

## **Appendix D**

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90% Preliminary Construction Designs Set 3 (pages 5-6)





**D**  
5 RECEIVER PIT AT EXISTING MIXING VALVE VAULT

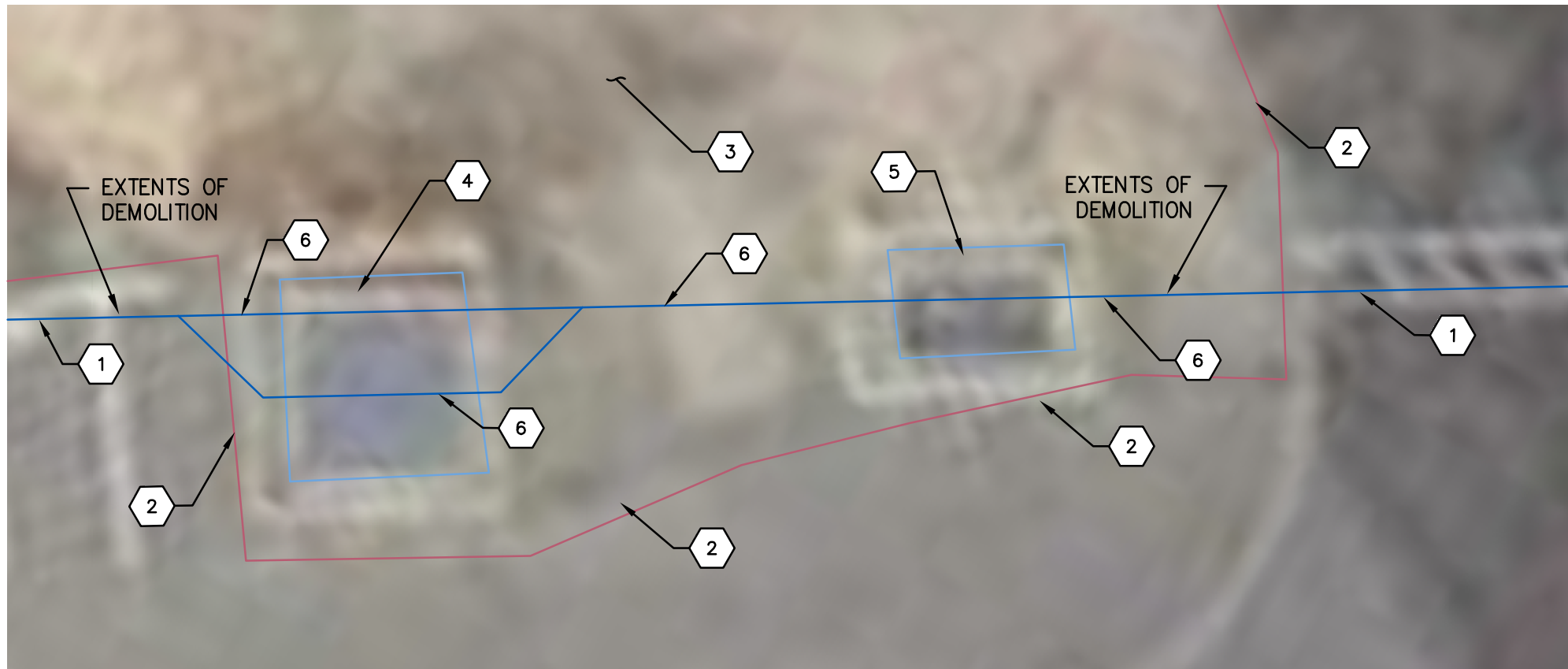
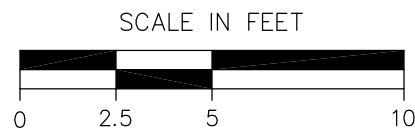
CONSTRUCTION NOTES:

- EXISTING 24-INCH STEEL PIPE FOR COLD-WATER FLOW FROM SAN JOAQUIN RIVER (LOWER) PENSTOCKS. CURRENTLY NOT IN USE.
- EXISTING 24-INCH STEEL PIPE FOR COLD-WATER FLOW FROM SAN JOAQUIN RIVER (LOWER) PENSTOCKS. IN USE WATER SUPPLY TO THE OGD POWER GENERATION PLANT AND DFG FISH HATCHERY.
- MIXING VAULT – EXISTING 24-INCH BUTTERFLY VALVE\*; CONTROLS COLD-WATER FLOW FROM LOWER PENSTOCKS.
- ABANDONED 18-INCH STEEL PIPE FOR WARM-WATER FLOW FROM FRIANT-KERN CANAL (UPPER) PENSTOCKS. CURRENTLY NOT IN USE.
- MIXING VAULT – ABANDONED 18-INCH BUTTERFLY VALVE\*; CONTROLS WARM-WATER FLOW FROM UPPER PENSTOCKS.

