

Exhibit G: Stormwater Report

Stormwater Report for

WWSS Commission; TVWD, City of Hillsboro and City of Beaverton

Water Treatment Plant (WTP_1.0)

CDM Smith

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DRAFT as of June 2020/60% Design

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Section 1

Section 1

Project Overview and Description

1.1 Introduction

Population size and municipal water needs in Washington County are expected to double in the next 50 years, with new source supplies needed as early as 2026. Tualatin Valley Water District (TVWD), the City of Hillsboro, and the City of Beaverton, collectively referred to as the WWSS Commission, or Owners, have identified the Willamette Water Supply System (WWSS) as the best option for future delivery of drinking water to their service areas in Washington County.

The WWSS Commission Water Treatment Plant (WTP_1.0) site is the focus of this report. The WTP_1.0 is one of four primary components to provide a long-term, resilient supply to serve the projected water supply needs of the Owners. The site is located in the City of Sherwood, within Washington County, Oregon. Exhibit 1 of **Appendix A** depicts a vicinity map of the project. This WTP_1.0 project is generally bound by SW 124th Avenue to the east, SW Blake Street to the north, a PGE easement to the west, and Kolk Pond to the south. The site is located on tax lot ID 2S128D000100.

Construction of the WTP_1.0 and associated roadways generate impacts to regulated wetlands and streams. As such, authorizations for removal/fill activities within these regulated areas in compliance with the Federal Clean Water Act Section 404 and State Removal/Fill Law is required. A Joint Permit Application (JPA) for this WTP_1.0 was prepared and submitted:

- To Oregon Department of State Lands (DSL) in January 2017, with subsequent concurrence on March 2017 (File No. WD2017-0008)
- To the United States Army Corps of Engineers (USACE) January 2017, with subsequent **concurrence pending** (File No. NWP-2015-41)

A preliminary Stormwater Management Plan (SWMP) accompanied the JPA, prepared by David, Evans and Associates (April 2017). The preliminary SWMP was generic enough to encompass the planning level nature of the project at the time, yet specific enough to obtain regulatory approval under Standard Local Operating Procedures for Endangered Species (SLOPES) V reporting criteria, as required by the USACE and National Marine Fisheries Service (NMFS). SLOPES V stormwater management requirements consist of:

- Explaining how runoff from impervious surfaces will be managed
- Identification of pollutants of concern; identification of contributing and non-contributing impervious surfaces within the project area

- Descriptions of Best Management Practices (BMPs) used to treat the identified pollutants of concern
- Define maintenance activities and schedule for BMPs
- Hydrologic and hydraulic analysis of BMPs

This report advances preliminary SWMP planning concepts into detailed stormwater management design and represents a current discussion of the approach and assumptions used by Murraysmith for the project. These findings are consistent with a planning approach memorandum contained within the preliminary SWMP (**Appendix E**), and the permitting requirements of the JPA.

1.2 Pollutants of Concern

During and after construction, the types of pollutants associated with the project that pose a potential risk for release into the surrounding environment are:

- Metals (zinc, copper, lead, etc.)
- Oil, grease and other petroleum products
- Sediment
- Temperature
- Polycyclic Aromatic Hydrocarbons (PAHs)

One potential source of metals resulting from the project is attributed to the placement of reinforcement for structural concrete during construction. Construction related sources of pollutants are typically covered under a 1200-C construction stormwater permit. For the purposes of this report, post-construction drainage contaminated by dissolved metals is due mainly to the operation of automobiles over the roadways. The main contributors of metal pollution are car brake pads and oil deposits leaking from vehicles.

Oil and grease are common contaminants resulting from the use of construction equipment and automobiles. The oil used to lubricate these machines leaks from moving parts over time. Petroleum spills are also a potential hazard during construction from the refueling of equipment on the construction site.

Sediments are a common source of contamination within runoff leaving a project site. Once native soils are exposed during grading activities, storm runoff can suspend loose soil particles and carry them downstream.

Temperature impacts to the surrounding environment occur mainly from impervious pavement areas and roof tops, which contribute to the “heat island effect”. These surfaces collect and retain the sun’s energy more readily than natural vegetation and soil, so that during rainfall, heat is transferred into the resulting runoff. If the runoff is not infiltrated into the ground, or passed through vegetation, it retains a larger portion of this heat which is passed down the conveyance

system into larger streams and rivers. In Oregon, temperature of drainage is primarily a function of shading (or lack thereof) over impervious surfaces, because of the hot, dry summer months.

By-products of the fuel combustion process, PAHs are generated from vehicular traffic. These pollutants may remain airborne or settle and adhere to sediments on the roadway where drainage can transport them into local receiving waters.

1.3 Name and Status of Receiving Water

There are two ultimate receiving waters for the WTP_1.0 site: Hedges Creek to the northeast and Coffee Lake Creek to the southeast. A Pre-development basin map contained within Figure 1 of **Appendix B** illustrates how the site drains to these receiving waters. The status of each receiving water for the project site is summarized below in **Table 1-1**. The Pollutant Removal Summary contained in **Section 6** of this report documents the project’s efforts related to these TMDLs and 303(d) listing status.

Table 1–1
Project Site 303(d) Listing Status of Receiving Water

Pre-development Drainage Basin	Receiving Water	303(d) or TMDL Pollutant*
HED-01.E1	Hedges Creek	1 thru 7
HED-02.F1		
HED-03.1		
COF-01.1	Coffee Lake Creek	n/a

Notes

1 = pH

2 = Biological Criteria

3 = Dissolved oxygen

4 = E. coli

5 = Pesticides

6 = Phosphorus

7 = Temperature



Section 2

Section 2

Existing Conditions Summary

2.1 Description of Pre-Development Site

The study area for the WWSS WTP_1.0 site is approximately 21 acres of undeveloped land. The site is mostly forested, with undulating topography and rocky outcroppings. The site is composed of mild slopes with several wetland areas. The northern part of the site drains to the north, eventually to Hedges Creek. The western portion of the site drains to the west through a PGE easement and eventually north to Hedges Creek. The southern portion of the site drains to the south and eventually to Coffee Lake Creek. See Figure 1 in **Appendix B** for existing conditions.

2.2 Floodplain

The entirety of the project area lies outside of the 500-year floodplain (FIRM Panel 41067C0606F). A copy of the FIRM is provided in Exhibit 2 of **Appendix A**. Since the project resides outside the floodplain, emergency responders anticipate unimpeded site access regardless of precipitation influences on adjacent drainage conveyances.

2.3 Wetlands and Existing Soil Conditions

The WWSS WTP_1.0 study area is forested with oak and madrone trees and contains both high quality and low quality wetlands. A large wetland is located on the southeastern portion of the site (Kolk Pond), and seven smaller ones are located across the site. See Exhibit 3 in **Appendix A** and the Project's JPA (WWSP, 2017) for more information. Impacts to these delineated areas are anticipated to be minimized to the extent practicable.

Multiple different soil classifications comprise the project site, as documented by the Natural Resource Conservation Service's (NRCS) Soil Survey of Washington County. The soils map excerpt from that report has been provided for reference (see Exhibit 4 of **Appendix A**) illustrating these boundaries. Native soils are classified as Hydrologic Soil Group (HSG) "B" throughout the majority of the project area, with HSG "C" soils being located on the north and east edges of the project area.

2.4 Groundwater Management

The project is outside the jurisdiction of the Southern Willamette Valley Groundwater Management Area designated by Oregon DEQ. It is also excluded from an EPA-designated sole source aquifer zone.

A *Geotechnical Engineering Report* (date pending) prepared by McMillen Jacobs, Inc. describes the detailed soil, infiltration, and groundwater conditions within the project area. In general, the project site tends to have shallow basalt bedrock and poorly draining soils. This is a condition found on the rolling hillsides of the Willamette Valley, and what attracted the Owners to develop a seismically resilient WTP_1.0. Due to the presence of poorly draining soils, retention strategies using infiltration into native soils is a secondary consideration for the project's approach to stormwater management.

2.5 Pre-Development Drainage Patterns

Figure 1 in **Appendix B** illustrates the pre-development flow regime prior to starting this project. To analyze impacts of the project on pre-development drainage patterns, computer modeled "basins" have been established where topography adjacent to the site creates distinct tributary boundaries. Each basin consists of land area that generates surface runoff during rainfall events. This runoff flows towards a common outfall at the low end of each of the two pre-development drainage basins, which serves as the analysis point for impacts from the project. The drainage patterns for each basin prior to construction are summarized below with detailed tabulations of each basin proposed in Table 5.4. Pre-development basins are assigned a prefix in accordance with the streamshed they ultimately discharge to. In this case, that is either Hedges Creek (prefix "HED-"), and Coffee Lake Creek (prefix "COF-"). Post-developed basins, while further discretized, follow a similar description and are discussed in **Section 3**.

The smallest of the pre-developed basins, HED-01.1 is 1.79 acres and is mostly pasture and trees with a mix of hydrologic soils groups, including C and D. It is located along the east side of the study area and drains to a ditch running north along SW 124th Ave to the stormwater conveyance network that conveys flows north-east along SW Tualatin-Sherwood Road. This basin ultimately discharges to Hedges Creek.

The largest of the pre-developed basins, HED-02.1 is 11.07 acres and contains a range of both forested and prairie land cover types. Hydrologic soils groups are typified by classes C and D. The basin is located within the northern portion of the overall study area and drains to the existing 36-inch culvert that conveys flows north, beneath SW Tualatin-Sherwood Rd, to a ditch that runs west along the north side of the road. This basin ultimately discharges to Hedges Creek.

Located in the south-west corner of the study area, HED-03.1 is 3.0 acres in size. Runoff is conveyed as surface flow to the south-west, through a PGE easement, then routed north through an existing drainage way in route to Hedges Creek. Hydrologic soils groups are mostly type D and the land cover is majority forested.

Located along the south-east corner of the study area. COF-01.1 is 5.23 acres in size. Runoff is conveyed as surface flow to the south-east, towards Coffee Lake Creek. Hydrologic soils groups are mostly type D and the land cover is majority forested. This basin ultimately discharges to Coffee Lake Creek.



Section 3

Proposed Development Summary

3.1 Description of Proposed Development

The WWSS WTP_1.0 site contains new impervious surfaces consisting of buildings, roadways, sidewalks, and parking areas. New pervious areas are landscaped with grasses, shrubs, and trees. Several Low Impact Development Approaches (LIDA) consisting of extended dry basins and planters are proposed to treat and detain the stormwater runoff from the site. A significant portion of the site's runoff managed by the LIDA stormwater facilities will discharge northerly toward an existing SW 124th Avenue open conveyance channel and then to an existing 36-inch culvert under SW Tualatin-Sherwood Road, both tributary to Hedges Creek. A lesser portion of the site's runoff heads east toward a roadside ditch along SW 124th Avenue, which heads east at the intersection of Tualatin-Sherwood Road and bypasses the existing 26-inch culvert in route to Hedges Creek. See Figure 2 in **Appendix B** for a graphical overview of proposed conditions. Subsequent discharges to Coffee Lake Creek are provided to mimic predevelopment flow patterns.

3.2 Post-Development Drainage Patterns

Left unaddressed, the additional impervious surfaces from roads and WTP_1.0 construction would generate increased peak flows during rainfall events. These peak flows require conveyance towards LIDA to comply with the codes and regulations applicable to the project, as described in **Section 4**. Drainage from tributary basins are generally described below, with more detailed information on their relationship to stormwater management facilities provided in **Section 5**.

Basins denoted by 'HED-LIDA_XX' and "COF-LIDA_XX' are on-site project areas impacted by proposed development. Unique area tabulations for each basin are documented in **Table 5-3**. These basins receive mitigated flows from tributary basins towards individual LIDA facilities, ultimately discharging to either Hedges Creek (denoted as 'HED') or Coffee Lake Creek (denoted as 'COF'). Each unique LIDA facility number matches the basin numbering scheme.



Section 4

Section 4

Methodology

4.1 Design Criteria

The design for stormwater management systems in this project rely on the standards, codes, and policies as adopted and/or amended by the City of Sherwood, Clean Water Services (CWS), Washington County, and the State of Oregon, summarized in **Table 4-1** below.

Table 4–1
Design Criteria Summary

Document	Description
1. Clean Water Act	Public Law 95.12 and 1977 amendments
2. Endangered Species Act	Design Criteria of the U.S. Army Corps of Engineers (USACE) Programmatic Biological Opinion entitled Standard Local Operating Procedures for Endangered Species (SLOPES V); March 2014
3. Goal 6	Oregon Department of State Land Conservation and Development – Statewide Planning Goal 6: Air, Water and Land Resource Quality
4. Section 401 Removal/Fill Stormwater Management Plan Submission Guidelines	Stormwater Management Plan submission guidelines for removal/fill permit applications which involve impervious surfaces
5. Final Hydraulic Report – SW 124 th Avenue Extension, SW Tualatin-Sherwood Road to SW Grahams Ferry Road	Washington County Dept of Land Use & Transportation and David Evans & Associates; January 2015
6. Stormwater Management Plan	WWSP and David Evans & Associates (April 2017)
7. City of Sherwood Engineering Design and Standard Details Manual	Chapter VI – Storm Drainage; January 2018
8. CWS Design and Construction Standards for Sanitary Sewer and Surface Water Management	R&O 19-5 (April 2019)

CWS classifies this development for Category 3 Hydromodification Approach Project Category due to its size exceeding 80,000 square feet. To address hydromodification risk, the project may utilize Peak-Flow Matching Detention and management of runoff from impervious area using LIDA. This approach is complementary to USACE SLOPES V design standards for continuous simulation of historic rainfall events and is described with more detail in **Section 5**.

4.2 Assumptions

The following is a summary of the current assumptions guiding design under this report.

- Assessment of the FEMA Firm Panel is adequate in determining the flood potential at the project site.
- Infiltration potential into native soils is reduced due to the shallow bedrock and poorly draining soils typical of their hydrologic soil group. Geotechnical field observations reported by **McMillen Jacobs's Geotechnical Engineering Report (date)** generally confirm that site contains poorly draining soils.
- Existing developed land uses within the project's drainage basins defined under **Section 2** are categorized as forested pervious surfaces in the pre-development drainage model. This approach is taken to comply with the "before development" conditions as defined by SLOPES V, Section 36.c.iii.
- The existing ditch running along the western side of SW 124th Avenue may convey a maximum flowrate of 5.90 cubic feet per second during the 25-year storm event, as reported in Washington County's Final Hydraulic Report for SW 124th Avenue (see Reference 6 in **Table 4-1**).

4.3 Contributing Impervious Areas

For the purposes of sizing conveyance and LIDA facilities, this section of the report discusses the impervious surfaces within each developed drainage basin. Both existing and developed contributing impervious surfaces that drain towards the project area are documented within this section for the purposes of providing water quality treatment in accordance with SLOPES V and CWS requirements. Impervious surfaces include roadways, sidewalks, and roofs. **Figure 3** in **Appendix B** illustrates the basins containing contributing impervious surfaces and their associated water quality treatment facilities, while **Table 5-3** tabulates their values. A description of the impervious areas within each basin is noted in the subsections below.

HED-LIDA_01, 02, 03, 04, 07, 09 and 10 contains new sidewalk and roadway along SW Blake Street under post-developed conditions. These contributing impervious areas drain to uniquely named LIDA roadside planters that match the basin naming convention for stormwater management, then ultimately discharge to Hedges Creek.

HED-LIDA_05, 06A and 08A contains new on-site sidewalk, roadway, parking areas and building roofs under post-developed conditions. These contributing impervious areas drain to uniquely named LIDA extended dry basins that match the basin naming convention for stormwater management, then ultimately discharge to Hedges Creek. Certain areas of new buildings within these basins lack roofs, and function as open process tanks for potable water treatment. Rainfall

on these open tank areas does not runoff toward LIDA facilities, and results in a slight net area reduction for post-development conditions are reported in **Table 5-3**.

HED-LIDA_08B contains new on-site sidewalk, roadway, parking areas and building roofs under post-developed conditions. These contributing impervious areas drain to a uniquely named LIDA extended dry basin that matches the basin naming convention for stormwater management, then ultimately discharge to Hedges Creek.

COF-LIDA_11 and 12 contains new on-site sidewalk, roadway, parking areas and building roofs under post-developed conditions. These contributing impervious areas drain to a uniquely named LIDA extended dry basin and rain garden that match the basin naming convention for stormwater management, then ultimately discharge to Coffee Lake Creek.

4.4 Downstream Conveyance System

4.4.1 Hedges Creek Conveyance

The primary conveyance system serving the project ultimately discharges to Hedges Creek and was assessed for 1/4-mile downstream of the WTP_1.0 site. The primary drainage basins from the project site drain to the north toward to an existing off-site 36-inch culvert that runs under Tualatin-Sherwood Road (see **Figure 4-4.A** below). Existing conditions find this culvert adequately sized to convey pre-development tributary flows.

After drainage exits the 36-inch culvert, the runoff is directed toward an existing off-site swale that extends easterly toward the intersection of SW 124th Avenue, running parallel to Tualatin-Sherwood Road. The swale drains to a ditch inlet at this intersection, served by an off-site 18-inch diameter outlet pipe (see **Figure 4-4.B** below, and Exhibit 5 in **Appendix A**). The 18-inch storm drain ultimately discharges northeast to an existing outfall at SW Cimino Street, which drains through an open marsh area towards Hedges Creek.

This existing off-site 18-inch diameter conveyance pipe creates restrictions and backwater during the 25-year design storm. To mitigate this condition, a series of on-site detention facilities are proposed¹.

¹ CWS R&O 19-5, Amended by R&O 19-22; Subsection 5.05.4.c

Figure 4-4.A

Off-site drainage, 36-inch culvert under Tualatin-Sherwood Road



Figure 4-4.B

Off-site drainage, ditch inlet at the intersection of SW 124th Avenue and Tualatin-Sherwood Road served by 18-inch storm drain



4.4.2 Coffee Lake Creek Conveyance

The secondary conveyance route from the site drains to Kolk Pond at the southeast corner of the WTP_1.0 site. Since Kolk Pond represents a large open body of water relative to the small tributary area draining towards it, this location serves as the downstream conveyance limits for this analysis. No further existing infrastructure is known downstream of the Kolk Pond within 1/4-mile that may generate a conveyance constraint.

4.5 Stormwater Management Features

LIDA for stormwater management facilities will treat runoff from the project's contributing impervious surfaces within the site development area. These facilities also serve as retention or storage facilities, attenuating flow rates so that post-development flows do not exceed pre-development flows. This approach entails biofiltration of stormwater runoff close to its origination and will capture sediments and pollution through use of street-side planters, rain gardens, and extended dry basins.

Design of LIDA facilities will rely upon reference to Chapter 4 of CWS' *Design and Construction Standards for Sanitary Sewer and Surface Water Management* and *LIDA Handbook*. **Figure 4-5.A** through **4-5.C** below are excerpts from these standards and show the typical configurations proposed for this project.

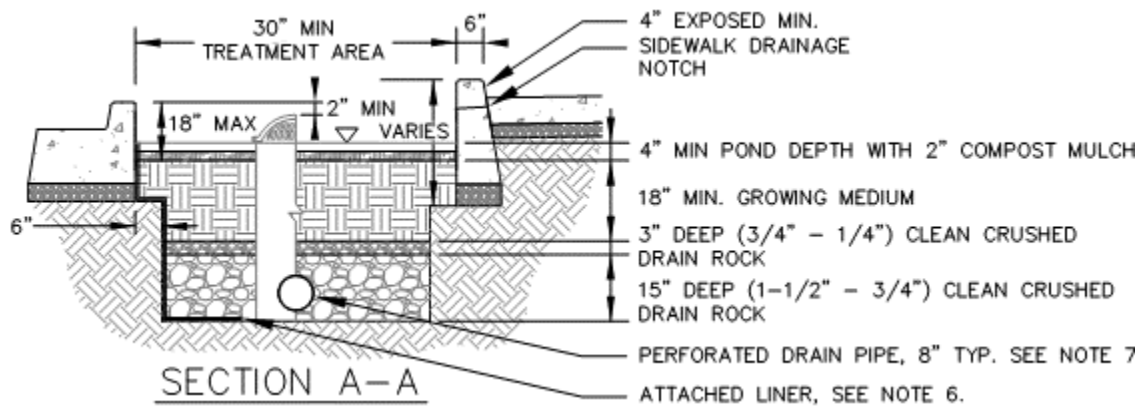
4.5.1 Street-side Planters

Street-side planters are landscaped reservoirs adjacent to roadways that collect, filter, and infiltrate stormwater runoff, allowing pollutants to settle and filter out as the water percolates through planter soil and partially infiltrates into the ground. Depending on the site, street-side planters can vary in shape and construction, with or without walls to contain the facility, or formed as a shallow, basin-like depression. The street-side planters proposed between the roadway and sidewalks along SW Blake Street as shown in **Figure 4-5.A**, and are given naming designations LIDA-01, 02, 03, 04, 07, 09, and 10.

Depending on site conditions, these facilities can be designed to completely or partially filter the stormwater they receive. For this project, the street-side planters are designed to fully retain the water quality storm event for filtration vertically through the growing media.

Because the site's native soils drain poorly, these facilities are anticipated to function under flow-through conditions. The facility base will provide exposure for rainfall runoff to native soils and allow for infiltration to the maximum extent practicable. Stormwater unable to infiltrate into poorly draining native soils will collect below the growing media in a perforated pipe surrounded by a layer of gravel and drain to an approved discharge point. As a result, numerous design variations of shape, wall treatment, and planting schemes are needed to fit the character of the site.

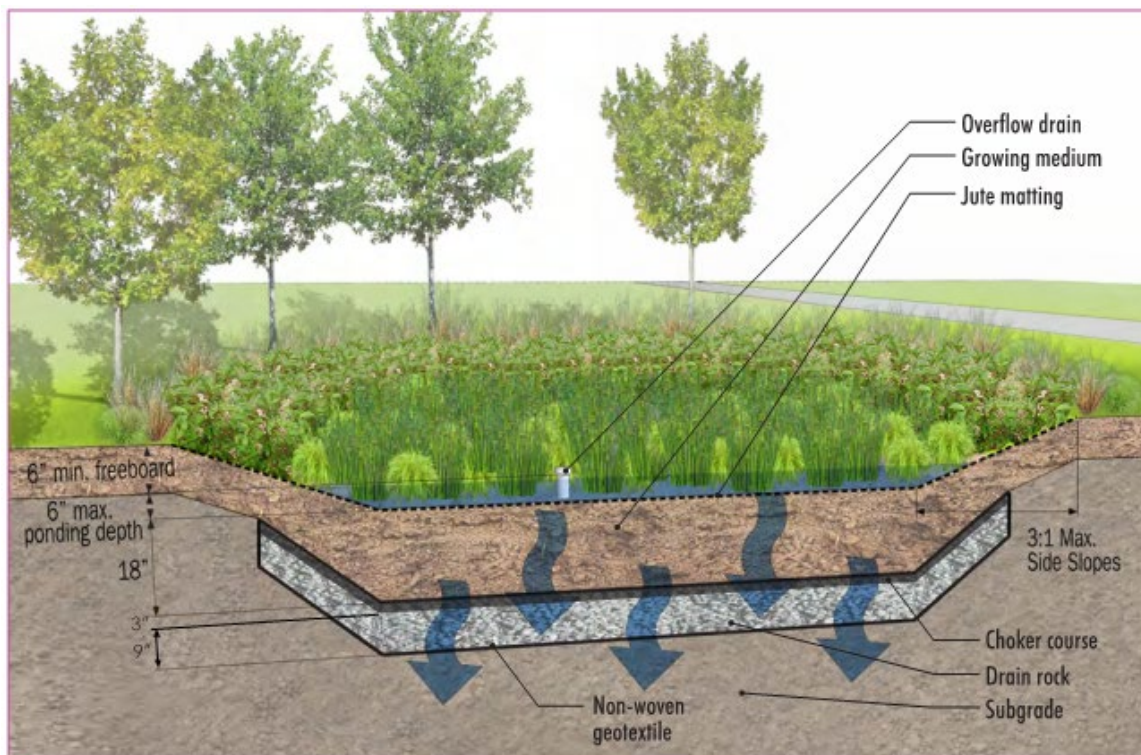
Figure 4-5.A
Infiltration Planter Section



4.5.2 Non-structural Infiltration Planter (Rain Garden)

Much like street-side planters, rain gardens are landscaped reservoirs that collect, filter, and infiltrate stormwater runoff, however they have greater flexibility to assume various geometries and shapes once separated from the roadway. The rain garden proposed for this project drains to Kolk Pond and is located on the southeast corner of the site. Its general cross section is illustrated in **Figure 4-5.B**, and is given the naming designation LIDA-12.

Figure 4-5.B
Infiltration Rain Garden Section

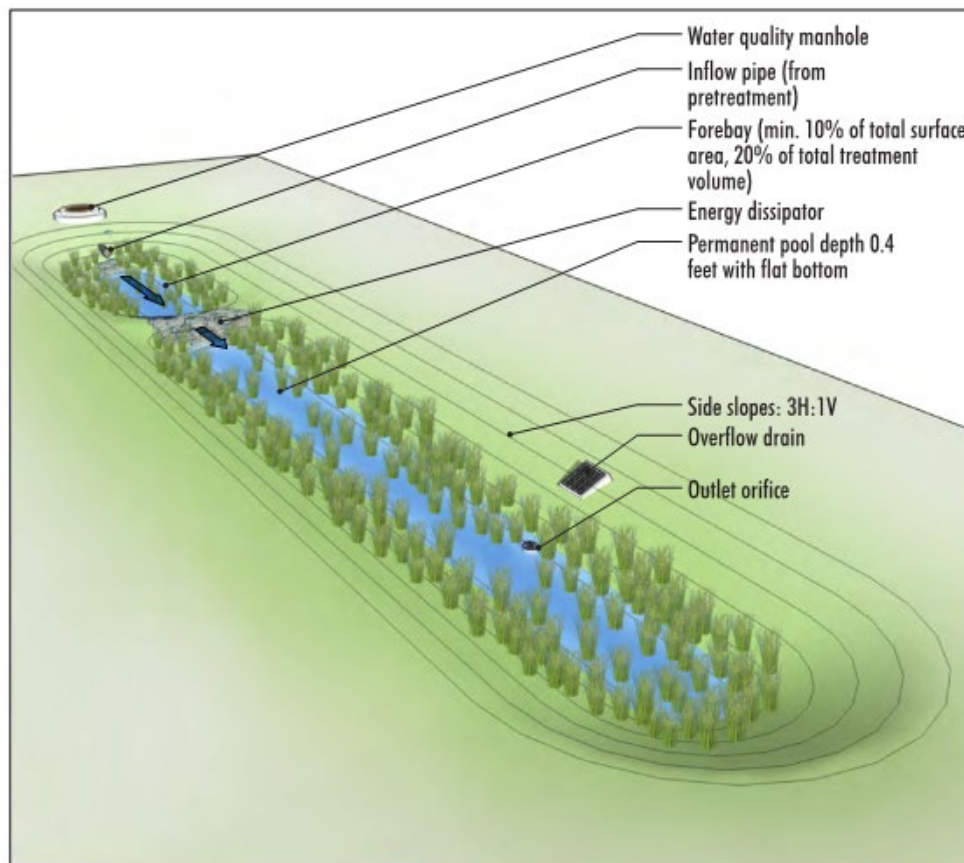


Depending on site conditions, these facilities can be designed to completely or partially filter the stormwater they receive. For this project, the rain garden is designed to fully retain the water quality storm event for retention. Because the site's native soils drain poorly, the rain garden's base area will provide exposure for rainfall runoff to native soils and allow for infiltration to the maximum extent practicable. Stormwater unable to immediately infiltrate into poorly draining native soils will remain collected in the above ground storage area for evaporation and prolonged infiltration or may overflow to an approved discharge point.

4.5.3 Extended Dry Basin

An extended dry basin is a shallow landscaped depression with a flat bottom that collects and holds stormwater runoff, allowing pollutants to settle and filter out as the water infiltrates into the ground or is discharged to an approved location. An extended dry basin has two or more cells (the first cell is the forebay as shown in **Figure 4-5.C**), and are given naming designations LIDA-05, 06A, 08A, 08B and 11. See Figure 3 in **Appendix B** for locations of extended dry basins.

Figure 4-5.C
Extended Dry Basin



An inflow pipe or ditch conveys stormwater into the basin where it is temporarily stored. Extended dry basins may infiltrate stormwater where soils have high infiltration rates or may overflow to an approved discharge point.

The entire facility area (side slopes and treatment areas) is planted with vegetation appropriate for the varying planting conditions within the extended dry basin. Planting conditions vary from saturated soil to relatively dry, and several planting zones should be considered. The flat bottom of the extended dry basin to the top of the permanent pool is a saturated zone and will be regularly inundated with water. The saturated zone should be planted with rushes, sedges, and other wetland species (oxygenators) that are well-suited to water-saturated, oxygen deprived (anaerobic) planting conditions.

4.5.4 Conveyance

In developing the drainage concepts for the project, natural features and existing infrastructure were assessed with emphasis placed on the most economically beneficial design to meet the project's regulatory needs. To meet the requirements prescribed by the DSL, the USACE, and the City, the drainage system will be designed to prevent negative impacts to the proposed improvements, waters of the State, and downstream properties and public infrastructure.

Modeling data documenting high flow conveyance for the ditches, pipes, and LIDA facilities are provided for reference in **Appendix D**. Storm conveyance design criteria includes analysis for the 25-year post development peak rate of runoff, and others². Since velocities through LIDA facilities will not exceed two feet per second during the 100-year storm, hydraulic forces are conducive to vegetation growth. Riprap and splash block armoring is provided at all locations of concentrated drainage point discharges to prevent erosion.

Where a LIDA facility serves as the primary discharge route for a drainage basin, a high flow analysis was conducted. When street-side planters are placed in series, such as along SW Blake Street, they may rely upon gutter capacity within the roadway to convey flows between each successive curb inlet during events exceeding the water quality storm. In these conditions, the gutter was analyzed for inundation into the roadway, and designed so that drainage does not flood into the travel lane of the road. Using the bicycle lane for conveyance, flowrates up to 2.5 cubic feet per second (cfs) may be conveyed by the gutter before inundating the travel lane. During the 50-year storm event applicable to the conveyance system design of major collectors such as SW Blake Street, the gutter flow is anticipated to be less than 0.38 cfs as a result of the roadside planters and will comply with design criteria.

4.5.5 Emergency Overflows

There is potential for the internal WTP_1.0 processes to fail, generating the need to temporarily store and convey raw or finished water from the facility on the order of 120 million gallons per day (MGD). The process water supply intake at the Willamette River near Wilsonville may continue

² CWS R&O 19-5, Amended by R&O 19-22; Subsection 5.05.

to operate and send water to the WTP_1.0 during such a failure. To mitigate this rare occurrence, on-site overflow basins are designed to hold up to 30 minutes of this process water. Should the river intake continue operating past this point, the overflows basins will discharge water in two directions.

(Placeholder - CDM Smith to provide additional language following land use) Roughly half the 120 MGD from the overflow basins will discharge towards an existing ditch along the west side of SW 124th Avenue via new stormwater facilities along SW Blake Street, and the other half towards an existing 36-inch culvert under SW Tualatin-Sherwood Road via a utility easement between the WTP site and Tualatin-Sherwood Road. Both routes lead to Hedges Creek as described under **Section 4.4**.

Emergency overflows towards the ditch along SW 124th Avenue will first overtop Road A at the SW Blake Street intersection in route to the large extended dry basin north of the proposed clearwell. Velocities are anticipated to exceed the 5 foot per second threshold typical of sustaining vegetation lining of the conveyance route and will require maintenance upon cessation of emergency flows to restore plants uprooted by the event.

Emergency overflows towards the 36-inch culvert under SW Tualatin-Sherwood Road will be conveyed through the SW Blake Street via a combination of stormwater facilities, pipes and ditches in route toward conveyances within a utility easement, then discharge to a proposed constructed wetland (by others) on the south side of SW Tualatin Sherwood Road, just upstream of the 36-inch culvert.

4.6 Site Constraint Summary & Best efforts to Surmount Constraints

The following is a summary of the site constraints affecting stormwater mitigation outlined in the preceding text, and the best efforts to surmount constraints.

- The presence of on-site wetlands influenced the design and approach to stormwater management. Concept development to replicate stormwater discharges to Kolk Pond were advanced to mimic pre-development conditions observed by this resource.
- The “Wetlands and Existing Soil Conditions” narrative contained in **Section 2** outlines the poorly draining soils and shallow bedrock prevalent throughout the project area. Stormwater facilities relying solely upon infiltration were avoided due to these conditions, in favor of encouraging infiltration to the maximum extent practicable.
- The constrained off-site downstream conveyance system towards Hedges Creek influenced on-site LIDA facility design. Pre-development peak flow rates were matched through post-development conditions, including assessment through the 100-year storm event.

The stormwater facilities described in this report achieve pollutant removal to the maximum extent practicable given the site constraints mentioned above and the typical pollutants of concern described in **Section 1**. The proposed water quality treatment facilities strike a balance between effective pollutant removal, low maintenance, and LIDA techniques to conserve existing resources and minimize impacts to wetlands. The LIDA facilities most suitable for the project site and conditions are street-side planters, rain gardens, and extended dry basins.

4.7 Operations, Maintenance, Contingency & Repair Plan

The on-site stormwater management facilities will be maintained and repaired by the WWSP WTP_1.0. The street-side planters within the dedicated SW Blake Street right-of-way will be maintained and repaired by the City of Sherwood. Further information is provided in the Operations, Maintenance, Contingency & Repair Plan provided in **Appendix E**.



FOR LAND USE PERMITTING (EXHIBIT B)

Section 5

Hydrologic and Hydraulic Analysis

5.1 Computer Model

Murraysmith utilized Autodesk Storm and Sanitary Analysis (SSA) 2019, version 13.0.04.0, modeling software to analyze the study site for pre-developed and post-developed conditions. This software runs TR-55 and SWMM computational methods and satisfies the Clean Water Services (CWS) flow determination design criteria¹.

SSA uses the U.S. EPA Storm Water Management Model (SWMM) and provides simulation and analysis of both discrete storm event and time series rainfall data. SSA provides both hydrologic and hydraulic analyses of drainage basins, conveyance networks, and BMPs. The goal of SSA is to analyze drainage basins for a range of design storms and ensure post-development conditions do not cause the hydrologic response of the study site to exceed that of the pre-development scenario. Further, users can size hydromodification management or flow control facilities to mitigate the impacts of increased runoff between pre-developed and post-developed (e.g., mitigated) conditions. The model results for SSA are provided for reference in **Appendix D**.

Modeling of drainage basins required the following information as input data for each software, as follows.

- SSA
 - Impervious Area (A_i), in acres
 - Pervious Area (A_p), in acres
 - Runoff Curve Number (CN), unitless
 - Time of Concentration (ToC), minutes
 - Conveyance system geometry, elevations, and connectivity
 - Ultimate discharge location (i.e., outfall)

Outfalls were developed to collect discharges from drainage basins such that the flow rates could be monitored at a consistent downstream location between pre- and post-development scenarios. A total of two outfalls were identified for the project, one to Hedges Creek and one to Coffee Lake Creek.

¹ CWS R&O 19-5, Amended by R&O 19-22; Subsection 5.04.2.

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5.2 Precipitation

Both long-term, continuous precipitation data and NRCS rainfall distributions were used. The NRCS storm events followed a Type 1A distribution for a range of return frequencies, including the 25-year, 24-hour design storm. Data from the Water Quality through the 100-year storm event is used in this analysis for demonstrating post-development flow rate requirements of CWS, the City of Sherwood, and SLOPES V. The design storm recurrence intervals and depths used in this report are tabulated in **Table 5-1**. These values originate from the 2016 *City of Sherwood Stormwater Master Plan*.

Table 5-1
Design Storm Depths for Recurrence Intervals

Design Storm Event	Intensity (inches/24-hrs)	Regulatory Agency
Water Quality*	1.25	USACE/DSL SLOPES V
2-Year	2.50	
10-Year	3.45	
25-Year	3.90	CWS, City of Sherwood
50-Year	4.20	
100-Year	4.50	

Note

*CWS has additional Water Quality requirements to manage 0.36 inches of runoff over 4 hours with a 96-hour return frequency.

5.3 Continuous Simulation

Additional analysis is required to determine if compliance with SLOPES V standards are met for "... continuous simulation for flows between 50 percent of the 2-year event and the 10-year flow event (annual series)." For the project's spatial location within Washington County, the SCS TR-55 calculation methodology results in a more conservative design than a continuous simulation for flows between 50 percent of the 2-year event and the 10-year flow event. A Rainfall Frequency Analysis and Design Storm Development Technical Memorandum (December 2, 2015) prepared by Murraysmith in **Appendix F** documents statistical analysis of historical rainfall observations and model results of several select historical storm events. The stormwater management facilities designed for this project meet the SLOPES V water quantity requirements using continuous simulation, with model results provided in **Appendix F**.

5.4 Pre-development Design Parameters

The pre-developed site conditions were represented by four drainage basins and delineated based on contours, wetlands, and land cover data. Pre-developed land cover was assumed to be match existing conditions, either brush/field or forested, in good condition, and with moderate slope. No impervious areas exist under the pre-developed scenario. The ToC for each pre-developed basin

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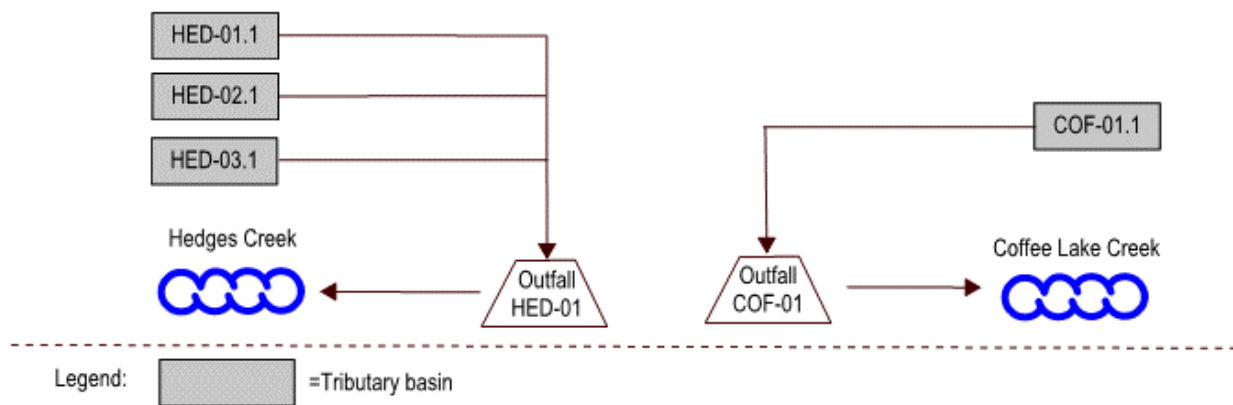
was based on a natural ground cover with dense underbrush. The naming convention for the basins identifies the ultimate discharge location, including either Hedges Creek (to the north-northeast of the project site), denoted by the prefix “HED-”, or Coffee Lake Creek (to the south-southeast of the project site), denoted by the prefix “-COF”. Pre-development input parameters are provided in **Table 5-2** for the SSA model.

Table 5-2
Pre-Developed Drainage Area Summary

Tributary Basin	Pervious Area, A_p (acre)	Impervious Area, A_i (acre)	Pervious Land Use	Soil Hydrologic Group	CN	ToC (min)
HED-01.1	1.790	0.00	Forested	Type C	70	19.1
HED-02.1	11.730	0.00	Brush/Field	Type C	80	16.4
HED-03.1	3.001	0.00	Forested	Type C	70	18.5
COF-01.1	5.230	0.00	Forested	Type C	70	13.1
Totals	21.751	0.00	N/A	N/A	N/A	N/A

A schematic of the pre-development models is provided in **Figure 5-1** below.

Figure 5-1
Pre-developed Model Schematic



5.5 Post-Development Design Parameters

The post-developed site conditions were represented by fourteen drainage basins and were delineated based on contours, wetlands, land cover, and proposed site layout data. Pervious areas were assumed to be represented by lawn, in good condition, and with moderate slope. The CN for pervious surfaces was assumed to be a value of 80. The impervious areas represent a collection of rooftops and pavement/asphalt land cover proposed in the water treatment plant site plans. The CN for impervious surfaces was assumed to be a value of 98.

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Water surfaces are representative of facilities that are open to the atmosphere and allow intercepted rainfall to enter the water treatment system rather than be converted to runoff. Water surface areas were removed from the overall drainage basin area. The ToC for each predeveloped basin was based on a natural ground cover with dense underbrush. These inputs were used to design flow control and water quality treatment facilities in the post-development models. Post-development input parameters are provided in **Table 5-3** for both SSA and TRUST models. A schematic of the post-development models is provided in **Figure 5-2** below.

Table 5-3
Post-Developed Drainage Area Summary

Tributary Basin	Pervious Area, Ap (acre)	Impervious Area, Ai (acre)	Open Basin, Lost Area, Al (acre)	Total Area (acre)	CN	ToC (min)
HED-LIDA_01	0.077	0.352	0.000	0.429	94.8	5.0
HED-LIDA_02	0.070	0.321	0.000	0.391	94.8	5.0
HED-LIDA_03	0.075	0.323	0.000	0.398	94.6	5.0
HED-LIDA_04	0.115	0.320	0.000	0.435	93.2	5.0
HED-LIDA_05	1.000	1.672	0.210	2.672	91.3	5.0
HED-LIDA_06A	2.924	3.030	0.413	5.954	89.2	5.0
HED-LIDA_07	0.264	0.813	0.000	1.077	93.6	5.0
HED-LIDA_08A	0.324	2.000	0.450	2.324	95.5	5.0
HED-LIDA_08B	0.459	1.793	0.000	2.252	94.3	5.0
HED-LIDA_09	0.030	0.199	0.000	0.229	95.6	5.0
HED-LIDA_10	0.052	0.269	0.000	0.321	95.1	5.0
COF-LIDA_11	0.230	3.475	0.000	3.705	96.9	5.0
COF-LIDA_12	0.051	0.440	0.000	0.491	93.1	5.0
Totals	5.671	15.007*	1.073	21.751	N/A	N/A

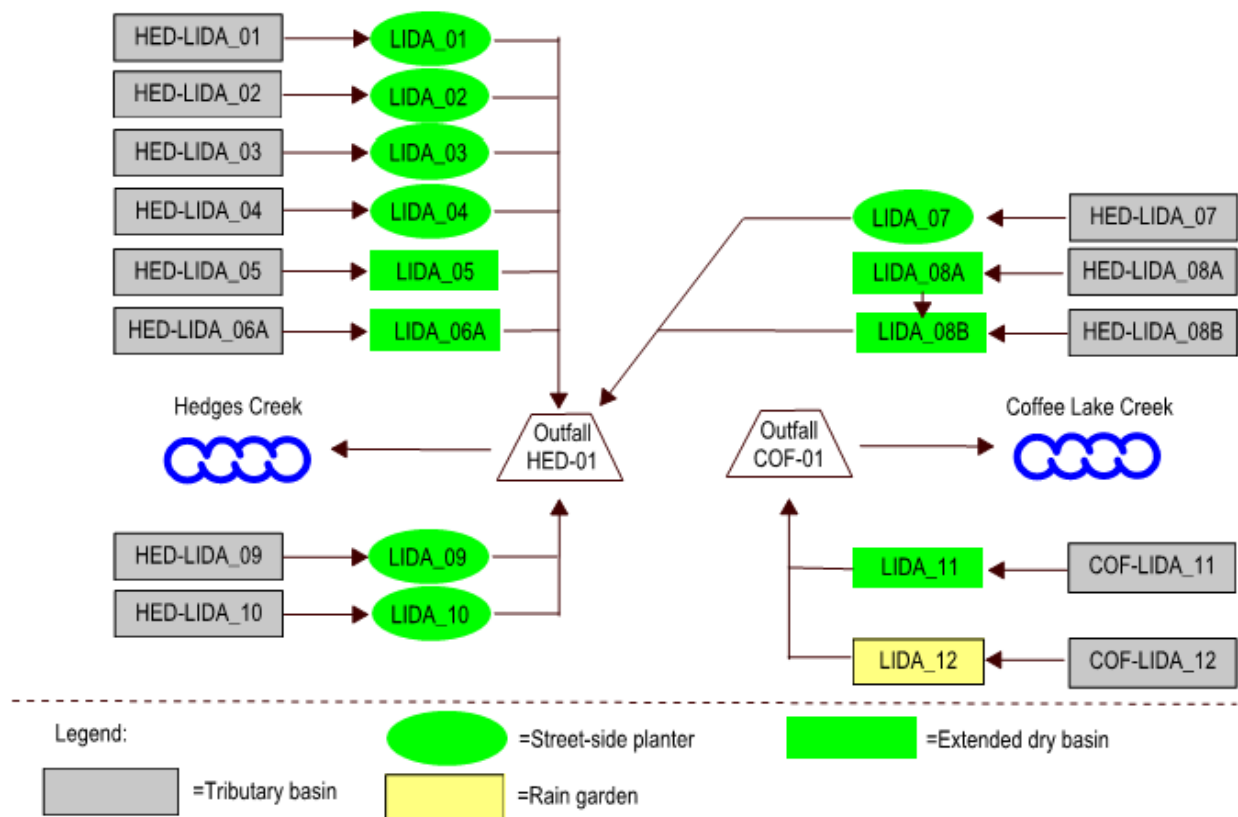
Note

*New impervious area from development is 15.007 acres and is the difference between post-development acreage and pre-development acreage indicated in Table 5-2.

The impervious and pervious assessment, evaluation and resultant calculations are based on the 60% design approach of restoring the area southwest of the PGE easement to natural habitat (or equivalent). Should the land use process identify a need to gravel this area and/or provide permanent stormwater management, this plan would need to be updated accordingly.

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Figure 5-2
Post-developed Model Schematic



5.6 Discharge Rate Summary

Pre-developed peak flow rates were generated using these tributary areas and serve to establish the maximum allowable release rate for post-developed flows. Post-developed peak flow rates were generated using the updated drainage areas and were hydraulically routed through LIDA facilities to attenuate the flows.

Table 5-4.A below is a summary of the design parameters for the water quality treatment facilities to be implemented for the project. Water quality runoff volumes are based on 50 percent of the 2-year, 24-hour storm event (1.25 inches), which is consistent with SLOPES V requirements and more conservative than CWS standard². Each facility is sized to completely retain the water quality storm event volume with no discharge. Where the runoff volume into the facility exceeds the dead storage volume, filtration of stormwater through the growing media provides additional capacity to keep each facility functioning within these requirements. For rain gardens and extended dry basins constructed within Quatama loam, Saum silt loam, and Xerocrepts-rock outcropping native soil conditions, a consistent infiltration rate of 0.5 inches per hour was applied. For street-side

² 0.36 inches falling within 4 hours and 96-hour return interval.

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planters, an infiltration rate of 2.0 inches per hour was applied to characterize Xerocrepts-rock outcropping native soil conditions³.

Table 5-4.A
LIDA Facility Design Results for the Water Quality Storm Event

LIDA Facility No.	Base Area (sq.ft.)	Design Infiltration Rate (inch/hour)	Rim storage depth (inch)	10-Year Storm Ponded Depth (feet)	Freeboard (inch)	Flow Control Orifice (inch)	WQ Drawdown (hour)	Facility Type
LIDA-01	938	2.0	6	0.55	2	n/a - beehive	16	Street-side Planter
LIDA-02	562	2.0	9	0.80	2	n/a - beehive	23	Street-side Planter
LIDA-03	875	2.0	6	0.54	2	n/a - beehive	16	Street-side Planter
LIDA-04	1,875	2.0	6	0.26	2	n/a - beehive	11	Street-side Planter
LIDA-05	12,000	0.5	12	1.00	12	0.75	30	Ext. Dry Basin
LIDA-06A	10,000	0.5	21	1.79	12	1.00	48	Ext. Dry Basin
LIDA-07	2,812	2.0	6	0.60	2	n/a - beehive	15	Street-side Planter
LIDA-08A	2,775	0.5	12	1.47	12	0.75	42	Ext. Dry Basin
LIDA-08B	18,650	0.5	18	1.16	12	0.75	29	Ext. Dry Basin
LIDA-09	375	2.0	9	0.79	2	n/a - beehive	21	Street-side Planter
LIDA-10	657	2.0	6	0.56	2	n/a - beehive	18	Street-side Planter
LIDA-11	13,000	0.5	18	1.52	12	0.75	48	Ext. Dry Basin
LIDA-12	1,000	0.5	12	1.01	12	0.50	19	Rain Garden

Table 5-4.B and **Table 5-4.C** below tabulate the model results for peak flows originating from each of the drainage basins and represent uncontrolled release rates. An increase in post-development peak flow can be primarily attributed to additional impervious surfaces created by the project and the change in land use from a pre-development condition to an urbanized condition.

Table 5-4.B
Pre-Developed Basin Peak Flow Summary (cfs)

Design Storm Event	HED-01.1	HED-02.1	HED-03.1	COF-01.1
50% of 2-Year	0.01	0.14	0.01	0.02
2-Year	0.06	1.97	0.17	0.19
5-Year	0.18	3.25	0.40	0.57
10-Year	0.27	4.06	0.55	0.83
25-Year	0.39	5.14	0.78	1.19
50-Year	0.45	5.65	0.88	1.36
100-Year	0.57	6.68	1.10	1.72

³ CWS R&O 19-5, Amended by R&O 19-22; Table 4-5.

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Table 5-4.C
Post-Developed Basin Peak Flow Summary (cfs)

Design Storm Event	HED-LIDA_01	HED-LIDA_02	HED-LIDA_03	HED-LIDA_04	HED-LIDA_05
WQ Storm	0.08	0.08	0.08	0.07	0.34
2-Year	0.22	0.20	0.20	0.20	1.12
5-Year	0.28	0.26	0.26	0.27	1.52
10-Year	0.32	0.29	0.30	0.31	1.76
25-Year	0.37	0.34	0.34	0.36	2.06
50-Year	0.39	0.36	0.36	0.38	2.20
100-Year	0.44	0.40	0.40	0.42	2.47

Design Storm Event	HED-LIDA_06A	HED-LIDA_07	HED-LIDA_08A	HED-LIDA_08B
WQ Storm	0.56	0.18	0.49	0.42
2-Year	2.18	0.51	1.22	1.12
5-Year	3.05	0.68	1.58	1.46
10-Year	3.57	0.77	1.78	1.66
25-Year	4.24	0.90	2.04	1.92
50-Year	4.55	0.95	2.16	2.03
100-Year	5.15	1.06	2.39	2.26

Design Storm Event	HED-LIDA_09	HED-LIDA_10	COF-LIDA_11	COF-LIDA_12
WQ Storm	0.05	0.06	0.90	0.11
2-Year	0.12	0.17	2.08	0.27
5-Year	0.16	0.21	2.63	0.34
10-Year	0.18	0.24	2.96	0.39
25-Year	0.20	0.28	3.37	0.44
50-Year	0.22	0.30	3.55	0.47
100-Year	0.24	0.33	3.92	0.51

The simulated peak flows at the outfalls to Hedges Creek and Coffee Lake Creek are presented in **Table 5-4.D** and **Table 5-4.E**, respectively. This information is provided to demonstrate the effectiveness of the project approach to stormwater management on the downstream conveyance system, including the effects due to flow attenuation in LID facilities.

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Table 5-4.D
Hedges Creek Outfall Peak Flow Summary

Design Storm Event	Pre-Developed (cfs)	Post-Developed (cfs)	Difference (cfs)
50% of 2-Year	0.15 ⁴	0.04	(0.11)
2-Year	1.21	0.13 ⁴	(1.08)
5-Year	2.38 ⁴	0.40 ⁴	(1.98)
10-Year	3.19 ⁴	0.61 ⁴	(2.58)
25-Year	4.30	1.03	(3.27)
50-Year	4.84	1.20	(3.64)
100-Year	5.90	1.60	(4.30)

Table 5-4.E
Coffee Lake Creek Outfall Peak Flow Summary

Design Storm Event	Pre-Developed (cfs)	Post-Developed (cfs)	Difference (cfs)
50% of 2-Year	0.02 ⁴	0.01	(0.01)
2-Year	0.19	0.02 ⁴	(0.17)
5-Year	0.57 ⁴	0.12 ⁴	(0.45)
10-Year	0.83 ⁴	0.24 ⁴	(0.59)
25-Year	1.19	0.45	(0.74)
50-Year	1.36	0.56	(0.80)
100-Year	1.72	0.88	(0.84)

Per CWS design standards, 50 percent of the 2-year Pre-development storm peak flow must remain equal to, or less than the 2-year Post-development storm peak flow. Similarly, the 5- and 10-year Pre-development storm peak flow must be equal to, or less than, their respective 5- and 10-year Post-development storm peak flow⁴.

⁴ CWS R&O 19-5, Amended by R&O 19-22; Table 4.7



Section 6

Engineering Conclusions

6.1 Pollutant Removal Summary

The Street-side planters, rain gardens, and extended dry basin selected for this project are a preferred LIDA approach towards stormwater management as outlined in the applicable design standards. The soil amendments that accompany these facilities will maximize the opportunity for stormwater to contact organic material (via filtration) which acts to remove dissolved pollutants and metals. This biofiltration process provides for filtration, sorption, density separation, uptake/storage, microbial transformation and hydraulic attenuation pollutant removal mechanisms. These physical processes specifically target the “pollutants of concern” as described in **Section 1**.

The primary sources of pollutants related to projects of this nature occur through the use of fertilizers in establishing plants over the exposed soils after grading work is complete. In order to decrease the amount of nutrients entering the surface and groundwater from the project site, the use of fertilizers will be eliminated through application of native plant and seed mixes, with mulch.

6.2 Contact Information

The following project contact is made available to any reviewing agency that requires additional information necessary to complete review and analysis of this report.

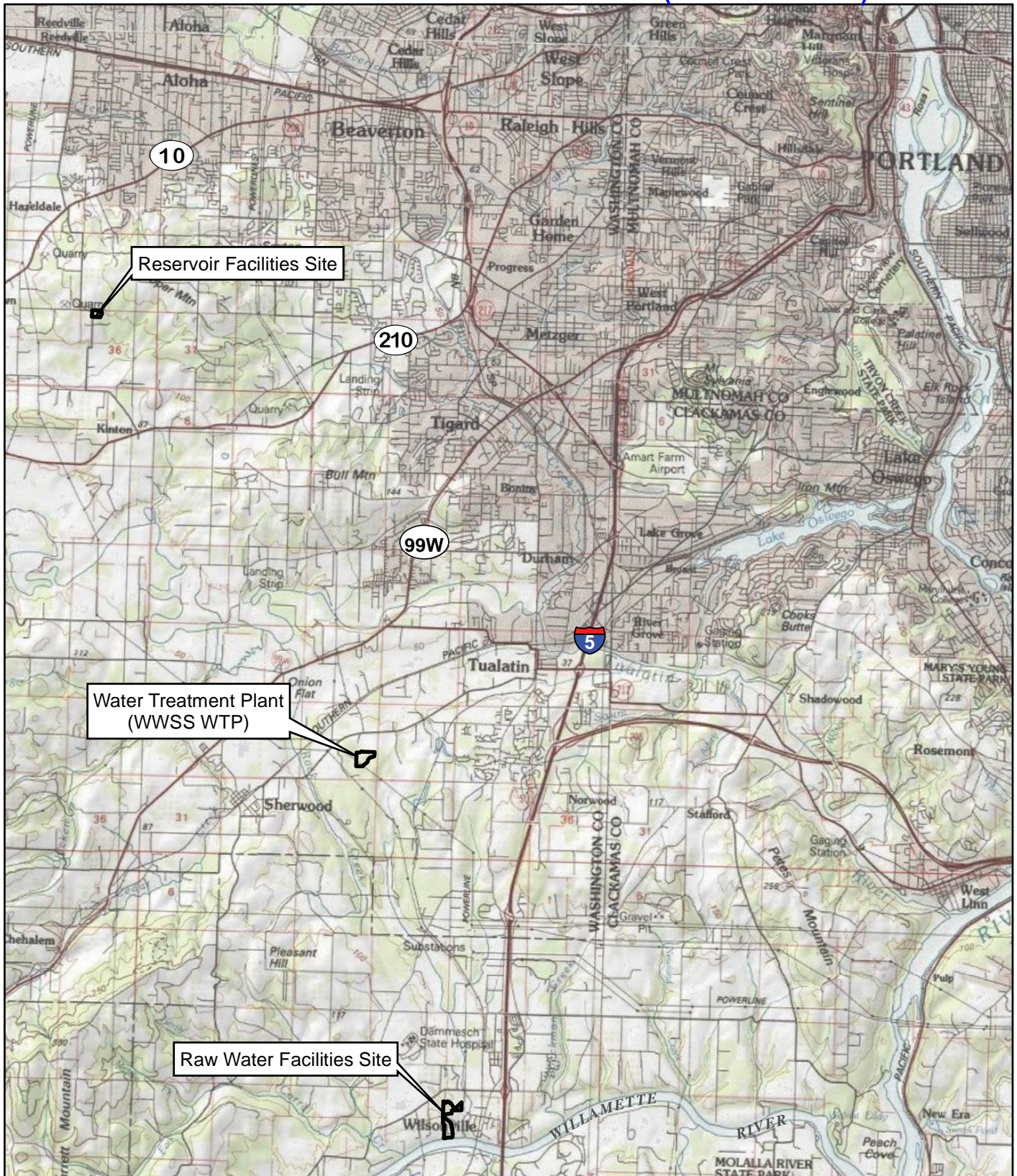
Nicholas McMurtrey, P.E.
Murraysmith
888 SW 5th Ave, Ste 1170
Portland, OR 97204
P: 503-225-9010 F: 503-225-9022
nicholas.mcmurtrey@murraysmith.us



Appendix

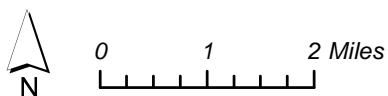
FOR LAND USE PERMITTING (EXHIBIT B)

FOR LAND USE PERMITTING (EXHIBIT B)

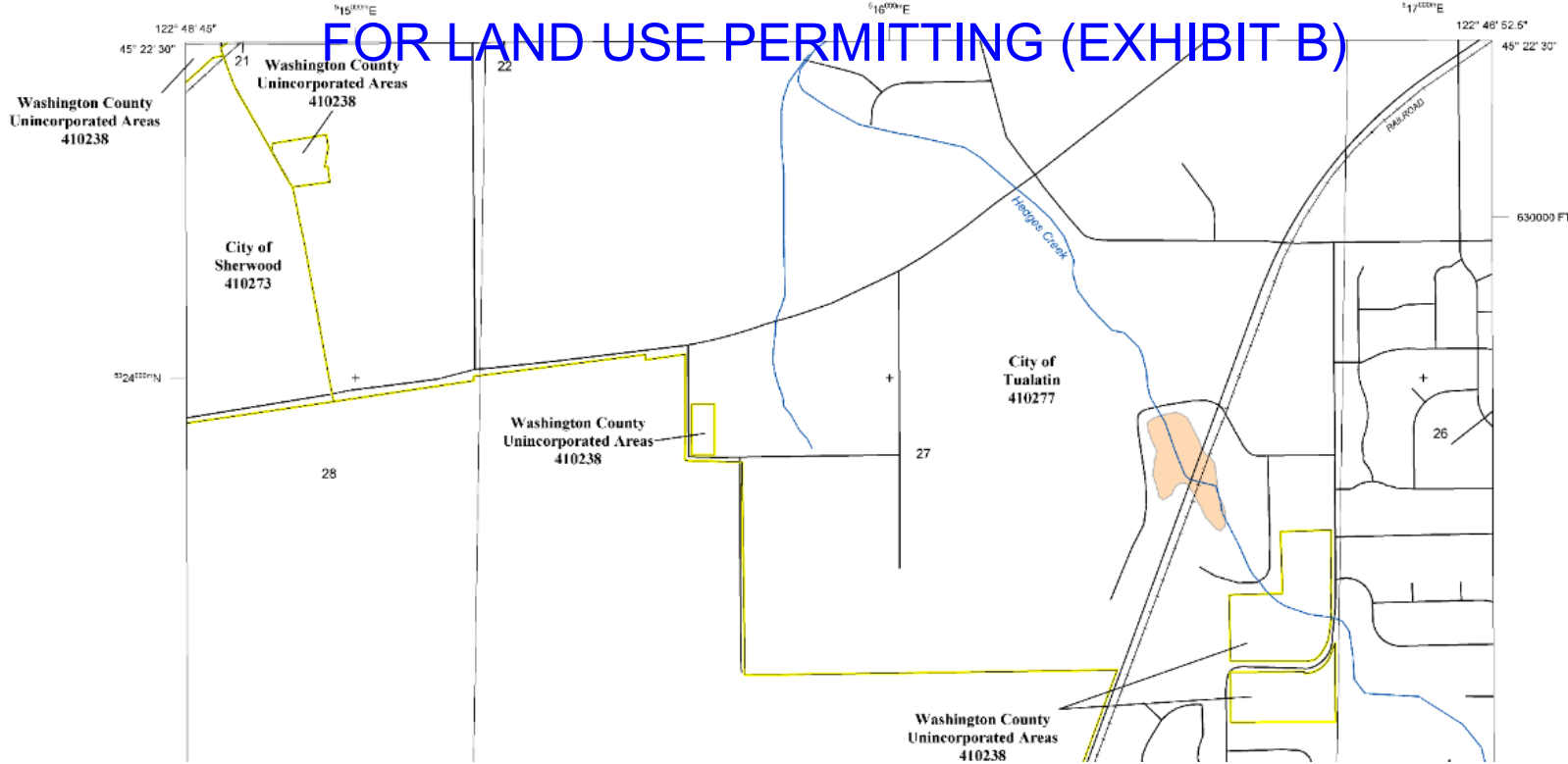


ESRI, ArcGIS Online, USA Topographic Maps. 30x60 GRID Quadrangles

Vicinity Map



FOR LAND USE PERMITTING (EXHIBIT B)



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR ZONE DESCRIPTIONS AND INDEX MAP
 THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING
 DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT
[HTTP://MSC.FEMA.GOV](http://MSC.FEMA.GOV)

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
OTHER AREAS OF FLOOD HAZARD		Regulatory Floodway
		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
OTHER AREAS		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Areas Determined to be Outside the 0.2% Annual Chance Floodplain. Zone X
GENERAL STRUCTURES		Area of Undetermined Flood Hazard. Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)
		Coastal Transect
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Base Flood Elevation Line (BFE)
	Limit of Study	
	Jurisdiction Boundary	

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products on the National Flood Insurance Program in general, please call the FEMA Map Information Exchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at <http://msc.fema.gov>. Available products may include: previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information Exchange.

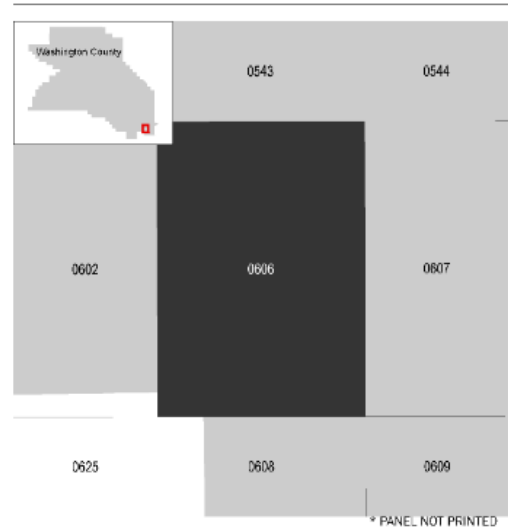
Communities annexing (and an adjacent FIRM) panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in the community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6020.

Base map information shown on this FIRM was derived from multiple sources. Base Map files were provided in digital format by the Metro Data Resource Center. This information was compiled from many local sources and include transportation features, water features, political boundaries, and Public Land Survey System features.

PANEL LOCATOR



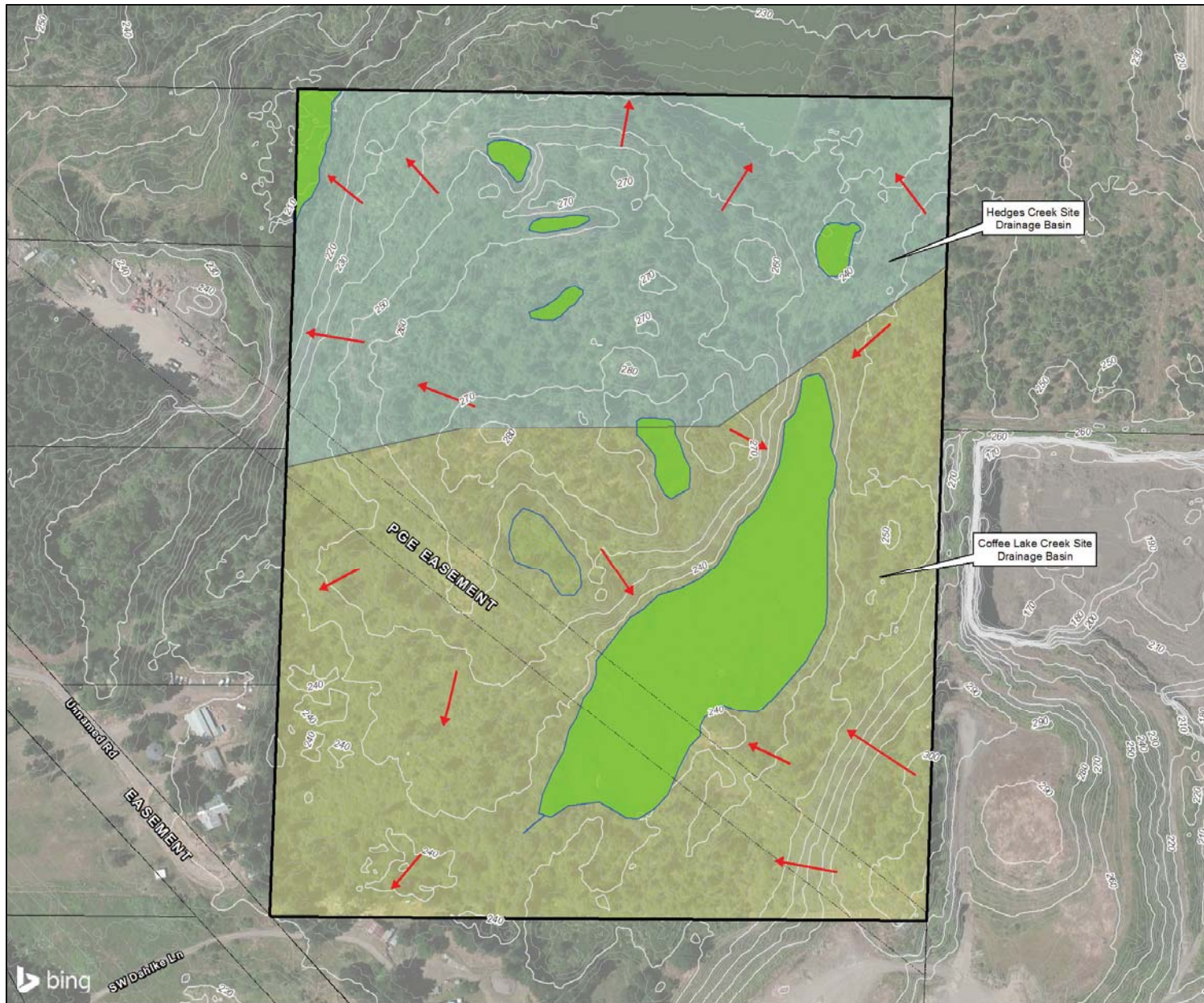
NATIONAL FLOOD INSURANCE PROGRAM FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, OREGON
 And Incorporated Areas

PANEL 606 OF 650

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
SHERWOOD, CITY OF	410273	9606	F
TUALATIN, CITY OF	410277	9606	F
WASHINGTON COUNTY	410238	9606	F



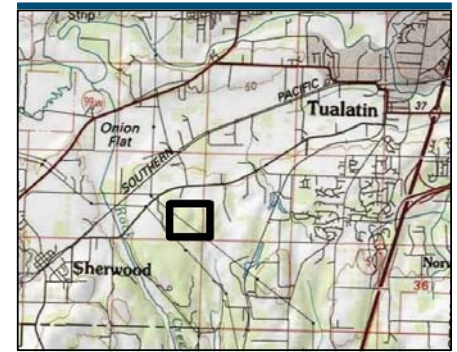
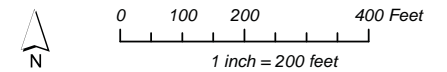
**Willamette Water Supply System
WWSS Water Treatment Plant
Stormwater Management Plan**

*Existing Conditions for the
WWSS Water Treatment Plant Site*

Legend

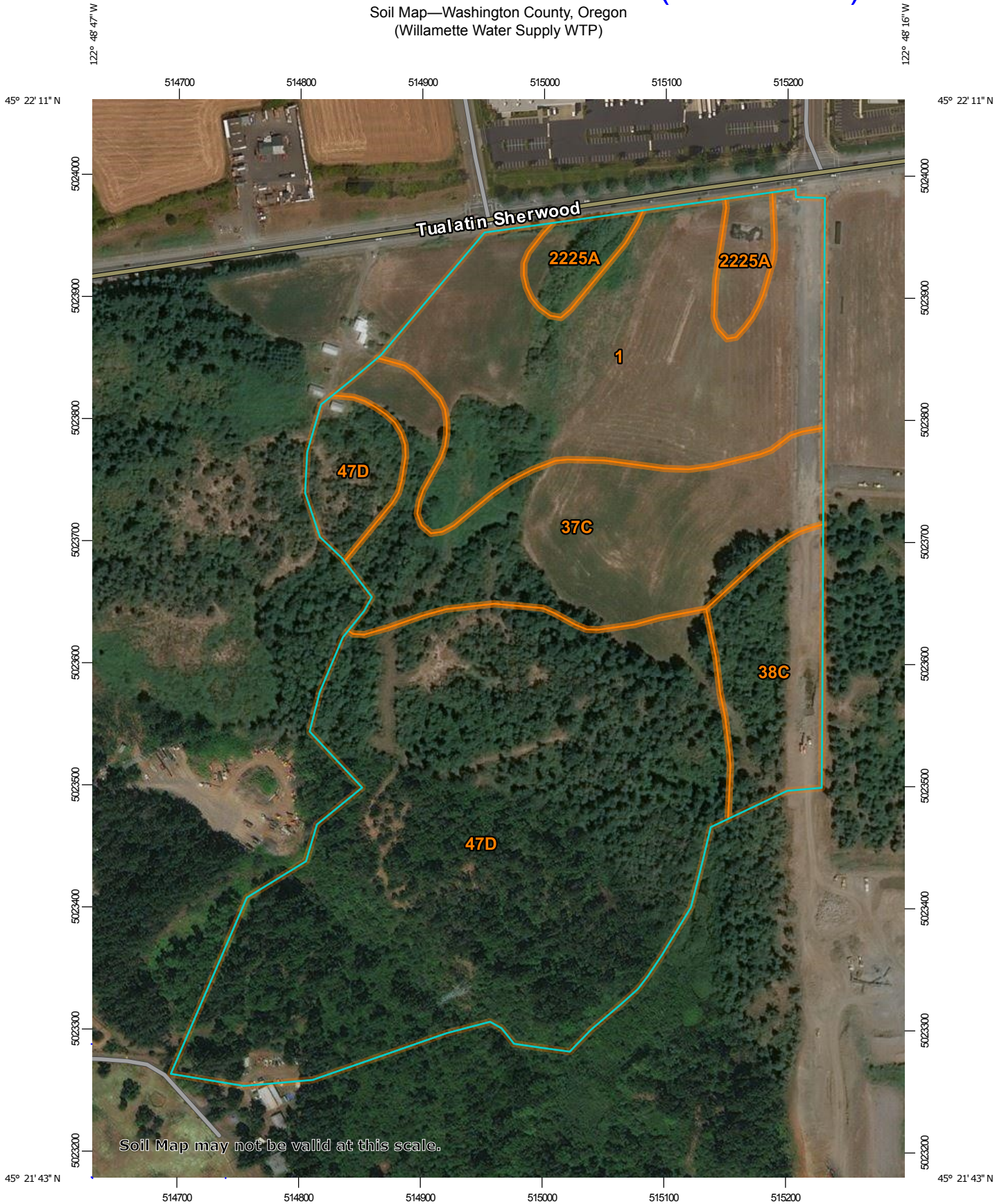
- Study Area (49.56 acres, 2,158,911 sq. ft.)
- Flow Direction
- Delineated Wetland
- Potential Wetland
- Hedges Creek Site Drainage Basin
- Coffee Lake Creek Site Drainage Basin
- Major Contour (10-ft interval)
- Minor Contour (2-ft interval)
- Taxlot
- Power ROW

Source: Metro RLIS
Imagery: BingMapsAerial



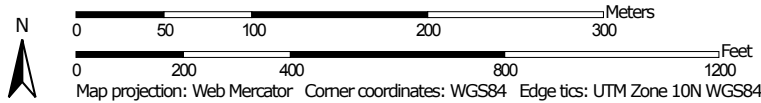
FOR LAND USE PERMITTING (EXHIBIT B)

Soil Map—Washington County, Oregon
(Willamette Water Supply WTP)



Soil Map may not be valid at this scale.

Map Scale: 1:4,300 if printed on A portrait (8.5" x 11") sheet.




FOR LAND USE PERMITTING (EXHIBIT B)

Soil Map—Washington County, Oregon
(Willamette Water Supply WTP)


MAP LEGEND


Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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: Washington County, Oregon
Survey Area Data: Version 16, Sep 18, 2018

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

Date(s) aerial images were photographed: Jul 8, 2010—Jul 22, 2017

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.

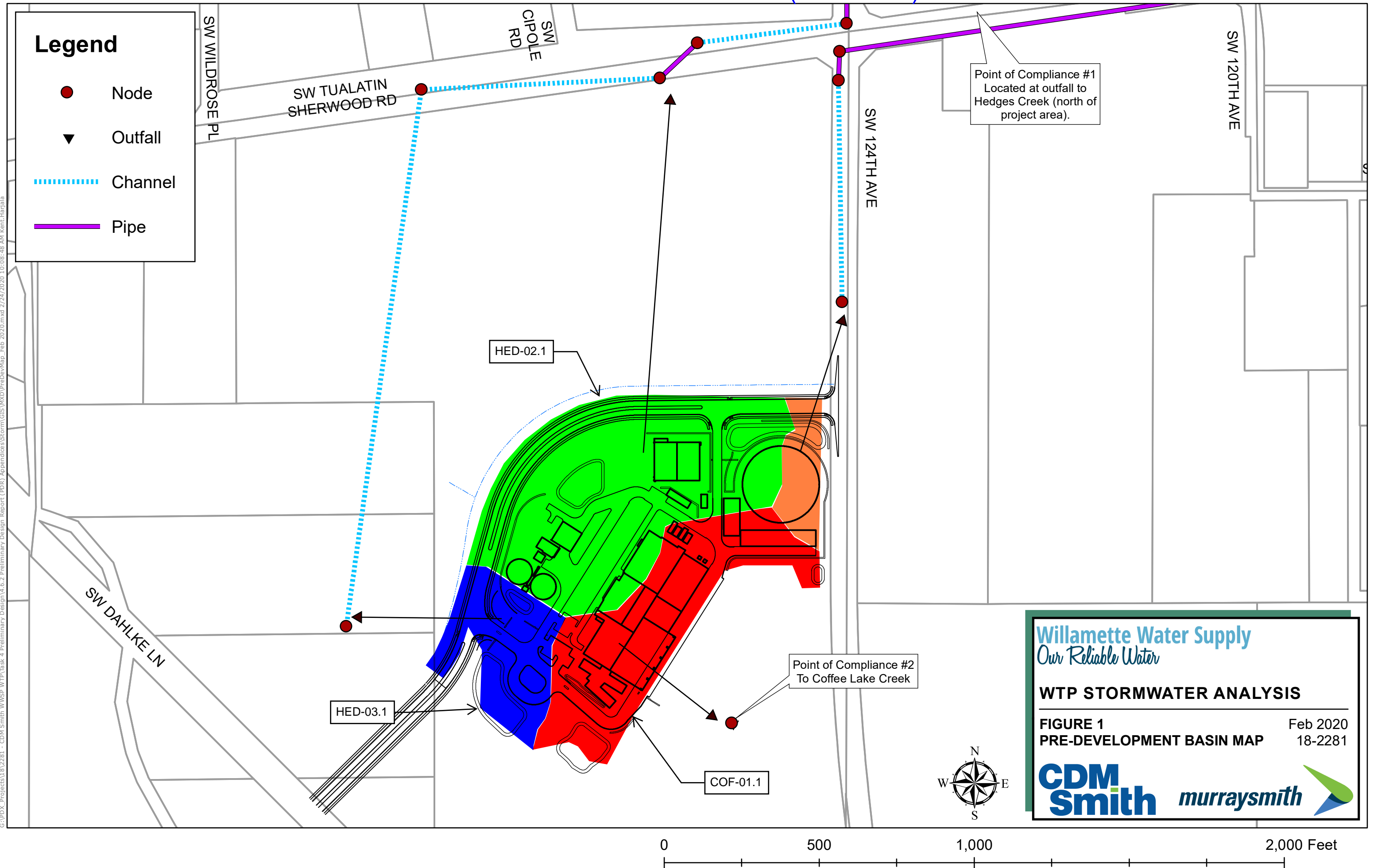
FOR LAND USE PERMITTING (EXHIBIT B)

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Aloha silt loam	14.6	22.9%
37C	Quatama loam, 7 to 12 percent slopes	10.9	17.1%
38C	Saum silt loam, 7 to 12 percent slopes	4.2	6.5%
47D	Xerochrepts-Rock outcrop complex	31.9	50.0%
2225A	Huberly silt loam, 0 to 3 percent slopes	2.3	3.6%
Totals for Area of Interest		63.9	100.0%

FOR LAND USE PERMITTING (EXHIBIT B)

FOR LAND USE PERMITTING (EXHIBIT B)



G:\PDY_Projects\18\2281 - CDM Smith WSP WTP\Task 4 Preliminary Design Report (PDR)\Appendices\Storm\GIS\MXD\PreDevMap_Feb_2020.mxd 2/24/2020 10:05:48 AM Kent.Harfala

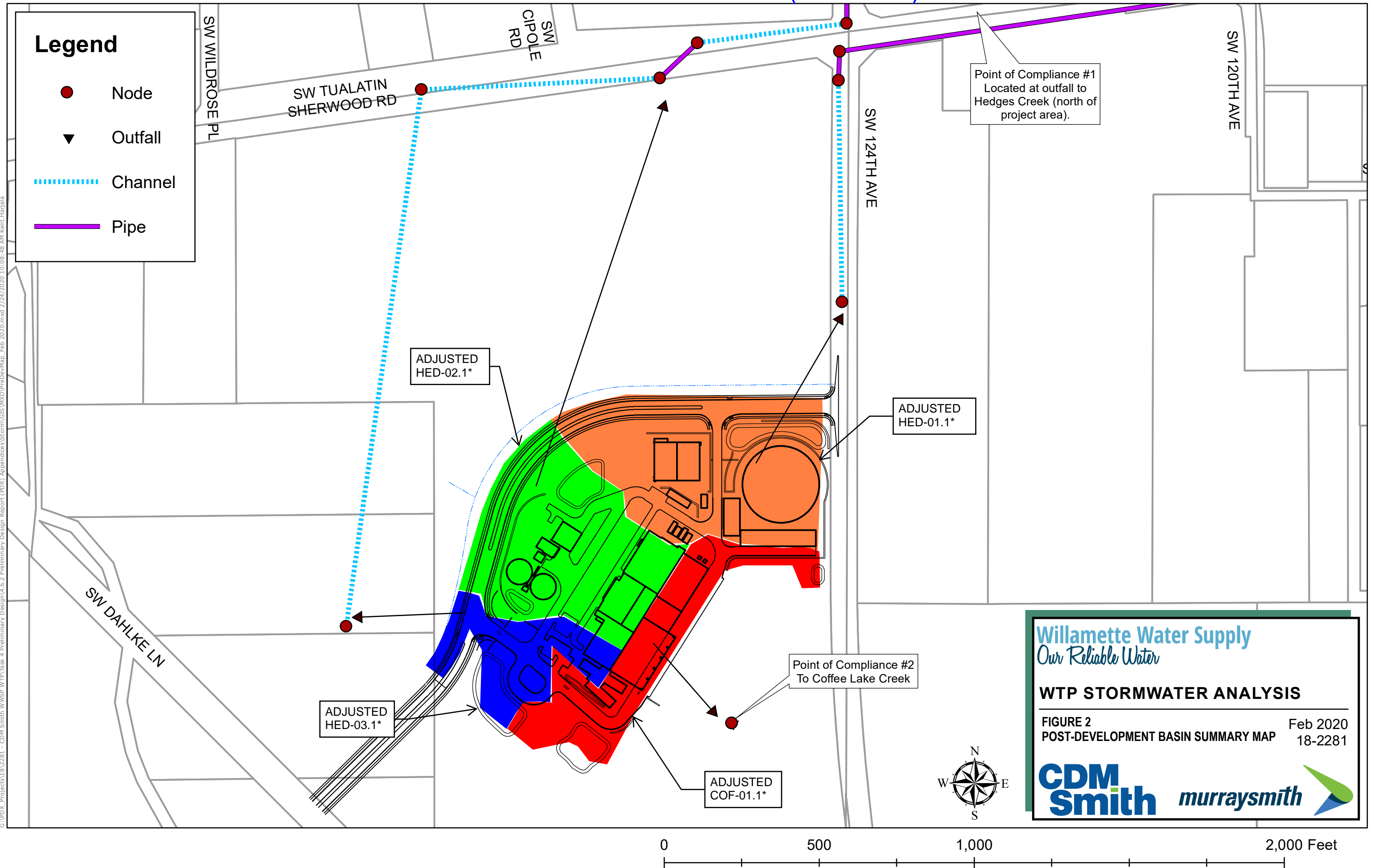
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FIGURE 1 Feb 2020
PRE-DEVELOPMENT BASIN MAP 18-2281

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FOR LAND USE PERMITTING (EXHIBIT B)



Legend

- Node
- ▼ Outfall
- ⋯ Channel
- Pipe

Point of Compliance #1
Located at outfall to
Hedges Creek (north of
project area).

ADJUSTED
HED-02.1*

ADJUSTED
HED-01.1*

ADJUSTED
HED-03.1*

ADJUSTED
COF-01.1*

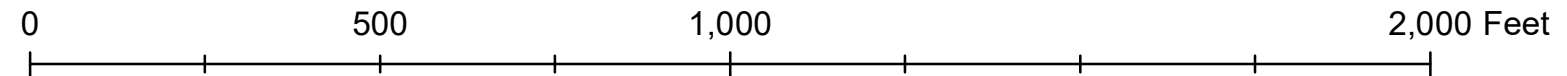
Point of Compliance #2
To Coffee Lake Creek

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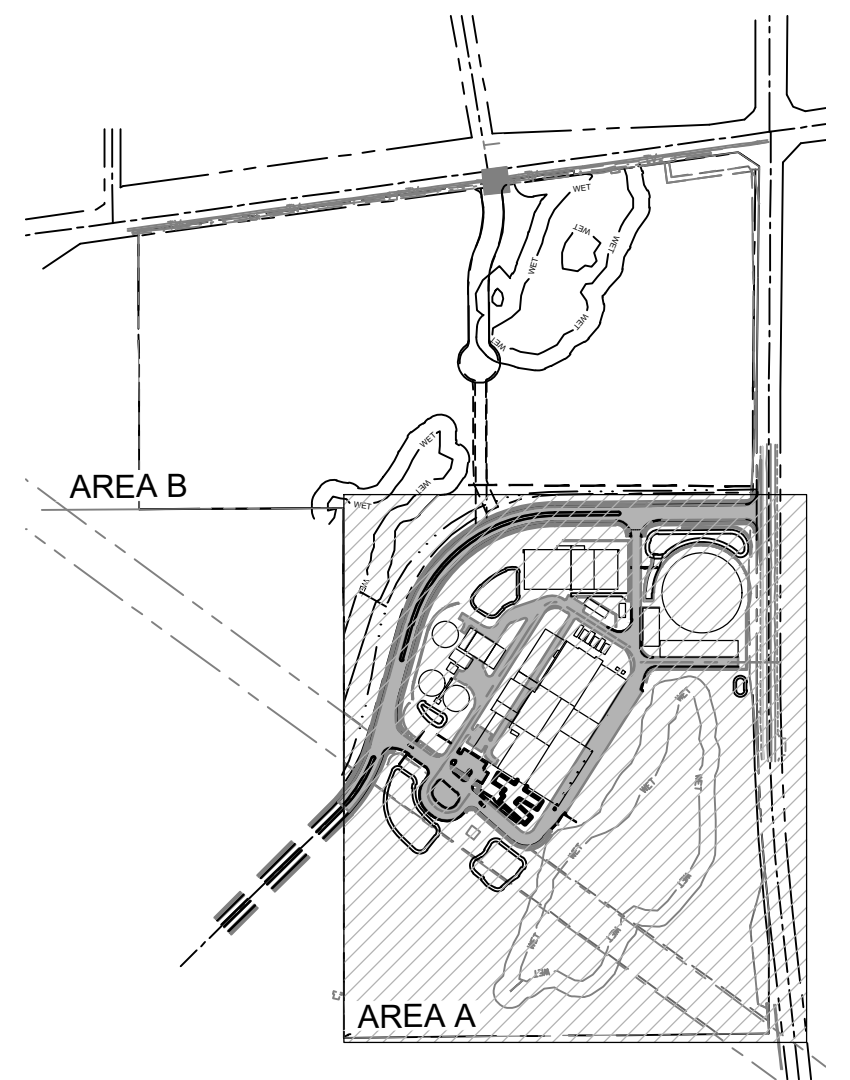
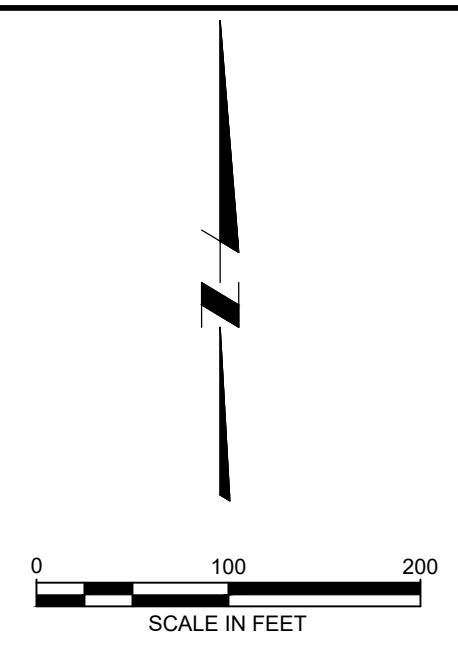
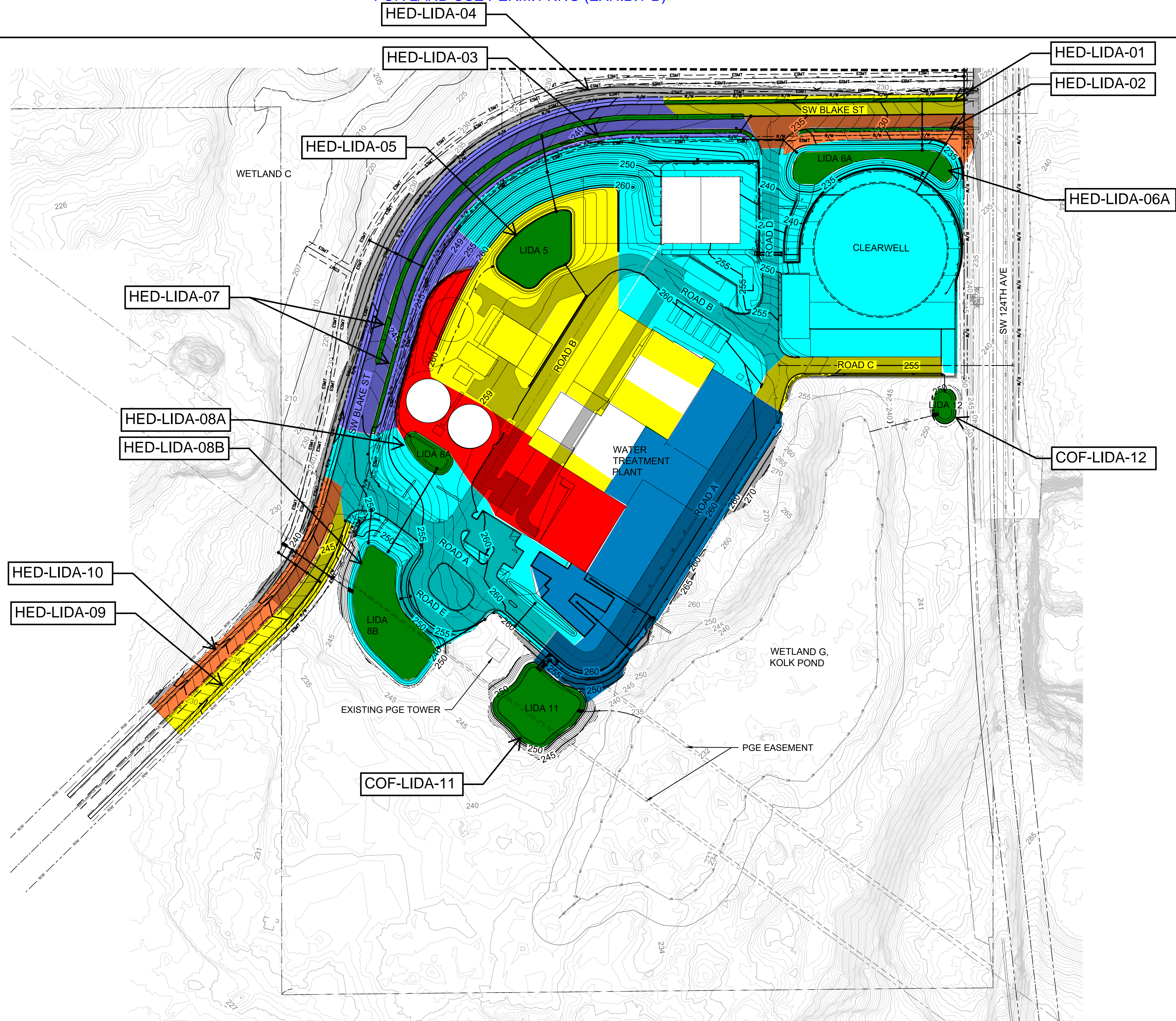
FIGURE 2
POST-DEVELOPMENT BASIN SUMMARY MAP Feb 2020
18-2281

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FOR LAND USE PERMITTING (EXHIBIT B)



KEY MAP
NTS

BY: BEN FOSTER
PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
DWG FILE: C:\cdm\ben.foster@murraysmith.us\0274278\WTP1-03-GR-20001.dwg

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DR	M ESTEP				
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GRADING, PAVING AND DRAINAGE OVERALL PLAN
AREA A

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DATE	FEBRUARY 2020	
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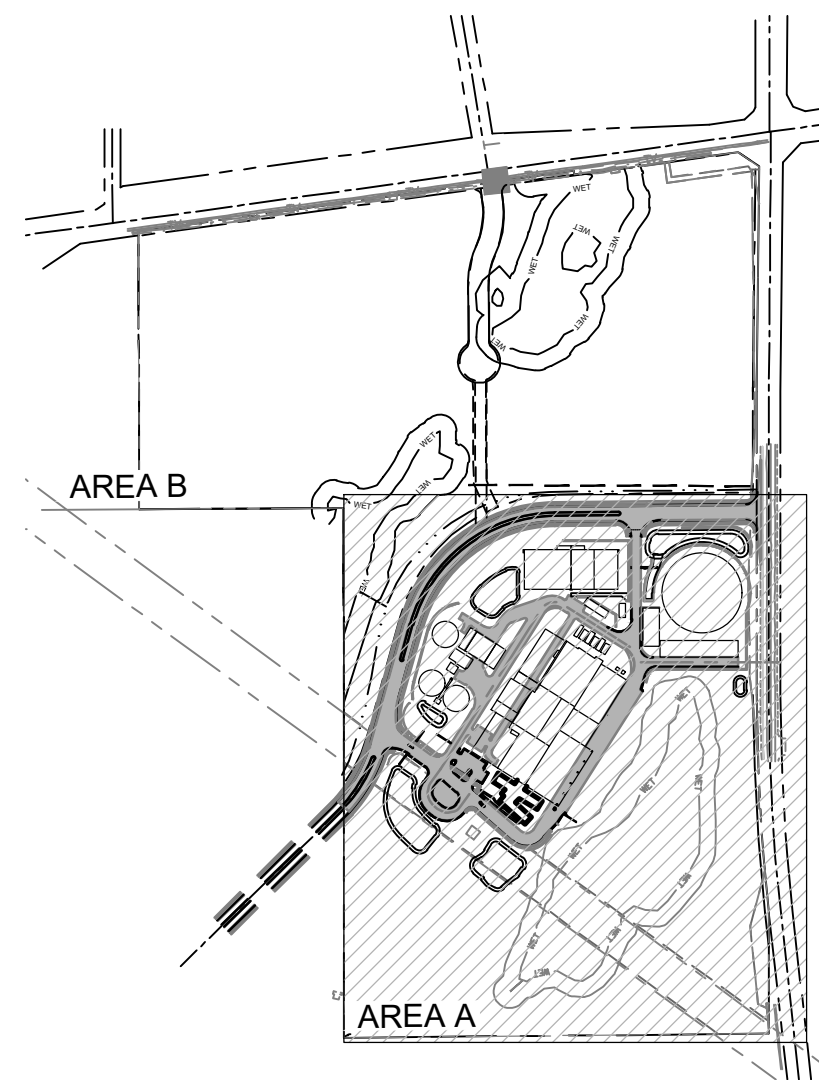
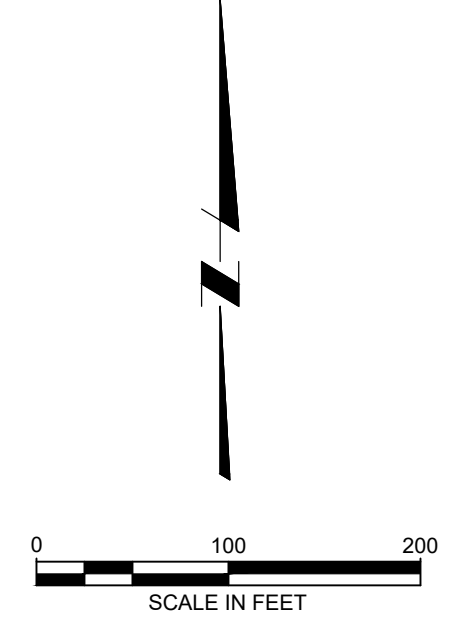
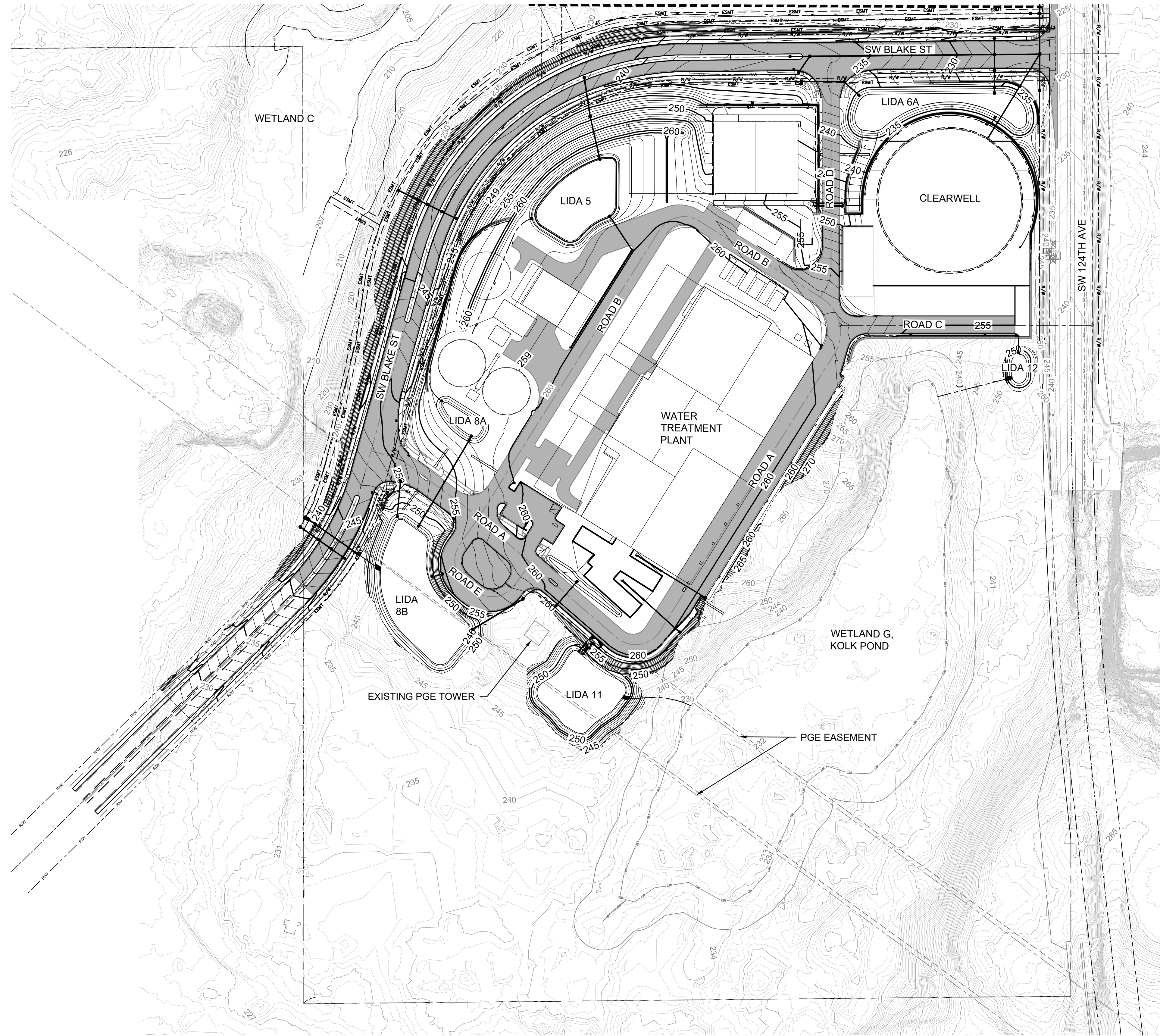
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KEY MAP
NTS

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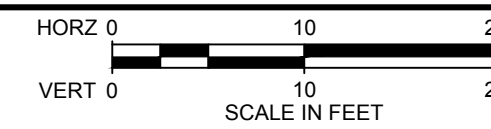
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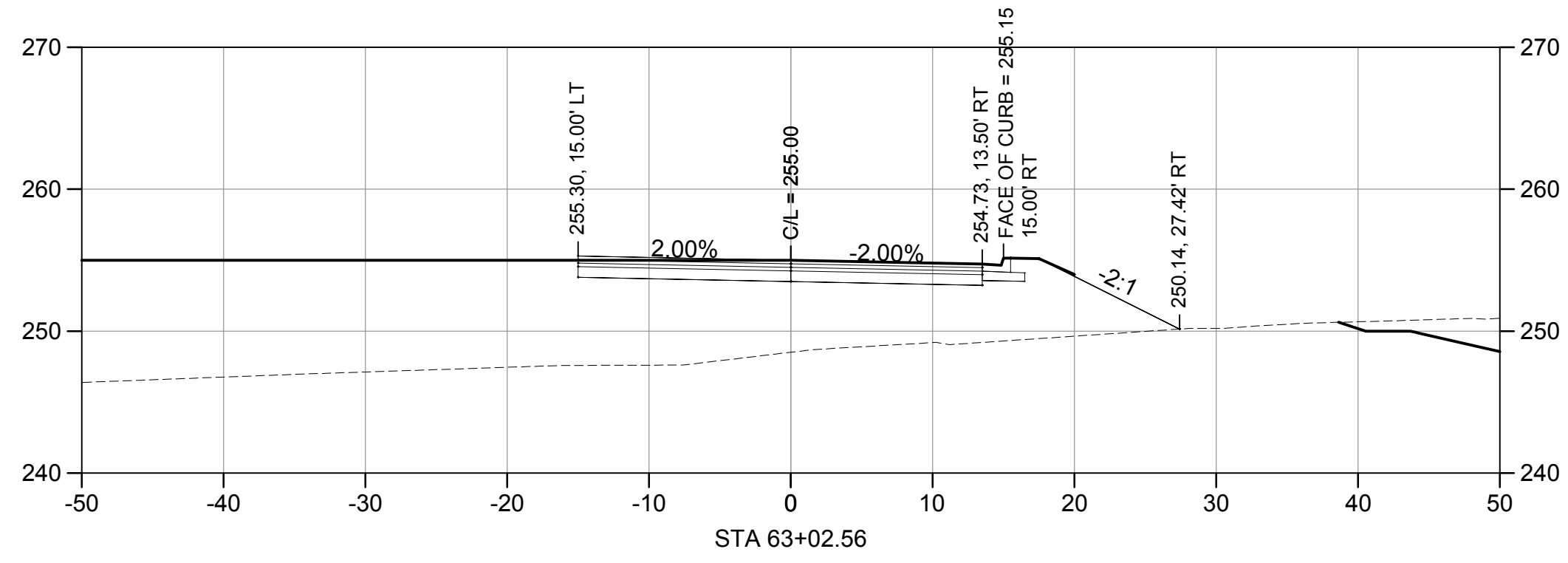
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					APVD

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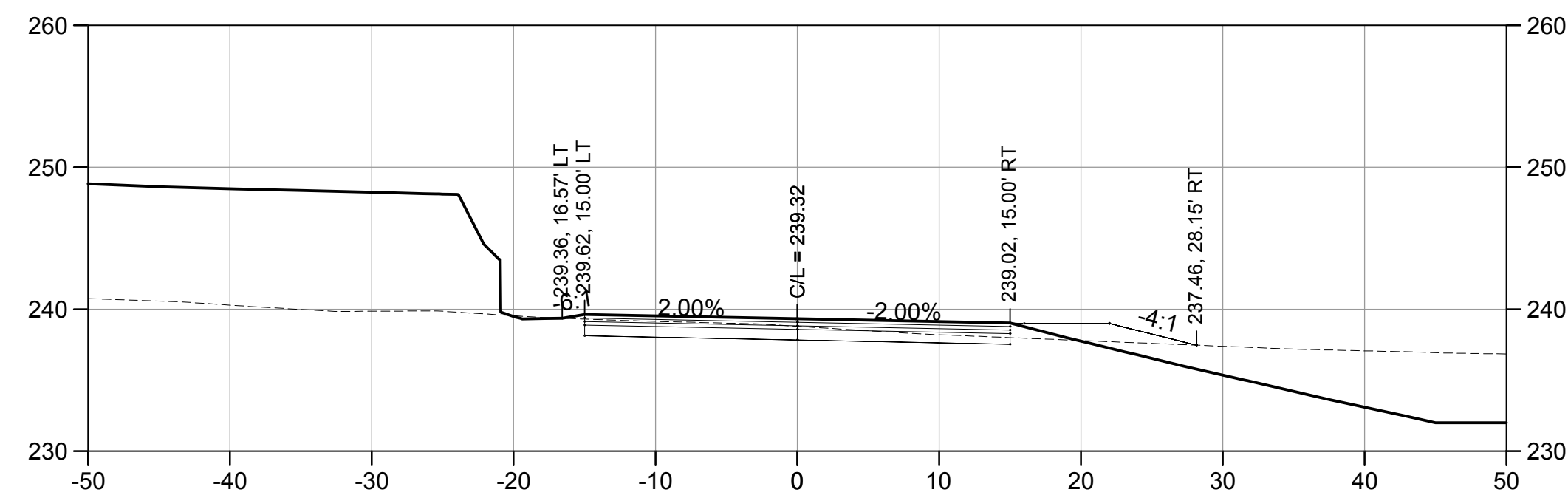
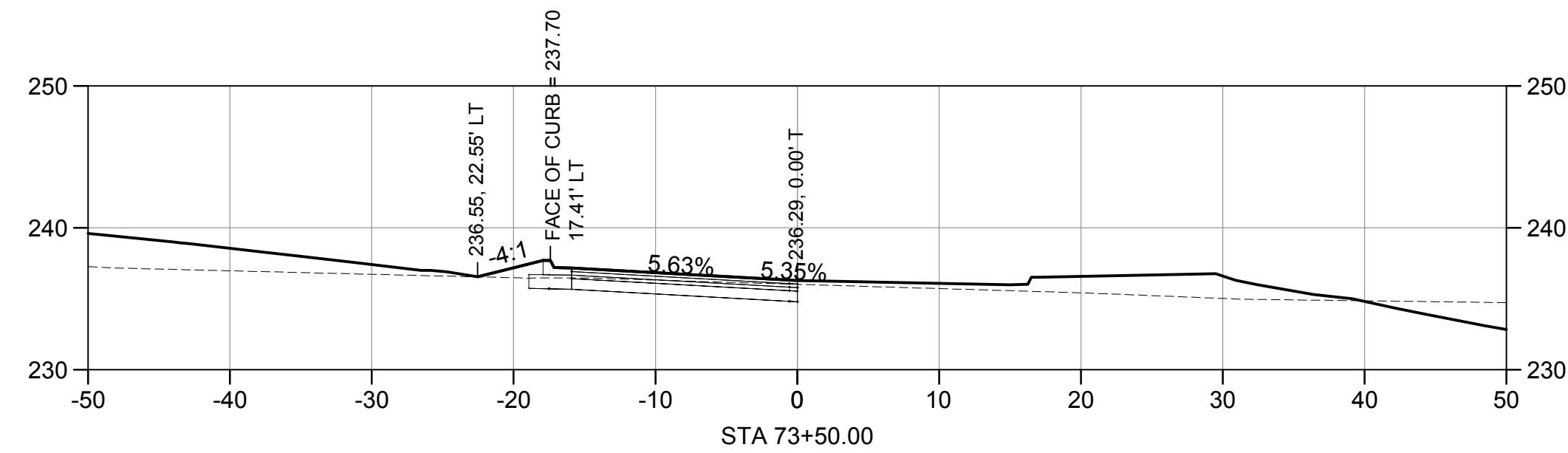
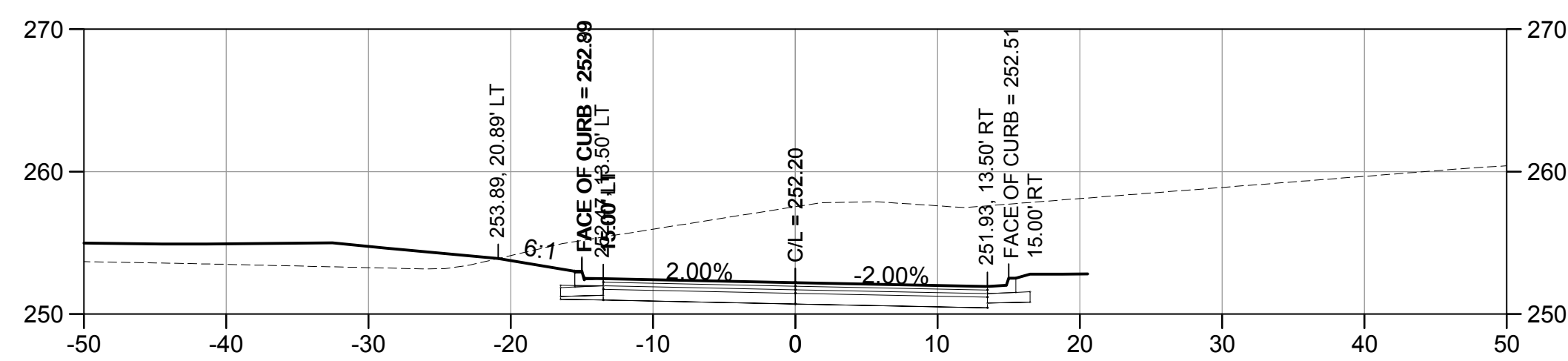
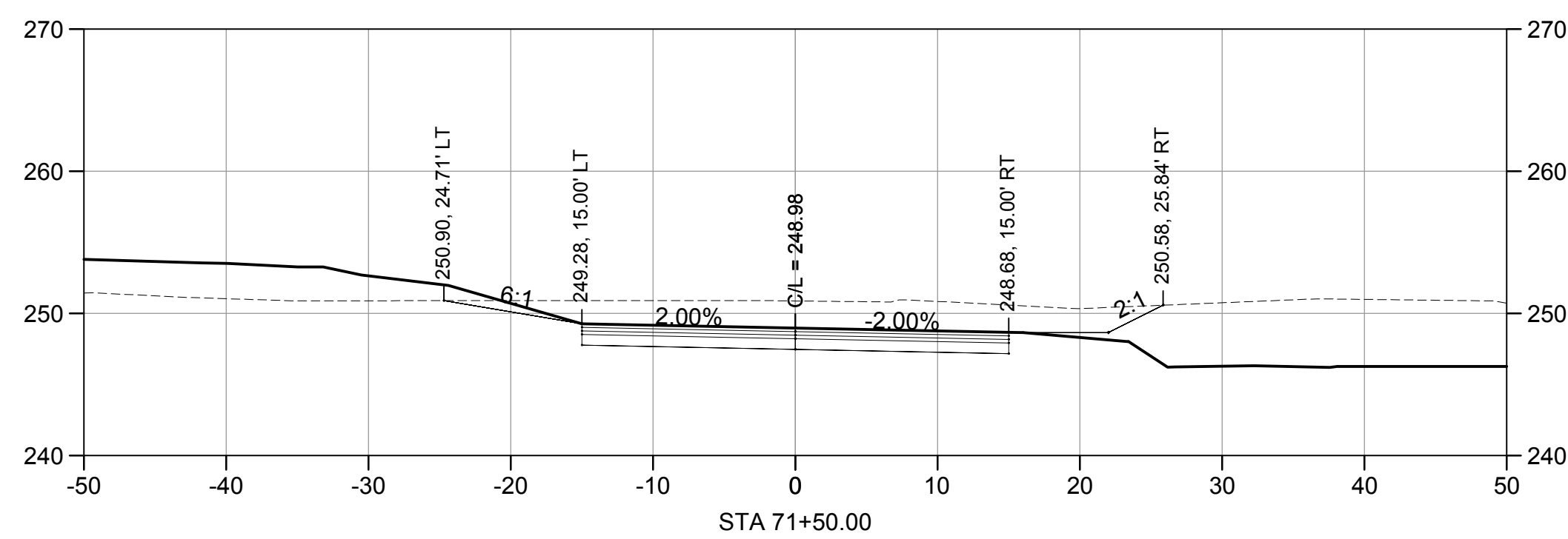
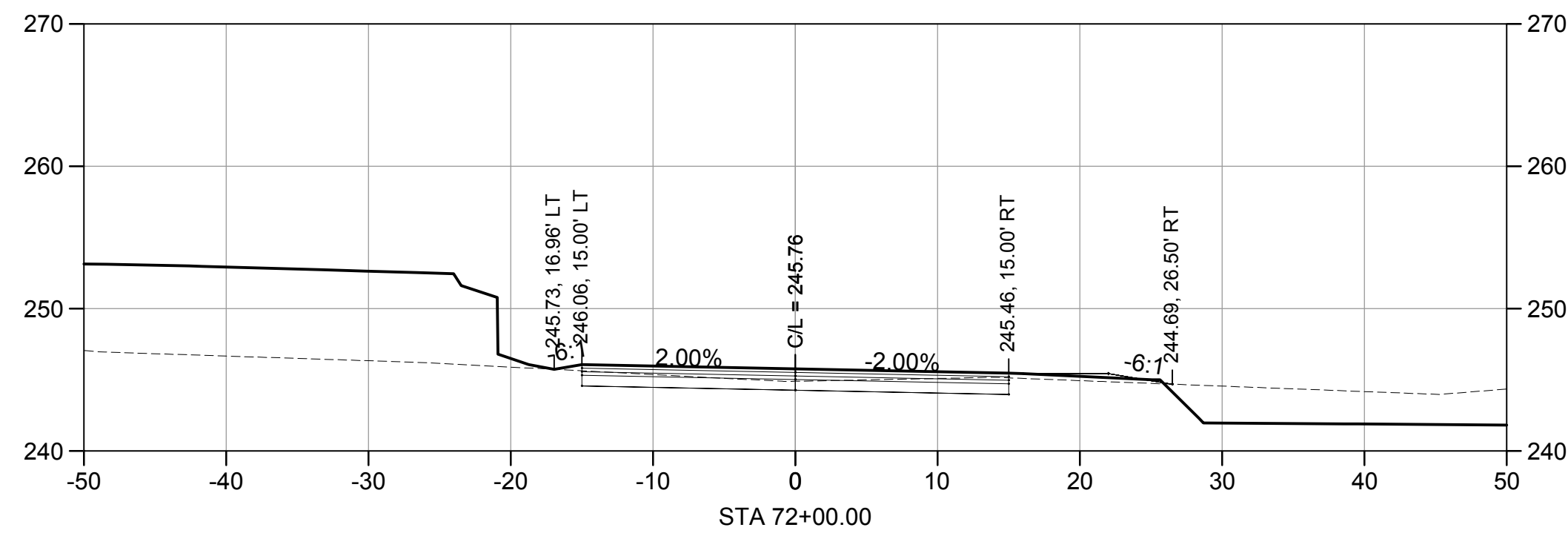
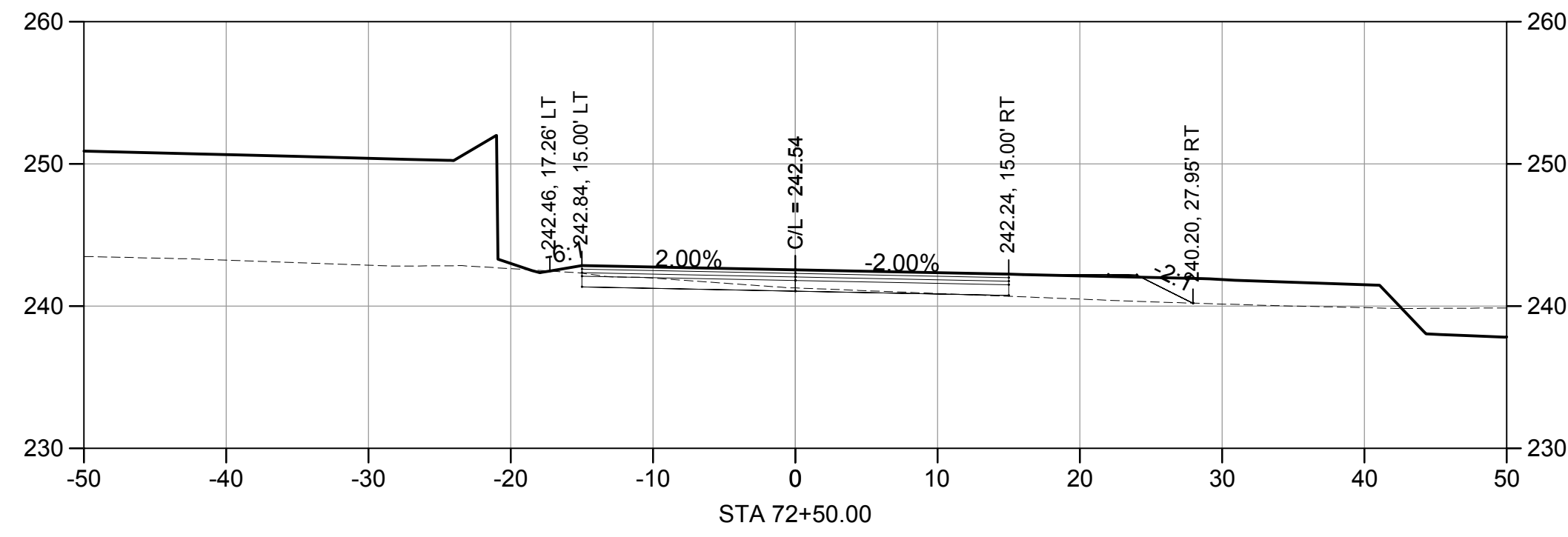
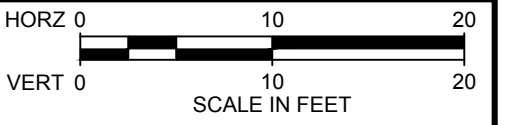


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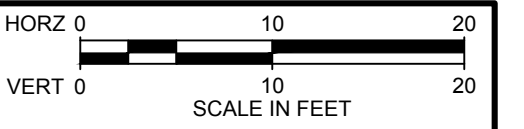
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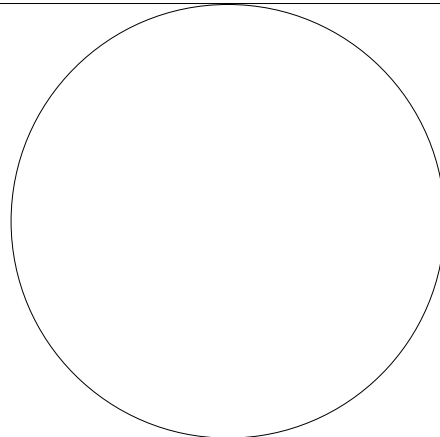
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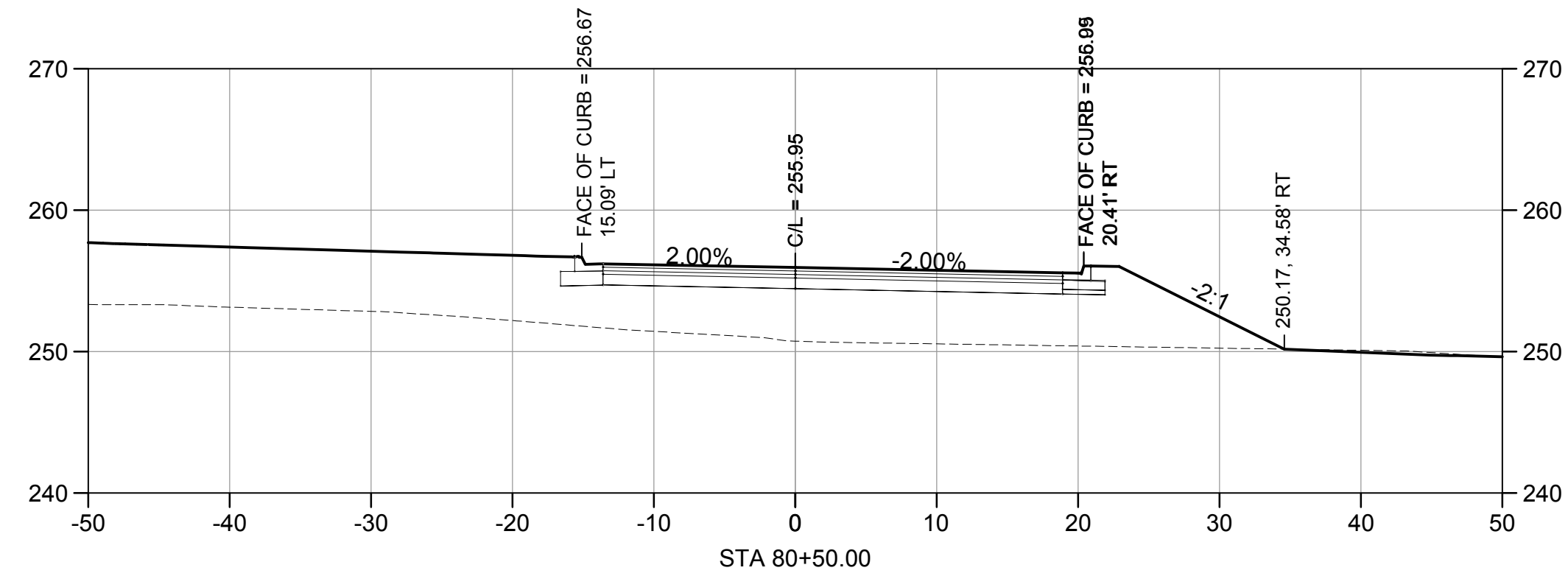
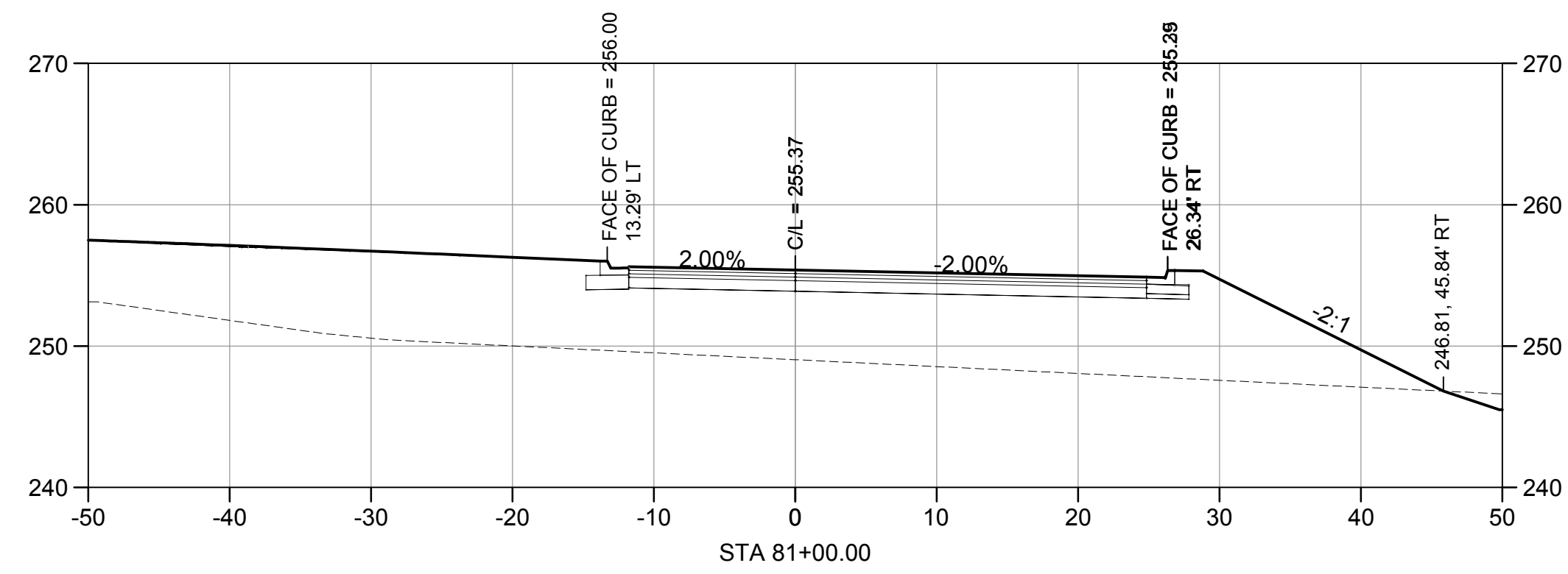
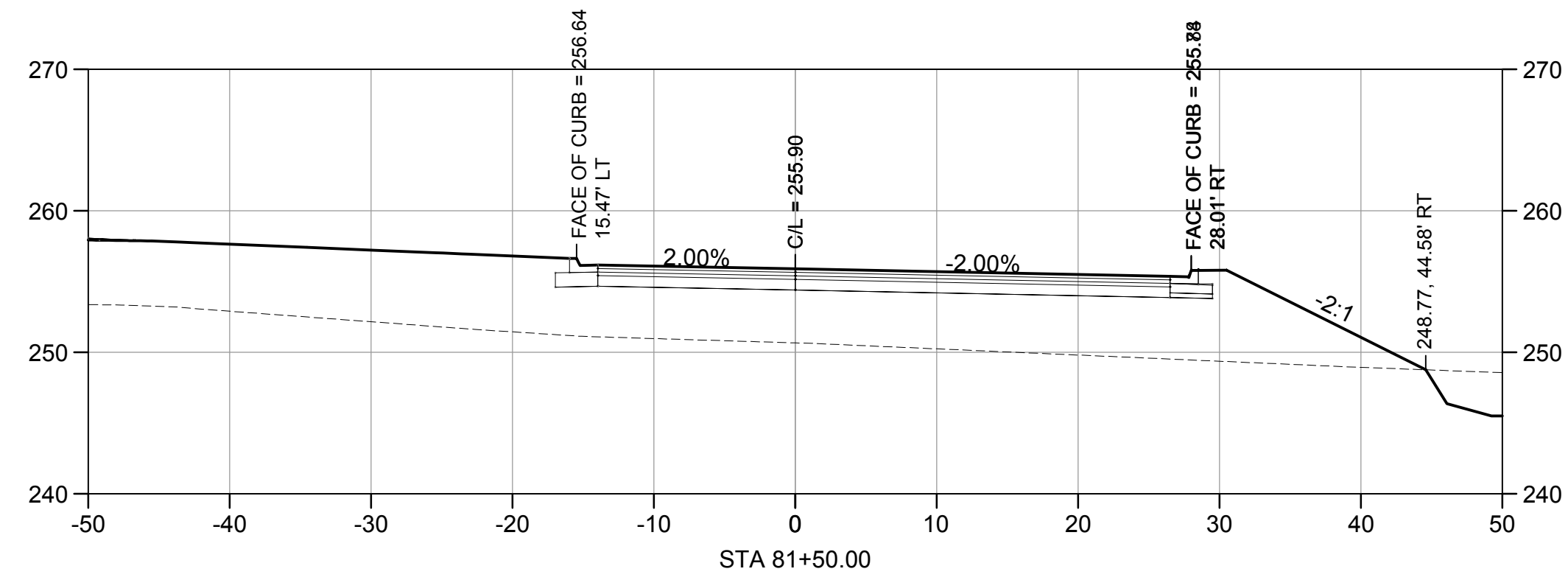
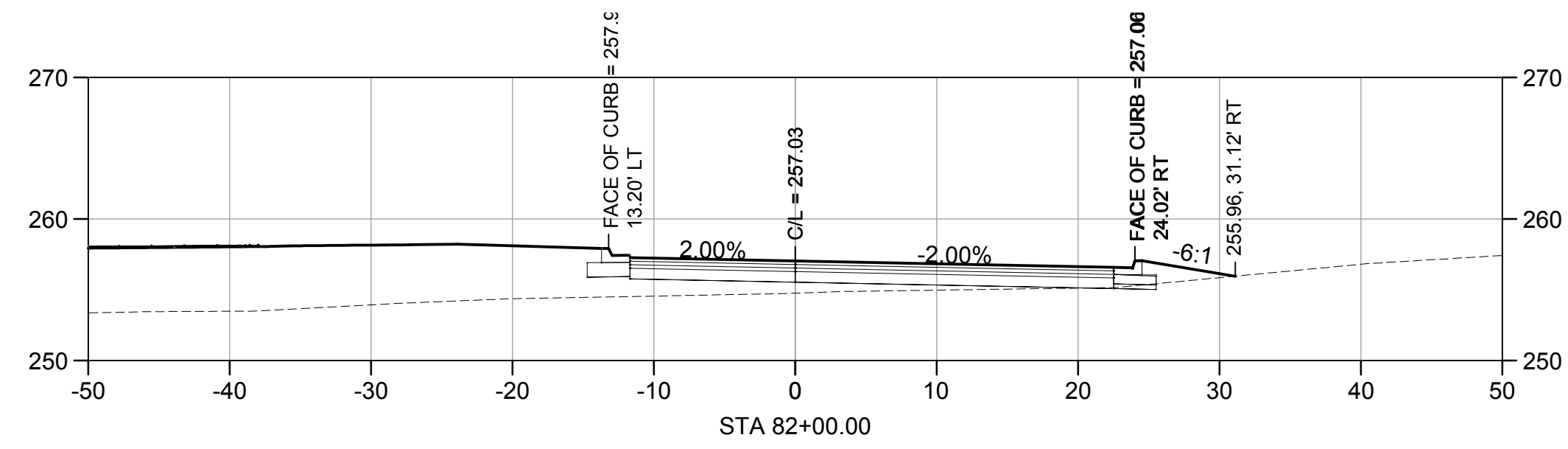
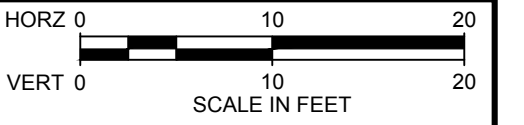


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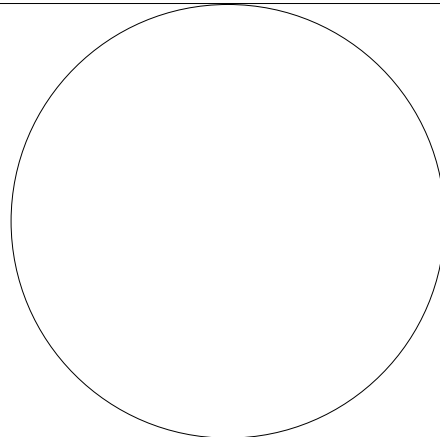
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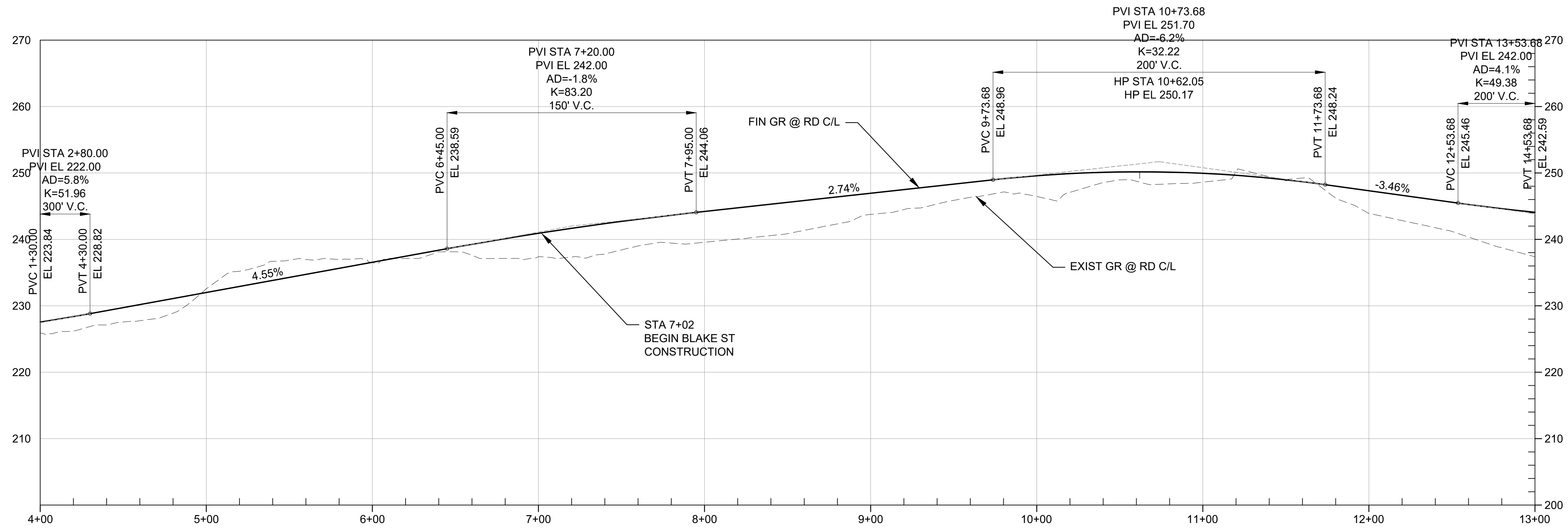
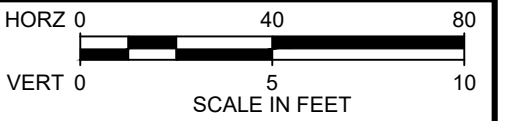


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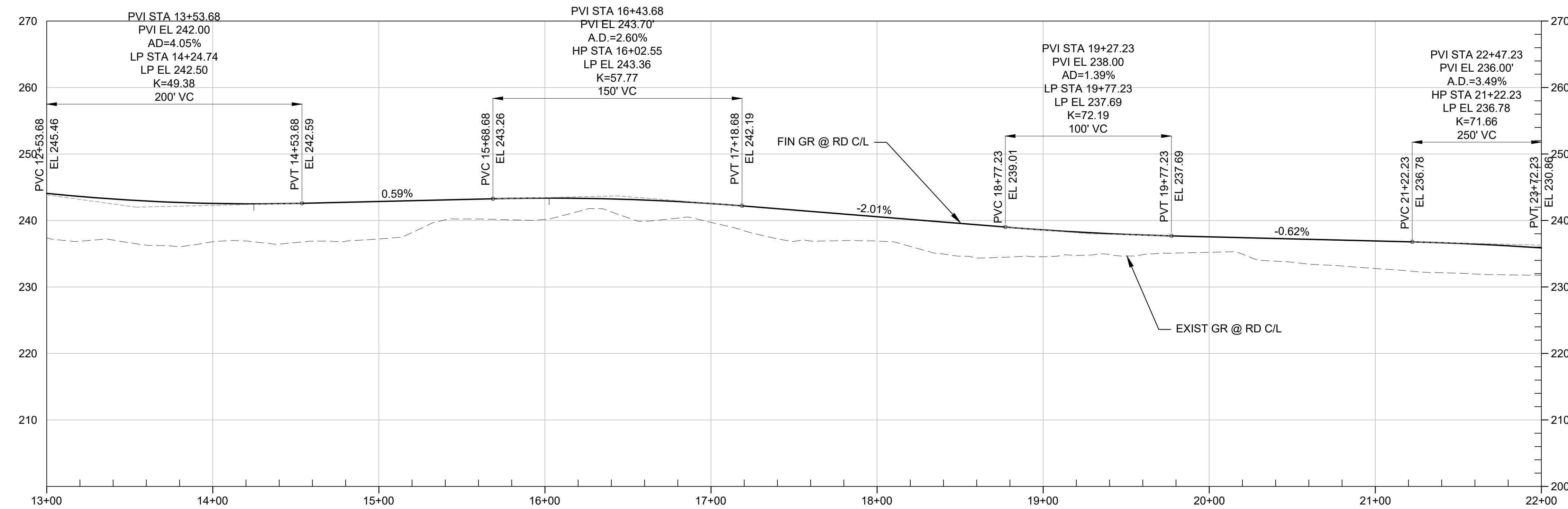
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1 PROFILE



2 PROFILE

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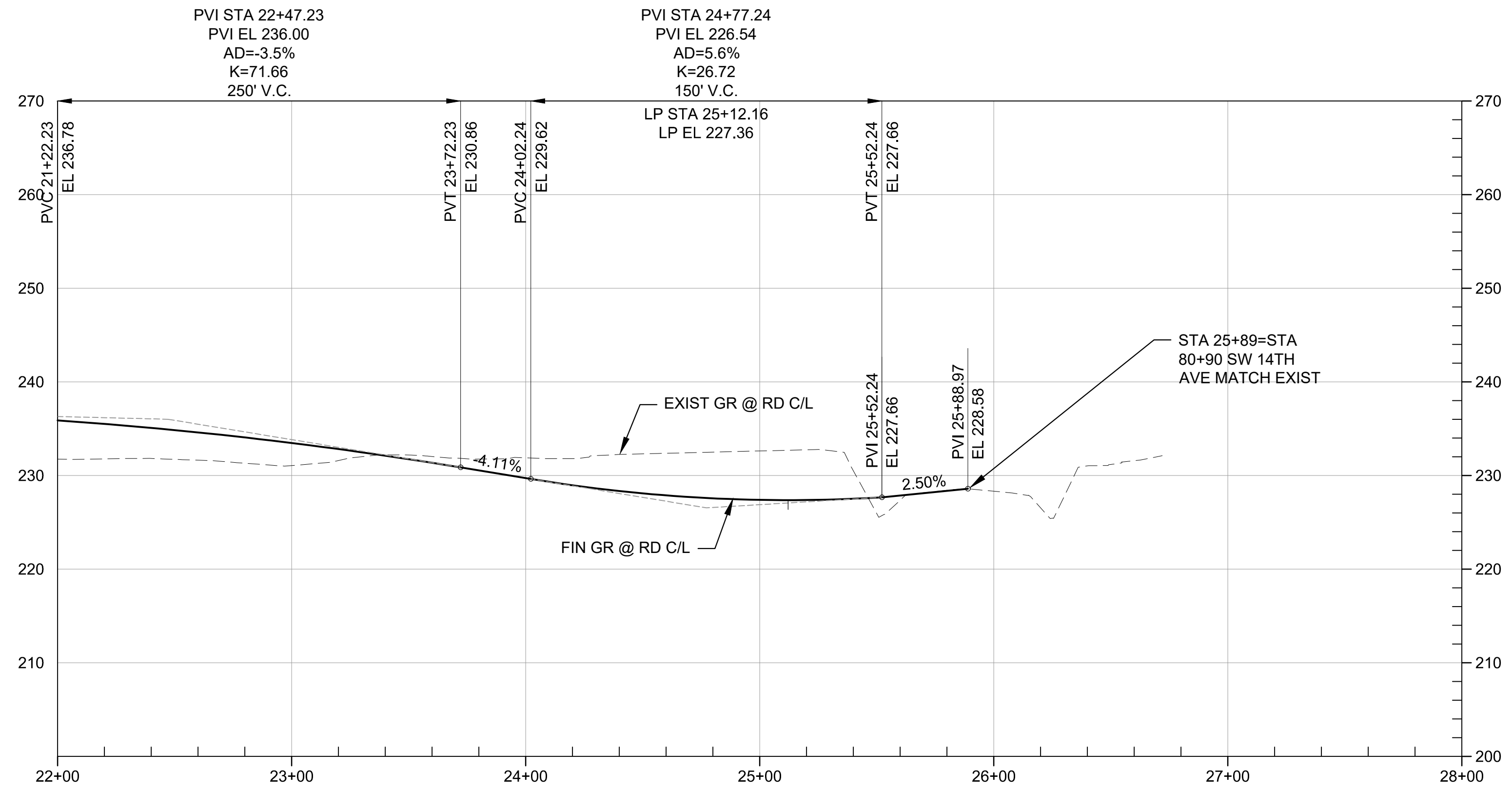
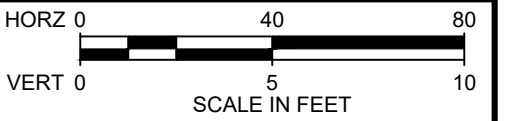


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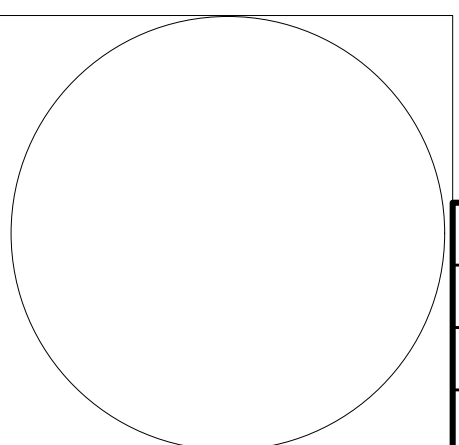
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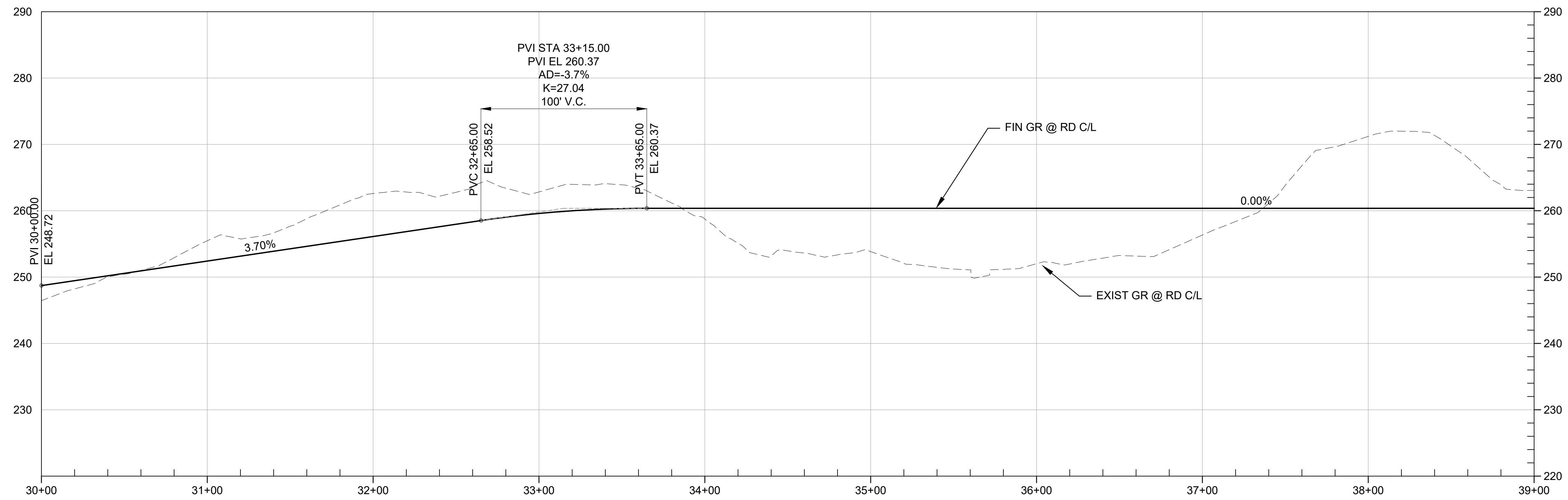
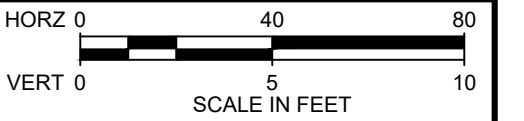
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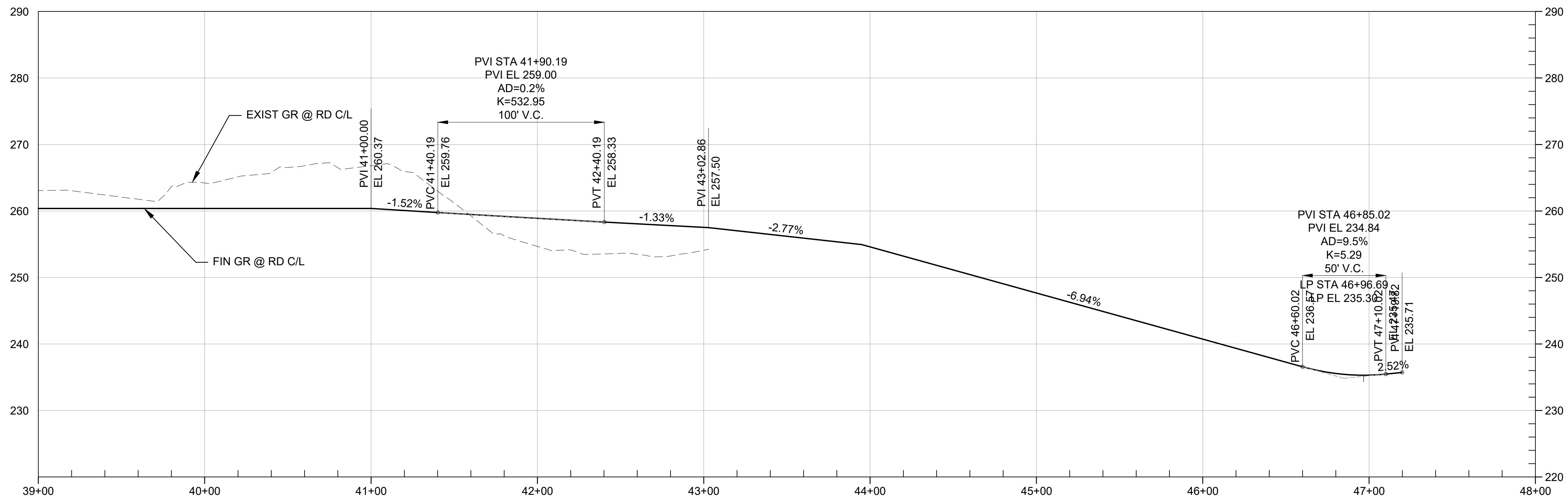
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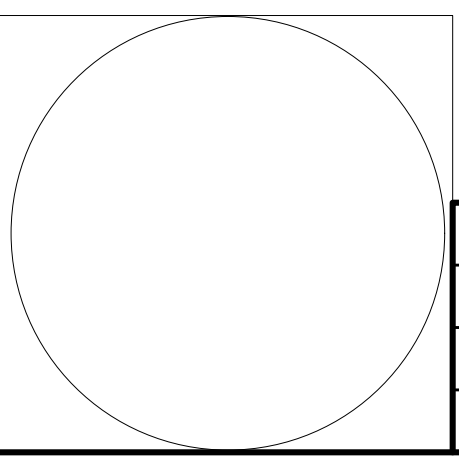


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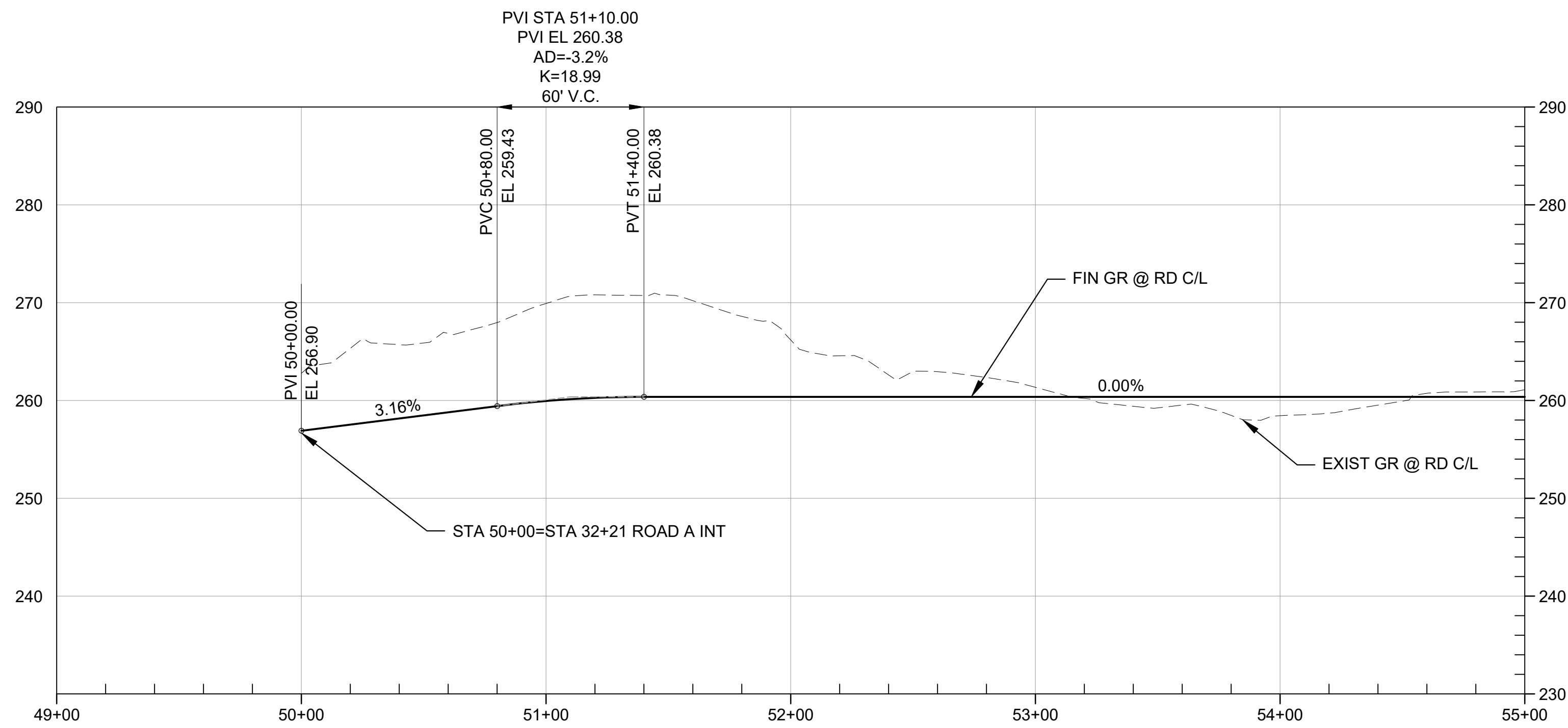
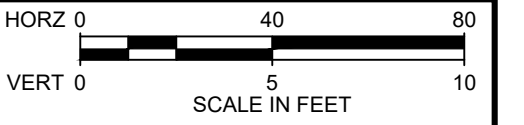


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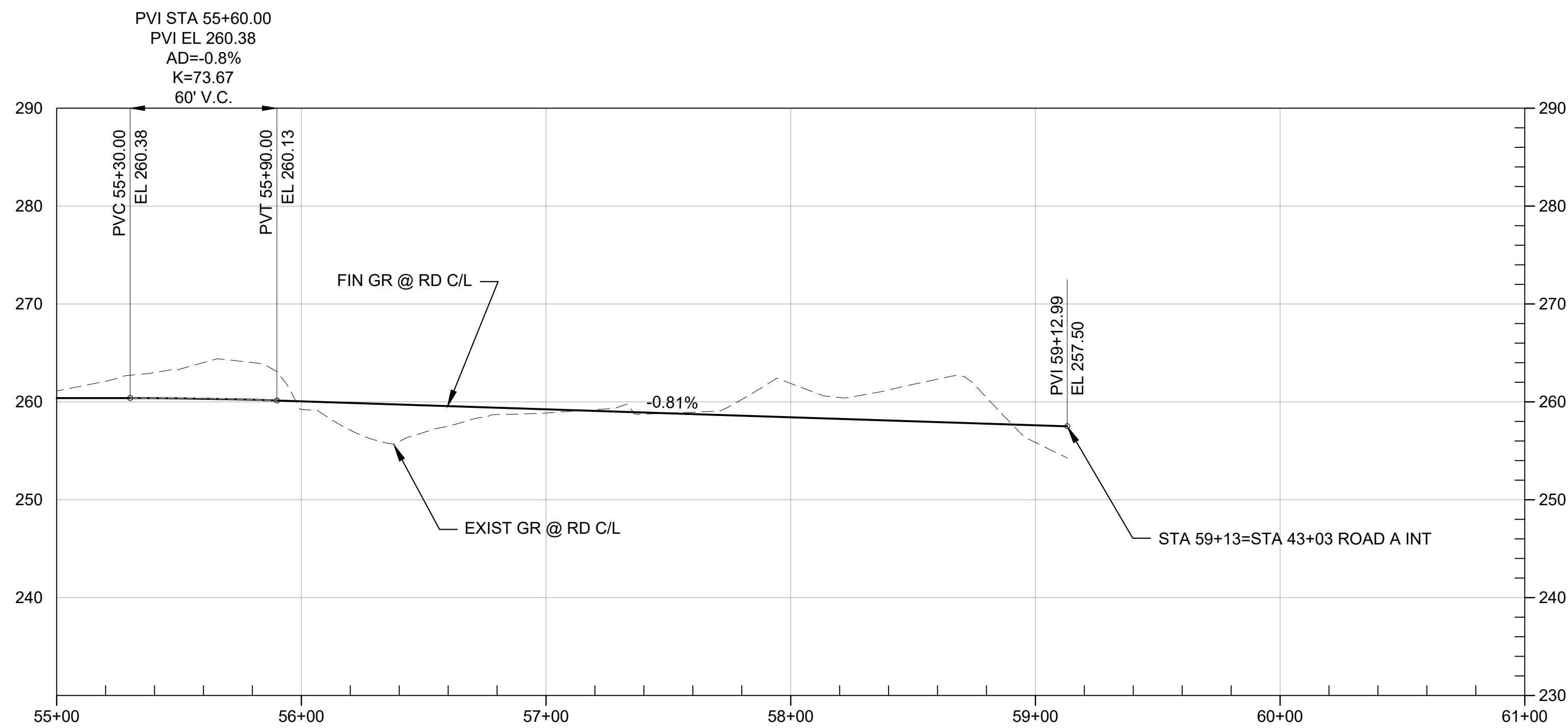
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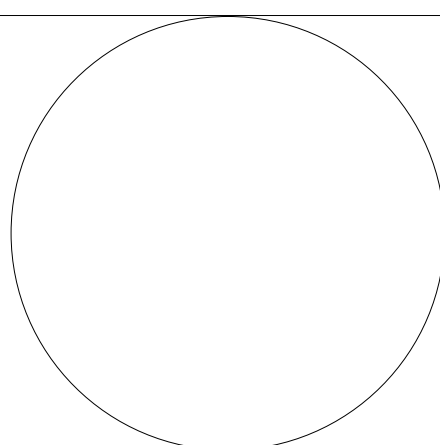


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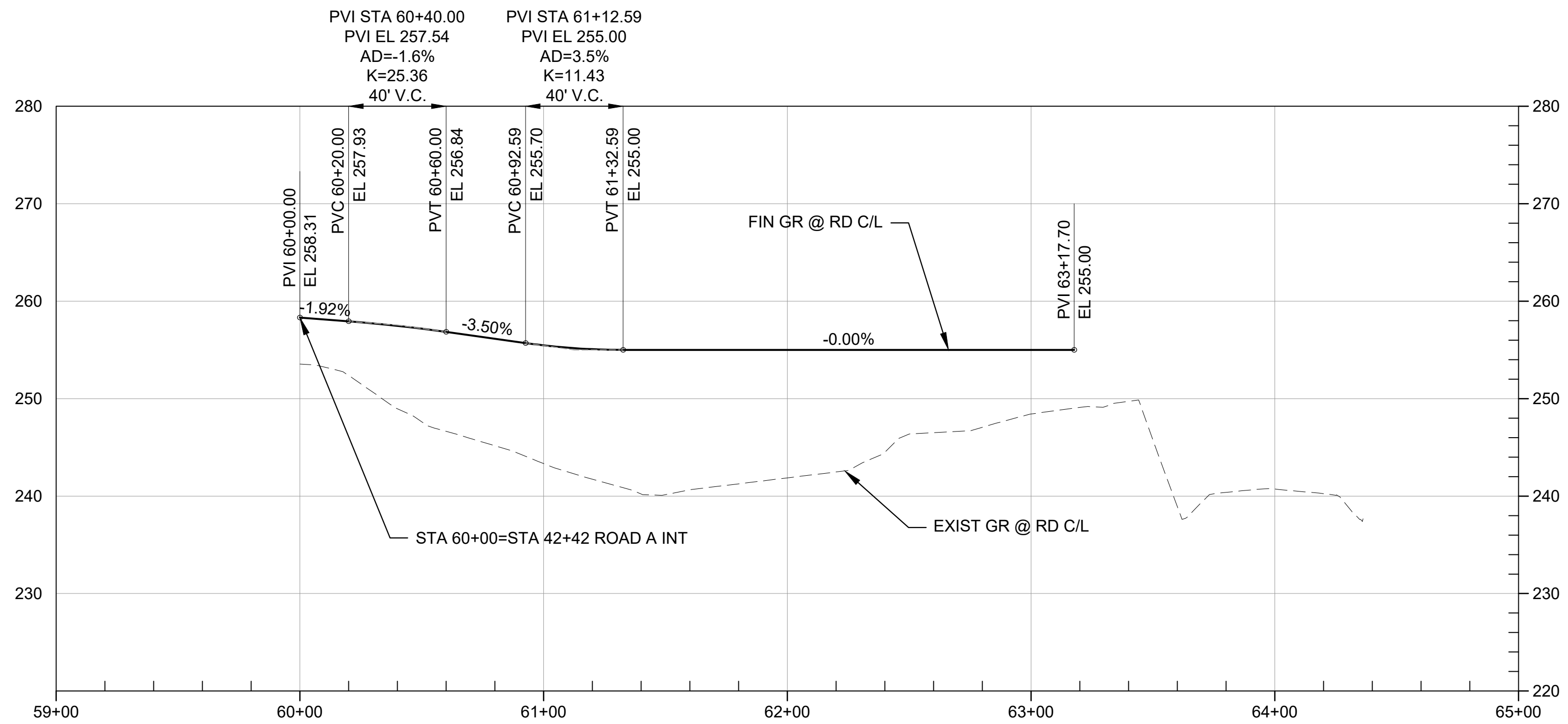
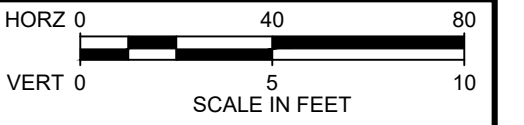
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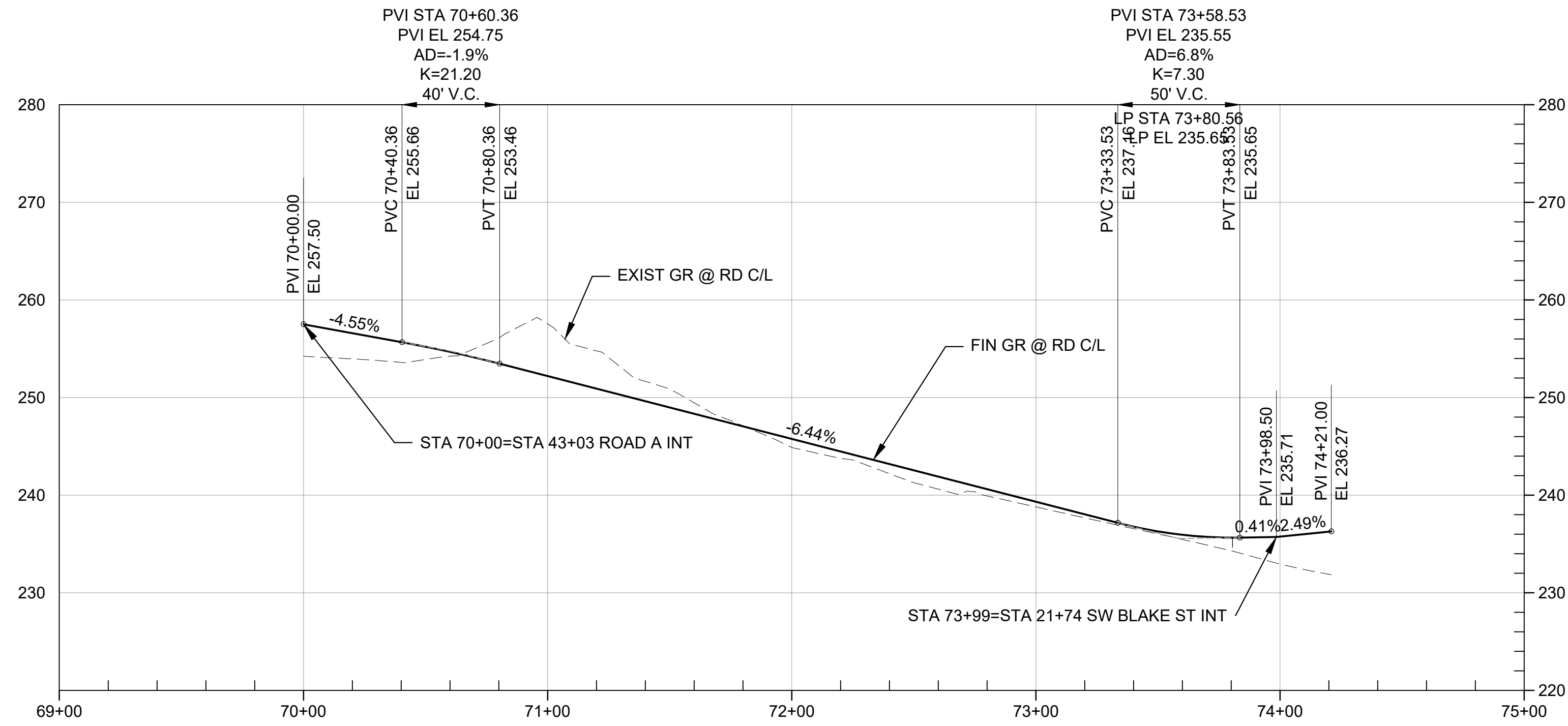
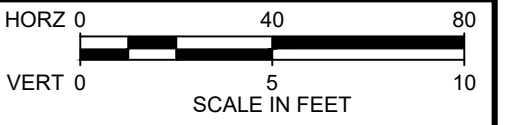


