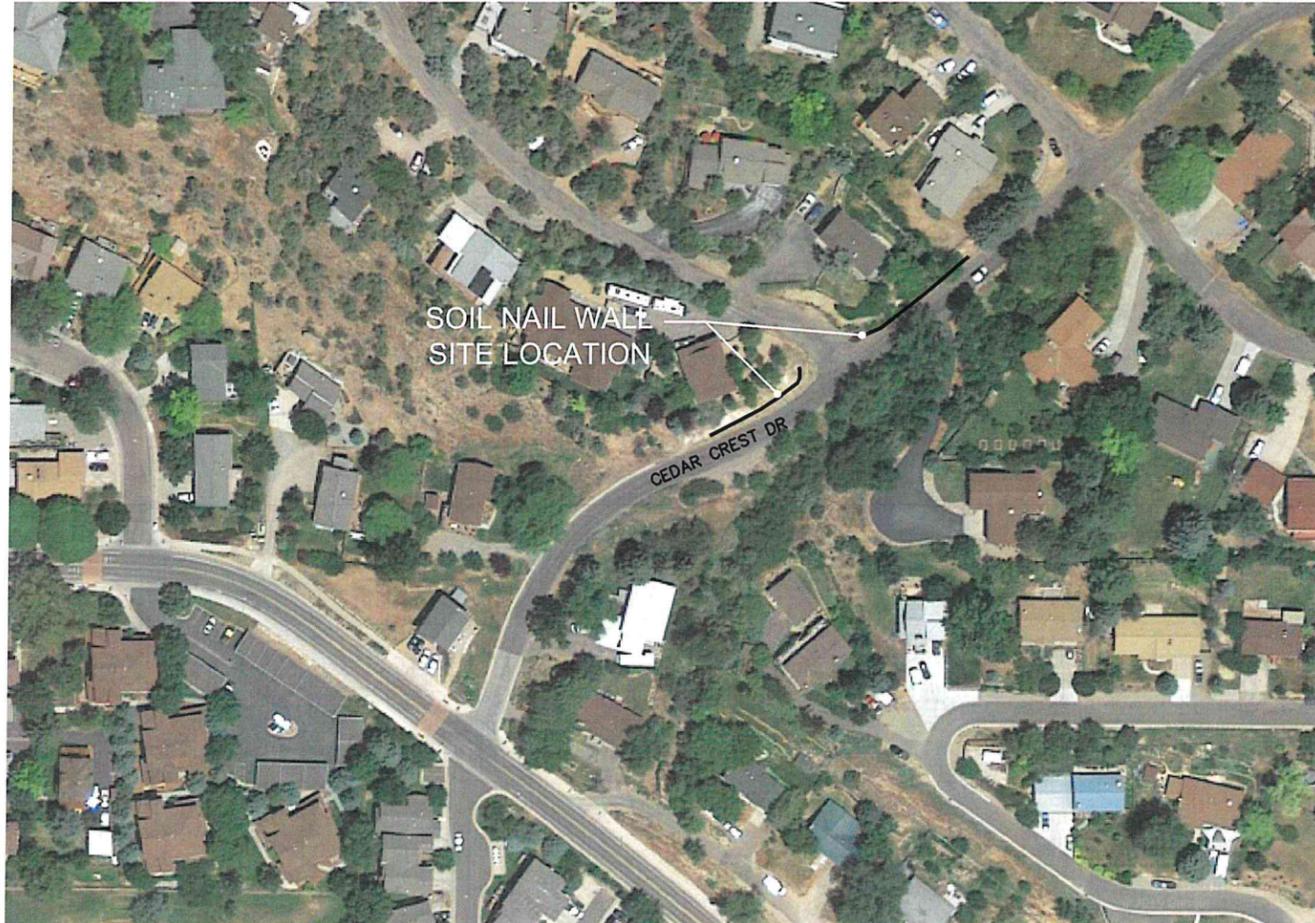


SOIL NAIL WALLS

Cedar Crest Improvements

GLENWOOD SPRINGS, COLORADO



SHEET NO. INDEX OF SHEETS

- S1 TITLE SHEET
- S2 GENERAL NOTES
- S3 PLAN VIEW
- S4 ELEVATION VIEWS
- S5 DETAIL SHEET

PREPARED FOR
 BOUNDARIES UNLIMITED, INC.
 923 COOPER AVE, SUITE 201
 GLENWOOD SPRINGS, CO 81601

NOTE:
 SOIL NAIL WALL INSTALLATION MUST BE IN GENERAL CONFORMANCE WITH THESE DRAWINGS. SUBSURFACE CONDITIONS WILL VARY. A REPRESENTATIVE OF CTL/THOMPSON, INC. SHOULD OBSERVE INSTALLATION TO CHECK CONFORMANCE WITH DRAWINGS AND INFORM THE DESIGN ENGINEER OF SUBSURFACE CONDITIONS DIFFERENT THAN ANTICIPATED AND THE CONTRACTORS PROGRESS.



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PROJECT LOCATION:
 CEDAR CREST DRIVE
 GLENWOOD SPRINGS, CO 81602

TITLE SHEET	
REV. NO.	DATE
1	12/09/2019
2	
3	

CLIENT:
 BOUNDARIES UNLIMITED, INC.
 923 COOPER AVE, SUITE 201
 GLENWOOD SPRINGS, CO 81601
 ATTENTION: DERIC WALTER, P.E.
 contact: (970) 945-5252

DATE	12/09/2019
SCALE	AS SHOWN
SHEET NO.	S1
TOTAL SHEETS	S5

Soil Nail General Notes

1. Design Basis:

- 1.1. The proposed soil nail walls are designed to accommodate normal construction surcharge of material and light trucks, not heavy point loads such as excavators, concrete pump trucks, or large stockpiles.
- 1.2. Reference codes:
 - A. AISC Steel Manual, Thirteenth Edition
 - B. Publication No. FHWA-NHI-14-007 "Soil Nail Wall - Reference Manual", Geotechnical Engineering Circular No. 7 (FHWA GEC 007).

2. Geotechnical Design:

- 2.1. Soil strength parameters were interpreted from information from subsurface data obtained by CTL/Thompson, Inc on September 12, 2019.
