

CHAMBERS DAM & RESERVOIR PROJECT
WATER DIVISION NO. 1, WATER DISTRICT 8
DOUGLAS COUNTY, COLORADO

CERTIFICATION:

I HEREBY CERTIFY THAT THESE PLANS FOR THE CHAMBERS DAM & RESERVOIR PROJECT WERE PREPARED UNDER MY DIRECT SUPERVISION FOR THE OWNERS THERE OF.

BY: BRAD L. HAGEN, P.E. DATE: 10-28-10
COLORADO, P.E. #32982



THE UNITED WATER AND SANITATION DISTRICT DOES HEREBY ACCEPT AND APPROVE THESE PLANS FOR THE CONSTRUCTION OF THE CHAMBERS DAM & RESERVOIR PROJECT.

BY: ANDREW R. DAMIANO, PROJECT ANALYST DATE: 10-28-10
UNITED WATER AND SANITATION DISTRICT

APPROVAL:

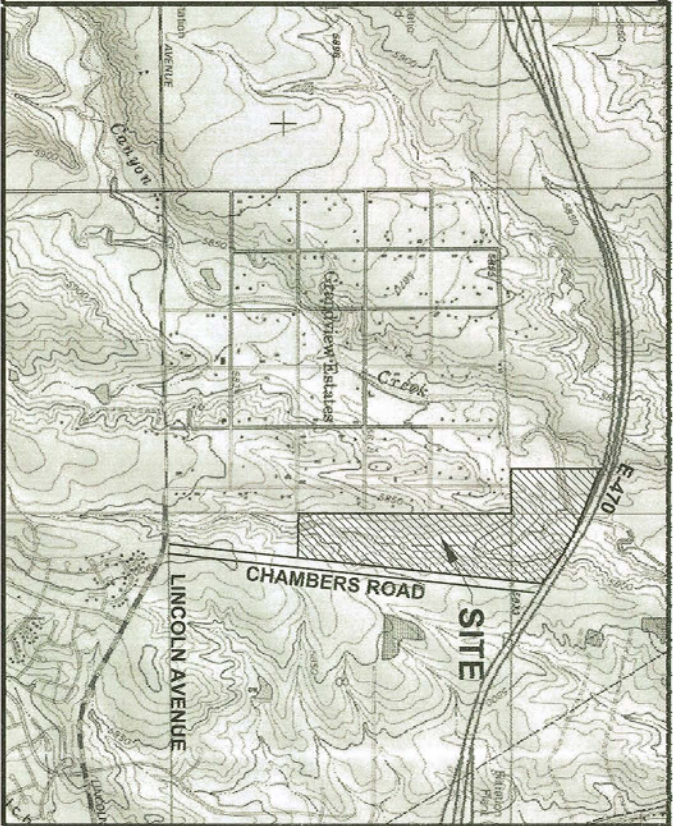
APPROVED ON THE 26th DAY OF OCTOBER, 2010

BY: DICK WOLFE
STATE ENGINEER

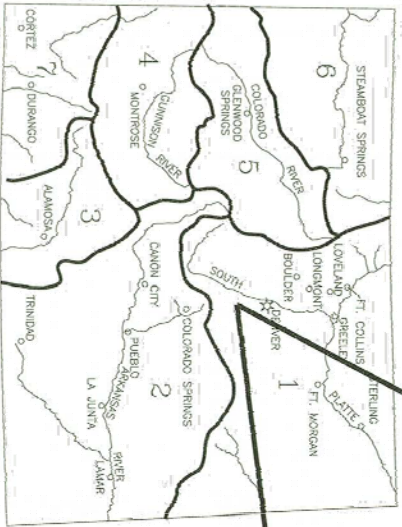


BY: BRAD L. HAGEN, P.E.
DIRECTOR OF DAMS PROGRAM
UNITED WATER AND SANITATION DISTRICT
THESE PLANS REPRESENT THE AS CONSTRUCTED CONDITIONS OF THE CHAMBERS DAM & RESERVOIR PROJECT TO THE BEST OF OUR KNOWLEDGE AND JUDGMENT. BASED IN PART ON THE INFORMATION FURNISHED BY OTHERS AS OF THE 20 DAY 20

BY: BRAD L. HAGEN, P.E.
COLORADO, P.E. #32982



PROJECT VICINITY MAP



STATE OF COLORADO
PROJECT LOCATION MAP

SCALE: NONE

PREPARED FOR:

UNITED WATER AND SANITATION DISTRICT
8301 EAST PRENTICE AVENUE, SUITE 100
GREENWOOD VILLAGE, CO 80111

PREPARED BY:

CIVIL RESOURCES, LLC
353 Fifth Street P.O. Box 680
Frederick, CO 80530
303 833 1416 (p) 303 833 2850 (f)



SEO FILE NO. C-1967		
NO.	REVISIONS	
DESCRIPTION	DATE	BY

C-1967

SHEET NO. DRAWING NO.

NOTE: SHEET NUMBER WITH "A" IS AS-BUILT SHEET UNLESS REVISION CLOUD REPORTS OTHERWISE ON ORIGINAL CONSTRUCTION PLANS.

1. ALTA SURVEY PREPARED BY SURVEY SYSTEMS, INC., OF EVERGREEN, COLORADO (303-679-8122), DATED 11/9/10.
2. CONTROL DATUM: VERTICAL: NAVD 88
HORIZONTAL: NAD 83 (2007)
3. SITE EROSION CONTROL DURING PROJECT CONSTRUCTION SHALL CONFORM TO THE APPROVED GRADING AND EROSION CONTROL PLAN. THE CONTRACTOR SHALL HAVE A COPY OF THE GRADING AND EROSION CONTROL PLAN ON-SITE DURING CONSTRUCTION.

GENERAL:

- COMMENCING BACKFILL.

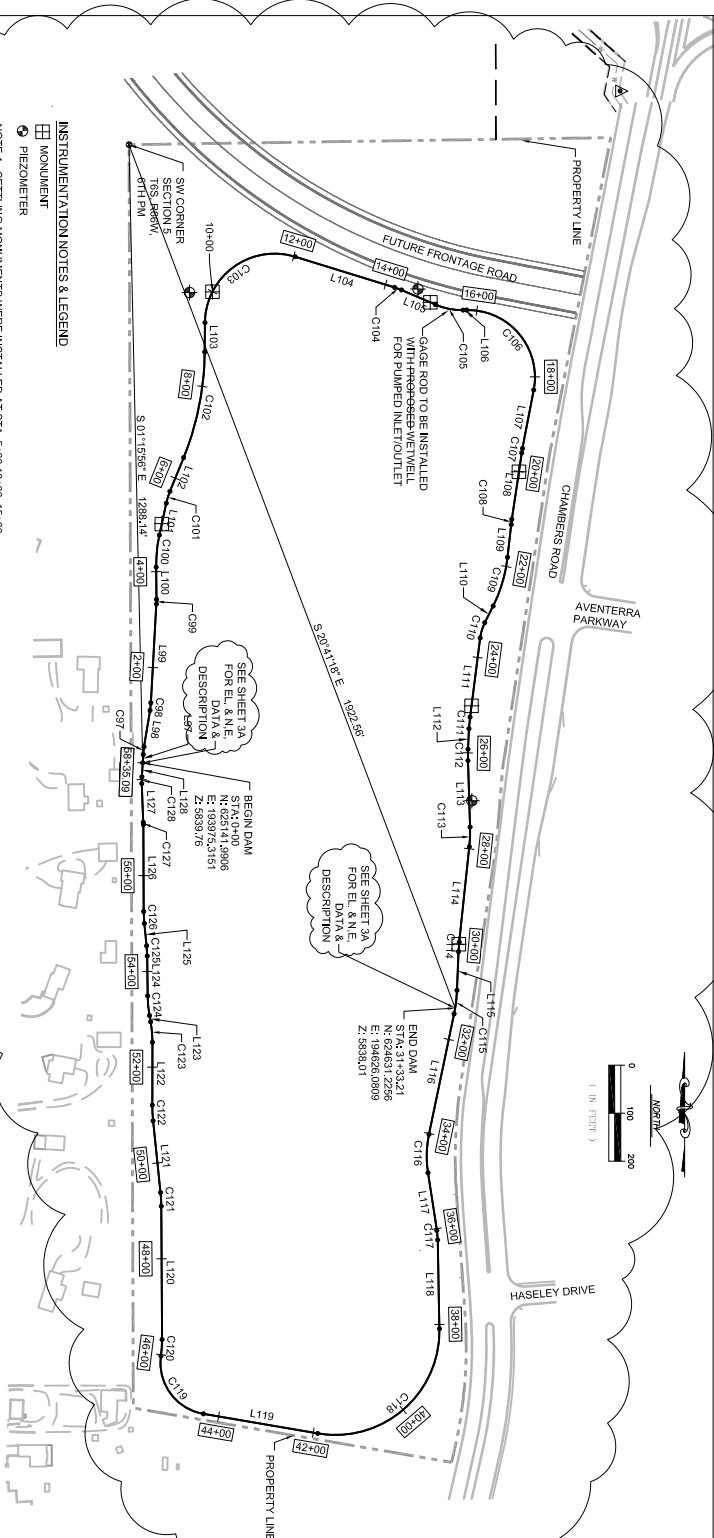
PROPERTY LINE

OVERHEAD UTILITY LINES
GEOLOGIC BORING
FLARED END SECTION
EXISTING TREES

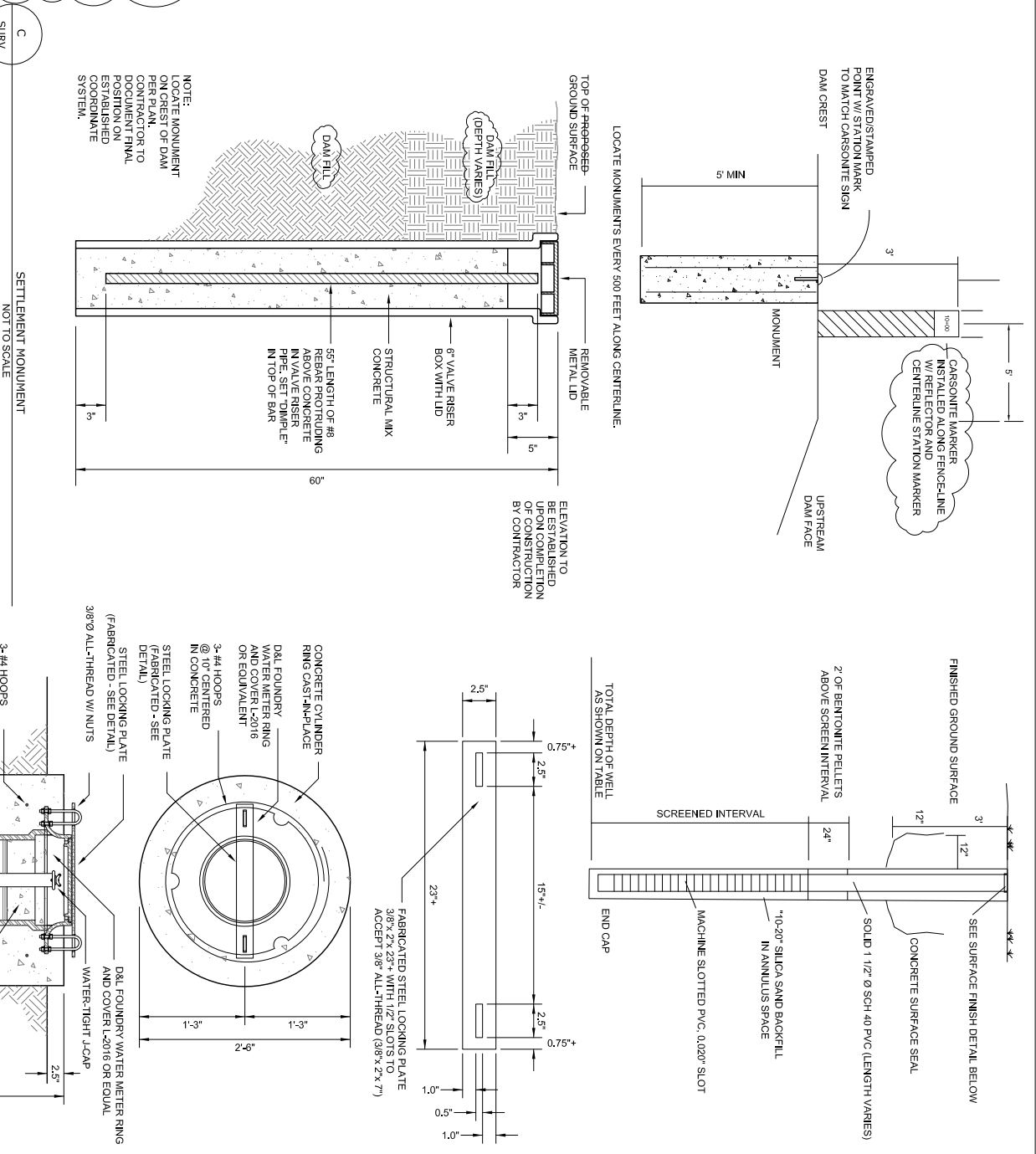
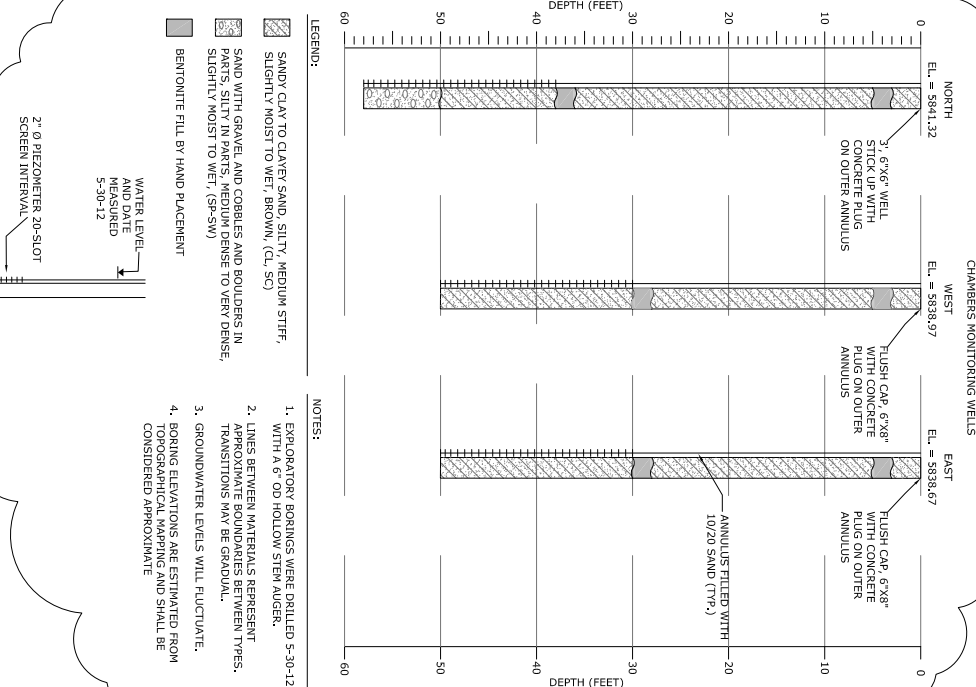
-DRAWING NUMBER WHERE DETAIL IS SHOWN



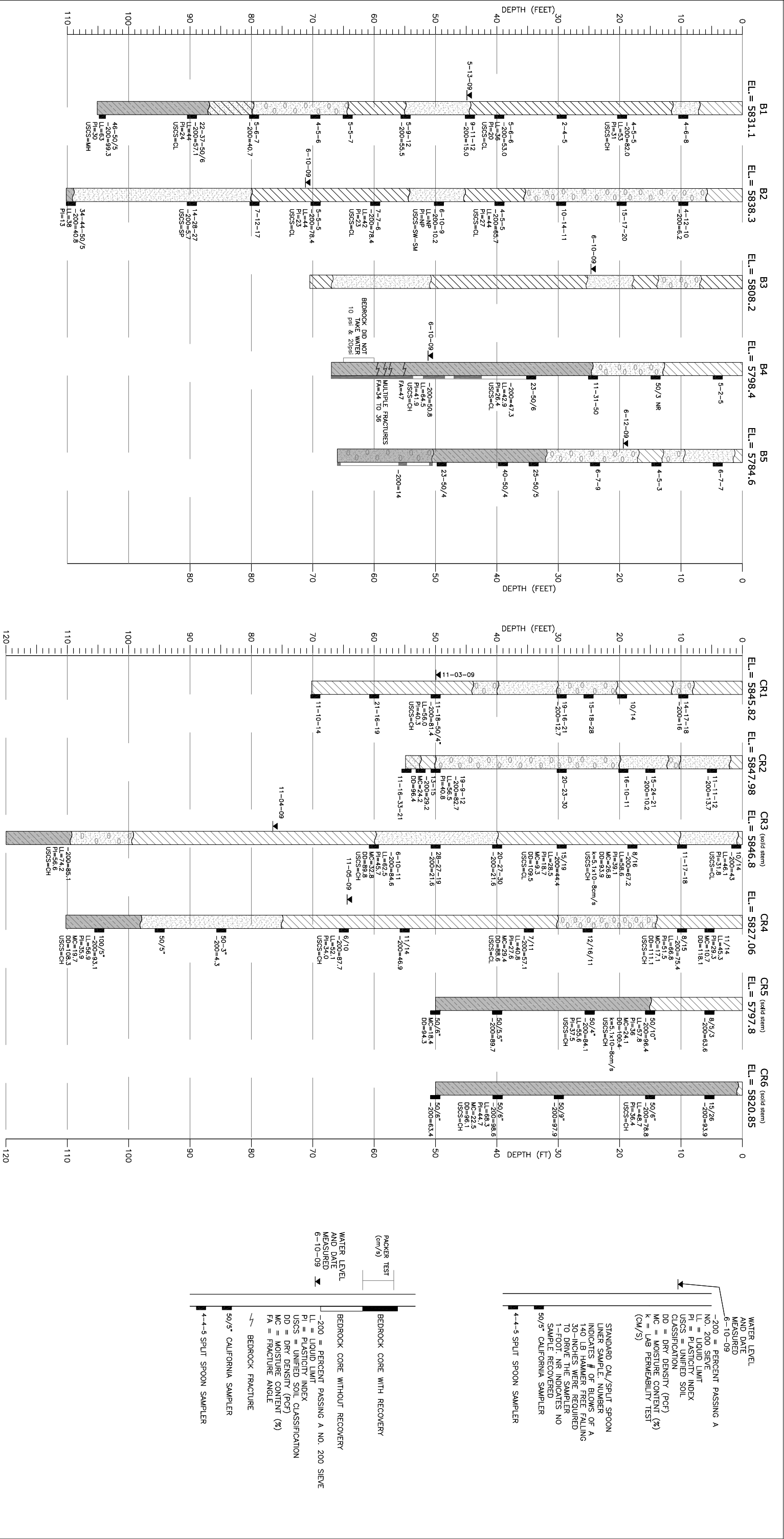
UNITED WATER AND SANITATION DISTRICT
CHAMBERS DAM & RESERVOIR
LEGEND & GENERAL NOTES



