



## El Paso County MS4 Post Construction Detention / Water Quality Facility Documentation Form

This document **must be completed and submitted** with required attachments to the County for projects requiring a detention and/or a water quality facility. A separate completed form must be submitted for each facility.

Project name: Timberridge Estates

\*\*\* This sheet for the offsite sand filter DP-8.

Owner name: Timberridge Estates, LLC

Location Address: 9210 Arroya Lane, Colorado Springs

Latitude and Longitude: 38.983743d, -104.661540d

Assessor's Parcel #: 5227000001

Section: 22

Township: 12S Range: 65W

Expected Completion date: Unknown

Project acreage: 34.9

Design Ponding Acres: 0.02

Design Storm: WQCV

Design Engineer Email Address: L@tnesinc.com

To ensure compliance with C.R.S. 37-92-602(8), the completed Stormwater

Detention and Infiltration Design Data Sheet **must be attached**. The form can be found here:

<https://maperture.digitaldataservices.com/gvh/?viewer=cswdif#> (click on Download SDI Design Data Sheet)

List all permanent water quality control measure(s) (EDBs, rain gardens, etc): sand filter DP8

For all projects for which the constrained redevelopment sites standard is applied, provide an explanation of why it is not practicable to meet the full design standards. N/A

**Attach Operations and Maintenance (O&M) Plan** describing the operation and maintenance procedures that ensure the long-term observation, maintenance, and operation of control measure(s), including routine inspection frequencies and maintenance activities. If multiple, different water quality control measures are used at the same location, a separate O & M Plan must be provided for each facility.

**Attach Private Detention Basin / Stormwater Quality Best Management Practice Maintenance Agreement and Easement** addressing maintenance of BMPs that shall be binding on all subsequent owners of the permanent BMPs.

### Attachments:

Stormwater Detention and Infiltration Design Data Sheet

O & M Plan

Maintenance and Access Agreement

Review Engineer

EPC Project File No.

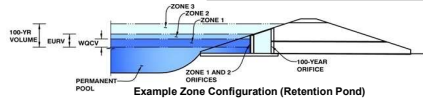


# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: TIMBERIDGE ESTATES

Basin ID: BASIN H - SAND FILTER AT DESIGN POINT 8



## Required Volume Calculation

Selected BMP Type =	SF
Watershed Area =	1.38 acres
Watershed Length =	1,100 ft
Watershed Slope =	0.048 ft/ft
Watershed Imperviousness =	27.00% percent
Percentage Hydrologic Soil Group A =	0.0% percent
Percentage Hydrologic Soil Group B =	100.0% percent
Percentage Hydrologic Soil Groups C/D =	0.0% percent
Desired WQCV Drain Time =	40.0 hours
Location for 1-hr Rainfall Depths =	User Input
Water Quality Capture Volume (WQCV) =	0.013 acre-feet
Excess Urban Runoff Volume (EURV) =	0.038 acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	0.029 acre-feet
5-yr Runoff Volume (P1 = 1.5 in.) =	0.041 acre-feet
10-yr Runoff Volume (P1 = 1.75 in.) =	0.065 acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	0.113 acre-feet
50-yr Runoff Volume (P1 = 2.25 in.) =	0.145 acre-feet
100-yr Runoff Volume (P1 = 2.52 in.) =	0.186 acre-feet
500-yr Runoff Volume (P1 = 3 in.) =	0.256 acre-feet
Approximate 2-yr Detention Volume =	0.027 acre-feet
Approximate 5-yr Detention Volume =	0.039 acre-feet
Approximate 10-yr Detention Volume =	0.058 acre-feet
Approximate 25-yr Detention Volume =	0.068 acre-feet
Approximate 50-yr Detention Volume =	0.072 acre-feet
Approximate 100-yr Detention Volume =	0.086 acre-feet

Note: L / W Ratio > 8  
L / W Ratio = 28.1

Drain Time Too Long

Optional User Override 1-hr Precipitation	1.19 inches
	1.50 inches
	1.75 inches
	2.00 inches
	2.25 inches
	2.52 inches
	3.00 inches

## Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.013 acre-feet
Select Zone 2 Storage Volume (Optional) =	acre-feet
Select Zone 3 Storage Volume (Optional) =	acre-feet
Total Detention Basin Volume =	0.013 acre-feet
Initial Surcharge Volume (ISV) =	N/A ft³
Initial Surcharge Depth (ISD) =	N/A ft
Total Available Detention Depth (H <sub>total</sub> ) =	0.75 ft
Depth of Trickle Channel (H <sub>TC</sub> ) =	N/A ft
Slope of Trickle Channel (S <sub>TC</sub> ) =	N/A ft/ft
Slopes of Main Basin Sides (S <sub>main</sub> ) =	4 H:V
Basin Length-to-Width Ratio (R <sub>L/W</sub> ) =	3
Initial Surcharge Area (A <sub>ISV</sub> ) =	0 ft²
Surcharge Volume Length (L <sub>ISV</sub> ) =	0.0 ft
Surcharge Volume Width (W <sub>ISV</sub> ) =	0.0 ft
Depth of Basin Floor (H <sub>basin</sub> ) =	0.00 ft
Length of Basin Floor (L <sub>basin</sub> ) =	41.7 ft
Width of Basin Floor (W <sub>basin</sub> ) =	13.9 ft
Area of Basin Floor (A <sub>basin</sub> ) =	580 ft²
Volume of Basin Floor (V <sub>basin</sub> ) =	0 ft³
Depth of Main Basin (H <sub>main</sub> ) =	0.75 ft
Length of Main Basin (L <sub>main</sub> ) =	47.7 ft
Width of Main Basin (W <sub>main</sub> ) =	19.9 ft
Area of Main Basin (A <sub>main</sub> ) =	950 ft²
Volume of Main Basin (V <sub>main</sub> ) =	568 ft³
Calculated Total Basin Volume (V <sub>total</sub> ) =	0.013 acre-feet

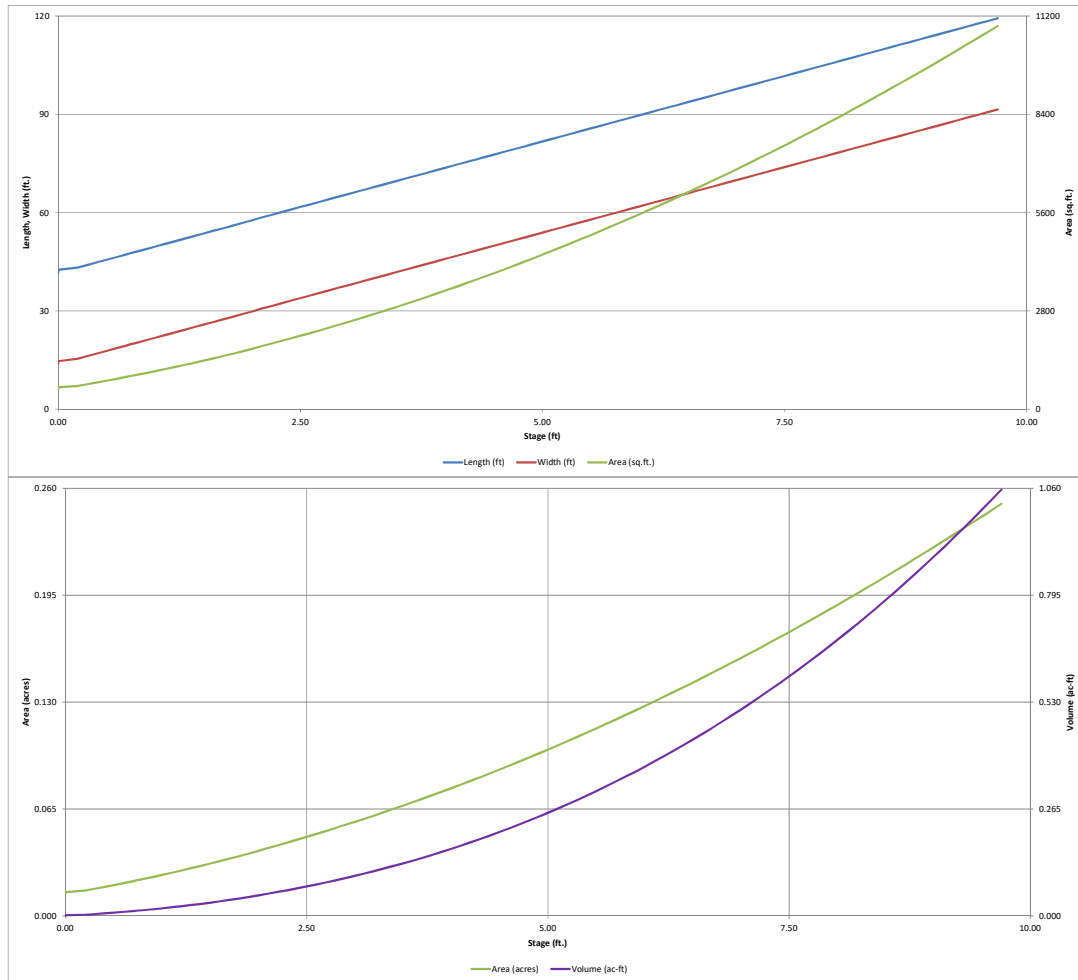
Total detention volume is less than 100-year volume.

Depth Increment =	0.1							
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft²)	Optional Override Area (ft²)	Area (acre)	Volume (ft³)
Media Surface	0.00		41.7	13.9	580		0.013	
Zone 1 (WQCV)	0.10		42.5	14.7	625		0.014	60
	0.20		43.2	15.4	667		0.015	118
	0.30		44.0	16.2	715		0.016	187
	0.40		44.8	17.0	763		0.018	261
	0.50		45.6	17.8	814		0.019	340
	0.60		46.4	18.6	865		0.020	424
	0.70		47.2	19.4	918		0.021	513
	0.75		47.7	19.9	950		0.022	569
	0.80		48.0	20.2	972		0.022	608
	0.90		48.8	21.0	1,027		0.024	708
	1.00		49.6	21.8	1,083		0.025	813
	1.10		50.4	22.6	1,141		0.026	924
	1.20		51.2	23.4	1,200		0.028	1,041
	1.30		52.0	24.2	1,261		0.029	1,164
	1.40		52.8	25.0	1,322		0.030	1,294
	1.50		53.6	25.8	1,385		0.032	1,429
	1.60		54.4	26.6	1,450		0.033	1,571
	1.70		55.2	27.4	1,515		0.035	1,719
	1.80		56.0	28.2	1,582		0.036	1,874
	1.90		56.8	29.0	1,650		0.038	2,035
	2.00		57.6	29.8	1,719		0.039	2,204
	2.10		58.5	30.7	1,797		0.041	2,397
	2.20		59.3	31.5	1,869		0.043	2,580
	2.30		60.1	32.3	1,942		0.045	2,771
	2.40		60.9	33.1	2,017		0.046	2,969
	2.50		61.7	33.9	2,093		0.048	3,174
	2.60		62.5	34.7	2,170		0.050	3,387
	2.70		63.3	35.5	2,248		0.052	3,608
	2.80		64.1	36.3	2,328		0.053	3,837
	2.90		64.9	37.1	2,409		0.055	4,074
	3.00		65.7	37.9	2,491		0.057	4,319
	3.10		66.5	38.7	2,575		0.059	4,572
	3.20		67.3	39.5	2,660		0.061	4,834
	3.30		68.1	40.3	2,746		0.063	5,104
	3.40		68.9	41.1	2,833		0.065	5,383
	3.50		69.7	41.9	2,922		0.067	5,671
	3.60		70.5	42.7	3,012		0.069	5,968
	3.70		71.3	43.5	3,103		0.071	6,273
	3.80		72.1	44.3	3,195		0.073	6,588
	3.90		72.9	45.1	3,289		0.076	6,912
4.00		73.7	45.9	3,384		0.078	7,246	
4.10		74.5	46.7	3,481		0.080	7,589	
4.20		75.3	47.5	3,578		0.082	7,942	
4.30		76.1	48.3	3,677		0.084	8,305	
4.40		76.9	49.1	3,777		0.087	8,678	
4.50		77.7	49.9	3,879		0.089	9,060	
4.60		78.5	50.7	3,981		0.091	9,453	
4.70		79.3	51.5	4,085		0.094	9,857	
4.80		80.1	52.3	4,191		0.096	10,271	
4.90		80.9	53.1	4,297		0.099	10,695	
5.00		81.7	53.9	4,405		0.101	11,130	
5.10		82.5	54.7	4,514		0.104	11,576	
5.20		83.3	55.5	4,625		0.106	12,033	
5.30		84.1	56.3	4,736		0.109	12,501	
5.40		84.9	57.1	4,849		0.111	12,980	
5.50		85.7	57.9	4,964		0.114	13,471	
5.60		86.5	58.7	5,079		0.117	13,973	
5.70		87.3	59.5	5,196		0.119	14,487	
5.80		88.1	60.3	5,314		0.122	15,012	
5.90		88.9	61.1	5,434		0.125	15,550	
6.00		89.7	61.9	5,554		0.128	16,099	
6.10		90.5	62.7	5,676		0.130	16,661	
6.20		91.3	63.5	5,799		0.133	17,234	
6.30		92.1	64.3	5,924		0.136	17,820	
6.40		92.9	65.1	6,050		0.139	18,419	
6.50		93.7	65.9	6,177		0.142	19,030	
6.60		94.5	66.7	6,305		0.145	19,654	
6.70		95.3	67.5	6,435		0.148	20,291	
6.80		96.1	68.3	6,566		0.151	20,941	
6.90		96.9	69.1	6,698		0.154	21,605	
7.00		97.7	69.9	6,831		0.157	22,281	
7.10		98.5	70.7	6,966		0.160	22,971	
7.20		99.3	71.5	7,102		0.163	23,674	
7.30		100.1	72.3	7,239		0.166	24,391	
7.40		100.9	73.1	7,378		0.169	25,122	
7.50		101.7	73.9	7,518		0.173	25,867	
7.60		102.5	74.7	7,659		0.176	26,626	
7.70		103.3	75.5	7,801		0.179	27,399	
7.80		104.1	76.3	7,945		0.182	28,186	
7.90		104.9	77.1	8,090		0.186	28,988	
8.00		105.7	77.9	8,236		0.189	29,804	
8.10		106.5	78.7	8,384		0.192	30,635	
8.20		107.3	79.5	8,533		0.196	31,481	
8.30		108.1	80.3	8,683		0.199	32,342	
8.40		108.9	81.1	8,834		0.203	33,217	
8.50		109.7	81.9	8,987		0.206	34,108	
8.60		110.5	82.7	9,141		0.210	35,015	
8.70		111.3	83.5	9,296		0.213	35,937	
8.80		112.1	84.3	9,452		0.217	36,874	
8.90		112.9	85.1	9,610		0.221	37,827	
9.00		113.7	85.9	9,769		0.224	38,796	
9.10		114.5	86.7	9,930		0.228	39,781	
9.20		115.3	87.5	10,091		0.232	40,782	
9.30		116.1	88.3	10,254		0.235	41,799	
9.40		116.9	89.1	10,418		0.239	42,833	
9.50		117.7	89.9	10,584		0.243	43,883	
9.60		118.5	90.7	10,750		0.247	44,950	
9.70		119.3	91.5	10,918		0.251	46,033	



# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



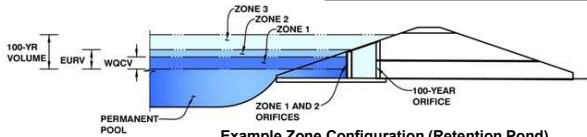


## Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: **TIMBERRIDGE ESTATES**

Basin ID: **BASIN H - SAND FILTER AT DESIGN POINT 8**



**Example Zone Configuration (Retention Pond)**

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.75	0.013	Filtration Media
Zone 2			
Zone 3			
		0.013	Total

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	2.17	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	0.30	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	0.0	ft <sup>2</sup>
Underdrain Orifice Centroid =	0.01	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =		ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =		ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =		inches
Orifice Plate: Orifice Area per Row =		inches

Calculated Parameters for Plate

WQ Orifice Area per Row =	N/A	ft <sup>2</sup>
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft <sup>2</sup>

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (optional)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								
	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =			ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =			inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =			ft <sup>2</sup>
Vertical Orifice Centroid =			feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Not Selected	Not Selected	
Overflow Weir Front Edge Height, H <sub>o</sub> =	0.75		ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	1.50		feet
Overflow Weir Slope =	0.00		H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	1.50		feet
Overflow Grate Open Area % =	70%		% grate open area/total area
Debris Clogging % =	50%		%

Calculated Parameters for Overflow Weir

	Not Selected	Not Selected	
Height of Grate Upper Edge, H <sub>c</sub> =	0.75		feet
Over Flow Weir Slope Length =	1.50		feet
Grate Open Area / 100-yr Orifice Area =			should be ≥ 4
Overflow Grate Open Area w/o Debris =	1.58		ft <sup>2</sup>
Overflow Grate Open Area w/ Debris =	0.79		ft <sup>2</sup>

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Not Selected	Not Selected	
Depth to Invert of Outlet Pipe =			ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter =			inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Not Selected	Not Selected	
Outlet Orifice Area =			ft <sup>2</sup>
Outlet Orifice Centroid =			feet
Half-Central Angle of Restrictor Plate on Pipe =	N/A	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =		ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =		feet
Spillway End Slopes =		H:V
Freeboard above Max Water Surface =		feet

Calculated Parameters for Spillway

Spillway Design Flow Depth =		feet
Stage at Top of Freeboard =		feet
Basin Area at Top of Freeboard =		acres

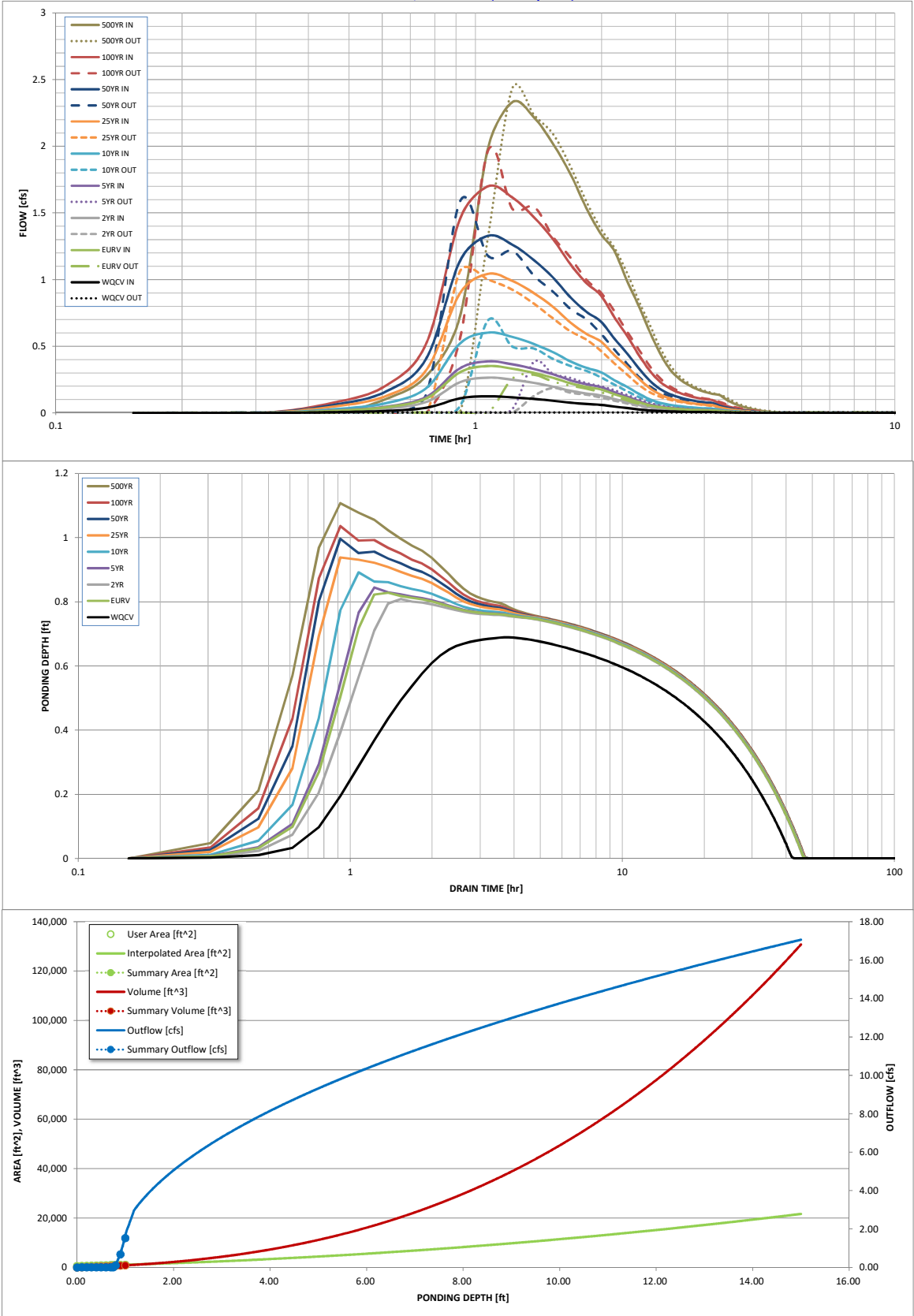
### Routed Hydrograph Results

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.00
Calculated Runoff Volume (acre-ft) =	0.013	0.038	0.029	0.041	0.065	0.113	0.145	0.186	0.256
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.013	0.037	0.028	0.041	0.065	0.113	0.144	0.185	0.255
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.02	0.14	0.50	0.69	0.94	1.34
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.0	0.2	0.7	1.0	1.3	1.8
Peak Inflow Q (cfs) =	0.1	0.4	0.3	0.4	0.6	1.0	1.3	1.7	2.3
Peak Outflow Q (cfs) =	0.0	0.3	0.2	0.4	0.7	1.1	1.6	2.0	2.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	18.1	3.5	1.5	1.7	1.5	1.3
Structure Controlling Flow =	Filtration Media	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1
Max Velocity through Grate 1 (fps) =	N/A	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	41	43	44	42	40	36	33	29	22
Time to Drain 99% of Inflow Volume (hours) =	42	45	46	45	45	43	42	41	38
Maximum Ponding Depth (ft) =	0.69	0.83	0.81	0.84	0.89	0.94	1.00	1.04	1.11
Area at Maximum Ponding Depth (acres) =	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03
Maximum Volume Stored (acre-ft) =	0.012	0.015	0.014	0.015	0.016	0.017	0.019	0.020	0.021



Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			







# **TimberRidge Estates Metropolitan District Operations and Maintenance Manual Sand Filter Basins (offsite)**

County Job No. SF-18-027

Sand Filter Basins (SFBs) are a common type of Stormwater Management facility utilized within the Front Range of Colorado. A SFB consists of a flat surfaced area of sand (sometimes covered with grass or sod), a filtration chamber, and a flat sand filter bed with an underdrain system. A surcharge zone exists within the filtration chambers for temporary storage of the Water Quality Capture Volume (WQCV). During a storm, runoff enters the filtration chamber where it ponds above the sand bed and gradually infiltrates into the underlying sand filter, filling the void spaces of the sand. The underdrain gradually dewateres the sand bed discharges the runoff to a nearby channel, swale, or storm sewer. SFBs provide for filtering and absorption of pollutants in the stormwater. The popularity of SFBs has grown because they allow the WQCV to be provided on a site that has little open area available for stormwater management. However, there are limitations on their use due to potential clogging from large amounts of sediment.

## TimberRidge Estates Metropolitan District Contact Info

Contact Person: TBD

Phone: TBD

Email: TBD

Mailing Address: TBD

## **1. TimberRidge Estates Sand Filter Basins Maintained by TimberRidge Estates Metropolitan District.**

There are two Sand Filter Basins associated with TimberRidge Estates that the TimberRidge Estates Metropolitan District owns and maintains. The following are details of these SFBs. Attached to this manual is a map showing these SFB basin locations.

Sand Filter Basin DP-7 – This SFB is located offsite to the west-southwest and is southwest of the crossing of Arroya Lane and Sand Creek. This sand filter basin will be built during a later phase of the Retreat @ Timberridge development and prior to the paving of Arroya Lane. The final drainage report for TimberRidge Estates covers the drainage calculations for this SFB.

Sand Filter Basin DP-8 – This SFB is located offsite to the southwest and is southeast of the crossing of Arroya Lane and Sand Creek. This sand filter basin will be built during a later phase of the Retreat @ Timberridge development and prior to the paving of Arroya Lane. The final drainage report for TimberRidge Estates covers the drainage calculations for this SFB.



## 2. Access

These SFBs will be accessed from adjacent future roads that are planned as part of the Retreat @ Timberridge development.

## 3. Inspections

### Inspecting Sand Filter Basins (SFBs)

SFBs have a number of features that are designed to serve a particular function. Many times the proper function of one feature depends on another. It is important for maintenance personnel to understand the function of each of these features to prevent damage to any feature during maintenance operations. Below is a list and description of the most common features within a SFB and the corresponding maintenance inspection items that can be anticipated:

**TABLE SFB-1 Typical Inspection & Maintenance Requirements Matrix**

	Sediment Removal	Mowing Weed Control	Trash / Debris Removal	Erosion	Overgrown Vegetation Removal	Removal / Replacement	Structure Repair
Inflow Points	X		X				X
Filter Media	X	X	X	X	X	X	
Underdrain System						X	
Overflow Outlet Works	X		X				X
Embankment		X	X	X	X		

### Inflow Points

Inflow points or outfalls into SFBs are the point of stormwater discharge into the facility. An inflow point is commonly a curb cut with a concrete or riprap rundown or a storm sewer pipe outfall with a flared end section.

The typical maintenance activities that are required at inflow points are as follows:

- a. Riprap Displaced – Many times, because of the repeated impact/force of water, the riprap can shift and settle. If any portion of the riprap apron appears to have settled, soil



is present between the riprap, or the riprap has shifted, maintenance may be required to ensure future erosion is prevented.

b. Sediment Accumulation – Because of the turbulence in the water created by the energy dissipater, sediment often deposits immediately downstream of the inflow point. To prevent a loss in performance of the upstream infrastructure, sediment that accumulates in this area must be removed on a timely basis. c. Structural Damage – Structural damage can occur at anytime during the life of the facility. Typically for an inflow, the structural damage occurs to the pipe flared end section (concrete or steel). Structural damage can lead to additional operating problems with the facility, including loss of hydraulic performance.

### Filter Media

The filter media is the main pollutant removal component of the SFB. The filter media consists of 18-inches of washed sand. The filter media removes pollutants through several different processes, including sedimentation, filtration, infiltration and microbial uptake.

Sedimentation is accomplished by the slow release of stormwater runoff through the filter media. This slow release allows for sediment particles that were not deposited in the sedimentation chamber to be deposited on the top layer of the filter media where they are easily removed through routine maintenance. Other pollutants are also removed through this process because they are attached to sediment.

Filtration is the main pollutant removal mechanism of SFBs. When the stormwater runoff migrates down through the filter media, many of the particulate pollutants are physically strained out as they pass through the filter bed of sand and are trapped on the surface or among the pores of the filter media.

SFBs that are not lined with an impervious liner allow for infiltration into the native soils. This process also allows for additional pollutant removal.

Microbes that naturally occur in the filter media can assist with pollutant removal by breaking down organic pollutants.

The typical maintenance activities that are required within the filter media areas are as follows:

a. Mowing/woody growth control/weeds present - Noxious weeds and other unwanted vegetation must be treated as needed throughout the SFB. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with a local Weed Inspector is highly recommended prior to the use of herbicide. Herbicides should be utilized sparingly and as a last resort. All herbicide applications should be in accordance with the manufacturer's recommendations.



b. Sediment/Pollutant Removal – Although SFBs should not be utilized in areas where large concentrations of sediment and other pollutants will enter the SFB, it is inevitable that some sediment and other pollutants will enter the SFB. Most sediment will be deposited in the sedimentation chamber, however finer suspended particles will migrate to the filter media. These sediments need to be removed to ensure proper infiltration rates of the stormwater runoff.

c. Filter Replacement - The top layers of the filter media are the most susceptible to pollutant loading and therefore may need to be removed and disposed of properly on a semi-regular basis when infiltration rates slow.

d. Infiltration Rate Test - An infiltration test may be necessary to ensure proper functioning of the filter media. The infiltration test can be conducted by filling the sand filter with water to the elevation of the overflow wall in the splitter box. The sand filter needs to drain completely within 24-hours of the filling. If the drain time for the basin is longer than 24-hours, the filter is in need of maintenance.

### Underdrain System

The underdrain system consists of a layer of geotextile fabric, gravel storage area and perforated PVC pipes. The geotextile fabric is utilized to prevent the filter media from entering the underdrain system. The gravel storage area allows for storage of treated stormwater runoff prior to the discharge of the runoff through the perforated PVC pipe.

The typical maintenance activities that are required for the underdrain system are as follows:

With proper maintenance of the filter media and sediment chamber, there should be a minimum amount of maintenance required on the underdrain system. Generally, the only maintenance performed on the underdrain system is jet-vac cleaning.

### Overflow Outlet Works

The overflow outlet works allows runoff amounts that exceed the WQCV to exit the SFB. The outlet works is typically constructed of reinforced concrete into the embankment of the SFB. The outlet structure typically have trash racks over them to prevent clogging. Proper inspection and maintenance of the outlet works is essential in ensuring the long-term operation of the SFB.

The typical maintenance activities that are required for the overflow outlet works are as follows:

a. Structural Damage - The overflow outlet structure is primarily constructed of concrete, which can crack, spall, and settle. The steel grate on the overflow outlet structure is also susceptible to damage.



b. Mowing/woody growth control/weeds present – The presence of plant material not part of the original landscaping, such as wetland plants or other woody growth, can clog the overflow outlet works during a larger storm event, causing flooding damage to adjacent areas. This plant material may indicate a clogging of the filter media and may require additional investigation.

### Embankments

The typical maintenance activities that are required for the embankments areas are as follows:

a. Vegetation Sparse – The embankments are one of the most visible parts of the SFB and, therefore, aesthetics is important. Adequate and properly maintained vegetation can greatly increase the overall appearance of the SFB. Also, vegetation can reduce the potential for erosion and subsequent sediment transport to the filter media, thereby reducing the need for more costly maintenance.

b. Erosion – Inadequate vegetative cover may result in erosion of the embankments. Erosion that occurs on the embankments can cause clogging of the filter media.

c. Trash/Debris – Trash and debris can accumulate in the upper area after large events, or from illegal dumping. Over time, this material can clog the SFB filter media and outlet works.

d. Mowing/woody growth control/weeds present – The presence of plant material not part of the original landscaping, such as wetland plants or other woody growth, can result in difficulty in performing maintenance activities. These trees and shrubs may also damage the underdrain system of the SFB. This plant material may indicate a clogging of the filter media and may require additional investigation.