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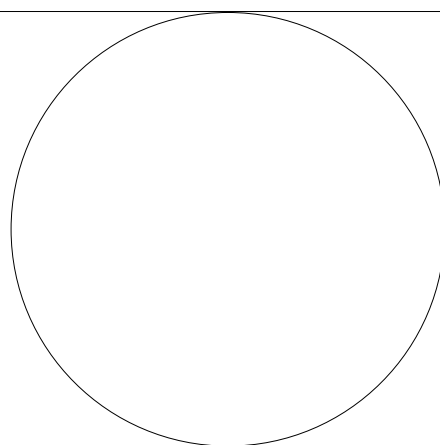


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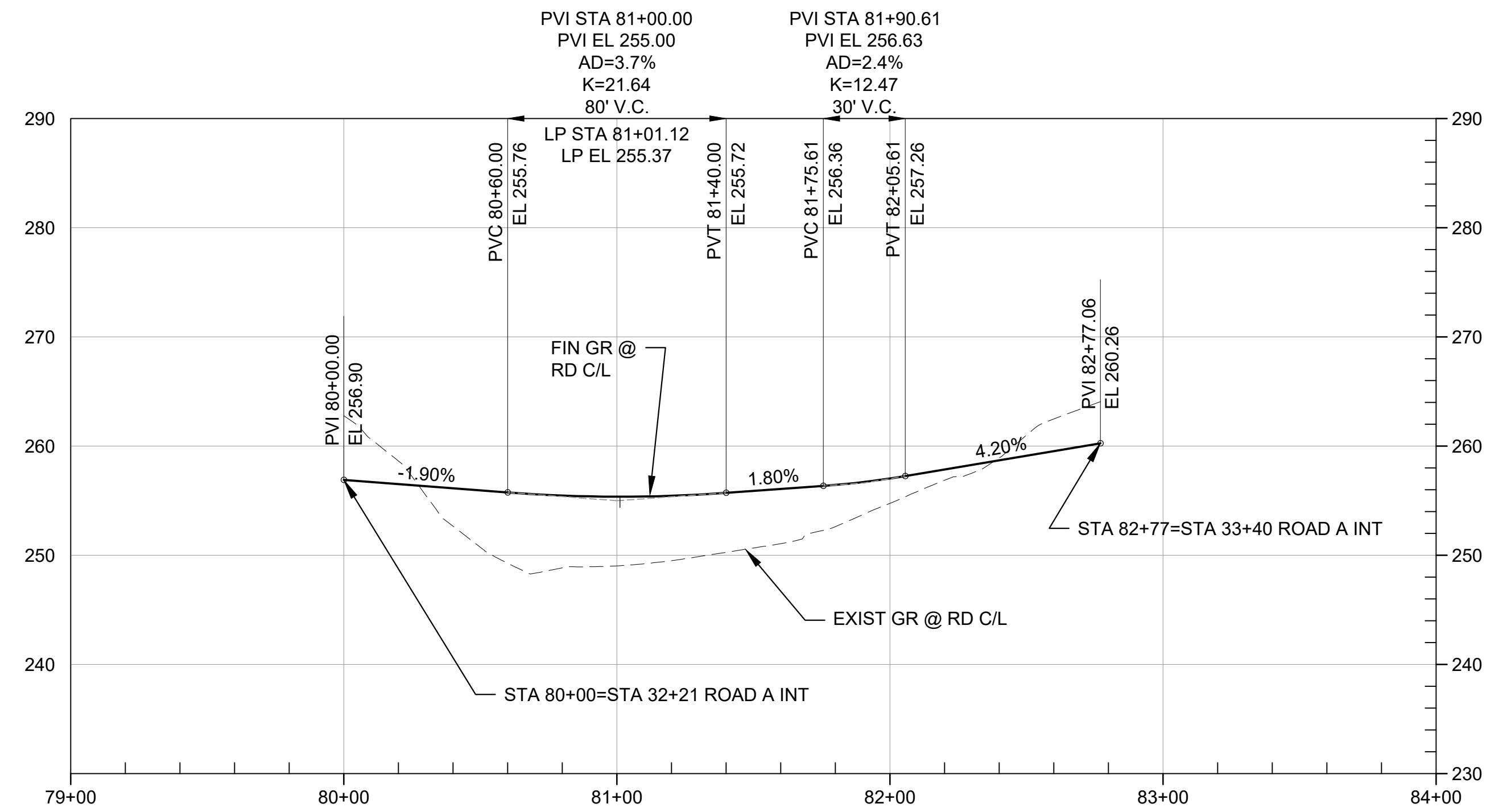
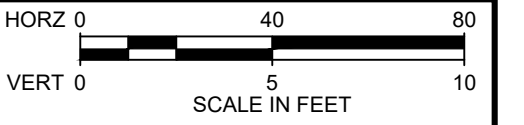
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SHEET	
DWG	03-GR-70104
DATE	FEBRUARY 2020
PROJ	WTP_1.0

60% DESIGN - NOT FOR CONSTRUCTION



1 PROFILE

BY: ERICA RODRIGUEZ

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\csm\erica.rodriguez@murraysmith.usa\02781WTP1-03-GR-70001.dwg

60% DESIGN - NOT FOR CONSTRUCTION

DSGN	C JAIN				
DR	A ROBERTS				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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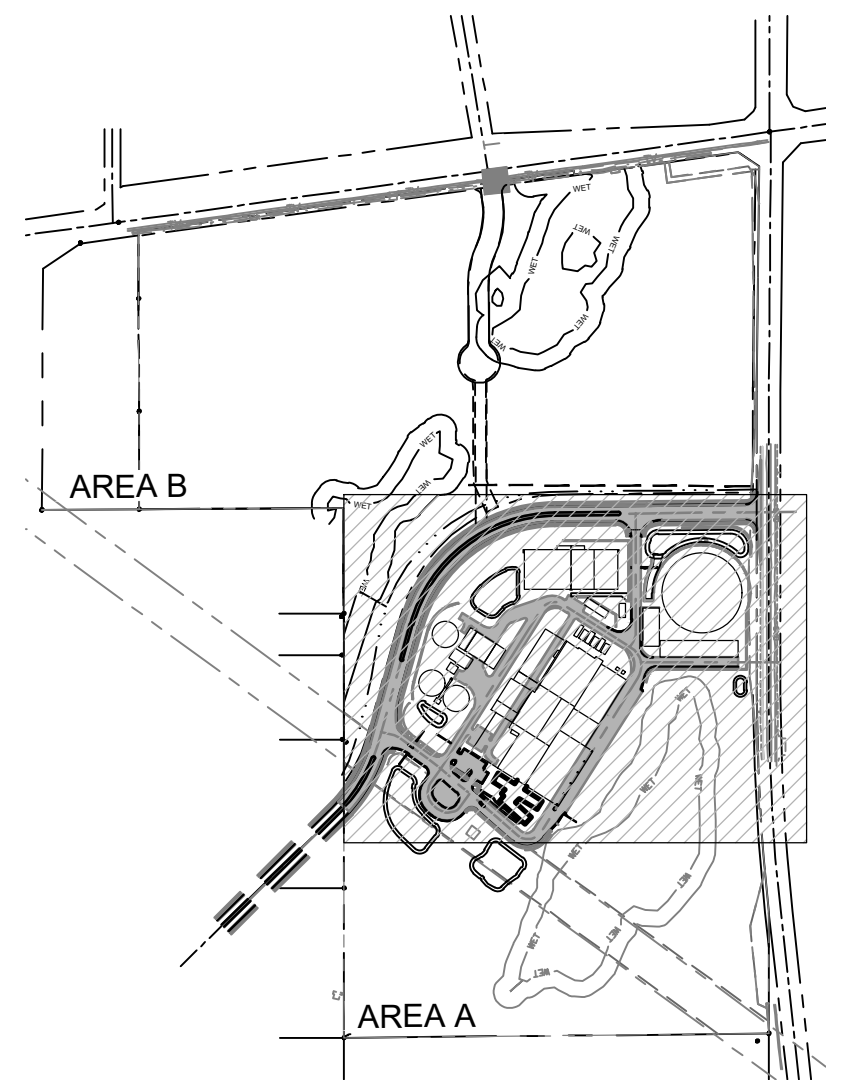
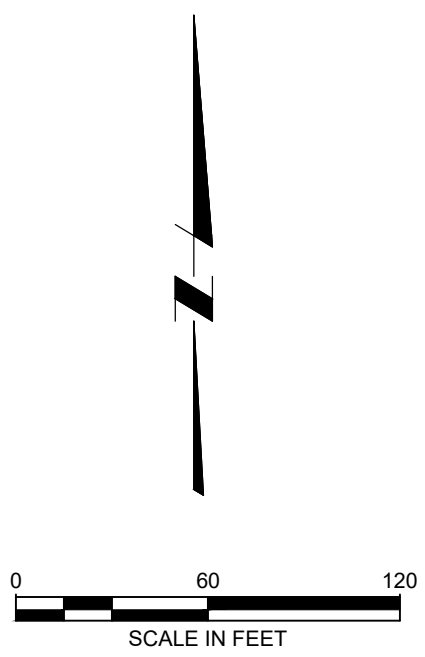
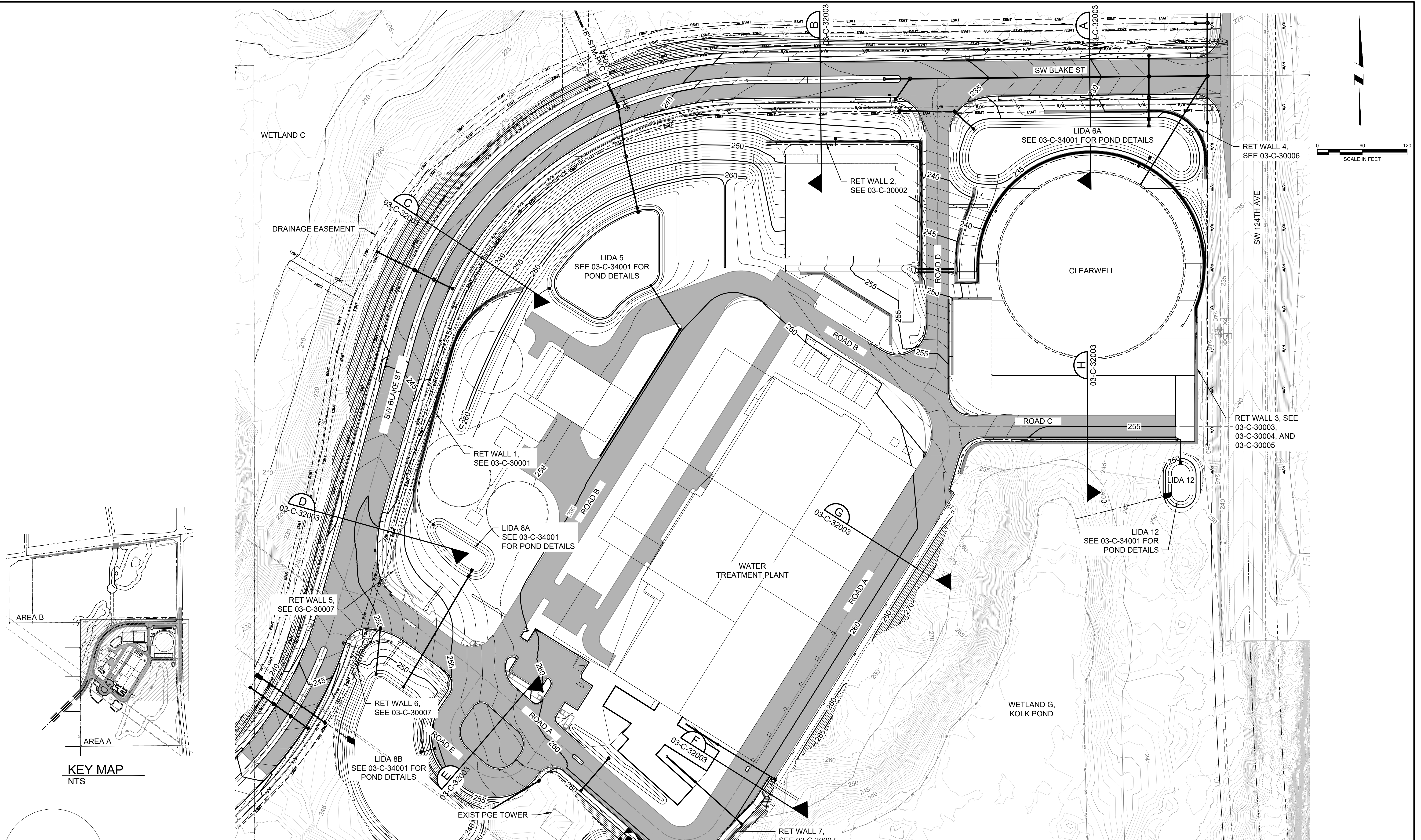
SITE
 GRADING
 ROAD E PROFILES 1

SHEET	
DWG	03-GR-70105
DATE	FEBRUARY 2020
PROJ	WTP_1.0

BY: BEN FOSTER

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\cdm\ben.foster@murraysmith.us\0274278\WTP1-03-GR-20001.dwg



KEY MAP
NTS

60% DESIGN - NOT FOR CONSTRUCTION

DSGN	K USAGAWA				
DR	M ESTEP				
CHK	B FOSTER				
APVD	M HICKEY	NO.	DATE	REVISION	BY

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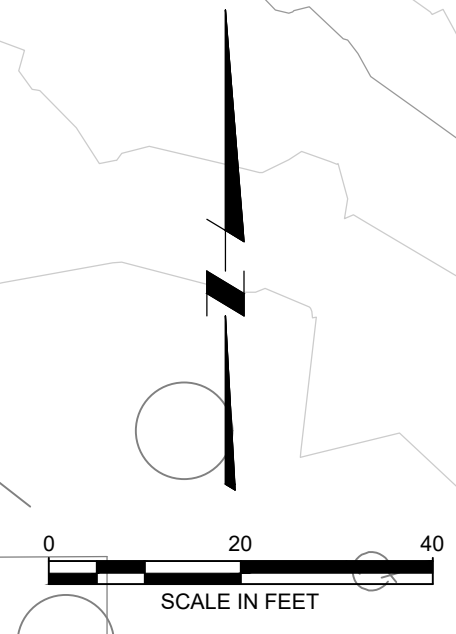
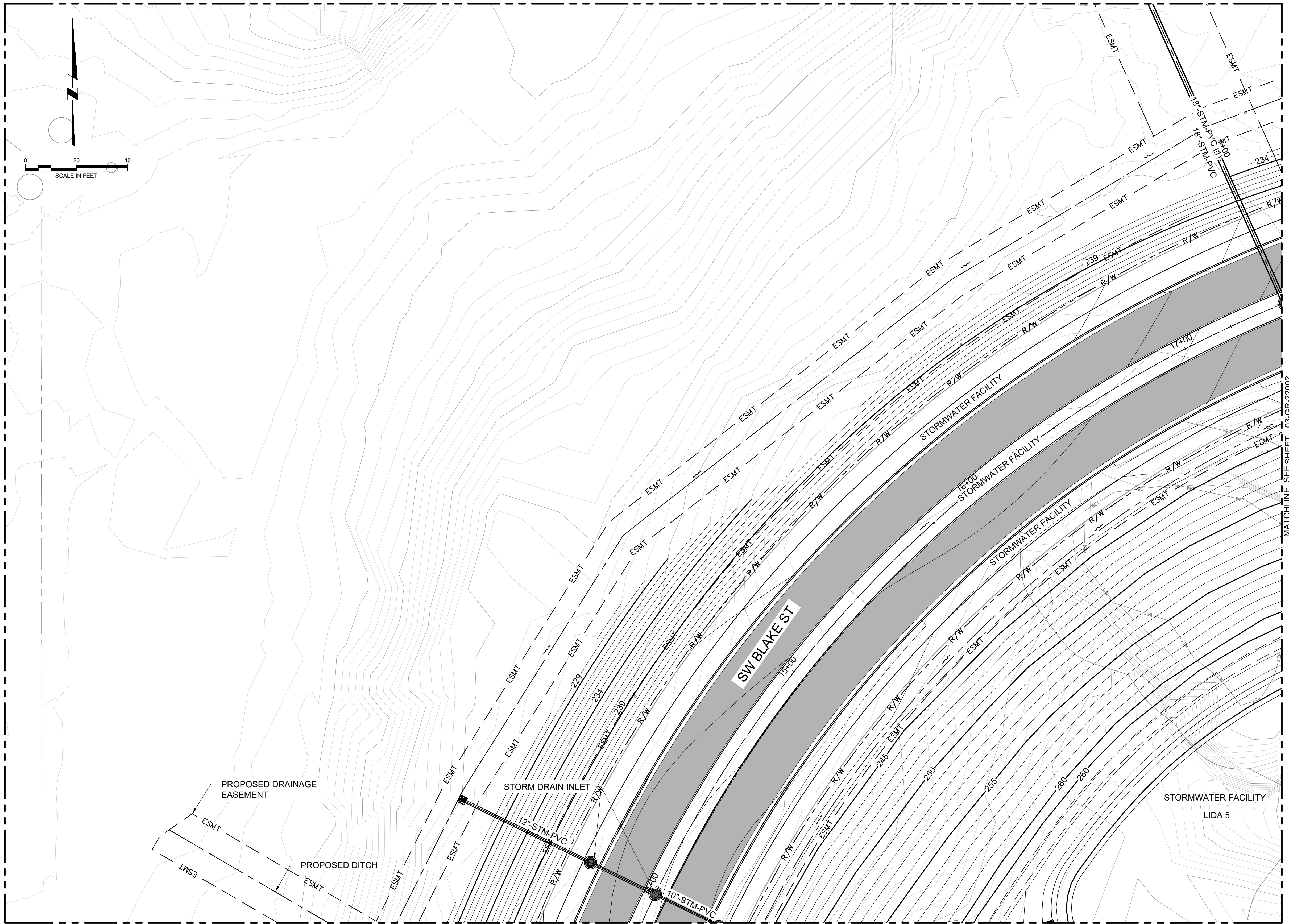
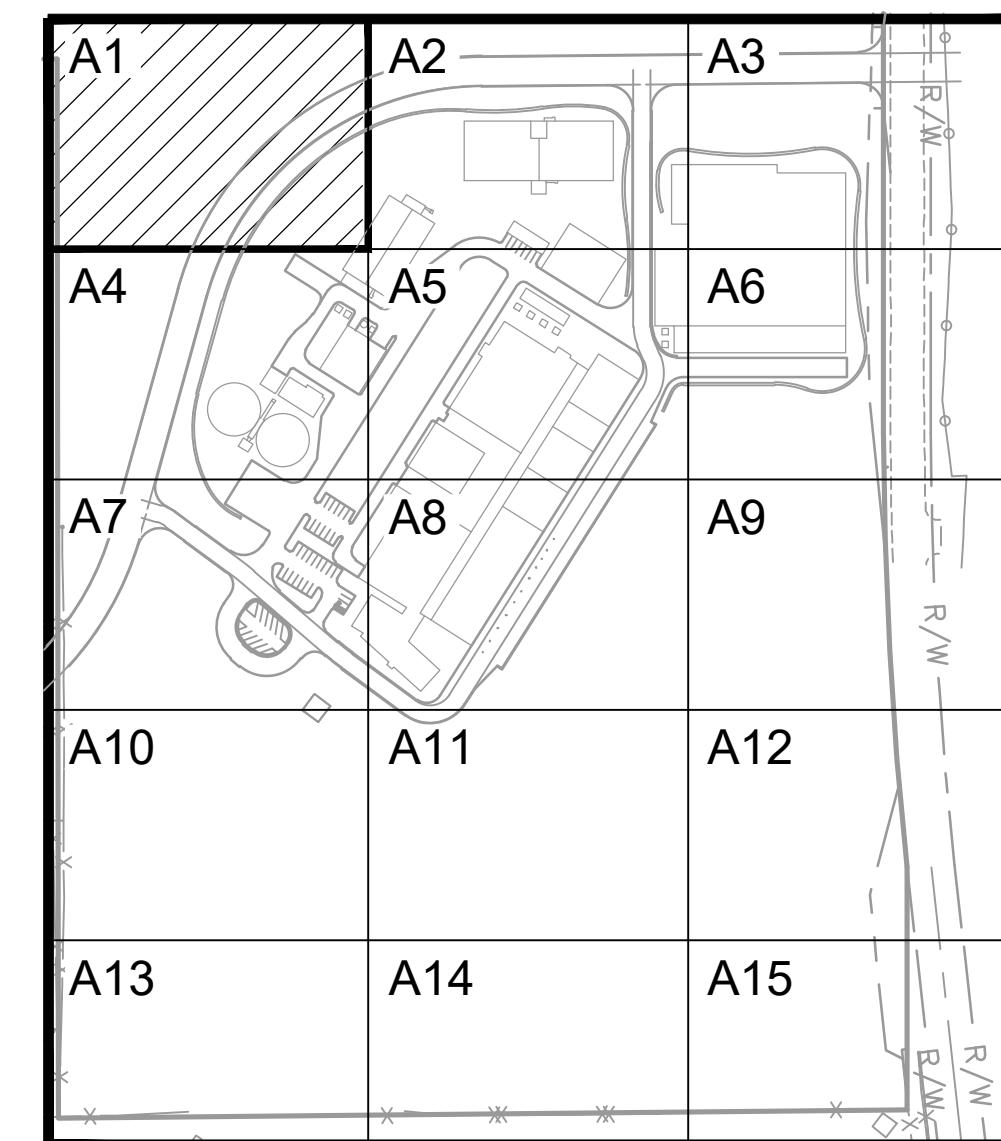
SITE
GRADING
GRADING, PAVING AND DRAINAGE LAYOUT PLAN
AREA A

SHEET	DWG	03-GR-20002
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

NOTES:

KEY NOTES

KEY MAP



DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg
 PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
 BY: KIERA USAGAWA

DSGN	C JAIN					
DR	M ESTEP					
CHK	NA					
APVD	NA	NO.	DATE	REVISION	BY	APVD

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SITE
 GRADING
 GRADING, PAVING AND DRAINAGE PLAN AREA A1

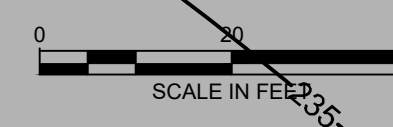
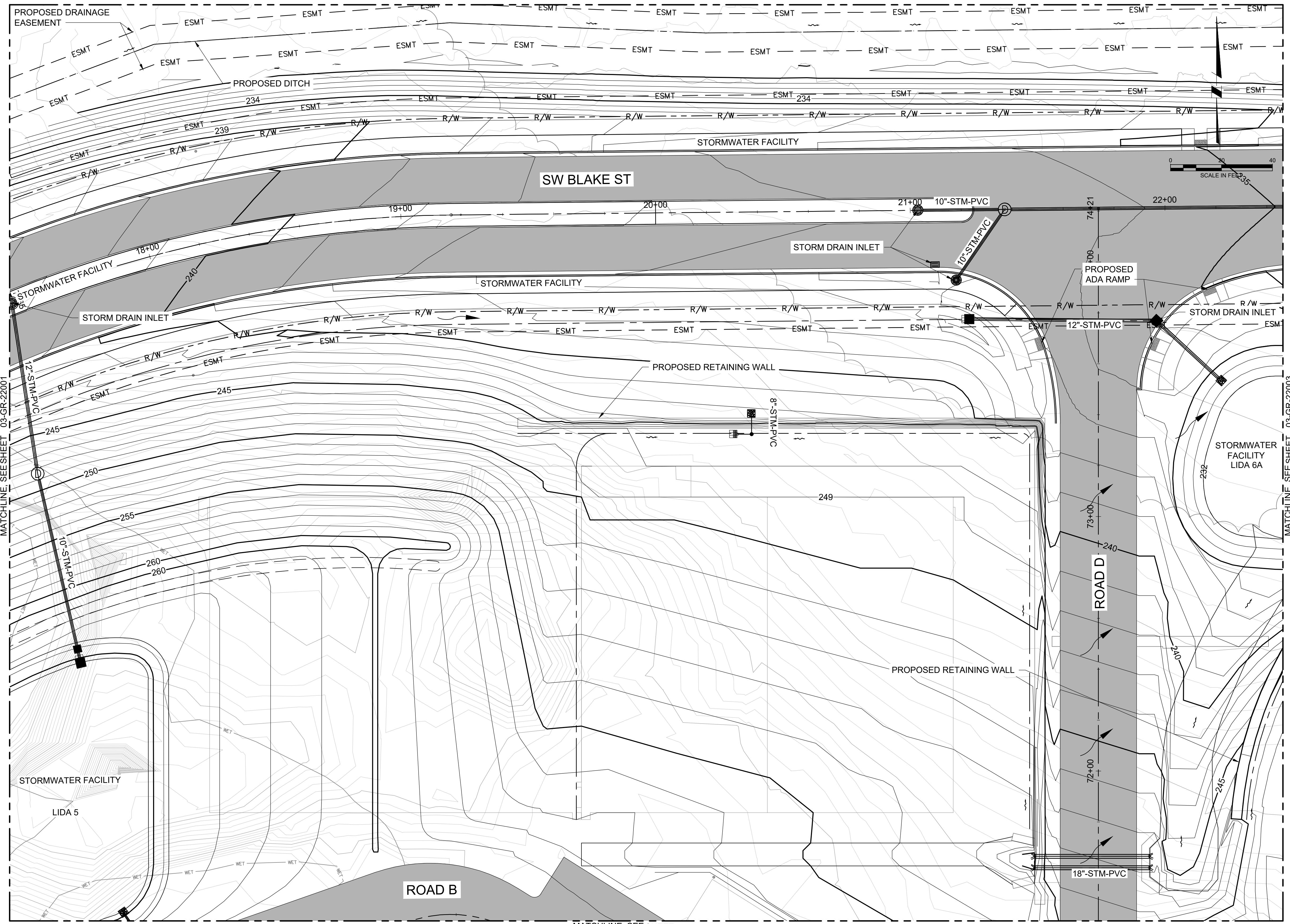
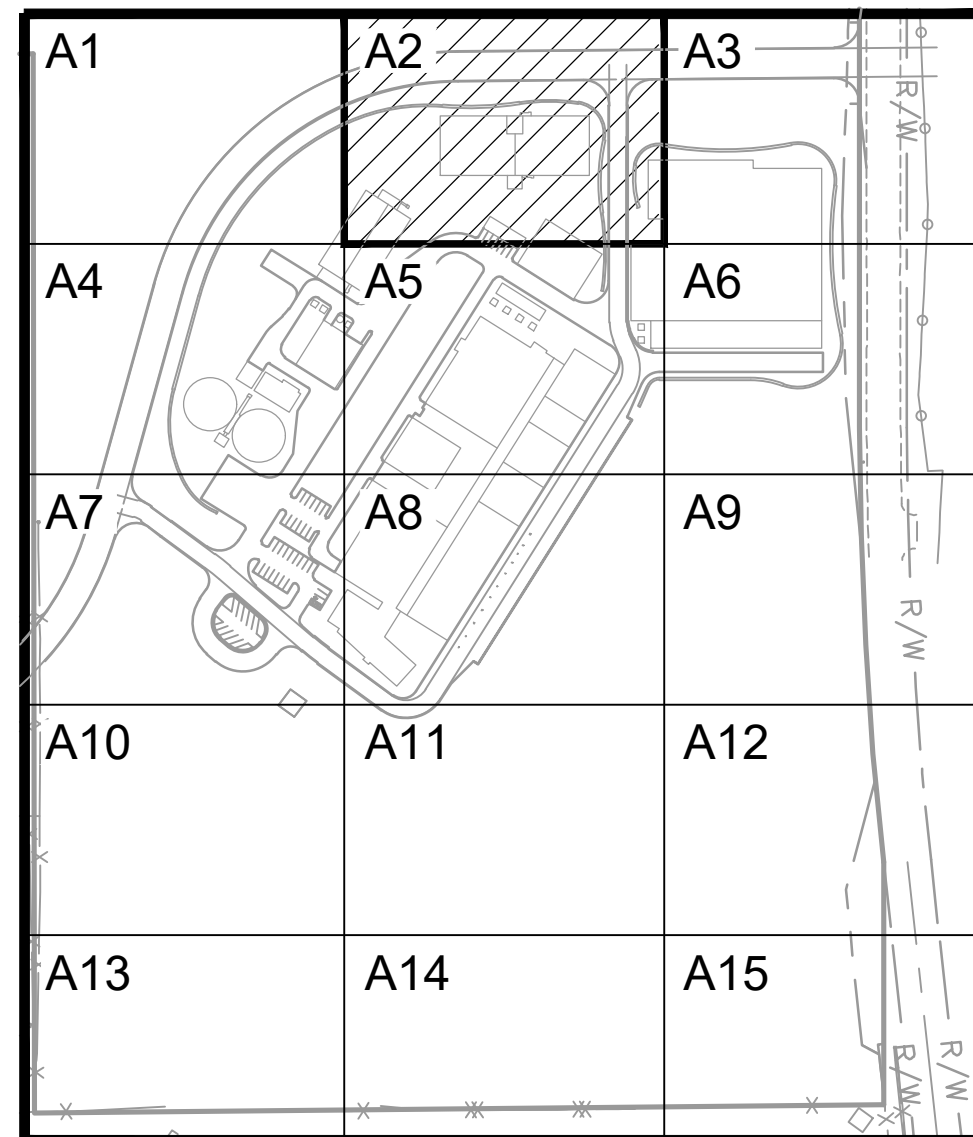
SHEET	DWG	03-GR-22001
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

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NOTES:

KEY NOTES

KEY MAP



BY: KIERA USAGAWA
PLOT DATE: Tuesday, December 17, 2019 11:17:53 AM
DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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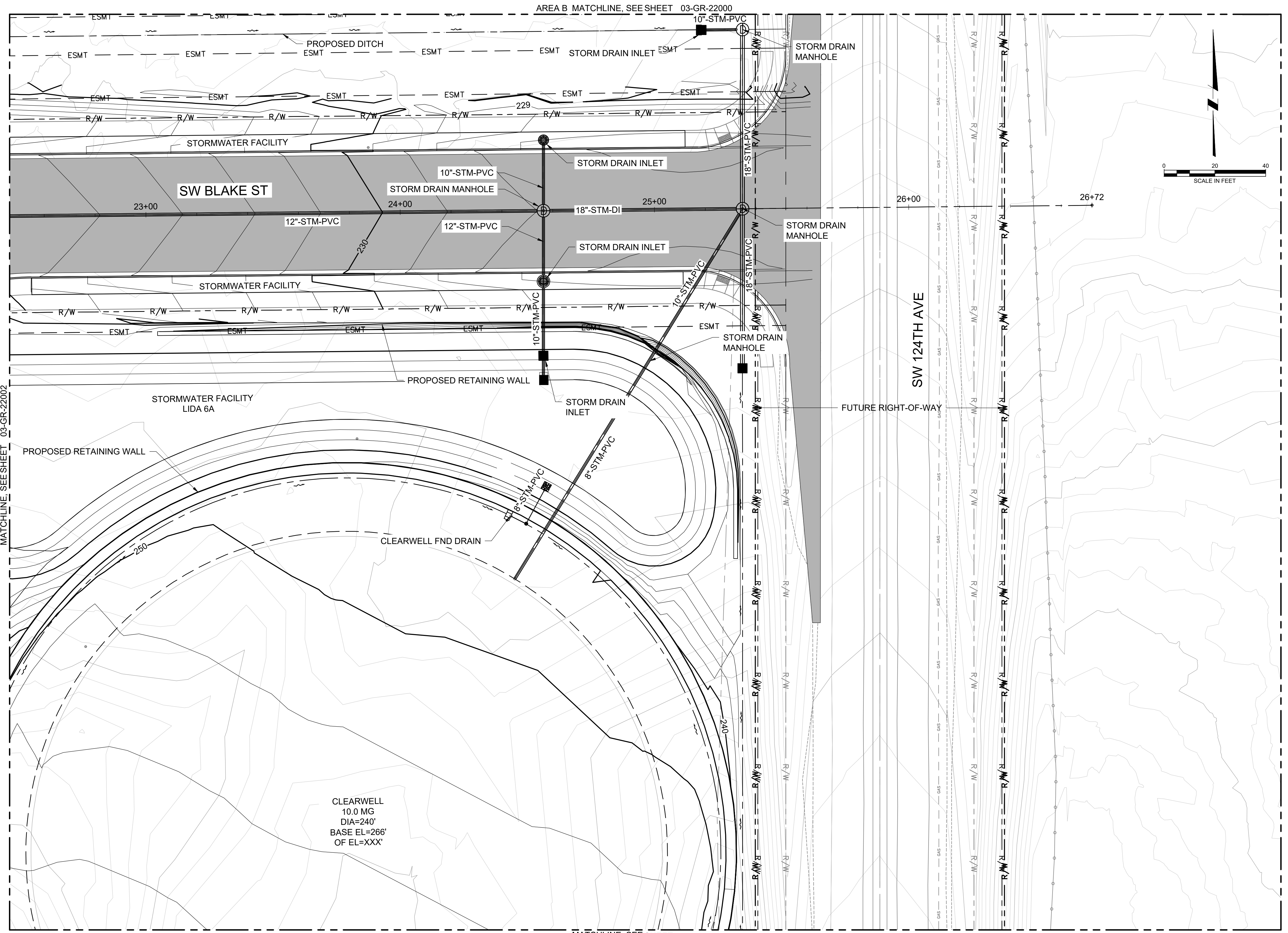
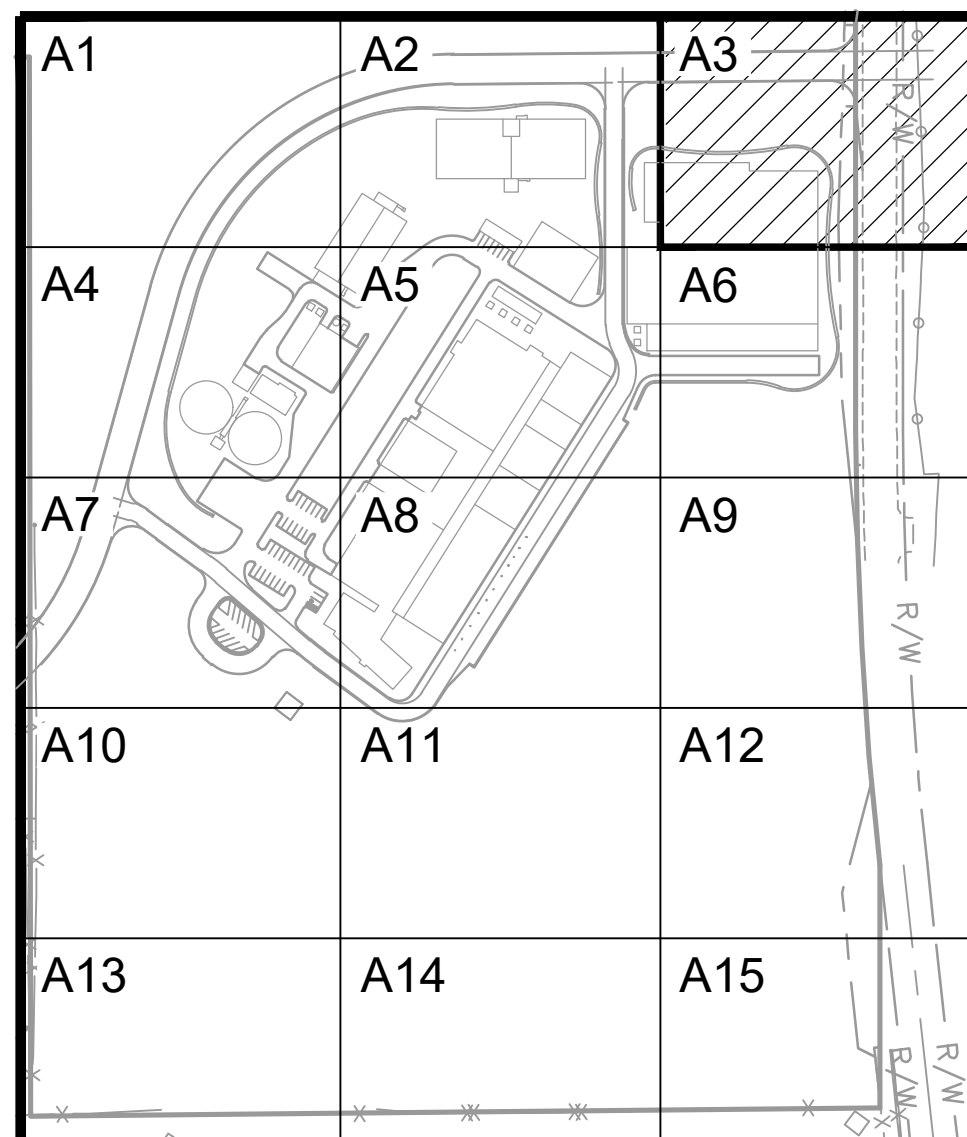
SITE GRADING
GRADING, PAVING AND DRAINAGE PLAN AREA A2

SHEET	DWG	03-GR-22002
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

NOTES:

KEY NOTES

KEY MAP



BY: KIERA USAGAWA
PLOT DATE: Tuesday, December 17, 2019 11:18:20 AM
DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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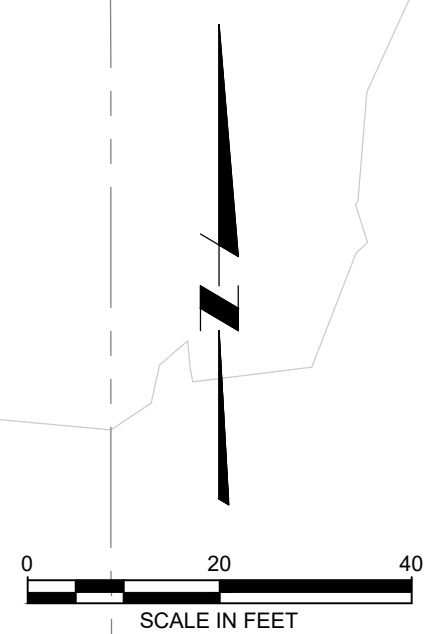
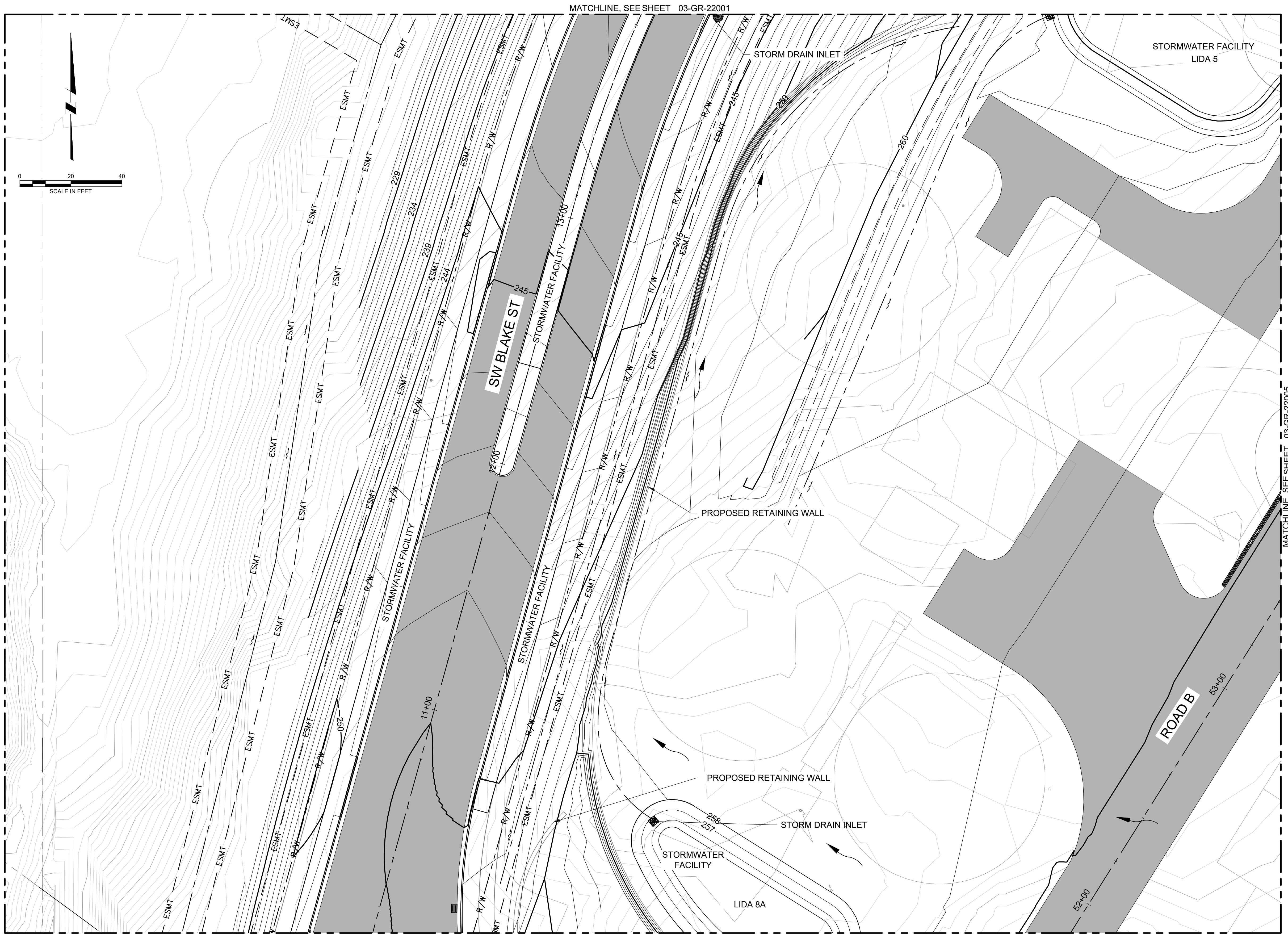
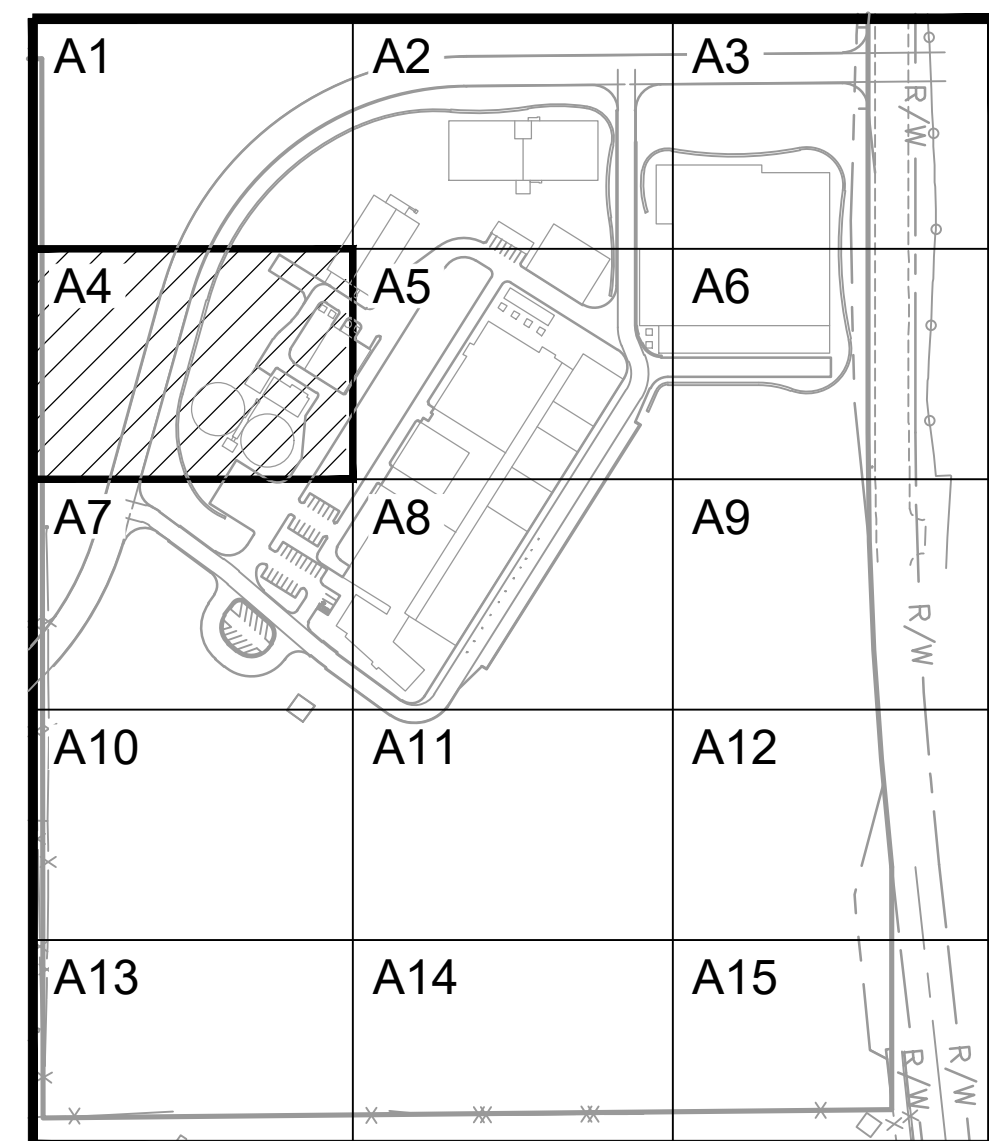
SITE GRADING
GRADING, PAVING AND DRAINAGE PLAN AREA A3

SHEET	DWG	03-GR-22003
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

NOTES:

KEY NOTES

KEY MAP



DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg
 PLOT DATE: Tuesday, December 17, 2019 11:18:42 AM
 BY: KIERA USAGAWA

DSGN	C JAIN					
DR	M ESTEP					
CHK	NA					
APVD	NA	NO.	DATE	REVISION	BY	APVD

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SITE
 GRADING
 GRADING, PAVING AND DRAINAGE PLAN AREA A4

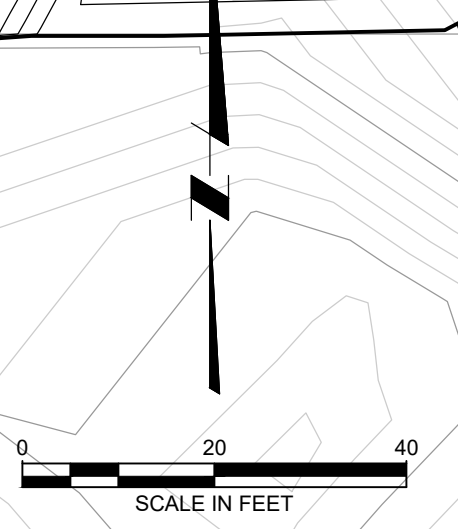
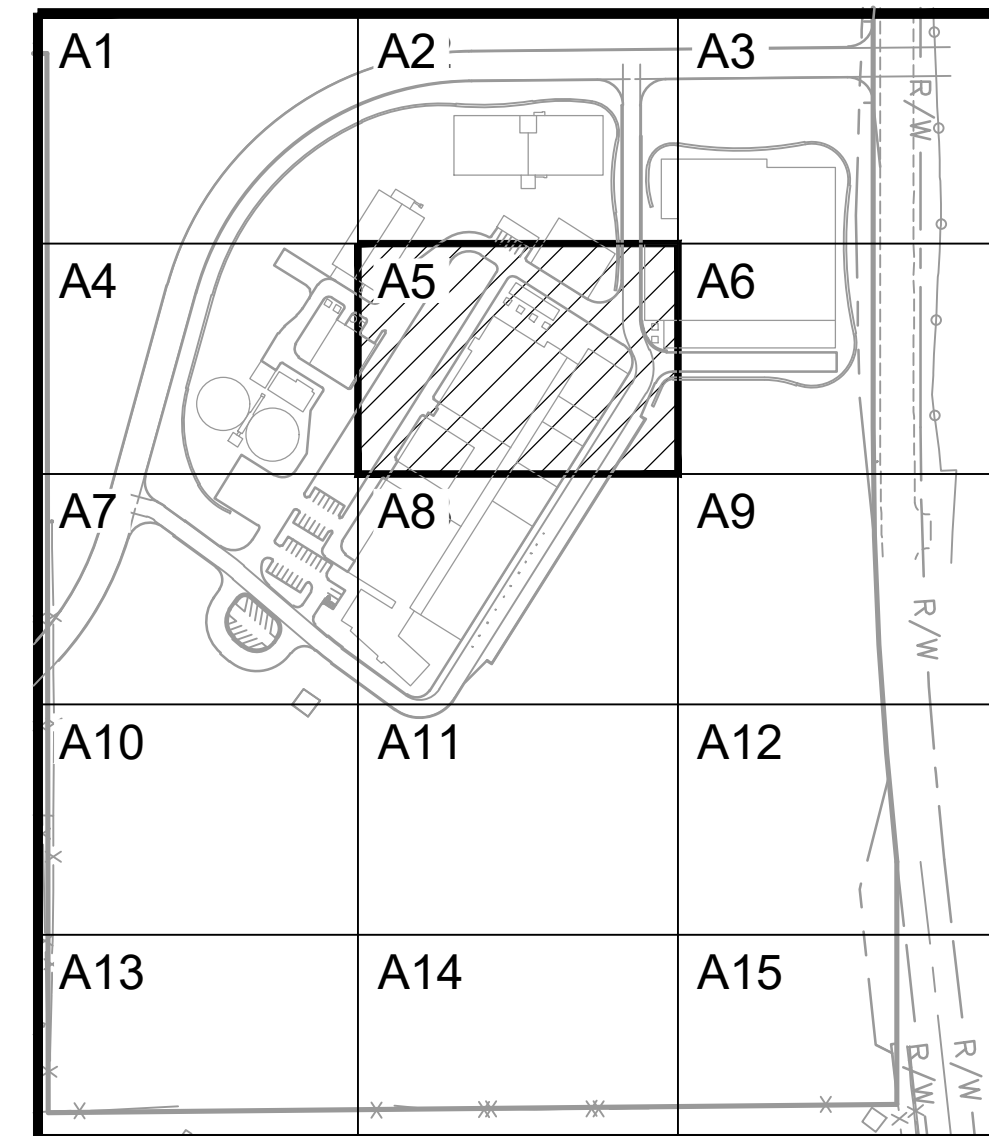
SHEET	DWG	03-GR-22004
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

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NOTES:

KEY NOTES

KEY MAP



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 Tuesday, December 17, 2019 11:18:57 AM
 BY: KIERA USAGAWA

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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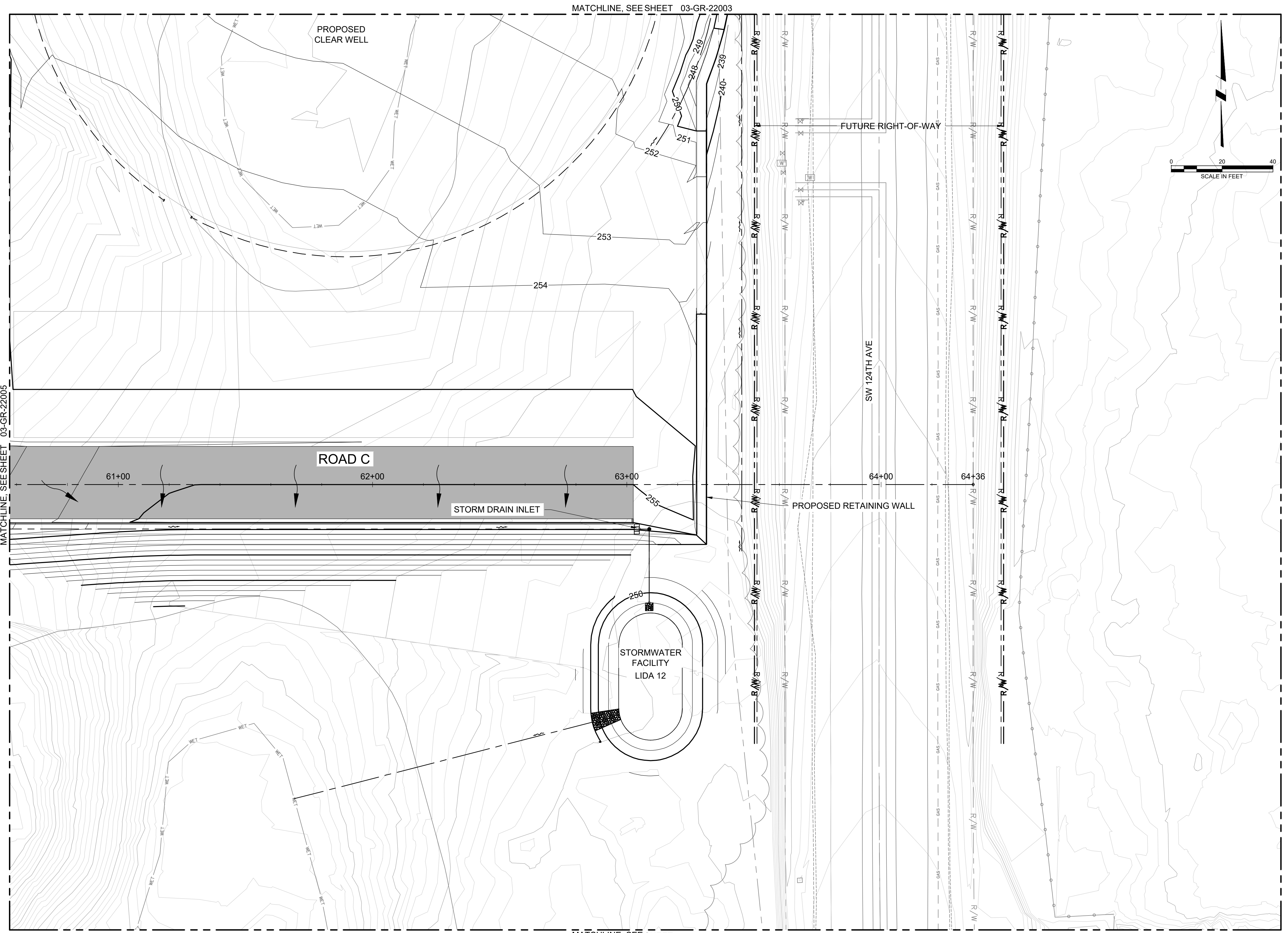
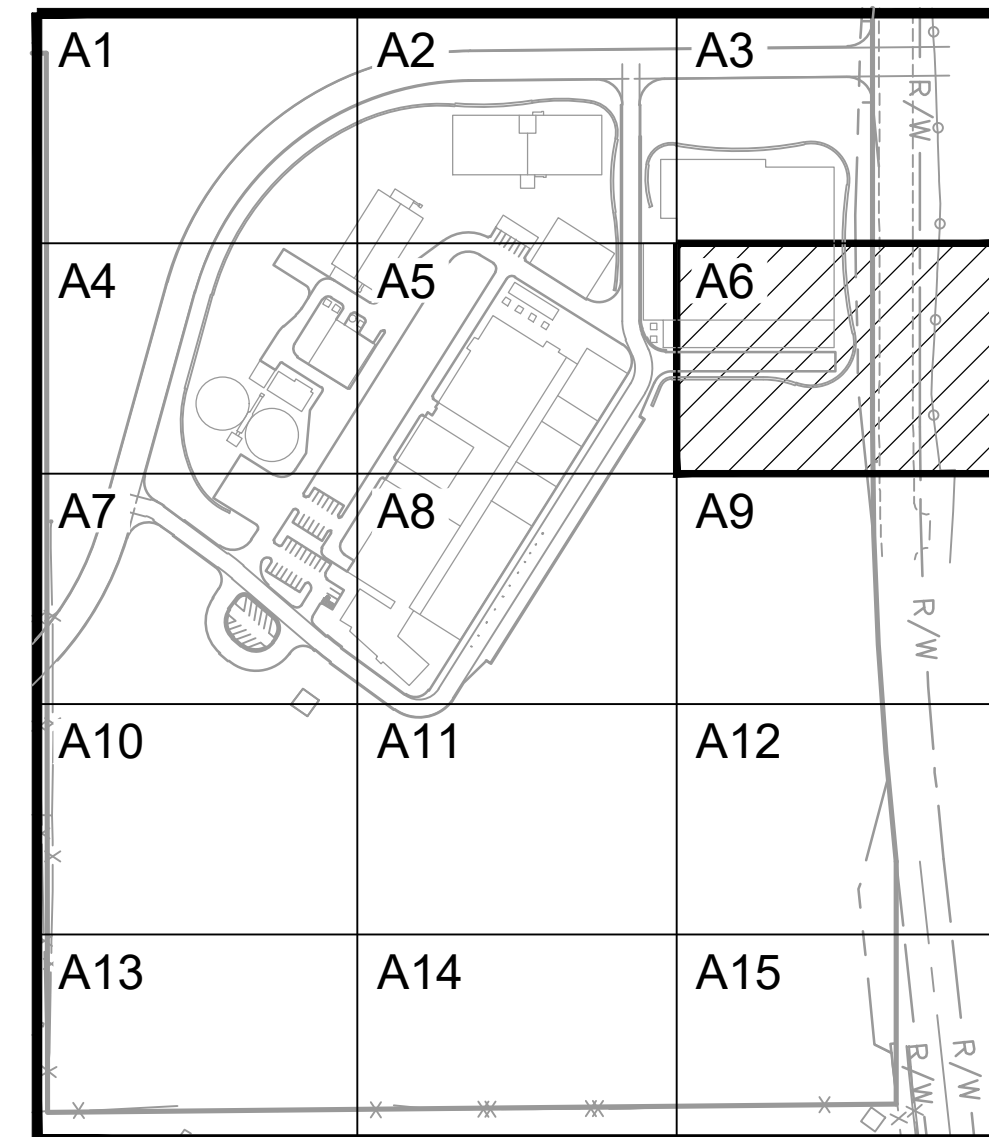
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 GRADING, PAVING AND DRAINAGE PLAN AREA A5

SHEET	DWG	03-GR-22005
DATE	FEBRUARY 2020	
PROJ	WTP 1.0	

NOTES:

KEY NOTES

KEY MAP



BY: KIERA USAGAWA
PLOT DATE: Tuesday, December 17, 2019 11:19:06 AM
DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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SITE GRADING
GRADING, PAVING AND DRAINAGE PLAN AREA A6

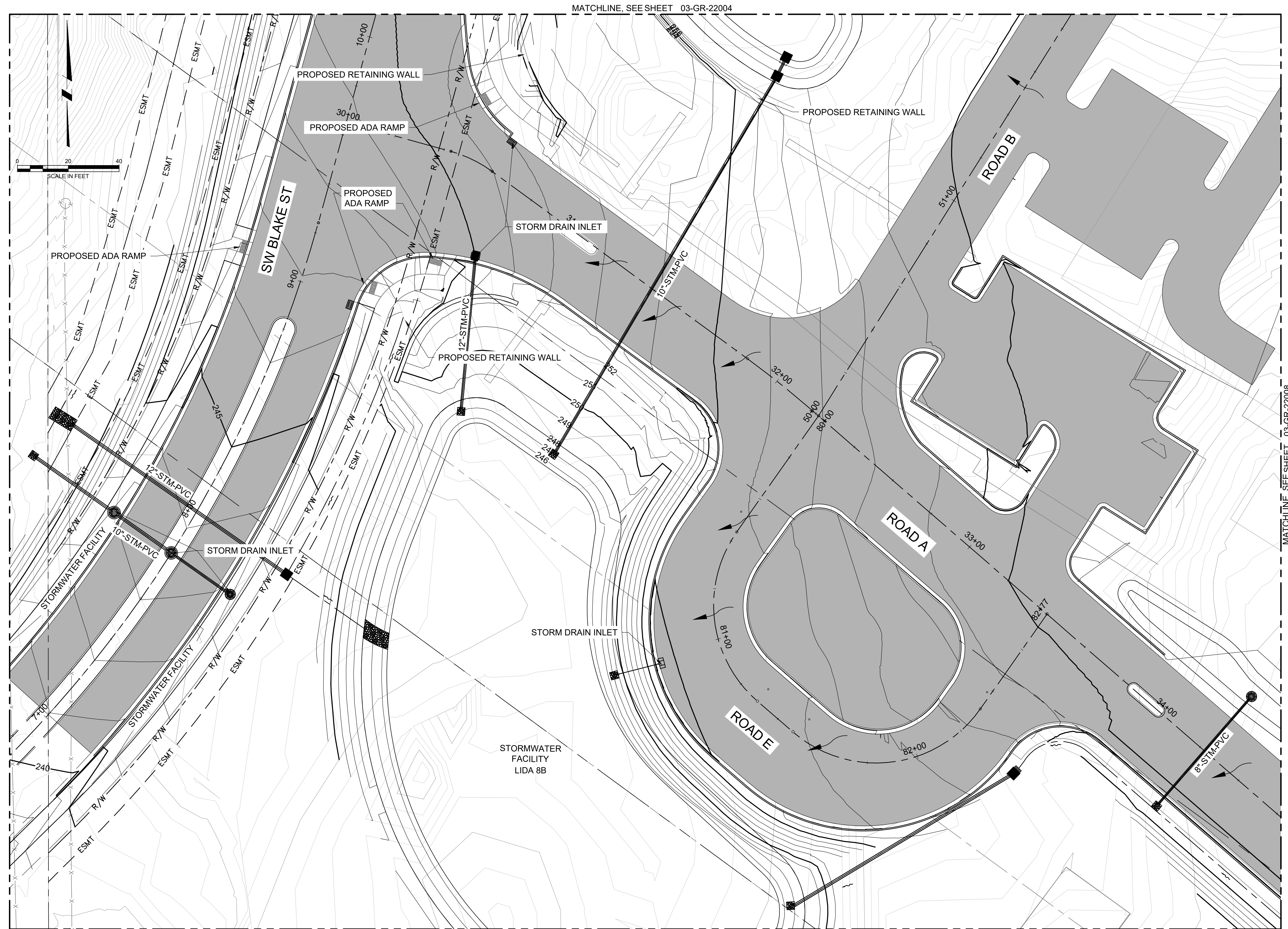
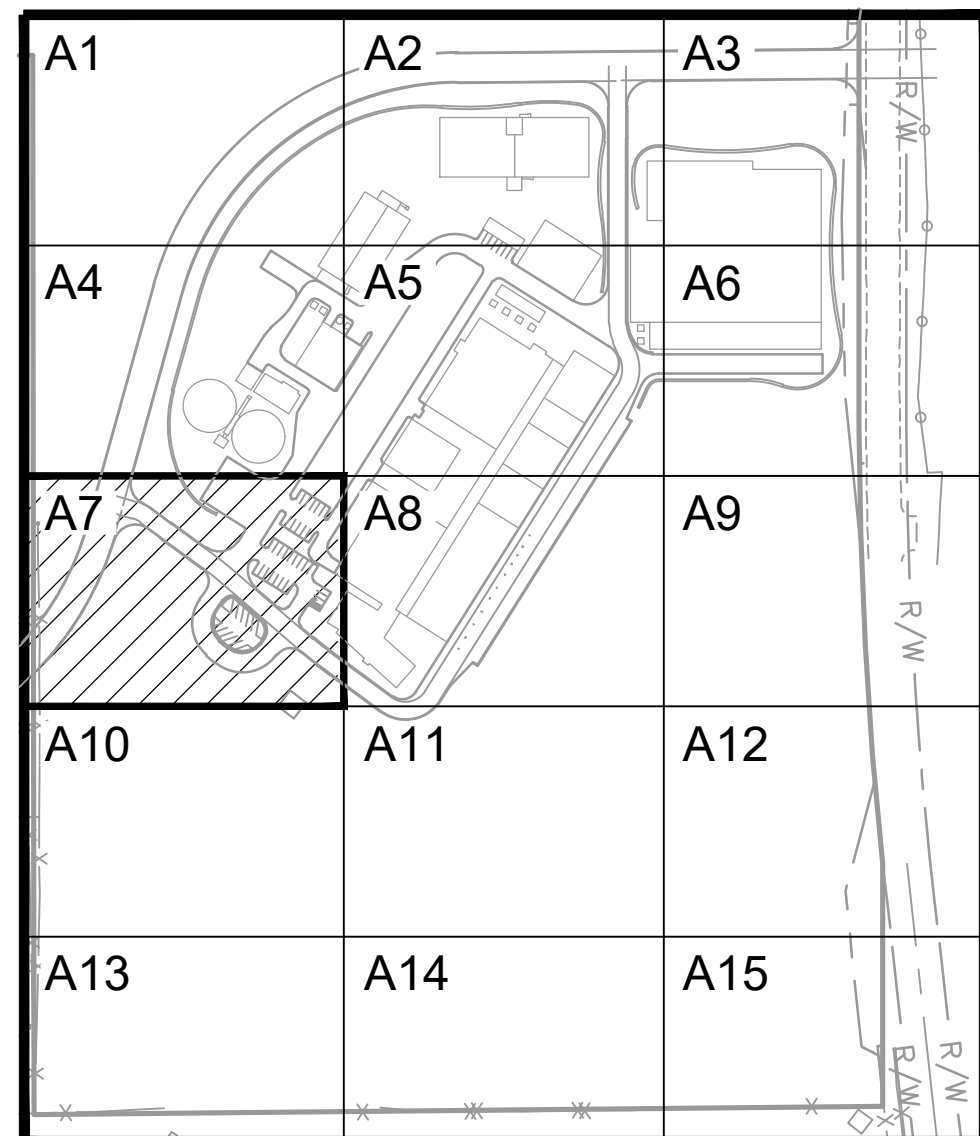
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DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

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NOTES:

KEY NOTES

KEY MAP



MATCHLINE, SEE SHEET 03-GR-22004

MATCHLINE, SEE SHEET 03-GR-22010

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DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg
 PLOT DATE: Tuesday, December 17, 2019 11:19:15 AM
 BY: KIERA USAGAWA

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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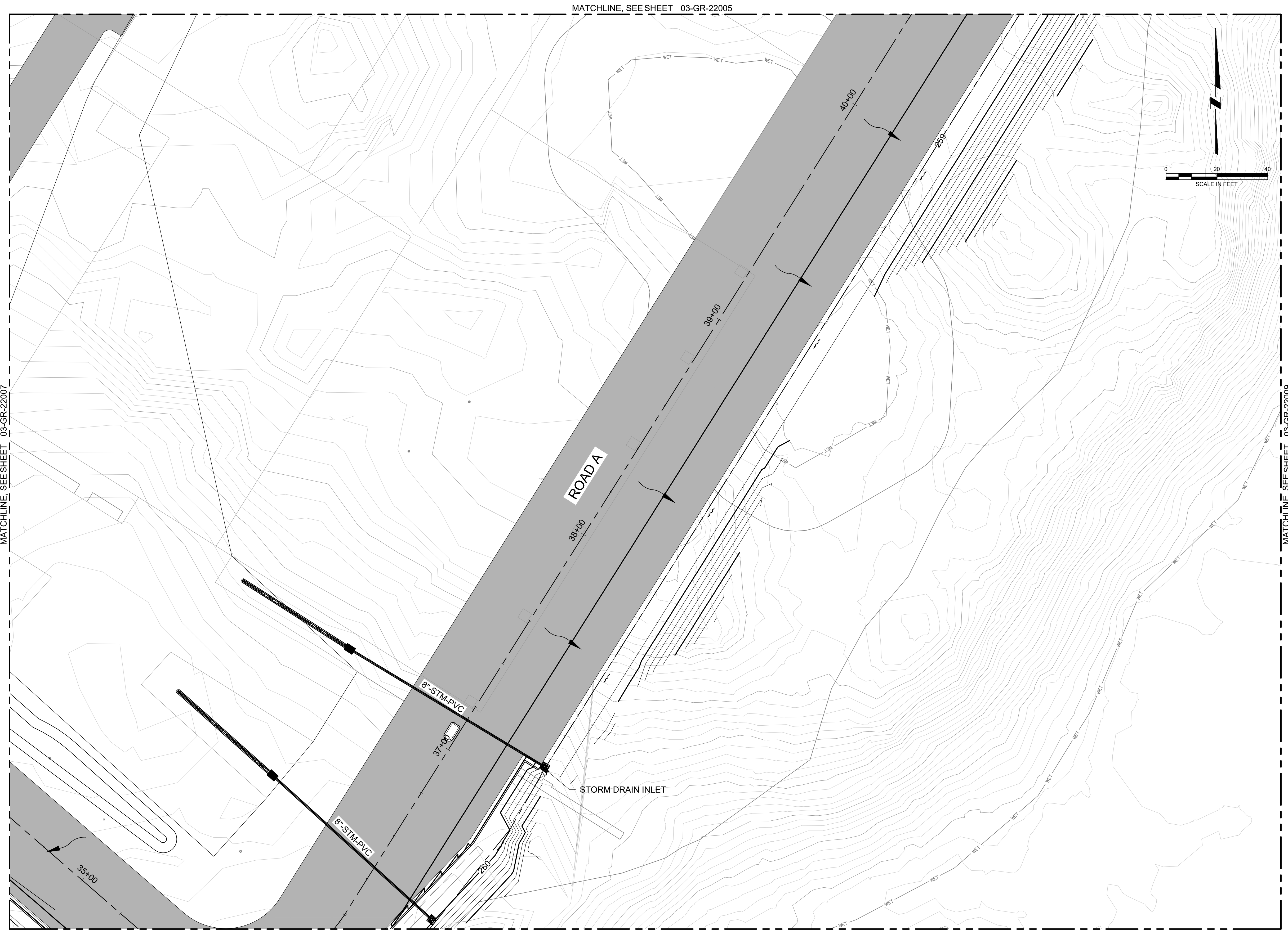
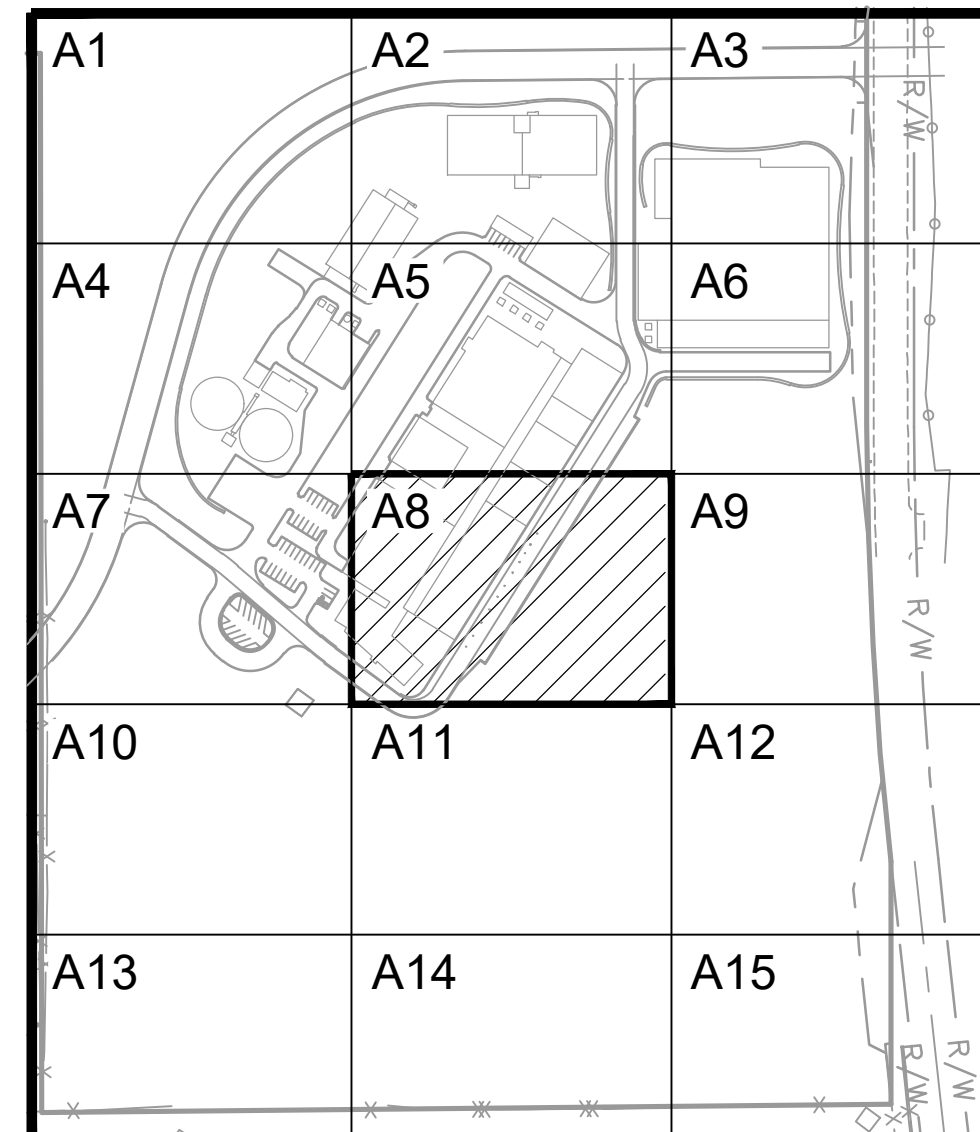
SITE GRADING, PAVING AND DRAINAGE PLAN AREA A7

SHEET	DWG	03-GR-22007
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

NOTES:

KEY NOTES

KEY MAP



BY: KIERA USAGAWA
PLOT DATE: Tuesday, December 17, 2019 11:19:24 AM
DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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SITE GRADING
GRADING, PAVING AND DRAINAGE PLAN AREA A8

SHEET	DWG	03-GR-22008
DATE	FEBRUARY 2020	
PROJ	WTP 1.0	

60% DESIGN - NOT FOR CONSTRUCTION

BY: KIERA USAGAWA

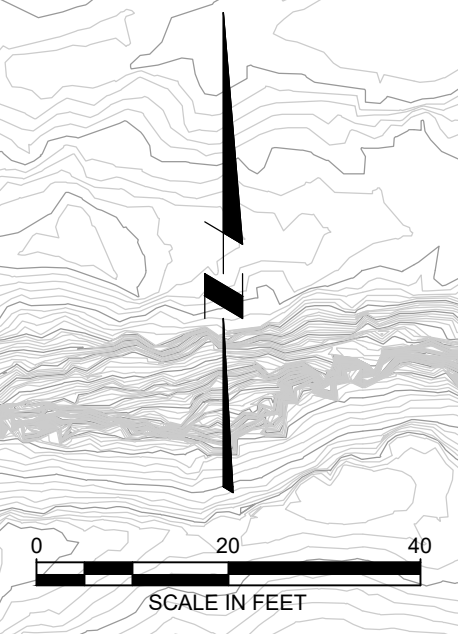
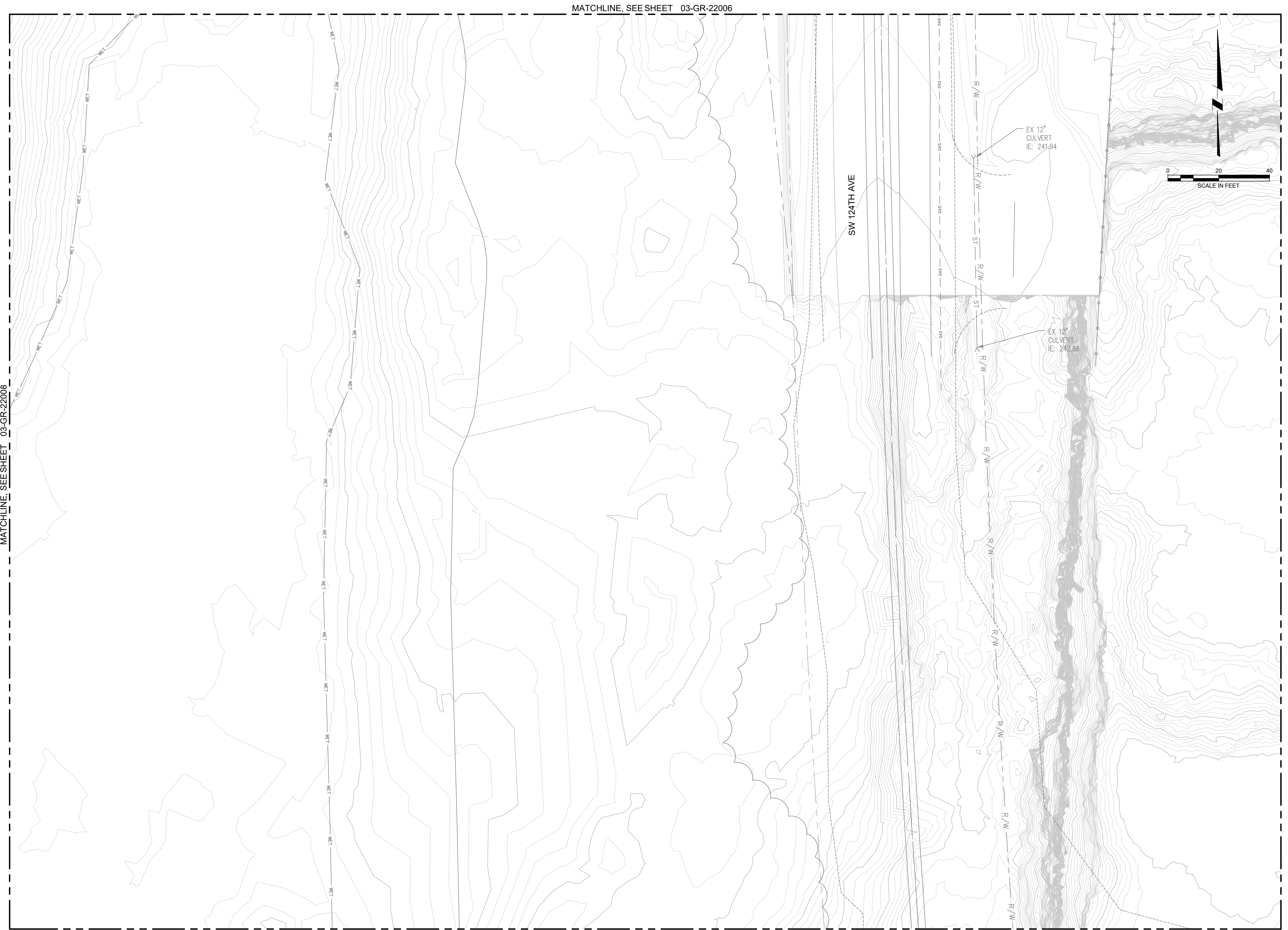
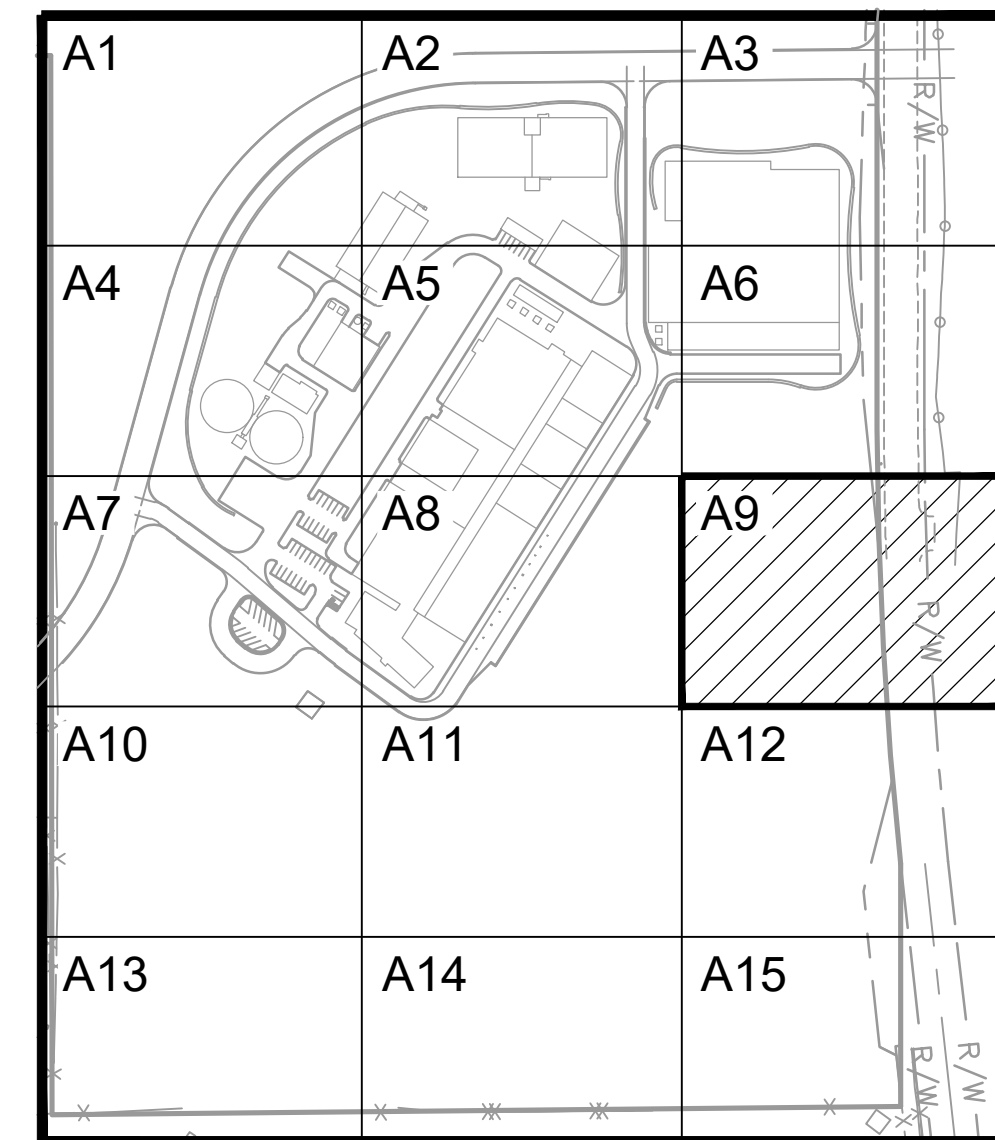
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NOTES:

KEY NOTES

KEY MAP



MATCHLINE, SEE SHEET 03-GR-22006

MATCHLINE, SEE SHEET 03-GR-22008

MATCHLINE, SEE SHEET 03-GR-22012

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DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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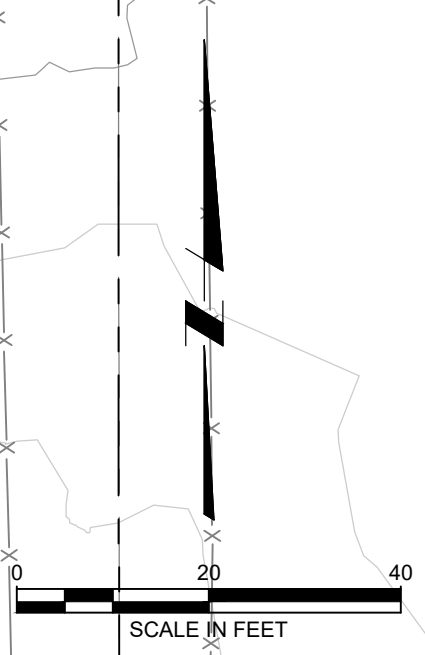
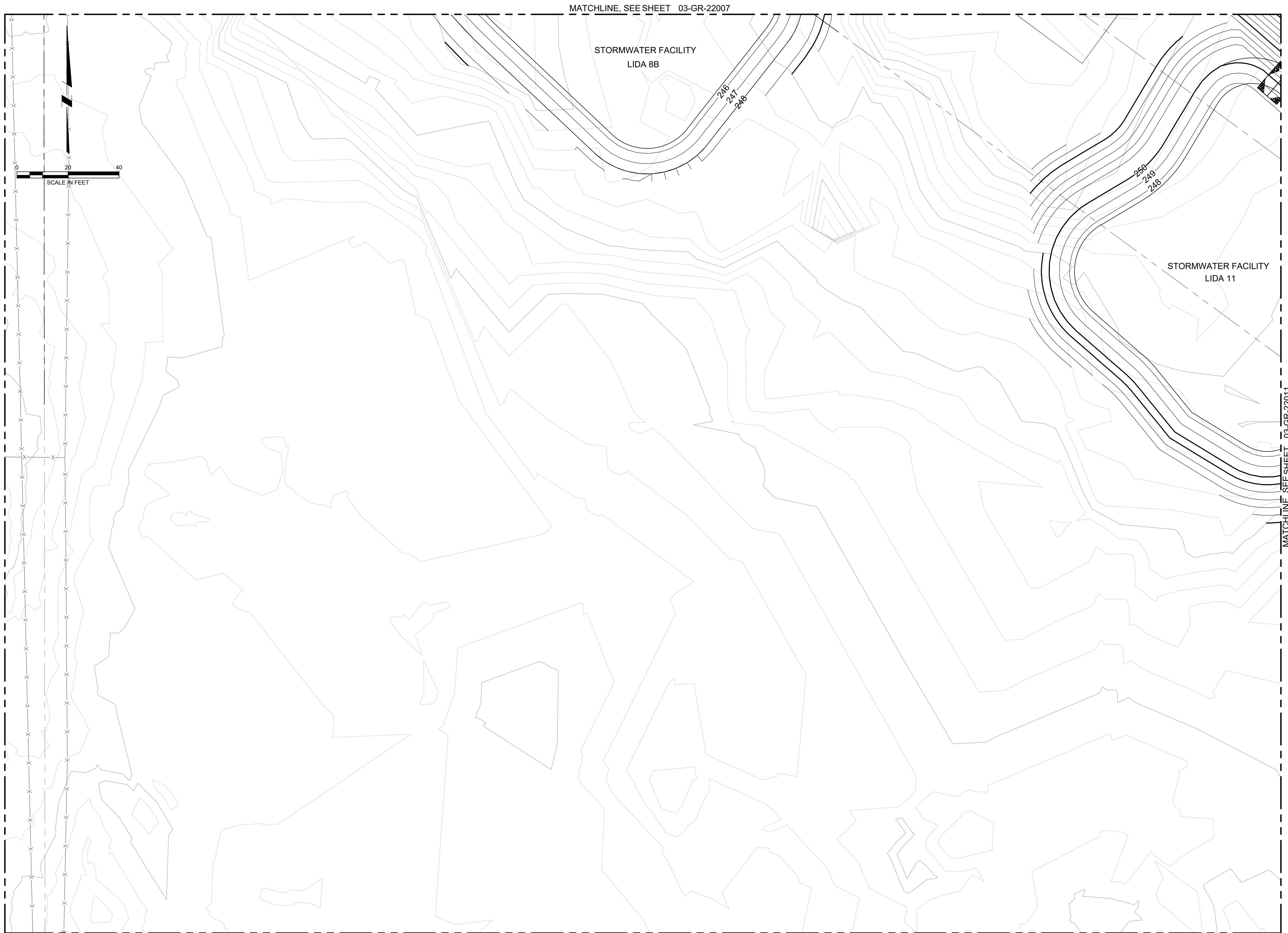
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SITE GRADING
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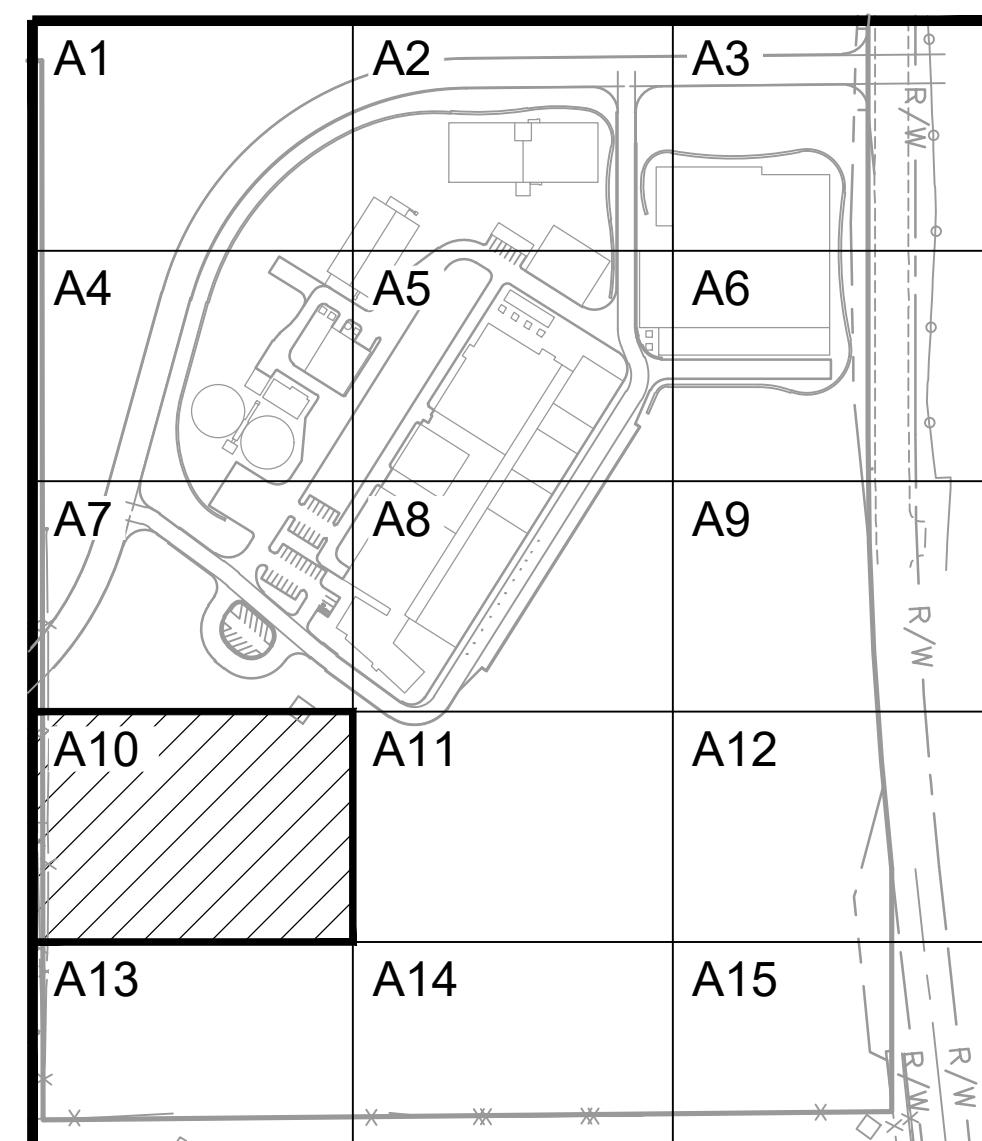
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DATE	FEBRUARY 2020	
PROJ	WTP 1.0	

NOTES:



KEY NOTES

KEY MAP



BY: KIERA USAGAWA
PLOT DATE: Tuesday, December 17, 2019 11:19:39 AM
DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d0274278\WTP1-03-GR-22001.dwg

DSGN	C JAIN					
DR	M ESTEP					
CHK	NA					
APVD	NA	NO.	DATE	REVISION	BY	APVD

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SITE
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GRADING, PAVING AND DRAINAGE PLAN AREA A10

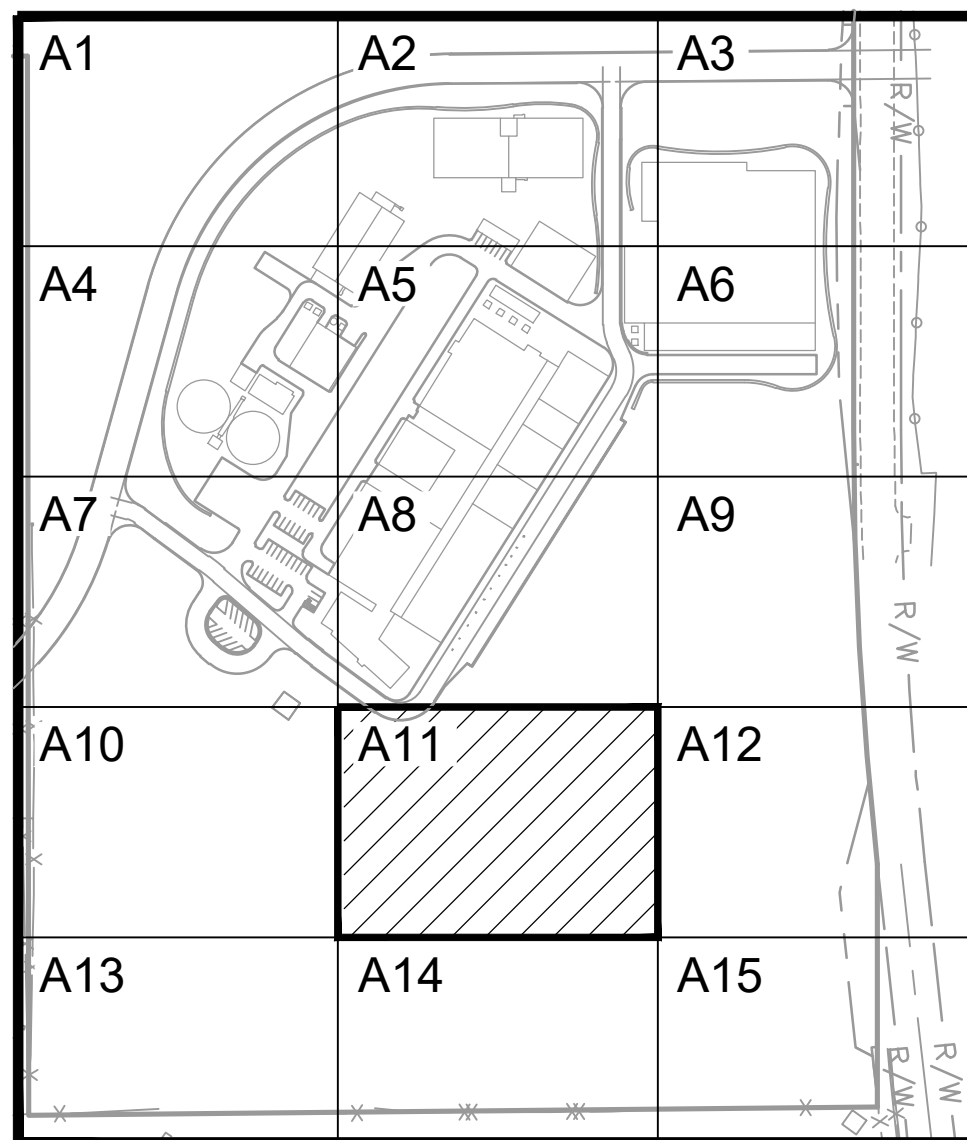
SHEET	DWG	03-GR-22010
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

60% DESIGN - NOT FOR CONSTRUCTION

NOTES:

KEY NOTES

KEY MAP



BY: KIERA USAGAWA
PLOT DATE: Tuesday, December 17, 2019 11:19:48 AM
DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\id274278\WTP1-03-GR-22001.dwg

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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SITE
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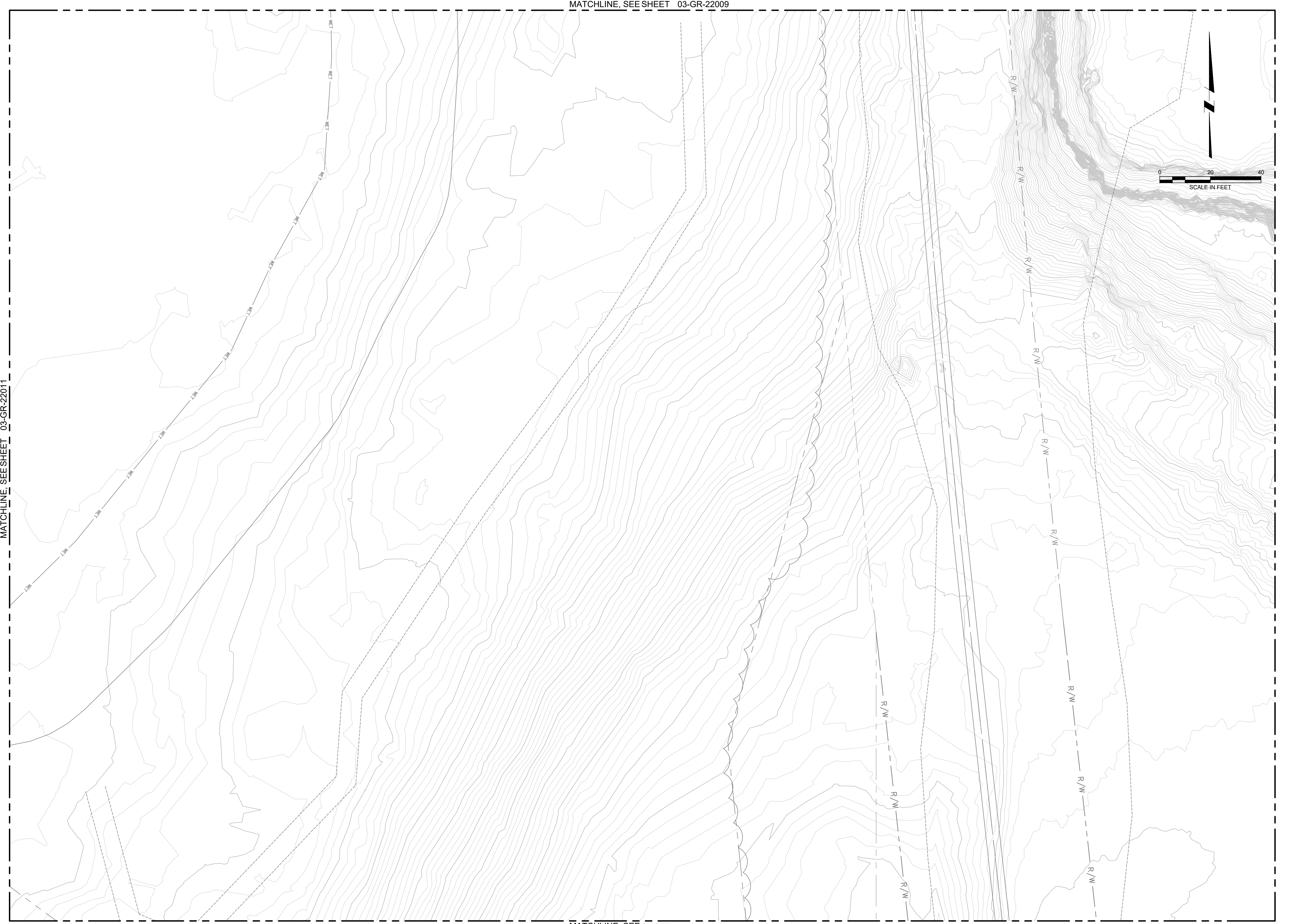
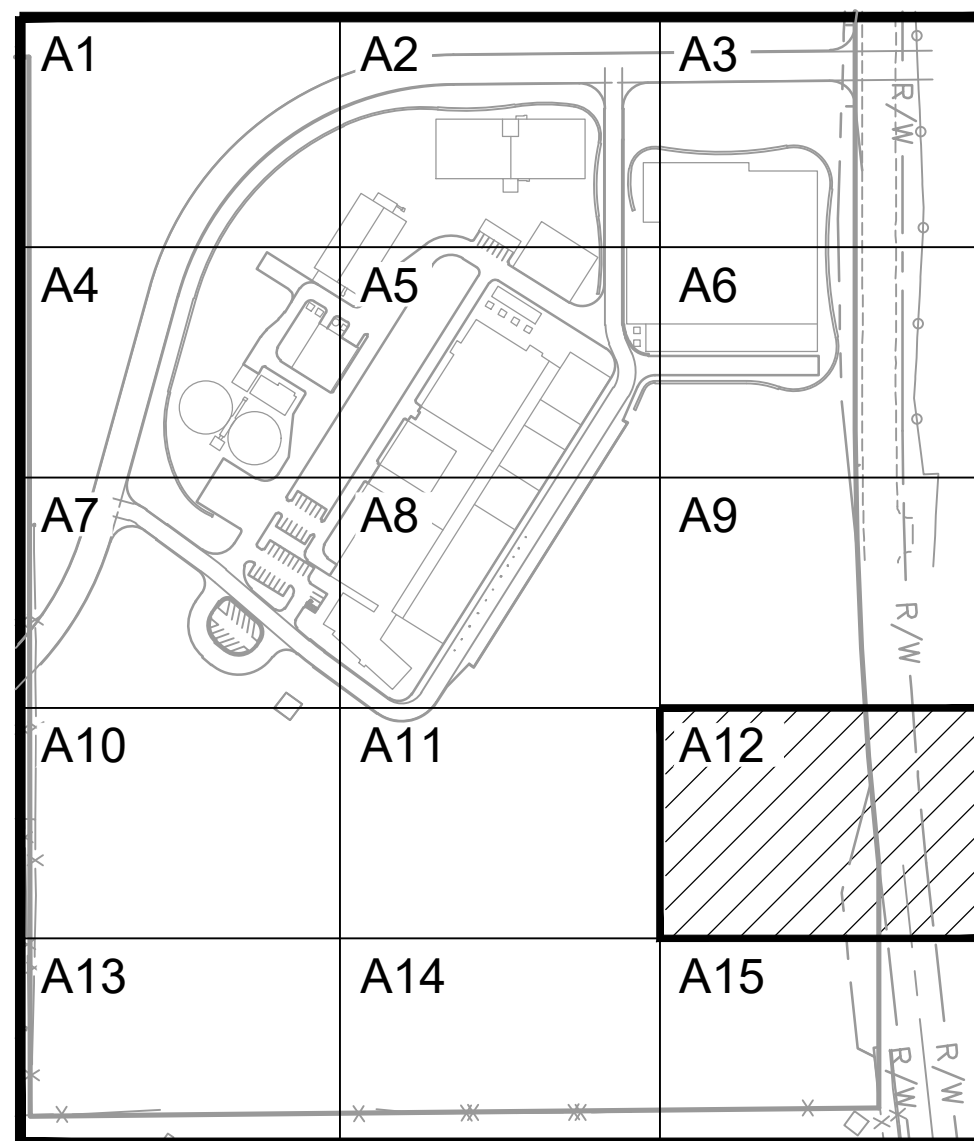
SHEET	DWG	03-GR-22011
DATE	FEBRUARY 2020	
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60% DESIGN - NOT FOR CONSTRUCTION

NOTES:

KEY NOTES

KEY MAP



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 PLOT DATE: Tuesday, December 17, 2019 11:19:55 AM
 BY: KIERA USAGAWA

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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SITE
 GRADING
 GRADING, PAVING AND DRAINAGE PLAN AREA A12

SHEET	DWG	03-GR-22012
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

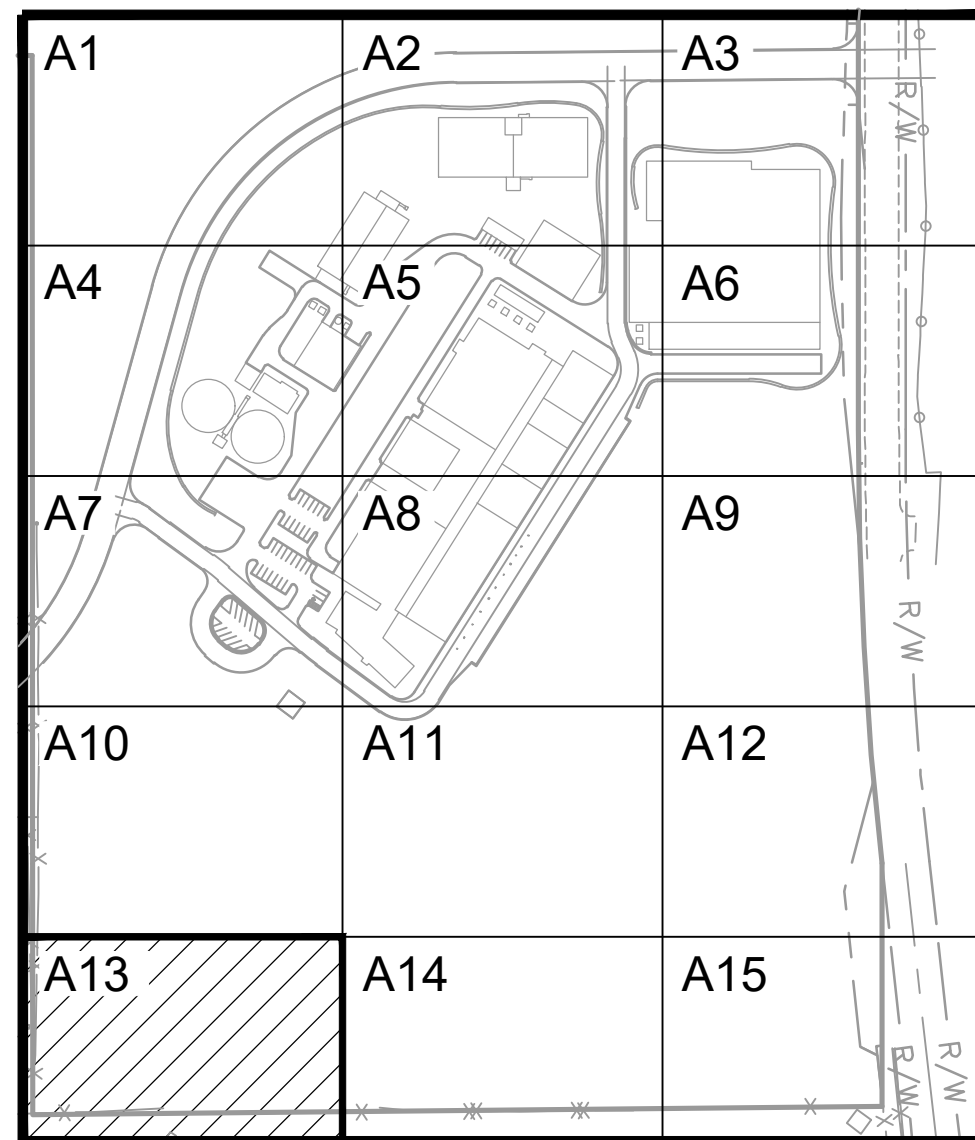
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MATCHLINE, SEE SHEET 03-GR-22010

NOTES:

KEY NOTES

KEY MAP



60% DESIGN - NOT FOR CONSTRUCTION

BY: KIERA USAGAWA
PLOT DATE: Tuesday, December 17, 2019 11:20:01 AM
DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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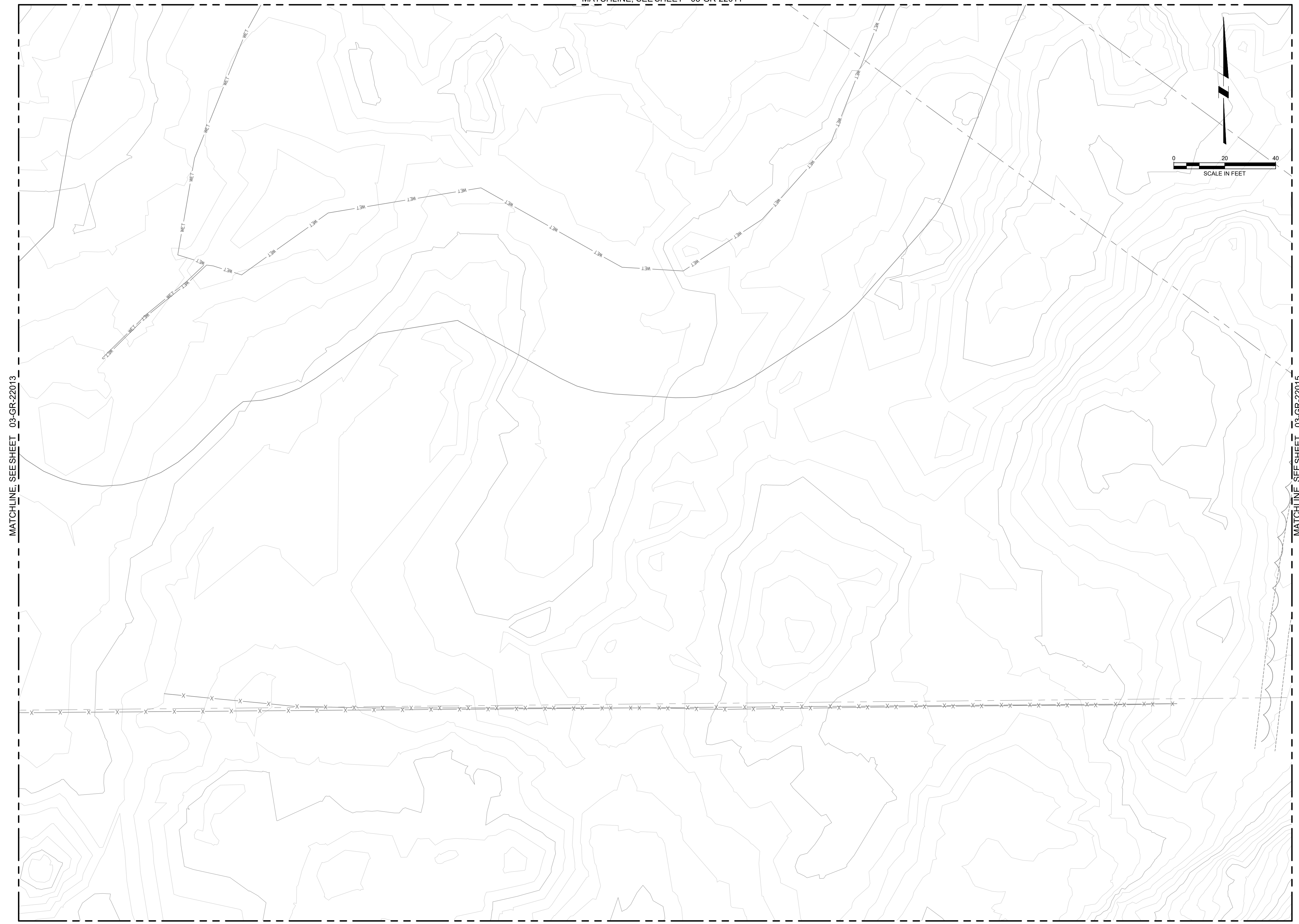
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GRADING, PAVING AND DRAINAGE PLAN AREA A13

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DATE	FEBRUARY 2020	
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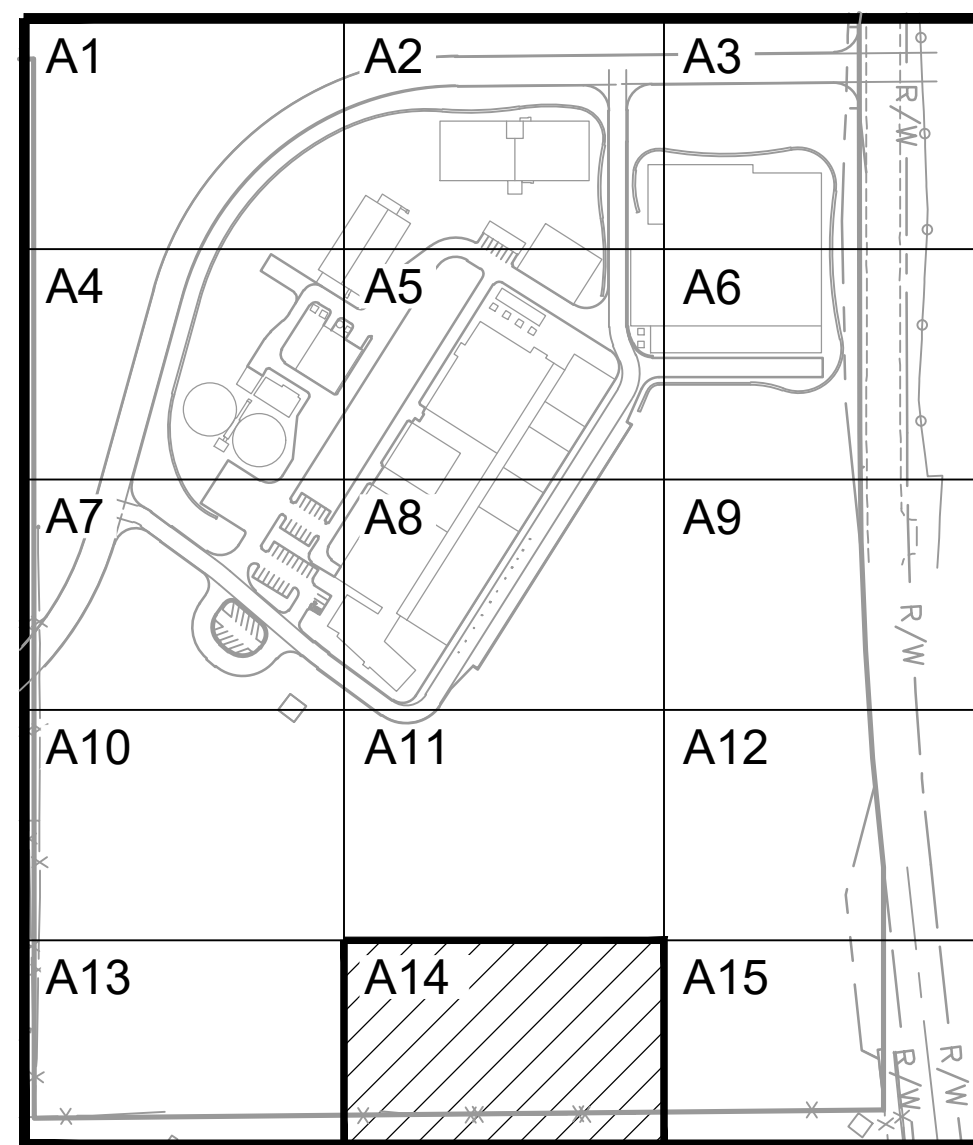
NOTES:

KEY NOTES

MATCHLINE, SEE SHEET 03-GR-22011



KEY MAP



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BY: KIERA USAGAWA
PLOT DATE: Tuesday, December 17, 2019 11:20:07 AM
DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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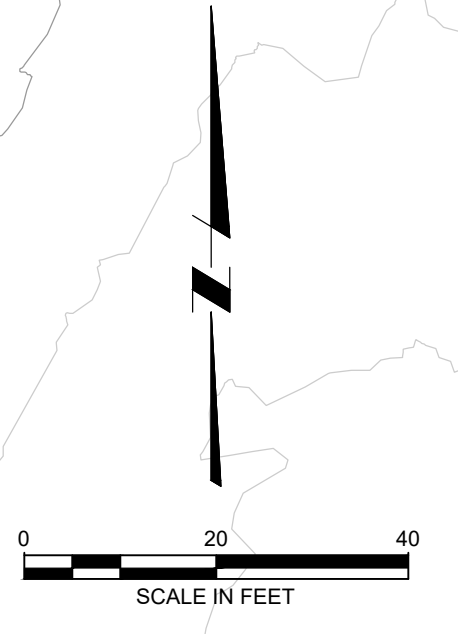
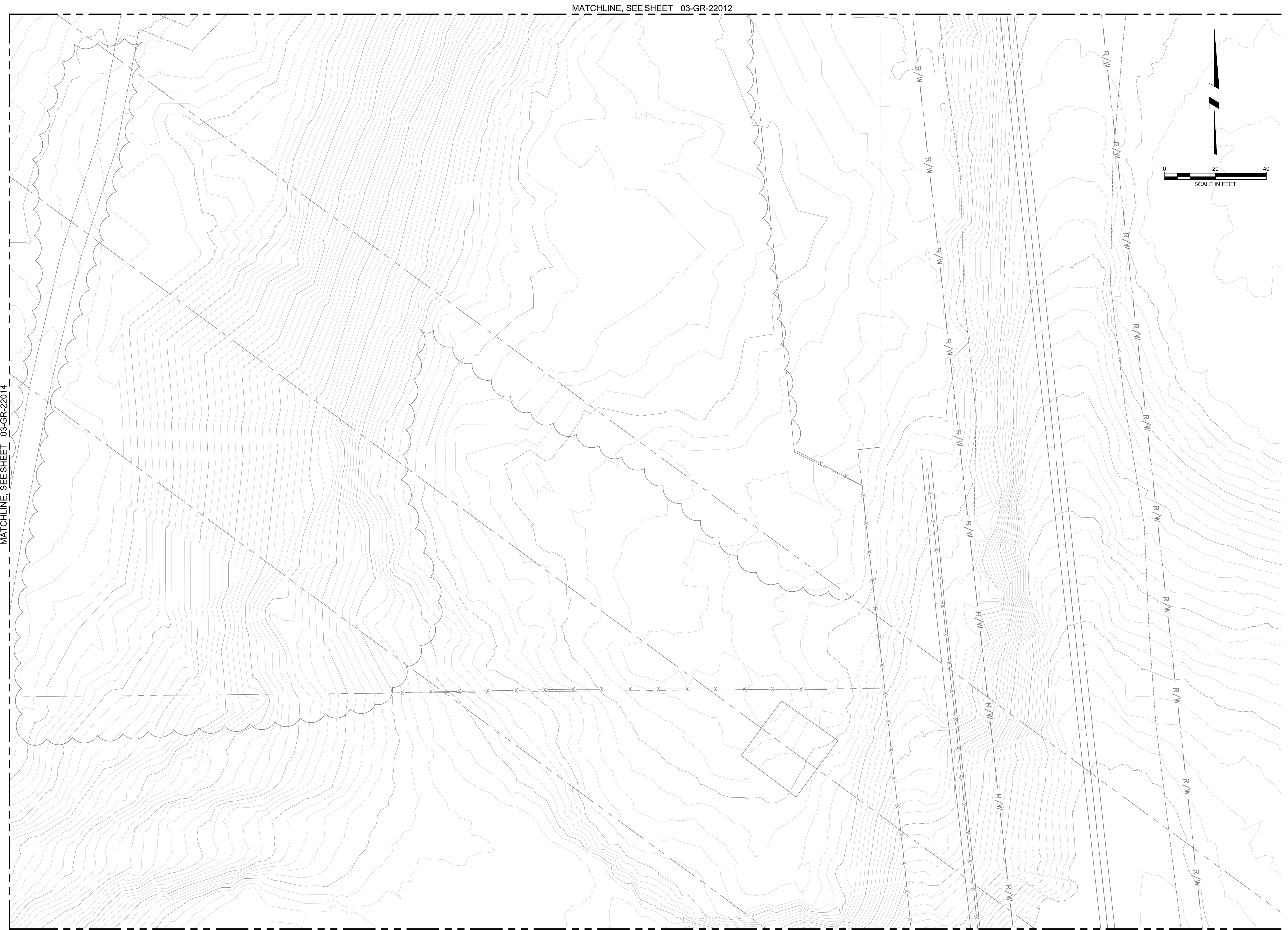
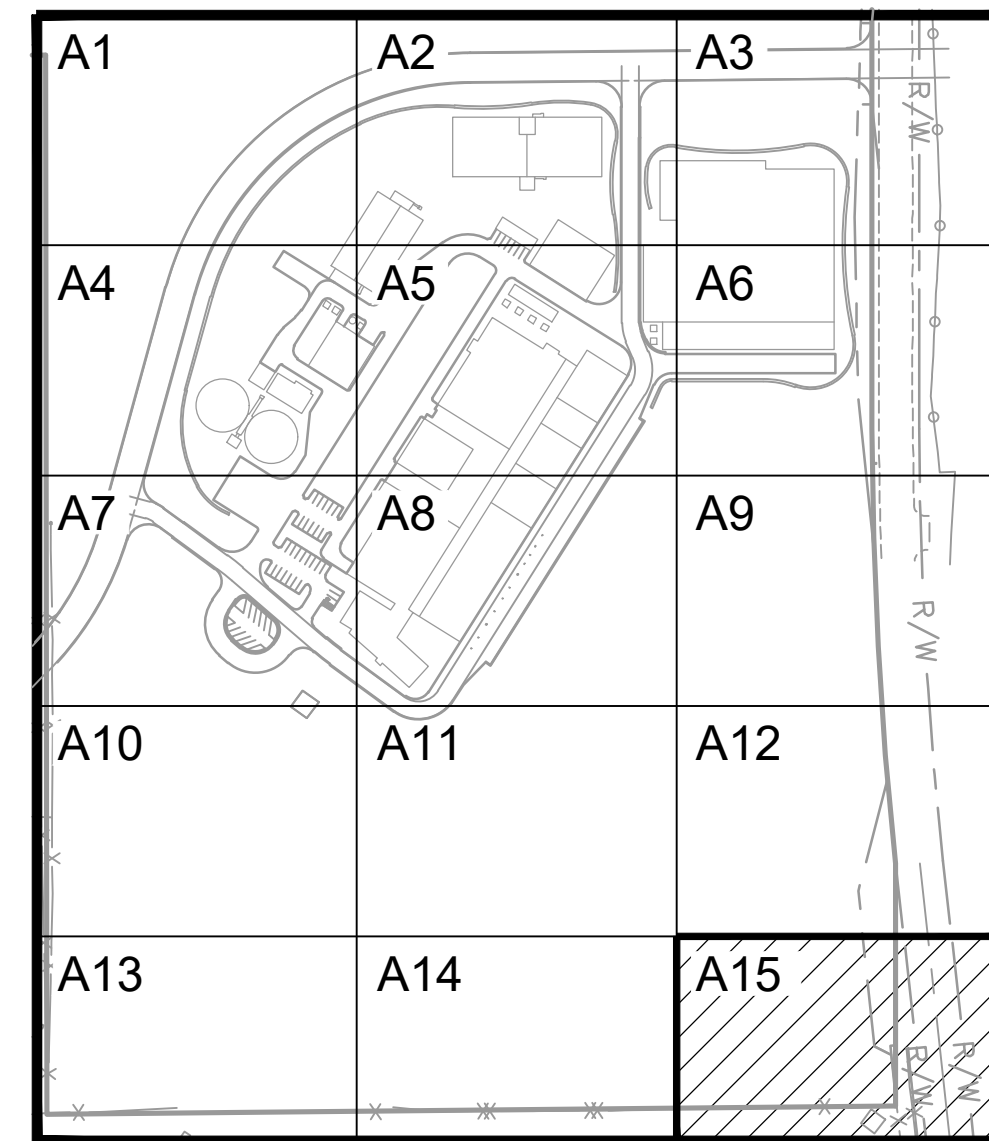
SITE
GRADING
GRADING, PAVING AND DRAINAGE PLAN AREA A14

SHEET	DWG	03-GR-22014
DATE	FEBRUARY 2020	
PROJ	WTP 1.0	

NOTES:

KEY NOTES

KEY MAP



60% DESIGN - NOT FOR CONSTRUCTION

DWG FILE: C:\cdm\kiera.usagawa@murraysmith.us\d024278\WTP1-03-GR-22001.dwg
 PLOT DATE: Tuesday, December 17, 2019 11:20:15 AM
 BY: KIERA USAGAWA

DSGN	C JAIN				
DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

VERIFY SCALE
 BAR IS ONE INCH ON ORIGINAL DRAWING.
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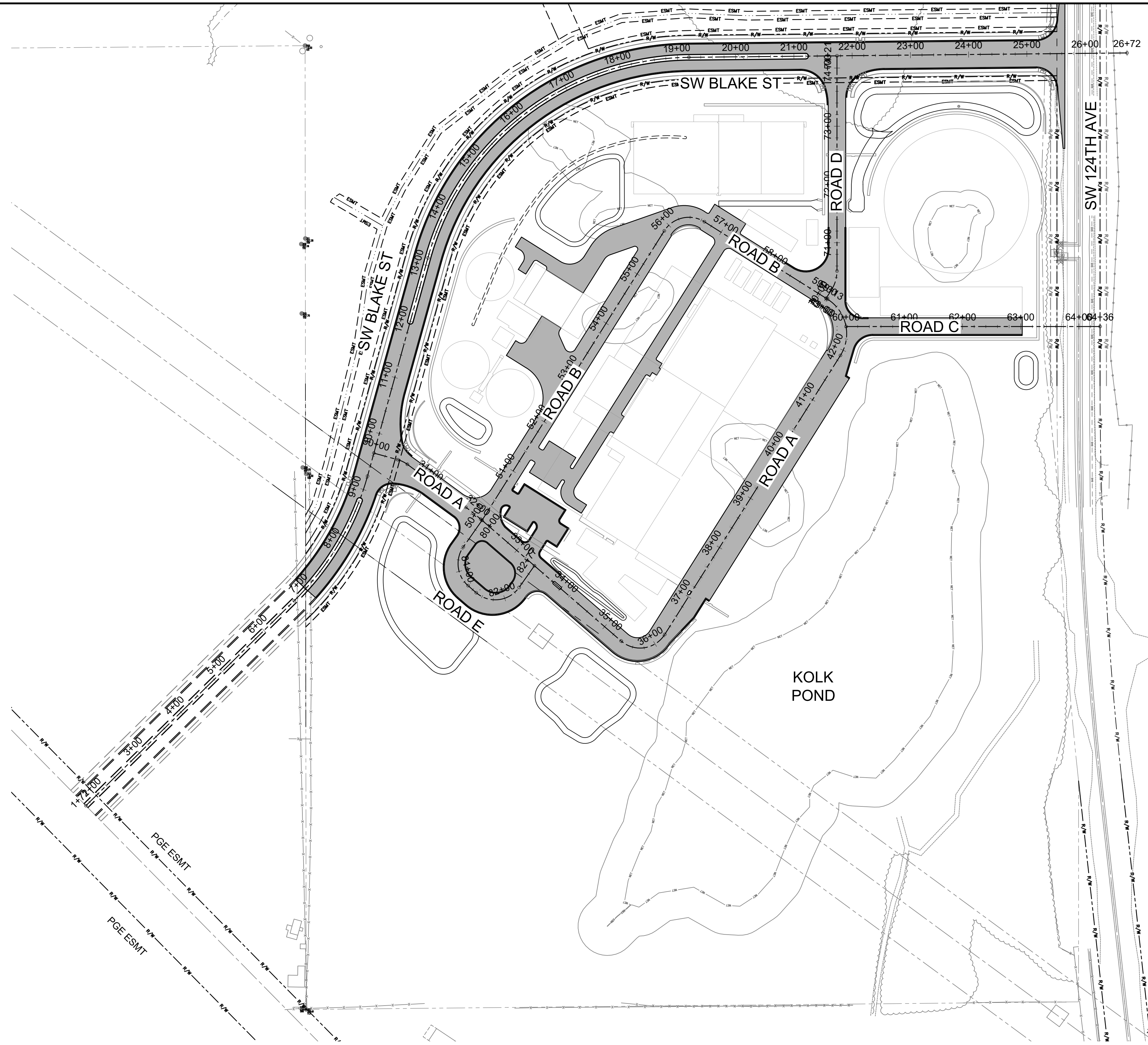
SITE
 GRADING
 GRADING, PAVING AND DRAINAGE PLAN AREA A15

SHEET	DWG	03-GR-22015
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

BY: AARON ROBERTS

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\cdm\laaron.roberts@murraysmith.us\d0274278\WTP1-03-GR-23001.dwg



1 PLAN

60% DESIGN - NOT FOR CONSTRUCTION

DSGN	C JAIN				
DR	A ROBERTS				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

VERIFY SCALE
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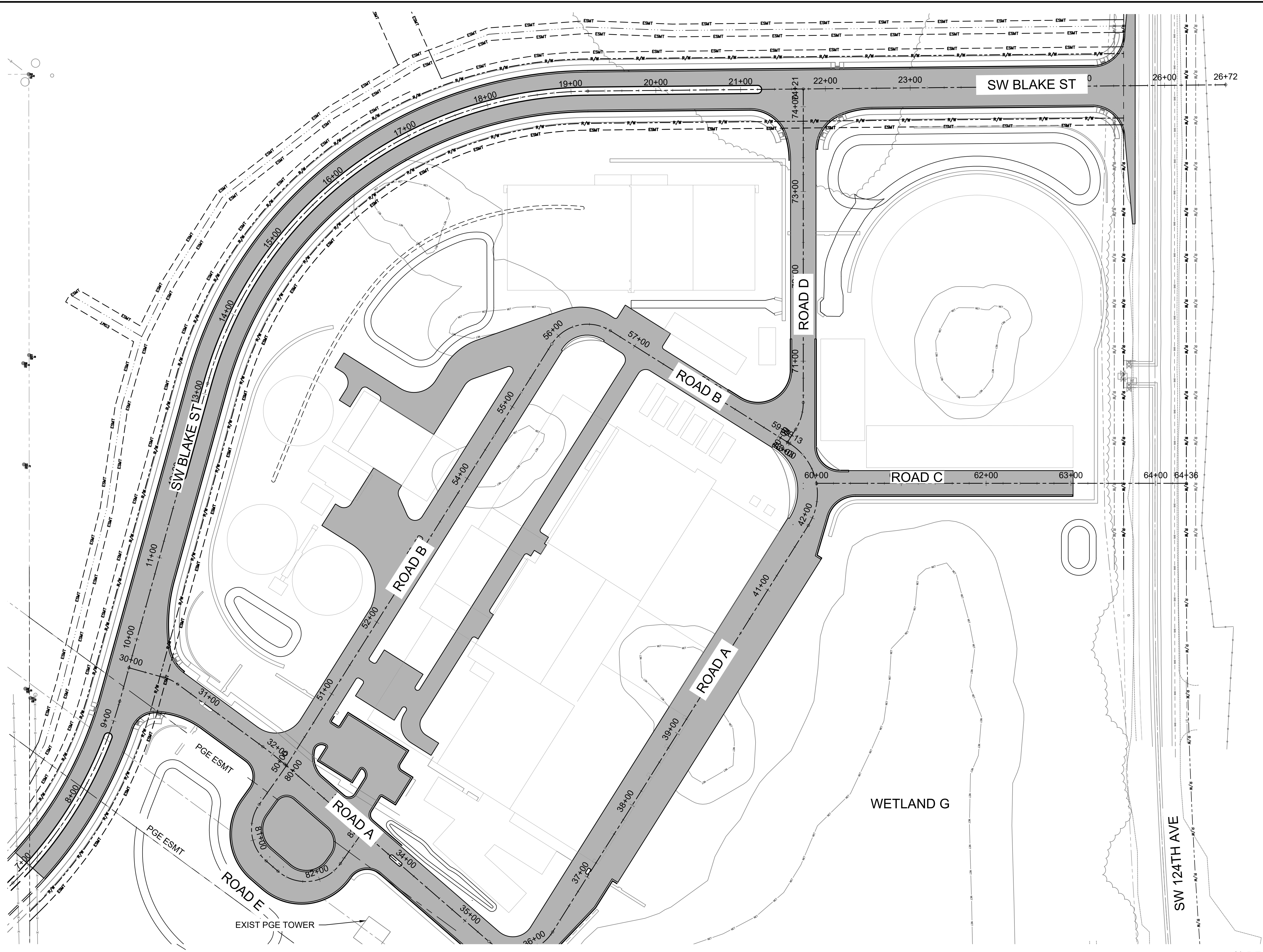
SITE GRADING
 HORIZONTAL AND VERTICAL CONTROL PLAN
 OVERALL PLAN AREA A

SHEET	DWG	03-GR-23001
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

BY: AARON ROBERTS

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\cdm\aaaron.roberts@murraysmith.us\d0274278\WTP1-03-GR-23001.dwg



60% DESIGN - NOT FOR CONSTRUCTION

DSGN	C JAIN					
DR	A ROBERTS					
CHK	NA					
APVD	NA					
	NO.	DATE	REVISION	BY	APVD	

VERIFY SCALE
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 ORIGINAL DRAWING.
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 SCALES ACCORDINGLY.



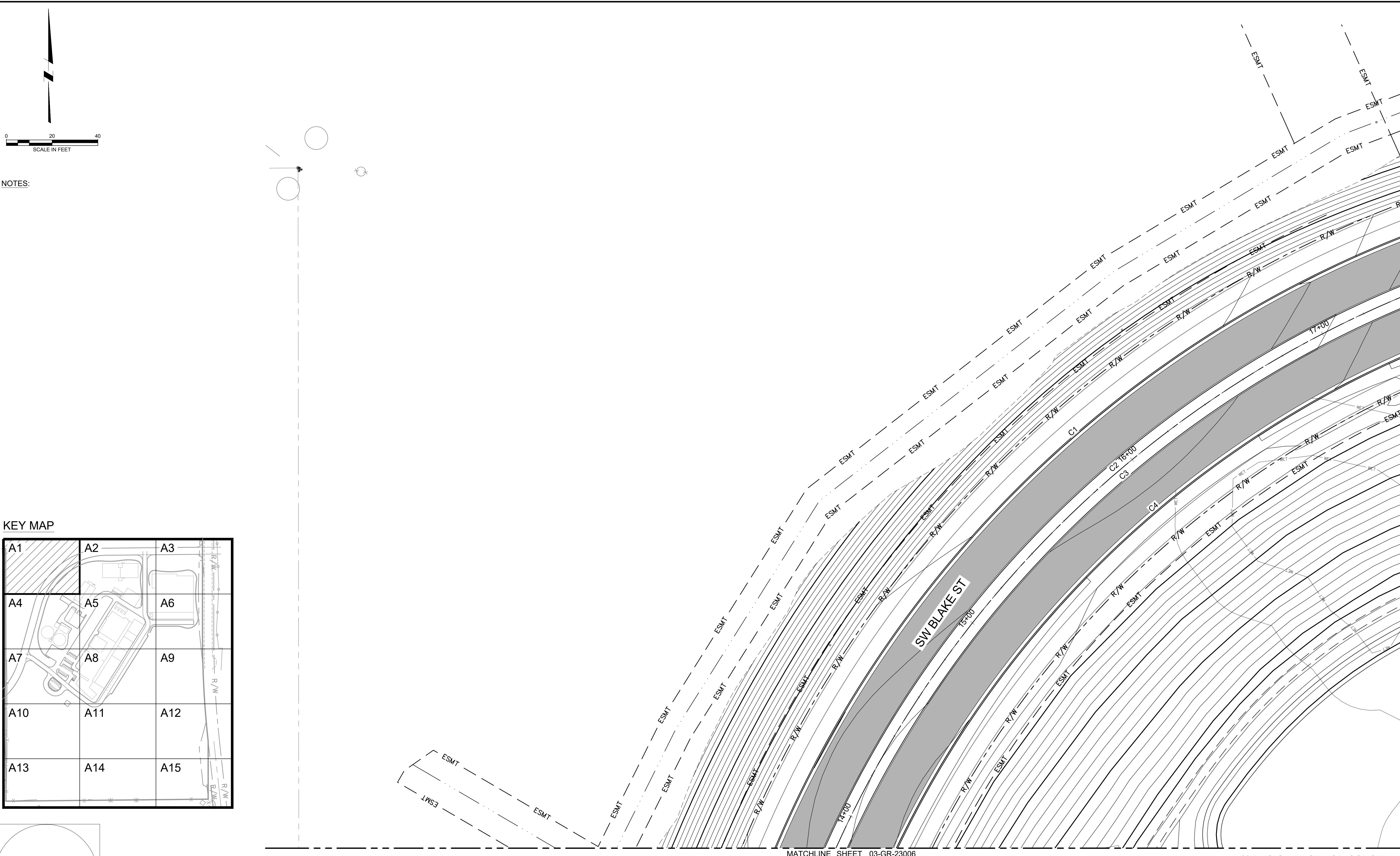
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SITE GRADING
 HORIZONTAL AND VERTICAL CONTROL PLAN
 LAYOUT PLAN AREA A

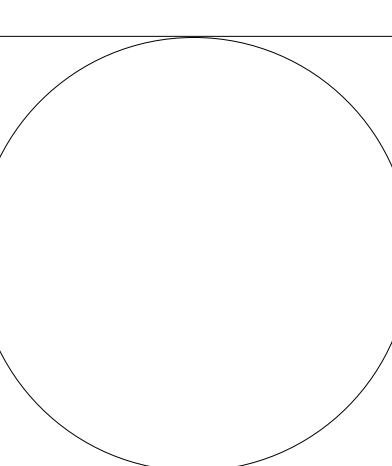
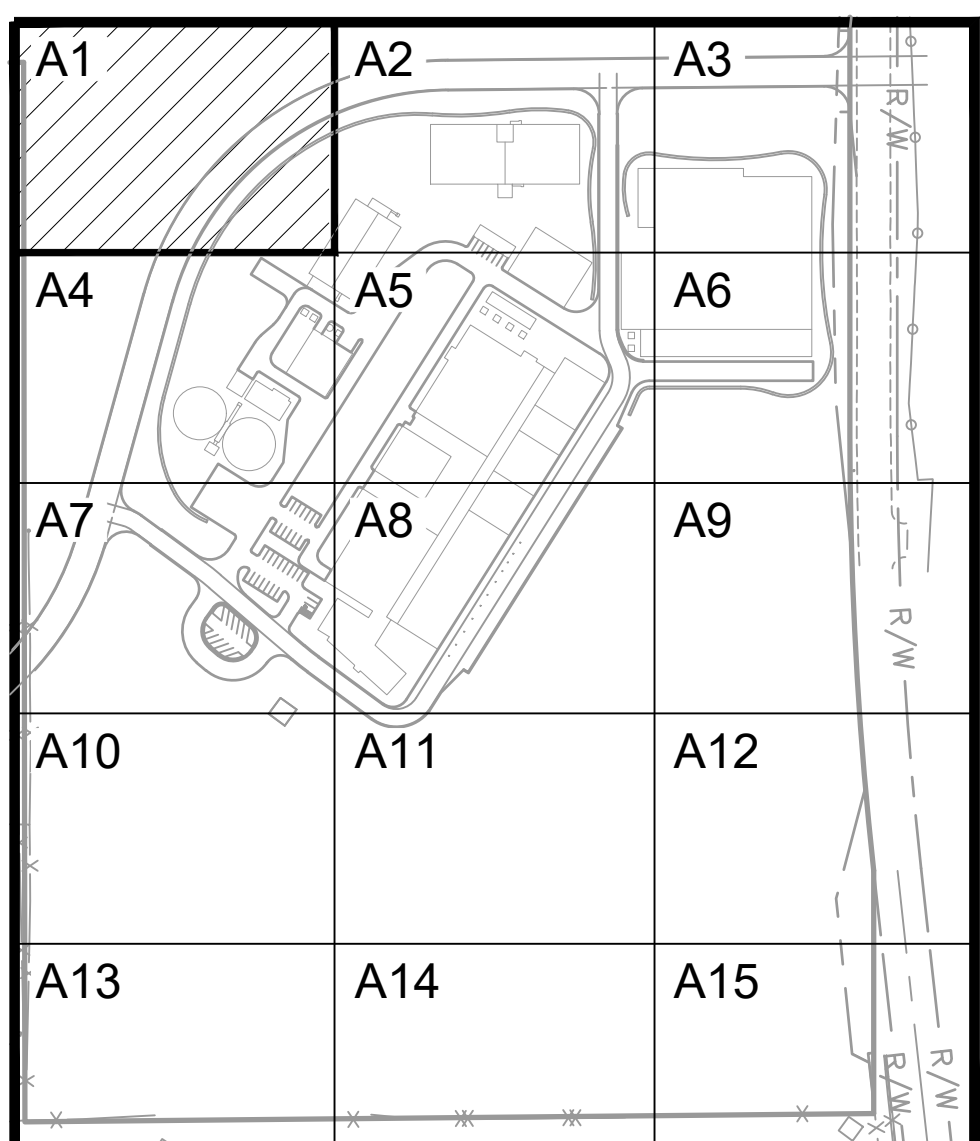
SHEET	
DWG	03-GR-23002
DATE	FEBRUARY 2020
PROJ	WTP_1.0

BY: AARON ROBERTS
PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
DWG FILE: C:\cdm\aaaron.roberts@murraysmith.us\d0274278\WTP1-03-GR-23003.dwg



NOTES:

KEY MAP



DSGN	C JAIN					
DR	A ROBERTS					
CHK	NA					
APVD	NA					
		NO.	DATE	REVISION	BY	APVD

VERIFY SCALE
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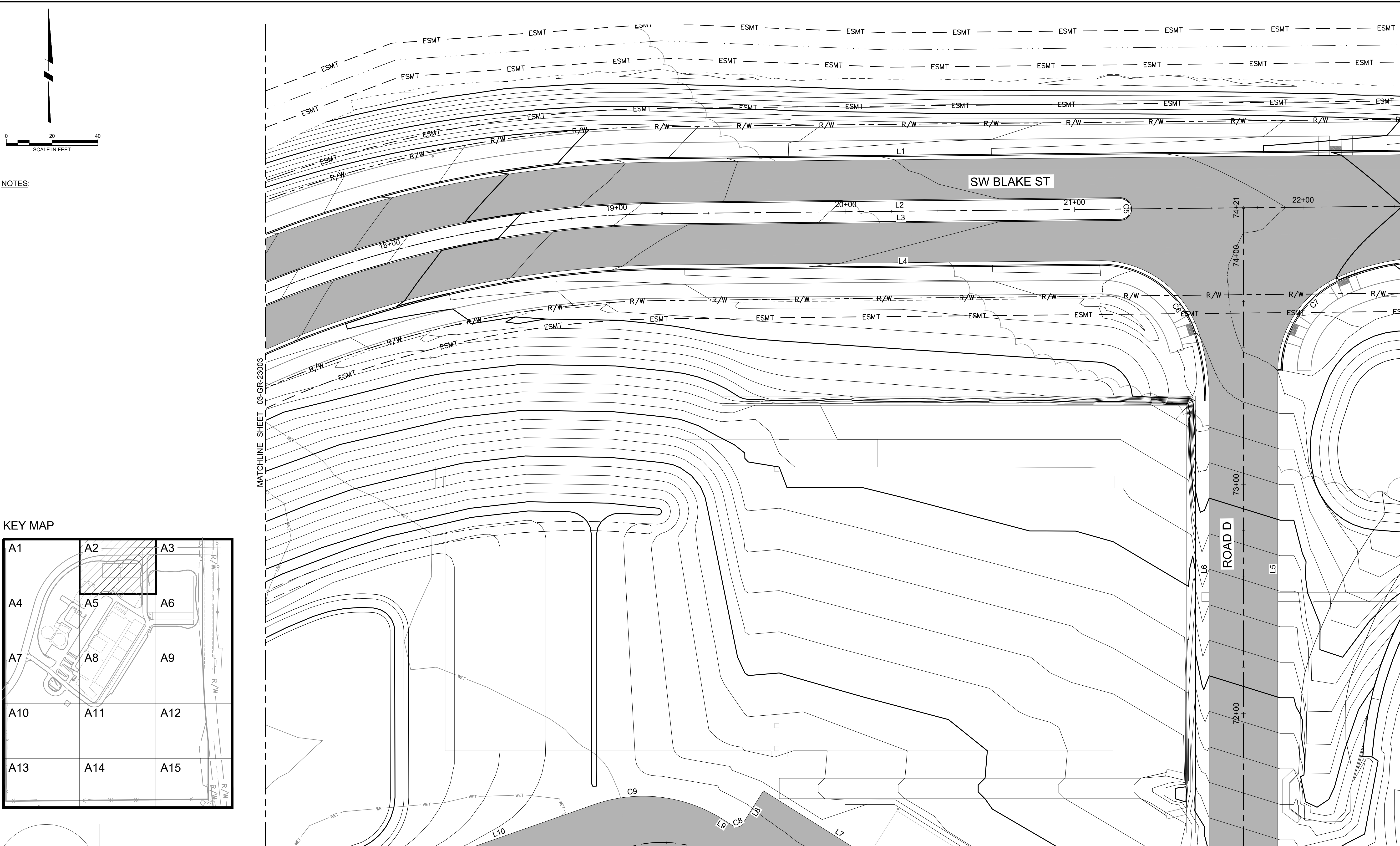
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SITE
GRADING
HORIZONTAL AND VERTICAL
CONTROL PLAN AREA A1

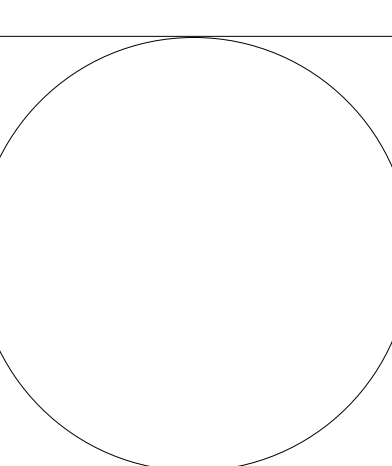
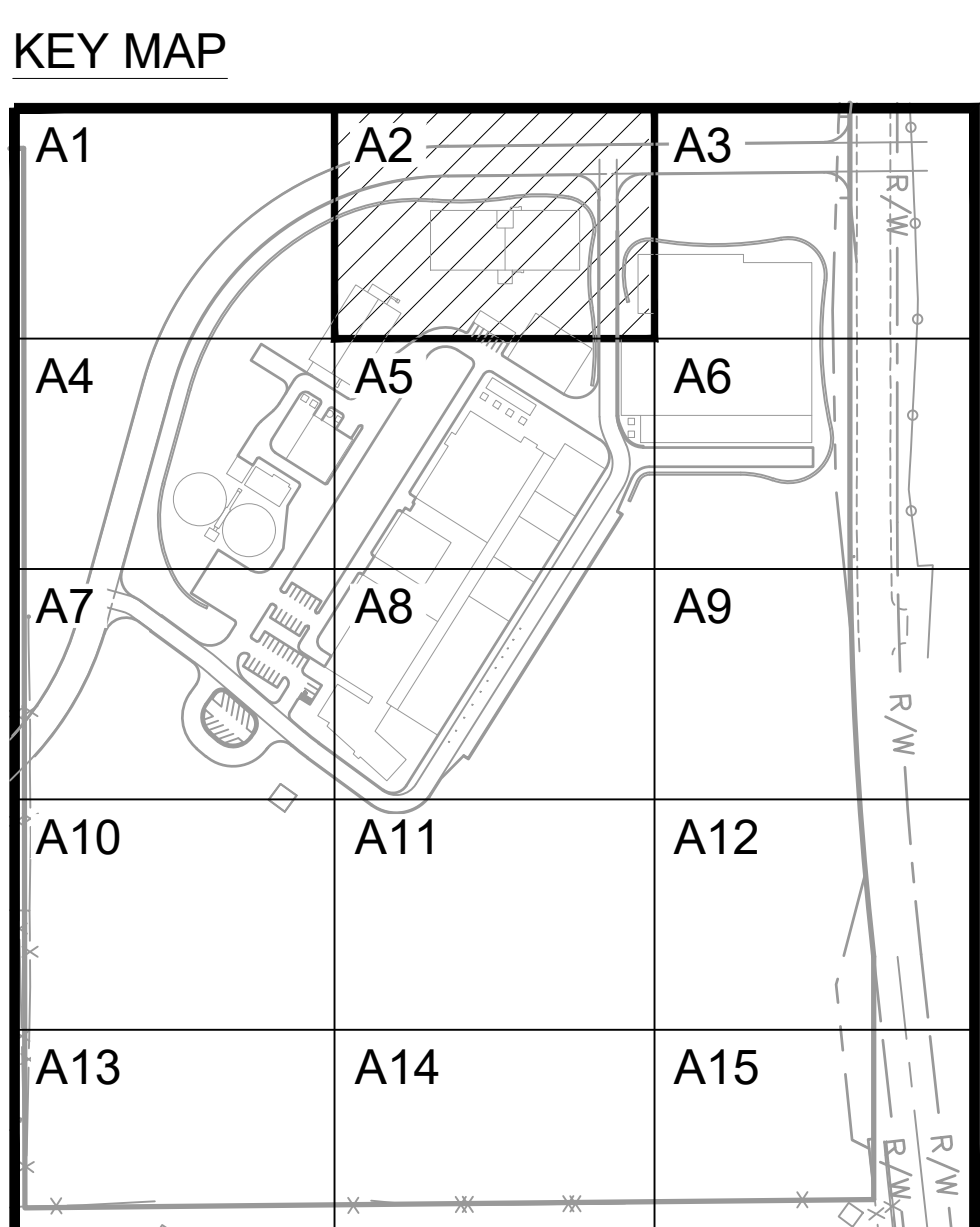
SHEET	
DWG	03-GR-23003
DATE	FEBRUARY 2020
PROJ	WTP_1.0

MATCHLINE SHEET 03-GR-23006

60% DESIGN - NOT FOR CONSTRUCTION



NOTES:



DSGN	C JAIN				
DR	A ROBERTS				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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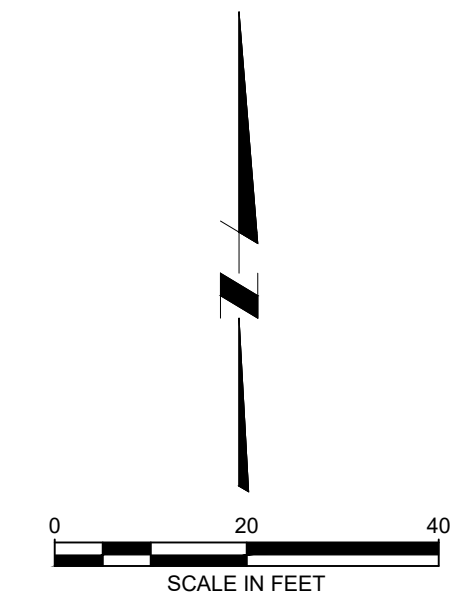
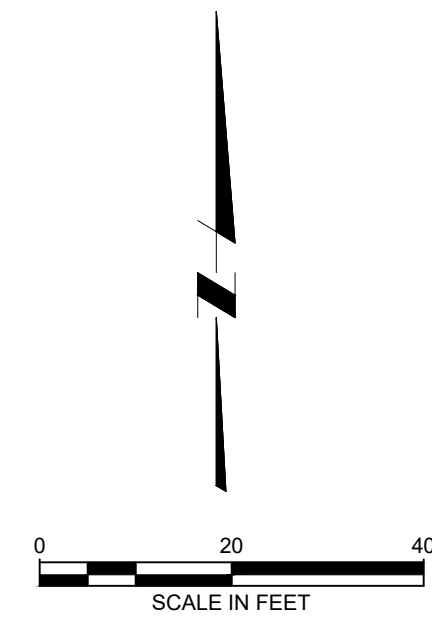
CDM Smith
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 Tel: (503) 232-1800

SITE
 GRADING
 HORIZONTAL AND VERTICAL
 CONTROL PLAN AREA A2

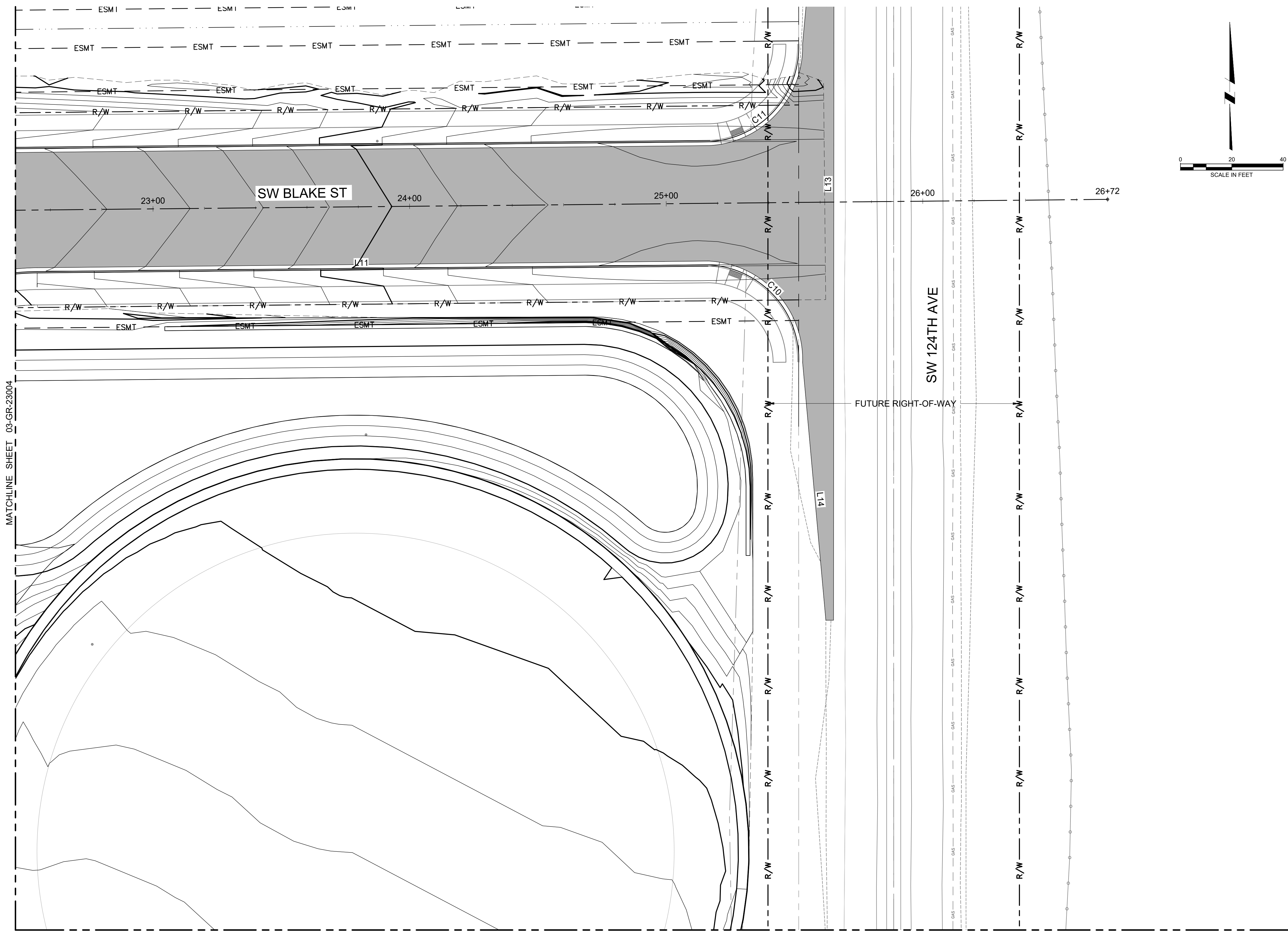
SHEET	DWG	03-GR-23004
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

DWG FILE: C:\cdm\laaron.roberts@murraysmith.us\0274278\WTP1-03-GR-23003.dwg
 PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
 BY: AARON ROBERTS

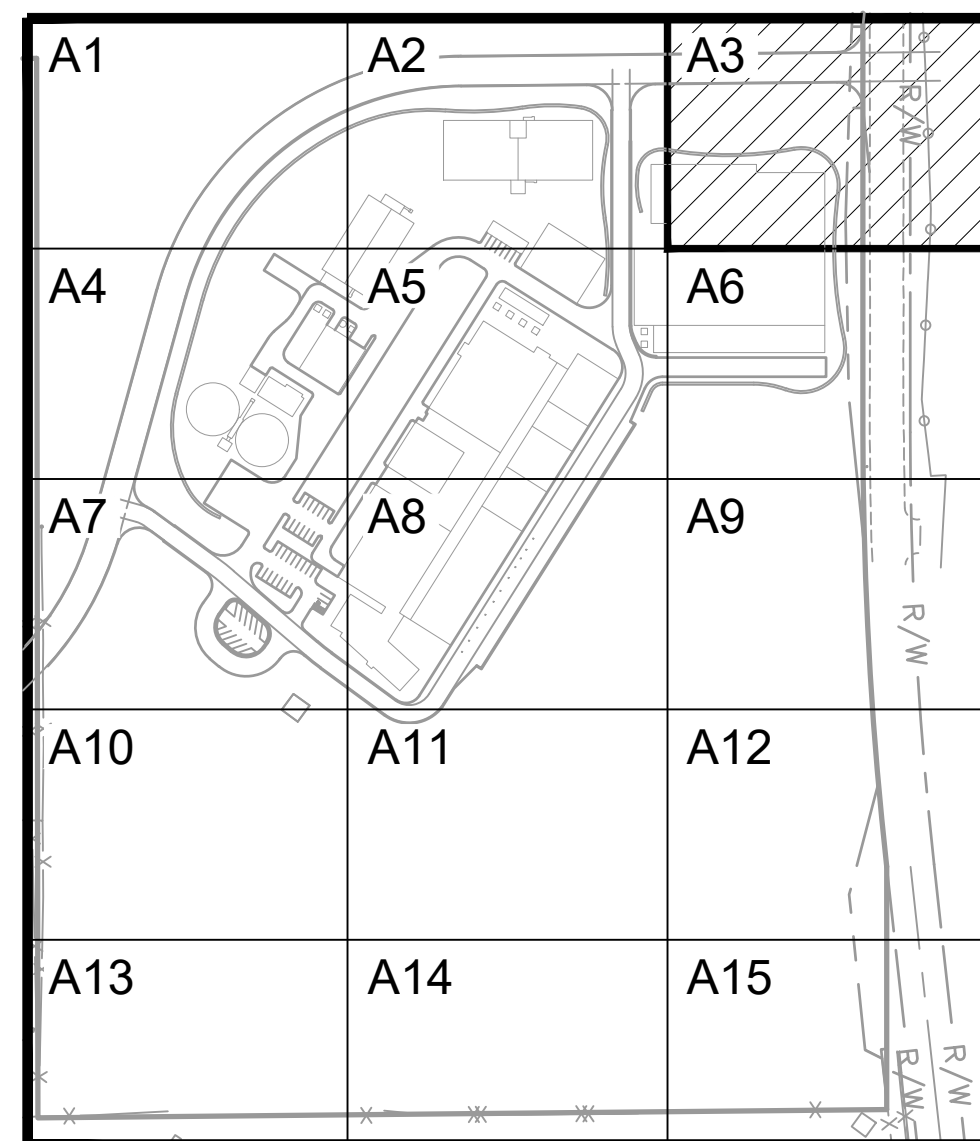
BY: AARON ROBERTS
PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
DWG FILE: C:\cdm\laaron.roberts@murraysmith.us\d0274278\WTP1-03-GR-23003.dwg



NOTES:



KEY MAP



MATCHLINE SHEET 03-GR-23008

60% DESIGN - NOT FOR CONSTRUCTION

DSGN	C JAIN				
DR	A ROBERTS				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

VERIFY SCALE
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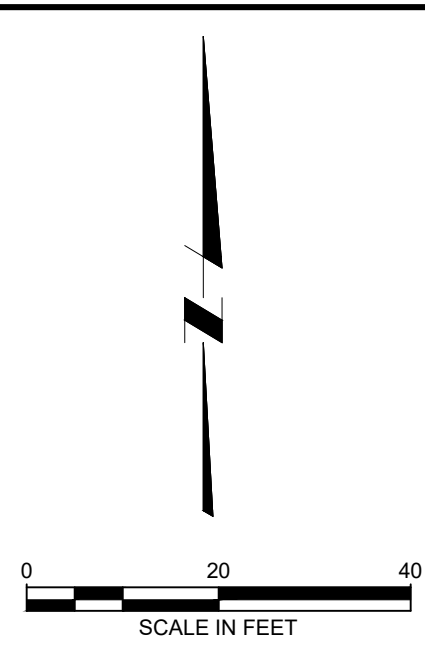
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SITE
GRADING
HORIZONTAL AND VERTICAL
CONTROL PLAN AREA A3