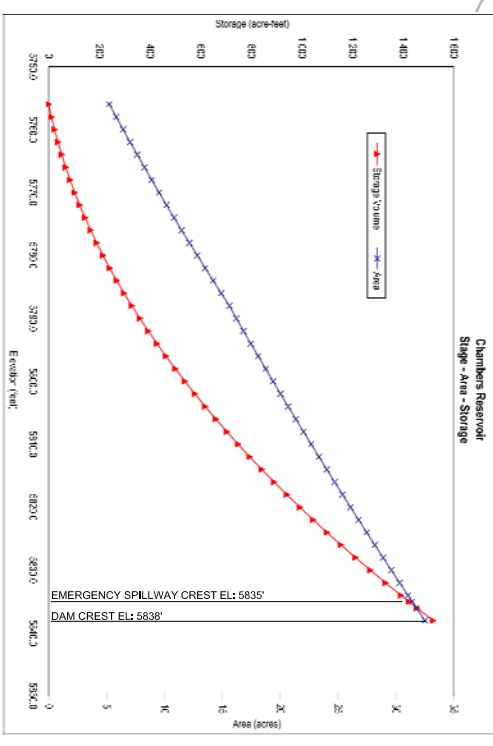
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Dc1	1746	N5°12'24.9"E			Dc17	1368.12	S°15'01.3"E		
Dc1	16.19	N6°17'55.27"E	16.19	150.00	Dc17	41.23	S2°56'13.1"W	41.20	300.00
Dc2	7660	N8°23'28.97"E			Dc18	2001.14	S6°02'28.91"W		
Dc2	16.19	N6°17'55.27"E	16.19	150.00	Dc18	194.3	S4°11'07.1"W	194.3	360.00
Dc3	205.82	N12'21.29"E			Dc19	80.94	S2°19'46.97"W		
Dc3	10.09	N1°16'46.29"E	10.08	150.00	Dc19	48.27	S7°02'05.97"W	48.22	300.00
Dc4	66.91	N0°38'48.79"W			Dc20	258.51	S1°44'24.17"W		
Dc4	67.23	N0°46'24.87"E	67.09	300.00	Dc20	80.42	S1°30'00.97"W	80.00	225.00
Dc5	68.08	N12°11'37.97"E			Dc21	12.63	S8°44'22.25"E		
Dc5	25.86	N1°07'05.60"E	25.85	150.00	Dc21	19.97	S4°55'34.97"E	19.95	150.00
Dc6	75.63	N22°04'15.40"E			Dc22	184.90	S1°06'46.30"E		
Dc6	225.90	N11°17'05.39"E	224.57	600.00	Dc22	38.19	S4°9'18.291"W	334.50	217.00
Dc7	60.91	N0°29'55.32"E			Dc23	241.39	N86°16'15.28"W		
Dc7	269.65	N55°46'48.87"E	232.56	145.00	Dc23	165.20	N36°14'46.99"E	149.42	107.50
Dc8	216.94	S7°52'17.59"E			Dc24	34.29	N3°43'37.90"E	34.26	242.50
Dc8	15.16	S86°46'10.11"E	15.15	140.00	Dc24	277.73	N0°19'25.97"W		
Dc9	77.10	S66°40'02.89"E			Dc25	28.82	N3°08'48.95"W	28.81	292.50
Dc9	59.14	S76°48'00.31"E	56.70	140.00	Dc25	150.02	N5°58'10.42"W		
Dc10	7.50	N86°07'44.00"E			Dc26	32.75	N2°55'07.69"W	32.73	307.50
Dc10	246.82	S39°59'44.20"E	217.22	140.00	Dc26	12.91	N0°07'54.98"E		
Dc11	124.17	S10°52'47.41"W			Dc27	42.80	N4°54'02.13"W	42.85	242.50
Dc11	9.34	S9°38'50.73"W	9.33	217.00	Dc27	13.36	N9°56'00.12"W		
Dc12	140.04	S8°24'54.05"W			Dc28	41.36	N5°19'56.97"W	41.31	297.50
Dc12	11.05	S7°21'34.07"W	11.05	300.00	Dc28	82.95	N0°43'53.09"W		
Dc13	68.45	S8°18'45.14"W			Dc29	21.43	N3°15'45.65"W	21.42	242.50
Dc13	106.46	S16°28'13.65"W	105.50	300.00	Dc29	46.77	N6°47'38.24"W		
Dc14	33.70	S26°38'12.16"W			Dc30	24.83	N3°01'52.84"W	24.82	297.50
Dc14	34.75	S16°56'03.16"W	33.69	100.00	Dc30	16.31	N0°16'07.41"W		
Dc15	166.12	S7°17'54.15"W			Dc31	4.63	N1°11'27.46"W	4.63	150.00
Dc16	24.12	S4°59'42.31"W	24.11	300.00	Dc31	80.82	N2°06'47.31"W		
Dc16	42.86	S2°41'30.48"W			Dc32	13.93	N0°32'46.97"E	13.92	150.00
Dc16	23.70	S0°25'44.57"W	23.69	300.00	Dc32	29.19	N3°12'21.97"E		



SHP FILE NO.		C-1962		UNITED WATER AND SANITATION DISTRICT			
REVISIONS				CHAMBERS DAM & RESERVOIR			
DESCRIPTION				SURVEY CONTROL & INSTRUMENTATION PLAN			
NO.	DATE	BY					
1	08/10	LRS					
2	06/12	LRS					
SHEET COMMENTS							
CIVIL RESOURCES, LLC				323 Ray Street P.O. Box 4000 Frederick, CO 80550 303.833.1415 (T) 303.833.2850 (F)			
DESIGNED BY:		LRS		DATE:		JUN 2010	
DRAWN BY:		LRS		SCALE:		AS NOTED	
CHECKED BY:		BLH		JOB NO.		DWG:	
				SHEET:		3	

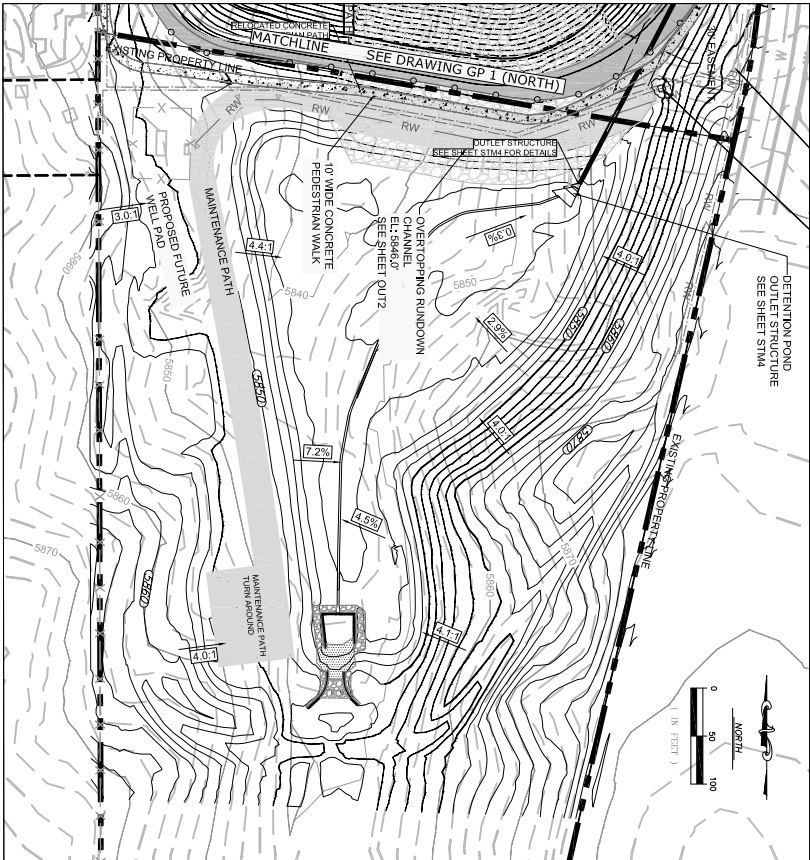


REVISED			UNITED WATER AND SANITATION DISTRICT		
NO.	DESCRIPTION	DATE	BY	CHAMBERS DAM & RESERVOIR	
1	SEO COMMENTS	08/10	LSJ	GEOLOGIC LOGS	
DESIGNED BY:			LSJ	323 5th Street	
DRAWN BY:			LSJ	P.O. Box 680, Frederick, CO 80530	
CHECKED BY:			LSJ	303 833 1416 (O) 303 833 2850 (T)	
			SCALE: AS NOTED	208 NO. 10th St. - GEO	
				SHEET: 5	



550 BLUE NO.		C-1967				UNITED WATER AND SANITATION DISTRICT	
REVISIONS						CHAMBERS DAM & RESERVOIR	
NO.	DESCRIPTION	DATE	BY			RESERVOIR GRADING PLAN	
1	FEED COMMENTS	8/10	AS				
2	REV. SPLITWAY	10/10	AS				
				CIVIL RESOURCES, LLC 323 S 5TH STREET P.O. BOX 6607 FREDERICK, CO 80530 303.843.6426 (F) 303.833.2850 (T)			
DESIGNED BY:		LJS		DATE:		JAN 2010	
DRAWN BY:				SCALE:		AS NOTED	
CHECKED BY:		JBL		SHEET:		6	





S&B FILE NO.		C-1967		REVISIONS	
NO.		DESCRIPTION		DATE	BY
1		S&B COMMENTS		08/10	LRS
2				5/12	AKR
CIVIL RESOURCES, LLC					
DESIGNED BY:		LRS			
DRAWN BY:		LRS			
CHECKED BY:		BLH			
DATE:		JAN 2010			
SCALE:		AS NOTED			
SHEET:		7A			

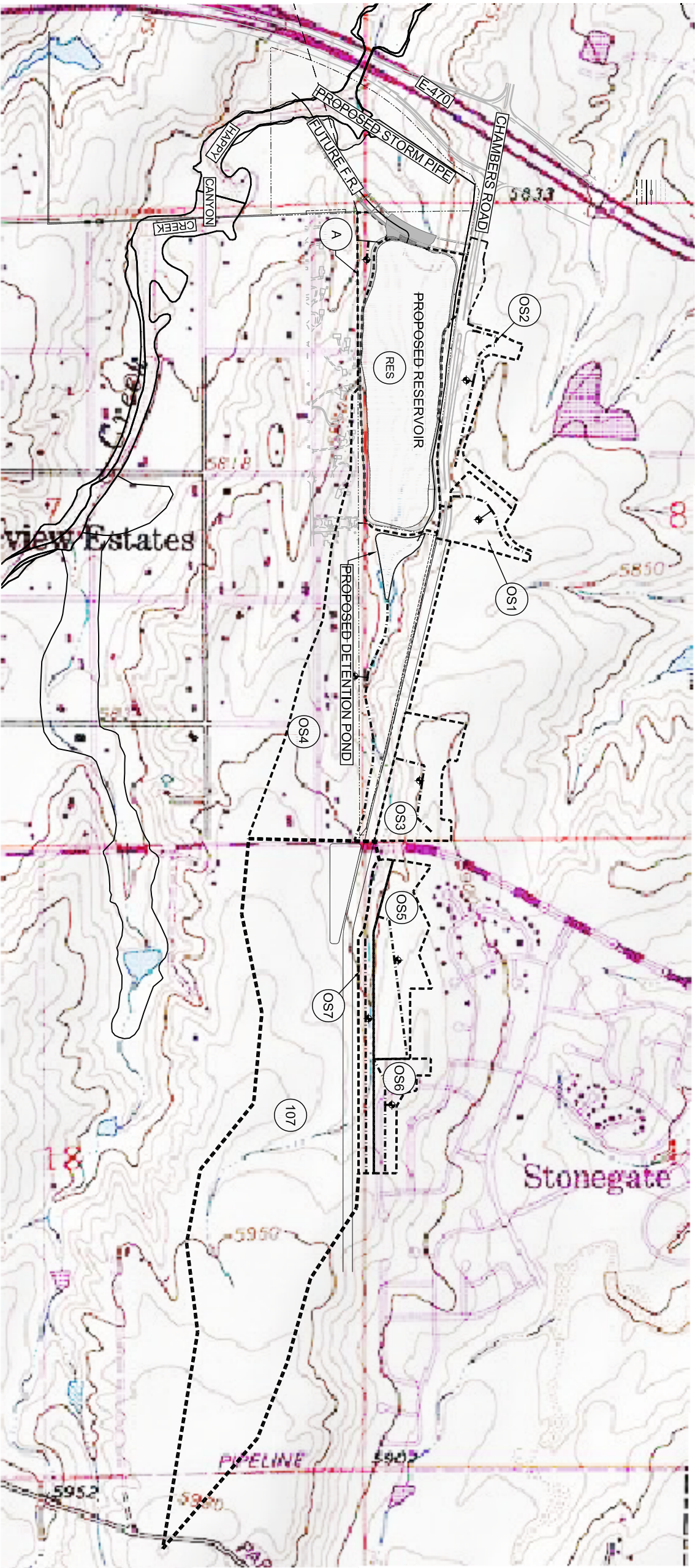


Table 1										
Chambers Reservoir										
Subsidiary and Channel Properties										
Subsidiary ID	Conveyance Element	Area (m2)	Flow length (L) (m)	Distance to Caninoid (Lc) (m)	Slope (ft/m)	Manning's n	Percent Impermeableness (%)	Side Slope (H:V)	Bottom Width (ft)	Notes
A	-	0.0064	0.0367	0.0477	1156.0000	-	6.00	-	-	Not tributary to reservoir
RES	-	0.0590	0.0000	0.0000	-	-	100.00	-	-	Direct Precipitation
CS1	-	0.0166	0.1700	0.1000	106	-	66.00	-	-	
CS2	-	0.0258	0.2700	0.1400	106	-	70.00	-	-	
CS3	-	0.0195	0.1644	0.0773	106	-	74.00	-	-	
CS4	-	0.1331	0.5652	0.2787	82.0000	-	6.00	-	-	
CS5	-	0.0216	0.2372	0.0896	58.0000	-	60.00	-	-	
CS6	-	0.0092	0.1847	0.0890	53.0000	-	60.00	-	-	
CS7	-	0.0121	0.3775	0.1334	58.0000	-	5.00	-	-	
BSN107	-	0.2325	1.3400	0.5770	84.4000	0.0600	60.00	-	-	Tributary to Ex Detention Pond
-	CH1	-	0.5000	-	216.9000	0.0600	-	20.0000	90.0	

560 FILE NO.				C-1967			
REVISIONS							
NO.				DESCRIPTION			
DATE				BY			
UNITED WATER AND SANITATION DISTRICT							
CHAMBERS DAM & RESERVOIR							
OVERALL DRAINAGE PLAN							
323 5th Street P.O. Box 680 Greeley, CO 80639 303 833 1416 (P) 303 833 2850 (T)							
CIVIL RESOURCES, LLC							
DESIGNED BY:		AJR		JDN		DWG	
DRAWN BY:		AJR		PIN		RPN	
CHECKED BY:		BLL		SCALE:		AS NOTED	
				SHEET:		8	

