

FINAL DRAINAGE REPORT
for
WILLOW SPRINGS RANCH FILING NO. 2

Forest Lakes Drive
Monument, Colorado

October 7, 2022

Prepared for:

Polo Brown Company
514 Pike Avenue
Canon City, CO 81212
Contact: Daniel Brown
(303) 999-5533

Prepared by:

Drexel, Barrell & Co.
3 South 7th Street
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FINAL DRAINAGE REPORT
for
WILLOW SPRINGS RANCH FILING NO. 2

1.0 DRAINAGE PLAN STATEMENTS

ENGINEER'S STATEMENT

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the Town/City/County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by negligent acts, errors, or omissions on my part in preparing this report.

Tim D. McConnell, P.E. #33797
For and on behalf of Drexel, Barrell & Co.

Date

DEVELOPER'S STATEMENT

I, the developer, have read and will comply with all the requirements specified in this drainage report and plan.

Polo Brown Company

By: _____
Daniel Brown

Date

TITLE: Managing Member

ADDRESS: 514 Pike Avenue
Canon City, CO 81212

TOWN OF MONUMENT

Filed in accordance with Section 17.45 of the Zoning Ordinance for the Town of Monument, and Section 16.12.060 of the Subdivision Code for the Town of Monument, revised February, 2007.

Director of Development Services

Date

CONDITIONS:

FINAL DRAINAGE REPORT
for
WILLOW SPRINGS RANCH FILING NO. 2

2.0 PURPOSE

The purpose of this Final Drainage Report is to identify the existing and proposed runoff patterns and drainage facilities required for Willow Springs Ranch Filing No. 2, and to present the ability to safely pass developed runoff to historic downstream facilities.

3.0 GENERAL SITE DESCRIPTION

Location

Willow Springs Ranch is currently located in El Paso County, Colorado, within portions of the Southeast Quarter of Section 22, the West Half of Section 26 and the East Half of Section 27, Township 11 South, Range 67 West of the 6th P.M., northeast of Baptist Road and Forest Lakes Drive. The property is currently in the Town of Monument.

Proposed Development

Willow Springs Ranch Filing No. 2 is approximately 17.1 acres in size that sits in the southwest corner of the greater Willow Springs Ranch Site. The development is proposed to consist of 27 single-family residential units, open space tracts and roads. The site is bound to the south by Forest Lake Drive, to the west and north by unplatted land, and to the east by Willow Springs Ranch Filing No. 1.

Soils

According to the Soil Survey of El Paso County Area, Colorado, prepared by the U.S. Department of Agriculture Soil Conservation Service, the following soils are found on the project site:

<u>Soil</u>	<u>Hydrologic Soil Group</u>	<u>Percent of site</u>
Tomah-Crowfoot complex	B	60.5%

Runoff coefficients corresponding to group B were used for the purposes of the site drainage analysis. See appendix for Soils map.

Climate

This area of El Paso County can be described as the foothills, with total precipitation amounts typical of a semi-arid region. Winters are generally cold and dry, and summers relatively warm and dry. Precipitation ranges from 12 to 14 inches per year, with the majority of this moisture occurring in the spring and summer in the form of rainfall. Thunderstorms are common during the summer months.

Floodplain Statement

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel 08041C0278G (December 7, 2018), no portions of the site lie within the designated 100-year floodplain.

4.0 DRAINAGE CRITERIA

The drainage analysis has been prepared in accordance with the current City of Colorado Springs Drainage Criteria Manual. Calculations were performed to determine runoff quantities during the 5 year and 100 year frequency storms for historic and developed conditions using the Rational Method as required for basins containing less than 100 acres.

In addition, Inlet and Street Capacity Charts from the City of Colorado Springs Drainage Criteria Manual were used for design of the roadway and storm sewer infrastructure.

Hydraulic grade line calculations utilizing UD-Sewer 2009 1.4.0 are included in the appendix.

5.0 EXISTING CONDITIONS

The existing terrain generally slopes from southwest to northeast at grades of approximately 1% to 10% in its current condition. Native and non-native grasses and vegetation cover the area to be developed.

Rational Method Runoff Summary

BASIN	DP	AREA (AC)	Q5 (cfs)	Q100 (cfs)
OS1	1	9.52	2.3	16.6
EX1	2	1.43	0.4	2.7
EX2	3	1.31	0.4	2.7
EX3		5.86	1.4	10.0
	4	18.12	3.6	26.4

Basin OS1 (9.52 acres) is located offsite, to the west of the Willow Springs Ranch Filing No. 2 site. The basin is made up of primarily short grass and native vegetation, sloping to the northeast at 3%-10%. Flows of $Q_5=2.3\text{cfs}$ and $Q_{100}=16.6\text{cfs}$ generally travel to the northeast via overland flow towards DP1.

Basin EX1 consists of 1.43 acres of open space at the southwest corner of the Filing 2 site. Flows of $Q_5=0.4\text{cfs}$ and $Q_{100}=2.7\text{cfs}$ generally travel as overland flow to the north towards DP2.

Basin EX2 covers 1.31 acres of open space along the southern boundary of the Filing 2

site. Flows of $Q_5=0.4\text{cfs}$ and $Q_{100}=2.7\text{cfs}$ generally travel as overland flow to the north towards DP3.

Basin EX3 covers 5.86 acres of open space along the north and eastern boundary of the Filing 2 site. Flows of $Q_5=1.4\text{cfs}$ and $Q_{100}=10.0\text{cfs}$ generally travel as overland flow to the northeast towards DP4.

Design Point 5 (DP5) represents all existing flows generated by the Filing No. 2 site, and the offsite basin. Flows of $Q_5=3.6\text{cfs}$ and $Q_{100}=26.4\text{cfs}$ exit the site at the northeast corner and travel overland towards Monument Creek.

6.0 DEVELOPED CONDITIONS

Grading of the site for the developed condition was designed to minimize import/export for the site and producing a cost effective drainage system while maintaining native areas as much as possible. Only minor offsite flows contribute to the on-site basins. See Proposed Drainage Conditions Map in the appendix.

The Rational Method was used to determine proposed conditions runoff quantities for the 5- and 100-year storm recurrence intervals.

Rational Method Runoff Summary

BASIN	DP	AREA (AC)	Q5 (cfs)	Q100 (cfs)
OS1	1	9.52	2.6	19.3
A	2	1.51	3.3	7.2
B		0.69	1.5	3.4
	3	11.72	5.9	26.4
C	4	1.26	1.3	4.6
D		1.57	3.6	7.9
E		1.00	1.8	4.1
	5	15.55	10.3	36.7
F	6	1.96	3.1	7.9

Basin OS1 (9.52 acres) is located offsite, to the west of the Willow Springs Ranch Filing No. 2 site. Some minor grading will occur within this basin to ensure that flows will be captured by the onsite 24" storm sewer system, but otherwise will remain unchanged from the existing condition.

Willow Springs Ranch Filing No. 2 has 2 roadways within its boundaries, Short Prairie Court runs west to east on the northern side of the site, Cattail Drive runs south to north through the middle of the site.

Basin A is located on the western side of the site, with basin OS1 to the west and Cattail Drive to the east. Basin A is made up of 7 residential lots and the western half of Cattail Drive, all are sloped to the north at roughly 6%. Flows from this basin ($Q_5=3.3\text{cfs}$ and

Q₁₀₀=7.2cfs) travel north via overland, side lot swale and curb and gutter flow until reaching the intersection with Short Prairie Court.

Basin B consists of the eastern half of Cattail Drive as well as the open space on the southeastern side of Cattail Drive and the western half of the 3 residential lots located on the northeastern side of Cattail Drive. Flows (Q₅=1.5cfs and Q₁₀₀=3.4cfs) from this basin are directed via the eastern curb line of Cattail Drive, north, towards DP-3 where they will combine with the DP-2 flows before flowing into Short Prairie Court.

Basin C is to remain open space with natural vegetation, to the south of basin D and east of basin B. Only the southern and western portions of the basin require some overlot grading, but for the most part the basin will be left, sloping to the north at roughly 6.5%. The basins flows (Q₅=1.3cfs and Q₁₀₀=4.6cfs) will enter basin D through DP-4.

The D basin is located on the southeastern side of Short Prairie Court and contains the southeastern half of Short Prairie Court, the eastern half of the 3 residential lots split by basin B, and the 5 residential lots on the southeast side of Short Prairie Court. The basin directs all flows (Q₅=3.6cfs and Q₁₀₀=7.9cfs) to the northeastern corner of the basin where they will be collected by the 10' Type R inlet structure at DP-5.

