Final
Drainage Report

Xcel – Pathways Segment 5 Transmission Line

El Paso County, Colorado

Submittal Date: June 26, 2026

Owner: Public Service Company of Colorado, a Colorado Company – John Geiger, PM

3500 Blake St

Denver, Colorado, 80205

(303) 437-4110

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By: Samuel Acosta, PE

5555 Tech Center Drive, Suite 310

Colorado Springs, Colorado 80919

(719) 272-8894

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 the report.

Samuel Acosta, PE
Registered Professional Engineer
State of Colorado
No. 52470

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.

Chad Campbell, Environmental Services Group Manager
Xcel Energy
3500 Blake St, Denver CO 80205

6/26/2026
Date

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.

Joshua Palmer, P.E.
County Engineer / ECM Administrator

Date

Conditions:

County Engineer

Date

Conditions:

Purpose

The purpose of this report is to present the stormwater criteria for Xcel Pathways Segment 5 and document the drainage analysis and supporting calculations to meet the County's criteria.

General Information

The Colorado Power Pathway project (Pathway) is an investment proposed by Xcel Energy to improve the state's electric grid, increase electric reliability and enable future renewable energy development around the state. Pathway includes the installation of approximately 560 miles of new 345-kilovolt (kV) double-circuit transmission line as well as new and expanded substations. This Preliminary Drainage Report is part of a larger packet submittal regarding the build of approximately 45 miles of new 345-kilovolt (kV) double-circuit transmission line for the Pathway Segment 5 El Paso County Transmission Line Build project (Project).

Location

The Project is located in El Paso County, Colorado and begins at proposed transmission line structure 328 (located 1.12 miles southwest of the intersection of Summit Street and Simla Highway) and runs south for 45 miles to proposed transmission line structure 64 (located 1.13 miles north of intersection of Prairie Hill Road and County Road 3608).

The project is located in the following townships and ranges: T11S R60W, T12S R60W, T13S R59W, T13S R60W, T14S R59W, T14S R60W, T15S R59W, T15S R60W, T16S R60W, T17S R60W, T17S R61W.

See Figure 1 below for the Vicinity Map.

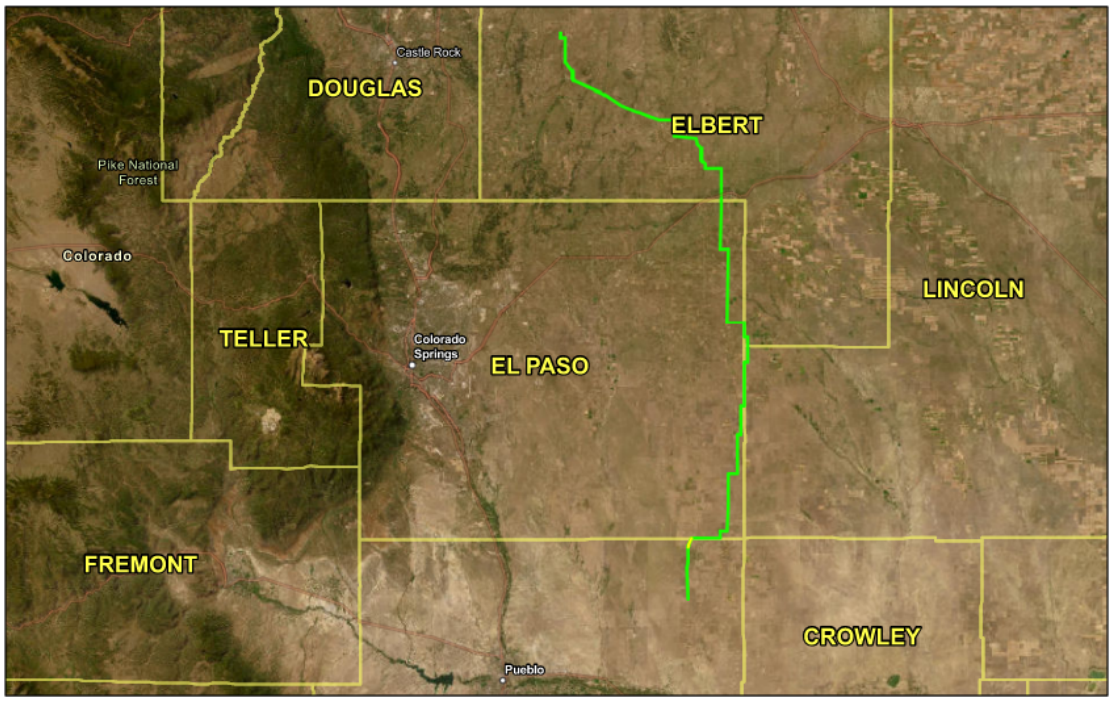


Figure 1: Vicinity Map

The average space between structures is 860 feet. The new line is comprised of a mix of monopole, tangent, and dead-end steel pole structures, with pole foundation diameters varying from 3 feet to 10 feet. The proposed structure locations are within the existing PSCo right-of-way.

Description of Property

The Project area through the County is approximately 782 acres with a utility easement width of 150 feet. The existing corridor generally consists of undeveloped and agricultural land uses with moderate to sparce levels of vegetation. Vegetation generally consists of grass land and areas of shrubbery near watercourses.

Topography along the project corridor consists of gently rolling terrain with intermittent areas of perennial floodplains and ephemeral drainageways.

The estimated change from vegetated area to imperviousness area due to the structure foundations is less than 0.5 acres over the span of 45 miles, roughly 171 square feet of new impervious surface per mile of line, a de minimis change. The substations referenced in the cover letter are not located within El Paso County, nor are they within basins that drain into El Paso County; therefore, they have been excluded from this report.

Soils conditions along the project corridor vary but generally consist of hydraulic soil group Type A and Type B soils.

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.

Major drainageways along the project corridor include West Branch Creek, Steels Fork Creek, Little Horse Creek, Horse Creek, North Fork Horse Creek, Pond Creek, and Mustang Creek. All creek and/or tributary crossings are located in Flood Zone A.

The following creek crossings are included in FEMA FIRM Panel # 08041C0900G:
The project passes through an Unnamed Tributary of West Branch Creek, along County Road 1, north of the intersection of Gieck Road and County Road 1. The project passes through Steels Fork Creek along County Road 1, south of the intersection of State Highway 94 and County Road 1.

The following creek crossings are included in FEMA FIRM Panel # 08041C0675G:
The project passes through Little Horse Creek Unnamed Tributary, along County Road 133 just south of the intersection of County Road 133 and County Road 12. The project passes through Little Horse Creek, at the intersection of Little Corona Road and North Rush Road. The project

passes through Horse Creek along North Rush Road, south of the intersection of Cold Iron Road and North Rush Road, and north of the intersection at Judge Orr Road and North Rush Road. The project passes through North Fork Horse Creek, just south of the intersection of Funk Road and Simla Highway.

The following creek crossings are included in FEMA FIRM Panel # 08041C0450G:
The project passes through an Unnamed Tributary of Mustang Creek, just north of the intersection of Hoot Owl Road and Simla Highway. The project passes through Mustang Creek just north of the intersection of Alta Vista Road and Simla Highway. The project passes through Mustang Creek along Harrisville Road, east of the intersection of Harrisville Road and Oil Well Road. The project passes through Mustang Creek along Oil Well Road, just north of the intersection of Harrisville Road and Oil Well Road.

The following creek crossings are included in FEMA FIRM Panel # 08041C1100G: The project passes through Pond Creek at Truckton Road.

Panels 08041C1275G, 08101C0175D, 08101C0200D, and 08041C1300G do not contain any creek crossings related to the project.

There are no known irrigation ditches or underground irrigation systems that will be affected by this project.

Drainage Basins and Sub-Basins

Major Basin Descriptions.
No drainage basin studies were found within the El Paso County Drainage Basin Plans and Studies for the project area. Specific locations of the project creek crossings are discussed in detail in the “Floodplains” section of this report. FEMA maps supporting that discussion are attached in Appendix B.

Multiple portions of the project are within special flood hazard Zone A.

In proposed conditions, the drainage basin patterns will remain the same as pre-construction conditions. This project is anticipated to have minor localized grading impacts throughout with the installation of foundations for the overhead transmission line. The foundations will be placed at approximately 860 foot intervals along the line of installation.

Drainage Design Criteria

Development Criteria Reference.

The El Paso County Drainage Basin Plans were used to verify that no drainage basin studies were present in the area of the project. FEMA FIRM maps were used to verify creek crossings and flood hazard zones for the project.

Hydrologic Criteria.

Since the proposed improvements will only add an impervious area less than 0.5 acres over the span of 45 miles, existing condition capacity and runoff for the project area are presumed to

stay the same. Calculations for existing conditions storage, discharge, and peak runoff were not verified.

Drainage Facility Design

General Concept.
The Project begins at proposed transmission line structure 328 (located 1.12 miles southwest of the intersection of Summit Street and Simla Highway) and runs south for approx. 45 miles to proposed transmission line structure 64 (located 1.13 miles north of intersection of Prairie Hill Road and County Road 3608).

The average space between structures is 860 feet. The new line is comprised of a mix of monopole, tangent, and dead-end steel pole structures, with pole foundation diameters varying from 3 feet to 10 feet. The proposed structure locations are within the existing PSCo right-of-way.

The Project area through the County is approximately 782 acres with a utility easement width of 150 feet. The estimated change from vegetated area to imperviousness area due to the structure foundations is less than 0.5 acres over the span of 45 miles, roughly 171 square feet of new impervious surface per mile of line, a de minimis change.

Surface water flow from the project area will not change due to the minor localized grading impacts and structure installation. Given the line length and lack of drainage changes due to construction, a drainage plan figure has not been included with this memo.

Site disturbance would include minor grading and mowing (if needed) around the structures, grading for temporary access roads, installation of concrete foundations, and placement of conductor wire. The temporarily disturbed areas will be restored to existing vegetated conditions as nearly as practical once construction is complete. Impacts to existing grade due to permanent access are expected to be minimal and have a de minimis impact on drainage flow, direction, and flow concentration therefore, hydrologic and hydraulic calculations and tabulations have not been included in this memo.

Permanent Culverts

Permanent maintenance access to transmission structures at 12 locations across existing roadside ditches will be required. Access approaches will be approximately 30 feet long and permanent culverts will be constructed under the approaches to maintain existing drainage patterns and flows. The locations of each of the 12 permanent culverts are shown in Appendix A.

Hydrology
In accordance with the “El Paso County Drainage Criteria Manual” Chapter 5 the rational method was used to calculate peak flow rates at each culvert location (Table 1). For the analysis two surface types were utilized. These surface types were “Streets - Paved” and “Undeveloped – Historic Flow Analysis-Greenbelts, Agriculture”. A weighted average for each basin was calculated to determine a composite “C” value. NOAA Atlas 14 was used to

determine rainfall intensities for the corresponding times of concentration. A land surface type of "Grassed Waterway" was used to determine concentrated flow time of concentrations. The rational method calculations can be found in Appendix F.