- 2.2. Soil Parameters used for design.

Soil Type	Unit Weight (pcf)	Soil Friction (deg)	Soil Cohesion (psf)
Sandy Silty clay	120	30	50

3. Materials:

- 3.1 **Shotcrete:** All shotcrete shall be ready mix plant produced concrete yielding a 3 day compressive strength of at least 2000 psi and 28 day compressive strength of at least 4000 psi. Prior to start, submit design mix to CTL/Thompson for review. One shotcrete panel shall be produced at the beginning of wall construction and once every week thereafter.
- 3.2 **Permanent Nails:** Permanent nails are to be galvanized B7X1 - 32, grade 85, hollow injection bar of size indicated on elevation view or structural details. Bars shall meet ASTM A 615/AASHTO M31 (GR. 85) specifications. Bars shall be hot-dip galvanized according to ASTM A123 with a 3.1-mil minimum coating thickness per bar. All nails installed with 102mm (4") sacrificial carbide bit.
- 3.3 **Steel:** Welded wire fabric shall meet ASTM A185 specifications. Reinforcing steel shall be ASTM A615 grade 60.
- 3.4 **Grout:** Pressure injected grout shall be Portland cement Type 1 and water mix, with a water to cement ratio not exceeding 0.45.
- 3.5 **Drainage Board:** Drainage board shall be of composite construction consisting of a cusped, single-sided, plastic drainage core and a geotextile filter fabric bonded to the cusped side of the drainage core. Minimum rated flow rate shall be 15 gpm/ft. of width with a hydraulic gradient of 1.0. Minimum compressive strength shall be 1500 psf. Acceptable products are Miradrain 6000 or Greenstreak Sheet Drain.

