HYDRAULIC REPORT
FOR
FOREST LAKES FILING 6
MESA TOP BRIDGE
EL PASO COUNTY, COLORADO

January 2021
Revised June 2021

Prepared for:
FOREST LAKES RESIDENTIAL DEVELOPMENT, LLC
2138 FLYING HORSE CLUB DR.
COLORADO SPRINGS CO 80921
(719) 592-9333

Prepared by:
CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. CASCADE AVENUE, SUITE 200
COLORADO SPRINGS CO 80903
(719) 785-0790

Job no. 1175.60
PCD File # SF-20-027

HYDRAULIC REPORT FOR FOREST LAKES FILING 6 MESA TOP BRIDGE

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 El Paso 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.

COLORADO LICENSED KYLE RAYE CAMPBELL 29794 PROFESSIONAL ENGINEER

Kyle R Campbell, Colorado P.E. #29794 — Date: 10.19.21

DEVELOPER'S STATEMENT:

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

Business Name: Forest Lakes Residential Development, LLC

By: Jim Boulton

Title: VICE PRES.

Address: 2138 Flying Horse Club Dr.

Colorado Springs, CO 80921

EL PASO COUNTY ONLY:

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.
County Engineer / ECM Administrator

APPROVED
Engineering Department
11/09/2021 12:52:30 PM
dsdnijkamp
EPC Planning & Community Development Department

CLASSIC CONSULTING ENGINEERS & SURVEYORS

HYDRAULIC REPORT FOR FOREST LAKES FILING 6 MESA TOP BRIDGE

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PURPOSE

This document is the Hydraulic Report for Forest Lakes Filing 6 Mesa Top Bridge. The purpose of this report is to provide drainage design paraments for the proposed bridge and define areas tributary to the proposed bridge.

PROJECT DESCRIPTION

The Forest Lakes Filing 6 is 79.168 acres of a phased master planned community located in northern El Paso County, Colorado. The proposed Filing 6 is located in the far westerly portion of the overall Forest Lakes Community, and is east of Filing 5 and includes a bridge crossing as a part of the continuation of Mesa Top Drive. The Filing 6 boundary is just north of the confluence of Beaver Creek, Hell Creek and North Beaver Creek. These watersheds are tributary to Monument Creek. The site is located within the Beaver Creek Drainage Basin.

A previous MDDP Amendment and Preliminary Drainage Report for Filings 5, 6, 7 has been approved by the County and defines existing and updated developed peak flow data for the 5-year and 100-year recurrence intervals within the Filings 5, 6, & 7 portions of the property. The previous report established the overall drainage design information and to identified the required storm drainage and flood control facilities within the Filings 5, 6, & 7 property. Final development of Filing 6 is consistent with this approved report with minor modification to the surrounding lot layout but no changes to the overall roadway design. The vicinity map for the Filings 5, 6, & 7 Amendment area is presented in the Appendix of this report.

As the limits of Filing 6 are outside of the existing drainage corridors, other than the bridge crossing, there is no land development grading proposed within the existing wetlands, mouse habitat, and/or 100-year floodplain limits, other than to construct and the mid-span supports for the bridge structure. The drainage maps in the Appendix of this report show the existing wetland limits, Preble's Jumping Mouse habitat limits, and effective FEMA floodplain in the area of the bridge. An existing historic ranch access road is present in the area of the bridge.

This road continues to be used for construction access to the west portion of the community. The proposed pier width is designed as 36" diameter mid-bridge column supports.

PREVIOUS REPORTS

The latest and most applicable previously approved drainage study is the following:

1. "Master Development Drainage Plan Amendment and Preliminary Drainage Report for Forest Lakes (Filing 5, 6, 7)," by Classic Consulting Engineers & Surveyors LLC, approved April 1, 2019.
2. "Final Drainage Report for Forest Lakes Filing No. 5," by Classic Consulting Engineers & Surveyors, LLC, approved June 9, 2020.

SOILS AND GEOLOGY

The soils within the Forest Lakes Filing 6 and tributary area are Hydrologic Soil Group B, mostly Jarre-Tecolote complex and Peyton-Pring complex (See Appendix for Soil Map).

DRAINAGE CRITERIA

Calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and October 1994. El Paso County requires freeboard of 2' form the 100-year water surface to the bottom of the bridge deck structure, which is obtained with this design.

HEC-RAS 5.07 was utilized to perform the existing and proposed conditions modeling. Sections used to model the proposed conditions (in relationship to the bridge) were also used in the existing condition modeling to compare identical sections.

FLOODPLAIN STATEMENT

The Mesa Top Bridge is located within a floodplain as determined by the Flood Insurance Rate Map (F.I.R.M.) Map Number 08041 C0267G, effective date, December 7, 2018 (See Appendix for overlay exhibit). A Floodplain Development Permit will be obtained prior to construction of the bridge.

This floodplain was modeled in the June 23, 2004 LOMR (see Appendix), and reflects a 100-year flow rate of 1,932 cfs for the 3.5 square mile North Beaver Creek Tributary area.

EXISTING DRAINAGE CONDITIONS

As defined in the MDDP Amendment and Preliminary Drainage Report, the proposed bridge crossing is located in the North Beaver Creek Drainage corridor.

(Q_5 = 1,047 cfs and Q_{100} = 3,123 cfs) is the overall runoff within North Beaver Creek channel as defined by the "Forest Lakes Master Development Drainage Plan El Paso County Colorado," by Kiowa Engineering Corporation, last revised April 11, 2002 (MDDP). This flow was used for air modeling and analysis. The 3.5 square mile northerly and western tributary North Beaver Creek Basin approximately bi-sects the Filing 6 boundary and drains from the north to the south-east into the larger Beaver Creek. Within North Beaver Creek are FEMA Effective 100-yr floodplain limits (Zone AE with no regulatory floodway) and US Corps of Engineers Jurisdictional Wetlands. These limits are shown and notated on the Drainage Maps. While the 2004 FEMA flows of Q_{100} = 1,932 cfs are less than the 2002 MDDP flows of Q_{100} = 3,123 cfs, the MDDP flows were used for the modeling effort in order to be conservative and match existing County Drainage Records.

The proposed bridge has been positioned in a location to ensure that the abutments are sitting outside of the limits of the existing 100-year floodplain. This was done to eliminate any FEMA processing and to maintain the drainage corridor topography and vegetation. Provided in the appendix, in the Hydraulic Calculations Section are the analysis that depicts both the Existing Conditions Profile and Proposed Conditions Profiles. A 0.3 contraction coefficient was used in modeling for the left overbank as reflected in the calculations in the appendix (see excerpt from modeling in appendix).

While using the larger county MDDP flows, some water surface elevation changes were noted, using the smaller FEMA flows do not warrant any FEMA precessing.

As a part of the bridge construction, impacts to existing non-wetland vegetation will take place, but no 404 Permitting is required as coordinated with USACOE letter in Appendix.

Grain sizes of D50 and D90 were used based upon results of site-specific geotechnical works in the area and coordination with the geotechnical consultant.

reflected as 1' above the 100 W.S.E. for the top, and either the toe of existing slope (where waters of the U.S. are present) or buried where noted on the exhibits in the Appendix. All Rip-Rap installation to be conducted in accordance with El Paso County Engineering Criteria Manual Specifications. Rip Rap sizing of D50 = 24" (VH) is proposed for this corridor and will be placed on 10" inches of granular bedding

SUMMARY

Based upon the finding of this analysis, we do not see any adverse impacts that the bridge introduces into the drainage corridor. While an increase in water surface elevation is identified per the modeling at section 700, this is based on upon the aforementioned MDDP flows and not the FEMA recognized base flood flows which are much less.

PREPARED BY:

Kyle R. Campbell
Division Manager

db/117560/Hydraulic Report Fil 6 Mesa Top Bridge.doc

REFERENCES

1. City of Colorado Springs and El Paso County Drainage Criteria Manual Volume 1, May 2014.
2. Drainage Criteria Manual (Volume 3) latest revision April 2008, Urban Drainage and Flood Criteria District.
3. "Forest Lakes Master Development Drainage Plan," by Kiowa Engineering Corporation, revised April 11, 2002.
4. "Preliminary and Final Drainage Report Forest Lakes Subdivision Filing No. 1," by Kiowa Engineering Corporation, filed September 8, 2004.
5. "Drainage Report Amendment for Preliminary and Final Drainage Report Forest Lakes Subdivision Filing No. 1," by Classic Consulting Engineers & Surveyors, LLC, dated August 2015.
6. "Debris Flow/Mudflow Analysis Forest Lakes Subdivision (Phase 2) Lindbergh Road and W. Baptist Road El Paso County, Colorado," by CTL Thompson Inc., dated August 6, 2018.
7. "Master Development Drainage Plan Amendment and Preliminary Drainage Report for Forest Lakes (Filing 5, 6, 7)," by Classic Consulting Engineers & Surveyors LLC, approved April 1, 2019.
8. "Final Drainage Report for Forest Lakes Filing 5," by Classic Consulting Engineers & Surveyors, LLC, approved June 9, 2020.

APPENDIX

VICINITY MAP

VICINITY MAP

NOT TO SCALE

N:\117560\DRAWINGS\CONSTRUCTION\GRADING-EROSION\01-117560-TITLE.dwg, 10/14/2020 10:30:39 AM, 1:1

SOILS MAP (S.C.S. SURVEY)

Hydrologic Soil Group—El Paso County Area, Colorado

Map Scale: 1:6,570 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 50 100 200 300

Feet: 0 300 600 1200 1800

N

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Aug 19, 2018—Sep 23, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
38	Jarre-Tecolote complex, 8 to 65 percent slopes	B	101.7	49.6%
65	Perrypark gravelly sandy loam, 3 to 9 percent slopes	B	5.0	2.4%
68	Peyton-Pring complex, 3 to 8 percent slopes	B	98.5	48.0%
Totals for Area of Interest			**205.2**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

F.E.M.A. MAP

CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

FOREST LAKES
OVERALL SITE EXHIBIT

DESIGNED BY		SCALE		DATE	09/05/18
DRAWN BY	MES	(H) 1"= 100'		SHEET	1 OF 1
CHECKED BY		(V) 1"= N/A		JOB NO.	1175.21

USACOE
LETTER

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, ALBUQUERQUE DISTRICT
201 WEST 8TH STREET, SUITE 350
PUEBLO, COLORADO 81003

November 24, 2020

Regulatory Division

SUBJECT: No Permit Required – Action No. SPA-2020-00242-RDS, Forest Lakes Mesa Top Drive Bridge Project, in Monument, El Paso County, Colorado

James Boulton
Classic Communities
2138 Flying Horse Club Drive
Colorado Springs, CO. 80921

Mr. Boulton:

This letter responds to your September 10, letter request for a No Permit Required determination of Department of the Army permit requirements for the proposed Forest Lakes Mesa Top Drive Bridge Project located at approximately latitude 39.0614, longitude -104.9044, in Monument, El Paso County, Colorado.

