

# FINAL DRAINAGE REPORT

FOR

## MEADOWBROOK TOWNHOMES DIRT BORROW SITE EL PASO COUNTY, COLORADO

This is not an approved town home development site. Town homes are not an allowed use in the CR zone district.

Townhomes  
removed from title

OCTOBER 2018

Prepared for:

**The Landuis Company**  
Mr. Jeff Mark  
212 N. Wahsatch Ave, Suite 301  
Colorado Springs, Colorado Springs 80903

Prepared by:



20 Boulder Crescent, Suite 110  
Colorado Springs, CO 80903  
(719) 955-5485

Project #43-089  
PCD Project No.CDR-18-009

**FINAL DRAINAGE REPORT  
FOR  
Meadowbrook Townhomes Dirt Borrow Site**

Townhomes  
removed from title

**DRAINAGE PLAN STATEMENTS**

ENGINEERS STATEMENT

The attached drainage plan and report was 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 acceptable to the City of Colorado Springs. I accept responsibility for any liability caused by any negligent acts, errors of omission on my part in preparing this report.

\_\_\_\_\_  
Virgil A. Sanchez, P.E. #37160  
For and on Behalf of M&S Civil Consultants, Inc

DEVELOPER'S STATEMENT

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

BY: \_\_\_\_\_  
Jeff Mark – President

DATE: \_\_\_\_\_

ADDRESS: The Landuis Company  
212 N. Wahsatch Ave. Suite 301  
Colorado Springs, CO 80903

EL PASO COUNTY'S STATEMENT

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

BY: \_\_\_\_\_ DATE: \_\_\_\_\_  
Jennifer Irvine, P.E.  
County Engineer / ECM Administrator

CONDITIONS:

**FINAL DRAINAGE REPORT  
FOR  
Meadowbrook Townhomes Dirt Borrow Site**

Townhomes  
removed from title

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Hydraulic Calculations / Sediment Basin Calculations  
Existing & Proposed Drainage Map  
Draft Grading Erosion Control Plan and Construction Details

**FINAL DRAINAGE REPORT**  
**FOR**  
**Meadowbrook Townhomes Dirt Borrow Site**

**Townhomes  
removed from title**

**Purpose**

The purpose of this drainage letter is to identify and analyze the onsite drainage patterns and to ensure that post development runoff is routed through the site safely and in a manner that satisfies the requirements set forth by the El Paso County and City of Colorado Springs Drainage Criteria Manual. The proposed site will be used as a borrow site for the purpose of exporting soil to another construction project.

It should be noted that subsequent drainage reports and analysis will be provided in accordance with El Paso County Drainage Criteria if and when the site is developed and impervious surfaces are added.

**Property Description**

Meadowbrook Townhomes Dirt Borrow Site is located at 0 Meadowbrook Parkway in Section 8, Township 14 South, Range 65 West of the 6<sup>th</sup> P.M. in El Paso County, Colorado. The site is currently undeveloped. The site is bound to the west by undeveloped Softball West Subdivision Filing No.2, to the north by Meadowbrook Crossing Subdivision, and to the south by Hwy 24 (West Bound) and to the east by Meadowbrook parkway. The site is currently undeveloped and is covered with native grasses with slopes ranging from 1-20%. The legal description for the parcel is TR. B 24/94 Business Park Filing No.1.

**Soils**

Soils for this project are delineated by the map in the appendix as Blakeland loamy sand (8) and Blendon Sandy Loam (10) which are characterized to be part of Hydrologic Soil Types "A" & "B". Soils in the study area are shown as mapped by S.C.S. in the "Soils Survey of El Paso County Area". Vegetation is sparse, consisting of native grasses and weeds.

**Floodplain Statement**

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) No. 08041C0754 F & 08041C0752 F, dated March 17, 1997, Revised to Reflect LOMR Case No 05-08-0368P effective date Aug. 6, 2018 none of the site lies within a designated flood plain. The Sand Creek East Fork Channel is located to the north and west of the site, to the northwest of the adjacent subdivisions.

**Hydrologic Calculations**

Hydrologic calculations were performed using the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual and where applicable the Urban Storm Drainage Criteria Manual. The

Rational Method was used to estimate stormwater runoff anticipated from design storms with 5-year and 100-year recurrence intervals.

### **Hydraulic Calculations**

Hydraulic calculations were estimated using the Manning's Formula and the methods described in the El Paso County and City of Colorado Springs Storm Drainage Design Criteria manual. The relevant data sheets are included in the appendix of this report.

### **Existing Drainage Characteristics**

The site is located in the East Fork of Sand Creek basin. In the existing condition, site vegetation is sparse, consisting primarily of native grasses and weeds. The parcel possess a ridgeline that bisects the parcel, directing runoff to the south and west boundaries, with slopes varying from 1% to 20%. A few small depressions are located on site, near the west boundary. For the purposed of hydrologic analysis, the small depressions are not considered to detain runoff. Ultimately all runoff from the parcel is conveyed to the west toward existing drainage facilities located adjacent to Peterson Road.

### **Detailed Drainage Discussion**

Basin A, 5.9 acres drains from east to west eventually discharging into the US HWY 24 rights of way at the southern boundary of the site. Peak runoff is estimated at 1.3 cfs and 9.2 cfs at Design Point 1 in the 5 year and 100 year events respectively.

Basin B, 11.0 acres drains from east to west eventually discharging along the western boundary of the site, approximately 250' south of the northern property line. Peak runoff is estimated at 2.2 cfs and 16.5 cfs at Design Point 2 in the 5 year and 100 year events respectively.

Basin C, 13.5 acres drains from northeast to southwest eventually discharging along the western boundary of the site, approximately 200' north of the southern property line. Peak runoff is estimated at 2.9 cfs and 21.5 cfs at Design Point 3 in the 5 year and 100 year events respectively.

### **Proposed Site Drainage Analysis**

The existing parcel will be utilized as a borrow site. This will be accomplished by leveling the site from northeast to southwest with proposed slopes ranging from 0.6 to 1.2%. Earthen berms, ditch/dikes, silt fence and two (2) temporary sediment basins will be constructed to ensure that sediment is retained onsite and ensure that developed runoff will be directed downstream at or below the historical discharge rates (as analyzed within the existing conditions analysis). Two small riprap pads will be required to be constructed to spread out discharge and reduce the velocities of runoff being discharged from the two sediment pond and ultimately before entering the adjacent property. As the discharge is limited the riprap can consist of  $D_{50}=6''$

### **Detailed Drainage Discussion**

**Basin A**, 13.2 acres, will be graded and stabilized by seeding and mulching. Four ditch/dikes spaced across the parcel will function to lengthen the overland flow of the the runoff produced within the basin. Runoff produced by the basin is estimated at 2.4 cfs and 17.3 cfs in the 5 year and 100 year storm events respectively. Runoff shall be collected by a proposed temporary sediment basin at **Design Point 1** Temporary Sediment Pond (SB1) has a modeled discharge of  $Q_5=0.0$  cfs and  $Q_{100}=0.08$  cfs with a peak maximum 100-year elevation of 6298.66, based upon the installation of a 6" PVC standpipe

with the top of the standpipe at 6299.00 and one row of (5) 1.06” dia drill holes at elevations of 6297.58, 6297.92, 6298.25, 6298.58, and 6298.91 as shown on Aug 2013, UDFCD SB detail SC-7 (page SB-5) and provided in the appendix. A 23 ft emergency overflow weir should be provided with a crest set at elev. 6299.00’. The 5 year and 100 year pondpack model input and output data is provided in the appendix of this report.

SB1 calculations and table on GEC indicates 22 ft. Revise.

**Basin B**, 16.1 acres, will be graded and stabilized by seeding and mulching. Four ditch/dikes spaced across the parcel will function to lengthen the overland flow of the runoff produced within the basin. Runoff produced by the basin is estimated at 3.0 cfs and 21.9 cfs in the 5 year and 100 year storm events respectively. Runoff shall be collected by a proposed temporary sediment basin at **Design Point 2**. Temporary Sediment Pond (SB2) has a modeled discharge of Q5=0.0 cfs and Q100=0.14 cfs with a peak maximum 100-year elevation of 6298.88, based upon the installation of a 6” PVC standpipe with the top of the standpipe at 6299.00 and one row of (5) 1.25” dia drill holes at elevations of 6297.58, 6297.92, 6298.25, 6298.58, and 6298.91 as shown on Aug 2013, UDFCD SB detail SC-7 (page SB-5). In accordance with the detail the pond will require a 22 ft emergency overflow weir with the crest set at elev. 6299.00’. The 5 year and 100 year pondpack model input and output data is provided in the appendix of this report.

SB2 calculations and table on GEC indicates 23 ft. Revise.

**Basin C**, 2.5 acres, will be graded and stabilized by seeding and mulching. Runoff produced by the basin is estimated at 0.6 cfs and 4.3 cfs in the 5 and 100 year events respectively. Flows are directed to design point 3.

In the post construction condition, runoff reaching **Design Point 3 (DP3)** at the southeast corner of the site consists of discharge from Temporary Sediment Basins SB1 and SB2 and from Basin C. The total runoff is anticipate to reach peak flow rates of Q5=0.6 cfs, Q100=4.5cfs. The proposed discharge rate is less than the historical runoff rate found to reach DP3 (see existing condition map and discussion) of 2.1 and 21.5 cfs in the 5 year and 100 year events. Two small riprap pads will be required to be constructed to spread out discharge and reduce the velocities of runoff being discharged from the two sediment pond and ultimately before entering the adjacent property. As the discharge is limited the riprap can consist of D<sub>50</sub>=6” General sizing for the pads is 2’-5’Wx4’Lx1’T for the pad at pond TSB2 and 3’-7’Wx5’Lx1.5’T at DP3

The construction of Meadowbrook Townhomes Dirt Borrow Site shall not adversely affect adjacent or downstream property.

### Erosion Control

It is the policy of the El Paso County that we submit a grading and erosion control plan with the drainage report. A copy of the ‘draft’ proposed GEC plan is provided in the appendix of this report. The plan includes proposed silt fence, vehicle traffic control and temporary sediment basins as proposed as erosion control measures. The plan also includes provisions for stockpiling and staging.

### Four Step Process

**Step 1 Employ Runoff Reduction Practices** – Runoff will be reduced through the use of temporary sediments ponds and ditch/dikes in the interim condition until the ground has been stabilized with vegetation.

**Step 2 Stabilize Drainageways** – The property site proposes two temporary sedimentation ponds, before discharging at the southwest property corner of the site and onto an adjacent undeveloped property via riprap-lined spillways. Thus the development of this project does not anticipate having negative effects on the downstream drainageways.

**Step 3 Provide Water Quality Capture Volume** – Two (2) temporary Sedimentation Ponds are provided to collect sediment for the disturbed area this will function to maintain existing water quality levels

**Step 4 Consider Need for Industrial and Commercial BMP's** – This site is to be utilized as a borrow site, temporary BMP will be provided. This includes silt fence, straw bales, a vehicle tracking control pad, and mulching and reseeding to mitigate the potential for erosion across the site.

**Private Water Quality Facility – Construction Cost Opinion:**

(2) Temporary Water Quality Sedimentation Facility:       **\$10,000.00**

**Drainage & Bridge Fees:**

No drainage fees are due as the site as it's not intended to plat the property as this time and fees shall be paid at the time of platting in the future.

**Conclusion:**

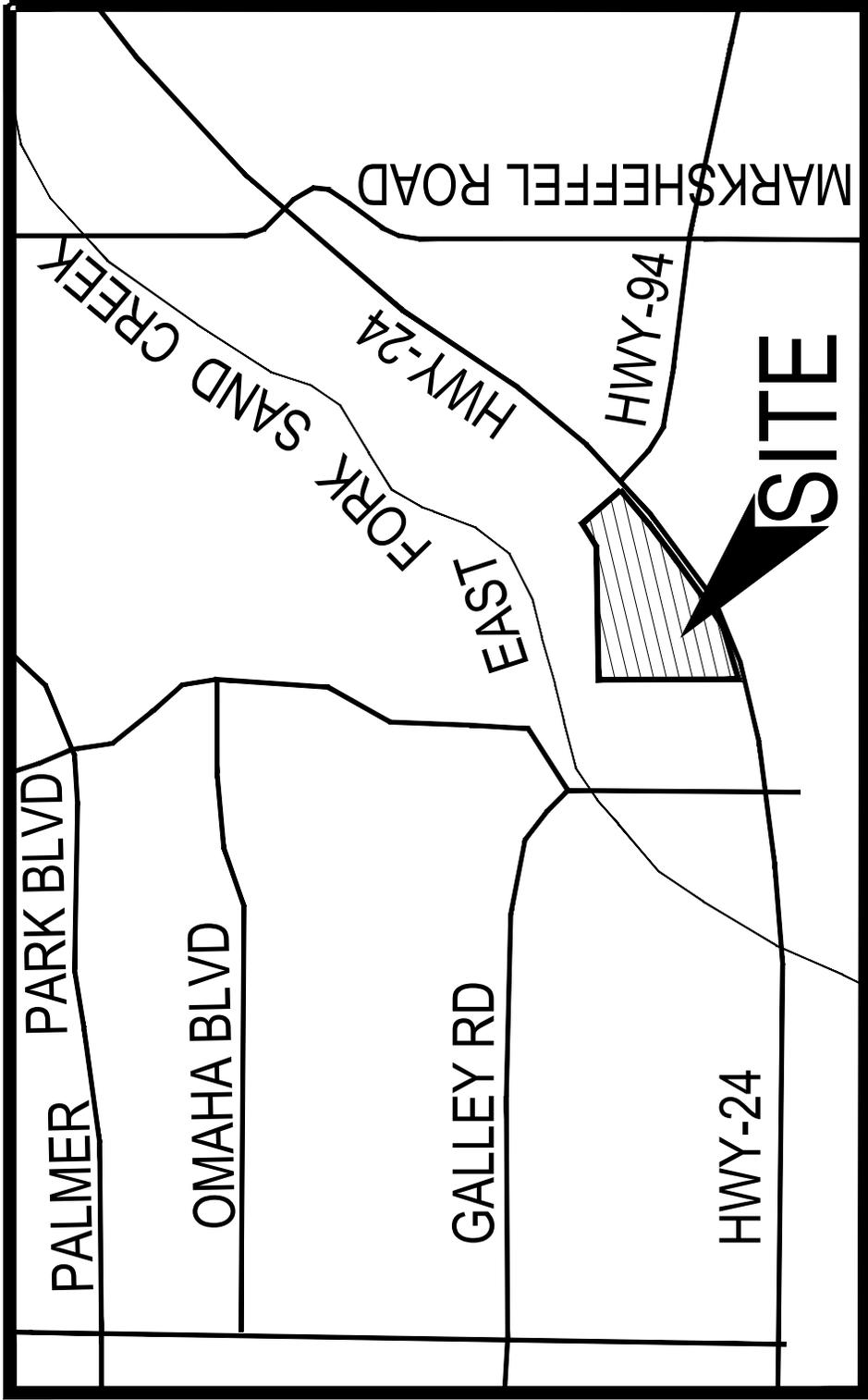
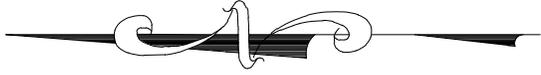
The construction of this site is for the purposes of grading with the intent to export earthen material As such no impervious surfaces are being constructed and all disturbed property will be seeded and mulched. Post Construction runoff will be discharged to downstream property at rates that are below historic discharge rates. Erosion control measures will be implemented to prevent sediment migration. The construction of Meadowbrook Townhomes Dirt Borrow Site shall not adversely affect adjacent or downstream property. Subsequent drainage reports will be required if the site is developed behind the uses defined within this report.

**References:**

- 1.) "El Paso County and City of Colorado Springs Drainage Criteria Manual".
- 2.) "Urban Storm Drainage Criteria Manual"
- 3.) SCS Soils Map for El Paso County.
- 4.) Flood Insurance Rate Map (FIRM), Federal Emergency Management Agency, Effective date March 17, 1997.
- 5.) "Final Drainage Report for Claremont Business Park Filing No. 2", dated November 2006, by Matrix Design Group, Inc.

## **APPENDIX**

**VICINITY MAP**

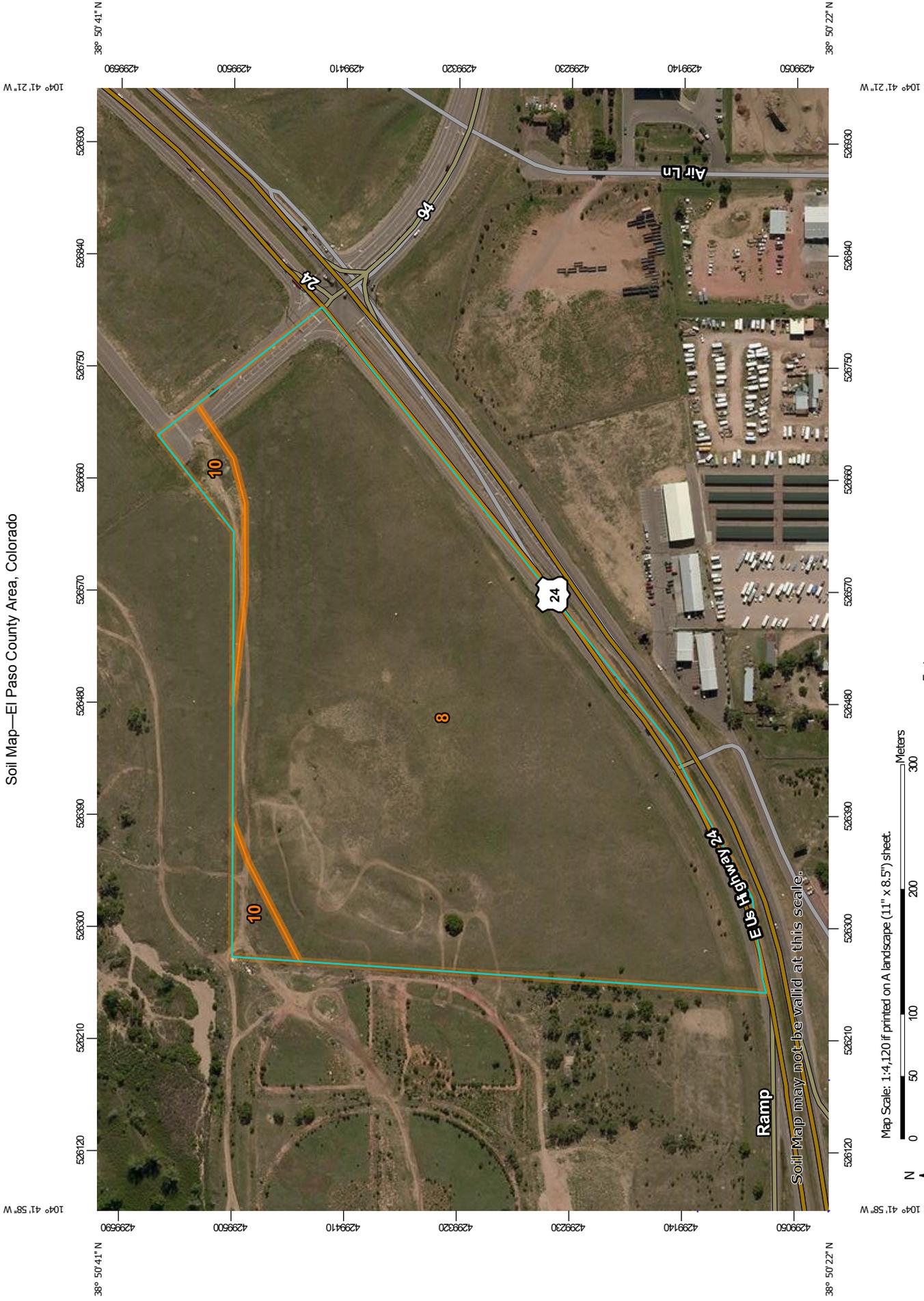


# VICINITY MAP

N.T.S.

