

**Briargate Bridge at Sand Creek  
Design Report  
Sand Creek Drainageway  
El Paso County, Colorado**

Prepared for:  
Sterling Ranch Metropolitan District  
20 Boulder Crescent Suite 2<sup>nd</sup> Floor  
Colorado Springs, Colorado 80903



Kiowa Project No. 19032

December 6, 2021

CDR-21-013

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## I. GENERAL LOCATION AND DESCRIPTION

This report summarizes the design of the Briargate Parkway bridge crossing of Sand Creek in the Sterling Ranch Development. A separate report by others will address design, drainage, and water quality design of the Briargate Parkway road.

The proposed crossing consists of a 42-foot wide Conspan precast bridge sized to convey 100-year frequency flows without resulting in increases to the effective base flood elevations (BFEs) for Sand Creek. Two grouted sloping boulder (GSB) drop structures are proposed upstream of the bridge crossing to provide necessary grade control. The current incised natural channel upstream and downstream of the bridge will be graded to provide stable 4:1 side embankment slopes and adequate capacity for major storm flows. The proposed channel revision, including the 228-foot long Conspan bridge crossing, will extend for approximately 625 feet along Sand Creek. The proposed channel and bridge improvements lie within El Paso County. The location of the site is shown on Figure 1.

Upon the completion of the crossing and acceptance by El Paso County and Sterling Ranch Metropolitan District, easements and or tracts will be dedicated for the purposes of maintenance access. The bridge and channel work will occur adjacent to Tracts A, B, and D of Sterling Ranch Filing No. 1. Operation and maintenance of the bridge and channel responsibility of the Sterling Ranch Metropolitan District. A "No-Rise" floodplain certification study will be conducted in lieu of a CLOMR submittal to FEMA. However, a LOMR submittal will be required after construction to account for the floodplain revision. No residential lots within future Sterling Ranch Filings that will lie within the 100-year floodplain.

The bridge over Sand Creek at Briargate Parkway is included within the design plans. The bridge consists of a Conspan precast structure that have the capacity to pass the 100-year discharge. The proposed road right-of-way is 130 feet for Briargate Parkway. The ultimate roadway section for Briargate Parkway as shown on the roadway design plans includes four 12-foot lanes and a 16-foot raised median, Type A curb and gutter, and 6-foot detached sidewalks. Protective guardrails as shown on the drawings have been designed in conformance with Colorado Department of Transportation M-standards. The roadway design plans have been included in the Appendix of this report.

Once the bridge and roadway facilities are completed and accepted by El Paso County, El Paso County will assume maintenance responsibility for the structures and roadways. A deed will be provided to transfer ownership to the County. The developer intends to request reimbursement for the cost to construct the bridges and drainageway facilities, or request credit against future drainage and bridge fees. Reimbursement will be processed in accordance with sections 1.7 and 3.3 of the Drainage Criteria Manual (DCM). The drainageway facilities will be operated and maintained by the Sterling Ranch Metropolitan District.

## II. PROJECT BACKGROUND

Sand Creek within Sterling Ranch is a natural drainageway at his time that was shown to be stabilized in the Sterling Ranch Master Development Drainage Plan (MDDP). The MDDP showed Sand Creek to be reconfigured into a trapezoidal channel section capable of conveying the 100-year discharge as listed in the MDDP. The original channel design was a benched trapezoidal channel with numerous drop structures to provide grade control. However after subsequent consideration by El

## Provide a design mimicking

Paso County and the Army Corps of Engineering, the decision was made to maintain the current natural configuration of the channel. Design plans for the bridge and channel are included in the Appendix. The present average slope of the drainageway within the design reach is 1.8 percent. As seen from the Briargate Bridge Plan and Profile, two drop structures upstream of the bridge were designed to reduce the channel slope through the bridge reach to 0.2 percent. Riprap channel and embankment lining through the bridge reach will provide erosion protection during major storm events.

### III. PREVIOUS REPORTS AND JURISDICTIONAL REQUIREMENTS

The basis for the development of the design has been developed from referencing the following reports:

1. *Sterling Ranch Master Development Drainage Plan (MDDP), prepared by M & S Civil Consultants, July 2018.*
2. *Sand Creek Drainage Basin Planning Study (DBPS), prepared by Kiowa Engineering, 1996.*
3. *City of Colorado Springs and El Paso County Drainage Criteria Manual, 1987.*
4. *El Paso County Engineering Criteria Manual, most current version.*
5. *City of Colorado Springs Drainage Criteria Manual, May 2014.*
6. *The City of Colorado Springs and El Paso County Flood Insurance Study (FIS), prepared by the Federal Emergency Management Agency, effective 2018.*
7. *Sterling Ranch Channel Improvements and Mitigation Plan, prepared by Core Consultants, October 2015.*

← updated?

### IV. SITE DESCRIPTION

The Sand Creek floodplain within the Briargate Bridge reach is well vegetated with native grasses that are in fair to good condition that exists on the floodplain overbanks and within the greater valley in general. There is little evidence of active invert degradation or bank sloughing except for the channel bends that occur at the location of future Sterling Ranch Road. Current longitudinal slope is approximately 1.4 percent. There is presently no base flow in this segment. There are presently no developed lots that lie within the 100-year floodplain. Lots in the Homestead at Sterling Ranch Filing No. 2 and Branding Iron at Sterling Ranch Filing No. 2 subdivisions do not encroach into the 100-year floodplain.

A 24-inch water line is proposed<sup>to</sup> cross the drainageway just upstream of future Briargate Boulevard. The water and wastewater facilities that may impact the drainageway are all owned and maintained by the Sterling Ranch Metropolitan District.

## V. HYDROLOGY

Hydrology for use in determining the typical channel sections shown on the plans were obtained from Reference 6. The 100-year discharges shown in Reference 6 is 2,600 cubic feet per second. The 100-year peak discharges from references 1 and 2 were reviewed as well. A comparison of peak discharges is presented below.

### Existing Development Condition Peak Discharges Sand Creek at Sterling Ranch

Location: South Property Line (cfs)	5yr	10yr	100yr
City of Colorado Springs FIS	NR	1,200	2,600
Sand Creek DBPS	NR	770	2,620
Sterling Ranch MDDP	435	713	1,912

The above listed discharges all assume existing, or pre-development conditions. The hydrology used in the FIS was obtained from a Soil Conservation Service study conducted in 1975 for the Sand Creek watershed using the SCS method. The hydrology developed in the DBPS also used the SCS method and obtained similar results. The MDDP used the U. S. Army Corps of Engineers HEC-1 hydrograph model and the SCS curve numbers to develop the peak discharges shown above. The MDDP applied a Type II storm distribution as proposed to the Type IIA distribution applied in the FIS and DBPS. This will typically cause peak discharges to decrease 10 to 15 percent. As the difference in the peak discharges cause relatively small differences in the hydraulic design the channel and the bridges, the FIS 100-year discharge was used in the hydraulic design of the channel and bridge improvements. According to the criteria set forth in Reference 4, the low flow channel was sized using 10 percent of the 100-year discharge, or 260 cubic feet per second.

The assumption that FSD will be required for all future development is reflected in the use of the existing development discharges in this design. There is a good correlation between the FIS and 1996 DBPS 100-year discharges for the segment of Sand Creek subject to this design. The future FSD's within Sterling Ranch will be publicly operated and maintained facilities by the Sterling Ranch Metropolitan District.

## VI. HYDRAULICS

The goal of the bridge crossing design was to provide adequate conveyance capacity for the effective 100-yr frequency flows per FEMA and avoid any increase in the effective BFEs for the Sand Creek Floodplain. In addition, the proposed crossing was designed to produce flow characteristics that meet El Paso County criteria. Two grouted sloping boulder drop structures are proposed upstream of the crossing to lower the channel invert and provide grade control through the crossing reach. In addition to the grouted boulders, the entire invert upstream, through the proposed bridge, and downstream outlet are to be riprap lined. The bridge, a **Conspan C42T**, will convey flows at a **depth of 4 to 7 feet with freeboard to the crown in excess of 14 feet**. The excess height of the bridge was required to match the roadway grade for Briargate Parkway and provide necessary invert elevation for the channel.

The hydraulic design of the bridge crossing of Sand Creek done with US Army Corps of Engineers HEC-RAS modeling system version 5.0.7. The model was used to determine the 100-year hydraulic grade line shown on the plan and profiles. The 100-year profile for the FIS hydrology has been determined. The location for the proposed 100-year floodplain using FIS hydrology has been presented on the plan view of the design plans and on the grading plan. Appendix A of this report has the floodplain maps that show the effective regulatory 100-year floodplain. The location for selected HEC-RAS cross-sections are shown on the design profile. The HEC-RAS model cross-sections are also contained within Appendix A. The summary output for the 10-, 50-, 100-year and 500-year recurrence intervals have been included in the Appendix A of this report. <sup>was</sup> <sup>year</sup> <sup>only the 100-year summary is provided in the Appendix</sup>

A riprap apron is included on the downstream end of the bridge to prevent channel degradation and undercutting of the bridge and wingwalls. A sheet pile cutoff wall is included on the downstream end of the riprap apron extending on foot above the proposed 100-year water surface. <sup>one</sup>

## VII. HYDRAULIC DESIGN CRITERIA

A “No-Rise” floodplain certification study will be conducted in lieu of a CLOMR submittal to FEMA. However a LOMR submittal will be required after construction to account for the floodplain revision. No residential lots within future Sterling Ranch Filings that will lie within the 100-year floodplain.

Freeboard (between bridge low chord and 100-year design flow water surface) for the Briargate bridge is in excess of 15 feet and well below the 2-foot minimum per section 6.4.2 of the El Paso County Drainage Criteria Manual bridge. <sup>Verify</sup> <sup>above?</sup>

Analysis of bridge scour was performed at upstream and downstream cross sections. Since the Conspan crossing structure is entered as a culvert, the bridge scour analysis was not available in the HECRAS program. Therefor shear force variable, also referred to as tractive force, was used to determine the adequacy of riprap erosion protection shown on the design plans.

Presented on the design plans associated with this design memorandum are the proposed drainageway conditions. Design criteria for the project are summarized as follows:

Channel design slope:	0.2 percent	
Maximum drop height:	4 feet	
Manning’s n-values:	.025-.035	
Froude number-(excluding crests of drops):	.25--.75	0.75 Provide drop structure calculations for boulder sizes, drop structure dimensions, cutoff wall depth, etc.
Permissible shear stress: channel and embankment:		
Type M soil riprap	5.0 psf	Discuss if the simplified or detailed drop structure design procedure was used.

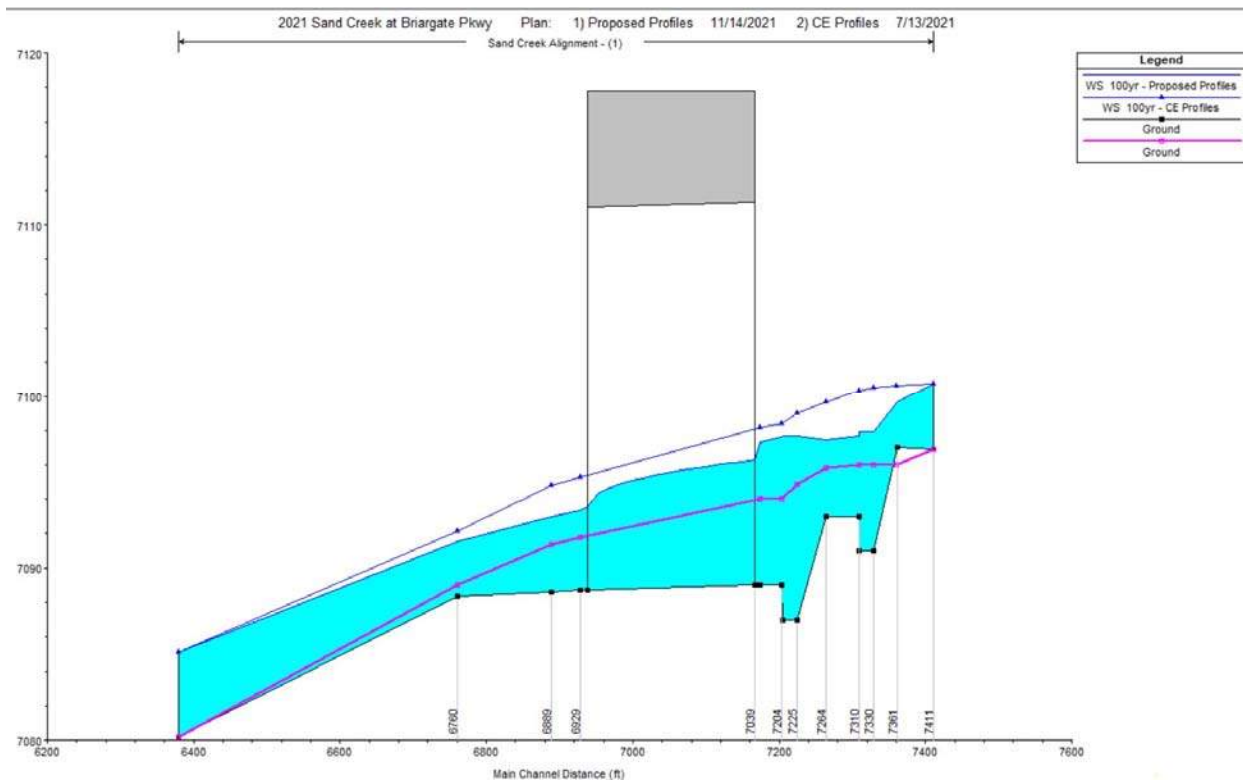
The drops will be constructed using grouted boulders. The selection of grouted boulders was chosen to address long-term durability of the drop. Each drop has an integral grouted boulder sill. Sheet pile cut-off walls are proposed at the crest of each drop that will extend across the entire width of the drop. The bottom depth of the sheet pile cut-off walls ranges from 6 to 7 feet. Wherever soil riprap linings are proposed, rock sizing and freeboard criteria followed is in accordance with Chapter 8 of the Urban Drainage and Flood Control Manual, equation 8-11.

A geotechnical investigation was conducted to support the design of the foundation for the bridge at Sterling Ranch Road and Briargate Parkway. The geotechnical report is included within the

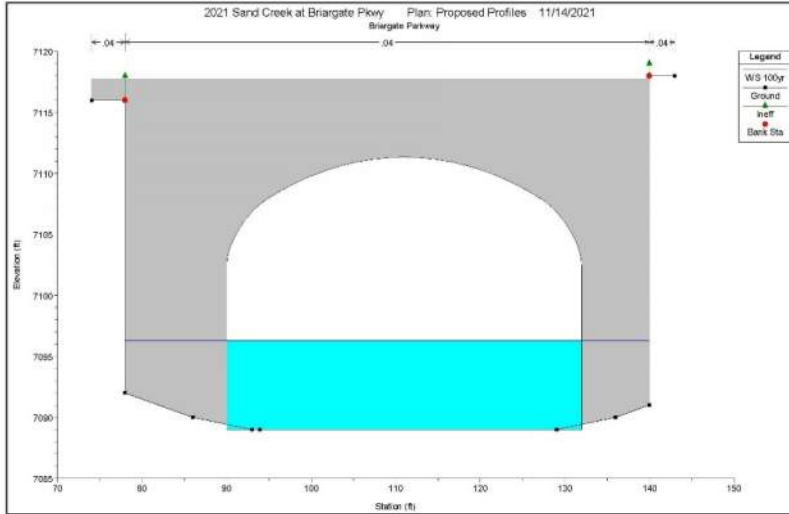
Appendix B. Two soil borings were drilled near the locations of the proposed footings for the bridges. Because of the depth to bedrock, deep foundations are proposed using driven H-piles at Briargate Boulevard. Bedrock is shallow at the Sterling Ranch Road and therefore it is assumed that spread footings will be used. A precast bridge section has been chosen that has a 42-foot clear span and a 22-foot rise. The 100-year discharge can be passed through the bridge at a depth of approximately 5 feet and headwater to depth of 0.22. Velocity during a 100-year event at the upstream and downstream reach of the bridge is 5.4 feet per second and 12.0 feet per second, respectively. A type M riprap invert will be provided at each bridge crossing. The construction of the improvements shown on the plans will prevent erosion due to changes in the channel hydraulic characteristics of the bridge and extend downstream to an extent where current conditions are matched.

### VIII. HYDRAULIC MODELLING RESULTS

HECRAS simulation output including tables and sections are included in the Appendix. The results indicate that the proposed Briargate crossing has conveyance capacity is well in excess during 100-year storm events. As seen below, the 100-year water surface elevations are below those of existing conditions model throughout the revised channel reach. Freeboard from the crown of the Conspan crossing is well in excess of 2 feet per El Paso County criteria.



HECRAS profile comparison of proposed (blue filled) and existing 100-yr WSEL



Upstream face Conspan crossing 100-yr WSEL.

### IX. SCOUR ANALYSIS

Scour analysis was performed to determine if bridge foundations and channel drop structures are susceptible to undermining during major storm events. Per CDOT Drainage Manual Section 10.4.3, the 500-year storm was used for scour analysis of the Conspan crossing abutment and foundation. Scour analysis in HECRAS is limited to bridges and therefore not available for the Conspan crossing modelled as a culvert. Therefore the shear stress variable calculated in HECRAS was used to determine the likelihood of scour. The crossing design includes riprap lining of the channel invert with added protection for the embankment on the downstream end of the crossing. This is shown on Figure 2 of Appendix A and the full design plans included in Appendix C.

As seen from Table 1 below, shear stress through the bridge reach is well below 5 lbs/ft<sup>2</sup> tolerance for the type M soil riprap lining of the channel bottom and embankments during 100-year and 500-year simulations. Velocities downstream of the bridge are comparable to existing conditions and will not result in an increase of erosive conditions.

**Table 1 HECRAS Shear Stress and Velocity at Proposed Conspan Crossing**

Location	Section	100-Yr Profile		500-Yr Profile	
		Maximum Velocity (ft/s)	Shear Stress Channel(lb/ft <sup>2</sup> )	Maximum Velocity (ft/s)	Shear Stress Channel(lb/ft <sup>2</sup> )
30' Upstream of Bridge	7205	4.3	0.4	4.1	0.4
Upstream Bridge Face	7175	6.0	0.7	6.1	0.9
Downstream Bridge Face	6929	12.3	1.8	13.6	2.1
40' Downstream of Bridge	6889	11.6	1.5	11.4	1.7
69' Downstream of Bridge	6760	9.3	1.1	10.2	1.0

Note: Permissible shear stress Type M soil riprap is 5 lb/ft<sup>2</sup>



**X. CONSTRUCTION PERMITTING**

The following permits are anticipated to allow for the construction of the project as shown on the design plans. A copy of the Sterling Ranch 404 Permit is included within the Appendix.

USACE notification of project in conformance with 404 permit - USACE

No-Rise Floodway Certification, Floodplain Development Permit – Pikes Peak Regional Building Department

Grading and Erosion Control Permit (ESQCP) – El Paso County

Construction Stormwater Discharge Permit – CDPHE

Construction Dewatering Permit - CDPHE

Letter of Map Revision (post construction) - FEMA

**XI. DRAINAGE AND BRIDGE FEES**

bridge (not drop structures)

The Sterling Ranch Development and specifically Sterling Ranch East lies wholly within the Sand Creek drainage basin. Drainage and bridge fees have been established by the County for the Sand Creek drainage basin for assessment against platted land within the watershed. The drainageway structures will be public and will be owned and maintained by the El Paso County upon acceptance. The costs for the public drainageway improvements are reimbursable or creditable against drainage and bridge fees owed when land within Sterling Ranch is platted. Reimbursement of drainage and bridge improvements require approval through the DCM reimbursement process. Construction of the bridge at Sterling Ranch Road and at Briargate Parkway will be creditable against bridge fees owed pending approval through the DCM reimbursement process.

The 2021 DBPS identifies the project section as unimproved SC1R11 channel with potential maintenance of future problems at \$700 per length foot. The total length of the proposed bridge and channel improvements is approximately 630 feet, resulting in an estimated cost of \$441,000.

The current 2021 drainage and bridge fees for the Sand Creek drainage basin are as follows:

Drainage Fee: \$18,841 per impervious acre

Bridge Fee: \$ 0 per acre

200' of channel,  
255' SABC

**XII. PHASING**

Construction of the drainage and bridge facilities shown on the plans is to be completed all at once and no phasing of the construction is proposed. The construction will commence prior to or concurrent with the subdivisions east of Sand Creek including Branding Iron Filing No. 2 and Homestead Filing No. 2.

**XIII. CONCLUSIONS**

The development of the future Branding Iron at Sterling Ranch and Homestead at Sterling Ranch subdivisions requires the Briargate Bridge crossing of Sand Creek. Per direction of El Paso County and the Army Corps of Engineers, improvements to Sand Creek through the Sterling Ranch Development were limited to stabilize the channel upstream and downstream reach of the

Delete "Branding Iron at Sterling Ranch and Homestead at"

This isn't correct.

proposed Briargate Boulevard Bridge. Results of hydraulic analysis demonstrate that the channel and Conspan crossing have adequate capacity to carry effective 100-year flows without causing an increase to existing water surface elevations. Scour analysis indicates that the riprap channel protection is sufficient to prevent undermining of the structure during major storm events and will not result in adverse impacts to the downstream natural channel compared to existing conditions.



shear stress

References?

## **APPENDIX TABLE OF CONTENTS**

### **Appendix A: Hydrology and Hydraulic Calculations**

Figure 1 Vicinity Map

Figure 2 Floodplain

Hydrology

Riprap Sizing

HECRAS Proposed Bridge Output

### **APPENDIX B: Geotechnical Report**

### **APPENDIX C:**

Roadway Design

Bridge and Channel Design

### **APPENDIX D: Sterling Ranch 404 Permit**

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## **Appendix A: Hydrology and Hydraulic Calculations**

**Figure 1 Vicinity Map**

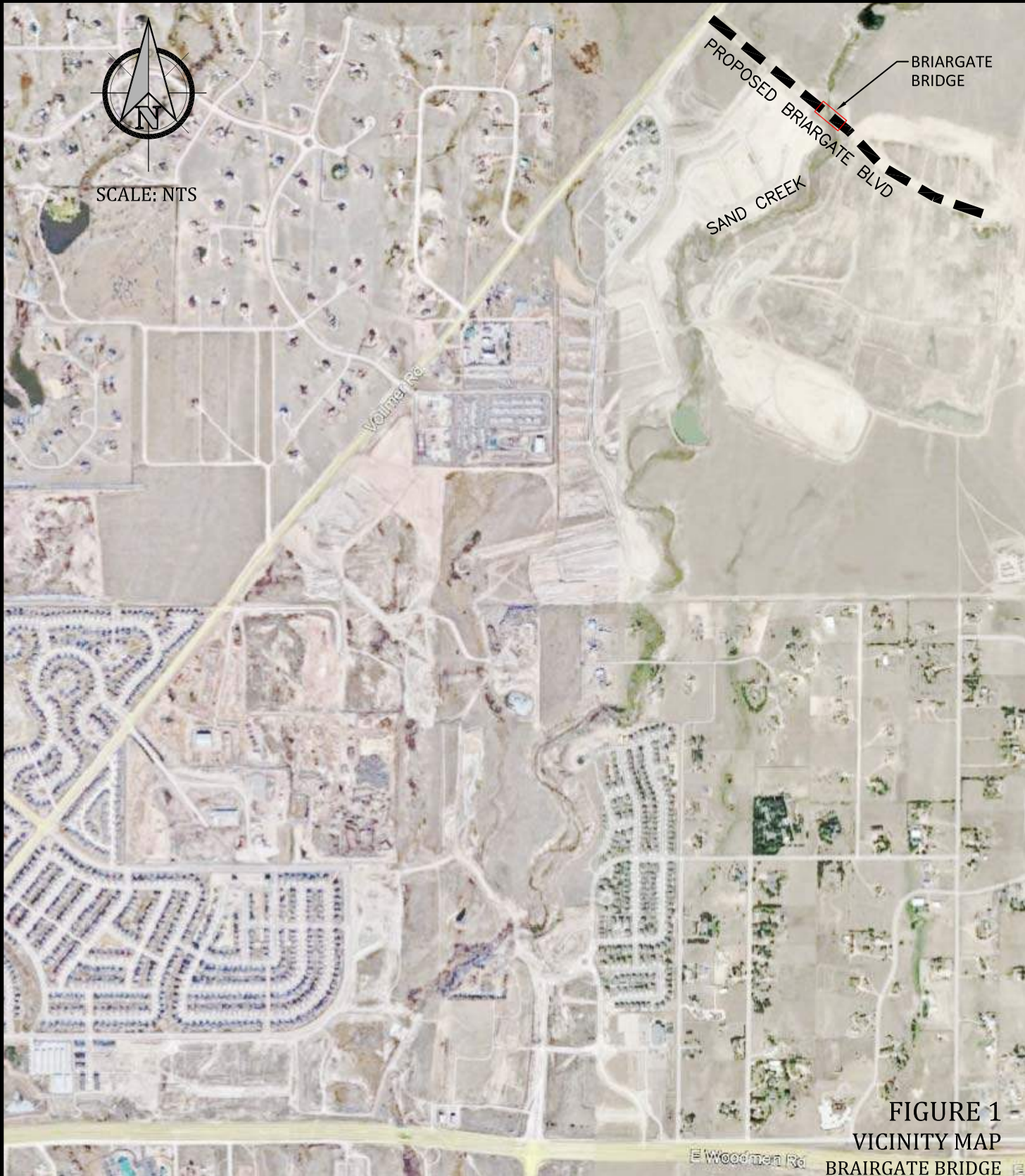
**Figure 2 Floodplain** Add FEMA FIRM panel

**Hydrology**

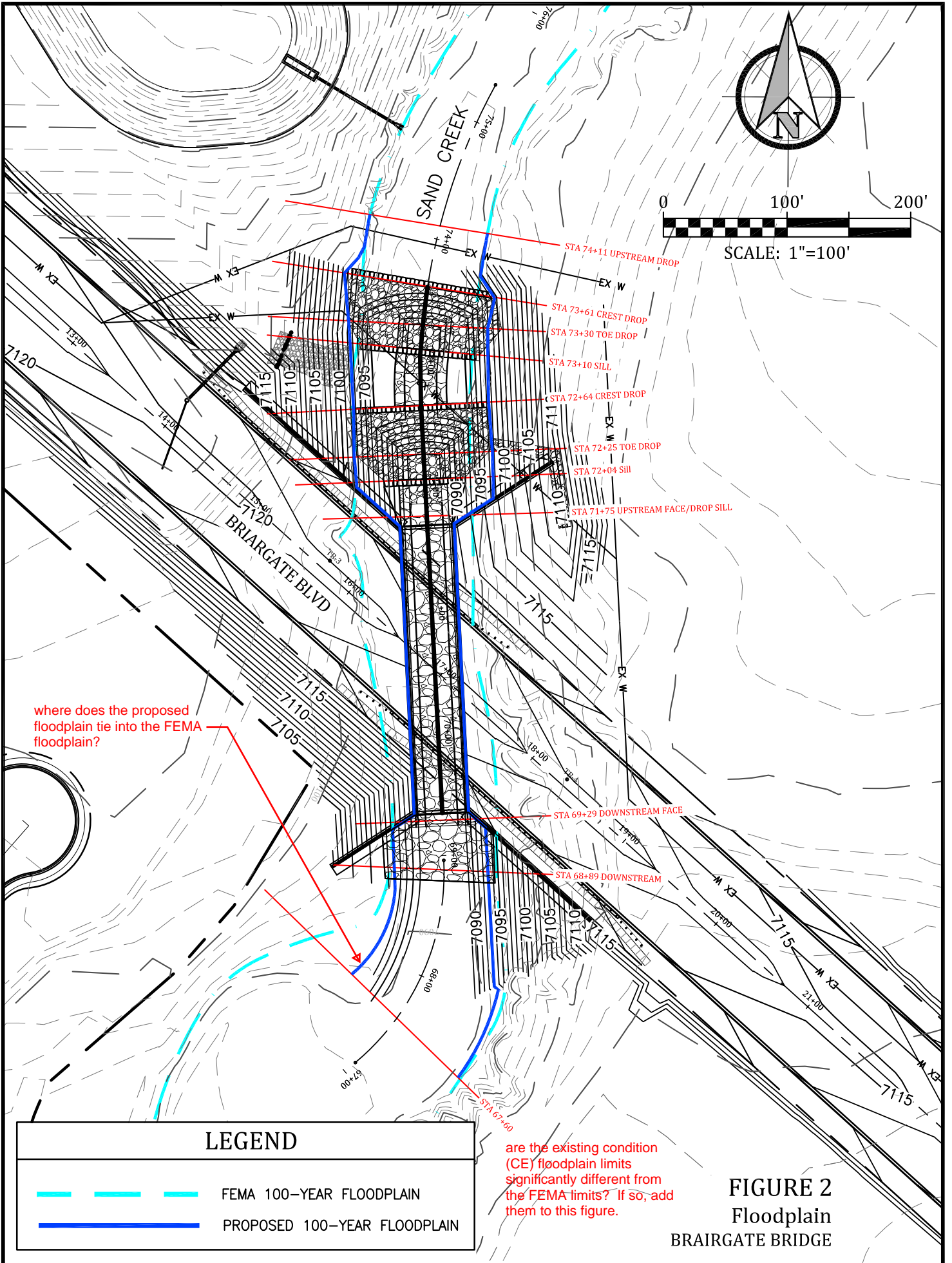
**Riprap Sizing**

**HECRAS Proposed Bridge Output**





**FIGURE 1**  
**VICINITY MAP**  
**BRAIRGATE BRIDGE**



**LEGEND**

- FEMA 100-YEAR FLOODPLAIN
- PROPOSED 100-YEAR FLOODPLAIN

are the existing condition (CE) floodplain limits significantly different from the FEMA limits? If so, add them to this figure.

**FIGURE 2**  
Floodplain  
BRAIRGATE BRIDGE



## 8.1 Riprap Sizing

Procedures for sizing rock to be used in soil riprap, void-filled riprap, and riprap over bedding are the same.

### 8.1.1 Mild Slope Conditions

When subcritical flow conditions occur and/or slopes are mild (less than 2 percent), UDFCD recommends the following equation (Hughes, et al, 1983):

$$d_{50} \geq \left[ \frac{VS^{0.17}}{4.5(G_s - 1)^{0.66}} \right]^2 \quad \text{Equation 8-11}$$

Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

$d_{50}$  = mean rock size (ft)

$G_s$  = specific gravity of stone (minimum = 2.50, typically 2.5 to 2.7), Note: In this equation ( $G_s - 1$ ) considers the buoyancy of the water, in that the specific gravity of water is subtracted from the specific gravity of the rock.

Note that Equation 8-11 is applicable for sizing riprap for channel lining with a longitudinal slope of no more than 2%. This equation is not intended for use in sizing riprap for steep slopes (typically in excess of 2 percent), rundowns, or protection downstream of culverts. Information on rundowns is provided in Section 7.0 of the *Hydraulic Structures* chapter of the USDCM, and protection downstream of culverts is discussed in the *Culverts and Bridges* chapter. For channel slopes greater than 2% use one of the methods presented in 8.1.2.

Rock size does not need to be increased for steeper channel side slopes, provided the side slopes are no steeper than 2.5H:1V (UDFCD 1982). Channel side slopes steeper than 2.5H:1V are not recommended because of stability, safety, and maintenance considerations. See Figure 8-34 for riprap placement specifications. At the upstream and downstream termination of a riprap lining, the thickness should be increased 50% for at least 3 feet to prevent undercutting.

### 8.1.2 Steep Slope Conditions

Steep slope rock sizing equations are used for applications where the slope is greater than 2 percent and/or flows are in the supercritical flow regime. The following rock sizing equations may be referred to for riprap design analysis on steep slopes:

- CSU Equation, *Development of Riprap Design Criteria by Riprap Testing in Flumes: Phase II* (prepared by S.R. Abt, et al, Colorado State University, 1988). This method was developed for steep slopes from 2 to 20 percent.
- USDA- Agricultural Research Service Equations, *Design of Rock Chutes* (by K.M. Robinson, et al, USDA- ARS, 1998 Transactions of ASAE) and *An Excel Program to Design Rock Chutes for Grade*

Riprap Sizing at Barragute Bridge per UDFCD Eq 8-11

From HECRAS! 100% velocities

S = 0.2%

Velocities:

5.36 ft/s	upstream approach
12.0 ft/s	outlet
10.4 ft/s	departure

$$d_{50} \geq \left[ \frac{V^{1.7}}{4.5(G_s - 1)^{0.66}} \right]^2$$

V = mean channel velocity

S = longitudinal slope (ft/ft)

d<sub>50</sub> = mean rock size (ft)

G<sub>s</sub> = specific gravity of stone (2.5 to 2.7)

$$\frac{12.0 (.002)^{.17}}{4.5(2.5-1)^{.66}}$$

= 1.0 (12" D<sub>50</sub>)

I don't think this will affect the final riprap size, but double check that this step was squared per the equation above.

**DESIGN OF ROADSIDE CHANNELS  
WITH FLEXIBLE LININGS**

Hydraulic Engineering Circular No. 15

Prepared By

Simons, Li & Associates, Inc.  
3555 Stanford Road  
P.O. Box 1816  
Fort Collins, Colorado 80522

For

U.S. Department of Transportation  
Federal Highway Administration

October 25, 1985

Table 4.1. Permissible Shear Stresses for Lining Materials.

Lining Category	Lining Type	Permissible Unit Shear Stress (lb/ft <sup>2</sup> )
Temporary	Woven Paper Net	0.15
	Jute Net	0.45
	Fiberglass Roving*	0.75
	Straw and Erosion Net	1.45
	Curled Wood Mat (CRM)	1.55
	Nylon Mat	2.00
Vegetative	Class A	3.70
	Class B	2.10
	Class C	1.00
	Class D	0.60
	Class E	0.35
Gravel Riprap	1-inch	0.40
	2-inch	0.80
Rock Riprap	6-inch	2.50
	12-inch	5.00

\* single and double applications

TABLE 3.1.--Classification of vegetal covers as to degree of retardance (6)

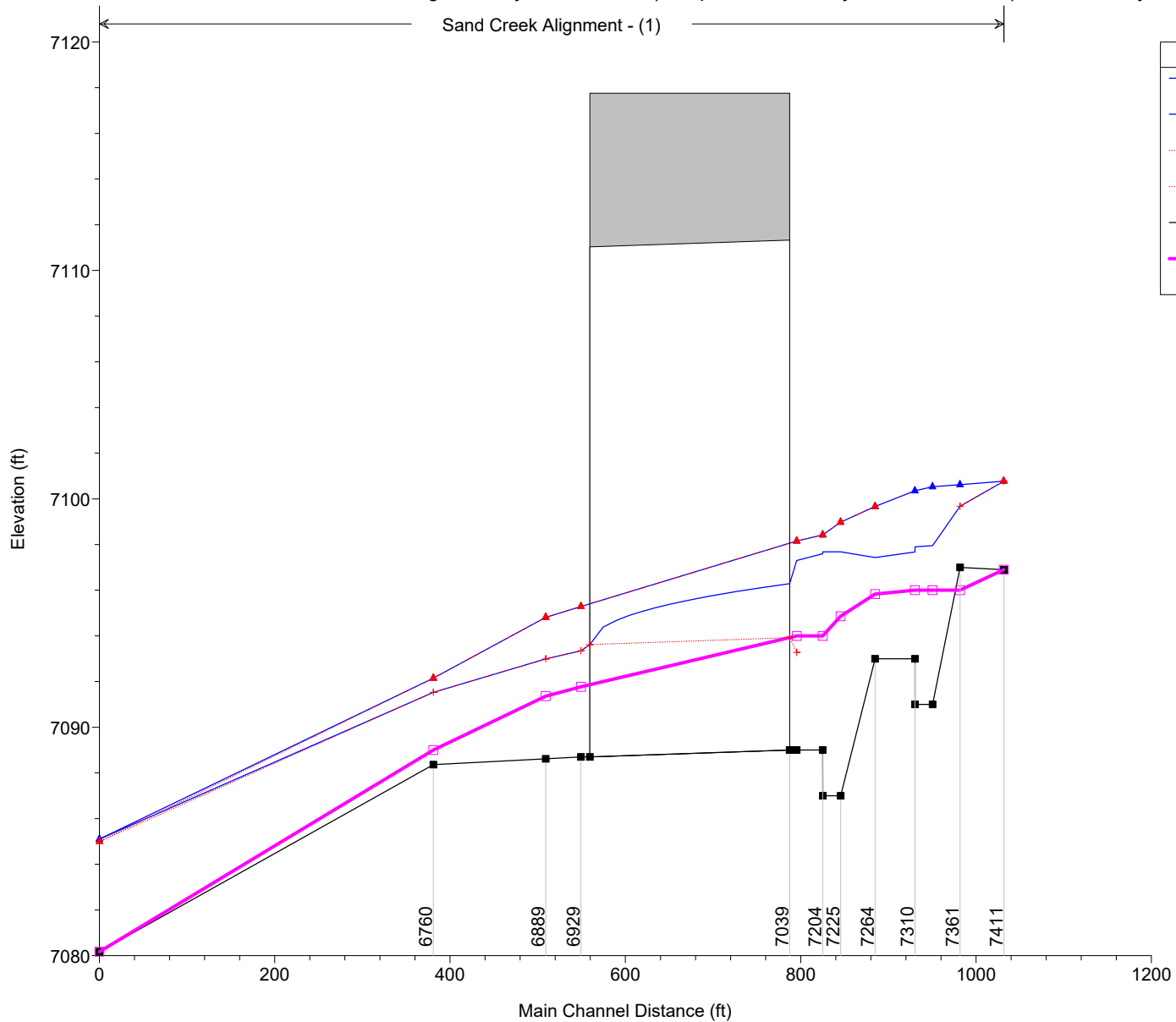
Note: Covers classified have been tested in experimental channels.  
Covers were green and generally uniform.

Retardance	Cover	Condition
A	Weeping lovegrass .....	Excellent stand, tall, (average 30")
	Yellow bluestem <i>Ischaemum</i> ..	Excellent stand, tall, (average 36")
B	Kudzu .....	Very dense growth, uncut
	Bermudagrass .....	Good stand, tall (average 12")
	Native grass mixture (little bluestem, blue grama, and other long and short mid-west grasses) .....	Good stand, unmowed
	Weeping lovegrass .....	Good stand, tall, (average 24")
	Lespedeza sericea .....	Good stand, not woody, tall (average 19")
	Alfalfa .....	Good stand, uncut, (average 11")
	Weeping lovegrass .....	Good stand, mowed, (average 13")
	Kudzu .....	Dense growth, uncut
	Blue grama .....	Good stand, uncut, (average 13")
	C	Crabgrass .....
Bermudagrass .....		Good stand, mowed (average 6")
Common lespedeza .....		Good stand, uncut (average 11")
Grass-legume mixture--summer (orchard grass, redbot, Italian ryegrass, and common lespedeza) .....		Good stand, uncut (6 to 8 inches)
Centipedegrass .....		Very dense cover (average 6 inches)
Kentucky bluegrass .....		Good stand, headed (6 to 12 inches)
D	Bermudagrass .....	Good stand, cut to 2.5-inch height
	Common lespedeza .....	Excellent stand, uncut (average 4.5")
	Buffalograss .....	Good stand, uncut (3 to 6 inches)
	Grass-legume mixture--fall, spring (Orchardgrass, redbot, Italian ryegrass, and common lespedeza) .....	Good stand, uncut (4 to 5 inches)
E	Lespedeza sericea .....	After cutting to 2-inch height. Very good stand before cutting.
	Bermudagrass .....	Good stand, cut to 1.5 inches height
	Bermudagrass .....	Burned stubble.



2021 Sand Creek at Briargate Pkwy Plan: 1) Proposed Floodway 8/29/2021 2) CE Floodway 8/29/2021

Sand Creek Alignment - (1)



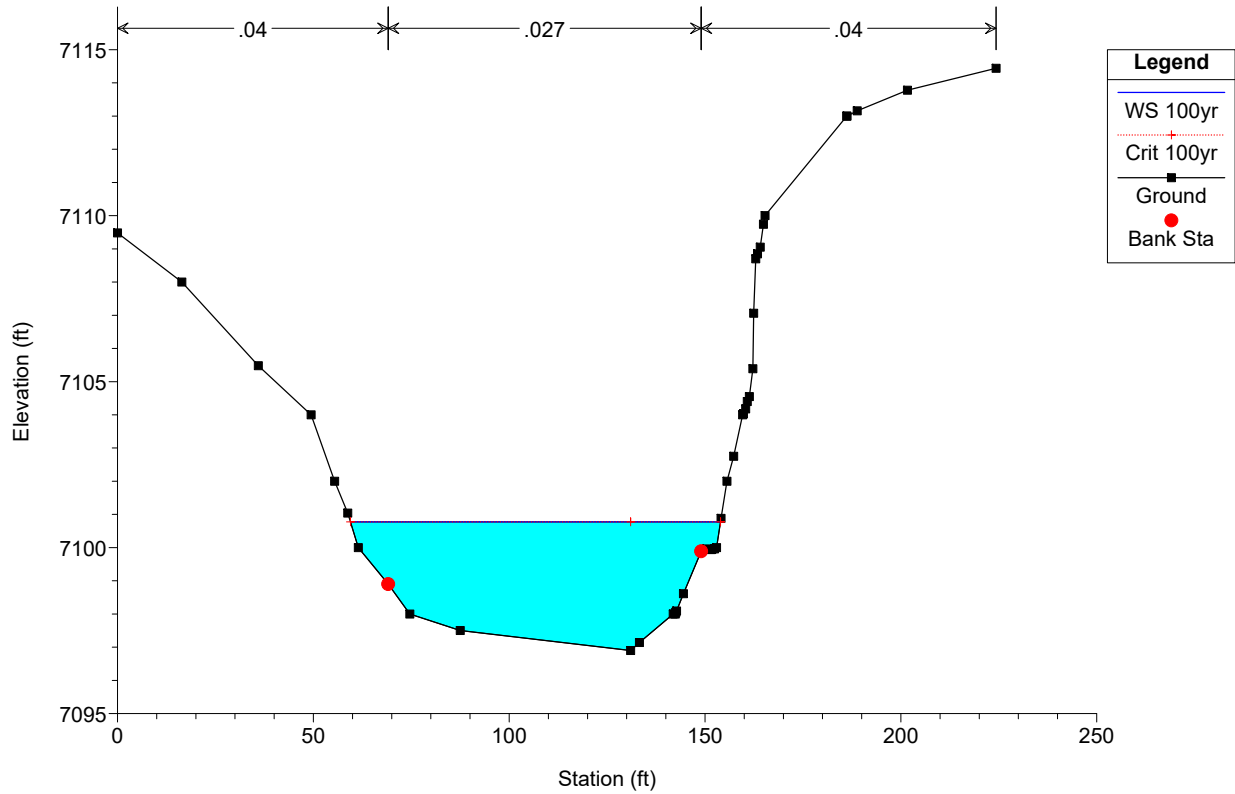
Legend	
WS 100yr - Proposed Floodway	▲
WS 100yr - CE Floodway	▲
Crit 100yr - Proposed Floodway	+
Crit 100yr - CE Floodway	▲
Ground	■
Ground	□

HEC-RAS Plan: Proposed Floodway River: Sand Creek Reach: Briargate Only Profile: 100yr

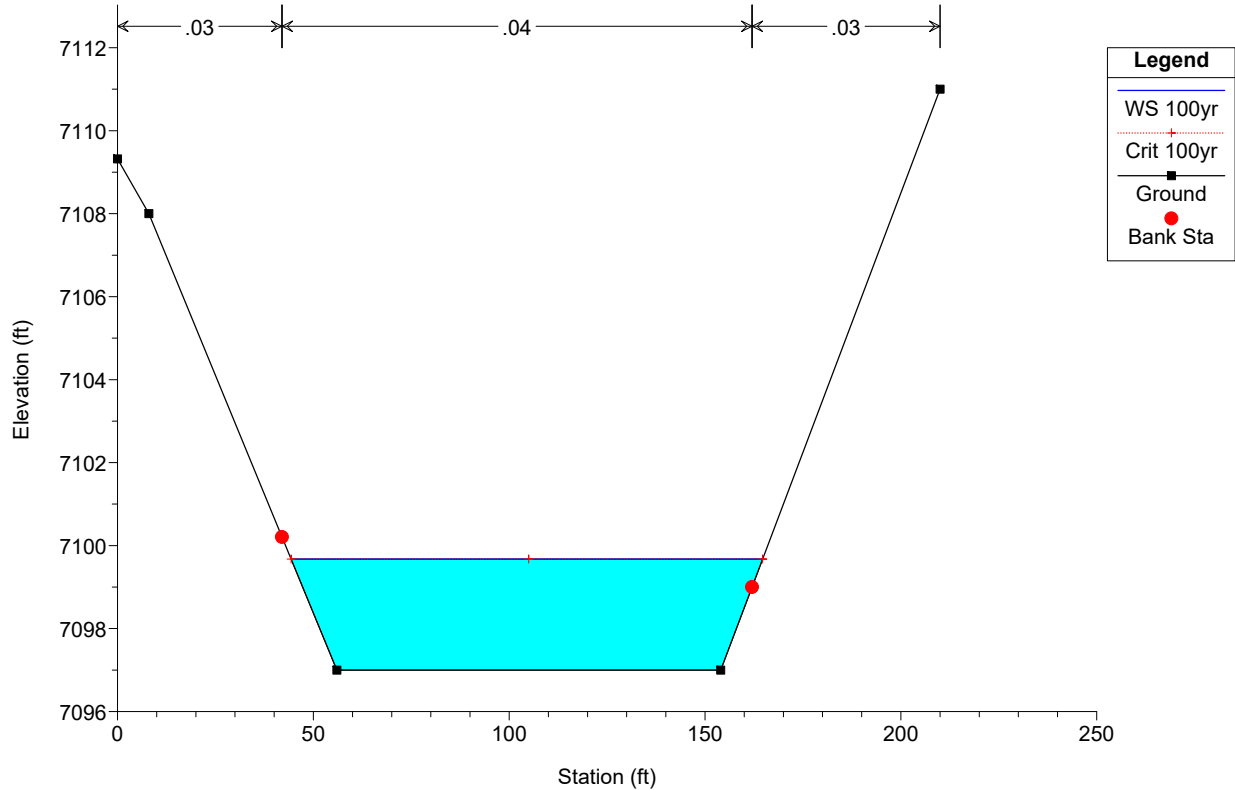
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Briargate Only	7411	100yr	2600.00	7096.90	7100.77	7100.77	7102.29	0.006934	9.95	271.39	94.46	0.98
Briargate Only	7361	100yr	2600.00	7097.00	7099.68	7099.68	7100.91	0.017318	8.92	292.17	120.38	1.00
Briargate Only	7330	100yr	2600.00	7091.00	7097.96		7098.36	0.002520	5.07	512.43	112.64	0.42
Briargate Only	7311	100yr	2600.00	7091.00	7097.90		7098.31	0.002238	5.16	512.93	113.74	0.40
Briargate Only	7310	100yr	2600.00	7093.00	7097.67		7098.29	0.004384	6.32	417.88	111.89	0.55
Briargate Only	7264	100yr	2600.00	7093.00	7097.43		7098.07	0.005030	6.41	406.42	109.33	0.58
Briargate Only	7225	100yr	2600.00	7087.00	7097.68		7097.88	0.000672	3.59	736.21	111.84	0.23
Briargate Only	7205	100yr	2600.00	7087.00	7097.68		7097.86	0.000709	3.45	754.43	111.05	0.23
Briargate Only	7204	100yr	2600.00	7089.00	7097.60		7097.84	0.001077	3.97	655.17	110.37	0.29
Briargate Only	7175	100yr	2600.00	7089.00	7097.30	7093.27	7097.75	0.001695	5.36	485.53	62.00	0.34
Briargate Only	7039		Culvert									
Briargate Only	6929	100yr	2600.00	7088.70	7093.35	7093.35	7095.58	0.006400	11.99	216.92	57.00	0.99
Briargate Only	6889	100yr	2600.00	7088.62	7092.99	7092.99	7094.66	0.007309	10.36	250.93	75.74	1.00
Briargate Only	6760	100yr	2600.00	7088.36	7091.53	7091.53	7092.88	0.007224	9.33	284.07	119.86	0.97
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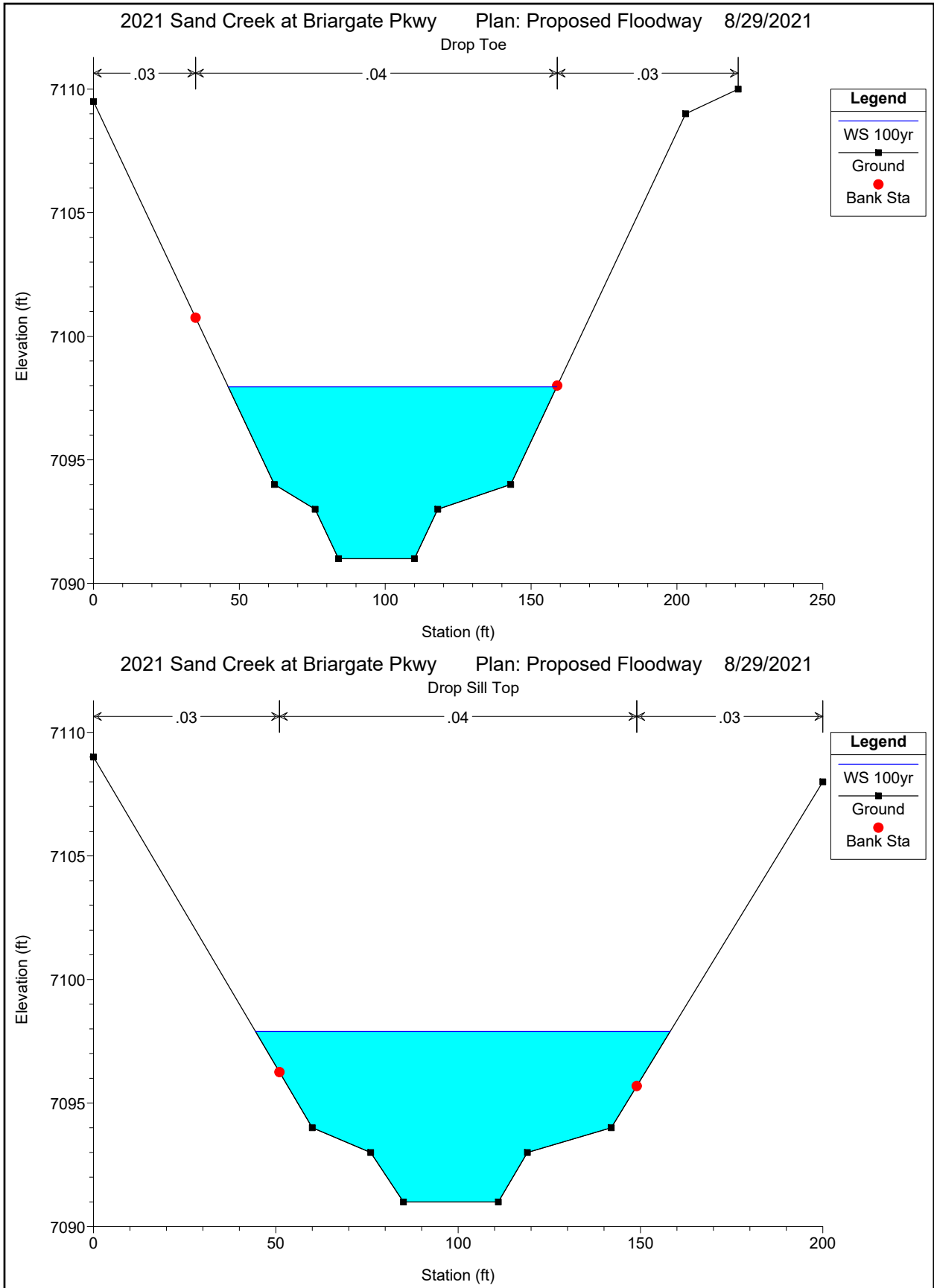
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2021 Sand Creek at Briargate Pkwy Plan: Proposed Floodway 8/29/2021