The work, as described in your application will consist of construction of a planned and designed bridge minimizing and avoiding discharge of fill into waters of the U.S. including wetlands in North Beaver Creek.

We have assigned Action No. SPA-2020-00242-RDS to this project. Please reference this number in all future correspondence concerning the project.

Based on the on my site visit and information provided, we have determined that a Department of the Army permit is not required since the project as planned and designed would not result in the discharge of dredged/fill material into waters of the United States. However, please be advised that there are potential waters of the U.S. located in close proximity of the project site and it is incumbent upon you to remain informed of any changes in the U.S. Army Corps of Engineers (Corps) Regulatory Program regulations and policy as they relate to your project. If your plans change such that waters of the U.S. could be impacted by the proposed project, please contact our office for a reevaluation of permit requirements.

This decision is based on a preliminary jurisdictional determination (JD) that there may be waters of the United States on the project site. Preliminary JDs are advisory in nature and may not be appealed. An approved JD is an official Corps determination that "waters of the U.S." and/or "navigable waters of the U.S." are either present or absent on a particular site. An approved JD precisely identifies the limits of those waters on the project site determined to be jurisdictional under the CWA or RHA. If you

wish, you may request that the Corps reevaluate this case and issue an approved JD. If you request an approved JD, you may not begin work until the approved JD, which may require coordination with the Environmental Protection Agency, is completed. Please contact me if you wish to request an approved JD for this case.

If you have any questions concerning our regulatory program, please contact me at (719) 600-8641 or by e-mail at Joseph.A.Martinez@usace.army.mil.

At your convenience, please complete a Customer Service Survey on-line available at http://corpsmapu.usace.army.mil/cm_apex/f?p=136:4:0.

Sincerely,

Tony Martinez, R.E.M.
Regulatory Program Manager
Southern Colorado Regulatory Branch

FEMA LOMR

CLASSIC℠
CONSULTING
ENGINEERS & SURVEYORS

Federal Emergency Management Agency

Washington, D.C. 20472

MAR 0 1 2004

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Chuck Brown
Chairman, El Paso County
Board of Commissioners
27 East Vermijo Avenue
Colorado Springs, CO 80903-2208

IN REPLY REFER TO:
Case No.: 03-08-0449P
Community Name: El Paso County, CO
Community No.: 080059
Effective Date of This Revision: JUN 2 3 2004

Dear Mr. Brown:

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

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

Sincerely,

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

For: Doug Bellomo, P.E., CFM, Acting Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

List of Enclosures:
- Letter of Map Revision Determination Document
- Annotated Flood Insurance Rate Map
- Annotated Flood Insurance Study Report

cc: Mr. Kevin Stilson, P.E., CFM
Regional Floodplain Administrator
Pikes Peak Regional Building Department

[redacted] P.E.
Principal
Kiowa Engineering Corporation

 | Issue Date: MAR 01 2004 | Effective Date: JUN 23 2004 | Case No.: 03-08-0449P | 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	El Paso County Colorado (Unincorporated Areas) COMMUNITY NO.: 080059	NO PROJECT	BASE MAP CHANGES HYDROLOGIC ANALYSIS HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
IDENTIFIER	Beaver Creek Letter of Map Revision	APPROXIMATE LATITUDE & LONGITUDE: 39.057, -104.875 SOURCE: USGS QUADRANGLE DATUM: NAD 83	
FLOODING SOURCE(S) & REVISED REACH(ES)	Beaver Creek – from the confluence with Monument Creek to approximately 12,000 feet upstream of Bristlecone Lake Dam North Beaver Creek – from the confluence with Beaver Creek to approximately 3,400 feet upstream Pinon Lake Tributary – from the confluence with Beaver Creek to approximately 850 feet upstream of Long Valley Drive		

SUMMARY OF REVISIONS

Effective Flooding:	Zone A	No BFEs*
Revised Flooding:	Zone AE	BFEs
Increases:	YES	YES
Decreases:	YES	NONE

* BFEs – Base Flood Elevations

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 08041C0260 F Date: March 17, 1997 TYPE: FIRM NO.: 08041C0270 F Date: March 17, 1997 TYPE: FIRM NO.: 08041C0286 F Date: March 17, 1997	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: August 23, 1999 PROFILES: 351P through 358P SUMMARY OF DISCHARGES TABLE

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

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 1-877-336-2677 (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.

Doug Bellomo, P.E., CFM, Acting Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate

100803 01.DA03080449 102-IAC

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.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist 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 1-877-336-2677 (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.

Doug Bellomo, P.E., CFM, Acting Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate

100803 01.DA03080449 102-IAC

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (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:

Mr. Steve L. Olsen
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 panels 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 1-877-336-2677 (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.

Doug Bellomo, P.E., CFM, Acting Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

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.

This information will be published in the *Federal Register* and your local newspaper as detailed below.

LOCAL NEWSPAPER Name: *El Paso County News*
Dates: 03/17/2004 03/24/2004

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NGVD)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Beaver Creek	Approximately 120 feet upstream of confluence with Monument Creek	None	6,736	08041C0286 F
	Approximately 12,000 feet upstream of Bristlecone Lake Dam	None	7,116	08041C0270 F
North Beaver Creek	Approximately 40 feet upstream of confluence with Beaver Creek	None	7,004	08041C0270 F
	Approximately 3,400 feet upstream of confluence with Beaver Creek	None	7,198	08041C0260 F
Pinon Lake Tributary	Approximately 100 feet upstream of confluence with Beaver Creek	None	6,818	08041C0286 F
	Approximately 850 feet upstream of Long Valley Drive	None	6,890	08041C0286 F

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 1-877-336-2677 (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.

Doug Bellomo, P.E., CFM, Acting Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate

100803 01.DA03080449 102-IAC

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

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

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

A hydraulic analysis was performed to incorporate new hydrologic, hydraulic, and topographic data along Beaver Creek from the confluence with Monument Creek to approximately 12,000 feet upstream of Bristlecone Lake Dam; along North Beaver Creek from the confluence with Beaver Creek to approximately 3,400 feet upstream; and along Pinon Lake Tributary from the confluence with Beaver Creek to approximately 850 feet upstream of Long Valley Drive. This has resulted in increases and decreases in SFHA width and establishment of BFEs for Beaver Creek, North Beaver Creek, and Pinon Lake Tributary. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Beaver Creek:		
Approximately 120 feet upstream of confluence with Monument Creek	None	6,736
Approximately 12,000 feet upstream of Bristlecone Lake Dam	None	7,116
North Beaver Creek:		
Approximately 40 feet upstream of confluence with Beaver Creek	None	7,004
Approximately 3,400 feet upstream of confluence with Beaver Creek	None	7,198
Pinon Lake Tributary:		
Approximately 100 feet upstream of confluence with Beaver Creek	None	6,818
Approximately 850 feet upstream of Long Valley Drive	None	6,890

*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Division must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These

modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

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

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

The Honorable Chuck Brown
Chairman, El Paso County
Board of Commissioners
27 East Vermijo Avenue
Colorado Springs, CO 80903-2208

APPROXIMATE SCALE IN FEET

1,000 500 0 1,000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 260 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0260	F
MONUMENT, TOWN OF	080064	0260	F
PALMER LAKE, TOWN OF	080065	0260	F

REVISED TO LOMR

MAP NUMBER
08041C0260 F

JUN 23 2004

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

Table3. Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharges (cubic feet per second) 10-Year	50-Year	100-Year	500-Year
Beaver Creek					
At Inlet to Bristlecone Lake	22.0	__[1]	__[1]	8,624	__[1]
At Confluence With Monument Creek	26.8	__[1]	__[1]	6,992	__[1]
North Beaver Creek					
At Confluence With Beaver Creek	3.5	__[1]	__[1]	1,932	__[1]
Pinon Lake Tributary					
At Confluence With Beaver Creek	0.41	__[1]	__[1]	140	__[1]

1Data Not Available

TO
LOMR
JUN 23 2004

351P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO

(UNINCORPORATED AREAS)

FLOOD PROFILES

BEAVER CREEK

REVISED TO REFLECT LOMR DATED JUN 23 2004

352P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO

(UNINCORPORATED AREAS)

FLOOD PROFILES

BEAVER CREEK

REVISED TO REFLECT LOMR DATED JUN 23 2004

353P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO

(UNINCORPORATED AREAS)

FLOOD PROFILES

BEAVER CREEK

REVISED TO REFLECT LOMR DATED JUN 23 2004

354P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO

(UNINCORPORATED AREAS)

FLOOD PROFILES

BEAVER CREEK

REVISED TO REFLECT LOMR DATED JUN 23 2004

355P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO

(UNINCORPORATED AREAS)

FLOOD PROFILES

PINON LAKE TRIBUTARY

REVISED TO REFLECT LOMR DATED JUN 23 2004

FLOOD PROFILES

PINON LAKE TRIBUTARY

REVISED TO REFLECT LOMR DATED JUN 23 2004

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
(UNINCORPORATED AREAS)

357P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO

(UNINCORPORATED AREAS)

FLOOD PROFILES

NORTH BEAVER CREEK

REVISED TO REFLECT LOMR

EFFECTIVE JUN 2 2 2004

358P

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO

(UNINCORPORATED AREAS)

FLOOD PROFILES

NORTH BEAVER CREEK

REVISED TO REFLECT LOMR DATED JUN 2 0 2001

JOINS PANEL 0260
ZONE AE
North Beaver Creek
ZONE X
29
ZONE AE
Beaver Creek
LIMIT OF DETAILED STUDY
ZONE X
28
LINDBERGH
ROAD
ZONE AE
27 (EL 6891)
ZONE AE
BRISTLECONE LAKE DAM
REVISED AREA
EL PASO COUNTY
UNINCORPORATED AREAS
080059
JOINS PANEL 0280
30
32
33
34
HAY CREEK ROAD
ZONE A
ZONE X
ZONE A
5
4
3
APPROXIMATE SCALE IN FEET
1,000 500 0 1,000
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS
PANEL 270 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
EL PASO COUNTY, UNINCORPORATED AREAS 080059 0270 F
REVISED TO REFLECT LOMR DATED JUN 23 2004
MAP NUMBER
08041C0270 F
EFFECTIVE DATE:
MARCH 17, 1997
Federal Emergency Management Agency

