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McLean Minor Subdivision
Final Drainage Report

2415 Hodgen Road, El Paso County, Colorado

Located within Section 28, Township 11 South, Range 66 West of the Sixth Principal Meridian

April 15, 2024

Prepared For:

Vertex Consulting Services

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PCD File No. MS243

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Engineer's Statement

This report and plan for the drainage design of the development, McLean Minor Subdivision, was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the *El Paso County Drainage Criteria* Manual and is in conformity with the master plan of the drainage basin. I understand that El Paso County does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

_____

Richie Lyon, PE Date

State of Colorado No. 53921

For and on behalf of HR Green Development, LLC

Developer's Statement

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

[Client Business Name]

_____

[Property Owner Name] Date

2415 Hodgen Road

Colorado Springs, CO 80921

El Paso County:

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

_____ _____

Joshua Palmer, P.E. Date

County Engineer/ECM Administrator

Final Drainage Report – McLean Minor Subdivision

I. General Purpose, Location and Description

Purpose and Scope

The purpose of this Final Drainage Report (FDR) is to identify specific solutions to drainage concerns for onsite and offsite tributary areas resulting from the development of the minor subdivision to be platted. The FDR is to describe the onsite and offsite drainage patterns, existing and proposed storm infrastructure and any water quality and stormwater detention related criteria for any proposed or existing facilities.

The items discussed in this FDR include final plat layout, land uses for the proposed subdivision of the larger parcel and the resultant drainage characteristics for the proposed immediate construction and future residential development. Included in this report are final hydrologic and hydraulic drainage calculations and design as required for the final design of the development of the two-lot single-family detached residential estate lots to be platted for the minor subdivision.

Location and General Project Description

The property addressed as 2415 Hodgen Road is within El Paso County jurisdiction and is located on the south side of Hodgen Road, east of Roller Coaster Road, and west of State Highway 83. The property is within Section 28, Township 11 South, Range 66 West of the Sixth Principal Meridian. It is an unplatted 38.66-acre property with RR-5 zoning and the Tax ID Schedule No. is 6128100014. The property is a total of 38.66 acres.

The following are the surrounding platted and unplatted developments adjacent to the property:

Three properties north, across Hodgen Road from west to east:

Address: 16685 Roller Coaster Road; Owner: Chernak Enterprises, LLC.; Schedule No. 6121000008; Zoning: A1; Platted as: Lot 4 Four Bar Kay Farm Subdivision; Area: ~23.86 acres; Land Uses: Multi-Unit Residential, Agricultural

Address: 2550 Hodgen Road; Owner: Estate of Robert B. Carubia; Schedule No. 6121000002; Zoning: RR-5; Unplatted; Area: ~20.2 acres; Land Use(s): Single-Family Residential

Address: 2520 Hodgen Road; Owner: Richard G. Jadomski; Schedule No. 6121000001; Zoning: RR-5; Unplatted; Area: ~20.21 acres; Land Use(s): Single-Family Residential

Two properties to the east, from north to south:

Address: 2915 Hodgen Road; Owner: Woodbury Family Trust; Schedule No. 6127000046; Zoning: RR-5; Unplatted; Area: ~10 acres; Land Use(s): Single-Family Residential

Address: 2935 Hodgen Road; Owner: Carol E. Marshall; Schedule No. 6127000035; Zoning: RR-5; Unplatted; Area: ~9.1 acres; Land Use(s): Single-Family Residential

Four properties to the south, from west to east:

Address: 2420 Reveille Drive; Owner: Stephanie J. Taylor; Schedule No. 6128101001; Zoning: RR-5; Plat No. R05592, platted as: Lot 1 Holley Subdivision; Area ~5.0 acres; Land Use(s): Single-Family Residential

Address: 2480 Reveille Drive; Owner: Andrew S. Emery; Schedule No. 6128101002; Zoning: RR-5; Plat No. R05592, platted as: Lot 2 Holley Subdivision; Area ~5.0 acres; Land Use(s): Single-Family Residential

Address: 2770 Reveille Drive; Owner: Donald James Hull Living Trust; Schedule No. 6128100010; Zoning: RR-5; Unplatted Area ~22.11 acres; Land Use(s): Single-Family Residential

Address: 2687 Reveille Drive; Owner: Edward J. Werner; Schedule No. 6128100011; Zoning: RR-5; Unplatted Area ~19.0 acres; Land Use(s): Single-Family Residential

Three properties to the west, from north to south:

Address: 2355 Hodgen Road; Owner: Michael Richard Pollard; Schedule No. 6128100012; Zoning: RR-5; Unplatted; Area: ~4.5 acres; Land Use(s): Single-Family Residential

Address: 16425 Roller Coaster Road; Owner: Morgan T. McKinsey; Schedule No. 6128100003; Zoning: RR-5; Unplatted; Area: ~4.8 acres; Land Use(s): Single-Family Residential

Address: 2355 Hodgen Road; Owner: Michael Richard Pollard; Schedule No. 6128100012; Zoning: RR-5; Unplatted; Area: ~4.5 acres; Land Use(s): Single-Family Residential

Address: 16375 Roller Coaster Road; Owner: John W. Elliott; Schedule No. 6128100004; Zoning: RR-5; Unplatted; Area: ~4.8 acres; Land Use(s): Single-Family Residential

The existing vegetative cover is approximately 25 percent as evidenced by a field survey and aerial imagery. The existing vegetation includes sparse native grasses and weeds, shrubs, and the majority of the site has dense areas of pinyon pine trees. There is a single-family residence and an accessory structure toward the west side of the site with a concrete paved driveway to the structures. The remaining land area is unvegetated exposed pervious soil and brush.

The general topography of the site is from northeast to southwest with the northern property boundary adjacent to the Hodgen Road right-of-way ranging from elevation 7520’ in the northwest corner to 7580’ at the northeast corner and the lowest areas of the site at the south property boundary with elevations of 7460’ at the northwest corner and 7520’ at the southeast corner. The north to south slopes average 6 percent grade and the east-west slopes vary by location and proximity to the natural swales on the property. The average east-west slope is approximately 10 percent. The asphalt paved roadway of Hodgen Road is a crowned public roadway. The roadway’s south half drains directly to the site for most of the property frontage and there is not a roadside swale that conveys stormwater within the right-of-way section.

Offsite flows do enter the site on the northern border of the property boundary. Runoff from the south half of Hodgen Road sheet flows directly into the site while portions of undeveloped land and runoff from the north half of Hodgen Road is routed underneath Hodgen Road via four 18” public culverts. The offsite flows continue south through the proposed site and exit at the southern property boundary where they

continue due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

There are five notable drainage swales on the site. These are considered tertiary drainage swales made up of pervious soil and native vegetation and are not formal drainage channels. The five drainage swales drain from the north property frontage at Hodgen Road due south to the south property line where the five swales converge into a single downstream drainage swale as it crosses the south property boundary. The swales average longitudinal slopes of approximately 5 percent grade. These swales are assessed in the appendix of this report to demonstrate that the minor and major storm event runoff do not surcharge the swale sections and meet freeboard requirements. The site ultimately drains due southwest through the Holley Subdivision which drains to the east roadside swale of Roller Coaster Road where it outfalls to Smith Creek approximately 1 mile south of the property.

There are no existing drainage facilities on the site or within adjacent properties.

The soils throughout the site consist of Kettle gravelly loamy sand, Peyton-Pring complex, Tomah-Crowfoot loamy sands and Tomah-Crowfoot complex which are all categorized as Hydrologic Soil Group B by the US Geological Survey. A hydrological soil group map is included in Appendix A.

There are no known irrigation facilities on the property. The existing single-family residence has a well and septic field. Platting is to keep these facilities within its lot and consider required setbacks from other well and septic infrastructure and permanent structures.

Other Government Agency Requirements

There are no other government agency requirements that are required to be involved in the permitting of the proposed minor subdivision and roadway construction. The site does not fall within a FEMA flood plain and there is no existing infrastructure that would require the involvement of the Army Corps of Engineers, the State Engineering Office, or the Colorado Water Conservation Board.

II. Drainage Basins and Sub-Basins

Existing Subbasin Description

The site falls within the Smith Creek Drainage Basin which has a drainage-way planning study entitled *Smith Creek Drainage Basin Planning Study* dated August of 2002 (MP02002). The study does not specify any required improvements for this site or its development.

There are no flood hazard delineation reports or flood insurance studies or maps for the site or surrounding areas.

The El Paso County Drainage Basins Map delineates the major drainage basin that this property falls within the Smith Creek Drainage Basin which is located south of the West Cherry Creek (CYCY0400) drainage basin, east of the Black Forest (FOMO4200), west of the Black Squirrel Creek (FOMO3600) drainage basin, and north of the Monument Branch (FOMO3800) drainage basin. Smith Creek is a drainage way that is tributary to Monument Creek. The location of Smith Creek is located approximately 3,000 feet south of the property and is the ultimate outfall location of stormwater runoff from the site.

The site does not fall within a FEMA flood plain and is within Zone X of the FEMA Floodplain FIRM Panel Map 08041C0285G effective date of December 7, 2018. Zone X indicates areas determined to be outside of the 0.2% annual chance floodplain.

The Existing Sub-basins for the Site are described as follows:

Offsite Basins:

Basin OS-1 (Area = 1.30 acres, Q_5 = 2.2 cfs, Q_{100} = 5.4 cfs) represents the upstream offsite tributary area which is the south half of the Hodgen Road right-of-way that consists of asphalt paved road and unpaved shoulder and some undeveloped area of the west adjacent property that drain to and through the property at the north and west boundaries of the property. The stormwater runoff from this basin directly drains to the site via overland sheet flow and exits the southwest corner of the Site at **Design Point 1** where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-2 (Area = 6.66 acres, Q_5 = 2.5 cfs, Q_{100} = 14.0 cfs) represents an upstream offsite tributary area which is a portion of the north half of the Hodgen Road consisting of asphalt paved road central to the Site, as well as a greater portion of undeveloped land that crosses Hodgen Road and enters the northern part of the site via a single 18" public culvert at **Design Point 2**. Flows entering the site then continue downstream due southwest to **Design Point 1** and offsite through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-3 (Area = 0.98 acres, Q_5 = 0.6 cfs, Q_{100} = 2.6 cfs) represents an upstream offsite tributary area which is a portion of the north half of Hodgen Road which consists of asphalt paved road. The basin also consists of undeveloped area north of Hodgen Road which crosses the roadway via a public 18" culvert that allows flows to enter the north part of the site. The stormwater runoff from this basin directly drains to the site via the culvert at **Design Point 3**, then continues downstream due southwest where it exits the site at **Design Point 1** through the unplatted residential property which drains through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-4 (Area = 2.63 acres, Q_5 = 1.1 cfs, Q_{100} = 6.2 cfs) represents an upstream offsite tributary area which is a portion of the north half of Hodgen Road which consists of asphalt paved road. The basin also consists of undeveloped area north of Hodgen Road which crosses the roadway via a public 18" culvert that allows flows to enter the north part of the site. The stormwater runoff from this basin directly drains to the site via the culvert at **Design Point 4**, then continues downstream due southwest where it exits the site at **Design Point 7** through the unplatted residential property which drains through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-5 (Area = 1.46 acres, Q_5 = 0.8 cfs, Q_{100} = 3.6 cfs) represents an upstream offsite tributary area which is a portion of the north half of Hodgen Road which consists of asphalt paved road. The basin also consists of undeveloped area north of Hodgen Road which crosses the roadway via a public 18" culvert that allows flows to enter the north part of the site. The stormwater runoff from this basin directly drains to the site via the culvert at **Design Point 5**, then continues downstream due southwest where it exits the site at **Design Point 7** through the unplatted residential property which drains through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-5.1 (Area = 0.47 acres, Q_5 = 1.0 cfs, Q_{100} = 2.3 cfs) represents an upstream offsite tributary area which is a portion of the south half of the Hodgen Road right-of-way that consists of asphalt paved

road and unpaved shoulder. Stormwater runoff from this basin directly drains into the site via overland sheet flow, into existing onsite basin A3. The stormwater continues due south, and exits the site at **Design Point 7**, where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately Smith Creek.

Basin OS-6 (Area = 0.33 acres, Q_5 = 0.7 cfs, Q_{100} = 1.6 cfs) represents the upstream offsite tributary area which is the south half of the Hodgen Road right-of-way that consists of asphalt paved road and unpaved shoulder and some undeveloped area of the east adjacent property that drain to and through the property at the north and east boundaries of the property. The stormwater runoff from this basin directly drains to the site via overland sheet flow and exits the southeast corner of the Site at **Design Point 8** where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Onsite Basins:

Basin A1 (Area = 15.03 acres, Q_5 = 4.8 cfs, Q_{100} = 29.6 cfs) is the existing condition of the west portion of the Site that includes existing paved roadway and structures including the existing single-family residence. The stormwater runoff from this basin drains to the site via overland sheet flow toward **Design Point 1** where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin A2 (Area = 1.88 acres, Q_5 = 0.6 cfs, Q_{100} = 4.2 cfs) is the existing condition area toward the south boundary that drains offsite at the southern boundary at **Design Point 6**. The stormwater runoff from this basin drains to the site via channelized flow and continues downstream due southwest in channel section A-A through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin A3 (Area = 11.85 acres, Q_5 = 3.2 cfs, Q_{100} = 23.2 cfs) is the existing condition central area of the Site that drains due south. The stormwater runoff from this basin drains south via channelized flow in two tertiary channels, channel sections B-B & C-C that converge to a single tertiary channel, section D-D, at **Design Point 7** and drains offsite due south through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin A4 (Area = 9.50 acres, Q_5 = 2.6 cfs, Q_{100} = 18.8 cfs) is the existing condition area toward the south boundary that drains offsite at the southern boundary at **Design Point 8**. The stormwater runoff from this basin drains south through the site via channelized flow, channel section E-E, and continues downstream due southwest through the unplatted residential property which drains through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin A5 (Area = 0.40 acres, Q_5 = 0.1 cfs, Q_{100} = 1.1 cfs) is a small area of pervious land at the east boundary of the Site that drains directly offsite to the east property and continues due south to **Design Point 9**, downstream through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Areas of existing tertiary channels are assessed within this report to compare to developed conditions where future single-family residences are to be built and will require freeboard from 100-year water surface elevation of nearby drainageways. Tertiary channels A-A, B-B, C-C, D-D-, and E-E are assessed within the appendix and the resultant drainage parameters are discussed in the Hydraulics section of this report.

The total offsite minor storm runoff is 8.9 cfs and the major storm runoff is 35.7 cfs. The total onsite minor storm runoff is 11.2 cfs and the major storm runoff is 77.0 cfs for the developed condition. The total runoff to and through the Site is 20.1 cfs for the minor storm event and 112.6 for the major storm event. The weighted imperviousness of the onsite tributary basins is 2.9% which includes the vast majority of the property consisting of barren pervious soil and a small portion of the paved driveway and residence and garage structure.

Proposed Subbasin Description

The proposed developed condition of the minor subdivision includes a driveway to the proposed Lot 2 single-family residence which is to be platted at about 18.41 acres. The proposed development condition includes the full build out of the new Lot 2 as a single-family development with a maximum imperviousness of 5.0%. The County DCM Appendix L for the development of large lots specifies a typical maximum imperiousness of 7% for 5 acre rural estate lots which includes rooftop cover for structures and site development of driveways and hardscape. For this drainage report and per platting requirements, Lots 1 and 2 will have covenants that limit development to a maximum of 5.0% imperviousness to have reasonable development standards as the lots are of large acreage. The result is a maximum imperviousness of just under one acre per lot, a conservative estimate of developed conditions and peak runoff.

Offsite Basins:

Basin OS-1 (Area = 0.83 acres, Q_5 = 0.9 cfs, Q_{100} = 2.8 cfs) represents the upstream offsite tributary area which is the south half of the Hodgen Road right-of-way that consists of asphalt paved road and unpaved shoulder and some undeveloped area of the west adjacent property that drain to and through the property at the north and west boundaries of the property. The stormwater runoff from this basin directly drains into **Basin B1** via overland sheet flow and exits the southwest corner of the Site at **Design Point 1** where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-2 (Area = 6.66 acres, Q_5 = 2.5 cfs, Q_{100} = 14.0 cfs) represents an upstream offsite tributary area which is a portion of the north half of the Hodgen Road consisting of asphalt paved road central to the Site, as well as a greater portion of undeveloped land that crosses Hodgen Road and enters **Basin B2** at the northern part of the site via a single 18” public culvert at **Design Point 2**. Flows entering the site then continue downstream due southwest to **Design Point 1** and offsite through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-2.1 (Area = 0.19 acres, Q_5 = 0.9 cfs, Q_{100} = 1.6 cfs) represents an upstream offsite tributary area which is a portion of the north half of the Hodgen Road consisting of asphalt paved road central to the Site and enters **Basin B2** at the northern part of the site via a overland sheet flow. Flows entering the site then continue downstream due southwest to **Design Point 1** and offsite through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-3 (Area = 0.98 acres, Q_5 = 0.6 cfs, Q_{100} = 2.6 cfs) represents the upstream offsite tributary area which is the north half of the Hodgen Road right-of-way and consists of asphalt paved road and unpaved shoulder. The basin also consists of undeveloped land north of Hodgen Road. The stormwater runoff from this basin directly drains to the site via an 18” public culvert where the discharge flows over the proposed gravel access road and continues downstream due southwest through **Basin B1** where it

continues offsite **(Design Point 1)** through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-3.1 (Area = 0.26 acres, Q_5 = 1.1 cfs, Q_{100} = 2.1 cfs) represents the upstream offsite tributary area which is the south half of the Hodgen Road right-of-way that consists of asphalt paved road and unpaved shoulder that drains directly to the Site. The stormwater runoff from this basin directly drains to the site via overland sheet flow where the discharge flows over the proposed gravel access road and continues downstream due southwest through **Basin B1** where it continues offsite **(Design Point 1)** through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-4 (Area = 2.63 acres, Q_5 = 1.1 cfs, Q_{100} = 6.2 cfs) represents an upstream offsite tributary area which is a portion of the north half of Hodgen Road which consists of asphalt paved road. The basin also consists of undeveloped area north of Hodgen Road which crosses the roadway via a public 18" culvert that allows flows to enter **Basin B5** at the north part of the site. The stormwater runoff from this basin directly drains to the site via the culvert at **Design Point 4**, then continues downstream through **Basin B4 and B5** due southwest where it exits the site at **Design Point 7** through the unplatted large acreage single-family residential property which drains through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek

Basin OS-4.1 (Area = 0.18 acres, Q_5 = 0.5 cfs, Q_{100} = 1.1 cfs) represents an upstream offsite tributary area which is a portion of the south half of Hodgen Road which consists of asphalt paved road. The basin drains directly on site via overland sheet flow and enters **Basin B5** at the north part of the site. The stormwater runoff from this basin directly drains to the site via the culvert at **Design Point 4**, then continues downstream through **Basin B4 and B5** due southwest where it exits the site at **Design Point 7** through the unplatted large acreage single-family residential property which drains through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek

Basin OS-5 (Area = 1.46 acres, Q_5 = 0.8 cfs, Q_{100} = 3.6 cfs) represents an upstream offsite tributary area which is a portion of the north half of Hodgen Road which consists of asphalt paved road. The basin also consists of undeveloped area north of Hodgen Road which crosses the roadway via a public 18" culvert that allows flows to enter the north part of the site. The stormwater runoff from this basin directly drains into **Basin B6** at the northern part of the site via the culvert at **Design Point 5**, then continues downstream due southwest through **Basin B4** where it exits the site at **Design Point 7** through the unplatted residential property which drains through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-5.1 (Area = 0.31 acres, Q_5 = 0.8 cfs, Q_{100} = 1.6 cfs) represents an upstream offsite tributary area which is a portion of the south half of Hodgen Road which consists of asphalt paved road. The basin drains directly into **Basin B6** via overland sheet flows where it enters the north part of the site. Flows then continue downstream due southwest through **Basin B4** where it exits the site at **Design Point 7** through the unplatted residential property which drains through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin OS-6 (Area = 0.33 acres, Q_5 = 0.6 cfs, Q_{100} = 1.5 cfs) represents the upstream offsite tributary area which is the south half of the Hodgen Road right-of-way up to the high point in the roadway to the east that consists of asphalt paved road and unpaved shoulder and some undeveloped area of the east adjacent property that drain to and through the property at the north and east boundaries of the property. The stormwater runoff from this basin directly drains into **Basin B7** via overland sheet flow and exits the

southeast corner of the Site at **Design Point 8** where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Onsite Basins:

