

Print Date: 7/9/2009	
File Name: 17269 North Pond Detail.dgn	
Horiz. Scale: 1:40	Vert. Scale: As Noted
Unit Information	Unit Leader Initials

Sheet Revisions		
Date:	Comments	Init.
07/01/09	Class A to Class 2	EJA

Colorado Department of Transportation

3803 North Main Avenue
 Suite 200
 Durango, CO 81301
 Phone: 970-385-1440 FAX: 970-385-8365

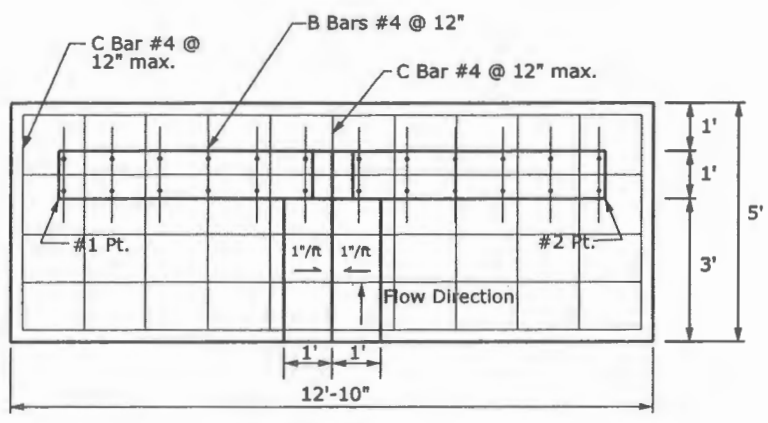
Region 5 **EJA**

As Constructed
No Revisions:
Revised: 8/27/10
Void:

NORTH POND AND DITCH DETAIL			
Designer:	SPC	Structure	
Detailer:	JND	Numbers	
Sheet Subset:	Drainage	Subset Sheets:	2 of 4

Project No./Code
ES5 160A-010
17269
Sheet Number 24

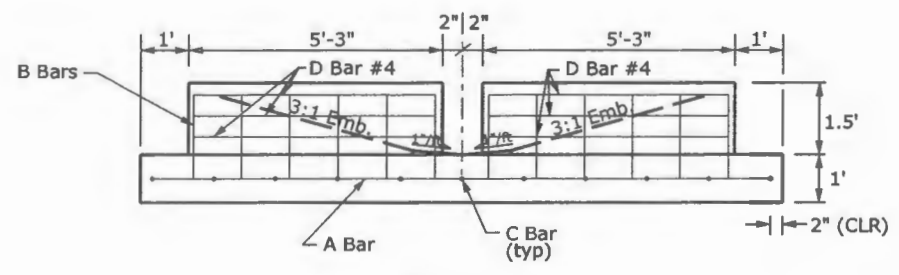
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Top View

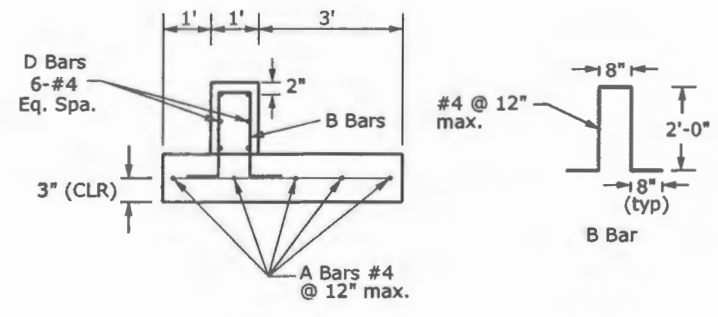
PT	NORTHING	EASTING
#1	1213337.87	2319927.40
#2	1213348.90	2319924.77

BARS	#	LENGTH	LBS.
A	6	12'-6"	50.1
B	12	4'-0"	32.1
C	14	4'-8"	43.64
D	12	4'-11"	39.41
TOTAL			165.25



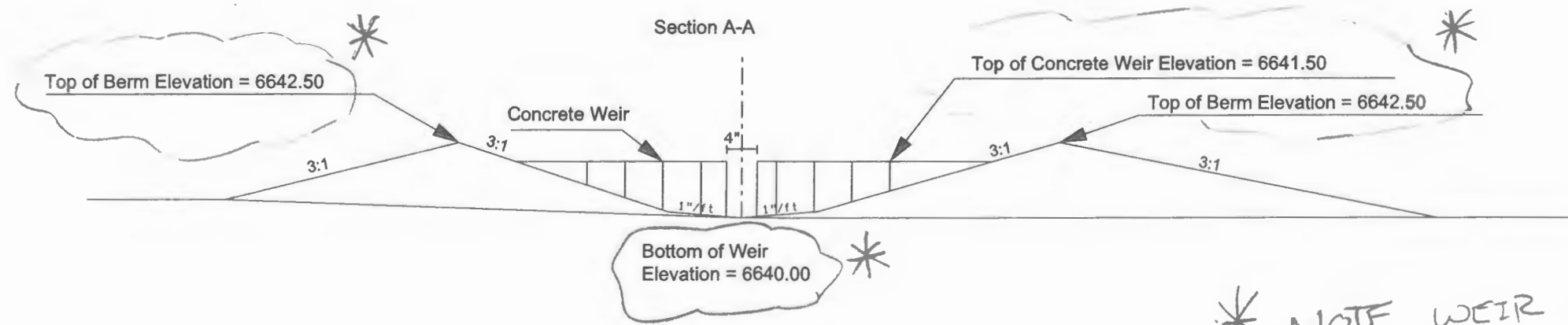
Front View
WEIR

Scale: 1 In. = 4 Ft.