4. Soil Nail Installation Procedure:

- 4.1 Excavate down to level of the first row of soil nails.
- 4.2 Drill and install hollow-bar soil nails with continuous grouting. For cases where the excavated face cannot stand, a continuous berm will be employed to stabilize the face. The soil nails are installed and grouted through the stabilizing berm. Subsequently, the berm is excavated and shotcrete is applied along the entire excavation level. Alternatively, the stabilizing berm can be removed in sequence in which alternating excavation slots are excavated and panels are created in between the nails. The width of the excavation slots will not exceed approximately the soil nails horizontal spacing. Next, hollow injection bar soil nails are installed and shotcrete is applied on the face of the excavation slots. Subsequently, the stabilizing berm panels are removed and the intermediate soil nails are installed and shotcrete is applied.
- 4.3 Apply welded wire fabric, facing reinforcement, and initial 4-inch thick temporary shotcrete layer to the excavation face.
- 4.4 Wet set soil nail bearing plates and nuts in initial temporary shotcrete.
- 4.5 Apply welded wire fabric and final 6-inch thick shotcrete layer. Soil nail grout must have sufficient cure before starting the next excavation cut.
- 4.6 Repeat above process to bottom of excavation.

5. Soil Nail Verification Testing

- 5.1 Each verification test nail shall be sacrificial and installation procedure shall be similar to that of production nails. Fully-grouted nails shall not be tested. Verification test nails are indicated in the elevation view and shall not be tested earlier than 3 days after installation. If soil conditions change, additional test nails will be added. Use the following load sequence. Each load sequence shall be held for a period of 10 minutes.

VERIFICATION TEST LOADING SEQUENCE	
INCREMENT	LOAD
1	AL
2	0.13*VTL
3	0.25*VTL
4	0.38*VTL
5	0.50*VTL
6	0.63*VTL
7	0.75*VTL (creep test)
8	0.88*VTL
9	1.00*VTL

AL = ALIGNMENT LOAD

VTL = VERIFICATION TEST LOAD
 $= L_b \text{ vr} \times r_{po}$

$L_b \text{ vr}$ = BONDED LENGTH OF VERIFICATION TEST NAIL

r_{po} = NOMINAL PULLOUT RESISTANCE OF NAIL

◆ = DENOTES VERIFICATION TEST NAIL ON ELEVATION VIEW



- 5.2 Soil nail contractor shall submit test plan prior to starting soil nail construction for approval by CTL/Thompson. Test plan shall include, but not be limited to ram calibration, means to protect shotcrete during test, and testing equipment (dial gages, etc). Results of verification testing should be provided to CTL/Thompson, Inc. for review.

6. Limitations:

- 6.1 Soil nail wall alignments and profiles developed by Boundaries Unlimited.
- 6.2 It is the contractors responsibility to verify and coordinate all dimensions prior to construction. Any discrepancies or changes should be brought to the attention of CTL/Thompson.
- 6.3 Wall layout is the responsibility of the contractor.
- 6.4 Before construction commences, a utility locate is required to field verify the locations of all utilities surrounding the site. The soil nail wall design will be reviewed and drawing revised, if required, when final utility location becomes available.
- 6.5 Permanent wall facing finish to be determined by City of Glenwood Springs.

7. Construction Monitoring (by others):

- 7.1 During the construction of the soil nail wall, the surveyor should monitor the wall with prisms attached to the shotcrete at various locations to measure horizontal and vertical movement.
- 7.2 Soil nail monitoring should be conducted once every week while the soil nail wall is under construction.
- 7.3 If any sudden movement occurs during soil nail wall construction, work shall be suspended immediately and CTL/Thompson shall be immediately notified.