## **SOILS MAP**

Soil Map—El Paso County Area, Colorado



Map Scale: 1:4,120 if printed on A landscape (11" x 8.5") sheet.



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

## MAP LEGEND

-  Area of Interest (AOI)
-  Area of Interest (AOI)
-  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 15, Oct 10, 2017

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

Date(s) aerial images were photographed: Jun 3, 2014—Jun 17, 2014

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.

## El Paso County Area, Colorado

### 8—Blakeland loamy sand, 1 to 9 percent slopes

#### Map Unit Setting

*National map unit symbol:* 369v

*Elevation:* 4,600 to 5,800 feet

*Mean annual precipitation:* 14 to 16 inches

*Mean annual air temperature:* 46 to 48 degrees F

*Frost-free period:* 125 to 145 days

*Farmland classification:* Not prime farmland

#### Map Unit Composition

*Blakeland and similar soils:* 85 percent

*Estimates are based on observations, descriptions, and transects of the mapunit.*

#### Description of Blakeland

##### Setting

*Landform:* Flats, hills

*Landform position (three-dimensional):* Side slope, talf

*Down-slope shape:* Linear

*Across-slope shape:* Linear

*Parent material:* Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

##### Typical profile

*A - 0 to 11 inches:* loamy sand

*AC - 11 to 27 inches:* loamy sand

*C - 27 to 60 inches:* sand

##### Properties and qualities

*Slope:* 1 to 9 percent

*Depth to restrictive feature:* More than 80 inches

*Natural drainage class:* Somewhat excessively drained

*Runoff class:* Low

*Capacity of the most limiting layer to transmit water (Ksat):* High to very high (5.95 to 19.98 in/hr)

*Depth to water table:* More than 80 inches

*Frequency of flooding:* None

*Frequency of ponding:* None

*Calcium carbonate, maximum in profile:* 5 percent

*Available water storage in profile:* Low (about 4.5 inches)

##### Interpretive groups

*Land capability classification (irrigated):* 3e

*Land capability classification (nonirrigated):* 6e

*Hydrologic Soil Group:* A

*Ecological site:* Sandy Foothill (R049BY210CO)

*Hydric soil rating:* No

**FIRM PANEL W/REVISED LOMR**

Follows Conditional Case No.: 17-08-0333R



# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	<b>El Paso County Colorado (Unincorporated Areas)</b>	<b>CHANNELIZATION DROP STRUCTURES</b>	<b>FLOODWAY HYDRAULIC ANALYSIS UPDATED TOPOGRAPHIC DATA</b>
	<b>COMMUNITY NO.: 080059</b>		
IDENTIFIER	East Fork Sand Creek LOMR	<b>APPROXIMATE LATITUDE AND LONGITUDE: 38.845, -104.695</b> <b>SOURCE: USGS QUADRANGLE DATUM: NAD 83</b>	
<b>ANNOTATED MAPPING ENCLOSURES</b>		<b>ANNOTATED STUDY ENCLOSURES</b>	
TYPE: FIRM*      NO.: 08041C0752F      DATE: March 17, 1997		DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE: 211P, 212P FLOODWAY DATA TABLE: 5	

Enclosures reflect changes to flooding sources affected by this revision.

\* FIRM - Flood Insurance Rate Map

### FLOODING SOURCE AND REVISED REACH

Sand Creek East Fork - from approximately 820 feet to approximately 2,990 feet upstream of Peterson Boulevard

### SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Sand Creek East Fork	Floodway	Floodway	YES	YES
	BFEs*	BFEs	YES	YES
	Zone AE	Zone AE	YES	YES
	Zone X (unshaded)	Zone X (shaded)	YES	NONE

\* BFEs - Base Flood Elevations

### DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at <https://www.fema.gov/national-flood-insurance-program>.

Patrick "Rick" F. Sacbbit, P.E., Branch Chief  
Engineering Services Branch  
Federal Insurance and Mitigation Administration



# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

### COMMUNITY INFORMATION

#### APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

#### COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at <https://www.fema.gov/national-flood-insurance-program>.

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Patrick "Rick" F. Sacbbit, P.E., Branch Chief  
Engineering Services Branch  
Federal Insurance and Mitigation Administration



# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Jeanine D. Petterson  
Director, Mitigation Division  
Federal Emergency Management Agency, Region VIII  
Denver Federal Center, Building 710  
P.O. Box 25267  
Denver, CO 80225-0267  
(303) 235-4830

### STATUS OF THE COMMUNITY NFIP MAPS

We are processing a revised FIRM and FIS report for El Paso County in our countywide format; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the countywide FIRM and FIS report, which present information from the effective FIRMs and FIS reports for your community and incorporated communities in El Paso County, were submitted to your community for review on November 22, 2017. We will incorporate the modifications made by this LOMR into the countywide FIRM and FIS report before they become effective.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at <https://www.fema.gov/national-flood-insurance-program>.

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Patrick "Rick" F. Sacbbit, P.E., Branch Chief  
Engineering Services Branch  
Federal Insurance and Mitigation Administration



# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

### PUBLIC NOTIFICATION OF REVISION

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below, and through FEMA's Flood Hazard Mapping website at

[https://www.floodmaps.fema.gov/fhm/bfe\\_status/bfe\\_main.asp](https://www.floodmaps.fema.gov/fhm/bfe_status/bfe_main.asp)

#### LOCAL NEWSPAPER

Name: *Colorado Springs Gazette*

Dates: March 30, 2018 and April 6, 2018

Within 90 days of the second publication in the local newspaper, any interested party may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised flood hazard determination presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information eXchange toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 3601 Eisenhower Avenue Suite 500, Alexandria, VA 22304-6426. Additional Information about the NFIP is available on our website at <https://www.fema.gov/national-flood-insurance-program>.

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Patrick "Rick" F. Sacbbit, P.E., Branch Chief  
Engineering Services Branch  
Federal Insurance and Mitigation Administration

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET	WITH FLOODWAY (NGVD)	INCREASE
<b>Sand Creek East Fork</b>								
A	1,100	100	455	11.9	6,038.7	6,038.7	6,038.7	0.0
B	2,400	100	446	12.2	6,054.3	6,054.3	6,054.3	0.0
C	3,330	100	450	12.0	6,069.9	6,069.9	6,069.9	0.0
D	4,240	100	449	12.1	6,085.1	6,085.1	6,085.1	0.0
E	4,870	102	446	12.0	6,095.1	6,095.1	6,095.1	0.0
F	6,188	70	489	10.9	6,118.5	6,118.5	6,118.5	0.0
G	7,403	71	396	13.5	6,136.0	6,136.0	6,136.0	0.0
H	7,931	148	507	10.5	6,158.8	6,158.8	6,158.8	0.0
I	8,943	98	444	12.0	6,169.0	6,169.0	6,169.0	0.0
J	9,666	86	423	12.6	6,177.0	6,177.0	6,177.0	0.0
K	10,721	81	415	12.8	6,193.3	6,193.3	6,193.3	0.0
L	11,347	166	526	10.1	6,207.3	6,207.3	6,207.3	0.0
M	11,375	173	632	8.4	6,207.9	6,207.9	6,207.9	0.0
N	12,610	367	699	7.6	6,228.8	6,228.8	6,228.8	0.1
O	13,720	188	570	10.0	6,241.7	6,241.7	6,241.7	0.0
P	14,805	125	479	11.1	6,257.9	6,257.9	6,257.9	0.0
Q	14,885	125	601	8.9	6,259.9	6,259.9	6,259.9	1.0
R	15,850	228	582	9.2	6,268.7	6,268.7	6,268.7	0.0
S	16,325	300	678	7.9	6,277.3	6,277.3	6,277.5	0.2
T	16,995	321	690	7.7	6,291.4	6,291.4	6,292.0	0.6
U	17,065	326	667	8.0	6,291.4	6,291.4	6,292.1	0.7
V	17,915	388	1,601	3.3	6,293.4	6,293.4	6,294.0	0.6
W	19,110	158	697	7.7	6,309.5	6,309.5	6,309.5	0.0
X	20,730	103	575	11.7	6,327.8	6,327.8	6,328.4	0.6
Y	22,560	142	506	11.0	6,348.8	6,348.8	6,349.4	0.6
Z	23,060	145	503	11.0	6,358.0	6,358.0	6,358.0	0.0
AA	24,835	418	3,156	7.0	6,383.5	6,383.5	6,383.5	0.0
AB	26,470	132	452	10.0	6,402.7	6,402.7	6,402.7	0.0
AC	27,715	112	419	10.8	6,416.6	6,416.6	6,416.6	0.0

REVISED BY LOMR DATED MAY 23, 2007

REVISED BY LOMR DATED OCTOBER 07, 2004

REVISED DATA

REVISED BY LOMR DATED DECEMBER 13, 2006

<sup>1</sup> Feet Above Confluence with Sand Creek

REVISED BY LOMR DATED OCTOBER 30, 2006

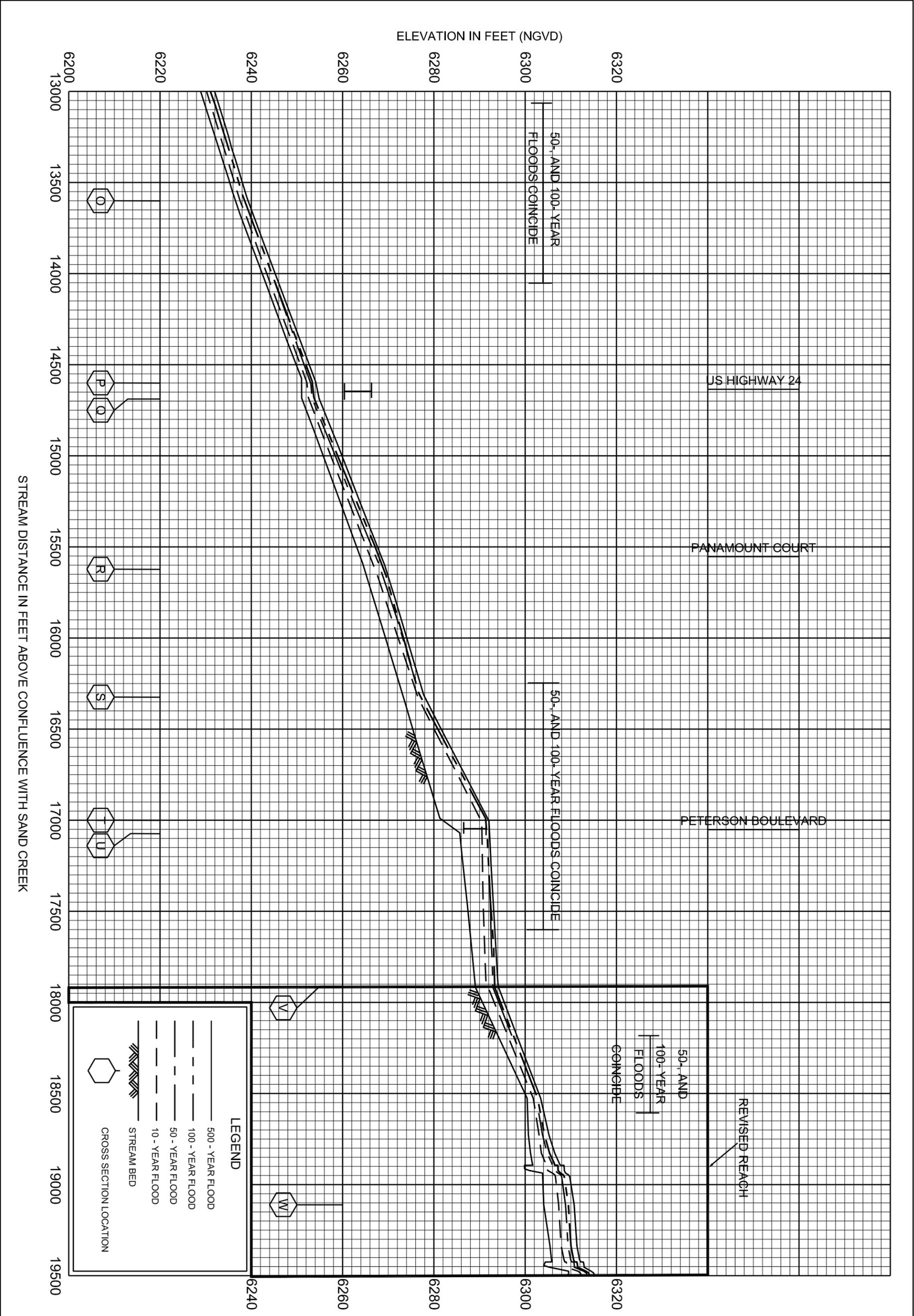
REVISED TO REFLECT LOMR EFFECTIVE: August 6, 2018

T  
A  
B  
L  
E  
  
5

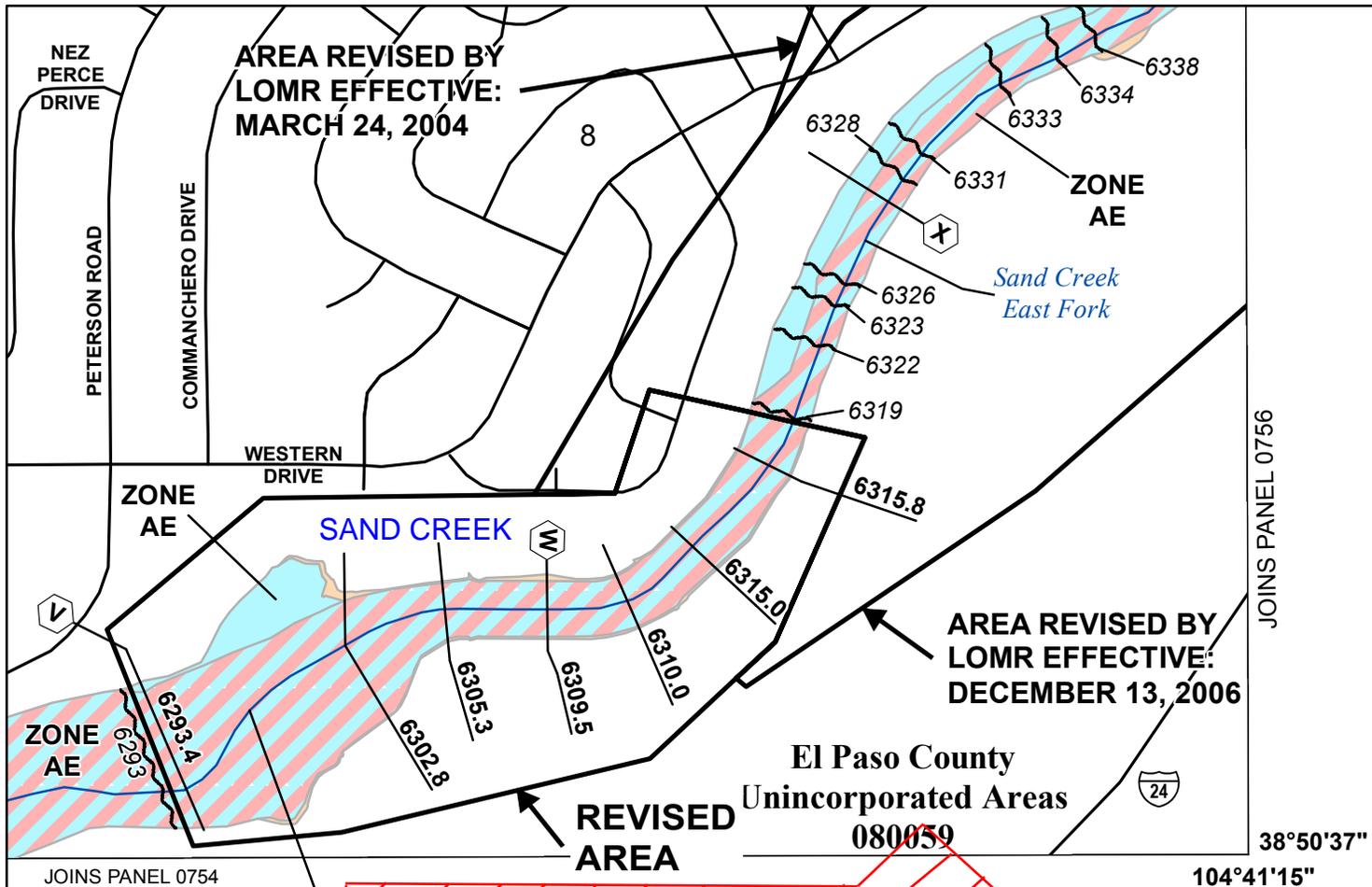
FEDERAL EMERGENCY MANAGEMENT AGENCY  
EL PASO COUNTY, CO  
AND INCORPORATED AREAS

FLOODWAY DATA

SAND CREEK EAST FORK







**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*

**SCALE**

Map Projection:  
Universal Transverse Mercator/NAD 1983 UTM Zone 13N  
Western Hemisphere; Vertical Datum: NGVD 29

1 inch = 500 feet      1:6,000

0 250 500 1,000 Feet

0 62.5 125 250 Meters

**FEMA**  
National Flood Insurance Program

**NATIONAL FLOOD INSURANCE PROGRAM**  
FLOOD INSURANCE RATE MAP

**EL PASO COUNTY, COLORADO**  
and Incorporated Areas

PANEL 752 OF 1300

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0752	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0752	F

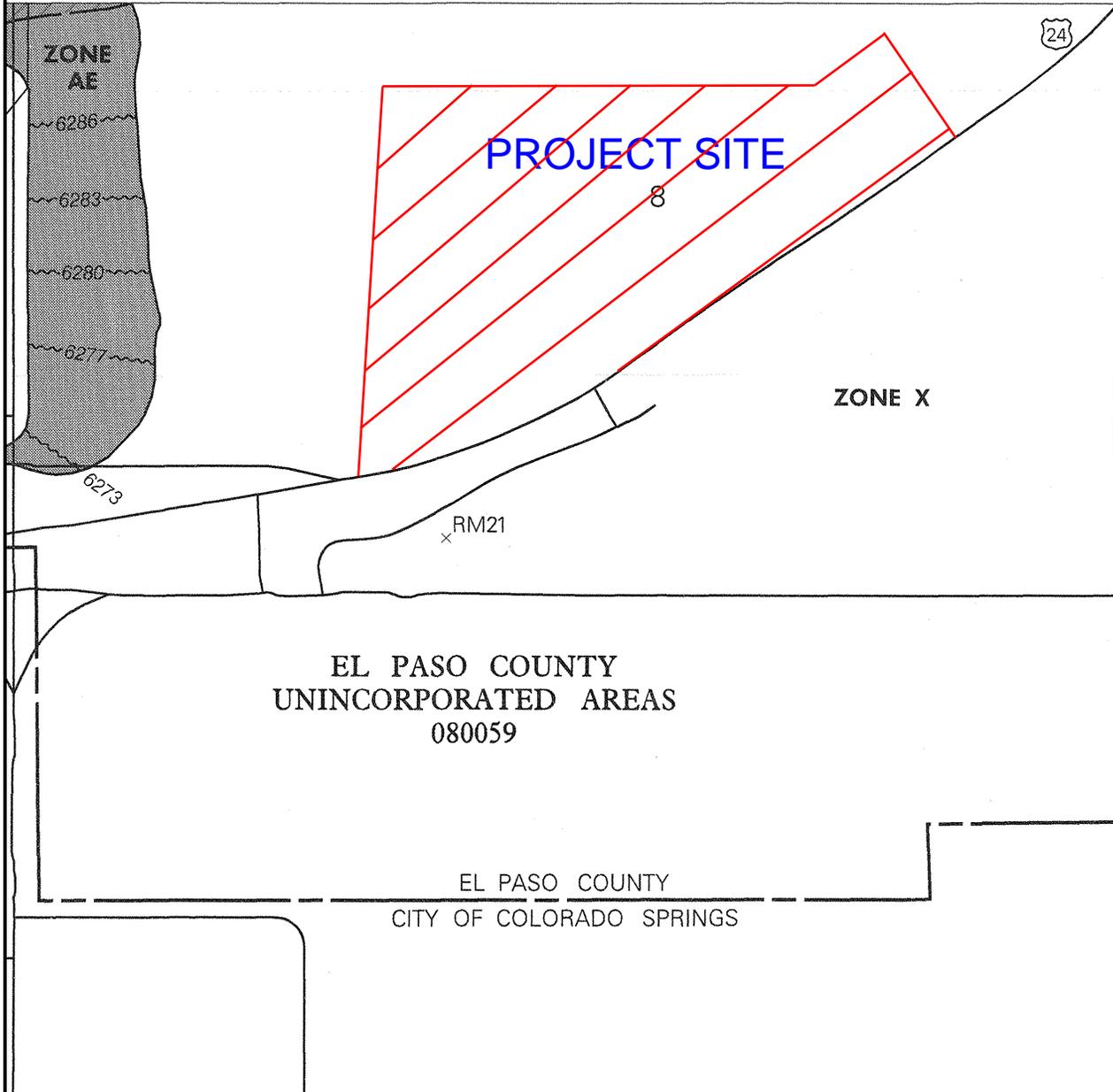
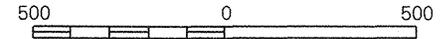
**REVISED TO REFLECT LOMR EFFECTIVE: August 6, 2018**

MAP NUMBER  
08041C0752 F  
EFFECTIVE DATE  
MARCH 17, 1997

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 13 SOUTH, RANGE 65 WEST AND TOWNSHIP 14 SOUTH, RANGE 65 WEST.