EL PASO COUNTY
UNINCORPORATED AREAS
080059
LIMIT OF DETAILED STUDY
JOINS PANEL 0278
Pinon Lake Tributary
Teachout Creek
ZONE A
ZONE X
PRIVATE ROAD
LONG VALLEY DRIVE
27
ZONE AE
Beaver Creek
PINON LAKE DAM
Monuments Creek
ASSEMBLY ROAD
REVISED AREA
DELACROCE RANCH ROAD
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
Monument Creek
WOODCARVER ROAD
HAY CREEK ROAD
34
JOINS PANEL 0279
APPROXIMATE SCALE IN FEET
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS
PANEL 286 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY
NUMBER
PANEL
SUFFIX
EL PASO COUNTY, UNINCORPORATED AREAS
080059
0286
F
MONUMENT, TOWN OF
080064
0255
F
REVISED TO REFLECT LOMR DATED JUN 23 2004
MAP NUMBER
08041C0286 F
EFFECTIVE DATE:
MARCH 17, 1997
Federal Emergency Management Agency

DRAINAGE MAP

BASIN RUNOFF		
BASIN	Q5 (CFS)	Q100 (CFS)
A	9.8	23.8
B1	4.2	14.9
B2	3.9	11.3
C	6.2	19.9
D	3.9	11.7
E	2.9	13.9
F1	4.1	8.3
F2	2.3	4.7
G	4.7	9.6
H1	3.0	6.2

BASIN	Q5 (CFS)	Q100 (CFS)
H2	5.2	10.9
J	6.4	27.6
K	4.1	8.1
L1	2.5	10.9
L2	5.9	15.6
M	7.3	15.9
N	5.1	17.3
P	3.7	7.1
Q	2.3	4.7
R	1.5	2.8
S	1.7	3.4

BASIN	Q5 (CFS)	Q100 (CFS)
T	4.1	9.3
U	1.3	3.6
W	3.2	13.4
X	5.6	37.7
Y	3.6	20.4
Z1	1.5	5.1
Z2	1.5	5.2

DESIGN POINT SUMMARY			
DESIGN POINT	Q5 (CFS)	Q100 (CFS)	FEATURE
9A	6.4	27.6	15' TYPE R AT-GRADE
9B	2.4	21.6	15' TYPE R AT-GRADE
10	4.1	8.1	15' TYPE R AT-GRADE
11	7.3	16.1	15' TYPE R AT-GRADE
12	5.7	21.9	15' TYPE R AT-GRADE
13	5.1	17.3	15' TYPE R AT-GRADE
14	3.7	7.1	10' TYPE R SUMP
15	2.1	18.5	15' TYPE R SUMP
16	1.5	2.8	5' TYPE R SUMP
17	1.7	3.4	5' TYPE R SUMP
18	66.4	183.5	FSD/SWQ POND "B"
EX-3	18.0	111.2	FROM SITE TO N. BEAVER CREEK

PIPE RUN SUMMARY			
PIPE	Q5 (CFS)	Q100 (CFS)	PIPE SIZE
15	6.4	16.4	24"
16	4.1	7.9	18"
17	10.3	23.8	24"
18	2.4	14.7	24"
19	12.5	38.1	30"
20	7.3	12.5	24"
21	5.7	14.7	24"
22	24.9	63.9	42"
23	5.1	13.0	18"
24	29.7	76.2	42"
25	3.7	7.1	18"

PIPE	Q5 (CFS)	Q100 (CFS)	PIPE SIZE
26	2.1	18.5	24"
27	34.1	98.7	48"
28	1.5	2.8	18"
29	1.7	3.4	18"
30	36.2	102.2	48"
31	0.9	60.0	30"

N

50 25 0 50 100

SCALE: 1" = 50'

CLASSIC CONSULTING

819 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

FOREST LAKES FILING NO. 6

DEVELOPED CONDITIONS DRAINAGE MAP

DESIGNED BY	MAL	SCALE	DATE	10/05/20
DRAWN BY	MAL	(H) 1" = 50'	SHEET	2 OF 4
CHECKED BY		(V) 1" = N/A	JOB NO.	1175.60

BRIDGE HYDRAULIC SECTIONS

CHANNEL DESCRIPTION

BOTTOM MATERIAL – COHESIVE ☐ NON COHESIVE ☒
BOTTOM MATERIAL SIZE – CLAY ☐ SILT ☒ SAND ☒ GRAVEL ☐ COBBLES ☐ OTHER _____

STREAM FORM – STRAIGHT ☒ MEANDERING ☐ BRAIDED ☐
MANNINGS "n" FOR DESIGN – CHANNEL 0.04 OVERBANK 0.10
DEBRIS – BRUSH ☒ TREES/LOGS ☐ ICE ☐ OTHER _____

COMPARISON OF HYDRAULICS

FOR DESIGN DISCHARGE (100 YR Q= 3,123 CFS)

	VELOCITY	FREEBOARD	BRIDGE LOSS
NATURAL CHANNEL	8.8 ft/s	N/A	N/A
PROPOSED CHANNEL	5.7 ft/s	4.58 ft*	1.66 ft

*MEASURED AT 25' UPSTREAM OF BRIDGE FACE
MINIMUM FREEBOARD REQUIRED FOR LOW-DEBRIS STREAM = 2.26'

NOTE: PROFILES ARE DRAWN LOOKING DOWNSTREAM.
PLAN VIEW SHOWN TRUE NORTH.
CHANNEL FLOWS TO THE SOUTH.

MESA TOP DRIVE BRIDGE (NORTH BRIDGE HCL)
(LOOKING DOWNSTREAM)

MESA TOP DRIVE BRIDGE (SOUTH BRIDGE HCL)
(LOOKING DOWNSTREAM)

48 HOURS BEFORE YOU DIG,
CALL UTILITY LOCATORS
811
UTILITY NOTIFICATION CENTER OF COLORADO
IT'S THE LAW

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO.	REVISION	DATE

REVIEW:

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

KYLE R. CAMPBELL, COLORADO P.E. #29794 DATE

CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799(Fax)

FOREST LAKES FILING NO. 6
BRIDGE HYDRAULIC INFORMATION
MESA TOP DRIVE OVER NORTH BEAVER CREEK

DESIGNED BY	MAL	SCALE	DATE 12/22/20
DRAWN BY	MES	(H) 1"= 50'	SHEET 1 OF 1
CHECKED BY		(V) 1"= 5'	JOB NO. 1175.60

N:\1175ROT\DRAWINGS\CONSTRUCTION\BRIDGE\BRIDGE HYDRAULIC SECTIONS.dwg, 7/12/2021 9:40:56 AM, 1:1

CHANNEL SECTIONS
EXISTING CONDITIONS

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

N
50 25 0 50 100
SCALE: 1" = 50' HORIZ.
100YR FLOODPLAIN
EXISTING O.H.W.M.
EXISTING WETLANDS
900
800
700
500
400
3+00
4+00
24+00
0+00
1+00
(7070)
(7068)
(7066)
(7062)
(7060)
(7056)
(7052)
(7050)
(7046)
(7040)
((7052))
FOREST LAKES FILING 6
MESA TOP DRIVE SOUTH
CHANNEL SECTIONS EXHIBIT
JOB NO. 1175.60
CLASSIC CONSULTING
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)
EXISTING CONDITIONS

CHANNEL SECTIONS
PROPOSED CONDITIONS

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

N
50 25 0 50 100
SCALE: 1" = 50' HORIZ.
100YR FLOODPLAIN
EXISTING O.H.W.M.
MESA TOP DRIVE
BRIDGE
BRIDGE
EXISTING WETLANDS
100YR FLOODPLAIN
100YR FLOODPLAIN
100YR FLOODPLAIN
900
800
700
500
400
3+00
4+00
2+00
1+00
0+00
(7070)
(7068)
(7066)
(7064)
(7062)
(7060)
(7056)
(7054)
(7052)
(7050)
(7046)
(7040)
7072
7070
7068
7066
7064
7062
7060
7054
FOREST LAKES FILING 6
MESA TOP DRIVE SOUTH
CHANNEL SECTIONS EXHIBIT
JOB NO. 1175.60
CLASSIC CONSULTING
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Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

BRIDGE HYDRAULICS

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

UPSTREAM CONTRACTION MODELING

Your computer is being controlled by Matt Larson

Daniel Bagwell

EC-RAS 5.0.7

Edit Run View Options GIS Tools Help

Geometric Data - DEV-02

Edit Contraction/Expansion Coefficients (Steady Flow)

River: N. BEAVER

Reach: REACH 1

Edit Interpolated XS's

Selected Area Edit Options

Add Constant ... | Multiply Factor ... | Set Values ... | Replace ...