Basin B1 (Area = 14.47 acres, Q_5 = 5.5 cfs, Q_{100} = 29.6 cfs) is the developed condition of the west portion of the Site that includes existing paved roadway and structures including the existing single-family residence. Additionally, assumed 5.0-acre minimum lot size single-family residential land use is included in the imperviousness of the basin to account for potential future developed as allowed when platted as the minor subdivision. The stormwater runoff from this basin is combined with flows from **Basin OS-1, OS-2, OS-2.1, OS-3, OS-3.1, and B2** which all drain through the site via overland sheet flow toward **Design Point 1** where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin B2 (Area = 0.56 acres, Q_5 = 0.3 cfs, Q_{100} = 1.7 cfs) is a small tributary area onsite and upstream of the proposed private gravel access road that has a natural low point where a proposed private 18" RCP culvert pipe is to drain under the driveway. The stormwater runoff from this basin combines with flows from **Basins OS-2 and OS-2.1** and drains to the culvert pipe at **Design Point 10**, which continues due south through **Basin B1** where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin B3 (Area = 1.88 acres, Q_5 = 0.6 cfs, Q_{100} = 4.2 cfs) is a portion of the Site to the south boundary that is assumed to be undisturbed and the topography and drainage pattern to remain per the existing conditions. No additional assumed 5.0-acre minimum lot size single-family residential land use is included in the imperviousness of this basin. The stormwater runoff from this basin flows offsite via channelized flow, section A-A, at **Design Point 6** where it continues downstream due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin B4 (Area = 10.25 acres, Q_5 = 3.4 cfs, Q_{100} = 21.1 cfs) is the developed condition of a central portion of the Site that includes the proposed private gravel drive access, and additional assumed 5.0-acre minimum lot size single-family residential land use is included in the imperviousness of the basin to account for potential future developed as allowed when platted as the minor subdivision. The stormwater runoff from this basin combines with flows from Basins OS-4, OS-4.1, OS-5, OS-5.1, B5, and B6 and drains south via overland sheet flow before being channelized through existing tertiary channels, sections B-B and C-C, where the runoff continues downstream due south and exits the Site via another existing channelized area, section D-D. Flows exit the Site between unplatted large acreage single-family residential lots at **Design Point 7** and continues downstream through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin B5 (Area = 0.40 acres, Q_5 = 0.2 cfs, Q_{100} = 1.2 cfs) is a small tributary area onsite and upstream of the proposed private gravel access road that has a natural low point where a proposed private 18" RCP culvert pipe is to drain under the driveway. The stormwater runoff from this basin is combined with flows from **Basins OS-4 and OS-4.1** and drains to the culvert pipe at **Design Point 5**, then continues due south through **Basin B4** where it continues downstream to **Design Point 7**, due southwest through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin B6 (Area = 1.2 acres, Q_5 = 0.4 cfs, Q_{100} = 2.9 cfs) is a small tributary area onsite and upstream of the proposed private gravel drive access. Assumed 5.0-acre minimum lot size single-family residential land use is included in the imperviousness of the basin to account for potential future developed as

allowed when platted as the minor subdivision. The stormwater runoff from this basin combines with **Basins OS-5 and OS-5.1** and sheet flows to a natural low-point within the basin where a proposed private 18" RCP culvert pipe allows flows to pass under the driveway. Flows exiting the basin drain south via overland sheet flow before being channelized through existing tertiary channels, sections C-C and D-D, where the runoff continues downstream due south and exits the Site between unplatted large acreage single-family residential lots at **Design Point 7** and continues downstream through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin B7 (Area = 9.50 acres, Q_5 = 3.2 cfs, Q_{100} = 19.7 cfs) is a large basin that consists of the east portion of the site. Assumed 5.0-acre minimum lot size single-family residential land use and a paved private driveway is included in the imperviousness of the basin to account for potential future developed as allowed when platted as the minor subdivision. The stormwater runoff from this basin combines with **Basin OS-6** and sheet flows south to an existing swale where flows will be channelized in section E-E and exit the site at **Design Point 8**. Flows continue downstream through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek.

Basin B8 (Area = 0.40 acres, Q_5 = 0.1 cfs, Q_{100} = 1.1 cfs) is a small area of assumed undisturbed pervious land at the east boundary of the Site that drains directly offsite to the east property and continues due south to **Design Point 9**, downstream through the Holley Subdivision to Roller Coaster Road, and ultimately to Smith Creek. No assumed residential land use is accounted for in this tributary basin as it is near setbacks of the property boundary.

Areas of existing tertiary channels are assessed within this report to demonstrate sufficient swale capacity on the proposed lots. The water surface elevations should be utilized to determine permanent structure locations and demonstrate freeboard to prevent stormwater inundation to any structures. Tertiary channels A-A, B-B, C-C, D-D, and E-E are assessed within the appendix and the resultant drainage parameters are discussed in the Hydraulics section of this report.

The total offsite minor storm runoff is 9.7 cfs and the major storm runoff is 37.1 cfs which is relatively unchanged from the existing conditions as no work in offsite areas is proposed. Discrepancies in existing versus proposed off-site flow values may stem from the time of concentration of some offsite sub-basins differing. The total onsite minor storm runoff is 13.7 cfs and the major storm runoff is 81.5 cfs for the developed condition. The total runoff to and through the Site is 23.4 cfs for the minor storm event and 118.6 for the major storm event. The increase in minor and major storm event flows is insignificant, with a total increase of 3.3 cfs and 6 cfs respectively compared to the existing conditions. The runoff increase is due to the assumed 5% maximum imperviousness for a full-build out of single-family residences on minimum the two large lots per the minor subdivision. The composite imperviousness of the onsite area with assumed future residences is 4.9% compared to the existing conditions of 2.9%. This increase of 2.0% yields a very small increase in runoff as the 38.66-acre property remains mostly barren pervious soil and vegetation. Water quality reduction is not required for the proposed site as the proposed lots will both be greater than 2.5 acres. Per the El paso County ECM, section I.7.1.B, lots larger than 2.5 acres do not require WQCV reduction. The proposed private gravel access driveway will not achieve the disturbance and construction limit of 1 acre, so no detention is required for this minor subdivision.

Methodology

Design rainfall was determined utilizing Table 6-2 from the City of Colorado Springs Drainage Criteria Manual to determine the 5-year and 100-year rainfall values for the 1-hour events. The 1-hour rainfall depths are 1.5 and 2.52 in/hr respectively.

The proposed development will consist of a total of two large lot (20.25 acres and 18.41 acres, respectively) single-family residential estate lots which are assumed at a percent imperviousness of 5% which is consistent with the County ECM Table 3-1 Typical Values of Percent Impervious within Appendix L of the ECM which provides guidance for larger rural lot developments. Existing undeveloped areas are to remain undisturbed and utilize a land use category of "lawn" with a percent imperviousness of 2% per the County ECM Table 6-6 land use table. Composite coefficients, rainfall intensities, and runoff flow rates are calculated on a Rational Method spreadsheet and provided within the Appendix.

III. Hydraulic Analysis

Major Drainageways

There are no major drainageways that exist within the development of the minor subdivision; however, small tertiary tributaries are within the site currently and function to convey flows toward Smith Creek. These tertiary drainage ways are analyzed within this report to assess the water surface elevation within the swales during the 100-year storm event and determine buildability of lots adjacent to these sections.

Sections A-A through E-E were assessed to compare existing and developed condition water surface elevations within the natural tertiary channels that drain downstream and offsite. The determination is that small, insignificant increases to the water surface elevations occur due to development that pose no adverse risk to downstream development and infrastructure.

Storm Sewer Infrastructure and Culvert Pipes

The minor subdivision requires three private culvert pipes to be installed under the proposed driveway to convey stormwater from the north side of the drive to the south side of the drvieway and continue downstream per the historic drainage pattern. The proposed private gravel driveway is to be pitched north to south to allow sheet flow across it, however, these culvert pipes are required at existing local low points to provide a flow through pattern. Because the driveway section does not have a roadside swale, the tributary areas to these culvert pipe low points are small and yield low stormwater runoff rates.

Design Point 10 is the westernmost private 18" RCP culvert pipe proposed that drains a minor storm runoff of 3.6 cfs and a major storm runoff of 17.2 cfs. These are very minor runoff totals and tailwater conditions do not pose a risk to the proposed roadway that the culvert pipe runs under. In the event that the culvert is clogged with debris, the emergency overflow path shall have flow overtop the driveway and continue south and follow the typical drainage pattern.

Design Point 11 is the center private 18" RCP culvert pipe that allows flows from Basin B5 to cross the gravel driveway with a minor storm runoff of 1.8 cfs and a major storm runoff of 8.4 cfs. These are very minor runoff totals and tailwater conditions do not pose a risk to the proposed roadway that the culvert pipe runs under. In the event that the culvert is clogged with debris, the emergency overflow path shall have flow overtop the driveway and continue south and follow the typical drainage pattern.

Design Point 12 is the easternmost private 18" RCP culvert pipe that allows flows from Basin B6 to cross the gravel driveway with a minor storm runoff of 1.9 cfs and a major storm runoff of 8.2 cfs. These are very minor runoff totals and tailwater conditions do not pose a risk to the proposed roadway that the

culvert pipe runs under. In the event that the culvert is clogged with debris, the emergency overflow path shall have flow overtop the driveway and continue south and follow the typical drainage pattern.

Culvert pipe calculations are provided in the Appendix to demonstrate capacity compliance.

IV. Environmental Evaluations

a. Significant Existing or Potential Wetland and Riparian Areas Impacts

There are no known existing or potential wetland and riparian areas that impact this site according to public GIS mapping.

Stormwater Quality Considerations and Proposed Practices

As described in previous sections, the County has indicated that there is no requirement to provide onsite detention with the demonstration of a disturbance area of less than 1.0 acre. Additionally, the proposed lots qualify for large lot exemptions so that no water quality runoff reduction is required for any disturbed areas such as the gravel roadway. The design plans and calculations provided in this report meet these requirements. As such, no onsite detention is proposed for this minor subdivision.

On site practices for the estate homes includes direct discharge of roof and hardscape runoff to the surrounding landscaped areas. This would include discharge of the gutters onto landscape areas vs. directly connecting to storm sewer and as discussed above as well using natural ditches and swales where it is logical and makes sense to convey stormwater in lieu of storm sewer piping.

Areas in which stormwater runoff is directed offsite without detention being provided have grass buffers that provide 100 percent water quality runoff reduction due to the small percent imperviousness compared to their respective buffer areas that consist of pervious open landscaped areas.

Permitting Requirements

When work infringes upon wetlands or floodplain a 404 Permit is required. This site is not within a flood plain nor disturbs wetlands.

The Colorado Department of Public Health and Environment requires permits for any disturbance that exceed 1 acre of land. The total disturbance and construction limits are under 1 acre. Should groundwater be encountered, a dewatering permit will be required.

El Paso County has indicated that an Erosion and Stormwater Quality Control Permit are not required due to the small scope of work under 1 acre.

4-Step Process

In accordance with the Engineering Criteria Manual I.7.2.A and DCM V2, this site has implemented the four-step process to minimize adverse impacts of urbanization. The four-step process includes reducing runoff volumes, stabilizing drainageways, treating the water quality capture volume, and considering the need for Industrial Commercial BMPs.

Step 1 – Reducing Runoff Volumes: The majority of the development of the project site includes the land use categories of large lot (>5.0 acres) single-family residential, paved concrete roadway, gravel

roadway, and lawn (undeveloped existing pervious land area). Most of the site has land uses that have relatively minor imperviousness and runoff coefficients. The developed areas for the homes are disbursed with open land areas of vegetation and trees between which provide runoff reduction into the pervious soil.

Step 2 – Stabilize Drainageways: The existing tertiary drainage ways are assessed for stormwater runoff capacity, velocity, and shear stress. Any altered drainage ways will be designed in a manner that provides water quality benefits through infiltration and the removal of pollutants via phytoremediation.

Step 3 – Provide WQCV: Runoff from this development is treated via grass buffers that provide water quality by way of infiltration into the existing pervious soil for all developed and disturbed areas.

Step 4 – Consider the need for Industrial and Commercial BMP's: Guidelines detailed in the El Paso DCM V2 4.2 pertaining to the covering and storage handline and spill containment and control shall be followed as necessary. This filing does not contain any commercial or industrial land use.

V. Drawings

Please refer to the appendices for the Vicinity Map, FEMA Floodplain Map, NRCS Soils Map, hydrology and hydraulic calculations, and drainage basin maps.

VI. Drainage and Bridge Fees

This Site falls within the Smith Creek Drainage Basin which has a 2024 Drainage Fee per impervious acre of $10,124 and 2024 Bridge Fee per impervious acre of $1,358.

The fees are calculated using the following impervious acreage method approved by El Paso County. The acreage for the minor subdivision totals 38.66 acres. This total area is made up of a concrete paved access drive, an existing single-family residence, an existing accessory structure, and the proposed developments of one additional 5.0-acre (minimum area) lot which have a maximum imperviousness of 5%. The hydrology calculations in the report appendix are the precise land use areas and the weighted imperviousness of the developed conditions of the site which inform this fee calculation. The total weighted imperviousness of the developed condition for the site with assumed maximum density for the residential lots comes out to 4.9 percent.

38.66 Ac. x 4.9% = 1.89 Impervious Ac.

The following calculations are based on the 2023 drainage/bridge fees for the Smith Creek Drainage Basin:

Drainage Fees

$ 10,124.00 x 1.89 ac. = $19,134.36

Bridge Fees

$ 1,358.00 x 1.89 ac. = $2,566.62

All outstanding fees are due at the time of plat recordation.

VII. Summary

The McLean Minor Subdivision Final Drainage Report is provide for a final plat application of a minor subdivision. The minor subdivision is a two-lot single-family residential estate lot minor subdivision on an existing single-family residential site of 38.66 acres. The two-lot minor subdivision is to plat new single-family residential estate lots that are to be a minimum of 5.0 acres. A proposed private gravel access driveway is to be constructed for access to the new platted lots. This access road is to provide sufficient vehicular access as well as emergency vehicle access for fire protection for each respective future single-family development.

This Final Drainage Report describes the existing drainage patterns and quantifies the peak stormwater runoff for the minor and major storm events and compares these parameters to the future full build out of the minor subdivision including the immediate access driveway construction as well as maximum imperviousness of future development residences. The report includes hydrology and hydraulic calculations demonstrating compliance with the County Drainage Criteria Manual including validation of existing drainage swale capacity and water quality runoff reduction practices.

All County and MHFD drainage design standards are met. It is anticipated that there will be no negative impacts to downstream and surrounding developments and facilities due to the development of this minor subdivision.

VIII. References

El Paso County – Drainage Criteria Manual, 2014

City of Colorado Springs – Drainage Criteria Manual, May 2014

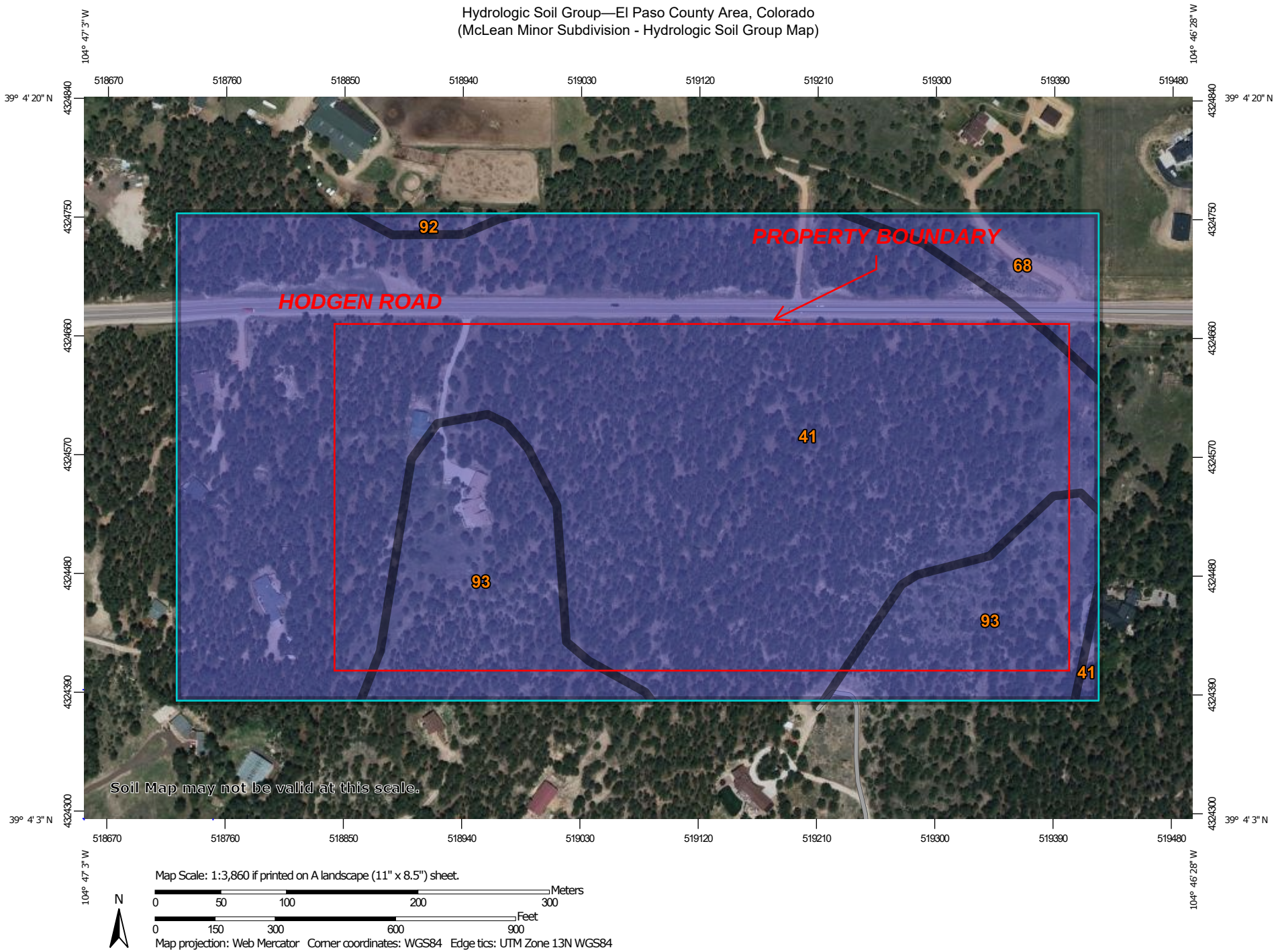
Urban Storm Drainage Criteria Manual, Urban Drainage Flood Control District, January 2018

Mile High Flood District Urban Storm Drainage Criteria Manual Volumes 1, 2, and 3; latest revisions

United States Department of Agriculture National Resources Conservation Service Rock Chute Design Data Spreadsheet

APPENDIX A
NRCS, FEMA, SOIL, AND VICINITY

Hydrologic Soil Group—El Paso County Area, Colorado
(McLean Minor Subdivision - Hydrologic Soil Group Map)



Map Scale: 1:3,860 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 150 300 600 900

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 21, Aug 24, 2023

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

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

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
41	Kettle gravelly loamy sand, 8 to 40 percent slopes	B	49.6	77.2%
68	Peyton-Pring complex, 3 to 8 percent slopes	B	2.5	3.9%
92	Tomah-Crowfoot loamy sands, 3 to 8 percent slopes	B	0.4	0.6%
93	Tomah-Crowfoot complex, 8 to 15 percent slopes	B	11.8	18.3%
Totals for Area of Interest			**64.3**	**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

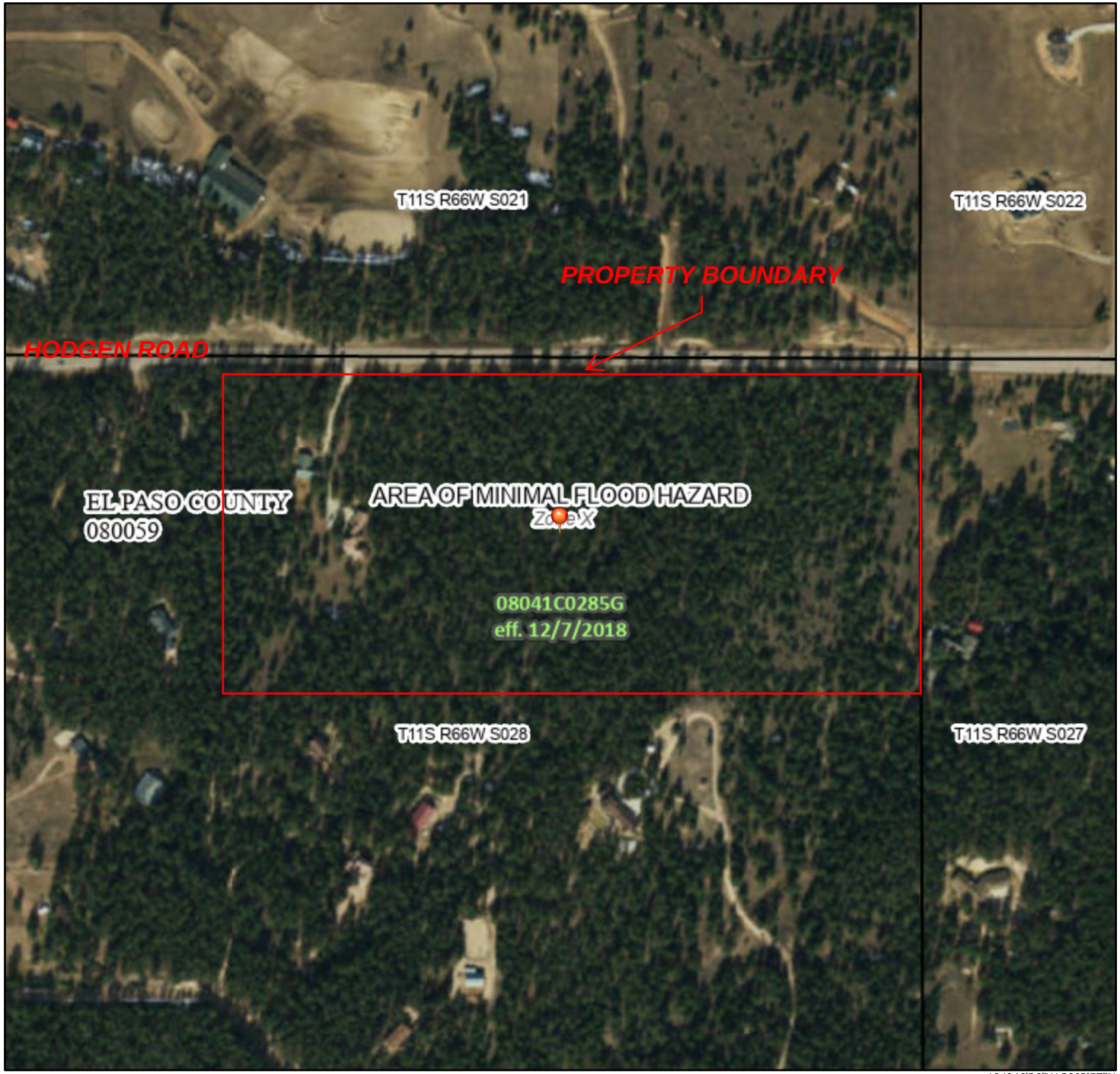
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