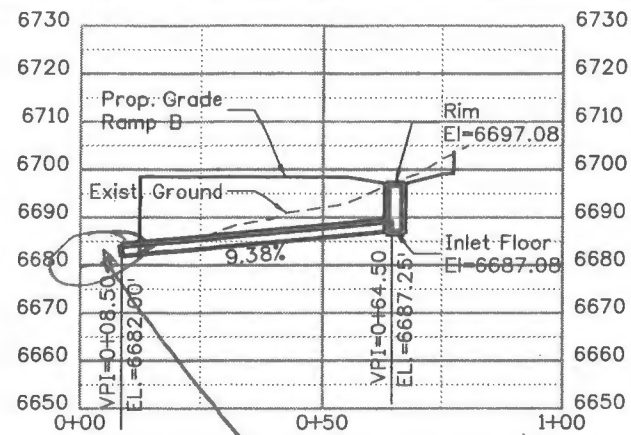
End View

QUANTITIES
Concrete (Class B) = 3 CY
Reinforcing Steel = 165.25 Lbs



* NOTE WEIR LOCATION ADJUSTED 7' = EL

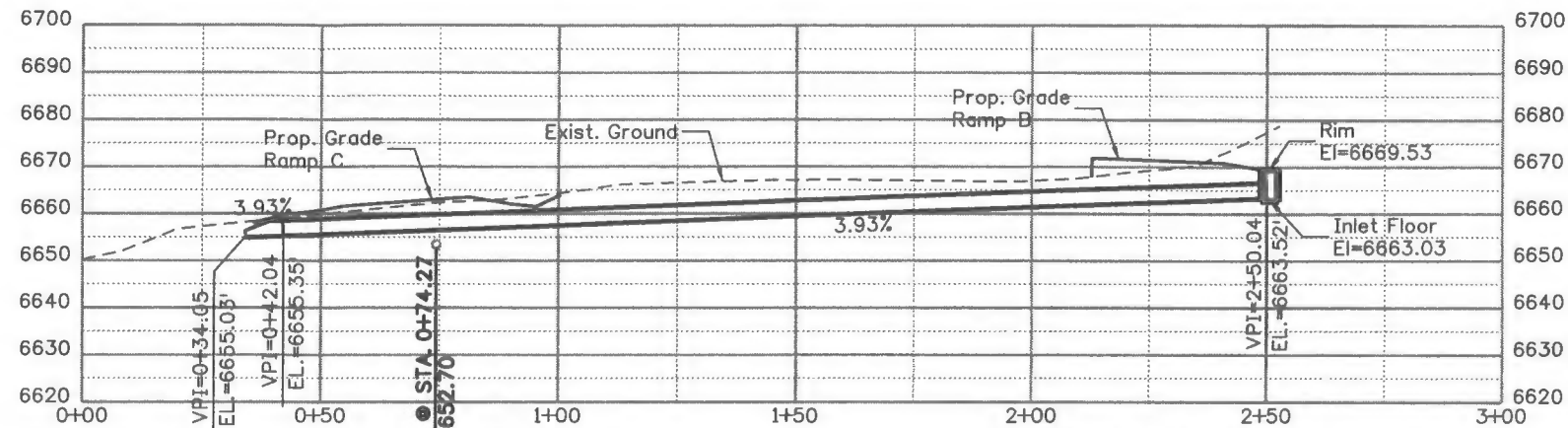
Print Date: 5/26/2009	Sheet Revisions			Colorado Department of Transportation		As Constructed		WEIR DETAIL		Project No./Code	
File Name: 17269 Pond Weir Detail.dgn	Date:	Comments	Init.	3803 North Main Avenue		No Revisions:		ES5 160A-010		17269	
Horiz. Scale: 1:40	Unit Information			Suite 200		Revised: 8/27/10		Designer: SPC		Structure Numbers	
Unit Leader Initials	Unit Leader Initials			Durango, CO 81301		Void:		Detailer: JND		Sheet Subsets: DRAINAGE	
				Phone: 970-385-1440 FAX: 970-385-8365				Sheet Subsets: DRAINAGE		Subset Sheets: 3 of 4	
				Region 5		EJA		Sheet Subsets: DRAINAGE		Sheet Number 25	



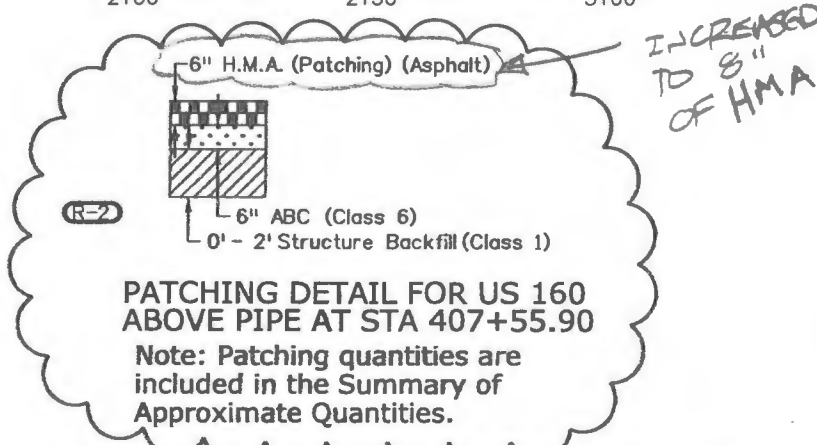
STATION 401+15
 Required: 24" X 56' RCP with
 Type C Inlet Rt.
 Top of Grate EL = 6697.08
 D.A. = 3.0 acres
 Q100 = 11.13 cfs
 DHW = 6697.40 ft
 AHW = 6698.43 ft

