

# CITY OF DURANGO - SANTA RITA PUMP INTAKE RIVER IMPROVEMENTS PROJECT DURANGO, COLORADO



PROJECT LOCATION MAP



PROJECT OWNER:



CITY OF DURANGO  
C/O MATT HOLDEN, P.E.  
949 EAST 2ND AVE.  
DURANGO, CO 81301  
MATT.HOLDEN@DURANGOGOV.ORG  
970-375-4813

ENGINEER OF RECORD:



SHANE SIGLE, P.E.  
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303-808-7734  
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RELEVANT PERMITS:

- 1) DEPARTMENT OF THE ARMY PERMIT NUMBER DA# SPK-2014-00221
- 2) CITY OF DURANGO FLOODPLAIN PERMIT.
- 3) COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT CONSTRUCTION DEWATERING PERMIT.
- 4) COLORADO DEPARTMENT OF TRANSPORTATION SPECIAL USE PERMIT.

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PROJECT LOCATION

LATITUDE 37°15'50.49"N LONGITUDE 107°52'53.11"W



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Designed by: SS, JB, AL, GL, MH	Date: FEB 25, 2016
Dwn by: AR, CN, SS	County: LA PLATA COUNTY
Reviewed by: SS, SM, MH	Client: CITY OF DURANGO
Submitted by: Shane A. Sigle, P.E.	File: Santa Rita.dwg

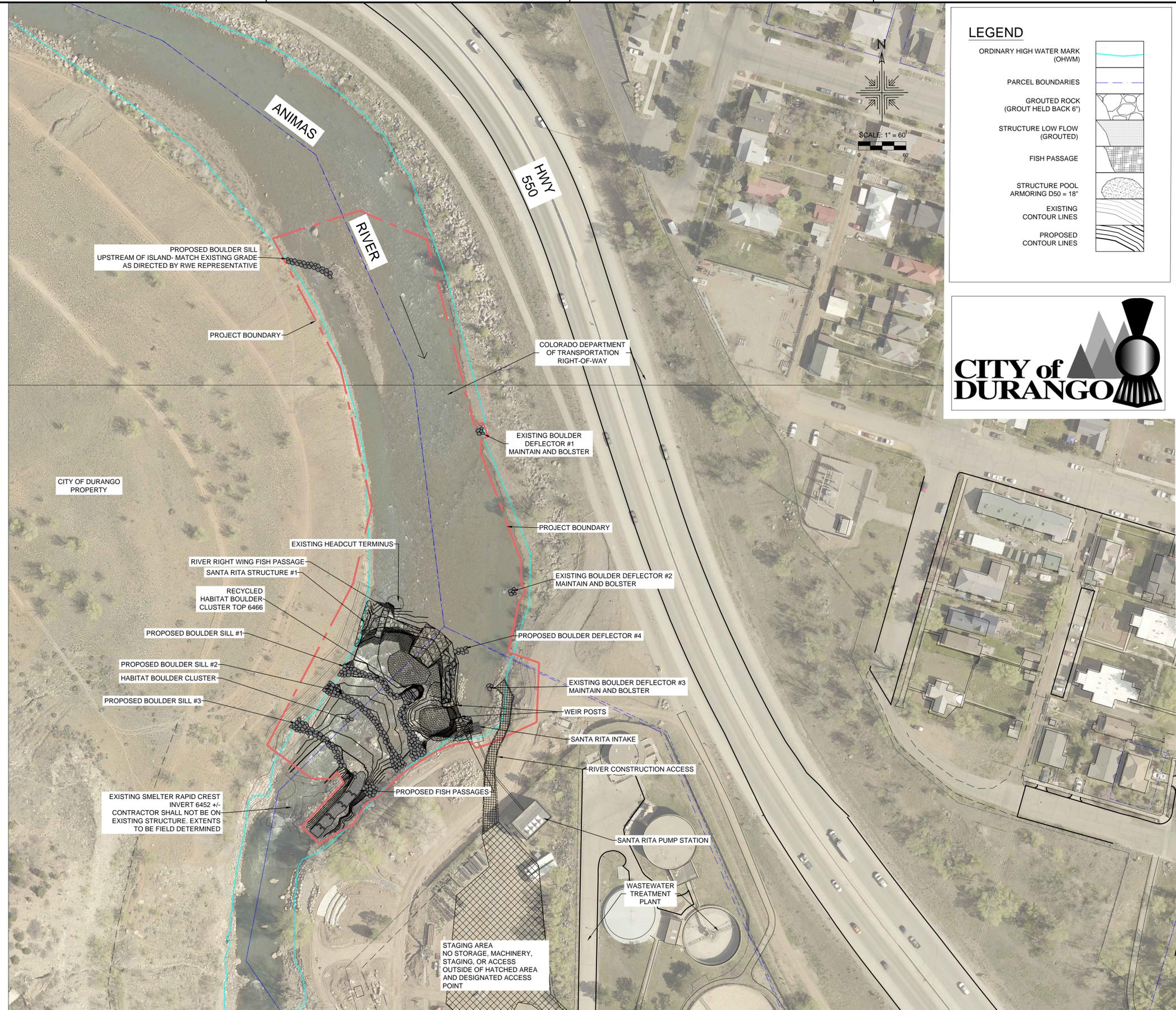
CITY OF DURANGO SANTA RITA PUMP  
INTAKE RIVER IMPROVEMENTS  
PROJECT LOCATION MAP AND TABLE OF CONTENTS  
LA PLATA COUNTY, DURANGO, COLORADO

Sheet  
reference  
**S-1**

Sheet 1 of 13

**CONSTRUCTION DRAWINGS**

NOTE:  
1.) DEFLECTOR #1 AND #2 MAINTENANCE ASSUMES CDOT APPROVAL.



**LEGEND**

ORDINARY HIGH WATER MARK (OHWM)	
PARCEL BOUNDARIES	
GROUTED ROCK (GROUT HELD BACK 6")	
STRUCTURE LOW FLOW (GROUTED)	
FISH PASSAGE	
STRUCTURE POOL ARMORING D50 = 18"	
EXISTING CONTOUR LINES	
PROPOSED CONTOUR LINES	



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File: Santa Rita.dwg

CITY OF DURANGO SANTA RITA PUMP  
INTAKE RIVER IMPROVEMENTS  
OVERALL  
LA PLATA COUNTY, DURANGO, COLORADO



CONSTRUCTION DRAWINGS

Sheet reference  
**S-2**  
Sheet 2 of 13

- GENERAL ACCESS NOTES:**
- FRONT GATE AT PLANT IS OPEN 5-DAYS PER WEEK 7:30AM-4 PM. WORK MAY CONTINUE UNTIL 5:30PM, OR LATER CONSIDERED ON A CASE BY CASE BASIS. SECURITY IS A CONCERN AT THE PLANT AT THE HOMELAND SECURITY LEVEL.
  - BACK GATE MUST BE LOCKED NIGHTLY. CONTRACTORS MAY LEAVE BUT NOT RE-ENTER WASTEWATER TREATMENT PLANT YARD AFTER HOURS VIA FRONT GATE.
  - ACCESS TO PUBLIC ROADS FOR PERSONNEL VEHICLES ONLY WILL BE ALLOWED AFTER HOURS ONLY VIA BIKE PATH/PRIMITIVE ROAD ALONG HIGHWAY RIGHT-OF-WAY. TRACKING WILL BE A CONTRACTOR RESPONSIBILITY TO PREVENT OR CLEAN UP.
  - CONSTRUCTION SITE SECURITY MUST BE MAINTAINED.
  - SPECIAL CONSIDERATIONS FOR AFTER-HOURS ACCESS WILL BE CONSIDERED ON A CASE-BY-CASE BASIS.
  - CONCRETE WASH-OUT LOCATION TO BE DETERMINED BETWEEN OWNER AND CONTRACTOR, AND TO BE DESIGNED BASED ON COLORADO DEPARTMENT OF TRANSPORTATION, EROSION CONTROL AND STORMWATER QUALITY FIELD GUIDE (2011).
  - CONTRACTOR MUST KEEP ACCESS TO FACILITIES AND STOCKPILED MATERIALS OPEN.
  - CONTRACTOR MUST KEEP ROOM TO TURN A 18-WHEEL TRUCK AROUND.
  - CONTRACTOR IS RESPONSIBLE FOR SITE SECURITY AND IS RESPONSIBLE FOR KEEPING PEOPLE OUT OF THE YARD WHEN IT IS BEING USED FOR CONSTRUCTION PURPOSES.

- CONCRETE PROTECTION NOTES:**
- CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF ALL CONCRETE FLATWORK WITHIN THE RIVER CONSTRUCTION ACCESS AREA AND THE ASSOCIATED TECHNIQUES USED TO AVOID DAMAGE.
  - THE CITY HAS SUPPLIED EXISTING TIMBERS AS NOTED ON THIS DRAWING THAT MAY BE USED TO COVER ANY RELEVANT CROSSINGS, OR POTENTIALLY IMPACTED AREAS.
  - IN ADDITION, A SECOND ALTERNATIVE TECHNIQUE FOR THE CROSSINGS IS THE USE OF APPROXIMATELY ONE FOOT OF GRAVEL OR ROADBASE MATERIAL.
  - THE TIMBERS MAY BE USED IN COMBINATION WITH THE GRAVEL. A DETAIL OF THIS ALTERNATIVE IS PRESENTED BELOW.

CONTRACTOR RESPONSIBLE FOR DAMAGE TO IRRIGATION SYSTEM. STAKING OF INFRASTRUCTURE RECOMMENDED

TEMPORARY CONSTRUCTION FENCE

CONCRETE TRAIL PROTECTION (SEE ALTERNATIVE BELOW)

RIVER CONSTRUCTION ACCESS

CONTRACTOR RESPONSIBLE FOR DAMAGE TO IRRIGATION SYSTEM. STAKING OF INFRASTRUCTURE RECOMMENDED

INSTALL SILT FENCE BOTH SIDES OF ACCESS

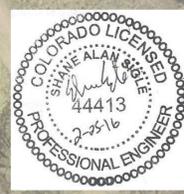
STAGING AREA  
NO STORAGE, MACHINERY, STAGING, OR ACCESS OUTSIDE OF HATCHED AREA AND DESIGNATED ACCESS POINT

PROJECT ACCESS

LOCATION OF EXISTING 8" X 8" X 10' TIMBERS (80+/- PIECES) FOR PATH PROTECTION

**LEGEND**

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- PARCEL BOUNDARIES
- GROUTED ROCK (GROUT HELD BACK 6')
- STRUCTURE LOW FLOW (GROUTED)
- FISH PASSAGE
- STRUCTURE POOL ARMORING D50 = 18"
- EXISTING CONTOUR LINES
- PROPOSED CONTOUR LINES



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CITY OF DURANGO SANTA RITA PUMP  
INTAKE RIVER IMPROVEMENTS  
ACCESS, STAGING, AND STRUCTURE DIMENSIONS  
LA PLATA COUNTY, DURANGO, COLORADO

Sheet reference  
**S-3**  
Sheet 3 of 13

CONSTRUCTION DRAWINGS

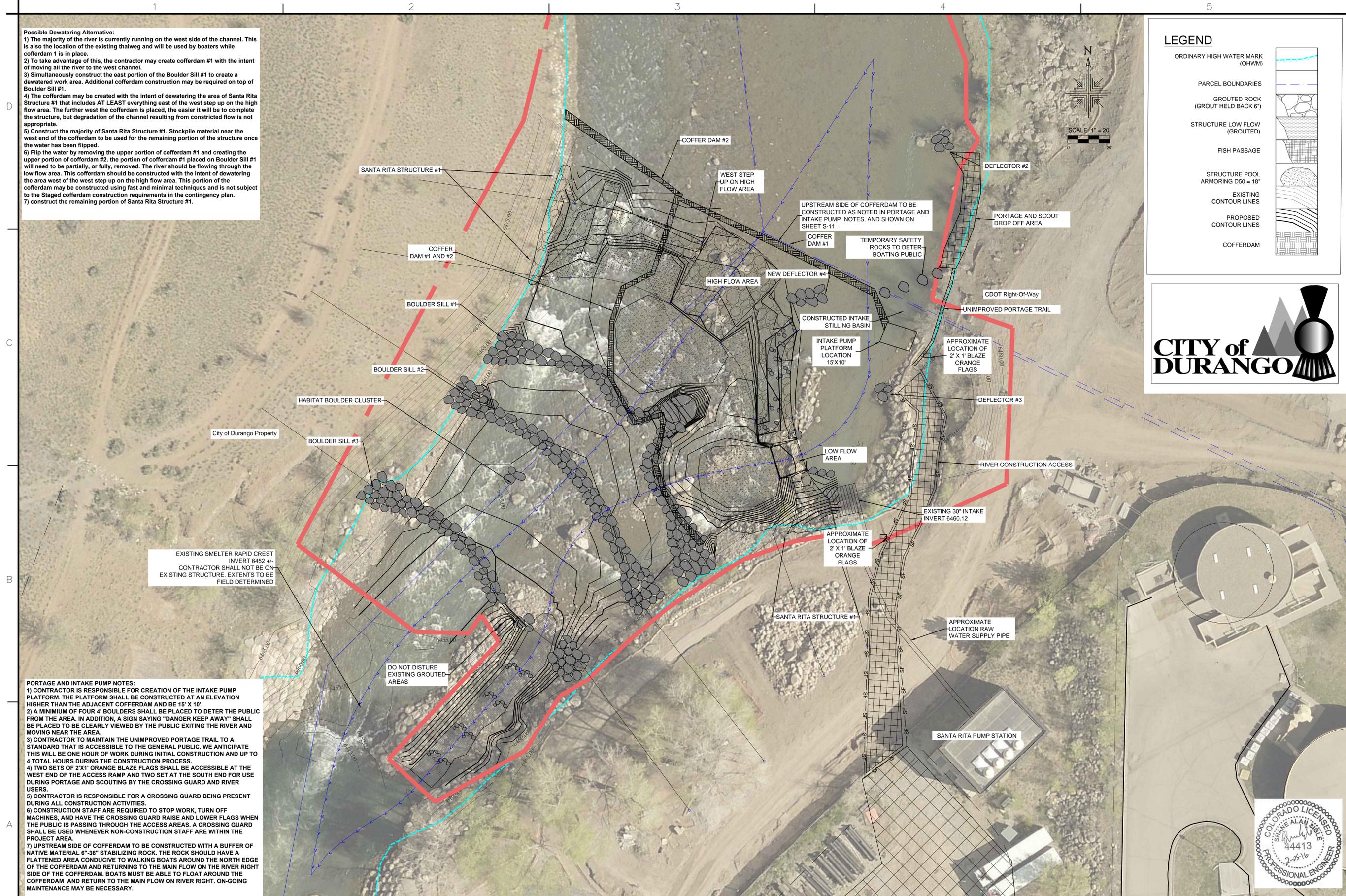
**Possible Dewatering Alternative:**

- 1) The majority of the river is currently running on the west side of the channel. This is also the location of the existing thalweg and will be used by boaters while cofferdam #1 is in place.
- 2) To take advantage of this, the contractor may create cofferdam #1 with the intent of moving all the river to the west channel.
- 3) Simultaneously construct the east portion of the Boulder Sill #1 to create a dewatered work area. Additional cofferdam construction may be required on top of Boulder Sill #1.
- 4) The cofferdam may be created with the intent of dewatering the area of Santa Rita Structure #1 that includes AT LEAST everything east of the west step up on the high flow area. The further west the cofferdam is placed, the easier it will be to complete the structure, but degradation of the channel resulting from constricted flow is not appropriate.
- 5) Construct the majority of Santa Rita Structure #1. Stockpile material near the west end of the cofferdam to be used for the remaining portion of the structure once the water has been flipped.
- 6) Flip the water by removing the upper portion of cofferdam #1 and creating the upper portion of cofferdam #2. The portion of cofferdam #1 placed on Boulder Sill #1 will need to be partially, or fully, removed. The river should be flowing through the low flow area. This cofferdam should be constructed with the intent of dewatering the area west of the west step up on the high flow area. This portion of the cofferdam may be constructed using fast and minimal techniques and is not subject to the Staged cofferdam construction requirements in the contingency plan.
- 7) construct the remaining portion of Santa Rita Structure #1.