National Flood Hazard Layer FIRMette

FEMA

104°47'3"W 39°4'25"N



Feet

0 250 500 1,000 1,500 2,000

1:6,000

104°46'26"W 39°3'57"N

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

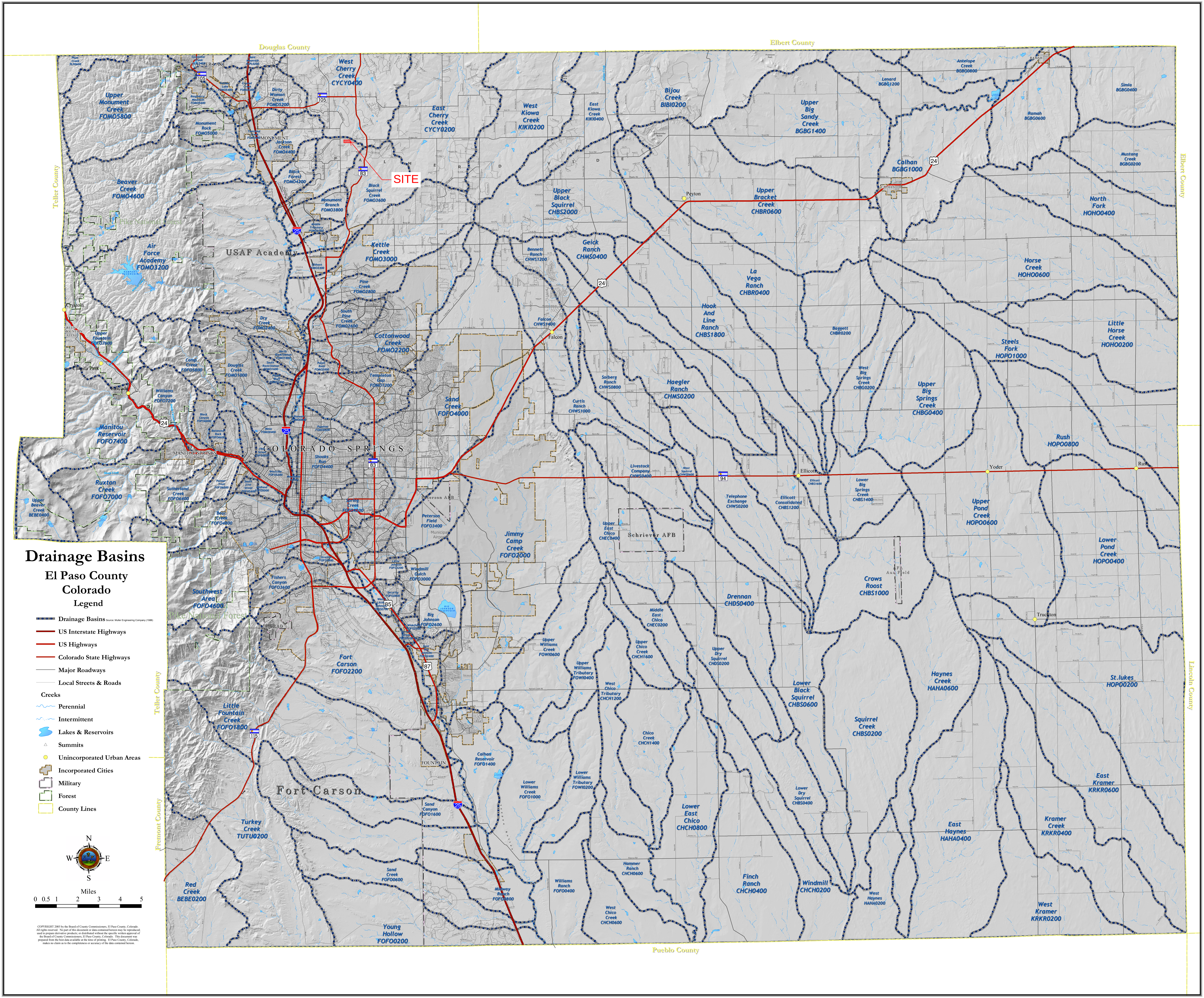
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/20/2023 at 3:26 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.


Drainage Basins
El Paso County
Colorado
Legend
Drainage Basins
US Interstate Highways
US Highways
Colorado State Highways
Major Roadways
Local Streets & Roads
Creeks
Perennial
Intermittent
Lakes & Reservoirs
Summits
Unincorporated Urban Areas
Incorporated Cities
Military
Forest
County Lines
N
S
E
W
Miles
0 0.5 1 2 3 4 5
SITE
Douglas County
Elbert County
Teller County
Lincoln County
Fremont County
Pueblo County
USAF Academy
COLORADO SPRINGS
Fort Carson
Schriever AFB
Peyton
Falcon
Ellicott
Yoder
Rush
Truckton
West Cherry Creek CYCY0400
East Cherry Creek CYCY0200
West Kiowa Creek KIKI0200
Bijou Creek BIBI0200
Upper Big Sandy Creek BGBG1400
Calhan BGBG1000
Upper Monument Creek FOMO5800
Beaver Creek FOMO4600
Air Force Academy FOMO3200
Upper Black Squirrel Creek CHBS2000
Upper Bracket Creek CHBR0600
North Fork HOHO0400
Geick Ranch CHMS0400
La Vega Ranch CHBR0400
Horse Creek HOHO0600
Kettle Creek FOMO3000
Hook And Line Ranch CHBS1800
Little Horse Creek HOHO0200
Steels Fork HOPO1000
Cottonwood Creek FOMO2200
Haegler Ranch CHMS0200
Upper Big Springs Creek CHBG0400
Sand Creek FOFO4000
Manitou Reservoir FOFO7400
Rush HOPO0800
Ruxton Creek FOFO7000
Upper Pond Creek HOPO0600
Jimmy Camp Creek FOFO2000
Lower Pond Creek HOPO0400
Crows Roost CHBS1000
Drennan CHBS0400
Southwest Area FOFO4600
Fort Carson FOFO2200
Haynes Creek HAHA0600
St.lukes HOPO0200
Lower Black Squirrel CHBS0600
Squirrel Creek CHBS0200
Little Fountain Creek FOFO1800
East Kramer KRKR0600
Lower East Chico CHCH0800
East Haynes HAHA0400
Kramer Creek KRKR0400
Turkey Creek TUTU0200
Finch Ranch CHCH0400
Windmill CHCH0200
Red Creek BEBE0200
West Kramer KRKR0200
Young Hollow FOFO0200

APPENDIX B
HYDROLOGIC CALCULATIONS

HRGreen

MCLEAN MINOR SUBDIVISION
EXISTING CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**DLH**
Checked by:	**RDL**
Date:	**3/14/2024**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS-1	1.30	43.3	0.43	0.61	2.2	5.4
OS-2	6.66	5.5	0.11	0.37	2.5	14.0
OS-3	0.98	13.1	0.17	0.42	0.6	2.6
OS-4	2.63	5.6	0.11	0.37	1.1	6.2
OS-5	1.46	9.4	0.14	0.40	0.8	3.6
OS-5.1	0.47	45.1	0.44	0.62	1.0	2.3
OS-6	0.33	42.2	0.42	0.60	0.7	1.6
A1	15.03	4.3	0.10	0.36	4.8	29.6
A2	1.88	2.0	0.08	0.35	0.6	4.2
A3	11.85	2.0	0.08	0.35	3.2	23.2
A4	9.50	2.0	0.08	0.35	2.6	18.8
A5	0.40	2.0	0.08	0.35	0.1	1.1
TOTAL OFFSITE	**13.83**	**12.3%**	**0.17**	**0.41**	**8.9**	**35.7**
TOTAL ONSITE	**38.66**	**2.9%**	**0.09**	**0.36**	**11.2**	**77.0**
TOTAL	**52.49**	**5.4%**	**0.11**	**0.37**	**20.1**	**112.6**

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS AND DESIGN POINTS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	OS-1, A1, DP2, DP3	10.1	51.6	24.0	7.1%
2	OS-2	2.5	14.0	6.7	5.5%
3	OS-3	0.6	2.6	1.0	13.1%
4	OS-4	1.1	6.2	2.6	5.6%
5	OS-5	0.8	3.6	1.5	9.4%
6	A2	0.6	4.2	1.9	2.0%
7	OS-5.1, A3, DP4, DP5	6.0	35.2	16.4	4.5%
8	OS-6, A4	3.2	20.5	9.8	3.4%
9	A5	0.1	1.1	0.4	2.0%

HRGreen	**MCLEAN MINOR SUBDIVISION**	**Calc'd by:**	**DLH**
	EXISTING CONDITIONS	**Checked by:**	**RDL**
	EL PASO COUNTY, COLORADO	**Date:**	**3/14/2024**

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	PAVED ROADWAY	RESIDENTIAL (5.0 AC LOT)	ROOFTOP	TOTAL	SOIL TYPE	UNDEVELOPED			PAVED ROADWAY			RESIDENTIAL (5.0 AC LOT)			ROOFTOP			COMPOSITE IMPERVIOUSNESS & C		
	ACRES						%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5*	C_{100}*	%I	C_5	C_{100}	%I	C_5	C_{100}
OS-1	0.75	0.55	0.00	0.00	1.30	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	43.3	0.43	0.61
OS-2	6.42	0.24	0.00	0.00	6.66	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	5.5	0.11	0.37
OS-3	0.87	0.11	0.00	0.00	0.98	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	13.1	0.17	0.42
OS-4	2.53	0.10	0.00	0.00	2.63	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	5.6	0.11	0.37
OS-5	1.35	0.11	0.00	0.00	1.46	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	9.4	0.14	0.40
OS-5.1	0.26	0.21	0.00	0.00	0.47	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	45.1	0.44	0.62
OS-6	0.19	0.14	0.00	0.00	0.33	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	42.2	0.42	0.60
A1	14.66	0.19	0.00	0.19	15.03	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	4.3	0.10	0.36
A2	1.88	0.00	0.00	0.00	1.88	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	2.0	0.08	0.35
A3	11.85	0.00	0.00	0.00	11.85	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	2.0	0.08	0.35
A4	9.50	0.00	0.00	0.00	9.50	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	2.0	0.08	0.35
A5	0.40	0.00	0.00	0.00	0.40	B	2	0.08	0.35	100	0.90	0.96	5	0.14	0.39	90	0.73	0.81	2.0	0.08	0.35
TOTAL OFFSITE	**12.38**	**1.45**	**0.00**	**0.00**	**13.83**														**12.3%**	**0.17**	**0.41**
TOTAL ONSITE	**38.29**	**0.19**	**0.00**	**0.19**	**38.66**														**2.9%**	**0.09**	**0.36**
GRAND TOTAL	**50.67**	**1.63**	**0.00**	**0.19**	**52.49**														**5.4%**	**0.11**	**0.37**

MCLEAN MINOR SUBDIVISION
EXISTING CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**DLH**
Checked by:	**RDL**
Date:	**3/14/2024**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	*tc=(L/180)+10*	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	*tc max*	*tc design (min)*
OS-1	0.43	1.30	25	2.0	4.9	10	1000	9.00	3.0	5.6	10.5	15.7	10.5
OS-2	0.11	6.66	300	6.9	16.5	10	900	8.00	2.8	5.3	21.8	16.7	16.7
OS-3	0.17	0.98	200	11.9	10.5	10	300	4.50	2.1	2.4	12.9	12.8	12.8
OS-4	0.11	2.63	300	13.9	13.1	10	225	4.50	2.1	1.8	14.8	12.9	12.9
OS-5	0.14	1.46	300	14.7	12.4	10	270	4.50	2.1	2.1	14.5	13.2	13.2
OS-5.1	0.44	0.47	25	2.0	4.8	10	275	4.50	2.1	2.2	7.0	11.7	7.0
OS-6	0.42	0.33	25	2.0	5.0	10	100	4.50	2.1	0.8	5.8	10.7	5.8
A1	0.10	15.03	300	6.5	17.0	10	1175	6.50	2.5	7.7	24.7	18.2	18.2
A2	0.08	1.88	200	8.2	13.1	10	200	18.50	4.3	0.8	13.9	12.2	12.2
A3	0.08	11.85	300	8.2	16.1	10	965	8.00	2.8	5.7	21.7	17.0	17.0
A4	0.08	9.50	300	7.6	16.5	10	872	6.00	2.4	5.9	22.4	16.5	16.5
A5	0.08	0.40	50	10.0	6.1	10	100	4.50	2.1	0.8	6.9	10.8	6.9

HRGreen

MCLEAN MINOR SUBDIVISION
EXISTING CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by: DLH
Checked by: RDL
Date: 3/14/2024

4.06166199

			DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min)	
	1	OS-1	1.30	0.43	10.5	0.55	4.06	2.2				2.2											DIRECT RUNOFF FROM HODGEN ROAD TO WEST BOUNDARY
	2	OS-2	6.66	0.11	16.7	0.73	3.36	2.5				2.5											OFFSITE UPSTREAM RUNOFF FROM NORTH OF HODGEN ROAD TO CULVERT THAT DRAINS TO PROPERTY
	3	OS-3	0.98	0.17	12.8	0.17	3.76	0.6				0.6											OFFSITE UPSTREAM RUNOFF FROM NORTH OF HODGEN ROAD TO CULVERT THAT DRAINS TO PROPERTY
	4	OS-4	2.63	0.11	12.9	0.29	3.75	1.1				1.1											OFFSITE UPSTREAM RUNOFF FROM NORTH OF HODGEN ROAD TO CULVERT THAT DRAINS TO PROPERTY
	5	OS-5	1.46	0.14	13.2	0.21	3.72	0.8				0.8											OFFSITE UPSTREAM RUNOFF FROM NORTH OF HODGEN ROAD TO CULVERT THAT DRAINS TO PROPERTY
	7	OS-5.1	0.47	0.44	7.0	0.21	4.67	1.0				1.0											DIRECT RUNOFF FOM HODGEN ROAD TO BASIN A3
	8	OS-6	0.33	0.42	5.8	0.14	4.96	0.7				0.7											DIRECT RUNOFF FOM HODGEN ROAD TO BASIN A4
	1	A1	15.03	0.10	18.2	1.48	3.23	4.8				4.8											EXISTING DEVELOPED AREA THAT FLOWS TO SOUTHWEST CORNER
	6	A2	1.88	0.08	12.2	0.15	3.83	0.6				0.6											SOUTH BORDERING AREA THAT DRAINS SOUTH
	7	A3	11.85	0.08	17.0	0.95	3.33	3.2				3.2											CENTRAL AREA THAT DRAINS TO SOUTH BOUNDARY
	8	A4	9.50	0.08	16.5	0.76	3.38	2.6				2.6											EAST AREA THAT DRAINS TO SOUTH BOUNDARY
	9	A5	0.40	0.08	6.9	0.03	4.68	0.1				0.1											SMALL EAST BOUNDARY AREA THAT DRAINS TO EAST ADJACENT LOT AND DUE SOUTH

HRGreen

MCLEAN MINOR SUBDIVISION
EXISTING CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by:	**DLH**
Checked by:	**RDL**
Date:	**3/14/2024**

			DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN PONT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min	
	1	OS-1	1.30	0.61	10.5	0.79	6.82	5.4				5.4											DIRECT RUNOFF FROM HODGEN ROAD TO WEST BOUNDARY
	2	OS-2	6.66	0.37	16.7	2.48	5.65	14.0				14.0											OFFSITE UPSTREAM RUNOFF FROM NORTH OF HODGEN ROAD TO CULVERT THAT DRAINS TO PROPERTY
	3	OS-3	0.98	0.42	12.8	0.41	6.31	2.6				2.6											OFFSITE UPSTREAM RUNOFF FROM NORTH OF HODGEN ROAD TO CULVERT THAT DRAINS TO PROPERTY
	4	OS-4	2.63	0.37	12.9	0.98	6.29	6.2				6.2											OFFSITE UPSTREAM RUNOFF FROM NORTH OF HODGEN ROAD TO CULVERT THAT DRAINS TO PROPERTY
	5	OS-5	1.46	0.40	13.2	0.58	6.24	3.6				3.6											OFFSITE UPSTREAM RUNOFF FROM NORTH OF HODGEN ROAD TO CULVERT THAT DRAINS TO PROPERTY
	7	OS-5.1	0.47	0.62	7.0	0.29	7.85	2.3				2.3											DIRECT RUNOFF FOM HODGEN ROAD TO BASIN A3
	8	OS-6	0.33	0.60	5.8	0.20	8.32	1.6				1.6											DIRECT RUNOFF FOM HODGEN ROAD TO BASIN A4
	1	A1	15.03	0.36	18.2	5.46	5.42	29.6				29.6											EXISTING DEVELOPED AREA THAT FLOWS TO SOUTHWEST CORNER
	6	A2	1.88	0.35	12.2	0.66	6.43	4.2				4.2											SOUTH BORDERING AREA THAT DRAINS SOUTH
	7	A3	11.85	0.35	17.0	4.15	5.59	23.2				23.2											CENTRAL AREA THAT DRAINS TO SOUTH BOUNDARY
	8	A4	9.50	0.35	16.5	3.33	5.67	18.8				18.8											EAST AREA THAT DRAINS TO SOUTH BOUNDARY
	9	A5	0.40	0.35	6.9	0.14	7.86	1.1				1.1											SMALL EAST BOUNDARY AREA THAT DRAINS TO EAST ADJACENT LOT AND DUE SOUTH

HRGreen

MCLEAN MINOR SUBDIVISION

DEVELOPED CONDITIONS

EL PASO COUNTY, COLORADO

Calc'd by:	**DLH**
Checked by:	**RDL**
Date:	**3/14/2024**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS-1	0.83	20.9	0.24	0.47	0.9	2.8
OS-2	6.66	5.5	0.11	0.37	2.5	14.0
OS-2.1	0.19	100.0	0.90	0.96	0.9	1.6
OS-3	0.98	13.1	0.17	0.42	0.6	2.6
OS-3.1	0.26	92.9	0.84	0.92	1.1	2.1
OS-4	2.63	5.6	0.11	0.37	1.1	6.2
OS-4.1	0.18	63.9	0.60	0.74	0.5	1.1
OS-5	1.46	9.4	0.14	0.40	0.8	3.6
OS-5.1	0.31	58.9	0.56	0.70	0.8	1.6
OS-6	0.33	43.6	0.43	0.61	0.6	1.5
B1	14.47	6.6	0.12	0.38	5.5	29.6
B2	0.56	3.3	0.09	0.36	0.3	1.7
B3	1.88	2.0	0.08	0.35	0.6	4.2
B4	10.25	4.2	0.10	0.36	3.4	21.1
B5	0.40	2.0	0.08	0.35	0.2	1.2
B6	1.20	2.0	0.08	0.35	0.4	2.9
B7	9.50	4.3	0.10	0.37	3.2	19.7
B8	0.40	2.0	0.08	0.35	0.1	1.1
TOTAL OFFSITE	**13.83**	**12.3%**	**0.17**	**0.42**	**9.7**	**37.1**
TOTAL ONSITE	**38.66**	**4.9%**	**0.10**	**0.37**	**13.7**	**81.5**
TOTAL	**52.49**	**7.1%**	**0.12**	**0.38**	**23.4**	**118.6**