APPROXIMATE SCALE IN FEET



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM**  
**FLOOD INSURANCE RATE MAP**  
**EL PASO COUNTY,**  
**COLORADO AND**  
**INCORPORATED AREAS**

**PANEL 754 OF 1300**  
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0754	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0754	F

**MAP NUMBER**  
**08041C0754 F**

**EFFECTIVE DATE:**  
**MARCH 17, 1997**



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)



# Federal Emergency Management Agency

Washington, D.C. 20472

JAN 30 2007

CERTIFIED MAIL  
RETURN RECEIPT REQUESTED

The Honorable Lionel Rivera  
Mayor, City of Colorado Springs  
P.O. Box 1575  
Colorado Springs, CO 80901

IN REPLY REFER TO:

Case No.: 05-08-0368P  
Community Name: City of Colorado Springs, CO  
Community No.: 080060  
Effective Date of **MAY 23 2007**  
This Revision:

Dear Mayor Rivera:

The Flood Insurance Study report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panel(s) revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Federal Insurance and Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Denver, Colorado, at (303) 235-4830, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Sincerely,

Patrick, F. Sacibit, P.E., CFM, Project Engineer .  
Engineering Management Section  
Mitigation Division

For: William R. Blanton Jr., CFM, Chief  
Engineering Management Section  
Mitigation Division

List of Enclosures:

Letter of Map Revision Determination Document  
Annotated Flood Insurance Rate Map  
Annotated Flood Insurance Study Report

cc: The Honorable Sallie Clark  
Chair, El Paso County  
Board of Commissioners

Regional Floodplain Administrator  
Pikes Peak Regional Building Department

J. F. Sato and Associates, Inc.

Engineering and Surveying, Inc.



**Federal Emergency Management Agency**  
Washington, D.C. 20472

**LETTER OF MAP REVISION  
DETERMINATION DOCUMENT**

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Colorado Springs El Paso County Colorado	CHANNELIZATION CULVERT	FLOODWAY HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA BASEMAP CHANGES
	COMMUNITY NO.: 080060		
IDENTIFIER	Sand Creek Center Tributary and East Fork LOMR	APPROXIMATE LATITUDE & LONGITUDE: 38.830, -104.720 SOURCE: USGS QUADRANGLE      DATUM: NAD 27	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM*      NO.: 08041C0753 F      DATE: March 17, 1997 TYPE: FIRM      NO.: 08041C0754 F      DATE: March 17, 1997		DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE(S): 205P, 206P, 209P, and 210P FLOODWAY DATA TABLE: 5	

Enclosures reflect changes to flooding sources affected by this revision.

\* FIRM - Flood Insurance Rate Map; \*\* FBFM - Flood Boundary and Floodway Map; \*\*\* FHBM - Flood Hazard Boundary Map

**FLOODING SOURCE(S) & REVISED REACH(ES)**

See Page 2 for Additional Flooding Sources

Sand Creek Center Tributary – from just upstream of Airport Road to approximately 1,350 feet upstream of East Frontage Road

**SUMMARY OF REVISIONS**

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Sand Creek Center Tributary	Zone AE	Zone AE	YES	YES
	Floodway	Floodway	YES	YES
	BFEs*	BFEs	YES	YES
	Zone X (shaded)	Zone X (shaded)	YES	YES

\* BFEs - Base Flood Elevations

**DETERMINATION**

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Patrick F. Sacbbit, P.E., CFM, Project Engineer  
Engineering Management Section  
Mitigation Division



Federal Emergency Management Agency  
Washington, D.C. 20472

**LETTER OF MAP REVISION  
DETERMINATION DOCUMENT (CONTINUED)**

**OTHER FLOODING SOURCES AFFECTED BY THIS REVISION**

**FLOODING SOURCE(S) & REVISED REACH(ES)**

Sand Creek East Fork – from approximately 970 feet downstream of Powers Boulevard to just downstream of Stewart Avenue

**SUMMARY OF REVISIONS**

<b>Flooding Source</b>	<b>Effective Flooding</b>	<b>Revised Flooding</b>	<b>Increases</b>	<b>Decreases</b>
Sand Creek East Fork	Zone AE	Zone AE	YES	YES
	Floodway	Floodway	YES	YES
	BFEs*	BFEs	YES	YES
	Zone X (shaded)	Zone X (shaded)	YES	YES

\* BFEs - Base Flood Elevations

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Patrick F. Sacbbit, P.E., CFM, Project Engineer  
Engineering Management Section  
Mitigation Division



Federal Emergency Management Agency  
Washington, D.C. 20472

**LETTER OF MAP REVISION  
DETERMINATION DOCUMENT (CONTINUED)**

**OTHER COMMUNITIES AFFECTED BY THIS REVISION**

**CID Number:** 080059      **Name:** El Paso County, Colorado

**AFFECTED MAP PANELS**

TYPE: FIRM	NO.: 08041C0752 F	DATE: March 17, 1997
TYPE: FIRM	NO.: 08041C0753 F	DATE: March 17, 1997
TYPE: FIRM	NO.: 08041C0754 F	DATE: March 17, 1997

**AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT**

DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999  
PROFILE(S): 206P  
FLOODWAY DATA TABLE: 5

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Patrick F. Sacbibit, P.E., CFM, Project Engineer  
Engineering Management Section  
Mitigation Division



# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

### COMMUNITY INFORMATION

#### APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

We provide the floodway designation to your community as a tool to regulate floodplain development. Therefore, the floodway revision we have described in this letter, while acceptable to us, must also be acceptable to your community and adopted by appropriate community action, as specified in Paragraph 60.3(d) of the NFIP regulations.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

#### COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

A handwritten signature in black ink, appearing to read "P. Sacbibit".

Patrick F. Sacbibit, P.E., CFM, Project Engineer  
Engineering Management Section  
Mitigation Division



Federal Emergency Management Agency  
Washington, D.C. 20472

**LETTER OF MAP REVISION  
DETERMINATION DOCUMENT (CONTINUED)**

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Jeanine D. Petterson  
Director, Federal Insurance and Mitigation Division  
Federal Emergency Management Agency, Region VIII  
Denver Federal Center, Building 710  
P.O. Box 25267  
Denver, CO 80225-0267  
(303) 235-4830

**STATUS OF THE COMMUNITY NFIP MAPS**

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional Information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

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Patrick F. Sacbibit, P.E., CFM, Project Engineer  
Engineering Management Section  
Mitigation Division



# Federal Emergency Management Agency

Washington, D.C. 20472

## LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

### PUBLIC NOTIFICATION OF REVISION

#### PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NGVD 29)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Sand Creek Center Tributary	Approximately 150 feet upstream of Airport Road	6,109	6,108	08041C0753 F
	Approximately 1,250 feet upstream of East Frontage Road	6,168	6,164	08041C0753 F
Sand Creek East Fork	Approximately 810 feet downstream of Powers Boulevard	6,099	6,096	08041C0753 F
	Approximately 140 feet downstream of Stewart Avenue	6,206	6,205	08041C0754 F

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below.

LOCAL NEWSPAPER      Name: *El Paso County News*  
    Dates: 02/14/2007                      02/21/2007

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at <http://www.fema.gov/nfip>.

Patrick F. Sacbibit, P.E., CFM, Project Engineer  
 Engineering Management Section  
 Mitigation Division

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
					FEET (NGVD)	FEET (NGVD)		
Sand Creek East Fork								
A	1,100	100	455	11.9	6,038.7	6,038.7	6,038.7	0.0
B	2,400	100	446	12.2	6,054.3	6,054.3	6,054.3	0.0
C	3,330	100	450	12.0	6,069.9	6,069.9	6,069.9	0.0
D	4,240	100	449	12.1	6,085.1	6,085.1	6,085.1	0.0
E	4,870	102	446	12.0	6,095.1	6,095.1	6,095.1	0.0
F	6,188	70	489	10.9	6,118.5	6,118.5	6,118.5	0.0
G	7,403	71	396	13.5	6,136.0	6,136.0	6,136.0	0.0
H	7,931	148	507	10.5	6,158.8	6,158.8	6,158.8	0.0
I	8,943	98	444	12.0	6,169.0	6,169.0	6,169.0	0.0
J	9,666	86	423	12.6	6,177.0	6,177.0	6,177.0	0.0
K	10,721	81	415	12.8	6,193.3	6,193.3	6,193.3	0.0
L	11,347	166	526	10.1	6,207.3	6,207.3	6,207.3	0.0
M	11,375	173	632	8.4	6,207.9	6,207.9	6,207.9	0.0
N	12,610	367	699	7.6	6,228.8	6,228.8	6,228.9	0.1
O	13,720	188	570	10.0	6,241.7	6,241.7	6,241.7	0.0
P	14,805	125	479	11.1	6,257.9	6,257.9	6,257.9	0.0
Q	14,885	125	601	8.9	6,259.9	6,259.9	6,259.9	1.0
R	15,850	228	582	9.2	6,268.7	6,268.7	6,268.7	0.0
S	16,325	300	678	7.9	6,277.3	6,277.3	6,277.5	0.2
T	16,995	321	690	7.7	6,291.4	6,291.4	6,292.0	0.6
U	17,065	326	667	8.0	6,291.4	6,291.4	6,292.1	0.7
V	17,915	388	1,598	3.3	6,293.4	6,293.4	6,294.0	0.6
W	18,995	367	683	7.8	6,307.2	6,307.2	6,307.6	0.4
X	20,525	413	706	7.5	6,326.4	6,326.4	6,327.1	0.7
Y	22,125	255	620	8.6	6,348.7	6,348.7	6,348.8	0.1
Z	23,105	397	706	7.6	6,359.9	6,359.9	6,359.9	0.0
AA	24,835	431	705	7.4	6,383.7	6,383.7	6,383.7	0.0
AB	26,505	353	667	7.8	6,401.0	6,401.0	6,401.5	0.5

Revised Data

Revised by LOMR dated OCT 07 2004

<sup>1</sup> Feet above confluence with Sand Creek

FLOODWAY DATA

FEDERAL EMERGENCY MANAGEMENT AGENCY  
**EL PASO COUNTY, CO**  
 AND INCORPORATED AREAS

SAND CREEK EAST FORK

MAY 29 2007

TABLE 5

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			INCREASE
CROSS SECTION	DISTANCE <sup>1</sup>	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	
Sand Creek Center Tributary	940	40	92	Revised Data 8.6	6,106.5	6,106.5	6,106.5	0.0
A	990	40	118	6.7	6,107.2	6,107.2	6,107.2	0.0
B	2,238	91	120	6.6	6,120.2	6,120.2	6,120.2	0.0
C	3,948	46	95	8.0	6,138.3	6,138.3	6,138.3	0.0
D	4,547	170	159	4.8	6,147.4	6,147.4	6,147.4	0.0
E	5,539	52	97	7.8	6,156.8	6,156.8	6,156.8	0.0
F	7,191	63	104	7.3	6,176.2	6,176.2	6,176.2	0.0
G	7,940	52	98	7.8	6,189.6	6,189.6	6,189.6	0.0
H	8,527	40	67	5.7	6,197.6	6,197.6	6,197.6	0.0
I	9,366	17	42	9.0	6,213.4	6,213.4	6,213.4	0.0
J	10,055	232	278	4.0	6,221.9	6,221.9	6,221.9	0.0
K	10,627	539	469	2.4	6,230.6	6,230.6	6,230.6	0.0
L	11,321	31	79	9.1	6,241.1	6,241.1	6,241.1	0.0
M	11,648	60	99	7.3	6,244.6	6,244.6	6,244.6	0.8
N	12,840	29	85	9.6	6,253.8	6,253.8	6,253.8	0.0
O	13,730	27	83	9.9	6,273.6	6,273.6	6,273.6	0.0
P	14,592	26	68	9.3	6,299.7	6,299.7	6,299.7	0.0
Q	14,670	40	61	6.9	6,304.2	6,304.2	6,305.2	1.0
R	15,050	20	63	10.1	6,307.6	6,307.6	6,308.1	0.5
S	15,460	25	68	9.5	6,310.8	6,310.8	6,311.4	0.6
T	15,750	20	41	7.8	6,319.6	6,319.6	6,319.6	0.0
U	16,670	20	39	8.1	6,346.0	6,346.0	6,346.0	0.0
V								

<sup>1</sup> Feet Above confluence with Sand Creek East Fork

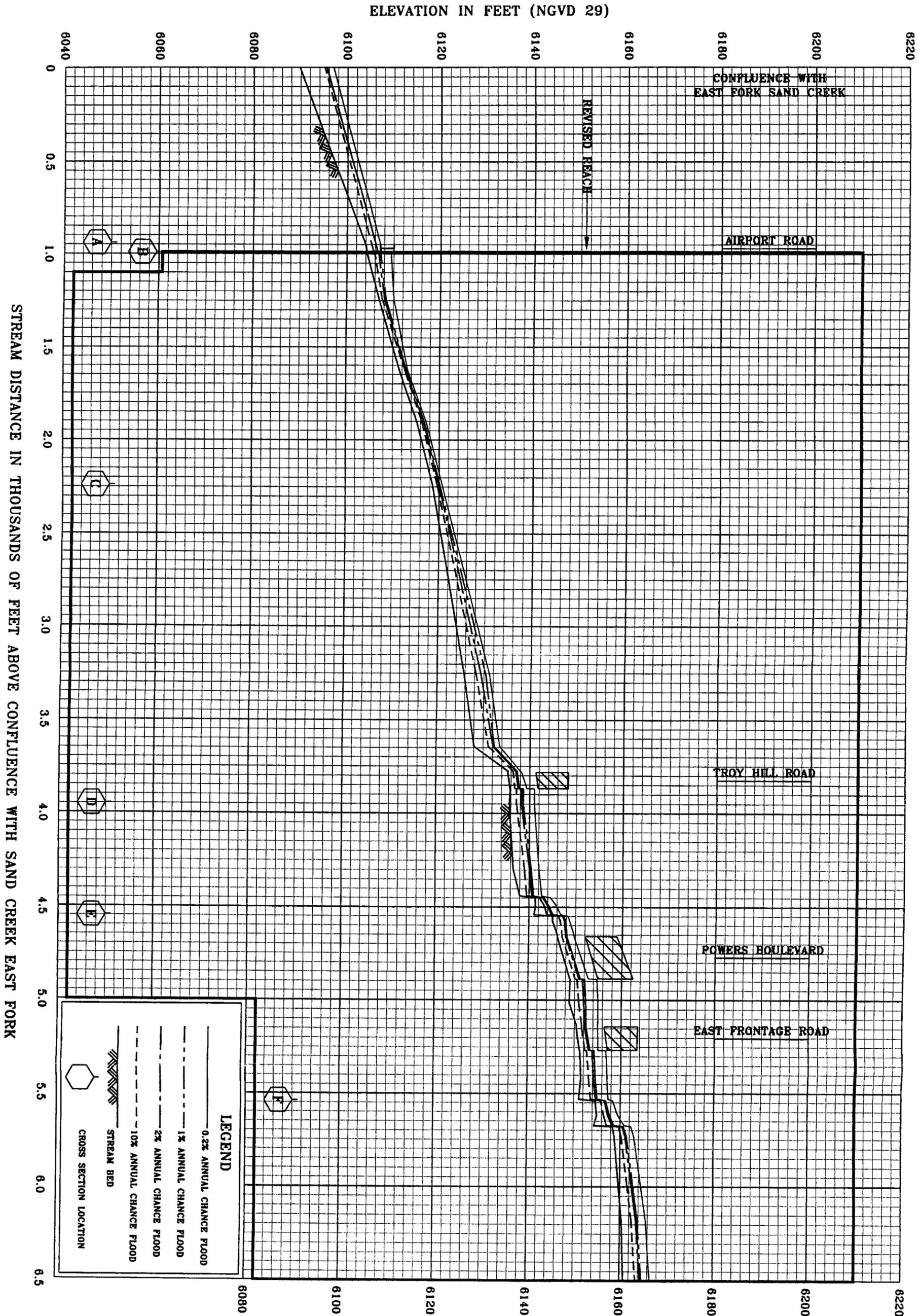
FEDERAL EMERGENCY MANAGEMENT AGENCY  
**EL PASO COUNTY, CO**  
 AND INCORPORATED AREAS