### Miscellaneous

There are a variety of inspection/maintenance issues that may not be attributed to a single feature within the SFB. This category on the inspection form is for maintenance items that are commonly found in the SFB, but may not be attributed to an individual feature.

a. Encroachment on the SFB – Private lots/property can sometimes be located very close to the SFBs. Property owners may place landscaping, trash, fencing, or other items within the easement area that may affect maintenance or the operation of the facility.

b. Graffiti/Vandalism – Vandals can cause damage to the SFB infrastructure. If criminal mischief is evident, the inspector should forward this information to the local Sheriff's Office.



c. Public Hazards – Public hazards include items such as vertical drops of greater than 4-feet, containers of unknown/suspicious substances, and exposed metal/jagged concrete on structures. If any hazard is found within the facility area that poses an immediate threat to public safety, contact the local Sheriff's Office at 911 immediately.

d. Other – Any miscellaneous inspection/maintenance items not contained on the form should be entered here.

## **4. Operations**

No specific operating instructions are required.

## **5. Maintenance**

Maintenance Categories and Activities: A typical SFB Maintenance Program will consist of three broad categories of work: Routine, Minor and Major. Within each category of work, a variety of maintenance activities can be performed on a SFB. A maintenance activity can be specific to each feature within the SFB, or general to the overall facility. This section of the SOP explains each of the categories and briefly describes the typical maintenance activities for a SFB.

A variety of maintenance activities are typical of SFBs. The maintenance activities range in magnitude from routine trash pickup to the reconstruction of the SFB filter media or underdrain system. Below is a description of each maintenance activity, the objectives, and frequency of actions:

Routine Maintenance Activities: The majority of this work consists of scheduled mowings, trash and debris pickups for the SFB during the growing season. It also includes activities such as weed control. These activities normally will be performed multiple times during the year. These items typically do not require any prior correspondence with EPC, however, completed inspection and maintenance forms shall be submitted to EPC for each inspection and maintenance.

The Routine Maintenance Activities are summarized below, and further described in the following sections.



**TABLE SFB-2**

<b>Maintenance Activity</b>	<b>Minimum Frequency</b>	<b>Look For:</b>	<b>Maintenance Action</b>
Mowing	Twice annually	Excessive grass height/aesthetics	2"-4" grass height
Trash/Debris Removal	Twice annually	Trash/debris in SFB	Remove and dispose of trash and debris
Overflow Outlet Works Cleaning	As needed-after significant rain events-twice annually minimum	Clogged outlet structure; ponding water	Remove and dispose of debris/trash/sediment to allow outlet to function properly
Woody Growth Control/Weed Removal	Minimum twice annually	Noxious weeds; Unwanted vegetation	Treat w/herbicide or hand pull; consult a local weed inspector

#### Mowing

Routine mowing of the vegetation in the SFB is necessary to improve the overall appearance of the SFB. Vegetation should be mowed to a height of 2 to 4-inches and shall be bagged to prevent potential contamination of the filter media.

Frequency – Routine - Minimum of twice annually or depending on aesthetics.

#### Trash/Debris Removal

Trash and debris must be removed from the entire SFB area to minimize outlet clogging and to improve aesthetics. This activity must be performed prior to mowing operations.

Frequency – Routine – Prior to mowing operations and minimum of twice annually.

#### Overflow Outlet Works Cleaning

Debris and other materials can clog the overflow outlet work's grate. This activity must be performed anytime other maintenance activities are conducted to ensure proper operation.

Frequency - Routine – After significant rainfall event or concurrently with other maintenance activities.

#### Woody Growth Control/Weed Removal



Noxious weeds and other unwanted vegetation must be treated as needed throughout the SFB. This activity can be performed either through mechanical means (mowing/pulling) or with herbicide. Consultation with a local County Weed Inspector is highly recommended prior to the use of herbicide. Herbicides should be utilized sparingly and as a last resort. All herbicide applications should be in accordance with the manufacturer's recommendations.

Frequency – Routine – As needed based on inspections.

Minor Maintenance Activities: This work consists of a variety of isolated or small-scale maintenance/operational problems. Most of this work can be completed by a small crew, hand tools, and small equipment. These items typically do not require any prior correspondence with EPC. Completed inspection and maintenance forms shall be submitted to EPC for each inspection and maintenance period. In the event that the SFB needs to be dewatered, care should be given to ensure sediment, filter material and other pollutants are not discharged. All dewatering activities shall be coordinated with EPC.

**TABLE SFB-3**  
**Summary of Minor Maintenance Activities**

<b>Maintenance Activity</b>	<b>Minimum Frequency</b>	<b>Look For:</b>	<b>Maintenance Action</b>
<b>Sediment/ Pollutant Removal</b>	As needed; typically every 1-2 years	Sediment build-up in sedimentation chamber and filter media; decrease in infiltration rate	Remove and dispose of sediment
<b>Erosion Repair</b>	As needed, based upon inspection	Rills/gullies on embankments or sedimentation in the forebay	Repair eroded areas & revegetate; address cause
<b>Jet-Vac/Cleaning Underdrains</b>	As needed, based upon inspection	Sediment build-up/ non-draining system	Clean drains; Jet- Vac if needed

#### Sediment Removal/Pollutant Removal

Sediment removal is necessary to ensure proper function of the filter media. The infiltration rate of the SFB needs to be checked in order to ensure proper functioning of the SFB. Generally, a SFB should drain completely within 12-hours of a storm event. If drain times exceed the 12hour drain time than maintenance of the filter media shall be required.

At a minimum, the top 3-inches of filter media should be removed at each removal period. Additional amounts of filter media may need to be removed if deeper sections of the filter media are contaminated. New filter media will need to be placed back into the



SFB when the total amount of sand removed reaches 9-inches. This may take multiple maintenance events to accomplish. It is critical that only sand that meets the American Society for Testing and Materials (ASTM) C-33 standard be utilized in the replacement of the filter media.

**ASTM C-33 Sand Standard**

<b>US Standard Sieve Size (Number)</b>	<b>Total Percent Passing (%)</b>
9.5 mm (3/8 inch)	100
4.75 mm (No. 4)	95-100
2.36 mm (No. 8)	80-100
1.18 mm (No. 16)	50-85
600 um (No. 30)	25-60
300 um (No. 50)	10-30
150 um (No. 100)	2-10

Other types of sand and soil material may lead to clogging of the SFB. The minor sediment removal activities can typically be addressed with shovels, rakes and smaller equipment. Major sediment removal activities will require larger and more specialized equipment. Extreme care should be taken when utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur.

Stormwater sediments removed from SFBs do not meet the regulatory definition of “hazardous waste”. However, these sediments can be contaminated with a wide array of organic and inorganic pollutants and handling must be done with care to ensure proper removal and disposal. Sediments should be transported by motor vehicle only after they are dewatered.

Frequency – Non-routine – As necessary, based upon inspections. Sediment removal may be necessary as frequently as every 1-2 years.

#### Erosion Repair

The repair of eroded areas is necessary to ensure the proper functioning of the SFB, to minimize sediment transport, and to reduce potential impacts to other features. Erosion can vary in magnitude from minor repairs to filter media and embankments, to rills, and gullies in the embankments and inflow points. The repair of eroded areas may require the use of excavators, earthmoving equipment, riprap, concrete, and sod. Extreme care should be taken when utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur.

Frequency – Non-routine – As necessary, based upon inspections.

#### Jet-Vac/Clearing Drains

A SFB contains an underdrain system that allows treated stormwater runoff to exit the facility. These underdrain systems can develop blockages that can result in a decrease



of hydraulic capacity. Many times the blockage to this infrastructure can be difficult to access and/or clean. Specialized equipment (jet-vac machines) may be necessary to clear debris from these difficult areas.

Frequency – Non-routine – As necessary, based upon inspections.

**Major Maintenance Activities:** This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. All of this work requires approval from EPC Engineering to ensure the proper maintenance is performed. This work requires that Engineering Staff review the original design and construction drawings to assess the situation and assign the necessary maintenance activities. This work may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants. In the event that the basin needs to be dewatered, care should be given to ensure sediment, filter material and other pollutants are not discharged. Consultation with EPC is required prior to any dewatering activity.

**TABLE SFB-4**  
**Summary of Major Maintenance Activities**

<b>Maintenance Activity</b>	<b>Minimum Frequency</b>	<b>Look For:</b>	<b>Maintenance Action</b>
<b>Major Erosion</b>	As needed – based upon scheduled inspections	Severe erosion including gullies, excessive soil displacement, areas of settlement, holes	Repair erosion – find cause of problem and address to avoid future erosion
<b>Structural Repair</b>	As needed based upon scheduled inspections	Deterioration and/or damage to structural components – broken concrete, damaged pipes & outlet works	Structural repair to restore the structure to its original design
<b>SFB Rebuild</b>	As needed – due to complete failure of SFB	Removal of filter media and underdrain system	Contact EPC Engineering

#### Major Erosion Repair

Major erosion repair consists of filling and revegetating areas of severe erosion. Determining the cause of the erosion as well as correcting the condition that caused the erosion should also be part of the erosion repair. Care should be given to ensure design grades and volumes are preserved. Extreme care should be taken when



utilizing motorized or heavy equipment to ensure damage to the underdrain system does not occur.

Frequency – Non-routine – Repair as needed, based upon inspections.

#### Structural Repair

A SFB generally includes a concrete overflow outlet structure that can deteriorate or be damaged during the service life of the facility. These structures are constructed of steel and concrete that can degrade or be damaged and may need to be repaired or re-constructed from time to time. Major repairs to structures may require input from a structural engineer and specialized contractors. Consultation with EPC Engineering Staff shall take place prior to all structural repairs.

Frequency – Non-routine – Repair as needed, based upon inspections.

#### SFB Rebuild

In very rare cases a SFB may need to be rebuilt. Generally, the need for a complete rebuild is a result of improper construction, improper maintenance resulting in structural damage to the underdrain system, or extensive contamination of the SFB. Consultation with EPC Engineering Staff shall take place prior to any rebuild project.

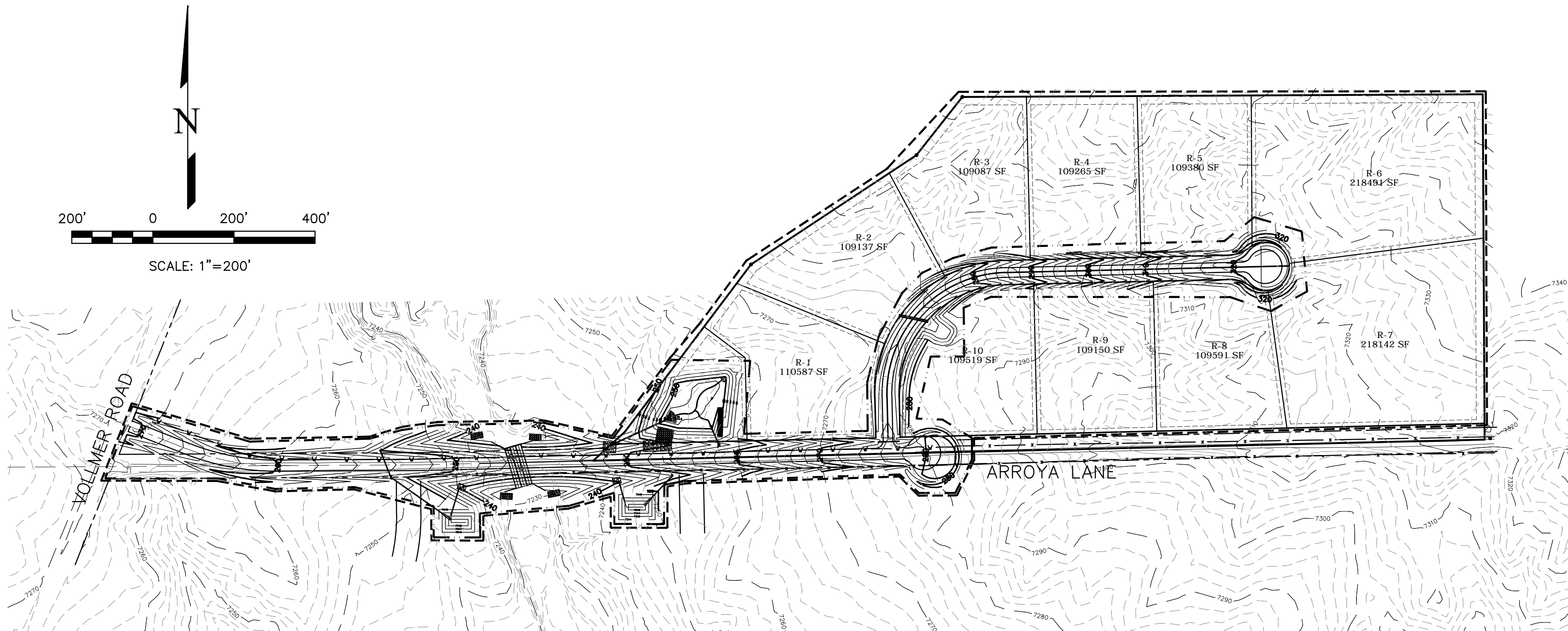
Frequency – Non-routine – As needed, based upon inspections.



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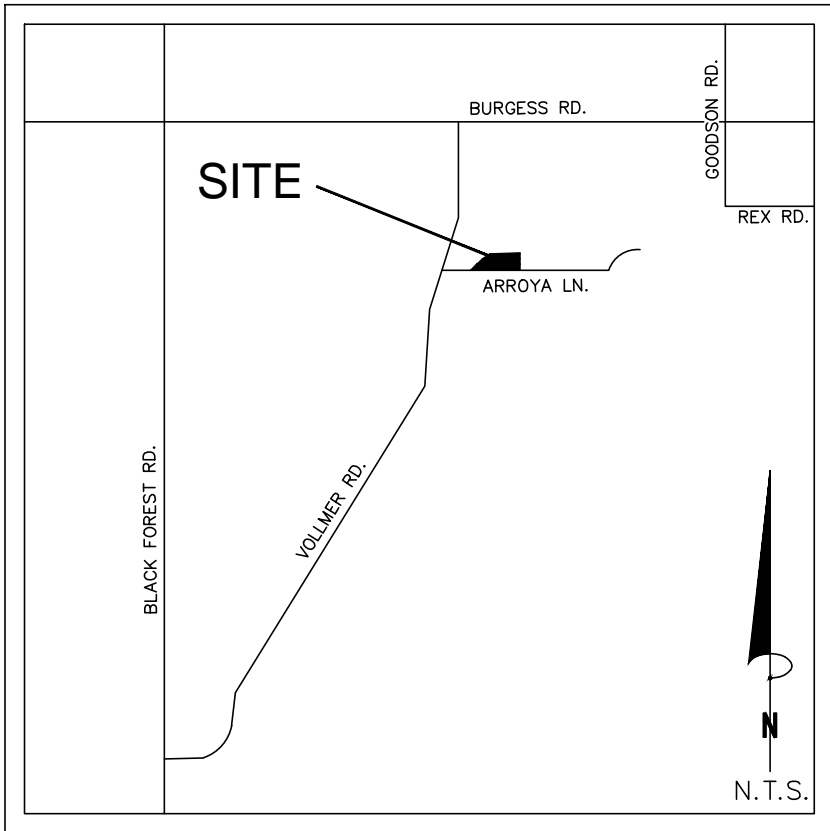
TIMBERRIDGE ESTATES - 9210 ARROYA LANE  
EL PASO COUNTY  
GRADING & EROSION CONTROL PLAN  
FEBRUARY 2019  
SF-18-027



EROSION CONTROL COST OPINION:

1. 2,525 LF-SILT FENCE @ \$4.00/LF	\$	10,100
2. 5,050 LF-SEDIMENT CONTROL LOGS \$4.00/LF	\$	20,200
3. 2 EA-VEHICLE TRACKING CONTROL @ \$1,325/ENTRANCE	\$	2,650
4. 8.8 AC-HYDROSEED @ \$1,000/AC	\$	8,800
5. 3,700 SY-EROSION CONTROL BLANKET @ \$8.00/SY	\$	29,600
6. 1 EA-CONCRETE WASHOUT @ \$760/EA	\$	760
7. 40% MAINTENANCE AND REPLACEMENT	\$	28,844
TOTAL	\$	100,954

VICINITY MAP



STILL NEED

1. TRACTS/EASEMENTS FOR SAND FILTERS – ONCE SIZE/LOCATION IS FINALED

**SHEET INDEX:**

1	COVER SHEET
2	NOTES SHEET
3	GRADING PLAN – EAST
4	GRADING PLAN – WEST
5	GRADING PLAN DETAILS
6	GRADING PLAN DETAILS
7	GRADING PLAN DETAILS
8	EROSION CONTROL PLAN
9	EROSION CONTROL DETAILS
10	EROSION CONTROL DETAILS

CONTACT INFORMATION:

OWNER:	TIMBERRIDGE ESTATES, LLC 2760 BROGANS BLUFF COLORADO SPRINGS, COLORADO 80819 (719) 499-6752
CIVIL ENGINEER:	TERRA NOVA ENGINEERING, INC. 721 S. 23RD STREET COLORADO SPRINGS, COLORADO 80904 QUENTIN N. ARMIJO, P.E., (719) 635-6422
EL PASO COUNTY	PLANNING AND COMMUNITY DEVELOPMENT 2880 INTERNATIONAL CIRCLE COLORADO SPRINGS, COLORADO 80910 (719) 520-6300

SOIL TYPES

ONSITE SOILS ARE HYDROLOGIC GROUP "B", KETTLE GRAVELLY LOAMY SAND (40), 3 TO 8 PERCENT SLOPES, KETTLE GRAVELLY LOAMY SAND (41), 8 TO 40 PERCENT SLOPES AND PRING COARSE SANDY LOAM (71)

BENCHMARKS

A #4 REBAR 28.3 FEET SOUTH AND 77.2 FEET WEST OF THE SOUTHEAST PROPERTY CORNER  
ELEV = 7,319.85' (NGVD-1929)

BASIS OF BEARING

THE EAST LINE OF THE SOUTHWEST QUARTER OF SECTION 22, TOWNSHIP 12 SOUTH, RANGE 65 WEST AND IS ASSUMED TO BEAR NORTH 0 DEGREES 18 MINUTES 04 SECONDS EAST 2640.26 FEET.

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, ERRORS OR OMISSIONS ON MY PART IN PREPARING THIS REPORT.

L DUCETT, P.E. #32339  
FOR AND ON BEHALF OF TERRA NOVA ENGINEERING, INC.

OWNER'S STATEMENT

THE OWNER WILL COMPLY WITH THE REQUIREMENTS OF THE GRADING AND EROSION CONTROL PLAN.

OWNER NAME: \_\_\_\_\_ DATE: \_\_\_\_\_

SIGNED BY: \_\_\_\_\_

TITLE: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

EL PASO COUNTY APPROVAL

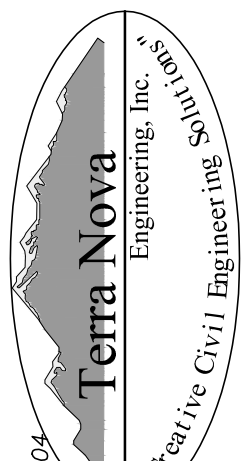
COUNTY PLAN REVIEW IS PROVIDED ONLY FOR GENERAL CONFORMANCE WITH COUNTY DESIGN CRITERIA. THE COUNTY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, DIMENSIONS, AND/OR ELEVATIONS WHICH SHALL BE CONFIRMED AT THE JOB SITE. THE COUNTY THROUGH THE APPROVAL OF THIS DOCUMENT ASSUMES NO RESPONSIBILITY FOR COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.

FILED IN ACCORDANCE WITH THE REQUIREMENTS OF THE EL PASO COUNTY LAND DEVELOPMENT CODE, DRAINAGE CRITERIA, 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.  
COUNTY ENGINEER / ECM ADMINISTRATOR

DATE

REVISIONS	NO.	DESCRIPTION	DATE
UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE EL PASO COUNTY ENGINEER, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PROJECT DESIGNATED BY THE WRITTEN AUTHORIZATION.			
PREPARED FOR: TIMBERRIDGE ESTATES, LLC ATTN: SCOTT HENTIE 2760 BROGANS BLUFF COLORADO SPRINGS, CO 80919 719.499.6752			
 721 S. 23RD STREET COLORADO SPRINGS, CO 80904 OFFICE: 719-635-6422 FAX: 719-635-6426 www.tresinc.com			
DESIGNED BY LD DRAWN BY DLF CHECKED BY LD H-SCALE AS SHOWN V-SCALE NA JOB NO. 1733.00 DATE ISSUED 02/28/19 SHEET NO. 1 OF 12			



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# TIMBERRIDGE ESTATES - 9210 ARROYA LANE

## EL PASO COUNTY

# GRADING & EROSION CONTROL PLAN

## FEBUARY 2019

### STANDARD NOTES FOR EL PASO COUNTY GRADING AND EROSION CONTROL PLANS

1. CONSTRUCTION MAY NOT COMMENCE UNTIL A CONSTRUCTION PERMIT IS OBTAINED FROM PLANNING AND COMMUNITY DEVELOPMENT (PCD) AND A PRE-CONSTRUCTION CONFERENCE IS HELD WITH PCD INSPECTIONS.
2. 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.
3. 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 TO REGULATIONS AND STANDARDS MUST BE REQUESTED, AND APPROVED, IN WRITING.
4. A SEPARATE STORMWATER MANAGEMENT PLAN (SWMP) FOR THIS PROJECT SHALL BE COMPLETED AND AN EROSION AND STORMWATER QUALITY CONTROL PERMIT (ESQCP) ISSUED PRIOR TO COMMENCING CONSTRUCTION. DURING CONSTRUCTION THE SWMP IS THE RESPONSIBILITY OF THE DESIGNATED STORMWATER MANAGER, SHALL BE LOCATED ON SITE AT ALL TIMES AND SHALL BE KEPT UP TO DATE WITH WORK PROGRESS AND CHANGES IN THE FIELD.
5. ONCE THE ESQCP HAS BEEN ISSUED, THE CONTRACTOR MAY INSTALL THE INITIAL STAGE EROSION AND SEDIMENT CONTROL BMPS AS INDICATED ON THE GEC. A PRECONSTRUCTION MEETING BETWEEN THE CONTRACTOR, ENGINEER, AND EL PASO COUNTY WILL BE HELD PRIOR TO ANY CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE APPLICANT TO COORDINATE THE MEETING TIME AND PLACE WITH COUNTY PCD INSPECTIONS STAFF.
6. SOIL EROSION CONTROL MEASURES FOR ALL SLOPES, CHANNELS, DITCHES, OR ANY DISTURBED LAND AREA SHALL BE COMPLETED WITHIN 21 CALENDAR DAYS AFTER FINAL GRADING, OR FINAL EARTH DISTURBANCE, HAS BEEN COMPLETED. DISTURBED AREAS AND STOCKPILES WHICH ARE NOT AT FINAL GRADE BUT WILL REMAIN DORMANT FOR LONGER THAN 30 DAYS SHALL ALSO BE MULCHED WITHIN 21 DAYS AFTER INTERIM GRADING. AN AREA THAT IS GOING TO REMAIN IN AN INTERIM STATE FOR MORE THAN 60 DAYS SHALL ALSO BE SEEDED. ALL TEMPORARY SOIL EROSION CONTROL MEASURES AND BMPS SHALL BE MAINTAINED UNTIL PERMANENT SOIL EROSION CONTROL MEASURES ARE IMPLEMENTED AND ESTABLISHED.
7. TEMPORARY SOIL EROSION CONTROL FACILITIES SHALL BE REMOVED AND EARTH DISTURBANCE AREAS GRADED AND STABILIZED WITH PERMANENT SOIL EROSION CONTROL MEASURES PURSUANT TO STANDARDS AND SPECIFICATION PRESCRIBED IN THE DCM VOLUME II AND THE ENGINEERING CRITERIA MANUAL (ECM) APPENDIX I.
8. ALL PERSONS ENGAGED IN EARTH DISTURBANCE SHALL IMPLEMENT AND MAINTAIN ACCEPTABLE SOIL EROSION AND SEDIMENT CONTROL MEASURES INCLUDING BMPS IN CONFORMANCE WITH THE EROSION CONTROL TECHNICAL STANDARDS OF THE DRAINAGE CRITERIA MANUAL (DCM) VOLUME II AND IN ACCORDANCE WITH THE STORMWATER MANAGEMENT PLAN (SWMP).
9. ALL TEMPORARY EROSION CONTROL FACILITIES INCLUDING BMPS AND ALL PERMANENT FACILITIES INTENDED TO CONTROL EROSION OF ANY EARTH DISTURBANCE OPERATIONS, SHALL BE INSTALLED AS DEFINED IN THE APPROVED PLANS, THE SWMP AND THE DCM VOLUME II AND MAINTAINED THROUGHOUT THE DURATION OF THE EARTH DISTURBANCE OPERATION.
10. ANY EARTH DISTURBANCE SHALL BE CONDUCTED IN SUCH A MANNER SO AS TO EFFECTIVELY REDUCE ACCELERATED SOIL EROSION AND RESULTING SEDIMENTATION. ALL DISTURBANCES SHALL BE DESIGNED, CONSTRUCTED, AND COMPLETED SO THAT THE EXPOSED AREA OF ANY DISTURBED LAND SHALL BE LIMITED TO THE SHORTEST PRACTICAL PERIOD OF TIME.
11. ANY TEMPORARY OR PERMANENT FACILITY DESIGNED AND CONSTRUCTED FOR THE CONVEYANCE OF STORMWATER AROUND, THROUGH, OR FROM THE EARTH DISTURBANCE AREA SHALL BE DESIGNED TO LIMIT THE DISCHARGE TO A NON-EROSIVE VELOCITY.
12. CONCRETE WASH WATER SHALL BE CONTAINED AND DISPOSED OF IN ACCORDANCE WITH THE SWMP. NO WASH WATER SHALL BE DISCHARGED TO OR ALLOWED TO RUNOFF TO STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.
13. EROSION CONTROL BLANKETING IS TO BE USED ON SLOPES STEEPER THAN 3:1.
14. BUILDING, CONSTRUCTION, EXCAVATION, OR OTHER WASTE MATERIALS SHALL NOT BE TEMPORARILY PLACED OR STORED IN THE STREET, ALLEY, OR OTHER PUBLIC WAY, UNLESS IN ACCORDANCE WITH AN APPROVED TRAFFIC CONTROL PLAN. BMPS MAY BE REQUIRED BY EL PASO COUNTY ENGINEERING IF DEEMED NECESSARY, BASED ON SPECIFIC CONDITIONS AND CIRCUMSTANCES.
15. VEHICLE TRACKING OF SOILS AND CONSTRUCTION DEBRIS OFF-SITE SHALL BE MINIMIZED. MATERIALS TRACKED OFFSITE SHALL BE CLEANED UP AND PROPERLY DISPOSED OF IMMEDIATELY.
16. CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL WASTES FROM THE CONSTRUCTION SITE FOR DISPOSAL IN ACCORDANCE WITH LOCAL AND STATE REGULATORY REQUIREMENTS. NO CONSTRUCTION DEBRIS, TREE SLASH, BUILDING MATERIAL WASTES OR UNUSED BUILDING MATERIALS SHALL BE BURIED, DUMPED, OR DISCHARGED AT THE SITE.
17. THE OWNER, SITE DEVELOPER, CONTRACTOR, AND/OR THEIR AUTHORIZED AGENTS SHALL BE RESPONSIBLE FOR THE REMOVAL OF ALL CONSTRUCTION DEBRIS, DIRT, TRASH, ROCK, SEDIMENT, AND SAND THAT MAY ACCUMULATE IN THE STORM SEWER OR OTHER DRAINAGE CONVEYANCE SYSTEM AND STORMWATER APPURTENANCES AS A RESULT OF SITE DEVELOPMENT.
18. THE QUANTITY OF MATERIALS STORED ON THE PROJECT SITE SHALL BE LIMITED, AS MUCH AS PRACTICAL, TO THAT QUANTITY REQUIRED TO PERFORM THE WORK IN AN ORDERLY SEQUENCE. ALL MATERIALS STORED ON-SITE SHALL BE STORED IN A NEAT, ORDERLY MANNER, IN THEIR ORIGINAL CONTAINERS, WITH ORIGINAL MANUFACTURER'S LABELS.
19. NO CHEMICALS ARE TO BE USED BY THE CONTRACTOR, WHICH HAVE THE POTENTIAL TO BE RELEASED IN STORMWATER UNLESS PERMISSION FOR THE USE OF A SPECIFIC CHEMICAL IS GRANTED IN WRITING BY THE ECM ADMINISTRATOR. IN GRANTING THE USE OF SUCH CHEMICALS, SPECIAL CONDITIONS AND MONITORING MAY BE REQUIRED.
20. BULK STORAGE STRUCTURES FOR PETROLEUM PRODUCTS AND OTHER CHEMICALS SHALL HAVE ADEQUATE PROTECTION SO AS TO CONTAIN ALL SPILLS AND PREVENT ANY SPILLED MATERIAL FROM ENTERING STATE WATERS, INCLUDING ANY SURFACE OR SUBSURFACE STORM DRAINAGE SYSTEM OR FACILITIES.
21. NO PERSON SHALL CAUSE THE IMPEDIMENT OF STORMWATER FLOW IN THE FLOW LINE OF THE CURB AND GUTTER OR IN THE DITCHLINE.
22. INDIVIDUALS SHALL COMPLY WITH THE "COLORADO WATER QUALITY CONTROL ACT" (TITLE 25, ARTICLE 8, AND THE "CLEAN WATER ACT" (33 USC 1344), IN ADDITION TO THE REQUIREMENTS INCLUDED IN THE DCM VOLUME II AND THE ECM APPENDIX I. ALL APPROPRIATE PERMITS MUST BE OBTAINED BY THE CONTRACTOR PRIOR TO CONSTRUCTION (NPDES, FLOODPLAIN, 404, FUGITIVE DUST, ETC.). IN THE EVENT OF CONFLICTS BETWEEN THESE REQUIREMENTS AND LAWS, RULES, OR REGULATIONS OF OTHER FEDERAL, STATE, OR COUNTY AGENCIES, THE MORE RESTRICTIVE LAWS, RULES, OR REGULATIONS SHALL APPLY.
23. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
24. PRIOR TO ACTUAL CONSTRUCTION THE PERMITEE SHALL VERIFY THE LOCATION OF EXISTING UTILITIES.
25. A WATER SOURCE SHALL BE AVAILABLE ON SITE DURING EARTHWORK OPERATIONS AND UTILIZED AS REQUIRED TO MINIMIZE DUST FROM EARTHWORK EQUIPMENT AND WIND.
26. THE SOILS REPORT FOR THIS SITE HAS BEEN PREPARED BY ENTECH ENGINEERING, INC. AND SHALL BE CONSIDERED A PART OF THESE PLANS.
27. AT LEAST TEN DAYS PRIOR TO THE ANTICIPATED START OF CONSTRUCTION, FOR PROJECTS THAT WILL DISTURB 1 ACRE OR MORE, THE OWNER OR OPERATOR OF CONSTRUCTION ACTIVITY SHALL SUBMIT A PERMIT APPLICATION FOR STORMWATER DISCHARGE TO THE COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT, WATER QUALITY DIVISION. THE APPLICATION CONTAINS CERTIFICATION OF COMPLETION OF A STORMWATER MANAGEMENT PLAN (SWMP), OF WHICH THIS GRADING AND EROSION CONTROL PLAN MAY BE A PART. FOR INFORMATION OR APPLICATION MATERIALS CONTACT:

COLORADO DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT  
WATER QUALITY CONTROL DIVISION  
WOOD - PERMITS  
4300 CHERRY CREEK DRIVE SOUTH  
DENVER, CO 80246-1530  
ATTN: PERMITS UNIT

### EL PASO COUNTY STANDARD CONSTRUCTION NOTES:

1. 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 & 2 AND THE EL PASO COUNTY ENGINEERING CRITERIA MANUAL.
2. 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).
3. 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:
  - A. EL PASO COUNTY ENGINEERING CRITERIA MANUAL (ECM)
  - B. CITY OF COLORADO SPRINGS/EL PASO COUNTY DRAINAGE CRITERIA MANUAL, VOLUMES 1 & 2
  - C. COLORADO DEPARTMENT OF TRANSPORTATION (CDOT) STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION
  - D. CDOT M & S STANDARDS.
4. 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-FACE WILL BE ENTIRELY THE DEVELOPER'S RESPONSIBILITY TO RECTIFY.
5. 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.
6. CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING WITH EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT (PCD) INSPECTIONS, PRIOR TO STARTING CONSTRUCTION.
7. IT IS THE CONTRACTORS 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.
8. 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.
9. ALL STORM DRAIN PIPE SHALL BE CLASS III RCP UNLESS OTHERWISE NOTED AND APPROVED BY PCD.
10. 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.
11. ALL CONSTRUCTION TRAFFIC MUST ENTER/EXIT THE SITE AT APPROVED CONSTRUCTION ACCESS POINTS.
12. 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.
13. SIGNING AND STRIPING SHALL COMPLY WITH EL PASO COUNTY PUBLIC WORK DEPARTMENT AND MUTCD CRITERIA.
14. CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED BY EL PASO COUNTY PWD, INCLUDING WORK WITHIN THE RIGHT-OF-WAY AND SPECIAL TRANSPORT PERMITS.
15. 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.