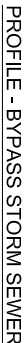
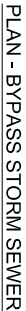
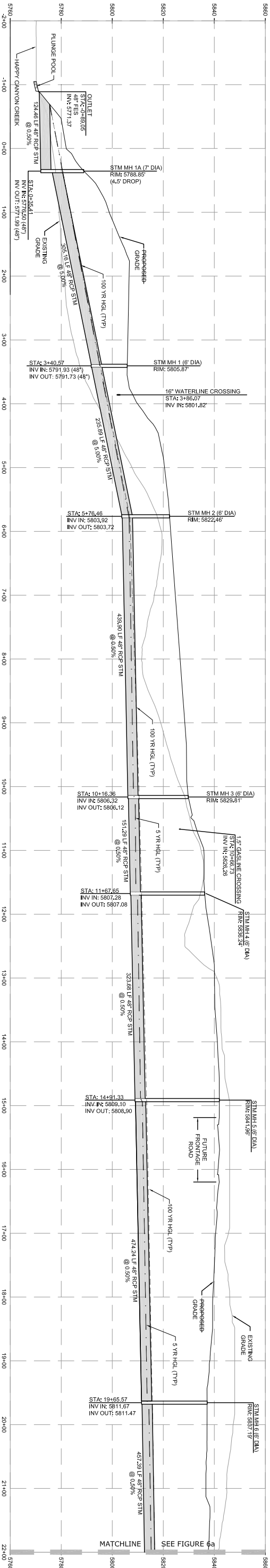
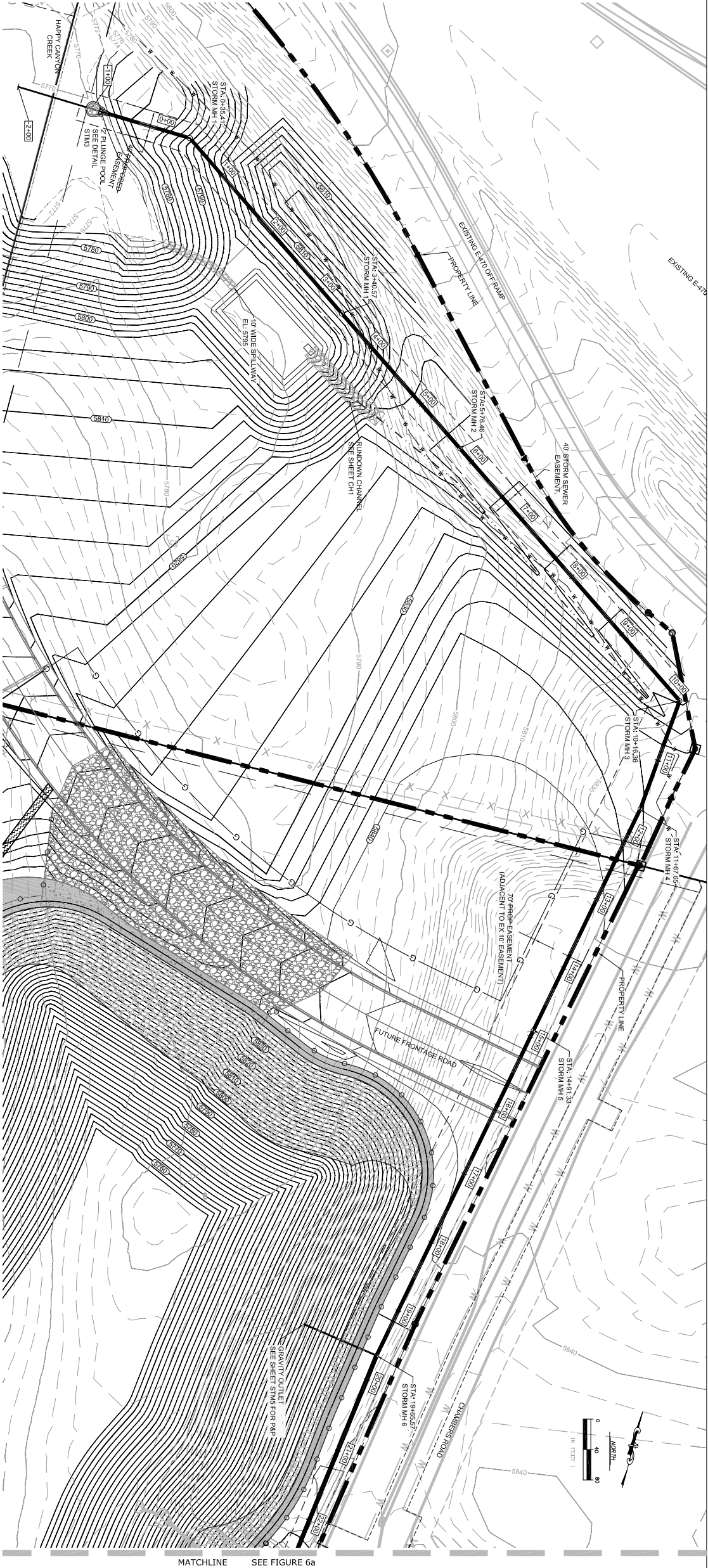


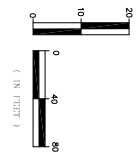
Figure 1 shows a schematic diagram of the experimental setup. It consists of a vertical column of water with a scale from 0 to 20. A horizontal tube is connected to the column at a height of 10. The tube is labeled "IN TUBE".

S&P FILE NO.		C-1957	
REVISIONS			
NO.	DESCRIPTION	DATE	BY
UNITED WATER AND SANITATION DISTRICT CHAMBERS DAM & RESERVOIR BYPASS STORM SEWER PLAN & PROFILE			
CIVIL RESOURCES, LLC 323 5th Street P.O. Box 680 Frederick, CO 80630 303 833 1416 (P) 303 833 2890 (F)			
DESIGNED BY:		US DATE: JAN 2010	
DRAWN BY:		US SCALE: AS NOTED	
CHECKED BY:		BLM SHEET: 9	



PROFILE - BYPASS STORM SEWER

NOTE:
1. CLAY CUTOFF WALLS SHALL BE CONSTRUCTED AT 500' INTERVALS ALONG STORM SEWER ALIGNMENT. SEE DETAIL SHEET UD1.



SEO FILE NO. C-1967				UNITED WATER AND SANITATION DISTRICT			
REVISIONS				CHAMBERS DAM & RESERVOIR			
NO.	DESCRIPTION	DATE	BY	BYPASS STORM SEWER PLAN & PROFILE			
1	REV. SPILLWAY	10/10/10	AS				
				CIVIL RESOURCES, LLC			
				323 S.W. Street, Frederick, CO 80520			
				300 S.W. Street, Frederick, CO 80520			
				DESIGNED BY: LJS			
				DATE: JUN 2010			
				DRAWN BY: LJS			
				SCALE: AS NOTED			
				CHECKED BY: JHL			
				SHEET: 10			

Typical Outlet Structure Notes:

1. The detail owner are intended to show design concepts. Preparation of final design plans, addressing details of structural adequacy, excavation, foundation preparation, concrete work, reinforcing steel details, foundation, and appearances, including preparation of structural specifications, are the responsibility of the design engineer.
2. Alternate designs to the typical utility trench structures shown may be considered; however, alternate designs must address the hydraulic and earth handling functional elements of the structures shown in the Manual.
3. Wriggless stone are intended to match the structure to be backfilled to be in line with the aesthetic of the basin, which is the recommended geometry. Other geometries may be considered if that design relates to public safety, aesthetics, maintainability, and function are equal to or better than the designs shown in the Manual.
4. Permanent Water Surface shows meters to microtop for Extended Detention Basin or permanent pool for Constructed Wetland Basin or Retention Pond.
5. An offset pipe is shown as an office's control; however, an unturned pipe, with offsets may also be used. See Figure 4 for offset design information.
6. A Vertical Trash Rack option is generally shown; however, an Adverse-Slope Trash Rack may also be used. Adverse-Slope trash racks for use with WQOC outlets are not recommended. See figure for trash rack design information.
7. References are made to 2- or 10-year detention above the WQOC; however, detention above the WQOC may be sized for any storm event, according to local criteria.
8. The underdrain, including a shut-off valve, at the perimeter of the pond is required for a Wetland Basin and a Retention Pond. An underdrain, without a shut-off valve, is optional for the micropond and may be used to help dry the micropond during dry-weather periods.
9. When outlet designs differ from those shown herein:

a) Provide needed orifices that are distributed over the vertical height of the WQCV, with the lowest orifice located at 2-6' or more above the bottom of the micropool.

b) Provide full hydraulic calculations demonstrating that the outlet will provide no less than the minimum required drain line of the Water Quality Capture Volume for the BMP type being designed.

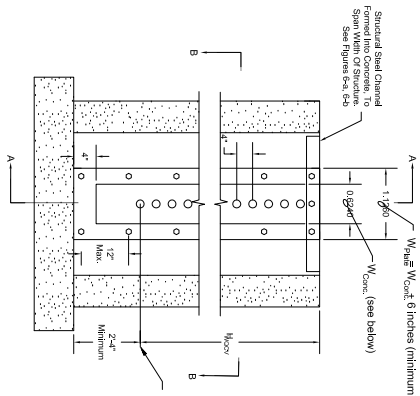
c) opening area called for by Figure 7, and all trash rack opening dimensions shall be smaller than the smallest dimension of the outlet orifices,

Trash racks shall be manufactured from stainless steel or aluminum alloy structurally designed to not fall under a full hydrostatic load on the upstream side.

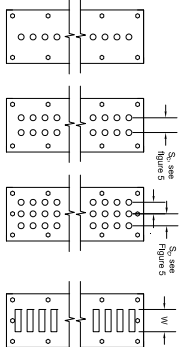
(d)

Urban Drainage and Flood Control District Drainage Criteria Manual (V.3) File: V3\Outlet Control.docx	Typical Outlet Structure General Notes
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Orifice Perforation Details



Circular Openings: W_{circ} Obtained From Table 6a-1



Example Perforation Patterns

Note: The goal in designing the outlet is to minimize the number of columns of perforations that will drain the WOCV in the desired time. Do not, however, increase the diameter of circular perforations or the height of the rectangular perforations beyond 2 inches. Use the allowed perforation shapes and configurations shown above along with Figure 5 to determine the pattern that provides an area per row closest to that required without exceeding it.

Urban Drainage and Flood Control District	Figure 4
Drainage Criteria Manual (V.3)	Office Details for Draining WOCV
File: V:\2004\01\Detail.dwg	

Note: Vertical WCOV Trash Racks are shown in Figures 6, 6-a, and 6-b for suggested standardized outlet design. Advanced Slope Trash Rack design may be used for non-standardized designs, but must meet minimum design criteria.

Structural Steel Channel
See Figure 6-a, 6-b

A $\rightarrow$ W_{rack}

Elevation

B

Structural Steel Head
See Figure 6-c

H $\rightarrow$ H_{rack}
 H $\rightarrow$ H_{head}
 2' $\rightarrow$ Foundation
 (inches)

1. Vertical trash racks shall be stainless steel and shall be attached by intermittent welds along the edge of the mounting frame.
2. Bar grate trash racks shall be aluminum and shall be bolted using stainless steel hardware.
3. Trash Rack widths are for specified trash rack material. Final wall-screen or mesh shall be than specified is acceptable, however, trash rack dimensions need to be adjusted for materials having a different open area/percentage area ratio (or value).
4. Structural design of trash rack shall be based on full hydrostatic head with zero head downstream of the rack.

Overflow Trash Racks:

1. All trash racks shall be mounted using stainless steel hardware and provided with flanged and lockable or bolted access panels.
2. Trash racks shall be stainless steel, aluminum, or steel. Steel trash racks shall be hot dip galvanized and may be hot powder painted after galvanizing.
3. Trash Racks shall be designed such that the diagonal dimension of each opening is smaller than the diameter of the outlet pipe.
4. Structural design of trash rack shall be based on full hydrostatic head with zero head downstream of the rack.

Figure 6
 Suggested WCOV Trash Rack

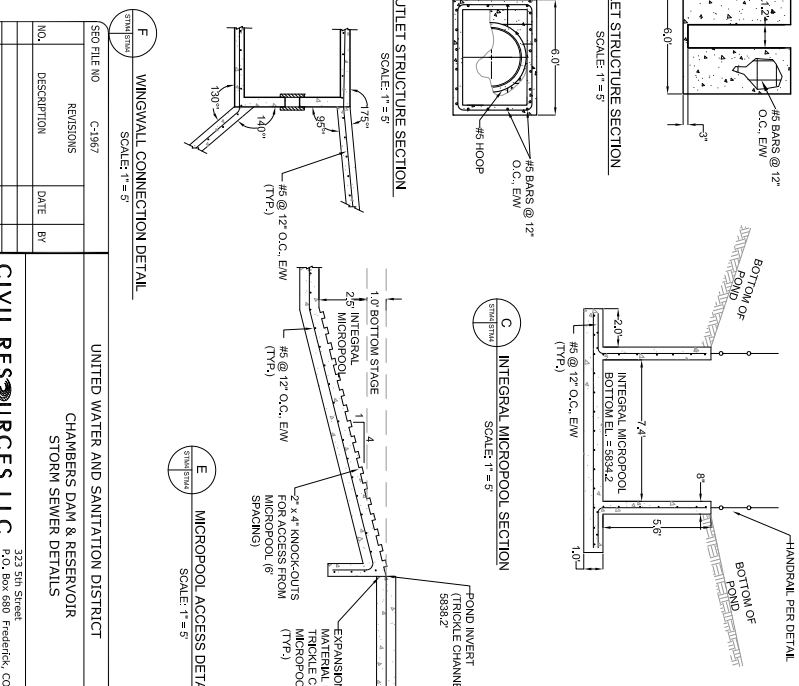
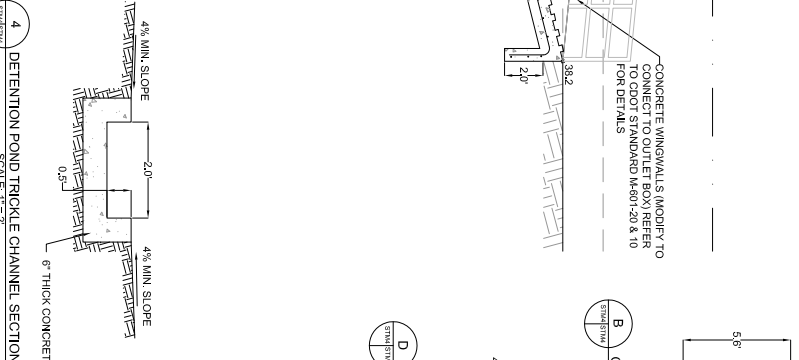
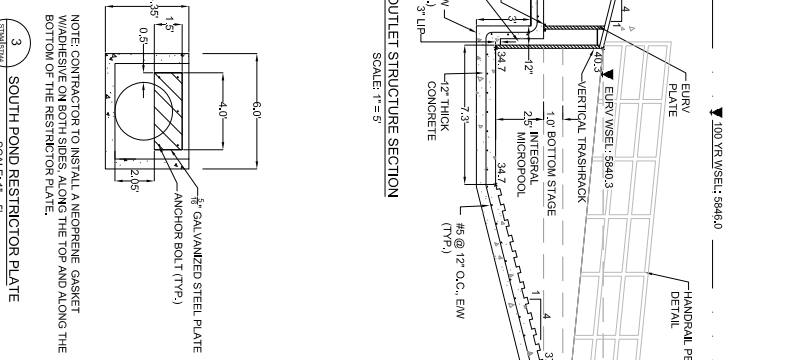
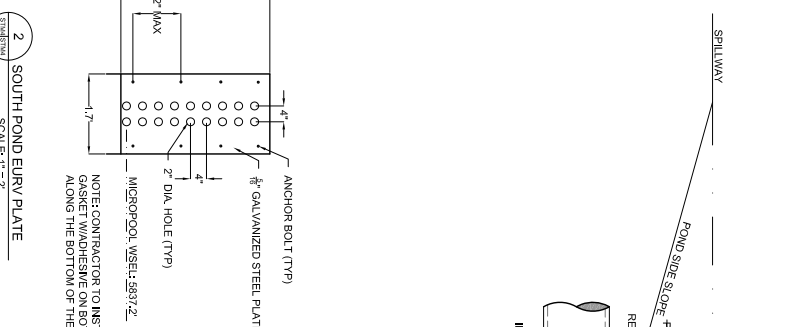
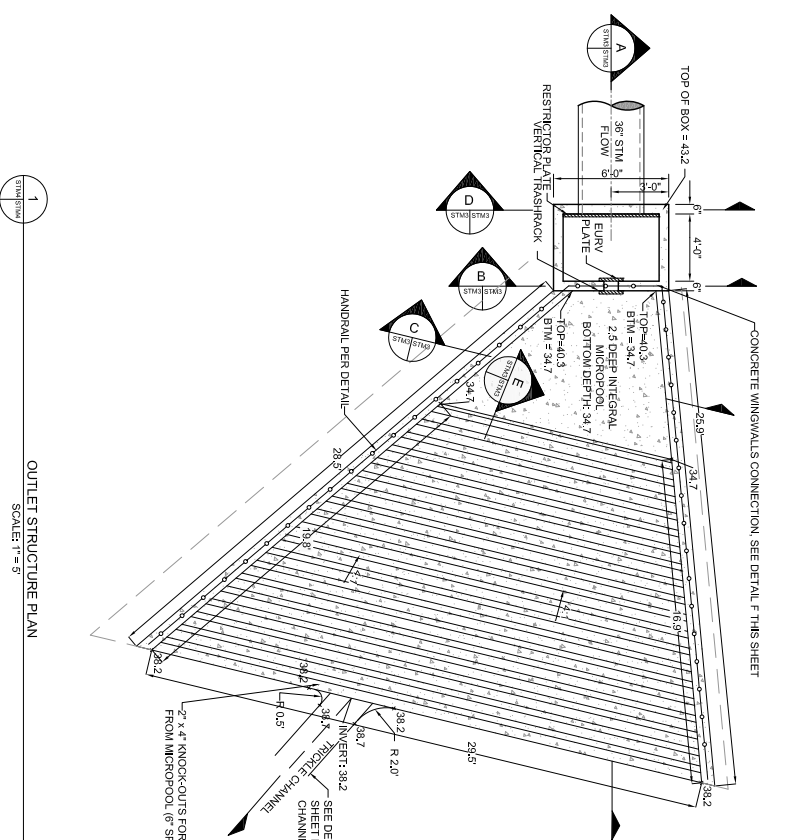
Urban Drainage and Flood Control District
 Suggested WCOV Trash Rack
 Design Criteria Manual (V.5)