SHEET	
DWG	03-GR-23005
DATE	FEBRUARY 2020
PROJ	WTP_1.0

MATCHLINE SHEET 03-GR-23003



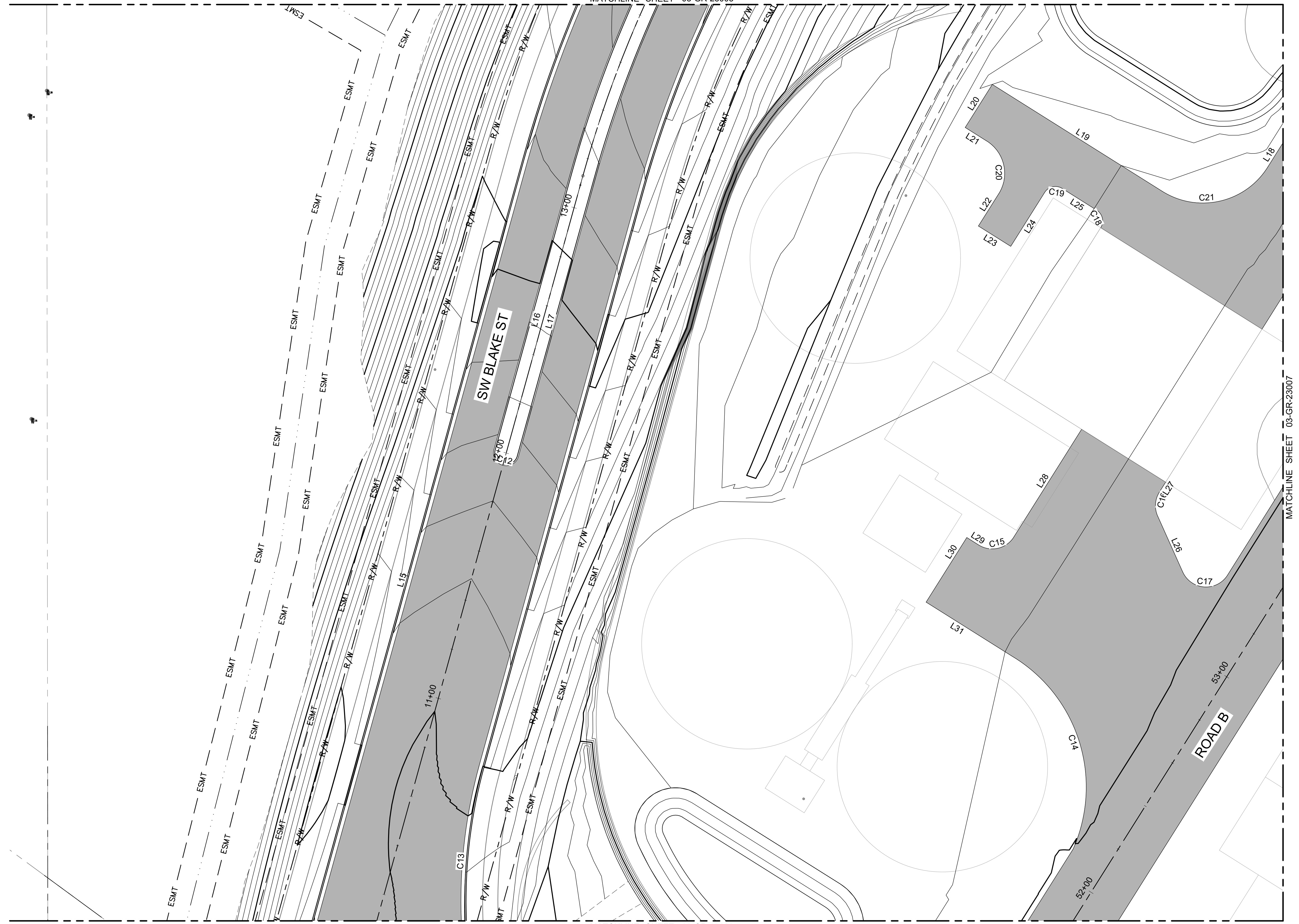
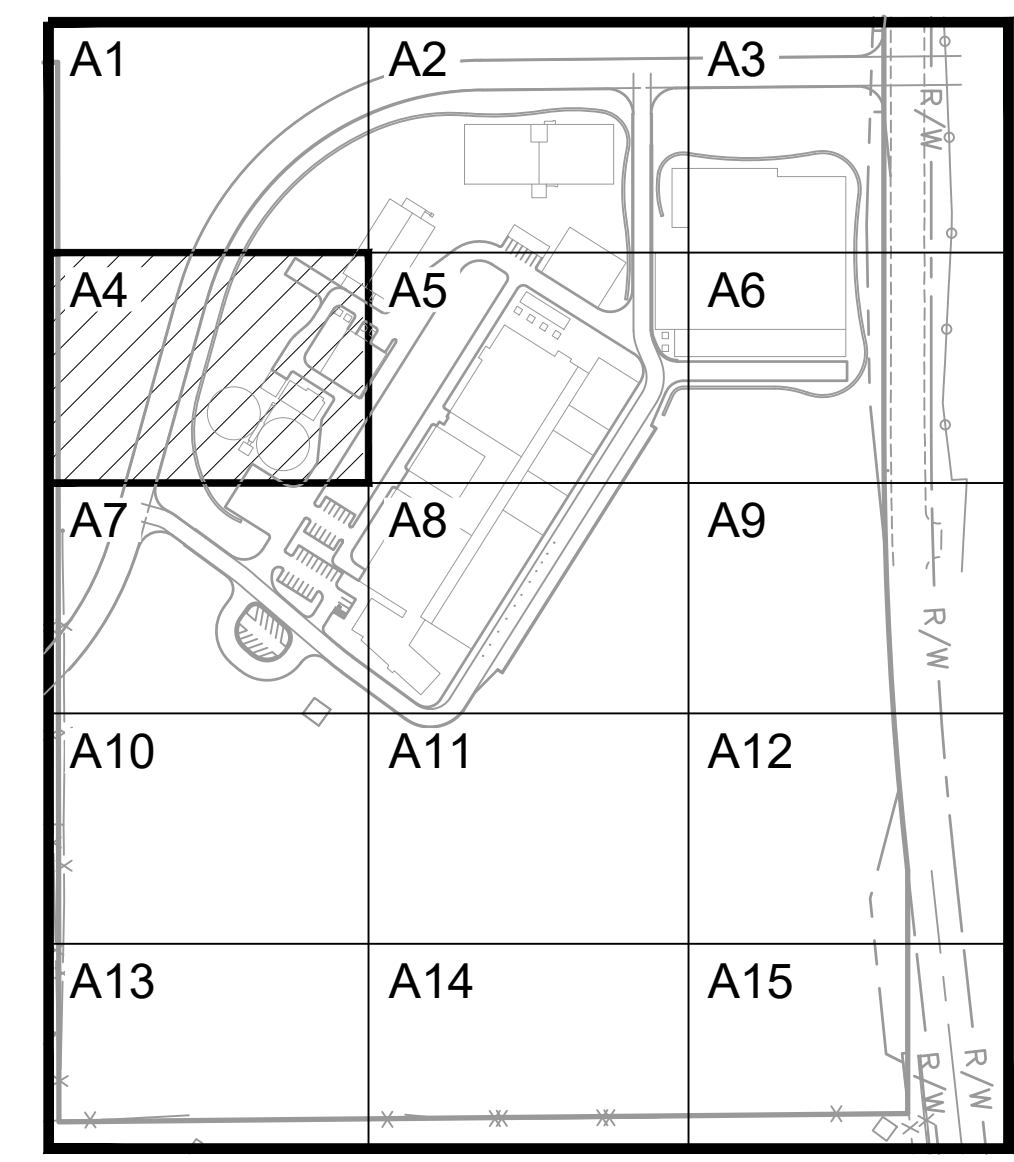
NOTES:

BY: AARON ROBERTS

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\cdm\aaaron.roberts@murraysmith.us\0274278\WTP1-03-GR-23003.dwg

KEY MAP



MATCHLINE SHEET 03-GR-23009

MATCHLINE SHEET 03-GR-23007

60% DESIGN - NOT FOR CONSTRUCTION

DSGN	C JAIN					
DR	A ROBERTS					
CHK	NA					
APVD	NA					
		NO.	DATE	REVISION	BY	APVD

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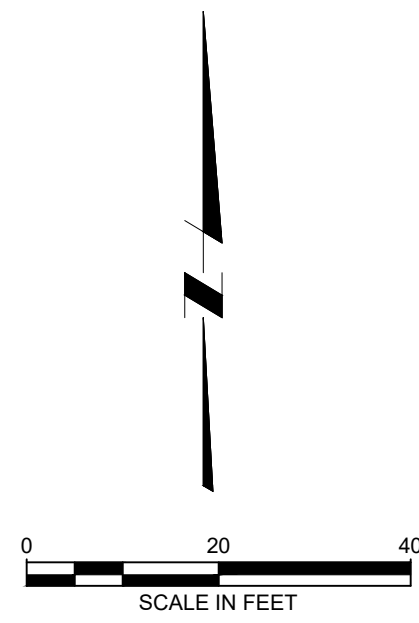
SITE
 GRADING
 HORIZONTAL AND VERTICAL
 CONTROL PLAN AREA A4

SHEET	DWG	03-GR-23006
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

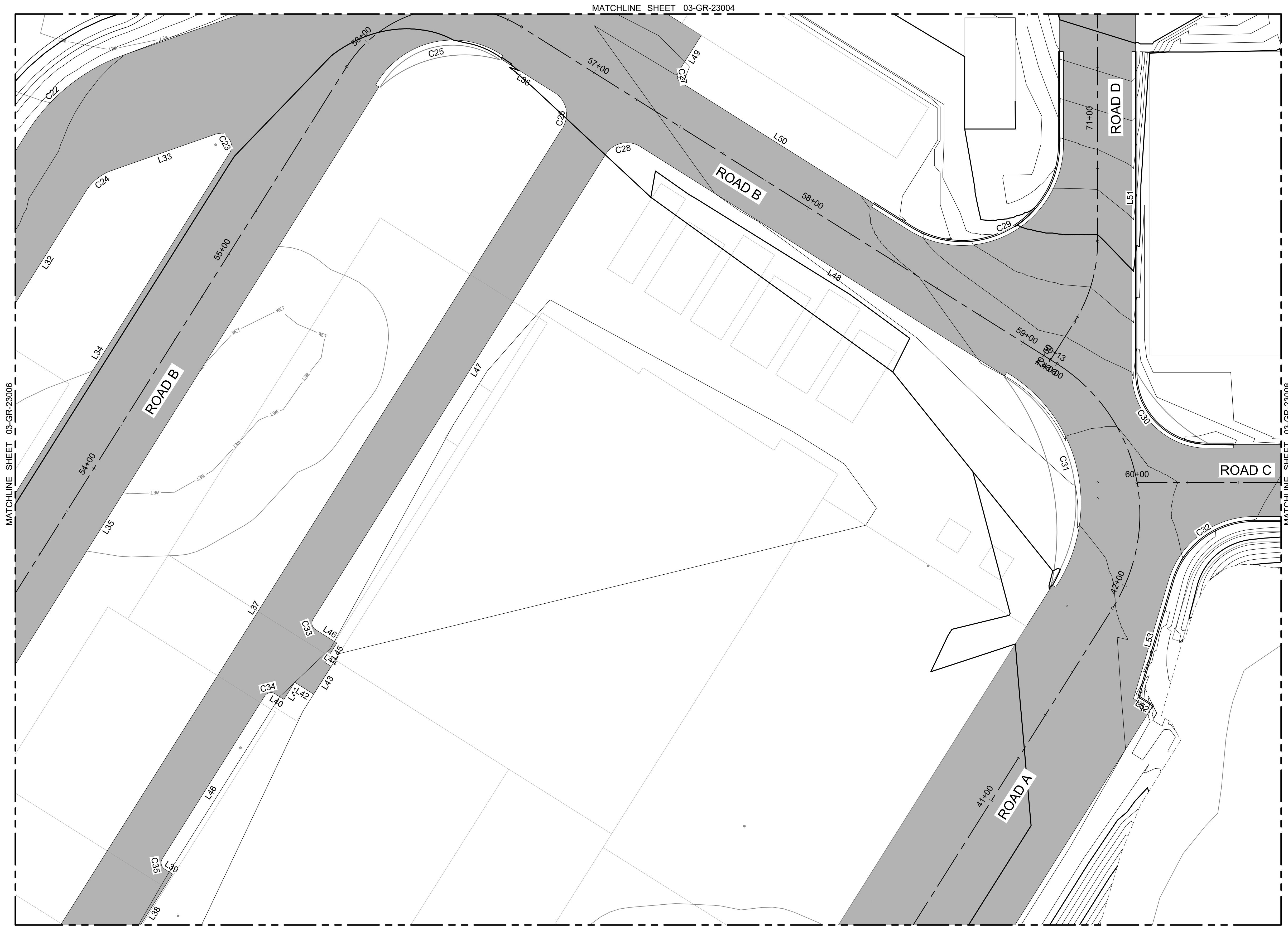
BY: AARON ROBERTS

Wednesday, May 25, 2016 1:37:44 PM

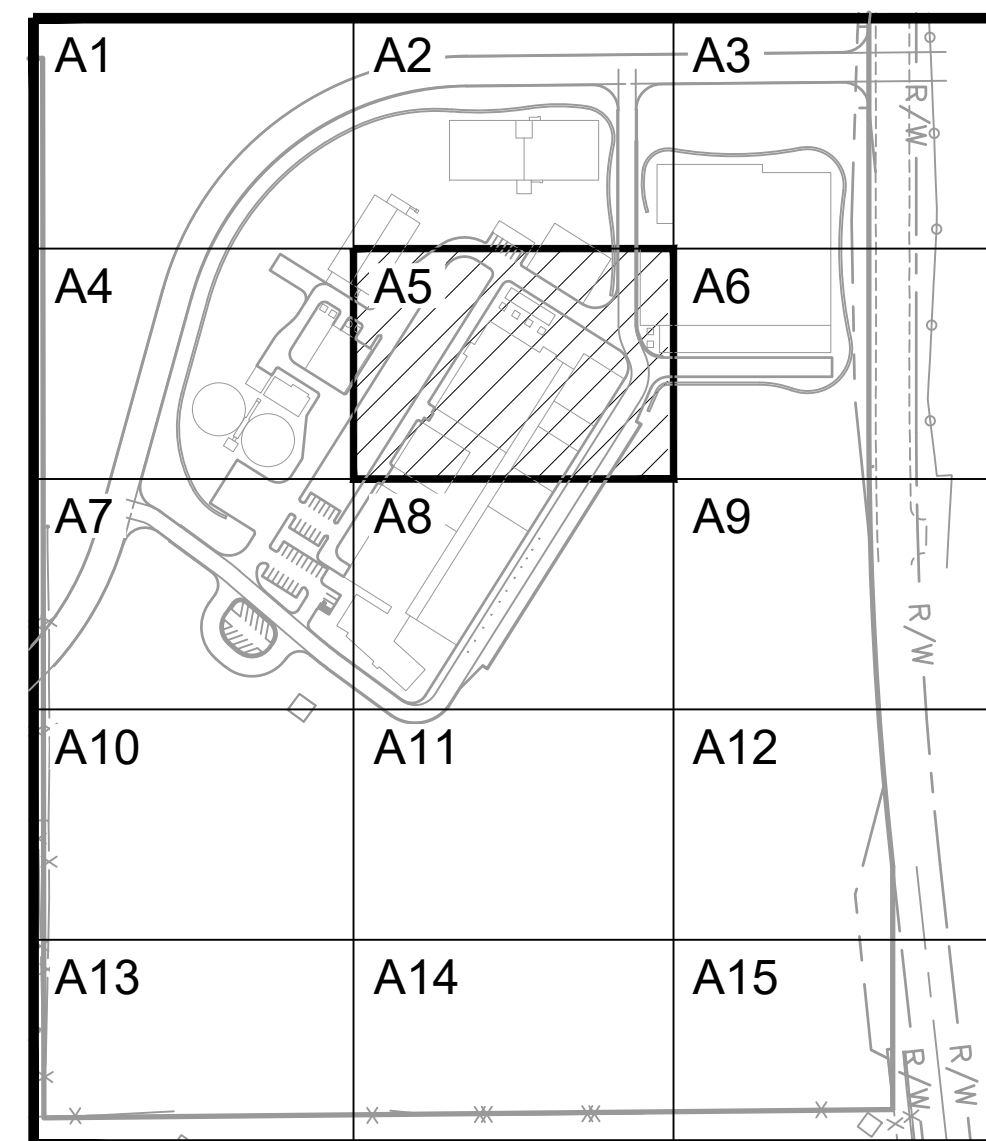
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NOTES:



KEY MAP



MATCHLINE SHEET 03-GR-23010

60% DESIGN - NOT FOR CONSTRUCTION

DSGN	C JAIN				
DR	A ROBERTS				
CHK	NA				
APVD	NA				
		NO.	DATE	REVISION	BY

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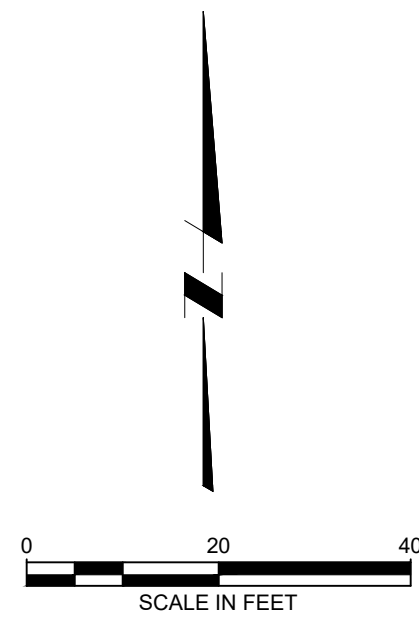
SITE GRADING
 HORIZONTAL AND VERTICAL
 CONTROL PLAN AREA A5

SHEET	
DWG	03-GR-23007
DATE	FEBRUARY 2020
PROJ	WTP_1.0

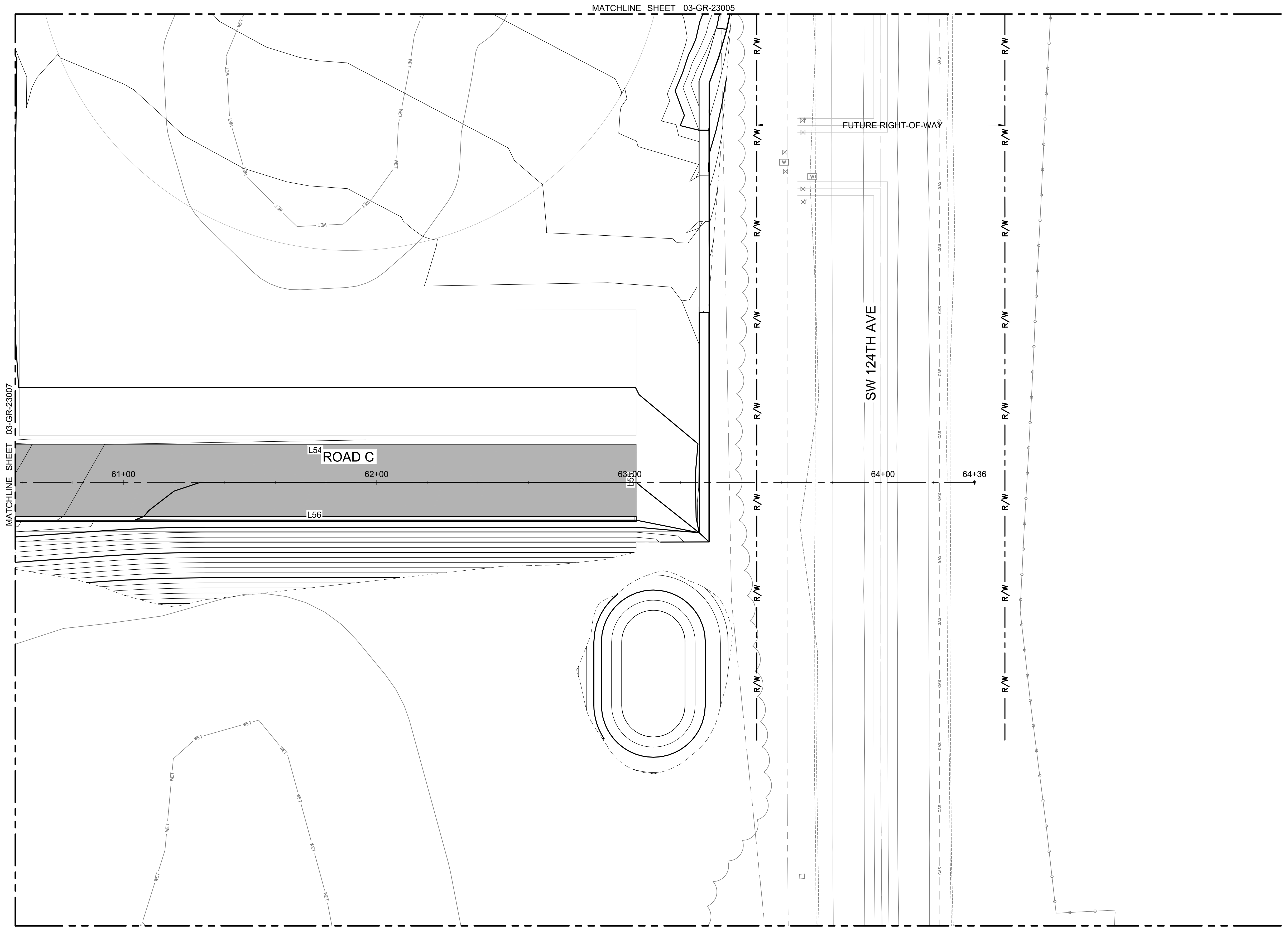
BY: AARON ROBERTS

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

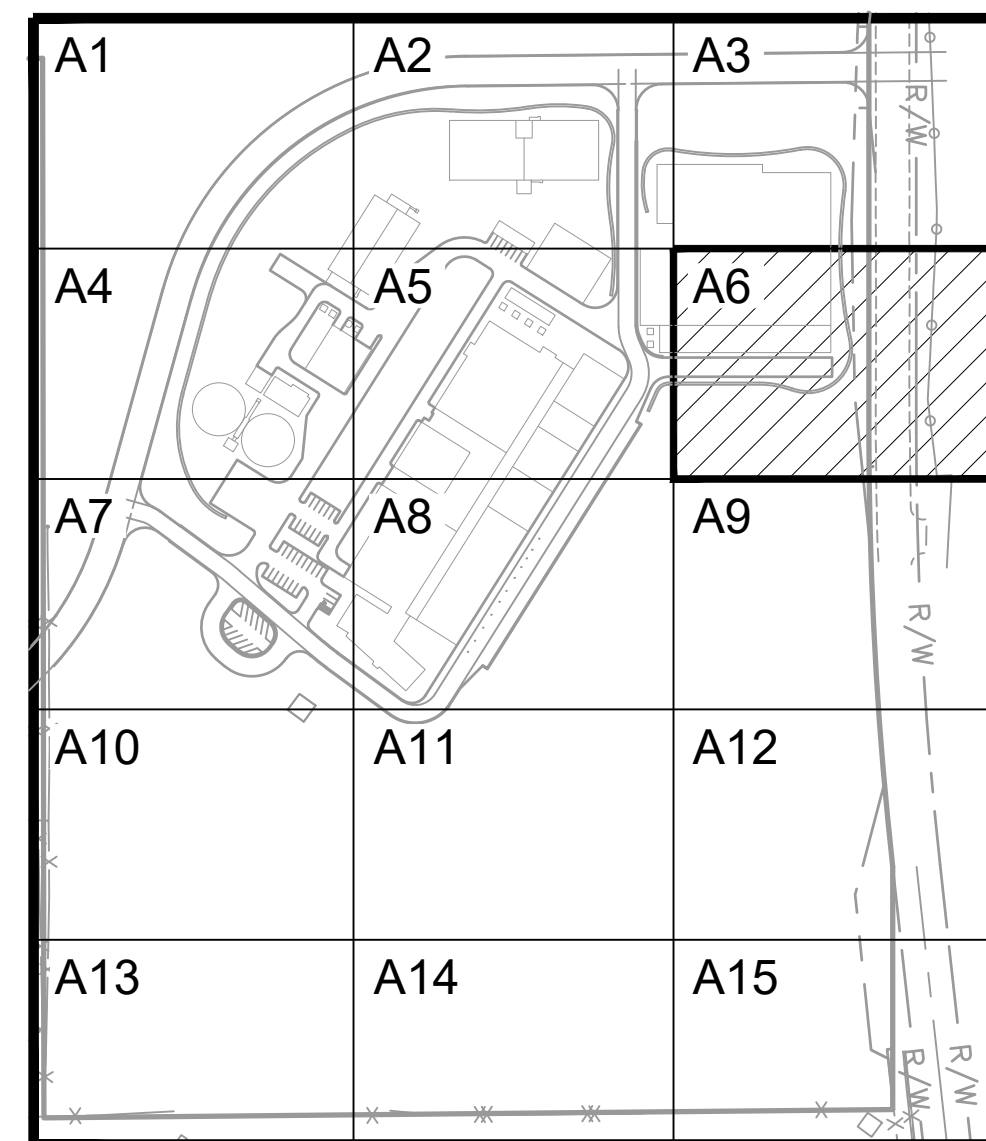
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NOTES:



KEY MAP



MATCHLINE SHEET 03-GR-23011

60% DESIGN - NOT FOR CONSTRUCTION

DSGN	C JAIN				
DR	A ROBERTS				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

VERIFY SCALE
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 IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.



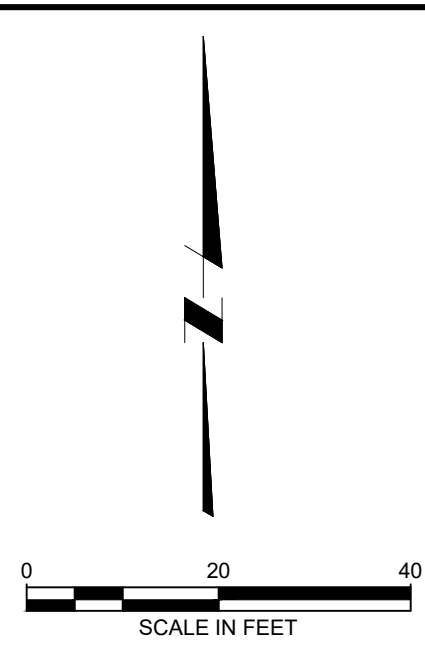
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SITE
 GRADING
 HORIZONTAL AND VERTICAL
 CONTROL PLAN AREA A6

SHEET	
DWG	03-GR-23008
DATE	FEBRUARY 2020
PROJ	WTP_1.0

MATCHLINE SHEET 03-GR-23006



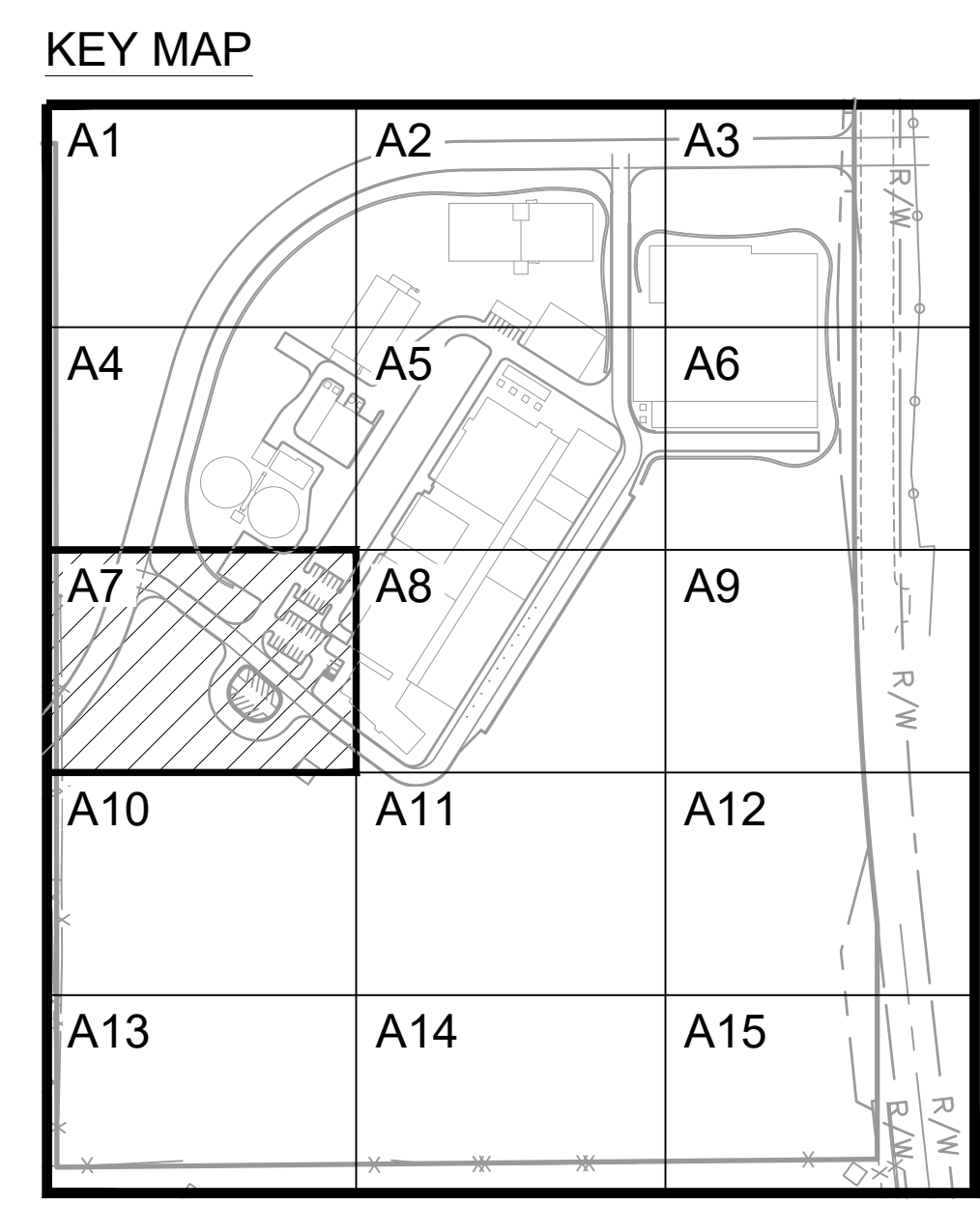
NOTES:



MATCHLINE SHEET 03-GR-23010

MATCHLINE SHEET 03-GR-23012

60% DESIGN - NOT FOR CONSTRUCTION



BY: AARON ROBERTS
PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
DWG FILE: C:\cdm\laaron.roberts@murraysmith.us\0274278\WTP1-03-GR-23003.dwg

DSGN	C JAIN					
DR	A ROBERTS					
CHK	NA					
APVD	NA					
		NO.	DATE	REVISION	BY	APVD

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
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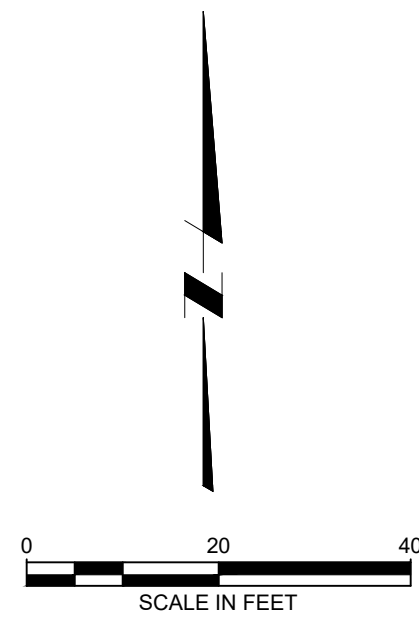
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WATER TREATMENT PLANT_1.0

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SITE
GRADING
HORIZONTAL AND VERTICAL
CONTROL PLAN AREA A7

SHEET	DWG	03-GR-23009
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

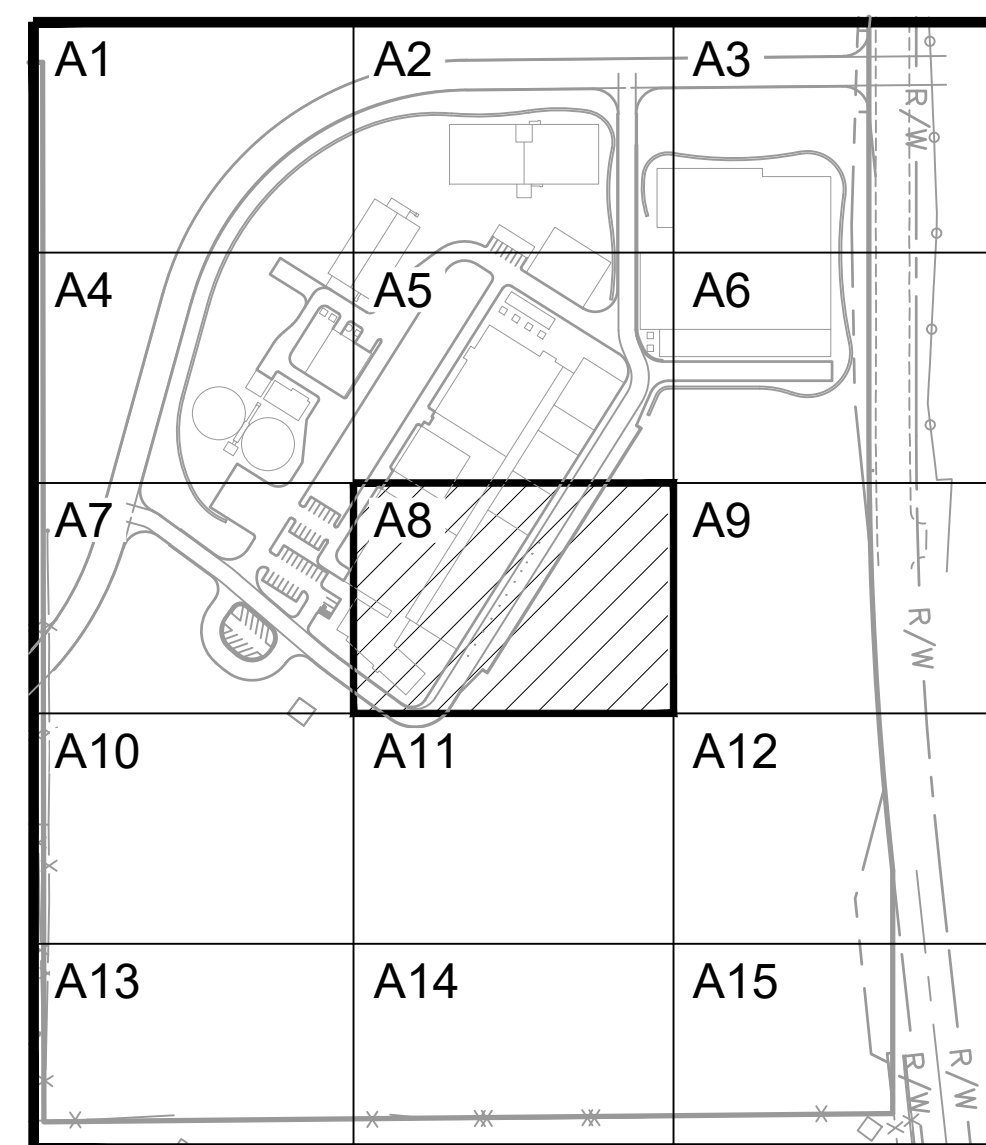
DWG FILE: C:\cdm\alexander.roberts@murraysmith.us\0274278\WTP1-03-GR-23003.dwg
 PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
 BY: AARON ROBERTS



NOTES:



KEY MAP



DSGN	C JAIN					
DR	A ROBERTS					
CHK	NA					
APVD	NA	NO.	DATE	REVISION	BY	APVD

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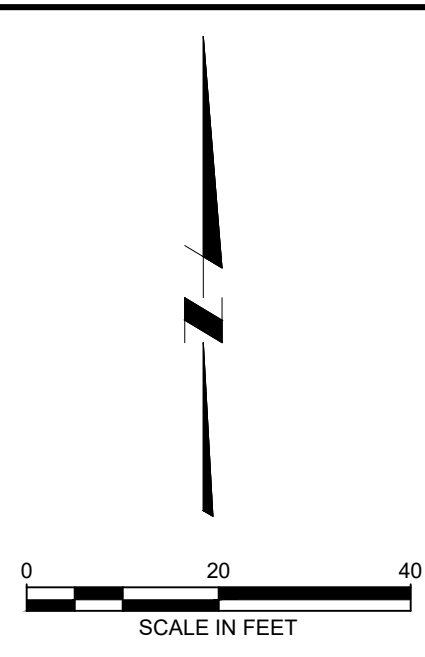
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SITE
 GRADING
 HORIZONTAL AND VERTICAL
 CONTROL PLAN AREA A8

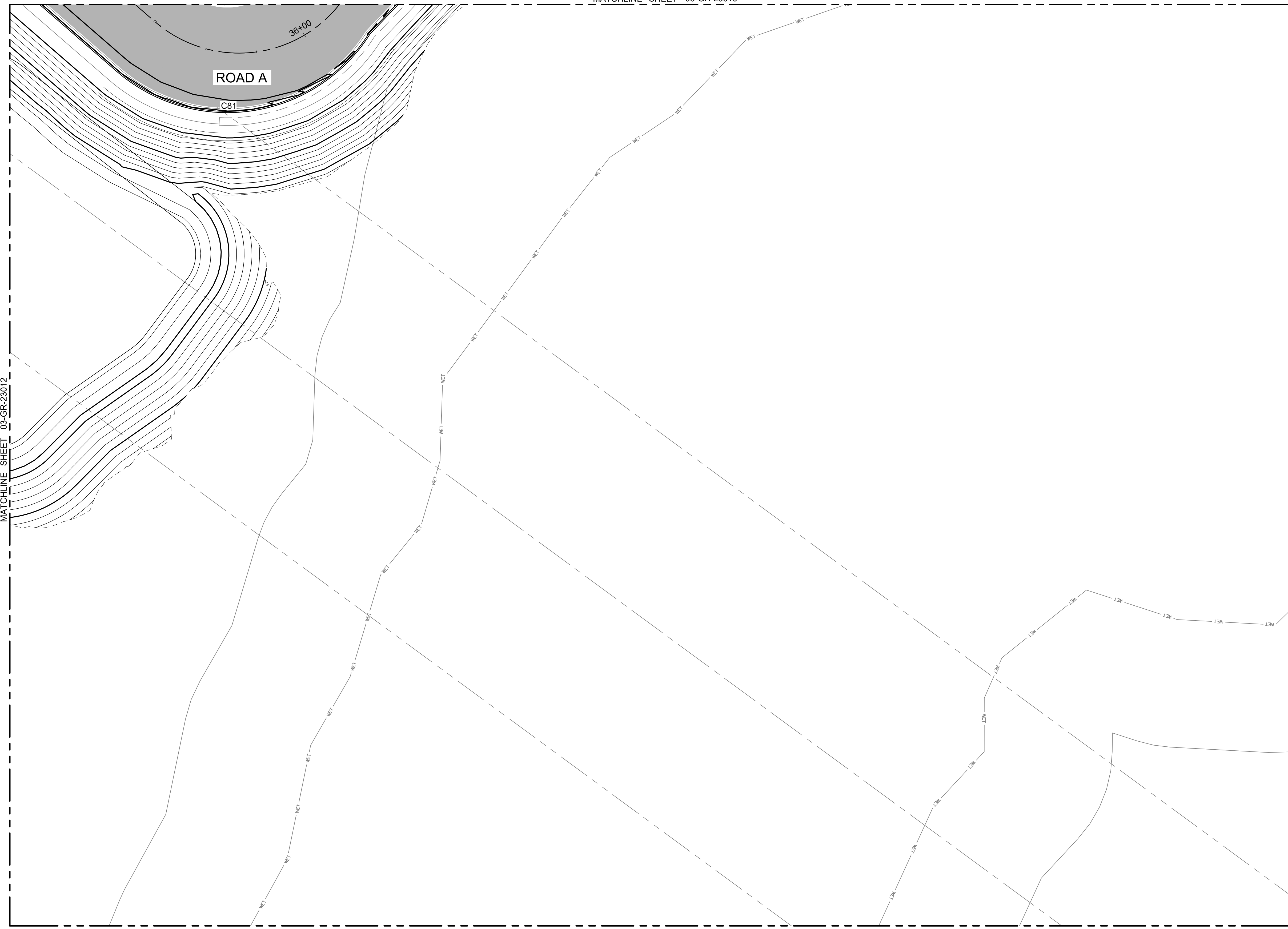
SHEET	
DWG	03-GR-23010
DATE	FEBRUARY 2020
PROJ	WTP_1.0

60% DESIGN - NOT FOR CONSTRUCTION

MATCHLINE SHEET 03-GR-23010



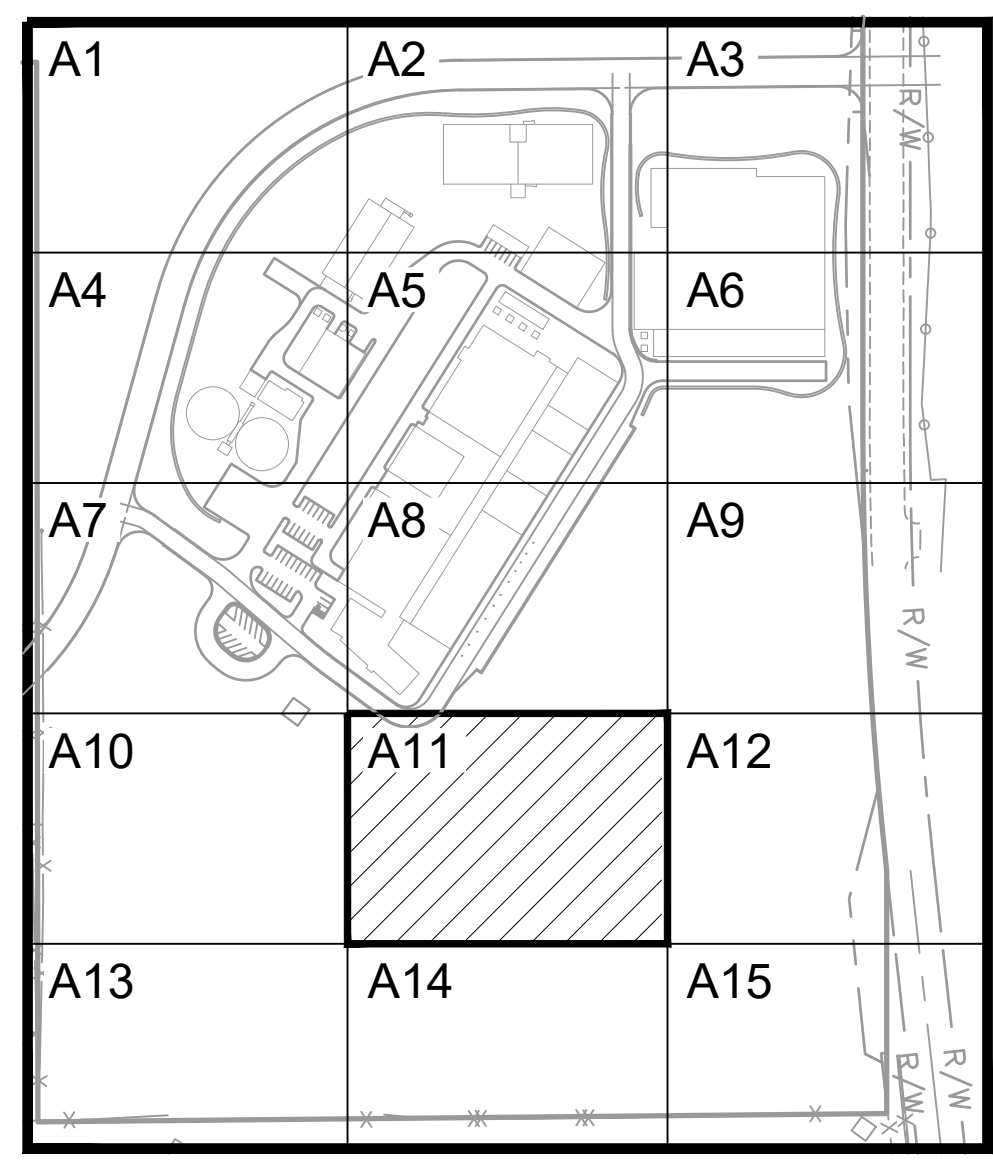
NOTES:



MATCHLINE SHEET 03-GR-23012

MATCHLINE SHEET 03-GR-23014

KEY MAP



MATCHLINE SHEET 03-GR-23016

60% DESIGN - NOT FOR CONSTRUCTION

DWG FILE: C:\cdm\laaron.roberts@murraysmith.us\d0274278\WTP1-03-GR-23003.dwg
 PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
 BY: AARON ROBERTS

DSGN	C JAIN				
DR	A ROBERTS				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY
					APVD

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SITE
 GRADING
 HORIZONTAL AND VERTICAL
 CONTROL PLAN AREA A11

SHEET	DWG	03-GR-23011
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

BY: AARON ROBERTS

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\cdm\alexaron.roberts@murraysmith.us\0274278\WTP1-03-GR-23003.dwg

LINE TABLE		
LINE	BEARING	DISTANCE (FT)
L1	N89°25'41"E	597.59
L2	S89°25'41"W	200.27
L3	N89°25'41"E	200.27
L4	N89°25'41"E	191.04
L5	N0°00'00"E	223.51
L6	N0°00'00"E	210.38
L7	S57°49'18"E	63.00
L8	N32°10'42"E	17.00
L9	S57°49'18"E	5.65
L10	N70°40'53"E	106.21
L11	N89°25'41"E	261.43
L12	S5°16'38"W	100.76
L13	N0°02'10"E	325.01
L14	S5°08'27"E	101.07
L15	N15°27'30"E	388.86
L16	S15°27'30"W	112.95
L17	N15°27'30"E	112.95
L18	N32°10'41"E	20.15
L19	S57°49'18"E	78.83
L20	N32°10'42"E	20.00

LINE TABLE		
LINE	BEARING	DISTANCE (FT)
L21	N57°49'18"W	10.00
L22	N32°10'42"E	15.00
L23	N57°49'18"W	15.00
L24	S32°10'42"W	25.00
L25	N57°49'18"W	16.00
L26	S24°07'53"E	24.04
L27	S32°10'24"W	4.65
L28	N32°10'40"E	33.00
L29	S57°49'18"E	5.52
L30	N32°10'42"E	30.00
L31	N57°49'18"W	39.83
L32	S32°10'41"W	67.94
L33	S70°40'53"W	43.47
L34	N32°10'42"E	199.91
L35	S32°10'42"W	427.45
L36	N57°49'18"W	25.00
L37	N32°11'03"E	452.45
L38	S32°10'42"W	34.00
L39	S57°49'18"E	3.67
L40	N57°49'18"W	4.17

LINE TABLE		
LINE	BEARING	DISTANCE (FT)
L41	S32°07'13"W	8.00
L42	N57°49'18"W	8.83
L43	S32°12'51"W	13.00
L43	N32°10'42"E	110.00
L44	S57°49'18"E	3.00
L44	S53°42'50"E	108.75
L45	S32°03'34"W	9.00
L46	S32°10'42"W	75.83
L46	S57°49'18"E	9.98
L47	S32°10'42"W	216.87
L47	S32°10'42"W	110.67
L48	N57°49'18"W	170.00
L49	S32°10'42"W	17.00
L50	S57°49'18"E	90.00
L51	N0°00'00"E	53.78
L52	N57°49'18"W	6.36
L52	S57°49'18"E	48.00
L53	N16°29'10"E	47.73
L53	N49°02'18"W	37.13
L54	N90°00'00"W	264.52

LINE TABLE		
LINE	BEARING	DISTANCE (FT)
L55	N0°00'00"E	28.50
L56	N90°00'00"E	256.04
L57	S53°42'50"E	63.62
L58	S35°34'10"W	16.61
L59	S49°02'18"E	18.57
L60	S49°02'18"E	150.22
L61	S49°02'18"E	198.37
L62	S49°02'18"E	45.44
L63	S32°10'42"W	20.09
L64	N57°49'18"W	18.50
L65	S32°10'42"W	35.00
L66	S57°49'18"E	15.50
L67	S32°10'42"W	18.50
L68	S57°49'18"E	81.00
L69	N32°10'42"E	18.50
L70	S57°49'18"E	8.67
L71	S32°10'42"W	6.21
L72	S32°10'42"W	56.92
L73	N57°49'18"W	3.95
L74	N32°10'42"E	17.00

LINE TABLE		
LINE	BEARING	DISTANCE (FT)
L75	N57°49'18"W	54.00
L76	S32°10'42"W	17.00
L77	N32°04'47"E	3.96
L78	N57°49'18"W	27.87
L79	S32°10'42"W	17.00
L80	S57°49'18"E	17.83
L81	S32°10'42"W	17.00
L82	S57°49'18"E	54.00
L83	N32°10'42"E	17.00
L84	S57°49'18"E	3.95
L85	N53°42'50"W	14.00
L86	S53°42'50"E	14.00
L86	N32°10'42"E	18.50
L87	N49°02'18"W	51.66
L87	S32°10'42"W	21.29
L88	N35°34'10"E	8.57
L88	S32°10'42"W	18.50
L89	S49°02'18"E	30.62
L90	S35°34'10"W	20.50
L91	N49°02'18"W	13.00

LINE TABLE		
LINE	BEARING	DISTANCE (FT)
L92	S49°02'18"E	13.00
L93	N43°32'47"E	60.88
L94	N32°10'42"E	30.15
L95	S57°49'18"E	6.50
L96	N32°10'42"E	450.00
L97	N32°10'42"E	569.92
L98	N32°10'42"E	4.50
L99	S32°10'42"W	4.50
L100	S57°49'18"E	2.00

60% DESIGN - NOT FOR CONSTRUCTION

DSGN	C JAIN				
DR	A ROBERTS				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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SHEET	
DWG	03-GR-23012
DATE	FEBRUARY 2020
PROJ	WTP_1.0

BY: AARON ROBERTS

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\cdm\alexander.roberts\murraysmith.us\40274278\WTP1-03-GR-23003.dwg

Curve Table						
CURVE	DELTA	RADIUS (FT)	LENGTH (FT)	CHORD BEARING	CHORD DISTANCE (FT)	DESCRIPTION
C1	73°58'10"	494.00	637.76	N52°26'35"E	594.38	FOC
C2	73°58'10"	475.00	613.23	S52°26'35"W	571.52	FOC
C3	73°58'10"	465.00	600.32	N52°26'35"E	559.49	FOC
C4	73°58'10"	446.00	575.79	N52°26'35"E	536.63	FOC
C5	180°00'00"	5.00	15.71	N00°34'19"W	10.00	FOC
C6	73°23'00"	43.50	55.71	N53°52'49"W	51.98	FOC
C7	65°51'04"	43.50	50.00	S33°35'03"W	47.29	FOC
C8	90°00'00"	3.00	4.71	N77°10'42"E	4.24	EOP
C9	51°29'49"	65.00	58.42	S83°34'13"E	56.47	
C10	88°57'02"	37.00	57.44	S43°01'55"E	51.84	
C11	88°06'12"	37.00	56.89	N42°13'45"E	51.45	
C12	180°00'00"	5.00	15.71	S74°32'30"E	10.00	
C13	22°55'06"	198.50	79.40	N03°59'57"E	78.87	
C14	82°58'03"	60.00	86.88	N17°35'48"W	79.49	
C15	90°00'02"	10.00	15.71	N77°10'41"E	14.14	
C16	56°18'34"	10.00	9.83	S04°01'24"W	9.44	
C17	123°41'24"	10.00	21.59	S85°58'36"E	17.63	
C18	90°00'00"	5.00	7.85	N12°49'18"W	7.07	
C19	90°00'00"	5.00	7.85	S77°10'42"W	7.07	
C20	90°00'00"	15.00	23.56	N12°49'18"W	21.21	

Curve Table						
CURVE	DELTA	RADIUS (FT)	LENGTH (FT)	CHORD BEARING	CHORD DISTANCE (FT)	DESCRIPTION
C21	90°00'01"	30.00	47.12	N77°10'41"E	42.43	XXX
C22	38°30'12"	75.00	50.40	N51°25'47"E	49.46	
C23	135°49'49"	5.00	11.85	N35°44'13"W	9.27	
C24	38°30'11"	20.00	13.44	S51°25'47"W	13.19	
C25	95°01'22"	33.00	54.73	S77°10'42"W	48.67	
C26	90°00'00"	10.00	15.71	N12°49'18"W	14.14	
C27	90°00'00"	3.00	4.71	S12°49'18"E	4.24	
C28	90°00'00"	10.00	15.71	S77°10'42"W	14.14	
C29	122°10'42"	38.50	82.10	N61°05'21"E	67.40	
C30	90°00'00"	28.50	44.77	N45°00'00"W	40.31	
C31	92°54'07"	58.00	94.04	N12°49'18"W	84.07	
C32	73°30'50"	33.50	42.98	N53°14'35"E	40.09	
C33	90°00'00"	3.00	4.71	S12°49'18"E	4.24	
C34	90°00'00"	3.00	4.71	S77°10'42"W	4.24	
C35	90°00'00"	3.00	4.71	S12°49'18"E	4.24	
C36	26°34'58"	456.00	211.57	N28°45'00"E	209.67	
C37	21°19'12"	475.00	176.75	S31°22'53"W	175.73	
C38	180°00'00"	5.00	15.71	N69°16'43"W	10.00	
C39	21°19'12"	485.00	180.47	N31°22'53"E	179.43	
C40	23°18'42"	503.90	205.02	N30°23'12"E	203.61	

Curve Table						
CURVE	DELTA	RADIUS (FT)	LENGTH (FT)	CHORD BEARING	CHORD DISTANCE (FT)	DESCRIPTION
C41	77°21'12"	28.50	38.48	N54°22'40"E	35.62	XXX
C42	33°13'54"	98.50	57.13	S70°19'47"E	56.33	
C43	45°35'44"	43.50	34.62	N30°15'27"W	33.71	
C44	90°00'00"	2.50	3.93	S81°17'10"W	3.54	
C45	90°00'00"	2.50	3.93	N81°17'10"E	3.54	
C46	94°06'28"	35.00	57.49	N79°13'56"E	51.24	
C47	89°17'00"	23.50	36.62	S09°04'20"E	33.03	
C48	84°36'28"	70.00	103.37	S06°44'04"E	94.23	
C49	96°45'23"	70.00	118.21	N82°35'00"E	104.66	
C50	96°45'23"	23.50	39.68	N82°35'00"E	35.13	
C51	95°23'32"	13.50	22.48	S83°15'56"W	19.97	
C52	84°36'28"	23.50	34.70	N06°44'04"W	31.63	
C53	95°23'32"	28.50	47.45	N83°15'56"E	42.16	
C54	84°36'28"	28.50	42.09	S06°44'04"E	38.36	
C55	54°01'08"	33.50	31.58	N13°20'08"W	30.43	
C56	108°30'16"	8.50	16.10	N67°55'34"E	13.80	
C57	90°00'00"	1.50	2.36	S12°49'18"E	2.12	
C58	90°00'00"	1.50	2.36	N77°10'42"E	2.12	
C59	90°00'00"	8.50	13.35	S12°49'18"E	12.02	
C60	98°47'00"	8.50	14.65	S81°34'12"W	12.91	

Curve Table						
CURVE	DELTA	RADIUS (FT)	LENGTH (FT)	CHORD BEARING	CHORD DISTANCE (FT)	DESCRIPTION
C61	81°13'00"	8.50	12.05	S08°25'48"E	11.07	XXX
C62	90°00'00"	1.50	2.36	S77°10'42"W	2.12	
C63	90°00'00"	5.50	8.64	S12°49'18"E	7.78	
C64	90°00'00"	1.50	2.36	N77°10'42"E	2.12	
C65	90°00'00"	1.50	2.36	S12°49'18"E	2.12	
C66	90°00'00"	3.00	4.71	S77°10'42"W	4.24	
C67	90°00'00"	3.00	4.71	N12°49'18"W	4.24	
C68	90°00'00"	3.00	4.71	N12°49'18"W	4.24	
C69	89°54'05"	25.00	39.23	N12°52'15"W	35.32	
C70	90°00'00"	15.00	23.56	S12°49'18"E	21.21	
C71	90°00'00"	3.00	4.71	N77°10'42"E	4.24	
C72	90°00'00"	3.00	4.71	N77°10'42"E	4.24	
C73	90°00'00"	3.00	4.71	S12°49'18"E	4.24	
C74	180°00'00"	2.50	7.85	N40°57'42"E	5.00	
C75	180°00'00"	2.50	7.85	S40°57'42"W	5.00	
C76	90°00'00"	3.00	4.71	S77°10'42"W	4.24	
C77	98°47'00"	25.00	43.10	N81°34'12"E	37.96	
C78	90°00'00"	2.00	3.14	N12°49'18"W	2.83	
C79	90°00'00"	1.00	1.57	N77°10'42"E	1.41	
C80	90°00'00"	1.00	1.57	S12°49'18"E	1.41	

Curve Table						
CURVE	DELTA	RADIUS (FT)	LENGTH (FT)	CHORD BEARING	CHORD DISTANCE (FT)	DESCRIPTION
C81	98°39'07"	65.50	112.78	N81°38'08"E	99.35	XXX

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DR	A ROBERTS					
CHK	NA					
APVD	NA					
		NO.	DATE	REVISION	BY	APVD

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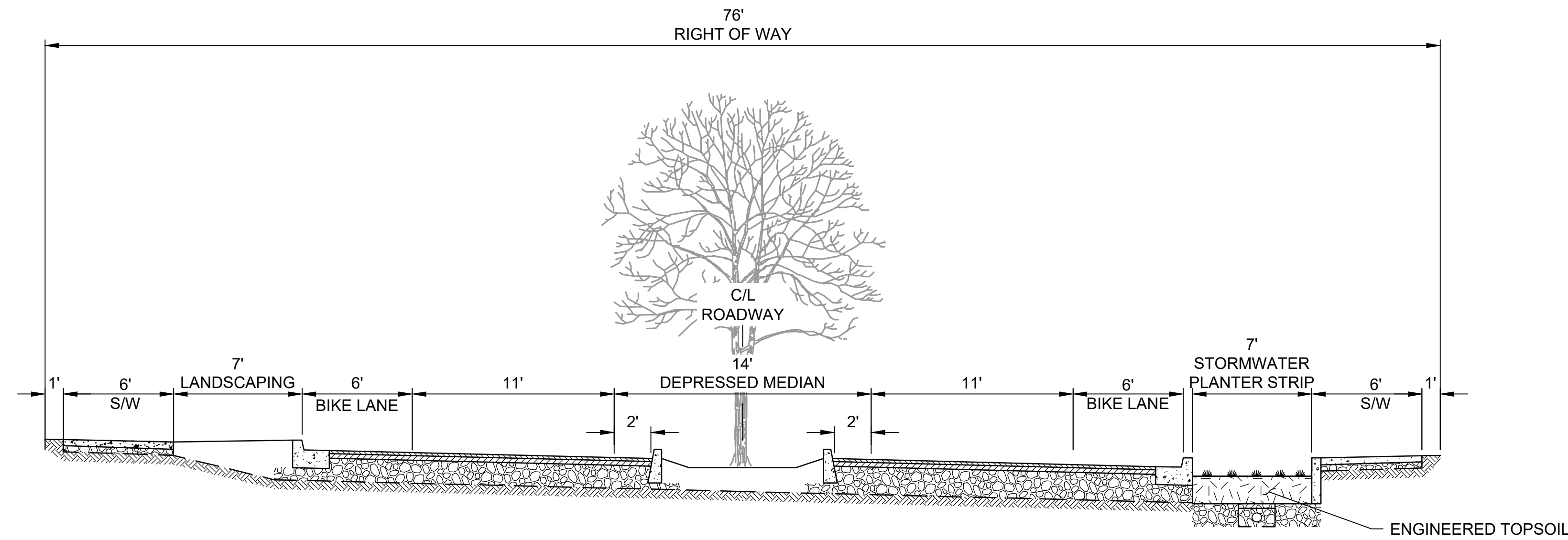
SITE
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SHEET	
DWG	03-GR-23013
DATE	FEBRUARY 2020
PROJ	WTP_1.0

BY: ERICA RODRIGUEZ

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\cdm\erica.rodriguez@murraysmith.us\d02781\WTP1-03-GR-30001.dwg

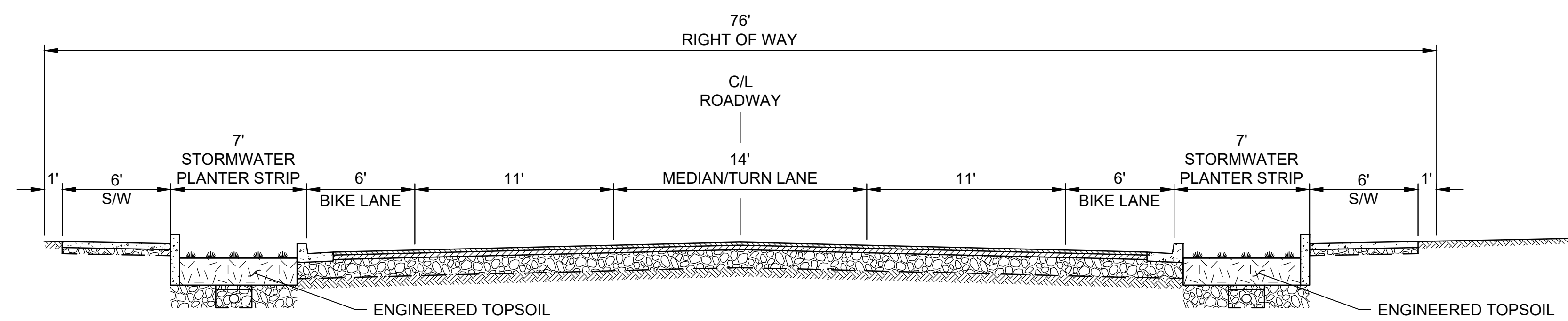


SW BLAKE STREET WITH DEPRESSED MEDIAN

SCALE: 1"=5'-0"

NOTES:

1. ONSITE STORMWATER FACILITIES, CURB AND GUTTER AND FENCING WHERE SHOWN ON PLANS.
2. CURB CUTS TO BE DETERMINED IN COORDINATION WITH STORMWATER DRAINAGE AND TREATMENT DESIGN.
3. SW BLAKE STREET DEPRESSED MEDIAN TO BE USED AS A STORMWATER PLANTER FROM STA 12+50± TO STA 19+50±.



SW BLAKE STREET WITH MEDIAN/LEFT TURN LANE

SCALE: 1"=5'-0"

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DR	M ESTEP				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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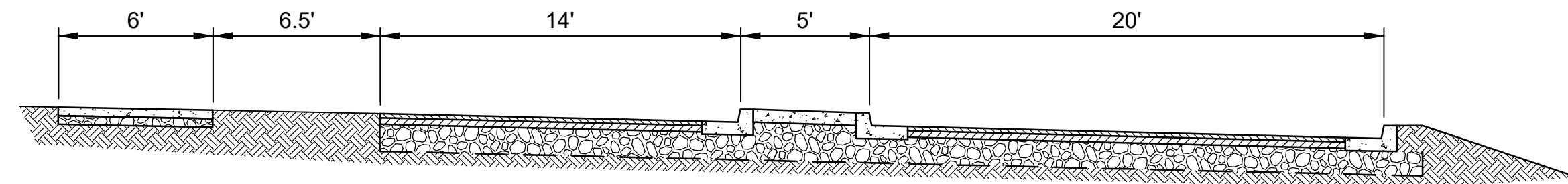
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SHEET	DWG 03-GR-30001
DATE	FEBRUARY 2020
PROJ	WTP_1.0

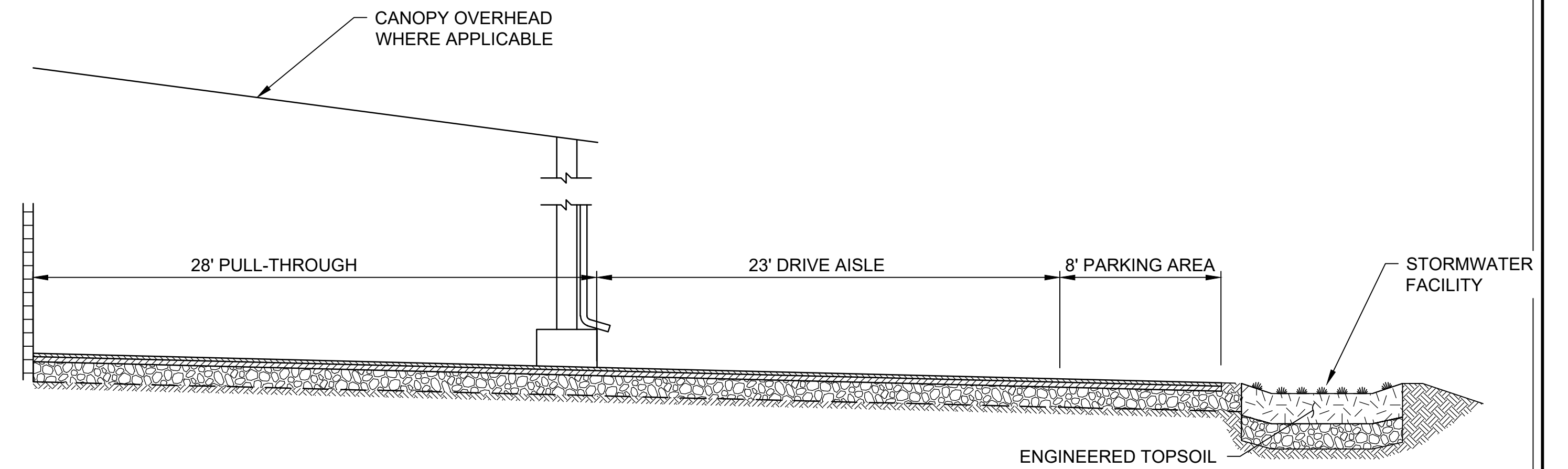
BY: ERICA RODRIGUEZ
PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
DWG FILE: C:\cdm\erica.rodriguez@murraysmith.us\10274278\WTP1-03-GR-30001.dwg



ROAD A ENTRANCE GATE

SCALE: 1"=5'-0"

STA. 31+10.00



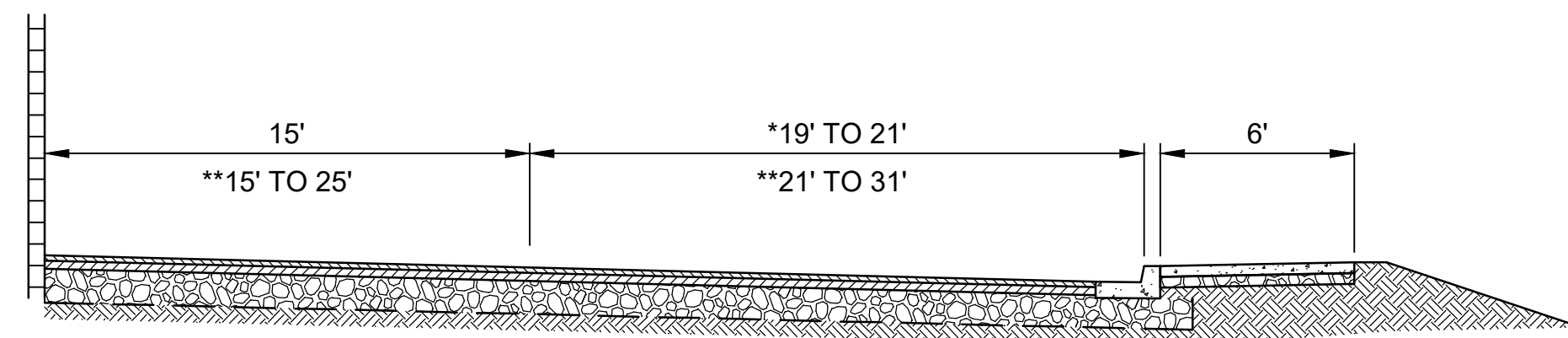
ROAD A PARKING

SCALE: 1"=5'-0"

STA. 37+00.00 TO STA. 41+50.00

NOTES:

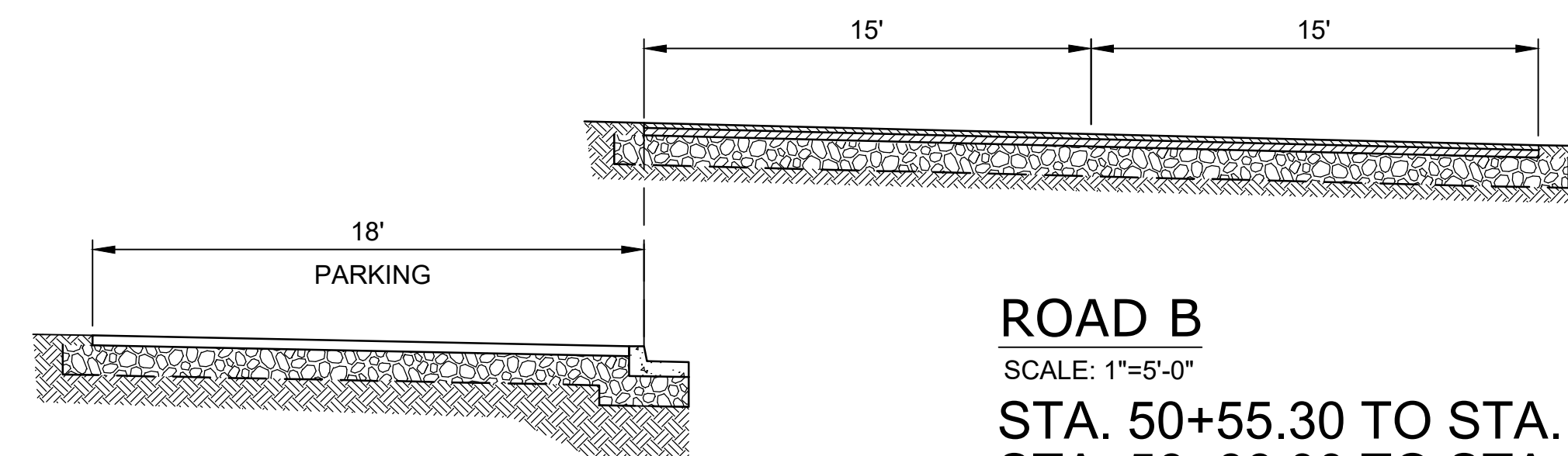
1. ONSITE STORMWATER FACILITIES, CURB AND GUTTER AND FENCING WHERE SHOWN ON PLANS.
2. CURB CUTS TO BE DETERMINED IN COORDINATION WITH STORMWATER DRAINAGE AND TREATMENT DESIGN.



ROAD A WIDENING

SCALE: NOT TO SCALE

*STA. 33+86.00 TO STA. 35+40.00
**STA. 35+40.00 TO STA. 37+00.00



ROAD B

SCALE: 1"=5'-0"

STA. 50+55.30 TO STA. 52+10.60
STA. 56+66.00 TO STA. 58+20.90

STA. 56+66.00 TO STA. 57+29.00

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DR	A ROBERTS				
CHK	NA				
APVD	NA	NO.	DATE	REVISION	BY

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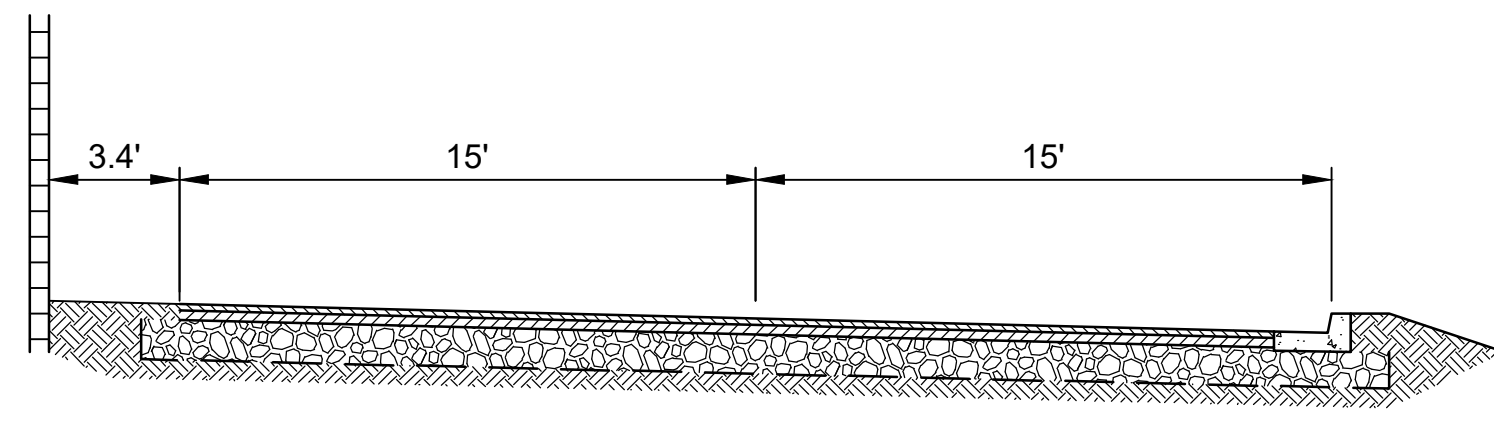


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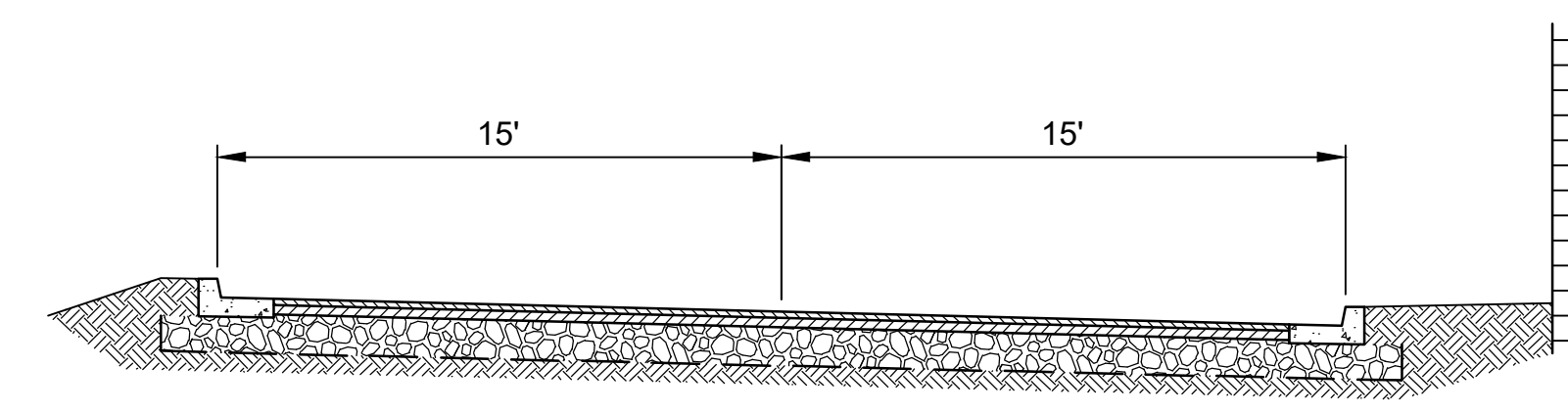
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SITE
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ROADWAY TYPICAL SECTIONS 2

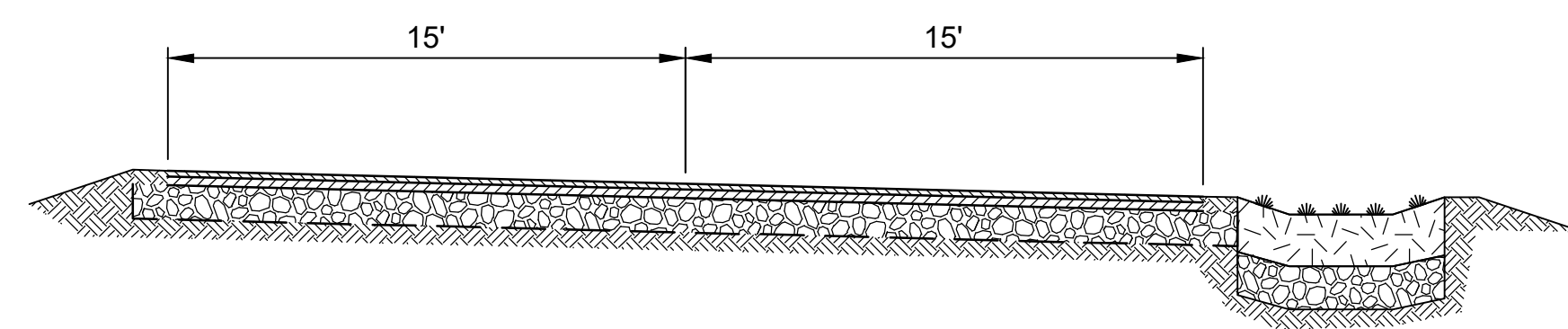
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DWG	03-GR-30002
DATE	FEBRUARY 2020
PROJ	WTP_1.0



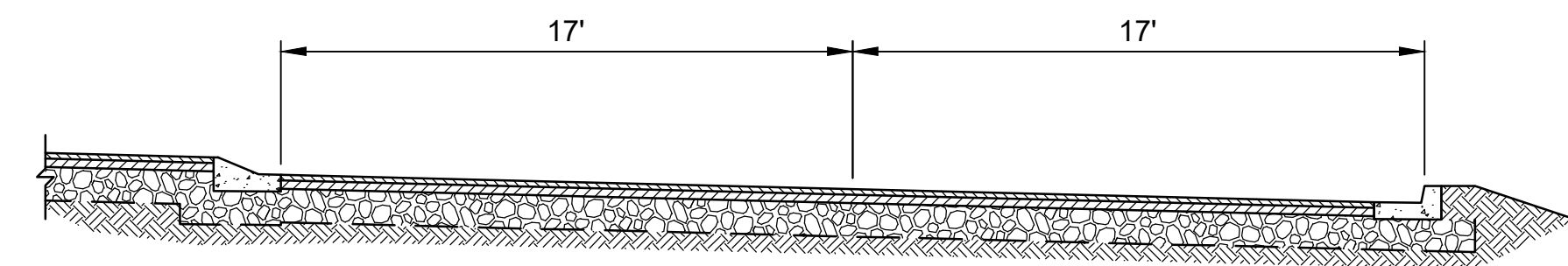
ROAD C
SCALE: 1"=5'-0"
STA. 60+46.00 TO STA. 63+02.50



ROAD D
SCALE: 1"=5'-0"
STA. 70+89.60 TO STA. 71+26.25



ROAD D
SCALE: 1"=5'-0"
STA. 71+26.25 TO STA. 73+36.60



ROAD E
SCALE: 1"=5'-0"
STA. 80+46.90 TO STA. 82+29.10

NOTES:

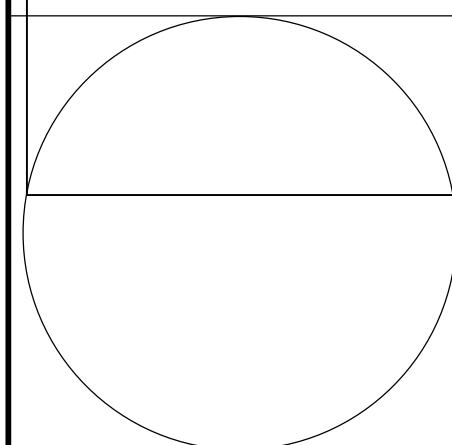
1. ONSITE STORMWATER FACILITIES, CURB AND GUTTER AND FENCING WHERE SHOWN ON PLANS.
2. CURB CUTS TO BE DETERMINED IN COORDINATION WITH STORMWATER DRAINAGE AND TREATMENT DESIGN.

BY: ERICA RODRIGUEZ

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\cdm\erica.rodriguez@murraysmith.us\102781\WTP1-03-GR-30001.dwg

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DR	A ROBERTS					
CHK	NA					
APVD	NA	NO.	DATE	REVISION	BY	APVD

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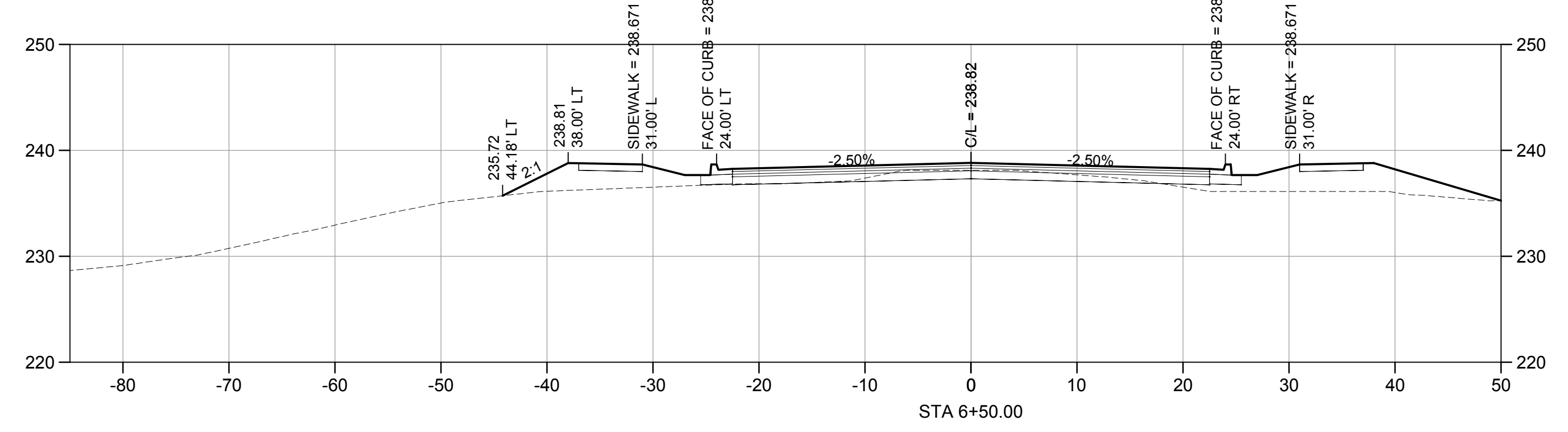
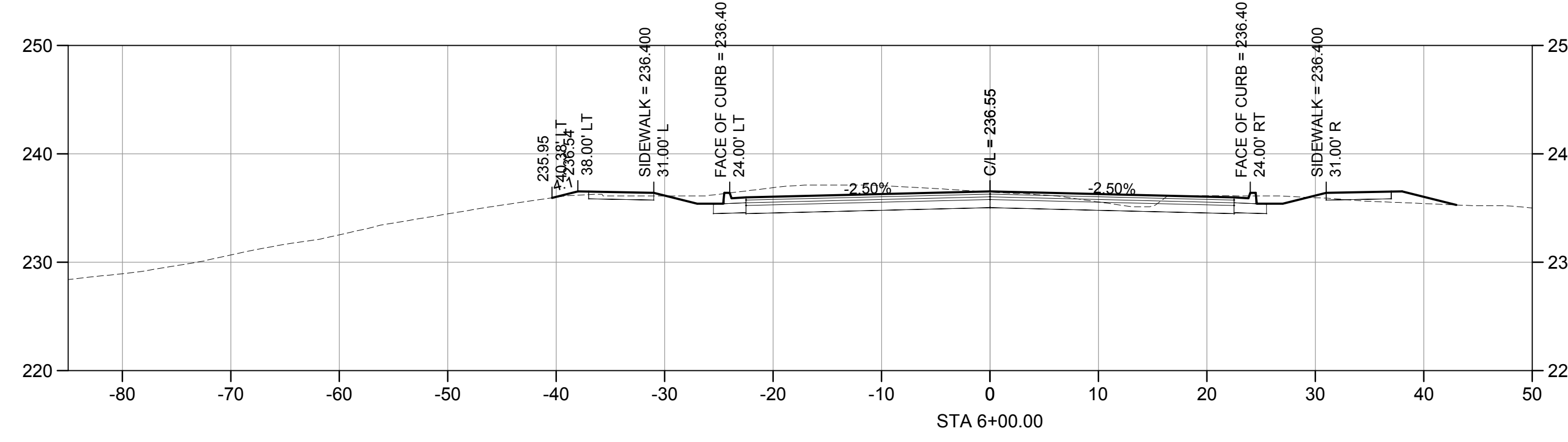
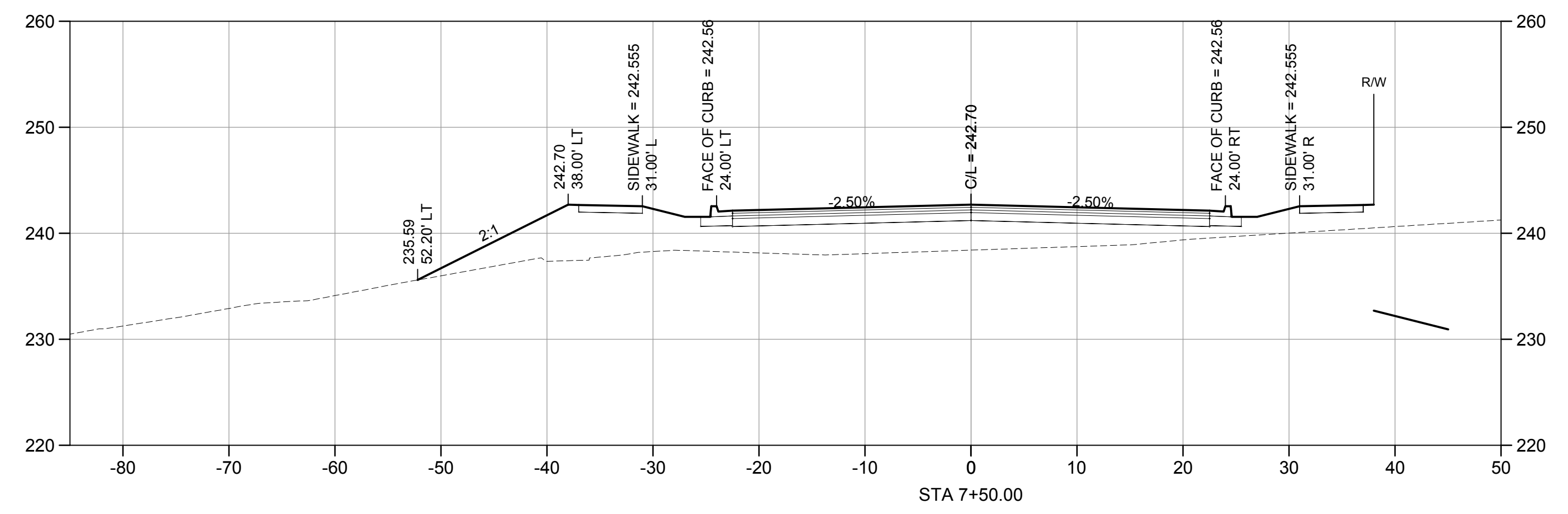
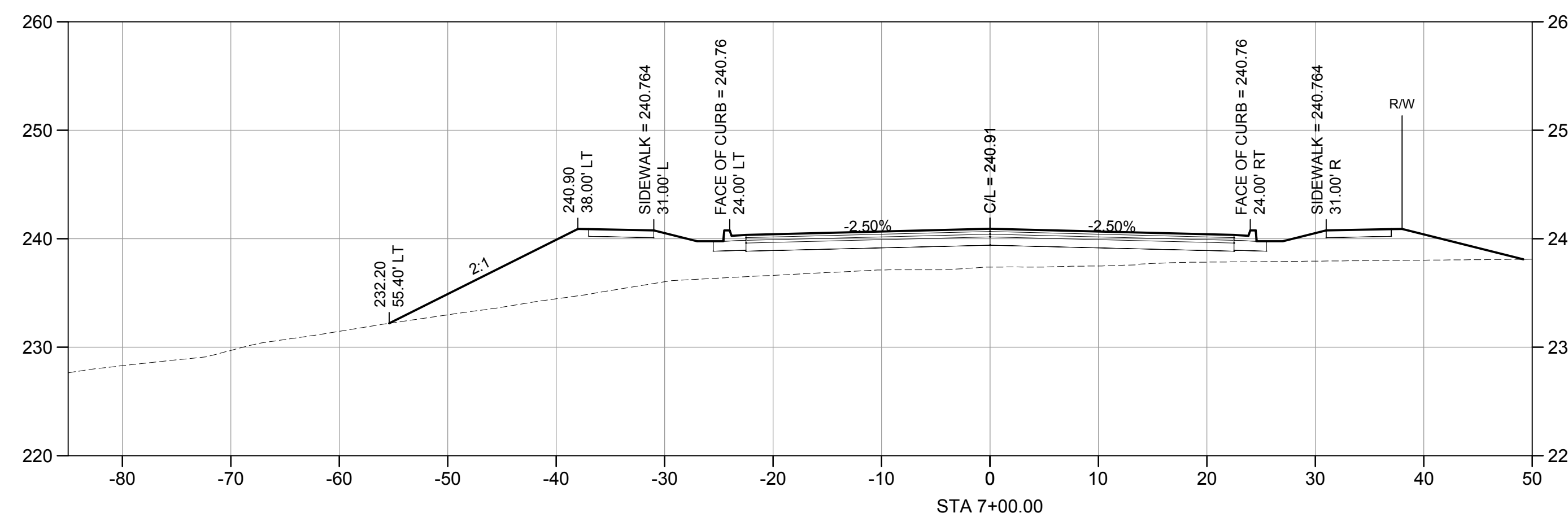
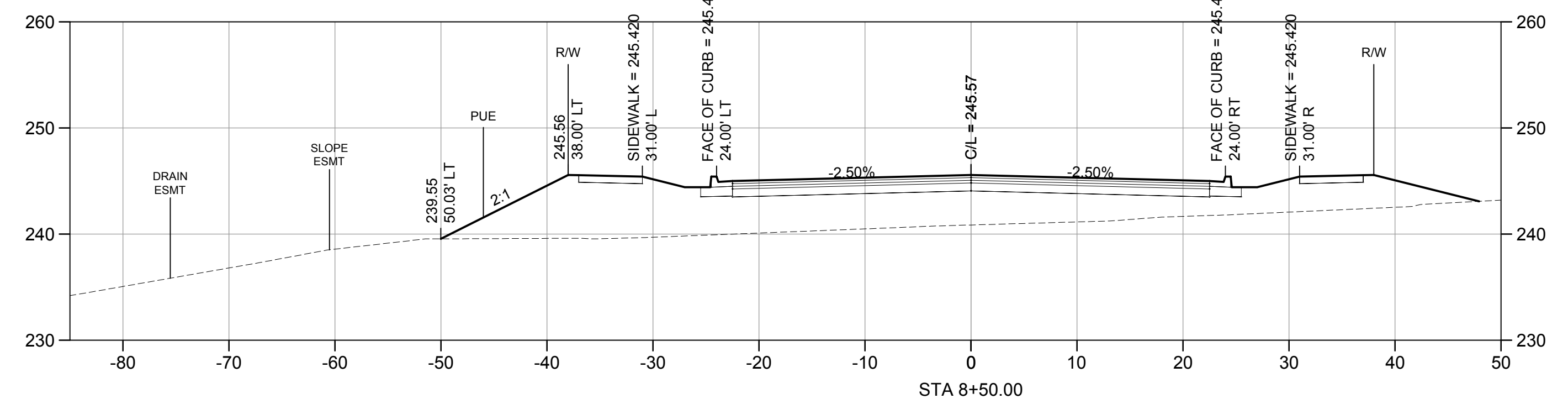
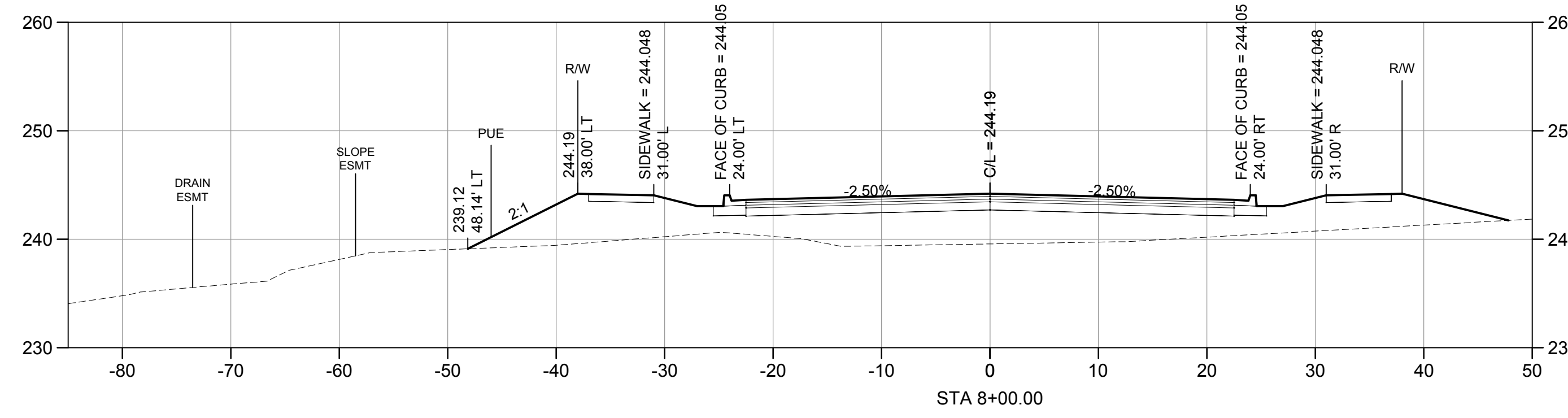
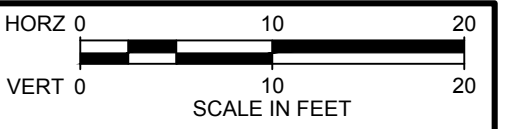


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SITE
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SHEET	
DWG	03-GR-30003
DATE	FEBRUARY 2020
PROJ	WTP_1.0



1 CROSS SECTIONS

60% DESIGN - NOT FOR CONSTRUCTION

BY: CHRIS JAIN PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM DWG FILE: C:\csm\chris.jain@murraysmith.us\d024278\WTP1-03-GR-3001.dwg

DSGN	C JAIN				
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APVD	NA	NO.	DATE	REVISION	BY

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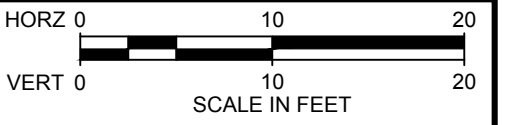
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SITE GRADING
 SW BLAKE STREET SECTIONS 1

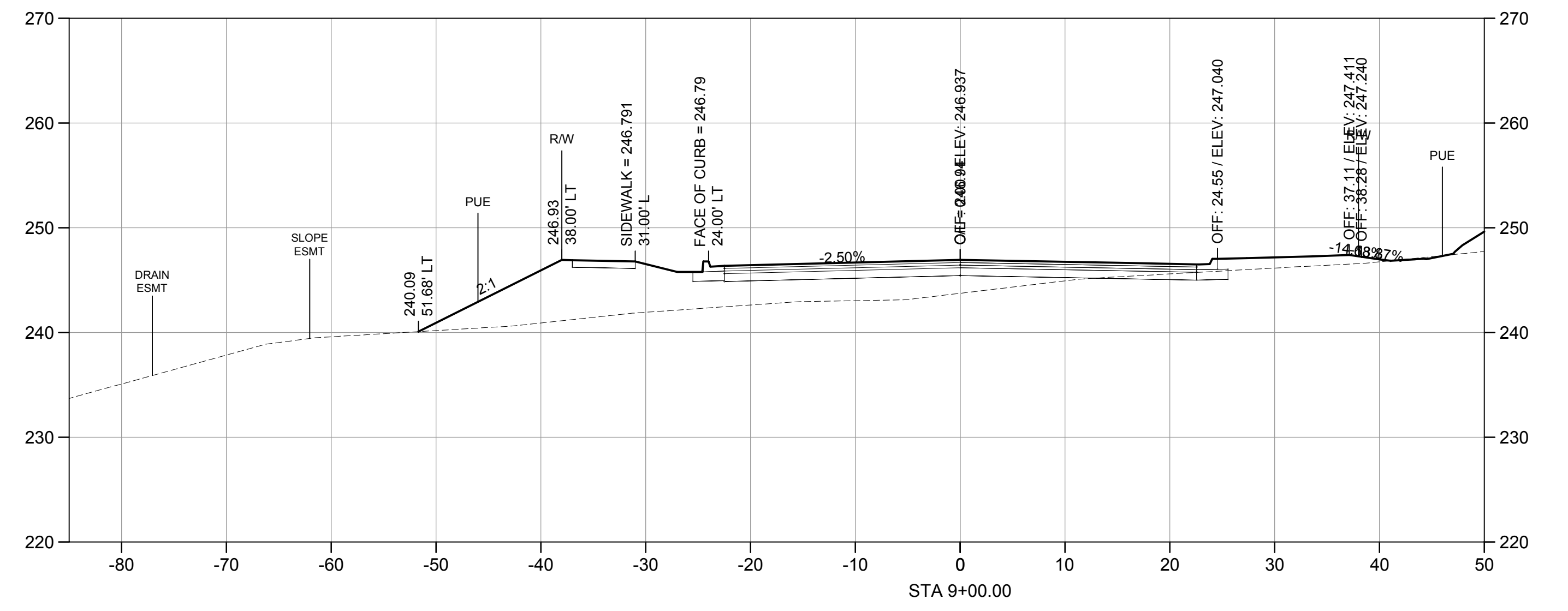
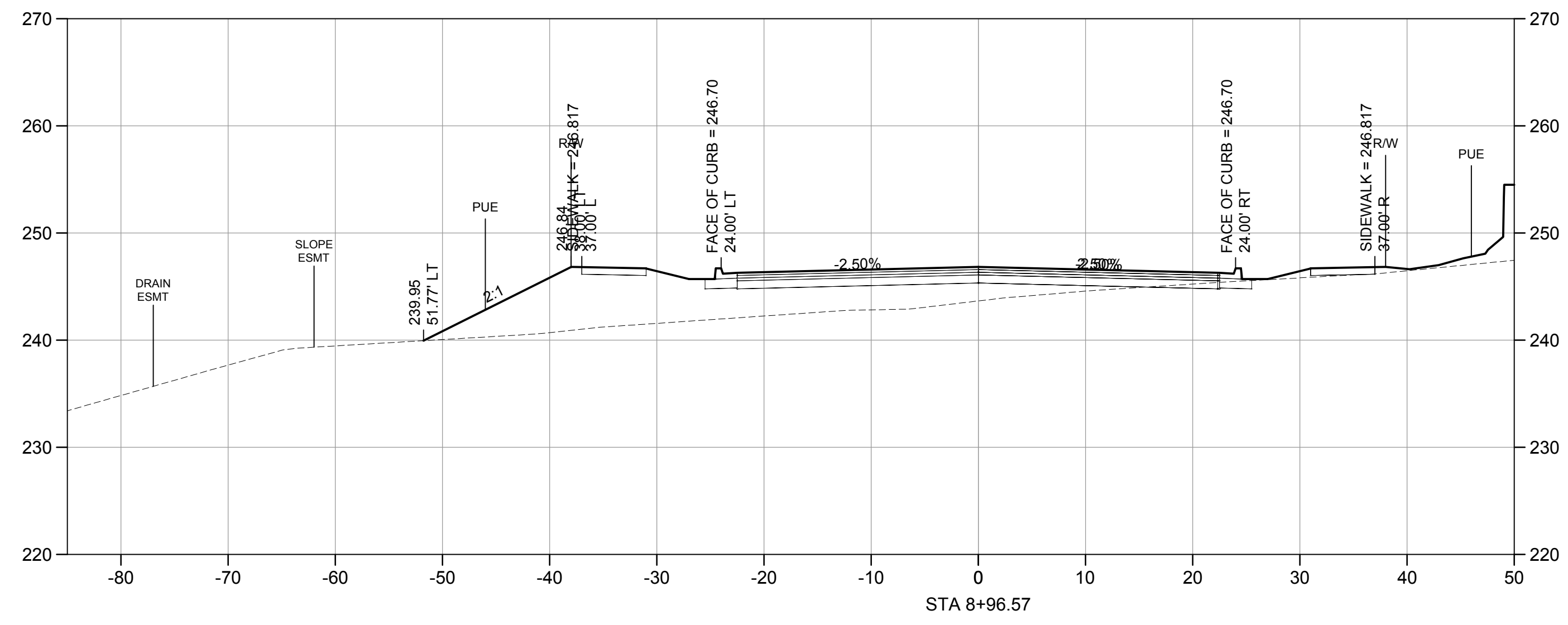
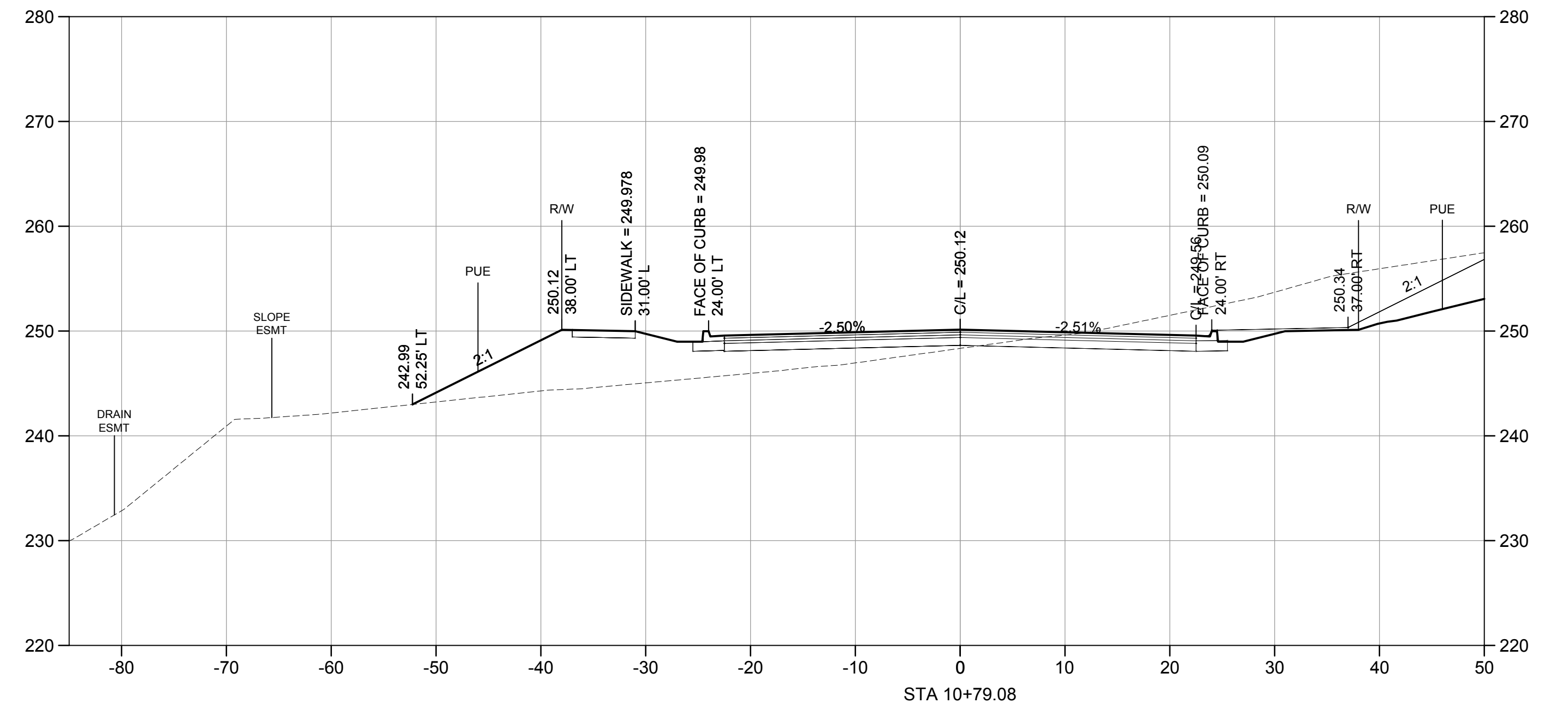
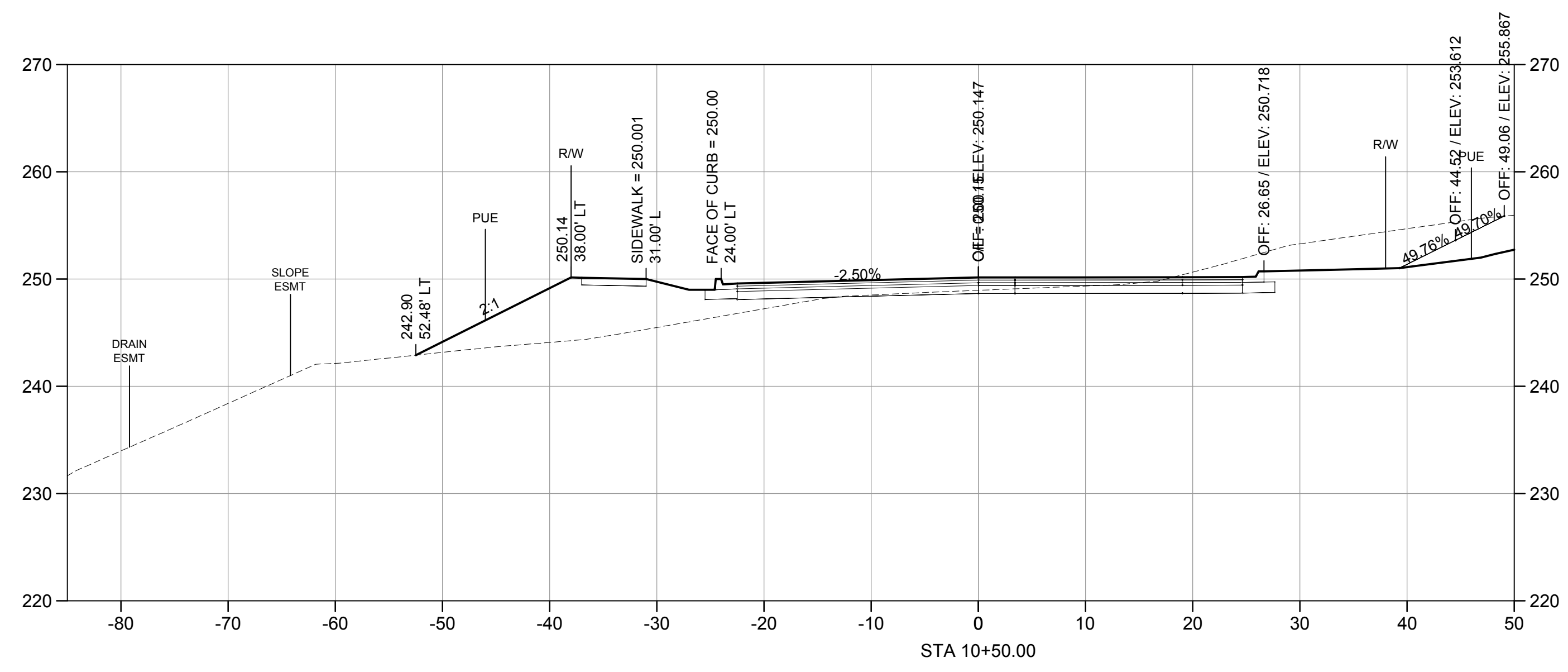
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DATE	FEBRUARY 2020
PROJ	WTP_1.0



BY: CHRIS JAIN

PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM

DWG FILE: C:\csm\chris.jain@murraysmith.us\d024278\WTP1-03-GR-3001.dwg



1 CROSS SECTIONS

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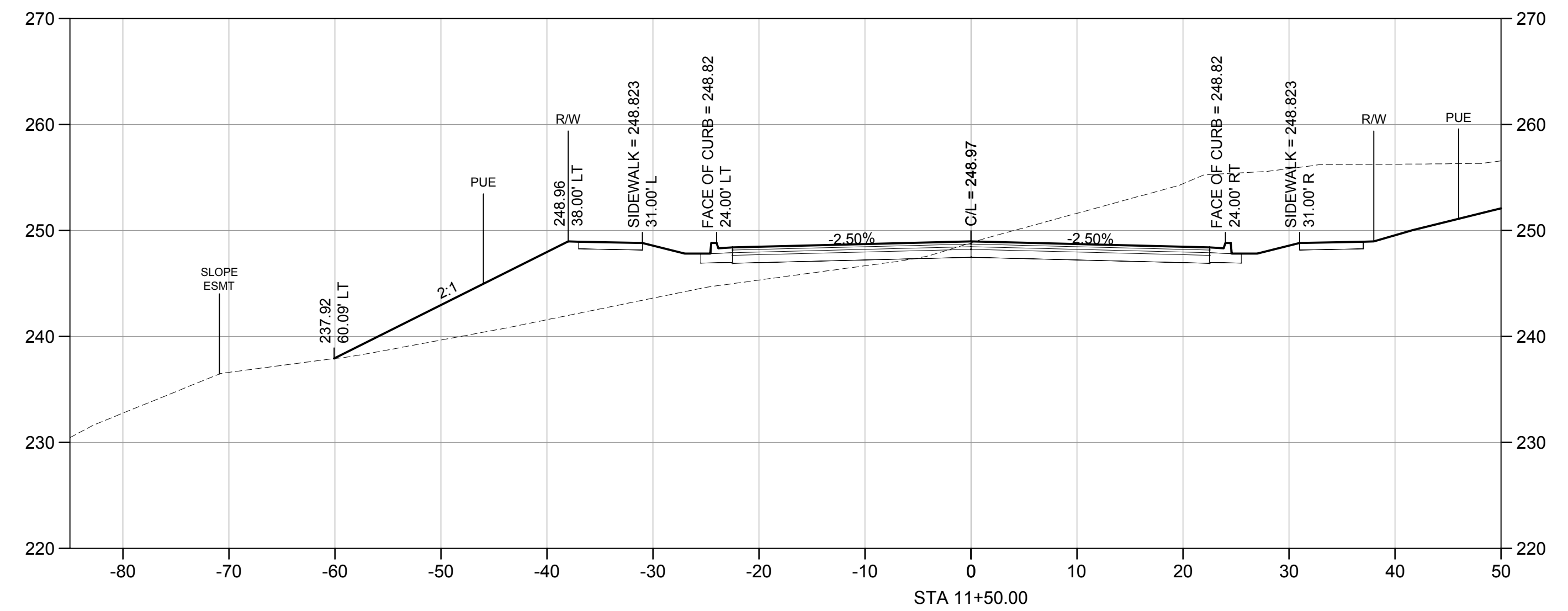
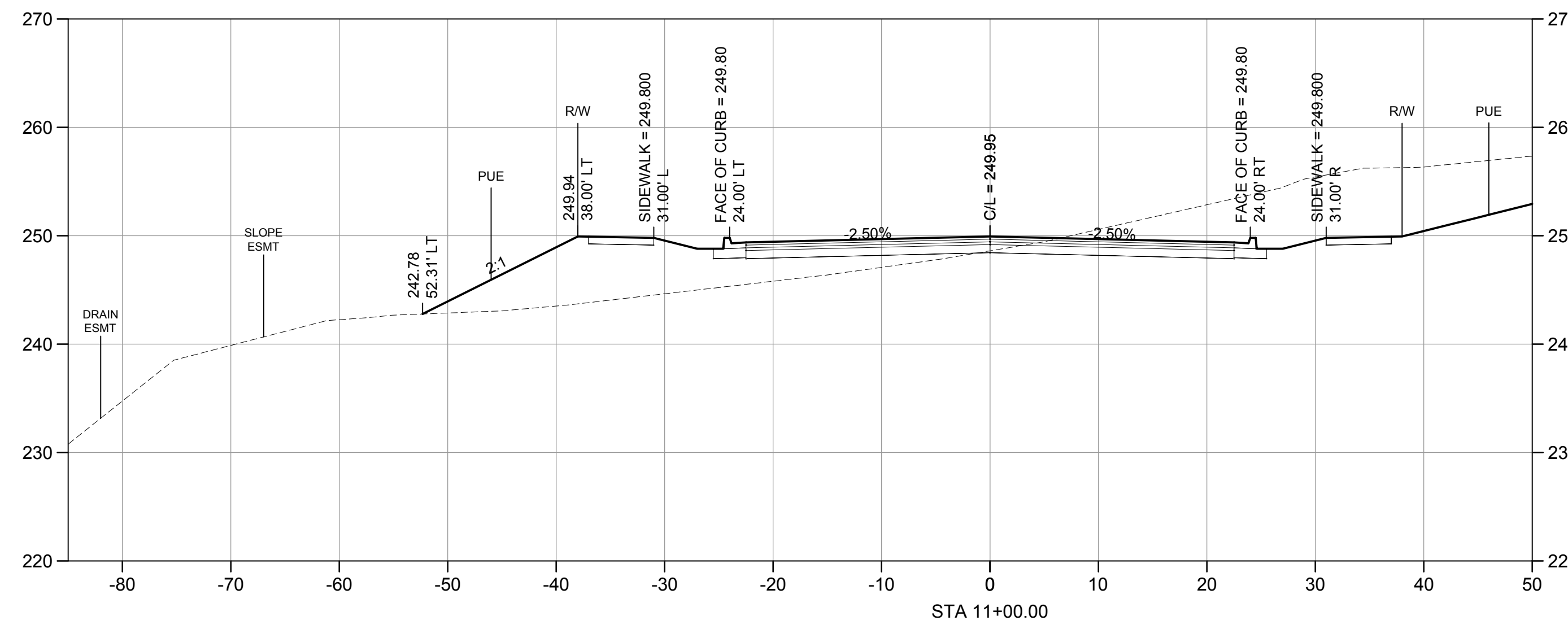
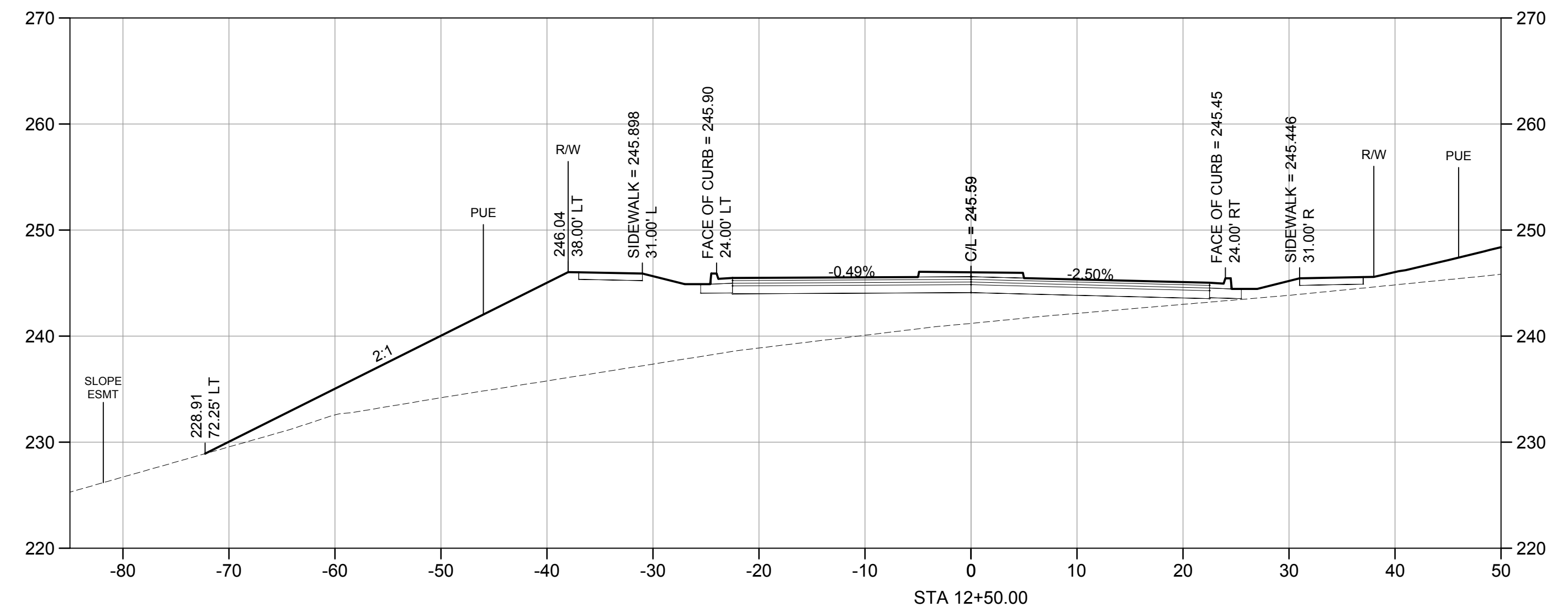
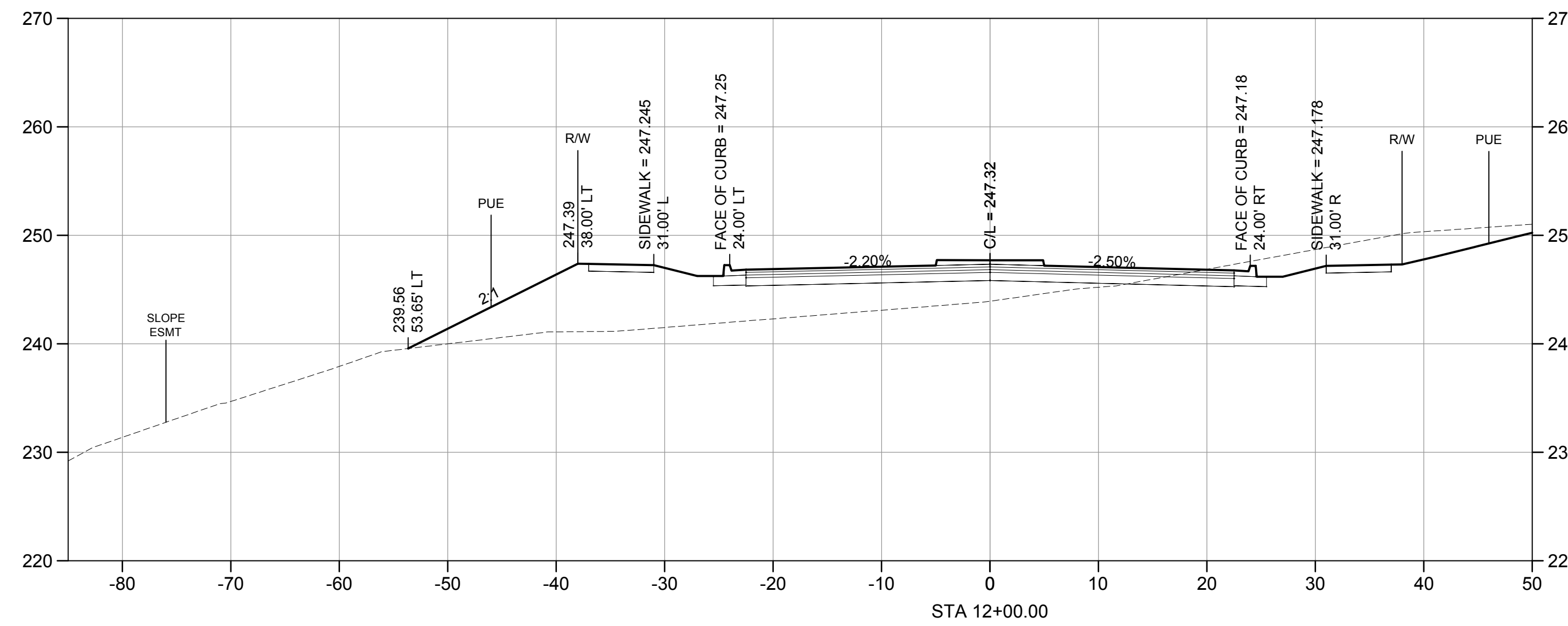
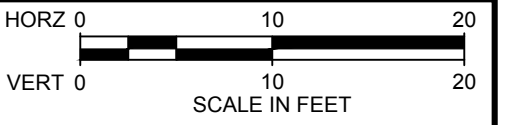


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SITE GRADING
 SW BLAKE STREET SECTIONS 2

SHEET	DWG 03-GR-30012
DATE	FEBRUARY 2020
PROJ	WTP_1.0



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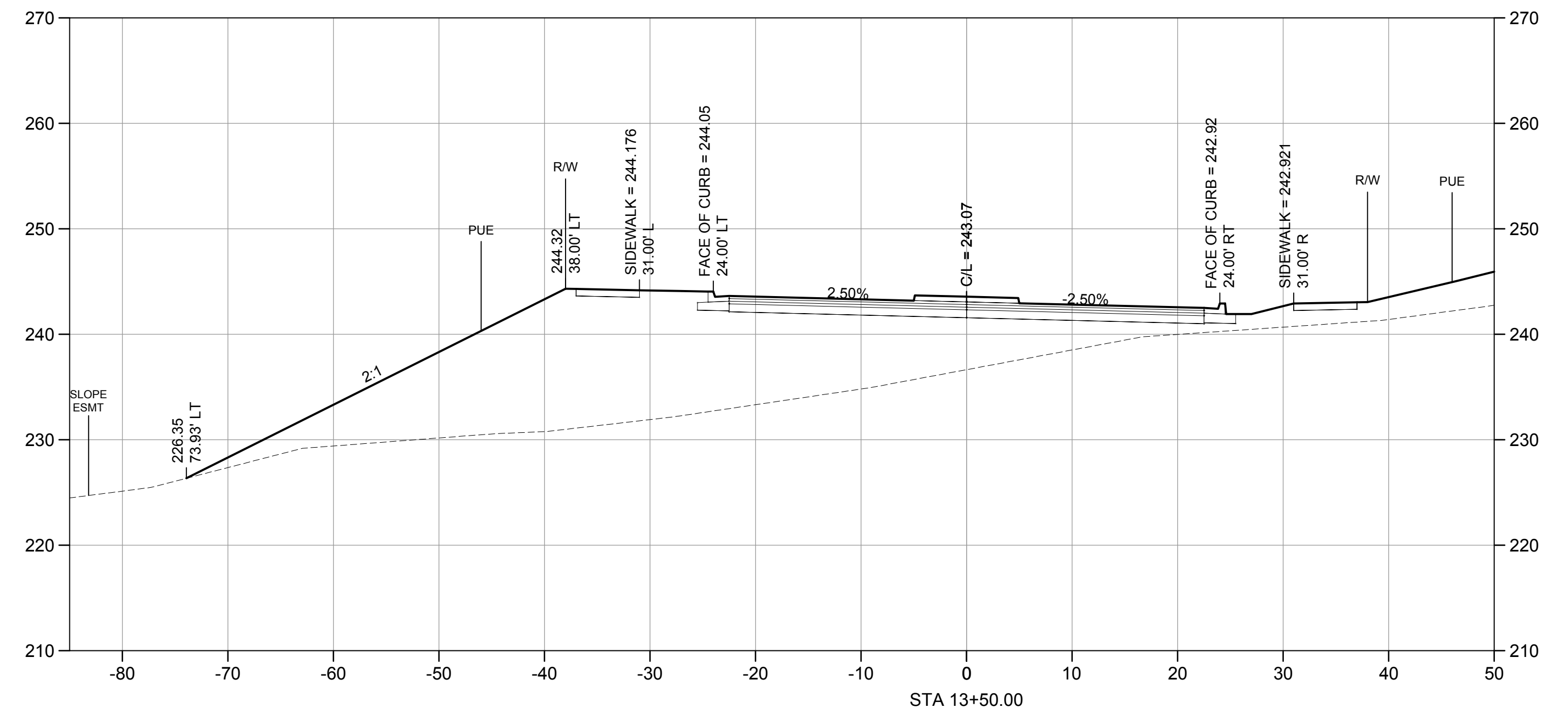
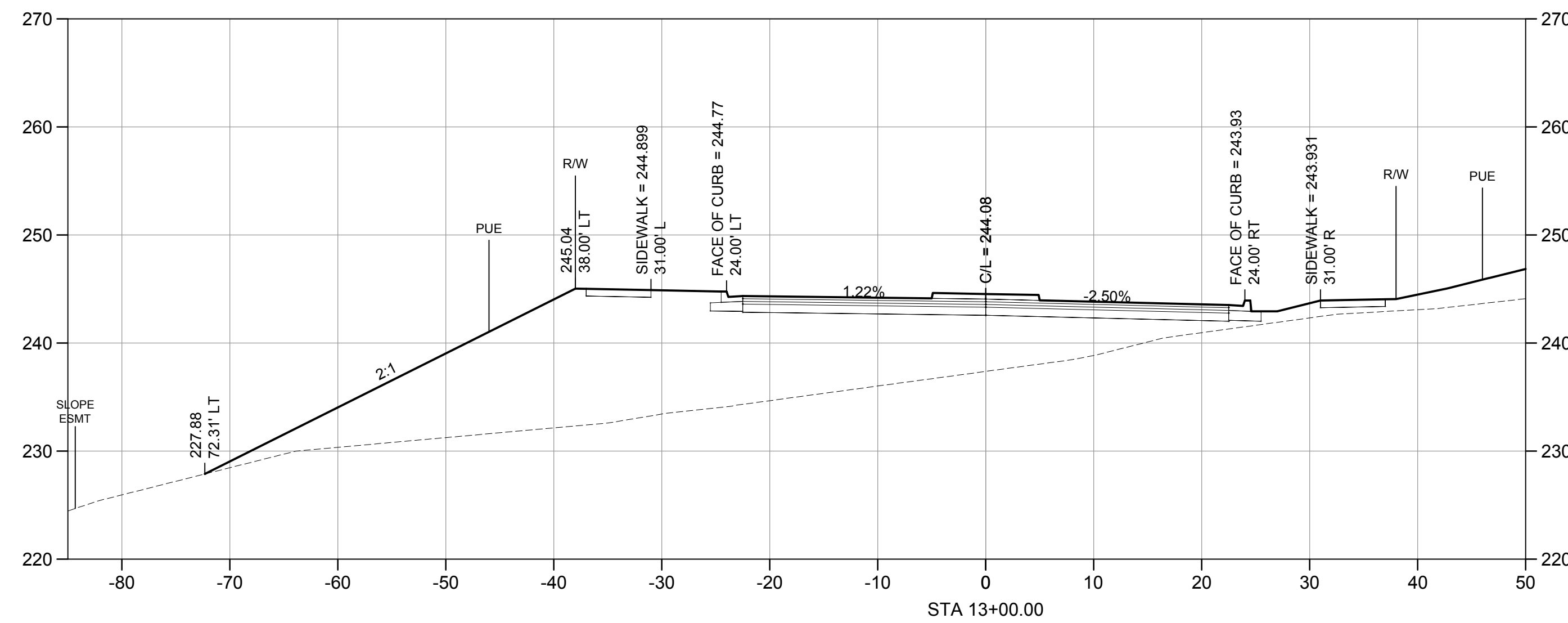
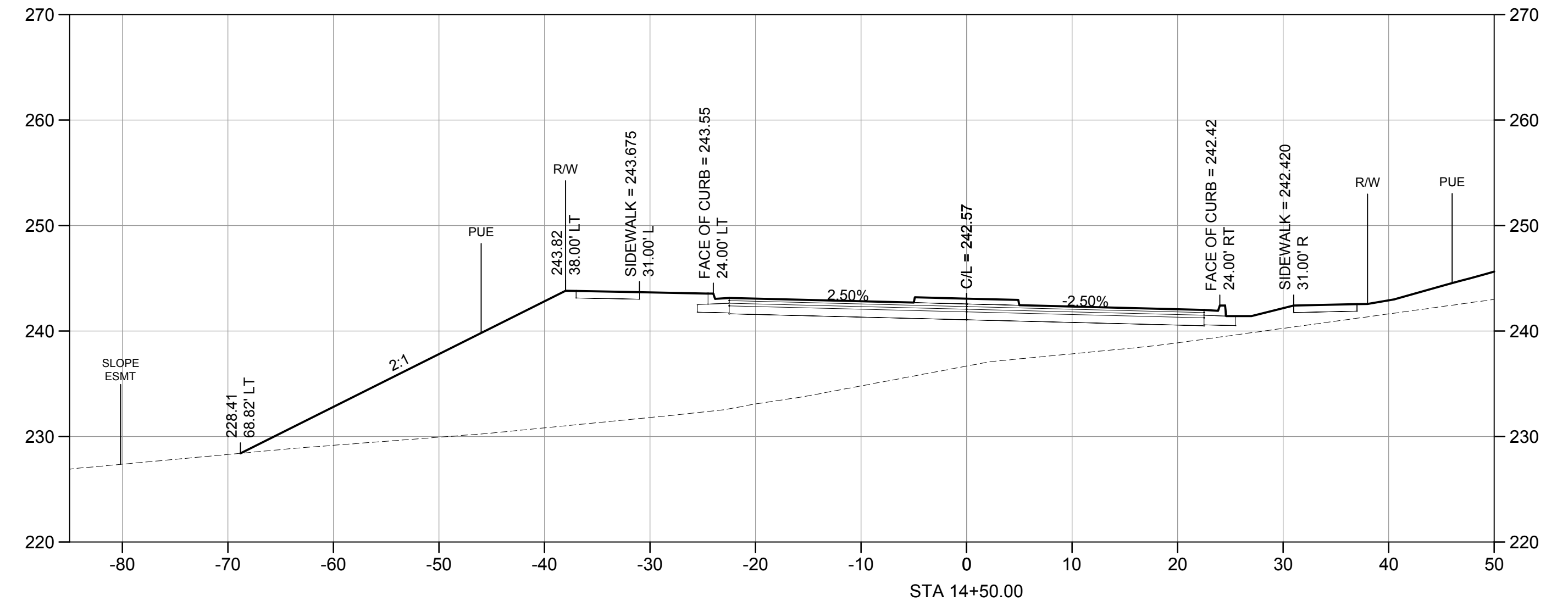
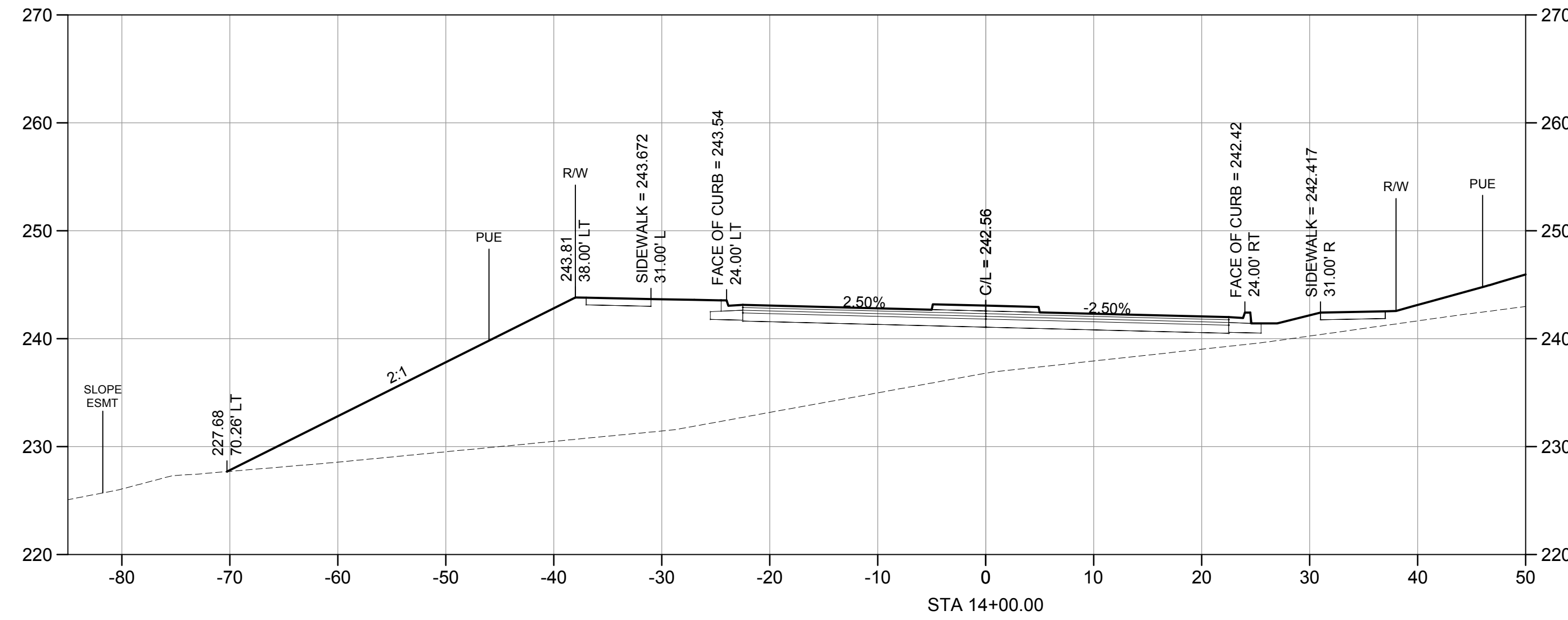
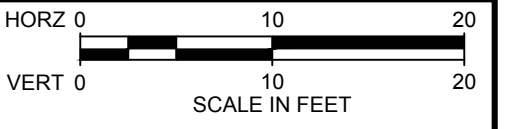
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SITE
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 SW BLAKE STREET SECTIONS 3

SHEET	DWG 03-GR-30013
DATE	FEBRUARY 2020
PROJ	WTP_1.0

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CHK	NA				
APVD	NA				
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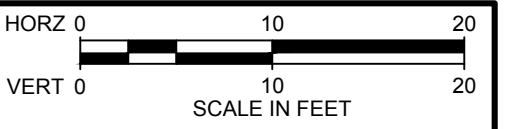


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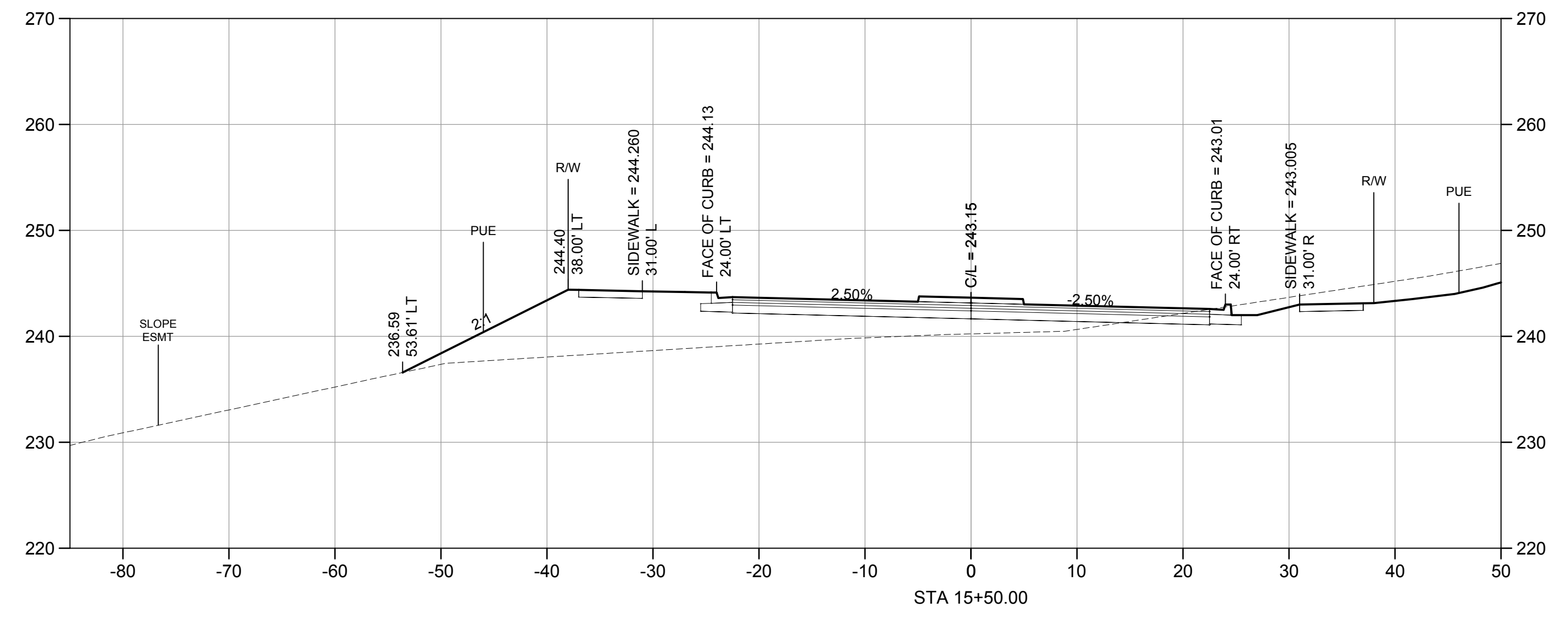
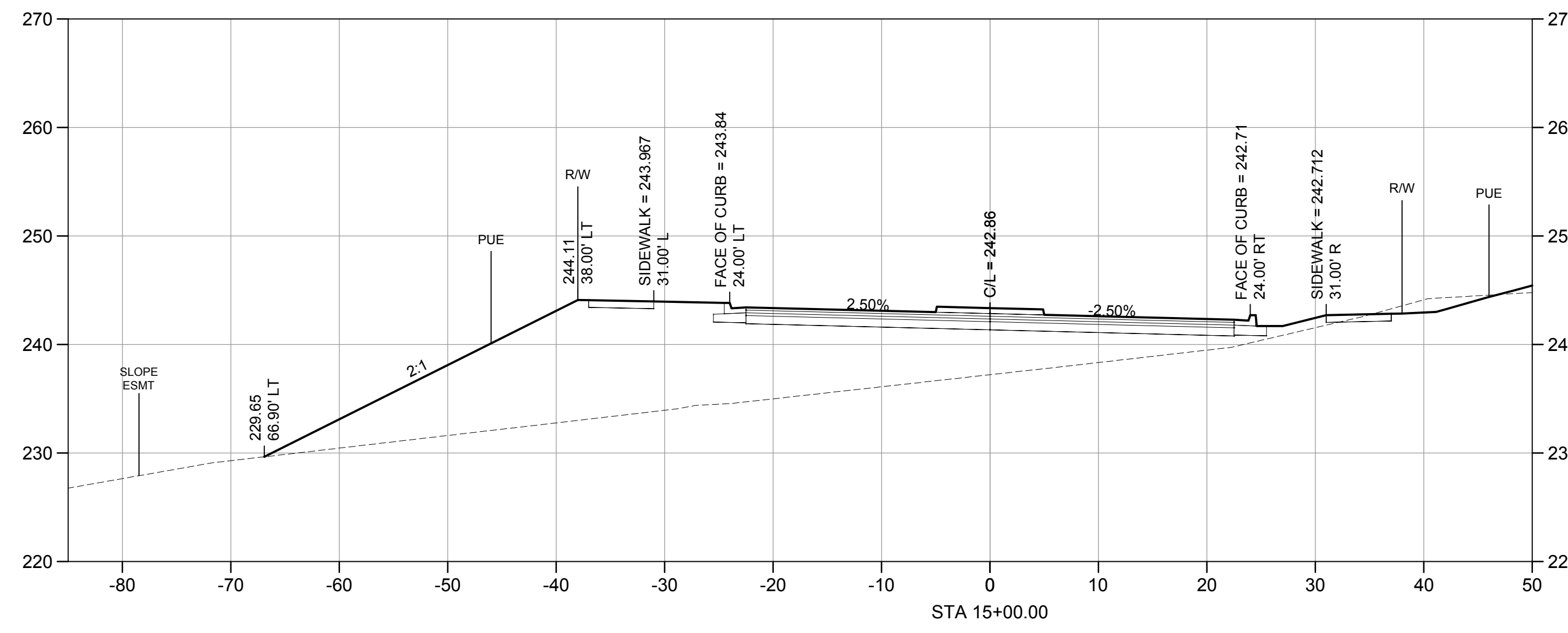
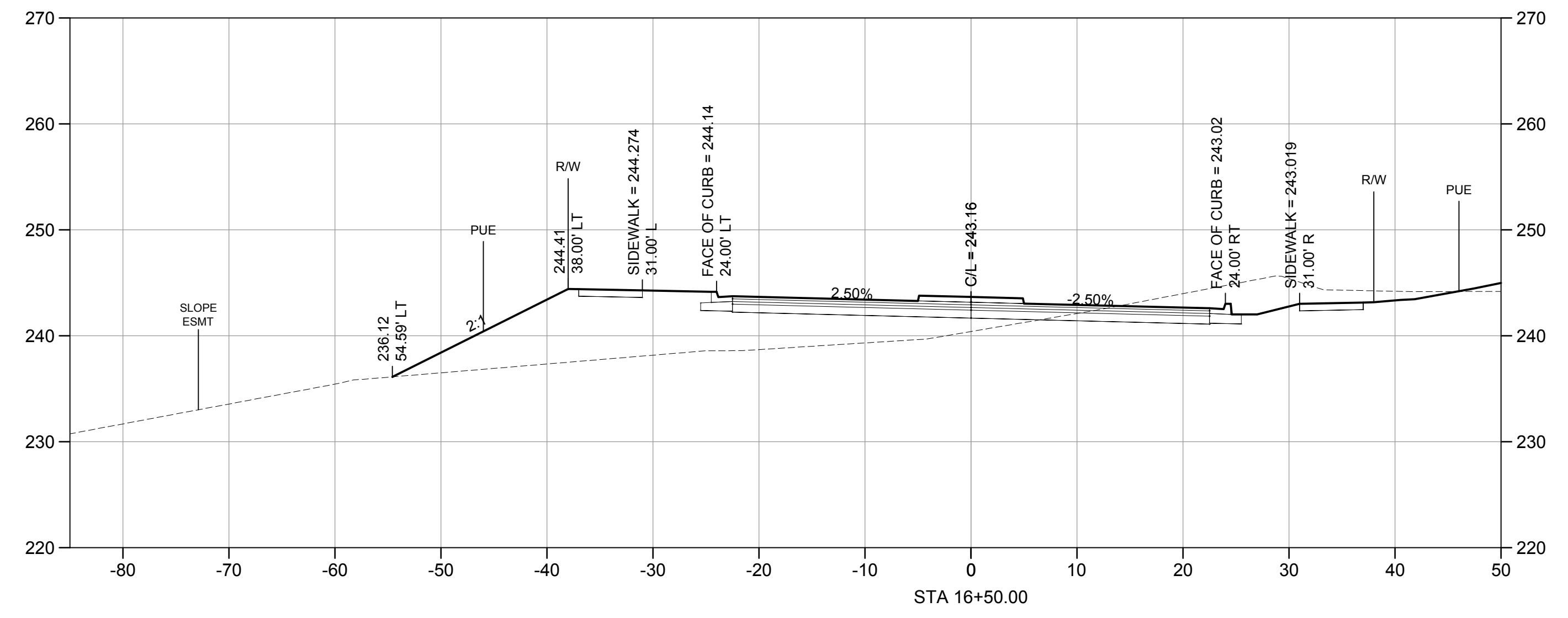
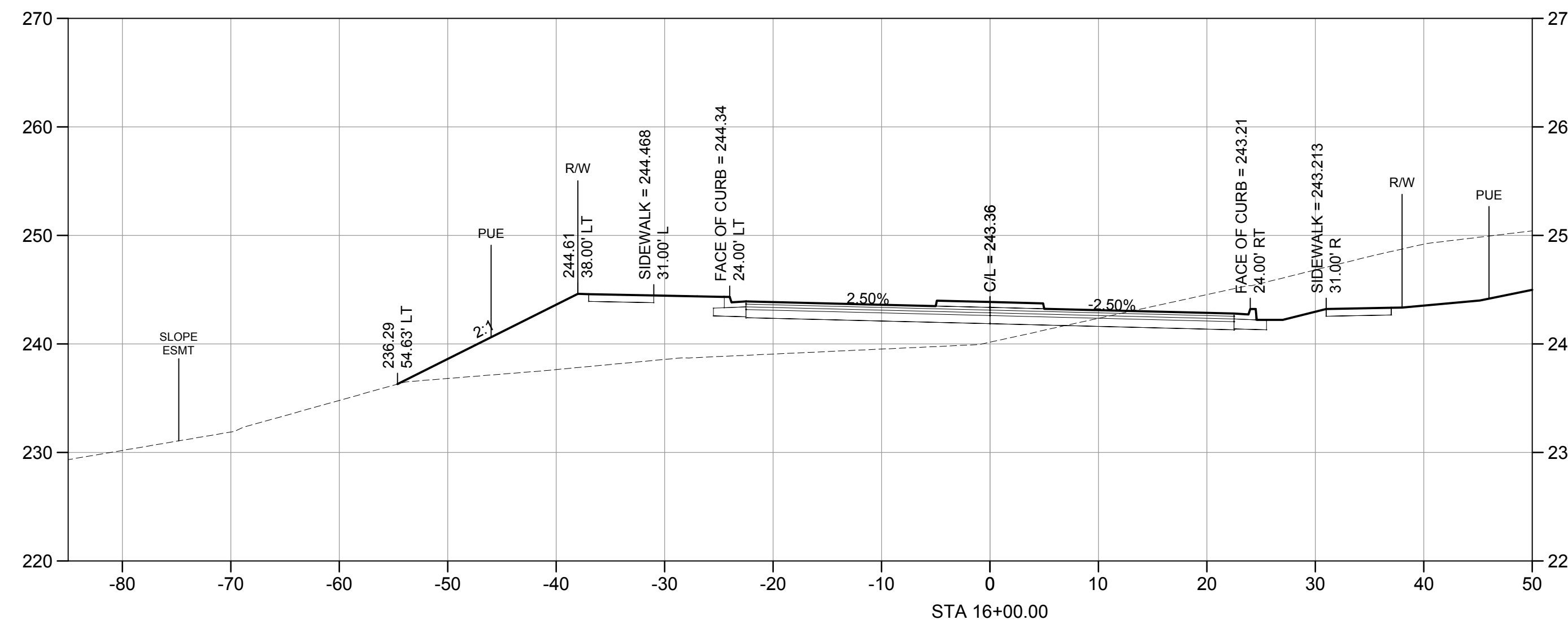
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SITE
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DWG	03-GR-30014
DATE	FEBRUARY 2020
PROJ	WTP_1.0



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APVD	NA				
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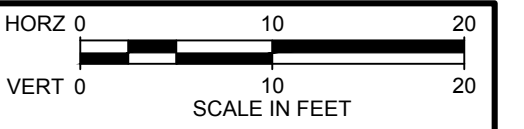


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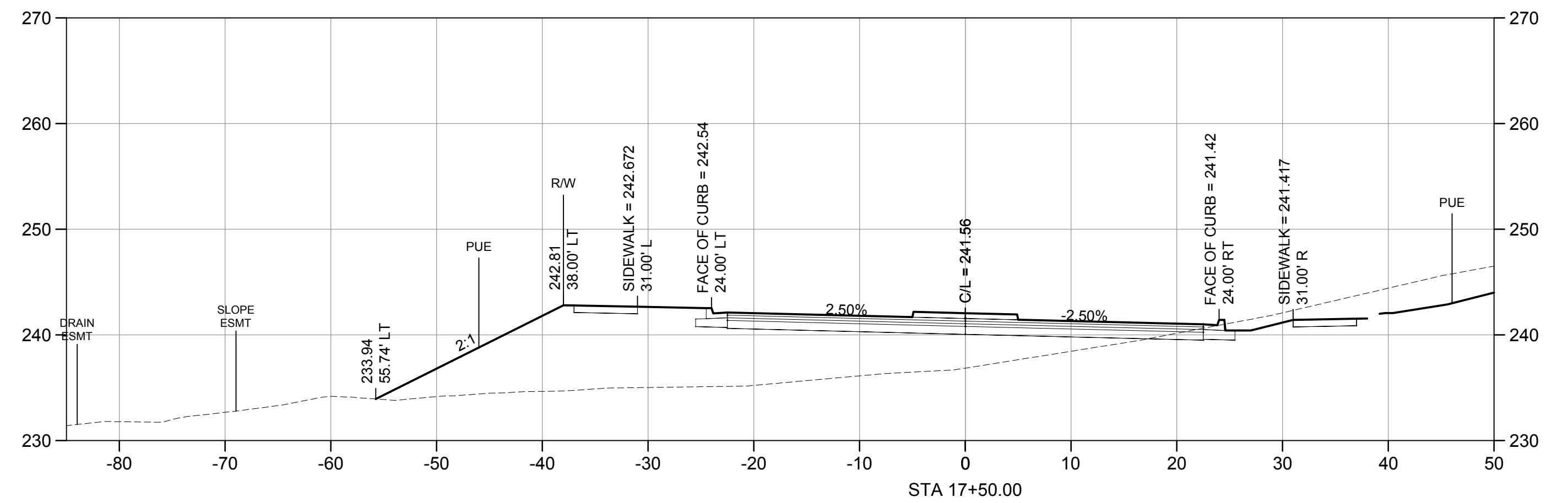
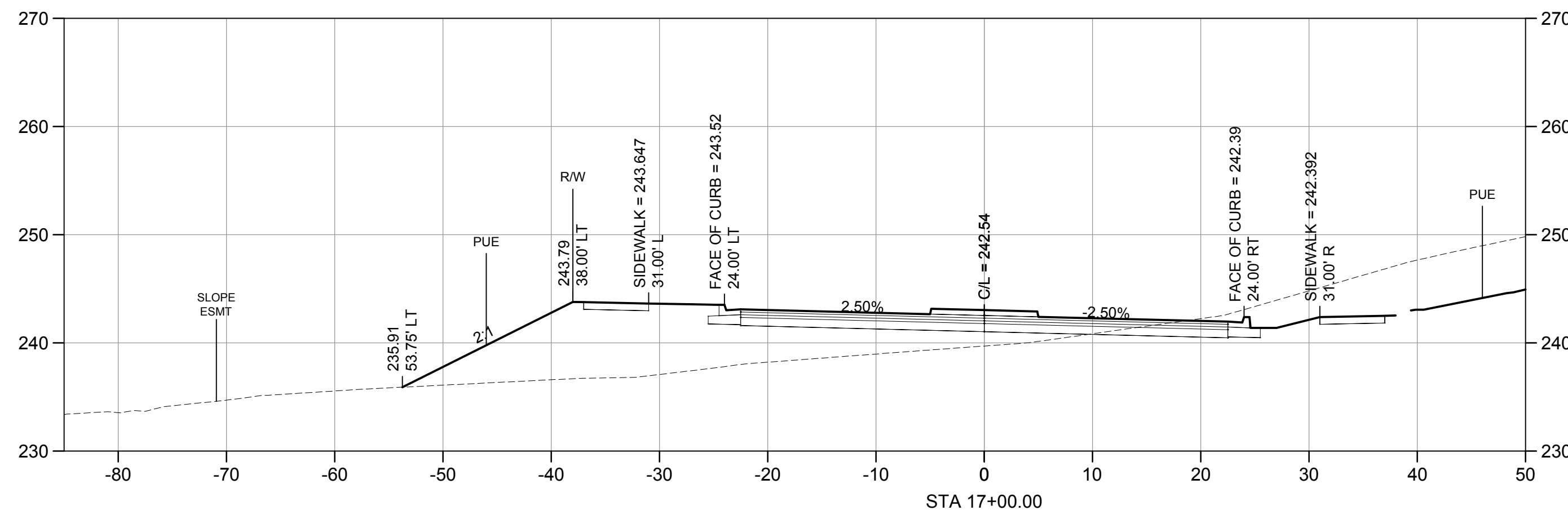
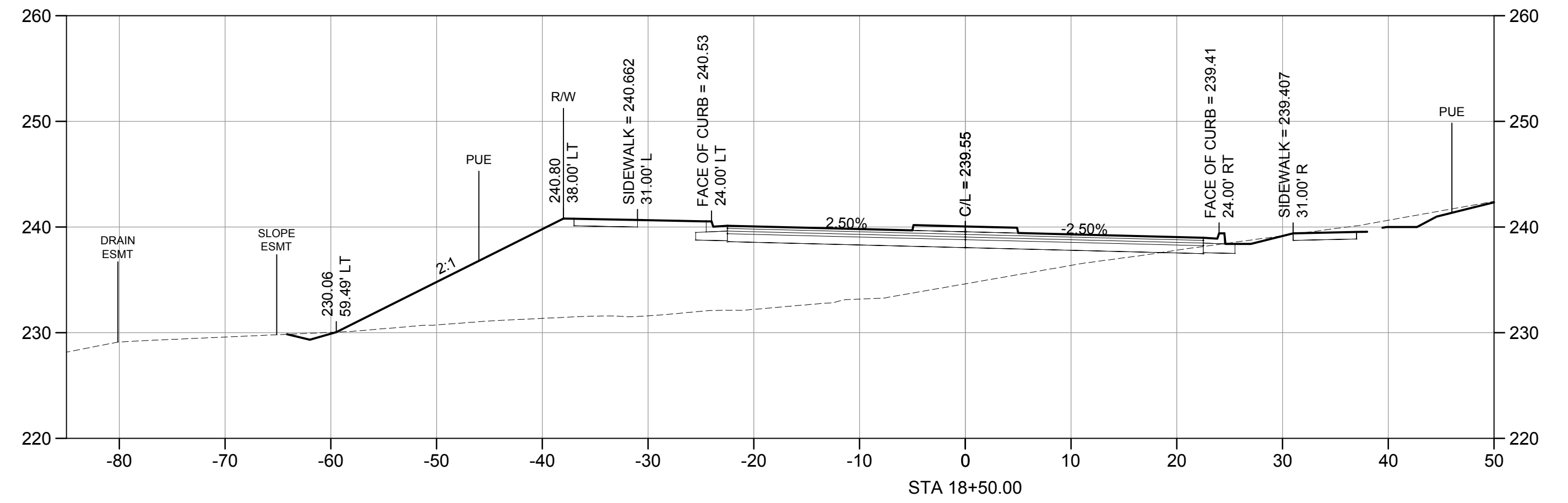
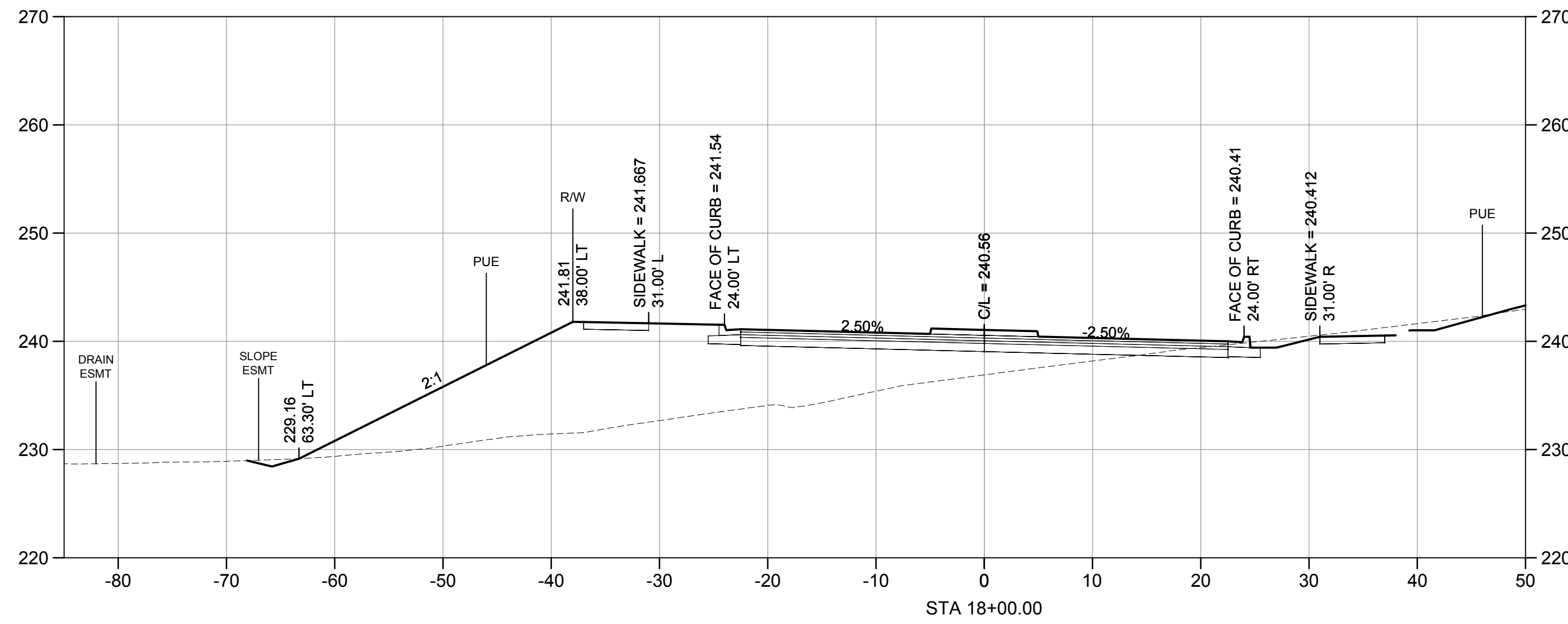
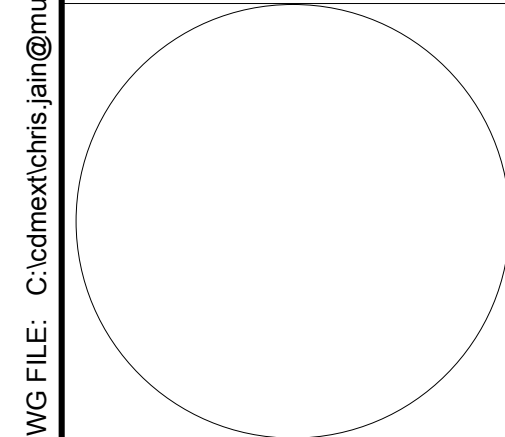
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DATE	FEBRUARY 2020
PROJ	WTP_1.0