FLOODWAY DATA

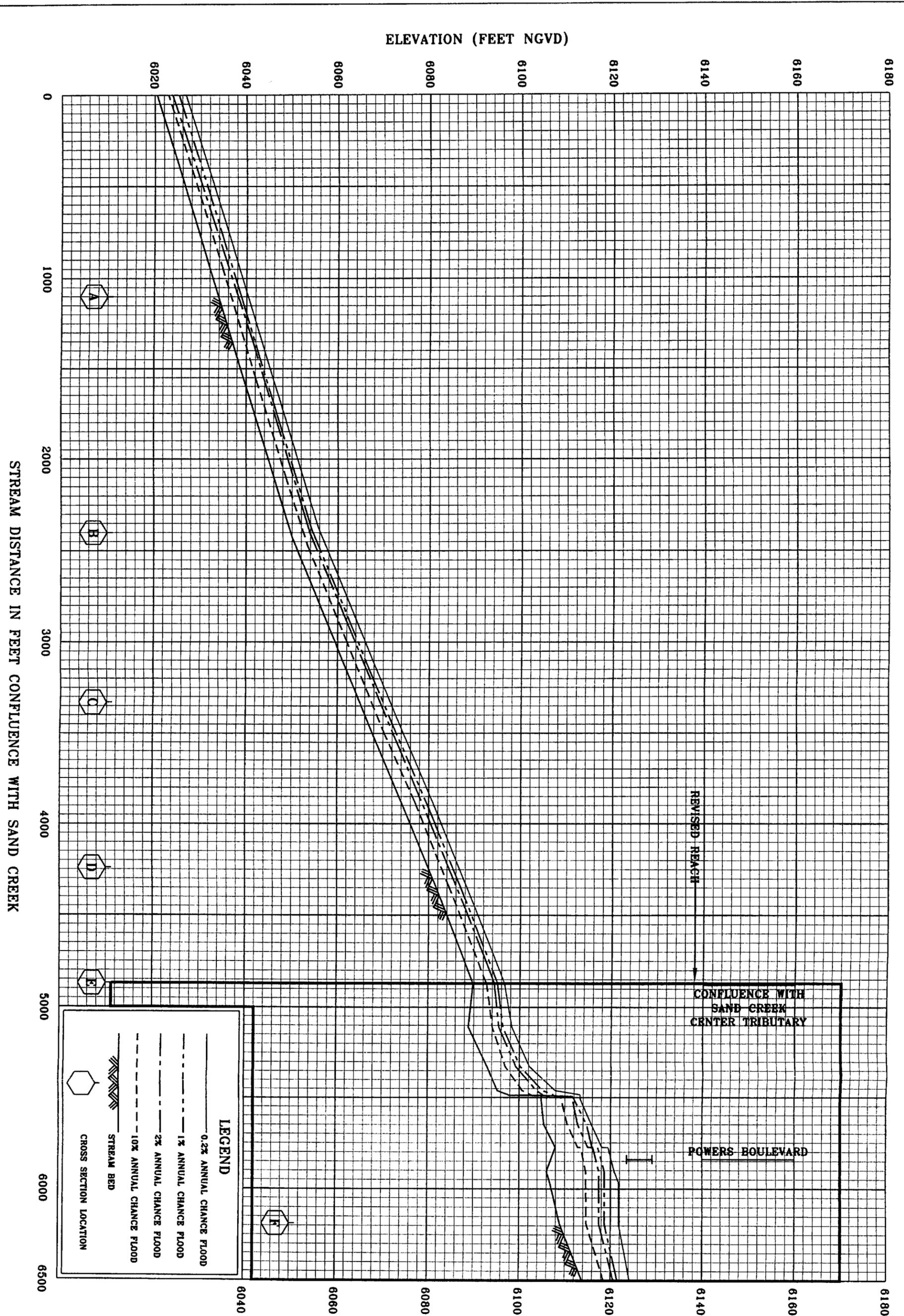
MAY 23 2007

Sand Creek Center Tributary

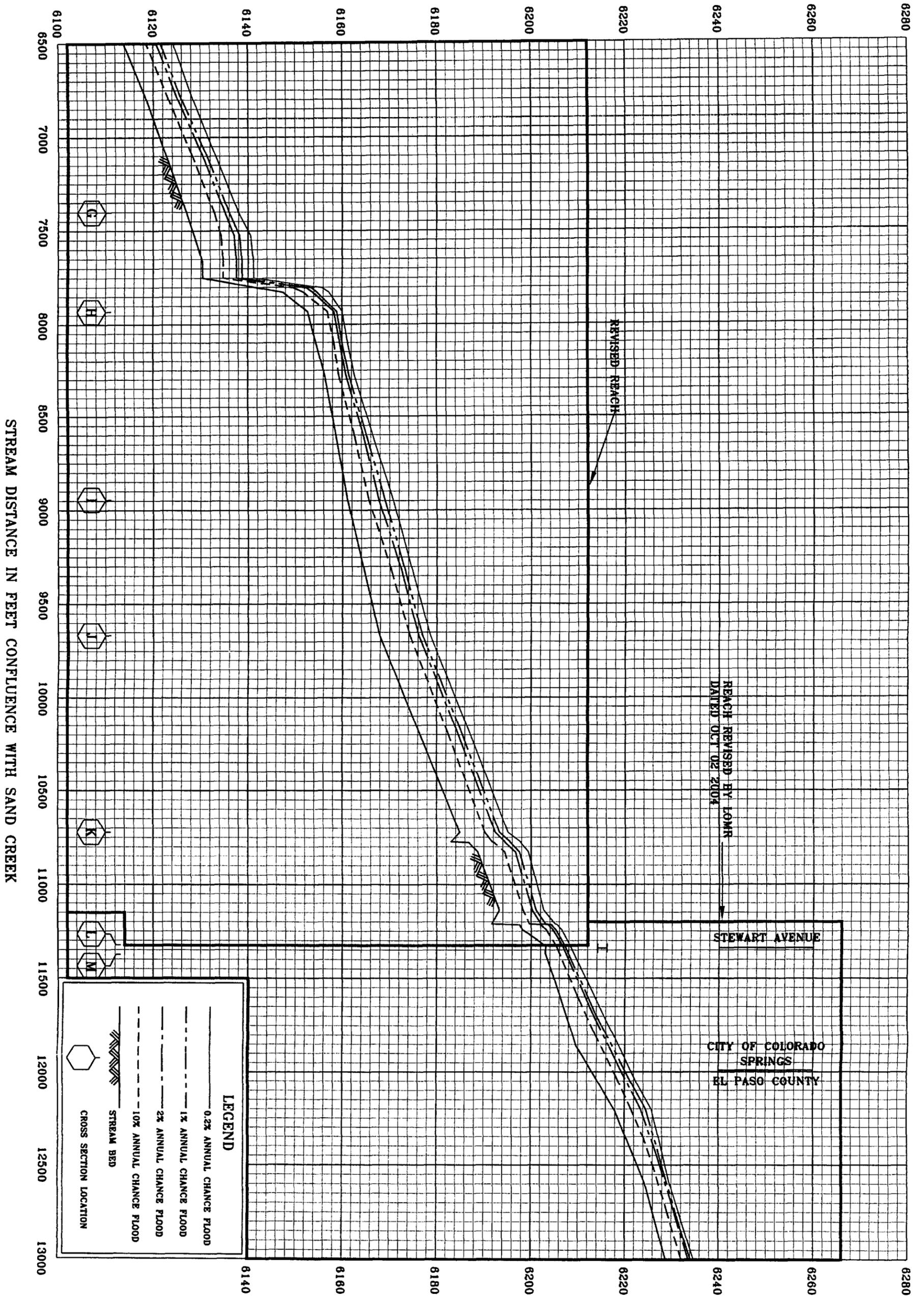
TABLE 5







ELEVATION (FEET NGVD)



**LEGEND**

- 0.2% ANNUAL CHANCE FLOOD
- 1% ANNUAL CHANCE FLOOD
- 2% ANNUAL CHANCE FLOOD
- 10% ANNUAL CHANCE FLOOD
- STREAM BED
- CROSS SECTION LOCATION

FEDERAL EMERGENCY MANAGEMENT AGENCY  
EL PASO COUNTY, CO  
AND INCORPORATED AREAS

FLOOD PROFILES

SAND CREEK EAST FORK

210P



104°43'07"  
38°50'37"

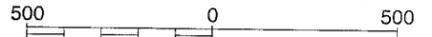
JOINS PANEL 0752

# EL PASO COUNTY UNINCORPORATED AREAS 080059

- Legend**
-  1% annual chance (100-Year) Floodplain
  -  1% annual chance (100-Year) Floodway
  -  0.2% annual chance (500-Year) Floodplain



APPROXIMATE SCALE IN FEET



NATIONAL FLOOD INSURANCE PROGRAM

## FIRM FLOOD INSURANCE RATE MAP

EL PASO COUNTY,  
COLORADO  
AND INCORPORATED AREAS

**PANEL 754 OF 1300**  
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL SUFFIX
COLORADO SPRINGS, CITY OF	080090	0754 F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0754 F

MAY 23 2007

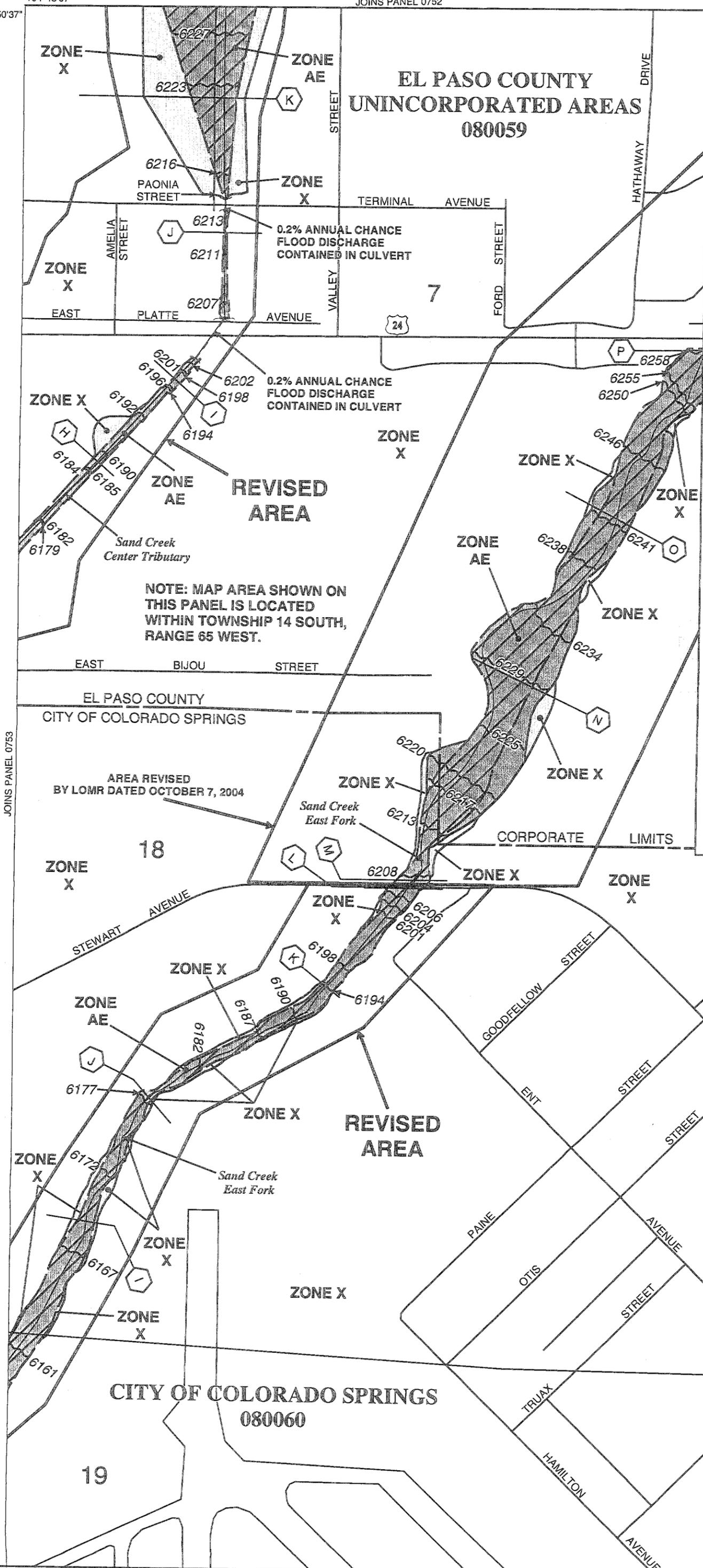
MAP NUMBER  
08041C0754 F

EFFECTIVE DATE:  
MARCH 17, 1997



Federal Emergency Management Agency

JOINS PANEL 0753



## **HYDROLOGIC CALCULATIONS**

***Meadowbrook Townhomes Borrow Site  
FINAL DRAINAGE REPORT  
(Existing Area Runoff Coefficient Summary)***

BASIN	TOTAL AREA (SF)	TOTAL AREA (Acres)	STREETS / DEVELOPED			OVERLAND / DEVELOPED			WEIGHTED	
			AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	C <sub>5</sub>	C <sub>100</sub>
<i>A</i>	256383.3	5.89	0.00	0.90	0.96	5.89	0.08	0.35	<b><i>0.08</i></b>	<b><i>0.35</i></b>
<i>B</i>	478377.5	10.98	0.00	0.90	0.96	16.14	0.08	0.35	<b><i>0.08</i></b>	<b><i>0.35</i></b>
<i>C</i>	585927.5	13.45	0.00	0.90	0.96	5.68	0.08	0.35	<b><i>0.08</i></b>	<b><i>0.35</i></b>

townhomes removed

**Meadowbrook Townhomes Borrow Site**  
**FINAL DRAINAGE REPORT**  
**(Existing Area Drainage Summary)**

<i>From Area Runoff Coefficient Summary</i>				<b>OVERLAND</b>				<b>STREET / CHANNEL FLOW</b>				<b>Time of Travel (T<sub>t</sub>)</b>	<b>INTENSITY *</b>		<b>TOTAL FLOWS</b>	
<b>BASIN</b>	<b>AREA TOTAL (Acres)</b>	<b>C<sub>5</sub></b>	<b>C<sub>100</sub></b>	<b>C<sub>5</sub></b>	<b>Length (ft)</b>	<b>Height (ft)</b>	<b>T<sub>c</sub> (min)</b>	<b>Length (ft)</b>	<b>Slope (%)</b>	<b>Velocity (fps)</b>	<b>T<sub>t</sub> (min)</b>	<b>TOTAL (min)</b>	<b>I<sub>5</sub> (in/hr)</b>	<b>I<sub>100</sub> (in/hr)</b>	<b>Q<sub>5</sub> (c.f.s.)</b>	<b>Q<sub>100</sub> (c.f.s.)</b>
		<i>From DCM Table 5-1</i>														
<b>A</b>	5.89	0.08	0.35	0.08	300	9	22.2	500	2.0%	2.0	4.2	26.4	2.7	4.5	1.3	9.2
<b>B</b>	10.98	0.08	0.35	0.08	300	13	19.7	1350	1.6%	2.6	8.8	28.5	2.6	4.3	2.2	16.5
<b>C</b>	13.45	0.08	0.35	0.08	300	11	20.8	750	1.7%	2.6	4.7	25.5	2.7	4.6	2.9	21.5

**Meadowbrook Townhomes Borrow Site**  
**FINAL DRAINAGE REPORT**  
**(Existing Basin Routing Summary)**

<i>From Area Runoff Coefficient Summary</i>				<b>OVERLAND</b>				<b>PIPE / CHANNEL FLOW</b>				<i>Time of Travel (T<sub>t</sub>)</i>	<b>INTENSITY *</b>		<b>TOTAL FLOWS</b>		COMMENTS
DESIGN POINT	CONTRIBUTING BASINS	CA <sub>5</sub>	CA <sub>100</sub>	C <sub>s</sub>	Length (ft)	Height (ft)	T <sub>c</sub> (min)	Length (ft)	Slope (%)	Velocity (fps)	T <sub>t</sub> (min)	TOTAL	I <sub>5</sub>	I <sub>100</sub>	Q <sub>5</sub>	Q <sub>100</sub>	
		(min)	(in/hr)									(in/hr)	(c.f.s.)	(c.f.s.)			
1	A	0.47	2.06	0.08	300	9	22.2	500	2.0%	2.0	4.2	26.4	2.7	4.5	1.3	9.2	
2	B	0.88	3.84	0.08	300	13	19.7	1350	1.6%	2.6	8.8	28.5	2.6	4.3	2.2	16.5	
3	C	1.08	4.71	0.08	300	11	20.8	750	1.7%	2.6	4.7	25.5	2.7	4.6	2.9	21.5	

Calculated by: JD  
 Date: 10/1/2018  
 Checked by: VAS

townhomes removed

***MEADOWBROOK TOWNHOMES - DIRT BORROW SITE  
FINAL DRAINAGE REPORT  
(Proposed Area Runoff Coefficient Summary)***

BASIN	TOTAL AREA (SF)	TOTAL AREA (Acres)	STREETS / DEVELOPED			OVERLAND / DEVELOPED			WEIGHTED	
			AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	AREA (Acres)	C <sub>5</sub>	C <sub>100</sub>	C <sub>5</sub>	C <sub>100</sub>
<i>A</i>	<i>576315.3</i>	13.23	0.00	0.90	0.96	13.23	0.08	0.35	<i>0.08</i>	<i>0.35</i>
<i>B</i>	<i>701316</i>	16.10	0.00	0.90	0.96	16.10	0.08	0.35	<i>0.08</i>	<i>0.35</i>
<i>C</i>	<i>109176.3</i>	2.51	0.00	0.90	0.96	2.51	0.08	0.35	<i>0.08</i>	<i>0.35</i>

townhomes removed

**MEADOWBROOK TOWNHOMES - DIRT BORROW SITE**  
**FINAL DRAINAGE REPORT**  
**(Proposed Area Drainage Summary)**

<i>From Area Runoff Coefficient Summary</i>				<b>OVERLAND</b>				<b>STREET / CHANNEL FLOW</b>				<b>Time of Travel (T<sub>t</sub>)</b>	<b>INTENSITY *</b>		<b>TOTAL FLOWS</b>	
<b>BASIN</b>	<b>AREA TOTAL (Acres)</b>	<b>C<sub>5</sub></b>	<b>C<sub>100</sub></b>	<b>C<sub>5</sub></b>	<b>Length (ft)</b>	<b>Height (ft)</b>	<b>T<sub>c</sub> (min)</b>	<b>Length (ft)</b>	<b>Slope (%)</b>	<b>Velocity (fps)</b>	<b>T<sub>t</sub> (min)</b>	<b>TOTAL (min)</b>	<b>I<sub>5</sub> (in/hr)</b>	<b>I<sub>100</sub> (in/hr)</b>	<b>Q<sub>5</sub> (c.f.s.)</b>	<b>Q<sub>100</sub> (c.f.s.)</b>
		<i>From DCM Table 5-1</i>														
<b>A</b>	13.23	0.08	0.35	0.08	200	2.5	24.2	1350	1.3%	2.0	11.3	35.4	2.2	3.7	2.4	17.3
<b>B</b>	16.10	0.08	0.35	0.08	200	2.5	24.2	1250	1.3%	2.2	9.3	33.5	2.3	3.9	3.0	21.9
<b>C</b>	2.51	0.08	0.35	0.08	100	2	14.7	650	0.5%	1.4	7.7	22.3	2.9	4.9	0.6	4.3

**MEADOWBROOK TOWNHOMES - DIRT BORROW SITE**  
**FINAL DRAINAGE REPORT**  
**(Basin Routing Summary)**

<i>From Area Runoff Coefficient Summary</i>				<b>OVERLAND</b>				<b>PIPE / CHANNEL FLOW</b>				<b>Time of Travel (T<sub>t</sub>)</b>	<b>INTENSITY *</b>		<b>TOTAL FLOWS</b>		COMMENTS
DESIGN POINT	CONTRIBUTING BASINS	CA <sub>5</sub>	CA <sub>100</sub>	C <sub>s</sub>	Length (ft)	Height (ft)	T <sub>c</sub> (min)	Length (ft)	Slope (%)	Velocity (fps)	T <sub>t</sub> (min)	TOTAL (min)	I <sub>5</sub> (in/hr)	I <sub>100</sub> (in/hr)	Q <sub>5</sub> (c.f.s.)	Q <sub>100</sub> (c.f.s.)	
1	A	1.06	4.63	0.08	200	2.5	24.2	1350	1.3%	2.0	11.3	35.4	2.2	3.7	2.4	17.3	TSB1 - Discharge TSB2 -Discharge Direct addition of Flows
2	B	1.29	5.64	0.08	200	3	24.2	1250	1.3%	2.2	9.3	33.5	2.3	3.9	3.0	21.9	
3	C SB1 SB2	0.20	0.88	0.08	100	2	14.7	650	0.5%	1.4	7.7	22.3	2.9	4.9	0.6	4.3	
															0.0	0.1	
															0.6	4.5	

Calculated by: JD  
 Date: 10/1/2018  
 Checked by: VAS

## **HYDRAULIC CALCUATIONS**

## Partially Full Pipe Flow Calculations - U.S. Units

### II. Calculation of Discharge, Q, and average velocity, V for pipes more than half full

**Instructions:** Enter values in blue boxes. Calculations in yellow

#### Inputs

Pipe Diameter,  $D = 6$  in  
Depth of flow,  $y = 2.35$  in

(must have  $y \geq D/2$ )

Full Pipe Manning  
roughness,  $n_{full} = 0.013$   
Channel bottom  
slope,  $S = 0.01$  ft/ft

