PLANS FOR
HANSON RESERVOIR DAM OUTLET REHABILITATION

PREPARED FOR
LEROUX CREEK WATER USERS ASSOCIATION

DELTA COUNTY, COLORADO
WATER DIVISION 4

PREPARED BY
WESTERN ENGINEERS, INC.
GRAND JUNCTION, COLORADO

LIST OF DRAWINGS:

DESCRIPTION	SHEET NUMBER
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PLAN AND DETAILS	2
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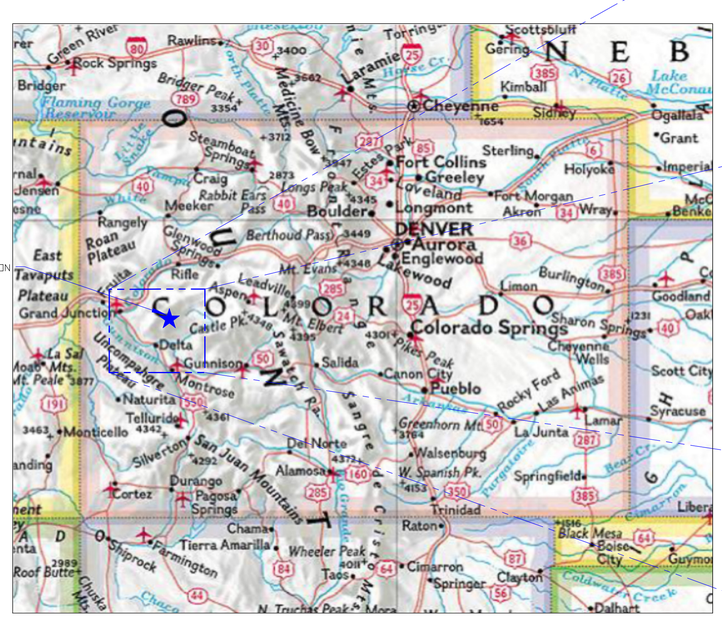
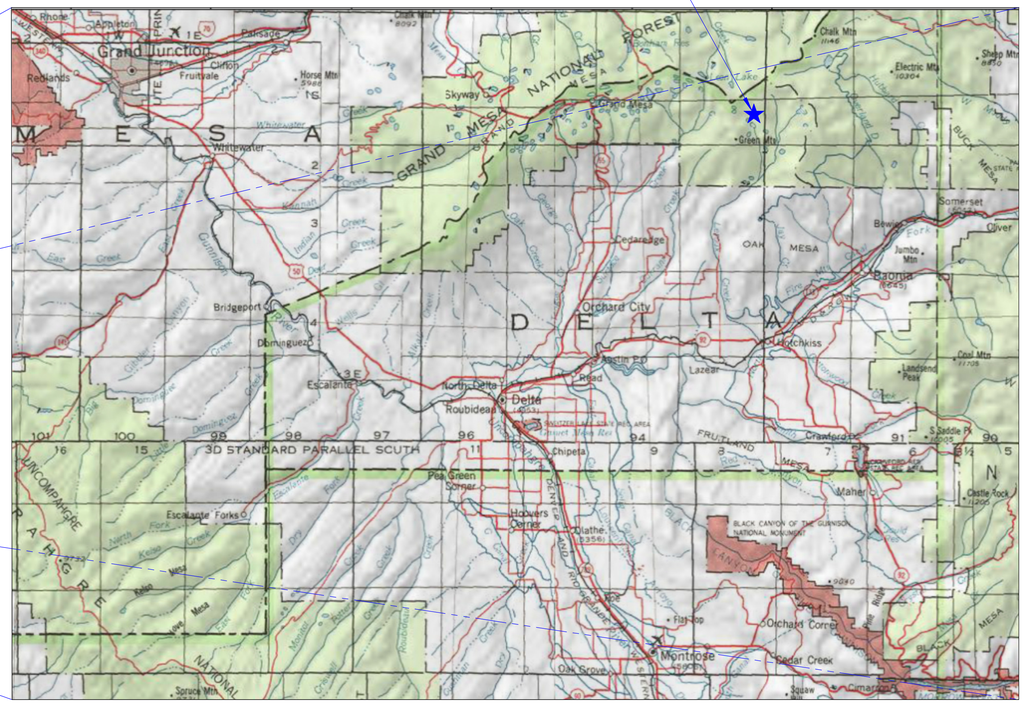


COLORADO MAP

50 MI 0 50 MI 100 MI

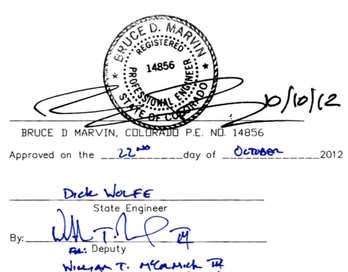
SCALE IN MILES



VICINITY MAP

5 0 5 10

SCALE IN MILES



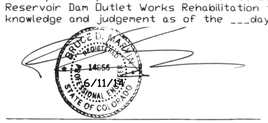
BRUCE D MARVIN, COLORADO P.E. NO. 14856

Approved on the 22ND day of October 2012

Dick Wolfe
State Engineer

By: _____
For: Deputy
William T. McCormick III
Chief Dam Safety Branch
CO PE 29127

These plans represent the AS-CONSTRUCTED conditons of Hanson Reservoir Dam Outlet Works Rehabilitation to the best of our knowledge and judgement as of the ___day of _____, 2012



BRUCE D MARVIN, COLORADO P.E. NO. 14856

AS-CONSTRUCTED 6/11/14
REVISED 10/09/12

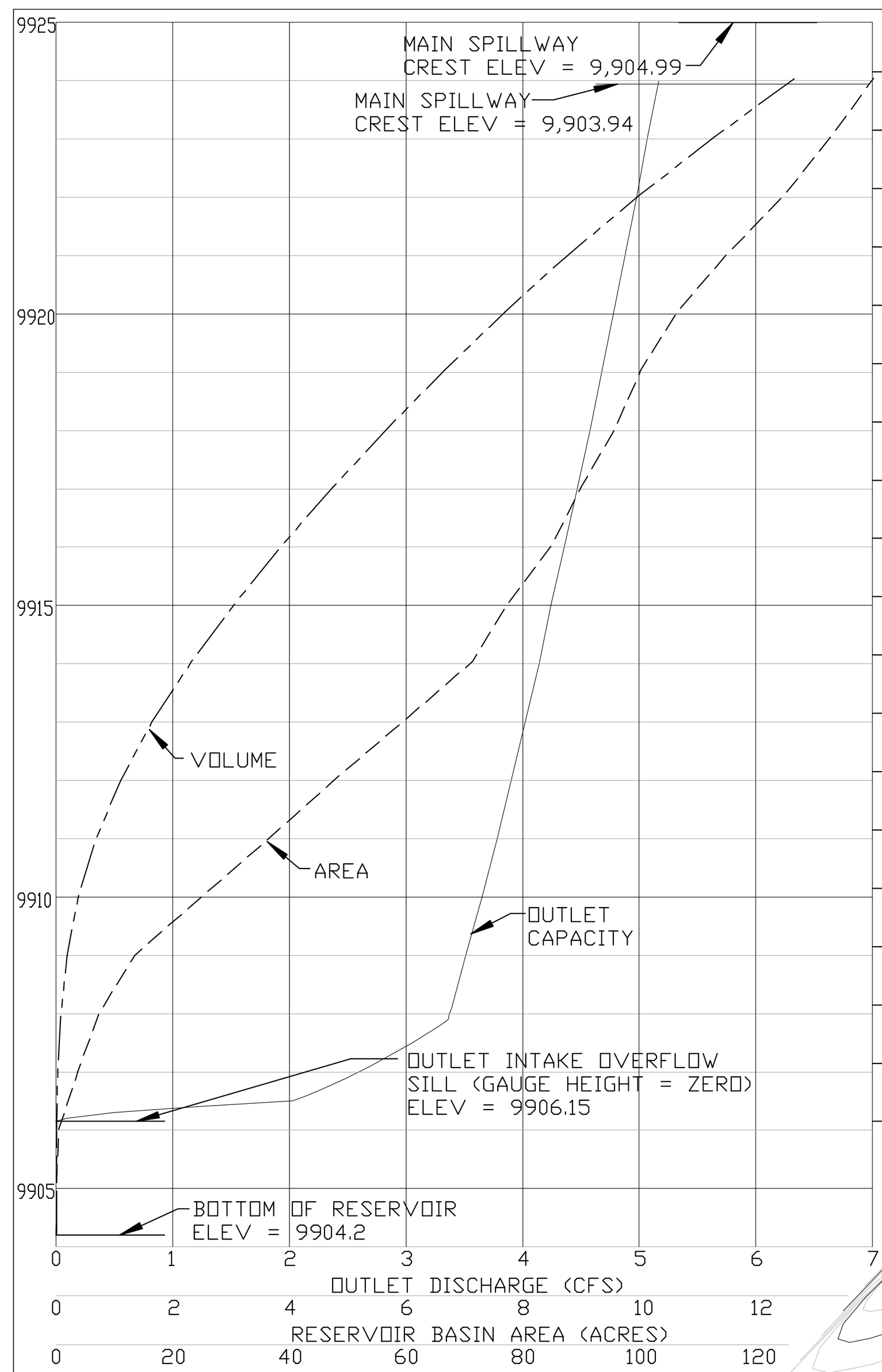
C-0185A

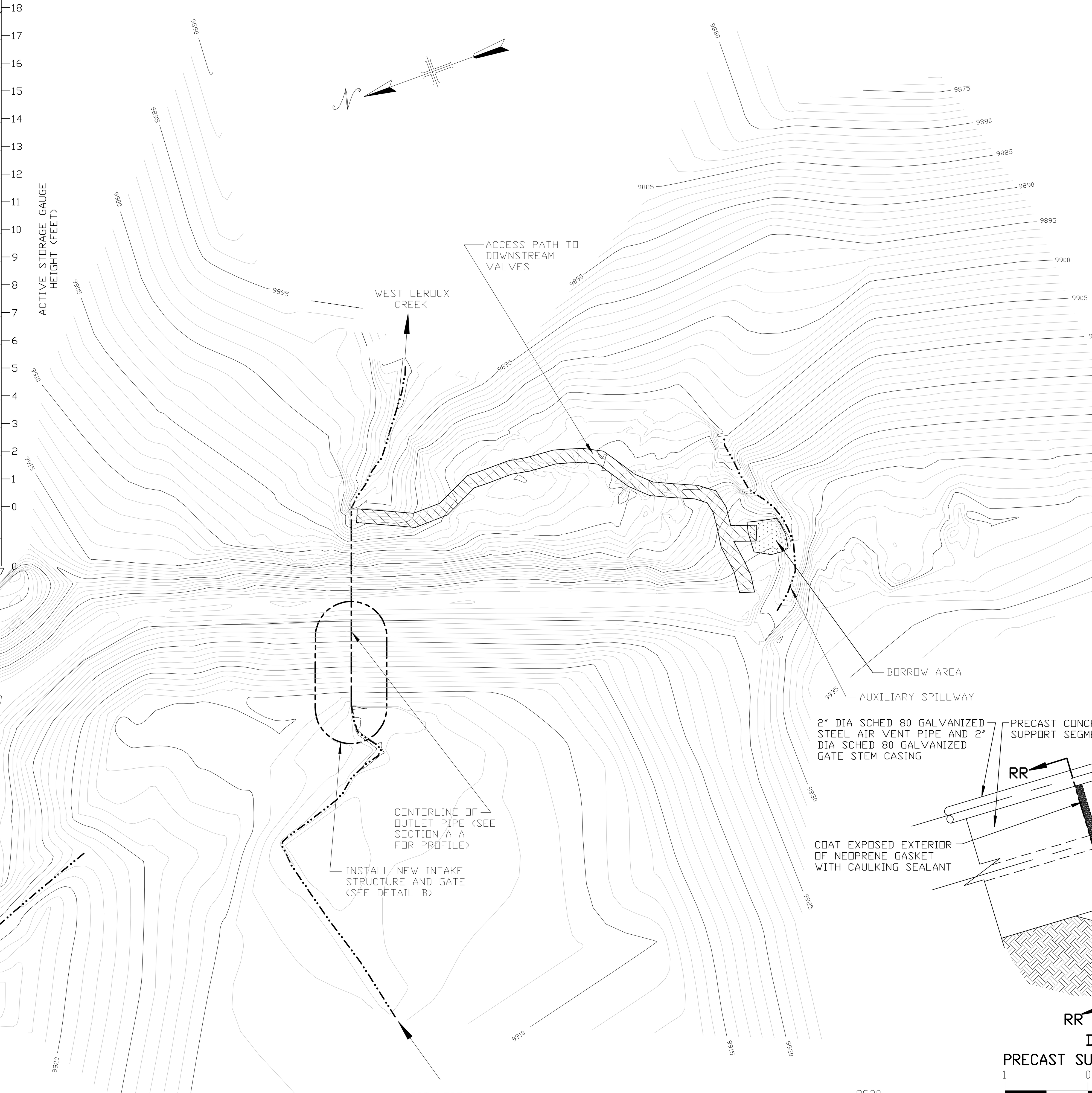
SHEET 1 OF 6

WESTERN ENGINEERS, INC.