EXISTING SMELTER RAPID CREST  
INVERT 6452 +/-  
CONTRACTOR SHALL NOT BE ON  
EXISTING STRUCTURE. EXTENTS TO BE  
FIELD DETERMINED

**PORTAGE AND INTAKE PUMP NOTES:**

- 1) CONTRACTOR IS RESPONSIBLE FOR CREATION OF THE INTAKE PUMP PLATFORM. THE PLATFORM SHALL BE CONSTRUCTED AT AN ELEVATION HIGHER THAN THE ADJACENT COFFERDAM AND BE 15' X 10'.
- 2) A MINIMUM OF FOUR 4' BOULDERS SHALL BE PLACED TO DETER THE PUBLIC FROM THE AREA. IN ADDITION, A SIGN SAYING "DANGER KEEP AWAY" SHALL BE PLACED TO BE CLEARLY VIEWED BY THE PUBLIC EXITING THE RIVER AND MOVING NEAR THE AREA.
- 3) CONTRACTOR TO MAINTAIN THE UNIMPROVED PORTAGE TRAIL TO A STANDARD THAT IS ACCESSIBLE TO THE GENERAL PUBLIC. WE ANTICIPATE THIS WILL BE ONE HOUR OF WORK DURING INITIAL CONSTRUCTION AND UP TO 4 TOTAL HOURS DURING THE CONSTRUCTION PROCESS.
- 4) TWO SETS OF 2'X1' ORANGE BLAZE FLAGS SHALL BE ACCESSIBLE AT THE WEST END OF THE ACCESS RAMP AND TWO SET AT THE SOUTH END FOR USE DURING PORTAGE AND SCOUTING BY THE CROSSING GUARD AND RIVER USERS.
- 5) CONTRACTOR IS RESPONSIBLE FOR A CROSSING GUARD BEING PRESENT DURING ALL CONSTRUCTION ACTIVITIES.
- 6) CONSTRUCTION STAFF ARE REQUIRED TO STOP WORK, TURN OFF MACHINES, AND HAVE THE CROSSING GUARD RAISE AND LOWER FLAGS WHEN THE PUBLIC IS PASSING THROUGH THE ACCESS AREAS. A CROSSING GUARD SHALL BE USED WHENEVER NON-CONSTRUCTION STAFF ARE WITHIN THE PROJECT AREA.
- 7) UPSTREAM SIDE OF COFFERDAM TO BE CONSTRUCTED WITH A BUFFER OF NATIVE MATERIAL 6"-36" STABILIZING ROCK. THE ROCK SHOULD HAVE A FLATTENED AREA CONDUJIVE TO WALKING BOATS AROUND THE NORTH EDGE OF THE COFFERDAM AND RETURNING TO THE MAIN FLOW ON THE RIVER RIGHT SIDE OF THE COFFERDAM. BOATS MUST BE ABLE TO FLOAT AROUND THE COFFERDAM AND RETURN TO THE MAIN FLOW ON RIVER RIGHT. ON-GOING MAINTENANCE MAY BE NECESSARY.



**LEGEND**

- ORDINARY HIGH WATER MARK (OHWM)
- PARCEL BOUNDARIES
- GROUTED ROCK (GROUT HELD BACK 6")
- STRUCTURE LOW FLOW (GROUTED)
- FISH PASSAGE
- STRUCTURE POOL ARMORING D50 = 18"
- EXISTING CONTOUR LINES
- PROPOSED CONTOUR LINES
- COFFERDAM



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**CITY OF DURANGO SANTA RITA PUMP  
INTAKE RIVER IMPROVEMENTS  
DEWATERING PLAN**  
LA PLATA COUNTY, DURANGO, COLORADO



**CONSTRUCTION DRAWINGS**

Sheet reference  
**S-4**  
Sheet 4 of 13

NOTE:  
1) DEFLECTOR #1 and #2 MAINTENANCE ASSUMES CDOT APPROVAL.

PROPOSED BOULDER SILL  
UPSTREAM OF ISLAND- MATCH EXISTING GRADE

PROJECT BOUNDARY

CDOT ROW

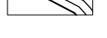
EXISTING BOULDER DEFLECTOR #1  
MAINTAIN AND BOLSTER

PROJECT BOUNDARY

MATCHLINE

MATCHLINE

### LEGEND

- ORDINARY HIGH WATER MARK (OHWM) 
- PARCEL BOUNDARIES 
- GROUTED ROCK (GROUT HELD BACK 6") 
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Submitted by:	Riverwise Engineering, LLC	File:	Santa Rita.pwg

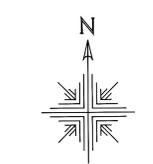
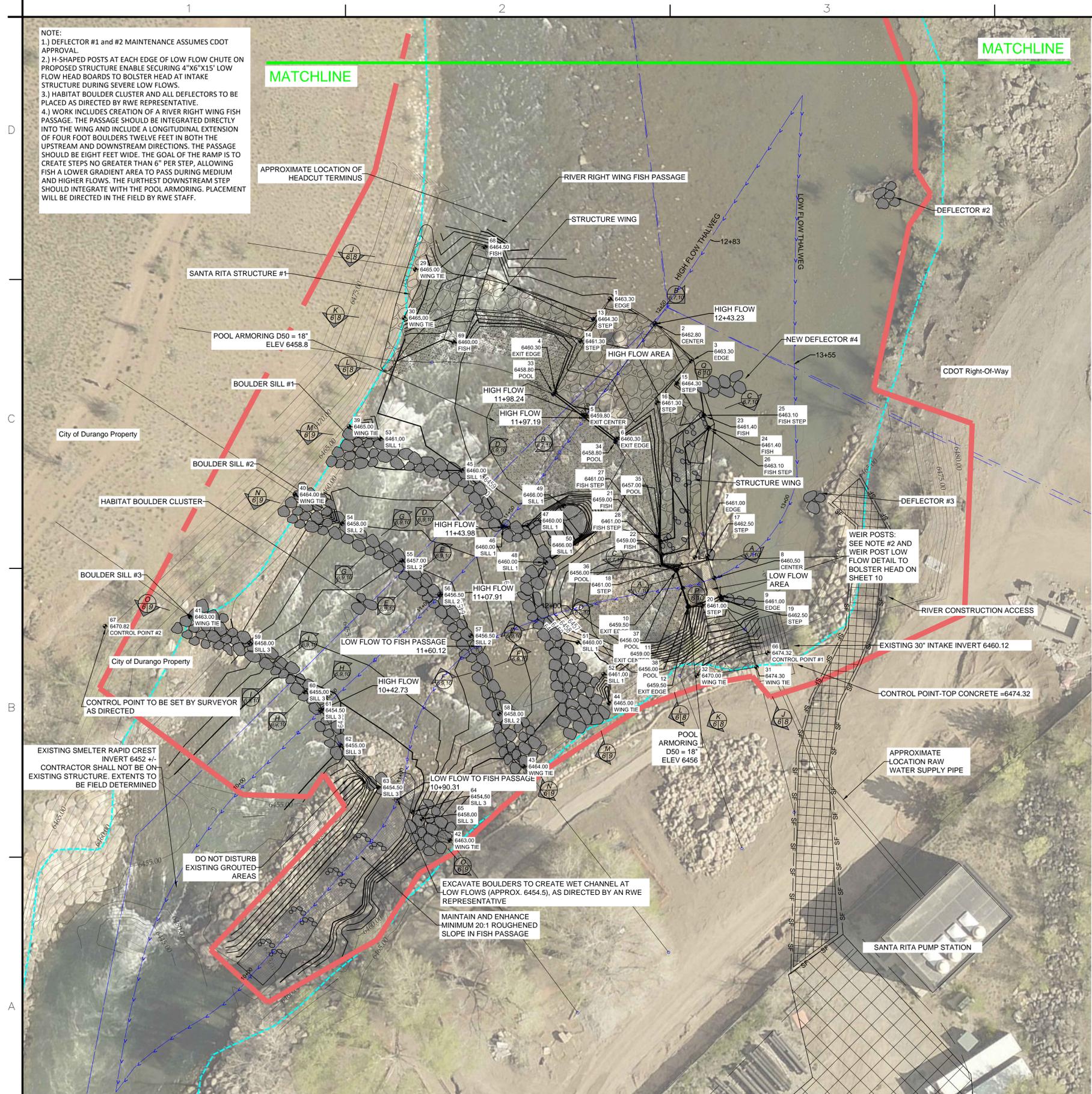
CITY OF DURANGO SANTA RITA PUMP  
 INTAKE RIVER IMPROVEMENTS  
 PLANVIEW - UPSTREAM  
 LA PLATA COUNTY, DURANGO, COLORADO



CONSTRUCTION DRAWINGS

Sheet reference  
**S-5**  
 Sheet 5 of 13

NOTE:  
 1.) DEFLECTOR #1 and #2 MAINTENANCE ASSUMES CDOT APPROVAL.  
 2.) H-SHAPED POSTS AT EACH EDGE OF LOW FLOW CHUTE ON PROPOSED STRUCTURE ENABLE SECURING 4"X6"X15" LOW FLOW HEAD BOARDS TO BOLSTER HEAD AT INTAKE STRUCTURE DURING SEVERE LOW FLOWS.  
 3.) HABITAT BOULDER CLUSTER AND ALL DEFLECTORS TO BE PLACED AS DIRECTED BY RWE REPRESENTATIVE.  
 4.) WORK INCLUDES CREATION OF A RIVER RIGHT WING FISH PASSAGE. THE PASSAGE SHOULD BE INTEGRATED DIRECTLY INTO THE WING AND INCLUDE A LONGITUDINAL EXTENSION OF FOUR FOOT BOULDERS TWELVE FEET IN BOTH THE UPSTREAM AND DOWNSTREAM DIRECTIONS. THE PASSAGE SHOULD BE EIGHT FEET WIDE. THE GOAL OF THE RAMP IS TO CREATE STEPS NO GREATER THAN 6" PER STEP, ALLOWING FISH A LOWER GRADIENT AREA TO PASS DURING MEDIUM AND HIGHER FLOWS. THE FURTHEST DOWNSTREAM STEP SHOULD INTEGRATE WITH THE POOL ARMORING. PLACEMENT WILL BE DIRECTED IN THE FIELD BY RWE STAFF.



SCALE: 1" = 20'  
 0 20'



**LEGEND**

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- PARCEL BOUNDARIES
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- STRUCTURE LOW FLOW (GROUTED)
- FISH PASSAGE
- STRUCTURE POOL ARMORING D50 = 18"
- EXISTING CONTOUR LINES
- PROPOSED CONTOUR LINES
- VIEW PERSPECTIVE
- SECTION LETTER OR DETAIL
- PAGES THAT REFERENCE SECTION OR DETAIL



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 File: Santa Rita.dwg  
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 Submitted by: MH  
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Point Table				Point Table					
Point #	Raw Description	Elevation	Northing	Easting	Point #	Raw Description	Elevation	Northing	Easting
1	EDGE	6463.30	1226454.1025	2307092.9058	36	POOL	6456.00	1226350.2078	2307112.8892
2	CENTER	6462.80	1226444.3940	2307110.5892	37	POOL	6456.00	1226348.1090	2307118.8164
3	EDGE	6463.30	1226249.8638	2307124.7254	38	POOL	6456.00	1226333.8737	2307123.4841
4	EXIT EDGE	6460.30	1226417.6616	2307071.4333	39	WING TIE	6465.00	1226404.2795	2306990.5486
5	EXIT CENTER	6459.80	1226408.5720	2307083.3657	40	WING TIE	6464.00	1226377.7635	2306969.2922
6	EXIT EDGE	6460.30	1226399.4825	2307095.2980	41	WING TIE	6463.00	1226330.0095	2306928.1753
7	EDGE	6461.00	1226353.2124	2307126.2208	42	WING TIE	6463.00	1226242.7147	2307030.1018
8	CENTER	6460.50	1226345.1403	2307133.9022	43	WING TIE	6464.00	1226271.5662	2307059.0511
9	EDGE	6461.00	1226337.9989	2307136.2067	44	WING TIE	6465.00	1226296.3575	2307092.5431
10	EXIT EDGE	6459.50	1226348.2584	2307119.2136	45	SILL 1	6460.00	1226387.1379	2307034.7956
11	EXIT CENTER	6459.00	1226341.1241	2307121.5270	46	SILL 1	6460.00	1226365.0997	2307050.9214
12	EXIT EDGE	6459.50	1226333.9898	2307123.8403	47	SILL 1	6460.00	1226365.7146	2307060.5578
13	STEP	6464.30	1226446.2586	2307086.3781	48	SILL 1	6460.00	1226351.2287	2307067.7521
14	STEP	6461.30	1226247.5865	2307081.4050	49	SILL 1	6466.00	1226373.2790	2307074.8431
15	STEP	6464.30	1226421.1394	2307119.1902	50	SILL 1	6466.00	1226361.7915	2307081.4683
16	STEP	6461.30	1226413.5279	2307111.3408	51	SILL 1	6460.00	1226320.0358	2307080.2456
17	STEP	6462.50	1226353.7308	2307131.2523	52	SILL 1	6461.00	1226307.5855	2307090.4404
18	STEP	6461.00	1226350.3669	2307120.7054	53	SILL 1	6461.00	1226399.5018	2307002.9094
19	STEP	6462.50	1226336.7575	2307136.7067	54	SILL 2	6458.00	1226366.3590	2306987.8349
20	STEP	6461.00	1226334.3599	2307129.0677	55	SILL 2	6457.00	1226351.9635	2307011.2570
21	FISH	6459.00	1226359.2485	2307112.7350	56	SILL 2	6456.50	1226338.5906	2307026.0350
22	FISH	6459.00	1226354.3209	2307113.2705	57	SILL 2	6456.50	1226322.6365	2307038.2453
23	FISH	6461.40	1226408.4880	2307129.9025	58	SILL 2	6458.00	1226292.0916	2307049.4520
24	FISH	6461.40	1226403.8428	2307131.6179	59	SILL 3	6458.00	1226319.7325	2306951.5756
25	FISH STEP	6463.10	1226408.6931	2307129.7597	60	SILL 3	6455.00	1226300.6882	2306973.1387
26	FISH STEP	6463.10	1226403.5697	2307131.7272	61	SILL 3	6454.50	1226293.5321	2306979.3956
27	FISH STEP	6461.00	1226359.4934	2307112.7089	62	SILL 3	6455.00	1226279.8218	2306987.2483
28	FISH STEP	6461.00	1226354.0707	2307113.2982	63	SILL 3	6454.50	1226263.4019	2307002.0009
29	WING TIE	6465.00	1226465.6135	2307016.5266	64	SILL 3	6454.50	1226253.8340	2307015.4083
30	WING TIE	6465.00	1226446.7428	2307012.1354	65	SILL 3	6458.00	1226251.0208	2307019.1787
31	WING TIE	6474.30	1226310.3481	2307150.4114	66	CONTROL POINT #1	6474.32	1226315.9165	2307154.6532
32	WING TIE	6470.00	1226307.0458	2307127.0048	67	CONTROL POINT #2	6470.82	1226326.3113	2306894.8340
33	POOL	6458.80	1226416.9399	2307070.7044	68	FISH	6464.50	1226474.4109	2307043.8079
34	POOL	6458.80	1226398.2997	2307095.0820	69	FISH	6460.00	1226437.3140	2307031.4740
35	POOL	6457.00	1226361.8070	2307111.8131					

CITY OF DURANGO SANTA RITA PUMP  
 INTAKE RIVER IMPROVEMENTS  
 PLANVIEW - DOWNSTREAM  
 LA PLATA COUNTY, DURANGO, COLORADO

Sheet reference  
**S-6**  
 Sheet 6 of 13

NOTES:  
 1.) SEE POINT TABLES ON SHEET 6 FOR LAYOUT OF SECTIONS.  
 2.) COMPLETE MINIMAL GRADING WHILE ENSURING PROJECT GRADES ARE MET.