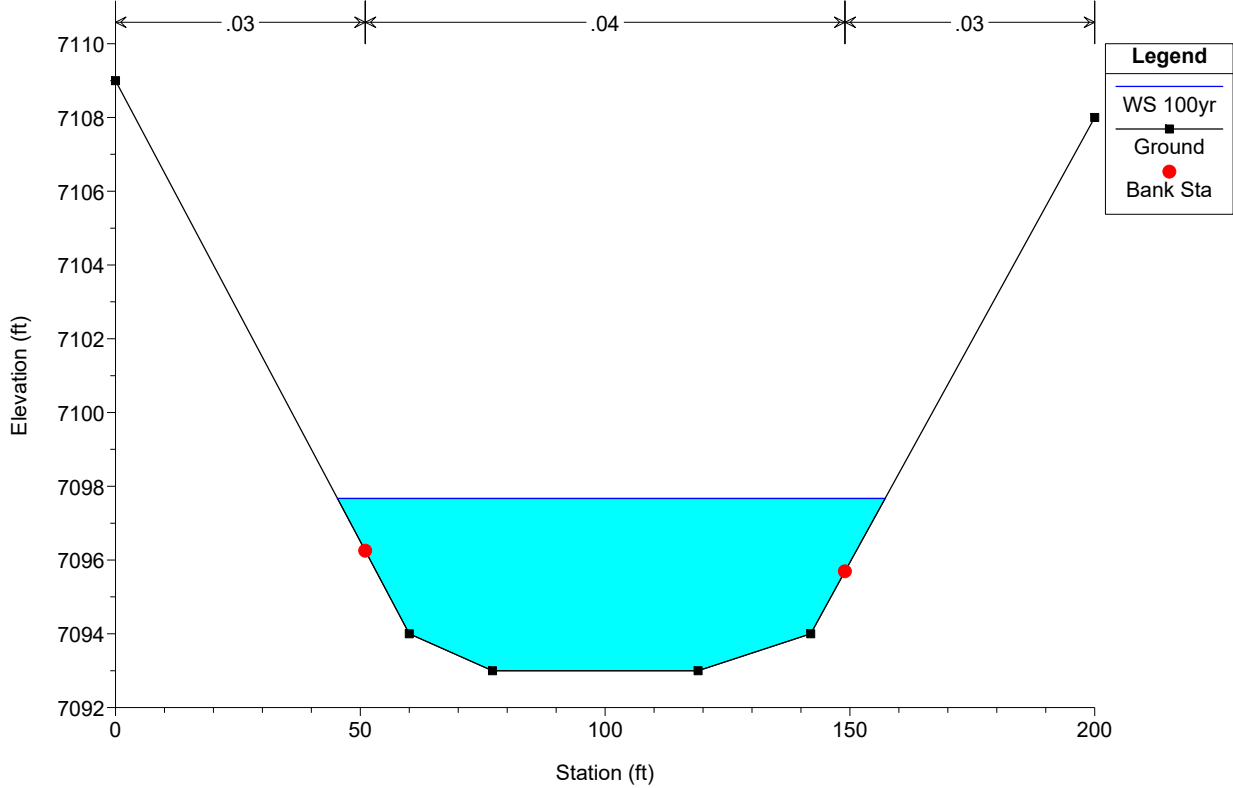
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Drop Crest





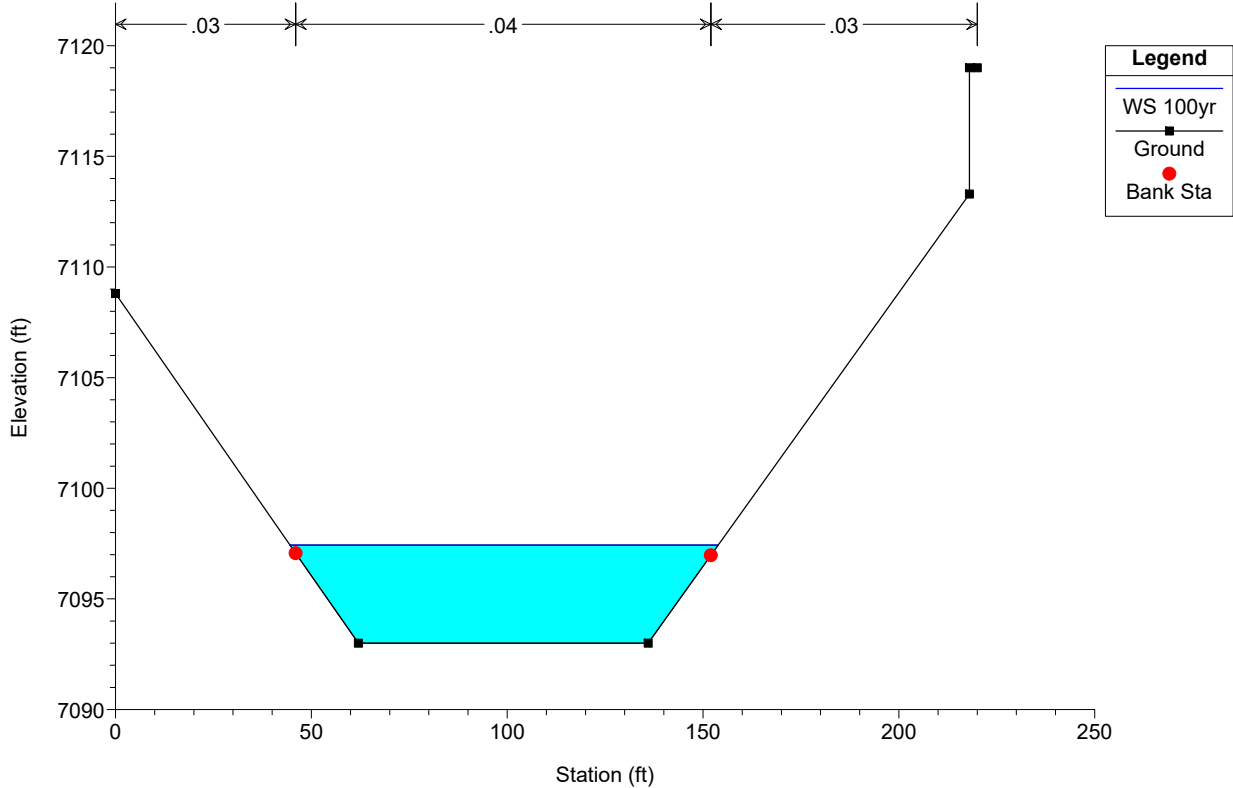
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Drop Sill Top



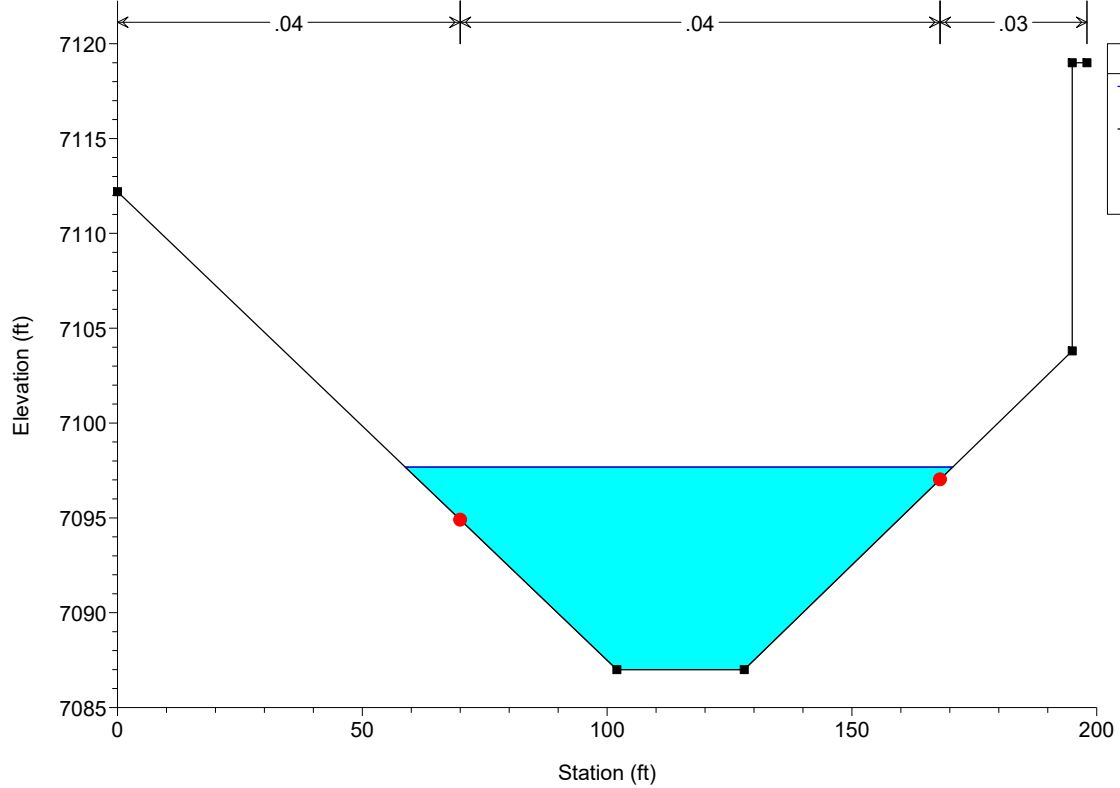
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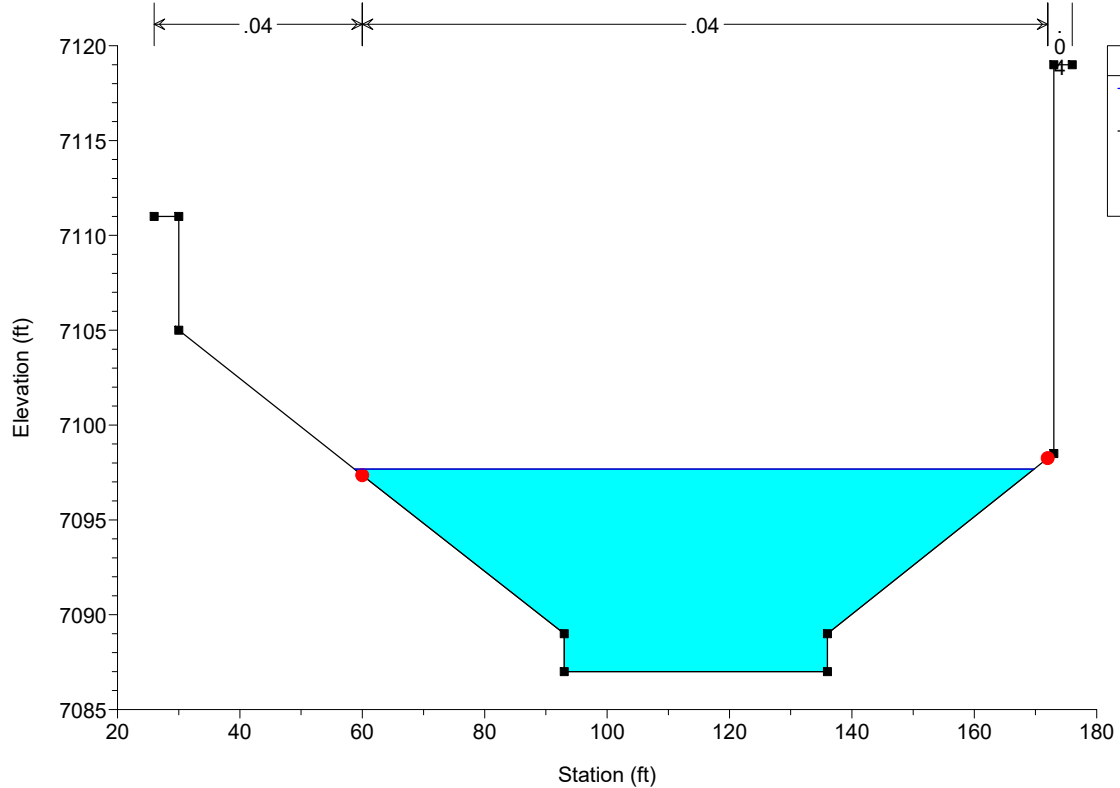
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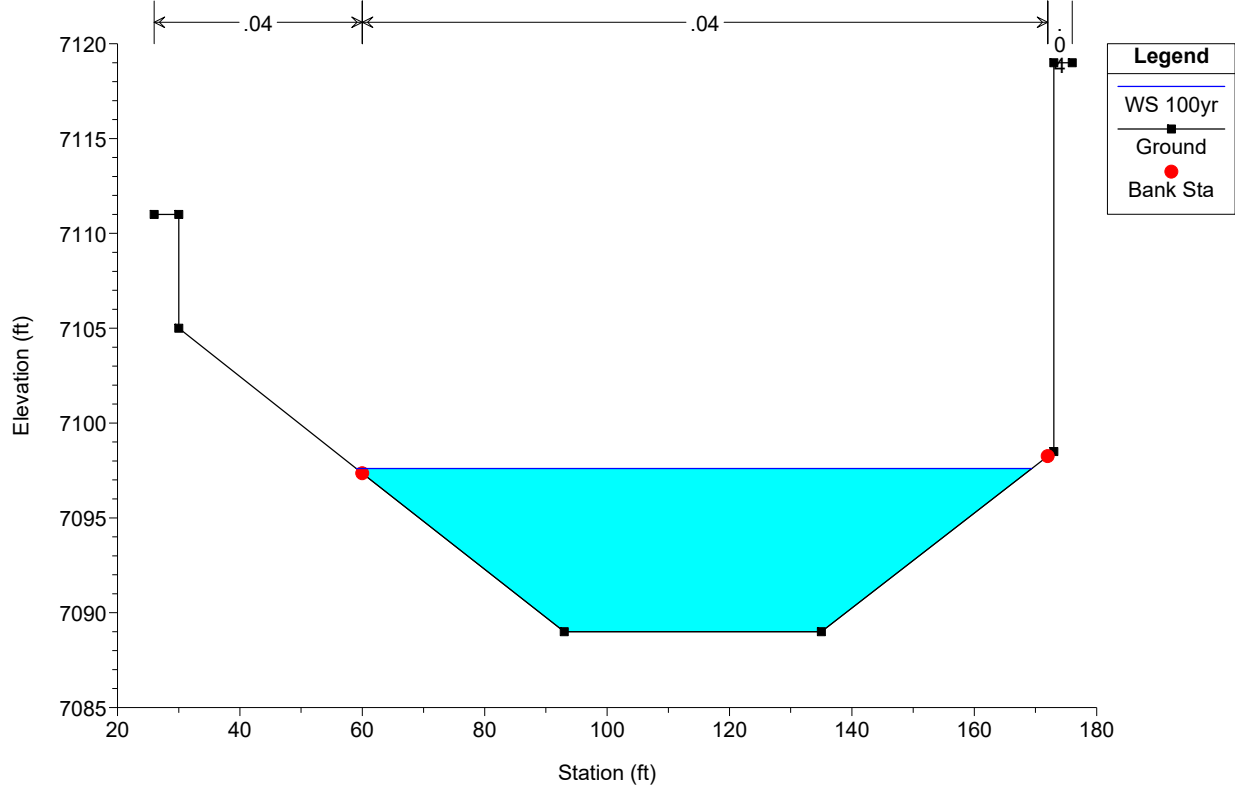


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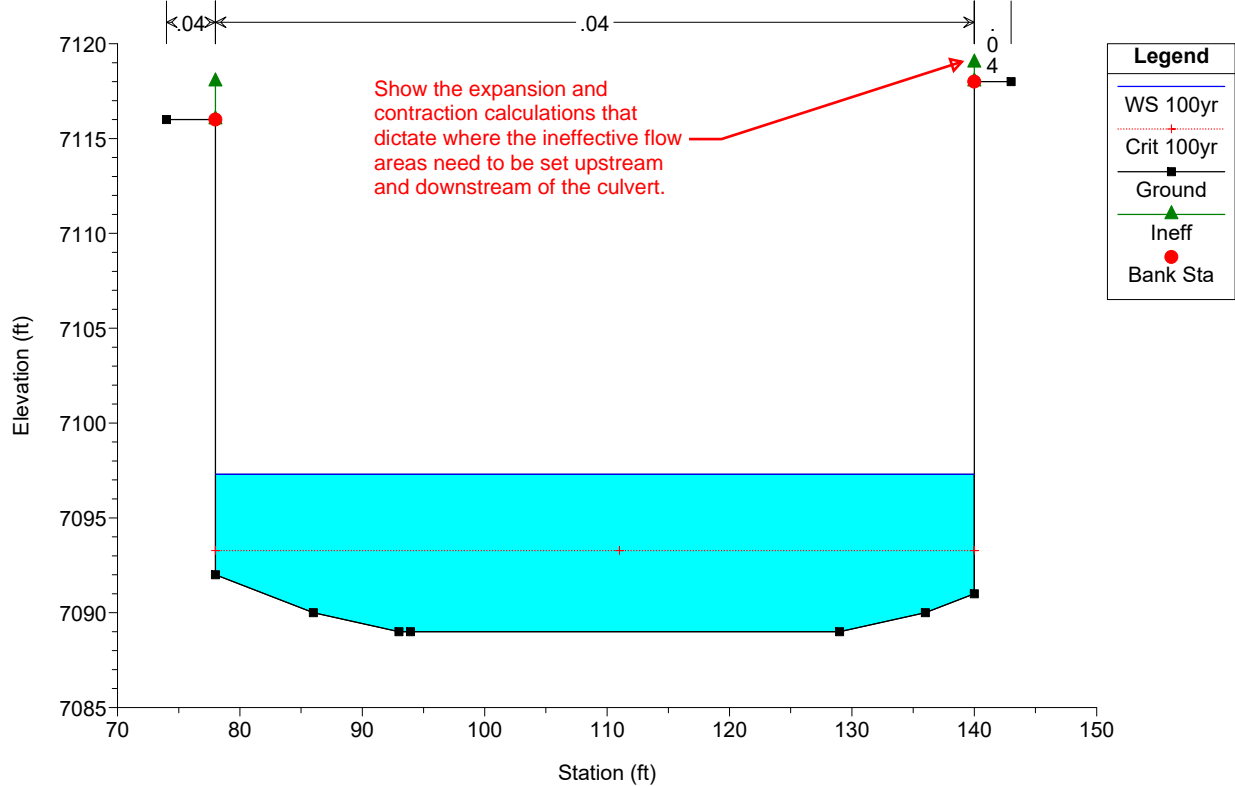
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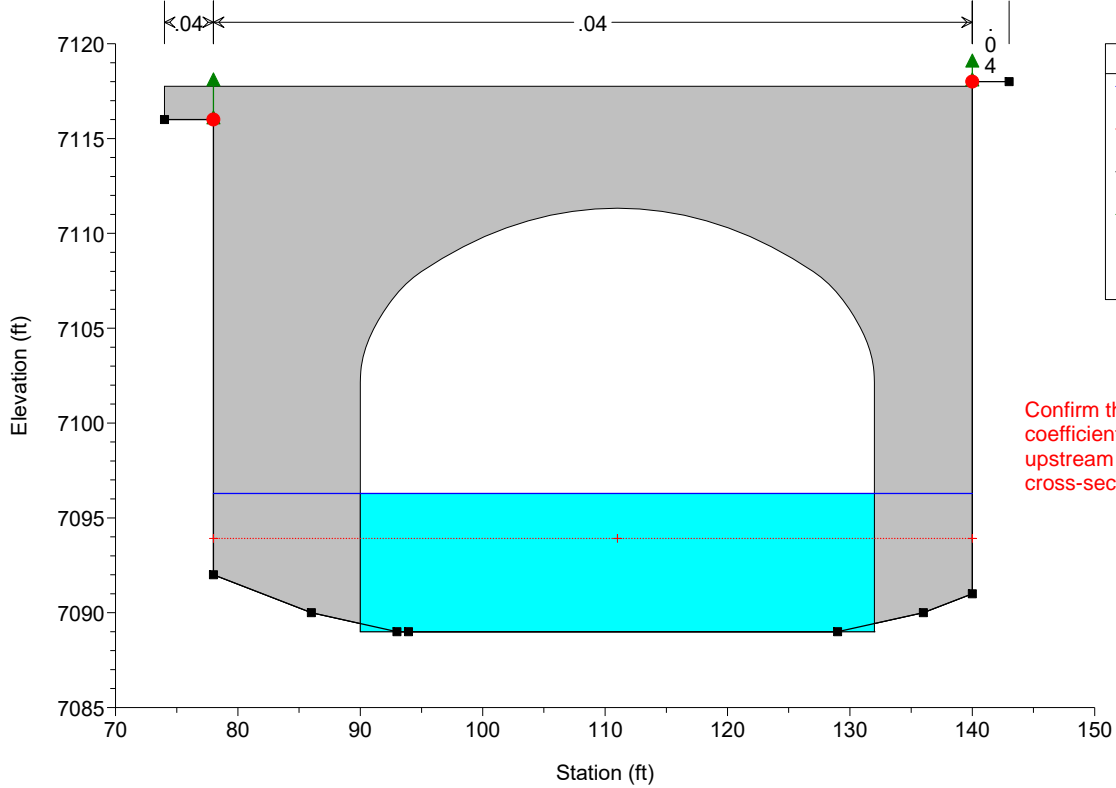
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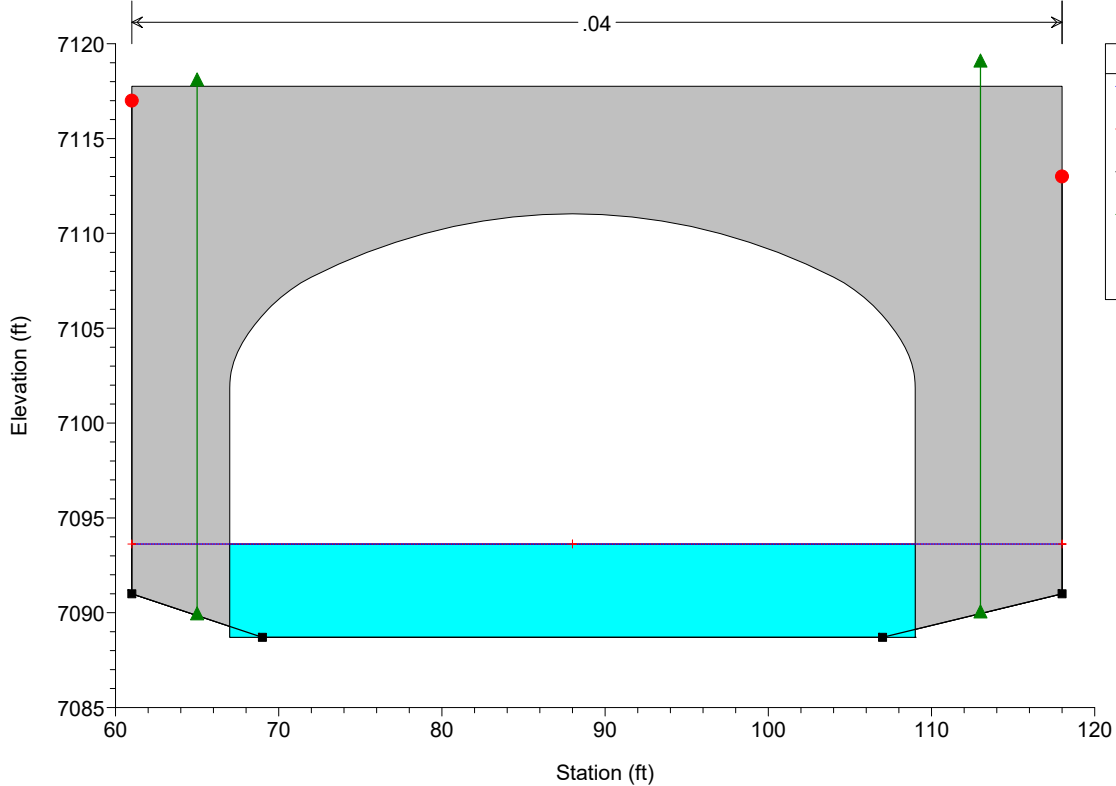
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Upstream Bridge Face



2021 Sand Creek at Briargate Pkwy Plan: Proposed Floodway 8/29/2021  
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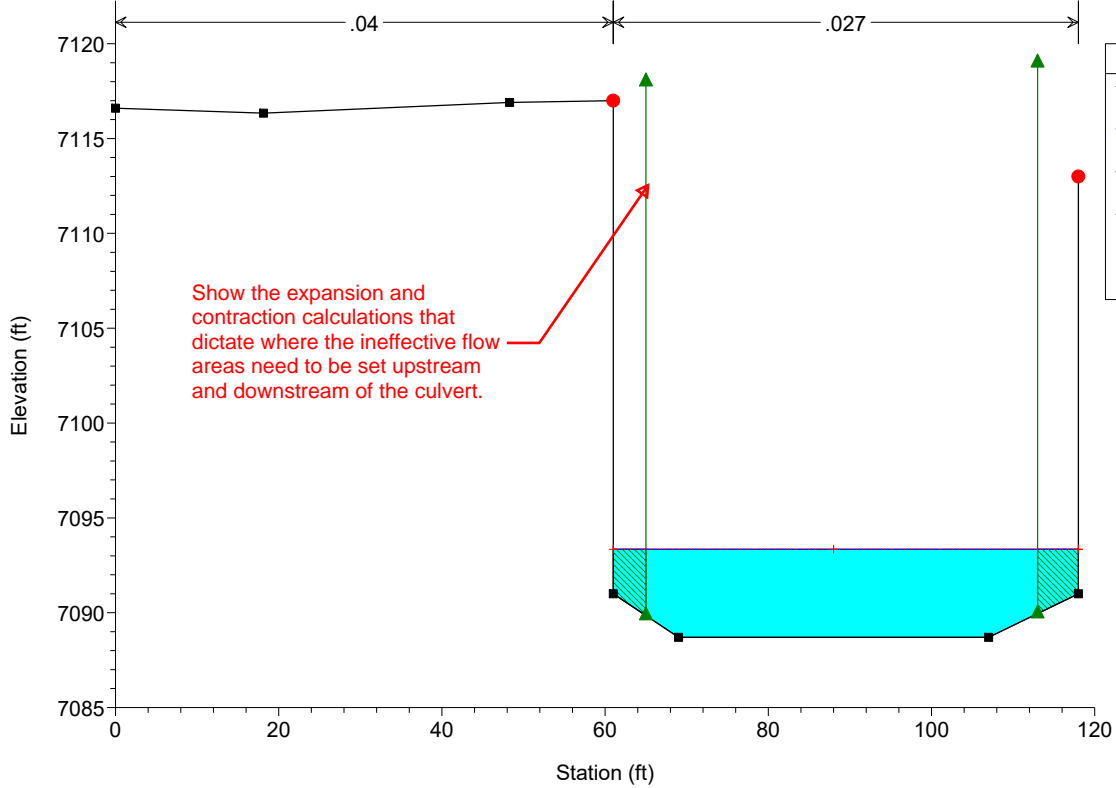


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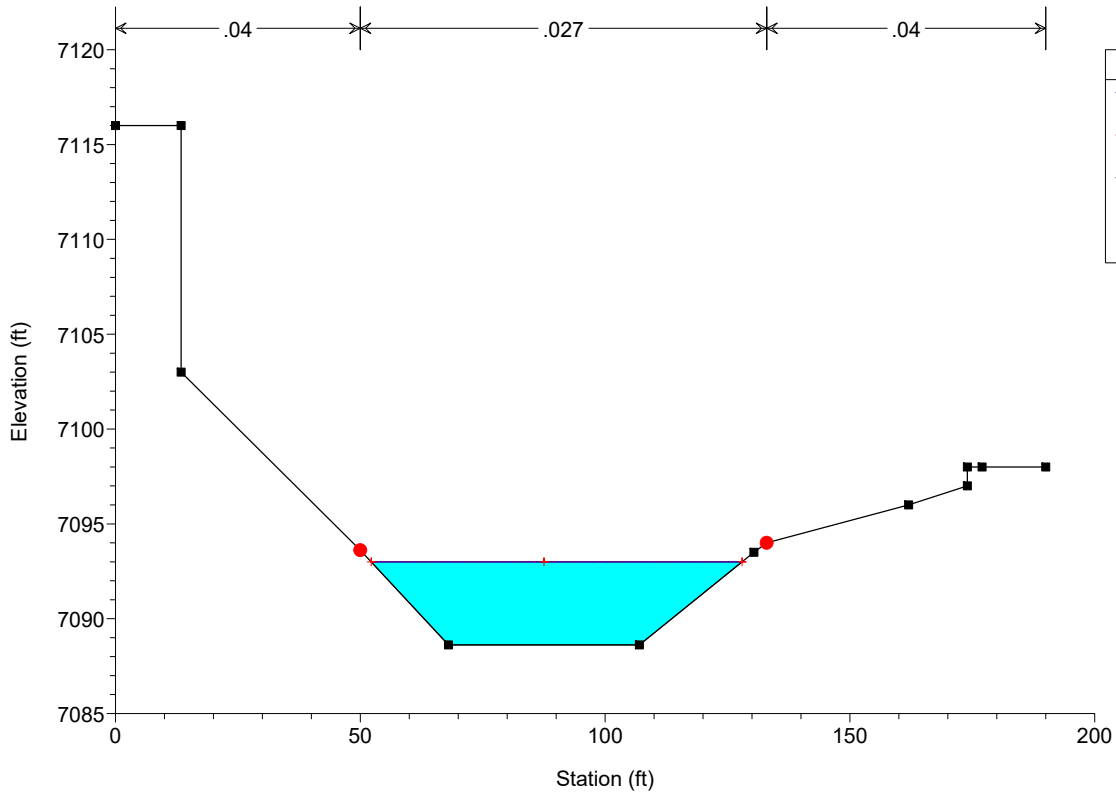




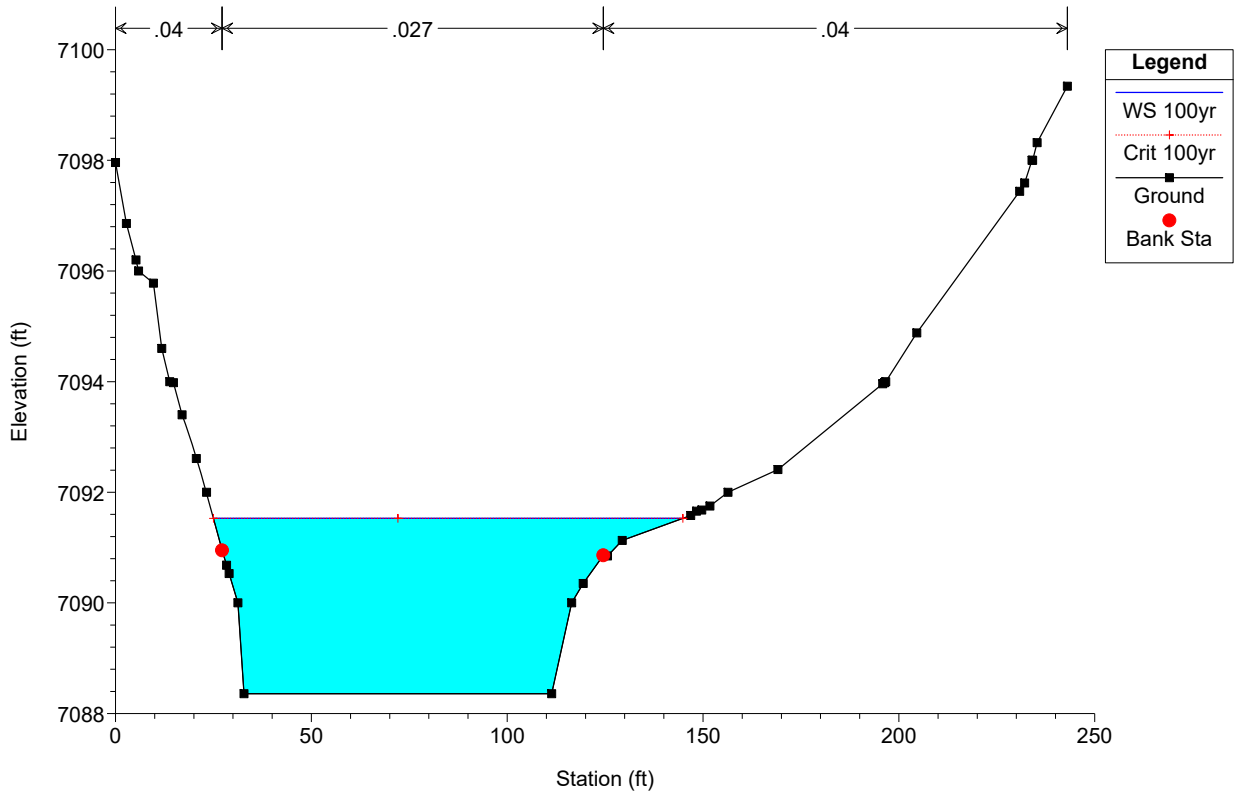
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Downstream Bridge Face



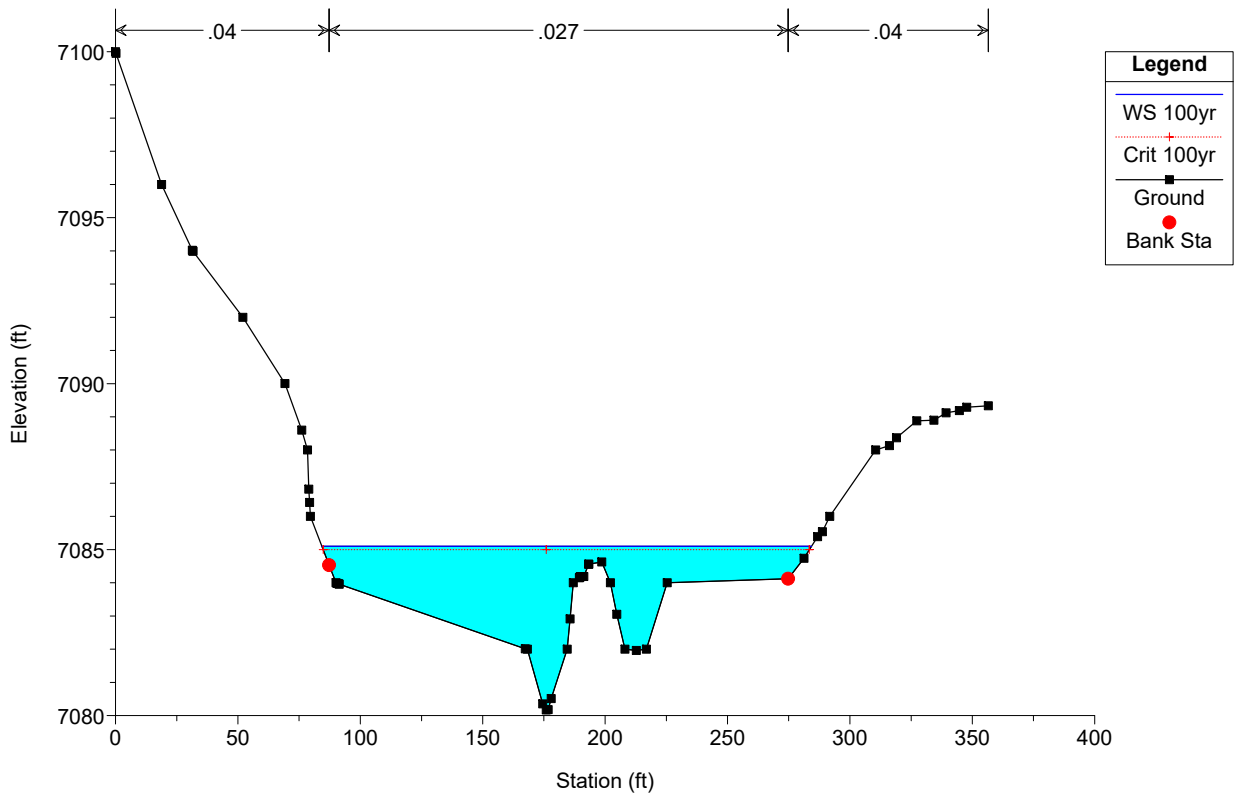
2021 Sand Creek at Briargate Pkwy Plan: Proposed Floodway 8/29/2021



2021 Sand Creek at Briargate Pkwy Plan: Proposed Floodway 8/29/2021



2021 Sand Creek at Briargate Pkwy Plan: Proposed Floodway 8/29/2021



**APPENDIX B: Geotechnical Report**

**Appendix B**

**Sterling Ranch Road and Briargate Parkway Bridges Geotechnical Report**



**ENTECH**  
ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, CO 80907  
PHONE (719) 531-5599  
FAX (719) 531-5238

**SUBSURFACE SOIL INVESTIGATION  
STERLING RANCH BRIDGES  
STERLING RANCH ROAD OVER SAND CREEK  
BRIARGATE BOULEVARD OVER SAND CREEK  
COLORADO SPRINGS, COLORADO**

Prepared for:

**C&C Land  
20 Boulder Crescent, 2<sup>nd</sup> Floor  
Colorado Springs, Colorado 80903**

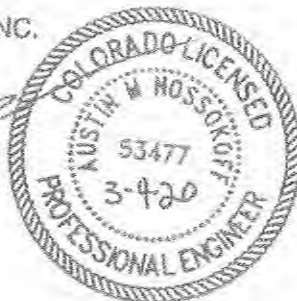
**Attn: Chaz Collins**

March 4, 2020


Respectfully Submitted,

ENTECH ENGINEERING, INC.

  
Austin M. Nossokoff, P.E.



Reviewed by:

  
Joseph C. Goode, Jr., P.E.  
President

AMN/amn

Encl.

Entech Job No. 200045

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**SUBSURFACE SOIL INVESTIGATION  
STERLING RANCH BRIDGES  
STERLING RANCH ROAD OVER SAND CREEK &  
BRIARGATE BOULEVARD OVER SAND CREEK  
EL PASO COUNTY, COLORADO**

**1.0 INTRODUCTION**

C&C Land is planning the construction of two vehicular bridges over sand creek for the proposed Sterling Ranch Road and Briargate Boulevard in El Paso County northeast of Colorado Springs, Colorado. The approximate location of the site is shown on the Vicinity Map, Figure 1. The planned layouts of the proposed bridges are shown on Figure 2, Site Plan/Test Boring Location Map.

This report describes the subsurface investigation conducted for the planned bridges and provides recommendations for foundation design and construction. The subsurface soil investigation included drilling test borings at four (4) locations within the footprints of the planned bridge foundations, collecting samples of soil, and conducting a geotechnical evaluation of the investigation findings. All drilling and subsurface investigation activities were performed by Entech Engineering, Inc. (Entech). The contents of this report, including the geotechnical evaluation and recommendations, are subject to the limitations and assumptions presented in Section 6.0.

## 2.0 PROJECT AND SITE DESCRIPTION

It is Entech's understanding that the project will consist of the construction of two (2) vehicular bridges spanning Sand Creek with driven H-pile foundations and associated site improvements. At the time of drilling, the sites for the proposed bridges were vacant. The crossing for the proposed Briargate Boulevard had been graded at the time of drilling. Sand Creek flows to the south. Current vegetation on the site consisted of grasses and small shrubs.

## 3.0 SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

The subsurface conditions were investigated by drilling four (4) exploratory test borings, one at each bridge abutment. The borings were drilled to depths 20 feet below the existing ground surface using a truck-mounted continuous flight auger-drilling rig supplied and operated by Entech Engineering, Inc. Boring Logs descriptive of the subsurface conditions encountered during drilling and subsequent to drilling are presented in Appendix A. At the conclusion of drilling, observations of groundwater levels were made in each of the open borings. The approximate locations of the test borings are indicated on Figure 2.

Soil samples were obtained from the borings utilizing the Standard Penetration Test (ASTM D-1586) using a 2-inch O.D. split-barrel sampler and a California Sampler. Results of the Standard Penetration Test (SPT) are included on the Test Boring Logs in terms of N-values expressed in blows per foot (bpf). Soil samples recovered from the borings were visually classified and recorded on the Test Boring Logs. The soil classifications were later verified utilizing laboratory testing and grouped by soil type. The soil type numbers are included on the Test Boring Logs. It should be understood that the soil descriptions shown on the Test Boring Logs may vary between boring location and sample depth.



It should also be noted that the lines of stratigraphic separation shown on the Test Boring Logs represent approximate boundaries between soil types and the actual stratigraphic transitions may be more gradual and vary with location. The Test Boring Logs are presented in Appendix A.

Moisture Content, ASTM D-2216, was obtained in the laboratory for all recovered samples. Grain-Size, ASTM D-422, and Atterberg Limits, ASTM D-4318, were determined for various samples for the purpose of classification and to obtain pertinent engineering characteristics. Volume change testing was performed on selected samples using the Swell/Consolidation Test (ASTM D-4546) in order to evaluate potential expansion/consolidation characteristics of the soil and bedrock. Sulfate testing was performed on select samples to determine the corrosive characteristics of the soils. The Laboratory Test Results are included in Appendix B and summarized in Table 1.

#### 4.0 SUBSURFACE CONDITIONS

Four (4) soil types were encountered in the borings drilled for the subsurface investigation: Type 1: silty sand fill (SM), Type 2: very silty sand (SM), Type 3: silty to very silty sandstone (SM), and Type 4: sandy to very sandy claystone (CL). The soils were classified in accordance with the Unified Soil Classification System (USCS) using the laboratory testing results and the observations made during drilling.

##### 4.1 Soil and Rock

Soil Type 1 is a silty sand fill (SM). The sand fill was encountered in Test Boring 1 at the existing ground surface extending to a depth of 6 feet. Standard Penetration Testing conducted on the sand resulted in SPT N-values of 4 to 6 blows per foot (bpf), which indicates loose states. Moisture content and grain size testing resulted in a moisture contents of 7 to 8 percent with approximately 29 percent of the soil size particles passing the No. 200 sieve. Atterberg limit testing was performed on a sample of sand fill and resulted in a liquid limit of no value with a plastic index of non-plastic. Sulfate testing on the sand resulted in 0.00 percent soluble sulfate

by weight, indicating negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 2 is a very silty sand (SM). The sand was encountered in three (3) of the test borings at the existing ground surface extending to depths of 1 to 10 feet. Standard Penetration Testing conducted on the soil resulted in SPT N-values of 7 to 26 blows per foot (bpf), indicating the sand is loose to medium dense in terms of density. Moisture content and grain size testing resulted in moisture contents of 5 to 20 percent with approximately 40 percent of the soil size particles passing the No. 200 sieve. Atterberg limit testing was performed on a sample of sand fill and resulted in a liquid limit of 15 with a plastic index of 3. Sulfate testing on the sand resulted in less than 0.01 percent soluble sulfate by weight, indicating negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 3 is a silty to very silty sandstone (SM). The sandstone was encountered in all of the test borings at depths ranging from 1 to 10 feet bgs and extending to depths of 12 feet and the termination of the borings (20 feet). Standard Penetration Testing conducted on the soil resulted in SPT N-values of greater than 50 blows per foot (bpf), indicating the sandstone is very dense in terms of density. Moisture content and grain size testing resulted in moisture contents of 10 to 17 percent with approximately 14 to 42 percent of the soil size particles passing the No. 200 sieve. Atterberg limit testing resulted in liquid limits of no value to 32 and plastic indexes of non plastic to 6. Sulfate testing on the sandstone resulted in 0.00 to less than 0.01 percent soluble sulfate by weight, indicating negligible potential for below grade concrete degradation due to sulfate attack.

Soil Type 4 is sandy to very sandy claystone (CL). The claystone was encountered in Test Boring 1 at a depth of 12 feet bgs and extending to the termination of the boring (20 feet). Standard Penetration Testing conducted on the soil resulted in SPT N-values of greater than 50 blows per foot (bpf), indicating the soil is hard in terms of consistency. Moisture content and grain size testing resulted in moisture contents of 15 to 16 percent with approximately 59 percent of the soil size particles passing the No. 200 sieve. Atterberg limit testing resulted in a liquid limit of 35 and a plastic index of 14.

Additional descriptions and engineering properties of the soil encountered during drilling are included on the boring logs. Laboratory Testing Results are summarized on Table 1 and presented in Appendix B. It should be understood that the soil descriptions reported on the boring logs may vary between boring locations and sampling depths. Similarly, the lines of stratigraphic separation shown on the boring logs represent approximate boundaries between soil types and the actual transitions between types may be more gradual or variable.

#### 4.2 Groundwater

Groundwater was encountered at depths ranging from 13 to 16.5 feet in Test Boring Nos. 3 and 4. Test Boring Nos. 1 and 2 were dry to 18 feet after drilling. Groundwater may affect development of significant foundation excavations or during installation of deep utilities depending on the final grading plans. Creek flow will vary due to rainfall, drainage, and other factors not readily apparent at this time. It should be noted that groundwater levels, observed at the time of the subsurface investigation, could change due to seasonal variations, changes in land runoff characteristics and future development including of nearby areas.

### 5.0 GEOTECHNICAL EVALUATION AND RECOMMENDATIONS

*The following discussion is based on the subsurface conditions encountered in the borings drilled in the planned bridge footprints. If subsurface conditions different from those described herein are encountered during construction or if the project elements change from those described, Entech Engineering, Inc. should be notified so that the evaluation and recommendations presented can be reviewed and revised if necessary.*

The site will be developed by constructing two (2) bridges over Sand Creek and associated site improvements at Sterling Ranch Road and Briargate Boulevard Crossings. The proposed bridges are expected to utilize driven H-pile foundations

Subsurface soil conditions encountered in the test borings drilled for the planned interchanges consisted of sand fill and silty to very silty sand overlying silty to very silty sandstone and sandy to very sandy claystone. Bedrock was encountered at depths of 1 to 10 feet in the test borings.

The surficial sands and sand fill were encountered in loose to medium dense states. The underlying sandstone was encountered in dense states, and the underlying claystone was encountered at hard consistencies.

### 5.1 Foundation Recommendations

The main purpose of the subsurface investigation was to gather soil and bedrock information for the proposed bridge abutments for use in providing foundation recommendations and design values. Recommendations for bridge supports using driven H-piles, shallow spread footings, and parameters for retaining walls are provided.

#### 5.1.1 Deep Foundation Systems (Driven H-piles)

Based on evaluation of the site subsurface conditions, it is believed that the planned H-piles will achieve most of their compressive strength through end bearing and skin friction in the underlying sandstone and claystone bedrock (Soil Types 3 and 4). Some frictional resistance will also be developed in the overburden sand (Soil Type 1). Design parameters for use in the H-pile design, which include allowable end bearing, side resistance, and resisting factors are presented in Table 2. L Pile parameters for the sand, sandstone, and claystone are also included in Table 2. The recommendations and parameters apply to piles spaced by horizontal distances of at least 3 times the pile width. If the piles are spaced closer, reductions in the allowable pile capacity may be warranted. The following unit weights are recommended for the site soil and bedrock.

