GENERAL NOTES:

FOR GENERAL NOTES AND REINFORCED CONCRETE NOTES, SEE BRIDGE PLANS.

CULVERT HEADWALL AND WINGWALL DETAILS ARE PRESENTED IN THESE PLANS. FOR GENERAL LAYOUT INFORMATION, SEE DRAINAGE PLANS.

INDEX OF DRAWINGS:

SUMMARY OF APPROXIMATE QUANTITIES:

ITEM	DESCRIPTION	UNIT	RETAINING WALL 1	RETAINING WALL 2	RETAINING WALL 3	RETAINING WALL 4	RETAINING WALL 5	RETAINING WALL 6	TOTALS
206	STRUCTURE EXCAVATION	CY	72	9	37	7	51	60	236
206	STRUCTURE BACKFILL (CLASS 2)	CY	29	5	12	4	19	40	109
503	DRILLED CAISSION (24 INCH)	LF					160	160	320
504	GROUND NAIL (15 FOOT)	EA	109	12	62	9	34	40	266
502	STRUCTURAL STEEL	LB					22,243	24,587	46,830
601	CONCRETE CLASS D (WALL)	CY					9.5	12.7	22.2
601	CUT STONE VENEER	SF	2,427	287	1,271	179	1,093	1,321	6,579
602	REINFORCING STEEL	LB	8,974	1,050	4,691	649	2,455	2,802	20,621
602	REINFORCING STEEL (EPOXY COATED)	LB					1,411	1,900	3,311
641	SHOTCRETE	SY	269	32	141	20	74	84	619

RETAINING WALL DESCRITIONS:

RETAINING WALL 1:
ANCHORED WALL (GROUND NAIL WALL)
WAGONWHEEL GAP ROAD LT.

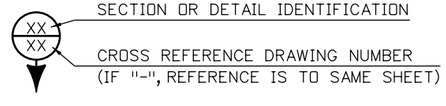
RETAINING WALL 2:
ANCHORED WALL (GROUND NAIL WALL)
WAGONWHEEL GAP ROAD LT.

RETAINING WALL 3:
ANCHORED WALL (GROUND NAIL WALL)
WAGONWHEEL GAP ROAD LT.

RETAINING WALL 4:
ANCHORED WALL (GROUND NAIL WALL)
WAGONWHEEL GAP ROAD LT.

RETAINING WALL 5:
CANTILEVER NON-GRAVITY WALL (SOLDIER PILE WALL)
AND ANCHORED WALL (GROUND NAIL WALL)
WAGONWHEEL GAP ROAD RT.

RETAINING WALL 6:
CANTILEVER NON-GRAVITY WALL (SOLDIER PILE WALL)
AND ANCHORED WALL (GROUND NAIL WALL)
WAGONWHEEL GAP ROAD LT.



100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

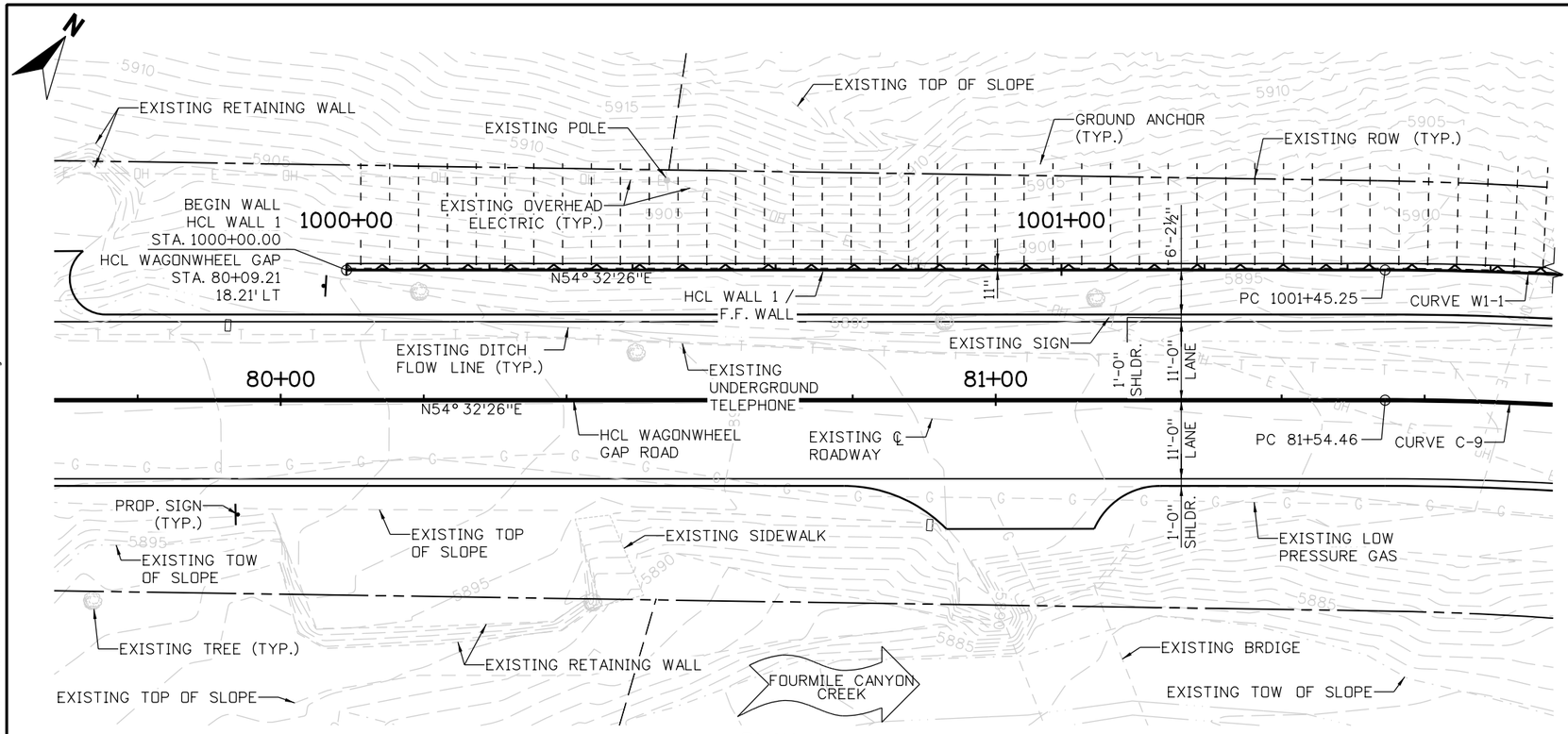
Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

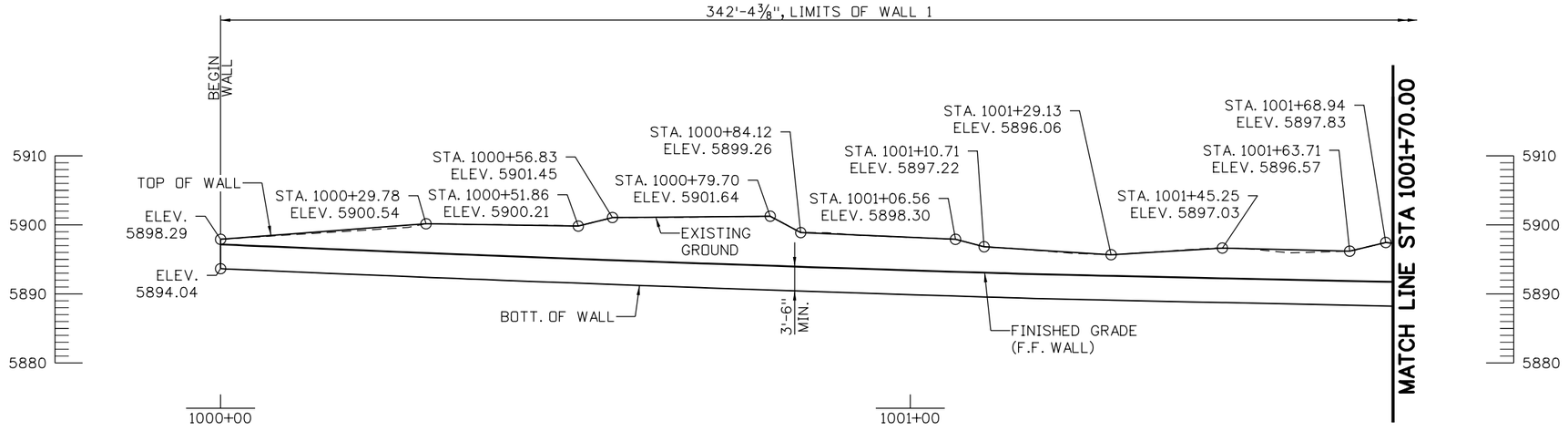
DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
GENERAL INFORMATION

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 141



PLAN



ELEVATION

TAKEN AT HCL WALL 1 / F.F. WALL

NOTES:

1. GROUND NAILS ARE GENERICALLY SHOWN. SEE GROUND NAIL LAYOUT FOR ACTUAL LOCATIONS.

CURVE W1-1 DATA

Δ = 24° 38'50" RT
R = 458.21'
L = 197.11'
T = 100.10'
PI 1002+45.35
N 266602.00
E 53808.30

10 0 10 20 FT
SCALE: 1"=20'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

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BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

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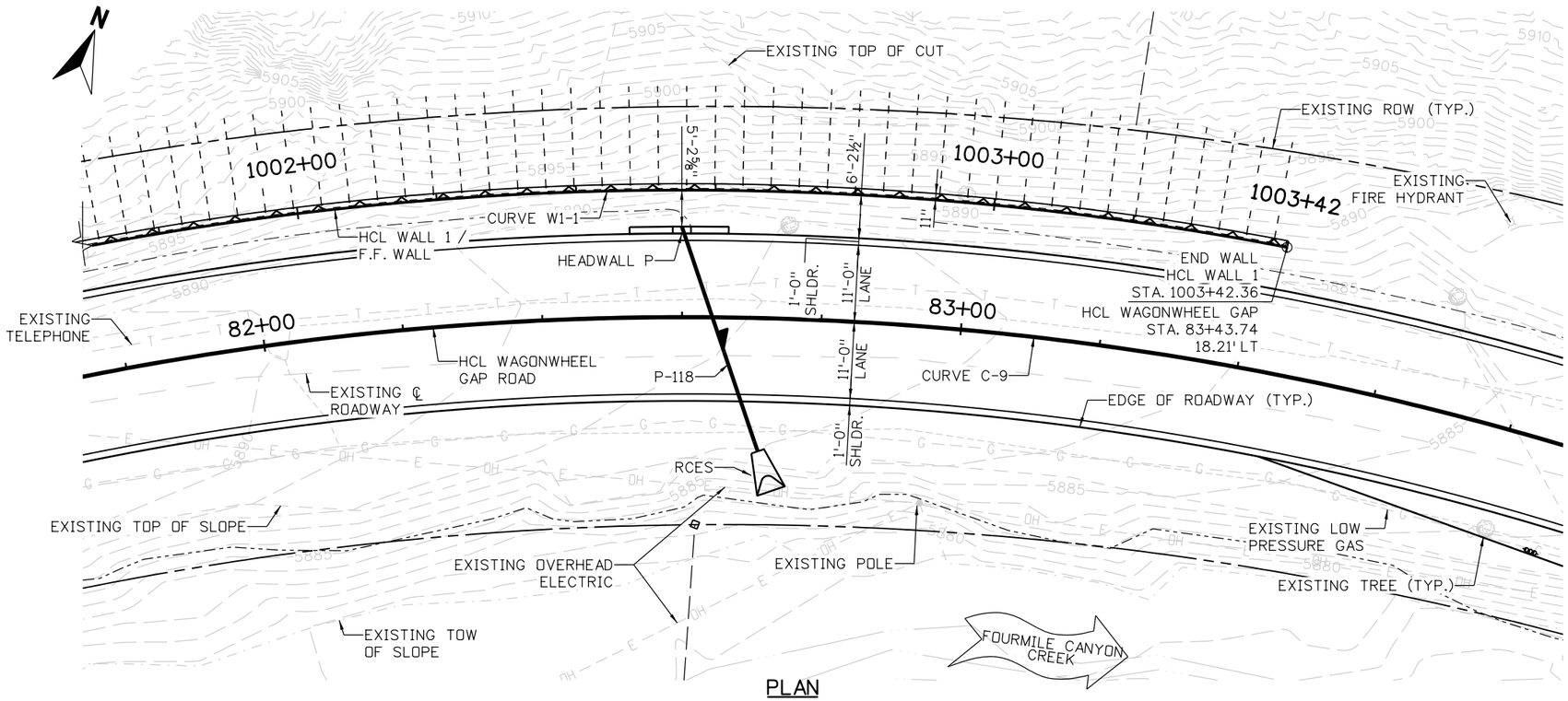
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 1
GENERAL LAYOUT (1 OF 3)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 142

brett.terrell 5:59:46 PM 11/4/2016 par:\\DCPWAPP1.bkr.mbakercorp.com\pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T04\08_Sheet_Files\06_Structures\DGN\Walls\138200_WALL_02.dgn



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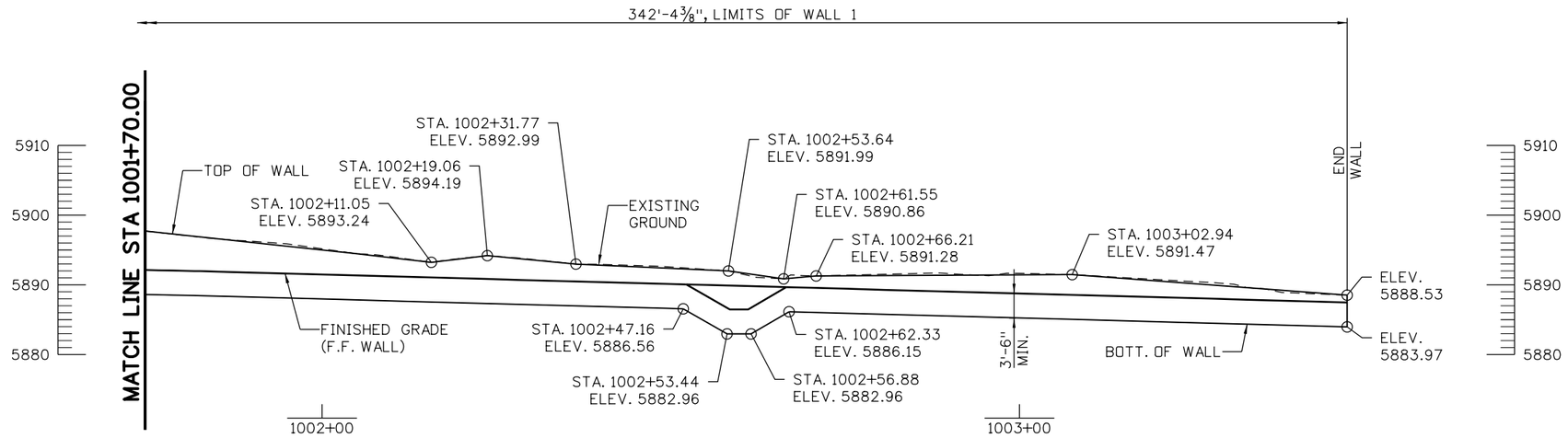


ELEVATION

TAKEN AT HCL WALL 1 / F.F. WALL

NOTES:

1. FOR END SECTIONS, HEADWALL AND WINGWALL DETAILS, REFER TO DRAINAGE PLANS.
2. GROUND NAILS ARE GENERICALLY SHOWN. SEE GROUND NAIL LAYOUT FOR ACTUAL LOCATIONS.

CURVE W1-1 DATA

Δ = 24° 38'50" RT
R = 458.21'
L = 197.11'
T = 100.10'
PI 1002+45.35
N 266602.00
E 53808.30

10 0 10 20 FT
SCALE: 1"=20'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 1
GENERAL LAYOUT (2 OF 3)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 143

DESIGN DATA

SEISMIC ZONE 1

REINFORCED CONCRETE:

CONCRETE CLASS SHOTCRETE :	f'c = 4,500 PSI
REINFORCING STEEL:	fy = 60,000 PSI
WELDED WIRE FABRIC:	fy = 65,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

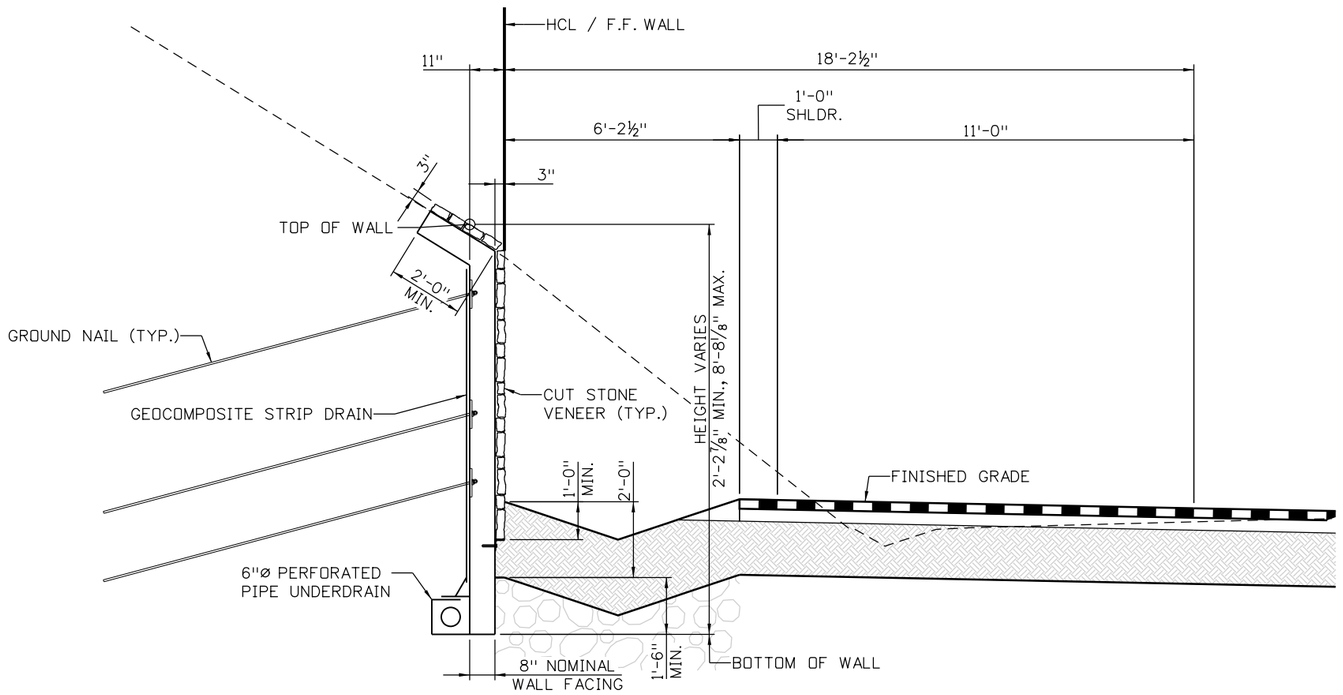
SOIL PROPERTIES:

IN-SITU SOIL:

SOIL UNIT WEIGHT:	145 PCF
SOIL COHESION:	5,000 PSF
SOIL FRICTION ANGLE:	38°

NOTES:

1. FOR ARCHITECTURAL DETAILS, REFER TO CUT STONE VENEER DETAILS SHEET.
2. GROUND NAILS ARE GENERICALLY SHOWN.



TYPICAL SECTION

LOOKING AHEAD STATION

2'-8" 0 2'-8" 5'-4"

SCALE: 1"=5'-4"

