

MEMORANDUM TO FILE



DATE	2/27/17	BY	TPatterson	PAGE	OF	FILE NO.
PROJECT	Compark Village South - Belford Ave					<input checked="" type="checkbox"/> MEETING
SUBJECT	Happy Canyon Creek					<input type="checkbox"/> TELEPHONE
ATTENDANCE/WITH	Chad Twiss + Zach Grady (FHU), Amie Drucker (Manhard) Jacob James (Parker - phone), UDFCD (Teresa)					

NOTES	FOLLOW UP ACTION
Discussed conceptual modifications to the design.	
Relocating the trail to a better hydraulic alignment farther DS.	
Discussed trying to elevate the trail under Belford bridge as much as possible to reduce frequency of inundation	Criteria
Drop #2 (just U/S of bridge) - location looks pretty good	rec. 5-yr + 10' clearance width + 10' clearance (8' Min.)
Drop #3 (middle U/S of bridge) shift DS + to the east	
Drop #4 (upper U/S drop) shift horiz location OK; discussed opening up right overbank to help relieve some of the pressure off D/S left bank then extend cutoff wall farther out	
Low flow through bridge to realign creek away from trail and east of center pier; advised	

MEMORANDUM TO FILE



DATE	BY	PAGE	OF	FILE NO.
PROJECT				<input type="checkbox"/> MEETING <input type="checkbox"/> TELEPHONE
SUBJECT				
ATTENDANCE/WITH				

NOTES	FOLLOW UP ACTION
<p>that rippap lining not necessary and could likely be counter productive</p>	
<p>Team hasn't consulted w/ environmental for Corps permitting restrictions - advised that this should be the next step as this may drive the design somewhat.</p>	
<p>Drop #1 - @ Ped Crossing Sheetpile cut off wall right through existing sanitary sewer. - realignment of trail may alleviate this. If cut off needs to be short on west side OK. - Parker concurred.</p>	



Know what's below.
Call before you dig.

GROUT NOTES

BOULDER PLACEMENT NOTES:

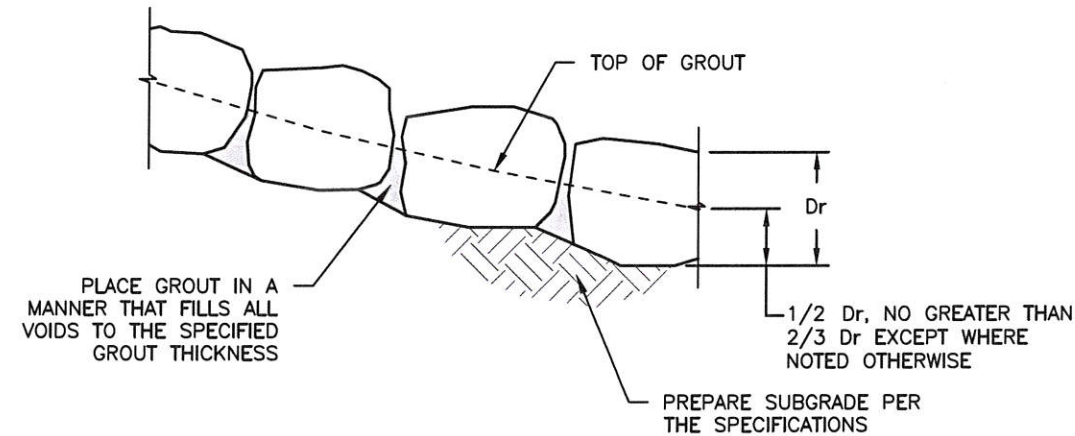
1. PLACE BOULDERS WITH THE REQUIRED BOULDER HEIGHT VERTICAL. PLACE BOULDERS AS TIGHTLY TOGETHER AS POSSIBLE (WITHOUT TOUCHING) WHILE PROVIDING ENOUGH ROOM BETWEEN THEM TO THOROUGHLY VIBRATE THE GROUT AND TO ENSURE NO GAPS IN THE GROUT. THE SMALL DIMENSION OF A 2X4 CAN BE USED AS A GUIDE TO CHECK MINIMUM SPACING.
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.

MATERIAL SPECIFICATIONS:

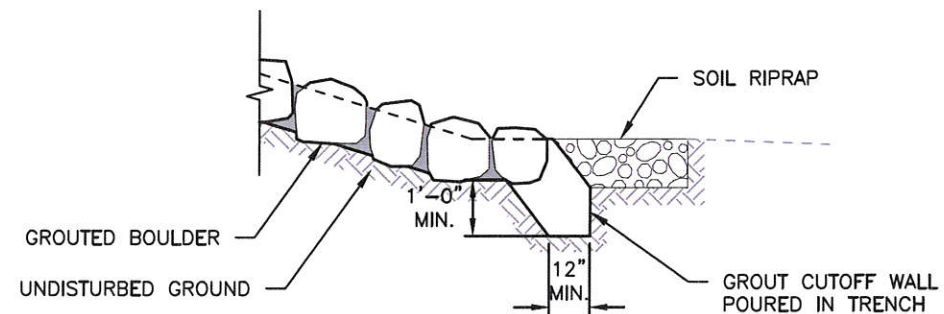
1. ALL GROUT SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH EQUAL TO 3200 PSI.
2. ONE CUBIC YARD OF GROUT SHALL HAVE A MINIMUM OF SIX (6) SACKS OF TYPE II PORTLAND CEMENT.
3. A MAXIMUM OF 25% TYPE F FLY ASH MAY BE SUBSTITUTED FOR THE PORTLAND CEMENT.
4. THE AGGREGATE SHALL BE COMPRISED OF 70% NATURAL SAND (FINES) AND 30% 3/8-INCH ROCK (COARSE).
5. THE GROUT SLUMP SHALL BE BETWEEN 4-INCHES TO 6-INCHES.
6. AIR ENTRAINMENT SHALL BE BETWEEN 5.5% AND 7.5%.
7. TO CONTROL SHRINKAGE AND CRACKING, 1.5 POUNDS OF FIBERMESH, OR EQUIVALENT, SHALL BE USED PER CUBIC YARD OF GROUT.
8. COLOR ADDITIVE IN REQUIRED AMOUNTS SHALL BE USED WHEN SO SPECIFIED BY CONTRACT.

GROUT PLACEMENT SPECIFICATIONS:

1. SPECIAL PROCEDURES SHALL BE REQUIRED FOR GROUT 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.
2. GROUT SHALL BE DELIVERED BY MEANS OF A LOW PRESSURE (LESS THAN 10 PSI) GROUT PUMP USING A 2-INCH DIAMETER (MAXIMUM) NOZZLE.
3. 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.
4. ALL GROUT BETWEEN BOULDERS SHALL BE TREATED WITH A BROOM FINISH.
5. AFTER GROUT PLACEMENT, EXPOSED BOULDER FACES SHALL BE CLEANED AND FREE OF GROUT.
6. ALL FINISHED GROUT SURFACES SHALL BE SPRAYED WITH A CLEAR LIQUID MEMBRANE CURING COMPOUND AS SPECIFIED IN ASTM C309.



GROUTED BOULDER PLACEMENT DETAIL
N.T.S.



STRUCTURE EDGE WALL DETAIL
N.T.S.

I:\115360-01 - Compark at Belford\CADD\Hydraulics\Drawings\Happy Cyn Creek Drop Structure - Dustin.Shaklee

Print Date: 11/18/2016 8:37:15 AM	<input checked="" type="checkbox"/> (R-X) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
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6300 South Syracuse Way, Suite 600 Centennial, CO 80111 tel 303.721.1440 fax 303.721.0832	

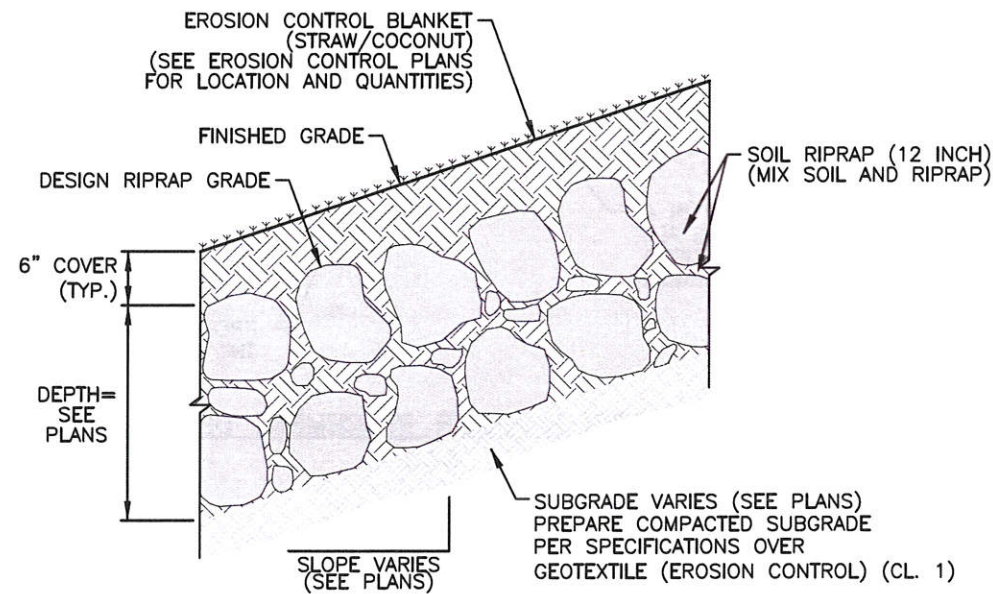
Sheet Revisions		
Date	Comments	Initials

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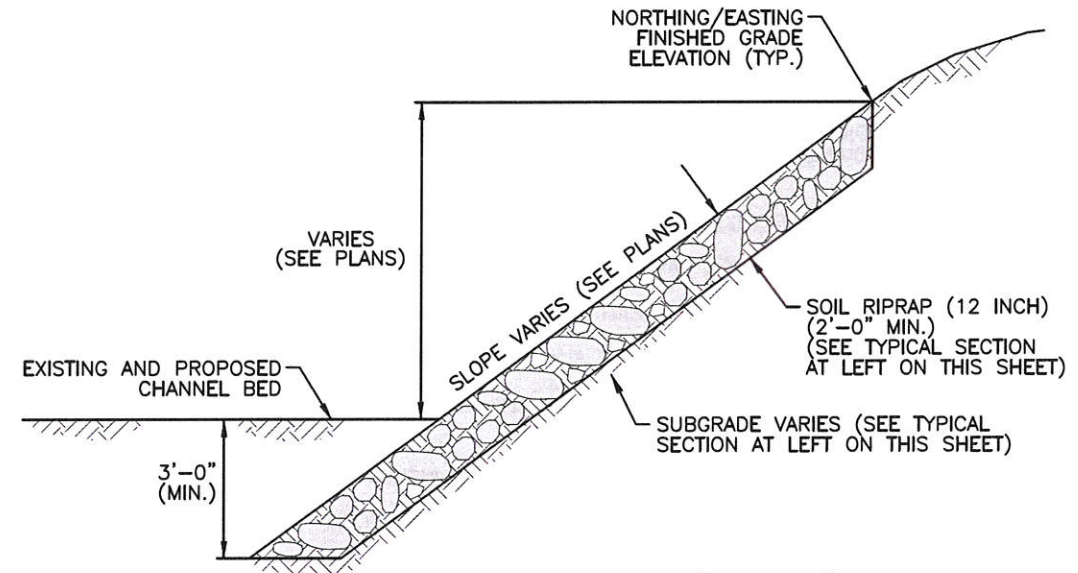
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No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT	Sheets: DD-06 of 18	Sheet Number 48
Void:	Subset: Drainage		



Know what's below.
Call before you dig.