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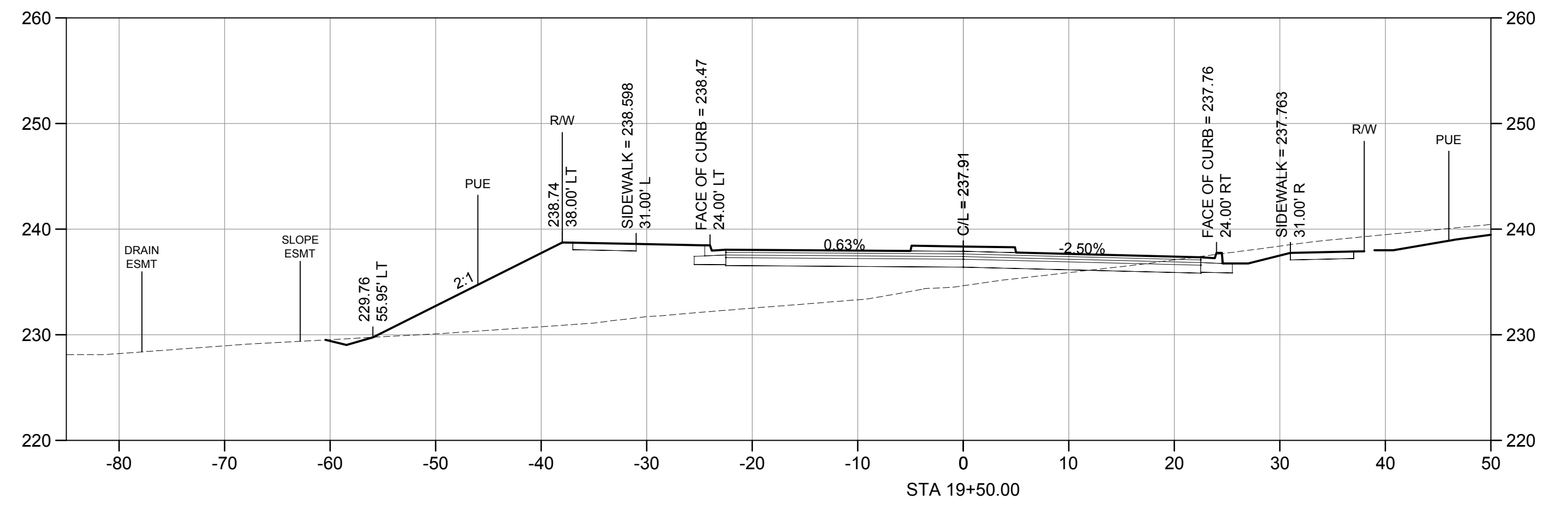
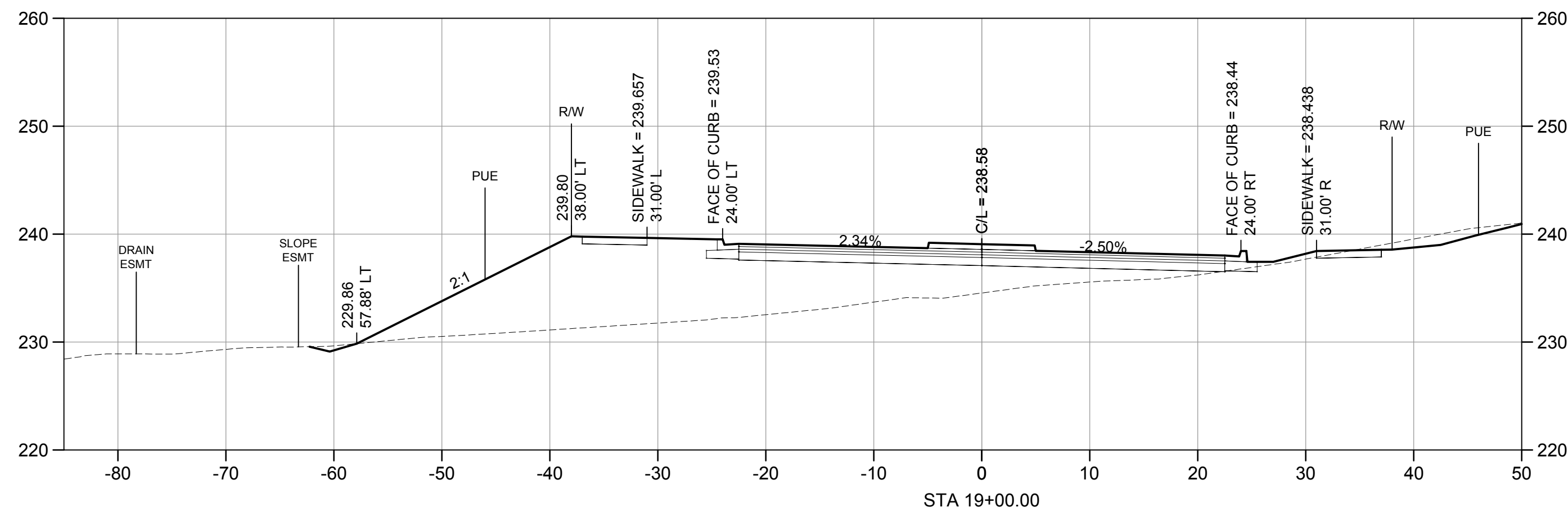
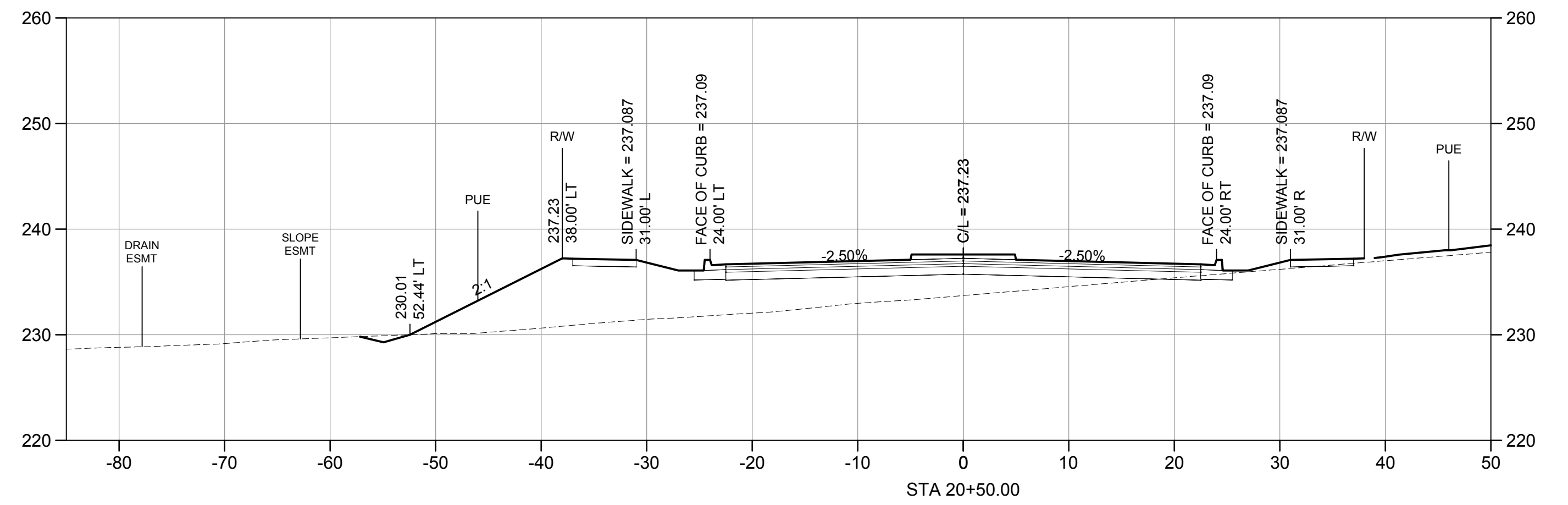
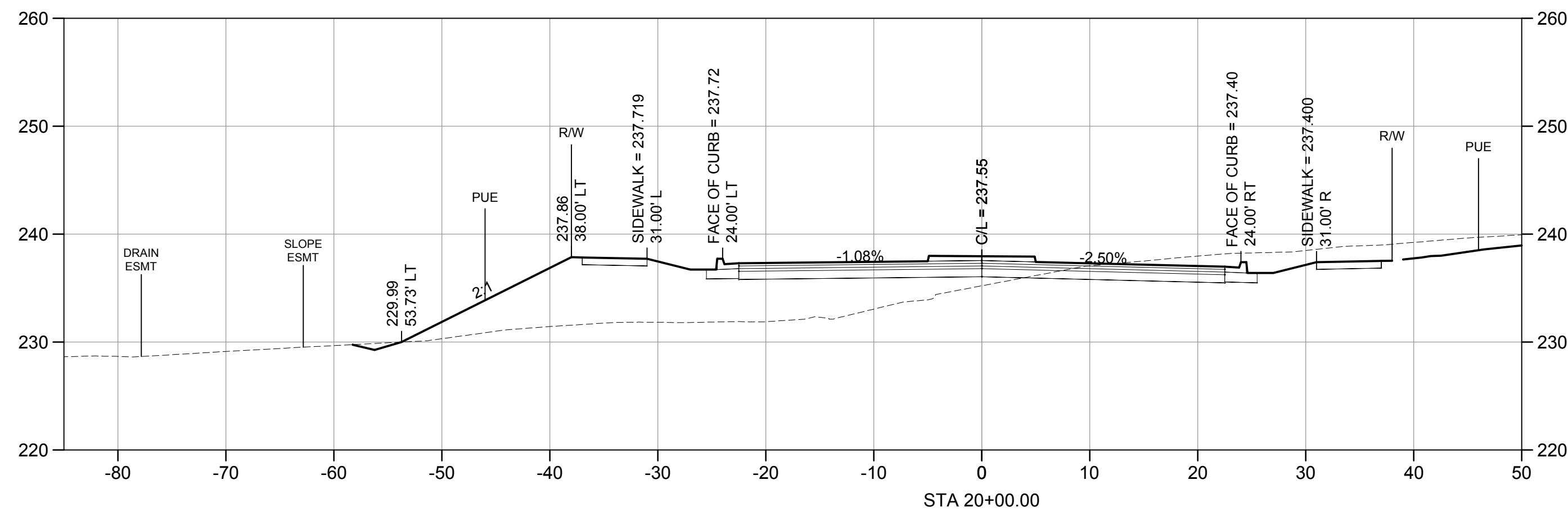
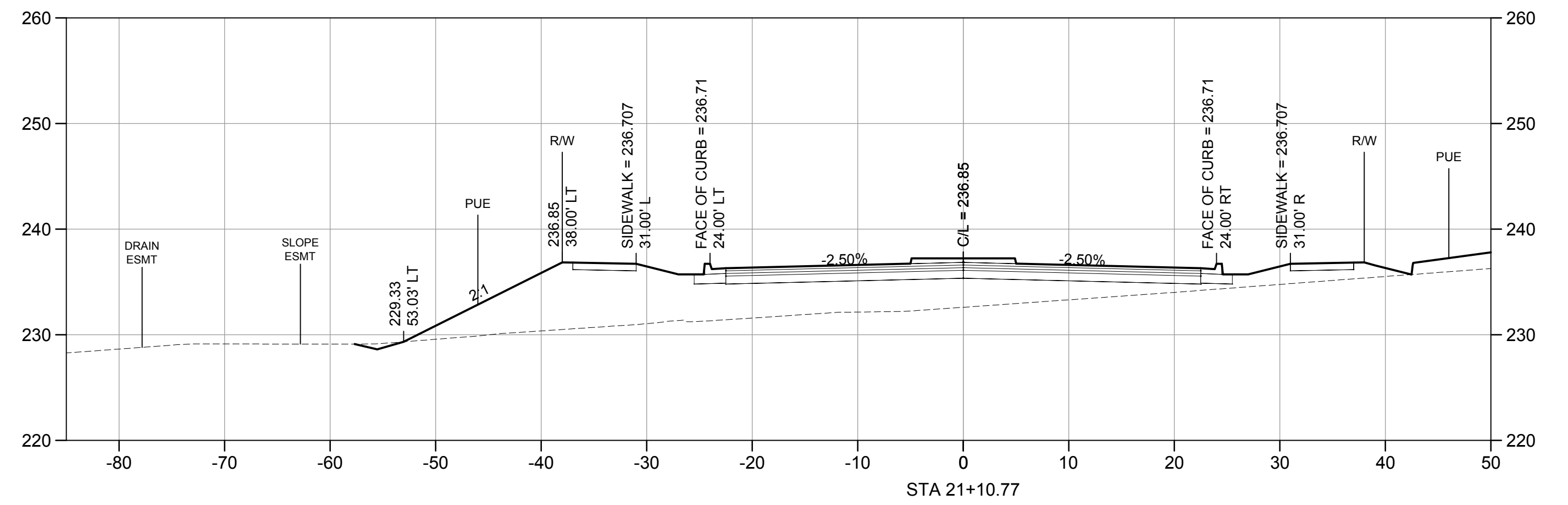
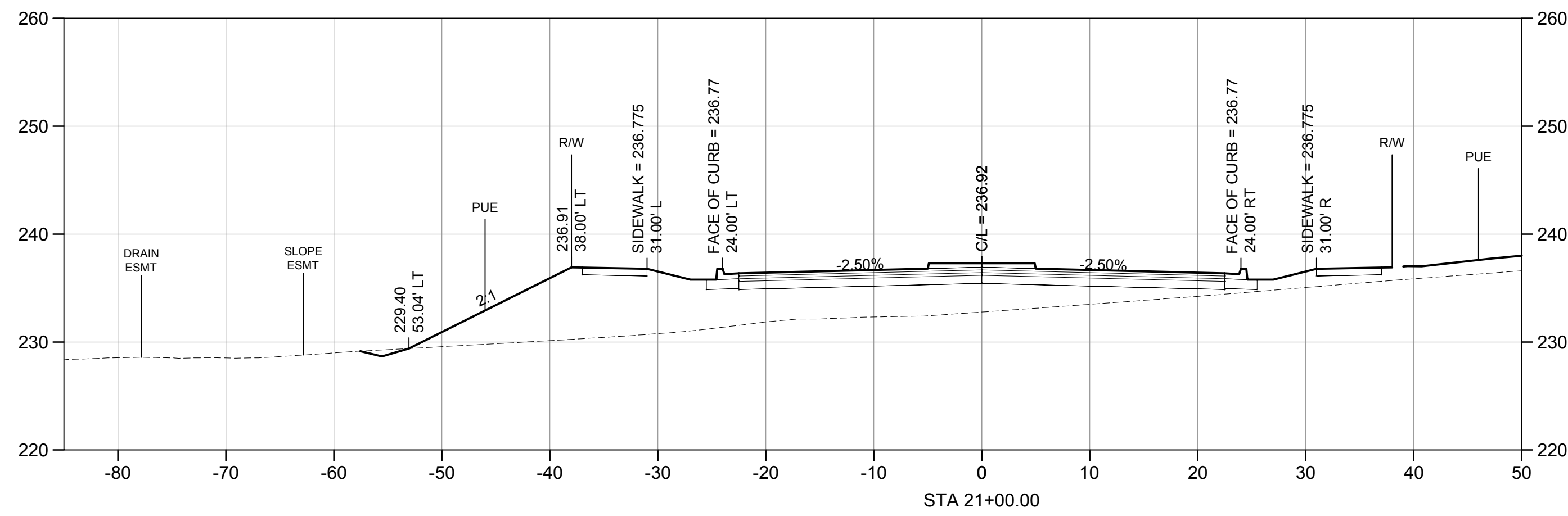
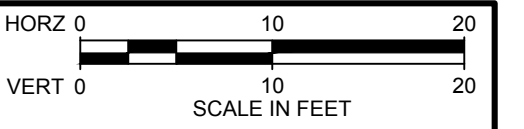


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SHEET	DWG 03-GR-30016
DATE	FEBRUARY 2020
PROJ	WTP_1.0



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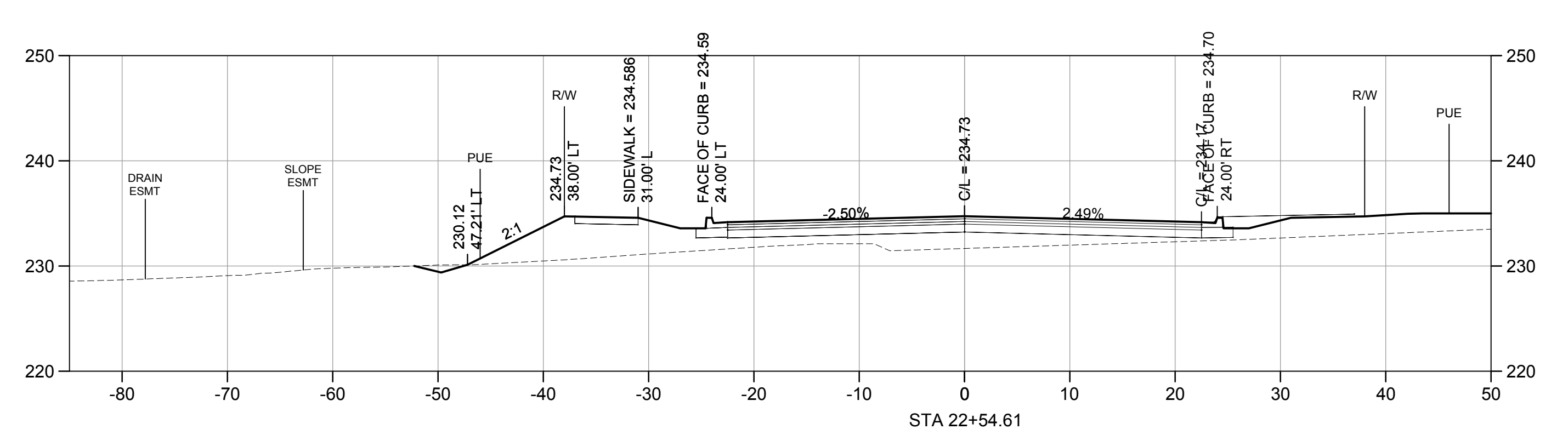
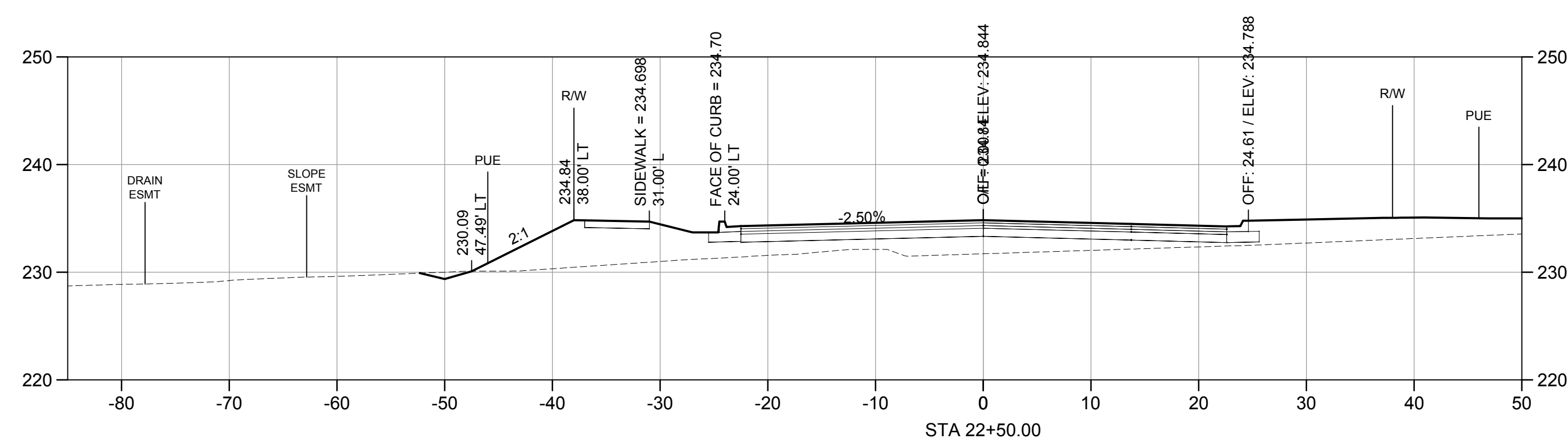
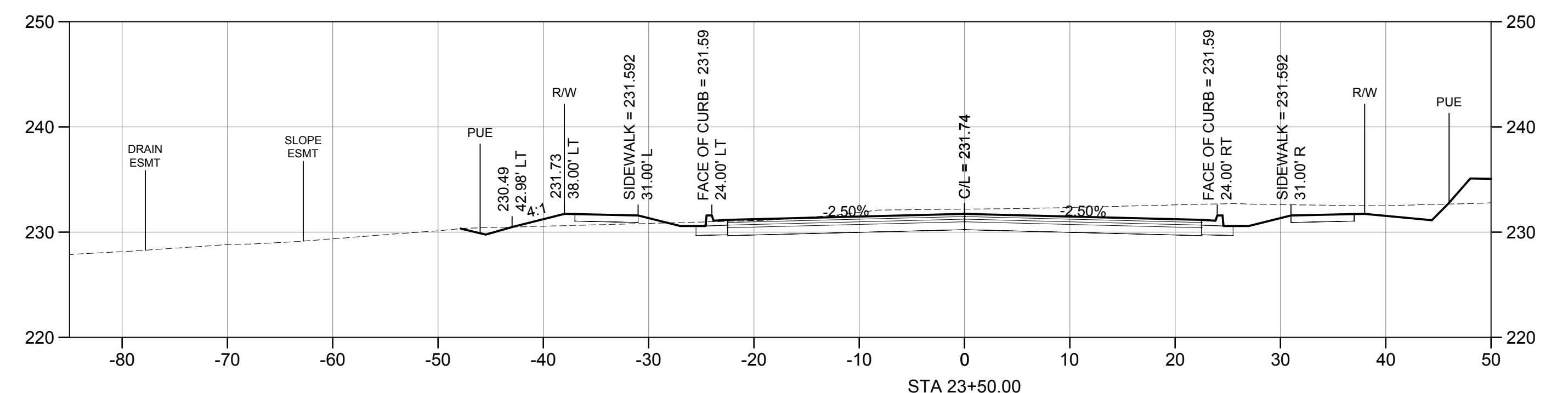
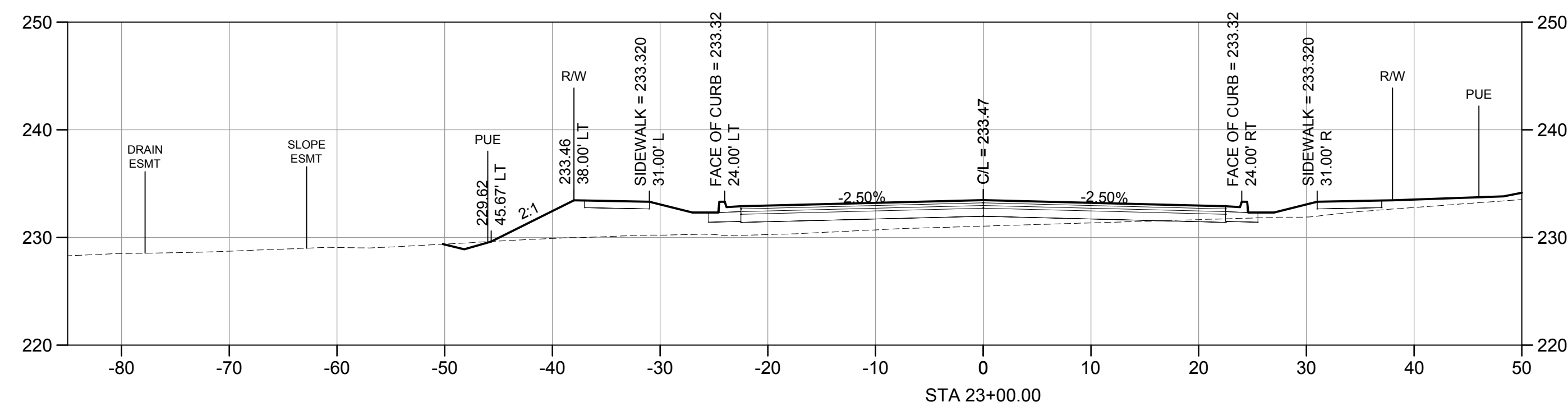
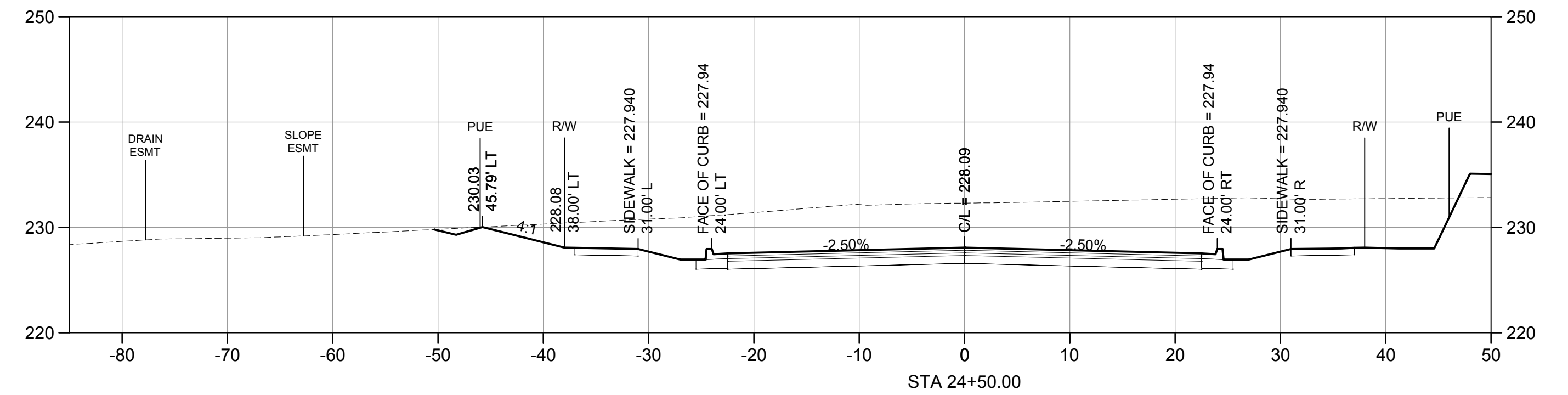
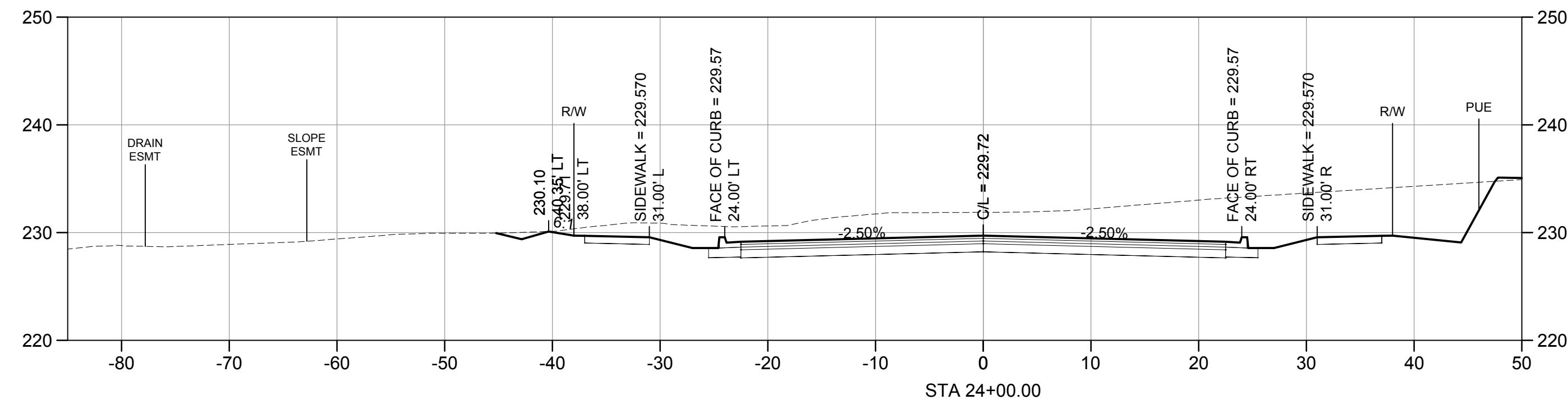
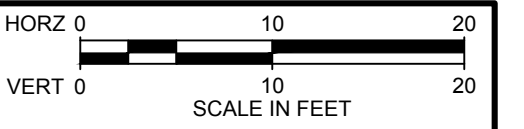


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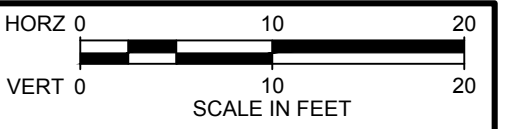
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DATE	FEBRUARY 2020
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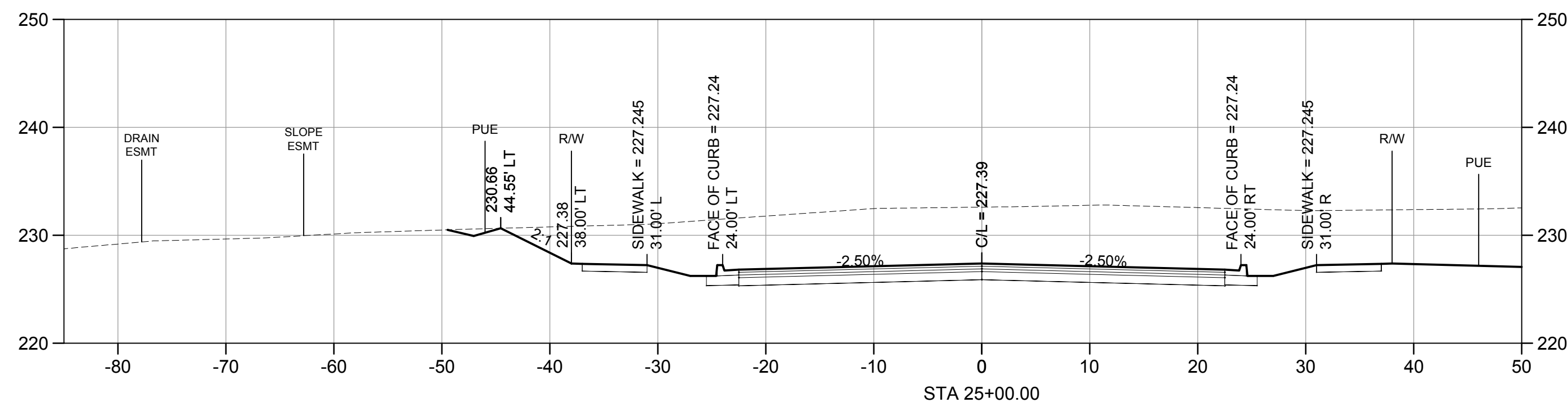
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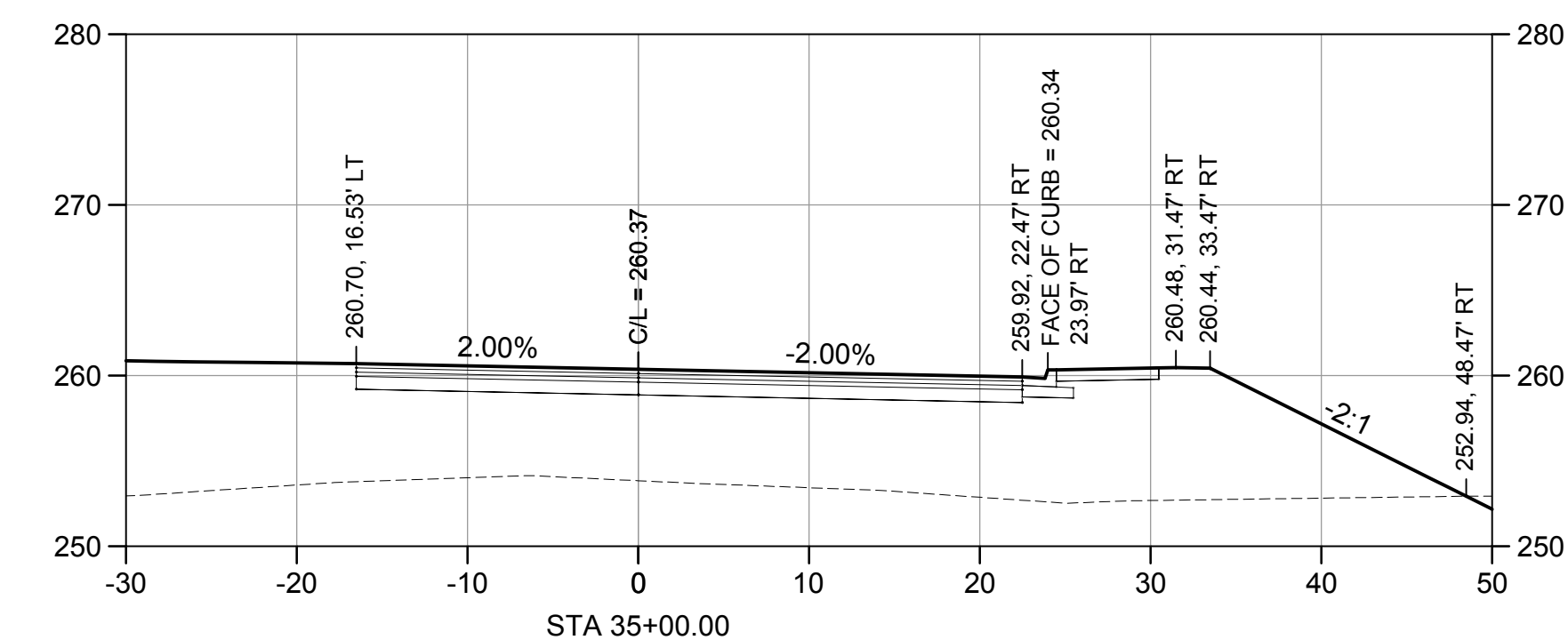
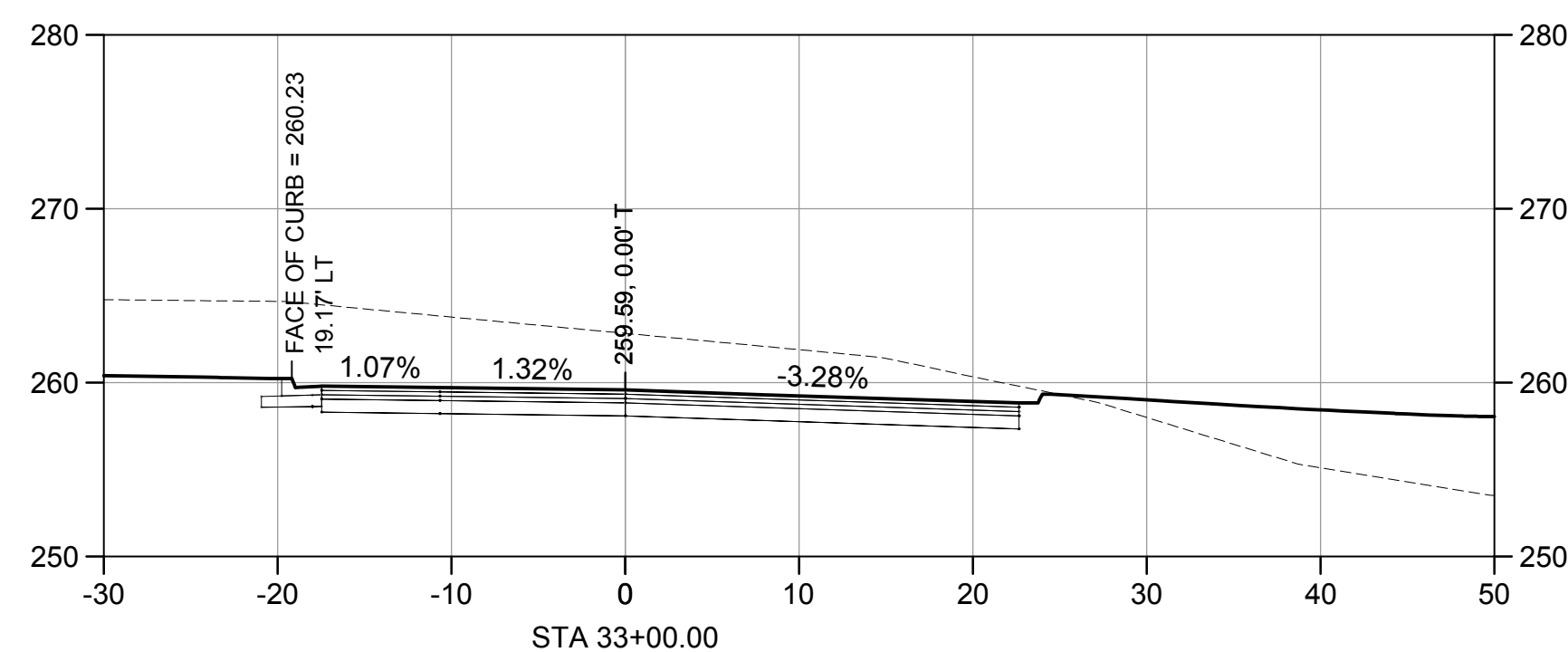
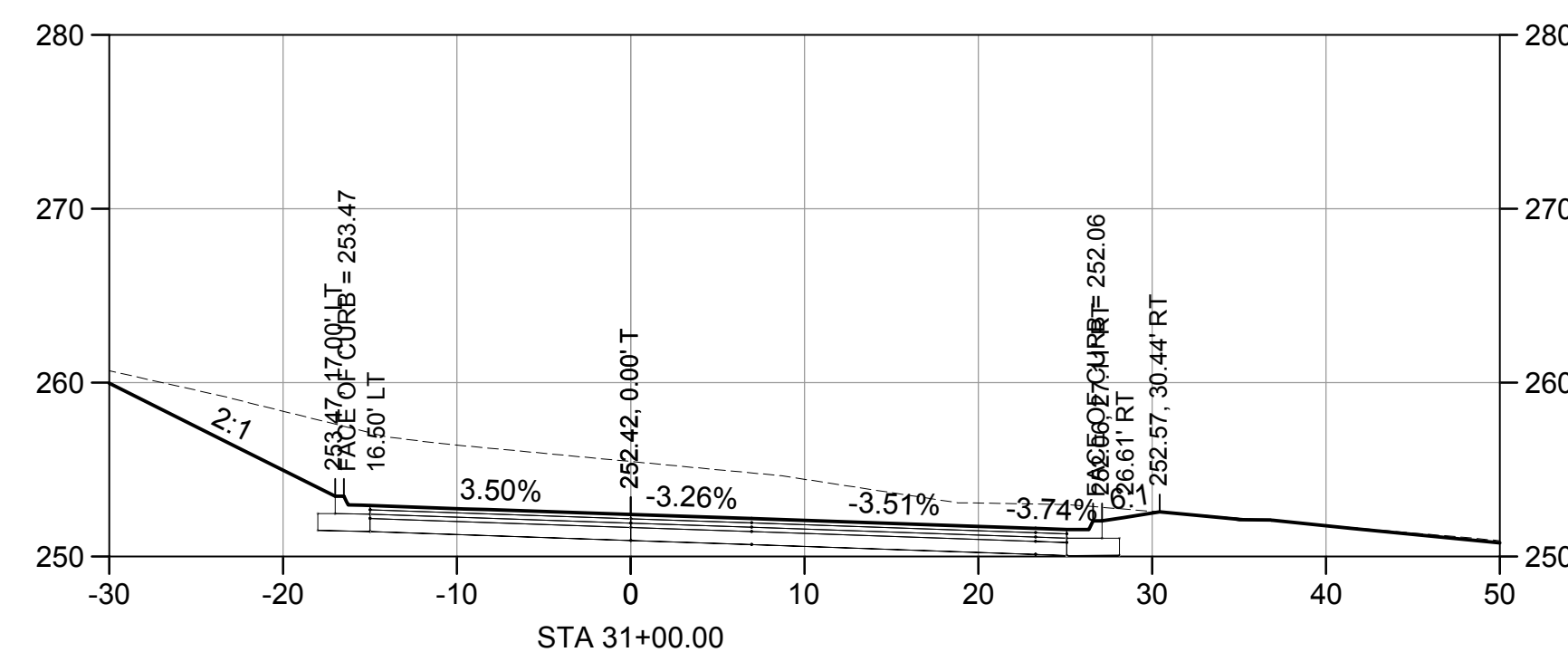
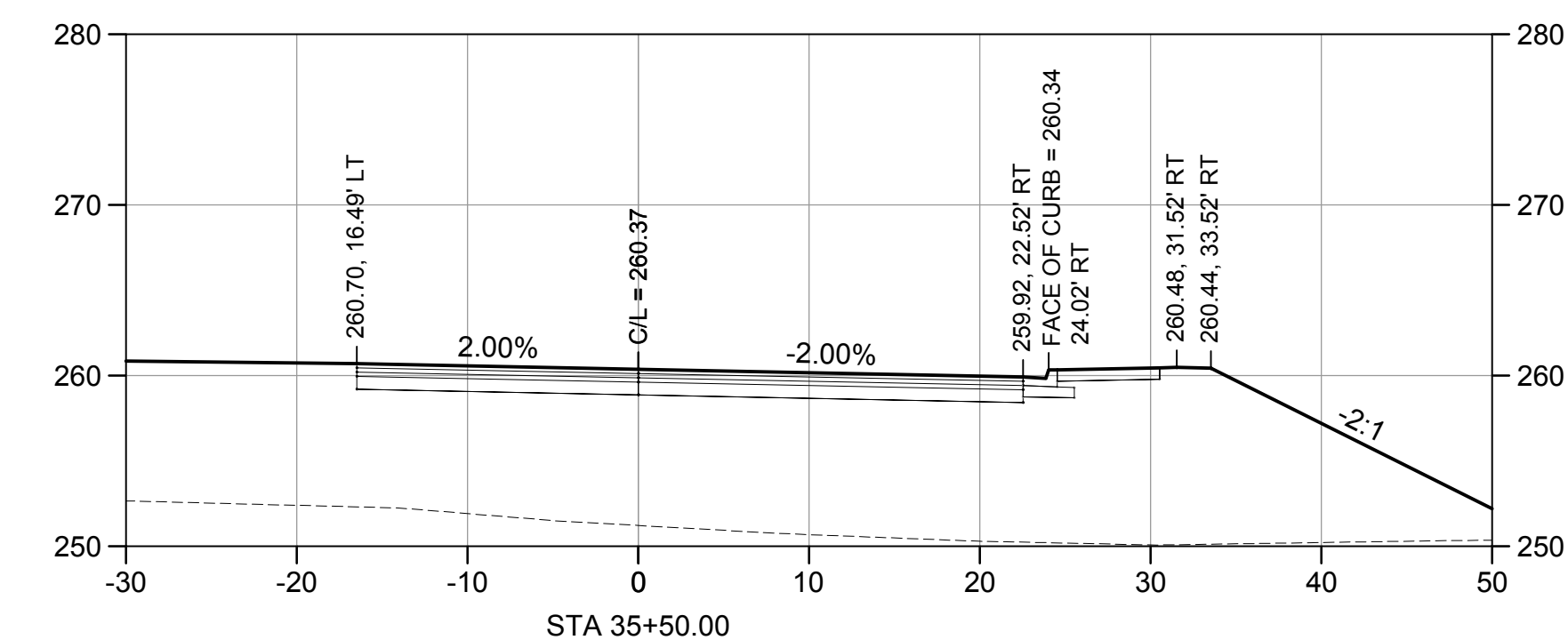
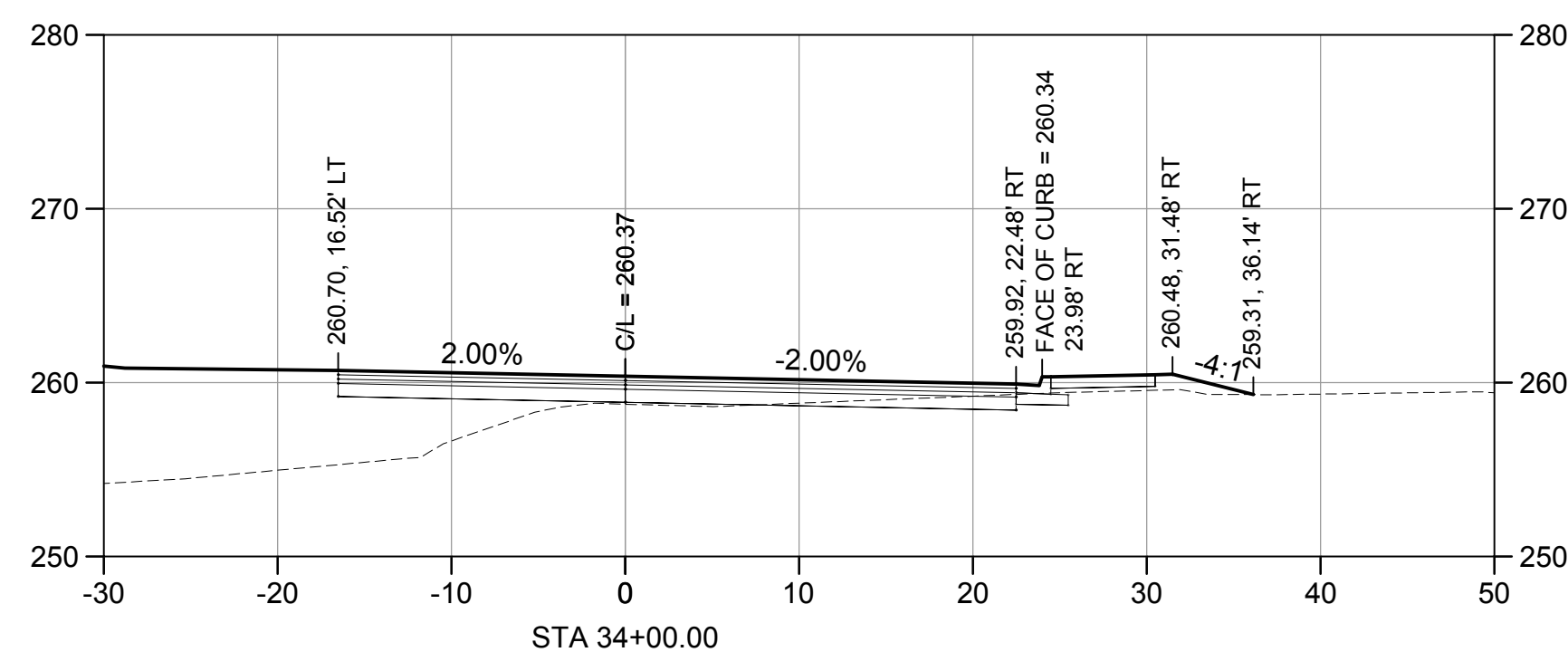
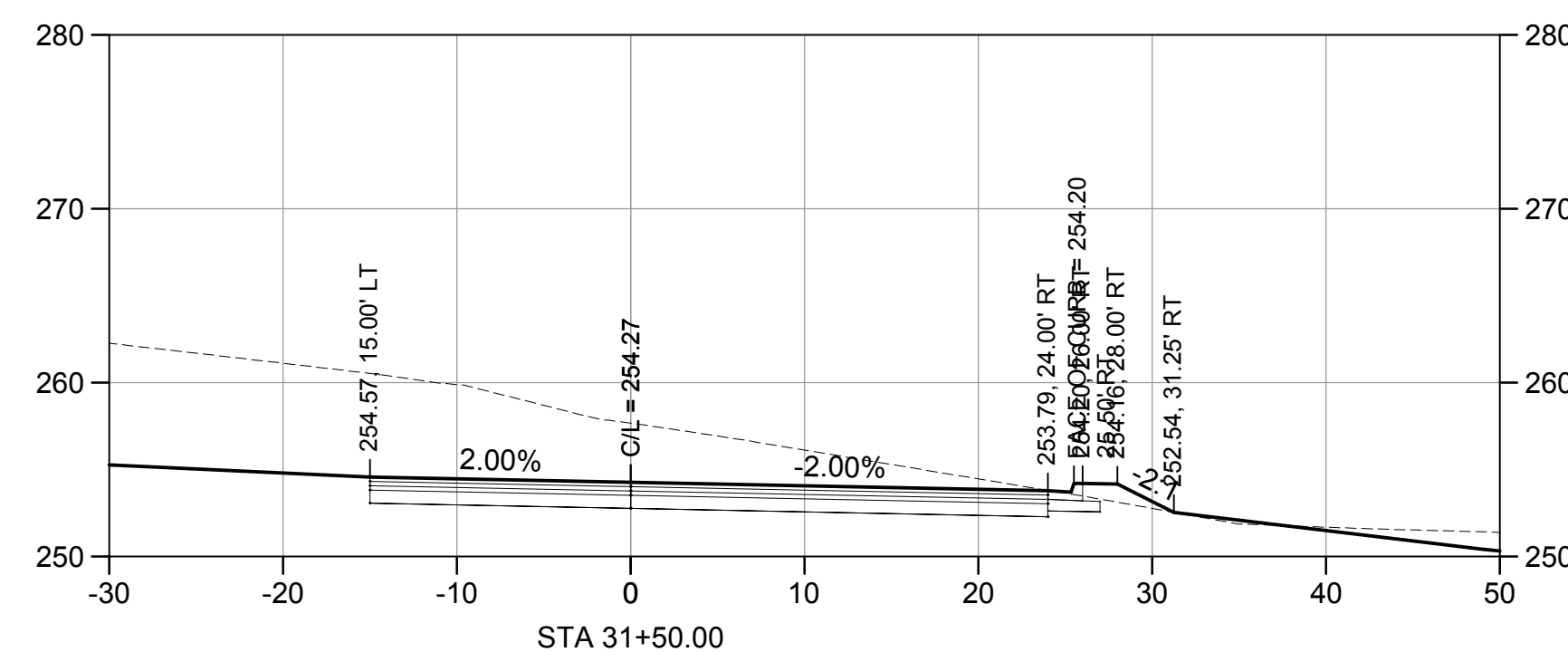
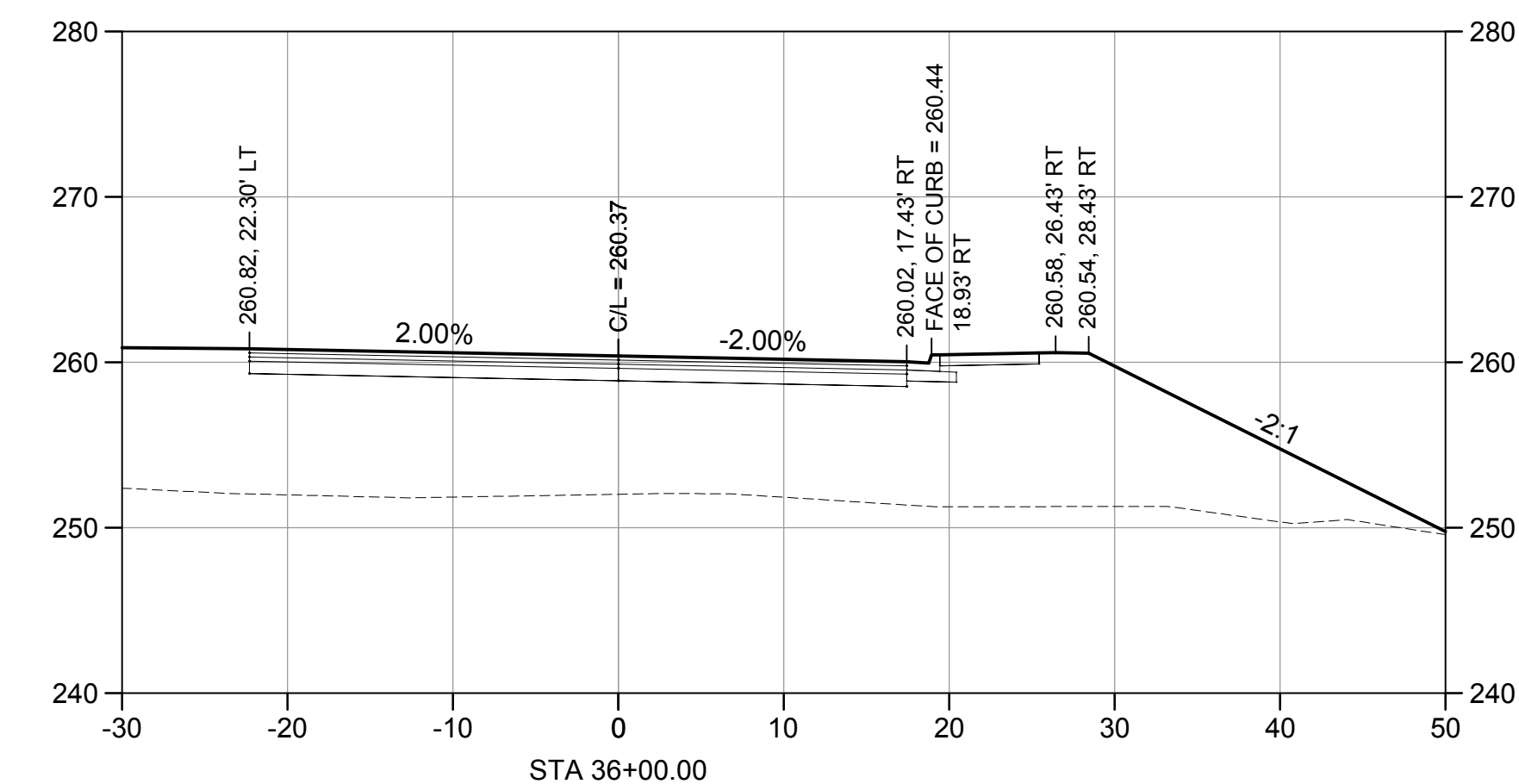
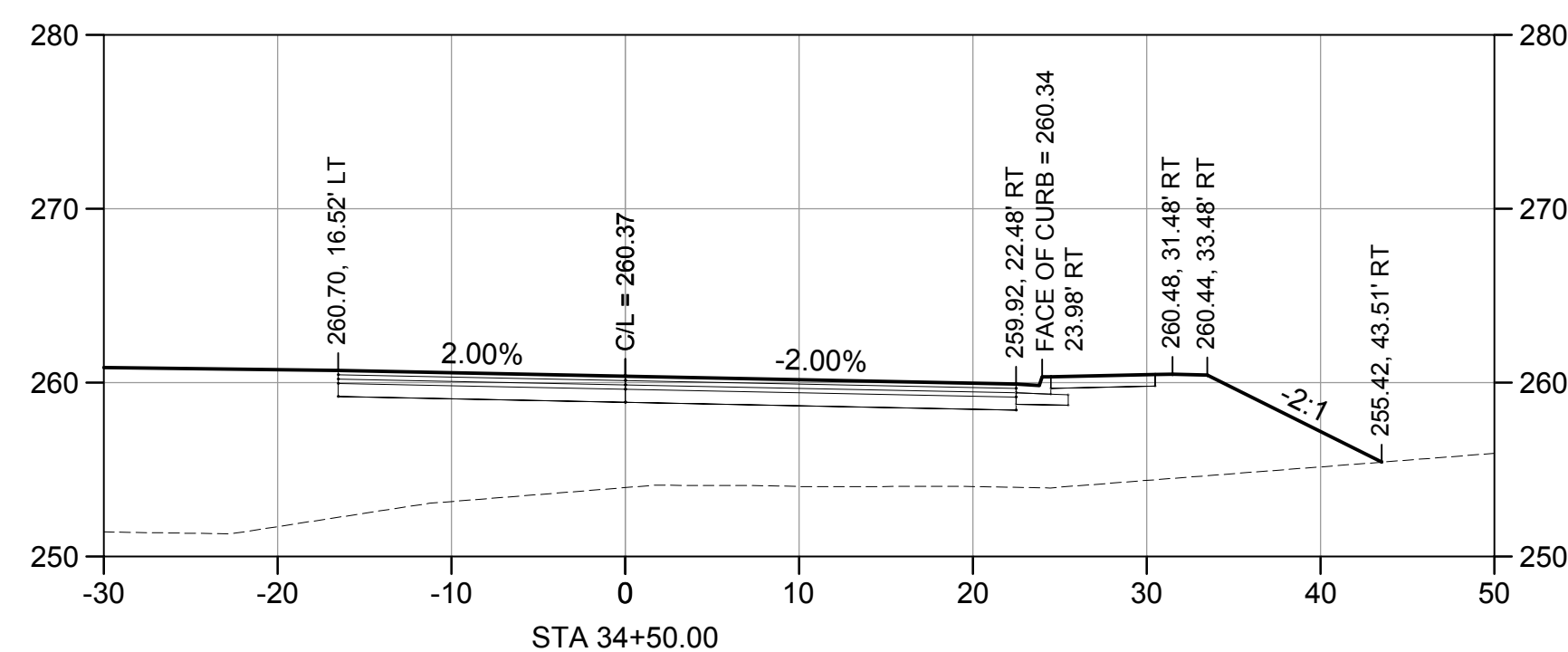
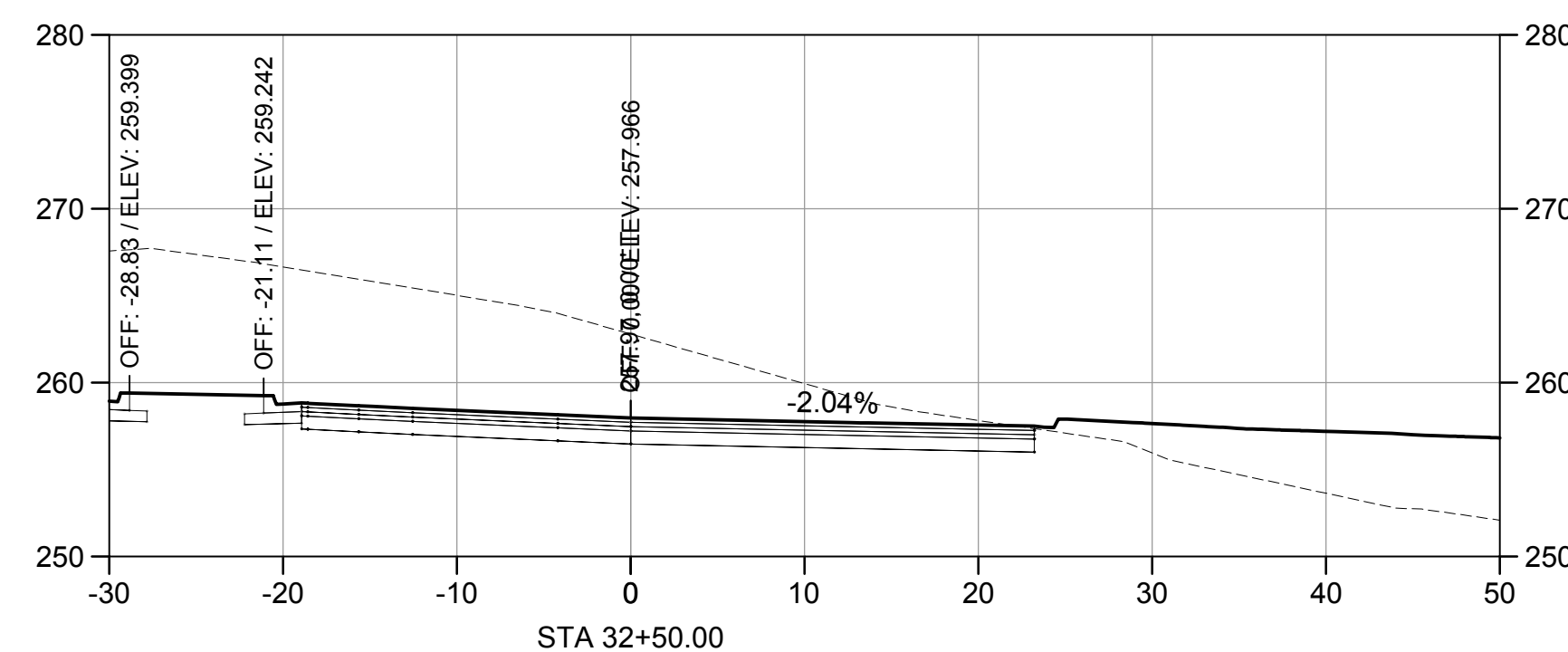
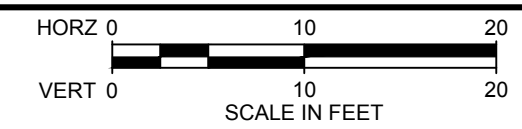


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DWG	03-GR-30019
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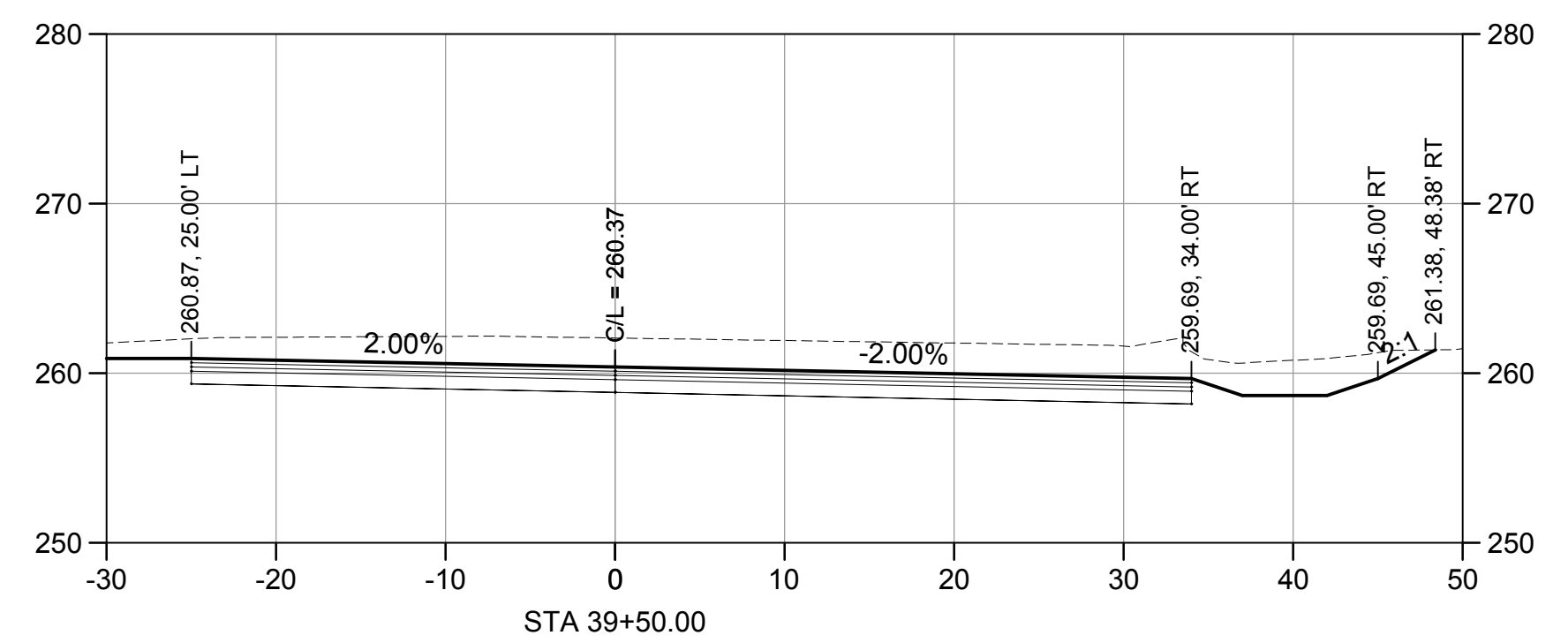
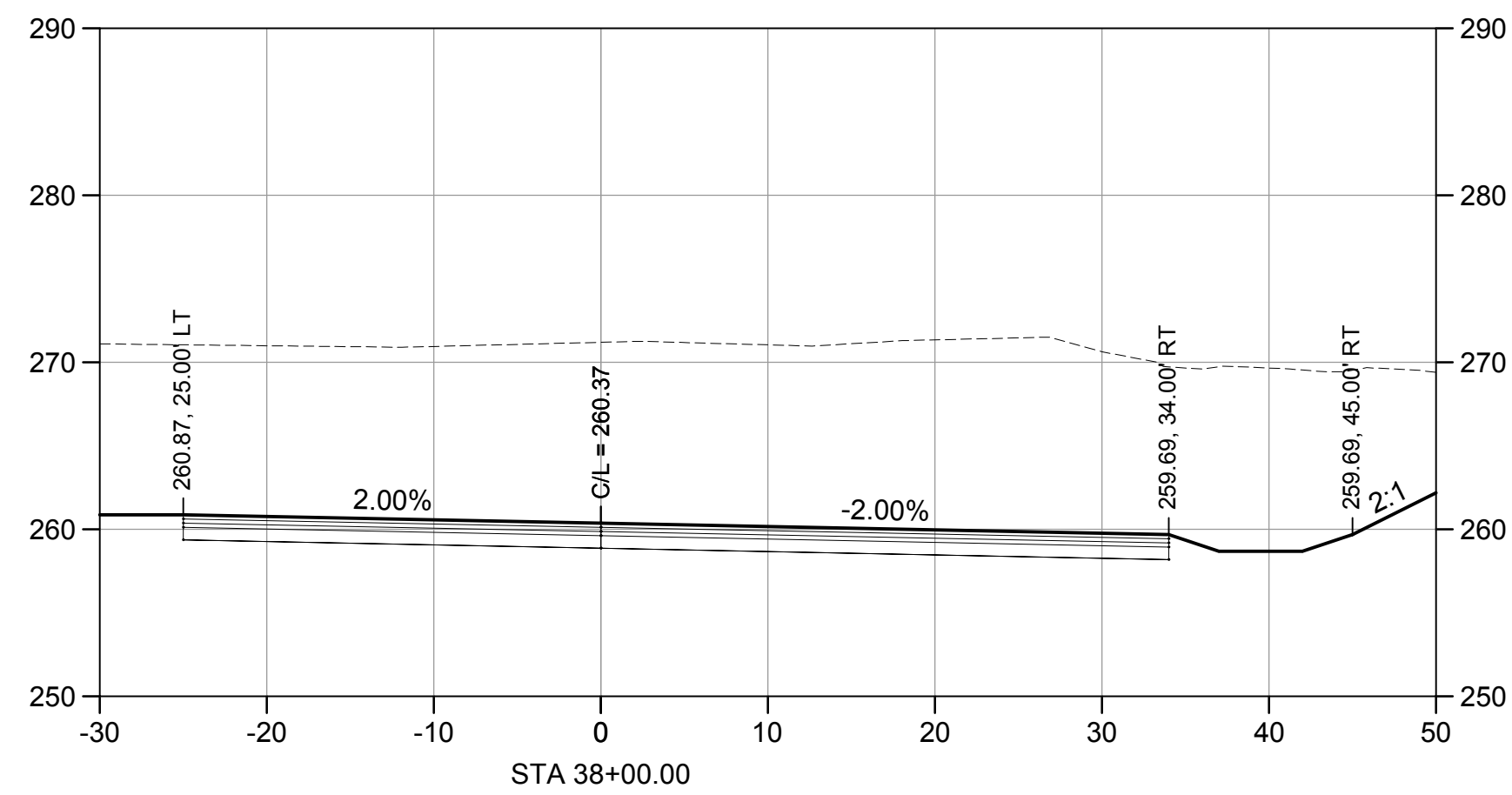
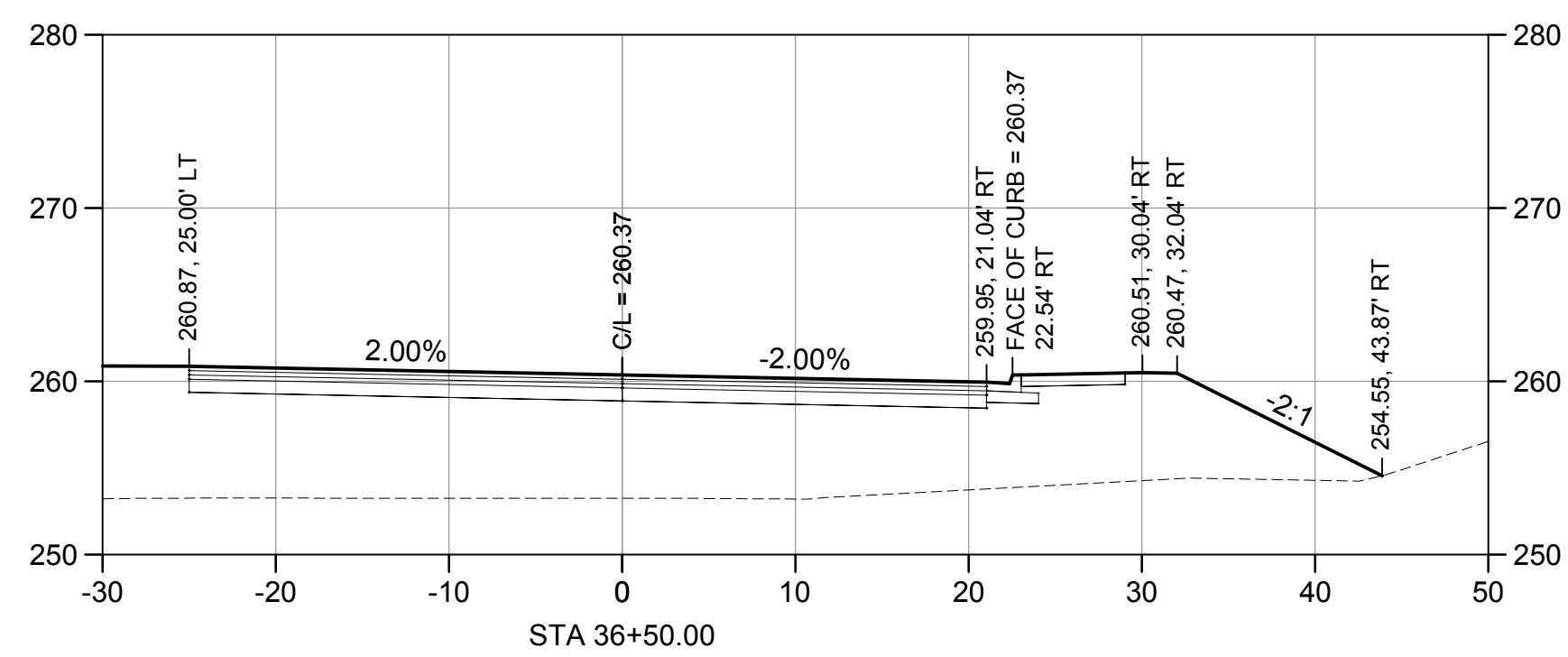
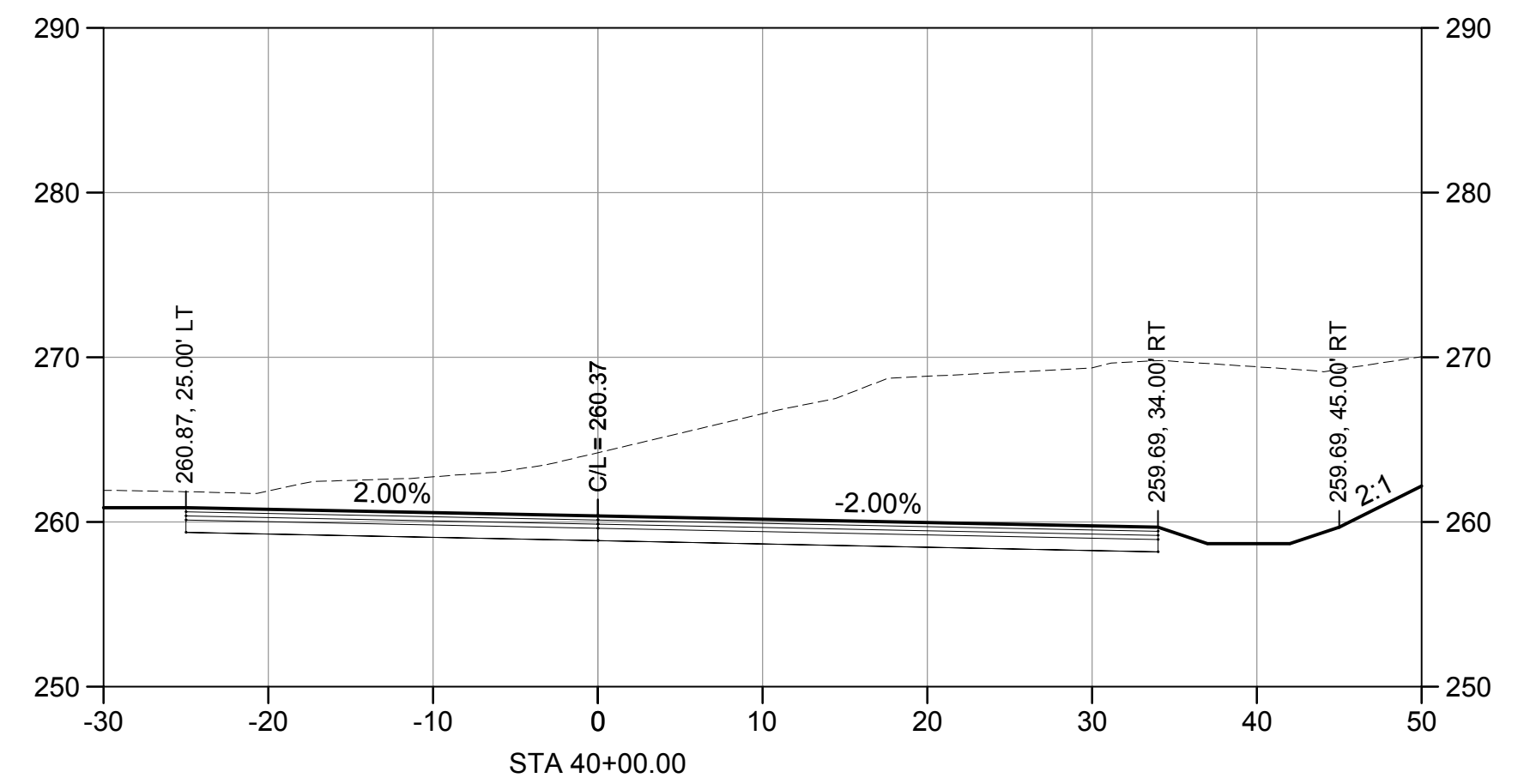
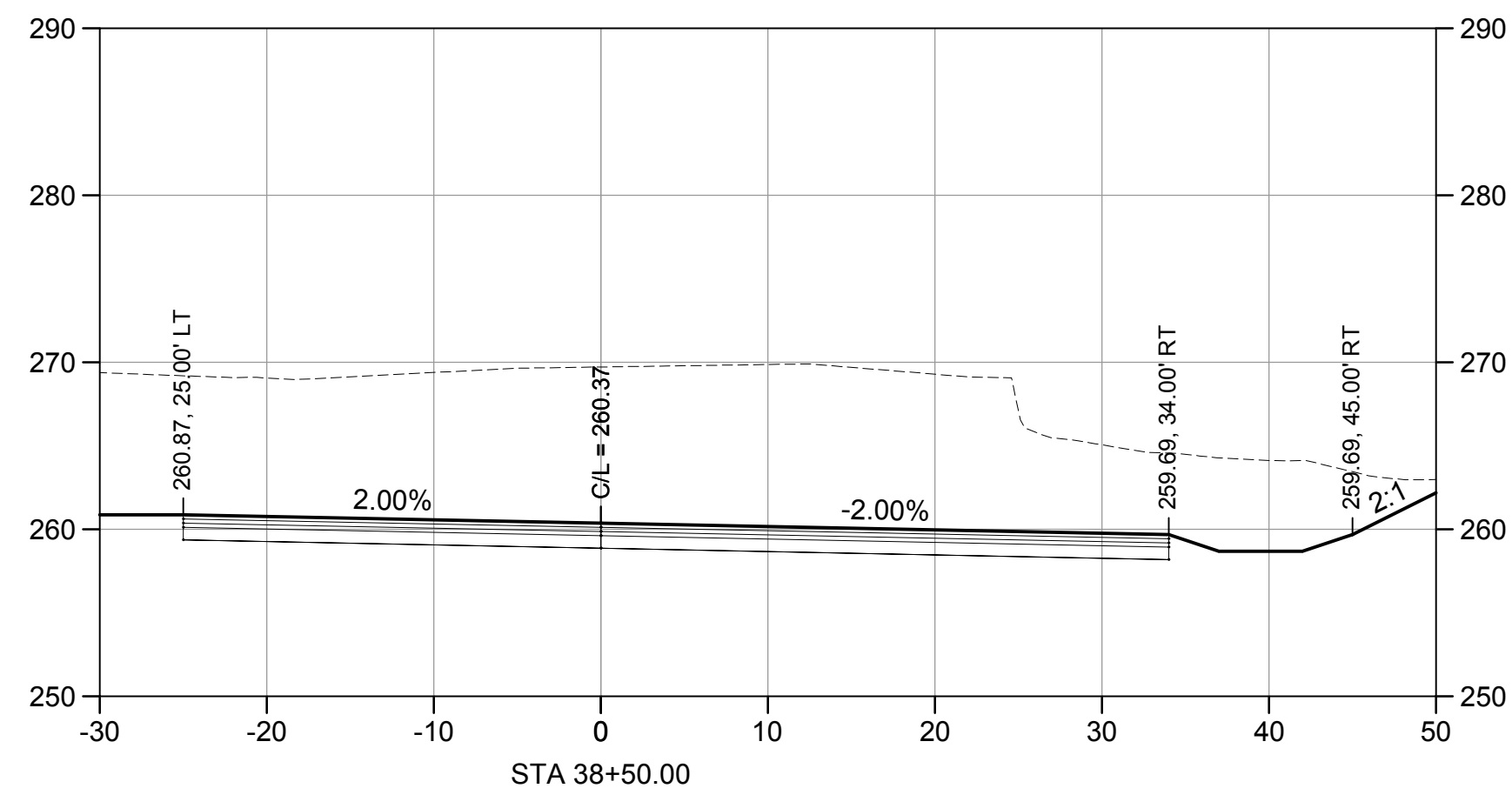
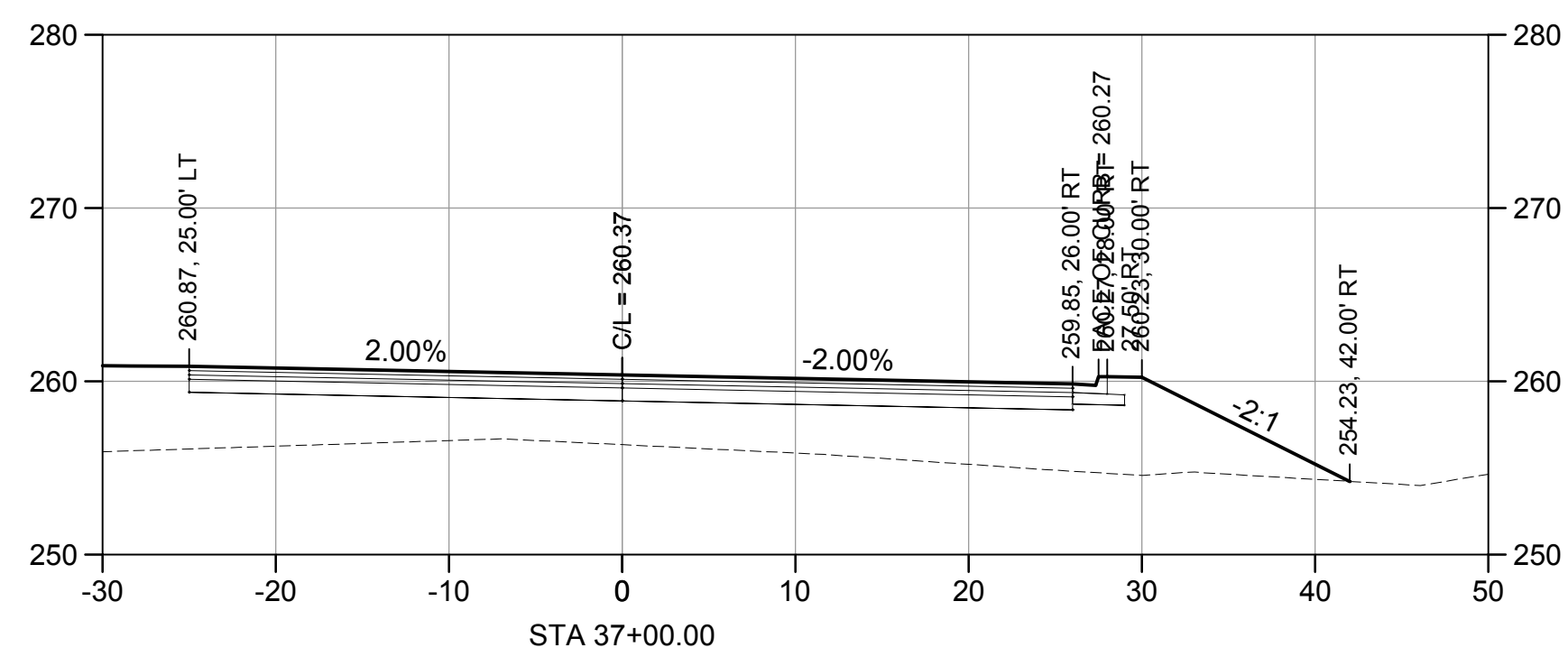
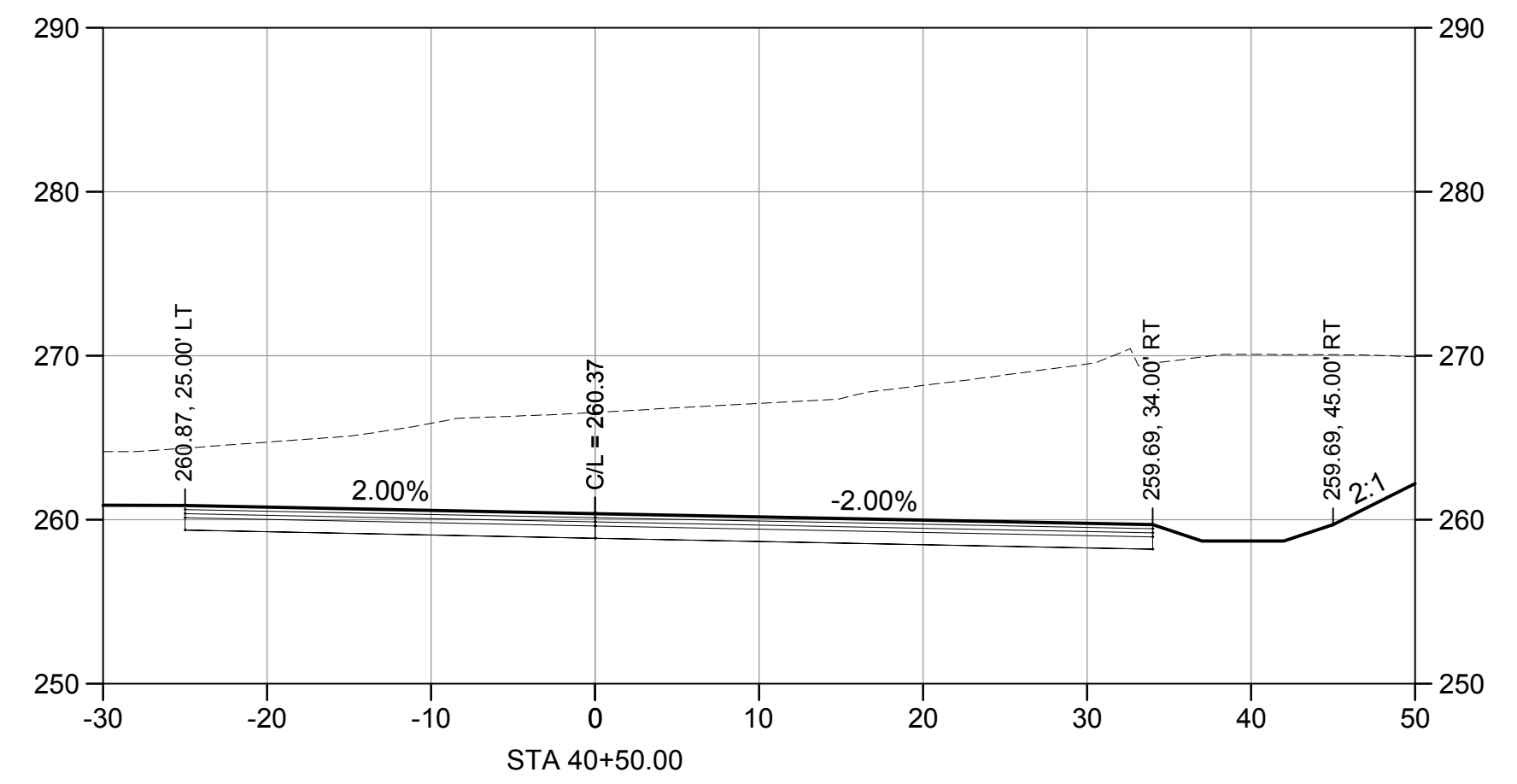
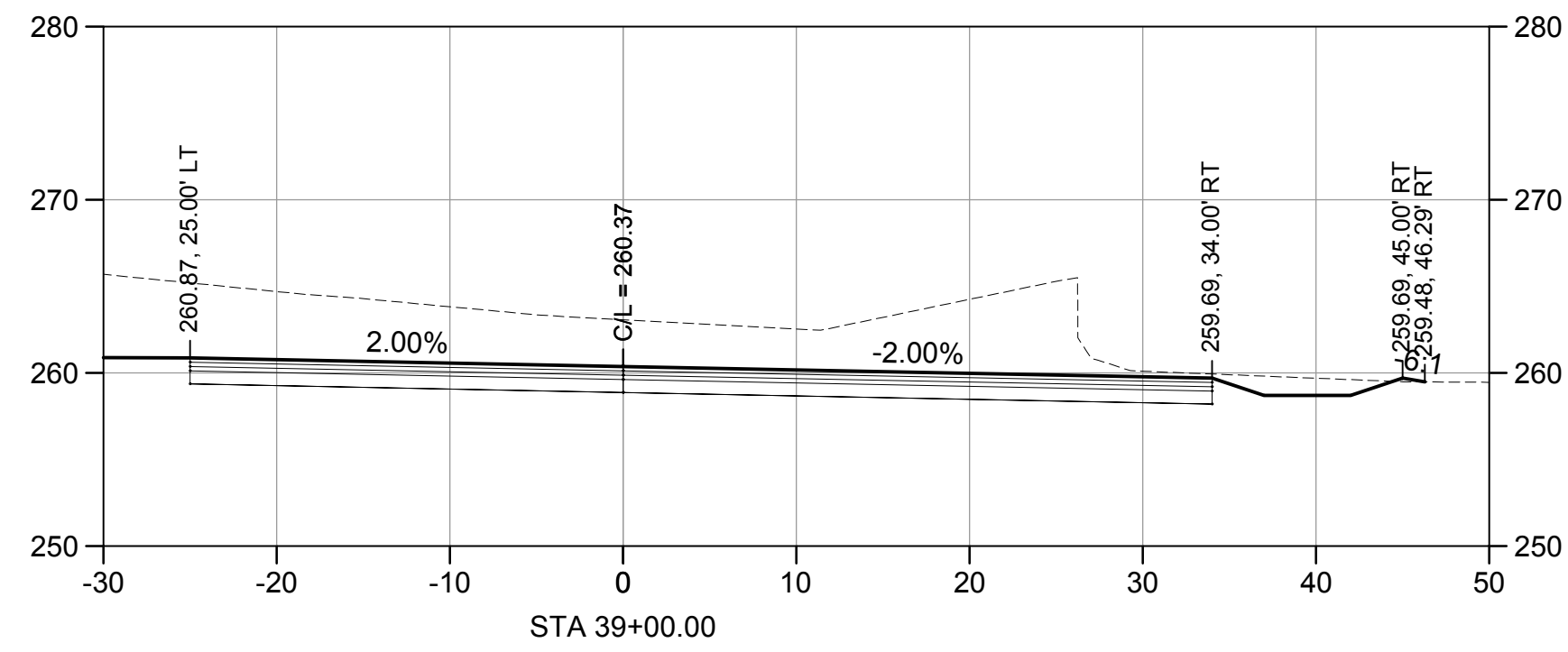
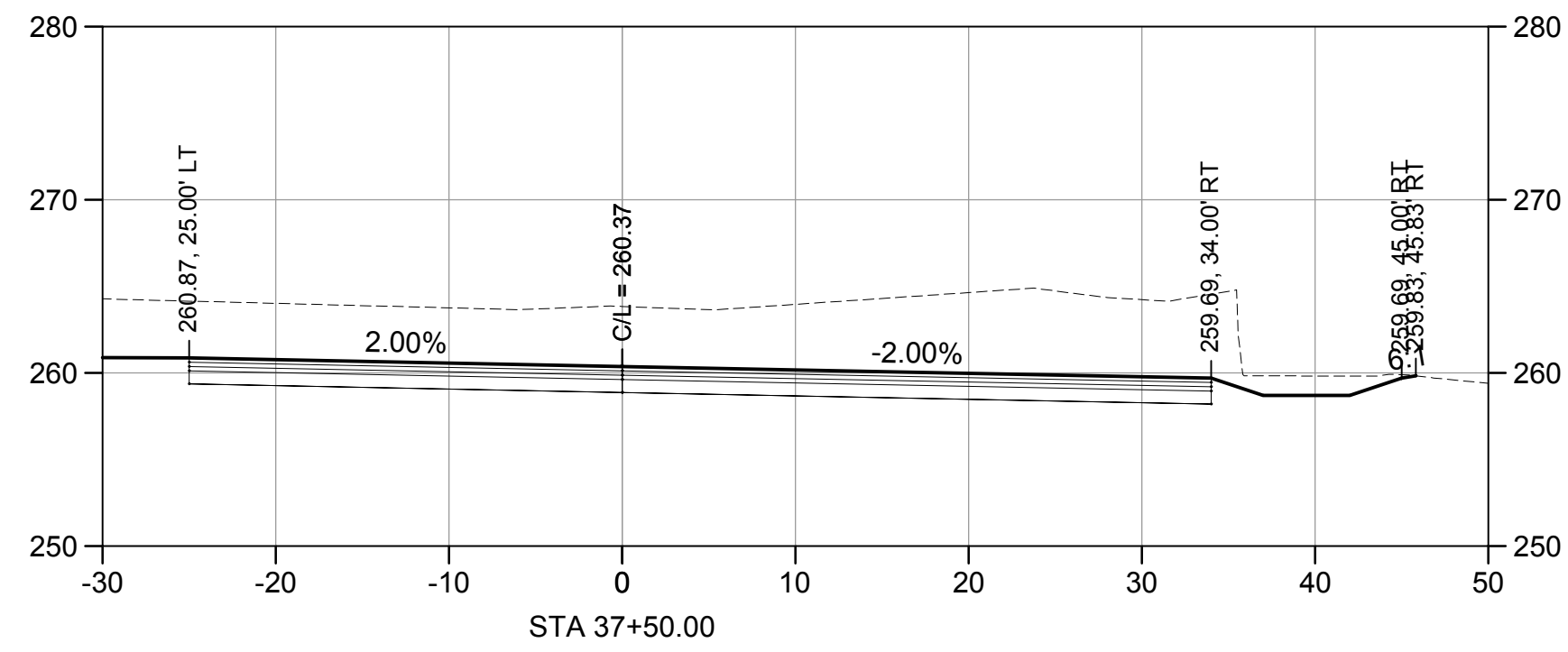
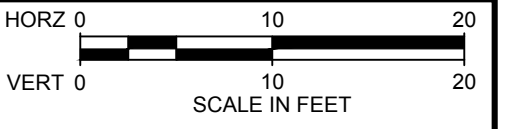


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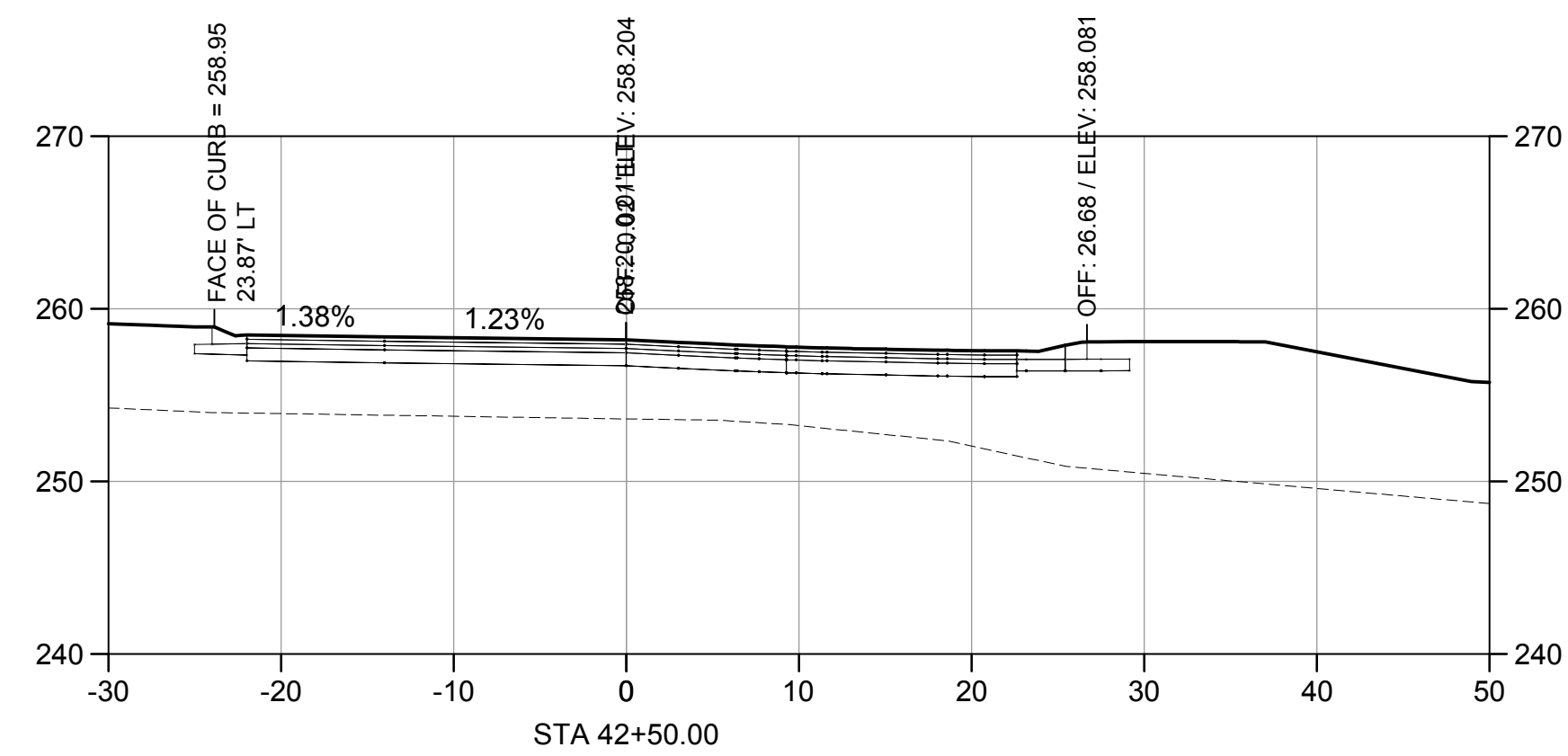
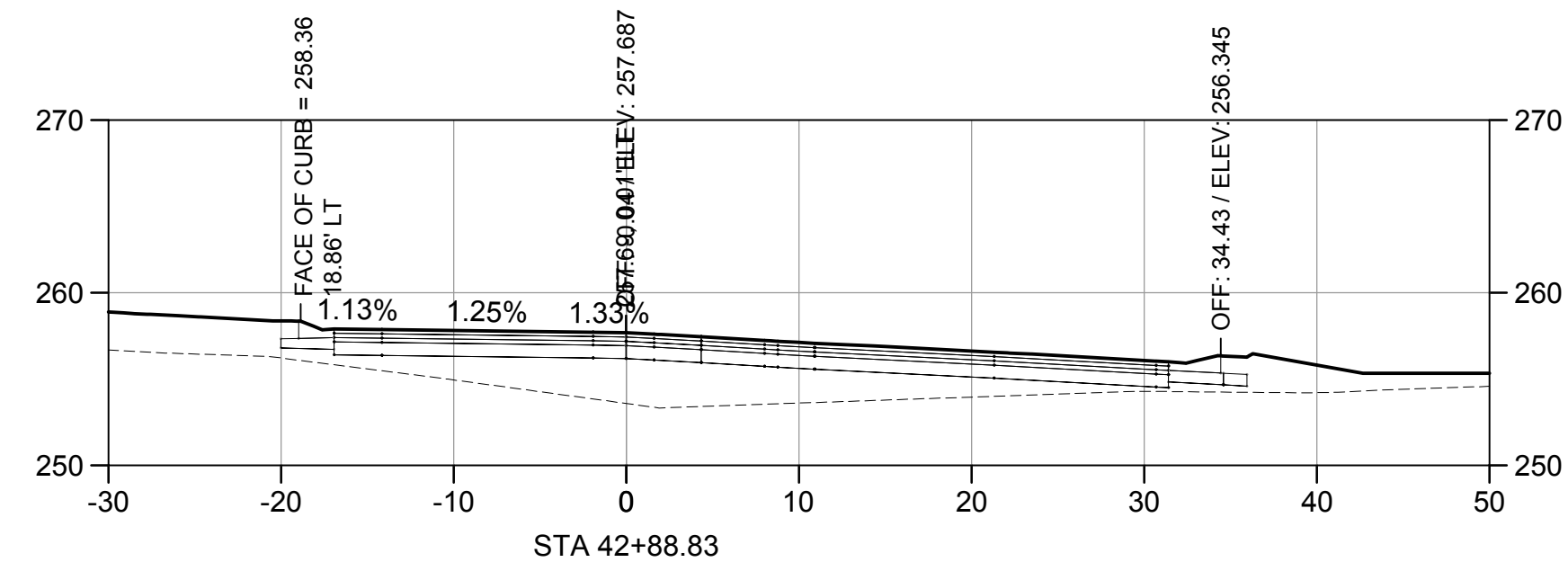
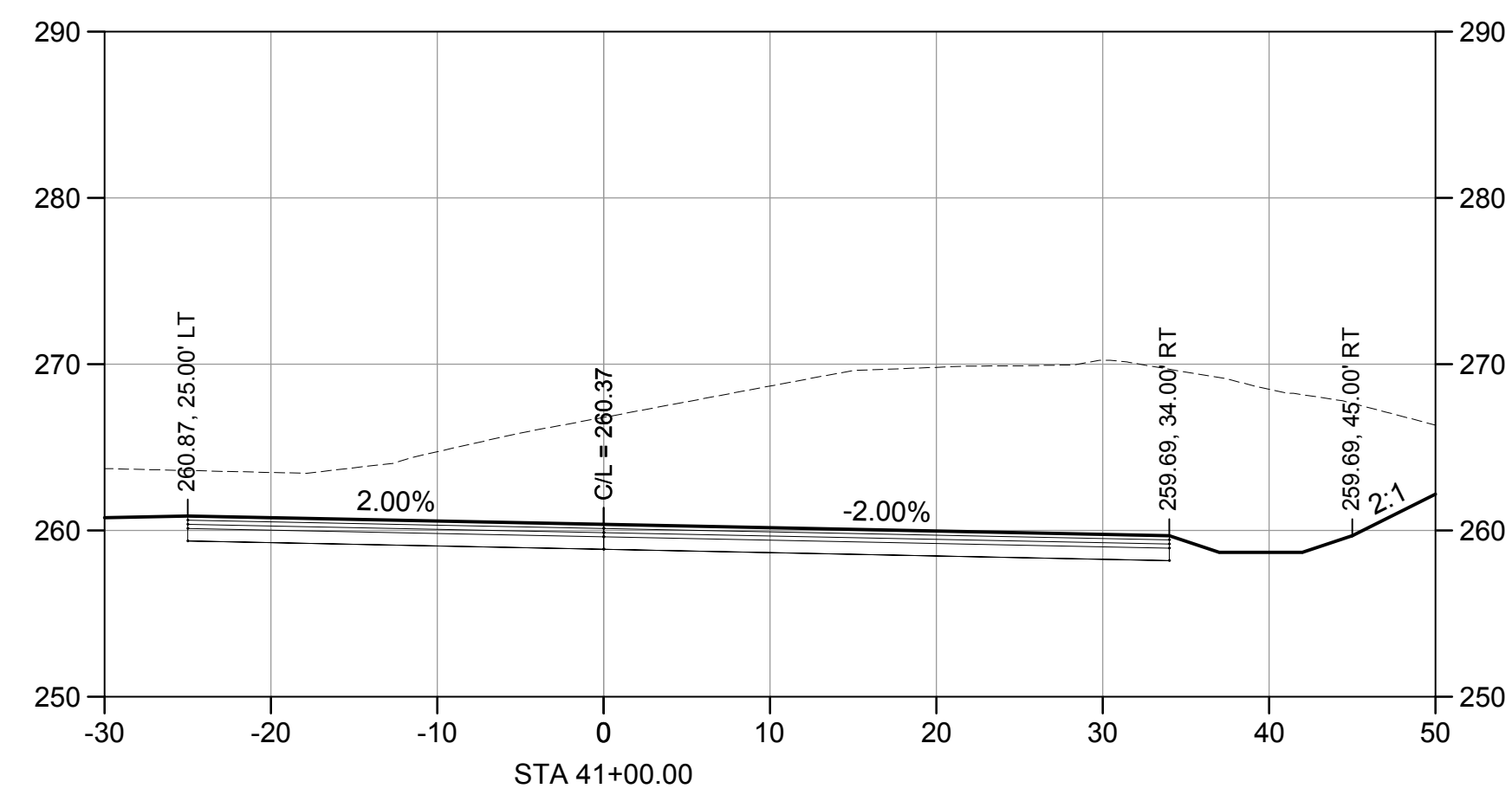
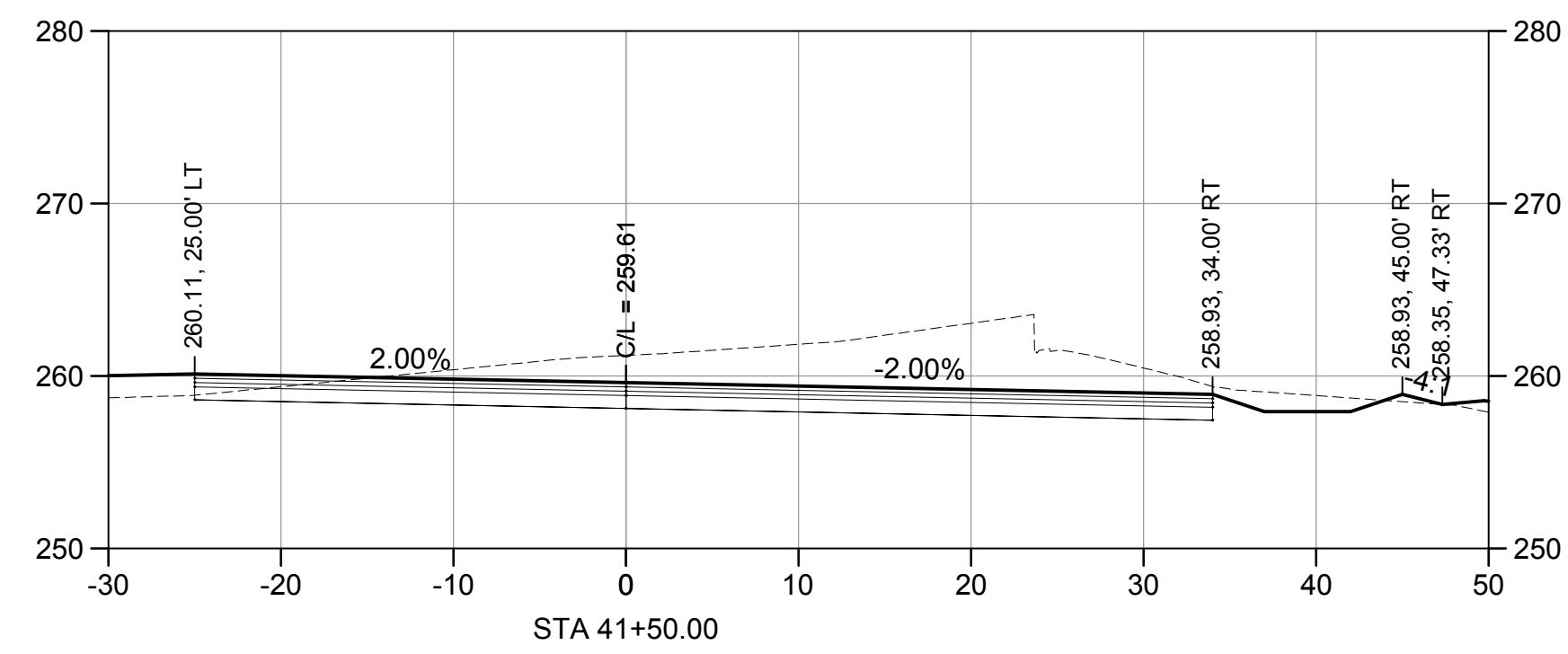
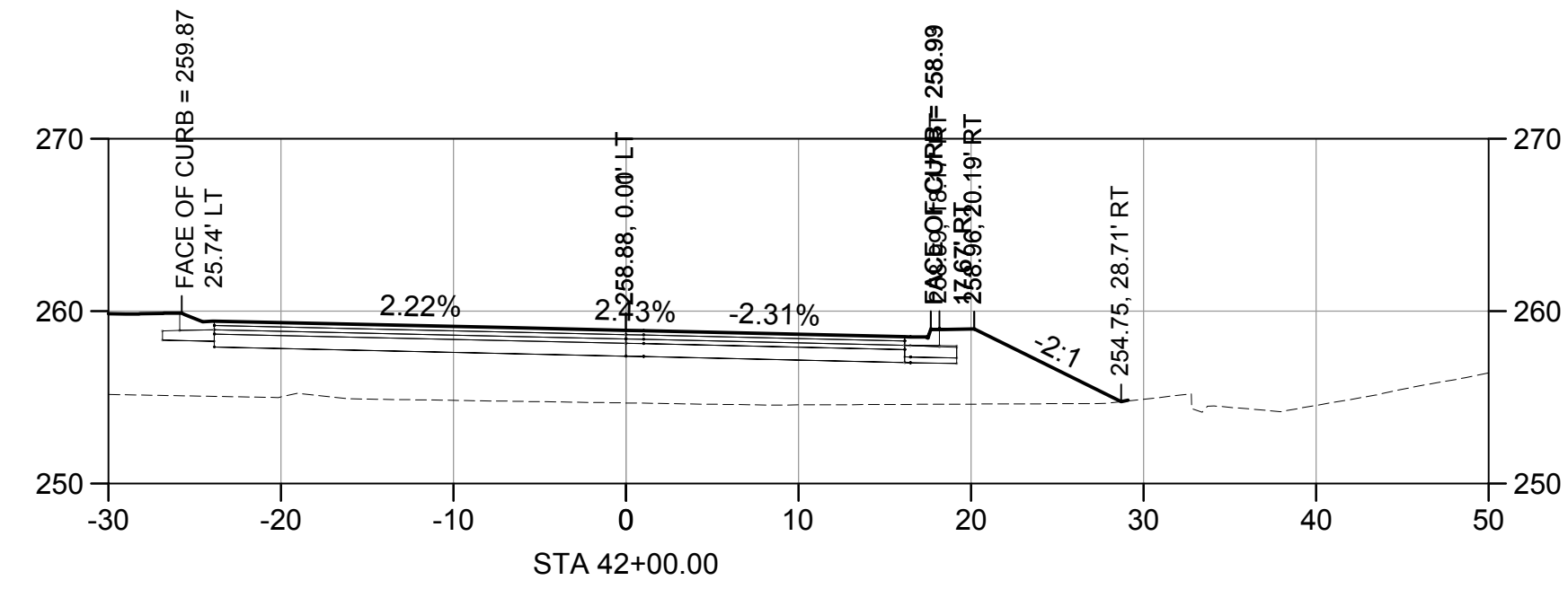
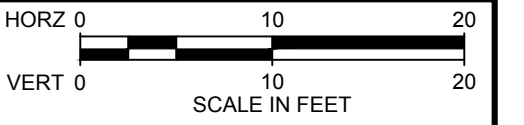
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SITE
 GRADING
 ROAD A SECTIONS 2

SHEET	
DWG	03-GR-30032
DATE	FEBRUARY 2020
PROJ	WTP_1.0

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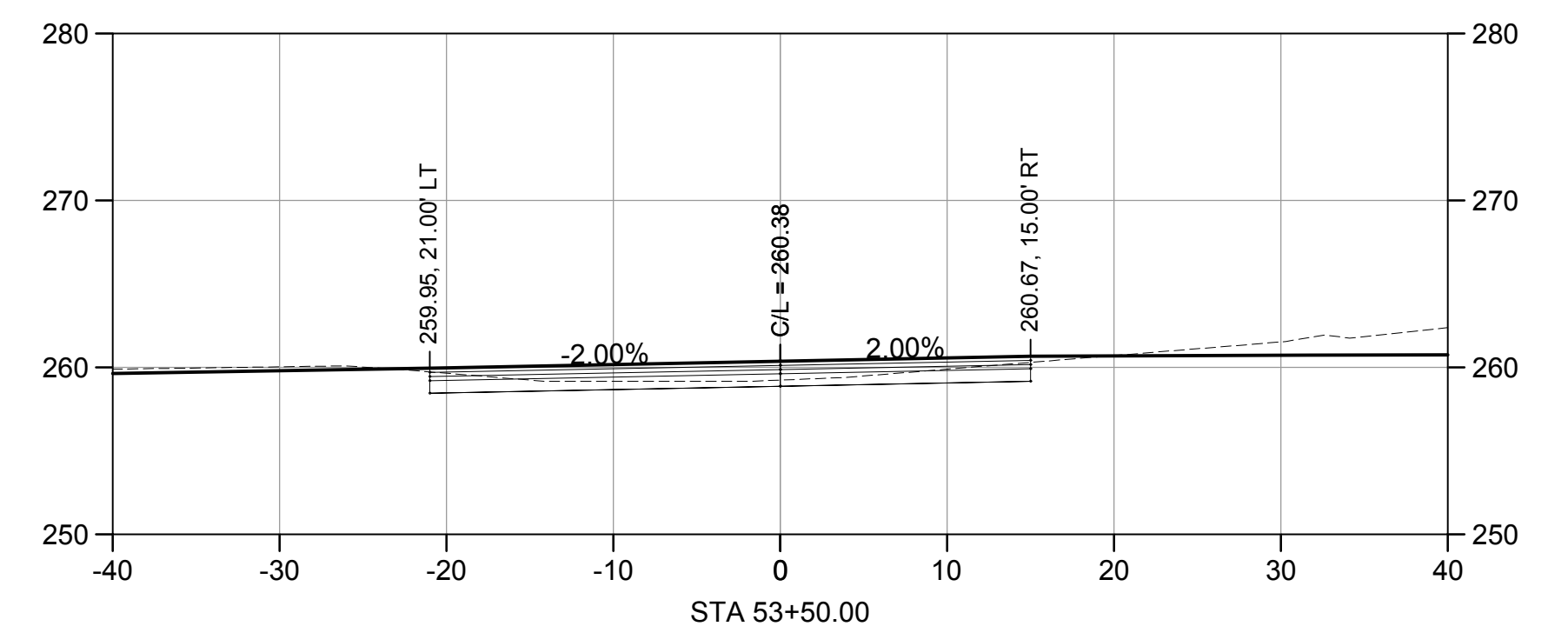
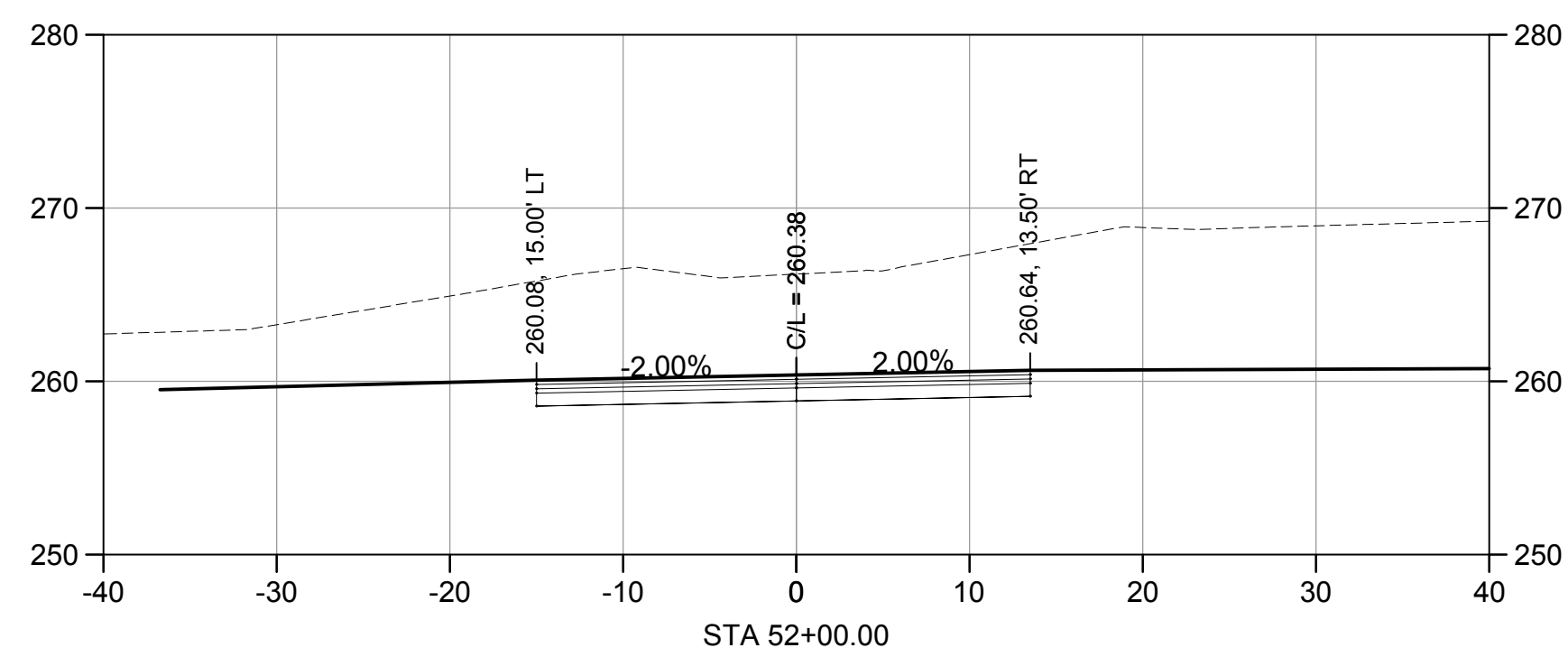
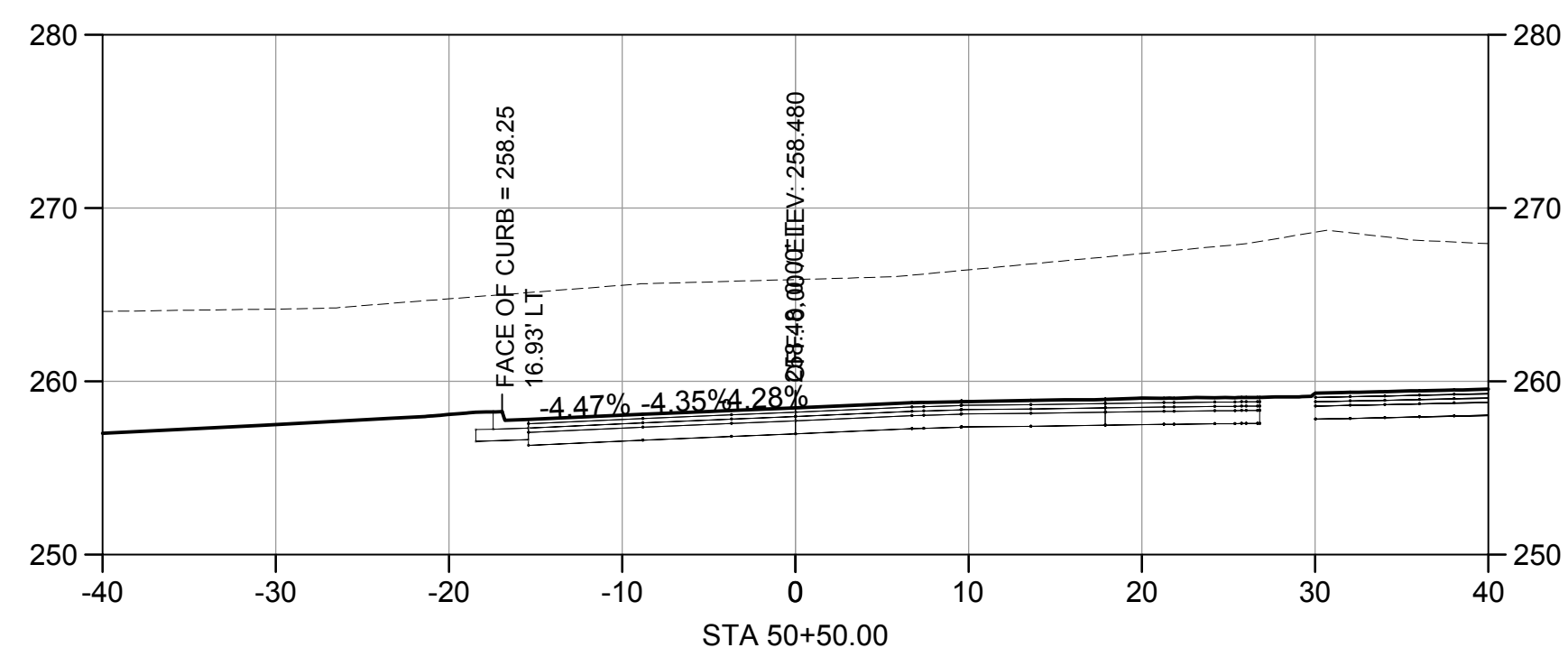
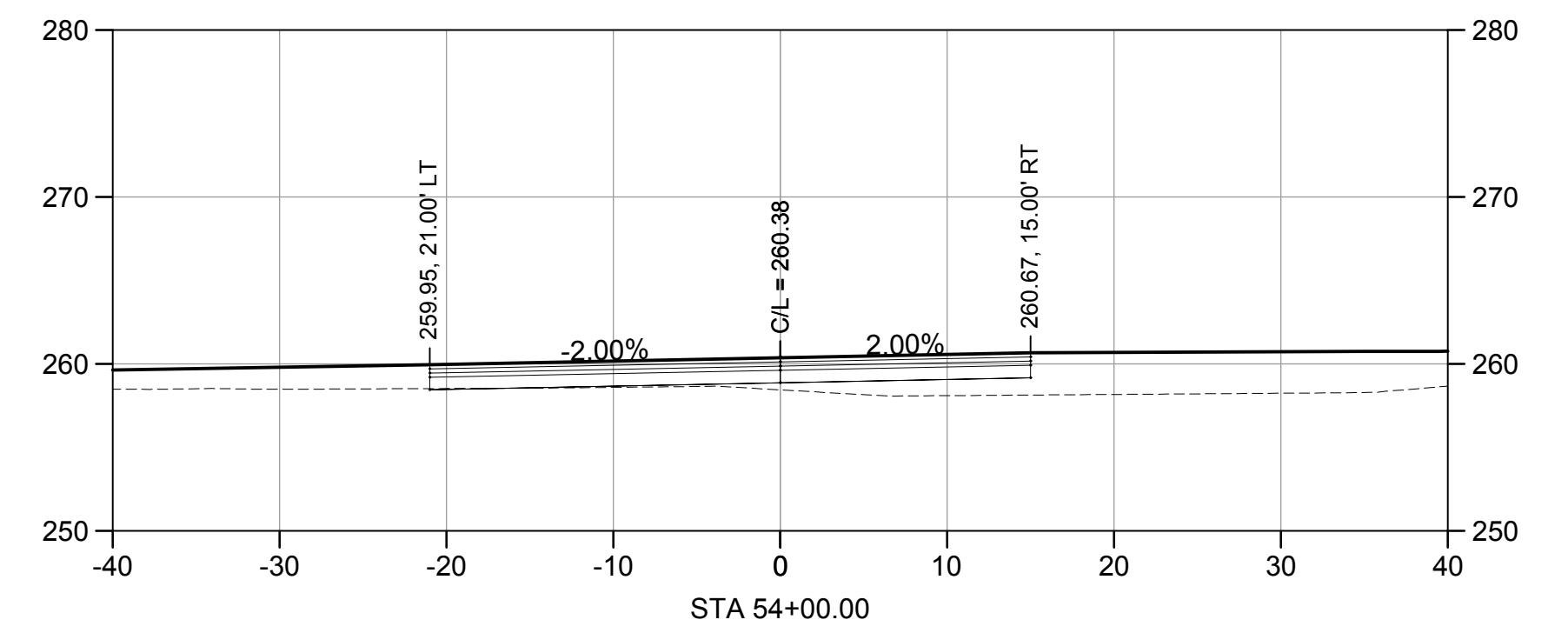
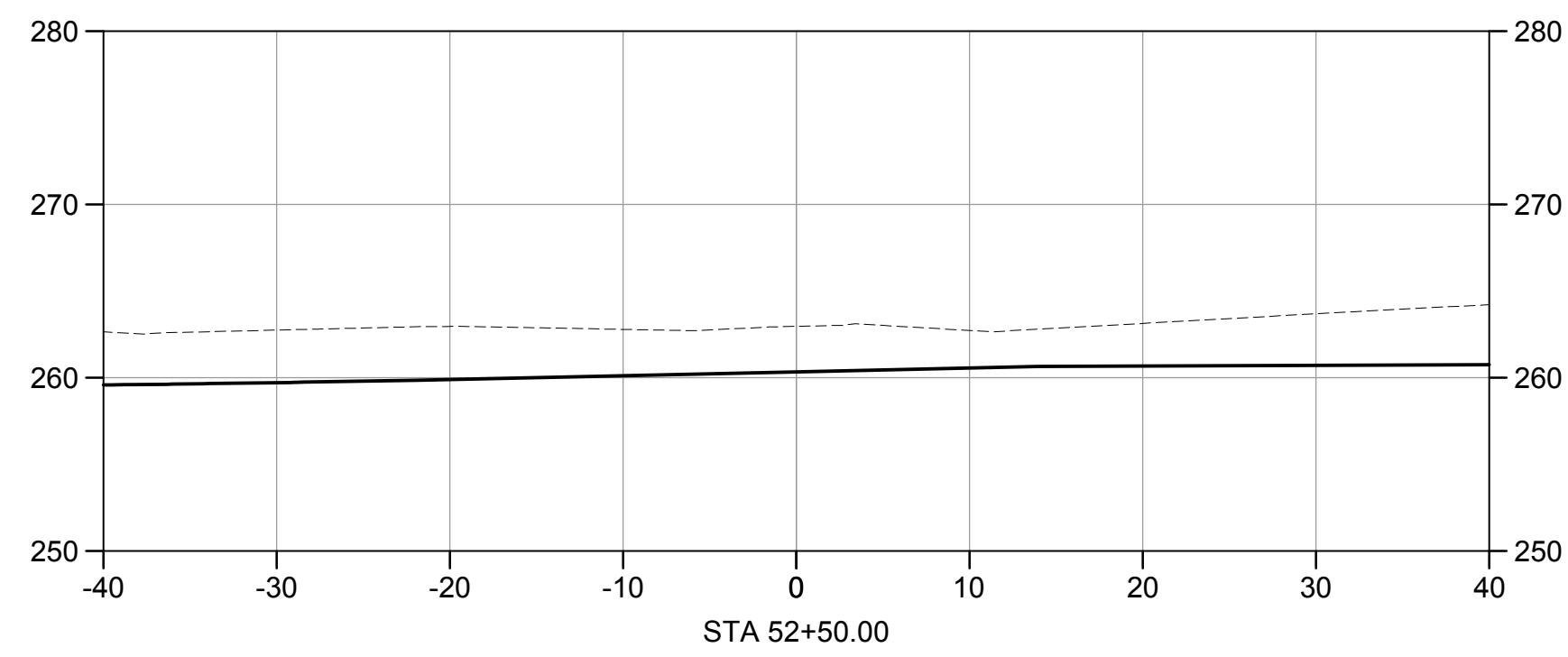
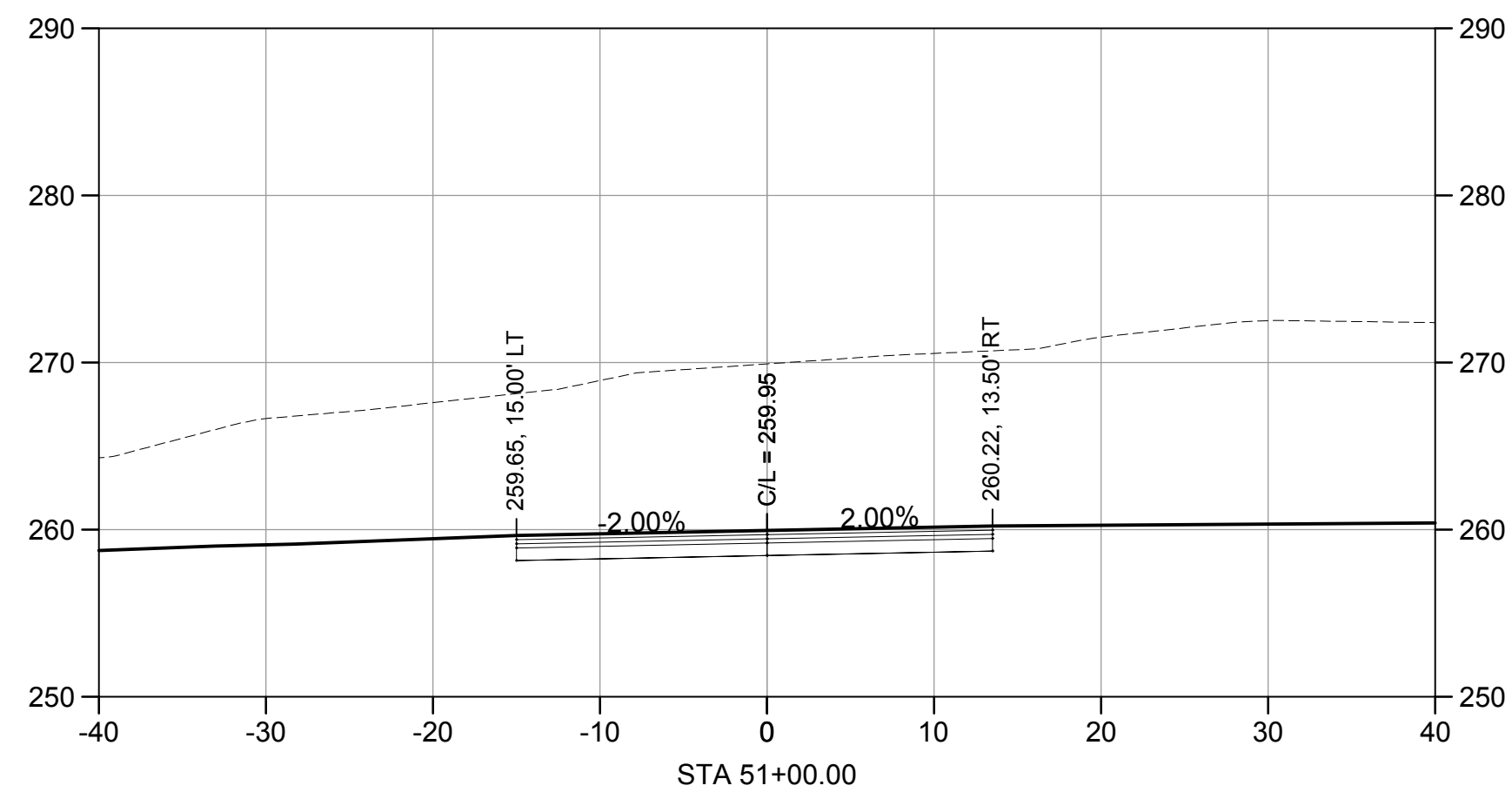
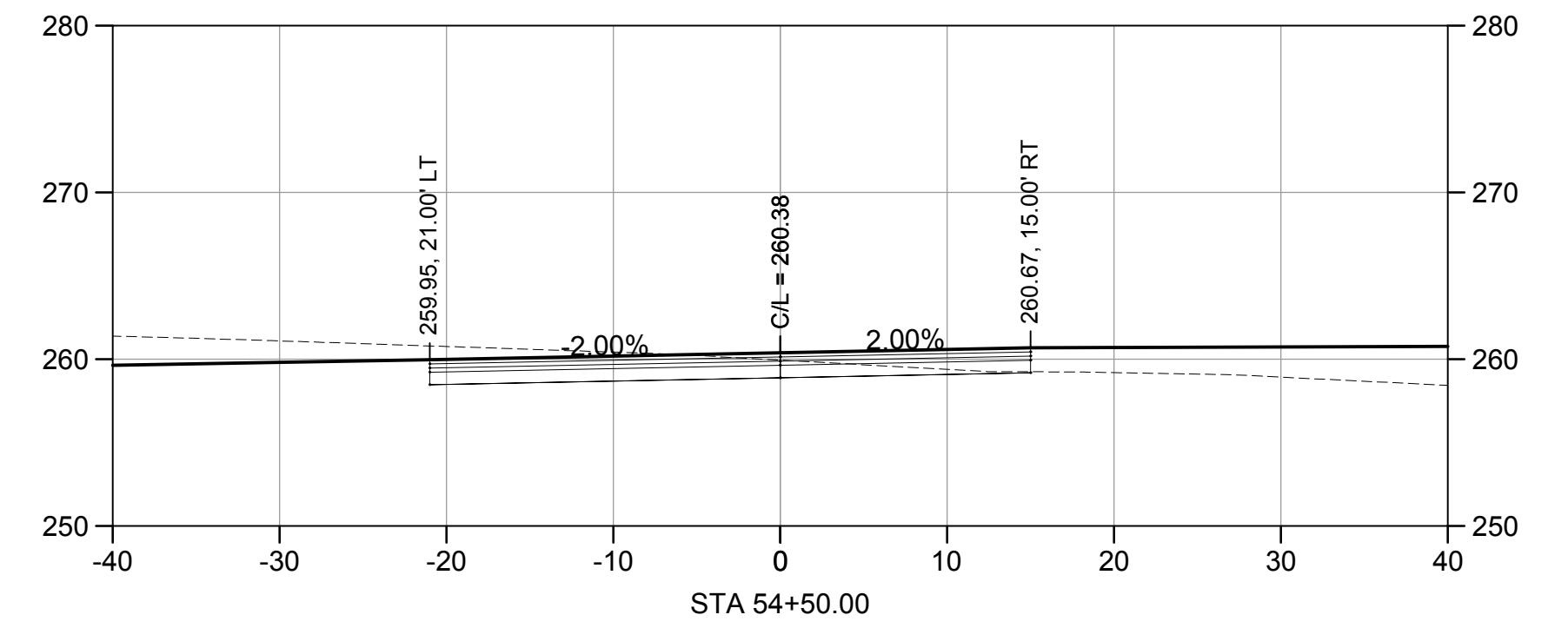
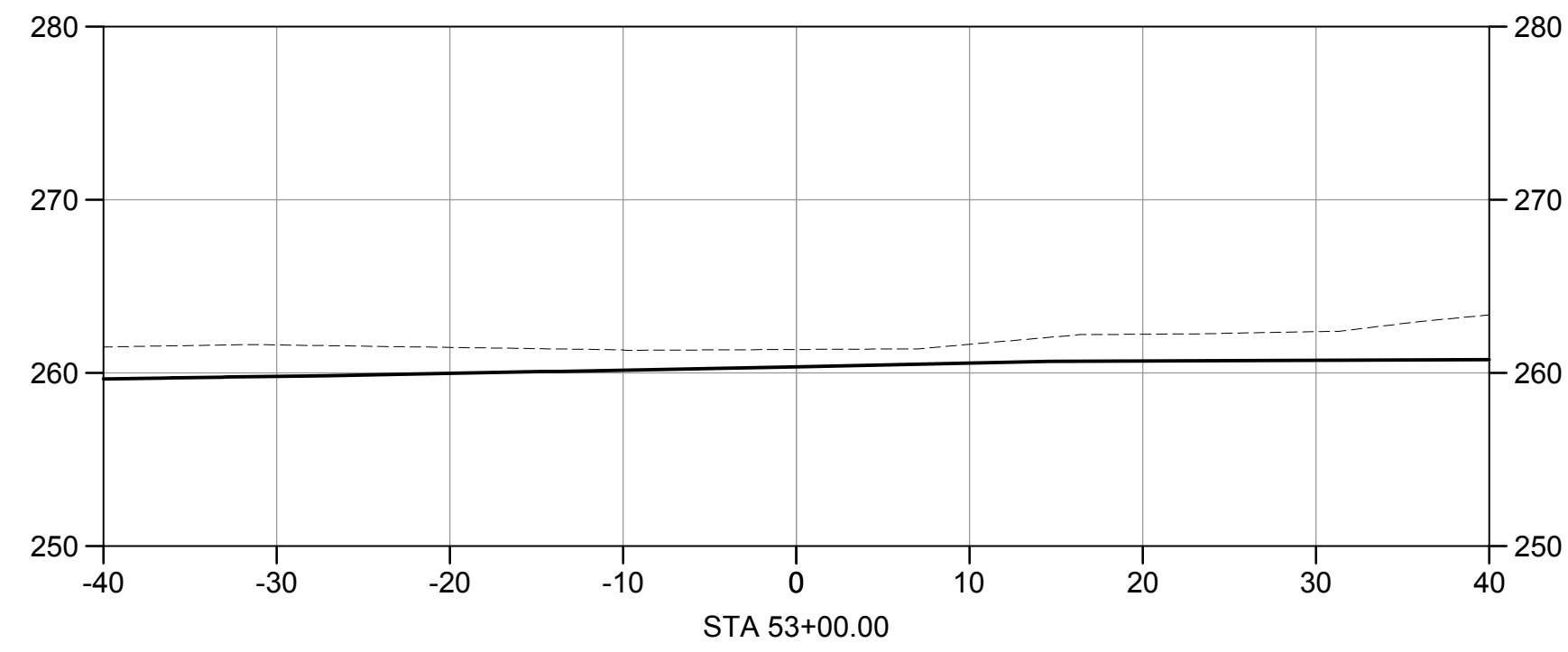
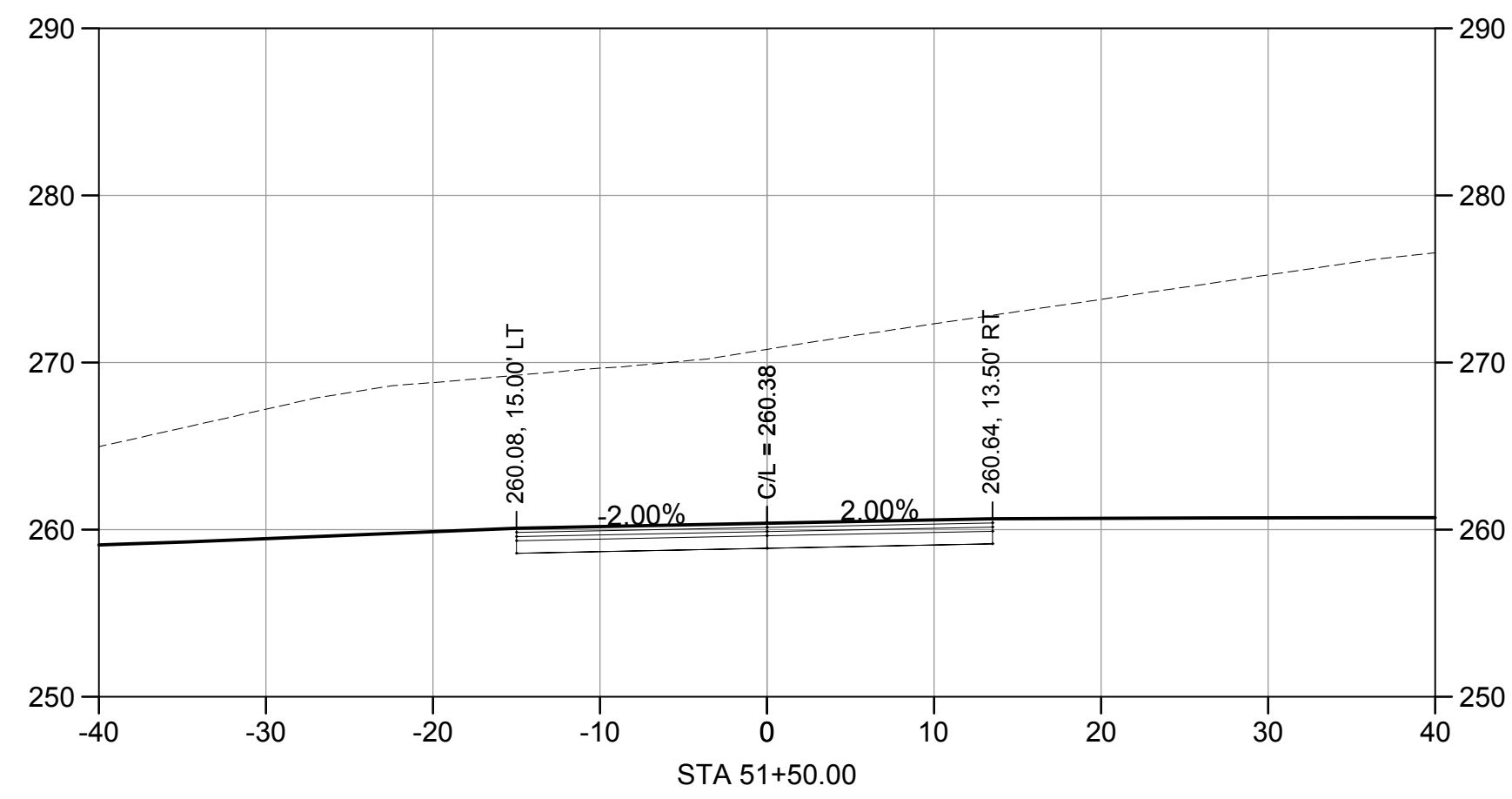
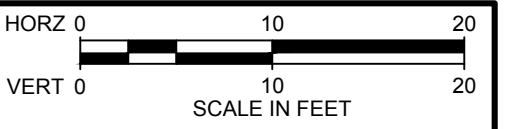
SITE
 GRADING
 ROAD A SECTIONS 3

SHEET	
DWG	03-GR-30033
DATE	FEBRUARY 2020
PROJ	WTP_1.0

BY: CHRIS JAIN

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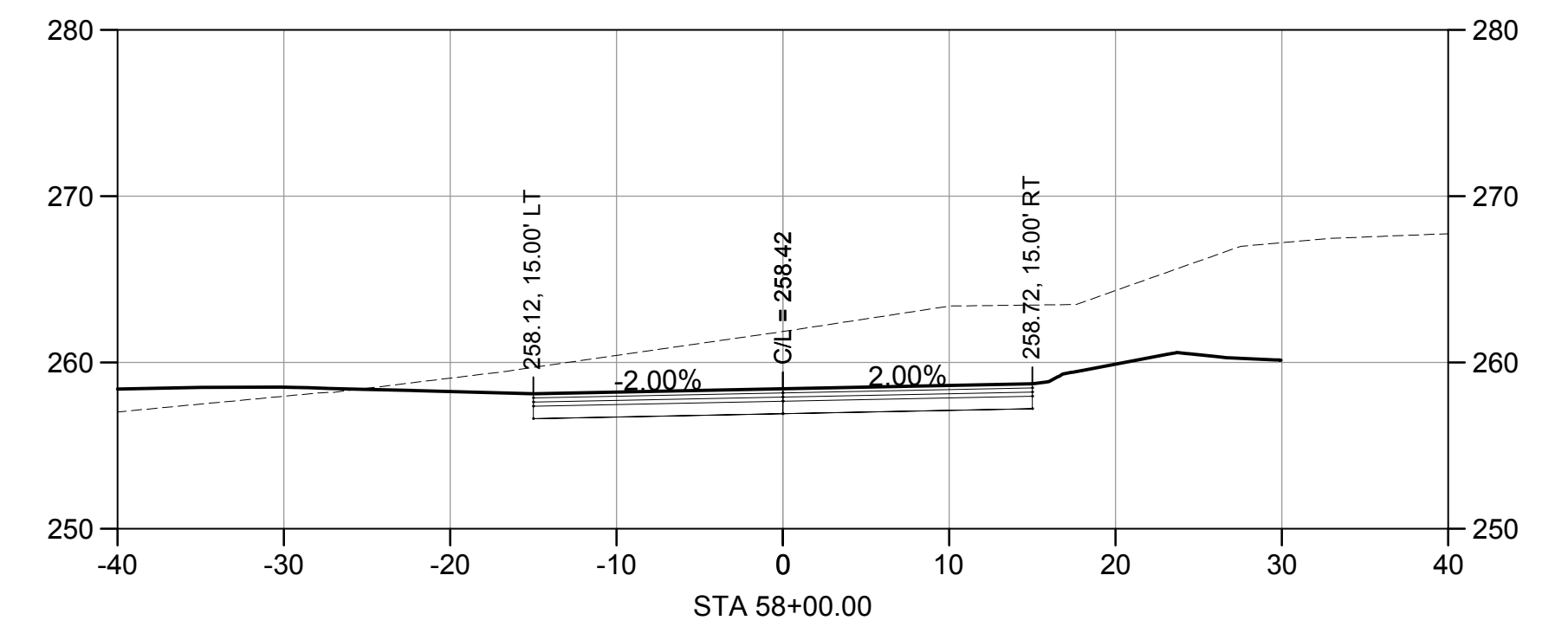
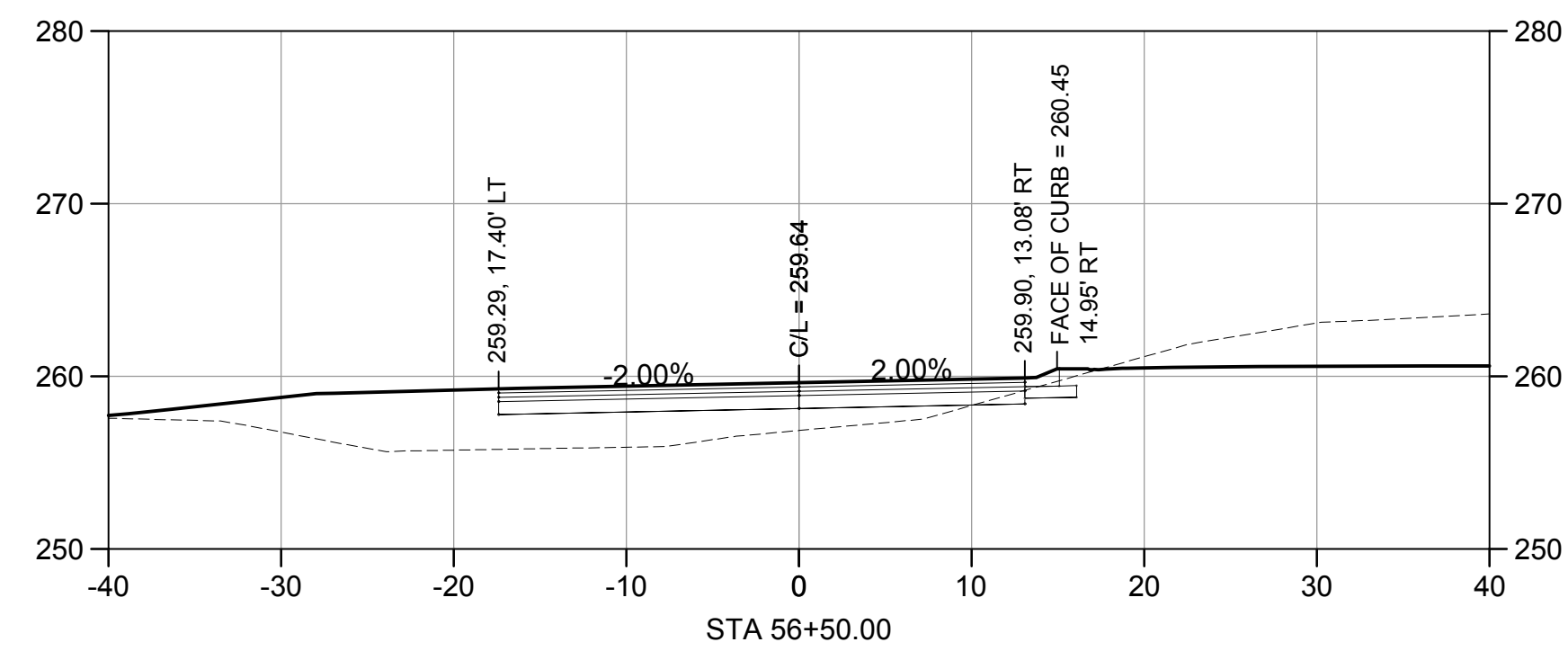
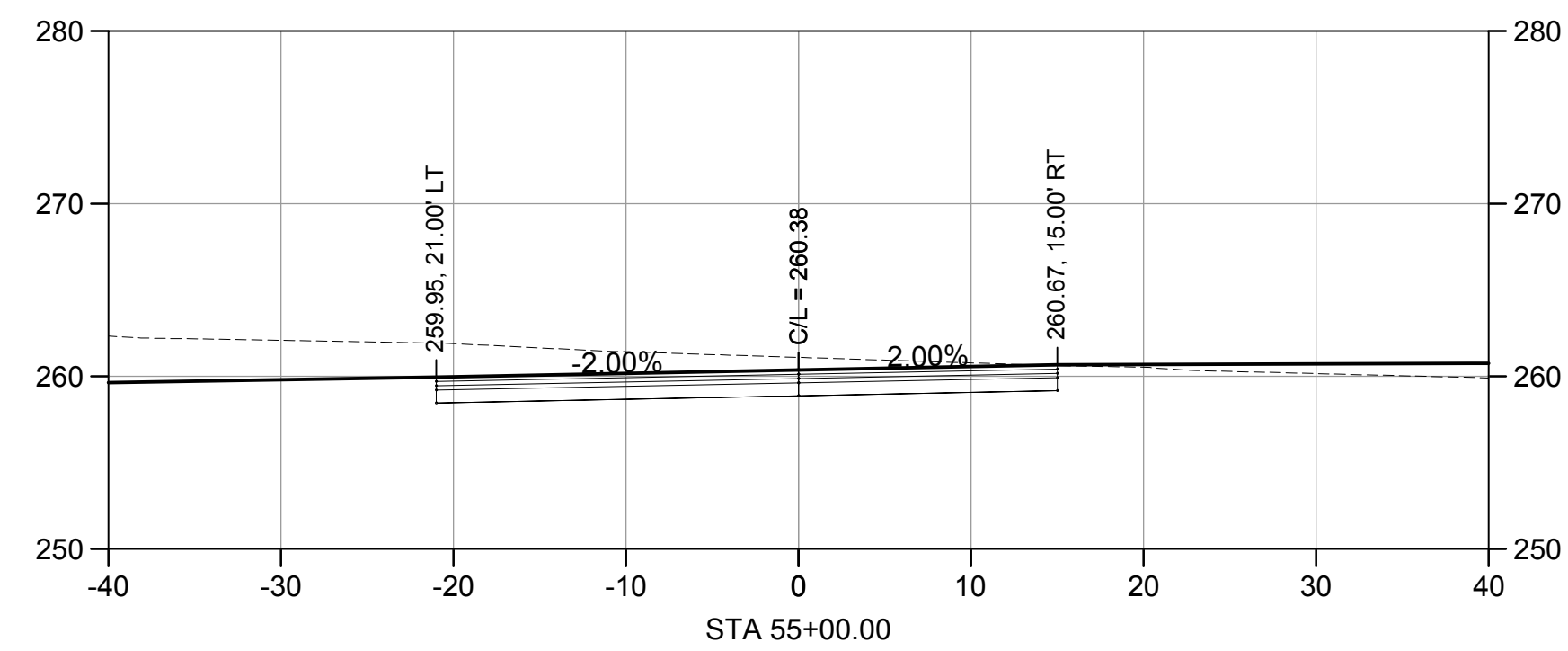
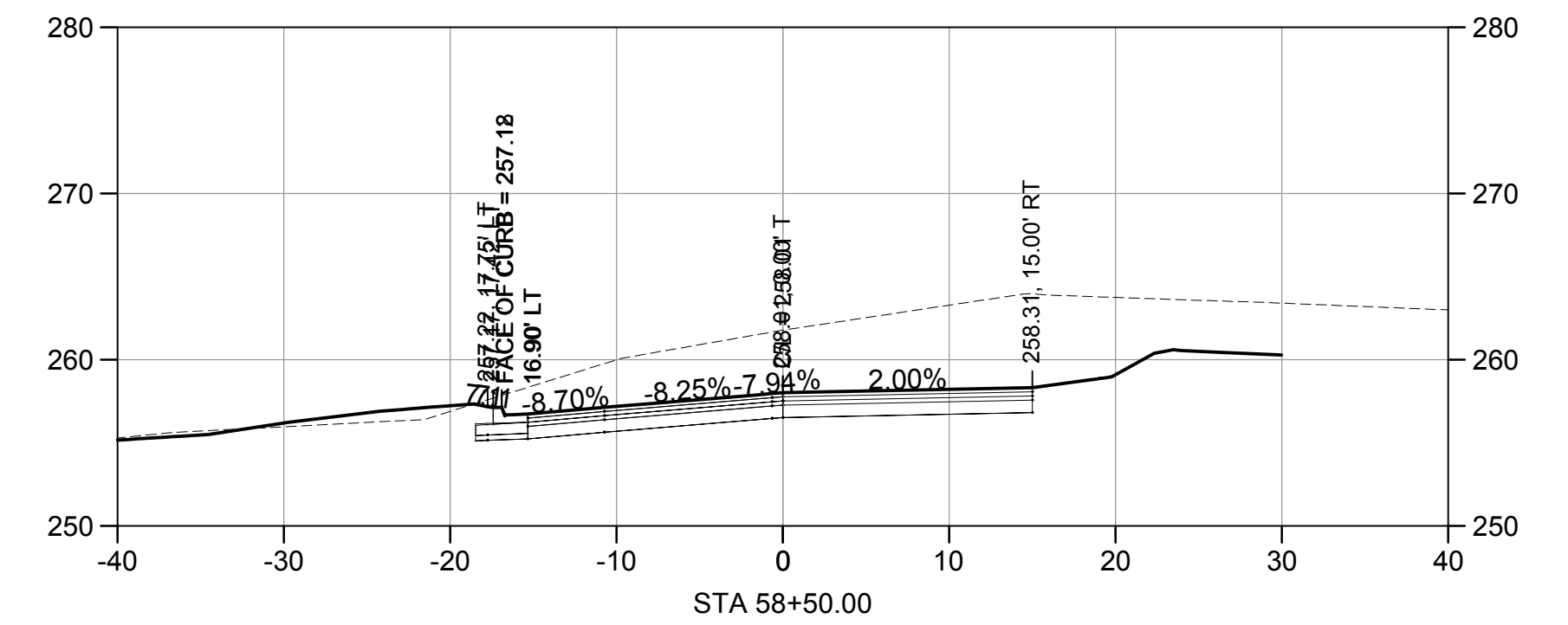
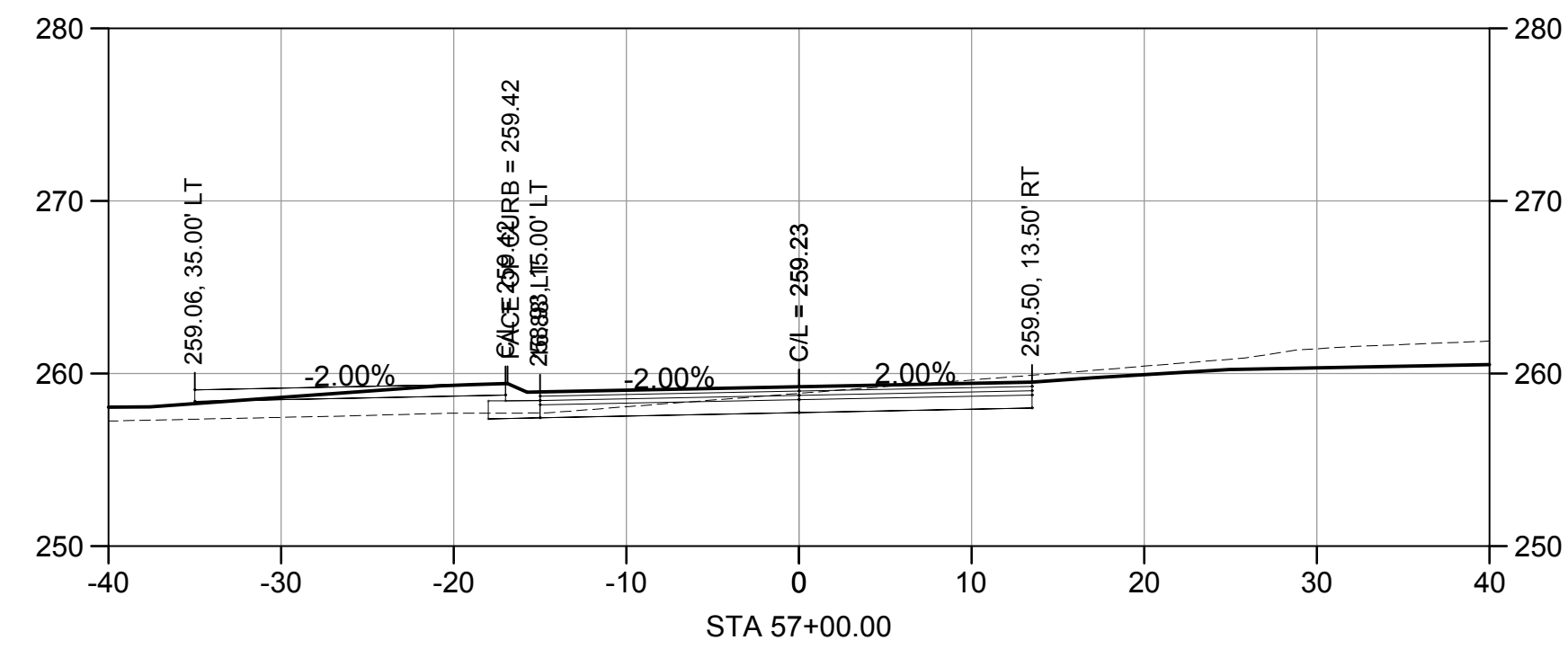
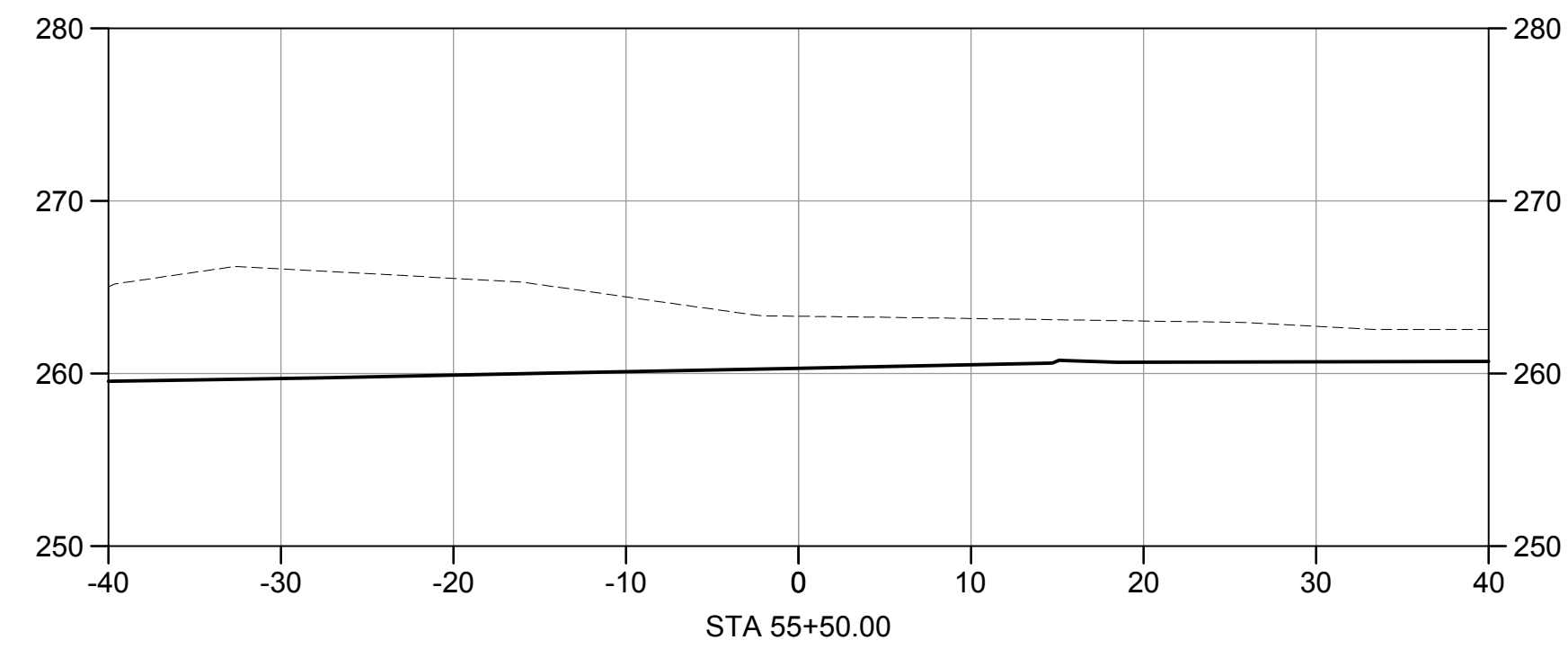
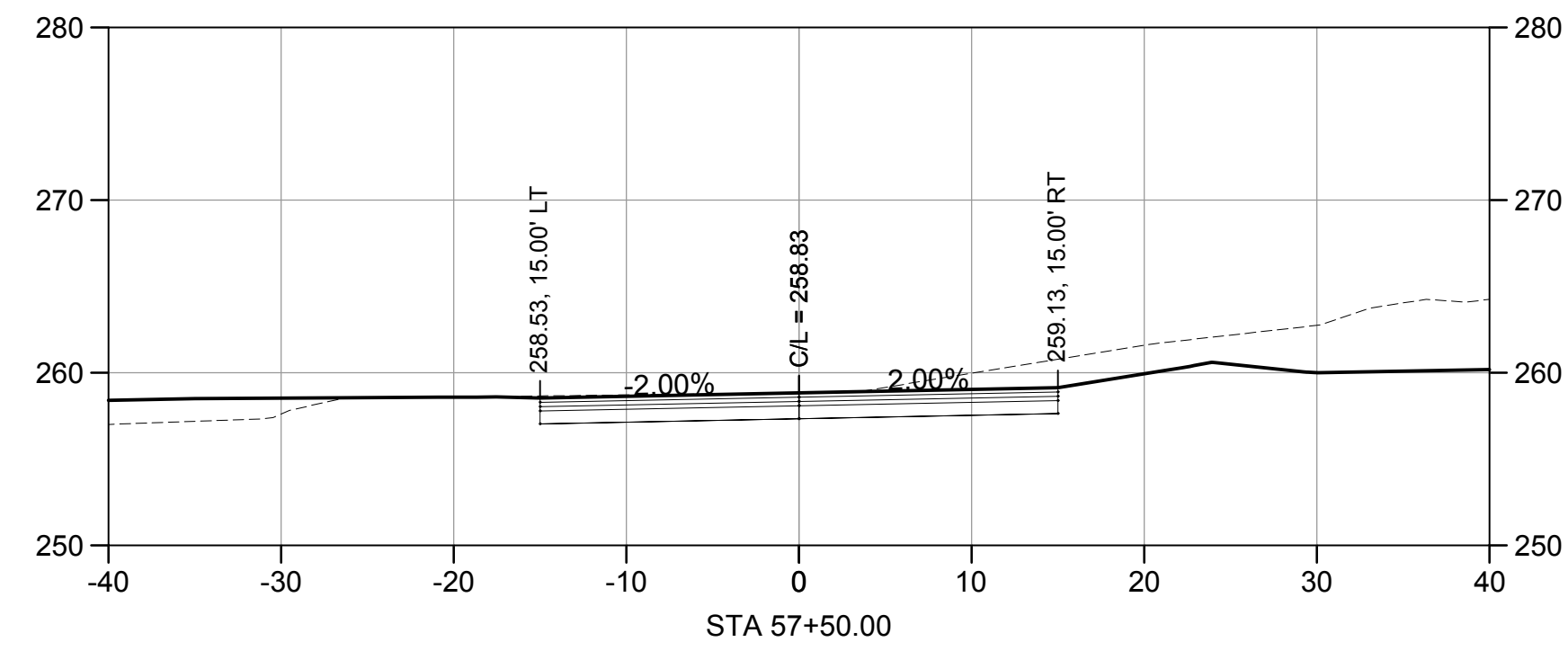
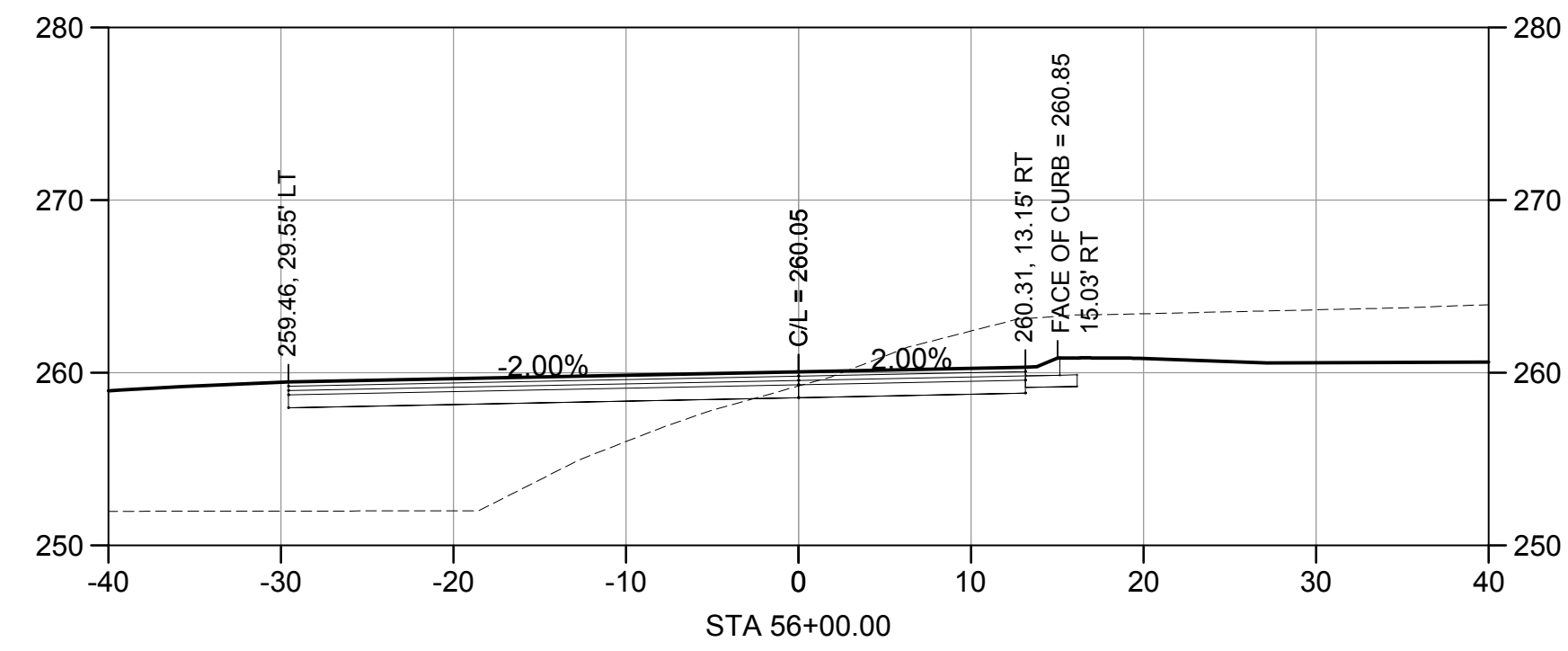
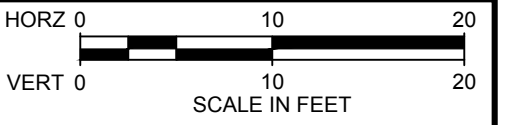
SITE
 GRADING
 ROAD B SECTIONS 1