SCALE: 1" = 20'

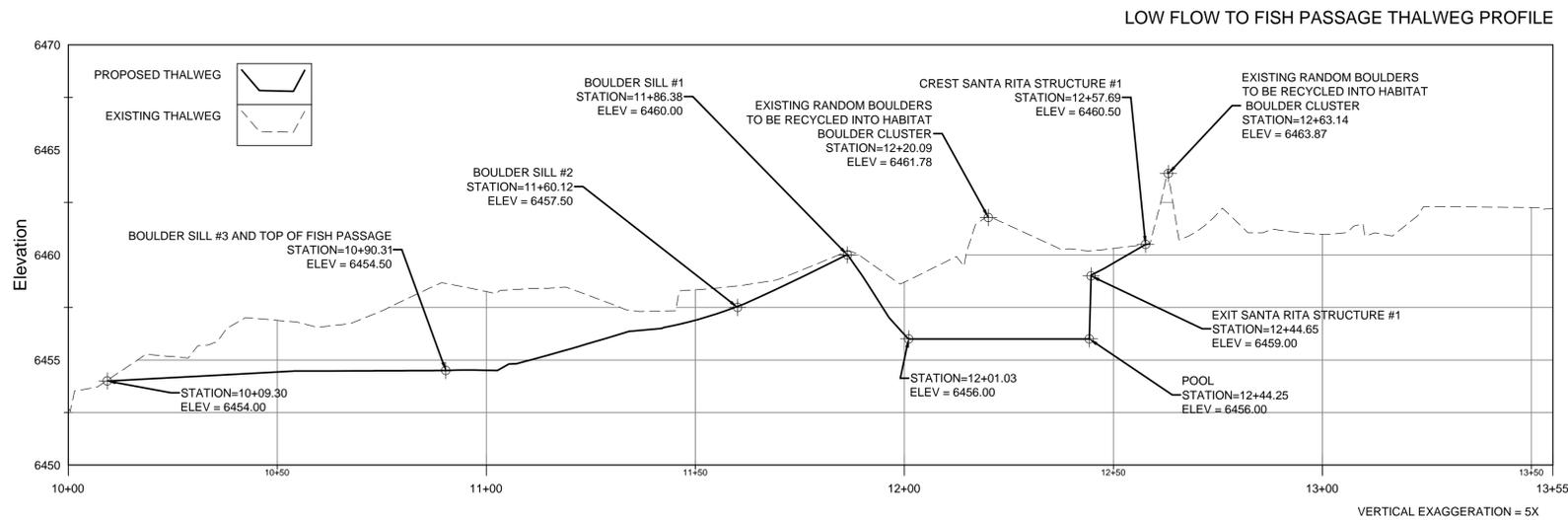
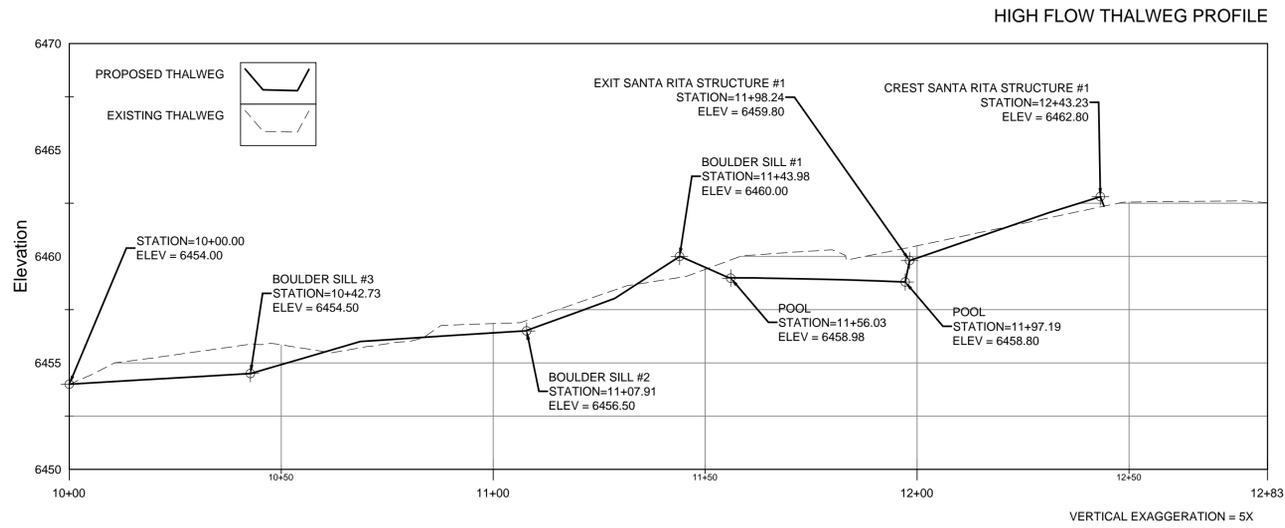


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CITY OF DURANGO SANTA RITA PUMP  
 INTAKE RIVER IMPROVEMENTS  
 LONGITUDINAL PROFILES  
 LA PLATA COUNTY, DURANGO, COLORADO

Sheet reference  
**S-7**  
 Sheet 7 of 13



CONSTRUCTION DRAWINGS

SCALE: 1" = 20'



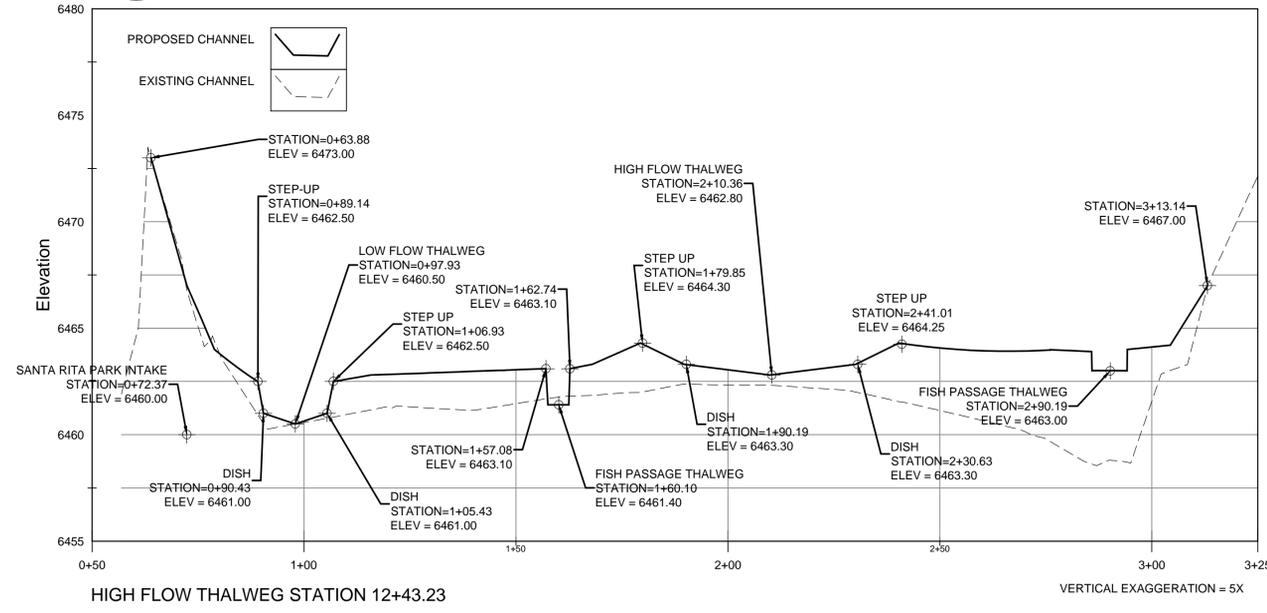
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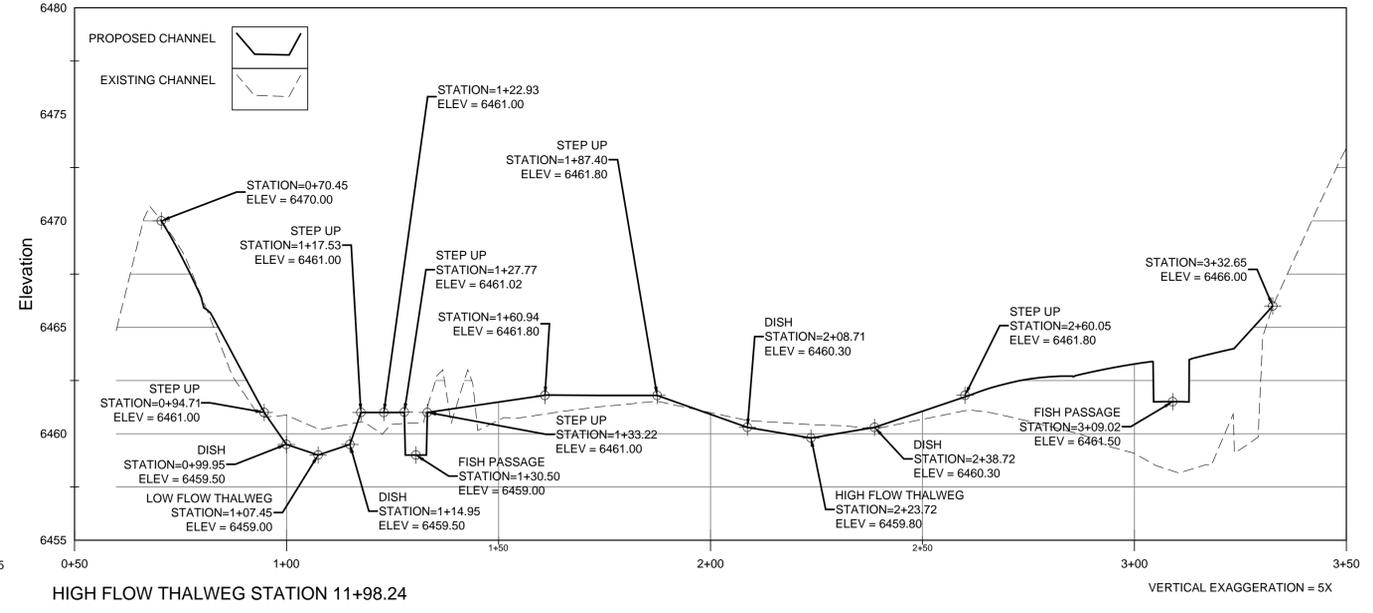
CITY OF DURANGO SANTA RITA PUMP  
 INTAKE RIVER IMPROVEMENTS  
 CROSS SECTIONS (1)  
 LA PLATA COUNTY, DURANGO, COLORADO

Sheet reference  
**S-8**  
 Sheet 8 of 13

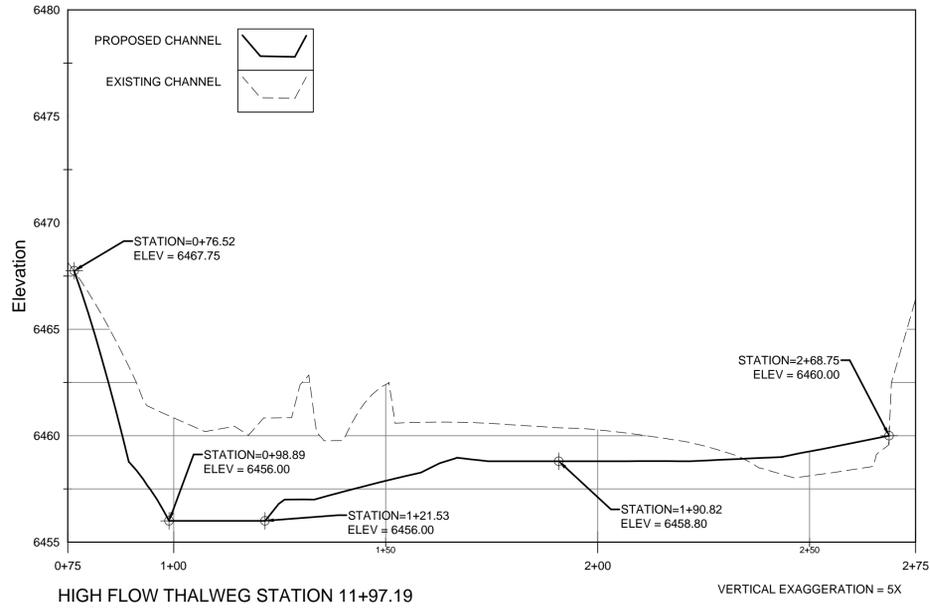
**J**  
 6/8  
 SANTA RITA STRUCTURE #1 CREST (SECTION LOOKING DOWNSTREAM)



**K**  
 6/8  
 SANTA RITA STRUCTURE #1 EXIT (SECTION LOOKING DOWNSTREAM)



**L**  
 6/8  
 SANTA RITA STRUCTURE #1 POOL (SECTION LOOKING DOWNSTREAM)



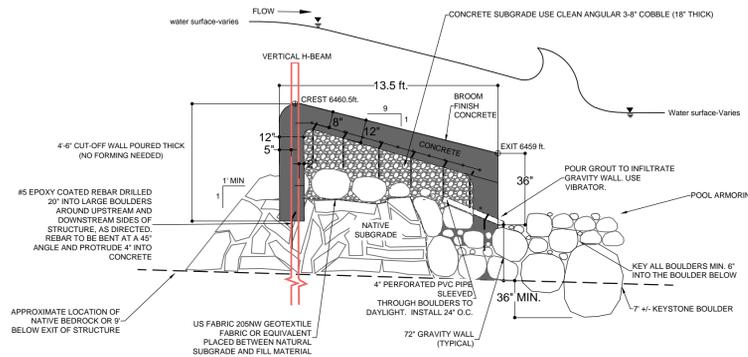
NOTE: SEE POINT TABLE ON SHEET 6 FOR LAYOUT OF SECTIONS



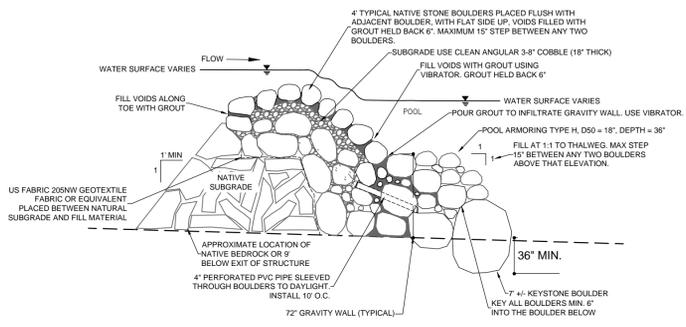
CONSTRUCTION DRAWINGS



NOTES:  
 A) TAPER CONCRETE THICKNESS FROM 24" AT STRUCTURE EXIT TO 12" AT CREST.  
 B) 16" LONG #5 EPOXY COATED REBAR 24" O.C. BENT AT 45° SET IN SUBGRADE AND PROTRUDING MIN. 4" INTO CONCRETE. WITH #5 EPOXY COATED REBAR HORIZONTAL 12" O.C. EACH WAY IN A GRID PATTERN.  
 C) USE GREY CONCRETE.  
 D) PVC PIPES MUST BE DAYLIGHTED THROUGH GROUT.  
 E) BOULDERS MAY BE PLACED AND RE-PLACED TO ATTAIN DESIRED FIT.  
 F) IF BEDROCK IS ENCOUNTERED, CONTRACTOR MAY SET KEYSTONE INTO BEDROCK WITH A MINIMUM SIX-INCH KEY-IN. HYDRAULIC HAMMERING MAY BE REQUIRED.

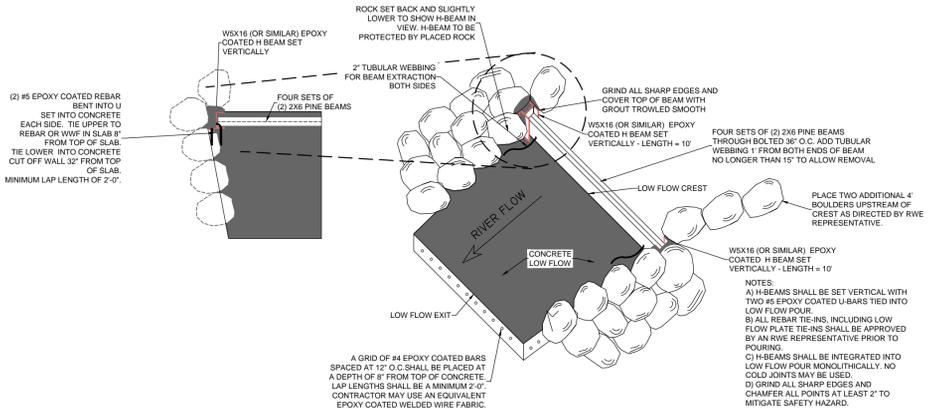


**A**  
 6,7,10  
**STRUCTURE 1  
 TYPICAL PROFILE CENTER LOW-FLOW  
 (NTS)**

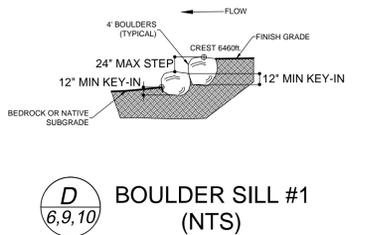


**B**  
 6,7,10  
**STRUCTURE 1  
 TYPICAL PROFILE OF ROCK IN HIGH FLOW AND WING  
 (NTS)**

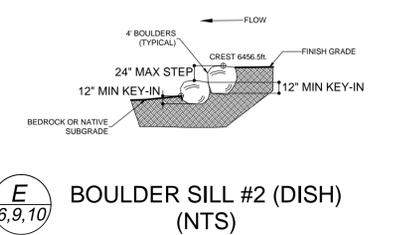
NOTE:  
 A) Fill voids flush along upstream and downstream toe with grout and all other voids filled with grout held back 6". All rock to be clean and swept after grouting. Use vibrator.  
 B) Make wing rounded to prevent deep water boat pins on upstream side as specified by whitewater engineer.  
 C) Step back side of wings with 15" steps to break up hydraulics.  
 D) Use grey grout.  
 E) All boulders to be placed flush with adjacent boulder.  
 F) 4" boulders may be placed and re-placed to attain desired fit.  
 G) PVC pipe must be daylighted through grout.  
 H) If bedrock is encountered, a minimum six-inch key-in is required. A hydraulic hammer may be necessary.



