS TAB FOR ATTACHMENT OF TIE RODS. SIZE TO BE DETERMINED BY CONTRACTOR.
3. CONTRACTOR TO SUBMIT DETAILS DURING SHOP DRAWING SUBMISSION.
4. ALL HARDWARE SHALL BE 316 STAINLESS STEEL. TIE RODS SHOULD BE THREADED.
5. THIS RESTRAINT DOES NOT REPLACE THRUST BLOCKS TO BE PROVIDED AT OTHER LOCATIONS.

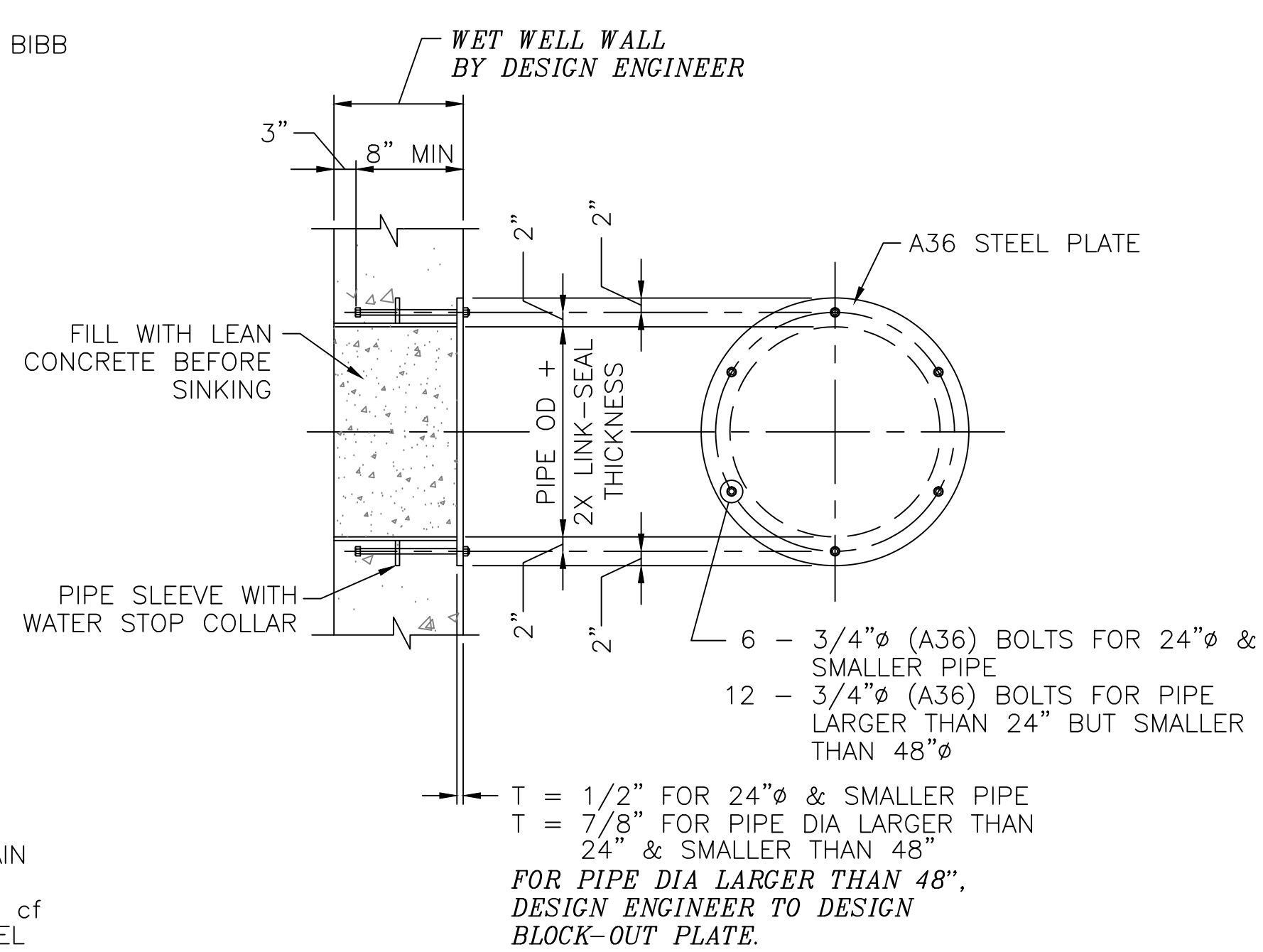
TYP FLANGED COUPLING ADAPTOR  
RESTRAINT DETAIL

DETAIL 14  
ZOC07



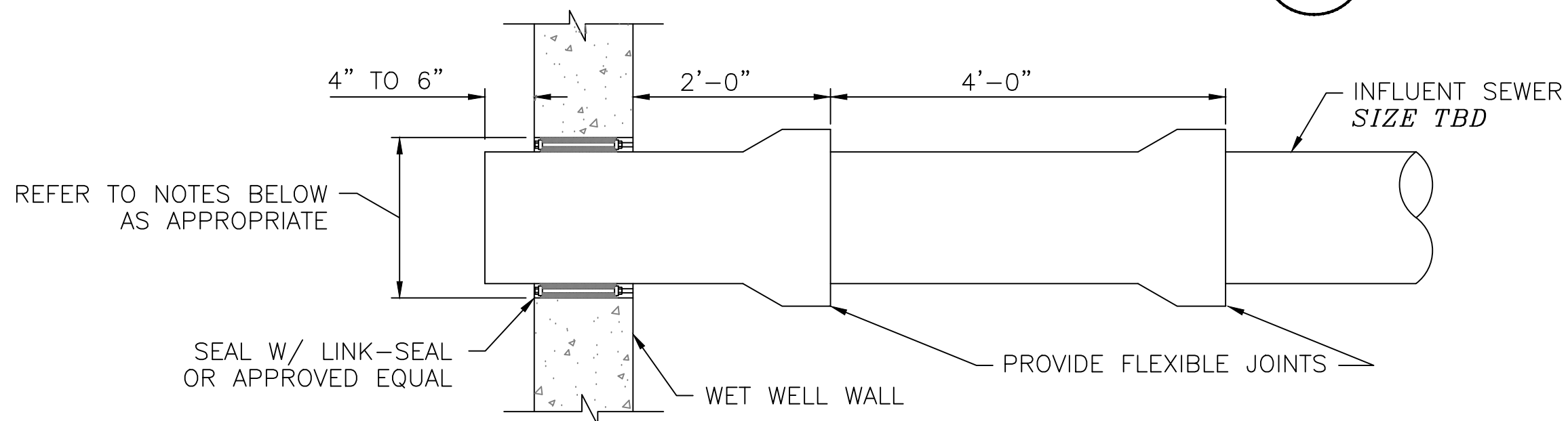
TYP NON-FREEZE HOSE BIBB DETAIL

DETAIL 12  
ZOC07



TYPICAL PIPE BLOCK-OUT DETAIL  
FOR CAISSON CONSTRUCTION

DETAIL 13A  
ZOC07



TYP INFLUENT SEWER ENTRY DETAIL

DETAIL 13  
ZOC07

NOTES TO DESIGN ENGINEER:

- A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER SUBMERSIBLE LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS. IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.
- B. DESIGN ENGINEER TO DETERMINE APPROPRIATE HEIGHT BASED ON SIZE OF VENTING. FINAL DIMENSION SHALL LOCATE VENT OUTLET AT NOT LESS THAN 1'-0" ABOVE THE 100 YEAR FLOOD PLAIN ELEVATION.
- C. DESIGN ENGINEER SHALL REVISE, AS REQUIRED, THE CORRESPONDING PROJECT CIVIL, ELECTRICAL, AND STRUCTURAL STATION DRAWINGS TO REFLECT THE CORRECT VENTING (LOW OR HIGH PROFILE).
- D. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.
- E. THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL, THE ENGINEERING DESIGN MANUAL, AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.
- F. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.
- G. THE DESIGN ENGINEER SHALL SPECIFY CURB SIZE AND REINFORCING BASED ON SIZE AND SHAPE REQUIRED FOR INSTALLATION OF GRAVITY RELIEF VENTILATOR.

NOTES:

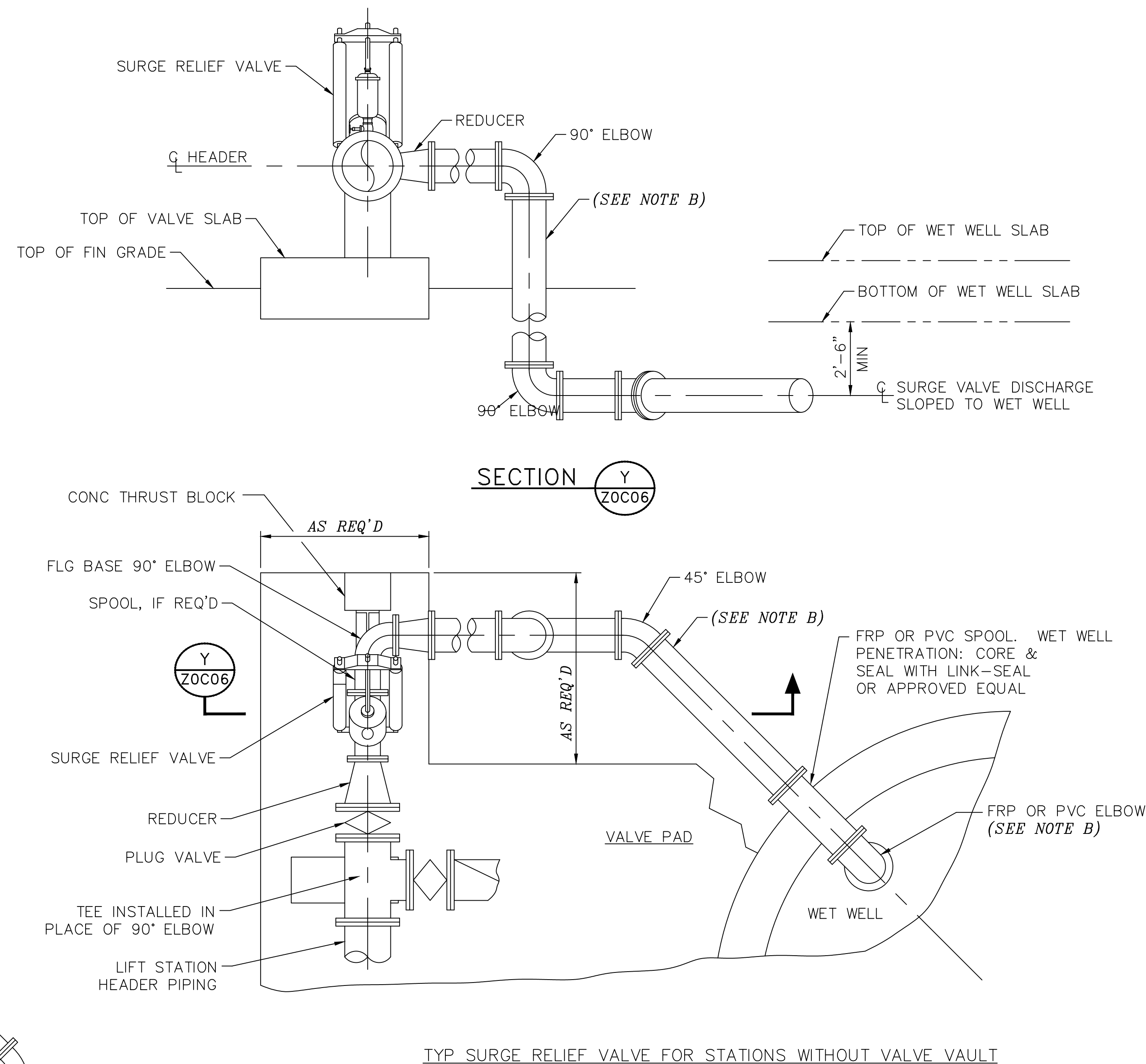
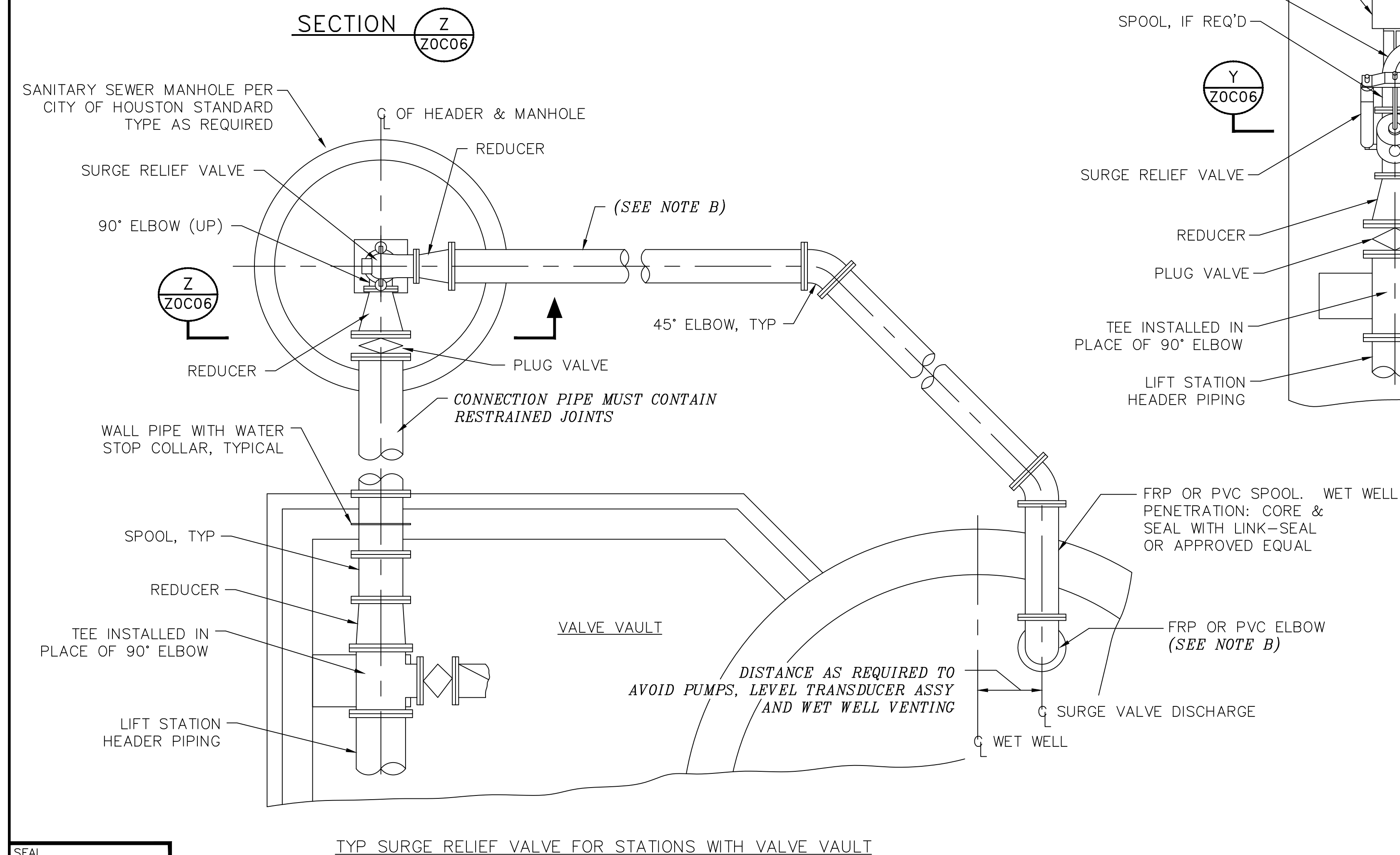
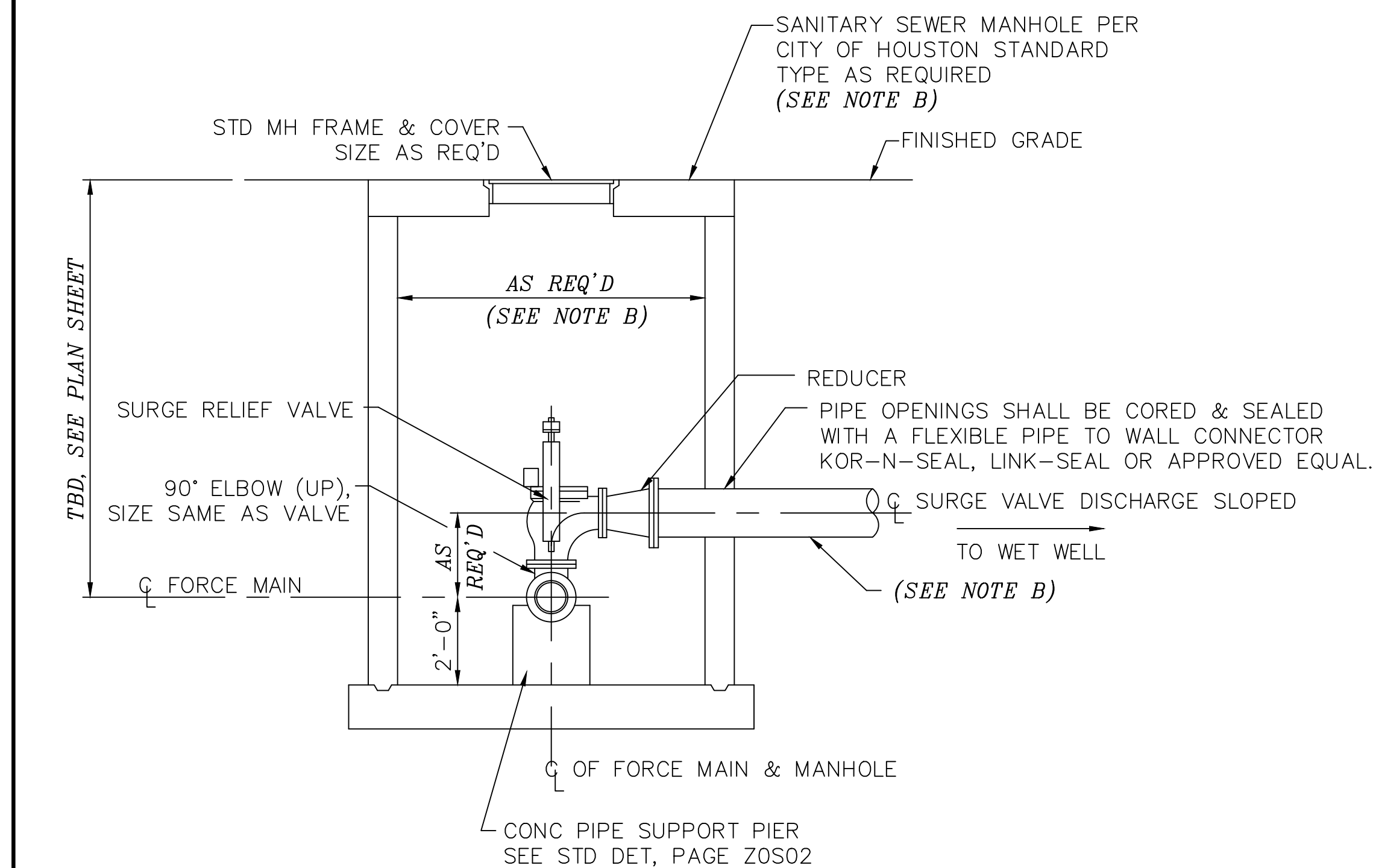
1. PROVIDE WARNING SIGN WHEN HOSE BIBB IS USED FOR POTABLE WATER.

TYPICAL DETAILS

|                          |                                                                                               |
|--------------------------|-----------------------------------------------------------------------------------------------|
| PROJECT NO.              | R-0267-02-2                                                                                   |
| TITLE                    | CITY OF HOUSTON<br>DESIGN GUIDELINE DRAWINGS<br>FOR SUBMERSIBLE LIFT STATIONS                 |
| CITY OF HOUSTON          | DEPARTMENT OF PUBLIC WORKS AND ENGINEERING<br>ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP |
| APPROVALS                |                                                                                               |
| WATER DESIGN             | TRAFFIC AND SIGNAL DESIGN                                                                     |
| STORM SEWER DESIGN       | STREET, BRIDGE & R.O.W.                                                                       |
| WASTEWATER DESIGN        | CONSTRUCTION                                                                                  |
| OTHER REVIEWS            |                                                                                               |
| PLANNING AND DEVELOPMENT |                                                                                               |
| CITY ENGINEER            | DATE                                                                                          |
| SCALE:                   | NONE                                                                                          |
| SUBMITTED:               | DESIGNED BY:                                                                                  |
| DATE:                    | DRAWN BY:                                                                                     |
| SURVEY BY:               | SHEET NO. OF SHEETS                                                                           |
| FIELD BOOK NO.           | DWG. NO. ZOC07                                                                                |

SEAL

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ZOC07.DWG (Scale: 1=24)



NOTE:  
WHEN A SURGE RELIEF VALVE IS USED IN LIFT STATION DESIGN THE  
DESIGN ENGINEER SHALL PROVIDE AN ANALYSIS IN THE FINAL  
ENGINEERING DESIGN REPORT FOR JUSTIFICATION OF ITS USE & ITS SIZE.

NOTES TO DESIGN ENGINEER:

A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER SUBMERSIBLE LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS.

IT IS THE RESPONSIBILITY OF THE CONTRACTED  
DESIGN ENGINEER TO VERIFY THE COMPLETENESS  
AND ACCURACY OF THE INFORMATION HEREIN  
CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC  
SITE REQUIREMENTS.

B. DESIGN ENGINEER SHALL SELECT THE APPROPRIATE SURGE VALVE INSTALLATION DETAIL, IF REQUIRED, AND DELETE THE OTHER. DESIGN ENGINEER SHALL PROVIDE MANHOLE, VALVE AND PIPE SIZES FOR SPECIFIC LIFT STATION REQUIREMENTS.

C. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.

D. THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL, THE ENGINEERING DESIGN MANUAL, AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.

E. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.

### TYPICAL DETAILS

#### SURGE RELIEF VALVE INSTALLATION

PROJECT NO. R-0267-02-2

|       |                                                                               |
|-------|-------------------------------------------------------------------------------|
| TITLE | CITY OF HOUSTON<br>DESIGN GUIDELINE DRAWINGS<br>FOR SUBMERSIBLE LIFT STATIONS |
|-------|-------------------------------------------------------------------------------|

**CITY OF HOUSTON**  
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP

## APPROVALS

|              |                           |
|--------------|---------------------------|
| WATER DESIGN | TRAFFIC AND SIGNAL DESIGN |
|--------------|---------------------------|

|                    |                         |
|--------------------|-------------------------|
| STORM SEWER DESIGN | STREET, BRIDGE & R.O.W. |
|--------------------|-------------------------|

|                   |              |
|-------------------|--------------|
| WASTEWATER DESIGN | CONSTRUCTION |
|-------------------|--------------|

## OTHER REVIEWS

## PLANNING AND DEVELOPMENT

CITY ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_

|        |      |
|--------|------|
| SCALE: | NONE |
|--------|------|

|            |       |           |
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| DATE:      | 11/12 | DRAWN BY: |
| SUBMITTED: |       |           |

|       |                |          |    |        |
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| DATE: | DECEMBER, 1996 | SHEET NO | OF | SHEETS |
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| DATE: DECEMBER, 1999 | SHEET NO. |
| SURVEY BY:           | DWG. NO.  |

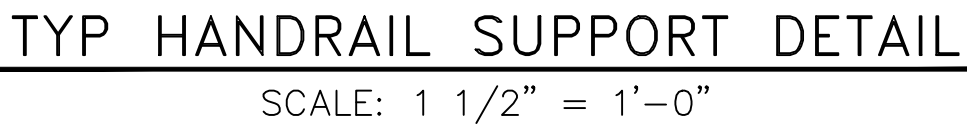
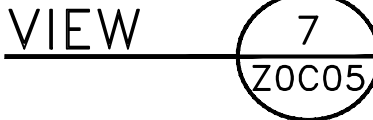
FIELD BOOK NO. Z0C06

SEAL

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TYP SURGE RELIEF VALVE INSTALLATION DETAILS  
(WHEN REQUIRED)

[illegible]



NOTES TO DESIGN ENGINEER:

A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS.

IT IS THE RESPONSIBILITY OF THE CONTRACTED  
DESIGN ENGINEER TO VERIFY THE COMPLETENESS  
AND ACCURACY OF THE INFORMATION HEREIN  
CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC  
SITE REQUIREMENTS.

