Forsgren Associates, LLC
56 Inverness Drive East, Suite 112
Englewood, CO 80128
(720) 214-5884

November 28, 2018
El Paso County Development Services
Attn: Len Kendall
2880 International Circle, Ste 110
Colorado Springs, CO 80910

SUBJECT: **Seeger Homes, Inc**
Sales Office
Drainage Letter – Appaloosa Highway 24 Subdivision Filing No. Lot 3

Dear Mr.Kendall,

This letter is being presented to discuss existing and future drainage features of the proposed site at Lot 3 in Appaloosa Highway 24 Subdivision and to provide a description of the proposed work. Justification will be provided showing there will be no negative impact to existing drainage features or downstream conditions.

This project is located in the southwest 1/4 of Section 7, Township 14 South, and Range 65 West of the 6th Principal Meridian. The legal description of the property is Lot 3 in Appaloosa Highway 24 Subdivision. It has a tax ID number of 54073-17-012 and is zoned I-2. The streets that border the project area are US Highway-24 (Platte Avenue) to the South and Amelia St. to the West. Lot 3 in Appaloosa Highway 24 Subdivision is a vacant plot of land with no previous use. A 50-foot drainage easement borders the property to the east and contains a large concrete channel. An existing one-story building is located to the northwest at 5975 Terminal Avenue. A Final Drainage Report for Appaloosa Highway 24 Subdivision Filing No. 2, Lots 1, 2 & 3 has been previously submitted for approval. This site shall be in conformance with all applicable information provided in said Final Drainage Report.

Description of Property
Lot 3 has an area of 4.66 acres and is currently vacant. Runoff from the site flows, generally, to the southwest to an existing swale which delivers the water to an existing storm inlet. The soil type for Lot 3 consists of Truckton sandy loam at slopes of 0-3%. Truckton sandy loams are of the hydrologic soil group A. See Appendix for the Custom Soils Resource Report for the site obtained from the National Cooperative Soil Survey (https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm).

Major Basin Description
The site is located within the Sand Creek Drainage Basin. The site was previously studied as part of the previously approved drainage letter by HY-Power Company, approved December 1, 2000.

Floodplain Statement
The proposed improvements are not within a 100-year floodplain, FIRM #08041C0754F; revision date May 23, 2007. See Appendix for FEMA FIRM Floodplain maps.

Subbasin Description

The entire site lies within the Sand Creek Drainage Basin. Stormwater runoff collected on site shall generally be detained in a proposed Extended Detention Basin (EDB) on the southwest corner of the site. In addition to the EDB being installed by others, a proposed Type C inlet shall be installed at the southwest corner of Lot 1 to convey flows to Lot 2. Flows will travel along the frontage of Amelia St. to the south along a grass lined swale to a second Type C inlet where the flows will be conveyed through a 18-inch HDPE storm sewer to the EDB. The EDB shall be owned and maintained by the Owner of Lot 3 in Appaloosa Highway 24 Subdivision.

Four Step Process to Minimize Adverse Impacts of Urbanization

El Paso County requires the UDFCD Four Step Process be utilized for receiving waters protection. The goal of the Four Step Process is to reduce runoff volumes, treat the water quality capture volume of runoff, stabilize drainageways, and implement long-term source controls. With development projects with construction activities disturbing 1 acre or more, the Four Step Process must be implemented. Below is a description of all steps of the Four Step Process and how they were utilized in design.

Step 1: Employ Runoff Reduction Practices

In order to reduce the runoff to Sand Creek Drainage Basin, LID strategies were implemented. LID techniques investigated and/or utilized include conserving existing features and minimizing impact to the overall site. Greater than 5% of the total square footage of the lot shall be grassed area with landscaping. In addition, prior to release into the extended detention basin, there is a grass buffer ranging from 5'-15', minimizing directly connected impervious areas.

Step 2: Implement BMPs that Provide a Water Quality Capture Volume with Slow Release

It has been determined that full-spectrum detention is required and will be provided on site. A full-spectrum, EDB will be installed with an outlet structure with three stages to release the water quality capture volume (WQCV) over 40-hours, excess urban runoff volume (EURV) over 72-hours, and the 100-year storm volume.

Step 3: Stabilize Drainageways

Runoff flows directly offsite via underground storm piping to the southwest. The 100-year storm runoff of 5.3 cfs will not impact downstream drainageways. No streams or drainageways are present on, or adjacent to, the site.

Step 4: Implement Site Specific and Other Source Control BMPs

Sites with specific needs, such as material storage or other site operations, require specific, source control BMPs be implemented on site, post-construction. For this site, contaminants from site activities are not anticipated. In addition, no hazardous materials or other outdoor storage will be done on-site. No site specific or other source control BMPs are proposed for this site.

Proposed Conditions

Seeger Homes, Inc proposes the construction of a new sales office, with 5 premanufactured mobile homes for display on the site. The majority of the surfacing will be gravel, with the entrance and parking being asphalt pavement. No wet utilities shall be provided to the premanufactured mobile homes, as

they are just show-homes for potential buyers. Currently, the site is covered in pervious, grass surface. A final drainage report shall be completed and submitted by others that takes into account all additional impervious surface added per this site work. An extended detention basin shall be installed to provide 100-year detention for Lots 1, 2 & 3 and shall release runoff at historic rates. The Owner of Appaloosa Highway 24 Subdivision Filing No. 2 shall be responsible for maintaining this drainage facility. All drainage features shall be approved prior to construction in order to adequately convey and detain stormwater runoff.

It is the professional opinion of the engineer that the proposed improvements will not have any negative impacts on the existing site conditions or the storm drainage system's ability to convey flows from the site and will not adversely affect the downstream and surrounding developments.

Please let me know if you have any questions.

Sincerely,
Forsgren Associates, Inc

Conner Burba, P.E.
Project Manager

Design 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 applicable 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.

_____ _____

Conner Burba, P.E. #51257 Date

Owner/Developer's Statement:

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

_____ _____

Louis Mastin, Manager Date

Seeger Homes, Inc

3800 N Nevada, Colorado Springs, CO 80907

El Paso County:

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

_____ _____

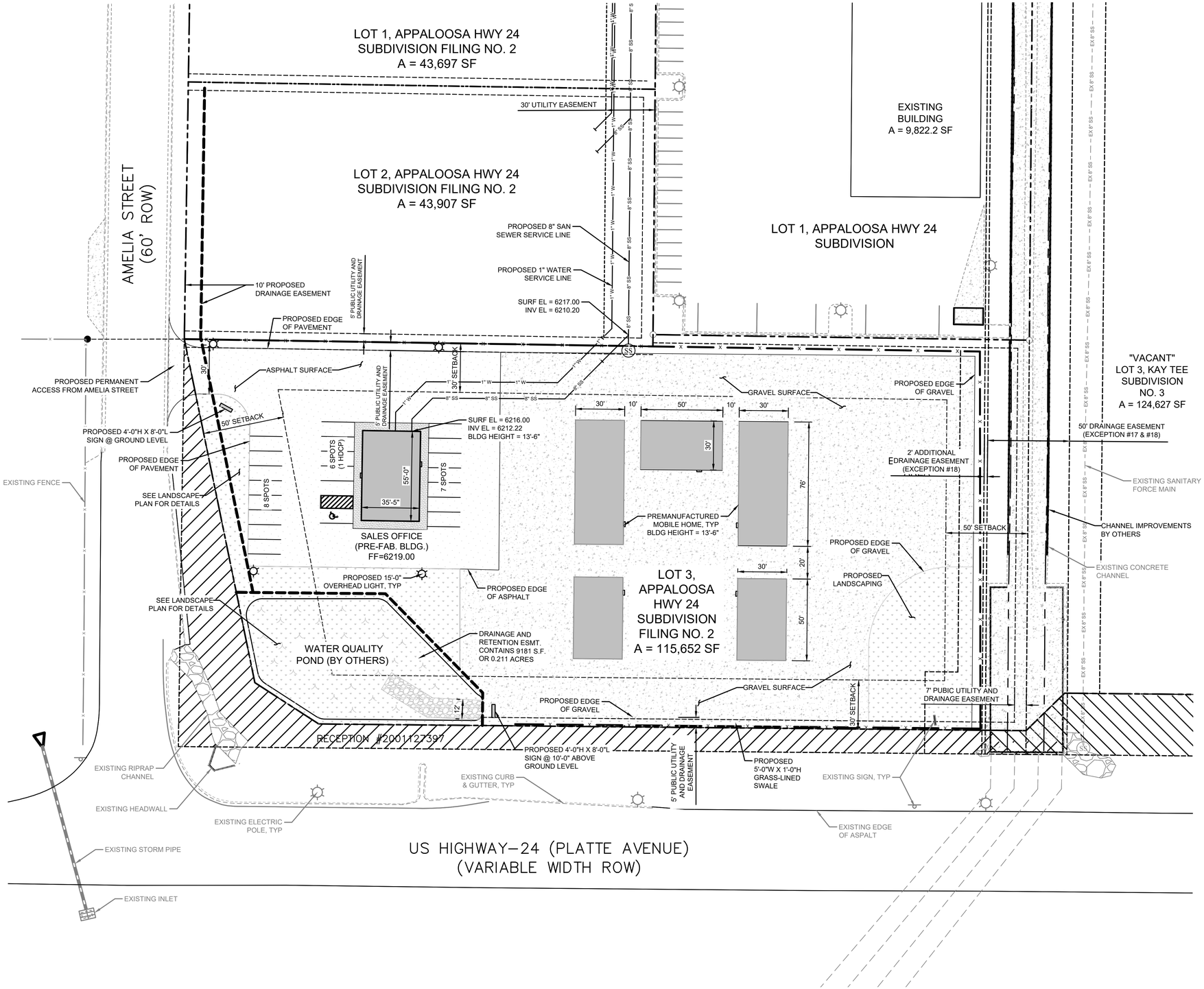
Jennifer Irvine, P.E. Date

County Engineer / ECM Administrator

Conditions:

SEEGER HOMES INC. - SALES OFFICE

SITE DEVELOPMENT PLANS
LOT 3, APPALOOSA HIGHWAY 24 SUBDIVISION



THE PARTIES RESPONSIBLE FOR THIS PLAN HAVE FAMILIARIZED THEMSELVES WITH ALL CURRENT ACCESSIBILITY CRITERIA AND SPECIFICATIONS AND THE PROPOSED PLAN REFLECTS ALL SITE ELEMENTS REQUIRED BY THE APPLICABLE ADA DESIGN STANDARDS AND GUIDELINES AS PUBLISHED BY THE UNITED STATES DEPARTMENT F JUSTICE. APPROVAL OF THIS PLAN BY EL PASO COUNTY DOES NOT ASSURE COMPLIANCE WITH THE ADA OR ANY REGULATIONS OR GUIDELINES ENACTED OR PROMULGATED UNDER OR WITH RESPECT TO SUCH LAWS.