SHEET	DWG 03-GR-30041
DATE	FEBRUARY 2020
PROJ	WTP_1.0

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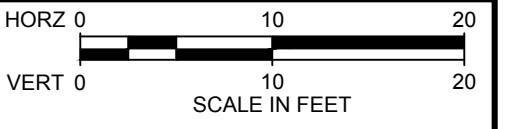


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SITE
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 ROAD B SECTIONS 2

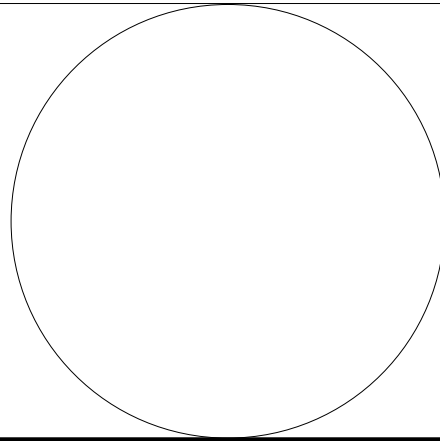
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DATE	FEBRUARY 2020
PROJ	WTP_1.0



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APVD	NA	NO.	DATE	REVISION	BY	APVD

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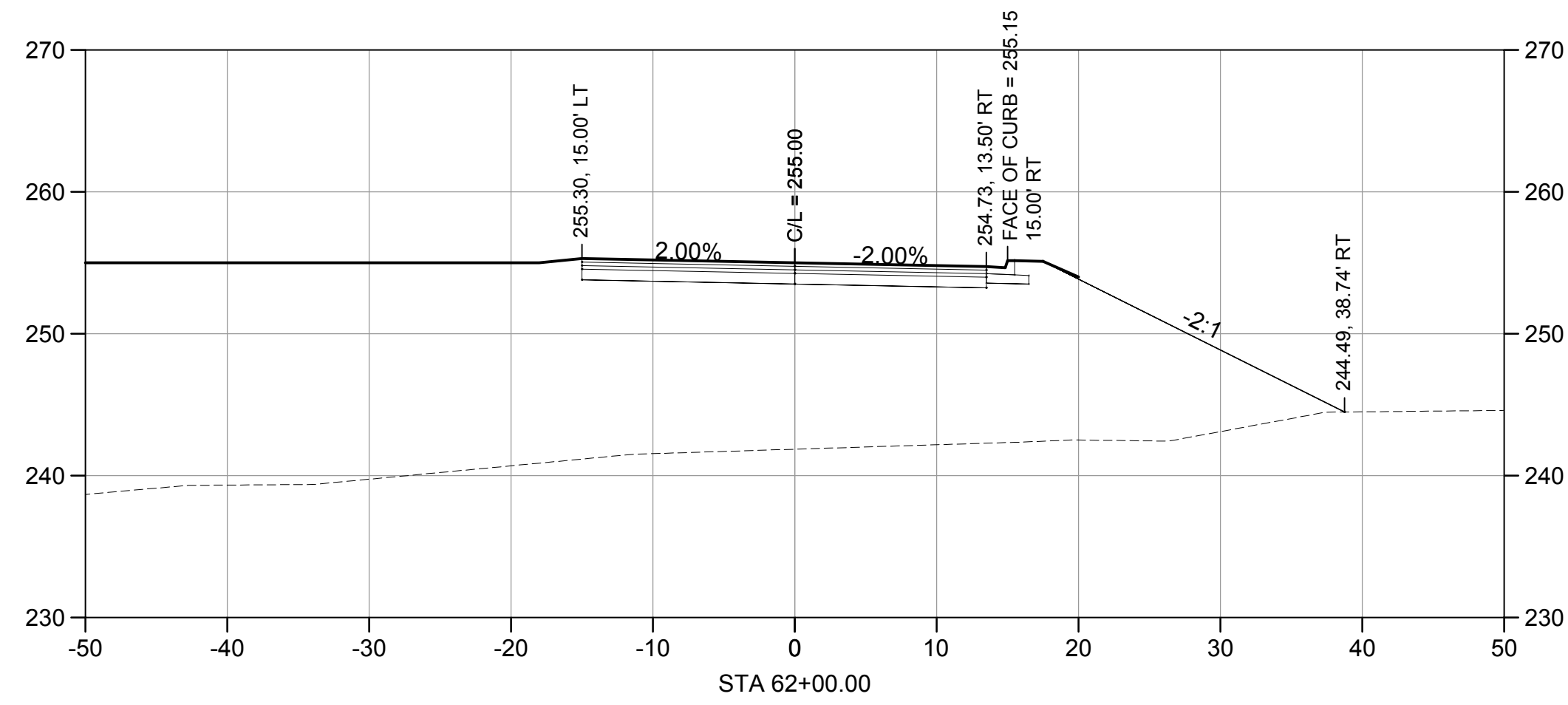
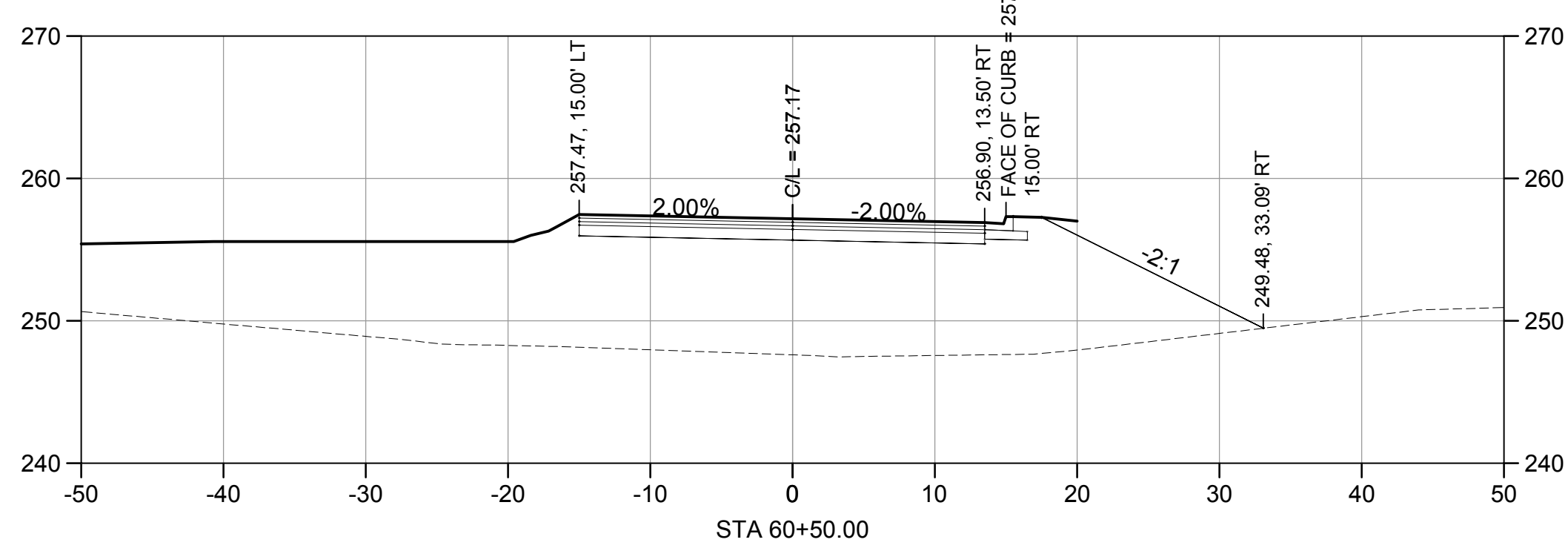
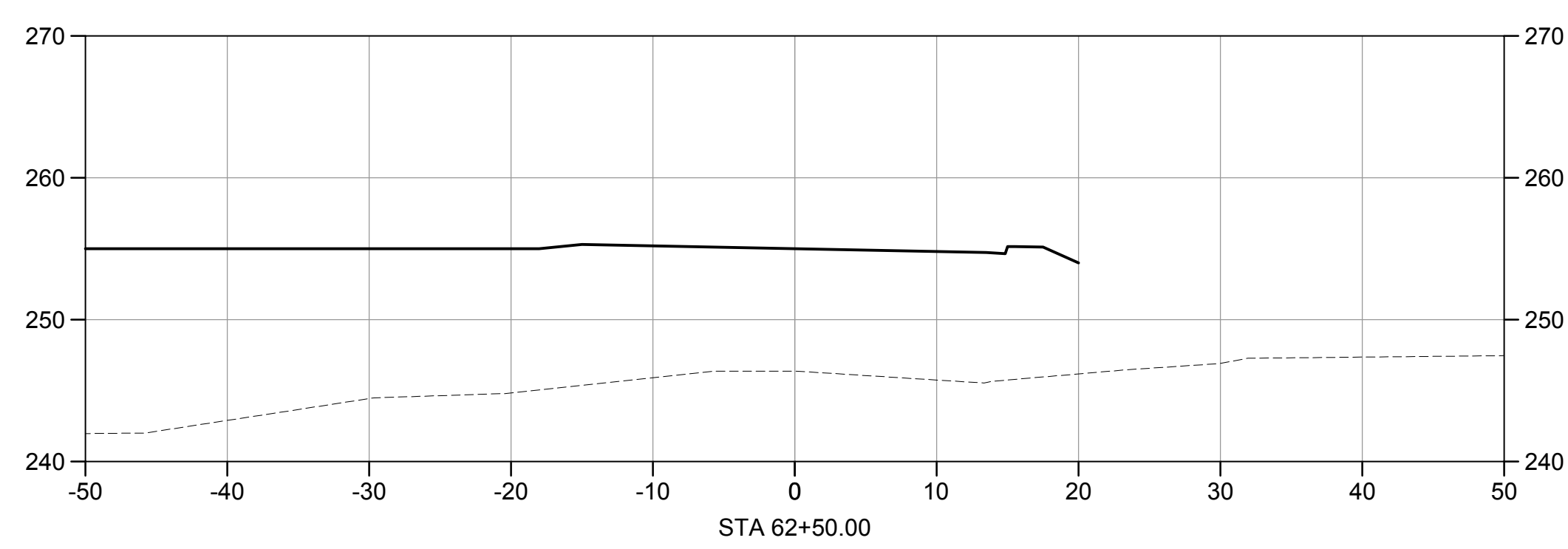
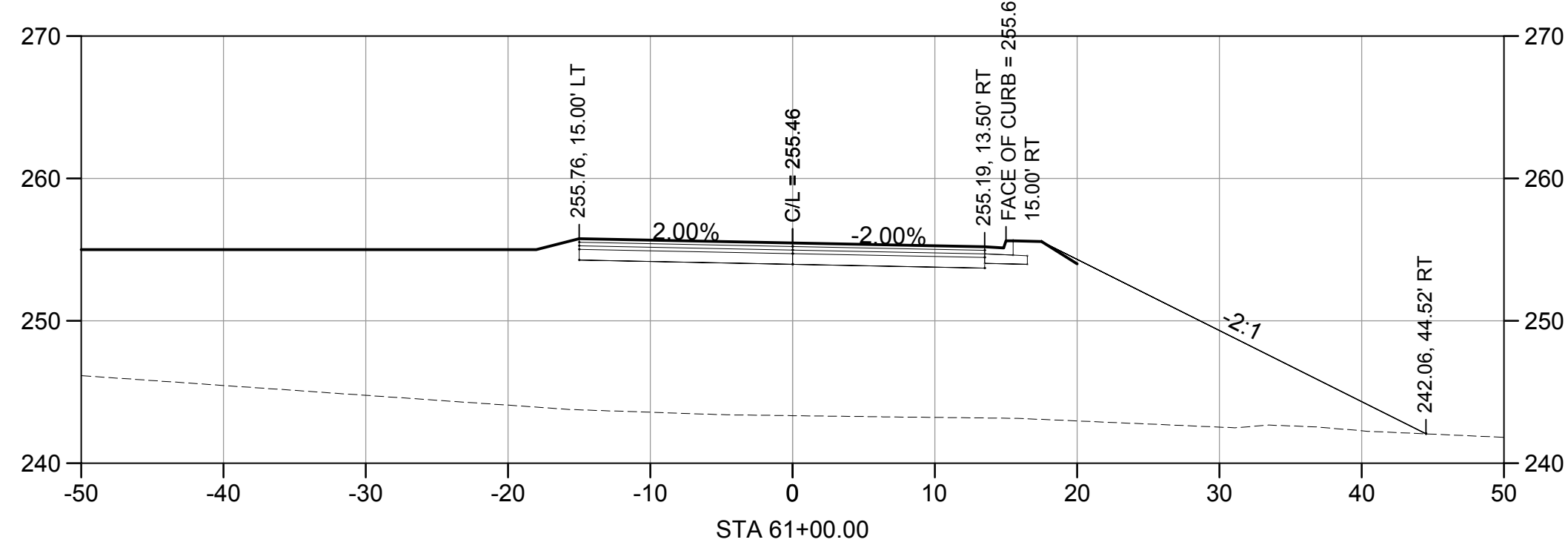
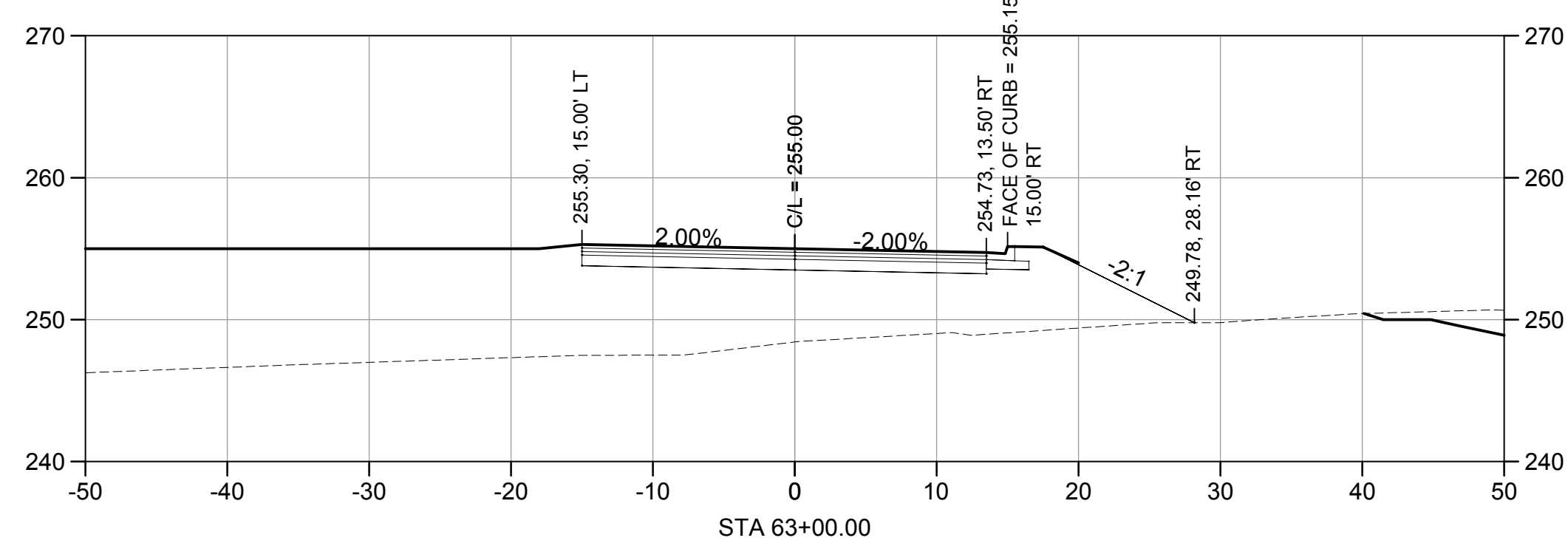
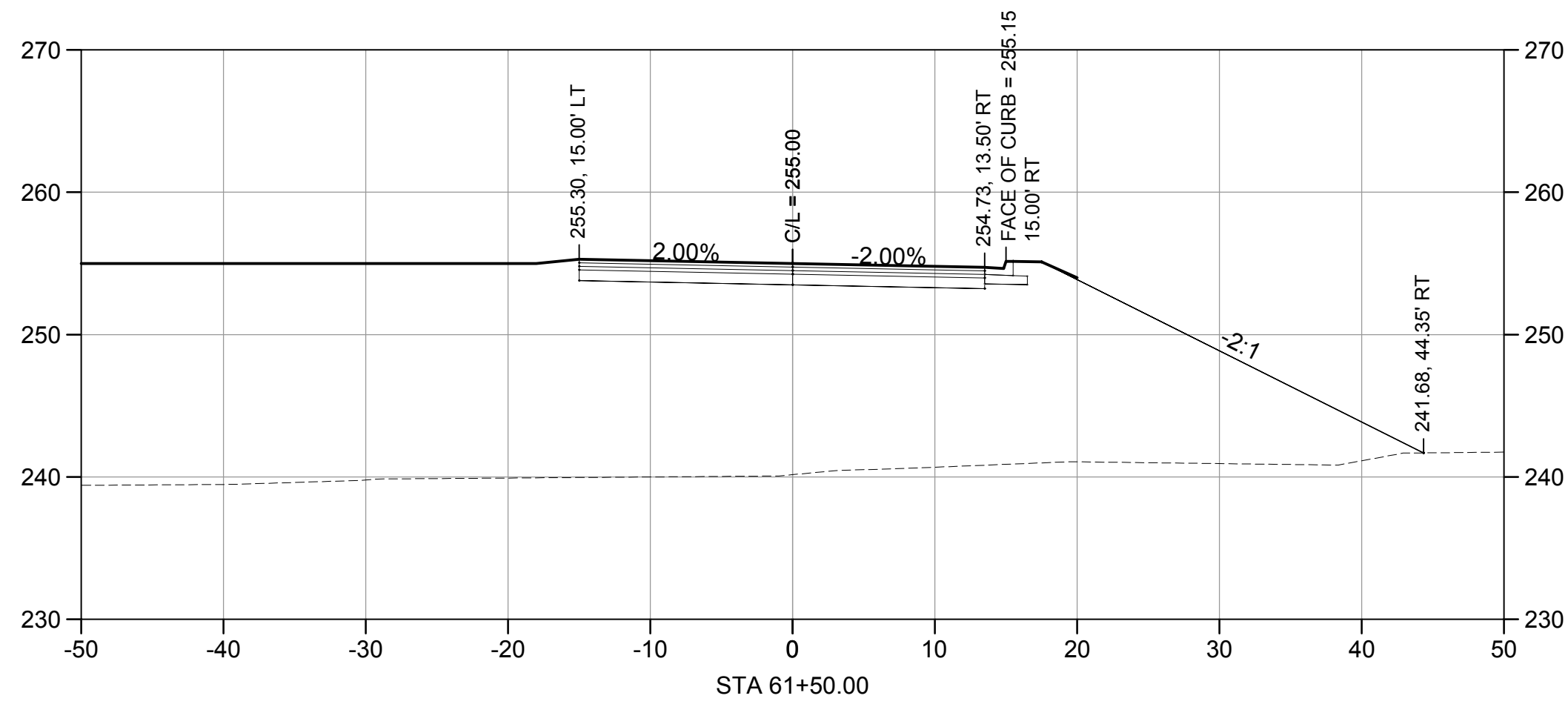
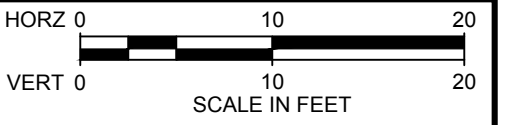


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SHEET	
DWG	03-GR-30043
DATE	FEBRUARY 2020
PROJ	WTP_1.0



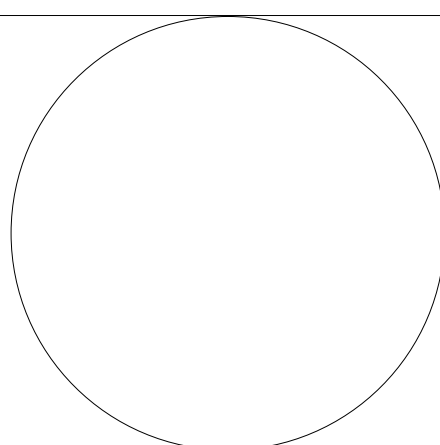
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SITE
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 ROAD C SECTIONS 1

SHEET	DWG 03-GR-30051
DATE	FEBRUARY 2020
PROJ	WTP 1.0

FOR LAND USE PERMITTING (EXHIBIT B)

Project Description

File Name 20191126-PRE-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 28, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	4
Nodes.....	17
<i>Junctions</i>	15
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	0
Links.....	15
<i>Channels</i>	8
<i>Pipes</i>	7
<i>Pumps</i>	0
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	REX-1949	Cumulative	inches				0.00	

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-01.1	5.23	70.00	11.58	7.66	40.07	1.18	0 00:13:03
2	HED-01.1	1.79	70.00	11.58	7.66	13.71	0.40	0 00:19:04
3	HED-02.1	11.73	80.00	11.58	9.04	106.04	2.83	0 00:16:21
4	HED-03.1	3.00	0.00	11.58	7.94	23.83	0.69	0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	3.48	152.16	0.00	7.84	0 00:00	0.00	0.00
2	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.40	157.05	0.00	7.95	0 00:00	0.00	0.00
3	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.40	158.04	0.00	6.96	0 00:00	0.00	0.00
4	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.40	177.21	0.00	4.04	0 00:00	0.00	0.00
5	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.40	181.17	0.00	10.83	0 00:00	0.00	0.00
6	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.40	223.12	0.00	5.88	0 00:00	0.00	0.00
7	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	3.10	171.13	0.00	7.87	0 00:00	0.00	0.00
8	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	3.10	172.04	0.00	4.96	0 00:00	0.00	0.00
9	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	3.10	174.13	0.00	3.87	0 00:00	0.00	0.00
10	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	3.11	175.79	0.00	9.95	0 00:00	0.00	0.00
11	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	3.21	181.45	0.00	6.55	0 00:00	0.00	0.00
12	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	3.28	182.23	0.00	5.73	0 00:00	0.00	0.00
13	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.66	183.08	0.00	6.92	0 00:00	0.00	0.00
14	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.67	235.03	0.00	4.97	0 00:00	0.00	0.00
15	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.69	236.14	0.00	13.86	0 00:00	0.00	0.00
16	COF-01	Outfall	238.00					1.18	238.00					
17	HED-01	Outfall	150.00					3.42	150.16					

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Reported Surcharged (min)	Condition
1	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.40	20.90	0.02	3.88	0.15	0.07	0.00	Calculated
2	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.40	28.48	0.01	3.22	0.17	0.08	0.00	Calculated
3	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.40	7.14	0.06	4.78	0.16	0.16	0.00	Calculated
4	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	3.10	40.58	0.08	4.96	0.43	0.14	0.00	Calculated
5	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	3.10	8.91	0.35	3.96	0.68	0.46	0.00	Calculated
6	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	3.10	4.04	0.77	2.77	0.91	0.61	0.00	Calculated
7	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	3.21	59.16	0.05	2.51	0.73	0.24	0.00	Calculated
8	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	3.42	1512.53	0.00	1.46	0.16	0.02	0.00	
9	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.40	1082.72	0.00	0.30	0.10	0.01	0.00	
10	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.40	2813.13	0.00	1.96	0.14	0.02	0.00	
11	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	3.09	1963.65	0.00	1.46	0.14	0.02	0.00	
12	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	3.11	614.42	0.01	0.85	0.62	0.08	0.00	
13	HED-03A	Channel	HED-03A	HED-02F	770.00	183.00	181.76	0.1600	60.000	0.0300	0.56	443.56	0.00	0.13	0.27	0.05	0.00	
14	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.66	2403.19	0.00	0.64	0.05	0.01	0.00	
15	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.67	417.77	0.00	0.38	0.09	0.02	0.00	

Subbasin Hydrology

Subbasin : COF-01.1

Input Data

Area (ac) 5.23
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	5.23	C/D	70.00
Composite Area & Weighted CN	5.23		70.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8}) / ((P^{0.5}) * (S_f^{0.4})))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

$$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$$

R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

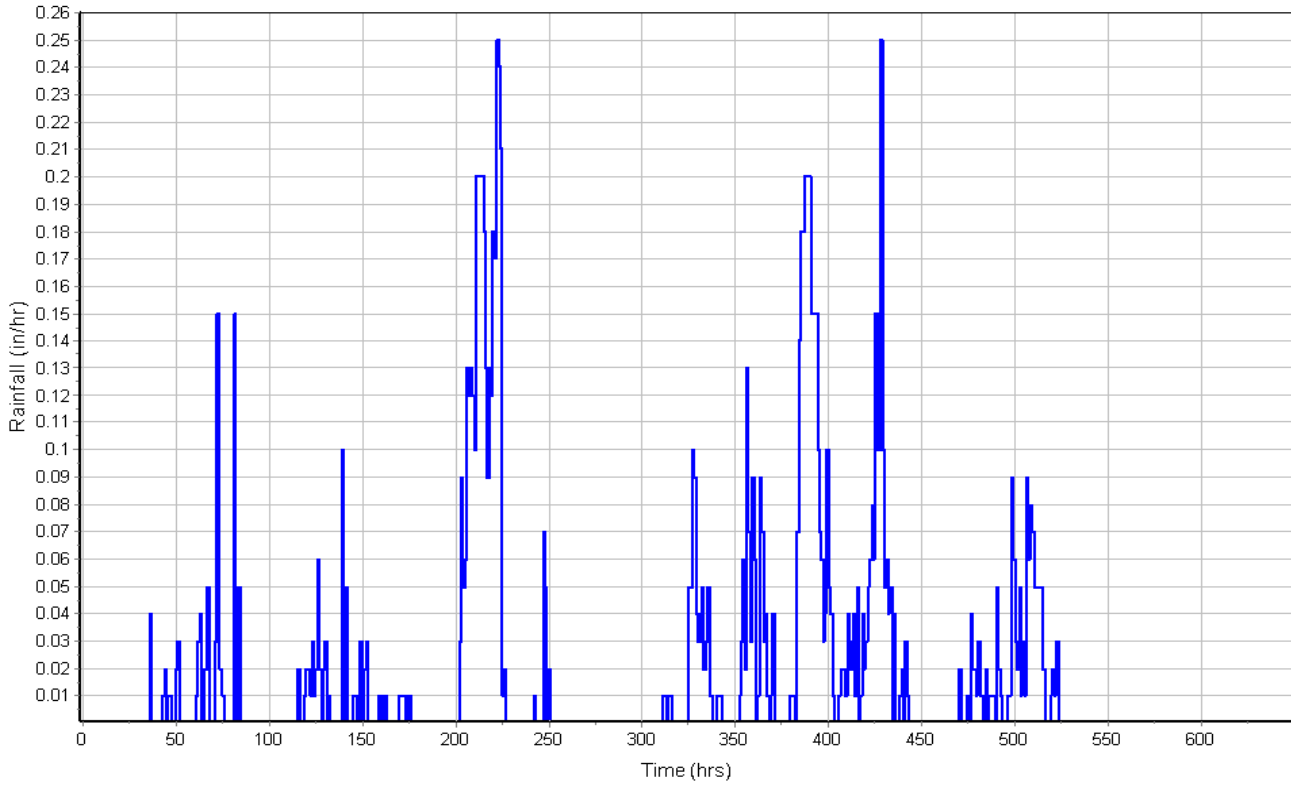
	Flowpath	Flowpath	Flowpath
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	17	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.16	0.00	0.00
Computed Flow Time (min) :	10.32	0.00	0.00
	Flowpath	Flowpath	Flowpath
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	210	0.00	0.00
Slope (%) :	6.6	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.28	0.00	0.00
Computed Flow Time (min) :	2.73	0.00	0.00
Total TOC (min)	13.06		

Subbasin Runoff Results

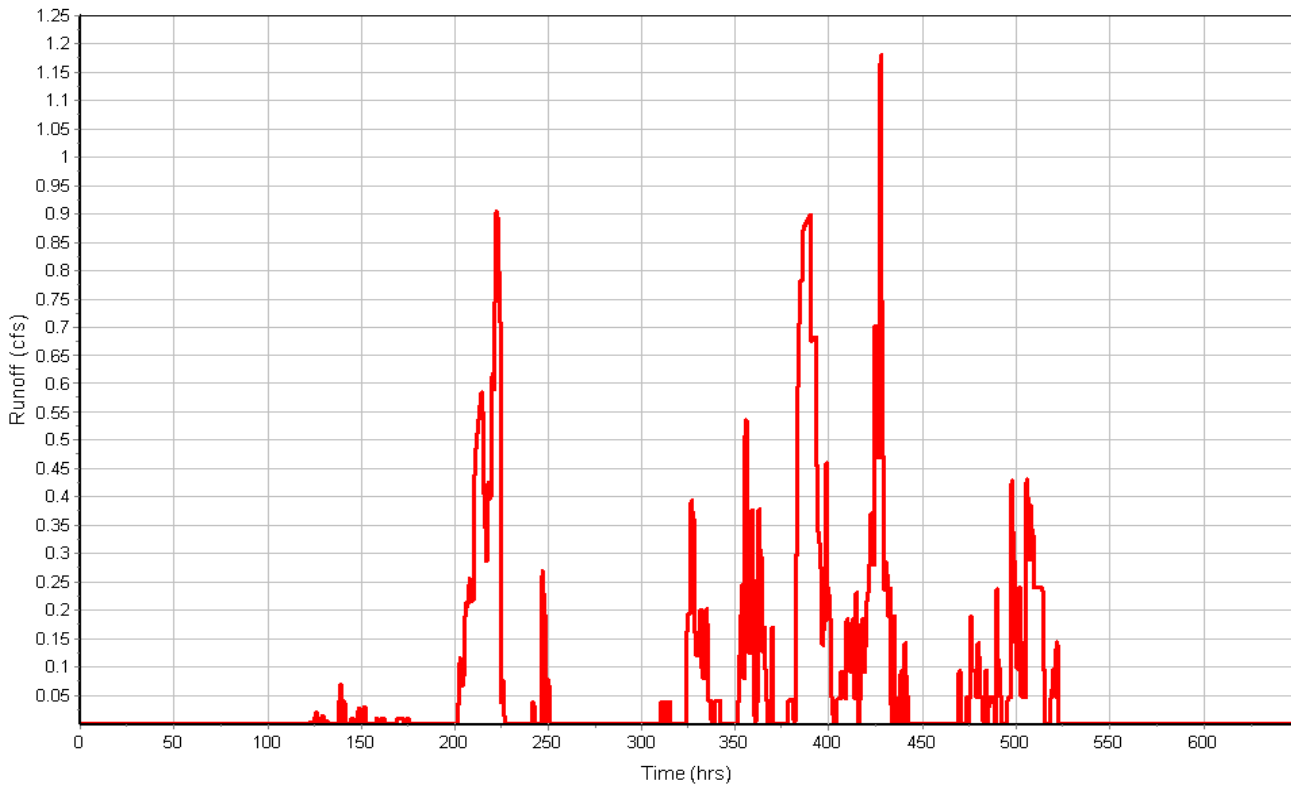
Total Rainfall (in)	11.58
Total Runoff (in)	7.66
Peak Runoff (cfs)	1.18
Weighted Curve Number	70.00
Time of Concentration (days hh:mm:ss)	0 00:13:04

Subbasin : COF-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Subbasin : HED-01.1

Input Data

Area (ac) 1.79
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	1.79	C/D	70.00
Composite Area & Weighted CN	1.79		70.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	10	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	12.76	0.00	0.00

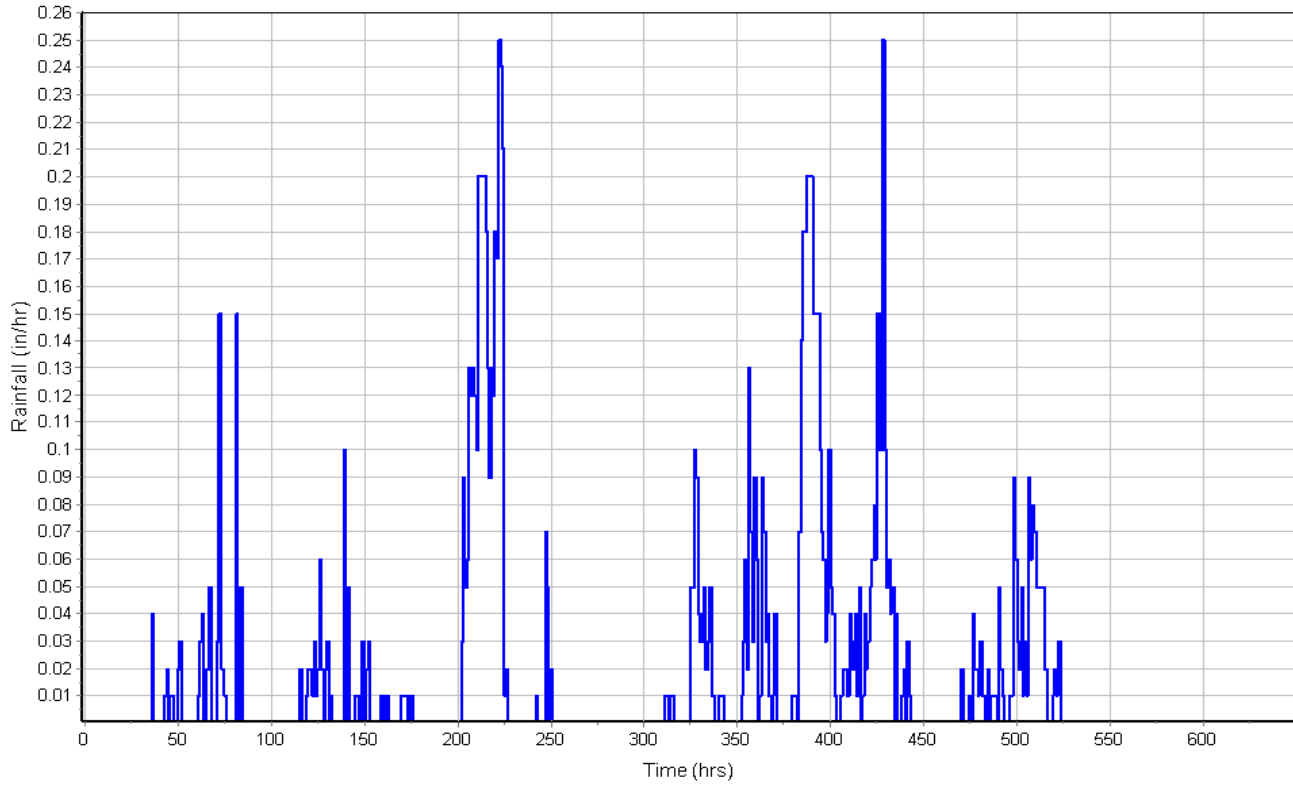
Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	364	0.00	0.00
Slope (%) :	3.7	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.96	0.00	0.00
Computed Flow Time (min) :	6.32	0.00	0.00
Total TOC (min)19.08			

Subbasin Runoff Results

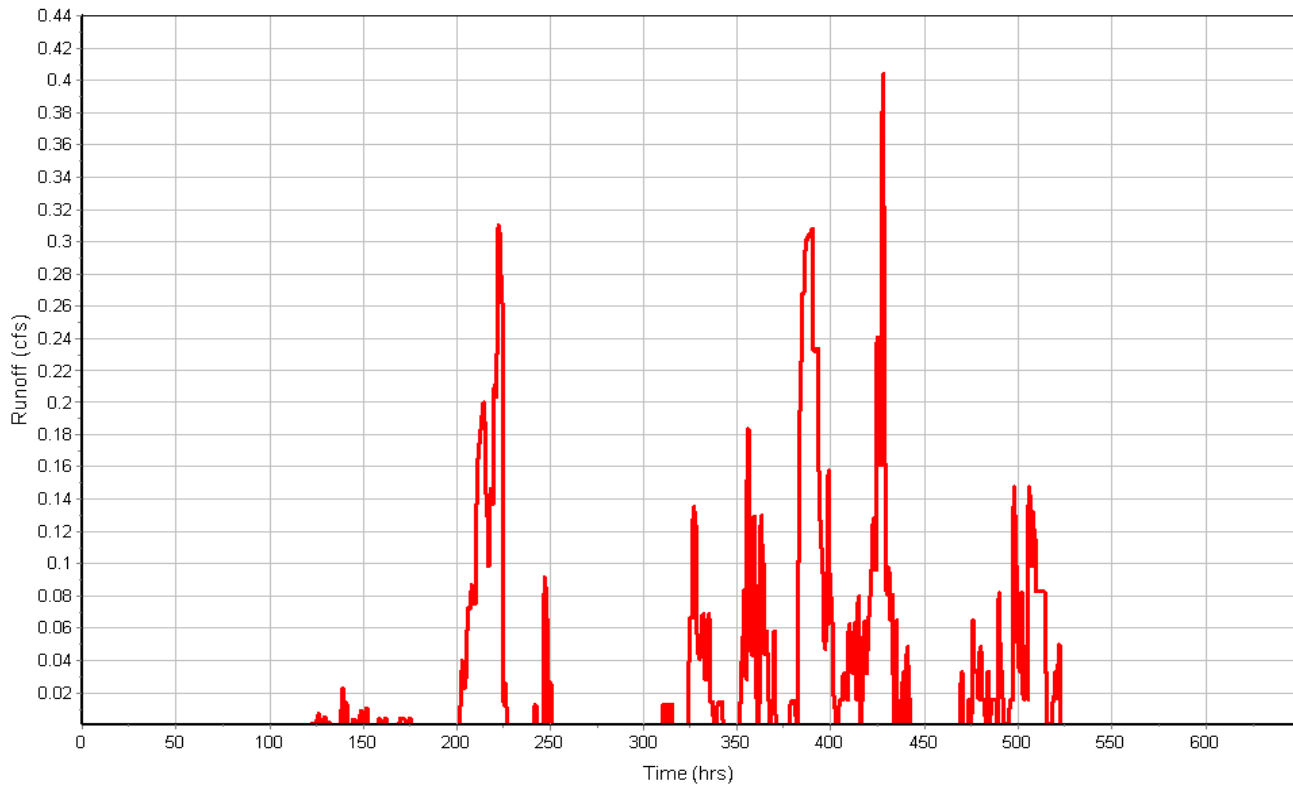
Total Rainfall (in) 11.58
 Total Runoff (in) 7.66
 Peak Runoff (cfs) 0.40
 Weighted Curve Number 70.00
 Time of Concentration (days hh:mm:ss) 0 00:19:05

Subbasin : HED-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Subbasin : HED-02.1

Input Data

Area (ac) 11.73
 Weighted Curve Number 80.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush/field	11.73	C/D	80.00
Composite Area & Weighted CN	11.73		80.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	18	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	10.09	0.00	0.00

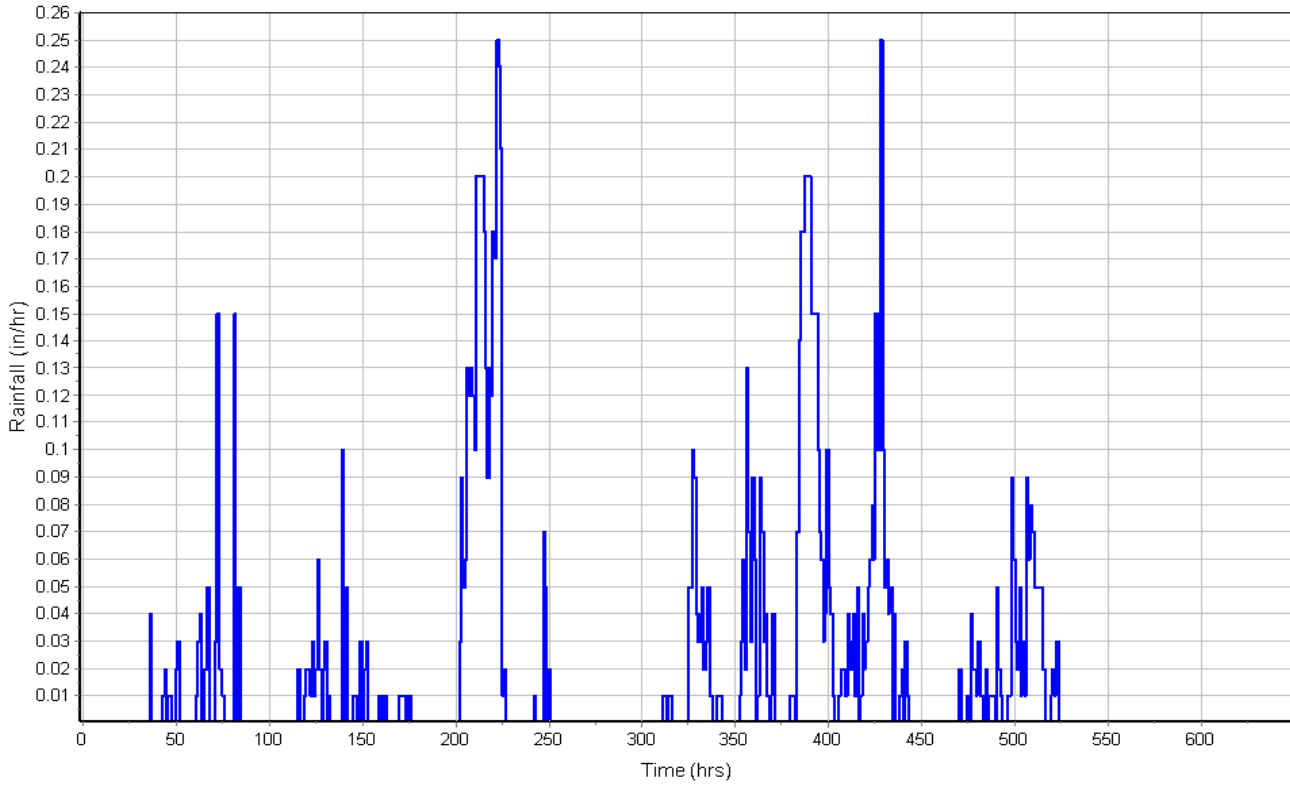
Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	500	0.00	0.00
Slope (%) :	3.6	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.33	0.00	0.00
Computed Flow Time (min) :	6.27	0.00	0.00
Total TOC (min)	16.35		

Subbasin Runoff Results

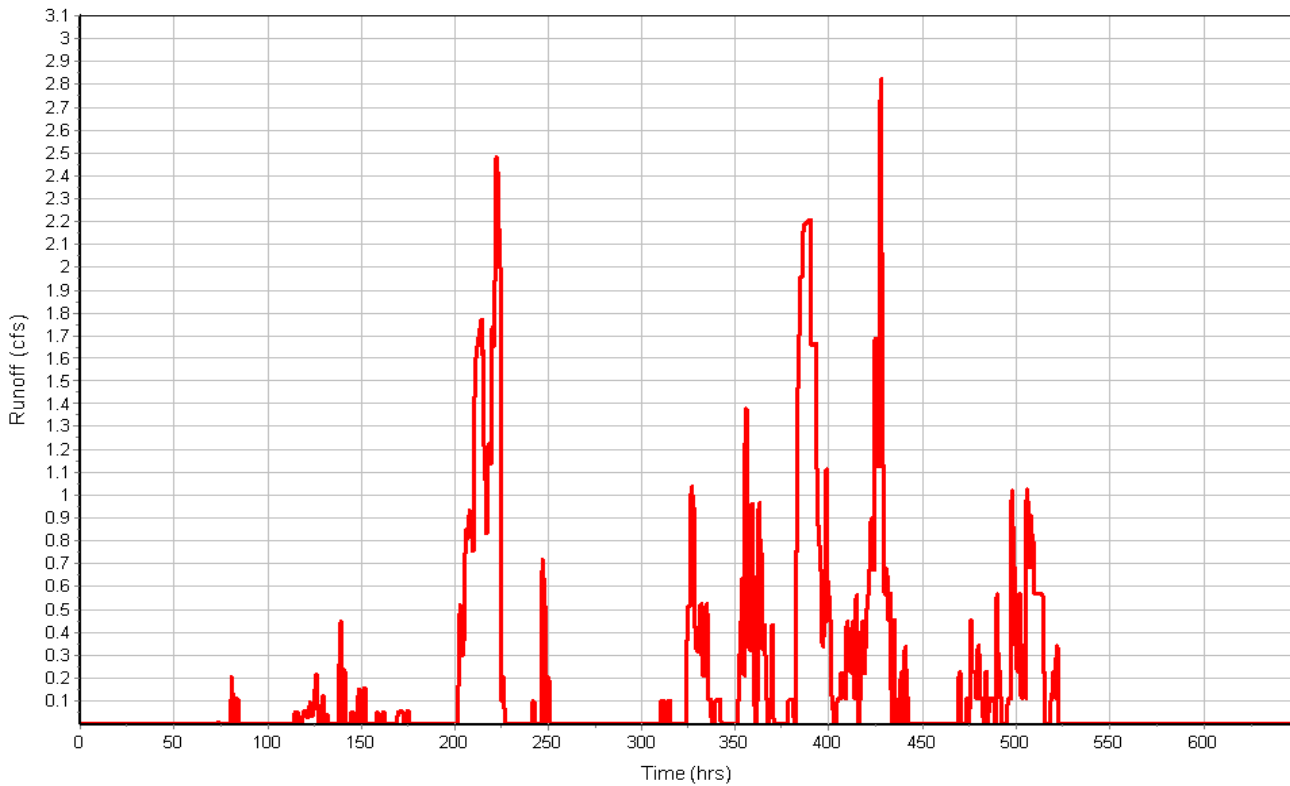
Total Rainfall (in) 11.58
 Total Runoff (in) 9.04
 Peak Runoff (cfs) 2.83
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:16:21

Subbasin : HED-02.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development Continuous Simulation

Subbasin : HED-03.1

Input Data

Area (ac) 3.00
 Weighted Curve Number 0.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	3.00	-	0.00
Composite Area & Weighted CN	3.00		0.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	12.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	11.67	0.00	0.00

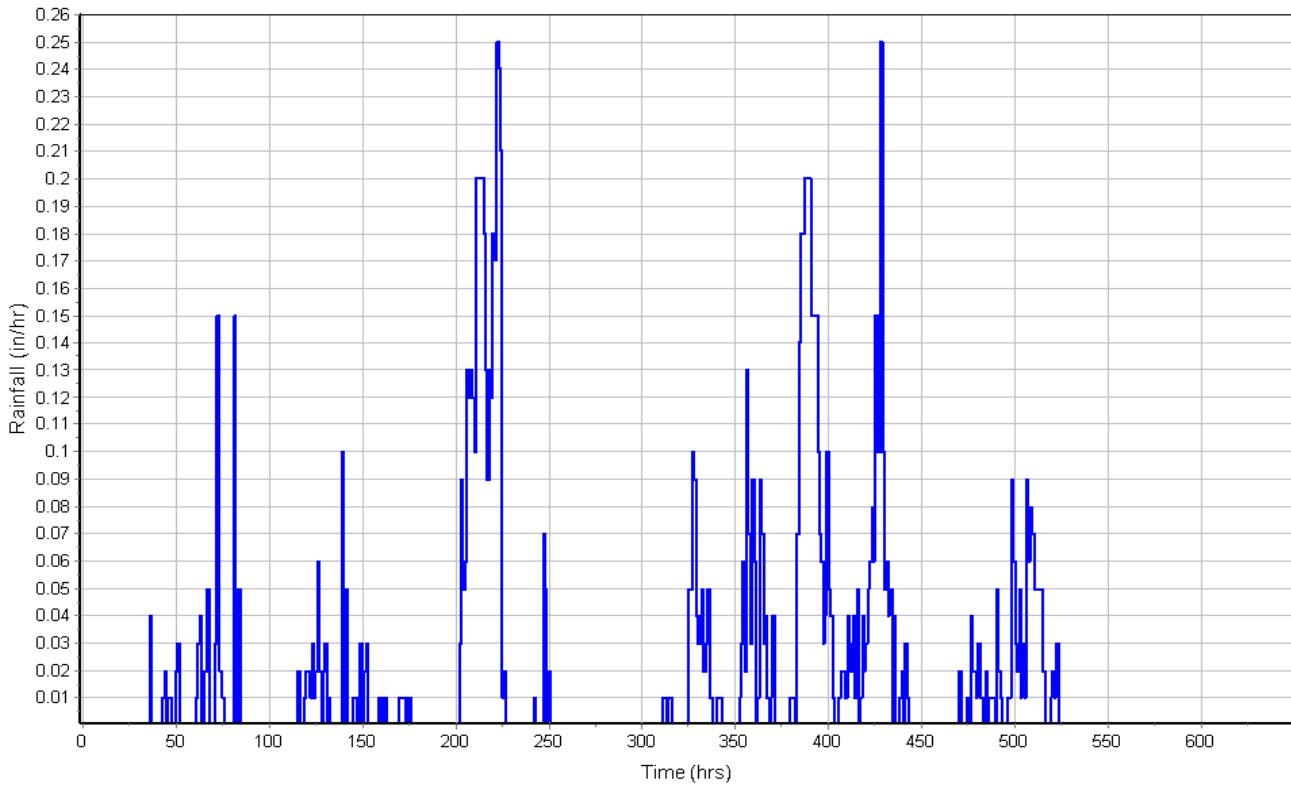
Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	354	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Woodland	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	6.78	0.00	0.00
Total TOC (min)	18.45		

Subbasin Runoff Results

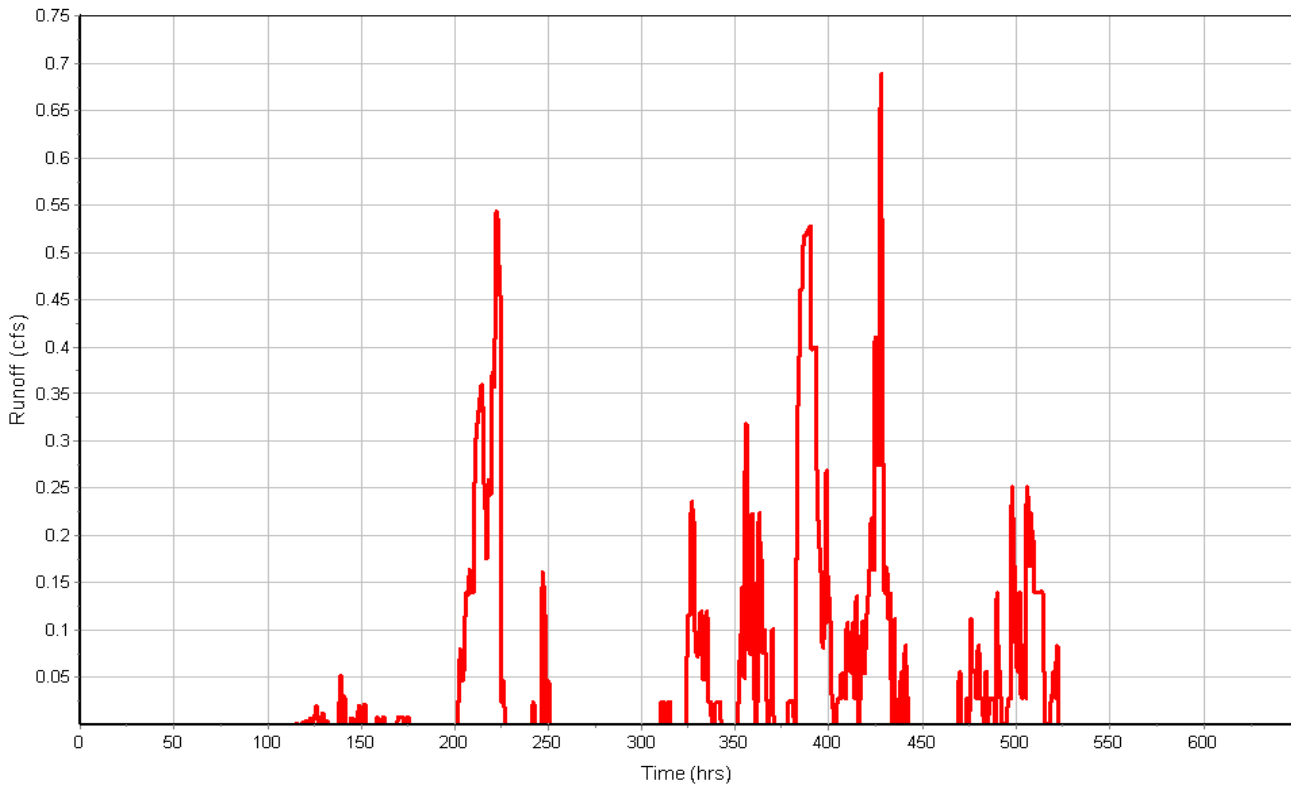
Total Rainfall (in) 11.58
 Total Runoff (in) 7.94
 Peak Runoff (cfs) 0.69
 Weighted Curve Number 0.00
 Time of Concentration (days hh:mm:ss) 0 00:18:27

Subbasin : HED-03.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
2	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
3	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
4	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
5	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
6	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
7	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
8	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
9	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
10	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
11	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
12	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
13	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
14	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
15	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	HED-01A	3.48	0.00	152.16	0.16	0.00	7.84	152.02	0.02	17 20:25	0 00:00	0.00	0.00
2	HED-01B	0.40	0.00	157.05	0.05	0.00	7.95	157.01	0.01	17 20:12	0 00:00	0.00	0.00
3	HED-01C	0.40	0.00	158.04	0.24	0.00	6.96	157.83	0.03	17 19:58	0 00:00	0.00	0.00
4	HED-01D	0.40	0.00	177.21	0.17	0.00	4.04	177.06	0.02	17 20:06	0 00:00	0.00	0.00
5	HED-01E	0.40	0.00	181.17	0.17	0.00	10.83	181.02	0.02	17 20:05	0 00:00	0.00	0.00
6	HED-01F	0.40	0.40	223.12	0.12	0.00	5.88	223.01	0.01	17 20:05	0 00:00	0.00	0.00
7	HED-02A	3.10	0.00	171.13	0.13	0.00	7.87	171.02	0.02	17 20:21	0 00:00	0.00	0.00
8	HED-02B	3.10	0.00	172.04	0.74	0.00	4.96	171.41	0.11	17 20:17	0 00:00	0.00	0.00
9	HED-02C	3.10	0.00	174.13	0.63	0.00	3.87	173.59	0.09	17 20:18	0 00:00	0.00	0.00
10	HED-02D	3.11	0.00	175.79	1.19	0.00	9.95	174.77	0.17	17 20:16	0 00:00	0.00	0.00
11	HED-02E	3.21	0.00	181.45	0.99	0.00	6.55	180.60	0.14	17 20:14	0 00:00	0.00	0.00
12	HED-02F	3.28	2.83	182.23	0.47	0.00	5.73	181.83	0.07	17 20:08	0 00:00	0.00	0.00
13	HED-03A	0.66	0.00	183.08	0.08	0.00	6.92	183.01	0.01	17 20:31	0 00:00	0.00	0.00
14	HED-03B	0.67	0.00	235.03	0.03	0.00	4.97	235.00	0.00	17 20:15	0 00:00	0.00	0.00
15	HED-03C	0.69	0.69	236.14	0.14	0.00	13.86	236.01	0.01	17 20:08	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00	No
6	HED-03A	770.00	183.00	0.00	181.76	0.00	1.24	0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
7	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
8	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01A	3.42	17 20:25	1512.53	0.00	1.46	1.88	0.16	0.02	0.00		
2 HED-01B	0.40	17 20:12	1082.72	0.00	0.30	44.72	0.10	0.01	0.00		
3 HED-01F	0.40	17 20:05	2813.13	0.00	1.96	5.26	0.14	0.02	0.00		
4 HED-02A	3.09	17 20:21	1963.65	0.00	1.46	10.62	0.14	0.02	0.00		
5 HED-02E	3.11	17 20:14	614.42	0.01	0.85	9.53	0.62	0.08	0.00		
6 HED-03A	0.56	17 20:31	443.56	0.00	0.13	98.72	0.27	0.05	0.00		
7 HED-03B	0.66	17 20:15	2403.19	0.00	0.64	28.65	0.05	0.01	0.00		
8 HED-03C	0.67	17 20:10	417.77	0.00	0.38	30.70	0.09	0.02	0.00		

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
2 HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
3 HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
4 HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5 HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6 HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7 HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
Continuous Simulation

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01C	0.40	17 20:07	20.90	0.02	3.88	0.40	0.15	0.07	0.00		Calculated
2 HED-01D	0.40	17 20:06	28.48	0.01	3.22	6.22	0.17	0.08	0.00		Calculated
3 HED-01E	0.40	17 20:05	7.14	0.06	4.78	0.33	0.16	0.16	0.00		Calculated
4 HED-02B	3.10	17 20:18	40.58	0.08	4.96	0.27	0.43	0.14	0.00		Calculated
5 HED-02C	3.10	17 20:18	8.91	0.35	3.96	1.29	0.68	0.46	0.00		Calculated
6 HED-02D	3.10	17 20:16	4.04	0.77	2.77	4.48	0.91	0.61	0.00		Calculated
7 HED-02F	3.21	17 20:08	59.16	0.05	2.51	1.10	0.73	0.24	0.00		Calculated

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Project Description

File Name 20191126-PRE-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 03, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	4
Nodes.....	17
<i>Junctions</i>	15
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	0
Links.....	15
<i>Channels</i>	8
<i>Pipes</i>	7
<i>Pumps</i>	0
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	2-yr 50%	Intensity	inches	Oregon	Washington	1	1.25	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-01.1	5.23	70.00	1.25	0.03	0.17	0.02	0 00:13:03
2	HED-01.1	1.79	70.00	1.25	0.03	0.06	0.01	0 00:19:04
3	HED-02.1	11.73	80.00	1.25	0.17	2.03	0.14	0 00:16:21
4	HED-03.1	3.00	0.00	1.25	0.05	0.15	0.02	0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 50% of 2-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	0.15	152.02	0.00	7.98	0 00:00	0.00	0.00
2	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.01	157.00	0.00	8.00	0 00:00	0.00	0.00
3	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.01	157.83	0.00	7.17	0 00:00	0.00	0.00
4	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.01	177.07	0.00	4.18	0 00:00	0.00	0.00
5	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.01	181.02	0.00	10.98	0 00:00	0.00	0.00
6	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.01	223.01	0.00	5.99	0 00:00	0.00	0.00
7	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	0.14	171.02	0.00	7.98	0 00:00	0.00	0.00
8	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	0.14	171.46	0.00	5.54	0 00:00	0.00	0.00
9	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	0.14	173.63	0.00	4.37	0 00:00	0.00	0.00
10	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	0.14	174.84	0.00	10.90	0 00:00	0.00	0.00
11	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	0.14	180.65	0.00	7.35	0 00:00	0.00	0.00
12	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	0.14	181.87	0.00	6.09	0 00:00	0.00	0.00
13	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.01	183.01	0.00	6.99	0 00:00	0.00	0.00
14	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.02	235.00	0.00	5.00	0 00:00	0.00	0.00
15	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.02	236.02	0.00	13.98	0 00:00	0.00	0.00
16	COF-01	Outfall	238.00					0.02	238.00					
17	HED-01	Outfall	150.00					0.15	150.02					

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Link Summary

SN Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	HED-01C Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.01	20.90	0.00	1.24	0.02	0.01	0.00	Calculated
2	HED-01D Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.01	28.48	0.00	1.31	0.02	0.01	0.00	Calculated
3	HED-01E Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.01	7.14	0.00	1.44	0.02	0.02	0.00	Calculated
4	HED-02B Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	0.14	40.58	0.00	2.28	0.09	0.03	0.00	Calculated
5	HED-02C Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	0.14	8.91	0.02	1.60	0.15	0.10	0.00	Calculated
6	HED-02D Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	0.14	4.04	0.04	1.12	0.19	0.13	0.00	Calculated
7	HED-02F Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	0.14	59.16	0.00	1.56	0.15	0.05	0.00	Calculated
8	HED-01A Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	0.15	1512.53	0.00	0.42	0.02	0.00	0.00	
9	HED-01B Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.01	1082.72	0.00	0.03	0.01	0.00	0.00	
10	HED-01F Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.01	2813.13	0.00	0.38	0.02	0.00	0.00	
11	HED-02A Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	0.14	1963.65	0.00	0.44	0.02	0.00	0.00	
12	HED-02E Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	0.14	614.42	0.00	0.29	0.11	0.02	0.00	
13	HED-03A Channel	HED-03A	HED-02F	770.00	183.00	181.76	0.1600	60.000	0.0300	0.01	443.56	0.00	0.02	0.06	0.01	0.00	
14	HED-03B Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.01	2403.19	0.00	0.00	0.01	0.00	0.00	
15	HED-03C Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.02	417.77	0.00	0.00	0.01	0.00	0.00	

Subbasin Hydrology

Subbasin : COF-01.1

Input Data

Area (ac) 5.23
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	5.23	C/D	70.00
Composite Area & Weighted CN	5.23		70.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8}) / ((P^{0.5}) * (S_f^{0.4})))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

$$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$$

R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 50% of 2-year storm

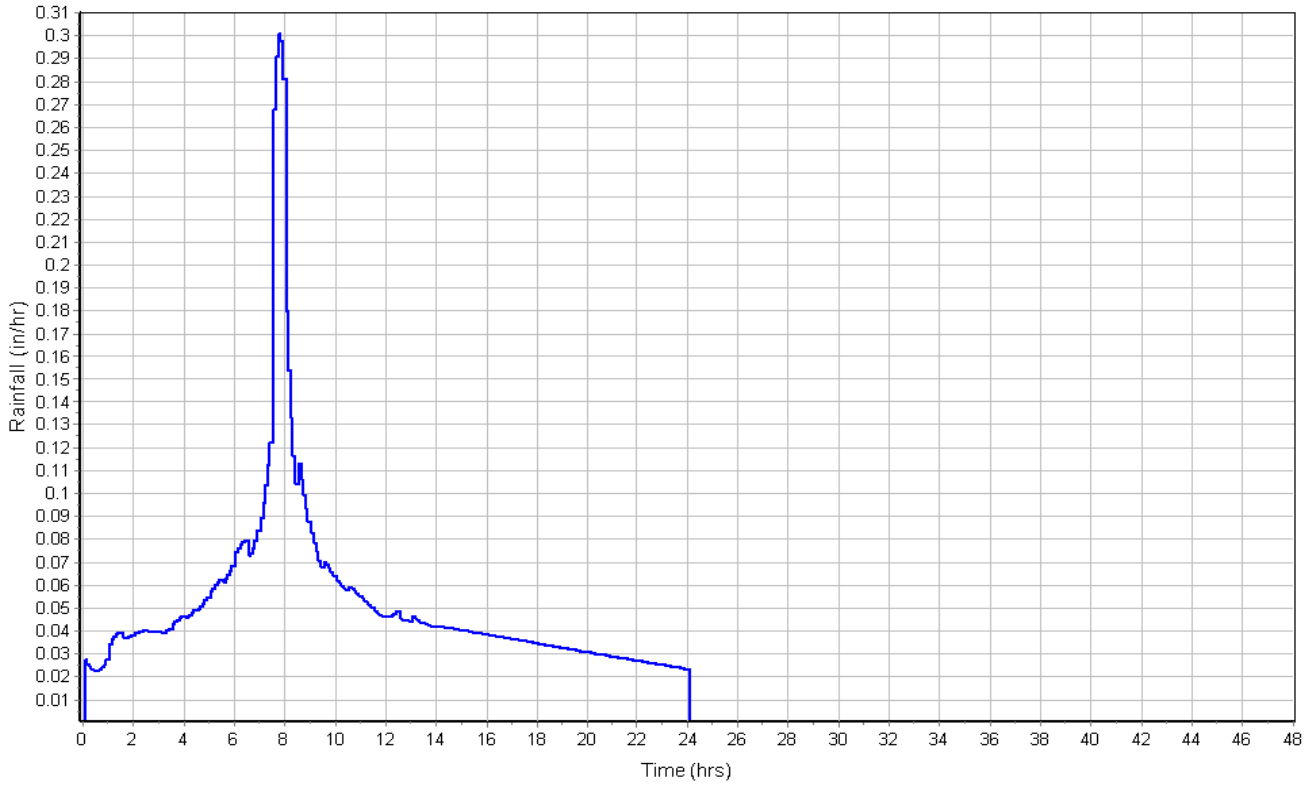
	Flowpath A	Flowpath B	Flowpath C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	17	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.16	0.00	0.00
Computed Flow Time (min) :	10.32	0.00	0.00
	Flowpath A	Flowpath B	Flowpath C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	210	0.00	0.00
Slope (%) :	6.6	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.28	0.00	0.00
Computed Flow Time (min) :	2.73	0.00	0.00
Total TOC (min)	13.06		

Subbasin Runoff Results

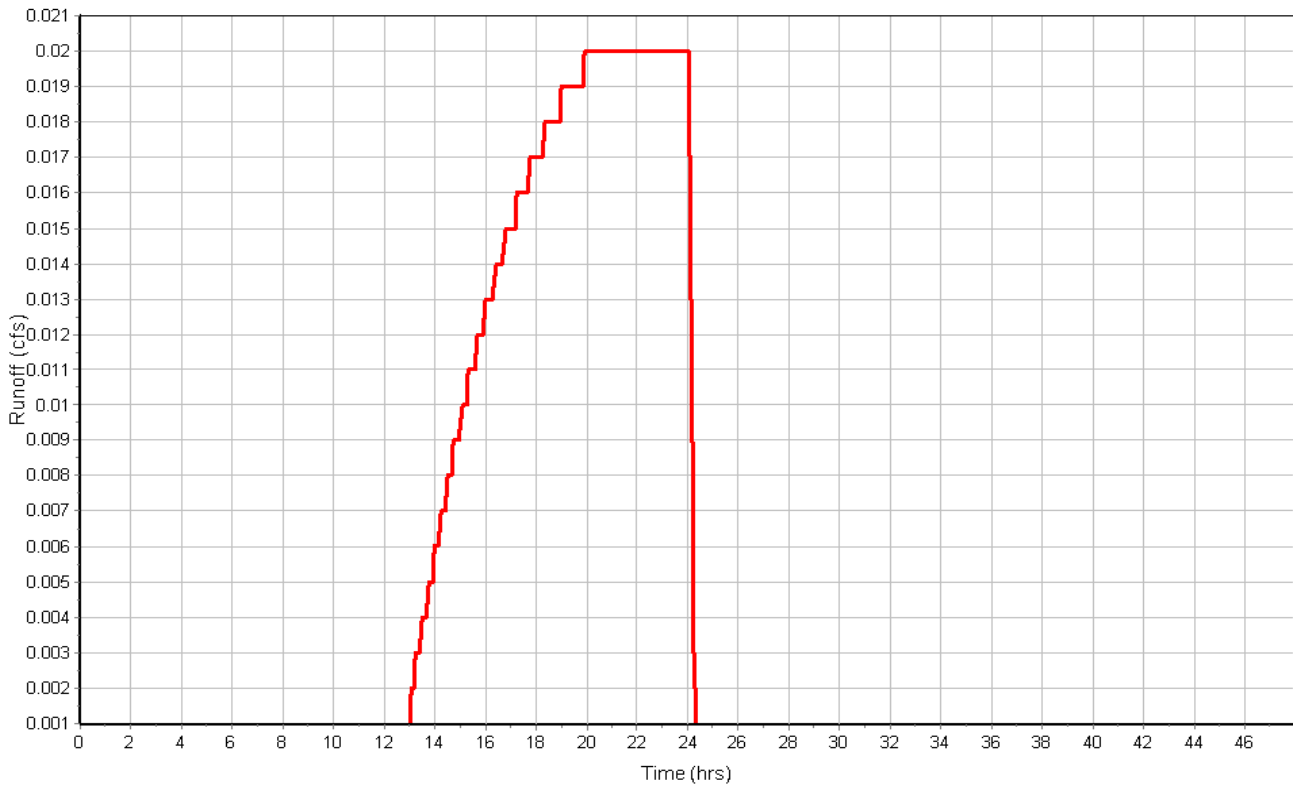
Total Rainfall (in)	1.25
Total Runoff (in)	0.03
Peak Runoff (cfs)	0.02
Weighted Curve Number	70.00
Time of Concentration (days hh:mm:ss)	0 00:13:04

Subbasin : COF-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Subbasin : HED-01.1

Input Data

Area (ac) 1.79
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	1.79	C/D	70.00
Composite Area & Weighted CN	1.79		70.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	10	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	12.76	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	364	0.00	0.00
Slope (%) :	3.7	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.96	0.00	0.00
Computed Flow Time (min) :	6.32	0.00	0.00
Total TOC (min)	19.08		

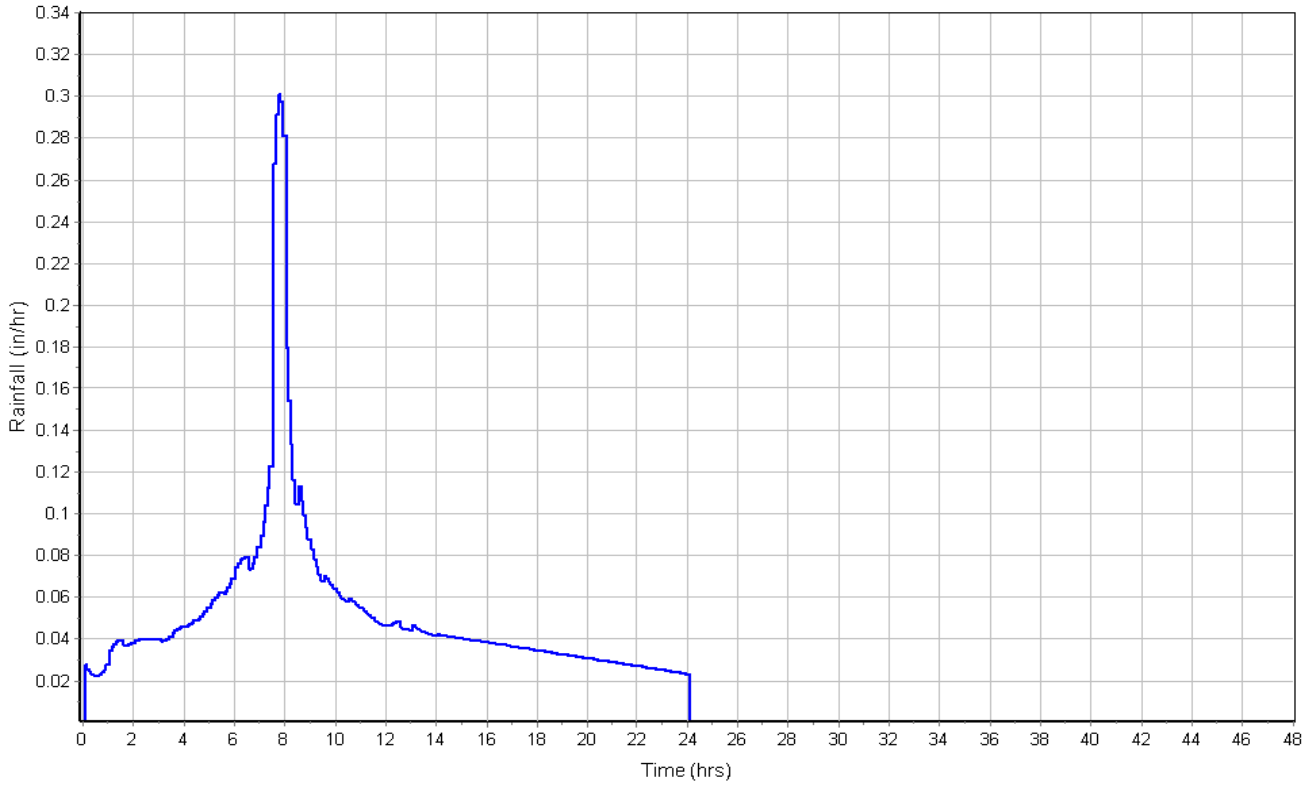
Subbasin Runoff Results

Total Rainfall (in) 1.25
 Total Runoff (in) 0.03
 Peak Runoff (cfs) 0.01
 Weighted Curve Number 70.00
 Time of Concentration (days hh:mm:ss) 0 00:19:05

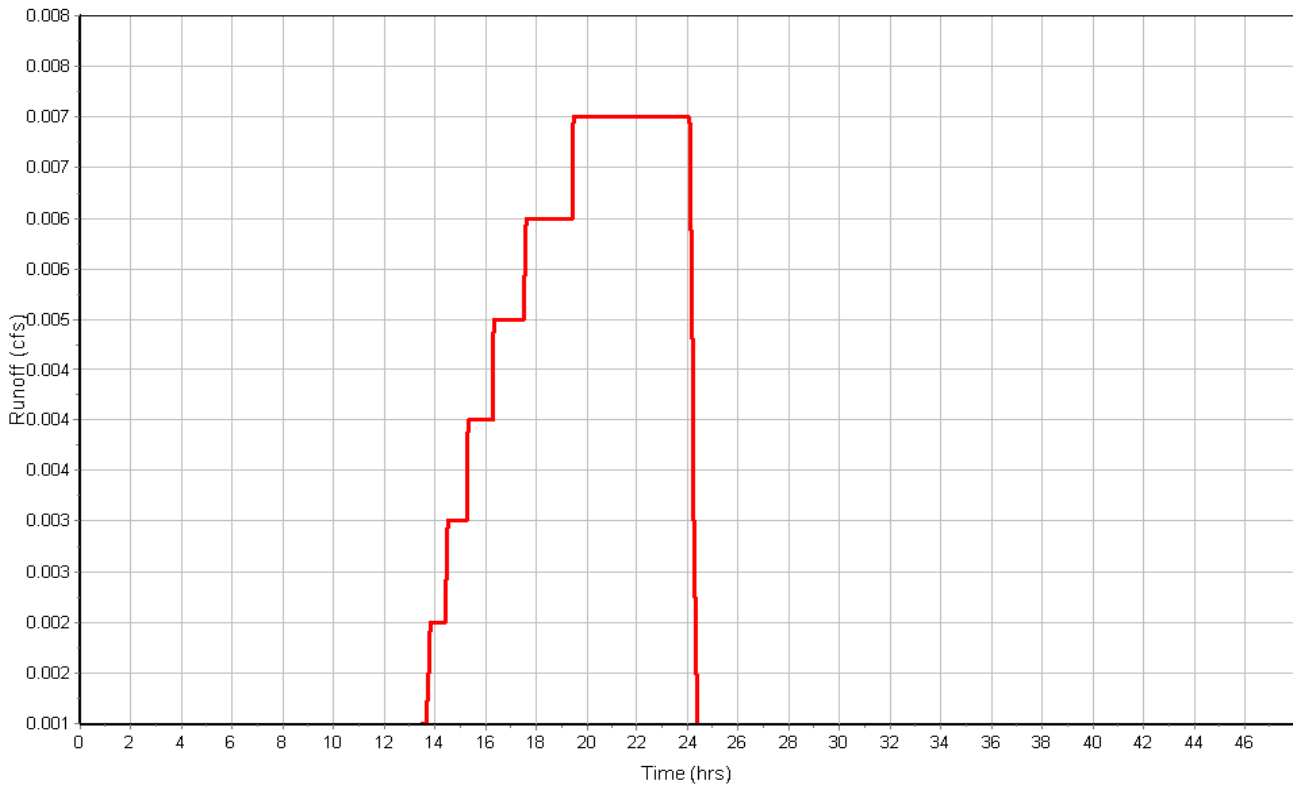
FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 50% of 2-year storm

Subbasin : HED-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Subbasin : HED-02.1

Input Data

Area (ac) 11.73
 Weighted Curve Number 80.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush/field	11.73	C/D	80.00
Composite Area & Weighted CN	11.73		80.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	18	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	10.09	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	500	0.00	0.00
Slope (%) :	3.6	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.33	0.00	0.00
Computed Flow Time (min) :	6.27	0.00	0.00
Total TOC (min)	16.35		

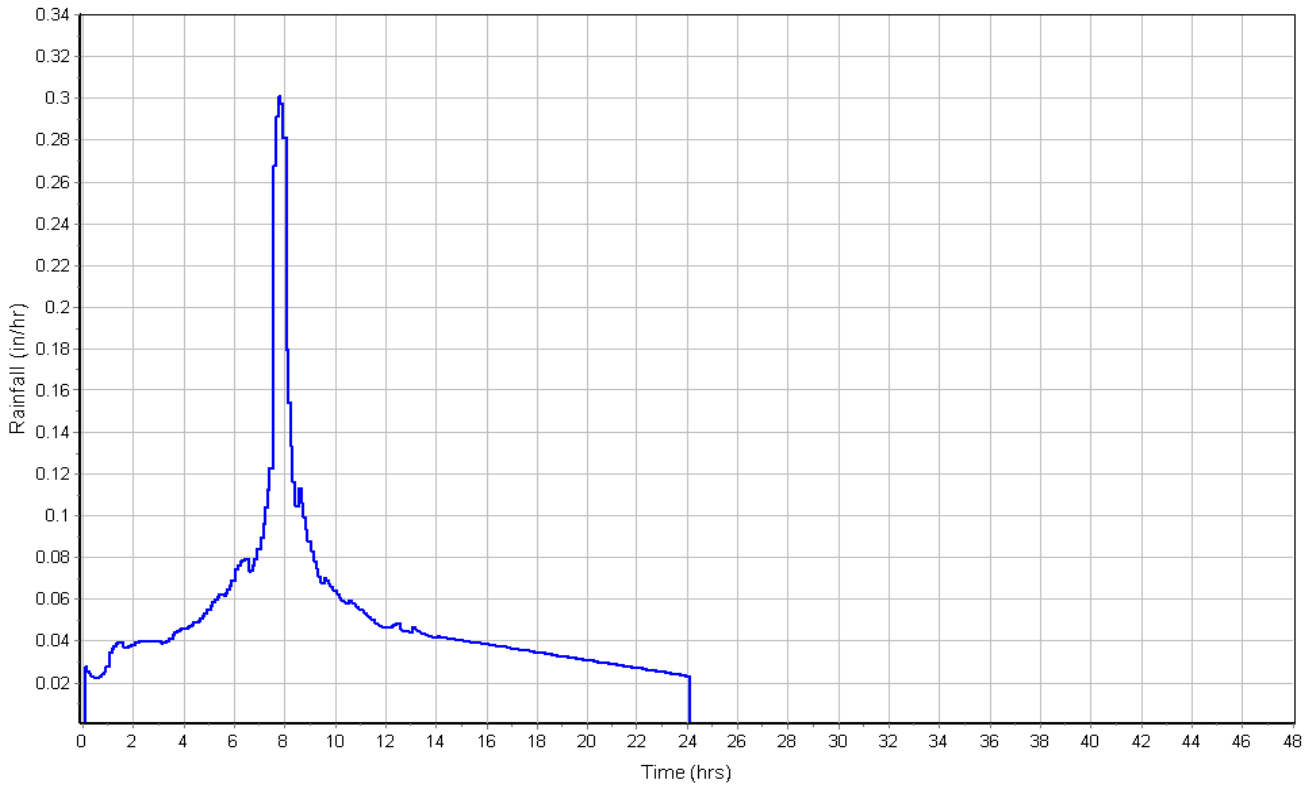
Subbasin Runoff Results

Total Rainfall (in) 1.25
 Total Runoff (in) 0.17
 Peak Runoff (cfs) 0.14
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:16:21

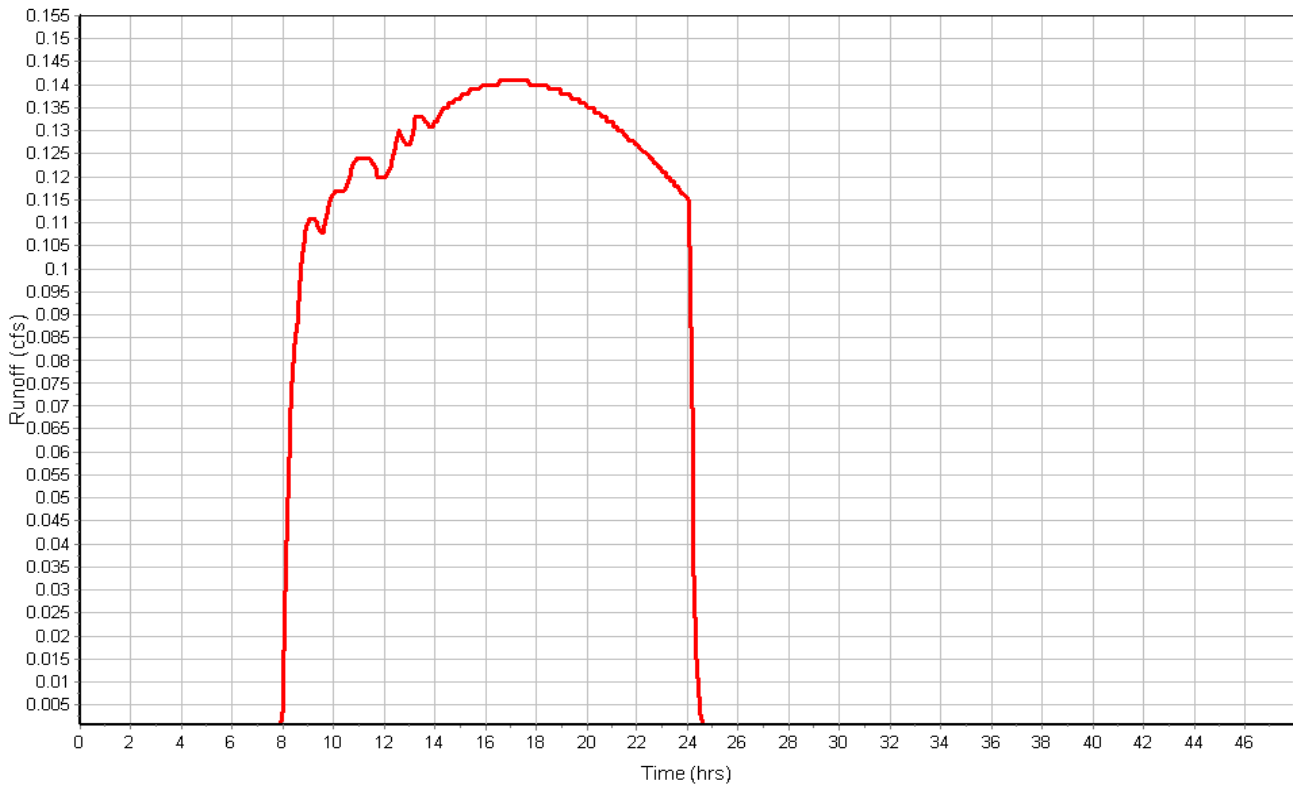
FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 50% of 2-year storm

Subbasin : HED-02.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Subbasin : HED-03.1

Input Data

Area (ac) 3.00
 Weighted Curve Number 0.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	3.00	-	0.00
Composite Area & Weighted CN	3.00		0.00

Time of Concentration

	Flowpath		
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	12.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	11.67	0.00	0.00

	Flowpath		
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	354	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Woodland	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	6.78	0.00	0.00
Total TOC (min)18.45			

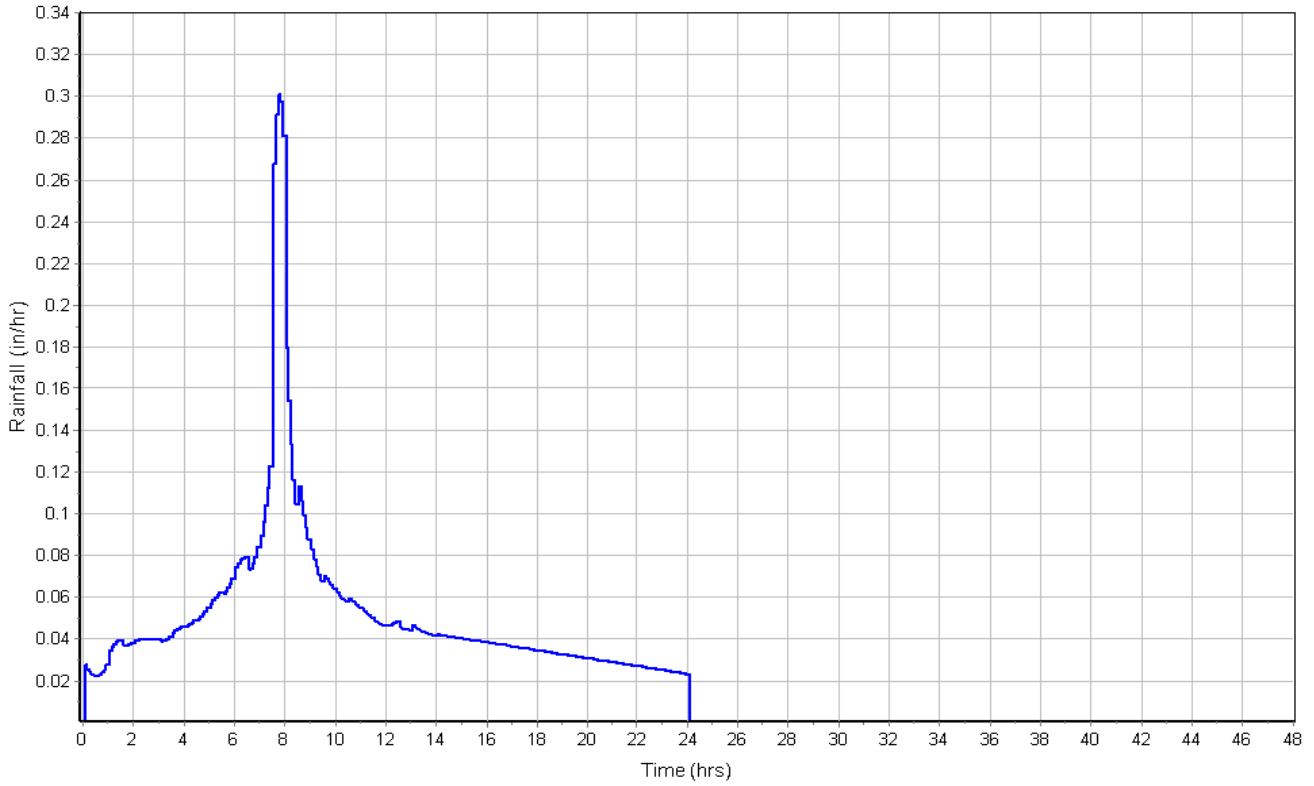
Subbasin Runoff Results

Total Rainfall (in) 1.25
 Total Runoff (in) 0.05
 Peak Runoff (cfs) 0.02
 Weighted Curve Number 0.00
 Time of Concentration (days hh:mm:ss) 0 00:18:27

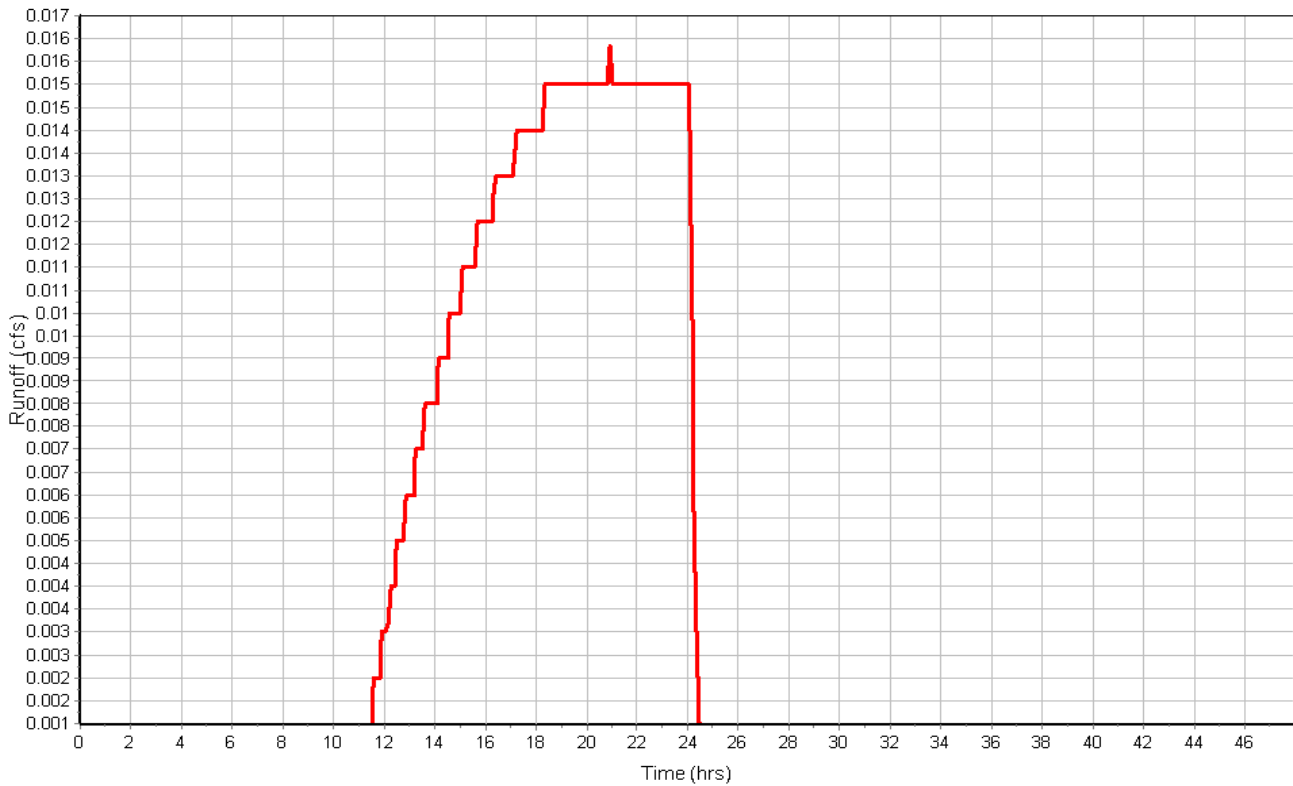
FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 50% of 2-year storm

Subbasin : HED-03.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
2	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
3	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
4	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
5	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
6	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
7	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
8	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
9	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
10	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
11	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
12	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
13	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
14	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
15	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	HED-01A	0.15	0.00	152.02	0.02	0.00	7.98	152.01	0.01	0 21:32	0 00:00	0.00	0.00
2	HED-01B	0.01	0.00	157.00	0.00	0.00	8.00	157.00	0.00	1 00:13	0 00:00	0.00	0.00
3	HED-01C	0.01	0.00	157.83	0.03	0.00	7.17	157.81	0.01	0 21:16	0 00:00	0.00	0.00
4	HED-01D	0.01	0.00	177.07	0.03	0.00	4.18	177.05	0.01	1 00:05	0 00:00	0.00	0.00
5	HED-01E	0.01	0.00	181.02	0.02	0.00	10.98	181.01	0.01	1 00:04	0 00:00	0.00	0.00
6	HED-01F	0.01	0.01	223.01	0.01	0.00	5.99	223.00	0.00	0 21:56	0 00:00	0.00	0.00
7	HED-02A	0.14	0.00	171.02	0.02	0.00	7.98	171.01	0.01	0 20:51	0 00:00	0.00	0.00
8	HED-02B	0.14	0.00	171.46	0.16	0.00	5.54	171.37	0.07	0 20:40	0 00:00	0.00	0.00
9	HED-02C	0.14	0.00	173.63	0.13	0.00	4.37	173.56	0.06	0 20:40	0 00:00	0.00	0.00
10	HED-02D	0.14	0.00	174.84	0.24	0.00	10.90	174.70	0.10	0 20:35	0 00:00	0.00	0.00
11	HED-02E	0.14	0.00	180.65	0.19	0.00	7.35	180.54	0.08	0 20:30	0 00:00	0.00	0.00
12	HED-02F	0.14	0.14	181.87	0.11	0.00	6.09	181.81	0.05	0 20:01	0 00:00	0.00	0.00
13	HED-03A	0.01	0.00	183.01	0.01	0.00	6.99	183.00	0.00	1 00:39	0 00:00	0.00	0.00
14	HED-03B	0.02	0.00	235.00	0.00	0.00	5.00	235.00	0.00	1 00:07	0 00:00	0.00	0.00
15	HED-03C	0.02	0.02	236.02	0.02	0.00	13.98	236.00	0.00	0 23:06	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 50% of 2-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flap Flow Gate (cfs)
1	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
2	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
3	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00 No
4	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
5	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00 No
6	HED-03A	770.00	183.00	0.00	181.76	0.00	1.24	0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No
7	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No
8	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01A	0.15	0 21:32	1512.53	0.00	0.42	6.55	0.02	0.00	0.00		0.00
2 HED-01B	0.01	1 00:13	1082.72	0.00	0.03	447.22	0.01	0.00	0.00		0.00
3 HED-01F	0.01	0 21:56	2813.13	0.00	0.38	27.12	0.02	0.00	0.00		0.00
4 HED-02A	0.14	0 20:51	1963.65	0.00	0.44	35.23	0.02	0.00	0.00		0.00
5 HED-02E	0.14	0 20:30	614.42	0.00	0.29	27.93	0.11	0.02	0.00		0.00
6 HED-03A	0.01	1 00:39	443.56	0.00	0.02	641.67	0.06	0.01	0.00		0.00
7 HED-03B	0.01	1 00:07	2403.19	0.00	0.00		0.01	0.00	0.00		0.00
8 HED-03C	0.02	1 00:04	417.77	0.00	0.00		0.01	0.00	0.00		0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
2 HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
3 HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
4 HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5 HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6 HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7 HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
50% of 2-year storm

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01C	0.01	0 22:32	20.90	0.00	1.24	1.26	0.02	0.01	0.00		Calculated
2 HED-01D	0.01	1 00:05	28.48	0.00	1.31	15.29	0.02	0.01	0.00		Calculated
3 HED-01E	0.01	0 23:54	7.14	0.00	1.44	1.08	0.02	0.02	0.00		Calculated
4 HED-02B	0.14	0 20:42	40.58	0.00	2.28	0.59	0.09	0.03	0.00		Calculated
5 HED-02C	0.14	0 20:40	8.91	0.02	1.60	3.19	0.15	0.10	0.00		Calculated
6 HED-02D	0.14	0 20:36	4.04	0.04	1.12	11.08	0.19	0.13	0.00		Calculated
7 HED-02F	0.14	0 20:01	59.16	0.00	1.56	1.77	0.15	0.05	0.00		Calculated

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Project Description

File Name 20191126-PRE-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 03, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	4
Nodes.....	17
<i>Junctions</i>	15
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	0
Links.....	15
<i>Channels</i>	8
<i>Pipes</i>	7
<i>Pumps</i>	0
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	2-yr	Intensity	inches	Oregon	Washington	2	2.50	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-01.1	5.23	70.00	2.50	0.46	2.38	0.20	0 00:13:03
2	HED-01.1	1.79	70.00	2.50	0.46	0.81	0.06	0 00:19:04
3	HED-02.1	11.73	80.00	2.50	0.89	10.43	1.97	0 00:16:21
4	HED-03.1	3.00	0.00	2.50	0.53	1.59	0.17	0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	1.33	152.08	0.00	7.92	0 00:00	0.00	0.00
2	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.06	157.02	0.00	7.98	0 00:00	0.00	0.00
3	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.06	157.90	0.00	7.10	0 00:00	0.00	0.00
4	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.06	177.11	0.00	4.14	0 00:00	0.00	0.00
5	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.06	181.07	0.00	10.93	0 00:00	0.00	0.00
6	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.06	223.04	0.00	5.96	0 00:00	0.00	0.00
7	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	1.24	171.08	0.00	7.92	0 00:00	0.00	0.00
8	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	1.24	171.95	0.00	5.05	0 00:00	0.00	0.00
9	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	1.24	173.88	0.00	4.12	0 00:00	0.00	0.00
10	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	1.25	175.29	0.00	10.45	0 00:00	0.00	0.00
11	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	1.55	181.09	0.00	6.91	0 00:00	0.00	0.00
12	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	1.97	182.09	0.00	5.87	0 00:00	0.00	0.00
13	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.11	183.03	0.00	6.97	0 00:00	0.00	0.00
14	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.11	235.01	0.00	4.99	0 00:00	0.00	0.00
15	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.17	236.05	0.00	13.95	0 00:00	0.00	0.00
16	COF-01	Outfall	238.00					0.19	238.00					
17	HED-01	Outfall	150.00					1.21	150.08					

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.06	20.90	0.00	2.42	0.05	0.03	0.00	Calculated
2	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.06	28.48	0.00	1.79	0.07	0.03	0.00	Calculated
3	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.06	7.14	0.01	2.74	0.07	0.07	0.00	Calculated
4	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	1.24	40.58	0.03	3.94	0.32	0.11	0.00	Calculated
5	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	1.24	8.91	0.14	3.07	0.45	0.31	0.00	Calculated
6	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	1.24	4.04	0.31	2.21	0.53	0.36	0.00	Calculated
7	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	1.55	59.16	0.03	3.10	0.47	0.16	0.00	Calculated
8	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	1.21	1512.53	0.00	0.97	0.08	0.01	0.00	
9	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.05	1082.72	0.00	0.09	0.05	0.01	0.00	
10	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.06	2813.13	0.00	1.19	0.05	0.01	0.00	
11	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	1.30	1963.65	0.00	1.30	0.08	0.01	0.00	
12	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	1.25	614.42	0.00	0.63	0.38	0.05	0.00	
13	HED-03A	Channel	HED-03A	HED-02F	770.00	183.00	181.76	0.1600	60.000	0.0300	0.10	443.56	0.00	0.05	0.17	0.03	0.00	
14	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.11	2403.19	0.00	0.53	0.02	0.00	0.00	
15	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.11	417.77	0.00	0.19	0.03	0.01	0.00	

Subbasin Hydrology

Subbasin : COF-01.1

Input Data

Area (ac) 5.23
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	5.23	C/D	70.00
Composite Area & Weighted CN	5.23		70.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

$$V = (1.49 * (R^{2/3})) * (S_f^{0.5}) / n$$

R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 2-year storm

	Flowpath	Flowpath	Flowpath
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	17	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.16	0.00	0.00
Computed Flow Time (min) :	10.32	0.00	0.00
	Flowpath	Flowpath	Flowpath
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	210	0.00	0.00
Slope (%) :	6.6	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.28	0.00	0.00
Computed Flow Time (min) :	2.73	0.00	0.00
Total TOC (min)	13.06		

Subbasin Runoff Results

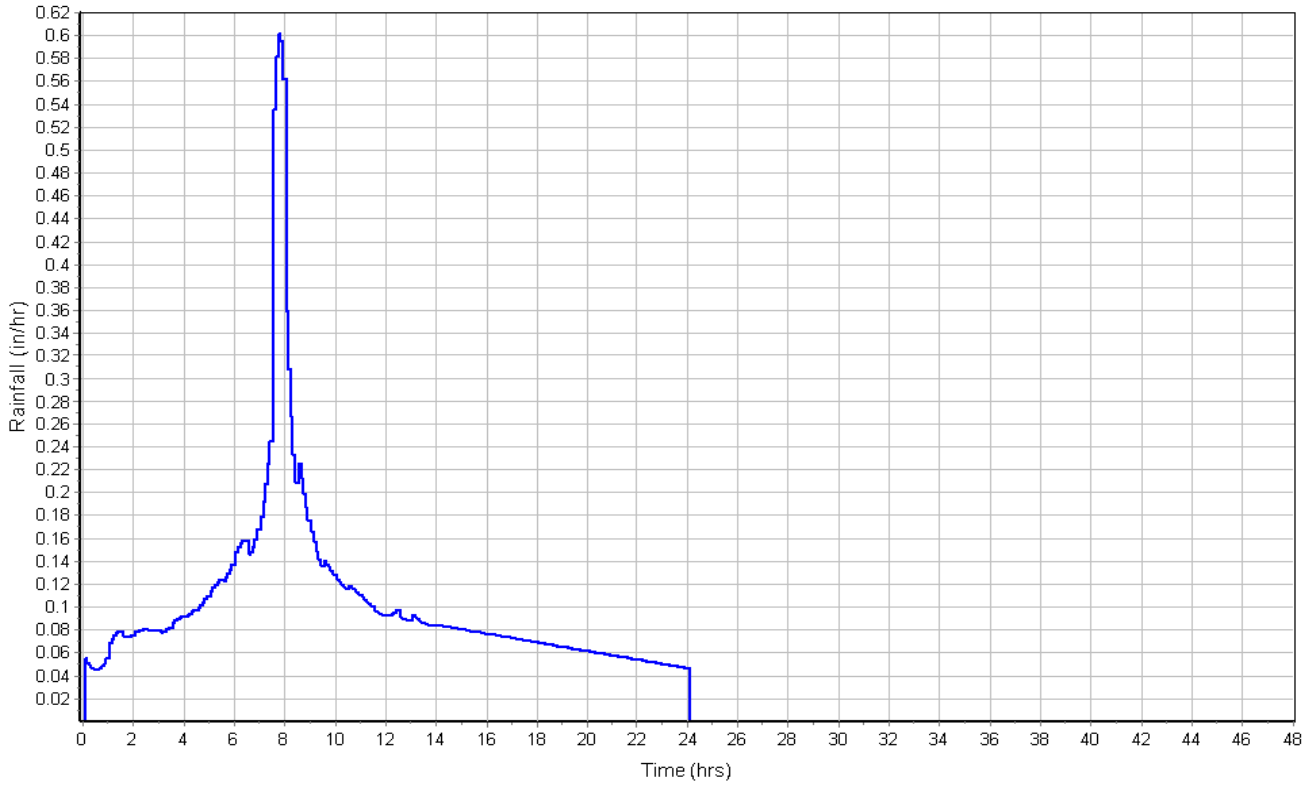
Total Rainfall (in)	2.50
Total Runoff (in)	0.46
Peak Runoff (cfs)	0.20
Weighted Curve Number	70.00
Time of Concentration (days hh:mm:ss)	0 00:13:04

FOR LAND USE PERMITTING (EXHIBIT B)

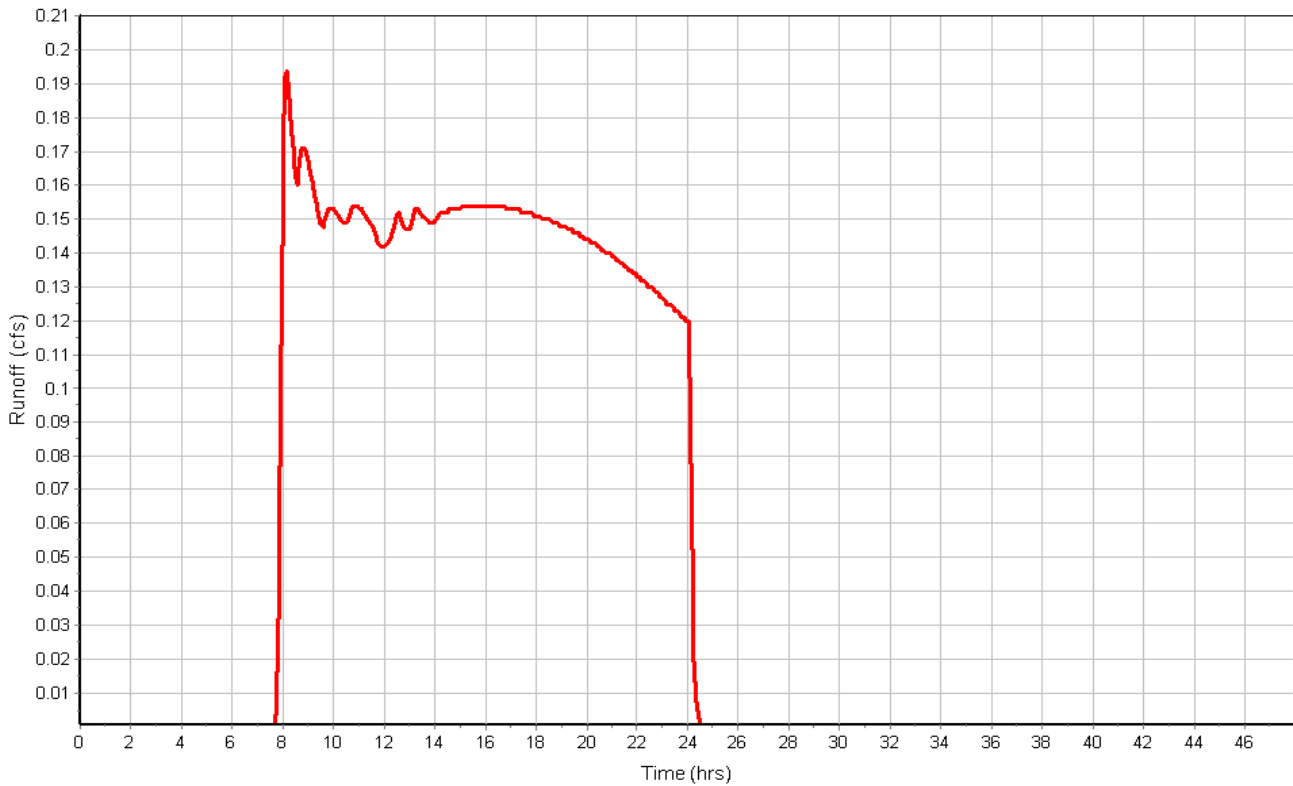
Pre-Development
2-year storm

Subbasin : COF-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Subbasin : HED-01.1

Input Data

Area (ac) 1.79
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	1.79	C/D	70.00
Composite Area & Weighted CN	1.79		70.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	10	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	12.76	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	364	0.00	0.00
Slope (%) :	3.7	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.96	0.00	0.00
Computed Flow Time (min) :	6.32	0.00	0.00
Total TOC (min)	19.08		

Subbasin Runoff Results

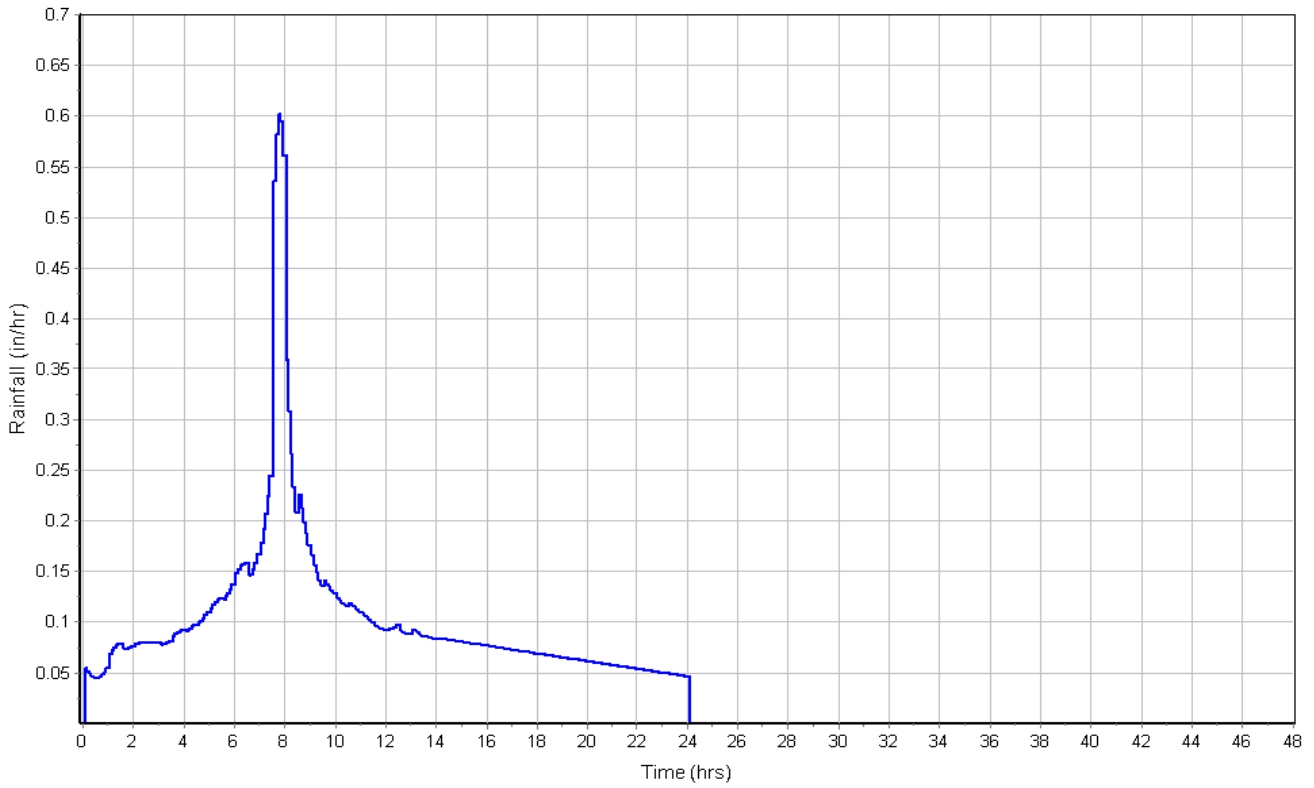
Total Rainfall (in) 2.50
 Total Runoff (in) 0.46
 Peak Runoff (cfs) 0.06
 Weighted Curve Number 70.00
 Time of Concentration (days hh:mm:ss) 0 00:19:05

FOR LAND USE PERMITTING (EXHIBIT B)

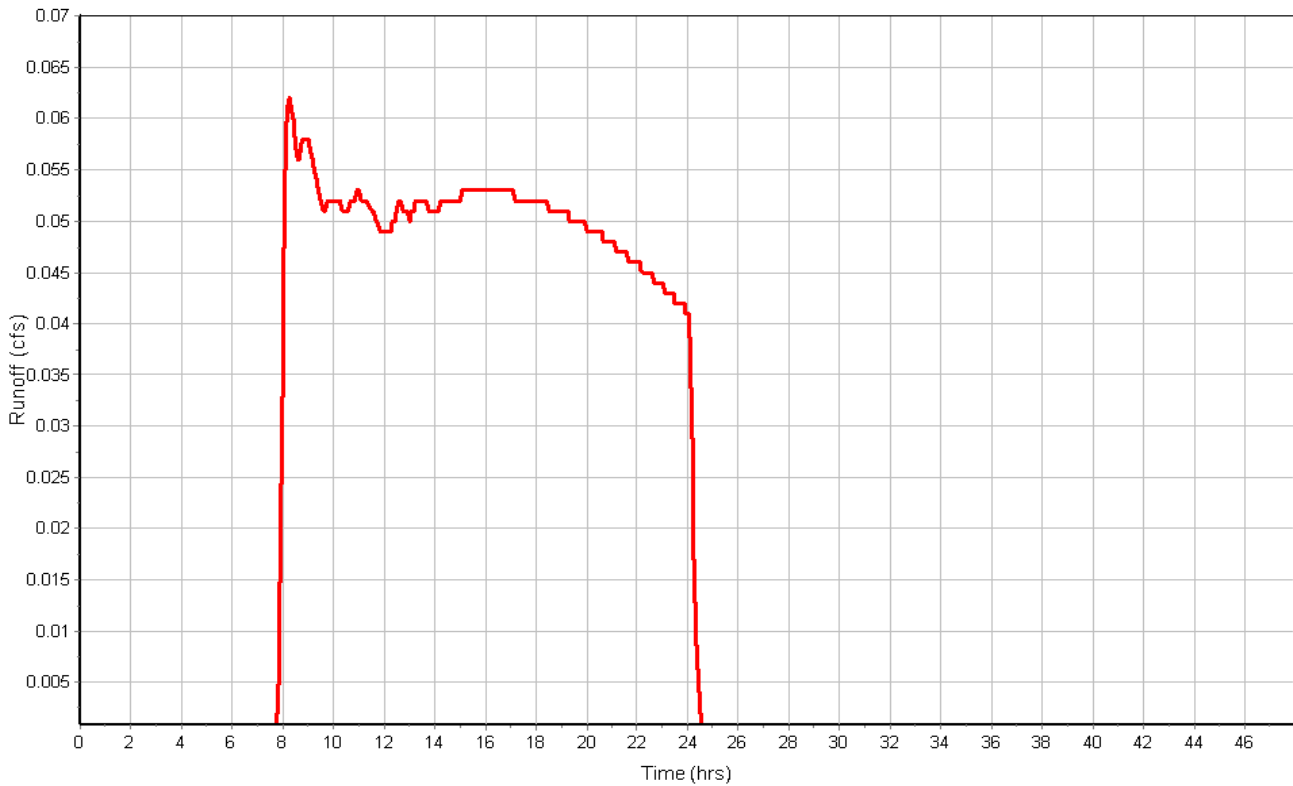
Pre-Development
2-year storm

Subbasin : HED-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Subbasin : HED-02.1

Input Data

Area (ac) 11.73
 Weighted Curve Number 80.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush/field	11.73	C/D	80.00
Composite Area & Weighted CN	11.73		80.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	18	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	10.09	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	500	0.00	0.00
Slope (%) :	3.6	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.33	0.00	0.00
Computed Flow Time (min) :	6.27	0.00	0.00
Total TOC (min)	16.35		

Subbasin Runoff Results

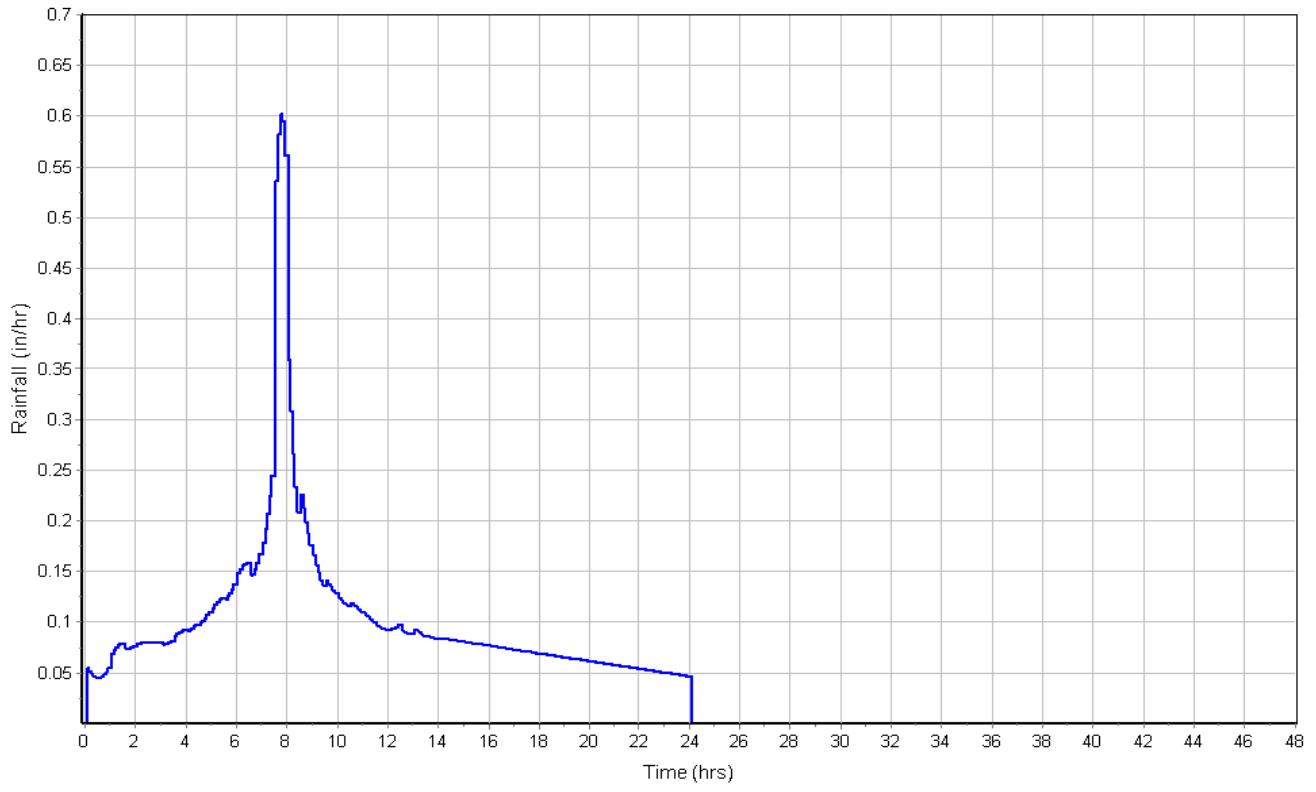
Total Rainfall (in) 2.50
 Total Runoff (in) 0.89
 Peak Runoff (cfs) 1.97
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:16:21

FOR LAND USE PERMITTING (EXHIBIT B)

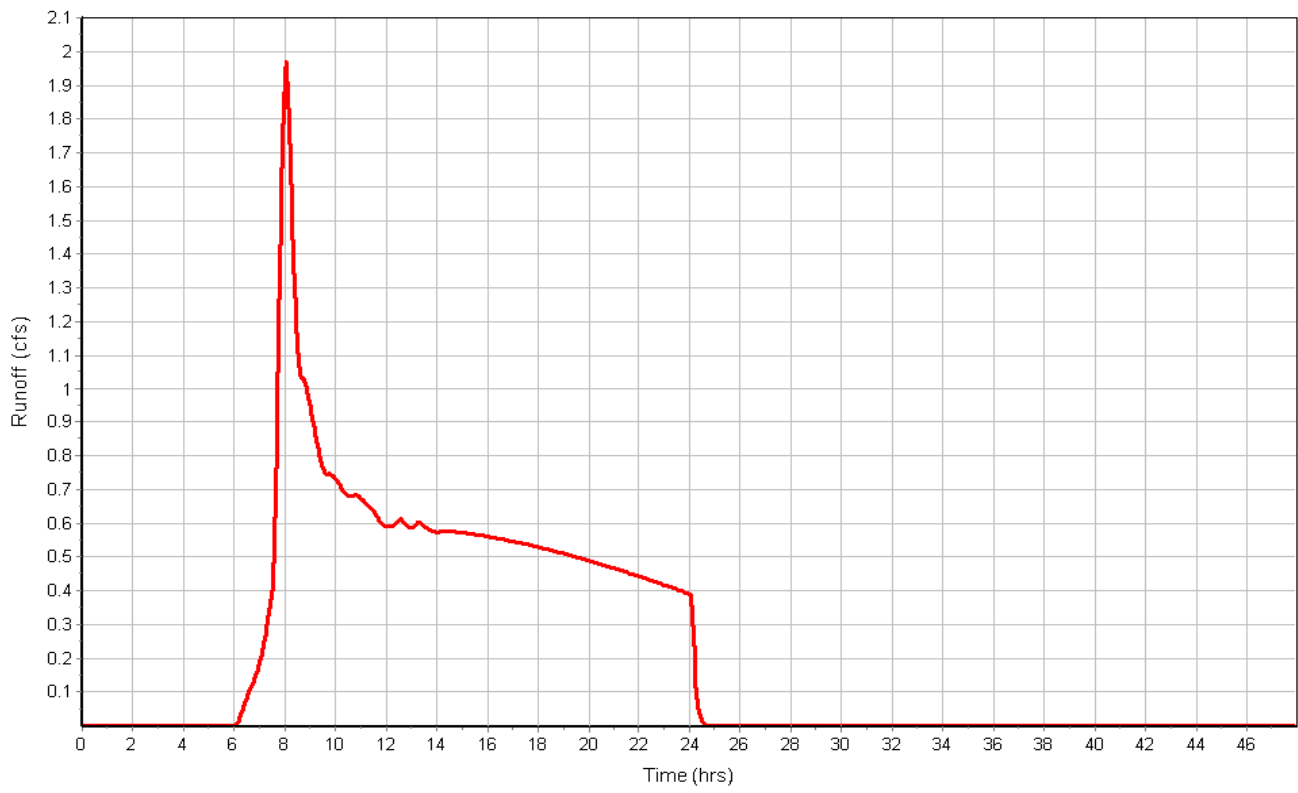
Pre-Development
2-year storm

Subbasin : HED-02.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Subbasin : HED-03.1

Input Data

Area (ac) 3.00
 Weighted Curve Number 0.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	3.00	-	0.00
Composite Area & Weighted CN	3.00		0.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	12.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	11.67	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	354	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Woodland	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	6.78	0.00	0.00
Total TOC (min)	18.45		

Subbasin Runoff Results

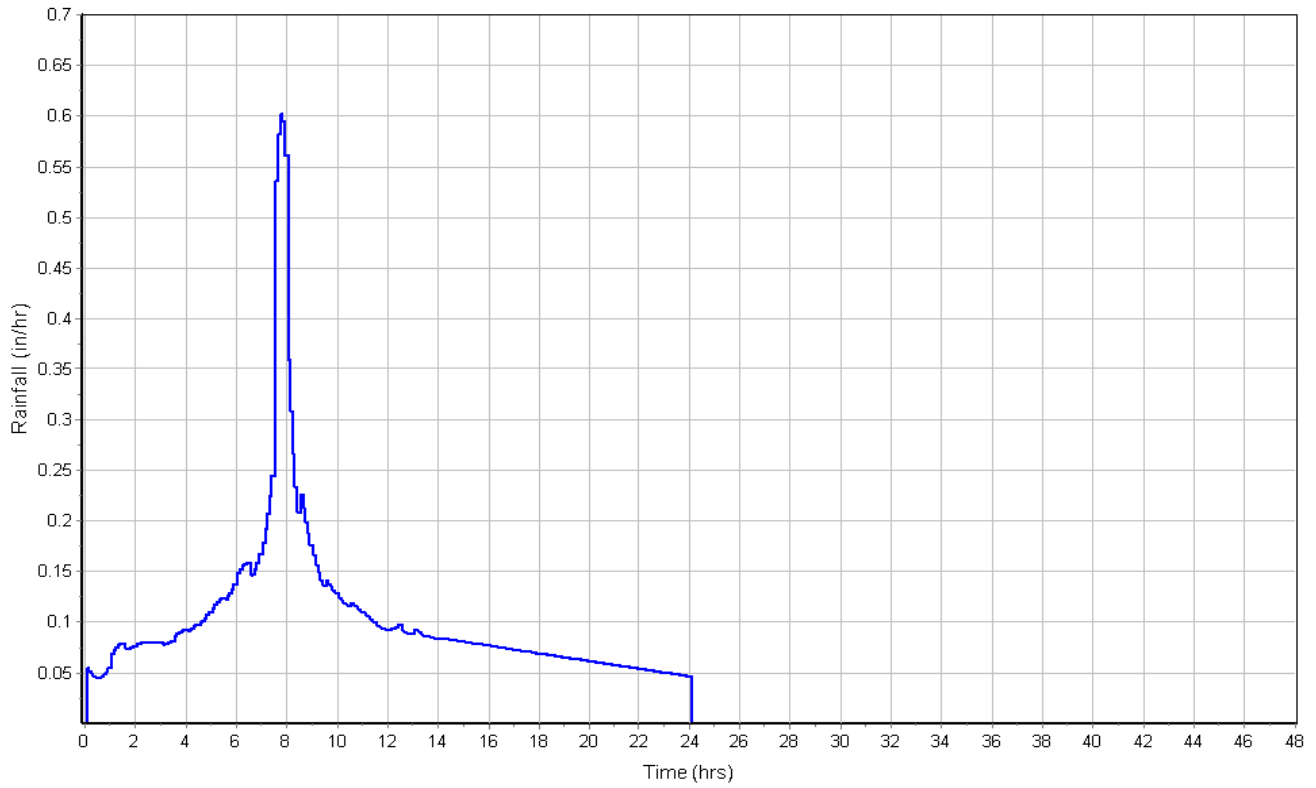
Total Rainfall (in) 2.50
 Total Runoff (in) 0.53
 Peak Runoff (cfs) 0.17
 Weighted Curve Number 0.00
 Time of Concentration (days hh:mm:ss) 0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B)

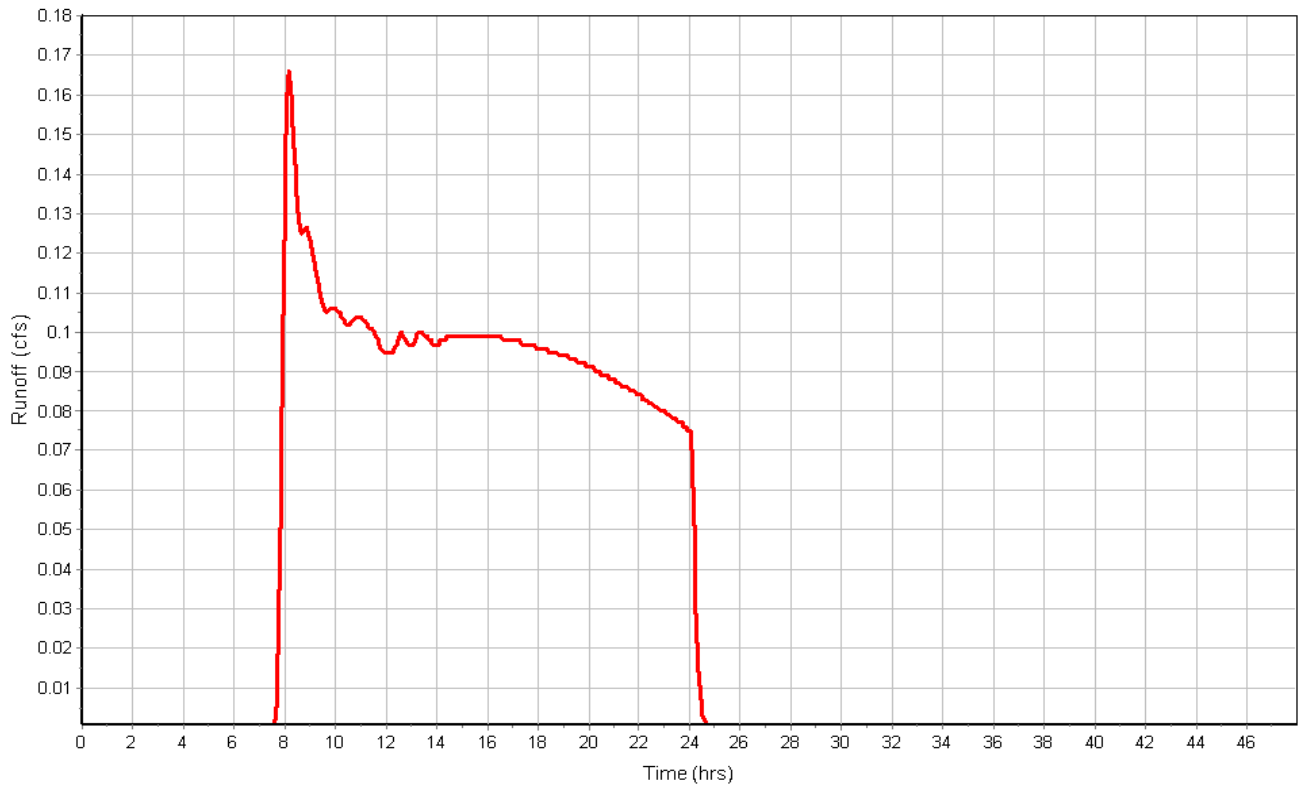
Pre-Development
2-year storm

Subbasin : HED-03.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
2	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
3	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
4	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
5	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
6	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
7	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
8	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
9	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
10	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
11	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
12	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
13	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
14	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
15	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	HED-01A	1.33	0.00	152.08	0.08	0.00	7.92	152.03	0.03	0 09:13	0 00:00	0.00	0.00
2	HED-01B	0.06	0.00	157.02	0.02	0.00	7.98	157.01	0.01	0 09:38	0 00:00	0.00	0.00
3	HED-01C	0.06	0.00	157.90	0.10	0.00	7.10	157.83	0.03	0 08:35	0 00:00	0.00	0.00
4	HED-01D	0.06	0.00	177.11	0.07	0.00	4.14	177.06	0.02	0 09:11	0 00:00	0.00	0.00
5	HED-01E	0.06	0.00	181.07	0.07	0.00	10.93	181.02	0.02	0 08:31	0 00:00	0.00	0.00
6	HED-01F	0.06	0.06	223.04	0.04	0.00	5.96	223.01	0.01	0 08:23	0 00:00	0.00	0.00
7	HED-02A	1.24	0.00	171.08	0.08	0.00	7.92	171.02	0.02	0 08:46	0 00:00	0.00	0.00
8	HED-02B	1.24	0.00	171.95	0.65	0.00	5.05	171.45	0.15	0 08:23	0 00:00	0.00	0.00
9	HED-02C	1.24	0.00	173.88	0.38	0.00	4.12	173.62	0.12	0 08:48	0 00:00	0.00	0.00
10	HED-02D	1.25	0.00	175.29	0.69	0.00	10.45	174.82	0.22	0 08:45	0 00:00	0.00	0.00
11	HED-02E	1.55	0.00	181.09	0.63	0.00	6.91	180.65	0.19	0 08:43	0 00:00	0.00	0.00
12	HED-02F	1.97	1.97	182.09	0.33	0.00	5.87	181.86	0.10	0 08:20	0 00:00	0.00	0.00
13	HED-03A	0.11	0.00	183.03	0.03	0.00	6.97	183.01	0.01	0 16:59	0 00:00	0.00	0.00
14	HED-03B	0.11	0.00	235.01	0.01	0.00	4.99	235.00	0.00	0 09:47	0 00:00	0.00	0.00
15	HED-03C	0.17	0.17	236.05	0.05	0.00	13.95	236.02	0.02	0 09:20	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 2-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow Gate	Flap Gate
1	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00	No
6	HED-03A	770.00	183.00	0.00	181.76	0.00	1.24	0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
7	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
8	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01A	1.21	0 09:13	1512.53	0.00	0.97	2.84	0.08	0.01	0.00		0.00
2 HED-01B	0.05	0 09:38	1082.72	0.00	0.09	149.07	0.05	0.01	0.00		0.00
3 HED-01F	0.06	0 08:23	2813.13	0.00	1.19	8.66	0.05	0.01	0.00		0.00
4 HED-02A	1.30	0 08:53	1963.65	0.00	1.30	11.92	0.08	0.01	0.00		0.00
5 HED-02E	1.25	0 08:43	614.42	0.00	0.63	12.86	0.38	0.05	0.00		0.00
6 HED-03A	0.10	0 16:59	443.56	0.00	0.05	256.67	0.17	0.03	0.00		0.00
7 HED-03B	0.11	0 09:47	2403.19	0.00	0.53	34.59	0.02	0.00	0.00		0.00
8 HED-03C	0.11	0 09:27	417.77	0.00	0.19	61.40	0.03	0.01	0.00		0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
2 HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
3 HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
4 HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5 HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6 HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7 HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
2-year storm

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01C	0.06	0 09:11	20.90	0.00	2.42	0.65	0.05	0.03	0.00		Calculated
2 HED-01D	0.06	0 09:11	28.48	0.00	1.79	11.19	0.07	0.03	0.00		Calculated
3 HED-01E	0.06	0 08:31	7.14	0.01	2.74	0.57	0.07	0.07	0.00		Calculated
4 HED-02B	1.24	0 08:48	40.58	0.03	3.94	0.34	0.32	0.11	0.00		Calculated
5 HED-02C	1.24	0 08:48	8.91	0.14	3.07	1.66	0.45	0.31	0.00		Calculated
6 HED-02D	1.24	0 08:46	4.04	0.31	2.21	5.62	0.53	0.36	0.00		Calculated
7 HED-02F	1.55	0 08:20	59.16	0.03	3.10	0.89	0.47	0.16	0.00		Calculated

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Project Description

File Name 20191126-PRE-DEV_CWS.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Hydrodynamic
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
End Analysis On Feb 03, 1949 00:00:00
Start Reporting On Feb 01, 1949 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 1 seconds

Number of Elements

Qty
Rain Gages 1
Subbasins..... 4
Nodes..... 17
 Junctions 15
 Outfalls 2
 Flow Diversions 0
 Inlets 0
 Storage Nodes 0
Links..... 15
 Channels 8
 Pipes 7
 Pumps 0
 Orifices 0
 Weirs 0
 Outlets 0
Pollutants 0
Land Uses 0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	5-yr	Intensity	inches	Oregon	Washington	5	3.10	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-01.1	5.23	70.00	3.10	0.77	4.03	0.57	0 00:13:03
2	HED-01.1	1.79	70.00	3.10	0.77	1.38	0.18	0 00:19:04
3	HED-02.1	11.73	80.00	3.10	1.33	15.54	3.27	0 00:16:21
4	HED-03.1	3.00	0.00	3.10	0.87	2.60	0.40	0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	2.51	152.13	0.00	7.87	0 00:00	0.00	0.00
2	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.17	157.03	0.00	7.97	0 00:00	0.00	0.00
3	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.17	157.97	0.00	7.03	0 00:00	0.00	0.00
4	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.18	177.15	0.00	4.10	0 00:00	0.00	0.00
5	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.18	181.11	0.00	10.89	0 00:00	0.00	0.00
6	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.18	223.08	0.00	5.92	0 00:00	0.00	0.00
7	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	2.38	171.11	0.00	7.89	0 00:00	0.00	0.00
8	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	2.38	171.95	0.00	5.05	0 00:00	0.00	0.00
9	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	2.39	174.04	0.00	3.96	0 00:00	0.00	0.00
10	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	2.39	175.60	0.00	10.14	0 00:00	0.00	0.00
11	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	2.81	181.33	0.00	6.67	0 00:00	0.00	0.00
12	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	3.25	182.20	0.00	5.76	0 00:00	0.00	0.00
13	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.26	183.04	0.00	6.96	0 00:00	0.00	0.00
14	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.27	235.02	0.00	4.98	0 00:00	0.00	0.00
15	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.40	236.09	0.00	13.91	0 00:00	0.00	0.00
16	COF-01	Outfall	238.00					0.57	238.00					
17	HED-01	Outfall	150.00					2.38	150.13					

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Link Summary

SN Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)	Reported Condition	
1	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.17	20.90	0.01	3.11	0.09	0.05	0.00	Calculated
2	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.17	28.48	0.01	2.46	0.11	0.05	0.00	Calculated
3	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.18	7.14	0.02	3.66	0.11	0.11	0.00	Calculated
4	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	2.38	40.58	0.06	4.62	0.38	0.13	0.00	Calculated
5	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	2.38	8.91	0.27	3.67	0.59	0.40	0.00	Calculated
6	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	2.39	4.04	0.59	2.61	0.77	0.51	0.00	Calculated
7	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	2.81	59.16	0.05	2.89	0.65	0.22	0.00	Calculated
8	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	2.38	1512.53	0.00	1.26	0.13	0.02	0.00	
9	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.14	1082.72	0.00	0.12	0.08	0.01	0.00	
10	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.18	2813.13	0.00	1.53	0.09	0.02	0.00	
11	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	2.37	1963.65	0.00	1.47	0.12	0.01	0.00	
12	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	2.39	614.42	0.00	0.78	0.54	0.07	0.00	
13	HED-03A	Channel	HED-03A	HED-02F	770.00	183.00	181.76	0.1600	60.000	0.0300	0.19	443.56	0.00	0.06	0.22	0.04	0.00	
14	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.26	2403.19	0.00	0.79	0.03	0.01	0.00	
15	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.27	417.77	0.00	0.26	0.05	0.01	0.00	

Subbasin Hydrology

Subbasin : COF-01.1

Input Data

Area (ac) 5.23
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	5.23	C/D	70.00
Composite Area & Weighted CN	5.23		70.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

$$V = (1.49 * (R^{2/3})) * (S_f^{0.5}) / n$$

R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

	Flowpath	Flowpath	Flowpath
	A	B	C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	17	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.16	0.00	0.00
Computed Flow Time (min) :	10.32	0.00	0.00
	Flowpath	Flowpath	Flowpath
	A	B	C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	210	0.00	0.00
Slope (%) :	6.6	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.28	0.00	0.00
Computed Flow Time (min) :	2.73	0.00	0.00
Total TOC (min)	13.06		

Subbasin Runoff Results

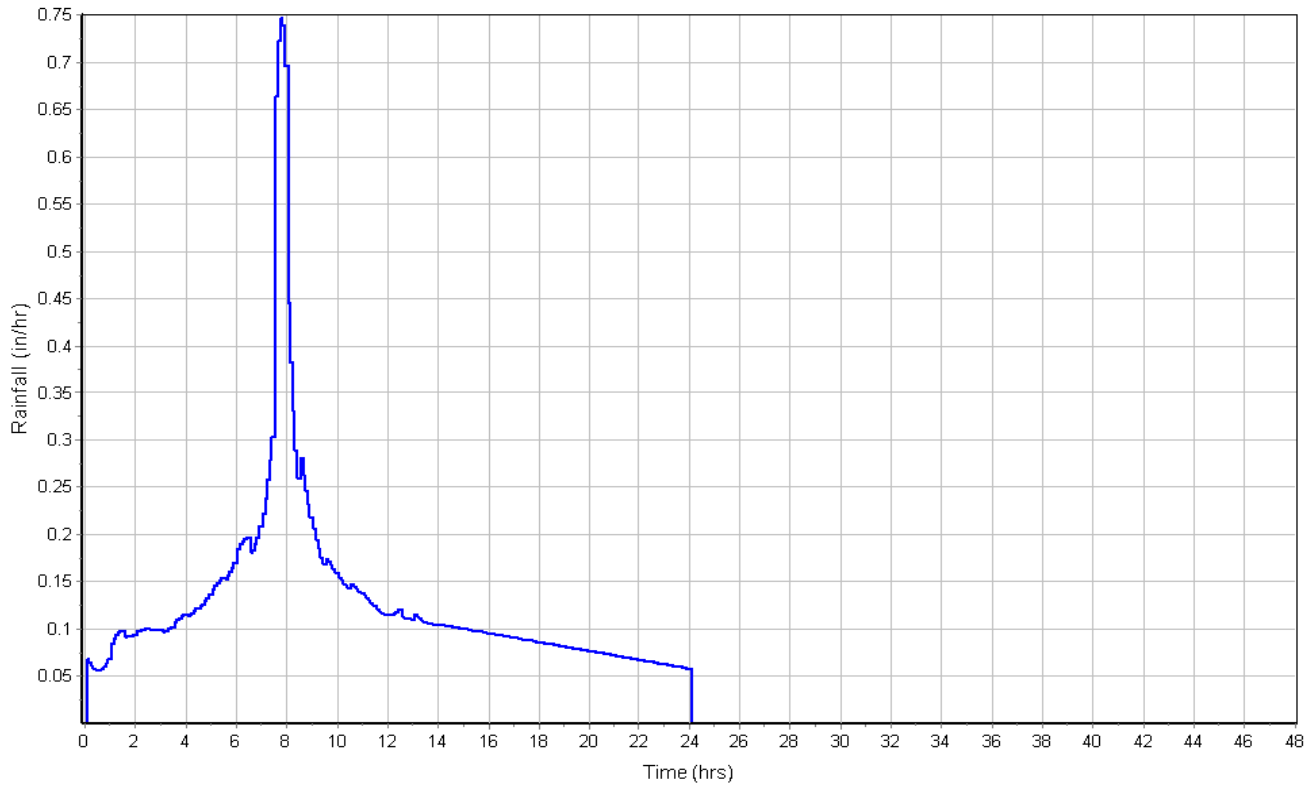
Total Rainfall (in)	3.10
Total Runoff (in)	0.77
Peak Runoff (cfs)	0.57
Weighted Curve Number	70.00
Time of Concentration (days hh:mm:ss)	0 00:13:04

FOR LAND USE PERMITTING (EXHIBIT B)

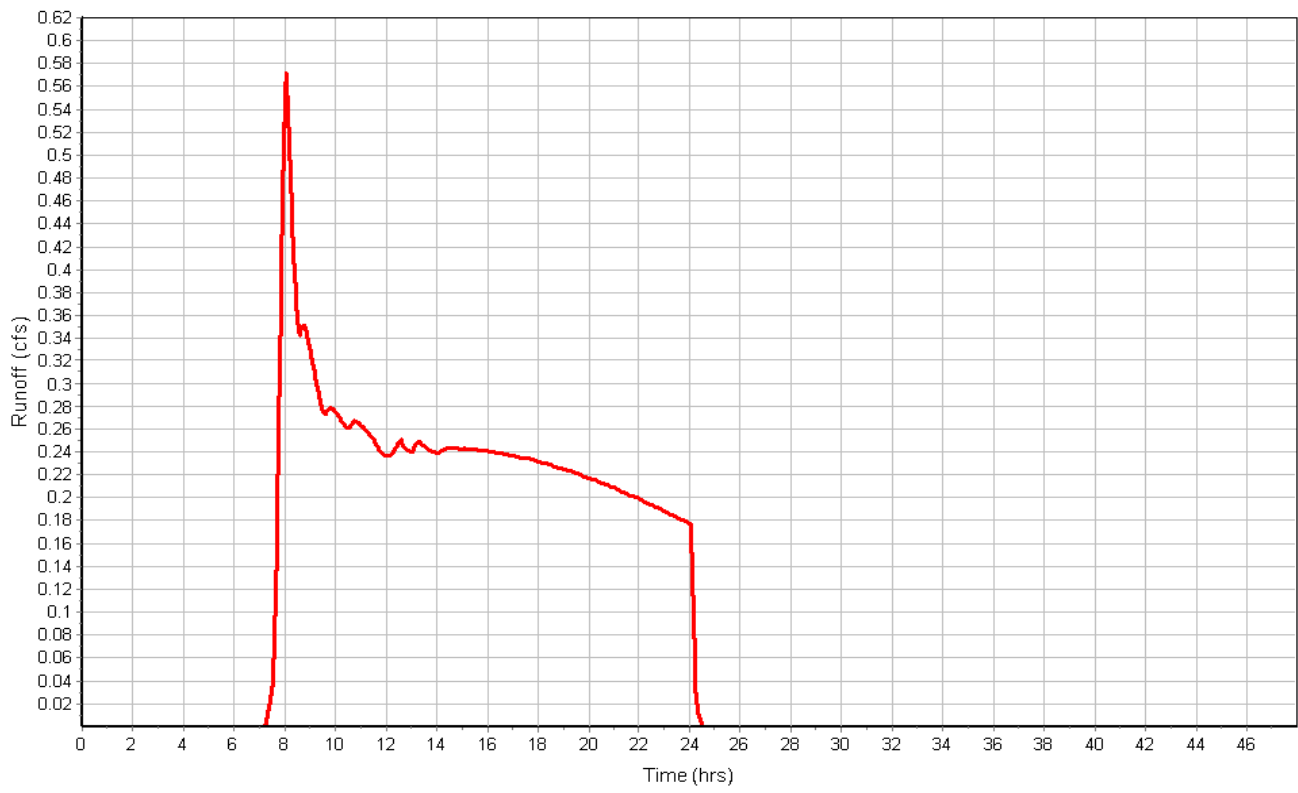
Pre-Development
5-year storm

Subbasin : COF-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Subbasin : HED-01.1

Input Data

Area (ac) 1.79
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	1.79	C/D	70.00
Composite Area & Weighted CN	1.79		70.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	10	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	12.76	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	364	0.00	0.00
Slope (%) :	3.7	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.96	0.00	0.00
Computed Flow Time (min) :	6.32	0.00	0.00
Total TOC (min)19.08			

Subbasin Runoff Results

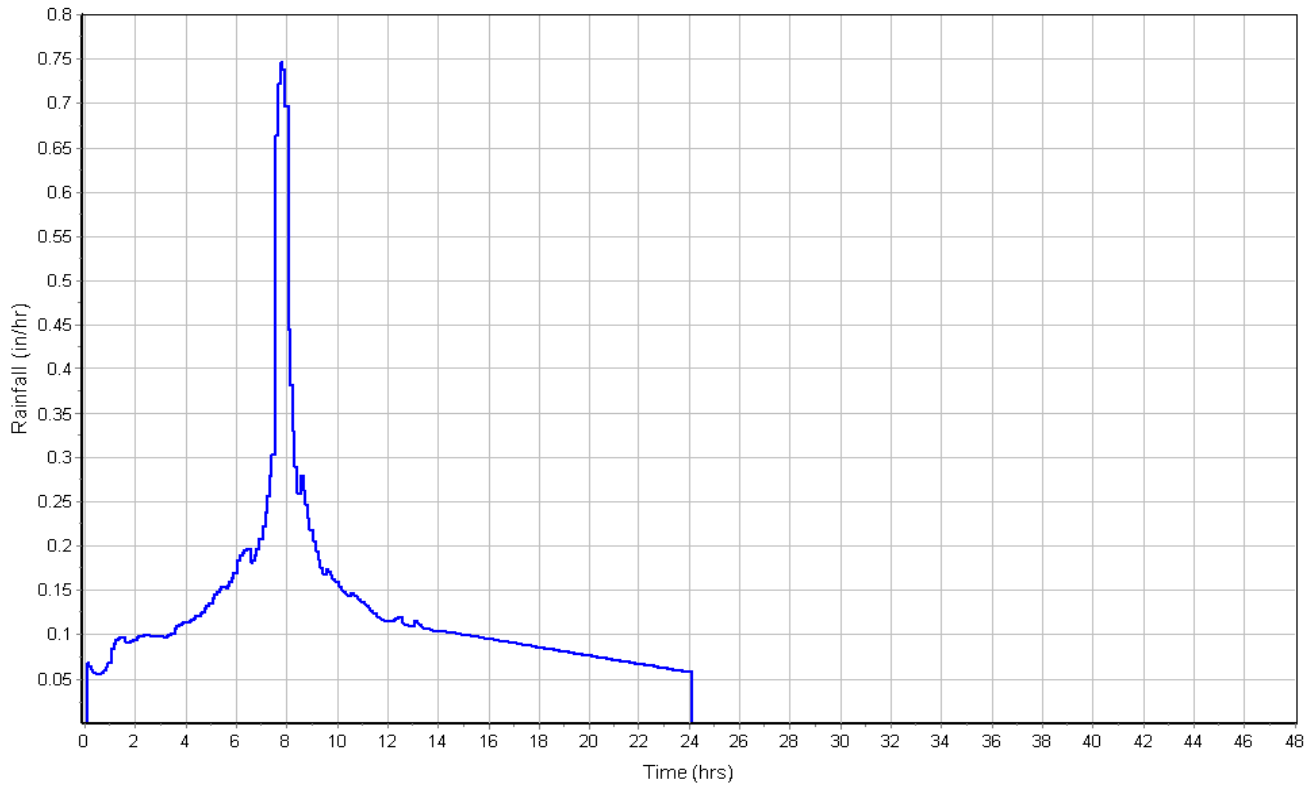
Total Rainfall (in) 3.10
 Total Runoff (in) 0.77
 Peak Runoff (cfs) 0.18
 Weighted Curve Number 70.00
 Time of Concentration (days hh:mm:ss) 0 00:19:05

FOR LAND USE PERMITTING (EXHIBIT B)

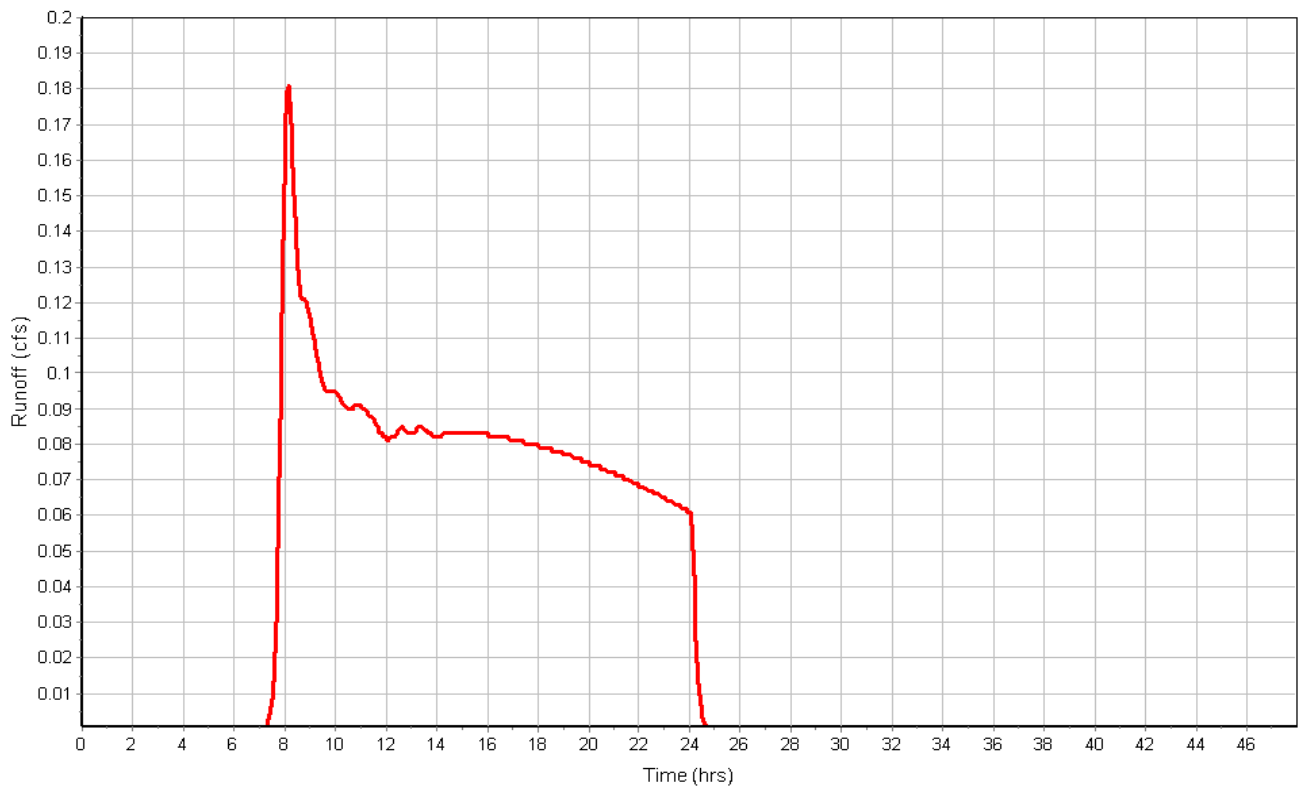
Pre-Development
5-year storm

Subbasin : HED-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Subbasin : HED-02.1

Input Data

Area (ac) 11.73
 Weighted Curve Number 80.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush/field	11.73	C/D	80.00
Composite Area & Weighted CN	11.73		80.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	18	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	10.09	0.00	0.00

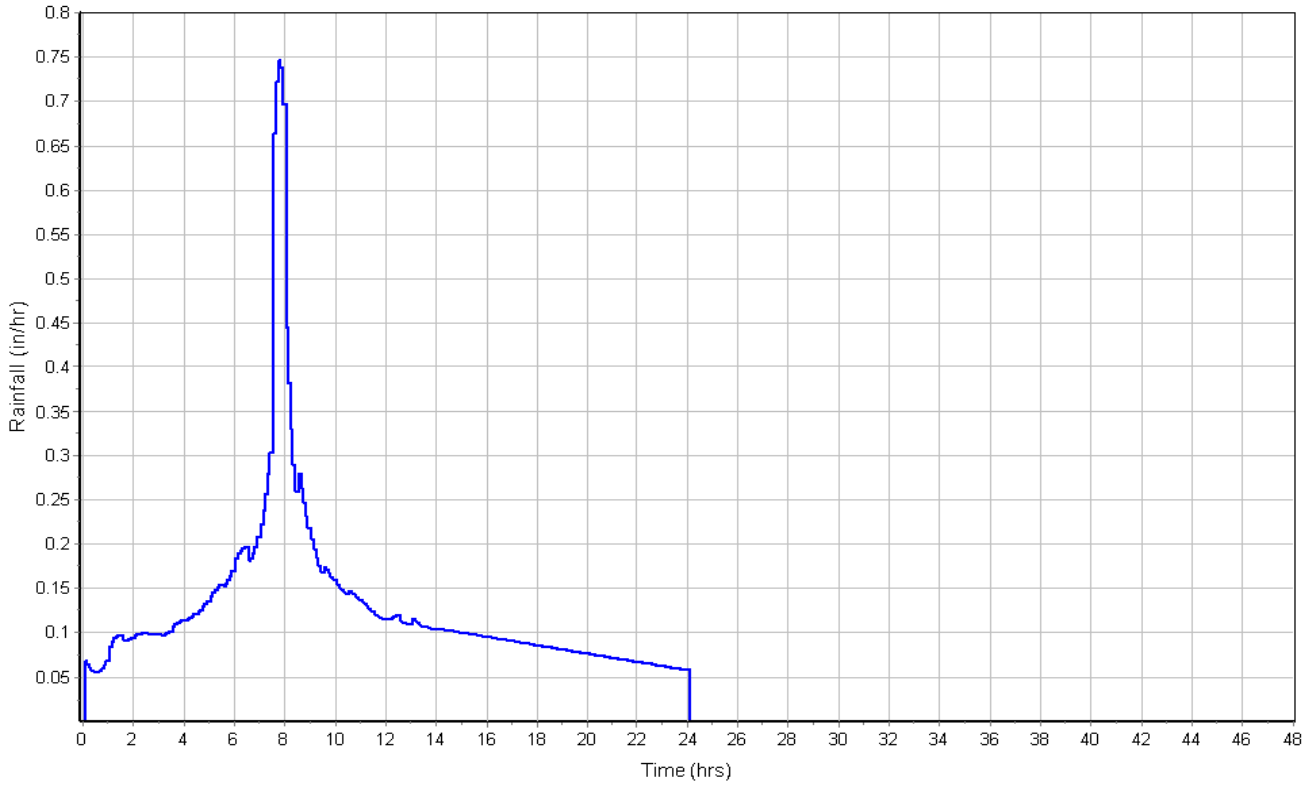
Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	500	0.00	0.00
Slope (%) :	3.6	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.33	0.00	0.00
Computed Flow Time (min) :	6.27	0.00	0.00
Total TOC (min)	16.35		

Subbasin Runoff Results

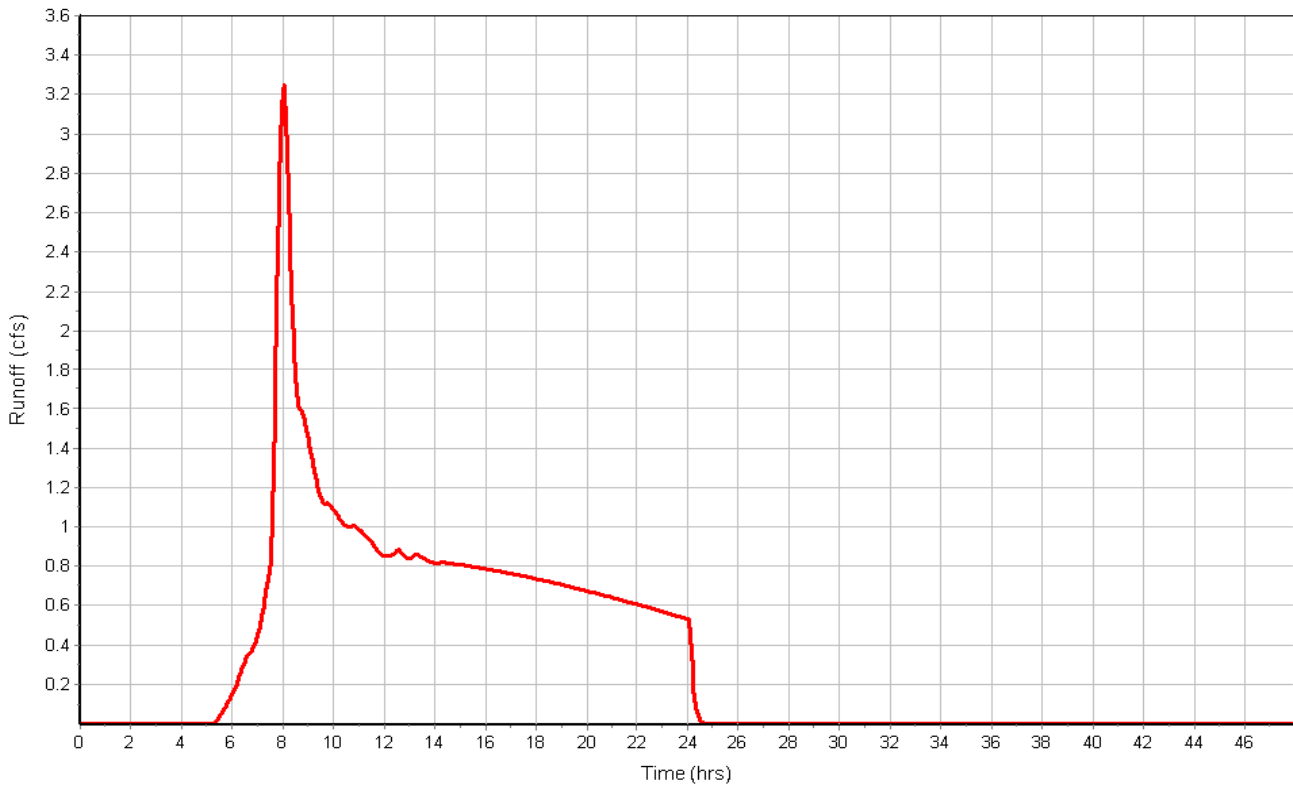
Total Rainfall (in) 3.10
 Total Runoff (in) 1.33
 Peak Runoff (cfs) 3.27
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:16:21

Subbasin : HED-02.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Subbasin : HED-03.1

Input Data

Area (ac) 3.00
 Weighted Curve Number 0.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	3.00	-	0.00
Composite Area & Weighted CN	3.00		0.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	12.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	11.67	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	354	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Woodland	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	6.78	0.00	0.00
Total TOC (min)	18.45		

Subbasin Runoff Results

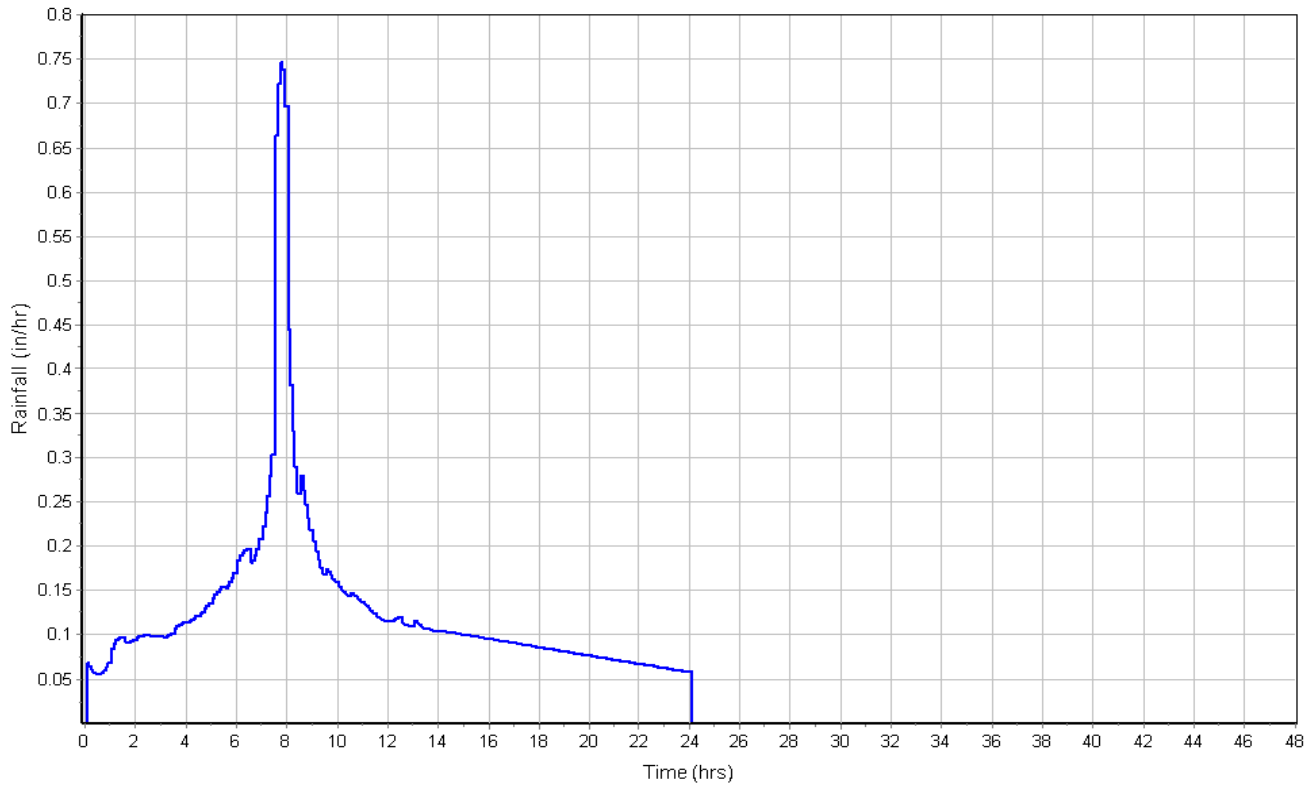
Total Rainfall (in) 3.10
 Total Runoff (in) 0.87
 Peak Runoff (cfs) 0.40
 Weighted Curve Number 0.00
 Time of Concentration (days hh:mm:ss) 0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B)