\*CONTRACTOR TO VERIFY OPERABILITY AND CONDITION OF EXISTING VALVES. SERVICE OR REPLACE AT NO EXPENSE TO USBR AS MAY BE REQUIRED.

CONSTRUCTION NOTES (CONTINUED):

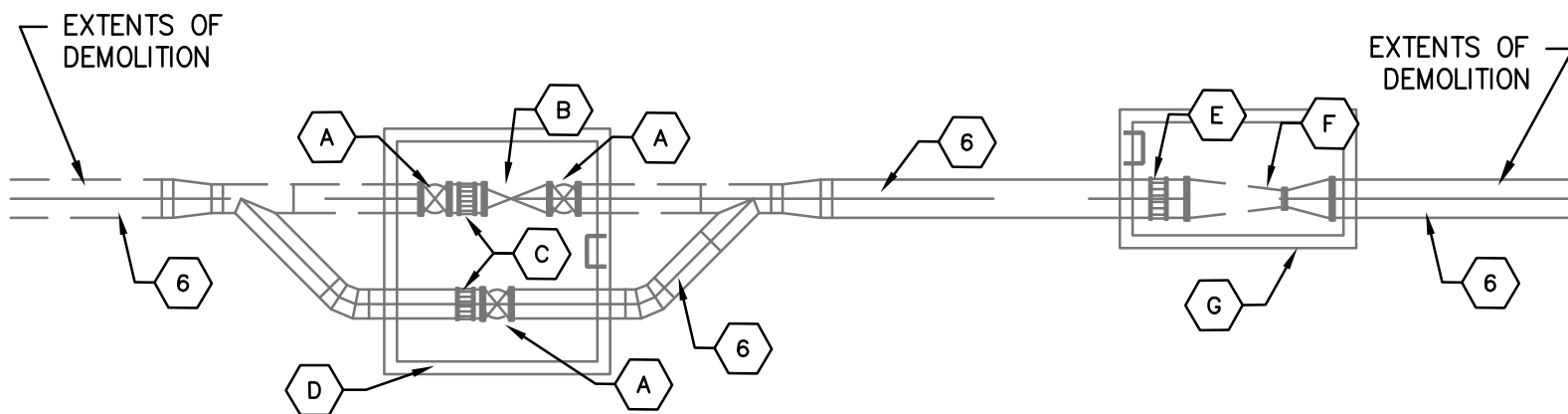
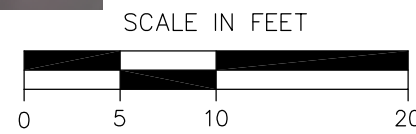
- LOCATION OF THE 8-FT X 12-FT RECEIVING PIT. BACKFILL AND COMPACT PER TYPICAL PIPE TRENCH DETAIL ON THIS SHEET.
- EXISTING 24-INCH ABANDONED STEEL PIPELINE TO BE SLIP-LINED WITH 18-INCH PIPE PER NOTES & SPECIFICATIONS ON SHEET 3. CONNECT TO EXISTING 24-INCH X 7 GAGE THICK PIPE WITH 18-INCH X 24-INCH REDUCER FITTING (SEE SHEET 6 FOR MJ ADAPTER DETAIL).
- EXISTING 44-INCH STEEL PIPELINE TO FISH HATCHERY TO BE PROTECTED DURING CONSTRUCTION.
- EXISTING 30-INCH STEEL PIPELINE TO OVERFLOW TO BE PROTECTED DURING CONSTRUCTION.
- EXISTING USBR GRAVEL ACCESS AREA. REMOVE AND STORE GRAVEL DURING CONSTRUCTION. AFTER BACKFILL COMPACTION AND GRADING IS COMPLETED, PLACE GRAVEL TO ORIGINAL THICKNESS. SUPPLY APPROVED SIMILAR MATERIAL AS MAY BE REQUIRED.



**E**  
5 DEMOLITION OF EXISTING VENTURI METER VAULT & PRV VAULT

CONSTRUCTION NOTES:

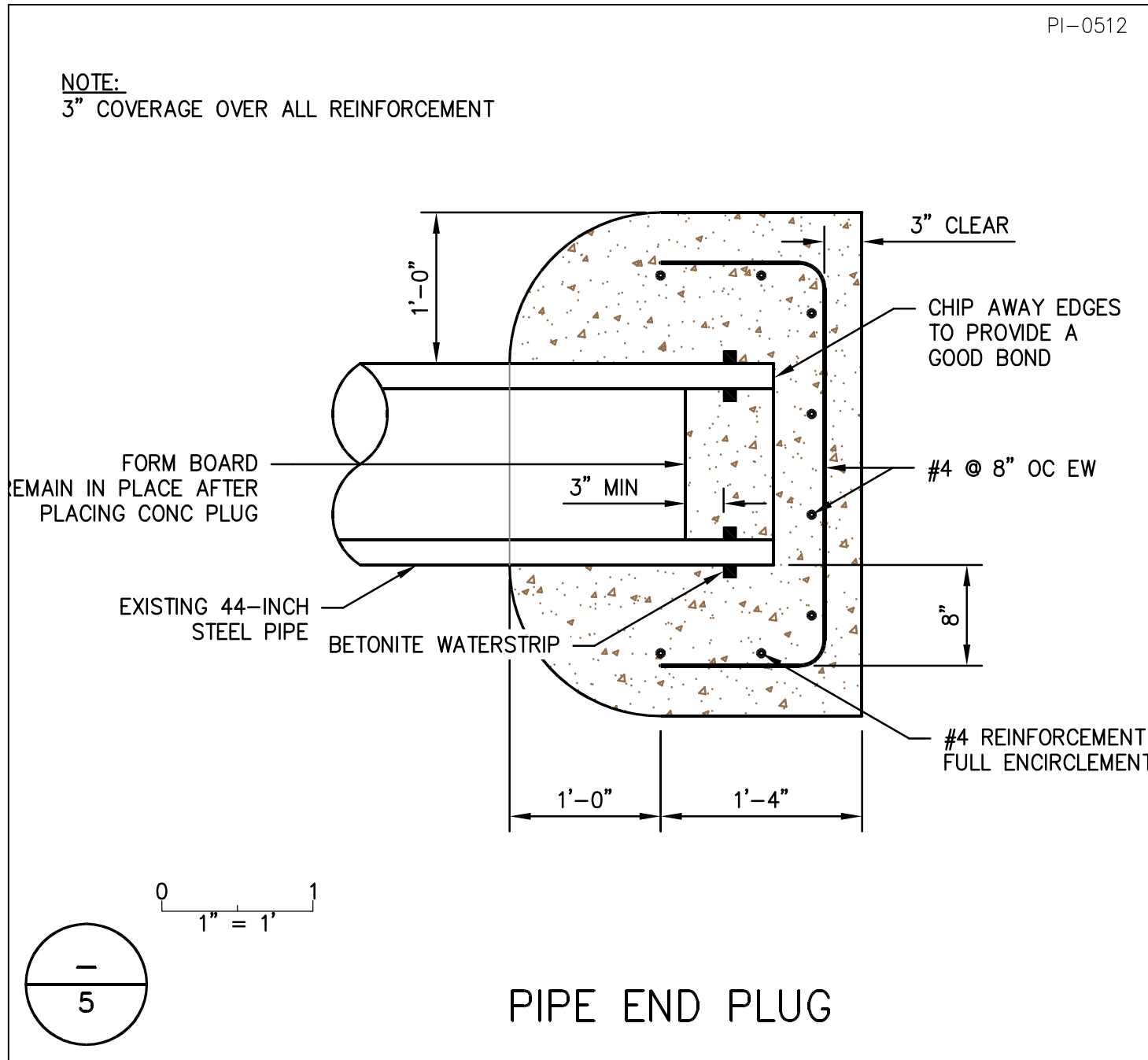
- EXISTING 24-INCH ABANDONED STEEL PIPELINE TO BE SLIP-LINED WITH 18-INCH PIPE PER NOTES & SPECIFICATIONS ON SHEET 3. GROUT SEAL THE FIRST 20-FT OF ANNULAR SPACE AT THE ENDS OF THE STEEL PIPE OPENINGS.
- EXISTING USBR AC PAVEMENT PARKING AREA AND ACCESS ROAD. REPAIR AND REPLACE ALL DAMAGED/REMOVED PAVEMENT. MATCH EXISTING BASE MATERIAL AND PAVEMENT THICKNESS. RE-STRIPE PARKING SPACES AND CROSSWALK STRIPES AS NEEDED.
- USBR LAYDOWN PAD AREA (COMPACTED SOIL SURFACE). REMOVE ALL CONSTRUCTION MATERIAL AND DELETERIOUS MATERIAL AT COMPLETION OF CONSTRUCTION AND GRADE AREA SMOOTH TO MATCH WITH EXISTING.
- DEMOLITION AND REMOVAL OF PRESSURE REDUCING VALVE (PRV) VAULT.  
– ITEMS TO BE REMOVED SHALL FIRST BE OFFERED TO USBR PRIOR TO HUAL-OFF AS SCRAP METAL.
- DEMOLITION AND REMOVAL OF VENTURI METER VAULT.  
– ITEMS TO BE REMOVED SHALL FIRST BE OFFERED TO USBR PRIOR TO HUAL-OFF AS SCRAP METAL.
- DEMOLITION AND REMOVAL OF EXISTING 24-INCH AND 18-INCH STEEL PIPING AT BOTH VAULT LOCATIONS AND IN-BETWEEN TO THE EXTENTS OF DEMOLITION.