B. THE DESIGN ENGINEER SHALL PROVIDE THE CATWALK MANUFACTURER WITH CLEARLY DEFINED DIMENSIONS AND SUPPORT LOCATIONS IN ORDER TO FACILITATE THE DESIGN OF CATWALK BY THE MANUFACTURER.

C. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.

D. THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL, THE ENGINEERING DESIGN MANUAL, AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.

E. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES AND ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.

NOTES:

1. CONTRACTOR TO PROVIDE DETAIL DRAWINGS DURING SHOP DRAWING SUBMISSION.

## TYPICAL CATWALK DETAILS

PROJECT NO. R-0267-02-2

TITLE CITY OF HOUSTON  
DESIGN GUIDELINE DRAWINGS  
FOR SUBMERSIBLE LIFT STATIONS

CITY OF HOUSTON  
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP

## APPROVALS

| WATER DESIGN                                                                                                                                                                                                                                                                                                                                                                | TRAFFIC AND SIGNAL DESIGN                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. <b>WATER SUPPLY</b></p> <p>2. <b>WATER DEMAND</b></p> <p>3. <b>WATER TREATMENT</b></p> <p>4. <b>WATER DISTRIBUTION</b></p> <p>5. <b>WATER TREATMENT PLANT</b></p> <p>6. <b>WATER TREATMENT PLANT</b></p> <p>7. <b>WATER TREATMENT PLANT</b></p> <p>8. <b>WATER TREATMENT PLANT</b></p> <p>9. <b>WATER TREATMENT PLANT</b></p> <p>10. <b>WATER TREATMENT PLANT</b></p> | <p>1. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>2. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>3. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>4. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>5. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>6. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>7. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>8. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>9. <b>TRAFFIC AND SIGNAL DESIGN</b></p> <p>10. <b>TRAFFIC AND SIGNAL DESIGN</b></p> |

STORM SEWER DESIGN

| WASTEWATER DESIGN | CONSTRUCTION |
|-------------------|--------------|
|-------------------|--------------|

## OTHER REVIEWS

PLANNING AND DEVELOPMENT

DATE \_\_\_\_\_

SCALE:  $3/4" = 1'-0"$

DESIGNED BY

SUBMITTED: \_\_\_\_\_

DRAWN BY:

DATE: NOVEMBER, 1996

SHEET NO. \_\_\_\_\_

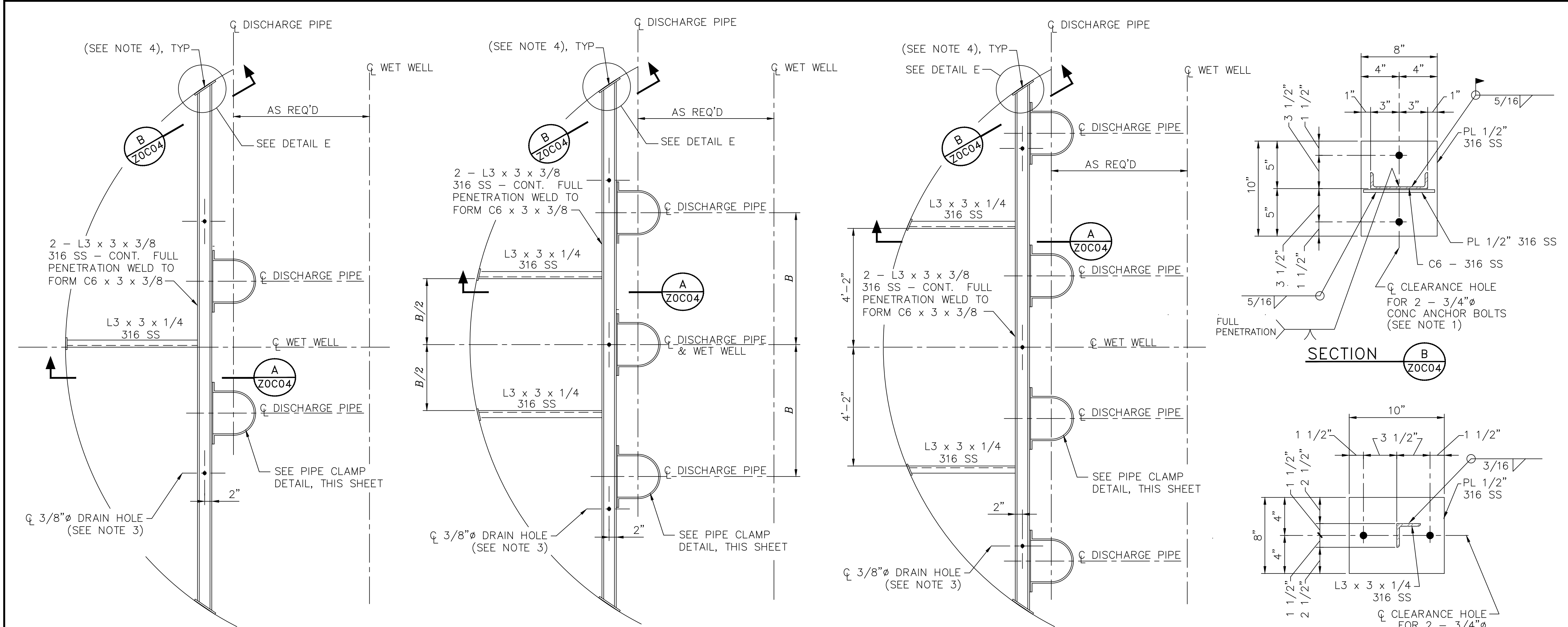
Z0C05

SEAL

CADD DWG. FILE NO. :  
ZOC05.DWG (Scale: 1=16)

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|          |             |       |      |
| REV. NO. | DESCRIPTION | APP'D | DATE |

