

FINAL DRAINAGE REPORT

FOR

CLAREMONT BUSINESS PARK
FILING NO. 2, LOT 2-1A

EL PASO COUNTY, COLORADO

JANUARY 2018

Prepared for:

Hammers Construction, Inc.
1411 Woolsey Heights
Colorado Springs, CO 80915

Prepared by:



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

Project #44-034
PCD Project #

PCD File No. PPR192

**FINAL DRAINAGE REPORT
FOR
CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A**

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 established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions 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: _____

TITLE: _____

DATE: _____

ADDRESS: Hammers Construction, LLC
 1411 Woolsey Heights
 Colorado Springs, CO80915

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
CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A**

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Proposed Drainage Map
Grading and Erosion Control Plan
Grading Erosion Control Plan

FINAL DRAINAGE REPORT FOR CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A

PURPOSE

This document is intended to serve as the Final Drainage Report for CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A. The purpose of this document is to identify and analyze the on and offsite 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 Drainage Criteria Manual. The proposed principal use for Lot 2-1A consists of all infrastructures typically associated with commercial building structures. The majority of the site will consist of asphalt, curb, lighting, a storm water quality facility and landscaping.

GENERAL LOCATION AND DESCRIPTION

CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A is located in the northeast quarter of the northeast quarter of Section 8, Township 14 South, Range 65 West of the 6th P.M. in El Paso County, Colorado. The site is bound on the north by Claremont Commercial Subdivision Filing No. 2, on the west by existing Meadowbrook Parkway, on the south by existing Woolsey Heights and an existing warehouse/storage facility. U.S. Highway 24 borders the site to the southeast. The site lies within the Sand Creek Drainage Basin. Flows from this site are tributary to East Fork Sand Creek.

Lot 2-1A of Claremont Business Park is presently undeveloped and consists of 2.929 acres. Vegetation is sparse, consisting of native grasses. The site had experienced overlot grading activities within the last ten years. Existing site terrain generally slopes from northeast to southwest at grade rates that vary between 2% and 12%.

CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A site is currently zoned "CS" and the proposed principal uses for Lot 2-1A will be an office/warehouse/light manufacturing. The majority of Lot 2-1A shall consist of two (2) warehouse buildings, asphalt, curb, lighting, a storm water quality facility and landscaping. A sand filter basin is located within the western portion of the lot and will function to provide water quality treatment for the site. Flows discharge from the sand filter basin through an outlet structure, into an existing private 42" RCP storm sewer, and eventually outfall directly to East Fork Sand Creek.

SOILS

Soils for this project are delineated by the map in the appendix as Blakeland Loamy Sand (8) and characterized as Hydrologic Soil Type "A". 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.

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.

FLOODPLAIN STATEMENT

Update the FEMA FIRM numbers and effective date to the December 2018 date.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) Panel No. 08041C0752 F, effective date March 17, 1997, LOMR 06-08-B137P dated November 13, 2006 and Panel No. 08041C0756 F, effective date March 17, 1997, LOMR 08-08-0630P dated September 24, 2008. No portion of this site is located within the 100 year floodplain. See Appendix.

DRAINAGE CRITERIA

This drainage analysis has been prepared in accordance with the current City of Colorado Springs/El Paso County Drainage Criteria Manual. Calculations were performed to determine runoff quantities for the 5-year and 100-year frequency storms for developed conditions using the Rational Method as required for basins having areas less than 100 acres.

FOUR STEP PROCESS

- Step1 Employ Runoff Reduction Practices** – Approx. 0.21 ac of the proposed developed 2.929 ac of ground within the project is being set aside for Open Space/WQ facility. Roof drains will be directed to landscaped areas to minimize direct connection of impervious surfaces.
- Step 2 Stabilize Drainageways** – The site ultimately discharges in the East Fork Sand Creek Channel via an existing public 48" RCP storm sewer located near the southwest corner of the site (intersection of Woolsey Heights and Meadowbrook Parkway). The "Final Drainage Report for Claremont Business Park Filing No. 2", dated November 2006, by Matrix Design Group, Inc. has been designed to discharge developed flows via the existing public 48" RCP directly to the East Fork Sand Creek Channel, as highlighted on the existing drainage map (Design Point 2). Lot 2-1A proposes a Sand Filter Basin Water Quality Facility before ultimately discharging to the East Fork Sand Creek Channel. The outlet underdrain has been designed to drain the pond in a peak event within 12 hours, therefore is not anticipated to have negative effects on downstream drainageways.
- Step 3 Provide Water Quality Capture Volume** – A Sand Filter Basin Water Quality Facility is proposed to provide WQCV.
- Step4 Consider Need for Industrial and Commercial BMP's** – This submittal provides a final grading and erosion control plans with BMPs in place. The proposed project will use silt fence, a vehicle tracking control pad, a concrete washout area, mulching and reseeded to mitigate the potential for erosion across the site.

EXISTING DRAINAGE CONDITIONS

CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A site consists of 2.929 acres and is situated east of the East Fork Reach of the Sand Creek Watershed. This area was previously studied in the "Final Drainage Report for Claremont Business Park Filing No. 2", dated November 2006, by Matrix Design Group, Inc. (hence for referred to as "MDDP"). The MDDP calculations indicate that, under the fully developed conditions, the total tributary area of Sub-basins OS1, B1, B2, and B3 (19.25 acres), with basin B3 including the eastern half of Meadowbrook Parkway, would produce a cumulative runoff of approximately Q5=42.6 cfs and Q100=86.6 cfs (Design Point 2). The MDDP illustrated that the

watershed would drain from east to the southwest towards the intersection of Woolsey Heights and Meadowbrook Parkway. As stated in the MDDP, overlot grading activities for the entire site have been completed. Per Resolution 16-426 of the BoCC, on-site WQCV is required but on-site stormwater detention is not required per the FDR for Claremont Business Park Fil. 2.

An existing 42" RCP private storm sewer runs along the eastern side of Meadowbrook Parkway. A sand filter water quality pond is planned with the development of Claremont Commercial Subdivision Filing No. 2, north of the site, and will discharge into the existing 42" RCP private storm sewer. The proposed sand filter water quality pond for this site is also planned to discharge into the same existing 42" RCP private storm sewer. An existing 10' Type R at grade inlet exist at the northeast corner of the intersection of Woolsey Heights and Meadowbrook Parkway. Runoff from the site and the two surrounding streets, Meadowbrook Parkway and Woolsey Heights, is intercepted by this inlet. The existing 42" RCP private storm sewer ties into the back of the existing 10' Type R at grade inlet and an existing 48" public storm sewer discharges all flows from the inlet. The existing 48" public storm sewer runs along Woolsey Heights and is routed directly to the East Fork Sand Creek Channel. All flows are discharged to the East Fork Sand Creek Channel via the existing 48" public storm sewer.

Refer to the drainage basin descriptions that follow for additional information as well as the Drainage Map located within the Appendix of this report.

PROPOSED DRAINAGE CHARACTERISTICS

General Concept Drainage Discussion

The majority of the site will consist of two (2) neighborhood commercial and light industrial buildings, asphalt, curb, a storm water quality sand filter basin, and landscaping. The site will drain, across asphalt and impermeable surfaces, to the southwest. Channelized flow will be conveyed via curb and gutter and ribbon gutters to the Design Points shown on the drainage map. Runoff of Q5=7.5 cfs and Q100=15.4 cfs has been calculated for the 2.929 acre site. Discharge from the planned site to the north (Claremont Commercial Subdivision Filing No. 2, Design Point 5, Q5=35.9 cfs and Q100=70.5 cfs) and runoff from the proposed site totals to Q5=43.4 cfs, Q100=85.9 cfs. These values are very similar to the previously mentioned MDDP study values (Q5=42.6 cfs, Q100=86.6 cfs), with the MDDP including runoff from the eastern half of Meadowbrook Parkway. A storm water quality sand filter basin is proposed to be constructed at the southwest end of the site and treat all onsite runoff with contributing nominal offsite flows from existing Basins EX1 and EX2. The outlet structure of the proposed sand filter water quality pond will release into a proposed 18" RCP storm sewer (Pipe Run 1) that ties in the existing private 42" RCP storm sewer that runs along the eastern side of Meadowbrook Parkway. The existing private 42" storm sewer ties into an existing public 48" storm sewer which will route the treated runoff to East Fork Sand Creek. For more information of drainage basins, existing and proposed structures, refer to the Proposed Drainage Map located within the Appendix of this report.

Please reference the approved drainage report for this site indicating the date and engineering company that prepared the report.

Detailed Drainage Discussion

Basin EX1 & Basin EX2, 0.61 acres, consists of steep slopes of 32% adjacent to U.S Highway 24 and N. Marksheffel Rd. The roadway embankment slopes into a soil retention wall that runs along the western boundary of each basin. Runoff for Basin EX1 Q5=0.1 cfs and Q100=0.8 cfs and EX2 Q5=0.2 cfs and Q100=1.1 cfs has been calculated to be produced within the basins. Flows produced within the two basins will be conveyed westward into adjacent basins (Basin A, B, & D) as sheet flow.

Basin A, 0.93 acres, consists of a portions of the two proposed buildings, asphalt paving, curb and gutter, and a ribbon gutter. Runoff produce by Basin A of Q5=3.9 cfs and Q100=7.0 cfs will begin as sheet flow near the high points of the basin, combine with flows from Basin EX1, and be conveyed northwest as

The approved preliminary drainage report for this site indicates this flow as Q5=38.5 cfs, Q100=75.6 cfs. Revise

concentrated flow via a proposed ribbon gutter to Design Point 1. A trapezoidal riprap rundown is proposed at Design Point 1 to convey runoff into the proposed sand filter water quality pond for treatment.

Basin B, 0.92 acres, consists of a portions of the two proposed buildings, asphalt paving, proposed parking, curb and gutter, and a ribbon gutter. Runoff produce by Basin B of $Q_5=3.8$ cfs and $Q_{100}=7.0$ cfs will begin as sheet flow near the high points of the basin, combine with flows from Basin EX2, and be conveyed northwest as concentrated flow via curb and gutter and a proposed ribbon gutter to Design Point 2. A trapezoidal riprap rundown is proposed at Design Point 2 to convey runoff into the proposed sand filter water quality pond for treatment.

Basin C, 0.21 acres, consists of the area proposed for the onsite Sand Filter Basin water quality pond. Runoff of $Q_5=0.1$ cfs and $Q_{100}=0.6$ cfs produced within the basin will ultimately combine with flows entering the pond from the proposed trapezoidal riprap rundowns at Design Point 1 and Design Point 2. Flows from the Sand Filter Basin are discharged through a CDOT Type D outlet structure and proposed private 18" RCP (Pipe Run 1, $Q_5=7.5$ cfs and $Q_{100}=15.4$ cfs). The proposed private 18" RCP is proposed to tie into the centerline of the existing private 42" RCP storm sewer that runs along the eastern side of Meadowbrook Parkway. Flows are then conveyed into the backside of the existing 10' Type R at grade inlet along Woolsey Heights.

Basin D, 0.26 acres, consists of a landscaping strip running alongside and adjacent to Meadowbrook Parkway and the southern boundary of the site. The basin will most likely be composed of trees, bushes/grasses, and decorative ground cover. Low runoff values produced by Basin D of $Q_5=0.5$ cfs and $Q_{100}=1.2$ cfs will travel as sheet flow into Meadowbrook Parkway and Woolsey Heights.

There are no planned or required improvements to the East Fork Sand Creek Drainage Channel with the development of the CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A site.

WATER QUALITY PROVISIONS AND MAINTENANCE

The proposed Sand Filter Basin (SFB) functions to provide water quality for runoff produced onsite. The water quality pond is designed to treat approximately 2.67 acres, and provide 1,830 cubic feet of water quality storage. Flows tributary to the SFB are released through a proposed CDOT Type D outlet structure and into a and proposed private 18" RCP storm sewer that ties into the centerline of the existing private 42" RCP storm sewer. The water quality basin will be private and shall be maintained by the property owner. Access shall be granted to the owner and El Paso County for access and maintenance of the private WQCV facility. A private maintenance agreement document shall accompany the submittal.

The subject site was previously analyzed within the Final Drainage Report for Claremont Business Park Filing No. 2 prepared by Matrix Design Group approved April 24, 2006. Per Resolution 16-426 of the BoCC, on-site WQCV is required but on-site stormwater detention is not required per the FDR for Claremont Business Park Fil. 2. The water quality volume required for the site has been determined using the UDFCD UD-Detention workbook per the guidelines set forth in the City of Colorado Springs/El Paso County Drainage Criteria Manual - Volume II. The length to width ration in the UD-Detention "Detention Basin Stage-Storage Table Builder" page has been adjusted to match the 100 yr calculated cfs for the Sand Filter Basin (Design Point 3, 15.4 cfs). This conservative approach increases storage volume and ensures the appropriate capacity of the pond. Refer to the water quality facility sizing calculations (UD-Detention, Version 3.07) located within the appendix of this report.

EROSION CONTROL

It is the policy of the El Paso County that we submit a grading and erosion control plan with the drainage report. Proposed silt fence, vehicle traffic control, and concrete washout area are proposed as erosion control measures.

CONSTRUCTION COST OPINION

Private Drainage Facilities NON-Reimbursable:

Item	Description	Quantity	Unit Cost	Cost
1.	18" RCP	18 LF	\$40 /LF	\$720.00
2.	WQ Sand Filter Basin	1 EA	\$4,000 /EA	\$4,000.00
3.	Spillway Protection (SC250 Mat)	42 SY	\$10 /SY	\$420.00
4.	Pond Outlet Structure	1 EA	\$3,500 /EA	\$3,500.00
Total \$				\$8,640.00

M &S Civil Consultants, Inc. (M &S) cannot and does not guarantee the construction cost will not vary from these opinions of probable costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development in particular. The above is only an estimate of the facility cost in 2018.

DRAINAGE & BRIDGE FEES

The site is currently platted, with no replat being submitted. Therefore drainage and bridge fees are not due for the development of The CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A.

SUMMARY

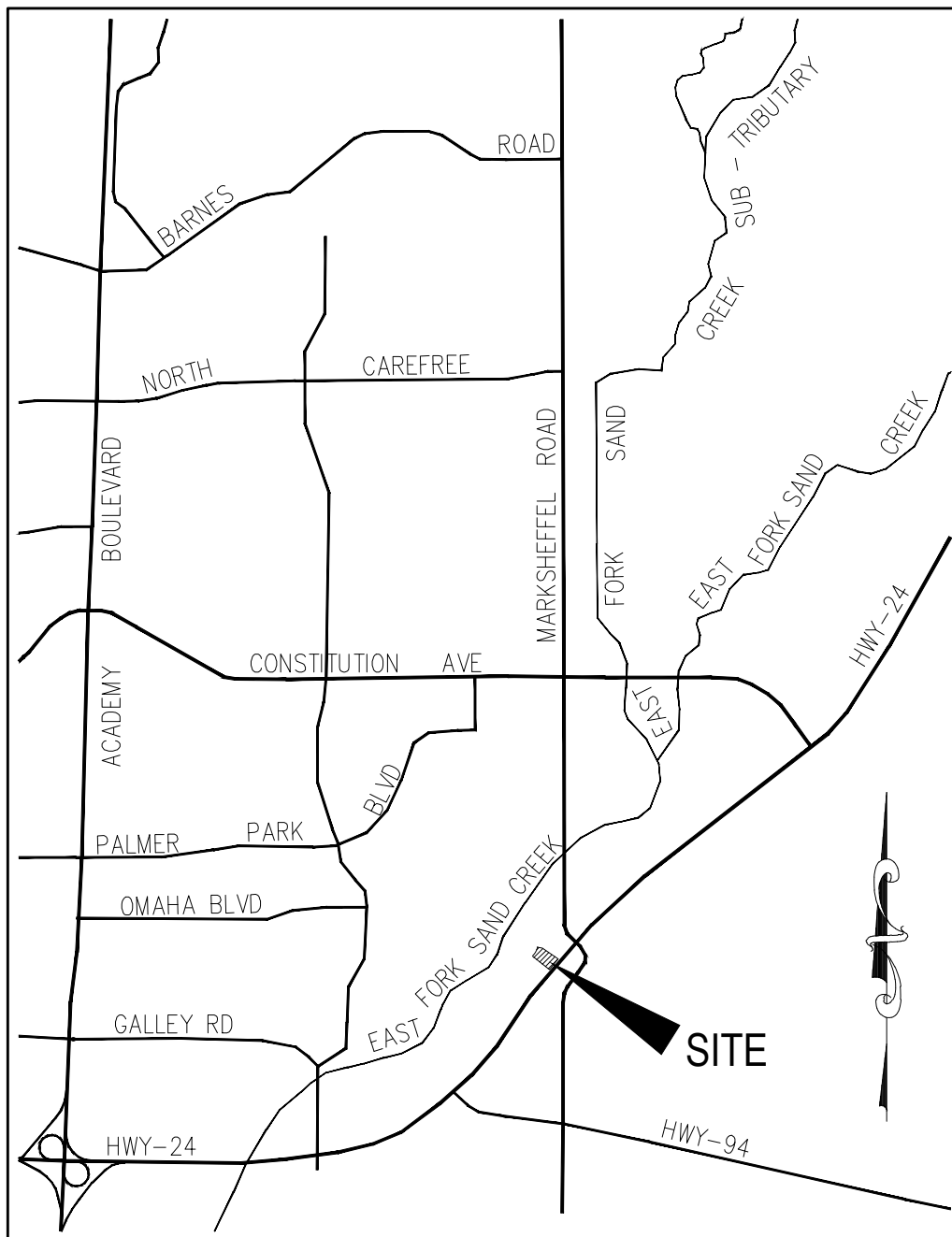
Development of the CLAREMONT BUSINESS PARK FILING NO. 2, LOT 2-1A shall not adversely affect adjacent or downstream properties per this final drainage report. The proposed drainage facilities will adequately convey, detain and route runoff from tributary onsite and existing offsite flows to the Sand Creek Drainage channel. All drainage facilities described herein and shown on the included drainage map are subject to change due to formal design considerations during the construction document preparation stage. Care will be taken to accommodate overland emergency flow routes on site and temporary drainage conditions.

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.



CIVIL CONSULTANTS, INC.