COVER SHEET
HANSON RESERVOIR DAM
OUTLET WORKS REHABILITATION
DAM ID 400315
LOCATED IN SECTION 11, T12S, R93W, 6TH PM
WATER DIVISION 4
WATER DISTRICT 40
DELTA COUNTY, COLORADO

DESIGN	B.D.M.	DRAWN	B.D.M.	CHECKED	B.D.M.
DATE	7/9/2012	WEI DWG. NO.	4072-H		

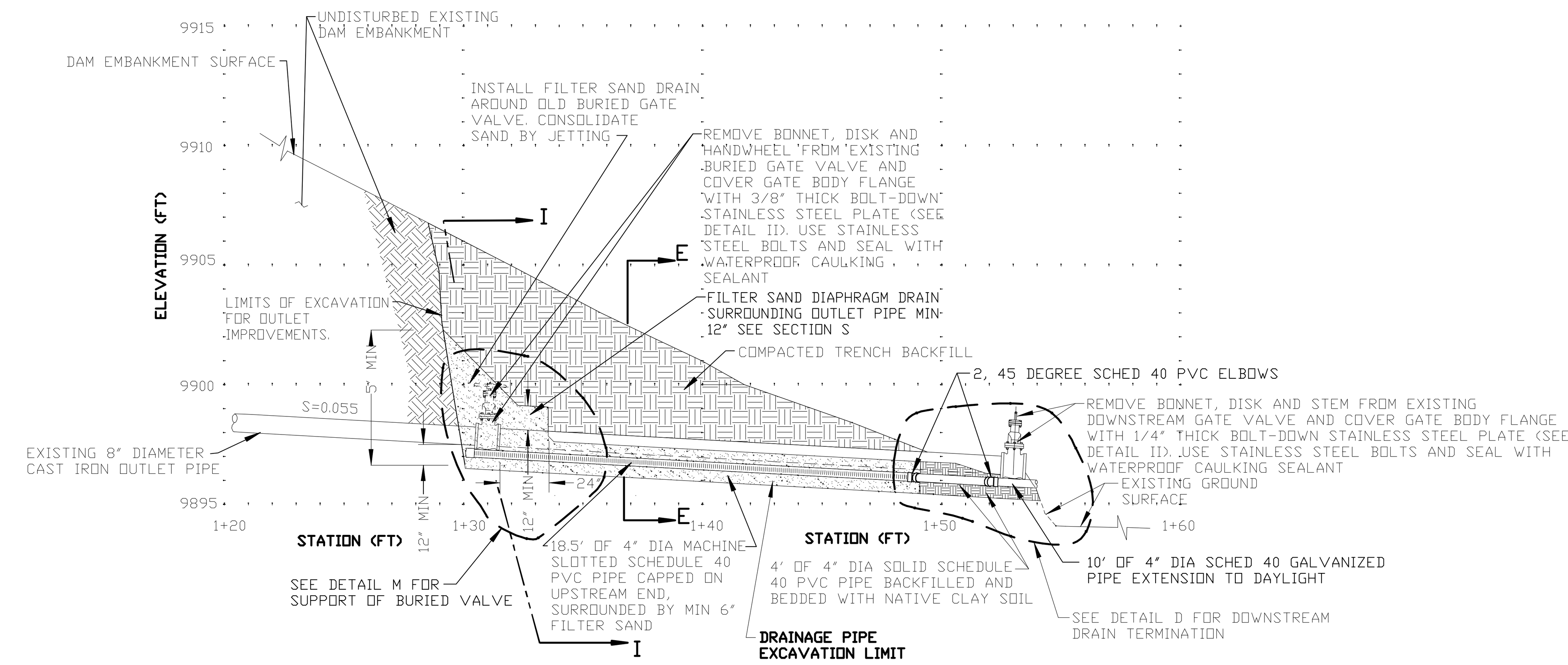




PLAN VIEW

GRAPHIC SCALE (IN FEET)

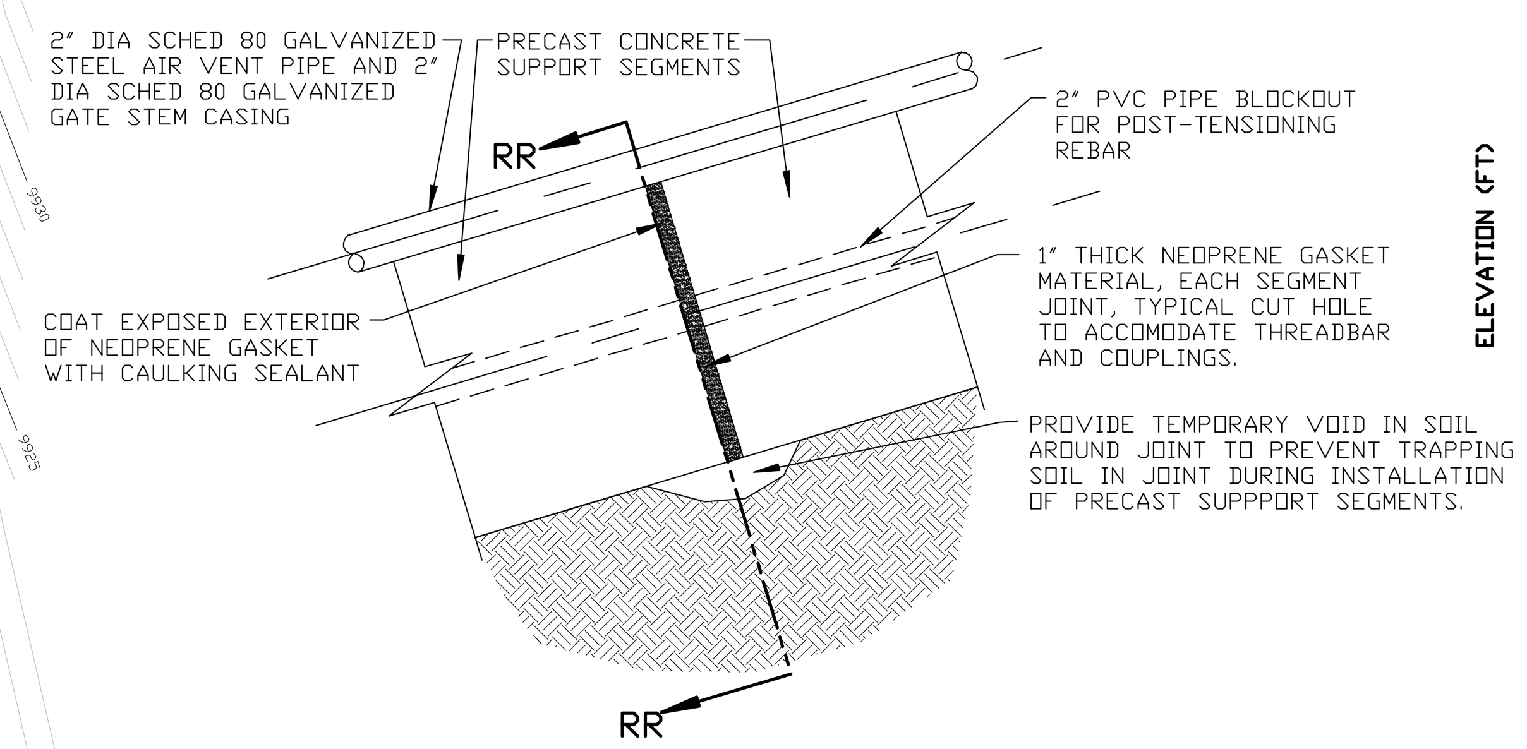
NOTE: ELEVATIONS ARE BASED ON NAVD 88 DATUM



SECTION C
DOWNSTREAM PIPE MODIFICATION

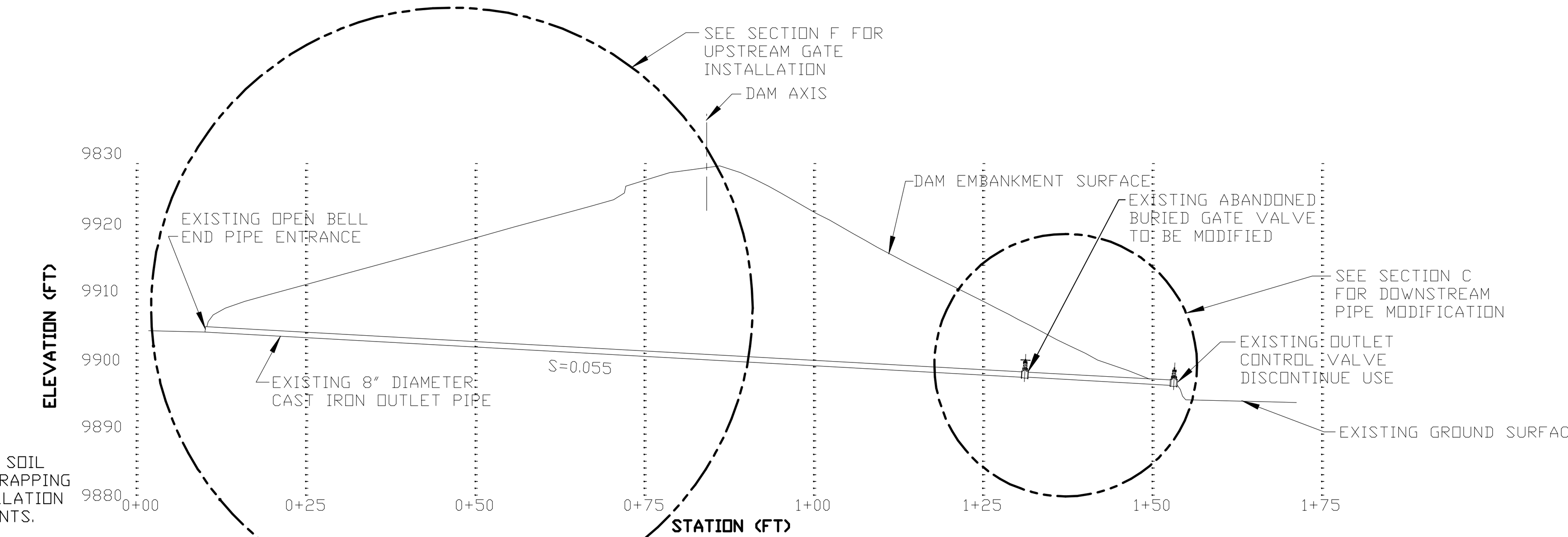
NOTES: 1.) SEE DETAIL D THIS SHEET, SECTION E-E SHEET 3, SECTION I-I SHEET 3, AND GENERAL NOTES SHEET 6 FOR EXCAVATION AND SAND PLACEMENT LIMITS AND REQUIREMENTS.
2.) SEE SECTION QQ THIS SHEET FOR PLAN VIEW OF SAND FILTER AND DRAIN PIPE.