Basin E contains the entire northern half of Short Prairie Court as well as the southern side of the 12 residential lots north of Short Prairie Court. Flows (Q₅=1.8cfs and Q₁₀₀=4.1cfs) within this basin are channeled east by way of the northern curb line of Short Prairie Court, with the eventual destination being the 10' Type R inlet structure at DP-5.

Design Point 5 represents all flows reaching the the easterly terminus of Short Prairie Court. Surface flows of Q₅=7.7cfs and Q₁₀₀=17.4cfs will reach the proposed 10' Type R inlet. Design Point 5 flows represent all flows discharging from this point via the downstream 30" storm sewer.

Basin F is located north of Short Prairie Court and consists of the rear of 12 residential lots. These lots all channel flows towards the northeast of the basin where they exit at DP-6 before traveling, offsite, to the east towards Monument Creek.

7.0 WATER QUALITY DETENTION FACILITIES

Flows exiting Willow Springs Filing No. 2 will be discharged directly into the existing full-spectrum detention Pond #2 located in Willow Springs Filing No. 1. This facility was designed to capture developed flows from this filing with the original design.

8.0 SUMMARY

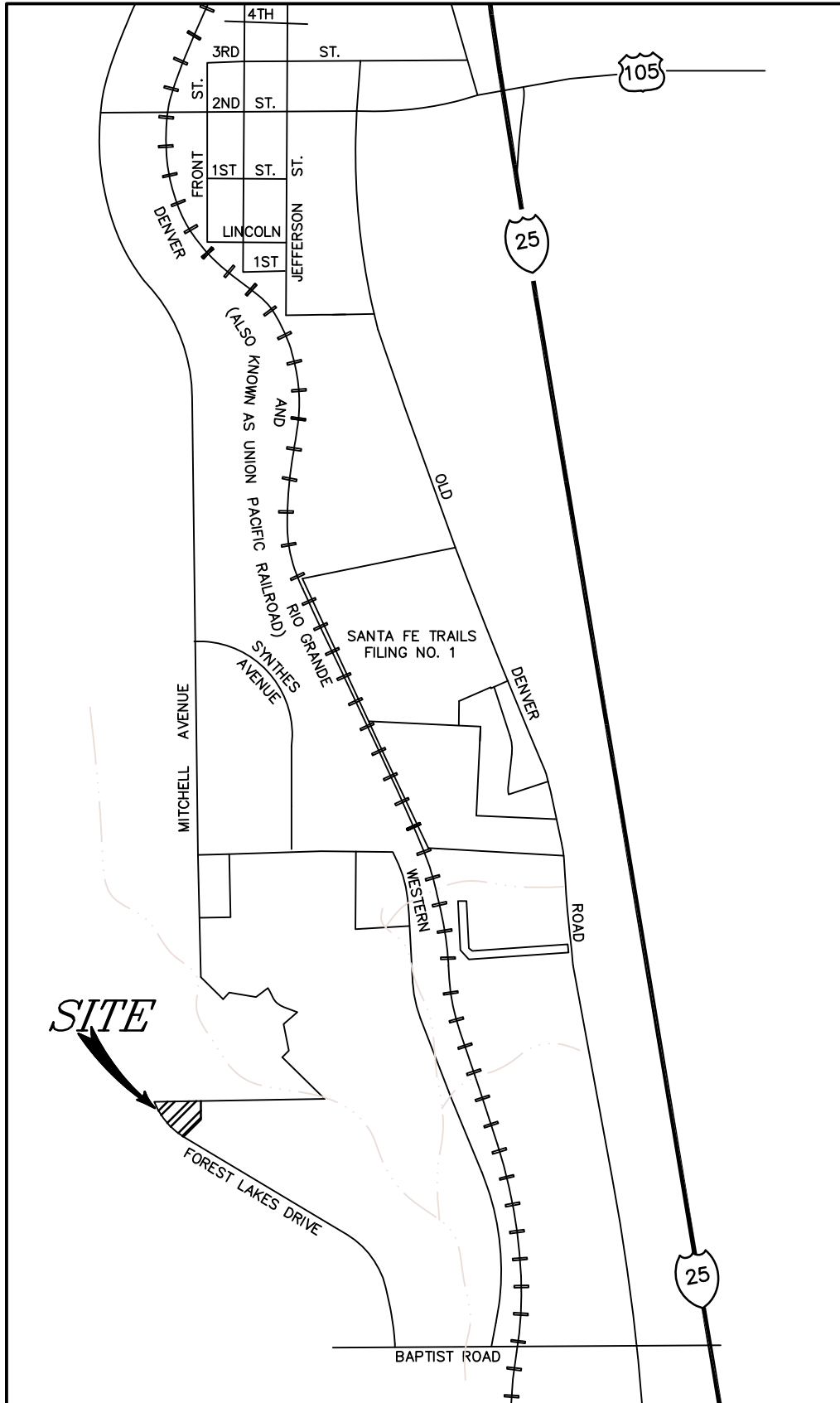
The findings of this report are in general conformance with the City of Colorado Springs Drainage Criteria Manual, as amended and as such, all site runoff, storm drains and appurtenances proposed by the development of Willow Springs Ranch Filing No. 2 will not adversely affect the surrounding or downstream developments. The proposed drainage system will safely route developed flows to the existing on-site full-spectrum detention facilities where flows will be released at or below historical rates.

9.0 REFERENCES

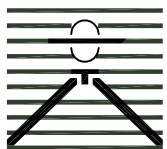
The sources of information used in the development of this study are listed below:

1. City of Colorado Springs Drainage Criteria Manual Volumes 1 & 2, May 2014 as amended.
2. Urban Storm Drainage Criteria Manuals, Urban Drainage and Flood Control District. June 2001, Revised April 2008.
3. Preliminary Drainage Report, Willow Springs Ranch Filing No. 1. December 19th, 2019.

APPENDIX



N.T.S.



WILLOW SPRINGS RANCH VICINITY MAP

Drexel, Barrell & Co.
Engineers • Surveyors

DATE:
10-06-22

DWG. NO.

JOB NO:
20876-05

VMAP

SHEET 1 OF 1

National Flood Hazard Layer FIRMette



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

- | | | |
|------------------------------------|--|---|
| SPECIAL FLOOD HAZARD AREAS | | Without Base Flood Elevation (BFE)
Zone A, V, A99 |
| | | With BFE or Depth Zone AE, AO, AH, VE, AR |
| | | Regulatory Floodway |
| OTHER AREAS OF FLOOD HAZARD | | 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X |
| | | Future Conditions 1% Annual Chance Flood Hazard Zone X |
| | | Area with Reduced Flood Risk due to Levee. See Notes. Zone X |
| | | Area with Flood Risk due to Levee Zone D |
| OTHER AREAS | | NO SCREEN Area of Minimal Flood Hazard Zone X |
| | | Effective LOMRs |
| | | Area of Undetermined Flood Hazard Zone D |
| GENERAL STRUCTURES | | Channel, Culvert, or Storm Sewer |
| | | Levee, Dike, or Floodwall |
| OTHER FEATURES | | 20.2 Cross Sections with 1% Annual Chance Water Surface Elevation |
| | | 17.5 |
| | | Coastal Transect |
| | | Base Flood Elevation Line (BFE) |
| | | Limit of Study |
| | | Jurisdiction Boundary |
| | | Coastal Transect Baseline |
| | | Profile Baseline |
| | | Hydrographic Feature |
| MAP PANELS | | Digital Data Available |
| | | No Digital Data Available |
| | | Unmapped |