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

SOILS MAP

Hydrologic Soil Group—El Paso County Area, Colorado



MAP LEGEND

Area of Interest (AOI)









 Area of Interest (AOI)

Soils

Soil Rating Polygons





 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Lines


 A
 A/D
 B
 B/D
 C
 C/D
 D
 Not rated or not available

Soil Rating Points






 A
 A/D
 B
 B/D

 C
 C/D
 D
 Not rated or not available


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 16, Sep 10, 2018

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	A	2.8	100.0%
Totals for Area of Interest			2.8	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

FIRM PANEL W/ REVISED LOMR

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

**EL PASO COUNTY,
COLORADO**
AND INCORPORATED AREAS

PANEL 756 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY NUMBER PANEL SUFFIX

COLORADO SPRINGS, CITY OF 080050 0756 F

EL PASO COUNTY,
UNINCORPORATED AREAS 080059 0756 F

REVISED TO
REFLECT LOMR
EFFECTIVE: September 24, 2008

MAP NUMBER
08041C0756 F

EFFECTIVE DATE:
MARCH 17, 1997

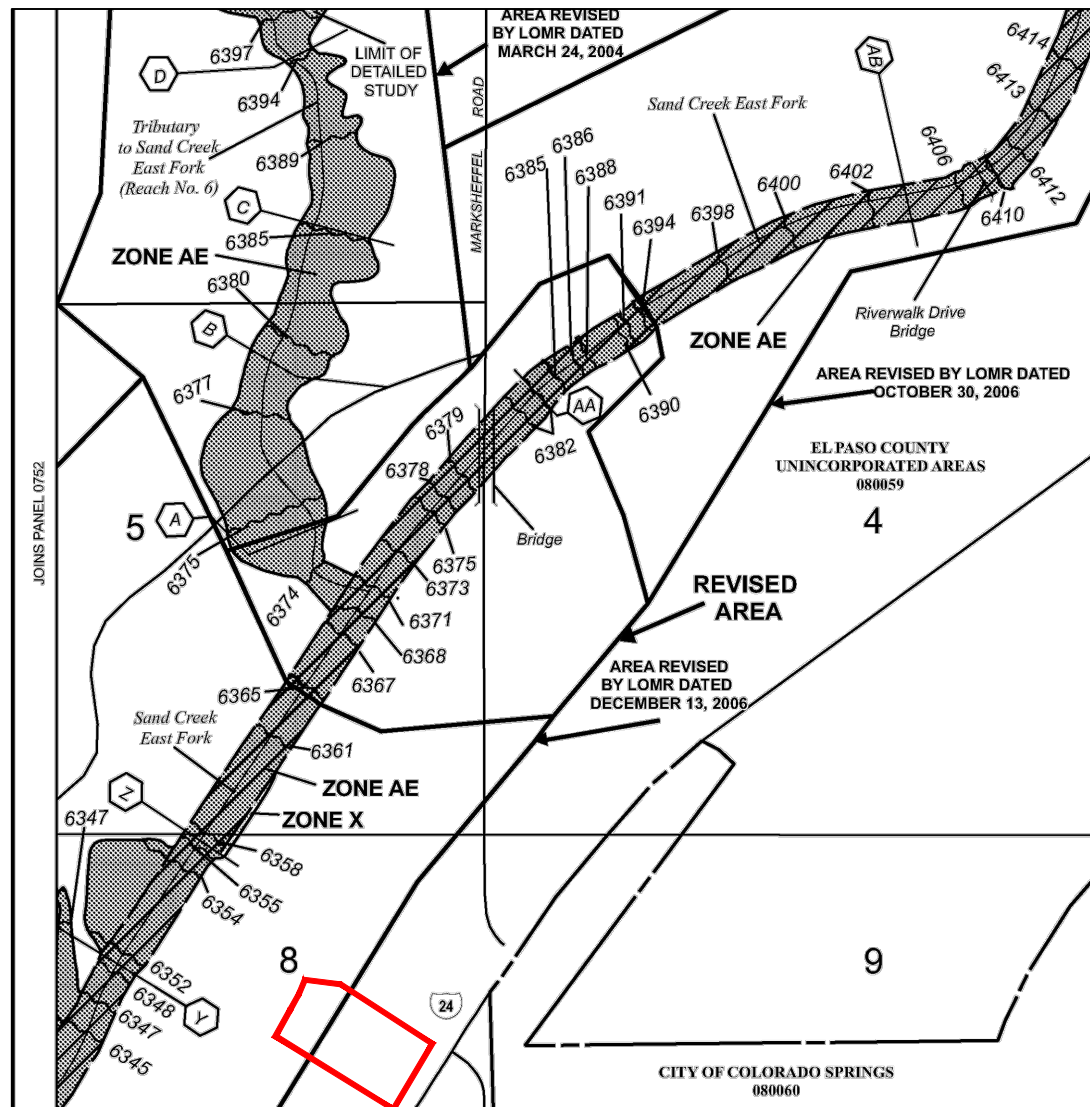


Federal Emergency Management Agency

LEGEND

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

SITE BOUNDARY



NOT TO SCALE

FIRM MAP





Federal Emergency Management Agency

Washington, D.C. 20472

NOV 13 2006

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Sallie Clark
Chair, El Paso County
Board of Commissioners
27 East Vermijo Avenue
Colorado Springs, CO 80903

IN REPLY REFER TO:

Case No.: 06-08-B137P

Follows Conditional

Case No.: 04-08-0469R

Community Name: El Paso County, CO

Community No.: 080059

Effective Date of
This Revision: **DEC 13 2006**

Dear Ms. Clark:

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,

Kevin C. Long, 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: Mr. Kevin Stilson, P.E., CFM
Regional Floodplain Administrator

Central Marksheffel Business District

Matrix Design Group



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	El Paso County Colorado (Unincorporated Areas)	CHANNELIZATION	FLOODWAY HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 080059		
IDENTIFIER	Marksheffel Business District	APPROXIMATE LATITUDE & LONGITUDE: 38.863, -104.674 SOURCE: USGS QUADRANGLE DATUM: NAD 27	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM* NO.: 08041C0752F DATE: March 17, 1997 TYPE: FIRM* NO.: 08041C0756F DATE: March 17, 1997		DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE: 212P 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)

East Fork Sand Creek - from approximately 5,250 feet downstream to just upstream of Marksheffel Road

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
East Fork Sand Creek	Floodway	Floodway	YES	YES
	Zone AE	Zone AE	YES	YES
	BFEs	BFEs	NONE	YES
	Zone X (Shaded)	Zone X (Unshaded)	NONE	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>.

Kevin C. Long
Kevin C. Long, 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>.

Kevin C. Long

Kevin C. Long, 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>.

Kevin C. Long
Kevin C. Long, 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	
East Fork Sand Creek	Approximately 5,150 feet downstream of Marksheffel Road	6,316	6,315	08041C0752F
	Approximately 210 feet downstream of Marksheffel Road	6,381	6,379	08041C0756F

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. This revision will become effective 30 days from the date of this letter. However, until the 90-day period has elapsed, 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: 11/29/2006 and 12/06/2006

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>.

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Engineering Management Section
Mitigation Division

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE UNINCORPORATED AREAS OF EL PASO COUNTY, COLORADO, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On March 17, 1997, the Department of Homeland Security's Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the unincorporated areas of El Paso County, Colorado, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Division has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified Base Flood Elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate the effects of channel improvements along Sand Creek East Fork from approximately 5,250 feet downstream to just upstream of Marksheffel Road, and has resulted in a revised delineation of the regulatory floodway, an increase in SFHA width, a decrease in SFHA width, and decreased BFEs for Sand Creek East Fork. The aforementioned channelized portion of Sand Creek East Fork contains the base flood. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Sand Creek East Fork		
Approximately 5,150 feet downstream of Marksheffel Road	6,316	6,315
Approximately 210 feet downstream of Marksheffel Road	6,381	6,379

*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Division must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Division reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Division's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable Sallie Clark
Chair, El Paso County
Board of Commissioners
27 East Vermijo Avenue
Colorado Springs, CO 80903

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE'	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET (NGVD)	WITH FLOODWAY INCREASE
Sand Creek East Fork	1,100	100	455	11.9	6,038.7	6,038.7	0.0
	2,400	100	446	12.2	6,054.3	6,054.3	0.0
	3,330	100	450	12.0	6,069.9	6,069.9	0.0
	4,240	100	449	12.1	6,085.1	6,085.1	0.0
	4,870	100	451	12.0	6,095.2	6,095.2	0.0
	5,820	250	602	8.9	6,118.4	6,118.4	0.5
	6,690	150	518	10.3	6,128.1	6,129.1	1.0
	7,795	125	477	11.2	6,155.2	6,155.2	0.0
	8,665	150	505	10.6	6,168.8	6,168.8	0.0
	9,675	100	443	12.0	6,188.4	6,188.4	0.0
	10,565	115	465	11.5	6,196.2	6,196.2	0.0
	11,325	166	525	10.2	6,207.3	6,207.3	0.0
	11,375	173	632	8.4	6,207.9	6,207.9	0.0
	12,610	367	699	7.6	6,228.8	6,228.8	0.1
	13,720	188	570	10.0	6,241.7	6,241.7	0.0
	14,805	125	479	11.1	6,257.9	6,257.9	0.0
	14,885	125	601	8.9	6,259.9	6,259.9	1.0
	15,850	228	582	9.2	6,268.7	6,268.7	0.0
	16,325	300	678	7.9	6,277.3	6,277.3	0.2
	16,995	321	690	7.7	6,291.4	6,291.4	0.6
	17,065	326	667	8.0	6,291.4	6,292.1	0.7
	17,915	388	1,598	3.3	6,293.4	6,294.0	0.6
	18,995	367	683	7.8	6,307.2	6,307.2	0.4
	20,730	103	575	11.7	6,327.8	6,328.4	0.6
	22,560	142	506	11.0	6,348.8	6,349.4	0.6
	23,060	145	503	11.0	6,358.0	6,358.0	0.0
	24,835	418	3,156	7.0	6,383.5	6,383.5	0.0
	26,470	132	452	10.0	6,402.7	6,402.7	0.0
	27,715	112	419	10.8	6,416.6	6,416.6	0.0

REVISED AREA

1 Feet Above Confluence With Sand Creek

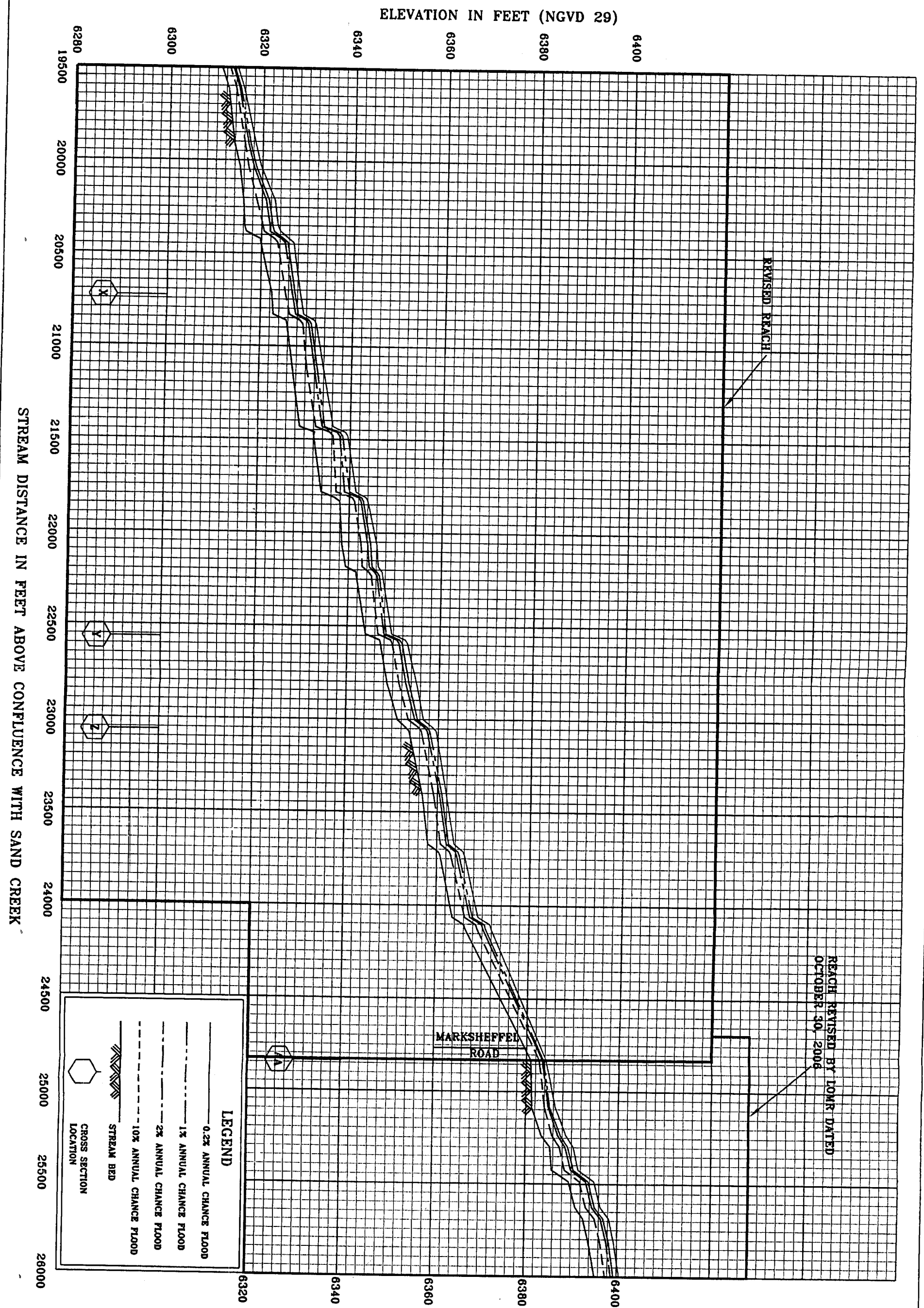
REFLECT LOMR

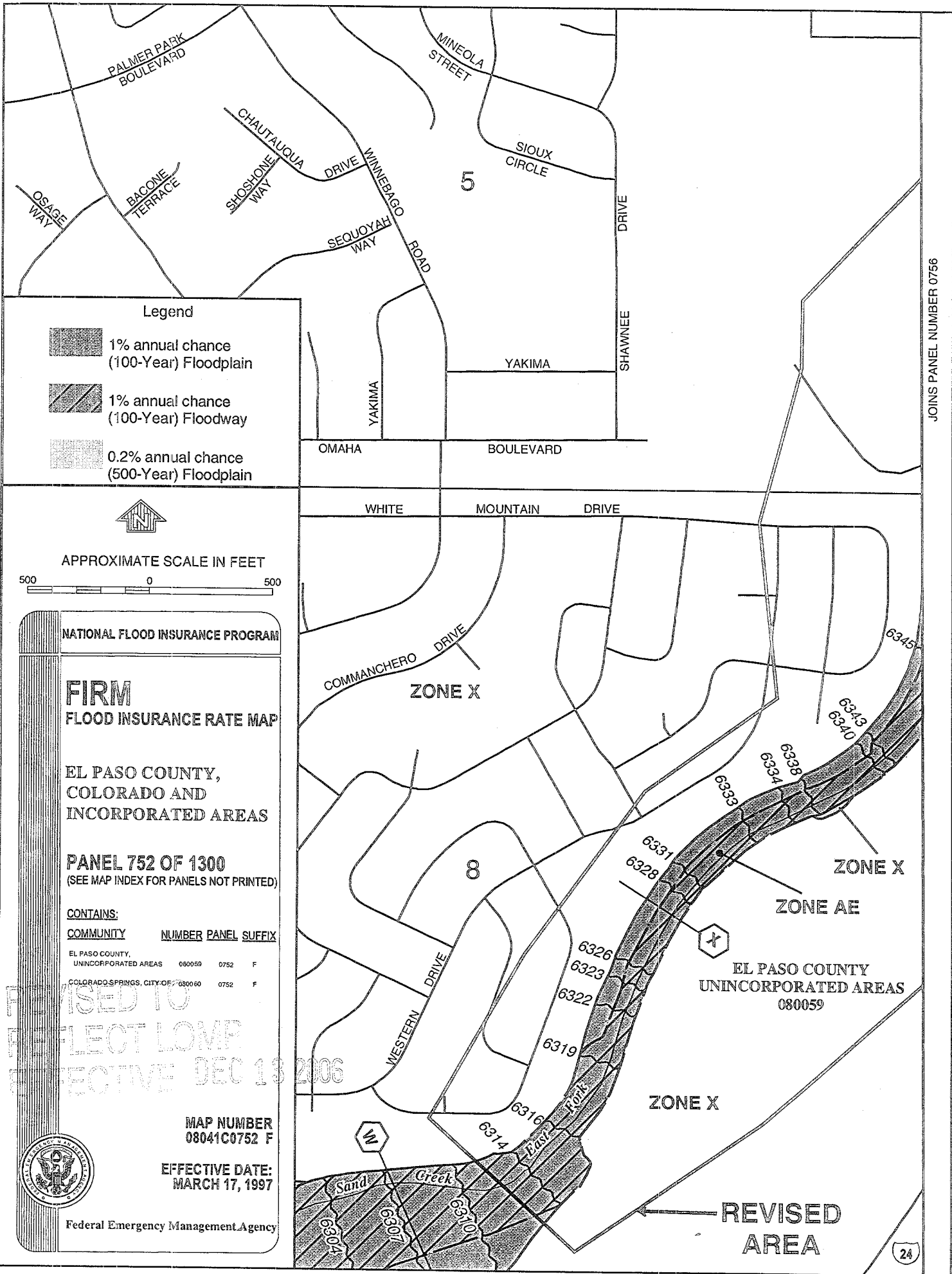
REVISED BY LOMR DATED OCTOBER 30, 2006

FLOODWAY DATA EFFECTIVE DEC 13 2006

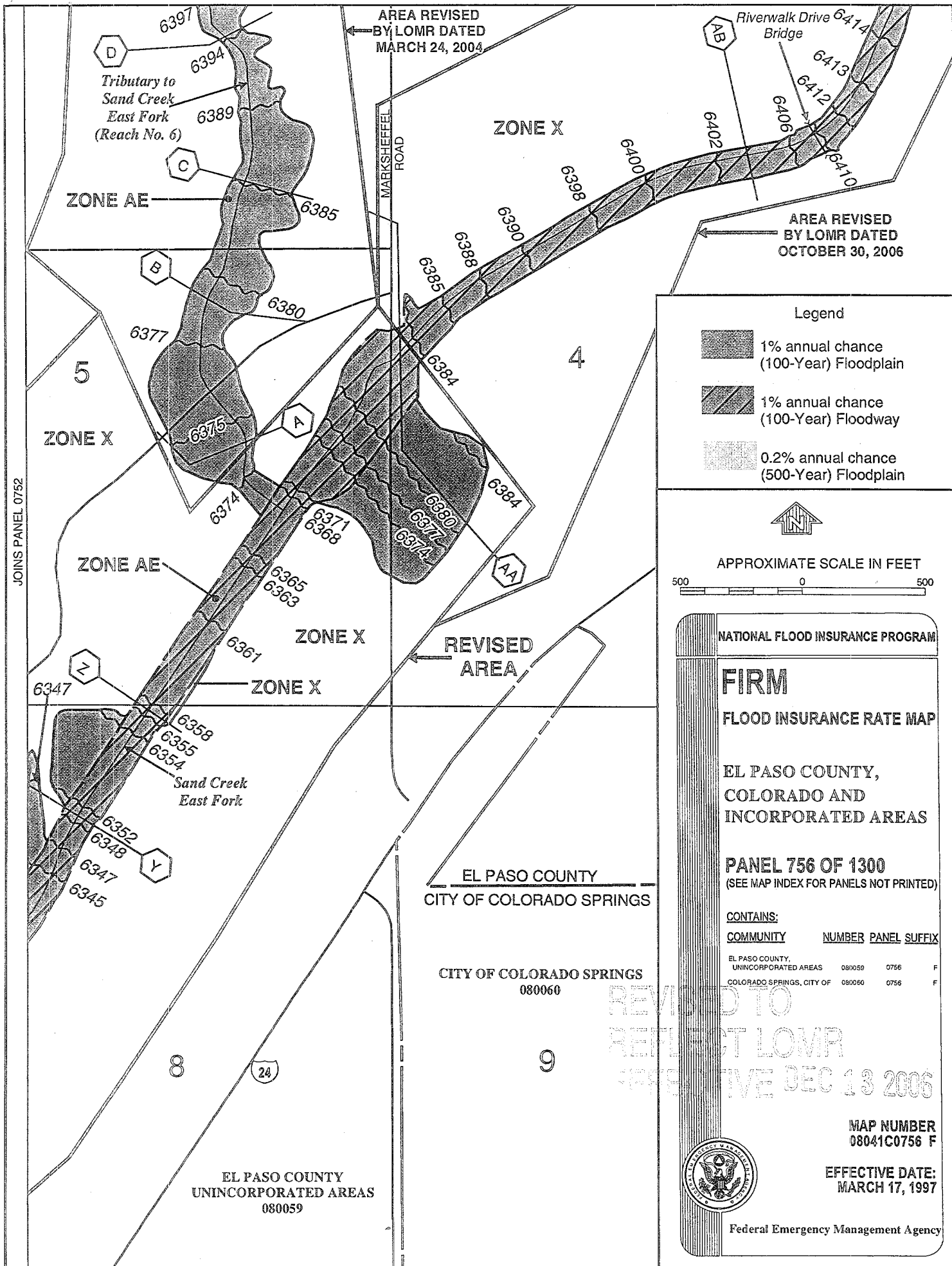
FEDERAL EMERGENCY MANAGEMENT AGENCY
EL PASO COUNTY, CO
AND INCORPORATED AREAS

SAND CREEK EAST FORK





JOINS PANEL 0752



Legend

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



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY,
COLORADO AND
INCORPORATED AREAS

PANEL 756 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY

NUMBER PANEL SUFFIX

EL PASO COUNTY, UNINCORPORATED AREAS	080059	0756	F
COLORADO SPRINGS, CITY OF	080060	0756	F

CITY OF COLORADO SPRINGS
080060

REVISED TO
REFLECT LOMR
EFFECTIVE DEC 13 2006

MAP NUMBER
08041C0756 F

EFFECTIVE DATE:
MARCH 17, 1997



Federal Emergency Management Agency

Follows Conditional Case No.: 04-08-0469R



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	El Paso County Colorado (Unincorporated Areas)	BRIDGE CHANNELIZATION FILL	FLOODWAY HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 080059		
IDENTIFIER	Marksheffel Road Bridge	APPROXIMATE LATITUDE & LONGITUDE: 38.857, -104.682 SOURCE: Precision Mapping Streets DATUM: NAD 83	
ANNOTATED MAPPING ENCLOSURES		ANNOTATED STUDY ENCLOSURES	
TYPE: FIRM* NO.: 08041C0756 F DATE: March 17, 1997		DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILE(S): 212P, 344P 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)

East Fork Sand Creek - from approximately 1,070 feet downstream of Marksheffel Road to 740 feet upstream

Tributary to Sand Creek East Fork (Reach No. 6) - from the confluence with Sand Creek East Fork to approximately 390 feet upstream

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
East Fork Sand Creek	Zone AE	Zone AE	YES	YES
	Floodway	Floodway	YES	YES
	BFEs*	BFEs	YES	YES
Tributary to Sand Creek East Fork (Reach No. 6)	BFEs	BFEs	NONE	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>.