### CONSTRUCTION SCHEDULE

BEGIN GRADING: SPRING 2019, END GRADING: FALL 2020

### TRAFFIC CONTROL NOTE

THE CONTRACTOR SHALL PROVIDE ALL TRAFFIC CONTROL DEVICES AND MONITORING NECESSARY TO SAFELY COMPLETE THE WORK SHOWN IN THESE CONSTRUCTION DOCUMENTS IN CONFORMANCE WITH M.U.T.C.D. GUIDELINES. THE CONTRACTOR SHALL COMPLETE ALL NECESSARY WORK FOR PLAN REVIEW, PERMITS AND PROCESSING. TRAFFIC CONTROL WILL NOT BE PAID SEPARATELY BUT IS INCLUDED IN THE COST OF THE PROJECT.

### UTILITY NOTES

1. UTILITY LINE LOCATIONS AND ELEVATIONS ARE APPROXIMATE AND ARE TO BE FIELD VERIFIED.
2. BURY DEPTH OF THE WATER MAIN ALONG ARROYA LANE TO BE CONFIRMED PRIOR TO STARTING ANY GRADING ABOVE THE WATER MAIN.

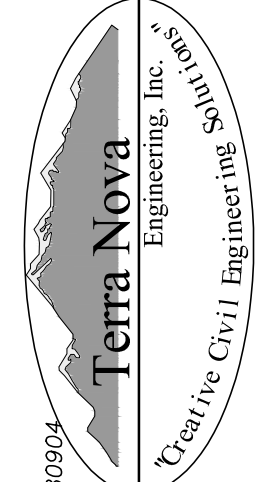
### CONSTRUCTION NOTES:

1. ALL WORK SHALL COMPLY WITH THE CODES AND POLICIES FOR EL PASO COUNTY.
2. EXISTING TOPOGRAPHIC INFORMATION SHOWN ON THIS GRADING PLAN WAS OBTAINED FROM AERIAL CONTOURS. THE CONTRACTOR SHALL BE RESPONSIBLE TO EXAMINE THE SITE AND BE FAMILIAR WITH THE EXISTING CONDITIONS.
3. DEPTH OF MOISTURE-DENSITY CONTROL FOR THIS PROJECT SHALL BE AS FOLLOWS: BASE OF ALL CUTS AND FILLS - 12 INCHES, FULL DEPTH OF ALL EMBANKMENTS.
4. THE CONTRACTOR IS RESPONSIBLE FOR THE RE-ESTABLISHMENT OF ALL SURVEY MONUMENTS DISTURBED WITHIN THE PROJECT LIMITS.
5. THE CONTRACTOR SHALL PROTECT ALL WORK AREAS AND FACILITIES FROM FLOODING AT ALL TIMES. AREAS AND FACILITIES SUBJECTED TO FLOODING, REGARDLESS OF THE SOURCE OF WATER, SHALL BE PROMPTLY DEWATERED AND RESTORED.
6. PRIOR TO PAVING OPERATIONS, THE ENTIRE SUBGRADE SHALL BE PROOF-ROLLED WITH A LOADED 988 FRONT-END LOADER OR SIMILAR HEAVY RUBBER TIRED VEHICLE (GVW OF 50,000 POUNDS WITH 18 KIP PER AXLE AT TIRE PRESSURES OF 90 PSI) TO DETECT ANY SOFT OR LOOSE AREAS. IN AREAS WHERE SOFT OR LOOSE SOILS, PUMPING OR EXCESSIVE MOVEMENT IS OBSERVED, THE EXPOSED MATERIALS SHALL BE OVER-EXCAVATED TO A MINIMUM DEPTH OF TWO FEET BELOW PROPOSED FINAL GRADE OR TO A DEPTH AT WHICH SOILS ARE STABLE. AFTER THIS HAS BEEN COMPLETED, THE EXPOSED MATERIALS SHALL BE SCARIFIED TO A DEPTH OF 12 INCHES AND MOISTURE CONDITIONED. THE SUBGRADE SHALL THEN BE UNIFORMLY COMPACTED TO A MINIMUM OF 95% OF STANDARD PROCTOR DENSITY (ASTM D-698) AT 0 TO +4.0% OF OPTIMUM MOISTURE CONTENT FOR A-6 AND A-7-6 SOILS ENCOUNTERED. OTHER SUBGRADE TYPES SHALL BE UNIFORMLY COMPACTED TO A MINIMUM OF 95% OF MODIFIED PROCTOR DENSITY (ASTM D-1557) AT PLUS OR MINUS 2.0% OF OPTIMUM MOISTURE CONTENT. AREAS WHERE STABLE NATURAL SOILS ARE ENCOUNTERED AT PROPOSED SUBGRADE ELEVATION SHALL ALSO BE SCARIFIED (18 INCHES FOR A-7-6 SOILS BELOW FULL-DEPTH ASPHALT CONCRETE) AND COMPACTED AS OUTLINED ABOVE PRIOR TO PAVING OPERATIONS. SUBGRADE FILL SHALL BE PLACED IN SIX-INCH LIFTS AND UNIFORMLY COMPACTED, MEETING THE REQUIREMENTS AS PREVIOUSLY DESCRIBED.
7. SUBGRADE MATERIALS DEEMED UNSUITABLE BY THE ENGINEER SHALL BE EXCAVATED, DISPOSED OF AND REPLACED WITH APPROVED MATERIALS.
8. FILL SHALL BE PLACED IN 8-INCH MAXIMUM LOOSE LIFTS AND SHALL BE COMPACTED PRIOR TO SUCCESSIVE LIFTS.
9. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING AND CONTROLLING EROSION DURING CONSTRUCTION ACTIVITIES AT ALL TIMES DURING GRADING AND CONSTRUCTION. THE CONTRACTOR SHALL PROVIDE THE FOLLOWING EROSION AND SEDIMENT CONTROL MEASURES:
  - SEDIMENT CONTROL LOGS WHERE NEEDED AND/OR AS DIRECTED BY THE ENGINEER.
  - SILT FENCE WHERE NEEDED AND/OR AS DIRECTED BY THE ENGINEER.
  - PERMANENT SEEDING AND MULCHING WHERE NEEDED AND/OR AS DIRECTED BY THE ENGINEER.
  - CONCRETE WASH AREAS.
  - VEHICLE TRACKING CONTROL.
  - SOIL STOCKPILING AREA.
  - MATERIALS STAGING AREA.THESE AND ALL EROSION CONTROL BEST MANAGEMENT PRACTICES AS SHOWN IN THE GRADING AND EROSION CONTROL PLANS SHALL BE STRICTLY ADHERED TO.
10. FINISHED CONTOURS/ SPOT ELEVATIONS SHOWN HEREON REPRESENT FINISHED GRADES.

REVISIONS	NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE FOLLOWING AGENCIES: TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PROJECT DESCRIBED BY WRITTEN AUTHORIZATION.
--

PREPARED FOR: <b>TIMBERRIDGE ESTATES, LLC</b> ATTN: SCOTT HENTIE 2760 BROGANS BLUFF COLORADO SPRINGS, CO 80919 719.499.6752
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721 S. 23RD STREET COLORADO SPRINGS, CO 80904 OFFICE: 719-635-6442 FAX: 719-635-6426 www.tresinc.com	
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TIMBERRIDGE ESTATES 9210 ARROYA LANE	GRADING & EROSION CONTROL PLAN NOTES SHEET
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DESIGNED BY LD
DRAWN BY DLF
CHECKED BY LD
H-SCALE NA
V-SCALE NA
JOB NO. 1733.00
DATE ISSUED 02/28/19
SHEET NO. 2 OF 12



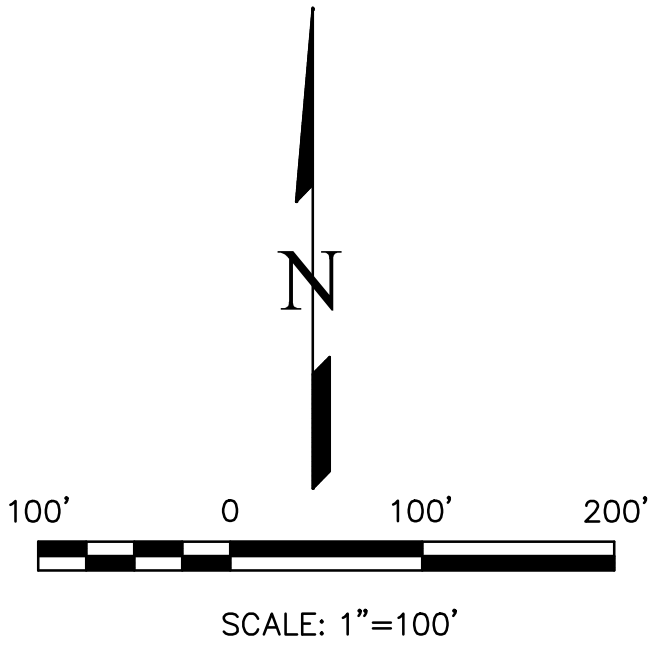
TIMBERRIDGE ESTATES - 9210 ARROYA LANE  
EL PASO COUNTY  
GRADING & EROSION CONTROL PLAN  
FEBRUARY 2019

**BENCHMARKS**  
A #4 REBAR 28.3 FEET SOUTH AND 77.2 FEET WEST OF THE SOUTHEAST  
PROPERTY CORNER.  
ELEV = 7,319.85' (NGVD-1929)

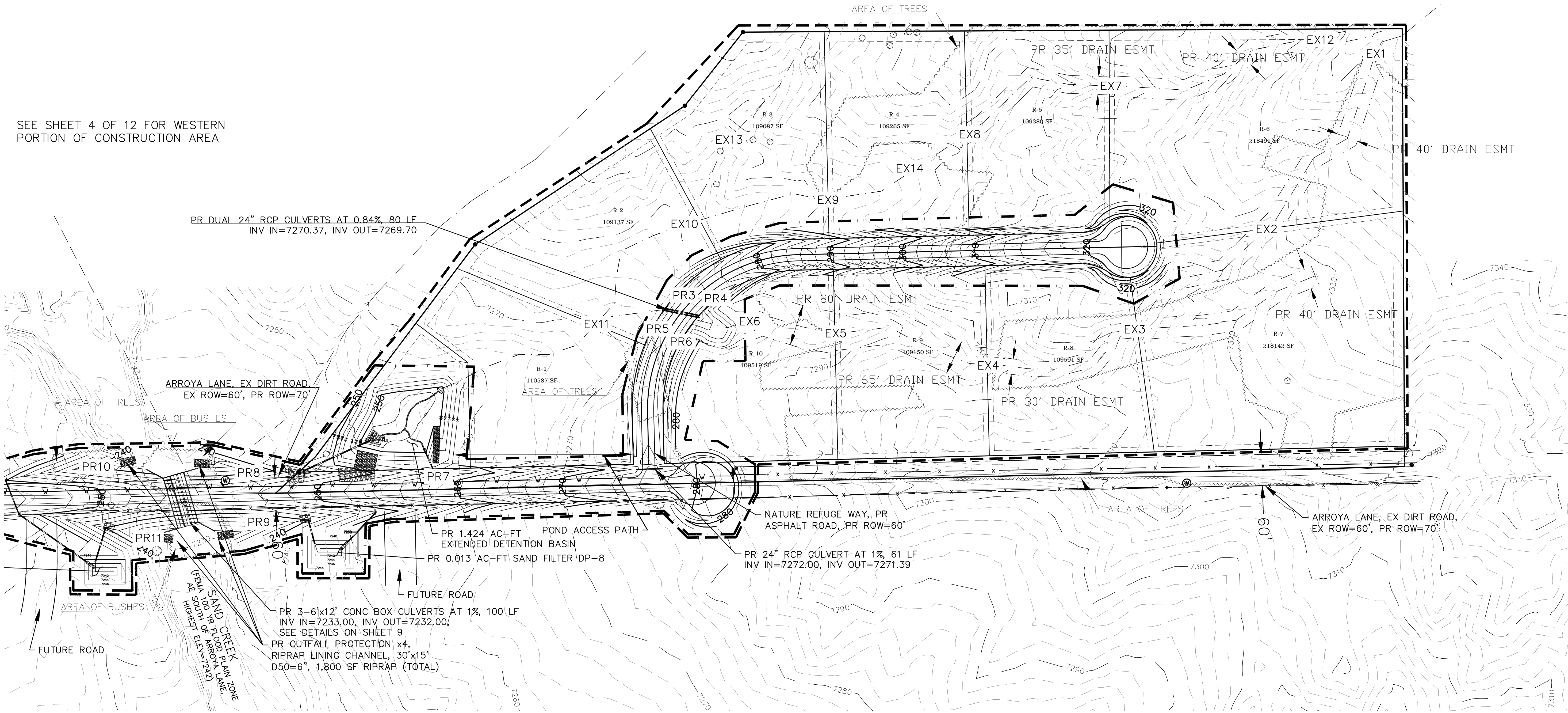
**NOTES**  
1. REINFORCE PROPOSED SWALES PR4, PR7, PR8, PR9, PR10, & PR11 WITH  
TURF REINFORCEMENT MATS (NORTH AMERICAN GREEN VMAX SC250, VMAX  
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SWALE AREAS WITH RIPRAP.  
2. SAND FILTER ACCESS WILL BE FROM THE FUTURE ROADS ADJACENT TO  
EACH SAND FILTER.  
3. PROPOSED DRAINAGE EASEMENTS ARE BASED ON EXISTING CONDITIONS,  
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4. DRAINAGE CHANNEL GRADING AND EASEMENT FOR LOTS R-1, R-2, R-3,  
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**LEGEND**

- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- SURFACE FLOW CHANNEL
- PROPOSED DRAINAGE EASEMENT
- EXISTING WATER LINE
- CONSTRUCTION SITE BOUNDARY
- AREA OF SOIL DISTURBANCE
- EXISTING TREE
- OPEN CHANNEL FLOW CALC POINT
- AREA OF TREES/BRUSH LIMIT

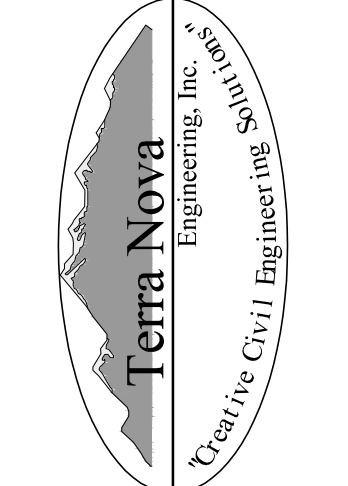


SEE SHEET 4 OF 12 FOR WESTERN  
PORTION OF CONSTRUCTION AREA



REVISIONS		DATE
NO.	DESCRIPTION	

PREPARED FOR:  
TIMBERRIDGE ESTATES, LLC  
ATTN: SCOTT HENTIE  
2760 BROGANS BLUFF  
COLORADO SPRINGS, CO 80919  
719.499.6752



Terra Nova  
Engineering, Inc.  
Creative Civil Engineering

721 S. 2960 STREET  
COLORADO SPRINGS, CO 80904  
OFFICE: 719-635-6422  
FAX: 719-635-6426  
www.tnainc.com

TIMBERRIDGE ESTATES 9210 ARROYA LANE	GRADING & EROSION CONTROL PLAN GRADING PLAN - EAST
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DESIGNED BY LD
DRAWN BY DLF
CHECKED BY LD
H-SCALE 1"=100'
V-SCALE NA
JOB NO. 1733.00
DATE ISSUED 02/28/19
SHEET NO. 3 OF 12



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**BENCHMARKS**  
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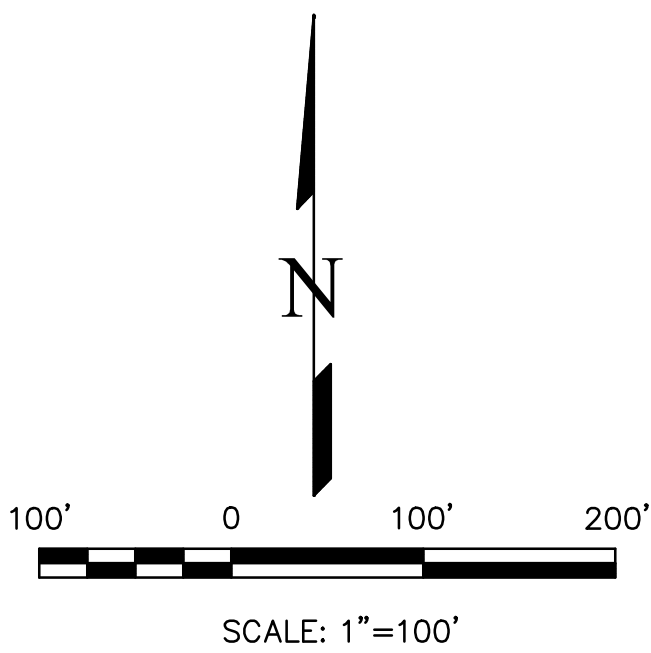
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# TIMBERRIDGE ESTATES - 9210 ARROYA LANE

## EL PASO COUNTY

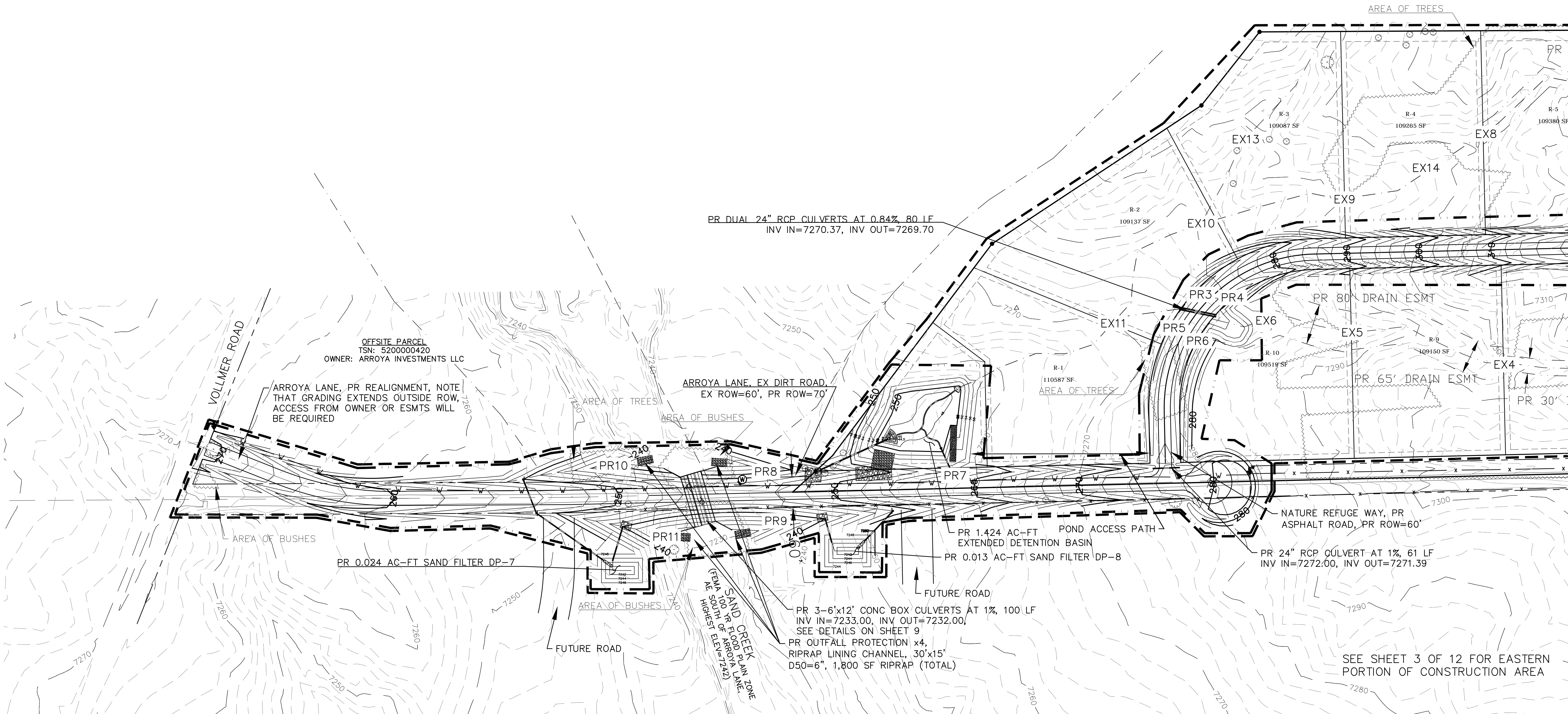
### GRADING & EROSION CONTROL PLAN

#### FEBRUARY 2019



**LEGEND**

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- EX# / PR#
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REVISIONS	
NO.	DESCRIPTION

UNTIL SUCH TIME AS THESE  
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ENGINEERING DEPARTMENT  
TERRA NOVA ENGINEERING,  
INC. APPROVES THEIR USE  
ONLY FOR THE PROJECT  
AND FOR THE DESIGNATED BY  
WRITTEN AUTHORIZATION.

PREPARED FOR:  
**TIMBERRIDGE ESTATES, LLC**  
ATTN: SCOTT HENTIE  
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COLORADO SPRINGS, CO 80919  
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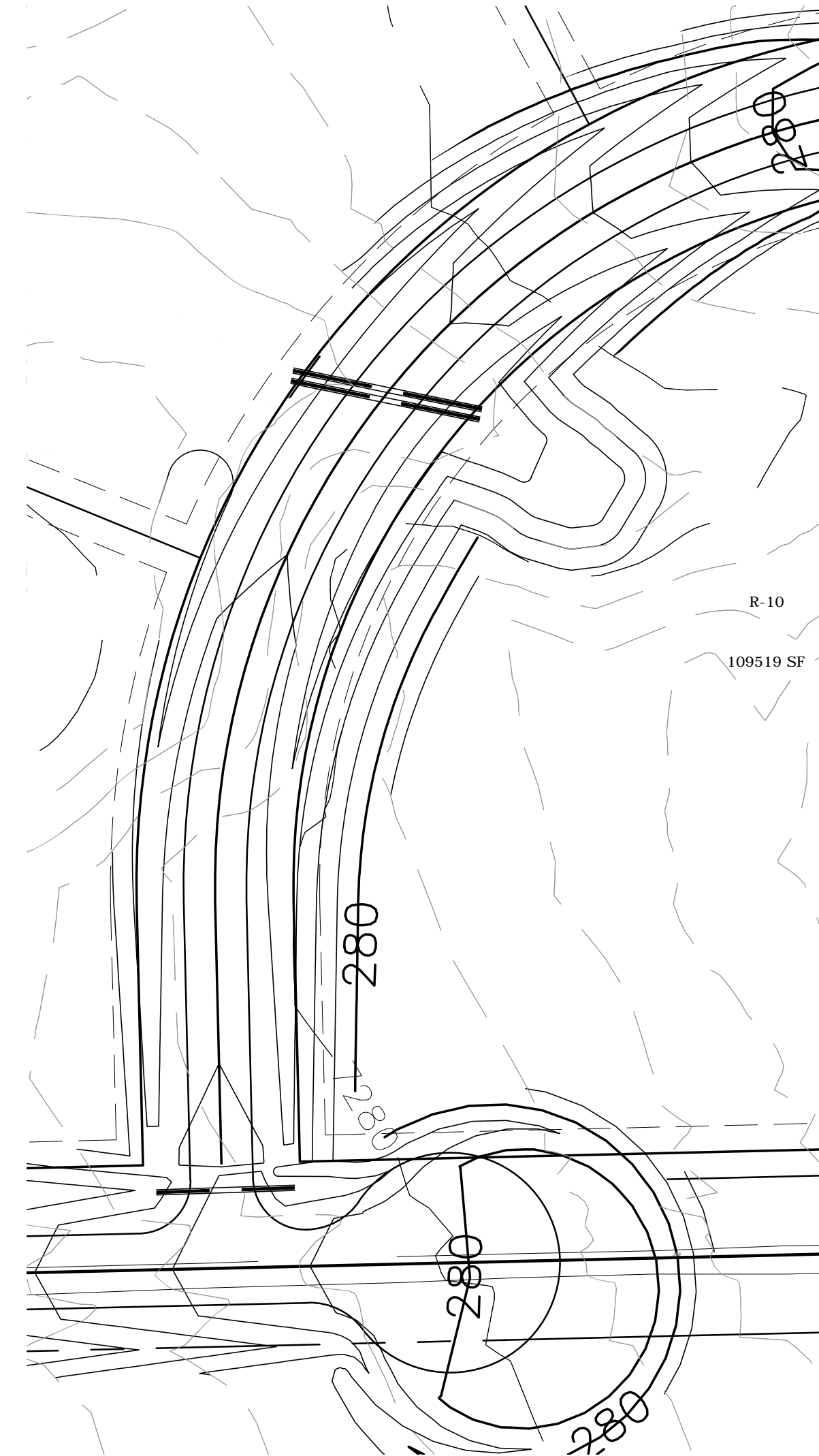
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**TIMBERRIDGE ESTATES**  
9210 ARROYA LANE  
GRADING & EROSION CONTROL PLAN  
GRADING PLAN - WEST

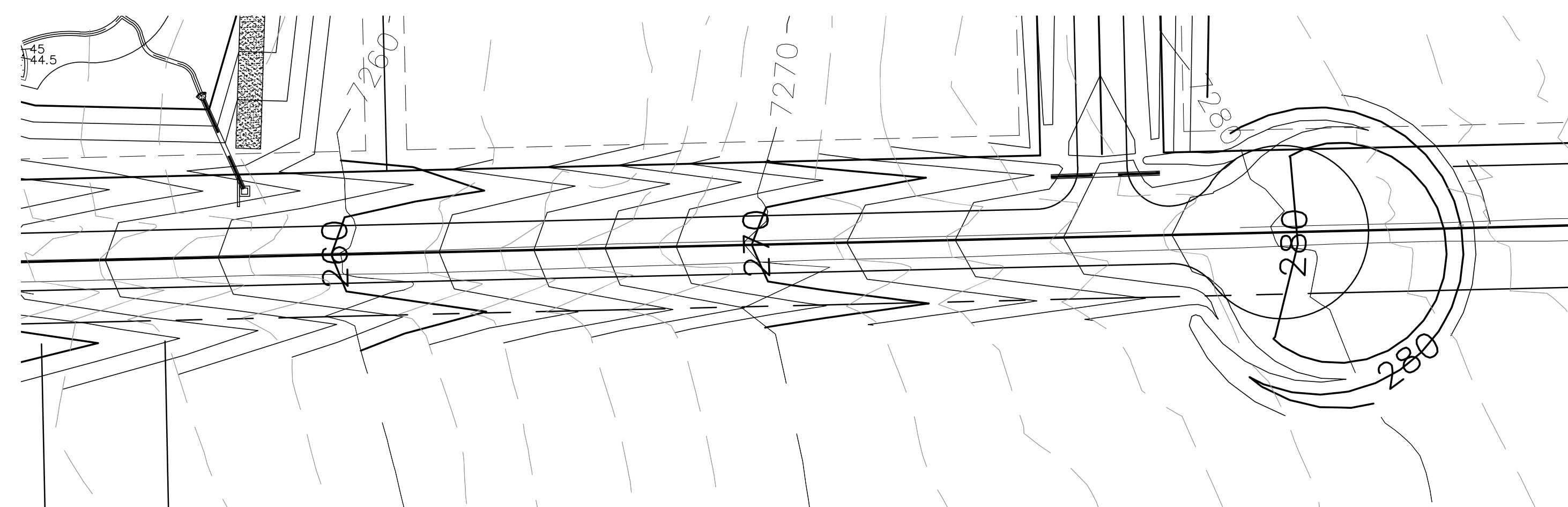
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V-SCALE NA
JOB NO. 1733.00
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SHEET NO. 4 OF 12