**SOIL RIPRAP (12 INCH)
TYPICAL SECTION**
N.T.S.



**SOIL RIPRAP (12 INCH)
CHANNEL BANKS
TYPICAL SECTION**
N.T.S.

Ordinary riprap detail with bedding material

SOIL RIPRAP (12 INCH) NOTES:

- (1) SOIL RIPRAP DETAILS ARE APPLICABLE TO SLOPED AREAS REFER TO THE SITE PLAN FOR ACTUAL LOCATION AND LIMITS.
- (2) MIX UNIFORMLY 70% RIPRAP BY VOLUME WITH 30% OF APPROVED SOIL BY VOLUME FROM THE ENGINEER PRIOR TO PLACEMENT.
- (3) PLACE STONE-SOIL MIX TO RESULT IN SECURELY INTERLOCKED ROCK AT THE DESIGN THICKNESS AND GRADE COMPACT AND LEVEL TO ELIMINATE ALL VOIDS AND ROCKS PROJECTING ABOVE DESIGN RIPRAP TOP GRADE.
- (4) CRIMP MULCH AS CALLED FOR IN THE PLANS AND SPECIFICATIONS.

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Print Date: 11/18/2016 8:37:07 AM
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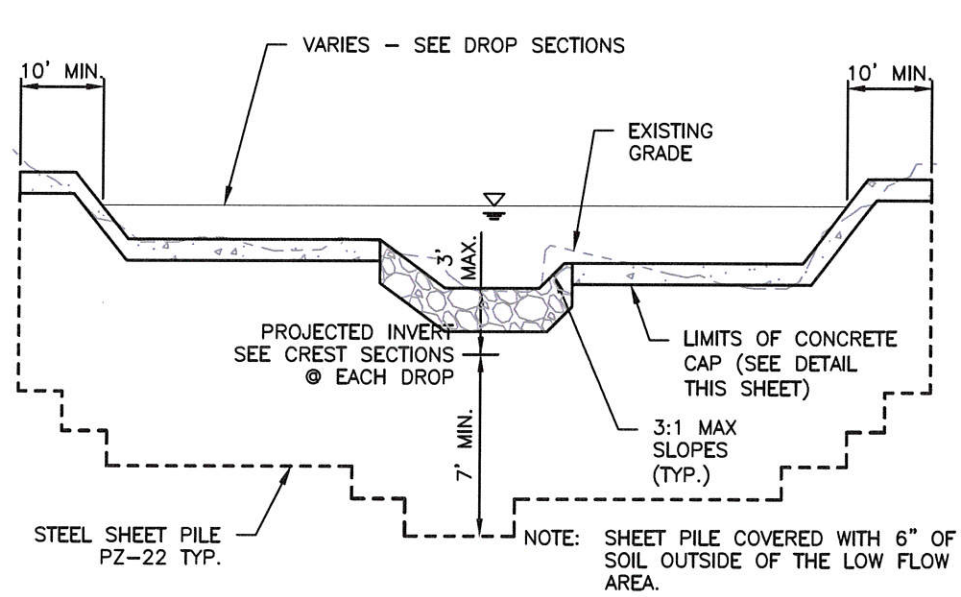
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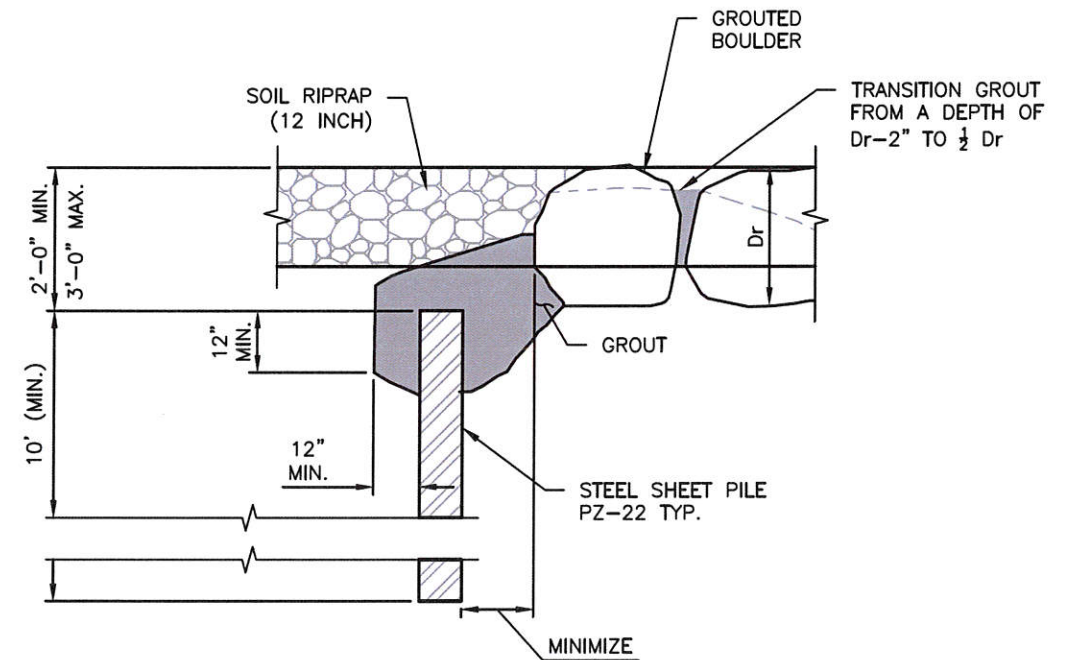
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Revised:	Detailer: KLT		
Void:	Subset: Drainage	Sheets: DD-05 of 18	Sheet Number 47



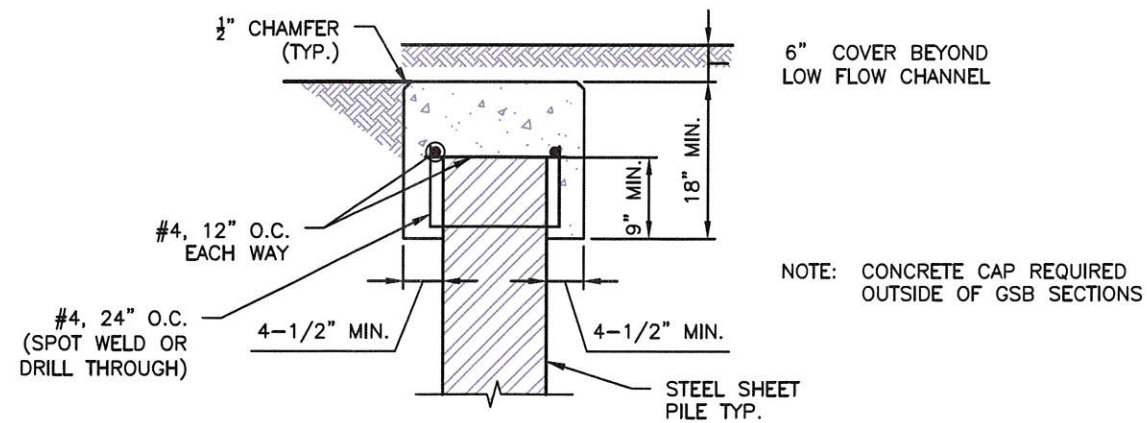
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SHEET PILE SECTION
N.T.S.



SHEET PILE CUTOFF CONNECTION (GSB)
N.T.S.



CONCRETE SHEET PILE CAP DETAIL
N.T.S.

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No Revisions:				
Revised:	Designer: CDT	Structure Numbers		
	Detailer: KLT			
Void:	Subset: Drainage	Sheets: DD-04 of 18	Sheet Number	46

HAPPY CANYON CREEK DROP STRUCTURE GRADING POINT DATA

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
G1				FINISHED GRADE
G2				FINISHED GRADE
G3				FINISHED GRADE
G4				FINISHED GRADE
G5				FINISHED GRADE
G6				FINISHED GRADE
G7				FINISHED GRADE
G8				FINISHED GRADE
G9				FINISHED GRADE
G10				FINISHED GRADE
G11				FINISHED GRADE
G12				FINISHED GRADE
G13				FINISHED GRADE
G14				FINISHED GRADE
G15				FINISHED GRADE
G16				FINISHED GRADE
G17				FINISHED GRADE
G18				FINISHED GRADE
G19				FINISHED GRADE
G20				FINISHED GRADE
G21				FINISHED GRADE
G22				FINISHED GRADE
G23				FINISHED GRADE
G24				FINISHED GRADE
G25				FINISHED GRADE
G26				FINISHED GRADE
G27				FINISHED GRADE
G28				FINISHED GRADE
G29				FINISHED GRADE
G30				FINISHED GRADE
G31				FINISHED GRADE
G32				FINISHED GRADE
G33				FINISHED GRADE
G34				FINISHED GRADE
G35				FINISHED GRADE

HAPPY CANYON CREEK DROP STRUCTURE SOIL RIPRAP (12 INCH) POINT DATA

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
SR1				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR2				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR3				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR4				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR5				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR6				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR7				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR8				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR9				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR10				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR11				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR12				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR13				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR14				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR15				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR16				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR17				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR18				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR19				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR20				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR21				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR22				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR23				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.
SR24				LIMITS OF SOIL RIPRAP (12 INCH) - FINISHED GRADE EL.

HAPPY CANYON CREEK DROP STRUCTURE STEEL SHEET PILE CUTOFF WALL POINT DATA

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
W1				SHEET PILE CUTOFF WALL - FINISHED GRADE EL.
W2				SHEET PILE CUTOFF WALL - FINISHED GRADE EL.
W3				SHEET PILE CUTOFF WALL - FINISHED GRADE EL.
W4				SHEET PILE CUTOFF WALL - FINISHED GRADE EL.
W5				SHEET PILE CUTOFF WALL - FINISHED GRADE EL.

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As Constructed	BELFORD-HAPPY CANYON CREEK HAPPY CANYON CREEK DROP STRUCTURE POINT DATA DETAIL		Project No./Code
No Revisions:	Designer: CDT	Structure Numbers	Sheet Number 44
Revised:	Detailer: KLT	Sheets: DD-02 of 18	
Void:	Subset: Drainage		

DROP STRUCTURE TABULATION

INDEX			ITEM NO.	CONTRACT ITEM	UNIT	GSB	
BOOK	PAGE	SHEET				PLAN	AS CONST.
			207	STOCKPILE TOPSOIL	CY	XX	
			420	GEOTEXTILE (EROSION CONTROL) (CLASS 1)	SY	XX	
			501	STEEL SHEET PILING	SF	XX	
			506	RIPRAP (12 INCH)	CY	XX	
			506	SOIL RIPRAP (12 INCH)	CY	XX	
			506	18 INCH GROUTED BOULDERS	CY	XX	

Min. Size 24"

No fabric. Use bedding material.

18 INCH GROUTED BOULDERS SHALL BE PAID FOR AS GROUTED RIPRAP (18 INCH)

SEE EROSION CONTROL PLANS FOR TABULATION OF EROSION CONTROL ITEMS.

FOR UNCLASSIFIED EXCAVATION SEE EARTHWORK SUMMARY. COST OF EXCAVATION FOR ALL GROUTED RIPRAP AND SOIL RIPRAP IS INCLUDED IN THE COST OF THE BID ITEM.