Table 1 – Basin Peak Flow Rates

Basin/Culvert	10-Year Peak Flow (cfs)	100-Year Peak Flow (cfs)
19	2.09	3.63
20	2.83	5.52
23.1	0.44	0.77
24	2.32	4.57
33	3.49	6.02
34	1.58	2.75
40	2.55	4.79
47	1.33	2.30
48	2.47	5.00
52	3.73	7.71
53	1.32	2.37
75	2.44	4.18

Hydraulics

The Federal Highway Administration's (FHWA) program HY-8 was used to determine the diameters needed for each of the permanent culverts. The drainage basin with the highest calculated peak flow rate (Basin/Culvert 52) was used to determine the maximum culvert diameter needed. To size the culvert, a 51-foot length was used to accommodate the 30-foot access approach with an assumed 3:1 side slope and an assumed 3.5-foot-deep roadside ditch. A 3:1 side slope triangular channel shape was assumed, and 0.5% slope was also assumed for both the channel and proposed culvert. The HY-8 results indicate that an 18-inch corrugated metal pipe is sufficient for conveying both the 10- and 100-year peak flow rates with more than 6-inches of freeboard and maintaining the current drainage patterns.

Per Section 2.4 of the drainage criteria manual, drainage driveway culverts have a minimum diameter of 18-inches. For this reason, all 12 permanent culverts are proposed to be 18-inch diameter corrugated metal pipes (CMP). All HY-8 calculations can be found in Appendix F.

All culverts shall be installed at the slope of the ditch and match existing grade. Adequate cover is required on all culverts and shall be based on H-20 Live Loads in addition to the manufacturer specifications for the culverts.

Floodplains

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) shows the project area located on Panel No. 08041C0450G in El Paso County, effective February 17, 2010. Panel No. 08041C0675G in El Paso County, effective March 17, 1997. Panel No. 08041C0900G in El Paso County, effective March 17, 1997. Panel No. 08041C1100G in El Paso County, effective March 17, 1997. Panel No. 08041C1275G in El

Paso County, effective March 17, 1997. The project is also located in panels 08101C0175D, 08101C0200D, and 08041C1300G, however their area was not printed and therefore these panels are not included in Appendix B. The project area is located along West Branch Creek, Steels Fork Creek, Little Horse Creek, Horse Creek, North Fork Horse Creek, Pond Creek, and Mustang Creek. All creek and/or tributary crossings are in Zone A, which is defined as having "No Base Flood Elevations Determined".

It should be noted that 2 permanent culverts, Culvert 33 and 34, are located within the FEMA SFHA Zone A in FIRM Panel # 08041C1100G at Truckton Road. The addition of this culvert is not expected to affect the floodplain in this area. A floodplain "No-Rise" certification letter and Floodplain Development permit will be submitted separately from this drainage report.

No increase to either the floodplain width or water surface elevation will result from the project because the proposed transmission line foundations will be located to avoid floodplains and floodways and permanent culvert will maintain existing drainage patterns and flows. This will cause no increase in the floodplain width or to the water surface elevation. This certification is intended as proof of meeting the requirements set forth in the El Paso County's Drainage Criteria Manual.

The following documentation in accordance with standard Engineering practice was used to support our findings:

a) The preliminary Xcel Pway Segment 5 structure location KMZ
b) FEMA FIRM panels 08041C1275G, 08101C0175D, 08101C0200D, 08041C1300G, 08041C1100G, 08041C0900G, 08041C0675G, 08041C0450G. Panels 08101C0175D, 08101C0200D, and 08041C1300G area was not printed and therefore are not included in Appendix B.

Erosion Control

Erosion and sediment control plans will be developed based on the El Paso County Standards and provided after Concept Design. Erosion and sediment control will be provided for construction activity throughout the entirety of the project.

Water Quality

Proposed improvements include installing new transmission line foundations which range in 3 feet to 10 feet in diameter which are spaced approximately 860 feet apart. These proposed foundations will not alter the proposed runoff patterns and will add a trivial amount of additional impervious area per mile of transmission line. The substation addressed in the cover letter are neither located within El Paso County, nor are they located within a basin that drains into El Paso County, and therefore have not been included in the water quality analysis of this report.

The Project area through the County is approximately 782 acres with a utility easement width of 150 feet. The estimated change from vegetated area to imperviousness area due to the structure foundations is less than 0.5 acres over the span of 45 miles, roughly 171 square feet of new impervious surface per mile of line, a de minimis change.

The El Paso County Engineering Criteria Manual (ECM) Appendix Section I.7.1.B.4 exception 4 for aboveground and underground utilities lists that activities for installation or maintenance of underground utilities or infrastructure that does not permanently alter the terrain, ground cover or drainage patterns from those present prior to the construction activity. This exclusion includes but is not limited to, activities to install, replace, or maintain utilities under roadways or other paced areas that return the surface to the same condition. While this provision is primarily applicable to underground utilities, the proposed aboveground transmission line work in El Paso County also meets the intent of this exemption, as it will not permanently alter drainage patterns. Furthermore, the project will result in less than one acre of permanent disturbance.

Maintenance

The Project area through the County is approximately 782 acres with a utility easement width of 150 feet.

The temporarily disturbed areas will be restored to existing vegetated conditions as nearly as practical once construction is complete.

Permanent access will be provided through existing easements. Maintenace around the proposed foundations are expected to be minimal and required on an as-needed basis.

Conclusion

The design of Xcel's Pathways Segment 5 Transmission Line project is in conformance with El Paso County's Drainage Criteria Manual. The design will adequately protect public health, safety, and general welfare and have no adverse impacts on public rights-of-way or offsite properties.

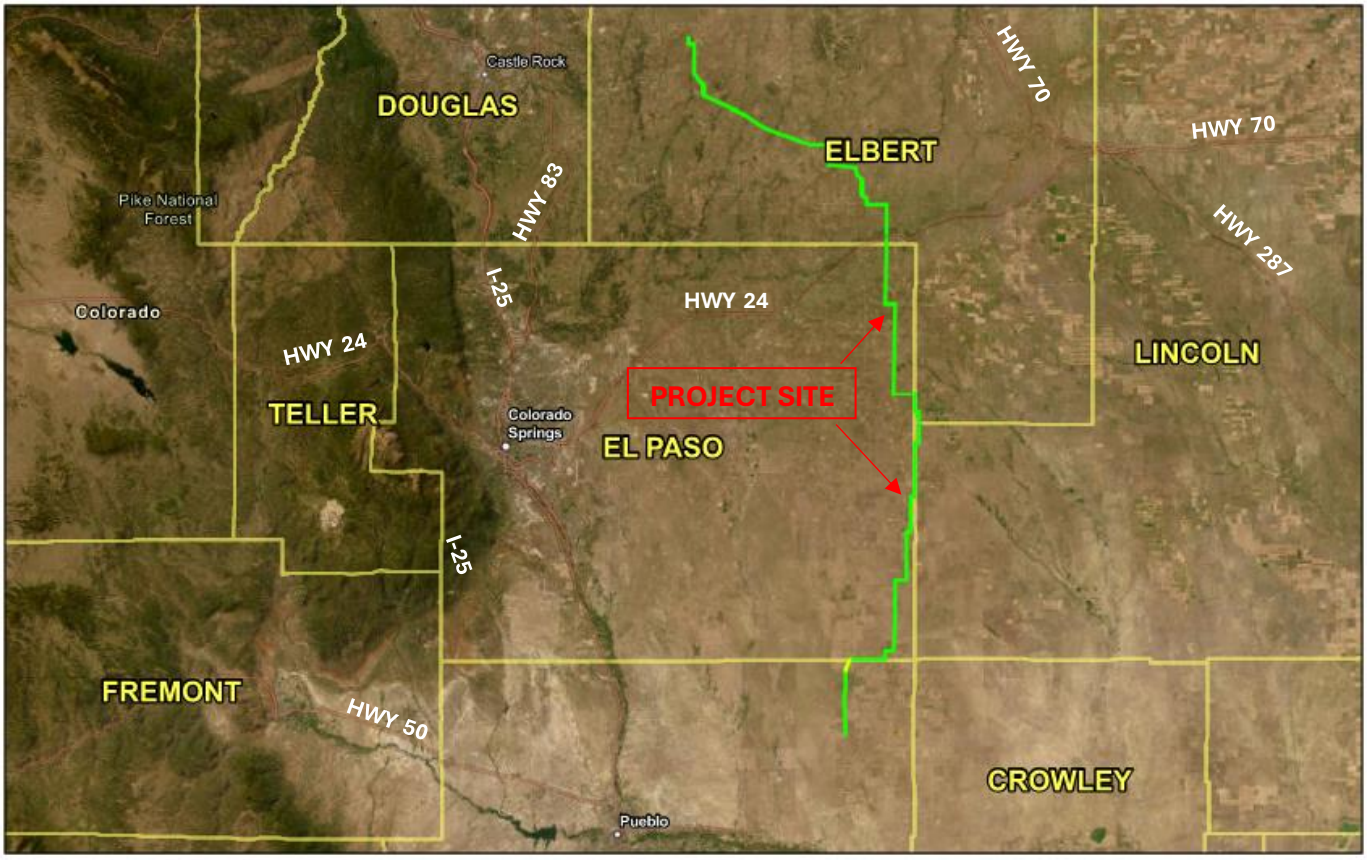
References

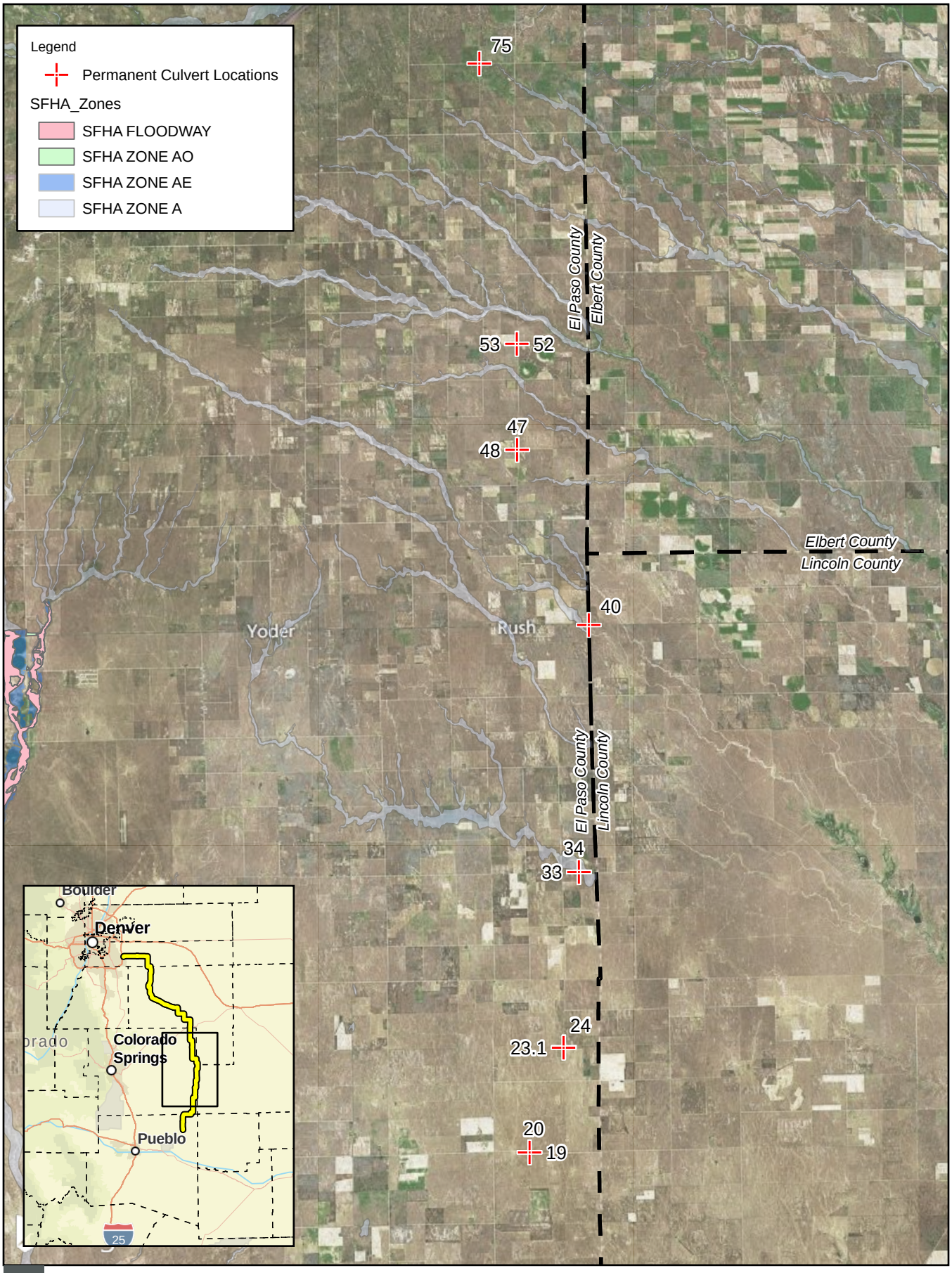
- El Paso County Drainage Criteria Manual, Rev October 2018.
- FEMA Map Service Center (https://msc.fema.gov/portal/home)