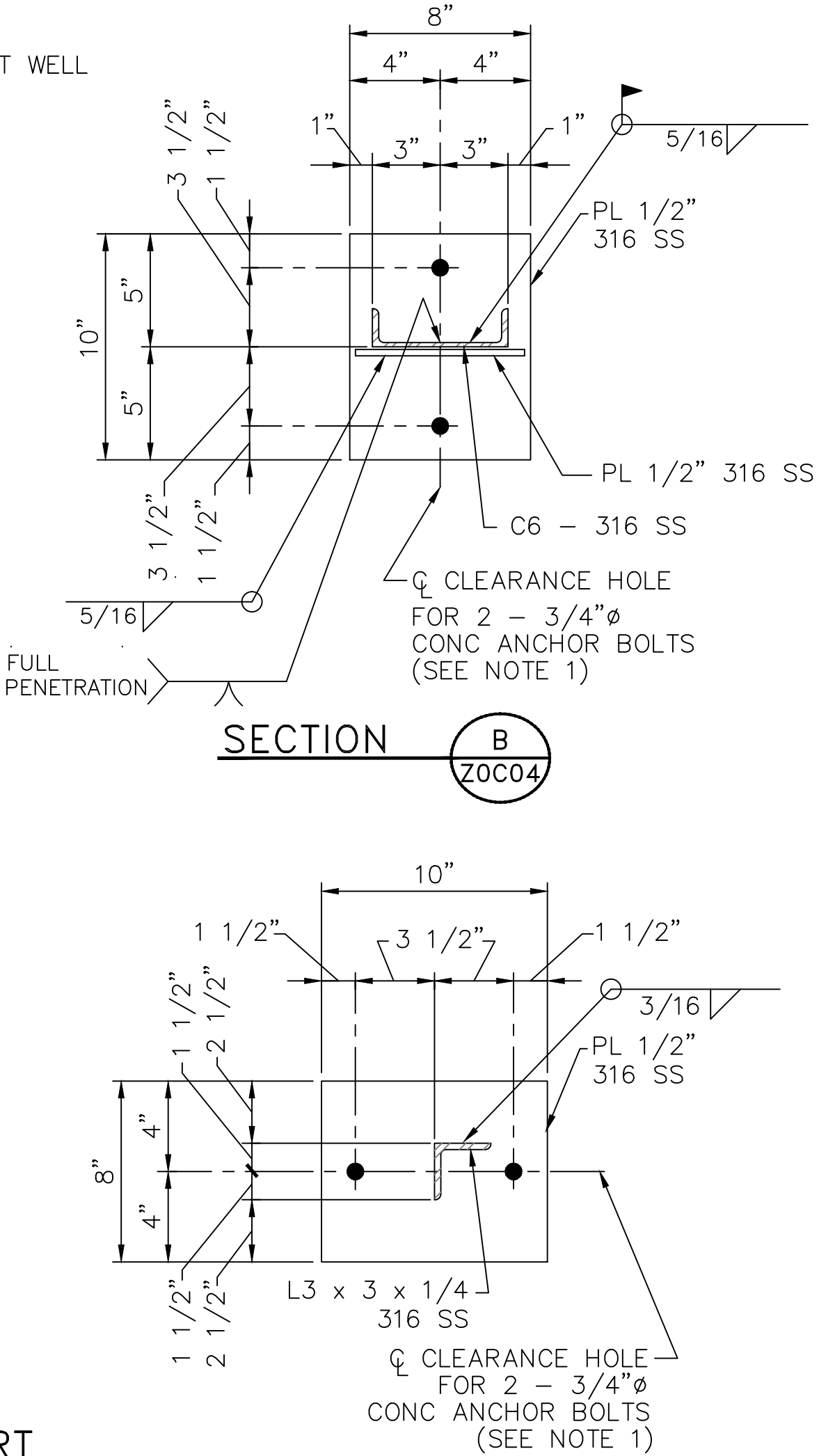




TYP DISCHARGE PIPING SUPPORT  
PLAN FOR 2 PUMPS

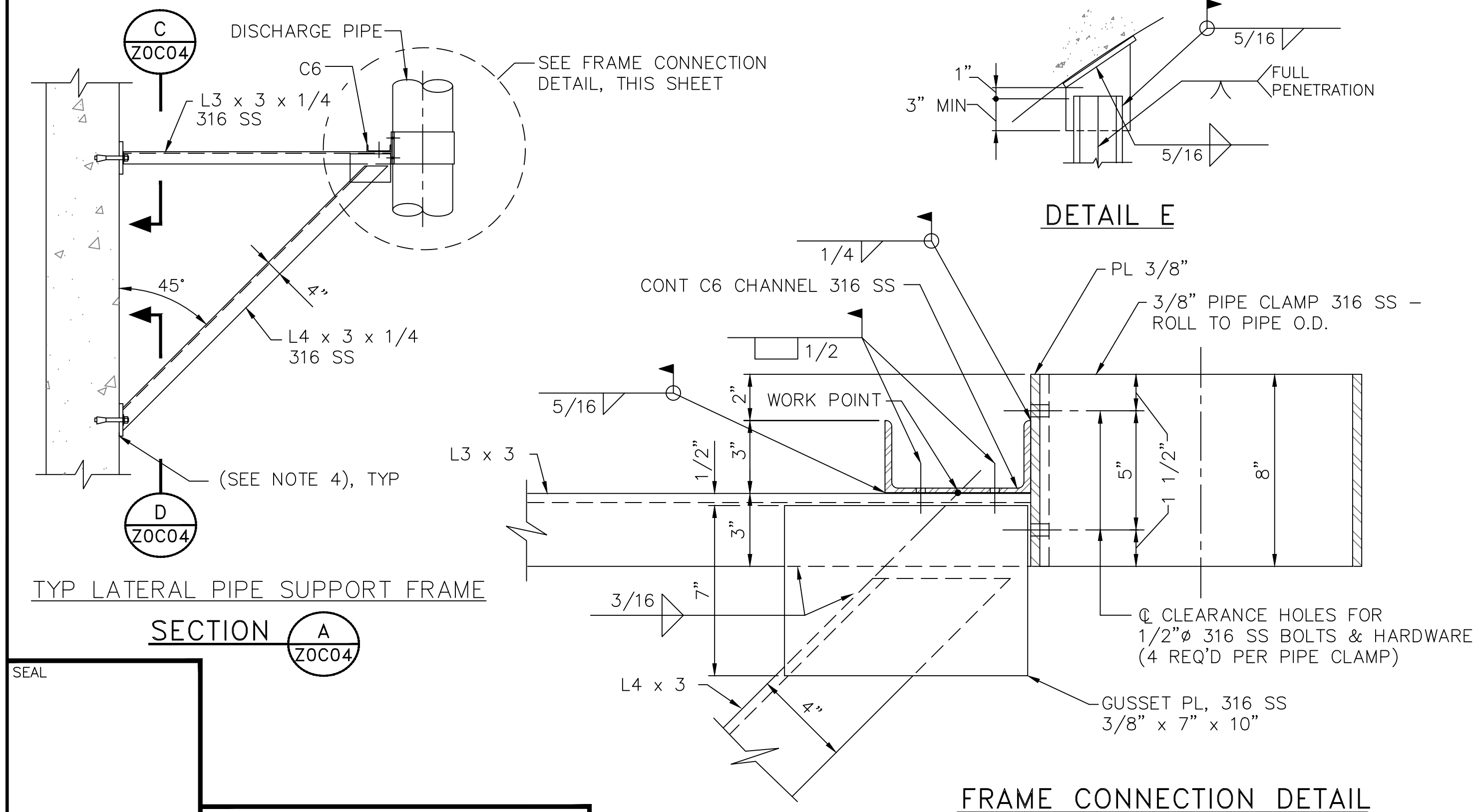
TYP DISCHARGE PIPING SUPPORT  
PLAN FOR 3 PUMPS

TYP DISCHARGE PIPING SUPPORT  
PLAN FOR 4 PUMPS



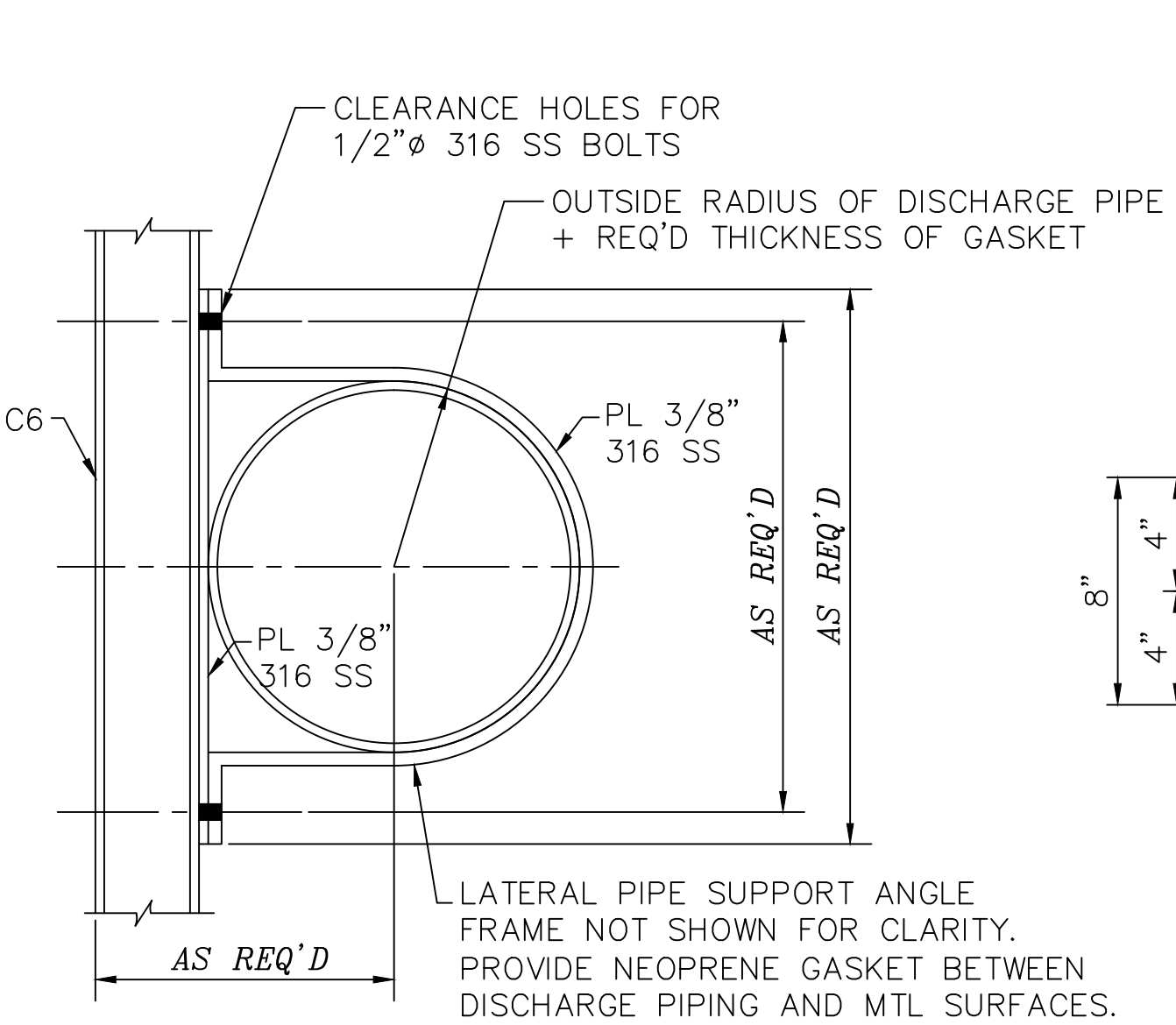
SECTION B  
ZOC04

SECTION C  
ZOC04

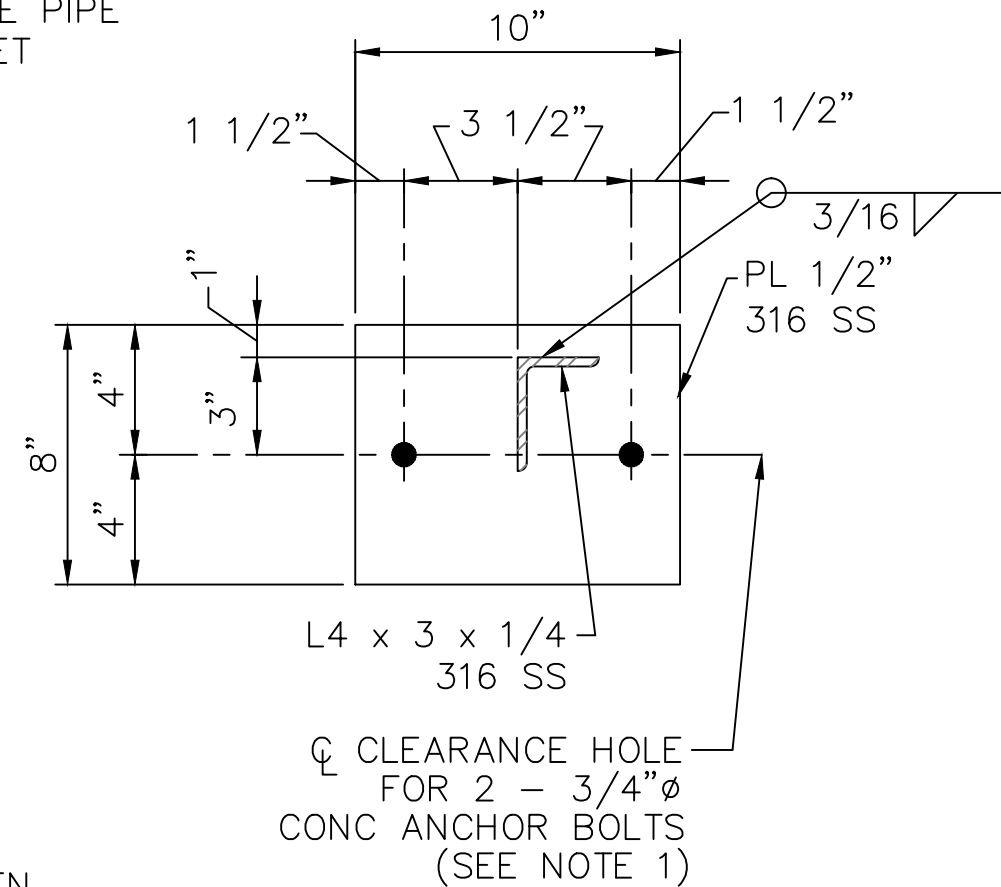


SECTION A  
ZOC04

FRAME CONNECTION DETAIL



PIPE CLAMP DETAIL



SECTION D  
ZOC04

**NOTES TO DESIGN ENGINEER:**

A. THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER SUBMERSIBLE LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS. IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.

B. SEE STATION AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.

C. THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.

D. THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL, THE ENGINEERING DESIGN MANUAL, AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.

E. THE DESIGN ENGINEER SHALL REMOVE THESE NOTES. ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.

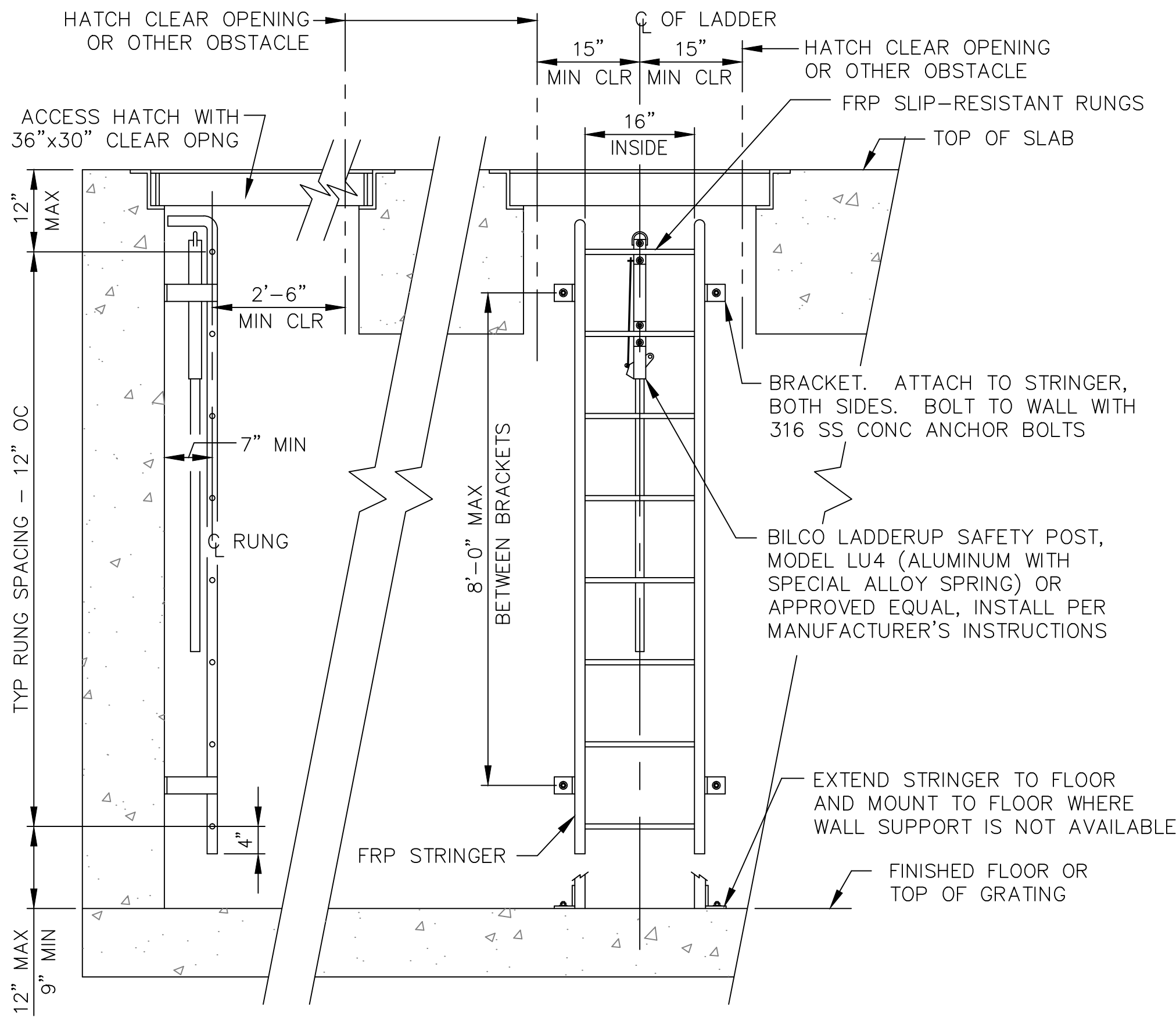
- NOTES:**
1. CONCRETE ANCHOR BOLTS SHALL HAVE 6" MINIMUM EMBEDMENT AND SHALL BE TYPE 316 STAINLESS STEEL, PER SPECIFICATIONS.
  2. SEE STATION AND STRUCTURAL DRAWINGS FOR DIMENSIONS AND INFORMATION NOT SHOWN.
  3. DRILL 3/8"Ø HOLES, 1" OFF C OF C6 AT MIDSPAN BETWEEN LATERAL PIPE SUPPORTS TO ALLOW FOR DRAINAGE. 3 HOLES PER CHANNEL WHERE 2 LATERAL SUPPORTS REQUIRED; 2 HOLES PER CHANNEL WHERE 1 LATERAL SUPPORT REQUIRED.
  4. SET 1/4" NEOPRENE GASKET ON WALL SURFACE IN SIKA 1A (OR EQUAL) SEALANT.