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS AND DESIGN POINTS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	OS-1, B1, DP3, DP10	11.7	54.4	24.0	8.7%
2	OS-2	2.5	14.0	6.7	5.5%
3	OS-3	0.6	4.2	1.9	13.1%
4	OS-4	5.4	32.0	14.7	5.6%
5	OS-5	0.9	4.8	1.9	9.4%
6	B3	1.0	4.4	1.5	2.0%
7	B4, DP11, DP12	7.1	37.7	16.4	6.3%
8	B7, OS-6	3.9	21.2	9.8	5.6%
9	B8	0.1	1.1	0.4	2.0%
10	OS-2.1, B2, DP2	3.6	17.2	7.4	7.8%
11	OS-4.1, B5, DP4	1.8	8.4	3.2	8.4%
12	OS-5.1, B6, DP-5	1.9	8.2	3.0	11.6%

HRGreen	**MCLEAN MINOR SUBDIVISION**	**Calc'd by:**		**DLH**
	DEVELOPED CONDITIONS	**Checked by:**		**RDL**
	EL PASO COUNTY, COLORADO	**Date:**		**3/14/2024**

COMPOSITE 'C' FACTORS

BASIN	UNDEVELOPED	PAVED ROADWAY	RESIDENTIAL	ROOFTOP	TOTAL	SOIL TYPE	UNDEVELOPED			PAVED ROADWAY			RESIDENTIAL			ROOFTOP			COMPOSITE IMPERVIOUSNESS & C		
	ACRES						%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5*	C_{100}*	%I	C_5	C_{100}	%I	C_5	C_{100}
OS-1	0.67	0.16	0.00	0.00	0.83	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	20.9	0.24	0.47
OS-2	6.42	0.24	0.00	0.00	6.66	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	5.5	0.11	0.37
OS-2.1	0.00	0.19	0.00	0.00	0.19	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	100.0	0.90	0.96
OS-3	0.87	0.11	0.00	0.00	0.98	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	13.1	0.17	0.42
OS-3.1	0.02	0.24	0.00	0.00	0.26	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	92.9	0.84	0.92
OS-4	2.53	0.10	0.00	0.00	2.63	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	5.6	0.11	0.37
OS-4.1	0.07	0.11	0.00	0.00	0.18	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	63.9	0.60	0.74
OS-5	1.35	0.11	0.00	0.00	1.46	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	9.4	0.14	0.40
OS-5.1	0.13	0.18	0.00	0.00	0.31	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	58.9	0.56	0.70
OS-6	0.19	0.14	0.00	0.00	0.33	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	43.6	0.43	0.61
B1	13.46	0.49	0.33	0.19	14.47	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	6.6	0.12	0.38
B2	0.55	0.01	0.00	0.00	0.56	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	3.3	0.09	0.36
B3	1.88	0.00	0.00	0.00	1.88	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	2.0	0.08	0.35
B4	9.54	0.20	0.51	0.00	10.25	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	4.2	0.10	0.36
B5	0.40	0.00	0.00	0.00	0.40	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	2.0	0.08	0.35
B6	1.20	0.00	0.00	0.00	1.20	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	2.0	0.08	0.35
B7	8.79	0.20	0.51	0.00	9.50	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	4.3	0.10	0.37
B8	0.40	0.00	0.00	0.00	0.40	B	2	0.08	0.35	100	0.90	0.96	7	0.14	0.39	90	0.73	0.81	2.0	0.08	0.35
TOTAL OFFSITE	**12.25**	**1.58**	**0.00**	**0.00**	**13.83**														**12.3%**	**0.17**	**0.42**
TOTAL ONSITE	**36.22**	**0.90**	**1.35**	**0.19**	**38.66**														**4.9%**	**0.10**	**0.37**
GRAND TOTAL	**48.47**	**2.48**	**1.35**	**0.19**	**52.49**														**7.1%**	**0.12**	**0.38**

MCLEAN MINOR SUBDIVISION
DEVELOPED CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**DLH**
Checked by:	**RDL**
Date:	**3/14/2024**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	*tc=(L/180)+10*	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	*tc max*	*tc design (min)*
OS-1	0.24	0.83	25	2.0	6.3	10	430	8.20	2.9	2.5	8.8	12.5	8.8
OS-2	0.11	6.66	300	6.9	16.5	10	900	8.00	2.8	5.3	21.8	16.7	16.7
OS-2.1	0.90	0.19	50	2.0	2.1	10	240	3.60	1.9	2.1	5.0	11.6	5.0
OS-3	0.17	0.98	200	11.9	10.5	10	300	4.50	2.1	2.4	12.9	12.8	12.8
OS-3.1	0.84	0.26	50	2.0	2.7	10	240	3.60	1.9	2.1	5.0	11.6	5.0
OS-4	0.11	2.63	300	13.9	13.1	10	225	4.50	2.1	1.8	14.8	12.9	12.9
OS-4.1	0.60	0.18	50	2.0	5.2	10	140	4.00	2.0	1.2	6.3	11.1	6.3
OS-5	0.14	1.46	300	14.7	12.4	10	270	4.50	2.1	2.1	14.5	13.2	13.2
OS-5.1	0.56	0.31	50	2.0	5.6	10	275	4.00	2.0	2.3	7.9	11.8	7.9
OS-6	0.43	0.33	50	2.0	6.9	10	100	4.50	2.1	0.8	7.7	10.8	7.7
B1	0.12	14.47	300	6.5	16.7	10	1175	6.50	2.5	7.7	24.4	18.2	18.2
B2	0.09	0.56	40	15.2	4.7	10	100	3.50	1.9	0.9	5.6	10.8	5.6
B3	0.08	1.88	200	8.2	13.1	10	200	18.50	4.3	0.8	13.9	12.2	12.2
B4	0.10	10.25	300	8.2	15.8	10	900	8.00	2.8	5.3	21.1	16.7	16.7
B5	0.08	0.40	40	17.0	4.6	10	50	7.00	2.6	0.3	5.0	10.5	5.0
B6	0.08	1.20	100	9.9	8.7	10	150	4.50	2.1	1.2	9.9	11.4	9.9
B7	0.10	9.50	300	7.6	16.1	10	872	6.00	2.4	5.9	22.1	16.5	16.5

HRGreen

MCLEAN MINOR SUBDIVISION

DEVELOPED CONDITIONS

DESIGN STORM: 5-YEAR

Calc'd by:	DLH
Checked by:	RDL
Date:	3/14/2024

4.325367904

			DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_5*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_5*A (ac)	SLOPE %	PIPE SIZE (FT)	LENGTH (FT)	VEL. (FPS)	TRAVEL TIME (min	
	1	OS-1	0.83	0.24	8.8	0.20	4.33	0.9				0.9											DIRECT RUNOFF FROM HODGEN ROAD TO WEST BOUNDARY
	2	OS-2	6.66	0.11	16.7	0.73	3.36	2.5				2.5											DIRECT RUNOFF FROM HODGEN ROAD TO PR. CULVERT PIPE (DP2)
	2	OS-2.1	0.19	0.90	5.0	0.17	5.17	0.9				0.9											DIRECT RUNOFF FROM HODGEN ROAD SOUTH LANE
	3	OS-3	0.98	0.17	12.8	0.17	3.76	0.6				0.6											DIRECT RUNOFF FOM HODGEN ROAD THAT SHEET FLOWS ACROSS PR. ROADWAY DUE SOUTH
	4	OS-3.1	0.26	0.84	5.0	0.22	5.17	1.1				1.1											DIRECT RUNOFF FROM HODGEN ROAD THAT SHEET FLOWS ACROSS PR. ROADWAY DUE SOUTH
	3	OS-4	2.63	0.11	12.9	0.29	3.75	1.1				0.8											DIRECT RUNOFF FROM HODGEN ROAD THAT SHEET FLOWS ACROSS PR. ROADWAY DUE SOUTH
	5	OS-4.1	0.18	0.60	6.3	0.11	4.81	0.5				0.6											DIRECT RUNOFF FROM HODGEN ROAD SOUTH LANE
	5	OS-5	1.46	0.14	13.2	0.21	3.72	0.8				0.8											DIRECT RUNOFF FROM HODGEN ROAD TO PR. CULVERT PIPE (DP5)
	5	OS-5.1	0.31	0.56	7.9	0.17	4.48	0.8				0.8											DIRECT RUNOFF FROM HODGEN ROAD SOUTH LANE
	6	OS-6	0.33	0.43	7.7	0.14	4.52	0.6				0.6											DIRECT RUNOFF FROM HODGEN ROAD THAT SHEET FLOWS DUE SOUTH THROUGH LOTS ON EAST SIDE
	1	B1	14.47	0.12	18.2	1.70	3.23	5.5				5.5											RESIDENTIAL LOTS WITH EXISTING STRUCTURES AND PAVED ROADWAY, ASSUMED FUTURE BUILD OUT TO REACH MAXIMUM 7% IMPERVIOUSNESS
	2	B2	0.56	0.09	5.6	0.05	4.99	0.3				0.3											SMALL AREA UPSTREAM OF PR. CULVERT PIPE (DP2)
	3	B3	1.88	0.08	12.2	0.15	3.83	0.6				0.6											SOUTH BORDERING AREA THAT DRAINS DIRECTLY OFFSITE, ASSUMED NO FUTURE DEVELOPMENT
	4	B4	10.25	0.10	16.7	1.01	3.36	3.4				3.4											RESIDENTIAL LOTS ASSUMED FUTURE BUILD OUT TO REACH MAXIMUM 7% IMPERVIOUSNESS
	5	B5	0.40	0.08	5.0	0.03	5.17	0.2				0.2											SMALL AREA UPSTREAM OF PR. CULVERT PIPE (DP5)
	6	B6	1.20	0.08	9.9	0.10	4.15	0.4				0.4											SMALL AREA UPSTREAM OF PR. CULVERT PIPE (DP6)
	7	B7	9.50	0.10	16.5	0.95	3.38	3.2				3.2											SMALL AREA ON EAST BORDER THAT DRAINS SOUTHEAST OFFSITE, ASSUMED NO DEVELOPMENT
	8	B8	0.40	0.08	6.9	0.03	4.68	0.1				0.1											SMALL AREA ON EAST BORDER THAT DRAINS SOUTHEAST OFFSITE, ASSUMED NO DEVELOPMENT

HRGreen

MCLEAN MINOR SUBDIVISION

DEVELOPED CONDITIONS

DESIGN STORM: 100-YEAR

Calc'd by:	**DLH**
Checked by:	**RDL**
Date:	**3/14/2024**

			DIRECT RUNOFF						TOTAL RUNOFF				OVERLAND			PIPE				TRAVEL TIME			REMARKS
STREET	DESIGN PONT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	Q_{street} (cfs)	C_{100}*A (ac)	SLOPE %	Q_{PIPE} (cfs)	C_{100}*A (ac)	SLOPE %	PIPE SIZE (ft)	LENGTH (ft)	VEL. (ft/s)	TRAVEL TIME (min)	
	1	OS-1	0.83	0.47	8.8	0.39	7.26	2.8				2.8											DIRECT RUNOFF FROM HODGEN ROAD TO WEST BOUNDARY
	2	OS-2	6.66	0.37	16.7	2.48	5.65	14.0				14.0											DIRECT RUNOFF FROM HODGEN ROAD TO PR. CULVERT PIPE (DP2)
	2	OS-2.1	0.19	0.96	5.0	0.18	8.68	1.6				1.6											DIRECT RUNOFF FROM HODGEN ROAD SOUTH LANE
	3	OS-3	0.98	0.42	12.8	0.41	6.31	2.6				2.6											DIRECT RUNOFF FOM HODGEN ROAD THAT SHEET FLOWS ACROSS PR. ROADWAY DUE SOUTH
	3	OS-3.1	0.26	0.92	5.0	0.24	8.68	2.1				2.1											DIRECT RUNOFF FROM HODGEN ROAD SOUTH LANE
	4	OS-4	2.63	0.37	12.9	0.98	6.29	6.2				6.2											DIRECT RUNOFF FROM HODGEN ROAD THAT SHEET FLOWS ACROSS PR. ROADWAY DUE SOUTH
	3	OS-4.1	0.18	0.74	6.3	0.13	8.08	1.1				1.1											DIRECT RUNOFF FROM HODGEN ROAD SOUTH LANE
	5	OS-5	1.46	0.40	13.2	0.58	6.24	3.6				3.6											DIRECT RUNOFF FROM HODGEN ROAD TO PR. CULVERT PIPE (DP5)
	5	OS-5.1	0.31	0.70	7.9	0.22	7.53	1.6				1.6											DIRECT RUNOFF FROM HODGEN ROAD SOUTH LANE
	6	OS-6	0.33	0.61	7.7	0.20	7.59	1.5				1.5											DIRECT RUNOFF FROM HODGEN ROAD THAT SHEET FLOWS DUE SOUTH THROUGH LOTS ON EAST SIDE
	1	B1	14.47	0.38	18.2	5.47	5.42	29.6				29.6											RESIDENTIAL LOTS WITH EXISTING STRUCTURES AND PAVED ROADWAY, ASSUMED FUTURE BUILD OUT TO REACH MAXIMUM 7% IMPERVIOUSNESS
	2	B2	0.56	0.36	5.6	0.20	8.39	1.7				1.7											SMALL AREA UPSTREAM OF PR. CULVERT PIPE (DP2)
	3	B3	1.88	0.35	12.2	0.66	6.43	4.2				4.2											SOUTH BORDERING AREA THAT DRAINS DIRECTLY OFFSITE, ASSUMED NO FUTURE DEVELOPMENT
	4	B4	10.25	0.36	16.7	3.73	5.65	21.1				21.1											RESIDENTIAL LOTS ASSUMED FUTURE BUILD OUT TO REACH MAXIMUM 7% IMPERVIOUSNESS
	5	B5	0.40	0.35	5.0	0.14	8.68	1.2				1.2											SMALL AREA UPSTREAM OF PR. CULVERT PIPE (DP5)
	6	B6	1.20	0.35	9.9	0.42	6.96	2.9				2.9											SMALL AREA UPSTREAM OF PR. CULVERT PIPE (DP6)
	7	B7	9.50	0.37	16.5	3.47	5.67	19.7				19.7											SMALL AREA ON EAST BORDER THAT DRAINS SOUTHEAST OFFSITE, ASSUMED NO DEVELOPMENT
	8	B8	0.40	0.35	6.9	0.14	7.86	1.1				1.1											SMALL AREA ON EAST BORDER THAT DRAINS SOUTHEAST OFFSITE, ASSUMED NO DEVELOPMENT

APPENDIX C
HYDRAULIC CALCULATIONS

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

CULVERT DP10

Invert Elev Dn (ft)	=	7508.26
Pipe Length (ft)	=	32.00
Slope (%)	=	8.13
Invert Elev Up (ft)	=	7510.86
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

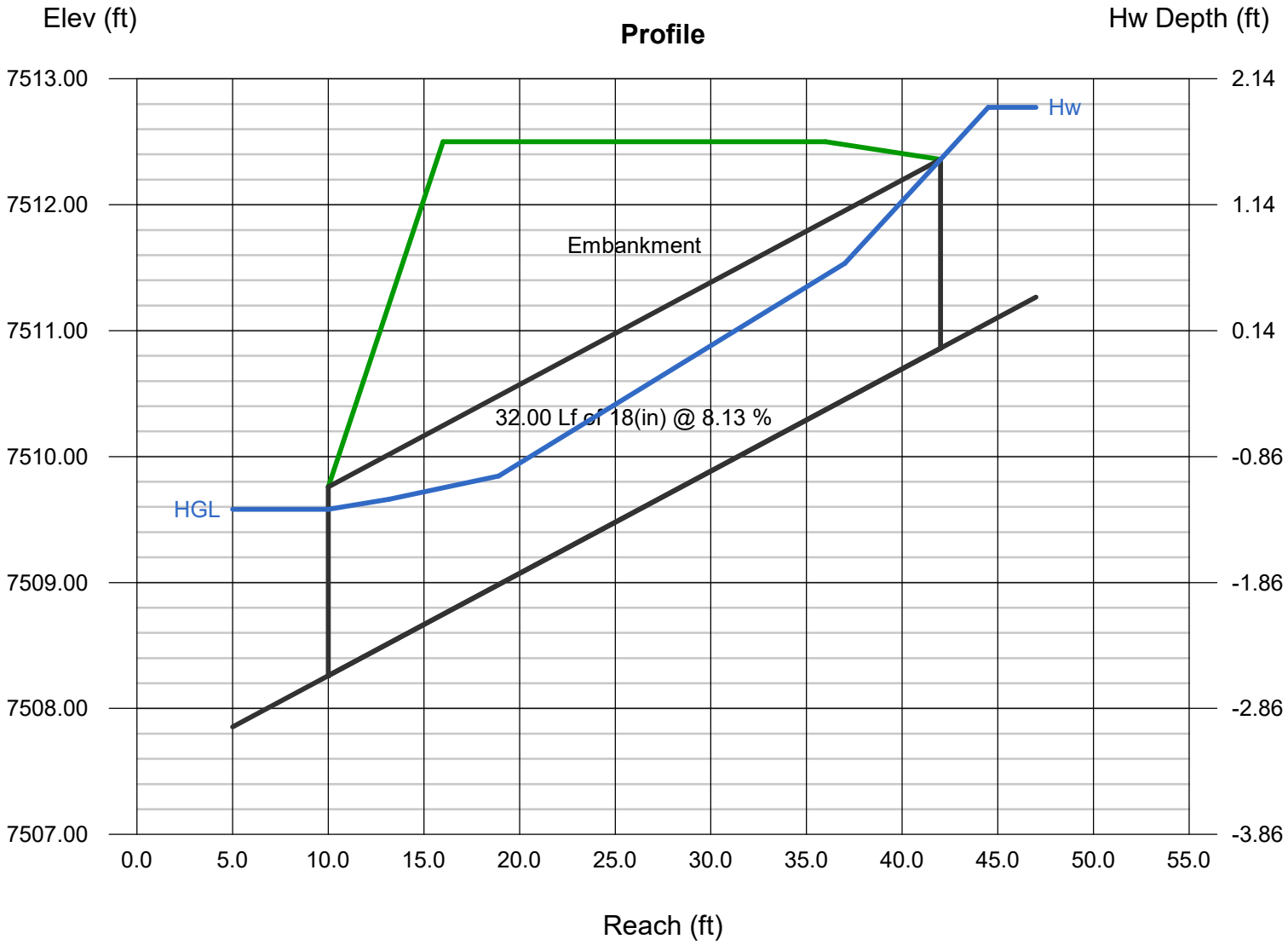
Top Elevation (ft)	=	7512.50
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	3.60
Qmax (cfs)	=	17.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	17.20
Qpipe (cfs)	=	8.72
Qovertop (cfs)	=	8.48
Veloc Dn (ft/s)	=	5.29
Veloc Up (ft/s)	=	6.04
HGL Dn (ft)	=	7509.58
HGL Up (ft)	=	7512.00
Hw Elev (ft)	=	7512.77
Hw/D (ft)	=	1.28
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

CULVERT DP11

Invert Elev Dn (ft)	=	7539.00
Pipe Length (ft)	=	52.00
Slope (%)	=	3.65
Invert Elev Up (ft)	=	7540.90
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

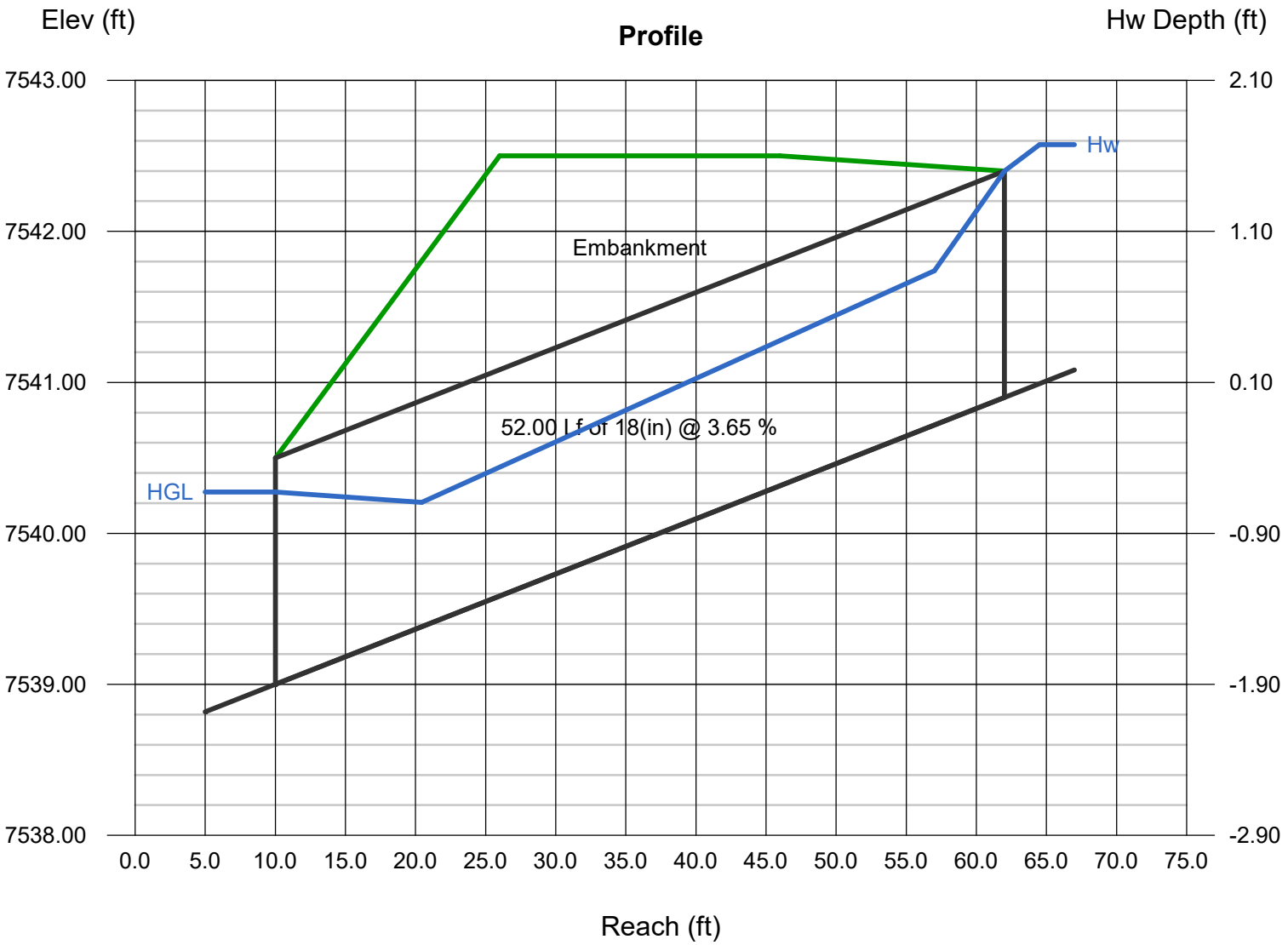
Top Elevation (ft)	=	7542.50
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	1.80
Qmax (cfs)	=	8.40
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	8.40
Qpipe (cfs)	=	7.35
Qovertop (cfs)	=	1.05
Veloc Dn (ft/s)	=	4.59
Veloc Up (ft/s)	=	5.57
HGL Dn (ft)	=	7540.28
HGL Up (ft)	=	7541.95
Hw Elev (ft)	=	7542.57
Hw/D (ft)	=	1.12
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