Beth A. Norton, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate



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 report 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 cursive script, reading "Beth A. Norton".

Beth A. Norton, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate



Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

This revision has met our criteria for removing an area from the 1-percent-annual-chance floodplain to reflect the placement of fill. However, we encourage you to require that the lowest adjacent grade and lowest floor (including basement) of any structure placed within the subject area be elevated to or above the Base (1-percent-annual-chance) Flood Elevation.

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 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>.

A handwritten signature in cursive script that reads "Beth A. Norton".

Beth A. Norton, CFM, Program Specialist
Engineering Management Branch
Mitigation Directorate



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	
East Fork Sand Creek	Approximately 430 feet downstream of Marksheffel Road	6,375	6,374	08041C0756 F
	Approximately 290 feet upstream of Marksheffel Road	6,385	6,384	08041C0756 F
Tributary to Sand Creek East Fork (Reach No. 6)	Approximately 120 feet upstream of the confluence with Sand Creek East Fork	6,374	6,373	08041C0756 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. This revision is effective as of the date of this letter. However, until the 90-day period has elapsed, the revised BFEs presented in this LOMR may be changed.

A notice of changes will be published in the *Federal Register*. A short notice also will be published in your local newspaper on or about the dates listed below. Please refer to FEMA's website at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp for a more detailed description of the proposed BFE changes, which will be posted within a week of the date of this letter.

LOCAL NEWSPAPER Name: *El Paso County News*
 Dates: 10/08/2008 10/15/2008

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>.

Beth A. Norton, CFM, Program Specialist
 Engineering Management Branch
 Mitigation Directorate

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY FEET	WITH FLOODWAY (NGVD)	INCREASE
Sand Creek East Fork					REVISED BY LOMR DATED OCTOBER 07, 2004			
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	100	451	12.0	6,095.2	6,095.2	6,095.2	0.0
F	5,820	250	602	8.9	6,118.4	6,118.4	6,118.9	0.5
G	6,690	150	518	10.3	6,128.1	6,128.1	6,129.1	1.0
H	7,795	125	477	11.2	6,155.2	6,155.2	6,155.2	0.0
I	8,665	150	505	10.6	6,168.8	6,168.8	6,168.8	0.0
J	9,675	100	443	12.0	6,188.4	6,188.4	6,188.4	0.0
K	10,565	115	465	11.5	6,196.2	6,196.2	6,196.2	0.0
L	11,325	166	525	10.2	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	1,598	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	20,730	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	25,020	139	580	9.3	6,382.1	6,382.1	6,382.1	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

¹ Feet Above Confluence With Sand Creek

REVISED BY LOMR DATED
OCTOBER 30, 2006

REVISED BY LOMR DATED
DECEMBER 13, 2006

T
A
B
L
E

5

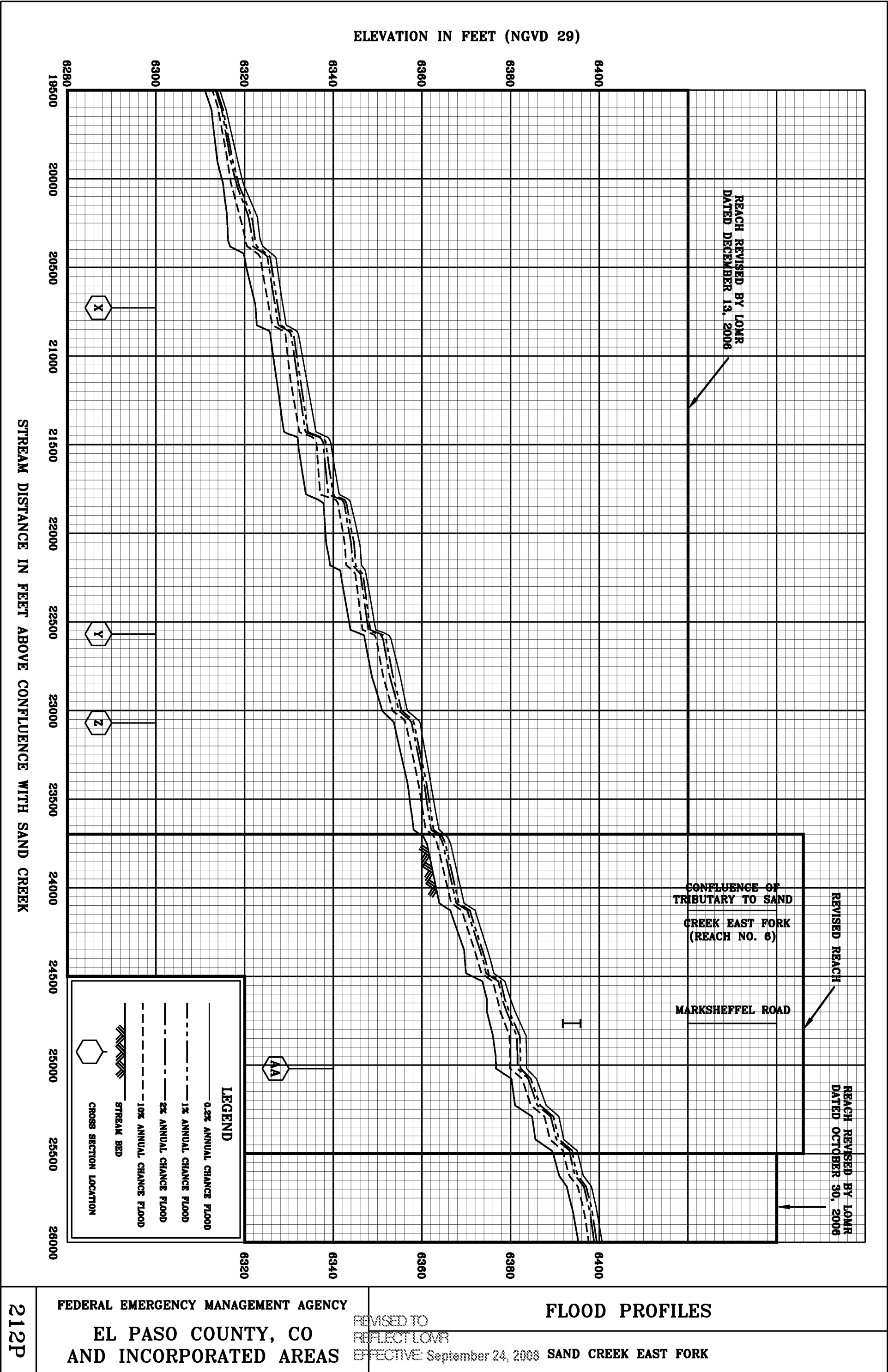
FEDERAL EMERGENCY MANAGEMENT AGENCY

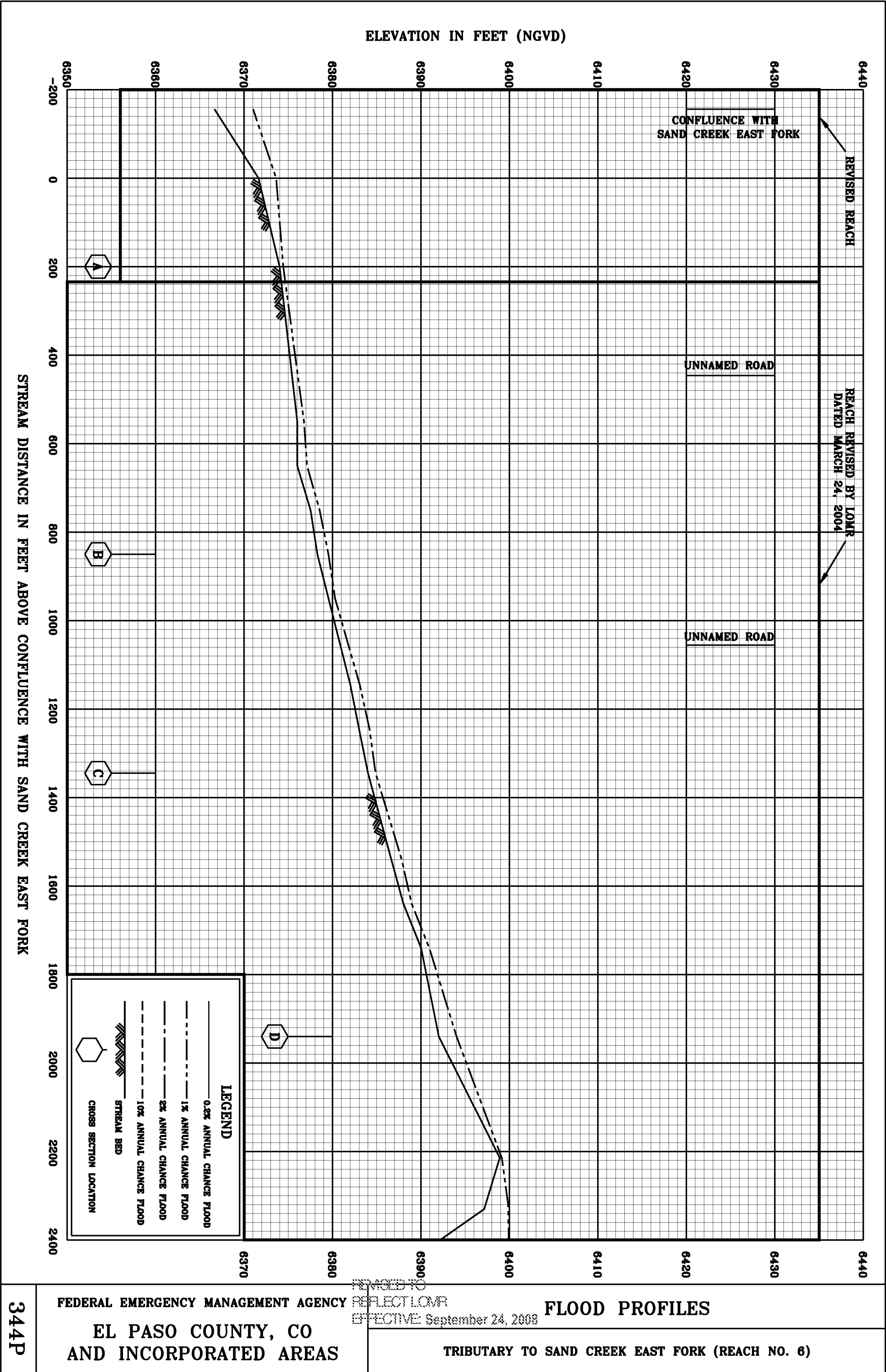
**EL PASO COUNTY, CO
AND INCORPORATED AREAS**

REVISED TO
REFLECT LOMR
EFFECTIVE: September 24, 2008




FLOODWAY DATA

SAND CREEK EAST FORK



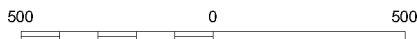


Legend

-  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 756 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY NUMBER PANEL SUFFIX

COLORADO SPRINGS, CITY OF 080060 0756 F

EL PASO COUNTY,
UNINCORPORATED AREAS 080059 0756 F

REVISED TO
REFLECT LOMR
EFFECTIVE: September 24, 2008

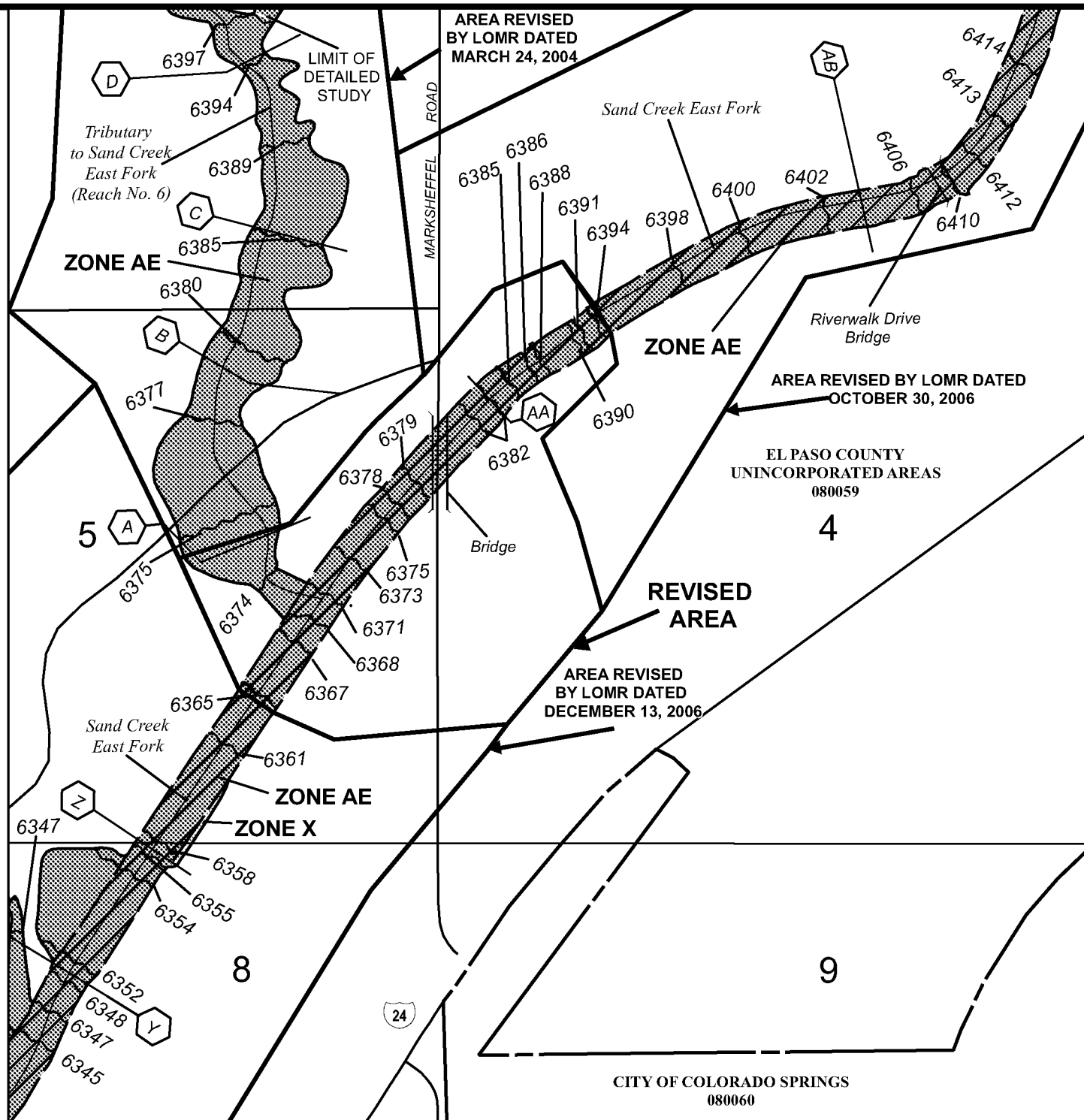
MAP NUMBER
08041C0756 F

EFFECTIVE DATE:
MARCH 17, 1997



Federal Emergency Management Agency

JOINS PANEL 0752



HYDROLOGIC CALCULATIONS

CBP LOT 2-1A
PROPOSED DRAINAGE CALCULATIONS
(Area Runoff Coefficient Summary)

			<i>STREETS / DEVELOPED</i>			<i>OVERLAND / DEVELOPED</i>			<i>OVERLAND / UNDEVELOPED</i>			<i>WEIGHTED</i>	
BASIN	TOTAL AREA (SF)	TOTAL AREA (Acres)	AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	AREA (Acres)	C ₅	C ₁₀₀	C ₅	C ₁₀₀
<i>EX1</i>	<i>11020.18</i>	0.25	0.00	0.90	0.96	0.00	0.81	0.88	0.25	0.09	0.36	<i>0.09</i>	<i>0.36</i>
<i>EX2</i>	<i>15748.2</i>	0.36	0.00	0.90	0.96	0.00	0.81	0.88	0.36	0.09	0.36	<i>0.09</i>	<i>0.36</i>
<i>A</i>	<i>40466.41</i>	0.93	0.00	0.90	0.96	0.93	0.81	0.88	0.00	0.09	0.36	<i>0.81</i>	<i>0.88</i>
<i>B</i>	<i>40008.5</i>	0.92	0.00	0.90	0.96	0.92	0.81	0.88	0.00	0.09	0.36	<i>0.81</i>	<i>0.88</i>
<i>C</i>	<i>9040.617</i>	0.21	0.00	0.90	0.96	0.00	0.81	0.88	0.21	0.09	0.36	<i>0.09</i>	<i>0.36</i>
<i>D</i>	<i>11284.07</i>	0.26	0.09	0.90	0.96	0.00	0.81	0.88	0.17	0.09	0.36	<i>0.37</i>	<i>0.57</i>

CBP LOT 2-1A
PROPOSED DRAINAGE CALCULATIONS
(Area Drainage Summary)

From Area Runoff Coefficient Summary				OVERLAND				STREET / CHANNEL FLOW				Time of Travel (T _t)		INTENSITY *		TOTAL FLOWS	
BASIN	AREA TOTAL	C ₅	C ₁₀₀	C ₅	Length	Height	T _C	Length	Slope	Velocity	T _t	TOTAL	CHECK	I ₅	I ₁₀₀	Q ₅	Q ₁₀₀
		From DCM Table 5-1															
EX1	0.25	0.09	0.36	0.09	30	10	3.1	70	31.0%	5.6	0.2	3.3	10.6	5.2	8.7	0.1	0.8
EX2	0.36	0.09	0.36	0.09	30	10	3.1	70	31.0%	5.6	0.2	3.3	10.6	5.2	8.7	0.2	1.1
A	0.93	0.81	0.88	0.81	50	2	2.3	290	0.75%	1.7	2.8	5.1	11.9	5.1	8.6	3.9	7.0
B	0.92	0.81	0.88	0.81	50	2	2.3	330	0.98%	2.0	2.8	5.1	12.1	5.1	8.6	3.8	7.0
C	0.21	0.09	0.36	0.09	16	4	2.5	100	0.5%	1.4	1.2	3.7	10.6	5.2	8.7	0.1	0.6
D	0.26	0.37	0.57	0.37	37	1.5	5.0	255	1.4%	2.4	1.8	6.8	11.6	4.7	7.9	0.5	1.2

* Intensity equations assume a minimum travel time of 5 minutes.