	River Station	Contraction	Expansion
1	1000	0.1	0.3
2	900	0.1	0.3
3	800	0.1	0.3
4	700	0.3	0.3
5	600	Bridge	
6	500	0.1	0.3
7	400	0.1	0.3
8	300	0.1	0.3

OK | Cancel | Help

0.2272, 1.0000

EXISTING CONDITIONS

HEC-RAS Plan: Plan 02 River: N. BEAVER Reach: REACH 1 Profile: PF 2

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
REACH 1	1000	PF 2	3123.00	7072.94	7078.15	7078.15	7079.09	0.018181	9.42	606.02	330.42	1.03
REACH 1	900	PF 2	3123.00	7063.38	7068.11	7068.11	7069.32	0.019043	10.03	478.75	211.67	1.06
REACH 1	800	PF 2	3123.00	7057.88	7061.70	7061.70	7062.70	0.018729	8.01	389.71	195.87	1.00
REACH 1	700	PF 2	3123.00	7052.36	7056.80	7056.80	7058.01	0.017609	8.83	353.79	146.36	1.00
REACH 1	500	PF 2	3123.00	7050.00	7053.70	7053.70	7054.89	0.017888	8.74	357.20	151.72	1.00
REACH 1	400	PF 2	3123.00	7039.05	7046.30	7046.30	7047.64	0.014699	9.37	367.74	162.77	0.95
REACH 1	300	PF 2	3123.00	7033.90	7040.16	7040.16	7041.70	0.016623	9.97	313.40	107.97	1.01

SECTION 1000

EXISTING CONDITIONS

SECTION 900

UNDEVELOPED Plan: Plan 02 6/9/2021
.1
.04
.1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7074
7072
7070
7068
7066
7064
7062
0
50
100
150
200
250
300
350
400
Station (ft)

SECTION 800

UNDEVELOPED Plan: Plan 02 6/9/2021
.04
.1
1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7070
7068
7066
7064
7062
7060
7058
7056
0
50
100
150
200
250
300
350
Station (ft)

SECTION 700

UNDEVELOPED Plan: Plan 02 6/9/2021
.1
.04
.1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7070
7068
7066
7064
7062
7060
7058
7056
7054
7052
0
50
100
150
200
250
300
350
400
Station (ft)

SECTION 500

UNDEVELOPED Plan: Plan 02 6/9/2021
.04
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7066
7064
7062
7060
7058
7056
7054
7052
7050
0
50
100
150
200
250
300
350
Station (ft)

SECTION 400

UNDEVELOPED Plan: Plan 02 6/9/2021
.1
.04
.1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7052
7050
7048
7046
7044
7042
7040
7038
0
50
100
150
200
250
300
350
400
Station (ft)

SECTION 300

UNDEVELOPED Plan: Plan 02 6/9/2021
.1
.04
.1
Legend
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
7050
7048
7046
7044
7042
7040
7038
7036
7034
7032
0
50
100
150
200
250
300
Station (ft)

DEVELOPED CONDITIONS

HEC-RAS Plan: Plan 03 River: N. BEAVER Reach: REACH 1 Profile: PF 2

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
REACH 1	1000	PF 2	3123.00	7072.94	7078.16	7078.16	7079.08	0.017967	9.38	608.92	331.58	1.02
REACH 1	900	PF 2	3123.00	7063.38	7068.11	7068.11	7069.32	0.019043	10.03	478.75	211.67	1.06
REACH 1	800	PF 2	3123.00	7057.88	7061.70	7061.70	7062.70	0.018755	8.02	389.51	195.83	1.00
REACH 1	700	PF 2	3123.00	7052.36	7058.46	7056.92	7058.96	0.004331	5.67	550.60	153.33	0.53
REACH 1	600		Bridge									
REACH 1	500	PF 2	3123.00	7050.00	7053.70	7053.70	7054.89	0.017888	8.74	357.20	151.72	1.00
REACH 1	400	PF 2	3123.00	7039.05	7046.31	7046.31	7047.64	0.014672	9.36	368.06	162.82	0.95
REACH 1	300	PF 2	3123.00	7033.90	7040.16	7040.16	7041.70	0.016528	9.95	314.03	108.32	1.01

SECTION 1000

DEVELOPED CONDITIONS

SECTION 900

DEV-02 Plan: Plan 03 6/30/2021
.1
.04
.1
Legend
EG PF 2
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
7074
7072
7070
7068
7066
7064
7062
0
50
100
150
200
250
300
350
400
Station (ft)

SECTION 800

DEV-02 Plan: Plan 03 6/30/2021
.04
.1
1
Legend
EG PF 2
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
7070
7068
7066
7064
7062
7060
7058
7056
0
50
100
150
200
250
300
350
Station (ft)

SECTION 700

DEV-02 Plan: Plan 03 6/30/2021
.1
.04
.1
Legend
EG PF 2
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
7070
7068
7066
7064
7062
7060
7058
7056
7054
7052
0
50
100
150
200
250
300
350
400
Station (ft)

SECTION 600 BR UP

SECTION 600 BR DOWN

SECTION 500

DEV-02 Plan: Plan 03 6/30/2021
.1
.04
.1
Legend
EG PF 2
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
7070
7065
7060
7055
7050
0
50
100
150
200
250
300
350
Station (ft)

SECTION 400

DEV-02 Plan: Plan 03 6/30/2021
.1
.04
.1
Legend
EG PF 2
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
7052
7050
7048
7046
7044
7042
7040
7038
0
50
100
150
200
250
300
350
400
Station (ft)

SECTION 300

DEV-02 Plan: Plan 03 6/30/2021
.1
.04
.1
Legend
EG PF 2
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
7050
7048
7046
7044
7042
7040
7038
7036
7034
7032
0
50
100
150
200
250
300
Station (ft)

SCOUR ANALYSIS

Pier Scour

All piers have the same scour depth

Input Data

Pier Shape:	Round nose
Pier Width (ft):	3.00
Grain Size D50 (mm):	0.60000
Depth Upstream (ft):	5.70
Velocity Upstream (ft/s):	7.01
K1 Nose Shape:	1.00
Pier Angle:	0.00
Pier Length (ft):	3.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	5.00000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	6.22
Froude #:	0.52
Equation:	CSU equation

Bridge Scour RS = 600
Legend
WS PF 2
Ground
Bank Sta
Total Scour
Elevation (ft)
Station (ft)
7070
7065
7060
7055
7050
7045
0
50
100
150
200
250
300
350
400

RIP-RAP SIZING

8.1 Riprap Sizing

Procedures for sizing rock to be used in soil riprap, void-filled riprap, and riprap over bedding are the same.

8.1.1 Mild Slope Conditions

When subcritical flow conditions occur and/or slopes are mild (less than 2 percent), UDFCD recommends the following equation (Hughes, et al, 1983):

$$d_{50} \geq \left[\frac{VS^{0.17}}{4.5(G_s - 1)^{0.66}} \right]^2 \qquad \text{Equation 8-11}$$

Where:

V = mean channel velocity (ft/sec)

S = longitudinal channel slope (ft/ft)

d_{50} = mean rock size (ft)

Gs = specific gravity of stone (minimum = 2.50, typically 2.5 to 2.7), Note: In this equation (Gs -1) considers the buoyancy of the water, in that the specific gravity of water is subtracted from the specific gravity of the rock.

Note that Equation 8-11 is applicable for sizing riprap for channel lining with a longitudinal slope of no more than 2%. This equation is not intended for use in sizing riprap for steep slopes (typically in excess of 2 percent), rundowns, or protection downstream of culverts. Information on rundowns is provided in Section 7.0 of the *Hydraulic Structures* chapter of the USDCM, and protection downstream of culverts is discussed in the *Culverts and Bridges* chapter. For channel slopes greater than 2% use one of the methods presented in 8.1.2.

Rock size does not need to be increased for steeper channel side slopes, provided the side slopes are no steeper than 2.5H:1V (UDFCD 1982). Channel side slopes steeper than 2.5H:1V are not recommended because of stability, safety, and maintenance considerations. See Figure 8-34 for riprap placement specifications. At the upstream and downstream termination of a riprap lining, the thickness should be increased 50% for at least 3 feet to prevent undercutting.

8.1.2 Steep Slope Conditions

Steep slope rock sizing equations are used for applications where the slope is greater than 2 percent and/or flows are in the supercritical flow regime. The following rock sizing equations may be referred to for riprap design analysis on steep slopes:

- CSU Equation, *Development of Riprap Design Criteria by Riprap Testing in Flumes: Phase II* (prepared by S.R. Abt, et al, Colorado State University, 1988). This method was developed for steep slopes from 2 to 20 percent.

- USDA- Agricultural Research Service Equations, *Design of Rock Chutes* (by K.M. Robinson, et al, USDA- ARS, 1998 Transactions of ASAE) and *An Excel Program to Design Rock Chutes for Grade*

$V = 7.21$ fps (mean) 10.0 fps (max)

$S = 1.95\% = .0195$ ft/ft

d_{50} = Mean rock size (ft)

$G_5 = 2.5$

$$d_{50} \geq (VS^{0.17} / 4.5 (G_5 - 1)^{0.66})^2$$

$d_{50} \geq$ 9” to 12”

Use 24” Rip Rap

BRIDGE PLANS

CLASSIC
CONSULTING
ENGINEERS & SURVEYORS

GENERAL NOTES

ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE COLORADO DEPARTMENT OF TRANSPORTATION 2019 STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION.

STRUCTURE EXCAVATION SHALL BE AS SHOWN ON M-206-2. STRUCTURE BACKFILL SHALL BE AS SHOWN ON THE PLANS.

EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPECIFICATION M213.

ALL EXPOSED CONCRETE SURFACES SHALL RECEIVE A CLASS 1 FINAL FINISH TO ONE FOOT BELOW THE GROUND LINE.

THE FOLLOWING STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 36 (ASTM A-36): EXPANSION DEVICES, REMOVABLE COVER PLATES, PIPE RAILING BASE PLATES.

THE FOLLOWING STRUCTURAL STEEL SHALL BE AASHTO M270 GRADE 50 (ASTM A-572): PILING.

ALL STRUCTURAL CONCRETE SHALL CONFORM TO CEMENTITIOUS MATERIALS REQUIREMENTS CORRESPONDING TO SULFATE EXPOSURE CLASS 0.

FIELD WELDING OF ANY KIND SHALL NOT BE PERMITTED ON THE STEEL GIRDERS UNLESS SPECIFICALLY CALLED FOR IN THE PLANS.

GRADE 60 REINFORCING STEEL IS REQUIRED

ALL REINFORCING STEEL SHALL BE EPOXY COATED UNLESS OTHERWISE NOTED

(N) DENOTES NON COATED REINFORCING STEEL

ALL THE PROVISIONS FOR BRIDGE DECK CONCRETE SHALL ALSO APPLY TO APPROACH SLAB CONCRETE

CLEARANCE FROM THE SURFACE OF CONCRETE TO THE FACE OF REINFORCEMENT SHALL BE 2 INCHES UNLESS NOTED OTHERWISE.

SPLICE LOCATIONS ARE BASED ON AN ASSUMED 60' STOCK LENGTH. SPLICES SHALL BE ALTERNATELY STAGGERED UNLESS NOTED OTHERWISE.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE DURING CONSTRUCTION

STATIONS, ELEVATIONS, AND DIMENSIONS CONTAINED IN THESE PLANS ARE BASED ON THE "FOREST LAKES FILING NO. 6 PUBLIC STREET IMPROVEMENT PLAN" BY CLASSIC CONSULTING. THE CONTRACTOR SHALL VERIFY ALL DEPENDENT DIMENSIONS IN THE FIELD PRIOR TO ORDERING OR FABRICATING ANY MATERIAL.