DROP STRUCTURE TABULATION QUANTITIES HAVE BEEN CARRIED FORWARD TO THE SUMMARY OF APPROXIMATE QUANTITIES SHEETS

I:\115360-01 - Compark at Belford\CADD\Hydraulics\Drawings\Happy Cyn Creek Drop Structure\, Dustin.Shaklee

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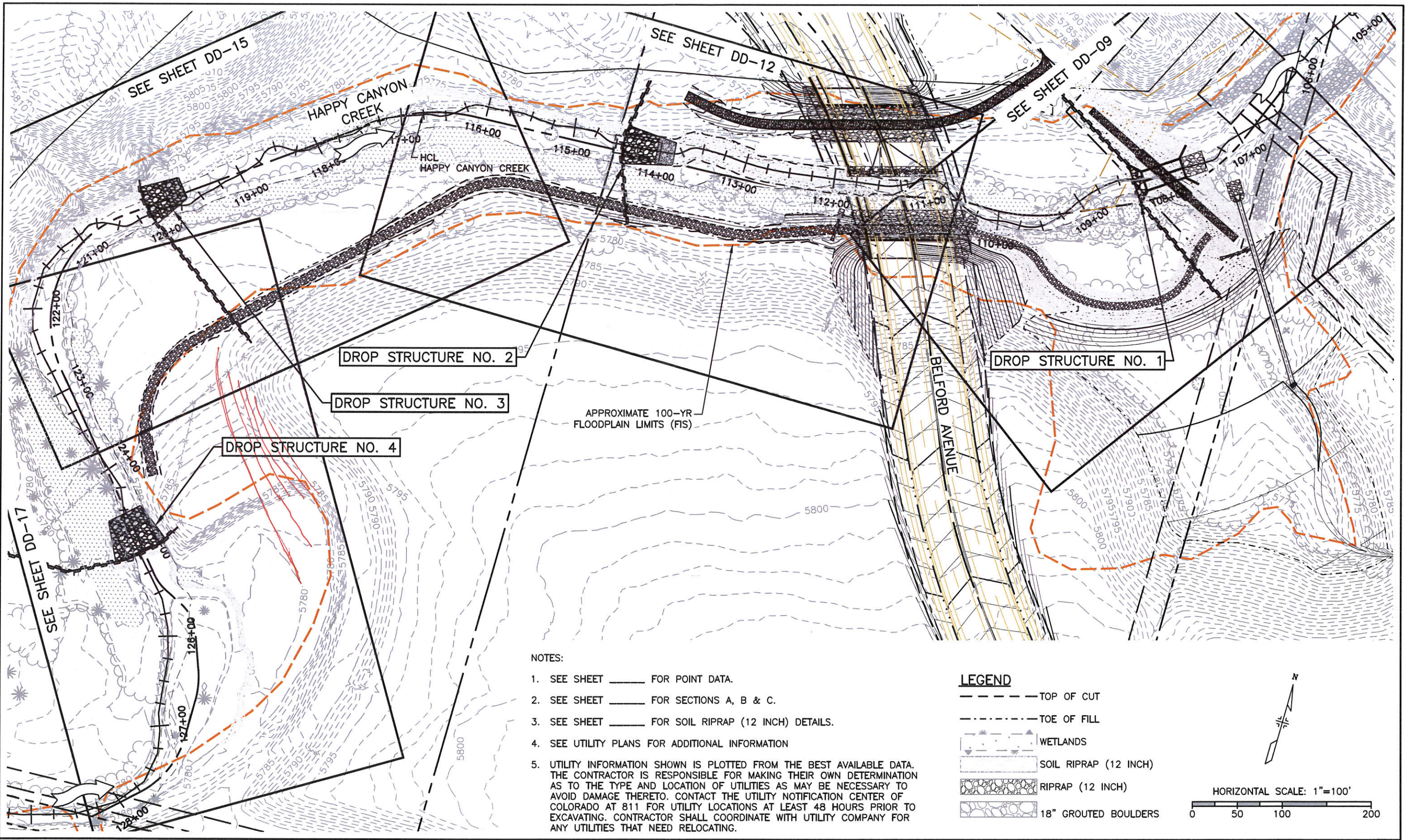
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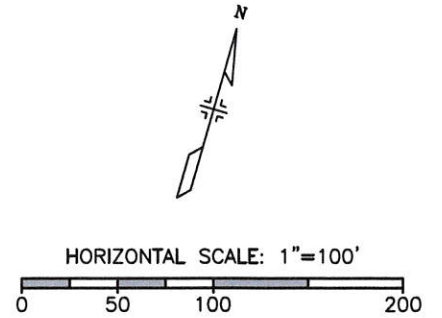
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No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT		
Void:	Subset: Drainage	Sheets: DD-01 of 18	Sheet Number 43

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- NOTES:**
1. SEE SHEET _____ FOR POINT DATA.
 2. SEE SHEET _____ FOR SECTIONS A, B & C.
 3. SEE SHEET _____ FOR SOIL RIPRAP (12 INCH) DETAILS.
 4. SEE UTILITY PLANS FOR ADDITIONAL INFORMATION
 5. UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.

- LEGEND**
- TOP OF CUT
 - - - - - TOE OF FILL
 - [Symbol] WETLANDS
 - [Symbol] SOIL RIPRAP (12 INCH)
 - [Symbol] RIPRAP (12 INCH)
 - [Symbol] 18" GROUTED BOULDERS



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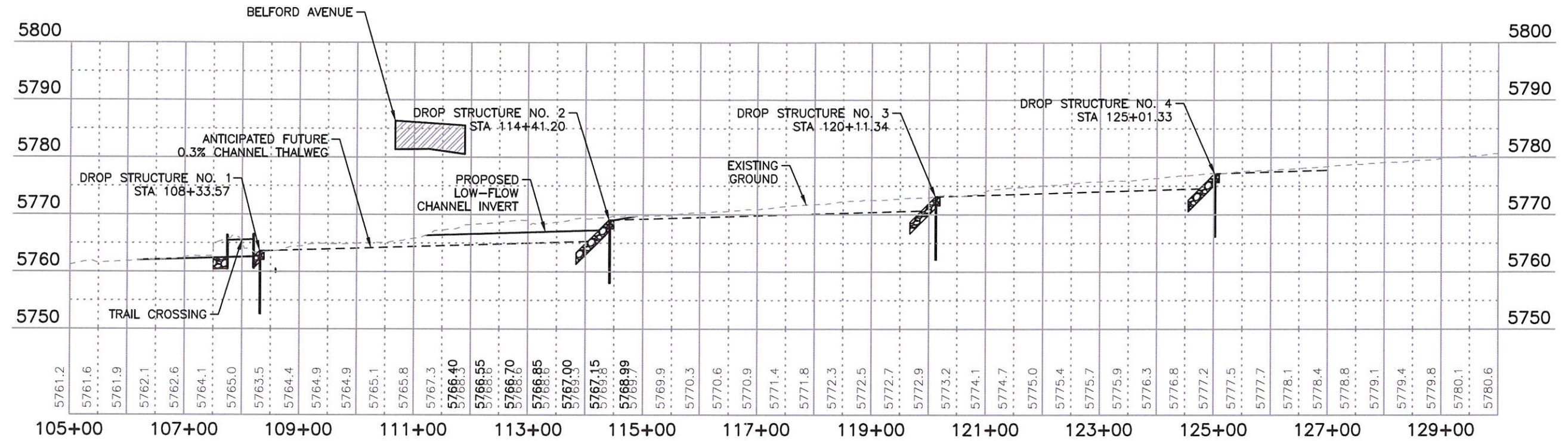
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Date	Comments	Initials	
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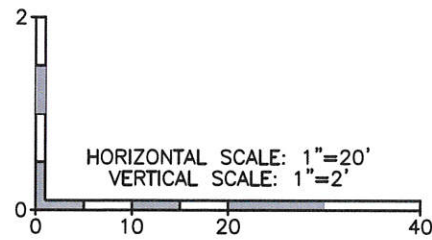
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	Revised:	Designer:	CDT	Structure			
	Void:	Detailer:	KLT	Numbers			
		Subset:	Drainage	Sheets:	DD-07 of 18	Sheet Number	49

NOTES

1. UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.
2. SEE UTILITY PLANS FOR ADDITIONAL INFORMATION.



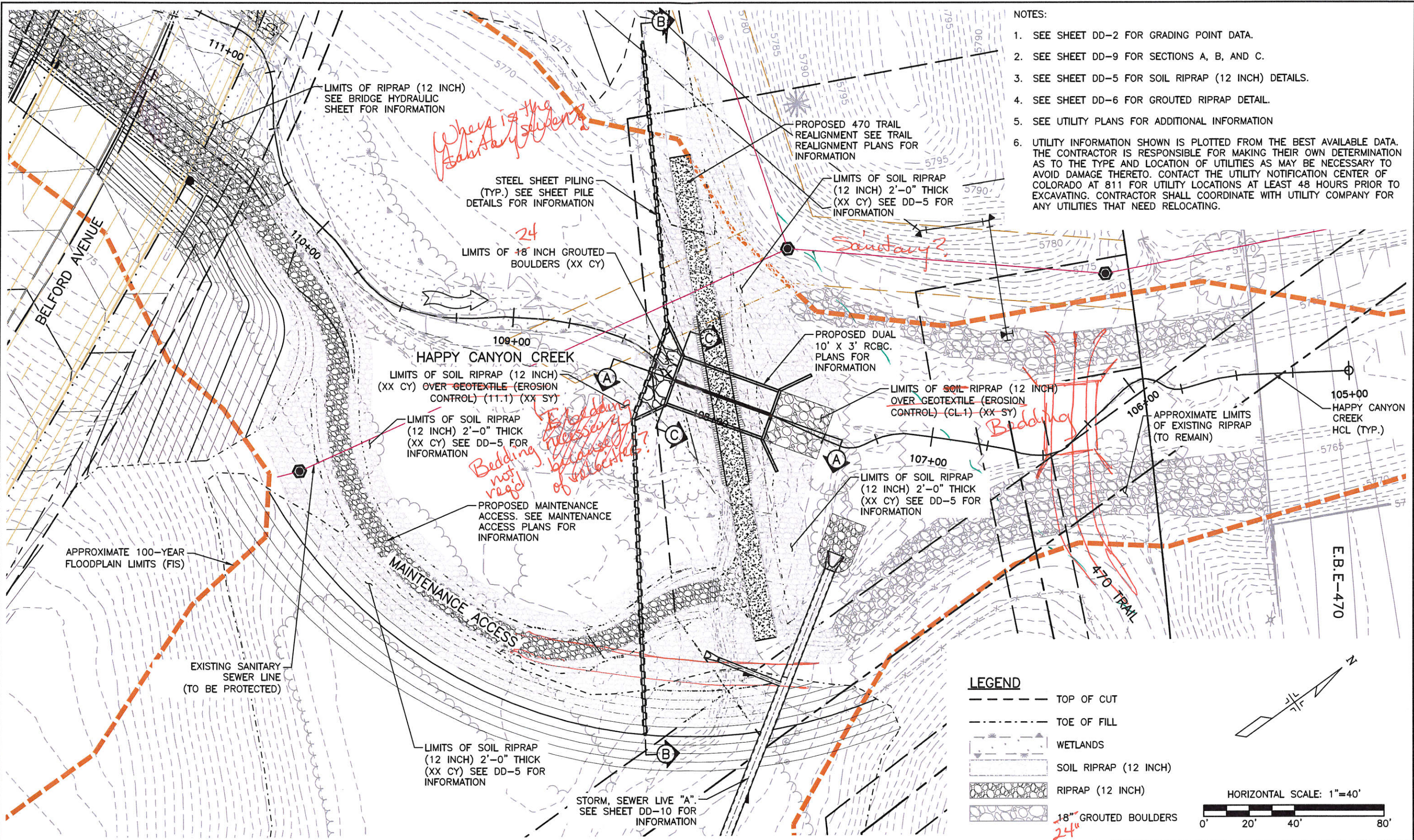
HAPPY CANYON CREEK PROFILE



I:\115360-01 - Compark at Belford\CADD\Hydraulics\Drawings\Happy Cyn Creek Drop Structure\, Dustin,Shaklee

Print Date: 11/18/2016 8:40:03 AM	Sheet Revisions			<p>Manhard CONSULTING LTD 9009 E. Arapahoe Court, Suite 110, Centennial, CO 80112 ph:303.708.0500 f:303.708.0400 manhard.com Civil Engineers • Surveyors • Water Resource Engineers • Water & Wastewater Engineers Construction Managers • Environmental Scientists • Landscape Architects • Planners</p>	As Constructed	BELFORD-HAPPY CANYON CREEK		Project No./Code
File Name: H115360-01DROP08?rofile.dwg	Date	Comments	Initials		No Revisions:	PROFILE		
Horizontal Scale: 1"=100' Vertical Scale: 1"=4'					Revised:	Designer: CDT	Structure Numbers	
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- NOTES:
1. SEE SHEET DD-2 FOR GRADING POINT DATA.
 2. SEE SHEET DD-9 FOR SECTIONS A, B, AND C.
 3. SEE SHEET DD-5 FOR SOIL RIPRAP (12 INCH) DETAILS.
 4. SEE SHEET DD-6 FOR GROUTED RIPRAP DETAIL.
 5. SEE UTILITY PLANS FOR ADDITIONAL INFORMATION
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LEGEND

- TOP OF CUT
 - TOE OF FILL
 - WETLANDS
 - SOIL RIPRAP (12 INCH)
 - RIPRAP (12 INCH)
 - 18" GROUTED BOULDERS
- HORIZONTAL SCALE: 1"=40'
- 0' 20' 40' 80'