Calculated by: CMN
Date: 12/21/2018
Checked by: VAS

CBP LOT 2-1A
PROPOSED DRAINAGE CALCULATIONS
(Basin Routing Summary)

From Area Runoff Coefficient Summary				OVERLAND				PIPE / CHANNEL FLOW				Time of Travel (T _t)	INTENSITY *		TOTAL FLOWS		COMMENTS
DESIGN POINT	CONTRIBUTING BASINS	CA ₅	CA ₁₀₀	C _s	Length (ft)	Height (ft)	T _c (min)	Length (ft)	Slope (%)	Velocity (fps)	T _t (min)	TOTAL (min)	I ₅ (in/hr)	I ₁₀₀ (in/hr)	Q ₅ (c.f.s.)	Q ₁₀₀ (c.f.s.)	
1	EX1, A	0.78	0.91	0.09	30	10	3.1	360	0.8%	1.8	3.4	6.5	4.8	8.0	3.7	7.3	Rundown To Pond
2	EX2, B	0.78	0.94	0.09	30	10	3.1	400	1.0%	2.0	3.3	6.5	4.8	8.0	3.7	7.5	Rundown To Pond
3	DP1, DP2, C	1.57	1.92					Tc Taken From DP2				6.5	4.8	8.0	7.5	15.4	Sand Filter Basin/Water Quality Pond with CDOT Outlet Structure

Calculated by: CMN

Date: 12/21/2018

Checked by: VAS

CBP LOT 2-1A
PROPOSED DRAINAGE CALCULATIONS
(Storm Sewer Routing Summary)

<i>PIPE RUN</i>	<i>Contributing Pipes/Design Points</i>	<i>Equivalent CA₅</i>	<i>Equivalent CA₁₀₀</i>	<i>Maximum T_C</i>	<i>Intensity*</i>		<i>Flow</i>	
					<i>I₅</i>	<i>I₁₀₀</i>	<i>Q₅</i>	<i>Q₁₀₀</i>
<i>1</i>	<i>DP3</i>	1.57	1.92	6.5	4.8	8.0	<i>7.5</i>	<i>15.4</i>

* Intensity equations assume a minimum travel time of 5 minutes.

DP - Design Point

EX - Existing Design Point

FB- Flow By from Design Point

INT- Intercepted Flow from Design Point

Calculated by: CMN

Date: 12/21/2018

Checked by: VAS

HYDRAULIC CALCULATIONS / SFB WQCV CALCULATIONS

Weighted Percent Imperviousness of Sand Filter Basin				
Contributing Basins	Area (Acres)	C_s	Impervious % (I)	(Acres)*(I)
EX1	0.25	0.09	2	0.51
EX2	0.36	0.09	2	0.72
A	0.93	0.81	95	88.25
B	0.92	0.81	95	87.25
C	0.21	0.09	2	0.42
Totals	2.67			177.15
Imperviousness of SFB	66.4			

Minimum Sand Filter Area (SF)	965
Area Provided (SF)	1580

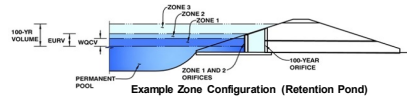
$$A_F = 0.0125AI \text{ (Eq SF-2, UDFCD VIII)}$$

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: CBP LOT 2-1A

Basin ID: _____



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	SF	
Watershed Area =	2.67	acres
Watershed Length =	130	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	66.40%	percent
Percentage Hydrologic Soil Group A =	100.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	0.0%	percent
Desired QWQ Drain Time =	12.0	hours
Location for 1-hr Rainfall Depths =	Denver - Capitol Building	
Water Quality Capture Volume (WQCV) =	0.066	acre-feet
Excess Urban Runoff Volume (EURV) =	0.221	acre-feet
2-yr Runoff Volume ($P_1 = 1.19$) =	0.152	acre-feet
5-yr Runoff Volume ($P_1 = 1.59$) =	0.199	acre-feet
10-yr Runoff Volume ($P_1 = 1.75$) =	0.242	acre-feet
25-yr Runoff Volume ($P_1 = 2.2$) =	0.292	acre-feet
50-yr Runoff Volume ($P_1 = 2.25$) =	0.347	acre-feet
100-yr Runoff Volume ($P_1 = 2.52$) =	0.411	acre-feet
500-yr Runoff Volume ($P_1 = 3.14$) =	0.557	acre-feet
Approximate 2-yr Detention Volume =	0.144	acre-feet
Approximate 5-yr Detention Volume =	0.188	acre-feet
Approximate 10-yr Detention Volume =	0.227	acre-feet
Approximate 25-yr Detention Volume =	0.272	acre-feet
Approximate 50-yr Detention Volume =	0.300	acre-feet
Approximate 100-yr Detention Volume =	0.328	acre-feet

Watershed Area =	2.67	acres	<p>★ Note: L / W Ratio < 1</p> <p>L / W Ratio = 0.1</p>
Watershed Length =	130	ft	
Watershed Width =	3,000	ft	

Water Quality Capture Volume (WQCV) =	0.046	acre-feet	Optional User Override 1-hr Precipitation
Excess Urban Runoff Volume (EURV) =	0.221	acre-feet	

2-yr Runoff Volume (P1 = 1.19 in.)	0.152	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.)	0.199	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.)	0.242	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.)	0.292	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.)	0.347	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.)	0.411	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.)	0.557	acre-feet		inches

Stage-Storage Calculation

Zone 1 Volume (WCV_1) =	0.046	acre-feet
Select Zone 2 Storage Volume (Optional) =		
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume (W_{DB}) =	0.046	acre-feet
Initial Surge Volume (ISV) =	N/A	ft ³
Initial Surge Depth (ISD) =	N/A	ft
Total Available Detention Depth ($H_{DB,AV}$) =	user	ft
Depth of Trickle Channel (H_{TC}) =	N/A	ft
Slope of Trickle Channel (S_{TC}) =	N/A	ft/ft
Slopes of Main Basin Sides ($S_{MB,SL}$) =	user	ft/V
Basin Length-to-Width Ratio ($R_{L,W}$) =	user	
Initial Surge Area (A_{ISV}) =	user	ft ²
Surge Volume Length (L_{ISV}) =	user	ft
Surge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor ($H_{F,100}$) =	user	ft
Length of Basin Floor ($L_{F,100}$) =	user	ft
Width of Basin Floor ($W_{F,100}$) =	user	ft
Area of Basin Floor ($A_{F,100}$) =	user	ft ²
Volume of Basin Floor ($V_{F,100}$) =	user	ft ³
Depth of Main Basin ($H_{MB,AV}$) =	user	ft
Length of Main Basin ($L_{MB,AV}$) =	user	ft
Width of Main Basin ($W_{MB,AV}$) =	user	ft
Area of Main Basin ($A_{MB,AV}$) =	user	ft ²
Volume of Main Basin ($V_{MB,AV}$) =	user	ft ³
Calculated Total Basin Volume ($V_{DB,AV}$) =	user	acre-feet

Select Zone 2 Storage Volume (Optional) = acre-feet
 Select Zone 3 Storage Volume (Optional) = acre-feet
 Total Detention Basin Volume = 0.046 acre-feet

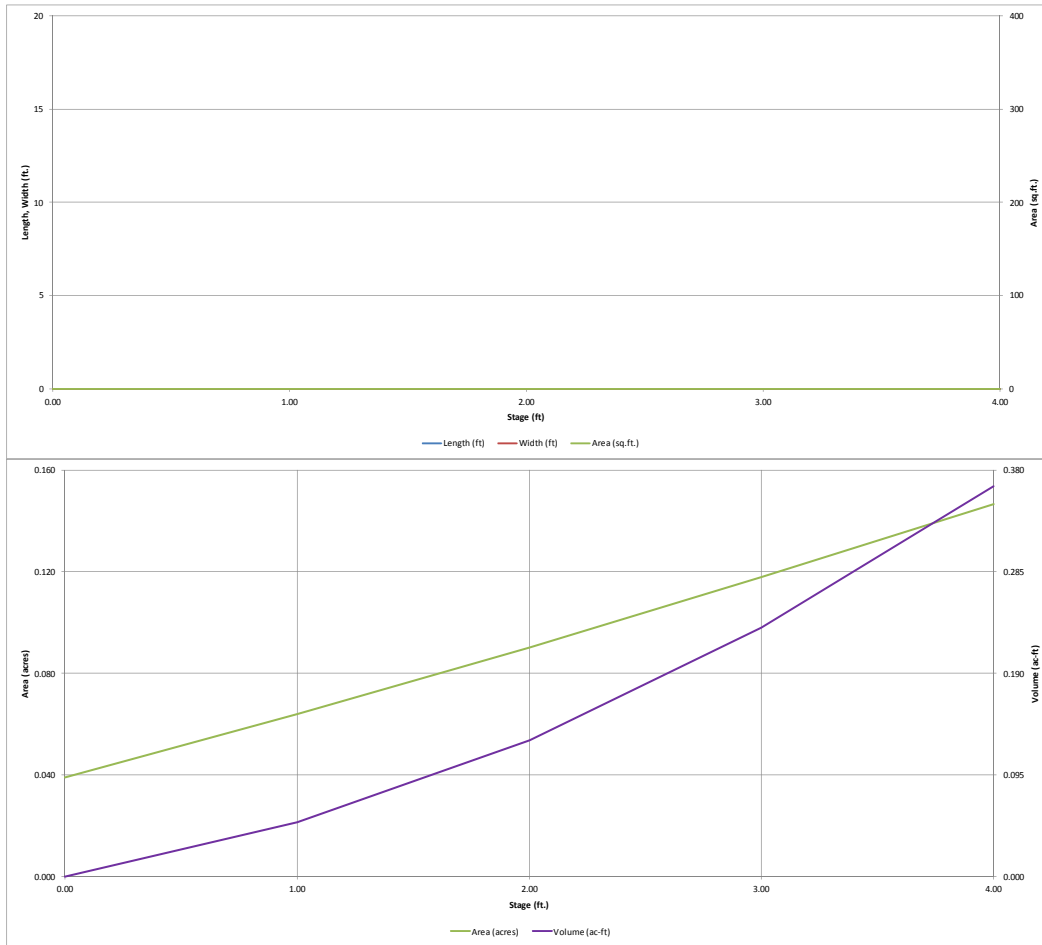
Total detention volume is less than 100-year volume.

[illegible]

*The length to width ration in the UD-Detention “Detention Basin Stage-Storage Table Builder” page has been adjusted to match the 100 yr calculated cfs for the Sand Filter Basin (Design Point 3, 15.4 cfs). This conservative approach increases storage volume and ensures the appropriate capacity of the pond.

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

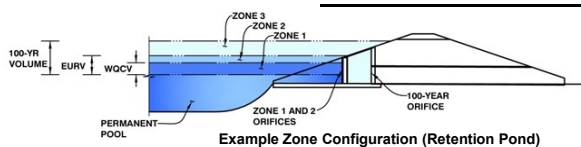


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project: CBP LOT 2-1A

Basin ID: _____



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	0.92	0.046	Filtration Media
Zone 2			
Zone 3			
		0.046	Total

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area = ft²
Underdrain Orifice Centroid = feet

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

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

Calculated Parameters for Plate

WQ Orifice Area per Row = ft²
Elliptical Half-Width = feet
Elliptical Slot Centroid = feet
Elliptical Slot Area = ft²

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

	Row 1 (optional)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Orifice Area (sq. inches)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
Orifice Area (sq. inches)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter = inches

Calculated Parameters for Vertical Orifice

Vertical Orifice Area = ft²
Vertical Orifice Centroid = feet

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

Overflow Weir Front Edge Height, H_o = ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Slope = H:V (enter zero for flat grate)
Horiz. Length of Weir Sides = feet
Overflow Grate Open Area % = %
Debris Clogging % = %

Calculated Parameters for Overflow Weir

Height of Grate Upper Edge, H_t = feet
Over Flow Weir Slope Length = feet
Grate Open Area / 100-yr Orifice Area = should be ≥ 4
Overflow Grate Open Area w/o Debris = ft²
Overflow Grate Open Area w/ Debris = ft²

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

Depth to Invert of Outlet Pipe = ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter = inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

Calculated Parameters for Spillway

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

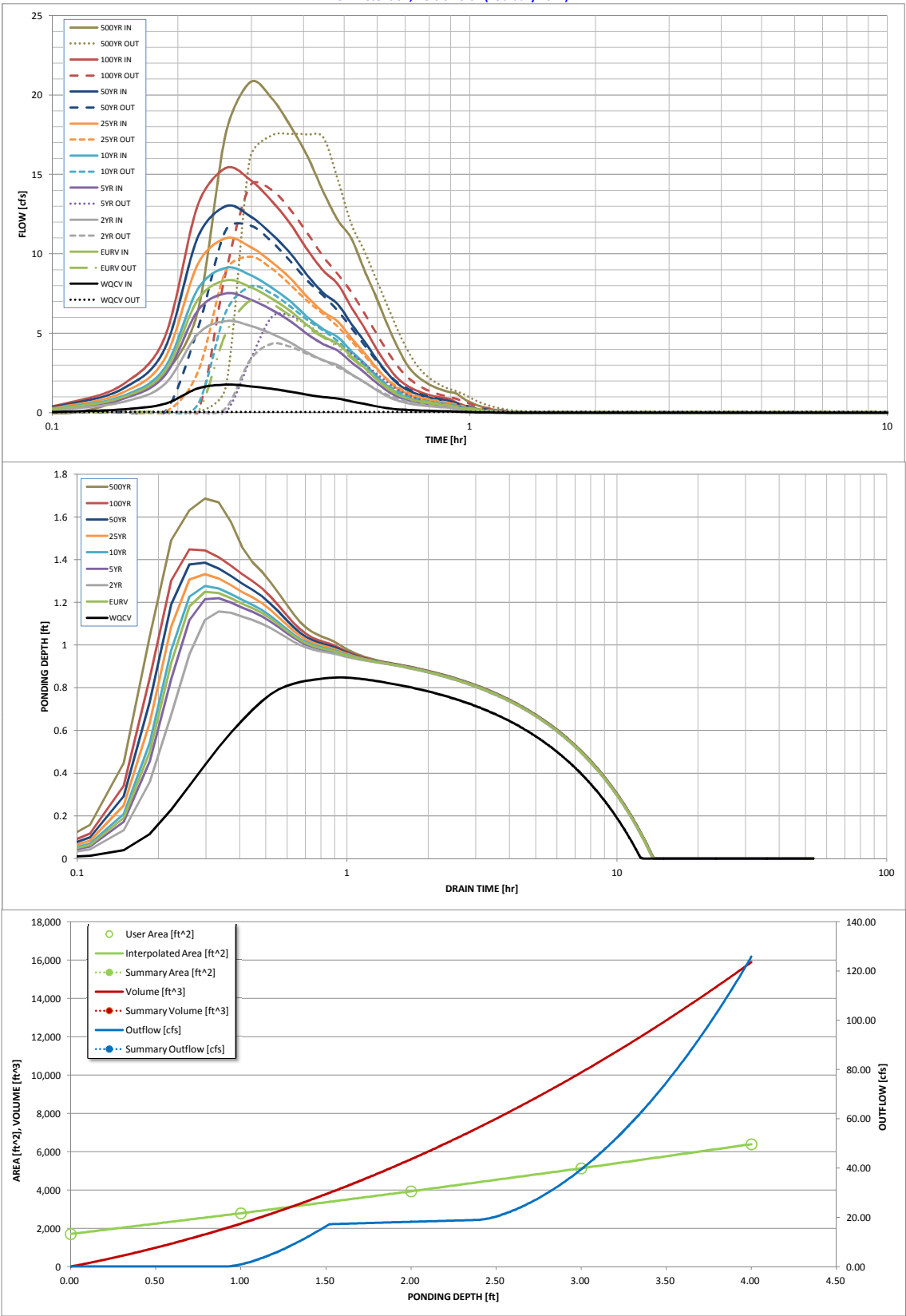
Routed Hydrograph Results

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.046	0.221	0.152	0.199	0.242	0.292	0.347	0.411	0.557
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.046	0.221	0.152	0.199	0.242	0.292	0.347	0.411	0.557
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.00	0.01	0.02	0.04	0.27	0.64	1.42
Predevelopment Peak Q (cfs) =	0.0	0.0	0.0	0.0	0.0	0.1	0.7	1.7	3.8
Peak Inflow Q (cfs) =	1.8	8.3	5.8	7.5	9.1	11.0	13.0	15.4	20.8
Peak Outflow Q (cfs) =	0.0	7.0	4.3	6.1	7.9	9.8	11.8	14.3	17.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	328.5	183.5	102.0	16.5	8.3	4.6
Structure Controlling Flow =	Filtration Media	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	0.58	0.35	0.5	0.7	0.8	1.0	1.2	1.5
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	12	12	12	12	12	11	11	10	9
Time to Drain 99% of Inflow Volume (hours) =	12	13	13	13	13	13	13	13	12
Maximum Ponding Depth (ft) =	0.85	1.25	1.16	1.22	1.28	1.33	1.39	1.45	1.69
Area at Maximum Ponding Depth (acres) =	0.06	0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08
Maximum Volume Stored (acre-ft) =	0.042	0.068	0.061	0.066	0.070	0.074	0.078	0.082	0.101

*Provide note that per Resolution 16-426 of the BoCC, on-site WQCV is required but on-site stormwater detention is not required per the FDR for Claremont Business Park Fil. 2.