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

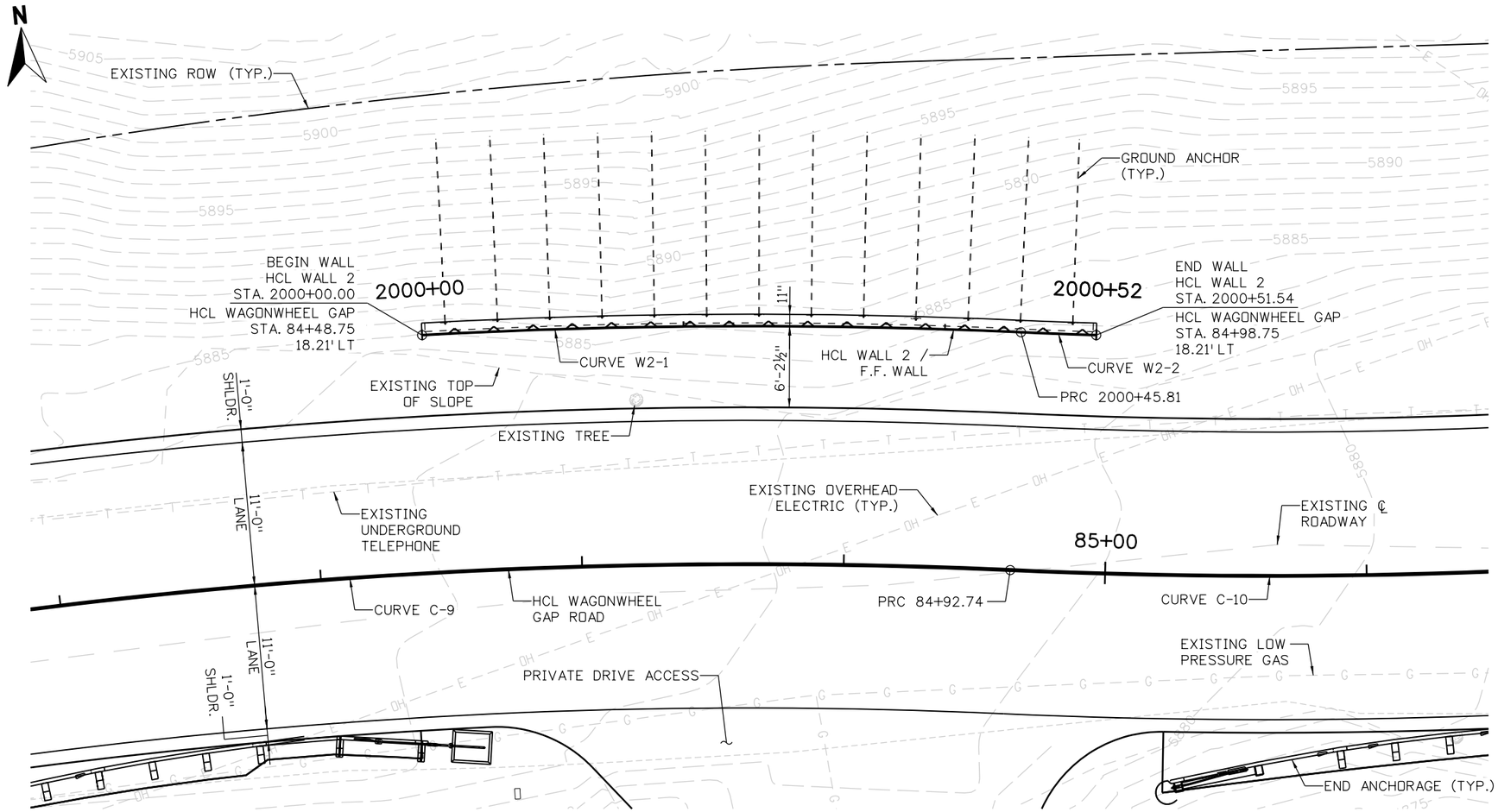
BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 1
GENERAL LAYOUT (3 OF 3)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 144



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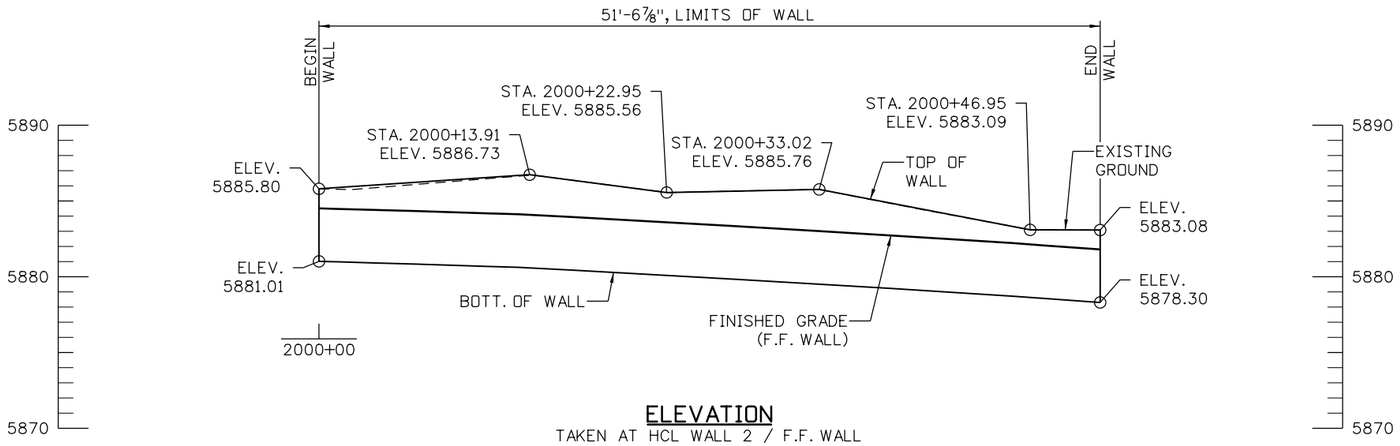


ELEVATION

TAKEN AT HCL WALL 2 / F.F. WALL

NOTES:

1. GROUND NAILS ARE GENERICALLY SHOWN. SEE GROUND NAIL LAYOUT FOR ACTUAL LOCATIONS.

CURVE W2-1 DATA:

Δ = 05° 43'41" RT
R = 458.21'
L = 45.81'
T = 22.92'
PI 2000+22.92
N 266627.20
E 54038.36

CURVE W2-2 DATA:

Δ = 00° 47'11" LT
R = 419.79'
L = 5.76'
T = 2.88'
PI 2000+48.69
N 266623.34
E 54063.87

5 0 5 10 FT
SCALE: 1"=10'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 2
GENERAL LAYOUT (1 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 145

DESIGN DATA

SEISMIC ZONE 1

REINFORCED CONCRETE:

CONCRETE CLASS SHOTCRETE :	f'c = 4,500 PSI
REINFORCING STEEL:	fy = 60,000 PSI
WELDED WIRE FABRIC:	fy = 65,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

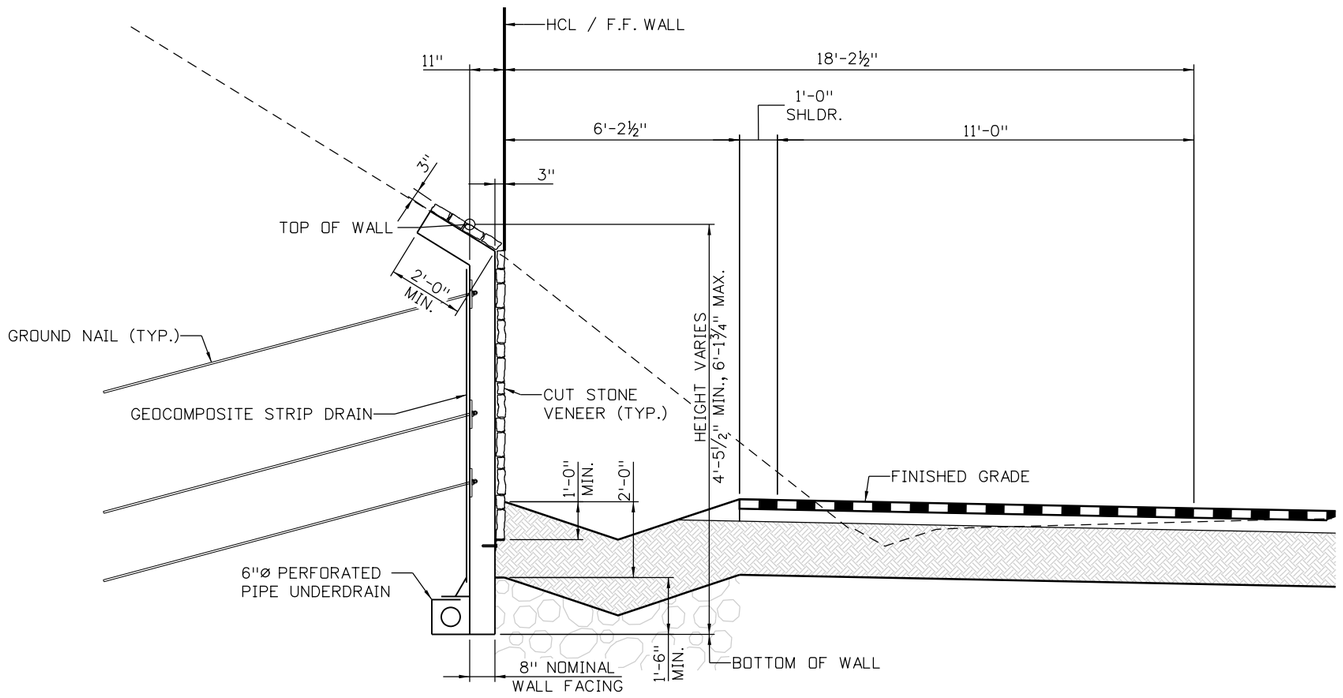
SOIL PROPERTIES:

IN-SITU SOIL:

SOIL UNIT WEIGHT:	145 PCF
SOIL COHESION:	5,000 PSF
SOIL FRICTION ANGLE:	38°

NOTES:

1. FOR ARCHITECTURAL DETAILS, REFER TO CUT STONE VENEER DETAILS SHEET.
2. GROUND NAILS ARE GENERICALLY SHOWN.



TYPICAL SECTION

LOOKING AHEAD STATION

2'-8" 0 2'-8" 5'-4"

SCALE: 1"=5'-4"

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO

811

CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

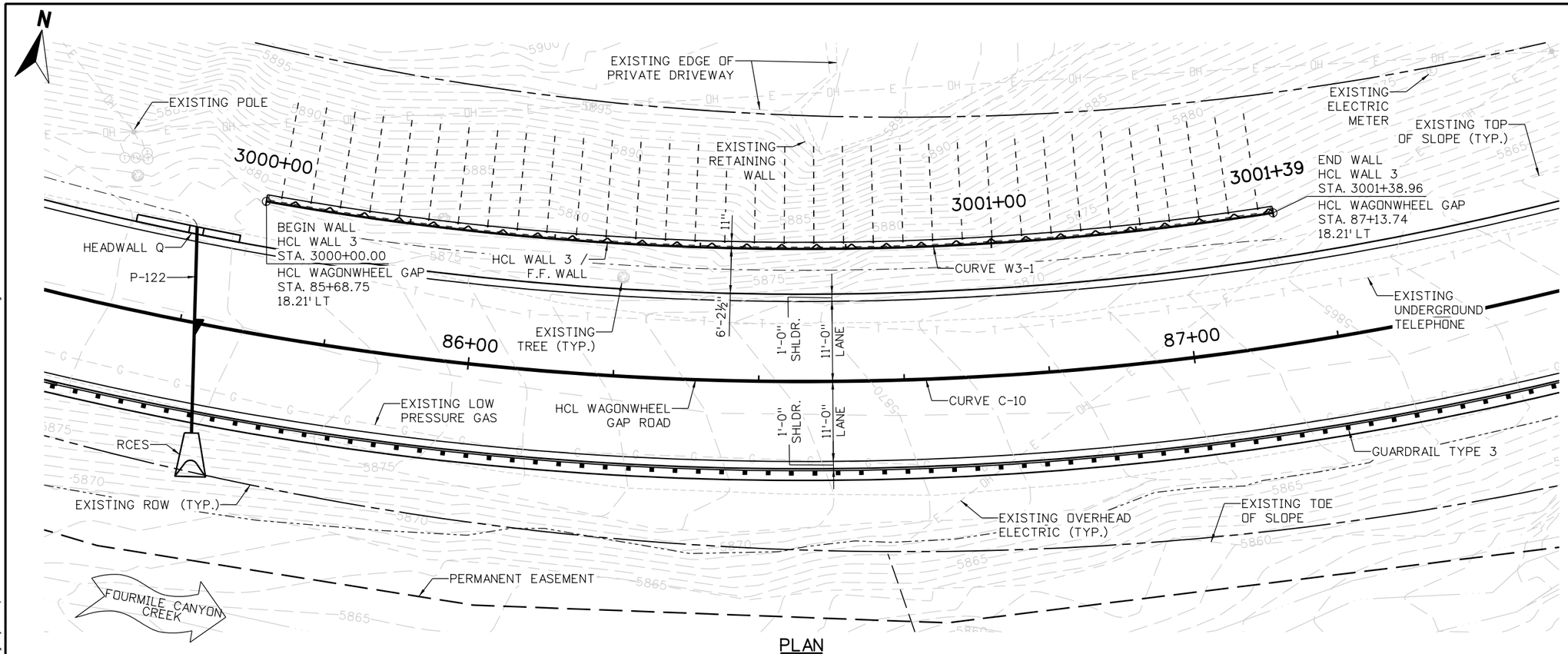
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

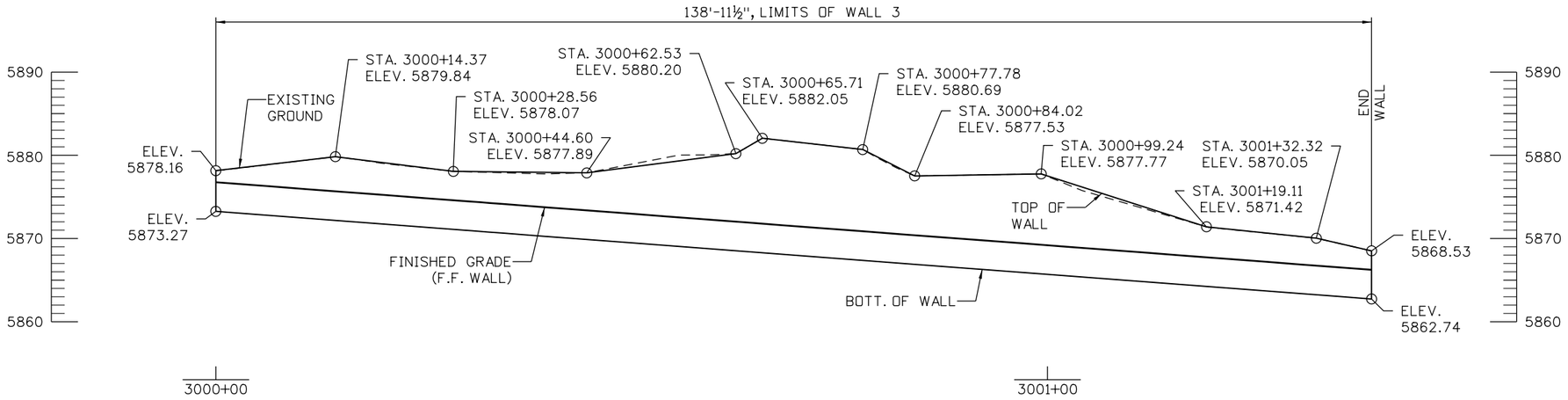
DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 2
GENERAL LAYOUT (2 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 146



PLAN



ELEVATION

TAKEN AT HCL WALL 3 / F.F. WALL

NOTES:

1. FOR GUARDRAIL INFORMATION, REFER TO ROADWAY PLANS.
2. GROUND NAILS ARE GENERICALLY SHOWN. SEE GROUND NAIL LAYOUT FOR ACTUAL LOCATIONS.

CURVE W3-1 DATA

Δ = 18° 57'59" LT
R = 419.79'
L = 138.96'
T = 70.12'
PI 3000+70.12
N 266620.84
E 54203.74

8 0 8 16 FT
SCALE: 1"=16'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION
Boulder County
Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 3
GENERAL LAYOUT (1 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 147

brett.terrell 6:01:26 PM 11/4/2016 pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T04\08_Sheet_Files\06_Structures\DGN\Walls\138200_WALL_07.dgn

DESIGN DATA

SEISMIC ZONE 1

REINFORCED CONCRETE:

CONCRETE CLASS SHOTCRETE :	f'c = 4,500 PSI
REINFORCING STEEL:	fy = 60,000 PSI
WELDED WIRE FABRIC:	fy = 65,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

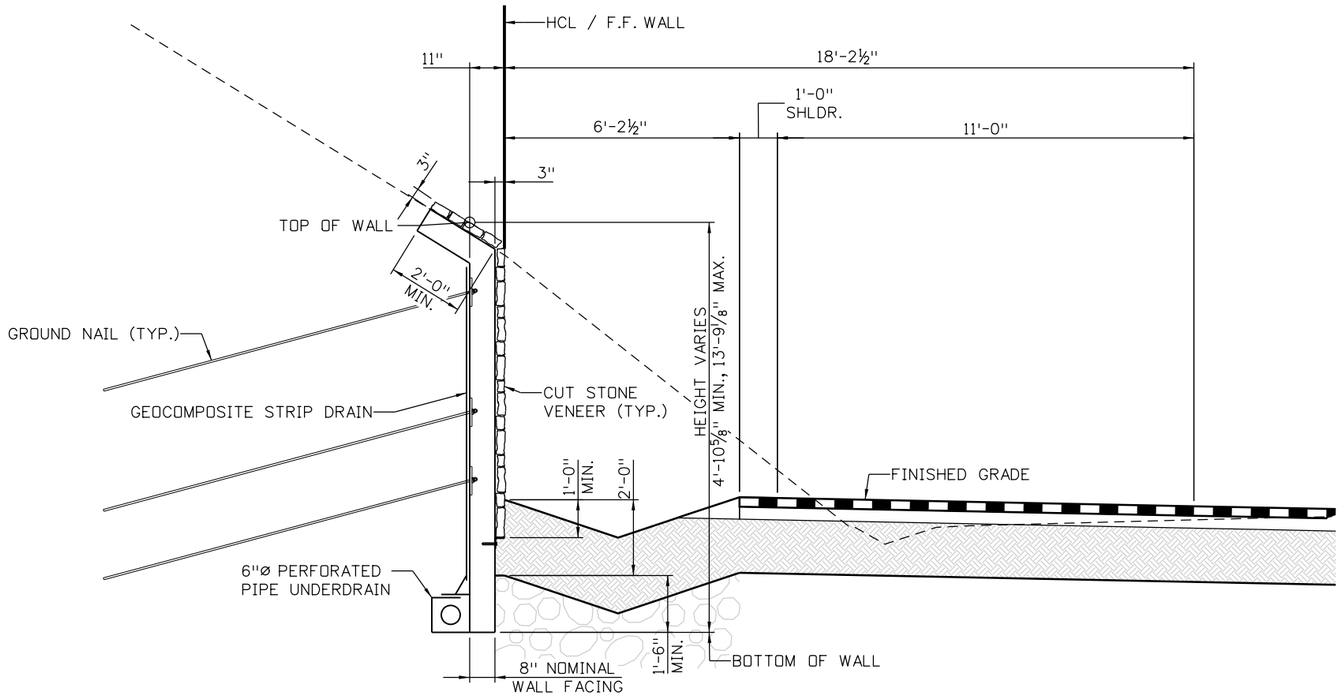
SOIL PROPERTIES:

IN-SITU SOIL:

SOIL UNIT WEIGHT:	145 PCF
SOIL COHESION:	5,000 PSF
SOIL FRICTION ANGLE:	38°

NOTES:

1. FOR ARCHITECTURAL DETAILS, REFER TO CUT STONE VENEER DETAILS SHEET.
2. GROUND NAILS ARE GENERICALLY SHOWN.



TYPICAL SECTION

LOOKING AHEAD STATION

2'-8" 0 2'-8" 5'-4"
SCALE: 1"=5'-4"