DISCHARGE PIPING SUPPORT DETAILS

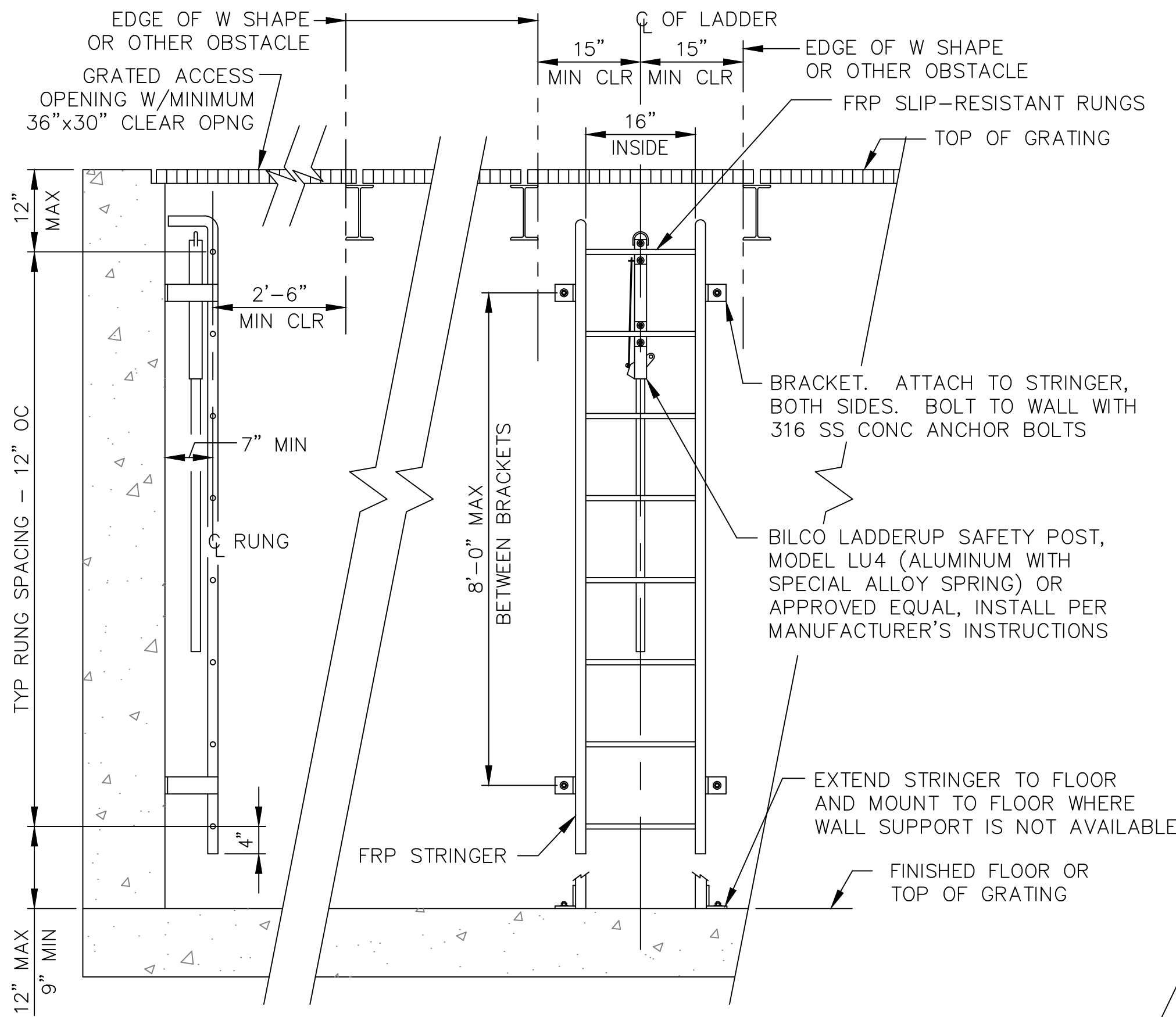
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|------------------------------------------------------------------------------------------------------------------|---------------------------|
| PROJECT NO.                                                                                                      |                           |
| R-0267-02-2                                                                                                      |                           |
| TITLE                                                                                                            |                           |
| CITY OF HOUSTON<br>DESIGN GUIDELINE DRAWINGS<br>FOR SUBMERSIBLE LIFT STATIONS                                    |                           |
| CITY OF HOUSTON<br>DEPARTMENT OF PUBLIC WORKS AND ENGINEERING<br>ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP |                           |
| APPROVALS                                                                                                        |                           |
| WATER DESIGN                                                                                                     | TRAFFIC AND SIGNAL DESIGN |
| STORM SEWER DESIGN                                                                                               | STREET, BRIDGE & R.O.W.   |
| WASTEWATER DESIGN                                                                                                | CONSTRUCTION              |
| OTHER REVIEWS                                                                                                    |                           |
| PLANNING AND DEVELOPMENT                                                                                         |                           |

|                |                |              |           |
|----------------|----------------|--------------|-----------|
| CITY ENGINEER  |                | DATE         |           |
| SCALE:         | NONE           | DESIGNED BY: |           |
| SUBMITTED:     |                | DRAWN BY:    |           |
| DATE:          | NOVEMBER, 1996 | SHEET NO.    | OF SHEETS |
| SURVEY BY:     |                | DWG. NO.     | ZOC04     |
| FIELD BOOK NO. |                |              |           |

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ZOC04.DWG (Scale: 1=24)