FOR REVIEW

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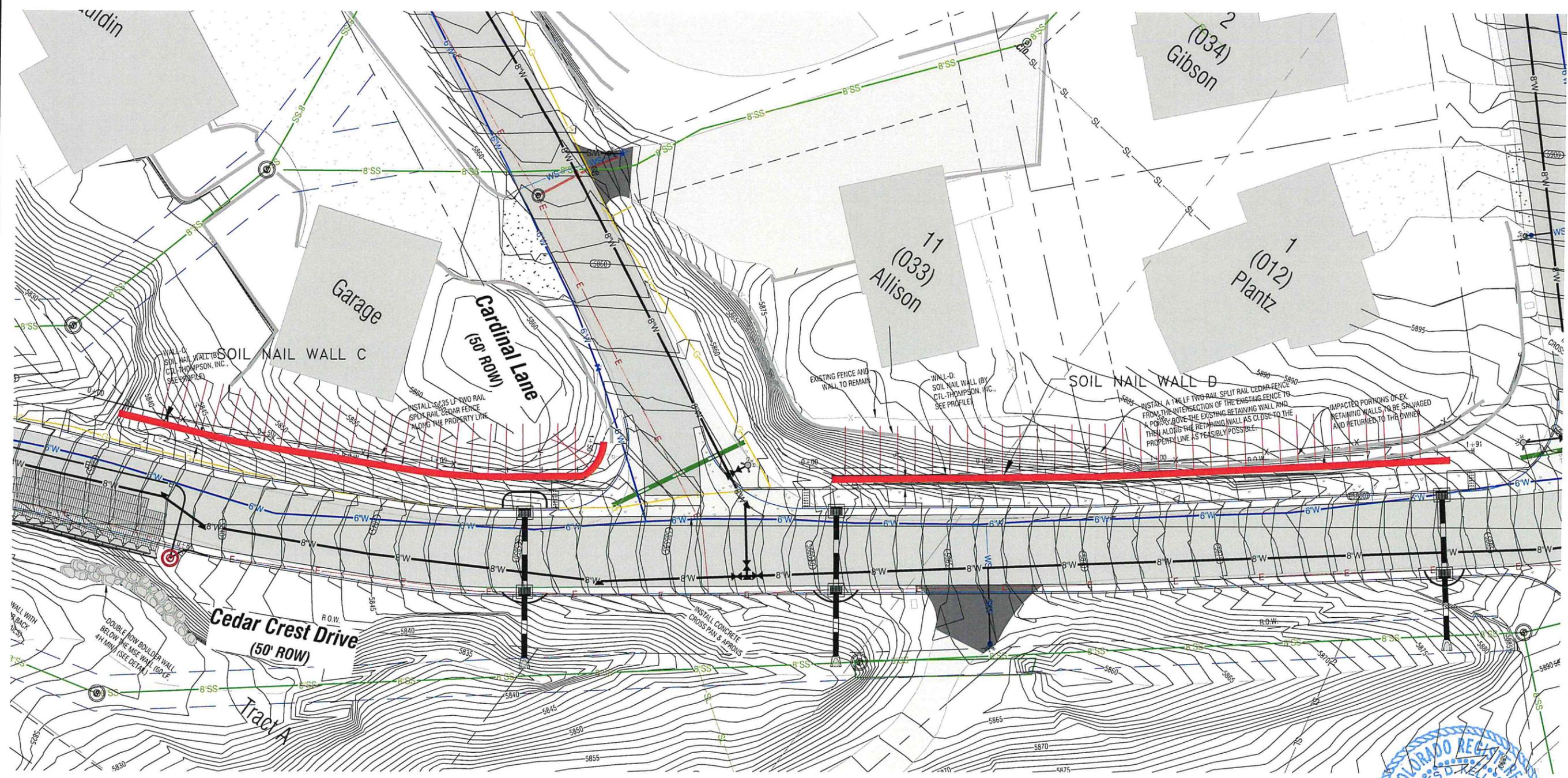
PROJECT LOCATION:
 CEDAR CREST DRIVE
 GLENWOOD SPRINGS, CO 81602