LEGEND:

- PROPOSED GRAVEL
- PROPOSED ASPHALT
- PROPOSED FENCE
- PROPOSED LANDSCAPING

GRAPHIC SCALE
0' 15' 30' 60' 90'
Scale: 1"=30'

PCD FILE NO. PPR1831

NO.	REVISIONS	BY	DATE

This document or any part thereof in detail or design concept is the property of Forsgren Associates Inc. and shall not be copied without the written authorization of Forsgren Associates Inc.

FORSGREN Associates Inc
56 Inverness Drive East, Suite 112, Englewood, CO 80112
PH: 720.214.5884 FAX: 720.000.0000

PROJECT NO.	04-18-0012
DRAWN	C. BURBA
DESIGNED	C. BURBA
APPROVED	C. BURBA
QA/QC	J. MOORE

OWNER
SEEGER HOMES
COLORADO SPRINGS, CO

SALES OFFICE - SPECIAL USE

DEVELOPMENT PLAN

SHEET NO: C-01
DATE: 10/24/18
PAGE NO: 1 OF 1

P:\Clients\Seeger\CAD\Development Plan\Site Plan.dwg - ---- - 11/20/2018 12:13 PM

Federal Emergency Management Agency

Washington, D.C. 20472

JAN 3 0 2007

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

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

IN REPLY REFER TO:
Case No.: 05-08-0368P
Community Name: City of Colorado Springs, CO
Community No.: 080060
Effective Date of This Revision: MAY 2 3 2007

Dear Mayor Rivera:

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

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

Sincerely,

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

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

List of Enclosures:

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

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

[redacted]
Regional Floodplain Administrator
Pikes Peak Regional Building Department

[redacted]
J. F. Sato and Associates, Inc.

[redacted]
Engineering and Surveying, Inc.

 | Issue Date: JAN 3 0 2007 | Effective Date: MAY 2 3 2007 | Case No.: 05-08-0368P | LOMR-APP

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of Colorado Springs El Paso County Colorado	CHANNELIZATION CULVERT	FLOODWAY HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA BASEMAP CHANGES
	COMMUNITY NO.: 080060		
IDENTIFIER	Sand Creek Center Tributary and East Fork LOMR	APPROXIMATE LATITUDE & LONGITUDE: 38.830, -104.720 SOURCE: USGS QUADRANGLE DATUM: NAD 27	

ANNOTATED MAPPING ENCLOSURES			ANNOTATED STUDY ENCLOSURES
TYPE: FIRM*	NO.: 08041C0753 F	DATE: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999
TYPE: FIRM	NO.: 08041C0754 F	DATE: March 17, 1997	PROFILE(S): 205P, 206P, 209P, and 210P FLOODWAY DATA TABLE: 5

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map; ** FBFM - Flood Boundary and Floodway Map; *** FHBM - Flood Hazard Boundary Map

FLOODING SOURCE(S) & REVISED REACH(ES) See Page 2 for Additional Flooding Sources

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

SUMMARY OF REVISIONS

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

* BFEs - Base Flood Elevations

DETERMINATION

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

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

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

109770 10.3.1.05080368 102-I-A-C

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER FLOODING SOURCES AFFECTED BY THIS REVISION

FLOODING SOURCE(S) & REVISED REACH(ES)

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

SUMMARY OF REVISIONS

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

* BFEs - Base Flood Elevations

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

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

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

OTHER COMMUNITIES AFFECTED BY THIS REVISION

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

AFFECTED MAP PANELS			AFFECTED PORTIONS OF THE FLOOD INSURANCE STUDY REPORT
TYPE: FIRM	NO.: 08041C0752 F	DATE: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999
TYPE: FIRM	NO.: 08041C0753 F	DATE: March 17, 1997	PROFILE(S): 206P
TYPE: FIRM	NO.: 08041C0754 F	DATE: March 17, 1997	FLOODWAY DATA TABLE: 5

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

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

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

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

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

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

COMMUNITY REMINDERS

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

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

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

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

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

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

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

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

STATUS OF THE COMMUNITY NFIP MAPS

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

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

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

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

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

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

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

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

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

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

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

Revised Data

Revised by LOMR dated OCT 07 2004

[1] Feet above confluence with Sand Creek

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOODWAY DATA

SAND CREEK EAST FORK

MAY 23 2007

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	WITH FLOODWAY	INCREASE
						FEET (NGVD)		
Sand Creek Center Tributary				Revised Data				
A	940	40	92	8.6	6,106.5	6,106.5	6,106.5	0.0
B	990	40	118	6.7	6,107.2	6,107.2	6,107.2	0.0
C	2,238	91	120	6.6	6,120.2	6,120.2	6,120.2	0.0
D	3,948	46	95	8.0	6,138.3	6,138.3	6,138.3	0.0
E	4,547	170	159	4.8	6,147.4	6,147.4	6,147.4	0.0
F	5,539	52	97	7.8	6,156.8	6,156.8	6,156.8	0.0
G	7,191	63	104	7.3	6,176.2	6,176.2	6,176.2	0.0
H	7,940	52	98	7.8	6,189.6	6,189.6	6,189.6	0.0
I	8,527	40	67	5.7	6,197.6	6,197.6	6,197.6	0.0
J	9,366	17	42	9.0	6,213.4	6,213.4	6,213.4	0.0
K	10,055	232	278	4.0	6,221.9	6,221.9	6,221.9	0.0
L	10,627	539	469	2.4	6,230.6	6,230.6	6,230.6	0.0
M	11,321	31	79	9.1	6,241.1	6,241.1	6,241.1	0.0
N	11,648	60	99	7.3	6,244.6	6,244.6	6,245.4	0.8
O	12,840	29	85	9.6	6,253.8	6,253.8	6,253.8	0.0
P	13,730	27	83	9.9	6,273.6	6,273.6	6,273.6	0.0
Q	14,592	26	68	9.3	6,299.7	6,299.7	6,299.7	0.0
R	14,670	40	61	6.9	6,304.2	6,304.2*	6,305.2	1.0
S	15,050	20	63	10.1	6,307.6	6,307.6	6,308.1	0.5
T	15,460	25	68	9.5	6,310.8	6,310.8	6,311.4	0.6
U	15,750	20	41	7.8	6,319.6	6,319.6	6,319.6	0.0
V	16,670	20	39	8.1	6,346.0	6,346.0	6,346.0	0.0