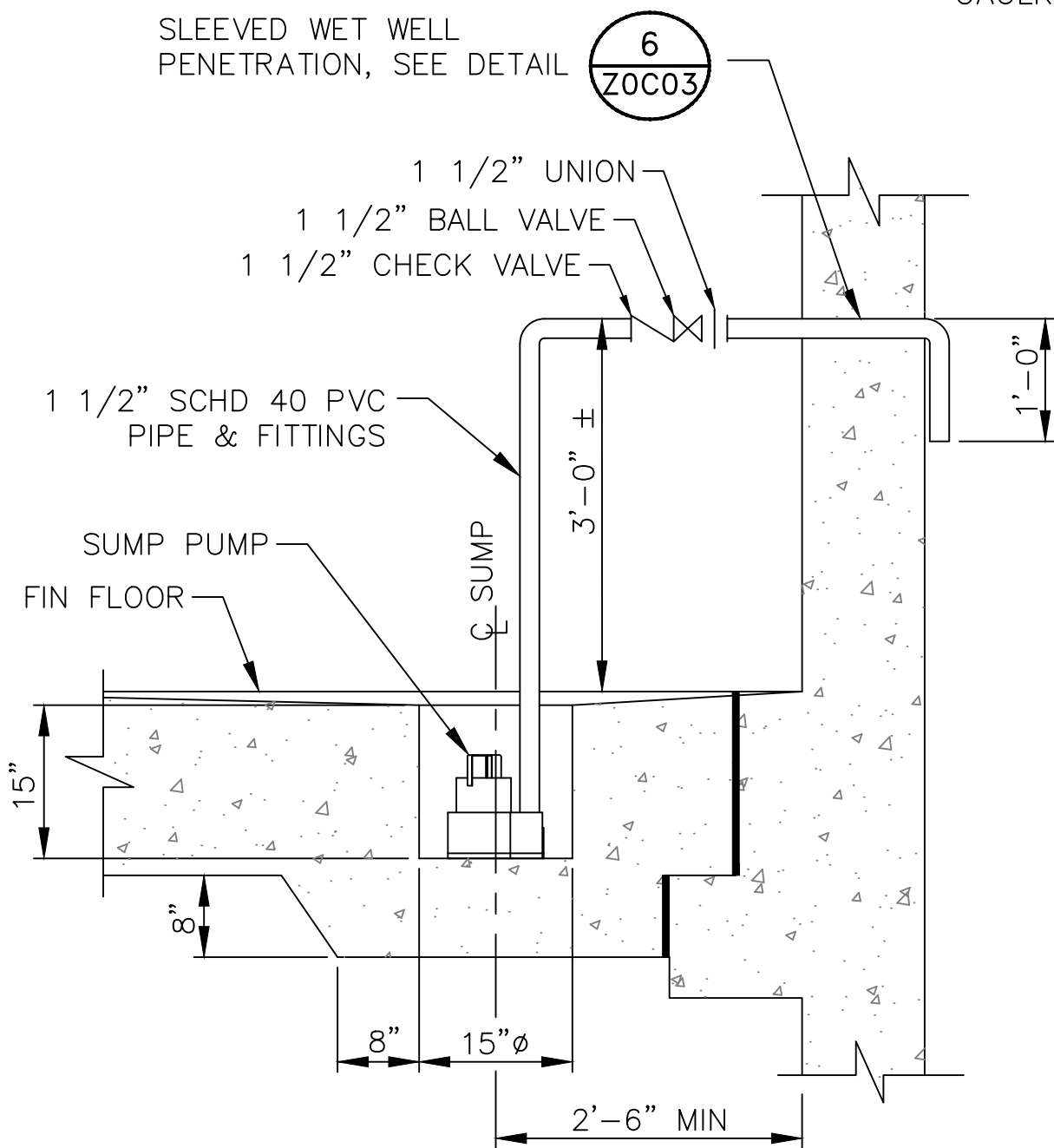
TYPICAL ENTRY ACCESS LADDER INSTALLATION  
FOR VALVE VAULTS WITH ACCESS HATCHES



TYPICAL ENTRY ACCESS LADDER INSTALLATION  
FOR VALVE VAULTS WITH GRATING

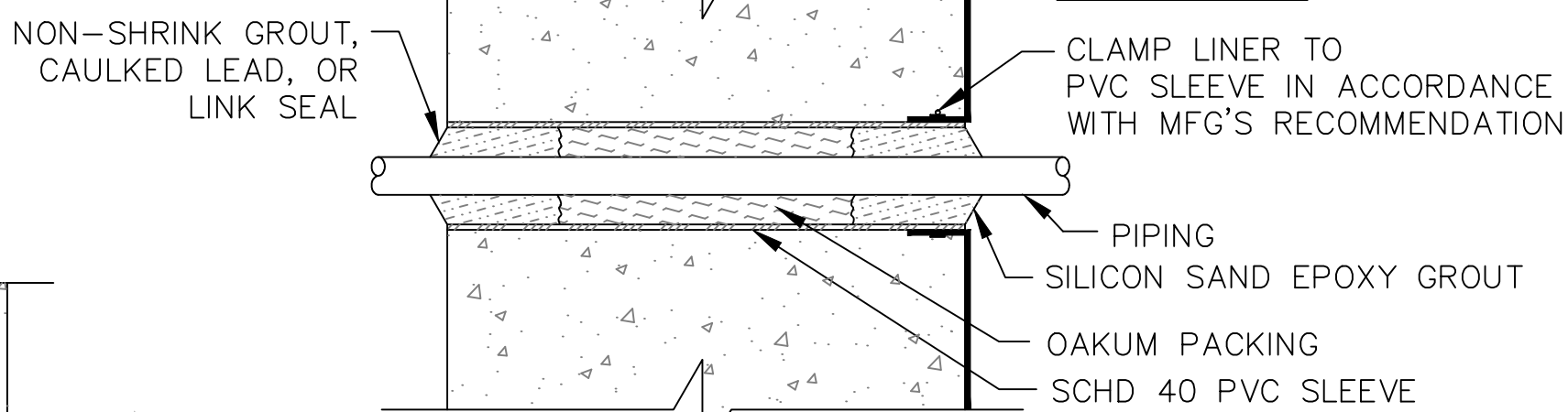
DETAIL 8  
SEE NOTE 1  
ZOC03

DETAIL 8A  
SEE NOTE 1  
ZOC03



TYPICAL SUMP PUMP INSTALLATION

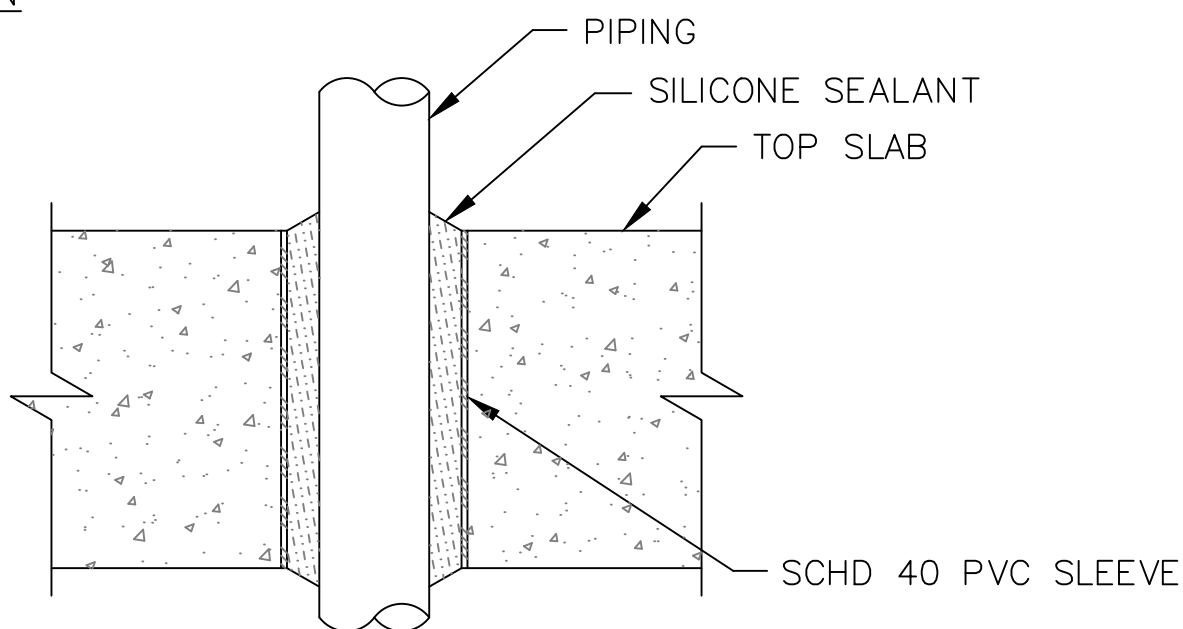
DETAIL 5  
ZOC03



NOTE:  
SLEEVED WET WELL PENETRATION IS NOT TO BE USED  
FOR CONDUIT INSTALLATION. SEE ELECTRICAL DETAIL  
SHEETS FOR CONDUIT PENETRATIONS.

SLEEVED WET WELL PENETRATION  
FOR PIPING 4"Ø & SMALLER

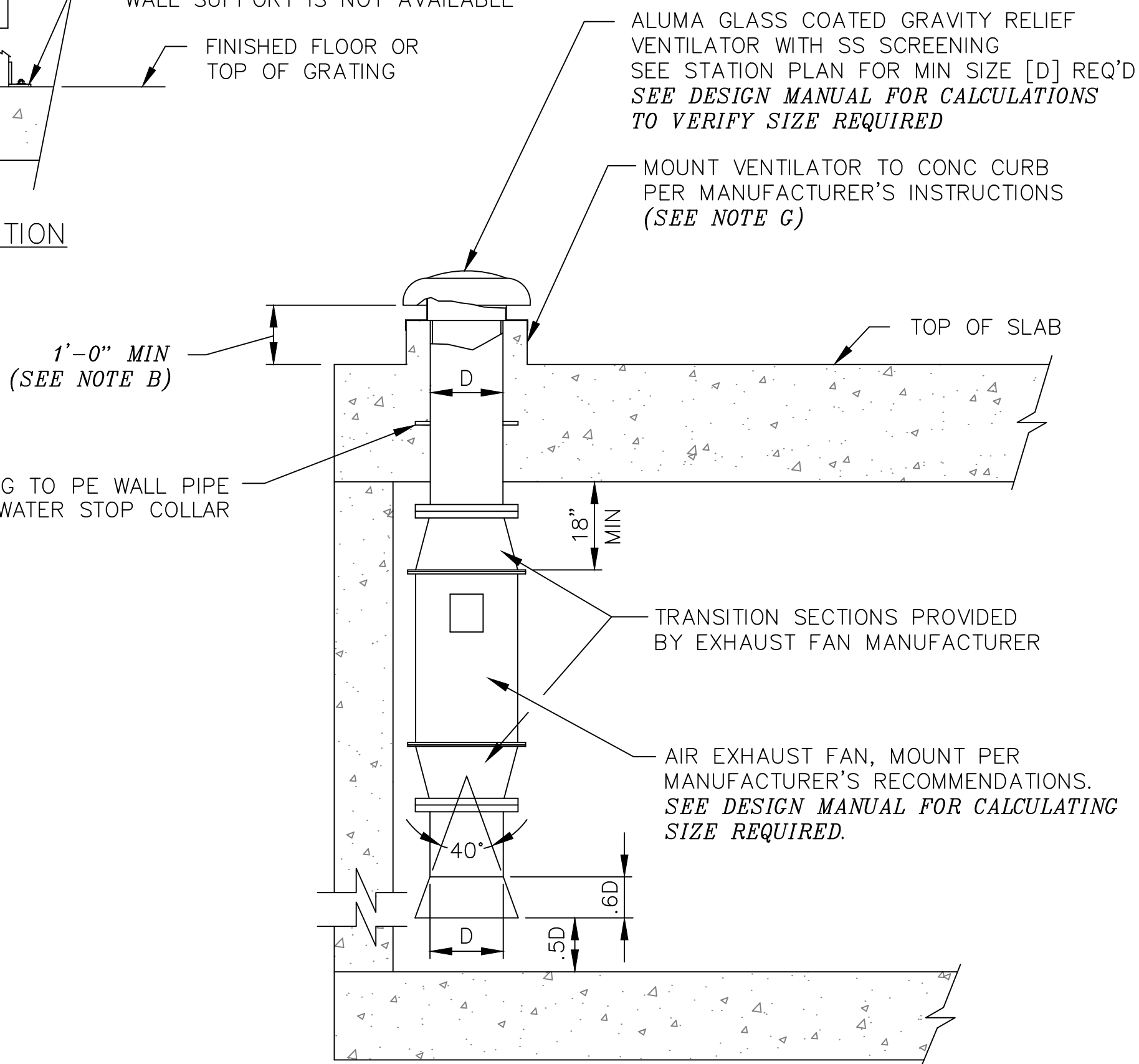
DETAIL 6  
ZOC03



NOTE:  
SLEEVED SLAB PENETRATION IS NOT TO BE USED FOR WET WELL PENETRATIONS.

SLEEVED SLAB PENETRATION

DETAIL 7  
ZOC03



TYP LOW PROFILE  
VALVE VAULT VENTING INSTALLATION

DETAIL 9  
ZOC03

NOTES TO DESIGN ENGINEER:

- THESE LIFT STATION DRAWINGS ARE CONSIDERED TO BE DESIGN GUIDELINES FOR THE CONSTRUCTION OF CITY OF HOUSTON WASTEWATER SUBMERSIBLE LIFT STATIONS. THEIR INTENDED USE IS AS A FRAMEWORK FOR THE CONTRACTED DESIGN ENGINEER IN DEVELOPING SPECIFIC LIFT STATION DESIGNS. IT IS THE RESPONSIBILITY OF THE CONTRACTED DESIGN ENGINEER TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION HEREIN CONTAINED AND TO ADJUST ACCORDING TO SPECIFIC SITE REQUIREMENTS.
- DESIGN ENGINEER TO DETERMINE APPROPRIATE HEIGHT BASED ON SIZE OF VENTING. FINAL DIMENSION SHALL LOCATE VENT OUTLET AT NOT LESS THAN 1'-0" ABOVE THE 100 YEAR FLOOD PLAIN ELEVATION.
- DESIGN ENGINEER SHALL REVISE, AS REQUIRED, THE CORRESPONDING PROJECT CIVIL, ELECTRICAL, AND STRUCTURAL STATION DRAWINGS TO REFLECT THE CORRECT VENTING (LOW OR HIGH PROFILE).
- THE DESIGN ENGINEER SHALL INCORPORATE ONLY THE NECESSARY STANDARD GUIDELINE DRAWINGS AND DETAILS INTO HIS PROJECT CONTRACT DOCUMENTATION PACKAGE, AND SHALL ADJUST PAGE NUMBERS AND CROSS REFERENCING ACCORDINGLY.
- THE DESIGN ENGINEER SHALL CONSULT THE CITY OF HOUSTON DESIGN GUIDELINES MANUAL, THE ENGINEERING DESIGN MANUAL, AND THE MASTER SPECIFICATIONS FOR FURTHER INSTRUCTIONS AND INFORMATION PERTINENT TO THESE STANDARD DESIGN GUIDELINE DRAWINGS.
- THE DESIGN ENGINEER SHALL REMOVE THESE NOTES, ALL REFERENCES TO THESE NOTES, AND ANY OTHER EXTRANEOUS INFORMATION FROM THE DESIGN GUIDELINE DRAWINGS. DESIGN ENGINEER SHALL PROVIDE ANY NOTES OR OTHER APPROPRIATE INFORMATION NECESSARY TO COMPLETE THE LIFT STATION DESIGN.
- THE DESIGN ENGINEER SHALL SPECIFY CURB SIZE AND REINFORCING BASED ON SIZE AND SHAPE REQUIRED FOR INSTALLATION OF GRAVITY RELIEF VENTILATOR. CHAMFER CURB AS REQUIRED TO AVOID EXPANSION JOINT IN VALVE VAULT TOP SLAB.

NOTES:

- CONTRACTOR TO PROVIDE DETAIL DRAWINGS OF LADDER DURING SHOP DRAWING SUBMISSION.