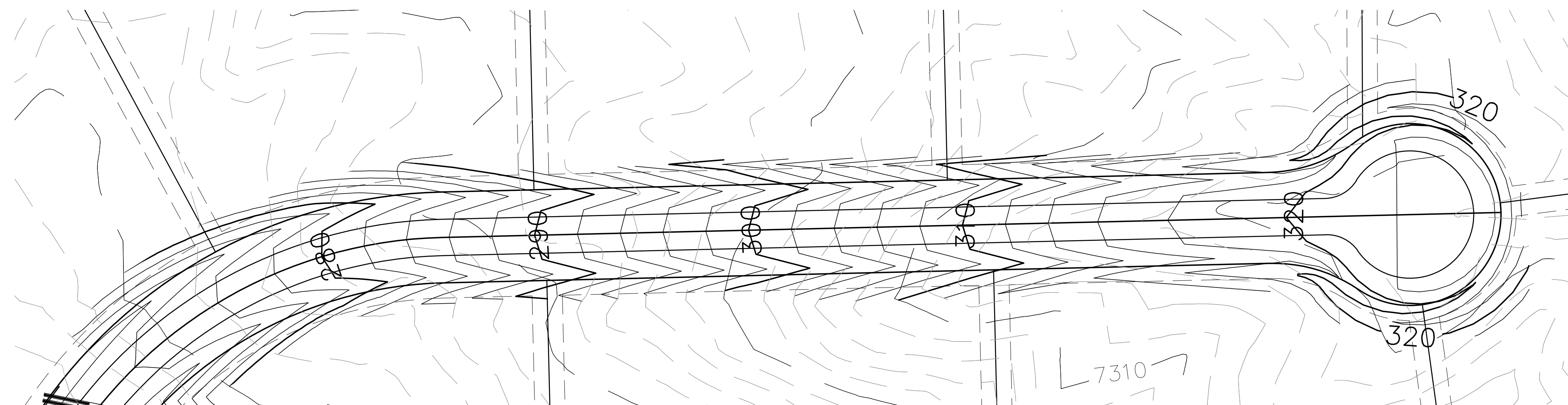
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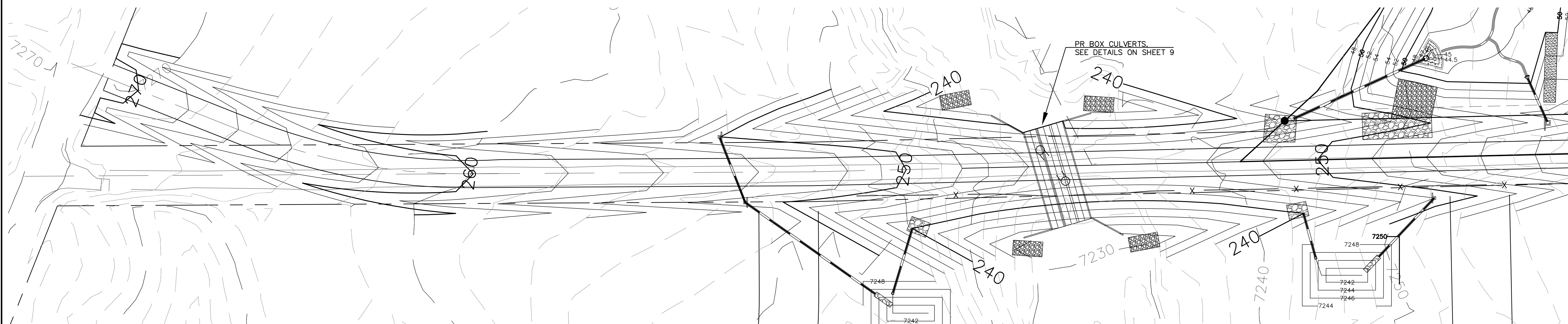
SOUTH PORTION NATURE REFUGE WAY DETAIL



EAST PORTION ARROYA LANE DETAIL

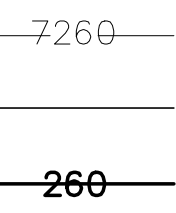












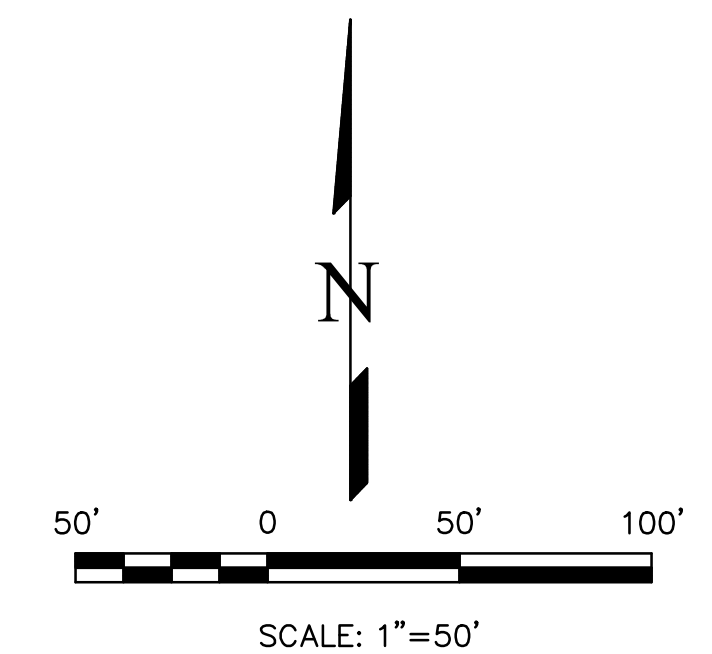
NORTH PORTION NATURE REFUGE WAY DETAIL



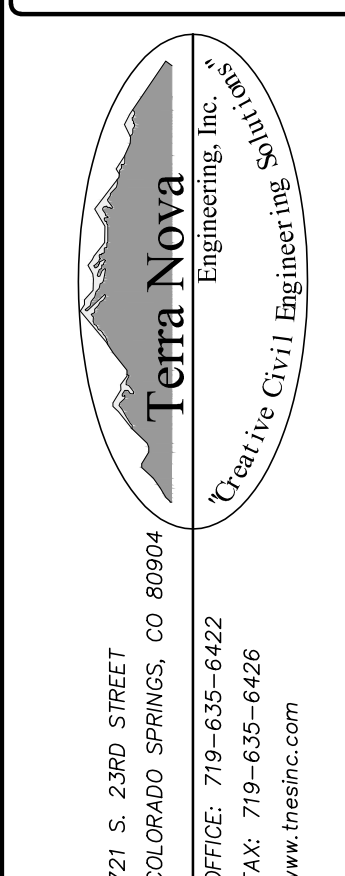
WEST PORTION ARROYA LANE DETAIL

LEGEND

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- |   |                            |
|---|----------------------------|
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|  | EXISTING 10' CONTOUR       |
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|  | EXISTING WATER LINE        |
|  | CONSTRUCTION SITE BOUNDARY |
|  | AREA OF SOIL DISTURBANCE   |
|  | EXISTING TREE              |

[illegible]

PREPARED FOR:  
TIMBERRIDGE ESTATES, LLC  
ATTN: SCOTT HENTE  
2760 BROGANS BLUFF  
COLORADO SPRINGS, CO 80919  
719.499.6752



**TIMBERIDGE ESTATES**  
9210 ARROYA LANE

DESIGNED BY LD
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H-SCALE 1"=50'
V-SCALE NA
JOB NO. 1733.00
DATE ISSUED 02/28/1
SHEET NO. 5 OF 5

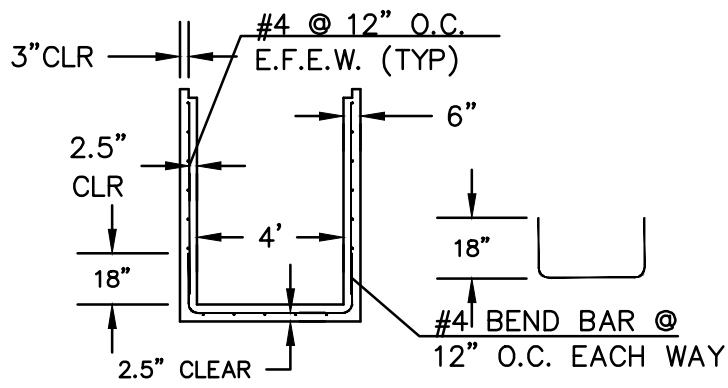


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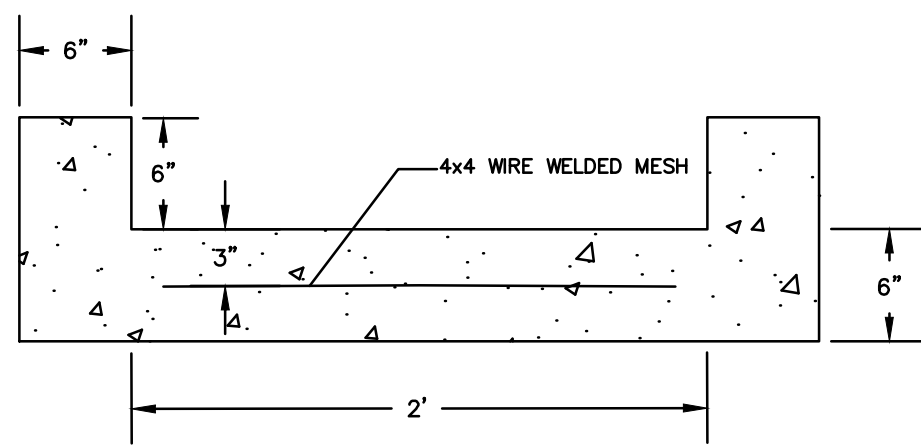
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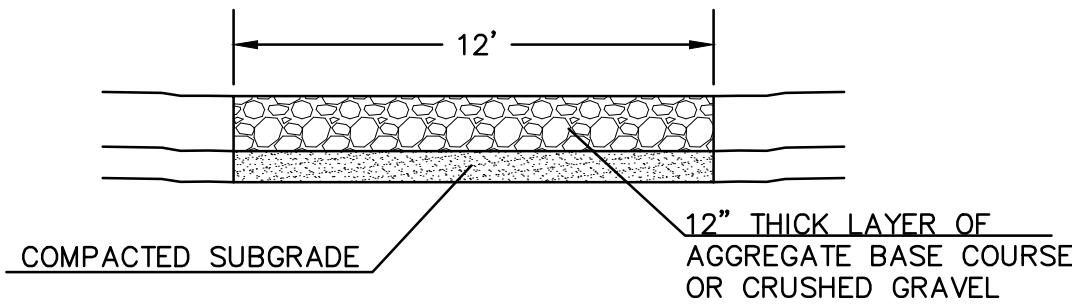
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SWALE AREAS WITH RIPRAP.



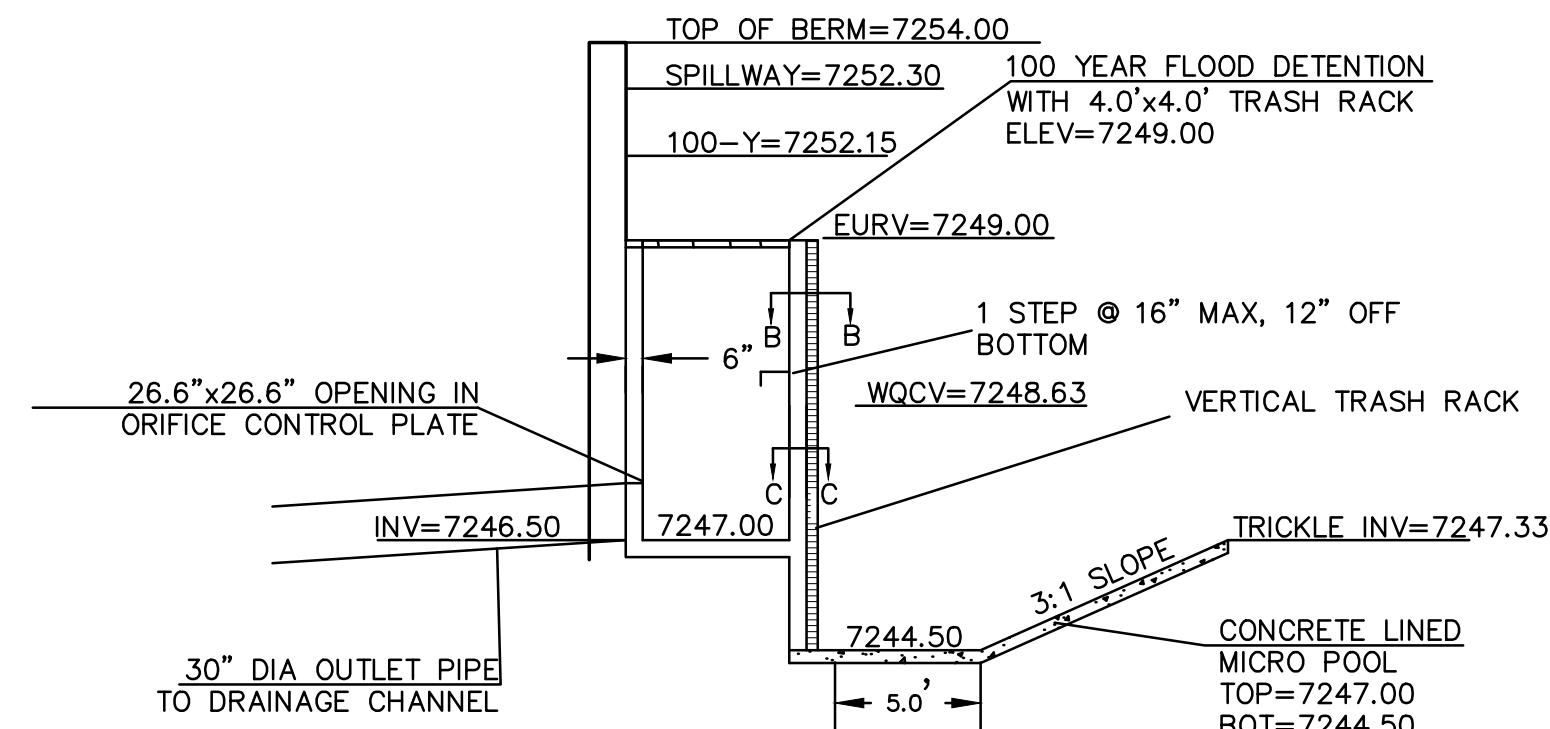
**4'x4' OUTLET BOX  
STRUCTURAL DETAIL**  
NOT TO SCALE



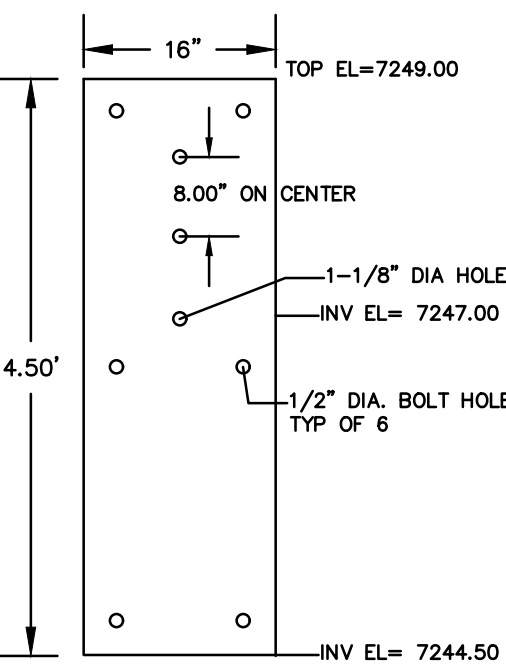
**2' CONCRETE TRICKLE CHANNEL**  
NOT TO SCALE



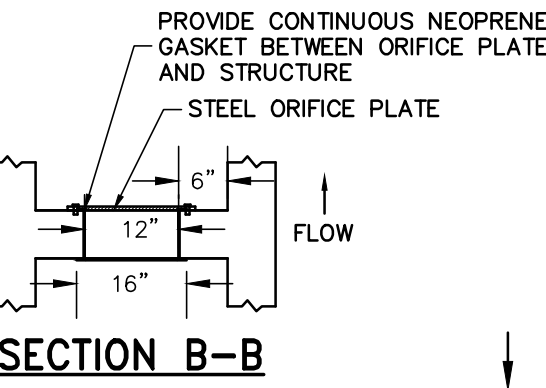
**12' MAINTENANCE ACCESS ROAD SECTION**  
NOT TO SCALE



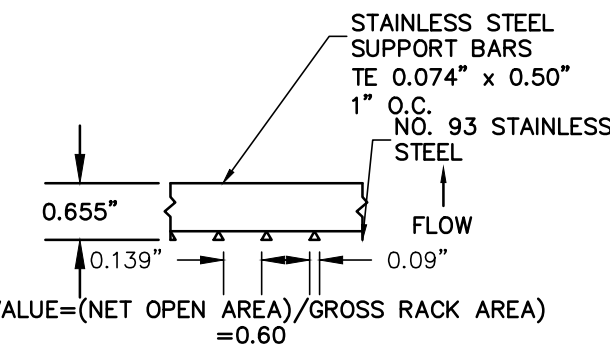
**OUTLET STRUCTURE**  
NOT TO SCALE



**ORIFICE PLATE  
PERFORATED HOLE PATTERN**  
NOT TO SCALE

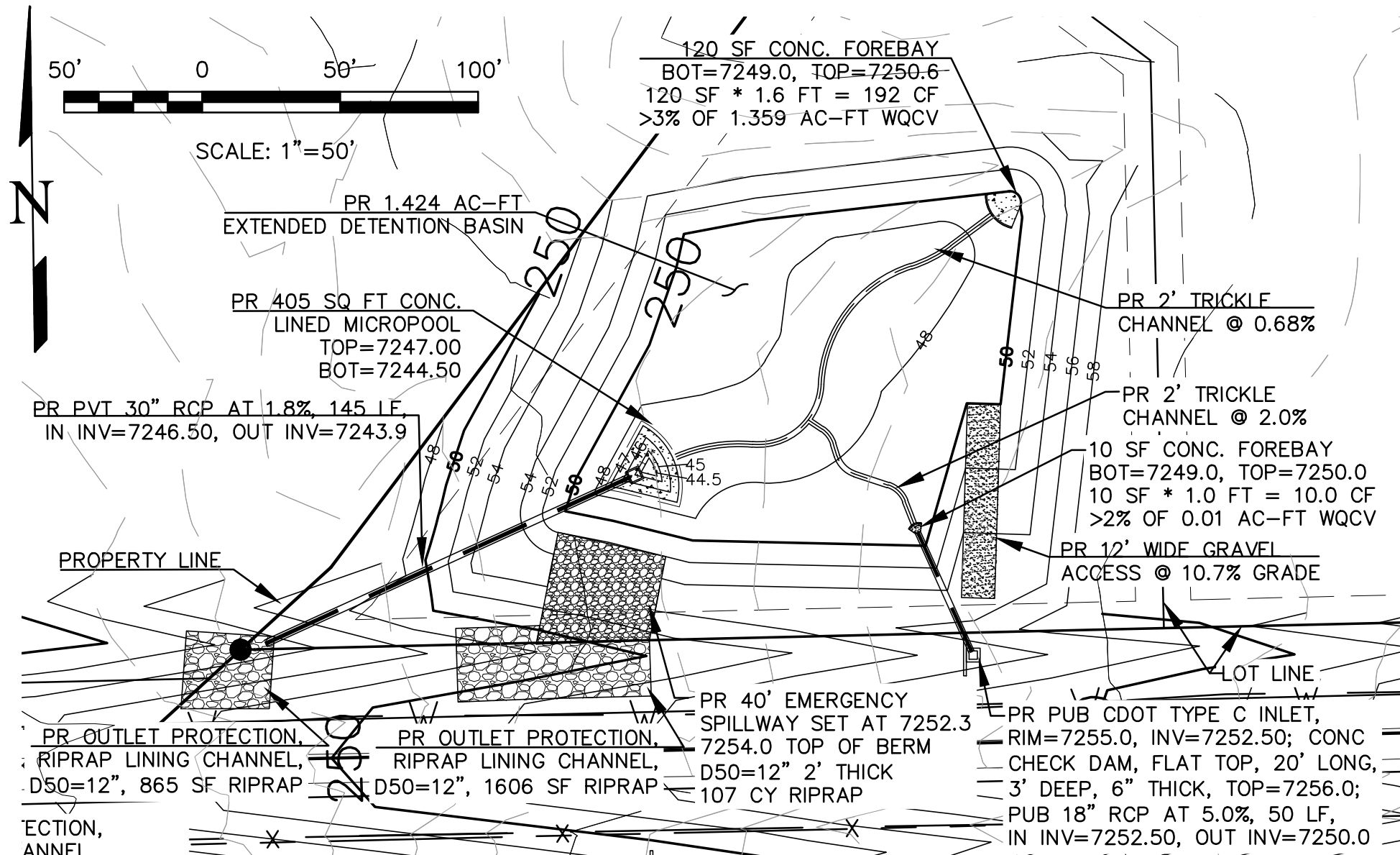


**SECTION B-B**  
NOT TO SCALE



**SECTION C-C**  
NOT TO SCALE

**POND OUTLET OVERALL DETAIL**



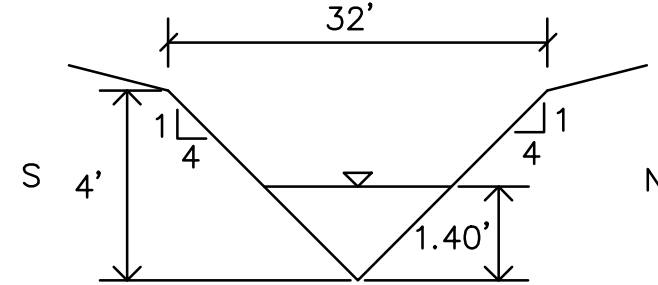
**EXTENDED DETENTION BASIN DETAIL**

# TIMBERRIDGE ESTATES - 9210 ARROYA LANE

## EL PASO COUNTY

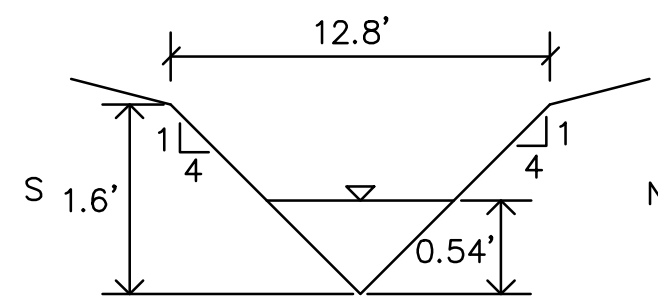
### GRADING & EROSION CONTROL PLAN

FEBRUARY 2019



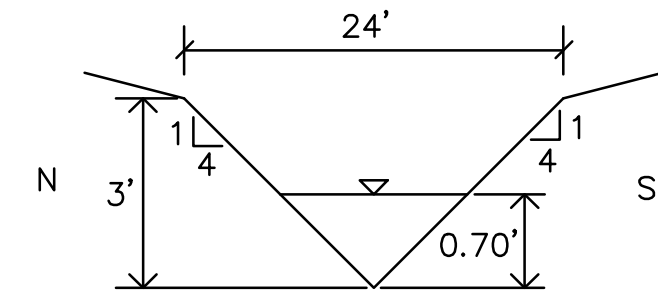
Q = 67.1 CFS  
SLOPE = 5.0%  
n VALUE = 0.03  
DEPTH = 1.40'  
VELOCITY = 8.56 FT/S  
\*EXPANDED TO ALLOW FOR  
POSSIBLE FUTURE FLOW INCREASES  
\*REINFORCE CHANNEL  
SIDES, SEE NOTE 1

**SWALE CROSS SECTION - PR8**



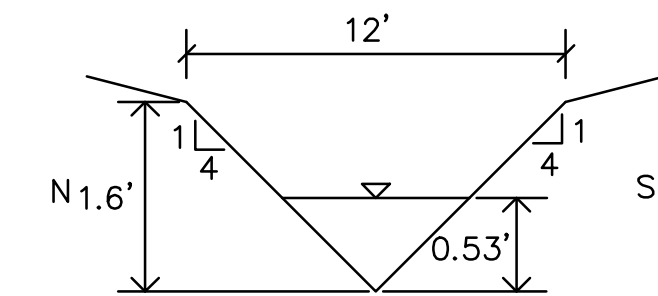
Q = 5.8 CFS  
SLOPE = 6.0%  
n VALUE = 0.03  
DEPTH = 0.54'  
VELOCITY = 4.97 FT/S  
\*REINFORCE CHANNEL  
SIDES, SEE NOTE 1

**SWALE CROSS SECTION - PR9**



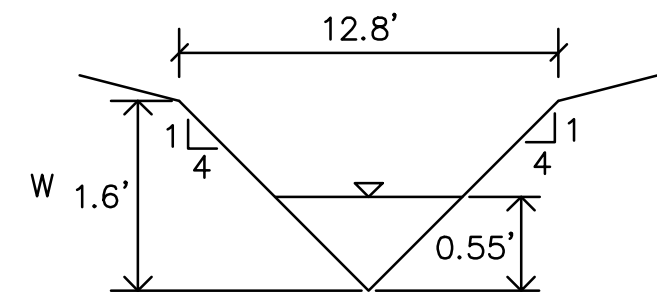
Q = 10.7 CFS  
SLOPE = 5.9%  
n VALUE = 0.03  
DEPTH = 0.70'  
VELOCITY = 5.84 FT/S  
\*EXPANDED TO ALLOW FOR  
POSSIBLE FUTURE FLOW INCREASES  
\*REINFORCE CHANNEL  
SIDES, SEE NOTE 1

**SWALE CROSS SECTION - PR10**



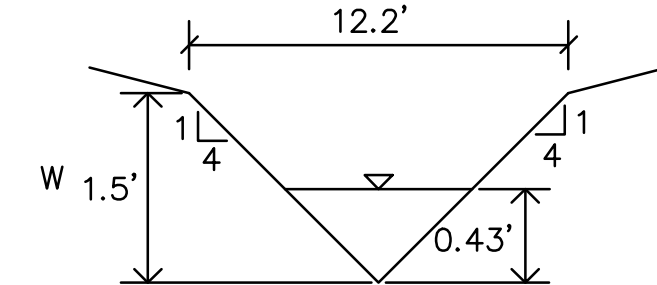
Q = 5.9 CFS  
SLOPE = 7.8%  
n VALUE = 0.03  
DEPTH = 0.53'  
VELOCITY = 5.58 FT/S  
\*REINFORCE CHANNEL  
SIDES, SEE NOTE 1

**SWALE CROSS SECTION - PR11**



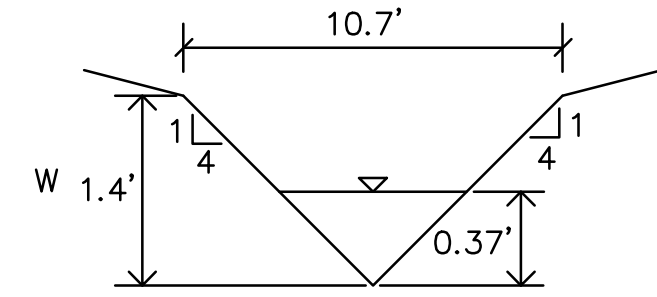
Q = 4.8 CFS  
SLOPE = 3.8%  
n VALUE = 0.03  
DEPTH = 0.55'  
VELOCITY = 4.00 FT/S

**SWALE CROSS SECTION - PR3**



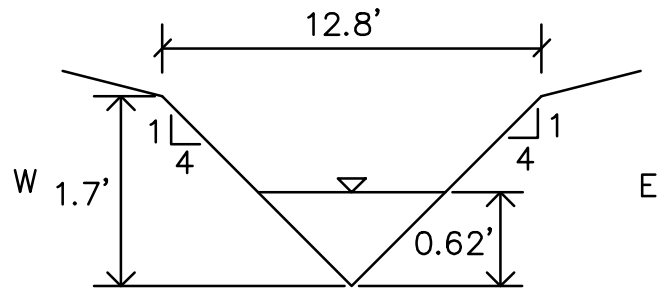
Q = 3.3 CFS  
SLOPE = 6.3%  
n VALUE = 0.03  
DEPTH = 0.43'  
VELOCITY = 4.37 FT/S  
\*REINFORCE CHANNEL  
SIDES, SEE NOTE 1

**SWALE CROSS SECTION - PR4**



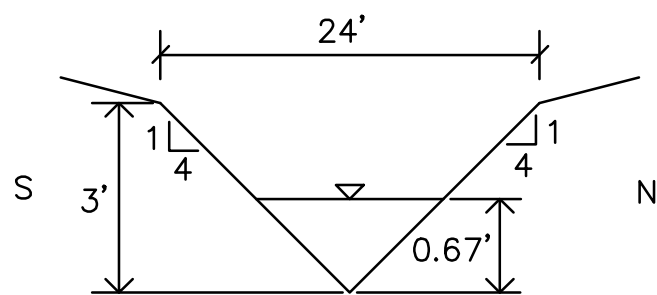
Q = 0.9 CFS  
SLOPE = 1.3%  
n VALUE = 0.03  
DEPTH = 0.37'  
VELOCITY = 1.79 FT/S

**SWALE CROSS SECTION - PR5**



Q = 3.6 CFS  
SLOPE = 1.3%  
n VALUE = 0.03  
DEPTH = 0.62'  
VELOCITY = 2.53 FT/S

**SWALE CROSS SECTION - PR6**



Q = 8.3 CFS  
SLOPE = 5.2%  
n VALUE = 0.03  
DEPTH = 0.67'  
VELOCITY = 5.30 FT/S  
\*EXPANDED TO ALLOW FOR  
POSSIBLE FUTURE FLOW INCREASES  
\*REINFORCE CHANNEL  
SIDES, SEE NOTE 1

**SWALE CROSS SECTION - PR7**

REVISIONS	NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE  
DRAWINGS ARE APPROVED  
BY THE APPLICABLE  
REVIEWING AGENCIES  
TERRA NOVA ENGINEERING,  
INC. APPROVES THEIR USE  
ONLY FOR THE PROJECT  
AND FOR THE DESIGN  
BY WRITTEN AUTHORIZATION.