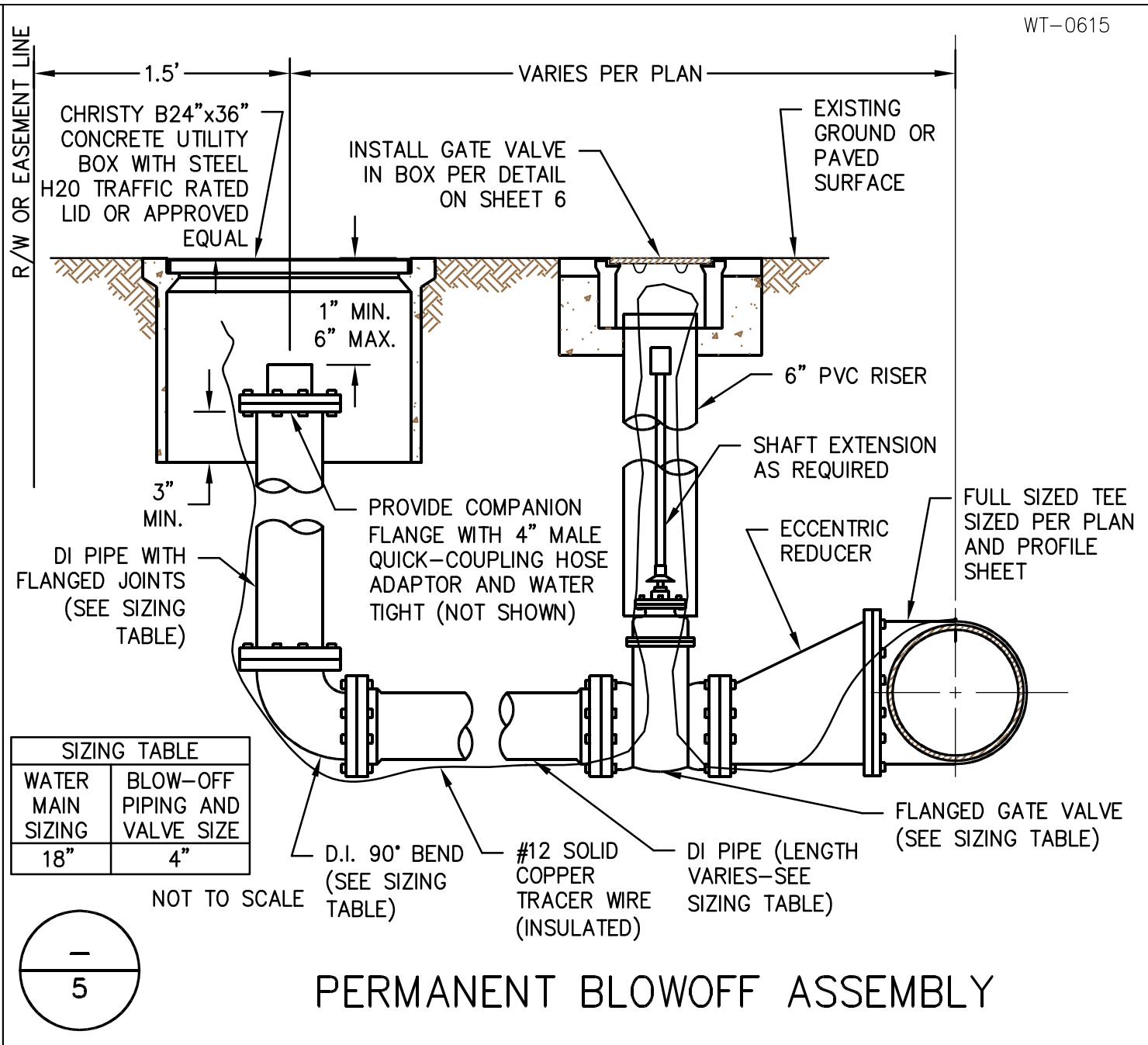
DEMOLITION – PLAN VIEW

- DEMOLITION AND REMOVAL OF PRESSURE REDUCING VALVE (PRV) VAULT.  
A REMOVE/SALVAGE (3) 18-INCH GATE VALVES.  
B REMOVE/SALVAGE (1) PRESSURE REDUCING VALVE (PRV).  
C DEMOLISH (2) SLEEVE TYPE COUPLERS.  
D DEMOLISH CONCRETE VAULT THAT IS APPROXIMATELY 11-FTx13-FTx6-FT WITH 8-INCH THICK WALLS AND 9-INCH THICK SLAB.  
D REMOVE/SALVAGE ALUMINUM GRATING PANELS.
- DEMOLITION AND REMOVAL OF VENTURI METER VAULT.  
E DEMOLISH (1) SLEEVE TYPE COUPLING.  
F REMOVE/SALVAGE (1) 24-INCHx14-INCH VENTURI METER.  
G DEMOLISH CONCRETE VAULT THAT IS APPROXIMATELY 12-FTx6-FTx6-FT WITH 8-INCH THICK WALLS AND 9-INCH THICK SLAB.  
G REMOVE/SALVAGE ALUMINUM GRATING PANELS.