GENERAL NOTES

NO.	REVISION/ISSUE
1	
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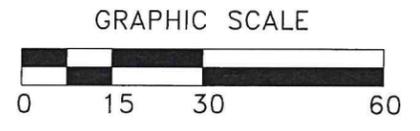


NOTES:

- PERMANENT SOIL NAILS ARE GRADE 85 GALVANIZED 32 mm (1-1/4") WILLIAMS B7X1-32 HOLLOW INJECTION BARS (OR EQUIVALENT UPON ENGINEER'S APPROVAL) WITH 15-FT LENGTH. ALL SOIL NAILS INSTALLED WITH 102 mm (4") SACRIFICIAL CC CARBIDE BIT.
- CTL/THOMPSON, INC. HAS RELIED UPON WALL ALIGNMENTS AND PROFILES BY BOUNDARIES UNLIMITED.

PLAN VIEW
SCALE: 1" = 30'-0"

LEGEND:
 PROPOSED SOIL NAIL WALL ALIGNMENT



FOR REVIEW

PROFESSIONAL ENGINEER
 JAMES D. ALLOTTED
 38298
 12/19/19

CTL | THOMPSON
 I N C O R P O R A T E D

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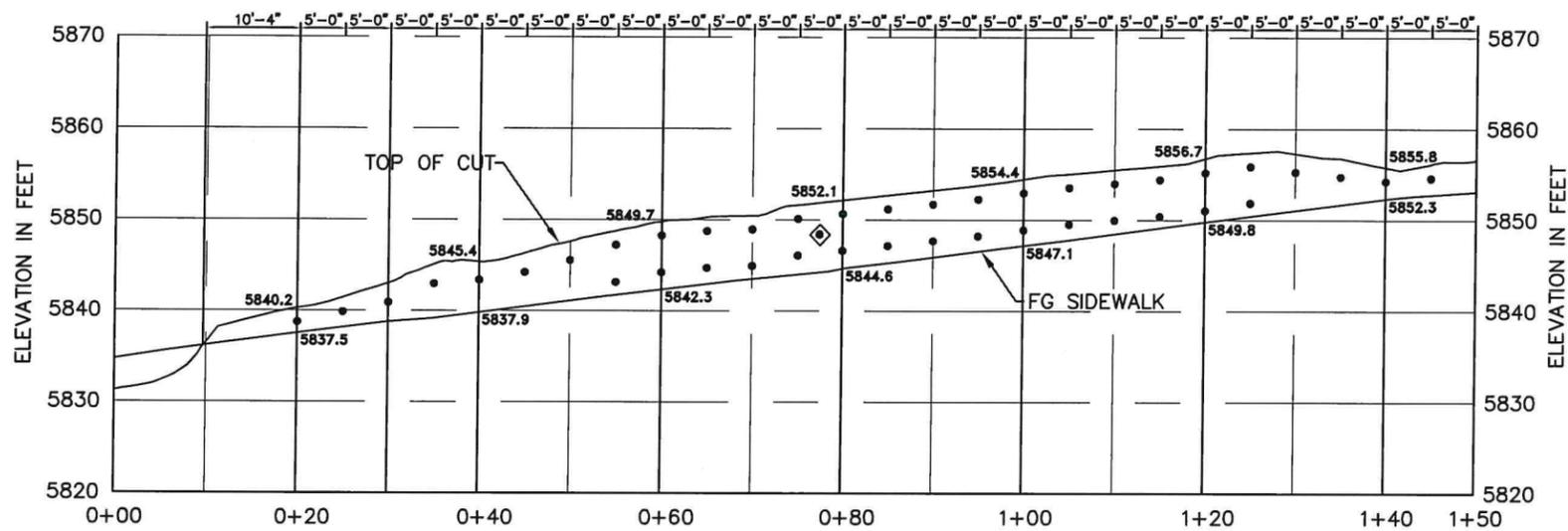
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PLAN VIEW