Unit weight of native overburden sand	120 pcf
Unit weight of sandstone bedrock	125 pcf
Unit weight of siltstone and claystone bedrock	125 pcf

It is recommended that full-time observation of the H-pile installation be performed to compile driving logs for each pile. At a minimum, the log should include: the driving resistance per foot of pile and per inch of pile over the last 3 inches; the pile driver make and model; rated energy; pile cushion/condition; observed damage; and final pile top location. The guidance set forth in the

State of Colorado Standard Specifications for Road and Bridge Construction, Section 502, Piling, is recommended. Piles should be driven 10 feet into bedrock or refusal.

#### 5.1.2 Shallow Foundation Parameters

Structures associated with the bridges can be supported with shallow foundations resting on the native sands, recompacted loose sands, or sandstone. It should be noted that due to potential shallow groundwater on this site (due to the proximity to Sand Creek), extensive subgrade improvements are anticipated to support shallow foundations. The foundation members should bear on the native site sands, sandstone, or be recompacted according to the "Structural Fill" paragraph. Any topsoil must be removed and the existing subgrade cleared of any debris prior to excavation. Loose soils or uncontrolled fill material beneath foundation components will require removal and recompaction. Any expansive soils encountered beneath the foundation will require removal and replacement with non-expansive structural fill compacted according to the "Structural Fill" paragraph. Any new fill should be placed to the requirements of the "Structural Fill" paragraph. On-site granular sands may be used as structural fill as approved by Entech. Any import material should be approved by Entech prior to hauling to the site.

Provided the above recommendations are followed, an allowable bearing pressure of 2400 psf is recommended for the native sands. For recompacted sands or imported granular structural fill, an allowable bearing capacity of 3000 psf is recommended. An allowable bearing capacity of 4000 psf is recommended for undisturbed sandstone. Footings should extend a minimum of 30 inches below the adjacent exterior surface grade for frost protection. Following the above foundation subgrade preparation recommendations, and adhering to the recommended maximum allowable bearing pressure, it is expected to result in foundation designs which should limit total and differential vertical movements.

Foundation excavations are recommended to extend at least 3 feet horizontally beyond the foundation limits in order to provide adequate space for installation of drain materials (if necessary) and placement of controlled fill. All foundation excavation side slopes should be inclined at angles of 1 1/2 horizontal to 1 vertical or flatter, as necessary, to provide for excavation sidewall stability during construction or as required by OSHA regulations.

Entech should observe overexcavated subgrades as well as the overall foundation excavation subgrade and evaluate if the exposed conditions are consistent with those described in this report. Entech should also provide recommendations for overexcavation depth and other subgrade improvements, if necessary, and the need for drain systems based on the excavation conditions observed at that time.

### 5.1.3 Retaining Wall Parameters

The following values are recommended for use in designing retaining walls with unbalanced lateral loading that may be associated with this project. Roadway/Vehicle surcharge loading is required for wall design.

#### Recommended Design Values – Lateral Loading

Equivalent fluid density for lateral earth pressure (active), pcf (site granular soils)	45
Equivalent fluid density for lateral earth pressure (passive), pcf	300
Equivalent fluid density for lateral earth pressure (at rest), pcf	60
Soil density (compacted sand), pcf	125
Angle of Internal Friction (loose silty sand and sandy clay-silt)	26°
Angle of Internal Friction (compacted silty sand)	34°
Coefficient of sliding between concrete and silty gravelly sand	0.35
Bearing capacity of sand, psf	2400 psf
Bearing capacity of sandstone, psf	3500 psf

\*Note: The above lateral loading design values are for level back slope angles and no surcharge loads. If wall backfill is submerged, water pressures must be taken into account as additional wall loading. If backfill slope angles are greater than zero degrees, or if the backfill is surcharged, the design values must be adjusted to account for additional lateral loading.

## 5.2 Site Seismic Classification

Based on the subsurface conditions encountered at the site and in accordance with Section 1613 of the 2015 International Building Code (IBC), the site meets the conditions of a Site Class C.

## 5.3 Surface and Subsurface Drainage

Positive surface drainage must be maintained around structures to minimize infiltration of surface water. A minimum gradient of 5 percent in the first 10 feet adjacent to foundation components is recommended. A minimum gradient of 2 percent is recommended for paved areas. All grades should be directed away from structures.

To help minimize infiltration of water into foundation zones, vegetative plantings placed close to foundation components should be limited to those species having low watering requirements and irrigated grass should not be located within 5 feet of foundation components. Similarly, sprinklers are not recommended to discharge water within 5 feet of foundation components. Irrigation near foundations should be limited to the minimum amount sufficient to maintain vegetation. Application of more irrigation water than necessary can increase the potential for foundation movement.

## 5.4 Concrete

Soluble sulfate testing was conducted on three samples of the site soils to evaluate the potential for sulfate attack on concrete placed below the surface grade. The test results indicated less than 0.01 percent soluble sulfate by weight for the site soils. The test results indicate the sulfate component of the in-place site soils present a negligible exposure threat to concrete placed below grade that comes into contact with the site soils.

Type II cement is recommended for concrete at this site. To further avoid concrete degradation during construction it is recommended that concrete not be placed on frozen or wet ground. Care should be taken to prevent the accumulation or ponding of water in foundation excavations prior to the placement of concrete. If standing water is present in the foundation excavations, it should be removed by ditching to sumps and pumping the water away from the foundation area

prior to concrete placement. If concrete is placed during periods of cold temperatures, the concrete must be kept from freezing. This may require covering the concrete with insulated blankets and adding heat to prohibit freezing.

#### 5.5 Foundation Excavation Observations

Subgrade preparation for bridge foundations and associated improvements should be observed by Entech Engineering prior to construction of the foundation elements in order to verify that (1) no anomalies are present, (2) materials of the proper bearing capacity have been encountered or placed, and (3) no soft, loose, uncontrolled fill material, expansive soil or debris are present in the foundation area prior to concrete placement or backfilling. Pile driving should be observed to verify proper embedment or refusal. Piles should be driven 10 feet into bedrock or refusal. Entech should make final recommendations for over-excavation or stabilization, if required, at the time of excavation observation, if necessary.

#### 5.6 Structural Fill

Areas to receive fill should have all topsoil, organic material or debris removed. Fill must be properly benched. The surface should be scarified and moisture conditioned to within  $\pm 2$  percent of its optimum moisture content and compacted to 95 percent of its maximum Modified Proctor Dry Density (ASTM D-1557) beneath footings or floor slabs prior to placing new fill. New fill beneath footings should be non-expansive and be placed in thin lifts not to exceed 6 inches after compaction while maintaining at least 95 percent of its maximum Modified Proctor Dry Density (ASTM D-1557). These materials should be placed at a moisture content conducive to compaction, usually  $\pm 2$  percent of Proctor optimum moisture content. The placement and compaction of fill should be observed and tested by Entech Engineering, Inc. Imported soils should be approved by Entech Engineering, Inc. prior to being hauled to the site and on-site granular soils prior to placement.

Compacted, non-expansive granular soil, free of organics, debris and cobbles greater than 3-inches in diameter, is recommended for filling foundation components. All fill placed within the foundation areas should be non-expansive and be compacted to a minimum of 95 percent of the



soils maximum dry density as determined by the Modified Proctor Test (ASTM D-1557). Fill material placed beneath floor slabs should be compacted to a minimum of 95 percent of its maximum Modified Proctor Dry Density, ASTM D-1557. Fill material should be placed in horizontal lifts such that each finished lift has a compacted thickness of six inches or less. Fill should be placed at water contents conducive to achieving adequate compaction; usually within  $\pm 2$  percent of the optimum water content as determined by ASTM D-1557. Mechanical methods can be used for placement and compaction of fill; however, heavy equipment should be kept at distance from foundation walls and below slab infrastructure to avoid overstressing. No water flooding techniques of any type should be used for compaction or placement of foundation or floor slab fill material.

#### 5.7 Utility Trench Backfill

Fill placed in utility trenches should be compacted to a minimum of 95 percent of its maximum dry density as determined by the Standard Proctor Test (ASTM D-698) for cohesive soils and 95 percent as determined by the Modified Proctor Test (ASTM D-1557) for cohesionless soils. Fill should be placed in horizontal lifts having a compacted thickness of six inches or less and at a water content conducive to adequate compaction, within  $\pm 2$  percent of the optimum water content. Mechanical methods should be used for fill placement; however, heavy equipment should be kept at a distance from foundation walls. No water flooding techniques of any type should be used for compaction or placement of utility trench fill.

Trench backfill placement should be performed in accordance with El Paso County specifications. All excavation and excavation shoring/bracing should be performed in accordance with OSHA guidelines.

### 5.8 General Backfill

Any areas to receive fill outside the foundation limits should have all topsoil, organic material, and debris removed. Fill must be properly benched into existing slopes in order to be adequately compacted. The fill receiving surface should be scarified to a depth of 12-inches and moisture conditioned to  $\pm 2$  percent of the optimum water content, and compacted to a minimum of 95 percent of the ASTM D-1557 maximum dry density before the addition of new fill. Fill should be placed in thin lifts not to exceed 6 inches in thickness after compaction while maintaining at least 95 percent of the ASTM D-1557 maximum dry density. Fill material should be free of vegetation and other unsuitable material and shall not contain rocks or fragments greater than 3-inches. Topsoil and strippings should be segregated from all other fill sources on the site. Fill placement and compaction beneath and around foundations, in utility trenches, beneath roadways or other structural features of the project should be observed and tested by Entech during construction.

### 5.9 Excavation Stability

Excavation sidewalls must be properly sloped, benched and/or otherwise supported in order to maintain stable conditions. All excavation openings and work completed therein shall conform to OSHA Standards as put forward in CFR 29, Part 1926.650-652, (Subpart P).

### 5.10 Winter Construction

In the event construction of the planned facility occurs during winter, foundations and subgrades should be protected from freezing conditions. Concrete should not be placed on frozen soil and once concrete has been placed, it should not be allowed to freeze. Similarly, once exposed, the foundation subgrade should not be allowed to freeze. During site grading and subgrade preparation, care should be taken to avoid burial of snow, ice or frozen material within the planned construction area.

#### 5.11 Construction Observations

It is recommended that Entech observe and document the following activities during construction of the building foundations.

- Excavated subgrades and subgrade preparation.
- Drilled Pier Installation
- Placement of drains (if installed).
- Placement/compaction of fill material for the foundation components and retaining walls.
- Placement/compaction of utility bedding and trench backfill.

### 6.0 CLOSURE

The subsurface investigation, geotechnical evaluation and recommendations presented in this report are intended for use of C&C Land with application to the proposed bridges over Sand Creek at Sterling Ranch Road and Briargate Boulevard and their associated site improvements, in El Paso County northeast of Colorado Springs, Colorado. In conducting the subsurface investigation, laboratory testing, engineering evaluation and reporting, Entech Engineering, Inc. endeavored to work in accordance with generally accepted professional geotechnical and geologic practices and principles consistent with the level of care and skill ordinarily exercised by members of the geotechnical profession currently practicing in same locality and under similar conditions. No other warranty, expressed or implied is made. During final design and/or construction, if conditions are encountered which appear different from those described in this report, Entech Engineering, Inc. requests that it be notified so that the evaluation and recommendations presented herein can be reviewed and modified as appropriate.

If there are any questions regarding the information provided herein or if Entech Engineering, Inc. can be of further assistance, please do not hesitate to contact us.

## TABLES

**TABLE 1**  
**SUMMARY OF LABORATORY TEST RESULTS**

CLIENT C&C LAND  
 PROJECT STERLING RANCH BRIDGES  
 JOB NO. 200045

SOIL TYPE	TEST BORING NO.	DEPTH (FT)	WATER (%)	DRY DENSITY (PCF)	PASSING NO. 200 SIEVE (%)	LIQUID LIMIT (%)	PLASTIC INDEX (%)	SULFATE (WT %)	FHA SWELL (PSF)	SWELL/CONSOL (%)	UNIFIED CLASSIFICATION	SOIL DESCRIPTION
1	1	2-3			29.1	NV	NP	0.00			SM	FILL, SAND, SILTY
2	3	5			39.8	15	3	<0.01			SM	SAND, VERY SILTY
3	2	10			13.9	NV	NP	<0.01			SM	SANDSTONE, SILTY
3	4	2-3			14.7						SM	SANDSTONE, SILTY
3	4	15	17.1	110.2	42.2	32	6	0.00		1.9	SM	SANDSTONE, VERY SILTY
4	1	15	14.3	116.1						1.6	CL	CLAYSTONE, SANDY
4	1	20			58.7	35	14				CL	CLAYSTONE, VERY SANDY

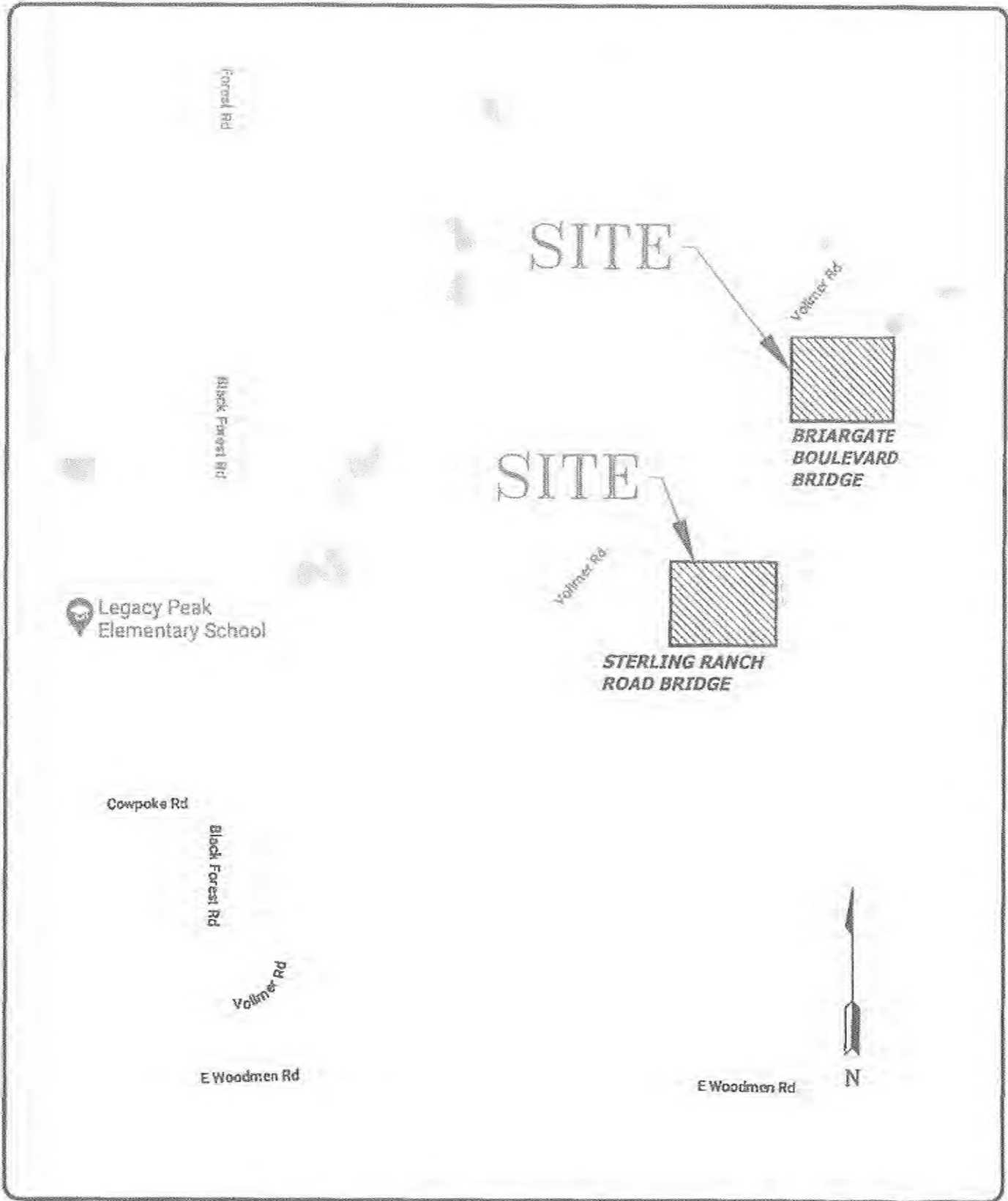

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**TABLE 2**  
Sterling Ranch Bridges - LPile Design Parameters

Depth Below Existing Ground Surface		Groundwater Elevation (ft) Below Existing Ground	Soil/rock Description	Axial Pile Capacity Parameters		PRELIMINARY LPile Parameters					
Top	Bottom			Allowable Side Resistance (kcf)	Allowable End Bearing (ksf)	p-y Curve	Unit Weight $\gamma^1$ (pcf)	Peak Friction Angle $\phi$ (deg)	Initial Static Modulus of Subgrade Reaction, $k$ (pcf)	Undrained Cohesion $c_u$ (ksf)	Strain Factor $\epsilon_{cr}$ (in/in)
0	0		Suitable Granular Structural Fill (Dense)	—	—	Sand	(120 60 <sup>1</sup> )	32	300 30 <sup>1</sup>	N/A	N/A
0	1 to 10 <sup>1</sup>		Native Silty Sand	—	—	Sand	(120 60 <sup>1</sup> )	32	35 30 <sup>1</sup>	N/A	N/A
1 to 10	12 to BOE	13 to 16	Silty Sandstone	0	30	Sand	(125 60 <sup>1</sup> )	34	225 195	N/A	N/A
12	BOE		Sandy to Very Sandy Claystone	0	30	Clay	(115 57 <sup>1</sup> )	N/A	500	1500	0.005

<sup>1</sup> = Submerged

## FIGURES

**ENTECH**  
ENGINEERING, INC.  
385 ELKTON DRIVE  
COLORADO SPRINGS, CO 80907 (719) 531-2393

Vicinity Map  
Sterling Ranch Bridges  
Sterling Ranch Rd & Briargate Blvd Over  
Sand Creek  
El Paso County, CO  
For: C & C Land

DRAWN: AMN	DATE: 2/14/20	CHECKED:	DATE:
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JOB NO.:  
200045

FIG NO.:  
1

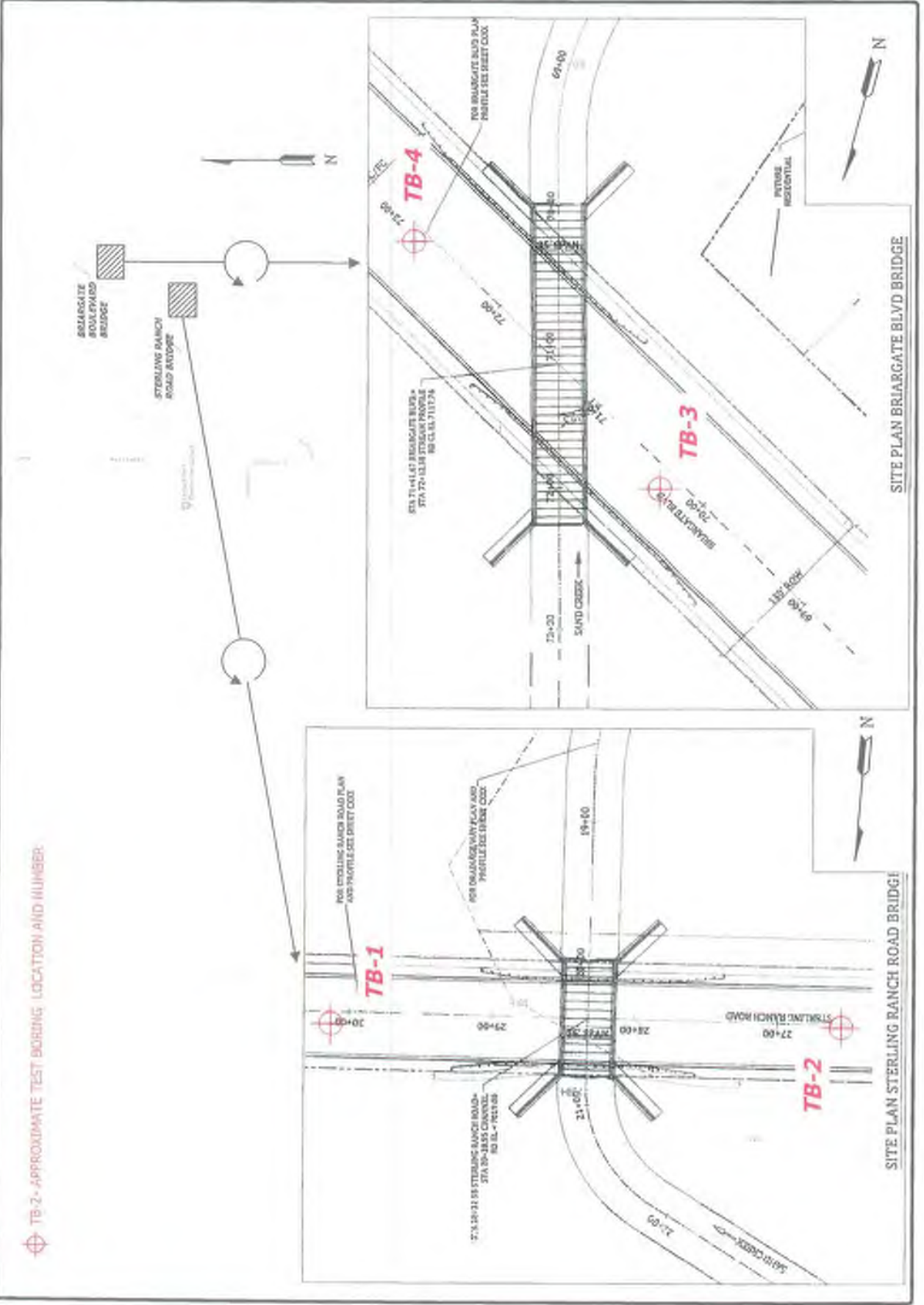


REV	DATE	BY	CHKD

**ENTTECH**  
ENGINEERING, INC.  
500 DIXON DRIVE  
SOUTH PLAINS, CO 80685  
TEL: 303-341-5599

Site Plan/Test Boring Map  
Sterling Ranch Bridges  
Sterling Ranch Rd & Briargate Blvd  
Over Sand Creek  
El Paso County, CO  
Part C & C Land

DATE	BY



## APPENDIX A: Test Boring Logs

TEST BORING NO. 1  
 DATE DRILLED 1/23/2020  
 Job # 200045

TEST BORING NO. 2  
 DATE DRILLED 1/23/2020  
 CLIENT C&C LAND  
 LOCATION STERLING RANCH BRIDGES

REMARKS

REMARKS

DRY TO 18', 1/28/20

FILL 0-6, SAND, SILTY, FINE TO COARSE GRAINED, BROWN, LOOSE, MOIST

SANDSTONE, SILTY, FINE GRAINED, TAN, VERY DENSE, MOIST

CLAYSTONE, SANDY TO VERY SANDY, GRAY BROWN, HARD, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-5	[Symbol]		6	7.7	1
5	[Symbol]		4	6.9	1
10	[Symbol]	50 7"		14.6	3
15	[Symbol]	50 8"		15.3	4
20	[Symbol]	50 7"		15.9	4

DRY TO 18', 1/28/20

SAND, SILTY, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, MOIST

SANDSTONE, SILTY, FINE GRAINED, TAN, VERY DENSE, MOIST

SANDSTONE, SILTY, FINE TO COARSE GRAINED, TAN TO GRAY BROWN, VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
0-5	[Symbol]		26	5.2	2
5	[Symbol]	50 11"		13.5	3
10	[Symbol]	50 6"		10.0	3
15	[Symbol]	50 10"		11.2	3
20	[Symbol]	50 5"		12.2	3



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505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN

DATE

CHECKED: *[Signature]*

DATE 2/10/20

JOB NO  
 200045

FIG NO  
 A-1

TEST BORING NO. 3  
 DATE DRILLED 1/23/2020  
 Job # 200045

TEST BORING NO. 4  
 DATE DRILLED 1/23/2020  
 CLIENT C&C LAND  
 LOCATION STERLING RANCH BRIDGES

REMARKS

REMARKS

WATER @ 16.5', 1/28/20

SAND, SILTY TO VERY SILTY,  
 FINE TO COARSE GRAINED, TAN  
 TO BROWN, MEDIUM DENSE TO  
 LOOSE, MOIST

SANDSTONE, SILTY, FINE TO  
 COARSE GRAINED, GRAY BROWN,  
 VERY DENSE, MOIST TO VERY  
 MOIST



Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			16	5.0	2
			7	19.7	2
10			24	15.1	2
15			50	12.7	3
			10"		
20			50	17.3	3
			10"		

WATER @ 13', 1/28/20

SAND, SILTY, TAN  
 SANDSTONE, SILTY, FINE TO  
 COARSE GRAINED, TAN, VERY  
 DENSE, MOIST

SANDSTONE, VERY SILTY, FINE  
 GRAINED, GRAY BROWN, VERY  
 DENSE, MOIST TO VERY MOIST



COARSE GRAINED LENSES

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
5			50	7.1	3
			10"		
			50	9.2	3
			11"		
10			50	10.3	3
			9"		
15			10	16.4	3
			10"		
20			50	14.9	3
			4"		



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TEST BORING LOG

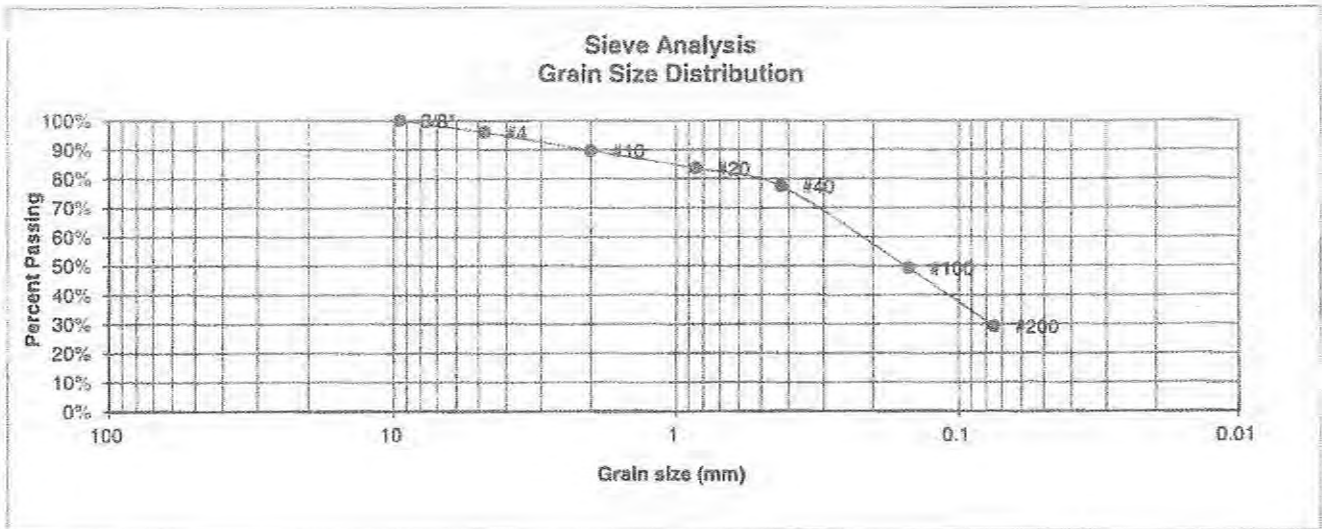
DRAWN \_\_\_\_\_ DATE \_\_\_\_\_ CHECKED: *L* DATE 2/10/20

JOB NO.  
200045

FIG NO  
A- 2

## **APPENDIX B: Laboratory Test Results**

UNIFIED CLASSIFICATION	SM	CLIENT	C&C LAND
SOIL TYPE #	1	PROJECT	STERLING RANCH BRIDGES
TEST BORING #	1	JOB NO.	200045
DEPTH (FT)	2.3	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	95.9%
10	89.7%
20	83.6%
40	77.3%
100	49.2%
200	29.1%

Atterberg Limits	
Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	



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COLORADO SPRINGS, COLORADO 80907

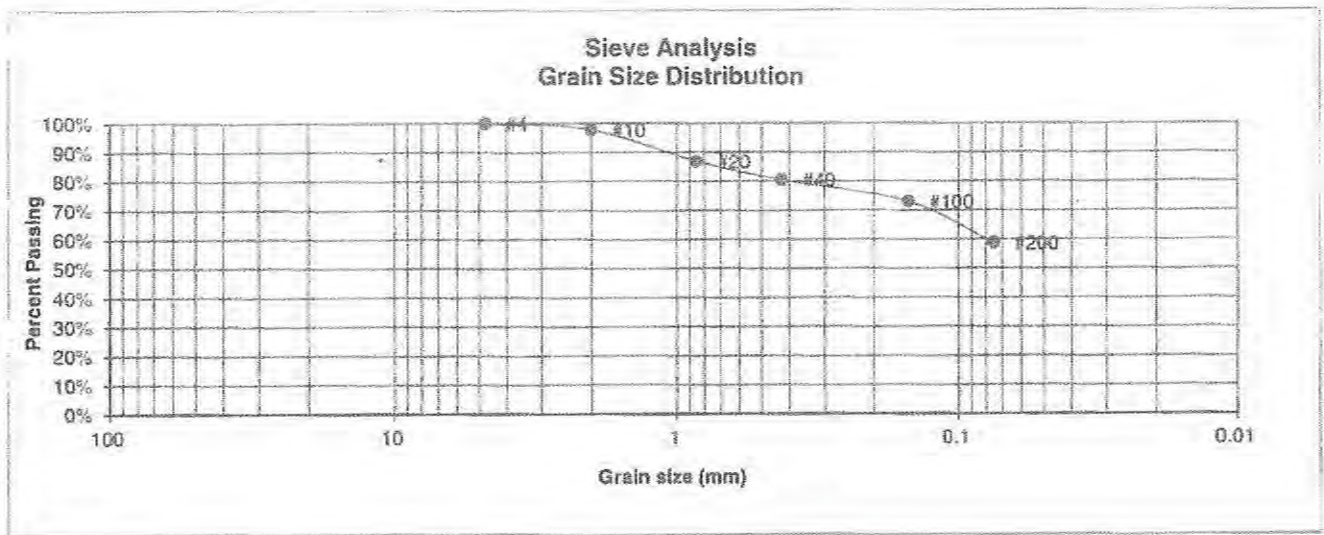
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE	CHECKED:	DATE: 7/10/20
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JOB NO  
200045

FIG NO  
B-1

UNIFIED CLASSIFICATION	CL	CLIENT	C&C LAND
SOIL TYPE #	4	PROJECT	STERLING RANCH BRIDGES
TEST BORING #	I	JOB NO.	200045
DEPTH (FT)	20	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	97.8%
20	86.9%
40	80.5%
100	72.9%
200	58.7%

Atterberg Limits	
Plastic Limit	21
Liquid Limit	35
Plastic Index	14

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	



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ENGINEERING, INC.**

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

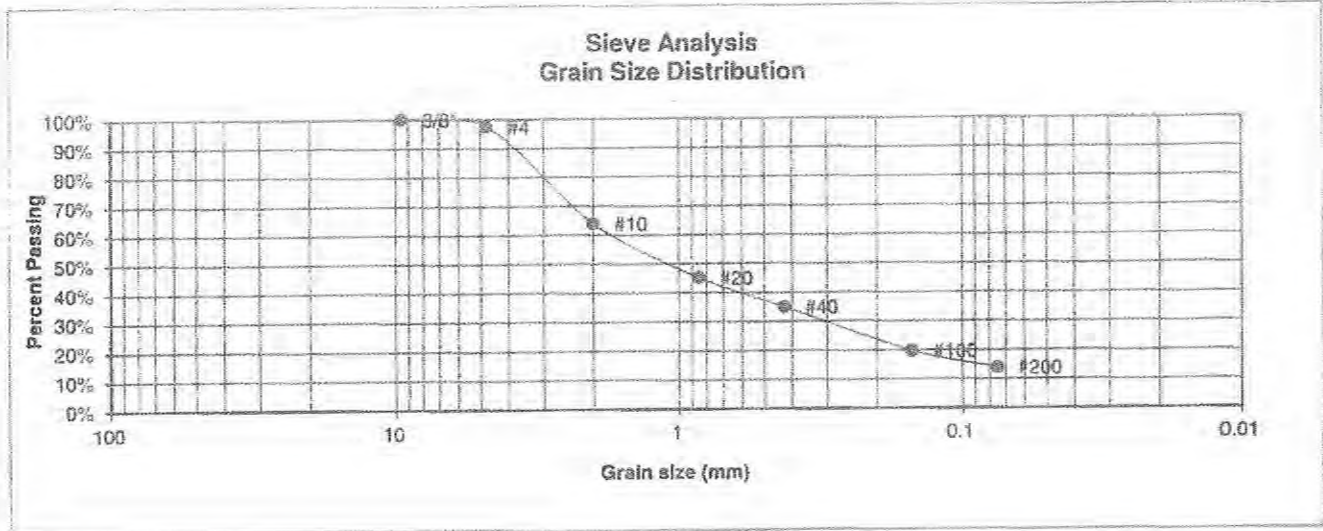
**LABORATORY TEST  
RESULTS**

DRAWN:	DATE:	CHECKED:	DATE:
		<i>[Signature]</i>	2/16/20

JOB NO.  
200045

FIG NO.  
B-2

<u>UNIFIED CLASSIFICATION</u>	SM	<u>CLIENT</u>	C&C LAND
<u>SOIL TYPE #</u>	3	<u>PROJECT</u>	STERLING RANCH BRIDGES
<u>TEST BORING #</u>	2	<u>JOB NO.</u>	200045
<u>DEPTH (FT)</u>	10	<u>TEST BY</u>	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	100.0%
4	97.4%
10	63.9%
20	45.2%
40	35.0%
100	19.7%
200	13.9%

Atterberg Limits	
Plastic Limit	NP
Liquid Limit	NV
Plastic Index	NP

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	



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ENGINEERING, INC.

505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

DRAWN

DATE

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DATE: 2/11/20

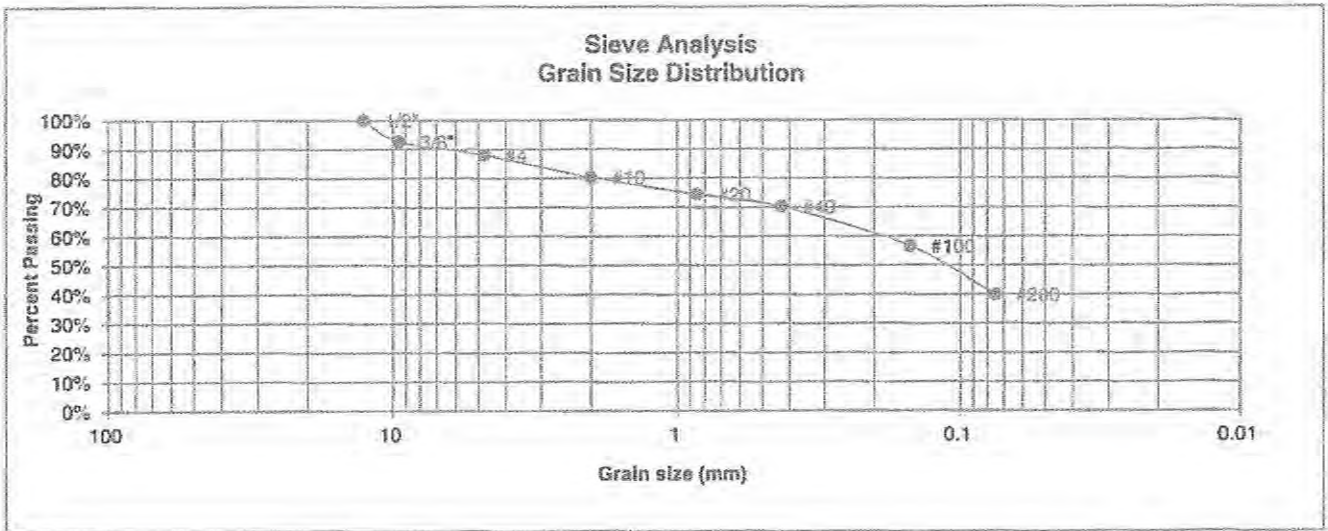
JOB NO  
2000-15

FIG NO

B-3



<u>UNIFIED CLASSIFICATION</u>	SM	<u>CLIENT</u>	C&C LAND
<u>SOIL TYPE #</u>	2	<u>PROJECT</u>	STERLING RANCH BRIDGES
<u>TEST BORING #</u>	3	<u>JOB NO.</u>	200045
<u>DEPTH (FT)</u>	5	<u>TEST BY</u>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	92.6%
4	88.0%
10	80.3%
20	74.4%
40	70.1%
100	56.5%
200	39.8%

<u>Atterberg Limits</u>	
Plastic Limit	12
Liquid Limit	15
Plastic Index	3

<u>Swell</u>	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	



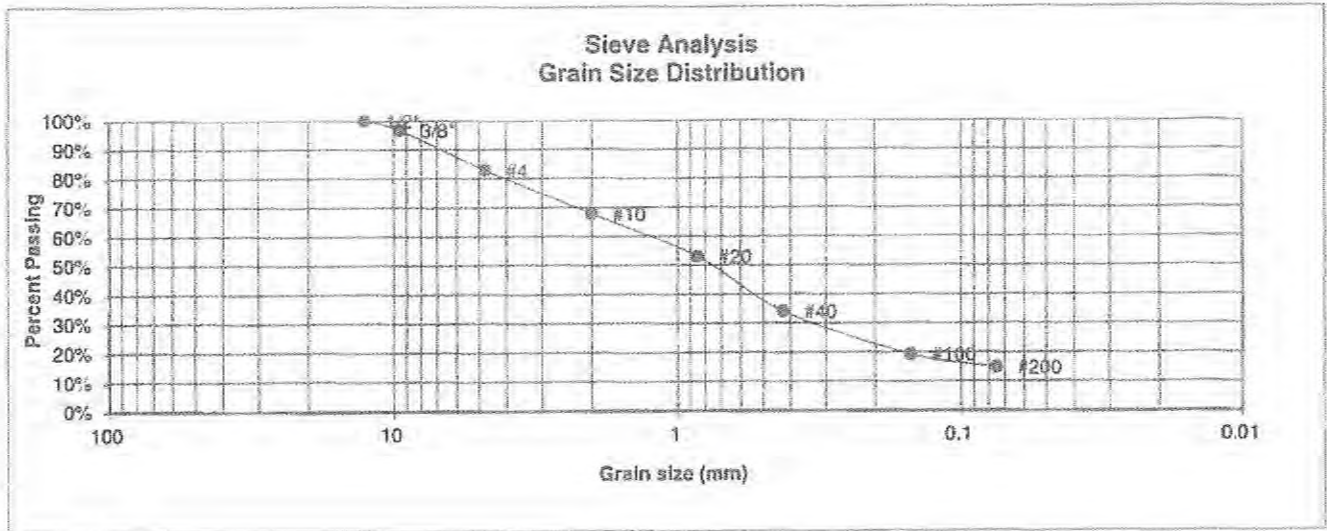
**ENTECH**  
ENGINEERING, INC.  
505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST RESULTS**

DRAWN:	DATE:	CHECKED: <i>M</i>	DATE: 3-2-20
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JOB NO.  
200045  
  
FIG NO.  
B-4

<u>UNIFIED CLASSIFICATION</u>	SM	<u>CLIENT</u>	C&C LAND
<u>SOIL TYPE #</u>	3	<u>PROJECT</u>	STERLING RANCH BRIDGES
<u>TEST BORING #</u>	4	<u>JOB NO.</u>	200045
<u>DEPTH (FT)</u>	2-3	<u>TEST BY</u>	BL



<u>U.S. Sieve #</u>	<u>Percent Finer</u>
3"	
1 1/2"	
3/4"	
1/2"	100.0%
3/8"	96.7%
4	82.8%
10	67.8%
20	53.0%
40	34.0%
100	19.2%
200	14.7%

Atterberg Limits  
 Plastic Limit  
 Liquid Limit  
 Plastic Index

Swell  
 Moisture at start  
 Moisture at finish  
 Moisture increase  
 Initial dry density (pcf)  
 Swell (psf)



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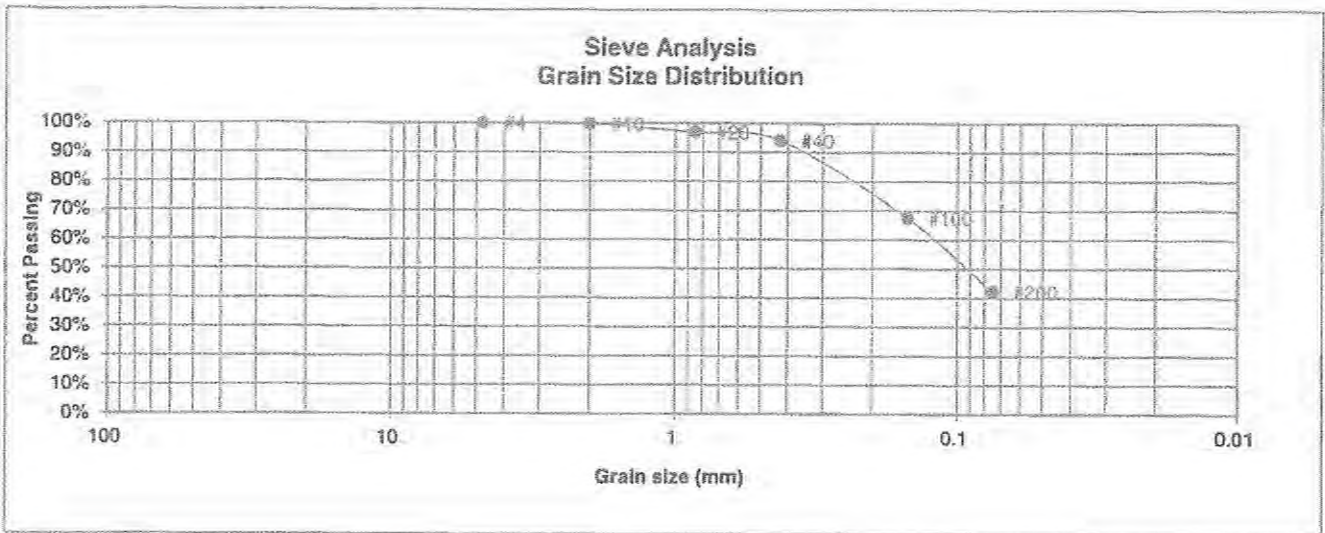
**LABORATORY TEST RESULTS**

DRAWN	DATE	CHECKED	DATE
			2/10/20

JOB NO.  
200045

FIG NO.  
B-5

UNIFIED CLASSIFICATION	SM	CLIENT	C&C LAND
SOIL TYPE #	3	PROJECT	STERLING RANCH BRIDGES
TEST BORING #	4	JOB NO.	200045
DEPTH (FT)	15	TEST BY	BL



U.S. Sieve #	Percent Finer
3"	
1 1/2"	
3/4"	
1/2"	
3/8"	
4	100.0%
10	99.7%
20	96.9%
40	94.0%
100	67.4%
200	42.2%

Atterberg Limits	
Plastic Limit	26
Liquid Limit	32
Plastic Index	6

Swell	
Moisture at start	
Moisture at finish	
Moisture increase	
Initial dry density (pcf)	
Swell (psf)	



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505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

**LABORATORY TEST  
RESULTS**

DRAWN	DATE	CHECKED	DATE
		<i>[Signature]</i>	<i>2/20/20</i>

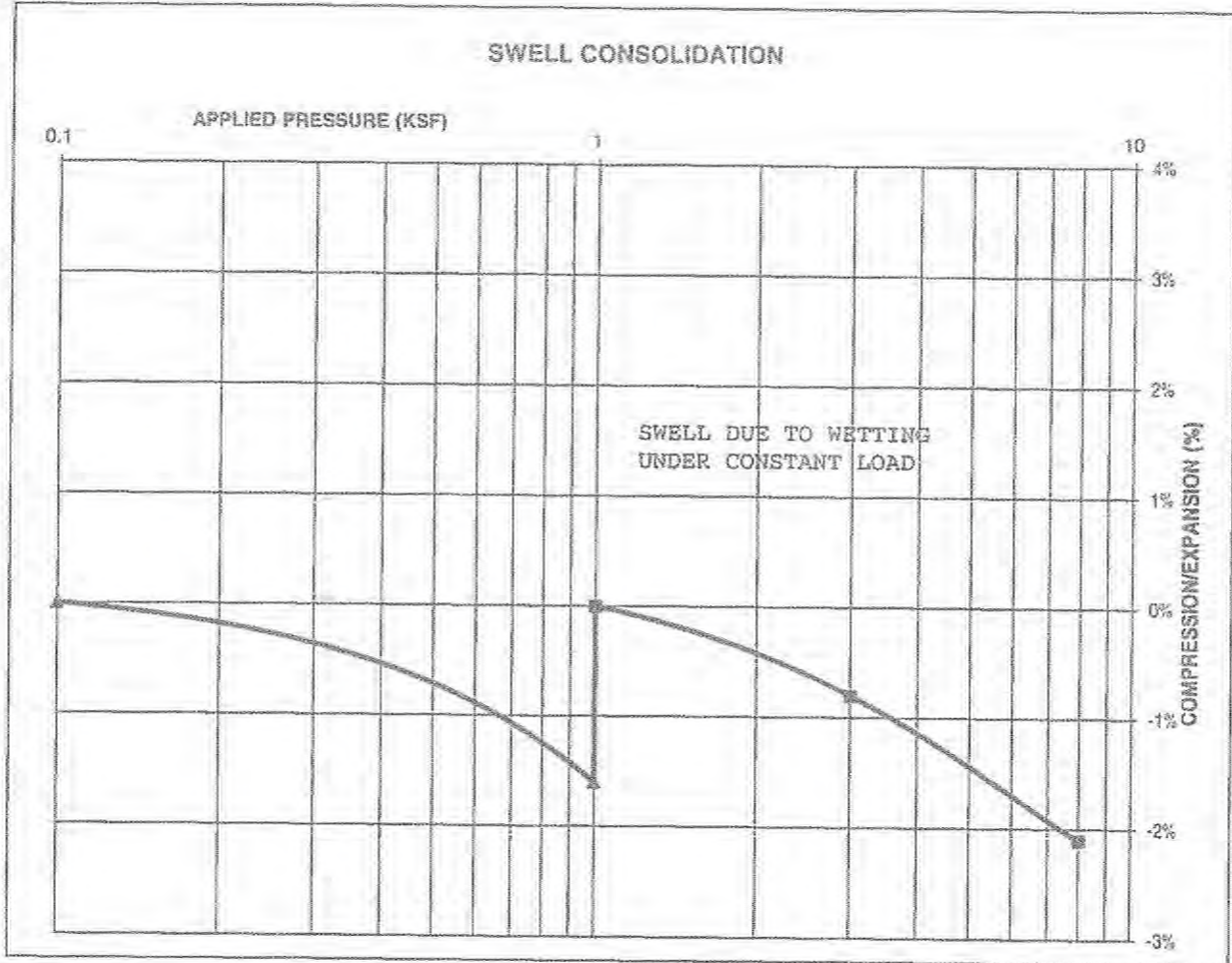
JOB NO.  
200045

REV NO.  
B-6

**CONSOLIDATION TEST RESULTS**

TEST BORING #	1	DEPTH(ft)	15
DESCRIPTION	CL	SOIL TYPE	4
NATURAL UNIT DRY WEIGHT (PCF)			116
NATURAL MOISTURE CONTENT			14.3%
SWELL/CONSOLIDATION (%)			1.6%

JOB NO. 200045  
 CLIENT C&C LAND  
 PROJECT STERLING RANCH BRIDGES



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 ENGINEERING, INC.  
 585 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**SWELL CONSOLIDATION  
 TEST RESULTS**

DRAWN

DATE

CHECKED

DATE 2/10/28

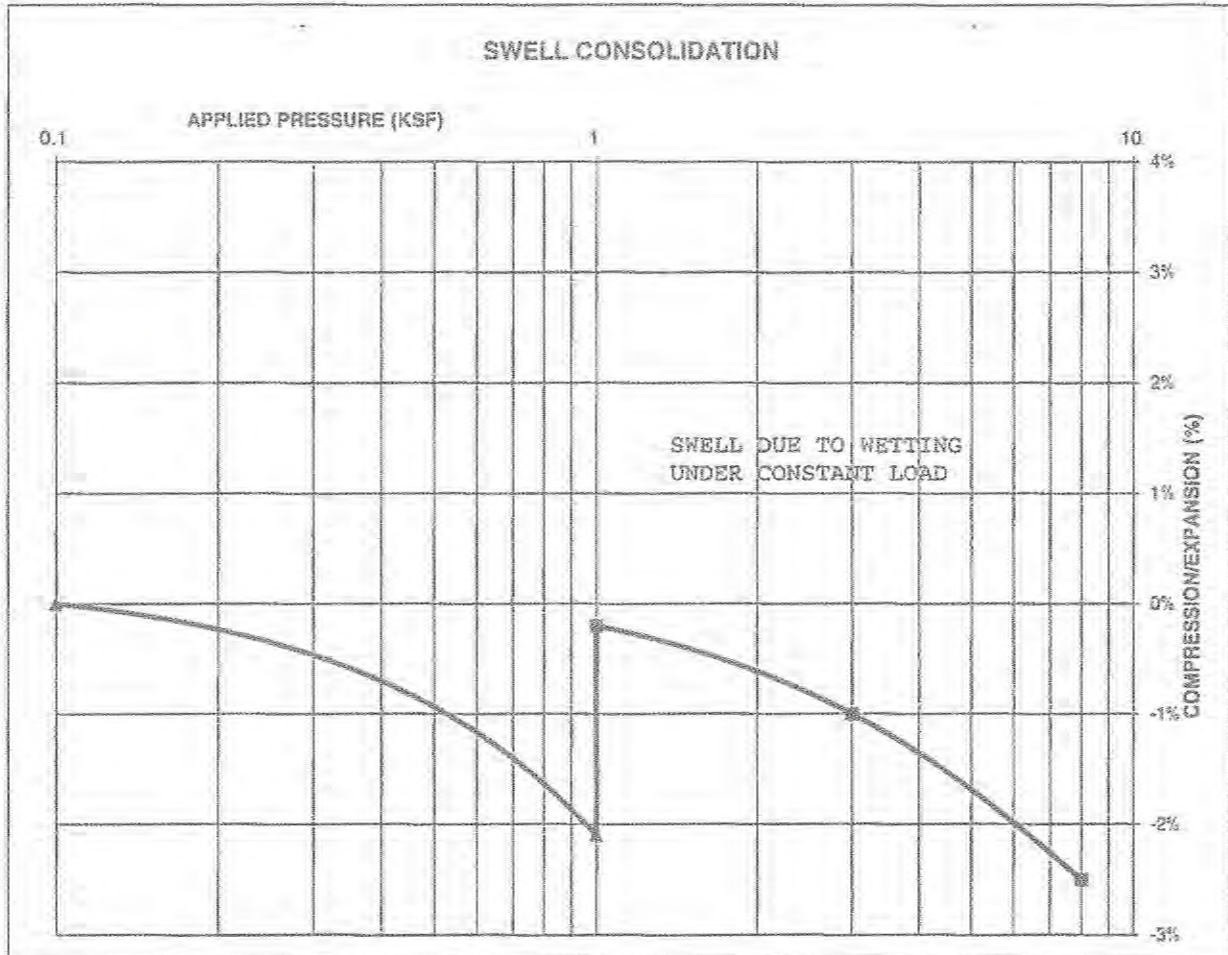
JOB NO. 200045

FIG. NO. B-7

**CONSOLIDATION TEST RESULTS**

TEST BORING #	4	DEPTH(ft)	15
DESCRIPTION	SM	SOIL TYPE	3
NATURAL UNIT DRY WEIGHT (PCF)			110
NATURAL MOISTURE CONTENT			17.1%
SWELL/CONSOLIDATION (%)			1.9%

JOB NO. 200045  
 CLIENT C&C LAND  
 PROJECT STERLING RANCH BRIDGES



**ENTECH**  
 ENGINEERING, INC.

505 ELKTON DRIVE  
 COLORADO SPRINGS, COLORADO 80907

**SWELL CONSOLIDATION  
 TEST RESULTS**

DRAWN

DATE

CHECKED: *LV*

DATE: *2/10/20*

JOB NO.  
 200045

FIG NO.  
 B-8

CLIENT	C&C LAND	JOB NO.	200045
PROJECT	STERLING RANCH BRIDGES	DATE	2/4/2020
LOCATION	STERLING RANCH BRIDGES	TEST BY	BL

BORING NUMBER	DEPTH, (ft)	SOIL TYPE NUMBER	UNIFIED CLASSIFICATION	WATER SOLUBLE SULFATE, (wt%)
TB-1	2-3	1	SM	0.00
TB-2	10	3	SM	<0.01
TB-4	15	3	SM	0.00
TB-3	5	2	SM	<0.01

QC BLANK PASS



LABORATORY TEST SULFATE RESULTS			
DRAWN	DATE	CHECKED: <i>AN</i>	DATE: <i>3-2-20</i>

JOB NO. 200045  
 FIG NO. B-9

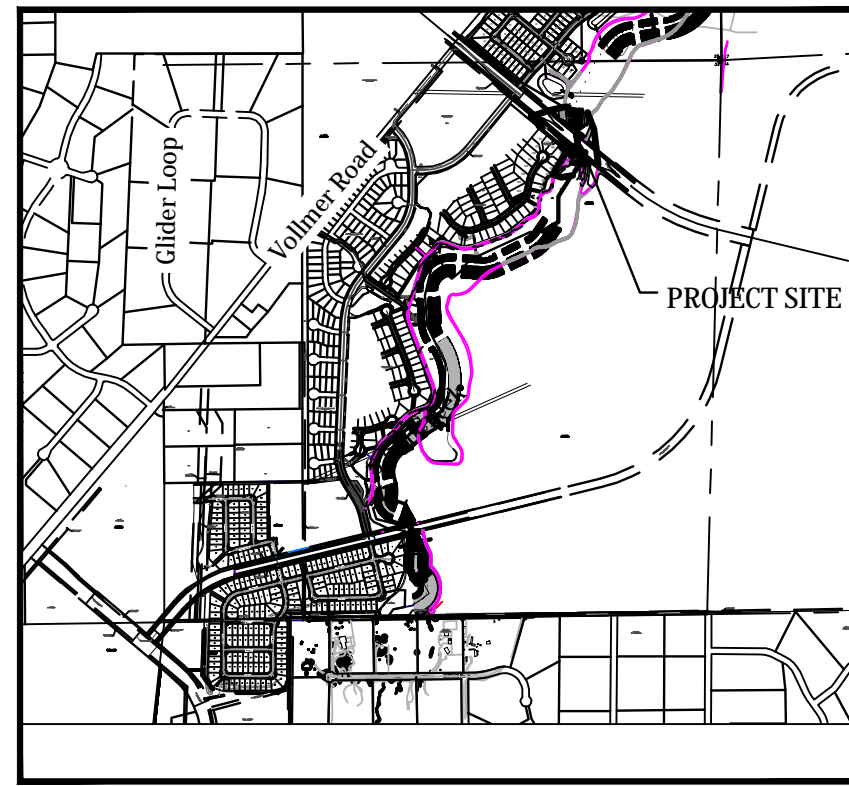
Should the newer report dated July 29, 2021 also be provided? (At least use the appendix sheets from that report, which are legible)

## **APPENDIX C: Briargate Bridge Design Plans**

# STERLING RANCH DEVELOPMENT BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS

## EL PASO COUNTY, COLORADO

Kiowa Project No. 19032  
12/6/2021



VICINITY MAP  
SCALE: N.T.S.