[1] Feet Above confluence with Sand Creek East Fork

TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

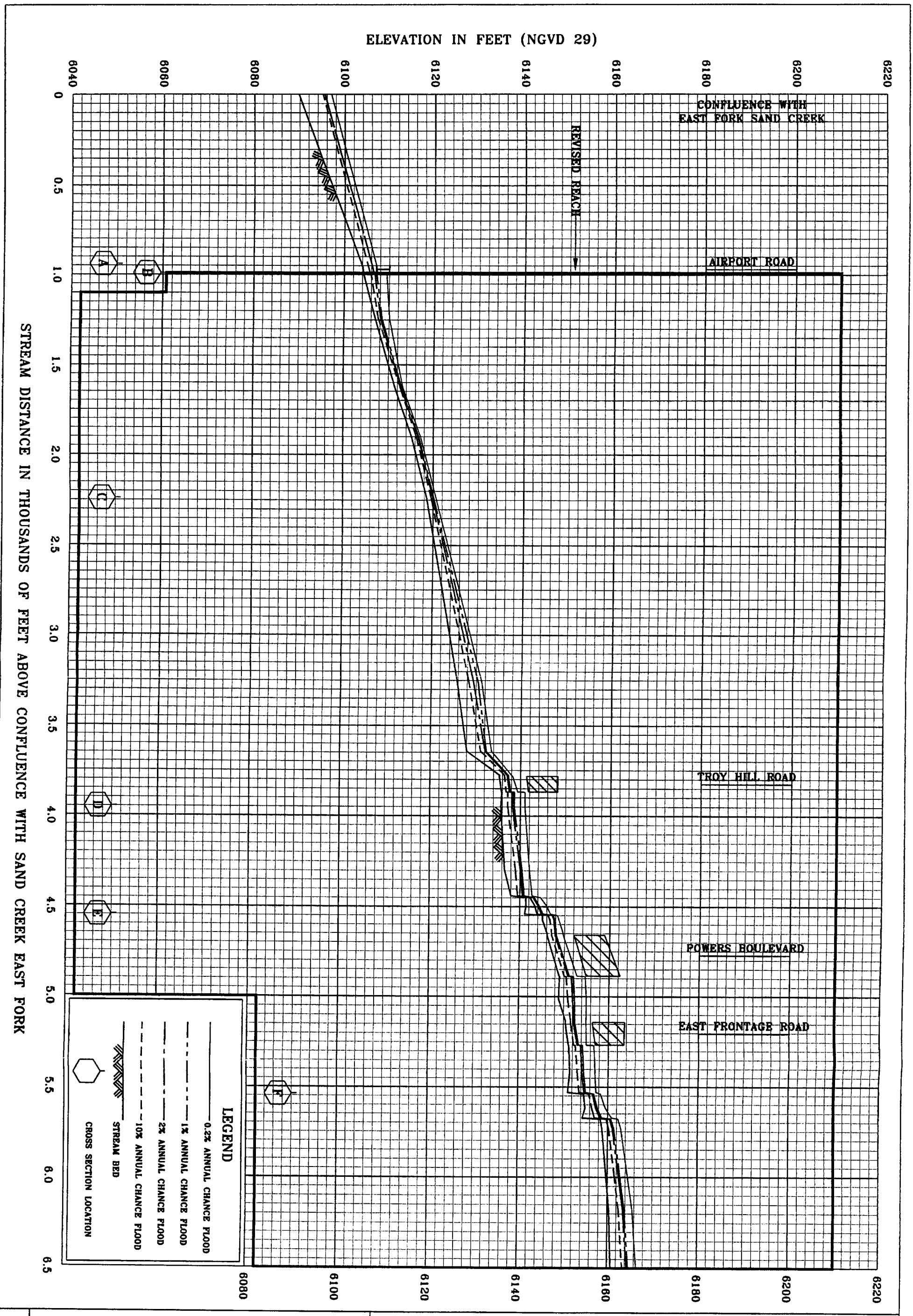
EL PASO COUNTY, CO

AND INCORPORATED AREAS

FLOODWAY DATA

MAY 23 2007

Sand Creek Center Tributary



205P

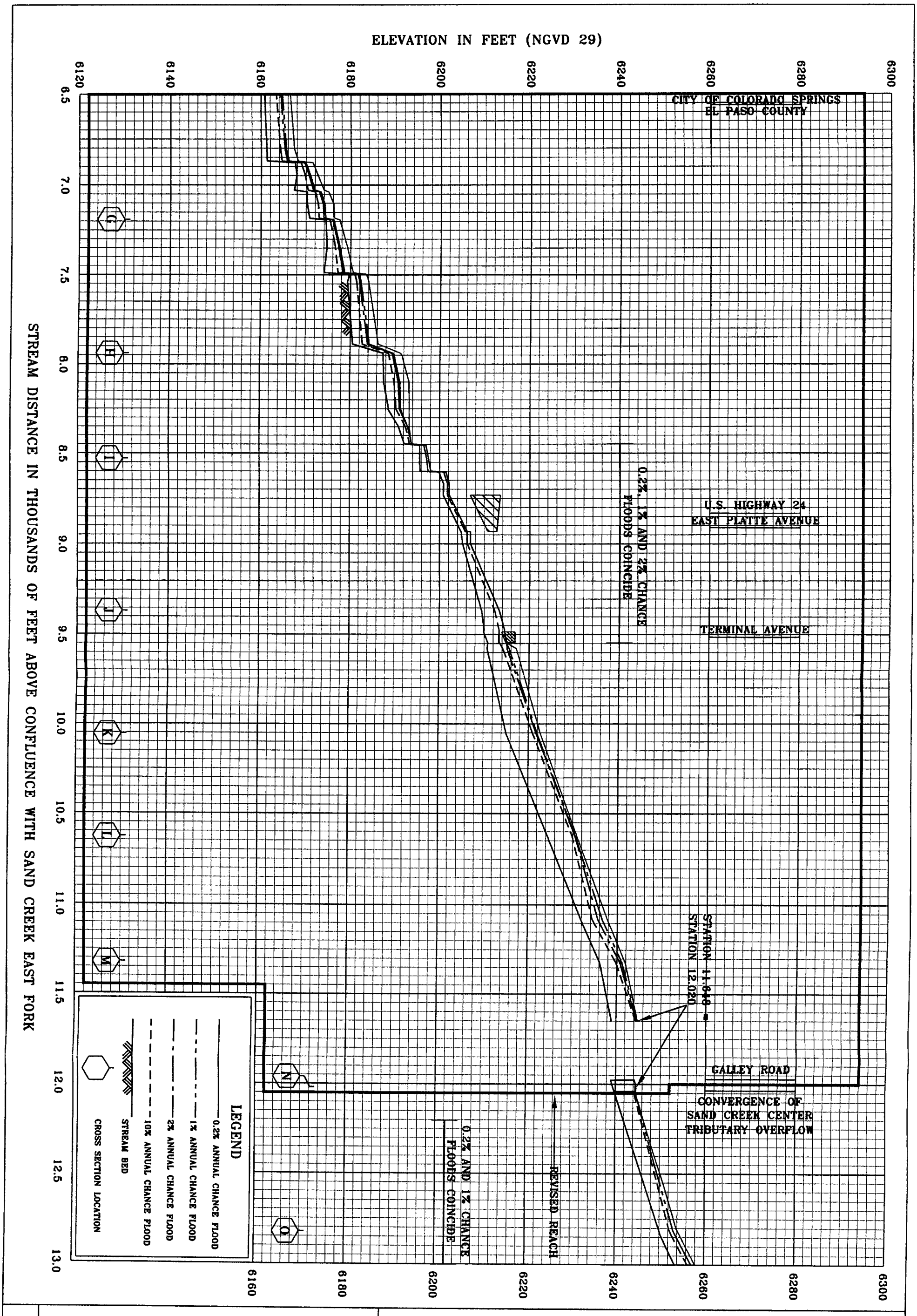
FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOOD PROFILES

SAND CREEK CENTER TRIBUTARY

MAR 30 2007



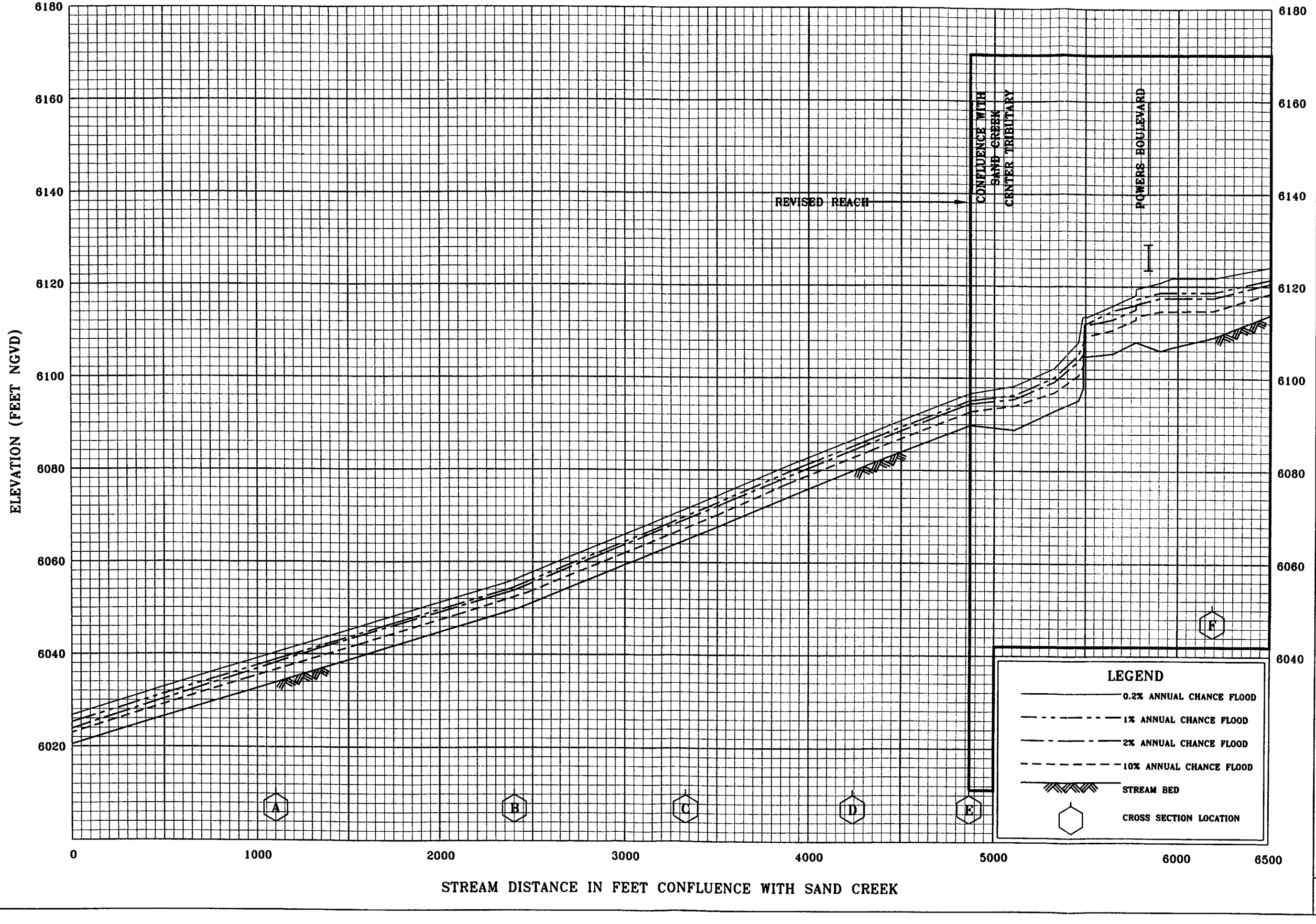
206P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOOD PROFILES