CULVERT DP12

Invert Elev Dn (ft)	=	7539.70
Pipe Length (ft)	=	50.00
Slope (%)	=	7.40
Invert Elev Up (ft)	=	7543.40
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

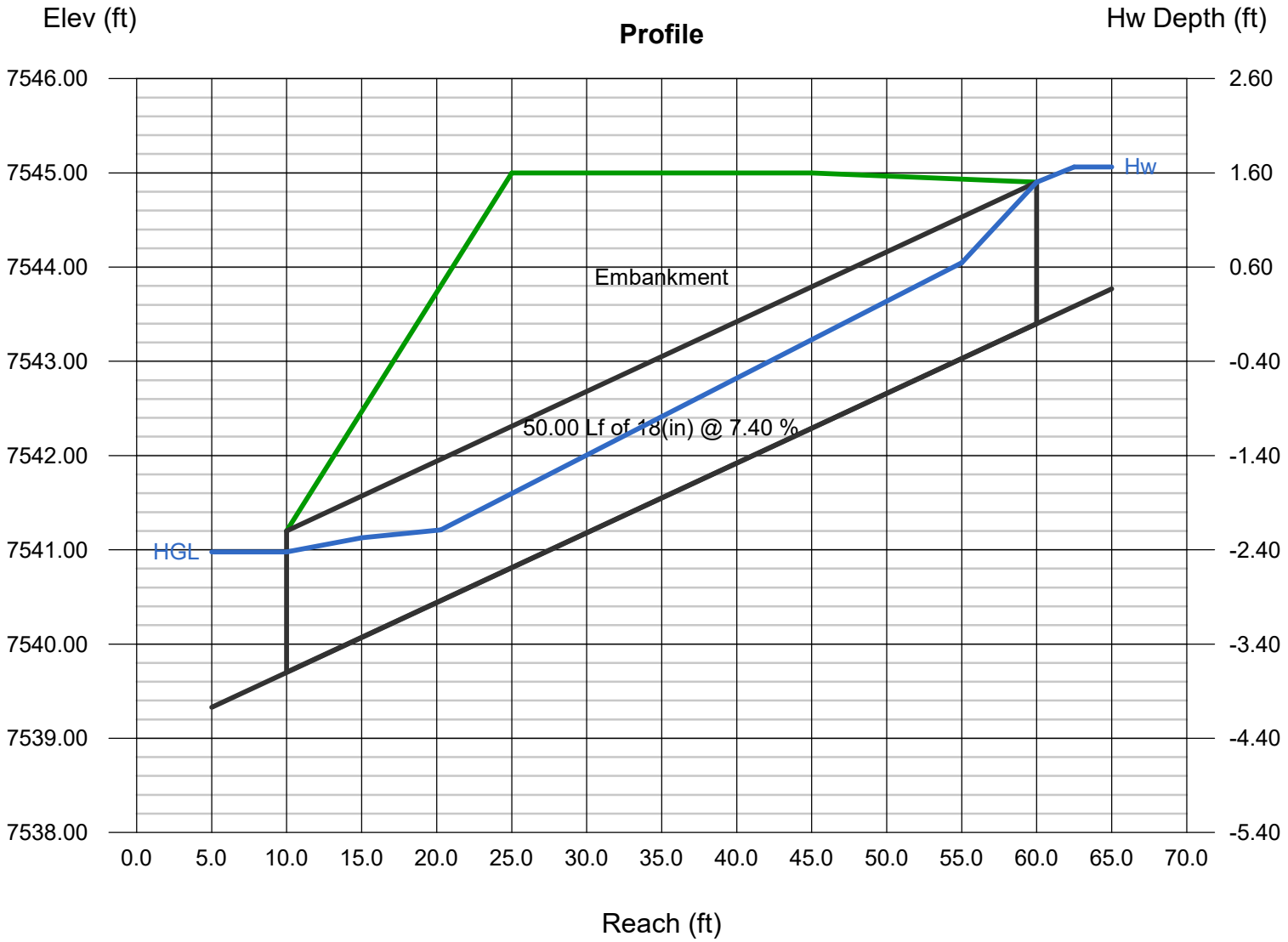
Top Elevation (ft)	=	7545.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	1.80
Qmax (cfs)	=	8.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	8.20
Qpipe (cfs)	=	7.45
Qovertop (cfs)	=	0.75
Veloc Dn (ft/s)	=	4.64
Veloc Up (ft/s)	=	5.60
HGL Dn (ft)	=	7540.98
HGL Up (ft)	=	7544.46
Hw Elev (ft)	=	7545.06
Hw/D (ft)	=	1.11
Flow Regime	=	Inlet Control



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

CHANNEL A-A 100-YEAR EXISTING

Triangular

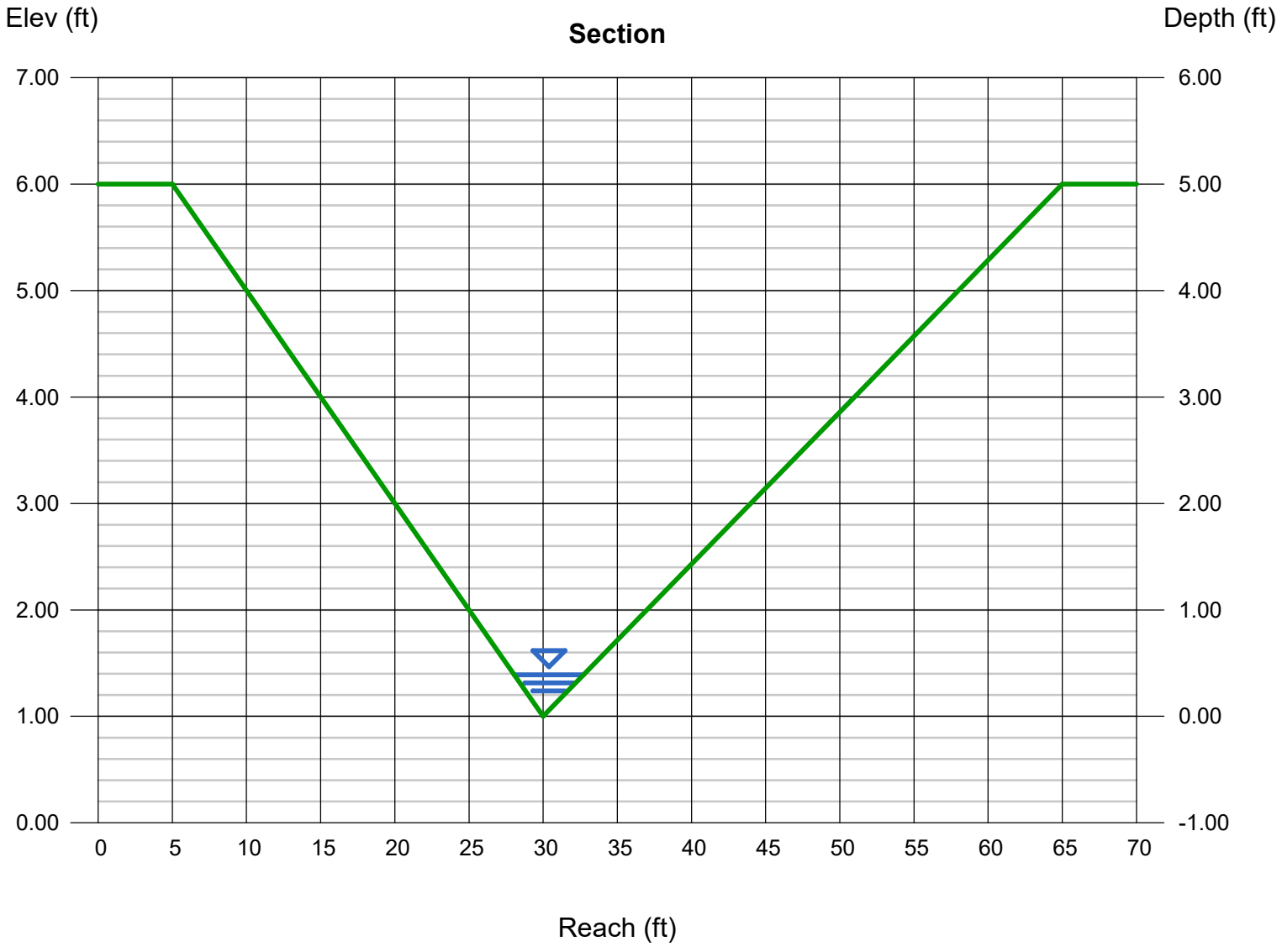
Side Slopes (z:1)	= 5.00, 7.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 1.00
Slope (%)	= 11.20
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.20

Highlighted

Depth (ft)	= 0.39
Q (cfs)	= 4.200
Area (sqft)	= 0.91
Velocity (ft/s)	= 4.60
Wetted Perim (ft)	= 4.75
Crit Depth, Yc (ft)	= 0.50
Top Width (ft)	= 4.68
EGL (ft)	= 0.72



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION B-B 100-YEAR EXISTING

Triangular

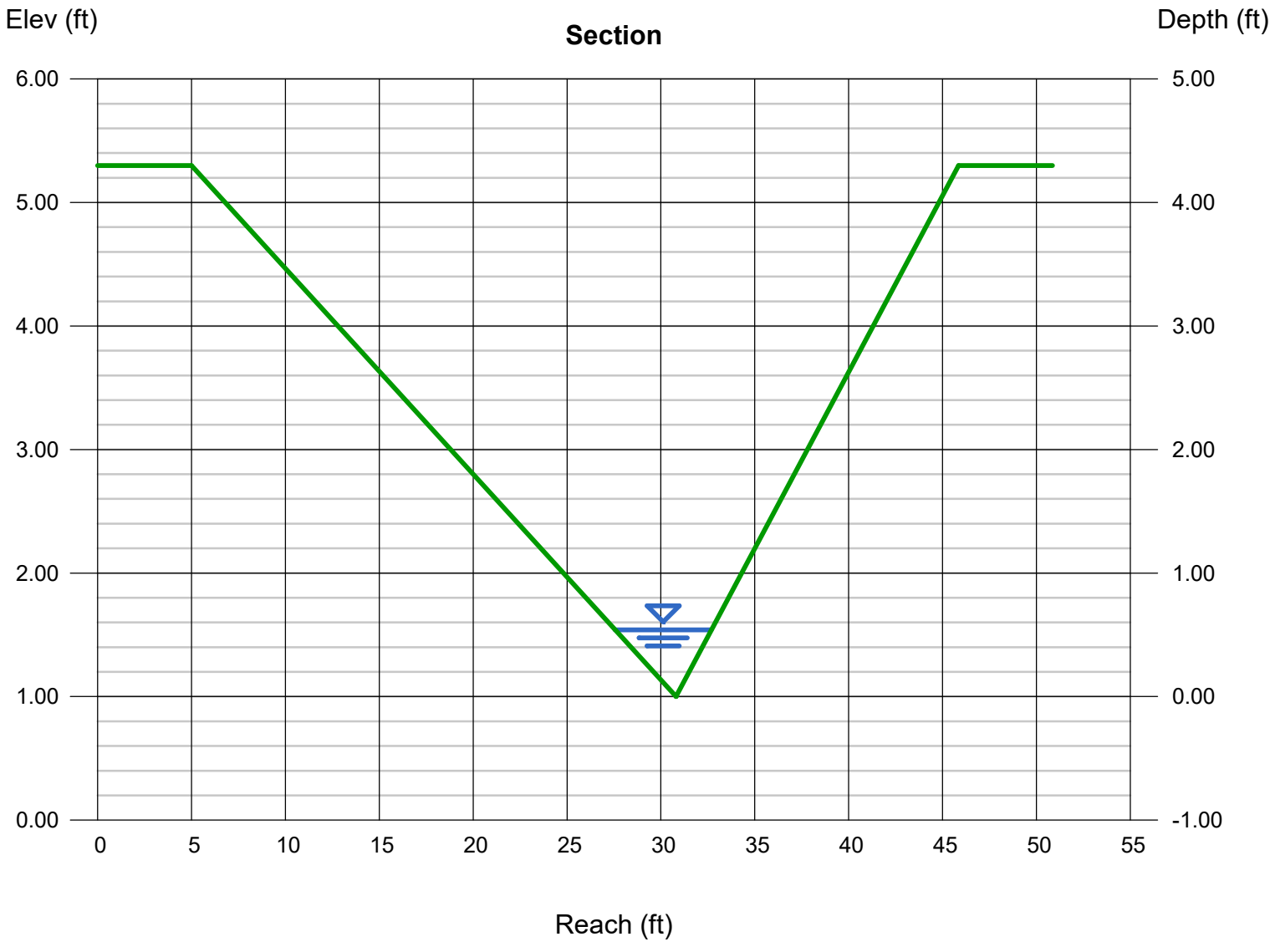
Side Slopes (z:1)	= 6.00, 3.50
Total Depth (ft)	= 4.30
Invert Elev (ft)	= 1.00
Slope (%)	= 12.40
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.50

Highlighted

Depth (ft)	= 0.54
Q (cfs)	= 8.500
Area (sqft)	= 1.39
Velocity (ft/s)	= 6.14
Wetted Perim (ft)	= 5.25
Crit Depth, Yc (ft)	= 0.73
Top Width (ft)	= 5.13
EGL (ft)	= 1.13



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION C-C 100-YEAR EXISTING

Trapezoidal

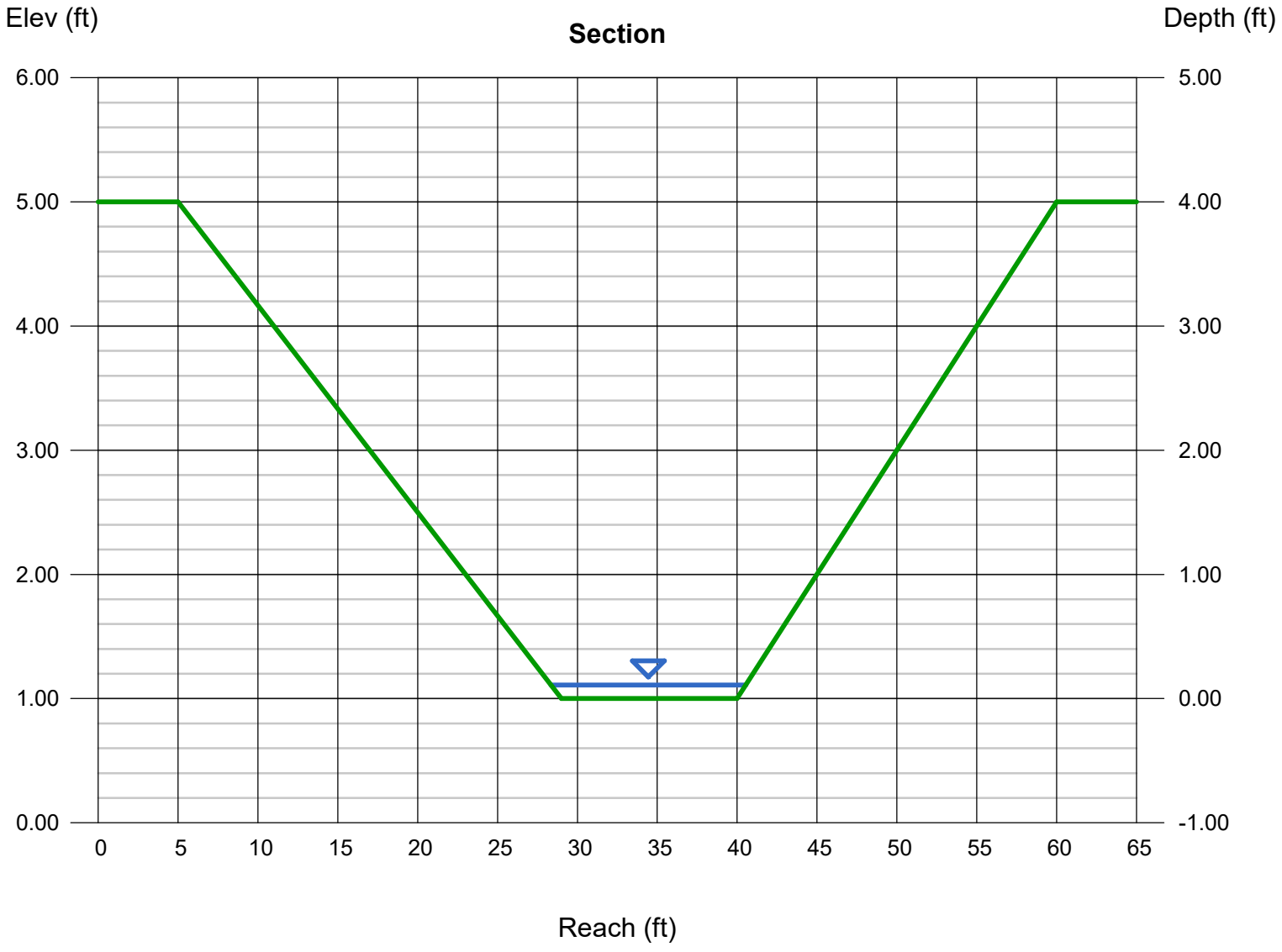
Bottom Width (ft)	= 11.00
Side Slopes (z:1)	= 6.00, 5.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 12.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.00

Highlighted

Depth (ft)	= 0.11
Q (cfs)	= 4.000
Area (sqft)	= 1.28
Velocity (ft/s)	= 3.13
Wetted Perim (ft)	= 12.23
Crit Depth, Yc (ft)	= 0.16
Top Width (ft)	= 12.21
EGL (ft)	= 0.26