#### Calculations

$n/n_{full} = 1.3041666$

Partially Full Manning

roughness,  $n = 0.017$

#### Calculations

Pipe Diameter,  $D = 0.5$  ft  
Pipe Radius,  $r = 0.25$  ft

Circ. Segment Height,  $h = 0.304$  ft

Central Angle,  $\theta = 3.58$  radians  
Cross-Sect. Area,  $A = 0.07$  ft<sup>2</sup>

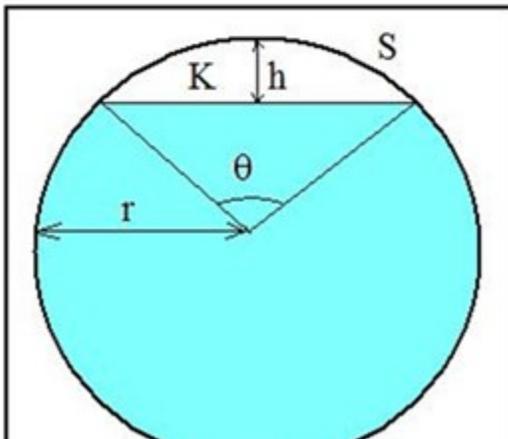
Wetted Perimeter,  $P = 0.7$  ft

Hydraulic Radius,  $R = 0.11$  ft

Discharge,  $Q = 0.14$  cfs

Ave. Velocity,  $V = 1.96$  ft/sec

pipe % full  $[(A/A_{full}) * 100\%] = 36.3\%$



$$r = D/2$$

$$h = 2r - y$$

**(hydraulic radius)**

$$R = A/P$$

**(Manning Equation)**

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2})$$

$$V = Q/A$$

P

## Partially Full Pipe Flow Calculations - U.S. Units

II. Calculation of Discharge, Q, and average velocity, V  
for pipes more than half full

**Instructions:** Enter values in blue boxes. Calculations in yellow

### Inputs

Pipe Diameter, D =  in  
Depth of flow, y =  in

(must have  $y \geq D/2$ )

Full Pipe Manning  
roughness,  $n_{full}$  =   
Channel bottom  
slope, S =  ft/ft

### Calculations

$n/n_{full}$  =   
Partially Full Manning  
roughness, n =

### Calculations

Pipe Diameter, D =  ft  
Pipe Radius, r =  ft

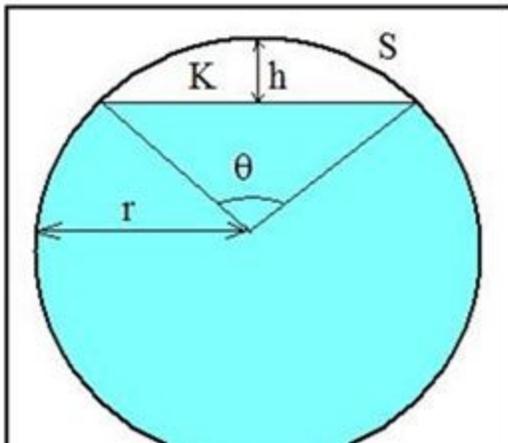
Circ. Segment Height, h =  ft

Central Angle,  $\theta$  =  radians  
Cross-Sect. Area, A =  ft<sup>2</sup>

Wetted Perimeter, P =  ft  
Hydraulic Radius, R =  ft

Discharge, Q =  cfs  
Ave. Velocity, V =  ft/sec

pipe % full  $[(A/A_{full}) \cdot 100\%]$  =



$$r = D/2$$

$$h = 2r - y$$

**(hydraulic radius)**

$$R = A/P$$

**(Manning Equation)**

$$Q = (1.49/n)(A)(R^{2/3})(S^{1/2})$$

$$V = Q/A \quad P$$

## **SEDIMENT BASIN CALCUATIONS**

townhomes removed

**MEADOWBROOK TOWNHOMES**  
**DRAINAGE REPORT DRAINAGE CALCULATIONS**  
**(Pond Volume Calculation)**

**SBI**

Elevation	SF	CF	Storage	
			AF	Sum
6296.00	9,750.00			0
6297.00	12,600.00	11,175.00	0.26	0.26
6298.00	16,200.00	14,400.00	0.33	0.59
6299.00	20,897.00	18,548.50	0.43	1.01
6300.00	30,000.00	25,448.50	0.58	1.60

Required Volume = 3600 cf/acre x 14.6 acres = 52,560 cf

Total = **69,572** CF  
Total = 1.3 Ac-ft

Calculated by: JD  
Date: 9/26/2018  
Checked by: \_\_\_\_\_

Subsection: Modified Rational Grand Summary

### Modified Rational Method

$$Q = CiA * \text{Units Conversion; Where conversion} = 43560 / (12 * 3600)$$

Frequency (years)	Area (ft <sup>2</sup> )	Adjusted C Coefficient	Duration (hours)	Intensity (in/h)	Flow (Peak) (ft <sup>3</sup> /s)	Flow (Allowable) (ft <sup>3</sup> /s)	Volume (inflow) (ac-ft)	Volume (Storage) (ac-ft)
100	576,315.00	0.350	0.599	3.713	17.34	17.30	0.858	0.002

Subsection: Master Network Summary

**Catchments Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Basin A	Base	100	0.858	0.600	17.31

**Node Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-1	Base	100	0.122	1.200	0.08

**Pond Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
TSB-1 (IN)	Base	100	0.858	0.600	17.31	(N/A)	(N/A)
TSB-1 (OUT)	Base	100	0.122	1.200	0.08	2.66	0.855

Subsection: I-D-F Table  
Label: CO Springs  
Scenario: Base

Return Event: 100 years  
Storm Event: CO Springs - 100 Year

**I-D-F Curve**

Time (hours)	Intensity (in/h)
0.083	8.679
0.167	6.932
0.250	5.911
0.333	5.186
0.417	4.623
0.500	4.164
0.583	3.776
0.667	3.439
0.750	3.142
0.833	2.887
0.917	2.637
1.000	2.417

Subsection: Addition Summary  
Label: O-1  
Scenario: Base

Return Event: 100 years  
Storm Event: CO Springs - 100 Year

**Summary for Hydrograph Addition at 'O-1'**

Upstream Link	Upstream Node
Outlet-1	TSB-1

**Node Inflows**

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Outlet-1	0.122	1.200	0.08
Flow (In)	O-1	0.122	1.200	0.08

Subsection: Elevation-Area Volume Curve  
 Label: TSB-1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Elevation (ft)	Planimeter (ft <sup>2</sup> )	Area (ft <sup>2</sup> )	A1+A2+sqr (A1*A2) (ft <sup>2</sup> )	Volume (ac-ft)	Volume (Total) (ac-ft)
0.00	0.0	9,750.000	0.000	0.000	0.000
1.00	0.0	12,600.000	33,433.772	0.256	0.256
2.00	0.0	16,200.000	43,087.057	0.330	0.586
3.00	0.0	20,879.000	55,470.297	0.424	1.010
4.00	0.0	30,000.000	75,906.385	0.581	1.591

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	0.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	4.00 ft

**Outlet Connectivity**

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 2	Forward	TW	1.92	4.00
Orifice-Circular	Orifice - 3	Forward	TW	2.25	4.00
Orifice-Circular	Orifice - 4	Forward	TW	2.58	4.00
Orifice-Circular	Orifice - 5	Forward	TW	2.91	4.00
Stand Pipe	Riser - 1	Forward	TW	3.00	4.00
Orifice-Circular	Orifice - 1	Forward	TW	1.58	4.00
Irregular Weir	Weir - 1	Forward	TW	3.00	4.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

**Structure ID: Weir - 1**  
**Structure Type: Irregular Weir**

Station (ft)	Elevation (ft)
1.00	1.00
4.00	0.00
26.00	0.00
29.00	1.00

Lowest Elevation 3.00 ft  
 Weir Coefficient 3.10 (ft<sup>0.5</sup>)/s

---

Structure ID: Riser - 1  
 Structure Type: Stand Pipe

Number of Openings	1
Elevation	3.00 ft
Diameter	6.0 in
Orifice Area	0.2 ft <sup>2</sup>
Orifice Coefficient	0.600
Weir Length	1.57 ft
Weir Coefficient	3.00 (ft <sup>0.5</sup> )/s
K Reverse	1.000
Manning's n	0.000
Kev, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	True

---

Structure ID: Orifice - 1  
 Structure Type: Orifice-Circular

Number of Openings	1
Elevation	1.58 ft
Orifice Diameter	1.1 in
Orifice Coefficient	0.600

---

Structure ID: Orifice - 2  
 Structure Type: Orifice-Circular

Number of Openings	1
Elevation	1.92 ft
Orifice Diameter	1.1 in
Orifice Coefficient	0.600

---

Structure ID: Orifice - 3  
 Structure Type: Orifice-Circular

Number of Openings	1
--------------------	---

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Structure ID: Orifice - 3	
Structure Type: Orifice-Circular	
Elevation	2.25 ft
Orifice Diameter	1.1 in
Orifice Coefficient	0.600
Structure ID: Orifice - 4	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	2.58 ft
Orifice Diameter	1.1 in
Orifice Coefficient	0.600
Structure ID: Orifice - 5	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	2.91 ft
Orifice Diameter	1.1 in
Orifice Coefficient	0.600
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Weir - 1 (Irregular Weir)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.00	(N/A)	0.00
2.58	0.00	(N/A)	0.00
2.91	0.00	(N/A)	0.00
3.00	0.00	(N/A)	0.00
3.50	25.27	(N/A)	0.00
4.00	74.78	(N/A)	0.00

Computation Messages

E < Y min=3.00  
 E = Y min=3.00  
 Max.H=.50;  
 Max.Htw=free out;; W(ft)  
 =25.00  
 Max.H=1.00;  
 Max.Htw=free out;; W(ft)  
 =28.00

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.00	(N/A)	0.00
2.58	0.00	(N/A)	0.00
2.91	0.00	(N/A)	0.00
3.00	0.00	(N/A)	0.00
3.50	0.67	(N/A)	0.00
4.00	0.95	(N/A)	0.00

Computation Messages

HW & TW <  
 Inv.El.=3.000  
 Weir: H =0ft

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.02	(N/A)	0.00
2.00	0.02	(N/A)	0.00
2.25	0.02	(N/A)	0.00
2.50	0.03	(N/A)	0.00
2.58	0.03	(N/A)	0.00
2.91	0.03	(N/A)	0.00
3.00	0.03	(N/A)	0.00
3.50	0.04	(N/A)	0.00
4.00	0.05	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 H =.30  
 H =.38  
 H =.63  
 H =.88  
 H =.96  
 H =1.29  
 H =1.38  
 H =1.88  
 H =2.38

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.01	(N/A)	0.00
2.25	0.02	(N/A)	0.00
2.50	0.02	(N/A)	0.00
2.58	0.02	(N/A)	0.00
2.91	0.03	(N/A)	0.00
3.00	0.03	(N/A)	0.00
3.50	0.04	(N/A)	0.00
4.00	0.04	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 CRIT.DEPTH CONTROL  
 Vh= .024ft Dcr= .055ft  
 CRIT.DEPTH Hev= .00ft  
 H =.29  
 H =.54  
 H =.62  
 H =.95  
 H =1.04  
 H =1.54  
 H =2.04

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 3 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.01	(N/A)	0.00
2.58	0.02	(N/A)	0.00
2.91	0.02	(N/A)	0.00
3.00	0.02	(N/A)	0.00
3.50	0.03	(N/A)	0.00
4.00	0.04	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 H =.21  
 H =.29  
 H =.62  
 H =.71  
 H =1.21  
 H =1.71

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 4 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.00	(N/A)	0.00
2.58	0.00	(N/A)	0.00
2.91	0.02	(N/A)	0.00
3.00	0.02	(N/A)	0.00
3.50	0.03	(N/A)	0.00
4.00	0.03	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 H =.29  
 H =.38  
 H =.88  
 H =1.38

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 5 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.00	(N/A)	0.00
2.58	0.00	(N/A)	0.00
2.91	0.00	(N/A)	0.00
3.00	0.01	(N/A)	0.00
3.50	0.02	(N/A)	0.00
4.00	0.03	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 H =.05  
 H =.55  
 H =1.05

Subsection: Composite Rating Curve  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.02	(N/A)	0.00
2.00	0.02	(N/A)	0.00
2.25	0.04	(N/A)	0.00
2.50	0.06	(N/A)	0.00
2.58	0.07	(N/A)	0.00
2.91	0.10	(N/A)	0.00
3.00	0.11	(N/A)	0.00
3.50	26.10	(N/A)	0.00
4.00	75.91	(N/A)	0.00

Contributing Structures

- None Contributing
- Orifice - 1
- Orifice - 2 + Orifice - 1
- Orifice - 2 + Orifice - 1
- Orifice - 2 + Orifice - 3 + Orifice - 1
- Orifice - 2 + Orifice - 3 + Orifice - 1
- Orifice - 2 + Orifice - 3 + Orifice - 4 + Orifice - 1
- Orifice - 2 + Orifice - 3 + Orifice - 4 + Orifice - 5 +
- Riser - 1 + Orifice - 1 + Weir - 1
- Orifice - 2 + Orifice - 3 + Orifice - 4 + Orifice - 5 + Riser - 1 + Orifice - 1 + Weir - 1
- Orifice - 2 + Orifice - 3 + Orifice - 4 + Orifice - 5 + Riser - 1 + Orifice - 1 + Weir - 1

Subsection: Detention Time  
 Label: TSB-1 (IN)  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration
<b>Approximate Detention Times</b>	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	1.200 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.600 hours
Detention Time (Peak to Peak)	0.600 hours
Time to Centroid (Outflow)	11.684 hours
Time to Centroid (Inflow)	0.599 hours
Detention Time (Centroid to Centroid)	11.085 hours
Weighted Average Plug Time	21.945 hours
Maximum Plug Volume Plug Time	23.400 hours
Maximum Inflow Plug Volume	0.069 ac-ft
Time (Maximum Plug Volume, Start)	0.550 hours
Time (Maximum Plug Volume, End)	0.600 hours

Subsection: Level Pool Pond Routing Summary  
 Label: TSB-1 (IN)  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

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Infiltration

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Infiltration Method (Computed)	No Infiltration
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Initial Conditions

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Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft <sup>3</sup> /s
Flow (Initial Infiltration)	0.00 ft <sup>3</sup> /s
Flow (Initial, Total)	0.00 ft <sup>3</sup> /s
Time Increment	0.050 hours

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Inflow/Outflow Hydrograph Summary

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Flow (Peak In)	17.31 ft <sup>3</sup> /s	Time to Peak (Flow, In)	0.600 hours
Flow (Peak Outlet)	0.08 ft <sup>3</sup> /s	Time to Peak (Flow, Outlet)	1.200 hours

---

Elevation (Water Surface, Peak)	2.66 ft
Volume (Peak)	0.855 ac-ft

---

Mass Balance (ac-ft)

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Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.858 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.122 ac-ft
Volume (Retained)	0.735 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.1 %

---

Subsection: Pond Inflow Summary  
Label: TSB-1 (IN)  
Scenario: Base

Return Event: 100 years  
Storm Event: CO Springs - 100 Year

**Summary for Hydrograph Addition at 'TSB-1'**

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin A

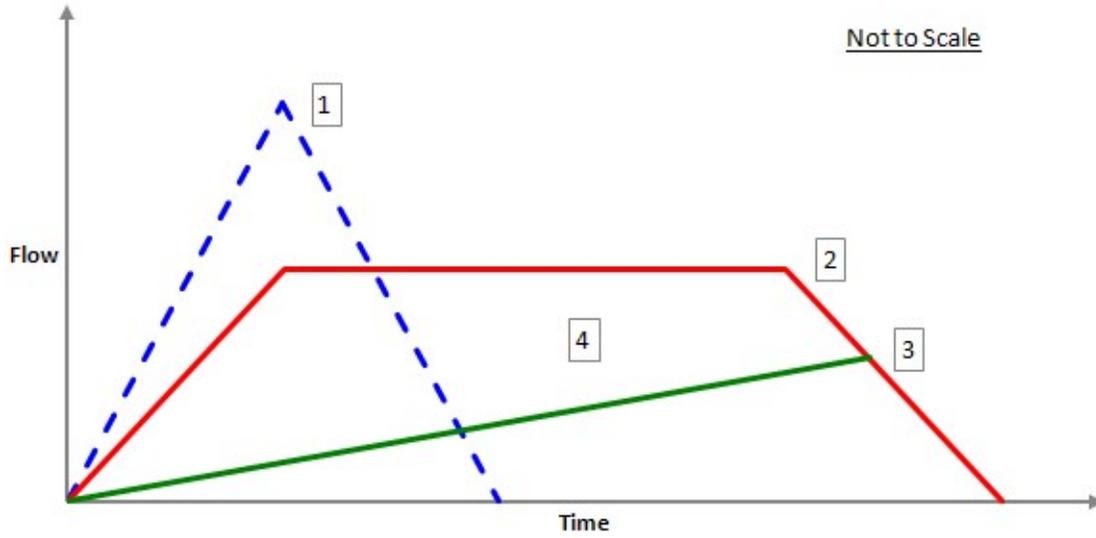
**Node Inflows**

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Basin A	0.858	0.600	17.31
Flow (In)	TSB-1	0.858	0.600	17.31

Subsection: Modified Rational Graph  
 Label: Basin A  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Method Type	Method I
Time of Duration (Modified Rational, Critical)	0.599 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.599	hours	Time of Duration (Modified Rational, Critical)	0.599	hours
Intensity (Modified Rational, Peak)	3.713	in/h	Intensity (Modified Rational, Critical)	3.713	in/h
Flow (Modified Rational, Peak)	17.34	ft <sup>3</sup> /s	Flow (Modified Rational, Critical)	17.34	ft <sup>3</sup> /s
[3]			[4]		
Second Outflow Breakpoint (Modified Rational)	0.600	hours	Storage (Modified Rational, Estimated)	0.002	ac-ft
Flow (Modified Rational, Allowable)	17.30	ft <sup>3</sup> /s			

Subsection: Modified Rational Grand Summary

**Modified Rational Method**

**$Q = CiA * \text{Units Conversion; Where conversion} = 43560 / (12 * 3600)$**

Frequency (years)	Area (ft <sup>2</sup> )	Adjusted C Coefficient	Duration (hours)	Intensity (in/h)	Flow (Peak) (ft <sup>3</sup> /s)	Flow (Allowable) (ft <sup>3</sup> /s)	Volume (inflow) (ac-ft)	Volume (Storage) (ac-ft)
5	576,315.00	0.080	0.583	2.251	2.40	2.40	0.116	0.000

Subsection: Master Network Summary

**Catchments Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Basin A	Base	5	0.116	0.600	2.33

**Node Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-1	Base	5	0.000	0.000	0.00

**Pond Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
TSB-1 (IN)	Base	5	0.116	0.600	2.33	(N/A)	(N/A)
TSB-1 (OUT)	Base	5	0.000	0.000	0.00	0.48	0.115

Subsection: I-D-F Table  
Label: CO Springs  
Scenario: Base

Return Event: 5 years  
Storm Event: CO Springs - 5 Year

**I-D-F Curve**

Time (hours)	Intensity (in/h)
0.083	5.169
0.167	4.129
0.250	3.521
0.333	3.089
0.417	2.755
0.500	2.481
0.583	2.250
0.667	2.050
0.750	1.873
0.833	1.715
0.917	1.572
1.000	1.441

Subsection: Level Pool Pond Routing Summary  
 Label: TSB-1 (IN)  
 Scenario: Base

Return Event: 5 years  
 Storm Event: CO Springs - 5 Year

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Infiltration

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Infiltration Method (Computed)	No Infiltration
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Initial Conditions

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Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft <sup>3</sup> /s
Flow (Initial Infiltration)	0.00 ft <sup>3</sup> /s
Flow (Initial, Total)	0.00 ft <sup>3</sup> /s
Time Increment	0.050 hours

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Inflow/Outflow Hydrograph Summary