*OUTLET PROTECTION
 ADDED PER 105-AB*

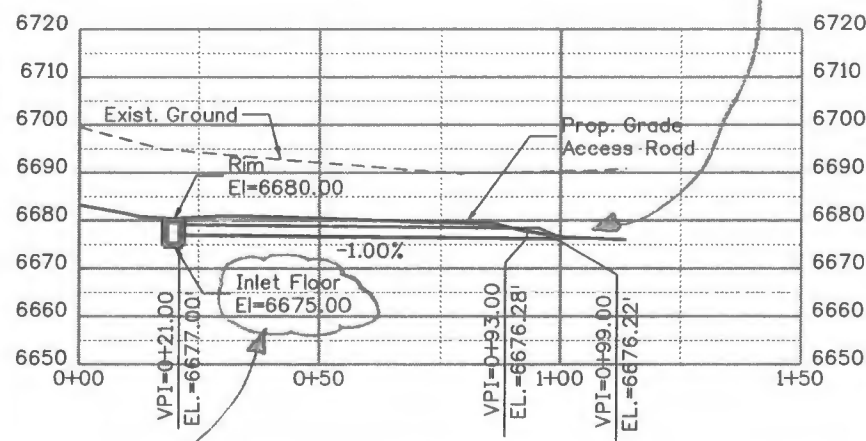
*CONCRETE PAVERS
 ADDED MOUND OUTLET
 FOR EROSION CONTROL*



STATION 407+55.90
 Required: 36" X 208' RCP with
 Type D Inlet Rt. and F.E.S. Lt.
 Top of Grate EL = 6669.53
 D.A. = 13.5 acres
 Q100 = 45.64 cfs
 DHW = 6670.77 ft
 AHW = 6670.87 ft



INCREASED TO 8" OF HMA



STATION 404+16 Rt.
 Required: 24" X 72' RCP with
 Type D Inlet Rt. and
 FES Lt.
 Top of Grate EL = 6680.00
 D.A. = 7.5 acres
 Q100 = 25.23 cfs
 DHW = 6680.37 ft
 AHW = 6680.92 ft

*BOTTOM OF INLET
 RAISED IN FIELD*

STATION-OFFSET	STRUCTURE QUANTITIES																REMARKS			
	INLET		REINFORCED CONCRETE PIPE (CIP)			REINFORCED CONCRETE END SECTIONS		RIPRAP			GEOTEXTILE (DRAINAGE) (CLASS 2)	STRUCTURE BEDDING BACKFILL (CLASS 1) FOR INFORMATION ONLY	STRUCTURE EXCAVATION FOR INFORMATION ONLY	STRUCTURE BACKFILL (CLASS 1) FOR INFORMATION ONLY	*STRUCTURE EXCAVATION	*EMBANKMENT				
	TYPE C	TYPE D	24 INCH	36 INCH		D 50														
	H	H	LF	LF	LF	EA	6"	Grouted Riprap	12"	CY	CY	CY	CY	CY	CY	CY				
401+15	1		56									11.2	57.5	39.7	29.4	93.5	Projects thru MSE Wall			
404+16 (R-2)	1		72			1						15.9	80.9	71.7	186.7	0	Pipe at Access Road			
407+55.90		1		208		1						53.1	319.5	178.1	108.7	58.3				
1+25 to 2+40										111	224						Ditch by Wall T			
2+40 to 3+26.32									21		96						Ditch by Wall T			
0+00										4	17						North Ditch Pad			
0+00 to 0+30									12		50						North Ditch			
0+30 to 2+90										98	433						North Ditch			
2+90 to 3+62									27		120						North Ditch			
TOTALS	4	1	1	1	128	208	0	1	1	0	60	102	111	940	80.2	448.9	289.5	315.8	151.8	

* Quantities carried to Summary of Earthwork Quantities

Print Date: 7/9/2009
 File Name: 17269 Structure Sections.dgn
 Horiz. Scale: 1:40
 Unit Information

Sheet Revisions		
Date:	Comments	Init.
07/01/09	Added Patching Detail	EJA

Colorado Department of Transportation
 3803 North Main Avenue
 Suite 200
 Durango, CO 81301
 Phone: 970-385-1440 FAX: 970-385-8365
 Region 5 EJA

As Constructed
 No Revisions:
 Revised: 8/27/10
 Void:

DRAINAGE STRUCTURE SECTIONS
 Designer: sc
 Detailer: mn
 Sheet Subset: Drainage
 Subset Sheets: 4 of 4

Project No./Code
 ES5 160A-010
 17269
 Sheet Number 26


THE ITEMS CROSSED OUT ON THIS PAGE ARE NOT INCLUDED IN THE CONTRACT,
BUT MAY BE ADDED IF FUNDS BECOME AVAILABLE.