SAND CREEK CENTER TRIBUTARY



FLOOD PROFILES

SAND CREEK EAST FORK

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

209P

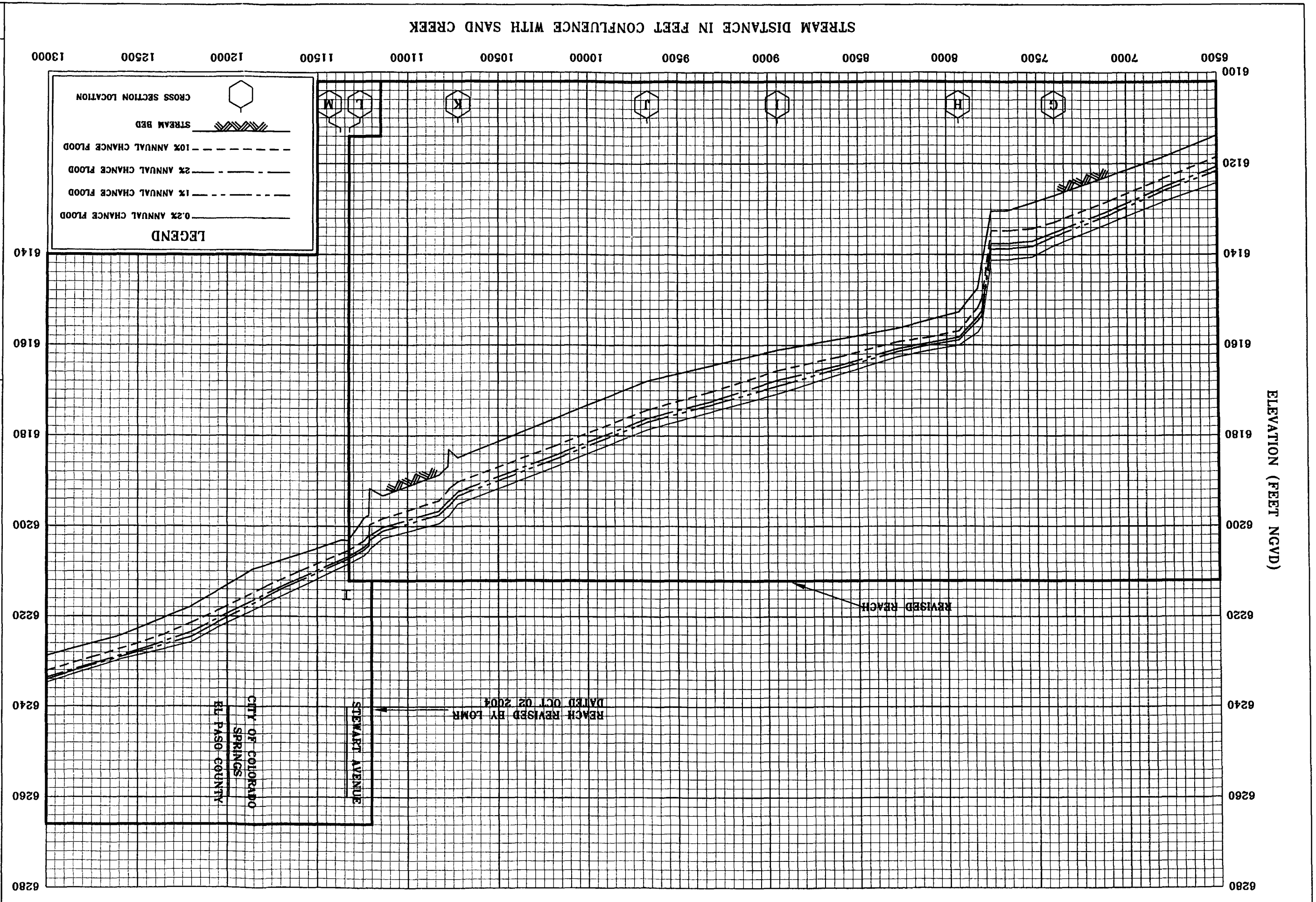
210P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOOD PROFILES

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

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 753 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0753	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0753	F

MAY 2 3 2007

MAP NUMBER
08041C0753 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

EL PASO COUNTY UNINCORPORATED AREAS
080059

CITY OF COLORADO SPRINGS
080060

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 14 SOUTH, RANGE 65 WEST AND TOWNSHIP 14 SOUTH, RANGE 66 WEST.

REVISED AREA

REVISED AREA

0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

ZONE X
ZONE AE
ZONE A
ZONE AH
ZONE AO
ZONE AR
ZONE V
ZONE VE
ZONE D
ZONE AE/A99
ZONE AE/AO
ZONE AE/AH
ZONE AE/AR
ZONE AE/V
ZONE AE/VE
ZONE A99
ZONE A/V
ZONE A/VE
ZONE V/VE
ZONE A99/V
ZONE A99/VE

Sand Creek
Sand Creek Center Tributary
Sand Creek East Fork

BABCOCK ROAD
EAST PLATTE AVENUE
PIKES PEAK ROAD
KARR ROAD
TROY HILL ROAD
AIRPORT ROAD
BOULEVARD
POWERS
FRONTAGE ROAD
NOLTE DRIVE NORTH
HOOSIER DRIVE
NOLTE CT
CITA LN
CITA DRIVE
IVOR DRIVE
BADGER DRIVE
NORDIC DRIVE

CITY OF COLORADO SPRINGS
EL PASO COUNTY

Bridge

12 13 18 19 24 7

R66W R65W

JOINS PANEL 0754

104°43'07"

38°50'37"

JOINS PANEL 0752

JOINS PANEL 0753

ZONE X

ZONE AE

6227

6223

K

6216

PAONIA STREET

ZONE X

6213

J

6211

6207

EAST PLATTE AVENUE

AMELIA STREET

VALLEY STREET

FORD STREET

TERMINAL AVENUE

HATHAWAY DRIVE

EL PASO COUNTY
UNINCORPORATED AREAS
080059

7

24

0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

6201

6196

6202

6198

I

6194

0.2% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT

H

6192

6184

6190

6185

6182

6179

ZONE AE

REVISED AREA

Sand Creek Center Tributary

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

ZONE X

P

6258

6255

6250

6246

ZONE X

ZONE X

6238

6241

O

ZONE AE

ZONE X

6234

6229

N

6225

6220

ZONE X

ZONE X

EAST BIJOU STREET

EL PASO COUNTY
CITY OF COLORADO SPRINGS

AREA REVISED BY LOMR DATED OCTOBER 7, 2004

Sand Creek East Fork

6241

6213

CORPORATE LIMITS

18

L

M

6208

ZONE X

ZONE X

ZONE X

6206

6204

6201

STEWART AVENUE

K

6198

6194

ZONE X

6190

6187

ZONE AE

6182

J

6177

ZONE X

REVISED AREA

ZONE X

6172

Sand Creek East Fork

ZONE X

ZONE X

6167

I

ZONE X

6161

CITY OF COLORADO SPRINGS
080060

19

GOODFELLOW STREET

PAINE STREET

ENT STREET

STREET

PAINE AVENUE

OTIS STREET

TRUAX

HAMILTON AVENUE

PETERSON BOULEVARD

Legend

1% annual chance (100-Year) Floodplain

1% annual chance (100-Year) Floodway

0.2% annual chance (500-Year) Floodplain

N

APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

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

CONTAINS:

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

MAY 2 3 2007

MAP NUMBER
08041C0754 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

2560

RECEIVED
DEC 1 2000

FINAL
DRAINAGE PLAN AND REPORT

LOT 1, APPALOOSA HWY 24 SUB.

October 20, 2000

Revised
October 26, 2000

Revised
November 15, 2000

Revised
November 30, 2000

prepared for

HY-POWER COMPANY

Oliver E. Watts
Consulting Engineer
Colorado Springs

OLIVER E. WATTS, PE-LS
CONSULTING ENGINEER, INC.
614 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907
719-593-0173
olliewatts@aol.com

November 30, 2000

El Paso County D.O.T.
3460 Marksheffel Road
Colorado Springs, CO 80922

ATTN: Andre Bracken

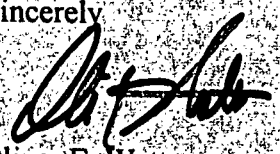
SUBJECT: Final Drainage Plan and Report
Lot 1, Appaloosa Hwy 24 Sub.

Gentlemen

Transmitted herewith for your review and approval is the final drainage plan and report for Lot 1 of the Appaloosa Hwy 24 Subdivision. This report has been revised in accordance with your verbal comments of October 25, 2000 and November 30, 2000.

Please contact me if I may provide any further information.

Sincerely,



Oliver E. Watts
Consulting Engineer

Encl:
Drainage Report 3 pages
Computations 2 pages
FEMA Panel No. 08041C0754 F
SCS Soils Map and Interpretation Sheets
Backup Information, 4 sheets
Sheet CT-5 Sand Creek Master Plan
Final Drainage Plan, Dwg 00-3039-06

1. 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.

Oliver E. Watts Colo. PE-LS No. 9853

OLIVER E. WATTS REGISTERED 9853 P. E. & L. S. STATE OF COLORADO

2. DEVELOPER'S STATEMENT:

The developer has read and will comply with all of the requirements specified in this drainage plan and report.

Hy-Power Company

By: _____

Matt Redlin
Hammers Construction, inc.
3460 Capital Drive
Colorado Springs, CO 80915-9731

3. EL PASO COUNTY:

Filed in accordance with Section 51.1 OF THE El Paso Land Development Code, as amended.

_____ 12-7-00
El Paso County Engineer / Director Date

Conditions:

4. LOCATION AND DESCRIPTION:
The Appaloosa Hwy 24 LLC Subdivision is a replat of lots 1 and 2 and Vacated Paonia Street, Kay Tee Subdivision No. 3, located at the southeast corner of Terminal Avenue and Amelia Street on the North Side of U.S. Highway 24 in El Paso County, Colorado. It occupies 6.57 acres in the Sand Creek Drainage Basin. Lot 1 comprises 1.587 acres in the Northwest corner of the subdivision.

5. FLOOD PLAIN STATEMENT:
This subdivision is partially within the limits of a flood plain or flood hazard area, according to FEMA map panel number 08041C0754 F, dated March 17, 1997, a copy of which is enclosed for reference. The limits of the flood plain are shown on the enclosed drainage plan. The finish floor elevations of the proposed buildings will be elevated to well above the flood protection elevation, and the entire building site is outside the limits of the flood plain, as shown on the enclosed plan.