Appendix

A. Vicinity Maps
B. FEMA Firm Panels
C. Floodplain Statement of No-Impact
D. Design Drawings
E. Drainage Letter of Conformance Checklist
F. Hydrologic and Hydraulic Calculations

Appendix A – Vicinity Map


Castle Rock
DOUGLAS
HWY 70
ELBERT
HWY 70
Pike National Forest
HWY 83
HWY 287
I-25
HWY 24
Colorado
HWY 24
LINCOLN
PROJECT SITE
TELLER
Colorado Springs
EL PASO
I-25
FREMONT
HWY 50
CROWLEY
Pueblo



PERMANENT CULVERT LOCATIONS

Appendix B – FEMA FIRM Maps

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-2, #9202
1315 East-West Highway
Silver Spring, MD 20910-0202

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by Elbert County GIS Department and Anderson Consulting Engineers, Inc. These data are current as of 2009.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables *in the Flood Insurance Study Report (which contains authoritative hydraulic data)* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

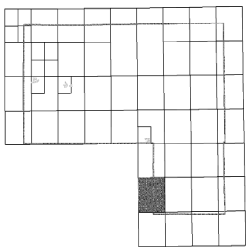
Contact **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, *a Flood Insurance Study Report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA Map (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

Elbert County Vertical Datum Offset Table

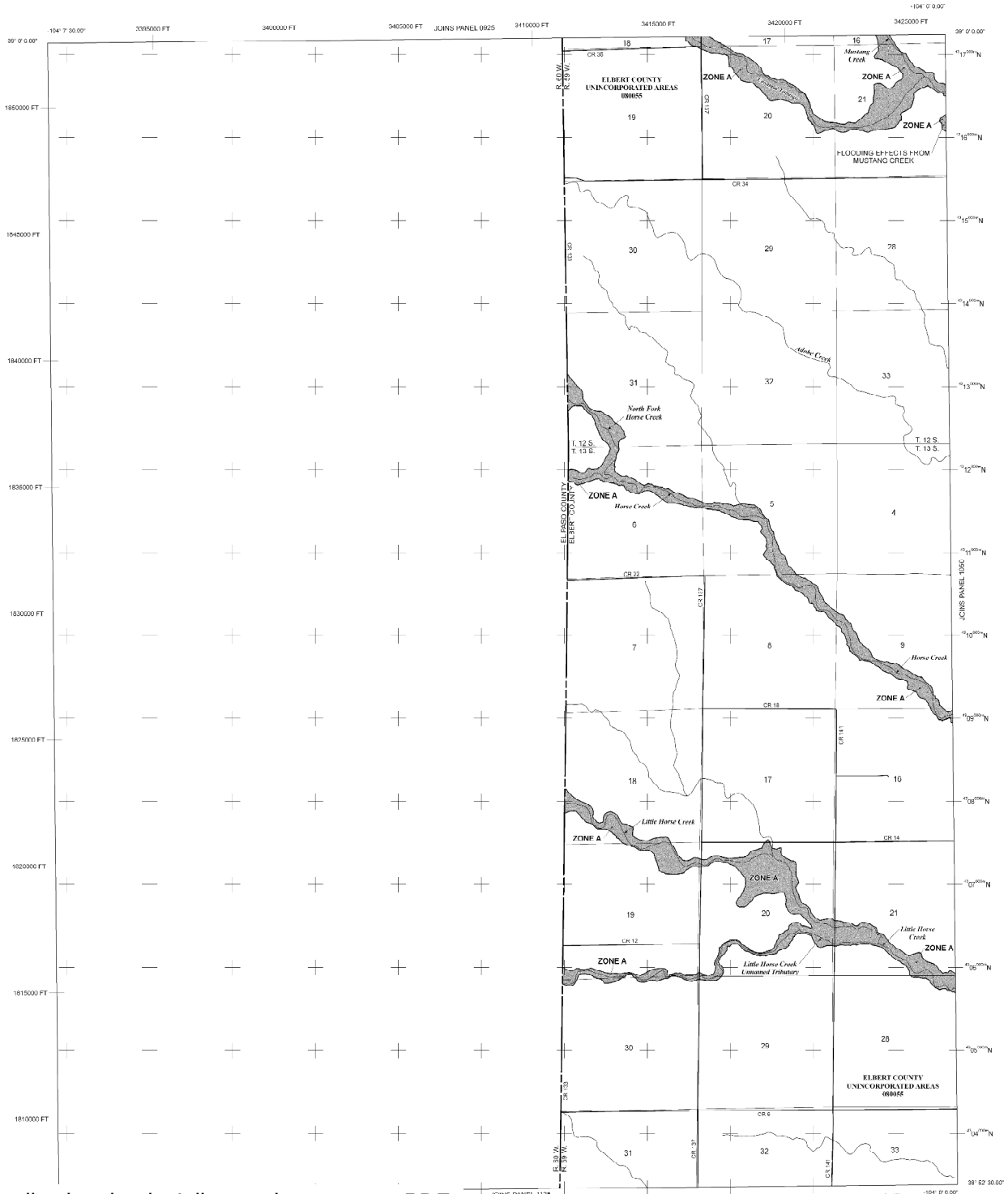
Flooding Source	Vertical Datum Offset (ft)
N/A	N/A

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado



WITHIN TOWNSHIP 12 SOUTH, RANGE 59 WEST, AND TOWNSHIP 13 SOUTH, RANGE 59 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100 year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, A1-A30, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance 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 AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A — A — Cross section line
- 23 — 23 — Transect line
- 97° 07' 30.00" / 32° 22' 30.00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4375000 N — 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT — 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 2011

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET
600 0 600 1200 METERS

NFIP

PANEL 1025C

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

ELBERT COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 1025 OF 1200

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
ELBERT COUNTY	080055	1025	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08039C1025C

EFFECTIVE DATE:
MARCH 17, 2011

Federal Emergency Management Agency

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NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

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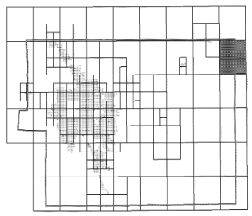
El Paso County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)

REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION

Panel Location Map



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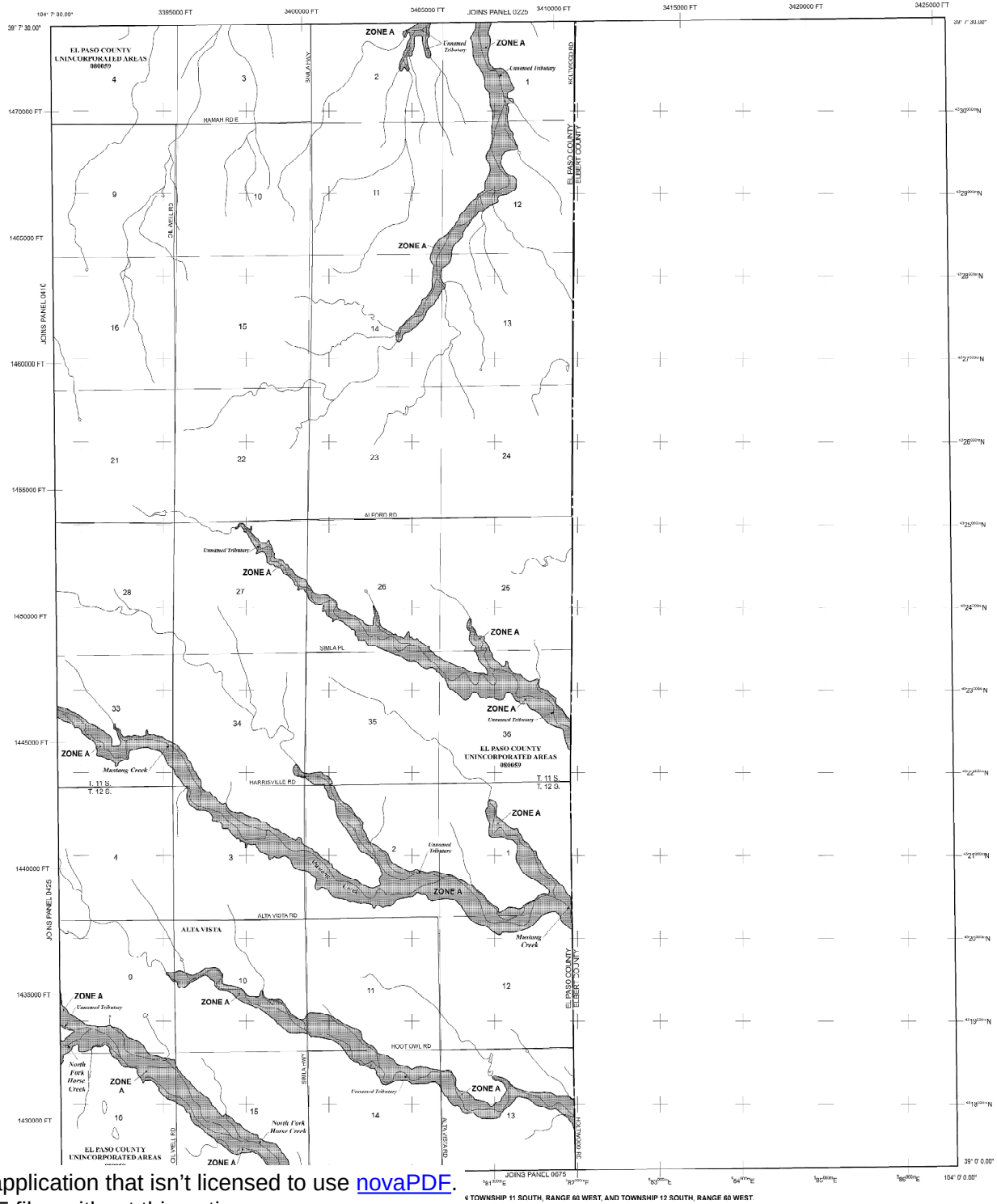