SCALE IN FEET



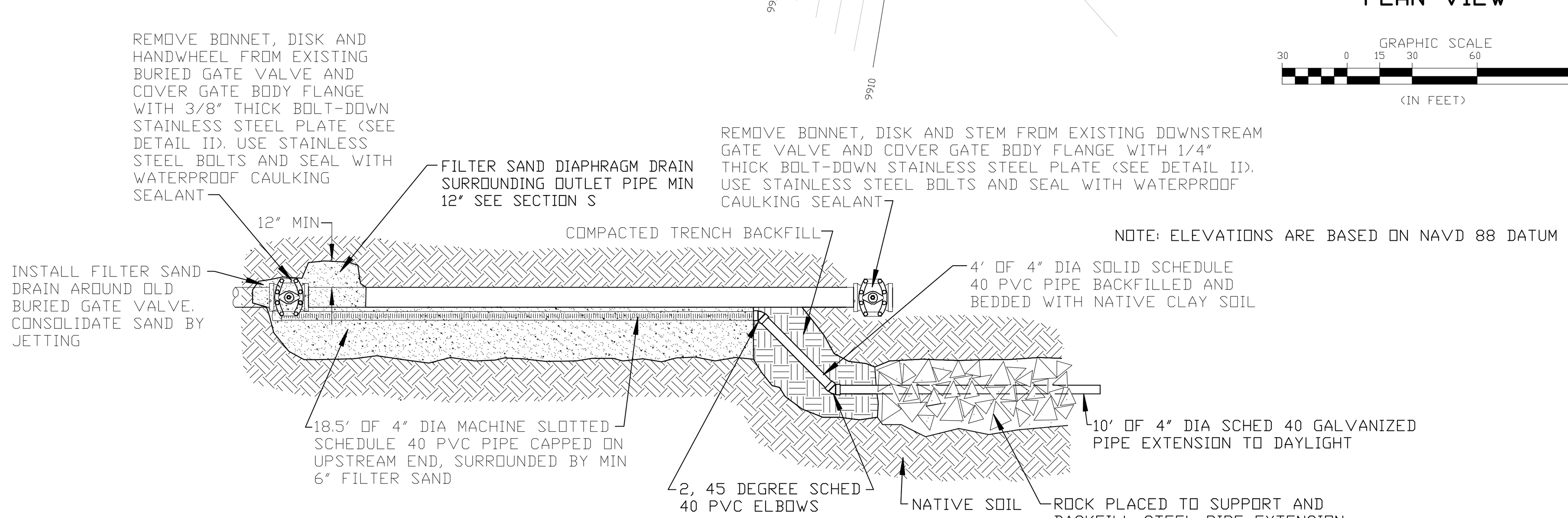
DETAIL P
PRECAST SUPPORT SEGMENT JOINT

SCALE IN FEET



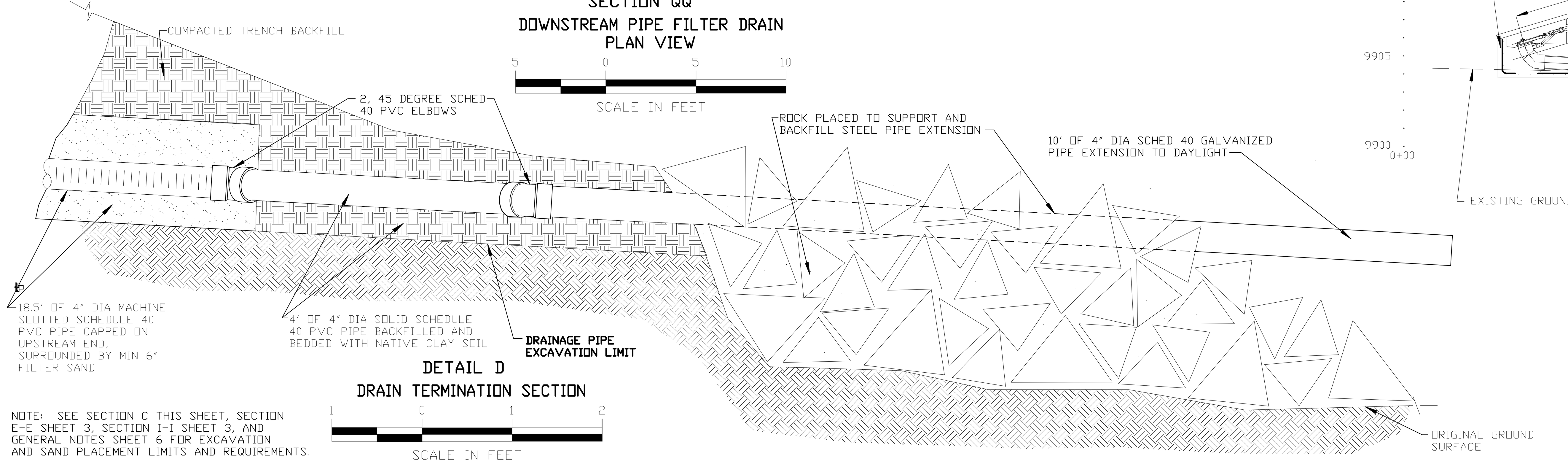
SECTION A-A
DAM SECTION THROUGH OUTLET

SCALE IN FEET



SECTION QQ
DOWNSTREAM PIPE FILTER DRAIN
PLAN VIEW

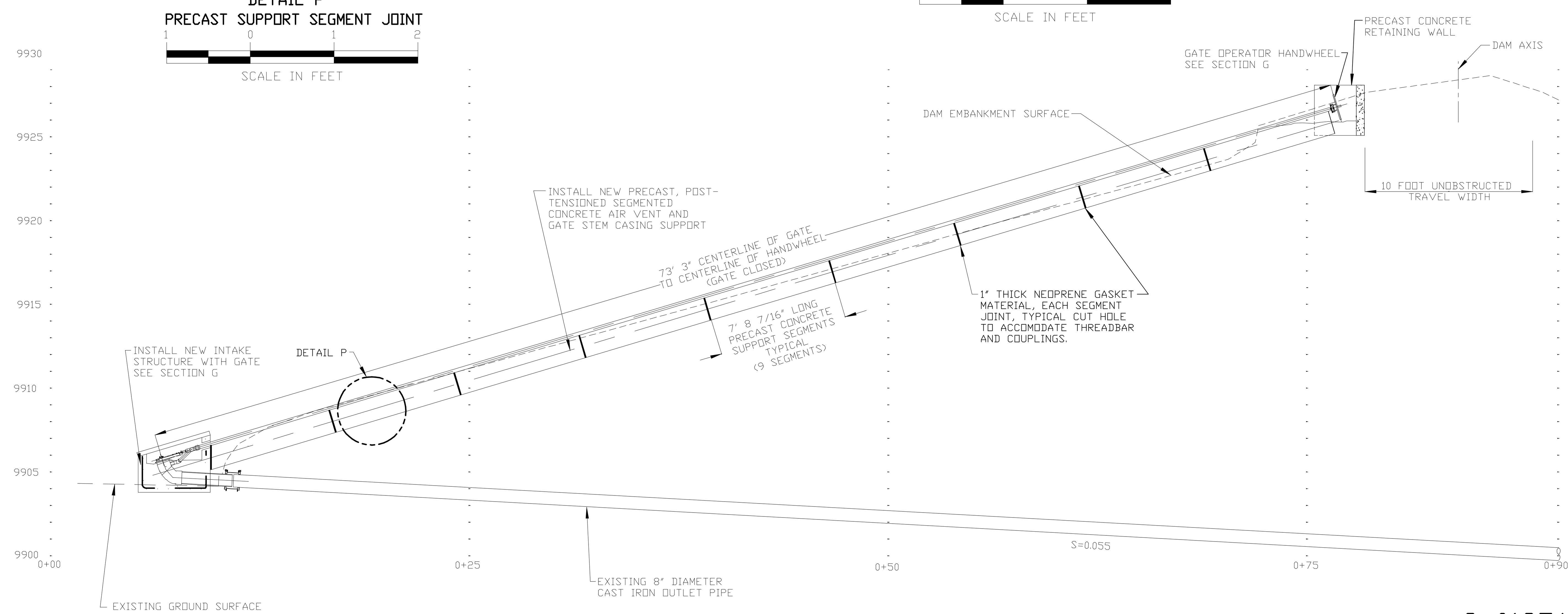
SCALE IN FEET



DETAIL D
DRAIN TERMINATION SECTION

SCALE IN FEET

NOTE: SEE SECTION C THIS SHEET, SECTION E-E SHEET 3, SECTION I-I SHEET 3, AND GENERAL NOTES SHEET 6 FOR EXCAVATION AND SAND PLACEMENT LIMITS AND REQUIREMENTS.



SECTION F
DAM SECTION THROUGH OUTLET

SCALE IN FEET

NOTE: SEE SHEET 6 FOR GENERAL NOTES.

BRUCE D MARV[IN] ... NO. 14856 (PROFESSIONAL ENGINEER STATE OF COLORADO seal, 6/11/14)

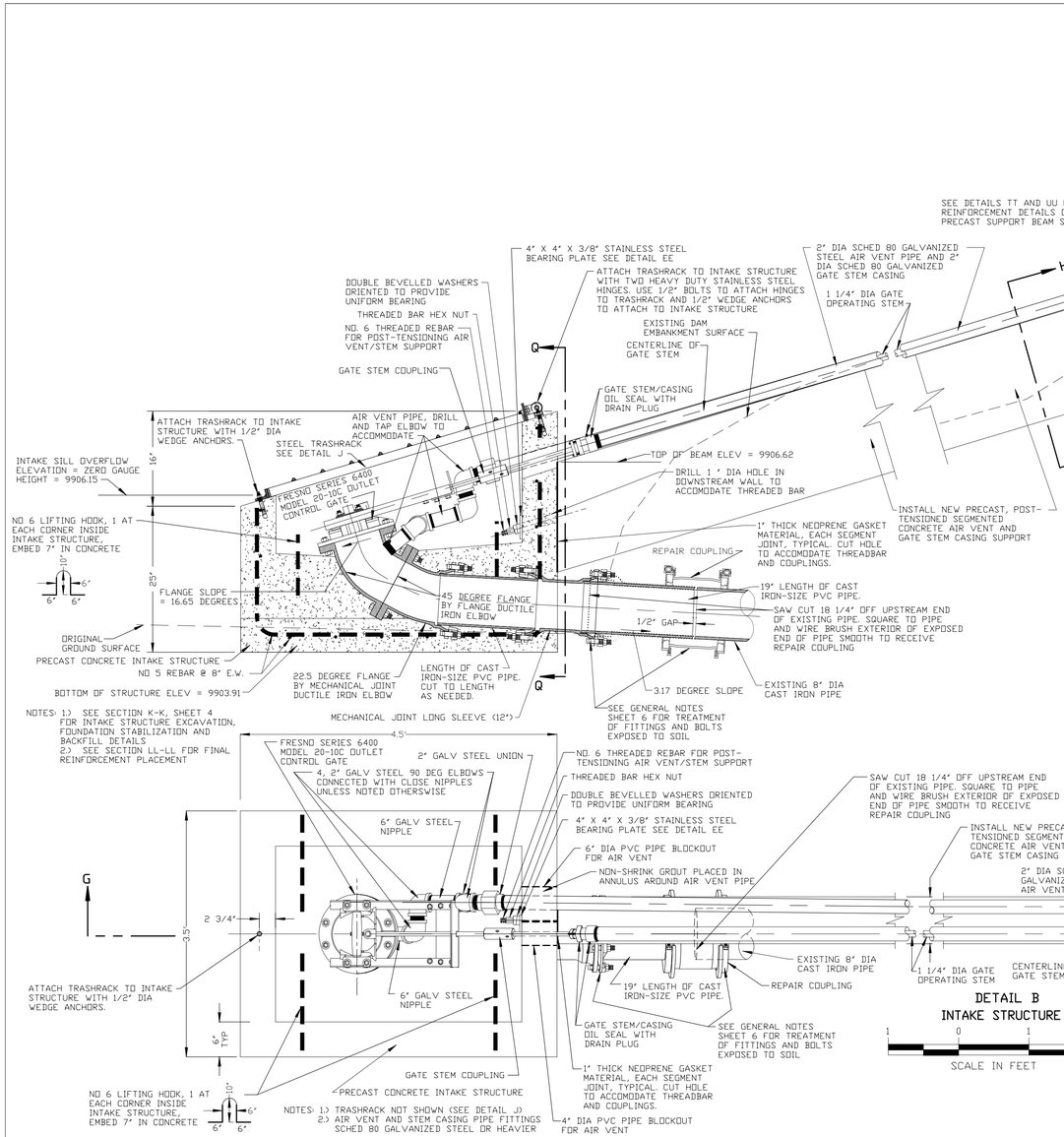
C-0185A

WESTERN ENGINEERS, INC.

PLAN, SECTIONS AND DETAILS
HANSON RESERVOIR DAM
OUTLET WORKS REHABILITATION
DAM ID 400315
LOCATED IN SECTION 11, T12S, R93W, 6TH PM
WATER DIVISION 4
WATER DISTRICT 40
DELTA COUNTY, COLORADO

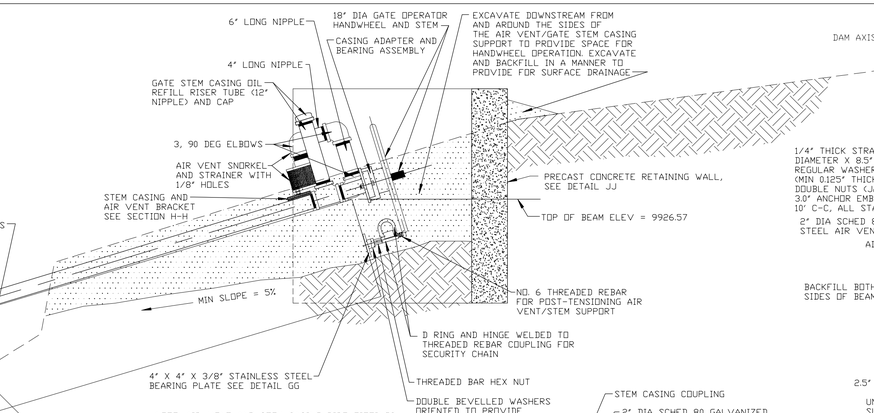
AS-CONSTRUCTED 6/11/14
REVISED 10/09/12

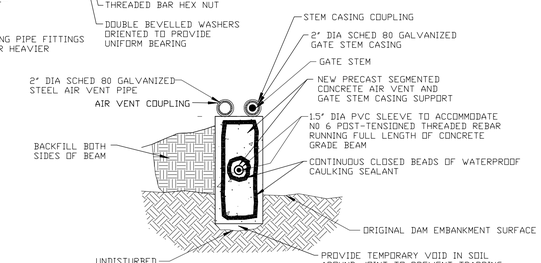
DESIGNED BDM	DRAWN BDM	CHECKED BDM
DATE: 7/9/2012	WORK ORDER NUMBER 4072-H	



SECTION G-G
INTAKE STRUCTURE

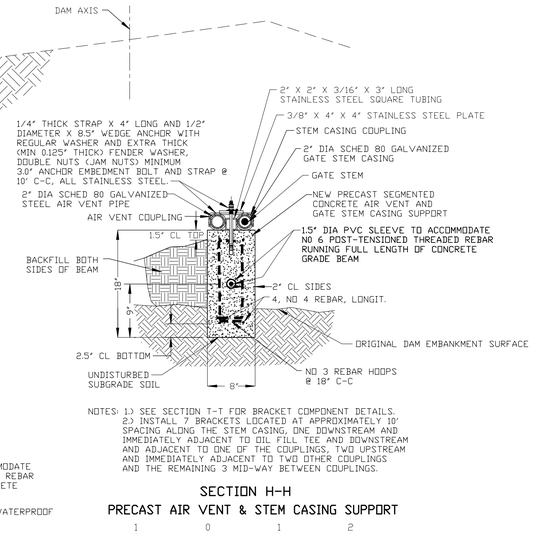
1 0 1 2
SCALE IN FEET





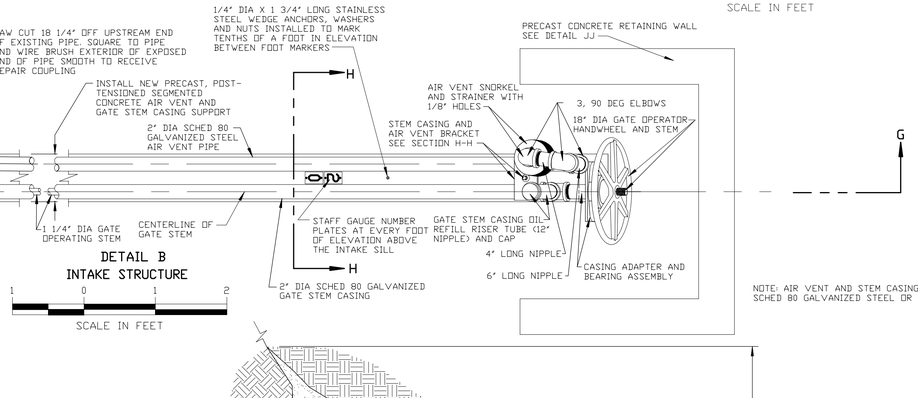
SECTION RR-RR
PRECAST AIR VENT & STEM CASING SUPPORT END JOINT TREATMENT

1 0 1 2
SCALE IN FEET



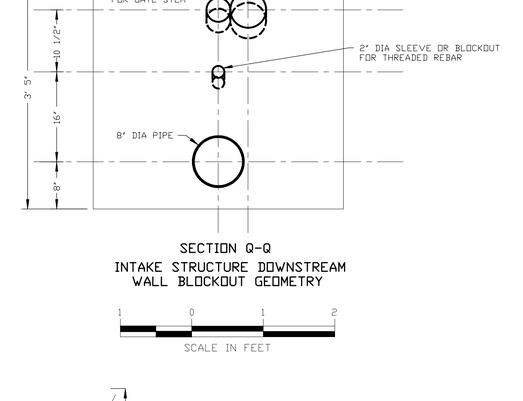
SECTION H-H
PRECAST AIR VENT & STEM CASING SUPPORT

1 0 1 2
SCALE IN FEET



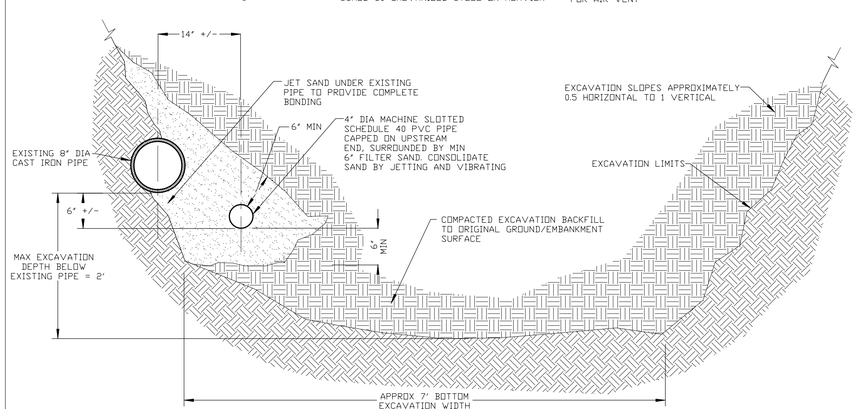
DETAIL B
INTAKE STRUCTURE

1 0 1 2
SCALE IN FEET



SECTION Q-Q
INTAKE STRUCTURE DOWNSTREAM WALL BLOCKOUT GEOMETRY

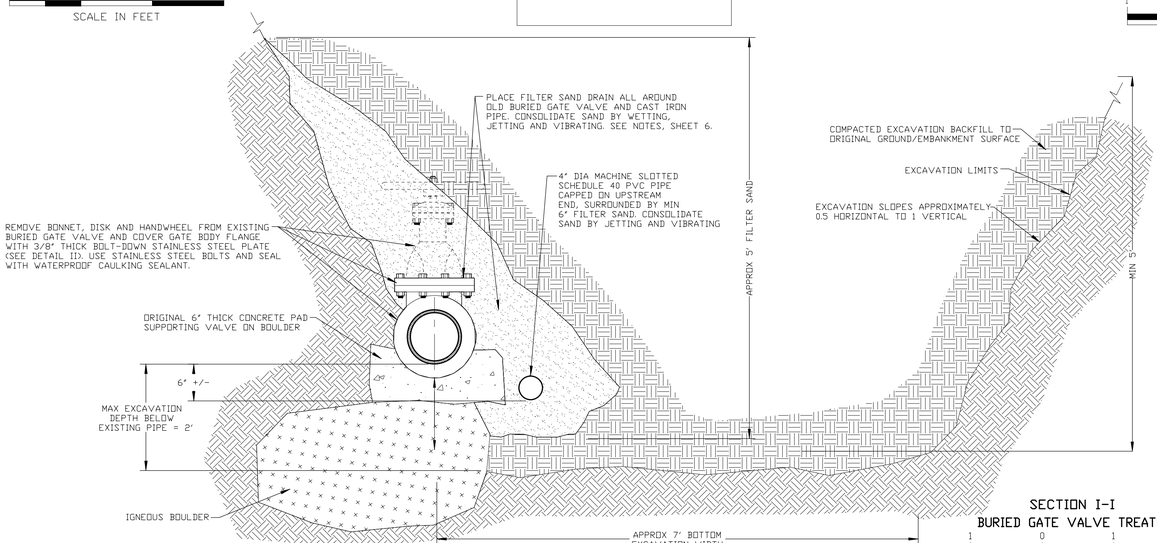
1 0 1 2
SCALE IN FEET



1 0 1 2
SCALE IN FEET

SECTION E-E
DOWNSTREAM DRAIN PIPE

NOTE: SEE DETAIL B SHEET 2, SECTION C SHEET 2, AND GENERAL NOTES SHEET 6 FOR EXCAVATION AND SAND PLACEMENT LIMITS AND REQUIREMENTS.