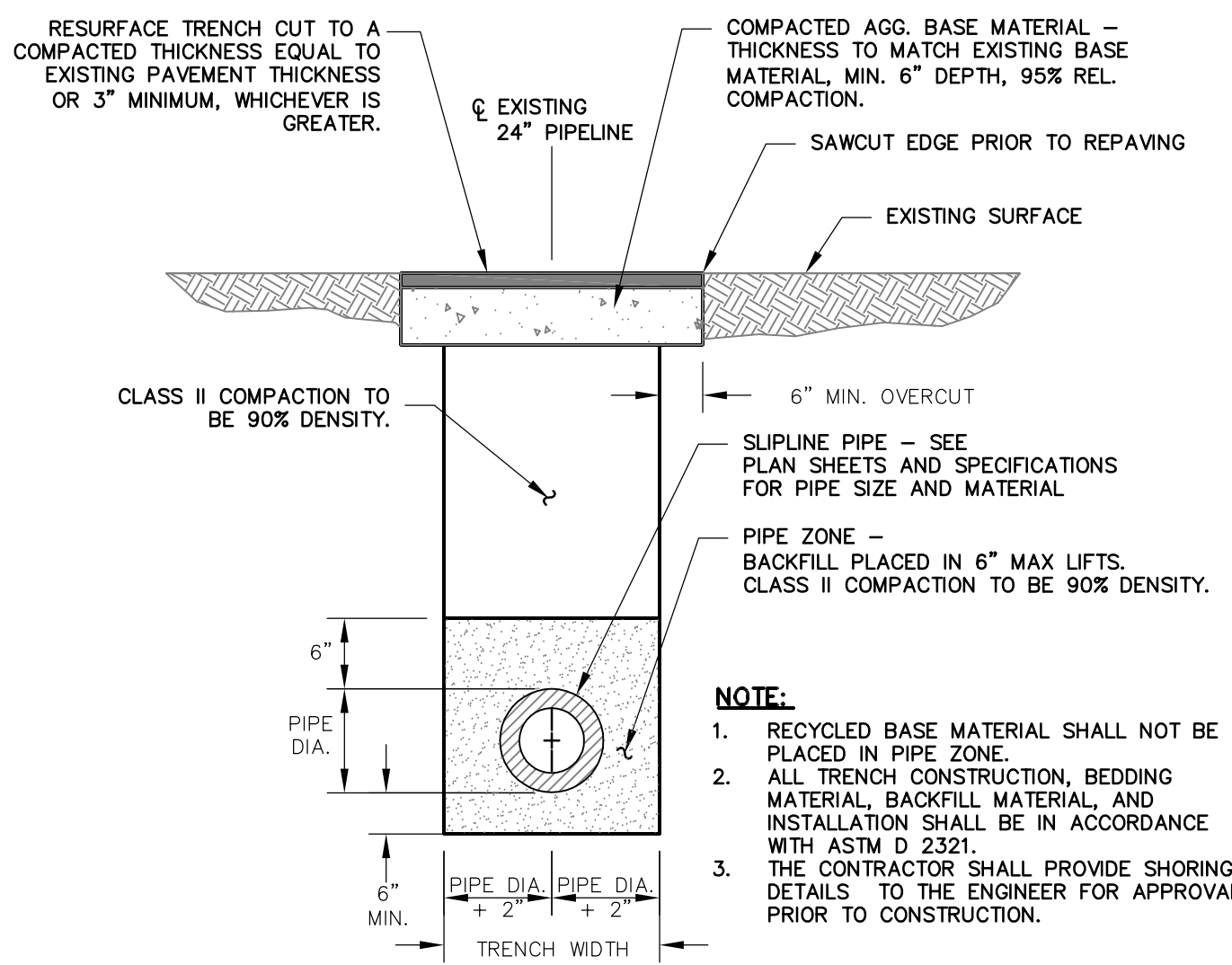
NOTE:  
DEMOLITION REMOVAL AND SALVAGING OF MATERIALS TO BE COORDINATED WITH USBR ENGINEER. USBR MAY DECIDE TO KEEP CERTAIN PARTS OTHER ITEMS TO BE DISPOSED OF IN CONFORMANCE WITH THE USBR WASTE REDUCTION PROGRAM.