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Flow (Peak In)	2.33 ft <sup>3</sup> /s	Time to Peak (Flow, In)	0.600 hours
Flow (Peak Outlet)	0.00 ft <sup>3</sup> /s	Time to Peak (Flow, Outlet)	0.000 hours

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Elevation (Water Surface, Peak)	0.48 ft
Volume (Peak)	0.115 ac-ft

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Mass Balance (ac-ft)

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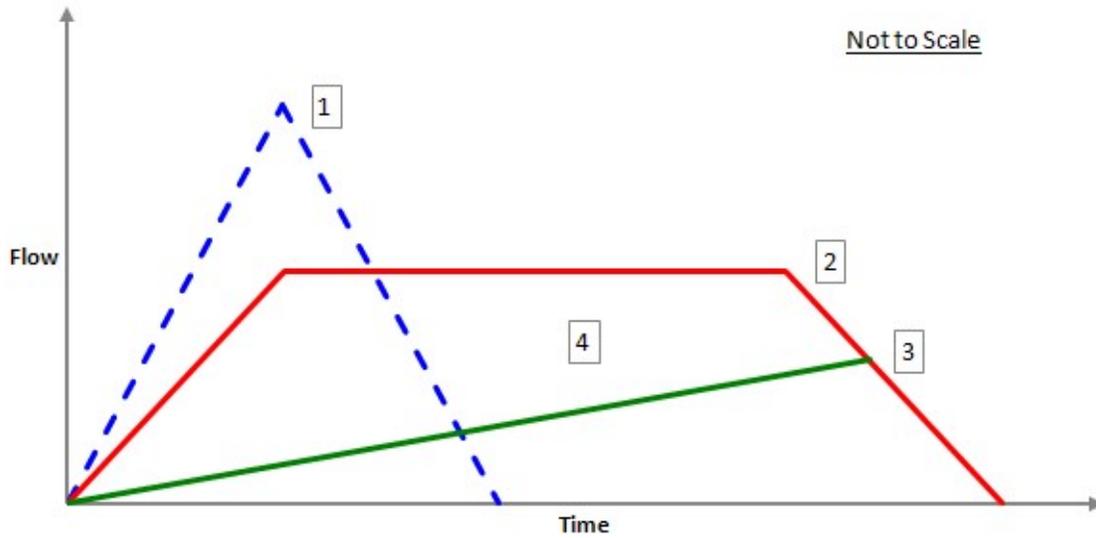
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.116 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.000 ac-ft
Volume (Retained)	0.115 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.2 %

---

Subsection: Modified Rational Graph  
 Label: Basin A  
 Scenario: Base

Return Event: 5 years  
 Storm Event: CO Springs - 5 Year

Method Type	Method I
Time of Duration (Modified Rational, Critical)	0.583 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.583	hours	Time of Duration (Modified Rational, Critical)	0.583	hours
Intensity (Modified Rational, Peak)	2.251	in/h	Intensity (Modified Rational, Critical)	2.251	in/h
Flow (Modified Rational, Peak)	2.40	ft <sup>3</sup> /s	Flow (Modified Rational, Critical)	2.40	ft <sup>3</sup> /s
[3]			[4]		
Second Outflow Breakpoint (Modified Rational)	0.584	hours	Storage (Modified Rational, Estimated)	0.000	ac-ft
Flow (Modified Rational, Allowable)	2.40	ft <sup>3</sup> /s			

**MEADOWBROOK TOWNHOMES  
DRAINAGE REPORT DRAINAGE CALCULATIONS  
(Pond Volume Calculation)**

**SB2**

Elevation	SF	CF	Storage	
			AF	Sum
6296.00	10,638.00			0
6297.00	12,673.00	11,655.50	0.27	0.27
6298.00	14,980.00	13,826.50	0.32	0.58
6299.00	22,912.00	18,946.00	0.43	1.02
6300.00	40,604.00	31,758.00	0.73	1.75

Required Volume = 3600 cf/acre x 13.5 acres = 48,600 cf

Total = 76,186 CF  
Total = 1.7 Ac-ft

Calculated by: JD \_\_\_\_\_  
Date: 9/26/2018  
Checked by: \_\_\_\_\_

Subsection: Modified Rational Grand Summary

**Modified Rational Method**

**$Q = CiA * \text{Units Conversion}; \text{Where conversion} = 43560 / (12 * 3600)$**

Frequency (years)	Area (ft <sup>2</sup> )	Adjusted C Coefficient	Duration (hours)	Intensity (in/h)	Flow (Peak) (ft <sup>3</sup> /s)	Flow (Allowable) (ft <sup>3</sup> /s)	Volume (inflow) (ac-ft)	Volume (Storage) (ac-ft)
100	701,316.00	0.350	0.563	3.871	21.99	21.90	1.023	0.004

Subsection: Master Network Summary

**Catchments Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Basin B	Base	100	1.023	0.550	21.48

**Node Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-2	Base	100	0.204	1.150	0.14

**Pond Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
TSB-2 (IN)	Base	100	1.023	0.550	21.48	(N/A)	(N/A)
TSB-2 (OUT)	Base	100	0.204	1.150	0.14	2.88	1.017

Subsection: I-D-F Table  
Label: CO Springs  
Scenario: Base

Return Event: 100 years  
Storm Event: CO Springs - 100 Year

**I-D-F Curve**

Time (hours)	Intensity (in/h)
0.083	8.679
0.167	6.932
0.250	5.911
0.333	5.186
0.417	4.623
0.500	4.164
0.583	3.776
0.667	3.439
0.750	3.142
0.833	2.887
0.917	2.637
1.000	2.417

Subsection: Addition Summary  
Label: O-2  
Scenario: Base

Return Event: 100 years  
Storm Event: CO Springs - 100 Year

### Summary for Hydrograph Addition at 'O-2'

Upstream Link	Upstream Node
Outlet-1	TSB-2

### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Outlet-1	0.204	1.150	0.14
Flow (In)	O-2	0.204	1.150	0.14

Subsection: Elevation-Area Volume Curve  
 Label: TSB-2  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Elevation (ft)	Planimeter (ft <sup>2</sup> )	Area (ft <sup>2</sup> )	A1+A2+sqr (A1*A2) (ft <sup>2</sup> )	Volume (ac-ft)	Volume (Total) (ac-ft)
0.00	0.0	11,495.000	0.000	0.000	0.000
1.00	0.0	13,596.000	37,592.441	0.288	0.288
2.00	0.0	15,973.000	44,305.652	0.339	0.627
3.00	0.0	23,964.000	59,501.687	0.455	1.082
4.00	0.0	42,457.000	98,318.328	0.752	1.834

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Requested Pond Water Surface Elevations	
Minimum (Headwater)	0.00 ft
Increment (Headwater)	0.50 ft
Maximum (Headwater)	4.00 ft

**Outlet Connectivity**

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Orifice-Circular	Orifice - 4	Forward	TW	1.92	4.00
Orifice-Circular	Orifice - 3	Forward	TW	2.25	4.00
Orifice-Circular	Orifice - 2	Forward	TW	2.58	4.00
Orifice-Circular	Orifice - 1	Forward	TW	2.91	4.00
Stand Pipe	Riser - 1	Forward	TW	3.00	4.00
Orifice-Circular	Orifice - 5	Forward	TW	1.58	4.00
Irregular Weir	Weir - 1	Forward	TW	3.00	4.00
Tailwater Settings	Tailwater			(N/A)	(N/A)

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

**Structure ID: Weir - 1**  
**Structure Type: Irregular Weir**

Station (ft)	Elevation (ft)
1.00	1.00
4.00	0.00
27.00	0.00
30.00	1.00

Lowest Elevation 3.00 ft  
 Weir Coefficient 3.10 (ft<sup>0.5</sup>)/s

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Structure ID: Riser - 1  
 Structure Type: Stand Pipe

Number of Openings	1
Elevation	3.00 ft
Diameter	6.0 in
Orifice Area	0.2 ft <sup>2</sup>
Orifice Coefficient	0.600
Weir Length	1.57 ft
Weir Coefficient	3.00 (ft <sup>0.5</sup> )/s
K Reverse	1.000
Manning's n	0.000
Key, Charged Riser	0.000
Weir Submergence	False
Orifice H to crest	True

---

Structure ID: Orifice - 1  
 Structure Type: Orifice-Circular

Number of Openings	1
Elevation	2.91 ft
Orifice Diameter	1.3 in
Orifice Coefficient	0.600

---

Structure ID: Orifice - 2  
 Structure Type: Orifice-Circular

Number of Openings	1
Elevation	2.58 ft
Orifice Diameter	1.3 in
Orifice Coefficient	0.600

---

Structure ID: Orifice - 3  
 Structure Type: Orifice-Circular

Number of Openings	1
--------------------	---

Subsection: Outlet Input Data  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Structure ID: Orifice - 3	
Structure Type: Orifice-Circular	
Elevation	2.25 ft
Orifice Diameter	1.3 in
Orifice Coefficient	0.600
Structure ID: Orifice - 4	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	1.92 ft
Orifice Diameter	1.3 in
Orifice Coefficient	0.600
Structure ID: Orifice - 5	
Structure Type: Orifice-Circular	
Number of Openings	1
Elevation	1.58 ft
Orifice Diameter	1.3 in
Orifice Coefficient	0.600
Structure ID: TW	
Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall
Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.01 ft
Tailwater Tolerance (Maximum)	0.50 ft
Headwater Tolerance (Minimum)	0.01 ft
Headwater Tolerance (Maximum)	0.50 ft
Flow Tolerance (Minimum)	0.001 ft <sup>3</sup> /s
Flow Tolerance (Maximum)	10.000 ft <sup>3</sup> /s

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Weir - 1 (Irregular Weir)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.00	(N/A)	0.00
2.58	0.00	(N/A)	0.00
2.91	0.00	(N/A)	0.00
3.00	0.00	(N/A)	0.00
3.50	26.37	(N/A)	0.00
4.00	77.88	(N/A)	0.00

Computation Messages

E < Y min=3.00  
 E = Y min=3.00  
 Max.H=.50;  
 Max.Htw=free out;; W(ft)  
 =26.00  
 Max.H=1.00;  
 Max.Htw=free out;; W(ft)  
 =29.00

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Riser - 1 (Stand Pipe)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.00	(N/A)	0.00
2.58	0.00	(N/A)	0.00
2.91	0.00	(N/A)	0.00
3.00	0.00	(N/A)	0.00
3.50	0.67	(N/A)	0.00
4.00	0.95	(N/A)	0.00

Computation Messages

HW & TW <  
 Inv.El.=3.000  
 Weir: H =0ft

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 1 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.00	(N/A)	0.00
2.58	0.00	(N/A)	0.00
2.91	0.00	(N/A)	0.00
3.00	0.01	(N/A)	0.00
3.50	0.03	(N/A)	0.00
4.00	0.04	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 CRIT.DEPTH CONTROL  
 Vh= .024ft Dcr= .065ft  
 CRIT.DEPTH Hev= .00ft  
 H =.54  
 H =1.04

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 2 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.00	(N/A)	0.00
2.58	0.00	(N/A)	0.00
2.91	0.02	(N/A)	0.00
3.00	0.02	(N/A)	0.00
3.50	0.04	(N/A)	0.00
4.00	0.05	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 H =.28  
 H =.37  
 H =.87  
 H =1.37

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 3 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.00	(N/A)	0.00
2.25	0.00	(N/A)	0.00
2.50	0.02	(N/A)	0.00
2.58	0.02	(N/A)	0.00
2.91	0.03	(N/A)	0.00
3.00	0.03	(N/A)	0.00
3.50	0.04	(N/A)	0.00
4.00	0.05	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 H =.20  
 H =.28  
 H =.61  
 H =.70  
 H =1.20  
 H =1.70

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 4 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.00	(N/A)	0.00
2.00	0.01	(N/A)	0.00
2.25	0.02	(N/A)	0.00
2.50	0.03	(N/A)	0.00
2.58	0.03	(N/A)	0.00
2.91	0.04	(N/A)	0.00
3.00	0.04	(N/A)	0.00
3.50	0.05	(N/A)	0.00
4.00	0.06	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 CRIT.DEPTH CONTROL  
 Vh= .028ft Dcr= .052ft  
 CRIT.DEPTH Hev= .00ft  
 H =.28  
 H =.53  
 H =.61  
 H =.94  
 H =1.03  
 H =1.53  
 H =2.03

Subsection: Individual Outlet Curves  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

RATING TABLE FOR ONE OUTLET TYPE  
 Structure ID = Orifice - 5 (Orifice-Circular)

Upstream ID = (Pond Water Surface)  
 Downstream ID = Tailwater (Pond Outfall)

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.02	(N/A)	0.00
2.00	0.02	(N/A)	0.00
2.25	0.03	(N/A)	0.00
2.50	0.04	(N/A)	0.00
2.58	0.04	(N/A)	0.00
2.91	0.05	(N/A)	0.00
3.00	0.05	(N/A)	0.00
3.50	0.06	(N/A)	0.00
4.00	0.06	(N/A)	0.00

Computation Messages

HW & TW below invert  
 Upstream HW &  
 DNstream TW < Inv.El  
 H =.29  
 H =.37  
 H =.62  
 H =.87  
 H =.95  
 H =1.28  
 H =1.37  
 H =1.87  
 H =2.37

Subsection: Composite Rating Curve  
 Label: Composite Outlet Structure - 1  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Composite Outflow Summary

Water Surface Elevation (ft)	Flow (ft <sup>3</sup> /s)	Tailwater Elevation (ft)	Convergence Error (ft)
0.00	0.00	(N/A)	0.00
0.50	0.00	(N/A)	0.00
1.00	0.00	(N/A)	0.00
1.50	0.00	(N/A)	0.00
1.58	0.00	(N/A)	0.00
1.92	0.02	(N/A)	0.00
2.00	0.03	(N/A)	0.00
2.25	0.05	(N/A)	0.00
2.50	0.09	(N/A)	0.00
2.58	0.09	(N/A)	0.00
2.91	0.14	(N/A)	0.00
3.00	0.16	(N/A)	0.00
3.50	27.26	(N/A)	0.00
4.00	79.09	(N/A)	0.00

Contributing Structures

- None Contributing
- Orifice - 5
- Orifice - 4 + Orifice - 5
- Orifice - 4 + Orifice - 5
- Orifice - 4 + Orifice - 3 + Orifice - 5
- Orifice - 4 + Orifice - 3 + Orifice - 5
- Orifice - 4 + Orifice - 3 + Orifice - 2 + Orifice - 5
- Orifice - 4 + Orifice - 3 + Orifice - 2 + Orifice - 1 +
- Riser - 1 + Orifice - 5 + Weir - 1
- Orifice - 4 + Orifice - 3 + Orifice - 2 + Orifice - 1 + Riser - 1 + Orifice - 5 + Weir - 1
- Orifice - 4 + Orifice - 3 + Orifice - 2 + Orifice - 1 + Riser - 1 + Orifice - 5 + Weir - 1

Subsection: Detention Time  
 Label: TSB-2 (IN)  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Infiltration	
Infiltration Method (Computed)	No Infiltration
<b>Approximate Detention Times</b>	
Time to Peak (Outflow + Infiltration, Peak to Peak Detention Time)	1.150 hours
Time to Peak (Inflow, Peak to Peak Detention Time)	0.550 hours
Detention Time (Peak to Peak)	0.600 hours
Time to Centroid (Outflow)	11.391 hours
Time to Centroid (Inflow)	0.564 hours
Detention Time (Centroid to Centroid)	10.828 hours
Weighted Average Plug Time	21.332 hours
Maximum Plug Volume Plug Time	23.400 hours
Maximum Inflow Plug Volume	0.087 ac-ft
Time (Maximum Plug Volume, Start)	0.550 hours
Time (Maximum Plug Volume, End)	0.600 hours

Subsection: Level Pool Pond Routing Summary  
 Label: TSB-2 (IN)  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

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Infiltration

---

Infiltration Method (Computed)	No Infiltration
-----------------------------------	-----------------

---



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Initial Conditions

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Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft <sup>3</sup> /s
Flow (Initial Infiltration)	0.00 ft <sup>3</sup> /s
Flow (Initial, Total)	0.00 ft <sup>3</sup> /s
Time Increment	0.050 hours

---



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Inflow/Outflow Hydrograph Summary

---

Flow (Peak In)	21.48 ft <sup>3</sup> /s	Time to Peak (Flow, In)	0.550 hours
Flow (Peak Outlet)	0.14 ft <sup>3</sup> /s	Time to Peak (Flow, Outlet)	1.150 hours

---

Elevation (Water Surface, Peak)	2.88 ft
Volume (Peak)	1.017 ac-ft

---



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Mass Balance (ac-ft)

---

Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	1.023 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.204 ac-ft
Volume (Retained)	0.818 ac-ft
Volume (Unrouted)	-0.001 ac-ft
Error (Mass Balance)	0.1 %

---

Subsection: Pond Inflow Summary  
Label: TSB-2 (IN)  
Scenario: Base

Return Event: 100 years  
Storm Event: CO Springs - 100 Year

### Summary for Hydrograph Addition at 'TSB-2'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Basin B

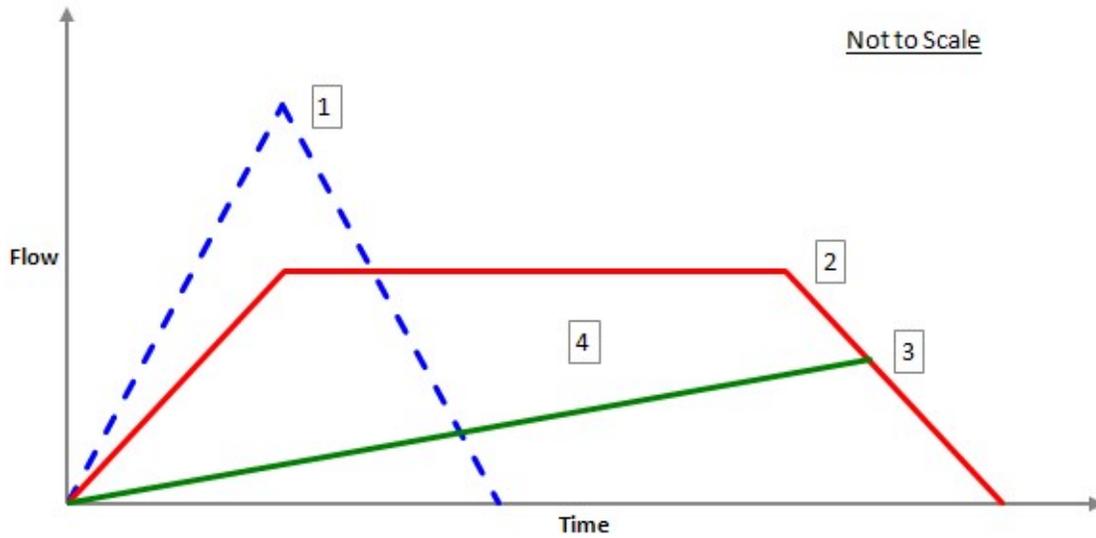
### Node Inflows

Inflow Type	Element	Volume (ac-ft)	Time to Peak (hours)	Flow (Peak) (ft <sup>3</sup> /s)
Flow (From)	Basin B	1.023	0.550	21.48
Flow (In)	TSB-2	1.023	0.550	21.48

Subsection: Modified Rational Graph  
 Label: Basin B  
 Scenario: Base

Return Event: 100 years  
 Storm Event: CO Springs - 100 Year

Method Type	Method I
Time of Duration (Modified Rational, Critical)	0.563 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.563	hours	Time of Duration (Modified Rational, Critical)	0.563	hours
Intensity (Modified Rational, Peak)	3.871	in/h	Intensity (Modified Rational, Critical)	3.871	in/h
Flow (Modified Rational, Peak)	21.99	ft <sup>3</sup> /s	Flow (Modified Rational, Critical)	21.99	ft <sup>3</sup> /s
[3]			[4]		
Second Outflow Breakpoint (Modified Rational)	0.565	hours	Storage (Modified Rational, Estimated)	0.004	ac-ft
Flow (Modified Rational, Allowable)	21.90	ft <sup>3</sup> /s			