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100 year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance 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.
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ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone D Boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 (EL 987) Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- A–A Cross section line
- 23–23 Transect line
- 97° 07' 30.00" / 32° 22' 30.00" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4319000 mN 1000-meter Universal Transverse Mercator grid ticks, zone 13
- 6000000 FT 5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
- DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'
1000 0 2000 4000 FEET
300 0 600 1200 METERS

NFIP
PANEL 0450G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
PANEL 450 OF 1300
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0450	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0450G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

NOTES TO USERS

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To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
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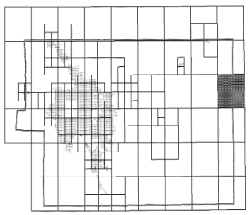
Panel Location Map



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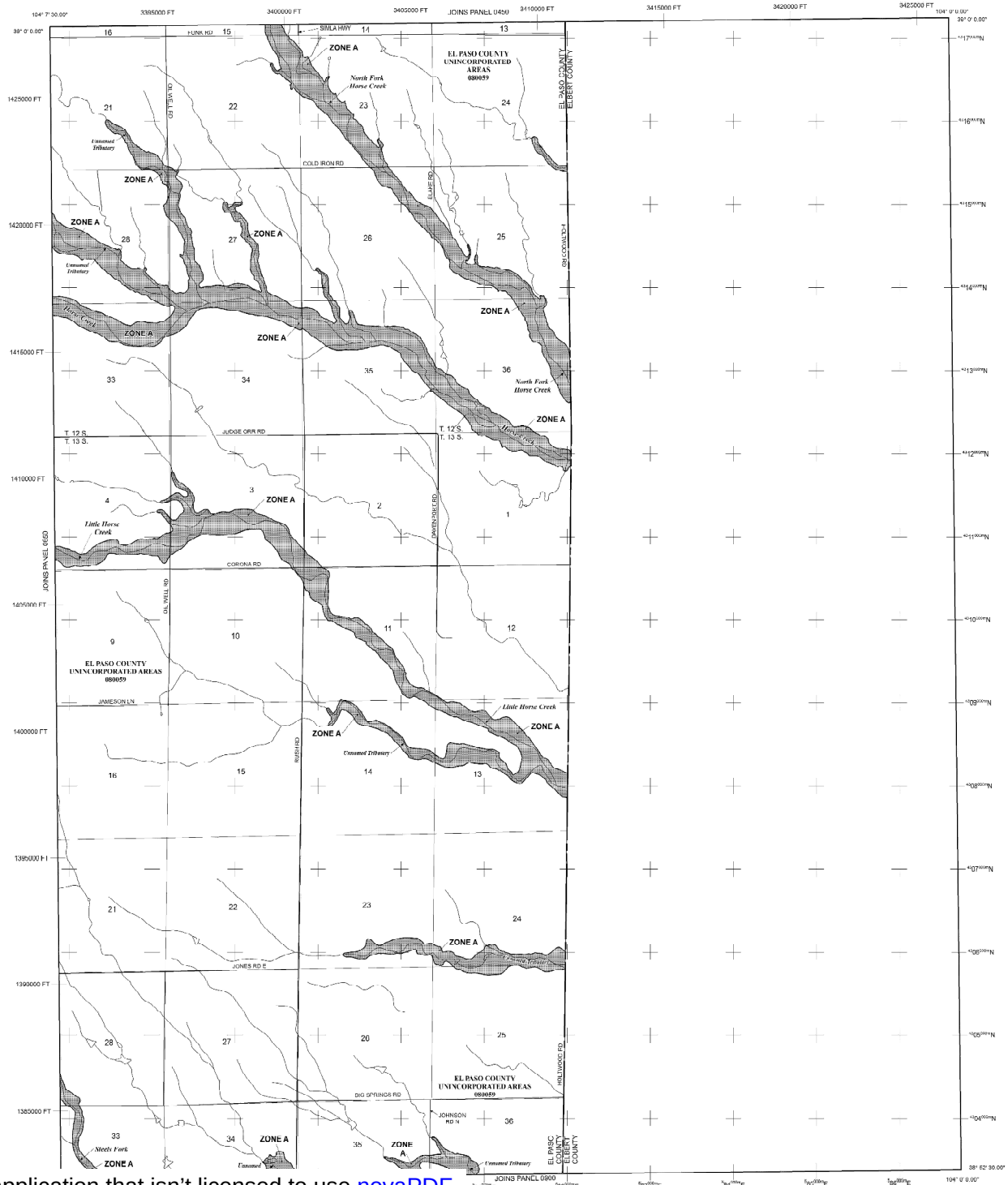

THIN TOWNSHIP 12 SOUTH, RANGE 66 WEST, AND TOWNSHIP 13 SOUTH, RANGE 66 WEST.

LEGEND

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MAP REPOSITORIES
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EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

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MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET
600 0 800 1200 METERS

NFIP

PANEL 0675G

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 675 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0675	G

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MAP NUMBER
08041C0675G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

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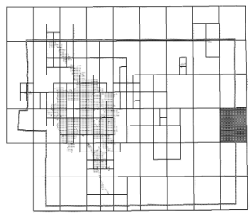

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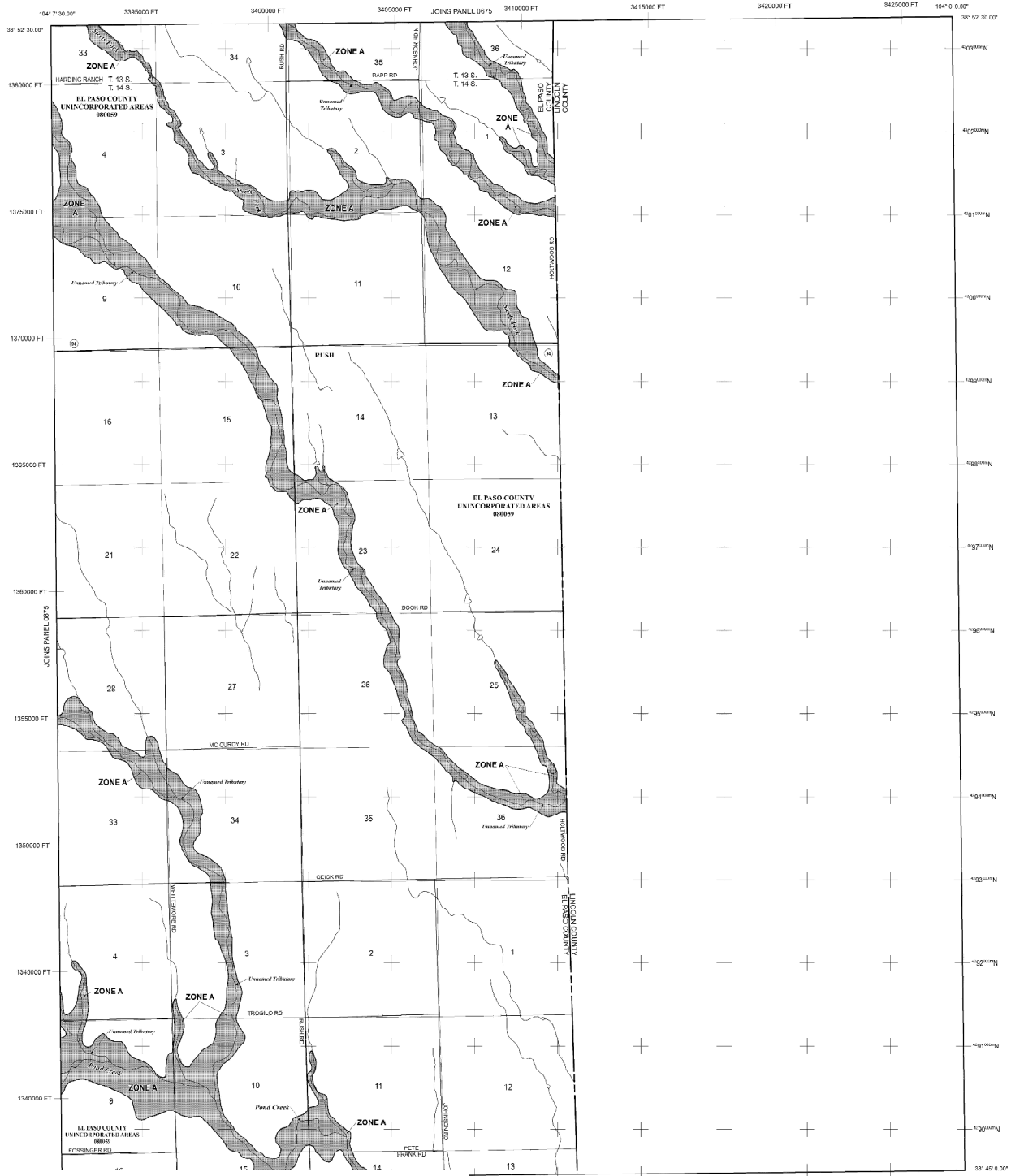

. RANGE 66 WEST, AND TOWNSHIP 14 SOUTH, RANGE 66 WEST, AND TOWNSHIP 15 SOUTH, RANGE 66 WEST.

LEGEND

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MARCH 17, 1997

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MAP SCALE 1" = 2000'
1000 0 2000 4000 FEET
300 0 600 1200 METERS

NFIP

PANEL 0900G

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

PANEL 900 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0900	G

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MAP NUMBER
08041C0900G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

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National Geodetic Survey
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Silver Spring, MD 20910-3282

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El Paso County Vertical Datum Offset Table

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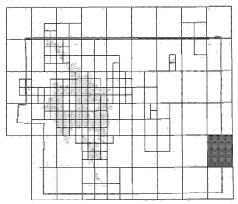
Panel Location Map