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION D-D 100-YEAR EXISTING

Triangular

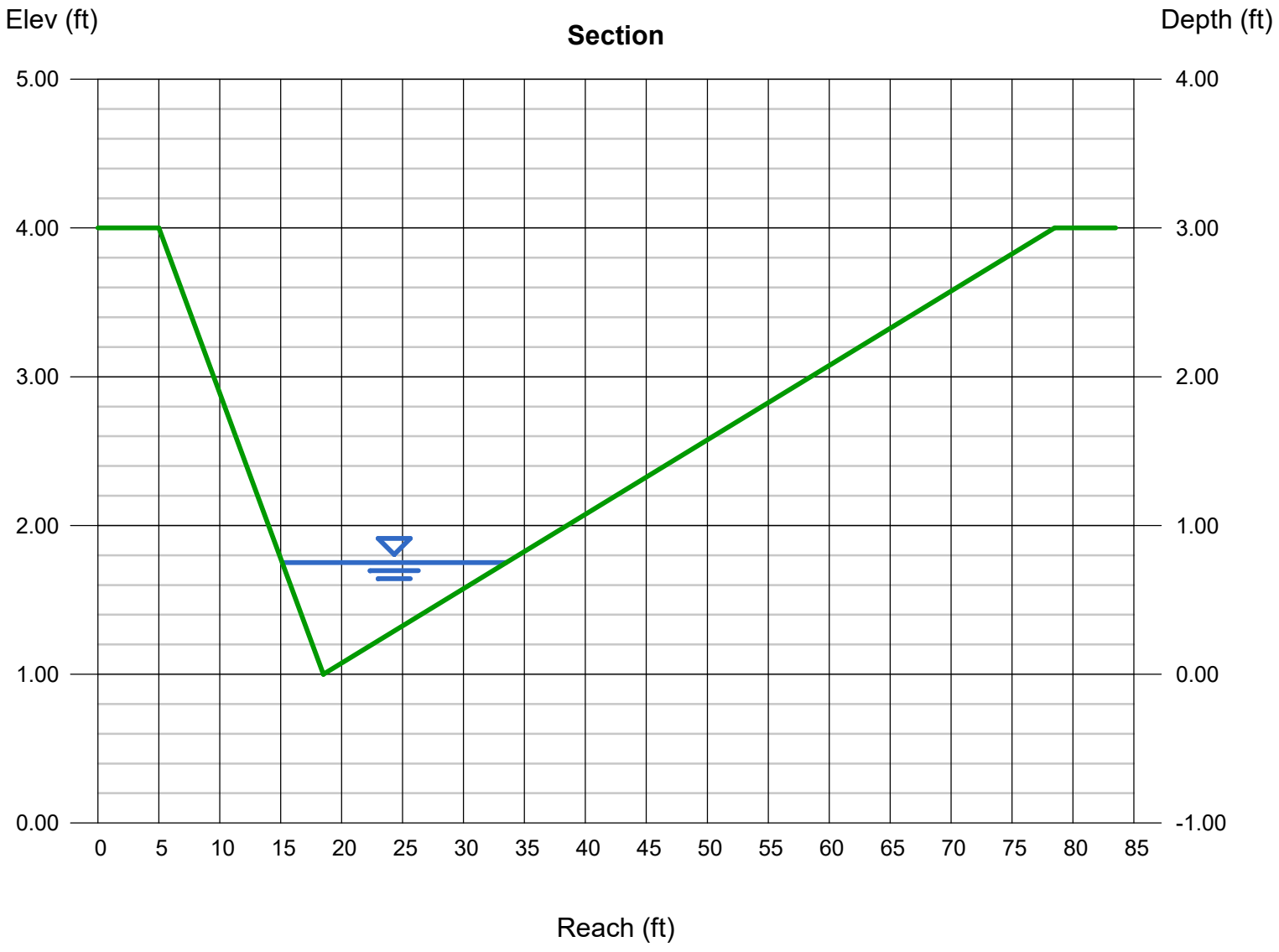
Side Slopes (z:1)	= 4.50, 20.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 5.60
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 35.20

Highlighted

Depth (ft)	= 0.75
Q (cfs)	= 35.20
Area (sqft)	= 6.89
Velocity (ft/s)	= 5.11
Wetted Perim (ft)	= 18.48
Crit Depth, Yc (ft)	= 0.88
Top Width (ft)	= 18.37
EGL (ft)	= 1.16



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION E-E 100-YEAR EXISTING

Triangular

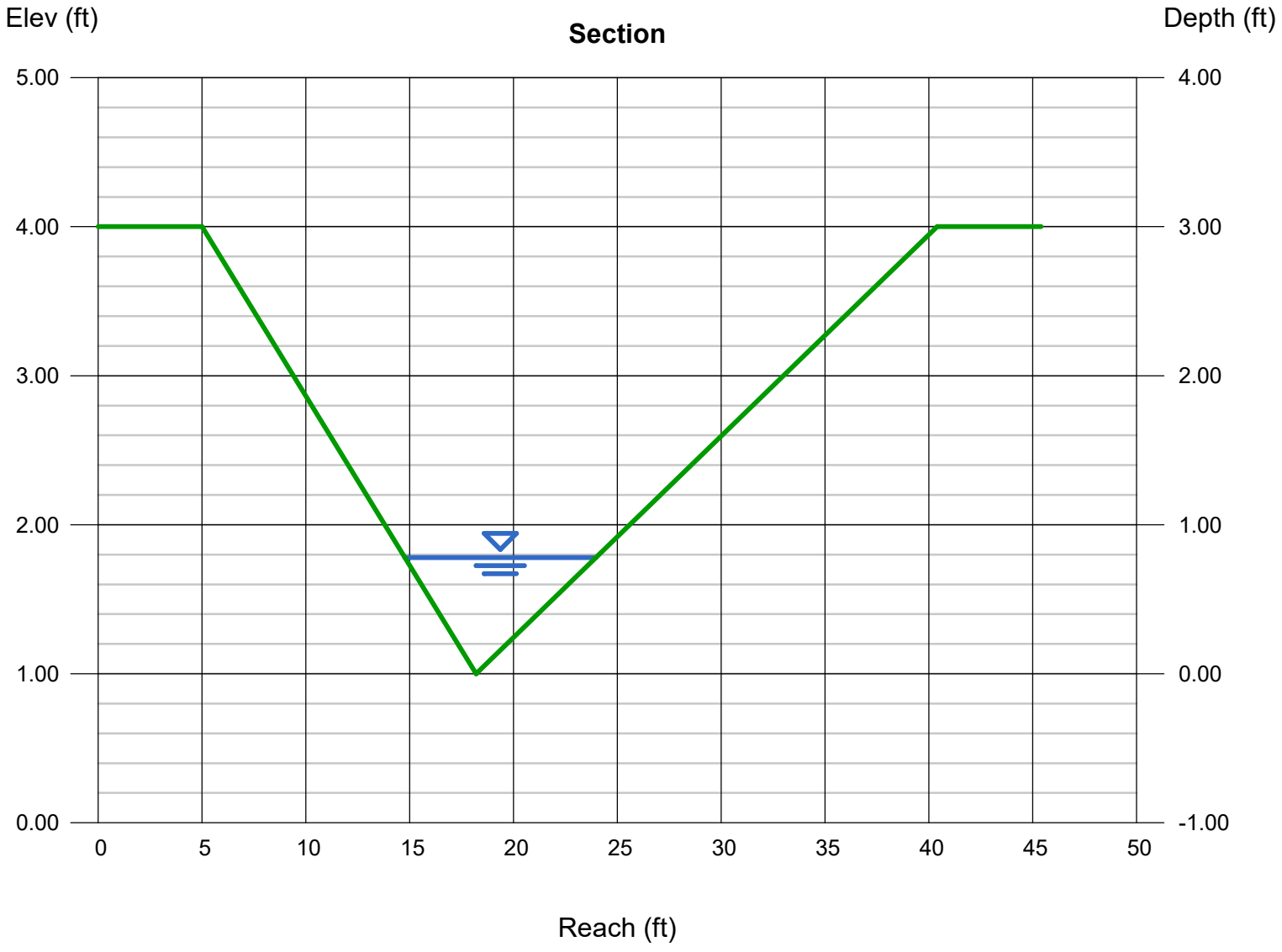
Side Slopes (z:1)	= 4.40, 7.40
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 6.70
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 20.50

Highlighted

Depth (ft)	= 0.78
Q (cfs)	= 20.50
Area (sqft)	= 3.59
Velocity (ft/s)	= 5.71
Wetted Perim (ft)	= 9.34
Crit Depth, Yc (ft)	= 0.95
Top Width (ft)	= 9.20
EGL (ft)	= 1.29



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

CHANNEL A-A 5-YEAR DEVELOPED

Triangular

Side Slopes (z:1)	= 5.00, 7.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 1.00
Slope (%)	= 11.20
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.00

Highlighted

Depth (ft)	= 0.23
Q (cfs)	= 1.000
Area (sqft)	= 0.32
Velocity (ft/s)	= 3.15
Wetted Perim (ft)	= 2.80
Crit Depth, Yc (ft)	= 0.29
Top Width (ft)	= 2.76
EGL (ft)	= 0.38

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

CHANNEL A-A 100-YEAR DEVELOPED

Triangular

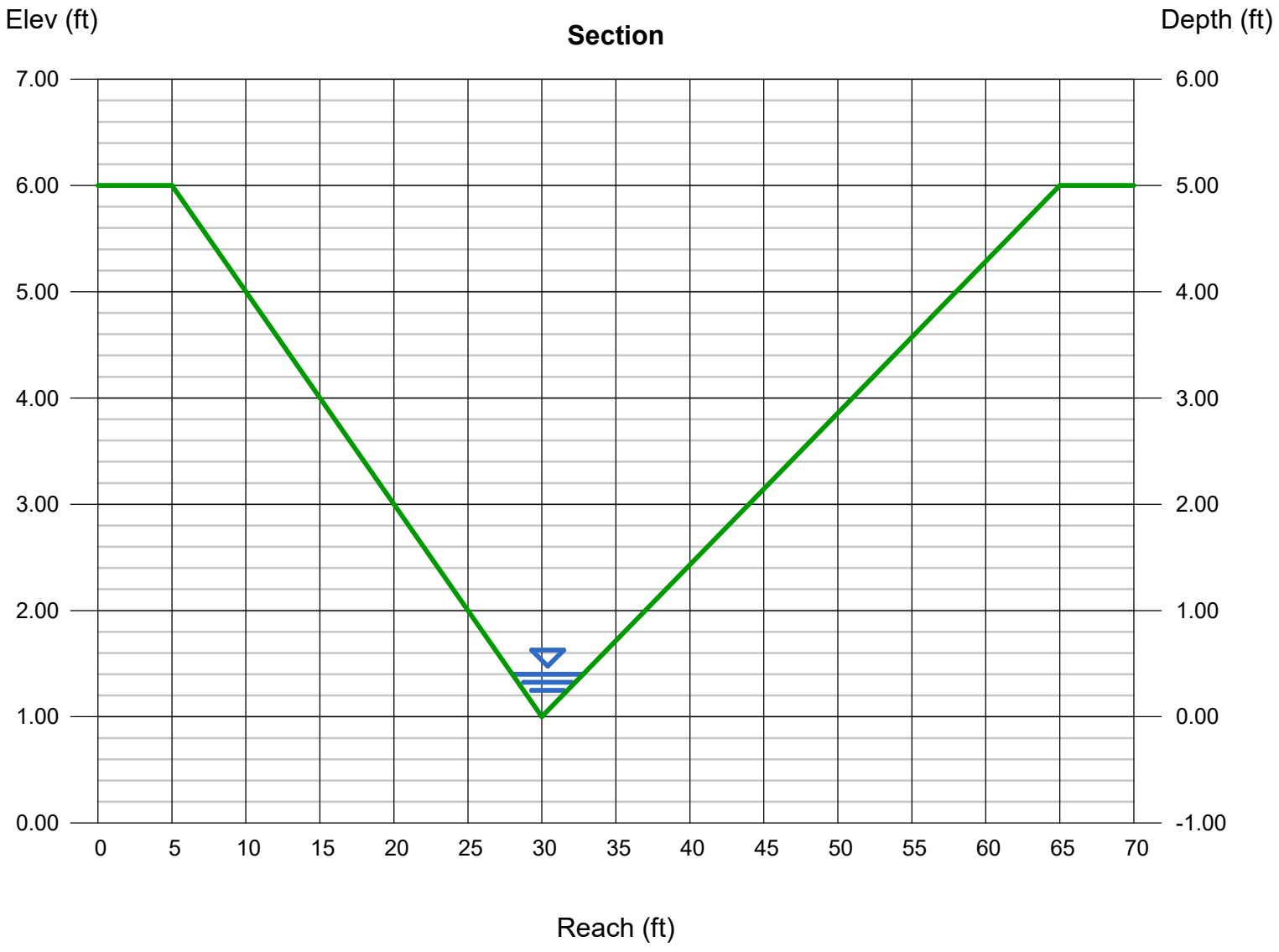
Side Slopes (z:1)	= 5.00, 7.00
Total Depth (ft)	= 5.00
Invert Elev (ft)	= 1.00
Slope (%)	= 11.20
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.40

Highlighted

Depth (ft)	= 0.40
Q (cfs)	= 4.400
Area (sqft)	= 0.96
Velocity (ft/s)	= 4.58
Wetted Perim (ft)	= 4.87
Crit Depth, Yc (ft)	= 0.51
Top Width (ft)	= 4.80
EGL (ft)	= 0.73



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION B-B 5-YEAR DEVELOPED

Triangular

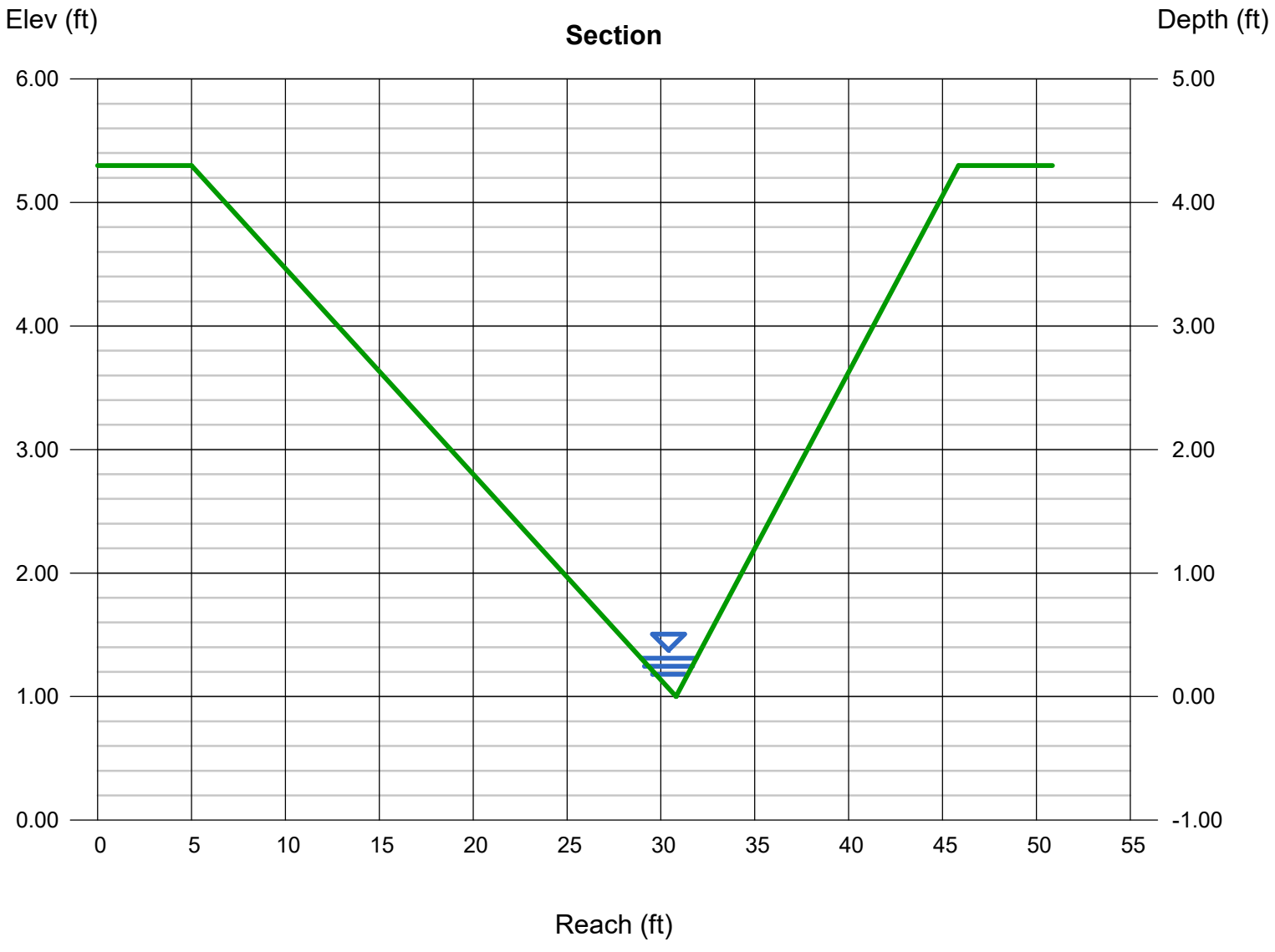
Side Slopes (z:1)	= 6.00, 3.50
Total Depth (ft)	= 4.30
Invert Elev (ft)	= 1.00
Slope (%)	= 12.40
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.80

Highlighted

Depth (ft)	= 0.31
Q (cfs)	= 1.800
Area (sqft)	= 0.46
Velocity (ft/s)	= 3.94
Wetted Perim (ft)	= 3.01
Crit Depth, Yc (ft)	= 0.39
Top Width (ft)	= 2.95
EGL (ft)	= 0.55



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION B-B 100-YEAR DEVELOPED

Triangular

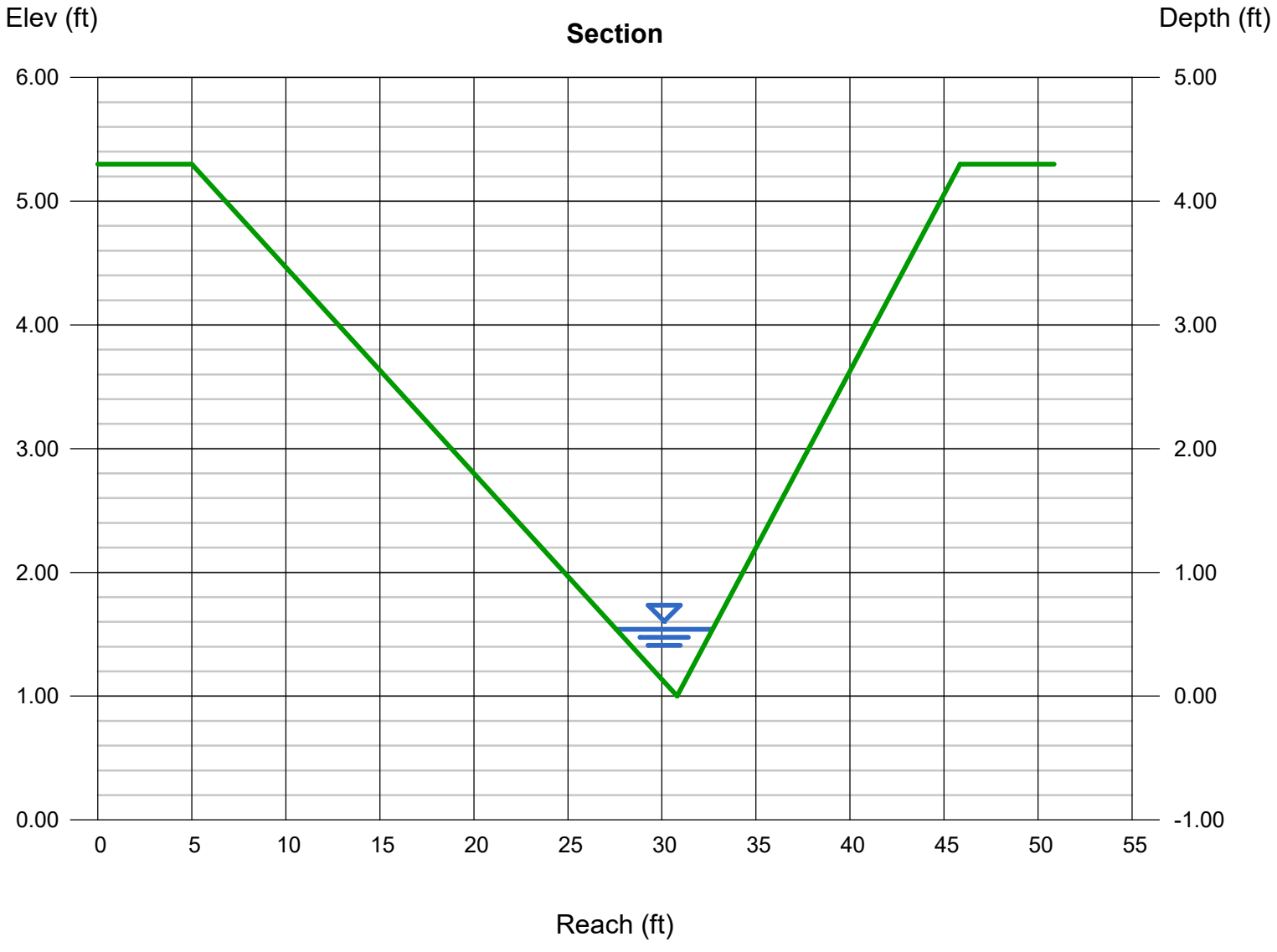
Side Slopes (z:1)	= 6.00, 3.50
Total Depth (ft)	= 4.30
Invert Elev (ft)	= 1.00
Slope (%)	= 12.40
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.40

Highlighted

Depth (ft)	= 0.54
Q (cfs)	= 8.400
Area (sqft)	= 1.39
Velocity (ft/s)	= 6.06
Wetted Perim (ft)	= 5.25
Crit Depth, Yc (ft)	= 0.73
Top Width (ft)	= 5.13
EGL (ft)	= 1.11