PREPARED FOR:  
**TIMBERRIDGE ESTATES, LLC**  
ATTN: SCOTT HENTIE  
2760 BROGANS BLUFF  
COLORADO SPRINGS, CO 80919  
719.499.6752

**Terra Nova**  
Engineering, Inc.  
Creative Civil Engineering  
721 S. 2900 STREET  
COLORADO SPRINGS, CO 80904  
OFFICE: 719-635-6422  
FAX: 719-635-6426  
www.tnainc.com

**TIMBERRIDGE ESTATES**  
9210 ARROYA LANE  
GRADING & EROSION CONTROL PLAN  
GRADING PLAN - DETAILS

DESIGNED BY LD  
DRAWN BY DLF  
CHECKED BY LD

H-SCALE 1"=200'  
V-SCALE NA

JOB NO. 1733.00  
DATE ISSUED 02/28/19  
SHEET NO. 6 OF 12



N:\jobs\1733.00\Drawings\CD\173300 GEC.dwg, GRAD DETAILS #3, 2/28/2019 11:43:59 AM

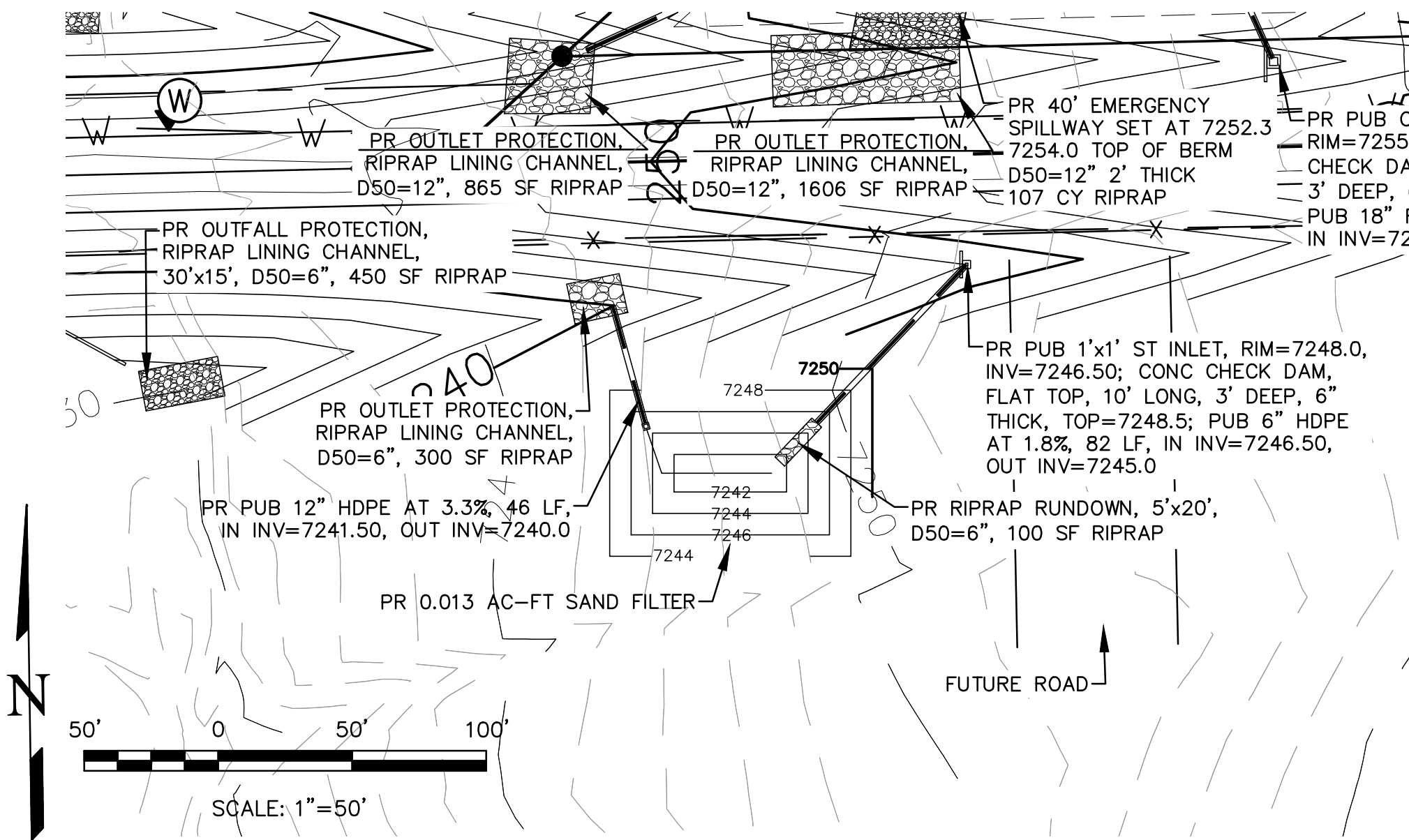
**BENCHMARKS**  
A #4 REBAR 28.3 FEET SOUTH AND 77.2 FEET WEST OF THE SOUTHEAST  
PROPERTY CORNER.  
ELEV = 7,319.85' (NGVD-1929)

**LEGEND**

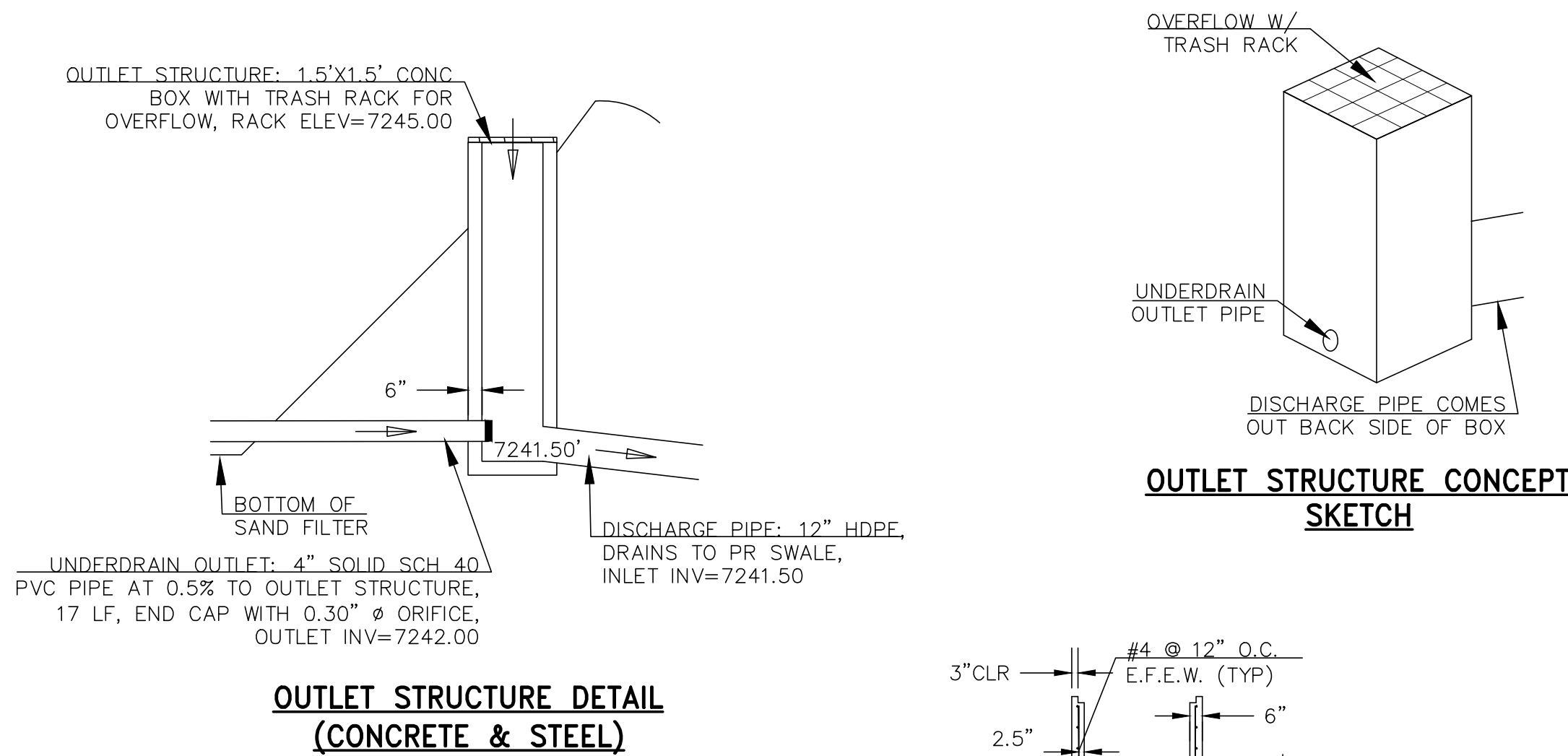
- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- SURFACE FLOW CHANNEL
- PROPOSED DRAINAGE EASEMENT
- EXISTING WATER LINE
- CONSTRUCTION SITE BOUNDARY
- AREA OF SOIL DISTURBANCE
- EXISTING TREE

**NOTES**

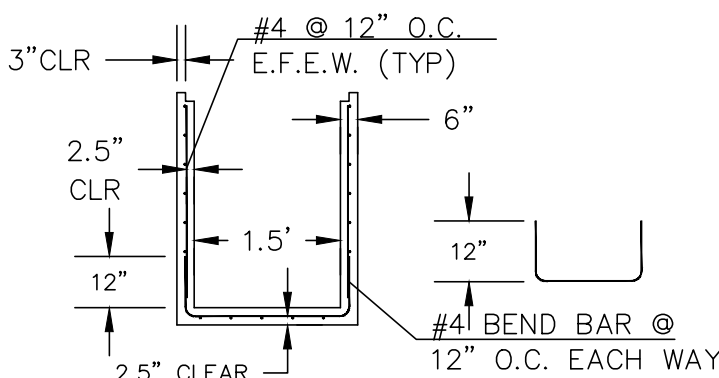
1. REINFORCE PROPOSED SWALES PR4, PR7, PR8, PR9, PR10, & PR11 WITH  
TURF REINFORCEMENT MATS (NORTH AMERICAN GREEN VMAX SC250, VMAX  
C350, OR SIMILAR). TURF REINFORCEMENT MATS ARE NOT REQUIRED FOR  
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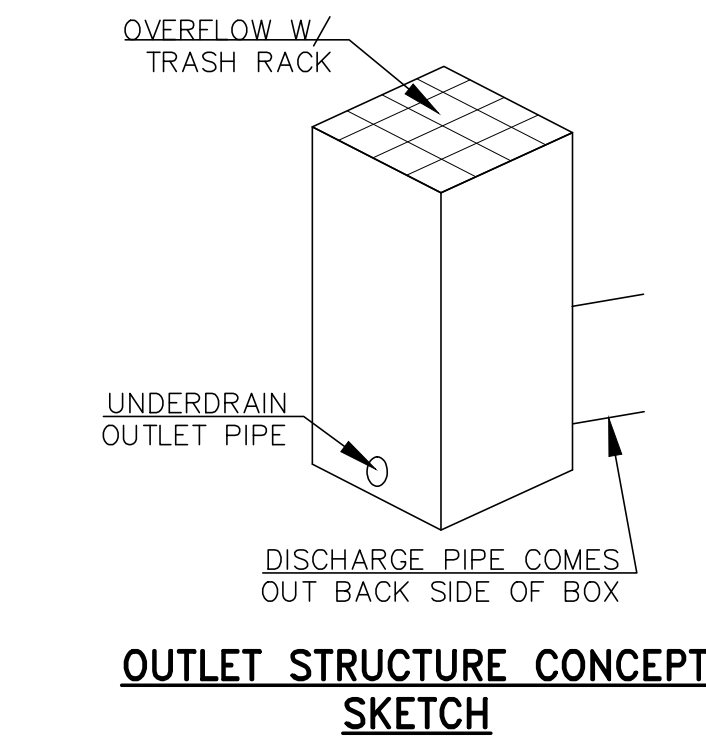
**SAND FILTER DP8 DETAIL**



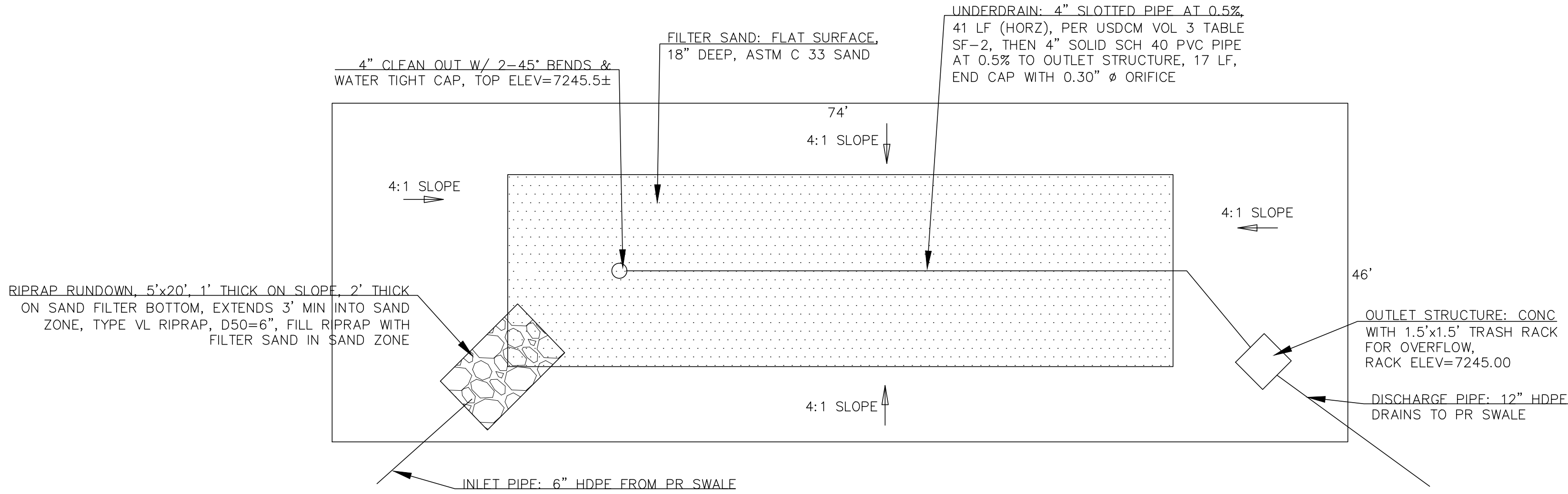
**OUTLET STRUCTURE DETAIL  
(CONCRETE & STEEL)**



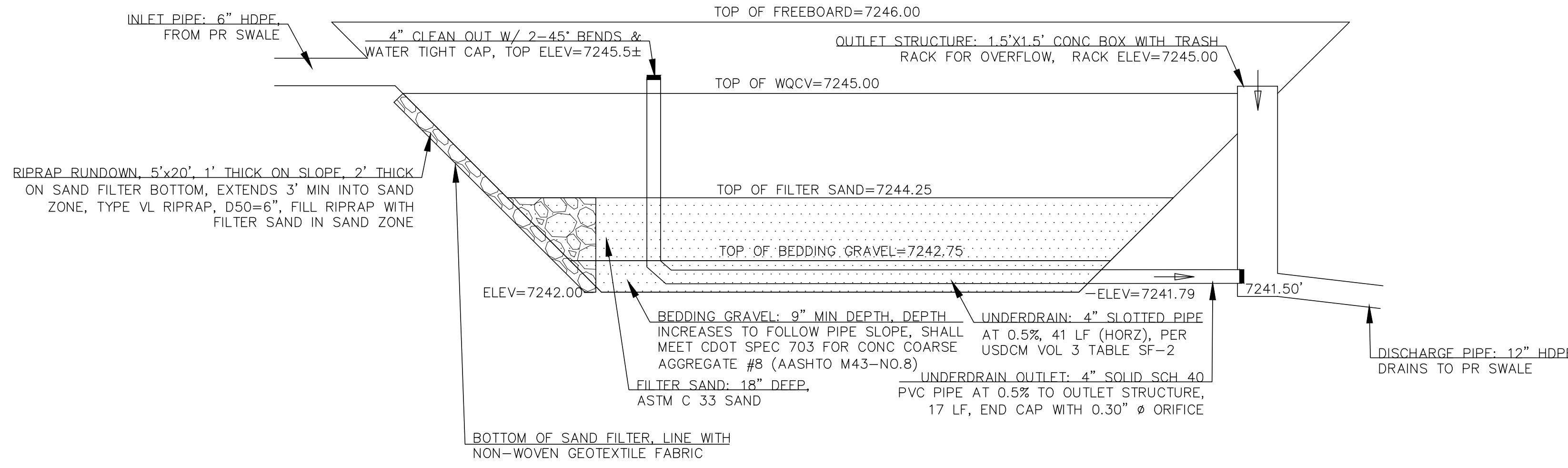
**1.5'x1.5' OUTLET BOX  
STRUCTURAL DETAIL**



**OUTLET STRUCTURE CONCEPT  
SKETCH**



**SAND FILTER DP8 DESIGN – PLAN VIEW  
N.T.S.**



**SAND FILTER DP8 DESIGN – PROFILE VIEW  
N.T.S.**

# TIMBERRIDGE ESTATES - 9210 ARROYA LANE

## EL PASO COUNTY

### GRADING & EROSION CONTROL PLAN

FEBRUARY 2019

REVISIONS	NO.	DESCRIPTION	DATE
UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED FOR CONSTRUCTION BY TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PROJECT SPECIFICALLY DESIGNATED BY WRITTEN AUTHORIZATION.			

PREPARED FOR:  
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719.499.6752

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**Terra Nova**  
Engineering, Inc.  
Creative Civil Engineering

**TIMBERRIDGE ESTATES**  
9210 ARROYA LANE

GRADING & EROSION CONTROL PLAN  
GRADING PLAN – DETAILS

DESIGNED BY LD
DRAWN BY DLF
CHECKED BY LD
H-SCALE 1"=200'
V-SCALE NA
JOB NO. 1733.00
DATE ISSUED 02/28/19
SHEET NO. 7 OF 12



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**BENCHMARKS**

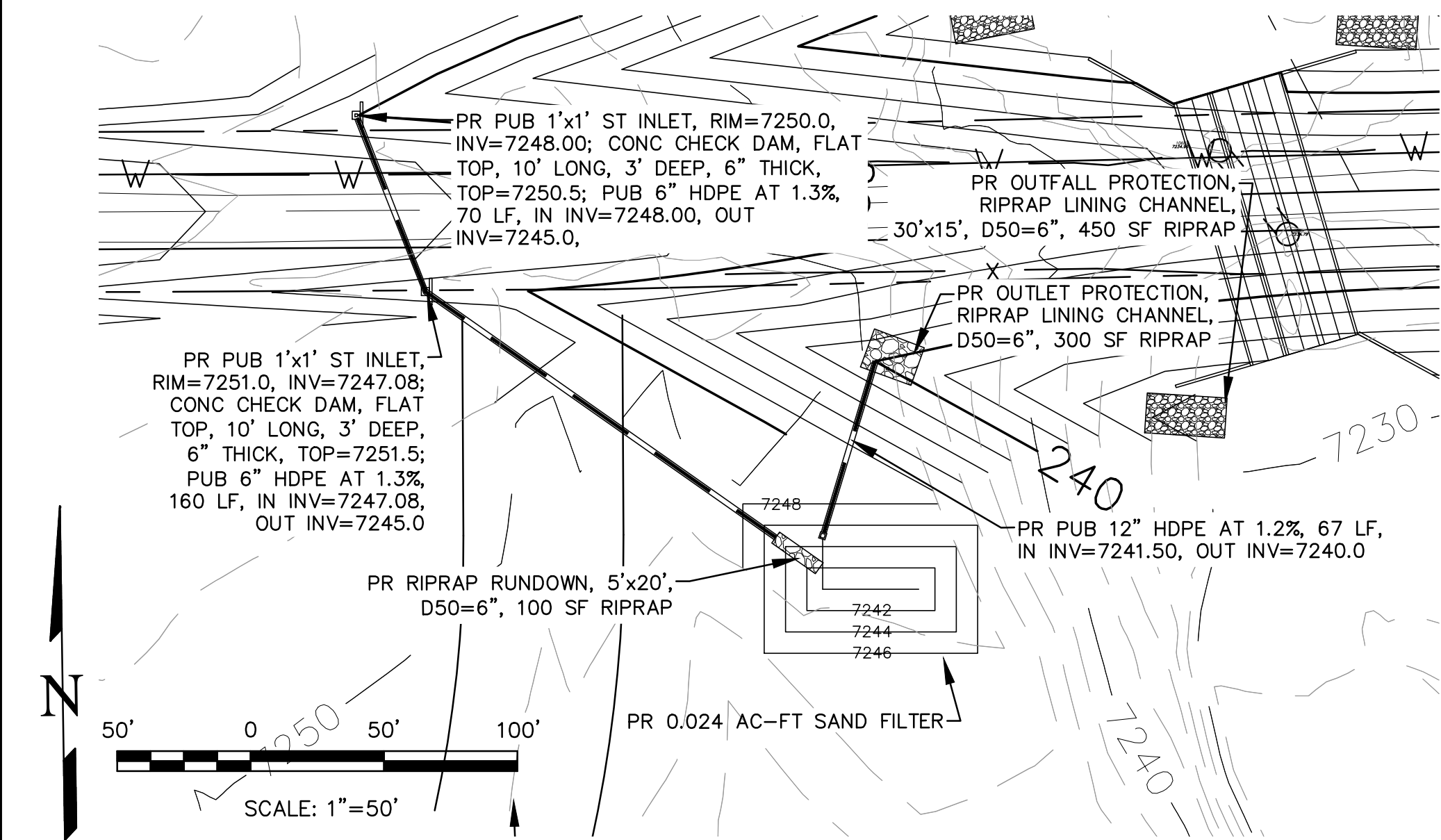
A #4 REBAR 28.3 FEET SOUTH AND 77.2 FEET WEST OF THE SOUTHEAST  
PROPERTY CORNER.  
ELEV = 7,319.85' (NGVD-1929)

**LEGEND**

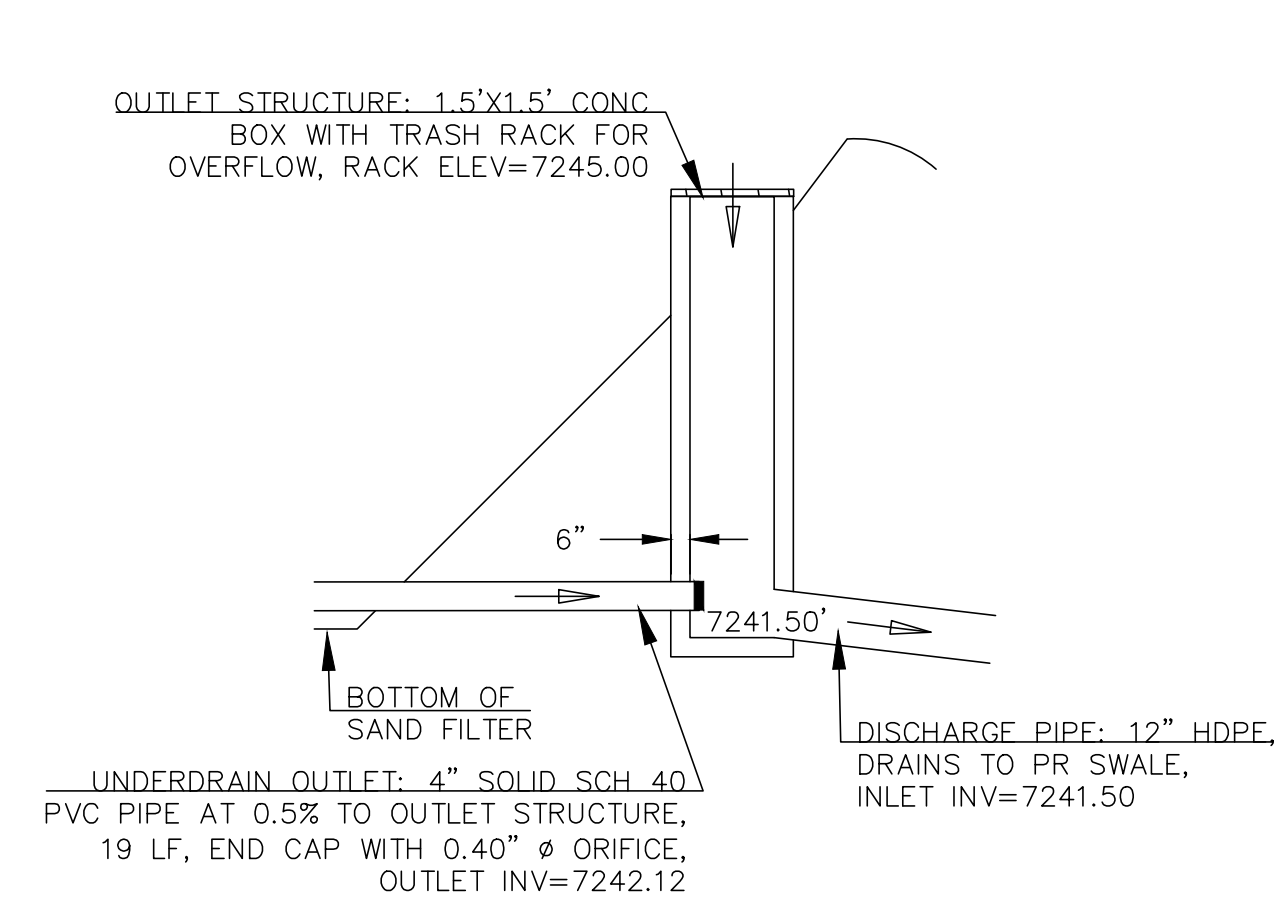
- EXISTING 2' CONTOUR
- EXISTING 10' CONTOUR
- PROPOSED 2' CONTOUR
- PROPOSED 10' CONTOUR
- SURFACE FLOW CHANNEL
- PROPOSED DRAINAGE EASEMENT
- EXISTING WATER LINE
- CONSTRUCTION SITE BOUNDARY
- AREA OF SOIL DISTURBANCE
- EXISTING TREE

**NOTES**

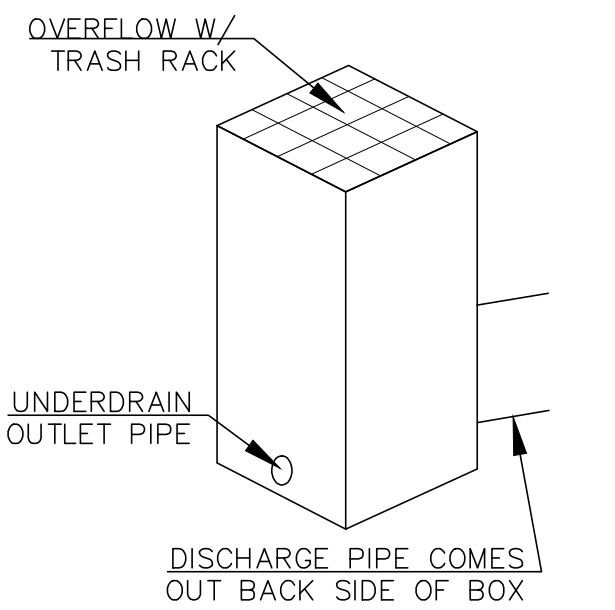
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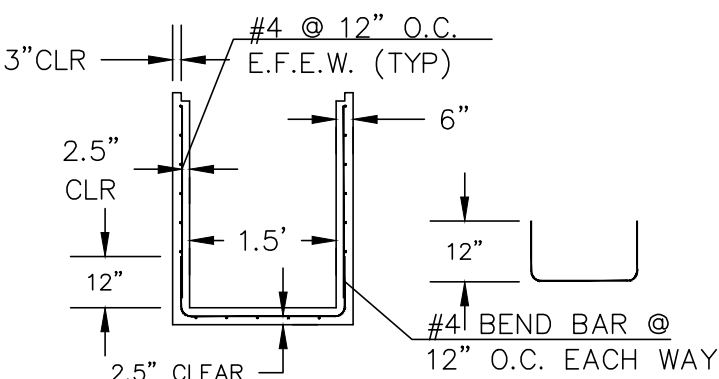
**SAND FILTER DP7 DETAIL**



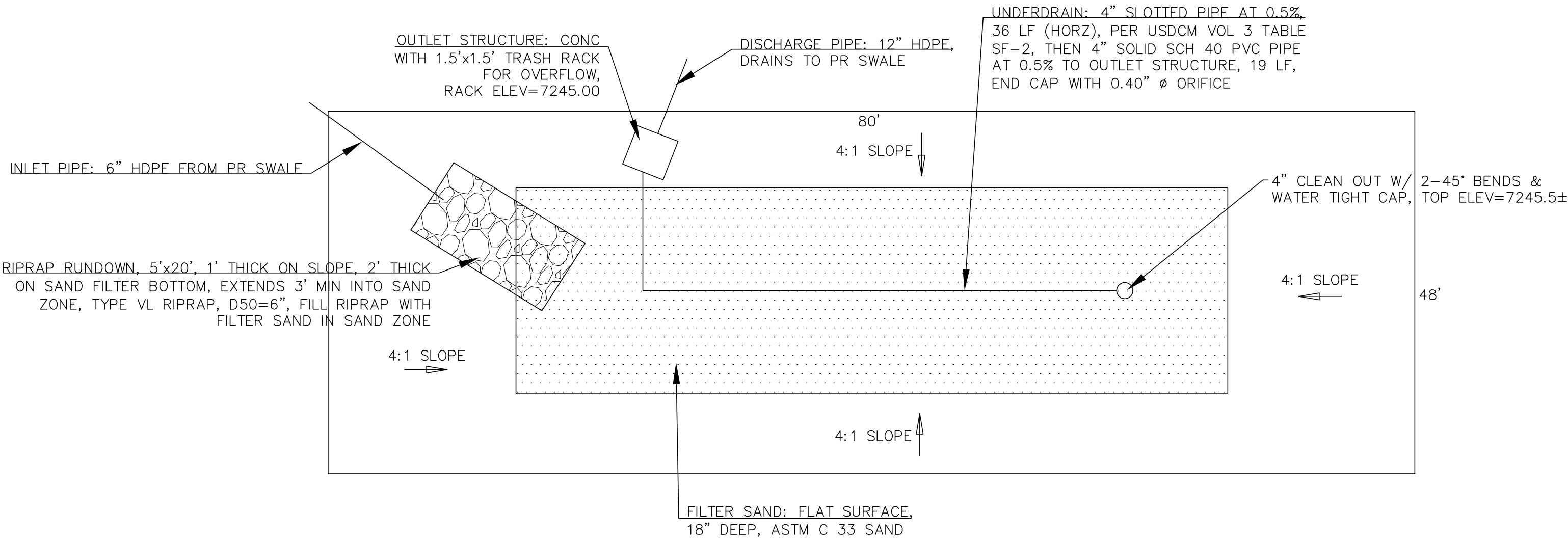
**OUTLET STRUCTURE DETAIL  
(CONCRETE & STEEL)**