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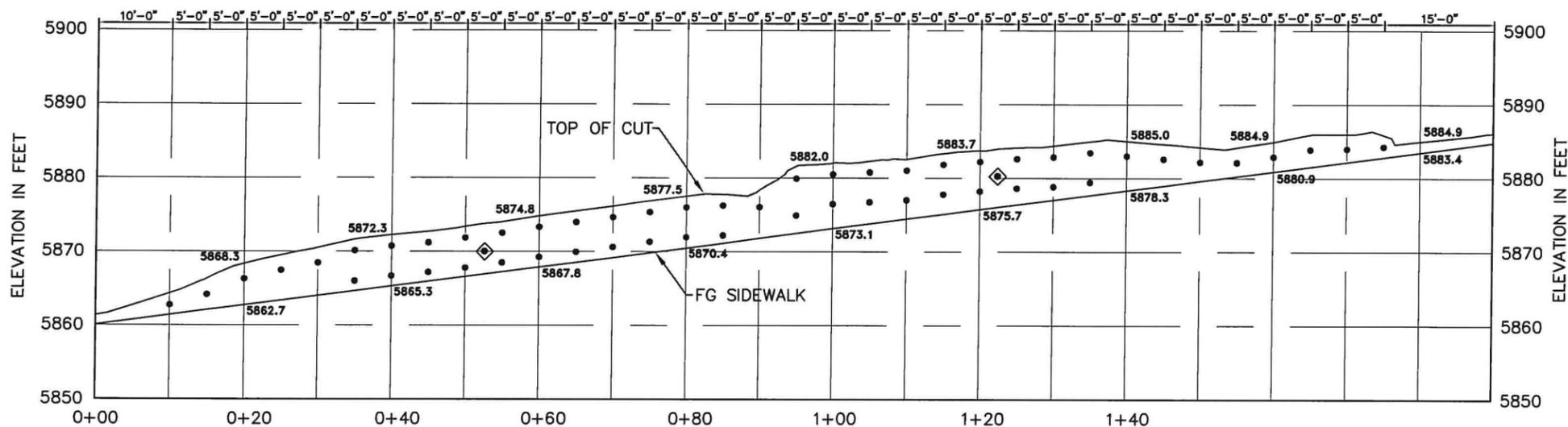
**ELEVATION VIEW
PERMANENT SOIL NAIL WALL "C"**
SHOTCRETE AREA = ~840 SF SCALE: 1" = 20'-0"
~ 146 LF LONG

LEGEND:

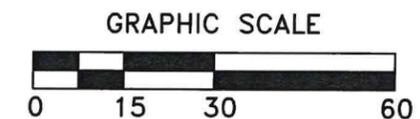
- INDICATES SOIL NAIL.
- ◊ INDICATES VEIFICATION TEST NAIL.

NOTES:

1. PERMANENT SOIL NAILS ARE GRADE 85 GALVANIZED 32 mm (1-1/4") WILLIAMS B7X1-32 HOLLOW INJECTION BARS (OR EQUIVALENT UPON ENGINEER'S APPROVAL) WITH 15-FT LENGTH. ALL SOIL NAILS INSTALLED WITH 102 mm (4") SACRIFICIAL CC CARBIDE BIT.
2. CTL/THOMPSON, INC. HAS RELIED UPON WALL ALIGNMENTS AND PROFILES BY BOUNDARIES UNLIMITED.