### GENERAL NOTES

- Profile design lines are based on centerline, as shown, unless otherwise noted.
- All new construction to conform to the specifications of El Paso County Department of Public Works. Any asphalt removed is to be replaced to meet the specifications of the El Paso County Public Works Department.
- For pavement design, curb and gutter, and sidewalks see individual plan and profile sheets. Pavement design to be based on Resistance Value 'R' derived from Hveem tests and are to be approved by the Engineering Division of the El Paso County Planning and Community Development prior to work above subgrade.
- At intersections, all curb returns will have 20-foot radius unless otherwise noted.
- All existing utilities have been shown according to the best available information. The contractor is responsible for field location and verification prior to beginning work. If it appears that there could be a conflict with any utilities, whether indicated on the plans or not, the contractor is to notify the engineer and owner immediately. The contractor is responsible for the protection and repair (if necessary) of all utilities.
- A Pre-Construction meeting shall be held with the El Paso County Planning and Community Development prior to any construction.
- Approved plans, Engineering Criteria Manual, etc. is required to be on-site at all times during construction.
- All necessary permits, such as SWMP, ESQCP, Fugitive Dust, Access, C.O.E. 404, etc. shall be obtained prior to construction.
- All handicap ramps to be per El Paso County Standard SD 2-40.
- The contractor shall coordinate locations and layout with the El Paso County Planning and Community Development on the placement of any pedestrian ramps prior to construction of the curb.
- Where appropriate, neatly saw cut all existing concrete and asphalt. Repair/replace all disturbed existing items with like materials and thicknesses.
- All disturbed areas shall be revegetated with native grasses within 21 days of excavation per Erosion Control Plan.
- The prepared Erosion/Sediment Control Plan is to be considered a part of these plans and its requirements adhered to during the construction of this project.
- All storm and sanitary sewer pipe lengths and slopes are figured from center of manhole or bend. Pipe lengths are given as a horizontal length.
- All storm sewer bedding to be per CDoT Standards.
- All storm sewer pipe shall be Class III B Wall unless otherwise shown on the storm sewer plan and profile sheets.
- All wyes and bends used in construction of storm sewer facilities shall be factory fabricated, unless approved by the El Paso County Planning and Community Development.
- Construction and materials used in all storm and sanitary sewer manholes shall be per specifications. Storm sewer radial deflections to be grouted or installed per manufacturer's recommendations.
- Storm sewer manholes sizes as follows unless otherwise shown:
  - 18" thru 36" use 48" I.D. manhole
  - 42" thru 48" use 60" I.D. manhole
  - 54" thru 60" use 72" I.D. manhole
 NOTE: Manhole sizes tabulated here shall be increased, if necessary, to accommodate incoming laterals.
- All horizontal stationing is based on the 'Face of Curb', unless otherwise shown.
- All vertical design and top of curb are based on the design point shown in the typical cross section.
- The curb line design point is located at the intersection of the face and top of curb for the Type III Standard 6-inch vertical curb. See typical street section for design point locations.
- Vertical curb to be used between curb returns (CR) and at curb inlets. Transitions from ramp to vertical curb shall be 10-foot unless otherwise approved by the El Paso County Public Services Department. All other curb & gutter to be ramp curb & gutter.
- Cross pans to be per El Paso County Standard Detail SD 2-26.
- Curb returns shall be straight graded from CR to CR unless otherwise noted.
- Inlets are Type 'R' inlets (CDOT STD M-604-12) unless otherwise noted.

**BENCHMARK:**  
THE TOP OF AN ALUMINUM SURVEYORS CAP, STAMPED "8953"  
NORTHING = 411416.273  
EASTING = 235167.071  
ELEVATION = 7023.42

THE TOP OF RED PLASTIC SURVEYORS CAP, ILLEGIBLE  
NORTHING = 410095.404  
EASTING = 235052.131  
ELEVATION = 7000.40

THE TOP OF RED PLASTIC SURVEYORS CAP, STAMPED "38141"  
NORTHING = 411399.962  
EASTING = 233849.817  
ELEVATION = 7030.82

**BASIS OF BEARING**  
THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW $\frac{1}{4}$ ) OF SECTION 34, TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AS MONUMENTED AT THE SOUTHWEST CORNER OF SAID SOUTHWEST QUARTER (SW $\frac{1}{4}$ ) BY A 2-1/2" ALUMINUM CAP STAMPED "LS 11624" AND AT THE SOUTHEAST CORNER OF SAID SOUTHWEST QUARTER (SW $\frac{1}{4}$ ) BY A 2-1/2" ALUMINUM CAP STAMPED "LS11624", SAID LINE BEARS N 89°14'14" E, A DISTANCE OF 2,722.56 FEET.



### STATEMENTS

**Design Engineer's Statement:**

These detailed plans and specifications were prepared under my direction and supervision. Said plans and specifications have been prepared according to the criteria established by the County for detailed roadway, drainage, grading and erosion control plans and specifications, and said plans and specifications are in conformity with applicable master drainage plans and master transportation plans. Said plans and specifications meet the purposes for which the particular roadway and drainage facilities are designed and are correct to the best of my knowledge and belief. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparation of these detailed plans and specifications.

\_\_\_\_\_  
Todd Cartwright, P.E. #33365 Date \_\_\_\_\_  
For and on behalf of Kiowa Engineering Corp.

**Owner/Developer's Statement:**

I, the owner/developer have read and will comply with of the requirements of the Grading and Erosion Control Plans and all of the requirements specified in these detailed plans and specifications.

\_\_\_\_\_  
James Morley Date \_\_\_\_\_  
Sterling Ranch Metropolitan District

**El Paso County:**

County plan review is provided only for general conformance with County Design Criteria. The County is not responsible for the accuracy and adequacy of the design, dimensions, and/or elevations which shall be confirmed at the job site. The County through the approval of this document assumes no responsibility for completeness and/or accuracy of this document.

Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual Volumes 1 and 2, and Engineering Criteria Manual as amended.

In accordance with ECM Section 1.12, these construction documents will be valid for construction for a period of 2 years from the date signed by the El Paso County Engineer. If construction has not started within those 2 years the plans will need to be resubmitted for approval, including payment of review fees at the Planning and Community Development Directors discretion.

\_\_\_\_\_  
Jennifer Irvine, P.E. Date \_\_\_\_\_  
County Engineer / ECM Administrator

### EL PASO COUNTY STANDARD NOTES

- All drainage and roadway construction shall meet the standards and specifications of the City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes 1 and 2, and the El Paso County Engineering Criteria Manual.
- Contractor shall be responsible for the notification and field notification of all existing utilities, whether shown on the plans or not, before beginning construction. Location of existing utilities shall be verified by the contractor prior to construction. Call 811 to contact the Utility Notification Center of Colorado (UNCC).
- Contractor shall keep a copy of these approved plans, the Grading and Erosion Control Plan, the Stormwater Management Plan (SWMP), the soils and geotechnical report, and the appropriate design and construction standards and specifications at the job site at all times, including the following:
  - El Paso County Engineering Criteria Manual (ECM)
  - City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes 1 and 2
  - Colorado Department of Transportation (CDOT) Standard Specifications for Road and Bridge Construction
  - CDOT M & S Standards
- Notwithstanding anything depicted in these plans in words or graphic representation, all design and construction related to roads, storm drainage and erosion control shall conform to the standards and requirements of the most recent version of the relevant adopted El Paso County standards, including the Land Development Code, the Engineering Criteria Manual, the Drainage Criteria Manual, and the Drainage Criteria Manual Volume 2. Any deviations from regulations and standards must be requested, and approved, in writing. Any modifications necessary to meet criteria after-the-fact will be entirely the developer's responsibility to rectify.
- It is the design engineer's responsibility to accurately show existing conditions, both onsite and offsite, on the construction plans. Any modifications necessary due to conflicts, omissions, or changed conditions will be entirely the developer's responsibility to rectify.
- Contractor shall schedule a pre-construction meeting with El Paso County Planning and Community Development (PCD) - Inspections, prior to starting construction.
- It is the contractor's responsibility to understand the requirements of all jurisdictional agencies and to obtain all required permits, including but not limited to El Paso County Erosion and Stormwater Quality Control Permit (ESQCP), Regional Building Floodplain Development Permit, U.S. Army Corps of Engineers-issued 401 and/or 404 permits, and county and state fugitive dust permits.
- Contractor shall not deviate from the plans without first obtaining written approval from the design engineer and PCD. Contractor shall notify the design engineer immediately upon discovery of any errors or inconsistencies.
- All storm drain pipe shall be Class III RCP unless otherwise noted and approved by PCD.
- Contractor shall coordinate geotechnical testing per ECM standards. Pavement design shall be approved by El Paso County PCD prior to placement of curb and gutter and pavement.
- All construction traffic must enter/exit the site at approved construction access points.
- Sight visibility triangles as identified in the plans shall be provided at all intersections. Obstructions greater than 18 inches above flowline are not allowed within sight triangles.
- Signing and striping shall comply with El Paso County Department of Public Works and MUTCD criteria. [If applicable, additional signing and striping notes will be provided.]
- Contractor shall obtain any permits required by El Paso County Department of Public Works, including Work Within the Right-of-Way and Special Transport permits.
- The limits of construction shall remain within the property line unless otherwise noted. The owner/developer shall obtain written permission and easements, where required, from adjoining property owner(s) prior to any off-site disturbance, grading, or construction.

### INDEX OF SHEETS

C001	COVER SHEET
C101	SITE PLAN
C201	BRIARGATE BOULEVARD BRIDGE PLAN & PROFILE
C202	BRIARGATE BOULEVARD BRIDGE STRUCTURE LAYOUT
C203	BRIARGATE BOULEVARD BRIDGE FOOTER DETAILS
C204	BRIARGATE BOULEVARD BRIDGE GUARDRAIL PLAN
C211	BRIARGATE BOULEVARD BRIDGE DETAILS
C212	BRIARGATE BOULEVARD BRIDGE GUARDRAIL DETAILS
C213	BRIARGATE BOULEVARD BRIDGE HANDRAIL DETAILS
C301	4' DROP STRUCTURE A DETAILS
C302	3' DROP STRUCTURE B DETAILS
C303	DROP STRUCTURE DETAILS

### ABBREVIATIONS

ASSY = ASSEMBLY	MIN. = MINIMUM
BNDY = BOUNDARY	NTS = NOT TO SCALE
BOA = BOTTOM OF ARCH	OD = OUTSIDE DIAMETER
BOF = BOTTOM OF FOOTER	PC = POINT OF HORIZONTAL CURVATURE
BOP = BOTTOM OF PIPE	PP = PROPOSED
CL = CENTERLINE	PT = POINT OF HORIZONTAL TANGENCY
CRA = CONCRETE REVERSE ANCHOR	PVC = POLY VINYL CHLORIDE PIPE
CTRB = CONCRETE THRUST BLOCK	PVC = POINT OF VERTICAL CURVATURE
CR = POINT OF CURB RETURN	PVI = POINT OF VERTICAL INTERSECTION
DIP = DUCTILE IRON PIPE	PVT = POINT OF VERTICAL TANGENCY
EL = ELEVATION	RCB = REINFORCED CONCRETE BOX
ESMT = EASEMENT	RCP = REINFORCED CONCRETE PIPE
EX = EXISTING	ROW = RIGHT OF WAY
FC = FACE OF CURB	RT = RIGHT
FES = FLARED END SECTION	SHT = SHEET
FLG = FLANGE	SS = SANITARY SEWER
FL = FLOWLINE	STA = STATION
GB = GRADE BREAK	STD = STANDARD
HP = HIGH POINT	TA = TOP OF ASPHALT
HORIZ = HORIZONTAL	TC = TOP OF CURB
HYD = HYDRANT	TOF = TOP OF FOOTER
I.D. = INSIDE DIAMETER	TOP = TOP OF PIPE
LT = LEFT	TOR = TOP OF ROCK
LF = LINEAR FEET	TYP = TYPICAL
LP = LOW POINT	VC = VERTICAL CURVE
MAX = MAXIMUM	VERT = VERTICAL
MH = MANHOLE	



STERLING RANCH DEVELOPMENT  
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS  
COVER SHEET  
EL PASO COUNTY, COLORADO

Project No.: 19032

Date: 12/6/2021

Design: TAC

Drawn: PAV

Check:

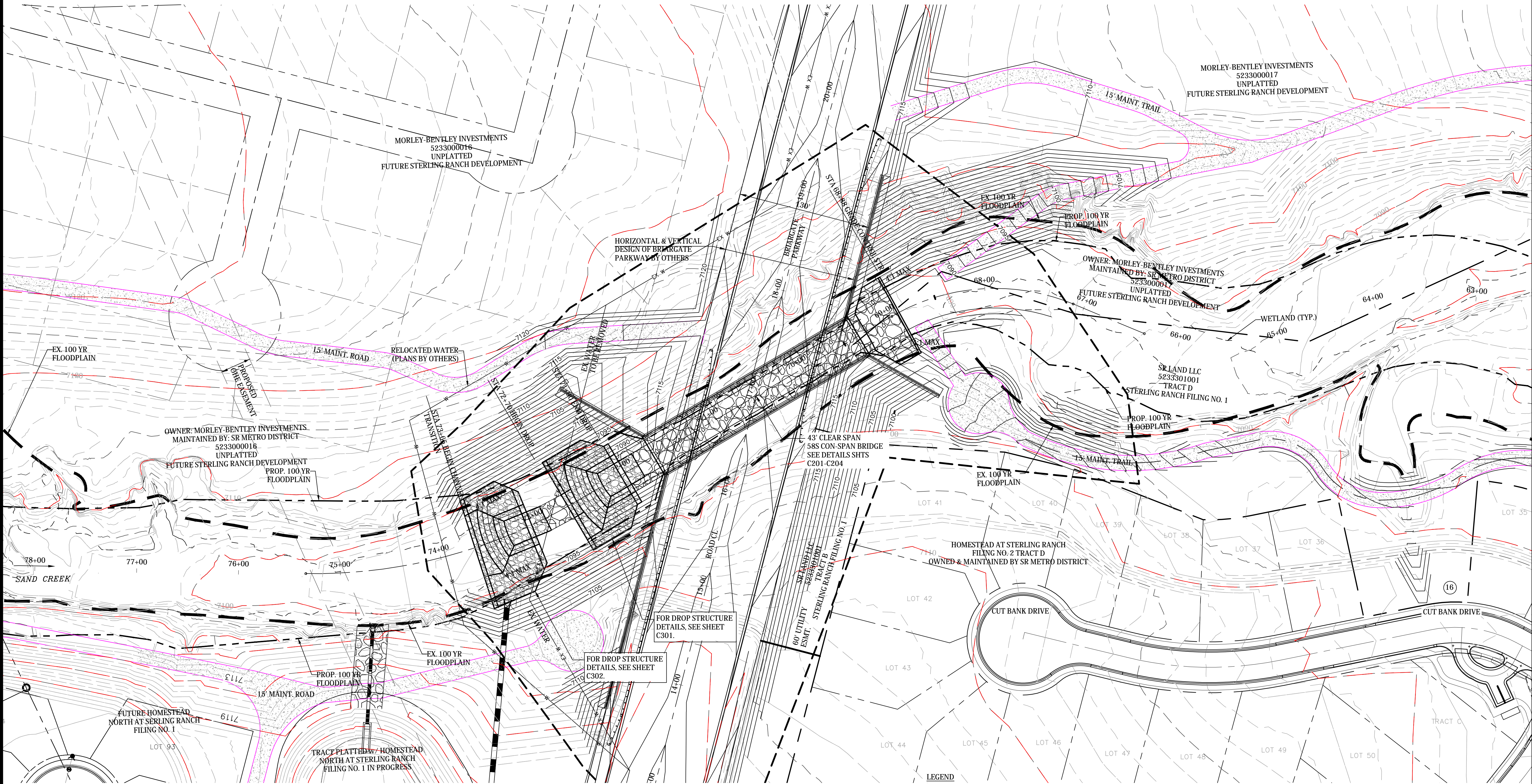
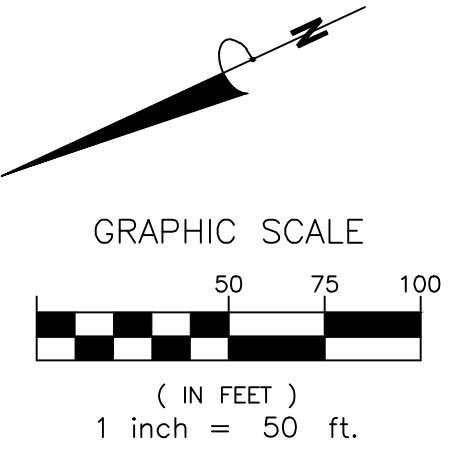
Revisions:

C001



WETLAND DISTURBANCE AREA: 0.74 AC. (0.74 AC. MAX.)  
 LENGTH CHANNEL DISTURBANCE: 630 LF. (635 LF MAX.)

CAUTION!!!  
 EXISTING UTILITIES TO BE PROTECTED FROM DISTURBANCE WHEN INSTALLING ALL DRAINAGE INFRASTRUCTURE.



LEGEND		HATCH LEGEND	
	EXISTING FEMA 100 YEAR FLOODPLAIN		GRouted BOULDER 36"-48"
	PROPOSED FEMA 100 YEAR FLOODPLAIN		TYPE L SOIL RIPRAP D50-9"
	10+00 PROFILE CENTERLINE		TYPE M SOIL RIPRAP D50=12"
	PROPERTY LINE		TURF REINFORCED MAT
	PROPOSED CONTOUR		WETLAND MITIGATION VEGETATION
	EXISTING CONTOUR		
	FENCE		

**STERLING RANCH DEVELOPMENT**  
**BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS**  
**SITE PLAN**  
 EL PASO COUNTY, COLORADO

Project No:	19032
Date:	12/6/2021
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

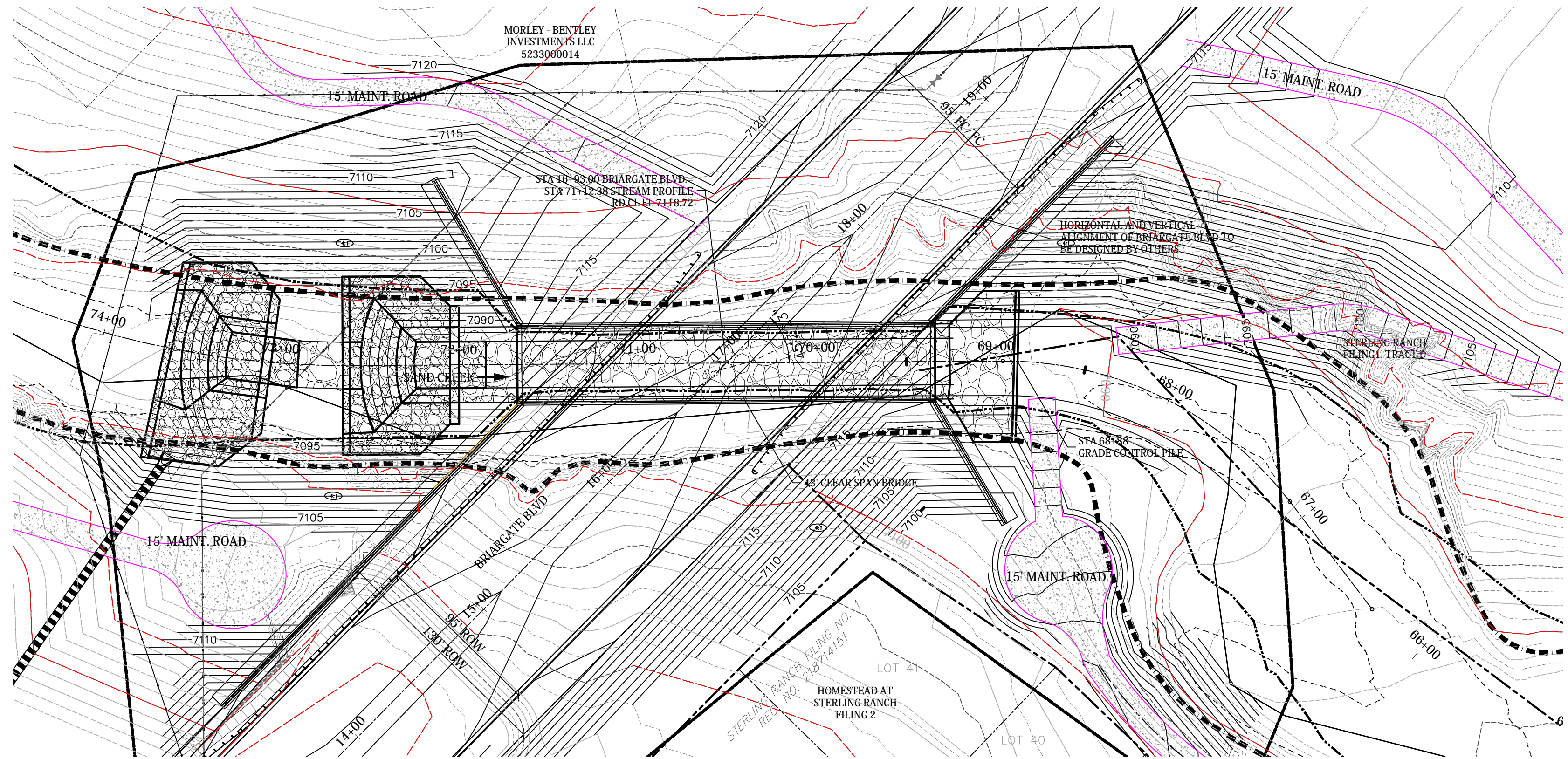
**C101**

TEST BORING NO. 1  
DATE DRILLED 7/13/2021  
JOB # 211647

REMARKS	Depth (ft)	Symbol	Blows per foot	Watercontent %	Soil Type
WATER @ 1.5', 7/20/21 SAND, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, DENSE, VERY MOIST					
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, DENSE TO VERY DENSE, VERY MOIST	5		47	16.5	1
SILTSTONE, SANDY, GRAY BROWN, HARD, MOIST	10		50	11.5	2
SILTSTONE, SANDY, GRAY BROWN, HARD, MOIST	15		50	16.0	3
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, VERY MOIST	20		50	15.5	2

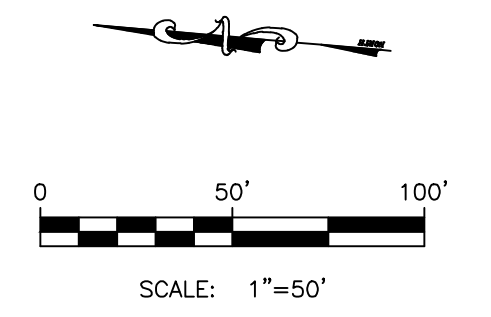
TEST BORING NO. 2  
DATE DRILLED 7/13/2021  
CLIENT C&C LAND  
LOCATION BRIARGATE BRIDGE

REMARKS	Depth (ft)	Symbol	Blows per foot	Watercontent %	Soil Type
WATER @ 3.5', 7/20/21 SAND, SILTY, BROWN					
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	5		50	13.2	2
SILTSTONE, SANDY, GRAY BROWN, HARD, MOIST	10		50	14.3	3
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	15		50	4	3
SANDSTONE, SLIGHTLY SILTY, FINE TO COARSE GRAINED, GRAY BROWN, VERY DENSE, MOIST	20		50	10.8	2



SITE PLAN BRIARGATE BLVD BRIDGE  
1" = 50'

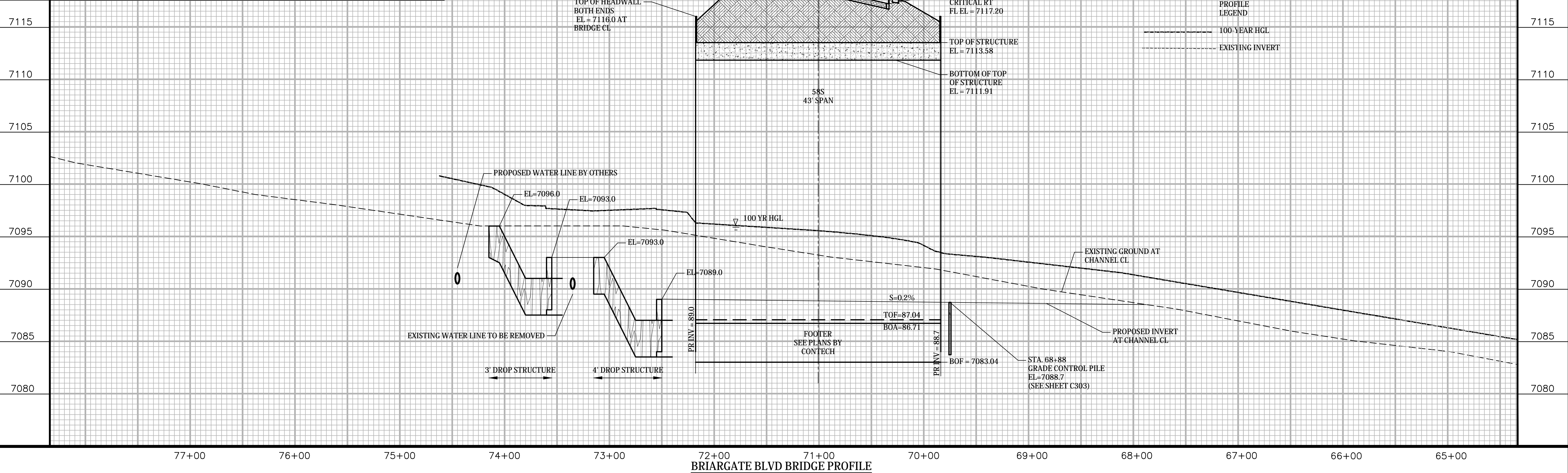
CAUTION!!!  
EXISTING UTILITIES TO BE PROTECTED FROM DISTURBANCE WHEN INSTALLING BRIDGE AND INFRASTRUCTURE.



**ENTECH ENGINEERING, INC.**  
505 ELKTON DRIVE  
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG  
DRAWN: DATE: CHECKED: R DATE: 7/23/21

JOB NO: 211647  
FIG NO: A-1



BRIARGATE BLVD BRIDGE PROFILE

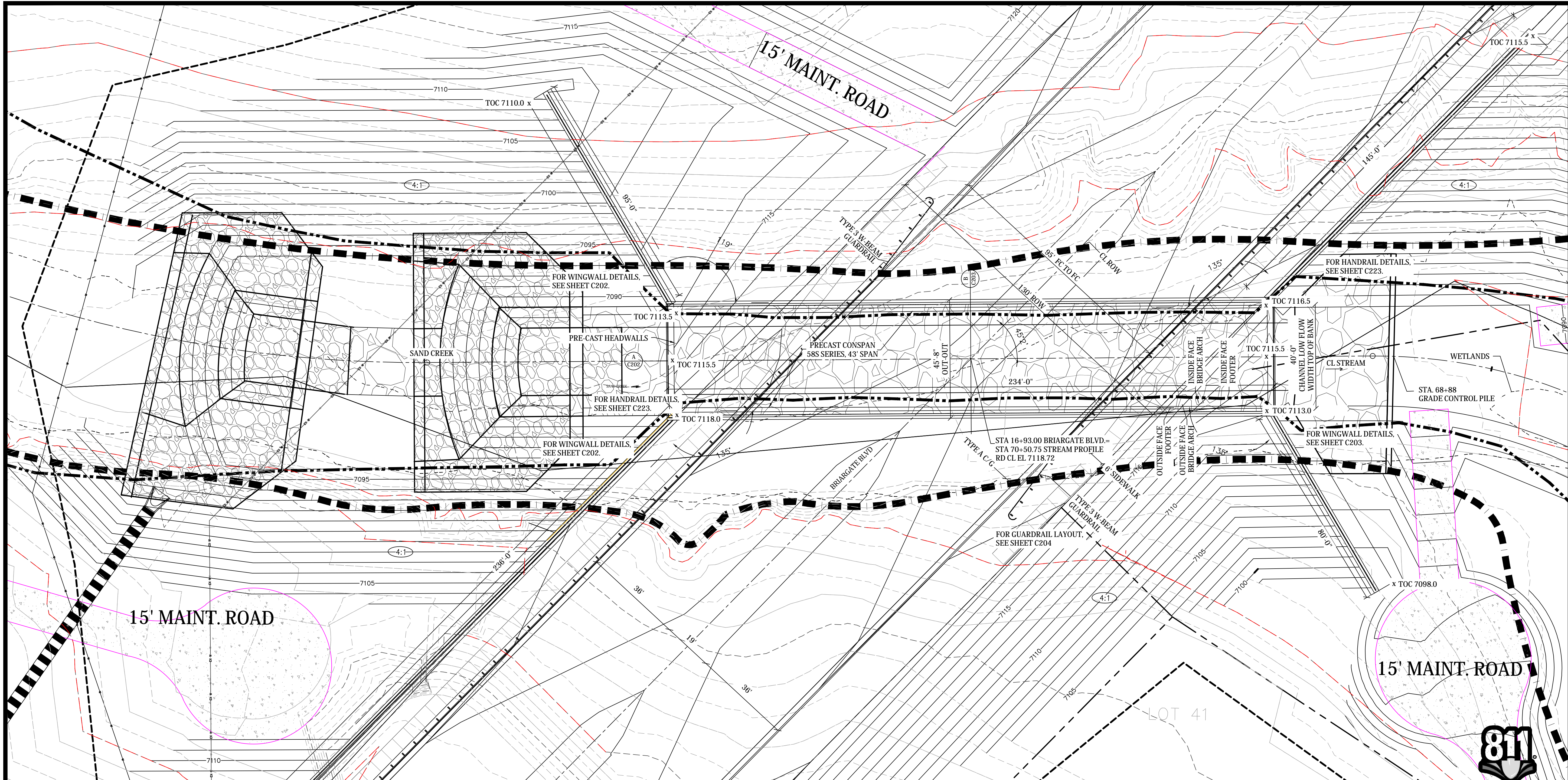
**Kiowa**  
Engineering Corporation  
1604 South 21st Street  
Colorado Springs, Colorado 80904  
(719) 630-7342

STERLING RANCH DEVELOPMENT  
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS  
PLAN AND PROFILE  
EL PASO COUNTY, COLORADO

Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C201**

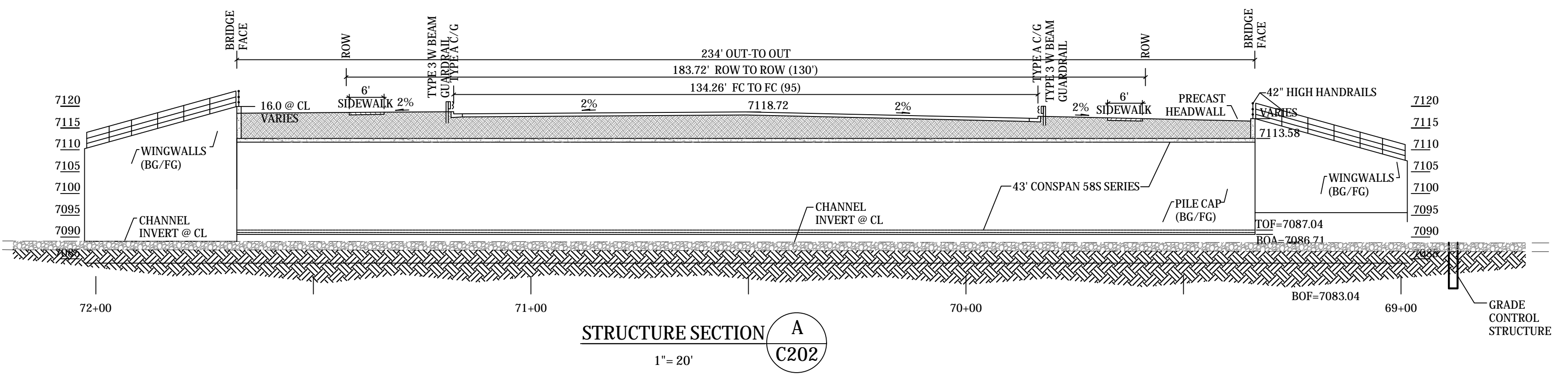
STERLING RANCH DEVELOPMENT  
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS  
STRUCTURE LAYOUT  
EL PASO COUNTY, COLORADO



**STRUCTURE LAYOUT**  
1" = 20'



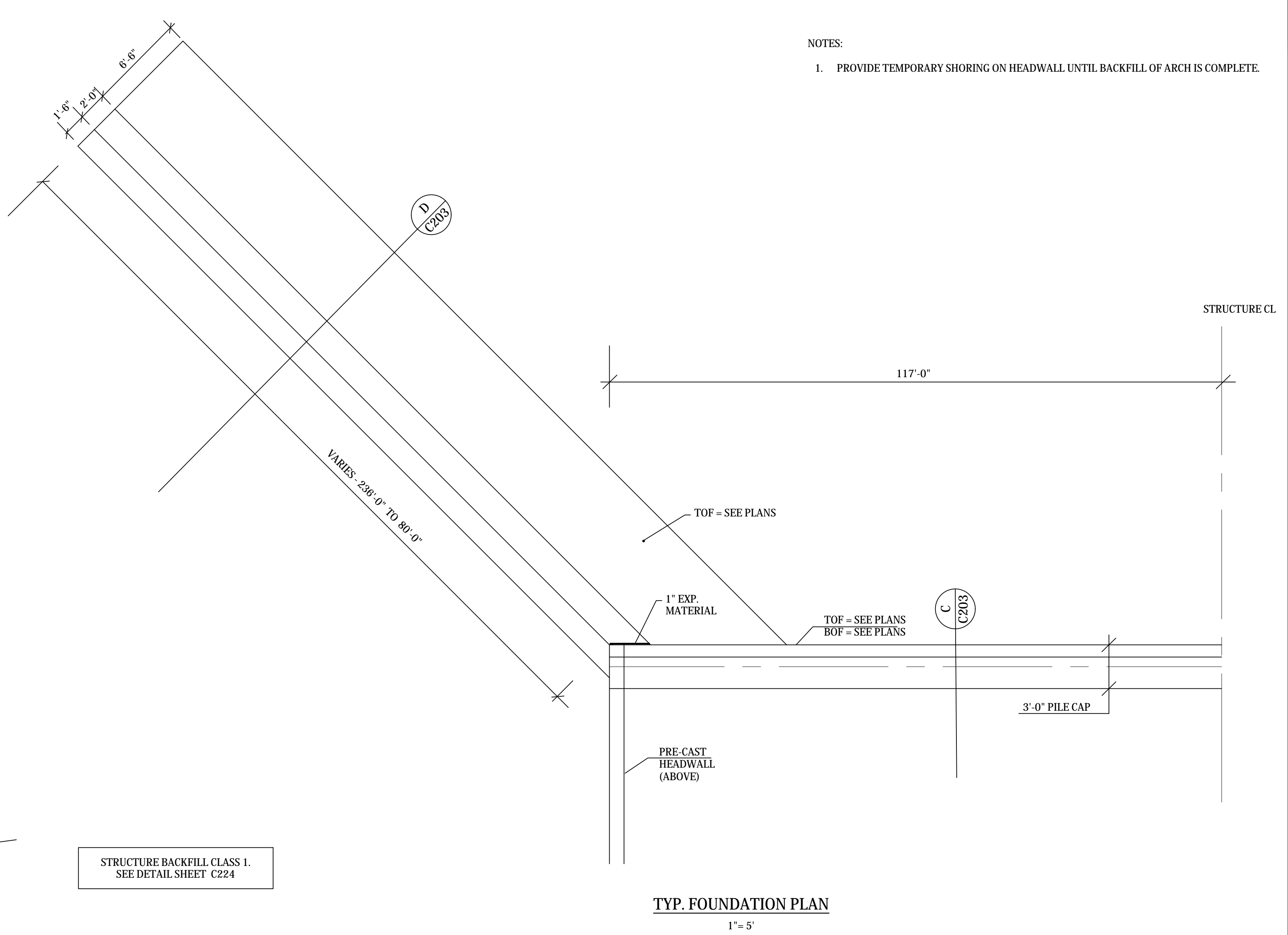
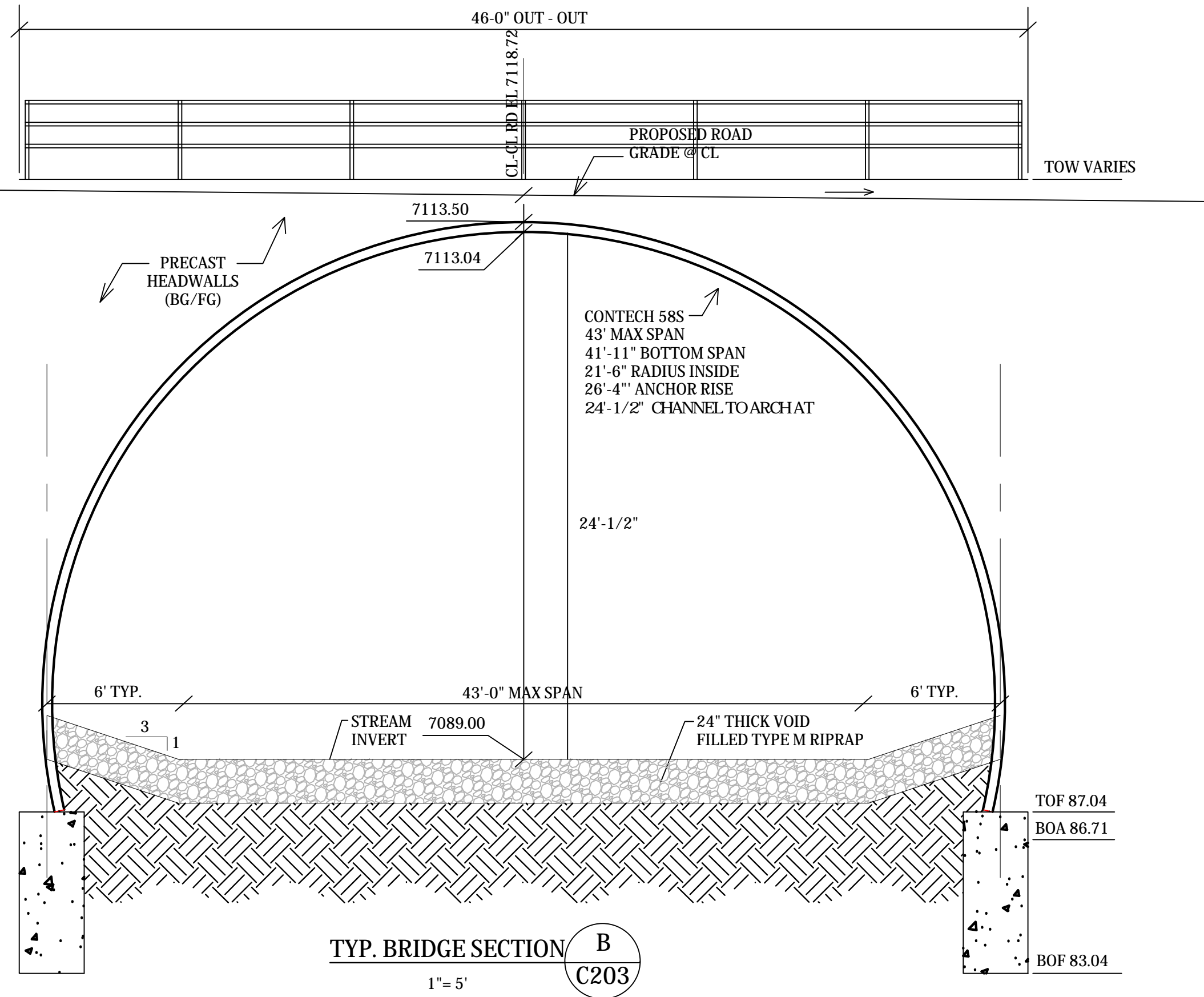
NOTES:  
1. PRECAST BRIDGE SECTIONS SHALL BE DESIGNED TO MEET HL-93 HIGHWAY LOADING AND MANUFACTURED IN CONFORMANCE WITH CDOT STANDARD SPECIFICATIONS.  
Know what's below. Call before you dig.