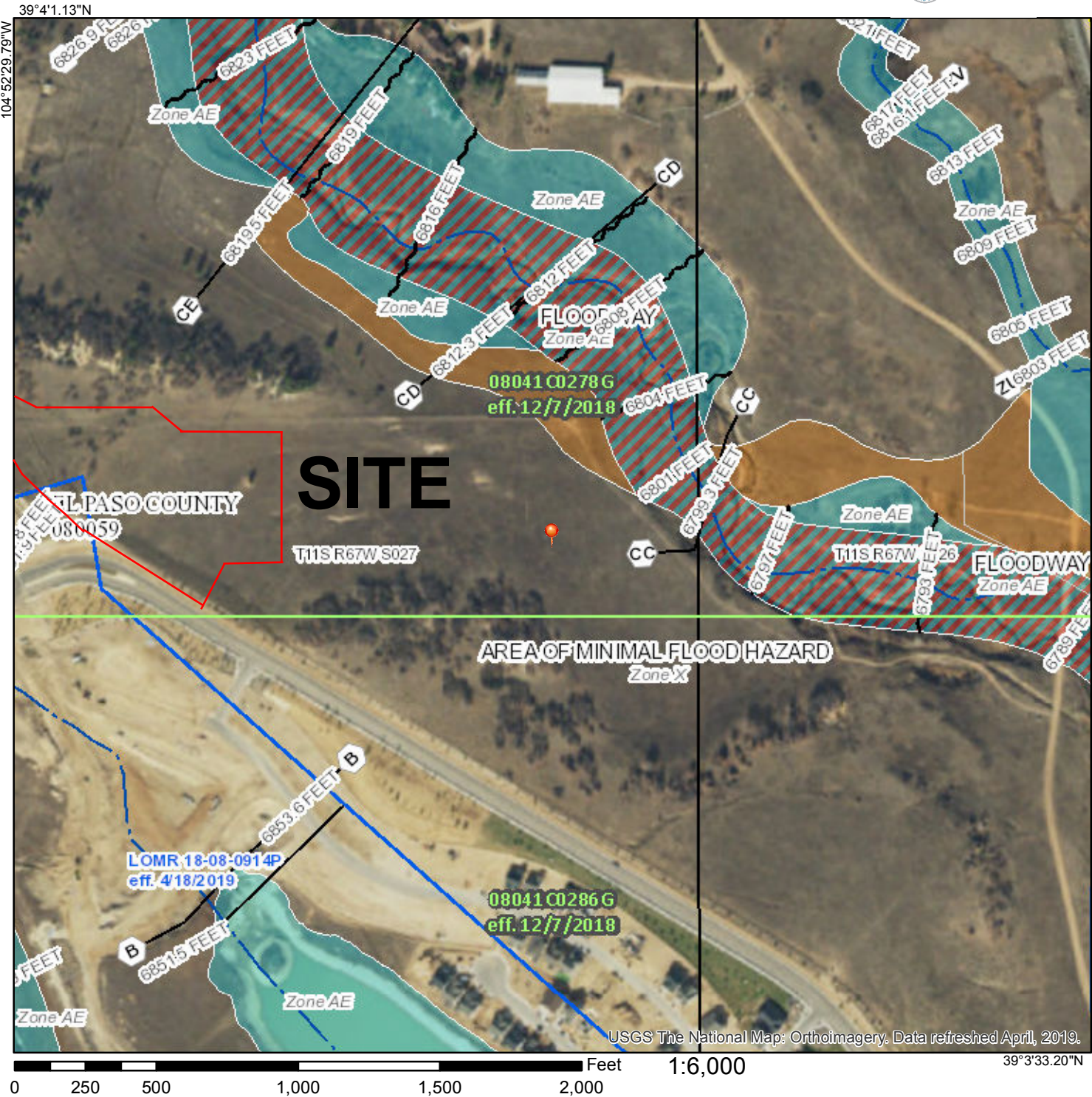


The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/15/2019 at 10:04:30 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Custom Soil Resource Report Soil Map



Soil Map may not be valid at this scale.

Map Scale: 1:9,490 if printed on A portrait (8.5" x 11") sheet.

0 100 200 400 600 Meters


0 450 900 1800 2700 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines


 Soil Map Unit Points

Special Point Features






-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features


Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: El Paso County Area, Colorado
 Survey Area Data: Version 17, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 4, 2010—Oct 16, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Alamosa loam, 1 to 3 percent slopes	1.9	1.9%
38	Jarre-Tecolote complex, 8 to 65 percent slopes	7.1	6.8%
71	Pring coarse sandy loam, 3 to 8 percent slopes	32.2	31.1%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	58.8	56.9%
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	1.5	1.5%
101	Ustic Torrifuvents, loamy	1.9	1.8%
Totals for Area of Interest		103.4	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

Custom Soil Resource Report

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

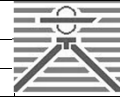
An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

PROJECT INFORMATION

PROJECT: Willow Springs Ranch Filing No. 2
 PROJECT NO: 20876-05
 DESIGN BY: KGV
 REV. BY: TDM
 AGENCY: El Paso County
 REPORT TYPE: Final
 DATE: 10/7/2022
 Soil Type: B



Drexel, Barrell & Co.

	C2*	C5*	C10*	C100*	% IMPERV
Pasture/Meadow		0.08		0.35	0
1/8 ac residential		0.45		0.59	65
Asphalt/Sidewalk		0.90		0.96	100

*C-Values and Basin Imperviousness based on Table 6-6, Colorado Springs Drainage Criteria Manual

EXISTING

SUB-BASIN	SURFACE DESIGNATION	AREA ACRE	COMPOSITE RUNOFF COEFFICIENTS				% IMPERV
			C2	C5	C10	C100	
OS1	Pasture/Meadow	9.52		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	1/8 ac residential	0.00		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.08		0.35	0.0%
TOTAL OS1		9.52					
EX1	Pasture/Meadow	1.43		0.08		0.35	0
	1/8 ac residential	0.00		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.08		0.35	0%
	TOTAL EX1		1.43				
EX2	Pasture/Meadow	1.31		0.08		0.35	0
	1/8 ac residential	0.00		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.08		0.35	0%
	TOTAL EX2		1.31				
EX3	Pasture/Meadow	5.86		0.08		0.35	0
	1/8 ac residential	0.00		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.08		0.35	0%
	TOTAL EX3		5.86				

PROPOSED

OS1	Pasture/Meadow	9.52		0.08		0.35	0
	Roofs	0.00		0.73		0.81	90
	1/8 ac residential	0.00		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.08		0.35	0.0%
TOTAL OS1		9.52					
A	Pasture/Meadow	0.00		0.08		0.35	0
	1/8 ac residential	1.51		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.45		0.59	65%
	TOTAL A		1.51				
B	Pasture/Meadow	0.00		0.08		0.35	0
	1/8 ac residential	0.69		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.45		0.59	65%
	TOTAL B		0.69				
C	Pasture/Meadow	0.84		0.08		0.35	0
	1/8 ac residential	0.42		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.20		0.43	22%
	TOTAL C		1.26				
D	Pasture/Meadow	0.00		0.08		0.35	0
	1/8 ac residential	1.57		0.45		0.59	65
	Asphalt/Sidewalk	0.00		0.90		0.96	100
	WEIGHTED AVERAGE			0.45		0.59	65%

TOTAL D			1.57				
E	Pasture/Meadow		0.00		0.08		0.35 0
	1/8 ac residential		1.00		0.45		0.59 65
	Asphalt/Sidewalk		0.00		0.90		0.96 100
	WEIGHTED AVERAGE				0.45		0.59 65%
TOTAL E			1.00				
F	Pasture/Meadow		0.54		0.08		0.35 0
	1/8 ac residential		1.42		0.45		0.59 65
	Asphalt/Sidewalk		0.00		0.90		0.96 100
	WEIGHTED AVERAGE				0.35		0.52 47%
TOTAL F			1.96				

PROJECT INFORMATION

PROJECT: Willow Springs Ranch Filing No. 2
 PROJECT NO: 20876-05
 DESIGN BY: KGV
 REV. BY: TDM
 AGENCY: El Paso County
 REPORT TYPE: Final
 DATE: 10/7/2022



RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

EXISTING TIME OF CONCENTRATION STANDARD FORM SF-2

SUB-BASIN DATA				INITIAL/OVERLAND TIME (t _i)				TRAVEL TIME (t _t)					TIME OF CONC. t _c		FINAL t _c	
BASIN	DESIGN PT.	C ₅	C ₁₀₀	AREA	LENGTH	HT	SLOPE	t _i	LENGTH	HT	SLOPE	VEL.	t _t	COMP.	MINIMUM	
				Ac	Ft	FT	%	Min	Ft	FT	%	FPS	Min	t _c	t _c	Min
OS1	1	0.08	0.35	9.52	300		7.0	17.3	418		7.0	2.0	3.5	20.8	5	20.8
EX1	2	0.08	0.35	1.43	300		10.0	15.3	418		8.0	2.5	2.8	18.1	5	18.1
EX2	3	0.08	0.35	1.31	300		25.0	11.3	431		9.5	2.5	2.9	14.2	5	14.2
EX3		0.08	0.35	5.86	300		15.0	13.4	733		5.0	1.5	8.1	21.5	5	21.5
DP1+DP2+DP3+EX3	4	0.08	0.35	18.12					733		5.0	1.5	8.1	28.9	5	28.9