*ROW FENCE
ADDED AS NOTED
ON NEXT SHEET
PER CMO #3*

FENCING TABULATION					
STATION TO STATION	SIDE	FENCE - BARBED WIRE WITH METAL POSTS	FENCE DEER	END POSTS	CORNER AND LINE BRACE POSTS
(US 160 STATIONING)		L.F.	L.F.	EA	EA
53+97 TO 68+45	RT		1,406	2	5
73+25.46 TO 95+35.09	LT	2,988		2	10
* 84+28.70 TO 89+74.41	RT	992		2	2
96+73.90 TO 101+18.53	LT	706		2	3
78+75.43 TO 81+71.76	RT		362	2	4
81+90.76 TO 87+29.26	RT		576	2	6
TOTAL		4,686	2,344	12	30

Sta. 53+97 to 68+45 Rt.
Required 1,406 LF of Fence Deer

* Access Road Sta. 11+50 Rt. Install a 16' Gate. See next sheet

Print Date: 6/8/2009	
File Name: 17269 Fencing01.dgn	
Horiz. Scale: 1:200 Vert. Scale: As Noted	
Unit Information Unit Leader Initials	

Sheet Revisions		
Date:	Comments	Init.

Colorado Department of Transportation

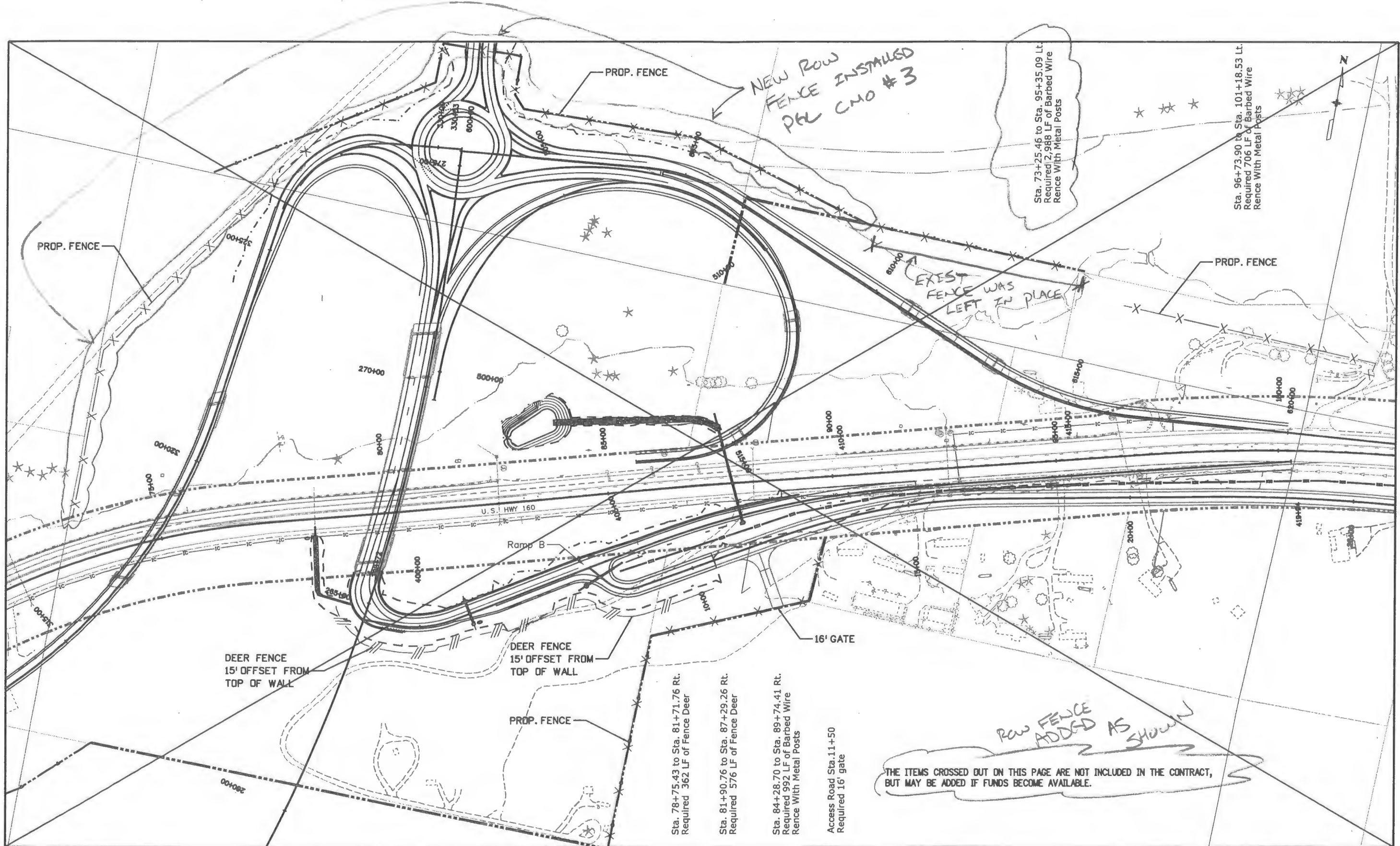
 3803 North Main Avenue
 Suite 200
 Durango, CO 81301
 Phone: 970-385-1440 FAX: 970-385-8365
Region 5 **EJA**

As Constructed
 No Revisions:
 Revised: *8/27/10*
 Void:

RIGHT OF WAY FENCE			
Designer:	SPC	Structure Numbers	
Detailer:	JND		
Sheet Subset:	Fencing	Subset Sheets:	1 of 2

Project No./Code
 ES5 160A-010
 17269
Sheet Number **27**

Program Files\PMZ_Working\dma5062717269 Fencing01.dgn
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Print Date: 6/8/2009	
File Name: 17269 Fencing02.dgn	
Horiz. Scale: 1:200	Vert. Scale: As Noted
Unit Information	Unit Leader Initials