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)



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

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

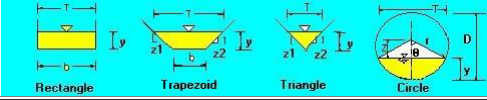
Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

[illegible]

Rundown into Sand Filter Basin at Design Point 1

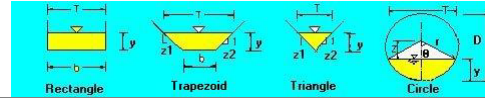
The open channel flow calculator					
Select Channel Type: Triangle ▾					
Depth from Q: ▾		Select unit system: Feet(ft) ▾			
Channel slope: 0.29 ft/ft		Water depth(y): 0.44 ft		Bottom W(b): 0 ft	
Flow velocity: 6.255967 ft/s		LeftSlope (Z1): 6 to 1 (H:V)		RightSlope (Z2): 6 to 1 (H:V)	
Flow discharge: 7.3 ft^3/s		Input n value: 0.045 or select n: clean,uncoated castiron:0.014 ▾			
Calculate!		Status: Calculation finished		Reset	
Wetted perimeter: 5.36 ft		Flow area: 1.17 ft^2		Top width(T): 5.29 ft	
Specific energy: 1.05 ft		Froude number: 2.35		Flow status: Supercritical flow	
Critical depth: 0.62 ft		Critical slope: 0.0437 ft/ft		Velocity head: 0.61 ft	

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Rundown into Sand Filter Basin at Design Point 2

The open channel flow calculator

Select Channel Type: Triangle ▼



Depth from Q ▼

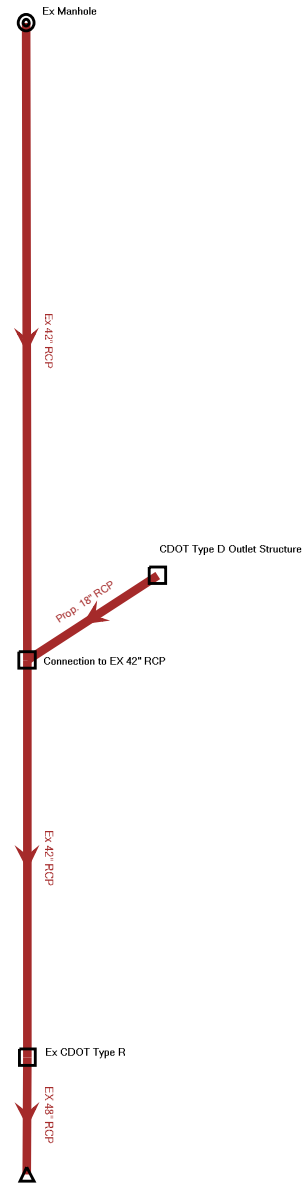
Select unit system: Feet(ft) ▼

Channel slope: 0.33	ft/ft	Water depth(y): 0.29	ft	Bottom W(b)	0	ft
Flow velocity 5.104082	ft/s	LeftSlope (Z1): 17	to 1 (H:V)	RightSlope (Z2): 17	to 1 (H:V)	
Flow discharge 7.5	ft^3/s	Input n value 0.045	or select n			
Calculate!		Status: Calculation finished	Reset			
Wetted perimeter 10.01	ft	Flow area 1.47	ft^2	Top width(T) 10	ft	
Specific energy 0.7	ft	Froude number 2.35		Flow status Supercritical flow		
Critical depth 0.42	ft	Critical slope 0.0482	ft/ft	Velocity head 0.4	ft	

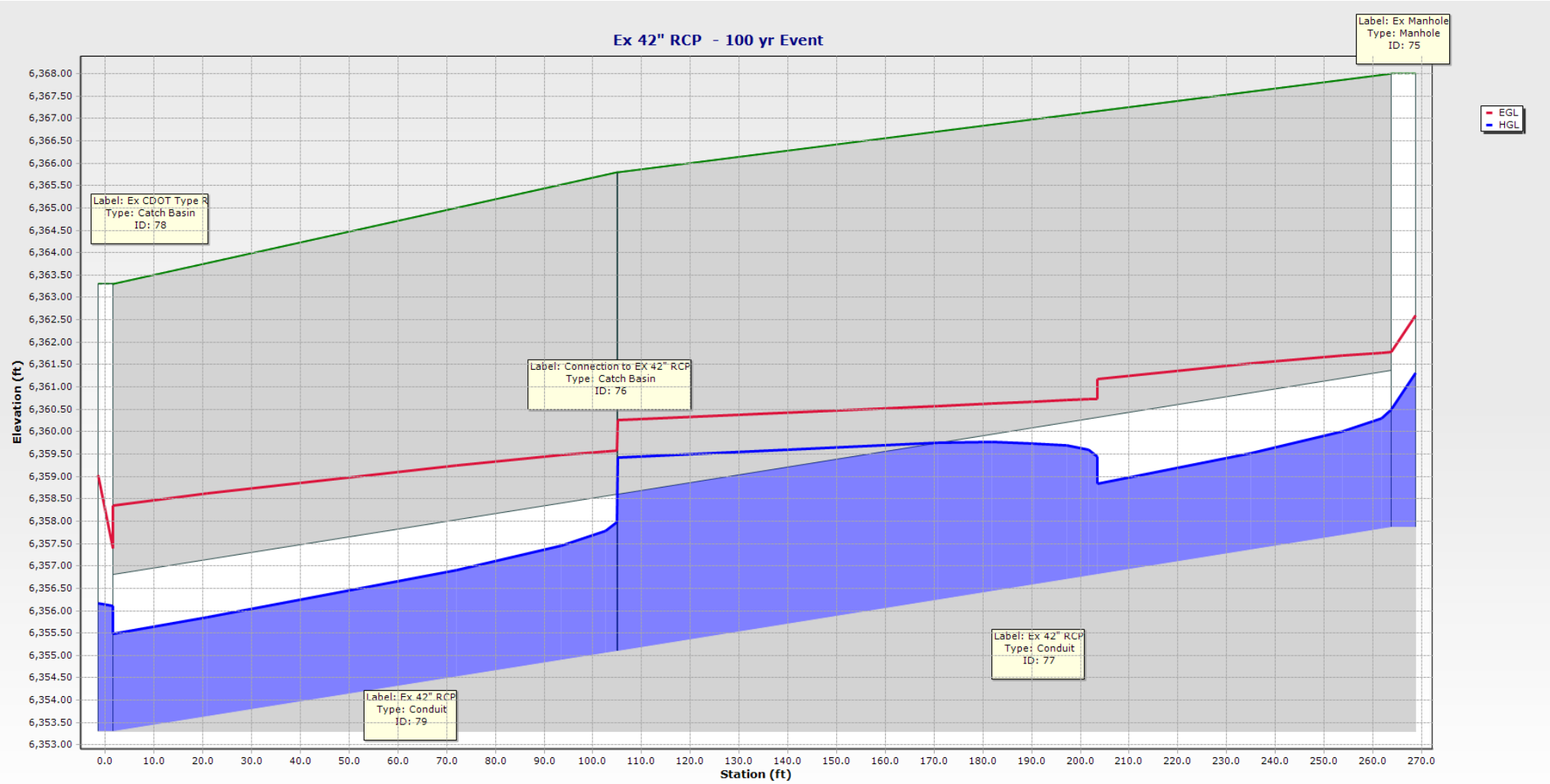
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Hydraulic Grade Line (HGL) Analysis

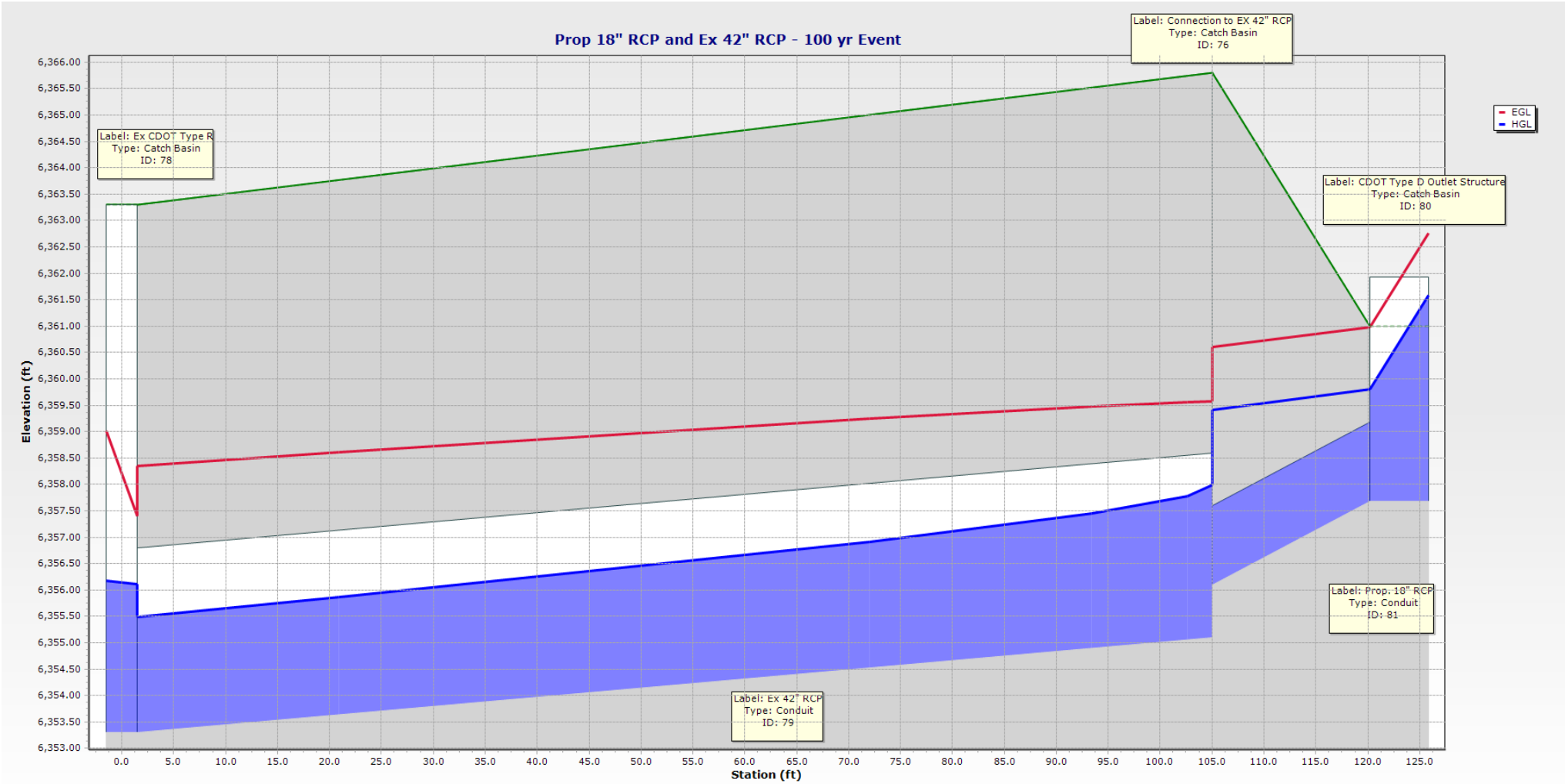
Scenario: 100 yr Event



Hydraulic Grade Line (HGL) Analysis



Hydraulic Grade Line (HGL) Analysis

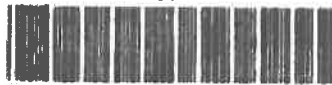


Hydraulic Grade Line (HGL) Analysis

Conduit FlexTable: Drainage Report Table

Label	Upstream Structure	Rise (Unified) (ft)	Flow (cfs)	Flow / Capacity (Design) (%)	Length (Unified) (ft)	Velocity (ft/s)	Froude Number (Normal)	Depth (Normal) (ft)	Depth (Critical) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Headloss (ft)	Upstream Structure Hydraulic Grade Line (In) (ft)	Upstream Structure Velocity Head (In-Governing) (ft)
Ex 42" RCP	Ex Manhole Connection to EX 42" RCP CDOT Type D Outlet Structure Ex CDOT Type R	3.50	70.50	53.5	161.3	13.94	2.043	1.82	2.63	6,360.50	6,359.42	1.08	6,361.32	1.28
Ex 42" RCP		3.50	85.90	65.2	105.0	14.58	1.966	2.06	2.89	6,357.99	6,355.49	2.49	6,359.42	1.59
Prop. 18" RCP		1.50	15.40	49.5	18.0	8.71	4.053	0.75	1.41	6,359.81	6,359.42	0.39	6,361.58	1.18
EX 48" RCP		4.00	85.90	59.8	10.0	11.94	1.564	2.23	2.81	6,356.11	6,355.78	0.33	6,356.17	1.29
Upstream Structure Headloss Coefficient	Upstream Structure Headloss (ft)	Elevation Ground (Start) (ft)	Invert (Start) (ft)	Invert (Stop) (ft)										
0.640	0.82	6,368.00	6,357.87	6,355.10										
0.900	1.43	6,365.80	6,355.10	6,353.30										
1.500	1.77	6,361.00	6,357.68	6,356.10										
0.050	0.06	6,363.30	6,353.30	6,353.20										

BOCC RESOLUTION 16-426

**RESOLUTION NO. 16- 426****BOARD OF COUNTY COMMISSIONERS
COUNTY OF EL PASO, STATE OF COLORADO**

Resolution Denying an Appeal by Hammers Construction LLC (APP-16-002) of the Administrative Determination made by the Planning and Community Development Department Executive Director regarding the requirement for permanent/post construction Water Quality (permanent stormwater quality best management practices or BMP's).

WHEREAS, pursuant to §§30-11-101(1)(e) and 30-11-107(1)(e), C.R.S., the Board of County Commissioners of El Paso County, Colorado (hereinafter "Board") has the legislative authority to manage the concerns of El Paso County when deemed by the Board to be in the best interests of the County and its inhabitants; and

WHEREAS, after consultation with the County Attorney's Office, the Executive Director of Planning and Community Development on August 4, 2016 issued an administrative determination finding made an administrative determination that all undeveloped lots within the Claremont Business Park are subject to installation of permanent stormwater management best management practices (BMP's) associated with development, and that the terms of a 2008 approved deviation relieving the developer of the requirements have not been met.; and

WHEREAS, an appeal of the administrative determination was filed by Hammers Construction on August 10, 2016, and a hearing date was set for September 27, 2016 to hear the appeal; and

WHEREAS, the hearing was continued to a date certain of November 22, 2016; and

WHEREAS, at the Applicant's appeal hearing on November 22, 2016, testimony from the Applicant and the Applicant's representatives was heard by the Board in favor of the appeal, testimony from representatives of Planning and Community Development Department and was presented, and such testimony and associated evidence was weighed by the Board; and

WHEREAS, the Board, having reviewed the testimony and evidence, hereby finds and determines that the requested appeal of the administrative determination by the Planning and Community Development Executive Director by the Applicant did not satisfy the criteria of approval to overturn the administrative determination.

NOW, THEREFORE, BE IT RESOLVED that the Board of County Commissioners of El Paso County, Colorado, hereby denies the appeal of the administrative determination by Hammers Construction and determines that permanent stormwater management best management practices (BMP's) are required with new development within the Claremont Business Park: and

BE IT FURTHER RESOLVED that Sallie Clark, duly elected, qualified member and Chair of the Board of County Commissioners, or Darryl Glenn, duly elected, qualified member and Vice Chair of the Board of County Commissioners, be and is hereby authorized on behalf of the Board to execute any and all documents necessary to carry out the intent of the Board as described herein.

DONE THIS 22nd day of November, 2016, at Colorado Springs Colorado.

**BOARD OF COUNTY COMMISSIONERS
EL PASO COUNTY, COLORADO**


ATTEST: Chad D. Broerman
County Clerk & Recorder

By: Sallie Clark
Chair of the Board

EXISTING DRAINAGE MAP



FINAL DRAINAGE REPORT

For

“Claremont Business Park Filing No. 2”

Prepared for:
El Paso County
Department of Public Works
Engineering Division

On Behalf of:
Claremont Development, Inc.

Prepared by:



2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
(719) 575-0100
fax (719) 572-0208

Revised November 2006

Engineer's Statement:

The *revisions* (changes made to the base Final Drainage Report since July, 2006) to the attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. The revisions encompassed adding additional right of way to the study area at the County's request, the handling of offsite drainage due to the additional right of way, a breakdown of private drainage within lot numbers 10 through 25 of Filing No. 2 due to cross-lot drainage (contrary to note # 25 on the recorded plat), profiling additional inlets along the channel edge, and rip-rap sizing for outlet structures along the channel. The Final Drainage Report dated July, 2006 was prepared under the direct supervision of Richard G. Gallegos, Jr. in July, 2006 and stamped (see next sheet).

The Final Drainage Report was prepared according to the criteria established by the County for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing the *revisions* to this report.

Brady A. Shyrock
Registered Professional Engineer
State of Colorado
No. 38164

SEAL

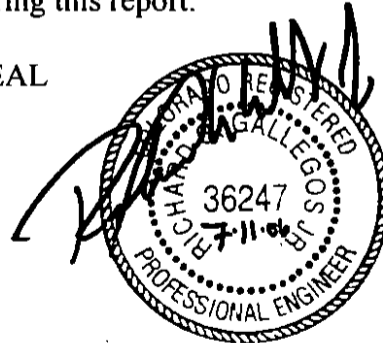


Engineer's Statement:

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

SEAL

Richard G. Gallegos, Jr.
Registered Professional Engineer
State of Colorado
No. 36247

**Developer's Statement:**

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

Claremont Development, Inc.

Business Name

By: _____

Title: _____

Address: 3460 Capital Drive
Colorado Springs, CO 80915

El Paso County:

Filed in accordance with Section 51.1 of the El Paso Land Development Code, as amended.

For Mr. John McCarty, County Engineer/Director

Date 4/23/07

Conditions:

D. Drainage and Bridge Fees

Claremont Business Park Filing No. 2 has not been previously platted. The drainage basin and bridge fees have been determined per the El Paso County Drainage Basin Fees Sheet, dated February 3, 2006, Resolution No. 06-31. The site is located entirely within the Sand Creek Drainage Basin. The fees are based upon the percent impervious of the development, which have been included within the appendix of this report. The fees due have been calculated as follows.

Claremont Business Park Filing No. 2Final Drainage Report
Drainage and Bridge Fees

	Area (ac.)	Fee/Imp. Acre	% Imp.	Fee Due	Reimbursable Const. Costs	Fee Credit	Fee Due at Platting	Fee Credit Remaining
Drainage Fee	62.967	\$15,000.00	80%	\$755,604.00	\$0.00	\$1,225,355.45	\$0.00	\$469,751.45
Bridge Fee	62.967	\$1,503.00	80%	\$75,711.52	\$75,711.52	\$0.00	\$0.00	\$0.00
Total Fee Due at Platting							\$0.00	

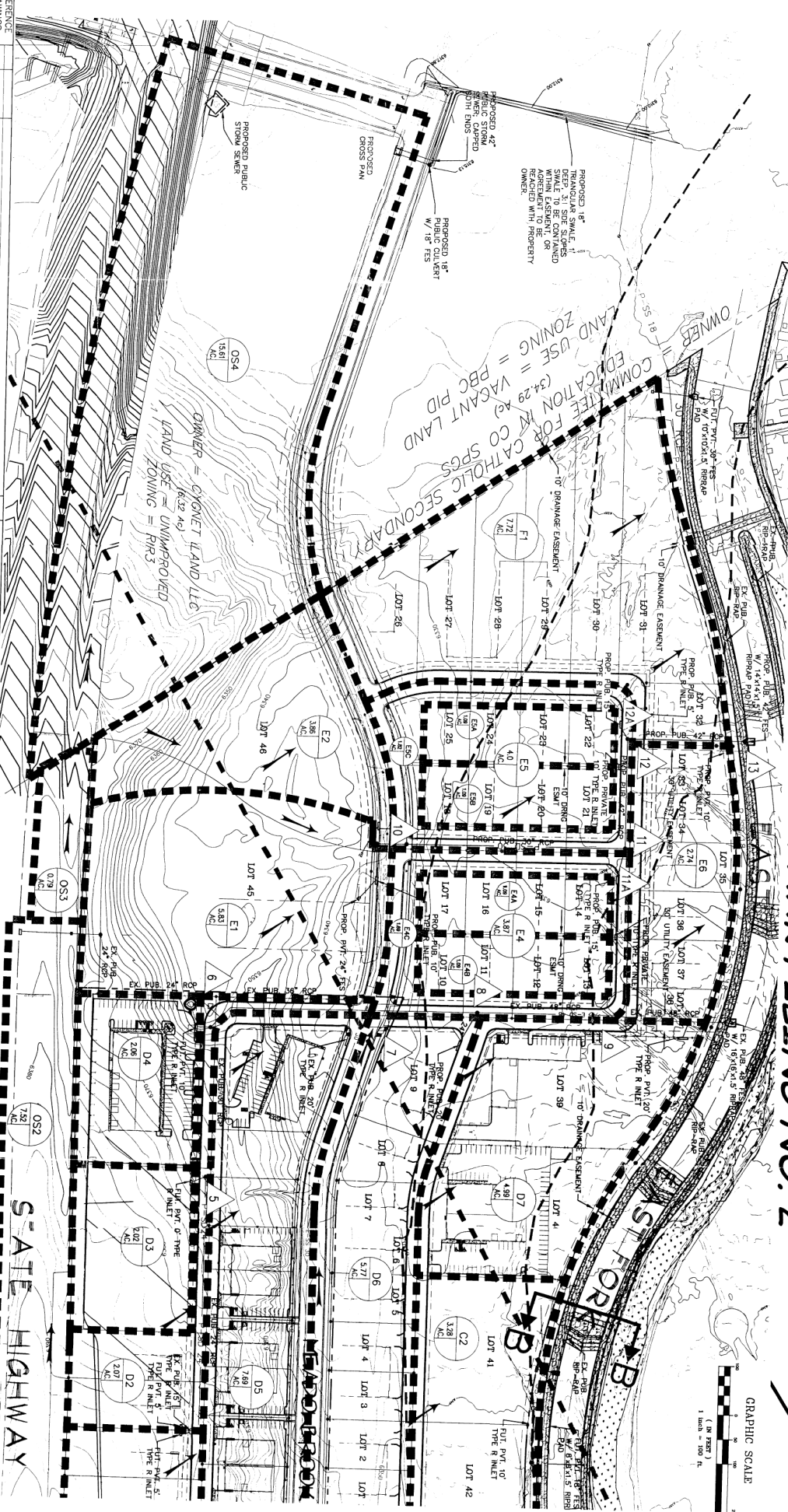
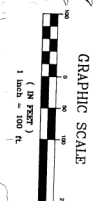
The developer of Claremont Business Park is completing the construction of the channel improvements on behalf of the Central Marksheffel Metropolitan District. The construction costs for both Filing 1 and Filing 2 combined exceed the drainage fees due for the site. No drainage fees will be required at the time of platting.