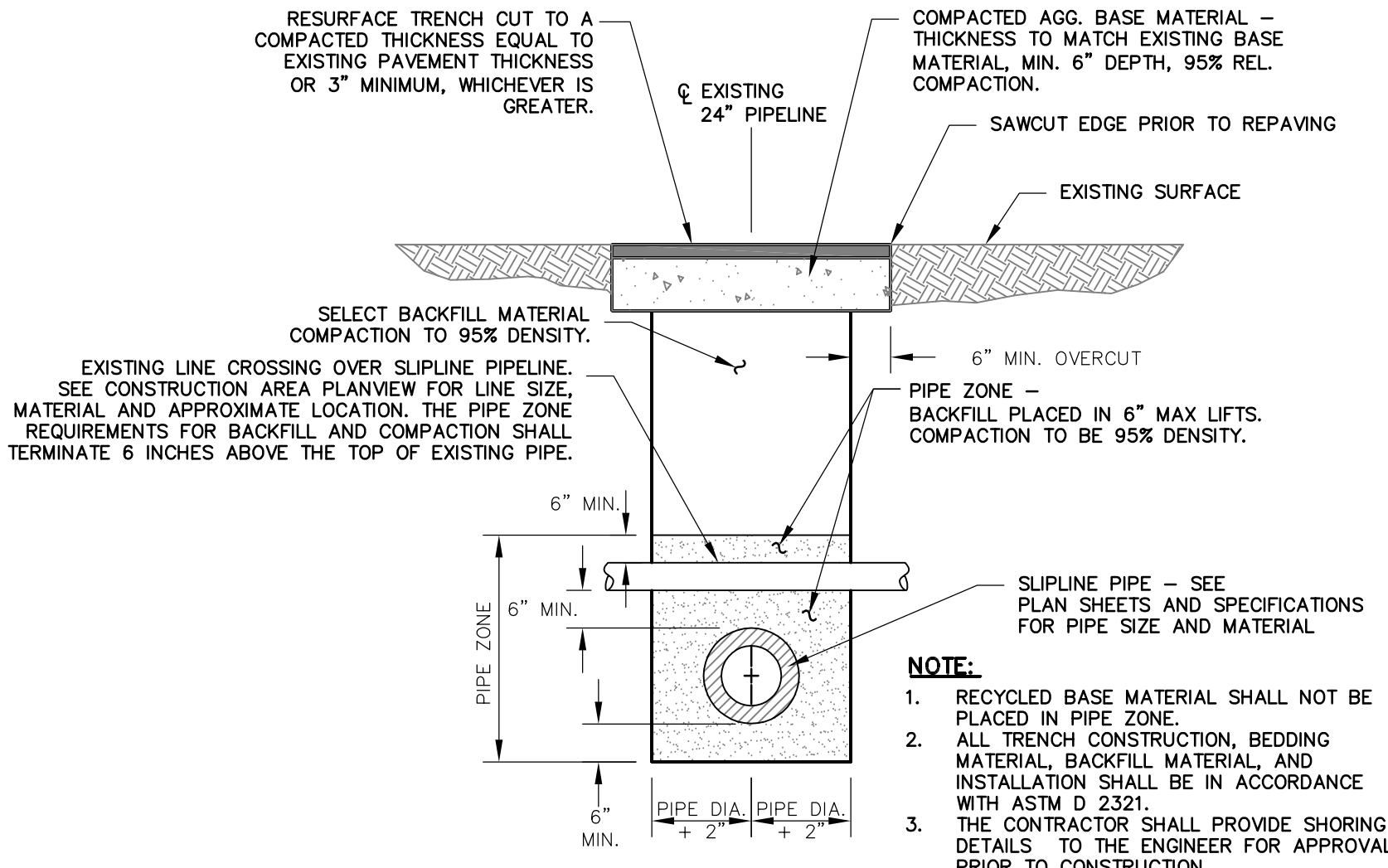
PIPE END PLUG



PERMANENT BLOWOFF ASSEMBLY



**TYP. PIPE TRENCH DETAIL**  
SCALE: N.T.S.



**TYP. PIPE CROSSING DETAIL**  
SCALE: N.T.S.

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PRELIMINARY  
NOT FOR CONSTRUCTION  
90% DRAFT SUBMITTAL

NEW RAW WATER CONNECTION  
AT FRIANT DAM  
FRESNO COUNTY WATER WORKS DISTRICT NO. 18  
FRESNO COUNTY, CA

DETAILS

EST. 1988  
**PROVOST & PRITCHARD**  
CONSULTING GROUP  
An Engineer/Owner Company  
788 WEST BROWELL AVENUE  
FRESNO, CALIFORNIA 93711-6162  
559/449-2700 FAX 559/449-2715  
www.ppg.com

DESIGN ENGINEER:

LICENSE NO:

DRAFTED BY: JSD

CHECKED BY:

SCALE: AS SHOWN

DATE: 2011-11-02

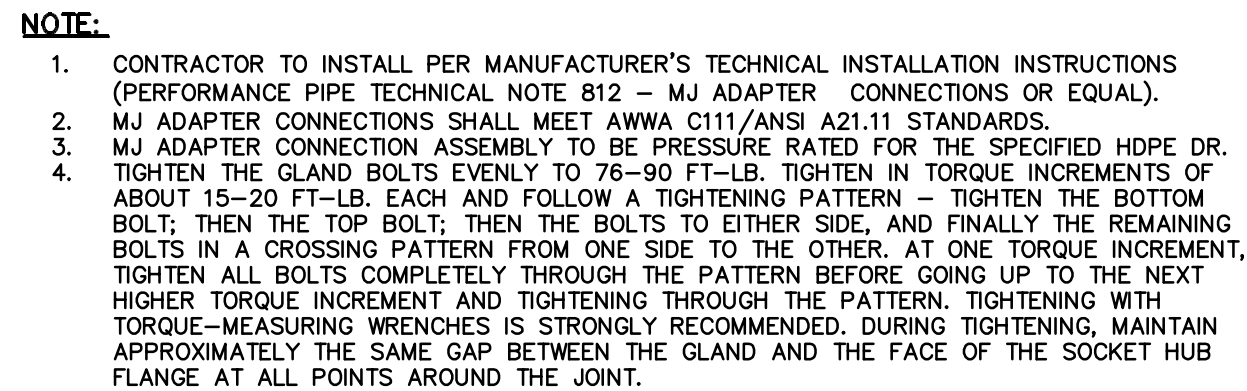
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SHEET