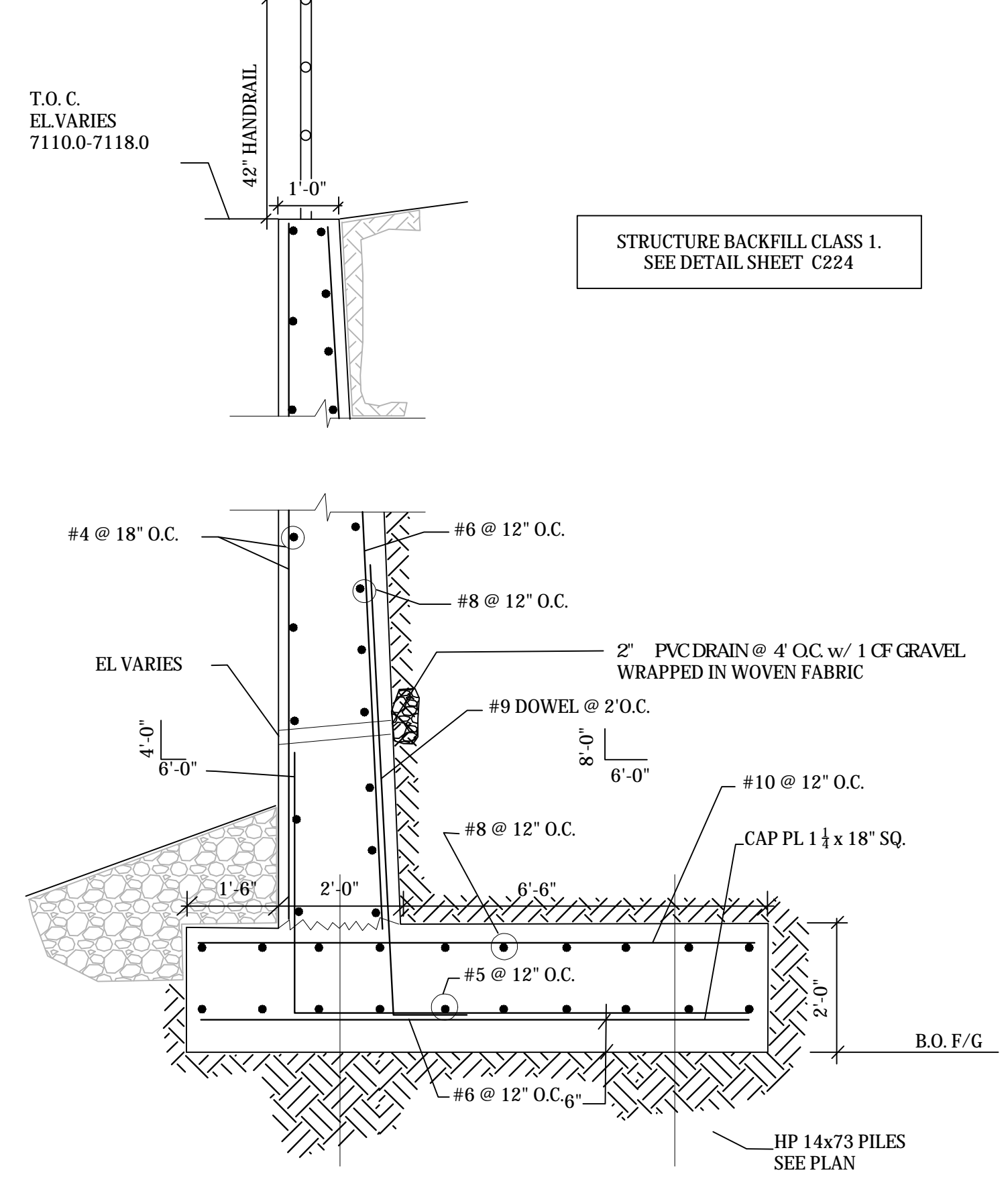
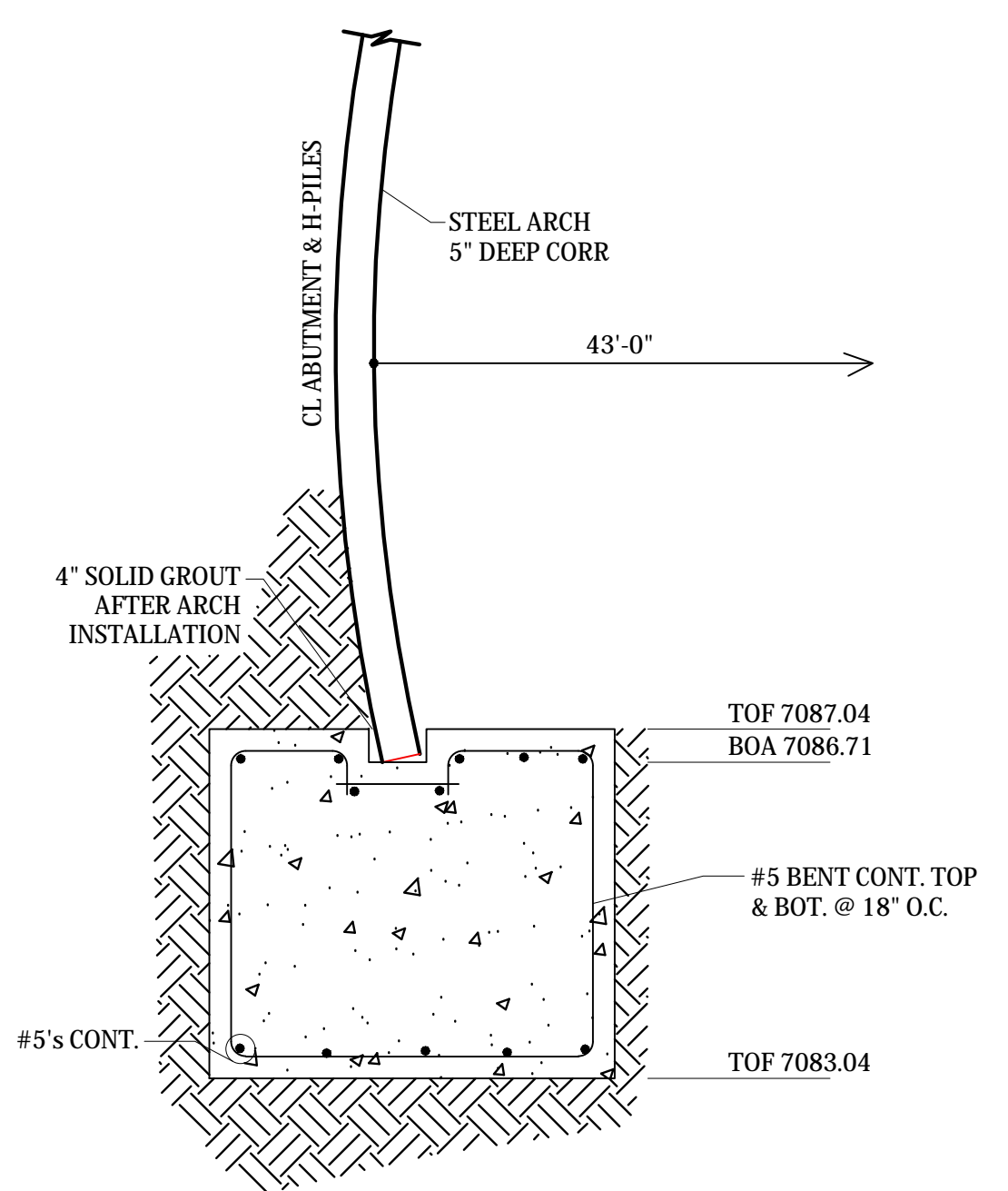
**STRUCTURE SECTION A**  
1" = 20'  
C202

Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C202**



NOTES:  
 1. PROVIDE TEMPORARY SHORING ON HEADWALL UNTIL BACKFILL OF ARCH IS COMPLETE.



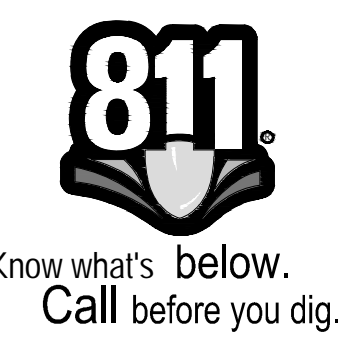
STRUCTURE BACKFILL CLASS 1.  
 SEE DETAIL SHEET C224

TYP. BRIDGE FOOTER SECTION C  
 1"=2'

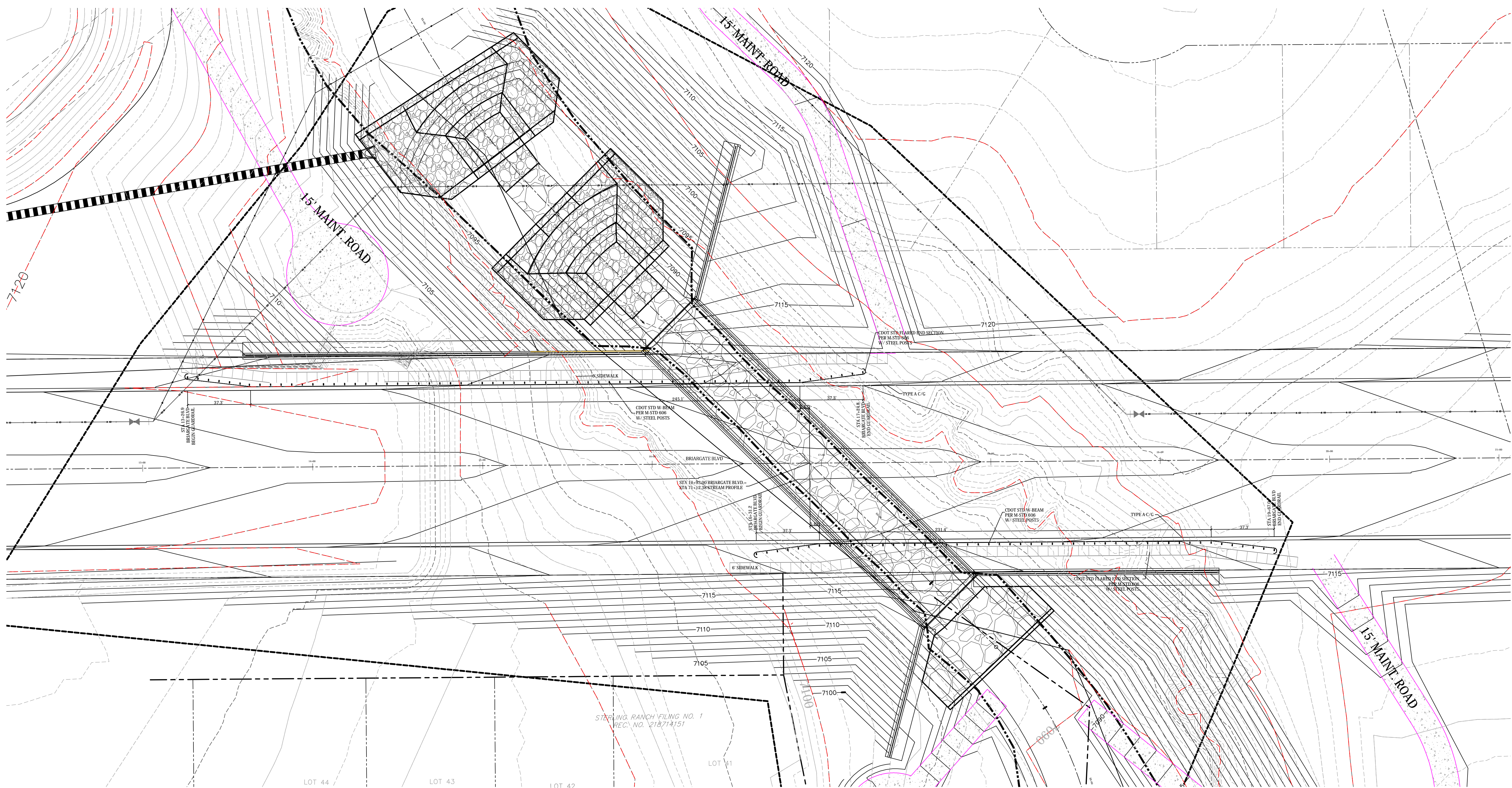
TYP. WINGWALL SECTION D  
 1"=2'

STERLING RANCH DEVELOPMENT  
 BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS  
 FOOTER DETAILS  
 EL PASO COUNTY, COLORADO

Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	



**C203**



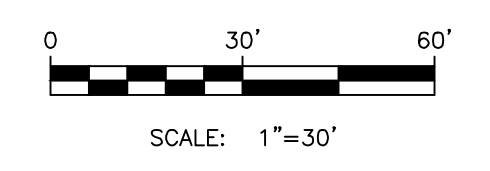
NOTES:  
 1. FOR GUARDRAIL DETAILS SEE SHEET C223

STERLING RANCH FILING NO. 1  
 REC. NO. 218714151

**GUARDRAIL LAYOUT**  
 1" = 20'



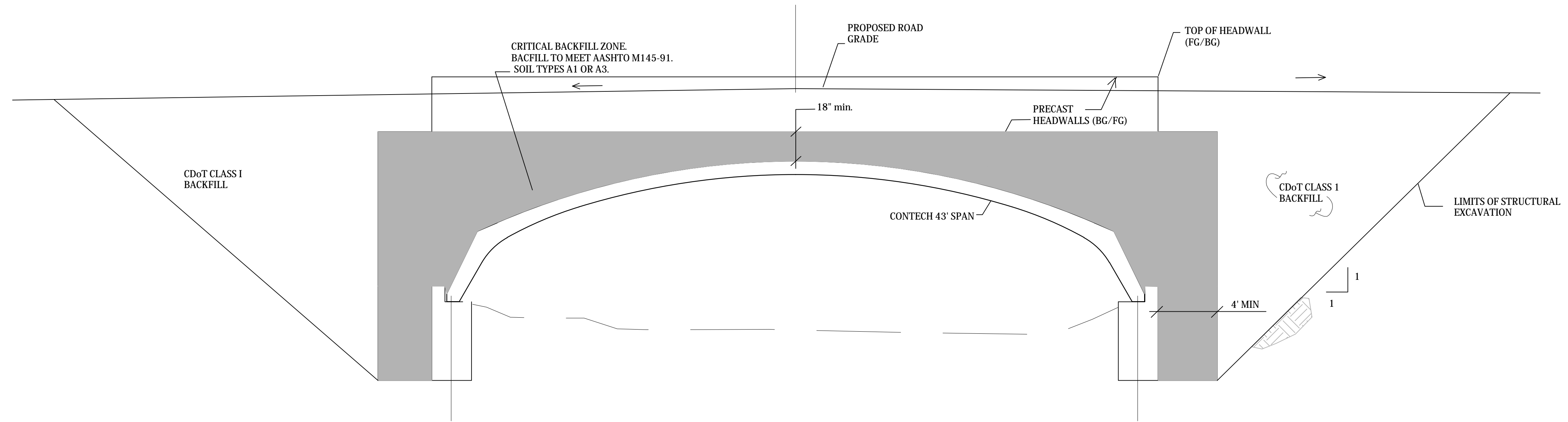
Know what's below.  
 Call before you dig.



**STERLING RANCH DEVELOPMENT**  
**BRIARGATE BOULEVARD BRIDGE CONSTRUCTION DRAWINGS**  
**GUARDRAIL PLAN**  
 EL PASO COUNTY, COLORADO

Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C204**



**BRIDGE BACKFILL SECTION**

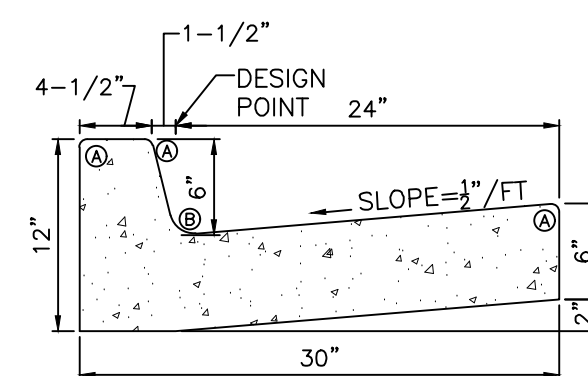
NTS

BACKFILL DESCRIPTION (AASHTO M 145-91)								
GROUP CLASSIFICATION	A-1		A-3	A-2				A-4
	A-1-a	A-1-b		A-2-4	A-2-5	A-2-6	A-2-7	
SIEVE ANALYSIS (100% PASSING 3" SIEVE)								
NO. 10	50 max		51 max	35 max	35 max	35 max	35 max	35 min
NO. 40	30 max	50 max	10 max	35 max	35 max	35 max	35 max	
NO. 200	15 max	25 max						
CHARACTERISTICS OF FRACTION PASSING NO. 40								
LIQUID LIMIT				40 max	41 max	11 min	11 min	10 max
USUAL TYPES OF SIGNIFICANT CONSTITUENT MATERIALS								
GRAVEL & SAND			SAND					
GENERAL RATING AS SUB-GRADE			EXCELLENT TO GOOD			FAIR TO POOR		

NOTES:

1. PROVIDE TEMPORARY SHORING ON HEADWALL UNTIL BACKFILL OF ARCH IS COMPLETE.

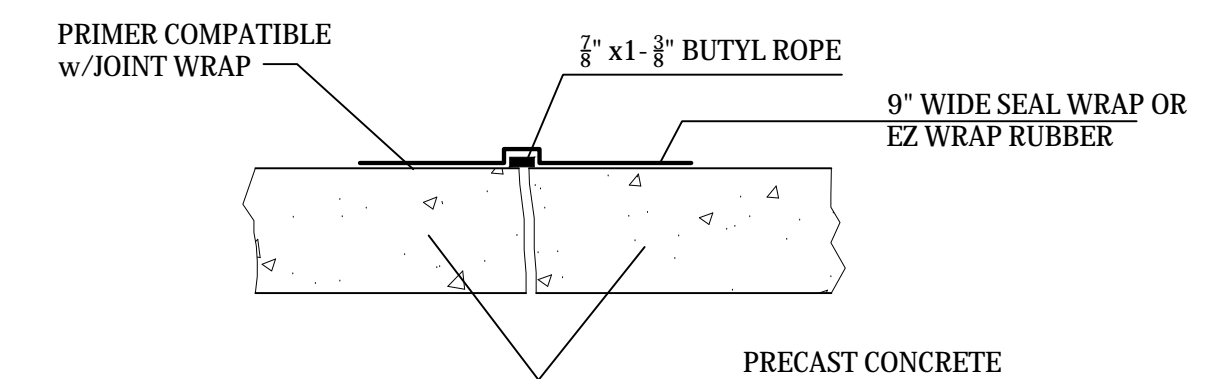
LENGTH FOR RADII  
A=1-1/2" B=1-1/2"



**EPC TYPE A VERTICAL CURB AND GUTTER**

NTS

EPC STD. SD\_2-20

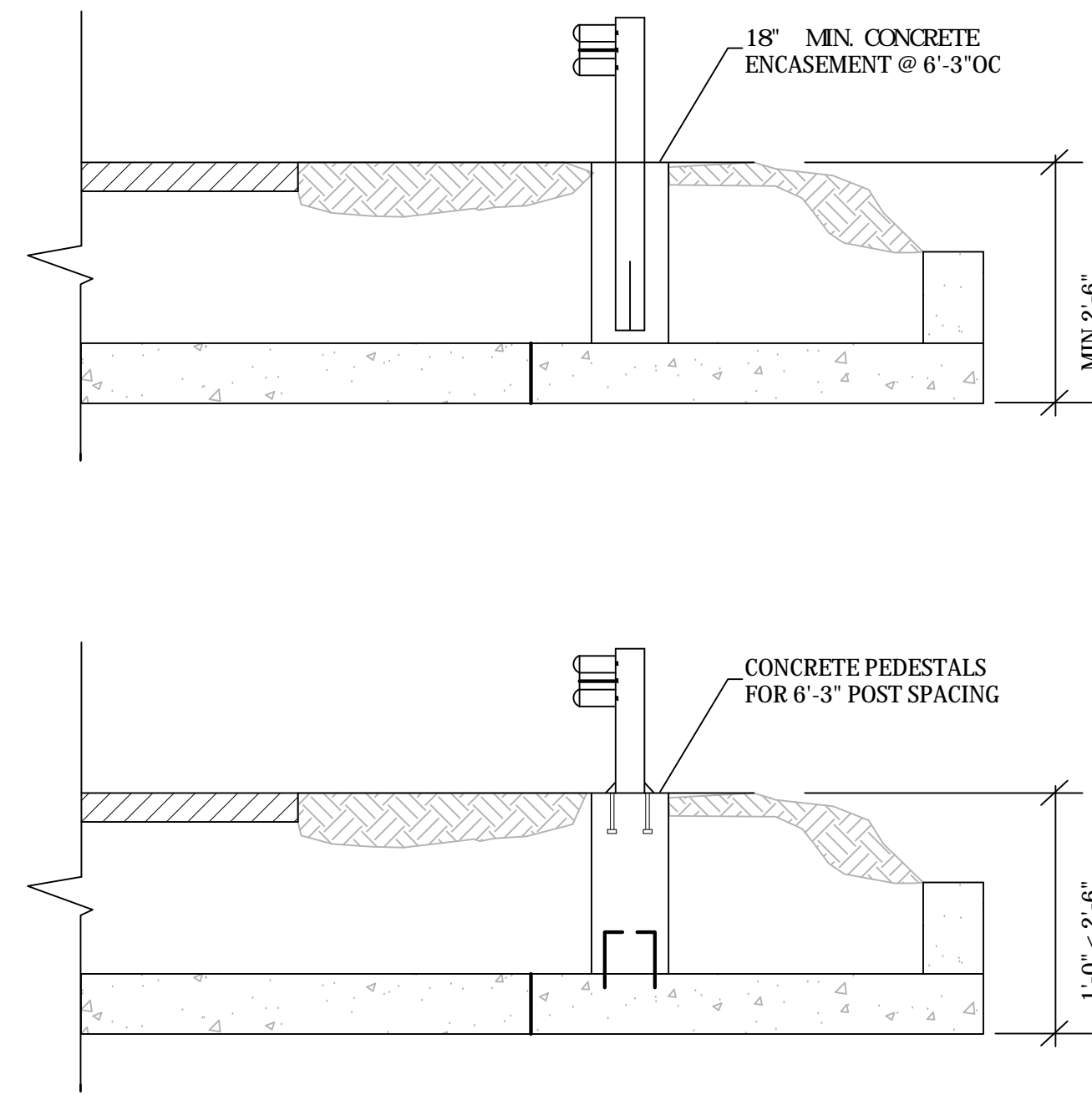


**TYPICAL JOINT SEAL**

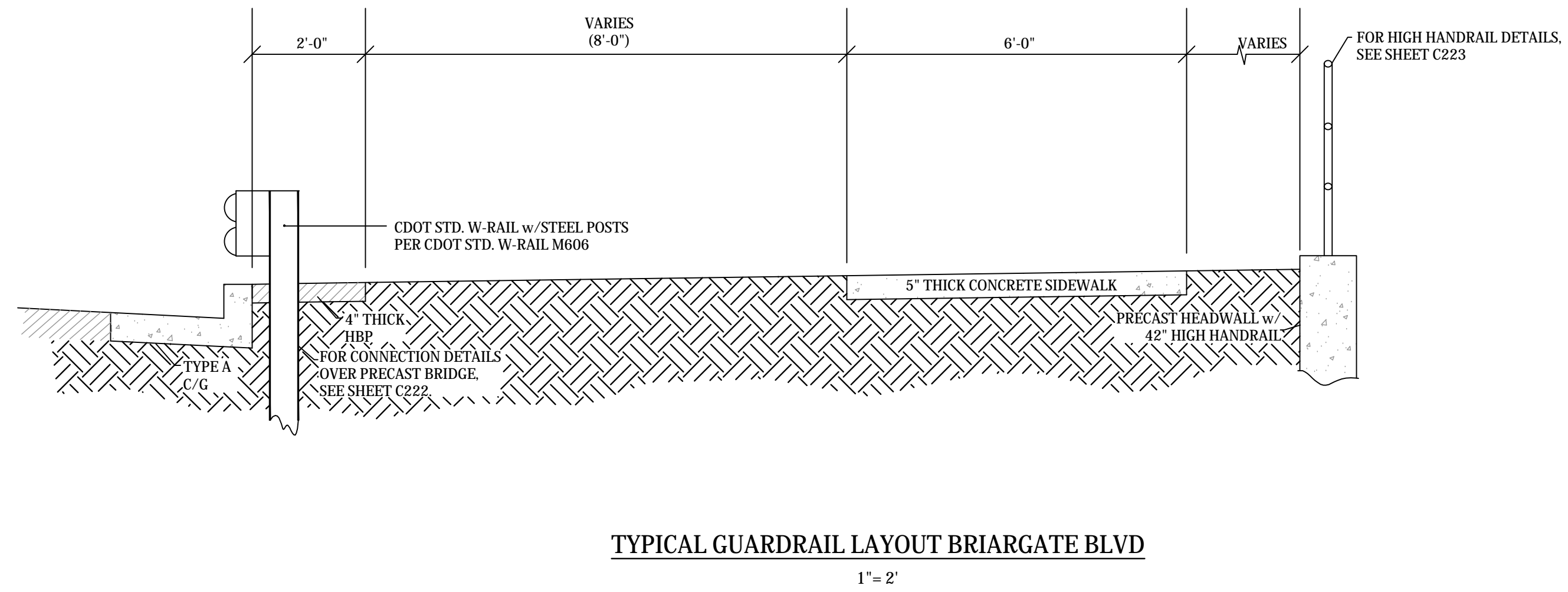
NTS



Know what's below.  
Call before you dig.



**GUARDRAIL MOUNTING DETAILS**  
NTS



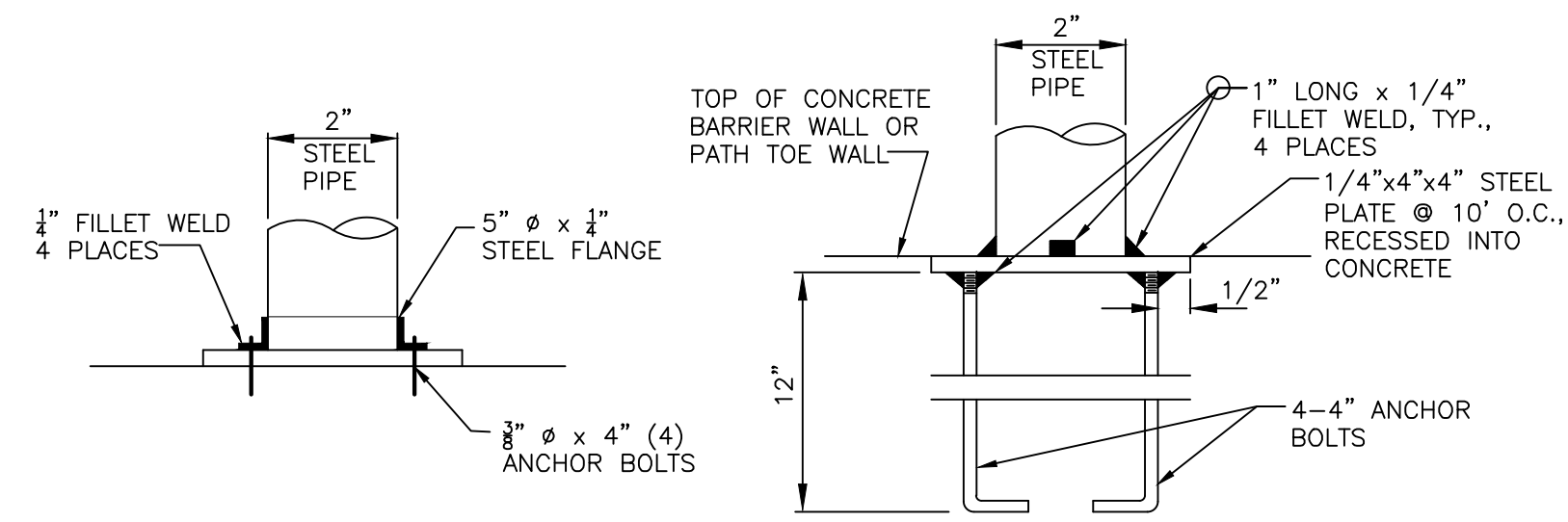
**TYPICAL GUARDRAIL LAYOUT BRIARGATE BLVD**  
1" = 2"

**NOTES:**

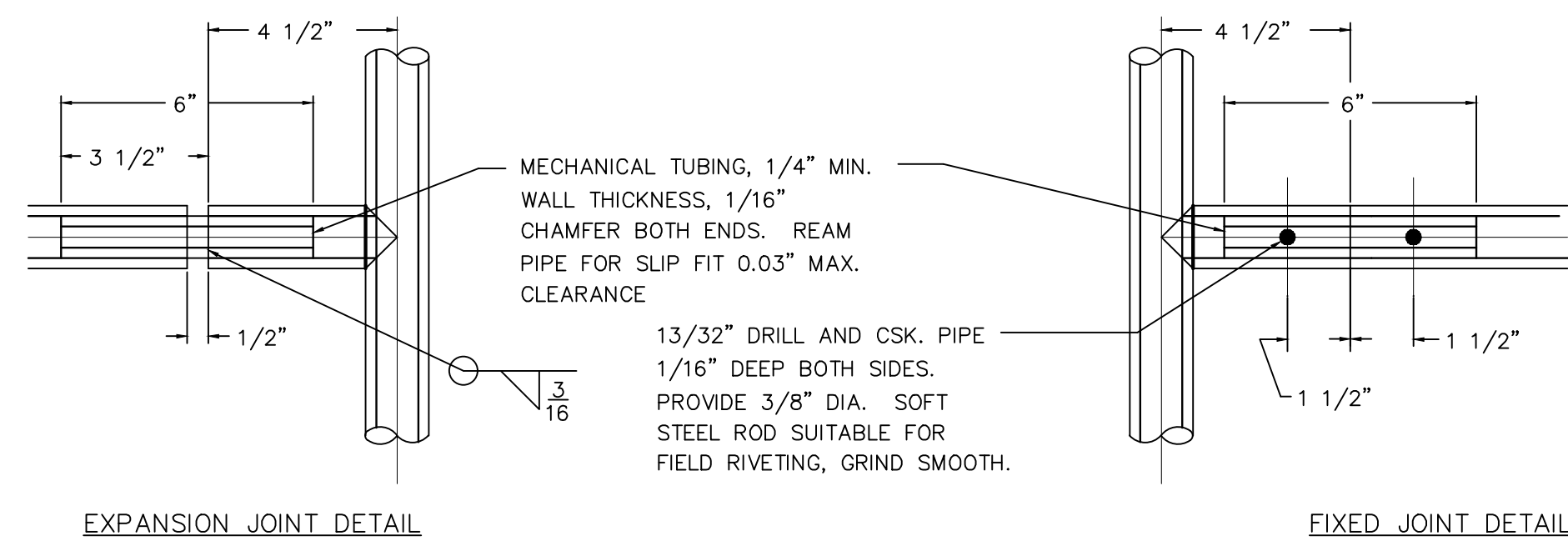
1. GUARDRAIL POST SPACING OVER THE PRECAST SECTIONS SHALL BE IN CONFORMANCE WITH CDOT M-606.



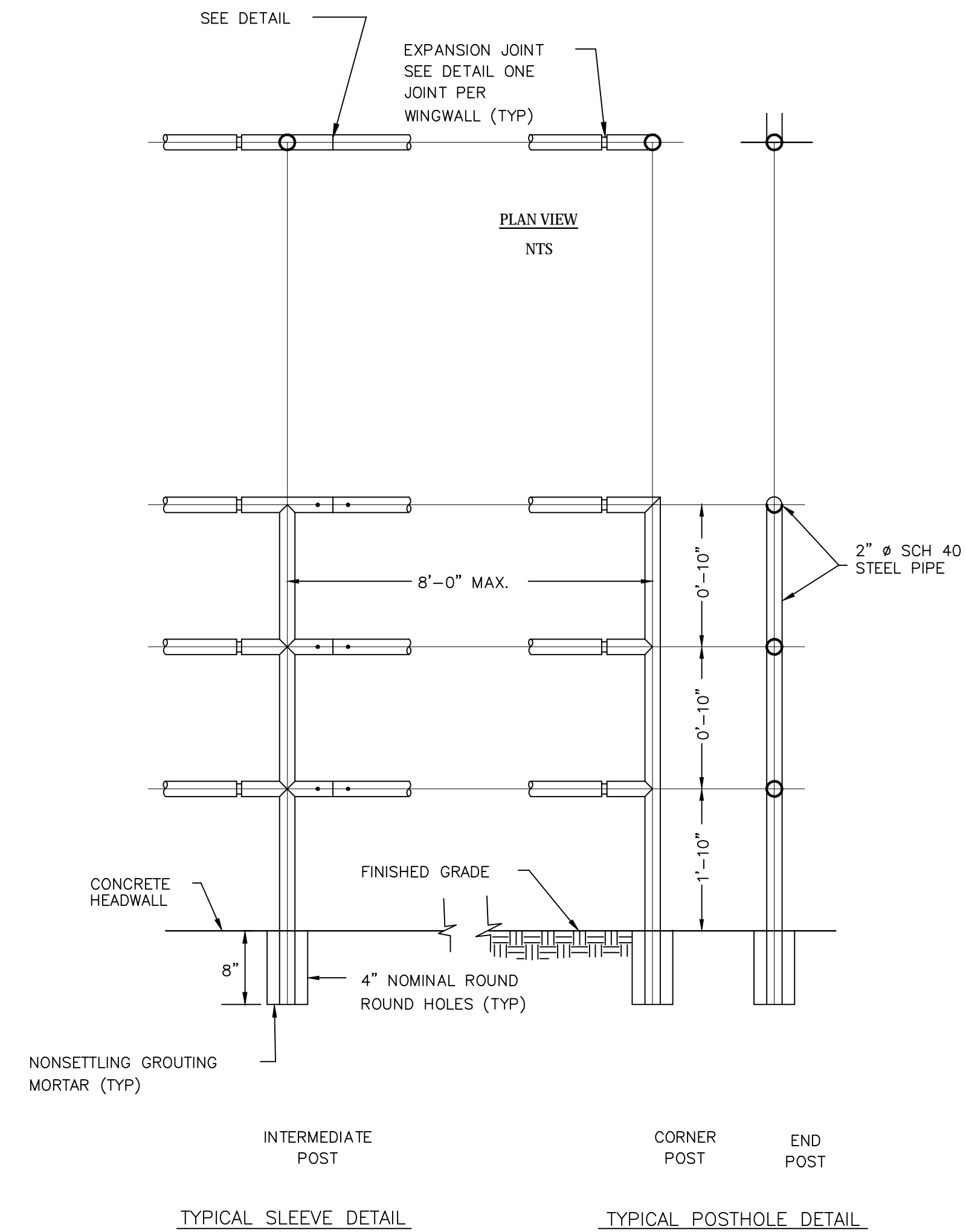
Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	



**ALTERNATE HANDRAIL POST CONNECTION DETAIL**  
NTS



**HANDRAIL DETAIL**  
NTS



**ELEVATION**  
NTS

**HANDRAIL PAINT NOTE:**

HANDRAIL FINISH SHALL BE ONE COAT METAL PRIMER AND TWO COATS SHERWIN WILLIAMS "BRIDGE GREEN" COLOR, ACROLON 218 HS ACRYLIC POLYURETHANE, SEMI-GLOSS. COLOR SHALL BE VERIFIED BY THE ENGINEER.

BRIDGE GREEN CUSTOM MANUAL MATCH	OZ	32	64	128
844-COLORANT				
LB-LAMP BLACK	2	16	-	-
PG-PHTH GREEN	10	-	-	-
TW-WHITE	2	46	-	-
YO-YELLOW OX	-	50	-	-
PB-PHTH	-	50	-	-
4 GALLON KIT				
B65T00654				
				ULTRADEEP 640335618

Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

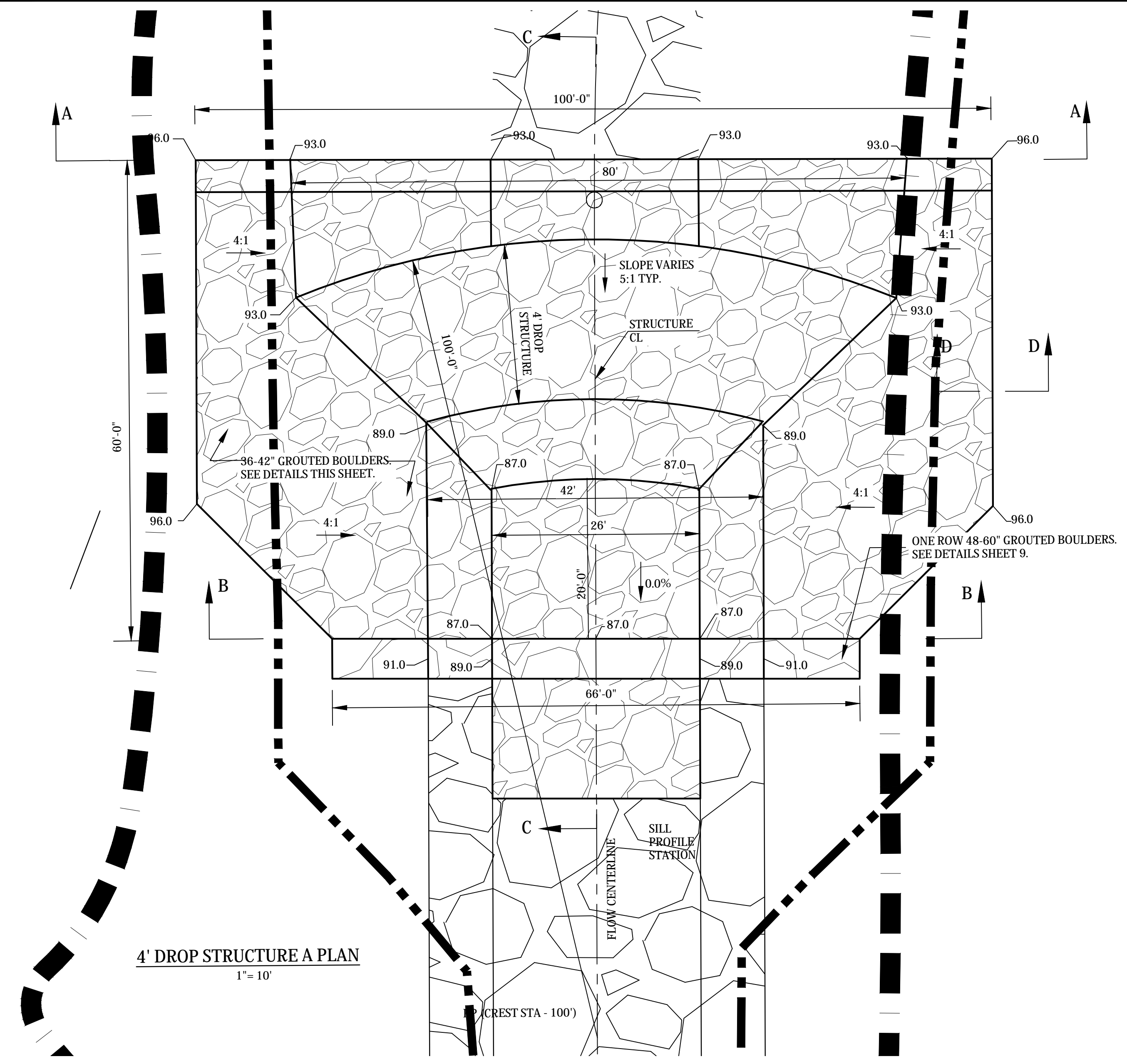




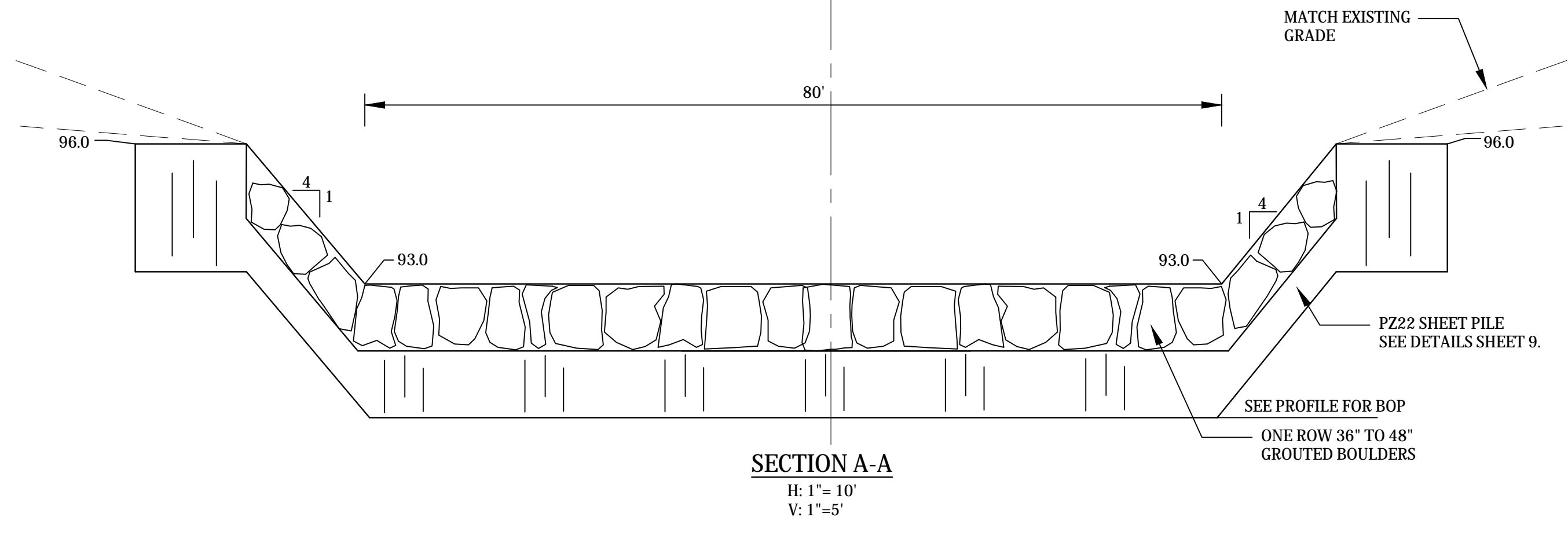
**STERLING RANCH DEVELOPMENT  
BRIARGATE BOULEVARD BRIDGE CONSTRUCTION PLANS  
4' DROP STRUCTURE A DETAILS  
EL PASO COUNTY, COLORADO**

Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

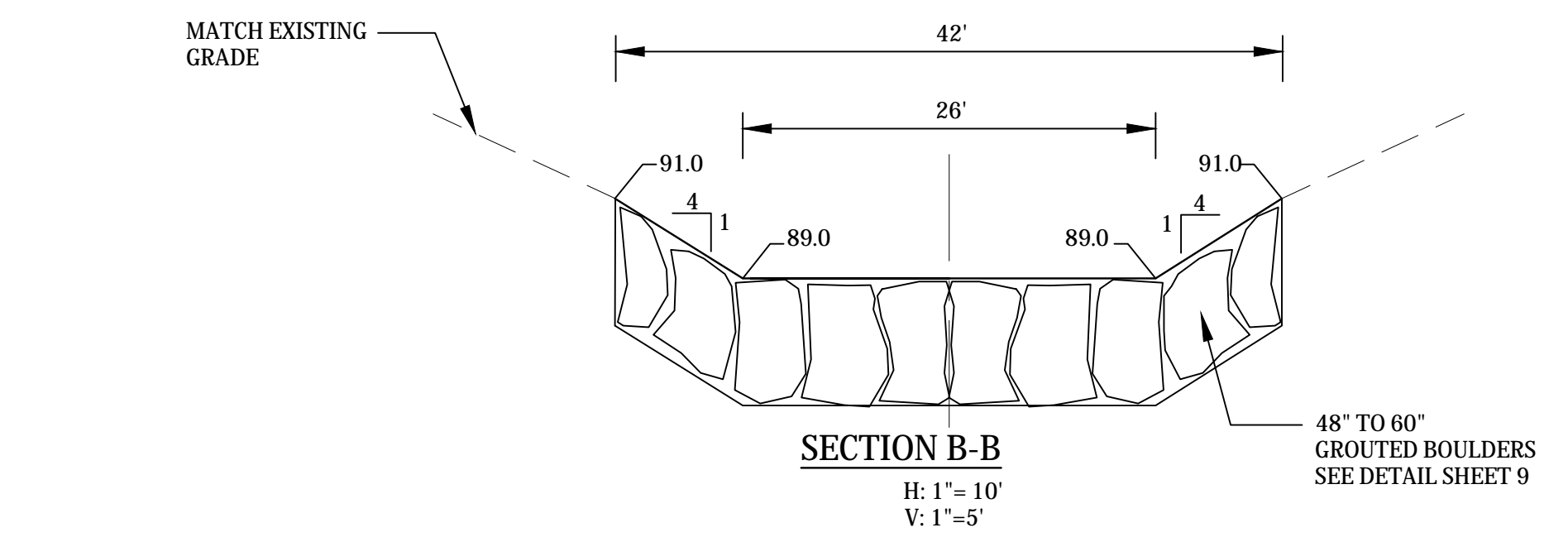
**C301**



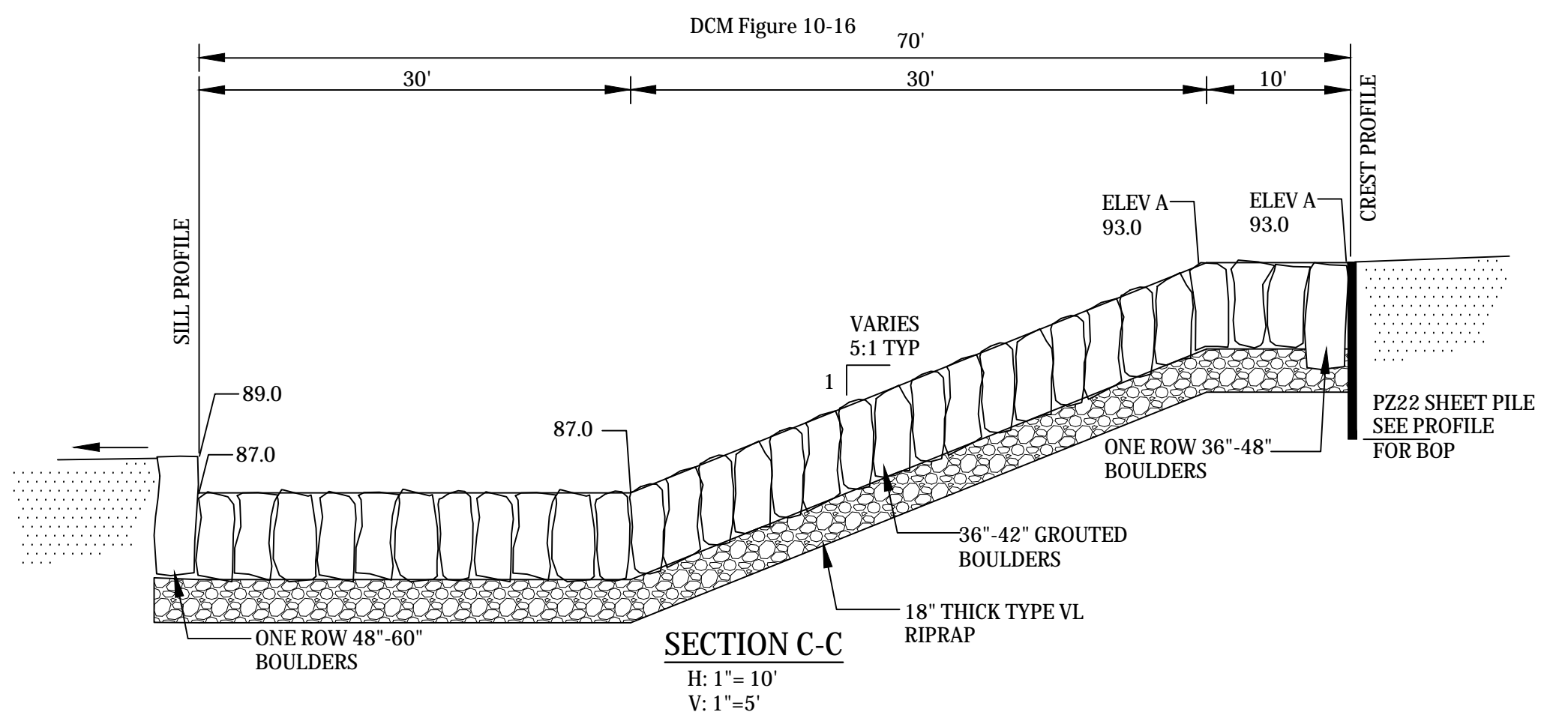
**4' DROP STRUCTURE A PLAN**  
1" = 10'



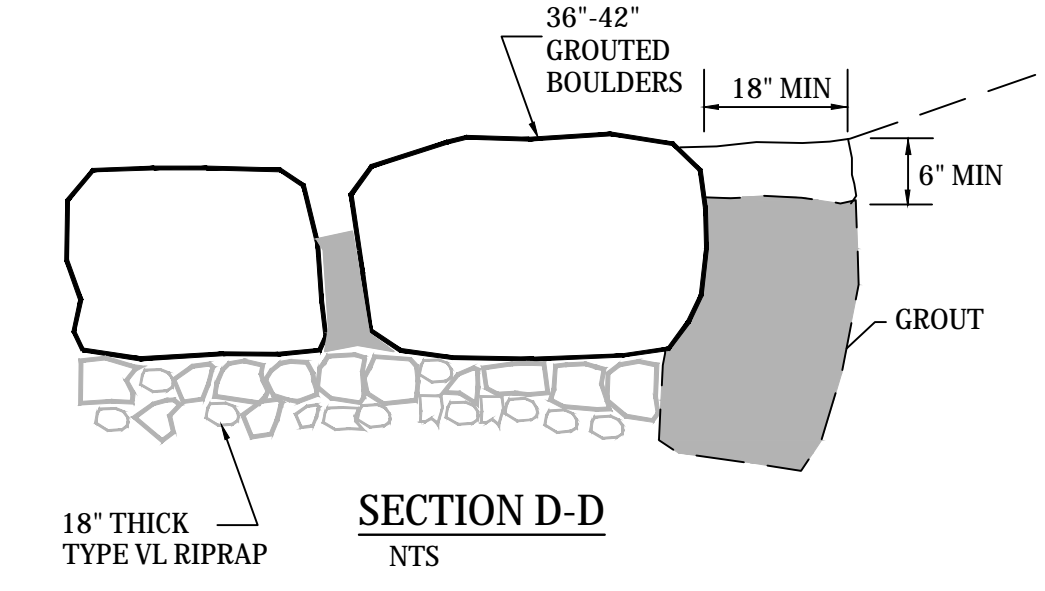
**SECTION A-A**  
H: 1" = 10'  
V: 1" = 5'