Print Date: 11/18/2016 8:42:15 AM
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Sheet Revisions			
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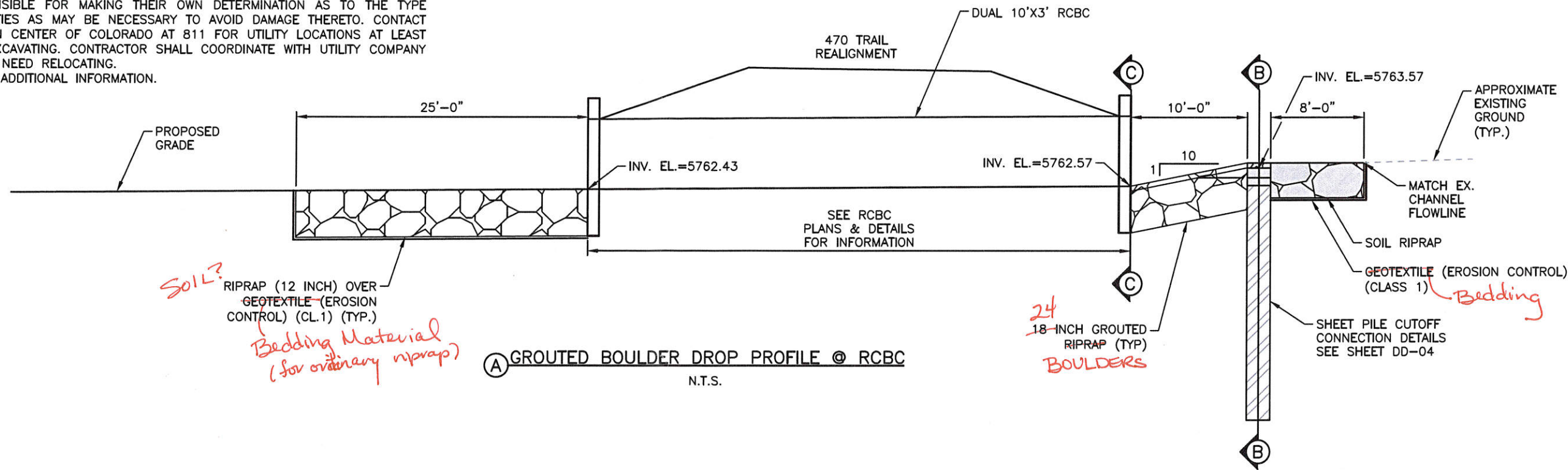
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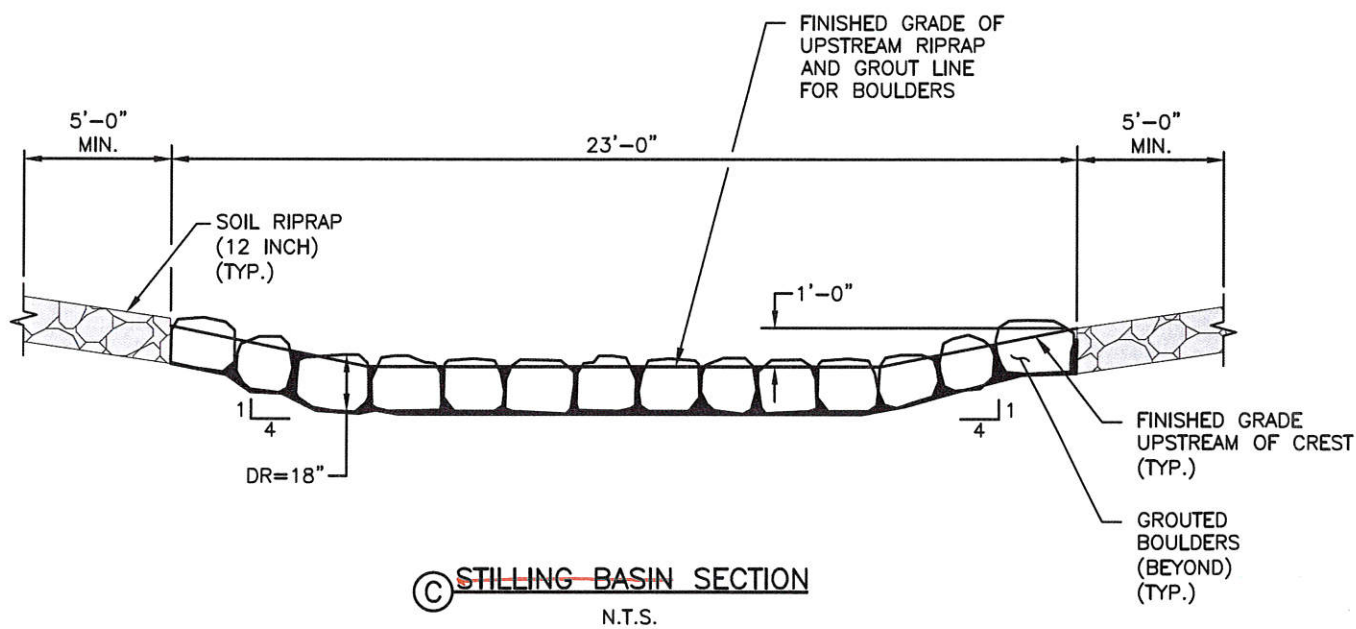
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No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT	Sheets: DD-09 of 18	Sheet Number 51
Void:	Subset: Drainage		

NOTES

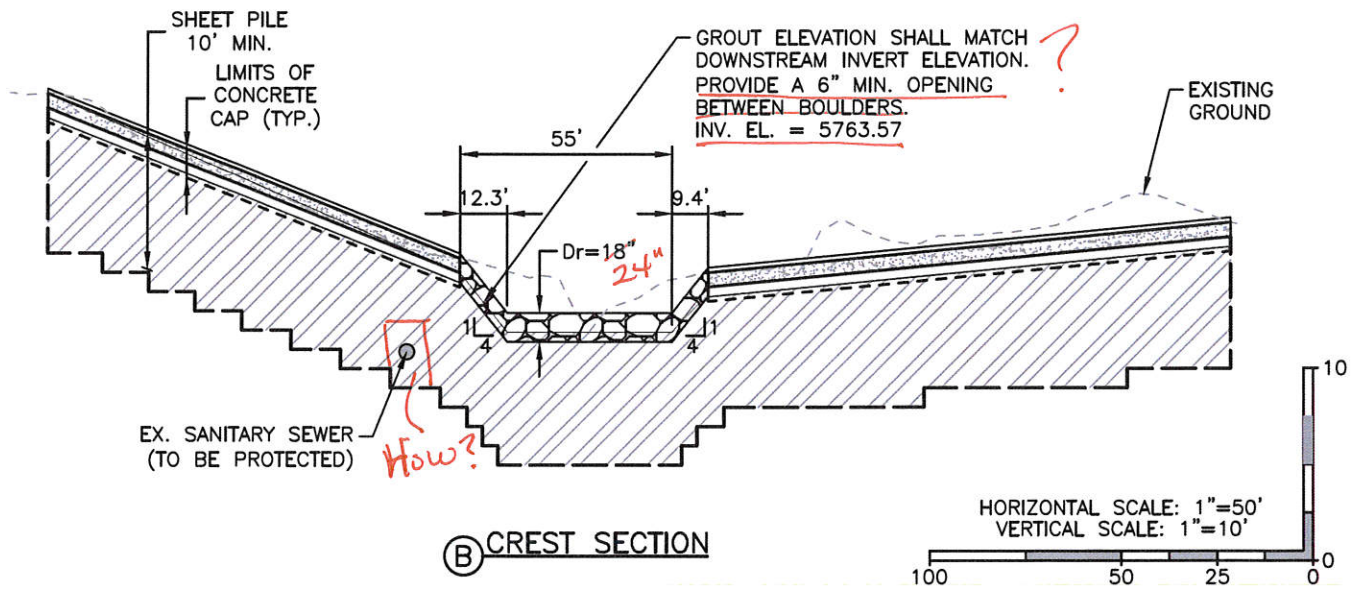
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- SEE UTILITY PLANS FOR ADDITIONAL INFORMATION.



(A) GROUDED BOULDER DROP PROFILE @ RCBC
N.T.S.



(C) STILLING BASIN SECTION
N.T.S.



(B) CREST SECTION

DROP STRUCTURE NO. 1

HAPPY CANYON CREEK HYDRAULICS

Q100 = 8,303 C.F.S
Q100 VELOCITY = 5.66 F.P.S
FROUDE No. = 0.30
FOR INFO ONLY

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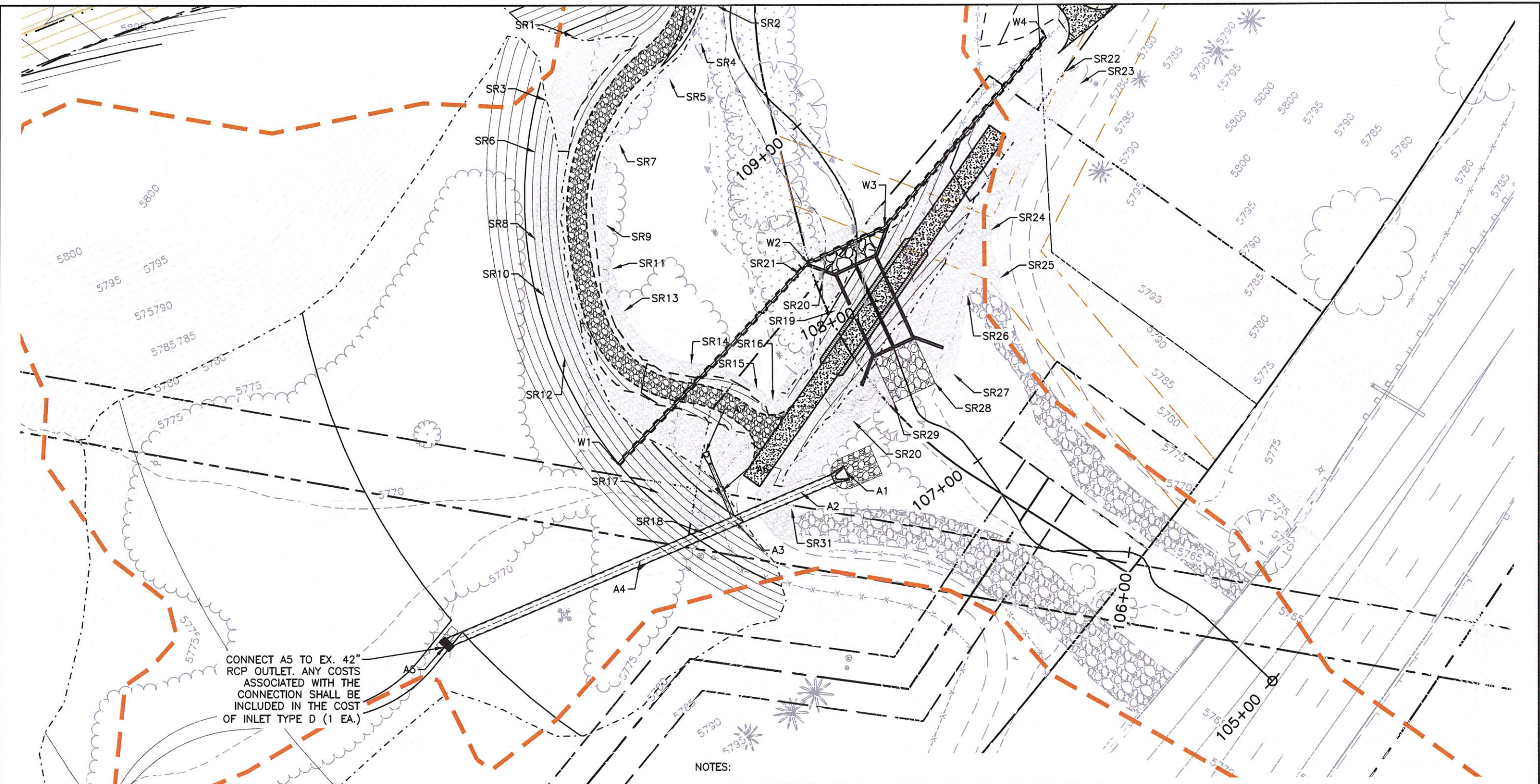
Sheet Revisions			
(R-X)	Date	Comments	Initials



As Constructed	BELFORD-HAPPY CANYON CREEK HAPPY CANYON CREEK DROP STRUCTURE DROP NO. 1 PROFILE/DETAILS		Project No./Code
No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT		
Void:	Subset: Drainage	Sheets: DD-10 of 18	Sheet Number 52

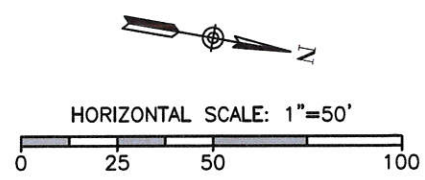
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CONNECT A5 TO EX. 42" RCP OUTLET. ANY COSTS ASSOCIATED WITH THE CONNECTION SHALL BE INCLUDED IN THE COST OF INLET TYPE D (1 EA.)