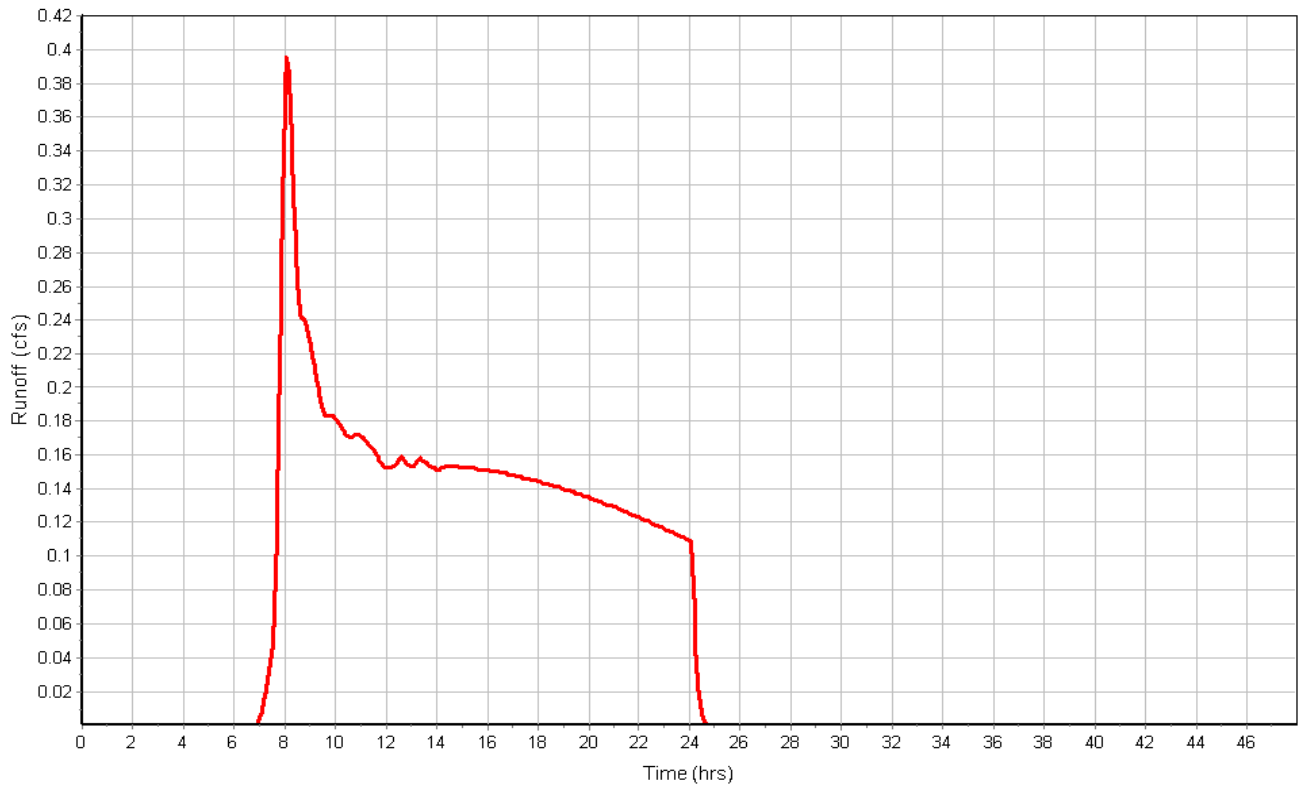
Pre-Development
5-year storm

Subbasin : HED-03.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
2	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
3	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
4	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
5	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
6	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
7	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
8	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
9	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
10	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
11	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
12	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
13	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
14	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
15	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	HED-01A	2.51	0.00	152.13	0.13	0.00	7.87	152.03	0.03	0 08:49	0 00:00	0.00	0.00
2	HED-01B	0.17	0.00	157.03	0.03	0.00	7.97	157.01	0.01	0 08:44	0 00:00	0.00	0.00
3	HED-01C	0.17	0.00	157.97	0.17	0.00	7.03	157.84	0.04	0 08:20	0 00:00	0.00	0.00
4	HED-01D	0.18	0.00	177.15	0.11	0.00	4.10	177.07	0.03	0 08:25	0 00:00	0.00	0.00
5	HED-01E	0.18	0.00	181.11	0.11	0.00	10.89	181.03	0.03	0 08:18	0 00:00	0.00	0.00
6	HED-01F	0.18	0.18	223.08	0.08	0.00	5.92	223.02	0.02	0 08:15	0 00:00	0.00	0.00
7	HED-02A	2.38	0.00	171.11	0.11	0.00	7.89	171.03	0.03	0 08:38	0 00:00	0.00	0.00
8	HED-02B	2.38	0.00	171.95	0.65	0.00	5.05	171.48	0.18	0 08:35	0 00:00	0.00	0.00
9	HED-02C	2.39	0.00	174.04	0.54	0.00	3.96	173.65	0.15	0 08:34	0 00:00	0.00	0.00
10	HED-02D	2.39	0.00	175.60	1.00	0.00	10.14	174.87	0.27	0 08:32	0 00:00	0.00	0.00
11	HED-02E	2.81	0.00	181.33	0.87	0.00	6.67	180.69	0.23	0 08:30	0 00:00	0.00	0.00
12	HED-02F	3.25	3.25	182.20	0.44	0.00	5.76	181.88	0.12	0 08:16	0 00:00	0.00	0.00
13	HED-03A	0.26	0.00	183.04	0.04	0.00	6.96	183.01	0.01	0 10:25	0 00:00	0.00	0.00
14	HED-03B	0.27	0.00	235.02	0.02	0.00	4.98	235.00	0.00	0 08:55	0 00:00	0.00	0.00
15	HED-03C	0.40	0.40	236.09	0.09	0.00	13.91	236.02	0.02	0 08:35	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 5-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flap Flow Gate (cfs)
1	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
2	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
3	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00 No
4	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
5	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00 No
6	HED-03A	770.00	183.00	0.00	181.76	0.00	1.24	0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No
7	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No
8	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01A	2.38	0 08:50	1512.53	0.00	1.26	2.18	0.13	0.02	0.00		
2 HED-01B	0.14	0 08:44	1082.72	0.00	0.12	111.81	0.08	0.01	0.00		
3 HED-01F	0.18	0 08:15	2813.13	0.00	1.53	6.74	0.09	0.02	0.00		
4 HED-02A	2.37	0 08:38	1963.65	0.00	1.47	10.54	0.12	0.01	0.00		
5 HED-02E	2.39	0 08:30	614.42	0.00	0.78	10.38	0.54	0.07	0.00		
6 HED-03A	0.19	0 10:25	443.56	0.00	0.06	213.89	0.22	0.04	0.00		
7 HED-03B	0.26	0 08:55	2403.19	0.00	0.79	23.21	0.03	0.01	0.00		
8 HED-03C	0.27	0 08:41	417.77	0.00	0.26	44.87	0.05	0.01	0.00		

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
2 HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
3 HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
4 HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5 HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6 HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7 HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
5-year storm

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01C	0.17	0 08:25	20.90	0.01	3.11	0.50	0.09	0.05	0.00		Calculated
2 HED-01D	0.17	0 08:25	28.48	0.01	2.46	8.14	0.11	0.05	0.00		Calculated
3 HED-01E	0.18	0 08:18	7.14	0.02	3.66	0.43	0.11	0.11	0.00		Calculated
4 HED-02B	2.38	0 08:36	40.58	0.06	4.62	0.29	0.38	0.13	0.00		Calculated
5 HED-02C	2.38	0 08:35	8.91	0.27	3.67	1.39	0.59	0.40	0.00		Calculated
6 HED-02D	2.39	0 08:33	4.04	0.59	2.61	4.76	0.77	0.51	0.00		Calculated
7 HED-02F	2.81	0 08:16	59.16	0.05	2.89	0.95	0.65	0.22	0.00		Calculated

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Project Description

File Name 20191126-PRE-DEV_CWS.SPF

Project Options

Flow Units CFS
Elevation Type Elevation
Hydrology Method SCS TR-55
Time of Concentration (TOC) Method SCS TR-55
Link Routing Method Hydrodynamic
Enable Overflow Ponding at Nodes YES
Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
End Analysis On Feb 03, 1949 00:00:00
Start Reporting On Feb 01, 1949 00:00:00
Antecedent Dry Days 0 days
Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
Reporting Time Step 0 00:05:00 days hh:mm:ss
Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	4
Nodes.....	17
<i>Junctions</i>	15
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	0
Links.....	15
<i>Channels</i>	8
<i>Pipes</i>	7
<i>Pumps</i>	0
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	10-yr	Intensity	inches	Oregon	Washington	10	3.45	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-01.1	5.23	70.00	3.45	0.98	5.11	0.84	0 00:13:03
2	HED-01.1	1.79	70.00	3.45	0.98	1.75	0.27	0 00:19:04
3	HED-02.1	11.73	80.00	3.45	1.60	18.73	4.09	0 00:16:21
4	HED-03.1	3.00	0.00	3.45	1.09	3.27	0.55	0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	3.33	152.15	0.00	7.85	0 00:00	0.00	0.00
2	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.25	157.04	0.00	7.96	0 00:00	0.00	0.00
3	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.25	158.00	0.00	7.00	0 00:00	0.00	0.00
4	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.26	177.17	0.00	4.08	0 00:00	0.00	0.00
5	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.26	181.13	0.00	10.87	0 00:00	0.00	0.00
6	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.27	223.09	0.00	5.91	0 00:00	0.00	0.00
7	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	3.14	171.13	0.00	7.87	0 00:00	0.00	0.00
8	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	3.13	172.04	0.00	4.96	0 00:00	0.00	0.00
9	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	3.14	174.13	0.00	3.87	0 00:00	0.00	0.00
10	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	3.15	175.80	0.00	9.94	0 00:00	0.00	0.00
11	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	3.63	181.46	0.00	6.54	0 00:00	0.00	0.00
12	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	4.06	182.26	0.00	5.70	0 00:00	0.00	0.00
13	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.39	183.05	0.00	6.95	0 00:00	0.00	0.00
14	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.41	235.02	0.00	4.98	0 00:00	0.00	0.00
15	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.55	236.11	0.00	13.89	0 00:00	0.00	0.00
16	COF-01	Outfall	238.00					0.83	238.00					
17	HED-01	Outfall	150.00					3.19	150.15					

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.25	20.90	0.01	3.46	0.11	0.06	0.00	Calculated
2	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.25	28.48	0.01	2.78	0.13	0.07	0.00	Calculated
3	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.26	7.14	0.04	4.23	0.13	0.13	0.00	Calculated
4	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	3.14	40.58	0.08	4.97	0.43	0.14	0.00	Calculated
5	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	3.13	8.91	0.35	3.97	0.69	0.46	0.00	Calculated
6	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	3.14	4.04	0.78	2.78	0.92	0.61	0.00	Calculated
7	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	3.63	59.16	0.06	2.98	0.74	0.25	0.00	Calculated
8	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	3.19	1512.53	0.00	1.42	0.15	0.02	0.00	
9	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.21	1082.72	0.00	0.16	0.09	0.01	0.00	
10	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.26	2813.13	0.00	1.74	0.11	0.02	0.00	
11	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	3.12	1963.65	0.00	1.59	0.14	0.02	0.00	
12	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	3.15	614.42	0.01	0.86	0.62	0.08	0.00	
13	HED-03A	Channel	HED-03A	HED-02F	770.00	183.00	181.76	0.1600	60.000	0.0300	0.27	443.56	0.00	0.07	0.25	0.05	0.00	
14	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.39	2403.19	0.00	0.91	0.03	0.01	0.00	
15	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.41	417.77	0.00	0.31	0.06	0.01	0.00	

Subbasin Hydrology

Subbasin : COF-01.1

Input Data

Area (ac) 5.23
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	5.23	C/D	70.00
Composite Area & Weighted CN	5.23		70.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8}) / ((P^{0.5}) * (S_f^{0.4})))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

$$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$$

R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

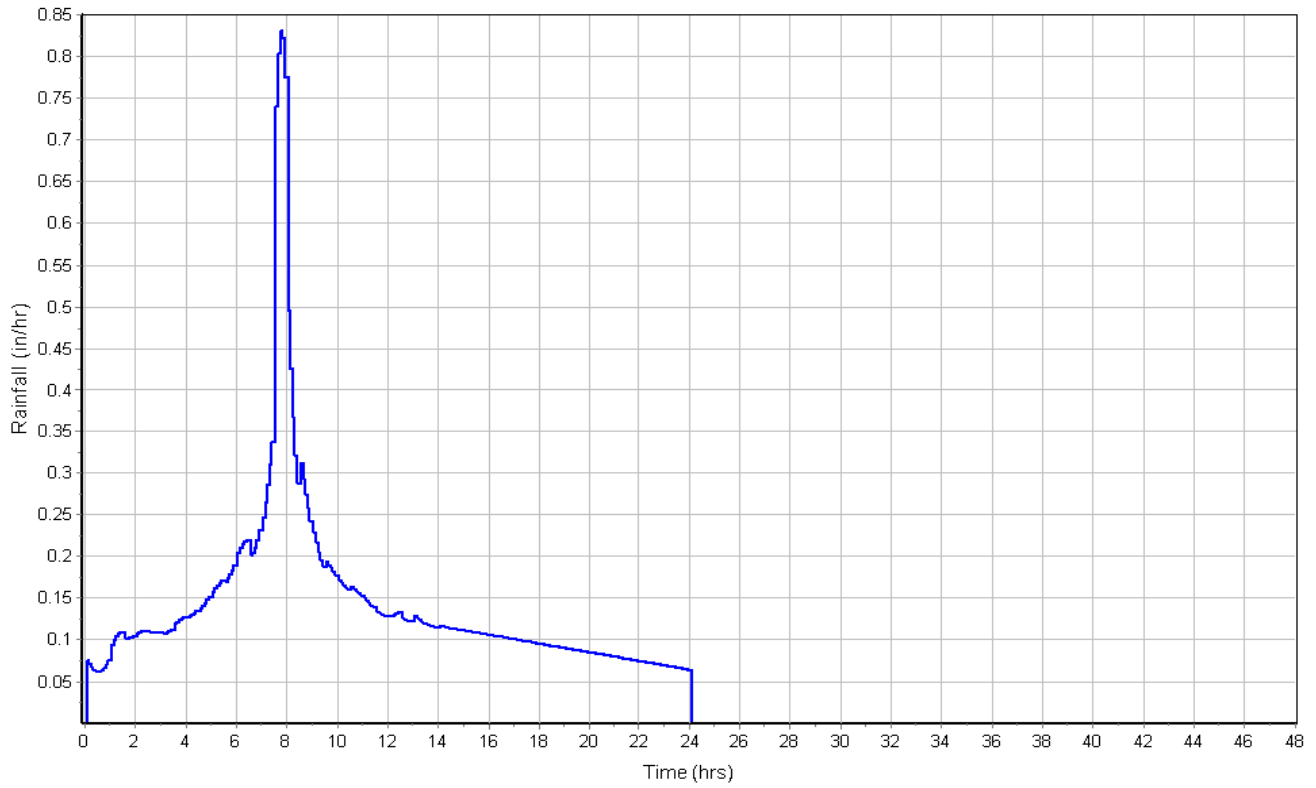
	Flowpath A	Flowpath B	Flowpath C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	17	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.16	0.00	0.00
Computed Flow Time (min) :	10.32	0.00	0.00
	Flowpath A	Flowpath B	Flowpath C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	210	0.00	0.00
Slope (%) :	6.6	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.28	0.00	0.00
Computed Flow Time (min) :	2.73	0.00	0.00
Total TOC (min)	13.06		

Subbasin Runoff Results

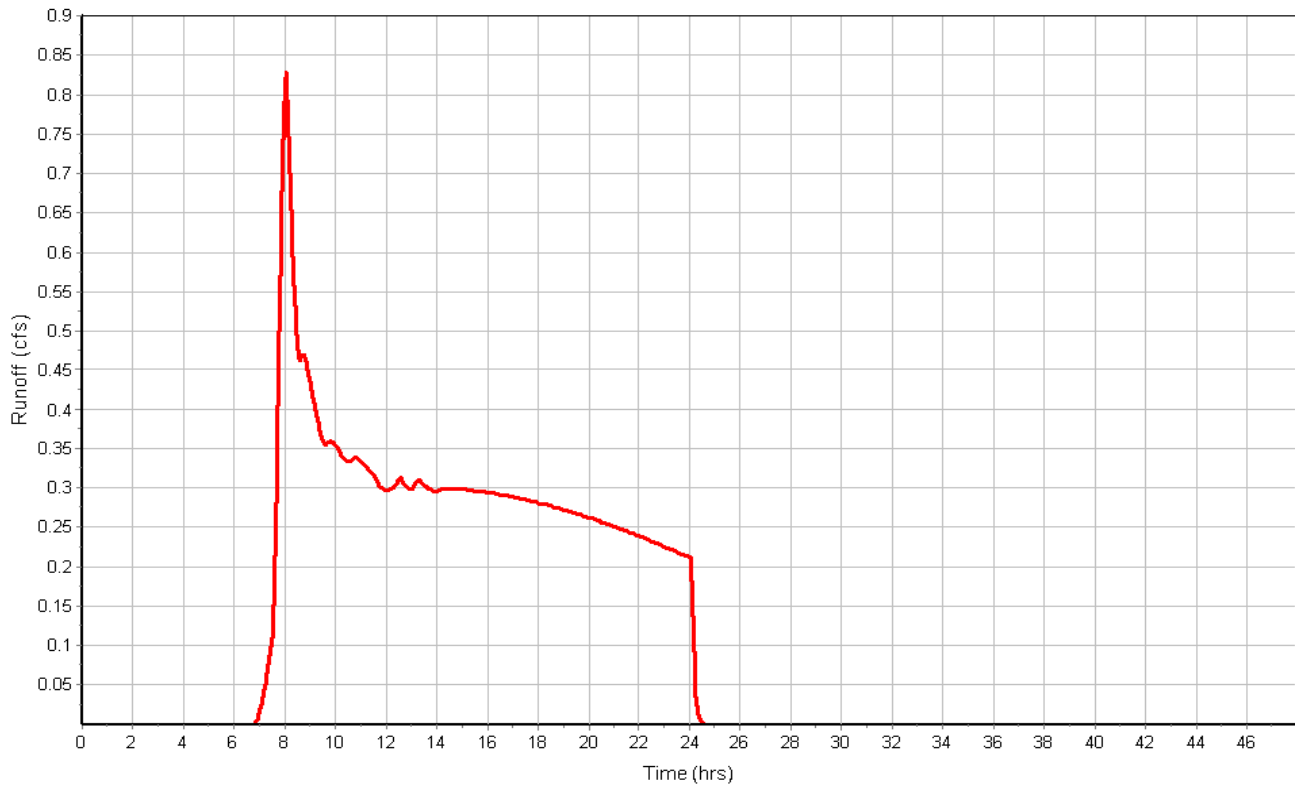
Total Rainfall (in)	3.45
Total Runoff (in)	0.98
Peak Runoff (cfs)	0.84
Weighted Curve Number	70.00
Time of Concentration (days hh:mm:ss)	0 00:13:04

Subbasin : COF-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Subbasin : HED-01.1

Input Data

Area (ac) 1.79
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	1.79	C/D	70.00
Composite Area & Weighted CN	1.79		70.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	10	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	12.76	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	364	0.00	0.00
Slope (%) :	3.7	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.96	0.00	0.00
Computed Flow Time (min) :	6.32	0.00	0.00
Total TOC (min)	19.08		

Subbasin Runoff Results

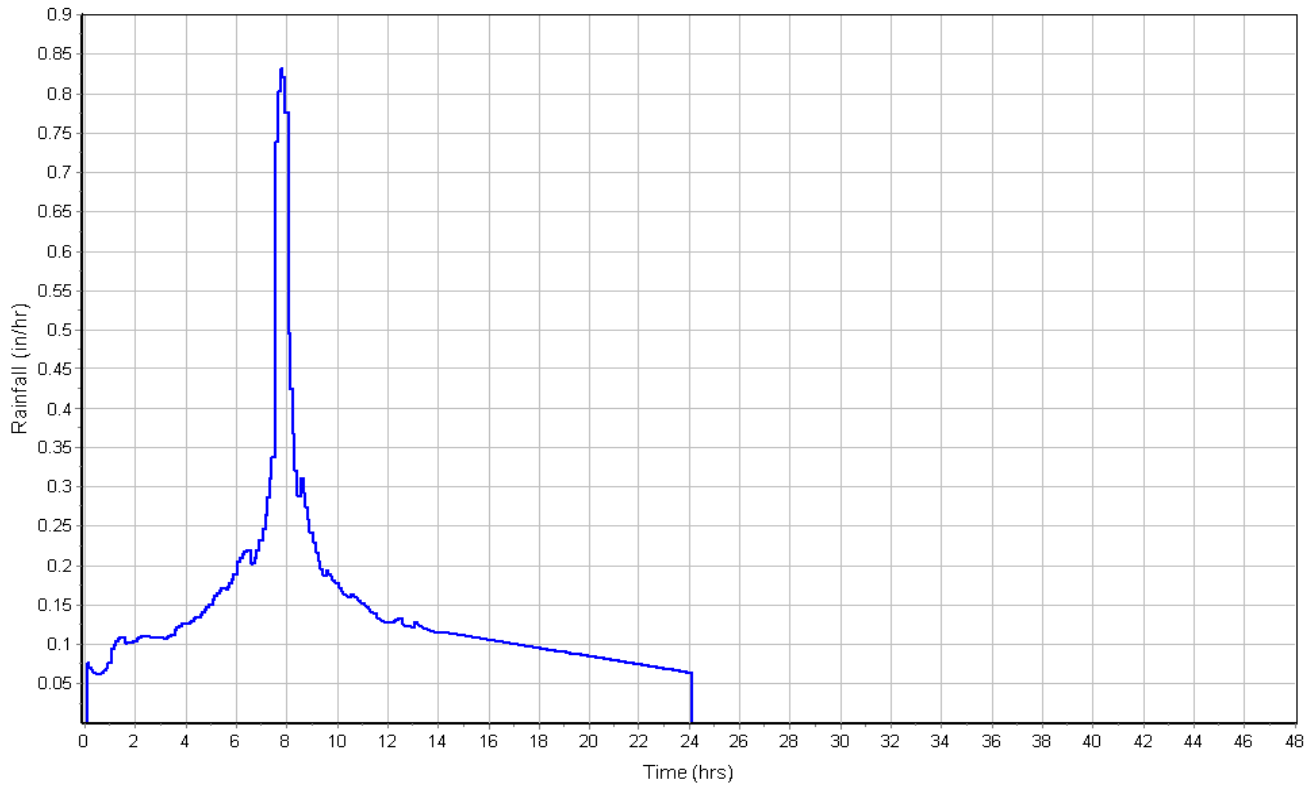
Total Rainfall (in) 3.45
 Total Runoff (in) 0.98
 Peak Runoff (cfs) 0.27
 Weighted Curve Number 70.00
 Time of Concentration (days hh:mm:ss) 0 00:19:05

FOR LAND USE PERMITTING (EXHIBIT B)

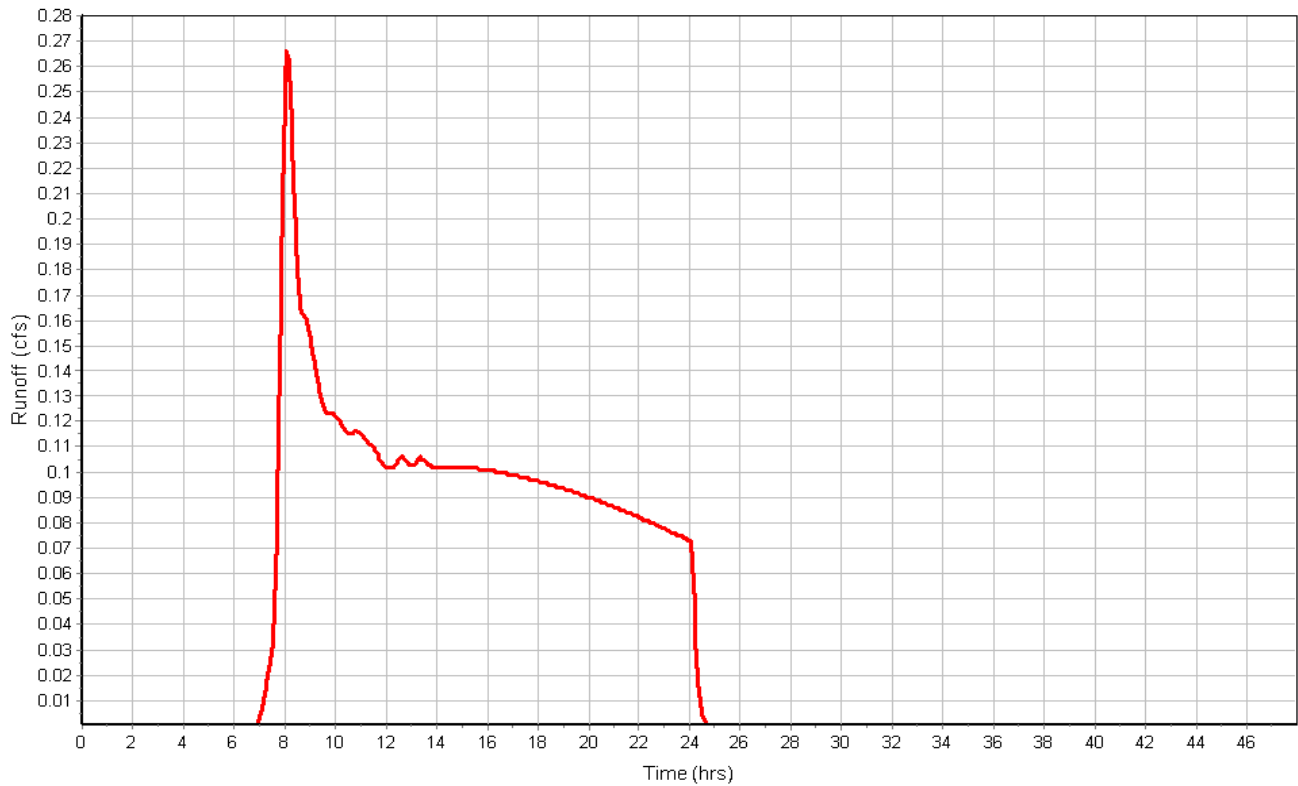
Pre-Development
10-year storm

Subbasin : HED-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Subbasin : HED-02.1

Input Data

Area (ac) 11.73
 Weighted Curve Number 80.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush/field	11.73	C/D	80.00
Composite Area & Weighted CN	11.73		80.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	18	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	10.09	0.00	0.00

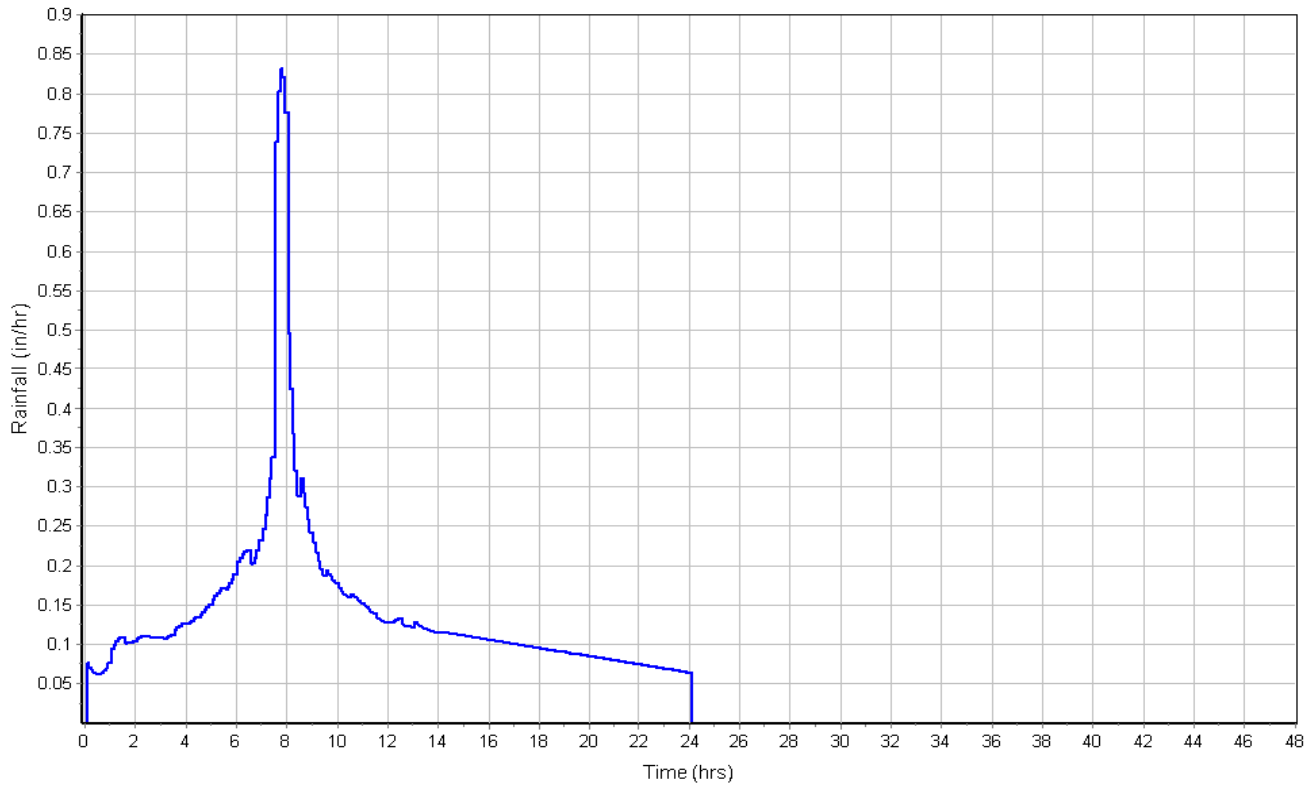
Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	500	0.00	0.00
Slope (%) :	3.6	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.33	0.00	0.00
Computed Flow Time (min) :	6.27	0.00	0.00
Total TOC (min)	16.35		

Subbasin Runoff Results

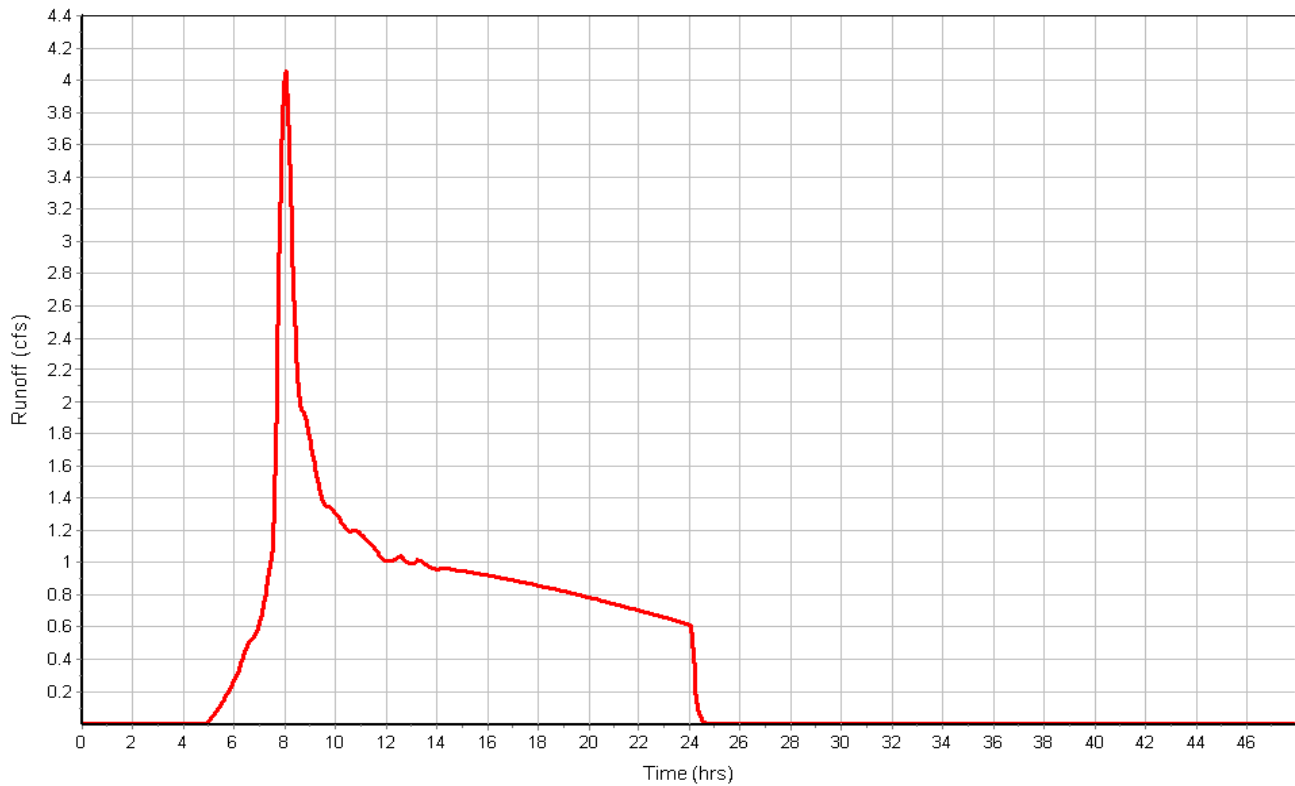
Total Rainfall (in) 3.45
 Total Runoff (in) 1.60
 Peak Runoff (cfs) 4.09
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:16:21

Subbasin : HED-02.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Subbasin : HED-03.1

Input Data

Area (ac) 3.00
 Weighted Curve Number 0.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	3.00	-	0.00
Composite Area & Weighted CN	3.00		0.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	12.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	11.67	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	354	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Woodland	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	6.78	0.00	0.00
Total TOC (min)	18.45		

Subbasin Runoff Results

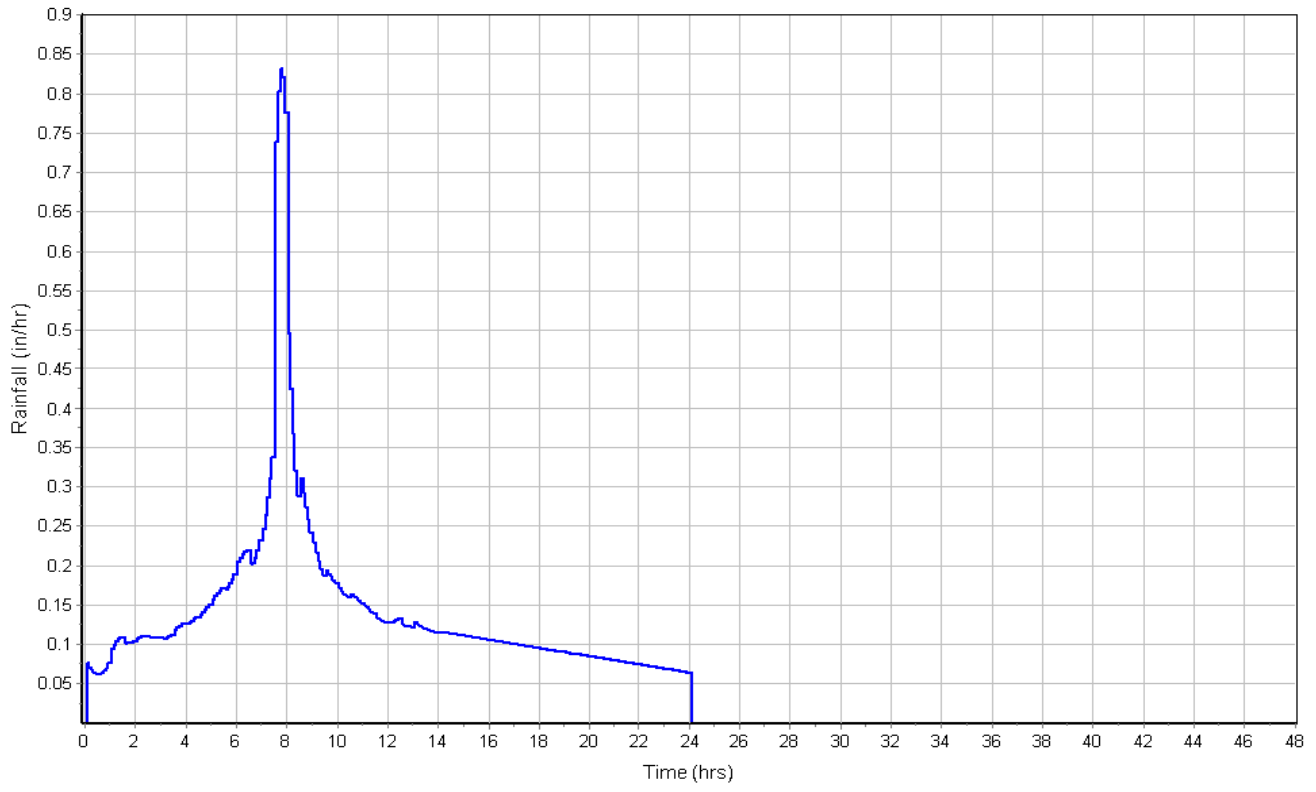
Total Rainfall (in) 3.45
 Total Runoff (in) 1.09
 Peak Runoff (cfs) 0.55
 Weighted Curve Number 0.00
 Time of Concentration (days hh:mm:ss) 0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B)

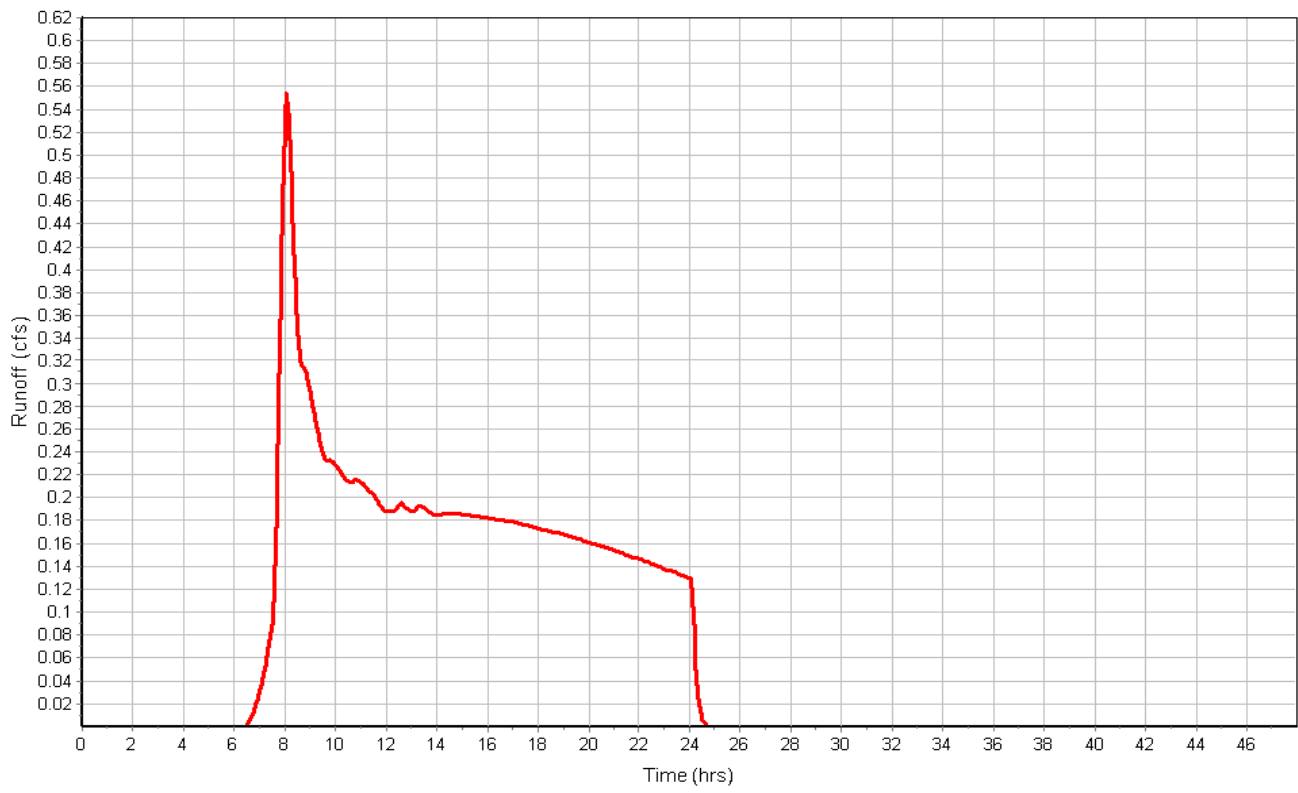
Pre-Development
10-year storm

Subbasin : HED-03.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
2	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
3	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
4	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
5	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
6	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
7	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
8	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
9	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
10	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
11	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
12	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
13	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
14	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
15	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	HED-01A	3.33	0.00	152.15	0.15	0.00	7.85	152.04	0.04	0 08:43	0 00:00	0.00	0.00
2	HED-01B	0.25	0.00	157.04	0.04	0.00	7.96	157.01	0.01	0 08:35	0 00:00	0.00	0.00
3	HED-01C	0.25	0.00	158.00	0.20	0.00	7.00	157.84	0.04	0 08:18	0 00:00	0.00	0.00
4	HED-01D	0.26	0.00	177.17	0.13	0.00	4.08	177.07	0.03	0 08:21	0 00:00	0.00	0.00
5	HED-01E	0.26	0.00	181.13	0.13	0.00	10.87	181.03	0.03	0 08:16	0 00:00	0.00	0.00
6	HED-01F	0.27	0.27	223.09	0.09	0.00	5.91	223.02	0.02	0 08:13	0 00:00	0.00	0.00
7	HED-02A	3.14	0.00	171.13	0.13	0.00	7.87	171.03	0.03	0 08:35	0 00:00	0.00	0.00
8	HED-02B	3.13	0.00	172.04	0.74	0.00	4.96	171.50	0.20	0 08:30	0 00:00	0.00	0.00
9	HED-02C	3.14	0.00	174.13	0.63	0.00	3.87	173.66	0.16	0 08:31	0 00:00	0.00	0.00
10	HED-02D	3.15	0.00	175.80	1.20	0.00	9.94	174.90	0.30	0 08:29	0 00:00	0.00	0.00
11	HED-02E	3.63	0.00	181.46	1.00	0.00	6.54	180.72	0.26	0 08:27	0 00:00	0.00	0.00
12	HED-02F	4.06	4.06	182.26	0.50	0.00	5.70	181.89	0.13	0 08:15	0 00:00	0.00	0.00
13	HED-03A	0.39	0.00	183.05	0.05	0.00	6.95	183.02	0.02	0 09:50	0 00:00	0.00	0.00
14	HED-03B	0.41	0.00	235.02	0.02	0.00	4.98	235.01	0.01	0 08:41	0 00:00	0.00	0.00
15	HED-03C	0.55	0.55	236.11	0.11	0.00	13.89	236.03	0.03	0 08:28	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate
1	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00	No
6	HED-03A	770.00	183.00	0.00	181.76	0.00	1.24	0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
7	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
8	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01A	3.19	0 08:43	1512.53	0.00	1.42	1.94	0.15	0.02	0.00		
2 HED-01B	0.21	0 08:35	1082.72	0.00	0.16	83.85	0.09	0.01	0.00		
3 HED-01F	0.26	0 08:13	2813.13	0.00	1.74	5.92	0.11	0.02	0.00		
4 HED-02A	3.12	0 08:35	1963.65	0.00	1.59	9.75	0.14	0.02	0.00		
5 HED-02E	3.15	0 08:27	614.42	0.01	0.86	9.42	0.62	0.08	0.00		
6 HED-03A	0.27	0 09:50	443.56	0.00	0.07	183.33	0.25	0.05	0.00		
7 HED-03B	0.39	0 08:41	2403.19	0.00	0.91	20.15	0.03	0.01	0.00		
8 HED-03C	0.41	0 08:31	417.77	0.00	0.31	37.63	0.06	0.01	0.00		

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
2 HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
3 HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
4 HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5 HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6 HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7 HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
10-year storm

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01C	0.25	0 08:22	20.90	0.01	3.46	0.45	0.11	0.06	0.00		Calculated
2 HED-01D	0.25	0 08:21	28.48	0.01	2.78	7.20	0.13	0.07	0.00		Calculated
3 HED-01E	0.26	0 08:16	7.14	0.04	4.23	0.37	0.13	0.13	0.00		Calculated
4 HED-02B	3.14	0 08:32	40.58	0.08	4.97	0.27	0.43	0.14	0.00		Calculated
5 HED-02C	3.13	0 08:31	8.91	0.35	3.97	1.28	0.69	0.46	0.00		Calculated
6 HED-02D	3.14	0 08:29	4.04	0.78	2.78	4.47	0.92	0.61	0.00		Calculated
7 HED-02F	3.63	0 08:15	59.16	0.06	2.98	0.92	0.74	0.25	0.00		Calculated

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Project Description

File Name 20191126-PRE-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 03, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	4
Nodes.....	17
<i>Junctions</i>	15
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	0
Links.....	15
<i>Channels</i>	8
<i>Pipes</i>	7
<i>Pumps</i>	0
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	25-yr	Intensity	inches	Oregon	Washington	25	3.90	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-01.1	5.23	70.00	3.90	1.26	6.61	1.21	0 00:13:03
2	HED-01.1	1.79	70.00	3.90	1.26	2.26	0.39	0 00:19:04
3	HED-02.1	11.73	80.00	3.90	1.96	22.98	5.20	0 00:16:21
4	HED-03.1	3.00	0.00	3.90	1.39	4.17	0.78	0 00:18:27

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	4.48	152.18	0.00	7.82	0 00:00	0.00	0.00
2	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.37	157.05	0.00	7.95	0 00:00	0.00	0.00
3	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.37	158.04	0.00	6.96	0 00:00	0.00	0.00
4	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.38	177.20	0.00	4.05	0 00:00	0.00	0.00
5	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.38	181.16	0.00	10.84	0 00:00	0.00	0.00
6	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.39	223.12	0.00	5.88	0 00:00	0.00	0.00
7	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	4.17	171.15	0.00	7.85	0 00:00	0.00	0.00
8	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	4.17	172.15	0.00	4.85	0 00:00	0.00	0.00
9	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	4.18	174.26	0.00	3.74	0 00:00	0.00	0.00
10	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	4.18	176.08	0.00	9.66	0 00:00	0.00	0.00
11	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	4.73	181.60	0.00	6.40	0 00:00	0.00	0.00
12	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	5.16	182.33	0.00	5.63	0 00:00	0.00	0.00
13	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.58	183.06	0.00	6.94	0 00:00	0.00	0.00
14	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.61	235.03	0.00	4.97	0 00:00	0.00	0.00
15	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.78	236.14	0.00	13.86	0 00:00	0.00	0.00
16	COF-01	Outfall	238.00					1.19	238.00					
17	HED-01	Outfall	150.00					4.31	150.18					

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)	Reported Condition
1	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.37	20.90	0.02	3.80	0.14	0.07	0.00	Calculated
2	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.37	28.48	0.01	3.14	0.16	0.08	0.00	Calculated
3	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.38	7.14	0.05	4.70	0.16	0.16	0.00	Calculated
4	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	4.17	40.58	0.10	5.37	0.50	0.17	0.00	Calculated
5	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	4.17	8.91	0.47	4.32	0.80	0.54	0.00	Calculated
6	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	4.18	4.04	1.04	2.96	1.12	0.75	0.00	> CAPACITY
7	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	4.73	59.16	0.08	3.14	0.85	0.28	0.00	Calculated
8	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	4.31	1512.53	0.00	1.59	0.18	0.02	0.00	
9	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.33	1082.72	0.00	0.21	0.11	0.01	0.00	
10	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.38	2813.13	0.00	1.96	0.14	0.02	0.00	
11	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	4.15	1963.65	0.00	1.73	0.16	0.02	0.00	
12	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	4.18	614.42	0.01	0.94	0.72	0.10	0.00	
13	HED-03A	Channel	HED-03A	HED-02F	770.00	183.00	181.76	0.1600	60.000	0.0300	0.40	443.56	0.00	0.09	0.29	0.06	0.00	
14	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.58	2403.19	0.00	1.01	0.04	0.01	0.00	
15	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.61	417.77	0.00	0.37	0.08	0.02	0.00	

Subbasin Hydrology

Subbasin : COF-01.1

Input Data

Area (ac) 5.23
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	5.23	C/D	70.00
Composite Area & Weighted CN	5.23		70.00

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8}) / ((P^{0.5}) * (S_f^{0.4})))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

$$V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n$$

R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

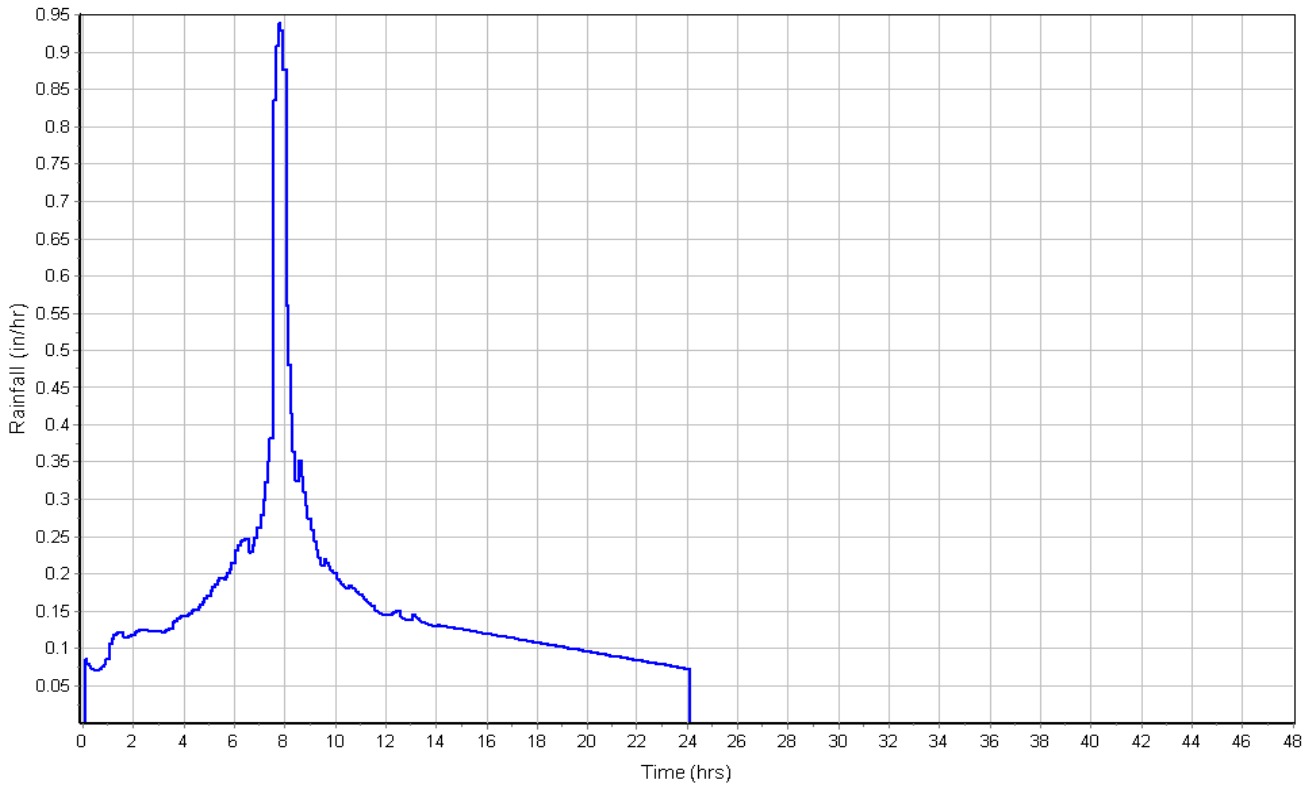
	Flowpath A	Flowpath B	Flowpath C
Sheet Flow Computations			
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	17	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.16	0.00	0.00
Computed Flow Time (min) :	10.32	0.00	0.00
	Flowpath A	Flowpath B	Flowpath C
Shallow Concentrated Flow Computations			
Flow Length (ft) :	210	0.00	0.00
Slope (%) :	6.6	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	1.28	0.00	0.00
Computed Flow Time (min) :	2.73	0.00	0.00
Total TOC (min)	13.06		

Subbasin Runoff Results

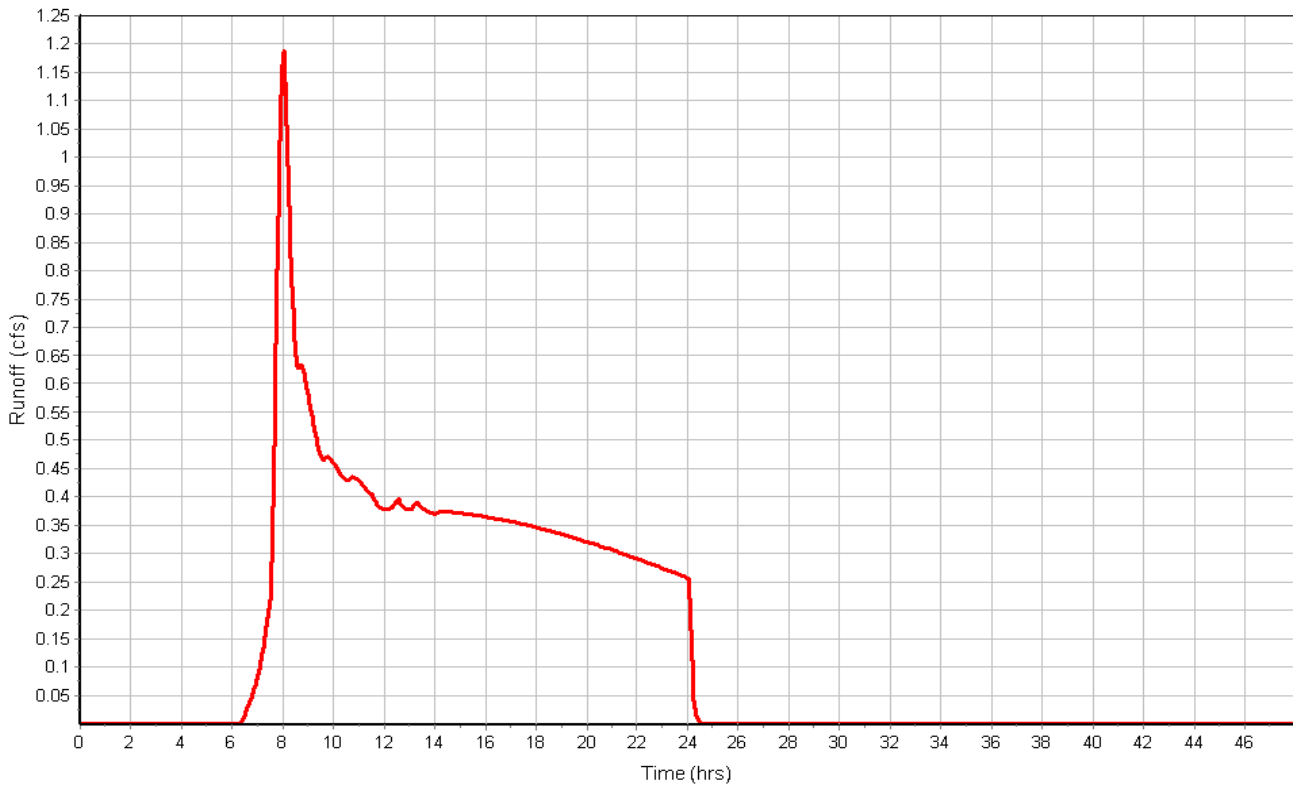
Total Rainfall (in)	3.90
Total Runoff (in)	1.26
Peak Runoff (cfs)	1.21
Weighted Curve Number	70.00
Time of Concentration (days hh:mm:ss)	0 00:13:04

Subbasin : COF-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Subbasin : HED-01.1

Input Data

Area (ac) 1.79
 Weighted Curve Number 70.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Woods, Good	1.79	C/D	70.00
Composite Area & Weighted CN	1.79		70.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	10	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.13	0.00	0.00
Computed Flow Time (min) :	12.76	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	364	0.00	0.00
Slope (%) :	3.7	0.00	0.00
Surface Type :	Woodland	Unpaved	Unpaved
Velocity (ft/sec) :	0.96	0.00	0.00
Computed Flow Time (min) :	6.32	0.00	0.00
Total TOC (min)	19.08		

Subbasin Runoff Results

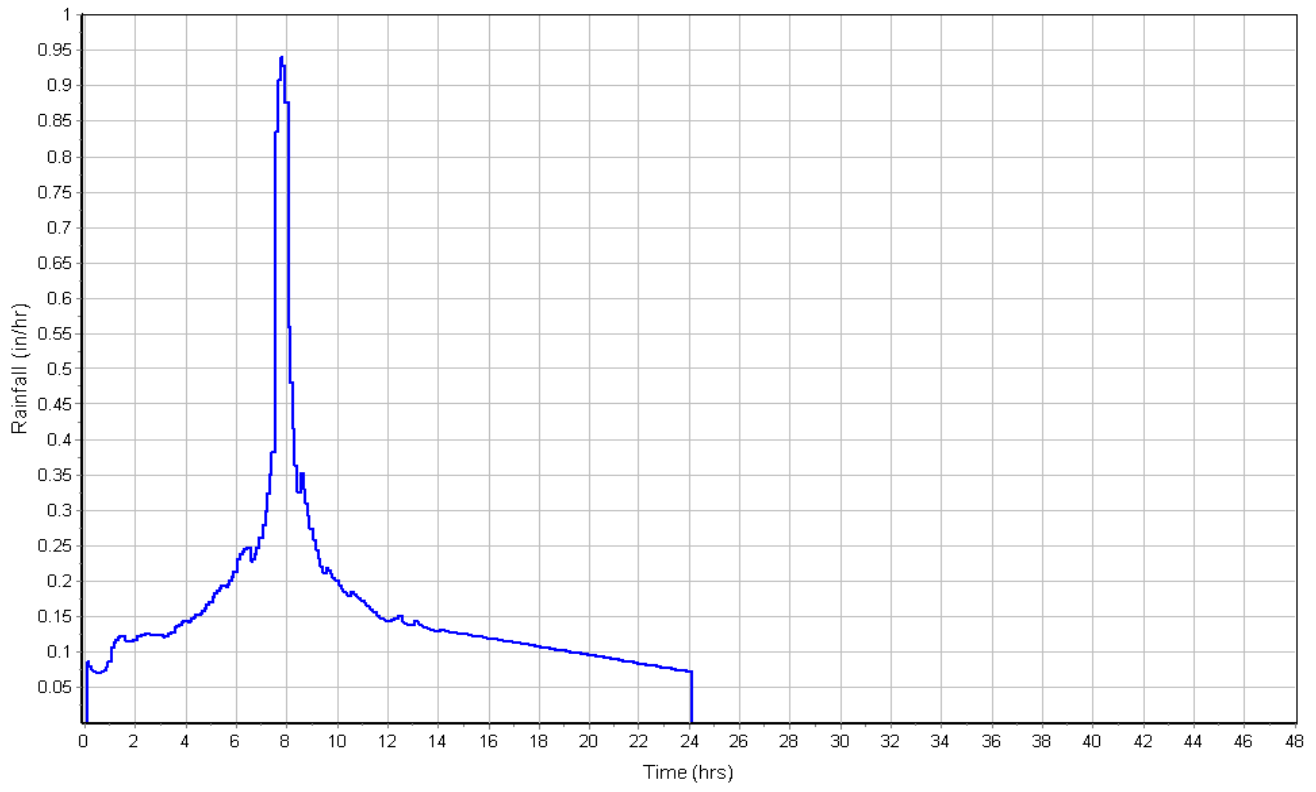
Total Rainfall (in) 3.90
 Total Runoff (in) 1.26
 Peak Runoff (cfs) 0.39
 Weighted Curve Number 70.00
 Time of Concentration (days hh:mm:ss) 0 00:19:05

FOR LAND USE PERMITTING (EXHIBIT B)

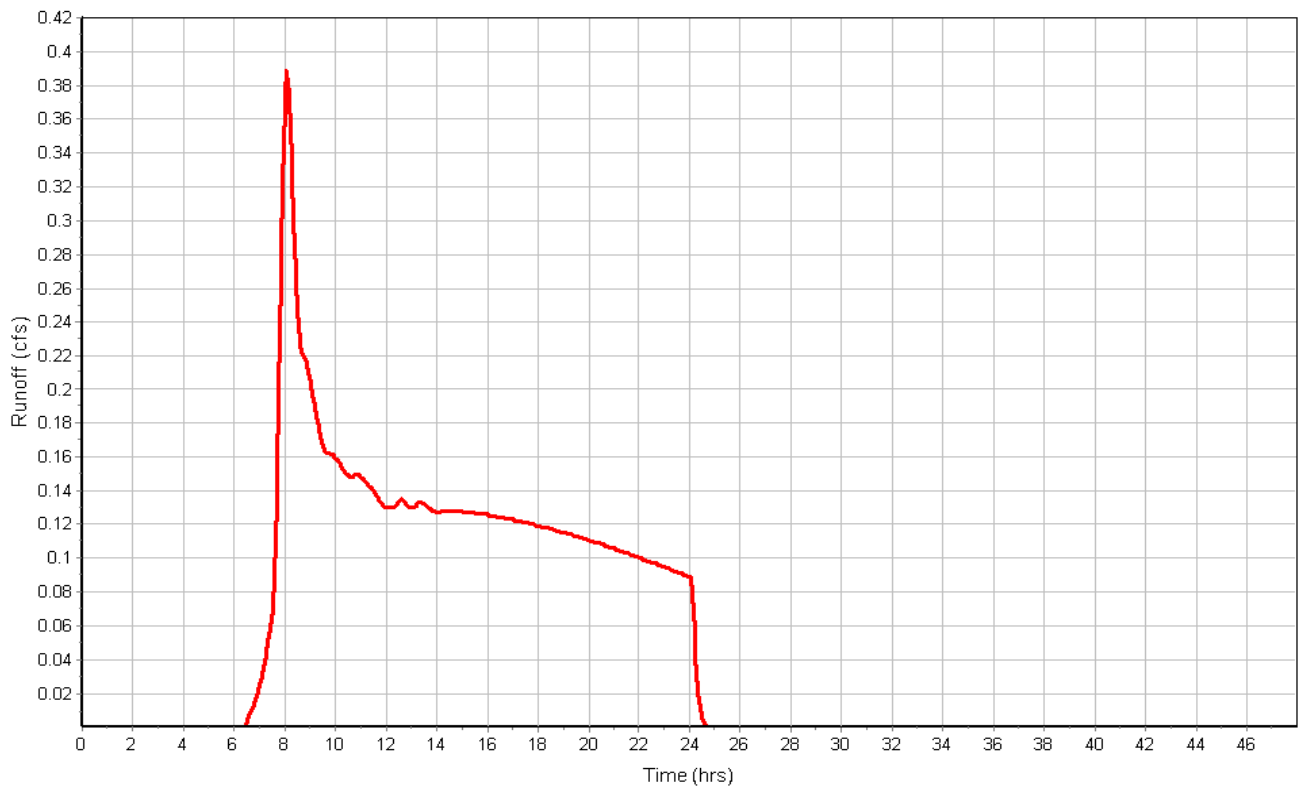
Pre-Development
25-year storm

Subbasin : HED-01.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Subbasin : HED-02.1

Input Data

Area (ac) 11.73
 Weighted Curve Number 80.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Brush/field	11.73	C/D	80.00
Composite Area & Weighted CN	11.73		80.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	18	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.17	0.00	0.00
Computed Flow Time (min) :	10.09	0.00	0.00

Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	500	0.00	0.00
Slope (%) :	3.6	0.00	0.00
Surface Type :	Grass pasture	Unpaved	Unpaved
Velocity (ft/sec) :	1.33	0.00	0.00
Computed Flow Time (min) :	6.27	0.00	0.00
Total TOC (min)	16.35		

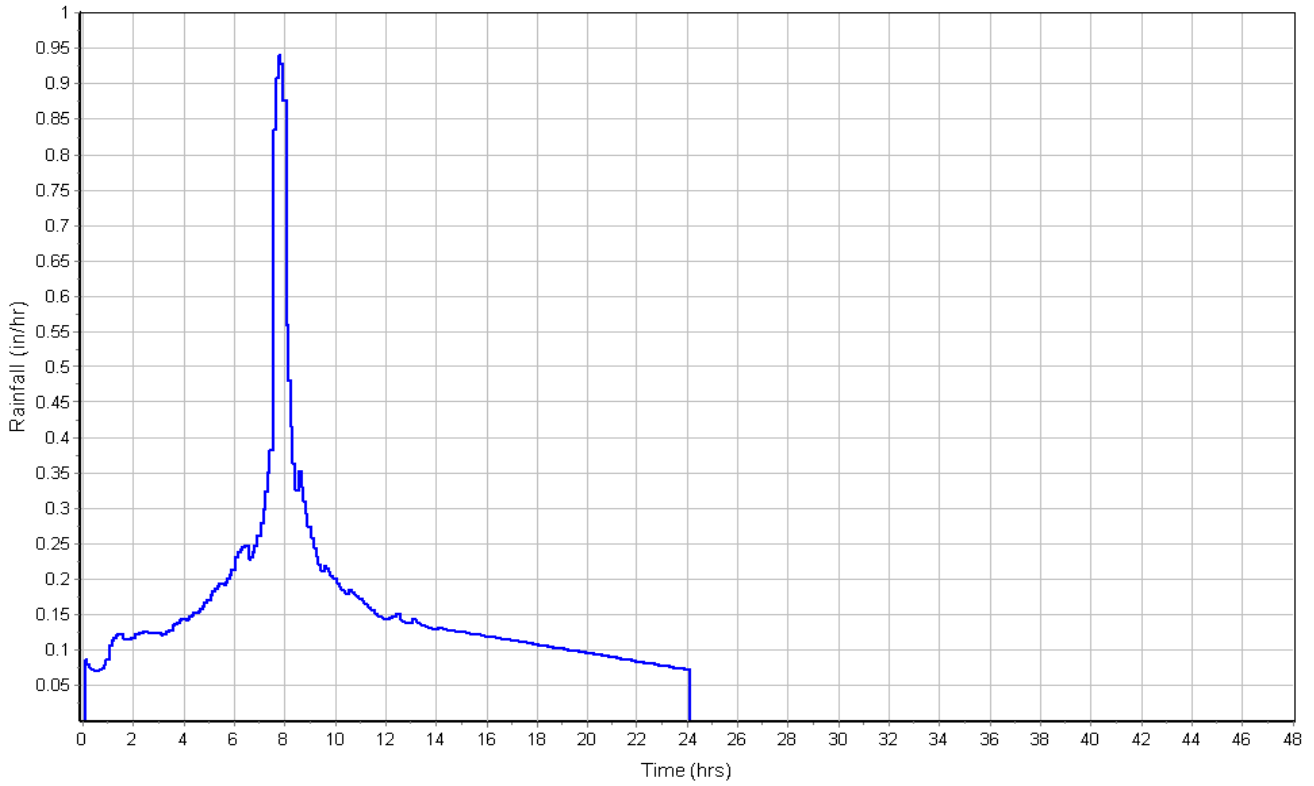
Subbasin Runoff Results

Total Rainfall (in) 3.90
 Total Runoff (in) 1.96
 Peak Runoff (cfs) 5.20
 Weighted Curve Number 80.00
 Time of Concentration (days hh:mm:ss) 0 00:16:21

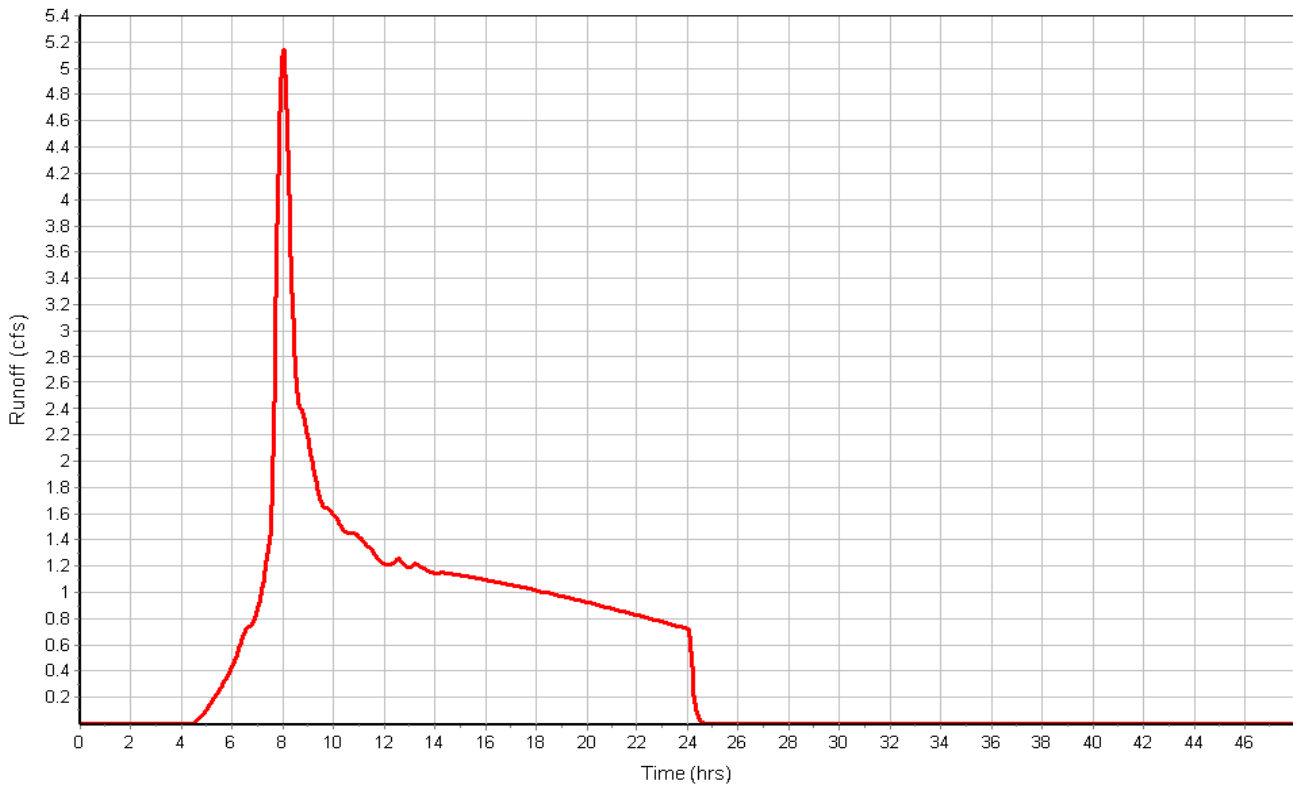
FOR LAND USE PERMITTING (EXHIBIT B) Pre-Development 25-year storm

Subbasin : HED-02.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Subbasin : HED-03.1

Input Data

Area (ac) 3.00
 Weighted Curve Number 0.00
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	3.00	-	0.00
Composite Area & Weighted CN	3.00		0.00

Time of Concentration

Sheet Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Manning's Roughness :	0.4	0.00	0.00
Flow Length (ft) :	100	0.00	0.00
Slope (%) :	12.5	0.00	0.00
2 yr, 24 hr Rainfall (in) :	2.5	0.00	0.00
Velocity (ft/sec) :	0.14	0.00	0.00
Computed Flow Time (min) :	11.67	0.00	0.00

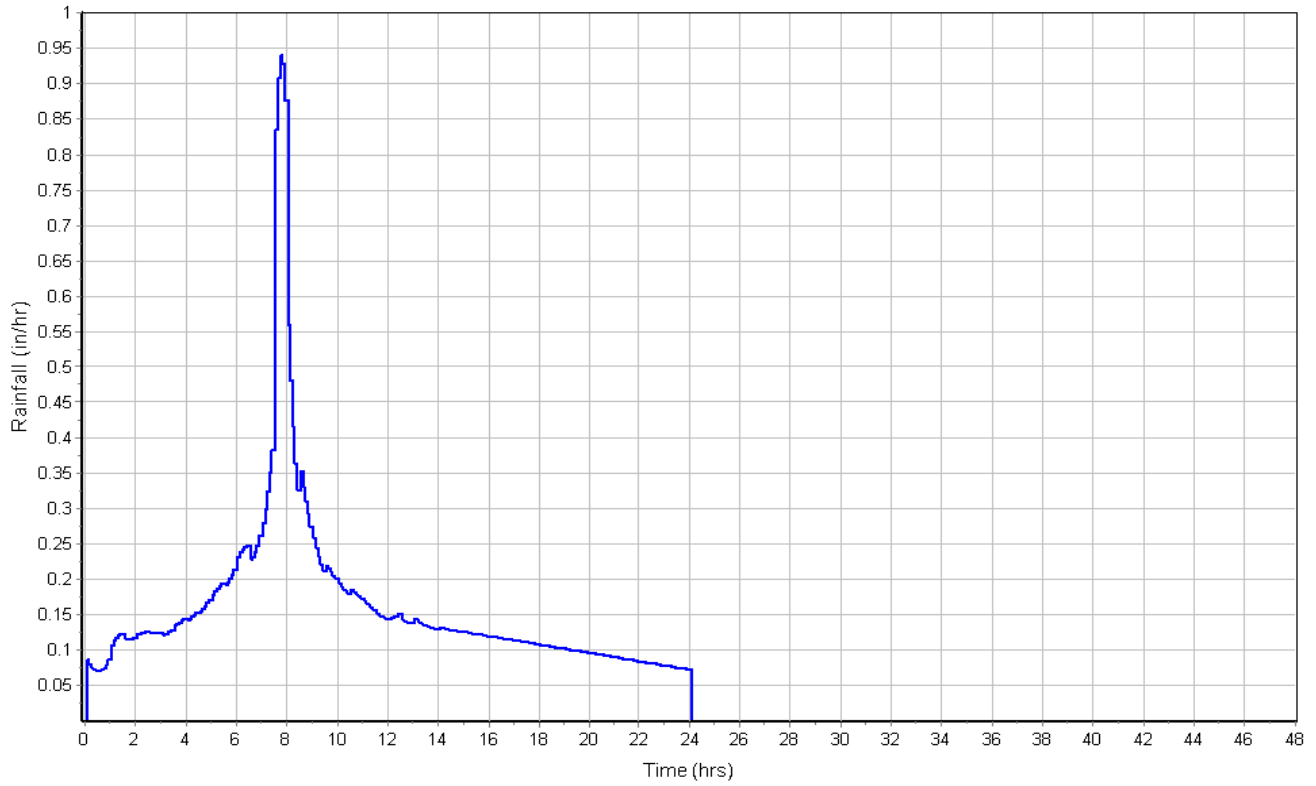
Shallow Concentrated Flow Computations	Flowpath	Flowpath	Flowpath
	A	B	C
Flow Length (ft) :	354	0.00	0.00
Slope (%) :	3	0.00	0.00
Surface Type :	Woodland	Woodland	Unpaved
Velocity (ft/sec) :	0.87	0.00	0.00
Computed Flow Time (min) :	6.78	0.00	0.00
Total TOC (min)	18.45		

Subbasin Runoff Results

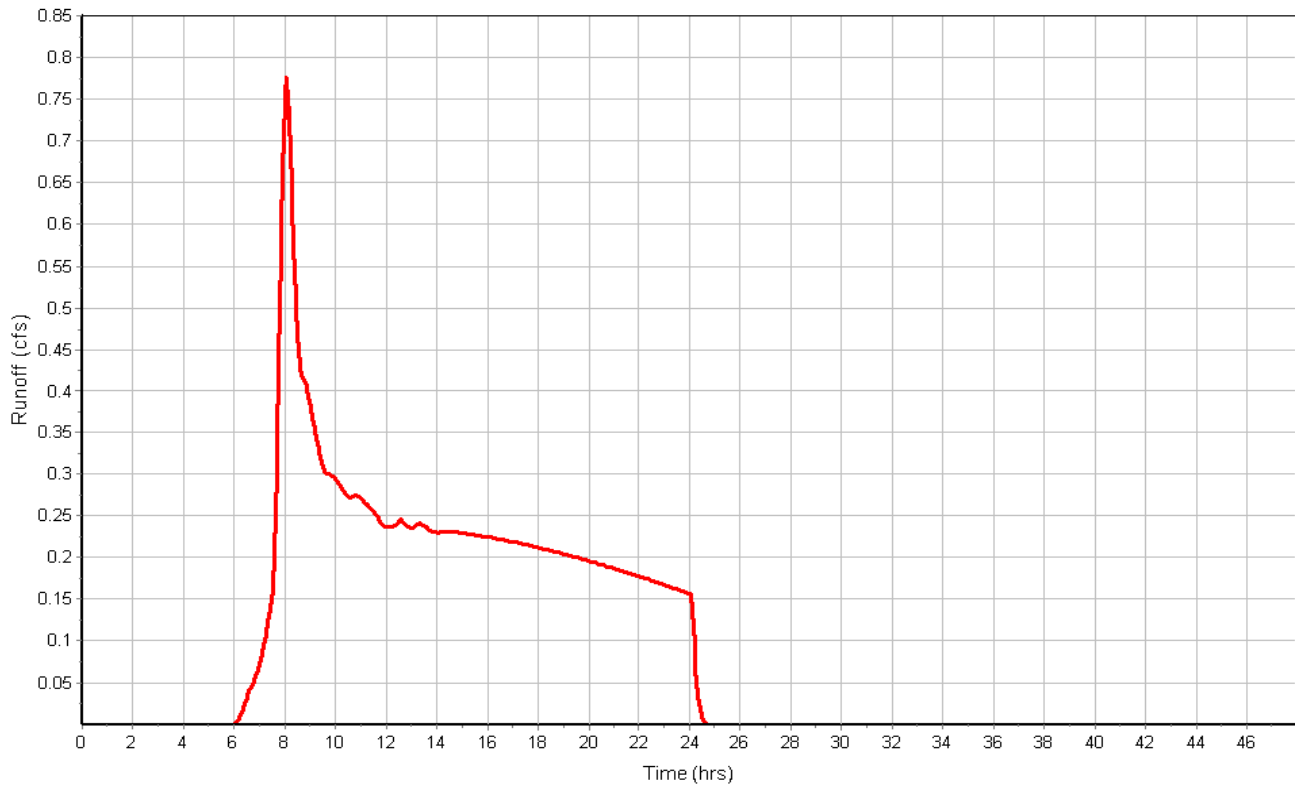
Total Rainfall (in) 3.90
 Total Runoff (in) 1.39
 Peak Runoff (cfs) 0.78
 Weighted Curve Number 0.00
 Time of Concentration (days hh:mm:ss) 0 00:18:27

Subbasin : HED-03.1

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
2	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
3	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
4	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
5	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
6	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
7	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
8	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
9	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
10	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
11	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
12	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
13	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
14	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
15	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	HED-01A	4.48	0.00	152.18	0.18	0.00	7.82	152.04	0.04	0 08:38	0 00:00	0.00	0.00
2	HED-01B	0.37	0.00	157.05	0.05	0.00	7.95	157.01	0.01	0 08:29	0 00:00	0.00	0.00
3	HED-01C	0.37	0.00	158.04	0.24	0.00	6.96	157.85	0.05	0 08:17	0 00:00	0.00	0.00
4	HED-01D	0.38	0.00	177.20	0.16	0.00	4.05	177.08	0.04	0 08:19	0 00:00	0.00	0.00
5	HED-01E	0.38	0.00	181.16	0.16	0.00	10.84	181.04	0.04	0 08:15	0 00:00	0.00	0.00
6	HED-01F	0.39	0.39	223.12	0.12	0.00	5.88	223.02	0.02	0 08:11	0 00:00	0.00	0.00
7	HED-02A	4.17	0.00	171.15	0.15	0.00	7.85	171.03	0.03	0 08:31	0 00:00	0.00	0.00
8	HED-02B	4.17	0.00	172.15	0.85	0.00	4.85	171.52	0.22	0 08:26	0 00:00	0.00	0.00
9	HED-02C	4.18	0.00	174.26	0.76	0.00	3.74	173.68	0.18	0 08:28	0 00:00	0.00	0.00
10	HED-02D	4.18	0.00	176.08	1.48	0.00	9.66	174.93	0.33	0 08:25	0 00:00	0.00	0.00
11	HED-02E	4.73	0.00	181.60	1.14	0.00	6.40	180.75	0.29	0 08:24	0 00:00	0.00	0.00
12	HED-02F	5.16	5.14	182.33	0.57	0.00	5.63	181.90	0.14	0 08:14	0 00:00	0.00	0.00
13	HED-03A	0.58	0.00	183.06	0.06	0.00	6.94	183.02	0.02	0 09:26	0 00:00	0.00	0.00
14	HED-03B	0.61	0.00	235.03	0.03	0.00	4.97	235.01	0.01	0 08:35	0 00:00	0.00	0.00
15	HED-03C	0.78	0.78	236.14	0.14	0.00	13.86	236.03	0.03	0 08:23	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flap Flow Gate
1	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
2	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
3	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00 No
4	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00 No
5	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00 No
6	HED-03A	770.00	183.00	0.00	181.76	0.00	1.24	0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No
7	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No
8	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00 No

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01A	4.31	0 08:39	1512.53	0.00	1.59	1.73	0.18	0.02	0.00		
2 HED-01B	0.33	0 08:29	1082.72	0.00	0.21	63.89	0.11	0.01	0.00		
3 HED-01F	0.38	0 08:11	2813.13	0.00	1.96	5.26	0.14	0.02	0.00		
4 HED-02A	4.15	0 08:31	1963.65	0.00	1.73	8.96	0.16	0.02	0.00		
5 HED-02E	4.18	0 08:24	614.42	0.01	0.94	8.62	0.72	0.10	0.00		
6 HED-03A	0.40	0 09:26	443.56	0.00	0.09	142.59	0.29	0.06	0.00		
7 HED-03B	0.58	0 08:35	2403.19	0.00	1.01	18.15	0.04	0.01	0.00		
8 HED-03C	0.61	0 08:25	417.77	0.00	0.37	31.53	0.08	0.02	0.00		

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Pipe Input

SN Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate	No. of Barrels
1 HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
2 HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
3 HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
4 HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5 HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6 HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7 HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Pre-Development
25-year storm

Pipe Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 HED-01C	0.37	0 08:19	20.90	0.02	3.80	0.41	0.14	0.07	0.00		Calculated
2 HED-01D	0.37	0 08:19	28.48	0.01	3.14	6.38	0.16	0.08	0.00		Calculated
3 HED-01E	0.38	0 08:15	7.14	0.05	4.70	0.33	0.16	0.16	0.00		Calculated
4 HED-02B	4.17	0 08:28	40.58	0.10	5.37	0.25	0.50	0.17	0.00		Calculated
5 HED-02C	4.17	0 08:28	8.91	0.47	4.32	1.18	0.80	0.54	0.00		Calculated
6 HED-02D	4.18	0 08:26	4.04	1.04	2.96	4.19	1.12	0.75	0.00		> CAPACITY
7 HED-02F	4.73	0 08:14	59.16	0.08	3.14	0.88	0.85	0.28	0.00		Calculated

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Project Description

File Name 20191126-POST-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 28, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	14
Nodes.....	62
<i>Junctions</i>	45
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	15
Links.....	67
<i>Channels</i>	36
<i>Pipes</i>	30
<i>Pumps</i>	1
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	REX-1949	Cumulative	inches				0.00	

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-LIDA_11	3.71	96.88	11.58	11.20	41.50	0.93	0 00:05:00
2	COF-LIDA_12	0.49	96.13	11.58	11.11	5.45	0.12	0 00:05:00
3	HED-LIDA_01	0.43	94.77	11.58	10.94	4.69	0.11	0 00:05:00
4	HED-LIDA_02	0.39	94.78	11.58	10.94	4.28	0.10	0 00:05:00
5	HED-LIDA_03	0.40	94.61	11.58	10.92	4.35	0.10	0 00:05:00
6	HED-LIDA_04	0.44	93.24	11.58	10.75	4.68	0.11	0 00:05:00
7	HED-LIDA_05	2.67	91.26	11.58	10.51	28.07	0.67	0 00:05:00
8	HED-LIDA_06A	5.95	89.16	11.58	10.24	60.96	1.48	0 00:05:00
9	HED-LIDA_06B	0.41	98.00	11.58	11.34	4.68	0.10	0 00:05:00
10	HED-LIDA_07	1.08	93.59	11.58	10.80	11.63	0.27	0 00:05:00
11	HED-LIDA_08B	2.25	94.33	11.58	10.89	24.52	0.57	0 00:05:00
12	HED-LIDA_09	0.23	95.64	11.58	11.05	2.53	0.06	0 00:05:00
13	HED-LIDA_10	0.32	95.08	11.58	10.98	3.52	0.08	0 00:05:00
14	HED-LIDA_8A	2.32	95.49	11.58	11.03	25.64	0.58	0 00:05:00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	COF-01A	Junction	238.00	250.00	238.00	1000.00	12.00	0.77	238.35	0.00	11.65	0 00:00	0.00	0.00
2	COF-01B	Junction	244.00	247.00	244.00	1000.00	12.00	0.75	244.09	0.00	2.91	0 00:00	0.00	0.00
3	COF-01C	Junction	245.00	247.00	245.00	1000.00	12.00	0.75	246.54	0.00	1.96	0 00:00	0.00	0.00
4	COF-02A	Junction	244.00	247.00	244.00	1000.00	12.00	0.36	244.08	0.00	3.92	0 00:00	0.00	0.00
5	COF-02B	Junction	245.00	247.00	245.00	1000.00	12.00	3.38	246.07	0.00	0.93	0 00:00	0.00	0.00
6	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	1.43	152.09	0.00	7.91	0 00:00	0.00	0.00
7	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	1.35	157.13	0.00	7.87	0 00:00	0.00	0.00
8	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	1.35	158.23	0.00	6.77	0 00:00	0.00	0.00
9	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	1.35	177.34	0.00	3.91	0 00:00	0.00	0.00
10	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	1.35	181.32	0.00	10.68	0 00:00	0.00	0.00
11	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	1.35	223.23	0.00	5.77	0 00:00	0.00	0.00
12	HED-01G	Junction	226.00	229.00	226.00	1000.00	12.00	1.33	226.21	0.00	3.29	0 00:00	0.00	0.00
13	HED-01H	Junction	229.00	232.00	229.00	1000.00	12.00	1.25	229.37	0.00	2.63	0 00:00	0.00	0.00
14	HED-01I	Junction	230.00	233.00	230.00	1000.00	12.00	1.25	230.38	0.00	2.62	0 00:00	0.00	0.00
15	HED-01J	Junction	231.00	233.00	231.00	1000.00	12.00	1.25	232.83	0.00	1.92	0 00:00	0.00	0.00
16	HED-01K	Junction	226.50	229.00	226.50	1000.00	12.00	1.01	228.21	0.00	1.54	0 00:00	0.00	0.00
17	HED-01L	Junction	226.50	229.00	226.50	1000.00	12.00	0.05	226.58	0.00	2.92	0 00:00	0.00	0.00
18	HED-01M	Junction	224.00	230.00	224.00	1000.00	12.00	0.04	224.05	0.00	5.95	0 00:00	0.00	0.00
19	HED-01N	Junction	230.00	235.00	230.00	1000.00	12.00	0.04	230.17	0.00	4.83	0 00:00	0.00	0.00
20	HED-01O	Junction	234.00	238.00	234.00	1000.00	12.00	0.04	234.05	0.00	4.45	0 00:00	0.00	0.00
21	HED-01P	Junction	234.00	239.00	234.00	1000.00	12.00	0.00	234.00	0.00	5.50	0 00:00	0.00	0.00
22	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	0.15	171.02	0.00	7.98	0 00:00	0.00	0.00
23	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	0.15	171.46	0.00	5.54	0 00:00	0.00	0.00
24	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	0.15	173.63	0.00	4.37	0 00:00	0.00	0.00
25	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	0.15	174.84	0.00	10.90	0 00:00	0.00	0.00
26	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	0.15	180.66	0.00	7.34	0 00:00	0.00	0.00
27	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	0.17	181.87	0.00	6.09	0 00:00	0.00	0.00
28	HED-02G	Junction	235.00	237.00	235.00	1000.00	12.00	0.07	235.05	0.00	2.95	0 00:00	0.00	0.00
29	HED-02H	Junction	236.00	238.00	236.00	1000.00	12.00	0.07	236.11	0.00	1.89	0 00:00	0.00	0.00
30	HED-02I	Junction	237.00	239.00	237.00	1000.00	12.00	0.00	237.00	0.00	2.00	0 00:00	0.00	0.00
31	HED-02J	Junction	237.00	250.00	237.00	1000.00	12.00	0.07	237.10	0.00	12.90	0 00:00	0.00	0.00
32	HED-02K	Junction	255.00	257.00	255.00	1000.00	12.00	0.08	256.33	0.00	2.17	0 00:00	0.00	0.00
33	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.13	183.03	0.00	6.97	0 00:00	0.00	0.00
34	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.13	235.01	0.00	4.99	0 00:00	0.00	0.00
35	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.08	236.04	0.00	13.96	0 00:00	0.00	0.00
36	HED-03D	Junction	241.00	245.00	241.00	1000.00	12.00	0.08	241.02	0.00	3.98	0 00:00	0.00	0.00
37	HED-03E	Junction	250.00	251.00	250.00	1000.00	12.00	0.04	250.05	0.00	1.45	0 00:00	0.00	0.00
38	HED-03F	Junction	250.00	251.00	250.00	1000.00	12.00	0.03	250.04	0.00	1.71	0 00:00	0.00	0.00
39	HED-03G	Junction	242.00	245.00	242.00	1000.00	12.00	0.03	242.00	0.00	3.00	0 00:00	0.00	0.00
40	HED-03H	Junction	243.00	245.00	243.00	1000.00	12.00	0.14	244.43	0.00	2.07	0 00:00	0.00	0.00
41	HED-03I	Junction	244.00	247.00	244.00	1000.00	12.00	0.01	244.43	0.00	2.57	0 00:00	0.00	0.00
42	HED-03J	Junction	245.00	247.00	245.00	1000.00	12.00	0.00	245.00	0.00	3.50	0 00:00	0.00	0.00
43	HED-03K	Junction	256.00	258.00	256.00	1000.00	12.00	0.55	257.05	0.00	1.95	0 00:00	0.00	0.00
44	HED-03L	Junction	256.00	258.00	256.00	1000.00	12.00	0.55	256.18	0.00	1.82	0 00:00	0.00	0.00
45	HED-03t	Junction	238.00	243.00	238.00	1000.00	12.00	0.06	238.13	0.00	5.87	0 00:00	0.00	0.00
46	COF-01	Outfall	238.00					0.77	238.35					
47	HED-01	Outfall	150.00					1.43	150.09					
48	LIDA-01	Storage Node	228.00	229.00	228.00		938.00	0.44	228.52				0.00	0.00
49	LIDA-02	Storage Node	228.00	229.00	228.00		562.00	3.97	228.78				0.00	0.00
50	LIDA-03	Storage Node	237.00	238.00	237.00		875.00	0.29	237.52				0.00	0.00
51	LIDA-04	Storage Node	238.00	239.00	238.00		1875.00	0.11	238.07				0.00	0.00
52	LIDA-05	Storage Node	255.00	257.00	255.00		12000.00	0.67	256.33				0.00	0.00
53	LIDA-06A	Storage Node	231.00	233.00	231.00		10000.00	1.48	232.83				0.00	0.00
54	LIDA-06B	Storage Node	237.00	247.00	237.00		18000.00	0.11	237.15				0.00	0.00
55	LIDA-07	Storage Node	242.00	243.00	242.00		2812.00	0.27	242.59				0.00	0.00
56	LIDA-08B	Storage Node	245.00	247.00	245.00		5650.00	0.00	245.00				0.00	0.00
57	LIDA-08C	Storage Node	243.00	245.00	243.00		18650.00	1.21	244.43				0.00	0.00
58	LIDA-09	Storage Node	250.00	251.00	250.00		375.00	0.20	250.76				0.00	0.00
59	LIDA-10	Storage Node	250.00	251.00	250.00		657.00	0.21	250.52				0.00	0.00
60	LIDA-11	Storage Node	245.00	247.00	245.00		13000.00	0.93	246.54				0.00	0.00
61	LIDA-12	Storage Node	245.00	247.00	245.00		1000.00	2.39	246.01				0.00	0.00
62	LIDA-8A	Storage Node	256.00	258.00	256.00		1777.00	0.58	257.05				0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Link Summary

SN	Element	From	To (Outlet)	Length	Inlet	Outlet	Average	Diameter or	Manning's	Peak	Design	Peak Flow/	Peak Flow	Peak Flow	Peak Flow	Total Time Reported
ID	Type	(Inlet)	Node	(ft)	Invert	Invert	Slope	Height	Roughness	Flow	Capacity	Design Flow	Velocity	Depth	Depth/	Surcharged Condition
		Node	Node	(ft)	Elevation	Elevation	(%)	(in)		(cfs)	(cfs)	Ratio	(ft/sec)	(ft)	Total Depth	(min)
															Ratio	
1	COF-01D	Pipe	COF-01C COF-01B	1.00	245.00	244.00	100.0000	0.750	0.0130	0.03	0.02	1.18	10.57	0.06	1.00	185.00 SURCHARGED
2	COF-2A	Pipe	COF-02A COF-01A	400.00	244.00	238.00	1.5000	18.000	0.0150	0.06	11.15	0.01	0.83	0.21	0.14	0.00 Calculated
3	COF-2C	Pipe	COF-02B COF-02A	1.00	245.00	244.00	100.0000	0.500	0.0130	0.01	0.01	1.32	12.44	0.04	1.00	77.00 SURCHARGED
4	HED-01C	Pipe	HED-01C HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	1.35	20.90	0.06	5.14	0.28	0.14	0.00 Calculated
5	HED-01D	Pipe	HED-01D HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	1.35	28.48	0.05	4.63	0.30	0.15	0.00 Calculated
6	HED-01E	Pipe	HED-01E HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	1.35	7.14	0.19	6.61	0.31	0.31	0.00 Calculated
7	HED-01G	Pipe	HED-01G HED-01F	20.00	226.00	223.00	15.0000	18.000	0.0130	1.33	40.68	0.03	8.45	0.22	0.14	0.00 Calculated
8	HED-01H	Pipe	HED-01L HED-01G	50.00	226.50	226.00	1.0000	12.000	0.0130	0.05	3.56	0.01	0.68	0.14	0.14	0.00 Calculated
9	HED-01L	Pipe	HED-01M HED-01F	47.37	224.00	223.00	2.1100	18.000	0.0130	0.04	15.26	0.00	0.44	0.14	0.09	0.00 Calculated
10	HED-01N	Pipe	HED-01O HED-01N	75.00	234.00	230.00	5.3300	12.000	0.0130	0.04	8.23	0.00	1.93	0.11	0.11	0.00 Calculated
11	HED-01P	Pipe	HED-01P HED-01N	65.00	234.00	230.00	6.1500	18.000	0.0130	0.00	26.06	0.00	0.00	0.09	0.06	0.00 Calculated
12	HED-01R	Pipe	HED-01I HED-01H	50.00	230.00	229.00	2.0000	12.000	0.0130	1.25	5.04	0.25	4.64	0.37	0.37	0.00 Calculated
13	HED-01S	Pipe	HED-01H HED-01G	100.00	229.00	228.00	1.0000	18.000	0.0130	1.25	10.50	0.12	3.81	0.36	0.24	0.00 Calculated
14	HED-01U	Pipe	HED-01J HED-01I	1.00	231.00	230.00	100.0000	1.000	0.0130	0.05	0.05	1.11	9.75	0.08	1.00	1545.00 SURCHARGED
15	HED-02B	Pipe	HED-02B HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	0.15	40.58	0.00	2.29	0.09	0.03	0.00 Calculated
16	HED-02C	Pipe	HED-02C HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	0.15	8.91	0.02	1.61	0.15	0.10	0.00 Calculated
17	HED-02D	Pipe	HED-02D HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	0.15	4.04	0.04	1.13	0.19	0.13	0.00 Calculated
18	HED-02F	Pipe	HED-02F HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	0.15	59.16	0.00	1.20	0.15	0.05	0.00 Calculated
19	HED-02H	Pipe	HED-02H HED-02G	100.00	236.00	235.00	1.0000	12.000	0.0130	0.07	3.56	0.02	2.44	0.08	0.08	0.00 Calculated
20	HED-02I	Pipe	HED-02J HED-02H	100.00	237.00	236.00	1.0000	12.000	0.0130	0.07	3.56	0.02	1.66	0.10	0.10	0.00 Calculated
21	HED-02J	Pipe	HED-02K HED-02J	1.00	255.00	237.00	1800.0000	0.750	0.0130	0.07	0.09	0.77	23.64	0.06	1.00	5628.00 SURCHARGED
22	HED-03D	Pipe	HED-03I HED-03B	500.00	238.00	235.00	0.6000	12.000	0.0130	0.06	2.76	0.02	2.52	0.07	0.07	0.00 Calculated
23	HED-03E	Pipe	LIDA-07 HED-03I	47.11	242.00	242.50	-1.0600	18.000	0.0130	0.06	10.82	0.01	0.21	0.34	0.22	0.00 Calculated
24	HED-03I	Pipe	HED-03I LIDA-08C	200.00	244.00	243.50	0.2500	18.000	0.0130	0.01	5.25	0.00	0.01	0.68	0.46	0.00 Calculated
25	HED-03J	Pipe	HED-03L LIDA-08C	200.00	256.00	243.00	6.5000	12.000	0.0130	0.55	9.08	0.06	8.65	0.58	0.58	0.00 Calculated
26	HED-03L	Pipe	HED-03F HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0130	0.03	10.69	0.00	4.18	0.03	0.03	0.00 Calculated
27	HED-03N	Pipe	HED-03E HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0150	0.04	9.26	0.00	4.14	0.04	0.04	0.00 Calculated
28	HED-03Q	Pipe	HED-03K HED-03L	1.00	256.00	256.00	0.0000	0.750	0.0130	0.02	0.00	23.06	5.63	0.06	1.00	3275.00 SURCHARGED
29	HED-03T	Pipe	HED-03J HED-03I	1.00	245.00	244.00	100.0000	0.750	0.0130	0.00	0.02	0.00	0.00	0.03	0.50	0.00 Calculated
30	HED-03V	Pipe	HED-03H HED-03G	1.00	243.00	242.00	100.0000	0.750	0.0130	0.03	0.02	1.17	15.25	0.03	0.54	0.00 > CAPACITY
31	COF-1A	Channel	COF-01A COF-01	10.00	238.00	238.00	0.0000	60.000	0.0320	0.77	42.77	0.02	0.22	0.35	0.07	0.00
32	COF-1B	Channel	COF-01B COF-01A	150.00	244.00	238.00	4.0000	12.000	0.0320	0.75	37.11	0.02	0.69	0.22	0.22	0.00
33	COF-1C	Channel	COF-01C COF-01B	1.00	246.50	244.00	250.0000	24.000	0.0320	0.72	224.13	0.00	5.68	0.06	0.03	0.00
34	COF-1E	Channel	LIDA-11 COF-01C	5.00	245.00	245.00	0.0000	24.000	0.0320	0.75	7.05	0.11	0.10	1.54	0.77	0.00
35	COF-2B	Channel	COF-02B COF-02A	1.00	245.00	246.00	-100.0000	24.000	0.0320	3.38	141.75	0.02	2.78	0.51	0.30	0.00
36	COF-2D	Channel	LIDA-12 COF-02B	5.00	245.00	245.00	0.0000	24.000	0.0320	2.37	2.00	1.18	1.15	1.01	0.52	0.00
37	HED-01A	Channel	HED-01A HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	1.43	1512.53	0.00	1.03	0.09	0.01	0.00
38	HED-01B	Channel	HED-01B HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	1.35	1082.72	0.00	0.83	0.11	0.01	0.00
39	HED-01F	Channel	HED-01F HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	1.35	2813.13	0.00	2.72	0.27	0.05	0.00
40	HED-01I	Channel	LIDA-01 HED-01L	5.00	228.00	228.50	-10.0000	12.000	0.0320	0.43	24.81	0.02	0.60	0.27	0.29	0.00
41	HED-01J	Channel	HED-01K HED-01G	20.00	227.00	228.00	-5.0000	12.000	0.0320	1.00	4.99	0.20	1.55	0.52	0.65	0.00
42	HED-01K	Channel	LIDA-02 HED-01K	5.00	228.00	228.75	-15.0000	12.000	0.0320	3.93	30.39	0.13	3.05	0.40	0.52	0.00
43	HED-01M	Channel	HED-01N HED-01M	500.00	230.00	224.00	1.2000	24.000	0.0320	0.04	37.78	0.00	1.54	0.11	0.06	0.00
44	HED-01O	Channel	LIDA-03 HED-01O	5.00	237.00	237.50	-10.0000	12.000	0.0320	0.28	24.81	0.01	0.41	0.27	0.28	0.00
45	HED-01Q	Channel	LIDA-04 HED-01P	5.00	238.00	238.50	-10.0000	12.000	0.0320	0.00	24.81	0.00	0.00	0.03	0.03	0.00
46	HED-01T	Channel	HED-01J HED-01I	1.00	232.75	231.00	175.0000	24.000	0.0320	1.20	187.52	0.01	8.16	0.07	0.04	0.00
47	HED-01V	Channel	LIDA-06A HED-01J	5.00	231.00	231.00	0.0000	24.000	0.0320	1.25	16.66	0.07	0.07	1.83	0.92	0.00
48	HED-02A	Channel	HED-02A HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	0.15	1963.65	0.00	0.40	0.05	0.01	0.00
49	HED-02E	Channel	HED-02E HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	0.15	614.42	0.00	0.29	0.12	0.02	0.00
50	HED-02G	Channel	HED-02G HED-02F	1130.10	235.00	181.76	4.7100	36.000	0.0320	0.07	396.58	0.00	1.50	0.08	0.03	0.00
51	HED-02K	Channel	HED-02K HED-02J	1.00	256.50	237.00	1950.0000	24.000	0.0320	0.00	625.97	0.00	0.00	0.05	0.02	0.00
52	HED-02L	Channel	HED-02I HED-02H	44.02	237.00	236.00	2.2700	24.000	0.0320	0.00	55.99	0.00	0.00	0.06	0.03	0.00
53	HED-02O	Channel	LIDA-05 HED-02K	5.00	255.00	255.00	0.0000	24.000	0.0320	0.07	16.66	0.00	0.11	1.33	0.67	0.00
54	HED-03A	Channel	HED-02F HED-03A	770.00	181.76	183.00	-0.1600	60.000	0.0300	0.10	443.56	0.00	0.07	0.07	0.01	0.00
55	HED-03B	Channel	HED-03B HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.13	2403.19	0.00	0.37	0.02	0.00	0.00
56	HED-03C	Channel	HED-03C HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.07	417.77	0.00	0.15	0.02	0.00	0.00
57	HED-03F	Channel	HED-03D HED-03C	400.00	241.00	236.00	1.2500	24.000	0.0320	0.08	131.71	0.00	0.34	0.03	0.01	0.00
58	HED-03G	Channel	HED-03G HED-03D	10.00	242.00	241.00	10.0000	24.000	0.0320	0.01	157.53	0.00	0.19	0.01	0.01	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Reported (min)	Surcharged Condition
59	HED-03H	Channel	HED-03H	HED-03G	1.00	244.50	242.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.00	0.00	0.00	0.00
60	HED-03K	Channel	LIDA-8A	HED-03K	5.00	256.00	256.00	0.0000	12.000	0.0320	0.55	0.83	0.66	0.27	1.00	1.00	3810.00	
61	HED-03M	Channel	LIDA-09	HED-03F	5.00	250.00	250.75	-15.0000	12.000	0.0320	0.19	22.66	0.01	0.24	0.39	0.40	0.00	
62	HED-03O	Channel	LIDA-10	HED-03E	5.00	250.00	250.50	-10.0000	12.000	0.0320	0.20	18.50	0.01	0.37	0.27	0.28	0.00	
63	HED-03P	Channel	HED-03K	HED-03L	1.00	257.00	256.00	100.0000	24.000	0.0320	0.53	141.75	0.00	2.51	0.11	0.05	0.00	
64	HED-03R	Channel	LIDA-08B	HED-03J	5.00	245.00	245.00	0.0000	24.000	0.0320	0.00	2.00	0.00	0.00	0.00	0.00	0.00	
65	HED-03S	Channel	HED-03J	HED-03I	1.00	246.50	244.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.22	0.11	0.00	
66	HED-03U	Channel	LIDA-08C	HED-03H	5.00	243.00	243.00	0.0000	24.000	0.0320	0.14	2.00	0.07	0.12	1.43	0.72	0.00	
67	HED-02M	Pump	LIDA-06B	HED-02K		237.00	255.00				0.04							

Subbasin Hydrology

Subbasin : COF-LIDA_11

Input Data

Area (ac) 3.71
 Weighted Curve Number 96.88
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	3.48	C/D	98.00
Landscape	0.23	C/D	80.00
Composite Area & Weighted CN	3.71		96.88

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
 R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

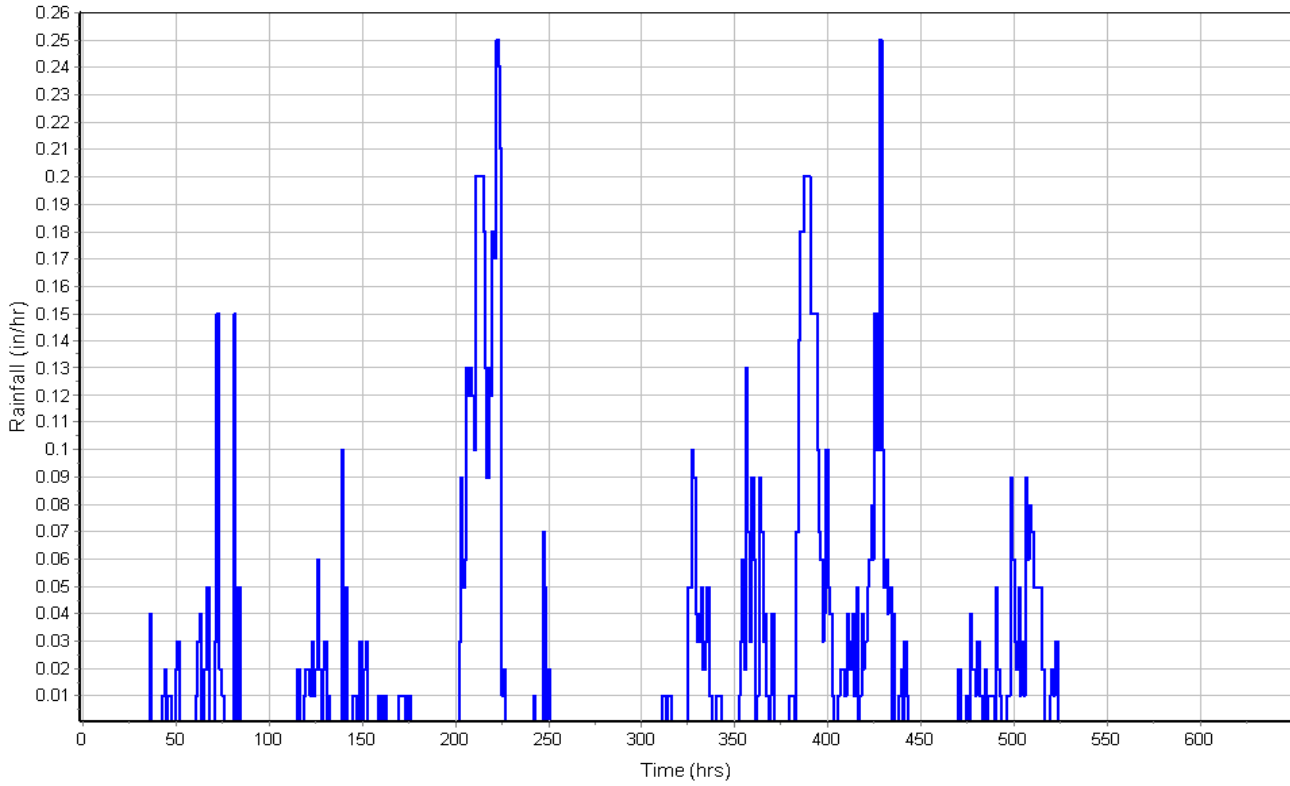
User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

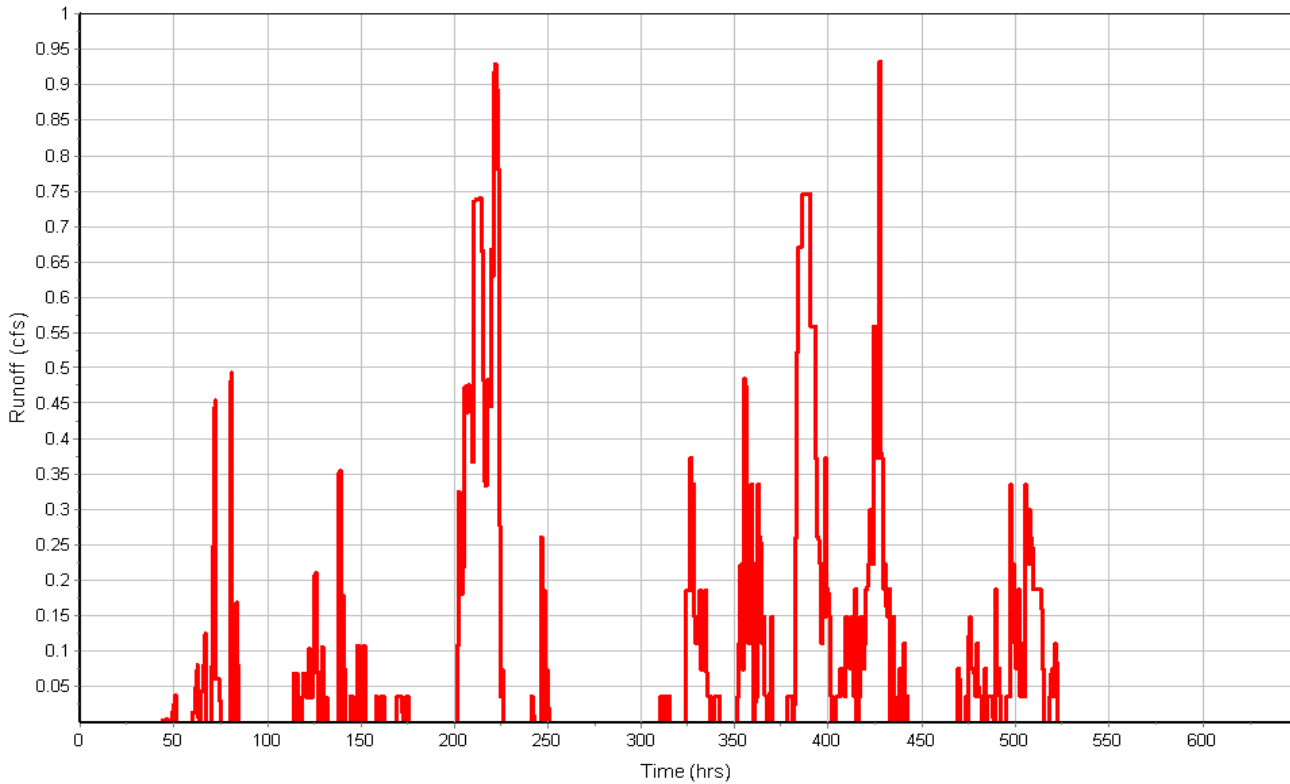
Total Rainfall (in) 11.58
 Total Runoff (in) 11.20
 Peak Runoff (cfs) 0.93
 Weighted Curve Number 96.88
 Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : COF-LIDA_11

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : COF-LIDA_12

Input Data

Area (ac) 0.49
Weighted Curve Number 96.13
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.44	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.49		96.13

Time of Concentration

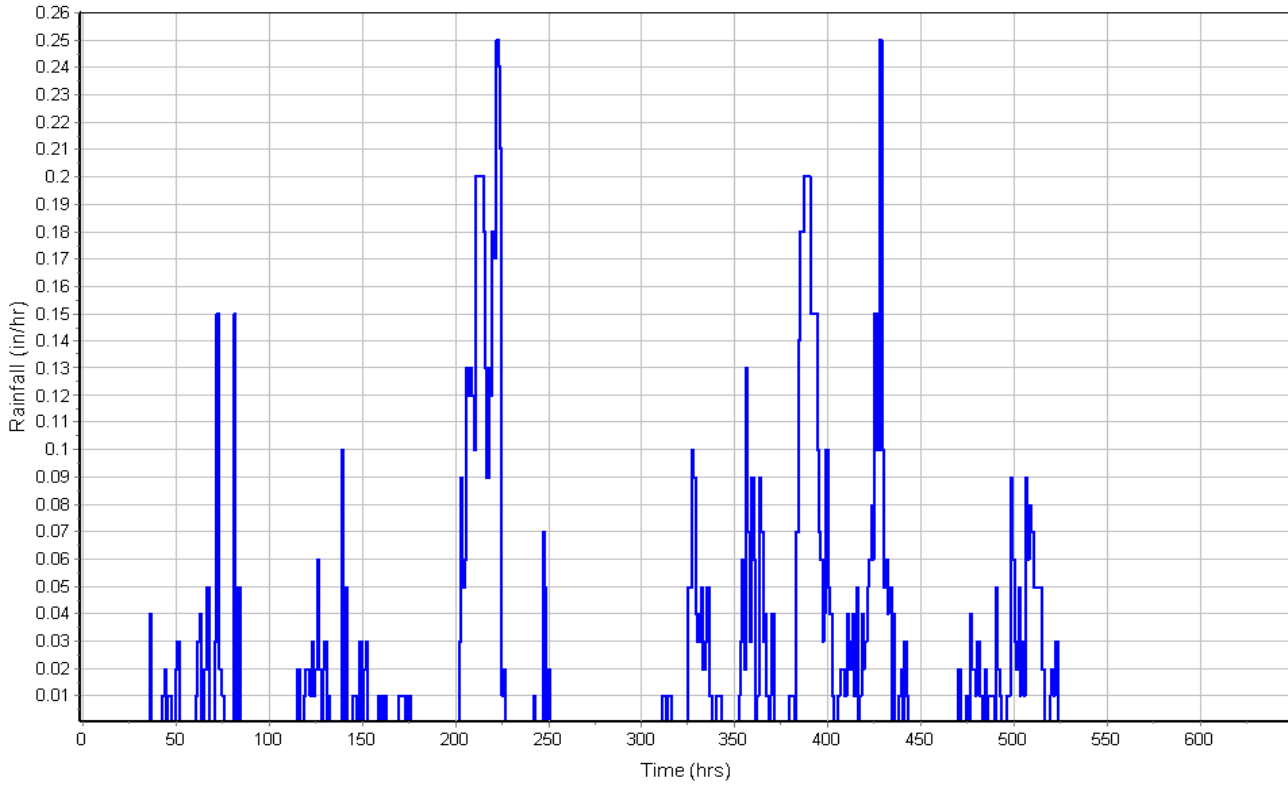
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

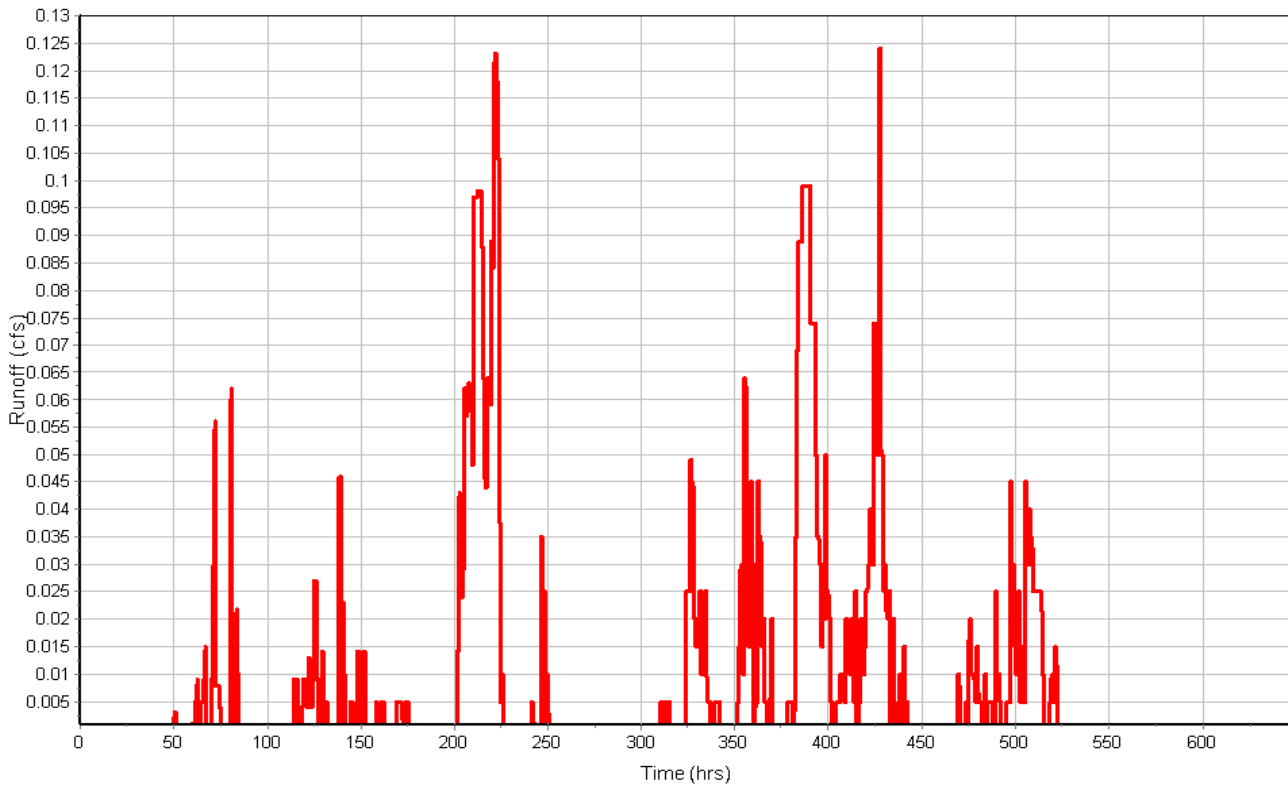
Total Rainfall (in) 11.58
Total Runoff (in) 11.11
Peak Runoff (cfs) 0.12
Weighted Curve Number 96.13
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : COF-LIDA_12

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_01

Input Data

Area (ac) 0.43
Weighted Curve Number 94.77
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.35	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.43		94.77

Time of Concentration

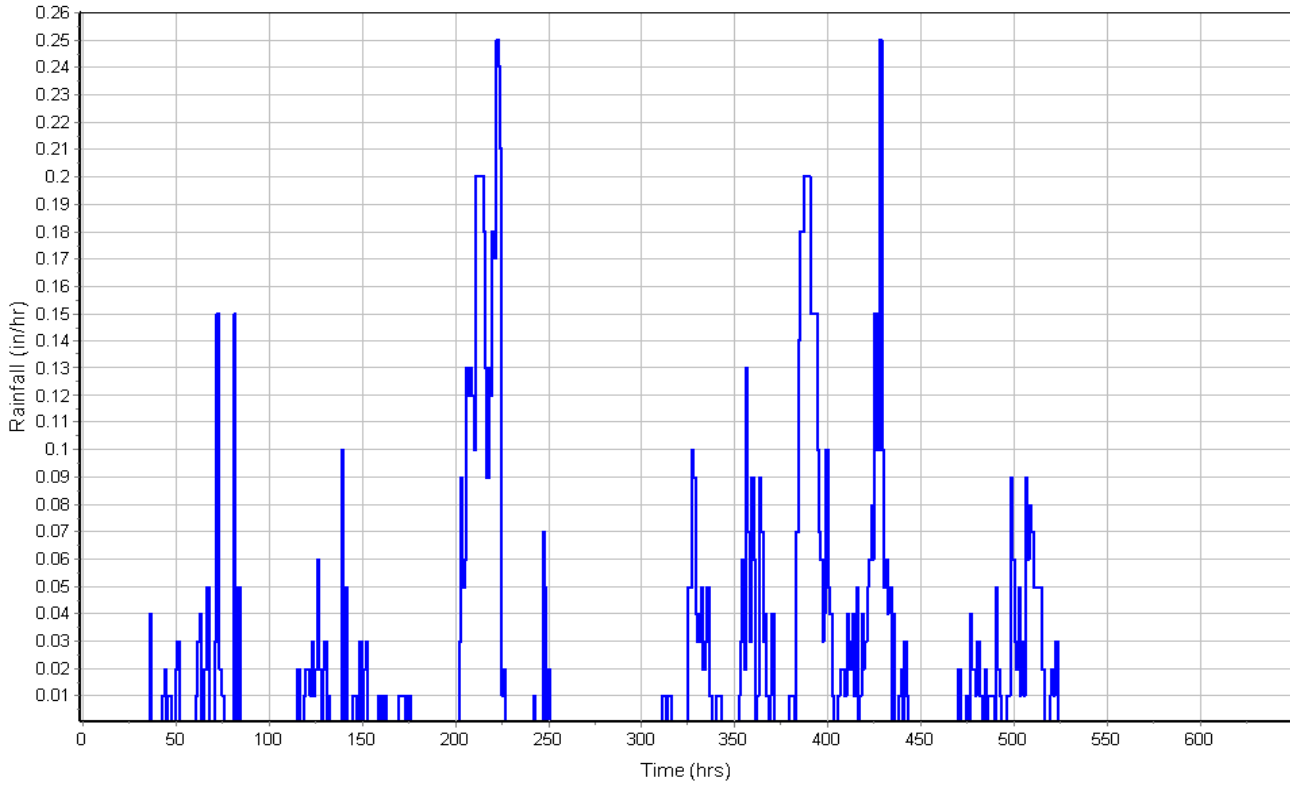
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

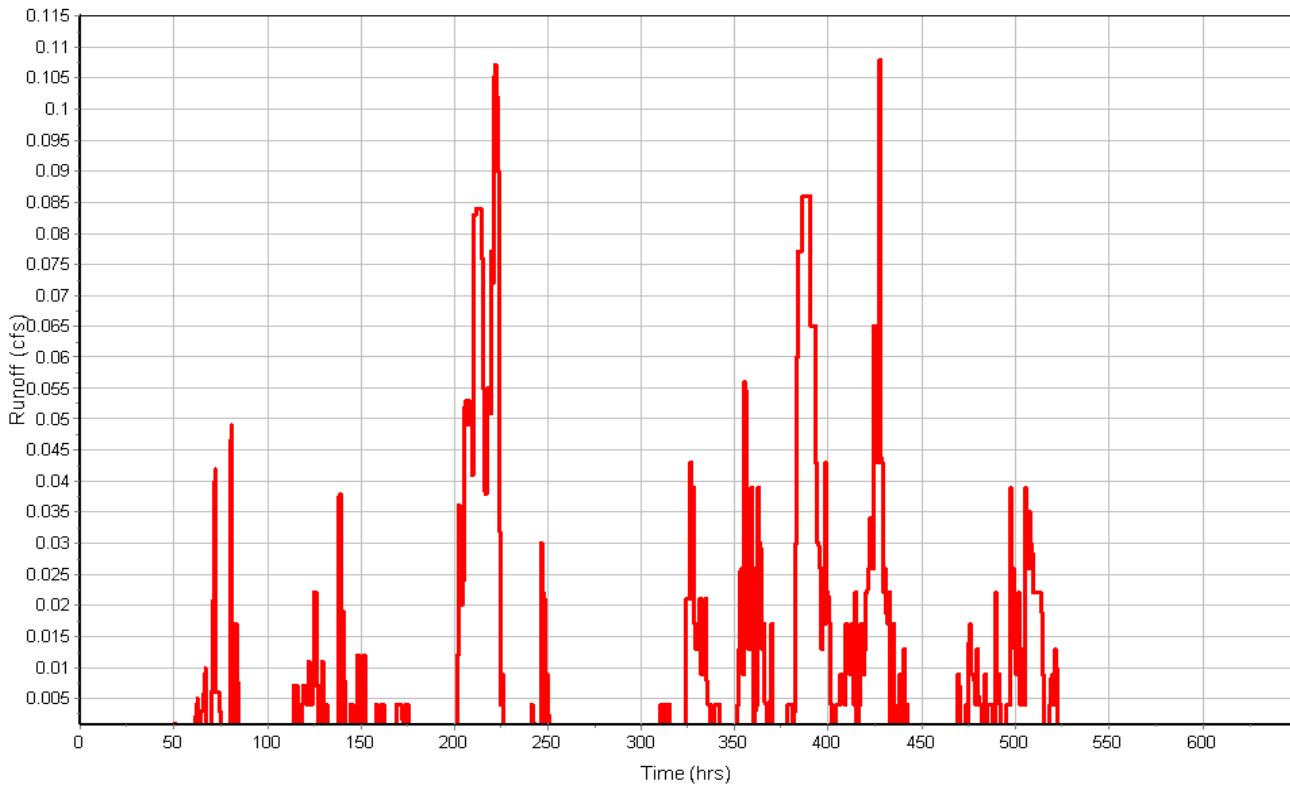
Total Rainfall (in) 11.58
Total Runoff (in) 10.94
Peak Runoff (cfs) 0.11
Weighted Curve Number 94.77
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_01

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_02

Input Data

Area (ac) 0.39
Weighted Curve Number 94.78
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.07	C/D	80.00
Composite Area & Weighted CN	0.39		94.78

Time of Concentration

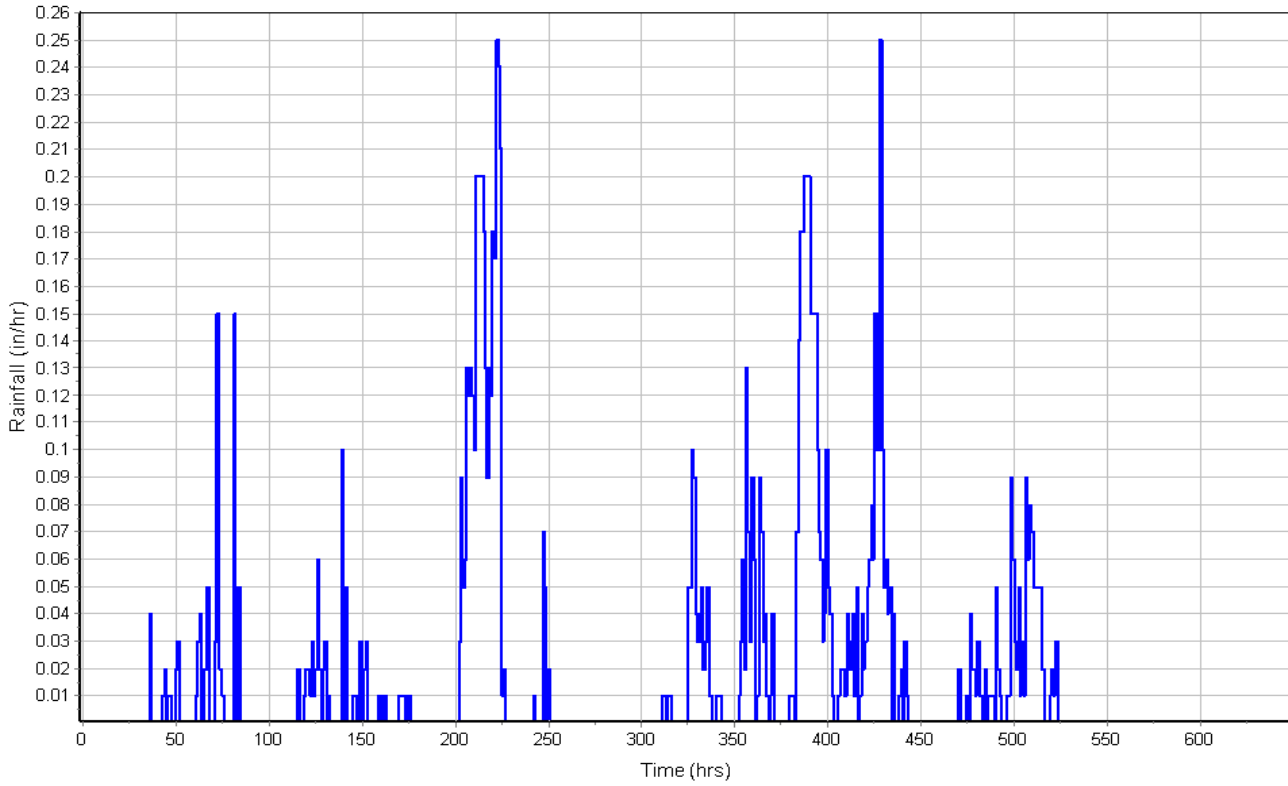
User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

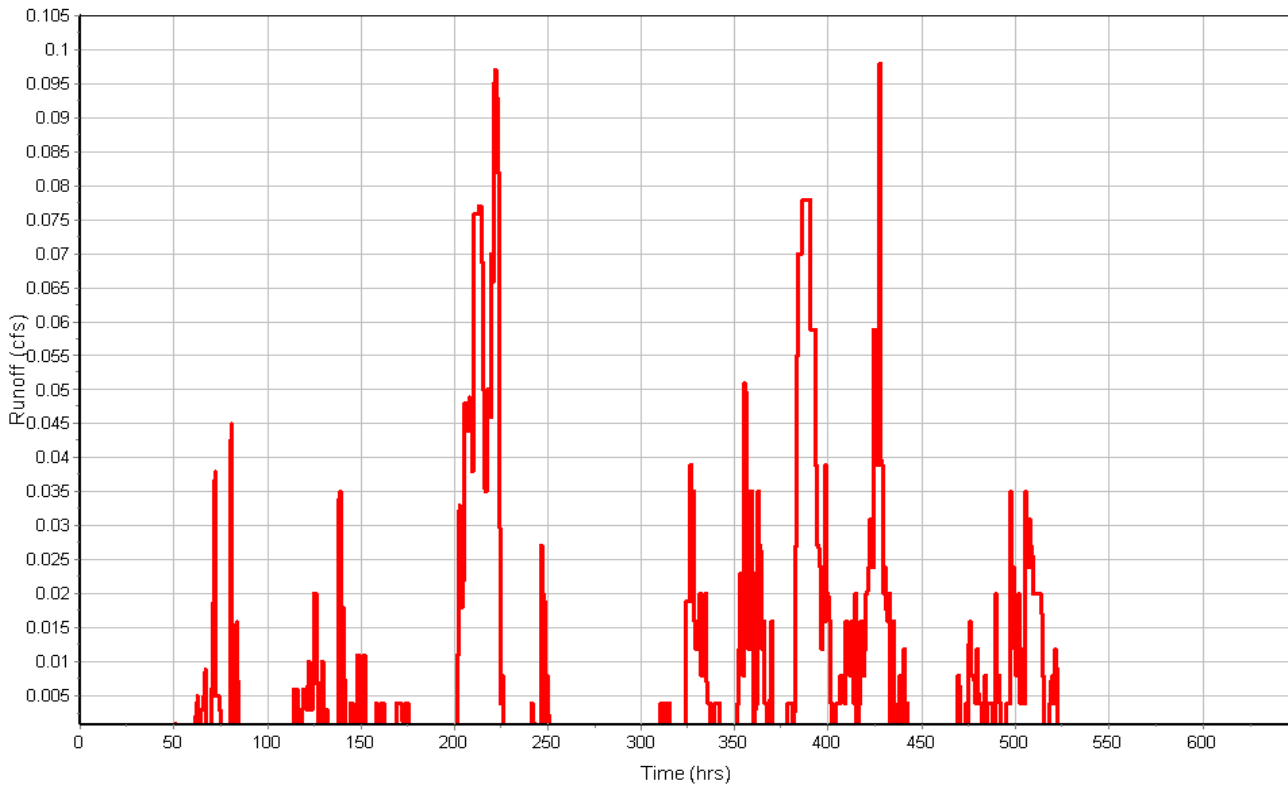
Total Rainfall (in) 11.58
Total Runoff (in) 10.94
Peak Runoff (cfs) 0.10
Weighted Curve Number 94.78
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_02

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_03

Input Data

Area (ac) 0.40
Weighted Curve Number 94.61
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.40		94.61

Time of Concentration

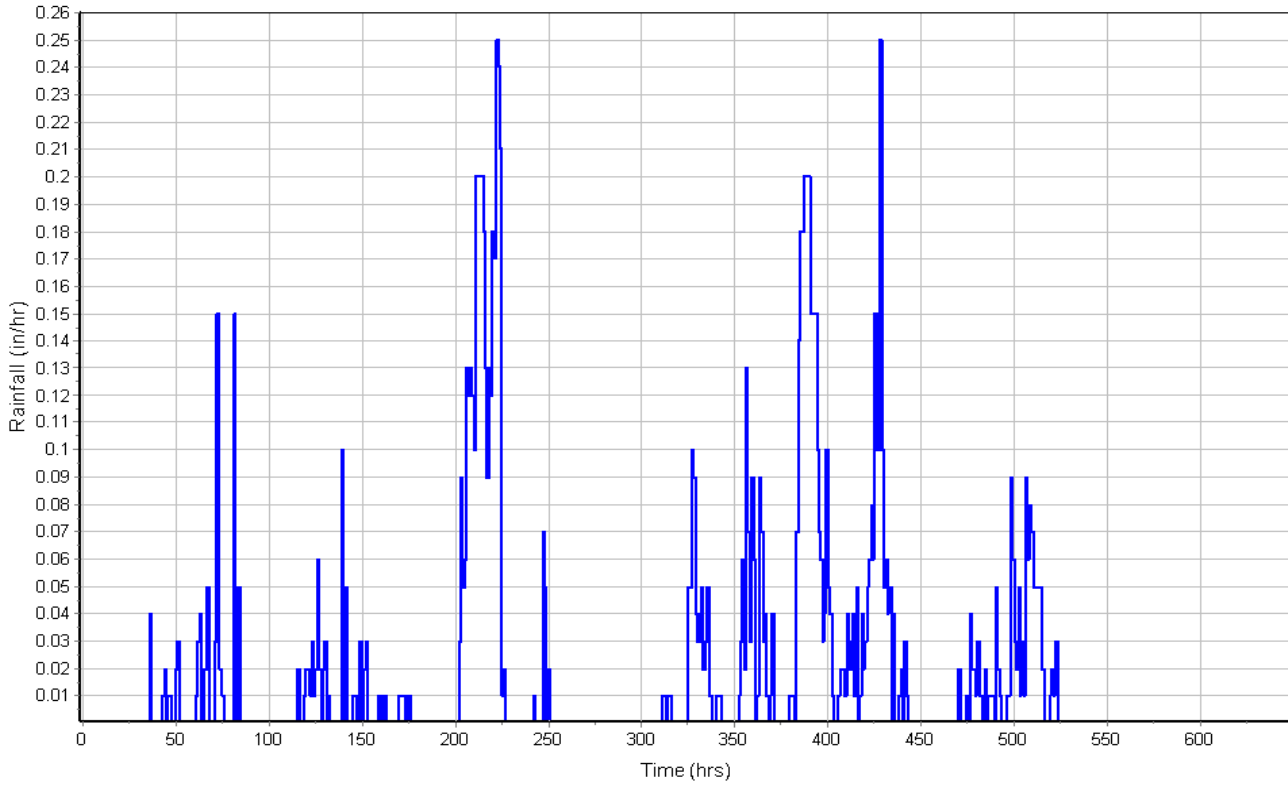
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

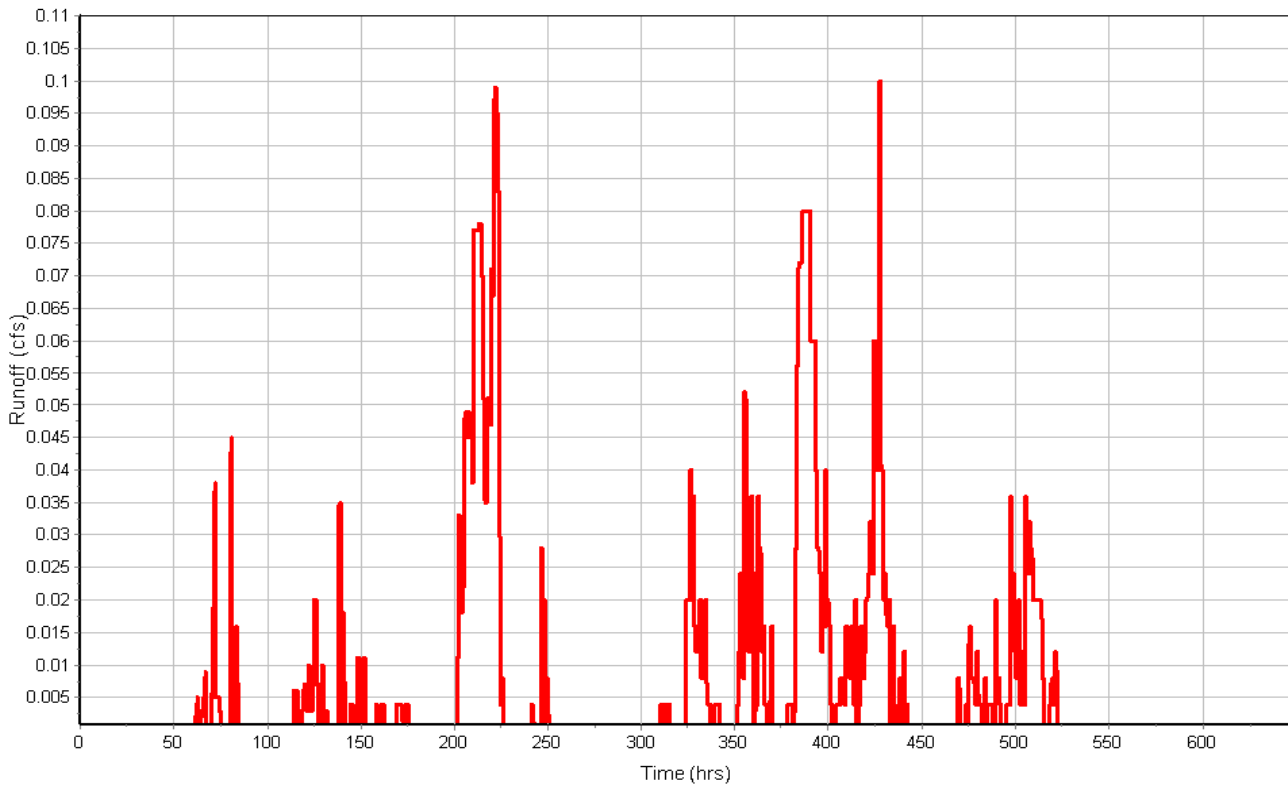
Total Rainfall (in) 11.58
Total Runoff (in) 10.92
Peak Runoff (cfs) 0.10
Weighted Curve Number 94.61
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_03

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_04

Input Data

Area (ac) 0.44
Weighted Curve Number 93.24
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	0.12	C/D	80.00
Pavement/roof	0.32	C/D	98.00
Composite Area & Weighted CN	0.44		93.24

Time of Concentration

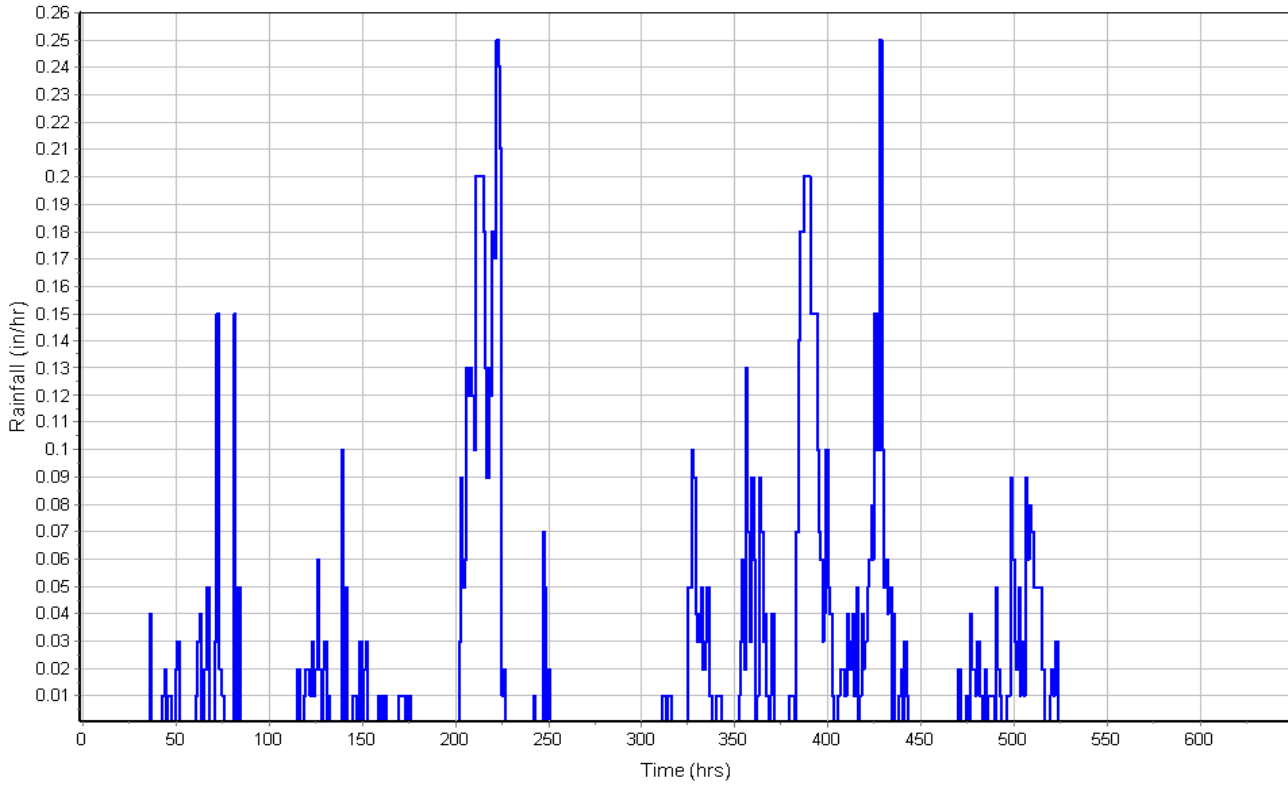
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

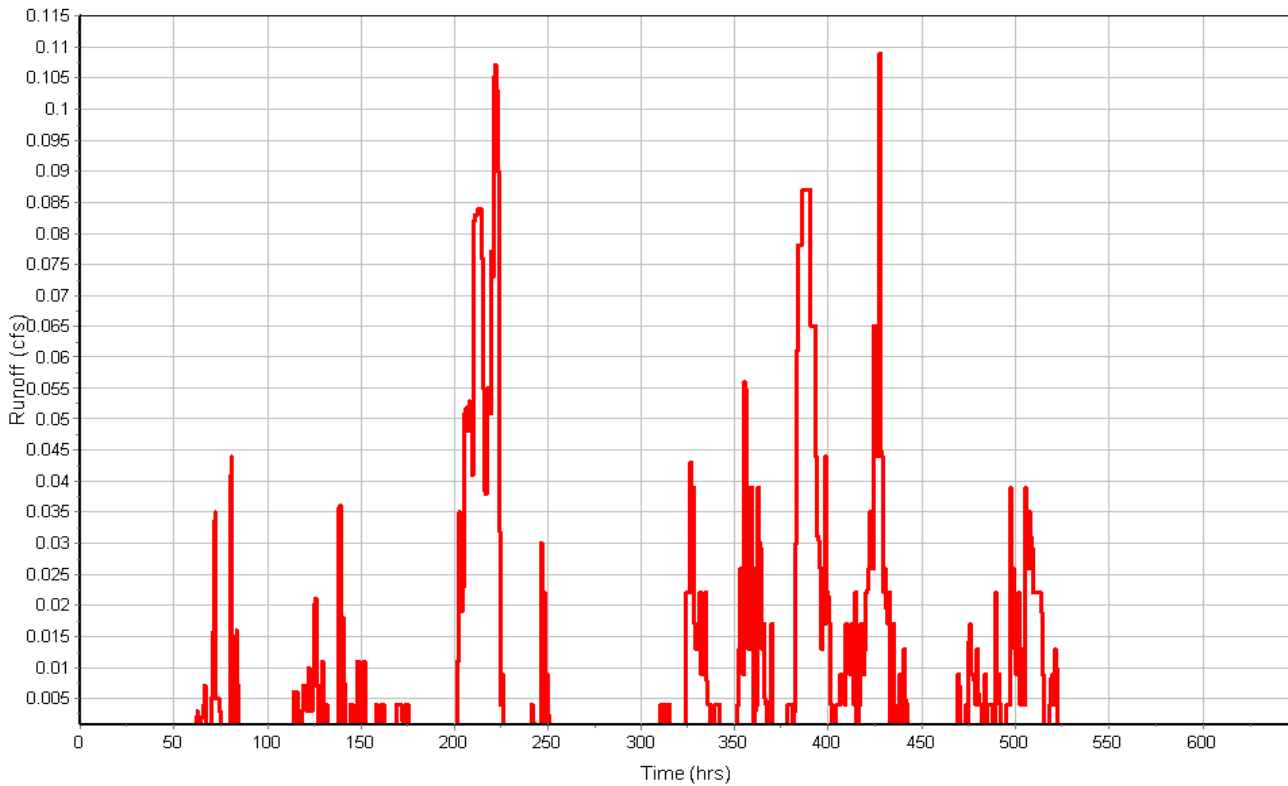
Total Rainfall (in) 11.58
Total Runoff (in) 10.75
Peak Runoff (cfs) 0.11
Weighted Curve Number 93.24
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_04

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_05

Input Data

Area (ac) 2.67
Weighted Curve Number 91.26
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.67	C/D	98.00
Landscape	1.00	C/D	80.00
Composite Area & Weighted CN	2.67		91.26

Time of Concentration

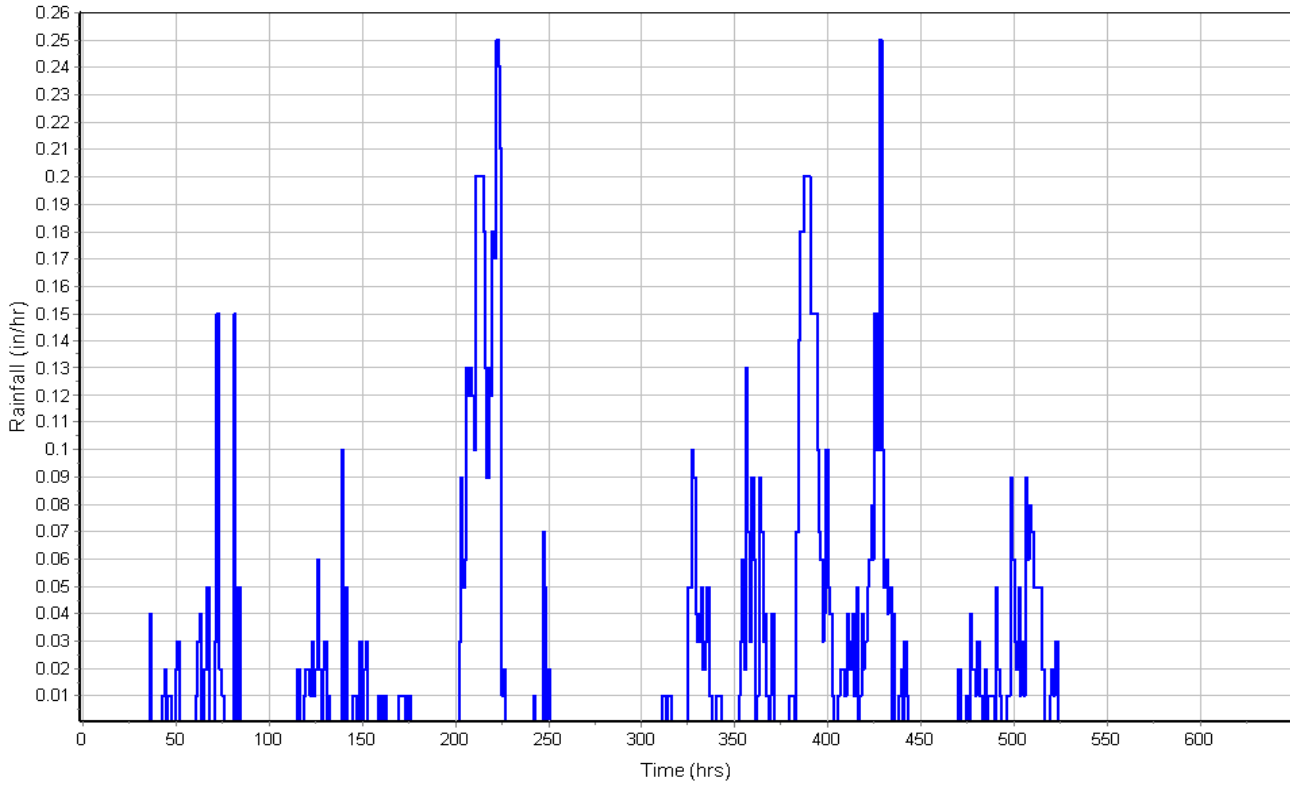
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

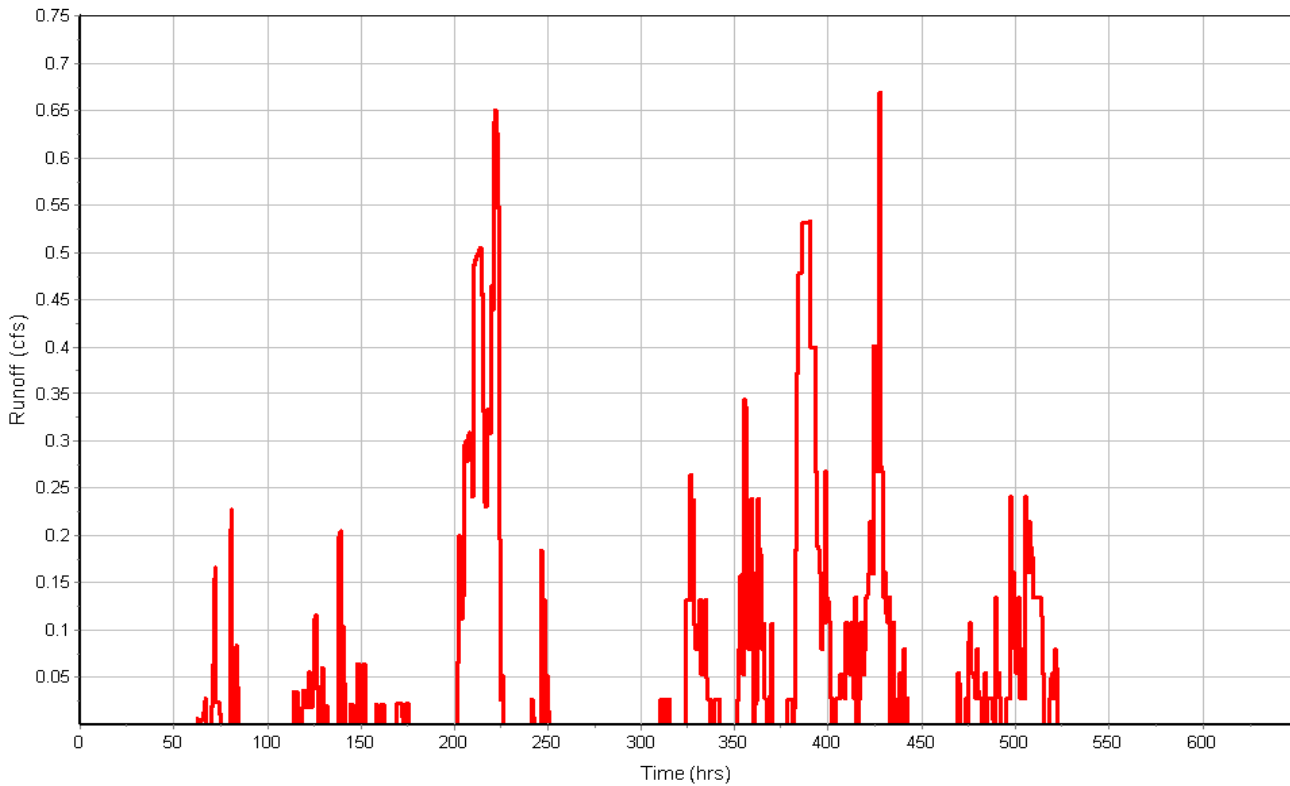
Total Rainfall (in) 11.58
Total Runoff (in) 10.51
Peak Runoff (cfs) 0.67
Weighted Curve Number 91.26
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_05

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_06A

Input Data

Area (ac) 5.95
Weighted Curve Number 89.16
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	2.92	C/D	80.00
Pavement/roof	3.03	C/D	98.00
Composite Area & Weighted CN	5.95		89.16

Time of Concentration

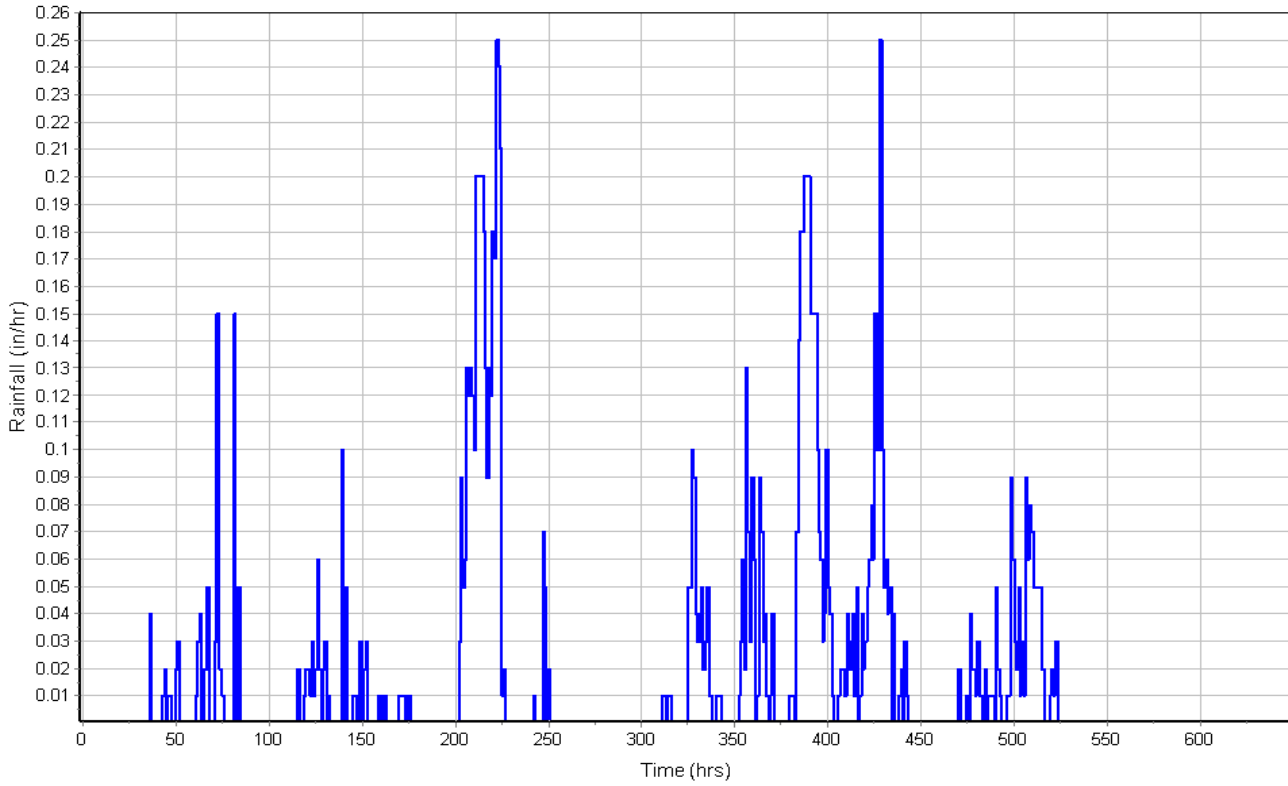
User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

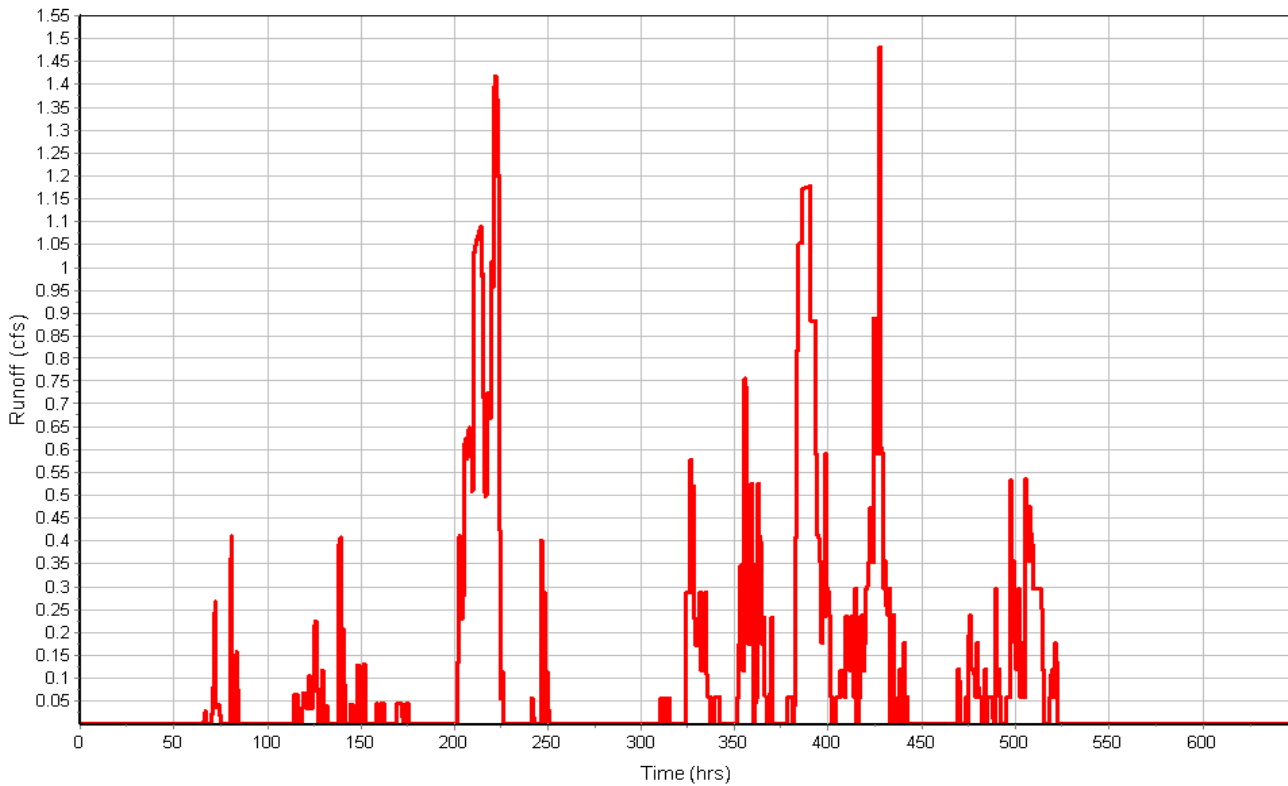
Total Rainfall (in) 11.58
Total Runoff (in) 10.24
Peak Runoff (cfs) 1.48
Weighted Curve Number 89.16
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_06A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_06B