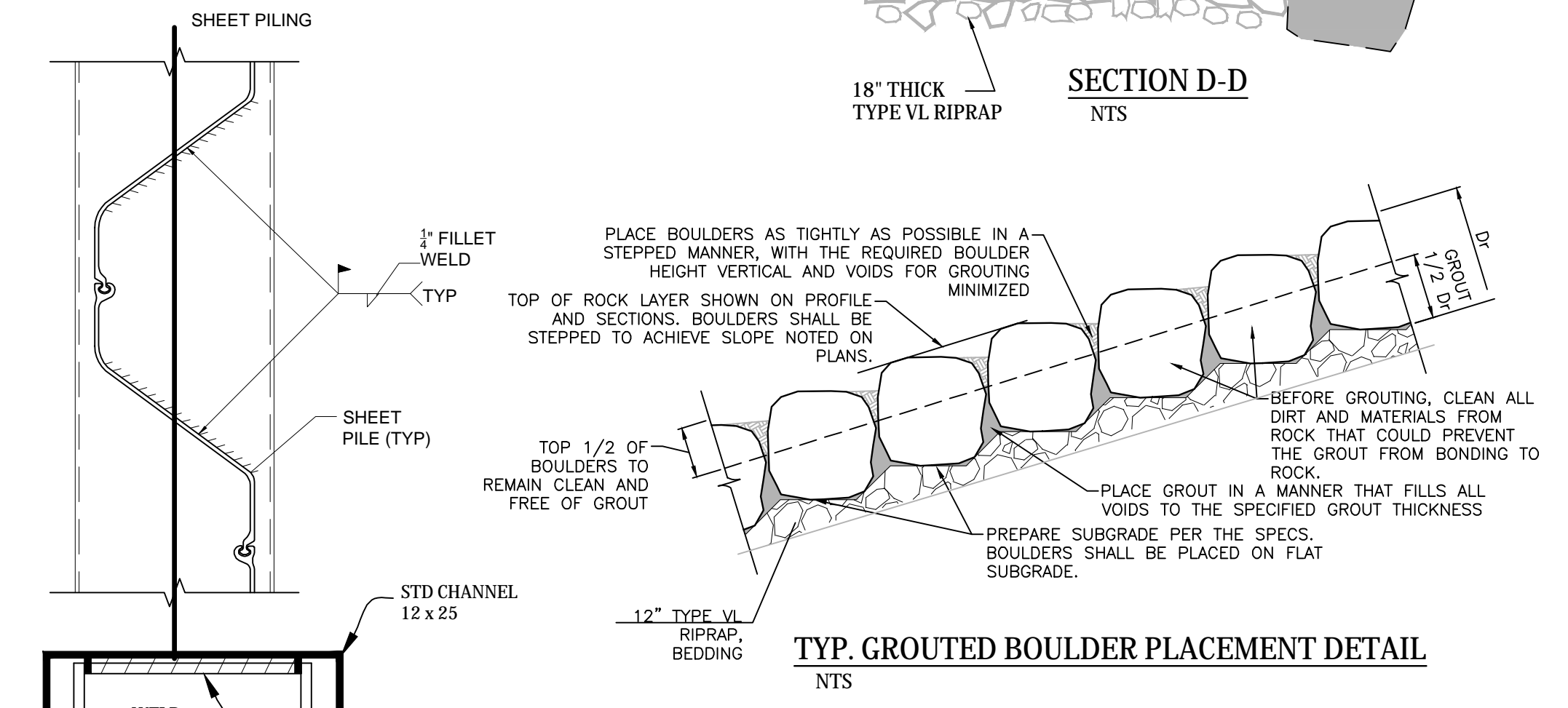
**SECTION B-B**  
H: 1" = 10'  
V: 1" = 5'



**SECTION C-C**  
H: 1" = 10'  
V: 1" = 5'



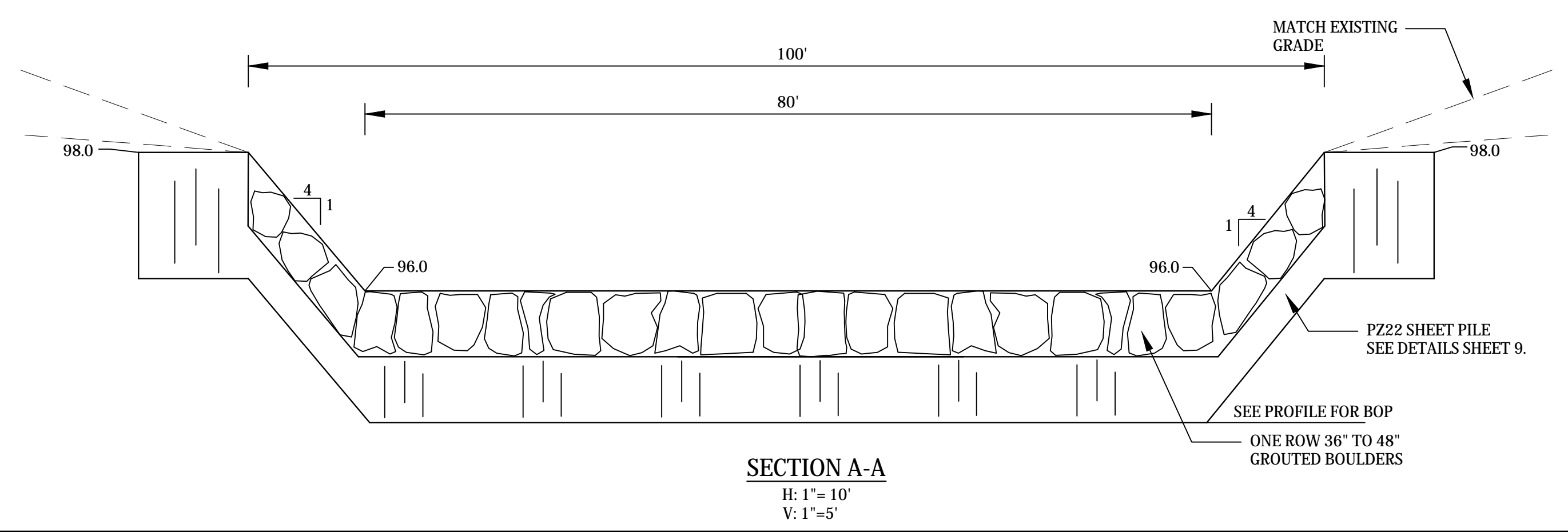
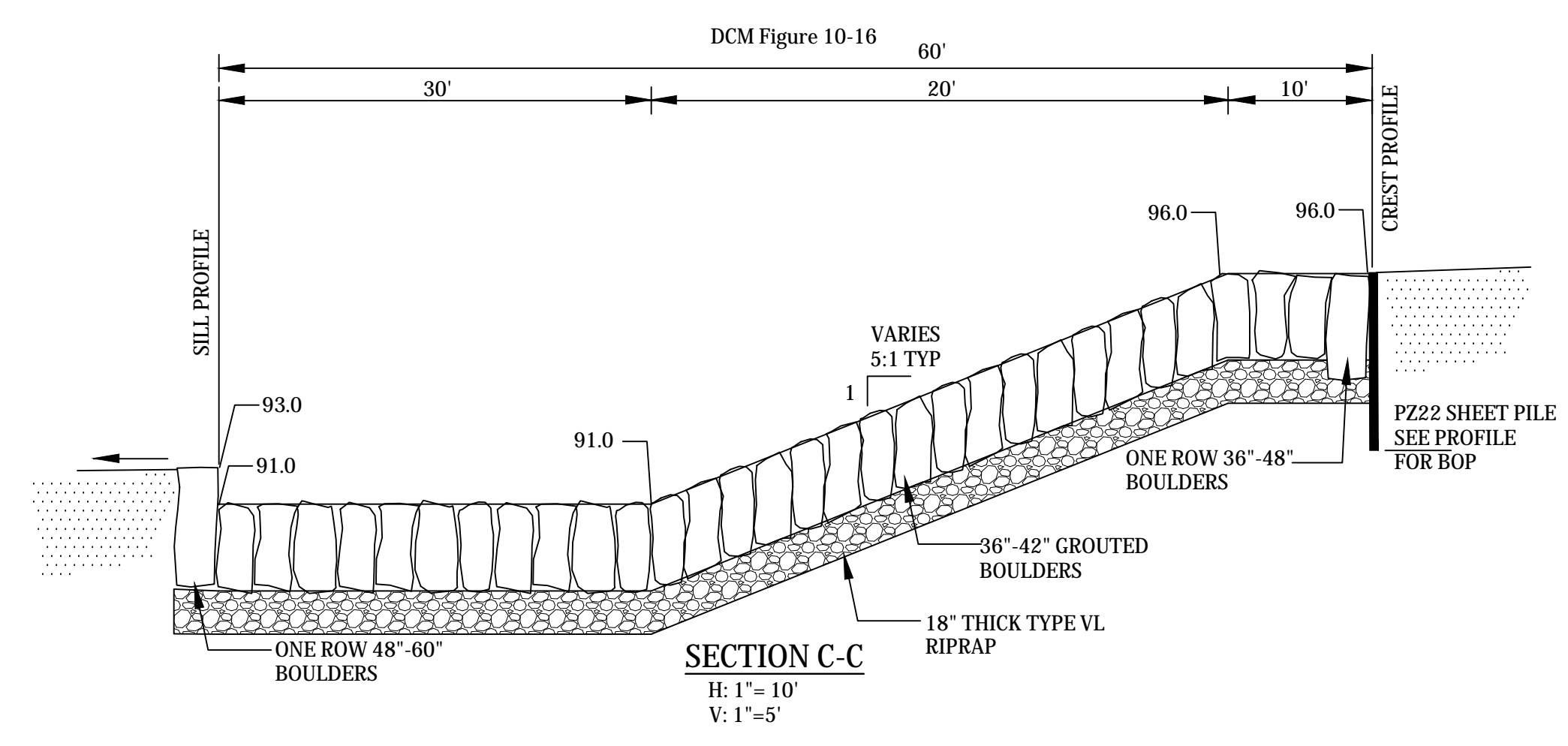
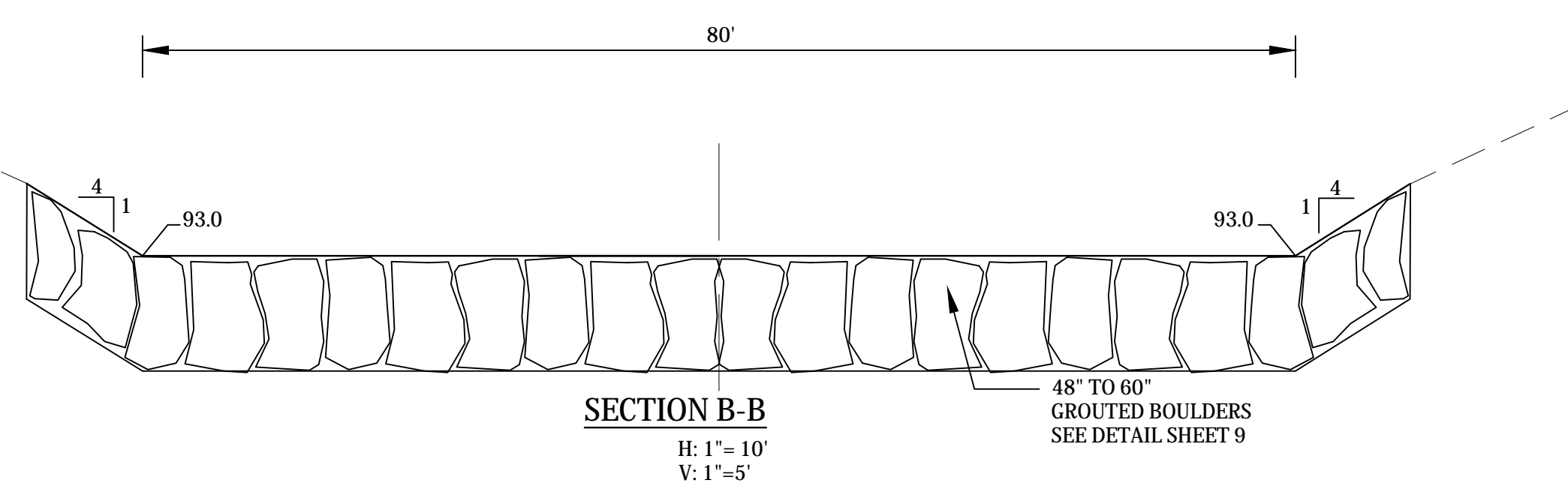
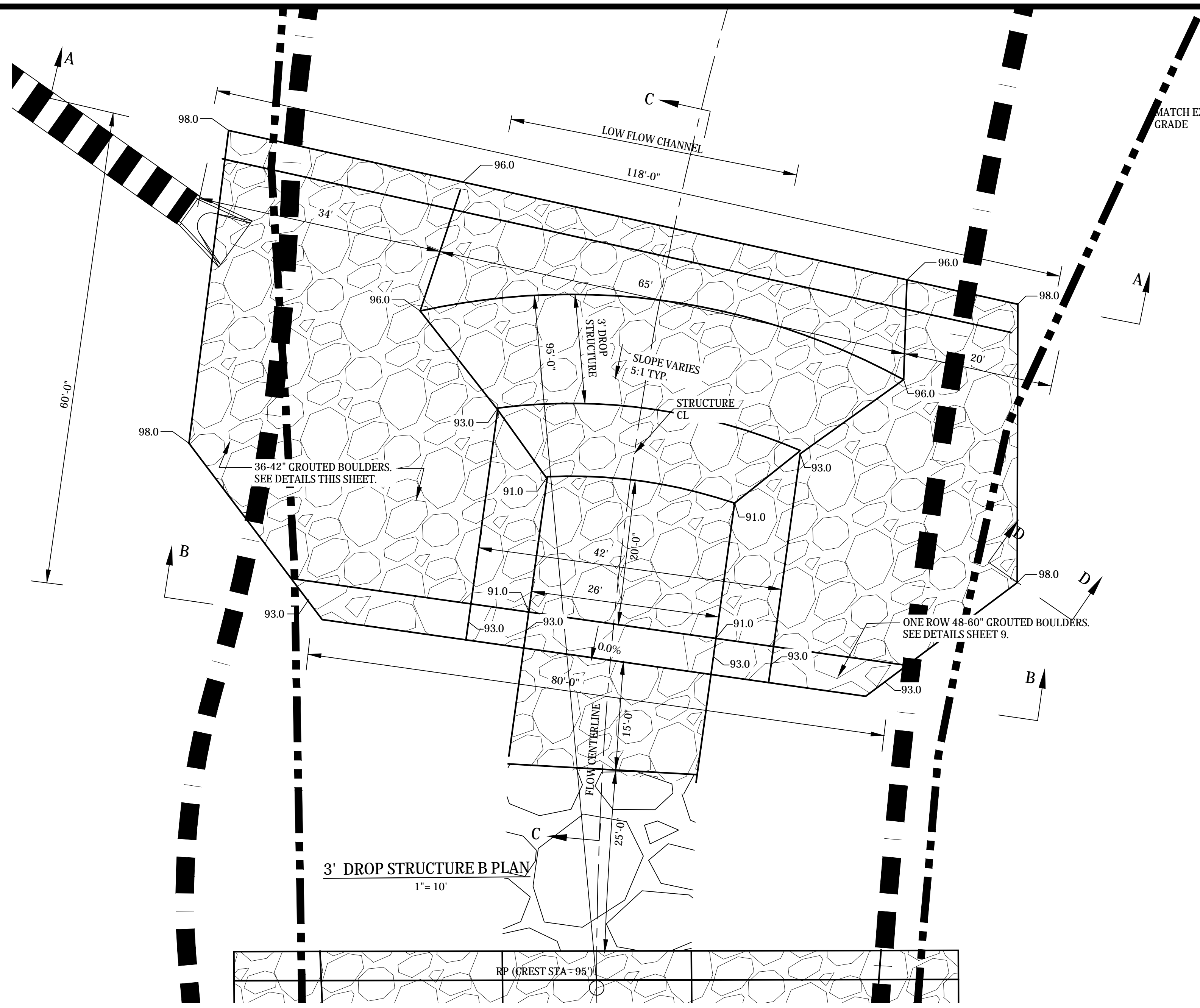
**SECTION D-D**  
NTS



**TYP. GROUDED BOULDER PLACEMENT DETAIL**  
NTS

**TYPICAL SHEET PILE CAP DETAILS**  
NTS

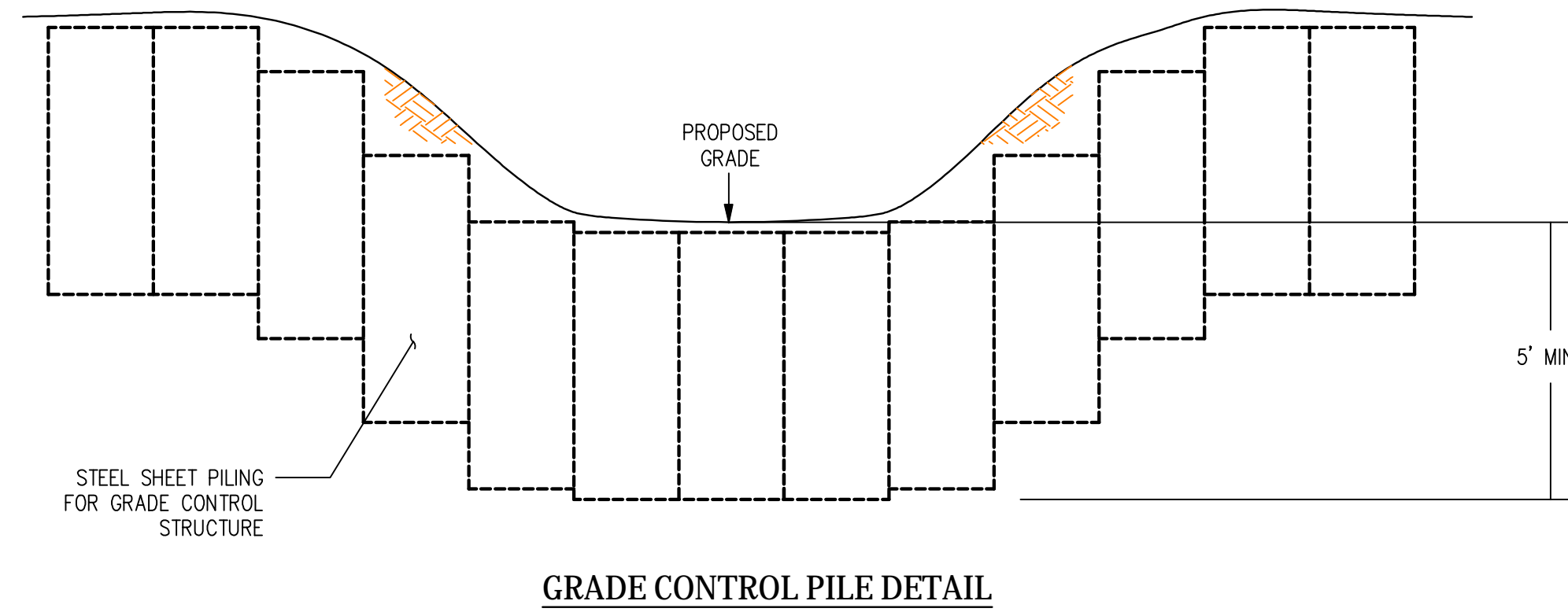
NOTES:  
1. SEE ALSO DRAINAGE CRITERIA MANUAL VOL. 1 FIGURE 10-16



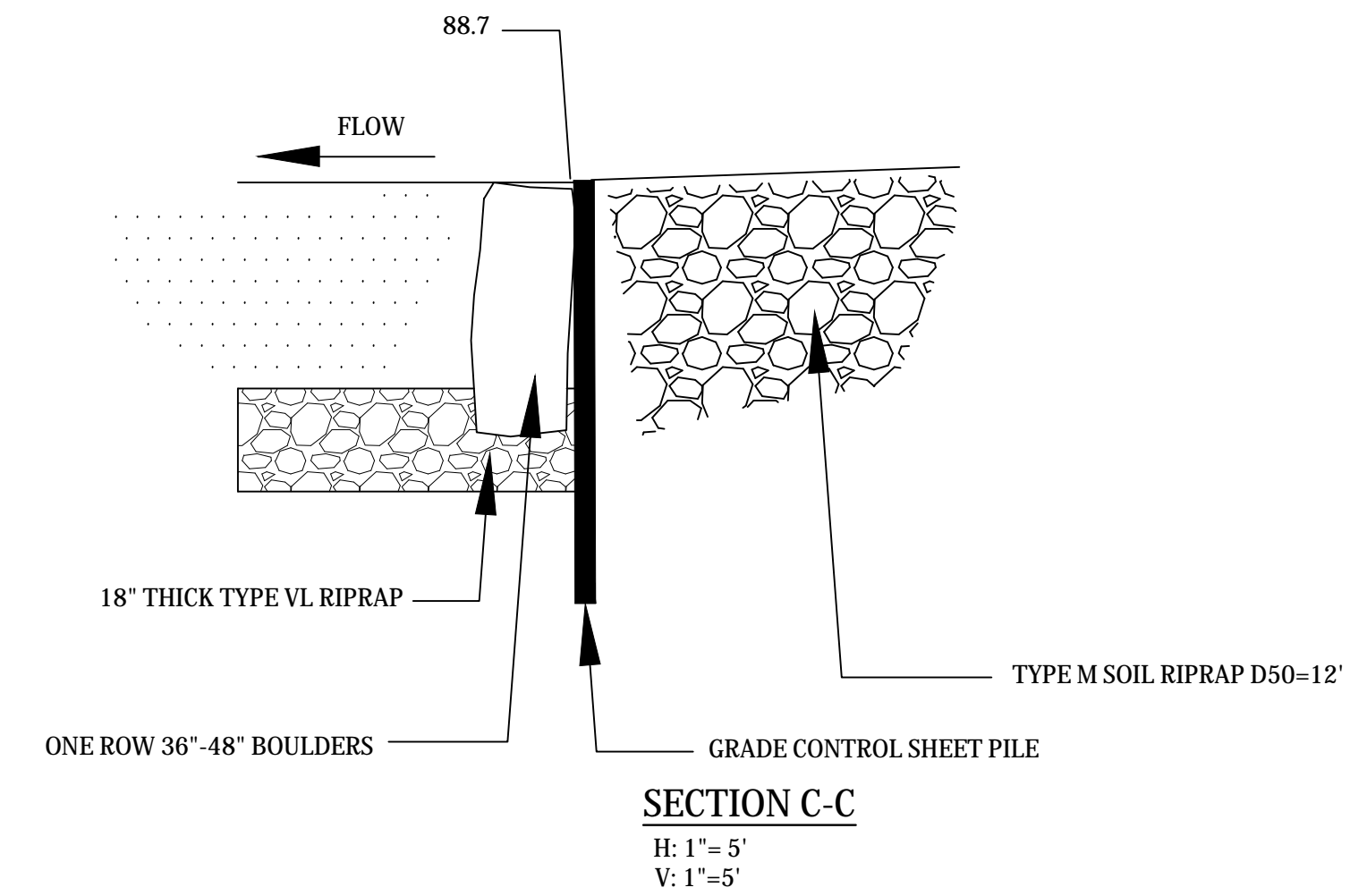
**STERLING RANCH DEVELOPMENT**  
**BRIARGATE BOULEVARD BRIDGE CONSTRUCTION PLANS**  
**3' DROP STRUCTURE B DETAILS**  
EL PASO COUNTY, COLORADO

Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**C302**

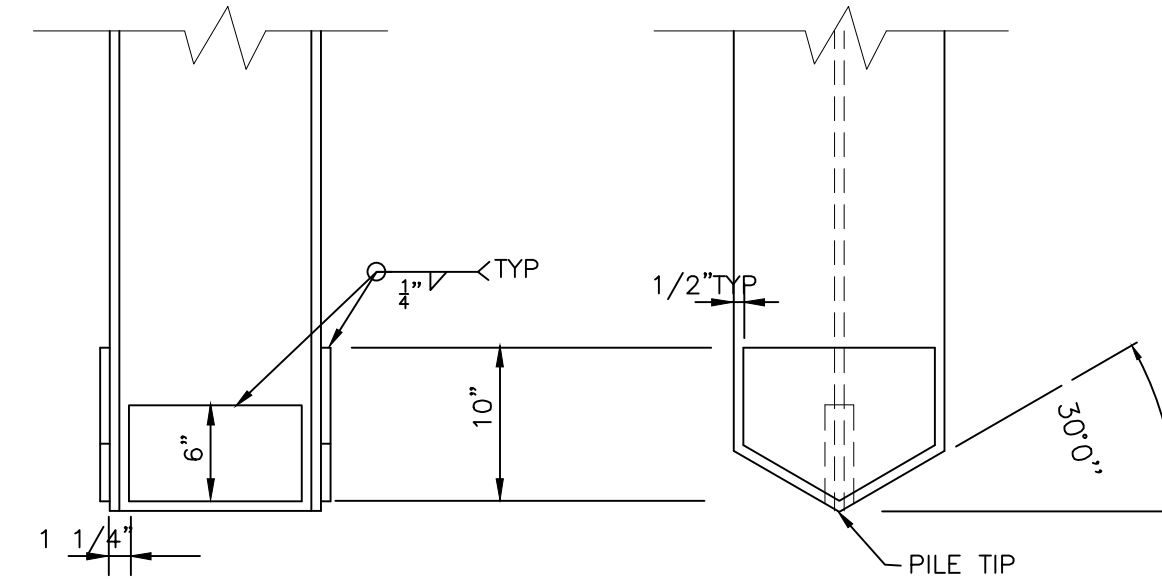


**GRADE CONTROL PILE DETAIL**



**SECTION C-C**

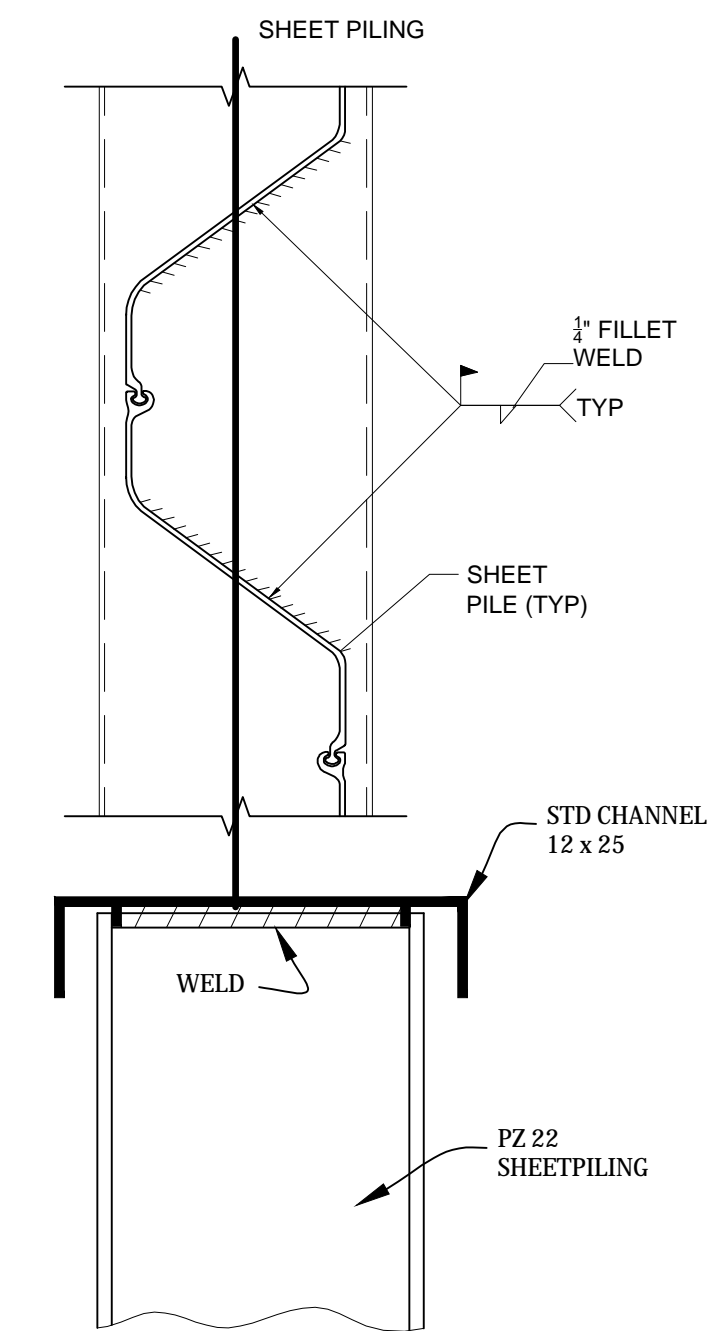
H: 1"=5'  
V: 1"=5'



**PILE TIP DETAIL**

NTS

AN APPROVED COMMERCIAL PILE MAY BE USED



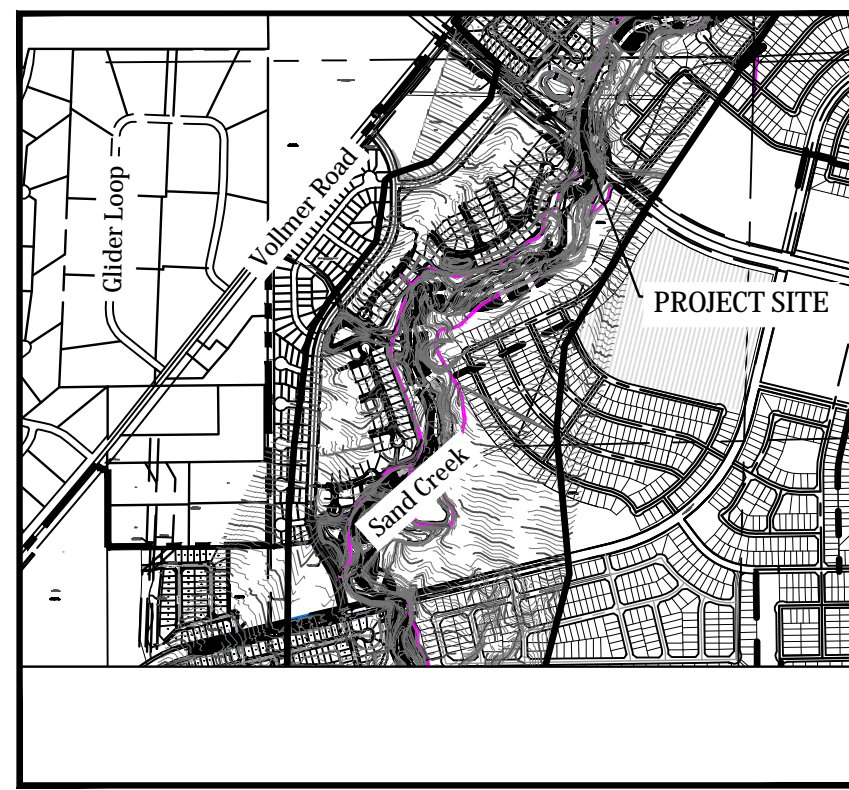
**SHEET PILE CAP DETAIL**

NTS

Project No.:	19032
Date:	12/6/21
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

# STERLING RANCH DEVELOPMENT BRIARGATE BOULEVARD BRIDGE GRADING & EROSION CONTROL PLANS

EL PASO COUNTY, COLORADO  
Kiowa Project No. 19032  
12/6/2021



VICINITY MAP  
SCALE: N.T.S.



## GENERAL NOTES

- Profile design lines are based on centerline, as shown, unless otherwise noted.
- All new construction to conform to the specifications of El Paso County Department of Public Works. Any asphalt removed is to be replaced to meet the specifications of the El Paso County Public Works Department.
- For pavement design, curb and gutter, and sidewalks see individual plan and profile sheets. Pavement design to be based on Resistance Value 'R' derived from Hveem tests and are to be approved by the Engineering Division of the El Paso County Planning and Community Development prior to work above subgrade.
- At intersections, all curb returns will have 20-foot radius unless otherwise noted.
- All existing utilities have been shown according to the best available information. The contractor is responsible for field location and verification prior to beginning work. If it appears that there could be a conflict with any utilities, whether indicated on the plans or not, the contractor is to notify the engineer and owner immediately. The contractor is responsible for the protection and repair (if necessary) of all utilities.
- A Pre-Construction meeting shall be held with the El Paso County Planning and Community Development prior to any construction.
- Approved plans, Engineering Criteria Manual, etc. is required to be on-site at all times during construction.
- All necessary permits, such as SWMP, ESQCP, Fugitive Dust, Access, C.O.E. 404, etc. shall be obtained prior to construction.
- All handicap ramps to be per El Paso County Standard SD\_2-40.
- The contractor shall coordinate locations and layout with the El Paso County Planning and Community Development on the placement of any pedestrian ramps prior to construction of the curb.
- Where appropriate, neatly saw cut all existing concrete and asphalt. Repair/replace all disturbed existing items with like materials and thicknesses.
- All disturbed areas shall be revegetated with native grasses within 21 days of excavation per Erosion Control Plan.
- The prepared Erosion/Sediment Control Plan is to be considered a part of these plans and its requirements adhered to during the construction of this project.
- All storm and sanitary sewer pipe lengths and slopes are figured from center of manhole or bend. Pipe lengths are given as a horizontal length.
- All storm sewer bedding to be per CDoT Standards.
- All storm sewer pipe shall be Class III B Wall unless otherwise shown on the storm sewer plan and profile sheets.
- All vyes and bends used in construction of storm sewer facilities shall be factory fabricated, unless approved by the El Paso County Planning and Community Development.
- Construction and materials used in all storm and sanitary sewer manholes shall be per specifications. Storm sewer radial deflections to be grouted or installed per manufacturer's recommendations.
- Storm sewer manholes sizes as follows unless otherwise shown:
  - 18" thru 36" use 48" I.D. manhole
  - 42" thru 48" use 60" I.D. manhole
  - 54" thru 60" use 72" I.D. manhole
 NOTE: Manhole sizes tabulated here shall be increased, if necessary, to accommodate incoming laterals.
- All horizontal stationing is based on the 'Face of Curb', unless otherwise shown.
- All vertical design and top of curb are based on the design point shown in the typical cross section.
- The curb line design point is located at the intersection of the face and top of curb for the Type III Standard 6-inch vertical curb. See typical street section for design point locations.
- Vertical curb to be used between curb returns (CR) and at curb inlets. Transitions from ramp to vertical curb shall be 10-feet unless otherwise approved by the El Paso County Public Services Department. All other curb & gutter to be ramp curb & gutter.
- Cross pans to be per El Paso County Standard Detail SD\_2-26.
- Curb returns shall be straight graded from CR to CR unless otherwise noted.
- Inlets are Type 'R' inlets (CDOT STD M-604-12) unless otherwise noted.

**BENCHMARK:**  
THE TOP OF AN ALUMINUM SURVEYORS CAP, STAMPED "8953"  
NORTHING = 411416.273  
EASTING = 235167.071  
ELEVATION = 7023.42

THE TOP OF RED PLASTIC SURVEYORS CAP, ILLEGIBLE  
NORTHING = 410095.404  
EASTING = 235052.131  
ELEVATION = 7000.40

THE TOP OF RED PLASTIC SURVEYORS CAP, STAMPED "38141"  
NORTHING = 411399.962  
EASTING = 233849.817  
ELEVATION = 7030.82

**BASIS OF BEARING**  
THE SOUTH LINE OF THE SOUTHWEST QUARTER (SW $\frac{1}{4}$ ) OF SECTION 34, TOWNSHIP 12 SOUTH, RANGE 65 WEST OF THE 6TH P.M. AS MONUMENTED AT THE SOUTHWEST CORNER OF SAID SOUTHWEST QUARTER (SW $\frac{1}{4}$ ) BY A 2-1/2" ALUMINUM CAP STAMPED "LS 11624" AND AT THE SOUTHEAST CORNER OF SAID SOUTHWEST QUARTER (SW $\frac{1}{4}$ ) BY A 2-1/2" ALUMINUM CAP STAMPED "LS 11624", SAID LINE BEARS N 89°14'14" E, A DISTANCE OF 2,722.56 FEET.



## EL PASO COUNTY STANDARD NOTES

- All drainage and roadway construction shall meet the standards and specifications of the City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes 1 and 2, and the El Paso County Engineering Criteria Manual.
- Contractor shall be responsible for the notification and field notification of all existing utilities, whether shown on the plans or not, before beginning construction. Location of existing utilities shall be verified by the contractor prior to construction. Call 811 to contact the Utility Notification Center of Colorado (UNCC).
- Contractor shall keep a copy of these approved plans, the Grading and Erosion Control Plan, the Stormwater Management Plan (SWMP), the soils and geotechnical report, and the appropriate design and construction standards and specifications at the job site at all times, including the following:
  - El Paso County Engineering Criteria Manual (ECM)
  - City of Colorado Springs/El Paso County Drainage Criteria Manual, Volumes 1 and 2
  - Colorado Department of Transportation (CDOT) Standard Specifications for Road and Bridge Construction
  - CDOT M & S Standards
- Notwithstanding anything depicted in these plans in words or graphic representation, all design and construction related to roads, storm drainage and erosion control shall conform to the standards and requirements of the most recent version of the relevant adopted El Paso County standards, including the Land Development Code, the Engineering Criteria Manual, the Drainage Criteria Manual, and the Drainage Criteria Manual Volume 2. Any deviations from regulations and standards must be requested, and approved, in writing. Any modifications necessary to meet criteria after-the-fact will be entirely the developer's responsibility to rectify.
- It is the design engineer's responsibility to accurately show existing conditions, both onsite and offsite, on the construction plans. Any modifications necessary due to conflicts, omissions, or changed conditions will be entirely the developer's responsibility to rectify.
- Contractor shall schedule a pre-construction meeting with El Paso County Planning and Community Development (PCD) - Inspections, prior to starting construction.
- It is the contractor's responsibility to understand the requirements of all jurisdictional agencies and to obtain all required permits, including but not limited to El Paso County Erosion and Stormwater Quality Control Permit (ESQCP), Regional Building Floodplain Development Permit, U.S. Army Corps of Engineers-issued 401 and/or 404 permits, and county and state fugitive dust permits.
- Contractor shall not deviate from the plans without first obtaining written approval from the design engineer and PCD. Contractor shall notify the design engineer immediately upon discovery of any errors or inconsistencies.
- All storm drain pipe shall be Class III RCP unless otherwise noted and approved by PCD.
- Contractor shall coordinate geotechnical testing per ECM standards. Pavement design shall be approved by El Paso County PCD prior to placement of curb and gutter and pavement.
- All construction traffic must enter/exit the site at approved construction access points.
- Sight visibility triangles as identified in the plans shall be provided at all intersections. Obstructions greater than 18 inches above flowline are not allowed within sight triangles.
- Signing and striping shall comply with El Paso County Department of Public Works and MUTCD criteria. [If applicable, additional signing and striping notes will be provided.]
- Contractor shall obtain any permits required by El Paso County Department of Public Works, including Work Within the Right-of-Way and Special Transport permits.
- The limits of construction shall remain within the property line unless otherwise noted. The owner/developer shall obtain written permission and easements, where required, from adjoining property owner(s) prior to any off-site disturbance, grading, or construction.

## STATEMENTS

### Design Engineer's Statement:

This grading and erosion control plan was prepared under my direction and supervision and is correct to the best of my knowledge and belief. Said plan has been prepared according to the criteria established by the County for grading and erosion control plans. I accept responsibility for any liability caused by any negligent acts, error or omissions on my part in preparing this plan.

\_\_\_\_\_  
Todd Cartwright, P.E. #33365 Date \_\_\_\_\_  
For and on behalf of Kiowa Engineering Corp.

### Owner/Developer's Statement:

I, the owner/developer have read and will comply with the requirements of the Grading and Erosion Control Plan.

\_\_\_\_\_  
James Morley Date \_\_\_\_\_  
Sterling Ranch Metropolitan District

### El Paso County:

County plan review is provided only for general conformance with County Design Criteria. The County is not responsible for the accuracy and adequacy of the design, dimensions, and/or elevations which shall be confirmed at the job site. The County through the approval of this document assumes no responsibility for completeness and/or accuracy of this document.

Filed in accordance with the requirements of the El Paso County Land Development Code, Drainage Criteria Manual Volumes 1 and 2, and Engineering Criteria Manual as amended.

In accordance with ECM Section 1.12, these construction documents will be valid for construction for a period of 2 years from the date signed by the El Paso County Engineer. If construction has not started within those 2 years the plans will need to be resubmitted for approval, including payment of review fees at the Planning and Community Development Directors discretion.

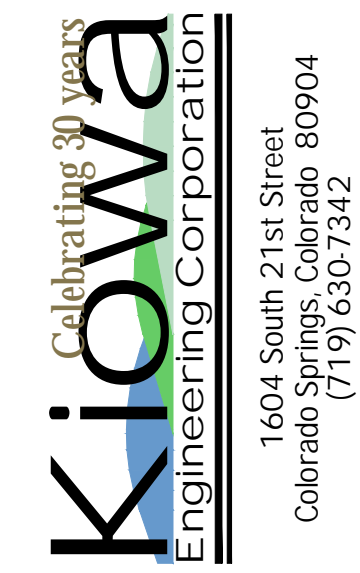
\_\_\_\_\_  
Jennifer Irvine, P.E. Date \_\_\_\_\_  
County Engineer / ECM Administrator

## INDEX OF SHEETS

GECO	GRADING & EROSION CONTROL COVER SHEET
GEC1	GRADING & EROSION CONTROL PLANS
GEC2	GEC NOTES AND SPECIFICATIONS
GEC3	GEC NOTES AND SPECIFICATIONS
GEC4	GEC NOTES AND SPECIFICATIONS

## ABBREVIATIONS

ASSY = ASSEMBLY	MIN. = MINIMUM
BNDY = BOUNDARY	NTS = NOT TO SCALE
BOP = BOTTOM OF PIPE	OD = OUTSIDE DIAMETER
CL = CENTERLINE	PP = POINT OF HORIZONTAL CURVATURE
CRA = CONCRETE REVERSE ANCHOR	PT = PROPOSED
CTRB = CONCRETE THRUST BLOCK	PH = POINT OF HORIZONTAL TANGENCY
CR = POINT OF CURB RETURN	PVC = POLY VINYL CHLORIDE PIPE
DIP = DUCTILE IRON PIPE	PVC = POINT OF VERTICAL CURVATURE
EL = ELEVATION	PVI = POINT OF VERTICAL INTERSECTION
ESMT = EASEMENT	PVT = POINT OF VERTICAL TANGENCY
EX. = EXISTING	RCB = REINFORCED CONCRETE BOX
FC = FACE OF CURB	RCP = REINFORCED CONCRETE PIPE
FES = FLARED END SECTION	ROW = RIGHT OF WAY
FLG = FLANGE	RT = RIGHT
FL = FLOWLINE	SHT = SHEET
GB = GRADE BREAK	SS = SANITARY SEWER
HP = HIGH POINT	STA = STATION
HORIZ = HORIZONTAL	STD = STANDARD
HYD = HYDRANT	TA = TOP OF ASPHALT
I.D. = INSIDE DIAMETER	TC = TOP OF CURB
LT = LEFT	TOP = TOP OF PIPE
LF = LINEAR FEET	TOR = TOP OF ROCK
LP = LOW POINT	TYP = TYPICAL
MAX = MAXIMUM	VC = VERTICAL CURVE
MH = MANHOLE	VERT = VERTICAL



STERLING RANCH DEVELOPMENT  
BRIARGATE BOULEVARD BRIDGE GRADING & EROSION CONTROL PLANS  
COVER SHEET  
EL PASO COUNTY, COLORADO

Project No.: 19032

Date: 12/6/2021

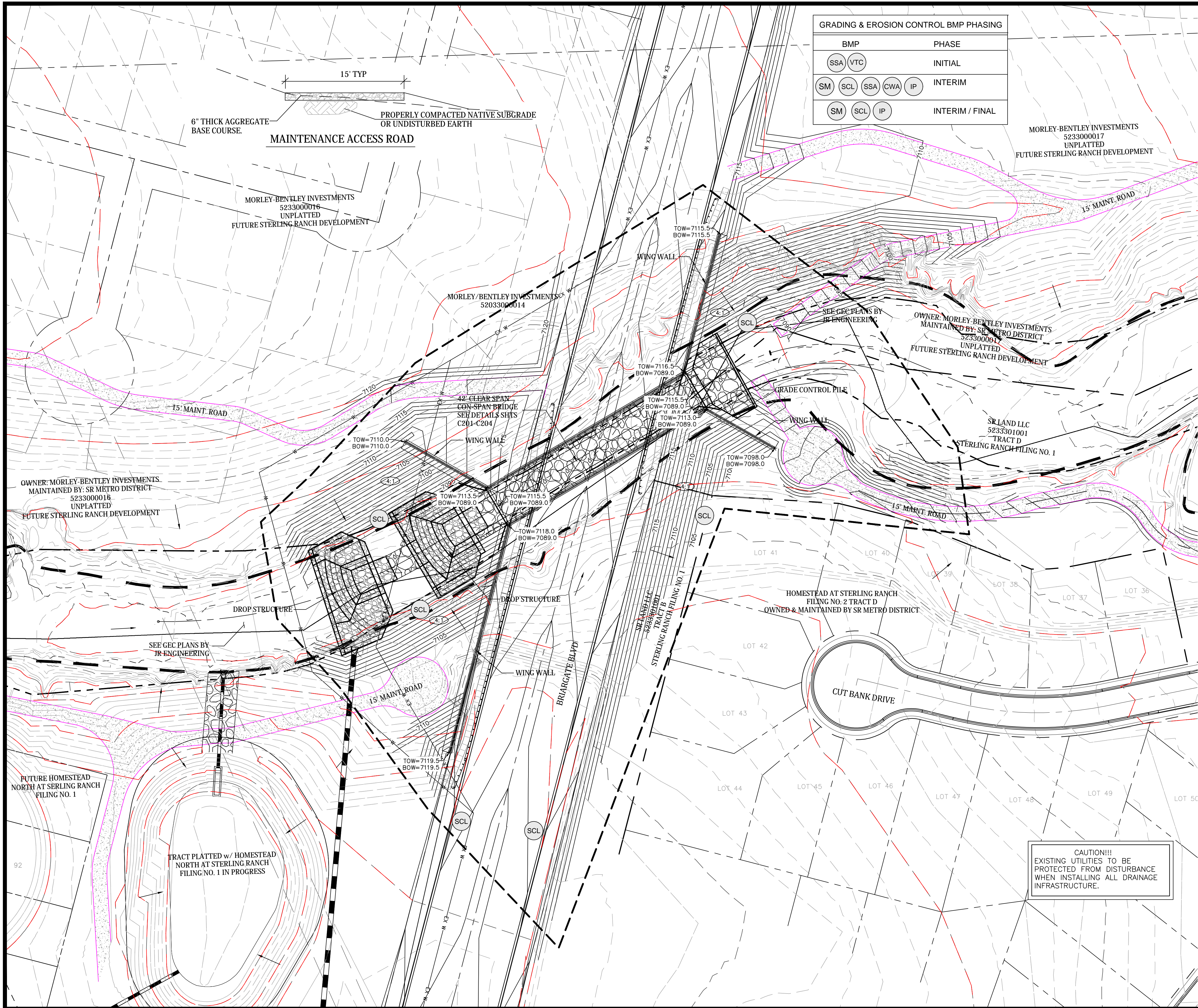
Design: TAC

Drawn: PAV

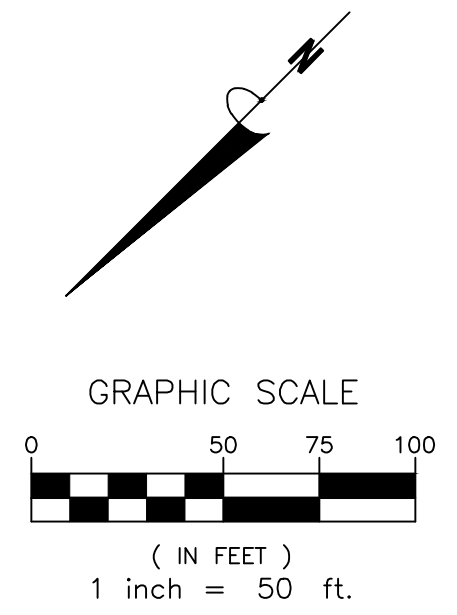
Check:

Revisions:

GECO



GRADING & EROSION CONTROL BMP PHASING	
BMP	PHASE
(SSA) (VTC)	INITIAL
(SM) (SCL) (SSA) (CWA) (IP)	INTERIM
(SM) (SCL) (IP)	INTERIM / FINAL



- LEGEND**
- (VTC) VEHICLE TRACKING CONTROL
  - (IP) INLET PROTECTION
  - (CWA) CONCRETE WASHOUT AREA
  - (SCL) SEDIMENT CONTROL LOGS
  - (SSA) STABILIZED STAGING AREA
  - (SM) SEED AND MULCH
  - (TRM) TURF REINFORCEMENT MAT
  - (ECB) EROSION CONTROL BLANKET
  - (TOR) TOP OF SOIL/RIPRAP
  - - - LIMITS OF GRADING & CONSTRUCTION
  - - - EXISTING FEMA 100 YEAR FLOODPLAIN
  - - - PROFILE CENTERLINE
  - - - PROPERTY LINE

- BANK LINING LEGEND**
- [Pattern] GROUTED BOULDER 36"-48"
  - [Pattern] TYPE M SOIL RIPRAP D50-12"
  - [Pattern] TURF REINFORCED MAT
  - [Pattern] WETLAND MITIGATION VEGETATION
  - [Arrow] FLOW DIRECTION

- NOTES:**
- CONTRACTOR TO IDENTIFY MATERIAL AND SOIL STOCKPILES AREA ON THE SWMP PRIOR TO THE COMMENCEMENT OF MOBILIZATION AND PROVIDE PERIMETER CONTROL CONSTRUCTION FENCE. CONTRACTOR SHALL IDENTIFY STABILIZED STAGING AREA ON THE PLAN. THE LOCATION OF VEHICLE AND EQUIPMENT STORAGE AND MAINTENANCE, STORAGE AREAS FOR FERTILIZERS AND PESTICIDES, ON SITE WASTE MANAGEMENT MEASURES SUCH AS PORTOLETS, TRASH ROLL-OFF AND CONCRETE TRUCK AND EQUIPMENT WASHING AREA PRIOR TO THE COMMENCEMENT OF LAND DISTURBING ACTIVITIES.
  - CONTRACTOR TO IDENTIFY STABILIZED STAGING AREA PRIOR TO THE COMMENCEMENT OF MOBILIZATION.
  - CONSTRUCTION FENCING SHALL BE PROVIDED AT LIMITS OF GRADING/CONSTRUCTION AS PART OF THE INSTALLATION OF THE INITIAL BMPs.
  - CONTRACTOR SHALL PROVIDE CONSTRUCTION FENCING AROUND AREAS TO REMAIN UNDISTURBED BUT WITHIN LIMITS OF GRADING.
  - VEHICLE TRACKING BMPs FOR THIS PROJECT WILL BE LOCATED OFFSITE FROM THE WORK SHOWN ON THESE PLANS. VEHICLE TRACKING OFFSITE FROM THE PROJECT SHALL BE MAINTAINED CONTINUOUSLY THROUGHOUT THE PERIOD OF CONSTRUCTION.
  - THERE WILL BE NO DEDICATED ASPHALT OR CONCRETE BATCH PLANS REQUIRED FOR THIS PROJECT.
  - EXISTING VEGETATION IS MAINLY GRASSES AND HERBS WITH SMALLER AMOUNTS OF SHRUBS. EXISTING VEGETATION IS ESTIMATED AT 80%. BUT CONTRACTOR SHALL FIELD VERIFY PRIOR TO CONSTRUCTION.
  - CONTRACTOR TO ESTABLISH CUT/FILL AREAS IN ACCORDANCE WITH PROPOSED GRADING IN PLANS.