It should be noted that the Central Marksheffel Business District is reimbursing the developer of Claremont Business Park Filing 2 for the construction costs of the channel minus the drainage fees due for the site. The District has \$1,225,355.45 of drainage credits available within the Sand Creek Basin. This credit amount is based upon the construction cost estimate for the channel minus the drainage fees assessed for Claremont Business Park Filing No. 1. The District will use an additional \$755,604.00 of the drainage credits for the platting of Claremont Business Park Filing No. 2. The District will have \$469,751.45 of drainage credits left within the Sand Creek Fee basin.

The Central Marksheffel Business District has also constructed the Marksheffel Road Bridge over East Fork Sand Creek. This structure has been identified as a needed public improvement within the Drainage Basin Planning Study for Sand Creek and is eligible for reimbursement. Since the construction of the Marksheffel Bridge is in excess of the \$75,711.52 in bridge fees due for this site, no bridge fees are required at the time of platting. The fee will be deducted from the eligible reimbursable construction costs of the bridge and the remaining credits will be utilized or reimbursement applied for by the Central Marksheffel Business District.

DESIGN POINT SUMMARY			
POINT	ELEVATION	DATE	BY
1	7200	01/15/07	MM
2	7200	01/15/07	MM
3	7200	01/15/07	MM
4	7200	01/15/07	MM
5	7200	01/15/07	MM
6	7200	01/15/07	MM
7	7200	01/15/07	MM
8	7200	01/15/07	MM
9	7200	01/15/07	MM
10	7200	01/15/07	MM

DRAINAGE PLAN CLAREMONT BUSINESS PARK FILING NO. 2



REFERENCE DRAWINGS		SUBDIVIDER		REVISIONS		BENCHMARK DATA/ELEV.		DESCRIPTION / LOCATION	
NO.	DATE	NO.	DATE	NO.	DATE	NO.	DATE	NO.	DATE
1	01/15/07	1	01/15/07	1	01/15/07	1	01/15/07	1	01/15/07
2	01/15/07	2	01/15/07	2	01/15/07	2	01/15/07	2	01/15/07
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CLAREMONT BUSINESS PARK
REVISED FINAL DRAINAGE PLAN
MASTER DEVELOPMENT DRAINAGE PLAN
REVISED FINAL DRAINAGE PLAN
FILING NO. 2
DR02

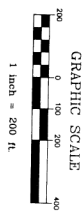
Matrix Design Group, Inc.
Integrated Design Solutions 2435 Research Parkway, Suite 300
Colorado Springs, CO 80920
Phone 719-575-1100
Fax 719-575-0208

FOR AND ON BEHALF OF
MATRIX DESIGN GROUP, INC.

SUBDIVIDER
HARRIS CONSTRUCTION, INC.
3460 S. WYOMING AVE.
COLORADO SPRINGS, CO 80915-9710

REFERENCE DRAWINGS
NO. DATE
1 01/15/07
2 01/15/07
3 01/15/07
4 01/15/07
5 01/15/07
6 01/15/07
7 01/15/07
8 01/15/07
9 01/15/07
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36 01/15/07
37 01/15/07
38 01/15/07
39 01/15/07
40 01/15/07
41 01/15/07
42 01/15/07

1

EXH01

PROPOSED DRAINAGE MAP

CBP LOT 2-1A
COUNTY OF EL PASO, STATE OF COLORADO
PROPOSED DRAINAGE MAP
DECEMBER 2018

LEGEND

BASIN DESIGNATION: Z, 25, .25, .35, C5, C100

ACRES

PIPE RUN REFERENCE LABEL: 4, 6

SURFACE DESIGN POINT

BASIN BOUNDARY

EXISTING CONTOUR: (6920)

PROP CONTOUR: 6920

SITE BOUNDARY

PROPOSED STORM SEWER PIPE

EXISTING STORM SEWER PIPE

CROSSSPAN

INLET

EXISTING FLOW DIRECTION ARROW

EMERGENCY OVERFLOW DIRECTION

PROPOSED FLOW DIRECTION

H.P. X

L.P. X

HIGH POINT

LOW POINT

SC250 PERM. EROSION CONTROL MAT

RIPRAP TYPE VL OR L

BASIN SUMMARY

BASIN	AREA (ACRES)	Q ₅	Q ₁₀₀
EX1	0.25	0.1	0.8
EX2	0.36	0.2	1.1
A	0.93	3.9	7.0
B	0.92	3.8	7.0
C	0.21	0.1	0.6
D	0.26	0.5	1.2

DESIGN POINT SUMMARY

DESIGN POINT	Q ₅	Q ₁₀₀	BASIN	STRUCTURE
1	3.7	7.3	EX1, A	RUNDOWN TO SFB
2	3.7	7.5	EX2, B	RUNDOWN TO SFB
3	7.5	15.4	DP1, DP2, C	WO SAND FILTER BASIN & OUTLET STRUCTURE

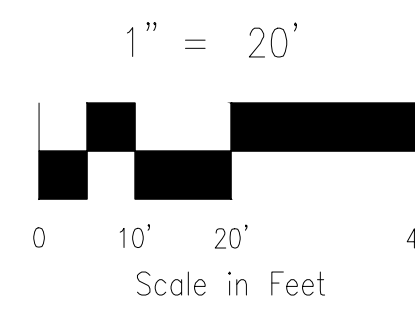
STORM SEWER SUMMARY

PIPE RUN	Q ₅	Q ₁₀₀	PIPE SIZE	CONTRIBUTING PIPES
1	7.5	15.4	18" RCP	DP3/SFB

WQCV SUMMARY

EPC/URBAN DRAINAGE SAND FILTER BASIN-SEE STD. DET.

WQCV PROVIDED	1,830 CF
AREA REQUIRED	965 SF
AREA PROVIDED	1,580 SF
100 YR WATER SURFACE EL	6362.45
EMERGENCY SPILLWAY CREST ELEVATION	6363.40 FT
SPILLWAY DESIGN FLOW DEPTH	0.52 FT
CDOT TYPE D OUTLET STRUCTURE TOB ELEVATION	6361.92 FT



Sand Filter

Benefits

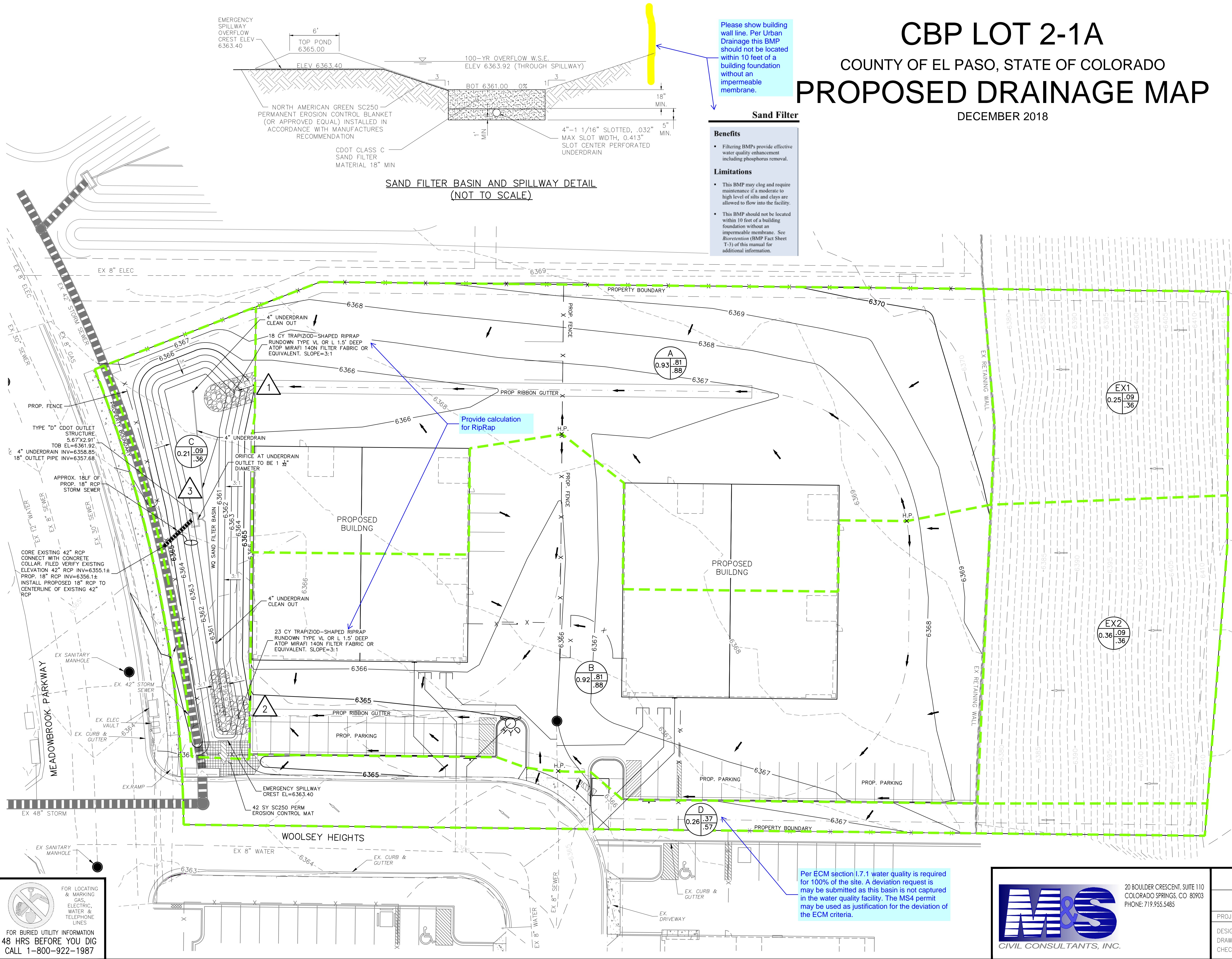
- Filtering BMPs provide effective water quality enhancement including phosphorus removal.

Limitations

- This BMP may clog and require maintenance if a moderate to high level of silts and clays are allowed to flow into the facility.
- This BMP should not be located within 10 feet of a building foundation without an impermeable membrane. See *Bioretention* (BMP Fact Sheet T-3) of this manual for additional information.

Please show building wall line. Per Urban Drainage this BMP should not be located within 10 feet of a building foundation without an impermeable membrane.

SAND FILTER BASIN AND SPILLWAY DETAIL (NOT TO SCALE)



Per ECM section 1.7.1 water quality is required for 100% of the site. A deviation request is may be submitted as this basin is not captured in the water quality facility. The MS4 permit may be used as justification for the deviation of the ECM criteria.

FOR LOCATING & MARKING GAS, ELECTRIC, WATER & TELEPHONE LINES

FOR BURIED UTILITY INFORMATION 48 HRS BEFORE YOU DIG CALL 1-800-922-1987

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

CBP LOT 2-1A

PROPOSED DRAINAGE MAP

PROJECT NO. 44-034

DESIGNED BY: CMN
DRAWN BY: CMN
CHECKED BY: VAS

SCALE: HORIZONTAL: 1"=20' VERTICAL: N/A

DATE: 12/21/2018

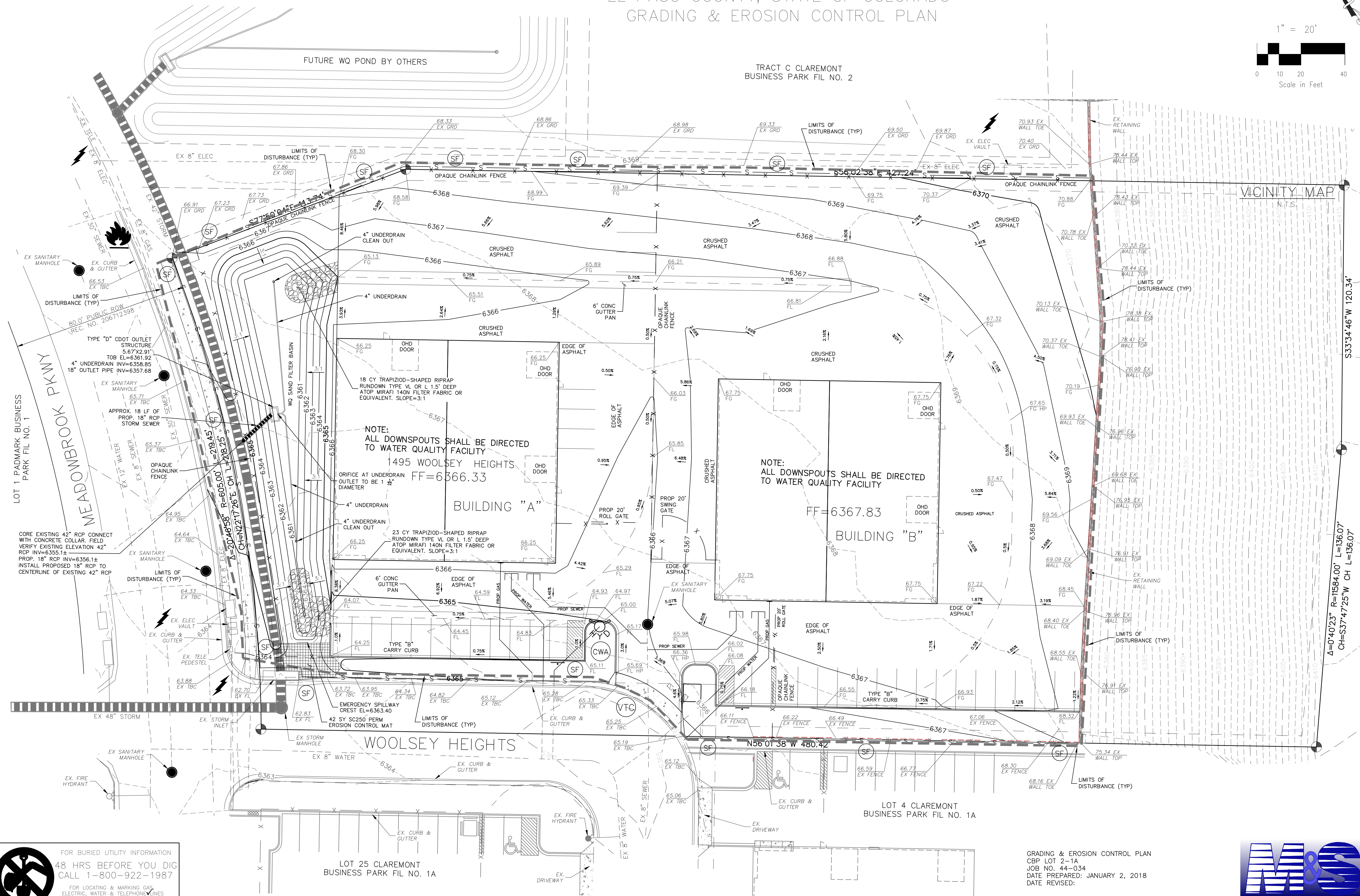
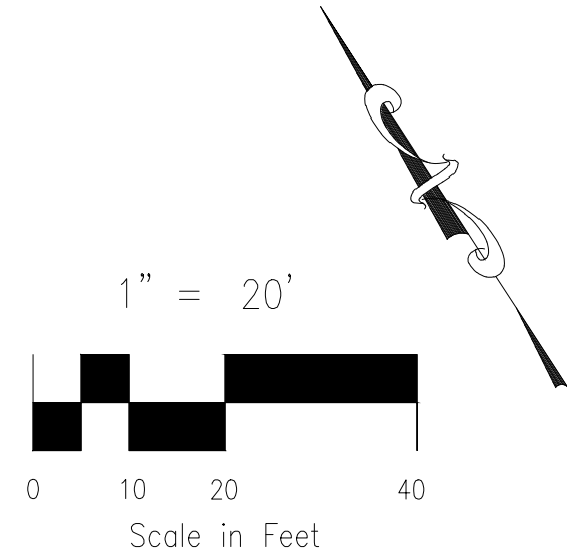
SHEET 1 OF 1

PDM

GRADING AND EROSION CONTROL PLAN

CBP LOT 2-1A

EL PASO COUNTY, STATE OF COLORADO
GRADING & EROSION CONTROL PLAN



FOR BURIED UTILITY INFORMATION
48 HRS BEFORE YOU DIG
CALL 1-800-922-1987

FOR LOCATING & MARKING GAS,
ELECTRIC, WATER & TELEPHONE LINES
WATER EMERGENCIES 520-0300

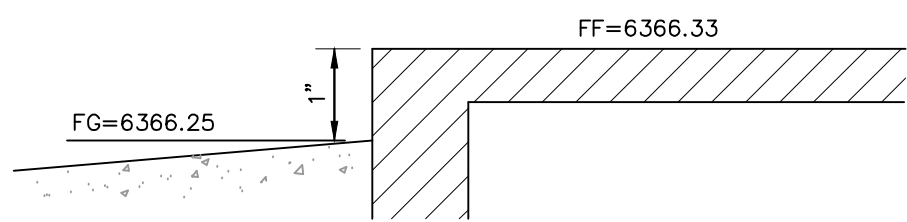
GRADING & EROSION CONTROL PLAN
CBP LOT 2-1A
JOB NO. 44-034
DATE PREPARED: JANUARY 2, 2018
DATE REVISED:



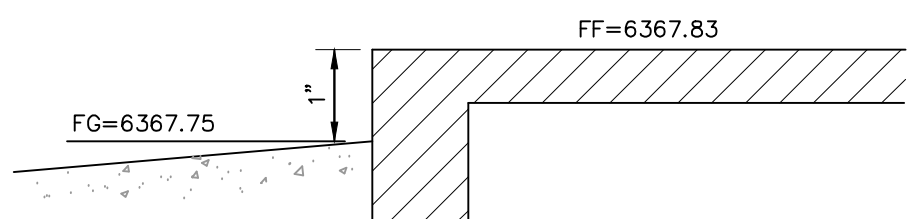
20 BOULDER CRESCENT, SUITE 110
COLORADO SPRINGS, CO 80903
PHONE: 719.955.5485

EL PASO COUNTY FILE NO. PPR 19-000

SHEET 2 OF 4



BUILDING "A" FINISH FLOOR DETAIL



BUILDING "B" FINISH FLOOR DETAIL

LEGEND

	EX MAJ CONT
	EX MIN CONT
	PROP MAJ CONT
	PROP MIN CONT
LP	LOW POINT
HP	HIGH POINT
EX	EXISTING
FL	FLOWLINE
TC	TOP OF CURB
FG	FINISH GRADE
FF	FINISH FLOOR
TOF	TOP OF FOOTING
	S — SILT FENCE
	VEHICLE TRACKING CONTROL
	CONCRETE WASH-OUT BASIN
	LIMITS OF DISTURBANCE