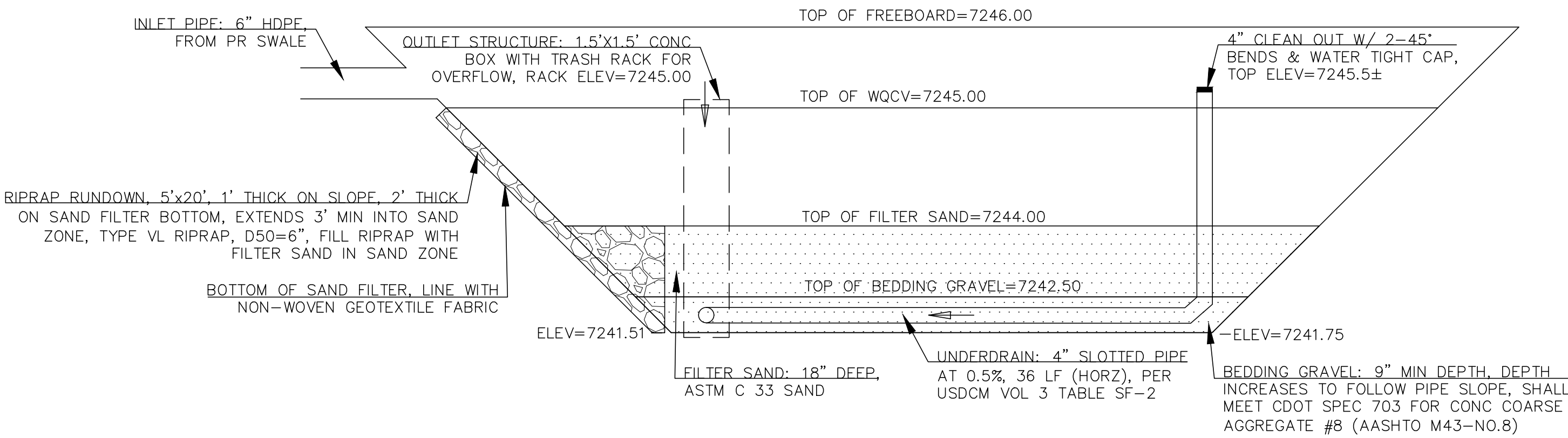
**OUTLET STRUCTURE CONCEPT  
SKETCH**



**1.5'x1.5' OUTLET BOX  
STRUCTURAL DETAIL**



**SAND FILTER DP7 DESIGN – PLAN VIEW  
N.T.S.**



**SAND FILTER DP7 DESIGN – PROFILE VIEW  
N.T.S.**

REVISIONS

NO.	DESCRIPTION	DATE

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**TIMBERRIDGE ESTATES**  
9210 ARROYA LANE

GRADING & EROSION CONTROL PLAN  
GRADING PLAN – DETAILS

DESIGNED BY LD

DRAWN BY DLF

CHECKED BY LD

H-SCALE 1"=200'

V-SCALE NA

JOB NO. 1733.00

DATE ISSUED 02/28/19

SHEET NO. 8 OF 12

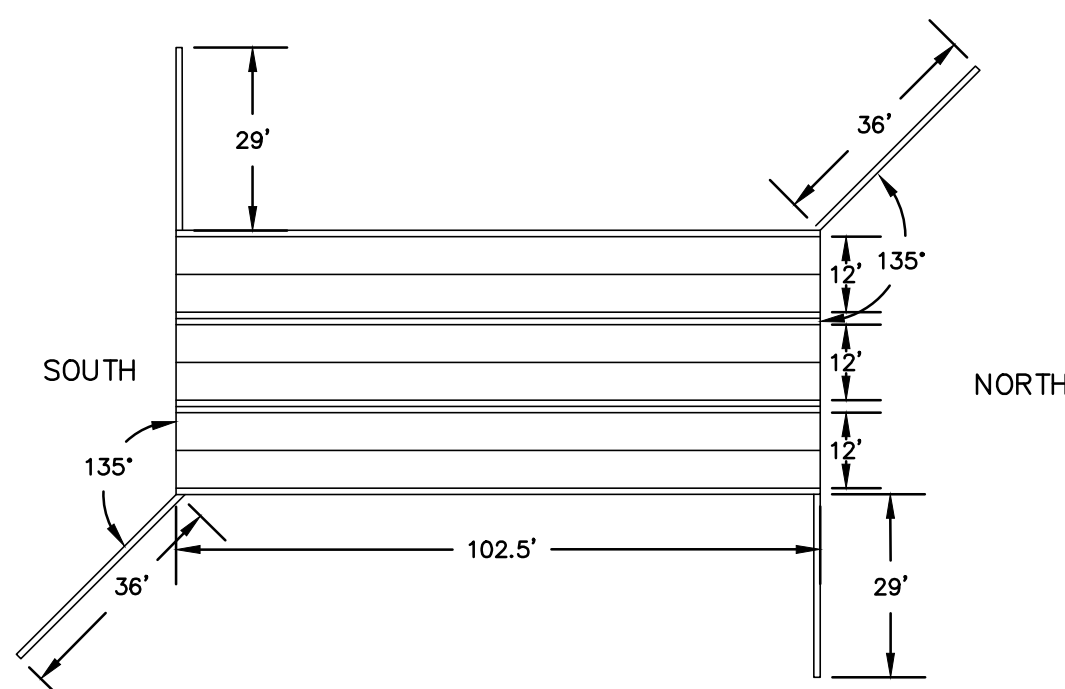


# TIMBERRIDGE ESTATES - 9210 ARROYA LANE

## EL PASO COUNTY

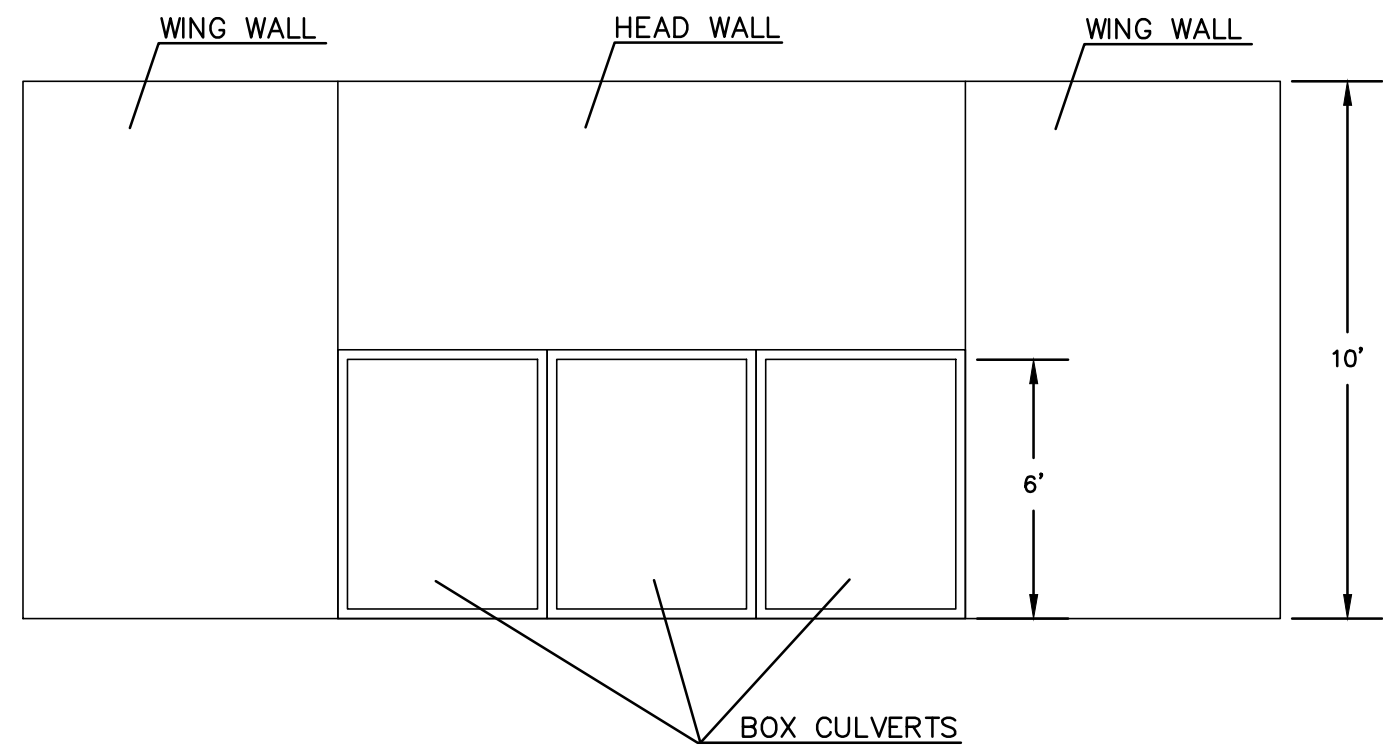
# GRADING & EROSION CONTROL PLAN

## FEBRUARY 2019



3-6'x12' CONCRETE BOX CULVERTS - PLAN VIEW

NOT TO SCALE



3-6'x12' CONCRETE BOX CULVERTS - PROFILE VIEW

NOT TO SCALE

TRIPLE CONCRETE BOX CULVERT DIMENSIONS, QUANTITIES & RATING FACTORS (EXCLUDING HEADWALL & TOEWALL QUANTITIES)

BOX SIZE	WIDTH	HEIGHT	THICKNESS	SPACING	QUANTITY	RATING FACTOR	VEHICLE
6'x12'	6'	12'	12"	12"	1.00	1.00	1.00
8'x12'	8'	12'	12"	12"	1.00	1.00	1.00
10'x12'	10'	12'	12"	12"	1.00	1.00	1.00
12'x12'	12'	12'	12"	12"	1.00	1.00	1.00
14'x12'	14'	12'	12"	12"	1.00	1.00	1.00
16'x12'	16'	12'	12"	12"	1.00	1.00	1.00
18'x12'	18'	12'	12"	12"	1.00	1.00	1.00
20'x12'	20'	12'	12"	12"	1.00	1.00	1.00
22'x12'	22'	12'	12"	12"	1.00	1.00	1.00
24'x12'	24'	12'	12"	12"	1.00	1.00	1.00
26'x12'	26'	12'	12"	12"	1.00	1.00	1.00
28'x12'	28'	12'	12"	12"	1.00	1.00	1.00
30'x12'	30'	12'	12"	12"	1.00	1.00	1.00
32'x12'	32'	12'	12"	12"	1.00	1.00	1.00
34'x12'	34'	12'	12"	12"	1.00	1.00	1.00
36'x12'	36'	12'	12"	12"	1.00	1.00	1.00
38'x12'	38'	12'	12"	12"	1.00	1.00	1.00
40'x12'	40'	12'	12"	12"	1.00	1.00	1.00
42'x12'	42'	12'	12"	12"	1.00	1.00	1.00
44'x12'	44'	12'	12"	12"	1.00	1.00	1.00
46'x12'	46'	12'	12"	12"	1.00	1.00	1.00
48'x12'	48'	12'	12"	12"	1.00	1.00	1.00
50'x12'	50'	12'	12"	12"	1.00	1.00	1.00
52'x12'	52'	12'	12"	12"	1.00	1.00	1.00
54'x12'	54'	12'	12"	12"	1.00	1.00	1.00
56'x12'	56'	12'	12"	12"	1.00	1.00	1.00
58'x12'	58'	12'	12"	12"	1.00	1.00	1.00
60'x12'	60'	12'	12"	12"	1.00	1.00	1.00
62'x12'	62'	12'	12"	12"	1.00	1.00	1.00
64'x12'	64'	12'	12"	12"	1.00	1.00	1.00
66'x12'	66'	12'	12"	12"	1.00	1.00	1.00
68'x12'	68'	12'	12"	12"	1.00	1.00	1.00
70'x12'	70'	12'	12"	12"	1.00	1.00	1.00
72'x12'	72'	12'	12"	12"	1.00	1.00	1.00
74'x12'	74'	12'	12"	12"	1.00	1.00	1.00
76'x12'	76'	12'	12"	12"	1.00	1.00	1.00
78'x12'	78'	12'	12"	12"	1.00	1.00	1.00
80'x12'	80'	12'	12"	12"	1.00	1.00	1.00
82'x12'	82'	12'	12"	12"	1.00	1.00	1.00
84'x12'	84'	12'	12"	12"	1.00	1.00	1.00
86'x12'	86'	12'	12"	12"	1.00	1.00	1.00
88'x12'	88'	12'	12"	12"	1.00	1.00	1.00
90'x12'	90'	12'	12"	12"	1.00	1.00	1.00
92'x12'	92'	12'	12"	12"	1.00	1.00	1.00
94'x12'	94'	12'	12"	12"	1.00	1.00	1.00
96'x12'	96'	12'	12"	12"	1.00	1.00	1.00
98'x12'	98'	12'	12"	12"	1.00	1.00	1.00
100'x12'	100'	12'	12"	12"	1.00	1.00	1.00

HEADWALL AND TOEWALL QUANTITIES

HEADWALL BENT ANGLE	90° TO 75°	74° TO 60°	59° TO 45°
SPACING (S)	#	#	#
8	4	4	4
10	5	5	5
12	6	6	6
14	6	6	6
16	6	6	6
18	7	7	7
20	7	7	7

### NOTES

- SIX INCH SPACING AT EACH END OF THE SPAN FOR A DISTANCE OF 1/4 OF THE SPAN LENGTH; 12 INCH SPACING ELSEWHERE.
- QUANTITIES ARE GIVEN FOR ONE HEADWALL AND ONE TOEWALL AND ARE BASED ON PER LINEAR FOOT OF HEADWALL. STEEL QUANTITIES INCLUDE ALL REINFORCING. QUANTITIES SHALL BE PAID FOR AS SHOWN ON THE PLANS.
- SKewed HEADWALLS ARE NOT RECOMMENDED FOR THESE SPANS. A SPECIAL DESIGN IS REQUIRED.
- FOR HEADWALL AND TOEWALL DETAILS SEE M-601-3, SHEET 1 OF 2.
- WHEN THE FILL HEIGHTS ARE LESS THAN OR EQUAL TO 2 FT, ALL REINFORCING BARS IN THE HEADWALL, ALL REINFORCING BARS DESIGNATED BY AN ASTERISK (\*), AND THE d1 BARS IN THE TOP MAT OF THE TOP SLAB SHALL BE EPOXY COATED.
- REINFORCING QUANTITIES INCLUDE BOTH EPOXY-COATED AND UNCOATED BARS.
- WHEN A (R) OF LESS THAN 6 FT IS REQUIRED, USE THE BAR SIZES AND THE SLAB AND WALL THICKNESSES FOR THE 6 FT RISE (IF AVAILABLE ON THE TABLE).
- FOR SIZE AND SPACING OF THE BOTTOM MAT BARS IN THE TOP SLAB SEE TABLE ON M-601-3, SHEET 1 OF 2. ALL OTHER d1 BARS ARE #4 AT 1'-0" SPACING. THE NUMBER OF BARS REQUIRED IS LISTED ON THIS SHEET AND INCLUDES BOTH #4 BARS AND THOSE FROM THE TABLE.
- LIVE LOAD IS NEGLECTED AS PER AASHTO LRFD SECTION 3.6.1.2.6. FOR THESE STRUCTURES REFER TO THE CDDT RATING MANUAL.
- FOR ALL NEW CULVERT DESIGNS, A RATING IS REQUIRED. THE RATING SUMMARY SHEET SHOULD BE PRINTED FROM THE CDDT EXTERNAL WEBSITE AND SUBMITTED TO THE BRIDGE RATING UNIT OR INCLUDED AS PART OF A LARGER DESIGN PACKAGE. FOR ADDITIONAL INFORMATION, SEE THE CDDT RATING MANUAL.

### GENERAL NOTES

- ALL CONCRETE SHALL BE CLASS B (BOX CULVERT).
- ALL CONSTRUCTION JOINTS SHALL BE THOROUGHLY CLEANED BEFORE FRESH CONCRETE IS PLACED.
- ALL CONSTRUCTION JOINTS NOT SHOWN ON THE PLANS SHALL BE CONSTRUCTED ONLY IF APPROVED BY THE ENGINEER.
- THE CONTRACTOR SHALL MAINTAIN THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION.
- STRUCTURE EXCAVATION AND BACKFILL SHALL BE IN ACCORDANCE WITH STANDARD PLAN M-200-1.
- FOR ANY CULVERT SPAN 20 FT. OR GREATER, A FOUNDATION INVESTIGATION AND REPORT ARE REQUIRED.
- BACKFILL SHALL NOT BEGIN UNTIL TOP SLAB HAS REACHED DESIGN STRENGTH, f<sub>c</sub>.
- SPICE QUANTITIES FOR LONGITUDINAL AND TRANSVERSE BARS ARE NOT INCLUDED.
- REINFORCING STEEL SHALL BE GRADE 60.
- THE MINIMUM LAP SPICE LENGTH FOR EPOXY COATED REINFORCING BARS SHALL BE:  
BAR SIZE: #4 #5 #6 #7 #8 #9 #10 #11  
SPICE LENGTH: 1'-3" 1'-7" 2'-0" 2'-10" 3'-0" 4'-0" 5'-11" 7'-3"
- THE MINIMUM LAP SPICE LENGTH FOR BLACK REINFORCING BARS SHALL BE:  
BAR SIZE: #4 #5 #6 #7 #8 #9 #10 #11  
SPICE LENGTH: 1'-4" 1'-4" 1'-7" 1'-7" 2'-0" 3'-4" 3'-11" 4'-10"
- THE ABOVE SPICE LENGTHS ARE FOR CLASS B SPLICES.
- ALL DIMENSIONS ARE PERPENDICULAR TO THE CENTERLINE OF THE BOX.
- WINGWALLS SHALL BE TIED TO CONCRETE BOX CULVERT IN ACCORDANCE WITH STANDARD PLAN M-200-20.
- ALL TRANSVERSE REINFORCING SHALL BE NORMAL TO THE CENTERLINE OF THE BOX.
- THE FILL HEIGHT IS THE DISTANCE MEASURED FROM THE TOP OF THE TOP SLAB TO THE TOP OF THE PAVEMENT.
- ALL EXPOSED CONCRETE CORNERS SHALL BE CHAMFERED 3/4" IN.
- FOR FILL HEIGHTS LESS THAN 2 FT, A WATERPROOFING MEMBRANE SHALL BE PROVIDED FOR THE TOP OF THE TOP SLAB AND 18" DOWN ALONG THE TOPS OF THE EXTERIOR WALLS.
- FOR FILL HEIGHTS LESS THAN 2 FT, THE d1 BARS FOR THE BOTTOM MAT OF THE TOP SLAB SHALL BE AS FOLLOWS:  
BAR SIZE: #5 #6 #7  
SPACING: 1'-0" 1'-0" 1'-0"
- DESIGN DATA: 7TH EDITION, 2014, OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS  
RATING DATA: 2ND EDITION, 2011, OF THE AASHTO MANUAL FOR BRIDGE EVALUATION  
LOADING DATA: f<sub>c</sub> = 4,500 psi  
LIVE LOAD = AASHTO LRFD, HL-93 TRUCK, HL-93 TANDEN, COLORADO PERMIT TRUCK AND NRI  
DEAD LOAD CASE 1: VERTICAL EARTH LOAD = 120 LBS./CU.FT.  
HORIZONTAL EARTH LOAD = 30 LBS./CU.FT.  
DEAD LOAD CASE 2: VERTICAL EARTH LOAD = 120 LBS./CU.FT.  
HORIZONTAL EARTH LOAD = 60 LBS./CU.FT.  
WEARING SURFACE = 12 IN THICK CONCRETE PAVEMENT.  
DEAD LOAD = TYPE 7 BARRIER.  
THRUST IS NOT CONSIDERED IN THIS STANDARD, I.E. THRUST = 0.  
EXTREME HEADWATER TO DEPTH RATIO IS IN ACCORDANCE WITH THE CDDT DRAINAGE MANUAL.  
EXTREME HEADWATER TO DEPTH RATIO WAS INCLUDED IN THE CULVERT DESIGNS BUT EXCLUDED FROM THE RATINGS AS PER THE AASHTO MANUAL FOR BRIDGE EVALUATION.  
LIVE LOAD SURCHARGE ON EXTERIOR WALLS = 2 FT. OF EARTH  
IF HEADWALL MOUNT GUARDRAIL IS USED (SEE STANDARD PLAN M-606-1, SHEET 19 AND NOTES BELOW):  
- ALL REINFORCING STEEL SHALL BE ACCORDING TO THIS BOX CULVERT PLAN.  
- ANY SPECIAL DESIGN FOR STIRRUPS WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.  
- HEADWALL DIMENSION AND CONCRETE QUANTITY SHALL BE ACCORDING TO STANDARD PLAN M-606-1, SHEET 19.  
- POST ANCHORS SHALL BE PROVIDED ACCORDING TO STANDARD PLAN M-606-1, SHEET 19.  
- POST ANCHORS AND CONCRETE FOR HEADWALL MOUNT OF GUARDRAIL WILL NOT BE MEASURED AND PAID FOR SEPARATELY BUT SHALL BE INCLUDED IN THE WORK.  
- POST ANCHORS WHEN REQUIRED AND ENCASED IN HEADWALL CONCRETE, SHALL CONFORM TO ASTM A-36 OR AASHTO M-169 STEEL.

### REINFORCING PLAN

BAR SIZE (#)	EPOXY BLACK X (FT.-IN.)
4	2-4
5	2-10
6	2-10
7	4-1
8	5-3
9	6-8

### CONSTRUCTION JOINT DETAIL FOR STAGED CONSTRUCTION

NOTE: THIS DETAIL IS FOR CONSTRUCTION JOINTS INSTALLED PERPENDICULAR TO THE R OF THE BOX ONLY. THE CONTRACTOR CAN DESIGN AND INSTALL J BARS AT HIS EXPENSE TO SUPPORT TEMPORARY LIVE LOADS DURING STAGE 1 CONSTRUCTION. J BARS SHALL BE THE SAME SIZE AS THE TOP AND BOTTOM SLAB REINFORCING WHEN THERE ARE NO TEMPORARY LIVE LOADS TO SUPPORT.

#### Computer File Information

Creation Date: 07/04/12 Initials: JBE  
Last Modification Date: 11/25/15 Initials: JBE  
Full Path: www.codot.gov/business/designsupport  
Drawing File Name: 601030202.dgn  
CAD Ver: MicroStation V8 Scale: Not to Scale Units: English

#### Sheet Revisions

Date	Comments
08/27/13	LRFD Design
08/01/15	Analysis Program Updates

#### Colorado Department of Transportation

4201 East Arkansas Avenue  
CDDT HQ, 4th Floor  
Denver, CO 80222  
Phone: 303-757-9021 FAX: 303-757-9868  
Division of Project Support DDG/Bridge

#### TRIPLE CONCRETE BOX CULVERT

Issued By: Project Development Branch July 4, 2012

#### STANDARD PLAN NO.

M-601-3  
Sheet No. 2 of 2

#### Computer File Information

Creation Date: 07/04/12 Initials: DD  
Last Modification Date: 11/25/15 Initials: JBE  
Full Path: www.codot.gov/business/designsupport  
Drawing File Name: 601030102.dgn  
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Date	Comments
08/27/13	LRFD Design
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#### TRIPLE CONCRETE BOX CULVERT

Issued By: Project Development Branch July 4, 2012

#### STANDARD PLAN NO.

M-601-3  
Sheet No. 1 of 2

#### REVISIONS

NO.	DESCRIPTION	DATE
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PREPARED FOR:  
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ATTN: SCOTT HENTIE  
2760 BROGANS BLUFF  
COLORADO SPRINGS, CO 80919  
719.499.6752

DESIGNED BY LD  
DRAWN BY DLF  
CHECKED BY LD

H-SCALE 1"=200'  
V-SCALE NA

JOB NO. 1733.00  
DATE ISSUED 02/28/2019  
SHEET NO. 9 OF 12

TIMBERRIDGE ESTATES  
9210 ARROYA LANE  
GRADING & EROSION CONTROL PLAN  
TIMBERRIDGE ESTATES - 9210 ARROYA LANE  
GRADING & EROSION CONTROL PLAN - DETAILS

Terra Nova Engineering, Inc.  
721 S. 2900 STREET  
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TIMBERRIDGE ESTATES - 9210 ARROYA LANE  
EL PASO COUNTY  
GRADING & EROSION CONTROL PLAN  
FEBRUARY 2019

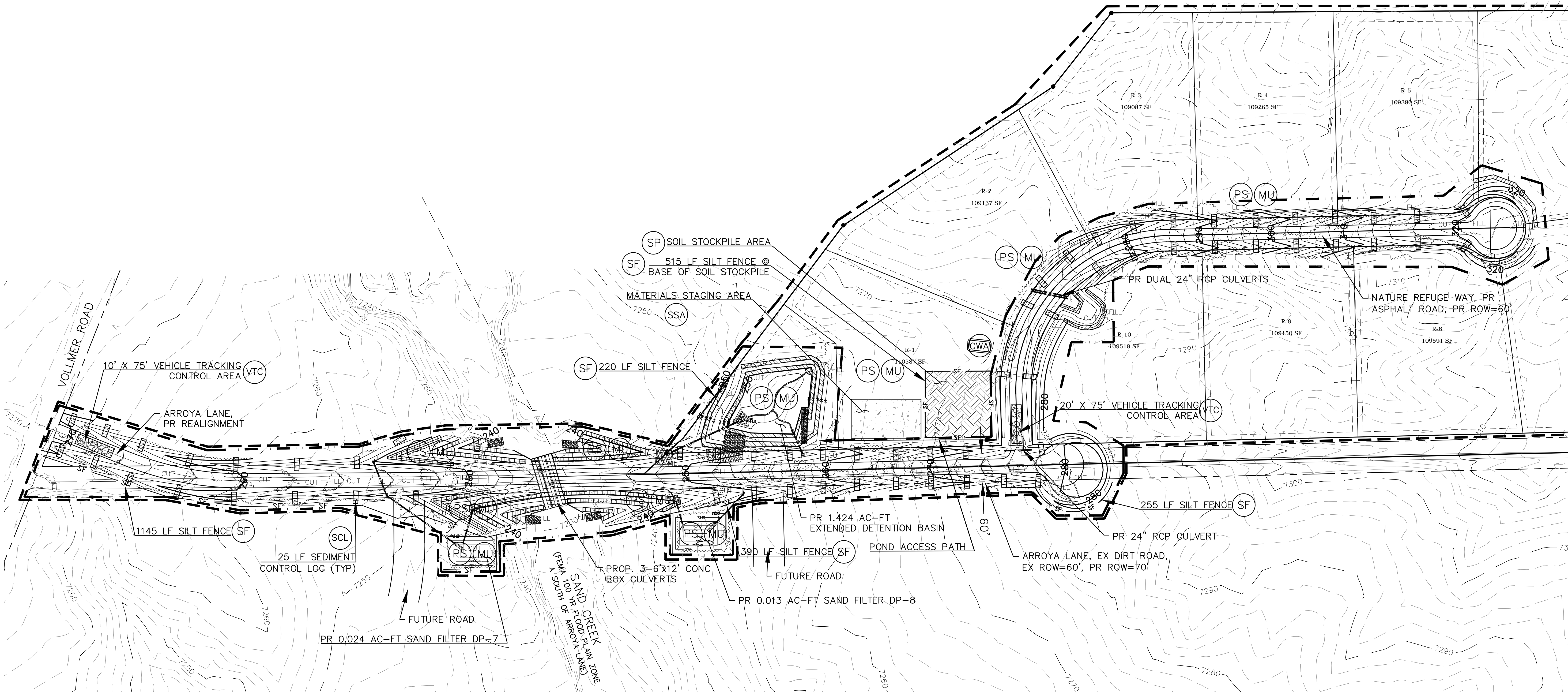
**BENCHMARKS**  
A #4 REBAR 28.3 FEET SOUTH AND 77.2 FEET WEST OF THE SOUTHEAST  
PROPERTY CORNER.  
ELEV = 7,319.85' (NGVD-1929)

**EROSION CONTROL NOTES**  
1. PERMANENT SEEDING AND MULCH IS TO BE APPLIED TO ALL DISTURBED  
AREAS OTHER THAN ROADWAYS. EROSION CONTROL BLANKETS MUST BE  
USED ALONG FLOW LINE PROPOSED DRAINAGE CHANNELS (3 FEET WIDE)  
AND ON DETENTION BASIN SIDES.  
2. SAND FILTERS TO BE INSTALLED PRIOR TO THE PAVING OF ARROYA  
LANE. SAND FILTERS WILL NOT BE PUT INTO OPERATION WHILE ARROYA  
LANE IS STILL A GRAVEL ROAD.