**CAUTION!!!**  
EXISTING UTILITIES TO BE PROTECTED FROM DISTURBANCE WHEN INSTALLING ALL DRAINAGE INFRASTRUCTURE.

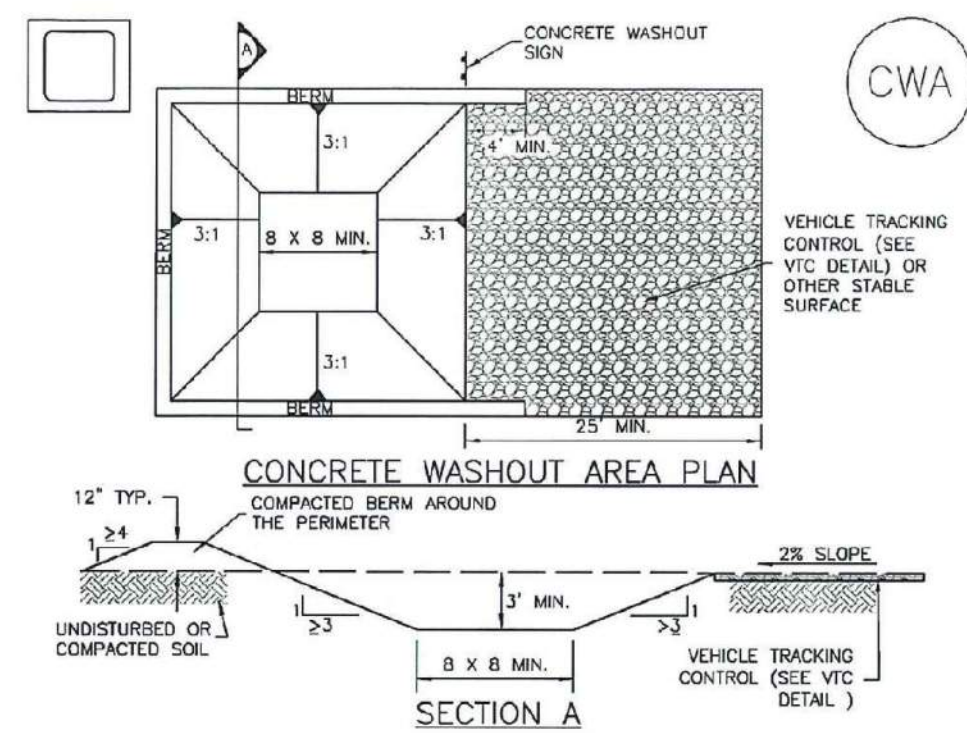
Celebrating 30 years  
**Kiowa**  
 Engineering Corporation  
 1604 South 21st Street  
 Colorado Springs, Colorado 80904  
 (719) 630-7342

**STERLING RANCH DEVELOPMENT**  
**BRIARGATE BOULEVARD BRIDGE GRADING & EROSION CONTROL PLANS**  
**GRADING AND EROSION CONTROL PLAN**  
 EL PASO COUNTY, COLORADO

Project No.:	19032
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GEC1

Concrete Washout Area (CWA) MM-1



CWA-1. CONCRETE WASHOUT AREA

CWA INSTALLATION NOTES

- SEE PLAN VIEW FOR CWA INSTALLATION LOCATION.
- DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE SOILS EXIST ON SITE, THE CWA MUST BE INSTALLED WITH AN IMPERMEABLE LINER (16 MIL MIN. THICKNESS) OR SURFACE STORAGE ALTERNATIVES USING PREFABRICATED CONCRETE WASHOUT DEVICES OR A LINED ABOVE GROUND STORAGE ARE SHOULD BE USED.
- THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.
- CWA SHALL INCLUDE A FLAT SUBSURFACE PIT THAT IS AT LEAST 8' BY 8' SLOPES LEADING OUT OF THE SUBSURFACE PIT SHALL BE 3:1 OR FLATTER. THE PIT SHALL BE AT LEAST 3' DEEP.
- BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.
- VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.
- SIGNS SHALL BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CWA, AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CWA TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS.
- USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

MM-1 Concrete Washout Area (CWA)

CWA MAINTENANCE NOTES

- INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
  - FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  - WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  - THE CWA SHALL BE REPAIRED, CLEANED, OR ENLARGED AS NECESSARY TO MAINTAIN CAPACITY FOR CONCRETE WASTE. CONCRETE MATERIALS ACCUMULATED IN PIT, SHALL BE REMOVED ONCE THE MATERIALS HAVE REACHED A DEPTH OF 2'.
  - CONCRETE WASHOUT WATER, WASTED PIECES OF CONCRETE AND ALL OTHER DEBRIS IN THE SUBSURFACE PIT SHALL BE TRANSPORTED FROM THE JOB SITE IN A WATER-TIGHT CONTAINER AND DISPOSED OF PROPERLY.
  - THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
  - WHEN THE CWA IS REMOVED, COVER THE DISTURBED AREA WITH TOP SOIL, SEED AND MULCH OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.
- (DETAIL ADAPTED FROM DOUGLAS COUNTY, COLORADO AND THE CITY OF PARKER, COLORADO, NOT AVAILABLE IN AUTOCAD).  
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

PROJECT SPECIFIC GRADING AND EROSION CONTROL NOTES

- All earthwork required of this construction shall be completed in accordance with all applicable sections of the Project Specifications and Soil Investigation Report (Geotechnical Report).
- Rubbish including timber, concrete rubble, trees, brush, and asphalt shall not be backfilled adjacent to any of the structures or be in the placement of any unclassified fill. The Contractor shall be responsible for the removal and hauling of such materials to a suitable spoil area. Costs associated with the removal of such materials shall be paid for as documented in the Project Specifications.
- Excess excavation shall become the property of the Contractor and shall be disposed of at the Contractor's expense. The cost of haulage and spoiling of excess excavated materials shall be paid for as documented in the Project Specifications.
- Water shall be used as a dust palliative as required and shall be included in the cost for earthwork item(s). No separate payment will be made for dust control associated with the site construction.
- The road grades shall be cleared of vegetation and the topsoil stockpiled for later use.
- All grading shall be in conformance with the Geotechnical Report for the area.
- Placement of fill for roadway embankments shall be completed in conformance with the Geotechnical Report.
- Grading contours shown on this plan are to final grade.
- Compaction under filled areas, including roadway and detention basin embankments, shall be 95 percent of the maximum Standard Proctor Density (ASTM D698) at two (2) percent of optimum moisture content.
- No rubble or debris shall be placed in the backfill under any of the proposed buildings, streets, curb & gutter, sidewalk and drainage structures or within five (5) feet of a building footprint. Properly graded rubble may be used in some locations as specified and verified by the Geotechnical Engineer.
- Contractor is responsible for reviewing the site prior to bidding to verify site conditions.
- Contractor is responsible for providing erosion control measures as approved by the El Paso County PCD Engineering Division and as may be required by the El Paso County Inspector.
- All slopes equal to or greater than 3:1 shall require anchored soil retention blanket (SRB), Geocor 700 or equal.
- The Developer is responsible for maintaining erosion control measures until a mature stage of vegetation is established.
- All soils used for fill must be approved by a representative of the Geotechnical Engineer.
- All natural ground to receive fill must be properly scarified, watered and compacted prior to placing fill.
- The Contractor is solely responsible for the design, maintenance and operation of any required dewatering system. The Contractor shall perform such independent investigation as he deems necessary to satisfy himself as to the subsurface groundwater conditions and unstable soil conditions to be encountered throughout the construction. Contractor shall coordinate the dewatering system with El Paso County when associated with public facilities.
- No fill shall be placed, spread or rolled while it is frozen, thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until a representative of the Geotechnical Engineer indicates that the moisture content and density of the previously placed fill are as specified. Fill surfaces may be scarified and recompact after rainfall if necessary, to obtain proper moisture density relation.
- Additional erosion control structures and/or grading may be required at the time of construction.
- Sediment removal for erosion control facilities shall be performed continuously for proper function.
- Base mapping was provided by MS Civil Engineers The date of the last survey update was 2019.
- Proposed Construction Schedule:  
Begin Construction: pending  
End Construction: pending  
Total Site Area = 60 Acres  
Area to be disturbed = 47.3 Acres (est.)  
Existing 100-year runoff coefficient = 0.25  
Proposed 100-year runoff coefficient = 0.25  
Existing Hydrologic Soil Groups: HSG A & B  
Site is currently undeveloped and covered with native grasses on mild to moderate to steep slopes (1%-4%).
- Site is located in the Sand Creek Drainage Basin.

Riprap Designation	% Smaller than Given Size by Weight	Intermediate Rock Dimension (inches)	d <sub>50</sub> * (inches)
Type VL	70-100 50-70 35-50 2-10	12 9 6 2	6**
Type L	70-100 50-70 35-50 2-10	15 12 9 3	9**
Type M	70-100 50-70 35-50 2-10	21 18 12 4	12**

\* d<sub>50</sub>=Mean Particle Size (Intermediate Dimension) by weight.  
\*\* Mix VL, L AND M Riprap with 35% Topsoil (by Volume) and bury with 4-6 inches of Topsoil, all vibration compacted & revegetate.  
(Table M0-7: Classification and Gradation of Ordinary Riprap. UDFCD, Drainage Criteria Manual, Vol. 1)

SEEDING AND MULCHING INSTALLATION NOTES

- 1. SEE PLAN VIEW FOR: AREA OF SEEDING AND MULCHING. TYPE OF SEED MIX. ALL BRANDS FURNISHED SHALL BE FREE FROM SUCH NOXIOUS SEEDS AS RUSSIAN OR CANADIAN THISTLE, COARSE FESCUE, EUROPEAN BINDWEED, JOHNSON GRASS, KNAP WEED AND LEAFY SPURGE.

SEEDING AND MULCH NTS

SEEDING AND MULCHING MAINTENANCE NOTES

- 1. SEEDED AND MULCHED AREAS SHALL BE INSPECTED FOR REQUIRED COVERAGE MONTHLY FOR A PERIOD OF TWO YEARS FOLLOWING INITIAL SEEDING. REPAIRS AND RE-SEEDING AND MULCHING SHALL BE UNDERTAKEN AFTER THE FIRST GROWING SEASON FOR ANY AREAS FAILING TO MEET THE REQUIRED COVERAGE.

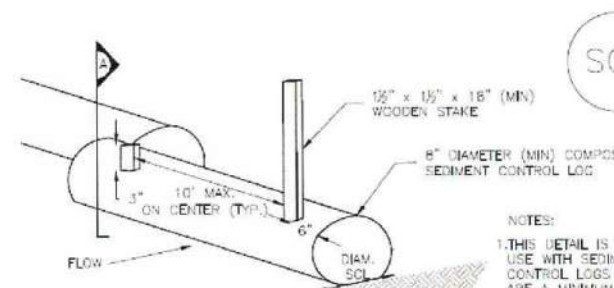
SEED MIX table with columns for SPECIES and lbs/acre. Includes species like Pasoppyrum smithii, Bouteloua curtipendula, and Elymus trachycarpus.

Standard Notes for El Paso County Grading and Erosion Control Plans

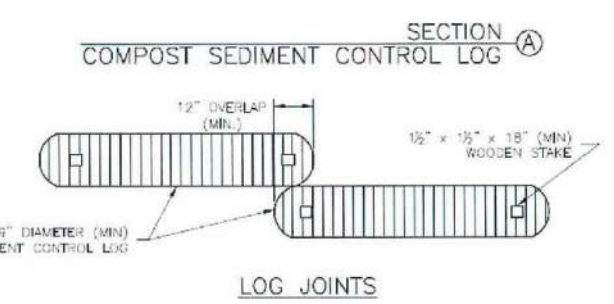
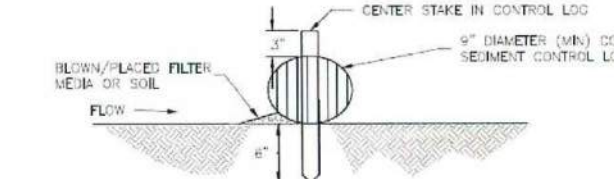
Revised 7/02/19

- 1. Stormwater discharges from construction sites shall not cause or threaten to cause pollution, contamination, or degradation of State Waters. All work and earth disturbance shall be done in a manner that minimizes pollution of any on-site or off-site waters, including wetlands.

SC-2 Sediment Control Log (SCL)

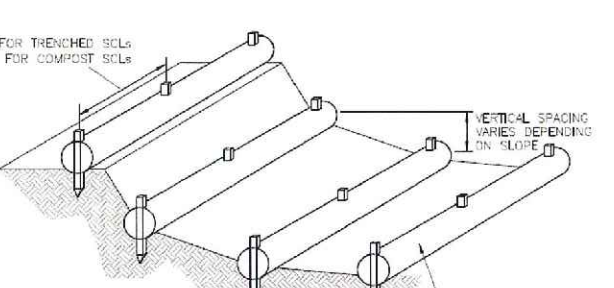


COMPOST SEDIMENT CONTROL LOG (WEIGHTED)



SCL-2 COMPOST SEDIMENT CONTROL LOG (WEIGHTED)

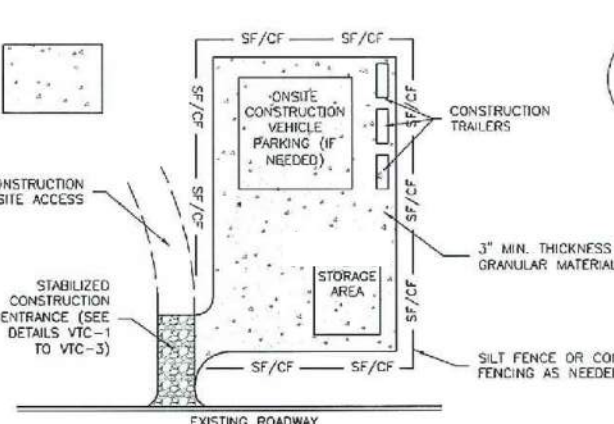
Sediment Control Log (SCL) SC-2



SCL-3 SEDIMENT CONTROL LOGS TO CONTROL SLOPE LENGTH

SCL-4 Urban Drainage and Flood Control District November 2015

Stabilized Staging Area (SSA) SM-6



SSA-1 STABILIZED STAGING AREA

- 1. SEE PLAN VIEW FOR: LOCATION OF STAGING AREA(S). CONTINGENT AND ACCESS LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.

November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SSA-3

Stabilized Staging Area (SSA) SM-6

- 5. STABILIZED STAGING AREA SHALL BE DELIMITED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.

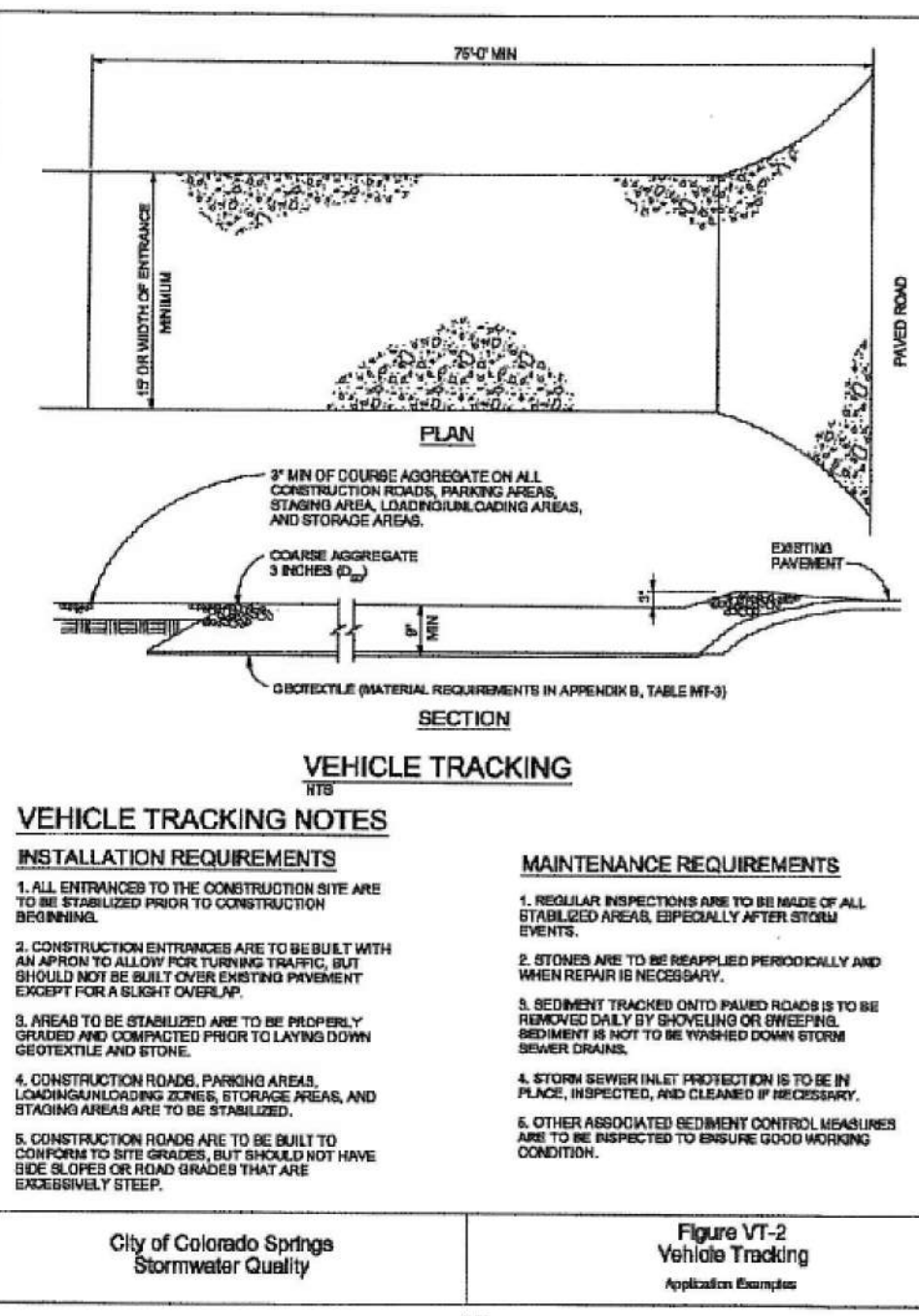
November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 SSA-4

SC-2 Sediment Control Log (SCL)

- SEEDING AND MULCHING MAINTENANCE NOTES

- SEEDING AND MULCHING INSTALLATION NOTES

SCL-6 Urban Drainage and Flood Control District November 2015



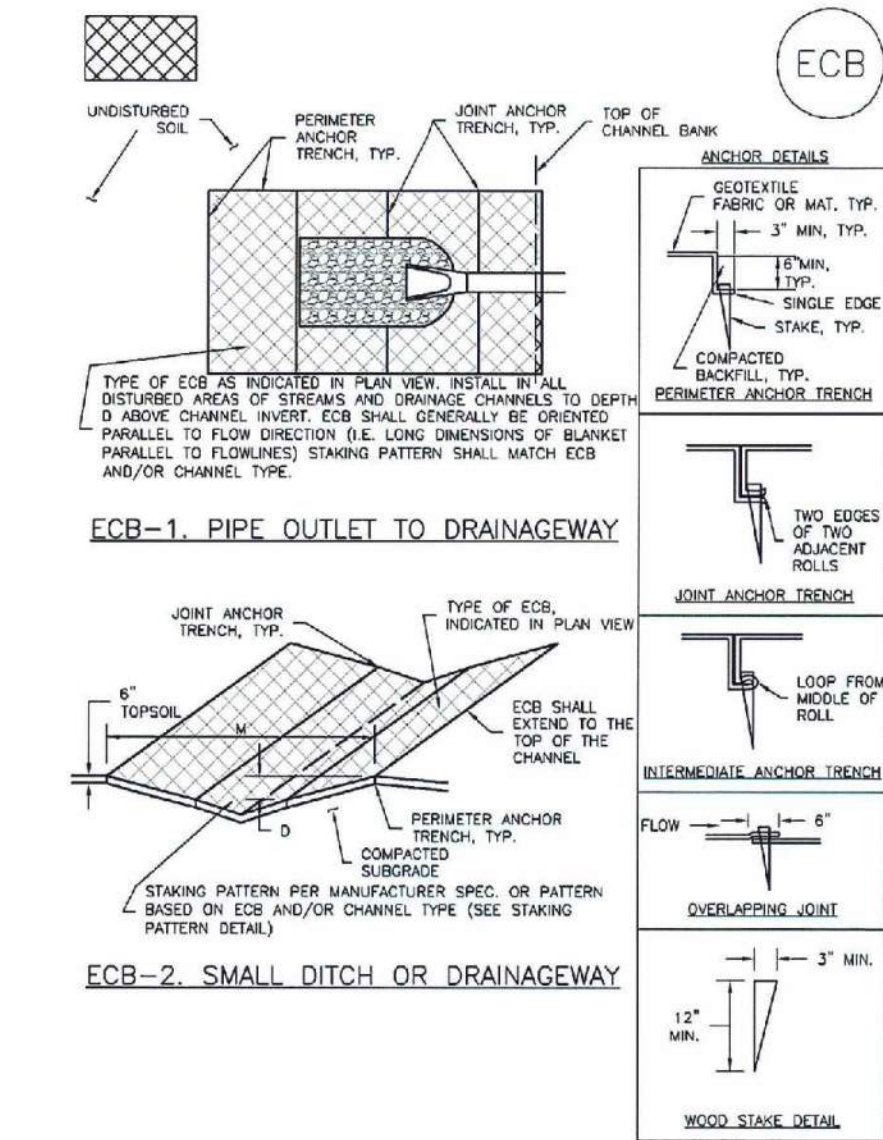
City of Colorado Springs Stormwater Quality Figure VI-2 Vehicle Tracking Application Examples

Kiowa Engineering Corporation logo and contact information: 1604 South 21st Street, Colorado Springs, Colorado 80904, (719) 630-7342

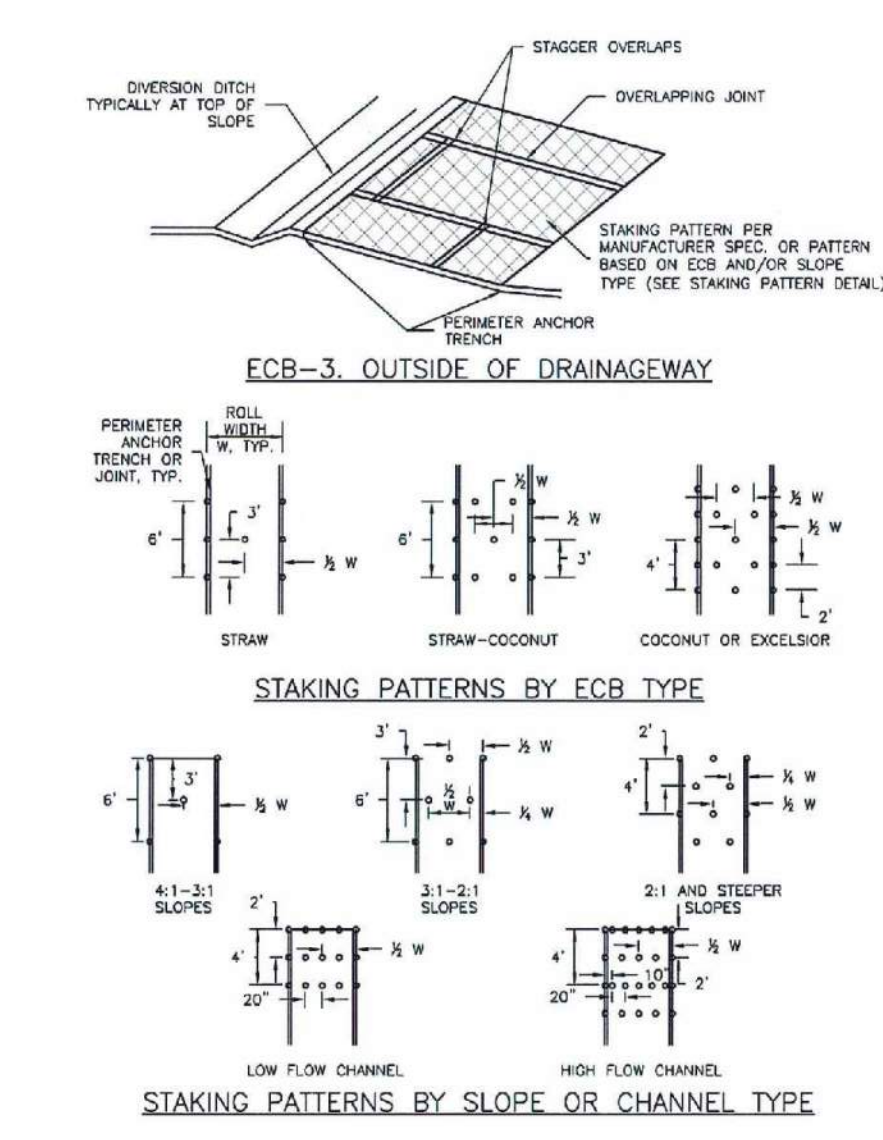
STERLING RANCH DEVELOPMENT BRIARGATE BOULEVARD BRIDGE GRADING & EROSION CONTROL PLANS NOTES AND SPECIFICATIONS ELPASO COUNTY, COLORADO

Table with project metadata: Project No.: 19032, Date: 12/6/2021, Design: TAC, Drawn: PAV, Check: , Revisions:

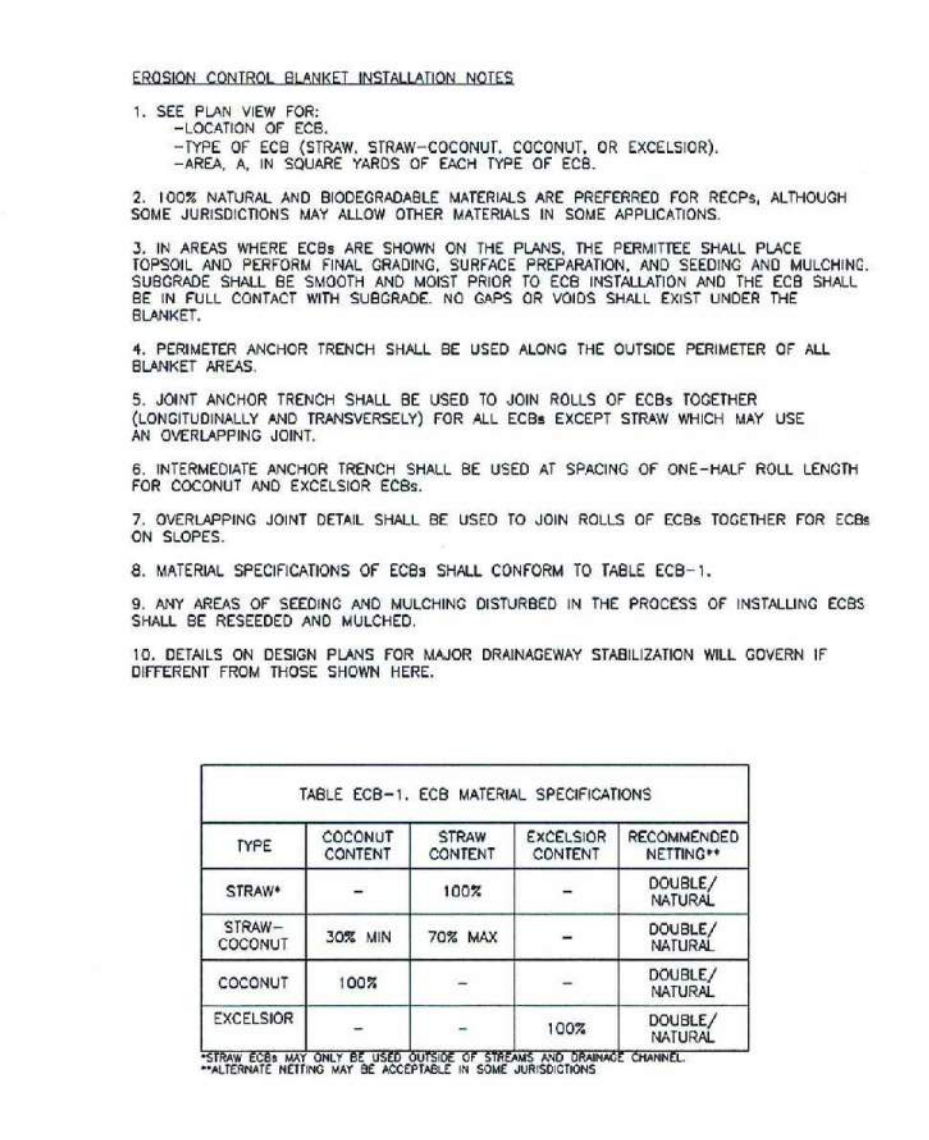
GEC3



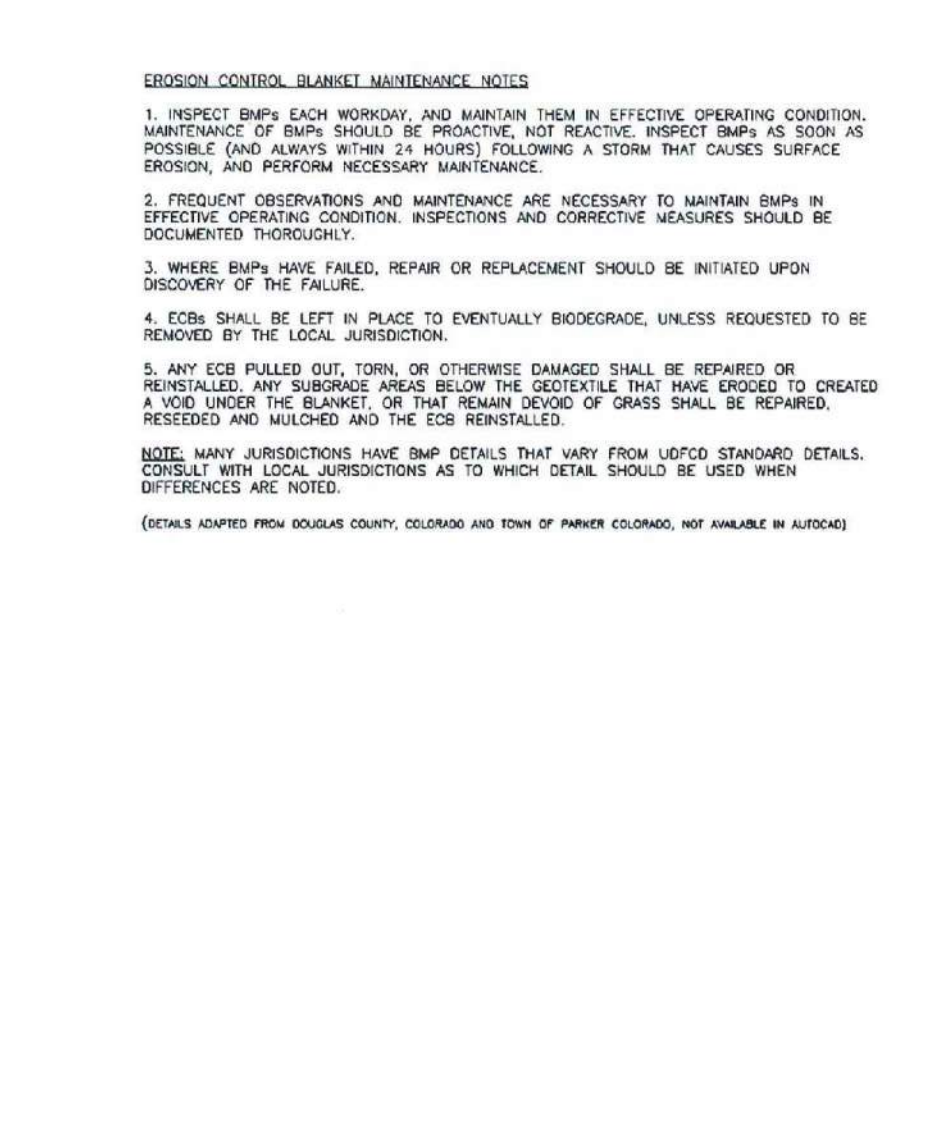
RECP-6 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010



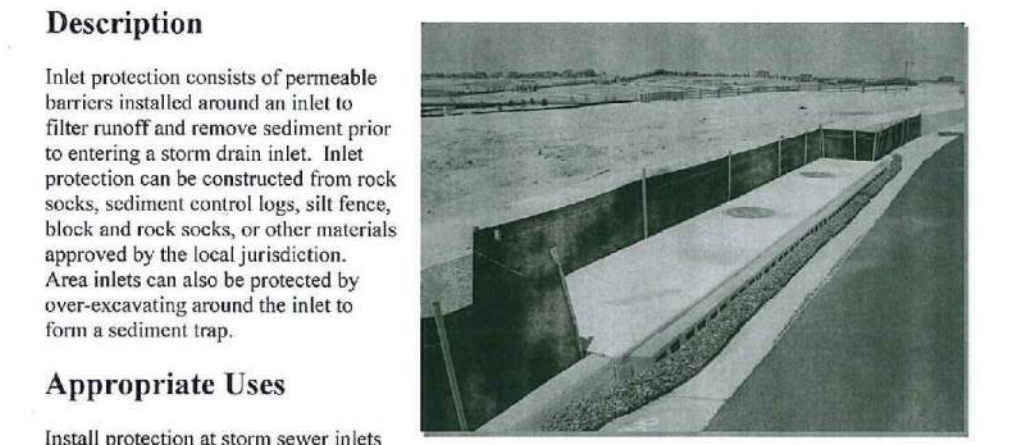
November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 RECP-7



RECP-8 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 November 2010



November 2010 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 RECP-9



**Description**  
Inlet protection consists of permeable barriers installed around an inlet to filter runoff and remove sediment prior to entering a storm drain inlet. Inlet protection can be constructed from rock socks, sediment control logs, silt fence, block and rock socks, or other materials approved by the local jurisdiction. Area inlets can also be protected by over-excavating around the inlet to form a sediment trap.

**Appropriate Uses**  
Install protection at storm sewer inlets that are operable during construction. Consider the potential for tracked-out sediment or temporary stockpile areas to contribute sediment to inlets when determining which inlets must be protected. This may include inlets in the general proximity of the construction area, not limited to downgradient inlets. Inlet protection is not a stand-alone BMP and should be used in conjunction with other upgradient BMPs.

**Design and Installation**  
To function effectively, inlet protection measures must be installed to ensure that flows do not bypass the inlet protection and enter the storm drain without treatment. However, designs must also enable the inlet to function without completely blocking flows into the inlet in a manner that causes localized flooding. When selecting the type of inlet protection, consider factors such as type of inlet (e.g., curb or area, ramp or on-grade conditions), traffic, anticipated flows, ability to secure the BMP properly, safety and other site-specific conditions. For example, block and rock socks will be better suited to a curb and gutter along a roadway, as opposed to silt fence or sediment control logs, which cannot be properly secured in a curb and gutter setting, but are effective area inlet protection measures.

Several inlet protection designs are provided in the Design Details. Additionally, a variety of proprietary products are available that may be approved for use by local governments. If proprietary products are used, design details and installation procedures from the manufacturer must be followed. Regardless of the type of inlet protection selected, inlet protection is most effective when combined with other BMPs such as curb socks and check dams. Inlet protection is often the last barrier before runoff enters the storm sewer or receiving water.

Design details with notes are provided for these forms of inlet protection:

	Inlet Protection (various forms)	
IP-1. Block and Rock Sock Inlet Protection for Sump or On-grade Inlets	Erosion Control	No
	Sediment Control	Yes
IP-2. Curb (Rock) Socks Upstream of Inlet Protection, On-grade Inlets	Site/Material Management	No

August 2013 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 IP-1

- IP-3. Rock Sock Inlet Protection for Sump/Area Inlet
  - IP-4. Silt Fence Inlet Protection for Sump/Area Inlet
  - IP-5. Over-excavation Inlet Protection
  - IP-6. Straw Bale Inlet Protection for Sump/Area Inlet
  - CIP-1. Culvert Inlet Protection
- Proprietary inlet protection devices should be installed in accordance with manufacturer specifications. More information is provided below on selecting inlet protection for sump and on-grade locations.

**Inlets Located in a Sump**  
When applying inlet protection in sump conditions, it is important that the inlet continue to function during larger runoff events. For curb inlets, the maximum height of the protective barrier should be lower than the top of the curb opening to allow overflow into the inlet during larger storms without excessive localized flooding. If the inlet protection height is greater than the curb elevation, particularly if the filter becomes clogged with sediment, runoff will not enter the inlet and may bypass it, possibly causing localized flooding, public safety issues, and downstream erosion and damage from bypassed flows.

Area inlets located in a sump setting can be protected through the use of silt fence, concrete block and rock socks (on paved surfaces), sediment control logs/straw wattles embedded in the adjacent soil and stacked around the area inlet (on gravel surfaces), over-excavation around the inlet, and proprietary products providing equivalent functions.

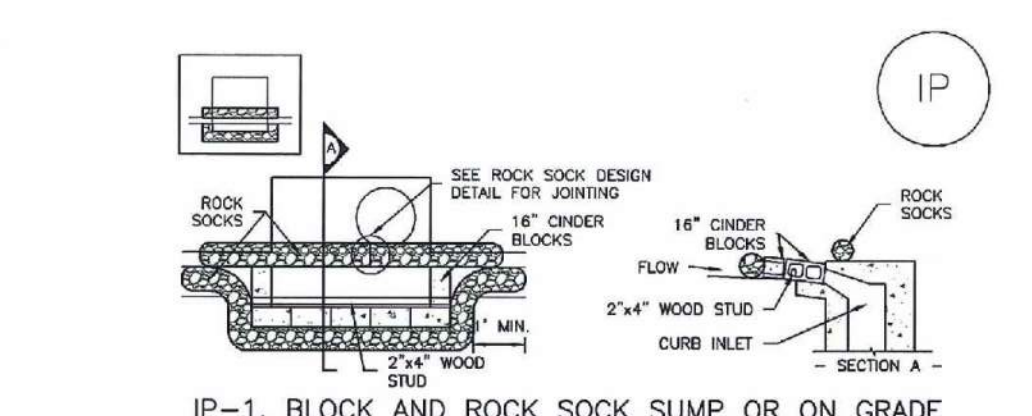
**Inlets Located on a Slope**  
For curb and gutter inlets on paved sloping streets, block and rock sock inlet protection is recommended in conjunction with curb socks in the gutter leading to the inlet. For inlets located along unpaved roads, also see the Check Dam Fact Sheet.

- Maintenance and Removal**  
Inspect inlet protection frequently. Inspection and maintenance guidance includes:
- Inspect for tears that can result in sediment directly entering the inlet, as well as result in the contents of the BMP (e.g., gravel) washing into the inlet.
  - Check for improper installation resulting in untreated flows bypassing the BMP and directly entering the inlet or bypassing to an unprotected downstream inlet. For example, silt fence that has not been properly trenched around the inlet can result in flows under the silt fence and directly into the inlet.
  - Look for displaced BMPs that are no longer protecting the inlet. Displacement may occur following larger storm events that wash away or reposition the inlet protection. Traffic or equipment may also crush or displace the BMP.
  - Monitor sediment accumulation upgradient of the inlet protection.

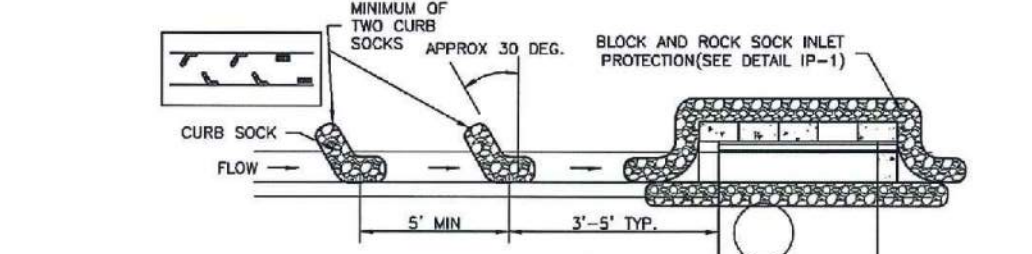
IP-2 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 August 2013

- Remove sediment accumulation from the area upstream of the inlet protection, as needed to maintain BMP effectiveness, typically when it reaches no more than half the storage capacity of the inlet protection. For silt fence, remove sediment when it accumulates to a depth of no more than 6 inches. Remove sediment accumulation from the area upstream of the inlet protection as needed to maintain the functionality of the BMP.
  - Proprietary inlet protection devices should be inspected and maintained in accordance with manufacturer specifications. If proprietary inlet insert devices are used, sediment should be removed in a timely manner to prevent devices from breaking and spilling sediment into the storm drain.
- Inlet protection must be removed and properly disposed of when the drainage area for the inlet has reached final stabilization.

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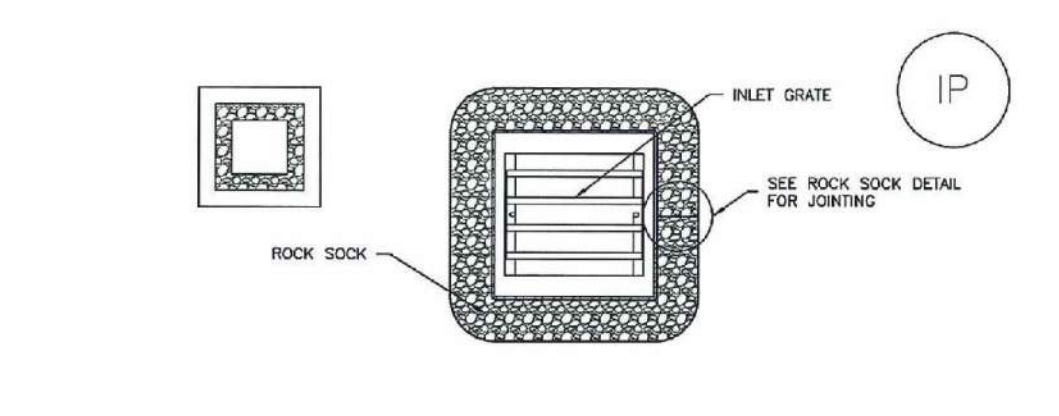


- BLOCK AND CURB SOCK INLET PROTECTION INSTALLATION NOTES**
- SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
  - CONCRETE "CINDER" BLOCKS SHALL BE LAID ON THEIR SIDES AROUND THE INLET IN A SINGLE ROW, ABUTTING ONE ANOTHER WITH THE OPEN END FACING AWAY FROM THE CURB.
  - GRAVEL BAGS SHALL BE PLACED AROUND CONCRETE BLOCKS, CLOSELY ABUTTING ONE ANOTHER AND JOINED TOGETHER IN ACCORDANCE WITH ROCK SOCK DESIGN DETAIL.

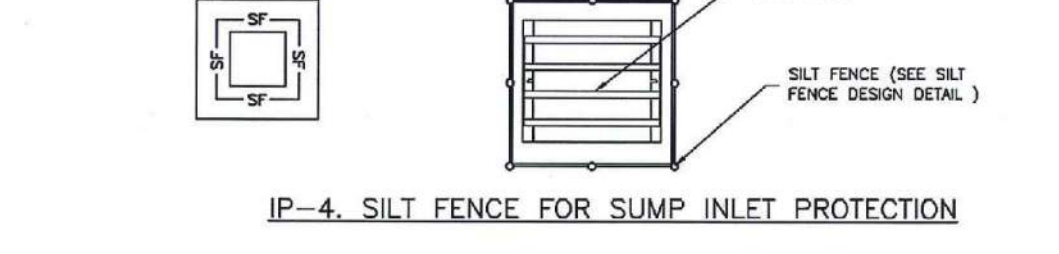


- CURB ROCK SOCK INLET PROTECTION INSTALLATION NOTES**
- SEE ROCK SOCK DESIGN DETAIL INSTALLATION REQUIREMENTS.
  - PLACEMENT OF THE SOCK SHALL BE APPROXIMATELY 30 DEGREES FROM PERPENDICULAR IN THE OPPOSITE DIRECTION OF FLOW.
  - SOCKS ARE TO BE FLUSH WITH THE CURB AND SPACED A MINIMUM OF 5 FEET APART.
  - AT LEAST TWO CURB SOCKS IN SERIES ARE REQUIRED UPSTREAM OF ON-GRADE INLETS.

IP-4 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 August 2013

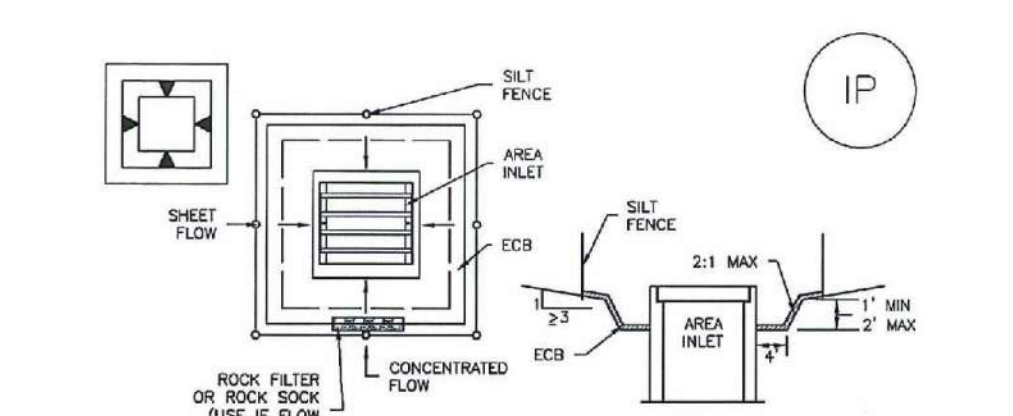


- ROCK SOCK SUMP/AREA INLET PROTECTION INSTALLATION NOTES**
- SEE ROCK SOCK DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
  - STRAW MATS/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF ROCK SOCKS FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

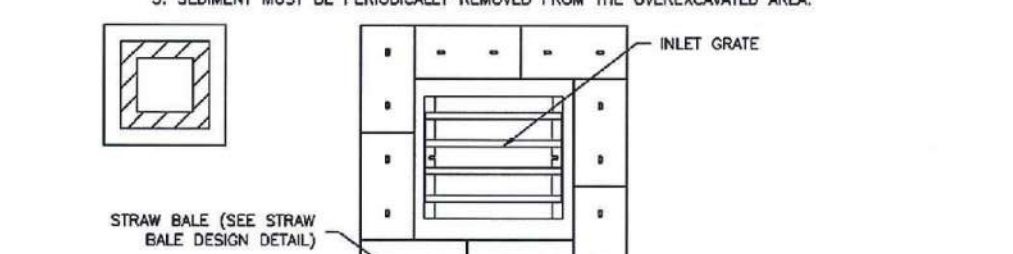


- SILT FENCE INLET PROTECTION INSTALLATION NOTES**
- SEE SILT FENCE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
  - POSTS SHALL BE PLACED AT EACH CORNER OF THE INLET AND AROUND THE EDGES AT A MAXIMUM SPACING OF 3 FEET.
  - STRAW MATS/SEDIMENT CONTROL LOGS MAY BE USED IN PLACE OF SILT FENCE FOR INLETS IN PERVIOUS AREAS. INSTALL PER SEDIMENT CONTROL LOG DETAIL.

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- OVEREXCAVATION INLET PROTECTION INSTALLATION NOTES**
- THIS FORM OF INLET PROTECTION IS PRIMARILY APPLICABLE FOR SITES THAT HAVE NOT YET REACHED FINAL GRADE AND SHOULD BE USED ONLY FOR INLETS WITH A RELATIVELY SMALL CONTRIBUTING DRAINAGE AREA.
  - WHEN USING FOR CONCENTRATED FLOWS, SHAPE BASIN IN 2:1 RATIO WITH LENGTH ORIENTED TOWARDS DIRECTION OF FLOW.
  - SEDIMENT MUST BE PERIODICALLY REMOVED FROM THE OVEREXCAVATED AREA.