1 0 1 2
SCALE IN FEET

SECTION I-I
BURIED GATE VALVE TREATMENT

NOTE: SEE SHEET 6 FOR GENERAL NOTES.

BRUCE D. MARVEL
REGISTERED
14856
6/11/14
PROFESSIONAL ENGINEER
STATE OF COLORADO

BRUCE D MARVEL, COLO. REG. NO. 14856

SHEET 3 OF 6

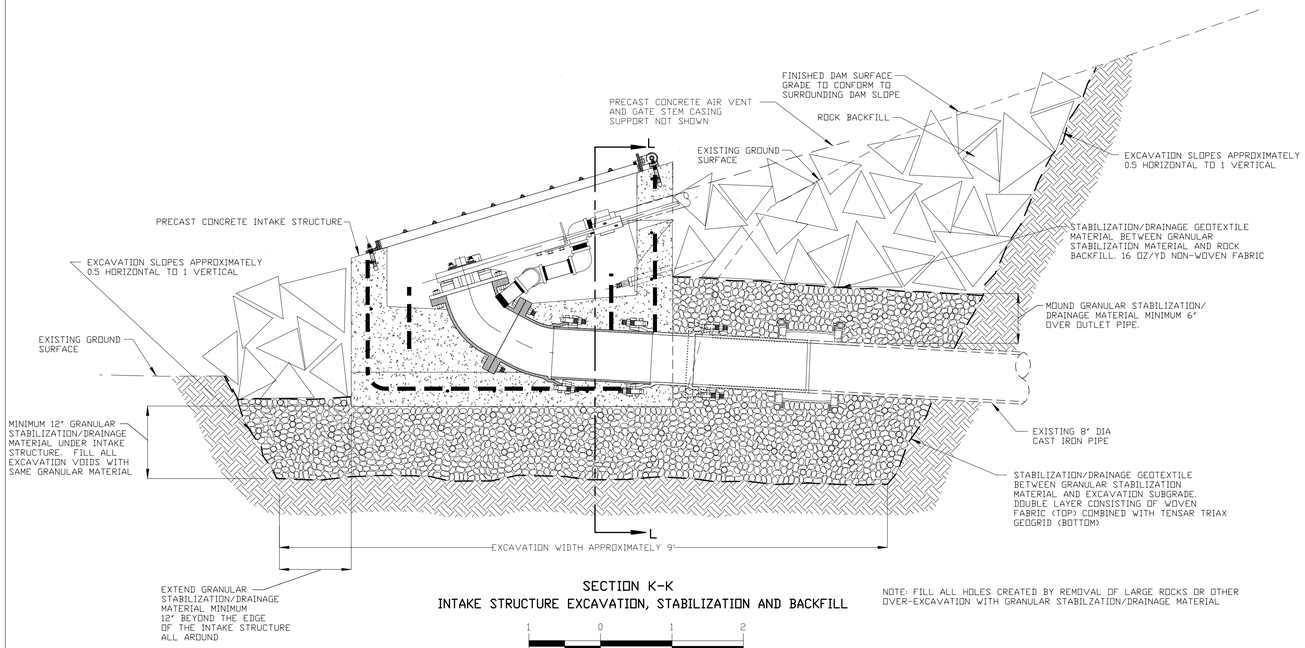
C-0185A

AS-CONSTRUCTED 6/11/14
REVISED 10/09/12

WESTERN ENGINEERS, INC.

SECTIONS AND DETAILS
HANSON RESERVOIR DAM OUTLET WORKS REHABILITATION
DAM ID 400315
LOCATED IN SECTION 11, T12S, R93W, 6TH PM
WATER DIVISION 4
WATER DISTRICT 40
DELTA COUNTY, COLORADO

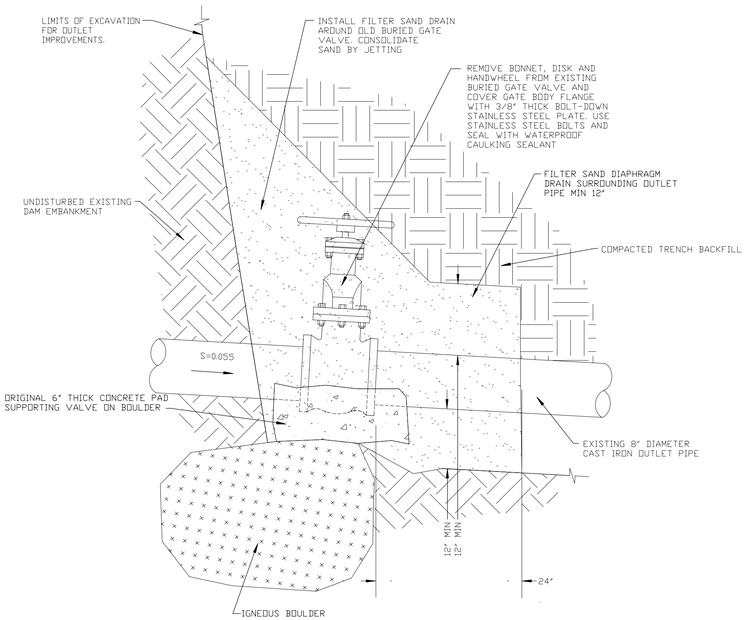
DESIGNED BDM	DRAWN BDM	CHECKED BDM
DATE: 7/9/2012	WORK ORDER NUMBER 4072-H	



SECTION K-K
INTAKE STRUCTURE EXCAVATION, STABILIZATION AND BACKFILL

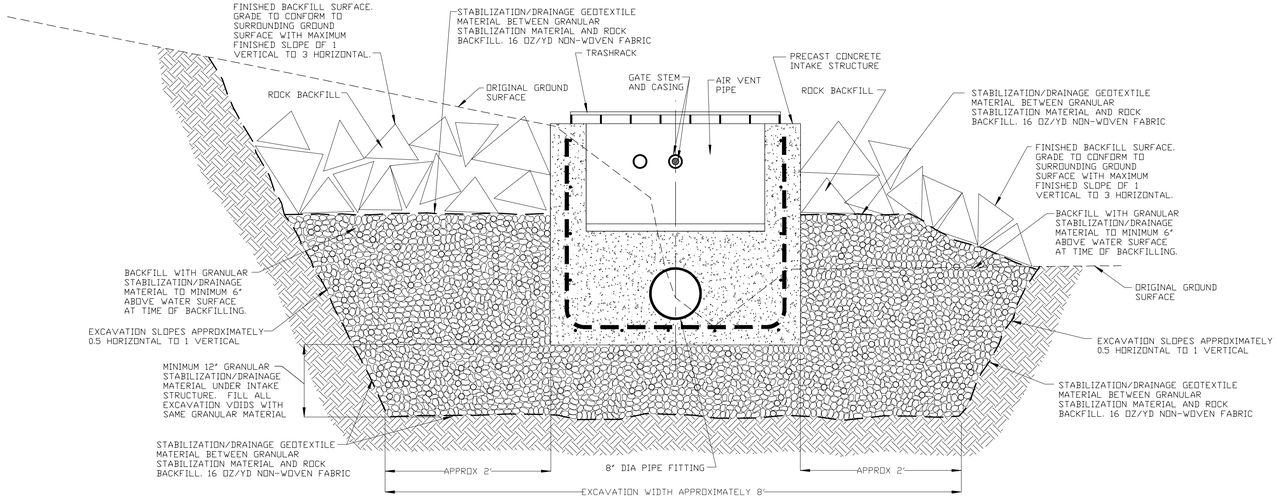
1 0 1 2
SCALE IN FEET

NOTE: FILL ALL HOLES CREATED BY REMOVAL OF LARGE ROCKS OR OTHER OVER-EXCAVATION WITH GRANULAR STABILZATION/DRAINAGE MATERIAL



DETAIL M
BURIED VALVE SUPPORT

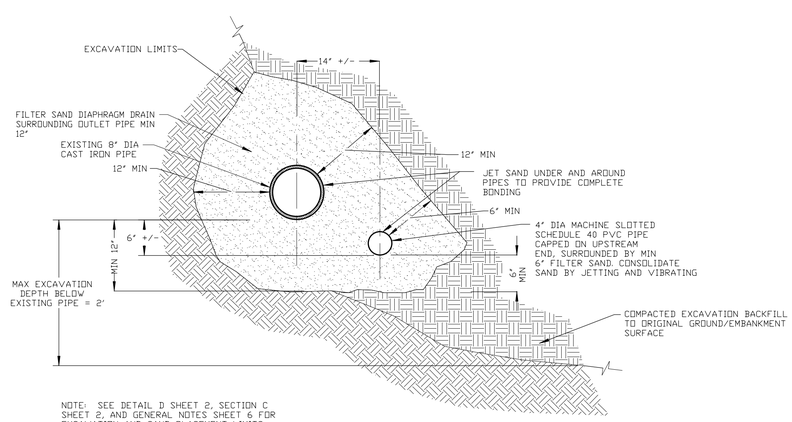
1 0 1 2
SCALE IN FEET



SECTION L-L
INTAKE STRUCTURE EXCAVATION, STABILIZATION AND BACKFILL

1 0 1 2
SCALE IN FEET

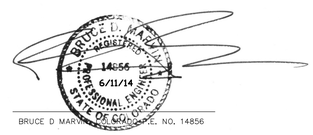
NOTE: FILL ALL HOLES CREATED BY REMOVAL OF LARGE ROCKS OR OTHER OVER-EXCAVATION WITH GRANULAR STABILIZATION/DRAINAGE MATERIAL



NOTE: SEE DETAIL D SHEET 2, SECTION C SHEET 2, AND GENERAL NOTES SHEET 6 FOR EXCAVATION AND SAND PLACEMENT LIMITS AND REQUIREMENTS.

SECTION S
FILTER SAND DIAPHRAGM DRAIN

1 0 1 2
SCALE IN FEET



BRUCE D MARVIN, COLORADO P.E. NO. 14856

NOTE: SEE SHEET 6 FOR GENERAL NOTES.

AS-CONSTRUCTED 6/11/14
REVISED 10/09/12

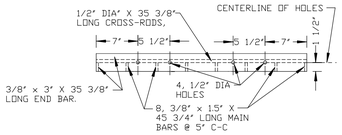
SHEET 4 OF 6

C-0185A

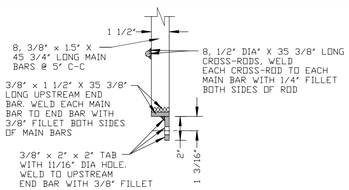
WESTERN ENGINEERS, INC.

SECTIONS, AND DETAILS
HANSON RESERVOIR DAM
OUTLET WORKS REHABILITATION
DAM ID 400315
LOCATED IN SECTION 11, T12S, R93W, 6TH PM
WATER DIVISION 4
WATER DISTRICT 40
DELTA COUNTY, COLORADO