Input Data

Area (ac) 0.41
Weighted Curve Number 98.00
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.41	C/D	98.00
Composite Area & Weighted CN	0.41		98.00

Time of Concentration

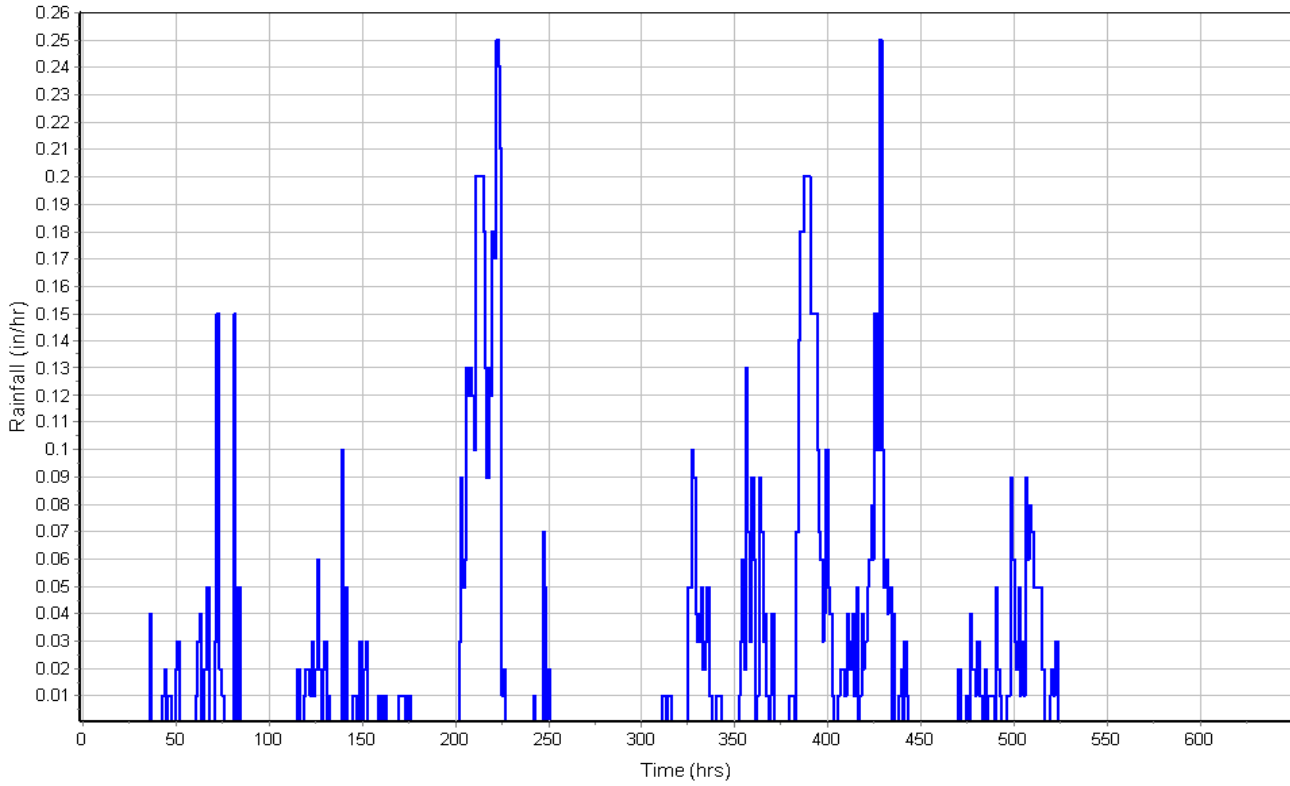
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

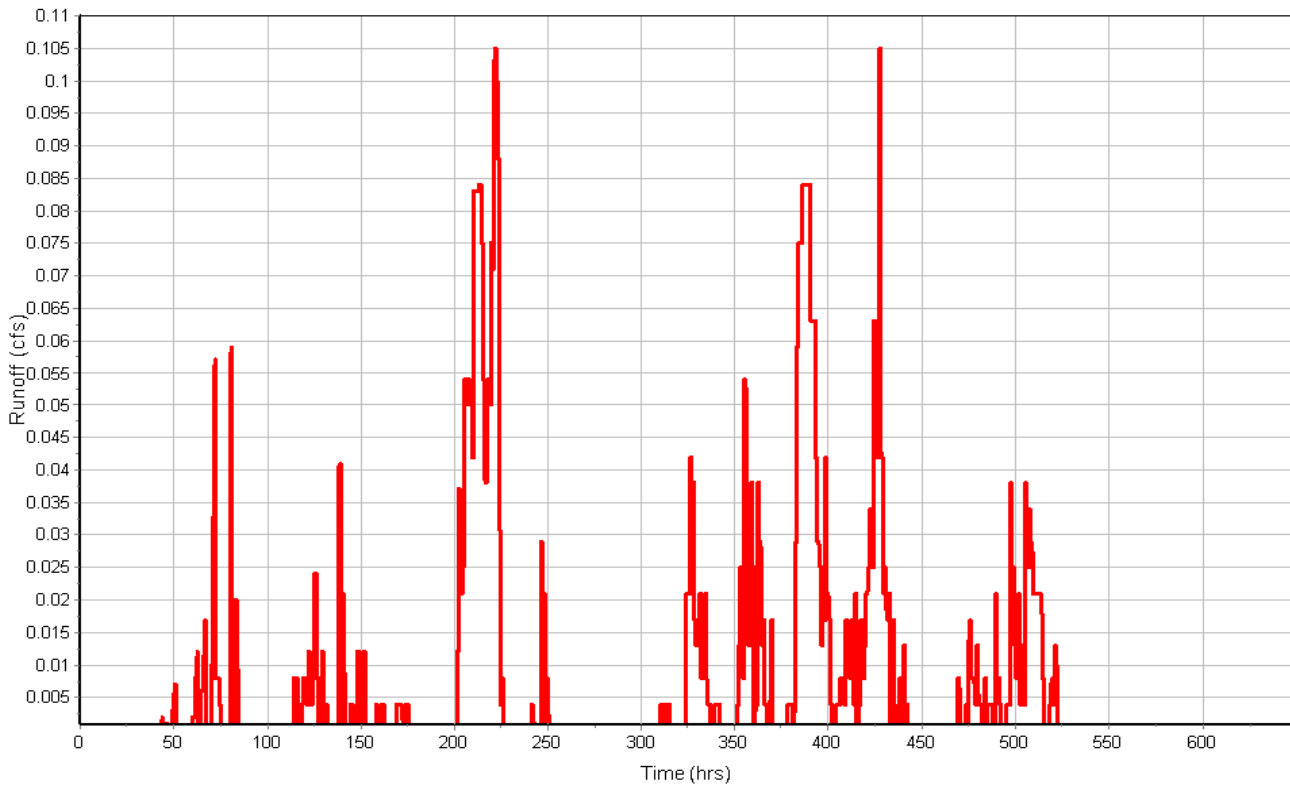
Total Rainfall (in) 11.58
Total Runoff (in) 11.34
Peak Runoff (cfs) 0.10
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_06B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_07

Input Data

Area (ac) 1.08
Weighted Curve Number 93.59
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.81	C/D	98.00
Landscape	0.26	C/D	80.00
Composite Area & Weighted CN	1.07		93.59

Time of Concentration

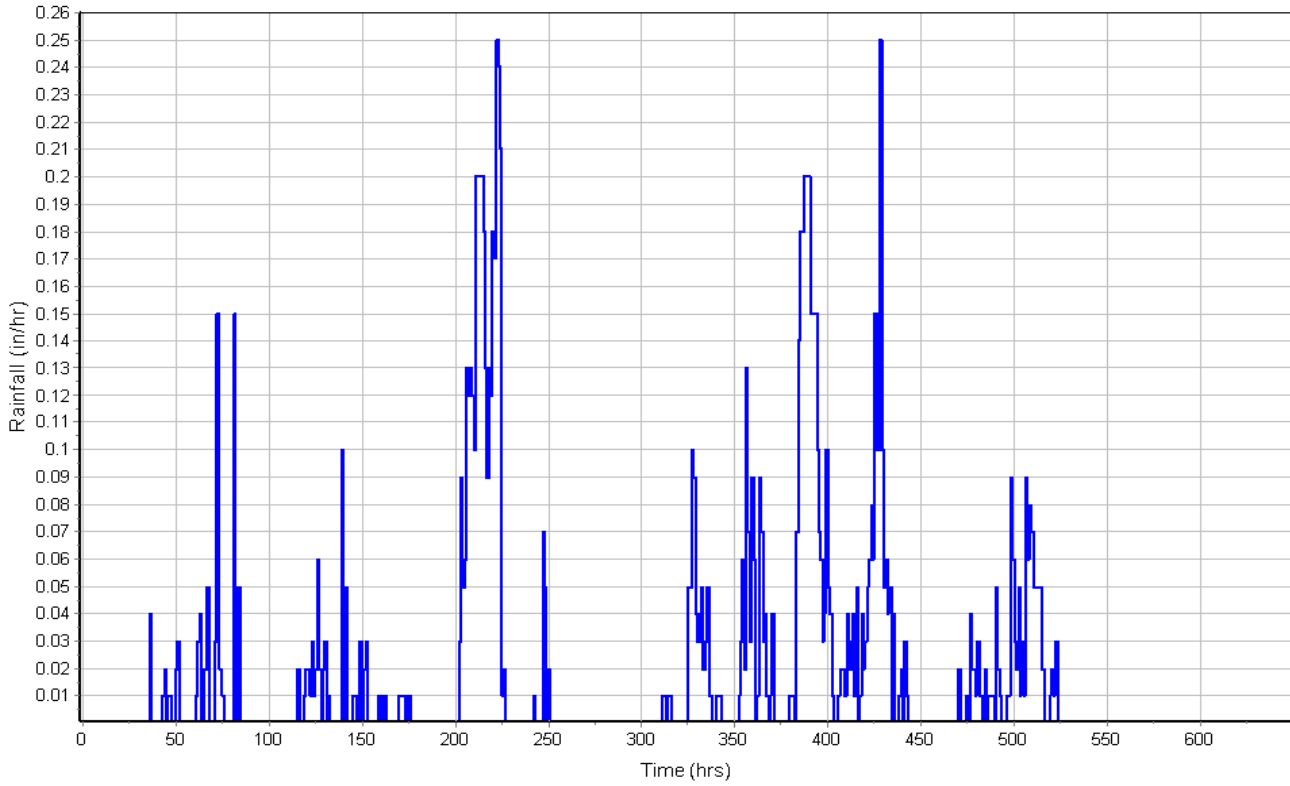
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

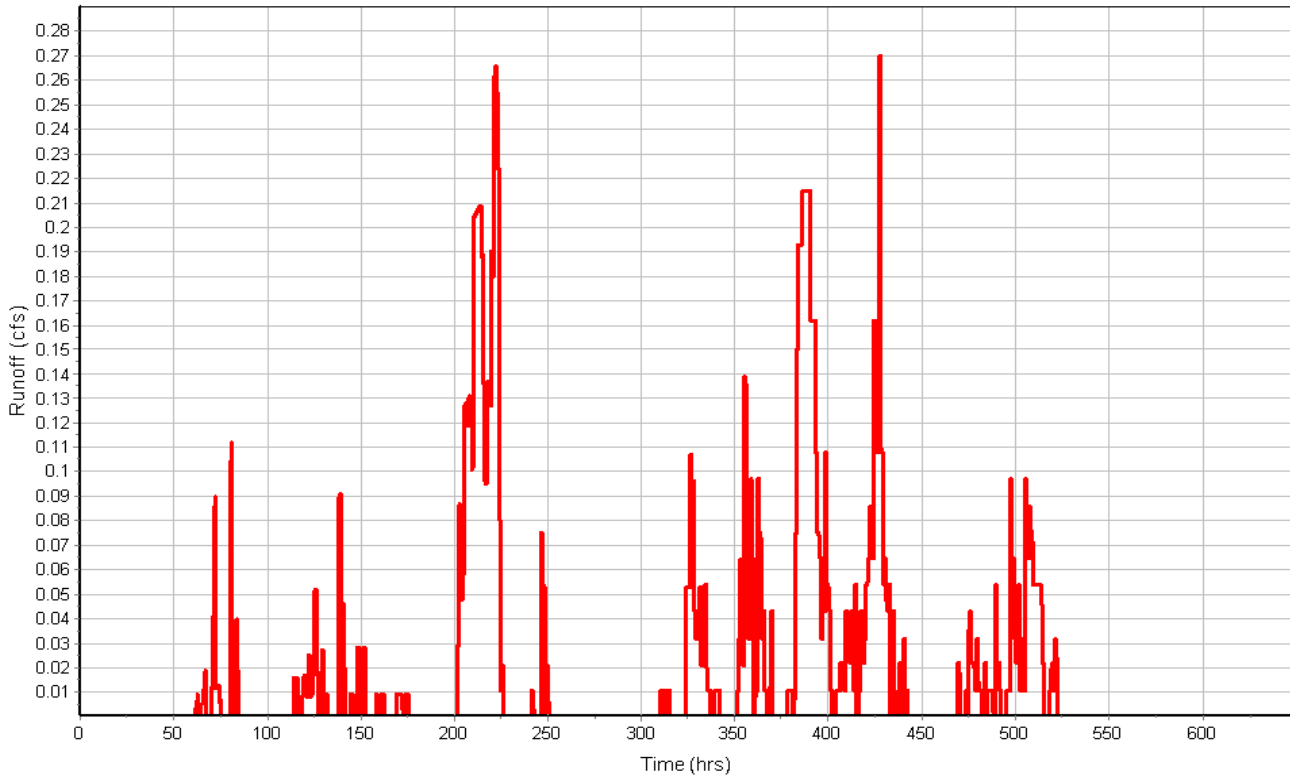
Total Rainfall (in) 11.58
Total Runoff (in) 10.80
Peak Runoff (cfs) 0.27
Weighted Curve Number 93.59
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_07

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_08B

Input Data

Area (ac) 2.25
Weighted Curve Number 94.33
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.79	C/D	98.00
Landscape	0.46	C/D	80.00
Composite Area & Weighted CN	2.25		94.33

Time of Concentration

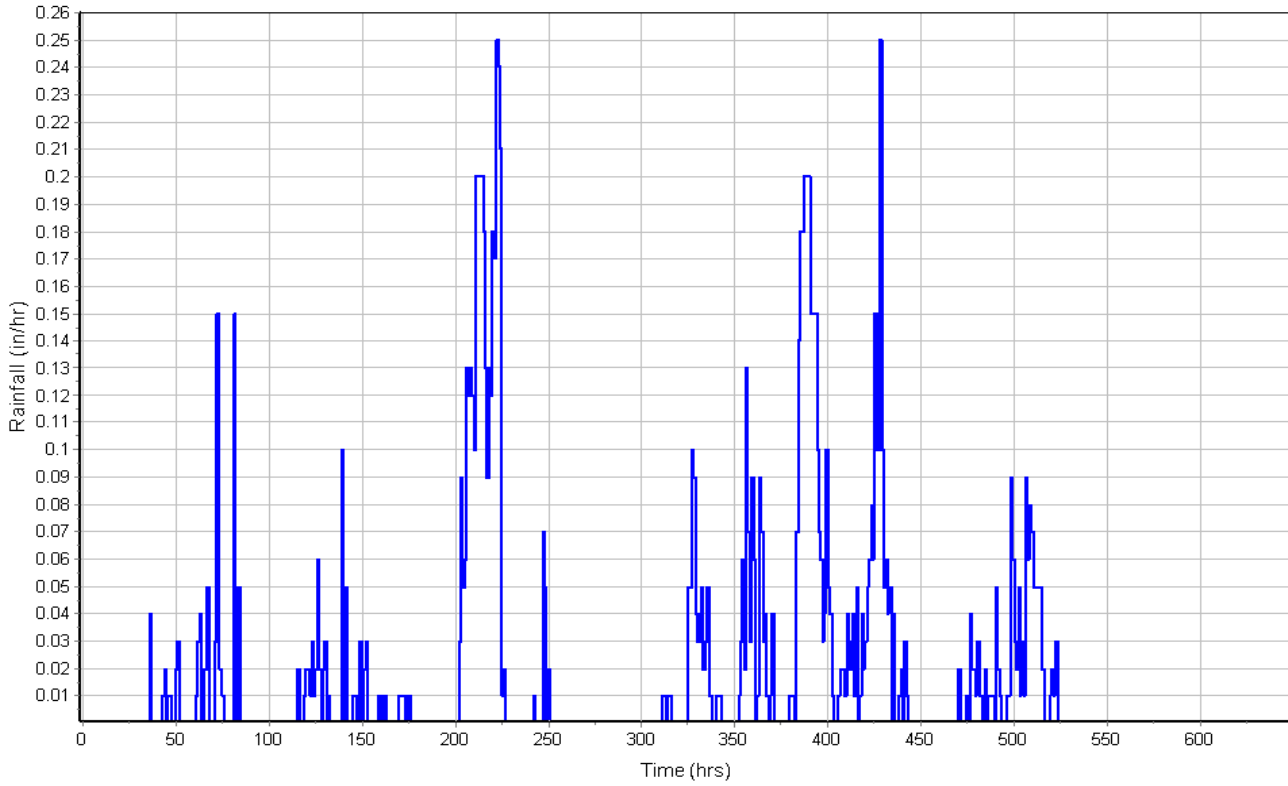
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

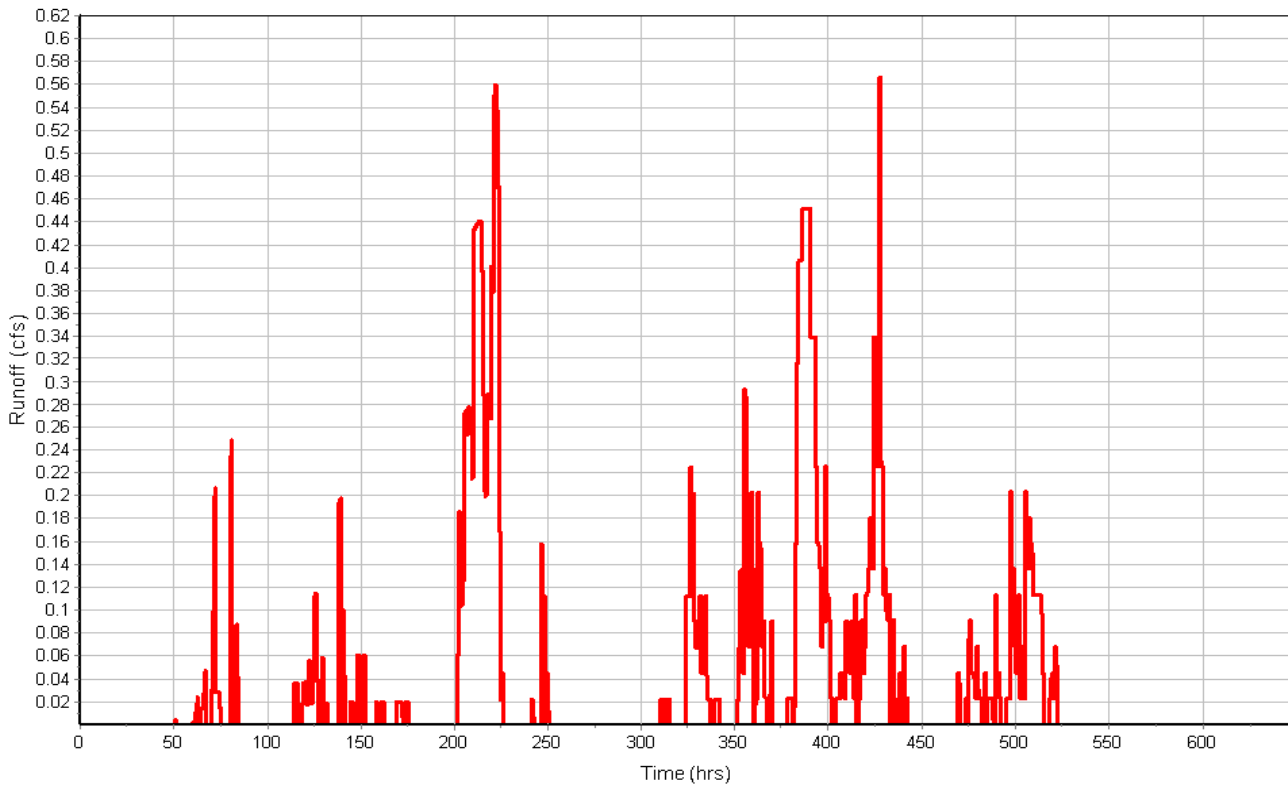
Total Rainfall (in) 11.58
Total Runoff (in) 10.89
Peak Runoff (cfs) 0.57
Weighted Curve Number 94.33
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_08B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_09

Input Data

Area (ac) 0.23
Weighted Curve Number 95.64
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.20	C/D	98.00
Landscape	0.03	C/D	80.00
Composite Area & Weighted CN	0.23		95.64

Time of Concentration

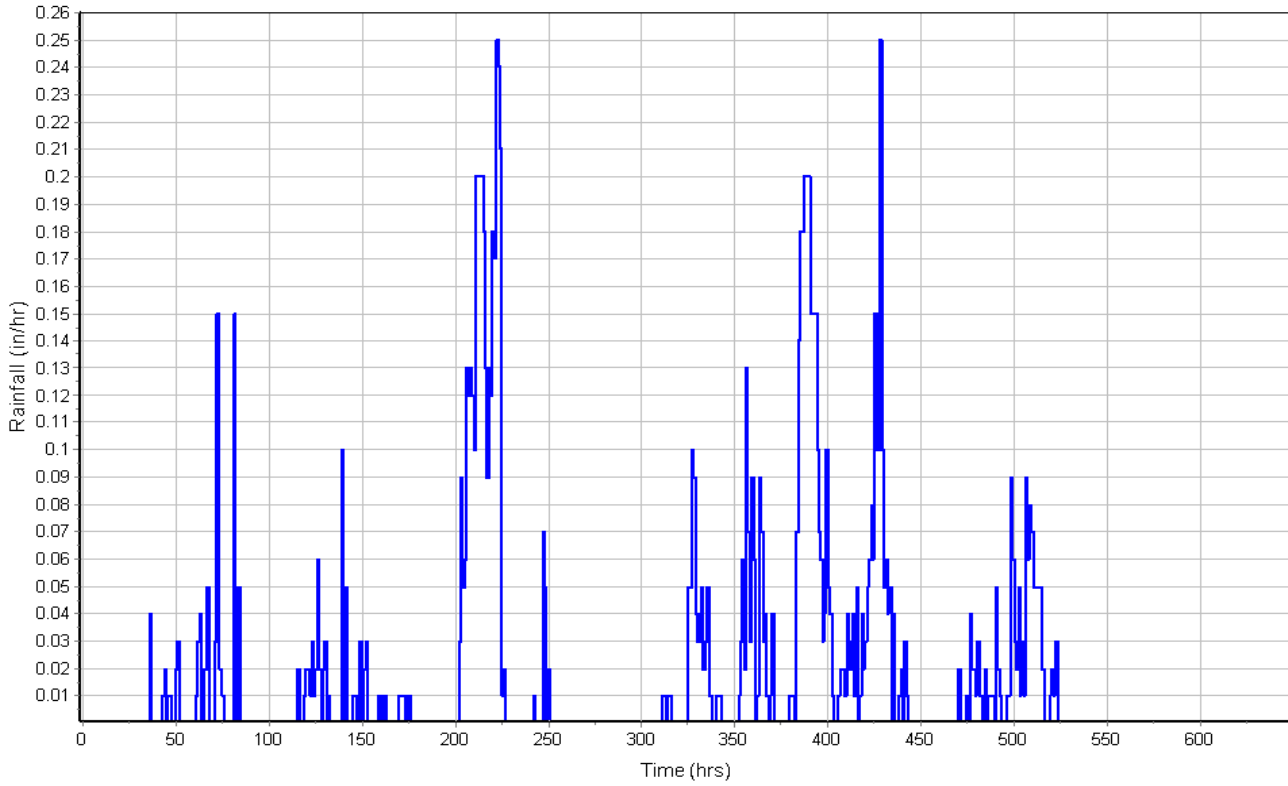
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

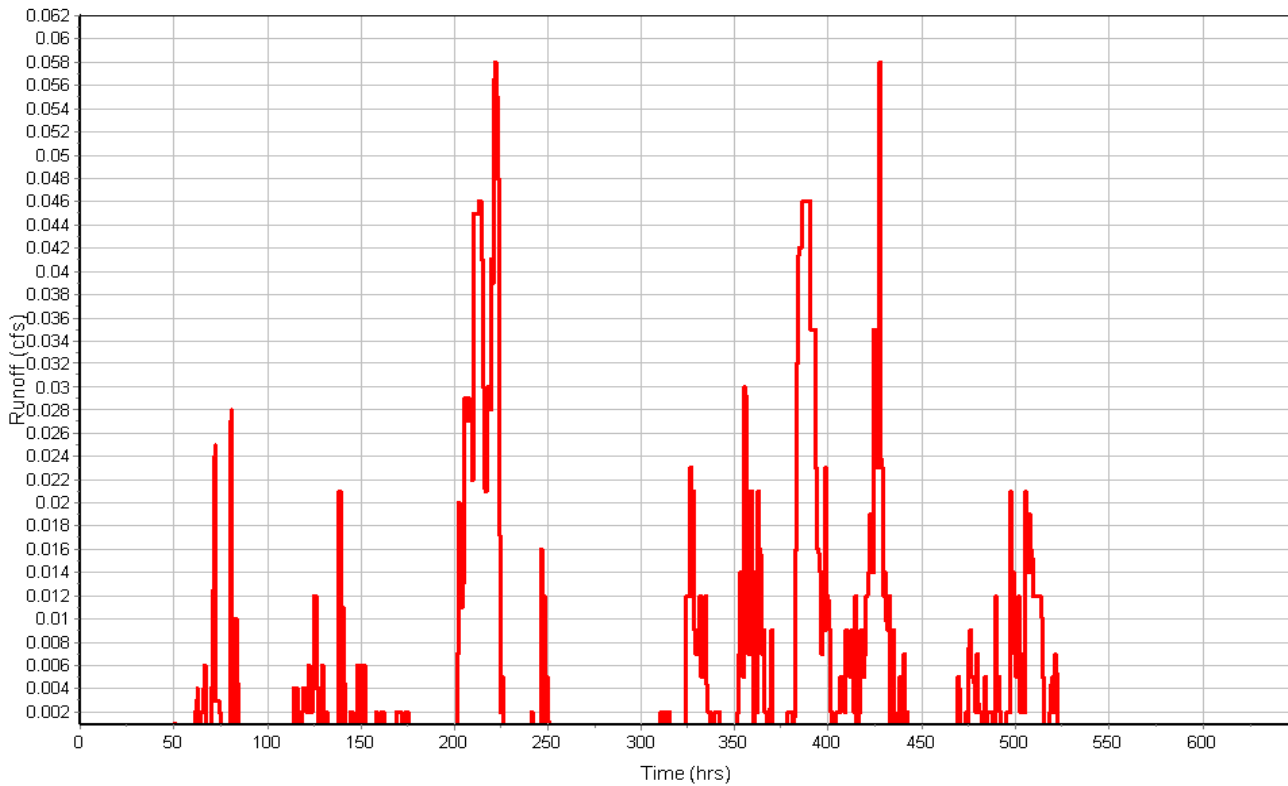
Total Rainfall (in) 11.58
Total Runoff (in) 11.05
Peak Runoff (cfs) 0.06
Weighted Curve Number 95.64
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_09

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_10

Input Data

Area (ac) 0.32
Weighted Curve Number 95.08
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.27	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.32		95.08

Time of Concentration

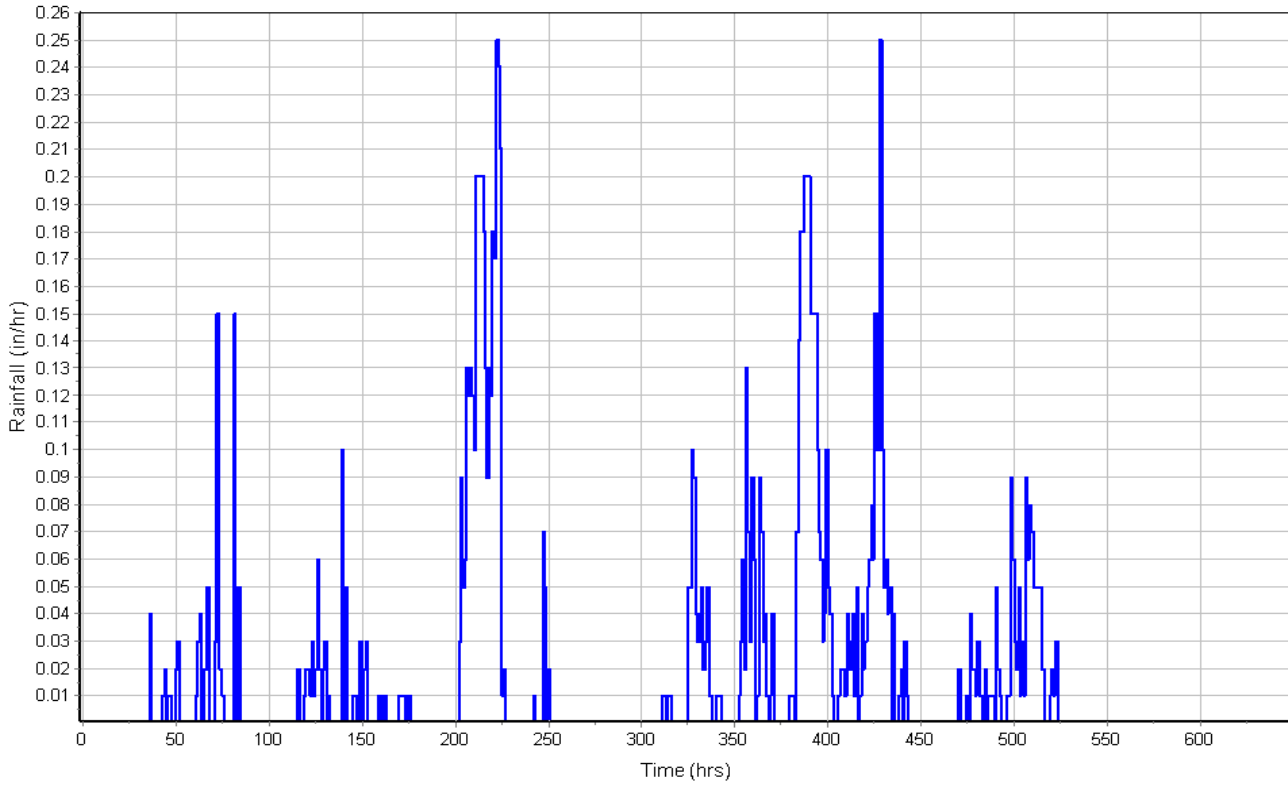
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

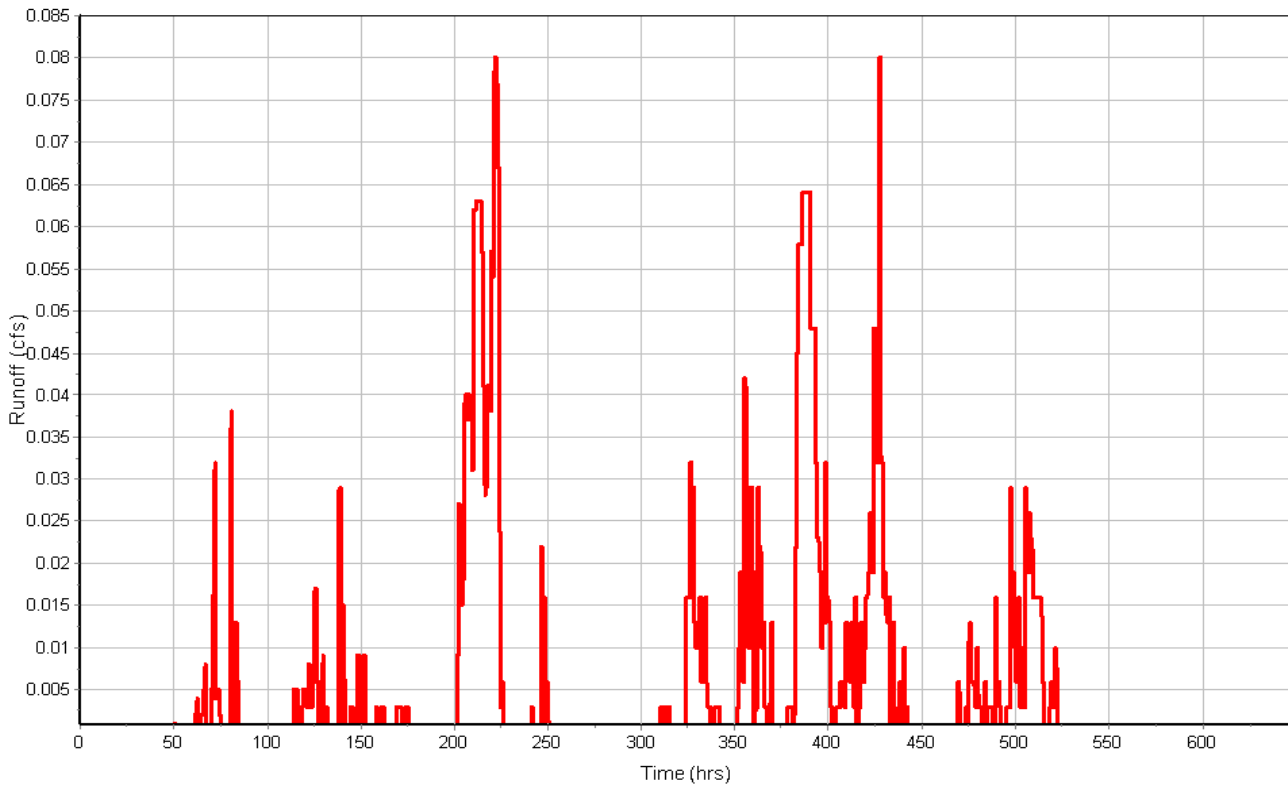
Total Rainfall (in) 11.58
Total Runoff (in) 10.98
Peak Runoff (cfs) 0.08
Weighted Curve Number 95.08
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_10

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Subbasin : HED-LIDA_8A

Input Data

Area (ac) 2.32
Weighted Curve Number 95.49
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	2.00	C/D	98.00
Landscape	0.32	C/D	80.00
Composite Area & Weighted CN	2.32		95.49

Time of Concentration

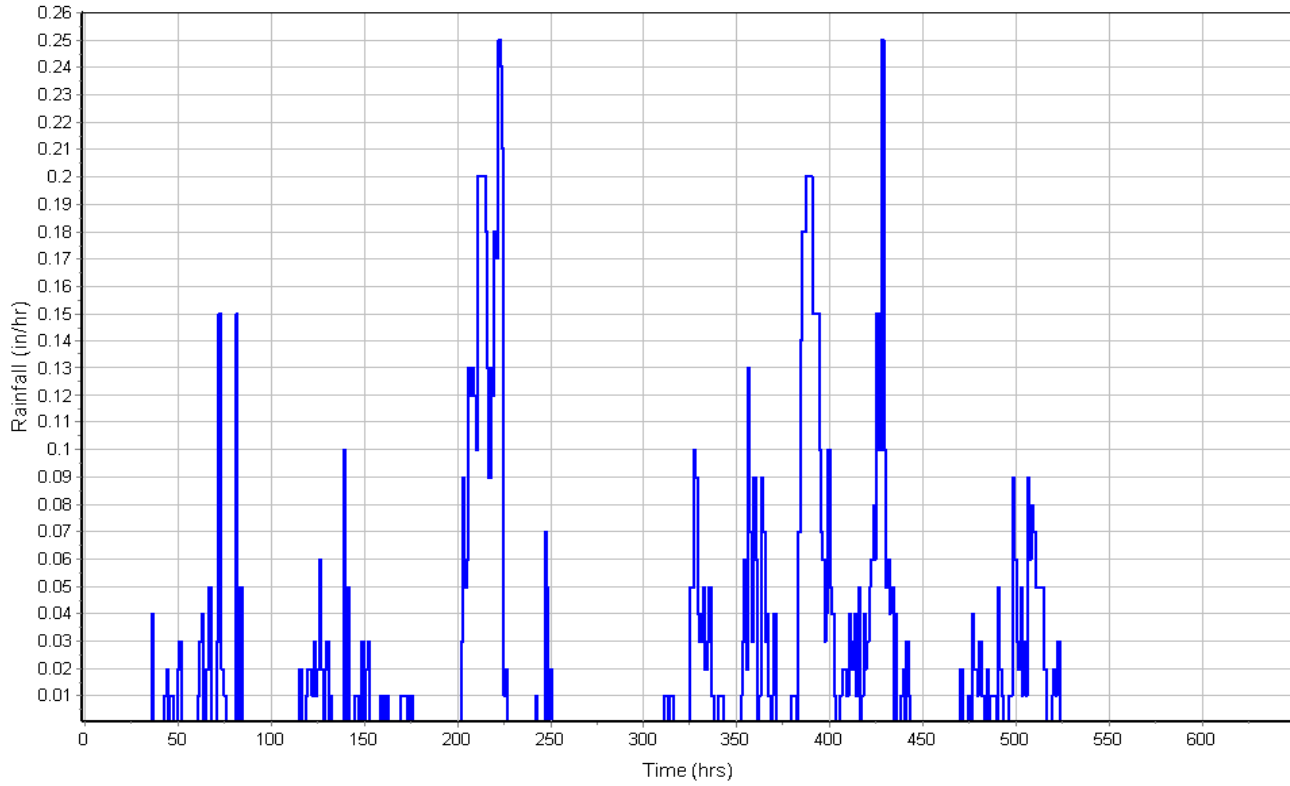
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

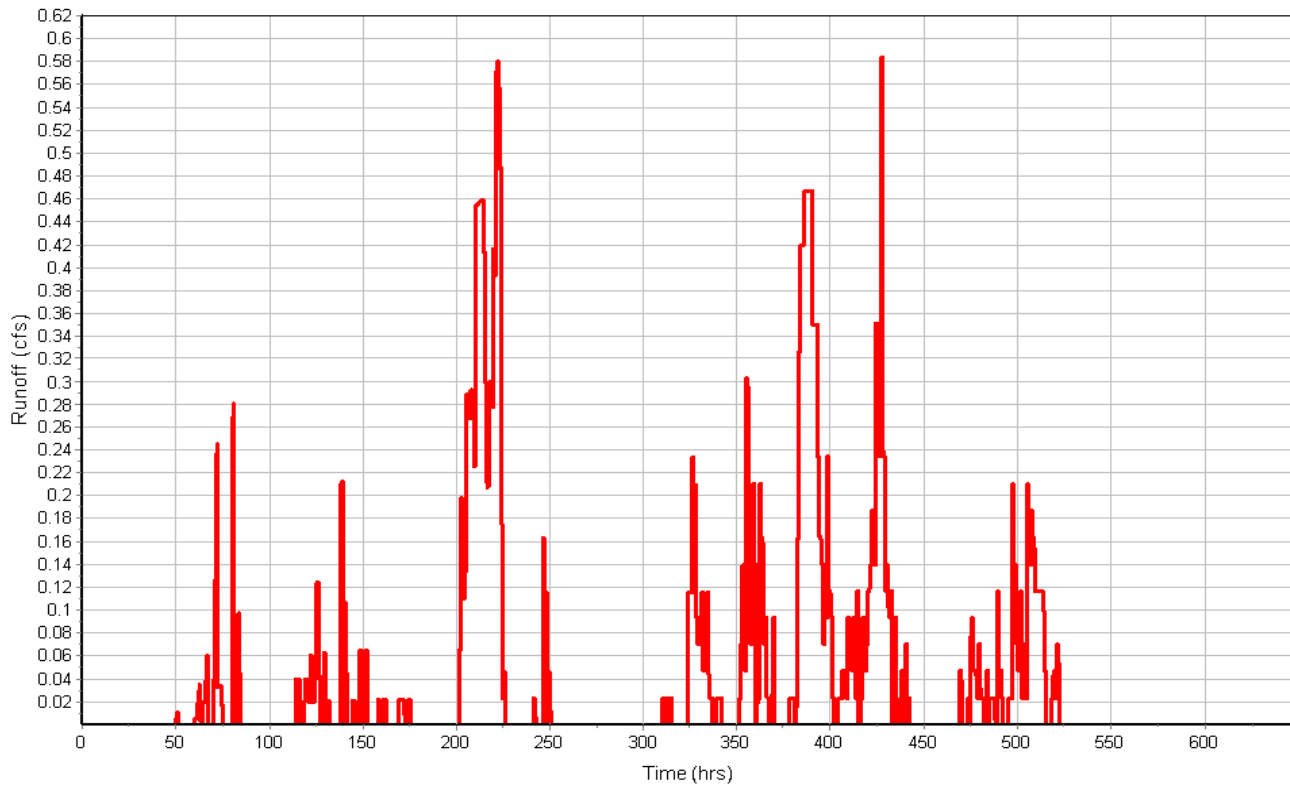
Total Rainfall (in) 11.58
Total Runoff (in) 11.03
Peak Runoff (cfs) 0.58
Weighted Curve Number 95.49
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_8A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	COF-01A	238.00	250.00	12.00	238.00	0.00	1000.00	750.00	12.00	0.00
2	COF-01B	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
3	COF-01C	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
4	COF-02A	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
5	COF-02B	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
6	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
7	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
8	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
9	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
10	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
11	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
12	HED-01G	226.00	229.00	3.00	226.00	0.00	1000.00	771.00	12.00	0.00
13	HED-01H	229.00	232.00	3.00	229.00	0.00	1000.00	768.00	12.00	0.00
14	HED-01I	230.00	233.00	3.00	230.00	0.00	1000.00	767.00	12.00	0.00
15	HED-01J	231.00	233.00	2.00	231.00	0.00	1000.00	767.00	12.00	0.00
16	HED-01K	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
17	HED-01L	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
18	HED-01M	224.00	230.00	6.00	224.00	0.00	1000.00	770.00	12.00	0.00
19	HED-01N	230.00	235.00	5.00	230.00	0.00	1000.00	765.00	12.00	0.00
20	HED-01O	234.00	238.00	4.00	234.00	0.00	1000.00	762.00	12.00	0.00
21	HED-01P	234.00	239.00	5.00	234.00	0.00	1000.00	761.00	12.00	0.00
22	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
23	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
24	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
25	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
26	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
27	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
28	HED-02G	235.00	237.00	2.00	235.00	0.00	1000.00	763.00	12.00	0.00
29	HED-02H	236.00	238.00	2.00	236.00	0.00	1000.00	762.00	12.00	0.00
30	HED-02I	237.00	239.00	2.00	237.00	0.00	1000.00	761.00	12.00	0.00
31	HED-02J	237.00	250.00	13.00	237.00	0.00	1000.00	750.00	12.00	0.00
32	HED-02K	255.00	257.00	2.00	255.00	0.00	1000.00	743.00	12.00	0.00
33	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
34	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
35	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00
36	HED-03D	241.00	245.00	4.00	241.00	0.00	1000.00	755.00	12.00	0.00
37	HED-03E	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
38	HED-03F	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
39	HED-03G	242.00	245.00	3.00	242.00	0.00	1000.00	755.00	12.00	0.00
40	HED-03H	243.00	245.00	2.00	243.00	0.00	1000.00	755.00	12.00	0.00
41	HED-03I	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
42	HED-03J	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
43	HED-03K	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
44	HED-03L	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
45	HED-03t	238.00	243.00	5.00	238.00	0.00	1000.00	757.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	COF-01A	0.77	0.00	238.35	0.35	0.00	11.65	238.01	0.01	9 07:07	0 00:00	0.00	0.00
2	COF-01B	0.75	0.00	244.09	0.09	0.00	2.91	244.00	0.00	9 06:05	0 00:00	0.00	0.00
3	COF-01C	0.75	0.00	246.54	1.54	0.00	1.96	245.24	0.24	9 06:05	0 00:00	0.00	0.00
4	COF-02A	0.36	0.00	244.08	0.08	0.00	3.92	244.00	0.00	9 07:06	0 00:00	0.00	0.00
5	COF-02B	3.38	0.00	246.07	1.07	0.00	0.93	245.04	0.04	9 08:11	0 00:00	0.00	0.00
6	HED-01A	1.43	0.00	152.09	0.09	0.00	7.91	152.01	0.01	9 06:33	0 00:00	0.00	0.00
7	HED-01B	1.35	0.00	157.13	0.13	0.00	7.87	157.01	0.01	17 20:09	0 00:00	0.00	0.00
8	HED-01C	1.35	0.00	158.23	0.43	0.00	6.77	157.84	0.04	9 06:18	0 00:00	0.00	0.00
9	HED-01D	1.35	0.00	177.34	0.30	0.00	3.91	177.07	0.03	9 06:18	0 00:00	0.00	0.00
10	HED-01E	1.35	0.00	181.32	0.32	0.00	10.68	181.03	0.03	9 06:15	0 00:00	0.00	0.00
11	HED-01F	1.35	0.00	223.23	0.23	0.00	5.77	223.02	0.02	9 06:13	0 00:00	0.00	0.00
12	HED-01G	1.33	0.00	226.21	0.21	0.00	3.29	226.02	0.02	9 06:06	0 00:00	0.00	0.00
13	HED-01H	1.25	0.00	229.37	0.37	0.00	2.63	229.04	0.04	17 20:05	0 00:00	0.00	0.00
14	HED-01I	1.25	0.00	230.38	0.38	0.00	2.62	230.03	0.03	17 20:05	0 00:00	0.00	0.00
15	HED-01J	1.25	0.00	232.83	1.83	0.00	1.92	231.37	0.37	17 20:05	0 00:00	0.00	0.00
16	HED-01K	1.01	0.00	228.21	1.71	0.00	1.54	226.55	0.05	9 01:50	0 00:00	0.00	0.00
17	HED-01L	0.05	0.00	226.58	0.08	0.00	2.92	226.50	0.00	9 06:05	0 00:00	0.00	0.00
18	HED-01M	0.04	0.00	224.05	0.05	0.00	5.95	224.00	0.00	9 07:05	0 00:00	0.00	0.00
19	HED-01N	0.04	0.00	230.17	0.17	0.00	4.83	230.01	0.01	9 07:05	0 00:00	0.00	0.00
20	HED-01O	0.04	0.00	234.05	0.05	0.00	4.45	234.00	0.00	9 06:14	0 00:00	0.00	0.00
21	HED-01P	0.00	0.00	234.00	0.00	0.00	5.50	234.00	0.00	0 00:00	0 00:00	0.00	0.00
22	HED-02A	0.15	0.00	171.02	0.02	0.00	7.98	171.00	0.00	9 10:07	0 00:00	0.00	0.00
23	HED-02B	0.15	0.00	171.46	0.16	0.00	5.54	171.35	0.05	9 09:54	0 00:00	0.00	0.00
24	HED-02C	0.15	0.00	173.63	0.13	0.00	4.37	173.54	0.04	9 09:55	0 00:00	0.00	0.00
25	HED-02D	0.15	0.00	174.84	0.24	0.00	10.90	174.67	0.07	9 09:49	0 00:00	0.00	0.00
26	HED-02E	0.15	0.00	180.66	0.20	0.00	7.34	180.51	0.05	9 09:46	0 00:00	0.00	0.00
27	HED-02F	0.17	0.00	181.87	0.11	0.00	6.09	181.79	0.03	9 09:12	0 00:00	0.00	0.00
28	HED-02G	0.07	0.00	235.05	0.05	0.00	2.95	235.02	0.02	8 14:37	0 00:00	0.00	0.00
29	HED-02H	0.07	0.00	236.11	0.11	0.00	1.89	236.04	0.04	17 13:27	0 00:00	0.00	0.00
30	HED-02I	0.00	0.00	237.00	0.00	0.00	2.00	237.00	0.00	0 00:00	0 00:00	0.00	0.00
31	HED-02J	0.07	0.00	237.10	0.10	0.00	12.90	237.03	0.03	17 15:03	0 00:00	0.00	0.00
32	HED-02K	0.08	0.00	256.33	1.33	0.00	2.17	255.11	0.11	9 08:09	0 00:00	0.00	0.00
33	HED-03A	0.13	0.00	183.03	0.03	0.00	6.97	183.00	0.00	9 08:30	0 00:00	0.00	0.00
34	HED-03B	0.13	0.00	235.01	0.01	0.00	4.99	235.00	0.00	9 08:08	0 00:00	0.00	0.00
35	HED-03C	0.08	0.00	236.04	0.04	0.00	13.96	236.00	0.00	9 07:09	0 00:00	0.00	0.00
36	HED-03D	0.08	0.00	241.02	0.02	0.00	3.98	241.00	0.00	9 06:06	0 00:00	0.00	0.00
37	HED-03E	0.04	0.00	250.05	0.05	0.00	1.45	250.00	0.00	9 05:47	0 00:00	0.00	0.00
38	HED-03F	0.03	0.00	250.04	0.04	0.00	1.71	250.00	0.00	9 06:05	0 00:00	0.00	0.00
39	HED-03G	0.03	0.00	242.00	0.00	0.00	3.00	242.00	0.00	9 08:20	0 00:00	0.00	0.00
40	HED-03H	0.14	0.00	244.43	1.43	0.00	2.07	243.12	0.12	9 08:12	0 00:00	0.00	0.00
41	HED-03I	0.01	0.00	244.43	0.43	0.00	2.57	244.01	0.01	9 08:13	0 00:00	0.00	0.00
42	HED-03J	0.00	0.00	245.00	0.00	0.00	3.50	245.00	0.00	0 00:00	0 00:00	0.00	0.00
43	HED-03K	0.55	0.00	257.05	1.05	0.00	1.95	256.35	0.35	17 20:05	0 00:00	0.00	0.00
44	HED-03L	0.55	0.00	256.18	0.18	0.00	1.82	256.03	0.03	14 23:00	0 00:00	0.00	0.00
45	HED-03M	0.06	0.00	238.13	0.13	0.00	5.87	238.00	0.00	9 08:06	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow Gate	Flap Flow Gate
1	COF-1A	10.00	238.00	0.00	238.00	0.00	0.00	0.0000	Rectangular	5.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	COF-1B	150.00	244.00	0.00	238.00	0.00	6.00	4.0000	Rectangular	1.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	COF-1C	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	COF-1E	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	COF-2B	1.00	245.00	0.00	246.00	2.00	-1.00	-100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	COF-2D	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
7	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
8	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
9	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00	No
10	HED-01I	5.00	228.00	0.00	228.50	2.00	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
11	HED-01J	20.00	227.00	0.50	228.00	2.00	-1.00	-5.0000	Rectangular	1.000	1.000	0.0320	0.5000	0.5000	0.0000	0.00	No
12	HED-01K	5.00	228.00	0.00	228.75	2.25	-0.75	-15.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
13	HED-01M	500.00	230.00	0.00	224.00	0.00	6.00	1.2000	Triangular	2.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
14	HED-01O	5.00	237.00	0.00	237.50	3.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
15	HED-01Q	5.00	238.00	0.00	238.50	4.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
16	HED-01T	1.00	232.75	1.75	231.00	1.00	1.75	175.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
17	HED-01V	5.00	231.00	0.00	231.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
18	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
19	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00	No
20	HED-02G	1130.10	235.00	0.00	181.76	0.00	53.24	4.7100	Trapezoidal	3.000	19.000	0.0320	0.5000	0.5000	0.0000	0.00	No
21	HED-02K	1.00	256.50	1.50	237.00	0.00	19.50	1950.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
22	HED-02L	44.02	237.00	0.00	236.00	0.00	1.00	2.2700	Rectangular	2.000	4.000	0.0320	0.5000	0.5000	0.0000	0.00	No
23	HED-02O	5.00	255.00	0.00	255.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
24	HED-03A	770.00	181.76	0.00	183.00	0.00	-1.24	-0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
25	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
26	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
27	HED-03F	400.00	241.00	0.00	236.00	0.00	5.00	1.2500	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
28	HED-03G	10.00	242.00	0.00	241.00	0.00	1.00	10.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
29	HED-03H	1.00	244.50	1.50	242.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
30	HED-03K	5.00	256.00	0.00	256.00	0.00	0.00	0.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
31	HED-03M	5.00	250.00	0.00	250.75	0.75	-0.75	-15.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
32	HED-03O	5.00	250.00	0.00	250.50	0.50	-0.50	-10.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
33	HED-03P	1.00	257.00	1.00	256.00	0.00	1.00	100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
34	HED-03R	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
35	HED-03S	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
36	HED-03U	5.00	243.00	0.00	243.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Channel Results

SN Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
	(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1 COF-1A	0.77	9 07:07	42.77	0.02	0.22	0.76	0.35	0.07	0.00		
2 COF-1B	0.75	9 06:05	37.11	0.02	0.69	3.62	0.22	0.22	0.00		
3 COF-1C	0.72	9 06:05	224.13	0.00	5.68	0.00	0.06	0.03	0.00		
4 COF-1E	0.75	9 06:05	7.05	0.11	0.10	0.83	1.54	0.77	0.00		
5 COF-2B	3.38	9 08:11	141.75	0.02	2.78	0.01	0.51	0.30	0.00		
6 COF-2D	2.37	9 08:11	2.00	1.18	1.15	0.07	1.01	0.52	0.00		
7 HED-01A	1.43	9 06:34	1512.53	0.00	1.03	2.67	0.09	0.01	0.00		
8 HED-01B	1.35	9 06:23	1082.72	0.00	0.83	16.16	0.11	0.01	0.00		
9 HED-01F	1.35	9 06:13	2813.13	0.00	2.72	3.79	0.27	0.05	0.00		
10 HED-01I	0.43	9 08:13	24.81	0.02	0.60	0.14	0.27	0.29	0.00		
11 HED-01J	1.00	9 01:50	4.99	0.20	1.55	0.22	0.52	0.65	0.00		
12 HED-01K	3.93	16 09:26	30.39	0.13	3.05	0.03	0.40	0.52	0.00		
13 HED-01M	0.04	9 07:05	37.78	0.00	1.54	5.41	0.11	0.06	0.00		
14 HED-01O	0.28	9 08:12	24.81	0.01	0.41	0.20	0.27	0.28	0.00		
15 HED-01Q	0.00	0 00:00	24.81	0.00	0.00		0.03	0.03	0.00		
16 HED-01T	1.20	17 20:05	187.52	0.01	8.16	0.00	0.07	0.04	0.00		
17 HED-01V	1.25	17 20:05	16.66	0.07	0.07	1.19	1.83	0.92	0.00		
18 HED-02A	0.15	9 10:07	1963.65	0.00	0.40	38.75	0.05	0.01	0.00		
19 HED-02E	0.15	9 09:46	614.42	0.00	0.29	27.93	0.12	0.02	0.00		
20 HED-02G	0.07	8 14:43	396.58	0.00	1.50	12.56	0.08	0.03	0.00		
21 HED-02K	0.00	0 00:00	625.97	0.00	0.00		0.05	0.02	0.00		
22 HED-02L	0.00	0 00:00	55.99	0.00	0.00		0.06	0.03	0.00		
23 HED-02O	0.07	10 04:34	16.66	0.00	0.11	0.76	1.33	0.67	0.00		
24 HED-03A	0.10	9 08:30	443.56	0.00	0.07	183.33	0.07	0.01	0.00		
25 HED-03B	0.13	9 08:08	2403.19	0.00	0.37	49.55	0.02	0.00	0.00		
26 HED-03C	0.07	9 07:19	417.77	0.00	0.15	77.78	0.02	0.00	0.00		
27 HED-03F	0.08	9 06:06	131.71	0.00	0.34	19.61	0.03	0.01	0.00		
28 HED-03G	0.01	9 08:20	157.53	0.00	0.19	0.88	0.01	0.01	0.00		
29 HED-03H	0.00	0 00:00	224.13	0.00	0.00		0.00	0.00	0.00		
30 HED-03K	0.55	17 20:05	0.83	0.66	0.27	0.31	1.00	1.00	3810.00		
31 HED-03M	0.19	9 08:12	22.66	0.01	0.24	0.35	0.39	0.40	0.00		
32 HED-03O	0.20	9 08:13	18.50	0.01	0.37	0.23	0.27	0.28	0.00		
33 HED-03P	0.53	17 20:05	141.75	0.00	2.51	0.01	0.11	0.05	0.00		
34 HED-03R	0.00	0 00:00	2.00	0.00	0.00		0.00	0.00	0.00		
35 HED-03S	0.00	0 00:00	224.13	0.00	0.00		0.22	0.11	0.00		
36 HED-03U	0.14	9 16:26	2.00	0.07	0.12	0.69	1.43	0.72	0.00		

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Pipe Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow Gate	Flap No	No. of Barrels
1	COF-01D	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	COF-2A	400.00	244.00	0.00	238.00	0.00	6.00	1.5000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	COF-2C	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.480	0.480	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5	HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6	HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7	HED-01G	20.00	226.00	0.00	223.00	0.00	3.00	15.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	HED-01H	50.00	226.50	0.00	226.00	0.00	0.50	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	HED-01L	47.37	224.00	0.00	223.00	0.00	1.00	2.1100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	HED-01N	75.00	234.00	0.00	230.00	0.00	4.00	5.3300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	HED-01P	65.00	234.00	0.00	230.00	0.00	4.00	6.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	HED-01R	50.00	230.00	0.00	229.00	0.00	1.00	2.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	HED-01S	100.00	229.00	0.00	228.00	2.00	1.00	1.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	HED-01U	1.00	231.00	0.00	230.00	0.00	1.00	100.0000	CIRCULAR	0.960	0.960	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
16	HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
17	HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
18	HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	HED-02H	100.00	236.00	0.00	235.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	HED-02I	100.00	237.00	0.00	236.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	HED-02J	1.00	255.00	0.00	237.00	0.00	18.00	1800.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	HED-03D	500.00	238.00	0.00	235.00	0.00	3.00	0.6000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	HED-03E	47.11	242.00	0.00	242.50	4.50	-0.50	-1.0600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	HED-03I	200.00	244.00	0.00	243.50	0.50	0.50	0.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	HED-03J	200.00	256.00	0.00	243.00	0.00	13.00	6.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	HED-03L	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	HED-03N	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
28	HED-03Q	1.00	256.00	0.00	256.00	0.00	0.00	0.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	HED-03T	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	HED-03V	1.00	243.00	0.00	242.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	COF-01D	0.03	9 05:06	0.02	1.18	10.57	0.00	0.06	1.00	185.00		SURCHARGED
2	COF-2A	0.06	9 07:06	11.15	0.01	0.83	8.03	0.21	0.14	0.00		Calculated
3	COF-2C	0.01	9 08:19	0.01	1.32	12.44	0.00	0.04	1.00	77.00		SURCHARGED
4	HED-01C	1.35	9 06:18	20.90	0.06	5.14	0.30	0.28	0.14	0.00		Calculated
5	HED-01D	1.35	9 06:18	28.48	0.05	4.63	4.33	0.30	0.15	0.00		Calculated
6	HED-01E	1.35	9 06:15	7.14	0.19	6.61	0.24	0.31	0.31	0.00		Calculated
7	HED-01G	1.33	9 06:06	40.68	0.03	8.45	0.04	0.22	0.14	0.00		Calculated
8	HED-01H	0.05	9 06:05	3.56	0.01	0.68	1.23	0.14	0.14	0.00		Calculated
9	HED-01L	0.04	9 07:05	15.26	0.00	0.44	1.79	0.14	0.09	0.00		Calculated
10	HED-01N	0.04	9 06:14	8.23	0.00	1.93	0.65	0.11	0.11	0.00		Calculated
11	HED-01P	0.00	0 00:00	26.06	0.00	0.00		0.09	0.06	0.00		Calculated
12	HED-01R	1.25	17 20:05	5.04	0.25	4.64	0.18	0.37	0.37	0.00		Calculated
13	HED-01S	1.25	17 20:05	10.50	0.12	3.81	0.44	0.36	0.24	0.00		Calculated
14	HED-01U	0.05	16 12:36	0.05	1.11	9.75	0.00	0.08	1.00	1545.00		SURCHARGED
15	HED-02B	0.15	9 09:56	40.58	0.00	2.29	0.59	0.09	0.03	0.00		Calculated
16	HED-02C	0.15	9 09:55	8.91	0.02	1.61	3.17	0.15	0.10	0.00		Calculated
17	HED-02D	0.15	9 09:51	4.04	0.04	1.13	10.99	0.19	0.13	0.00		Calculated
18	HED-02F	0.15	9 09:12	59.16	0.00	1.20	2.30	0.15	0.05	0.00		Calculated
19	HED-02H	0.07	17 13:30	3.56	0.02	2.44	0.68	0.08	0.08	0.00		Calculated
20	HED-02I	0.07	17 15:03	3.56	0.02	1.66	1.00	0.10	0.10	0.00		Calculated
21	HED-02J	0.07	18 05:46	0.09	0.77	23.64	0.00	0.06	1.00	5628.00		SURCHARGED
22	HED-03D	0.06	9 08:06	2.76	0.02	2.52	3.31	0.07	0.07	0.00		Calculated
23	HED-03E	0.06	9 08:05	10.82	0.01	0.21	3.74	0.34	0.22	0.00		Calculated
24	HED-03I	0.01	9 07:05	5.25	0.00	0.01	333.33	0.68	0.46	0.00		Calculated
25	HED-03J	0.55	17 20:05	9.08	0.06	8.65	0.39	0.58	0.58	0.00		Calculated
26	HED-03L	0.03	9 06:05	10.69	0.00	4.18	0.40	0.03	0.03	0.00		Calculated
27	HED-03N	0.04	9 06:05	9.26	0.00	4.14	0.40	0.04	0.04	0.00		Calculated
28	HED-03Q	0.02	16 14:08	0.00	23.06	5.63	0.00	0.06	1.00	3275.00		SURCHARGED
29	HED-03T	0.00	0 00:00	0.02	0.00	0.00		0.03	0.50	0.00		Calculated
30	HED-03V	0.03	9 08:12	0.02	1.17	15.25	0.00	0.03	0.54	0.00		> CAPACITY

Storage Nodes

Storage Node : LIDA-01

Input Data

Invert Elevation (ft) 228.00
 Max (Rim) Elevation (ft) 229.00
 Max (Rim) Offset (ft) 1.00
 Initial Water Elevation (ft) 228.00
 Initial Water Depth (ft) 0.00
 Ponded Area (ft²) 938.00
 Evaporation Loss 0.00

Infiltration/Exfiltration

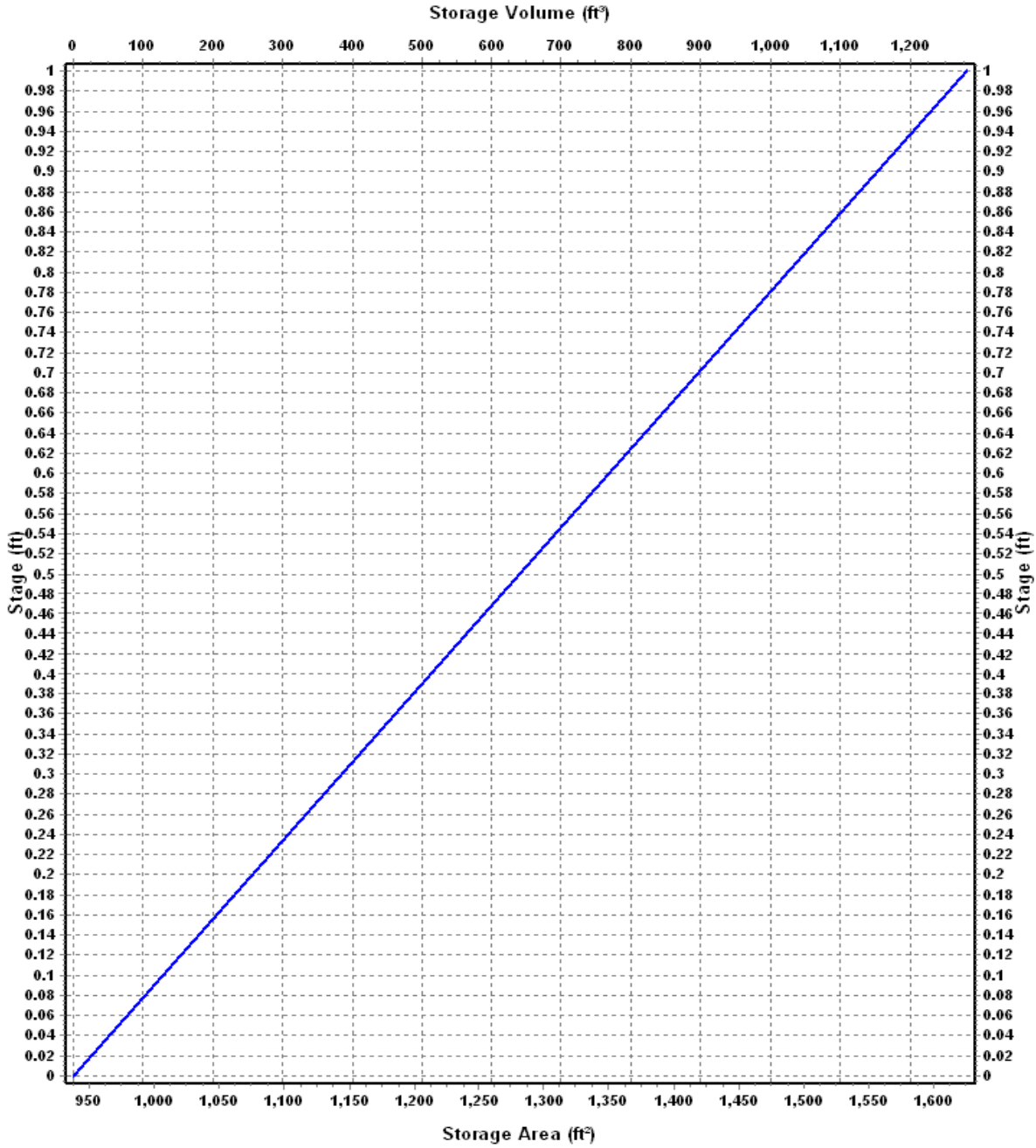
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-01

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	938	0.000
1	1625	1281.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-01 (continued)

Output Summary Results

Peak Inflow (cfs)	0.44
Peak Lateral Inflow (cfs)	0.11
Peak Outflow (cfs)	0.05
Peak Exfiltration Flow Rate (cfm)	3.60
Max HGL Elevation Attained (ft)	228.52
Max HGL Depth Attained (ft)	0.52
Average HGL Elevation Attained (ft)	228.02
Average HGL Depth Attained (ft)	0.02
Time of Max HGL Occurrence (days hh:mm)	9 06:05
Total Exfiltration Volume (1000-ft ³)	16.638
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-02

Input Data

Invert Elevation (ft) 228.00
Max (Rim) Elevation (ft) 229.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 228.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 562.00
Evaporation Loss 0.00

Infiltration/Exfiltration

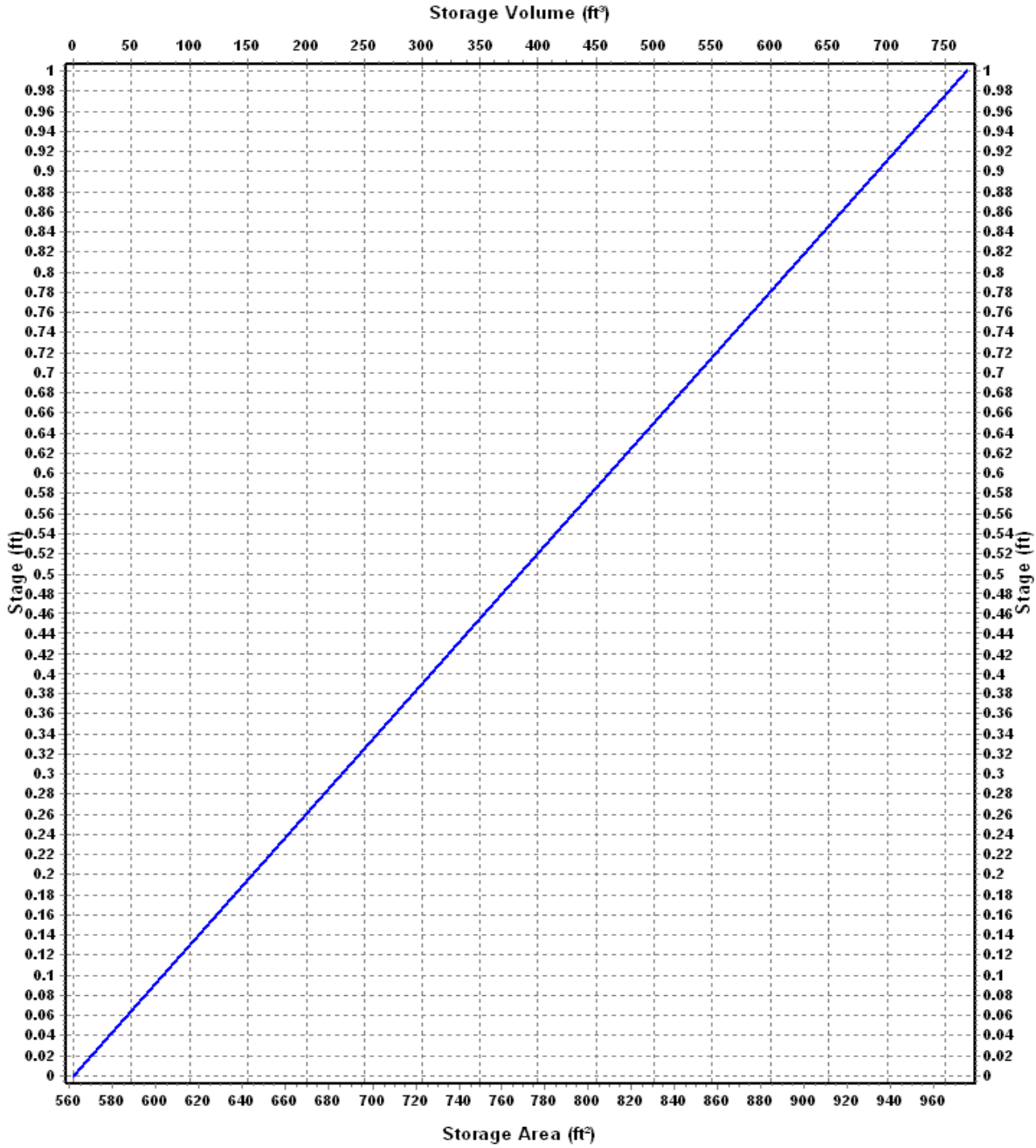
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-02

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	562	0.000
1	975	768.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-02 (continued)

Output Summary Results

Peak Inflow (cfs)	3.97
Peak Lateral Inflow (cfs)	0.10
Peak Outflow (cfs)	0.14
Peak Exfiltration Flow Rate (cfm)	2.46
Max HGL Elevation Attained (ft)	228.78
Max HGL Depth Attained (ft)	0.78
Average HGL Elevation Attained (ft)	228.05
Average HGL Depth Attained (ft)	0.05
Time of Max HGL Occurrence (days hh:mm)	16 09:26
Total Exfiltration Volume (1000-ft ³)	14.037
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-03

Input Data

Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 238.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

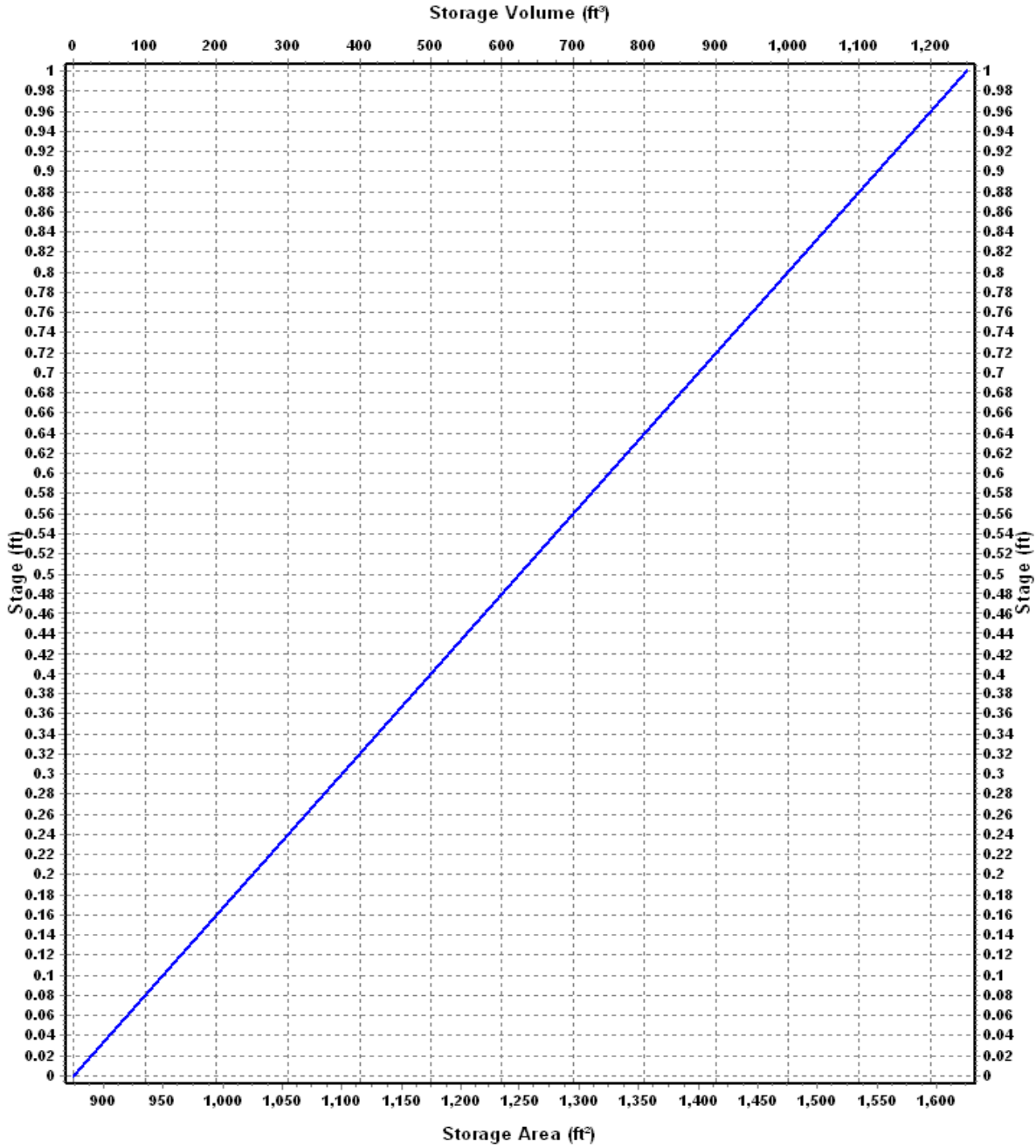
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-03

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	875	0.000
1	1625	1250.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-03 (continued)

Output Summary Results

Peak Inflow (cfs)	0.29
Peak Lateral Inflow (cfs)	0.10
Peak Outflow (cfs)	0.04
Peak Exfiltration Flow Rate (cfm)	3.51
Max HGL Elevation Attained (ft)	237.52
Max HGL Depth Attained (ft)	0.52
Average HGL Elevation Attained (ft)	237.02
Average HGL Depth Attained (ft)	0.02
Time of Max HGL Occurrence (days hh:mm)	9 06:14
Total Exfiltration Volume (1000-ft ³)	15.526
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Storage Node : LIDA-04

Input Data

Invert Elevation (ft) 238.00
 Max (Rim) Elevation (ft) 239.00
 Max (Rim) Offset (ft) 1.00
 Initial Water Elevation (ft) 238.00
 Initial Water Depth (ft) 0.00
 Ponded Area (ft²) 1875.00
 Evaporation Loss 0.00

Infiltration/Exfiltration

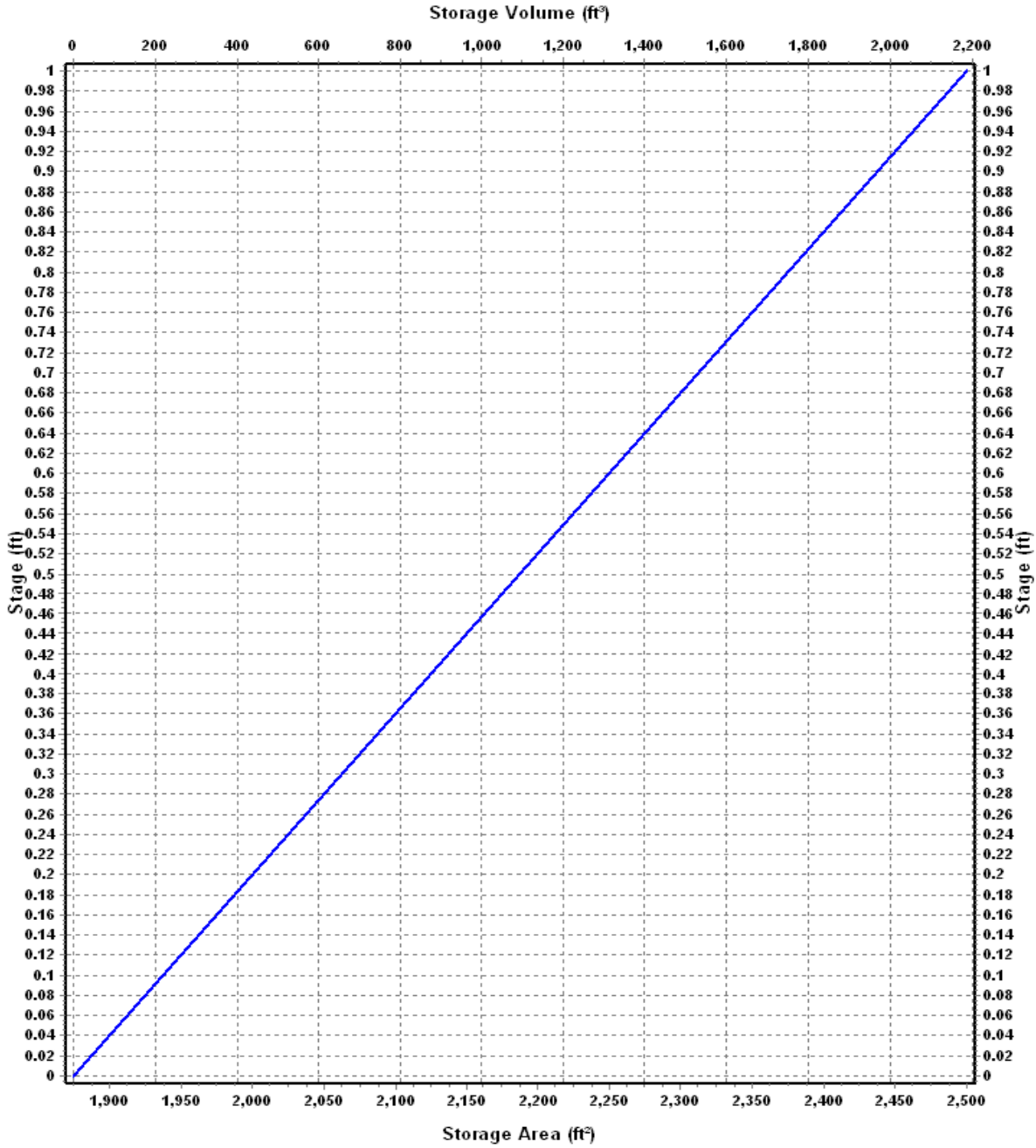
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-04

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	1875	0.000
1	2500	2187.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-04 (continued)

Output Summary Results

Peak Inflow (cfs)	0.11
Peak Lateral Inflow (cfs)	0.11
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	5.32
Max HGL Elevation Attained (ft)	238.07
Max HGL Depth Attained (ft)	0.07
Average HGL Elevation Attained (ft)	238.00
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	9 08:05
Total Exfiltration Volume (1000-ft ³)	16.931
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-05

Input Data

Invert Elevation (ft) 255.00
Max (Rim) Elevation (ft) 257.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 255.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 12000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

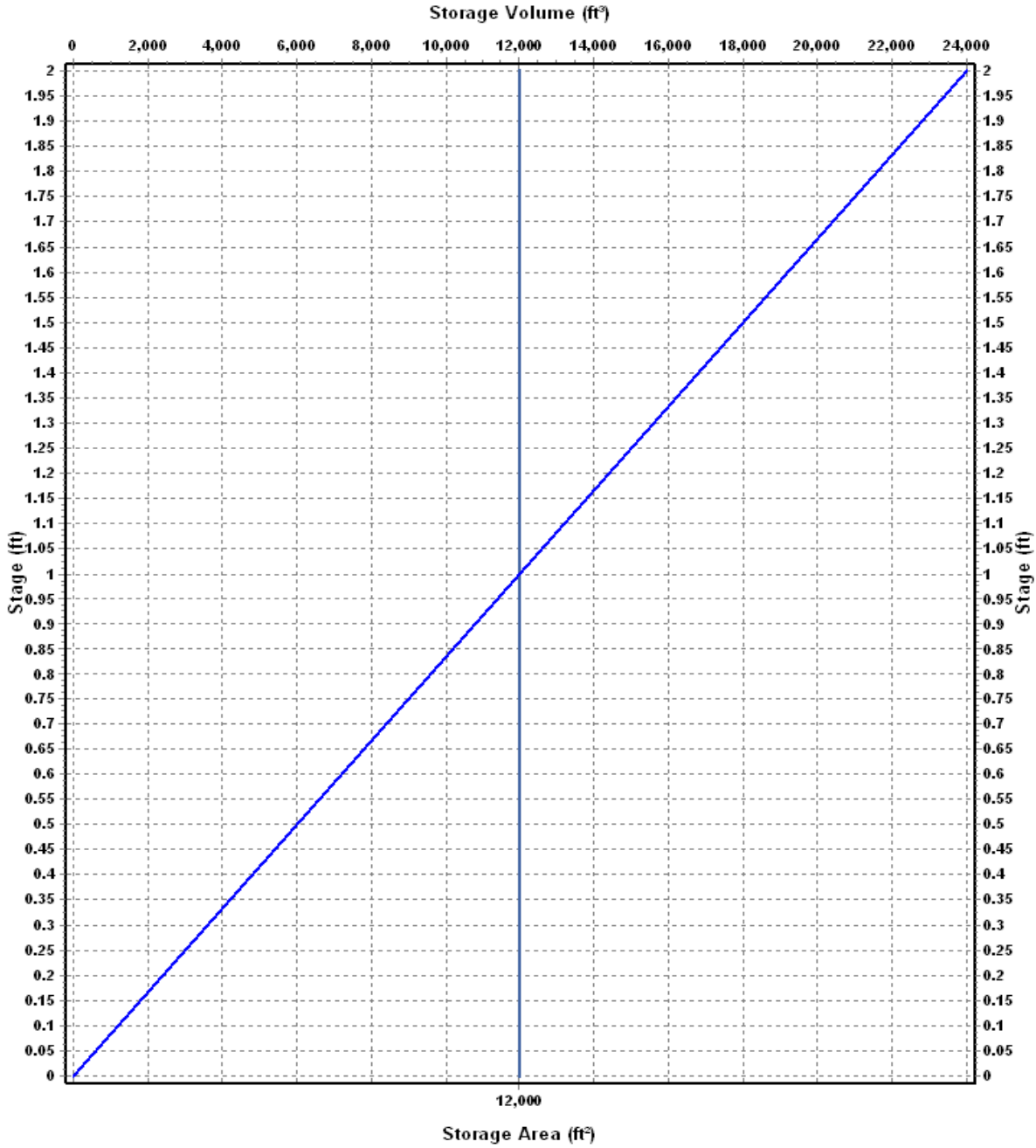
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-05

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	12000	0.000
2	12000	24000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-05 (continued)

Output Summary Results

Peak Inflow (cfs)	0.67
Peak Lateral Inflow (cfs)	0.67
Peak Outflow (cfs)	0.07
Peak Exfiltration Flow Rate (cfm)	8.33
Max HGL Elevation Attained (ft)	256.33
Max HGL Depth Attained (ft)	1.33
Average HGL Elevation Attained (ft)	255.11
Average HGL Depth Attained (ft)	0.11
Time of Max HGL Occurrence (days hh:mm)	9 08:09
Total Exfiltration Volume (1000-ft ³)	86.771
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-06A

Input Data

Invert Elevation (ft) 231.00
Max (Rim) Elevation (ft) 233.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 231.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 10000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

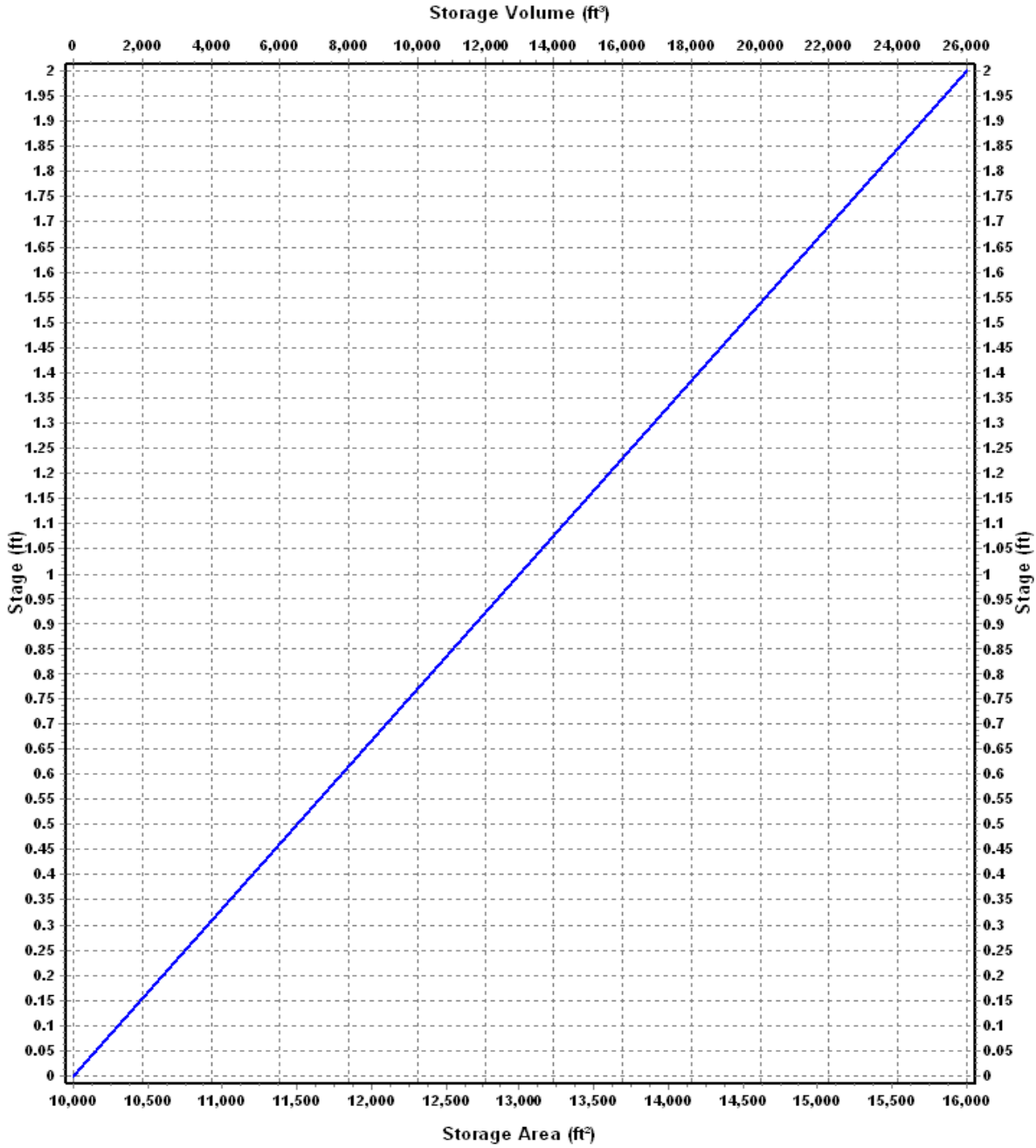
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-06A

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	10000	0.000
2	16000	26000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-06A (continued)

Output Summary Results

Peak Inflow (cfs)	1.48
Peak Lateral Inflow (cfs)	1.48
Peak Outflow (cfs)	1.25
Peak Exfiltration Flow Rate (cfm)	10.76
Max HGL Elevation Attained (ft)	232.83
Max HGL Depth Attained (ft)	1.83
Average HGL Elevation Attained (ft)	231.37
Average HGL Depth Attained (ft)	0.37
Time of Max HGL Occurrence (days hh:mm)	17 20:05
Total Exfiltration Volume (1000-ft ³)	149.352
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-06B

Input Data

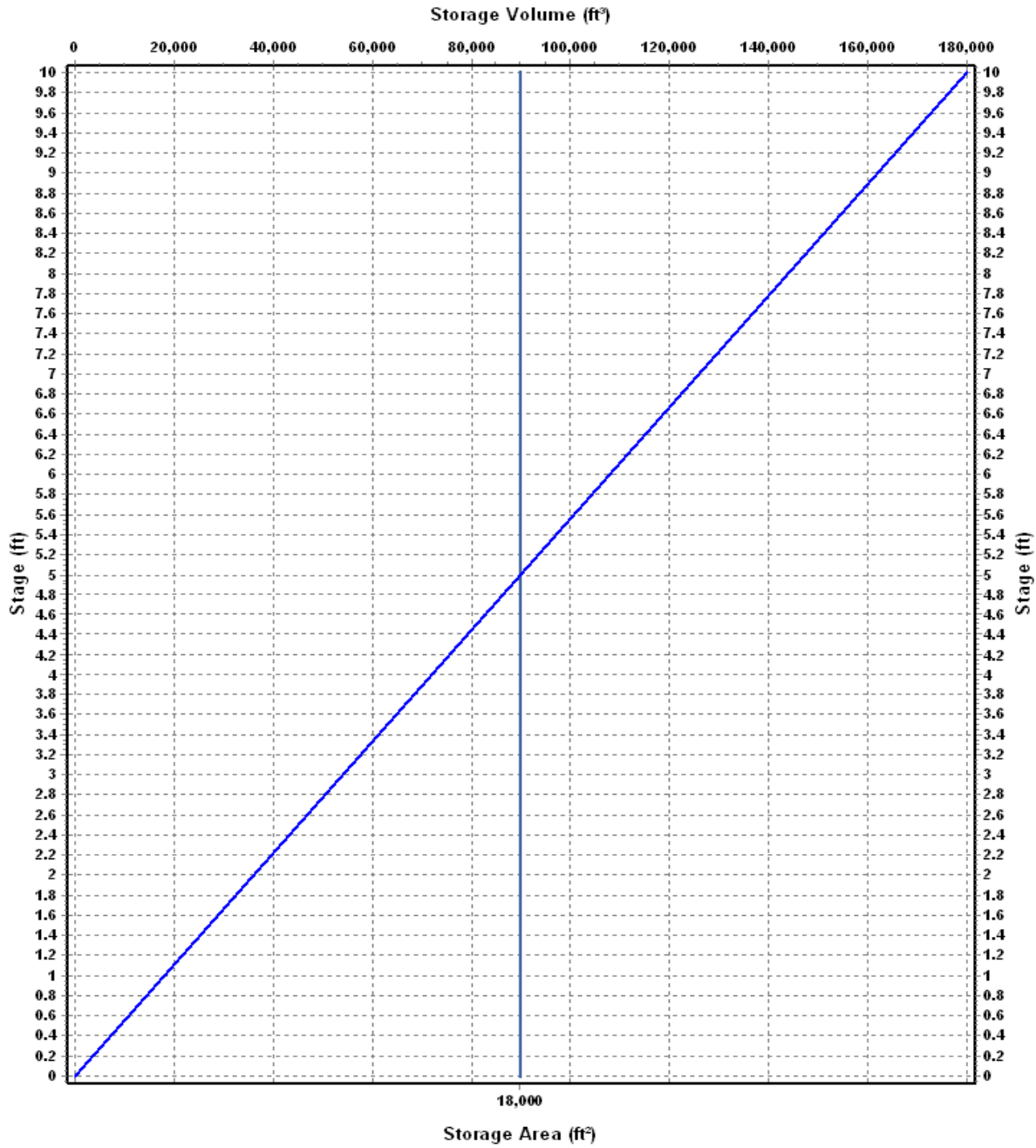
Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 10.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18000.00
Evaporation Loss 0.00

Storage Area Volume Curves

Storage Curve : LIDA-06B

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	18000	0.000
10	18000	180000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-06B (continued)

Output Summary Results

Peak Inflow (cfs)	0.11
Peak Lateral Inflow (cfs)	0.11
Peak Outflow (cfs)	0.04
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	237.15
Max HGL Depth Attained (ft)	0.15
Average HGL Elevation Attained (ft)	237.02
Average HGL Depth Attained (ft)	0.02
Time of Max HGL Occurrence (days hh:mm)	9 08:08
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-07

Input Data

Invert Elevation (ft) 242.00
Max (Rim) Elevation (ft) 243.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 242.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 2812.00
Evaporation Loss 0.00

Infiltration/Exfiltration

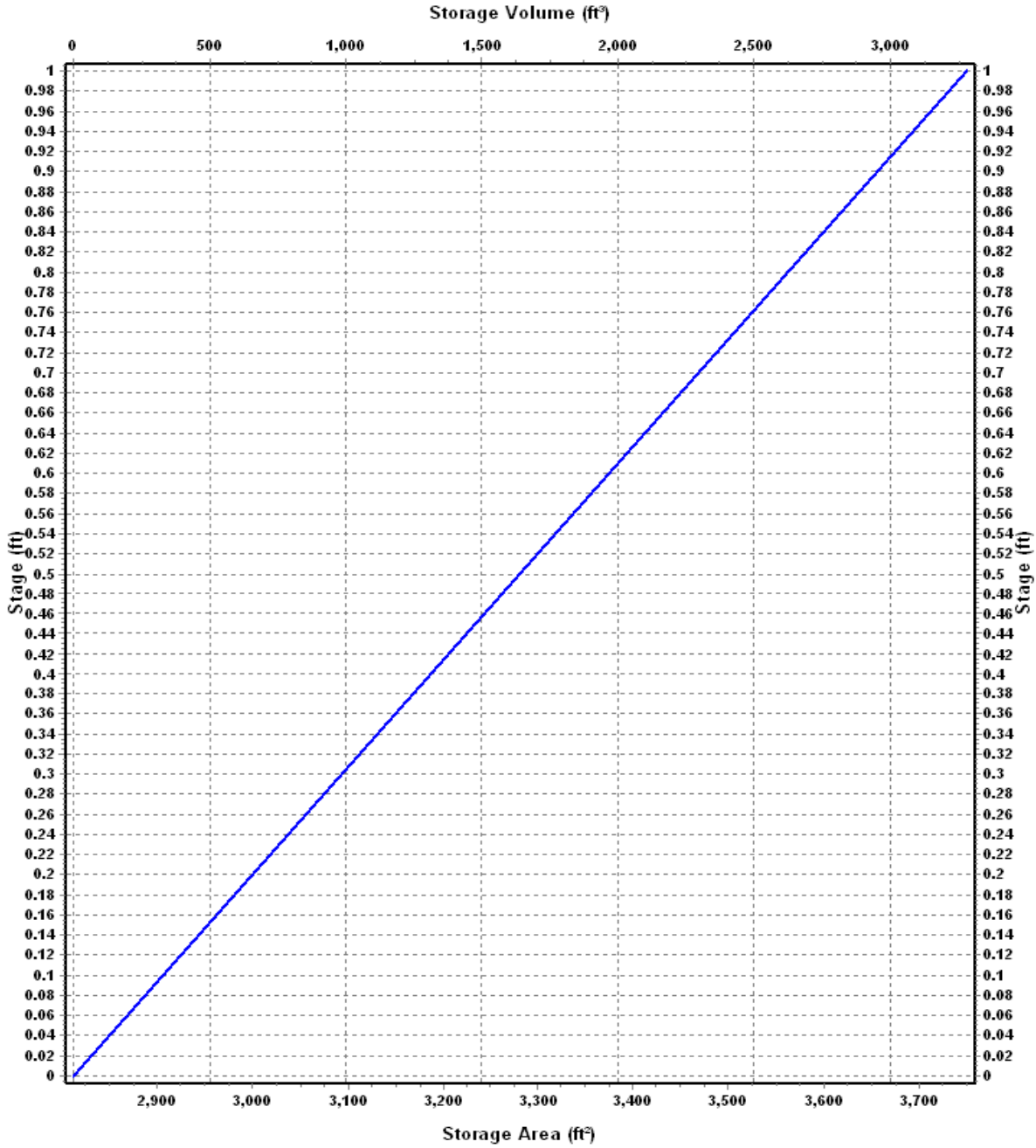
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-07

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	2812	0.000
1	3750	3281.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-07 (continued)

Output Summary Results

Peak Inflow (cfs)	0.27
Peak Lateral Inflow (cfs)	0.27
Peak Outflow (cfs)	0.06
Peak Exfiltration Flow Rate (cfm)	9.35
Max HGL Elevation Attained (ft)	242.59
Max HGL Depth Attained (ft)	0.59
Average HGL Elevation Attained (ft)	242.02
Average HGL Depth Attained (ft)	0.02
Time of Max HGL Occurrence (days hh:mm)	9 08:05
Total Exfiltration Volume (1000-ft ³)	41.829
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-08B

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 5650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

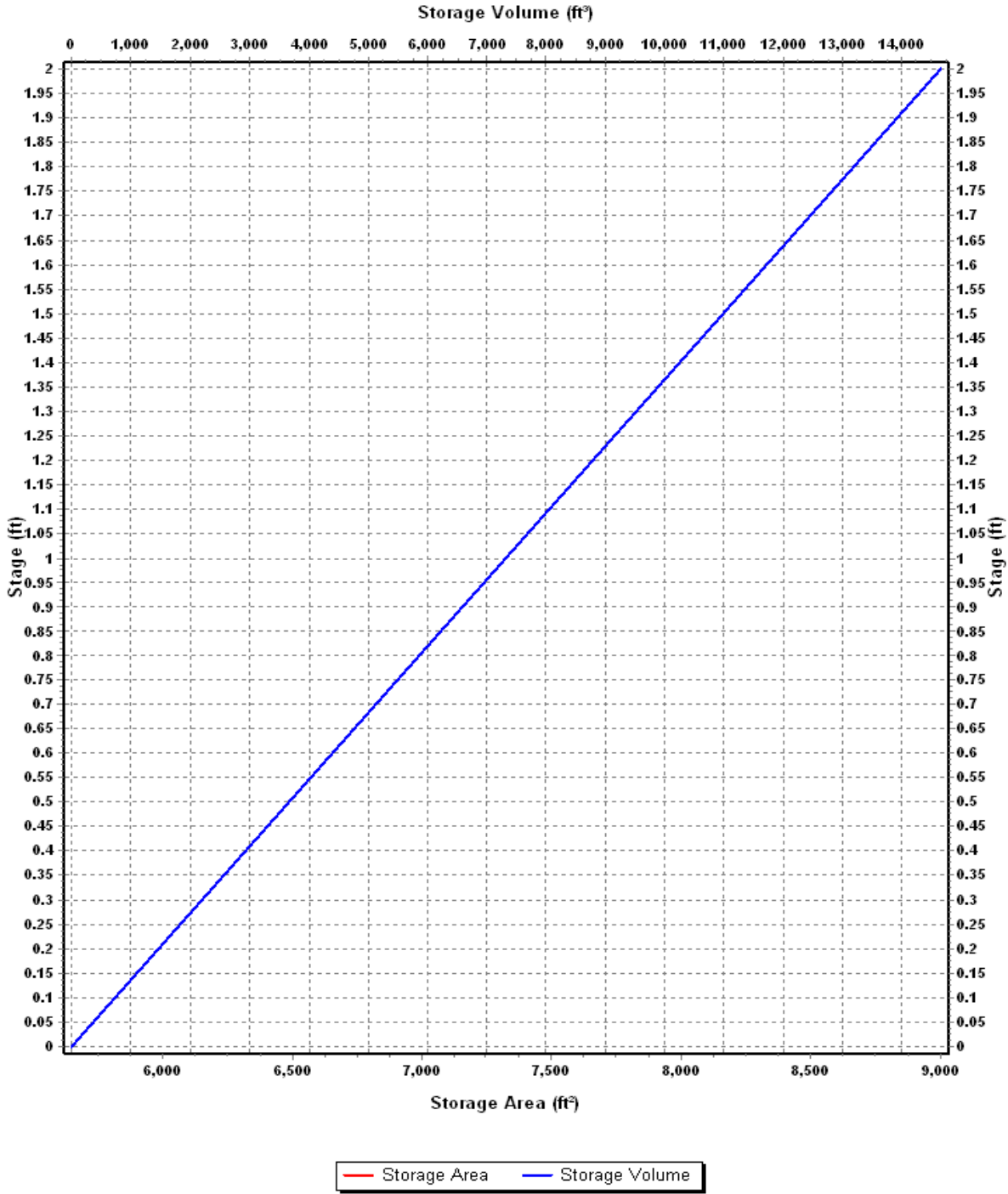
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08B

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	5650	0.000
2	9000	14650.00

Storage Area Volume Curves



Storage Node : LIDA-08B (continued)

Output Summary Results

Peak Inflow (cfs)	0.00
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	3.92
Max HGL Elevation Attained (ft)	245.00
Max HGL Depth Attained (ft)	0
Average HGL Elevation Attained (ft)	245.00
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 00:00
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-08C

Input Data

Invert Elevation (ft) 243.00
Max (Rim) Elevation (ft) 245.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 243.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

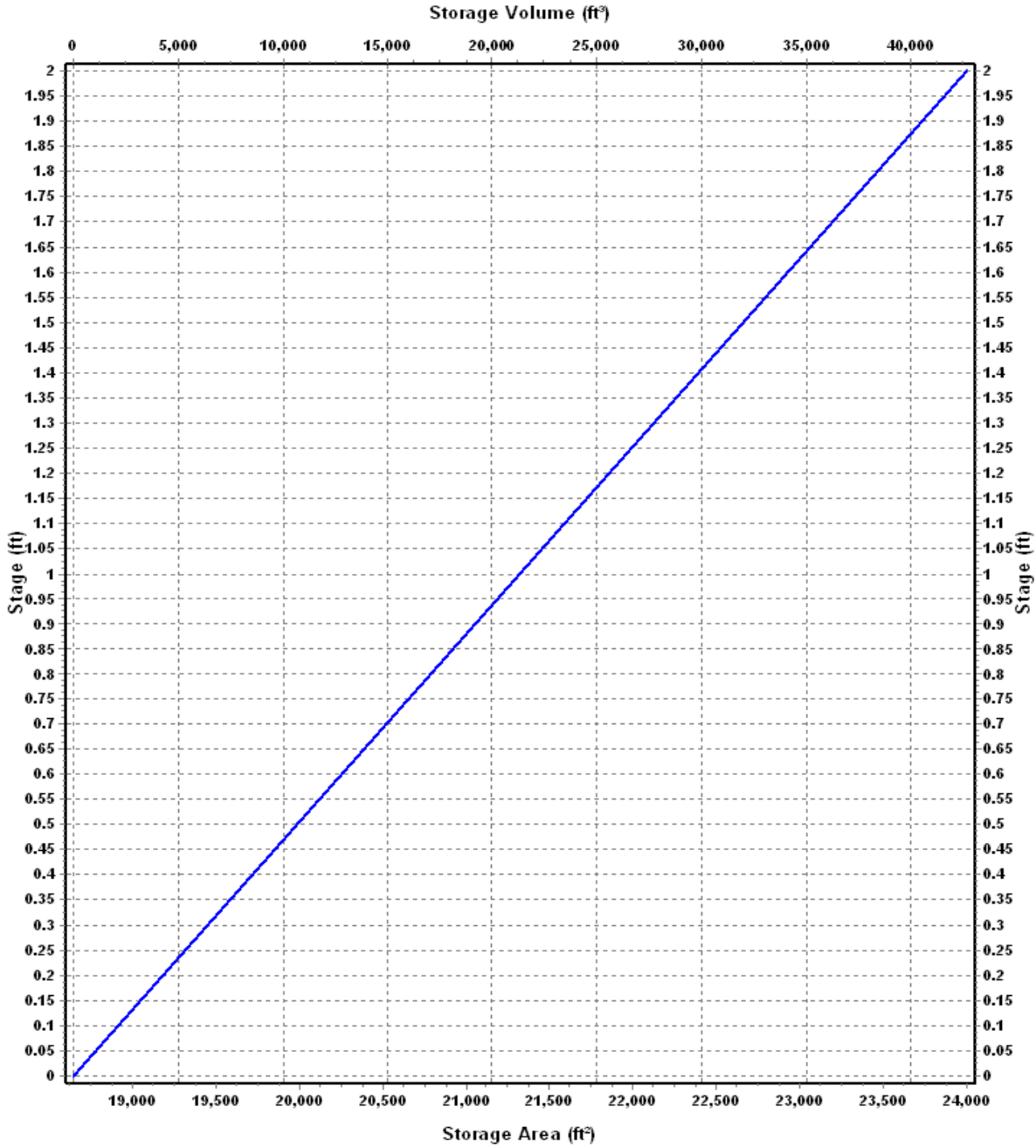
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08C

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	18650	0.000
2	24000	42650.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-08C (continued)

Output Summary Results

Peak Inflow (cfs)	1.21
Peak Lateral Inflow (cfs)	0.57
Peak Outflow (cfs)	0.14
Peak Exfiltration Flow Rate (cfm)	15.61
Max HGL Elevation Attained (ft)	244.43
Max HGL Depth Attained (ft)	1.43
Average HGL Elevation Attained (ft)	243.12
Average HGL Depth Attained (ft)	0.12
Time of Max HGL Occurrence (days hh:mm)	9 08:12
Total Exfiltration Volume (1000-ft ³)	141.400
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-09

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 375.00
Evaporation Loss 0.00

Infiltration/Exfiltration

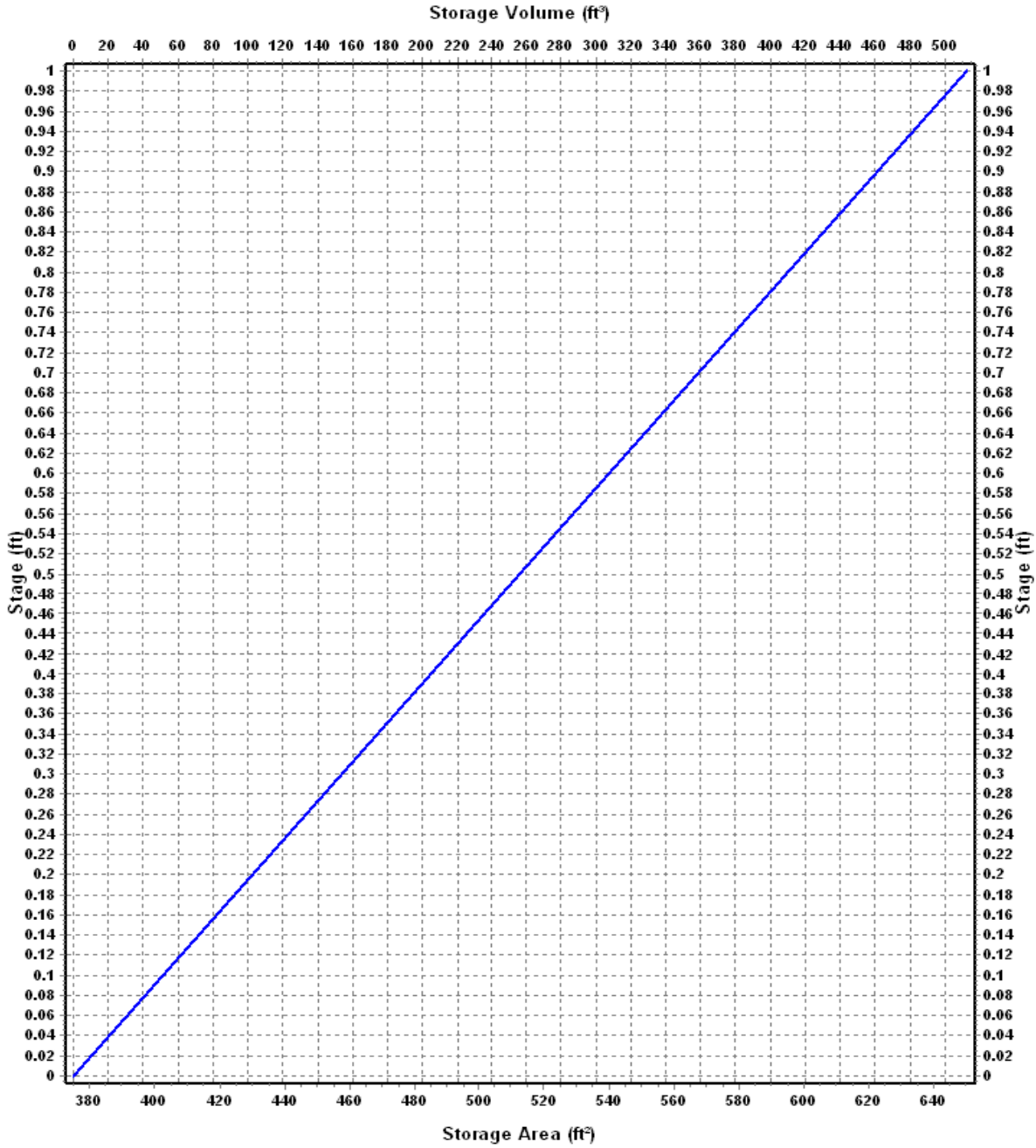
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-09

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	375	0.000
1	650	512.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-09 (continued)

Output Summary Results

Peak Inflow (cfs)	0.20
Peak Lateral Inflow (cfs)	0.06
Peak Outflow (cfs)	0.03
Peak Exfiltration Flow Rate (cfm)	1.63
Max HGL Elevation Attained (ft)	250.76
Max HGL Depth Attained (ft)	0.76
Average HGL Elevation Attained (ft)	250.05
Average HGL Depth Attained (ft)	0.05
Time of Max HGL Occurrence (days hh:mm)	9 06:05
Total Exfiltration Volume (1000-ft ³)	8.631
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-10

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 657.00
Evaporation Loss 0.00

Infiltration/Exfiltration

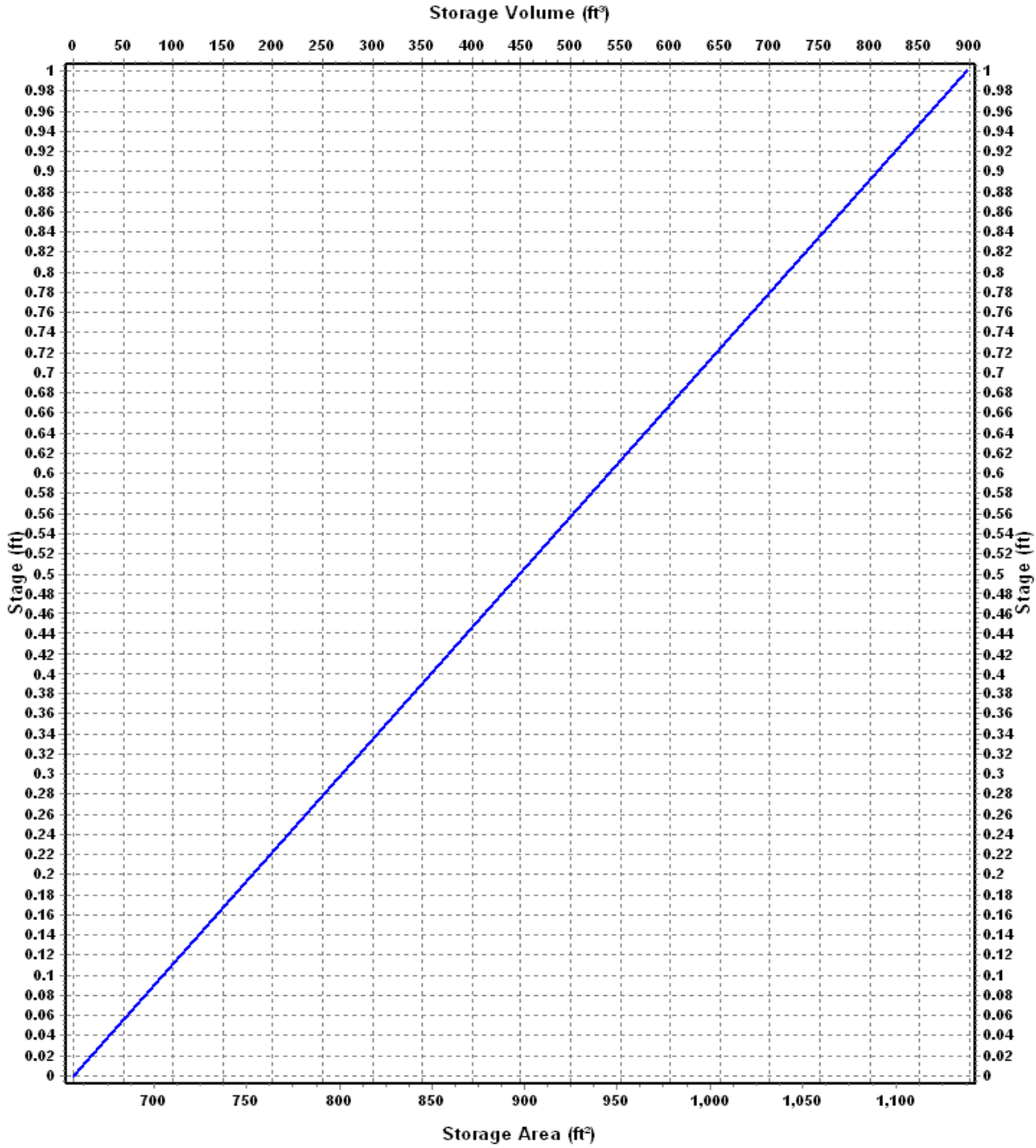
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-10

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	657	0.000
1	1138	897.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-10 (continued)

Output Summary Results

Peak Inflow (cfs)	0.21
Peak Lateral Inflow (cfs)	0.08
Peak Outflow (cfs)	0.04
Peak Exfiltration Flow Rate (cfm)	2.52
Max HGL Elevation Attained (ft)	250.52
Max HGL Depth Attained (ft)	0.52
Average HGL Elevation Attained (ft)	250.03
Average HGL Depth Attained (ft)	0.03
Time of Max HGL Occurrence (days hh:mm)	9 06:05
Total Exfiltration Volume (1000-ft ³)	12.133
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-11

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 13000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

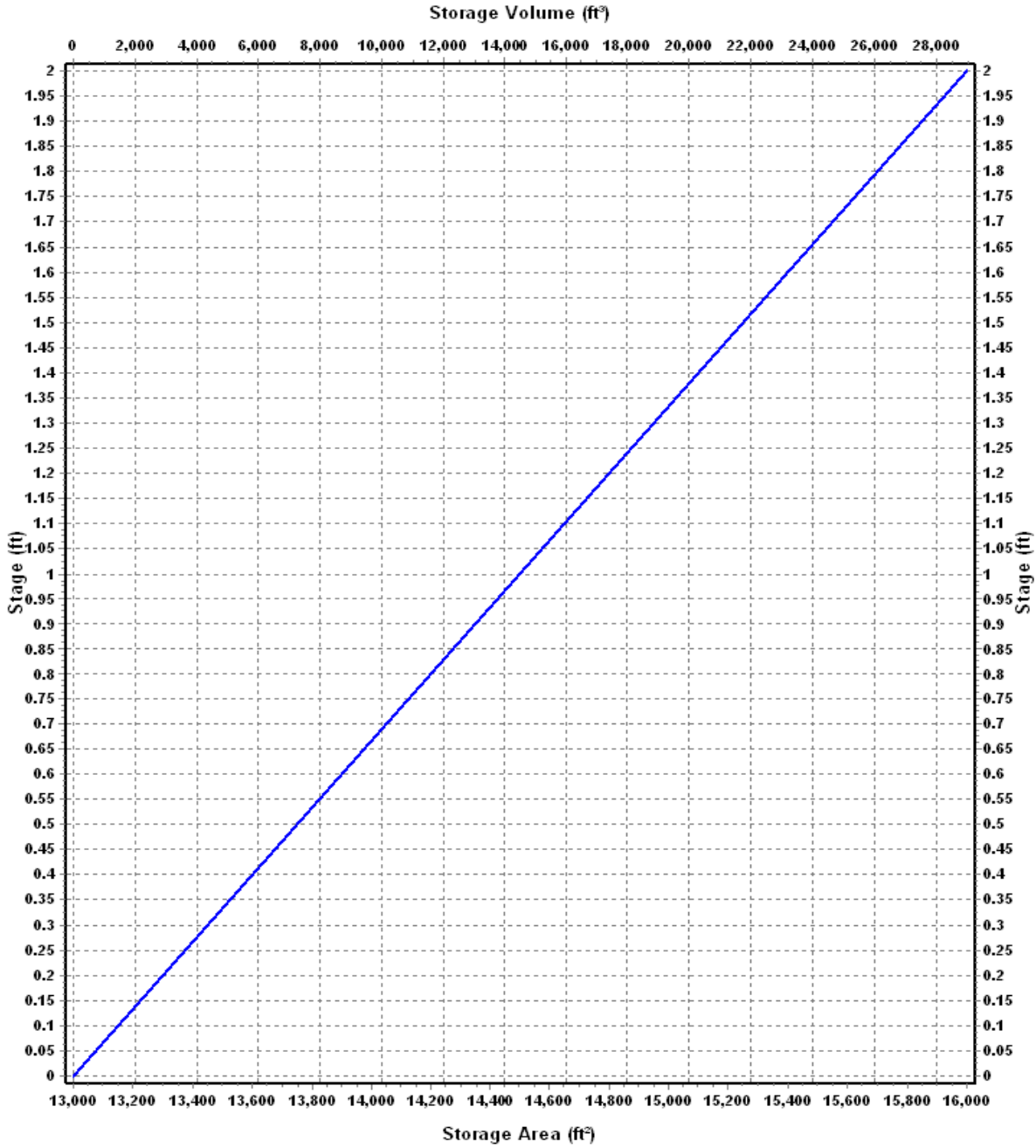
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-11

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	13000	0.000
2	16000	29000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-11 (continued)

Output Summary Results

Peak Inflow (cfs)	0.93
Peak Lateral Inflow (cfs)	0.93
Peak Outflow (cfs)	0.75
Peak Exfiltration Flow Rate (cfm)	10.63
Max HGL Elevation Attained (ft)	246.54
Max HGL Depth Attained (ft)	1.54
Average HGL Elevation Attained (ft)	245.24
Average HGL Depth Attained (ft)	0.24
Time of Max HGL Occurrence (days hh:mm)	9 06:05
Total Exfiltration Volume (1000-ft ³)	136.665
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-12

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

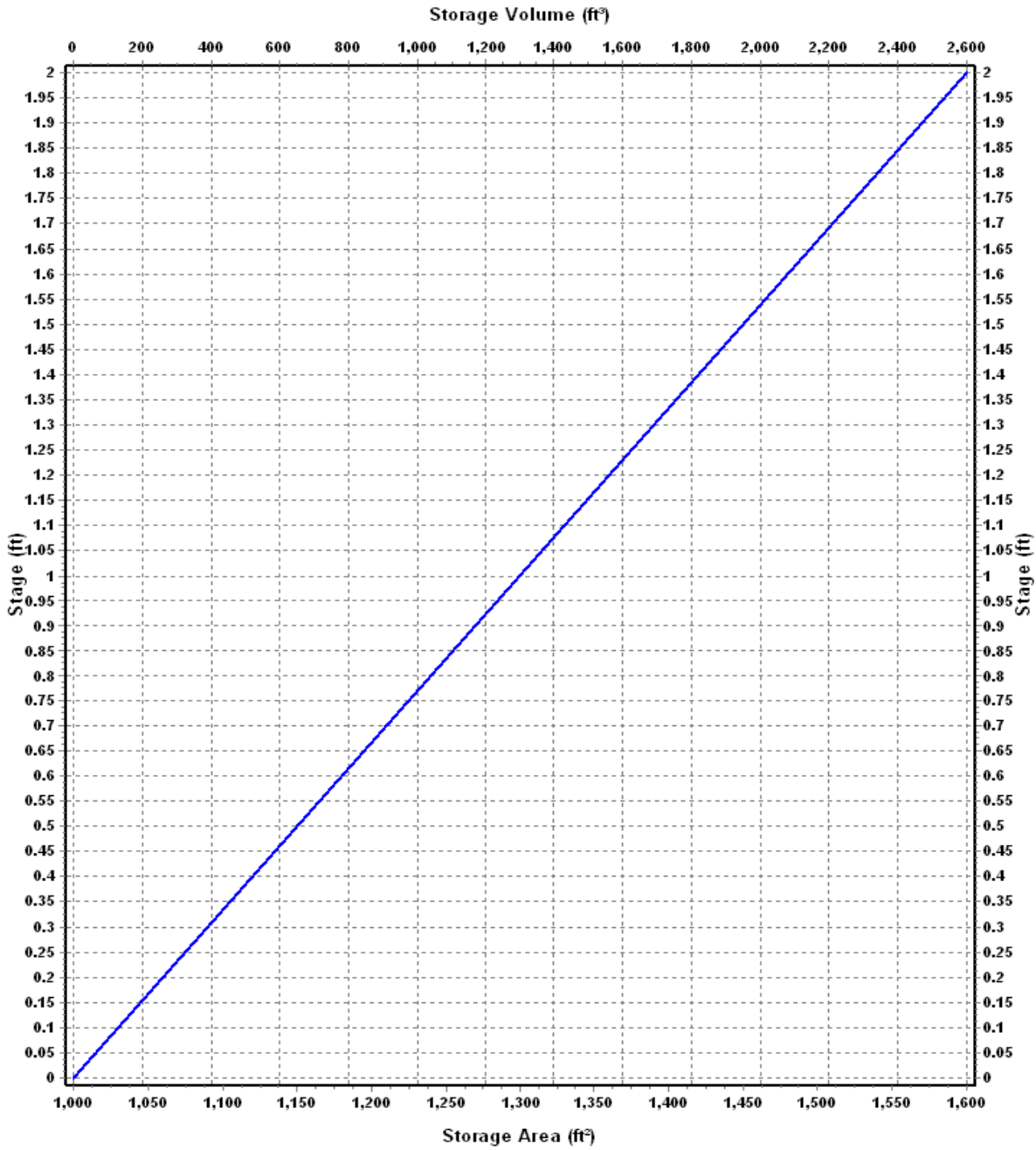
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-12

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	1000	0.000
2	1600	2600.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-12 (continued)

Output Summary Results

Peak Inflow (cfs)	2.39
Peak Lateral Inflow (cfs)	0.12
Peak Outflow (cfs)	1.76
Peak Exfiltration Flow Rate (cfm)	3.62
Max HGL Elevation Attained (ft)	246.01
Max HGL Depth Attained (ft)	1.01
Average HGL Elevation Attained (ft)	245.04
Average HGL Depth Attained (ft)	0.04
Time of Max HGL Occurrence (days hh:mm)	9 07:05
Total Exfiltration Volume (1000-ft ³)	18.755
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
Continuous Simulation

Storage Node : LIDA-8A

Input Data

Invert Elevation (ft) 256.00
Max (Rim) Elevation (ft) 258.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 256.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1777.00
Evaporation Loss 0.00

Infiltration/Exfiltration

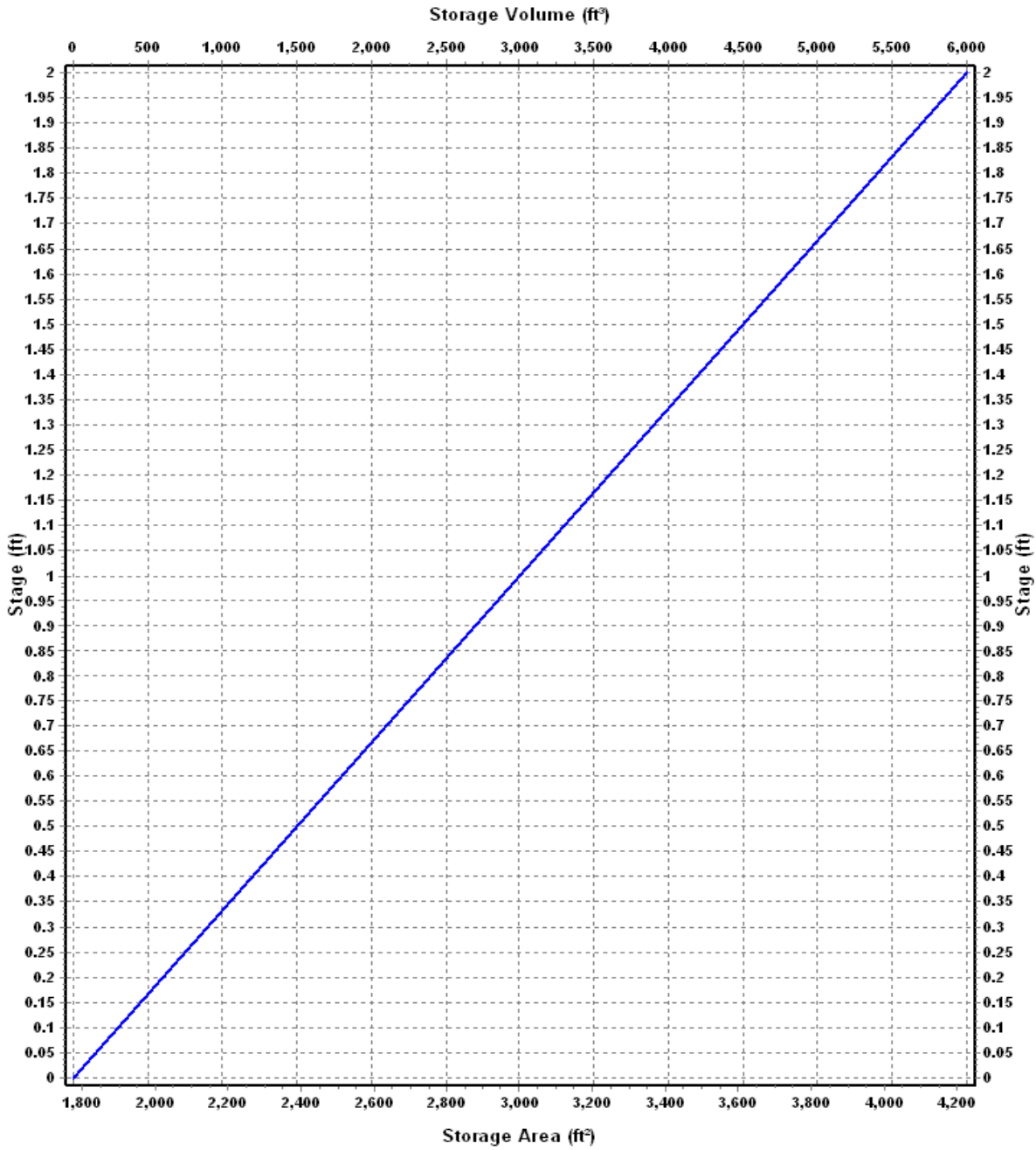
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-8A

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	1777	0.000
2	4226	6003.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-8A (continued)

Output Summary Results

Peak Inflow (cfs)	0.58
Peak Lateral Inflow (cfs)	0.58
Peak Outflow (cfs)	0.55
Peak Exfiltration Flow Rate (cfm)	2.12
Max HGL Elevation Attained (ft)	257.05
Max HGL Depth Attained (ft)	1.05
Average HGL Elevation Attained (ft)	256.35
Average HGL Depth Attained (ft)	0.35
Time of Max HGL Occurrence (days hh:mm)	17 20:05
Total Exfiltration Volume (1000-ft ³)	37.131
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Project Description

File Name 20191126-POST-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 03, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	14
Nodes.....	62
<i>Junctions</i>	45
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	15
Links.....	67
<i>Channels</i>	36
<i>Pipes</i>	30
<i>Pumps</i>	1
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	2-yr	Intensity	inches	Oregon	Washington	2	2.50	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
2-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-LIDA_11	3.71	96.88	2.50	2.15	7.97	2.08	0 00:05:00
2	COF-LIDA_12	0.49	96.13	2.50	2.07	1.02	0.27	0 00:05:00
3	HED-LIDA_01	0.43	94.77	2.50	1.94	0.83	0.22	0 00:05:00
4	HED-LIDA_02	0.39	94.78	2.50	1.94	0.76	0.20	0 00:05:00
5	HED-LIDA_03	0.40	94.61	2.50	1.93	0.77	0.20	0 00:05:00
6	HED-LIDA_04	0.44	93.24	2.50	1.80	0.78	0.20	0 00:05:00
7	HED-LIDA_05	2.67	91.26	2.50	1.63	4.36	1.12	0 00:05:00
8	HED-LIDA_06A	5.95	89.16	2.50	1.47	8.73	2.18	0 00:05:00
9	HED-LIDA_06B	0.41	98.00	2.50	2.27	0.94	0.24	0 00:05:00
10	HED-LIDA_07	1.08	93.59	2.50	1.83	1.97	0.51	0 00:05:00
11	HED-LIDA_08B	2.25	94.33	2.50	1.90	4.28	1.12	0 00:05:00
12	HED-LIDA_09	0.23	95.64	2.50	2.03	0.46	0.12	0 00:05:00
13	HED-LIDA_10	0.32	95.08	2.50	1.97	0.63	0.17	0 00:05:00
14	HED-LIDA_8A	2.32	95.49	2.50	2.01	4.67	1.22	0 00:05:00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
2-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation	Max Surcharge Depth Attained	Min Freeboard	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft ²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	COF-01A	Junction	238.00	250.00	238.00	1000.00	12.00	0.02	238.04	0.00	11.96	0 00:00	0.00	0.00
2	COF-01B	Junction	244.00	247.00	244.00	1000.00	12.00	0.01	244.01	0.00	2.99	0 00:00	0.00	0.00
3	COF-01C	Junction	245.00	247.00	245.00	1000.00	12.00	0.01	246.11	0.00	2.39	0 00:00	0.00	0.00
4	COF-02A	Junction	244.00	247.00	244.00	1000.00	12.00	0.01	244.03	0.00	3.97	0 00:00	0.00	0.00
5	COF-02B	Junction	245.00	247.00	245.00	1000.00	12.00	0.01	245.60	0.00	1.40	0 00:00	0.00	0.00
6	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	0.13	152.02	0.00	7.98	0 00:00	0.00	0.00
7	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.05	157.02	0.00	7.98	0 00:00	0.00	0.00
8	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.05	157.89	0.00	7.11	0 00:00	0.00	0.00
9	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.05	177.10	0.00	4.15	0 00:00	0.00	0.00
10	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.05	181.06	0.00	10.94	0 00:00	0.00	0.00
11	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.06	223.04	0.00	5.96	0 00:00	0.00	0.00
12	HED-01G	Junction	226.00	229.00	226.00	1000.00	12.00	0.06	226.04	0.00	3.46	0 00:00	0.00	0.00
13	HED-01H	Junction	229.00	232.00	229.00	1000.00	12.00	0.05	229.07	0.00	2.93	0 00:00	0.00	0.00
14	HED-01I	Junction	230.00	233.00	230.00	1000.00	12.00	0.05	230.07	0.00	2.93	0 00:00	0.00	0.00
15	HED-01J	Junction	231.00	233.00	231.00	1000.00	12.00	0.05	232.48	0.00	2.27	0 00:00	0.00	0.00
16	HED-01K	Junction	226.50	229.00	226.50	1000.00	12.00	0.14	228.02	0.00	1.73	0 00:00	0.00	0.00
17	HED-01L	Junction	226.50	229.00	226.50	1000.00	12.00	0.00	226.50	0.00	3.00	0 00:00	0.00	0.00
18	HED-01M	Junction	224.00	230.00	224.00	1000.00	12.00	0.00	224.00	0.00	6.00	0 00:00	0.00	0.00
19	HED-01N	Junction	230.00	235.00	230.00	1000.00	12.00	0.00	230.00	0.00	5.00	0 00:00	0.00	0.00
20	HED-01O	Junction	234.00	238.00	234.00	1000.00	12.00	0.00	234.00	0.00	4.50	0 00:00	0.00	0.00
21	HED-01P	Junction	234.00	239.00	234.00	1000.00	12.00	0.00	234.00	0.00	5.50	0 00:00	0.00	0.00
22	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	0.08	171.01	0.00	7.99	0 00:00	0.00	0.00
23	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	0.08	171.42	0.00	5.58	0 00:00	0.00	0.00
24	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	0.08	173.60	0.00	4.40	0 00:00	0.00	0.00
25	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	0.08	174.79	0.00	10.95	0 00:00	0.00	0.00
26	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	0.08	180.60	0.00	7.40	0 00:00	0.00	0.00
27	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	0.08	181.84	0.00	6.12	0 00:00	0.00	0.00
28	HED-02G	Junction	235.00	237.00	235.00	1000.00	12.00	0.07	235.05	0.00	2.95	0 00:00	0.00	0.00
29	HED-02H	Junction	236.00	238.00	236.00	1000.00	12.00	0.07	236.11	0.00	1.89	0 00:00	0.00	0.00
30	HED-02I	Junction	237.00	239.00	237.00	1000.00	12.00	0.00	237.00	0.00	2.00	0 00:00	0.00	0.00
31	HED-02J	Junction	237.00	250.00	237.00	1000.00	12.00	0.07	237.10	0.00	12.90	0 00:00	0.00	0.00
32	HED-02K	Junction	255.00	257.00	255.00	1000.00	12.00	0.09	255.37	0.00	3.13	0 00:00	0.00	0.00
33	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.01	183.01	0.00	6.99	0 00:00	0.00	0.00
34	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.01	235.00	0.00	5.00	0 00:00	0.00	0.00
35	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.01	236.01	0.00	13.99	0 00:00	0.00	0.00
36	HED-03D	Junction	241.00	245.00	241.00	1000.00	12.00	0.01	241.01	0.00	3.99	0 00:00	0.00	0.00
37	HED-03E	Junction	250.00	251.00	250.00	1000.00	12.00	0.00	250.00	0.00	1.50	0 00:00	0.00	0.00
38	HED-03F	Junction	250.00	251.00	250.00	1000.00	12.00	0.00	250.00	0.00	1.75	0 00:00	0.00	0.00
39	HED-03G	Junction	242.00	245.00	242.00	1000.00	12.00	0.02	242.00	0.00	3.00	0 00:00	0.00	0.00
40	HED-03H	Junction	243.00	245.00	243.00	1000.00	12.00	0.02	243.56	0.00	2.94	0 00:00	0.00	0.00
41	HED-03I	Junction	244.00	247.00	244.00	1000.00	12.00	0.00	244.00	0.00	3.00	0 00:00	0.00	0.00
42	HED-03J	Junction	245.00	247.00	245.00	1000.00	12.00	0.00	245.00	0.00	3.50	0 00:00	0.00	0.00
43	HED-03K	Junction	256.00	258.00	256.00	1000.00	12.00	0.83	257.06	0.00	1.94	0 00:00	0.00	0.00
44	HED-03L	Junction	256.00	258.00	256.00	1000.00	12.00	0.83	256.26	0.00	1.74	0 00:00	0.00	0.00
45	HED-03t	Junction	238.00	243.00	238.00	1000.00	12.00	0.00	238.00	0.00	6.00	0 00:00	0.00	0.00
46	COF-01	Outfall	238.00					0.02	238.03					
47	HED-01	Outfall	150.00					0.13	150.02					
48	LIDA-01	Storage Node	228.00	229.00	228.00		938.00	0.22	228.43				0.00	0.00
49	LIDA-02	Storage Node	228.00	229.00	228.00		562.00	3.97	228.78				0.00	0.00
50	LIDA-03	Storage Node	237.00	238.00	237.00		875.00	0.20	237.41				0.00	0.00
51	LIDA-04	Storage Node	238.00	239.00	238.00		1875.00	0.20	238.11				0.00	0.00
52	LIDA-05	Storage Node	255.00	257.00	255.00		12000.00	1.12	255.37				0.00	0.00
53	LIDA-06A	Storage Node	231.00	233.00	231.00		10000.00	2.18	232.48				0.00	0.00
54	LIDA-06B	Storage Node	237.00	247.00	237.00		18000.00	0.24	237.08				0.00	0.00
55	LIDA-07	Storage Node	242.00	243.00	242.00		2812.00	0.51	242.32				0.00	0.00
56	LIDA-08B	Storage Node	245.00	247.00	245.00		5650.00	0.00	245.00				0.00	0.00
57	LIDA-08C	Storage Node	243.00	245.00	243.00		18650.00	1.95	243.56				0.00	0.00
58	LIDA-09	Storage Node	250.00	251.00	250.00		375.00	0.12	250.74				0.00	0.00
59	LIDA-10	Storage Node	250.00	251.00	250.00		657.00	0.17	250.49				0.00	0.00
60	LIDA-11	Storage Node	245.00	247.00	245.00		13000.00	2.08	246.11				0.00	0.00
61	LIDA-12	Storage Node	245.00	247.00	245.00		1000.00	0.27	245.60				0.00	0.00
62	LIDA-8A	Storage Node	256.00	258.00	256.00		1777.00	1.22	257.21				0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
2-year storm

Link Summary

SN	Element	From	To (Outlet)	Length	Inlet	Outlet	Average	Diameter or	Manning's	Peak	Design Flow	Peak Flow/	Peak Flow	Peak Flow	Peak Flow	Total Time Reported	
ID	Type	(Inlet)	Node		Invert	Invert	Slope	Height	Roughness	Flow	Capacity	Design Flow	Velocity	Depth	Depth/	Surcharged	
		Node		(ft)	Elevation	Elevation	(%)	(in)		(cfs)	(cfs)	Ratio	(ft/sec)	(ft)	Total Depth	Condition	
															Ratio	(min)	
1	COF-01D	Pipe	COF-01C	COF-01B	1.00	245.00	244.00	100.0000	0.750	0.0130	0.01	0.02	0.66	10.57	0.03	0.55	0.00 Calculated
2	COF-2A	Pipe	COF-02A	COF-01A	400.00	244.00	238.00	1.5000	18.000	0.0150	0.01	11.15	0.00	0.81	0.03	0.02	0.00 Calculated
3	COF-2C	Pipe	COF-02B	COF-02A	1.00	245.00	244.00	100.0000	0.500	0.0130	0.01	0.01	0.98	5.86	0.04	0.86	0.00 Calculated
4	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.05	20.90	0.00	2.26	0.05	0.03	0.00 Calculated
5	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.05	28.48	0.00	1.72	0.06	0.03	0.00 Calculated
6	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.05	7.14	0.01	2.64	0.06	0.06	0.00 Calculated
7	HED-01G	Pipe	HED-01G	HED-01F	20.00	226.00	223.00	15.0000	18.000	0.0130	0.06	40.68	0.00	4.45	0.04	0.03	0.00 Calculated
8	HED-01H	Pipe	HED-01L	HED-01G	50.00	226.50	226.00	1.0000	12.000	0.0130	0.00	3.56	0.00	0.00	0.02	0.02	0.00 Calculated
9	HED-01L	Pipe	HED-01M	HED-01F	47.37	224.00	223.00	2.1100	18.000	0.0130	0.00	15.26	0.00	0.00	0.02	0.01	0.00 Calculated
10	HED-01N	Pipe	HED-01O	HED-01N	75.00	234.00	230.00	5.3300	12.000	0.0130	0.00	8.23	0.00	0.00	0.00	0.00	0.00 Calculated
11	HED-01P	Pipe	HED-01P	HED-01N	65.00	234.00	230.00	6.1500	18.000	0.0130	0.00	26.06	0.00	0.00	0.00	0.00	0.00 Calculated
12	HED-01R	Pipe	HED-01I	HED-01H	50.00	230.00	229.00	2.0000	12.000	0.0130	0.05	5.04	0.01	1.93	0.07	0.07	0.00 Calculated
13	HED-01S	Pipe	HED-01H	HED-01G	100.00	229.00	228.00	1.0000	18.000	0.0130	0.05	10.50	0.00	1.49	0.07	0.05	0.00 Calculated
14	HED-01U	Pipe	HED-01J	HED-01I	1.00	231.00	230.00	100.0000	1.000	0.0130	0.05	0.05	1.03	9.27	0.08	0.92	0.00 > CAPACITY
15	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	0.08	40.58	0.00	1.96	0.07	0.02	0.00 Calculated
16	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	0.08	8.91	0.01	1.34	0.11	0.07	0.00 Calculated
17	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	0.08	4.04	0.02	0.92	0.14	0.10	0.00 Calculated
18	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	0.08	59.16	0.00	1.22	0.11	0.04	0.00 Calculated
19	HED-02H	Pipe	HED-02H	HED-02G	100.00	236.00	235.00	1.0000	12.000	0.0130	0.07	3.56	0.02	2.44	0.08	0.08	0.00 Calculated
20	HED-02I	Pipe	HED-02J	HED-02H	100.00	237.00	236.00	1.0000	12.000	0.0130	0.07	3.56	0.02	1.68	0.10	0.10	0.00 Calculated
21	HED-02J	Pipe	HED-02K	HED-02J	1.00	255.00	237.00	1800.0000	0.750	0.0130	0.07	0.09	0.77	23.64	0.06	1.00	1255.00 SURCHARGED
22	HED-03D	Pipe	HED-03I	HED-03B	500.00	238.00	235.00	0.6000	12.000	0.0130	0.00	2.76	0.00	0.00	0.00	0.00	0.00 Calculated
23	HED-03E	Pipe	LIDA-07	HED-03I	47.11	242.00	242.50	-1.0600	18.000	0.0130	0.00	10.82	0.00	0.00	0.16	0.11	0.00 Calculated
24	HED-03I	Pipe	HED-03I	LIDA-08C	200.00	244.00	243.50	0.2500	18.000	0.0130	0.00	5.25	0.00	0.00	0.03	0.02	0.00 Calculated
25	HED-03J	Pipe	HED-03L	LIDA-08C	200.00	256.00	243.00	6.5000	12.000	0.0130	0.83	9.08	0.09	10.78	0.32	0.32	0.00 Calculated
26	HED-03L	Pipe	HED-03F	HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0130	0.00	10.69	0.00	0.00	0.00	0.00	0.00 Calculated
27	HED-03N	Pipe	HED-03E	HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0150	0.00	9.26	0.00	0.00	0.00	0.00	0.00 Calculated
28	HED-03Q	Pipe	HED-03K	HED-03L	1.00	256.00	256.00	0.0000	0.750	0.0130	0.02	0.00	23.05	5.62	0.06	1.00	998.00 SURCHARGED
29	HED-03T	Pipe	HED-03J	HED-03I	1.00	245.00	244.00	100.0000	0.750	0.0130	0.00	0.02	0.00	0.00	0.00	0.00	0.00 Calculated
30	HED-03V	Pipe	HED-03H	HED-03G	1.00	243.00	242.00	100.0000	0.750	0.0130	0.02	0.02	0.89	11.63	0.03	0.54	0.00 Calculated
31	COF-1A	Channel	COF-01A	COF-01	10.00	238.00	238.00	0.0000	60.000	0.0320	0.02	42.77	0.00	0.05	0.03	0.01	0.00
32	COF-1B	Channel	COF-01B	COF-01A	150.00	244.00	238.00	4.0000	12.000	0.0320	0.01	37.11	0.00	0.13	0.02	0.02	0.00
33	COF-1C	Channel	COF-01C	COF-01B	1.00	246.50	244.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.00	0.00	0.00
34	COF-1E	Channel	LIDA-11	COF-01C	5.00	245.00	245.00	0.0000	24.000	0.0320	0.01	7.05	0.00	0.04	1.11	0.55	0.00
35	COF-2B	Channel	COF-02B	COF-02A	1.00	245.00	246.00	-100.0000	24.000	0.0320	0.00	141.75	0.00	0.00	0.30	0.15	0.00
36	COF-2D	Channel	LIDA-12	COF-02B	5.00	245.00	245.00	0.0000	24.000	0.0320	0.01	2.00	0.01	0.08	0.60	0.30	0.00
37	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	0.13	1512.53	0.00	0.39	0.02	0.00	0.00
38	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.05	1082.72	0.00	0.23	0.02	0.00	0.00
39	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.05	2813.13	0.00	0.97	0.05	0.01	0.00
40	HED-01I	Channel	LIDA-01	HED-01L	5.00	228.00	228.50	-10.0000	12.000	0.0320	0.00	24.81	0.00	0.00	0.22	0.22	0.00
41	HED-01J	Channel	HED-01K	HED-01G	20.00	227.00	228.00	-5.0000	12.000	0.0320	0.02	4.99	0.00	0.03	0.51	0.51	0.00
42	HED-01K	Channel	LIDA-02	HED-01K	5.00	228.00	228.75	-15.0000	12.000	0.0320	3.93	30.39	0.13	3.05	0.40	0.52	0.00
43	HED-01M	Channel	HED-01N	HED-01M	500.00	230.00	224.00	1.2000	24.000	0.0320	0.00	37.78	0.00	0.00	0.00	0.00	0.00
44	HED-01O	Channel	LIDA-03	HED-01O	5.00	237.00	237.50	-10.0000	12.000	0.0320	0.00	24.81	0.00	0.00	0.20	0.20	0.00
45	HED-01Q	Channel	LIDA-04	HED-01P	5.00	238.00	238.50	-10.0000	12.000	0.0320	0.00	24.81	0.00	0.00	0.05	0.05	0.00
46	HED-01T	Channel	HED-01J	HED-01I	1.00	232.75	231.00	175.0000	24.000	0.0320	0.00	187.52	0.00	0.00	0.00	0.00	0.00
47	HED-01V	Channel	LIDA-06A	HED-01J	5.00	231.00	231.00	0.0000	24.000	0.0320	0.05	16.66	0.00	0.04	1.48	0.74	0.00
48	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	0.08	1963.65	0.00	0.30	0.02	0.00	0.00
49	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	0.08	614.42	0.00	0.23	0.08	0.01	0.00
50	HED-02G	Channel	HED-02G	HED-02F	1130.10	235.00	181.76	4.7100	36.000	0.0320	0.07	396.58	0.00	1.56	0.07	0.02	0.00
51	HED-02K	Channel	HED-02K	HED-02J	1.00	256.50	237.00	1950.0000	24.000	0.0320	0.00	625.97	0.00	0.00	0.05	0.02	0.00
52	HED-02L	Channel	HED-02I	HED-02H	44.02	237.00	236.00	2.2700	24.000	0.0320	0.00	55.99	0.00	0.00	0.06	0.03	0.00
53	HED-02O	Channel	LIDA-05	HED-02K	5.00	255.00	255.00	0.0000	24.000	0.0320	0.06	16.66	0.00	0.10	0.37	0.19	0.00
54	HED-03A	Channel	HED-02F	HED-03A	770.00	181.76	183.00	-0.1600	60.000	0.0300	0.01	443.56	0.00	0.02	0.04	0.01	0.00
55	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.01	2403.19	0.00	0.00	0.00	0.00	0.00
56	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.01	417.77	0.00	0.00	0.01	0.00	0.00
57	HED-03F	Channel	HED-03D	HED-03C	400.00	241.00	236.00	1.2500	24.000	0.0320	0.01	131.71	0.00	0.00	0.01	0.00	0.00
58	HED-03G	Channel	HED-03G	HED-03D	10.00	242.00	241.00	10.0000	24.000	0.0320	0.01	157.53	0.00	0.00	0.01	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
2-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Reported Surcharged Condition (min)
59	HED-03H	Channel	HED-03H	HED-03G	1.00	244.50	242.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.00	0.00	0.00
60	HED-03K	Channel	LIDA-8A	HED-03K	5.00	256.00	256.00	0.0000	12.000	0.0320	0.83	0.83	1.00	0.41	1.00	1.00	1012.00
61	HED-03M	Channel	LIDA-09	HED-03F	5.00	250.00	250.75	-15.0000	12.000	0.0320	0.00	22.66	0.00	0.00	0.37	0.37	0.00
62	HED-03O	Channel	LIDA-10	HED-03E	5.00	250.00	250.50	-10.0000	12.000	0.0320	0.00	18.50	0.00	0.00	0.25	0.25	0.00
63	HED-03P	Channel	HED-03K	HED-03L	1.00	257.00	256.00	100.0000	24.000	0.0320	0.81	141.75	0.01	3.06	0.16	0.08	0.00
64	HED-03R	Channel	LIDA-08B	HED-03J	5.00	245.00	245.00	0.0000	24.000	0.0320	0.00	2.00	0.00	0.00	0.00	0.00	0.00
65	HED-03S	Channel	HED-03J	HED-03I	1.00	246.50	244.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.00	0.00	0.00
66	HED-03U	Channel	LIDA-08C	HED-03H	5.00	243.00	243.00	0.0000	24.000	0.0320	0.02	2.00	0.01	0.13	0.56	0.28	0.00
67	HED-02M	Pump	LIDA-06B	HED-02K		237.00	255.00				0.04						

Subbasin Hydrology

Subbasin : COF-LIDA_11

Input Data

Area (ac) 3.71
 Weighted Curve Number 96.88
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	3.48	C/D	98.00
Landscape	0.23	C/D	80.00
Composite Area & Weighted CN	3.71		96.88

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
 R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

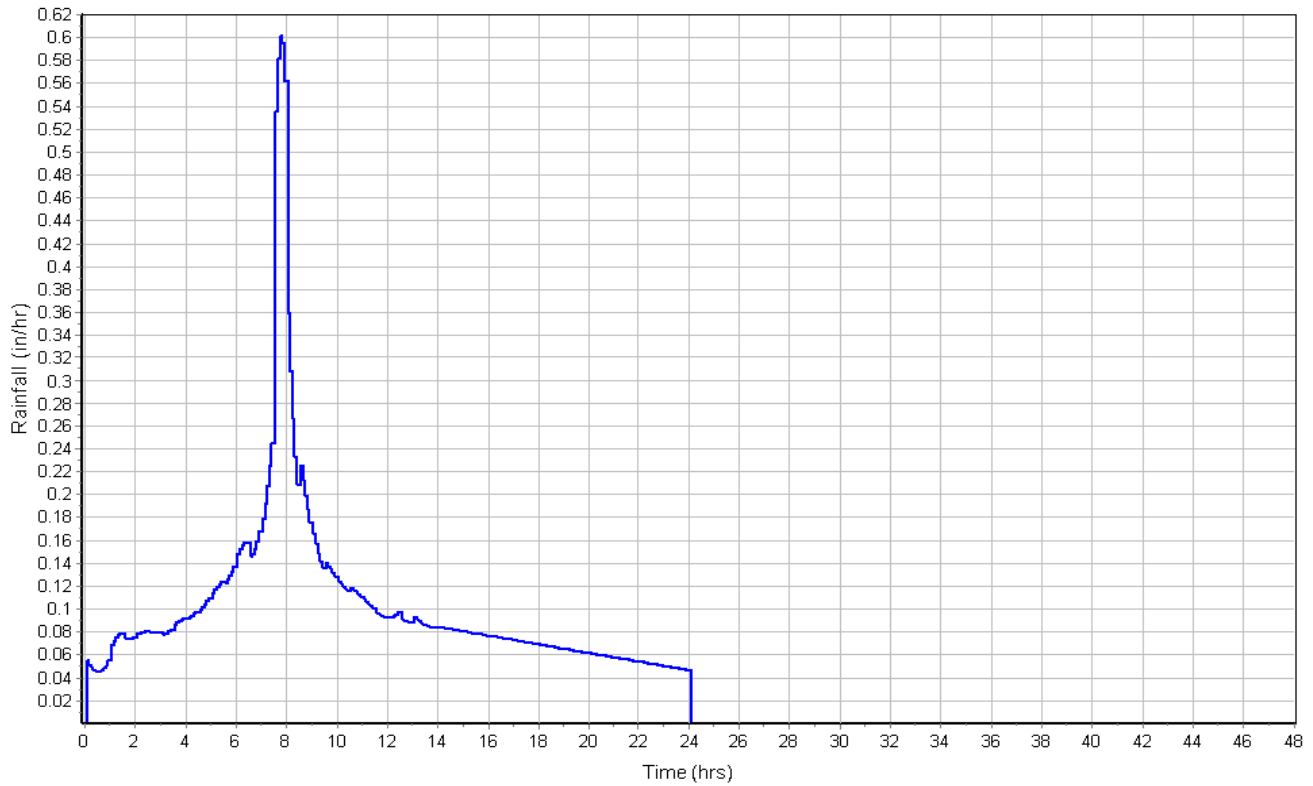
User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

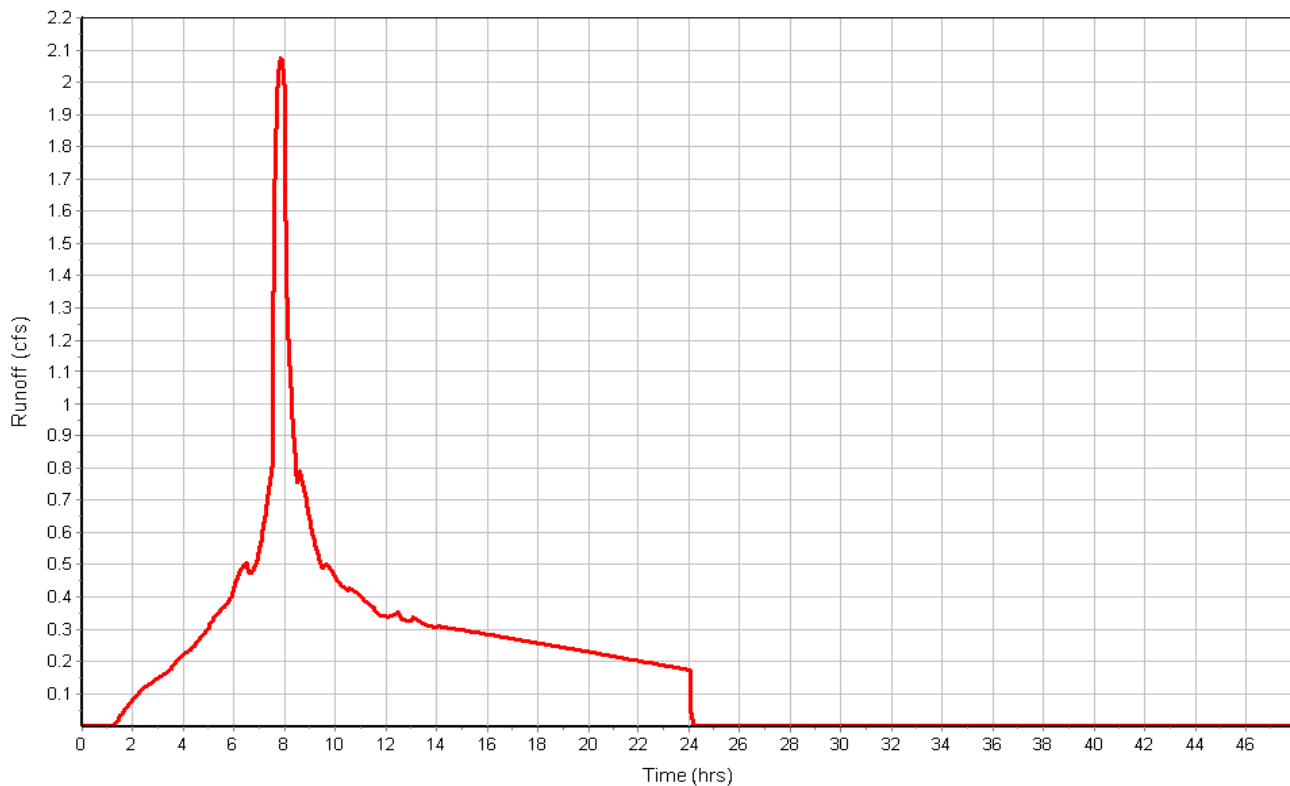
Total Rainfall (in) 2.50
 Total Runoff (in) 2.15
 Peak Runoff (cfs) 2.08
 Weighted Curve Number 96.88
 Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : COF-LIDA_11

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : COF-LIDA_12

Input Data

Area (ac) 0.49
Weighted Curve Number 96.13
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.44	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.49		96.13

Time of Concentration

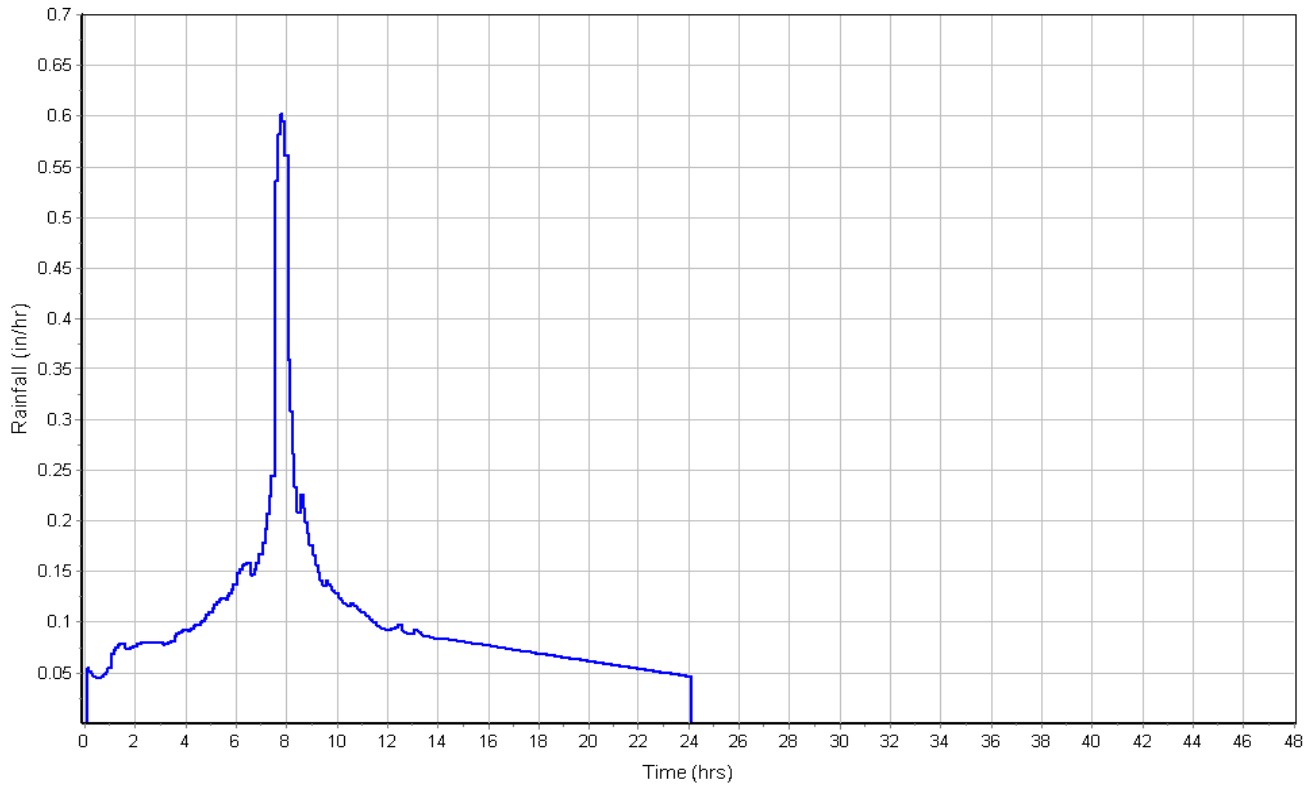
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