**EROSION CONTROL QUANTITIES**  
SILT FENCE: 2,525 LF  
SEDIMENT CONTROL LOG: 5,050 LF  
SEED & MULCH: 8.8 AC  
EROSION CONTROL BLANKET: 3,700 SY

- LEGEND**
- EXISTING 2' CONTOUR
  - EXISTING 10' CONTOUR
  - PROPOSED 2' CONTOUR
  - PROPOSED 10' CONTOUR
  - SURFACE FLOW CHANNEL
  - PROPOSED DRAINAGE EASEMENT
  - EXISTING WATER LINE
  - CONSTRUCTION SITE BOUNDARY
  - AREA OF SOIL DISTURBANCE
  - EXISTING TREE
  - CUT FILL AREA BOUNDARY

- EROSION CONTROL LEGEND**
- | KEY | TITLE   | SYMBOL |
|-----|---|--------|
| SF  | SILT FENCE  | SF     |
| SSA | STABILIZED STAGING AREA   | SSA    |
| VTC | VEHICLE TRACKING CONTROL  | VTC    |
| SP  | STOCKPILE MANAGEMENT WITH PROTECTION  | SP     |
| CWA | CONCRETE WASHOUT AREA   | CWA    |
| SCL | SEDIMENT CONTROL LOG  | SCL    |
| MU  | MULCHING - HYDROSEED OR EROSION CONTROL BLANKET, ECB MUST BE USED WITHIN DRAINAGE CHANNELS & ON POND SIDES          | MU     |
| PS  | PERMANENT SEEDING - HYDROSEED, SEED MIX PER COLORADO SPRINGS DRAINAGE CRITERIA MANUAL (MAY 2014) VOL 1, TABLE 14-12 | PS     |



REVISIONS

NO.	DESCRIPTION	DATE

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TIMBERRIDGE ESTATES  
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GRADING & EROSION CONTROL PLAN  
EROSION CONTROL PLAN

DESIGNED BY LD  
DRAWN BY DLF  
CHECKED BY LD

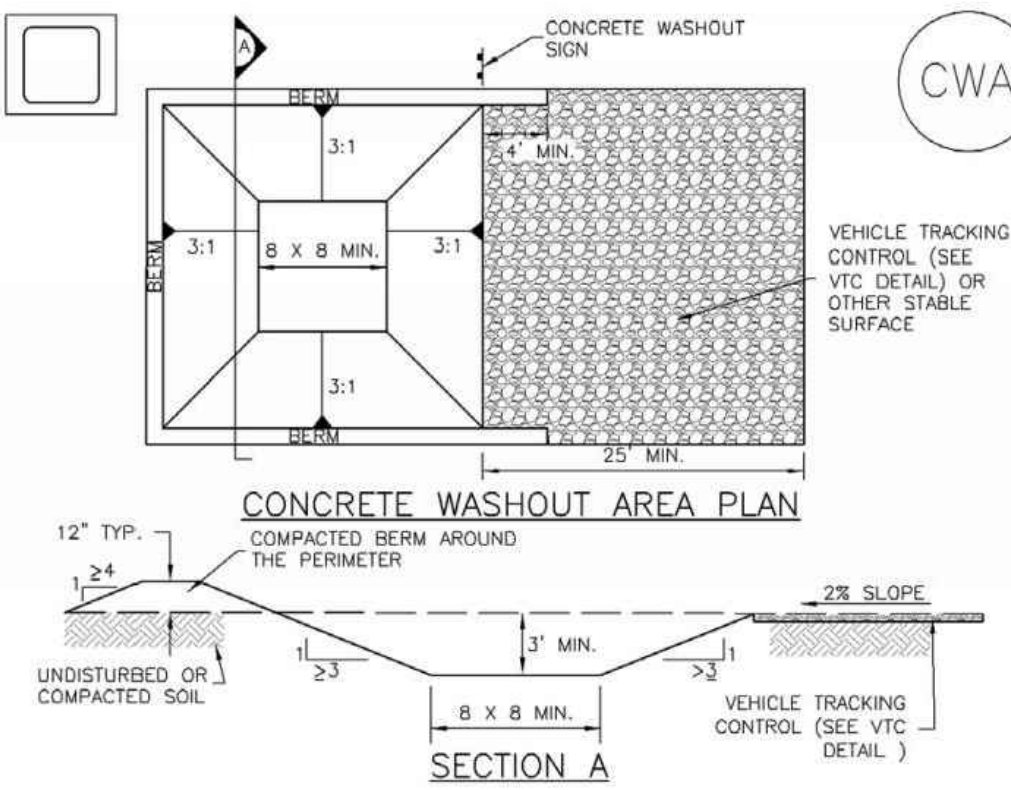
H-SCALE 1"=100'  
V-SCALE NA

JOB NO. 1733.00  
DATE ISSUED 02/28/19  
SHEET NO. 10 OF 12



Concrete Washout Area (CWA)

MM-1



CWA-1. CONCRETE WASHOUT AREA

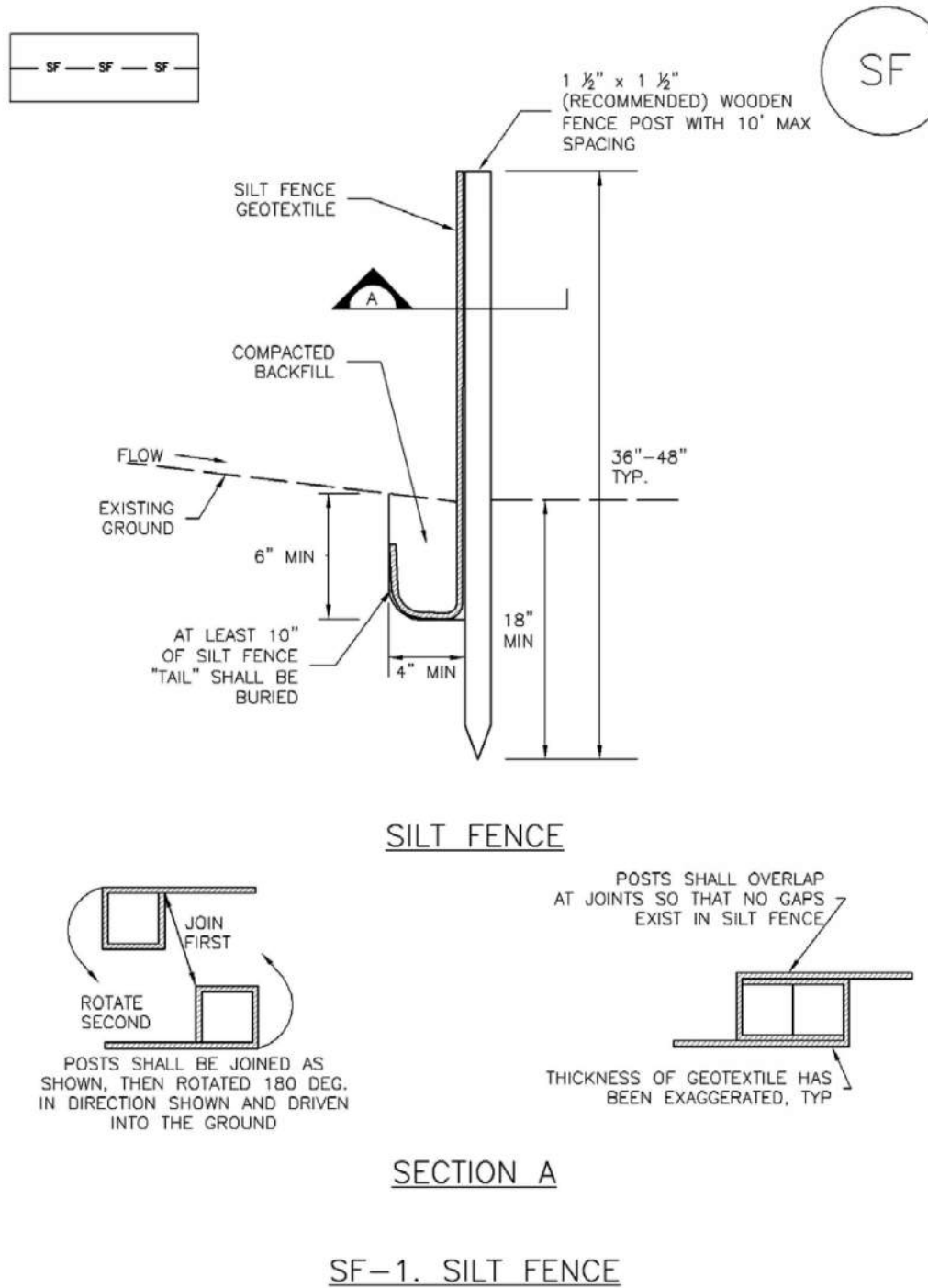
CWA INSTALLATION NOTES

1. SEE PLAN VIEW FOR:  
-CWA INSTALLATION LOCATION.
2. 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.
3. THE CWA SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE.
4. 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.
5. BERM SURROUNDING SIDES AND BACK OF THE CWA SHALL HAVE MINIMUM HEIGHT OF 1'.
6. VEHICLE TRACKING PAD SHALL BE SLOPED 2% TOWARDS THE CWA.
7. 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.
8. USE EXCAVATED MATERIAL FOR PERIMETER BERM CONSTRUCTION.

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

Silt Fence (SF)

SC-1



SECTION A

SF-1. SILT FENCE

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

MM-1

Concrete Washout Area (CWA)

CWA MAINTENANCE NOTES

1. 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.
  2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  4. 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'.
  5. 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.
  6. THE CWA SHALL REMAIN IN PLACE UNTIL ALL CONCRETE FOR THE PROJECT IS PLACED.
  7. 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.

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

SC-1

Silt Fence (SF)

SILT FENCE INSTALLATION NOTES

1. SILT FENCE MUST BE PLACED AWAY FROM THE TOE OF THE SLOPE TO ALLOW FOR WATER PONDING. SILT FENCE AT THE TOE OF A SLOPE SHOULD BE INSTALLED IN A FLAT LOCATION AT LEAST SEVERAL FEET (2-5 FT) FROM THE TOE OF THE SLOPE TO ALLOW ROOM FOR PONDING AND DEPOSITION.
2. A UNIFORM 6" X 4" ANCHOR TRENCH SHALL BE EXCAVATED USING TRENCHER OR SILT FENCE INSTALLATION DEVICE. NO ROAD GRADERS, BACKHOES, OR SIMILAR EQUIPMENT SHALL BE USED.
3. COMPACT ANCHOR TRENCH BY HAND WITH A "JUMPING JACK" OR BY "WHEEL ROLLING. COMPACTION SHALL BE SUCH THAT SILT FENCE RESISTS BEING PULLED OUT OF ANCHOR TRENCH BY HAND.
4. SILT FENCE SHALL BE PULLED TIGHT AS IT IS ANCHORED TO THE STAKES. THERE SHOULD BE NO NOTICEABLE SAG BETWEEN STAKES AFTER IT HAS BEEN ANCHORED TO THE STAKES.
5. SILT FENCE FABRIC SHALL BE ANCHORED TO THE STAKES USING 1" HEAVY DUTY STAPLES OR NAILS WITH 1" HEADS. STAPLES AND NAILS SHOULD BE PLACED 3" ALONG THE FABRIC DOWN THE STAKE.
6. AT THE END OF A RUN OF SILT FENCE ALONG A CONTOUR, THE SILT FENCE SHOULD BE TURNED PERPENDICULAR TO THE CONTOUR TO CREATE A "J-HOOK." THE "J-HOOK" EXTENDING PERPENDICULAR TO THE CONTOUR SHOULD BE OF SUFFICIENT LENGTH TO KEEP RUNOFF FROM FLOWING AROUND THE END OF THE SILT FENCE (TYPICALLY 10' - 20').
7. SILT FENCE SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.

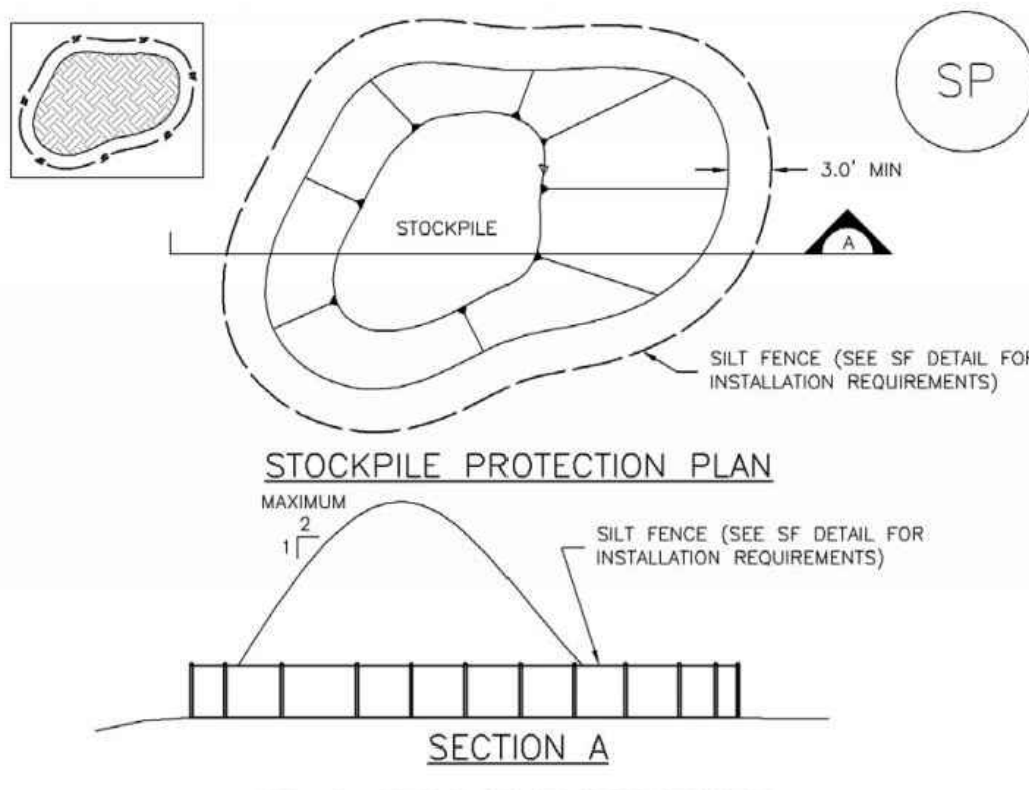
SILT FENCE MAINTENANCE NOTES

1. 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.
  2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
  3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
  4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".
  5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.
  6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.
  7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.
- (DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, 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.

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

Stockpile Management (SP)

MM-2



SP-1. STOCKPILE PROTECTION

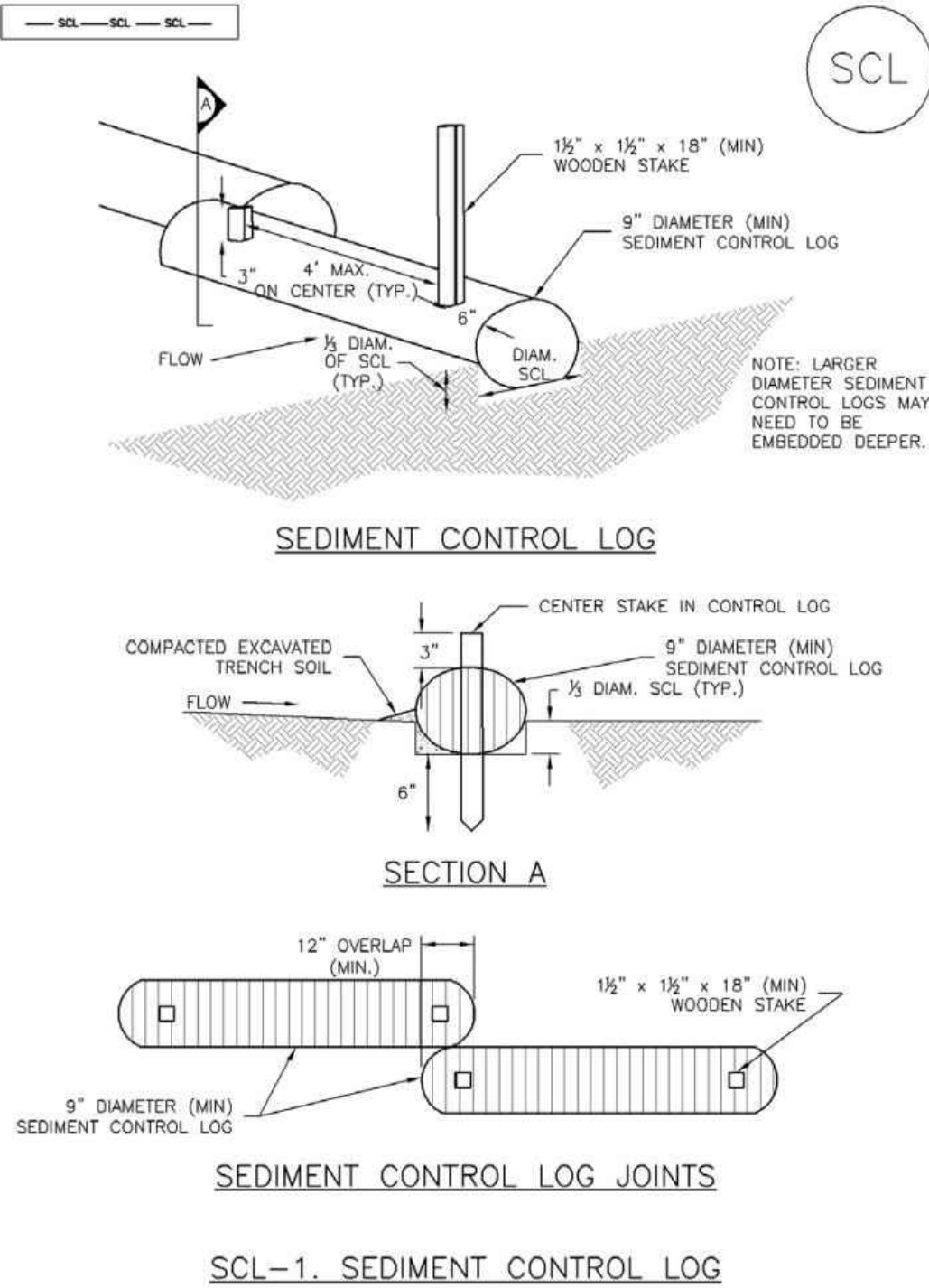
STOCKPILE PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:  
-LOCATION OF STOCKPILES.  
-TYPE OF STOCKPILE PROTECTION.
2. INSTALL PERIMETER CONTROLS IN ACCORDANCE WITH THEIR RESPECTIVE DESIGN DETAILS. SILT FENCE IS SHOWN IN THE STOCKPILE PROTECTION DETAILS; HOWEVER, OTHER TYPES OF PERIMETER CONTROLS INCLUDING SEDIMENT CONTROL LOGS OR ROCK SOCKS MAY BE SUITABLE IN SOME CIRCUMSTANCES. CONSIDERATIONS FOR DETERMINING THE APPROPRIATE TYPE OF PERIMETER CONTROL FOR A STOCKPILE INCLUDE WHETHER THE STOCKPILE IS LOCATED ON A PERVIOUS OR IMPERVIOUS SURFACE, THE RELATIVE HEIGHTS OF THE PERIMETER CONTROL AND STOCKPILE, THE ABILITY OF THE PERIMETER CONTROL TO CONTAIN THE STOCKPILE WITHOUT FAILING IN THE EVENT THAT MATERIAL FROM THE STOCKPILE SHIFTS OR SLUMPS AGAINST THE PERIMETER, AND OTHER FACTORS.
3. STABILIZE THE STOCKPILE SURFACE WITH SURFACE ROUGHENING, TEMPORARY SEEDING AND MULCHING, EROSION CONTROL BLANKETS, OR SOIL BINDERS. SOILS STOCKPILED FOR AN EXTENDED PERIOD (TYPICALLY FOR MORE THAN 60 DAYS) SHOULD BE SEEDED AND MULCHED WITH A TEMPORARY GRASS COVER ONCE THE STOCKPILE IS PLACED (TYPICALLY WITHIN 14 DAYS). USE OF MULCH ONLY OR A SOIL BINDER IS ACCEPTABLE IF THE STOCKPILE WILL BE IN PLACE FOR A MORE LIMITED TIME PERIOD (TYPICALLY 30-60 DAYS).
4. FOR TEMPORARY STOCKPILES ON THE INTERIOR PORTION OF A CONSTRUCTION SITE, WHERE OTHER DOWNGRADEMENT CONTROLS, INCLUDING PERIMETER CONTROL, ARE IN PLACE, STOCKPILE PERIMETER CONTROLS MAY NOT BE REQUIRED.

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

Sediment Control Log (SCL)

SC-2



SEDIMENT CONTROL LOG

SECTION A

SEDIMENT CONTROL LOG JOINTS

SCL-1. SEDIMENT CONTROL LOG

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

MM-2

Stockpile Management (SM)

STOCKPILE PROTECTION MAINTENANCE NOTES

1. 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.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. IF PERIMETER PROTECTION MUST BE MOVED TO ACCESS SOIL STOCKPILE, REPLACE PERIMETER CONTROLS BY THE END OF THE WORKDAY.
5. STOCKPILE PERIMETER CONTROLS CAN BE REMOVED ONCE ALL THE MATERIAL FROM THE STOCKPILE HAS BEEN USED.

(DETAILS ADAPTED FROM 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.

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

Sediment Control Log (SCL)

SC-2

SEDIMENT CONTROL LOG INSTALLATION NOTES

1. SEE PLAN VIEW FOR LOCATION AND LENGTH OF SEDIMENT CONTROL LOGS.
2. SEDIMENT CONTROL LOGS THAT ACT AS A PERIMETER CONTROL SHALL BE INSTALLED PRIOR TO ANY UPGRADEMENT LAND-DISTURBING ACTIVITIES.
3. SEDIMENT CONTROL LOGS SHALL CONSIST OF STRAW, COMPOST, EXCELSIOR OR COCONUT FIBER, AND SHALL BE FREE OF ANY NOXIOUS WEED SEEDS OR DEFECTS INCLUDING RIPS, HOLES AND OBVIOUS WEAR.
4. SEDIMENT CONTROL LOGS MAY BE USED AS SMALL CHECK DAMS IN DITCHES AND SWALES. HOWEVER, THEY SHOULD NOT BE USED IN PERENNIAL STREAMS OR HIGH VELOCITY DRAINAGE WAYS.
5. IT IS RECOMMENDED THAT SEDIMENT CONTROL LOGS BE TRENCHED INTO THE GROUND TO A DEPTH OF APPROXIMATELY 1/2 OF THE DIAMETER OF THE LOG. IF TRENCHING TO THIS DEPTH IS NOT FEASIBLE AND/OR DESIRABLE (SHORT TERM INSTALLATION WITH DESIRE NOT TO DAMAGE LANDSCAPE) A LESSER TRENCHING DEPTH MAY BE ACCEPTABLE WITH MORE ROBUST STAKING.
6. THE UPHILL SIDE OF THE SEDIMENT CONTROL LOG SHALL BE BACKFILLED WITH SOIL THAT IS FREE OF ROCKS AND DEBRIS. THE SOIL SHALL BE TIGHTLY COMPACTED INTO THE SHAPE OF A RIGHT TRIANGLE USING A SHOVEL OR WEIGHTED LAWN ROLLER.
7. FOLLOW MANUFACTURERS' GUIDANCE FOR STAKING. IF MANUFACTURERS' INSTRUCTIONS DO NOT SPECIFY SPACING, STAKES SHALL BE PLACED ON 4' CENTERS AND EMBEDDED A MINIMUM OF 6" INTO THE GROUND. 3" OF THE STAKE SHALL PROTRUDE FROM THE TOP OF THE LOG. STAKES THAT ARE BROKEN PRIOR TO INSTALLATION SHALL BE REPLACED.

SEDIMENT CONTROL LOG MAINTENANCE NOTES

1. 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.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF SEDIMENT CONTROL LOG SHALL BE REMOVED AS NEEDED TO MAINTAIN FUNCTIONALITY OF THE BMP, TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 1/2 OF THE HEIGHT OF THE SEDIMENT CONTROL LOG.
5. SEDIMENT CONTROL LOG SHALL BE REMOVED AT THE END OF CONSTRUCTION. IF DISTURBED AREAS EXIST AFTER REMOVAL, THEY SHALL BE COVERED WITH TOP SOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAILS ADAPTED FROM TOWN OF PARKER, COLORADO, JEFFERSON COUNTY, COLORADO, DOUGLAS COUNTY, COLORADO, AND CITY OF AURORA, 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.

November 2010 Urban Drainage and Flood Control District  
Urban Storm Drainage Criteria Manual Volume 3 SCL-5

REVISIONS		DATE
NO.	DESCRIPTION	

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721 S. 2960 STREET COLORADO SPRINGS, CO 80904 OFFICE: 719-635-6422 FAX: 719-635-6426 www.tneshinc.com
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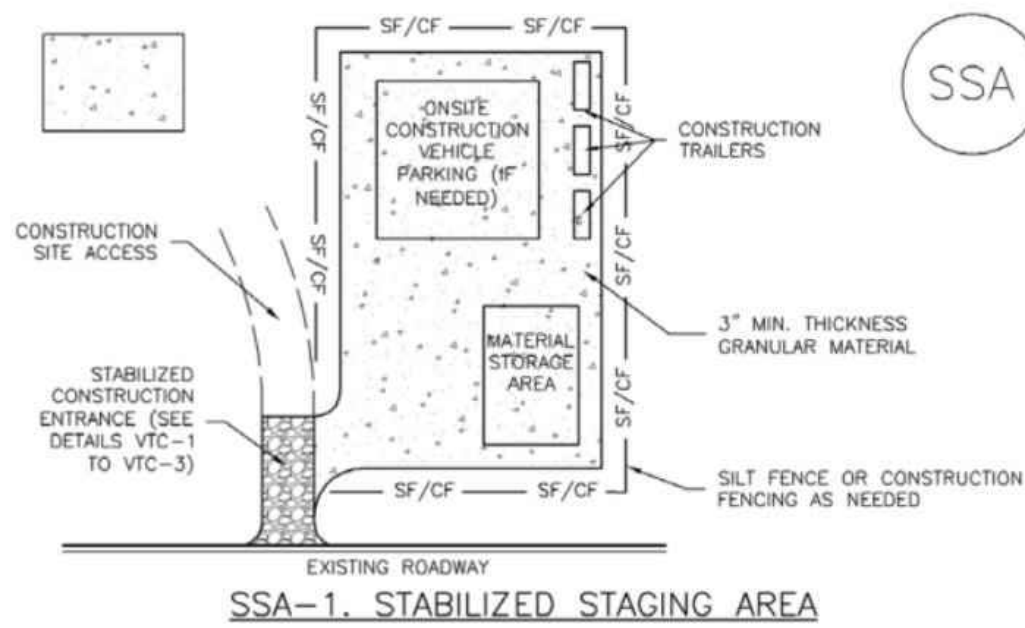
<b>TIMBRIDGE ESTATES</b> 9210 ARROYA LANE GRADING & EROSION CONTROL PLAN EROSION CONTROL PLAN - DETAILS
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DESIGNED BY LD
DRAWN BY DLF
CHECKED BY LD
H-SCALE NA
V-SCALE NA
JOB NO. 1733.00
DATE ISSUED 02/28/19
SHEET NO. 11 OF 12



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Stabilized Staging Area (SSA) SM-6



SSA-1. STABILIZED STAGING AREA

STABILIZED STAGING AREA INSTALLATION NOTES

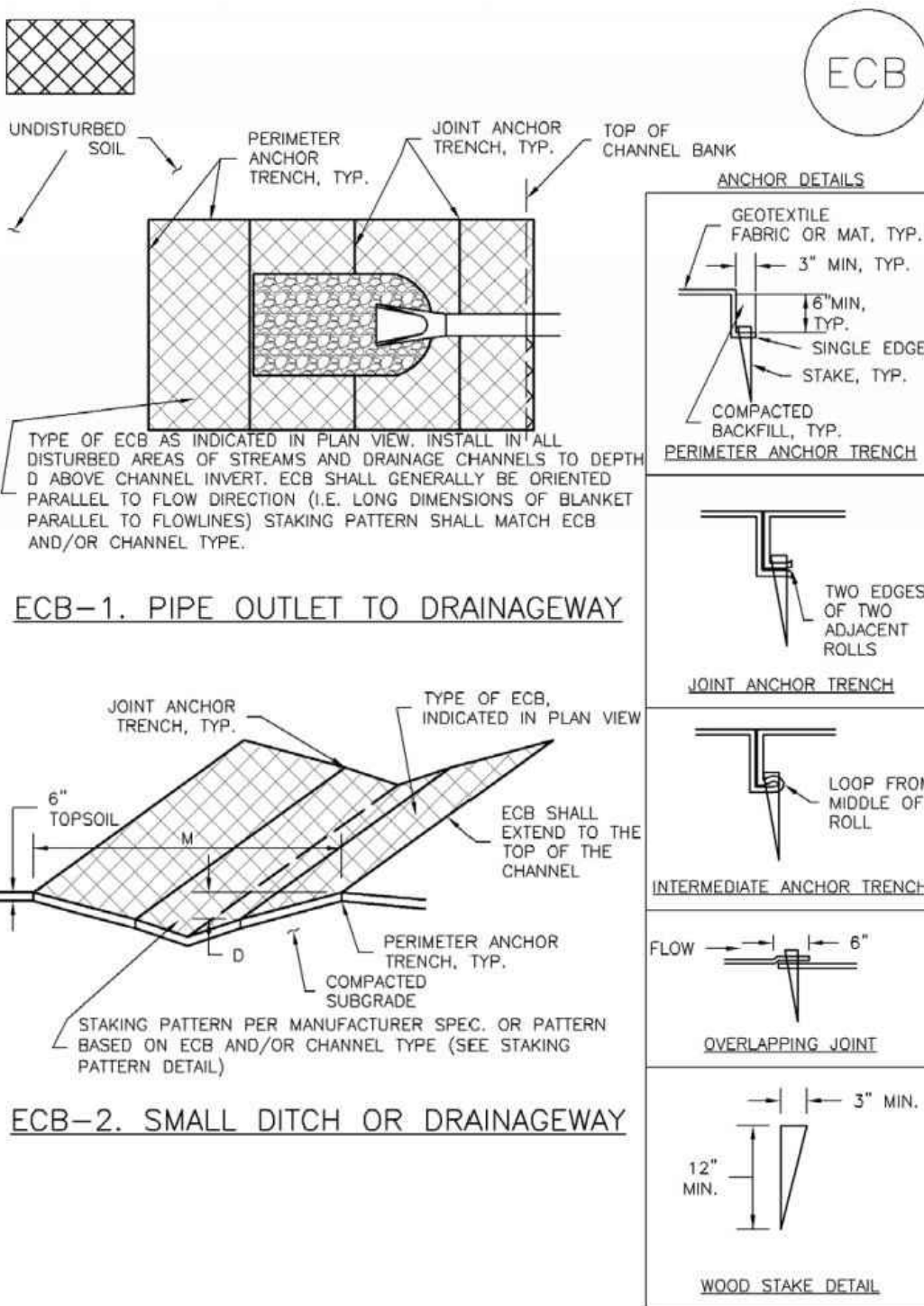
- SEE PLAN VIEW FOR:  
-LOCATION OF STAGING AREA(S).  
-CONTRACTOR MAY ADJUST LOCATION AND SIZE OF STAGING AREA WITH APPROVAL FROM THE LOCAL JURISDICTION.
- STABILIZED STAGING AREA SHOULD BE APPROPRIATE FOR THE NEEDS OF THE SITE. OVERSIZING RESULTS IN A LARGER AREA TO STABILIZE FOLLOWING CONSTRUCTION.
- STAGING AREA SHALL BE STABILIZED PRIOR TO OTHER OPERATIONS ON THE SITE.
- THE STABILIZED STAGING AREA SHALL CONSIST OF A MINIMUM 3" THICK GRANULAR MATERIAL.
- UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.
- ADDITIONAL PERIMETER BMPs MAY BE REQUIRED INCLUDING BUT NOT LIMITED TO SILT FENCE AND CONSTRUCTION FENCING.

STABILIZED STAGING AREA 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.
- ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY IF RUTTING OCCURS OR UNDERLYING SUBGRADE BECOMES EXPOSED.