- NOTES:
- UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.
 - SEE SHEET _____ FOR POINT DATA.



I.D.	NORTHING & EASTING	ITEM	LENGTH	PAY DEPTH
A1	N: 27899.87, E: 94884.63	48" RCES		
A2		48" RCP	54'	
A3	N: 27854.05, E: 94914.30	MANHOLE SLAB BASE		10'
A4		48" RCP	157'	
A5	N: 27721.77, E: 95000.49	TYPE D INLET		10'
A6		18" RCP	30'	
A7	N: 27836.83, E: 94887.70	18" RECS		

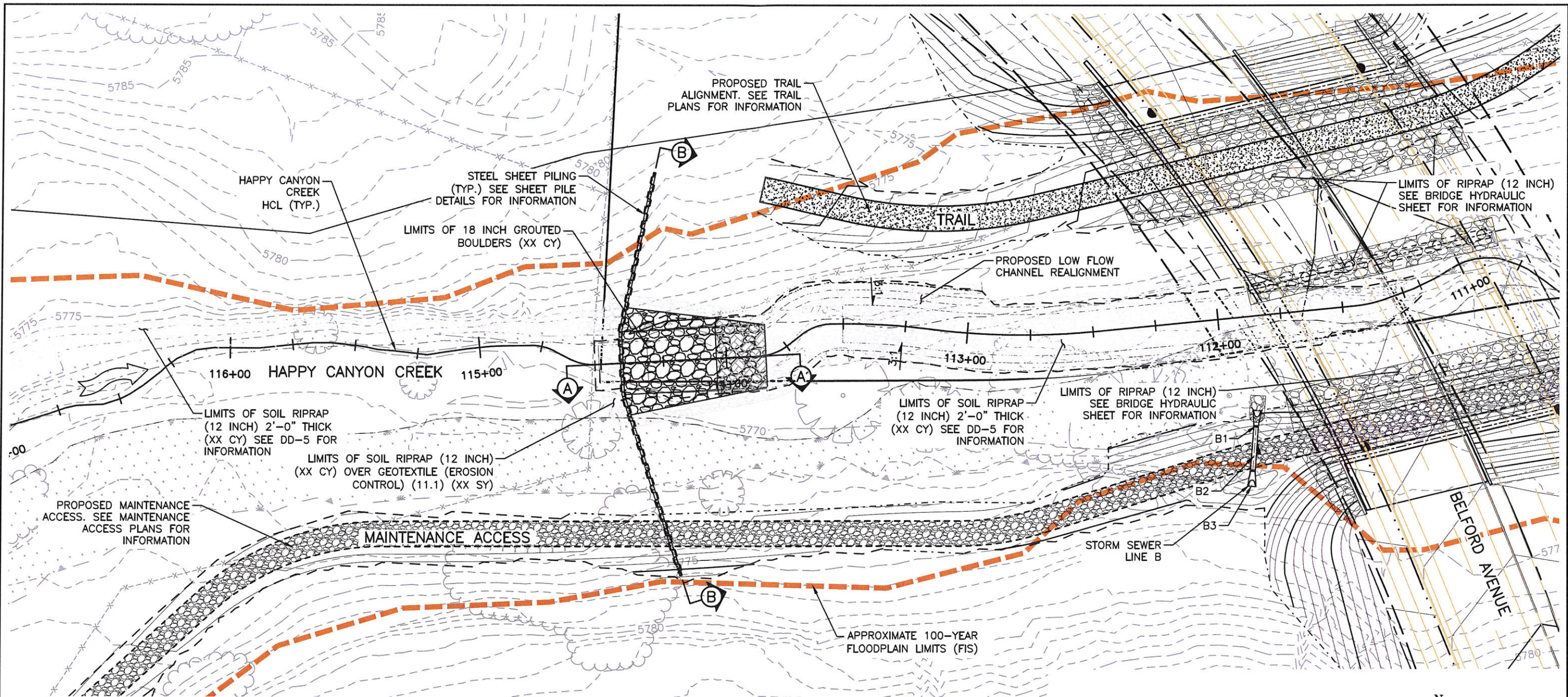
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Sheet Revisions			
(R-X)	Date	Comments	Initials



As Constructed	BELFORD-HAPPY CANYON CREEK HAPPY CANYON CREEK DROP STRUCTURE GRADING DETAIL			Project No./Code
No Revisions:	Designer:	CDT	Structure	
Revised:	Detailer:	KLT	Numbers	
Void:	Subset:	Drainage	Sheets:	DD-11 of 18
				Sheet Number 53

I:\115360-01 - Compark at Belford\CADD\Hydraulics\Drawings\Happy Cyn Creek Drop Structure - Dustin.Shaklee

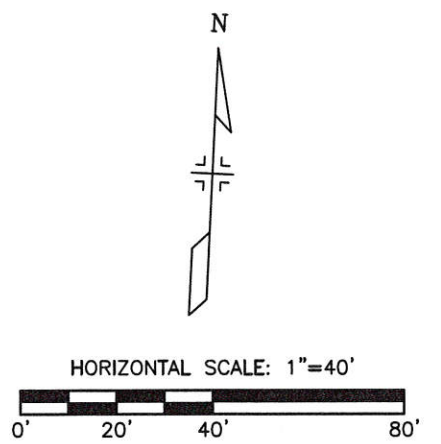


- NOTES:
1. SEE SHEET DD-2 FOR GRADING POINT DATA.
 2. SEE SHEET DD-4, AND DD-5 FOR SECTIONS A, AND B.
 3. SEE SHEET DD-5 FOR SOIL RIPRAP (12 INCH) DETAILS.
 4. SEE SHEET DD-6 FOR GROUDED RIPRAP DETAIL.
 5. SEE UTILITY PLANS FOR ADDITIONAL INFORMATION
 6. UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.

I.D.	NORTHING & EASTING	ITEM	LENGTH	PAY DEPTH
B1	N: 27756.42, E: 94460.52	18" RCES		
B2		18" RCP	18'	
B3	N: 27733.11, E: 94459.99	18" RCES		

LEGEND

- TOP OF CUT
- TOE OF FILL
- WETLANDS
- SOIL RIPRAP (12 INCH)
- RIPRAP (12 INCH)
- 18" GROUDED BOULDERS



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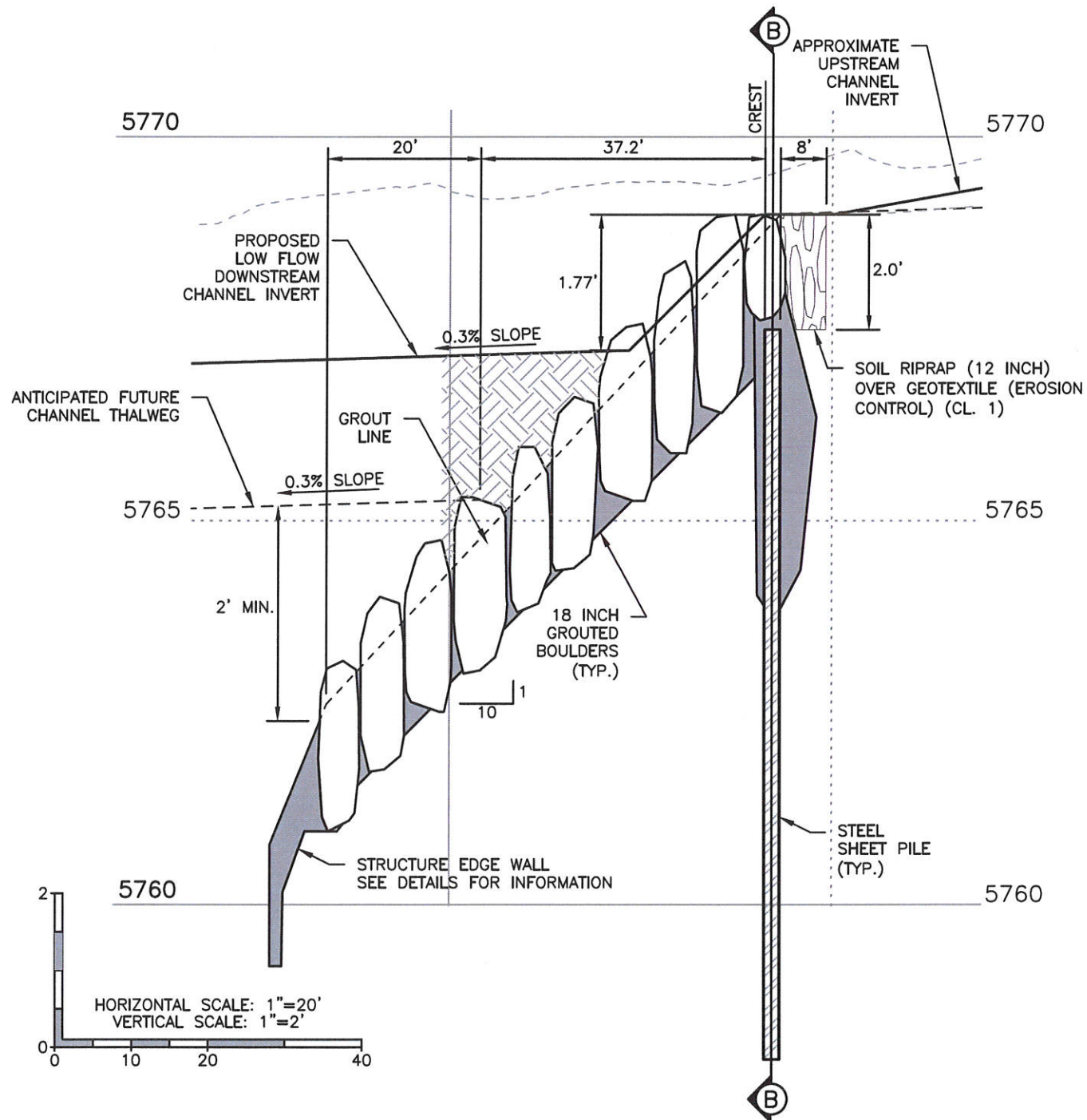
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Date	Comments	Initials	