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

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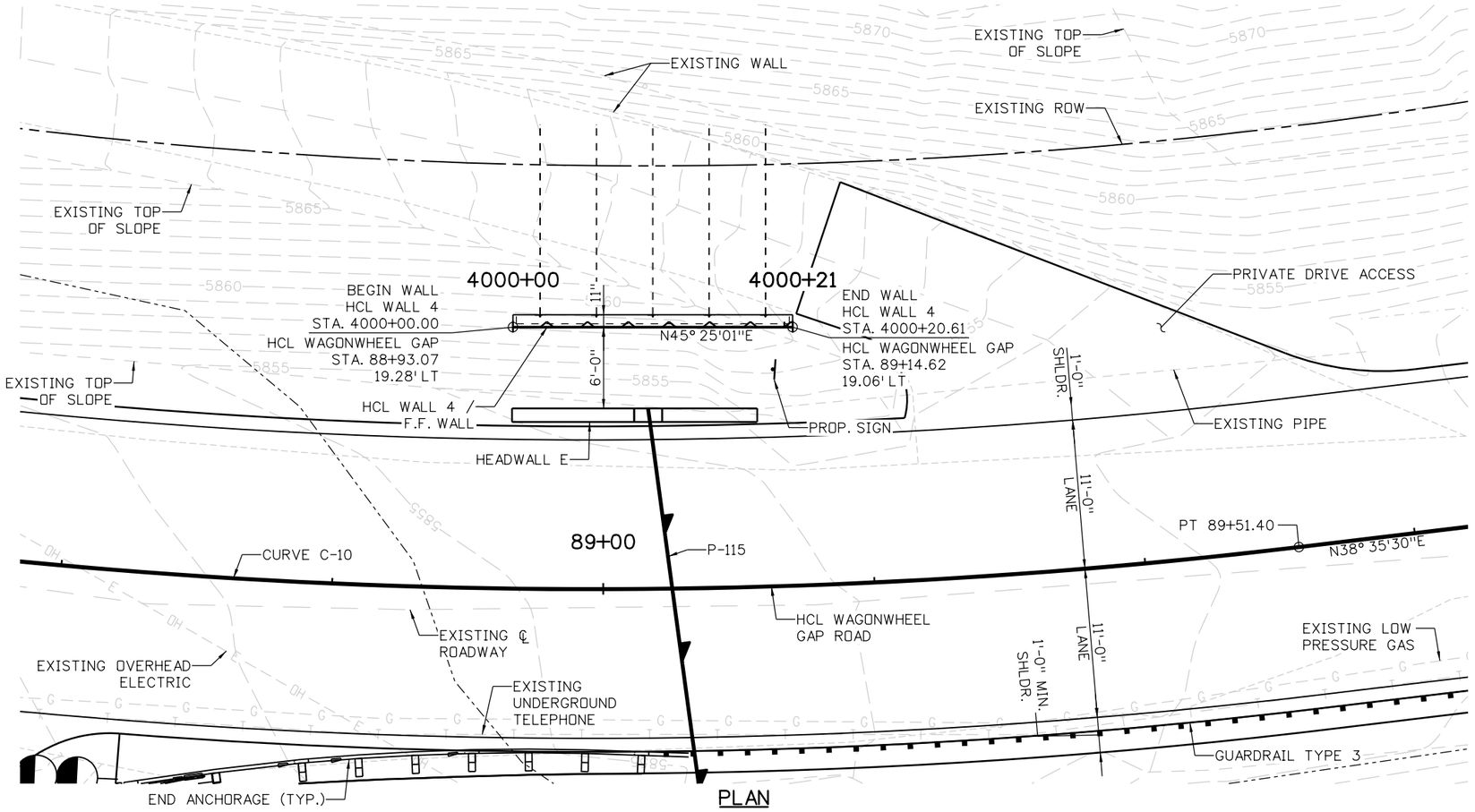
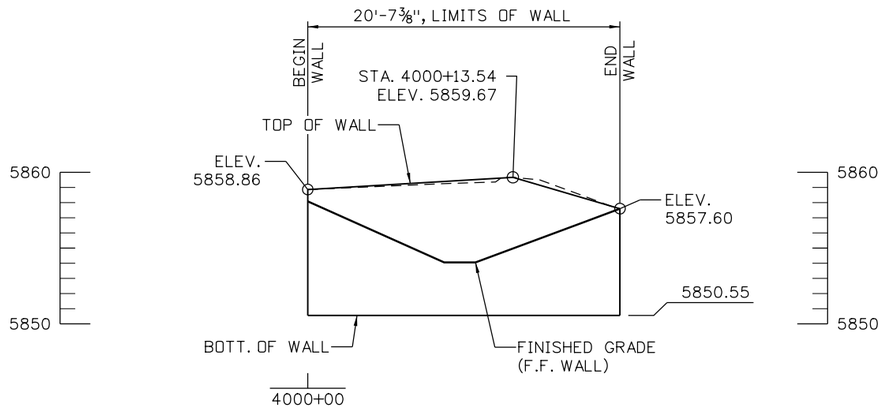
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 3
GENERAL LAYOUT (2 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 148



PLAN



ELEVATION

TAKEN AT HCL WALL 4 / F.F. WALL

NOTES:

1. FOR END SECTIONS, HEADWALL AND WINGWALL DETAILS, REFER TO DRAINAGE PLANS.
2. FOR GUARDRAIL INFORMATION REFER TO ROADWAY PLANS.
3. GROUND NAILS ARE GENERICALLY SHOWN. SEE GROUND NAIL LAYOUT FOR ACTUAL LOCATIONS.

5 0 5 10 FT
SCALE: 1"=10'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

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Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

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DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 4
GENERAL LAYOUT (1 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 149

DESIGN DATA

SEISMIC ZONE 1

REINFORCED CONCRETE:

CONCRETE CLASS SHOTCRETE :	f'c = 4,500 PSI
REINFORCING STEEL:	fy = 60,000 PSI
WELDED WIRE FABRIC:	fy = 65,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

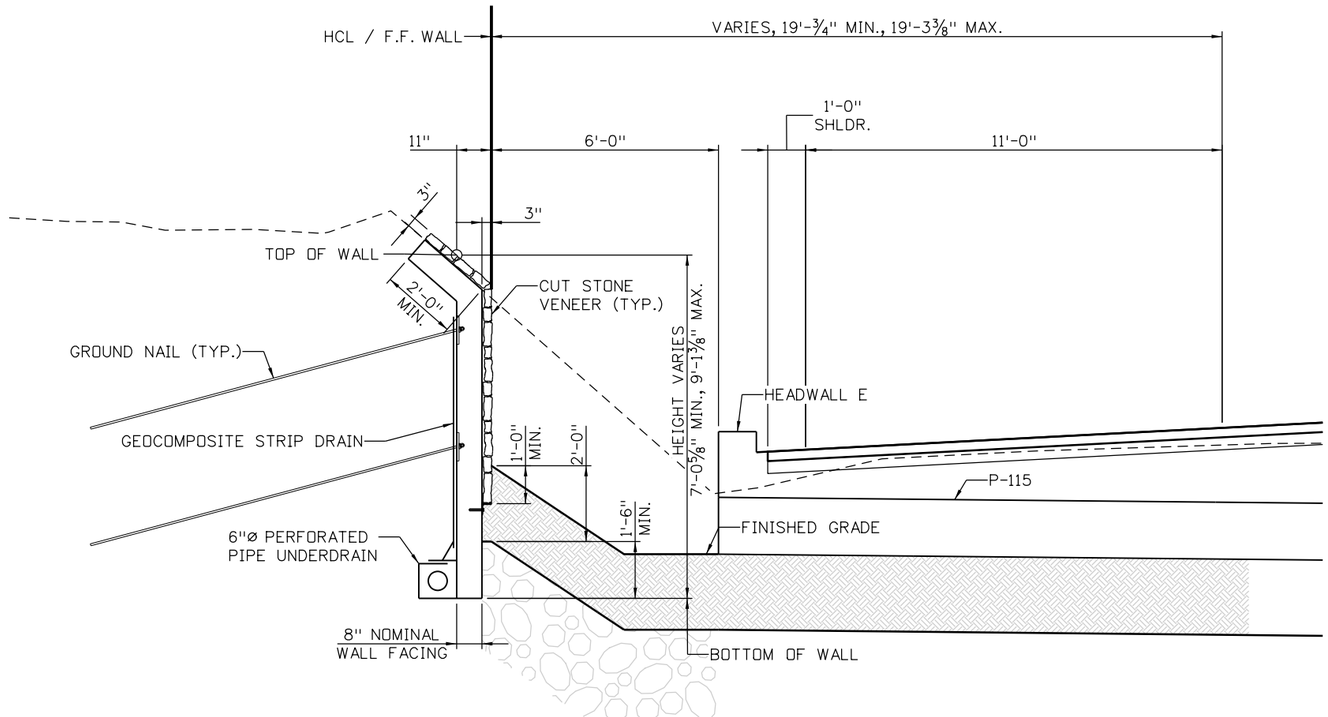
SOIL PROPERTIES:

IN-SITU SOIL:

SOIL UNIT WEIGHT:	145 PCF
SOIL COHESION:	5,000 PSF
SOIL FRICTION ANGLE:	38°

NOTES:

1. FOR ARCHITECTURAL DETAILS, REFER TO CUT STONE VENEER DETAILS SHEET.
2. GROUND NAILS ARE GENERICALLY SHOWN.



TYPICAL SECTION

LOOKING AHEAD STATION

2'-8" 0 2'-8" 5'-4"

SCALE: 1"=5'-4"

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO

811

CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

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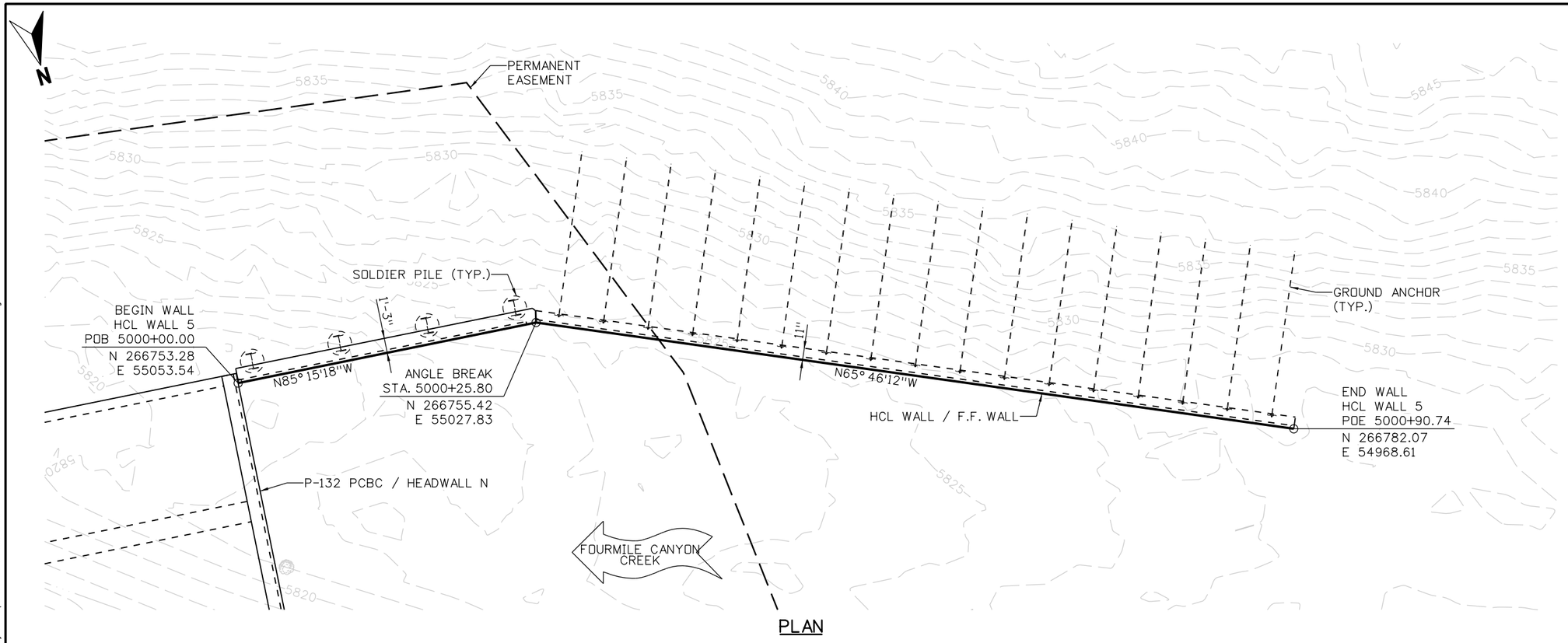
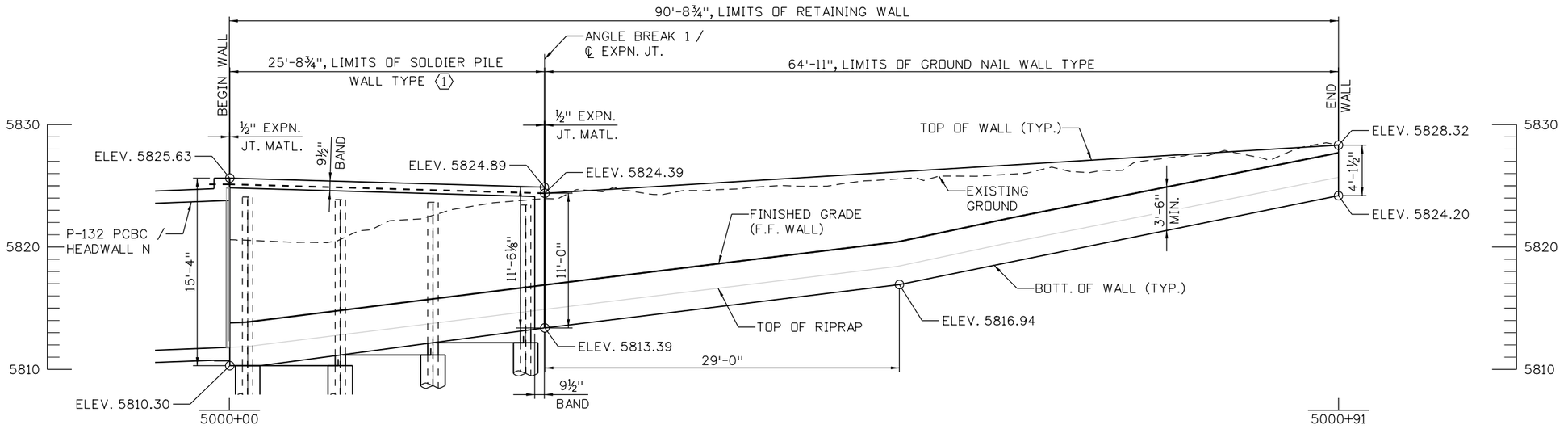
WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 4
GENERAL LAYOUT (2 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 150



PLAN



ELEVATION

TAKEN AT HCL WALL / F.F. WALL

NOTES:

1. GROUND NAILS ARE GENERICALLY SHOWN. SEE GROUND NAIL LAYOUT FOR ACTUAL LOCATIONS.

KEYNOTES:

1. THE LENGTH OF SOLDIER PILE WALL TYPE WAS DETERMINED CONSIDERING EXCAVATION LIMITS FOR THE BOX CULVERT. EXCAVATION LIMITS SHALL NOT IMPEDE EXISTING GROUND AT GROUND NAIL WALL TYPE.

5 0 5 10 FT
SCALE: 1"=10'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

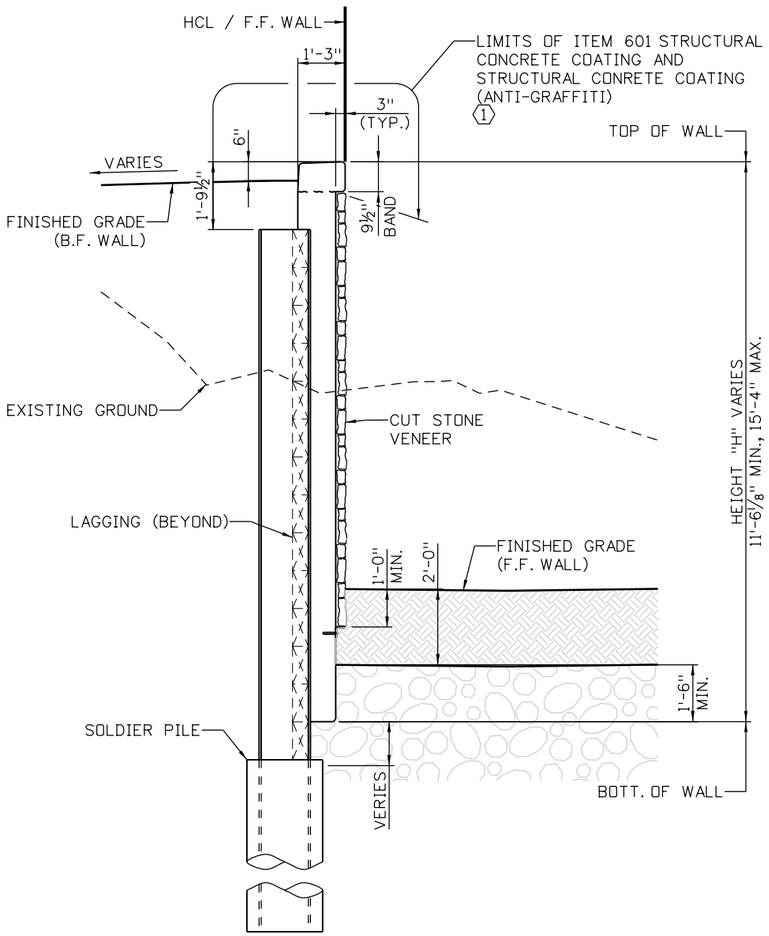
Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

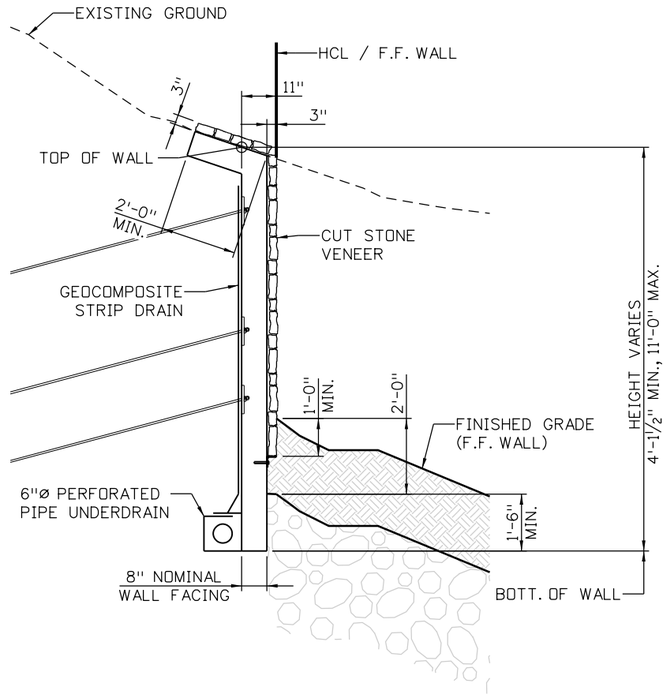
DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 5
GENERAL LAYOUT (1 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 151



TYPICAL SECTION
LOOKING AHEAD STATION
TAKEN AT ℄ SOLDIER PILE



TYPICAL SECTION
LOOKING AHEAD STATION

DESIGN DATA
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SIXTH EDITION WITH INTERIMS THROUGH 2012

DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN (LRFD)

LIVE LOAD: HL-93 (DESIGN TRUCK OR DESIGN TANDEM, AND DESIGN LANE LOAD)

SEISMIC ZONE 1

REINFORCED CONCRETE:

CLASS D CONCRETE:	f'c = 4,500 PSI
REINFORCING STEEL:	fy = 60,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

CAISSON CONCRETE:

CLASS BZ CONCRETE:	f'c = 4,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

STRUCTURAL STEEL:

AASHTO M270 (ASTM A992) GRADE 50:	fy = 50,000 PSI

SOIL PROPERTIES:

ABOVE BOTTOM OF WALL:

SOIL UNIT WEIGHT:	120 PCF
SOIL FRICTION ANGLE:	32°
ACTIVE HORIZONTAL PRESSURE COEFFICEINT WITH LEVEL BACKSLOPE:	0.238

BELOW BOTTOM OF WALL:

SOIL UNIT WEIGHT:	135 PCF
SOIL FRICTION ANGLE:	38°
ACTIVE HORIZONTAL PRESSURE COEFFICEINT WITH LEVEL BACKSLOPE:	0.283
PASSIVE HORIZONTAL PRESSURE COEFFICEINT WITH LEVEL FORESLOPE:	1.290

DESIGN DATA
SEISMIC ZONE 1

REINFORCED CONCRETE:

CONCRETE CLASS SHOTCRETE :	f'c = 4,500 PSI
REINFORCING STEEL:	fy = 60,000 PSI
WELDED WIRE FABRIC:	fy = 65,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

SOIL PROPERTIES:

IN-SITU SOIL:

SOIL UNIT WEIGHT:	145 PCF
SOIL COHESION:	5,000 PSF
SOIL FRICTION ANGLE:	38°

NOTES:
1. FOR CUT STONE VENEER DETAILS, REFER TO ARCHITECTURAL DETAILS SHEET.
2. THE CONTRACTOR SHALL NOT DISTURB THE EXISTING GROUND CONDITIONS EXCEPT AS NECESSARY TO INSTALL THE WALL FOUNDATION AND COMPLETE FINISHED GRADING.