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION C-C 5-YEAR DEVELOPED

Trapezoidal

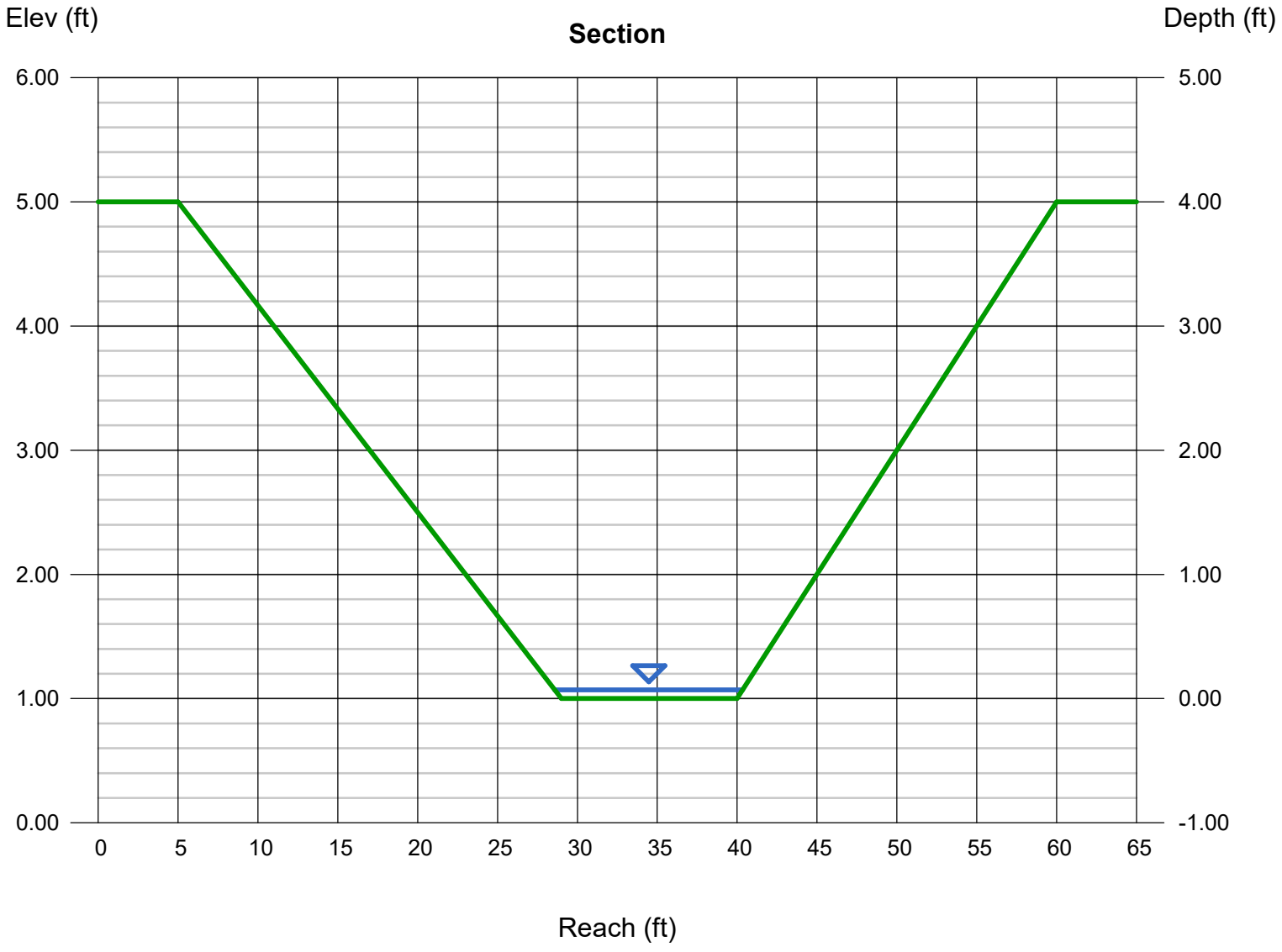
Bottom Width (ft)	= 11.00
Side Slopes (z:1)	= 6.00, 5.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 12.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.90

Highlighted

Depth (ft)	= 0.07
Q (cfs)	= 1.900
Area (sqft)	= 0.80
Velocity (ft/s)	= 2.38
Wetted Perim (ft)	= 11.78
Crit Depth, Yc (ft)	= 0.10
Top Width (ft)	= 11.77
EGL (ft)	= 0.16



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION C-C 100-YEAR DEVELOPED

Trapezoidal

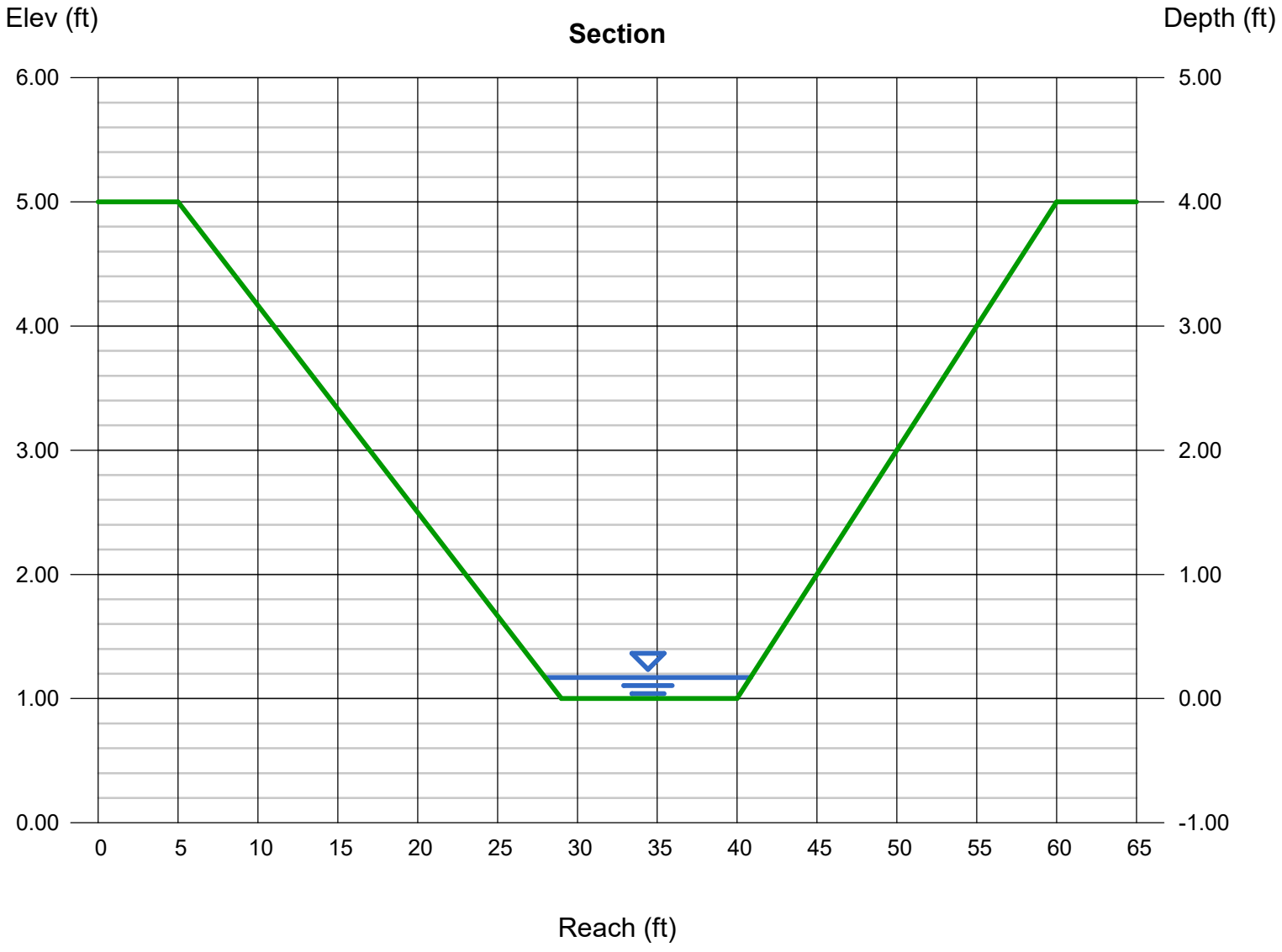
Bottom Width (ft)	= 11.00
Side Slopes (z:1)	= 6.00, 5.00
Total Depth (ft)	= 4.00
Invert Elev (ft)	= 1.00
Slope (%)	= 12.00
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 8.20

Highlighted

Depth (ft)	= 0.17
Q (cfs)	= 8.200
Area (sqft)	= 2.03
Velocity (ft/s)	= 4.04
Wetted Perim (ft)	= 12.90
Crit Depth, Yc (ft)	= 0.25
Top Width (ft)	= 12.87
EGL (ft)	= 0.42



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION D-D 5-YEAR DEVELOPED

Triangular

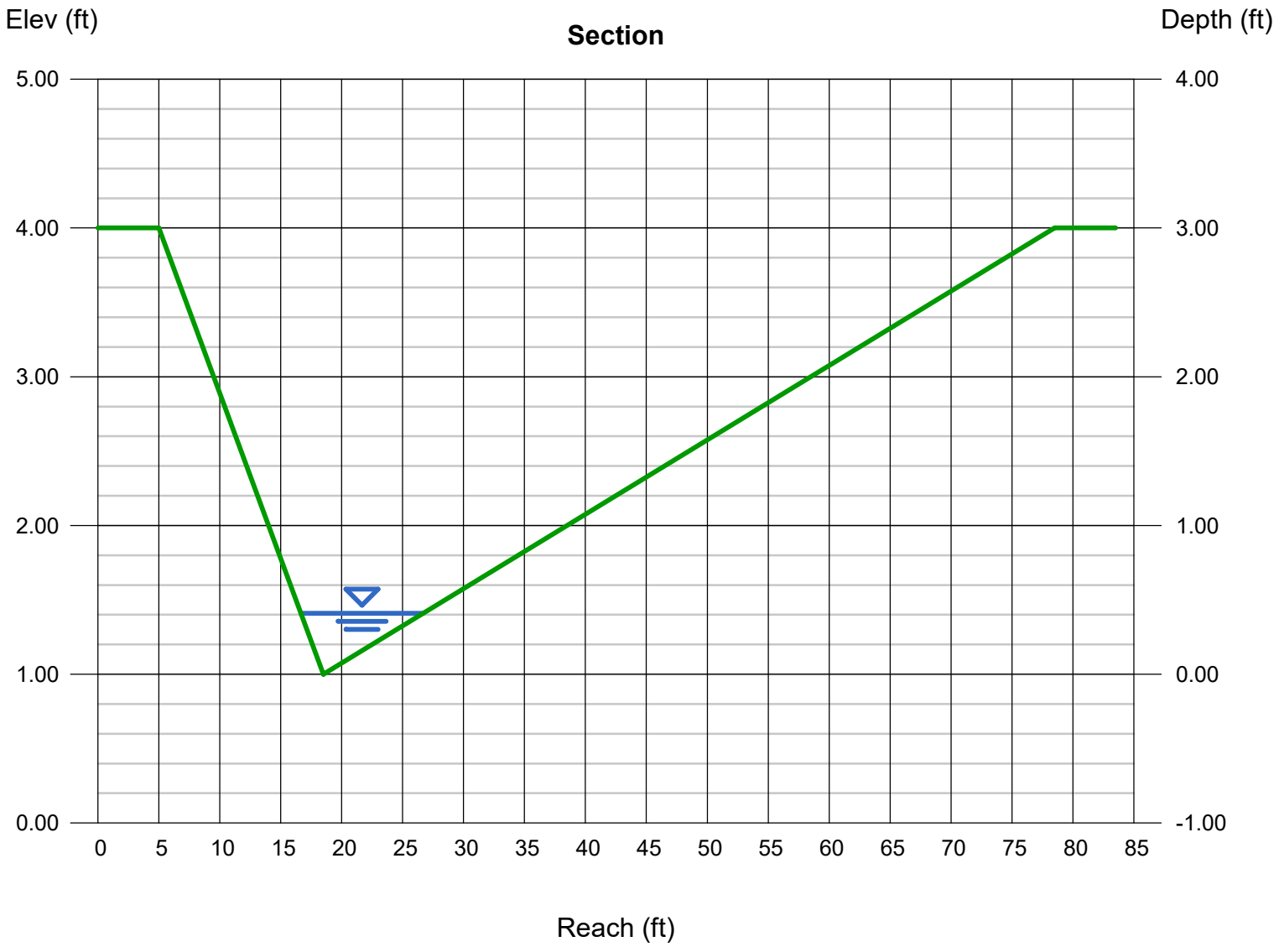
Side Slopes (z:1)	= 4.50, 20.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 5.60
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 7.10

Highlighted

Depth (ft)	= 0.41
Q (cfs)	= 7.100
Area (sqft)	= 2.06
Velocity (ft/s)	= 3.45
Wetted Perim (ft)	= 10.10
Crit Depth, Yc (ft)	= 0.47
Top Width (ft)	= 10.05
EGL (ft)	= 0.59



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION D-D 100-YEAR DEVELOPED

Triangular

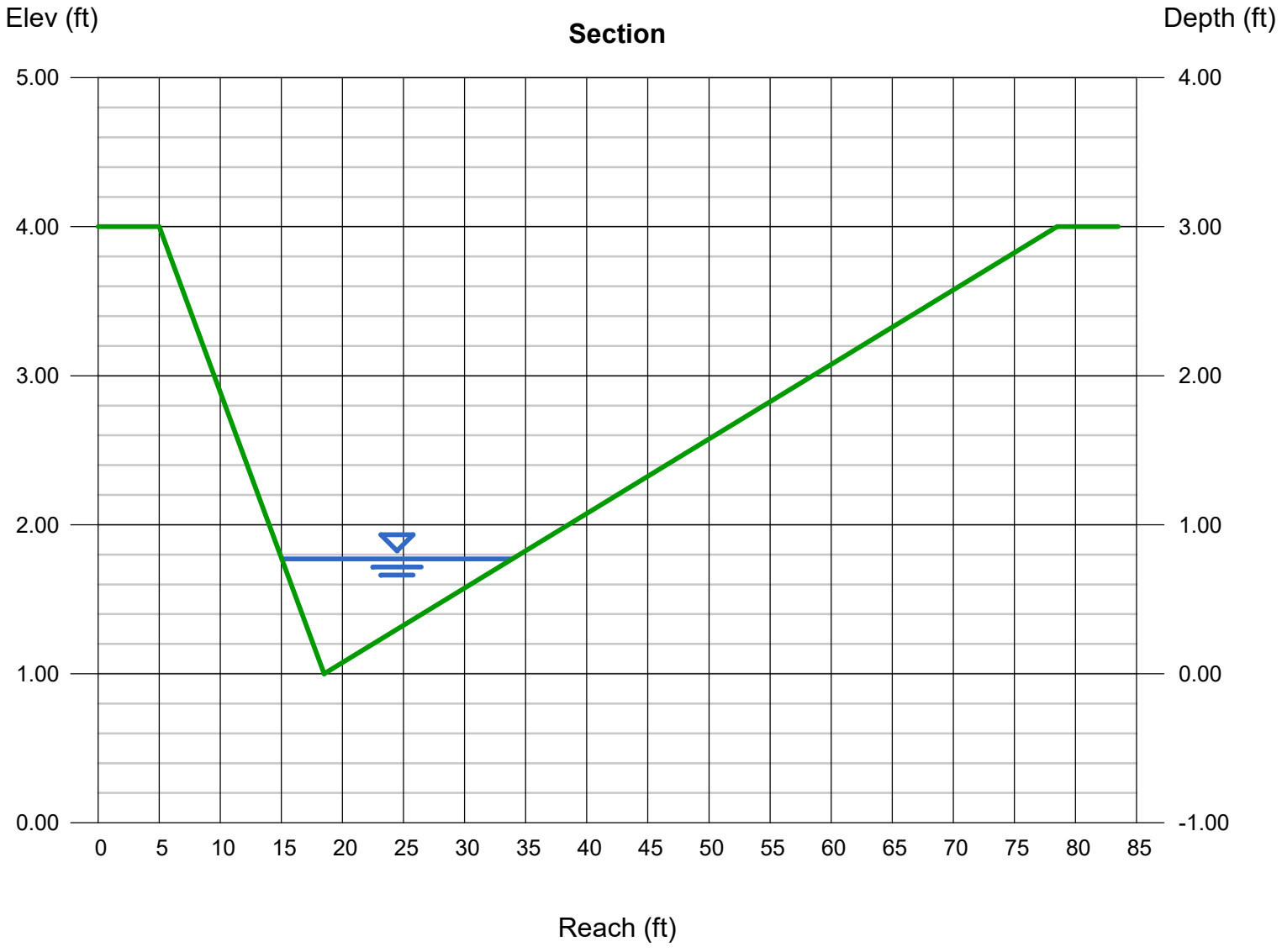
Side Slopes (z:1)	= 4.50, 20.00
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 5.60
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 37.70

Highlighted

Depth (ft)	= 0.77
Q (cfs)	= 37.70
Area (sqft)	= 7.26
Velocity (ft/s)	= 5.19
Wetted Perim (ft)	= 18.97
Crit Depth, Yc (ft)	= 0.90
Top Width (ft)	= 18.86
EGL (ft)	= 1.19



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION E-E 5-YEAR DEVELOPED

Triangular

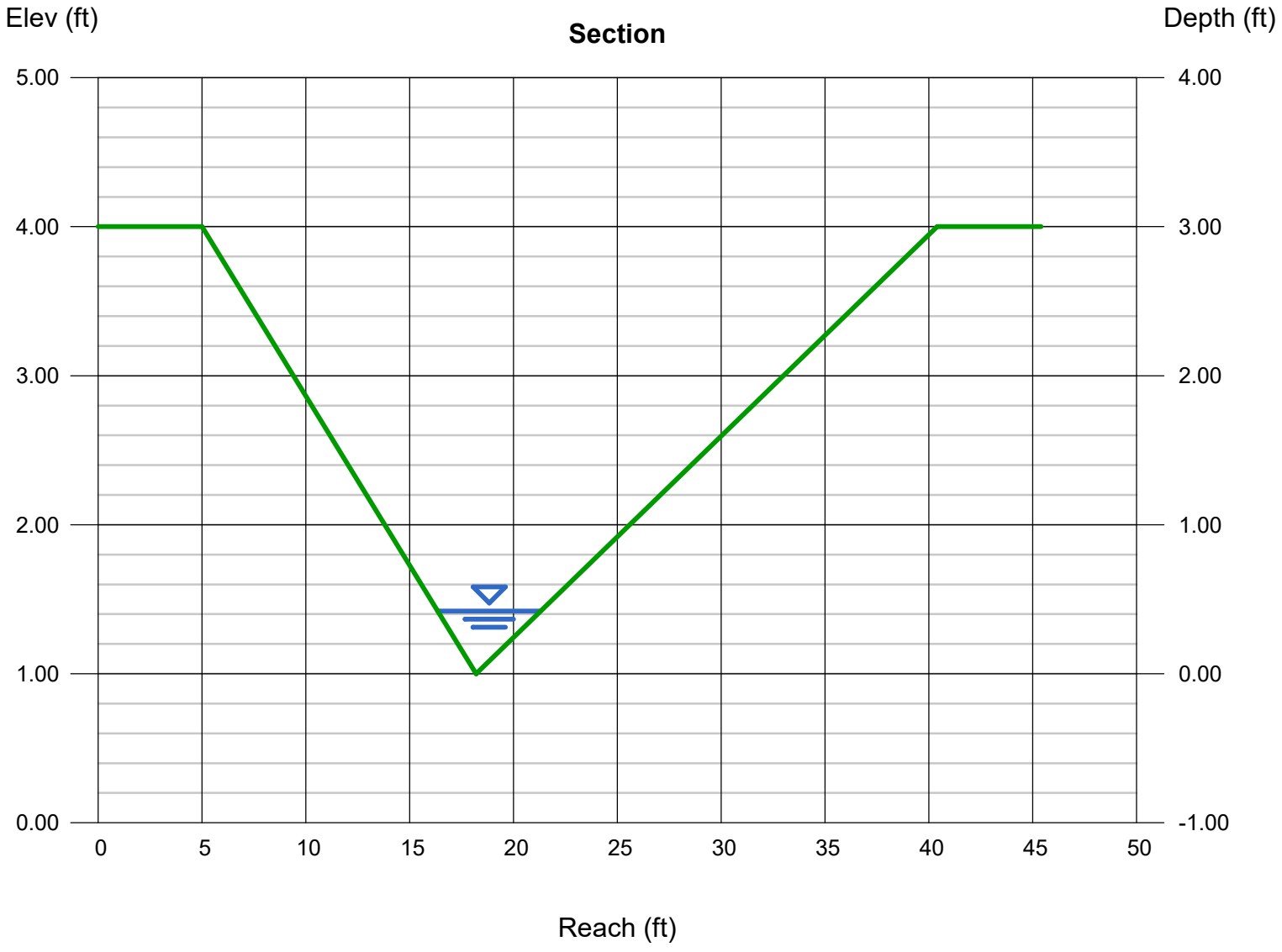
Side Slopes (z:1)	= 4.40, 7.40
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 6.70
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 3.90

Highlighted

Depth (ft)	= 0.42
Q (cfs)	= 3.900
Area (sqft)	= 1.04
Velocity (ft/s)	= 3.75
Wetted Perim (ft)	= 5.03
Crit Depth, Yc (ft)	= 0.49
Top Width (ft)	= 4.96
EGL (ft)	= 0.64