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Region 5 EJA

As Constructed
No Revisions:
Revised: 8/27/10
Void:

RIGHT OF WAY FENCE			
Designer:	SPC	Structure	
Detailer:	JND	Numbers	
Sheet Subset:	Fencing	Subset Sheets:	2 of 2

Project No./Code	ES5 160A-010
	17269
Sheet Number	28

1.0 GENERAL NOTES

- 1.1 EXCEPT AS SHOWN IN THE PLANS, STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH M-206-1 AND THE PROJECT SPECIAL PROVISIONS, REVISION OF SECTION 504.
- 1.2 THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF EXCAVATIONS DURING CONSTRUCTION.
- 1.3 EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M213.
- 1.4 ALL REINFORCING STEEL SHALL BE EPOXY-COATED UNLESS OTHERWISE NOTED.
- 1.5 (N) DENOTES NON-COATED REINFORCING STEEL.

2.0 DESIGN DATA

- 2.1 REINFORCED CONCRETE:
 - CLASS B CONCRETE: $f'_c = 4,500$ psi
 - CLASS D CONCRETE: $f'_c = 4,500$ psi
 - REINFORCING STEEL: $f_y = 60,000$ psi
- 2.2 THE FOLLOWING TABLE GIVES THE MINIMUM LAP SPLICE LENGTH FOR EPOXY COATED REINFORCING BARS PLACED IN ACCORDANCE WITH SUBSECTION 602.06. THESE SPLICE LENGTHS SHALL BE INCREASED BY 25% FOR BARS SPACED AT LESS THAN 6" ON CENTER.

BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH FOR CLASS B AND CLASS D CONCRETE	1'-3"	1'-7"	2'-5"	2'-10"	3'-8"	4'-8"	5'-11"	7'-3"

- 2.3 WHEN THE CONTRACTOR ELECTS TO SUBSTITUTE EPOXY COATED REINFORCEMENT FOR BLACK REINFORCING BARS, THE MINIMUM LAP SPLICE SHALL BE AS DESCRIBED ABOVE.
- 2.4 THE FOLLOWING TABLE GIVES THE MINIMUM LAP SPLICE LENGTH FOR BLACK REINFORCING BARS PLACED IN ACCORDANCE WITH SUBSECTION 602.06. THESE SPLICE LENGTHS SHALL BE INCREASED BY 25% FOR BARS SPACED AT LESS THAN 6" ON CENTER.

BAR SIZE	#4	#5	#6	#7	#8	#9	#10	#11
SPLICE LENGTH FOR CLASS B AND CLASS D CONCRETE	1'-1"	1'-4"	1'-7"	1'-11"	2'-6"	3'-1"	3'-11"	4'-10"

THE ABOVE SPLICE LENGTHS SHALL BE INCREASED BY 20 PERCENT FOR 3 BAR BUNDLES AND 33 PERCENT FOR 4 BAR BUNDLES.

THE ABOVE SPLICE LENGTHS MAY BE REDUCED BY 20% WHEN 3" OF CLEAR COVER EXISTS AND BAR SPACING IS 6" OR GREATER ON CENTER.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.

FOR STRUCTURE NUMBER INSTALLATION, SEE STANDARD S-614-12.

STATIONS, ELEVATIONS, AND DIMENSIONS CONTAINED IN THESE PLANS ARE CALCULATED FROM A RECENT FIELD SURVEY. THE CONTRACTOR SHALL VERIFY ALL DEPENDENT DIMENSIONS IN THE FIELD BEFORE ORDERING OR FABRICATING ANY MATERIAL.

THE INFORMATION SHOWN ON THESE PLANS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 1-800-922-1987 AT LEAST 2 DAYS (NOT INCLUDING THE DAY OF NOTIFICATION) PRIOR TO ANY EXCAVATION OR OTHER EARTHWORK.

**CALL UTILITY NOTIFICATION
CENTER OF COLORADO
1-800-922-1987**

CALL 2 BUSINESS DAYS (NOT INCLUDING INITIAL DAY OF CONTACT) IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

3.0 GROUND NAIL WALLS

- 3.1 GROUND NAILS - GRADE 75 THREADBAR OR EQUIVALENT IN ACCORDANCE WITH ASTM A615 AND GALVANIZED OR EPOXY COATED IN ACCORDANCE WITH ASTM A153 AS SHOWN ON THE DRAWINGS. $F_y=75,000$ PSI
- 3.2 GROUT - GROUT MAY BE NEAT-CEMENT OR WITH SAND, WITH TYPE II CEMENT IN ACCORDANCE WITH ASTM C150. WATER-CEMENT RATIO SHOULD BE BETWEEN 0.4 AND 0.6 AND SHOULD DEVELOP THE FOLLOWING STRENGTHS AT THE SPECIFIED CURE PERIODS. $f'_c=3,000$ PSI MINIMUM 7 DAY
- 3.3 END HARDWARE - NUTS AND WASHERS SHALL BE IN ACCORDANCE WITH GROUND NAIL MANUFACTURER'S RECOMMENDATIONS. BEARING PLATE SHALL BE IN ACCORDANCE WITH ASTM A36, GRADE 36. BEARING PLATE, NUTS AND WASHERS SHALL BE EPOXY-COATED.
- 3.4 SHOTCRETE - SHOTCRETE MIX SHALL CONSIST OF TYPE II CEMENT IN ACCORDANCE WITH ASTM C150, POTABLE WATER AND NORMAL WEIGHT AGGREGATE IN ACCORDANCE WITH ASTM C33. ADMIXTURES, IF USED, SHOULD BE NON-CORROSIVE TO STEEL. $f'_c=4,500$ PSI (28-DAY STRENGTH)
- 3.5 UNLESS OTHERWISE NOTED ON THE PLANS, MINIMUM COVER OF SHOTCRETE REINFORCEMENT AND NAIL END HARDWARE SHOULD BE AS FOLLOWS:
FACE EXPOSED TO WEATHER - 2"
FACE EXPOSED TO SOIL - 3"
- 3.6 WELDED WIRE MESH SHALL BE IN ACCORDANCE WITH ASTM A185.
- 3.7 WALERS AND VERTICAL BEARING BARS SHALL BE IN ACCORDANCE WITH ASTM A615. $F_y=60,000$ PSI
- 3.8 STRIP DRAINS CONSIST OF 12" WIDE DIMPLED CORES WRAPPED IN GEOTEXTILE.
- 3.9 CENTRALIZERS SHOULD BE PLASTIC AND ATTACHED TO THE NAILS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