KEYNOTES:
1 STRUCTURAL CONCRETE SHALL BE PAINTED BROWN, EQUIVALENT TO FEDERAL STANDARD 595C COLOR 10059.

2 0 2 4 FT
SCALE: 1"=4'

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO 811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

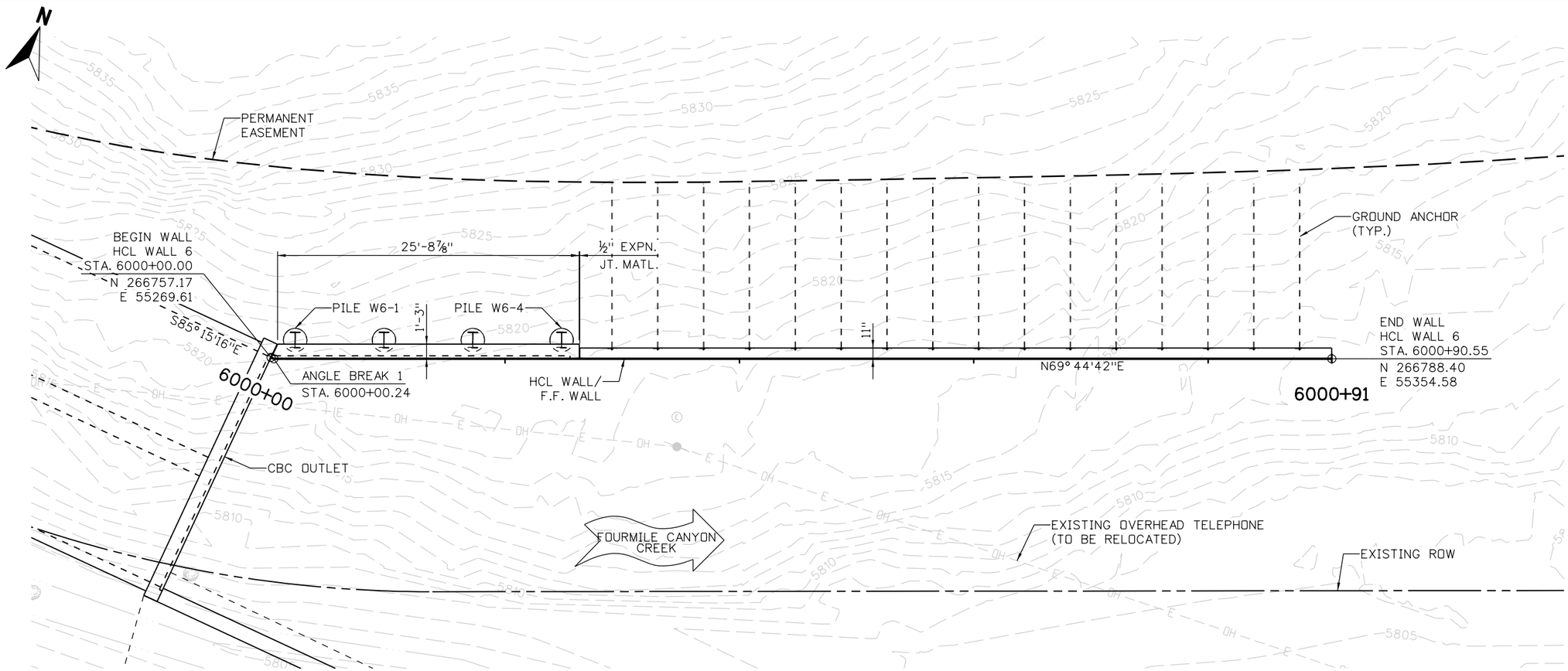
Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 5
GENERAL LAYOUT (2 OF 2)

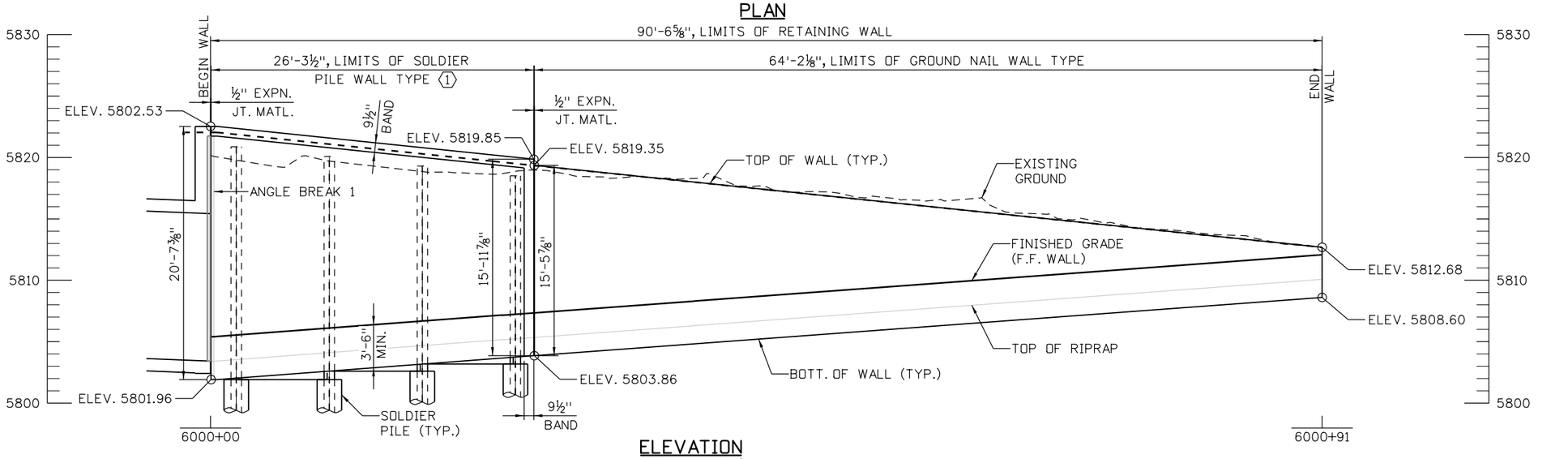
PROJECT NO: 4043.SEPT12C34 | SHEET NO: 152



NOTES:

1. GROUND NAILS ARE GENERICALLY SHOWN. SEE GROUND NAIL LAYOUT FOR ACTUAL LOCATIONS.

PLAN



ELEVATION

TAKEN AT HCL WALL 6 / F.F. WALL

KEYNOTES:

1. THE LENGTH OF SOLDIER PILE WALL TYPE WAS DETERMINED CONSIDERING EXCAVATION LIMITS FOR THE BOX CULVERT. EXCAVATION LIMITS SHALL NOT IMPEDE EXISTING GROUND AT GROUND NAIL WALL TYPE.

5 0 5 10 FT
SCALE: 1"=10'

100% SET

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811
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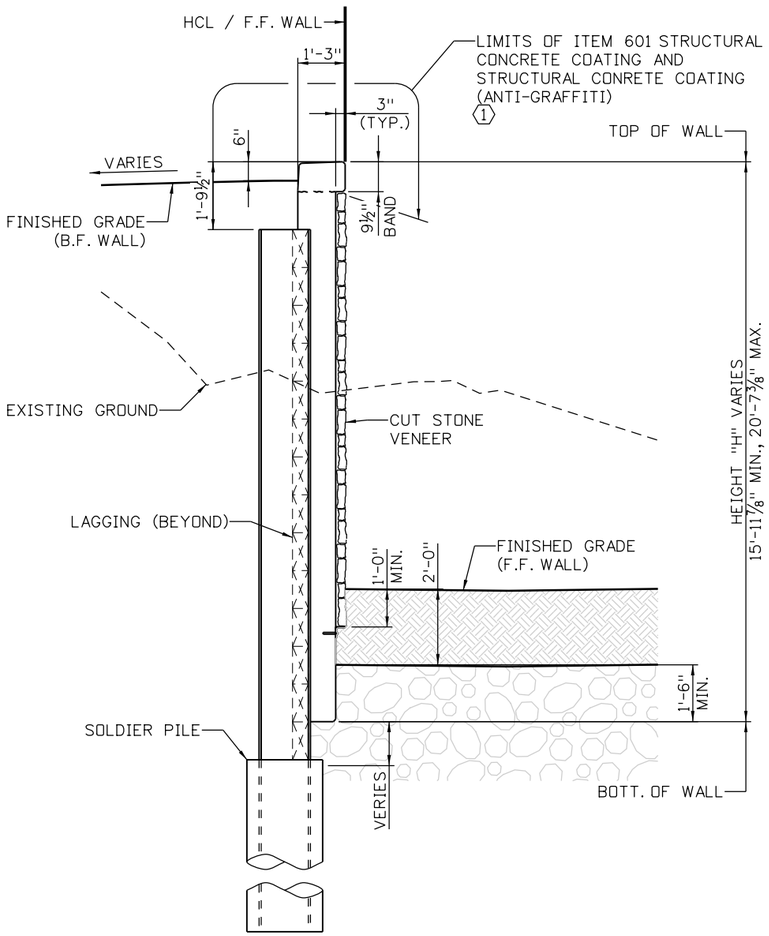
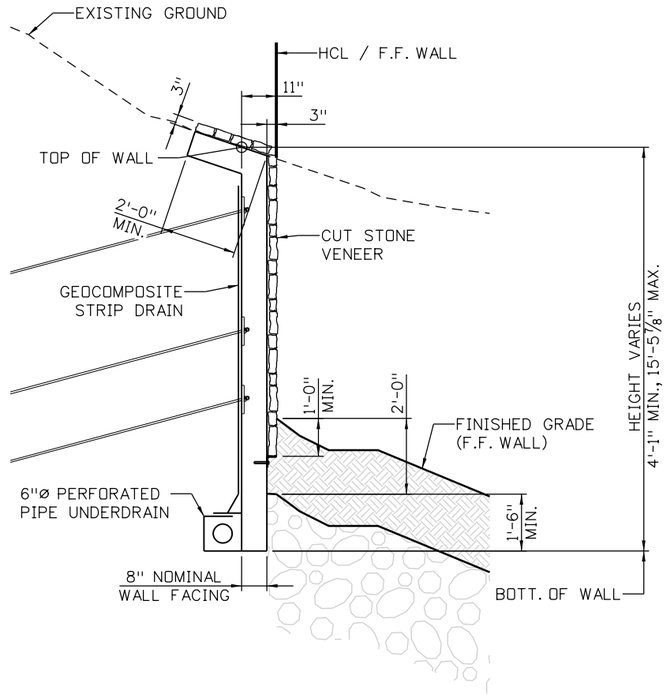
WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 6
GENERAL LAYOUT (1 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 153



TYPICAL SECTION
LOOKING AHEAD STATION
TAKEN AT ℄ SOLDIER PILE



TYPICAL SECTION
LOOKING AHEAD STATION

DESIGN DATA
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SIXTH EDITION WITH INTERIMS THROUGH 2012

DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN (LRFD)

LIVE LOAD: HL-93 (DESIGN TRUCK OR DESIGN TANDEM, AND DESIGN LANE LOAD)

SEISMIC ZONE 1

REINFORCED CONCRETE:

CLASS D CONCRETE:	f'c = 4,500 PSI
REINFORCING STEEL:	fy = 60,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

CAISSON CONCRETE:

CLASS BZ CONCRETE:	f'c = 4,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

STRUCTURAL STEEL:

AASHTO M270 (ASTM A992) GRADE 50:	fy = 50,000 PSI

SOIL PROPERTIES:

ABOVE BOTTOM OF WALL:

SOIL UNIT WEIGHT:	120 PCF
SOIL FRICTION ANGLE:	32°
ACTIVE HORIZONTAL PRESSURE COEFFICEINT WITH LEVEL BACKSLOPE:	0.238

BELOW BOTTOM OF WALL:

SOIL UNIT WEIGHT:	135 PCF
SOIL FRICTION ANGLE:	38°
ACTIVE HORIZONTAL PRESSURE COEFFICEINT WITH LEVEL BACKSLOPE:	0.283
PASSIVE HORIZONTAL PRESSURE COEFFICEINT WITH LEVEL FORESLOPE:	1.290

DESIGN DATA
SEISMIC ZONE 1

REINFORCED CONCRETE:

CONCRETE CLASS SHOTCRETE :	f'c = 4,500 PSI
REINFORCING STEEL:	fy = 60,000 PSI
WELDED WIRE FABRIC:	fy = 65,000 PSI
SEVERITY OF SULFATE EXPOSURE:	CLASS 0

SOIL PROPERTIES:

IN-SITU SOIL:

SOIL UNIT WEIGHT:	145 PCF
SOIL COHESION:	5,000 PSF
SOIL FRICTION ANGLE:	38°

NOTES:
1. FOR CUT STONE VENEER DETAILS, REFER TO ARCHITECTURAL DETAILS SHEET.
2. THE CONTRACTOR SHALL NOT DISTURB THE EXISTING GROUND CONDITIONS EXCEPT AS NECESSARY TO INSTALL THE WALL FOUNDATION AND COMPLETE FINISHED GRADING.

KEYNOTES:
1 STRUCTURAL CONCRETE SHALL BE PAINTED BROWN, EQUIVALENT TO FEDERAL STANDARD 595C COLOR 10059.

2 0 2 4 FT
SCALE: 1"=4'

100% SET

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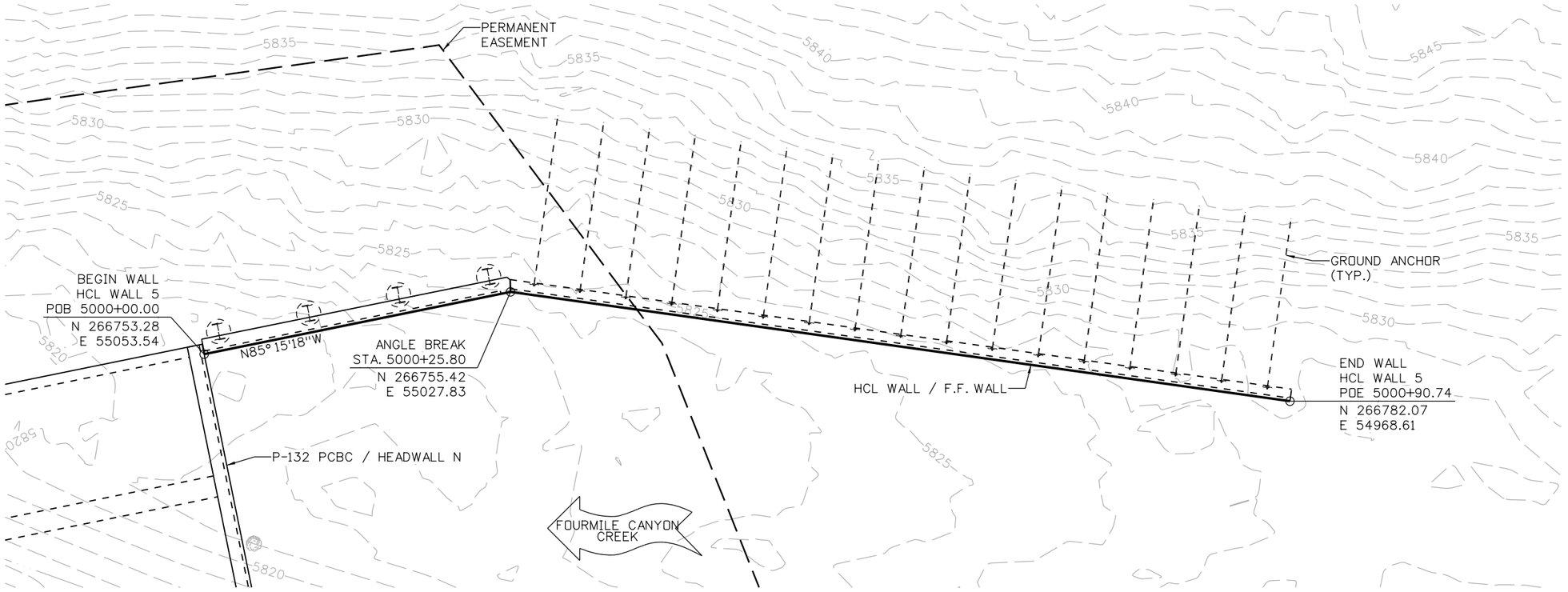
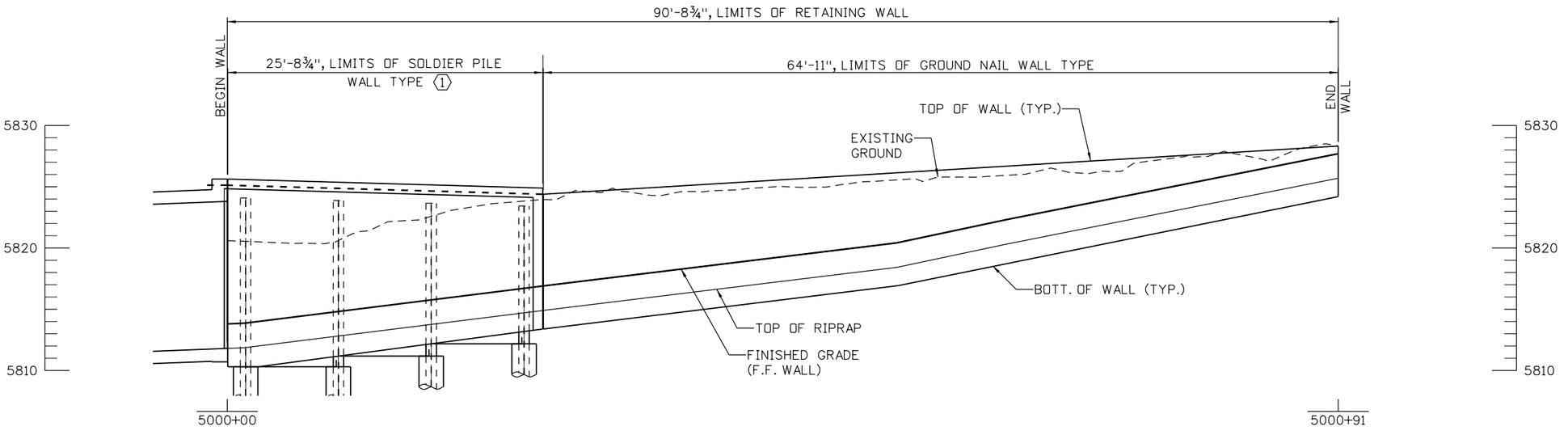
WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 6
GENERAL LAYOUT (2 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 154