DESIGNED BDM	DRAWN BDM	CHECKED BDM
DATE: 7/9/2012	WORK ORDER NUMBER 4072-H	

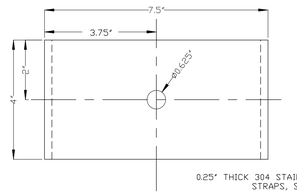


SECTION BB-BB
DOWNSTREAM TRASHRACK END BAR

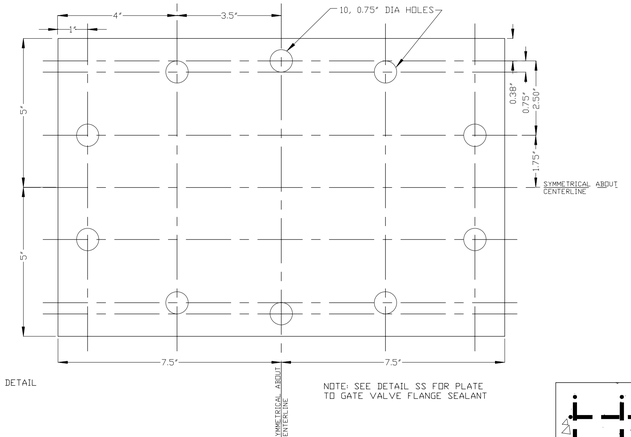


DETAIL DD
TRASHRACK ATTACHMENT TAB

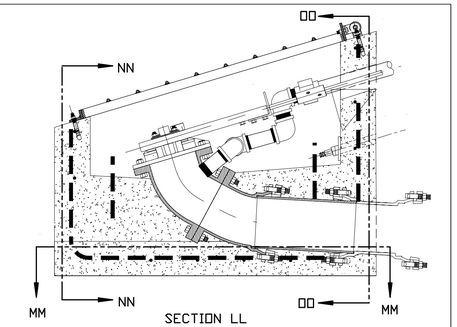
SCALE IN FEET



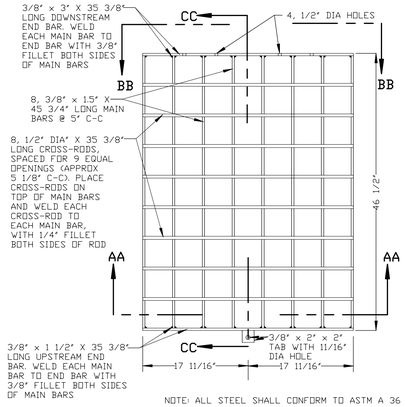
DETAIL U
BRACKET STRAP TOP VIEW



DETAIL II
GATE VALVE COVER PLATE

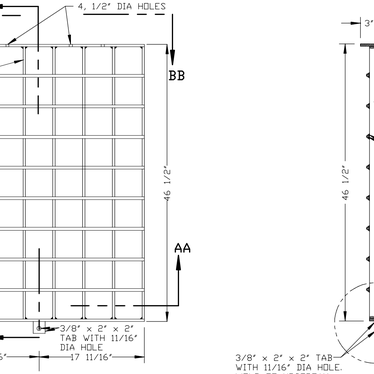


SECTION LL
FINAL INTAKE STRUCTURE REINFORCEMENT PLACEMENT

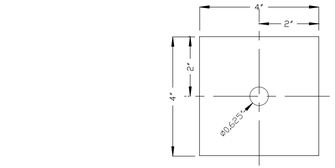


NOTE: ALL STEEL SHALL CONFORM TO ASTM A 36

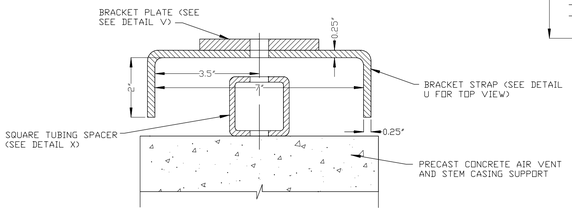
DETAIL J
TRASHRACK PLAN VIEW



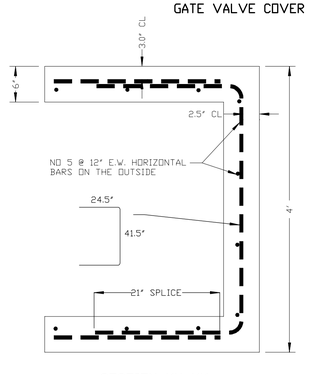
SECTION CC-CC
LONGITUDINAL TRASHRACK SECTION



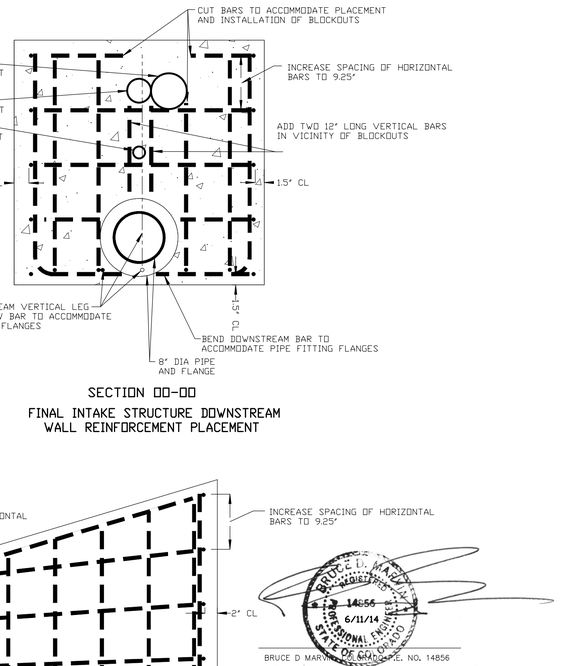
DETAIL W
BRACKET PLATE TOP VIEW



SECTION T-T
BRACKET COMPONENTS

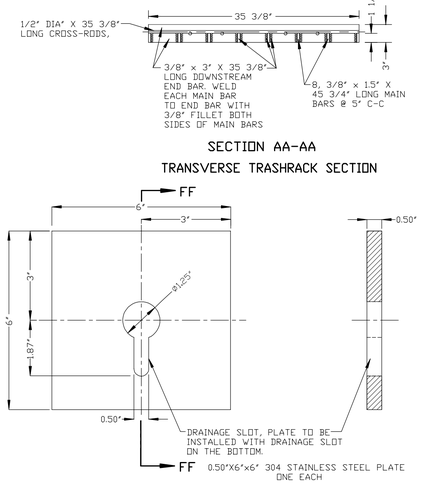


SECTION KK-KK
RETAINING WALL REINFORCEMENT

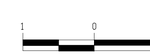


SECTION MM-MM
FINAL INTAKE STRUCTURE BOTTOM REINFORCEMENT PLACEMENT

SECTION OO-OO
FINAL INTAKE STRUCTURE DOWNSTREAM WALL REINFORCEMENT PLACEMENT

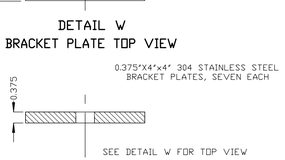


SECTION AA-AA
TRANSVERSE TRASHRACK SECTION

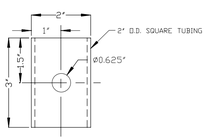


SCALE IN FEET

(THIS SCALE APPLIES TO TRASHRACK PLAN VIEW - DETAIL J, SECTION AA-AA, SECTION BB-BB AND SECTION CC-CC)

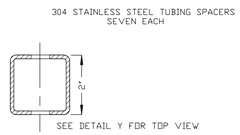


DETAIL V
BRACKET PLATE



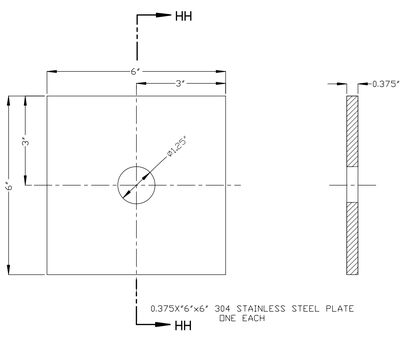
DETAIL Y
BRACKET SPACER TOP VIEW

DETAIL EE
UPSTREAM POST-TENSIONING BAR BEARING PLATE



DETAIL X
BRACKET SPACER

SECTION FF-FF
UPSTREAM POST-TENSIONING BAR BEARING PLATE



DETAIL GG
DOWNSTREAM POST-TENSIONING BAR BEARING PLATE

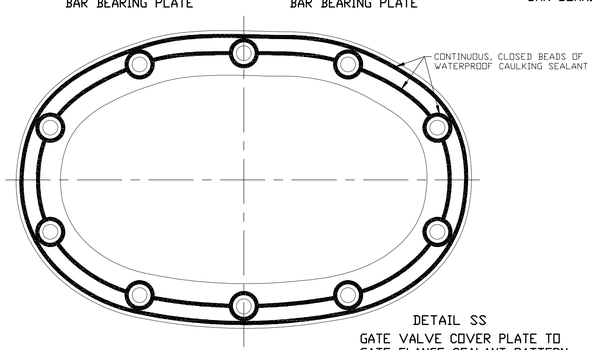
SECTION HH-HH
DOWNSTREAM POST-TENSIONING BAR BEARING PLATE

SCALE IN FEET

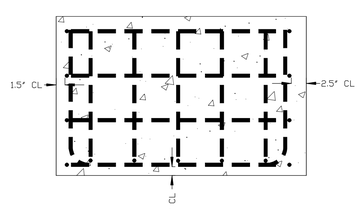
(THIS SCALE APPLIES TO BRACKET COMPONENTS AND GATE VALVE COVER PLATE SECTION T-T, DETAIL U, DETAIL V, DETAIL W, DETAIL X, DETAIL Y, DETAIL EE, SECTION FF-FF, DETAIL GG, SECTION HH-HH, DETAIL II AND DETAIL SS)

SCALE IN FEET

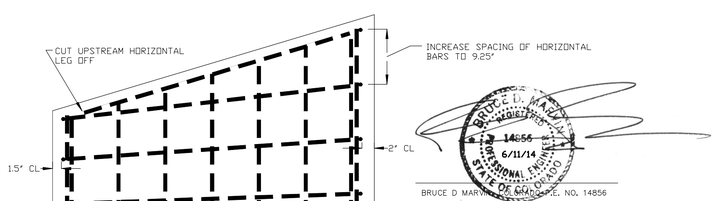
(THIS SCALE APPLIES TO RETAINING WALL AND INTAKE STRUCTURE DETAILS - DETAIL JJ, SECTION KK-KK, SECTION LL, SECTION MM-MM, SECTION NN-NN, SECTION OO-OO AND SECTION PP-PP)



DETAIL SS
GATE VALVE COVER PLATE TO GATE FLANGE SEALANT PATTERN



SECTION NN-NN
FINAL INTAKE STRUCTURE UPSTREAM WALL REINFORCEMENT PLACEMENT



BRUCE D MARR, COLORADO P.E. NO. 14856

SECTION PP-PP
FINAL INTAKE STRUCTURE SIDE WALL REINFORCEMENT PLACEMENT

NOTE: SEE SHEET 6 FOR GENERAL NOTES.

SHEET 5 OF 6

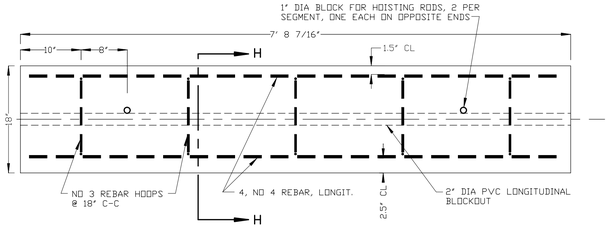
C-0185A

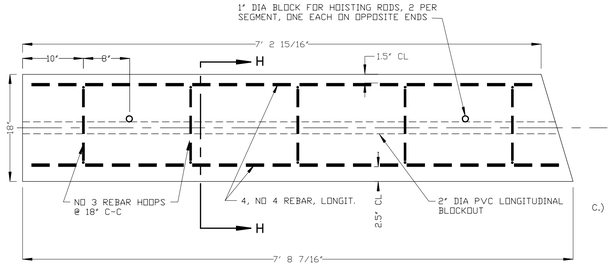
WESTERN ENGINEERS, INC.

SECTIONS, AND DETAILS
HANSON RESERVOIR DAM
OUTLET WORKS REHABILITATION
DAM ID 400315
LOCATED IN SECTION 11, T12S, R93W, 6TH PM
WATER DIVISION 4
WATER DISTRICT 40
DELTA COUNTY, COLORADO

DESIGNED BDM	DRAWN BDM	CHECKED BDM
DATE: 7/9/2012	WORK ORDER NUMBER 4072-H	

AS-CONSTRUCTED 6/11/14
REVISED 10/09/12





GENERAL NOTES

DETAIL TT
PRECAST RECTANGULAR AIR VENT & STEM CASING SUPPORT
(8 EACH)

1 0 1 2
SCALE IN FEET

DETAIL UU
PRECAST UPSTREAM AIR VENT & STEM CASING SUPPORT
(1 PIECE)

1 0 1 2
SCALE IN FEET

A.) DESIGN, FABRICATION AND CONSTRUCTION OF ALL ELEMENTS ARE SUBJECT TO THE PROVISIONS AND REQUIREMENTS OF THE COLORADO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER RESOURCES, OFFICE OF THE STATE ENGINEER, "RULES AND REGULATIONS FOR DAM SAFETY AND DAM CONSTRUCTION", LATEST EDITION, AND THE PROVISIONS OF THE UNIFORM BUILDING CODE, LATEST EDITION. THE PLANS AND SPECIFICATIONS CANNOT BE SIGNIFICANTLY CHANGED WITHOUT THE PRIOR WRITTEN APPROVAL OF THE STATE ENGINEER. CONSTRUCTION SHALL NOT BE CONSIDERED COMPLETE UNTIL THE STATE ENGINEER HAS ACCEPTED THE CONSTRUCTION IN WRITING.

B.) CONCRETE:

1.) ALL CONCRETE SHALL HAVE A 28 DAY MINIMUM COMPRESSIVE STRENGTH OF 3,000 PSI. TESTING OF CONCRETE STRENGTH SHALL BE PERFORMED BY A TESTING LABORATORY CERTIFIED UNDER THE ACI CERTIFICATION REQUIREMENTS. MIX DESIGN SHALL PROVIDE 5 1/2% +/- 1 1/2% ENTRAINED AIR, 3/4" MAXIMUM AGGREGATE SIZE, MAXIMUM 4" SLUMP AND SULFATE RESISTANT. IF FLY ASH IS USED IT SHALL BE CLASS F WITH A MAXIMUM CEMENT REPLACEMENT OF 20% BY WEIGHT UNLESS OTHERWISE APPROVED. COMPRESSIVE STRENGTH OF THE FLY ASH MIX SHALL EQUAL OR EXCEED THE 28 DAY COMPRESSIVE STRENGTH OF AN EQUIVALENT, ALL-CEMENT MIX.

2.) ALL CONCRETE ITEMS SHALL BE PRECAST IN A TEMPERATURE CONTROLLED SHOP. UNLESS STEAM CURED, CONCRETE SHALL BE CURED FOR THE FIRST 24 HOURS AFTER PLACEMENT IN AN AMBIENT TEMPERATURE BETWEEN 50 AND 90 DEGREES FARENHEIT. CONCRETE SHALL BE TRANSPORTED, MIXED, PLACED, CURED AND TESTED IN ACCORDANCE WITH ACI 318, LATEST EDITION. ALL TEST CYLINDERS SHALL BE TAKEN AT THE POINT OF CONCRETE PLACEMENT BY A REPRESENTATIVE OF THE TESTING LABORATORY. A MINIMUM OF ONE SET OF TEST CYLINDERS SHALL BE TAKEN FOR EACH 30 CUBIC YARDS OR EACH PLACEMENT. CYLINDER SETS SHALL CONSIST OF (7) CYLINDERS WITH ONE (1) TESTED AT 7 DAYS, TWO (2) TESTED AT 28 DAYS AND ONE (1) HELD FOR POSSIBLE FUTURE TESTING IF THE STRENGTH AT 28 DAYS DOES NOT MEET OR EXCEED THE SPECIFIED STRENGTH REQUIREMENTS. THE REMAINING THREE (3) CYLINDERS WILL BE GIVEN TO THE ENGINEER FOR QUALITY ASSURANCE TESTING.

3.) ALL REINFORCING BARS SHALL CONFORM TO ASTM SPECIFICATIONS A-615, GRADE 60.

4.) THREADED REINFORCING BARS SHALL CONFORM TO ASTM SPECIFICATIONS A-615, MINIMUM GRADE 60. THREADED BARS AND ALL APPURTENANT NUTS, COUPLING WASHERS BEARING PLATES AND OTHER FITTINGS SHALL BE STAINLESS STEEL, GALVANIZED OR EPOXY COATED. POST-TENSIONING THREADED BARS SHALL BE INSTALLED IN THE OPENINGS INDICATED WITH ALL COUPLINGS AND NUTS FULLY ENGAGED AS RECOMMENDED BY THE MANUFACTURER PRIOR TO TENSIONING. ALL COUPLINGS SHALL BE INSTALLED WITH FULLY TORQUED JAM NUTS AT EACH END OF THE COUPLING SO THAT THE BAR CAN BE ROTATED DURING INSERTION WITHOUT LOOSENING THE COUPLING. TENSIONING SHALL BE PERFORMED PRIOR TO ATTACHMENT OF VENT PIPES, CASINGS, OR OTHER ITEMS WHICH COULD BE DAMAGED BY OR INTERFERE WITH THE TENSIONING MOVEMENTS. POST-TENSIONING BARS SHALL BE TENSIONED AFTER INSTALLATION OF THE PRECAST CONCRETE SUPPORT SEGMENTS FOR THE AIR VENT AND GATE STEM CASING, BUT PRIOR TO TORQUING WEDGE ANCHOR BOLTS FOR THE AIR VENT AND GATE STEM BRACKETS. THE THREADED REBAR END NUTS AT BOTH EXPOSED ENDS SHALL BE TORQUED TO 330 FT-LBS, OR AS DIRECTED BY THE ENGINEER. AFTER TORQUING OF THE THREADED REBAR IS COMPLETE, THE BRACKET NUTS SHALL BE TORQUED TO APPROXIMATELY 30 IN-LBS AND THE EXPOSED EDGES OF ALL NEOPRENE CUSHIONS SHALL BE COVERED WITH CAULKING. EXPOSED ENDS OF POST-TENSIONED BARS SHALL BE COATED AS SPECIFIED HEREIN.