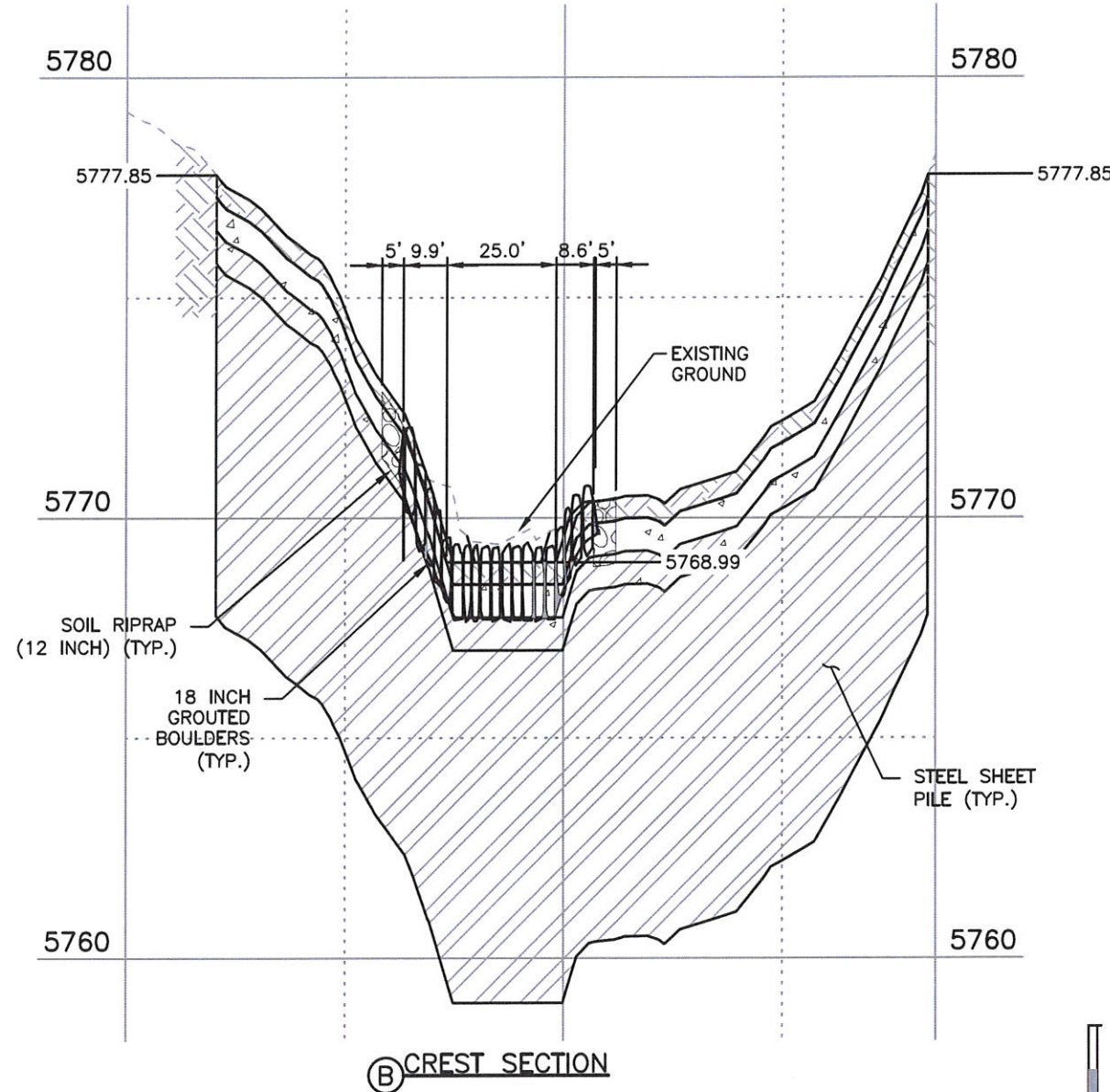
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No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT	Sheets: DD-12 of 18	Sheet Number 54
Void:	Subset: Drainage		

NOTES

1. UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.
2. SEE UTILITY PLANS FOR ADDITIONAL INFORMATION.



(A) GROUTED BOULDER DROP PROFILE



(B) CREST SECTION

DROP STRUCTURE NO. 2

HAPPY CANYON CREEK HYDRAULICS
 Q100 = 8,303 C.F.S.
 Q100 VELOCITY = 14.03 F.P.S.
 FROUDE No. = 0.95
 FOR INFO ONLY

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 6300 South Syracuse Way, Suite 600
 Centennial, CO 80111
 tel 303.721.1440
 fax 303.721.0832

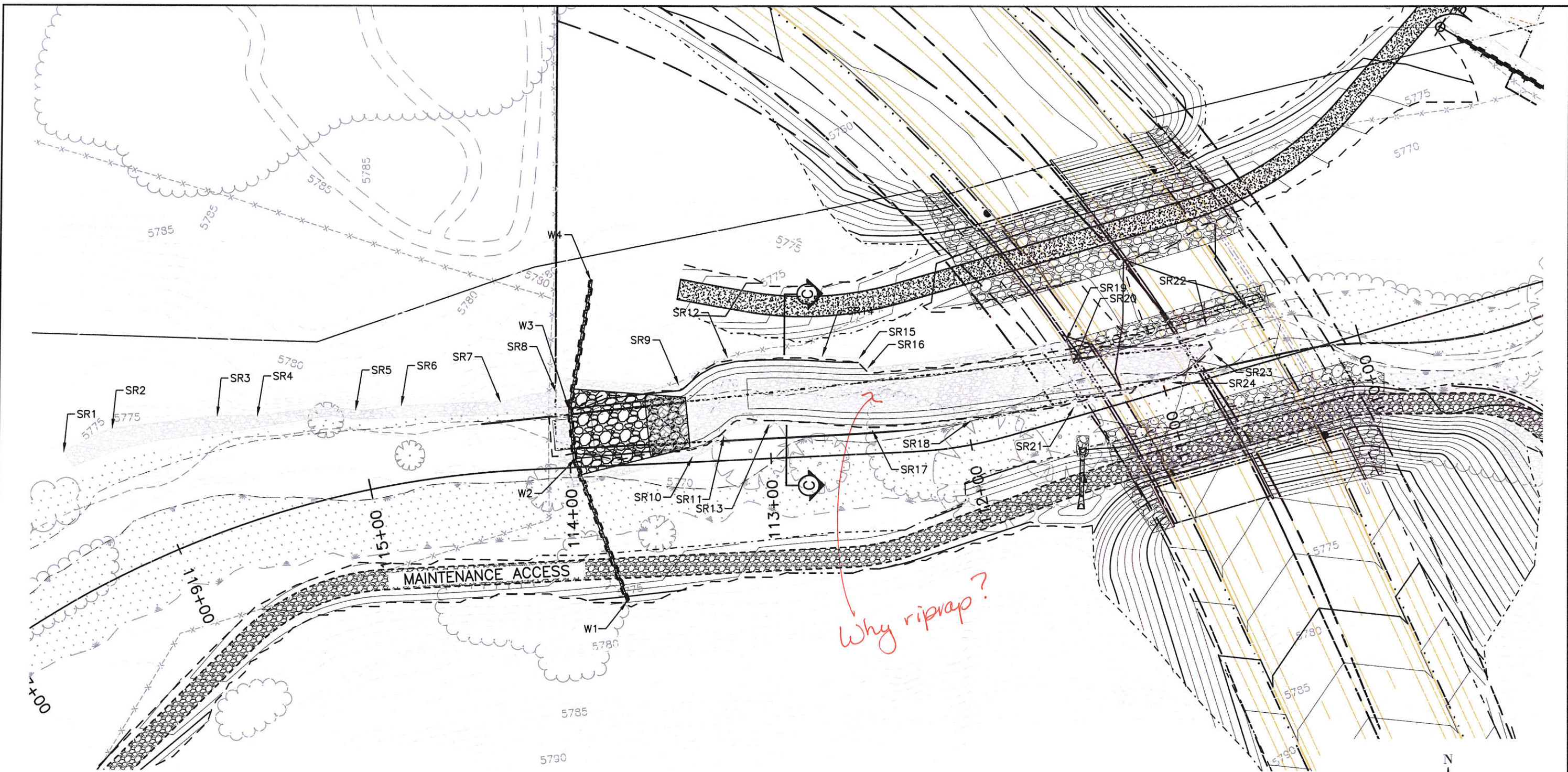
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Date	Comments	Initials	
			(R-X)



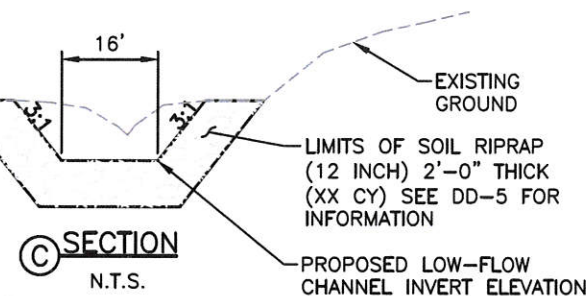
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No Revisions:	DROP NO. 2 PROFILE/DETAILS		
Revised:	Designer: CDT	Structure Numbers	
Void:	Detailer: KLT	Sheets: DD-13 of 18	Sheet Number 55
	Subset: Drainage		

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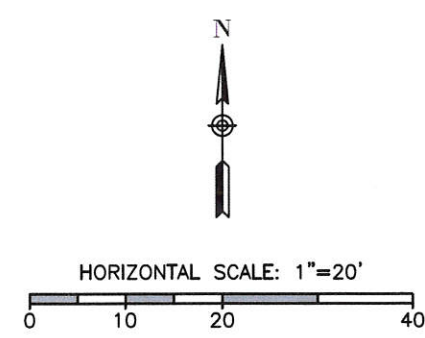


Why riprap?



NOTES:

- UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.
- SEE SHEET _____ FOR POINT DATA.



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Sheet Revisions			
(R-X)	Date	Comments	Initials

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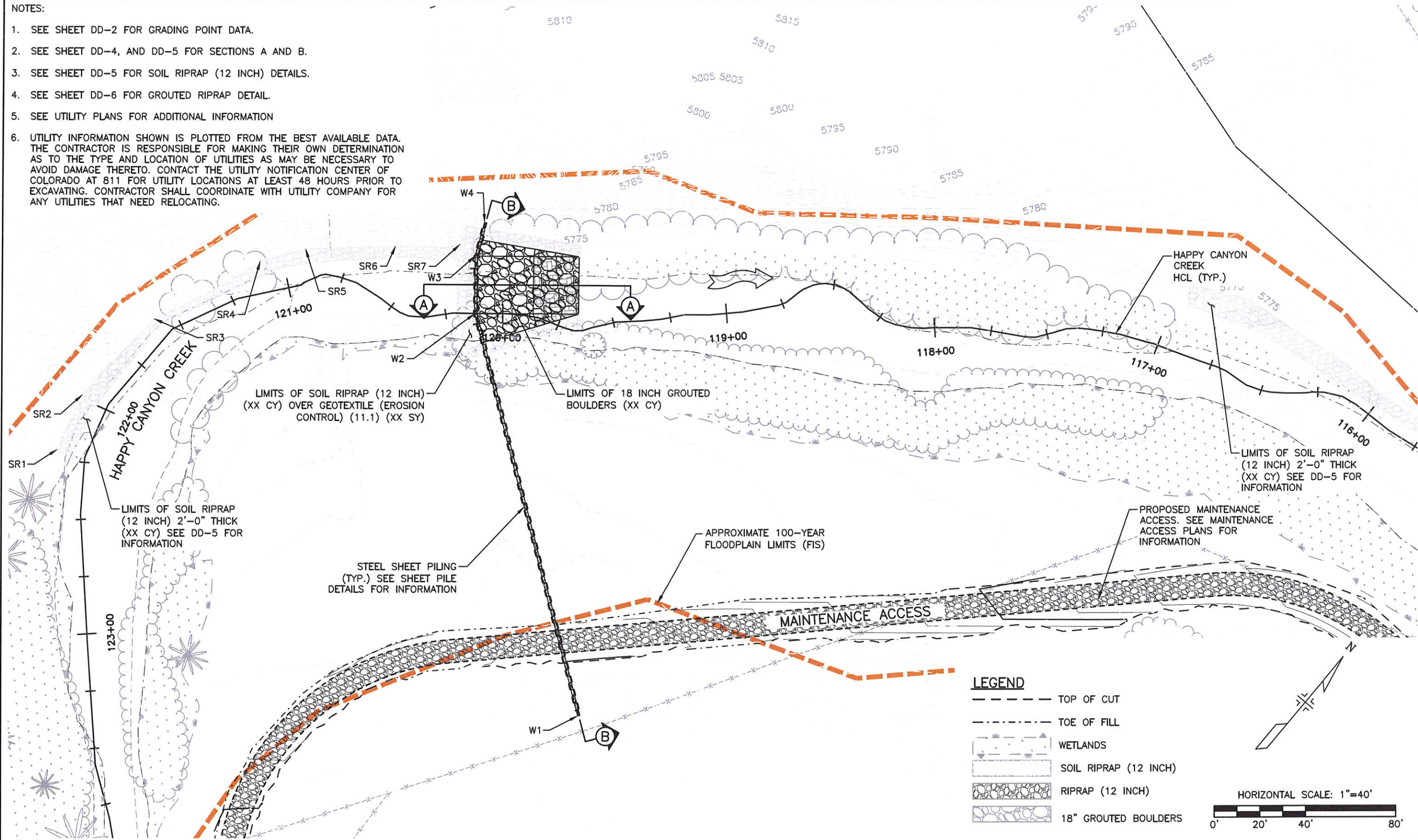
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No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT		
Void:	Subset: Drainage	Sheets: DD-14 of 18	Sheet Number 56

Project No./Code
 Sheet Number 56

NOTES:

1. SEE SHEET DD-2 FOR GRADING POINT DATA.
2. SEE SHEET DD-4, AND DD-5 FOR SECTIONS A AND B.
3. SEE SHEET DD-5 FOR SOIL RIPRAP (12 INCH) DETAILS.
4. SEE SHEET DD-6 FOR GROUTED RIPRAP DETAIL.
5. SEE UTILITY PLANS FOR ADDITIONAL INFORMATION
6. UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.