Elevation

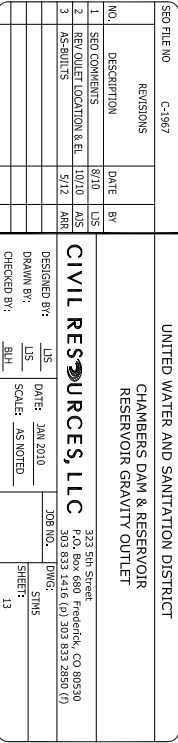
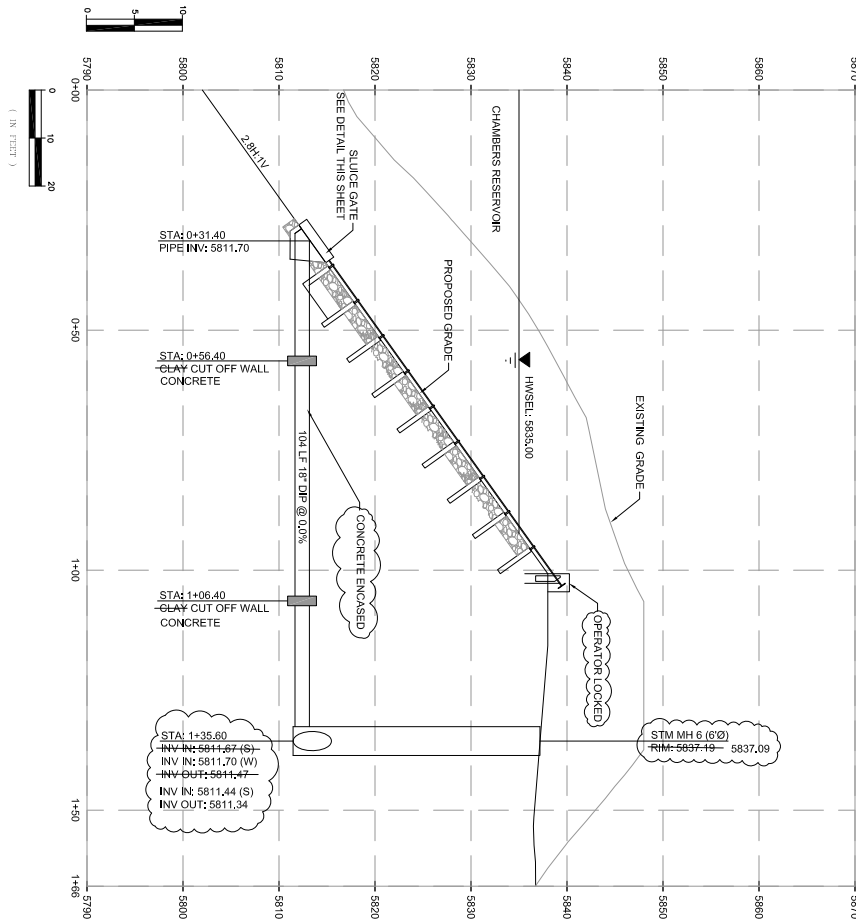
WQCV Trash Racks:

1. Weld-on steel truss rods shall be stainless steel and shall be attached by mechanical means along the edge of the mounting frame.
 2. Truss rods shall be attached to the truss and shall be bolted using stainless steel hardware.
 3. Truss rods, whether or not specified, truss arm material, Flange and/or nut on both ends, when specified is acceptable, however, truss rod dimensions (per material) shall be adjusted for material having a different open area ratio (R value).
 4. Structural design of truss rod shall be based on full hydrostatic head with zero head overpressure of the rack.
- For Truss Rods:
1. All truss rods shall be mounted using stainless steel hardware and provided with flanges and lockable or lockless access panels.
 2. Truss rods shall be stainless steel, aluminum or steel. Steel truss rods shall be hot dip galvanized and may or not be powder primed after galvanizing.
 3. Truss rods shall be designed such that the diagonal dimension of each opening is smaller than the diameter of the outlet pipe.
 4. Structural design of truss rod shall be based on full hydrostatic head with zero head overpressure of the rack.

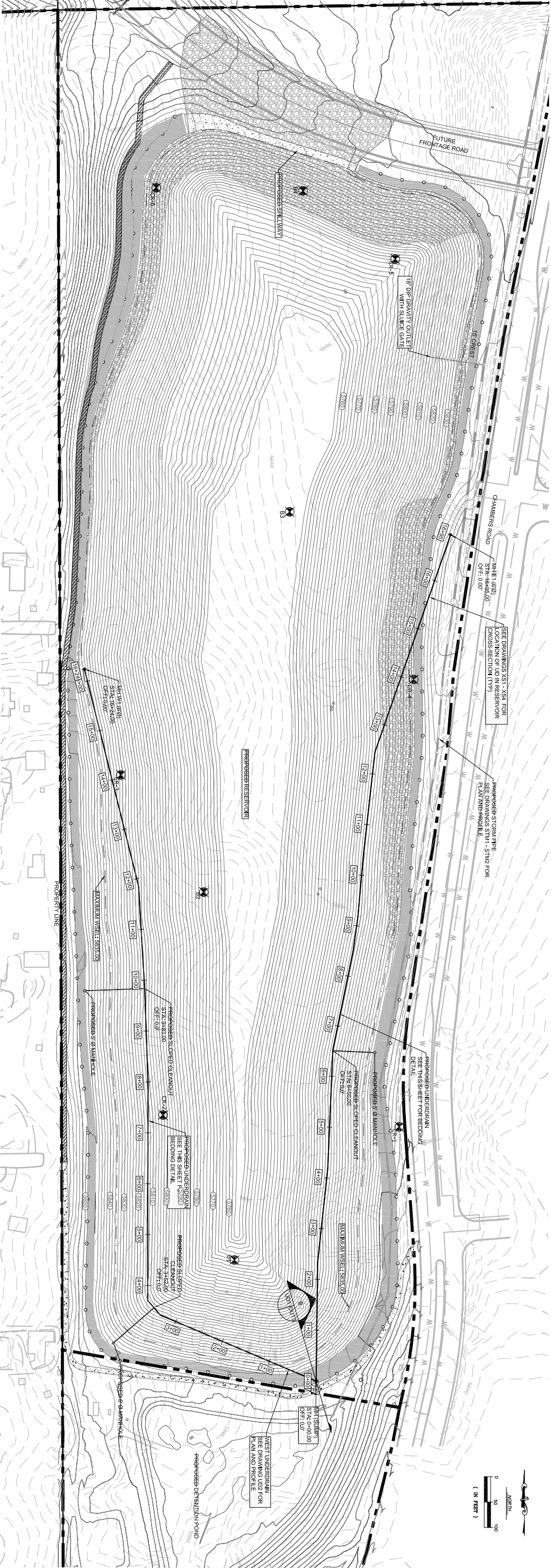
Urban Drainage and Flood Control District Drainage Criteria Manual (V.3) The Wastewater Engineering	Figure 6 Suggested WOCV Outlet Standardized Trash Rack Design
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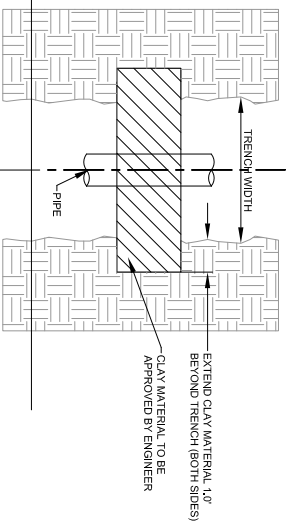
550 FILE NO	C-1965		
REVISIONS			
UNITED WATER AND SANITATION DISTRICT			
CHAMBERS DAM & RESERVOIR			
STORM SEWER DETAILS			
NO.	DESCRIPTION	DATE	BY
CIVIL RESOURCES, LLC 333 S.W. Street P.O. Box 680 Frederick, CO 80530 303 833 1416 (P) 303 833 2850 (T)			
DESIGNED BY: <u>LJS</u> DRAWN BY: <u>LJS</u> CHECKED BY: <u>BLH</u>			
DATE: <u>JAN 2010</u>		JOB NO. <u>1006</u>	
SCALE: <u>AS NOTED</u>		SHEET: <u>12</u>	



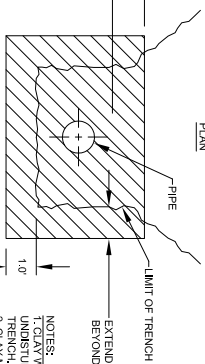
ID.	OUTLET PIPE Ø	INVERT ELEV	CREST ELEV	OFFSET ANGLE	LENGTH *	PEOS **
CHAMBERS RESERVOIR	18"Ø	5698.27	5638	0°	32 FT	3



OVERALL UNDERDRAIN PLAN



PLAN



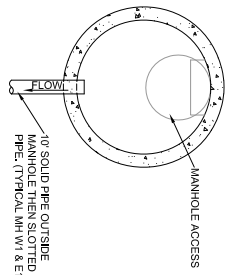
SECTION

- NOTES:
1. CLAY WALL EXTENDS A MINIMUM OF 12 INCHES INTO TRENCH MATERIAL, TO BE CLASSIFIED AS CL, CH OR OH OR AS DIRECTED BY ENGINEER.
 2. CLAY WALL MAY BE USED INSTEAD OF CLAY MATERIAL, EVEN 900 FEET ALONG UNDERDRAIN ALIGNMENT.

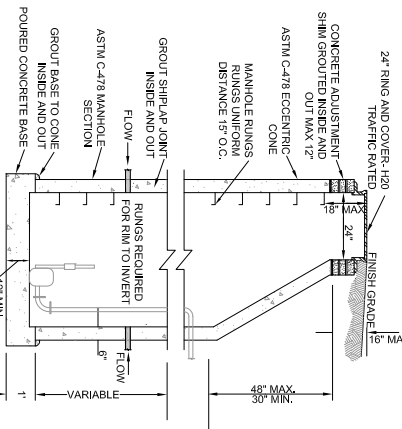
- MIN. BASE REINFORCEMENT @ 8" O.C., E.W. OR AS APPROVED BY ENGINEER

8 TYPICAL UNDERDRAIN AND SLOPED CLEANOUT MANHOLE

- NOTES:
1. MH WT, MH ET AND SLIMP MANHOLE ARE 8' Ø.
 2. MANHOLES ON DAM ACCESS ROAD FOR SLOPED CLEANOUTS ARE 90".
 3. SHOP DRAWINGS BY MANHOLE MANUFACTURER REQUIRED.

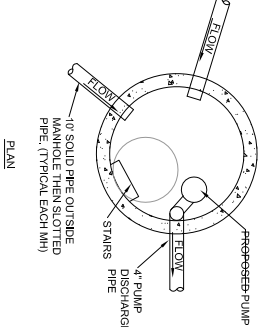


PLAN



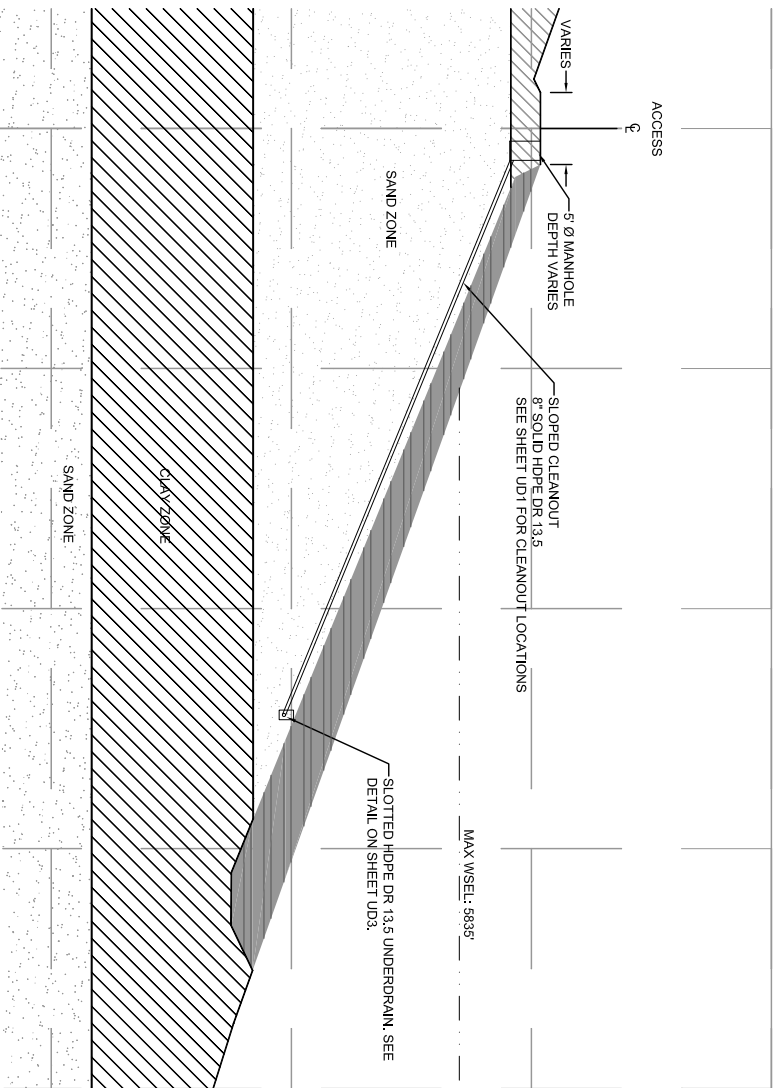
D TYPICAL SLIMP UNDERDRAIN MANHOLE

- NOTES:
1. MANHOLES ARE 8' Ø EXCEPT SLIMP MANHOLE WHICH IS 6' Ø.
 2. 0.2' DROP ACROSS ALL MANHOLES.
 3. SHOP DRAWINGS BY MANHOLE MANUFACTURER REQUIRED.