PROPOSED

OS1	1	0.08	0.35	9.52	100		7.0	10.0	618	45	7.3	2.0	5.2	15.1	5	15.1
A	2	0.45	0.59	1.51	70		7.0	5.3	427	25.5	6.0	8.5	0.8	6.2	5	6.2
B		0.45	0.59	0.69	70		10.0	4.7	488	32	6.6	9.0	0.9	5.6	5	5.6
DP1+DP2+B	3	0.15	0.40	11.72					67		0.5	2.0	0.6	15.7	5	15.7
C	4	0.20	0.43	1.26	40		30.0	3.4	201	29	14.4	5.0	0.7	4.1	5	5.0
D		0.45	0.59	1.57	60		15.0	3.8	399	26	6.5	9.0	0.7	4.6	5	5.0
E		0.45	0.59	1.00	80		2.4	8.1	583	23	3.9	5.0	1.9	10.1	5	10.1
D+E+DP3+DP4	5	0.20	0.43	15.55					583		3.9	7.2	1.3	17.0	5	17.0
F	6	0.35	0.52	1.96	70		9.1	5.6	655	36.5	5.6	7.0	1.6	7.2	5	7.2

PROJECT INFORMATION

PROJECT: Willow Springs Ranch Filing No. 2
PROJECT NO: 20876-05
DESIGN BY: KGV
REV. BY: TDM
AGENCY: El Paso County
REPORT TYPE: Final
DATE: 10/7/2022



RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

EXISTING		RUNOFF 5 YR STORM				P1= 1.50	
BASIN (S)	DESIGN POINT	AREA (AC)	DIRECT RUNOFF		C * A	I (IN/HR)	Q (CFS)
			RUNOFF COEFF	t _c (MIN)			
OS1	1	9.52	0.08	20.8	0.76	2.96	2.3
EX1	2	1.43	0.08	18.1	0.11	3.17	0.4
EX2	3	1.31	0.08	14.2	0.10	3.55	0.4
EX3		5.86	0.08	21.5	0.47	2.90	1.4
DP1+DP2+DP3+EX3	4	18.12	0.08	28.9	1.45	2.47	3.6

PROPOSED		RUNOFF 5 YR STORM				P1= 1.50	
BASIN (S)	DESIGN POINT	AREA (AC)	DIRECT RUNOFF		C * A	I (IN/HR)	Q (CFS)
			RUNOFF COEFF	t _c (MIN)			
OS1	1	9.52	0.08	15.1	0.76	3.45	2.6
A	2	1.51	0.45	6.2	0.68	4.83	3.3
B		0.69	0.45	5.6	0.31	4.95	1.5
DP1+DP2+B	3	11.72	0.15	15.7	1.75	3.39	5.9
C	4	1.26	0.20	5.0	0.26	5.10	1.3
D		1.57	0.45	5.0	0.71	5.10	3.6
E		1.00	0.45	10.1	0.45	4.09	1.8
D+E+DP3+DP4	5	15.55	0.20	17.0	3.16	3.26	10.3
F	6	1.96	0.35	7.2	0.68	4.60	3.1

PROJECT INFORMATION

PROJECT: Willow Springs Ranch Filing No. 2
 PROJECT NO: 20876-05
 DESIGN BY: KGV
 REV. BY: TDM
 AGENCY: El Paso County
 REPORT TYPE: Final
 DATE: 10/7/2022



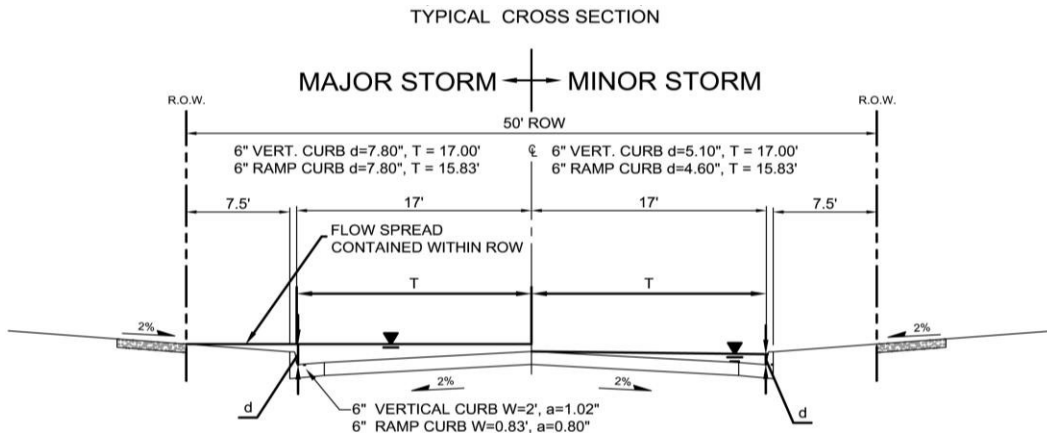
Drexel, Barrell & Co.

RATIONAL METHOD CALCULATIONS FOR STORM WATER RUNOFF

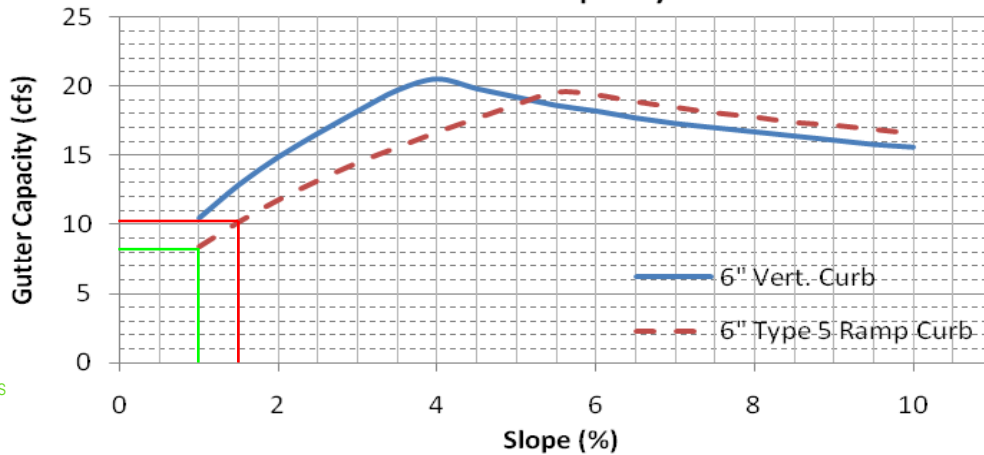
EXISTING		RUNOFF 100 YR STORM				P1= 2.52	
BASIN (S)	DESIGN POINT	AREA (AC)	DIRECT RUNOFF		C * A	I (IN/HR)	Q (CFS)
			RUNOFF COEFF	t _c (MIN)			
OS1	1	9.52	0.35	20.8	3.33	4.97	16.6
EX1	2	1.43	0.35	18.1	0.50	5.32	2.7
EX2	3	1.31	0.35	14.2	0.46	5.97	2.7
EX3		5.86	0.35	21.5	2.05	4.87	10.0
DP1+DP2+DP3+EX3	4	18.12	0.35	28.9	6.34	4.16	26.4

PROPOSED		RUNOFF 100 YR STORM				P1= 2.52	
BASIN (S)	DESIGN POINT	AREA (AC)	DIRECT RUNOFF		C * A	I (IN/HR)	Q (CFS)
			RUNOFF COEFF	t _c (MIN)			
OS1	1	9.52	0.35	15.1	3.33	5.80	19.3
A	2	1.51	0.59	6.2	0.89	8.11	7.2
B		0.69	0.59	5.6	0.41	8.31	3.4
DP1+DP2+B	3	11.72	0.40	15.7	4.63	5.70	26.4
C	4	1.26	0.43	5.0	0.54	8.58	4.6
D		1.57	0.59	5.0	0.93	8.58	7.9
E		1.00	0.59	10.1	0.59	6.87	4.1
D+E+DP3+DP4	5	15.55	0.43	17.0	6.69	5.48	36.7
F	6	1.96	0.52	7.2	1.03	7.73	7.9

Figure 7-7. Street Capacity Charts Residential (Detached Sidewalk)