5 OF 6





— MJ ADAPTER — HDPE TO STEEL PIPE  
6 SCALE: N.T.S.

BOLT TORQUE TABLE TO SEAT HDPE FLANGE FACE TO A BFV, STEEL PIPE FLANGE, OR DIP FLANGE

**NOTE (BOLT TORQUE TABLES).**

1. ESTIMATED VALUES ARE BASED ON NON-PLATED BOLTS AND STUDS, USING A UT FACTOR OF K=0.16 FOR LIGHTLY GREASED BOLTS AND NUTS. THESE CALCULATIONS USE AN HDPE MATERIAL MINIMUM AND MAXIMUM COMPRESSIVE SEATING STRESS OF 1200-PSI TO 1800-PSI.

2. GASKETS ARE NOT NECESSARILY REQUIRED FOR HDPE FLANGES WHEN THE LAP-JOINT FLANGE IS PROPERLY ALIGNED, TIGHTENED, AND THE FLANGE-ADAPTER FACE IS DRY. THE THICKNESS OF HDPE IS ABOUT AS SHORE D. QUALITY RATHER THAN RUBBER OR TEFLO GASKETS. THE THICK FACE OF THE HDPE FLANGE ADAPTER ENABLES THE USER TO COMPRESS THE FLANGE FACE, THROUGH BOLT TORQUE, SUCH THAT THE FLANGE FACE IS ELASTICALLY COMPRESSED. THIS STRAIN IS THE APPROXIMATE THICKNESS OF A TRADITIONAL ELASTIC, RESILIENT, REINFORCED RUBBER GASKET.

### BOLT TIGHTENING SEQUENCE TABLE

NOTE (BOLT TIGHTENING TABLE):

1. NUMBER THE BOLTS IN ROTATION AROUND THE LAP—JOINT FLANGE CIRCUMFERENCE, IN A CLOCKWISE ORDER, BEGINNING WITH THE FIRST BOLT AT THE TOP IN THE NOMINAL 12:00 POSITION, THE SECOND BOLT BEING NEXT BOLT TO THE RIGHT, THE THIRD BEING THE NEXT TO THE RIGHT, ECT., UNTIL ALL BOLTS ARE NUMBERED SEQUENTIALLY.
2. FOLLOWING THE TABLE ABOVE, TIGHTEN THE GIVEN BOLT NUMBER TO THE DESIRED TORQUE VALUE FOR THE GIVEN ROUND OF TIGHTENING AS SPECIFIED IN THE INSTALLATION.