**ELEVATION VIEW
PERMANENT SOIL NAIL WALL "D"**
SHOTCRETE AREA = ~1,092 SF SCALE: 1" = 20'-0"
~ 177 LF LONG



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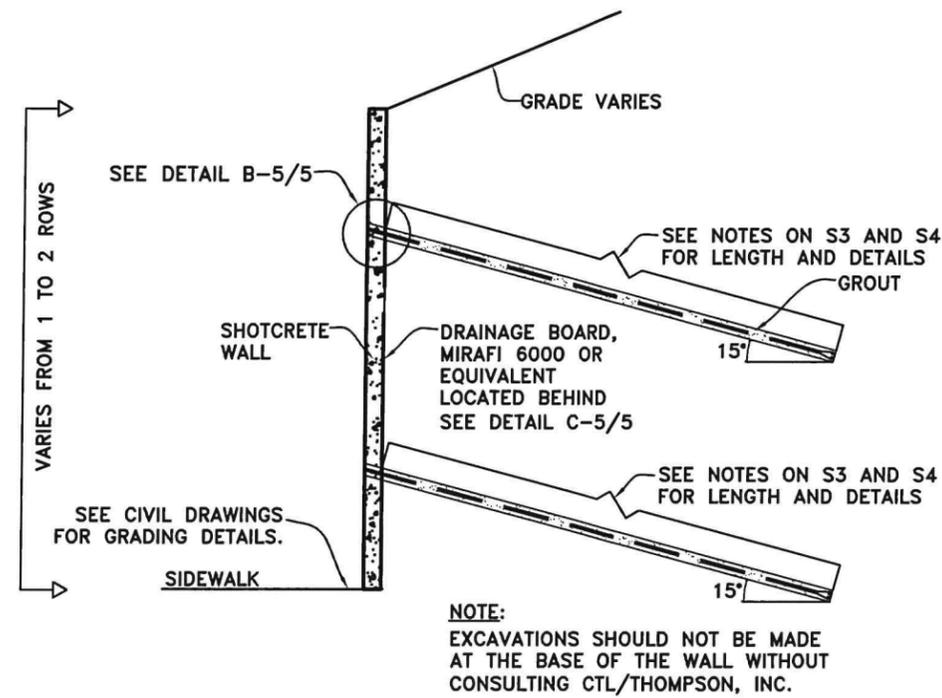
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ELEVATION VIEWS	
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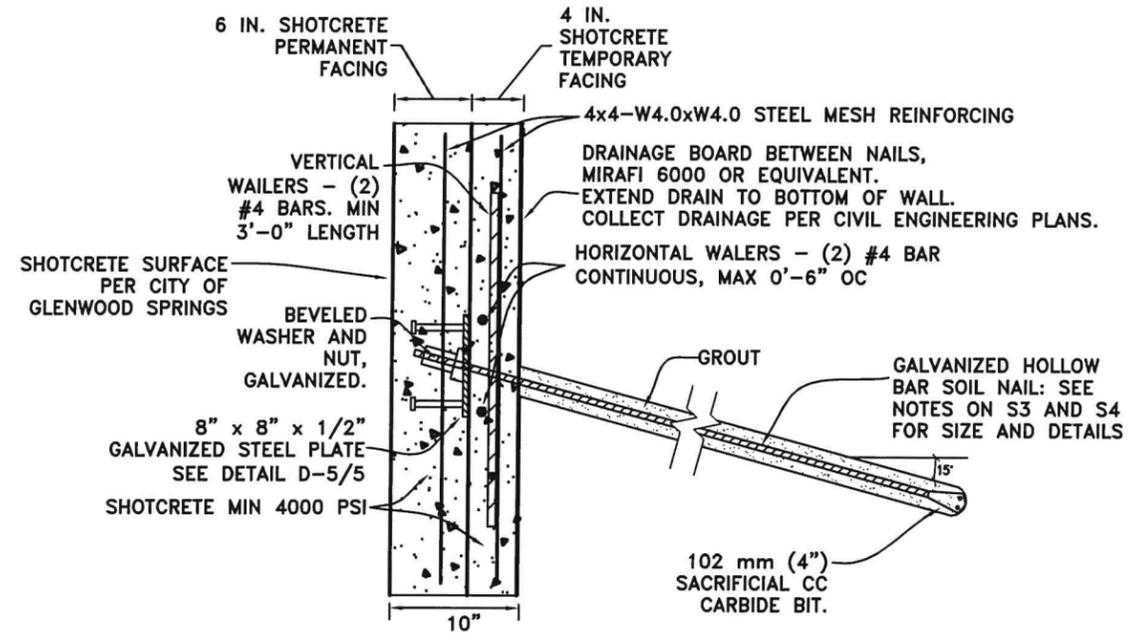
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12/08/2019				S5