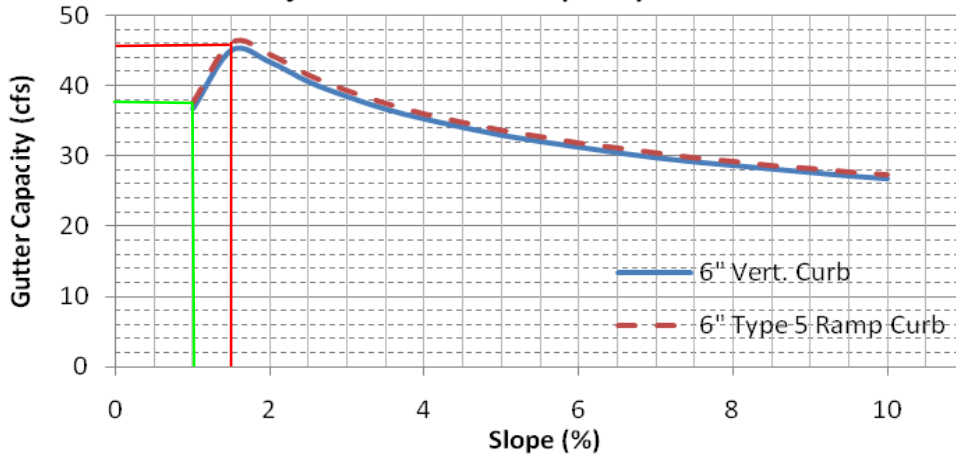
Minor Storm Street Capacity Chart



CATTAIL DRIVE
 5-YR MIN STREET CAPACITY @ 1.5% = 8 CFS
 5-YR DP2 = 3.3CFS - OK
 100-YR MIN STREET CAPACITY @ 1.5% = 38 CFS
 100 YR DP2 = 7.2CFS - OK

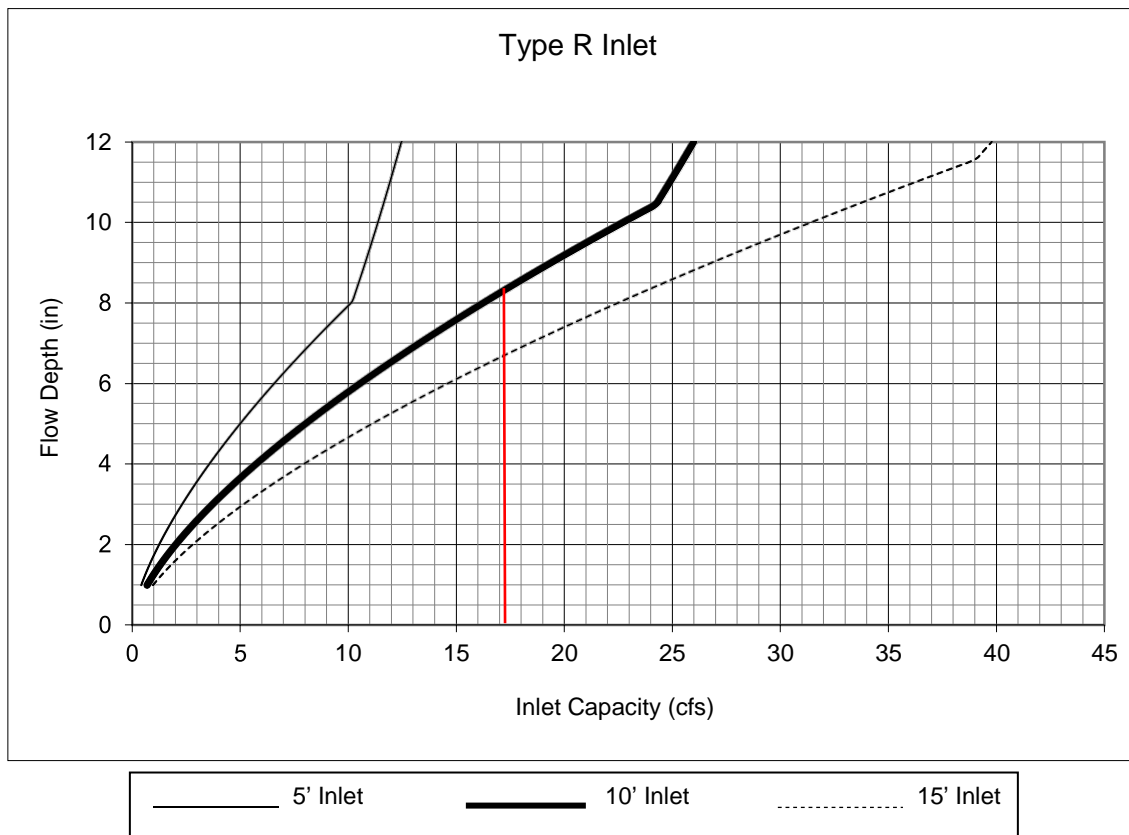
SHORT PRAIRIE COURT
 5-YR MIN STREET CAPACITY @ 1.75% = 10 CFS
 5-YR DP5 (SURFACE) = 7.7 CFS - OK
 100-YR MIN STREET CAPACITY @ 1.75% = 56 CFS
 100-YR DP5 (SURFACE) = 17.4CFS - OK

Major Storm Street Capacity Chart



These charts shall only be used for the standard street sections as shown. The capacity shown is based on 1/2 the street section as calculated by the UD-Inlet spreadsheets. Minor storm capacities are based on no crown overtopping, curb height or maximum allowable spread widths. Major storm capacities are based on flow being contained within the public right-of-way, including conveyance capacity behind the curb. The UDFCD Safety Reduction Factor was applied. An 'n_{STREET}' of 0.016 and 'n_{BACK}' of 0.020 was used. Calculations were done using UD-Inlet 3.00.xls, March, 2011.

Figure 8-11. Inlet Capacity Chart Sump Conditions , Curb Opening (Type R) Inlet



Notes:

1. The standard inlet parameters must apply to use this chart.

2	6835.58	10.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	6841.49	2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	6853.15	2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6857.48	2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	6854.92	2.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

Element Name	Local Contribution					Total Design Flow				Comment
	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	1.71	6.02	2.10	10.30	
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.30	
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	10.30	
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.60	

Sewer Input Summary:

Element Name	Sewer Length (ft)	Elevation			Loss Coefficients			Given Dimensions		
		Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
1	264.62	6799.92	4.0	6810.50	0.015	0.10	0.00	CIRCULAR	30.00 in	30.00 in
2	349.46	6810.63	5.4	6829.50	0.015	0.05	0.00	CIRCULAR	30.00 in	30.00 in
3	145.68	6830.00	4.0	6835.83	0.015	2.91	0.00	CIRCULAR	24.00 in	24.00 in
4	162.69	6836.02	7.8	6848.71	0.015	1.47	0.00	CIRCULAR	24.00 in	24.00 in
5	220.76	6848.82	1.0	6851.03	0.015	0.05	0.00	CIRCULAR	24.00 in	24.00 in
6	14.85	6850.93	1.0	6851.08	0.015	0.05	0.00	CIRCULAR	24.00 in	24.00 in

Sewer Flow Summary:

Element Name	Full Flow Capacity		Critical Flow		Normal Flow				Flow (cfs)	Surcharged Length (ft)	Comment
	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition			
1	71.29	14.52	12.87	5.12	7.70	10.33	2.70	Supercritical	10.30	0.00	
2	82.83	16.87	12.87	5.12	7.14	11.50	3.12	Supercritical	10.30	0.00	
3	39.32	12.52	6.74	3.60	4.18	7.09	2.54	Supercritical	2.60	0.00	
4	54.90	17.48	6.74	3.60	3.55	8.96	3.49	Supercritical	2.60	0.00	
5	19.66	6.26	6.74	3.60	5.89	4.34	1.30	Supercritical	2.60	0.00	

6	19.66	6.26	6.74	3.60	5.89	4.34	1.30	Supercritical	2.60	0.00
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- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

Element Name	Peak Flow (cfs)	Cross Section	Existing		Calculated		Used			Comment
			Rise	Span	Rise	Span	Rise	Span	Area (ft ²)	
1	10.30	CIRCULAR	30.00 in	30.00 in	18.00 in	18.00 in	30.00 in	30.00 in	4.91	
2	10.30	CIRCULAR	30.00 in	30.00 in	18.00 in	18.00 in	30.00 in	30.00 in	4.91	
3	2.60	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
4	2.60	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
5	2.60	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	
6	2.60	CIRCULAR	24.00 in	24.00 in	18.00 in	18.00 in	24.00 in	24.00 in	3.14	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics were calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 6799.86