5.) MINIMUM CLEAR CONCRETE PROTECTION FOR REINFORCEMENT SHALL BE 1.5".

6.) NO SPLICES OF REINFORCEMENT SHALL BE MADE EXCEPT AS DETAILED OR AUTHORIZED BY THE ENGINEER. WELDING OF REINFORCEMENT WILL NOT BE ALLOWED. THE MINIMUM LENGTH OF LAP FOR SPLICING SHALL BE IN ACCORDANCE WITH ACI 315, LATEST EDITION. SPLICES ARE TO BE MADE SO THAT THE GIVEN DISTANCE TO THE FACE OF THE CONCRETE WILL BE MAINTAINED.

7.) ANY DAMAGE DONE TO CONCRETE BY THE ACTIVITIES OF THE CONTRACTOR WHICH, IN THE OPINION OF THE ENGINEER CAN BE REMEDIED BY A LOCALIZED REPAIR SHALL BE REPAIRED WITH EPOXY MORTAR. AREAS TO BE REPAIRED SHALL BE PREPARED BY CHIPPING OR CUTTING OUT THE DEFECTIVE CONCRETE TO SOUND CONCRETE WITHOUT VOIDS, CRACKS OR OTHER DEFECTS. THE CONCRETE SUBSTRATE SHALL BE CLEANED OF ALL STANDING WATER, LAITANCE, DUST, GREASE, FOREIGN PARTICLES AND OTHER CONTAMINANTS. EPOXY MORTAR SHALL BE SIKADUR 23 LO-MOD GEL (2-COMPONENT) OR APPROVED EQUIVALENT MOISTURE TOLERANT, LOW-MODULUS, NON-SAG EPOXY MORTAR. FOR PATCHED AREAS LESS THAN 1/2" IN DEPTH THE MORTAR SHALL NOT BE AMENDED WITH SAND OR OTHER AGGREGATE. THE SURFACE SHALL BE TROWEL FINISHED SMOOTH AND EVEN, FLUSH WITH THE SURFACE OF THE CONCRETE. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. CONCRETE DAMAGE WHICH, IN THE OPINION OF THE ENGINEER, CANNOT BE REMEDIED WITH A LOCALIZED REPAIR SHALL BE REPAIRED IN ACCORDANCE WITH THE INSTRUCTIONS OF THE ENGINEER. THE CONTRACTOR SHALL BEAR ALL COSTS ASSOCIATED WITH ANY CONCRETE REPAIR INCLUDING, BUT NOT LIMITED TO ENGINEERING COSTS, MATERIALS, EQUIPMENT AND LABOR.

8.) CHAMFER EDGES OF PERMANENTLY EXPOSED CONCRETE WITH A 45° BEVEL 3/4" X 3/4".

9.) UNLESS OTHER RADIUS BENDS ARE INDICATED ON THE DESIGN DRAWINGS, ALL REINFORCEMTNE REQUIRING BENDING SHALL BE BENT AROUND A PIN HAVING THE FOLLOWING DIAMETER.

TABLE OF PIN DIAMETERS IN INCHES

BAR NO.	3	4	5	6	7	8	9	10	11	14	15
STANDARD BENDS	$2\frac{1}{4}$	3	$3\frac{3}{4}$	6	7	8	$10\frac{1}{8}$	$11\frac{1}{2}$	$12\frac{3}{4}$	17	$22\frac{1}{2}$
STIRRUP AND TIE BENDS	$1\frac{7}{8}$	$2\frac{1}{2}$	$2\frac{1}{2}$	$5\frac{1}{4}$	7	8	$10\frac{1}{8}$	$11\frac{1}{2}$	$12\frac{3}{4}$		

10.) BAR SUPPORTS, SPACERS, AND OTHER ACCESSORIES ARE NOT SHOWN ON THE DESIGN DRAWINGS. THE RECOMMENDATIONS OF ACI 315 OR OTHER APPROVED STANDARDS SHALL BE USED.

11.) PRECAST ITEMS WHICH HAVE MATING SURFACES (SUCH AS THE ENDS OF VENT/CASING SUPPORTS) SHALL HAVE ABUTING SURFACES WHICH ARE SMOOTH, FLAT AND EITHER PERPENDICULAR TO THE AXIS OF THE ITEM OR AT THE ANGLE INDICATED WITH DEVIATIONS BETWEEN THE MINIMUM AND MAXIMUM POINTS OF NO MORE THAN 1/8 INCH. WHEN ABUTING ADJACENT SEGMENTS OF THE VENT/CASING SUPPORT, CARE SHALL BE TAKEN TO KEEP THE CONCRETE AND GASKET SURFACES FREE FROM DIRT, OIL OR OTHER FORIEGN SUBSTANCES. PROVISIONS SHALL BE MADE TO PREVENT DIRT FROM COLLECTING IN THE JOINT DURING PLACEMENT AND ALIGNMENT OF ADJACENT SEGMENTS. EVERY EFFORT SHALL BE MADE TO EXACTLY ALIGN THE SEGMENTS SO THAT THE TOP AND SIDE SURFACES OF THE CONCRETE FOLLOW A STRAIGHT LINE.

C.) STEEL:

1.) ALL STRUCTURAL STEEL ROLLED SHAPES AND PLATES SHALL CONFORM TO ASTM SPECIFICATIONS A-36, LATEST EDITION. FLANGED DUCTILE IRON PIPE AND FITTINGS SHALL CONFORM TO ANSI/AWWA C110 LATEST EDITION. MECHANICAL JOINT DUCTILE IRON PIPE AND FITTINGS SHALL CONFORM TO ANSI/AWWA C110 OR C153, LATEST EDITION. STEEL PIPE SHALL CONFORM TO ASTM A-53, LATEST EDITION.

2.) BOLTED SHOP AND FIELD CONNECTIONS BETWEEN MILD STEEL ELEMENTS SHALL BE MADE WITH ASTM A-325 HIGH STRENGTH BOLTS IN TYPE N CONNECTIONS UNLESS OTHERWISE SHOWN.

3.) WELDED SHOP AND FIELD CONNECTIONS BETWEEN MILD STEEL ELEMENTS SHALL BE MADE WITH AWS A-5.1 OR A-5.5 CLASS E70 ELECTRODES OR EQUIVALENT SUBMERGED ARC UNLESS OTHERWISE SHOWN.

4.) ALL WELDERS SHALL HAVE EVIDENCE OF PASSING THE APPLICABLE AWS STANDARD QUALIFICATION TESTS.

5.) ALL STAINLESS STEEL ITEMS SHALL BE TYPE 304 AND SHALL CONFORM TO ASTM SPECIFICATIONS A-240, LATEST EDITION OR ASTM SPECIFICATIONS A-276, AS APPLICABLE. WELDS SHALL BE MADE WITH AWS A-5.4 CLASS E308 ELECTRODES OR EQUIVALENT SUBMERGED ARC UNLESS OTHERWISE NOTED.

6.) FABRICATION AND ERECTION SHALL BE IN ACCORDANCE WITH THE AISC SPECIFICATION AND CODE OF STANDARD PRACTICE, LATEST EDITIONS.

7.) CONNECTIONS WHICH WILL BE SUBJECT TO WET OR SUBMERGED CONDITIONS SHALL BE MADE WITH TYPE 304 STAINLESS STEEL BOLTS AND NUTS. BOLTS SHALL CONFORM TO ASTM A193 GRADE B8. BOLTS SHALL BE OF THE SPECIFIED DIAMETER WITH TYPE N CONNECTIONS UNLESS OTHERWISE SHOWN. ALL STAINLESS STEEL BOLTS AND NUTS SHALL BE LUBRICATED WITH AN APPROVED ANTI-SEIZE/ANTI-GALLING COMPOUND SUCH AS CRC COPPER ANTI-SEIZE PRIOR TO ASSEMBLY.

8.) ALL FABRICATED EXPOSED STEEL ITEMS SHALL BE COATED WITH TWO COATS OF COAL TAR EPOXY TO A FINAL MINIMUM THICKNESS OF 18 MILS. COATING SHALL BE PERFORMED IN ACCORDANCE WITH ALL RECOMMENDATIONS OF THE MANUFACTURER INCLUDING STEEL SURFACE PREPARATION MIXING, COATING APPLICATION, CURING, ETC. SURFACES TO BE COATED INCLUDE THE TRASHRACK.

9.) ALL NON-FABRICATED EXPOSED STEEL ITEMS SHALL BE COATED WITH TWO COATS OF POR-15 OR APPROVED EQUIVALENT RUST PREVENTIVE COATING. COATING SHALL BE PERFORMED IN ACCORDANCE WITH ALL RECOMMENDATIONS OF THE MANUFACTURER INCLUDING STEEL SURFACE PREPARATION MIXING, COATING APPLICATION, CURING, ETC. SURFACES TO BE COATED INCLUDE EXPOSED ENDS OF THREADED BARS AND THREADED BAR APPURTENANCES. EXPOSED WELDS AND WELDS EMBEDED IN CONCRETE.

10.) BOLTS FOR PIPE FITTINGS WHICH WILL BE EXPOSED TO SOIL SHALL EITHER CONSIST OF STAINLESS STEEL BOLTS OR SHALL BE COATED WITH A BITUMINOUS PAINT-ON (NON-AEROSOL) COATING SUCH AS POR-15 RUST PREVENTIVE COATING OR APPROVED EQUIVALENT, COMBINED WITH WRAPPING THE FITTINGS WITH POLYETHELYENE SHEETING (MIN 10 MIL THICKNESS).

11.) ALL HOLES TO ACCOMMODATE BOLTS SHALL BE DRILLED (NOT TORCH-CUT) WITH BITS SIZED ACCORDING TO ASME STANDARDS FOR FREE-FIT CONNECTIONS FOR THE APPLICABLE BOLT SIZE. ALL BOLTS AND NUTS SHALL BE TORQUED IN THE FOLLOWING ORDER OF PRIORITY: AS INDICATED IN THE CONSTRUCTION DRAWINGS AND DOCUMENTS, TO THE MANUFACTURER'S RECOMMENDATIONS, TO 50% OF THEIR YIELD STRENGTH.

12.) ALL WEDGE ANCHOR BOLTS AND DROP-IN ANCHOR INSERTS SHALL BE INSTALLED IN HOLES DRILLED WITH A BIT THE SAME SIZE AS THE ANCHOR DIAMETER OR AS OTHERSIZE SPECIFIED BY THE MANUFACTURER. HOLES SHALL BE DRILLED TO A DEPTH EXCEEDING THE SPECIFIED EMBEDMENT DEPTH. HOLES SHALL BE CLEANED OF ALL DRILL CUTTINGS AND OTHER LOOSE DEBRIS TO A DEPTH AT LEAST 1/2 INCH GREATER THAN THE EMBEDMENT DEPTH. THE NUT AND ALL WASHERS SHALL BE PLACED ON ANCHOR BOLTS LEAVING THE NUT FLUSH WITH THE END OF THE ANCHOR TO PROTECT THE THREADS OR BELOW THE END OF THE ANCHOR IF IT IS FOUND THAT DRIVING THE ANCHOR HOME JAMS THE NUT. THE ANCHOR OR INSERT SHALL BE DRIVEN TO AT LEAST THE SPECIFIED EMBEDMENT DEPTH. INSERTS SHALL BE INSTALLED USING THE MANUFACTURER'S RECOMMENDED SETTING TOOL. ANCHOR BOLTS AND INSERTS SHALL BE EXPANDED BY TIGHTENING THE NUT OR BOLT TO THE SPECIFIED TORQUE OR, IF NO TORQUE IS SPECIFIED, TIGHTENING 3 TO 5 TURNS PAST THE HAND-TIGHT POSITION.

C.) PIPE:

1.) ALL FITTINGS AND VALVES WHICH WILL BE EXPOSED TO SOIL OR GROUNDWATER SHALL BE ENCASED IN POLYETHYLENE IN ACCORDANCE WITH ANSI/AWWA C105/A21.5. THESE ITEMS SHALL INCLUDE THE REPAIR COUPLING.

2.) PIPE BEDDING AND BACKFILL IN CONTACT WITH THE PIPE SHALL BE FREE FROM ALL ROCK LARGER THAN 3/4 ".

3.) THE REPAIR COUPLING JOINING THE INTAKE STRUCTURE PIPE TO THE EXISTING OUTLET PIPE SHALL BE AN 8 INCH COUPLING AS MANUFACTURED BY HYMAX OR EQUAL. THE EXISTING PIPE SHALL BE PREPARED TO RECEIVE THE COUPLING BY EXPOSING A SUFFICIENT LENGTH OF THE END OF THE PIPE AND REMOVING ALL RUST, SCALE, MUD, SURFACE ROUGHNESS, ETC. BY GRINDING, WIRE BRUSHING AND/OR OTHER MEANS TO ASSURE A POSITIVE GASKET SEAL TO THE PIPE.

4.) SLOTTED PVC PIPE SHALL BE MACHINE SLOTTED WITH 0.020" WIDE SLOTS SPACED NO MORE THAN 0.25", 4 ROWS OF SLOTS, SLOTTED FULL LENGTH WITH A MINIMUM SLOT OPEN AREA OF 8 SQ IN/FT.

5.) THE EXISTING BELL ON THE UPSTREAM END OF THE EXISTING PIPE SHALL BE REMOVED BY SAW-CUTTING IN SUCH A MANNER THAT THE REMAINING PIPE END IS AS SMOOTH AND SQUARE TO THE PIPE AS POSSIBLE.THE PORTION OF THE EXTERIOR OF THE EXISTING PIPE WHICH WILL MATE WITH THE REPAIR COUPLING SHALL BE GROUND TO REMOVE ALL RUST, ENCRUSTATIONS AND DEPOSITS TO BE AS SMOOTH AND UNIFORM AS POSSIBLE TO ALLOW SEALING WITH THE REPAIR COUPLING.

D.) EXCAVATION, SUBGRADE, FILL AND COMPACTION:

1.) SUBGRADE, FILL AND BACKFILL, SHALL BE COMPACTED TO AT LEAST 95% STANDARD PROCTOR DENSITY (ASTM D-698) OR AS DIRECTED BY THE ENGINEER.