THE ENGINEER SHALL BE NOTIFIED IN WRITING OF ANY DISCREPANCIES BETWEEN THE PLANS AND ACTUAL FIELD CONDITIONS.

ALL LONGITUDINAL AND TRANSVERSE DIMENSIONS ARE MEASURED HORIZONTALLY AND INCLUDE NO CORRECTION FOR GRADE

THE INFORMATION SHOWN IN THESE PLANS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING HIS OWN DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES AS MAY BE NECESSARY TO AVOID DAMAGE THERETO. THE CONTRACTOR SHALL CONTACT THE UTILITY NOTIFICATION CENTER OF COLORADO AT 811 (1-800-922-1987) AT LEAST 3 DAYS (2 DAYS NOT INCLUDING THE DAY OF NOTIFICATION) PRIOR TO ANY EXCAVATION OR OTHER EARTHWORK.

THE SUPERSTRUCTURE DESIGN WAS PERFORMED BY CONTECH ENGINEERED SOLUTIONS LLC. THE INFORMATION PERTAINING TO THE SUPERSTRUCTURE IS CONTAINED IN CONTRACT DRAWINGS DATED 12/15/2020 (JOB NO. 621715).

THE SOILS AND FOUNDATION INVESTIGATION FOR THIS PROJECT WAS PERFORMED BY ENTECH ENGINEERING, INC. THE SUBSURFACE CONDITIONS AND RECOMMENDATIONS FOR THE STRUCTURE PROJECT ARE CONTAINED IN A REPORT DATED 09/04/2020 (JOB NO. 200150).

THE END 6' OF THE GIRDER AT EACH ABUTMENT AND PIER SHALL BE PAINTED, EQUIVALENT TO FEDERAL STANDARD 595B COLOR NO. 30045 (WEATHERED STEEL COLOR).

DESIGN DATA

AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, EIGHTH EDITION WITH CURRENT INTERIMS.
DESIGN METHOD: LOAD AND RESISTANCE FACTOR DESIGN (LRFD).

LIVE LOAD: HL-93 (DESIGN TRUCK OR TANDEM, AND DESIGN LANE LOAD)
DEAD LOAD: ASSUMES 36 LBS. PER SQ. FT. FOR BRIDGE DECK OVERLAY
EARTH LOAD: γ = 135 PCF.

STRUCTURAL BACKFILL CLASS 1:
AT-REST WINGWALL: EFW = 57 pcf
ACTIVE ABUTMENT: EFW = 45 pcf

REINFORCED CONCRETE:
CLASS D CONCRETE: f'c = 4,500 psi
REINFORCING STEEL: fy = 60,000 psi

CAISSON CONCRETE:
CLASS BZ CONCRETE: f'c = 4,000 psi
REINFORCING STEEL: fs = 60,000 psi

STRUCTURAL STEEL, AASHTO M270 (ASTM A-572):
GRADE 50 fy = 50,000 psi

SEISMIC DESIGN CRITERIA

SEISMIC ZONE = 1
NO SEISMIC DESIGN IS REQUIRED

PEAK GROUND ACCELERATION PGA = 0.058 g
SHORT-PERIOD SPECTRAL ACCELERATION Ss = 0.185 g (PER GEOTECH REPORT)
LONG-PERIOD SPECTRAL ACCELERATION S1 =0.059 g (PER GEOTECH REPORT)
SITE CLASS D
SITE FACTOR Fpga = 1.6
SITE FACTOR Fa = 1.6
SITE FACTOR Fv = 2.4
PEAK DESIGN SPECTRAL ACCELERATION As = 0.0928 g
SHORT-PERIOD DESIGN SPECTRAL ACCELERATION Sds = 0.296 g
LONG-PERIOD DESIGN SPECTRAL ACCELERATION Sd1 = 0.142 g
To = 0.096 sec
Ts = 0.478 sec

BRIDGE DESCRIPTION

2 SPAN (99'-7⅛", 99'-7⅛") TWIN BRIDGES
PREFABRICATED CONTECH BRIDGES WITH STEEL WIDE FLANGE GIRDERS
MESA TOP DRIVE SOUTH OVER NORTH BEAVER CREEK
24'-0" ROADWAY CURB TO CURB
45°00'00" SKEW
5'-6" SIDEWALK, THRIE BEAM RAIL WITH SAFETY RAIL ABOVE SIDEWALK
6" CURB, THRIE BEAM

HYDRAULIC DATA

100YR WSE = 7058.49 AT NORTH BRIDGE HCL
100YR SCOUR AT PIER = 7047.76
NO 100YR SCOUR AT ABUTMENTS
100YR VELOCITY = 6.30 FT/S

PROFILE GRADE

INDEX OF SHEETS:

B01	GENERAL INFORMATION
B02	SUMMARY OF QUANTITIES
B03	GENERAL LAYOUT
B04	TYPICAL SECTION
B05	ENGINEERING GEOLOGY
B06	BRIDGE HYDRAULIC INFORMATION
B07	CONSTRUCTION LAYOUT
B08	FOUNDATION LAYOUT
B09	CAISSON DETAILS
B10	ABUTMENT 1 PLAN AND ELEVATION
B11	ABUTMENT 3 PLAN AND ELEVATION
B12	ABUTMENT DETAILS
B13	WINGWALL DETAILS
B14	PIER 2 PLAN AND ELEVATION
B15	PIER DETAILS
B16	BRIDGE EXPANSION DEVICE (1 OF 2)
B17	BRIDGE EXPANSION DEVICE (2 OF 2)
B18	PIPE RAILING
B19	APPROACH SLAB
B20	BACKFILL DETAILS (1 OF 2)
B21	BACKFILL DETAILS (2 OF 2)

GENERAL KEY:

811
FOR BURIED UTILITY INFORMATION
THREE (3) BUSINESS DAYS
BEFORE YOU DIG
CALL 811
(or 1-800-922-1987)
UTILITY NOTIFICATION
CENTER OF COLORADO (UNCC)
www.uncc.org

ISSUED FOR CONSTRUCTION

COLORADO REGISTERED PROFESSIONAL ENGINEER
HEATHER MARIE RAE
49431
05-21-21

	REVISIONS	DATE	BY
1	REVISED BEARING PAD DEPTH	5-19-21	HMR
2			
3			
4			
5			
6			
7			

PREPARED FOR: STRUCTURES / CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES
PROJECT LOCATION: MONUMENT, CO
GENERAL INFORMATION
STRUCT/JOB:
SHEET NO.

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SUMMARY OF QUANTITIES (TWO BRIDGES, EASTBOUND AND WESTBOUND BRIDGES)

	ITEM NO.	DESCRIPTION	UNIT	SUPERSTRUCTURE	ABUTMENT 1	PIER 2	ABUTMENT 3	TOTAL
	206	STRUCTURE EXCAVATION	CY	-	545	45	65	655
	206	STRUCTURE BACKFILL (CLASS 1)	CY	-	1,595	25	1,275	2,895
	206	MECHANICAL REINFORCEMENT OF SOIL	CY	-	1,595	-	1,275	2,870
	502	STEEL PILING (HP 12x53)	LF	-	827	-	958	1,785
	503	DRILLED CAISSON (42 INCH)	LF	-	-	182	-	182
1	506	RIPRAP	CY	-	146	-	219	365
	514	PIPE RAILING	LF	108	-	-	-	108
	518	BRIDGE COMPRESSION SEAL	LF	85	-	-	-	85
	518	BRIDGE EXPANSION DEVICE (0-4 INCH)	LF	170	-	-	-	170
2	601	CONCRETE CLASS D (BRIDGE)	CY	503	210	68	182	963
3	602	REINFORCING STEEL (EPOXY)	LB	70,195	23,035	16,885	20,260	130,375
	628	BRIDGE GIRDER AND DECK UNIT (BY OTHERS)	EACH	1	-	-	-	1

1. RIPRAP QUANTITY PROVIDED FOR INFORMATION ONLY. REFER TO CIVIL PLANS AND BRIDGE HYDRAULIC INFORMATION SHEET FOR RIPRAP LIMITS. QUANTITY ASSUMES 3' DEEP RIPRAP.
2. INCLUDES 377 CY OF CONCRETE WITHIN THE DECK, CURB AND SIDEWALK WHICH IS TO BE INCLUDED IN THE CONTECH PLANS. THE VALUE IS INCLUDED FOR OVERALL QUANTITY CALCULATIONS INFORMATION ONLY.
3. INCLUDES 52,250 LB OF REINFORCING STEEL WITHIN THE DECK, CURB AND SIDEWALK WHICH IS TO BE INCLUDED IN THE CONTECH PLANS. THE VALUE IS INCLUDED FOR OVERALL QUANTITY CALCULATIONS INFORMATION ONLY.

ISSUED FOR CONSTRUCTION

COLORADO REGISTERED PROFESSIONAL ENGINEER
HEATHER MARIE RAST
49431
05-21-21

	REVISIONS	DATE	BY
1	REVISED BEARING PAD DEPTH	05-19-21	HMR
2			
3			
4			
5			
6			
7			

PREPARED FOR: STRUCTURES, CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES

PROJECT LOCATION: MONUMENT, CO

SUMMARIES

STRUCT/JOB:

SHEET NO.

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ELEVATION

ELEVATIONS ARE AT FINISHED GRADE AT HCL
(WINGWALLS NOT SHOWN FOR CLARITY)

NOTES:

1. REFER TO CIVIL PLANS FOR RIPRAP LIMITS AND INFORMATION.
2. REFER TO CIVIL PLANS FOR LANDSCAPE WALL INFORMATION.
3. DIMENSIONS AND ELEVATIONS ARE BASED ON CIVIL STREET PLANS. CONTRACTOR TO VERIFY.
4. REFER TO CIVIL PLANS FOR GUARDRAIL AND MEDIAN GUARDRAIL LOCATION, LENGTHS AND DIMENSIONS.