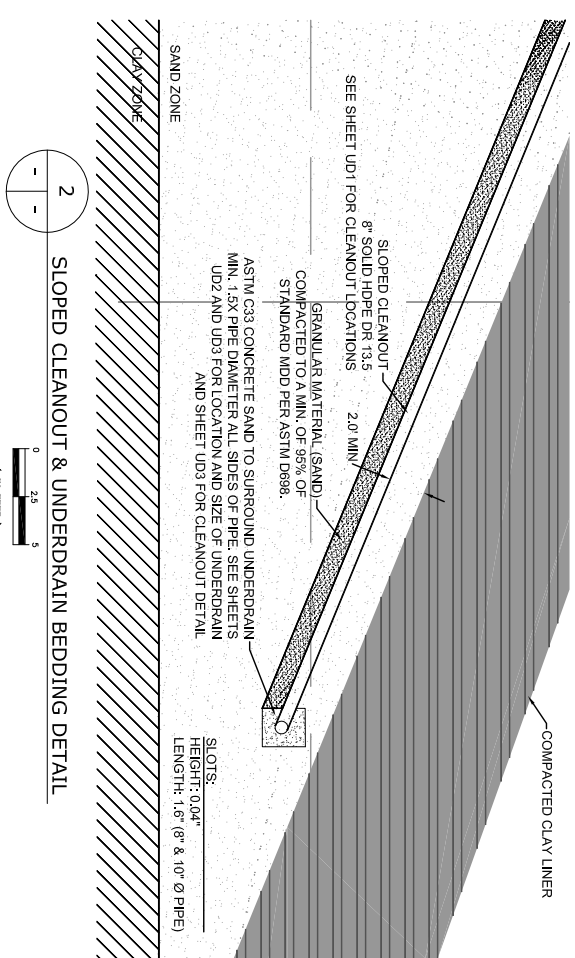
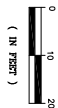


PLAN

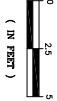
580 FILE NO			C-1937			UNITED WATER AND SANITATION DISTRICT									
REVISIONS						CHAMBERS DAM & RESERVOIR									
OVERALL UNDERDRAIN PLAN															
NO.	DESCRIPTION	DATE	BY												
1	REV/PLAN	10/10	A/S												
2	REV/UD, ALIGNMENT	12/10	A/S												
3	AS-BUILTS	5/12	ARR												
DESIGNED BY:				A/S	DATE:		MARCH 2010		JOB NO.:		DWG:		101		
DRAWN BY:				A/S	SCALE:		AS NOTED								
CHECKED BY:				BHL											
								SHEET:		14A					



1
TYPICAL SLOPED CLEANOUT SECTION

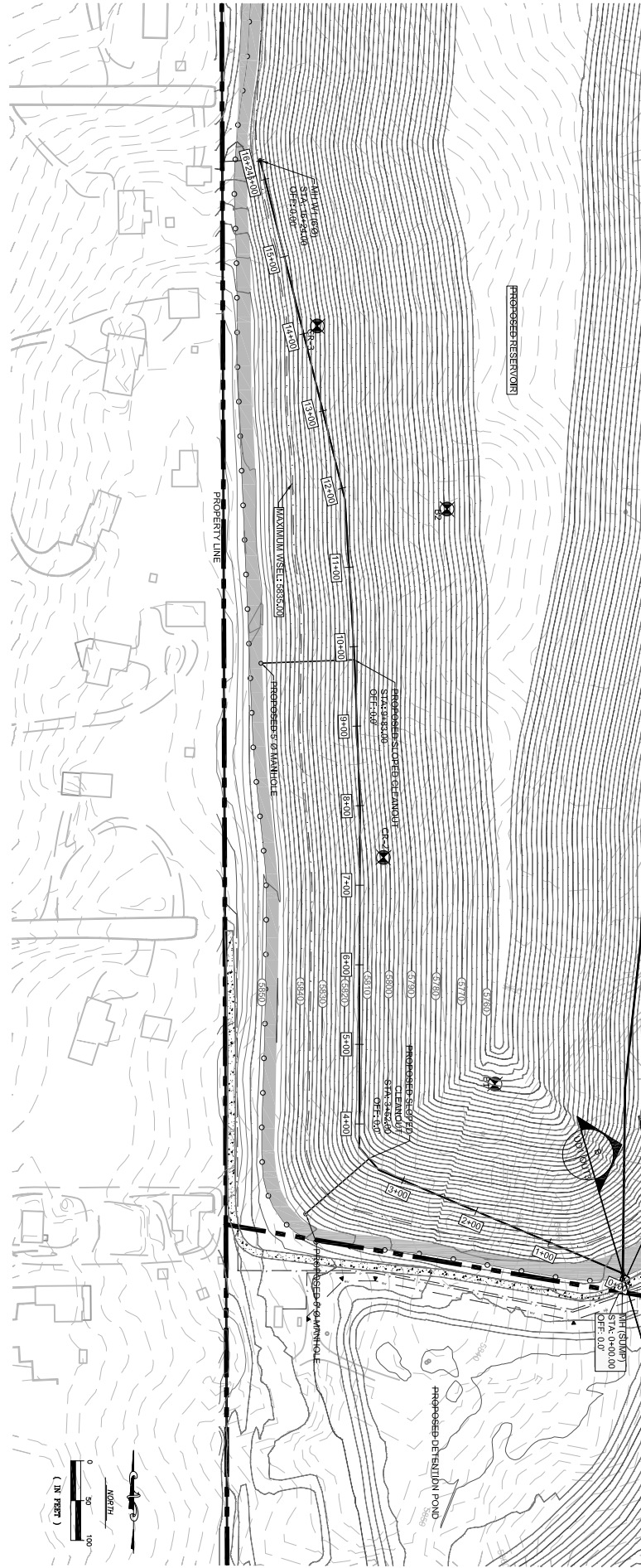


2
SLOPED CLEANOUT & UNDERDRAIN BEDDING DETAIL

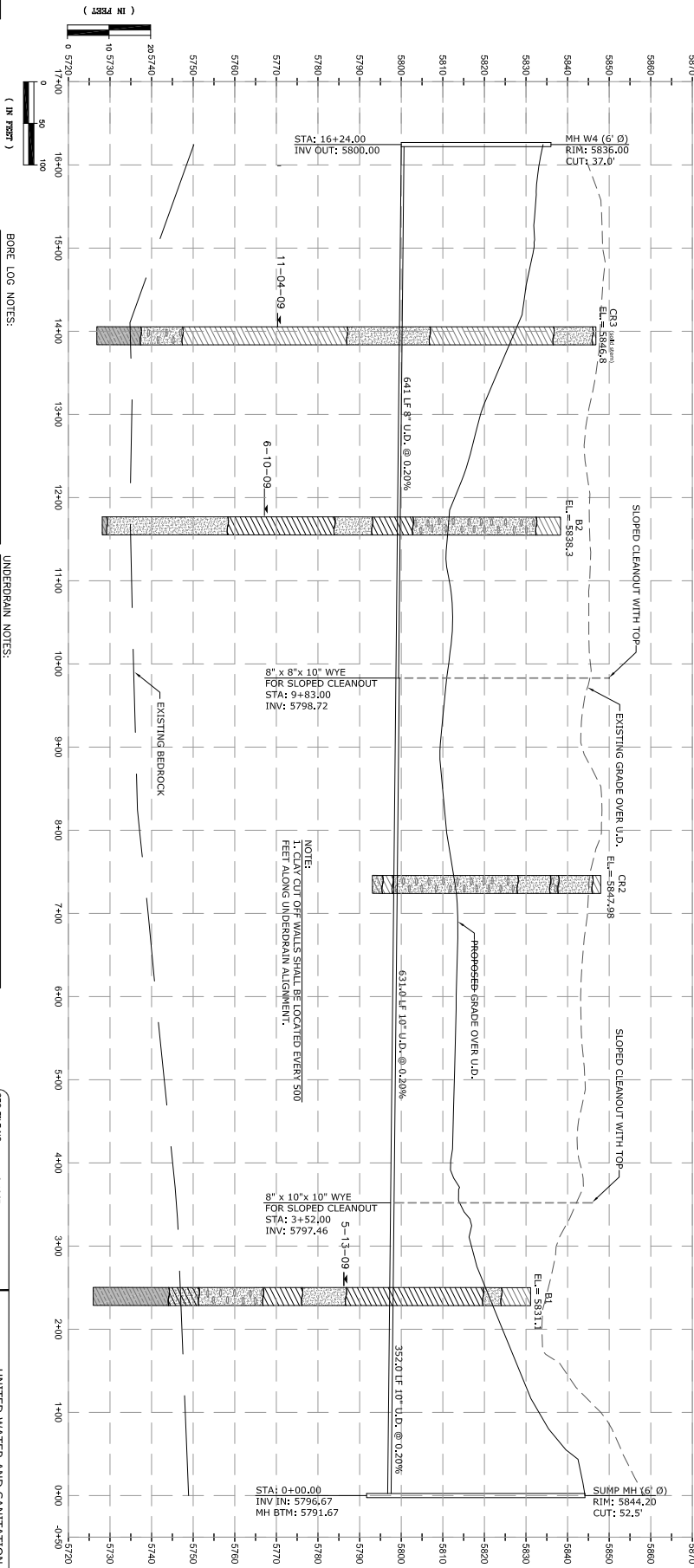


LEGEND:

- CLAY, SANDY PARTS, MEDIUM SOFT TO VERY STIFF, SLIGHTLY MOIST TO MOIST, GRAY, BROWN, AND IRON STAINING IN PARTS, (CL-CM)
- SANDY CLAY TO CLAYEY SAND, SILTY, MEDIUM STIFF, SLIGHTLY MOIST TO WET, BROWN, (CL, SC)
- SAND, SILTY, MEDIUM DENSE TO VERY DENSE, SLIGHTLY MOIST TO WET, BROWN, (SM, SP)
- CONGREGATE, CEMENTED SAND W/ GRAVEL AND COBBLES, HARD, MEDIUM MOIST, GRAY TO DARK GRAY (SM, SP, SW)
- SAND WITH GRAVEL AND COBBLES AND BOULDERS IN PARTS, SILTY, MEDIUM DENSE TO VERY DENSE, SLIGHTLY MOIST TO WET, (SP-SW)
- CLAYSTONE, HARD TO VERY HARD, SILTY TO SANDY IN PARTS, IRON STAINING, GRAY TO DARK GRAY AND BROWN W/ IRON STAINING (SC, CS)



WEST UNDERDRAIN PLAN AND PROFILE STATION 0+00 TO 16+24



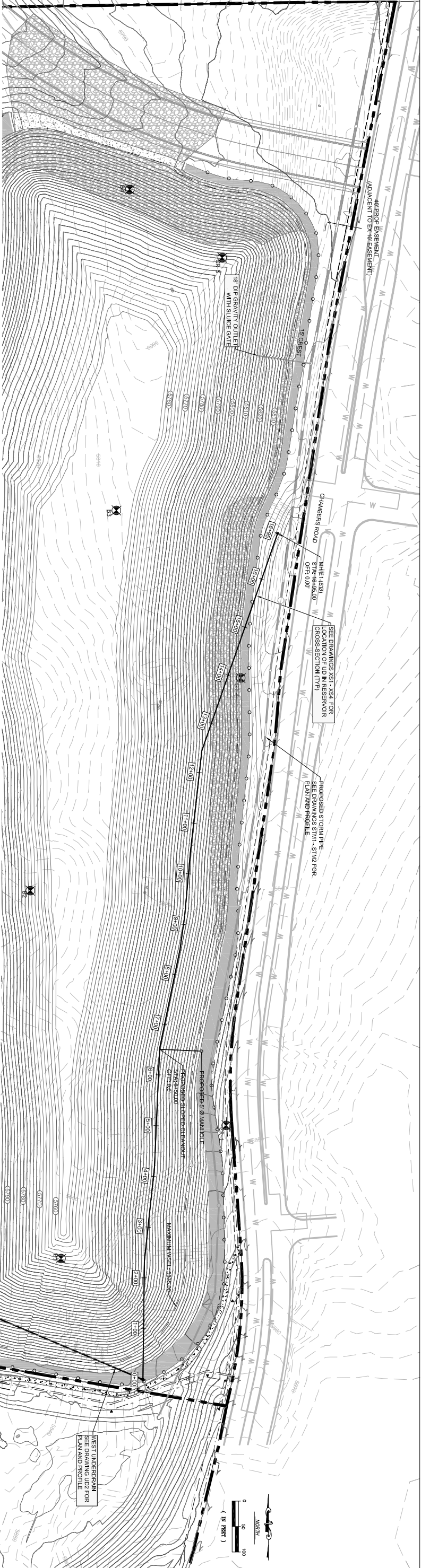
BORE LOG NOTES:

1. EXPLORE BORE LOGS WERE DRILLED NOV. 4-6 WITH A ONE CONTINUOUS SAMPLER AND 6" OD HOLLOW STEM (OR AS NOTED) AUGERS USING A TRUCK MOUNTED ONE-75 RIGGING REPRESENT APPROXIMATE BOUNDARIES BETWEEN TYPES.
2. GROUNDWATER LEVELS WILL FLUCTUATE.
3. BORE LOG ELEVATIONS ARE ESTIMATED FROM THEORETICAL MEASUREMENTS AND SHALL BE CONSIDERED APPROXIMATE.

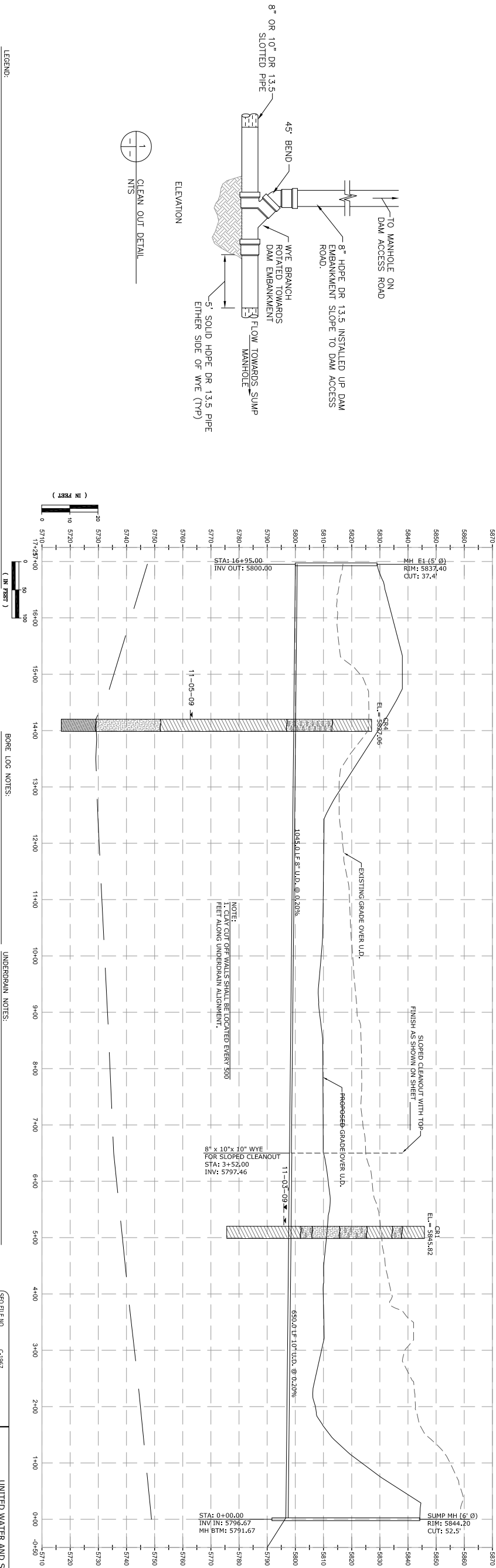
UNDERDRAIN NOTES:

1. UNDERDRAIN PIPE SLOPES AT 0.20% TOWARDS MH (SWMP)
2. UNDERDRAIN SHALL BE SLOTTED HDPE DR 13.5 PIPE
3. ALL CONSTRUCTION TRENCHES MUST MEET CURRENT O.S.H.O. SAFETY
4. MANHOLES SHALL BE CENTERED OVER UNDERDRAIN OR CLEANOUT PIPE.
5. PIPE WITHIN 10' OF MANHOLE SHALL BE SOLID PIPE.

SEO FILE NO. C-1967				UNITED WATER AND SANITATION DISTRICT			
REVISIONS		DATE BY		CHAMBERS DAM & RESERVOIR			
NO. DESCRIPTION		DATE BY		WEST UNDERDRAIN PLAN & PROFILE			
1	ISSUED FOR PERMIT	10/10	AS				
2	REVISED ALIGNMENT	12/10	AS				
3	AS-BUILT	5/12	ARR				
				CIVIL RESOURCES, LLC			
				DESIGNED BY: AIS			
				DRAWN BY: BHL			
				CHECKED BY: BHL			
				DATE: MARCH 2010			
				SCALE: AS NOTED			
				JOB NO.: 333 Sth Street, Chambersburg, CO 80930			
				SHEET: 154			



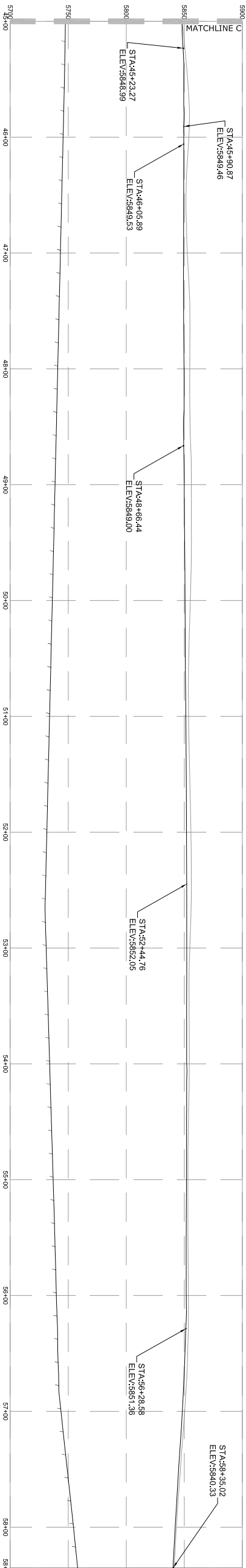
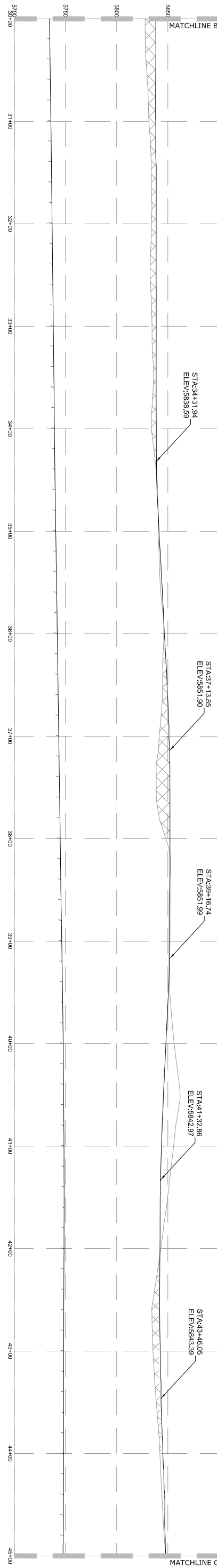
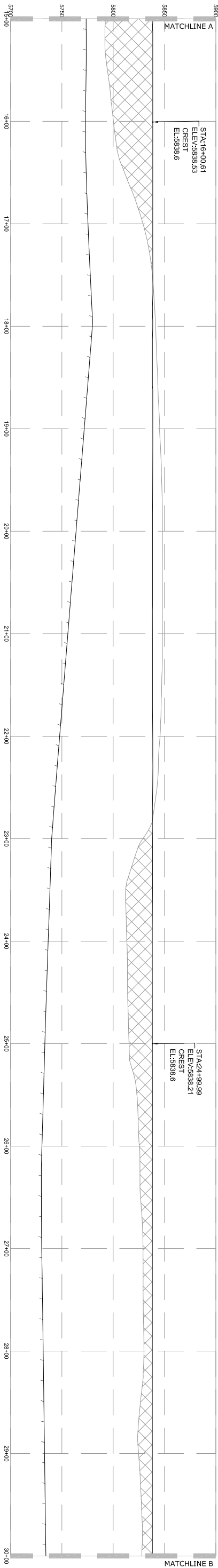
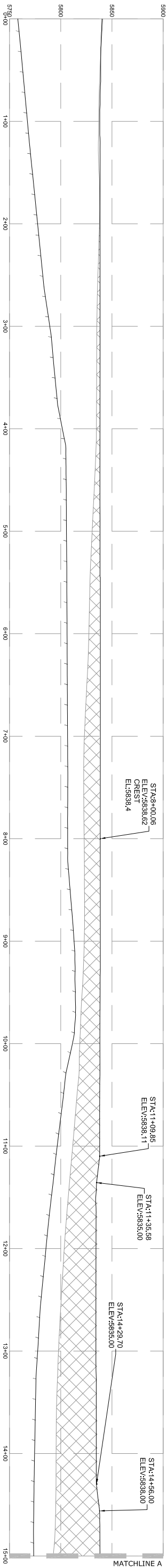
EAST UNDERDRAIN PLAN AND PROFILE STATION 0+00 TO 16+95