2.) IT IS ANTICIPATED THAT SOIL REMOVED FROM EXCAVATIONS REQUIRED FOR THE WORK WILL BE TOO WET TO BE RE-USED AS BACKFILL. NATIVE BACKFILL MATERIAL SHALL BE OBTAINED FROM THE DESIGNATED BORROW AREA.

3.) BACKFILL AGAINST WALLS AND PIPES WHICH ARE BACKFILLED ON BOTH SIDES SHALL BE BROUGHT UP UNIFORMLY ON BOTH SIDES. UNBALANCED BACKFILL ELEVATIONS SHALL NOT EXCEED 8 INCHES.

4.) FILTER SAND SHALL CONFORM TO THE REQUIREMENTS OF ASTM C-33, CONCRETE SAND (FINE AGGREGATE). FILTER SAND SHALL BE CONSOLIDATED BY FULLY SATURATING THE SAND AND VIBRATING IT WITH A CONCRETE VIBRATOR. VIBRATION SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION OF THE ENGINEER AND SHALL CONSIST OF THE MINIMUM EFFORT NEEDED TO ASSURE THAT NO VOIDS OR GAPS EXIST IN THE SAND OR IN THE CONTACT ZONE BETWEEN THE SAND AND ADJACENT ITEMS. PLACEMENT AND CONSOLIDATION OF SAND AROUND PIPES, FITTINGS AND OTHER APPRUTENANCES SHALL BE PERFORMED IN A MANNER SUCH THAT THE SAND SHALL BE UNIFORMLY IN CONTACT WITH THE ENTIRE PERIMETER OF THE PIPE OR ADJACENT SURFACE. PIPE SHALL BE RESTRAINED AGAINST MOVEMENT DURING PLACEMENT AND CONSOLIDATION OF THE SAND.

5.) GRANULAR STABILIZATION/DRAINAGE MATERIAL SHALL CONSIST OF CLEAN GRAVEL WITH 100 PERCENT PASSING A 3" SCREEN AND LESS THAN 10 PERCENT PASSING A NO. 4 SIEVE. STABILIZATION/DRAINAGE GRAVEL SHALL BE CONSOLIDATED BY FULLY SATURATING THE GRAVEL AND VIBRATING IT WITH A CONCRETE VIBRATOR. OR VIBRATORY PLATE COMPACTOR. VIBRATION AND/OR COMPACTION SHALL BE PERFORMED UNDER THE DIRECT SUPERVISION OF THE ENGINEER. PLACEMENT AND CONSOLIDATION OF GRAVEL AROUND CONCRETE, PIPES, FITTINGS AND OTHER APPURTENANCES SHALL BE PERFORMED IN A MANNER SUCH THAT THE GRAVEL SHALL BE UNIFORMLY IN CONTACT WITH THE ENTIRE SURFACE OF THE ITEM.

D.) EXCAVATION, SUBGRADE, FILL AND COMPACTION (CONTINUED):

6.) EXCAVATION FOR PLACEMENT OF THE INTAKE STRUCTURE SHALL BE MADE AT SLOPES NO STEEPER THAN REQUIRED TO MAINTAIN STABLE BANKS AND SAFE WORKING CONDITIONS. THE SLOPES SHOWN ON THESE DRAWINGS ARE FOR ILLUSTRATION PURPOSES ONLY. IF THE SLOPES SHOW SIGNS OF MOVEMENT, FORMATION OF TENSION CRACKS OR OTHER INDICATIONS OF SLOPE INSTABILITY, THE EXCAVATION CUT SHALL BE LAID BACK TO SLOPES WHICH ARE SUFFICIENTLY FLAT TO WILL REMAIN STABLE. EXCAVATION SLOPES FOR MODIFICATION OF THE EXISTING GATE VALVE AND PLACEMENT OF SAND DRAINS ARE INTENDED TO BE MADE AS STEEP AS POSSIBLE WHILE ACHIEVING WORKER SAFETY AND SLOPE STABILITY. TEMPORARY SHORING MAY BE REQUIRED TO PROVIDE SAFETY AND STABILITY.

7.) COMPACTION WITH HEAVY EQUIPMENT SHALL NOT BE PERFORMED WITHIN 5 FEET FROM THE BACKFILLED FACE OF ANY CONCRETE WALLS. DURING BACKFILL AND BACKFILL COMPACTION BEHIND WALLS. WALLS SHALL BE CAREFULLY MONITORED FOR MOVEMENT OR DISTRESS. IF, IN THE OPINION OF THE ENGINEER, WALL MOVEMENT OR DISTRESS BECOMES TOO GREAT, BACKFILL AND COMPACTION PROCEDURES SUCH AS LIFT THICKNESS, COMPACTION EQUIPMENT WEIGHT OR APPLIED ENERGY, ETC SHALL BE MODIFIED TO MINIMIZE FURTHER WALL MOVEMENT.

8.) ANY WORKING PADS REQUIRED FOR STAGING EXCAVATING EQUIPMENT SHALL BE CONSTRUCTED ENTIRELY OF FILL MATERIAL. UNLESS APPROVED BY THE ENGINEER, NO EXCAVATION WILL BE ALLOWED FOR CONSRUCTION OF PADS AND ANY EXCAVATION MADE FOR SUCH PURPOSES SHALL BE FILLED WITH COMPACTED BACKFILL.

9) EXCAVATION IN THE BORROW AREA SHALL BEGIN ALONG THE SOUTH BANK OF THE SPILLWAY IN THE LOCATION SHOWN ON THE DRAWINGS AND SHALL PROCEED IN A MANNER THAT WIDENS THE SPILLWAY CHANNEL AT APPROXIMATELY THE SAME SLOPE AS THE EXISTING SPILLWAY BANK, AS DIRECTED BY THE ENGINEER. BORROWING SHALL BE LIMITED TO THE SPILLWAY BANK. ALL EXCAVATION SPOIL WHICH IS NOT USEABLE IN THE WORK SHALL BE SPREAD IN THE DESIGNATED BORROW AREA OUTSIDE OF THE SPILLWAY CHANNEL, AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL SHAPE THE FINAL SURFACE COUTOURS IN THE DESIGNATED BORROW AREA TO CONFORM TO THE SPILLWAY CHANNEL AND THE SURROUNDING TERRAIN AND TO PROVIDE UN-OBSTRUCTED SURFACE DRAINAGE WITHOUT STEEP DRAINAGE PATHS OR POOLS. COFFERDAMS SHALL BE COMPLETELY REMOVED AFTER THEY ARE NO LONGER NEEDED, THE SPOIL MATERIAL RESULTING FROM COFFERDAM REMOVAL SHALL BE DISPOSED OF IN THE DESIGNATED BORROW AREA IN ACCORDANCE WITH THESE REQUIREMENTS.

E.) GENERAL:

1.) FOR ANY CONDITION OF CONFLICT OF INFORMATION IN THE CONSTRUCTION DOCUMENTS, THE MORE STRINGENT CONDITION SHALL PREVAIL.

2.) THE ENGINEER'S APPROVAL MUST BE OBTAINED FOR ANY DEVIATIONS FROM THE PLANS. THE ENGINEER MONITORING THE CONSTRUCTION FOR THE OWNER IS RESPONSIBLE TO THE STATE ENGINEER FOR THE QUALITY OF CONSTRUCTION, COMPLIANCE WITH THE APPROVED DESIGN AND SPECIFICATIONS, PREPARATION OF THE NECESSARY DOCUMENTATION FOR THE STATE ENGINEER'S REVIEW AND APPROVAL OF ALL CONSTRUCTION CHANGE ORDERS, AND PREPARATION OF THE PROJECT COMPLETION DOCUMENTS. ANY UNAUTHORIZED MODIFICATIONS ARE THE RESPONSIBILITY OF THE PERSON MAKING THE CHANGE TO UNCOVER, REMOVE, REPLACE OR OTHERWISE CONFIRM THEY MEET THESE REQUIREMENTS. ALL WORK SHALL BE CONDUCTED IN THE PRESENCE OF THE ENGINEER UNLESS OTHERWISE AUTHORIZED IN ADVANCE BY THE ENGINEER. AT THE ENGINEER'S DISCRETION, ANY WORK PERFORMED WITHOUT THE ENGINEER PRESENT SHALL, AT THE CONTRACTOR'S EXPENSE, BE UNCOVERED, TESTED, OR ITS CONDITION OTHERWISE VERIFIED TO SHOW, TO THE ENGINEER'S SATISFACTION, WHETHER THE REQUIREMENTS OF THE DRAWINGS AND CONTRACT DOCUMENTS WERE SATISFIED.

3.) DETAILS APPLY TO ANY LOCATION WHICH HAS CONDITIONS SIMILAR TO THE CONDITIONS WHERE THE DETAIL IS CUT.

4.) ALL ELEVATIONS ARE REFERENCED TO AN ELEVATION ESTABLISHED FOR A U.S. BUREAU OF RECLAMATION BRASS CAP BENCH MARK LOCATED SOUTH OF THE SOUTH DAM ABUTMENT. THE ENGINEER WILL ESTABLISH ALL LOCAL REFERENCE POINTS NEEDED FOR THE WORK.

5.) THE SEQUENCE OF CONSTRUCTION SHALL INLCUDE INSTALLING THE INTAKE STRUCURE AND GATE PRIOR TO UNCOVERING AND MODIFYING THE BURIED GATE VALVE SO THAT THE OUTLET PIPE CAN BE FULLY DEWATERED WHEN THE BURIED GATE VALVE EXCAVATION IS MADE.

6.) THE CONTRACTOR IS ADVISED THAT THE DAM EMBANKMENT SLOPES AND SURROUNDING AREAS ARE EXPECTED TO BE WET, SOFT AND SLICK. STABILIZATION OF THESE AREAS MAY BE REQUIRED FOR CONSTRUCTION ACCESS AND SUITABLE WORKING AREAS.

7.) GEOTEXTILE FABRIC FOR DRAINAGE, STABILIZATION OR BARRIER SHALL BE MIRAFI HP 270 OR EQUAL AND SHALL BE PLACED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. UNLESS OTHERWISE SHOWN OR APPROVED, SPLICE LAPS SHALL BE MINIMUM 24" AND SHALL BE PINNED AT INTERVALS NO LESS THAN 10 FEET.

8.) THE OUTLET GATE SHALL BE 8" DIAMETER WATERMAN P-30 FF, FLANGED BACK WITH FLANGES FACED AND DRILLED IN ACCORDANCE WITH ASME/ANSI B 16.1, CLASS 125, STAINLESS STEEL RISING STEM, BRONZE SEATS, MINIMUM 60 FOOT SEATING HEAD AND MINIMUM 10 FOOT UNSEATING HEAD, OR EQUAL.

9.) SHEET MATERIAL FOR FLAT RUBBER SEALS AND GASKETS SHALL CONSIST OF NATURAL RUBBER OR SOFT NEOPRENE OF THE THICKNESS INDICATED WITH A SHORE A DUROMETER BETWEEN 35 AND 45. DURING PLACEMENT OF SEALS AND GASKETS, ONE SIDE SHALL BE GLUED TO ITS MATING SURFACE TO HOLD IT IN PLACE WHILE THE SECOND MATING SURFACE IS PLACED AGAINST IT. CARE SHALL BE TAKEN THAT THE SURFACE OF THE NEOPRENE IS FREE FROM DIRT, GREASE, SAND OR ANY OTHER DELETERIOUS MATERIAL PRIOR TO MATING WITH THE ADJACENT SURFACE. NEOPRENE ADHESIVE SHALL BE 3M SCOTCH WELD NEOPRENE HIGH PERFORMANCE CONTACT ADHESIVE 1357 OR APPROVED EQUAL, SHALL BE APPLIED TO BOTH SURFACES AND APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. AT THE JOINTS WHERE PRECAST AIR VENT/GATE STEM CASING SUPPORT SEGMENTS MEET, A SMALL VOID SHALL BE EXCAVATED UNDER THE JOINT TO PREVENT DIRT FROM CONTAMINATING THE CONTACT BETWEEN THE NEOPRENE CUSHION AND THE CONCRETE DURING INSTALLATION.

10.) STAFF GAUGE NUMBER PLATES SHALL BE PORCELAIN ENAMEL COATED PLATES, BLACK NUMERALS ON A WHITE BACKGROUND. THEY SHALL BE INSTALLED AT THE ELEVATIONS AS DIRECTED BY THE ENGINEER AND SHALL BE IN ONE FOOT INCREMENTS STARTING AT THE NUMERAL ONE AND CONTINUING THROUGH TWENTY-TWO. THE PLATES SHALL BE SECURED TO THE VENT/CASING SUPPORT WITH 1/4" X 1 3/4" LONG STAINLESS STEEL WEDGE ANCHORS - TWO PER PLATE.

11.) DIVERSION OF FLOWING WATER AND GROUND WATER WILL BE REQUIRED SO THAT EXCAVATION, INSTALLATION AND BACKFILL OF THE INTAKE STRUCTURE CAN BE DONE IN THE DRY. THE ENTIRE WORK AREA DOWN TO AT LEAST THE SURFACE OF THE STABILIZATION MATERIAL SHALL BE MAINTAINED FREE FROM STANDING OR FLOWING WATER NON-STOP FROM THE TIME THAT EXCAVATION COMMENCES UNTIL THE INTAKE STRUCTURE IS COMPLETELY INSTALLED AND BACKFILLED TO A LEVEL ABOVE THE TOP OF THE HIGHEST POINT OF THE INTAKE STRUCTURE. FOR THE CONTRACTOR'S INFORMATION, THE FLOW IN WEST LEROUX CREEK CAN VARY WIDELY ON A SEASONAL BASIS. DURING LATE SUMMER AND FALL THE FLOW IS TYPICALLY BETWEEN 0.5 AND 1.0 CU FT/SEC BUT IS HIGHLY DEPENDENT ON RECENT AND CURRENT CLIMATIC CONDITIONS AT THE TIME. THE OWNERS INTEND TO MAKE EVERY EFFORT TO REDUCE THE FLOW DURING THE DIVERSION PERIOD BY MINIMIZING DISCHARGE FROM UPSTREAM RESERVOIRS. HOWEVER, IT IS THE CONTRACTOR'S RESPONSIBILITY TO BE FAMILIAR WITH THE LIKELY STREAM FLOW CONDITIONS AND AMOUNTS AT THE TIME OF DIVERSION AND TO PLAN HIS ACTIVITIES ACCORDINGLY. THE CONTRACTOR'S DIVERSION AND DEWATERING PLAN SHALL INCLUDE PROVISIONS FOR THE POSSIBILITY OF A SUDDEN AND SIGNIFICANT INCREASE IN STREAM FLOW DUE TO PRECIPITATION EVENTS. DIVERSION EFFORTS MAY CONSIST OF A COMBINATION OF COFFERDAMS, PUMPS, ETC. DIVERSION WORKS WILL BE LIMITED TO THE IMMEDIATE LOCATION OF THE INTAKE STRUCTURE UNLESS THE CONTRACTOR OBTAINS PRIOR WRITTEN APPROVAL FROM THE FOREST SERVICE OTHERWISE. THE INTAKE STRUCTURE SHALL BE INSTALLED WITH THE BYPASS PLUG REMOVED FROM THE STRUCTURE. THE FLOW CAPACITY OF THE INTAKE STRUCTURE'S 6" BYPASS IS ESTIMATED TO BE 1.3 CU FT/SEC WITH THE WATER LEVEL AT THE OVERFLOW LIP. IF THE CONTRACTOR FINDS THAT THE EXCAVATION FOR THE INTAKE STRUCTURE STABILIZATION INSTALLATION CAN BE PERFORMED WHILE MAINTAINING STABLE AND REASONABLY STEEP EXCAVATION SLOPES WITHOUT DEWATERING THE FOUNDATION TO SUBGRADE, PREPARING THE INTAKE STRUCTURE FOUNDATION WITHOUT DEWATERING BELOW THE BOTTOM OF THE INTAKE STRUCTURE WILL BE PERMISSIBLE. HOWEVER, IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO REPLACE ALL REMOVED AND DISTURBED MATERIAL WITH COMPACTED FILL AT HIS EXPENSE. ANY PUMP SUMPS SHALL BE HYDRAULICALLY CONNECTED TO THE STABILIZATION/DRAINAGE GRAVEL PLACED UNDER THE INTAKE STRUCTURE. AFTER TEMPORARY DIVERSION FEATURES SUCH AS COFFERDAMS, PUMP SUMPS, ETC. ARE NOT LONGER NEEDED, THEY SHALL BE FULLY REMOVED AND THE ORIGINAL SURFACE SHALL BE RESTORED TO THE ORIGINAL ELEVATIONS, GRADES AND CONTOURS. THE BYPASS PLUG SHALL BE INSTALLED IN THE BYPASS OPENING AFTER DIVERSION IS NO LONGER NEEDED. THE PERIMETER OF THE PLUG SHALL BE COATED WITH APPROVED WATERPROOF MARINE GREASE PRIOR TO INSERTION INTO THE DIVERSION OPENING.