T-6

Sand Filter

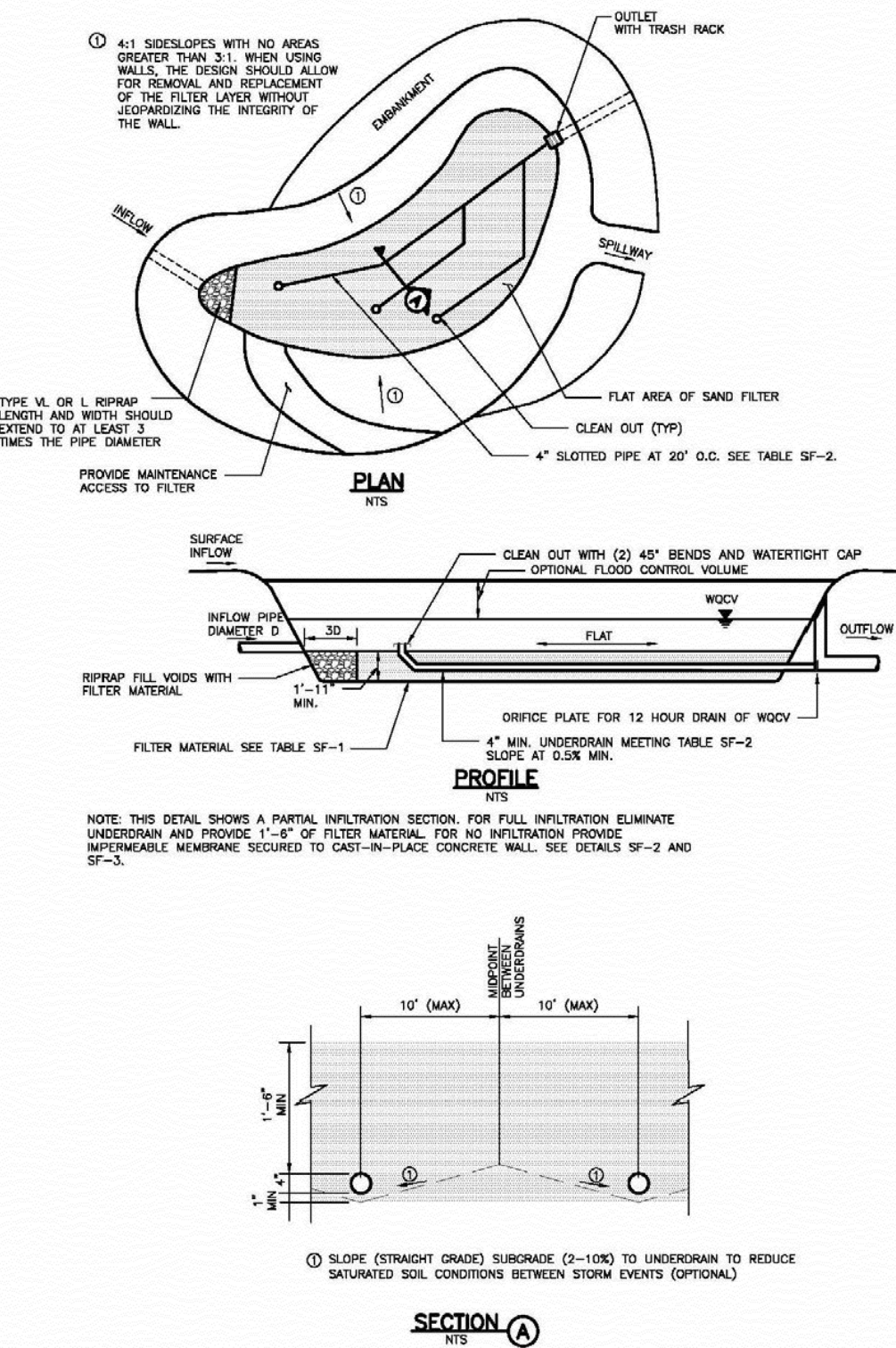


Figure SF-1. Sand Filter Plan and Sections

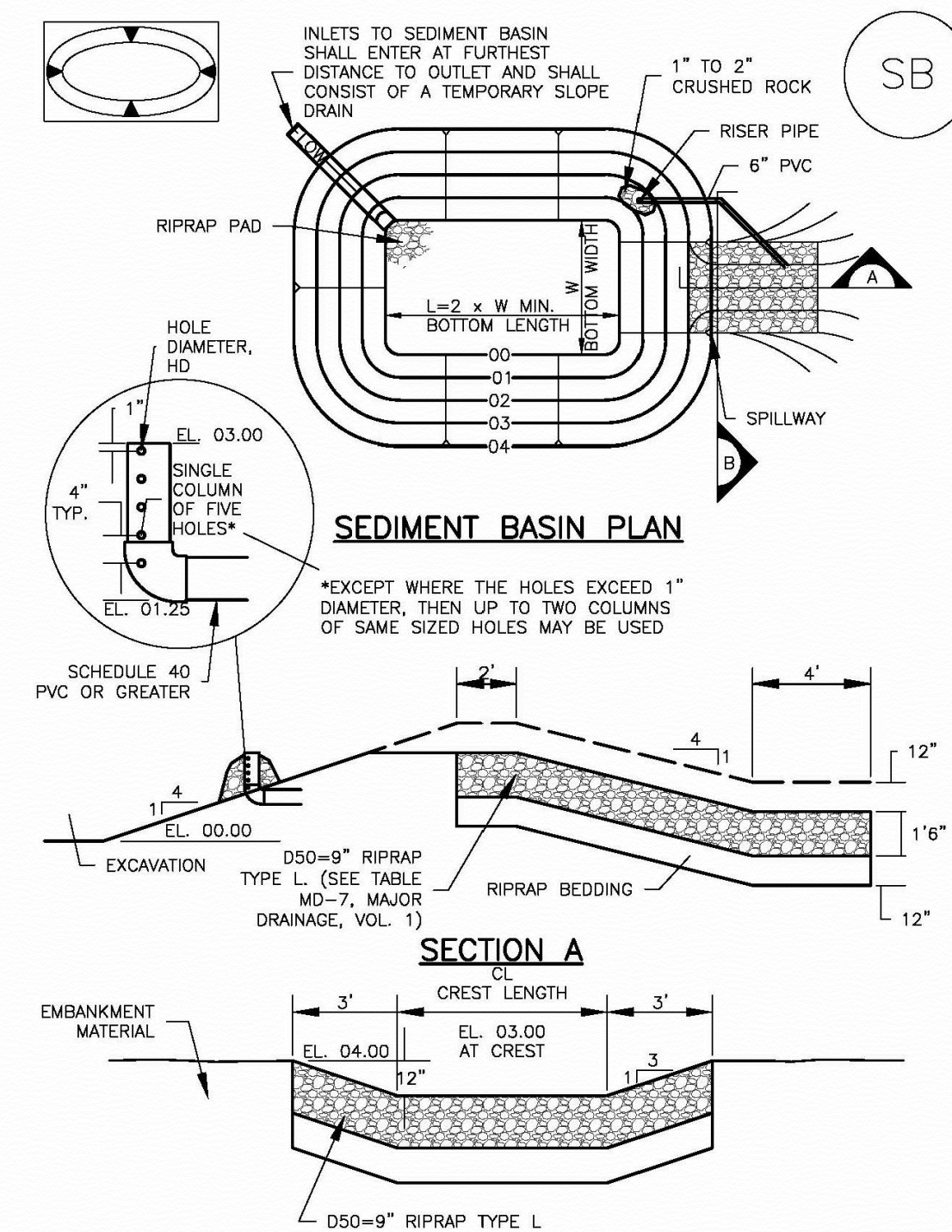
SF-8

Urban Drainage and Flood Control District
Urban Storm Drainage Criteria Manual Volume 3

November 2010

Sediment Basin (SB)

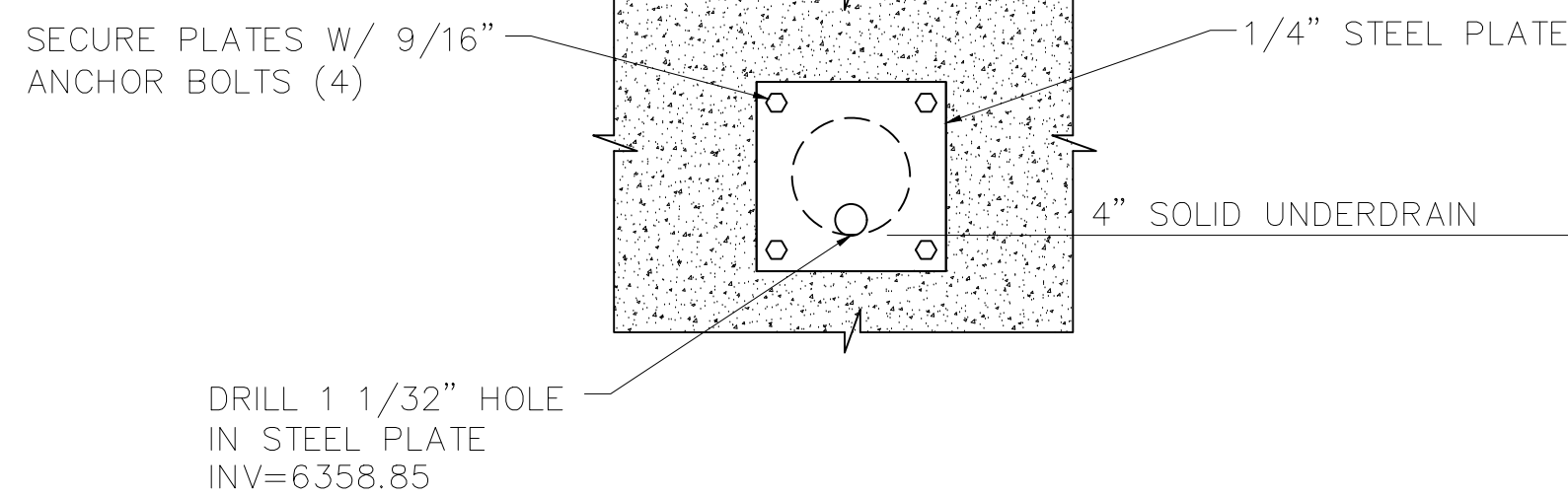
SC-7



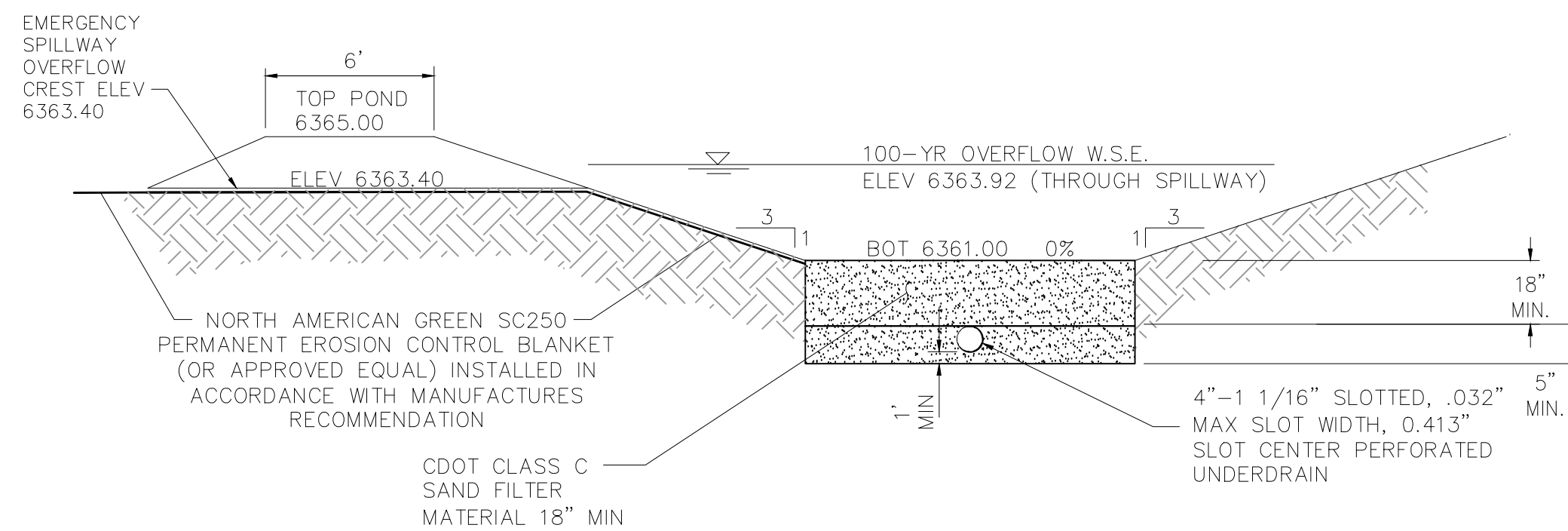
August 2013

Urban Drainage and Flood Control District
Urban Storm Drainage Criteria Manual Volume 3

SB-5



4" UNDERDRAIN
ORIFICE PLATE DETAIL



SAND FILTER BASIN AND SPILLWAY DETAIL
(NOT TO SCALE)

WQCV SUMMARY
EPC/URBAN DRAINAGE SAND FILTER BASIN—SEE STD DET.
WQCV PROVIDED = 1830 CF
AREA REQUIRED = 965 SF
AREA PROVIDED = 1,580 SF
100 YR OUTLET — CDOT TYPE D INLET TOP OF BOX=6361.92
100 YR WSE = 6362.45
EMERGENCY SPILLWAY EL = 6363.40

GRADING & EROSION CONTROL PLAN
CBP LOT 2-1A
JOB NO. 44-034
DATE PREPARED: JANUARY 2, 2019
DATE REVISED:

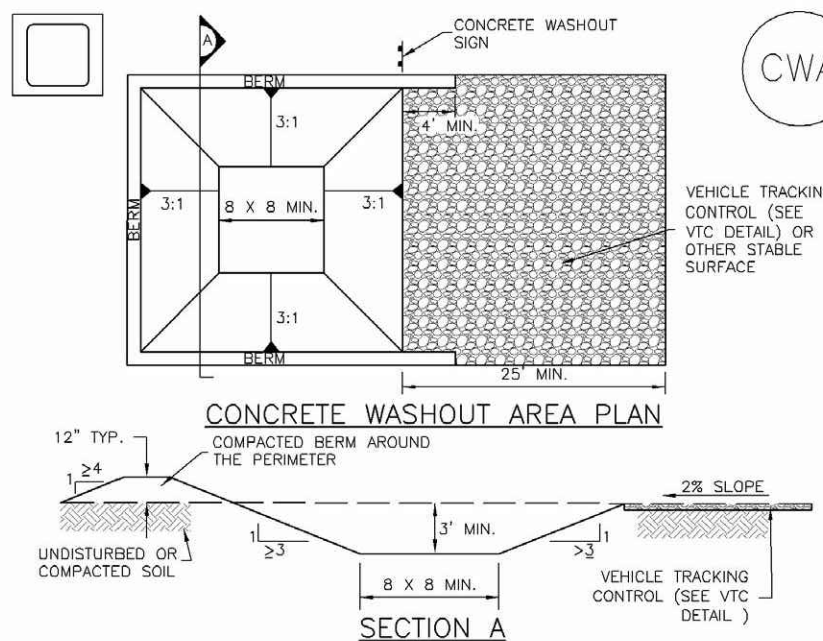
EL PASO COUNTY FILE NO. PPR 19-000



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

Concrete Washout Area (CWA)

MM-1



CWA-1. CONCRETE WASHOUT AREA

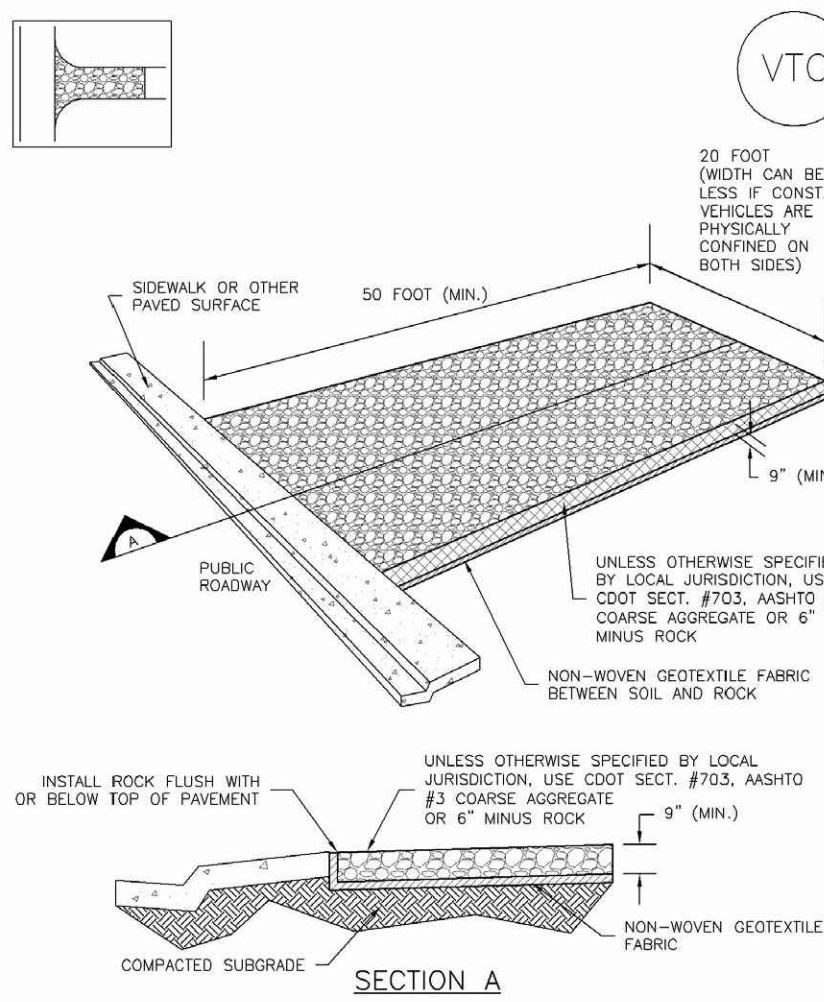
- CWA INSTALLATION NOTES**
1. SEE PLAN VIEW FOR:
—CWA INSTALLATION LOCATION.
 2. DO NOT LOCATE AN UNLINED CWA WITHIN 400' OF ANY NATURAL DRAINAGE PATHWAY OR WATERBODY. DO NOT LOCATE WITHIN 1,000' OF ANY WELLS OR DRINKING WATER SOURCES. IF SITE CONSTRAINTS MAKE THIS INFEASIBLE, OR IF HIGHLY PERMEABLE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

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CWA-3

Vehicle Tracking Control (VTC)

SM-4



VTC-1. AGGREGATE VEHICLE TRACKING CONTROL

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VTC-3

SM-4

Vehicle Tracking Control (VTC)