Subsection: Modified Rational Grand Summary

**Modified Rational Method**

**$Q = CiA * \text{Units Conversion}; \text{Where conversion} = 43560 / (12 * 3600)$**

Frequency (years)	Area (ft <sup>2</sup> )	Adjusted C Coefficient	Duration (hours)	Intensity (in/h)	Flow (Peak) (ft <sup>3</sup> /s)	Flow (Allowable) (ft <sup>3</sup> /s)	Volume (inflow) (ac-ft)	Volume (Storage) (ac-ft)
5	701,316.00	0.080	0.561	2.312	3.00	3.00	0.139	0.000

Subsection: Master Network Summary

**Catchments Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
Basin B	Base	5	0.139	0.550	2.94

**Node Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)
O-2	Base	5	0.000	0.000	0.00

**Pond Summary**

Label	Scenario	Return Event (years)	Hydrograph Volume (ac-ft)	Time to Peak (hours)	Peak Flow (ft <sup>3</sup> /s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ac-ft)
TSB-2 (IN)	Base	5	0.139	0.550	2.94	(N/A)	(N/A)
TSB-2 (OUT)	Base	5	0.000	0.000	0.00	0.50	0.139

Subsection: I-D-F Table  
Label: CO Springs  
Scenario: Base

Return Event: 5 years  
Storm Event: CO Springs - 5 Year

**I-D-F Curve**

Time (hours)	Intensity (in/h)
0.083	5.169
0.167	4.129
0.250	3.521
0.333	3.089
0.417	2.755
0.500	2.481
0.583	2.250
0.667	2.050
0.750	1.873
0.833	1.715
0.917	1.572
1.000	1.441

Subsection: Level Pool Pond Routing Summary  
 Label: TSB-2 (IN)  
 Scenario: Base

Return Event: 5 years  
 Storm Event: CO Springs - 5 Year

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Infiltration

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Infiltration Method (Computed)	No Infiltration
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Initial Conditions

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Elevation (Water Surface, Initial)	0.00 ft
Volume (Initial)	0.000 ac-ft
Flow (Initial Outlet)	0.00 ft <sup>3</sup> /s
Flow (Initial Infiltration)	0.00 ft <sup>3</sup> /s
Flow (Initial, Total)	0.00 ft <sup>3</sup> /s
Time Increment	0.050 hours

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Inflow/Outflow Hydrograph Summary

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Flow (Peak In)	2.94 ft <sup>3</sup> /s	Time to Peak (Flow, In)	0.550 hours
Flow (Peak Outlet)	0.00 ft <sup>3</sup> /s	Time to Peak (Flow, Outlet)	0.000 hours

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Elevation (Water Surface, Peak)	0.50 ft
Volume (Peak)	0.139 ac-ft

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Mass Balance (ac-ft)

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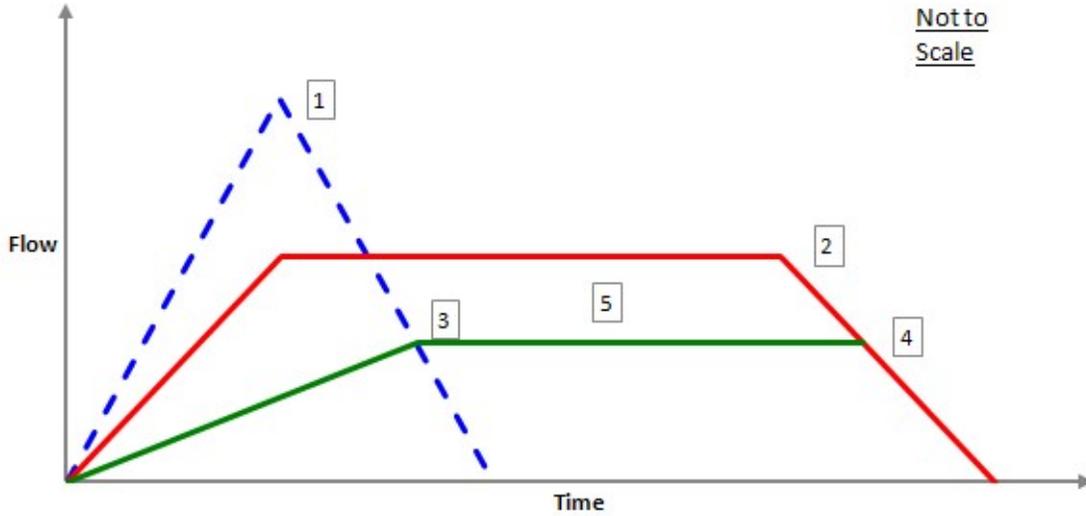
Volume (Initial)	0.000 ac-ft
Volume (Total Inflow)	0.139 ac-ft
Volume (Total Infiltration)	0.000 ac-ft
Volume (Total Outlet Outflow)	0.000 ac-ft
Volume (Retained)	0.139 ac-ft
Volume (Unrouted)	0.000 ac-ft
Error (Mass Balance)	0.0 %

---

Subsection: Modified Rational Graph  
 Label: Basin B  
 Scenario: Base

Return Event: 5 years  
 Storm Event: CO Springs - 5 Year

Method Type	Method T
Time of Duration (Modified Rational, Critical)	0.561 hours



[1]			[2]		
Time of Concentration (Modified Rational, Composite)	0.561	hours	Time of Duration (Modified Rational, Critical)	0.561	hours
Intensity (Modified Rational, Peak)	2.312	in/h	Intensity (Modified Rational, Critical)	2.312	in/h
Flow (Modified Rational, Peak)	3.00	ft <sup>3</sup> /s	Flow (Modified Rational, Critical)	3.00	ft <sup>3</sup> /s

[3]	
First Outflow Breakpoint (Modified Rational, Method T)	0.000 hours
Flow (Modified Rational, Allowable)	3.00 ft <sup>3</sup> /s

[4]			[5]		
Second Outflow Breakpoint (Modified Rational)	0.561	hours	Storage (Modified Rational, Estimated)	0.000	ac-ft
Flow (Modified Rational, Allowable)	3.00	ft <sup>3</sup> /s			

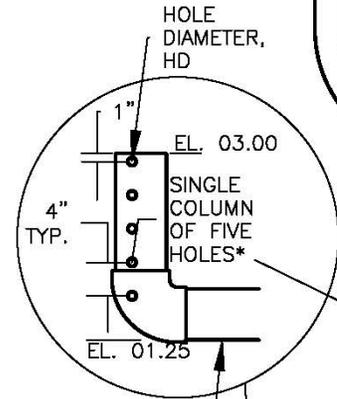
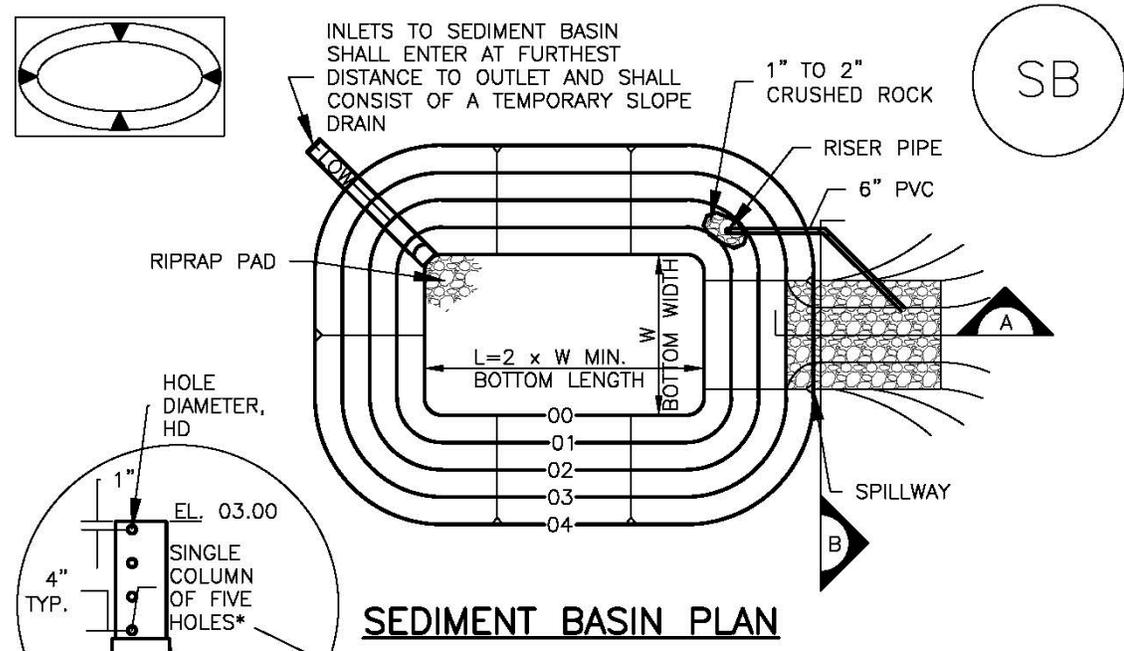
**TEMPORARY SEDIMENT BASIN INFORMATION**

## Maintenance and Removal

Maintenance activities include the following:

- Dredge sediment from the basin, as needed to maintain BMP effectiveness, typically when the design storage volume is no more than one-third filled with sediment.
- Inspect the sediment basin embankments for stability and seepage.
- Inspect the inlet and outlet of the basin, repair damage, and remove debris. Remove, clean and replace the gravel around the outlet on a regular basis to remove the accumulated sediment within it and keep the outlet functioning.
- Be aware that removal of a sediment basin may require dewatering and associated permit requirements.
- Do not remove a sediment basin until the upstream area has been stabilized with vegetation.

Final disposition of the sediment basin depends on whether the basin will be converted to a permanent post-construction stormwater basin or whether the basin area will be returned to grade. For basins being converted to permanent detention basins, remove accumulated sediment and reconfigure the basin and outlet to meet the requirements of the final design for the detention facility. If the sediment basin is not to be used as a permanent detention facility, fill the excavated area with soil and stabilize with vegetation.



\*EXCEPT WHERE THE HOLES EXCEED 1" DIAMETER, THEN UP TO TWO COLUMNS OF SAME SIZED HOLES MAY BE USED

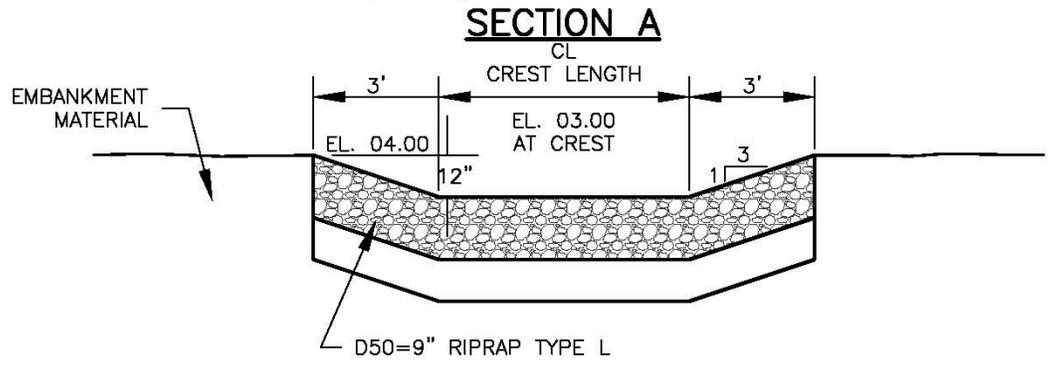
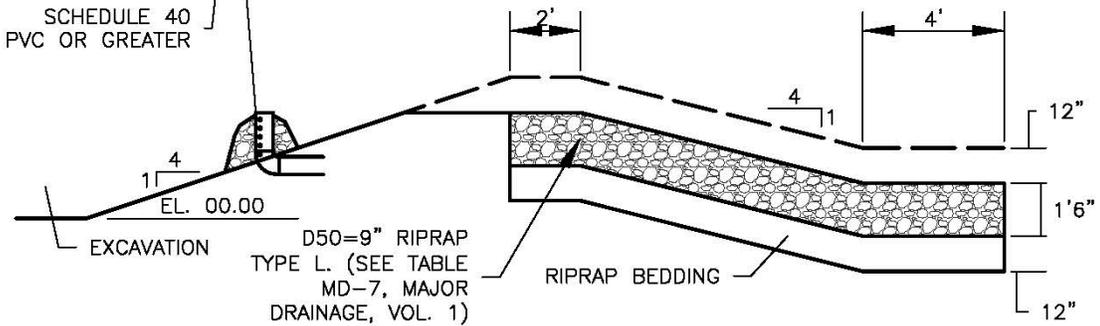


TABLE SB-1. SIZING INFORMATION FOR STANDARD SEDIMENT BASIN			
Upstream Drainage Area (rounded to nearest acre), (ac)	Basin Bottom Width (W), (ft)	Spillway Crest Length (CL), (ft)	Hole Diameter (HD), (in)
1	12 1/2	2	9/32
2	21	3	13/16
3	28	5	1/2
4	33 1/2	6	9/16
5	38 1/2	8	2 1/32
6	43	9	2 1/32
7	47 1/4	11	2 5/32
8	51	12	2 7/32
9	55	13	7/8
10	58 1/4	15	1 5/16
11	61	16	3 1/32
12	64	18	1
13	67 1/2	19	1 1/16
14	70 1/2	21	1 1/8
15	73 1/4	22	1 3/16

SEDIMENT BASIN INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
  - LOCATION OF SEDIMENT BASIN.
  - TYPE OF BASIN (STANDARD BASIN OR NONSTANDARD BASIN).
  - FOR STANDARD BASIN, BOTTOM WIDTH W, CREST LENGTH CL, AND HOLE DIAMETER, HD.
  - FOR NONSTANDARD BASIN, SEE CONSTRUCTION DRAWINGS FOR DESIGN OF BASIN INCLUDING RISER HEIGHT H, NUMBER OF COLUMNS N, HOLE DIAMETER HD AND PIPE DIAMETER D.
2. FOR STANDARD BASIN, BOTTOM DIMENSION MAY BE MODIFIED AS LONG AS BOTTOM AREA IS NOT REDUCED.
3. SEDIMENT BASINS SHALL BE INSTALLED PRIOR TO ANY OTHER LAND-DISTURBING ACTIVITY THAT RELIES ON ON BASINS AS AS A STORMWATER CONTROL.
4. EMBANKMENT MATERIAL SHALL CONSIST OF SOIL FREE OF DEBRIS, ORGANIC MATERIAL, AND ROCKS OR CONCRETE GREATER THAN 3 INCHES AND SHALL HAVE A MINIMUM OF 15 PERCENT BY WEIGHT PASSING THE NO. 200 SIEVE.
5. EMBANKMENT MATERIAL SHALL BE COMPACTED TO AT LEAST 95 PERCENT OF MAXIMUM DENSITY IN ACCORDANCE WITH ASTM D698.
6. PIPE SCH 40 OR GREATER SHALL BE USED.
7. THE DETAILS SHOWN ON THESE SHEETS PERTAIN TO STANDARD SEDIMENT BASIN(S) FOR DRAINAGE AREAS LESS THAN 15 ACRES. SEE CONSTRUCTION DRAWINGS FOR EMBANKMENT, STORAGE VOLUME, SPILLWAY, OUTLET, AND OUTLET PROTECTION DETAILS FOR ANY SEDIMENT BASIN(S) THAT HAVE BEEN INDIVIDUALLY DESIGNED FOR DRAINAGE AREAS LARGER THAN 15 ACRES.

## SEDIMENT BASIN 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 IN BASIN SHALL BE REMOVED AS NEEDED TO MAINTAIN BMP EFFECTIVENESS, TYPICALLY WHEN SEDIMENT DEPTH REACHES ONE FOOT (I.E., TWO FEET BELOW THE SPILLWAY CREST).
5. SEDIMENT BASINS ARE TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND GRASS COVER IS ACCEPTED BY THE LOCAL JURISDICTION.
6. WHEN SEDIMENT BASINS ARE REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDED AND MULCHED OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAILS ADAPTED FROM DOUGLAS COUNTY, COLORADO)

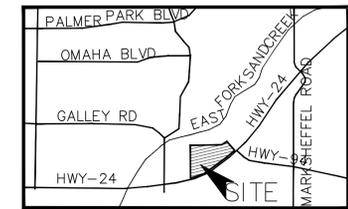
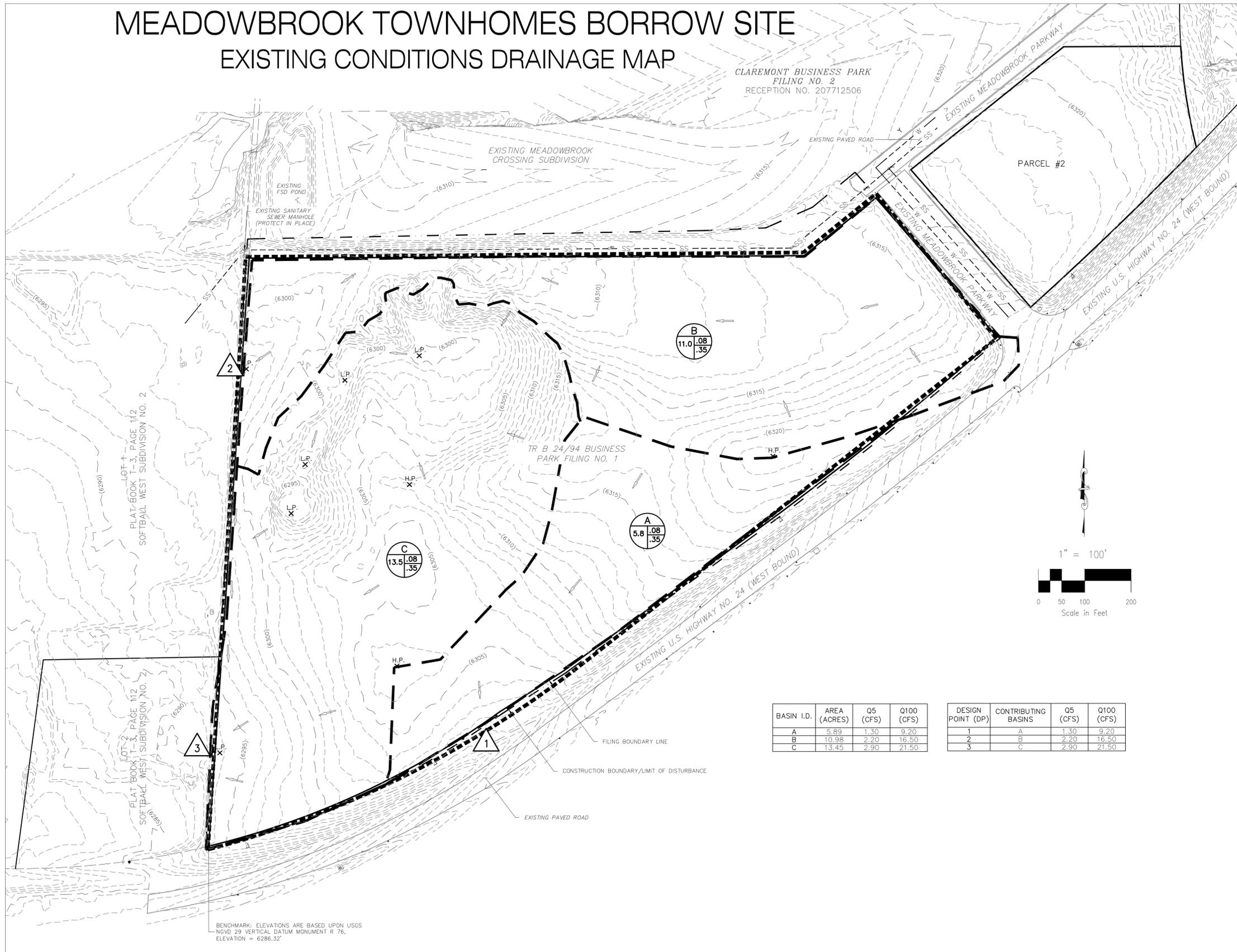
NOTE: MANY JURISDICTIONS HAVE BMP DETAILS THAT VARY FROM UDFCD STANDARD DETAILS. CONSULT WITH LOCAL JURISDICTIONS AS TO WHICH DETAIL SHOULD BE USED WHEN DIFFERENCES ARE NOTED.