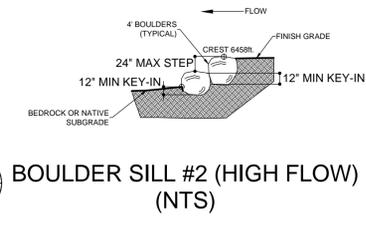
**P**  
 6,10  
**WEIR POST LOW FLOW DETAIL  
 TO BOLSTER HEAD  
 (NTS)**



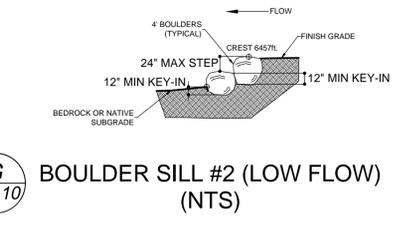
**D**  
 6,9,10  
**BOULDER SILL #1  
 (NTS)**



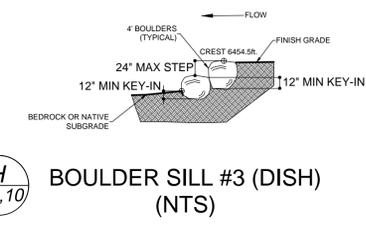
**E**  
 6,9,10  
**BOULDER SILL #2 (DISH)  
 (NTS)**



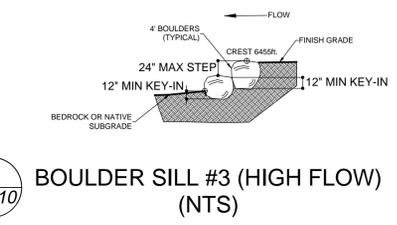
**F**  
 6,9,10  
**BOULDER SILL #2 (HIGH FLOW)  
 (NTS)**



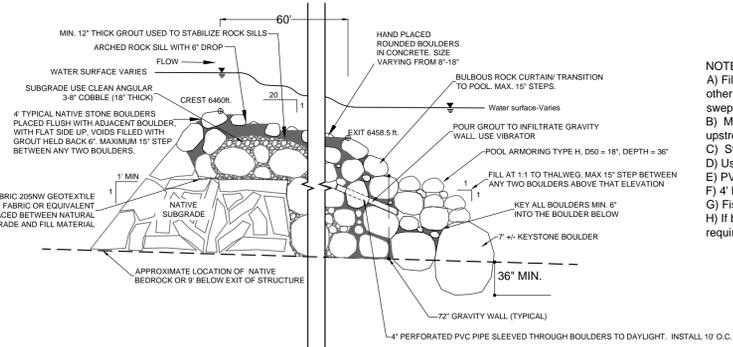
**G**  
 6,9,10  
**BOULDER SILL #2 (LOW FLOW)  
 (NTS)**



**H**  
 6,9,10  
**BOULDER SILL #3 (DISH)  
 (NTS)**

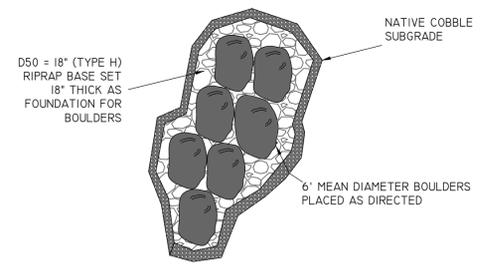


**I**  
 6,9,10  
**BOULDER SILL #3 (HIGH FLOW)  
 (NTS)**



**C**  
 6,7,10  
**STRUCTURE 1  
 TYPICAL SECTION OF DROP STRUCTURE, IN FISH PASSAGE CHANNEL  
 (NTS)**

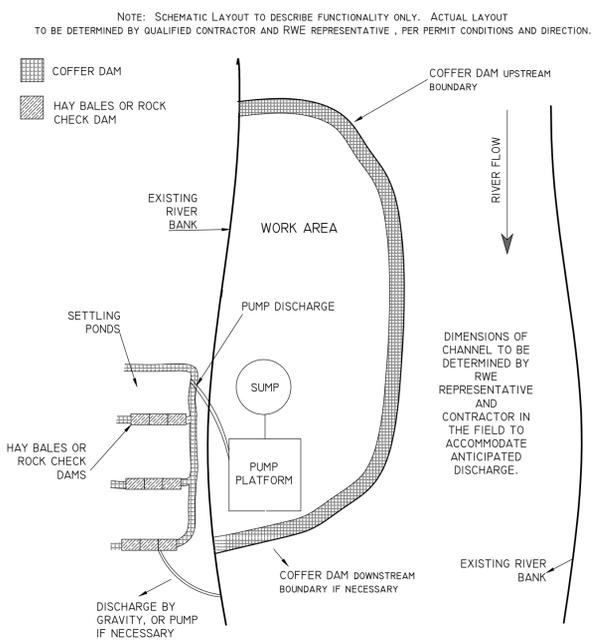
NOTE:  
 A) Fill voids along upstream and downstream toe with grout and all other voids filled with grout held back. All rock to be clean and swept after grouting.  
 B) Make wing rounded to prevent deep water boat pins on upstream side as specified by whitewater engineer.  
 C) Step back side of wings with 15" steps to break up hydraulics.  
 D) Use grey grout.  
 E) PVC pipe must be daylighted through grout.  
 F) 4" boulders may be placed and re-placed to attain desired fit.  
 G) Fish passage actual length is 60 feet.  
 H) If bedrock is encountered, a minimum six-inch key-in is required. A hydraulic hammer may be necessary.



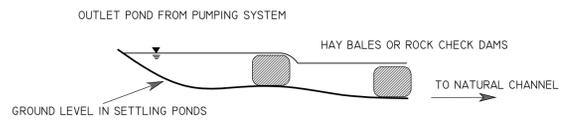
**Q**  
 6,10  
**NEW DEFLECTOR #4  
 PLANVIEW TYPICAL  
 (NTS)**



**TYPICAL LAYOUT COFFERDAM DEWATERING AREA**

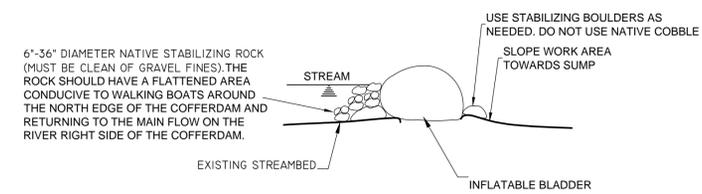


- DEWATERING NOTES:**
- SUMPS CAN BE MADE FROM DIGGING A HOLE AND INSERTING A PERFORATED PIPE OR PLASTIC BUCKET, AND BACKFILLING WITH CLEAN DRAIN ROCK OR OTHER APPROVED METHOD.
  - SETTLING PONDS SHOULD BE BASED UPON SITE SPECIFICS (I.E. INFILTRATION AND SETTLING RATES, PARTICLE SIZE). DETENTION TIMES WILL BE BASED UPON THE SIZE OF THE SUSPENDED PARTICLES. IF THERE IS EXCESSIVE LEAKAGE THROUGH ANY COFFER DAM, BASE ROCK IS TO BE LINED WITH VISQUENE PRIOR TO BEING COVERED IN COBBLE. NUMBER OF SETTLING PONDS TO BE DETERMINED BY CLARITY OF DISCHARGE FLUID.
  - UPON COMPLETION VISQUENE AND SETTLED FINES SHALL BE REMOVED AND DISPOSED OF OFFSITE BY THE CONTRACTOR.
  - PUMP STATION SHALL BE ELEVATED. FUEL CONTAINMENT BMP'S AND SPILL CLEANUP SUPPLIES SHALL BE ONSITE AT ALL TIMES.
  - PUMP REMAINING WATER IN CONSTRUCTION AREA AS NECESSARY, TO MANAGE GROUNDWATER AND LEAKAGE. ALL DISCHARGED WATER MUST BE ROUTED TO THE SETTLING PONDS.
  - CONTRACTOR IS RESPONSIBLE FOR SECURITY OF DEWATERING MACHINERY DURING CONSTRUCTION. ANY VANDALISM WILL BE CORRECTED AT CONTRACTOR'S OWN EXPENSE.
  - CONTRACTOR REQUIRED TO REVIEW SUPPLIED US ARMY CORPS OF ENGINEERS PRE-CONSTRUCTION NOTIFICATION (PCN) PROVIDED IN THE BID PACKAGE.
  - THE CONTRACTOR SHALL BE RESPONSIBLE FOR CARE OF ALL WATER DURING CONSTRUCTION INCLUDING MAINTENANCE OF ALL DITCHES, COFFERDAMS, LEVEES, DIVERSIONS AND PUMPS TO KEEP THE WORK AREA FREE FROM WATER.
  - COFFERDAMS MUST BE CONSTRUCTED TO A MINIMUM ELEVATION OF 6465.5 FT ASL BASED ON THE CONTINGENCY PLAN. CONTRACTOR IS RESPONSIBLE FOR THE CONTINGENCY PLAN.
  - CONTRACTOR IS REQUIRED TO BE ON CALL 24 HOURS A DAY AND 7 DAYS A WEEK IN CASE OF FLOODING.
  - IN THE EVENT OF FLOODING EXCEEDING 2,895 CFS, CONTRACTOR IS REQUIRED TO DISMANTLE AND ALLOW RIVER TO FLOW FREELY THOUGH THE WORK AREA. RWE STAFF WILL PROVIDE RECOMMENDATIONS WITH THE GOAL OF MINIMIZING SEDIMENT ENTRAINMENT.
  - IN THE EVENT COFFERDAMS WILL BE USED DURING ANY MONTHS OUTSIDE OF JULY, AUGUST, AND SEPTEMBER, THE CONTRACTOR MAY BE REQUIRED TO REPORT WEEKLY WEATHER, SNOW WATER EQUIVALENT, AND DISCHARGE REPORTING TO THE U.S ARMY CORPS AND RWE STAFF. ADDITIONAL BOLSTERING TO COFFERDAMS MAY BE REQUIRED. ALL ITEMS IN THIS NOTE, ARE TO BE COMPLETED AT THE SOLE EXPENSE OF THE CONTRACTOR.
- GENERAL NOTES:**
- ALTERNATE METHODS PRESENTED TO DESCRIBE FUNCTIONALITY ONLY. ACTUAL METHOD TO BE DETERMINED BY QUALIFIED CONTRACTOR, PER PERMIT CONDITIONS, IN ORDER TO ACHIEVE DRY WORK AREA.
  - CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL DEWATERING AND COFFERDAMS DURING CONSTRUCTION. REPAIRS AND REPLACEMENTS DUE TO NATURAL CAUSES ARE AT THE SOLE EXPENSE OF THE CONTRACTOR.
  - IF THE CONTRACTOR CHOOSES NOT TO USE ONE OF THE ALTERNATIVES PRESENTED OR WOULD LIKE TO DEVIATE FROM THE ALTERNATIVES OR THE CONTINGENCY PLAN, THEY MUST SUBMIT A DEWATERING PLAN FOR APPROVAL FROM RWE AND THE U.S. ARMY CORPS OF ENGINEERS PROJECT MANAGER, MRS. KARA HELTIGE IN THE DURANGO REGULATORY FIELD OFFICE. SHE CAN BE REACHED AT 970-259-1604.

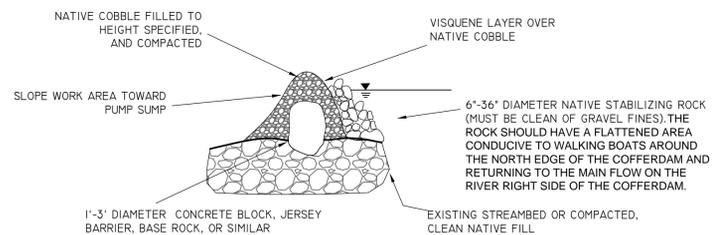


**TYPICAL SECTION IN SETTLING PONDS**

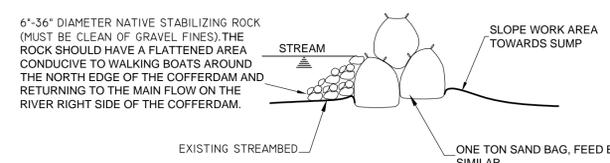
NOTE: SCHEMATIC LAYOUT TO DESCRIBE FUNCTIONALITY ONLY. ACTUAL SIZE, CONFIGURATION, MATERIALS, AND LAYOUT TO BE DETERMINED BY CONTRACTOR AND RWE REPRESENTATIVE, PER PERMIT CONDITIONS AND DIRECTION.



**TYPICAL COFFER DAM CROSS SECTION ALTERNATIVE (INFLATABLE BLADDER)**



**TYPICAL COFFER DAM CROSS SECTION ALTERNATIVE (CONCRETE BLOCK, JERSEY BARRIER, BOULDER FOUNDATION, OR SIMILAR)**



**TYPICAL COFFER DAM CROSS SECTION ALTERNATIVE (SAND BAG, FEED BAG, OR SIMILAR)**



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 info@riverwise.org  
 303.888.7734

Designed by:	SS, JB, AL, MR, MH, GL	Date:	JAN 25, 2016
Dwn by:	AR, SS	County:	LA PLATA COUNTY
Reviewed by:	SS, SM, MH	Client:	CITY OF DURANGO
Submitted by:	Riverwise Engineering, LLC	File:	RWE Details.dwg

CITY OF DURANGO SANTA RITA PUMP  
 INTAKE RIVER IMPROVEMENTS  
 DEWATERING TYPICAL DETAILS  
 LA PLATA COUNTY, DURANGO, COLORADO