STABILIZED CONSTRUCTION ENTRANCE/EXIT INSTALLATION NOTES

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

STABILIZED CONSTRUCTION ENTRANCE/EXIT MAINTENANCE NOTES

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

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

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

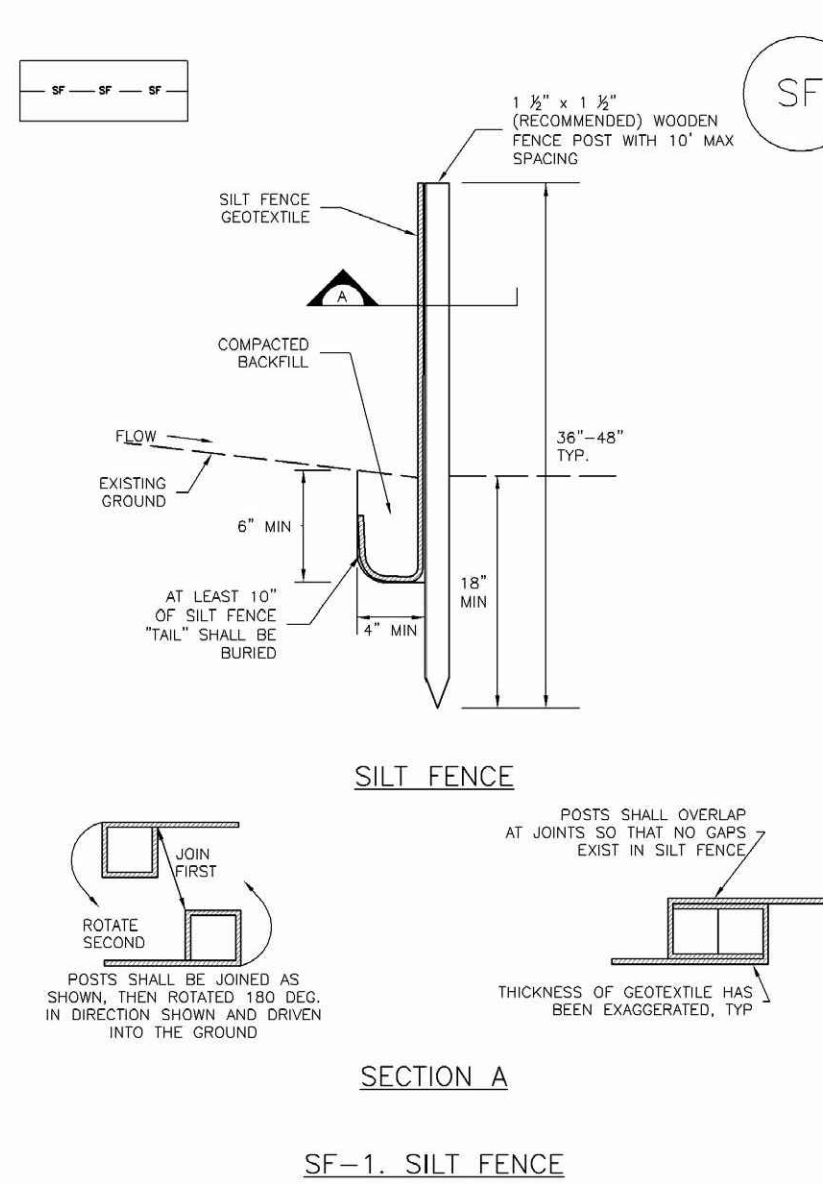
VTC-6

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Silt Fence (SF)

SC-1



SF-1. SILT FENCE

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SF-3

SC-1

Silt Fence (SF)

SILT FENCE INSTALLATION NOTES

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

SILT FENCE MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF THE SILT FENCE SHALL BE REMOVED AS NEEDED TO MAINTAIN THE FUNCTIONALITY OF THE BMP. TYPICALLY WHEN DEPTH OF ACCUMULATED SEDIMENTS IS APPROXIMATELY 6".
5. REPAIR OR REPLACE SILT FENCE WHEN THERE ARE SIGNS OF WEAR, SUCH AS SAGGING, TEARING, OR COLLAPSE.
6. SILT FENCE IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS STABILIZED AND APPROVED BY THE LOCAL JURISDICTION, OR IS REPLACED BY AN EQUIVALENT PERIMETER SEDIMENT CONTROL BMP.
7. WHEN SILT FENCE IS REMOVED, ALL DISTURBED AREAS SHALL BE COVERED WITH TOPSOIL, SEEDS, AND MULCH OR OTHERWISE STABILIZED AS APPROVED BY LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, NOT AVAILABLE IN AUTOCAD)

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

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EC-2 Temporary and Permanent Seeding (TS/PS)

Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses

Common Name	Botanical Name	Growth Season	Growth Form	Seeds/Pound	Pounds of PLS/Acre
Alkali Soil Seed Mix					
Alkali sacaton	<i>Sporobolus airoides</i>	Cool	Bunch	1,750,000	0.25
Basin wildrice	<i>Zizania americana</i>	Cool	Bunch	165,000	2.5
Sodier streambank wheatgrass	<i>Agropyron riparium 'Sodier'</i>	Cool	Sod	170,000	2.5
Jose tall wheatgrass	<i>Agropyron elongatum 'Jose'</i>	Cool	Bunch	79,000	7.0
Arriba western wheatgrass	<i>Agropyron michx 'terribat'</i>	Cool	Sod	110,000	5.5
Total					17.75
Fertile Loam Soil Seed Mix					
Ephraim crested wheatgrass	<i>Agropyron cristatum 'Ephraim'</i>	Cool	Sod	175,000	2.0
Dural hard fescue	<i>Festuca ovina 'duraeoides'</i>	Cool	Bunch	565,000	1.0
Lincoln smooth brome	<i>Bromus inermis laevis 'Lincoln'</i>	Cool	Sod	130,000	3.0
Sodier streambank wheatgrass	<i>Agropyron riparium 'Sodier'</i>	Cool	Sod	170,000	2.5
Arriba western wheatgrass	<i>Agropyron michx 'terribat'</i>	Cool	Sod	110,000	7.0
Total					18.5
High Water Table Soil Seed Mix					
Meadow foxtail	<i>Alopecurus pratensis</i>	Cool	Sod	900,000	0.5
Reedtop	<i>Agrostis alba</i>	Warm	Open sod	5,000,000	0.25
Reed canarygrass	<i>Phalaris arundinacea</i>	Cool	Sod	68,000	0.5
Lincoln smooth brome	<i>Bromus inermis laevis 'Lincoln'</i>	Cool	Sod	130,000	3.0
Pathfinder switchgrass	<i>Panicum virgatum 'Pathfinder'</i>	Warm	Sod	389,000	1.0
Altair tall wheatgrass	<i>Agropyron elongatum 'Altair'</i>	Cool	Bunch	79,000	5.5
Total					18.75
Transition Turf Seed Mix					
Ruckers Canadian blaggrass	<i>Poa compressa 'Ruckers'</i>	Cool	Sod	2,500,000	0.5
Dural hard fescue	<i>Festuca ovina 'duraeoides'</i>	Cool	Bunch	565,000	1.0
Citation perennial ryegrass	<i>Lolium perenne 'Citation'</i>	Cool	Sod	247,000	3.0
Lincoln smooth brome	<i>Bromus inermis laevis 'Lincoln'</i>	Cool	Sod	130,000	3.0
Total					7.5

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Temporary and Permanent Seeding (TS/PS) EC-2

Table TS/PS-2. Minimum Drill Seeding Rates for Perennial Grasses (cont.)

Common Name	Botanical Name	Growth Season	Growth Form	Seeds/Pound	Pounds of PLS/Acre
Sandy Soil Seed Mix					
Blue grama	<i>Bouteloua gracilis</i>	Warm	Sod-forming bunchgrass	825,000	0.5
Camper little bluestem	<i>Schizachyrium scoparium 'Camper'</i>	Warm	Bunch	240,000	1.0
Prairie sandreed	<i>Calamagrostis longifolia</i>	Warm	Open sod	274,000	1.0
Sand dropseed	<i>Sporobolus cryptandrus</i>	Cool	Bunch	5,298,000	0.25
Vaughn sidecoats grama	<i>Bouteloua curtipendula 'Vaughn'</i>	Warm	Sod	191,000	2.0
Arriba western wheatgrass	<i>Agropyron michx 'terribat'</i>	Cool	Sod	110,000	5.5
Total					10.25
Heavy Clay, Rocky Foothill Seed Mix					
Ephraim crested wheatgrass	<i>Agropyron cristatum 'Ephraim'</i>	Cool	Sod	175,000	1.5
Oshe intermediate wheatgrass	<i>Agropyron intermedium 'Oshe'</i>	Cool	Sod	115,000	5.5
Vaughn sidecoats grama	<i>Bouteloua curtipendula 'Vaughn'</i>	Warm	Sod	191,000	2.0
Lincoln smooth brome	<i>Bromus inermis laevis 'Lincoln'</i>	Cool	Sod	130,000	3.0
Arriba western wheatgrass	<i>Agropyron michx 'terribat'</i>	Cool	Sod	110,000	5.5
Total					17.5

* All of the above seeding mixes and rates are based on drill seeding followed by crimped straw mulch. These rates should be doubled if used in broadcast and should be increased by 50 percent if the seeding is done using a Brollion Drill or is applied through hydraulic seeding. Hydraulic seeding may be substituted for drilling only where slopes are steeper than 3:1. If hydraulic seeding is used, hydraulic mulching should be done as a separate operation.

† See Table TS/PS-3 for seeding dates.

‡ If site is to be irrigated, the transition turf seed rates should be doubled.

§ Crested wheatgrass should not be used on slopes steeper than 6H to 1V.

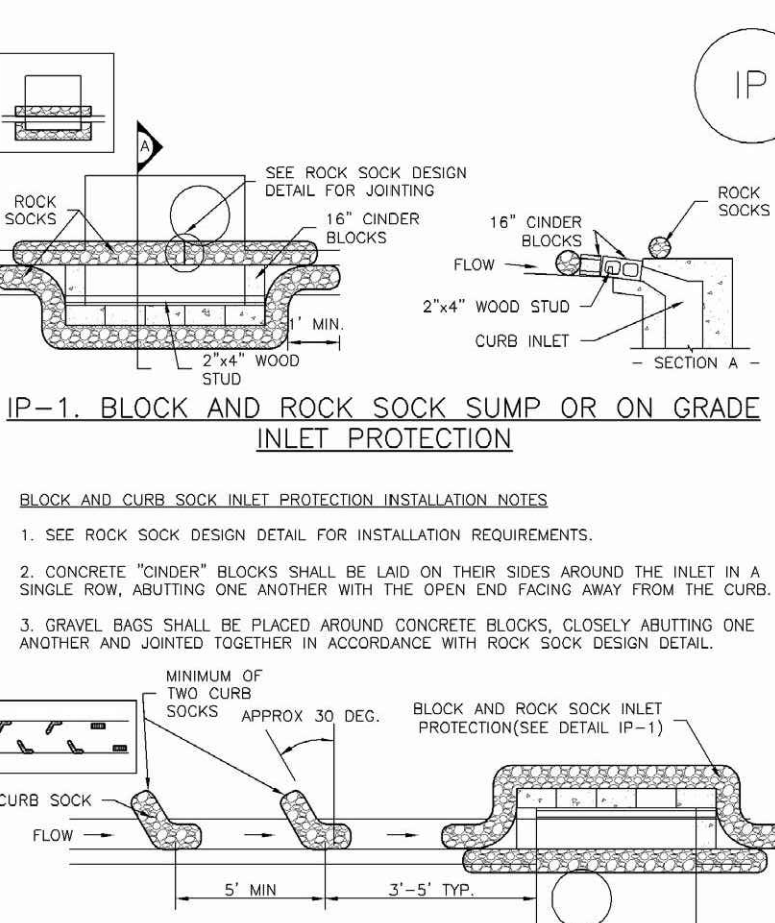
¶ Can substitute 0.5 lbs PLS of blue grama for the 2.0 lbs PLS of Vaughn sidecoats grama.

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TS/PS-5

SC-6

Inlet Protection (IP)



IP-2. CURB ROCK SOCKS UPSTREAM OF INLET PROTECTION

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

IP-4

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SC-6

Inlet Protection (IP)

GENERAL INLET PROTECTION INSTALLATION NOTES

1. SEE PLAN VIEW FOR:
—LOCATION OF INLET PROTECTION.
—TYPE OF INLET PROTECTION (IP-1, IP-2, IP-3, IP-4, IP-5, IP-6).
2. INLET PROTECTION SHALL BE INSTALLED PROMPTLY AFTER INLET CONSTRUCTION OR PAVING IS COMPLETE (TYPICALLY WITHIN 48 HOURS). IF A RAINFALL/RUNOFF EVENT IS FORECAST, INSTALL INLET PROTECTION PRIOR TO ONSET OF EVENT.
3. 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.

INLET PROTECTION MAINTENANCE NOTES

1. INSPECT BMPs EACH WORKDAY, AND MAINTAIN THEM IN EFFECTIVE OPERATING CONDITION. MAINTENANCE OF BMPs SHOULD BE PROACTIVE, NOT REACTIVE. INSPECT BMPs AS SOON AS POSSIBLE (AND ALWAYS WITHIN 24 HOURS) FOLLOWING A STORM THAT CAUSES SURFACE EROSION, AND PERFORM NECESSARY MAINTENANCE.
2. FREQUENT OBSERVATIONS AND MAINTENANCE ARE NECESSARY TO MAINTAIN BMPs IN EFFECTIVE OPERATING CONDITION. INSPECTIONS AND CORRECTIVE MEASURES SHOULD BE DOCUMENTED THOROUGHLY.
3. WHERE BMPs HAVE FAILED, REPAIR OR REPLACEMENT SHOULD BE INITIATED UPON DISCOVERY OF THE FAILURE.
4. SEDIMENT ACCUMULATED UPSTREAM OF INLET PROTECTION SHALL BE REMOVED AS NECESSARY TO MAINTAIN BMP EFFECTIVENESS. TYPICALLY WHEN STORAGE VOLUME REACHES 50% OF CAPACITY, A DEPTH OF 6" WHEN SILT FENCE IS USED, OR 1/4 OF THE HEIGHT FOR STRAW BALES.
5. INLET PROTECTION IS TO REMAIN IN PLACE UNTIL THE UPSTREAM DISTURBED AREA IS PERMANENTLY STABILIZED, UNLESS THE LOCAL JURISDICTION APPROVES EARLIER REMOVAL OF INLET PROTECTION IN STREETS.
6. WHEN INLET PROTECTION AT AREA INLETS IS REMOVED, THE DISTURBED AREA SHALL BE COVERED WITH TOP SOIL, SEEDS, AND MULCH, OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE LOCAL JURISDICTION.

(DETAIL ADAPTED FROM TOWN OF PARKER, COLORADO AND CITY OF AURORA, COLORADO, NOT AVAILABLE IN AUTOCAD)

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

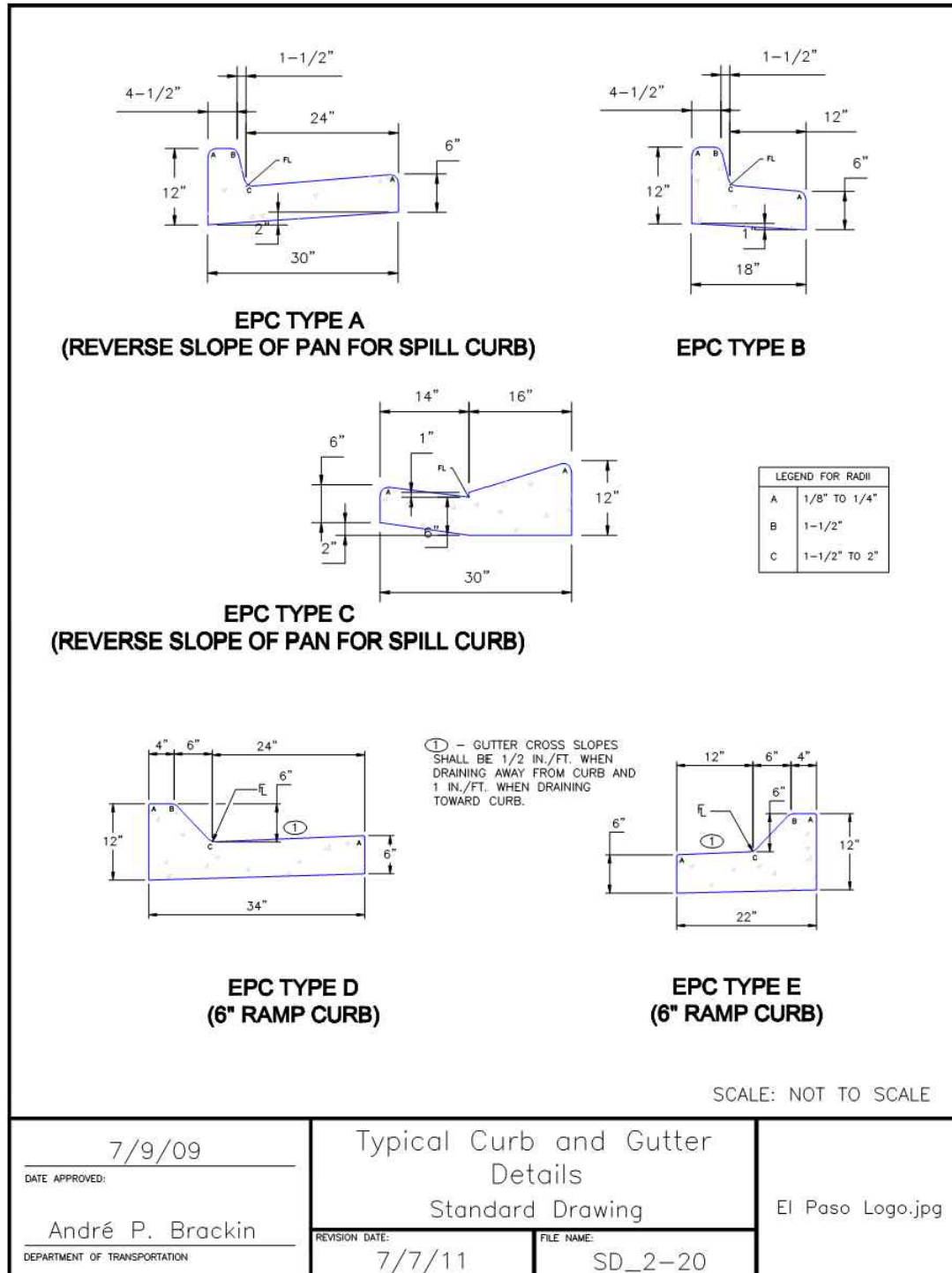
NOTE: THE DETAILS INCLUDED WITH THIS FACT SHEET SHOW COMMONLY USED, CONVENTIONAL METHODS OF INLET PROTECTION IN THE DENVER METROPOLITAN AREA. THERE ARE MANY PROPRIETARY INLET PROTECTION METHODS ON THE MARKET. UDFCD NEITHER ENDORSES NOR DISCOURAGES USE OF PROPRIETARY INLET PROTECTION. HOWEVER, IN THE EVENT PROPRIETARY METHODS ARE USED, THE APPROPRIATE DETAIL FROM THE MANUFACTURER MUST BE INCLUDED IN THE SWMP AND THE BMP MUST BE INSTALLED AND MAINTAINED AS SHOWN IN THE MANUFACTURER'S DETAILS.

NOTE: SOME MUNICIPALITIES DISCOURAGE OR PROHIBIT THE USE OF STRAW BALES FOR INLET PROTECTION. CHECK WITH LOCAL JURISDICTION TO DETERMINE IF STRAW BALE INLET PROTECTION IS ACCEPTABLE.

IP-8

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SCALE: NOT TO SCALE

DATE APPROVED: 7/9/09 André P. Brockin	Typical Curb and Gutter Details Standard Drawing 7/7/11	El Paso Logo.jpg SD_2-20
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GRADING & EROSION CONTROL PLAN
CBP LOT 2-1A
JOB NO. 44-034
DATE PREPARED: JANUARY 2, 2019
DATE REVISED:

EL PASO COUNTY FILE NO. PPR 19-000



20 BOULDER CRESCENT, SUITE 110
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SHEET 4 OF 4