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Print Date: 11/18/2016 8:52:42 AM
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 Horizontal Scale: 1"=20' Vertical Scale: N.T.S.

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Sheet Revisions			
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 8008 E. Arapahoe Court, Suite 110, Centennial, CO 80112 ph 303.708.0500 fx 303.708.0400 manhard.com
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As Constructed	No Revisions:
Revised:	Void:

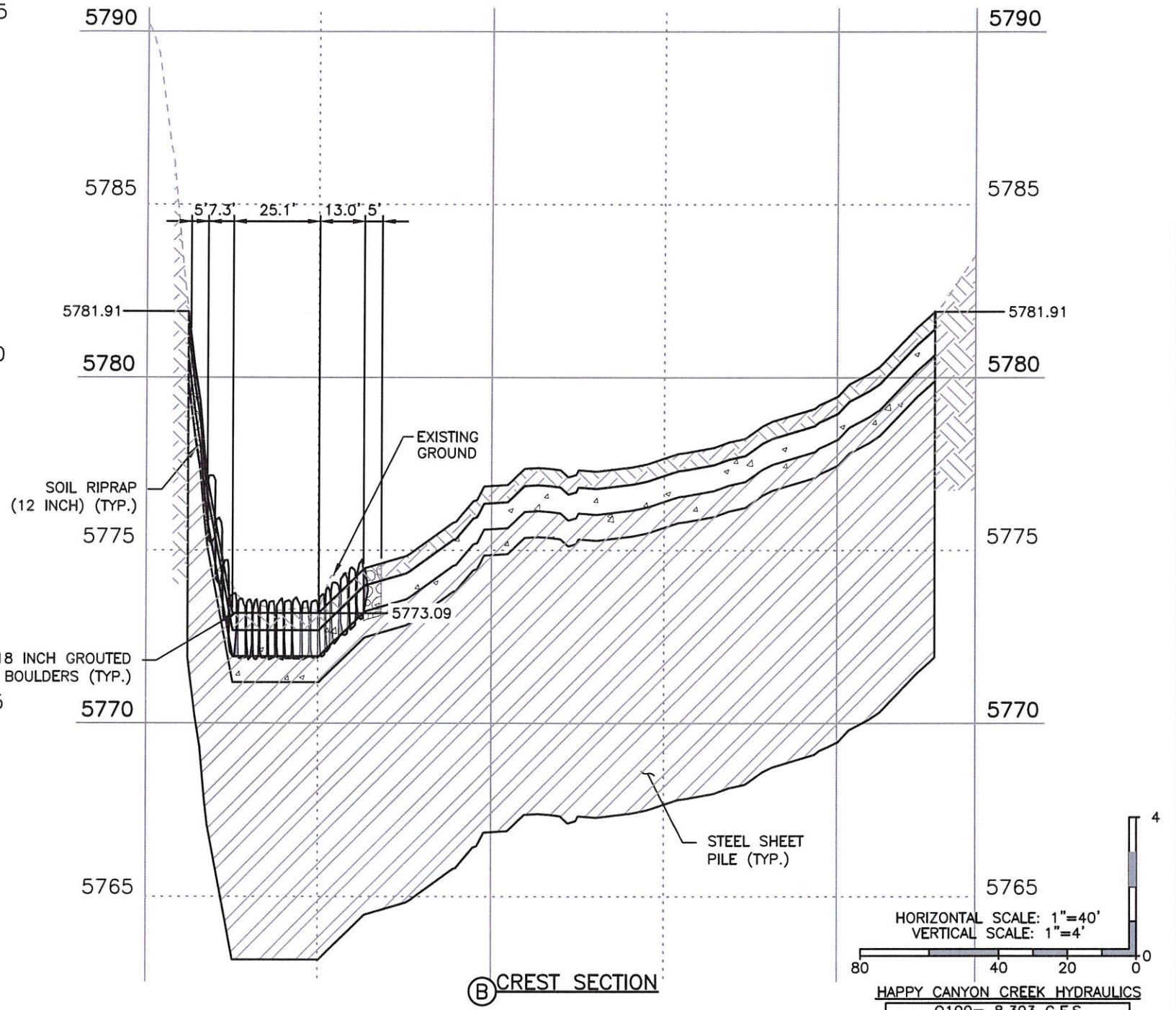
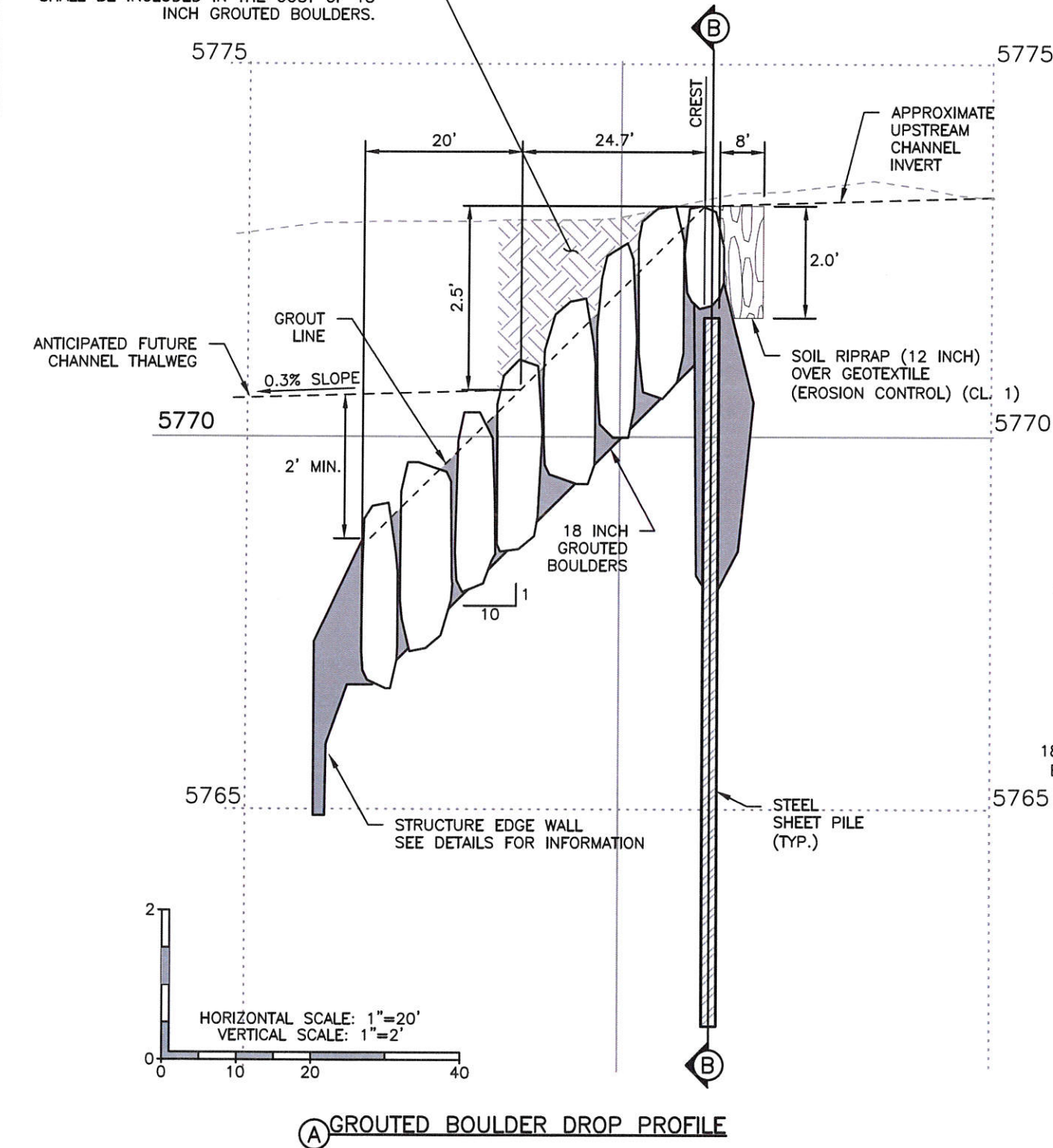
BELFORD-HAPPY CANYON CREEK HAPPY CANYON CREEK DROP STRUCTURE DROP NO. 3 PLAN			
Designer:	CDT	Structure Numbers	
Detailer:	KLT	Sheets:	DD-15 of 18
Subset:	Drainage		

Project No./Code	
Sheet Number	57

MATERIAL TO BE EXCAVATED FOR 18 INCH GROUTED BOULDERS SHALL BE STOCKPILED AND REAPPLIED AFTER DROP STRUCTURE IS CONSTRUCTED. ALL EXCAVATION, DEWATERING, STOCKPILING, AND PLACEMENT OF MATERIAL SHALL BE INCLUDED IN THE COST OF 18 INCH GROUTED BOULDERS.

NOTES

- UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.
- SEE UTILITY PLANS FOR ADDITIONAL INFORMATION.



DROP STRUCTURE NO. 3

HAPPY CANYON CREEK HYDRAULICS
 Q100 = 8,303 C.F.S.
 Q100 VELOCITY = 12.71 F.P.S.
 FROUDE No. = 0.87
 FOR INFO ONLY

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Print Date: 11/18/2016 8:53:39 AM
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 6300 South Syracuse Way, Suite 600
 Centennial, CO 80111
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 fax 303.721.0832

Sheet Revisions			
Date	Comments	Initials	



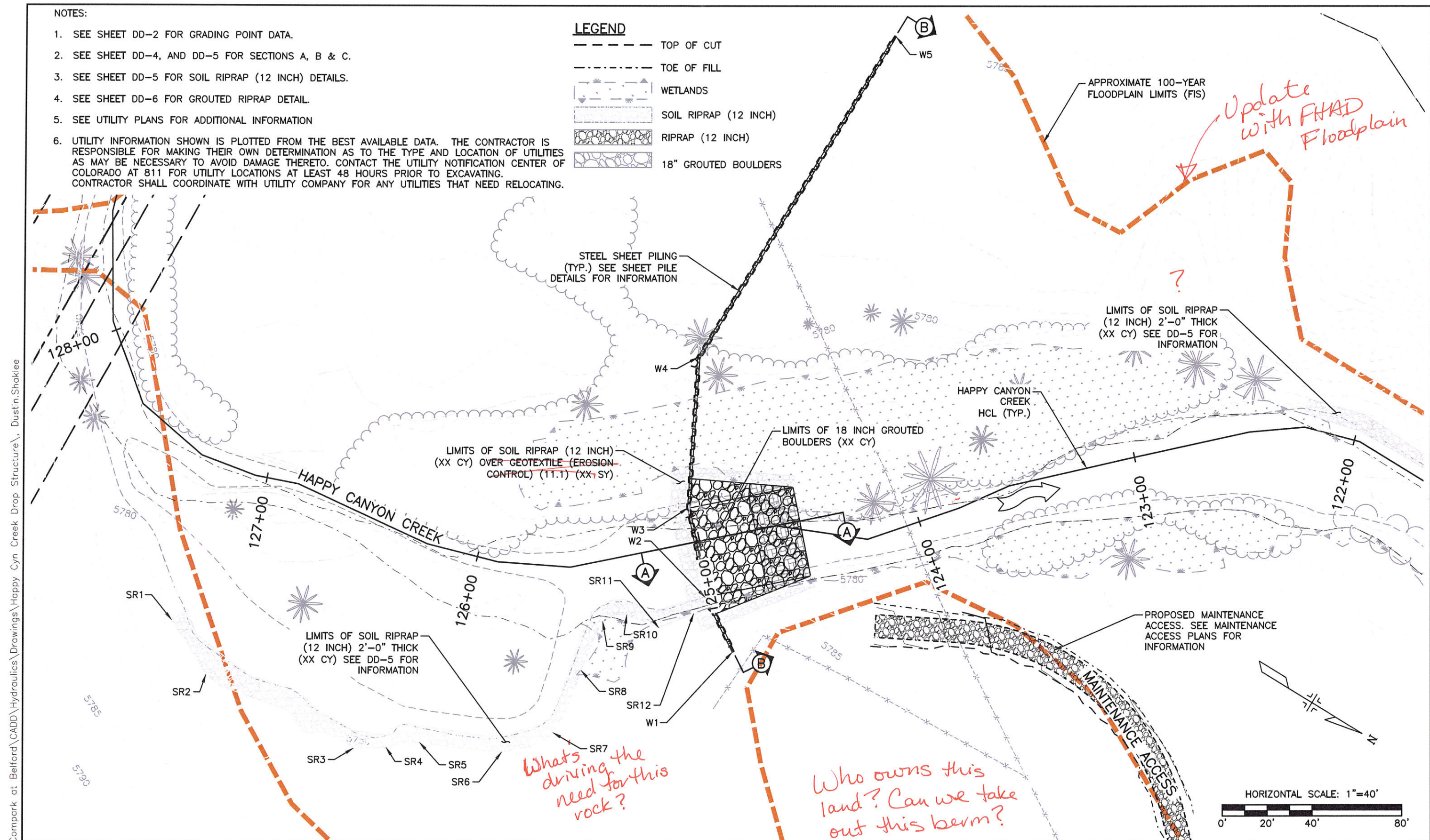
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No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT	Sheets: DD-16 of 18	Sheet Number 58
Void:	Subset: Drainage		