12.) WHEREVER CALLED FOR ON THESE DRAWINGS, WATERPROOF SEALANTS AND CAULKING SHALL BE SIKAFLEX 1a (1-COMPONENT), SIKAFLEX 2c NS (2-COMPONENT), OR APPROVED EQUIVALENT POLYURETHANE BASED SEALANT SPECIFICALLY APPROVED BY THE MANUFACTURER FOR USE IN SUBMERGED CONDITIONS. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

13.) THE CONTRACTOR SHALL BE PREPARED TO APPLY GROUT TO THE ENDS OF PRECAST STEM CASING/AIR VENT SEGMENTS OR TO OTHER AREAS DEEMED NECESSARY BY THE ENGINEER. GENERAL PURPOSE GROUT SHALL BE CEMENT-BASED, NON-SHRINK GROUT WITH A MINIMUM 28 DAY COMPRESSIVE STRENGTH OF 5,000 PSI SUCH AS FIVE STAR GROUT. LEAN GROUT SHALL CONSIST OF A MIXTURE OF CEMENT AND CONCRETE SAND IN A RATIO OF 15 PARTS SAND TO 1 PART CEMENT (BY VOLUME). GROUT SHALL BE APPROVED BY THE ENGINEER PRIOR TO USE. GROUT SHALL BE PLACED IN THICKNESSES NO GREATER THAN THREE INCHES AND TAMPED TO REMOVE AIR BUBBLES AND TO CONSOLIDATE THE GROUT. GROUT WITH VISIBLE VOIDS, AIR POCKETS OR SHRINKAGE CRACKS SHALL BE REMOVED AND REPAIRED OR REPLACED AT THE COST OF THE CONTRACTOR.

14.) IT HAS BEEN ASSUMED THAT THE CAUSE OF LEAKAGE OF THE EXISTING BURIED VALVE IS DUE TO STEM, SEALS OR BONNET DAMAGE. CONTRACTOR SHALL BE PREPARED TO FIELD DRILL HOLES IN THE VALVE COVER PLATES AND GASKETS. ALSO, IT IS POSSIBLE THAT THE VALVE BODY HAS BEEN DAMAGED. THE PLAN DOES NOT INCLUDE REPLACEMENT OF THE VALVE BODY. THE CONTRACTOR SHALL BE PREPARED TO BRAZE OR WELD CLOSED ANY CRACKS OR HOLES IN THE VALVE BODY. WELDING OR BRAZING OF ANY CAST OR DUCTILE IRON ITEMS SHALL BE PERFORMED IN ACCORDANCE WITH LINCOLN ELECTRIC'S "GUIDELINES FOR WELDING CAST IRON" USING THE PREHEATING METHOD.

15.) IF THE ALL-THREAD RODS FOR THE INTAKE STRUCTURE BYPASS PLUG ARE TO BE INSTALLED BY GROUTING INTO DRILLED HOLES, THE DRILL HOLES SHALL BE 1/8" LARGER DIAMETER THAN ROD. DUST SHALL BE REMOVED FROM THE DRILL HOLE BY BLOWING WITH OIL-FREE COMPRESSED AIR USING A NOZZLE THAT EXTENDS TO THE BOTTOM OF THE DRILL HOLE. THE HOLE SHALL THEN BE CLEANED WITH A WIRE BRUSH AND THE HOLE BLOWN CLEAN AGAIN USING THE SAME PROCEDURE AS BEFORE. THE HOLE SHALL THEN BE FILLED 1/2 TO 2/3 FULL WITH A TWO-PART EPOXY ADHESIVE (SIMPSON STRONG TIE SET XP OR EQUAL) USING A MIXING NOZZLE AND EXTENSION TUBE THAT EXTENDS TO THE BOTTOM OF THE HOLE. THE ROD SHALL BE INSERTED INTO THE HOLE BY TURNING IT SLOWLY UNTIL THE ROD CONTACTS THE BOTTOM OF THE HOLE. INSTALLATION SHALL BE IN ACCORDANCE WITH ALL MANUFACTURER'S REQUIREMENTS.

16.) ACCESS TO THE SITE AND THE LOCATION OF THE APPROVED STAGING AREAS ARE AS SHOWN ON THE MAPS INCLUDED IN THE FOREST SERVICE SPECIAL USE PERMIT AND ROAD USE PERMIT INCLUDED IN THE CONTRACT DOCUMENTS. THE LEROUX CREEK GRAVELED ROAD (NFSR 128) EXTENDING TO NEAR WASHTUB RESERVOIR IS MAINTAINED. THE GRAVELED ROAD EXTENDS A SHORT DISTANCE UP THE BAILEY RES ROAD (NFSR 128.1B) AND, AT THAT POINT, THERE IS A GRAVELED PARKING AREA. THE PARKING AREA CAN BE USED FOR TEMPORARY VEHICLE PARKING, BUT NOT FOR STORAGE OF MATERIALS, STAGING OR LONG-TERM PARKING. FROM THAT POINT TO THE HANSON DAM TRAILHEAD, THE LEROUX CREEK ROAD IS NON-GRAVELED WITH HOLES AND SOFT SPOTS. THE CONSTRUCTION STAGING AREA IS LOCATED AS SHOWN NEAR THE ELLA ATV TRAILHEAD (NFST 732). FROM THAT POINT TO HANSON DAM, THE ACCESS CONSISTS OF ABOUT 1.3 MILES OF ATV TRAILS - A COMBINATION OF ELLA ATV TRAIL, REYNOLDS ATV TRAIL (NFST 733) AND A SHORT SEGMENT OF THE HANSON ATV TRAIL. FOR THIS 1.3 MILES OF ATV TRAIL, NO HIGHWAY VEHICLES WILL BE ALLOWED (INCLUDING 4WD HIGHWAY VEHICLES). ALL EQUIPMENT AND MATERIALS SHALL BE TRANSPORTED TO THE SITE USING ATV'S OR CONSTRUCTION EQUIPMENT USED IN THE WORK. THE ATV TRAIL INCLUDES 3 STREAM CROSSINGS AND 4 CROSSINGS OF AREAS THAT CAN BE VERY SOFT AND WET. THE STREAM CROSSINGS VARY FROM 25 TO 35 FEET WIDE AND GENERALLY SEEM TO HAVE SOLID BOTTOMS. HOWEVER, IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THE ABILITY OF THE STREAM BOTTOM TO SUPPORT HIS PROPOSED TRAFFIC LOADS AND NUMBER OF TRIPS. THE SOFT AND WET AREAS VARY IN WIDTH DEPENDING ON TIME OF THE YEAR AND RECENT CLIMATIC CONDITIONS. IN AUGUST OF 2010 THEY WERE FOUND TO VARY FROM 15 TO 35 FEET WIDE. THESE AREAS ARE SOFT ENOUGH THAT ATV'S ARE NECESSARY FOR CROSSING. EXCEPT FOR THE SOFT, WET AREAS, MINOR IMPROVEMENTS TO THE TRAIL WILL BE ALLOWED TO IMPROVE ACCESS FOR CONSTRUCTION VEHICLES. ANY STABILIZATION MATERIAL REQUIRED TO IMPROVE STREAM CROSSINGS WILL BE OBTAINED FROM OUTSIDE THE NATIONAL FOREST UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM THE FOREST SERVICE. EXCAVATION AND/OR PLACEMENT OF PERMANENT STABILIZATION MEASURES IN THESE SOFT, WET AREAS WILL NOT BE ALLOWED AND IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO FULLY FAMILIARIZE HIMSELF WITH THE CONDITIONS AT THE TIME OF BIDDING AND DETERMINE THE MOST APPROPRIATE METHODS TO USE FOR CROSSING THESE AREAS, SUCH AS USE OF GROUND MATS OR LOW GROUND PRESSURE EQUIPMENT. DURING CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN BARRIERS TO LIMIT GENERAL PUBLIC USE OF THE ATV TRAILS TO ATV TRAFFIC. THE PURPOSE OF THE STAGING AREA IS FOR CONSTRUCTION EQUIPMENT LOADING AND UNLOADING, VEHICLE PARKING AND TEMPORARY STORAGE OF CONSTRUCTION MATERIALS. USE OF THE STAGING AREA SHALL BE LIMITED TO AS SMALL AN AREA AS POSSIBLE, TO PREVIOUSLY DISTURBED AREAS AS MUCH AS POSSIBLE, AND TO AREAS THAT ARE DRY AND FIRM ENOUGH TO SUPPORT THE ANTICIPATED VEHICLE AND OTHER LOADS. AFTER COMPLETION OF THE WORK, THE CONTRACTOR SHALL RESTORE THE TRAILS TO THE GENERAL CHARACTER AND WIDTH PRIOR TO COMMENCEMENT OF THE WORK. THE CONTRACTOR SHALL ALSO RESTORE THE STAGING AREA TO ITS GENERAL CHARACTER PRIOR TO COMMENCEMENT OF THE WORK. THE CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH THE ROAD USE AND OTHER PERMITS INCLUDED IN THE CONTRACT DOCUMENTS AND SHALL FULLY COMPLY WITH ALL REQUIREMENTS THEREIN.

E.) GENERAL (CONTINUED):

17.) EROSION CONTROL AND RECLAMATION OF DISTURBED AREAS (INCLUDING ALL STAGING AREAS) SHALL BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE STIPULATIONS OF THE FOREST SERVICE SPECIAL USE PERMIT (SEE CONTRACT DOCUMENTS).

18.) THE CONTRACTOR SHALL LIMIT DISTURBANCE DUE TO EQUIPMENT TRAFFIC AND CONSTRUCTION WORK TO ESTABLISHED ROADS AND TRAILS, APPROVED STAGING AREAS, THE ACCESS PATH TO THE DOWNSTREAM AREA SHOWN ON THE DRAWINGS, THE DAM CREST, THE BORROW AREA, AND THE UPSTREAM AND DOWNSTREAM SLOPES IN THE VICINITY OF THE DESIGNATED WORK.

19.) THE CONTRACTOR SHALL ONLY REMOVE TREES SPECIFICALLY MARKED BY THE FOREST SERVICE OR THE ENGINEER FOR REMOVAL. ALL RESULTING LOGS, BRANCHES AND SLASH GENERATED BY TREE REMOVAL SHALL BE REMOVED FROM THE SITE BY THE CONTRACTOR. THE CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS OF THE APPROVED FOREST SERVICE TIMBER REMOVAL PERMIT.

20.) UPON COMPLETION OF THE INSTALLATION OF THE INTAKE STRUCTURE AND ALL APPURTENANCES, THE CONTRACTOR SHALL FILL THE GATE STEM CASING WITH OIL, INSTALL STEM STOPS, AND ADJUST GATE STOPS AND WEDGES IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. THE CONTRACTOR SHALL TAKE EXTREME CAUTION IN SETTING THE STEM STOP PRIOR TO CLOSING THE GATE. OVER-CLOSING THE GATE CAN DAMAGE THE LEAN GROUT FILL OF THE INTAKE STRUCTURE. ANY SUCH DAMAGE RESULTING FROM THE CONTRACTOR'S OVER-CLOSING OF THE GATE SHALL BE REPAIRED BY THE CONTRACTOR AT HIS EXPENSE.

21.) AT LEAST 5 WORKING DAYS PRIOR TO START OF CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH THE FOLLOWING WRITTEN SUBMITTALS: A DETAILED SCHEDULE OF CONSTRUCTION ACTIVITIES; DIVERSION PLANS INCLUDING SIZE AND LOCATION OF COFFERDAMS, PUMPING PLANS AND SUMP LOCATIONS, ESTIMATED TIME FOR CONSTRUCTION ACTIVITIES REQUIRING WATER DIVERSION PUMP SUMP LOCATIONS. ETC.; GRADATIONS FOR CONCRETE SAND TO BE USED, GRANULAR STABILIZATION AND DRAINAGE MATERIAL; MIX DESIGN FOR FLOWABLE FILL, GENERAL PURPOSE AND LEAN GROUT; GEOTEXTILE FABRICS; EROSION CONTROL PLAN; PLAN FOR VEHICLE CROSSING OF STREAMS AND WET AREAS AND STAGING AREA PLAN. THE CONTRACTOR SHALL SATISFACTORILY ANSWER ALL OF THE ENGINEER'S QUESTIONS PRIOR TO COMMENCING THE WORK AND PRIOR TO ORDERING OR USE OF ANY OF THESE ITEMS.

14856
6/11/14

BRUCE D MARVIN, COLORADO P.E. NO. 14856

WESTERN
ENGINEERS, INC.

NOTES
HANSON RESERVOIR DAM
OUTLET WORKS REHABILITATION
DAM ID 400315
LOCATED IN SECTION 11, T12S, R93W, 6TH PM
WATER DIVISION 4
WATER DISTRICT 40
DELTA COUNTY, COLORADO

AS-CONSTRUCTED 6/11/14
REVISED 10/09/12

DESIGNED BDM	DRAWN BDM	CHECKED BDM
DATE: 7/9/2012	WORK ORDER NUMBER 4072-H	