Element Name	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
1	6799.92	6810.50	0.00	0.00	6800.56	6811.57	6802.22	9.76	6811.98
2	6810.63	6829.50	0.00	0.00	6811.58	6830.57	6813.28	17.70	6830.98
3	6830.00	6835.83	0.03	0.00	6830.60	6836.39	6831.13	5.46	6836.59
4	6836.02	6848.71	0.02	0.00	6836.41	6849.27	6837.56	11.91	6849.47
5	6848.82	6851.03	0.00	0.00	6849.31	6851.59	6849.61	2.19	6851.79
6	6850.93	6851.08	0.00	0.00	6851.71	6851.71	6851.79	0.06	6851.86

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_{fi}² / (2 * g)
- Lateral loss = V_{fo}² / (2 * g) - Junction Loss K * V_{fi}² / (2 * g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

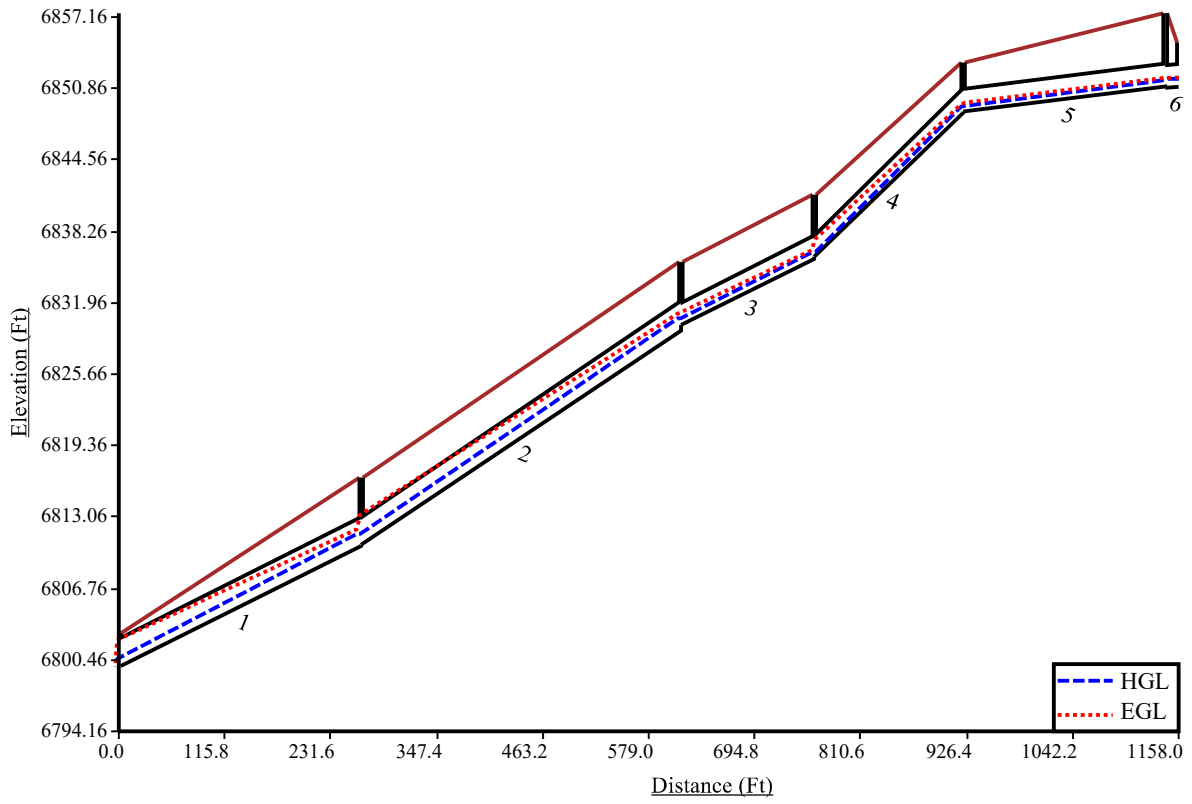
The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Downstream			Upstream			Volume (cu. yd)	Comment
					Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)		
1	264.62	3.50	6.00	6.08	0.00	3.69	0.10	10.60	6.84	3.26	335.77	Sewer Too Shallow
2	349.46	3.50	6.00	6.08	10.34	6.71	3.13	10.66	6.87	3.29	598.01	
3	145.68	3.00	4.00	5.50	10.15	6.16	3.33	10.32	6.24	3.41	214.33	
4	162.69	3.00	4.00	5.50	9.94	6.05	3.22	7.88	5.02	2.19	202.65	
5	220.76	3.00	4.00	5.50	7.66	4.91	2.08	11.90	7.03	4.20	315.17	
6	14.85	3.00	4.00	5.50	12.10	7.13	4.30	6.68	4.42	1.59	20.57	Sewer Too Shallow

Total earth volume for sewer trenches = 1687 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: $(\text{equivalent diameter in inches}/12)+1$ inches
- The sewer bedding thickness is equal to:
 - Four inches for pipes less than 33 inches.
 - Six inches for pipes less than 60 inches.
 - Eight inches for all larger sizes.

5-yr



2	6835.58	36.70	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	6841.49	19.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	6853.15	19.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	6857.48	19.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	6854.92	19.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Manhole Output Summary:

Element Name	Local Contribution					Total Design Flow				Comment
	Overland Time (min)	Gutter Time (min)	Basin Tc (min)	Intensity (in/hr)	Local Contrib (cfs)	Coeff. Area	Intensity (in/hr)	Manhole Tc (min)	Peak Flow (cfs)	
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	3.27	11.24	0.59	36.70	
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.70	
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.70	
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.30	

Sewer Input Summary:

Element Name	Sewer Length (ft)	Elevation			Loss Coefficients			Given Dimensions		
		Downstream Invert (ft)	Slope (%)	Upstream Invert (ft)	Mannings n	Bend Loss	Lateral Loss	Cross Section	Rise (ft or in)	Span (ft or in)
1	264.62	6799.92	4.0	6810.50	0.015	0.10	0.00	CIRCULAR	30.00 in	30.00 in
2	349.46	6810.63	5.4	6829.50	0.015	0.05	0.00	CIRCULAR	30.00 in	30.00 in
3	145.68	6830.00	4.0	6835.83	0.015	0.05	0.00	CIRCULAR	30.00 in	30.00 in
4	162.69	6836.02	7.8	6848.71	0.015	1.47	0.00	CIRCULAR	30.00 in	30.00 in
5	220.76	6848.82	1.0	6851.03	0.015	0.05	0.00	CIRCULAR	24.00 in	24.00 in
6	14.85	6850.93	1.0	6851.08	0.015	0.05	0.00	CIRCULAR	24.00 in	24.00 in

Sewer Flow Summary:

Element Name	Full Flow Capacity		Critical Flow		Normal Flow				Flow (cfs)	Surcharged Length (ft)	Comment
	Flow (cfs)	Velocity (fps)	Depth (in)	Velocity (fps)	Depth (in)	Velocity (fps)	Froude Number	Flow Condition			
1	71.29	14.52	24.63	8.51	15.26	14.63	2.57	Supercritical	36.70	0.00	
2	82.83	16.87	24.63	8.51	13.98	16.36	3.04	Supercritical	36.70	0.00	
3	71.29	14.52	17.88	6.33	10.66	12.34	2.69	Supercritical	19.30	0.00	
4	99.55	20.28	17.88	6.33	8.95	15.70	3.77	Supercritical	19.30	0.00	
5	19.66	6.26	18.96	7.25	19.29	7.13	0.96	Subcritical	19.30	0.00	

6	19.66	6.26	18.96	7.25	19.29	7.13	0.96	Subcritical	19.30	0.00	
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- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

Element Name	Peak Flow (cfs)	Cross Section	Existing		Calculated		Used			Comment
			Rise	Span	Rise	Span	Rise	Span	Area (ft ²)	
1	36.70	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	
2	36.70	CIRCULAR	30.00 in	30.00 in	24.00 in	24.00 in	30.00 in	30.00 in	4.91	
3	19.30	CIRCULAR	30.00 in	30.00 in	21.00 in	21.00 in	30.00 in	30.00 in	4.91	
4	19.30	CIRCULAR	30.00 in	30.00 in	18.00 in	18.00 in	30.00 in	30.00 in	4.91	
5	19.30	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	
6	19.30	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics were calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 6799.86