CONSTRUCTION DRAWINGS

Sheet reference  
**S-11**  
 Sheet 11 of 13

GENERAL NOTES

- 1. GENERAL
  - 1.1. ALL ELEVATIONS GIVEN IN FEET ABOVE SEA LEVEL (VERTICAL DATUM NAVD 1988).
  - 1.2. THE CONTRACTOR IS RESPONSIBLE FOR CONFORMING TO ALL PLANS AND SPECIFICATIONS PROVIDED BY THE CITY AND/OR RWE, INCLUDING BID DOCUMENTS, CONSTRUCTION DRAWINGS, SPECIAL PROVISIONS, PERMIT CONDITIONS, ETC.
  - 1.3. IF TWO CONDITIONS, DIMENSIONS, SPECIFICATIONS, NOTES, STANDARDS, ETC. ARE FOUND TO BE CONTRADICTORY OR DIFFERENT, THE MORE STRINGENT ONE SHALL BE USED. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING A RWE REPRESENTATIVE TO DISCUSS ANY OF THESE SITUATIONS.
  - 1.4. THE CONTRACTOR IS RESPONSIBLE FOR SUBMITTING ALL PLANS AND REQUIRED DOCUMENTS ASSOCIATED WITH SHOP DRAWINGS SUCH AS DEWATERING PLANS, ACCESS AND STAGING PLANS, STORMWATER CONTROL PLANS, AND EMERGENCY SPILL PLANS.
  - 1.5. THE CONTRACTOR MUST BE AVAILABLE DURING PERIODIC INSPECTIONS FROM CITY, RWE, AND AGENCY STAFF.
  - 1.6. CONTRACTOR SHALL SUSPEND INSTREAM WORK ANYTIME, WHEN IN THE OPINION OF CITY STAFF AND/OR RWE REPRESENTATIVES, WORK CANNOT BE PERFORMED IN ACCORDANCE WITH THE PROJECT DRAWINGS AND SPECIFICATIONS DUE TO ENVIRONMENTAL CONDITIONS SUCH AS RAIN, FLOODING, LIGHTNING, AND COLD WEATHER.
  - 1.7. RWE RECOMMENDS A SAFETY, FUNCTIONALITY, AND FLUVIAL GEOMORPHOLOGICAL SITE VISIT BETWEEN THE CITY, RWE, USACOE, AND CPW STAFF ANNUALLY AND FOLLOWING ANY DISCHARGE EVENT EXCEEDING 20-YEAR RECURRENCE INTERVAL TO MONITOR THE FOLLOWING:
    - 1.7.1. STABILITY TO DETERMINE IF THE STRUCTURES HAVE MOVED, SETTLED, OR BEEN IMPACTED IN A WAY THAT COMPROMISES THE FUNCTION.
    - 1.7.2. DAMAGE FROM FLOWS, SEDIMENT, FLOATING OBJECTS, ETC.
    - 1.7.3. AGGRADATION AND/OR EROSION THAT MAY COMPROMISE STABILITY AND/OR LEAD TO STRUCTURE FAILURE.
    - 1.7.4. NAVIGATIONAL ISSUES.
  - 1.8. CONTRACTOR IS RESPONSIBLE FOR IMPACTS TO ALL EXISTING INFRASTRUCTURE.
- 2. ENGINEERS OVERSIGHT
  - 2.1. THE ENGINEER WAIVES ANY AND ALL RESPONSIBILITY, AND IS NOT LIABLE FOR PROBLEMS WHICH ARISE FROM FAILURE TO FOLLOW THESE PLANS, SPECIFICATIONS AND THE DESIGN INTENT THEY CONVEY OR FOR PROBLEMS WHICH ARISE FROM OTHERS OR OTHERS' FAILURE TO OBTAIN AND/OR FOLLOW THE ENGINEER'S GUIDANCE WITH RESPECT TO ANY ERRORS, OMISSIONS, INCONSISTENCIES, AMBIGUITIES OR CONFLICTS.
  - 2.2. ALL ELEVATIONS, DIMENSIONS, ALIGNMENTS AND ORIENTATION OF ALL ELEMENTS SHOWN IN THE PLANS MUST BE APPROVED BY THE RWE ENGINEER OR RWE ENGINEER'S REPRESENTATIVE (ENGINEER).
  - 2.3. WORK SHALL NOT COMMENCE UNTIL AFTER THE DATE OF THE ON-SITE PRE-CONSTRUCTION MEETING WHICH WILL BE ATTENDED BY REPRESENTATIVES OF THE PROJECT OWNER, ENGINEER, CONTRACTOR AND ANY SUB-CONTRACTORS. IN THE EVENT THAT WORK DOES NOT BEGIN IMMEDIATELY FOLLOWING THE PRE-CONSTRUCTION MEETING, THE CONTRACTOR SHALL PROVIDE REPRESENTATIVES OF THE PROJECT OWNER, ENGINEER, ANY SUB-CONTRACTORS, AND RELEVANT AGENCIES NOTED IN THE PERMITS, TWO WEEKS NOTICE BEFORE CONSTRUCTION COMMENCES.
  - 2.4. ALL CONSTRUCTION WORK SHALL CONFORM TO THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT STANDARD SPECIFICATIONS, LATEST EDITION, STANDARD SPECIFICATIONS OF MATERIALS FOR AGGREGATES AND SOIL AGGREGATE SUB-BASE, BASE AND SURFACE COURSES SHALL BE GOVERNED BY AASHTO DESIGNATION M147-65 (1993) OR LATEST REVISION. ALL CONSTRUCTION SHALL CONFORM TO CITY, COUNTY, STATE, AND FEDERAL STANDARDS AND SPECIFICATIONS AS APPLICABLE.
  - 2.5. WHENEVER THE INCLUDED DRAWINGS ARE FOUND TO BE INCONSISTENT WITH ANY OTHER RESOLUTION, ORDINANCE, CODE, REGULATION, PERMIT, OR OTHER STANDARDS REFERENCED, THE ENACTMENT IMPOSING THE MORE RESTRICTIVE STANDARDS OR REQUIREMENTS SHALL CONTROL.
  - 2.6. THE CONTRACTOR SHALL NOT COMMENCE CONSTRUCTION WITHOUT CONSTRUCTION PLAN APPROVAL BY ALL RELEVANT AGENCIES. A COPY OF THE APPROVED PLANS SHALL BE AVAILABLE AT THE CONSTRUCTION SITE AT ALL TIMES DURING WORKING HOURS. A COPY OF ALL PERMITS SHALL BE AVAILABLE AND VISIBLE AT THE CONSTRUCTION SITE AT ALL TIMES. RELEVANT PERMITS INCLUDE:
    - 2.6.1. US ARMY CORPS OF ENGINEERS 404 PERMIT, CITY OF DURANGO FLOODPLAIN DEVELOPMENT PERMIT AND COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT CONSTRUCTION DEWATERING.
- 3. UTILITIES
  - 3.1. A MINIMUM OF 12 INCHES OF SEPARATION MUST BE MAINTAINED BETWEEN UTILITY LINES.
  - 3.2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE LOCATION OF ALL EXISTING UTILITIES AND SHOULD NOT RELY SOLELY ON THESE CONSTRUCTION PLANS FOR UTILITY LOCATIONS. CONTRACTOR MUST COMPLETE ALL UTILITY LOCATES PRIOR TO CONSTRUCTION. LOCATES CAN BE COORDINATED WITH THE COLORADO ONE CALL 1-800-922-1987. DAMAGE TO ANY EXISTING UTILITIES IS THE RESPONSIBILITY OF THE CONTRACTOR.
- 4. SURVEY
  - 4.1. THE CONSTRUCTION SURVEYOR SHALL VERIFY PROPOSED GRADES AND INVERT ELEVATIONS, FLOW LINES, ALIGNMENTS, SETBACKS AND TOPOGRAPHY PRIOR TO CONSTRUCTION. CONTRACTOR IS RESPONSIBLE FOR THE SURVEYING AND ASSOCIATED COSTS.
  - 4.2. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL SURVEY EQUIPMENT, STAKING, CONTROL POINT LOCATIONS, AND TOOLS FOR ELEVATION DETERMINATION.
  - 4.3. THE CONTRACTOR IS RESPONSIBLE TO SET UP CONTROL POINTS NEAR EACH FEATURE. THESE CONTROL POINTS MUST OVERLAP SO GRADES MAY BE CHECKED FROM MULTIPLE CONTROL POINTS.
  - 4.4. THE CONTRACTOR IS RESPONSIBLE FOR COMPLETING AN AS-BUILT SURVEY, FOLLOWING COMPLETION OF THE FINAL GRADES. THE SURVEY SHALL INCLUDE ALL NOTED POINTS IN THE POINTS TABLES PROVIDED IN THE CONSTRUCTION DRAWINGS. DELIVERABLES SHALL BE PRODUCED IN AUTOCAD AND PDF FORMAT. THE EXISTING SURVEY WAS COMPLETED BY MOUNTAIN MAN SURVEYING AND THEY CAN BE REACHED AT [MMSURVEYING@FRONTIER.NET](mailto:MMSURVEYING@FRONTIER.NET) OR 970-946-1886.
  - 4.5. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF EXISTING TOPO IN RELATION TO THE DESIGN GRADES. SURVEY LOCATIONS AND ELEVATIONS OF NOTED POINTS SHALL BE REVIEWED AND FIELD APPROVED BY AN RWE REPRESENTATIVE PRIOR TO CONSTRUCTION.
- 5. GENERAL ENVIRONMENTAL
  - 5.1. WORK SHALL COMPLY WITH ALL LOCAL, STATE, AND FEDERAL AGENCIES' LAWS, RULES, REGULATIONS, AND PERMITS. ALL WORK SHALL BE SUBJECT TO INSPECTIONS AND SITE INVESTIGATION BY REGULATORY AGENCIES. FAILURE TO COMPLY WITH THESE REGULATIONS IS SUBJECT TO LEGAL ENFORCEMENT ACTION.
  - 5.2. CONTRACTOR IS RESPONSIBLE FOR GOOD HOUSEKEEPING PRACTICES AS NOTED IN THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT, URBAN STORM

- 2. DRAINAGE CRITERIA MANUAL: VOLUME 3: STORMWATER QUALITY GOOD HOUSEKEEPING PRACTICES (MM-3), VEHICLE MAINTENANCE, FUELING AND STORAGE (S-7), AND TEMPORARY ENVIRONMENTAL CONTROLS (SECTION 01 57 19). A STORMWATER MANAGEMENT PLAN (SWMP) IS NOT REQUIRED.
- 5.3. CONCRETE WASHOUT AREA(S) SHALL BE INSTALLED BASED ON COLORADO DEPARTMENT OF TRANSPORTATION, EROSION CONTROL AND STORMWATER FIELD GUIDE (2011).
- 5.4. COPIES OF PERMITS OBTAINED BY THE OWNER WILL BE PROVIDED TO THE CONTRACTOR. CONTRACTOR SHALL MAINTAIN COPIES OF ALL PERMITS ON THE SITE AT ALL TIMES. THESE MAY INCLUDE, BUT ARE NOT LIMITED TO, THE FOLLOWING: CLEAN WATER ACT SECTION 404 PERMIT FROM THE U.S. ARMY CORPS OF ENGINEERS, FLOODPLAIN DEVELOPMENT PERMIT, ANY APPROPRIATE LAND USE PERMITS, AND ANY RELEVANT CONSTRUCTION STORM WATER PERMITS.
- 5.5. A PRE-CONSTRUCTION MEETING WITH EQUIPMENT OPERATORS SHALL BE HELD TO DISCUSS THE PROJECT REQUIREMENTS AS THEY RELATE TO ENVIRONMENTAL PERMIT COMPLIANCE.
- 5.6. ON-SITE CONSTRUCTION REVIEWS SHALL BE CONDUCTED TO IDENTIFY MAINTENANCE NEEDS AND CHRONIC PROBLEMS THAT MAY BE OCCURRING. APPROPRIATE REMEDIAL ACTIONS SHALL BE IMPLEMENTED IN A TIMELY MANNER.
- 5.7. IF PREVIOUSLY UNKNOWN ARCHEOLOGICAL MATERIALS ARE DISCOVERED DURING CONSTRUCTION ACTIVITIES, WORK SHALL STOP IMMEDIATELY AND THE ENGINEER AND OWNER SHALL BE CONTACTED.
- 6. SEDIMENT AND POLLUTION CONTROL
  - 6.1. ALL APPROPRIATE SEDIMENT AND POLLUTION CONTROL MEASURES, AND BEST MANAGEMENT PRACTICES (BMP'S) SHALL BE IN PLACE TO MINIMIZE SEDIMENTATION AND RIVERBED IMPACTS PRIOR TO INITIATING IN-RIVER / RIVERBANK WORK. ALL BMP'S SHOULD BE INSTALLED AND MAINTAINED BASED ON GUIDANCE AND CRITERIA SET FORTH IN THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT, URBAN STORM DRAINAGE CRITERIA MANUAL.
  - 6.2. CONTRACTOR SHALL BE WHOLLY RESPONSIBLE FOR THE DESIGN, IMPLEMENTATION, AND MAINTENANCE OF SEDIMENT AND EROSION CONTROLS IN CONFORMANCE WITH CONSTRUCTION STANDARDS AND THE REQUIREMENTS OF REGULATORY AGENCIES THROUGHOUT THE CONSTRUCTION PERIOD. THE ENGINEER WILL NOT BE ON-SITE TO APPROVE, REVIEW, OR MAINTAIN THE CONTROLS. STORMWATER MEASURES MAY BE REQUIRED TO BE INSTALLED AT ANY TIME DURING CONSTRUCTION AT THE DIRECTION OF THE ENGINEER OR OWNER.
  - 6.3. IN ADDITION TO CONSTRUCTION BMP'S, TEMPORARY SEDIMENT AND EROSION CONTROLS (E.G., TEMPORARY SEEDING, MULCHING, SILT FENCE, STRAW WADDLE) SHALL BE IMPLEMENTED FOR ALL AREAS ANTICIPATED TO BE DISTURBED. PERMANENT SOIL STABILIZATION (E.G., PERMANENT SEEDING, EROSION CONTROL FABRIC) SHALL BE IMPLEMENTED ON DISTURBED AREAS WITHIN 2-DAYS AFTER FINAL GRADE IS REACHED ON ANY PORTION OF THE PROJECT AREA.
  - 6.4. SILT FENCING SHALL BE INSTALLED AND MAINTAINED AS NOTED IN THE COLORADO DEPARTMENT OF TRANSPORTATION, EROSION CONTROL AND STORMWATER QUALITY FIELD GUIDE (2011).
  - 6.5. SPOIL PILES SHALL BE COVERED OR OTHERWISE MANAGED TO REDUCE SEDIMENTATION. ALL MATERIAL WHICH IS TO BE PLACED AT UPLAND SITE SHALL BE DISPOSED OF IN SUCH A WAY THAT SEDIMENT RUNOFF IS CONTROLLED AND MINIMIZED. THEY SHALL BE INSTALLED AND MAINTAINED AS NOTED IN THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT, URBAN STORM DRAINAGE CRITERIA MANUAL, VOLUME 3, MATERIALS MANAGEMENT, MM-2.
  - 6.6. CONTRACTOR SHALL NOT STORE EQUIPMENT BELOW THE ORDINARY HIGH WATER LINE, AND TAKES FULL RESPONSIBILITY FOR ANY MATERIALS VANDALIZED, DAMAGED, BROKEN, OR LOST AS A RESULT OF RIVER EVENTS.
  - 6.7. ALL FUELING OPERATIONS, LUBRICATING, HYDRAULIC TOPPING OFF, FUEL TANK PURGING, AND EQUIPMENT MAINTENANCE/REPAIRS SHALL BE PERFORMED AT AN UPLAND SITE OUTSIDE OF THE BANKS OF ANY SITE WATERWAYS AT A LOCATION TO BE DETERMINED BY THE ENGINEER OR OWNER. THESE ACTIVITIES SHALL TAKE PLACE ON AN APPROVED PAD WITH SPILL CONTROL/ COLLECTION DEVICES IN PLACE.
  - 6.8. ALL CONSTRUCTION EQUIPMENT SHALL BE INSPECTED DAILY FOR HYDRAULIC AND FUEL LEAKS. LEAKS SHALL BE REPAIRED PRIOR TO OPERATION WITHIN THE 100-YEAR FLOODPLAIN. WHEN NOT IN USE, FUEL AND HYDRAULIC FLUIDS SHALL BE STORED AT AN UPLAND SITE OUTSIDE OF THE 100-YEAR FLOODPLAIN. EMERGENCY SPILL RESPONSE DEVICES SHALL BE ON-SITE AT ALL TIMES DURING CONSTRUCTION IN WATERWAYS AND FLOODPLAINS AND SHALL BE READY TO DEPLOY IN THE EVENT OF A SPILL.
  - 6.9. NO CHEMICALS, FUELS, LUBRICANTS, BRUSH, ETC. SHALL BE DISCHARGED OR DISPOSED OF INTO OR ALONGSIDE ANY STREAM, WATERCOURSE, OR FLOODPLAIN UNDER ANY CIRCUMSTANCES.
  - 6.10. LITTER AND CONSTRUCTION DEBRIS SHALL BE CONTAINED DAILY. ALL CONSTRUCTION DEBRIS AND LITTER SHALL BE COMPLETELY REMOVED OFFSITE AND DISPOSED OF PROPERLY UPON PROJECT COMPLETION.
  - 6.11. CONSTRUCTION ENTRANCES SHALL BE INSTALLED AS NECESSARY TO PROVIDE ACCESS TO CONSTRUCTION AREAS FROM ALL EXISTING ROADWAYS AND PATHS TO MINIMIZE GROUND DISTURBANCE AND SEDIMENT TRACKING FROM VEHICLE TIRES. ADJACENT ROADWAYS AND PATHS SHALL BE VISUALLY INSPECTED DAILY TO ENSURE THAT SEDIMENT IS NOT BEING CARRIED OFF-SITE. IF SEDIMENT IS BEING CARRIED OFF-SITE, THE ADJACENT ROADWAYS AND PATHS SHALL BE SWEEP CLEAN DAILY.
  - 6.12. BMP'S PLUS TEMPORARY SEDIMENT AND EROSION CONTROLS SHALL BE MAINTAINED TO BE FUNCTIONAL UNTIL THE SITE HAS REACHED FINAL STABILIZATION. THE PROJECT AREA SHALL BE CONSIDERED TO HAVE REACHED FINAL STABILIZATION WHEN:
    - 6.12.1. A PERENNIAL, VEGETATIVE COVER HAS GROWN TO A 80-PERCENT DENSITY THROUGHOUT THE ENTIRE DISTURBED AREA.
    - 6.12.2. ALL TEMPORARY SEDIMENT AND EROSION CONTROLS HAVE BEEN REMOVED AND DISPOSED OF PROPERLY.
    - 6.12.3. ALL TRAPPED SEDIMENT HAS BEEN REMOVED AND PERMANENTLY STABILIZED TO PREVENT FURTHER EROSION.
    - 6.12.4. ALL CONSTRUCTION ACTIVITIES HAVE CEASED.
- 7. BEST MANAGEMENT PRACTICES (BMP'S)
  - 7.1. BMP'S SUCH AS DRAINAGE CHANNELS, PERIMETER FENCING, DETENTION BASINS, AND VEHICLE TRACKING CONTROLS MUST BE INSTALLED PRIOR TO CONSTRUCTION ACTIVITIES. EFFECTIVE EROSION CONTROL REQUIRES ADAPTATION AND CHANGES DURING CONSTRUCTION THAT CANNOT BE DESIGNED OR ANTICIPATED PRIOR TO CONSTRUCTION. A CERTIFIED STORMWATER SUPERVISOR MUST CHECK AND REPORT ON ALL BMP'S REGULARLY AND NOTIFY THE ENGINEER IF THERE ARE QUESTIONS OR CONCERNS. THE ENGINEER ACCEPTS NO LIABILITY FOR THE PLACEMENT, EFFECTIVENESS, MAINTENANCE, OR CHOICE OF BMP ON THE SITE IF THE ENGINEER AND/OR ENGINEER'S REPRESENTATIVE ARE NOT PRESENT.
  - 7.2. THE CONTRACTOR SHALL IMPLEMENT THE NECESSARY SITE EROSION CONTROL MEASURES FOR INHIBITING DUST, WIND, AND AIR SEDIMENT MOVEMENT OFFSITE DURING ALL PHASES OR STAGES OF CONSTRUCTION.
  - 7.3. THE CONTRACTOR SHALL PROVIDE AN AREA TO STORE CONSTRUCTION DEBRIS WHERE IT WILL NOT BE A NUISANCE TO THE SURROUNDING NEIGHBORHOOD. ALL DEBRIS SHALL BE CONTAINED IN SUCH A MANNER THAT WILL PREVENT