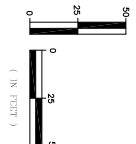
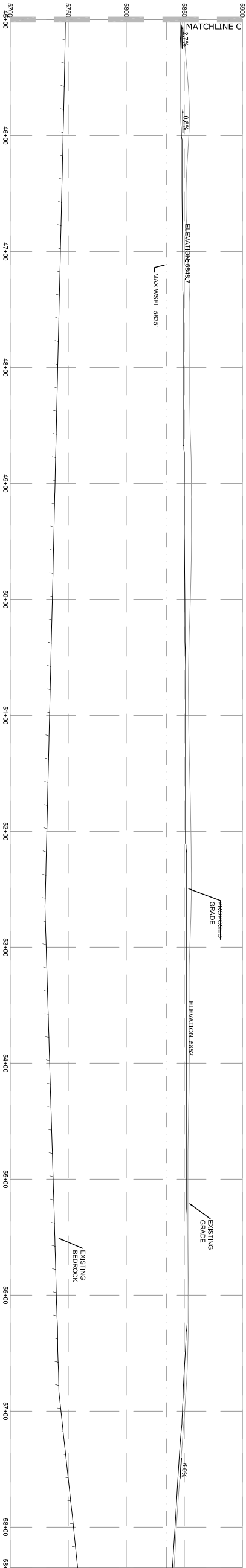
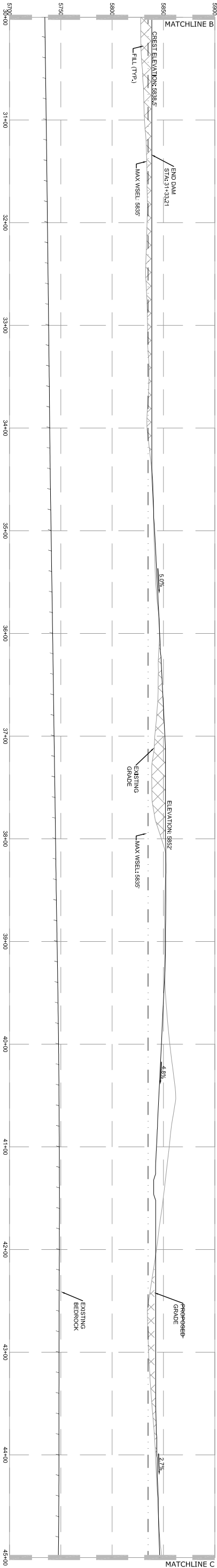
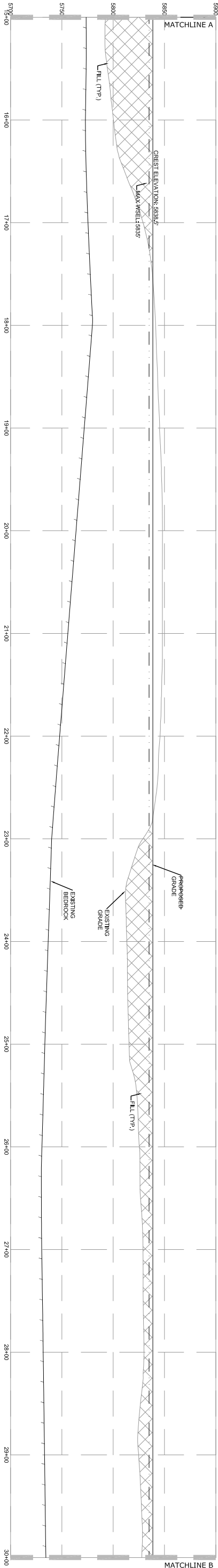
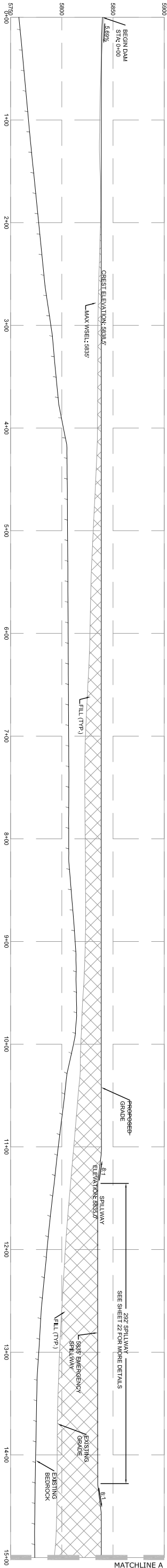
- LEGEND:
- CLAY, SANDY PARTS, MEDIUM SOFT TO VERY STIFF, SLIGHTLY MOIST, GRAY, BROWN, AND IRON STAINING IN PARTS, (CL-CH)
 - SANDY CLAY TO CLAYEY SAND, SILTY, MEDIUM STIFF, SLIGHTLY MOIST TO WET, BROWN, (CL, SC)
 - SAND, SILTY, MEDIUM DENSE TO VERY DENSE, SLIGHTLY MOIST TO WET, BROWN, (SM, SP)
 - CONGLOMERATE, CEMENTED SAND W/GRAVEL AND COBBLES, HARD, MEDIUM MOIST, GRAY TO DARK GRAY (SM, SP, SN)
 - SAND WITH GRAVEL AND COBBLES AND BOULDERS IN PARTS, SILTY IN PARTS, MEDIUM DENSE TO VERY DENSE, SLIGHTLY MOIST TO WET, (SP-SM)
 - CLASTONE, HARD TO VERY HARD, SILTY TO SANDY IN PARTS, DRY TO MEDIUM MOIST, GRAY TO DARK GRAY AND BROWN W/IRON STAINING (SC, CL)

- BORE LOG NOTES:
1. EXPLORATORY BORINGS WERE DRILLED NOV. 4-6, 1970, TO A DEPTH OF 10 FEET. BORE LOGS WERE MOUNTED CME-75 RIG.
 2. LINES BETWEEN MATERIALS REPRESENT APPROXIMATE BOUNDARIES BETWEEN TYPES. TRANSITIONS MAY BE TO WET, (SP-SM)
 3. GROUNDWATER LEVELS WILL FLUCTUATE.
 4. BORING ELEVATIONS ARE ESTIMATED FROM TOPOGRAPHICAL MAPPING AND SHALL BE CONSIDERED APPROXIMATE.
- UNDERDRAIN NOTES:
1. UNDERDRAIN PIPE SLOPES AT 0.20% TOWARDS MH (SUMP)
 2. UNDERDRAIN SHALL BE SLOTTED HOPE DR 13.5 PIPE
 3. ALL CONSTRUCTION TRENCHING MUST MEET CURRENT O.S.H.O. SAFETY STANDARDS SHALL BE COVERED OVER UNDERDRAIN OR CLEANOUT PIPE.
 4. MANHOLE LIDS SHALL BE RATED FOR H2O LOADING.
 5. PIPE WITHIN 10' OF MANHOLE SHALL BE SOLID PIPE.
 6. PIPE ELEVATIONS ARE ESTIMATED FROM TOPOGRAPHICAL MAPPING AND SHALL BE CONSIDERED APPROXIMATE.

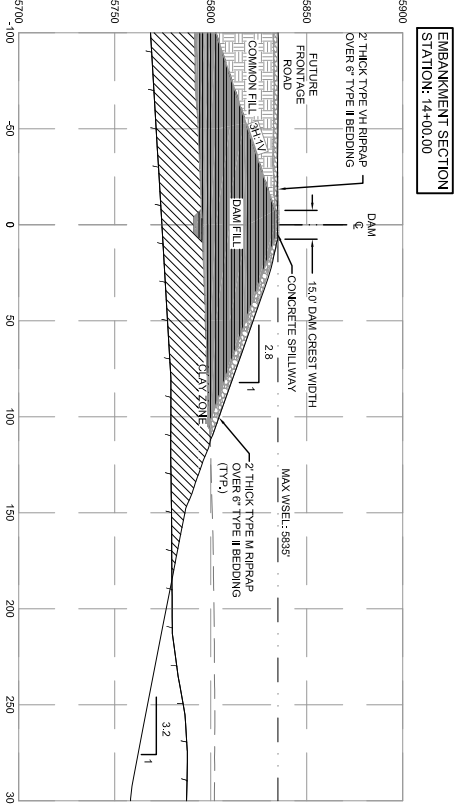
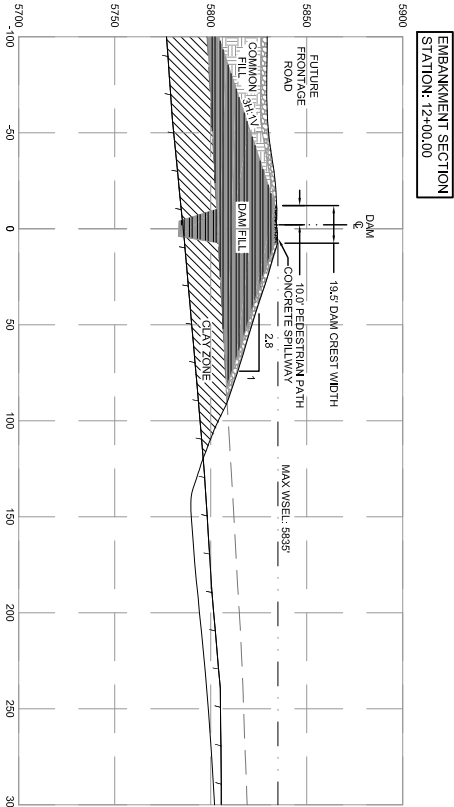
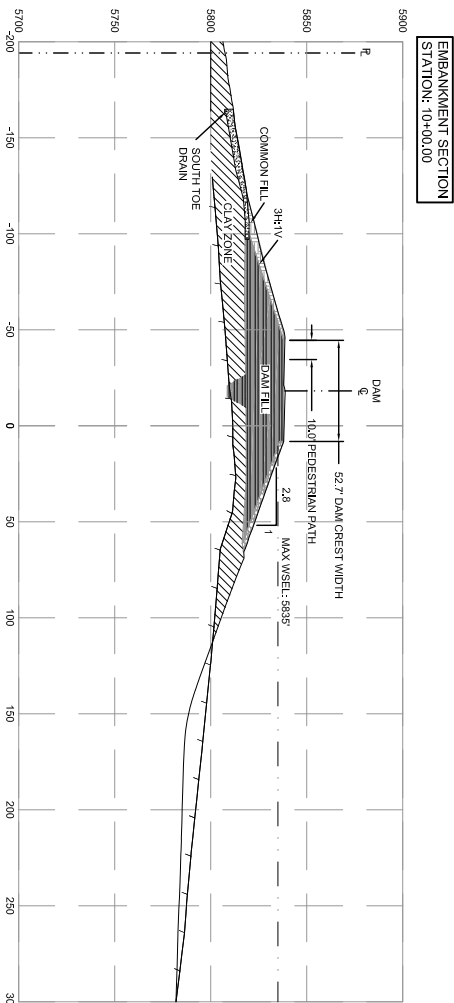
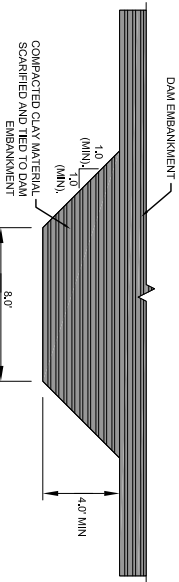
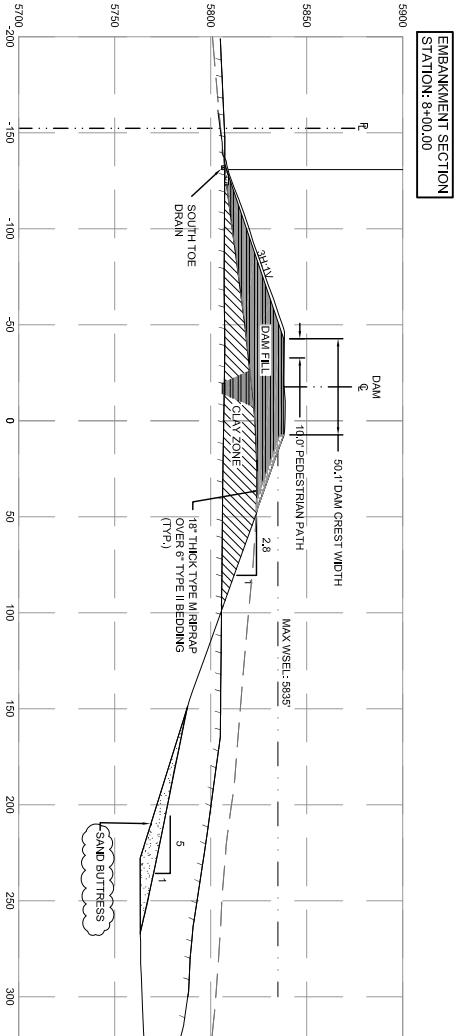
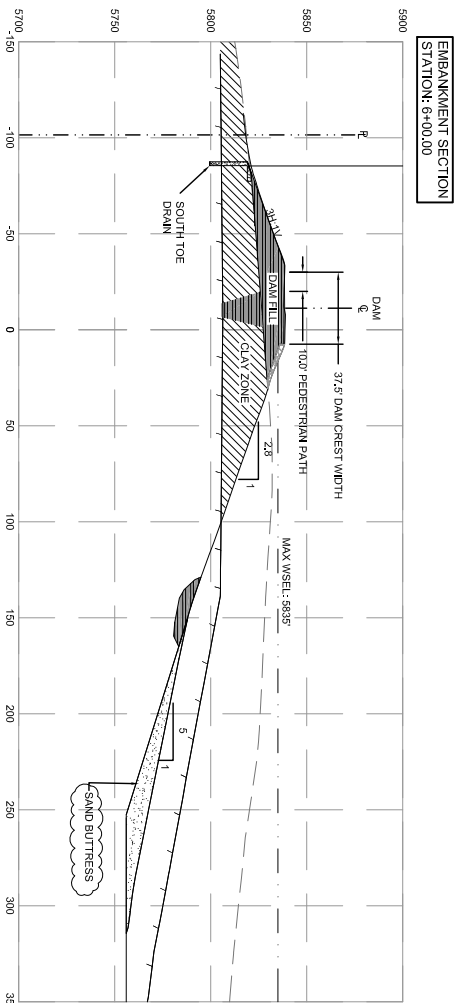
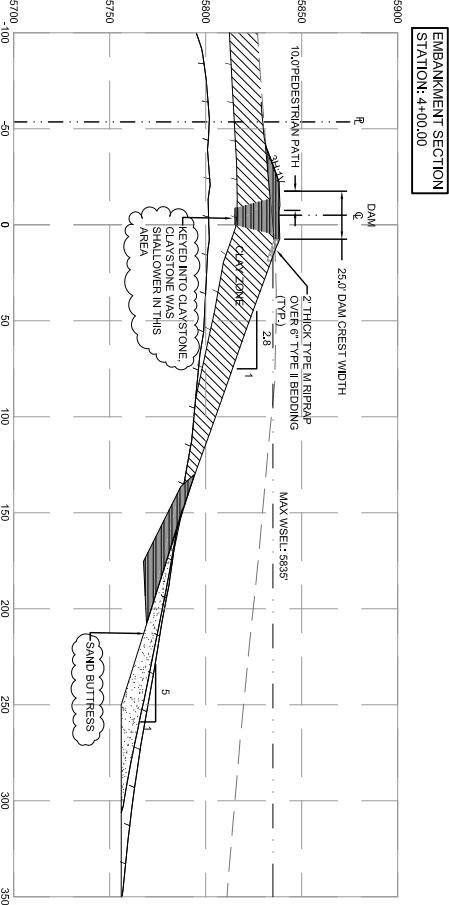
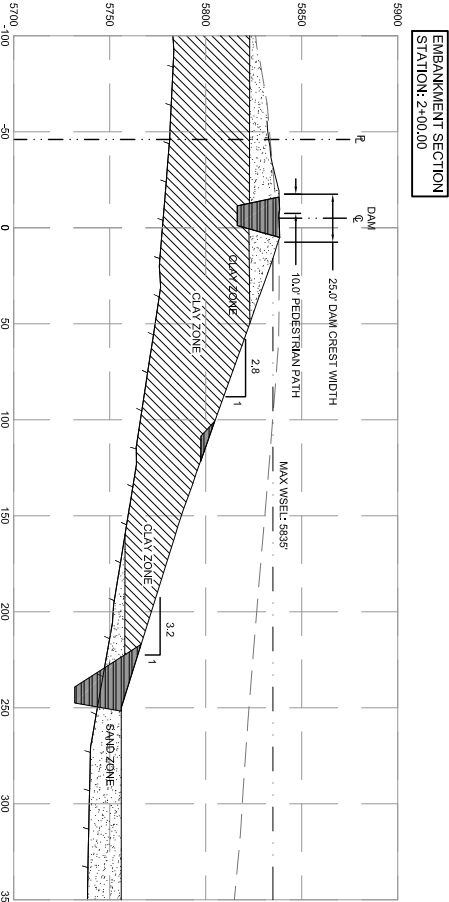
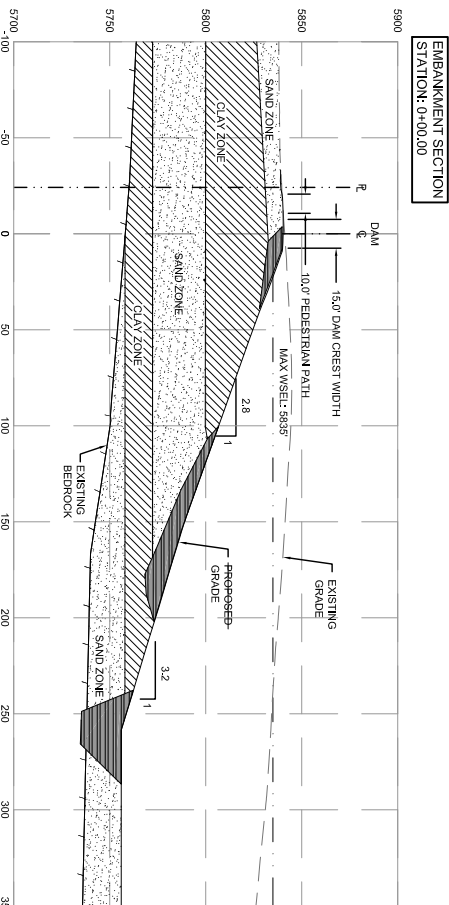
SEO FILE NO. C-1397				UNITED WATER AND SANITATION DISTRICT			
REVISIONS				CHAMBERS DAM & RESERVOIR			
EAST UNDERDRAIN PLAN & PROFILE							
NO.	DESCRIPTION	DATE	BY	DESIGNED BY:	DATE:	JOB NO.	SHEET:
1	REV. INITIAL	10/10/10	ASIS	ASIS	MARCH 2010	323 5th Street	
2	REV. INITIAL	5/12/12	ASIS	ASIS		700 Box 680 Frederick, CO 80530	
3	AS-BUILTS			SCALE: AS NOTED		103	
				CHECKED BY:	BHL		164