- STRAW BALE BARRIER INLET PROTECTION INSTALLATION NOTES**
- SEE STRAW BALE DESIGN DETAIL FOR INSTALLATION REQUIREMENTS.
  - BALES SHALL BE PLACED IN A SINGLE ROW AROUND THE INLET WITH ENDS OF BALES TIGHTLY ABUTTING ONE ANOTHER.

IP-6 Urban Drainage and Flood Control District Urban Storm Drainage Criteria Manual Volume 3 August 2013

Celebrating 30 years  
**Kiowa**  
Engineering Corporation  
1604 South 21st Street  
Colorado Springs, Colorado 80904  
(719) 630-7342

**STERLING RANCH DEVELOPMENT  
BRIARGATE BOULEVARD BRIDGE GRADING & EROSION CONTROL PLANS  
NOTES AND SPECIFICATIONS  
EL PASO COUNTY, COLORADO**

Project No.:	19032
Date:	12/6/2021
Design:	TAC
Drawn:	PAV
Check:	
Revisions:	

**GEC4**



**APPENDIX D: Sterling Ranch 404 Permit**

**Appendix D**

**Sterling Ranch 404 Permit**



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS  
200 SOUTH SANTA FE AVENUE, SUITE 301  
PUEBLO, COLORADO 81003-4270

NOT SIGNED  
ce-24-16

February 18, 2016

Regulatory Division

SUBJECT: Action No. SPA-2015-00428-SCO, Sterling Ranch Residential Development Project, El Paso County, Colorado

Jim Morley  
SR Land, LLC  
20 Boulder Crescent Suite 201  
Colorado Springs, CO 80903

Mr. Morley:

Enclosed for your review and signature are two copies of the draft permit for Action No. SPA-2015-00428-SCO discharge dredged and fill material into waters of the United States.

You may either sign the permit or object to the permit and request the permit to be modified in accordance with the enclosed Notification of Administrative Appeal Options and Process and Request For Appeal (NAAOP-RFA). If you elect to object to this permit, you must complete Section II (Request for Appeal or Objections to an Initial Proffered Permit) of the enclosure and return to: U.S. Army Corps of Engineers, Attn: Mr. Tom Cavanaugh, Administrative Appeal Review Officer, 1455 Market Street, Room 1760, San Francisco, CA 94103-1399, within 60 days of the date of this letter.

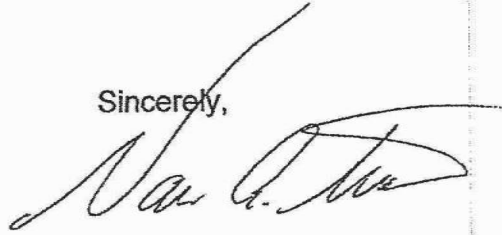
If you elect to sign the permit, please ensure that both copies are signed and dated and return them to the attention of the Regulatory Division at the address above. Your signature on the permit indicates that you accept the permit in its entirety and forfeit all rights to appeal the permit or its terms and conditions, and denotes your assurance that the work will be conducted in accordance with the plans, description, and all terms and conditions of the permit.

A fee in the amount of \$100.00 for commercial project must be paid before the permit can be issued. Your check should be made payable to the "Finance and Accounting Officer, UFC, Albuquerque", and mailed to the attention of the Regulatory Division at the above address.

Within ten days, both signed copies of the accepted permit should be returned to us. One copy of the signed permit will be returned to you. The permit is not valid until signed by the U.S. Army Corps of Engineers. If you have any questions concerning this

permit, please contact me at 719-543-6915 or by e-mail at [van.a.truan@usace.army.mil](mailto:van.a.truan@usace.army.mil).

Sincerely,

A handwritten signature in black ink, appearing to read "Van A. Truan". The signature is fluid and cursive, with a large loop at the end.

Van Truan  
Chief, Southern Colorado  
Regulatory Branch

Enclosures



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS  
200 SOUTH SANTA FE AVENUE, SUITE 301  
PUEBLO, COLORADO 81003-4270

SIGNED

February 29, 2016

Regulatory Division

SUBJECT: Action No. SPA-2015-00428-SCO, Sterling Ranch Residential Development Project, El Paso County, Colorado

Jim Morley  
SR Land, LLC  
20 Boulder Crescent Suite 201  
Colorado Springs, CO 80903

Mr. Morley:

You are hereby authorized under Section 404 of the Clean Water Act to discharge dredged and fill material into waters of the United States to conduct work in associated with construction of the Sterling Ranch Residential Development in accordance with Action Number SPA-2015-00428-SCO. A copy of the permit is enclosed.

To use this permit, you must ensure that the work is conducted in accordance with the terms and conditions of the permit. You must submit revised drawings to us for approval prior to construction should any changes be found necessary in either the location or plans for the work. Approval of revised plans may be granted if they are found not contrary to the public interest.

This permit is not an approval of the project design features, nor does it imply that the construction is adequate for its intended purpose. This permit does not authorize any injury to property or invasion of rights or any infringement of Federal, state or local laws or regulations. You must possess the authority, including property rights, to undertake the proposed work.

Enclosed is a compliance certification form. Upon completion of the project, please sign and date the form and return it to this office.

If you have any questions concerning our regulatory program, please contact me at 719-543-6915 or by e-mail at [van.a.truan@usace.army.mil](mailto:van.a.truan@usace.army.mil). At your convenience,

please complete a Customer Service Survey at  
<http://per2.nwp.usace.army.mil/survey.html>.

Sincerely,



Van Truan  
Chief, Southern Colorado  
Regulatory Branch

Enclosure(s)

**Certification of Compliance  
with Department of the Army Permit**

Action Number: SPA-2015-00428-SCO

Name of Permittee: SR Land, LLC

Upon completion of the activity authorized by this permit and any mitigation required by the permit, sign this certification and return it to the following address:

Van Truan  
Albuquerque District, U.S. Army Corps of Engineers  
200 South Santa Fe Avenue, Suite 301  
Pueblo, Colorado 81003-4270

Please note that your permitted activity is subject to a compliance inspection by an U.S. Army Corps of Engineers representative. If you fail to comply with this permit, you are subject to permit suspension, modification, or revocation.

Please enclose photographs showing the completed project (if available).

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of the said permit, and required mitigation was completed in accordance with the permit conditions.

Date Work Started \_\_\_\_\_

Date Work Completed \_\_\_\_\_

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Permittee

## DEPARTMENT OF THE ARMY PERMIT

Permittee Jim Morley

Permit No. SPA-2015-00428-SCO

Issuing Office Albuquerque District, U.S. Army Corps of Engineers

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

**Project Description:** The Sterling Ranch Residential Development Project includes installation of attendant utilities, channel improvements to the main stem of Sand Creek, three off-line stormwater detention ponds, development of two permanent residential access roads and associated culverts, and development of residential units. Permanent impacts to waters of the US will result from construction of the residential access roads and associated culverts, and construction of residential units in the unnamed western tributary to Sand Creek. Total cumulative permanent impacts from the discharge of fill material into waters/wetlands of the US from the proposed project will total 4.21 acres and 5,048 linear feet within the main channel of Sand Creek and its western tributary. The project will be constructed in accordance with the attached drawings, entitled, "Sterling Ranch Wetland Impact Location Map, Sterling Ranch Sketch Plan figure number 8, and Sterling Ranch Channel Improvements & Mitigation Plan sheets 1 through 3 dated October 13, 2015, in Sand Creek, El Paso County, Colorado, Application by Jim Morley, Application No. SPA-2015-00428-SCO".

**Project Location:** The project is located on 1,443.7 acres northeast of the intersection of Black Forest Road and Woodmen Road in unincorporated El Paso County, Colorado. The property is on the United States Geological Survey (USGS) Falcon Quadrangle on portions of Sections 27, 28, 32, 33, and 34 in Township 12 South, Range 65 West and the northwest portion of Section 4, Township 13 South, Range 65 West. The approximate coordinates of the project center are 39.964483 latitude and -104.664944 longitude (WGS 84 datum).

**Permit Conditions:** In accordance with the attached Colorado Department of Public Health and Environment Section 401 Water Quality Certification pages 1 through 6 of 6, dated February 4, 2016.

### General Conditions:

1. The time limit for completing the work authorized ends on March 1, 2021. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity,



although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

#### Special Conditions:

1. The permittee shall implement and abide by the compensatory mitigation plan titled Conceptual Mitigation Plan for Sterling Ranch Residential Development, prepared by CORE Consultants, Inc. on October 29, 2015 except where changes are necessary to comply with special conditions listed below. The permittee shall implement the mitigation plan concurrently with the construction of the project and complete the initial construction and plantings associated with the mitigation work prior to EITHER the initiation of operation OR completion of construction of the project. Completion of all elements of this mitigation plan is a requirement of this permit.

2. The permittee shall submit annual compensatory mitigation site monitoring reports to the Corps Albuquerque District Office by December 31st of each year, beginning in 2016, for a minimum of 3 years or until the Corps has determined that the mitigation performance standards and success criteria have been met. The monitoring reports shall be prepared in accordance with Corps Regulatory Guidance Letter 08-03 (Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Restoration, Establishment, and/or Enhancement of Aquatic Resources) and current Corps Albuquerque District Mitigation Monitoring Guidelines available at <http://www.spa.usace.army.mil/Missions/RegulatoryProgramandPermits/Mitigation.aspx>. The mitigation monitoring reports shall at a minimum include the following:

a. Comparison of pre-construction site conditions to an as-built survey as submitted in accordance with Special Condition 4.

b. A map showing the wetland AND/OR Ordinary High Water Mark (OHWM) delineation, and aerial photos marked to show the wetland AND/OR OHWM boundary.

c. Photographs (minimum 5) from fixed photographic monitoring points with a location reference map and indicating camera orientation.

d. All data collected to document whether the mitigation site is achieving performance standards described in the mitigation plan and a narrative discussion of progress made toward meeting performance standards.

e. Fish and wildlife observations at the mitigation site.

f. Summary statement regarding the perceived success of the mitigation project and any potential problem areas. Suggestions and a timetable for corrections should be included if it is anticipated that project goals may not be met.

g. Date(s) of field inspection(s).

3. In order to assist the Corps in scheduling compliance inspections, the permittee shall notify the Corps Albuquerque District Office, in writing, at least 7 calendar days in advance of the initiation of mitigation construction AND no later than 15 calendar days following completion of construction activities.

4. Within 60 days after completion of construction of the mitigation project, the permittee shall submit as-built drawings and a description of the work conducted to the Corps Albuquerque District Office. The drawings shall include the following:

a. The Department of the Army Action Number.

b. A plan view drawing of the location of the authorized work footprint (as shown in permit drawings) with an overlay of the work as constructed in the same scale. The drawing should show all "earth disturbance," wetland impacts, structures, and the boundaries of any on-site and/or off-site mitigation or avoidance areas. The drawings shall contain, at a minimum, 1-foot OR greater topographic contours of the entire site.

c. Ground photographs of the completed work. The camera positions and view-angles of the ground photographs shall be identified on a map, aerial photograph, or project drawing.

d. A description of all deviations between the work as authorized by the permit and the work as constructed. Clearly indicate on the as-built drawings the location of any deviations.

5. Your responsibility to complete the required compensatory mitigation as set forth in Special Condition No. 1 will not be considered fulfilled until you have demonstrated mitigation success and have received written verification from the U.S. Army Corps of Engineers.

#### Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

Section 404 of the Clean Water Act (33 U.S.C. 1344).

Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

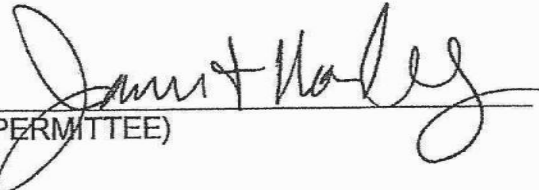
c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this

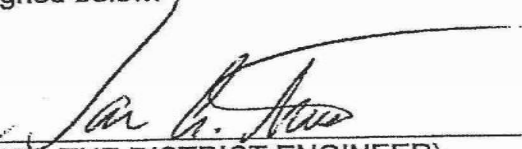
permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

  
\_\_\_\_\_  
(PERMITTEE)

2/23/2016  
\_\_\_\_\_  
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

  
\_\_\_\_\_  
(FOR THE DISTRICT ENGINEER)

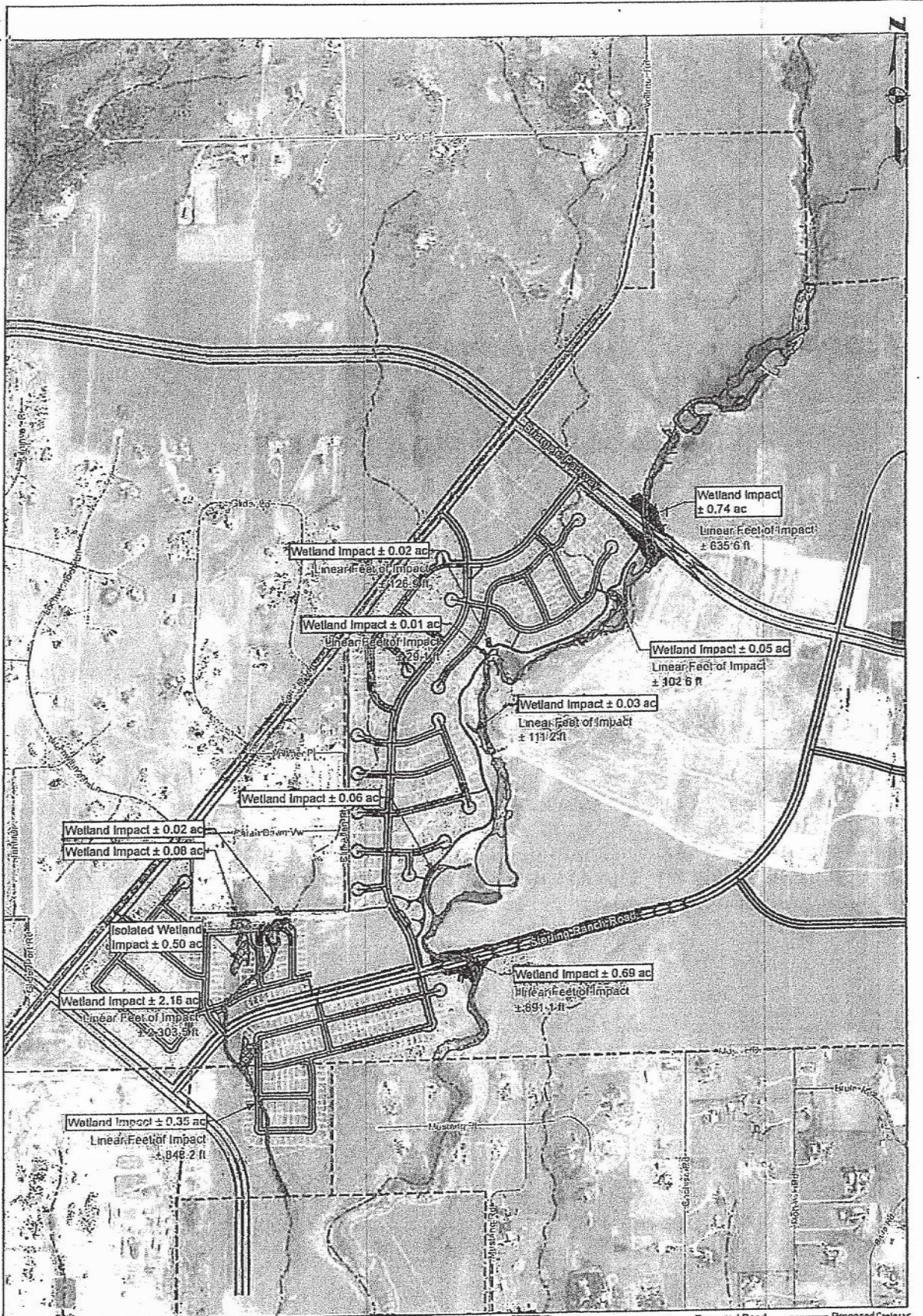
29 Feb 2016  
\_\_\_\_\_  
(DATE)


Patrick J. Dagon  
Lieutenant Colonel, U.S. Army  
District Commander

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

\_\_\_\_\_  
(TRANSFEREE)

\_\_\_\_\_  
(DATE)

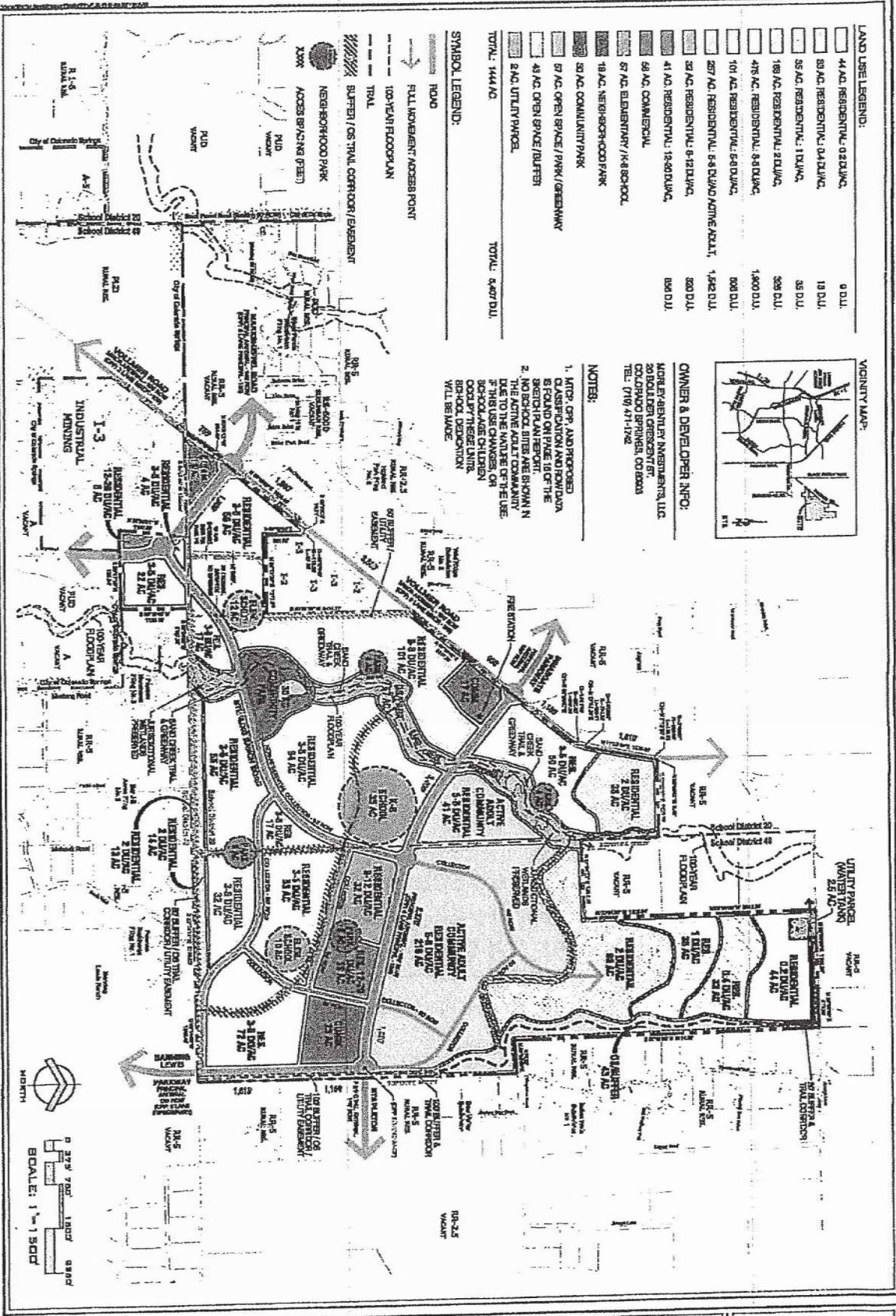



**CORE**  
 CONSULTANTS

CIVIL ENGINEERING  
 DEVELOPMENT CONSULTING  
 LAND SURVEYING  
 303.703.4444  
 1950 W. Lincoln Blvd., Ste. 102  
 Littleton, CO 80120

**Sterling Ranch**  
**Wetland Impact Location Map**  
 El Paso County, Colorado

Date: 10/13/2015  
 Project #: 15-001



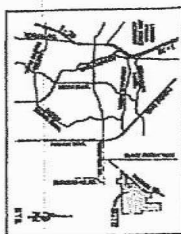
LAND USE LEGEND:

44 AC. RESIDENTIAL 0-20 DU/AC	0 DU/AC
33 AC. RESIDENTIAL 0-4 DU/AC	18 DU/AC
35 AC. RESIDENTIAL 1 DU/AC	35 DU/AC
189 AC. RESIDENTIAL 2 DU/AC	378 DU/AC
476 AC. RESIDENTIAL 3-8 DU/AC	1,904 DU/AC
101 AC. RESIDENTIAL 5-8 DU/AC	808 DU/AC
257 AC. RESIDENTIAL 5-8 DU/AC ACTIVE ADULT	1,482 DU/AC
23 AC. RESIDENTIAL 9-12 DU/AC	230 DU/AC
41 AC. RESIDENTIAL 12-20 DU/AC	820 DU/AC
59 AC. COMMERCIAL	
57 AC. ELEMENTARY / K-8 SCHOOL	
18 AC. NEIGHBORHOOD PARK	
30 AC. COMMUNITY PARK	
57 AC. OPEN SPACE / PARK / GREENWAY	
48 AC. OPEN SPACE / BUFFER	
2 AC. UTILITY PRICE	
TOTAL 1444 AC	TOTAL 5,820 DU/AC

SYMBOL LEGEND:

- ROAD
- FULL MOVEMENT ACCESS POINT
- 100-YEAR FLOODPLAIN
- TOTAL
- BUFFER / OS TRAIL CORRIDOR / EASEMENT
- NEIGHBORHOOD PARK
- ACCESS SERVICES (FEET)
- PLD
- WACANT

VICINITY MAP:



OWNER & DEVELOPER INFO:

MORLEY-BENTLEY INVESTMENTS, LLC  
 20 BOLLARD CRESSENT, #1  
 COLOMBO SPRINGS, CO 80003  
 TEL: (719) 471-1122

NOTES:

1. LOTS 599 AND PROPOSED 100-YEAR FLOODPLAIN AND FLOODPLAIN BUFFER ARE SHOWN IN THE SKETCH PLAN REPORT.
2. NO SCHOOL SITES ARE SHOWN IN THIS USE PLAN DUE TO THE NATURE OF THE USE. FURTHER USE OF THE SCHOOLS AND CHILDREN'S PLAY AREAS WILL BE DETERMINED BY THE BOARD OF DIRECTORS.

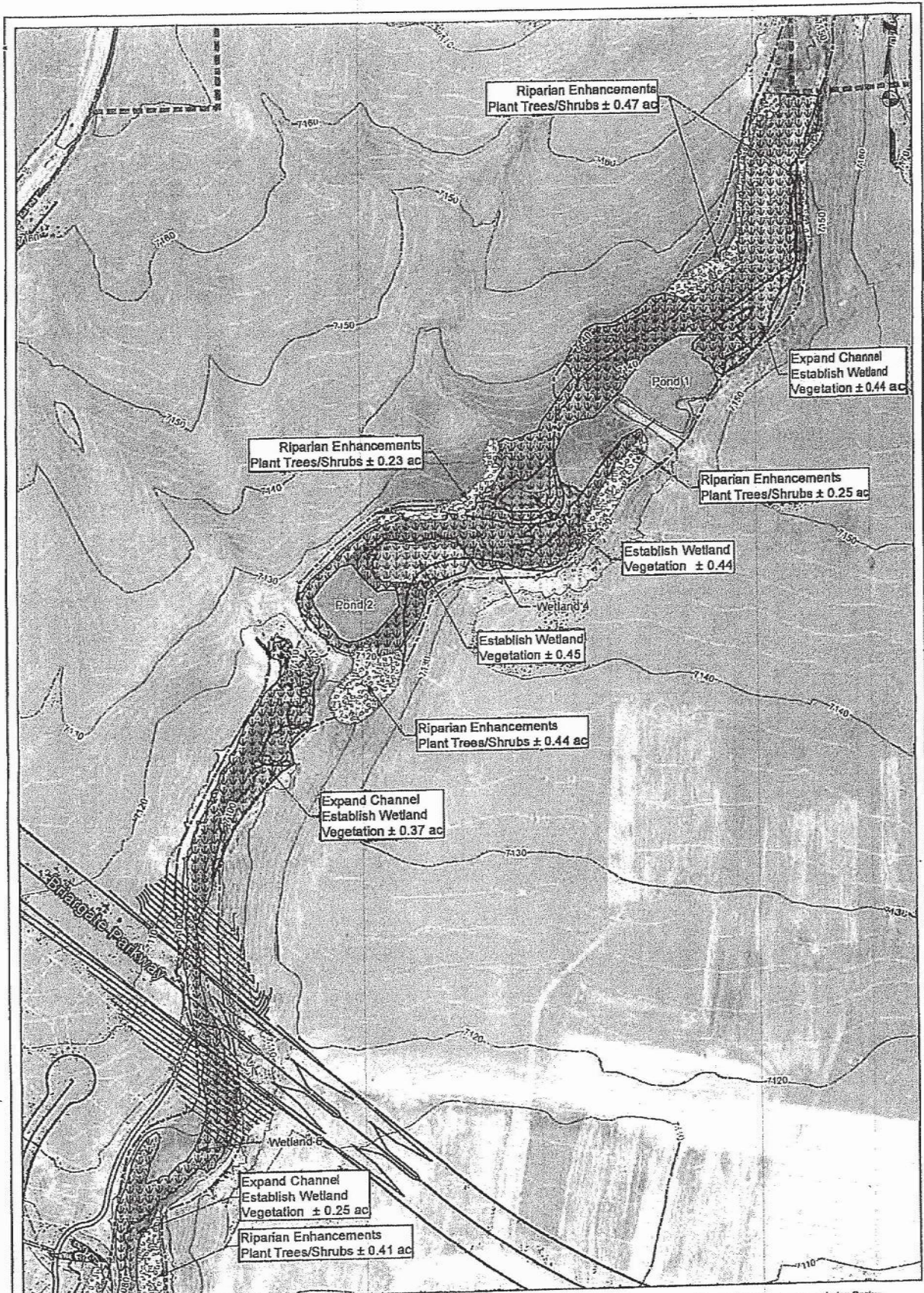


FIGURE NO. 8  
 DATE: 05/18/2008

# Sterling Ranch SKETCH PLAN

MORLEY-BENTLEY INVESTMENTS, LLC.

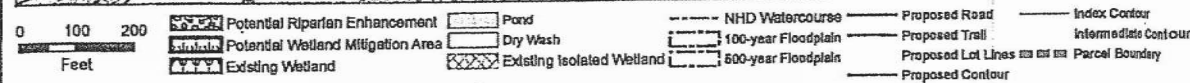
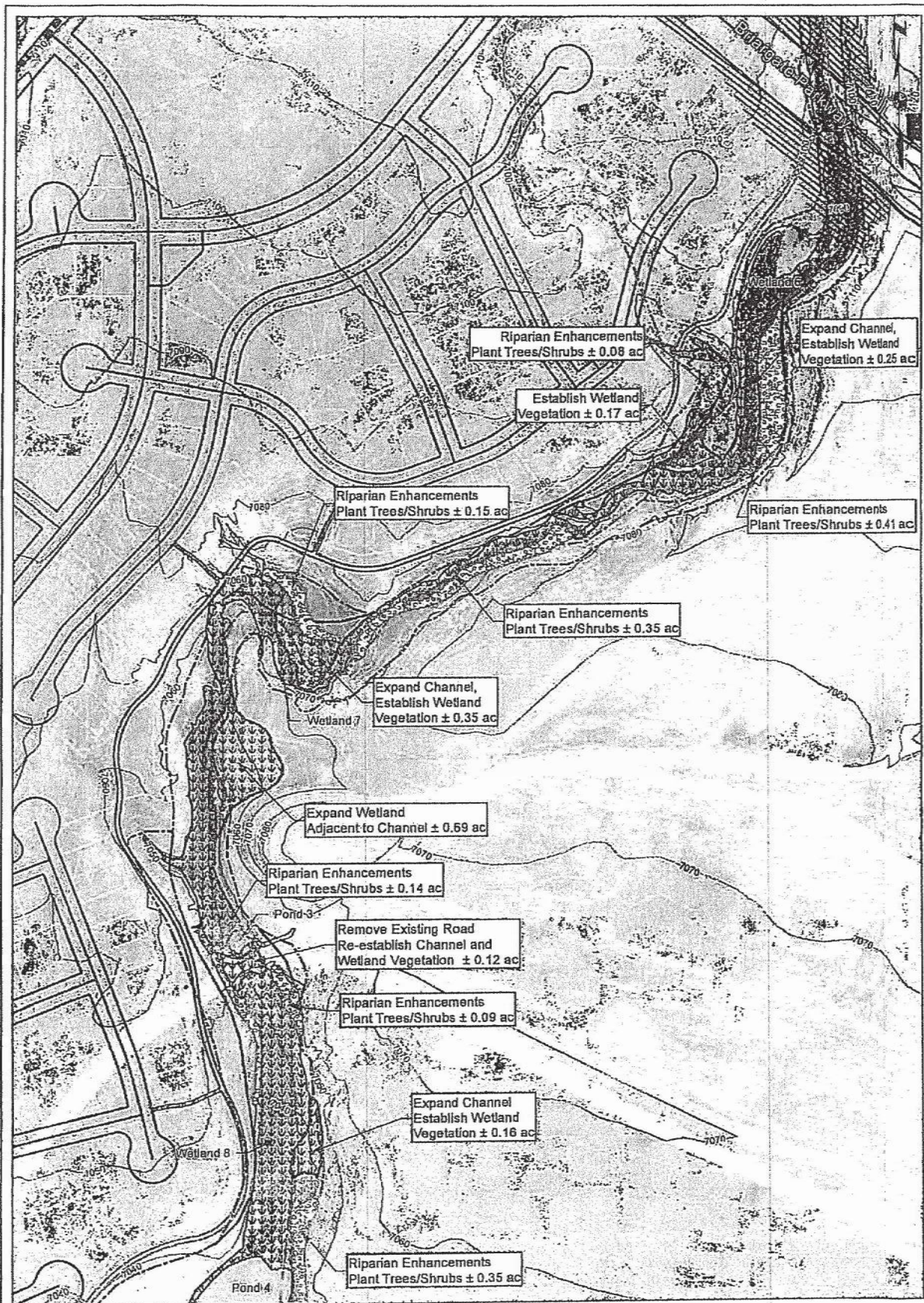




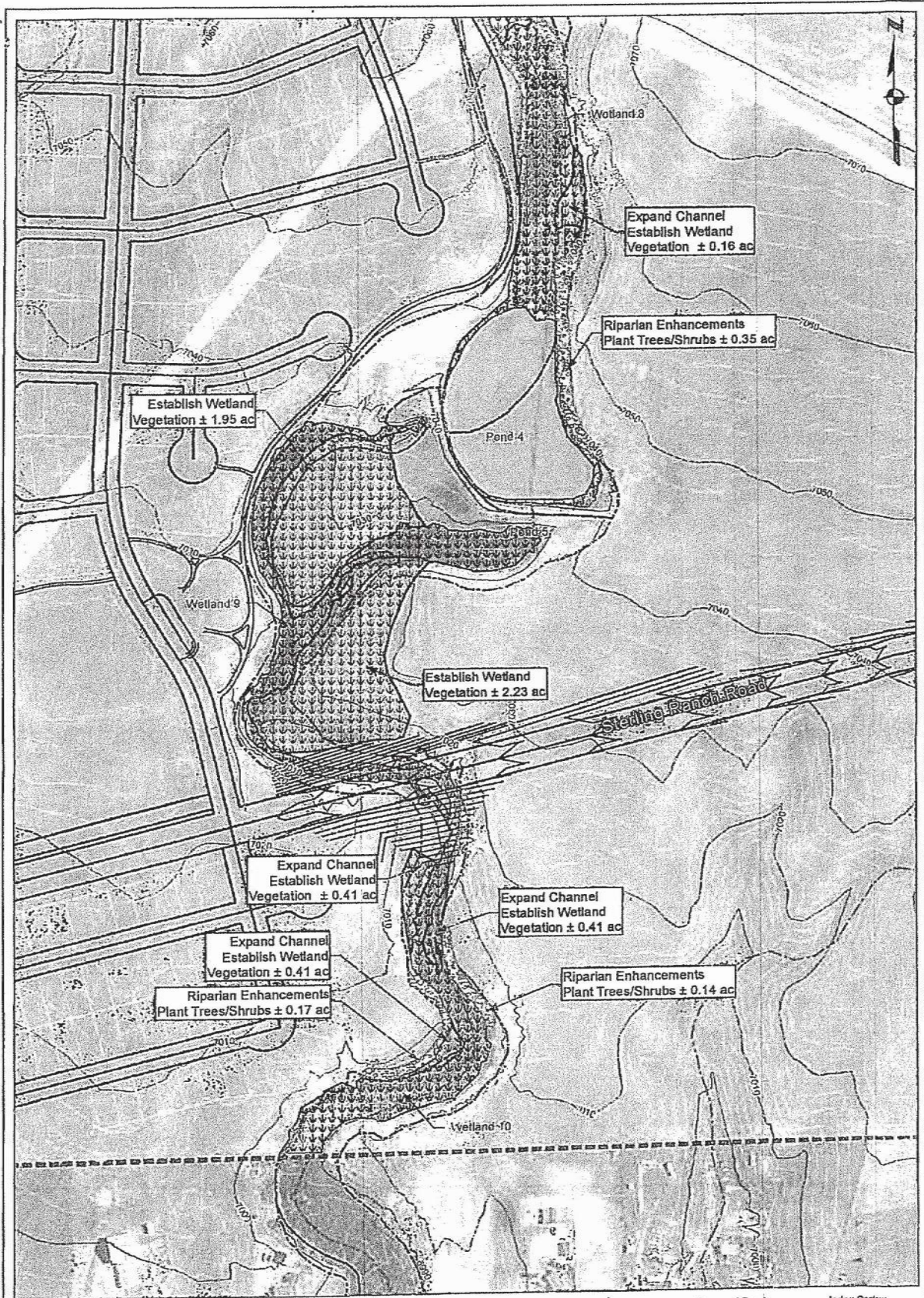
CIVIL ENGINEERING  
 DEVELOPMENT CONSULTING  
 LAND SURVEYING  
 801.708.4444  
 1950 W. Ludlow Blvd., Ste. 103  
 Littleton, CO 80120

**Sterling Ranch**  
 Channel Improvements & Mitigation Plan  
 Sheet 1  
 El Paso County, Colorado

Date: 10/13/2015  
 Project #: 15-001









**US Army Corps  
of Engineers®**  
Albuquerque District  
Project

## PUBLIC NOTICE

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Permit Application No.: SPA-2015-00428-SCO  
Project Name: Sterling Ranch Residential  
Development Project  
Applicant: SR Land, LLC  
Waterway: Sand Creek  
Public Notice Date: December 9, 2015  
Comment Due Date: January 9, 2016  
USACE Contact Phone: (719) 543-8102

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Reply To:

Southern Colorado Regulatory Office  
US Army Corps of Engineers, Albuquerque District  
200 South Santa Fe Avenue, Suite 301  
Pueblo, Colorado 81003-4270

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### PERMIT APPLICATION UNDER SECTION 404 OF THE CLEAN WATER ACT (33 USC 1344)

Summary of Proposed Project: We are requesting public comment on the following project before the above comment due date. The application is for a permit to place dredged/fill material into waters of the US associated with the construction of a residential development in Sand Creek and one tributary located near Falcon, El Paso County, Colorado. Details of the proposed project are provided below.

Name of Applicant: SR Land, LLC, 20 Boulder Crescent, Suite 201, Colorado Springs, CO 80903.

Location: The project is located on 1,443.7 acres northeast of the intersection of Black Forest Road and Woodmen Road in unincorporated El Paso County, Colorado. The property is on the United States Geological Survey (USGS) Falcon Quadrangle on portions of Sections 27, 28, 32, 33, and 34 in Township 12 South, Range 65 West and the northwest portion of Section 4, Township 13 South, Range 65 West. The approximate coordinates of the project center are 39.964483 latitude and -104.664944 longitude (WGS 84 datum).

Description of Work: The Sterling Ranch Residential Development Project includes installation of attendant utilities, channel improvements to the main stem of Sand Creek, three off-line stormwater detention ponds, development of two permanent residential access roads and associated culverts, and development of residential units. Permanent impacts to waters of the US will result from construction of the residential access roads and associated culverts, and construction of residential units in the unnamed western

## NEWS RELEASE

CESPA-RD-SC  
SPA-2015-00428-SCO

tributary to Sand Creek. Total cumulative permanent impacts to waters of the US from the proposed project will total 4.21 acres and 5,048 linear feet within the main channel of Sand Creek and its western tributary.

Purpose and Need: The project purpose is twofold: (1) the development of a medium sized single-family residential development and associated facilities and infrastructure on multiple parcels of land which will be incorporated in the City of Colorado Springs; and (2) creek channel improvements for hydrology and stormwater capability through control of flood water conveyance, establishing improved grade control, and facilitating improved water quality.

Likewise, the project need is twofold: (1) to satisfy market demand for additional housing in the City of Colorado Springs, El Paso County, based on recent County and City economic development reports; and (2) to address a County-wide high-priority stormwater management project while simultaneously managing an increase in stormwater runoff to Sand Creek via channel improvements.

Mitigation: Mitigation for impacts to wetlands and waters of the US on the Sterling Ranch project site is proposed within the Middle Fountain Creek watershed and includes creation of 4.21 acres of emergent wetlands located within and adjacent to the main channel of Sand Creek, with improvements throughout to allow for construction and reestablishment of wetlands.

Plans and Data: Drawings showing the location of the work site and other data are enclosed with this notice. If additional information is desired, it may be obtained from the applicant, or from:

Christopher M. Grosso  
U.S. Army Corps of Engineers  
Southern Colorado Regulatory Office  
200 South Santa Fe Avenue, Suite 301  
Pueblo, Colorado 81003-4270  
(719) 543-8102  
Fax No. (719) 543-9475  
E-mail: [Christopher.M.Grosso@usace.army.mil](mailto:Christopher.M.Grosso@usace.army.mil)

Statement of Findings: The Corps consulted district files and records, the latest version of the National Register of Historic Places (NRHP), and state records of NRHP-eligible and potentially eligible historic properties to determine if there are any historic properties that may be affected by the proposed undertaking. Based on this initial information, the Corps has made a preliminary determination that the proposed project will not affect any historic properties that meet the criteria for inclusion in the NRHP.

The Corps has reviewed the U.S. Fish and Wildlife Service's latest published version of Federally-listed endangered and threatened species located in El Paso County, Colorado to determine if any listed species or their critical habitat may occur in the proposed project area. The Corps has made a preliminary determination that the

## ***NEWS RELEASE***

CESPA-RD-SC  
SPA-2015-00428-SCO

proposed project will not affect any Federally-listed endangered or threatened species or their critical habitat that are protected by the Endangered Species Act.

The applicant is required to obtain water quality certification, under Section 401 of the Clean Water Act, from the Colorado Department of Public Health and Environment. Section 401 requires that any applicant for an individual Section 404 permit provide proof of water quality certification to the Corps of Engineers prior to permit issuance.

In accordance with environmental procedures and documentation required by the National Environmental Policy Act of 1969, an environmental assessment will be prepared for this project. Upon completion, the assessment may be seen at the U.S. Army Corps of Engineers, Albuquerque District Office, at the address given above.

Comments: Any comments concerning this project should be received by the District Engineer no later than January 9, 2016. Comments received after the end of the Public Notice comment period will not be considered. However, more time may be given if a request, with a valid reason, is received prior to the suspense date. The Corps of Engineers is soliciting comments from the public; federal, state, and local agencies and officials; Indian tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition, or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed below. Comments are used in the preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

The decision whether to issue a permit will be based on an evaluation of the probable impact, including cumulative impacts, of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. The evaluation of the impact of this activity will include application of the guidelines promulgated by the Administrator, EPA, under authority of Section 404(b) of the Clean Water Act. All factors relevant to the proposal and the cumulative effects will be considered; among these are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and, in general, the needs and welfare of the people.

If the District Engineer determines that the project complies with the 404(b) (1) guidelines, he will grant the permit unless issuance would be contrary to the public interest.

## **NEWS RELEASE**

CESPA-RD-SC  
SPA-2015-00428-SCO

Any person may request a public hearing. The request must be submitted, in writing, to the District Engineer within 21 days of the date of this notice and must clearly set forth the reasons for holding a public hearing.

Patrick J. Dagon  
Lieutenant Colonel, U.S. Army  
District Commander

Enclosures:  
Sheet 1 of 2 – Wetland Location Map  
Sheet 2 of 2 – Wetland Impact Location Map

**NEWS RELEASE**

CESPA-RD-SC  
SPA-2015-00428-SCO



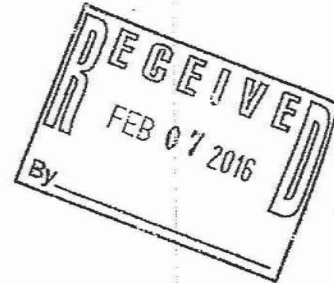
## COLORADO

Department of Public  
Health & Environment

Dedicated to protecting and improving the health and environment of the people of Colorado

February 4, 2016

SR Land, LLC  
Attn: Jim Morley  
20 Boulder Crescent, Ste. 201  
Colorado Springs, CO 80903



Re: Section 401 Water Quality Certification  
Colorado 401 Certification No.: 4378  
US Corps of Engineers 404 Permit No.: SPA-2015-00428-SCO  
Description: Construction of a residential development  
Location: Latitude: 38.962389, Longitude -104.675084 in El Paso County,  
Colorado  
Watercourse: Sand Creek and tributaries, Arkansas River Basin, Segment  
COARFO04 of Fountain Creek Sub-basin  
Designation: Use Protected

Dear Mr. Morley:

The Colorado Department of Public Health and Environment (CDPHE), Water Quality Control Division (Division) has completed its review of the subject Clean Water Act (CWA) Section 404 Permit Application, and our preliminary determination with the issuance of the State of Colorado 401 Certification Public Notice (5 CCR 1002-82.5(B)). This segment is designated "Use Protected" thus no antidegradation review is required (5 CCR 1002-31.8(2)).

This letter shall serve as official notification that the Division is issuing "Regular Certification" in accordance with 5 CCR 1002-82.5(A)(2).

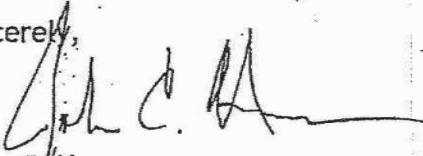
The 401 Certification issued by the Division pursuant to 5 CCR 1002-82.3(C) shall apply to both the construction and operation of the project for which a federal license or permit is required, and shall apply to the water quality impacts associated with the project. This certification does not constitute a relinquishment of the Division's authority as defined in the Colorado Water Quality Control Act, nor does it fulfill or waive any other local, state, or federal regulations.



February 4, 2016  
SR Land, LLC  
Page 2

If you have any questions or need additional information, please contact me at  
(303) 692-3586.

Sincerely,



John C. Hranac  
Water Quality Assessor  
Environmental Data Unit  
Water Quality Control Division

Attachment

cc: US Army Corps of Engineers, Southern Colorado Regulatory Office  
Applicant's Agent, Mr. Chris Haas - CORE Consultants, Inc.  
File

## Certification Requirements:

(A) The following requirements shall apply to all certifications:

- (1) Authorized representatives from the Division shall be permitted to enter upon the site where the construction activity or operation of the project is taking place for purposes of inspection of compliance with BMPs and certification conditions.
- (2) In the event of any changes in control or ownership of facilities where the construction activity or operation of the project is taking place, the successor shall be notified in writing by his predecessor of the existence of the BMPs and certification conditions. A copy of such notification shall be provided to the Division.
- (3) If the permittee discovers that certification conditions are not being implemented as designed, or if there is an exceedance of water quality standards despite compliance with the certification conditions and there is reason to believe that the exceedance is caused, in whole or in part, by the project, the permittee shall verbally notify the Division of such failure or exceedance within two (2) working days of becoming aware of the same. Within ten (10) working days of such notification, the permittee shall provide to the Division, in writing, the following:
  - (a) In the case of the failure to comply with the certification conditions, a description of (i) the nature of such failure, (ii) any reasons for such failure, (iii) the period of non-compliance, and (iv) the measures to be taken to correct such failure to comply; and
  - (b) In the case of the exceedance of a water quality standard, (i) an explanation, to the extent known after reasonable investigation, of the relationship between the project and the exceedance, (ii) the identity of any other known contributions to the exceedance, and (iii) a proposal to modify the certification conditions so as to remedy the contribution of the project to the exceedance.
- (4) Any anticipated change in discharge location and/or quantities associated with the project which may result in water quality impacts not considered in the original certification must be reported to the Division by submission of a written notice by the permittee prior to the change. If the change is determined to be significant, the permittee will be notified within ten days, and the change will be acknowledged and approved or disapproved.
- (5) Any diversion from or bypass of facilities necessary to maintain compliance with the terms and conditions herein is prohibited, except (i) where unavoidable to prevent loss of life or severe property damage, or (ii) where excessive storm drainage or runoff would damage any facilities necessary for compliance with limitations and prohibitions herein. The Division shall be notified immediately in writing of each such diversion or bypass.



- (6) At least fifteen days prior to commencement of a project in a watercourse, which the Division has certified, or conditionally certified, the permittee shall notify the following:
- (a) Applicable local health departments;
  - (b) Owners or operators of municipal and domestic water treatment intakes which are located within twenty miles downstream from the site of the project; and
  - (c) Owners or operators of other intakes or diversions which are located within five miles downstream from the site of the project.

The permittee shall maintain a list of the persons and entities notified, including the date and form of notification.

- (7) Immediately upon discovery of any spill or other discharge to waters of the state not authorized by the applicable license or permit, the permittee shall notify the following:
- (a) Applicable local health departments;
  - (b) Owners or operators of municipal and domestic water treatment intakes which are located within twenty miles downstream from the site of the project; and
  - (c) Owners or operators of other intakes or diversions which are located within five miles downstream from the site of the project.

The permittee shall maintain a list of the persons and entities notified, including the date and form of notification.

- (8) Construction operations within watercourses and water bodies shall be restricted to only those project areas specified in the federal license or permit.
- (9) No construction equipment shall be operated below the existing water surface unless specifically authorized by the 401 certification issued by the Division.
- (10) Work should be carried out diligently and completed as soon as practicable. To the maximum extent practicable, discharges of dredged or fill material shall be restricted to those periods when impacts to designated uses are minimal.
- (11) The project shall incorporate provisions for operation, maintenance, and replacement of BMPs to assure compliance with the conditions identified in this section, and any other conditions placed in the permit or certification. All such provisions shall be identified and compiled in an operation and maintenance plan which will be retained by the project owner and available for inspection within a reasonable timeframe upon request by any authorized representative of the Division.

- (12) The use of chemicals during construction and operation shall be in accordance with the manufacturers' specifications. There shall be no excess application and introduction of chemicals into state waters.
  - (13) All solids, sludges, dredged or stockpiled materials and all fuels, lubricants, or other toxic materials shall be controlled in a manner so as to prevent such materials from entering state waters.
  - (14) All seed, mulching material and straw used in the project shall be state-certified weed-free.
  - (15) Discharges of dredged or fill material in excess of that necessary to complete the project are not permitted.
  - (16) Discharges to state waters not identified in the license or permit and not certified in accordance therewith are not allowed, subject to the terms of any 401 certification.
  - (17) Except as otherwise provided pursuant to subsection 82.7(C), no discharge shall be allowed which causes non-attainment of a narrative water quality standard identified in the Basic Standards and Methodologies for Surface Waters, Regulation #31 (5 CCR 1002-31), including, but not limited to discharges of substances in amounts, concentrations or combinations which:
    - (a) Can settle to form bottom deposits detrimental to beneficial uses; or
    - (b) Form floating debris, scum, or other surface materials sufficient to harm existing beneficial uses; or
    - (c) Produce color, odor, or other conditions in such a degree as to create a nuisance or harm existing beneficial uses or impart any undesirable taste to significant edible aquatic species, or to the water; or
    - (d) Are harmful to the beneficial uses or toxic to humans, animals, plants, or aquatic life; or
    - (e) Produce a predominance of undesirable aquatic life; or
    - (f) Cause a film on the surface or produce a deposit on shorelines.
- (B) Best Management Practices:
- (1) Best management practices are required for all projects for which Division certification is issued except for section 402 permits. Project applicants must select BMPs to be employed in their project. A listing and description of best management practices is located in Appendix I of Regulation No. 82: 401 Certification Regulation 5 CCR 1002-82.
  - (2) All requests for certifications which require BMPs shall include a map of project location, a site plan, and a listing of the selected BMPs chosen for the project. At a minimum, each project must provide for the following:

- (a) Permanent erosion and sediment control measures that shall be installed at the earliest practicable time consistent with good construction practices and that shall be maintained and replaced as necessary throughout the life of the project.
- (b) Temporary erosion and sediment control measures that shall be coordinated with permanent measures to assure economical, effective, and continuous control throughout the construction phase and during the operation of the project.