6. METHOD AND CRITERIA:
The method used for all computations is that specified in the City-County Drainage Criteria Manual, using the rational method for areas of the size of the subdivision. All computations are enclosed for reference and review.

The soils in the subdivision have been mapped by the local USDA/SCS office, and a soils map and interpretation sheet are enclosed for reference. All soils in this area are of hydrologic group "A".

7. DESCRIPTION OF RUNOFF:
The historic runoff from this subdivision is 0.9 / 2.4 cfs (5-year / 100-year runoffs), as shown on the enclosed plan, outfalling near the southwest property corner.

Lot 1 will be graded with a one percent cross slope as shown on the enclosed drainage plan so that the finish floor elevation is more than one foot over the flood elevation, and so that the lot will drain to the Southeast corner. A small portion will drain by overland flow to the drainage channel in the northerly portion of the east boundary. The runoff for this basin "A1" will total 1.3 cfs / 2.2 cfs (5-year / 100-year runoffs) and will be concentrated into a four foot drain inlet at a depth of 0.32' as shown on the computations. A detail of this inlet is shown on the enclosed drainage plan a drainage swale is continued from the end of this outlet to the concrete drainage channel across the drainage easement. This swale is designed to allow traffic crossing. The remainder of the lot (Basin A2) will drain by overland flow to the southeast corner of the parking lot, where another curb outlet will be provided, flowing to a depth of 0.69' as shown on the computations. The runoff for this basin is 4.7 cfs / 8.2 cfs.

These runoffs are well within the anticipated runoff from this property, according to the Master Drainage Study for the drainage basin, and existing drainage facilities have adequate capacity to accommodate the developed runoff.

8. COST ESTIMATE: Two minor structures are proposed as described above, which are considered private and estimated to cost as follows:

Item No	Description	Quantity	Unit Cost	Cost

1	4' concrete drainage inlet	2 ea	$ 600.00	$ 1200.00
2	8" concrete swale	432 sf	4.00	1728.00
	Subtotal Construction Cost			$ 2928.00
	Engineering			292.80
	Total Estimated Cost			$ 3220.80

9. FEES:

Drainage fees are not due on this lot, and described in the final drainage plan for the subdivision.

MAJOR BASIN	SUB BASIN	AREA		BASIN		T_c MIN.	I		SOIL GRP	DEV. TYPE	C		FLOW		RETURN PERIOD	
		PLANIM. READ	ACRES	LENGTH	HEIGHT								qp	qp		
SAND CREEK	A1	COGO	0.29	165	1.6	5	5.3	9.0	A	85%	0.84	0.86	1.3	2.2	5	100
	A2	COGO	1.29	340	3.4	9	4.3	7.4	A	85%	0.84	0.86	4.7	8.2	5	100
	HISTORIC	COGO	1.58	390	5	29	2.4	4.3	A	R/L F	0.25	0.35	0.9	2.4	5	100

HYDROLOGIC COMPUTATION - BASIC DATA
PROJ: LOT 1 APPALOOSA HWY 24 SUB BY: O.E. WATTS
RATIONAL METHOD DATE: 10-20-00 10-26-00

Oliver E. Watts
CONSULTING ENGINEER

STREET AND STORM SEWER CALCULATIONS

STREET	LOCATION	DIST.	ELEVATION & SLOPE	TOTAL RUNOFF	STREET FLOW /CAPACITY	PIPE FLOW	TYPE PIPE, CATCH BASIN & SLOPE %
CHANNEL	BASIN A1			1.3/2.2		2.2	DOWNDRAIN, W=4', D=0.32'
						2.2	8' SWALE, SEE ENCLOSED SHEET
	BASIN A2			4.7/8.2		8.2	DOWNDRAIN, W=4', D=0.69'
						8.2	8' SWALE, SEE ENCLOSED SHEET, D=0.48'

STREET AND STORM SEWER CALCULATIONS
PROJ: LOT 1 APPALOOSA HWY 24 SUB BY: O.E. WATTS
DATE: 10-20-00

OLIVER E. WATTS

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500-year floodplain.

ZONE D Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

fied
83

Identified
1990

Otherwise Protected Areas

astal barrier areas are normally located within or adjacent to Special od Hazard Areas.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

D Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.

RM7 × Elevation Reference Mark

• M2 River Mile

'30", 32°22'30" Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

o is for use in administering the National Flood Insurance Program; ot necessarily identify all areas subject to flooding, particularly from ainage sources of small size, or all planimetric features outside cial Flood Hazard Areas.

astal base flood elevations apply only landward of 0.0 NGVD, and include cts of wave action; these elevations may also differ significantly hose developed by the National Weather Service for hurricane on planning.

fer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown this map to determine when actuarial rates apply to structures in es where elevations or depths have been established.

determine if flood insurance is available, contact an insurance agent or the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 754 OF 1300

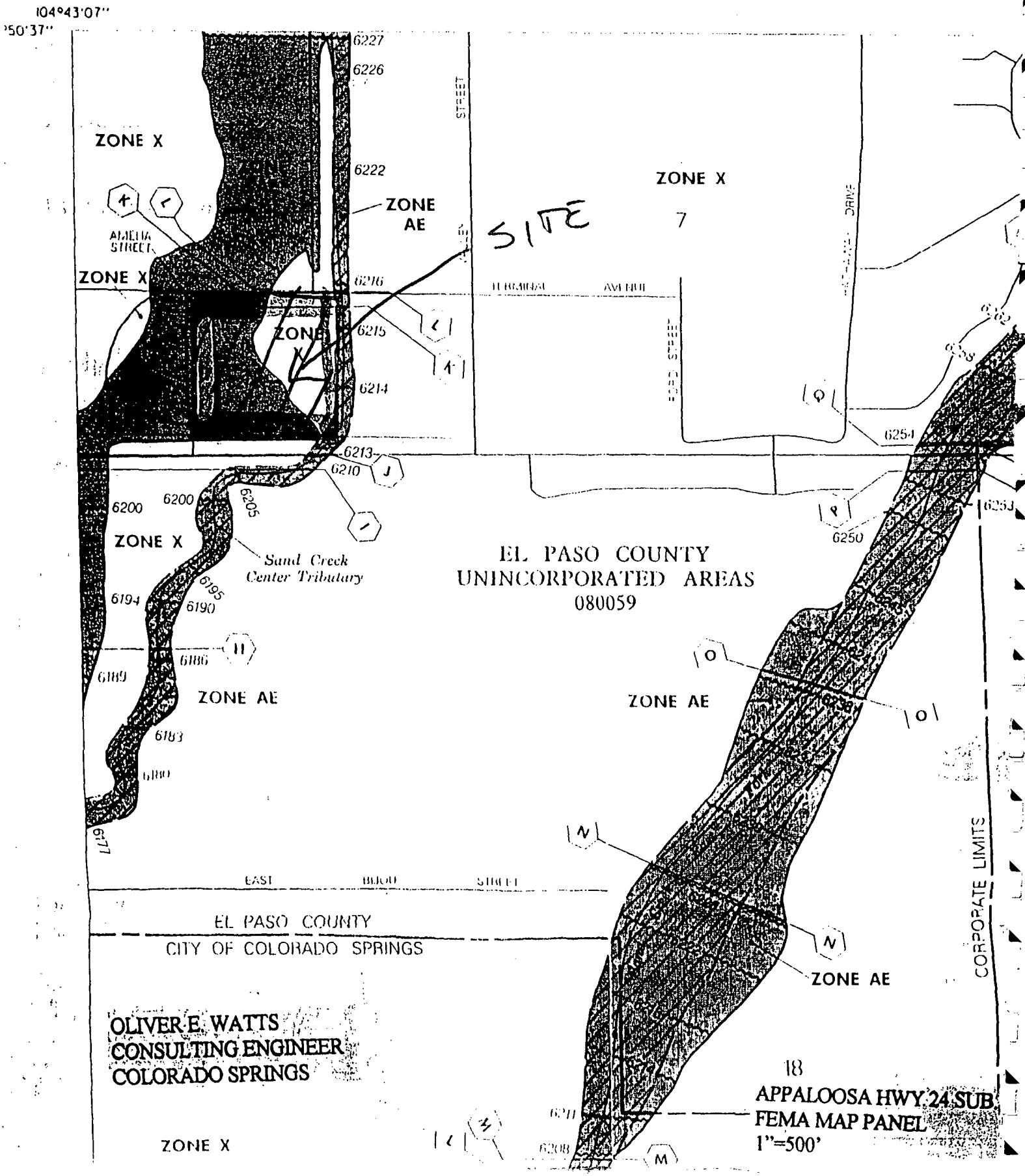
(SEE MAP INDEX FOR PANELS NOT PRINTED)

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

MAP NUMBER 08041C0754 F

EFFECTIVE DATE: MARCH 17, 1997

Federal Emergency Management Agency


104°43'07"
50'37"
ZONE X
6227
6226
6222
ZONE AE
SITE
7
ZONE X
ARIETA STREET
ZONE X
6216
TURQUOISE AVENUE
ZONE
6215
6214
6213
6210
6200
6205
ZONE X
Sand Creek
Center Tributary
6195
6194
6190
6186
6189
ZONE AE
6183
6180
6177
6254
6253
6250
EL PASO COUNTY
UNINCORPORATED AREAS
080059
ZONE AE
ZONE AE
EAST BIJOU STREET
EL PASO COUNTY
CITY OF COLORADO SPRINGS
CORPORATE LIMITS
ZONE AE
ZONE X
6211
6208
OLIVER E. WATTS
CONSULTING ENGINEER
COLORADO SPRINGS
18
APPALOOSA HWY 24 SUB
FEMA MAP PANEL
1"=500'