NOTES:

1. SEE SHEET DD-2 FOR GRADING POINT DATA.
2. SEE SHEET DD-4, AND DD-5 FOR SECTIONS A, B & C.
3. SEE SHEET DD-5 FOR SOIL RIPRAP (12 INCH) DETAILS.
4. SEE SHEET DD-6 FOR GROUDED RIPRAP DETAIL.
5. SEE UTILITY PLANS FOR ADDITIONAL INFORMATION
6. UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.

LEGEND

- TOP OF CUT
- TOE OF FILL
- [Symbol] WETLANDS
- [Symbol] SOIL RIPRAP (12 INCH)
- [Symbol] RIPRAP (12 INCH)
- [Symbol] 18" GROUDED BOULDERS



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Print Date: 11/18/2016 8:56:03 AM
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 6300 South Syracuse Way, Suite 600
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Sheet Revisions			
(R-X)	Date	Comments	Initials

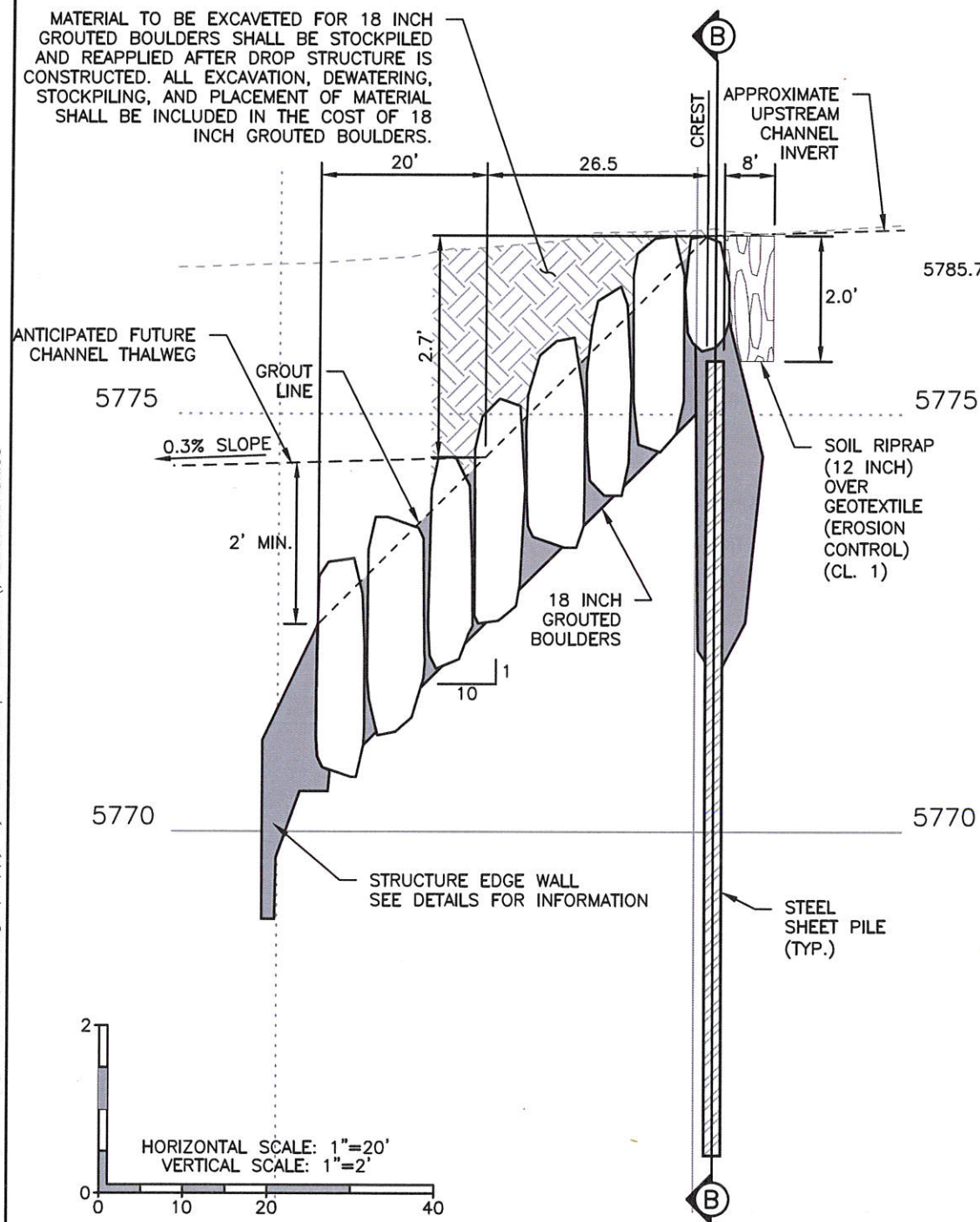
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 ph 303.708.0500 fax 303.708.0500
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As Constructed	BELFORD-HAPPY CANYON CREEK HAPPY CANYON CREEK DROP STRUCTURE DROP NO. 4 PLAN		Project No./Code
No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT	Sheets: DD-17 of 18	Sheet Number 59
Void:	Subset: Drainage		

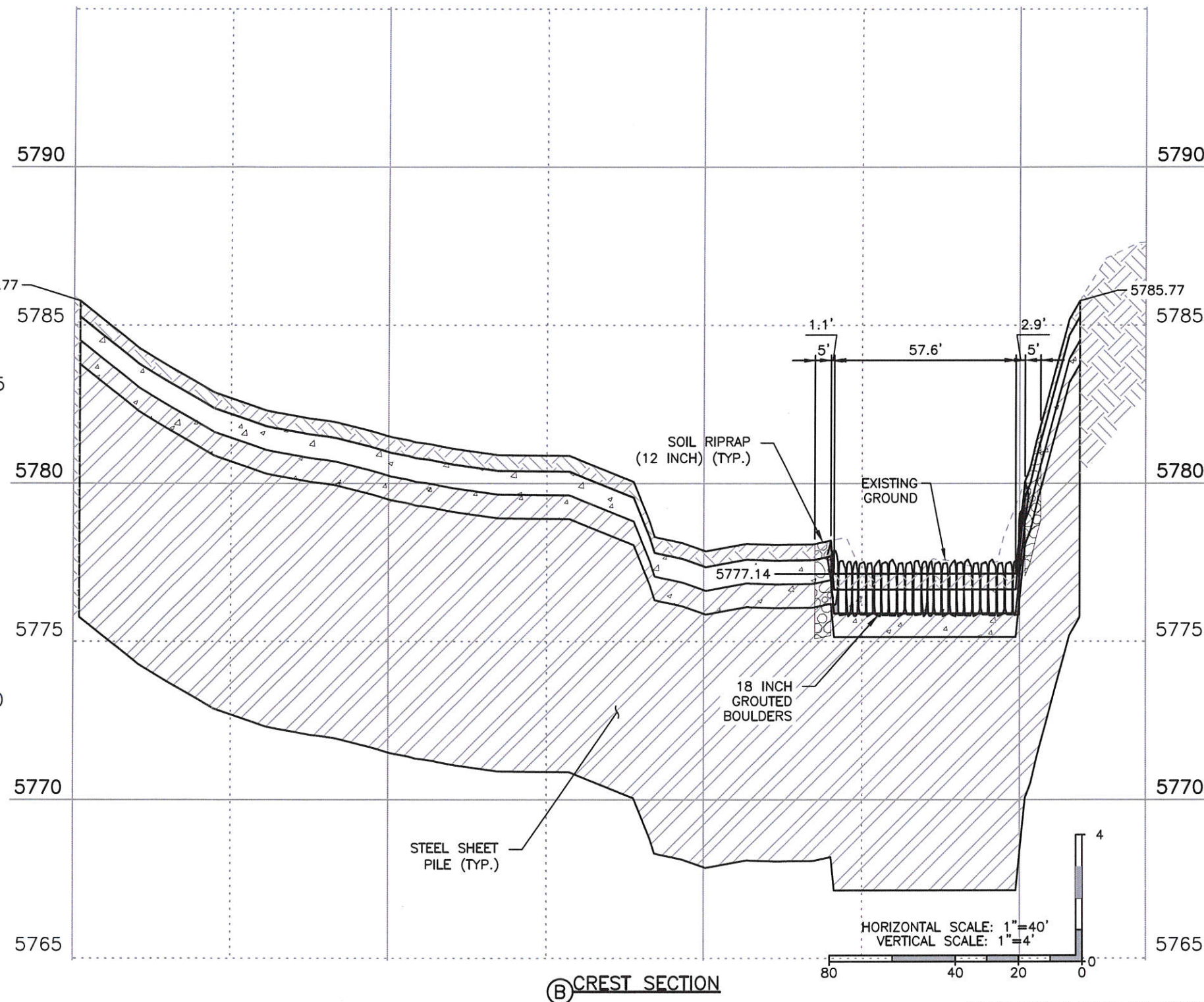
NOTES

- UTILITY INFORMATION SHOWN IS PLOTTED FROM THE BEST AVAILABLE DATA. THE CONTRACTOR IS RESPONSIBLE FOR MAKING THEIR OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 FOR UTILITY LOCATIONS AT LEAST 48 HOURS PRIOR TO EXCAVATING. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANY FOR ANY UTILITIES THAT NEED RELOCATING.
- SEE UTILITY PLANS FOR ADDITIONAL INFORMATION.

MATERIAL TO BE EXCAVATED FOR 18 INCH GROUTED BOULDERS SHALL BE STOCKPILED AND REAPPLIED AFTER DROP STRUCTURE IS CONSTRUCTED. ALL EXCAVATION, DEWATERING, STOCKPILING, AND PLACEMENT OF MATERIAL SHALL BE INCLUDED IN THE COST OF 18 INCH GROUTED BOULDERS.



A GROUTED BOULDER DROP PROFILE



B CREST SECTION

DROP STRUCTURE NO. 4

HAPPY CANYON CREEK HYDRAULICS	
Q100 = 8,303 C.F.S.	
Q100 VELOCITY = 8.95 F.P.S.	
FROUDE No. = 0.58	
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Sheet Revisions			
Date	Comments	Initials	



As Constructed	BELFORD-HAPPY CANYON CREEK HAPPY CANYON CREEK DROP STRUCTURE DROP NO. 4 PROFILE/DETAILS		Project No./Code
No Revisions:	Designer: CDT	Structure Numbers	
Revised:	Detailer: KLT	Sheets: DD-18 of 18	Sheet Number 60
Void:	Subset: Drainage		

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