**INSTALLATION:**

1. **FLANGE FACE INSPECTION AND INTEGRITY:** THE HDPE AND METAL FLANGE FACES SHOULD BE INSPECTED TO INSURE THEY ARE FREE FROM RADIAL GOUCHES ACROSS NO MORE THAN 1/3RD OF THE FACE WIDTH. SOME SURFACE MARRING OR DENTING IS ACCEPTABLE. THE METAL FLANGE SEALING FACES SHOULD BE FREE FROM RUST, WELD SPLATTER, DIRT, DEBRIS, ETC. HDPE FLANGE-ADAPTER FACES EXHIBITING SURFACE MARRING OR DENTS SHOULD LIMIT SUCH DEFECTS TO NO MORE THAN 1/4" IN ANY ONE PLACE. (IF THE HDPE FLANGE-ADAPTER FACES ARE CRACKED OR SERRATED FACES) CAN BE "FLATTENED" BY LIGHTLY STRIKING THE DAMAGED AREA WITH A FLAT FENCE 5-LB SLEDGE HAMMER TO "WORK" THE DEFECT FLAT").
2. **ALIGNMENT OF THE FLANGE FACES:** ALIGN FLANGE FACES PRIOR TO BOLTING SO THAT ANY GAP IS MINIMAL. THE MATING FLANGE FACES SHOULD BE ALIGNED SQUARE AND TRUE. AS A GENERAL RULE, THE AXIAL CENTERLINE OFF-SET MISALIGNMENT SHOULD NOT EXCEED 1/8". THE ANGULAR MISALIGNMENT OF THE FLANGE-ADAPTER FACE IS USUALLY LIMITED TO LESS THAN 0.005" PER INCH OF DIAMETER. THE TOLERABLE AXIAL GAP SHOULD BE LESS THAN 1/32".
3. **SEALING SURFACE PREPARE:** THE SEALING SURFACES OF THE FLANGE-ADAPTER SHOULD BE THOROUGHLY CLEANED AND DRY. THE SURFACES SHOULD BE FREE OF OIL, GREASE, AND OTHER CONTAMINANTS. THE SURFACES SHOULD BE DRY AND FREE OF OIL, GREASE, AND OTHER CONTAMINANTS. THE SURFACES SHOULD BE DRY AND FREE OF OIL, GREASE, AND OTHER CONTAMINANTS.
4. **CIRCUMFERENCE IN AT LEAST 3 TO 4 PLACES TO VALIDATE THAT THE FLANGES ARE BEING BROUGHT TOGETHER EVENLY. THE CLOSURE DISTANCE FOR EACH ROUND SHOULD BE ABOUT THE SAME FOR EACH POSITION MEASURED. THE GAP SHOULD BE MEASURED AT EVERY OTHER OR EVERY THIRD BOLT. RECORD THE GAP POSITION AND GAP CLOSURE DISTANCE AFTER EACH ROTATIONAL ROUND.**
5. **AXIAL ALIGNMENT:** THE FLANGE-ADAPTER SHOULD BE REMAINING CONCENTRIC WITH THE OD OF THE HDPE FLANGE ADAPTERS. THE WEIGHT OF THE LIF'S WILL TEND TO CAUSE THEM TO "HANG"CENTRIC WITH AN UN-EVEN CRESCENT CONTACT AREA ON THE BACK FACE OF THE FLANGE ADAPTER. BY SNUGGING A FEW BOLTS FIRST, THE L/JF CAN THEN BE RAISED UPWARDS AND HELD CONCENTRICALLY IN PLACE BY LIGHT BOLT FRICTION, SO AS TO MAXIMIZE, AND MAKE UNIFORM, THE CONTACT AREA BETWEEN THE L/JF AND THE FLANGE ADAPTER.
6. **TOPIR, BOLT POSITION, AND TORQUE SEQUENCE:** THE SEQUENCE OF THE BOLTS SHOULD BE USED WHEN TORQUING THE BOLTS. EACH BOLT SHOULD BE NUMBERED TO INSURE IT IS USED IN THE PROPER SEQUENCE. KEEPING TRACK OF THE BOLTING SEQUENCE ON LARGE DIAMETER FLANGES CAN BE CONFUSING.
7. **TORQUE PROGRESSION:** WHEN TIGHTENING PIPE FLANGE BOLTS, THE BEST EVEN LOADING OF THE BOLTS, AND THE BEST EVEN COMPRESSION OF THE HDPE FLANGE FACE IS ACHIEVED BY PROGRESSING THROUGH SEVERAL LEVELS TO THE FINAL TORQUE VALUE. FOR 18" AND LARGER NOMINAL DIAMETER FLANGES, THE 25-25 RULE APPLIES IN WHICH BOLTS ARE SEQUENTIALLY TIGHTENED IN FOUR (25%) STAGES, WITH A FINAL CLOCKWISE TORQUE CHECK.
8. **RESIDUAL BOLT TORQUE (RBT) & MANDATORY RE-TORQUING:** WITH TIME THE INITIAL BOLT TORQUE WILL SLOWLY DECLINE TO A RESIDUAL LEVEL OF ABOUT 35% OF THE INITIAL BOLT TORQUE. THIS LONG TERM LEVEL OF ENGINEERED TORQUE IS SUFFICIENT TO SEAL THE L/JF ASSEMBLY. THE RBT IS THE MINIMUM TORQUE NECESSARY TO MAINTAIN THE SEALING SURFACES OF THE FLANGE-ADAPTER IN CONTACT. THE RBT IS THE MINIMUM TORQUE NECESSARY TO MAINTAIN THE SEALING SURFACES OF THE FLANGE-ADAPTER IN CONTACT. THE RBT IS THE MINIMUM TORQUE NECESSARY TO MAINTAIN THE SEALING SURFACES OF THE FLANGE-ADAPTER IN CONTACT.
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# BOLT TORQUE TABLES FOR FLANGED JOINTS

PRELIMINARY  
NOT FOR CONSTRUCTION  
90% DRAFT SUBMITTAL

NEW RAW WATER CONNECTION  
AT FRIANT DAM  
FRESNO COUNTY WATER WORKS DISTRICT NO. 18  
FRESNO COUNTY, CA

## DETAILS

**EST. 1968**

**PROVOST & PRITCHARD**

**CONSULTING GROUP**

*An Employee Owned Company*  
286 WEST CROWMLAY AVENUE  
FRESNO, CALIFORNIA 93711-6162  
559/449-2700 FAX 559/449-2715  
[www.ppeng.com](http://www.ppeng.com)

DESIGN ENGINEER:

LICENSE NO:

DRAFTED BY  
JSD

SCALE: AS SHOWN

DATE: 2011-11-

JOB NO: 13281106

DWG.