ISS□ED□□R
□□□STR□□TI□□

COLORADO REGISTERED PROFESSIONAL ENGINEER
HEATHER MARIE RAE
49431
05-21-21

	REVISIONS	DATE	BY
1	REVISED BEARING PAD DEPTH	05-19-21	HMR
2			
3			
4			
5			
6			
7			

PREPARED FOR:
STRUCTURES
CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES
PROJECT LOCATION: MONUMENT, CO

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STRUCT/JOB: □
SHEET NO. □□□

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TYPICAL SECTION

(LOOKING AHEAD STATION)
(NORMAL TO HCL)

NOTES:

1. REFER TO CONTECH'S PLANS FOR INFORMATION REGARDING SUPERSTRUCTURE.

COLORADO REGISTERED PROFESSIONAL ENGINEER
HEATHER MARIE RAEF
49431
05-21-21

ISSUED FOR CONSTRUCTION

	REVISIONS	DATE	BY
1	REVISED BEARING PAD DEPTH	05-19-21	HMR
2			
3			
4			
5			
6			
7			

PREPARED FOR:

STRUCTURES

CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES

PROJECT LOCATION: MONUMENT, CO

TITLE SECTION

STRUCT/JOB:

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PLAN

TEST BORING NO. 1
DATE DRILLED 1/22/2020
Job # 200150

REMARKS

WATER @ 10', 1/28/20

SAND, GRAVELLY, SLIGHTLY SILTY, FINE TO COARSE GRAINED, BROWN TO RED BROWN, VERY DENSE TO MEDIUM DENSE, DRY TO WET

SANDSTONE, SILTY, FINE TO COARSE GRAINED, RED BROWN, VERY DENSE, MOIST

* - HIGH BLOW COUNTS TO GRAVEL

* - BULK SAMPLE TAKEN

B - BOUNCE

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
		**		1.2	1
5		**		5.1	1
10		50* 9"		4.9	1
15		20		10.9	1
20		50 4"		13.9	2
25		B		16.5	2
30		50 4"		10.3	2

TEST BORING NO. 2
DATE DRILLED 1/22/2020
CLIENT FLRD
LOCATION N. BEAVER CREEK BRIDGE

REMARKS

WATER @ 13', 1/27/20

SAND, VERY SILTY TO SILTY, FINE TO COARSE GRAINED, BROWN TO RED BROWN, MEDIUM DENSE, MOIST

SANDSTONE, VERY SILTY TO SILTY, FINE TO COARSE GRAINED, RED BROWN, VERY DENSE, MOIST

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			12	2.9	1
5			20	8.4	1
10			18	3.4	1
15			50 6"	12.0	2
20			50 6"	14.4	2
25			50 5"	19.5	2
30			50 4"	15.7	2

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN	DATE	CHECKED	DATE
		HMR	8-10-20

JOB NO. 200150
FIG NO. A- 1

TEST BORING NO. 3
DATE DRILLED 1/22/2020
Job # 200150

REMARKS

WATER @ 19.5', 1/28/20

SAND, GRAVELLY, SILTY, FINE TO COARSE GRAINED, BROWN TO RED BROWN, LOOSE TO MEDIUM DENSE, DRY TO WET

COBBLES

SANDSTONE, SILTY TO CLAYEY, FINE TO COARSE GRAINED, RED BROWN, VERY DENSE, MOIST

* - BULK SAMPLE TAKEN

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
		9	5.3	1	
5		19	2.5	1	
10		27	1.5	1	
15		*	8.2	1	
20		9	17.8	1	
25		50 4"	11.6	2	
30		50 4"	11.0	2	
35		50 4"	14.4	2	

TEST BORING NO. 4
DATE DRILLED 1/22/2020
CLIENT FLRD
LOCATION N. BEAVER CREEK BRIDGE

REMARKS

WATER @ 19', 1/28/20

SAND, GRAVELLY, SILTY TO SLIGHTLY SILTY, FIN TO COARSE GRAINED, BROWN, MEDIUM DENSE, MOIST TO DRY

COBBLES

WEATHERED TO FORMATIONAL SANDSTONE, SILTY, FINE TO COARSE GRAINED, RED BROWN, DENSE TO VERY DENSE, MOIST

* - BULK SAMPLE TAKEN

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
			13	4.7	1
5			20	3.0	1
10			*	1.8	1
15			*	1.8	1
20			41	12.4	2
25			50 4"	13.2	2
30			50 4"	10.9	2
35					

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN	DATE	CHECKED	DATE
		HMR	8-10-20

JOB NO. 200150
FIG NO. A- 2

TEST BORING NO. 5
DATE DRILLED 7/22/2020
Job # 200150

REMARKS

WATER @ 18', 7/28/20

SAND, SILTY WITH COBBLES, FINE TO COARSE GRAINED, BROWN, VERY DENSE TO DENSE, DRY

COBBLES

HIGHLY WEATHERED TO FORMATIONAL SANDSTONE, SILTY, FINE TO COARSE GRAINED, RED BROWN, MEDIUM DENSE TO VERY DENSE, MOIST TO WET

* - BULK SAMPLE TAKEN

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
		50 8"		1.6	1
5		39		3.2	1
10		50 11"		2.2	1
15		*		4.4	1
20		21		13.0	2
25		50 1"		16.1	2
30		50 1"		14.9	2

TEST BORING NO.
DATE DRILLED
CLIENT FLRD
LOCATION N. BEAVER CREEK BRIDGE
REMARKS

Depth (ft)	Symbol	Samples	Blows per foot	Watercontent %	Soil Type
10					
15					
20					

ENTECH ENGINEERING, INC.
505 ELKTON DRIVE
COLORADO SPRINGS, COLORADO 80907

TEST BORING LOG

DRAWN	DATE	CHECKED	DATE
		HMR	8-10-20

JOB NO. 200150
FIG NO. A- 3

THE GEOTECHNICAL DATA SHOWN IS PROVIDED FOR INFORMATION ONLY AND WAS PERFORMED BY ENTECH ENGINEERING, INC. ENTECH JOB NO. 200150. REFER TO THE FULL GEOTECHNICAL REPORT FOR ALL INFORMATION PERTAINING TO BRIDGE GEOTECHNICAL DATA.

REVISIONS	DATE	BY
1		
2		
3		
4		
5		
6		
7		

PREPARED FOR:

STRUCTURES

DESIGNED BY: ENTECH
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 1/21/21

PROJECT TITLE
FOREST LAKES BRIDGES

PROJECT LOCATION
MONUMENT, CO

STRUCT/JOB:

SHEET NO.

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CONSTRUCTION LAYOUT

DECK JOINT SECTION (S|A)

NOTES:

1. REFER TO CONTECH PLANS FOR INFORMATION REGARDING ALL DIMENSIONS, BEARINGS, DIAPHRAGMS, ANCHOR BOLTS, AND BRIDGE RAIL DETAILS.
2. REFER TO CIVIL PLANS FOR GUARDRAIL INFORMATION AT ALL 4 OUTSIDE CORNERS & MEDIAN.

ISSUED FOR CONSTRUCTION

COLORADO REGISTERED PROFESSIONAL ENGINEER — MARTIN RAUL — 49431

05-21-21

	REVISIONS	DATE	BY
1	REVISED BEARING PAD DEPTH	05-19-21	HMR
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PREPARED FOR: STRUCTURES / CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES

PROJECT LOCATION: MONUMENT, CO

STRUCT/JOB:

SHEET NO.

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PILE NOTES:

1. PILES ARE ORIENTED SUCH THAT THE STRONG AXIS IS PARALLEL TO THE CENTERLINE OF THE ABUTMENT OR WINGWALL AS SHOWN.
2. PILE FIELD SPLICES, IF REQUIRED, SHALL BE MADE WITH COMPLETE JOINT PENETRATION (CJP) WELDS IN ACCORDANCE WITH CDOT STANDARD PROVISION OF SECTION 502 - EXTENSIONS AND SPLICES.
3. ONLY COMPLETE JOINT PENETRATION (CJP) WELDS SHALL BE USED FOR PILE SPLICES.
4. PILE TIP TO BE INCLUDED IN THE COST OF THE PILE.
5. ALL PILES ARE END BEARING AND SHALL BE DRIVEN VERTICAL.
6. PILE DRIVING ANALYZER (PDA) IS REQUIRED FOR THIS PROJECT. THE PDA MONITORING SHALL BE PERFORMED ON ONE PILE AT EACH ABUTMENT IN ACCORDANCE WITH SECTION 502 OF THE STANDARD SPECIFICATIONS.
7. ALL STEEL PILES SHALL BE AASHTO M270 GRADE 50 AND PROTECTED WITH AN APPROVED COMMERCIAL PILE TIP.
8. ELEVATIONS SHOWN SHALL BE VERIFIED AT TIME OF CONSTRUCTION BY THE GEOTECHNICAL ENGINEER.
9. AXIAL GEOTECHINCAL RESISTANCE FACTOR = 0.65.

FOUNDATION LAYOUT

REINFORCING TIP LAYOUT

PILE SUMMARY

	PILE SIZE	MAX LOAD (FACTORED) (KIPS)	MAX LOAD (SERVICE) (KIPS)	CUTOFF ELEVATION	ESTIMATED BEDROCK ELEV	ESTIMATED TIP ELEV	MINMUM REQ'D TIP ELEV	AS-BUILT TIP ELEV
WINGWALL 1A	HP 12x53	28	22	7055	7045	7035	7035	
WINGWALL 1B	HP 12x53	40	32	7055	7038	7028	7028	
ABUTMENT 1	HP 12x53	215	158	7054	7038-7045	7028-7035	7028-7035	
WINGWALL 3A	HP 12x53	38	30	7055	7034	7024	7024	
WINGWALL 3B	HP 12x53	29	23	7055	7038	7028	7028	
ABUTMENT 3	HP 12x53	200	150	7054	7034-7038	7024-7028	7024-7028	

Know what's below. Call before you dig.