- SCATTERING. ALL DEBRIS, INCLUDING TREES AND UNDERGROWTH SHALL BE DISPOSED OF PROPERLY. ALL DEBRIS SHALL BE REMOVED FROM THE SITE PRIOR TO FINAL SITE INSPECTION.
- 7.4. CONTRACTOR SHALL LIMIT THE AREAS OF DISTURBANCE AND COMPLETE CONSTRUCTION WITH PHASES IN MIND.
- 7.5. CONTRACTOR SHALL LIMIT DIRECTLY CONNECTED IMPERVIOUS AREAS (DCIA).
- 7.6. BUFFER STRIPS SHOULD BE USED DURING CONSTRUCTION TO LIMIT THE DCIA'S. WHEN POSSIBLE, SHIFTING CHANGES IN SLOPE, TERRACING LONGER SLOPES, SURFACE ROUGHENING, AND CONTOUR FURROWS SHOULD BE USED TO MINIMIZE CONSOLIDATED FLOW.
- 7.7. ANY STAGED GRADING MUST BE DONE TO DIRECT STORMWATER TOWARDS THE APPROPRIATE BMP'S.
- 7.8. DURING CONSTRUCTION, STRAW WADDLES, COMPACTED SOIL BERMS, AGGREGATE BAGS, OR SIMILAR MUST BE USED ON ALL DISTURBED SLOPES OF 3:1 AND GREATER THAN 20 FEET IN LENGTH.
- 7.9. SILT FENCING LOCATED ON THE PERIMETER OF DISTURBED AREAS SHOULD BE CHECKED AT LEAST DAILY, FOLLOWING SIGNIFICANT STORM EVENTS, OR AS NOTED WITHIN PERMITTING DOCUMENTS TO ENSURE IT IS WORKING PROPERLY.
- 7.10. INLET PROTECTION MUST BE INCLUDED AT ALL STORM, SEWER, AND CULVERT LINKS. APPROPRIATE BMP'S INCLUDE ROCK SOCKS, SEDIMENT CONTROL LOGS, OR SIMILAR.
- 7.11. SEDIMENT ENTRAINMENT FACILITIES HAVE BEEN DESIGNED TO STORE THE APPROPRIATE VOLUME OF STORMWATER DISCHARGE, BUT CONTAIN MINIMAL ADDITIONAL CAPACITY. THEY MUST BE MAINTAINED AND DREGDED AS NECESSARY.
- 8. MATERIAL HANDLING
  - 8.1. A LIST OF ALL POTENTIALLY TOXIC OR HAZARDOUS CHEMICALS THAT WILL BE USED OR STORED ON-SITE SHALL BE MAINTAINED WITH THE EROSION CONTROL SUPERVISOR, IF APPLICABLE. WARNING LABELS MUST BE ATTACHED. MATERIAL SAFETY DATA SHEETS (MSDS) AND OTHER SAFETY INFORMATION FOR A POTENTIALLY TOXIC OR HAZARDOUS SUBSTANCE MUST BE ON THE SITE WHILE THE SUBSTANCE IS USED OR STORED.
  - 8.2. THE FOLLOWING MATERIALS MANAGEMENT PRACTICES MUST BE FOLLOWED:
    - 8.2.1. THE QUANTITY OF FUEL AND LUBRICANT AT THE CONSTRUCTION SITE MUST BE MINIMIZED.
    - 8.2.2. STRICT STORAGE PRACTICES (I.E. OFF-SITE STORAGE) ARE PREFERABLE. FUEL, HYDRAULIC OIL, AND FORM OIL MUST BE STORED OFFSITE.
    - 8.2.3. MATERIALS STORED AT THE CONSTRUCTION SITE MUST BE PROPERLY PROTECTED FROM THE ELEMENTS.
    - 8.2.4. MATERIALS MUST BE HANDLED IN ACCORDANCE WITH OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) REQUIREMENTS AND MANUFACTURERS' INSTRUCTIONS.
    - 8.2.5. CHEMICALS REGULATED UNDER THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA) WILL BE DOCUMENTED.
- 9. SPILL REMEDIATION PRACTICES
  - 9.1. ALL CONSTRUCTION SITE PERSONNEL MUST FOLLOW SPILL PREVENTION AND CONTROL PRACTICES AS FOLLOWS:
    - 9.1.1. THE SENIOR PROJECT MANAGER (MATT HOLDEN, 970-375-4813), RWE STAFF (SHANE SIGLE 303-808-7734), DURANGO FIRE AND RESCUE (911), BUREAU OF RECLAMATION (TYLER ARTICHOKEK 970-759-3277), ANIMAS LA PLATA WATER CONSERVANCY OPERATIONS, MAINTENANCE, AND REPLACEMENT ASSOCIATION (970-759-1362), DURANGO WASTEWATER TREATMENT PLANT STAFF (JEFF WHITMAN, 970-375-4895), AND THE WATER QUALITY OFFICER MUST BE CONTACTED IMMEDIATELY FOLLOWING ANY SPILL. THE SENIOR SAFETY MANAGER (OR DESIGNEE) MUST IN TURN REPORT THE SPILL TO THE APPROPRIATE FEDERAL, STATE, OR LOCAL AGENCIES IN ACCORDANCE WITH APPLICABLE REGULATIONS AND/OR PERMIT REQUIREMENTS.
    - 9.2. PERSONNEL WILL WEAR APPROPRIATE PROTECTIVE EQUIPMENT.
    - 9.3. THERE MUST BE A DESIGNATED INDIVIDUAL ON THE SITE TRAINED IN THE APPROPRIATE CLEANUP PROCEDURES FOR VARIOUS TYPES OF CHEMICALS AND THE LOCATION OF INFORMATION AND CLEANUP SUPPLIES.
    - 9.4. THE MSDS OF ANY MATERIAL SHOULD BE CONSULTED ON THE EVENT OF A SPILL. THE MSDS FOR ALL CHEMICALS USED ON THE SITE WILL BE KEPT ON THE SITE, AND WORKERS WILL BE REQUIRED TO REVIEW MSDS'S.
    - 9.5. SPILL KITS MUST BE LOCATED ON-SITE. SUBCONTRACTORS MUST BE NOTIFIED OF THEIR LOCATION AND INSTRUCTED HOW TO USE THEM WHEN NECESSARY.
    - 9.6. SPILLS MUST BE CLEANED UP PROMPTLY AFTER DISCOVERY, AND MATERIALS USED FOR CLEANUP MUST BE DISPOSED OF OFF-SITE AT AN APPROVED FACILITY.
- 10. WORK LIMITS AND LAYDOWN
  - 10.1. WORK LIMITS, ACCESS, STAGING, LAYDOWN, AND STOCKPILE AREAS SHALL BE LOCATED WHERE SHOWN ON THE CONSTRUCTION DRAWINGS OR OTHERWISE AS APPROVED BY THE ENGINEER OR OWNER.
  - 10.2. ALL CONSTRUCTION ACTIVITIES SHALL OCCUR WITHIN CURRENTLY DISTURBED AREAS TO THE EXTENT POSSIBLE.
  - 10.3. DISTURBED/ EXPOSED RIVERBANKS AND STAGING AND PROJECT ACCESS AREAS SHALL BE PROPERLY STABILIZED (SEEDED, MULCHED, OR OTHERWISE) WITH NATIVE VEGETATION IMMEDIATELY AFTER GRADING TO PREVENT EROSION AND ESTABLISHMENT OF INVASIVE PLANT SPECIES.
  - 10.4. CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGE TO VEGETATION OR PROPERTY OUTSIDE THE WORK LIMITS RESULTING FROM CONSTRUCTION OPERATIONS.
  - 10.5. ALL AREAS TEMPORARILY DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION, SLOPES, AND ELEVATIONS, UNLESS OTHERWISE NOTED IN THE CONSTRUCTION DRAWINGS.
- 11. ROCK QUALITY
  - 11.1. INDIVIDUAL STONE BOULDERS SHALL BE DENSE, SOUND AND FREE FROM CRACKS, SEAMS AND OTHER DEFECTS CONDUCIVE TO ACCELERATED WEATHERING.
  - 11.2. AT A MINIMUM EXPOSED ROCK SHOULD HAVE ONE FLAT SURFACE AND THIS SHOULD BE THE ONLY EXPOSED SURFACE.
  - 11.3. THE ROCK SHALL HAVE THE FOLLOWING PROPERTIES:
    - 11.3.1. BULK SPECIFIC GRAVITY (SATURATED SURFACE-DRY BASIS) NOT LESS THAN 2.5.
    - 11.3.2. ABSORPTION NOT MORE THAN 2% BY WEIGHT.
    - 11.3.3. THE BULK SPECIFIC GRAVITY AND ABSORPTION SHALL BE DETERMINED BY ASTM METHOD C-127.
  - 11.4. ROCK THAT FAILS TO MEET THESE REQUIREMENTS MAY BE ACCEPTED ONLY IF SIMILAR ROCK FROM THE SAME SOURCE HAS BEEN DEMONSTRATED TO BE SOUND AFTER FIVE YEARS OR MORE OF SERVICE UNDER CONDITIONS OF WEATHER, WETTING AND DRYING, AND EROSIIVE FORCES SIMILAR TO THOSE ANTICIPATED. ALTERNATIVELY, NATIVE OR IMPORTED STONE, ALREADY AT THE SITE AND MEETING THE STANDARDS OUTLINED ABOVE, MAY BE USED.
  - 11.5. THE ENGINEER RETAINS RIGHT OF REFUSAL FOR ANY ROCK BROUGHT TO THE SITE WHICH IS NOT SUITABLE AND DOES NOT MEET THE ABOVE CRITERIA AND/OR SHOWS EXCESSIVE WEATHERING, CRACKING OR DEFORMATION.