Element Name	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
	Downstream (ft)	Upstream (ft)	Bend Loss (ft)	Lateral Loss (ft)	Downstream (ft)	Upstream (ft)	Downstream (ft)	Friction Loss (ft)	Upstream (ft)
1	6799.92	6810.50	0.00	0.00	6801.19	6812.55	6804.51	9.17	6813.68
2	6810.63	6829.50	0.04	0.00	6812.60	6831.55	6815.95	16.72	6832.68
3	6830.00	6835.83	0.01	0.00	6831.56	6837.32	6833.26	4.68	6837.94
4	6836.02	6848.71	0.35	0.00	6837.67	6850.20	6840.59	10.23	6850.82
5	6848.82	6851.03	0.03	0.00	6850.40	6852.66	6851.22	2.21	6853.43
6	6850.93	6851.08	0.03	0.00	6852.86	6852.97	6853.46	0.12	6853.58

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_{fi}² / (2*g)
- Lateral loss = V_{fo}² / (2*g) - Junction Loss K * V_{fi}² / (2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

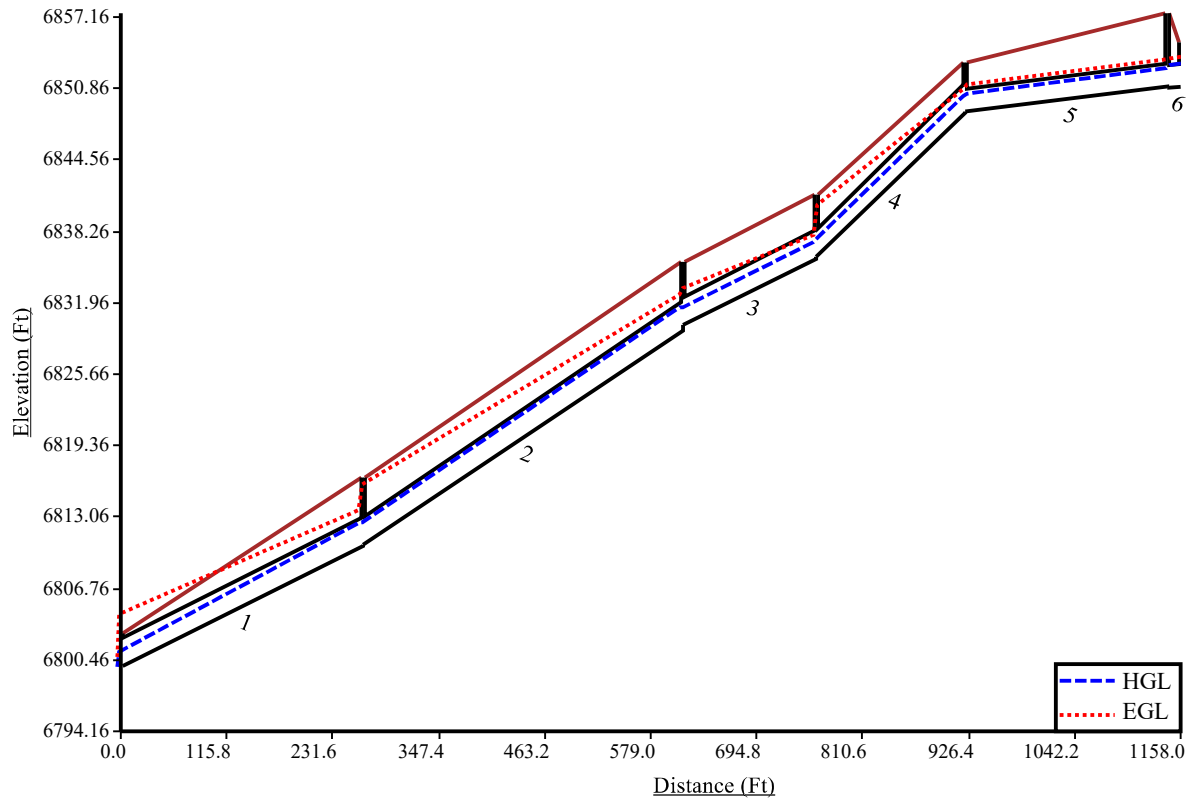
The trench side slope is 1.0 ft/ft
 The minimum trench width is 2.00 ft

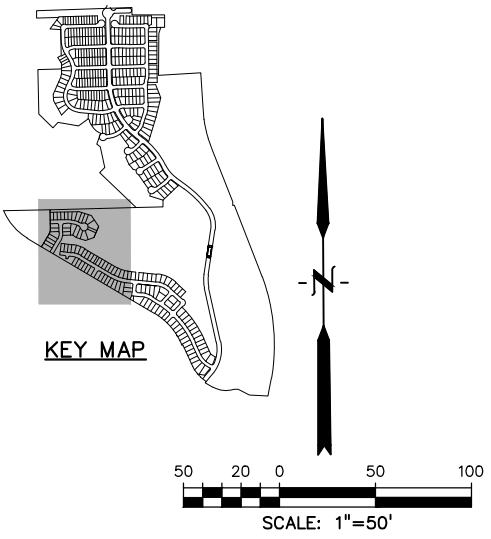
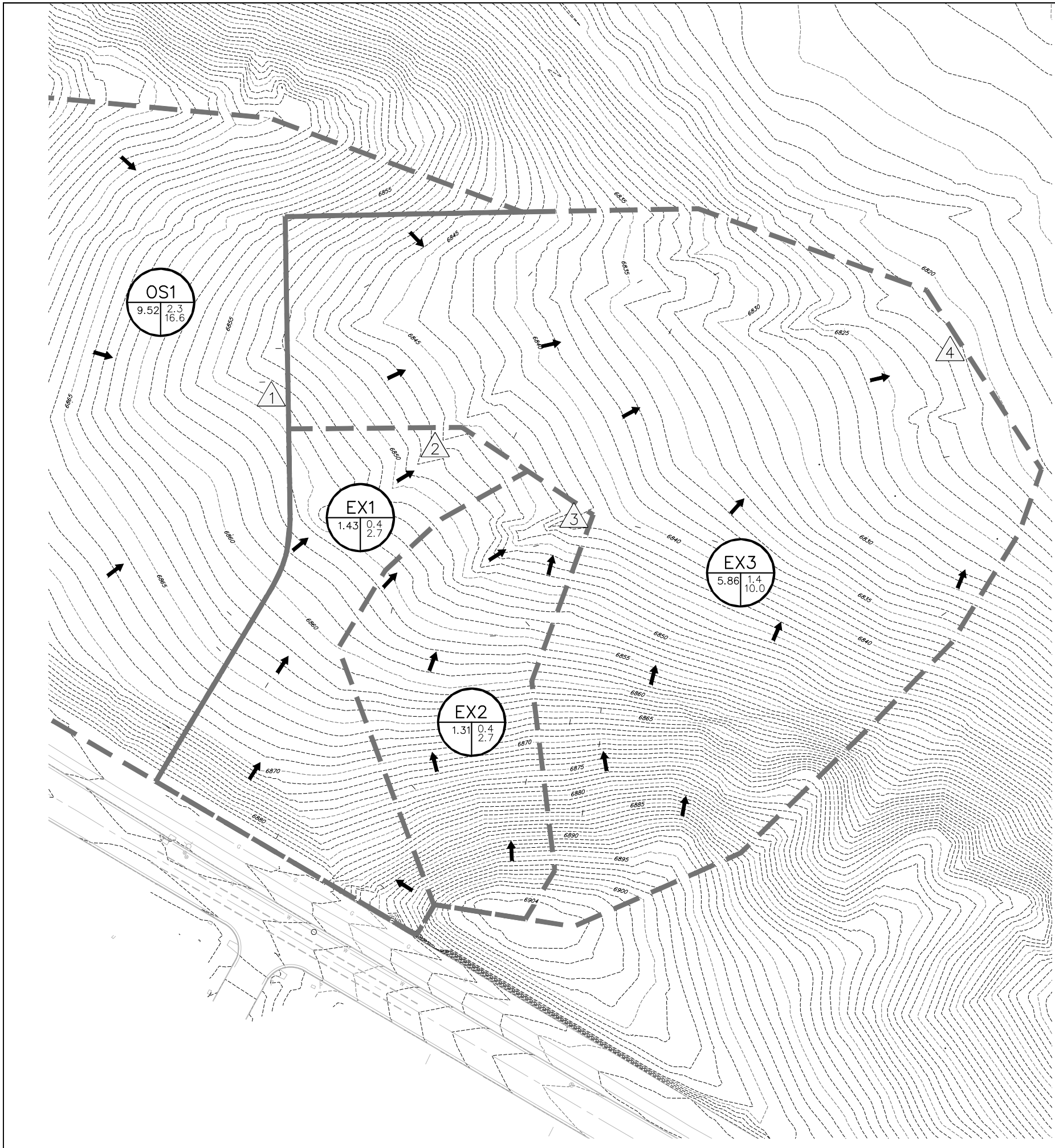
Element Name	Length (ft)	Wall (in)	Bedding (in)	Bottom Width (ft)	Downstream			Upstream			Volume (cu. yd)	Comment
					Top Width (ft)	Trench Depth (ft)	Cover (ft)	Top Width (ft)	Trench Depth (ft)	Cover (ft)		
1	264.62	3.50	6.00	6.08	0.00	3.69	0.10	10.60	6.84	3.26	335.77	Sewer Too Shallow
2	349.46	3.50	6.00	6.08	10.34	6.71	3.13	10.66	6.87	3.29	598.01	
3	145.68	3.50	6.00	6.08	9.65	6.37	2.79	9.82	6.45	2.87	228.42	
4	162.69	3.50	6.00	6.08	9.44	6.26	2.68	7.38	5.23	1.65	220.39	Sewer Too Shallow
5	220.76	3.00	4.00	5.50	7.66	4.91	2.08	11.90	7.03	4.20	315.17	
6	14.85	3.00	4.00	5.50	12.10	7.13	4.30	6.68	4.42	1.59	20.57	Sewer Too Shallow