S&O FILE NO.		C-1492		UNITED WATER AND SANITATION DISTRICT	
REVISIONS				CHAMBERS DAM & RESERVOIR CREST CENTERLINE PROFILE	
NO.	DESCRIPTION	DATE	BY		
1.	S&O COMMENTS	06/10	LJS		
2.	S&O COMMENTS-CREST	10/23	ASR		
3.	ADD STAKE LABELS	02/01	ASR		
4.	MS-BUILT	06/20/14	ASR		
DESIGNED BY: LJS				323 5th Street	
DRAWN BY: LJS				P.O. Box 660, Frederick, CO 80530	
CHECKED BY: BULL				303 833 1416 (t) 303 833 2890 (f)	
DATE: JAN 2010		JOB NO.		DWG. NO.	
SCALE: AS NOTED				SHEETS: 17A	



SEO FILE NO.				UNITED WATER AND SANITATION DISTRICT			
C-1962				CHAMBERS DAM & RESERVOIR			
REVISIONS				CREST CENTERLINE PROFILE			
NO.	DESCRIPTION	DATE	BY	323 5th Street	200, 888, 680	Frederick, CO 80530	
1	SEO COMMENTS	10/23	AKS				
2	SEO COMMENTS-CREST	10/23	AKS				
DESIGNED BY: LIS				DATE: JAN 2010			
DRAWN BY: LIS				SCALE: AS NOTED			
CHECKED BY: JHL				JOB NO.: DWG: PRO			
				SHEET: 17			



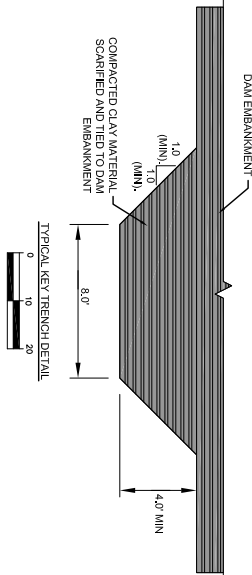
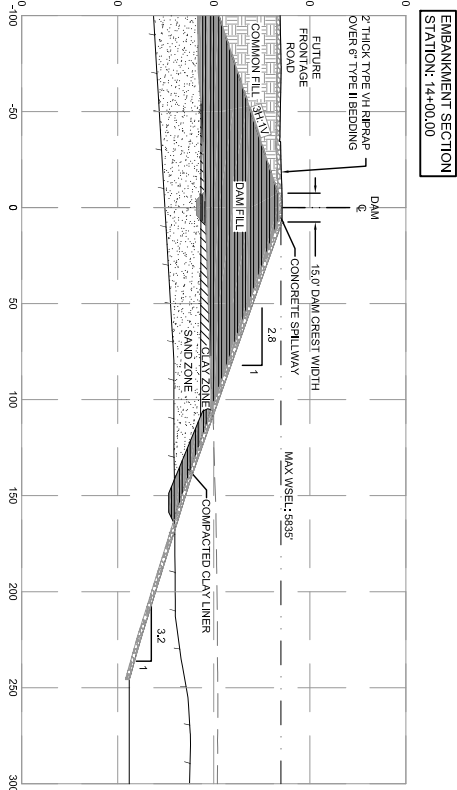
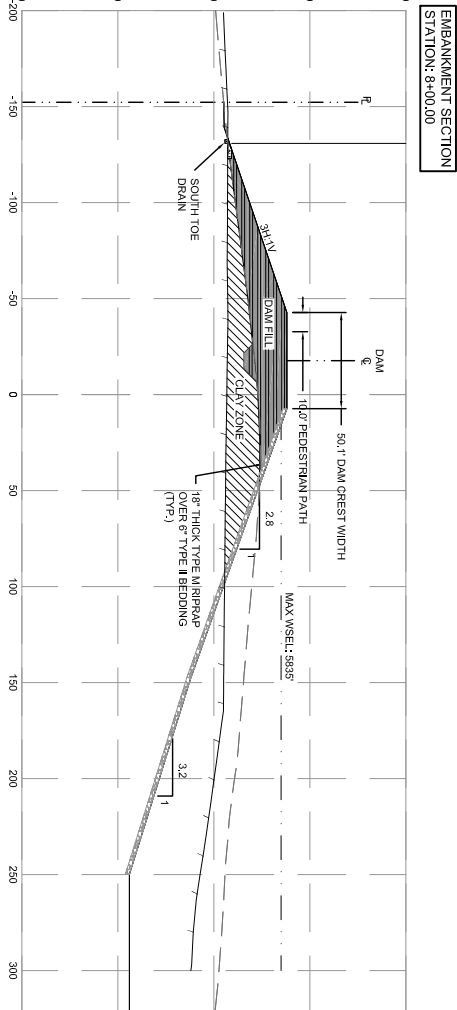
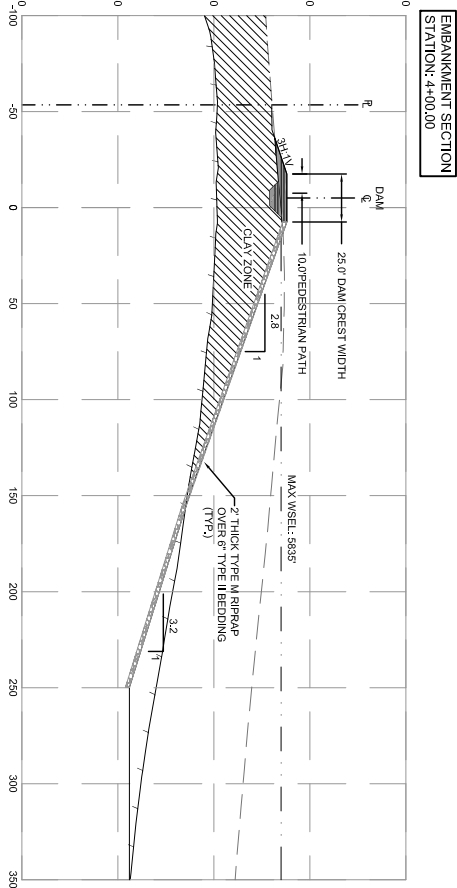
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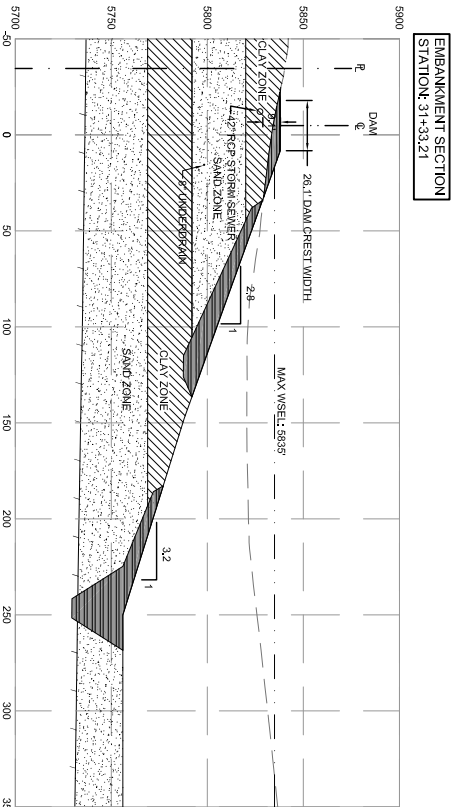
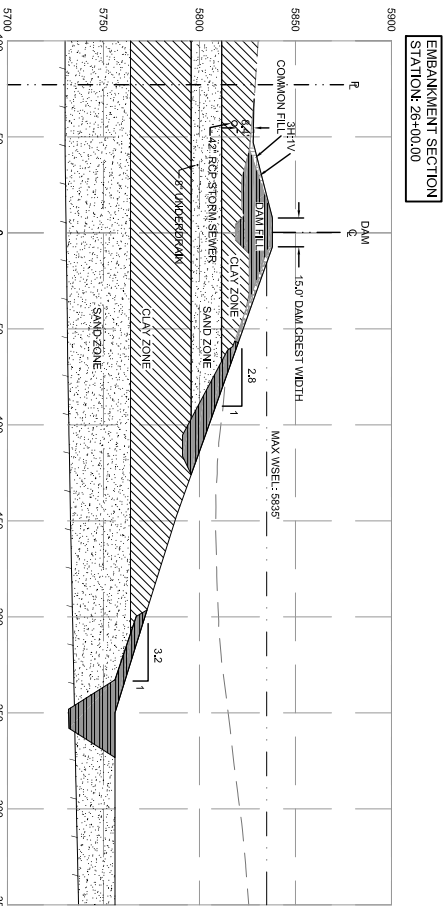
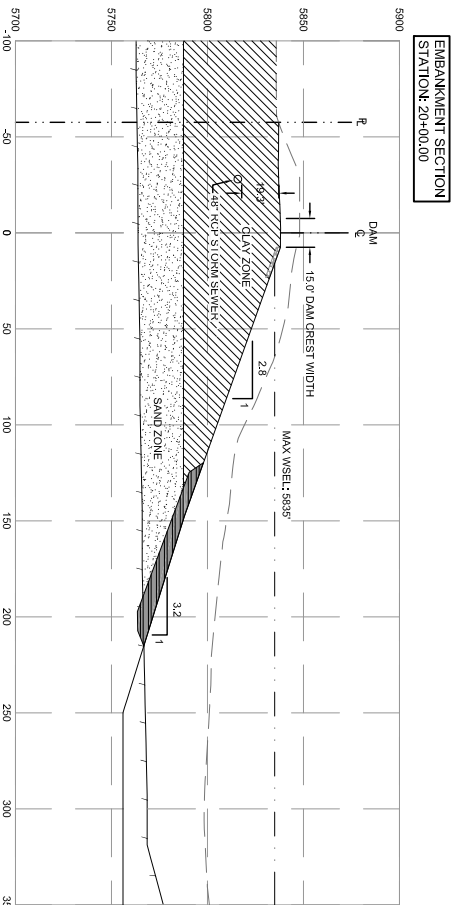
- CLAY, SANDY PARTS, MEDIUM SOFT TO VERY SOFT, BROWN, (CL-SH), BROWN, AND IRON STAINING IN PARTS, (CL-SH), BROWN, SAND, SILTY, MEDIUM DENSE TO VERY DENSE, SLIGHTLY MOIST TO WET, BROWN, (SM, SP)
- SAND WITH GRAVEL AND COBBLES AND BOULDERS IN PARTS, SILTY IN PARTS, MEDIUM DENSE TO VERY DENSE, SLIGHTLY MOIST TO WET, (SP-SW)
- SANDY CLAY TO CLAYEY SAND, SILTY, MEDIUM STIFF, SLIGHTLY MOIST TO WET, BROWN, (CL, SC)
- CLAYSTONE, SANDY IN PARTS, SILTY & SANDY IN PARTS WITH SAND, DRY TO MEDIUM MOIST, DARK GRAY AND BLACK (CL-SH)
- COMPACTED DAM FILL/CLAY LNER, SLIGHTLY MOIST TO WET, BROWN, (CL, SC)

NOTES

- 1. EMBANKMENT SHALL MEET THE FOLLOWING SPECIFICATION AS STATED IN SECTIONS 02200 AND 02290 OF THE TECHNICAL SPECIFICATIONS FOR CHAMBERS DAM & RESERVOIR.
- 2. COMMON FILL: 90% OF MOD AT +/- 2% OPTIMUM MOISTURE CONTENT PER ASTM D698
- 3. DAM EMBANKMENT FILL: 95% OF MOD AT +/- 2% OPTIMUM MOISTURE CONTENT PER ASTM D698
- 4. STRUCTURAL FILL: 95% OF MOD AT +/- 2% OPTIMUM MOISTURE CONTENT PER ASTM D698

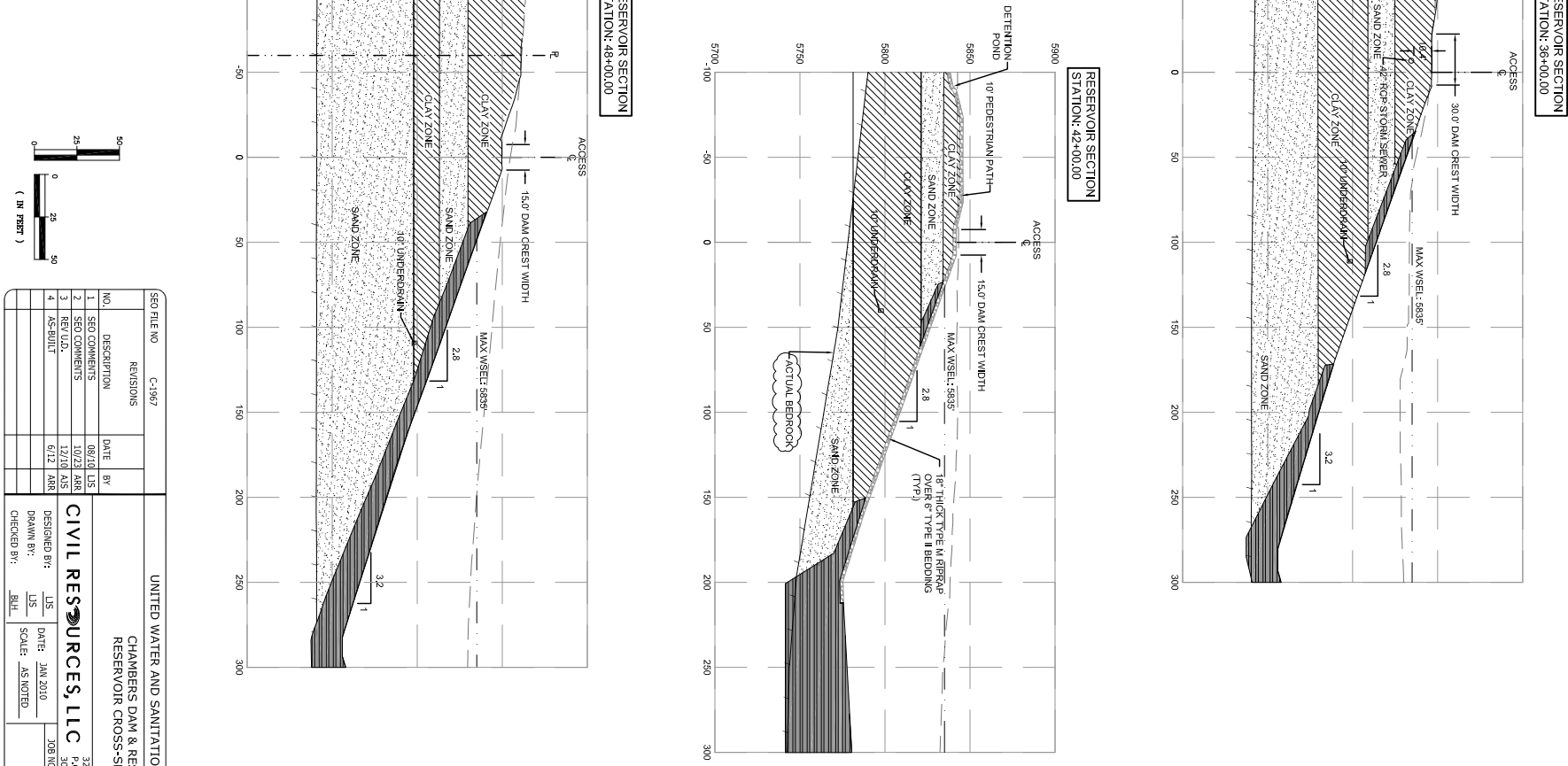
SEO FILE NO. C-1367				UNITED WATER AND SANITATION DISTRICT			
REVISIONS				CHAMBERS DAM & RESERVOIR			
REVISIONS				RESERVOIR CROSS-SECTIONS			
NO.	DESCRIPTION	DATE	BY	DESIGNED BY:	DATE:	JOBS NO.	DWG:
1	SEO COMMENTS	06/10/08	US	US	JAN 2010		51
2	SEO COMMENTS	10/23/08	US	US			
3	AS-BUILT	06/12/08	US	US			
				CHECKED BY:	SCALE:	AS NOTED	SHEET: 13A