- 11.6. MINIMUM ROCK DIMENSIONS FOR 3', 3.5', 4', AND 4.5' BOULDERS SHALL BE NOTED DIMENSION FOR THREE DIMENSIONS. SEE DRAWINGS FOR SPECIFIC DIMENSIONS.
- 11.7. ALL RIP RAP TO MEET ASTM C-535-69, AASHTO TEST 103 AND HAVE A SPECIFIC GRAVITY OF 2.65. THE ENGINEER TAKES NO RESPONSIBILITY FOR MATERIAL USED NOT MEETING THESE SPECIFICATIONS OR NOT APPROVED ON-SITE BY THE ENGINEER OR OWNER.
- 11.8. ALL RIPRAP AND POOL ARMORING SHALL HAVE THE GRADATIONS AS NOTED IN SECTION 28 OF THE GENERAL NOTES AND THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT (UDFCD) GRADATION TABLE AS PROVIDED IN THE URBAN STORM DRAINAGE CRITERIA MANUAL (2016).
- 12. SITE PREPARATION-ROCK EXCAVATION
  - 12.1. CONTRACTOR SHALL USE SUITABLE EXCAVATION TECHNIQUES THAT INCLUDE HYDRAULIC RIPPER AND HAMMERS, STANDARD BUCKET EXCAVATION, AND HYDRAULIC BREAKERS. NO BLASTING OR EXPLOSIVES MAY BE USED WITHOUT PRIOR APPROVAL.
  - 12.2. SUBGRADE, BASE MATERIAL, AND SURFACE COURSE IS TO BE COMPACTED TO 95% STANDARD PROCTOR WITH A MOISTURE CONTENT WITHIN 2% OF OPTIMAL PER ASTM D1558 AND AASHTO T180.
- 13. SITE PREPARATION- STONES PLACED IN CHANNEL
  - 13.1. NO ROCK PLACEMENT SHALL OCCUR IN CHANNEL UNTIL APPROPRIATE WATER CONTROL MEASURES ARE IN PLACE (AS OUTLINED IN THE DEWATERING PLAN. NO WATER CONTROL IS REQUIRED FOR BOULDER SILLS, DEFLECTORS, HABITAT BOULDER CLUSTERS AND THE UPSTREAM BOULDER SILL.
  - 13.2. EACH STONE SHALL BE PLACED TO THE FINAL POSITION BY SUITABLE EQUIPMENT FOR HANDLING MATERIAL AND, IF NECESSARY, THE STONE SHALL BE PICKED UP AND REPOSITIONED.
  - 13.3. IT SHOULD BE ANTICIPATED THAT RE-HANDLING OF INDIVIDUAL STONES, AFTER INITIAL PLACEMENT WILL BE REQUIRED TO ACHIEVE REQUIRED SLOPES, GRADES, ELEVATIONS AND POSITION.
  - 13.4. THE ENGINEER SHALL OBSERVE AND APPROVE CONTRACTOR'S METHOD FOR STONE PLACEMENT IN A REPRESENTATIVE AREA FOR EACH PROJECT COMPONENT.
- 14. SITE PREPARATION-ROCKS PLACED IN STONE TERRACING
  - 14.1. ALL ROCKS PLACED AS STONE TERRACING MUST BE PLACED WITH FLAT SIDE FACING UP AND BE CLEAN OF ALL SHARP PROTRUSIONS THAT COULD CREATE A SAFETY HAZARD.
  - 14.2. IT SHOULD BE ANTICIPATED THAT RE-HANDLING OF INDIVIDUAL STONES, AFTER INITIAL PLACEMENT WILL BE REQUIRED TO ACHIEVE REQUIRED SLOPES, GRADES, ELEVATIONS AND POSITION.
  - 14.3. ALL PLACED ROCKS MUST BE KEYED IN 12-INCHES IN BOTH THE HORIZONTAL AND VERTICAL DIRECTIONS.
  - 14.4. ALL STONE TERRACING SHALL BE PLACED WITH SUITABLE GEOTEXTILE UNDERLYING THE MATERIAL (IF INCLUDED IN THE DESIGN) AND BACKFILLED WITH CLEAN NATIVE FILL.
  - 14.5. ALL PLACED STONES SHALL BE PLACED ON SUITABLE SUBGRADE APPROVED BY ENGINEER. IF UNSUITABLE SUBGRADE IS EXPERIENCED, CONTRACTOR MUST INCLUDE SUITABLE SUBGRADE MATERIAL SUCH AS ROAD BASE GRAVEL.
- 15. REVEGETATION NOTES
  - 15.1. ANY REVEGETATION OR PLANTING SHALL OCCUR WITHIN THE APPROPRIATE PLANTING WINDOWS AND IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. THIS TIMEFRAME SHOULD NOT EXCEED 14 DAYS AFTER COMPLETION OF FINAL GRADES.
  - 15.2. THE CONTRACTOR SHALL PLANT THE TYPE OF PLANT MATERIAL AND MIX OF SPECIES INDICATED FOR EACH PLANTING ZONE. BOUNDARIES OF PLANTING ZONES AND LOCATIONS OF TREE AND SHRUB PLANTINGS WILL BE MARKED IN THE FIELD UPON COMPLETION OF EARTHWORK BY THE ENGINEER, AND MAY VARY FROM THOSE SHOWN ON THE DRAWING DUE TO ACTUAL SITE CONDITIONS.
  - 15.3. ALL SUITABLE TOPSOIL SHALL BE STOCKPILED DURING CONSTRUCTION AND PLACED WITHIN THE SEEDED AREAS IN MINIMUM 3-INCH DEPTHS.
  - 15.4. CONTRACTOR SHALL MAINTAIN ALL PLANT MATERIAL IN A VIABLE CONDITION UP TO THE TIME OF PLANTING AND SHALL NOT PLANT DEAD, DISEASED, OR DAMAGED PLANTS OR SEEDS.
  - 15.5. NO PLANTING OR SEEDING SHALL OCCUR UNTIL THE AREA HAS BEEN PROPERLY PREPARED AND APPROVED BY THE ENGINEER (INCLUDING SOILS BEING SATURATED AND/OR FLOODED TO APPROPRIATE WATER DEPTHS).
  - 15.6. PLANT MATERIALS SHALL BE INSTALLED USING STANDARD PRACTICES FOR THE TYPE OF MATERIAL.
- 16. SEEDING
  - 16.1. ALL SEEDING SHALL BE COMPLETED BASED THE COLORADO DEPARTMENT OF TRANSPORTATION, EROSION CONTROL AND STORMWATER QUALITY FIELD GUIDE (2011) OR AS NOTED BELOW.
  - 16.2. THE UPPER THREE (3) INCHES (MINIMUM) OF THE AREA TO BE SEEDED SHALL BE IN A LOOSE AND FRIABLE CONDITION SUITABLE FOR SEEDING. IF NECESSARY, AREAS TO BE SEEDED WILL BE TILLED TO RELIEVE COMPACTION PRIOR TO SEEDING. ONCE SEEDING IS COMPLETE, NO MORE THAN 0.5-INCHES OF SOIL MAY BE PLACED OVER THE SEED.
  - 16.3. TONS PER ACRE OF SEED SHALL BE APPLIED IMMEDIATELY AFTER TILLING OR GROUND PREPARATION.
  - 16.4. CONTROL ANY SURFACE FLOW TO ENABLE SEEDING. THE SEED MIXES SPECIFIED SHALL BE BROADCAST SEEDED IN WETLAND PLANTING AND TRANSITION AREAS AND SHALL BE DRILL SEEDED IN OTHER AREAS. SEPARATE SEED BOXES SHALL BE USED AS NEEDED, TO ACCOMMODATE THE SEED SIZES IN THE MIXTURES.
  - 16.5. MULCH SHALL BE CRIMPED OR TACKIFIER APPLIED TO PREVENT MOVEMENT. IF TACKIFIER IS USED, IT SHALL BE "M-BINDER" TACKIFIER APPLIED AT A RATE OF 100 POUNDS PER ACRE.
  - 16.6. THE SEED MIX SHOWN IN SECTION 29 SHALL BE USED FOR ALL DISTURBED AREAS UPLAND OF THE ORDINARY HIGH WATER MARK AS SHOWN ON THE CONSTRUCTION DRAWINGS AND/OR DELINEATED BY RWE REPRESENTATIVE. FAILURE TO USE THIS MIX OR DESIRE TO USE A DIFFERENT MIX REQUIRES SUBMISSION AND APPROVAL BY RWE STAFF.
  - 16.7. THE SEED MIX SHOWN IN SECTION 30 SHALL BE USED FOR ALL DISTURBED AREAS WATERWARD OF THE ORDINARY HIGH WATER MARK AS SHOWN ON THE CONSTRUCTION DRAWINGS AND/OR DELINEATED BY RWE REPRESENTATIVE. FAILURE TO USE THIS MIX OR DESIRE TO USE A DIFFERENT MIX REQUIRES SUBMISSION AND APPROVAL BY RWE STAFF.
- 17. EROSION CONTROL BLANKET
  - 17.1. BLANKET SHALL BE MACHINE PRODUCED MATTING WITH 30 PERCENT COCONUT FIBER AND 70 PERCENT AGRICULTURAL STRAW. THE THICKNESS SHALL BE CONSISTENT AND THE TWO TYPES OF FIBER SHALL BE EVENLY DISTRIBUTED

- THROUGHOUT THE PRODUCT. BOTH SIDES SHALL BE COVERED WITH 100 PERCENT BIODEGRADABLE NATURAL ORGANIC FIBER NETTING. USE OF DIFFERENT TYPES OF BLANKETS SHALL NOT BE USED UNLESS APPROVED BY RWE PERSONNEL. UNDER NO CIRCUMSTANCES SHALL PLASTIC, OR NON-BIODEGRADABLE MATERIALS, BE USED.
- 17.2. MATERIAL REQUIREMENTS:
  - 17.2.1. COCONUT FIBER CONTENT: 30 PERCENT OR 0.15 POUNDS PER SQUARE YARD
  - 17.2.2. STRAW CONTENT: 70 PERCENT OR 0.35 POUNDS PER SQUARE YARD
  - 17.2.3. NETTING: 100 PERCENT BIODEGRADABLE JUTE FIBER (ORGANIC)
  - 17.2.4. BIODEGRADABLE THREAD
  - 17.2.5. ROLL WIDTHS MAY VARY FROM 6.5 TO 8 FEET
  - 17.2.6. ROLL LENGTHS MAY VARY FROM 108 TO 112.5 FEET
  - 17.2.7. ROLL WEIGHT MAY VARY FROM 50 TO 52.22 POUNDS
- 18. WILLOW STAKES
  - 18.1. WILLOW STAKES SHALL BE INSTALLED WITHIN THE WING AREAS OF SANTA RITA STRUCTURE #1 ON THE RIVER LEFT, BOTH SIDES OF THE THREE BOULDER SILLS, AND WITHIN THE FOUR DEFLECTORS.
  - 18.2. THE STAKES SHALL BE PLACED BETWEEN THE ORDINARY LOW WATER MARK AND THE ORDINARY HIGH WATER MARK AS STAKED BY RWE REPRESENTATIVE.
  - 18.3. THE STAKES SHALL BE NURSERY PROVIDED SALIX EXIGUA 'COYOTE WILLOW OR ALTERNATE SPECIES AS APPROVED BY CITY RWE REPRESENTATIVE.
  - 18.4. THE STAKES SHALL BE 36" TO 60" IN LENGTH WITH A STRAIGHT CUT AT THE TOP AND AN ANGLED CUT AT THE BOTTOM. STAKES TO BE INSTALLED WITHIN ONE WEEK AFTER HARVESTING, WHILE IN A DORMANT STATE, WITHIN THAWED GROUND SHOWING SIGNS OF HYDRIC SOIL CHARACTERISTICS.
  - 18.5. STAKES SHALL BE STORED IN WATER. STAKES SHALL BE PLANTED AT A DENSITY OF 18-INCHES TO 24-INCHES ON CENTER.
- 19. WATER CONTROL
  - 19.1. CONTRACTOR SHALL PREPARE A DEWATERING PLAN TO BE APPROVED BY THE ENGINEER OR OWNER PRIOR TO COMMENCEMENT OF ANY DEWATERING ACTIVITIES IF THE PRESENTED ALTERNATIVES ARE NOT USED.
  - 19.2. CONTRACTOR TO FOLLOW GUIDELINES IN THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT, URBAN STORM DRAINAGE CRITERIA MANUAL, SECTION 31 23
  - 19.3. ALL DEWATERING DISCHARGES MUST BE FILTERED TO REMOVE EXCESSIVE SEDIMENTS AND MUST BE DISCHARGED ONTO AN ENERGY-DISSIPATION DEVICE (E.G., PLUNGE POOL, SPLASH PUP, CONCRETE WEIGHT, OR EQUIVALENT) PRIOR TO DISCHARGE INTO ANY SURFACE WATER. FISH OR MUSSELS TRAPPED IN THE DRY AREA MUST BE PROPERLY RELOCATED TO A DOWNSTREAM SECTION OF THE RIVER BY A DESIGNATED/QUALIFIED INDIVIDUAL.
  - 19.4. STEPS SHALL BE EMPLOYED THROUGHOUT THE COURSE OF THE PROJECT TO AVOID THE CREATION OF EXCESSIVE TURBIDITY WHICH MAY DEGRADE WATER QUALITY OR ADVERSELY AFFECT AQUATIC LIFE.
  - 19.5. THE WATERWAY MAY EXPERIENCE FLOODING AND CHANGES IN WATER LEVEL AT ANY TIME. IT IS THE CONTRACTORS RESPONSIBILITY TO MONITOR AND ANTICIPATE CHANGES AND PLAN ACCORDINGLY. ANY DAMAGE, LOSSES, PERMIT CONDITION VIOLATIONS, ETC. AS A RESULT OF FLOODING IN THE WATERWAY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
  - 19.6. PRIOR TO CREATION OF COFFERDAMS OR DIVERTING WATER IN ANY MANNER, THE CONTRACTOR MUST REVIEW ALL RELEVANT PERMIT CONDITIONS AND INFORM THE ENGINEER OF THEIR TIMING, METHODS, AND TECHNIQUES FOR WATER CONTROL.
  - 19.7. UNLESS PRIOR APPROVAL HAS BEEN GRANTED, THE CONTRACTOR MUST ONLY CONSTRUCT AND WORK WITHIN ONE COFFERDAM AT A TIME.
  - 19.8. ANY COFFERDAM FAILURE MUST BE REPORTED TO THE ENGINEER AND/OR OWNER IMMEDIATELY.
- 20. EMERGENCY PLANNING
  - 20.1. CONTRACTOR SHALL CREATE AND HOLD ON FILE AN EMERGENCY ACTION PLAN. THAT PLAN MUST INCLUDE CONTACT NUMBERS FOR ALL UTILITIES LOCATED WITHIN THE PROJECT SITE, IN ADDITION TO PHONE NUMBERS FOR ALL PERMIT AGENCY PROJECT MANAGERS.
  - 20.2. THE ENGINEER AND THE OWNER MUST BE NOTIFIED IMMEDIATELY FOLLOWING AN EMERGENCY SITUATION.
- 21. BOULDER PLACEMENT
  - 21.1. PLACE BOULDERS WITH THE REQUIRED BOULDER HEIGHT VERTICAL, PLACE BOULDERS AS TIGHTLY TOGETHER AS POSSIBLE (WITHOUT TOUCHING) WHILE PROVIDING ENOUGH ROOM BETWEEN THEM TO THOROUGHLY VIBRATE THE GROUT AND TO ENSURE NO GAPS IN THE GROUT.
  - 21.2. BEFORE GROUTING, CLEAN ALL DIRT AND MATERIAL FROM ROCK THAT COULD PREVENT THE GROUT FROM BINDING TO THE ROCK. KEEP BOULDERS FROM TOUCHING. AVOID SLIDING BOULDERS AGAINST SUBGRADE TO PROPERLY POSITION.
  - 21.3. IN THE EVENT OF FREEZING CONDITIONS, ALL BOULDERS MUST BE THAWED PRIOR TO GROUTING.
  - 21.4. ALL REINFORCING STEEL USED WITHIN BOULDERS AND/OR CONCRETE/GROUT SHALL FOLLOW GUIDELINES SET IN THE URBAN DRAINAGE AND FLOOD CONTROL DISTRICT, URBAN STORM DRAINAGE CRITERIA MANUAL, SECTION 03 21 00.
- 22. GROUT/CONCRETE SPECIFICATIONS
  - 22.1. IF NOT NOTED CONTRADICTED BELOW, CONTRACTOR TO FOLLOW URBAN DRAINAGE AND FLOOD CONTROL DISTRICT, URBAN STORM DRAINAGE CRITERIA MANUAL, SECTION 03 60 00.
  - 22.2. ALL GROUT/CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH EQUAL TO 3000 PSI.
  - 22.3. GROUT/CONCRETE SHALL CONSIST OF PORTLAND CEMENT, SAND, AND GRAVEL, THOROUGHLY MIXED WITH WATER TO PRODUCE A THICK, CREAMY CONSISTENCY. THE MINIMUM AMOUNT OF WATER SHOULD BE USED TO PREVENT EXCESS SHRINKAGE OF THE CONCRETE AFTER PLACEMENT AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM SPECIFICATION C150.
  - 22.4. THE WATER CEMENT RATIO SHALL NOT EXCEED 0.48. A STIFFER MIX SHALL BE USED FOR STEEPER APPLICATIONS. AIR ENTRAINMENT SHALL BE USED FOR ALL APPLICATIONS.
  - 22.5. AIR ENTRAINMENT SHALL BE BETWEEN 5.5% AND 7.5%. AIR ENTRAINING AGENTS SHALL CONFORM TO ASTM C260 AND WATER REDUCING AGENTS SHALL CONFORM TO ASTM C494.
  - 22.6. THE AGGREGATE SHALL BE COMPRISED OF 70% NATURAL SAND (FINES) AND 30% 3/8-INCH ROCK (COARSE) AND SHALL CONFORM TO THE REQUIREMENTS OF ASTM C33.
  - 22.7. ONE CUBIC YARD OF GROUT/CONCRETE SHALL HAVE A MINIMUM OF SIX (6) SACKS OF TYPE II PORTLAND CEMENT.
  - 22.8. A MAXIMUM OF 25% TYPE F FLY ASH MAY BE SUBSTITUTED FOR THE PORTLAND



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 File: RWE Durango.dwg

CITY OF DURANGO SANTA RITA PUMP  
 INTAKE RIVER IMPROVEMENTS  
 NOTES AND SPECIFICATIONS  
 LA PLATA COUNTY, DURANGO, COLORADO



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CEMENT.

- 22.9. THE GROUT/CONCRETE SLUMP SHALL BE BETWEEN 4-INCHES TO 11-INCHES.
- 22.10. TO CONTROL SHRINKAGE AND CRACKING, 1.5 POUNDS OF FIBERMESH, OR EQUIVALENT, SHALL BE USED PER CUBIC YARD OF GROUT/CONCRETE.
- 22.11. COLOR ADDITIVE IN REQUIRED AMOUNTS SHALL BE USED AS SPECIFIED BY RWE AND CITY STAFF.
- 22.12. ADMIXTURES: SHALL BE USED FOR ADJUSTING FLOW AND WORKABILITY, AS REQUIRED, AND COULD CONSIST OF WATER-REDUCERS, RETARDERS, PLASTICIZERS, SUPERPLASTICIZERS, OR NONCHLORIDE ACCELERATORS. ALL ADMIXTURES SHALL CONFORM TO THE REQUIREMENTS OF ASTM C494 AND ASTM C1017 AS APPLICABLE.