PLAN



ELEVATION

TAKEN AT HCL WALL / F.F. WALL

Yeh and Associates, Inc.
Consulting Engineers & Scientists

100% SET

CALL UTILITY NOTIFICATION CENTER OF COLORADO
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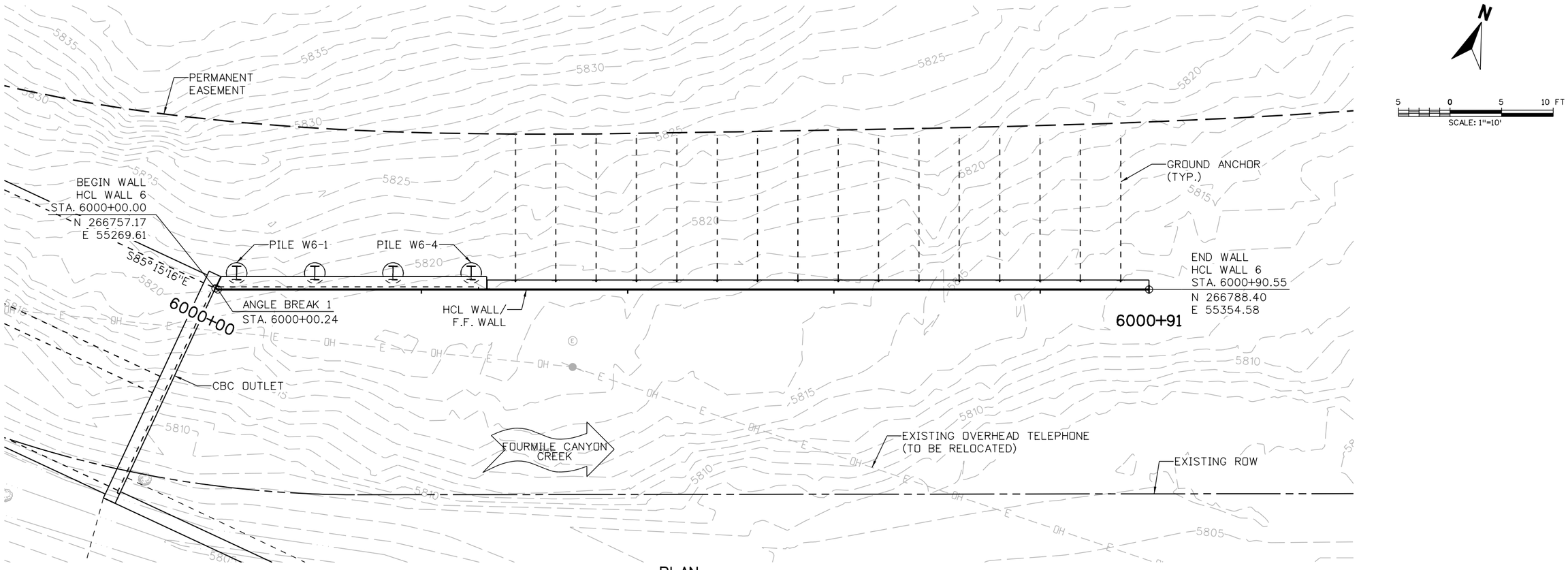
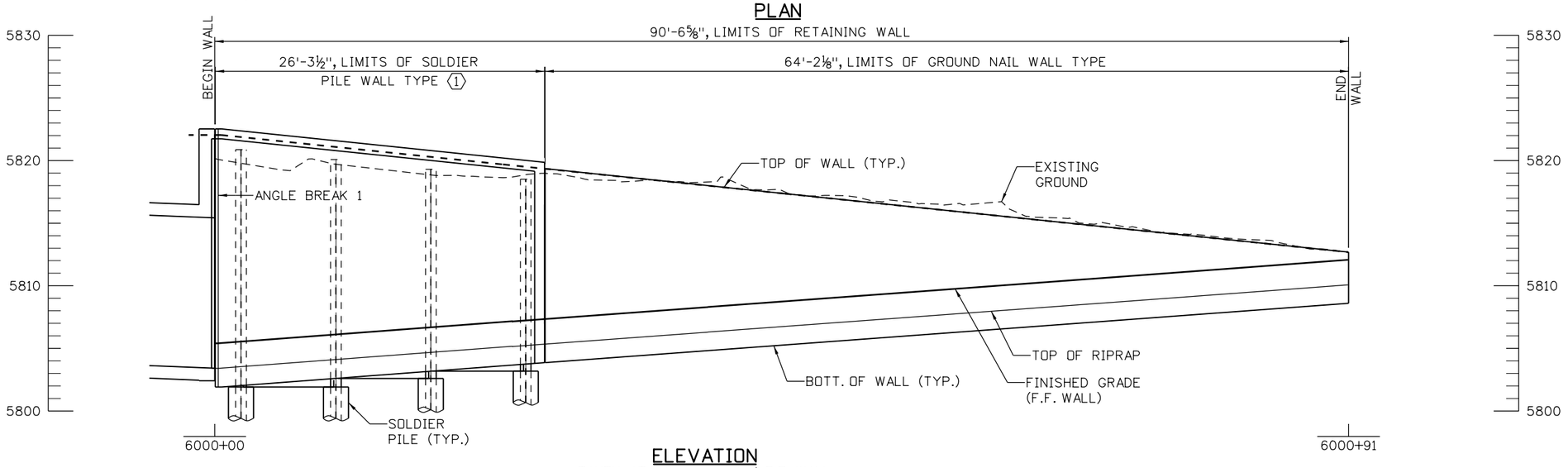
WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 5
ENGINEERING GEOLOGY

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 155



PLAN



ELEVATION

TAKEN AT HCL WALL 6 / F.F. WALL

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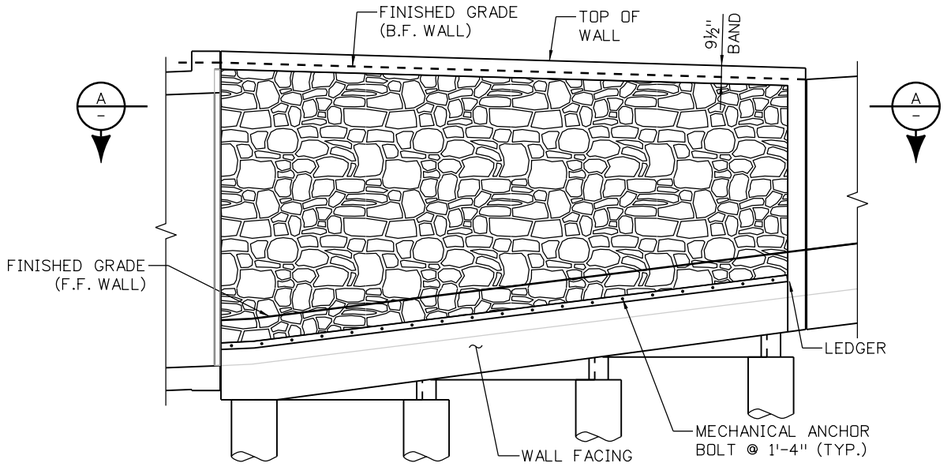
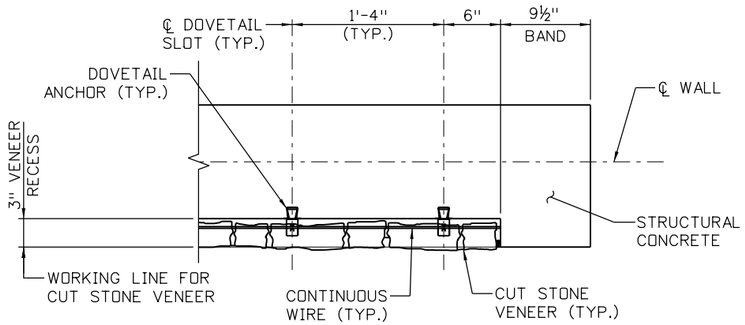
WAGONWHEEL GAP ROAD WALLS
RETAINING WALL 6
ENGINEERING GEOLOGY

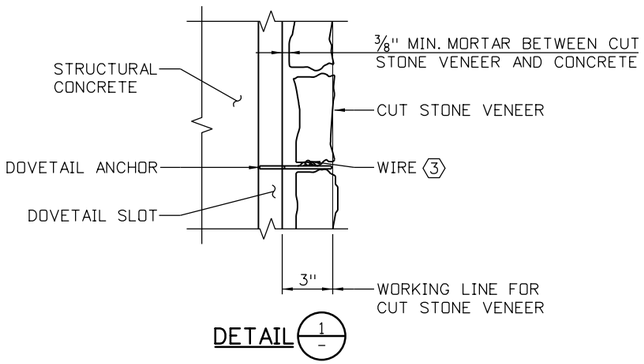
PROJECT NO: 4043.SEPT12C34 | SHEET NO: 156



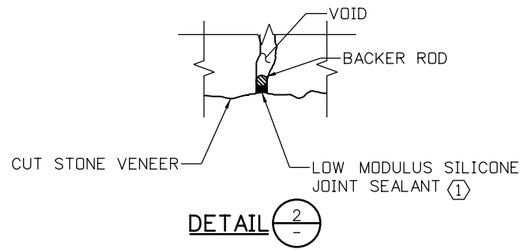
TYPICAL ELEVATION



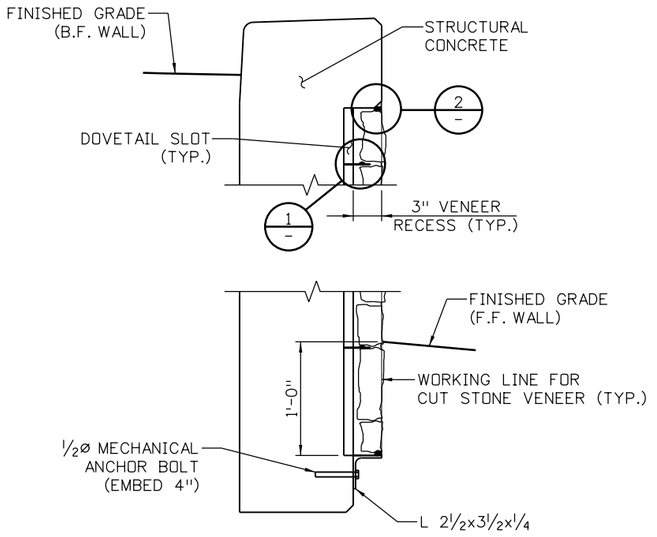
SECTION A



DETAIL 1



DETAIL 2



TYPICAL SECTION

NOTES:

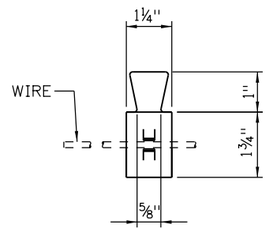
1. CUT STONE VENEER SHALL BE DAKOTA TOP ROCK AS SUPPLIED BY ELDORADO STONE OR APPROVED EQUAL AND PLACED A RANDOM PATTERN.
2. DOVETAIL SLOTS SHALL BE TYPE 305 AS MANUFACTURED BY HOHMANN & BARNARD, INC., OR APPROVED EQUAL. THEY SHALL BE 22 GAGE HOT-DIPPED GALVANIZED STEEL, AND HAVE A THROAT OPENING WIDTH OF 5/8".
3. THE DOVETAIL ANCHORS SHALL BE 303 SV - SEISMIC-NOTCH AS MANUFACTURED BY HOHMANN & BARNARD, INC., OR AN APPROVED EQUAL. MATERIAL FOR DOVETAIL ANCHORS SHALL BE 3/32" THICK HOT-DIPPED GALVANIZED STEEL.
4. WIRE SHALL BE 9 GAGE PLAIN COLD-DRAWN STEEL WIRE CONFORMING TO ASTM A82. WIRE SHALL BE MILL GALVANIZED CONFORMING TO ASTM A153.
5. CONCRETE SURFACES SHALL BE PREPARED IN ACCORDANCE WITH SUPPLIER'S RECOMMENDATION PRIOR TO INSTALLATION OF CUT STONE VENEER.
6. MORTAR JOINTS SHALL BE ½" MAXIMUM THICKNESS UNLESS SHOWN OTHERWISE.
7. ALL WORK NECESSARY FOR THE INSTALLATION OF CUT STONE VENEER, INCLUDING SURFACE PREPARATION, DOVETAIL SLOTS, WIRE TIES, STONE, CAP STONE, MORTAR AND MISC. HARDWARE, SHALL BE INCLUDED IN ITEM 601 CUT STONE VENEER.
8. CUT STONE VENEER SHALL BE ANCHORED TO THE WALL CONCRETE BY MEANS OF WIRE TIES PLACED IN DOVETAIL SLOTS, AS SHOWN. ALTERNATIVE METHODS OF ANCHORING THE STONE VENEER MAY BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
9. REINFORCING STEEL IN STRUCTURAL CONCRETE NOT SHOWN.
10. VENEER LIMITS EXTEND TO 1'-0" MINIMUM BELOW FINISHED GRADE ON ALL EXPOSED CONCRETE SURFACES.

KEYNOTES:

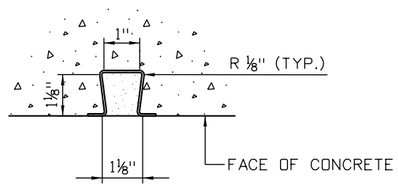
⟨1⟩ TOOL SEALANT TO A ROUNDED SURFACE AND THE REQUIRED DIMENSIONS SHOWN. COLOR TO MATCH MORTAR JOINTS.

⟨2⟩ VENEER PATTERN SHALL NOT BE BROKEN WITH A VERTICAL JOINT AT WALL EXPANSION JOINT. PROVIDE EXPANSION JOINT IN VENEER FOLLOWING GROUT LINE AS SHOWN.

⟨3⟩ FIELD BEND WIRE SO THAT TAILS ARE EMBEDDED IN THE MIDDLE OF MORTAR BED. 1" MIN. CLR. FROM STRUCTURAL CONCRETE.



DOVETAIL ANCHOR AND WIRE



DOVETAIL SLOT

ANCHORAGE DETAIL
PLAN VIEW

100% SET

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811
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Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
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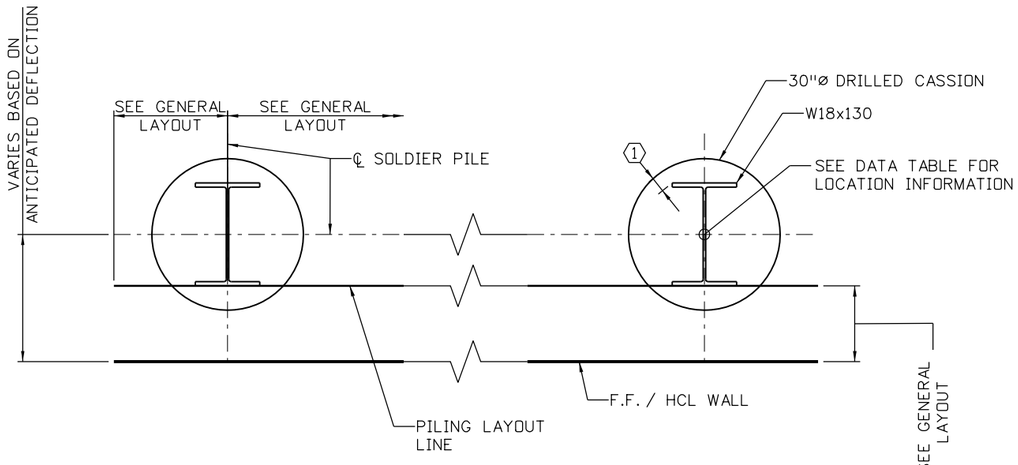
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
CUT STONE VENEER DETAILS

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 157



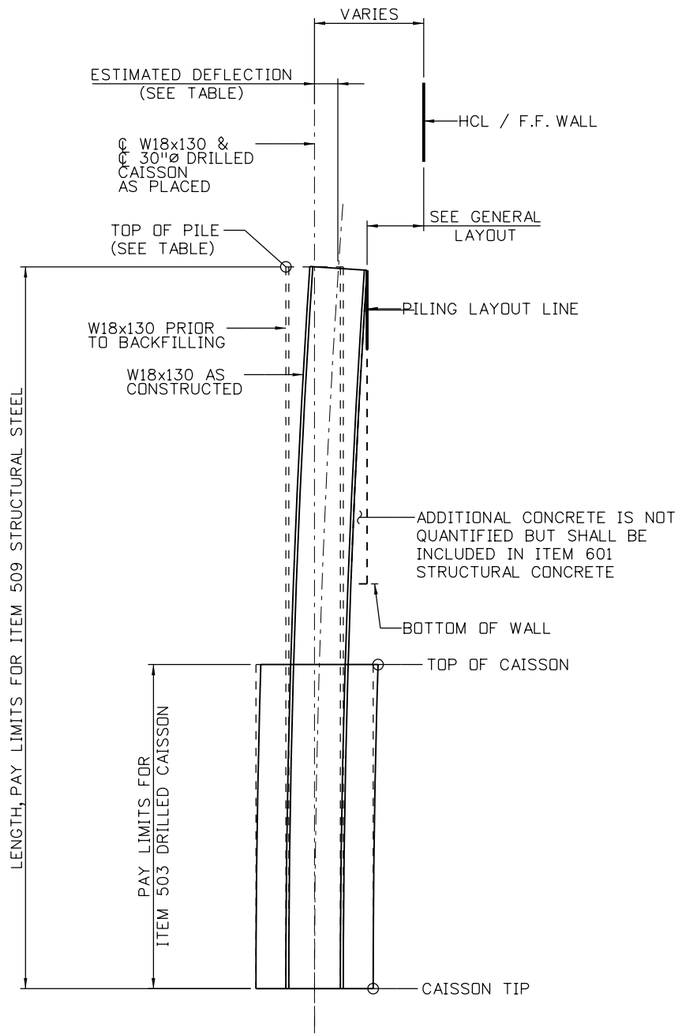
FOUNDATION LAYOUT - PLAN

NOTES

1. ORIENT ℄ PILING WEB PERPENDICULAR TO F.F. WALL AS SHOWN.
2. TEMPORARY CASING MAY BE REQUIRED TO PREVENT CAVING OF GRANULAR SOILS AND/OR TO REDUCE TO INTRUSION OF GROUND WATER. TEMPORARY CASING AND DEWATERING SHALL BE INCLUDED IN ITEM 503 DRILLED CAISSON.
3. DRILLED CAISSON CONCRETE SHALL BE CONCRETE CLASS BZ.

KEYNOTES

〈1〉 1½" MINIMUM CLEAR.



SOLDIER PILE DETAIL

N.T.S.

100% SET

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WAGONWHEEL GAP ROAD WALLS
SOLDIER PILE WALL DETAILS (1 OF 3)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 158

WALL 5 SOLDIER PILE DATA TABLE

SOLDIER PILE DESIGNATION	NORTHING	EASTING	WALL HCL		ESTIMATED TOP OF WALL DEFLECTION ⟨1⟩	EST. ℄ CAISSON PLACEMENT OFFSET FROM WALL HCL	EXISITNG GROUND ELEVATION AT ℄ CAISSON	TOP OF WALL ELEVATION	BOTTOM OF WALL ELEVATION	WALL HEIGHT ("H")	PILE CUTOFF ELEVATION	TOP OF CAISSON ELEVATION	MIN. CAISSON LENGTH	CAISSON MIN. TIP ELEVATION	AS-BUILT PILE TIP ELEV.
			STATION AT ℄ CAISSON	PLAN OFFSET AT ℄ CAISSON											
W5-1	266,751.82	55,051.88	5000+01.50	1.60 FT. LT.	0.08 FT	1.67 FT. LT.	5820.78	5825.59	5810.30	15.29 FT.	5823.80	5810.89	30.00 FT.	5780.89	
W5-2	266,752.45	55,044.32	5000+09.08	1.60 FT. LT.	0.07 FT	1.67 FT. LT.	5821.10	5825.37	5810.89	14.48 FT.	5823.58	5811.57	30.00 FT.	5781.57	
W5-3	266,753.07	55,036.77	5000+16.66	1.60 FT. LT.	0.07 FT	1.66 FT. LT.	5823.16	5825.15	5811.57	13.59 FT.	5823.36	5812.25	30.00 FT.	5782.25	
W5-4	266,753.70	55,029.21	5000+24.24	1.60 FT. LT.	0.06 FT	1.66 FT. LT.	5824.36	5824.94	5812.25	12.69 FT.	5823.14	5812.25	30.00 FT.	5782.25	

WALL 6 SOLDIER PILE DATA TABLE

SOLDIER PILE DESIGNATION	NORTHING	EASTING	WALL HCL		ESTIMATED TOP OF WALL DEFLECTION ⟨1⟩	EST. ℄ CAISSON PLACEMENT OFFSET FROM WALL HCL	EXISITNG GROUND ELEVATION AT ℄ CAISSON	TOP OF WALL ELEVATION	BOTTOM OF WALL ELEVATION	WALL HEIGHT ("H")	PILE CUTOFF ELEVATION	TOP OF CAISSON ELEVATION	MIN. CAISSON LENGTH	CAISSON MIN. TIP ELEVATION	AS-BUILT PILE TIP ELEV.
			STATION AT ℄ CAISSON	PLAN OFFSET AT ℄ CAISSON											
W6-1	266,751.82	55,051.88	6000+02.05	1.60 FT. LT.	0.10 FT	1.70 FT. LT.	5821.06	5822.37	5802.03	20.34 FT	5820.58	5802.60	30.00	5772.60	
W6-2	266,752.45	55,044.32	6000+09.63	1.60 FT. LT.	0.09 FT	1.69 FT. LT.	5820.66	5821.58	5802.60	18.98 FT	5819.79	5803.18	30.00	5773.18	
W6-3	266,753.07	55,036.77	6000+17.21	1.60 FT. LT.	0.09 FT	1.68 FT. LT.	5819.73	5820.79	5803.18	17.62 FT	5819.00	5803.75	30.00	5773.75	
W6-4	266,753.70	55,029.21	6000+24.79	1.60 FT. LT.	0.08 FT	1.68 FT. LT.	5819.09	5820.01	5803.75	16.26 FT	5818.21	5803.75	30.00	5773.75	

KEYNOTES:

⟨1⟩ ESTIMATED DEFLECTION = 0.5% "H". ESTIMATED DEFLECTIONS ARE APPROXIMATE AND MAY VARY DEPENDING ON BACKFILL EQUIPMENT AND PROCEDURE.