OLIVER E. WATTS
CONSULTING ENGINEER
COLORADO SPRINGS
APPALOOSA HWY 24 SUB
SCS SOILS MAP
1"=2000'

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					In		
Elbeth:							
Pring part-----	B	None----------	---	---	>60	---	Moderate.
Ellicott:							
28----------	A	Frequent------	Brief---------	Mar-Jun	>60	---	Low.
Fluvaquentic Haplaquolls:							
29----------	B/D	Frequent------	Brief---------	Mar-Jul	>60	---	High.
Fort Collins:							
30, 31----------	B	None to rare	---	---	>60	---	Moderate.
Fortwingate:							
[1]32:							
Fortwingate part----------	C	None----------	---	---	20-40	Hard	Low.
Rock outcrop part----------	D	---	---	---	---	---	---
Heldt:							
33----------	C	None----------	---	---	>60	---	Moderate.
Holderness:							
34, 35, 36-------	C	None----------	---	---	>60	---	Moderate.
Jarre:							
37----------	B	None----------	---	---	>60	---	Moderate.
[1]38:							
Jarre part-----	B	None----------	---	---	>60	---	Moderate.
Tecolote part--	B	None----------	---	---	>60	---	Moderate.
Keith:							
39----------	B	None----------	---	---	>60	---	High.
Kettle:							
40, 41----------	B	None----------	---	---	>60	---	Moderate.
[1]42:							
Kettle part----	B	None----------	---	---	>60	---	Moderate.
Rock outcrop part----------	D	---	---	---	---	---	---
Kim:							
43----------	B	None----------	---	---	>60	---	Moderate.
Kutch:							
44, 45----------	C	None----------	---	---	20-40	Rippable	Moderate.
Kutler:							
[1]46:							
Kutler part----	C	None----------	---	---	20-40	Rippable	Low.
Broadmoor part-	C	None----------	---	---	20-40	Rippable	Low.
Rock outcrop part----------	D	---	---	---	---	---	---
Limon:							
47----------	C	Occasional----	Brief---------	May-Sep	>60	---	Moderate.
Louviers:							
48----------	D	None----------	---	---	10-20	Rippable	Moderate.
49----------	D	None----------	---	---	10-20	Rippable	Low.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					In		
Tomah:							
[1]92, [1]93:							
Tomah part-----	B	None----------	---	---	>60	---	Moderate.
Crowfoot part--	B	None----------	---	---	>60	---	Moderate.
Travessilla:							
[1]94:							
Travessilla part----------	D	None----------	---	---	6-20	Hard	Low.
Rock outcrop part----------	D	---	---	---	---	---	---
Truckton:							
95, 96, 97-------	B	None----------	---	---	>60	---	Moderate.
[1]98:							
Truckton part--	B	None----------	---	---	>60	---	Moderate.
Blakeland part-	A	None----------	---	---	>60	---	Low.
[1]99, [1]100:							
Truckton part--	B	None----------	---	---	>60	---	Moderate.
Bresser part---	B	None----------	---	---	>60	---	Low.
Ustic Torrifluvents:							
101--------------	B	Occasional----	Very brief----	Mar-Aug	>60	---	Moderate.
Valent:							
102, 103---------	A	None----------	---	---	>60	---	Low.
Vona:							
104, 105---------	B	None----------	---	---	>60	---	Moderate.
Wigton:							
106--------------	A	None----------	---	---	>60	---	Low.
Wiley:							
107, 108---------	B	None----------	---	---	>60	---	Low.
Yoder:							
109, 110---------	B	None----------	---	---	>60	---	Low.

[1]This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

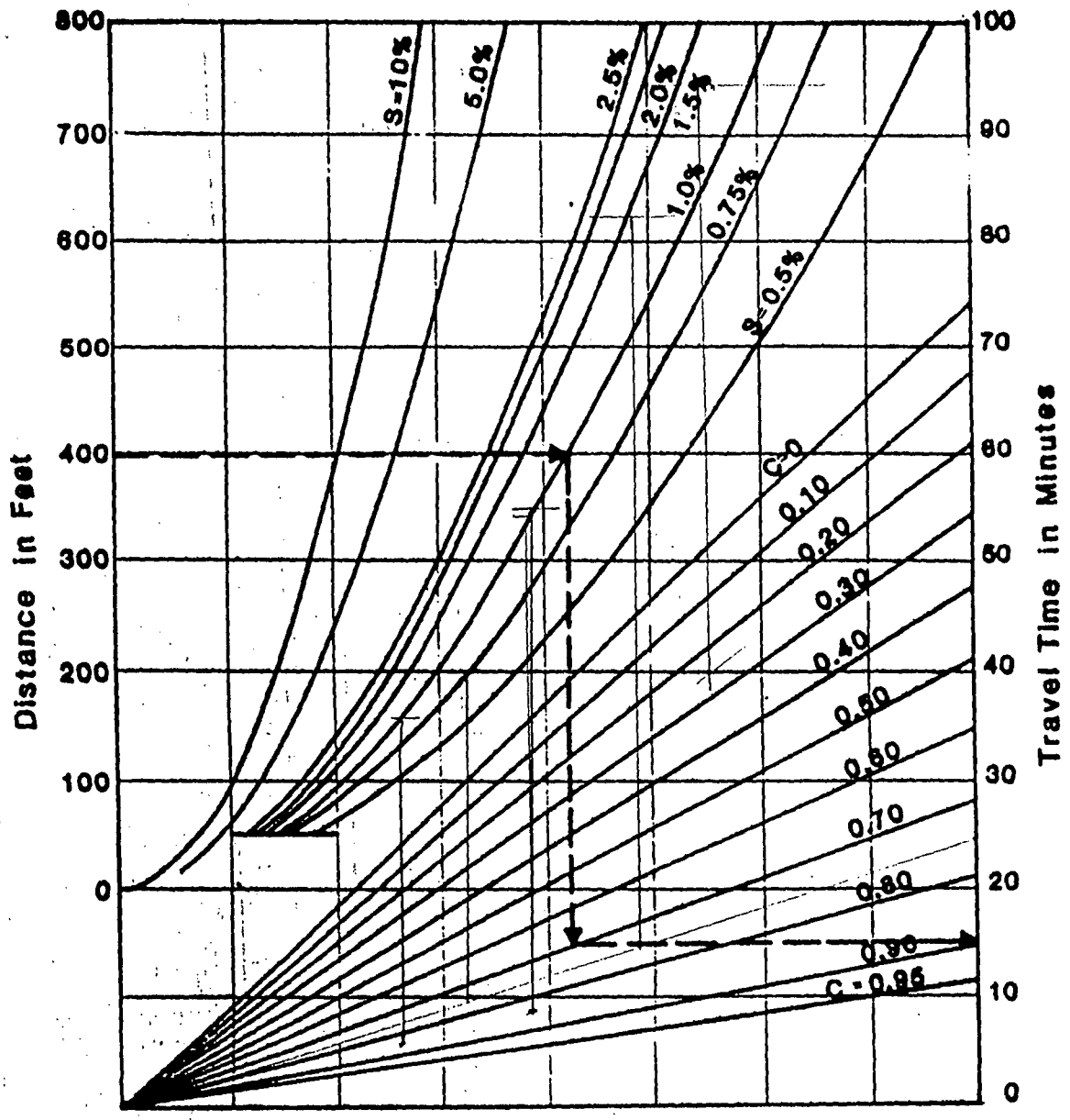
TABLE 5-1

RECOMMENDED AVERAGE RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY 10 A&B*	"C" FREQUENCY 10 C&D*	"C" FREQUENCY 100 A&B*	"C" FREQUENCY 100 C&D*
Business					
Commercial Areas	95	0.90	0.90	0.90	0.90
Neighborhood Areas	70	0.75	0.75	0.80	0.80
Residential					
1/8 Acre or less	65	0.60	0.70	0.70	0.80
1/4 Acre	40	0.50	0.60	0.60	0.70
1/3 Acre	30	0.40	0.50	0.55	0.60
1/2 Acre	25	0.35	0.45	0.45	0.55
1 Acre	20	0.30	0.40	0.40	0.50
Industrial					
Light Areas	80	0.70	0.70	0.80	0.80
Heavy Areas	90	0.80	0.80	0.90	0.90
Parks and Cemeteries	7	0.30	0.35	0.55	0.60
Playgrounds	13	0.30	0.35	0.60	0.65
Railroad Yard Areas	40	0.50	0.55	0.60	0.65
Undeveloped Areas					
Historic Flow Analysis- Greenbelts, Agricultural	2	0.15	0.25	0.20	0.30
Pasture/Meadow	0	0.25	0.30	0.35	0.45
Forest	0	0.10	0.15	0.15	0.20
Exposed Rock	100	0.90	0.90	0.95	0.95
Offsite Flow Analysis (when land use not defined)	45	0.55	0.60	0.65	0.70
Streets					
Paved	100	0.90	0.90	0.95	0.95
Gravel	80	0.80	0.80	0.85	0.85
Drive and Walks	100	0.90	0.90	0.95	0.95
Roofs	90	0.90	0.90	0.95	0.95
Lawns	0	0.25	0.30	0.35	0.45

* Hydrologic Soil Group

9/30/90



REFERENCE : Wright – McLaughlin Engineers, Urban Storm Drainage Criteria Manual, Vol. 1, Denver Regional Council of Governments, Denver, Co. 1977