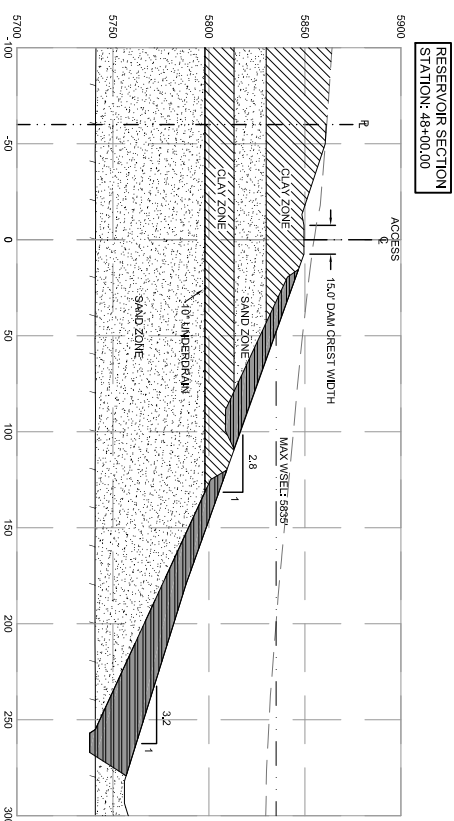
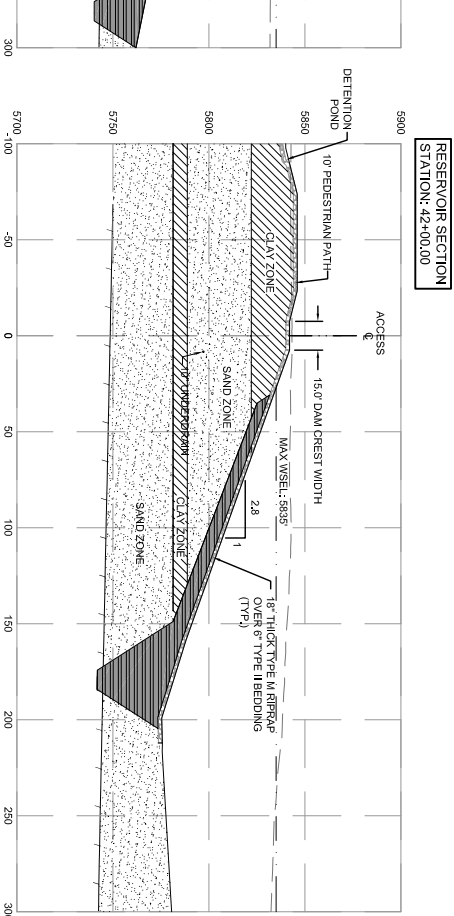
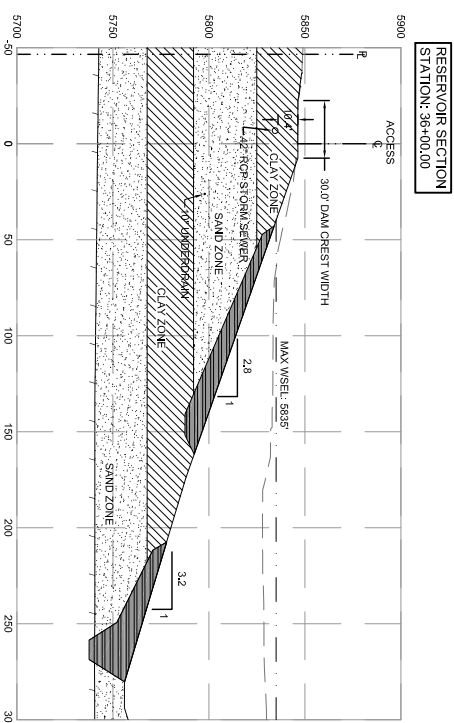


	CLAYSTONE, SANDY IN PARTS, SLITY & SANDY IF HARD WITH SMALL (1" - 3") IGNITE SPARS, PARTS TO VERY HARD, DRY TO MEDIUM MOIST, DARK GRAY AND BLACK (CL-C4)
	COMPACTED DAM FILL/CLAY LINER, SLIGHTLY MOIST TO WET, BROWN, (CL).
	CLEAN COMMON FILL, SLIGHTLY MOIST TO WET, BROWN, (CL, SC).

DESIGNED BY: <u>US</u>		DATE: <u>JAN 2010</u>		JOB NO. <u>X52</u>	
DRAWN BY: <u>US</u>		SCALE: <u>AS NOTED</u>		SHEET: <u>19</u>	
CHECKED BY: <u>RLH</u>					



DISTRICT	3th Street
RAVIOIR	333 4th Street, West, Westfield, CO 80150
CTIONS	333 4th St (E) 303 833 2850 (F)
	PMG:
	XS3
	SHEET:
	2P-CO1A



NOTES

1. COMPACTION SHALL MEET THE FOLLOWING SPECIFICATION AS STATED IN SECTIONS 02200 AND 02290 OF THE TECHNICAL SPECIFICATIONS FOR CHAMBERS DAM & RESERVOIR:

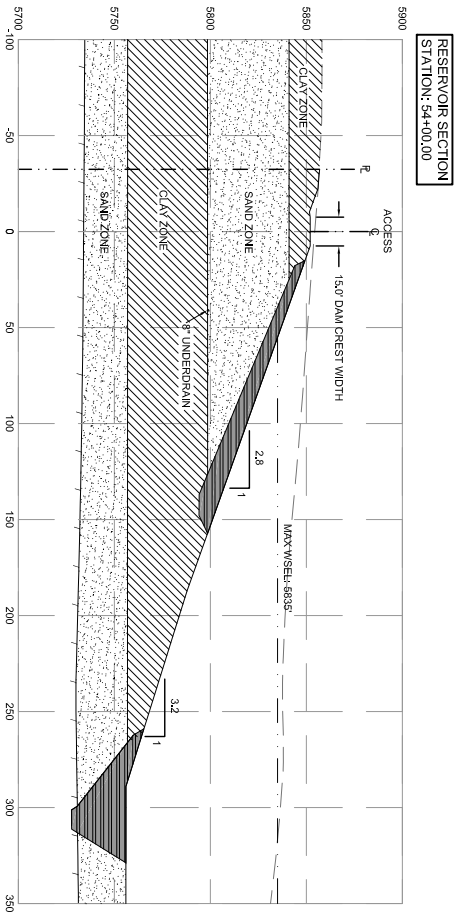
-COMMON FILL: 90% OF MOD AT +/- 2% OPTIMUM MOISTURE CONTENT PER ASTM D698

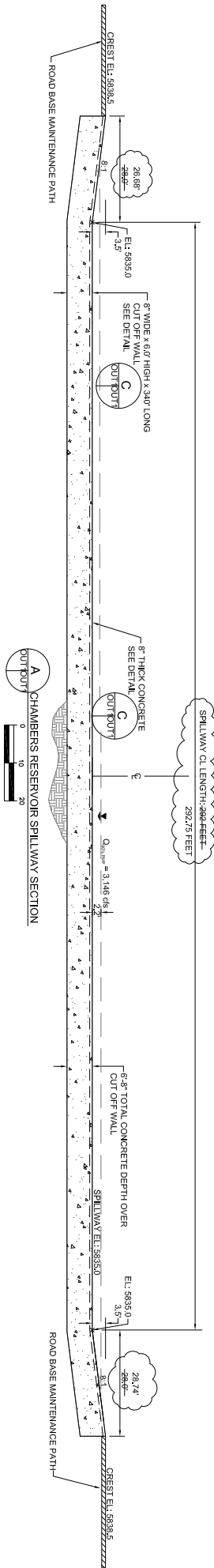
-DAM EMBANKMENT FILL: 95% OF MOD AT +/- 2% OPTIMUM MOISTURE CONTENT PER ASTM

-STRUCTURAL FILL: 95% OF MOD AT +/- 2% OPTIMUM MOISTURE CONTENT PER ASTM D698

NOTES

S&O FILE NO.		C-1567					
REVISIONS							
NO.	DESCRIPTION	DATE	BY				
1	S&O COMMENTS	09/10/18	LAR				
2	S&O COMMENTS	10/21/18	LAR				
CIVIL RESOURCES, LLC 323 6th Street 303 B33 1416 (f) 303 833 2850 (f) DESIGNED BY: <u>LIS</u> DRAWN BY: <u>LIS</u> CHECKED BY: <u>BLH</u> DATE: JAN 2010 SCALE: AS NOTED SHEET: 21							

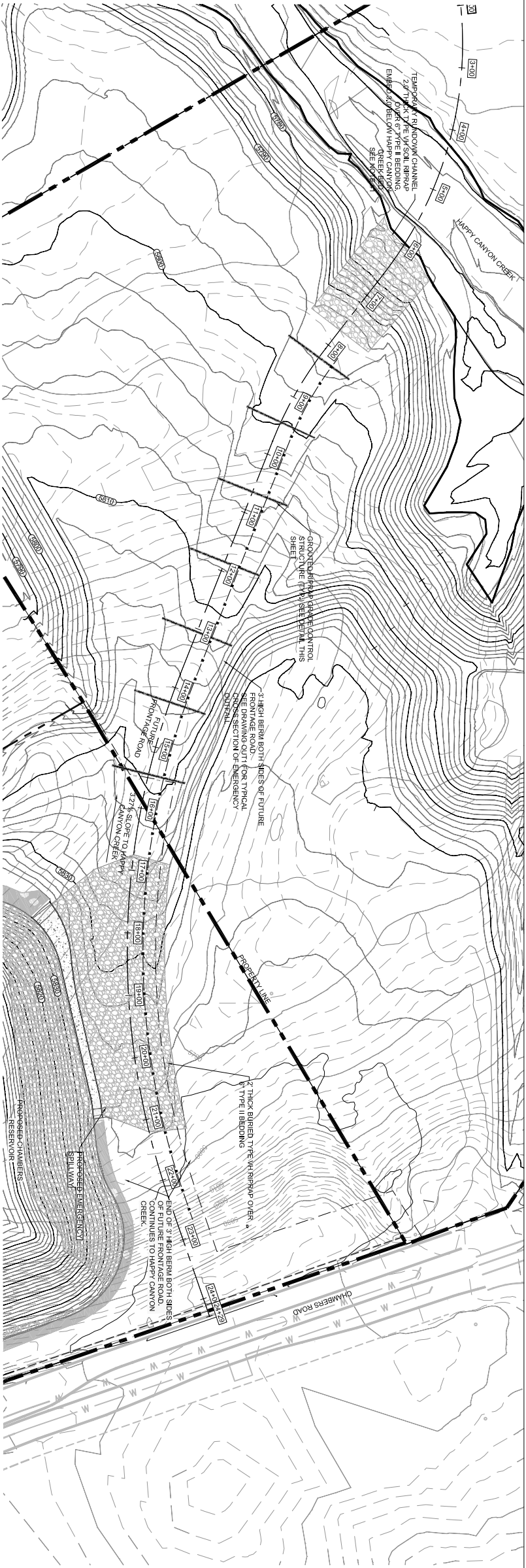




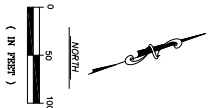
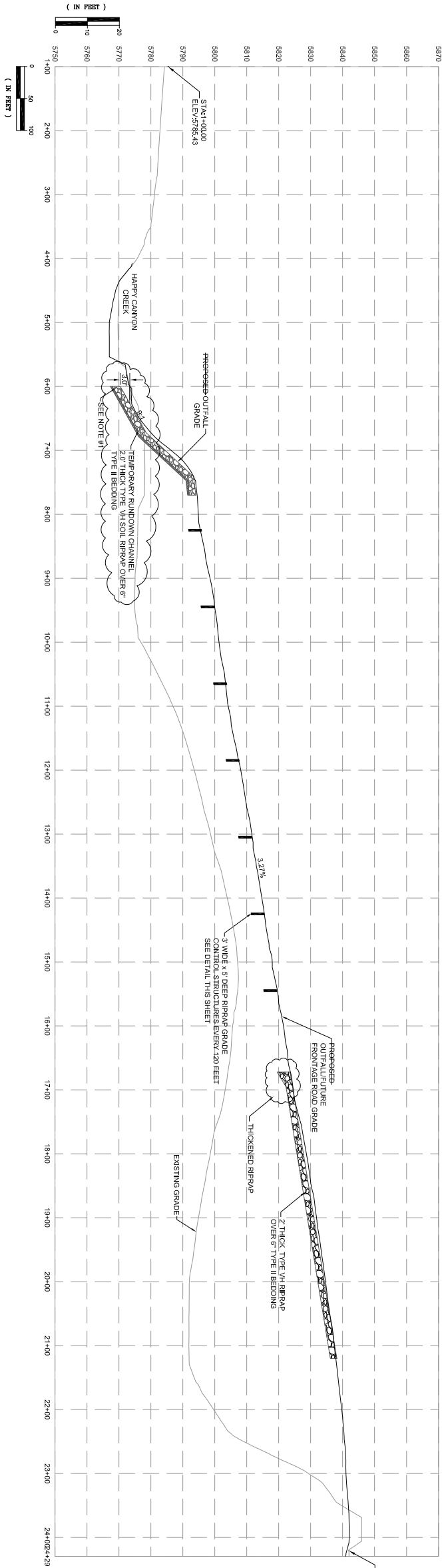
CONCRETE NOTES

1. ALL CONCRETE SHALL BE CLASS D.
2. ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS POURED.
3. ALL CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS SHALL BE APPROVED BY THE ENGINEER.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.
5. ALL DIMENSIONS ARE PERPENDICULAR TO THE CENTRELINE OF THE BOX.
6. ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED IN $\frac{3}{4}$ "
7. ALL TRANSVERSE REINFORCING SHALL BE NORMAL TO THE CENTRELINE OF THE BOX.
8. SPICE QUANTITIES FOR LONGITUDINAL AND TRANSVERSE BARS ARE NOT INCLUDED.
9. GRADE OR EPOXY COATED REINFORCING STEEL IS REQUIRED. REINFORCING STEEL SHALL BE PER DESIGN DRAWING CALL OUT.
10. THE MINIMUM LAP SPICE LENGTH FOR EPOXY COATED REINFORCING BARS SHALL

BAR SIZE:	#4	#5	#6	#7	#8	#9	#10	#11
SPACE LENGTH:	1'-3"	1'-6"	1'-10"	2'-2"	3'-8"	4'-8"	5'-11"	7'-3"



CHAMBERS RESERVOIR EMERGENCY OUTFALL PLAN AND PROFILE



NOTE:
1. CONTRACTOR SHALL PLACE FILL ABOVE
NATURAL GROUND WITHIN FLOODPLAIN AND
FLOODWAY DELINEATION.

SEO FILE NO. C-1967		UNITED WATER AND SANITATION DISTRICT	
REVISIONS		CHAMBERS DAM & RESERVOIR	
NO.	DESCRIPTION	DATE	BY
1	REV SPILLWAY	10/10/10	AS
2	AS-BUILTS	3/12/10	AKS
DESIGNED BY: AKS		DATE: MARCH 2010	323 5th Street
DRAWN BY: BHL		SCALE: AS NOTED	P.O. Box 5801, Frederick, CO 80530
CHECKED BY: BHL			PH: 303.532.8550 (F)
			DWG NO. 0072
			SHEET: 24