4.0 GROUND NAIL WALL CONSTRUCTION SEQUENCE

- 4.1 EXCAVATE ONE LIFT TO A MAXIMUM DEPTH OF SIX (6) FEET. BOULDERS, COBBLES AND/OR BEDROCK MAY BE ENCOUNTERED AT ANY DEPTH OF THE EXCAVATION OR DRILLING. IF SLOUGHING GROUND CONDITIONS ARE ENCOUNTERED, GROUND NAILS MAY BE DRILLED AND INSTALLED THROUGH A TEMPORARY STABILIZING BERM. CARE SHOULD BE TAKEN DURING EXCAVATION THAT NO GROUND IS LOST FROM BEHIND THE EXISTING SHOTCRETE.
- 4.2 FOLLOW FHWA GUIDELINES TO DETERMINE GROUND NAIL LOCATIONS. PROVIDE A NAIL LOCATION PLAN TO THE ENGINEER FOR REVIEW. INSTALL GROUND NAILS AT THE SPACINGS AND TO THE LENGTHS SHOWN ON THE PLANS. THE TOP ROW OF GROUND NAILS SHALL BE WITHIN 2.5 FEET OF THE TOP OF THE WALL. THE BOTTOM ROW OF NAILS SHALL BE WITHIN 3 FEET OF THE BOTTOM OF THE WALL. THE TOLERANCE FOR GROUND NAIL LOCATIONS SHALL BE 6 INCHES. TREMIE THE GROUT FROM THE BOTTOM OF THE HOLE UP.
- 4.3 INSTALL STRIP DRAINS, WELDED WIRE MESH, WALERS AND VERTICAL BEARING BARS AS SHOWN ON THE DRAWINGS. USE PLASTIC CHAIRS TO HOLD THE WELDED WIRE MESH AWAY FROM THE SOIL AS NECESSARY.
- 4.4 INSTALL SHOTCRETE TO THE MINIMUM THICKNESS SHOWN ON THE DRAWINGS AND TO ATTAIN THE MINIMUM COVERAGES SPECIFIED HEREIN. GIVE SPECIAL ATTENTION TO FILLING THE VOID IN THE BOREHOLE ABOVE THE GROUT LINE. COLD WEATHER PROTECTION MEASURES MAY BE NECESSARY.
- 4.5 INSTALL THE GROUND NAIL END HARDWARE AFTER THE SHOTCRETE HAS BEEN INSTALLED. WHILE THE SHOTCRETE IS STILL WET, EMBED THE PLATE INTO THE SHOTCRETE SURFACE UNTIL THERE IS NO VOID BEHIND THE PLATE. HAND TIGHTEN THE NUT. APPLY ADDITIONAL SHOTCRETE TO ATTAIN MINIMUM COVERAGE FOR THE GROUND NAIL AND END HARDWARE.
- 4.6 ONCE THE GROUT AND SHOTCRETE OF THE CURRENT LIFT HAVE ATTAINED 50% OF THEIR SPECIFIC STRENGTHS, REPEAT CONSTRUCTION SEQUENCE TO THE BOTTOM OF THE WALL.
- 4.7 AT THE BOTTOM LIFT, CONSTRUCT DRAINPIPE, FILTER MATERIAL, AND GEOCOMPOSITE STRIP DRAINS AS SHOWN ON THE DRAWINGS.

5.0 GROUND NAIL WALL DESIGN PARAMETERS

- 5.1 THE GROUND NAIL WALL HAS BEEN DESIGNED IN GENERAL ACCORDANCE WITH PROCEDURES CONTAINED IN THE FHWA "MANUAL FOR DESIGN AND CONSTRUCTION MONITORING OF GROUND NAIL WALLS", REPORT NO. FHWA-SA-96-069R, USING ASD AND GEOTECHNICAL ENGINEERING CIRCULAR NO. 7 "SOIL NAIL WALLS" PUBLICATION NO. FHWA O-IF-03-017.
- 5.2 THE FOLLOWING VALUES HAVE BEEN USED FOR DESIGN PARAMETERS:

	ϕ	c	γ	Quit	Q_d	
CLAYSTONE/SANDSTONE MOD. WEATHERED	(DEG)	(PSF)	(PCF)	(PSI)	(lb/ft)	
	36	500	140	15	1480	
- 5.3 NO GROUNDWATER TABLE WAS ASSUMED.