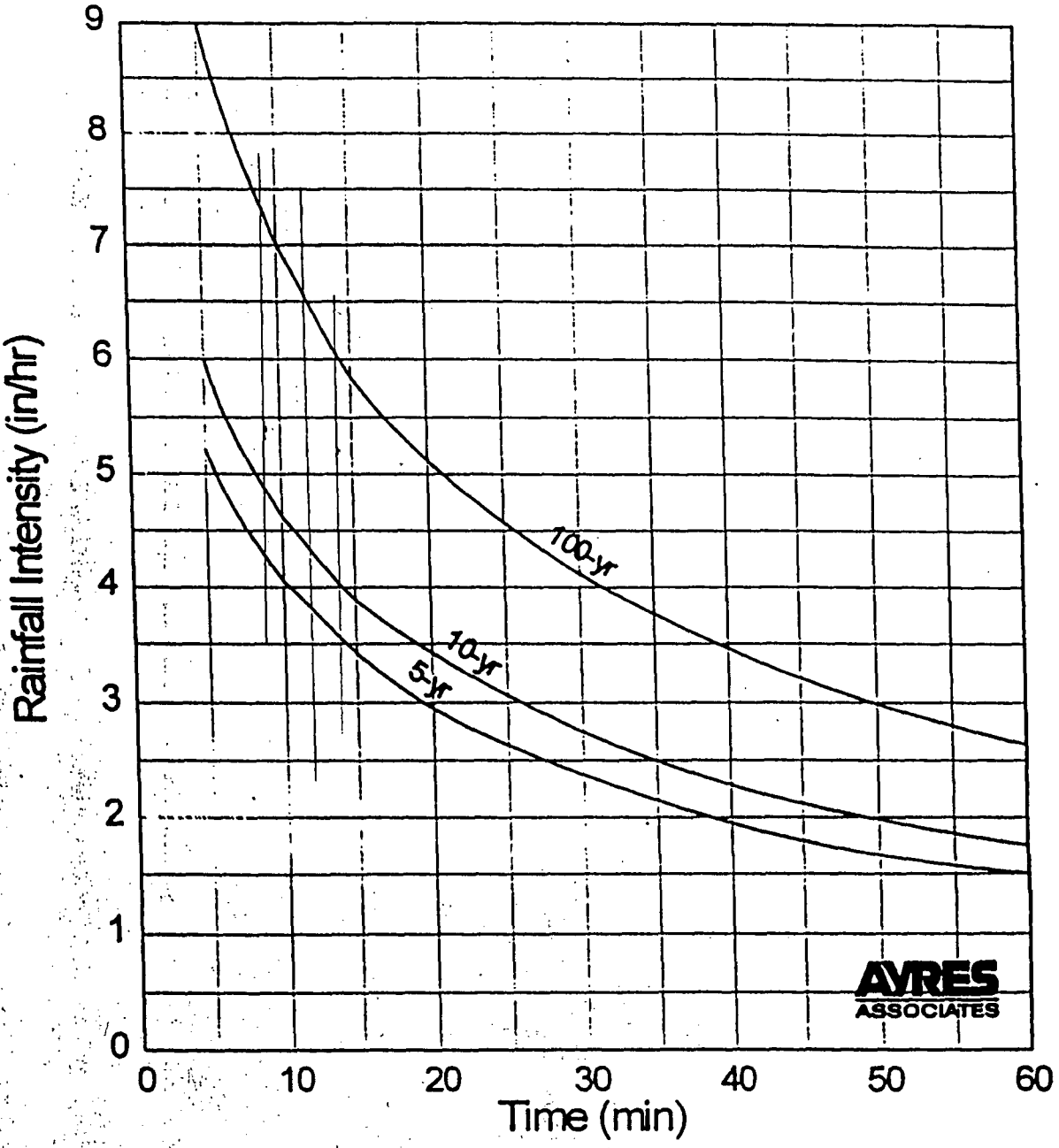
HDR Infrastructure, Inc.
A Centerra Company

The City of Colorado Springs / El Paso County
Drainage Criteria Manual

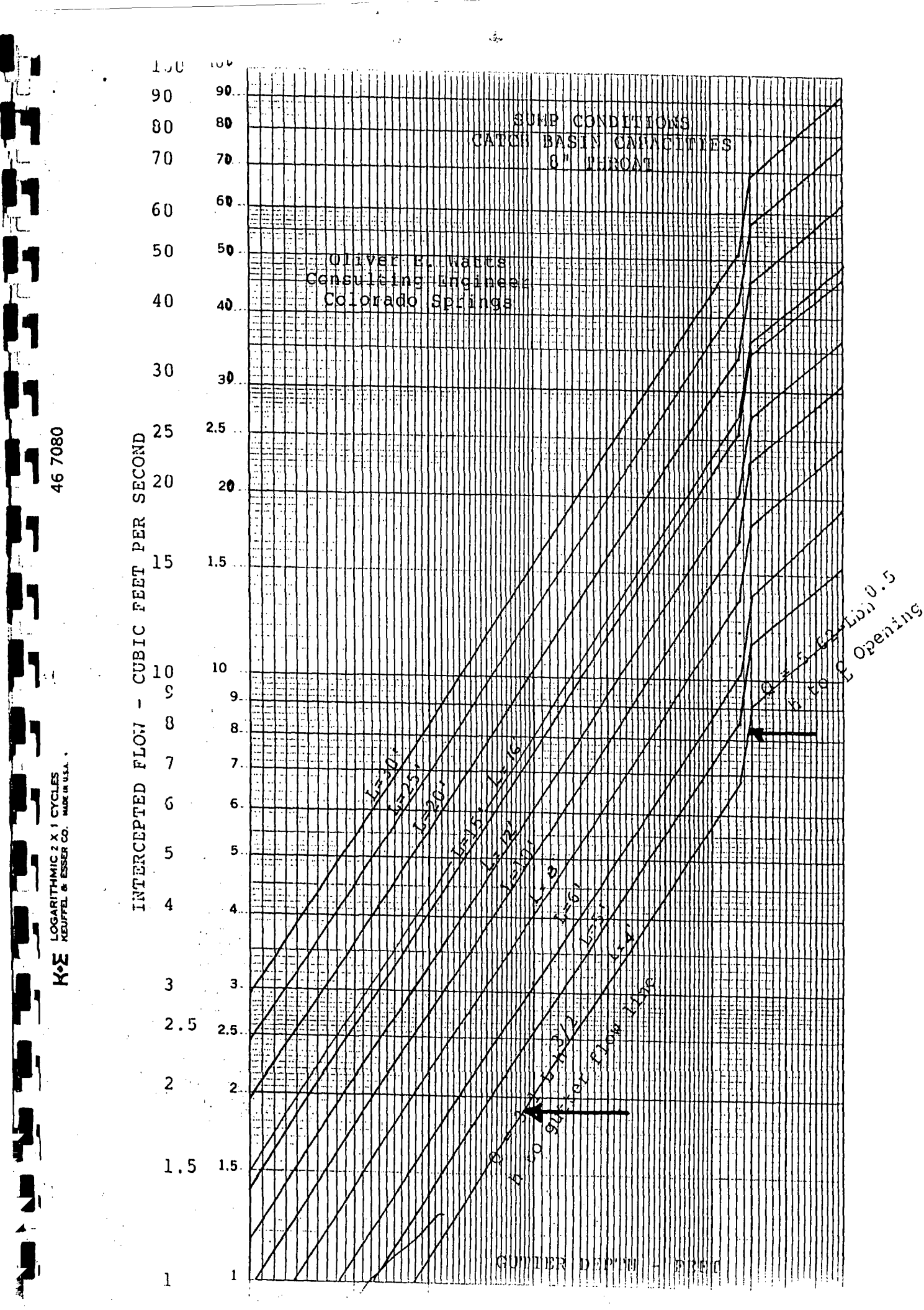
Overland Flow Curves

Date
OCT. 1987

Figure



Interim Release October 12, 1994 , Rainfall Intensity Curves
City Of Colorado Springs Drainage Criteria Manual


SUMP CONDITIONS
CATCH BASIN CAPACITIES
6" THROAT
Oliver E. Watts
Consulting Engineer
Colorado Springs
INTERCEPTED FLOW - CUBIC FEET PER SECOND
GUTTER DEPTH - FEET
L=30'
L=25'
L=20'
L=15'
L=10'
L=8'
L=6'
L=4'
L=2'
Q = 3.3 Lh^3/2
h to 9" for Flow Line
Q = 5 L2 Lh 0.5
h to ℄ Opening
46 7080
K•E LOGARITHMIC 2 X 1 CYCLES
KEUFFEL & ESSER CO. MADE IN U.S.A.

MATCH STA 73+50 SHT CT-4

NEW 4'-W x 5'-H CBC

SITE

CONCRETE CHANNEL TRANSITION

ABANDON EX. CBC

EX CONC. CHANNEL TO REMAIN STA 92+00 TO 98+00

EX 4'x4' CBC TO REMAIN

OI-CUL-1387 36" CMP

OI-CHA-1388

OI-CUL-1389 36" CMP

OI-CHA-1391

OI-CUL-1392 4'Hx8'W CBC

OI-CHA-1393

OI-CHA-1394

OI-CUL-1395 4'Hx8'W CBC

OI-CHA-1396

OI-CUL-1398 18" CMP

OI-CHA-1399

OI-CHA-1400

DROP

DROP

DROP

DROP

DROP

PLATTE AV E

POWERS BD

EAST FRONTAGE ROAD

SAND CREEK TRIBUTARY

DISTURBED AREA

CHANNEL IMPROVEMENTS

142	40	100-YEAR RIPRAP CHANNEL DEPTH
143	40	
144	N/A	EXISTING TO REMAIN

FOR PROFILE SEE SHEET CTP-2

FOR PROFILE INFORMATION BETWEEN STATIONS 39+00 TO 92+00, SEE US 24 BYPASS PHASE II PROJECT DESIGN PLANS, PROJECT NO. STA(CX)-CY 024-3(41), PREPARED BY THE COLORADO DEPARTMENT OF TRANSPORTATION, JUNE 1992.

0' 200' 400'

THIS DRAWING IS FOR PRELIMINARY AND CONCEPTUAL REPRESENTING PRELIMINARY ENGINEERING. IT SHOULD NOT BE USED FOR CONSTRUCTION PURPOSES.