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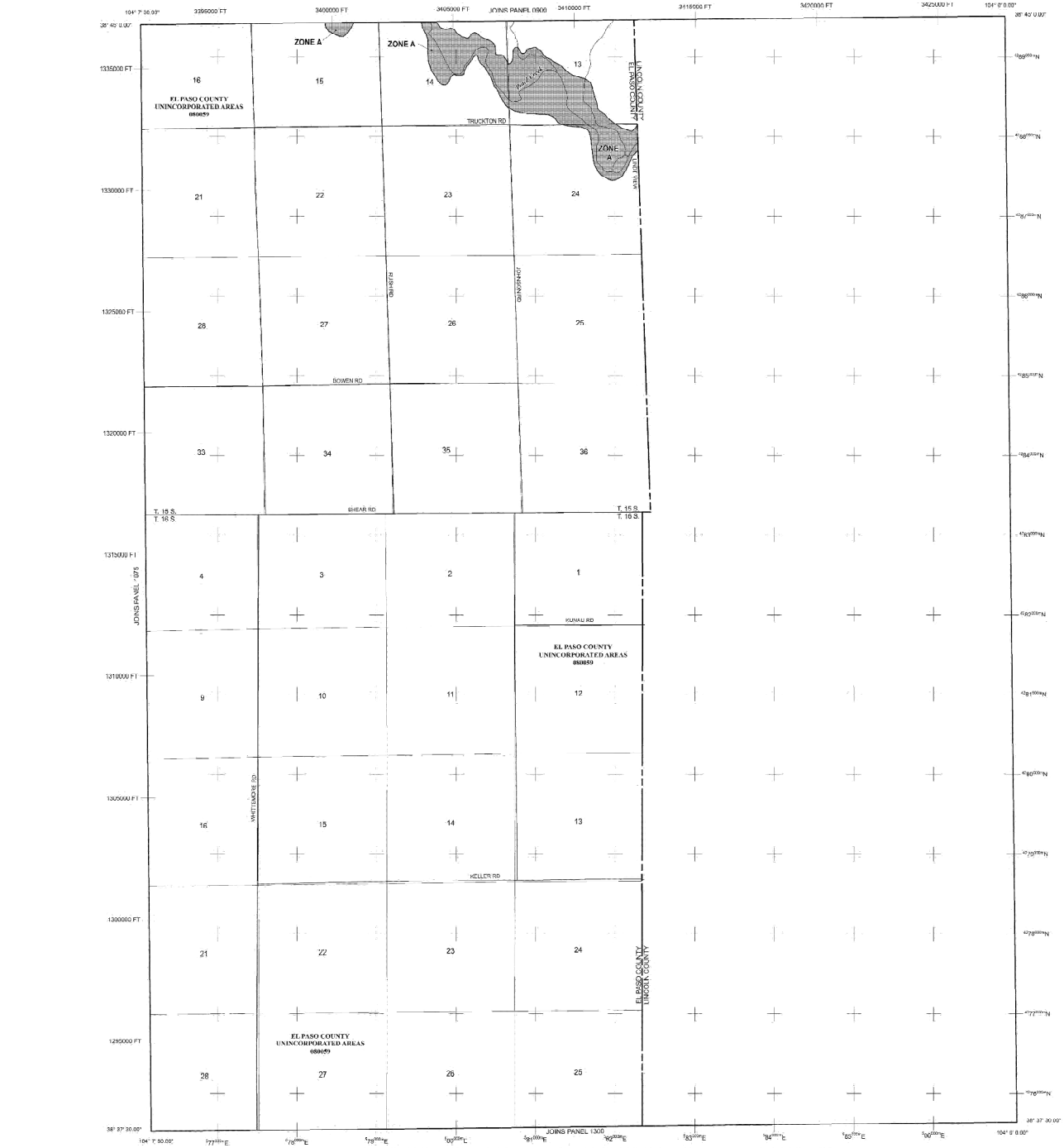

NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 15 SOUTH, RANGE 66 WEST, AND TOWNSHIP 16 SOUTH, RANGE 66 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance 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.
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ZONE AR Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
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ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to special Flood Hazard Areas.

- Floodplain boundary
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MARCH 17, 1997

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MAP SCALE 1" = 2000'
1000 0 2000 4000 FEET
300 0 600 1200 METERS

PANEL 1100G

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

PANEL 1100 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	1100	G

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MAP NUMBER
08041C1100G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

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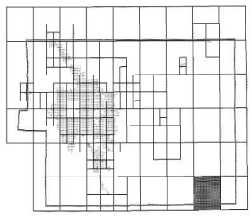

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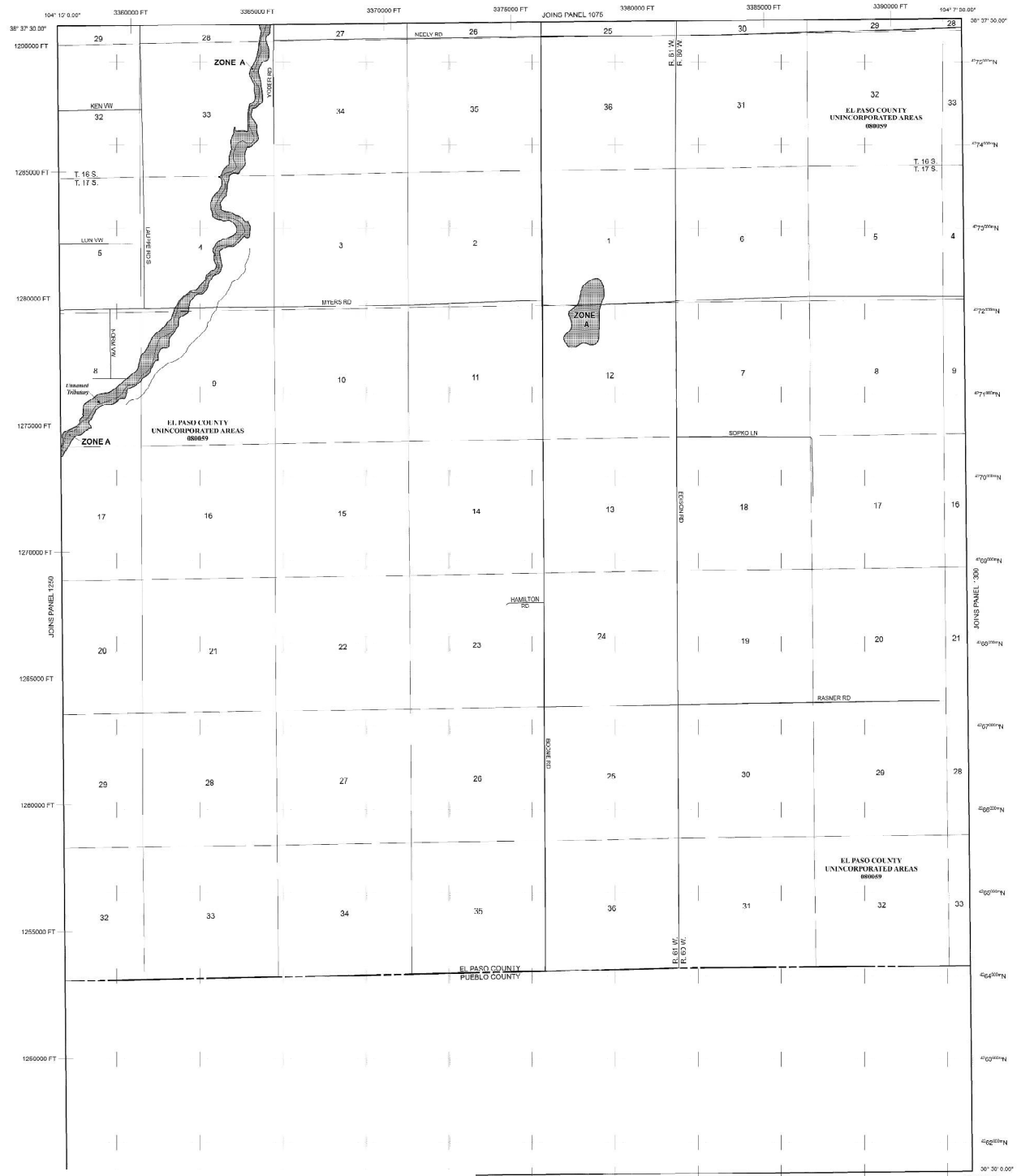

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300 0 600 1200 METERS

NFIP
PANEL 1275G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO AND INCORPORATED AREAS
PANEL 1275 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	1275	G

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MAP NUMBER
08041C1275G

MAP REVISED
DECEMBER 7, 2018

Federal Emergency Management Agency

Appendix C – Floodplain Statement of No-Impact

See Floodplain Development Permit Technical Memos.

Appendix D – Design Drawings

See SWMP Drawings. No
Permanent Control Measures
proposed for this linear utility work.

Appendix E - Drainage Letter of Conformance Checklist

2880 International Circle, Suite 110
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Phone 719-520-6300
Fax 719-520-6695
www.elpasoco.com

EL PASO COUNTY PLANNING AND COMMUNITY DEVELOPMENT DEPARTMENT

FINAL DRAINAGE REPORT (FDR) CHECKLIST

Revised: January 2022

Final Drainage Report

The purpose of the Final Drainage Report is to finalize concepts and to present the final design details for the drainage facilities presented in the PDR, including any changes to the preliminary design. The FDR shall contain all components of the PDR checklist plus additional necessary information relating to the final design of specific facilities associated with the development.

		Applicant	PCD
	Please confirm each item below has been included by placing a check mark in the "Applicant" column. See right for an example. The "PCD" column is for office use only.	✓	Office use only
	Report Contents		
1	Table of contents, pages numbered	✓	
2	Existing/Historic and Developed Conditions Plans at the end of the report	N/A	
	General Location		
1	City and County, and local streets within and adjacent to the subdivision	✓	
2	Township, Range, Section, 1/4 section	✓	
3	Major drainage ways and existing facilities	✓	
4	Names of surrounding platted developments	✓	
	Description of Property		
1	Area in acres	✓	
2	Ground cover, (type of trees, shrubs, vegetation)	✓	
3	General topography	✓	
4	General soil conditions	✓	
5	Major drainageways	✓	
6	Irrigation facilities	✓	
7	Utilities and other encumbrances	✓	
	Major Basin Descriptions		
1	Reference should be made to major drainageway planning studies; Such as Drainage Basin Planning Studies; Flood Hazard delineation reports, and flood insurance studies or maps if available.	✓	
2	A floodplain statement shall be provided indicating whether any portion of the development is in a designated floodplain as delineated on the current FEMA mapping.	✓	
3	Major basin drainage characteristics	✓	
4	Identification of all nearby irrigation facilities and other obstructions which could influence or be influenced by local drainage.	✓	
	Sub-Basin Descriptions		
1	Discussion of historic drainage patterns of the property in question	✓	
2	Discussion of offsite drainage flow patterns and their impact on the development	✓	
	Drainage Design Criteria		
1	Reference all criteria, master plans, and technical information used for report preparation and design; any deviation from such material must be discussed and justified.	✓	
2	Discussion of previous drainage studies (i.e. PDR, drainage basin planning studies, master plans, flood insurance studies) for the site in question that influence or are influenced by the drainage design and how the studies affect drainage design for the site	✓	
	Four Step Process		
1	Runoff reduction proposed	N/A	
2	Stabilization of drainage ways proposed/discussed	N/A	
3	Proposed Stormwater Quality Capture Volume (WQCV) proposed	N/A	
4	Identify Best Management Practices (BMP's) to be used to control industrial and commercial pollutants	N/A	