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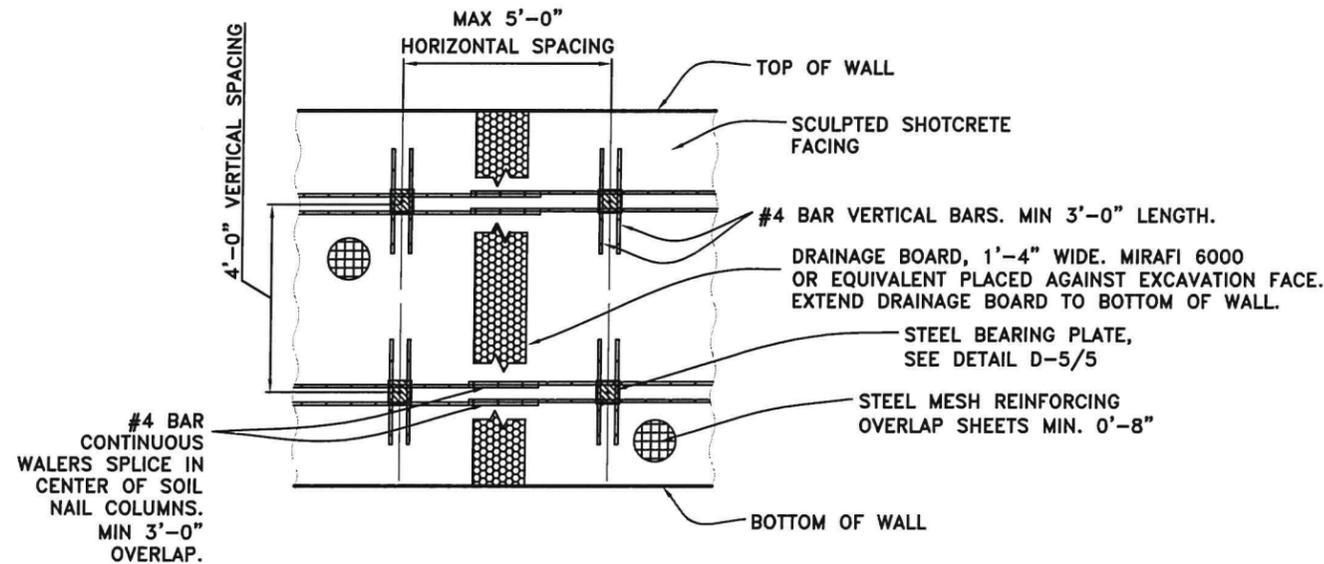
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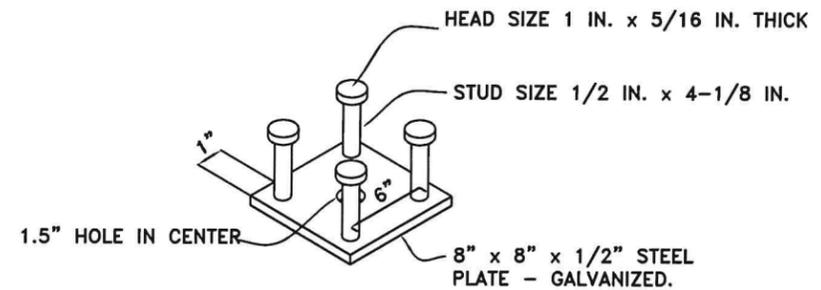
A GENERAL WALL SECTION
SCALE: NOT TO SCALE



B SOIL NAIL DETAIL
SCALE: NOT TO SCALE



C FACING DETAIL
SCALE: NOT TO SCALE



D BEARING PLATE DETAIL
SCALE: NOT TO SCALE

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12/09/2019	S5
	S5