100% SET

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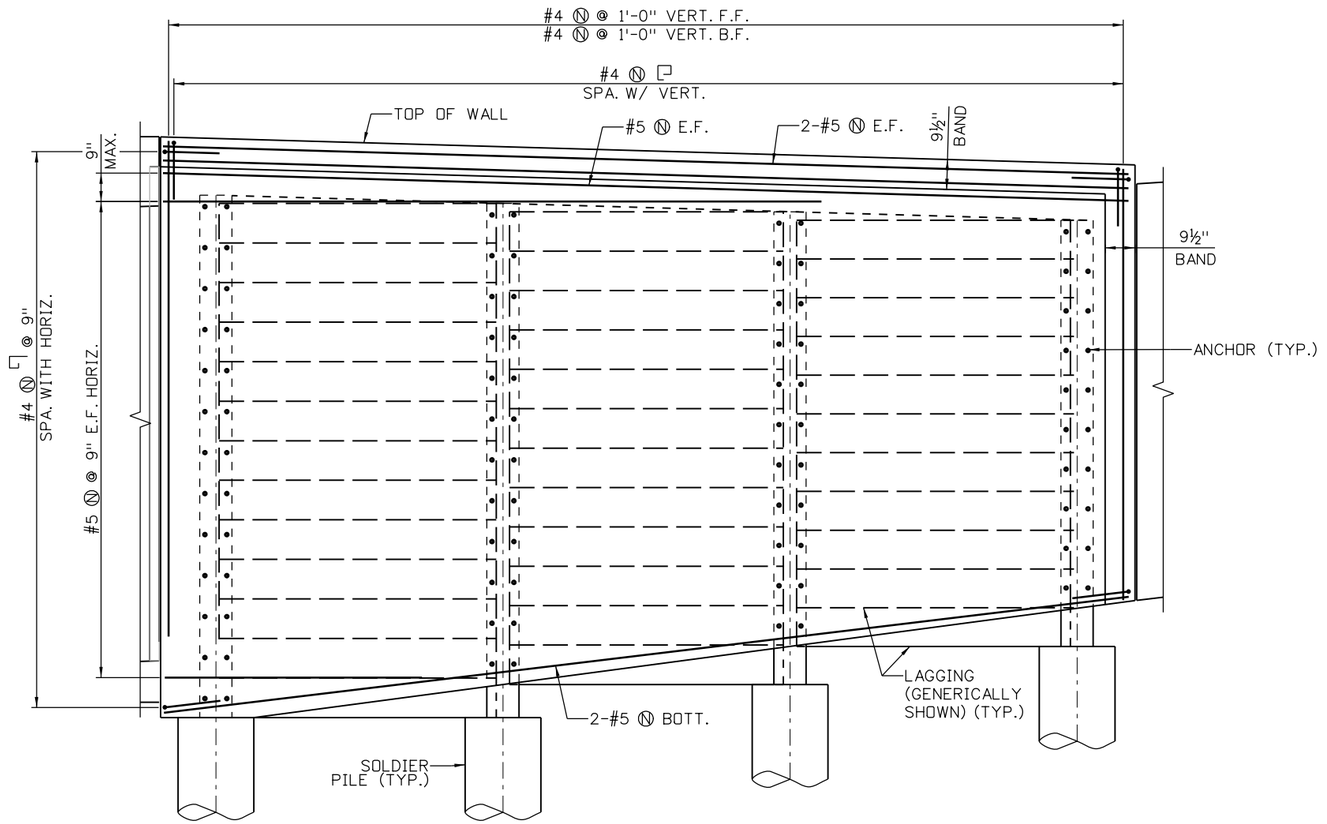
WAGONWHEEL GAP ROAD WALLS
SOLDIER PILE WALL DETAILS (2 OF 3)

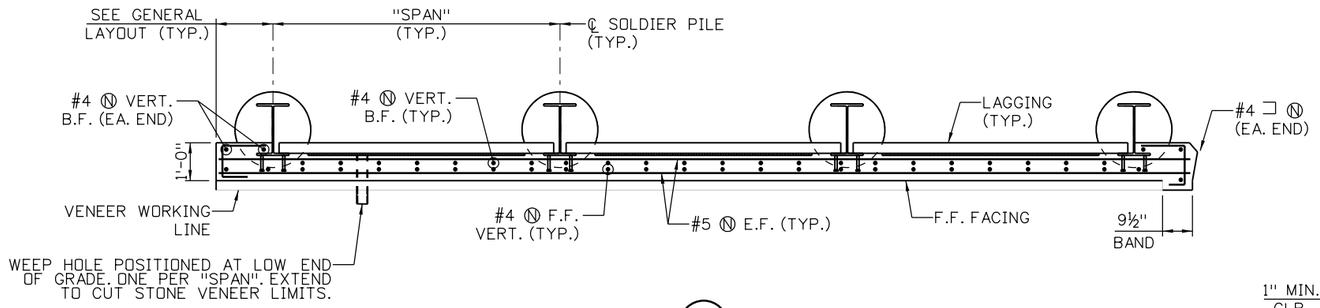
PROJECT NO: 4043.SEPT12C38 | SHEET NO: 159



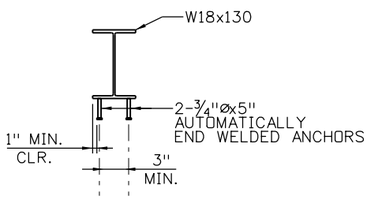
ELEVATION
DRAINAGE NOT SHOWN

NOTES
1. FACING CONCRETE SHALL BE CONCRETE CLASS D (WALL).
2. WEEP HOLES SHALL BE 3 INCH DIAMETER SCHEDULE 40 PVC PIPE POSITIONED 6 INCHES CLEAR ABOVE FINSIHED GRADE (F.F. WALL). PROVIDE 1 INCH CLEAR TO REINFORCING.
3. GEOCOMPOSITE SHALL BE SECURED TO PREVENT MOVEMENT DURING OPERATIONS.
4. ALL ELEMENTS ASSOCIATED WITH LAGGING, GEOCOMPOSITE DRAIN, AND WEEP HOLES SHALL BE INCLUDED IN ITEM 601 CONCRETE CLASS D (WALL).
5. THE CONCTRACTOR SHALL DESIGN LAGGING TO SPAN BETWEEN SOLDIER PILES. THE CONTRACTOR SHALL SUBMIT DESIGN CALCULATIONS AND WORKING DRAWINGS SEALED BY THE CONTRACTOR'S ENGINEER FOR INFORMATION ONLY 10 DAYS BEFORE THE START OF WORK.
6. FOR ARCHITECTURAL DETAILS AND ASSOCIATED EMBEDDED ELEMENTS, REFER TO CUT STONE VENEER SHEETS.
7. F.F. WALL SHALL BE PLUMB. SEE SOLDIER PILE DETAIL FOR ADDITIONAL CONCRETE QUANITITIES NOT SHOWN.

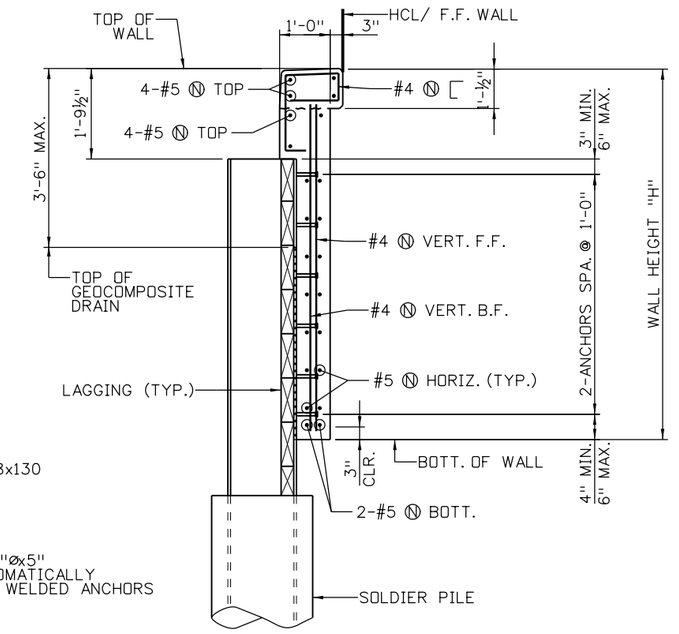
KEYNOTES
⟨1⟩ DRAINAGE NOT REQUIRED WHERE WALL HEIGHT "H" IS LESS THAN 6'-0".



SECTION A



DETAIL 1



SECTION B
WEEP HOLES NOT SHOWN

100% SET

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WAGONWHEEL GAP ROAD WALLS
SOLDIER PILE WALL DETAILS (3 OF 3)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 160

NOTES:

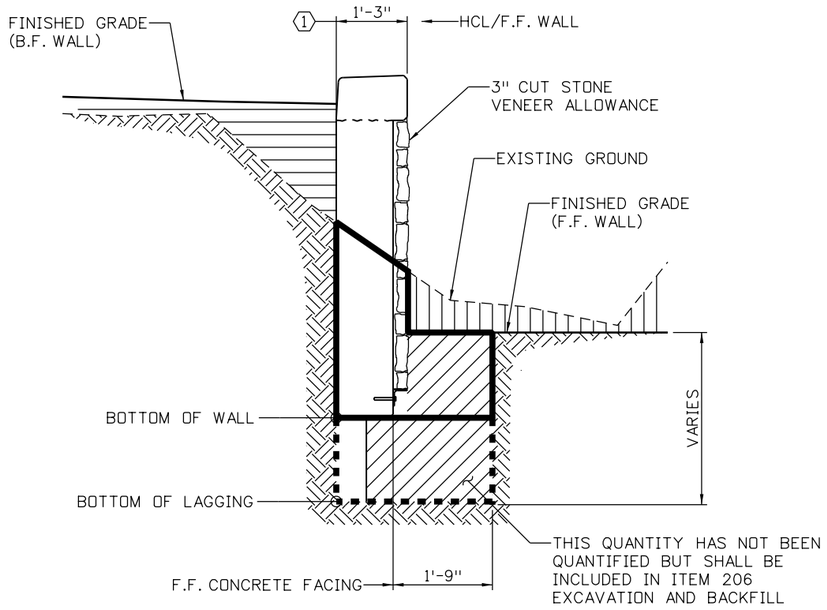
1. THIS SHEET GIVES THE MINIMUM EXTENT OF EARTHWORK. THE CONTRACTOR MAY ELECT TO EXTEND THE STRUCTURE EXCAVATION AND STRUCTURE BACKFILL BEYOND THE LIMITS SHOWN. ANY ADDITIONAL EXCAVATION BEHIND THE WALL SHALL BE BACKFILLED WITH STRUCTURE BACKFILL (CLASS 1). ANY ADDITIONAL EXCAVATION IN FRONT OF THE WALL SHALL BE BACKFILLED WITH STRUCTURE BACKFILL (CLASS 2). ANY ADDITIONAL EXCAVATION OR BACKFILL BEYOND THE LIMITS SHOWN ON THIS SHEET WILL BE BOURNE BY THE CONTRACTOR AND WILL NOT BE MEASURED OR PAID FOR.
2. EXCAVATION AND BACKFILL IN THE DRILLED HOLE OF THE CAISSON SHALL NOT BE PAID FOR SEPERATELY BUT INCLUDED IN ITEM 503 DRILLED CAISSON.
3. FOR DRAINAGE DETAILS, SEE SOLDIER PILE WALL DETAILS.

KEYNOTES:

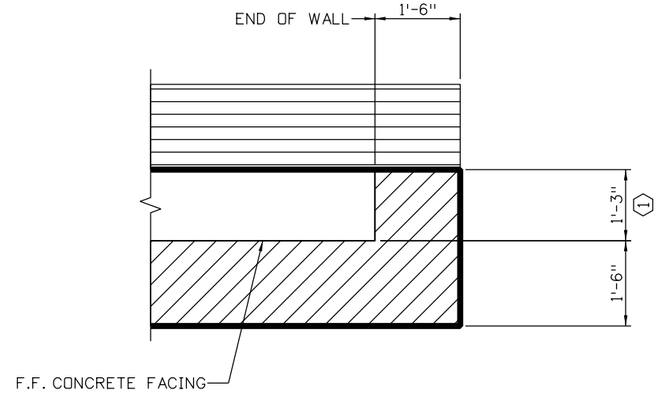
(1) DIMENSION SHOWN IS USED FOR QUANTITY PURPOSES ONLY AND APPLIES FROM BEGINNING TO END OF WALL.

LEGEND:

- PAY LIMITS OF STRUCTURE EXCAVATION
- LIMITS OF STRUCTURE BACKFILL (CLASS 2)
- SEE ROADWAY PLANS
- LIMITS OF UNCLASSIFIED EXCAVATION (INCLUDED WITH ROADWAY PLANS)
- CONCRETE
- EARTH



TYPICAL SECTION BETWEEN CAISSONS



END OF RETAINING WALL DETAIL - PLAN

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811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

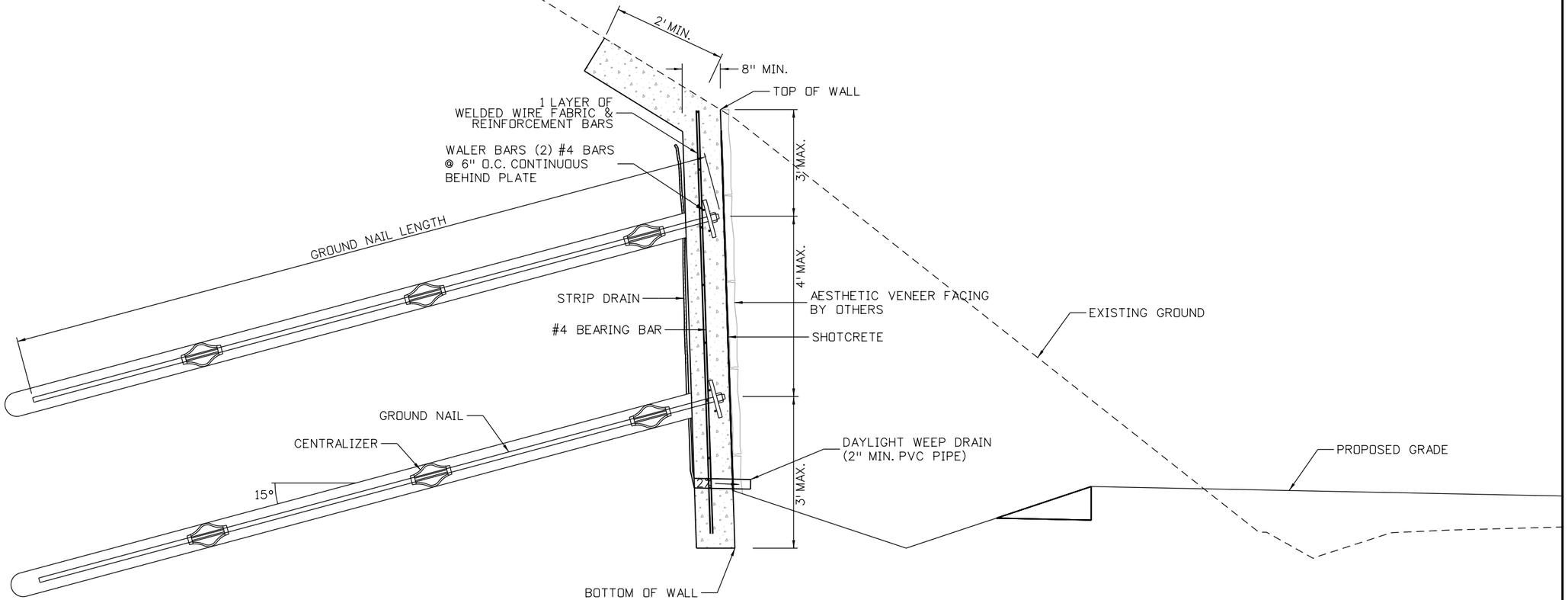
BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

Michael Baker INTERNATIONAL

DESIGNED:	CAD:	CHECKED:	DATE:
MCD	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
SOLDIER PILE WALL EXCAVATION AND BACKFILL

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 161



Mike Woltz 11:43:20 AM pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T04\08_Sheet_Files\01_Geotech\DGN\138200_Typical Section01

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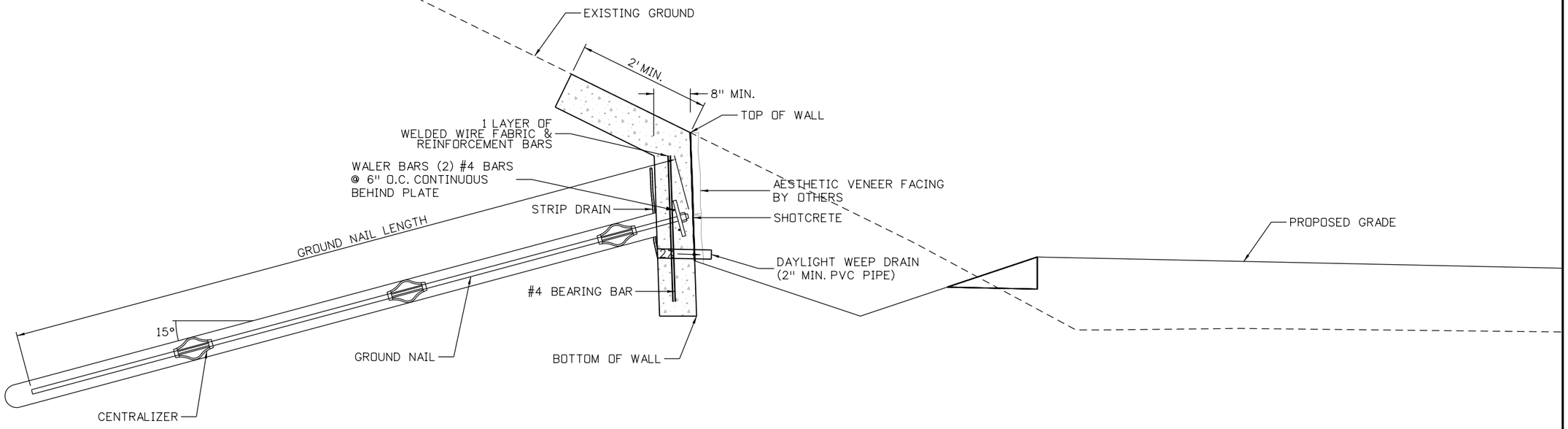
WAGONWHEEL GAP ROAD
GROUND NAIL WALL 1 TYPICAL SECTION