TYPICAL DETAILS

PROJECT NO. R-0267-02-2  
TITLE CITY OF HOUSTON  
DESIGN GUIDELINE DRAWINGS  
FOR SUBMERSIBLE LIFT STATIONS

CITY OF HOUSTON  
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP

APPROVALS

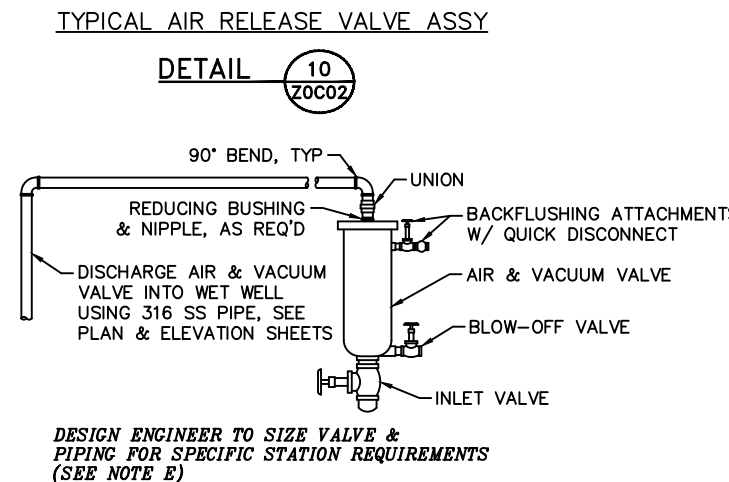
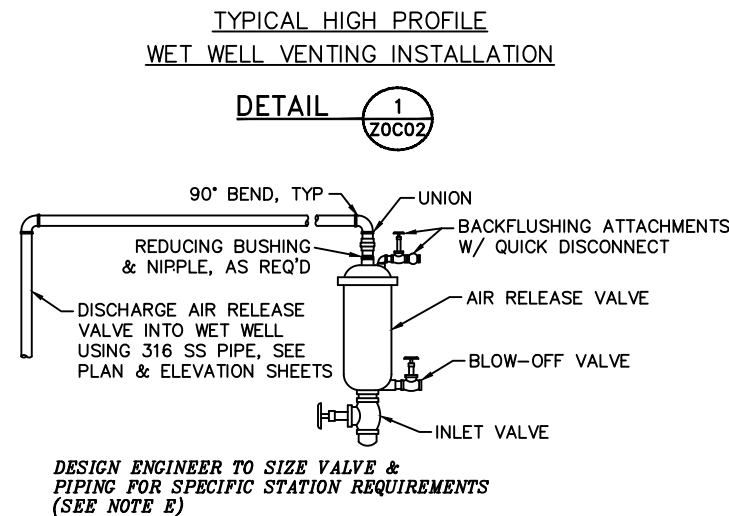
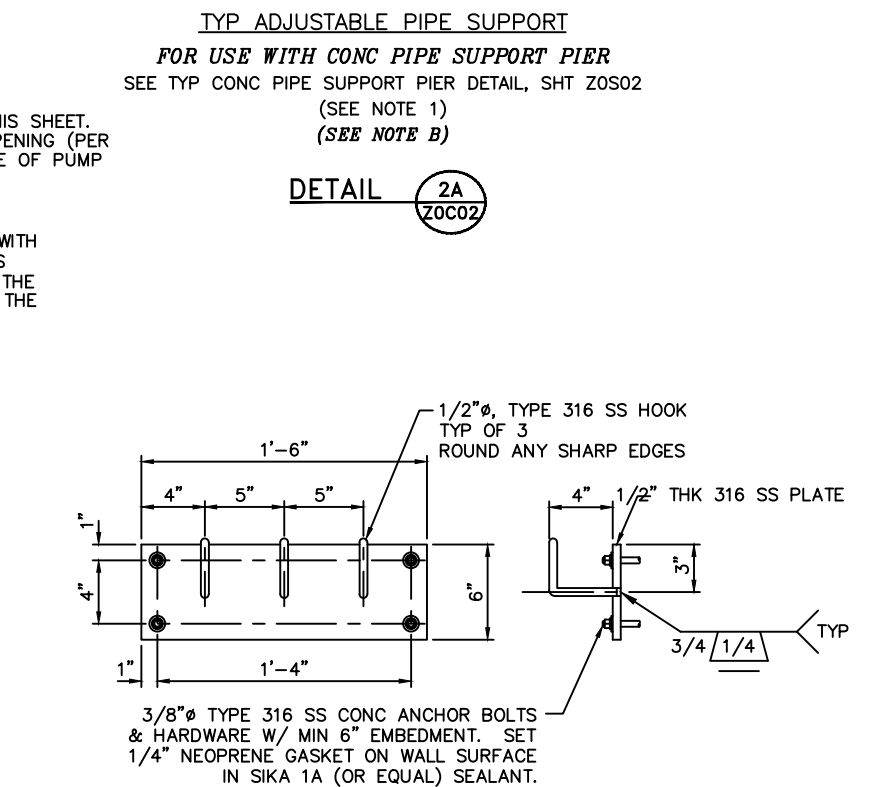
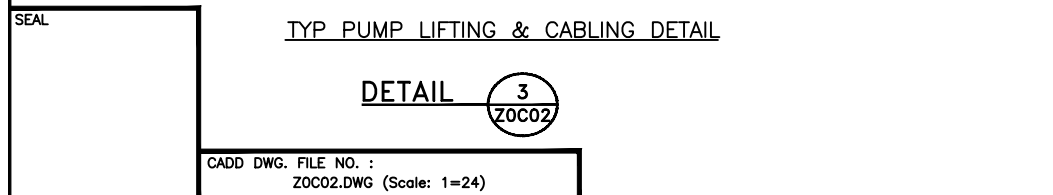
|                    |                           |
|--------------------|---------------------------|
| WATER DESIGN       | TRAFFIC AND SIGNAL DESIGN |
| STORM SEWER DESIGN | STREET, BRIDGE & R.O.W.   |
| WASTEWATER DESIGN  | CONSTRUCTION              |

OTHER REVIEWS

PLANNING AND DEVELOPMENT

|                      |                     |
|----------------------|---------------------|
| CITY ENGINEER        | DATE                |
| SCALE: NONE          | DESIGNED BY:        |
| SUBMITTED:           | DRAWN BY:           |
| DATE: DECEMBER, 1996 | SHEET NO. OF SHEETS |
| SURVEY BY:           | DWG. NO. ZOC03      |
| FIELD BOOK NO.       |                     |

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ZOC03.DWG (Scale: 1=24)



**NOTES:**

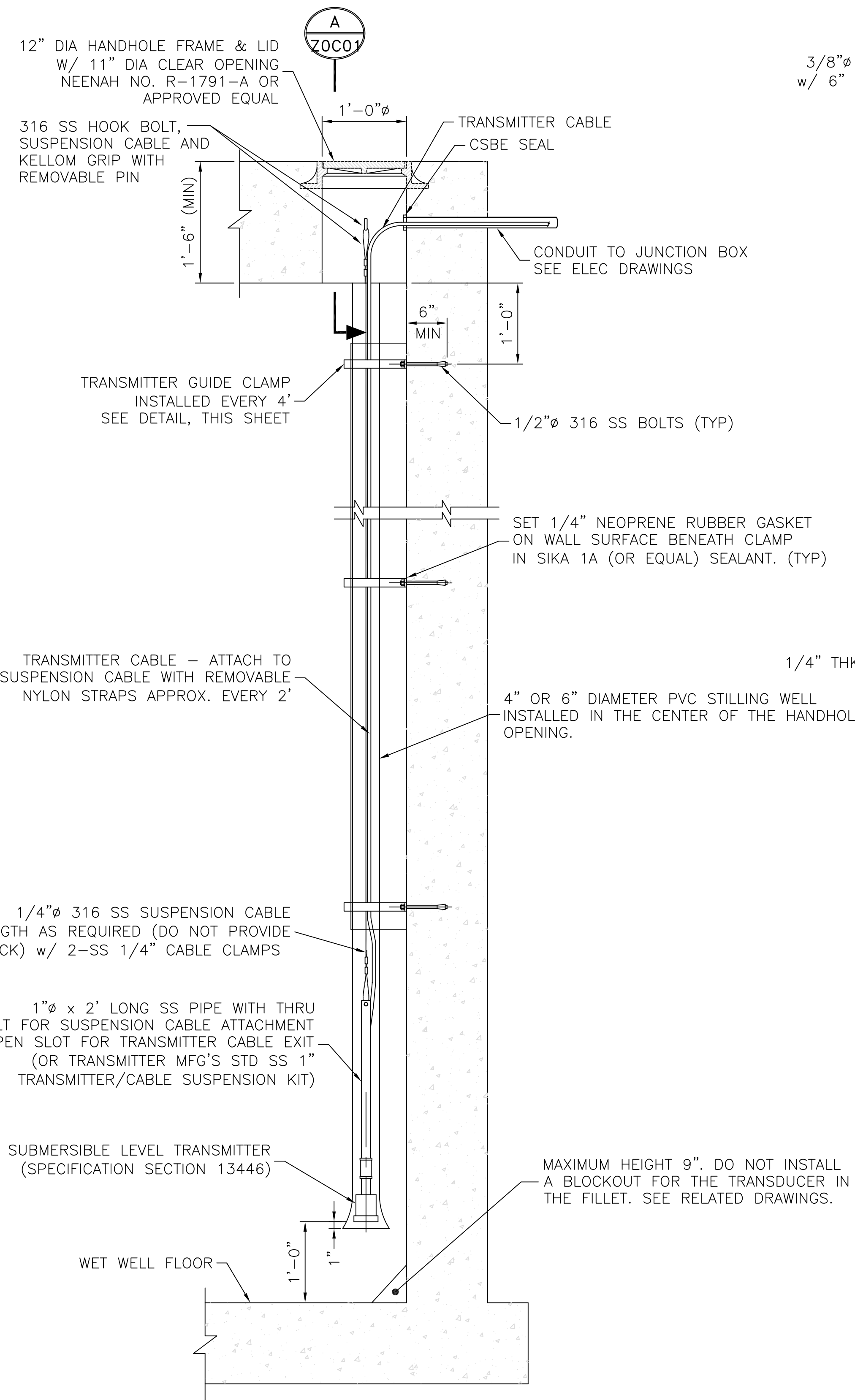
1. ADJUSTABLE PIPE SUPPORT ASSEMBLY TO BE HOT DIPPED GALVANIZED AFTER FABRICATION. COLD GALVANIZING COMPOUND TO BE USED AS TOUCH UP AFTER INSTALLATION.

AT CONTRACTOR'S OPTION, THE ADJUSTABLE PIPE SUPPORT MAY BE AN EQUAL PURCHASED PRODUCT AS MANUFACTURED BY MATERIAL RESOURCES, GRINNELL OR OTHER MANUFACTURER.

|                                                                                                                         |  |                                                                           |  |
|-------------------------------------------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------|--|
| <b>TYPICAL DETAILS</b>                                                                                                  |  |                                                                           |  |
| PROJECT NO. <span style="float: right; font-weight: bold;">R-0267-02-2</span>                                           |  |                                                                           |  |
| <b>TITLE</b><br><b>CITY OF HOUSTON</b><br><b>DESIGN GUIDELINE DRAWINGS</b><br><b>FOR SUBMERSIBLE LIFT STATIONS</b>      |  |                                                                           |  |
| <b>CITY OF HOUSTON</b><br>DEPARTMENT OF PUBLIC WORKS AND ENGINEERING<br>ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP |  |                                                                           |  |
| <b>APPROVALS</b>                                                                                                        |  |                                                                           |  |
| WATER DESIGN                                                                                                            |  | TRAFFIC AND SIGNAL DESIGN                                                 |  |
| STORM SEWER DESIGN                                                                                                      |  | STREET, BRIDGE & R.O.W.                                                   |  |
| WASTEWATER DESIGN                                                                                                       |  | CONSTRUCTION                                                              |  |
| <b>OTHER REVIEWS</b>                                                                                                    |  |                                                                           |  |
| PLANNING AND DEVELOPMENT                                                                                                |  |                                                                           |  |
|                                                                                                                         |  |                                                                           |  |
| CITY ENGINEER                                                                                                           |  | DATE                                                                      |  |
| SCALE: <span style="float: right; font-weight: bold;">NONE</span>                                                       |  | DESIGNED BY:                                                              |  |
| SUBMITTED:                                                                                                              |  | DRAWN BY:                                                                 |  |
| DATE: <span style="float: right; font-weight: bold;">JULY, 2010</span>                                                  |  | SHEET NO. <span style="float: right; font-weight: bold;">OF</span> SHEETS |  |
| SURVEY BY:                                                                                                              |  | DWG. NO. <span style="float: right; font-weight: bold;">Z0C02</span>      |  |
| FIELD BOOK NO.                                                                                                          |  |                                                                           |  |