23. GROUT/CONCRETE PLACEMENT SPECIFICATIONS (PER UDFCD CRITERIA MANUAL, 2016)

- 23.1. SPECIAL PROCEDURES SHALL BE REQUIRED FOR GROUT/CONCRETE PLACEMENT WHEN THE AIR TEMPERATURES ARE LESS THAN 40°F OR GREATER THAN 90°F. CONTRACTOR SHALL OBTAIN PRIOR APPROVAL FROM THE DESIGN ENGINEER OF THE PROCEDURES TO BE USED FOR PROTECTING THE GROUT/CONCRETE. SEE "COLD WEATHER PLACEMENT" SECTION.
- 23.2. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE A MINIMUM OF 48 HOURS PRIOR TO THE PLACEMENT OF CONCRETE OR GROUT. THE OWNER'S REPRESENTATIVE MUST APPROVE THE FORM WORK AND REINFORCEMENT PRIOR TO PLACEMENT OF CONCRETE OR GROUT. FILL LEVELS SHALL BE MARKED ON THE BOULDERS.
- 23.3. GROUT AND CONCRETE SHALL BE DELIVERED BY MEANS OF A LOW PRESSURE (LESS THAN 10 PSI) PUMP USING A 4-INCH DIAMETER (MAXIMUM) NOZZLE.
- 23.4. FULL DEPTH PENETRATION OF THE GROUT INTO THE BOULDER VOIDS SHALL BE ACHIEVED BY INJECTING GROUT STARTING WITH THE NOZZLE NEAR THE BOTTOM AND RAISING IT AS THE GROUT FILLS, WHILE VIBRATING GROUT INTO PLACE USING A PENCIL VIBRATOR.
- 23.5. CONTRACTOR IS REQUIRED TO HAVE AT LEAST ONE BACKUP VIBRATOR AND POWER SOURCE ON-SITE.
- 23.6. ALL GROUT BETWEEN BOULDERS SHALL BE TREATED WITH A BROOM FINISH.
- 23.7. AFTER GROUT/CONCRETE PLACEMENT, EXPOSED BOULDER FACES SHALL BE CLEANED AND FREE OF GROUT/CONCRETE.
- 23.8. ALL EXPOSED GROUT AND CONCRETE TO HAVE A BULL-NOSE OF AT LEAST 1.5" REGARDLESS OF EDGE CONTACT POINT.
- 23.9. WHERE GROUT OR CONCRETE CONTACTS BOULDERS, A 1.5" FILLET IS REQUIRED WITH ALL GROUT CLEANED FROM THE BOULDER SURFACE USING BRUSHES.
- 23.10. ALL FINISHED GROUT OR CONCRETE SURFACES SHALL BE SPRAYED WITH A CLEAR LIQUID MEMBRANE CURING COMPOUND AS SPECIFIED IN ASTM C309.
- 23.11. THE TIME INTERVAL BETWEEN GROUT AND CONCRETE BATCHING, AND PLACEMENT, SHALL BE 90 MINUTES. THIS REQUIREMENT MAY BE WAIVED IF, AFTER 90 MINUTES, THE GROUT OR CONCRETE CAN STILL BE PLACED WITHOUT ADDING WATER (TO REDUCE SLUMP) TO THE BATCH. FIELD PACKS OF WATER REDUCING ADMIXTURES MAY BE ADDED TO THE BATCH TO INCREASE SLUMP/WORKABILITY. MAXIMUM TIME INTERVAL, REGARDLESS OF SLUMP, SHALL BE 180 MINUTES.
- 23.12. IN ANY CASE, GROUT AND CONCRETE SHALL BE CONVEYED FROM THE MIXER TO THE FINAL PLACEMENT AS RAPIDLY AS PRACTICABLE AND MANAGEABLE BY FINISHERS, BY METHODS THAT WILL PREVENT SEGREGATION OF THE AGGREGATES AND/OR LOSS OF CEMENTITIOUS MATERIALS.
- 23.13. GROUT AND CONCRETE MIX SHALL NOT BE ALLOWED TO FREE FALL MORE THAN FIVE (5) FEET UNLESS SUITABLE EQUIPMENT IS USED TO PREVENT SEGREGATION.
- 23.14. THE GROUT AND CONCRETE MIXES SHALL NOT BE PLACED UNTIL THE AFFECTED AREA HAS BEEN INSPECTED AND APPROVED BY THE DESIGNER FOR PLACEMENT.
- 23.15. CONCRETE WITHIN THE LOW FLOW AREA IS TO BE BROOM FINISHED.
- 23.16. THE CONTRACTOR IS REQUIRED TO FINISH ALL GROUT AND CONCRETE INTERFACING WITH BOULDER, WITHIN THE INSTREAM STRUCTURES AND TERRACING, USING THE FOLLOWING TECHNIQUE:

- 23.16.1. FOLLOWING INITIAL PLACEMENT, A TROWEL WILL BE USED TO REMOVE ALL SPILLED, SPLATTERED, AND DUMPED MATERIAL FROM ROCK FACES AND EXPOSED SURFACES.
- 23.16.2. ONCE THE MATERIAL HAS BEEN REMOVED BY A TROWEL, ALL SURFACES ARE TO BE TROWEL FINISHED AND SMOOTHED.
- 23.17. FOLLOWING TROWEL WORK, WET BROOMS AND BRUSHES ARE TO BE USED IN COMBINATION WITH BUCKETS OF WATER TO CLEAN ALL EXPOSED SURFACES AND TRANSITIONS FROM ROCK TO GROUT/CONCRETE WITH THE INTENTION OF MAKING THE GROUT/CONCRETE BLEND WITH THE ENVIRONMENT.
- 23.18. FOLLOWING COMPLETION OF PLACEMENT, THE WORK AREA SHOULD BE FLOODED TO ENSURE OPTIMAL CURING. THE WORK AREA SHALL BE ISOLATED TO ENSURE THERE IS NO CONTACT WITH THE LIVE RIVER. THE STATIC WATER LEVEL IN THE WORK AREA SHOULD EQUAL THE WATER LEVEL IN THE LIVE RIVER.
- 23.19. THE STRUCTURE SHALL BE LEFT AS NOTED IN 22.17 FOR A MINIMUM OF 24 HOURS BEFORE CONTACT WITH THE LIVE RIVER MAY OCCUR. APPROVAL MUST BE GAINED FROM RWE REPRESENTATIVE PRIOR TO BREACHING OF THE COFFERDAM AND EXPOSING GROUT OR CONCRETE TO THE LIVE RIVER. STANDARD PRACTICES FOR CURINGS, AS NOTED IN ACI STANDARD 308.1 SHALL BE FOLLOWED.

24. PRODUCT OPTIMIZATION

- 24.1. FOLLOWING COMPLETION OF SANTA RITA STRUCTURE #1 AND PRIOR TO THE COMPLETE REMOVAL OF THE COFFER DAM, THE COFFERDAM SHALL BE BREACHED TO ALLOW >80% OF TOTAL FLOW TO INUNDATE THE LOW FLOW PORTION OF THE STRUCTURE. THE ENGINEER WILL PRODUCT TEST AT THAT TIME. THE COFFERDAM WILL THEN BE CLOSED AND MODIFICATIONS WILL BE REQUESTED BY THE ENGINEER. THE CONTRACTOR SHOULD ANTICIPATE THE ADDITION OR SUBTRACTION OF UP TO 10 CUBIC YARDS OF MATERIAL AT THIS TIME.
- 24.2. BOULDER SILL #1 AND THE POOL ARMORING BELOW THE STRUCTURE MUST BE COMPLETED PRIOR TO PRODUCT TESTING.

25. COLD WEATHER PLACEMENT

- 25.1. CONTRACTOR MUST FOLLOW RECOMMENDATIONS SET IN THE AMERICAN CONCRETE INSTITUTE COMMITTEE 306 (ACI 306R-88). WHEN PLACING CONCRETE AFTER THE FIRST FROST OR WHEN THE MEAN DAILY TEMPERATURES ARE BELOW 40° F.
- 25.2. HEAT AGGREGATES AND WATER IN ORDER TO PLACE GROUT/CONCRETE AT TEMPERATURES BETWEEN 50° F AND 80° F.
- 25.3. PLACING OF CONCRETE MAY BEGIN IN MORNING, BUT SHALL BE DISCONTINUED AT 3:00 PM OF SAME DAY IF FREEZING WEATHER THREATENS.
- 25.4. AFTER CONCRETE IS PLACED, PROVIDE SUFFICIENT PROTECTION SUCH AS COVER, CANVAS, FRAMEWORK, HEATING APPARATUS, ETC., TO ENCLOSE AND PROTECT GROUT/CONCRETE AND MAINTAIN TEMPERATURE OF 70° F FOR 3 DAYS OR 50° F FOR 5 DAYS AFTER PLACING.
- 25.5. IF FLAKING OR SPAWLING IS FOUND, THAT PORTION OF THE CONCRETE DID NOT APPROPRIATELY CURE AND WILL BE RE-DONE AT THE EXPENSE OF THE CONTRACTOR.
- 25.6. IF IN THE OPINION OF ENGINEER OR OWNER, PROTECTION IS NOT ADEQUATE, CEASE PLACEMENT UNTIL CONDITIONS OR PROCEDURES ARE SATISFACTORY TO

OWNER'S REPRESENTATIVE.

26. INSPECTING AND TESTING FRESH GROUT/CONCRETE

- 26.1. THE ENGINEER SHALL HAVE FREE ACCESS TO ALL PARTS OF THE CONTRACTOR'S PLANT AND EQUIPMENT UTILIZED FOR MIXING AND PLACING GROUT/CONCRETE DURING THE PERIOD OF THE CONTRACT. PROPER FACILITIES SHALL BE PROVIDED FOR THE ENGINEER TO SAMPLE MATERIALS AND VIEW PROCESSES IMPLEMENTED IN THE MIXING AND PLACING OF GROUT/CONCRETE AS WELL AS FOR SECURING GROUT/CONCRETE TEST SAMPLES. ALL TESTS AND INSPECTIONS SHALL BE SO CONDUCTED AS A MINIMUM OF INTERFERENCE TO THE CONTRACTOR'S OPERATION OCCURS.
- 26.2. GROUT/CONCRETE SHALL BE TESTED FOR SLUMP, TEMPERATURE, AIR ENTRAINMENT, 7 AND 28 DAY STRENGTH BY A TESTING LABORATORY OPERATED UNDER THE DIRECTION OF A PROFESSIONAL ENGINEER. TESTING SERVICES SHALL BE PROVIDED BY THE CITY.
- 26.3. FOR READY-MIXED GROUT/CONCRETE, THE CONTRACTOR SHALL FURNISH TO THE ENGINEER A STATEMENT OF DELIVERY TICKET FOR EACH BATCH DELIVERED TO THE SITE. THE TICKET SHALL PROVIDE AS A MINIMUM, WEIGHTS IN POUNDS OF CEMENT, AGGREGATES (FINE AND COARSE), WATER, WEIGHT IN OUNCES OF AIR-ENTRAINING AGENT, TIME OF LOADING, AND, THE REVOLUTION COUNTER READING AT THE TIME BATCHING WAS STARTED.

27. OTHER

- 27.1. IN THE EVENT AN ITEM IS NOT COVERED IN THE SPECIFICATIONS, THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE AND THEY MUST APPROVE ANY ADDITIONS OR MODIFICATIONS TO THE SPECIFICATIONS IN WRITING PRIOR TO COMPLETION OF THE WORK.
- 27.2. ALL WASTE MATERIAL AND/OR EXCESS EXCAVATION NOT USED AS PART OF THE WORK SHALL BE REMOVED FROM THE JOB SITE AND DISPOSED OF AT ACCEPTABLE LOCATIONS IN ACCORDANCE WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
- 27.3. THE CONTRACTOR SHALL SUBMIT TRAFFIC CONTROL PLAN FOR REVIEW AND APPROVAL PRIOR TO MOBILIZATION ON SITE, AND AT ALL TIMES DURING CONSTRUCTION SHALL PROVIDE WARNING SIGNS, BARRICADES, AND OTHER SAFETY DEVICES (INCLUDING TEMPORARY FENCING AROUND THE JOB SITE) TO PROTECT PUBLIC SAFETY AND HEALTH IN COMPLIANCE WITH THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES. CONTRACTOR IS RESPONSIBLE FOR SITE SAFETY AND TRAFFIC CONTROL RELATIVE TO PARK USERS AND USERS OF THE RIVER TRAIL, IN ADDITION TO INSTREAM USERS. CONTRACTOR TO FOLLOW PROTOCOL FOR RIVER USERS AS SPECIFIED BY THE CITY OF DURANGO AND RWE.
- 27.4. ALL EXISTING TOPOGRAPHIC SURVEY DATA SHOWN ON THESE PLANS HAS BEEN OBTAINED AND CERTIFIED BY MOUNTAIN MAN SURVEYING.
- 27.5. THE CONTRACTOR SHALL CONFINE HIS OPERATIONS TO THE CONSTRUCTION LIMITS OF THE PROJECT AND IN NO WAY SHALL ENCROACHMENT OCCUR ONTO ADJACENT PROPERTIES UNLESS LEGAL EASEMENTS ARE OBTAINED. ALL FILL AND CUT SLOPES SHALL BE SETBACK FROM THE PROPERTY LINE IN ACCORDANCE WITH CHAPTER 70 OF THE UNIFORM BUILDING CODE. THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR ANY AGREEMENTS NECESSARY OR DAMAGE CAUSED BY CONSTRUCTION ACTIVITIES TO PUBLIC OR PRIVATE PROPERTY, INCLUDING UTILITIES.
- 27.6. THE CONTRACTOR IS RESPONSIBLE FOR PROTECTING ALL EXISTING INFRASTRUCTURE. ANY DAMAGE IS THE RESPONSIBILITY OF THE CONTRACTOR.
- 27.7. CONTRACTOR IS REQUIRED TO USE THE DESIGNATED RIVER ACCESS POINT. NO OTHER ACCESS POINTS MAY BE USED.
- 27.8. CONTRACTOR IS REQUIRED TO USE THE DESIGNATED STAGING AREA. NO OTHER STAGING AREAS MAY BE USED.

28. GRADATION TABLE

Riprap Designation	% Smaller Than Given Size By Weight	Intermediate Rock Dimension (Inches)	d <sub>50</sub> * (Inches)
Type VL	70 - 100	12	6**
	50 - 70	9	
	35 - 50	6	
	2 - 10	2	
Type L	70 - 100	15	9**
	50 - 70	12	
	35 - 50	9	
	2 - 10	3	
Type M	70 - 100	21	12**
	50 - 70	18	
	35 - 50	12	
	2 - 10	4	
Type H	70 - 100	30	18
	50 - 70	24	
	35 - 50	18	
	2 - 10	6	
Type VH	70 - 100	41	24
	50 - 70	33	
	35 - 50	24	
	2 - 10	9	

\*d<sub>50</sub> = Mean Particle Size  
 \*\*Mix VL, L and M riprap with 35% topsoil (by volume) and bury it with 4 to 6 inches of topsoil, all vibration compacted, and revegetate.

29. UPLAND SEED MIX

Upland Seed Mix	Common Name	Botanic Name	PLS
	Arriba Western Wheatgrass	Pascopyrum smith 'Arriba'	4
	Pubescent Luna Wheatgrass	Thinopyrum intermediums sp.Barulatum	3.5
	Indian Ricegrass 'Rimrock'	Achnatherum hymenoides	1.5
	Tall Fescue	Festuca arundinacea	1
	Garnet Mountain Brome	Bromus marginatus	3.5
	Blue Flax	Linum lewisii	1
	Lovington Blue Grama	Bouteloua gracilis 'Lovington'	1
	Gulf (Lonestar) Annual Rye	Lolium perenne ssp.Multiflorum	3.5
	AntelopeBitter-Purshia	Purshia tridentata	0.125
	Saltbrush-Fourwing	Atriplex canescens	0.375
	Small Burnet-Delar	Sanguisorba minor	0.75
	Blue Wildrye	Elymus glaucus	2.75
	Ryegrass,Wild Russian Bozoiisky	Psathyrostachys juncea	1.5
	<b>TOTAL</b>		<b>24.5 lbs/acre</b>

30. WATERWARD SEED MIX

Waterward Seed Mix	Common Name	Botanic Name	PLS
	Redtop	Agrostis alba	1
	Tufted hairgrass	Deschampsia cespitosa	1
	Switchgrass	Panicum virgatum	3
	Fowl Bluegrass	Poa palustris	2
	Common Spikerush	Eleocharis palustris	0.5
	Sodar* Streambank	"Sodar" Elymus lanceolatus	2
	<b>TOTAL</b>		<b>9.5 lbs/acre</b>

\*Seeding rate based on 100 pure live seeds (PLS) per square foot, broadcast or drill-seeded. The seeding application rate shall be doubled for hand broadcast application.



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Date: JAN 25, 2016  
 County: LA PLATA COUNTY  
 Client: CITY OF DURANGO  
 File: RWE Durango.dwg

CITY OF DURANGO SANTA RITA PUMP  
 INTAKE RIVER IMPROVEMENTS  
 NOTES AND SPECIFICATIONS (2)  
 LA PLATA COUNTY, DURANGO, COLORADO



Sheet reference  
**S-13**  
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