PROJECT NO: 4041.SEPT12C37 | SHEET NO: 162



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ENGINEERING DIVISION

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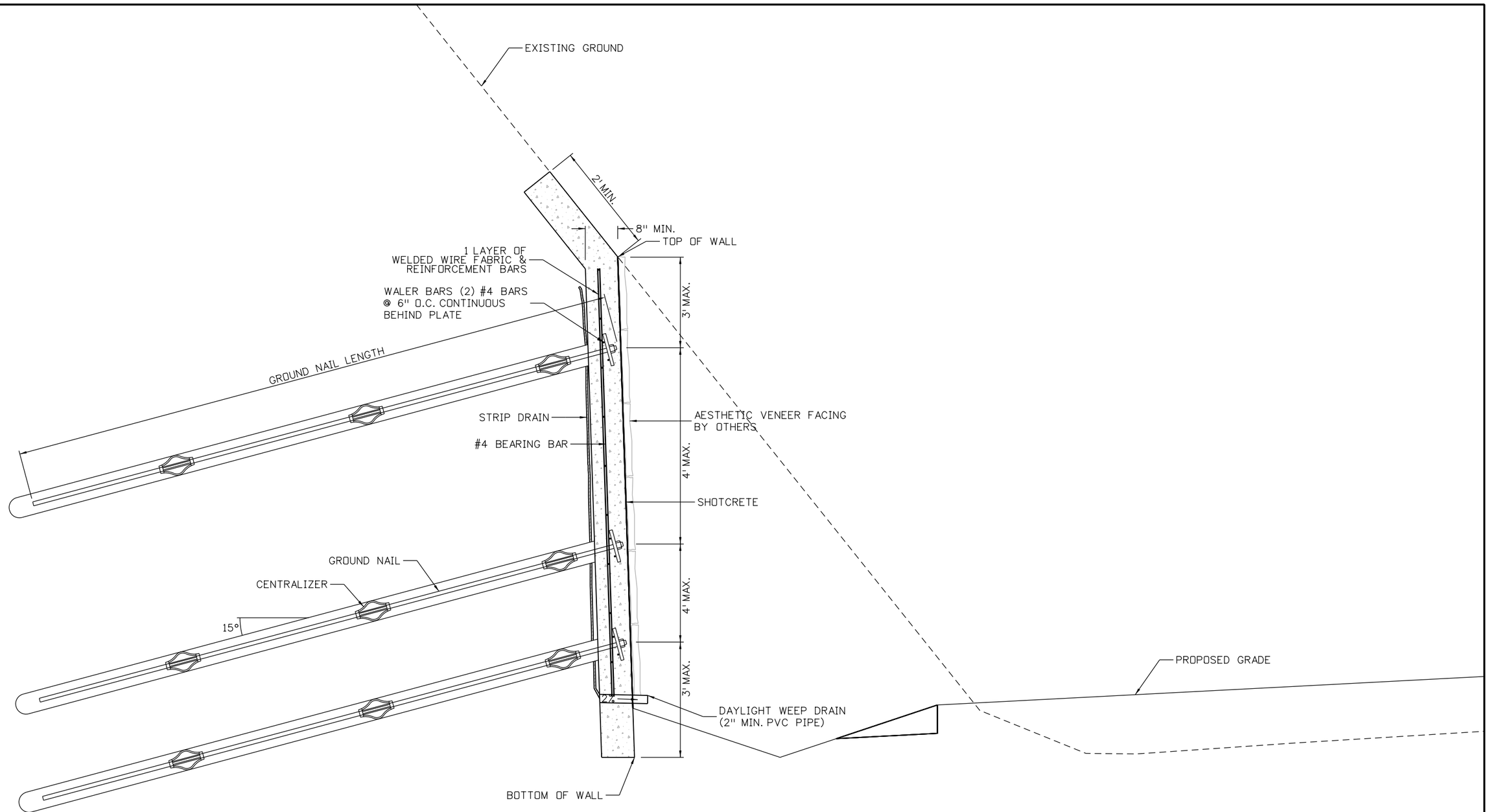
SCS	MJW		11/04/16

WAGONWHEEL GAP ROAD
GROUND NAIL WALL 2 TYPICAL SECTION

PROJECT NO: 4041.SEPT12C37 | SHEET NO: 163



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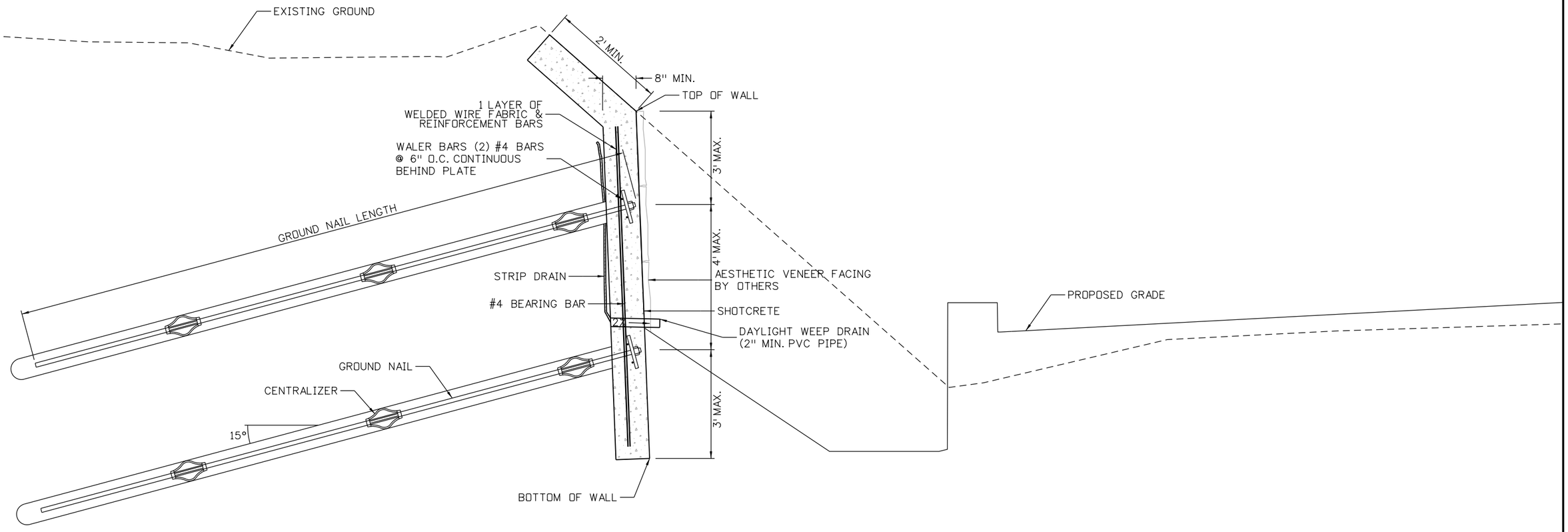
WAGONWHEEL GAP ROAD
GROUND NAIL WALL 3 TYPICAL SECTION

PROJECT NO: 4041.SEPT12C37 | SHEET NO: 164



Mike Wolz 11:53:01 AM pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T04\08_Sheet_Files\01_Geotech\DGN\138200_Typical Section04

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WAGONWHEEL GAP ROAD
GROUND NAIL WALL 4 TYPICAL SECTION

PROJECT NO: 4041.SEPT12C37 | SHEET NO: 165

TO BE UPDATED

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WAGONWHEEL GAP ROAD
GROUND NAIL WALL 5
TYPICAL SECTION

PROJECT NO: 4041.SEPT12C37 | SHEET NO: 166

TO BE UPDATED

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WAGONWHEEL GAP ROAD
GROUND NAIL WALL 6
TYPICAL SECTION

PROJECT NO: 4041.SEPT12C37 | SHEET NO: 167

GROUND NAIL WALL GENERAL NOTES

1.0 GENERAL NOTES

1.1 THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF STRUCTURES, INCLUDING EXCAVATIONS, DURING CONSTRUCTION.

1.2 ALL REINFORCING STEEL SHALL BE NON-EPOXY COATED UNLESS OTHERWISE NOTED.

1.3 THE MINIMUM LAP SPLICE LENGTH SHALL BE 1'-1" AND PLACED IN ACCORDANCE WITH SUBSECTION 602.06.

1.4 GROUND NAILS - GRADE 75 THREAD BAR OR EQUIVALENT IN ACCORDANCE WITH ASTM A615 AND EPOXY COATED IN ACCORDANCE WITH ASTM A775 AS SHOWN ON THE DRAWINGS.
FY=75,000 PSI

1.5 GROUT - GROUT SHALL BE NEAT-CEMENT OR WITH SAND, WITH TYPE I, TYPE II, OR TYPE III CEMENT IN ACCORDANCE WITH ASTM C150. WATER-CEMENT RATIO SHALL BE BETWEEN 0.4 AND 0.6 AND SHALL DEVELOP THE FOLLOWING STRENGTHS AT THE SPECIFIED CURE PERIODS.
F'C=3,000 PSI MINIMUM (7 DAY STRENGTH)

1.6 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.

1.7 SHOTCRETE - PER CDOT STANDARD SPECIFICATIONS SECTION 641 SHOTCRETE.

1.8 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"

1.9 WELDED WIRE MESH SHALL BE IN ACCORDANCE WITH ASTM A1064.
FY=65,000 PSI

1.10 WALERS AND VERTICAL BEARING BARS SHALL BE IN ACCORDANCE WITH ASTM A615.
FY=60,000 PSI

1.11 STRIP DRAINS CONSIST OF 12" WIDE DIMPLED CORES WRAPPED IN GEOTEXTILE IN CONFORMANCE WITH SUBSECTION 712.12 GEOCOMPOSITE DRAINS.

1.12 CENTRALIZERS SHALL BE PLASTIC AND ATTACHED TO THE NAILS IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

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

2.0 GROUND NAIL WALL CONSTRUCTION SEQUENCE

2.1 EXCAVATE ONE LIFT TO A MAXIMUM DEPTH OF FOUR (4) 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 AND/OR PLACEMENT OF A SACRIFICIAL REINFORCED SHOTCRETE FLASH COAT MAY BE USED TO TEMPORARILY STABILIZE EXCAVATION PRIOR TO DRILLING GROUND NAILS. CARE SHOULD BE TAKEN DURING EXCAVATION THAT NO GROUND IS LOST FROM BEHIND THE PREVIOUSLY COMPLETED SHOTCRETE. OBSTRUCTIONS INCLUDING BUT NOT LIMITED TO STEEL, PLATING AND CRIBBING SHALL BE ANTICIPATED IN EXCAVATIONS.

2.2 INSTALL GROUND NAILS AT THE SPACINGS AND TO THE LENGTHS SHOWN ON THE PLANS. THE TOP ROW OF GROUND NAILS SHALL BE WITHIN 3 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.

2.3 INSTALL STRIP DRAINS, WELDED WIRE MESH, WALERS AND VERTICAL BEARING BARS AS SHOWN ON THE DRAWINGS. USE PLASTIC CHAIRS TO HOLD THE REINFORCEMENT AWAY FROM THE SOIL AS NECESSARY.

2.4 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 BORE HOLE ABOVE THE GROUT LINE. COLD WEATHER PROTECTION MEASURES MAY BE NECESSARY.

2.5 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 SNUG. APPLY ADDITIONAL SHOTCRETE TO ATTAIN MINIMUM COVERAGE FOR THE GROUND NAIL AND END HARDWARE.

2.0 GROUND NAIL WALL CONSTRUCTION SEQUENCE con't

2.6 ONCE THE GROUT AND SHOTCRETE OF THE CURRENT LIFT HAVE ATTAINED 50% OF THEIR SPECIFIED STRENGTHS, REPEAT CONSTRUCTION SEQUENCE TO THE BOTTOM OF THE WALL.

3.0 GROUND NAIL WALL DESIGN PARAMETERS

3.1 THE GROUND NAIL WALL HAS BEEN DESIGNED IN GENERAL ACCORDANCE WITH PROCEDURES CONTAINED IN THE FWHA "MANUAL FOR DESIGN AND CONSTRUCTION MONITORING OF GROUND NAIL WALLS", REPORT NO. FHWA-SA-96-069R AND AASHTO 2002 STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES (17TH EDITION).

3.2 THE FOLLOWING VALUES HAVE BEEN USED FOR DESIGN PARAMETERS:

	ø (DEG)	c (PSF)	γ (PCF)	Qd (lb/ft)
CLAYEY SAND/GRAVEL	32	25	120	1360

ø ANGLE OF INTERNAL FRICTION
c COHESION
γ UNIT WEIGHT
Q_d DESIGN SHEAR RESISTANCE
BOND STRESS (ALLOWABLE)

3.3 GROUNDWATER TABLE ASSUMED TO BE BELOW BASE OF WALL.

4.0 GROUND NAIL WALL SPECIAL NOTES

4.1 THE CONTRACTOR IS RESPONSIBLE FOR FIELD LOCATING ALL NEARBY UTILITIES.

4.2 THE BOND STRENGTHS (Qd) SHOWN ON THE PLANS ARE THE MINIMUM ASSUMED FOR DESIGN.

4.3 GROUND NAIL LENGTHS SHOWN ON THE PLANS ARE THE MINIMUM LENGTHS REQUIRED.

4.4 PRIOR TO BEGINNING EXCAVATION FOR THE GROUND NAIL WALL, THE CONTRACTOR SHALL:

4.4.1 SURVEY THE LAYOUT LINE AND TOP OF WALL LINE.

4.4.2 CONFIRM THE LINES, GRADES, AND EXCAVATION LIMITS SHOWN ON THE PLANS.

4.4.3 THE CONTRACTOR SHALL MODIFY THE PLAN WALL PROFILES USING THE FIELD SURVEY INFORMATION AND SUBMIT TO THE ENGINEER FOR REVIEW AND APPROVAL.

4.5 TOP APPROXIMATELY 18" OF SHOTCRETE FACING SHALL BE REMOVED AFTER WIRE MESH WALL CONSTRUCTION AND PRIOR TO PAVEMENT CONSTRUCTION.

Know what's **below.**
Call before you dig.

Yeh and Associates, Inc.
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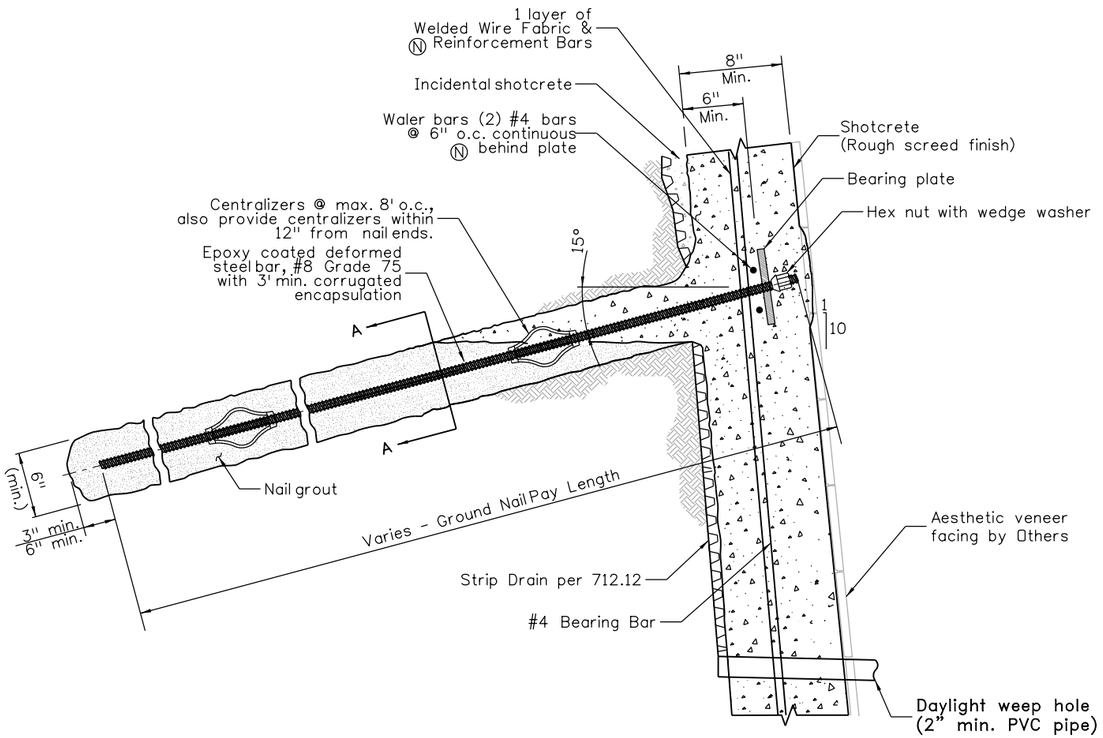
Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
SCS	MJW		11/04/16

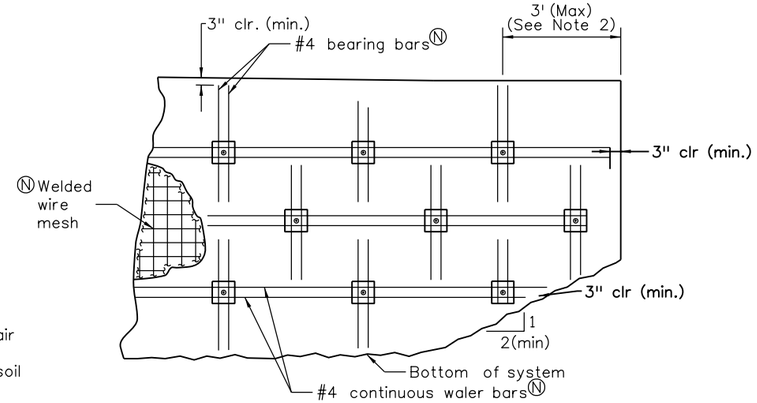
WAGONWHEEL GAP ROAD
GROUND NAIL WALL GENERAL NOTES

PROJECT NO: 4041.SEPT12C37 | SHEET NO: 168



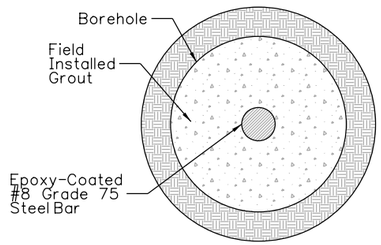
Notes:

1. Reinforcement of the shotcrete facing shall be installed throughout the entire shotcrete facing, including the facing beyond the ground nails.
2. Maximum edge distance of 3 ft for each row of ground nails at end of system.
3. The minimum shotcrete thickness is 8 in. for system face with 4 in. minimum behind the bearing plate.
4. Ⓝ denotes non-coated reinforcing steel.
5. 2" min. cover over nail end and hardware
6. 2" min. cover on all reinforcing exposed to air
7. 3" min. cover on all reinforcing exposed to soil



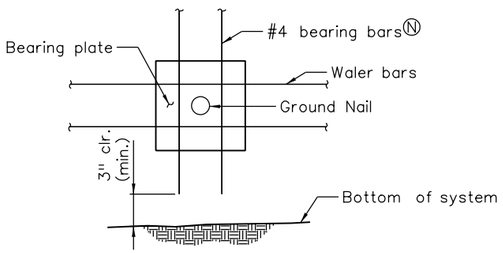
TYPICAL SHOTCRETE FACING REINFORCEMENT - END OF SYSTEM (NOTE 1)

NTS



GROUND NAIL CROSS SECTION A-A'

NTS



TYPICAL GROUND NAIL DETAIL

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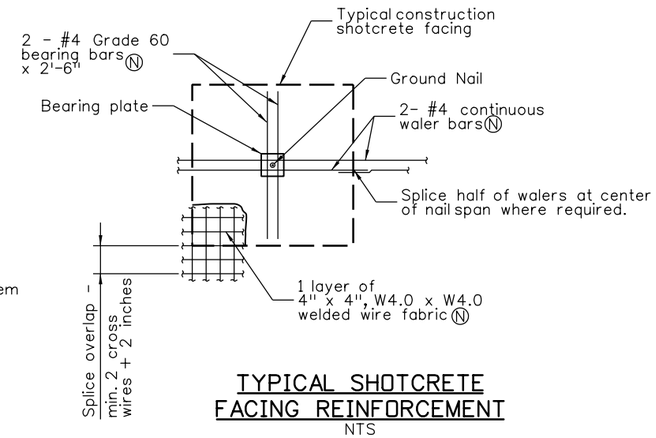
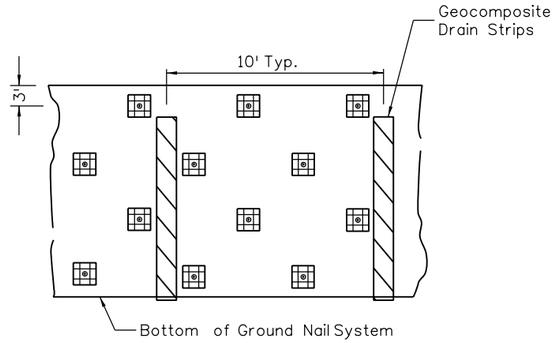