Kiowa Engineering Corporation
418 W. Bijou Street
Colorado Springs, Colorado
80905-1308

SAND CREEK DRAINAGE BASIN PLANNING STUDY
PRELIMINARY DESIGN PLANS

CT-5

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for El Paso County Area, Colorado

May 3, 2018

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

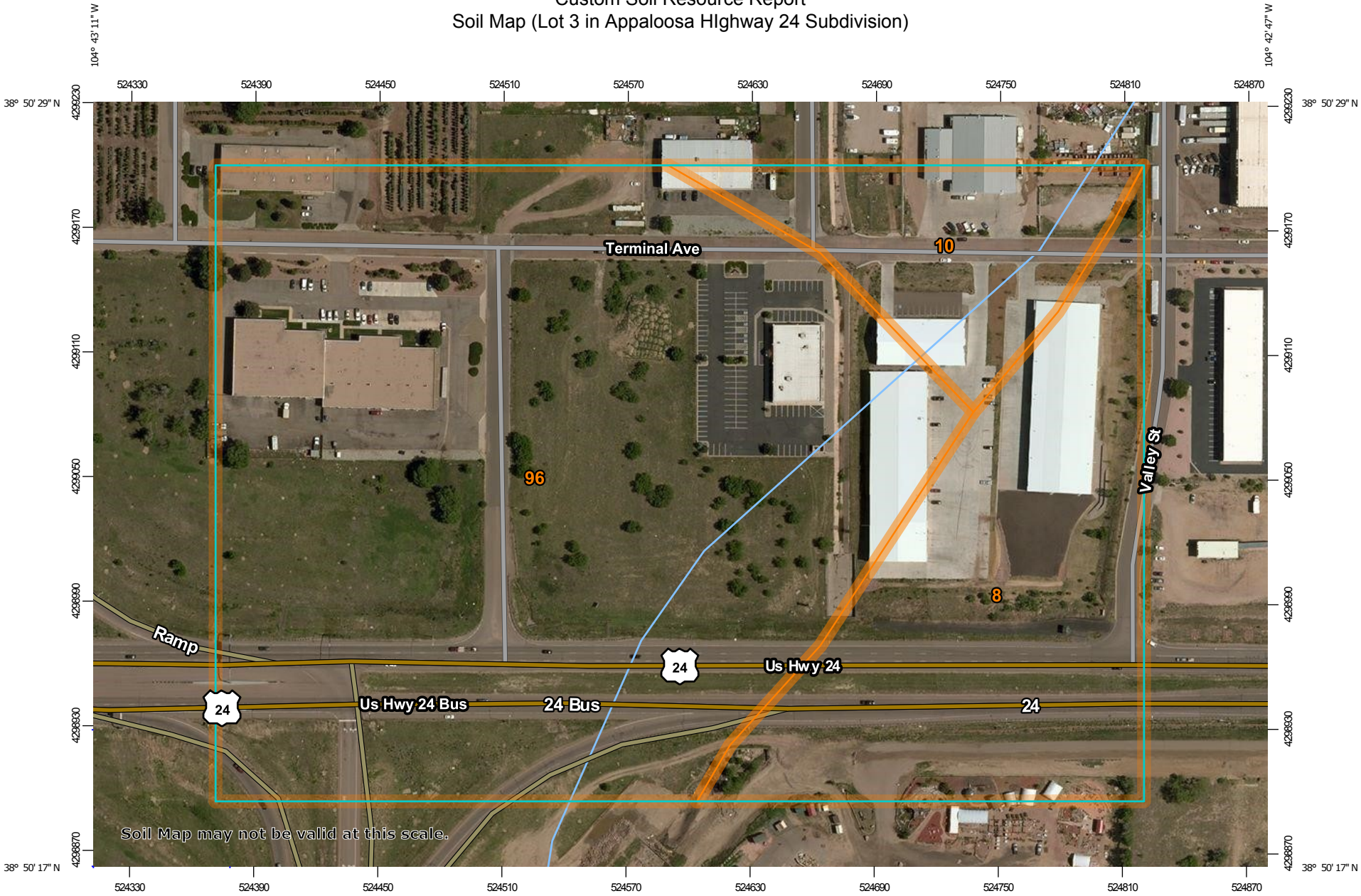
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map (Lot 3 in Appaloosa HIghway 24 Subdivision)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 15, Oct 10, 2017

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

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

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

Map Unit Legend (Lot 3 in Appaloosa Hlghway 24 Subdivision)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Blakeland loamy sand, 1 to 9 percent slopes	8.0	23.3%
10	Blendon sandy loam, 0 to 3 percent slopes	3.2	9.4%
96	Truckton sandy loam, 0 to 3 percent slopes	23.0	67.3%
Totals for Area of Interest		**34.1**	**100.0%**

Map Unit Descriptions (Lot 3 in Appaloosa Hlghway 24 Subdivision)

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

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

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

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

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

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

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

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

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

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

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

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

El Paso County Area, Colorado

8—Blakeland loamy sand, 1 to 9 percent slopes

Map Unit Setting

National map unit symbol: 369v
Elevation: 4,600 to 5,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blakeland and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blakeland

Setting

Landform: Flats, hills
Landform position (three-dimensional): Side slope, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock and/or eolian deposits derived from sedimentary rock

Typical profile

A - 0 to 11 inches: loamy sand
AC - 11 to 27 inches: loamy sand
C - 27 to 60 inches: sand

Properties and qualities

Slope: 1 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

10—Blendon sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3671
Elevation: 6,000 to 6,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blendon and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blendon

Setting

Landform: Alluvial fans, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

A - 0 to 10 inches: sandy loam
Bw - 10 to 36 inches: sandy loam
C - 36 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Available water storage in profile: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Sandy Foothill (R049BY210CO)

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

96—Truckton sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 36bf
Elevation: 6,000 to 7,000 feet
Mean annual precipitation: 14 to 15 inches
Mean annual air temperature: 46 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Truckton and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Arkosic alluvium derived from sedimentary rock and/or arkosic residuum weathered from sedimentary rock

Typical profile

A - 0 to 8 inches: sandy loam
Bt - 8 to 24 inches: sandy loam
C - 24 to 60 inches: coarse sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 6.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

Soil Information for All Uses

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Engineering Properties (Lot 3 in Appaloosa Hlghway 24 Subdivision)

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Hydrologic soil group is a group of soils having similar runoff potential under similar storm and cover conditions. The criteria for determining Hydrologic soil group is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Listing HSGs by soil map unit component and not by soil series is a new concept for the engineers. Past engineering references contained lists of HSGs by soil series. Soil series are continually being defined and redefined, and the list of soil series names changes so frequently as to make the task of maintaining a single national list virtually impossible. Therefore, the criteria is now used to calculate the HSG using the component soil properties and no such national series lists will be maintained. All such references are obsolete and their use should be discontinued. Soil properties that influence runoff potential are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen. These

properties are depth to a seasonal high water table, saturated hydraulic conductivity after prolonged wetting, and depth to a layer with a very slow water transmission rate. Changes in soil properties caused by land management or climate changes also cause the hydrologic soil group to change. The influence of ground cover is treated independently. There are four hydrologic soil groups, A, B, C, and D, and three dual groups, A/D, B/D, and C/D. In the dual groups, the first letter is for drained areas and the second letter is for undrained areas.

The four hydrologic soil groups are described in the following paragraphs:

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.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Percentage of rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination. Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash. The criteria for determining the hydrologic soil group for individual soil components is found in the National Engineering Handbook, Chapter 7 issued May 2007(http://directives.sc.egov.usda.gov/OpenNonWebContent.aspx?content=17757.wba). Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

Engineering Properties–El Paso County Area, Colorado														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
8—Blakeland loamy sand, 1 to 9 percent slopes														
Blakeland	85	A	0-11	Loamy sand	SM	A-1, A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	40-50-60	15-23-30	—	NP
			11-27	Loamy sand	SM	A-1, A-2	0- 0- 0	0- 0- 0	95-98-100	90-95-100	40-50-60	15-23-30	—	NP
			27-60	Loamy sand, loamy coarse sand, sand	SM, SP-SM, SW-SM	A-1, A-2, A-3	0- 0- 0	0- 0- 0	95-98-100	80-90-100	35-48-60	5-15- 25	—	NP
10—Blendon sandy loam, 0 to 3 percent slopes														
Blendon	85	B	0-10	Sandy loam	SC, SC-SM	A-2-4, A-4	0- 0- 0	0- 0- 0	100-100-100	90-95-100	60-65-70	30-35-40	25-28-30	5-8 -10
			10-36	Sandy loam, fine sandy loam	CL, CL-ML, SC, SC-SM	A-2-4, A-4	0- 0- 0	0- 0- 0	85-93-100	80-90-100	50-68-85	25-40-55	25-28-30	5-8 -10
			36-60	Gravelly sandy loam	GM, SC-SM, SM	A-1-b, A-2	0- 0- 0	0- 0- 0	60-70-80	55-65-75	35-43-50	20-25-30	20-23-25	NP-3 -5

Engineering Properties–El Paso County Area, Colorado														
Map unit symbol and soil name	Pct. of map unit	Hydrologic group	Depth	USDA texture	Classification		Pct Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
					Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
			In				*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*	*L-R-H*
96—Truckton sandy loam, 0 to 3 percent slopes														
Truckton	85	A	0-8	Sandy loam	SC-SM, SM	A-2-4, A-4	0- 0- 0	0- 0- 0	95-98-100	95-98-100	60-65-70	30-35-40	20-23-25	NP-3 -5
			8-24	Sandy loam	SC-SM, SM	A-2-4, A-4	0- 0- 0	0- 0- 0	95-98-100	95-98-100	60-65-70	30-35-40	20-23-25	NP-3 -5
			24-60	Coarse sandy loam, loamy coarse sand	SM, SP-SM, SC-SM	A-2-4, A-1	0- 0- 0	0- 0- 0	85-93-100	80-90-100	35-53-70	10-20-30	20-23-25	NP-3 -5

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