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	Hydrologic Criteria		
1	Identify design rainfall	N/A	
2	Identify runoff calculation method	N/A	
3	Identify design storm recurrence intervals	N/A	
4	Identify detention discharge and storage calculation method	N/A	
5	Note ECM Appendix I Full Spectrum Detention (FSD) requirement	N/A	
	Drainage Facility Design - General Concept		
1	Discussion of compliance with offsite runoff considerations	✓	
2	Discussion of anticipated and proposed drainage patterns	✓	
3	Discussion of the content of tables, charts, figures, plates or drawings presented in the report	✓	
	Drainage Facility Design - Specific Details		
1	Presentation of existing and proposed hydrologic conditions including approximate flow rates entering and exiting the subdivision with all necessary calculations.	N/A	
2	Presentation of approach to accommodate drainage impacts on existing or proposed improvements and facilities.	N/A	
3	Presentation of proposed facilities with respect to alignment, material and structure type.	N/A	
4	Discussion of drainage impact of site constraints such as streets, utilities, existing and proposed structures.	N/A	
5	Environmental features and issues shall be presented if applicable.	N/A	
6	Discussion of maintenance access and aspects of the design.	N/A	
7	Discussion and analysis of existing and proposed downstream drainage facilities and their ability to convey developed runoff from the proposed development.	N/A	
8	Presentation of detention storage and outlet design (including reservoir routings) when applicable. Note that the Engineering Criteria Manual Appendix I requires Full Spectrum Detention.	N/A	
9	Presentations of all hydrologic and hydraulic calculations including hydraulic grade line computations as appropriate. Recommended use of Mile High Flood District (MHFD / UDFCD) spreadsheets and calculations to properly meet this requirement, however other commonly used software may acceptable.	N/A	
10	Presentation of an accurate, complete current estimate of cost of proposed facilties.	N/A	
11	Presentation of all drainage basin fees and bridge fees for the property in question as applicable.	N/A	
	Other Government agency requirements		
1	Federal Emergency Management Agency (FEMA) Coordinating with PPRBD for floodplain permits.	✓	
2	Army Corps of Engineers (COE)	N/A	
3	Colorado State Engineer	N/A	
4	Colorado Water Conservation Board (CWCB)	N/A	
5	Others	N/A	

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	Drawing Contents, two maps/plans are required, existing conditions & the proposed plans		
1	General Location Map: A map shall be provided in sufficient detail to identify drainage flows entering and leaving the development and general drainage patterns. The map should be at a scale of 1"=50' to 1"=2000'. The map shall identify any major construction (i.e. development, irrigation ditches, existing detention facilities, culverts, storm sewers, etc.) that shall influence or be influenced by the subdivision.	✓	
2	Drainage Plan: Map(s) of the proposed development at a scale of 1"=20' to 1"=200' shall be included to identify existing and proposed conditions on or adjacent to the site in question. It shall include a minimum of: See SWMP Maps.	N/A	
	Existing and proposed contours at 2 feet maximum intervals. For subdivisions involving rural lots greater than 1.0 acre, the maximum interval may be 5 feet where approved. In terrain greater than 10% the intervals should be 10 foot intervals.	✓	
	Property lines and existing or proposed easements with purposes noted.	✓	
	All Streets	✓	
	Existing drainage facilities and structures, including irrigation ditches roadside ditches, drainageways, gutters and culverts, all indicating flow direction. All pertinent information such as material, size, shape, slope and locations shall also be included.	N/A	
	Overall drainage area boundary and drainage sub-area boundaries relating to the subdivision.	N/A	
	Proposed type of street sections (i.e., vertical or ramp curb and gutters, roadside ditch, gutter flow and/or cross pans).	N/A	
	Proposed storm sewers and open drainageways, including inlets, manholes, culverts, and other appurtenances.	N/A	
	Proposed outfall point for runoff from the developed area and facilities to convey flows to the final outfall point without damage to downstream properties.	N/A	
	Routing and summary of initial and major flow rates at various design points for all storm runoff associated with the property.	N/A	
	Path (s) chosen for computation of time of concentration.	N/A	
	Details of and design computations for detention storage facilities including outlet.	N/A	
	Location and elevations of all defined 100-year floodplains affecting the property.	N/A	
	Location of all existing and proposed utilities affected by or affecting the drainage design.	N/A	

Appendix F – Hydrologic and Hydraulic Calculations

Runoff Coefficients

Corridor / Design Package: PWAY Seg 5
System Name:

Computed: CAB Date: 6/24/2026
Checked: SDA Date: 6/24/2026

Computed: Checked:

Sub-Basin Data				Composite C			Streets (Paved)				Undeveloped Areas or Parks			
Basin ID	Description	Hydr Soils Group	Total Area (ac)	C_5	C_{10}	C_{100}	C_5	C_{10}	C_{100}	Area (ac)	C_5	C_{10}	C_{100}	Area (ac)
19	Proposed Culvert	A	0.94	-	0.52	0.53	-	1.00	0.95	0.41	-	0.15	0.20	0.53
20	Proposed Culvert	A	2.57	-	0.27	0.30	-	1.00	0.95	0.35	-	0.15	0.20	2.22
23.1	Proposed Culvert	B	0.18	-	0.48	0.49	-	1.00	0.95	0.07	-	0.15	0.20	0.11
24	Proposed Culvert	B	2.40	-	0.26	0.29	-	1.00	0.95	0.30	-	0.15	0.20	2.10
33	Proposed Culvert	A	2.26	-	0.53	0.54	-	1.00	0.95	1.01	-	0.15	0.20	1.25
34	Proposed Culvert	A	0.73	-	0.51	0.52	-	1.00	0.95	0.31	-	0.15	0.20	0.42
40	Proposed Culvert	B	2.27	-	0.32	0.35	-	1.00	0.95	0.45	-	0.15	0.20	1.82
47	Proposed Culvert	B	0.71	-	0.55	0.55	-	1.00	0.95	0.33	-	0.15	0.20	0.38
48	Proposed Culvert	B	3.27	-	0.23	0.27	-	1.00	0.95	0.29	-	0.15	0.20	2.98
52	Proposed Culvert	B	5.90	-	0.21	0.25	-	1.00	0.95	0.40	-	0.15	0.20	5.50
53	Proposed Culvert	B	0.99	-	0.42	0.43	-	1.00	0.95	0.31	-	0.15	0.20	0.68
75	Proposed Culvert	A	1.05	-	0.59	0.59	-	1.00	0.95	0.54	-	0.15	0.20	0.51
			23.27							**4.77**				**18.50**

Standard Form SF-1 . Time of Concentration

Corridor / Design Package: PWAY Seg 5
System Name:

Minimum Tc of 5 minutes used for roadway basins 0.50 acres or smaller

Computed: CAB Date: 6/24/2026
Checked: SDA Date: 6/24/2026

SUB-BASIN DATA				INITIAL/OVERLAND FLOW (t_i)			TRAVEL TIME (t_t)							Total	Tc CHECK (Urbanized basins)				FINAL Tc (min)
									Type of Land Surface										
Basin ID	Description	C_{10}	Area (ac)	Length (ft)	Slope (ft/ft)	t_i (min)	Length (ft)	S_w (ft/ft)	Code	Description	Convey Coef (C_v)	Velocity (ft/s)	Travel Time (min)	$t_c = t_i + t_t$ (min)	Urban (Yes /No)	Imperviousness i	Regional $T_{c\,max}$ (min)	$T_{c\,max} > t_c$	
19	Proposed Culvert	0.52	0.94	108	0.02	3.0	820	0.02	5	Grassed waterway	15.00	1.89	7.23	10.2	No	0.000	38.06	Check	10.2
20	Proposed Culvert	0.27	2.57	137	0.01	4.5	765	0.02	5	Grassed waterway	15.00	1.96	6.52	11.0	No	0.000	36.87	Check	11.0
23.1	Proposed Culvert	0.48	0.18	60	0.08	3.9	281	0.01	5	Grassed waterway	15.00	1.27	3.69	7.6	No	0.000	32.15	Check	7.6
24	Proposed Culvert	0.26	2.40	22	0.04	2.7	863	0.01	5	Grassed waterway	15.00	1.35	10.65	13.3	No	0.000	43.75	Check	13.3
33	Proposed Culvert	0.53	2.26	300	0.02	5.4	2222	0.02	5	Grassed waterway	15.00	2.00	18.52	23.9	No	0.000	56.86	Check	23.9
34	Proposed Culvert	0.51	0.73	300	0.00	2.9	829	0.01	5	Grassed waterway	15.00	1.82	7.59	10.5	No	0.000	38.65	Check	10.5
40	Proposed Culvert	0.32	2.27	122	0.03	5.2	912	0.01	5	Grassed waterway	15.00	1.57	9.68	14.9	No	0.000	42.13	Check	14.9
47	Proposed Culvert	0.55	0.71	64	0.03	2.6	951	0.01	5	Grassed waterway	15.00	1.19	13.29	15.9	No	0.000	48.16	Check	15.9
48	Proposed Culvert	0.23	3.27	53	0.04	4.0	957	0.01	5	Grassed waterway	15.00	1.19	13.43	17.5	No	0.000	48.38	Check	17.5
52	Proposed Culvert	0.21	5.90	47	0.06	4.6	1194	0.01	5	Grassed waterway	15.00	1.15	17.33	21.9	No	0.000	54.88	Check	21.9
53	Proposed Culvert	0.42	0.99	40	0.05	3.0	1208	0.01	5	Grassed waterway	15.00	1.22	16.50	19.5	No	0.000	53.49	Check	19.5
75	Proposed Culvert	0.59	1.05	205	0.01	3.0	1259	0.02	5	Grassed waterway	15.00	2.28	9.21	12.2	No	0.000	41.35	Check	12.2

CS-DCM Table 6-7 Conveyance Coefficients

Code	Description	Cv
1	Heavy meadow	2.5
2	Tillage/field	5
3	`	7
4	Nearly bare ground	10
5	Grassed waterway	15
6	Paved areas and shallow paved swales	20
7	Rail Ballast	1.5
8	Riprap	6.5

Standard Form SF-2 . Storm Drainage System Design (Rational Method Procedure)

Corridor / Design Package: PWAY Seg 5
System Name:

Computed: CAB Date: 6/24/2026
Checked: SDA Date: 6/24/2026

Design Storm: 10-yr

Basin Area Description		DIRECT RUNOFF							TOTAL RUNOFF				REMARKS
		AREA DESIGN (name)	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C.A. (AC)	I IN / HR	Q (CFS)	t_c (MIN)	SUM (C*A) (AC)	I (IN / HR)	Q (CFS)	
(1)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
Proposed Culvert		19	0.940	0.521	10.25	0.49	4.27	**2.09**					
Proposed Culvert		20	2.570	0.266	11.05	0.68	4.14	**2.83**					
Proposed Culvert		23.1	0.180	0.481	7.64	0.09	5.06	**0.44**					
Proposed Culvert		24	2.400	0.256	13.32	0.62	3.78	**2.32**					
Proposed Culvert		33	2.260	0.530	23.94	1.20	2.91	**3.49**					
Proposed Culvert		34	0.730	0.511	10.46	0.37	4.24	**1.58**					
Proposed Culvert		40	2.270	0.319	14.90	0.72	3.53	**2.55**					
Proposed Culvert		47	0.710	0.545	15.94	0.39	3.44	**1.33**					
Proposed Culvert		48	3.270	0.225	17.46	0.74	3.35	**2.47**					
Proposed Culvert		52	5.900	0.208	21.95	1.23	3.04	**3.73**					
Proposed Culvert		53	0.990	0.416	19.50	0.41	3.21	**1.32**					
Proposed Culvert		75	1.050	0.587	12.19	0.62	3.96	**2.44**					

Standard Form SF-2 . Storm Drainage System Design (Rational Method Procedure)

Corridor / Design Package: PWAY Seg 5
System Name:

Computed: CAB Date: 6/24/2026
Checked: SDA Date: 6/24/2026

Design Storm: 100-yr

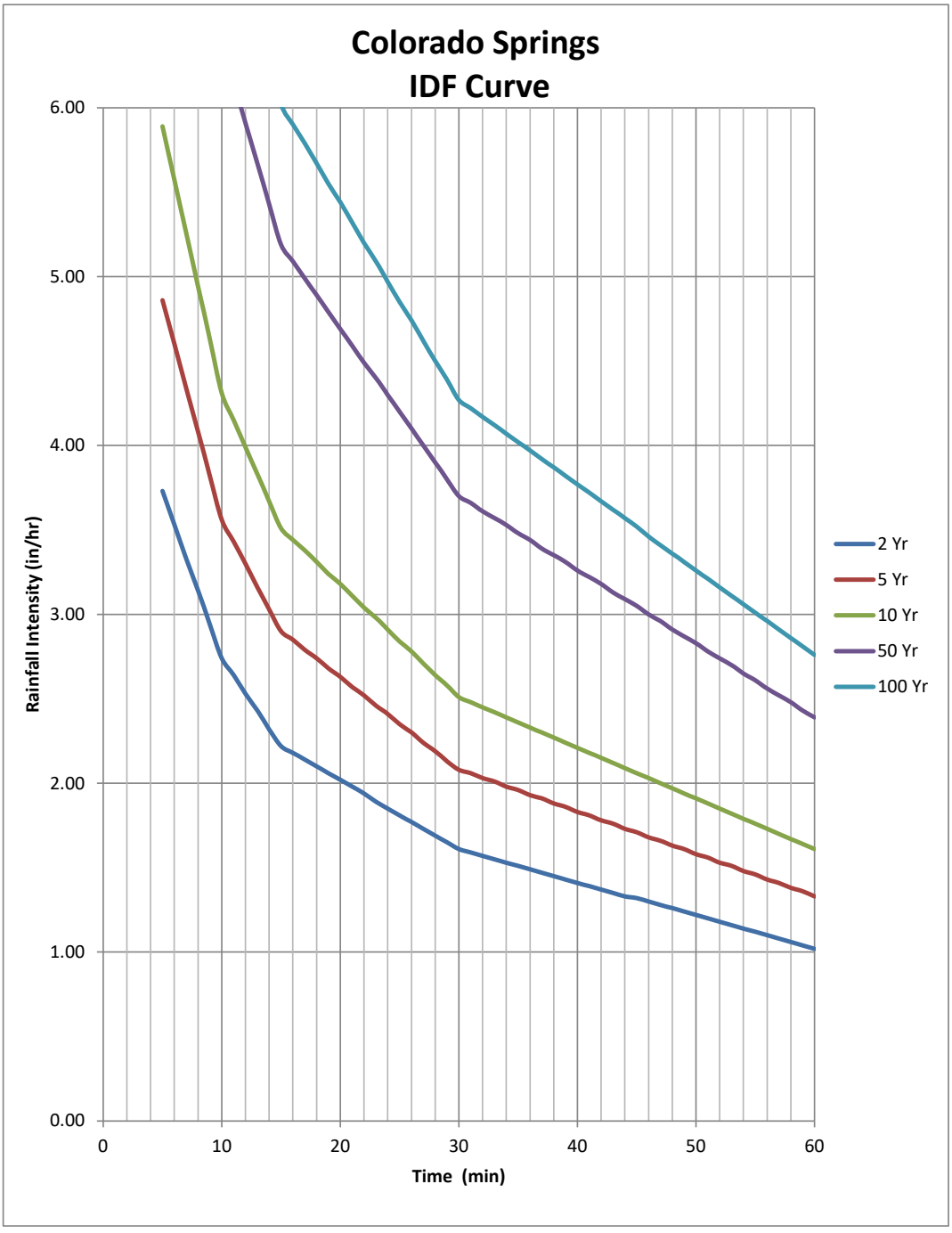
Basin Area Description		DIRECT RUNOFF							TOTAL RUNOFF				REMARKS
		AREA DESIGN (name)	AREA (AC)	RUNOFF COEFF	t_c (MIN)	C.A. (AC)	I IN / HR	Q (CFS)	t_c (MIN)	SUM (C*A) (AC)	I (IN / HR)	Q (CFS)	
(1)		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	
Proposed Culvert		19	0.940	0.527	10.25	0.50	7.33	**3.63**					
Proposed Culvert		20	2.570	0.302	11.05	0.78	7.11	**5.52**					
Proposed Culvert		23.1	0.180	0.492	7.64	0.09	8.68	**0.77**					
Proposed Culvert		24	2.400	0.294	13.32	0.71	6.48	**4.57**					
Proposed Culvert		33	2.260	0.535	23.94	1.21	4.98	**6.02**					
Proposed Culvert		34	0.730	0.518	10.46	0.38	7.27	**2.75**					
Proposed Culvert		40	2.270	0.349	14.90	0.79	6.05	**4.79**					
Proposed Culvert		47	0.710	0.549	15.94	0.39	5.91	**2.30**					
Proposed Culvert		48	3.270	0.267	17.46	0.87	5.73	**5.00**					
Proposed Culvert		52	5.900	0.251	21.95	1.48	5.21	**7.71**					
Proposed Culvert		53	0.990	0.435	19.50	0.43	5.49	**2.37**					
Proposed Culvert		75	1.050	0.586	12.19	0.62	6.80	**4.18**					

Colorado SpringsIDF Computed: CAB Date: 6/24/2026

Checked: SDA Date: 6/24/2026

Time (min)	(in/hr)				
	2 Yr	5 Yr	10 Yr	50 Yr	100 Yr
5	3.73	4.86	5.89	8.72	10.10
6	3.53	4.60	5.57	8.25	9.56
7	3.33	4.34	5.26	7.79	9.02
8	3.14	4.08	4.94	7.32	8.48
9	2.94	3.82	4.63	6.86	7.94
10	2.74	3.56	4.31	6.39	7.40
11	2.64	3.43	4.15	6.15	7.12
12	2.53	3.30	3.99	5.91	6.85
13	2.43	3.16	3.83	5.67	6.57
14	2.32	3.03	3.67	5.43	6.30
15	2.22	2.90	3.51	5.19	6.02
16	2.18	2.85	3.44	5.09	5.90
17	2.14	2.79	3.38	4.99	5.79
18	2.10	2.74	3.31	4.89	5.67
19	2.06	2.68	3.24	4.79	5.55
20	2.02	2.63	3.18	4.69	5.44
21	1.98	2.57	3.11	4.59	5.32
22	1.94	2.52	3.04	4.49	5.20
23	1.89	2.46	2.98	4.40	5.09
24	1.85	2.41	2.91	4.30	4.97
25	1.81	2.35	2.84	4.20	4.85
26	1.77	2.30	2.78	4.10	4.74
27	1.73	2.24	2.71	4.00	4.62
28	1.69	2.19	2.64	3.90	4.50
29	1.65	2.13	2.58	3.80	4.39
30	1.61	2.08	2.51	3.70	4.27
31	1.59	2.06	2.48	3.66	4.22
32	1.57	2.03	2.45	3.61	4.17
33	1.55	2.01	2.42	3.57	4.12
34	1.53	1.98	2.39	3.53	4.07
35	1.51	1.96	2.36	3.48	4.02
36	1.49	1.93	2.33	3.44	3.97
37	1.47	1.91	2.30	3.39	3.92
38	1.45	1.88	2.27	3.35	3.87
39	1.43	1.86	2.24	3.31	3.82
40	1.41	1.83	2.21	3.26	3.77
41	1.39	1.81	2.18	3.22	3.72
42	1.37	1.78	2.15	3.18	3.67
43	1.35	1.76	2.12	3.13	3.62
44	1.33	1.73	2.09	3.09	3.57
45	1.32	1.71	2.06	3.05	3.52
46	1.30	1.68	2.03	3.00	3.46
47	1.28	1.66	2.00	2.96	3.41
48	1.26	1.63	1.97	2.91	3.36
49	1.24	1.61	1.94	2.87	3.31
50	1.22	1.58	1.91	2.83	3.26
51	1.20	1.56	1.88	2.78	3.21
52	1.18	1.53	1.85	2.74	3.16
53	1.16	1.51	1.82	2.70	3.11
54	1.14	1.48	1.79	2.65	3.06
55	1.12	1.46	1.76	2.61	3.01
56	1.10	1.43	1.73	2.56	2.96
57	1.08	1.41	1.70	2.52	2.91
58	1.06	1.38	1.67	2.48	2.86
59	1.04	1.36	1.64	2.43	2.81
60	1.02	1.33	1.61	2.39	2.76

Calculated using City of Colorado Springs Equations on Figure 6-5.


Colorado Springs
IDF Curve
Rainfall Intensity (in/hr)
6.00
5.00
4.00
3.00
2.00
1.00
0.00
0
10
20
30
40
50
60
Time (min)
2 Yr
5 Yr
10 Yr
50 Yr
100 Yr

HY-8 Culvert Analysis Report

Table 1 - Project Headwater Table

Crossing Name	Culvert Name	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	HW / D (ft)	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Outlet Velocity (ft/s)
Culvert 52	Culvert 1	7.73	7.73	2.78	2.00	2.529	1.69	1.50	1.08	1.08	5.69

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow
Minimum Flow: 3.73 cfs
Design Flow: 7.73 cfs
Maximum Flow: 10.00 cfs

Table 2 - Summary of Culvert Flows at crossing: Culvert 52

Headwater Elevation (ft)	Total Discharge (cfs)	Culvert 1 Discharge (cfs)	Roadway Discharge (cfs)	Iterations
1.54	3.73	3.73	0.00	1
1.67	4.36	4.36	0.00	1
1.81	4.98	4.98	0.00	1
1.96	5.61	5.61	0.00	1
2.16	6.24	6.24	0.00	1
2.42	6.87	6.87	0.00	1
2.78	7.73	7.73	0.00	1
2.94	8.12	8.12	0.00	1
3.24	8.75	8.75	0.00	1
3.50	9.37	9.28	0.01	54
3.52	10.00	9.32	0.65	6
3.50	9.29	9.29	0.00	Overtopping