TYPICAL REINFORCEMENT BOTTOM ROW OF GROUND NAILS

NTS

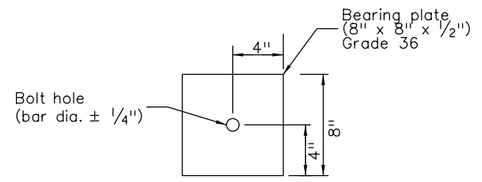
TYPICAL SHOTCRETE FACING REINFORCEMENT

NTS



TYPICAL STRIP DRAIN DETAIL

NTS



BEARING PLATE DETAIL

NTS

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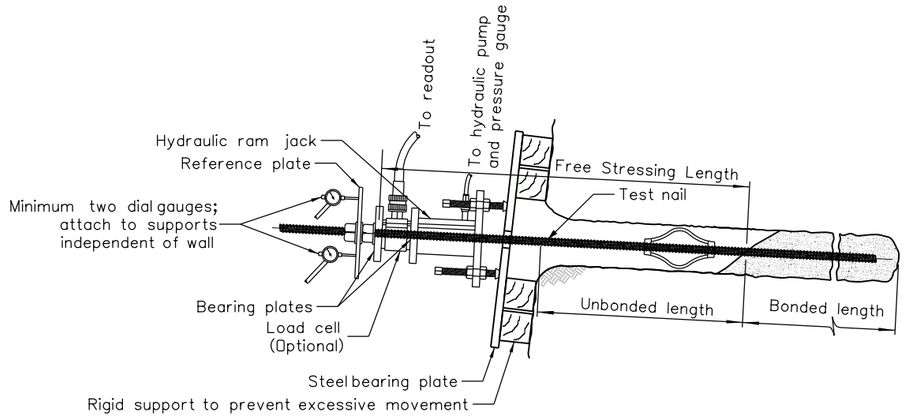
WAGONWHEEL GAP ROAD
GROUND NAIL WALL DETAILS

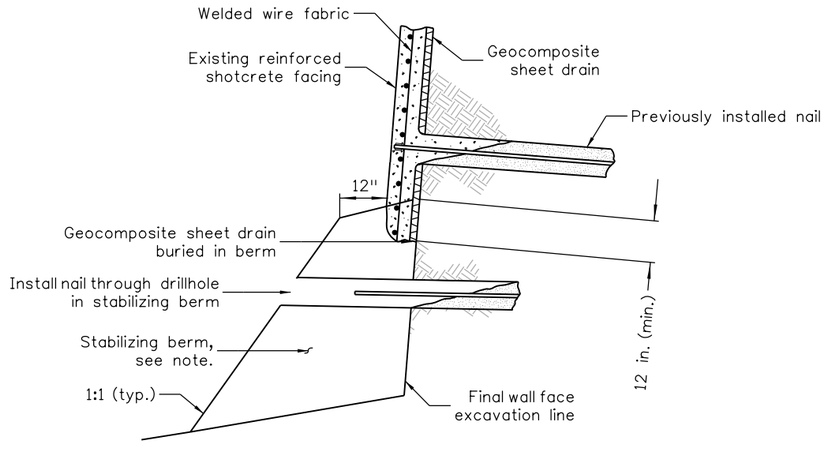
PROJECT NO: 4041.SEPT12C37 | SHEET NO: 169



TYPICAL GROUND NAIL TEST SETUP

GROUND NAIL TESTING NOTES:

1. See specifications for verification and proof test nail requirements,
2. Required ground nail allowable pullout resistance:
3. The test support system (eg. cribbing, chairs, bearing plates, etc.) shall be sufficient to complete the test without excessive deflection or bearing failure.
4. A minimum of 1 sacrificial verification test is required for each ground nail wall. Additional verification tests may be required by the Engineer if ground conditions or construction methods change.
5. A minimum of 5% of the ground nails shall be proof-tested at each wall location.



NAIL INSTALLATION THROUGH TEMPORARY STABILIZING BERM

(USE IN CASE OF SLOUGHING GROUND)

Note:
Excavate stabilizing berm to final wall face excavation line for shotcrete placement. Contractor shall carefully excavate stabilizing berm to avoid hitting ground nails buried in the berm.

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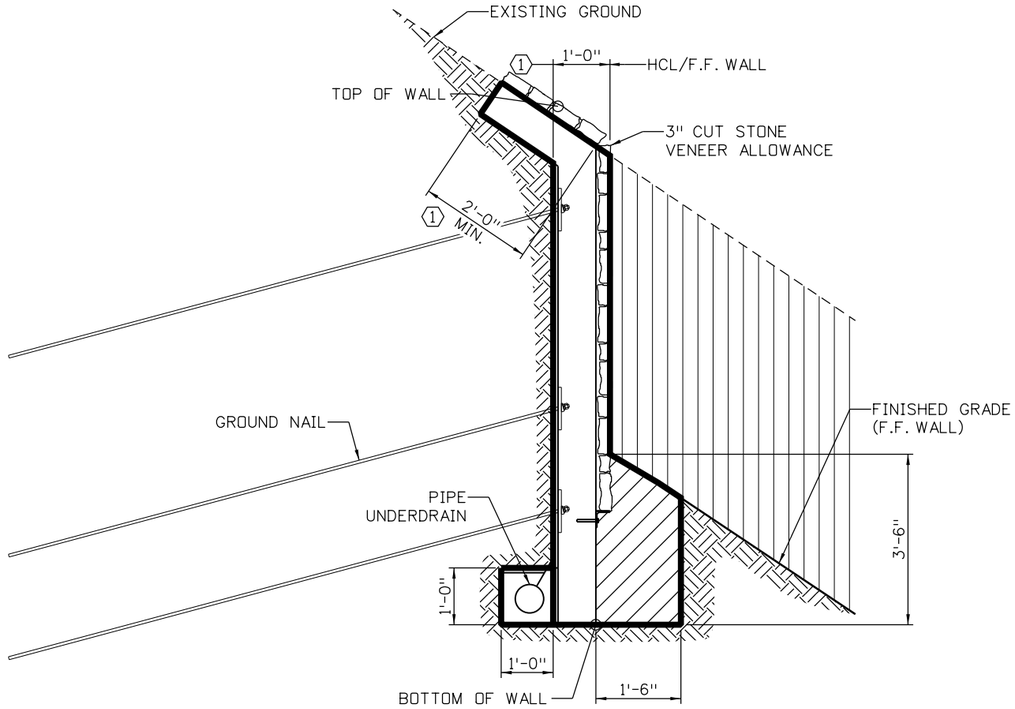
WAGONWHEEL GAP ROAD
GROUND NAIL WALL TESTING AND CONSTRUCTION

PROJECT NO: 4041.SEPT12C37 | SHEET NO: 170



TYPICAL SECTION

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2. FOR DRAINAGE DETAILS, SEE SOIL NAIL WALL DETAILS.

KEYNOTES:

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LEGEND:

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WAGONWHEEL GAP ROAD WALLS
GROUND NAIL WALL EXCAVATION AND BACKFILL

PROJECT NO: 4043.SEPT12C38 | SHEET NO: 171

DESIGN DATA:

DESIGN SPECIFICATIONS:
AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SIXTH EDITION WITH INTERIMS THROUGH 2012.

DESIGN METHOD:
LOAD AND RESISTANCE FACTOR DESIGN (LRFD)

LIVE LOAD SURCHARGE:
250 PSF FOR HL-93 (DESIGN TRUCK OR DESIGN TANDEM, AND DESIGN LANE LOAD) OR COLORADO PERMIT VEHICLE

DEAD LOAD:
SOIL UNIT WEIGHT: 135 pcf

EQUIVALENT FLUID PRESSURE: SEE GEOTECHNICAL REPORT

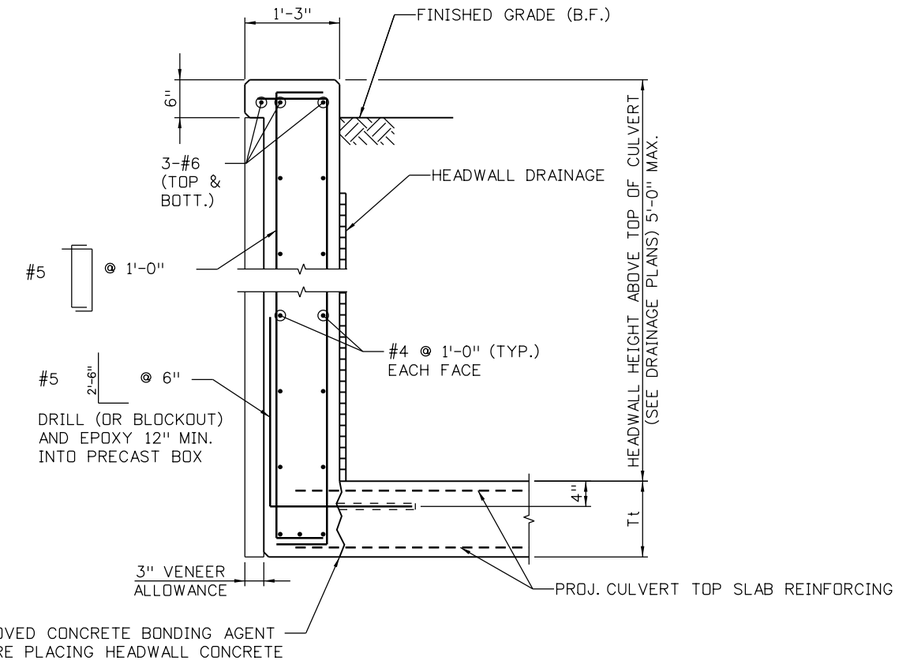
ALLOWABLE BEARING PRESSURE: SEE GEOTECHNICAL REPORT

REINFORCED CONCRETE:
CLASS D CONCRETE: f'c = 4,500 psi
REINFORCING STEEL: fy = 60,000 psi

DE-ICING CATEGORY: MODERATE

SEVERITY OF SULFATE EXPOSURE: CLASS 2

SEISMIC ZONE 1



TYPICAL HEADWALL SECTION

NOTES:

1. FOR HEADWALL AND WINGWALL GEOMETRY, SEE DRAINAGE PLANS.
2. FOR HEADWALL / WINGWALL CONNECTION REINFORCEMENT, SEE CDOT STANDARD PLAN NO. M-601-20.
3. FOR PRECAST CONCRETE BOX CULVERT HEADWALL DETAILS, SEE CDOT STANDARD PLAN NO. M-603-3.
4. TOE WALL AT CULVERT ENDS SHALL EXTEND TO BOTTOM OF WINGWALL FOOTING. PLAN DIMENSION DO NOT MATCH THE CDOT STANDARD PLANS.
5. HEADWALLS SHALL DRAIN ACCORDING TO CDOT STANDARD PLAN NO. M-603-3, GEOCOMPOSITE DRAIN WITH PIPE. BEYOND THE HEADWALL LIMITS, CONTINUE TO RUN TO DAYLIGHT, USING NON-PERFORATED PIPE WITH 45° MAXIMUM BEND IN PIPE.
6. WINGWALLS SHALL DRAIN ACCORIDING TO CDOT STANDARD PLAN NO. M-603-3, GEOCOMPOSITE DRAIN WITHOUT PIPE.

100% SET

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CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County
Michael Baker INTERNATIONAL

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
DLT	BMT		11/4/2016

WAGONWHEEL GAP ROAD WALLS
CULVERT HEADWALL & WINGWALL DETAILS (1 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 172

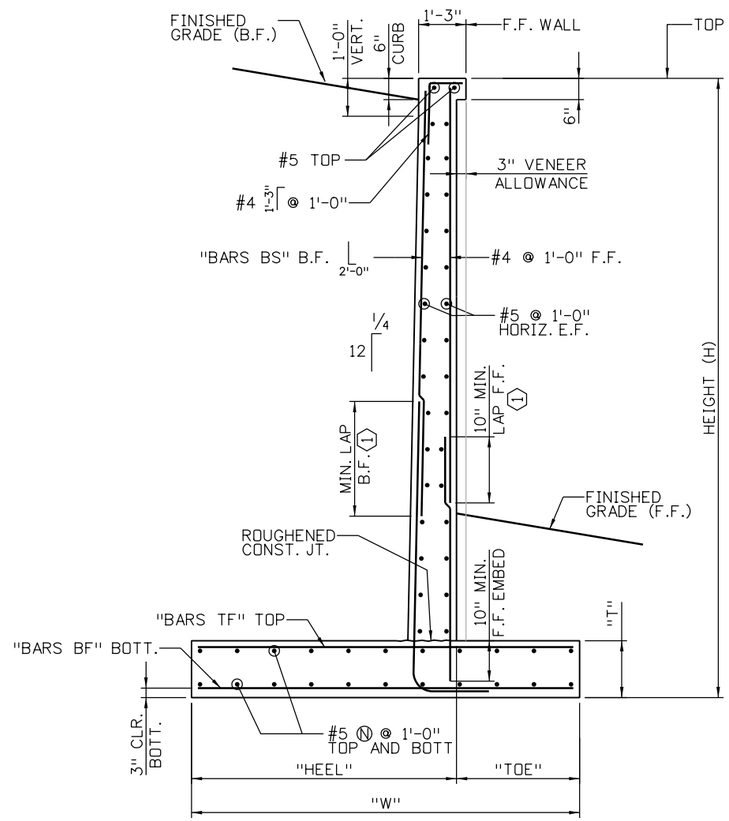
SPREAD FOOTING WINGWALL DATA TABLE

PARAMETER	DESCRIPTION	DESIGN HEIGHT (DH) 5.00 FT.	6.00 FT.	7.00 FT.	8.00 FT.	9.00 FT.	10.00 FT.	11.00 FT.	12.00 FT.	13.00 FT.	14.00 FT.	15.00 FT.	16.00 FT.	17.00 FT.	
	BACKSLOPE USED FOR DESIGN	1 1/2 : 1	1 1/2 : 1	1 1/2 : 1	1 1/2 : 1	1 1/2 : 1	1 1/2 : 1	1 1/2 : 1	1 1/2 : 1	2 1/2 : 1	2 1/2 : 1	2 1/2 : 1	4 : 1	4 : 1	⟨2⟩
"T"	FOOTING THICKNESS	1'-3"	1'-3"	1'-6"	1'-6"	1'-6"	1'-9"	1'-9"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-3"	
"W"	FOOTING WIDTH	3'-0"	4'-0"	5'-6"	6'-0"	6'-6"	7'-9"	8'-6"	9'-0"	9'-0"	9'-0"	9'-6"	9'-6"	10'-0"	
"TOE"	FOOTING TOE WIDTH	1'-0"	1'-0"	1'-0"	1'-0"	1'-3"	1'-3"	1'-3"	1'-6"	1'-6"	1'-6"	1'-6"	1'-6"	1'-6"	
"HEEL"	FOOTING HEEL WIDTH	2'-0"	3'-0"	4'-6"	5'-0"	5'-3"	6'-6"	7'-3"	7'-6"	7'-6"	7'-6"	8'-0"	8'-0"	8'-6"	
"BARS BS"	PROJECTED FOOTING REINFORCING ALONG B.F. STEM	#5 @ 1'-0"	#5 @ 9"	#5 @ 6"	#5 @ 6"	#6 @ 6"	#7 @ 6"	#7 @ 6"	#8 @ 6"	#7 @ 6"	#8 @ 6"	#8 @ 6"	#8 @ 6"	#9 @ 6"	
"BARS TF"	TOP OF FOOTING REINFORCING	#5 Ⓝ @ 1'-0"	#5 Ⓝ @ 1'-0"	#5 Ⓝ @ 1'-0"	#5 Ⓝ @ 9"	#5 Ⓝ @ 9"	#5 Ⓝ @ 9"	#6 Ⓝ @ 6"	#7 Ⓝ @ 6"	#5 Ⓝ @ 6"	#6 Ⓝ @ 6"	#7 Ⓝ @ 6"	#7 Ⓝ @ 6"	#9 Ⓝ @ 6"	
"BARS BF"	BOTTOM OF FOOTING REINFORCING	#5 Ⓝ @ 1'-0"	#5 Ⓝ @ 1'-0"	#5 Ⓝ @ 1'-0"	#5 Ⓝ @ 9"	#5 Ⓝ @ 6"	#5 Ⓝ @ 6"	#5 Ⓝ @ 6"	#6 Ⓝ @ 6"	#5 Ⓝ @ 6"	#6 Ⓝ @ 6"	#6 Ⓝ @ 6"	#6 Ⓝ @ 6"	#7 Ⓝ @ 6"	

FOR INFORMATION ONLY

DESCRIPTION	UNIT.	HEIGHT (H) 5.00 FT.	6.00 FT.	7.00 FT.	8.00 FT.	9.00 FT.	10.00 FT.	11.00 FT.	12.00 FT.	13.00 FT.	14.00 FT.	15.00 FT.	16.00 FT.	17.00 FT.
		PER LINEAR FOOT												
CONCRETE CLASS D (WALL)	CY.													
REINFORCING STEEL	LB.													
REINFORCING STEEL (EPOXY COATED)	LB.													

LOCATION	HEIGHT (H) 5.00 FT.	6.00 FT.	7.00 FT.	8.00 FT.	9.00 FT.	10.00 FT.	11.00 FT.	12.00 FT.	13.00 FT.	14.00 FT.	15.00 FT.	16.00 FT.	17.00 FT.
STEM THICKNESS AT TOP OF FOOTING	1.17 FT.	1.21 FT.	1.25 FT.	1.29 FT.	1.33 FT.	1.38 FT.	1.42 FT.	1.46 FT.	1.50 FT.	1.54 FT.	1.58 FT.	1.63 FT.	1.67 FT.



WINGWALL TYPICAL SECTION

NOTES:

1. FINISHED GRADE AT THE FRONT FACE OF WALL SHALL BE 3'-0" MIN. ABOVE BOTTOM OF FOOTING.
2. WALL HEIGHT MAY EXCEED DESIGN HEIGHT BY UP TO 6 INCHES IN ACCORDDANCE WITH CDOT STANDARD PLAN NO. M-601-20.
3. ALL CONCRETE SHALL BE CLASS D (BOX CULVERT).
4. WALL DRAINAGE SHALL BE PROVIDED. WEEP HOLES NOT SHOWN, SLOPE 2% TO DRAIN. ALL DRAINAGE ITEMS SHALL BE INCLUDED WITH ITEM 601, CLASS D (BOX CULVERT).
5. FOR VENEER DETAILS INCLUDING EMBEDDED ELEMENTS NOT SHOWN, SEE CUT STONE VENEER DETAILS.
6. WINGWALL FOOTING SHALL BE CAST INDEPENDENTLY OF CULVERT BOTTOM SLAB WHEN PLACED AT DIFFERENT ELEVATIONS.
8. ALL ELEMENTS FOR CULVERT HEADWALL AND WINGWALLS ARE QUANTIFIED IN THE DRAINAGE PLANS.
9. FOR ADDITIONAL DETAILS, SEE DRAINAGE PLANS.

KEYNOTES:

⟨1⟩ OPTIONAL SPLICE.

⟨2⟩ BACKSLOPES STEEPER THAN 1½ : 1 SHALL BE GEOTEXTILE REINFORCED SLOPES THAT ARE ASSUMED TO RELEAVE THE EQUIVALENT FLUID PRESSURE BELOW THE BACKSLOPE THRESHOLD DESIGNED FOR. SEE DRAINAGE PLANS FOR DETAILS.

100% SET

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WAGONWHEEL GAP ROAD WALLS
CULVERT HEADWALL AND WINGWALL DETAILS (2 OF 2)

PROJECT NO: 4043.SEPT12C34 | SHEET NO: 173