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Thursday, Mar 14 2024

SECTION E-E 100-YEAR DEVELOPED

Triangular

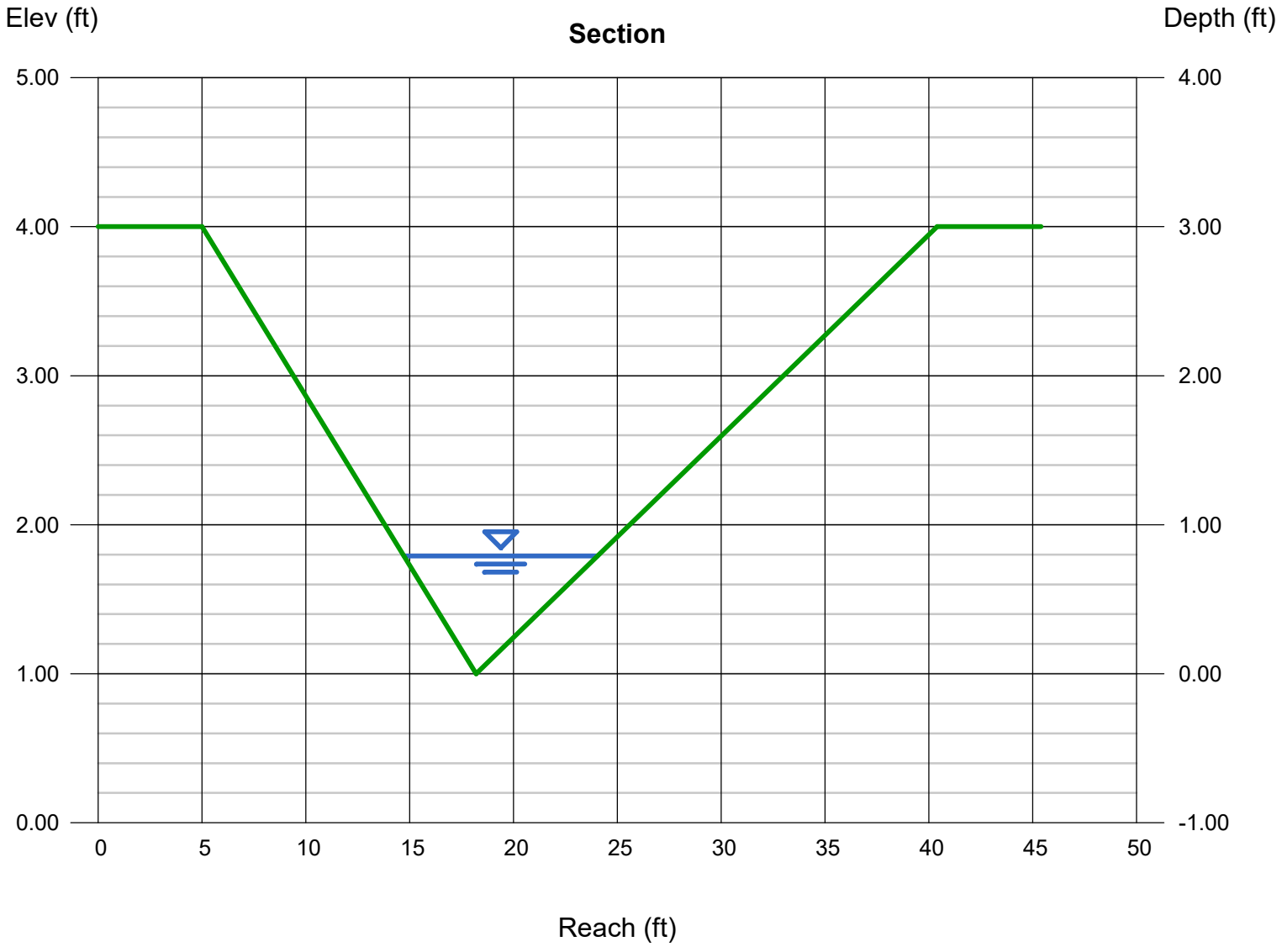
Side Slopes (z:1)	= 4.40, 7.40
Total Depth (ft)	= 3.00
Invert Elev (ft)	= 1.00
Slope (%)	= 6.70
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 21.20

Highlighted

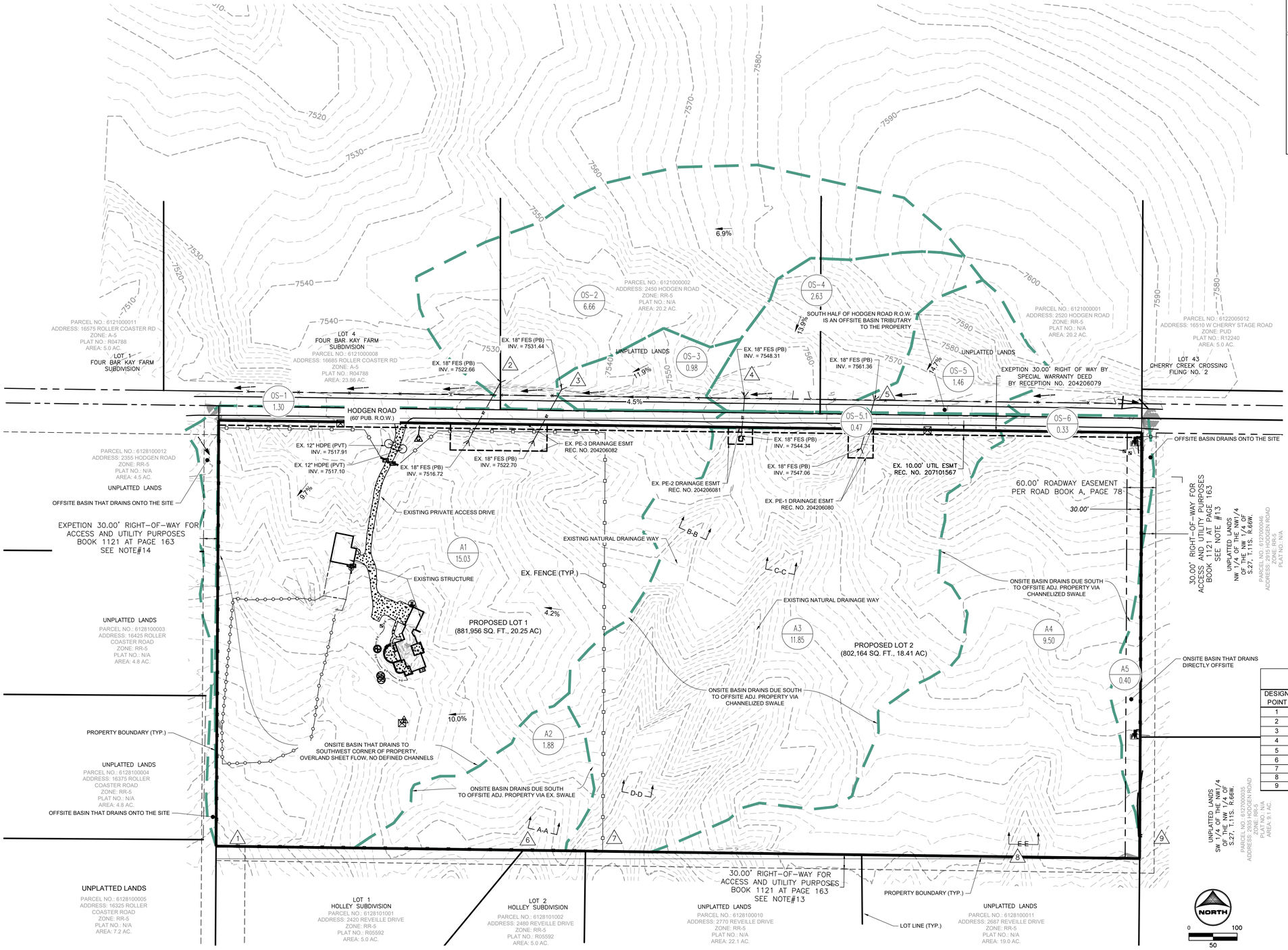
Depth (ft)	= 0.79
Q (cfs)	= 21.20
Area (sqft)	= 3.68
Velocity (ft/s)	= 5.76
Wetted Perim (ft)	= 9.46
Crit Depth, Yc (ft)	= 0.96
Top Width (ft)	= 9.32
EGL (ft)	= 1.31

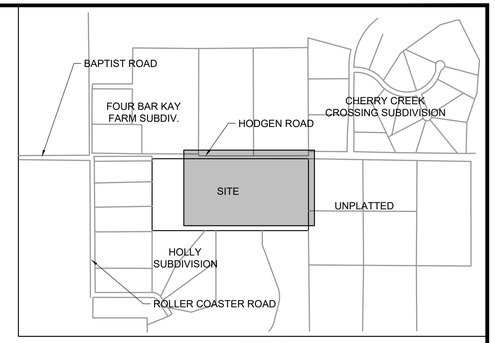


APPENDIX D
DRAINAGE MAPS

McLEAN MINOR SUBDIVISION
FINAL DRAINAGE REPORT

LOCATED WITHIN A PORTION OF SECTION 28, TOWNSHIP 11 SOUTH, RANGE 66
WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO





KEY MAP
SCALE: NTS

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- EXISTING DRAINAGE SWALE
- PROPOSED DRAINAGE SWALE
- EXISTING TERTIARY DRAINAGE WAY
- PROPOSED DRAINAGE EASEMENT
- PROPERTY BOUNDARY
- EXISTING EASEMENT
- PROPOSED ACCESS EASEMENT
- EXISTING ROW
- EXISTING DRAINAGE EASEMENT
- DRAINAGE BASIN
- PROPOSED FLOW DIRECTION
- DESIGN POINT
- PROPOSED BASIN LABEL — 11 / 1.25 — BASIN DESIGNATION / AREA (AC.)

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS-1	1.30	43.3	0.43	0.61	2.2	5.4
OS-2	6.66	5.5	0.11	0.37	2.5	14.0
OS-3	0.98	13.1	0.17	0.42	0.6	2.6
OS-4	2.63	5.6	0.11	0.37	1.1	6.2
OS-5	1.46	9.4	0.14	0.40	0.8	3.6
OS-5.1	0.47	45.1	0.44	0.62	1.0	2.3
OS-6	0.33	42.2	0.42	0.60	0.7	1.6
A1	15.03	4.3	0.10	0.36	4.8	29.6
A2	1.88	2.0	0.08	0.35	0.6	4.2
A3	11.85	2.0	0.08	0.35	3.2	23.2
A4	9.50	2.0	0.08	0.35	2.6	18.8
A5	0.40	2.0	0.08	0.35	0.1	1.1
TOTAL OFFSITE	**13.83**	**12.3%**	**0.17**	**0.41**	**8.9**	**35.7**
TOTAL ONSITE	**38.66**	**2.9%**	**0.09**	**0.36**	**11.2**	**77.0**
TOTAL	**52.49**	**5.4%**	**0.11**	**0.37**	**20.1**	**112.6**

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS AND DESIGN POINTS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	OS-1, A1, DP2, DP3	10.1	51.6	24.0	7.1%
2	OS-2	2.5	14.0	6.7	5.5%
3	OS-3	0.6	2.6	1.0	13.1%
4	OS-4	1.1	6.2	2.6	5.6%
5	OS-5	0.8	3.6	1.5	9.4%
6	A2	0.6	4.2	1.9	2.0%
7	OS-5.1, A3, DP4, DP5	6.0	35.2	16.4	4.5%
8	OS-6, A4	3.2	20.5	9.8	3.4%
9	A5	0.1	1.1	0.4	2.0%

EXISTING CONDITIONS CHANNEL SECTION SUMMARY

SECTION	A-A	B-B	C-C	D-D	E-E
100-YR FLOW (CFS)	4.2	8.5	4	35.2	20.5
100-YR DEPTH (FT)	0.39	0.54	0.11	0.75	0.78

DRAWN BY: DLH JOB DATE: 4/15/2024
APPROVED: RDL JOB NUMBER: 2303713
CAD DATE: 4/15/2024
CAD FILE: J:\2023\2303713\Corr\CAD\Dwgs\C\Drainage\Ex_Hydrology

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 230
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

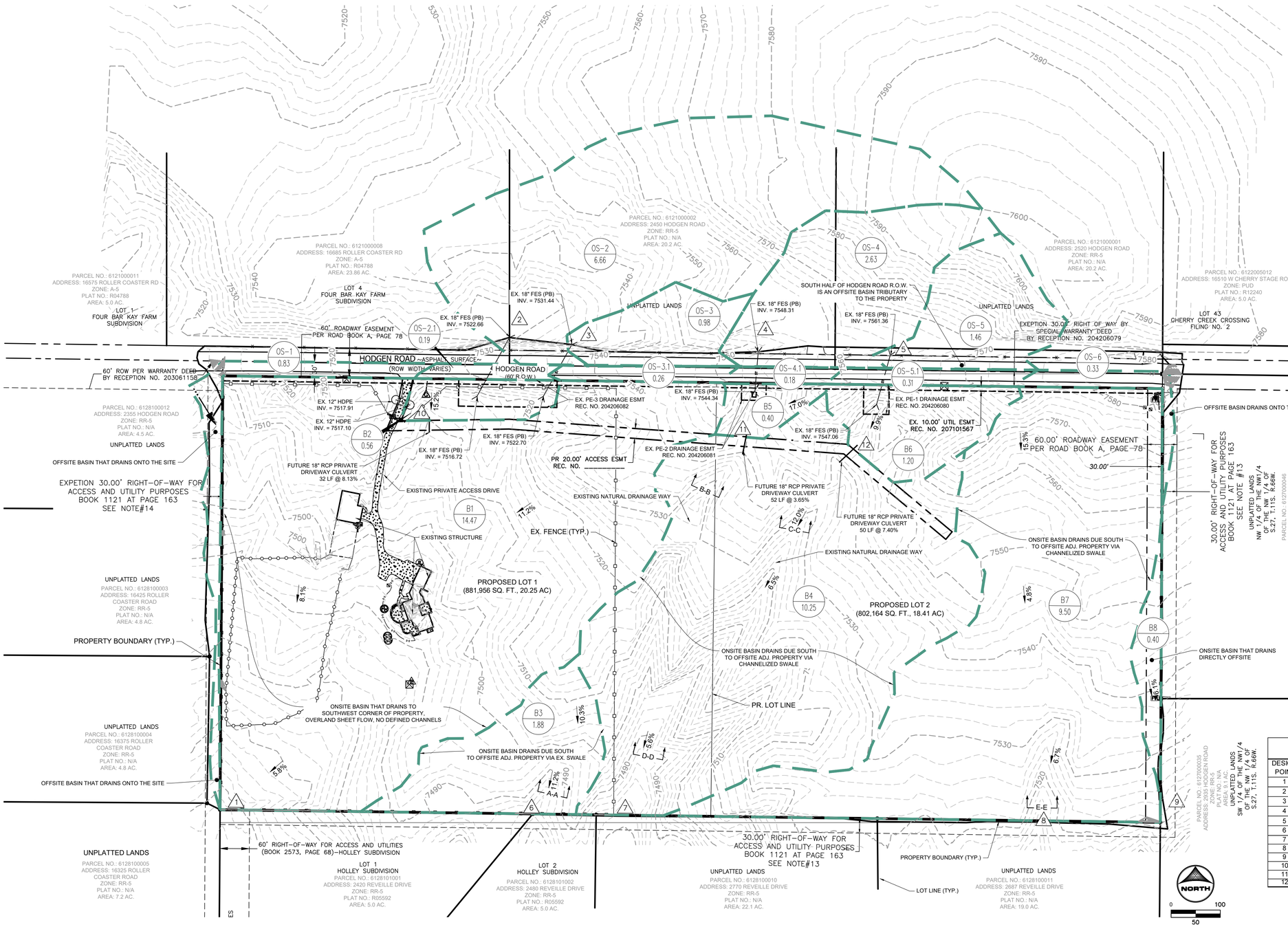
MCLEAN MINOR SUBDIVISION
VERTEX CONSULTING SERVICES
EL PASO COUNTY, CO

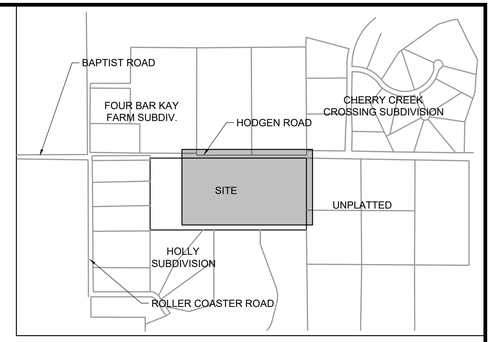
FINAL DRAINAGE REPORT
EXISTING CONDITIONS HYDROLOGY MAP

SHEET HYD 1

McLEAN MINOR SUBDIVISION
FINAL DRAINAGE REPORT

LOCATED WITHIN A PORTION OF SECTION 28, TOWNSHIP 11 SOUTH, RANGE 66
WEST OF THE 6TH P.M., COUNTY OF EL PASO, STATE OF COLORADO





KEY MAP
SCALE: NTS

LEGEND:

- PROPOSED MAJOR CONTOUR — 5250
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- EXISTING EASEMENT
- PROPOSED ACCESS EASEMENT
- EXISTING ROW
- EXISTING DRAINAGE EASEMENT
- DRAINAGE BASIN
- PROPOSED FLOW DIRECTION
- DESIGN POINT
- PROPOSED BASIN LABEL
- 11 / 1.25 — BASIN DESIGNATION / AREA (AC.)

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
OS-1	0.83	20.9	0.24	0.47	0.9	2.8
OS-2	6.66	5.5	0.11	0.37	2.5	14.0
OS-2.1	0.19	100.0	0.90	0.96	0.9	1.6
OS-3	0.98	13.1	0.17	0.42	0.6	2.6
OS-3.1	0.26	92.9	0.84	0.92	1.1	2.1
OS-4	2.63	5.6	0.11	0.37	1.1	6.2
OS-4.1	0.18	63.9	0.60	0.74	0.5	1.1
OS-5	1.46	9.4	0.14	0.40	0.8	3.6
OS-5.1	0.31	58.9	0.56	0.70	0.8	1.6
OS-6	0.33	43.6	0.43	0.61	0.6	1.5
B1	14.47	6.6	0.12	0.38	5.5	29.6
B2	0.56	3.3	0.09	0.36	0.3	1.7
B3	1.88	2.0	0.08	0.35	0.6	4.2
B4	10.25	4.2	0.10	0.36	3.4	21.1
B5	0.40	2.0	0.08	0.35	0.2	1.2
B6	1.20	2.0	0.08	0.35	0.4	2.9
B7	9.50	4.3	0.10	0.37	3.2	19.7
B8	0.40	2.0	0.08	0.35	0.1	1.1
TOTAL OFFSITE	**13.83**	**12.3%**	**0.17**	**0.42**	**9.7**	**37.1**
TOTAL ONSITE	**38.66**	**4.9%**	**0.10**	**0.37**	**13.7**	**81.5**
TOTAL	**52.49**	**7.1%**	**0.12**	**0.38**	**23.4**	**118.6**

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS AND DESIGN POINTS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	OS-1, B1, DP3, DP10	11.7	54.4	24.0	8.7%
2	OS-2	2.5	14.0	6.7	5.5%
3	OS-3	0.6	4.2	1.9	13.1%
4	OS-4	5.4	32.0	14.7	5.6%
5	OS-5	0.9	4.8	1.9	9.4%
6	B3	1.0	4.4	1.5	2.0%
7	B4, DP11, DP12	7.1	37.7	16.4	6.3%
8	B7, OS-6	3.9	21.2	9.8	5.6%
9	B8	0.1	1.1	0.4	2.0%
10	OS-2.1, B2, DP2	3.6	17.2	7.4	7.8%
11	OS-4.1, B5, DP4	1.8	8.4	3.2	8.4%
12	OS-5.1, B6, DP-5	1.9	8.2	3.0	11.6%

DEVELOPED CONDITIONS CHANNEL SECTION SUMMARY

SECTION	A-A	B-B	C-C	D-D	E-E
100-YR FLOW (CFS)	4.4	8.4	8.2	37.7	21.2
5-YR FLOW (CFS)	1	1.8	1.9	7.1	3.9
100-YR DEPTH (FT)	0.4	0.54	0.17	0.77	0.79
5-YR DEPTH (FT)	0.23	0.31	0.07	0.41	0.42
100-YR FLOW % INCREASE	4.5%	-1.2%	51.2%	6.6%	3.3%
100-YR DEPTH % INCREASE	2.5%	0.0%	35.3%	2.6%	1.3%

DRAWN BY: DLH | JOB DATE: 3/14/2024
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CAD FILE: J:\2023\2303713\Corr\CAD\Dwgs\C\Drainage\Dev_Hydrology

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MCLEAN MINOR SUBDIVISION
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FINAL DRAINAGE REPORT
DEVELOPED CONDITIONS HYDROLOGY MAP

SHEET HYD 2