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COLORADO REGISTERED PROFESSIONAL ENGINEER
HEATHER MARIE RUSH
49431
05-21-21

	REVISIONS	DATE	BY
1	REVISED BEARING PAD DEPTH	05-19-21	HMR
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PREPARED FOR: STRUCTURES, CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

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PROJECT LOCATION: MONUMENT, CO

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CAISSON NOTES:

1. MINIMUM EMBEDMENT TO BE PROVIDED. BEDROCK ELEVATIONS MAY VARY.
2. 2" DIA CSL TUBES SHALL BE SCHEDULE 40 STEEL PIPE WITH TIGHT END CAPS. CSL TUBES SHALL BE SECURED TO REINFORCEMENT AND FILLED WITH WATER AND CAPPED PRIOR TO CONCRETE PLACEMENT.
3. CSL TESTING SHALL BE PERFORMED ON 100% OF PIER 2 CAISSONS.
4. CONTRACTOR SHALL VERIFY THAT FOUNDATION LOCATIONS DO NOT INTERFERE WITH ANY EXISTING OR PROPOSED UTILITIES.
5. ALL TIES AND VERTICAL REINFORCEMENT IN CAISSONS ARE NON-EPOXY COATED.
6. CAISSON REINFORCING SHALL EXTEND TO FULL DEPTH OF DRILLED HOLE.
7. DRILLED CAISSON CONCRETE IS CLASS BZ.
8. MINIMUM LENGTH OF CAISSON SHALL BE 29.91' FOR EB BRIDGE, 30.56' FOR WB BRIDGE.
9. CONCRETE SHOULD BE PLACED IN THE CAISSON IMMEDIATELY AFTER DRILLING AND MUST BE PLACED THE SAME DAY THE HOLES ARE DRILLED.
10. THE MAXIMUM PERMISSIBLE VARIATION OF THE CENTER AXIS OF ANY DRILLED CAISSON AT THE TOP FROM IT'S PLANNED LOCATION SHALL BE 3 INCHES.
11. REFER TO THE GEOTECHNICAL REPORT FOR GROUND WATER AND POTENTIAL CAVING SOIL CONDITIONS. THE CONTRACTOR SHOULD BE PREPARED TO DE-WATER DRILLED CAISSONS AND TO CONSTRUCT CAISSONS WITH TEMPORARY CASINGS TO CONTROL GROUNDWATER AND MAINTAIN A STABLE OPEN EXCAVATION.
12. REFER TO THE GEOTECHNICAL REPORT FOR SHEAR RING INFORMATION AND REQUIREMENTS.
13. END BEARING & SIDE RESISTANCE FACTOR = 0.60

CAISSON ELEVATION

DRILLED CAISSON SUMMARY		
	WESTBOUND PIER CAISSONS	EASTBOUND PIER CAISSONS
MAX FACTORED AXIAL	740	740
MAX SERVICE AXIAL	502	502
TOP OF CAISSON	7049.06	7048.41
ESTIMATED BEDROCK ELEV	7032.50	7032.50
MIN BEDROCK PENETRATION	14.0'	14.0'
ESTIMATED TIP ELEV	7018.50	7018.50
SCOUR ELEV	7047.76	7047.76
AS-BUILT BEDROCK ELEV		
AS-BUILT TIP ELEV		

CAISSON SECTION S A

ISSUED FOR CONSTRUCTION

COLORADO REGISTERED PROFESSIONAL ENGINEER
HEATHER MARIE RAEF
49431
05-21-21

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PREPARED FOR: STRUCTURES, CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES
PROJECT LOCATION: MONUMENT, CO
ISSUED FOR DETAILS
STRUCT/JOB:
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PLAN

ELEVATION

(H-PILES NOT SHOWN FOR CLARITY)
(LOOKING BACK STATION)

NOTES:

1. REFER TO CONTECH'S PLANS FOR SUPERSTRUCTURE DIMENSIONS AND DETAILS. SUPERSTRUCTURE SHOWN FOR INFORMATION ONLY.
2. ABUTMENT SHALL BE CONCRETE CLASS D (BRIDGE).
3. SEAT ELEVATIONS ARE PROVIDED ON THE CONTECH PLANS. SEAT ELEVATIONS ARE AT CENTERLINE OF BEARING AND CENTERLINE OF GIRDER AT TOP OF CONCRETE.
4. THERE ARE 2 ANCHOR BOLTS PER GIRDER BEARING PLATE. TOTAL 20 ANCHOR BOLTS FOR ABUTMENT 1.

ISSUED FOR CONSTRUCTION

COLORADO REGISTERED PROFESSIONAL ENGINEER
HEATHER MARIE RAST
49431
05-21-21

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PREPARED FOR: STRUCTURES, CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES

PROJECT LOCATION: MONUMENT, CO

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PLAN

ELEVATION

(H-PILES NOT SHOWN FOR CLARITY)
(LOOKING AHEAD STATION)

NOTES:

1. REFER TO CONTECH'S PLANS FOR SUPERSTRUCTURE DIMENSIONS AND DETAILS. SUPERSTRUCTURE SHOWN FOR INFORMATION ONLY.
2. ABUTMENT SHALL BE CONCRETE CLASS D (BRIDGE).
3. SEAT ELEVATIONS ARE PROVIDED ON THE CONTECH PLANS. SEAT ELEVATIONS ARE AT CENTERLINE OF BEARING AND CENTERLINE OF GIRDER AT TOP OF CONCRETE.
4. THERE ARE 2 ANCHOR BOLTS PER GIRDER BEARING PLATE. TOTAL 20 ANCHOR BOLTS FOR ABUTMENT 3.

COLORADO REGISTERED
MARTIN
49431
PROFESSIONAL ENGINEER
05-21-21

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PREPARED FOR:

STEAMBOAT STRUCTURES

DESIGNED BY:	HMR
DRAWN BY:	AJM
PROJECT MANAGER:	HMR
DATE:	5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES

PROJECT LOCATION: MONUMENT, CO

TREATMENT DETERMINATION

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TYPICAL ABUTMENT SECTION

PLAN

SECTION S B

FOOTING ACUTE CORNER PLAN

LONGITUDINAL FOOTING BARS NOT SHOWN FOR CLARITY.

MEDIAN BACK STUBWALL ELEVATION S A

ISSUED FOR CONSTRUCTION

NOTES:

1. SLOPE TOP OF BEARING SEAT TOWARDS FRONT FACE AT 2% BETWEEN BEARING SEATS.

COLORADO REGISTERED PROFESSIONAL ENGINEER 49431 HEATHER MARIE RAE

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SECTION THRU BACK STUBWALL

WINGWALL 3B SHOWN
(WINGWALL 1A OPPOSITE HAND)

SECTION THRU ABUTMENT STEM

WINGWALL 3A SHOWN
(WINGWALL 1B OPPOSITE HAND)

ELEVATION

WINGWALL	EL A	EL B	EL C	X
1A	7069.08	7069.20	7055.00	17'-8"
1B	7068.36	7068.61	7055.00	26'-0"
3A	7067.09	7066.85	7055.00	24'-9"
3B	7066.36	7066.05	7055.00	19'-0"

WINGWALL TYPICAL SECTION

PILE PLATE DETAIL

NOTE: STEEL PLATE WILL NOT BE MEASURED AND PAID FOR SEPARATELY, BUT SHALL BE INCLUDED IN THE COST OF THE PILES. FOR WINGWALL SUPPORT PILE ONLY (4 PILES TOTAL).

NOTES:

1. CHAMFER 1'-0" AT FF OF ACUTE CORNERS.
2. CHAMFER 2'-0" AT BF OF ACUTE CORNERS WITHIN STEM & STUBWALL. DO NOT CHAMFER CORBEL.

COLORADO REGISTERED
HEATHER MARIE ROSS
49431
PROFESSIONAL ENGINEER
05-21-21

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STRUCTURES CLASSIC HOMES

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PLAN

ELEVATION

(LOOKING AHEAD STATION)

NOTES:

1. REFER TO CONTECH'S PLANS FOR BEARING PLATE/PAD INFORMATION.
2. THERE ARE 2 ANCHOR BOLTS PER GIRDER BEARING PLATE. 20 ANCHOR BOLTS PER PIER, 40 TOTAL FOR PIER 2.

ISSUED FOR CONSTRUCTION

COLORADO REGISTERED PROFESSIONAL ENGINEER 49431 MARTIN

05-21-21

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PIER DETAILS

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TYPICAL PIER CAP SECTION S A
B14

COLUMN SECTION S B
B14

SPLICE SECTION S C
B14

NOTES:

1. REFER TO CONTECH'S PLANS FOR ANCHOR BOLT LOCATIONS & INFORMATION.

ISSUED FOR STRUCTURES

COLORADO REGISTERED HEATHER MARIE MCCLELLAND 49431 PROFESSIONAL ENGINEER

05-21-21

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SECTION THRU STRIP SEAL BRIDGE EXPANSION

SECTION TAKEN PERPENDICULAR TO ℄ EXP'N DEVICE

RAIL FIELD SPLICE DETAIL

ANCHORAGE DETAIL

NOTES:

THE EXPANSION DEVICE SHALL BE INSTALLED ON GRADE, PARALLEL TO THE SLOPE AND GRADE OF THE DECK.

THE EXPANSION DEVICE SHALL NOT BE SET BEFORE THE DECK ELEVATIONS HAVE BEEN APPROVED BY THE ENGINEER. THE CONTRACTOR SHALL TAKE SHOTS OF THE EXPANSION DEVICE TO ACHIEVE THE REQUIRED ELEVATIONS FOR SMOOTHER RIDEABILITY ON BRIDGE APPROACHES.

AFTER THE CONCRETE HAS ATTAINED INITIAL SET, THE ATTACHMENTS USED TO HOLD THE EXPANSION DEVICE ASSEMBLY IN ITS PROPER POSITION SHALL BE REMOVED.

"W" AND "E" DIMENSIONS ARE DEPENDENT UPON THE PARTICULAR EXPANSION DEVICE SUPPLIED, AND SHALL BE SHOWN ON THE WORKING DRAWINGS.

SEE TABLE FOR DIMENSIONS "A" AND "W"; INTERPOLATE AS NEEDED. DO NOT INSTALL THE GLAND UNTIL DIMENSION "A" HAS OPENED UP TO AT LEAST ½" (2½" FOR SILICOFLEX).

THE NEOPRENE GLAND SHALL BE INSTALLED IN ONE PIECE IN ACCORDANCE WITH SECTION 518 OF THE STANDARD SPECIFICATIONS.

SEE SECTION 518.09 IN THE STANDARD SPECIFICATIONS FOR WATER TIGHT INTEGRITY TESTING REQUIREMENTS.

SET ELEVATIONS AT TOP OF END OF DECK AND BACK STUBWALL WITH THE GRADE PROJECTION SCHEME.

ALL STEEL ELEMENTS (WHETHER GRADE A36 OR A588) OF THE BRIDGE EXPANSION DEVICE, INCLUDING COVER PLATES, SHALL BE HOT DIP GALVANIZED AFTER FABRICATION AS PER SECTION 509.11 OF THE STANDARD SPECIFICATIONS.