ϕ ANGLE OF INTERNAL FRICTION
c COHESION
 γ UNIT WEIGHT
Quit ULTIMATE SHEAR RESISTANCE BETWEEN GROUT/GROUND BOND
 Q_d BOND STRENGTH (ALLOWABLE)

- 5.4 FACTORS OF SAFETY
 - BEARING CAPACITY - $FS=2.5$
 - OVERTURNING - $ECCENTRICITY \leq B/6$
 - GLOBAL STABILITY - $FS=1.35$
 - PULLOUT - $FS=2.0$
 - YIELD REDUCTION FACTOR - $\alpha_y=0.55$
 - FACING FLEXURE FACTOR - $\alpha_f=0.67$
 - FACING PUNCHING FACTOR - $\alpha_p=0.67$
 - SEISMIC COEFFICIENT =0.04

6.0 GROUND NAIL WALL SPECIAL NOTES

- 6.1 THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING SLOPE STABILITY ABOVE AND BELOW THE GROUND NAIL WALL DURING CONSTRUCTION.
- 6.2 THE CONTRACTORS ARE RESPONSIBLE FOR FIELD LOCATING ALL NEARBY UTILITIES. CONFLICTING UTILITIES MAY REQUIRE GROUND NAIL WALL REDESIGN, AT ENGINEER'S DISCRETION.
- 6.3 THE BOND STRENGTHS (Q_d) SHOWN ON THE PLANS ARE THE MINIMUM ASSUMED FOR DESIGN.
- 6.4 GROUND NAIL LENGTHS SHOWN ON THE PLANS ARE THE MINIMUM LENGTHS REQUIRED.
- 6.5 PRIOR TO BEGINNING EXCAVATION FOR THE GROUND NAIL WALL, THE CONTRACTOR SHALL:
 - 6.5.1 SURVEY THE LAYOUT LINE AND TOP OF WALL LINE.
 - 6.5.2 CONFIRM THE LINES, GRADES, AND EXCAVATION LIMITS SHOWN ON THE PLANS.
 - 6.5.3 MODIFY PANEL HEIGHTS AND/OR STEP ELEVATIONS TO CONFORM TO THE SURVEY DATA AND CONTRACT REQUIREMENTS FOR TOP OF WALL SMOOTHNESS.
 - 6.5.4 SUBMIT SHOP DRAWINGS INCLUDING GROUND NAIL LAYOUT, PANEL DESIGN, AND COPING DETAILS.
 - 6.5.5 THE CONTRACTOR SHALL SUBMIT THE PROPOSED WALL PROFILE TO THE ENGINEER FOR REVIEW AND APPROVAL.

INDEX OF DRAWINGS

1	GROUND NAIL WALL GENERAL NOTES
2-3	GROUND NAIL WALL TYPICAL SECTIONS
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6	GROUND NAIL WALL P-05-AW PLAN AND ELEVATION
7	GROUND NAIL WALL P-05-AU PLAN AND ELEVATION
8-9	MSE WALL GENERAL NOTES AND SUMMARY OF WALL QUANTITIES
10	MSE WALL TYPICAL SECTION
11-12	MSE WALL DETAILS
13	MSE WALL P-05-AT PLAN AND ELEVATION
14	MSE WALL P-05-AV PLAN AND ELEVATION
W01-W06	PRE-CAST PANEL AND COPING DETAILS

Print Date: 5/21/2009	Sheet Revisions	Colorado Department of Transportation	As Constructed	GROUND NAIL WALL GENERAL NOTES	Project No./Code
File Name: 17269Ramp B_GNW General Notes.dgn	Date: _____	 3803 North Main Avenue Suite 200 Durango, CO 81301 Phone: 970-385-1440 FAX: 970-385-8365	No Revisions: <i>8/27/10</i>	Designer: TLA Detailer: TLB	ES5 160A-010
Horiz. Scale: 1:10 Vert. Scale: As Noted	Comments: _____	Region 5	Revised: _____	Structure Numbers: P-05-AU P-05-AW	17269
Unit Information: SPC	Init: _____	EJA	Void: _____	Sheet Subset: WALLS Subset Sheets: 1 of 14	Sheet Number: 29
Yeh and Associates, Inc. Consulting Engineers & Scientists					

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Terry Barron

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 Terry Barron Li

GROUND NAIL WALL TYPICAL SECTION

WALL P-05-AU
STATION 4+00 TO STATION 7+22

WALL P-05-AW
STATION 0+70 TO STATION 1+25
STATION 2+98 TO STATION 3+80

GROUND NAIL AS-BUILT TOTALS

NAIL LENGTH	AW	AU
10'	85	127
15'	70	62
20'	70	320
25'	0	48
30'	160	205
40'	243	0

SUMMARY OF APPROXIMATE QUANTITIES (FOR INFORMATION ONLY)

WALL P-05-AW

STATION	WALL HEIGHT (FT)	MINIMUM NAIL LENGTH (NL) (FT)	APPROXIMATE WALL AREA LOWER (SF)	ESTIMATED NUMBER OF NAILS LOWER	APPROXIMATE WALL AREA UPPER (SF)	ESTIMATED NUMBER OF NAILS UPPER
0+70 TO 0+97	<20	10	410	20		0
0+97 TO 1+17	20-30	20	520	25		0
1+25 TO 1+50	30-42	30	1040	50	250	12
1+50 TO 2+50	42-51	40	3200	154	1875	90
2+50 TO 2+98	33-45	30	1540	74	510	24
2+98 TO 3+29	20-29	20	850	41		0
3+29 TO 3+80	<20	10	750	36		0
TOTAL				399		127