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

EC-6 Rolled Erosion Control Products (RECP) EC-6



ECB-1. PIPE OUTLET TO DRAINAGEWAY

ECB-2. SMALL DITCH OR DRAINAGEWAY

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

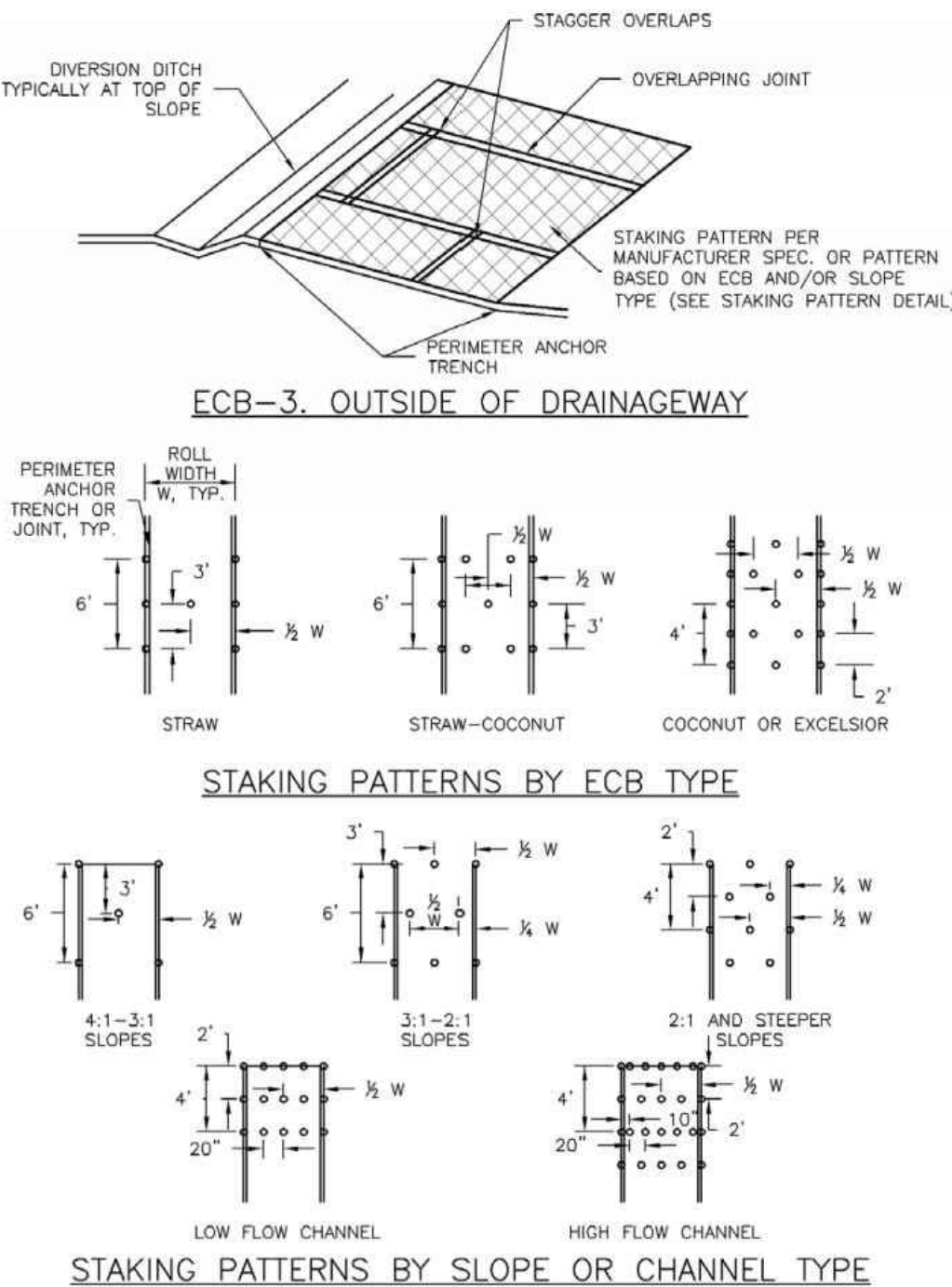
SM-6 Stabilized Staging Area (SSA)

STABILIZED STAGING AREA MAINTENANCE NOTES

- STABILIZED STAGING AREA SHALL BE ENLARGED IF NECESSARY TO CONTAIN PARKING, STORAGE, AND UNLOADING/LOADING OPERATIONS.
  - THE STABILIZED STAGING AREA SHALL BE REMOVED AT THE END OF CONSTRUCTION THE GRANULAR MATERIAL SHALL BE REMOVED OR, IF APPROVED BY THE LOCAL JURISDICTION, USED ON SITE, AND THE AREA COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY LOCAL JURISDICTION.
- NOTE: MANY MUNICIPALITIES PROHIBIT THE USE OF RECYCLED CONCRETE AS GRANULAR MATERIAL FOR STABILIZED STAGING AREAS DUE TO DIFFICULTIES WITH RE-ESTABLISHMENT OF VEGETATION IN AREAS WHERE RECYCLED CONCRETE WAS PLACED.
- 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.
- (DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO, NOT AVAILABLE IN AUTOCAD)

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

EC-6 Rolled Erosion Control Products (RECP) EC-6



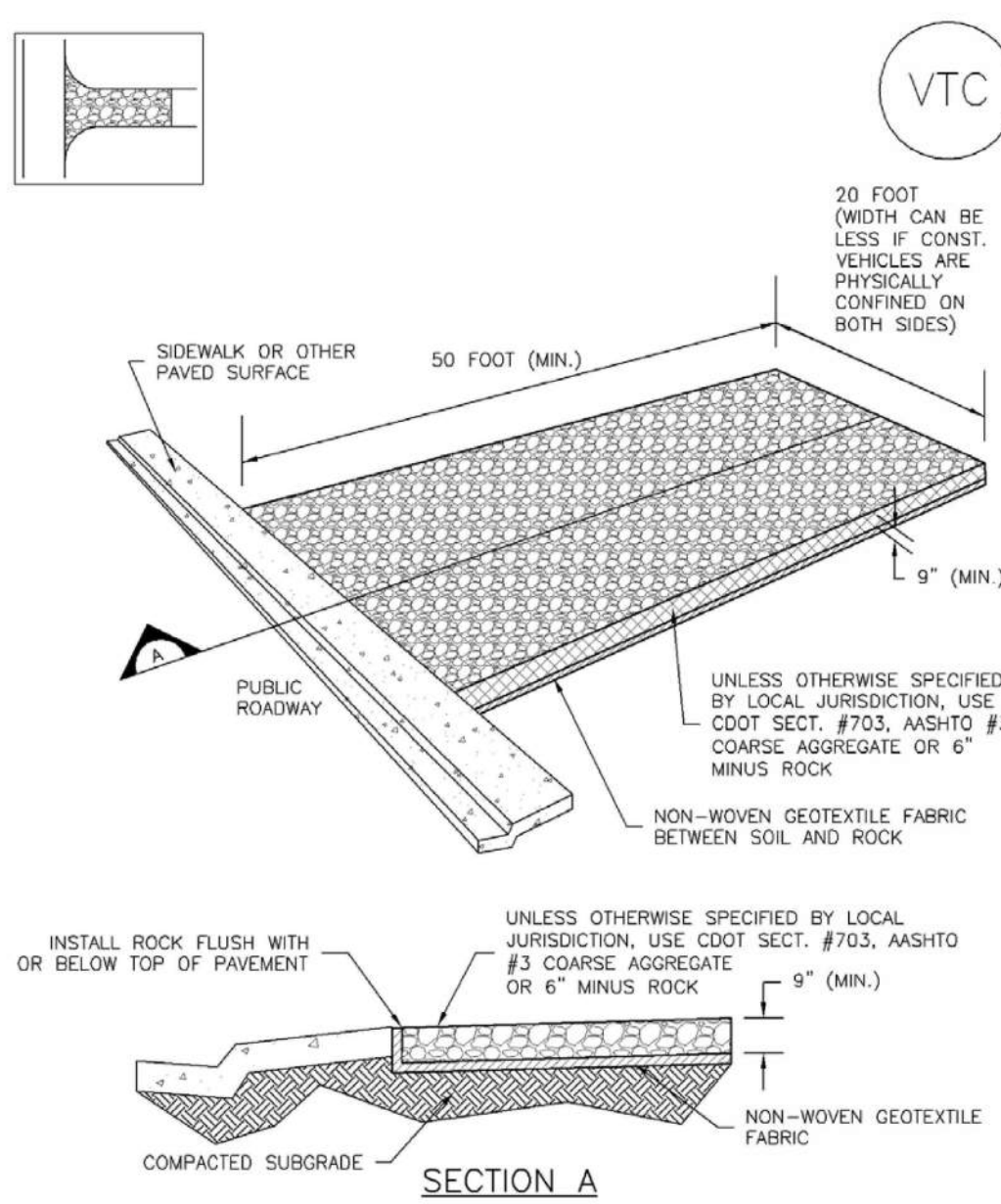
ECB-3. OUTSIDE OF DRAINAGEWAY

STAKING PATTERNS BY ECB TYPE

STAKING PATTERNS BY SLOPE OR CHANNEL TYPE

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

Vehicle Tracking Control (VTC) SM-4



VTC-1. AGGREGATE VEHICLE TRACKING CONTROL

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

EC-6 Rolled Erosion Control Products (RECP) EC-6

EROSION CONTROL BLANKET INSTALLATION NOTES

- SEE PLAN VIEW FOR:  
-LOCATION OF ECB.  
-TYPE OF ECB (STRAW, STRAW-COCONUT, COCONUT, OR EXCELSIOR).  
-AREA, A, IN SQUARE YARDS OF EACH TYPE OF ECB.
- 100% NATURAL AND BIODEGRADABLE MATERIALS ARE PREFERRED FOR RECPs, ALTHOUGH SOME JURISDICTIONS MAY ALLOW OTHER MATERIALS IN SOME APPLICATIONS.
- IN AREAS WHERE ECBs ARE SHOWN ON THE PLANS, THE PERMITEE SHALL PLACE TOPSOIL AND PERFORM FINAL GRADING, SURFACE PREPARATION, AND SEEDING AND MULCHING. SUBGRADE SHALL BE SMOOTH AND MOIST PRIOR TO ECB INSTALLATION AND THE ECB SHALL BE IN FULL CONTACT WITH SUBGRADE. NO GAPS OR VOIDS SHALL EXIST UNDER THE BLANKET.
- PERIMETER ANCHOR TRENCH SHALL BE USED ALONG THE OUTSIDE PERIMETER OF ALL BLANKET AREAS.
- JOINT ANCHOR TRENCH SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER (LONGITUDINALLY AND TRANSVERSELY) FOR ALL ECBs EXCEPT STRAW WHICH MAY USE AN OVERLAPPING JOINT.
- INTERMEDIATE ANCHOR TRENCH SHALL BE USED AT SPACING OF ONE-HALF ROLL LENGTH FOR COCONUT AND EXCELSIOR ECBs.
- OVERLAPPING JOINT DETAIL SHALL BE USED TO JOIN ROLLS OF ECBs TOGETHER FOR ECBs ON SLOPES.
- MATERIAL SPECIFICATIONS OF ECBs SHALL CONFORM TO TABLE ECB-1.
- ANY AREAS OF SEEDING AND MULCHING DISTURBED IN THE PROCESS OF INSTALLING ECBs SHALL BE RESEEDED AND MULCHED.
- DETAILS ON DESIGN PLANS FOR MAJOR DRAINAGEWAY STABILIZATION WILL GOVERN IF DIFFERENT FROM THOSE SHOWN HERE.

TABLE ECB-1. ECB MATERIAL SPECIFICATIONS			
TYPE	COCONUT CONTENT	STRAW CONTENT	EXCELSIOR CONTENT
STRAW**	-	100%	-
STRAW-COCONUT	30% MIN	70% MAX	-
COCONUT	100%	-	-
EXCELSIOR	-	-	100%

\*\*STRAW ECBs MAY ONLY BE USED OUTSIDE OF STREAMS AND DRAINAGE CHANNELS.

\*\*ALTERNATE NETTING MAY BE ACCEPTABLE IN SOME JURISDICTIONS.

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

SM-4 Vehicle Tracking Control (VTC)

STABILIZED CONSTRUCTION ENTRANCE/EXIT INSTALLATION NOTES

- SEE PLAN VIEW FOR:  
-LOCATION OF CONSTRUCTION ENTRANCE(S)/EXIT(S).  
-TYPE OF CONSTRUCTION ENTRANCE(S)/EXIT(S) (WITH/WITHOUT WHEEL WASH, CONSTRUCTION MAT OR TRM).
- CONSTRUCTION MAT OR TRM STABILIZED CONSTRUCTION ENTRANCES ARE ONLY TO BE USED ON SHORT DURATION PROJECTS (TYPICALLY RANGING FROM A WEEK TO A MONTH) WHERE THERE WILL BE LIMITED VEHICULAR ACCESS.
- A STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE LOCATED AT ALL ACCESS POINTS WHERE VEHICLES ACCESS THE CONSTRUCTION SITE FROM PAVED RIGHT-OF-WAYS.
- STABILIZED CONSTRUCTION ENTRANCE/EXIT SHALL BE INSTALLED PRIOR TO ANY LAND DISTURBING ACTIVITIES.
- A NON-WOVEN GEOTEXTILE FABRIC SHALL BE PLACED UNDER THE STABILIZED CONSTRUCTION ENTRANCE/EXIT PRIOR TO THE PLACEMENT OF ROCK.
- UNLESS OTHERWISE SPECIFIED BY LOCAL JURISDICTION, ROCK SHALL CONSIST OF DOT SECT. #703, AASHTO #3 COARSE AGGREGATE OR 6" (MINUS) ROCK.

STABILIZED CONSTRUCTION ENTRANCE/EXIT 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.
- ROCK SHALL BE REAPPLIED OR REGRADED AS NECESSARY TO THE STABILIZED ENTRANCE/EXIT TO MAINTAIN A CONSISTENT DEPTH.
- SEDIMENT TRACKED ONTO PAVED ROADS IS TO BE REMOVED THROUGHOUT THE DAY AND AT THE END OF THE DAY BY SHOVELING OR SWEEPING. SEDIMENT MAY NOT BE WASHED DOWN STORM SEWER DRAINS.

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.

(DETAILS ADAPTED FROM CITY OF BROOMFIELD, COLORADO, NOT AVAILABLE IN AUTOCAD)

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

EC-6 Rolled Erosion Control Products (RECP) EC-6

EROSION CONTROL BLANKET 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.
- ECBs SHALL BE LEFT IN PLACE TO EVENTUALLY BIODEGRADE, UNLESS REQUESTED TO BE REMOVED BY THE LOCAL JURISDICTION.
- ANY ECB PULLED OUT, TORN, OR OTHERWISE DAMAGED SHALL BE REPAIRED OR REINSTALLED. ANY SUBGRADE AREAS BELOW THE GEOTEXTILE THAT HAVE ERODED TO CREATED A VOID UNDER THE BLANKET, OR THAT REMAIN DEVOID OF GRASS SHALL BE REPAIRED, RESEEDED AND MULCHED AND THE ECB REINSTALLED.

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.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO AND TOWN OF PARKER COLORADO, NOT AVAILABLE IN AUTOCAD)

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

REVISIONS

NO.	DESCRIPTION	DATE

UNTIL SUCH TIME AS THESE DRAWINGS ARE APPROVED BY THE REVIEWING ENGINEER, TERRA NOVA ENGINEERING, INC. APPROVES THEIR USE ONLY FOR THE PROJECT DESIGNATED BY WRITTEN AUTHORIZATION.

PREPARED FOR:  
TIMBERRIDGE ESTATES, LLC  
ATTN: SCOTT HENTIE  
2760 BROGANS BLUFF  
COLORADO SPRINGS, CO 80919  
719.499.6752

Terra Nova Engineering, Inc.  
Creative Civil Engineering

721 S. 2960 STREET  
COLORADO SPRINGS, CO 80904  
OFFICE: 719-635-6422  
FAX: 719-635-6426  
www.tnasec.com

TIMBERRIDGE ESTATES

9210 ARROYA LANE

GRADING & EROSION CONTROL PLAN  
EROSION CONTROL PLAN - DETAILS

DESIGNED BY LD

DRAWN BY DLF

CHECKED BY LD

H-SCALE NA

V-SCALE NA

JOB NO. 1733.00

DATE ISSUED 02/28/19

SHEET NO. 12 OF 12



**PRIVATE DETENTION BASIN /  
STORMWATER QUALITY BEST MANAGEMENT PRACTICE  
MAINTENANCE AGREEMENT AND EASEMENT**

This PRIVATE DETENTION BASIN / STORMWATER QUALITY BEST MANAGEMENT PRACTICE MAINTENANCE AGREEMENT AND EASEMENT (Agreement) is made by and between EL PASO COUNTY by and through THE BOARD OF COUNTY COMMISSIONERS OF EL PASO COUNTY, COLORADO (Board or County) TIMBERRIDGE ESTATES, LLC (Developer), **ARROYA INVESTMENTS, LLC** (Owner), and TIMBERRIDGE ESTATES METROPOLITAN DISTRICT (Metro District), a quasi-municipal corporation and political subdivision of the State of Colorado. The above may occasionally be referred to herein singularly as “Party” and collectively as “Parties.”

Recitals

- A. WHEREAS, the District provides various municipal services to certain real property in El Paso County, Colorado referred to as The Retreat at TimberRidge; and
- B. WHEREAS, Developer is the owner of certain real estate (the Property or Subdivision) in El Paso County, Colorado, which Property is legally described in [Exhibit A](#) attached hereto and incorporated herein by this reference; and
- C. WHEREAS, Developer desires to plat and develop on the Property a subdivision to be known as TimberRidge Estates; and
- D. WHEREAS, the development of this Property will substantially increase the volume of water runoff and will decrease the quality of the stormwater runoff from the Property, and, therefore, it is in the best interest of public health, safety and welfare for the County to condition approval of this subdivision on Developer’s promise to construct adequate drainage, water runoff control facilities, and stormwater quality structural Best Management Practices (“BMPs”) for the subdivision; and
- E. WHEREAS, Chapter 8, Section 8.4.5 of the El Paso County Land Development Code, as periodically amended, promulgated pursuant to Section 30-28-133(1), Colorado Revised Statutes (C.R.S.), requires the County to condition approval of all subdivisions on a developer’s promise to so construct adequate drainage, water runoff control facilities, and BMPs in subdivisions; and
- F. WHEREAS, the Drainage Criteria Manual, Volume 2, as amended by Appendix I of the El Paso County Engineering Criteria Manual (ECM), as each may be periodically amended, promulgated pursuant to the County’s Colorado Discharge Permit System General Permit (MS4 Permit) as required by Phase II of the National Pollutant Discharge Elimination System (NPDES), which MS4 Permit requires that the County take measures to protect the quality of stormwater from sediment and other contaminants, requires subdividers, developers, landowners, and owners of facilities located in the County’s rights-of-way or easements to provide adequate permanent stormwater quality BMPs with new development or significant redevelopment; and



G. WHEREAS, Section 2.9 of the El Paso County Drainage Criteria Manual provides for a developer's promise to maintain a subdivision's drainage facilities in the event the County does not assume such responsibility; and

H. WHEREAS, developers in El Paso County have historically chosen water runoff detention basins as a means to provide adequate drainage and water runoff control in subdivisions, which basins, while effective, are less expensive for developers to construct than other methods of providing drainage and water runoff control; and

I. WHEREAS, Developer desires to construct for the subdivision one detention basin/stormwater quality BMP(s) ("detention basin/BMP(s)") as the means for providing adequate drainage and stormwater runoff control and to meet requirements of the County's MS4 Permit, and to provide for operating, cleaning, maintaining and repairing such detention basin/BMP(s); and

J. WHEREAS, Developer desires to construct the detention basin/BMP(s) on property that is or will be platted as Tract A, TimberRidge Estates and as set forth on [Exhibit B](#) attached hereto; and

K. WHEREAS, Developer shall be charged with the duty of constructing the detention basin/BMP(s) and the Metro District shall be charged with the duties of operating, maintaining and repairing the detention basin/BMP(s) on the Property described in [Exhibit B](#); and

L. WHEREAS, it is the County's experience that subdivision developers and property owners historically have not properly cleaned and otherwise not properly maintained and repaired these detention basins/BMPs, and that these detention basins/BMPs, when not so properly cleaned, maintained, and repaired, threaten the public health, safety and welfare; and

M. WHEREAS, the County, in order to protect the public health, safety and welfare, has historically expended valuable and limited public resources to so properly clean, maintain, and repair these detention basins/BMPs when developers and property owners have failed in their responsibilities, and therefore, the County desires the means to recover its costs incurred in the event the burden falls on the County to so clean, maintain and repair the detention basin/BMP(s) serving this Subdivision due to the Developer's or the Metro District's failure to meet its obligations to do the same; and

N. WHEREAS, the County conditions approval of this Subdivision on the Developer's promise to so construct the detention basin/BMP(s), and further conditions approval on the Metro District's promise to reimburse the County in the event the burden falls upon the County to so clean, maintain and/or repair the detention basin/BMP(s) serving this Subdivision; and

O. WHEREAS, the County could condition subdivision approval on the Developer's promise to construct a different and more expensive drainage, water runoff control system and BMPs than those proposed herein, which more expensive system would not create the possibility of the burden of cleaning, maintenance and repair expenses falling on the County; however, the County is willing to forego such right upon the performance of Developer's and the Metro District's promises contained herein; and

P. WHEREAS, the County, in order to secure performance of the promises contained herein, conditions approval of this Subdivision upon the Developer's grant herein of a perpetual



Easement over a portion of the Property for the purpose of allowing the County to periodically access, inspect, and, when so necessary, to clean, maintain and/or repair the detention basin/BMP(s); and

Q. WHEREAS, Pursuant to Colorado Constitution, Article XIV, Section 18(2) and Section 29-1-203, Colorado Revised Statutes, governmental entities may cooperate and contract with each other to provide any function, services, or facilities lawfully authorized to each.

### Agreement

NOW, THEREFORE, in consideration of the mutual Promises contained herein, the sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. Incorporation of Recitals: The Parties incorporate the Recitals above into this Agreement.

2. Covenants Running with the Land: Developer and the Metro District agree that this entire Agreement and the performance thereof shall become a covenant running with the land, which land is legally described in Exhibit A attached hereto, and that this entire Agreement and the performance thereof shall be binding upon themselves, their respective successors and assigns.

3. Construction: Developer shall construct on that portion of the Property described in Exhibit B attached hereto and incorporated herein by this reference, one detention basin/BMP(s). Developer shall not commence construction of the detention basin/BMP(s) until the El Paso County Planning and Community Development Department (PCD) has approved in writing the plans and specifications for the detention basin/BMP(s) and this Agreement has been signed by all Parties and returned to the PCD. Developer shall complete construction of the detention basin/BMP(s) in substantial compliance with the County-approved plans and specifications for the detention basin/BMP(s). Failure to meet these requirements shall be a material breach of this Agreement, and shall entitle the County to pursue any remedies available to it at law or in equity to enforce the same. Construction of the detention basin/BMP(s) shall be substantially completed within one (1) year (defined as 365 days), which one year period will commence to run on the date the approved plat of this Subdivision is recorded in the records of the El Paso County Clerk and Recorder. Rough grading of the detention basin/BMP(s) must be completed and inspected by the El Paso County Planning and Community Development Department prior to commencing road construction.

In the event construction is not substantially completed within the one (1) year period, then the County may exercise its discretion to complete the project, and shall have the right to seek reimbursement from the Developer and its respective successors and assigns, for its actual costs and expenses incurred in the process of completing construction. The term actual costs and expenses shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tool and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the Provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.



4. Maintenance: The Metro District agrees for itself and its successors and assigns that it will regularly and routinely inspect, clean and maintain the detention basin/BMP(s), and otherwise keep the same in good repair, all at its own cost and expense. No trees or shrubs that will impair the structural integrity of the detention basin/BMP(s) shall be planted or allowed to grow on the detention basin/BMP(s).

5. Creation of Easement: Developer hereby grants the County and the Metro District a non-exclusive perpetual easement upon and across that portion of the Property described in [Exhibit B](#). The purpose of the easement is to allow the County and the Metro District to access, inspect, clean, repair and maintain the detention basin/BMP(s); however, the creation of the easement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

6. County's Rights and Obligations: Any time the County determines, in the sole exercise of its discretion, that the detention basin/BMP(s) is not properly cleaned, maintained and/or otherwise kept in good repair, the County shall give reasonable notice to the Developer, the Metro District and their respective successors and assigns, that the detention basin/BMP(s) needs to be cleaned, maintained and/or otherwise repaired. The notice shall provide a reasonable time to correct the problem(s). Should the responsible parties fail to correct the specified problem(s), the County may enter upon the Property to so correct the specified problem(s). Notice shall be effective to the above by the County's deposit of the same into the regular United States mail, postage pre-paid. Notwithstanding the foregoing, this Agreement does not expressly or implicitly impose on the County a duty to so inspect, clean, repair or maintain the detention basin/BMP(s).

7. Reimbursement of County's Costs / Covenant Running With the Land: The Developer and the Metro District agree and covenant, for themselves, their respective successors and assigns, that they will reimburse the County for its costs and expenses incurred in the process of completing construction of, cleaning, maintaining, and/or repairing the detention basin/BMP(s) pursuant to the provisions of this Agreement.

The term "actual costs and expenses" shall be liberally construed in favor of the County, and shall include, but shall not be limited to, labor costs, tools and equipment costs, supply costs, and engineering and design costs, regardless of whether the County uses its own personnel, tools, equipment and supplies, etc. to correct the matter. In the event the County initiates any litigation or engages the services of legal counsel in order to enforce the provisions arising herein, the County shall be entitled to its damages and costs, including reasonable attorney's fees, regardless of whether the County contracts with outside legal counsel or utilizes in-house legal counsel for the same.

8. Contingencies of Subdivision Approval: Developer's and the Metro District's execution of this Agreement is a condition of subdivision approval. Additional conditions of this Agreement include, but are not limited to, the following:

- a. Conveyance of Tract A, TimberRidge Estates from Developer to the Metro District (which will include a reservation of easement in favor of the County for purposes of accessing, inspecting, cleaning, maintaining, and repairing the detention basin/BMP(s)), and recording of the Deed for the same; and



- b. A copy of the court order declaring the organization of the Metro District and a copy of the approved service plan establishing that the Metro District is obligated to inspect, clean, maintain, and repair the detention basin/BMP(s).

The County shall have the right, in the sole exercise of its discretion, to approve or disapprove any documentation submitted to it under the conditions of this Paragraph, including but not limited to, any separate agreement or amendment, if applicable, identifying any specific maintenance responsibilities not addressed herein. The County's rejection of any documentation submitted hereunder shall mean that the appropriate condition of this Agreement has not been fulfilled.

9. Agreement Monitored by El Paso County Planning and Community Development Department and/or El Paso County Department of Public Works: Any and all actions and decisions to be made hereunder by the County shall be made by the Director of the El Paso County Planning and Community Development Department and/or the Director of the El Paso County Department of Public Works. Accordingly, any and all documents, submissions, plan approvals, inspections, etc. shall be submitted to and shall be made by the Director of the Planning and Community Development Department and/or the Director of the El Paso County Department of Public Works.

10. Indemnification and Hold Harmless: To the extent authorized by law, Developer and the Metro District agree, for themselves, their respective successors and assigns, that they will indemnify, defend, and hold the County harmless from any and all loss, costs, damage, injury, liability, claim, lien, demand, action and causes of action whatsoever, whether at law or in equity, arising from or related to their respective intentional or negligent acts, errors or omissions or that of their agents, officers, servants, employees, invitees and licensees in the construction, operation, inspection, cleaning (including analyzing and disposing of any solid or hazardous wastes as defined by State and/or Federal environmental laws and regulations), maintenance, and repair of the detention basin/BMP(s), and such obligation arising under this Paragraph shall be joint and several. Nothing in this Paragraph shall be deemed to waive or otherwise limit the defense available to the County pursuant to the Colorado Governmental Immunity Act, Sections 24-10-101, *et seq.* C.R.S., or as otherwise provided by law.

11. Severability: In the event any Court of competent jurisdiction declares any part of this Agreement to be unenforceable, such declaration shall not affect the enforceability of the remaining parts of this Agreement.

12. Third Parties: This Agreement does not and shall not be deemed to confer upon or grant to any third party any right to claim damages or to bring any lawsuit, action or other proceeding against either the County, the Developer, the Metro District, or their respective successors and assigns, because of any breach hereof or because of any terms, covenants, agreements or conditions contained herein.

13. Solid Waste or Hazardous Materials: Should any refuse from the detention basin/BMP(s) be suspected or identified as solid waste or petroleum products, hazardous substances or hazardous materials (collectively referred to herein as "hazardous materials"), the Developer and the Metro District shall take all necessary and proper steps to characterize the solid waste or hazardous materials and properly dispose of it in accordance with applicable State and/or Federal environmental laws and regulations, including, but not limited to, the following: Solid Wastes Disposal Sites and Facilities Acts, §§ 30-20-100.5 – 30-20-119, C.R.S., Colorado Regulations Pertaining to Solid Waste Disposal Sites and Facilities, 6 C.C.R. 1007-2, *et seq.*, Solid Waste Disposal Act, 42 U.S.C. §§ 6901-6992k, and Federal Solid Waste Regulations 40 CFR Ch. I. The County shall not be responsible or liable for identifying,



characterizing, cleaning up, or disposing of such solid waste or hazardous materials. Notwithstanding the previous sentence, should any refuse cleaned up and disposed of by the County be determined to be solid waste or hazardous materials, the Developer and the Metro District, but not the County, shall be responsible and liable as the owner, generator, and/or transporter of said solid waste or hazardous materials.

14. Applicable Law and Venue: The laws, rules, and regulations of the State of Colorado and El Paso County shall be applicable in the enforcement, interpretation, and execution of this Agreement, except that Federal law may be applicable regarding solid waste or hazardous materials. Venue shall be in the El Paso County District Court.

15. Limitation on Developer's Obligation and Liability: The obligation and liability of the Developer hereunder shall only continue until such time as the Final Plat as described in Paragraph Three (3) of the Recitals set forth above is recorded and the Developer completes the construction of the detention basin/BMP(s) and transfers all applicable maintenance and operation responsibilities to the Metro District. By execution of this agreement, the Metro District agrees to accept all responsibilities and to perform all duties assigned to it, including those of the Developer, as specified herein, upon transfer of Tract A from Developer to the Metro District.

IN WITNESS WHEREOF, the Parties affix their signatures below.

DEVELOPER

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by:

TIMBERRIDGE ESTATES, LLC

By: \_\_\_\_\_  
Bob Ormstom, Manager

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by Bob Ormstom, Authorized signing Agent, TimberRidge Estates, LLC.

Witness my hand and official seal.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public



OWNER

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by:

ARROYA INVESTMENTS, LLC

By: \_\_\_\_\_  
Name ???, Manager

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by Name???, Authorized signing Agent, ARROYA INVESTMENTS, LLC.

Witness my hand and official seal.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

METRO DISTRICT

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by:

TIMBERRIDGE ESTATES METROPOLITAN DISTRICT

By: \_\_\_\_\_  
TBD, President

Attest:

By: \_\_\_\_\_  
TBD, President

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by TBD, President, TimberRidge Estates Metropolitan District.

Witness my hand and official seal.

My commission expires: \_\_\_\_\_



\_\_\_\_\_  
Notary Public

COUNTY

Executed this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by:

BOARD OF COUNTY COMMISSIONERS  
OF EL PASO COUNTY, COLORADO

By: \_\_\_\_\_  
Craig Dossey, Executive Director  
Planning and Community Development Department  
Authorized signatory pursuant to LDC

Attest:

\_\_\_\_\_  
County Clerk and Recorder

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by Craig Dossey, Executive Director, Planning and Community Development Department, as attested to by \_\_\_\_\_, County Clerk and Recorder.

Witness my hand and official seal.

My commission expires: \_\_\_\_\_

\_\_\_\_\_  
Notary Public

Approved as to Content and Form:

\_\_\_\_\_  
Assistant County Attorney



## Exhibit A – Legal Description

Not yet prepared



## Exhibit B – Pond Location

Not yet prepared