**EXISTING AND PROPOSED  
DRAINAGE MAPS**

townhomes removed

# MEADOWBROOK TOWNHOMES BORROW SITE EXISTING CONDITIONS DRAINAGE MAP

CLAREMONT BUSINESS PARK  
FILING NO. 2  
RECEPTION NO. 207712506



VICINITY MAP  
N.T.S.

**LEGEND**

- BASIN DESIGNATION: Z 25 .25 .35
- ACRES: C5, C100
- SURFACE DESIGN POINT
- CURRENT DEVELOPMENT BASIN BOUNDARY
- EXISTING CONTOUR
- PROP CONTOUR
- EXISTING STORM SEWER PIPE
- EXISTING FLOW DIRECTION
- FLOW DIRECTION
- HIGH POINT
- LOW POINT

BASIN I.D.	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
A	5.89	1.30	9.20
B	10.98	2.20	16.50
C	13.45	2.90	21.50

DESIGN POINT (DP)	CONTRIBUTING BASINS	Q5 (CFS)	Q100 (CFS)
1	A	1.30	9.20
2	B	2.20	16.50
3	C	2.90	21.50

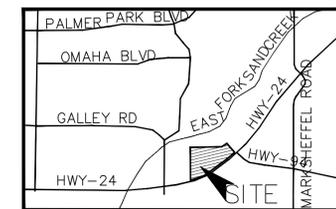
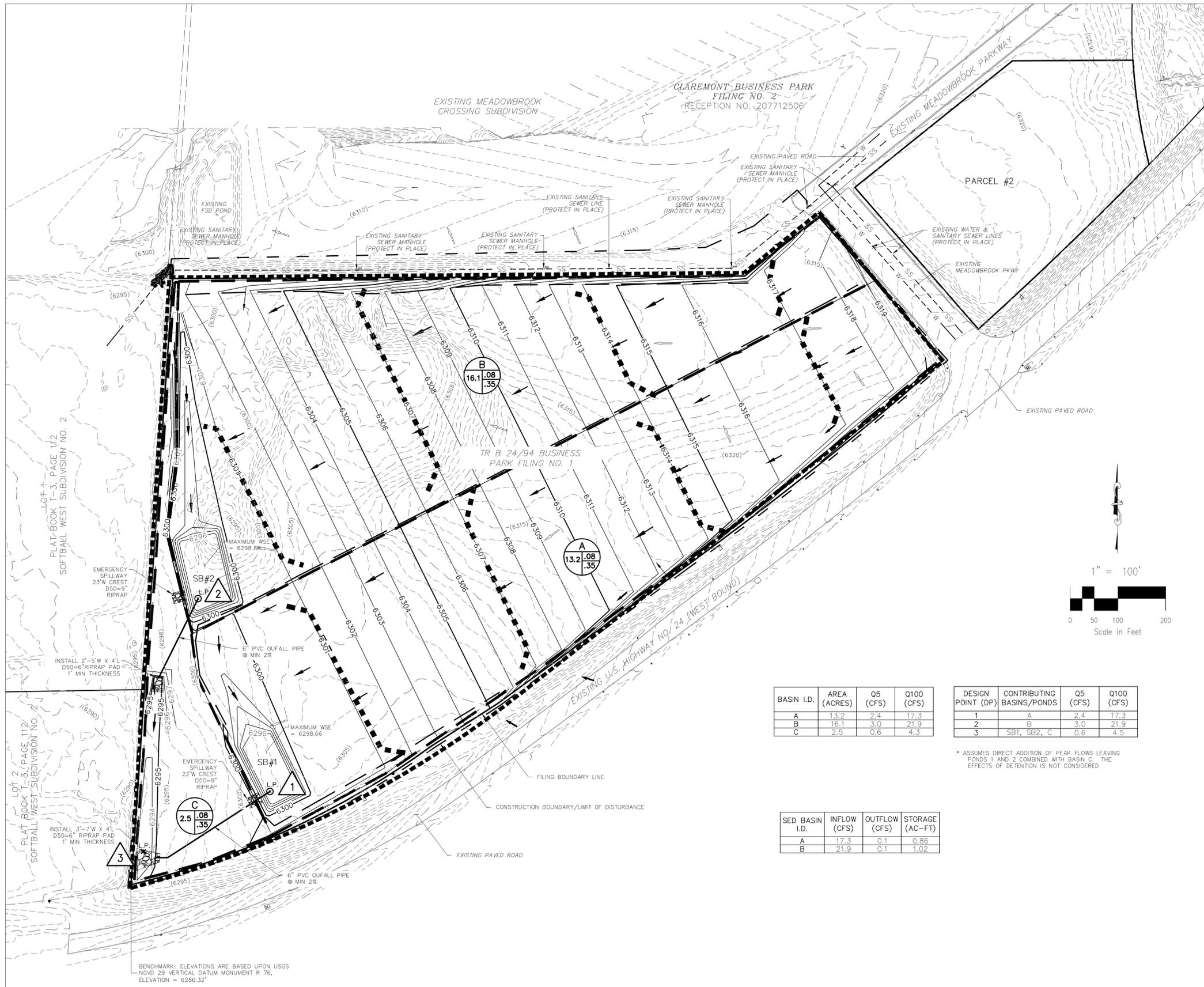
BENCHMARK: ELEVATIONS ARE BASED UPON USGS  
NGVD 29 VERTICAL DATUM MONUMENT R 76,  
ELEVATION = 6286.32'

townhomes removed

EXISTING DRAINAGE MAP  
MEADOWBROOK TOWNHOMES BORROW SITE  
JOB NO. 43-089  
DATE PREPARED: SEPT 20, 2018  
DATE REVISED:



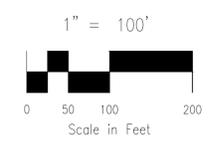
20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903  
PHONE: 719.955.5485



VICINITY MAP  
N.T.S.

LEGEND

- BASIN DESIGNATION: Z  
25  
.25  
.35  
C5  
C100
- SURFACE DESIGN POINT
- CURRENT DEVELOPMENT BASIN BOUNDARY
- EXISTING CONTOUR
- PROP CONTOUR
- EXISTING STORM SEWER PIPE
- LIMITS OF CONSTRUCTION
- MINOR BERMING TO RETAIN RUNOFF
- FLOW DIRECTION
- HIGH POINT
- LOW POINT



BASIN I.D.	AREA (ACRES)	Q5 (CFS)	Q100 (CFS)
A	13.2	2.4	17.3
B	16.1	3.0	21.9
C	2.5	0.6	4.3

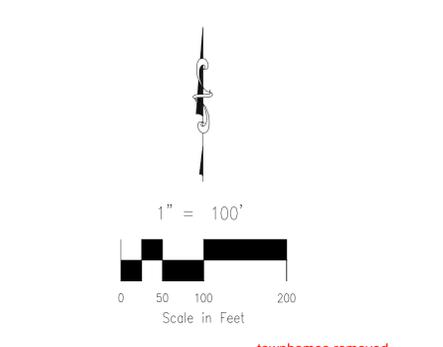
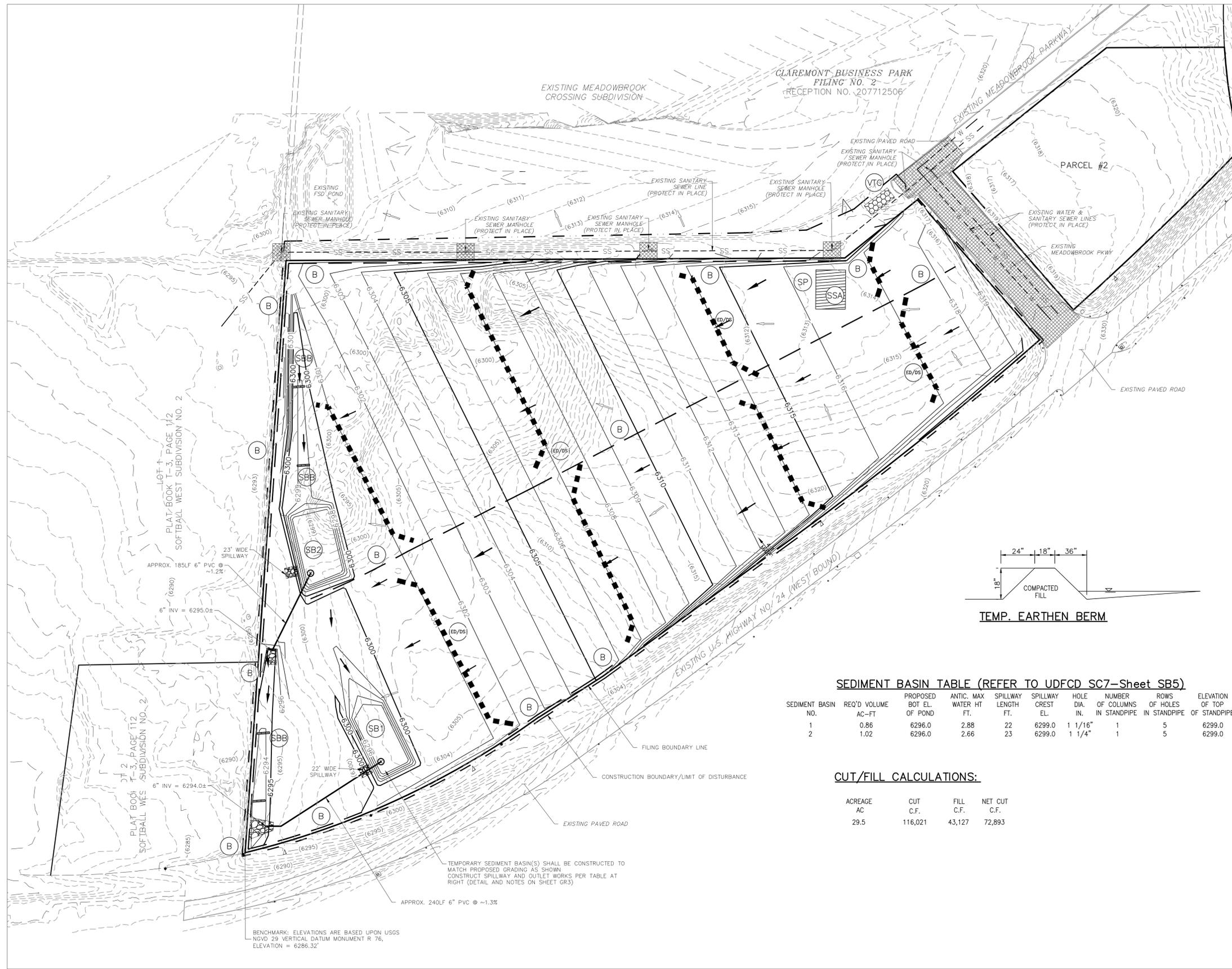
DESIGN POINT (DP)	CONTRIBUTING BASINS/PONDS	Q5 (CFS)	Q100 (CFS)
1	A	2.4	17.3
2	B	3.0	21.9
3	SB1, SB2, C	0.6	4.5

\* ASSUMES DIRECT ADDITION OF PEAK FLOWS LEAVING PONDS 1 AND 2 COMBINED WITH BASIN C. THE EFFECTS OF DETENTION IS NOT CONSIDERED

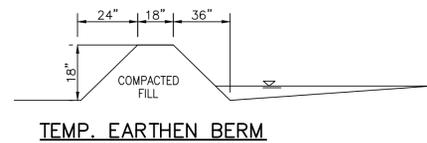
SED BASIN I.D.	INFLOW (CFS)	OUTFLOW (CFS)	STORAGE (AC-FT)
A	17.3	0.1	0.86
B	21.9	0.1	1.02

BENCHMARK: ELEVATIONS ARE BASED UPON USGS NGVD 29 VERTICAL DATUM MONUMENT R 76, ELEVATION = 6286.32'

**DRAFT GRADING AND EROSION CONTROL PLAN**



- LEGEND**
- (6320) --- EXISTING MAJOR CONTOUR (5' INTERVAL)
  - (6319) --- EXISTING MINOR CONTOUR (1' INTERVAL)
  - - - - - EXISTING SANITARY SEWER LINE
  - 6920 --- PROPOSED MAJOR CONTOUR (5' INTERVAL)
  - 6918 --- PROPOSED MINOR CONTOUR (1' INTERVAL)
  - FILING BOUNDARY LINE
  - - - - - CONST BOUNDARY/LIMITS OF DISTURBANCE
  - (Tree symbols) EXISTING VEGETATION (TREES/SHRUBS)
  - x L.P./H.P. LOW POINT/HIGH POINT
  - (Arrow) EXISTING FLOW DIRECTION ARROW
  - 3:1 FLOW DIRECTION & SLOPE
  - (Arrow) FLOW DIRECTION ARROW/ EMERGENCY OVERTFLOW
  - (Hatched box) REFRAIN FROM GRADING
  - (Stippled box) TEMPORARY RIP-RAP
  - (SBB symbol) STRAW BALE DITCH CHECK
  - (B symbol) EARTH BERM
  - (VTC symbol) VEHICLE TRACKING CONTROL
  - (SB symbol) TEMPORARY SEDIMENT BASIN
  - (SP symbol) STOCK PILE STAGING
  - (SSA symbol) STABILIZED STATION AREA
  - (ED/DS symbol) EARTH DIKES & DRAINAGE SWALES



**SEDIMENT BASIN TABLE (REFER TO UDFCD SC7-Sheet SB5)**

SEDIMENT BASIN NO.	REQ'D VOLUME AC-FT	PROPOSED BOT EL. OF POND	ANTIC. MAX WATER HT. FT.	SPILLWAY LENGTH FT.	SPILLWAY CREST EL.	HOLE DIA. IN.	NUMBER OF COLUMNS IN STANDPIPE	ROWS OF HOLES IN STANDPIPE	ELEVATION OF TOP OF STANDPIPE
1	0.86	6296.0	2.88	22	6299.0	1 1/16"	1	5	6299.0
2	1.02	6296.0	2.66	23	6299.0	1 1/4"	1	5	6299.0

**CUT/FILL CALCULATIONS:**

ACREAGE AC	CUT C.F.	FILL C.F.	NET CUT C.F.
29.5	116,021	43,127	72,893

TEMPORARY SEDIMENT BASIN(S) SHALL BE CONSTRUCTED TO MATCH PROPOSED GRADING AS SHOWN. CONSTRUCT SPILLWAY AND OUTLET WORKS PER TABLE AT RIGHT (DETAIL AND NOTES ON SHEET GR3)

BENCHMARK: ELEVATIONS ARE BASED UPON USGS NGVD 29 VERTICAL DATUM MONUMENT R 76, ELEVATION = 6286.32'

- ADDITIONAL NOTES:**
1. STAGING AREA TO BE DETERMINED BY CONTRACTOR IN THE FIELD. THE LOCATIONS SHALL BE DELINEATED ON THIS PLAN BY THE CONTRACTOR.
  2. THE EROSION CONTROL DELINEATED ON THIS PLAN SHALL BE REGULARLY UPDATED BY THE CONTRACTOR.
  3. A FLOODPLAIN DEVELOPMENT PERMIT IS REQUIRED TO CONDUCT THE WORK SHOWN WITHIN THE 100 YEAR FLOODPLAIN.
  4. PROPOSED SLOPES SHALL BE 4:1 OR LESS.
  5. THE CONTRACTOR SHALL OBTAIN A COPY OF THE GEOTECHNICAL ENGINEERING REPORT AND KEEP A COPY ONSITE DURING ALL EARTHWORK OPERATIONS.
  6. THE CONTRACTOR SHALL PROVIDE SUFFICIENT BUFFER BETWEEN THE LIMITS OF DISTURBANCE AND AREAS IN WHICH NO GRADING SHALL OCCUR TO MAKE SUFFICIENT TIE IN BETWEEN THE PROPOSED GRADE AND EXISTING GRADE WHICH MAY NOT BE CLEARLY ILLUSTRATED ON THIS PLAN.

**STATEMENT:**  
THE CITY OF COLORADO SPRINGS RECOGNIZES THE DESIGN ENGINEER AS HAVING RESPONSIBILITY FOR THE DESIGN; THE CITY HAS LIMITED ITS SCOPE OF REVIEW ACCORDINGLY. RESUBMITTAL REQUIRED IF CONSTRUCTION HAS NOT COMMENCED WITHIN 180 DAYS AFTER APPROVAL DATE.

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES  
**FOR BURIED UTILITY INFORMATION 48 HRS BEFORE YOU DIG CALL 1-800-922-1987**

**MEADOWBROOK TOWNHOMES - DIRT BORROW SITE**

**GRADING & EROSION CONTROL PLAN**

PROJECT NO. 43-089A DATE: 10/24/2018

DESIGNED BY: DLM SCALE: HORIZONTAL: 1"=50' VERTICAL: N/A

DRAWN BY: SM CHECKED BY: JD SHEET 2 OF 3 **GR2**

20 BOULDER CRESCENT, SUITE 110  
COLORADO SPRINGS, CO 80903  
PHONE: 719.555.5485

**M&S CIVIL CONSULTANTS, INC.**

FOR AND ON BEHALF OF M&S CIVIL CONSULTANTS, INC.

WROEL A. SANCHEZ, COLORADO P.E. NO. 371160

NO.	DATE	DESCRIPTION

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR UNAUTHORIZED CHANGES TO OR USE OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

**CAUTION**

# Markup Summary

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## Daniel Torres (4)

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It and one row of (7) 1.00' dia. 400 holes at elevations of 4208.51 as shown on Aug. 2013, LERFD SB sheet SC-7 (see 3. 2.6) emergency overflow were added to provided year and month. Revised table on sheet SC-7. SB1 calculations and table on GEC indicates 23 ft. Revised.

**Subject:** Callout  
**Page Label:** 6  
**Author:** Daniel Torres  
**Date:** 10/30/2018 1:24:09 PM  
**Color:** ■

SB1 calculations and table on GEC indicates 22 ft. Revise.

20.71  
A 23 ft  
and 10

**Subject:** Highlight  
**Page Label:** 6  
**Author:** Daniel Torres  
**Date:** 10/30/2018 1:24:32 PM  
**Color:** ■

2

Aug 2013  
a 22 ft  
back m

**Subject:** Highlight  
**Page Label:** 6  
**Author:** Daniel Torres  
**Date:** 10/30/2018 1:24:37 PM  
**Color:** ■

22

It and one row of (7) 1.00' dia. 400 holes at elevations of 4208.51 as shown on Aug. 2013, LERFD SB sheet SC-7 (see 3. 2.6) emergency overflow were added to provided year and month. Revised table on sheet SC-7. SB1 calculations and table on GEC indicates 23 ft. Revised.

**Subject:** Callout  
**Page Label:** 6  
**Author:** Daniel Torres  
**Date:** 10/30/2018 1:57:10 PM  
**Color:** ■

SB2 calculations and table on GEC indicates 23 ft. Revise.

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## dsdparsons (1)

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GE REPORT  
WNHOMES DIRT  
SITE

This is not an approved town home development site. Town homes are not an allowed use in the CR zone district.

**Subject:** Callout  
**Page Label:** 1  
**Author:** dsdparsons  
**Date:** 10/30/2018 5:15:01 PM  
**Color:** ■

This is not an approved town home development site. Town homes are not an allowed use in the CR zone district.