Total earth volume for sewer trenches = 1718 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: $(\text{equivalent diameter in inches}/12)+1$ inches
- The sewer bedding thickness is equal to:
 - Four inches for pipes less than 33 inches.
 - Six inches for pipes less than 60 inches.
 - Eight inches for all larger sizes.

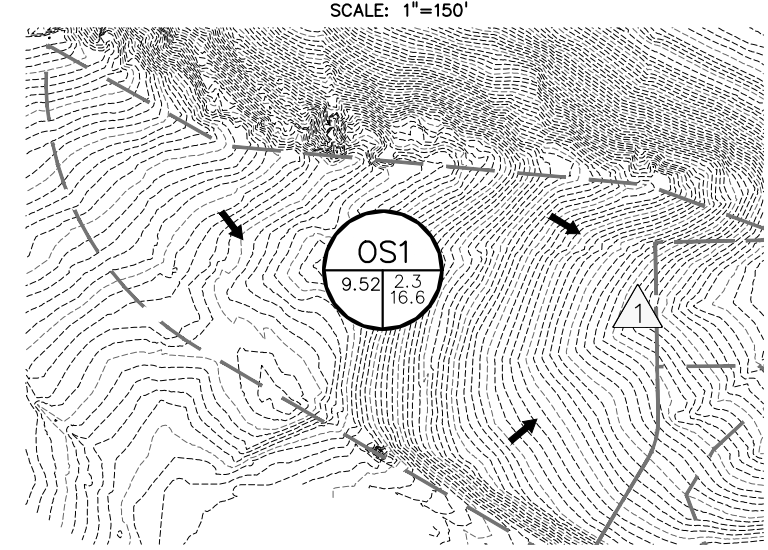
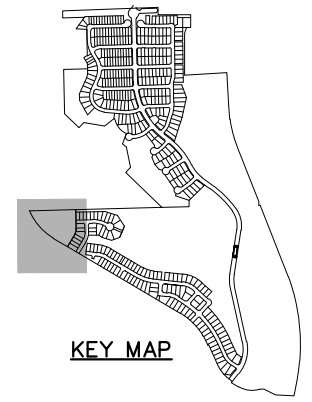
100-yr





LEGEND

PROPERTY LINE	—
BASIN JURISDICTION BOUNDARY	— — — — —
EXISTING DRAINAGE BASIN BOUNDARY	- - - - -
PROPOSED DRAINAGE BASIN BOUNDARY	- - - - -
DRAINAGE BASIN DESIGN POINT	△
BASIN I.D.	○
BASIN AREA (Acres)	○
5 YEAR DEVELOPED FLOW (CFS)	○
100 YEAR DEVELOPED FLOW (CFS)	○
PROPOSED INTERMEDIATE CONTOUR	— 6203 —
PROPOSED INDEX CONTOUR	— 6205 —
EX. INTERMEDIATE CONTOUR	- - 6203 - -
EX. INDEX CONTOUR	- - 6205 - -
DIRECTION OF FLOW	←



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DRAINAGE DOCUMENTS FOR:
WILLOW SPRINGS RANCH
FILING NO. 2
 BAPTIST ROAD & FOREST LAKES DRIVE
 MONUMENT, COLORADO

ISSUE	DATE
INITIAL ISSUE	10-7-22

DESIGNED BY: KGV
 DRAWN BY: KGV
 CHECKED BY: TDM
 FILE NAME: 20876-05 F2 DR

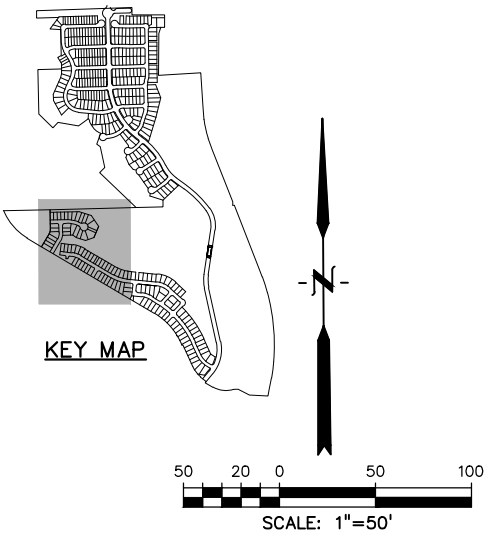
DRAWING SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: N/A

EXISTING
 DRAINAGE
 MAP

PROJECT NO. 20876-05CSCV
 DRAWING NO.

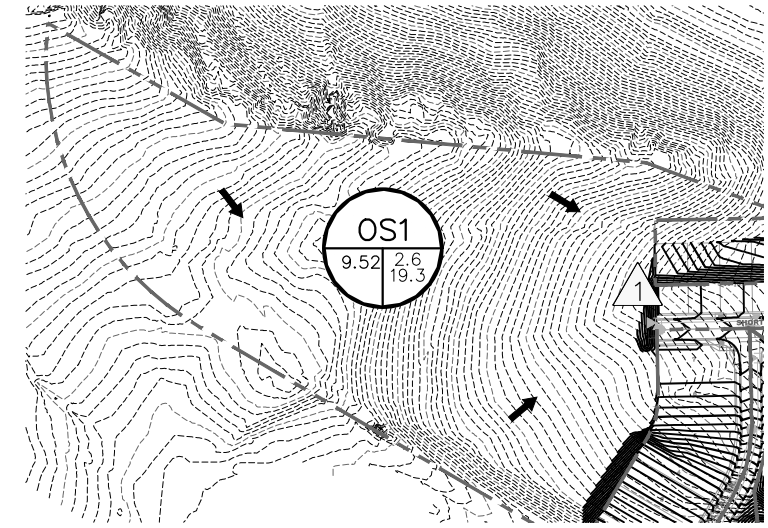
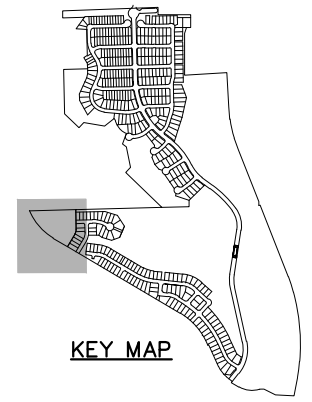
EX-DR

SHEET: 1 OF 2



LEGEND

PROPERTY LINE	---
BASIN JURISDICTION BOUNDARY	====
EXISTING DRAINAGE BASIN BOUNDARY	-----
PROPOSED DRAINAGE BASIN BOUNDARY	-----
DRAINAGE BASIN DESIGN POINT	▲
BASIN I.D.	○
BASIN AREA (Acres)	○
5 YEAR DEVELOPED FLOW (CFS)	○
100 YEAR DEVELOPED FLOW (CFS)	○
PROPOSED INTERMEDIATE CONTOUR	— 6203 —
PROPOSED INDEX CONTOUR	— 6205 —
EX. INTERMEDIATE CONTOUR	- - - 6203 - - -
EX. INDEX CONTOUR	- - - 6205 - - -
DIRECTION OF FLOW	←



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ISSUE	DATE
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DESIGNED BY: KGV
 DRAWN BY: KGV
 CHECKED BY: TDM
 FILE NAME: 20876-05 F2 DR

DRAWING SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: N/A

PROPOSED DRAINAGE MAP

PROJECT NO. 20876-05CSCV
 DRAWING NO.

P-DRN

SHEET: 2 OF 2