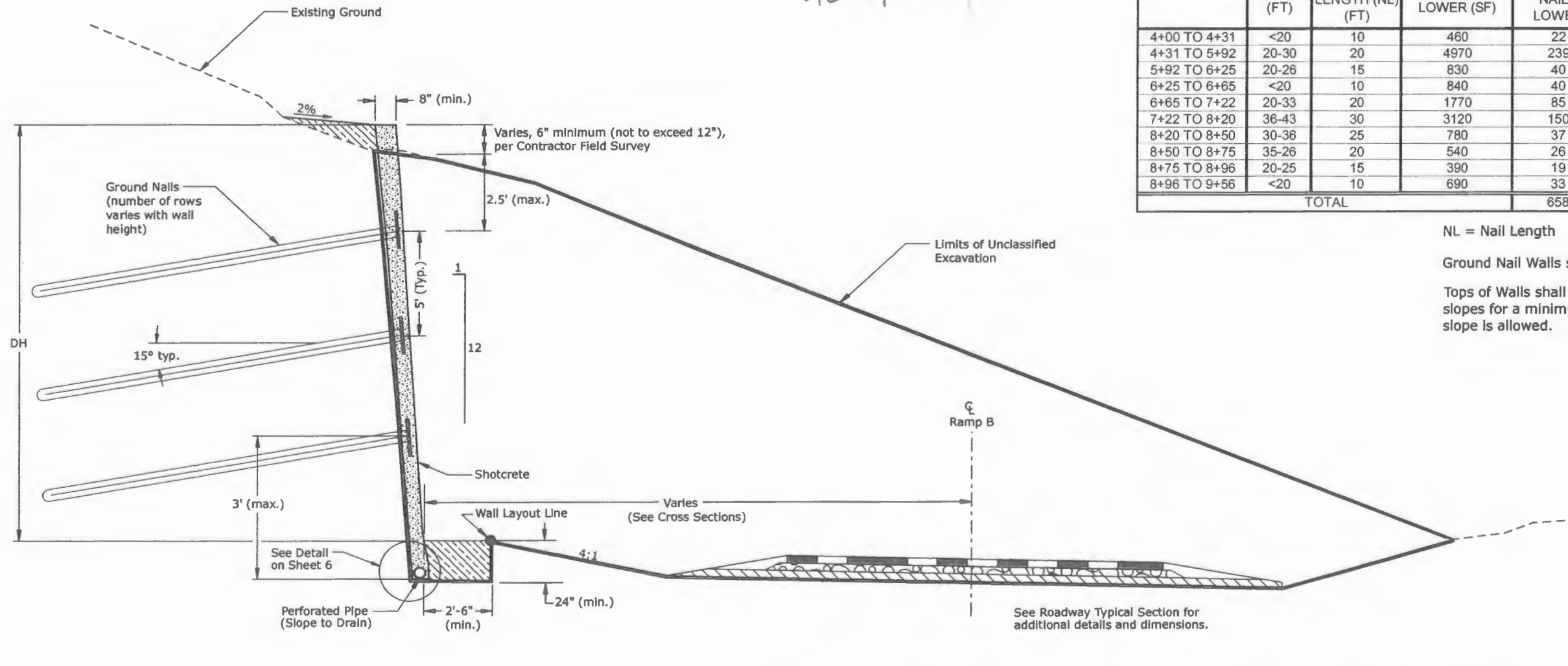
WALL P-05-AU

STATION	WALL HEIGHT (FT)	MINIMUM NAIL LENGTH (NL) (FT)	APPROXIMATE WALL AREA LOWER (SF)	ESTIMATED NUMBER OF NAILS LOWER	APPROXIMATE WALL AREA UPPER (SF)	ESTIMATED NUMBER OF NAILS UPPER
4+00 TO 4+31	<20	10	460	22		0
4+31 TO 5+92	20-30	20	4970	239		0
5+92 TO 6+25	20-26	15	830	40		0
6+25 TO 6+65	<20	10	840	40		0
6+65 TO 7+22	20-33	20	1770	85		0
7+22 TO 8+20	36-43	30	3120	150	990	48
8+20 TO 8+50	30-36	25	780	37	260	12
8+50 TO 8+75	35-26	20	540	26	200	10
8+75 TO 8+96	20-25	15	390	19	140	7
8+96 TO 9+56	<20	10	690	33	330	16
TOTAL				658		76

NL = Nail Length

Ground Nail Walls shall use a 5ft v x 5ft h nail pattern.

Tops of Walls shall be constructed to have constant slopes for a minimum of 30 feet before a change in slope is allowed.



Print Date: 5/26/2009	0000
File Name: 17269Ramp B_Typical GNW Section.dgn	
Horiz. Scale: 1:10 Vert. Scale: As Noted	
Unit Information: SPC	
Yeh and Associates, Inc. Consulting Engineers & Scientists	

Sheet Revisions		
Date:	Comments	Init.

Colorado Department of Transportation

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Region 5 EJA

As Constructed	GROUND NAIL WALL TYPICAL SECTION		Project No./Code ESS 160A-010	
	No Revisions:			
	Revised: 8/27/10	Designer: TLA	Structure Numbers: P-05-AU	17269
	Void:	Detaller: TLB	Structure Numbers: P-05-AW	
Sheet Subset: WALLS		Subset Sheets: 2 of 14	Sheet Number: 30	