Rating Curve Plot for crossing: Culvert 52

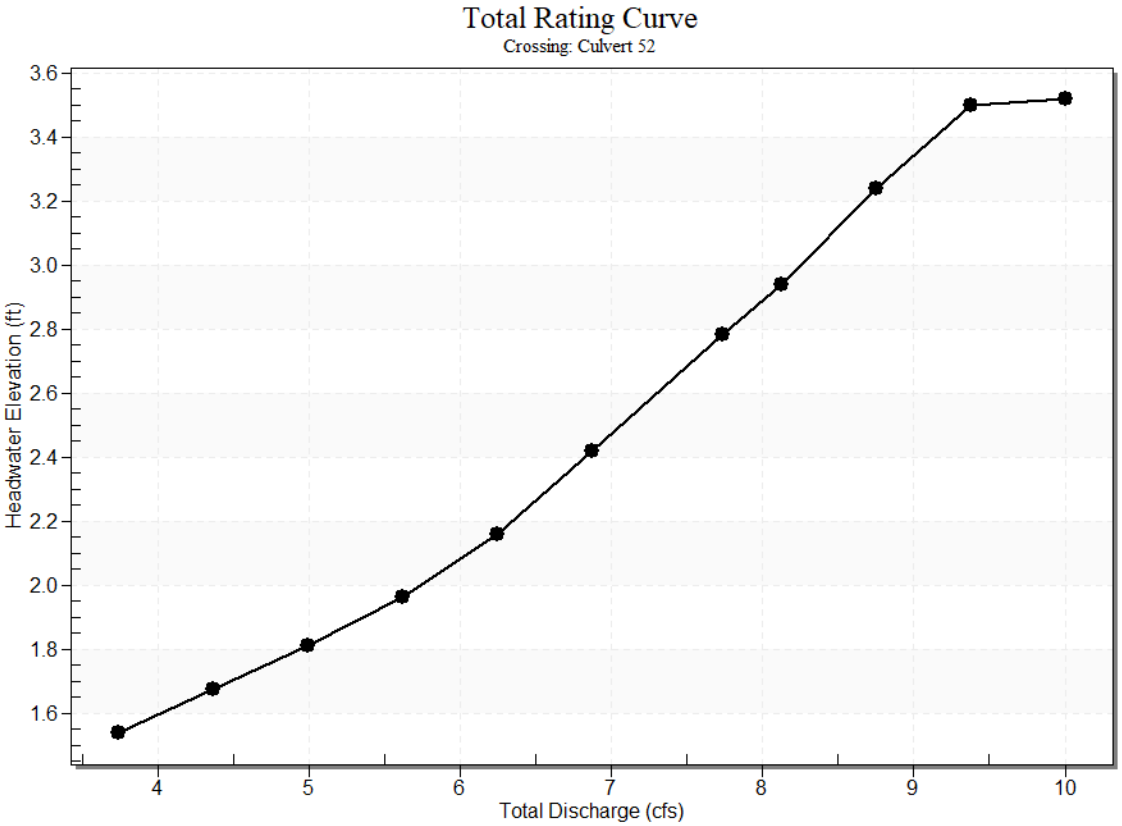


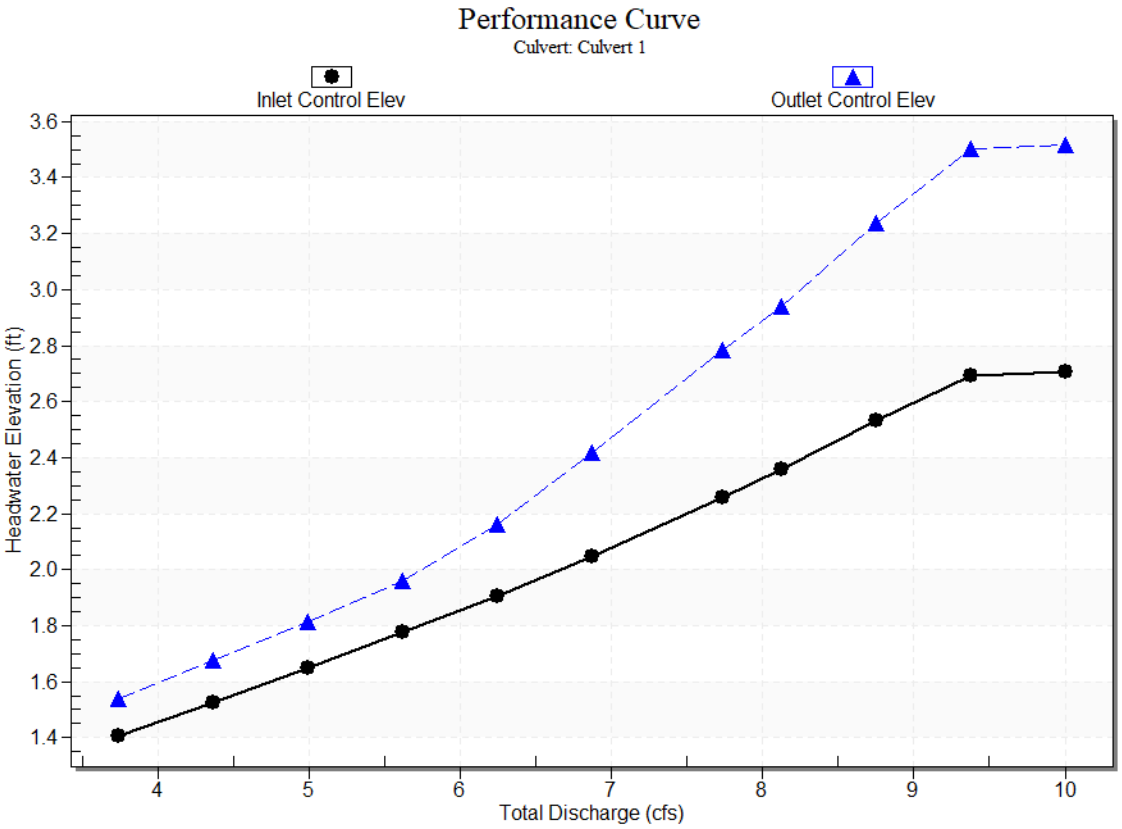
Table 3 - Culvert Summary Table: Culvert 1

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	HW / D (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
3.73	3.73	1.54	1.15	1.285	0.86	3-M2t	1.14	0.74	0.82	0.82	3.79	1.86
4.36	4.36	1.67	1.27	1.420	0.95	3-M2t	1.50	0.80	0.87	0.87	4.12	1.94
4.98	4.98	1.81	1.39	1.558	1.04	3-M2t	1.50	0.86	0.91	0.91	4.44	2.00
5.61	5.61	1.96	1.52	1.707	1.14	3-M2t	1.50	0.91	0.95	0.95	4.74	2.06
6.24	6.24	2.16	1.65	1.906	1.27	7-M2t	1.50	0.97	0.99	0.99	5.04	2.12
6.87	6.87	2.42	1.79	2.164	1.44	7-M2t	1.50	1.01	1.03	1.03	5.32	2.17
7.73	7.73	2.78	2.00	2.529	1.69	7-M2c	1.50	1.08	1.08	1.07	5.69	2.23
8.12	8.12	2.94	2.10	2.683	1.79	7-M2c	1.50	1.10	1.10	1.09	5.83	2.26
8.75	8.75	3.24	2.28	2.985	1.99	7-M2c	1.50	1.14	1.14	1.12	6.04	2.30
9.37	9.28	3.50	2.44	3.246	2.16	7-M2c	1.50	1.18	1.18	1.15	6.23	2.34
10.00	9.32	3.52	2.45	3.263	2.18	7-M2t	1.50	1.18	1.18	1.18	6.24	2.38
10.00	9.32	3.52	2.45	3.263	2.18	7-M2t	1.50	1.18	1.18	1.18	6.24	2.38

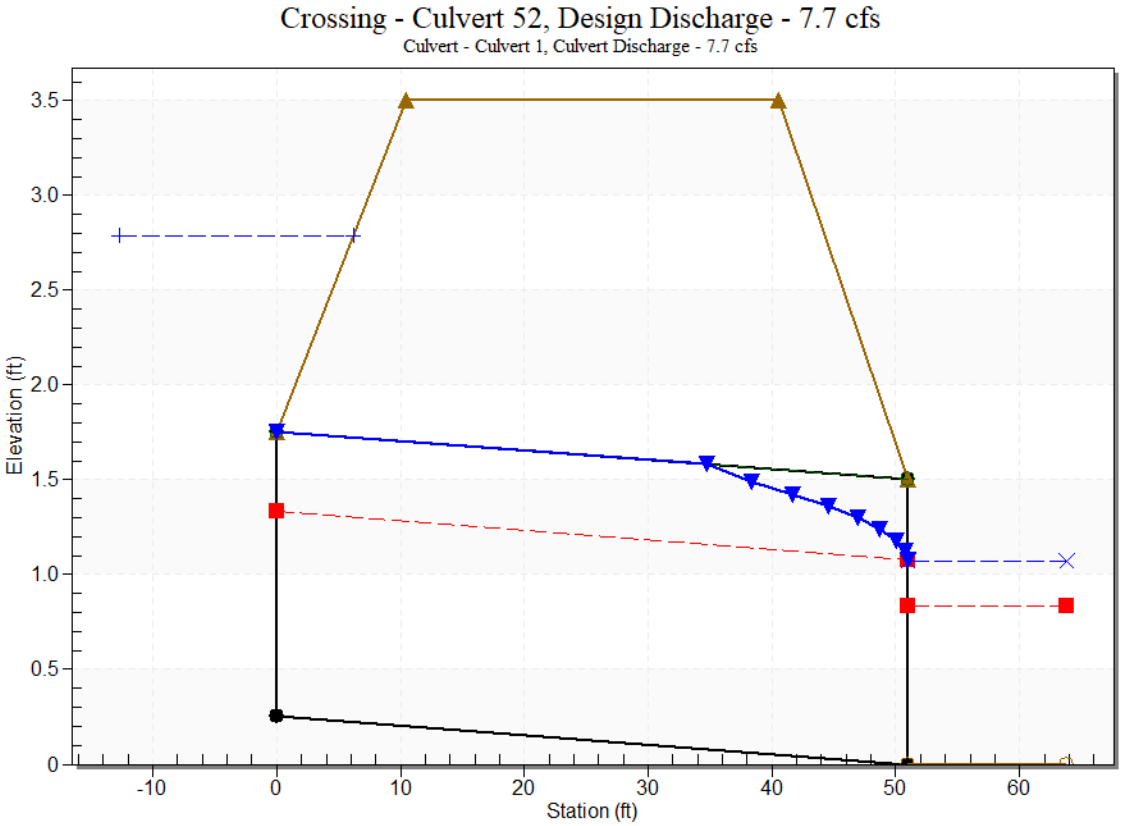
Culvert Barrel Data

Culvert Barrel Type: Straight Culvert
Inlet Elevation(invert): 0.26 ft
Outlet Elevation (invert): 0.00 ft
Culvert Length: 51.00 ft
Culvert Slope: 0.01 ft/ft

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1



Site Data - Culvert 1

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 0.26 ft
Outlet Station: 51.00 ft
Outlet Elevation: 0.00 ft
Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular
Barrel Diameter: 1.50 ft
Barrel Material: Corrugated Steel
Embedment: 0.00 in
Barrel Manning's n: 0.0240
Culvert Type: Straight
Inlet Configuration: Thin Edge Projecting (Ke=0.9)
Inlet Depression: None

Tailwater Channel Data for Crossing: Culvert 52

Tailwater Channel Option: Triangular Channel
a_side Slope (H:V): 3.00 (_:1)
Channel Slope: 0.01 ft/ft
Channel Manning's n: 0.0300

Channel Invert Elevation: 0.00 ft

Table 4 - Downstream Channel Rating Curve (crossing: Culvert 52)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
3.73	0.82	0.82	1.86	0.25	0.51
4.36	0.87	0.87	1.94	0.27	0.52
4.98	0.91	0.91	2.00	0.28	0.52
5.61	0.95	0.95	2.06	0.30	0.53
6.24	0.99	0.99	2.12	0.31	0.53
6.87	1.03	1.03	2.17	0.32	0.53
7.73	1.07	1.07	2.23	0.34	0.54
8.12	1.09	1.09	2.26	0.34	0.54
8.75	1.12	1.12	2.30	0.35	0.54
9.37	1.15	1.15	2.34	0.36	0.54
10.00	1.18	1.18	2.38	0.37	0.55

Roadway Data for crossing: Culvert 52

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 3.50 ft
Roadway Surface: Gravel
Roadway Top Width: 30.00 ft