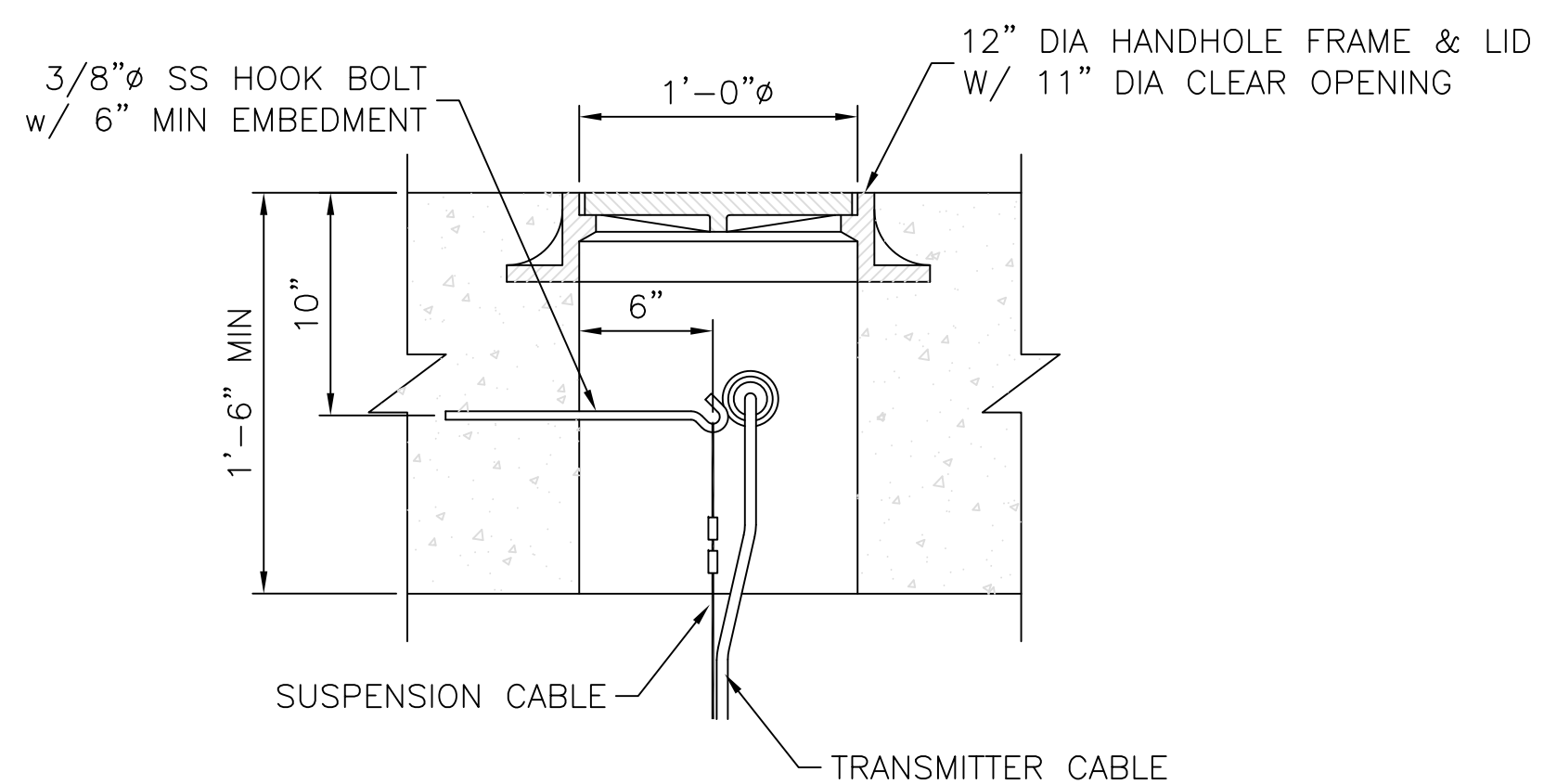
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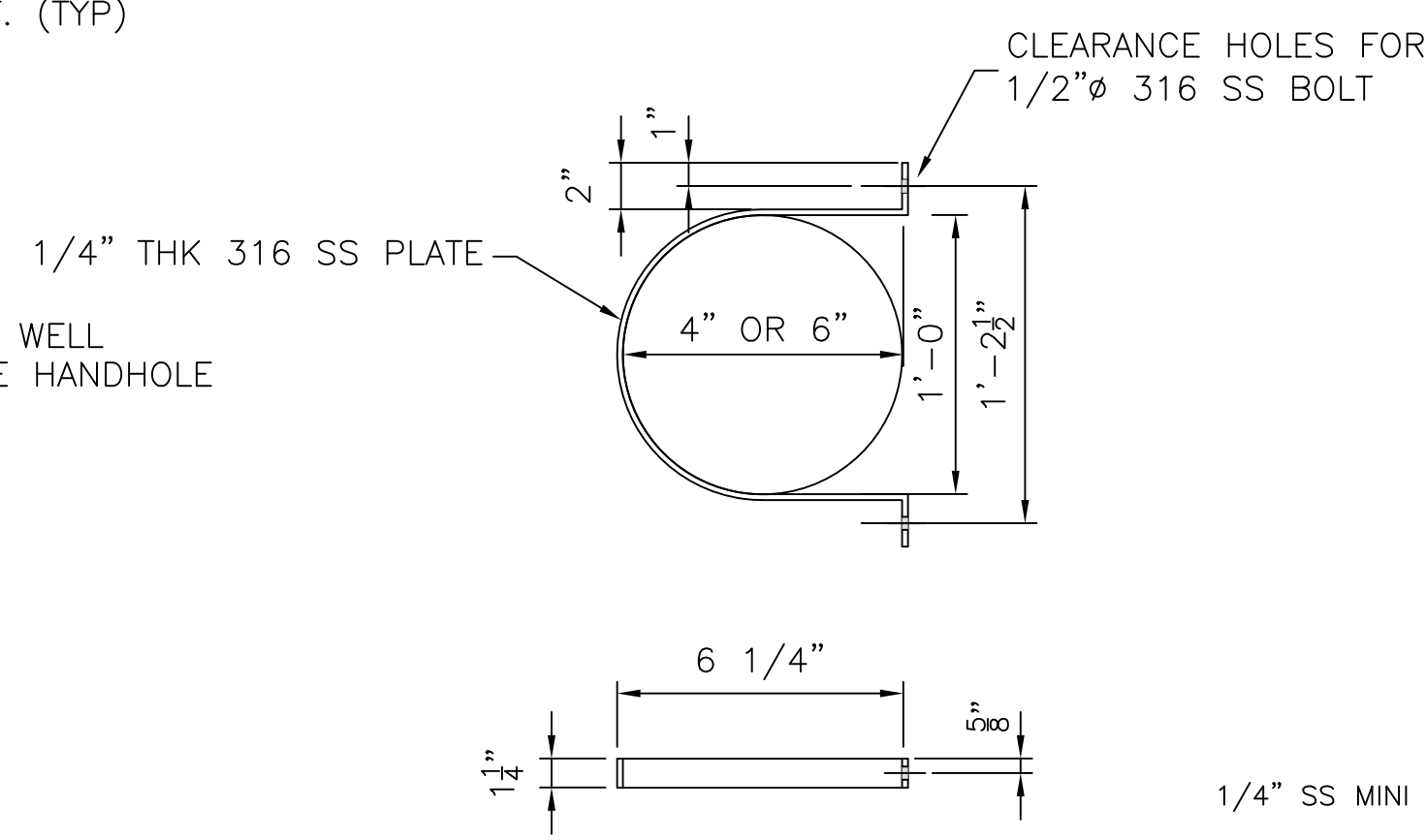


SUBMERSIBLE TRANSDUCER WELL LEVEL GAUGING SYSTEM  
TYP INSTALLATION DETAIL

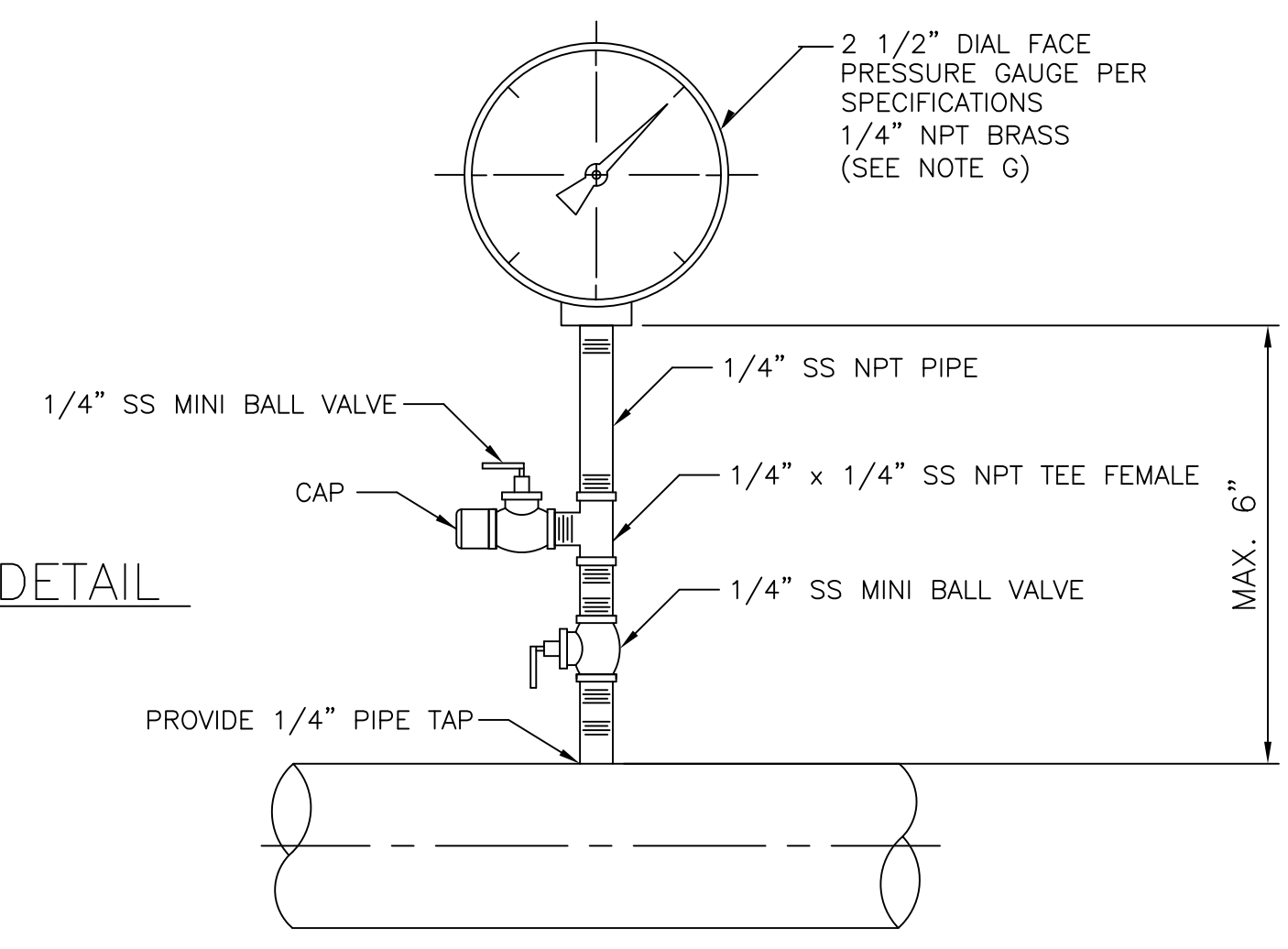
SCALE: 1" = 1'-0"



SECTION A  
SCALE: 1 1/2" = 1'-0"



TRANSMITTER GUIDE BRACKET DETAIL  
SCALE: 1 1/2" = 1'-0"



1. ALL FITTINGS SHALL BE STAINLESS STEEL (316).

PRESSURE GAUGE DETAIL  
SCALE: NTS

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F. TRANSMITTER CABLE MUST BE THE SAME LENGTH REGARDLESS OF ITS LOCATION FROM TERMINAL/JUNCTION BOX.

G. ENGINEER TO SELECT PRESSURE GAUGE RANGE TO FIT APPLICATION

|                          |          |                                                                                               |           |
|--------------------------|----------|-----------------------------------------------------------------------------------------------|-----------|
| PROJECT NO.              |          | R-0267-02-2                                                                                   |           |
| TITLE                    |          | CITY OF HOUSTON<br>DESIGN GUIDELINE DRAWINGS<br>FOR SUBMERSIBLE LIFT STATIONS                 |           |
| CITY OF HOUSTON          |          | DEPARTMENT OF PUBLIC WORKS AND ENGINEERING<br>ENGINEERING, CONSTRUCTION AND REAL ESTATE GROUP |           |
| APPROVALS                |          |                                                                                               |           |
| WATER DESIGN             |          | TRAFFIC AND SIGNAL DESIGN                                                                     |           |
| STORM SEWER DESIGN       |          | STREET, BRIDGE & R.O.W.                                                                       |           |
| WASTEWATER DESIGN        |          | CONSTRUCTION                                                                                  |           |
| OTHER REVIEWS            |          |                                                                                               |           |
| PLANNING AND DEVELOPMENT |          |                                                                                               |           |
| CITY ENGINEER            |          | DATE                                                                                          |           |
| SCALE:                   | AS NOTED | DESIGNED BY:                                                                                  |           |
| SUBMITTED:               |          | DRAWN BY:                                                                                     |           |
| DATE:                    |          | SHEET NO. 43                                                                                  | OF SHEETS |
| SURVEY BY:               |          | DWG. NO.                                                                                      |           |
| FIELD BOOK NO.           |          | ZOC01-0909                                                                                    |           |

|                                                   |
|---------------------------------------------------|
| SEAL                                              |
| CADD DWG. FILE NO. :<br>FILENAME.DWG (Scale: ###) |