USE A RUN OF 1 FOR NEW CONSTRUCTION.

PROVIDE EXPANSION DEVICE SUPPORT AS SHOWN AT 6'-0" INTERVALS.

FOR REINFORCING NOT SHOWN HEREON, SEE ABUTMENT DETAILS AND CONTECH PLANS.

CUT THREADED ROD FLUSH TO CONCRETE FOR FINISHED JOINT.

CONCRETE SHALL BE PLACED AFTER EXPANSION DEVICE HAS BEEN ADJUSTED TO PROPER GRADE AND APPROVED BY THE ENGINEER.

MINIMUM SUPPORT BRACKET REQUIREMENTS

TYPICAL ANCHOR BAR DETAIL

ANCHOR BAR SPACING

ACCEPTABLE EXPANSION DEVICE ALTERNATES

D.S. BROWN A2R400-SSA2WABO SE400 TYPE AEPOXY INDUSTRIES S400-A
R. J. WATSON SILICOFLEX SF 400

AIR TEMP (°F)	"A"	"W"*
-30	2.75	5.25
0	2.55	5.05
30	2.35	4.85
60	2.15	4.65
90	1.95	4.45
120	1.75	4.25

* FOR E = ¼" (MIN.)

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COLORADO REGISTERED
HEATHER MARIE JOHNSON
49431
PROFESSIONAL ENGINEER
05-21-21

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PREPARED FOR: STRUCTURES CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
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PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES

PROJECT LOCATION: MONUMENT, CO

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NOTE:

THREADED CONC INSERTS & FLAT HEAD CAP SCREWS SHALL BE ASTM A307 STAINLESS STEEL OR EQUIVALENT.

CURB - PLAN

SIMILAR AT SIDEWALK

SECTION S B

SECTION S C

SECTION S A

AT CURB

SECTION S A

AT SIDEWALK

NOTE:
PROVIDE 2" MINIMUM COVER BETWEEN ANCHORS AND ALL CONCRETE SURFACES.

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COLORADO REGISTERED HEATHER MARTIN 49431 PROFESSIONAL ENGINEER

05-21-21

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MEDIAN PIPE RAILING - ELEVATION

(TYPICAL AT ABUTMENT MEDIAN)

END PIPE RAILING - ELEVATION

(TYPICAL ALL ABUTMENT CORNERS)

TYPICAL SECTION

BASE PLATE DETAIL

WINGWALL PIPE RAILING - ELEVATION

1 EXPANSION ANCHOR SHALL HAVE A MINIMUM ALLOWABLE TENSION CAPACITY OF 3000 LBS AND A MINIMUM ALLOWABLE SHEAR CAPACITY OF 3000 LBS. THE CONTRACTOR MAY SUBMIT AN ALTERNATE ANCHOR SYSTEM, WHICH MEETS THE MINIMUM ALLOWABLE CAPACITY REQUIREMENTS, FOR ENGINEER APPROVAL. FIELD DRILL AND INSTALL PER ANCHOR MANUFACTURER'S RECOMMENDATION.

NOTES:

1. BASE PLATE SHALL BE ASTM A36.
2. ALL RAILING STEEL SHALL BE GALVANIZED.
3. STEEL PIPE SHALL BE ASTM A53 GRADE B.
4. RAILING SHALL BE FABRICATED AND INSTALLED SUCH THAT POSTS ARE PLUMB AND HORIZONTAL MEMBERS ARE LEVEL.
5. SEE ABUTMENT DETAILS SHEET AND WINGWALL DETAILS SHEET FOR ADDITIONAL INFORMATION CONCERNING CLOSURE WALL.

ISSUED FOR CONSTRUCTION

COLORADO REGISTERED PROFESSIONAL ENGINEER
HEATHER MARIE ROSS
49431
05-21-21

REVISIONS		DATE	BY
1	REVISED BEARING PAD DEPTH	05-19-21	HMR
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PREPARED FOR: STRUCTURES, CLASSIC HOMES

STEAMBOAT STRUCTURES

DESIGNED BY: HMR
DRAWN BY: AJM
PROJECT MANAGER: HMR
DATE: 5/21/21

PROJECT TITLE: FOREST LAKES BRIDGES

PROJECT LOCATION: MONUMENT, CO

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PLAN

NOTES:

1. CONCRETE CLASS D (BRIDGE) SHALL BE USED FOR APPROACH SLABS.
2. APPROACH SLAB CONCRETE SHALL BE CURED IN ACCORDANCE WITH THE SPECIFICATIONS FOR BRIDGE DECK CONCRETE IN SUBSECTION 601.
3. ½" EXPANSION JOINT MATERIAL SHALL MEET AASHTO SPEC M213.
4. FOR EXPANSION DEVICE DETAILS, SEE BRIDGE EXPANSION DEVICE SHEETS.
5. FOR CURB & SIDEWALK DETAILS, SEE CIVIL PLANS.

DETAIL D 01

SECTION S A

(PERPENDICULAR TO ℄ ABUT)

SECTION S B

APPROACH SLAB REINFORCEMENT NOT SHOWN FOR CLARITY

**MEDIAN CURB NOTE:
IN APPROACH SLAB MEDIAN, CURB IS NOT CONTINUOUS, COORDINATE MEDIAN CURB LOCATION AND REINFORCING LOCATIONS WITH THE CIVIL SHEETS.

ISSUED FOR CONSTRUCTION

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ELEVATION SCHEMATIC

SECTION (BACKFILL) S B

LEGEND

- STRUCTURE BACKFILL (CLASS 1) WITH MECHANICAL REINFORCEMENT AS SHOWN ON THE PLANS
- REFER TO CIVIL PLANS FOR GRADING IN FRONT OF ABUTMENTS AND WINGWALLS
- FILTER MATERIAL
- STRUCTURE BACKFILL (CLASS 1)

PLAN

SECTION (BACKFILL) S C

SECTION (BACKFILL) S D

★ FILTER MATERIAL IS ONLY USED IN AREA NEAR THE ABUTMENT AND NOT AT THE END OF THE WINGWALL

SECTION (BACKFILL) S E

SECTION PERPENDICULAR TO ABUTMENT

● MEASURED PERPENDICULAR TO PLANNED BOTTOM OF MECHANICALLY STABILIZED BACKFILL

■ PAYMENT BASED ON 2:1 SLOPE. ADDITIONAL QUANTITIES SHALL BE INCLUDED IN THE WORK.

NOTES:

1. REFER TO M-206-2 FOR EXCAVATION LIMITS.
2. GEOTEXTILE REINFORCEMENT SHALL BE WOVEN FABRIC WITH A MINIMUM AVERAGE ROLL VALUE OF 4800 LB/FT FOR INSTALLATIONS WITH A GAP AND 2400 LB/FT FOR INSTALLATIONS WITHOUT A GAP BASED ON ASTM D4595.
3. GEOTEXTILE REINFORCEMENT SHALL BE PLACED BY ALTERNATING MACHINE DIRECTION (MD) WITH CROSS MACHINE DIRECTION (XD) FROM LAYER TO LAYER.
4. THE GEOTECXTILE REINFORCEMENT WRAP AT BACK FACE OF ABUTMENT SHALL BE PULLED BACK SLACK FREE WITH ITS END ANCHORED TO SOIL UNDERNEATH WITH STAPLES OR PINS.
5. MINIMUM SPLICE OF ALL GEOFABRIC SHALL CONSIST OF 6" OF OVERLAP.
6. PAYMENT FOR ALL WORK ITEMS SHOWN WILL BE MADE UNDER ITEM 206 MECHANICAL REINFORCEMENT OF SOIL (CY) AND ITEM 206 STRUCTURE BACKFILL (CLASS 1) (CY) AND SHALL INCLUDE THE COST FOR 6 INCH Φ PERFORATED PIPE UNDERDRAIN AND SUBSURFACE DRAIN OUTLET (6 INCH Φ NON-PERFORATED PIPE) AND FILTER MATERIAL (CLASS B) QUANTITIES.
7. INSTALLATION OF PIPE UNDERDRAIN, SUBSURFACE DRAIN OUTLET, AND GEOCOMPOSITE DRAIN WILL CONFORM TO THE CONSTRUCTION REQUIREMENTS OF SECTION 605.03, 605.06 AND 605.04, RESPECTIVELY.
8. GEOCOMPOSITE DRAINAGE BOARD SHALL BE PLACED ON THE SOIL SIDE OF WALLS AND ABUTMENTS.

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COLORADO REGISTERED MARTIN PROFESSIONAL ENGINEER 49431

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PREPARED FOR: STRUCTURES / CLASSIC HOMES

STEAMBOAT STRUCTURES

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PROJECT LOCATION: MONUMENT, CO

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LEGEND

STRUCTURE BACKFILL (CLASS 1) WITH MECHANICAL REINFORCEMENT AS SHOWN ON THE PLANS

FILTER MATERIAL

6 INCH PERFORATED PIPE UNDERDRAIN

WRAP DETAIL

SECTION S A / 20

GAP DETAIL STEP 1

GAP DETAIL STEP 2

WHEN REQUIRED, THE GEOTEXTILE REINFORCEMENT WRAP AT BACK FACE OF ABUTMENT OR WINGWALL SHALL BE TEMPORARILY HUNG WITH A SPACER BOARD AND TACK STRIP. AFTER REACHING TOTAL OF 1'-0" COMPACTED LIFT, THE TACK STRIP SHALL BE REMOVED AND TEXTILE REINFORCEMENT SHALL BE PULLED BACK SLACK FREE WITH ITS END ANCHORED TO SOIL UNDERNEATH WITH STAPLE OR PINS BEFORE THE SPACER BOARD IS PULLED. ANY ALTERNATE METHOD TO MAINTAIN THE MINIMUM GAP BETWEEN ABUTMENT CONCRETE AND REINFORCED SOIL MAY BE PROPOSED TO THE ENGINEER FOR APPROVAL

NOTES:

1. REFER TO M-206-2 FOR EXCAVATION LIMITS.
2. GEOTEXTILE REINFORCEMENT SHALL BE WOVEN FABRIC WITH A MINIMUM AVERAGE ROLL VALUE OF 4800 LB/FT FOR INSTALLATIONS WITH A GAP AND 2400 LB/FT FOR INSTALLATIONS WITHOUT A GAP BASED ON ASTM D4595.
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