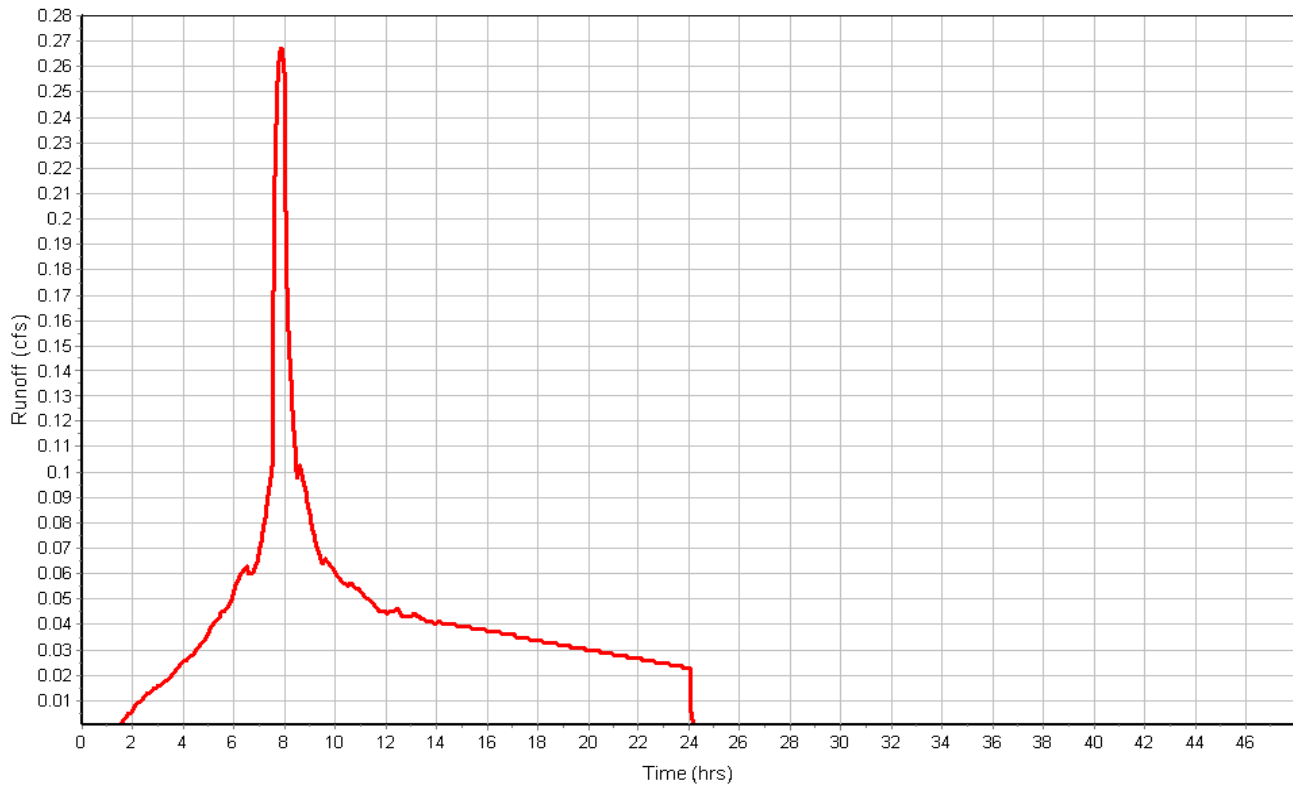
Total Rainfall (in) 2.50
Total Runoff (in) 2.07
Peak Runoff (cfs) 0.27
Weighted Curve Number 96.13
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : COF-LIDA_12

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_01

Input Data

Area (ac) 0.43
Weighted Curve Number 94.77
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.35	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.43		94.77

Time of Concentration

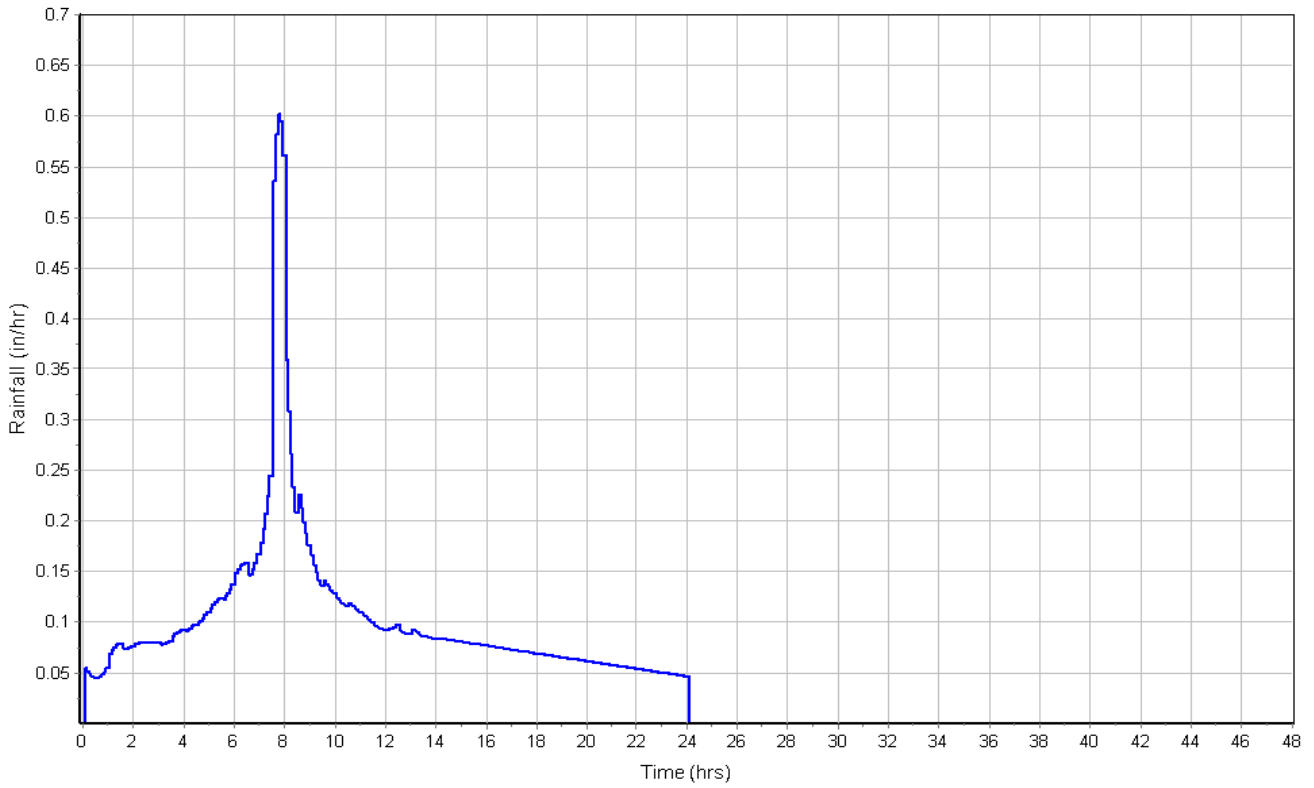
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

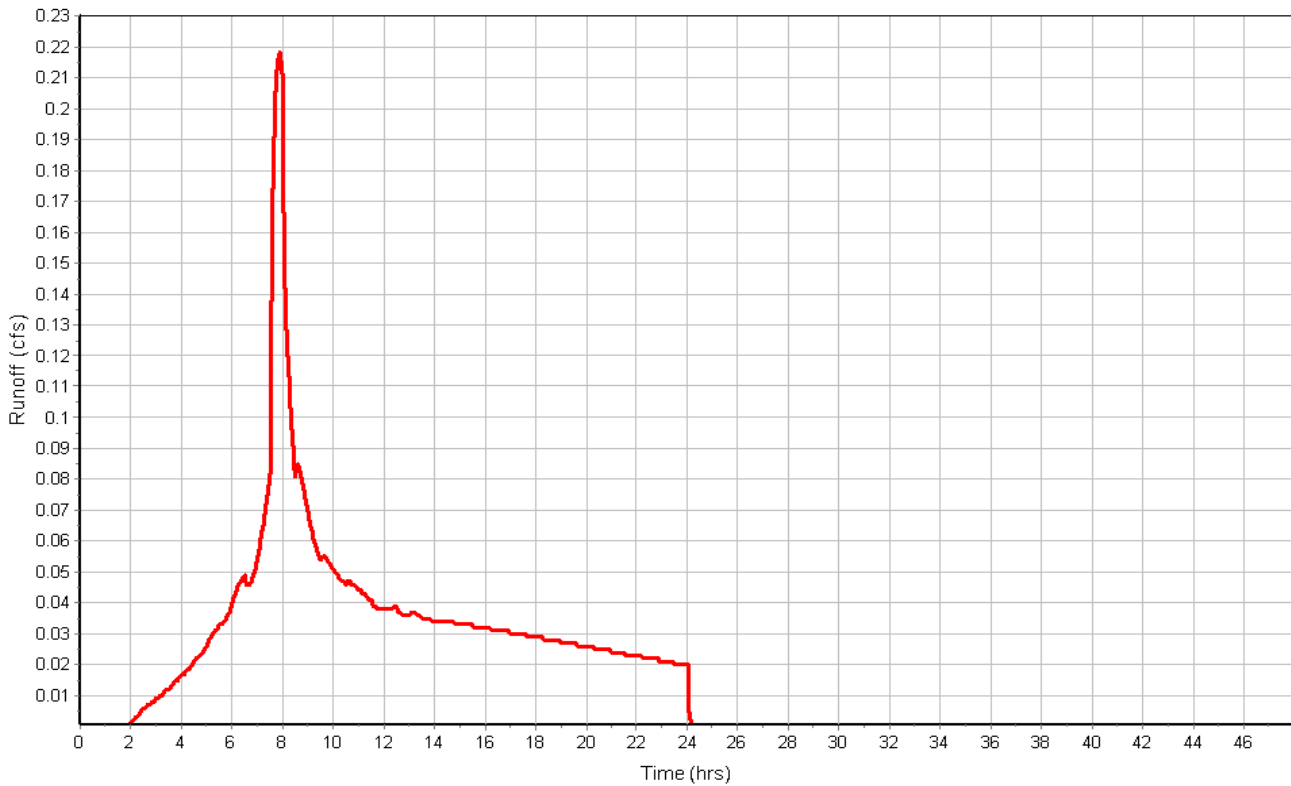
Total Rainfall (in) 2.50
Total Runoff (in) 1.94
Peak Runoff (cfs) 0.22
Weighted Curve Number 94.77
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_01

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_02

Input Data

Area (ac) 0.39
Weighted Curve Number 94.78
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.07	C/D	80.00
Composite Area & Weighted CN	0.39		94.78

Time of Concentration

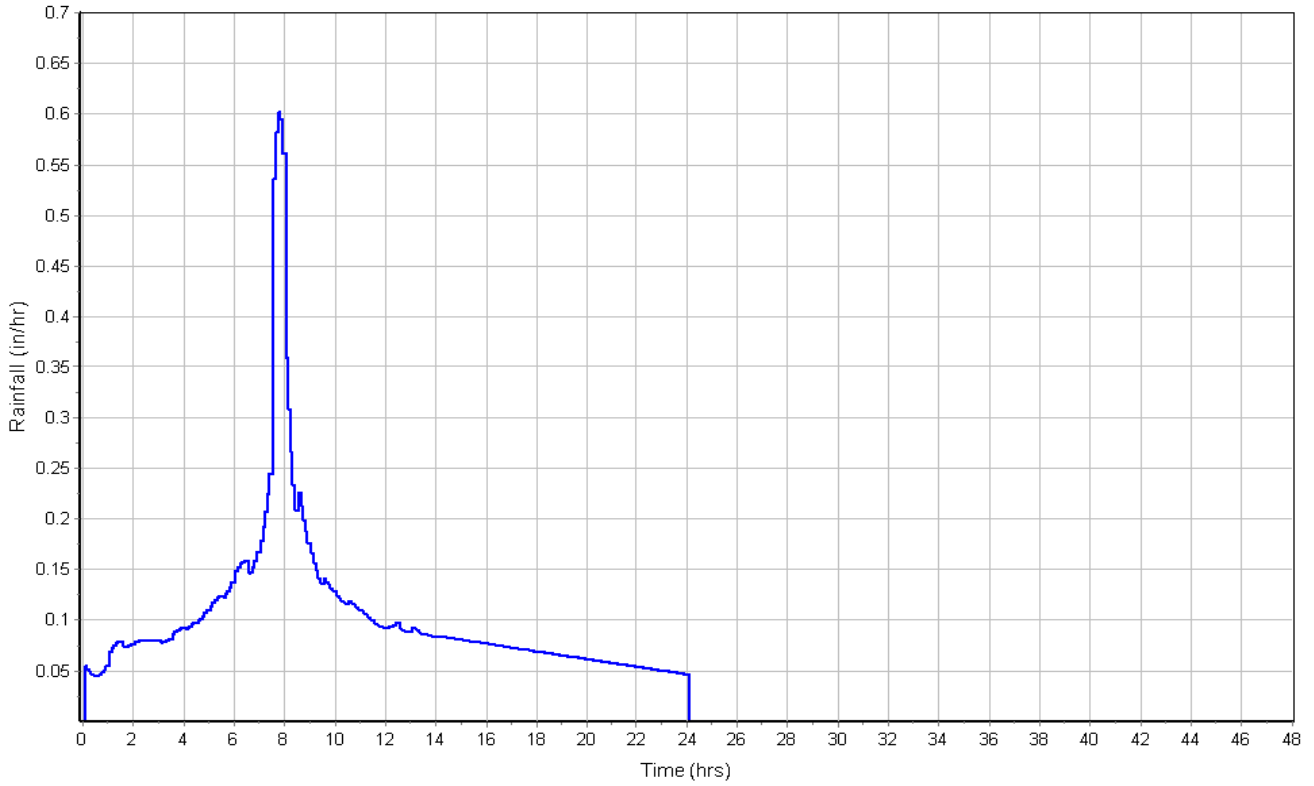
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Subbasin Runoff Results

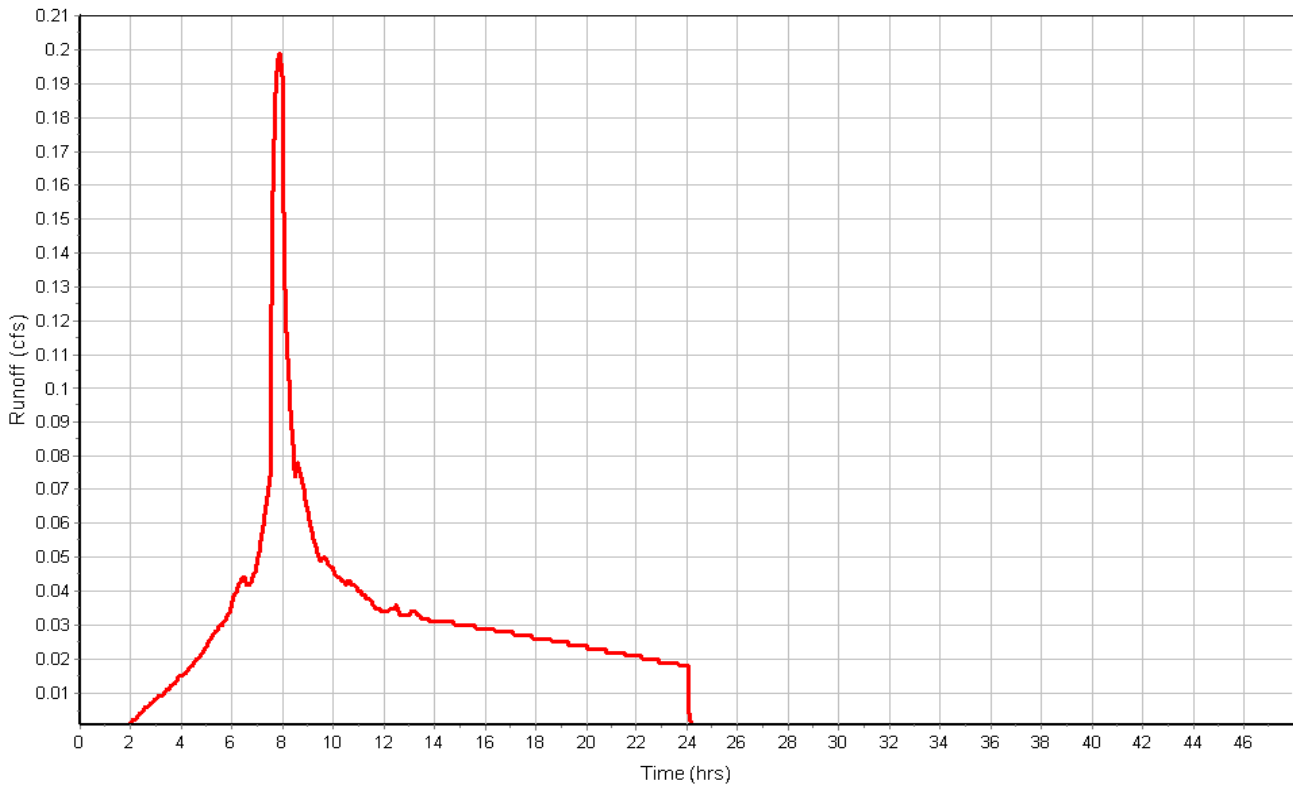
Total Rainfall (in) 2.50
Total Runoff (in) 1.94
Peak Runoff (cfs) 0.20
Weighted Curve Number 94.78
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_02

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_03

Input Data

Area (ac) 0.40
Weighted Curve Number 94.61
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.40		94.61

Time of Concentration

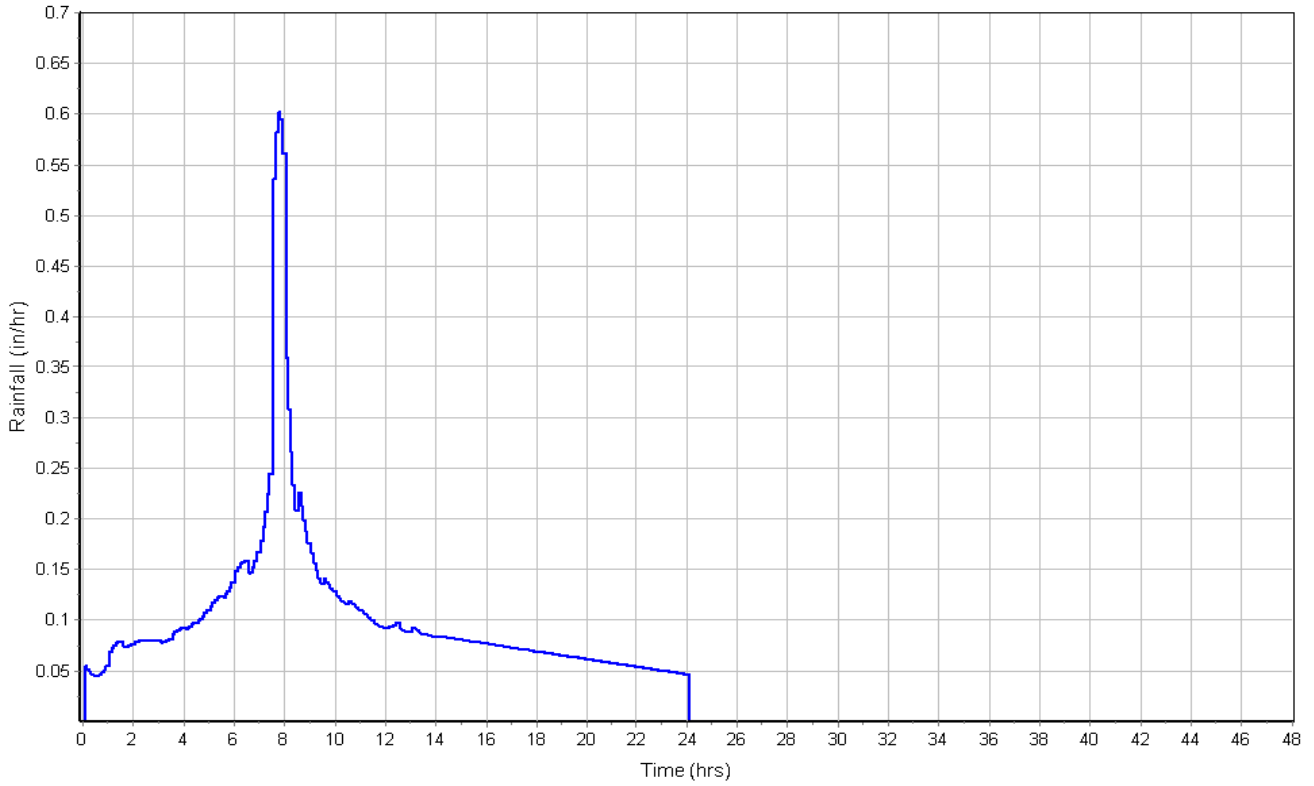
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

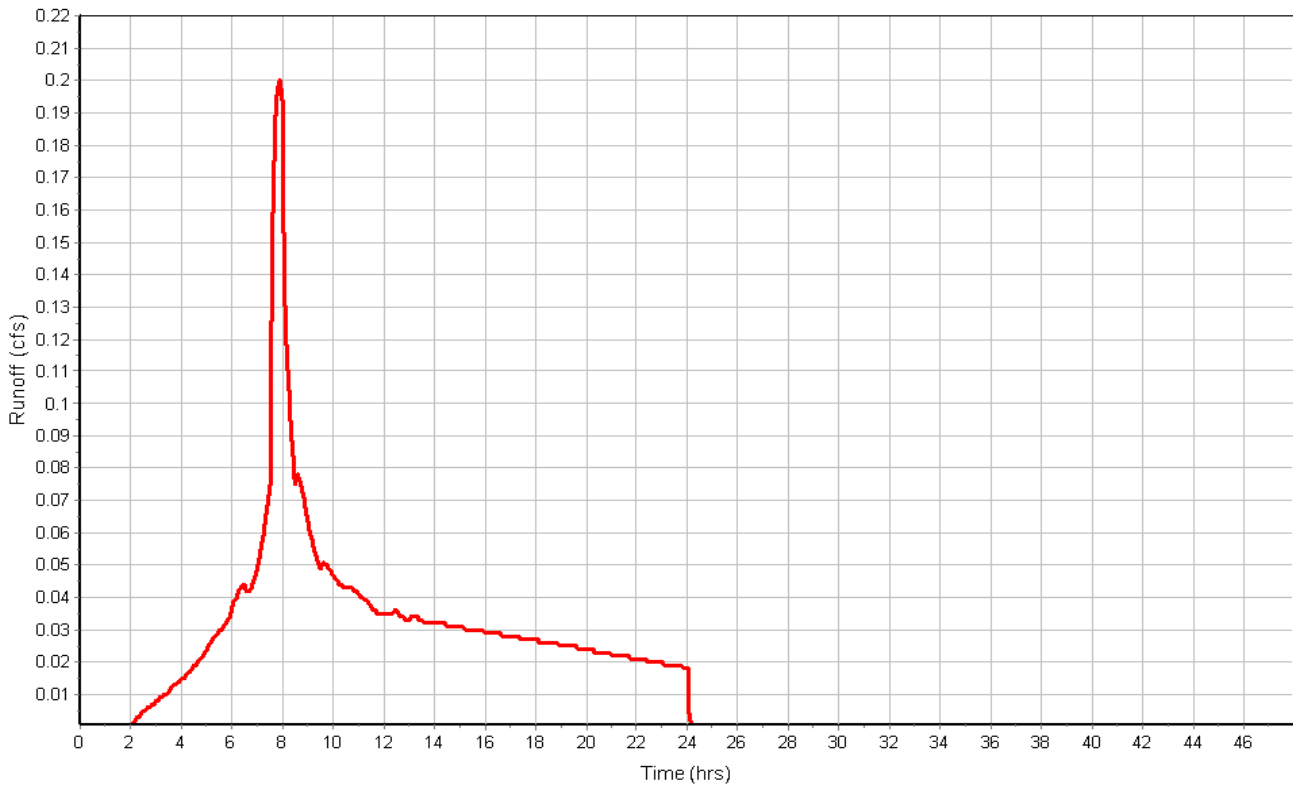
Total Rainfall (in) 2.50
Total Runoff (in) 1.93
Peak Runoff (cfs) 0.20
Weighted Curve Number 94.61
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_03

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_04

Input Data

Area (ac) 0.44
Weighted Curve Number 93.24
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	0.12	C/D	80.00
Pavement/roof	0.32	C/D	98.00
Composite Area & Weighted CN	0.44		93.24

Time of Concentration

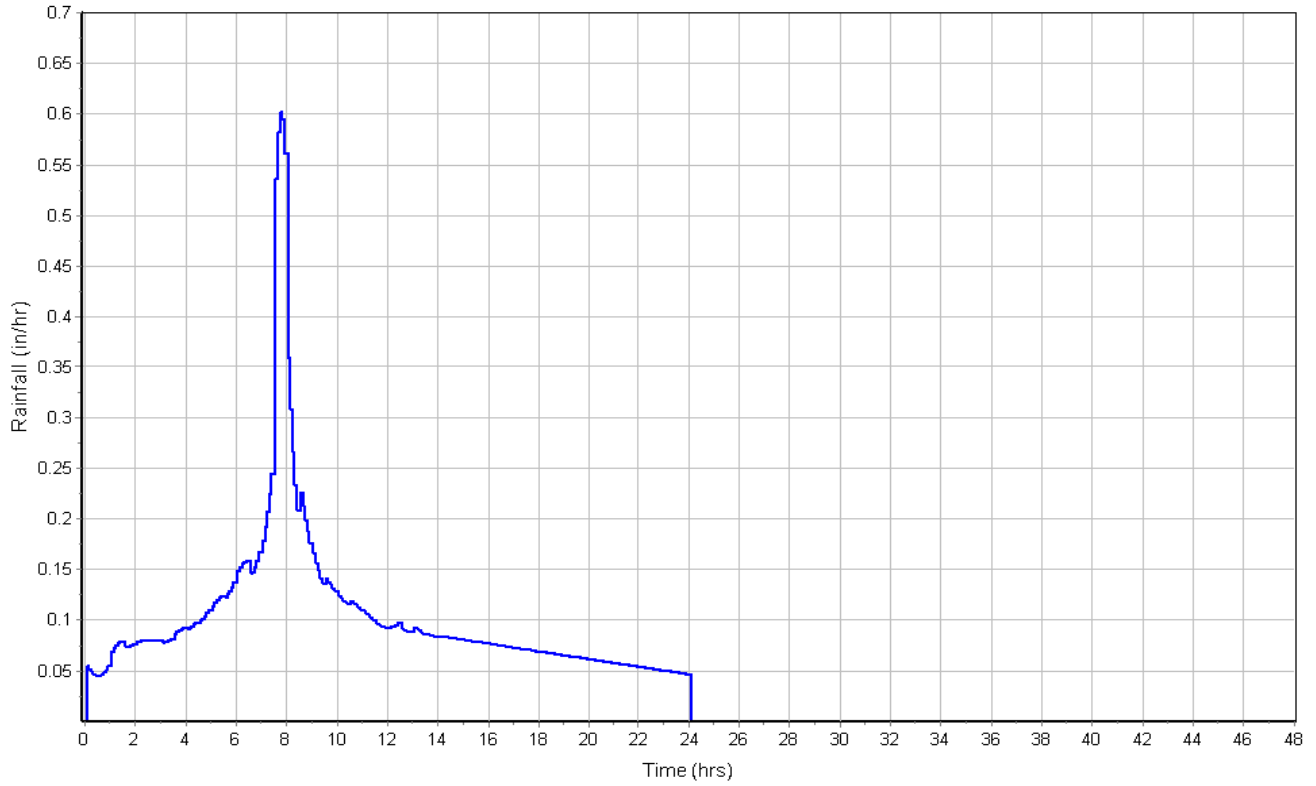
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

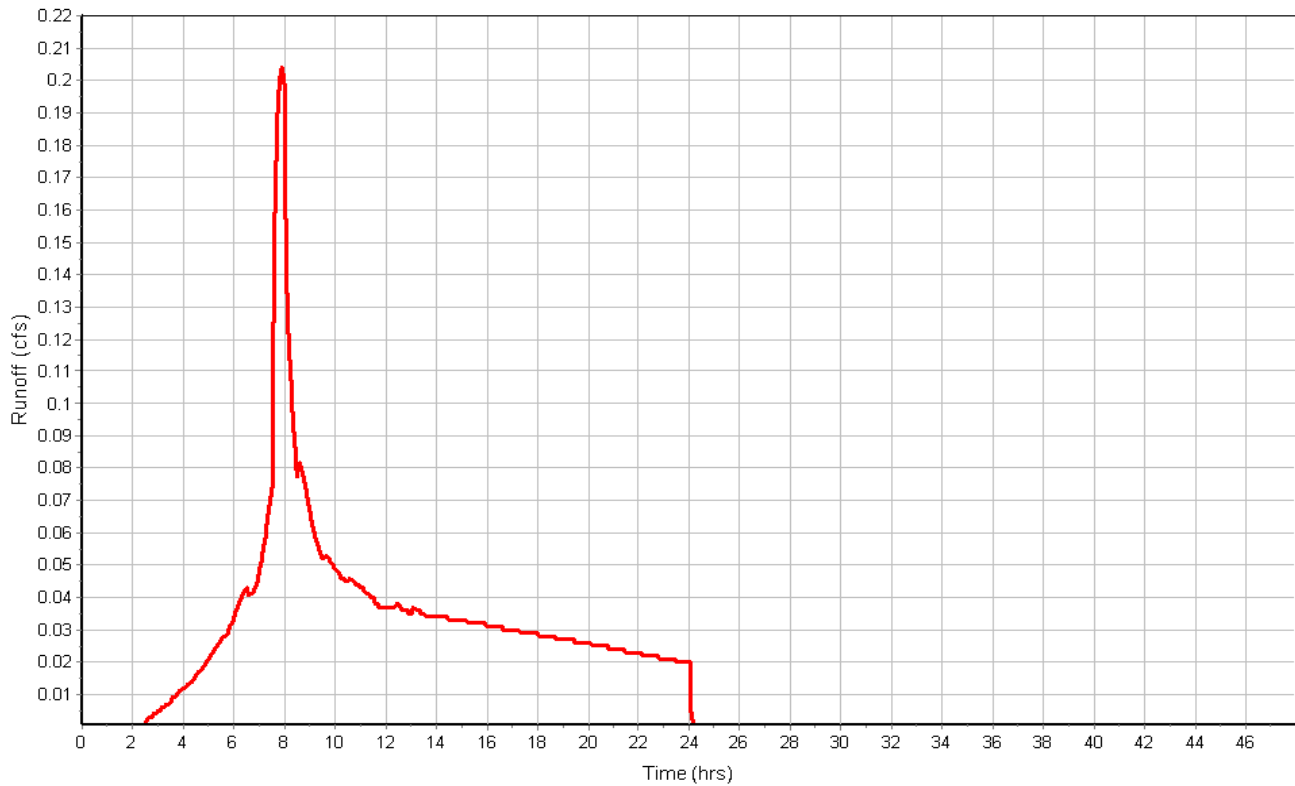
Total Rainfall (in) 2.50
Total Runoff (in) 1.80
Peak Runoff (cfs) 0.20
Weighted Curve Number 93.24
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_04

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_05

Input Data

Area (ac) 2.67
Weighted Curve Number 91.26
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.67	C/D	98.00
Landscape	1.00	C/D	80.00
Composite Area & Weighted CN	2.67		91.26

Time of Concentration

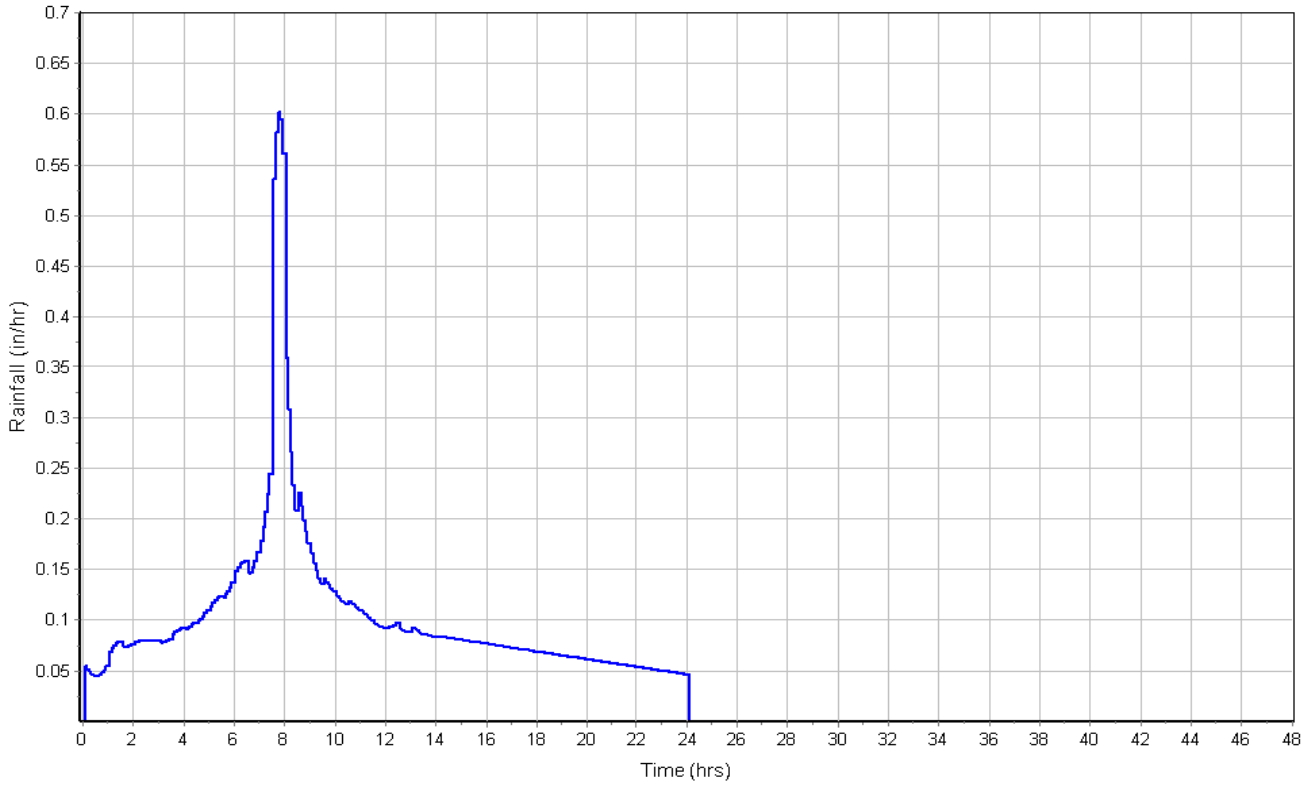
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

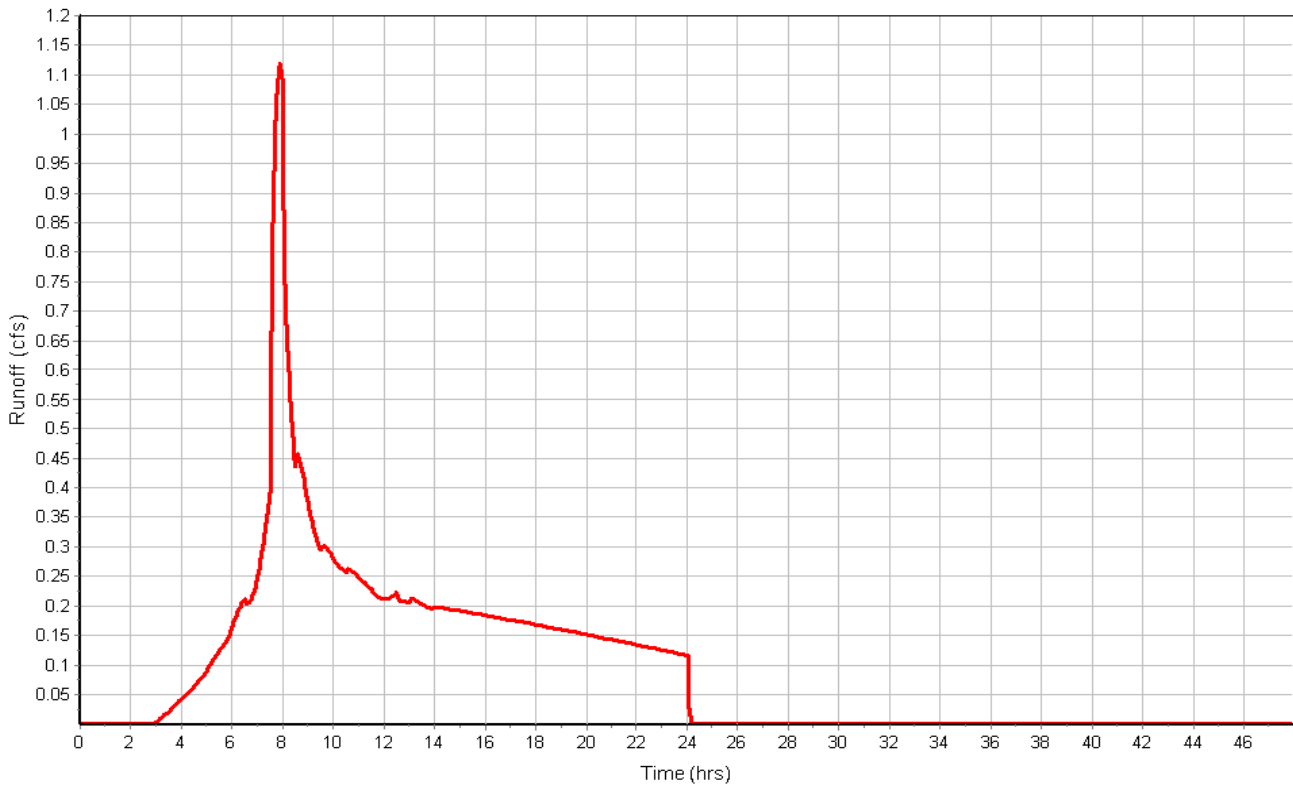
Total Rainfall (in) 2.50
Total Runoff (in) 1.63
Peak Runoff (cfs) 1.12
Weighted Curve Number 91.26
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_05

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_06A

Input Data

Area (ac) 5.95
Weighted Curve Number 89.16
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	2.92	C/D	80.00
Pavement/roof	3.03	C/D	98.00
Composite Area & Weighted CN	5.95		89.16

Time of Concentration

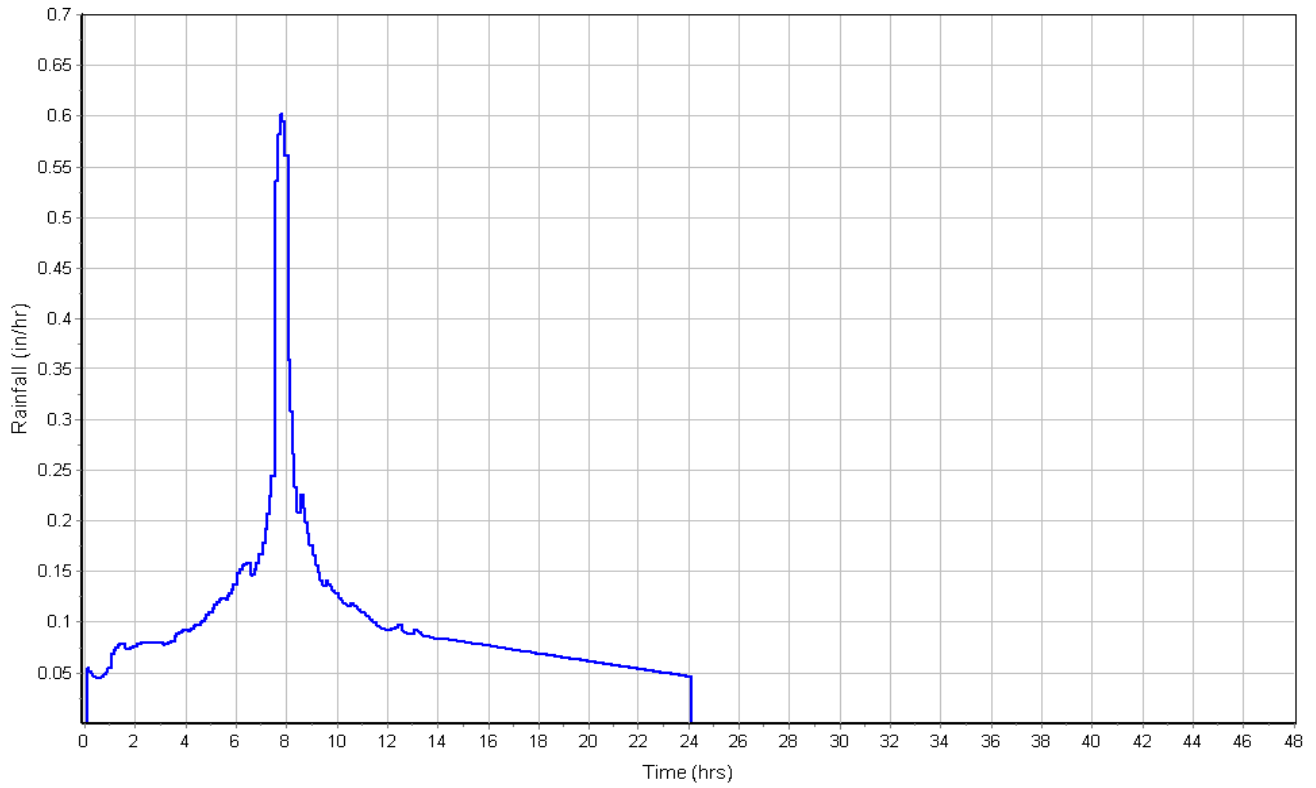
User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

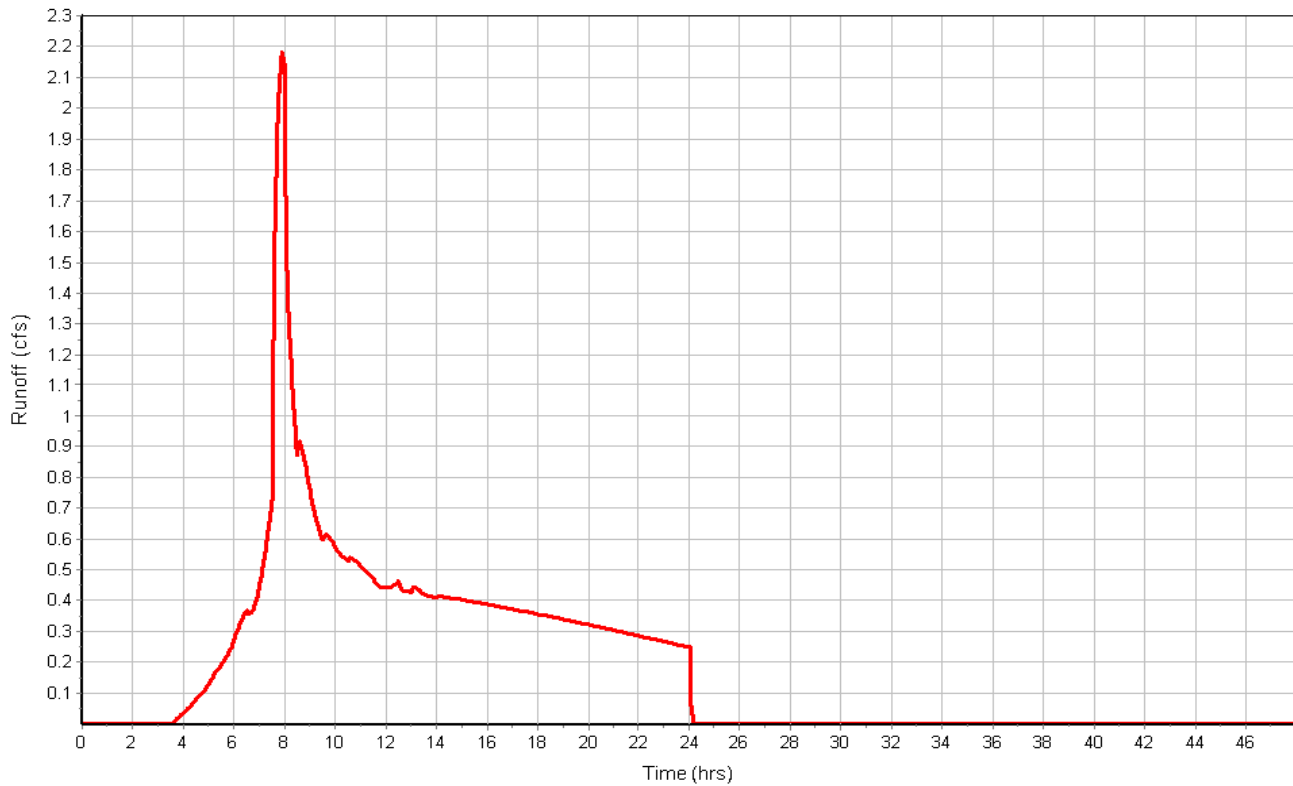
Total Rainfall (in) 2.50
Total Runoff (in) 1.47
Peak Runoff (cfs) 2.18
Weighted Curve Number 89.16
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_06A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_06B

Input Data

Area (ac) 0.41
Weighted Curve Number 98.00
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.41	C/D	98.00
Composite Area & Weighted CN	0.41		98.00

Time of Concentration

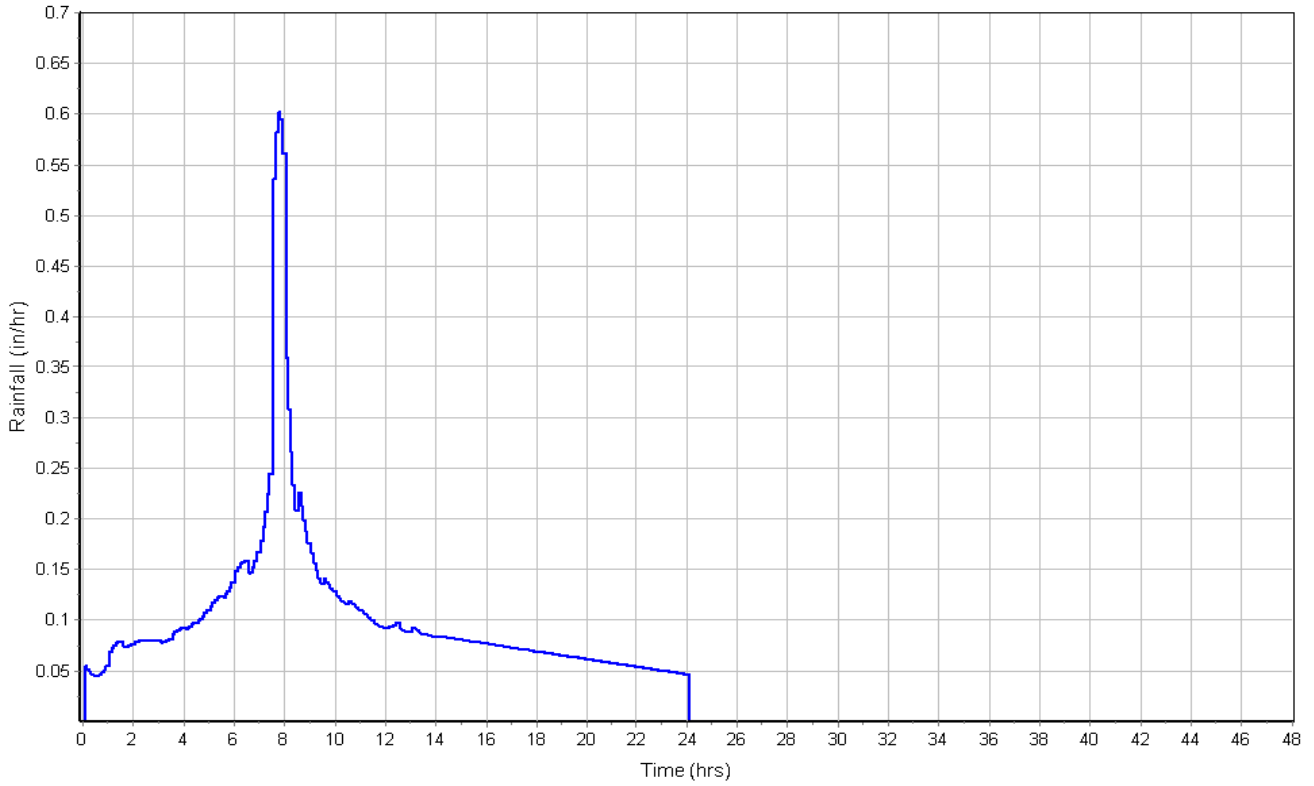
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

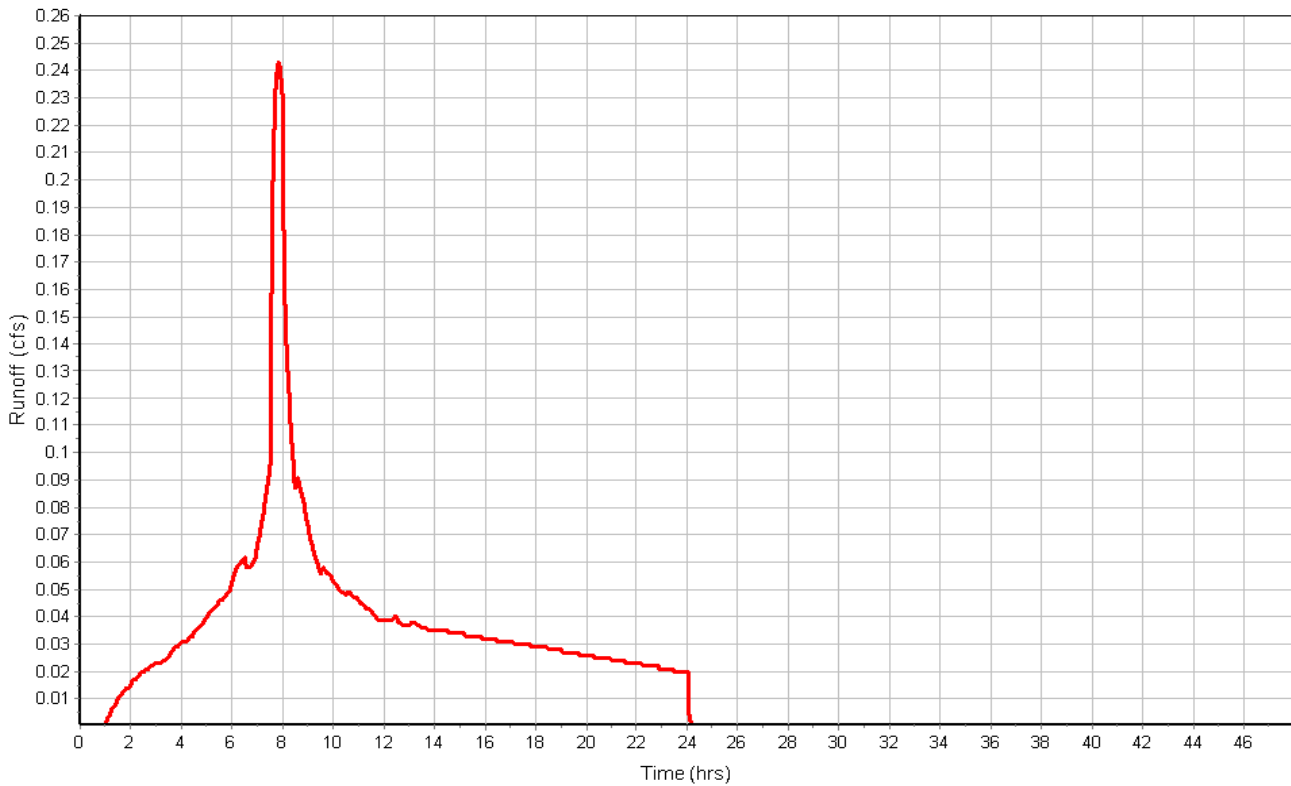
Total Rainfall (in) 2.50
Total Runoff (in) 2.27
Peak Runoff (cfs) 0.24
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_06B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_07

Input Data

Area (ac) 1.08
Weighted Curve Number 93.59
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.81	C/D	98.00
Landscape	0.26	C/D	80.00
Composite Area & Weighted CN	1.07		93.59

Time of Concentration

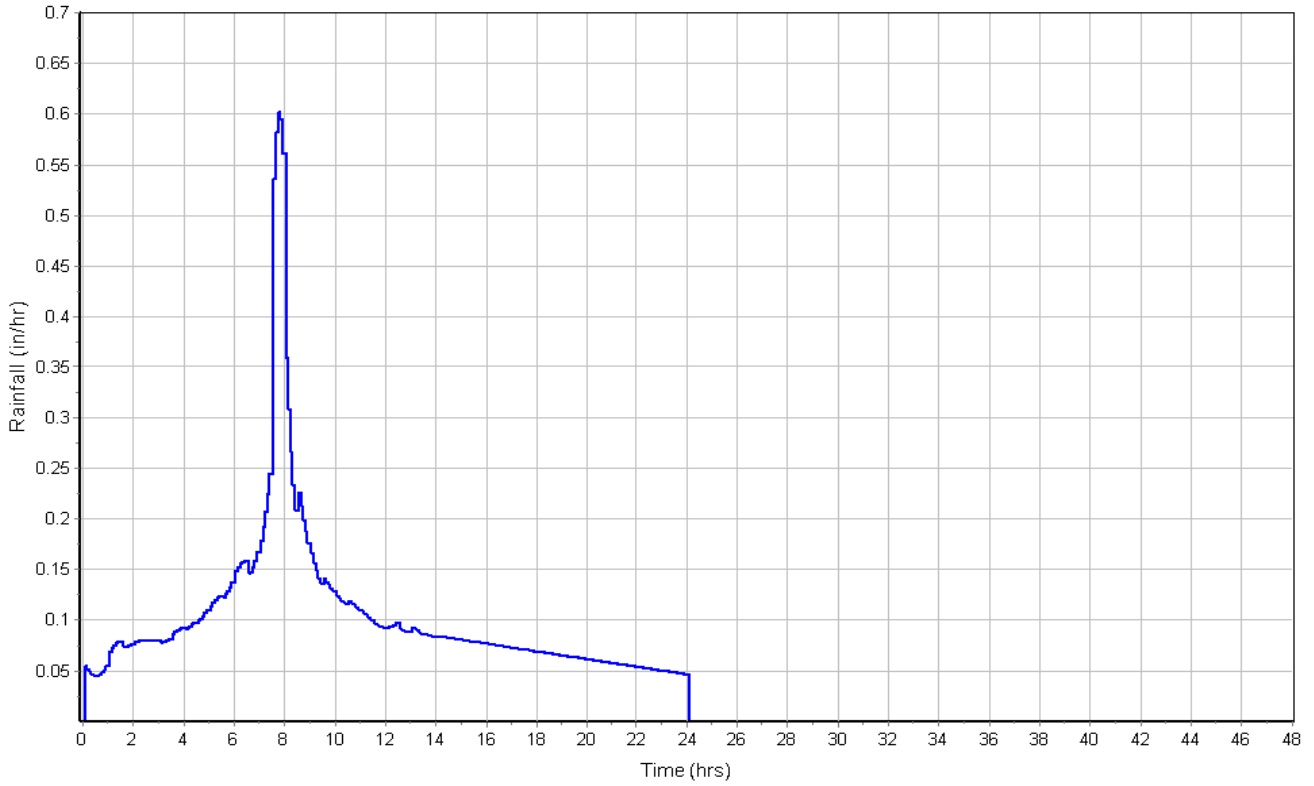
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

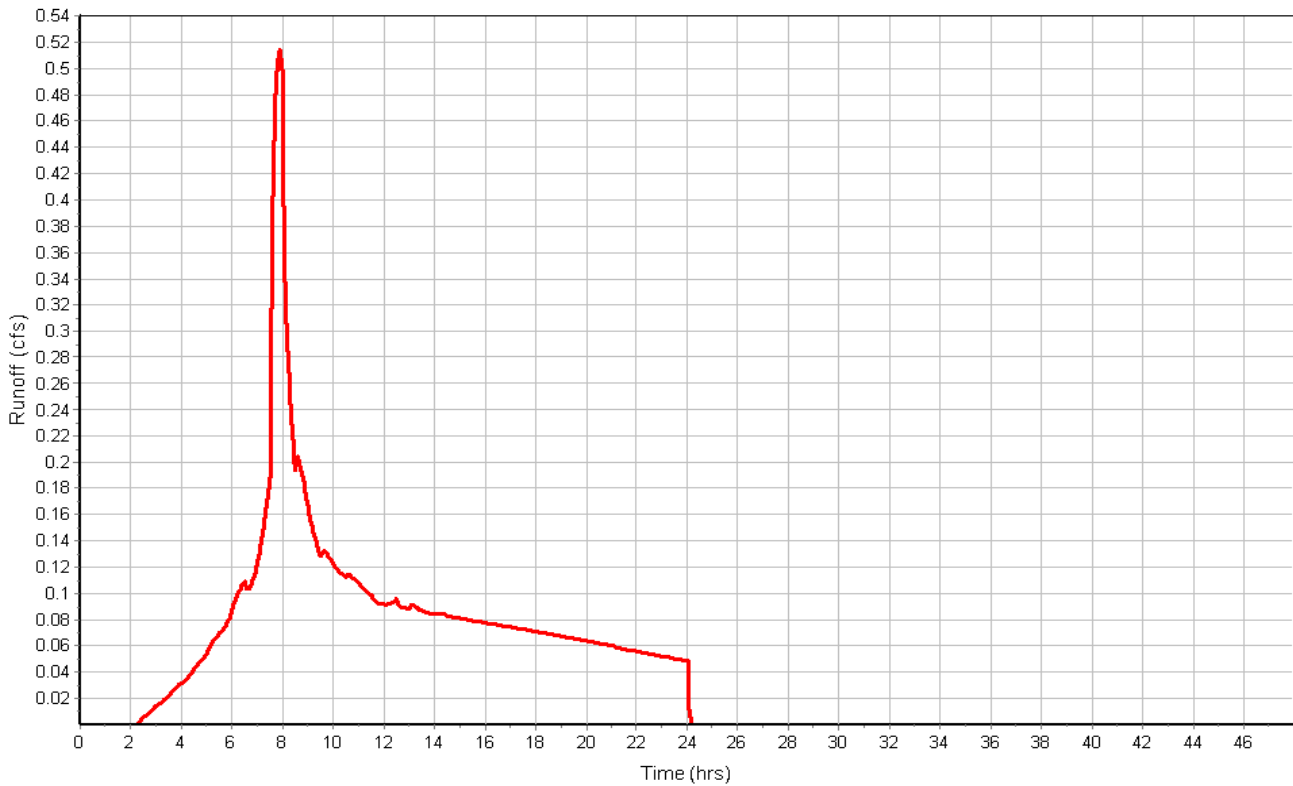
Total Rainfall (in) 2.50
Total Runoff (in) 1.83
Peak Runoff (cfs) 0.51
Weighted Curve Number 93.59
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_07

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_08B

Input Data

Area (ac) 2.25
Weighted Curve Number 94.33
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.79	C/D	98.00
Landscape	0.46	C/D	80.00
Composite Area & Weighted CN	2.25		94.33

Time of Concentration

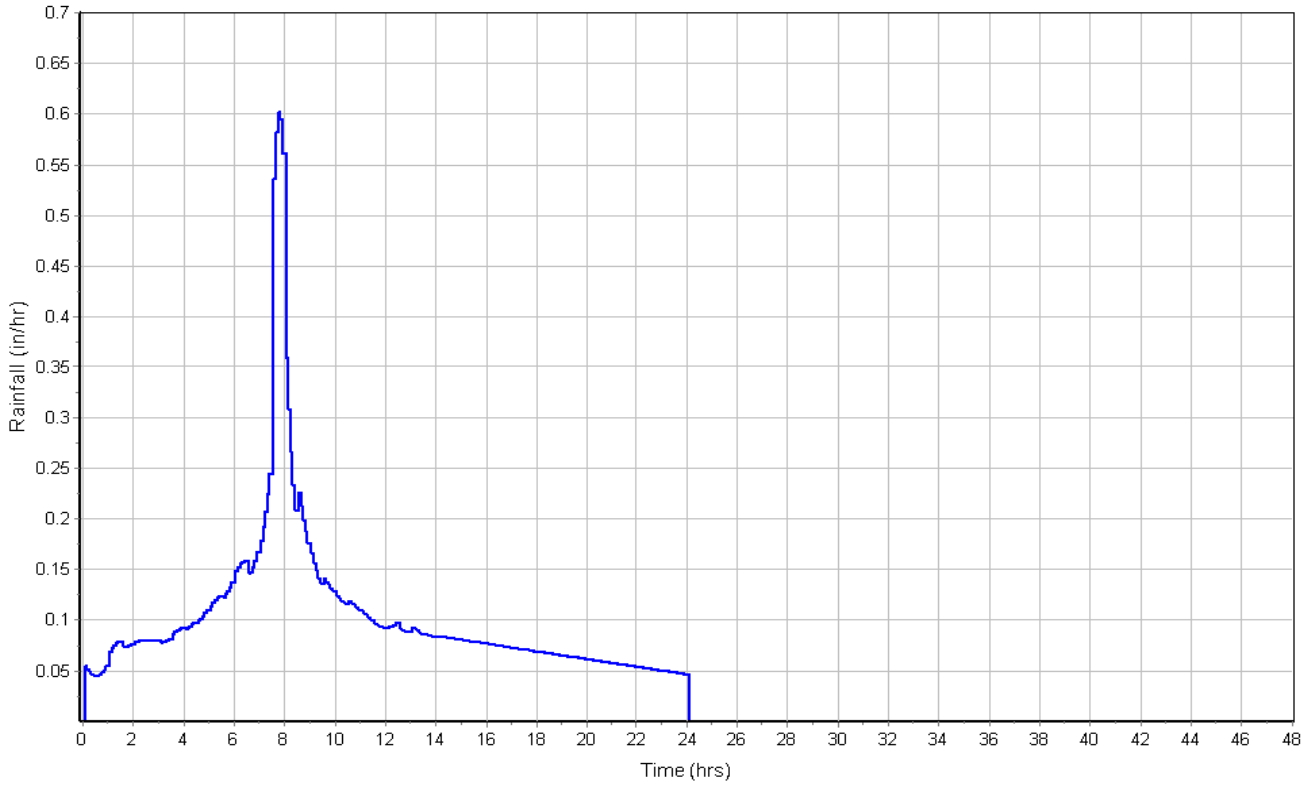
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

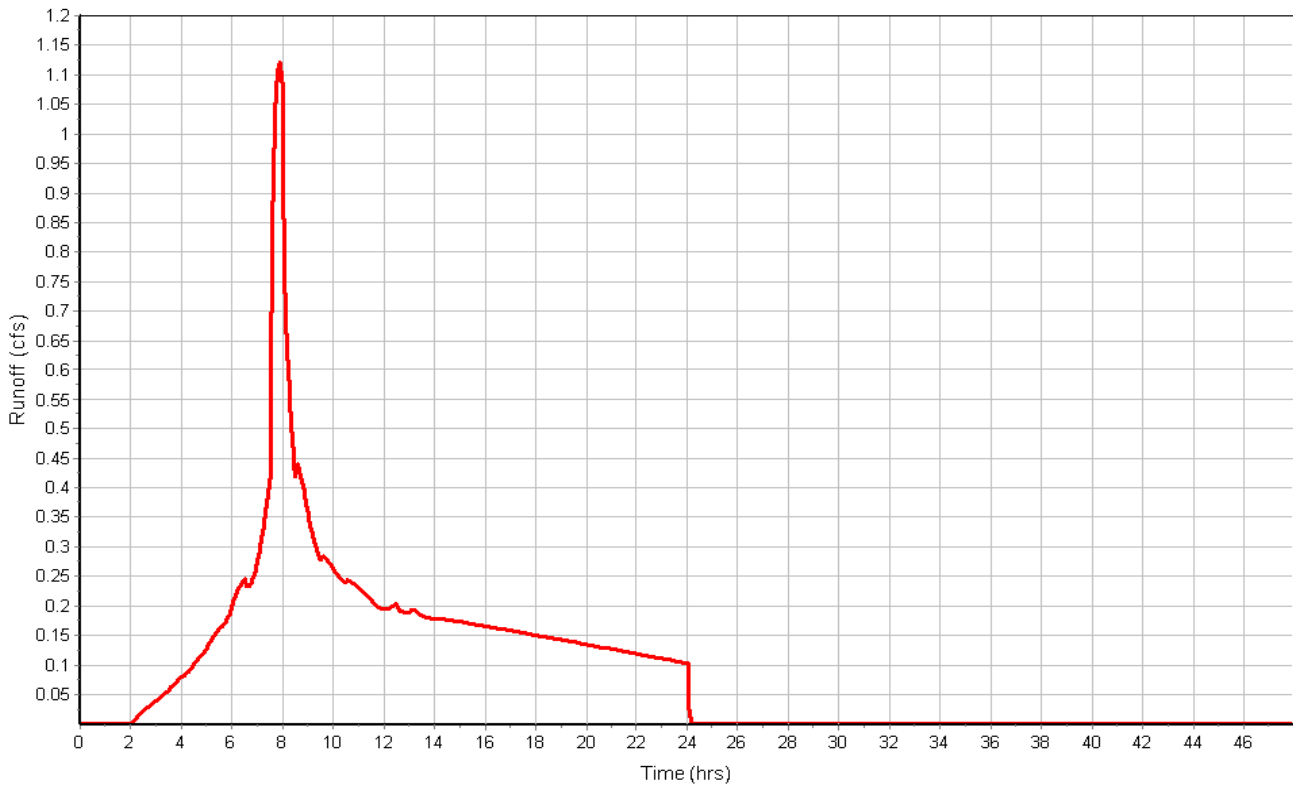
Total Rainfall (in) 2.50
Total Runoff (in) 1.90
Peak Runoff (cfs) 1.12
Weighted Curve Number 94.33
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_08B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_09

Input Data

Area (ac) 0.23
Weighted Curve Number 95.64
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.20	C/D	98.00
Landscape	0.03	C/D	80.00
Composite Area & Weighted CN	0.23		95.64

Time of Concentration

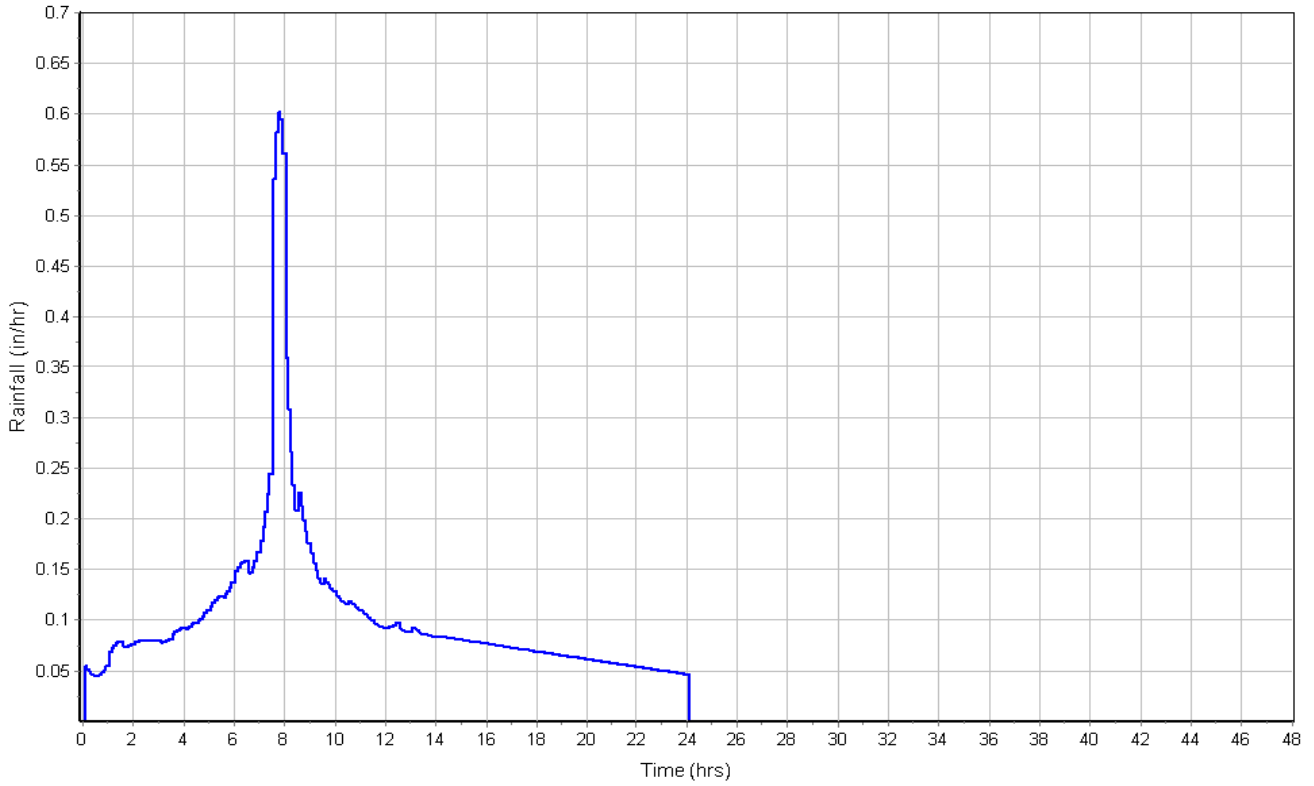
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

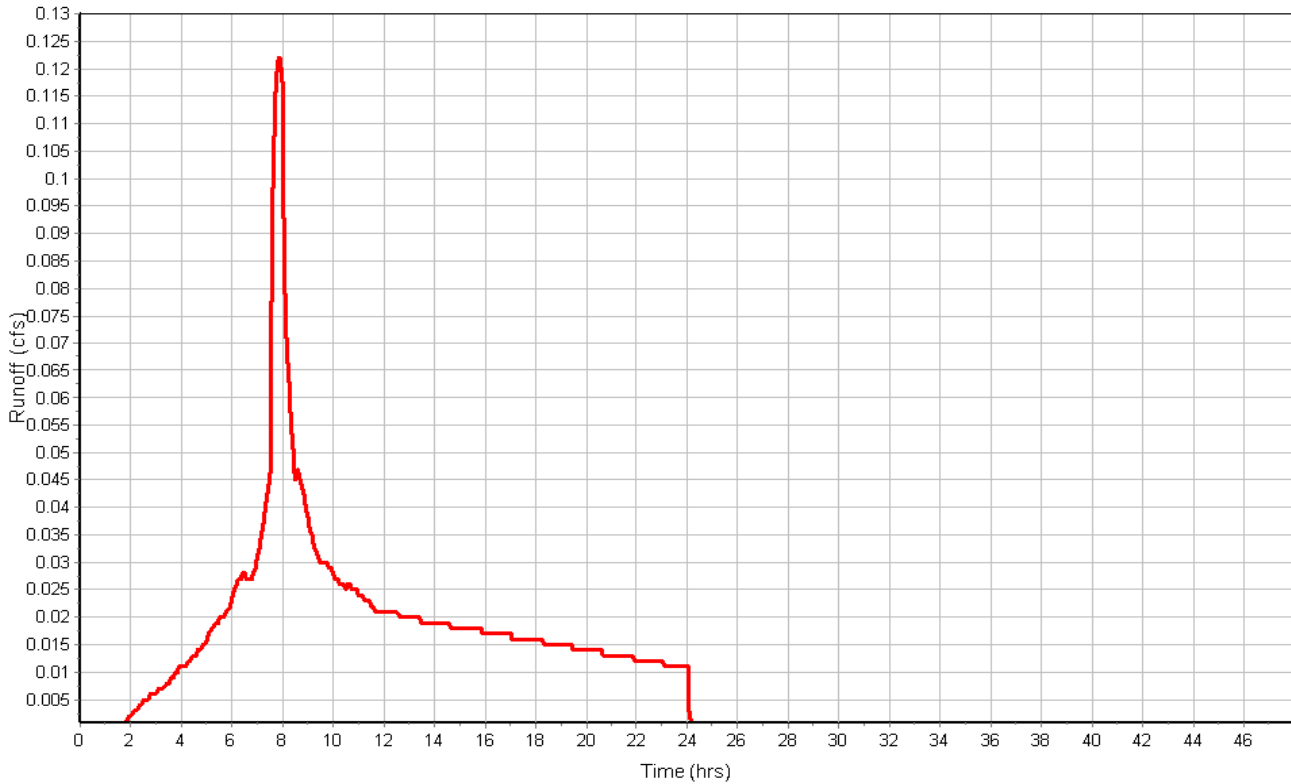
Total Rainfall (in) 2.50
Total Runoff (in) 2.03
Peak Runoff (cfs) 0.12
Weighted Curve Number 95.64
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_09

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_10

Input Data

Area (ac) 0.32
Weighted Curve Number 95.08
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.27	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.32		95.08

Time of Concentration

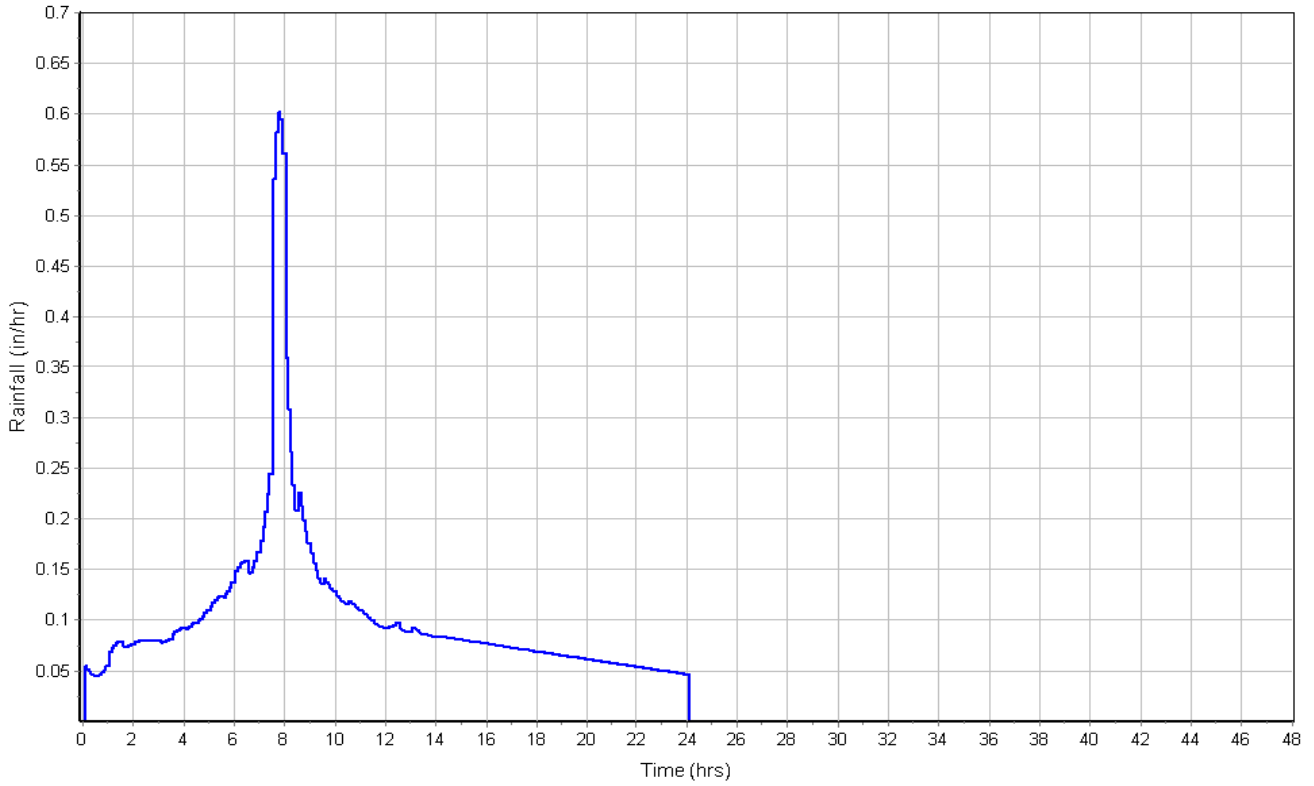
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

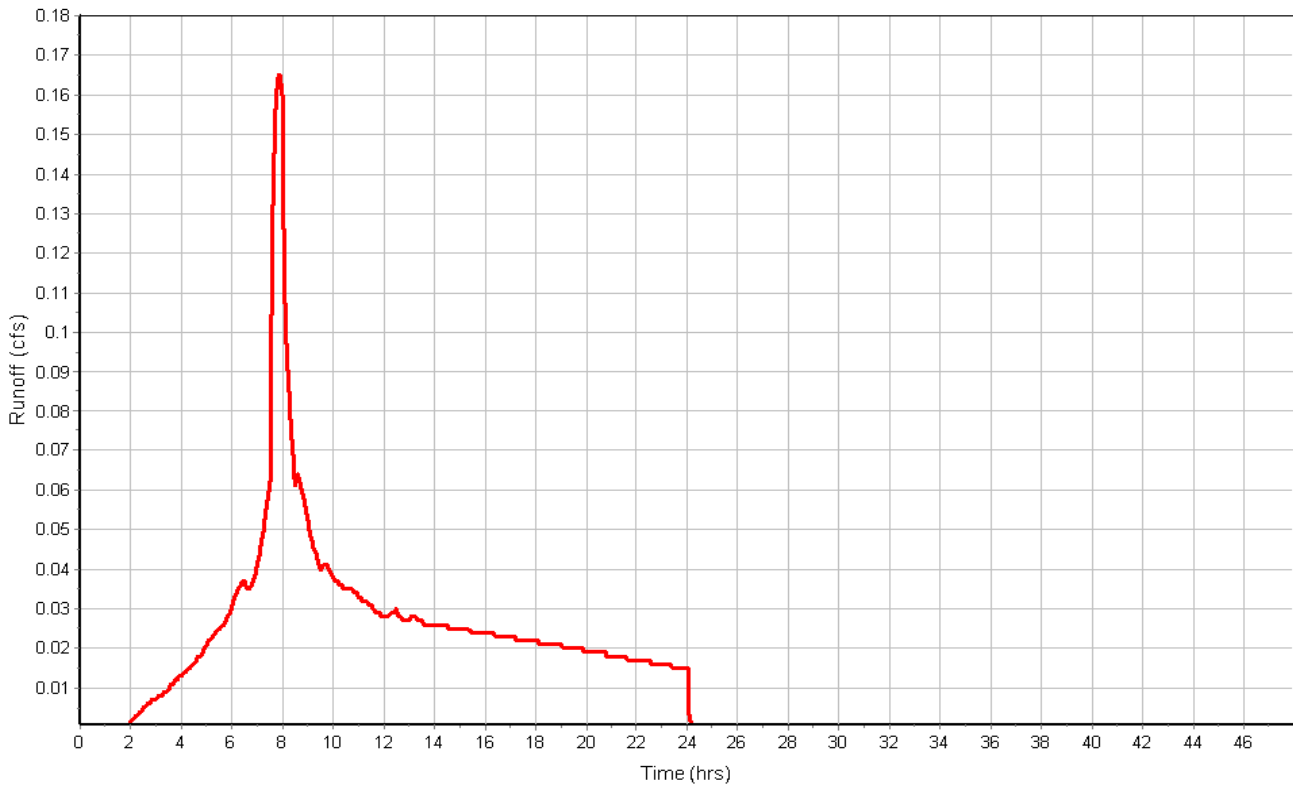
Total Rainfall (in) 2.50
Total Runoff (in) 1.97
Peak Runoff (cfs) 0.17
Weighted Curve Number 95.08
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_10

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Subbasin : HED-LIDA_8A

Input Data

Area (ac) 2.32
Weighted Curve Number 95.49
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	2.00	C/D	98.00
Landscape	0.32	C/D	80.00
Composite Area & Weighted CN	2.32		95.49

Time of Concentration

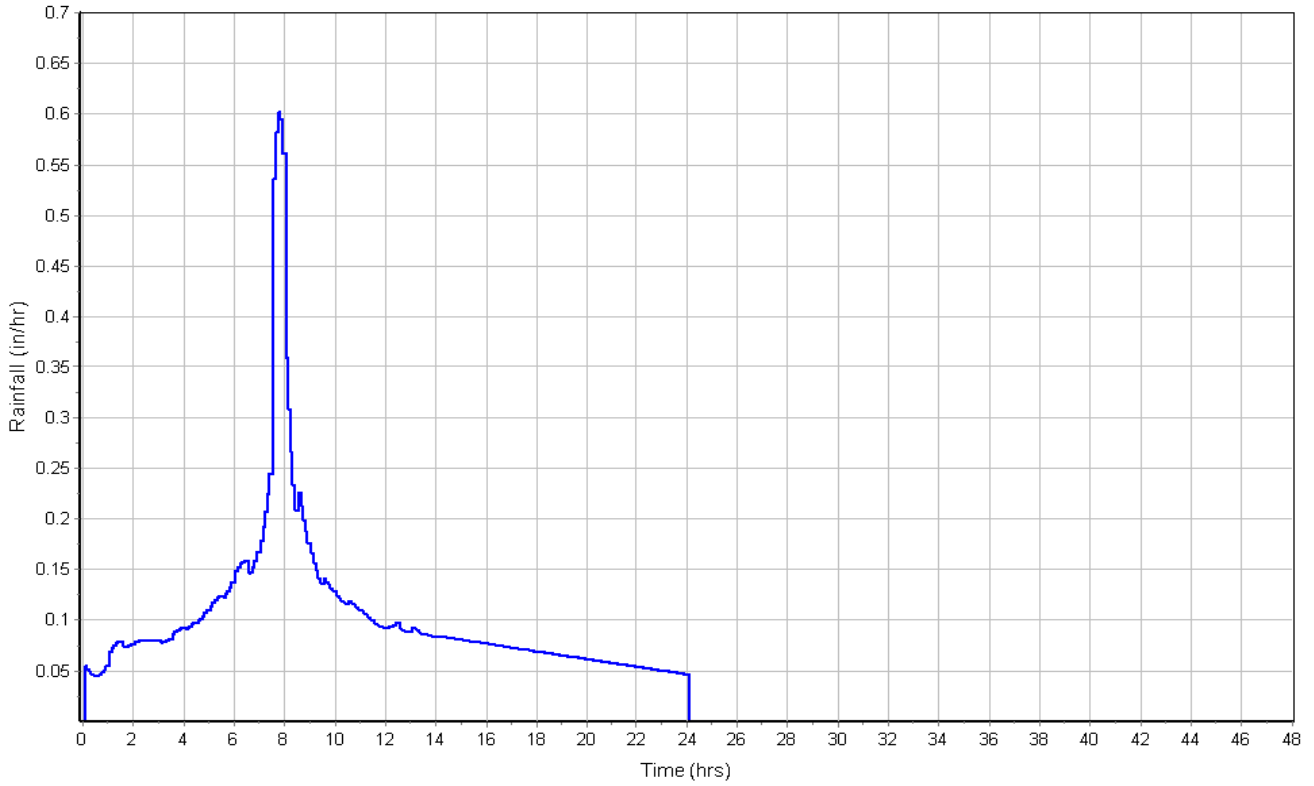
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

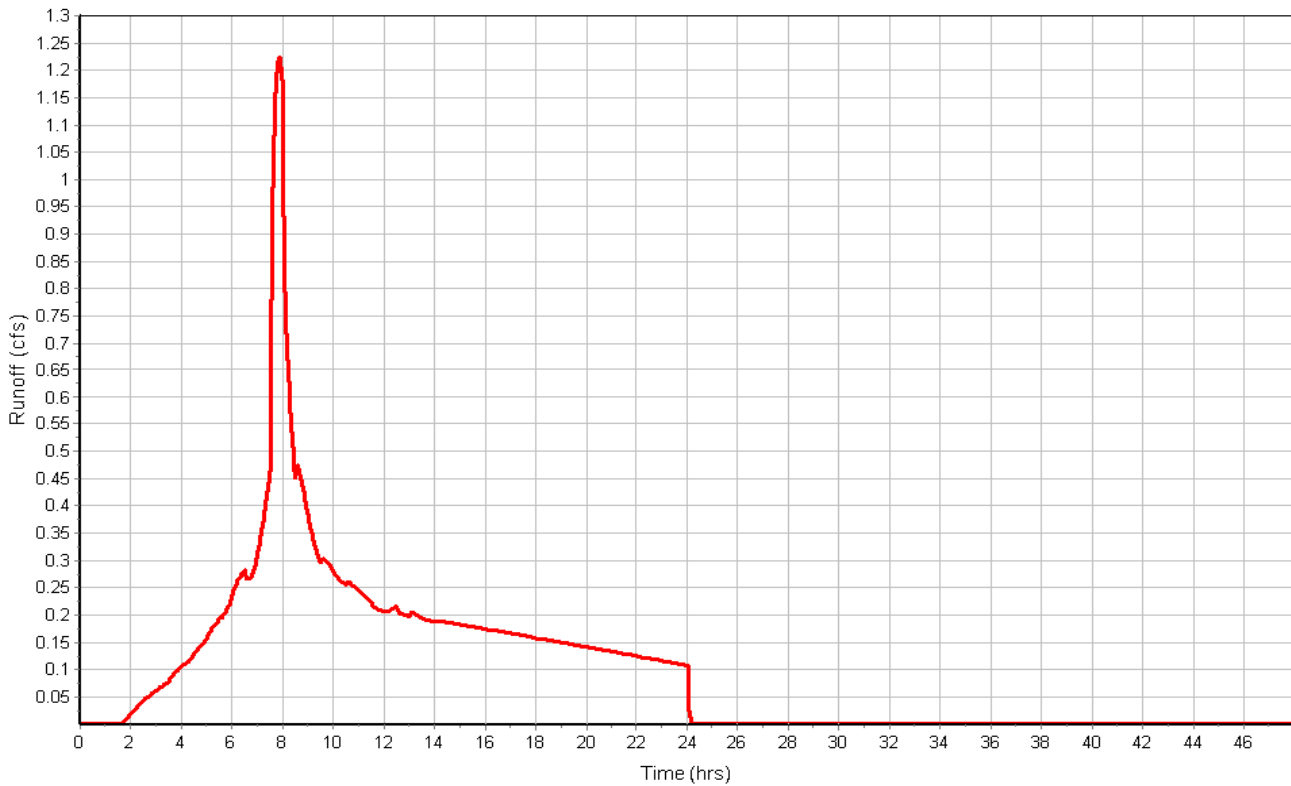
Total Rainfall (in) 2.50
Total Runoff (in) 2.01
Peak Runoff (cfs) 1.22
Weighted Curve Number 95.49
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_8A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
2-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	COF-01A	238.00	250.00	12.00	238.00	0.00	1000.00	750.00	12.00	0.00
2	COF-01B	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
3	COF-01C	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
4	COF-02A	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
5	COF-02B	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
6	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
7	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
8	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
9	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
10	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
11	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
12	HED-01G	226.00	229.00	3.00	226.00	0.00	1000.00	771.00	12.00	0.00
13	HED-01H	229.00	232.00	3.00	229.00	0.00	1000.00	768.00	12.00	0.00
14	HED-01I	230.00	233.00	3.00	230.00	0.00	1000.00	767.00	12.00	0.00
15	HED-01J	231.00	233.00	2.00	231.00	0.00	1000.00	767.00	12.00	0.00
16	HED-01K	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
17	HED-01L	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
18	HED-01M	224.00	230.00	6.00	224.00	0.00	1000.00	770.00	12.00	0.00
19	HED-01N	230.00	235.00	5.00	230.00	0.00	1000.00	765.00	12.00	0.00
20	HED-01O	234.00	238.00	4.00	234.00	0.00	1000.00	762.00	12.00	0.00
21	HED-01P	234.00	239.00	5.00	234.00	0.00	1000.00	761.00	12.00	0.00
22	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
23	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
24	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
25	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
26	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
27	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
28	HED-02G	235.00	237.00	2.00	235.00	0.00	1000.00	763.00	12.00	0.00
29	HED-02H	236.00	238.00	2.00	236.00	0.00	1000.00	762.00	12.00	0.00
30	HED-02I	237.00	239.00	2.00	237.00	0.00	1000.00	761.00	12.00	0.00
31	HED-02J	237.00	250.00	13.00	237.00	0.00	1000.00	750.00	12.00	0.00
32	HED-02K	255.00	257.00	2.00	255.00	0.00	1000.00	743.00	12.00	0.00
33	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
34	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
35	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00
36	HED-03D	241.00	245.00	4.00	241.00	0.00	1000.00	755.00	12.00	0.00
37	HED-03E	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
38	HED-03F	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
39	HED-03G	242.00	245.00	3.00	242.00	0.00	1000.00	755.00	12.00	0.00
40	HED-03H	243.00	245.00	2.00	243.00	0.00	1000.00	755.00	12.00	0.00
41	HED-03I	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
42	HED-03J	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
43	HED-03K	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
44	HED-03L	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
45	HED-03t	238.00	243.00	5.00	238.00	0.00	1000.00	757.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	COF-01A	0.02	0.00	238.04	0.04	0.00	11.96	238.02	0.02	0 13:02	0 00:00	0.00	0.00
2	COF-01B	0.01	0.00	244.01	0.01	0.00	2.99	244.01	0.01	0 23:43	0 00:00	0.00	0.00
3	COF-01C	0.01	0.00	246.11	1.11	0.00	2.39	245.62	0.62	0 23:39	0 00:00	0.00	0.00
4	COF-02A	0.01	0.00	244.03	0.03	0.00	3.97	244.01	0.01	0 10:04	0 00:00	0.00	0.00
5	COF-02B	0.01	0.00	245.60	0.60	0.00	1.40	245.10	0.10	0 10:00	0 00:00	0.00	0.00
6	HED-01A	0.13	0.00	152.02	0.02	0.00	7.98	152.01	0.01	1 00:53	0 00:00	0.00	0.00
7	HED-01B	0.05	0.00	157.02	0.02	0.00	7.98	157.01	0.01	0 10:00	0 00:00	0.00	0.00
8	HED-01C	0.05	0.00	157.89	0.09	0.00	7.11	157.87	0.07	0 09:45	0 00:00	0.00	0.00
9	HED-01D	0.05	0.00	177.10	0.06	0.00	4.15	177.09	0.05	0 09:45	0 00:00	0.00	0.00
10	HED-01E	0.05	0.00	181.06	0.06	0.00	10.94	181.05	0.05	0 09:33	0 00:00	0.00	0.00
11	HED-01F	0.06	0.00	223.04	0.04	0.00	5.96	223.03	0.03	0 09:26	0 00:00	0.00	0.00
12	HED-01G	0.06	0.00	226.04	0.04	0.00	3.46	226.03	0.03	0 09:19	0 00:00	0.00	0.00
13	HED-01H	0.05	0.00	229.07	0.07	0.00	2.93	229.06	0.06	1 00:07	0 00:00	0.00	0.00
14	HED-01I	0.05	0.00	230.07	0.07	0.00	2.93	230.06	0.06	1 00:06	0 00:00	0.00	0.00
15	HED-01J	0.05	0.00	232.48	1.48	0.00	2.27	231.81	0.81	1 00:05	0 00:00	0.00	0.00
16	HED-01K	0.14	0.00	228.02	1.52	0.00	1.73	226.59	0.09	0 09:19	0 00:00	0.00	0.00
17	HED-01L	0.00	0.00	226.50	0.00	0.00	3.00	226.50	0.00	0 00:00	0 00:00	0.00	0.00
18	HED-01M	0.00	0.00	224.00	0.00	0.00	6.00	224.00	0.00	0 00:00	0 00:00	0.00	0.00
19	HED-01N	0.00	0.00	230.00	0.00	0.00	5.00	230.00	0.00	0 00:00	0 00:00	0.00	0.00
20	HED-01O	0.00	0.00	234.00	0.00	0.00	4.50	234.00	0.00	0 00:00	0 00:00	0.00	0.00
21	HED-01P	0.00	0.00	234.00	0.00	0.00	5.50	234.00	0.00	0 00:00	0 00:00	0.00	0.00
22	HED-02A	0.08	0.00	171.01	0.01	0.00	7.99	171.01	0.01	1 02:29	0 00:00	0.00	0.00
23	HED-02B	0.08	0.00	171.42	0.12	0.00	5.58	171.38	0.08	1 02:14	0 00:00	0.00	0.00
24	HED-02C	0.08	0.00	173.60	0.10	0.00	4.40	173.56	0.06	1 02:14	0 00:00	0.00	0.00
25	HED-02D	0.08	0.00	174.79	0.19	0.00	10.95	174.72	0.12	1 02:07	0 00:00	0.00	0.00
26	HED-02E	0.08	0.00	180.60	0.14	0.00	7.40	180.54	0.08	1 02:03	0 00:00	0.00	0.00
27	HED-02F	0.08	0.00	181.84	0.08	0.00	6.12	181.81	0.05	1 01:17	0 00:00	0.00	0.00
28	HED-02G	0.07	0.00	235.05	0.05	0.00	2.95	235.03	0.03	0 07:57	0 00:00	0.00	0.00
29	HED-02H	0.07	0.00	236.11	0.11	0.00	1.89	236.07	0.07	1 04:43	0 00:00	0.00	0.00
30	HED-02I	0.00	0.00	237.00	0.00	0.00	2.00	237.00	0.00	0 00:00	0 00:00	0.00	0.00
31	HED-02J	0.07	0.00	237.10	0.10	0.00	12.90	237.06	0.06	1 04:41	0 00:00	0.00	0.00
32	HED-02K	0.09	0.00	255.37	0.37	0.00	3.13	255.14	0.14	0 17:13	0 00:00	0.00	0.00
33	HED-03A	0.01	0.00	183.01	0.01	0.00	6.99	183.00	0.00	1 05:59	0 00:00	0.00	0.00
34	HED-03B	0.01	0.00	235.00	0.00	0.00	5.00	235.00	0.00	0 22:33	0 00:00	0.00	0.00
35	HED-03C	0.01	0.00	236.01	0.01	0.00	13.99	236.01	0.01	0 21:38	0 00:00	0.00	0.00
36	HED-03D	0.01	0.00	241.01	0.01	0.00	3.99	241.00	0.00	0 08:44	0 00:00	0.00	0.00
37	HED-03E	0.00	0.00	250.00	0.00	0.00	1.50	250.00	0.00	0 00:00	0 00:00	0.00	0.00
38	HED-03F	0.00	0.00	250.00	0.00	0.00	1.75	250.00	0.00	0 00:00	0 00:00	0.00	0.00
39	HED-03G	0.02	0.00	242.00	0.00	0.00	3.00	242.00	0.00	0 11:13	0 00:00	0.00	0.00
40	HED-03H	0.02	0.00	243.56	0.56	0.00	2.94	243.24	0.24	0 19:53	0 00:00	0.00	0.00
41	HED-03I	0.00	0.00	244.00	0.00	0.00	3.00	244.00	0.00	0 00:00	0 00:00	0.00	0.00
42	HED-03J	0.00	0.00	245.00	0.00	0.00	3.50	245.00	0.00	0 00:00	0 00:00	0.00	0.00
43	HED-03K	0.83	0.00	257.06	1.06	0.00	1.94	256.56	0.56	0 08:22	0 00:00	0.00	0.00
44	HED-03L	0.83	0.00	256.26	0.26	0.00	1.74	256.04	0.04	0 07:43	0 00:00	0.00	0.00
45	HED-03M	0.00	0.00	238.00	0.00	0.00	6.00	238.00	0.00	0 00:00	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	COF-1A	10.00	238.00	0.00	238.00	0.00	0.00	0.0000	Rectangular	5.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	COF-1B	150.00	244.00	0.00	238.00	0.00	6.00	4.0000	Rectangular	1.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	COF-1C	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	COF-1E	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	COF-2B	1.00	245.00	0.00	246.00	2.00	-1.00	-100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	COF-2D	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
7	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
8	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
9	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00	No
10	HED-01J	5.00	228.00	0.00	228.50	2.00	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
11	HED-01I	20.00	227.00	0.50	228.00	2.00	-1.00	-5.0000	Rectangular	1.000	1.000	0.0320	0.5000	0.5000	0.0000	0.00	No
12	HED-01K	5.00	228.00	0.00	228.75	2.25	-0.75	-15.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
13	HED-01M	500.00	230.00	0.00	224.00	0.00	6.00	1.2000	Triangular	2.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
14	HED-01O	5.00	237.00	0.00	237.50	3.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
15	HED-01Q	5.00	238.00	0.00	238.50	4.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
16	HED-01T	1.00	232.75	1.75	231.00	1.00	1.75	175.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
17	HED-01V	5.00	231.00	0.00	231.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
18	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
19	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00	No
20	HED-02G	1130.10	235.00	0.00	181.76	0.00	53.24	4.7100	Trapezoidal	3.000	19.000	0.0320	0.5000	0.5000	0.0000	0.00	No
21	HED-02K	1.00	256.50	1.50	237.00	0.00	19.50	1950.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
22	HED-02L	44.02	237.00	0.00	236.00	0.00	1.00	2.2700	Rectangular	2.000	4.000	0.0320	0.5000	0.5000	0.0000	0.00	No
23	HED-02O	5.00	255.00	0.00	255.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
24	HED-03A	770.00	181.76	0.00	183.00	0.00	-1.24	-0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
25	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
26	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
27	HED-03F	400.00	241.00	0.00	236.00	0.00	5.00	1.2500	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
28	HED-03G	10.00	242.00	0.00	241.00	0.00	1.00	10.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
29	HED-03H	1.00	244.50	1.50	242.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
30	HED-03K	5.00	256.00	0.00	256.00	0.00	0.00	0.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
31	HED-03M	5.00	250.00	0.00	250.75	0.75	-0.75	-15.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
32	HED-03O	5.00	250.00	0.00	250.50	0.50	-0.50	-10.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
33	HED-03P	1.00	257.00	1.00	256.00	0.00	1.00	100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
34	HED-03R	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
35	HED-03S	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
36	HED-03U	5.00	243.00	0.00	243.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
2-year storm

Channel Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	COF-1A	0.02	0 13:02	42.77	0.00	0.05	3.33	0.03	0.01	0.00		0.00
2	COF-1B	0.01	0 23:43	37.11	0.00	0.13	19.23	0.02	0.02	0.00		0.00
3	COF-1C	0.00	0 00:00	224.13	0.00	0.00		0.00	0.00	0.00		0.00
4	COF-1E	0.01	0 08:00	7.05	0.00	0.04	2.08	1.11	0.55	0.00		0.00
5	COF-2B	0.00	0 00:00	141.75	0.00	0.00		0.30	0.15	0.00		0.00
6	COF-2D	0.01	0 08:00	2.00	0.01	0.08	1.04	0.60	0.30	0.00		0.00
7	HED-01A	0.13	1 00:53	1512.53	0.00	0.39	7.05	0.02	0.00	0.00		0.00
8	HED-01B	0.05	0 10:35	1082.72	0.00	0.23	58.33	0.02	0.00	0.00		0.00
9	HED-01F	0.05	0 09:26	2813.13	0.00	0.97	10.62	0.05	0.01	0.00		0.00
10	HED-01I	0.00	0 00:00	24.81	0.00	0.00		0.22	0.22	0.00		0.00
11	HED-01J	0.02	0 09:19	4.99	0.00	0.03	11.11	0.51	0.51	0.00		0.00
12	HED-01K	3.93	0 11:13	30.39	0.13	3.05	0.03	0.40	0.52	0.00		0.00
13	HED-01M	0.00	0 00:00	37.78	0.00	0.00		0.00	0.00	0.00		0.00
14	HED-01O	0.00	0 00:00	24.81	0.00	0.00		0.20	0.20	0.00		0.00
15	HED-01Q	0.00	0 00:00	24.81	0.00	0.00		0.05	0.05	0.00		0.00
16	HED-01T	0.00	0 00:00	187.52	0.00	0.00		0.00	0.00	0.00		0.00
17	HED-01V	0.05	1 00:05	16.66	0.00	0.04	2.08	1.48	0.74	0.00		0.00
18	HED-02A	0.08	1 02:29	1963.65	0.00	0.30	51.67	0.02	0.00	0.00		0.00
19	HED-02E	0.08	1 02:03	614.42	0.00	0.23	35.22	0.08	0.01	0.00		0.00
20	HED-02G	0.07	0 08:21	396.58	0.00	1.56	12.07	0.07	0.02	0.00		0.00
21	HED-02K	0.00	0 00:00	625.97	0.00	0.00		0.05	0.02	0.00		0.00
22	HED-02L	0.00	0 00:00	55.99	0.00	0.00		0.06	0.03	0.00		0.00
23	HED-02O	0.06	1 03:37	16.66	0.00	0.10	0.83	0.37	0.19	0.00		0.00
24	HED-03A	0.01	1 05:59	443.56	0.00	0.02	641.67	0.04	0.01	0.00		0.00
25	HED-03B	0.01	0 22:33	2403.19	0.00	0.00		0.00	0.00	0.00		0.00
26	HED-03C	0.01	0 21:47	417.77	0.00	0.00		0.01	0.00	0.00		0.00
27	HED-03F	0.01	0 09:50	131.71	0.00	0.00		0.01	0.00	0.00		0.00
28	HED-03G	0.01	0 11:13	157.53	0.00	0.00		0.01	0.00	0.00		0.00
29	HED-03H	0.00	0 00:00	224.13	0.00	0.00		0.00	0.00	0.00		0.00
30	HED-03K	0.83	0 07:42	0.83	1.00	0.41	0.20	1.00	1.00	1012.00		0.00
31	HED-03M	0.00	0 00:00	22.66	0.00	0.00		0.37	0.37	0.00		0.00
32	HED-03O	0.00	0 00:00	18.50	0.00	0.00		0.25	0.25	0.00		0.00
33	HED-03P	0.81	0 07:42	141.75	0.01	3.06	0.01	0.16	0.08	0.00		0.00
34	HED-03R	0.00	0 00:00	2.00	0.00	0.00		0.00	0.00	0.00		0.00
35	HED-03S	0.00	0 00:00	224.13	0.00	0.00		0.00	0.00	0.00		0.00
36	HED-03U	0.02	0 15:06	2.00	0.01	0.13	0.64	0.56	0.28	0.00		0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
2-year storm

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Pipe Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow Gate	Flap No	No. of Barrels
1	COF-01D	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	COF-2A	400.00	244.00	0.00	238.00	0.00	6.00	1.5000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	COF-2C	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.480	0.480	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5	HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6	HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7	HED-01G	20.00	226.00	0.00	223.00	0.00	3.00	15.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	HED-01H	50.00	226.50	0.00	226.00	0.00	0.50	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	HED-01L	47.37	224.00	0.00	223.00	0.00	1.00	2.1100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	HED-01N	75.00	234.00	0.00	230.00	0.00	4.00	5.3300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	HED-01P	65.00	234.00	0.00	230.00	0.00	4.00	6.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	HED-01R	50.00	230.00	0.00	229.00	0.00	1.00	2.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	HED-01S	100.00	229.00	0.00	228.00	2.00	1.00	1.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	HED-01U	1.00	231.00	0.00	230.00	0.00	1.00	100.0000	CIRCULAR	0.960	0.960	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
16	HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
17	HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
18	HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	HED-02H	100.00	236.00	0.00	235.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	HED-02I	100.00	237.00	0.00	236.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	HED-02J	1.00	255.00	0.00	237.00	0.00	18.00	1800.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	HED-03D	500.00	238.00	0.00	235.00	0.00	3.00	0.6000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	HED-03E	47.11	242.00	0.00	242.50	4.50	-0.50	-1.0600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	HED-03I	200.00	244.00	0.00	243.50	0.50	0.50	0.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	HED-03J	200.00	256.00	0.00	243.00	0.00	13.00	6.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	HED-03L	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	HED-03N	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
28	HED-03Q	1.00	256.00	0.00	256.00	0.00	0.00	0.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	HED-03T	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	HED-03V	1.00	243.00	0.00	242.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
2-year storm

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	COF-01D	0.01	0 05:26	0.02	0.66	10.57	0.00	0.03	0.55	0.00		Calculated
2	COF-2A	0.01	0 10:04	11.15	0.00	0.81	8.23	0.03	0.02	0.00		Calculated
3	COF-2C	0.01	0 10:00	0.01	0.98	5.86	0.00	0.04	0.86	0.00		Calculated
4	HED-01C	0.05	0 09:46	20.90	0.00	2.26	0.69	0.05	0.03	0.00		Calculated
5	HED-01D	0.05	0 09:46	28.48	0.00	1.72	11.64	0.06	0.03	0.00		Calculated
6	HED-01E	0.05	0 09:33	7.14	0.01	2.64	0.59	0.06	0.06	0.00		Calculated
7	HED-01G	0.06	0 09:20	40.68	0.00	4.45	0.07	0.04	0.03	0.00		Calculated
8	HED-01H	0.00	0 00:00	3.56	0.00	0.00		0.02	0.02	0.00		Calculated
9	HED-01L	0.00	0 00:00	15.26	0.00	0.00		0.02	0.01	0.00		Calculated
10	HED-01N	0.00	0 00:00	8.23	0.00	0.00		0.00	0.00	0.00		Calculated
11	HED-01P	0.00	0 00:00	26.06	0.00	0.00		0.00	0.00	0.00		Calculated
12	HED-01R	0.05	1 00:06	5.04	0.01	1.93	0.43	0.07	0.07	0.00		Calculated
13	HED-01S	0.05	1 00:07	10.50	0.00	1.49	1.12	0.07	0.05	0.00		Calculated
14	HED-01U	0.05	1 00:05	0.05	1.03	9.27	0.00	0.08	0.92	0.00		> CAPACITY
15	HED-02B	0.08	1 02:16	40.58	0.00	1.96	0.69	0.07	0.02	0.00		Calculated
16	HED-02C	0.08	1 02:14	8.91	0.01	1.34	3.81	0.11	0.07	0.00		Calculated
17	HED-02D	0.08	1 02:09	4.04	0.02	0.92	13.49	0.14	0.10	0.00		Calculated
18	HED-02F	0.08	1 01:17	59.16	0.00	1.22	2.26	0.11	0.04	0.00		Calculated
19	HED-02H	0.07	1 04:43	3.56	0.02	2.44	0.68	0.08	0.08	0.00		Calculated
20	HED-02I	0.07	1 04:41	3.56	0.02	1.68	0.99	0.10	0.10	0.00		Calculated
21	HED-02J	0.07	0 07:42	0.09	0.77	23.64	0.00	0.06	1.00	1255.00		SURCHARGED
22	HED-03D	0.00	0 00:00	2.76	0.00	0.00		0.00	0.00	0.00		Calculated
23	HED-03E	0.00	0 00:00	10.82	0.00	0.00		0.16	0.11	0.00		Calculated
24	HED-03I	0.00	0 00:00	5.25	0.00	0.00		0.03	0.02	0.00		Calculated
25	HED-03J	0.83	0 07:44	9.08	0.09	10.78	0.31	0.32	0.32	0.00		Calculated
26	HED-03L	0.00	0 00:00	10.69	0.00	0.00		0.00	0.00	0.00		Calculated
27	HED-03N	0.00	0 00:00	9.26	0.00	0.00		0.00	0.00	0.00		Calculated
28	HED-03Q	0.02	1 00:06	0.00	23.05	5.62	0.00	0.06	1.00	998.00		SURCHARGED
29	HED-03T	0.00	0 00:00	0.02	0.00	0.00		0.00	0.00	0.00		Calculated
30	HED-03V	0.02	0 19:53	0.02	0.89	11.63	0.00	0.03	0.54	0.00		Calculated

Storage Nodes

Storage Node : LIDA-01

Input Data

Invert Elevation (ft) 228.00
 Max (Rim) Elevation (ft) 229.00
 Max (Rim) Offset (ft) 1.00
 Initial Water Elevation (ft) 228.00
 Initial Water Depth (ft) 0.00
 Ponded Area (ft²) 938.00
 Evaporation Loss 0.00

Infiltration/Exfiltration

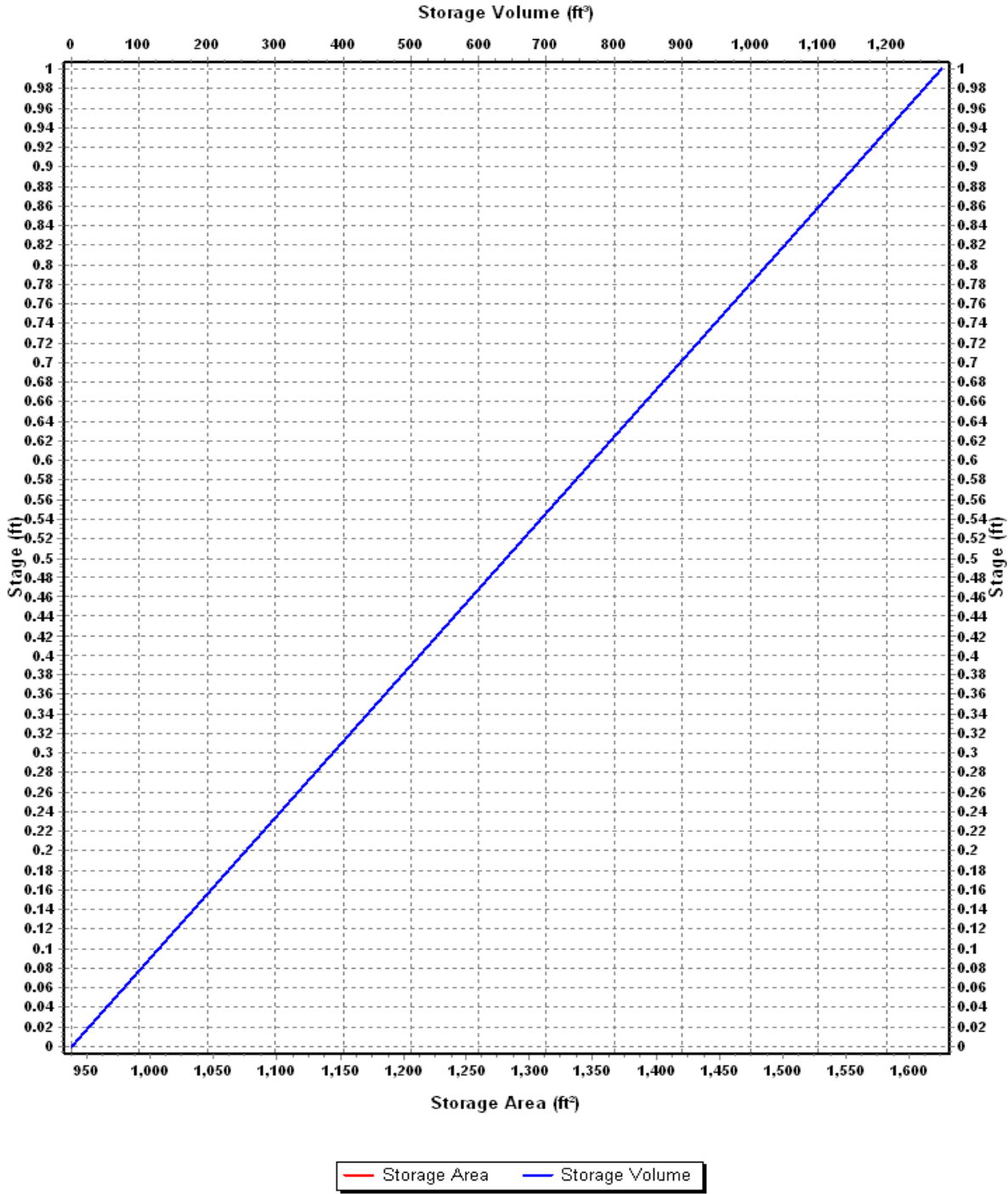
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-01

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	938	0.000
1	1625	1281.50

Storage Area Volume Curves



Storage Node : LIDA-01 (continued)

Output Summary Results

Peak Inflow (cfs)	0.22
Peak Lateral Inflow (cfs)	0.22
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	3.44
Max HGL Elevation Attained (ft)	228.43
Max HGL Depth Attained (ft)	0.43
Average HGL Elevation Attained (ft)	228.05
Average HGL Depth Attained (ft)	0.05
Time of Max HGL Occurrence (days hh:mm)	0 09:26
Total Exfiltration Volume (1000-ft ³)	3.024
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-02

Input Data

Invert Elevation (ft) 228.00
Max (Rim) Elevation (ft) 229.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 228.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 562.00
Evaporation Loss 0.00

Infiltration/Exfiltration

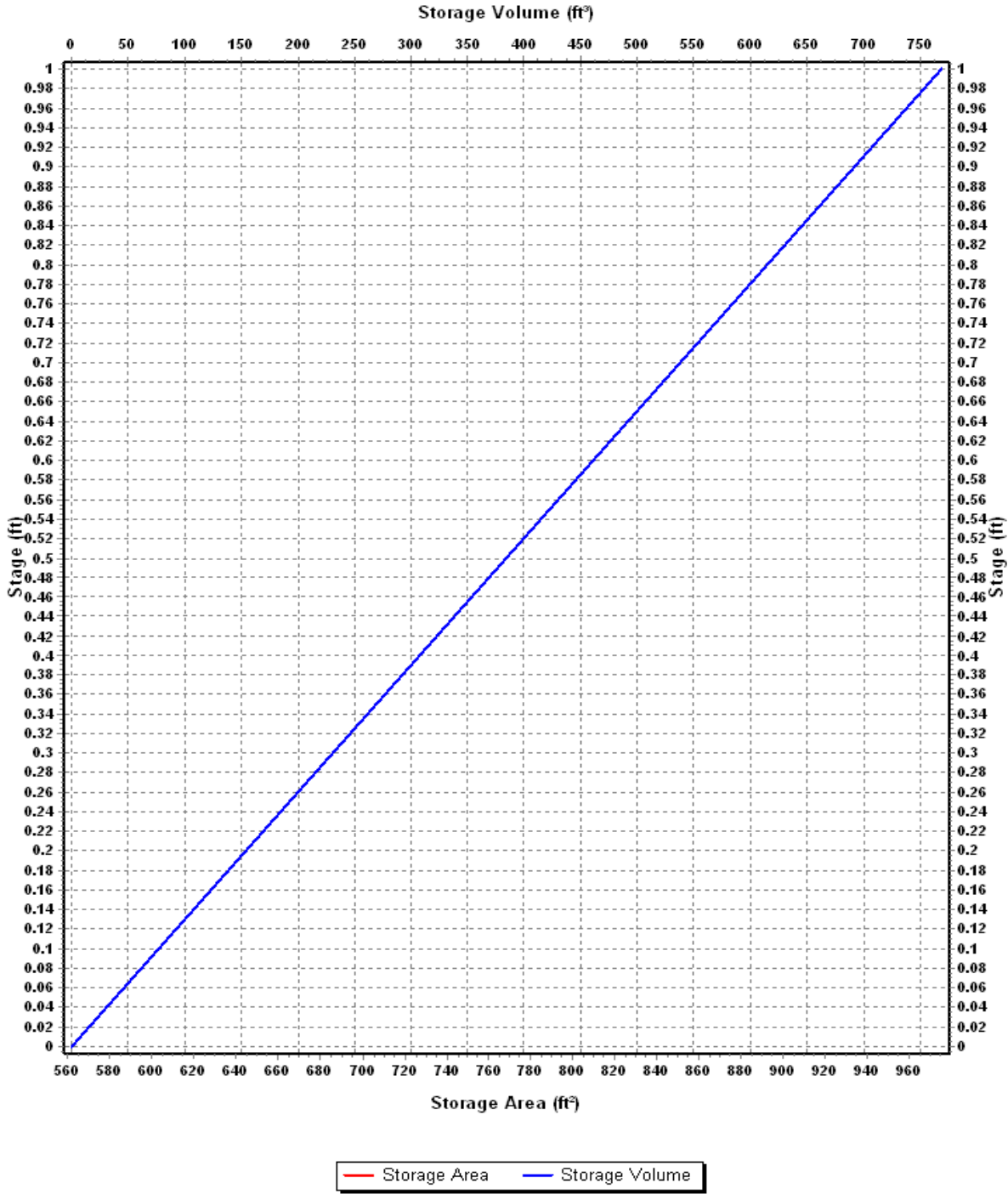
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-02

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	562	0.000
1	975	768.50

Storage Area Volume Curves



Storage Node : LIDA-02 (continued)

Output Summary Results

Peak Inflow (cfs)	3.97
Peak Lateral Inflow (cfs)	0.20
Peak Outflow (cfs)	0.14
Peak Exfiltration Flow Rate (cfm)	2.46
Max HGL Elevation Attained (ft)	228.78
Max HGL Depth Attained (ft)	0.78
Average HGL Elevation Attained (ft)	228.18
Average HGL Depth Attained (ft)	0.18
Time of Max HGL Occurrence (days hh:mm)	0 11:13
Total Exfiltration Volume (1000-ft ³)	2.712
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-03

Input Data

Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 238.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

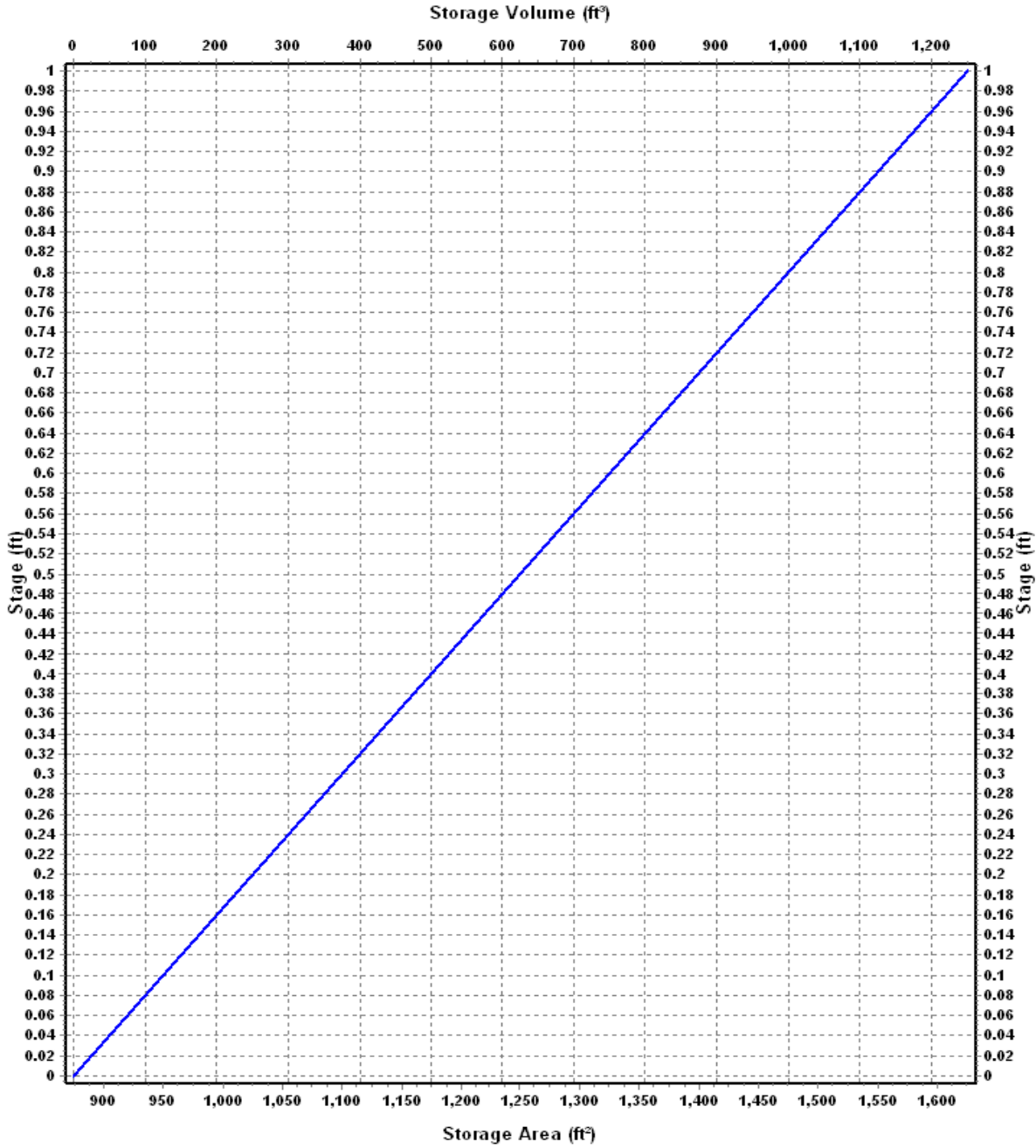
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-03

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	875	0.000
1	1625	1250.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-03 (continued)

Output Summary Results

Peak Inflow (cfs)	0.20
Peak Lateral Inflow (cfs)	0.20
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	3.28
Max HGL Elevation Attained (ft)	237.41
Max HGL Depth Attained (ft)	0.41
Average HGL Elevation Attained (ft)	237.05
Average HGL Depth Attained (ft)	0.05
Time of Max HGL Occurrence (days hh:mm)	0 09:20
Total Exfiltration Volume (1000-ft ³)	2.773
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-04

Input Data

Invert Elevation (ft) 238.00
Max (Rim) Elevation (ft) 239.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 238.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

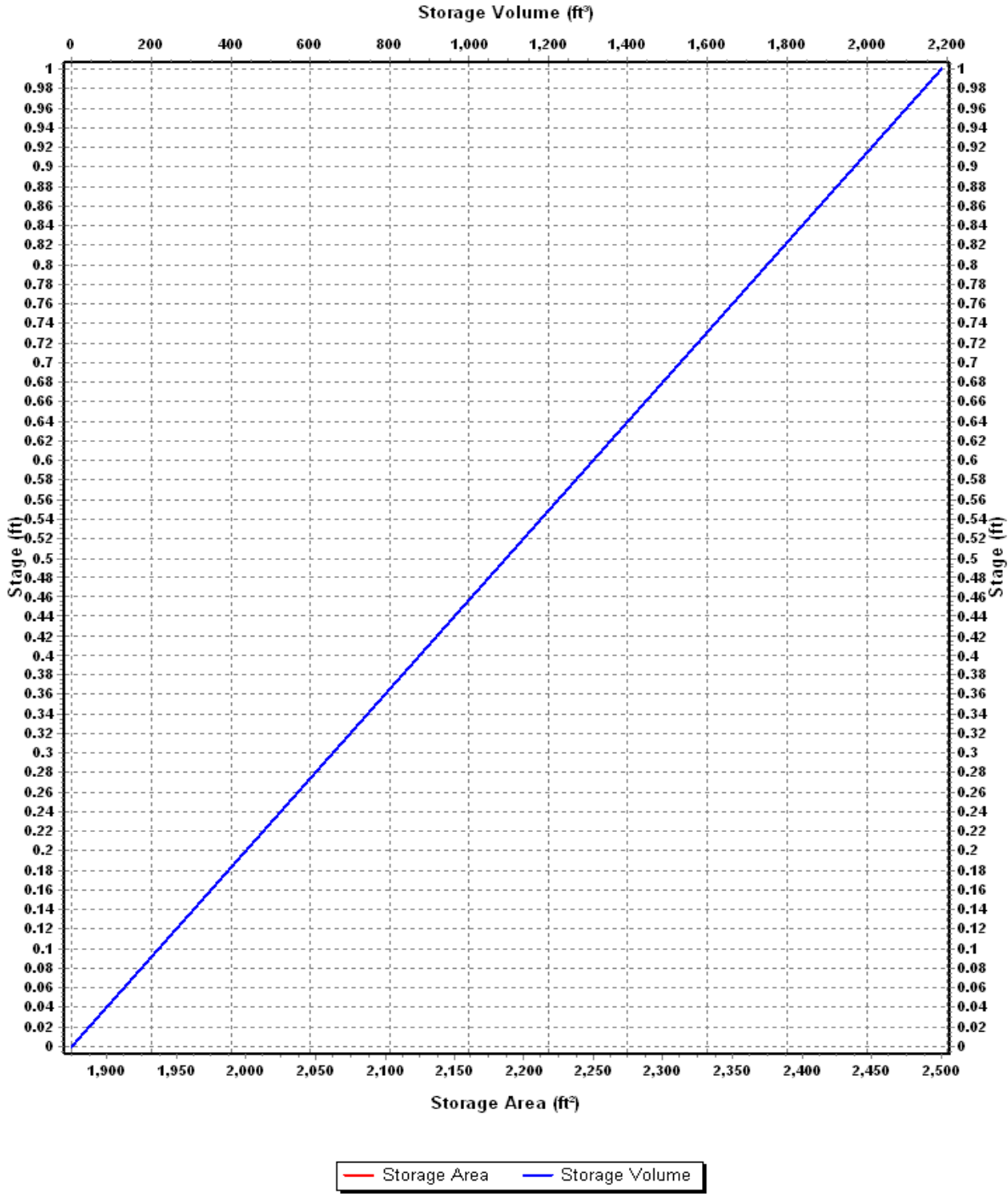
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-04

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	1875	0.000
1	2500	2187.50

Storage Area Volume Curves



Storage Node : LIDA-04 (continued)

Output Summary Results

Peak Inflow (cfs)	0.20
Peak Lateral Inflow (cfs)	0.20
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	5.40
Max HGL Elevation Attained (ft)	238.11
Max HGL Depth Attained (ft)	0.11
Average HGL Elevation Attained (ft)	238.00
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 08:27
Total Exfiltration Volume (1000-ft ³)	2.849
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-05

Input Data

Invert Elevation (ft) 255.00
Max (Rim) Elevation (ft) 257.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 255.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 12000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

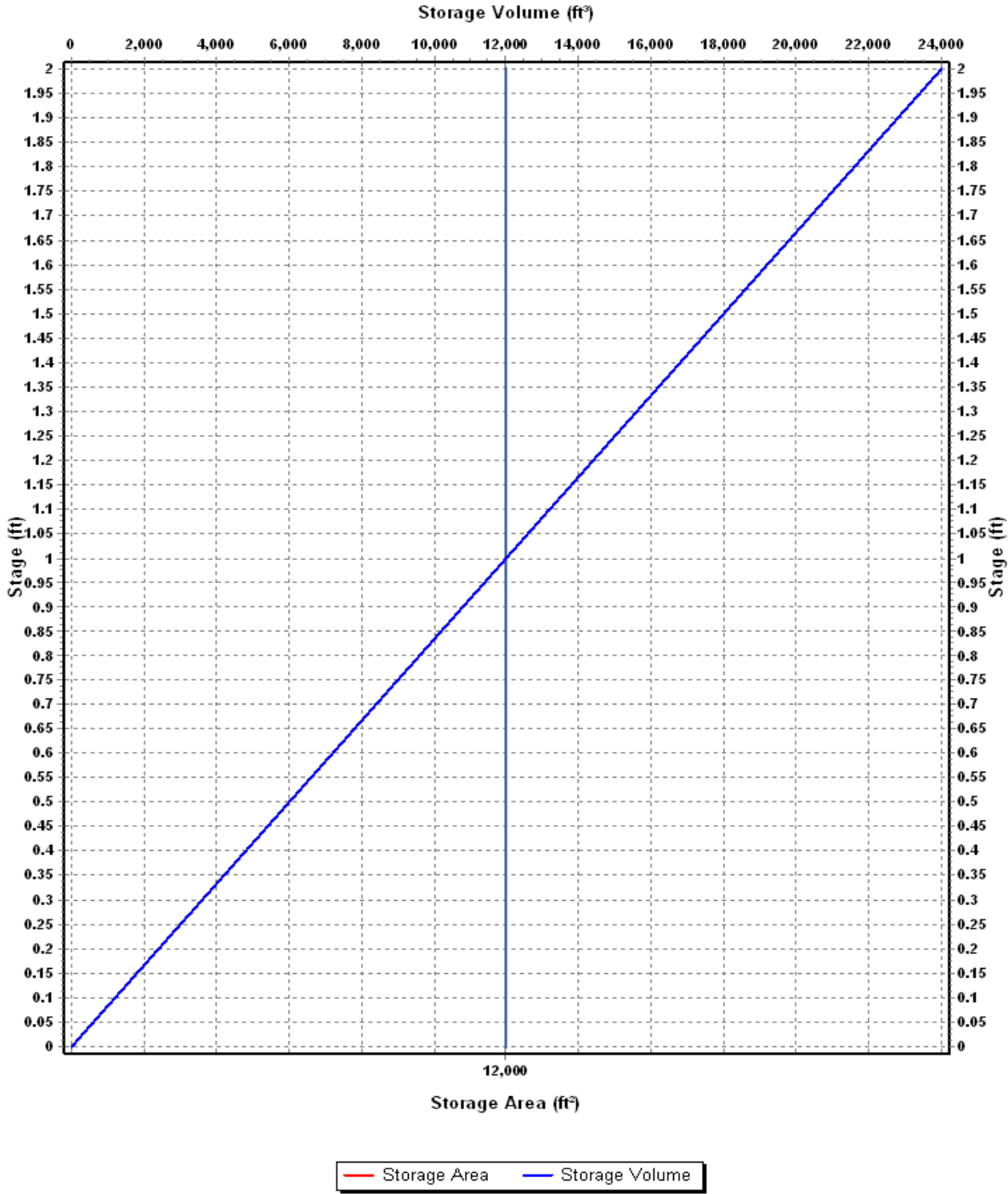
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-05

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	12000	0.000
2	12000	24000.00

Storage Area Volume Curves



Storage Node : LIDA-05 (continued)

Output Summary Results

Peak Inflow (cfs)	1.12
Peak Lateral Inflow (cfs)	1.12
Peak Outflow (cfs)	0.06
Peak Exfiltration Flow Rate (cfm)	8.33
Max HGL Elevation Attained (ft)	255.37
Max HGL Depth Attained (ft)	0.37
Average HGL Elevation Attained (ft)	255.14
Average HGL Depth Attained (ft)	0.14
Time of Max HGL Occurrence (days hh:mm)	0 16:55
Total Exfiltration Volume (1000-ft³)	13.027
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-06A

Input Data

Invert Elevation (ft) 231.00
Max (Rim) Elevation (ft) 233.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 231.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 10000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

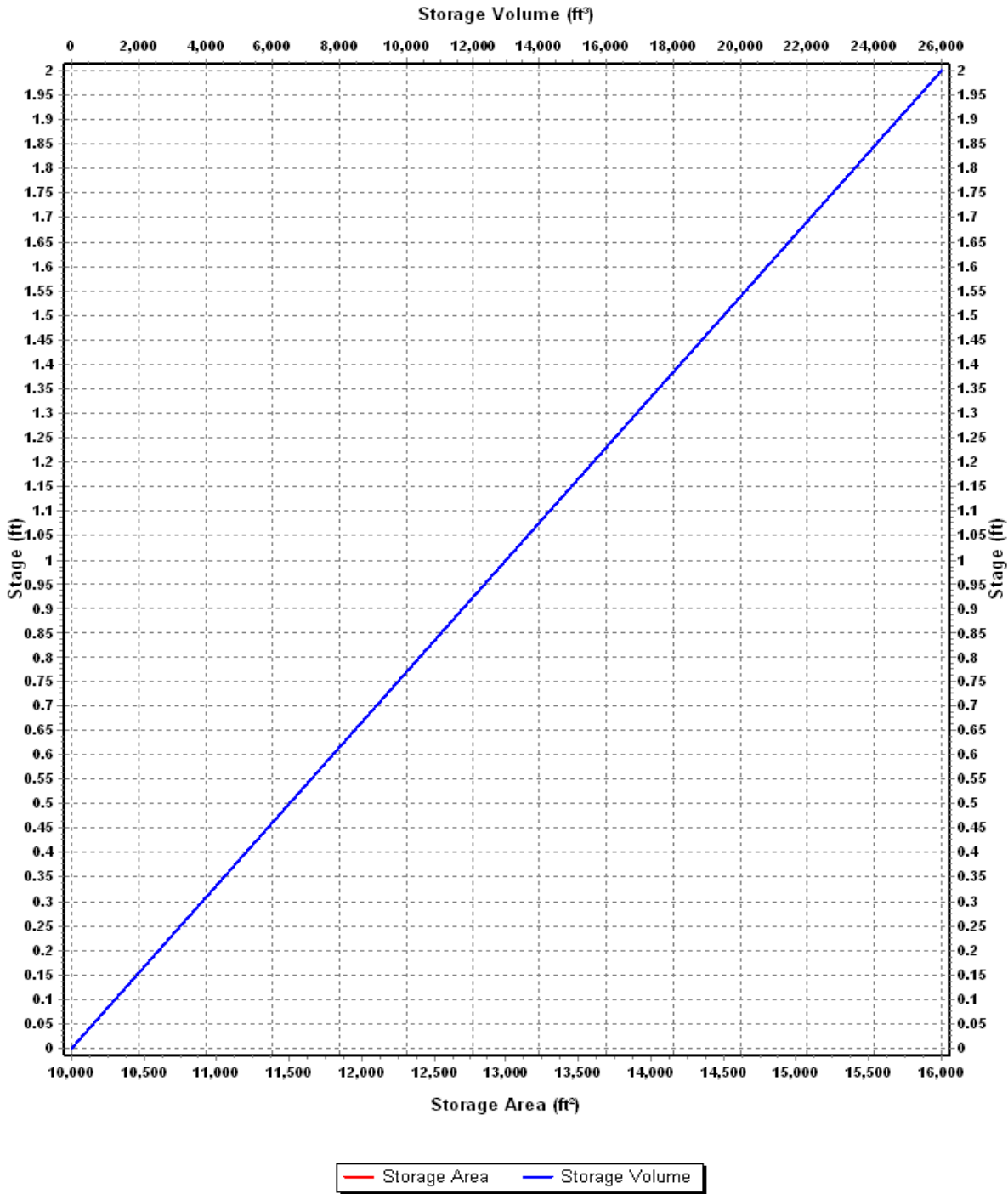
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-06A

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	10000	0.000
2	16000	26000.00

Storage Area Volume Curves



Storage Node : LIDA-06A (continued)

Output Summary Results

Peak Inflow (cfs)	2.18
Peak Lateral Inflow (cfs)	2.18
Peak Outflow (cfs)	0.05
Peak Exfiltration Flow Rate (cfm)	10.03
Max HGL Elevation Attained (ft)	232.48
Max HGL Depth Attained (ft)	1.48
Average HGL Elevation Attained (ft)	231.81
Average HGL Depth Attained (ft)	0.81
Time of Max HGL Occurrence (days hh:mm)	1 00:05
Total Exfiltration Volume (1000-ft ³)	25.060
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-06B

Input Data

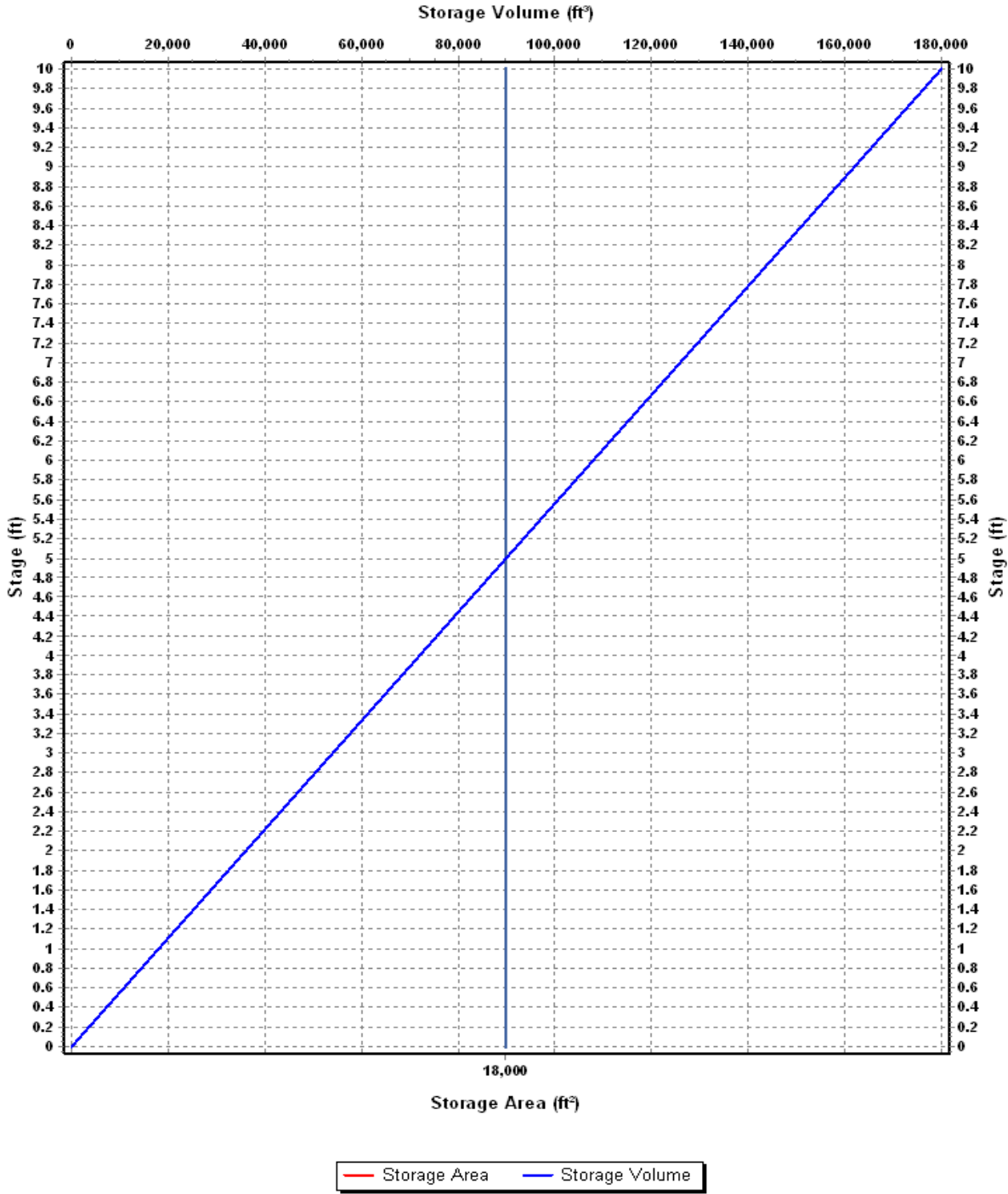
Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 10.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18000.00
Evaporation Loss 0.00

Storage Area Volume Curves

Storage Curve : LIDA-06B

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	18000	0.000
10	18000	180000.00

Storage Area Volume Curves



Storage Node : LIDA-06B (continued)

Output Summary Results

Peak Inflow (cfs)	0.24
Peak Lateral Inflow (cfs)	0.24
Peak Outflow (cfs)	0.04
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	237.08
Max HGL Depth Attained (ft)	0.08
Average HGL Elevation Attained (ft)	237.04
Average HGL Depth Attained (ft)	0.04
Time of Max HGL Occurrence (days hh:mm)	0 13:45
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-07

Input Data

Invert Elevation (ft) 242.00
Max (Rim) Elevation (ft) 243.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 242.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 2812.00
Evaporation Loss 0.00

Infiltration/Exfiltration

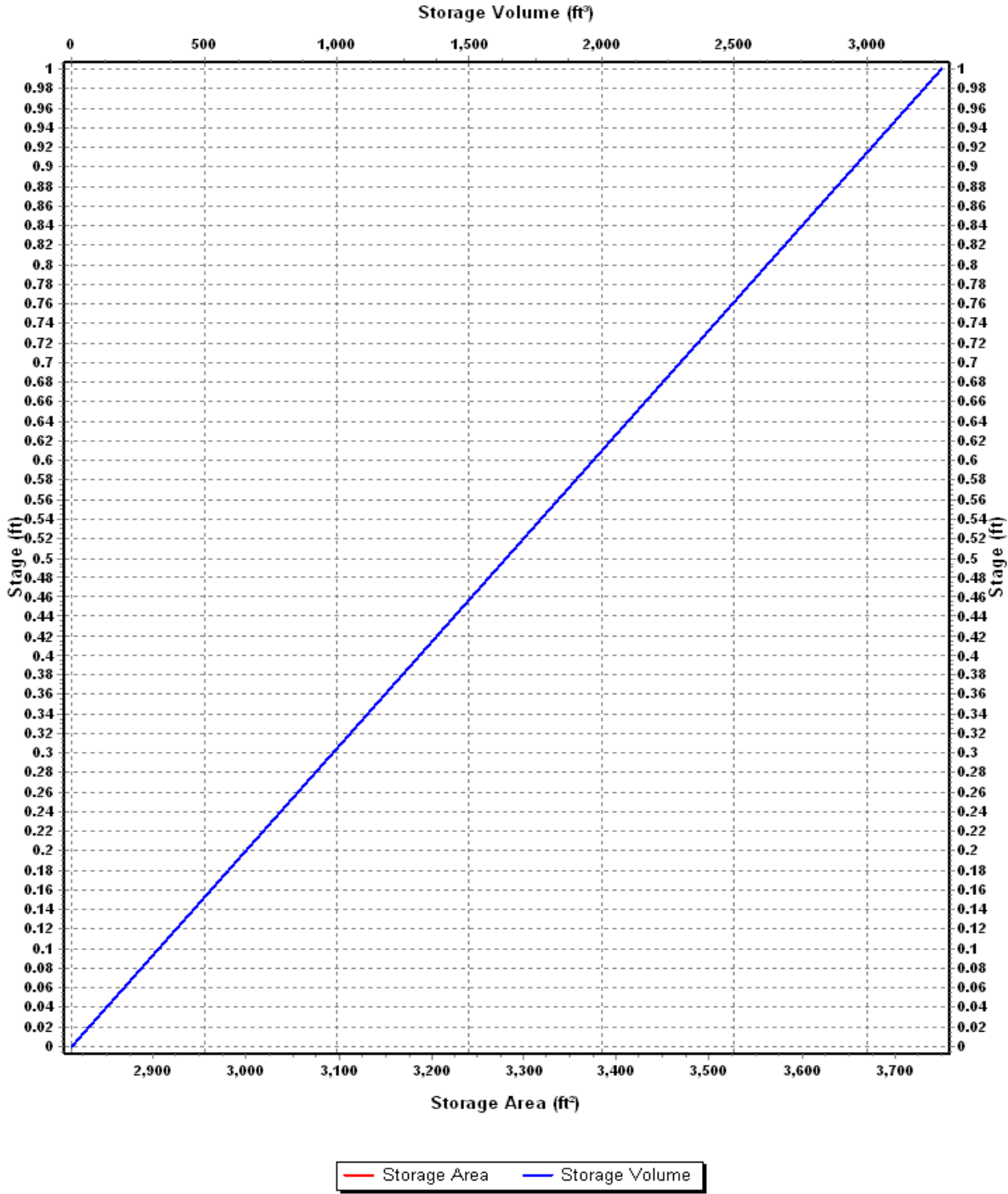
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-07

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	2812	0.000
1	3750	3281.00

Storage Area Volume Curves



Storage Node : LIDA-07 (continued)

Output Summary Results

Peak Inflow (cfs)	0.51
Peak Lateral Inflow (cfs)	0.51
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	8.65
Max HGL Elevation Attained (ft)	242.32
Max HGL Depth Attained (ft)	0.32
Average HGL Elevation Attained (ft)	242.03
Average HGL Depth Attained (ft)	0.03
Time of Max HGL Occurrence (days hh:mm)	0 09:20
Total Exfiltration Volume (1000-ft ³)	7.141
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-08B

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 5650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

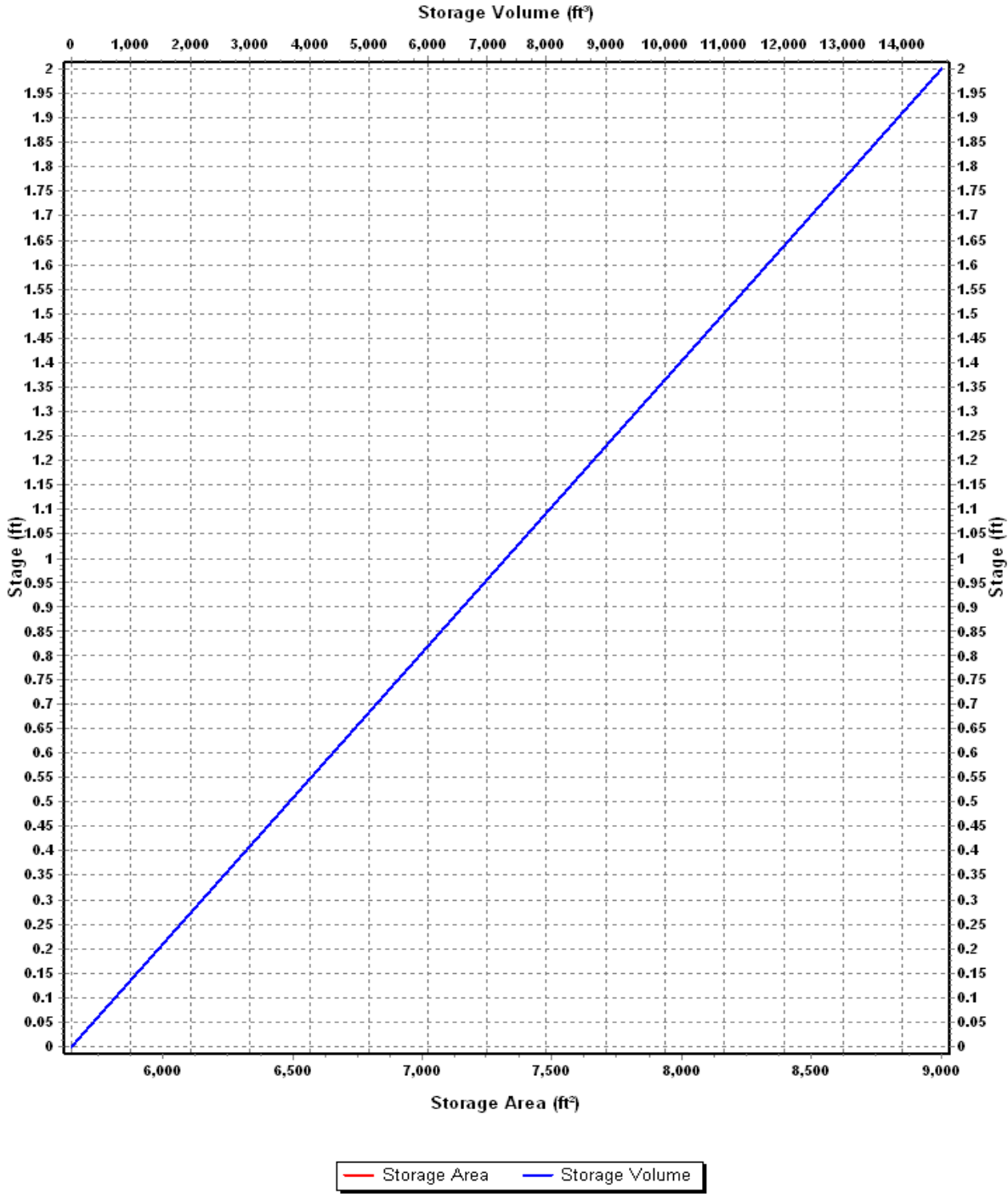
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08B

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	5650	0.000
2	9000	14650.00

Storage Area Volume Curves



Storage Node : LIDA-08B (continued)

Output Summary Results

Peak Inflow (cfs)	0.00
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	3.92
Max HGL Elevation Attained (ft)	245.00
Max HGL Depth Attained (ft)	0
Average HGL Elevation Attained (ft)	245.00
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 00:00
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-08C

Input Data

Invert Elevation (ft) 243.00
Max (Rim) Elevation (ft) 245.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 243.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

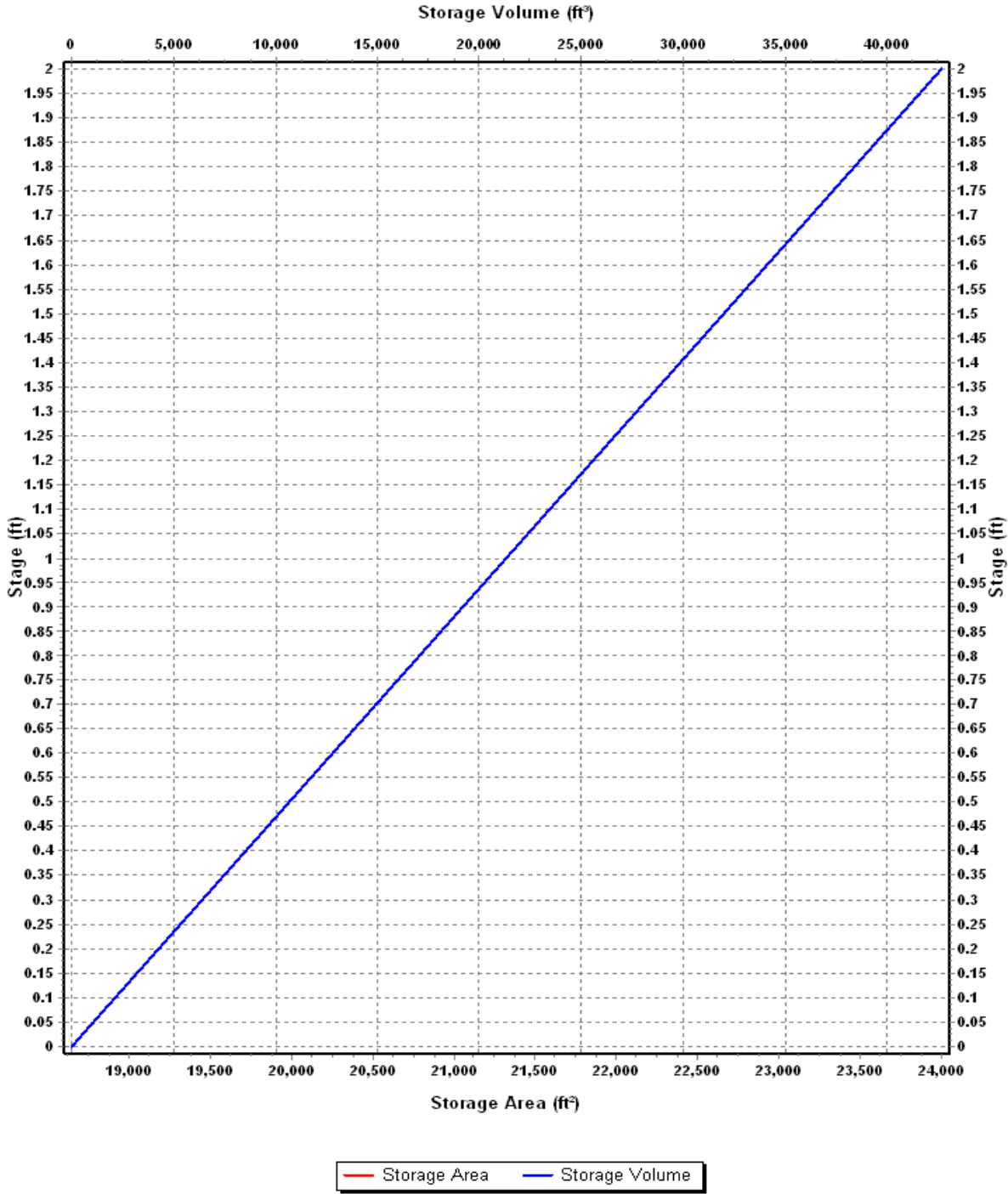
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08C

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	18650	0.000
2	24000	42650.00

Storage Area Volume Curves



Storage Node : LIDA-08C (continued)

Output Summary Results

Peak Inflow (cfs)	1.95
Peak Lateral Inflow (cfs)	1.12
Peak Outflow (cfs)	0.02
Peak Exfiltration Flow Rate (cfm)	14.00
Max HGL Elevation Attained (ft)	243.56
Max HGL Depth Attained (ft)	0.56
Average HGL Elevation Attained (ft)	243.24
Average HGL Depth Attained (ft)	0.24
Time of Max HGL Occurrence (days hh:mm)	0 19:54
Total Exfiltration Volume (1000-ft ³)	26.815
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-09

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 375.00
Evaporation Loss 0.00

Infiltration/Exfiltration

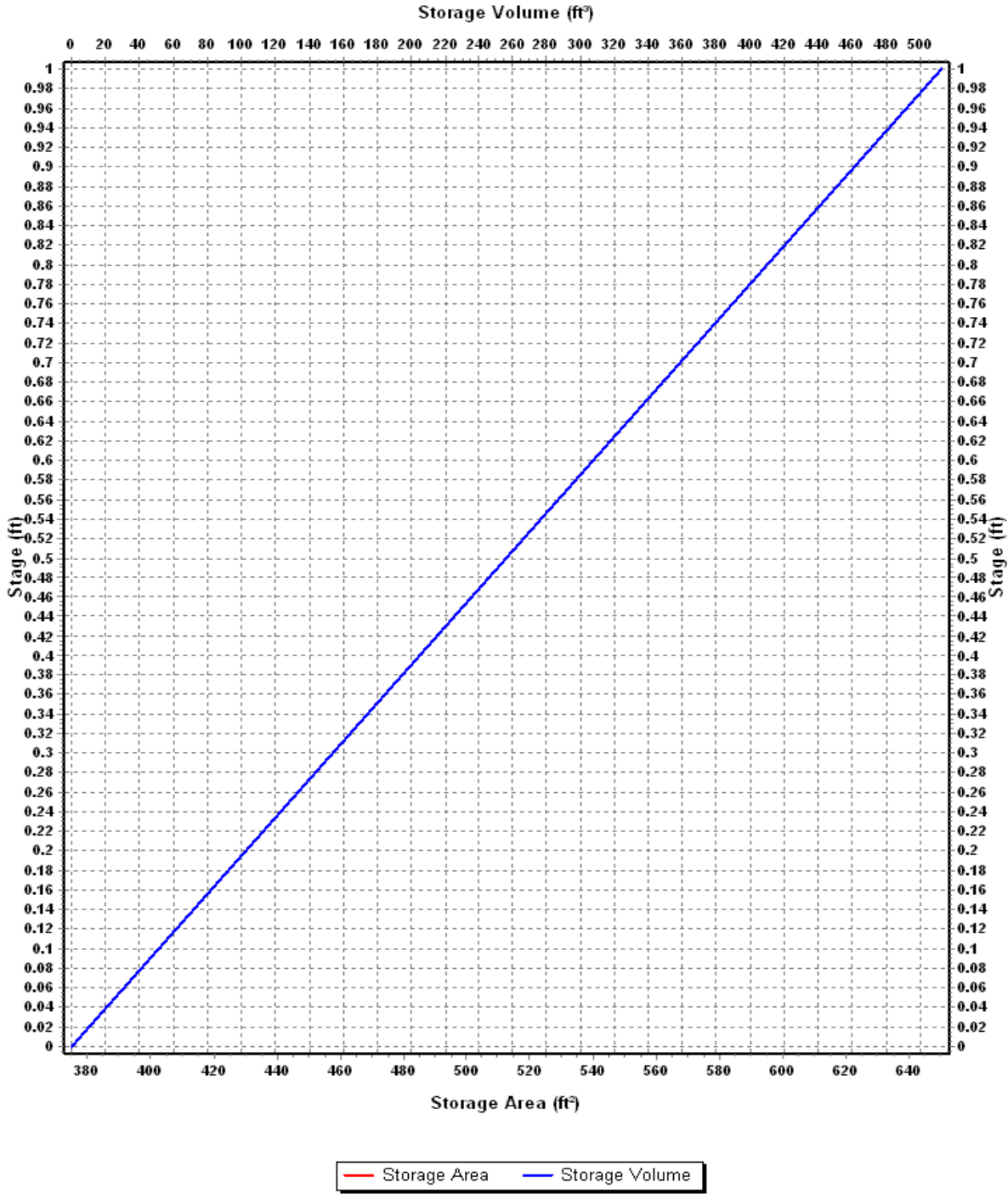
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-09

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	375	0.000
1	650	512.50

Storage Area Volume Curves



Storage Node : LIDA-09 (continued)

Output Summary Results

Peak Inflow (cfs)	0.12
Peak Lateral Inflow (cfs)	0.12
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	1.60
Max HGL Elevation Attained (ft)	250.74
Max HGL Depth Attained (ft)	0.74
Average HGL Elevation Attained (ft)	250.15
Average HGL Depth Attained (ft)	0.15
Time of Max HGL Occurrence (days hh:mm)	0 10:16
Total Exfiltration Volume (1000-ft ³)	1.693
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-10

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 657.00
Evaporation Loss 0.00

Infiltration/Exfiltration

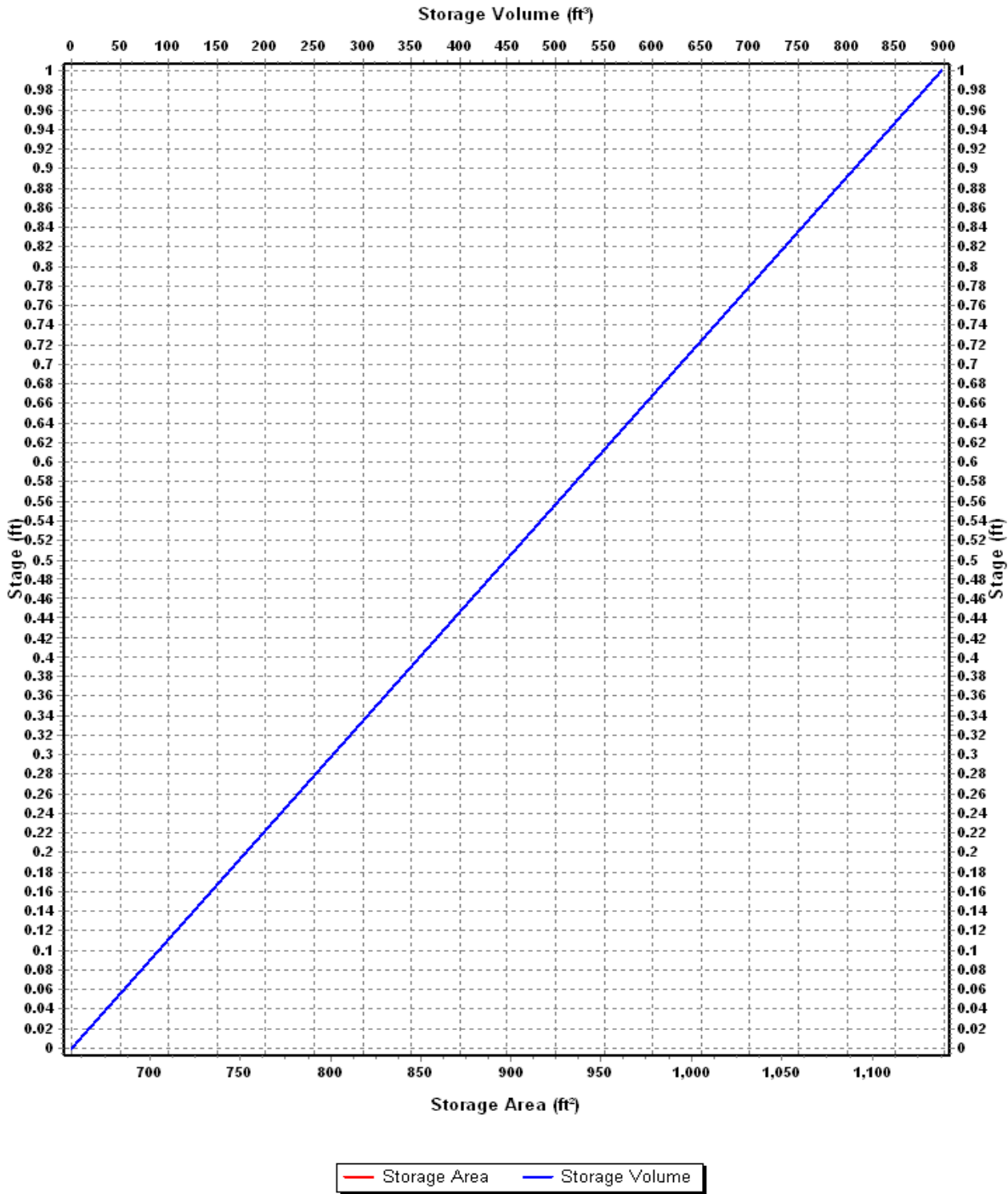
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-10

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	657	0.000
1	1138	897.50

Storage Area Volume Curves



Storage Node : LIDA-10 (continued)

Output Summary Results

Peak Inflow (cfs)	0.17
Peak Lateral Inflow (cfs)	0.17
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	2.49
Max HGL Elevation Attained (ft)	250.49
Max HGL Depth Attained (ft)	0.49
Average HGL Elevation Attained (ft)	250.07
Average HGL Depth Attained (ft)	0.07
Time of Max HGL Occurrence (days hh:mm)	0 09:31
Total Exfiltration Volume (1000-ft ³)	2.286
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-11

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 13000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

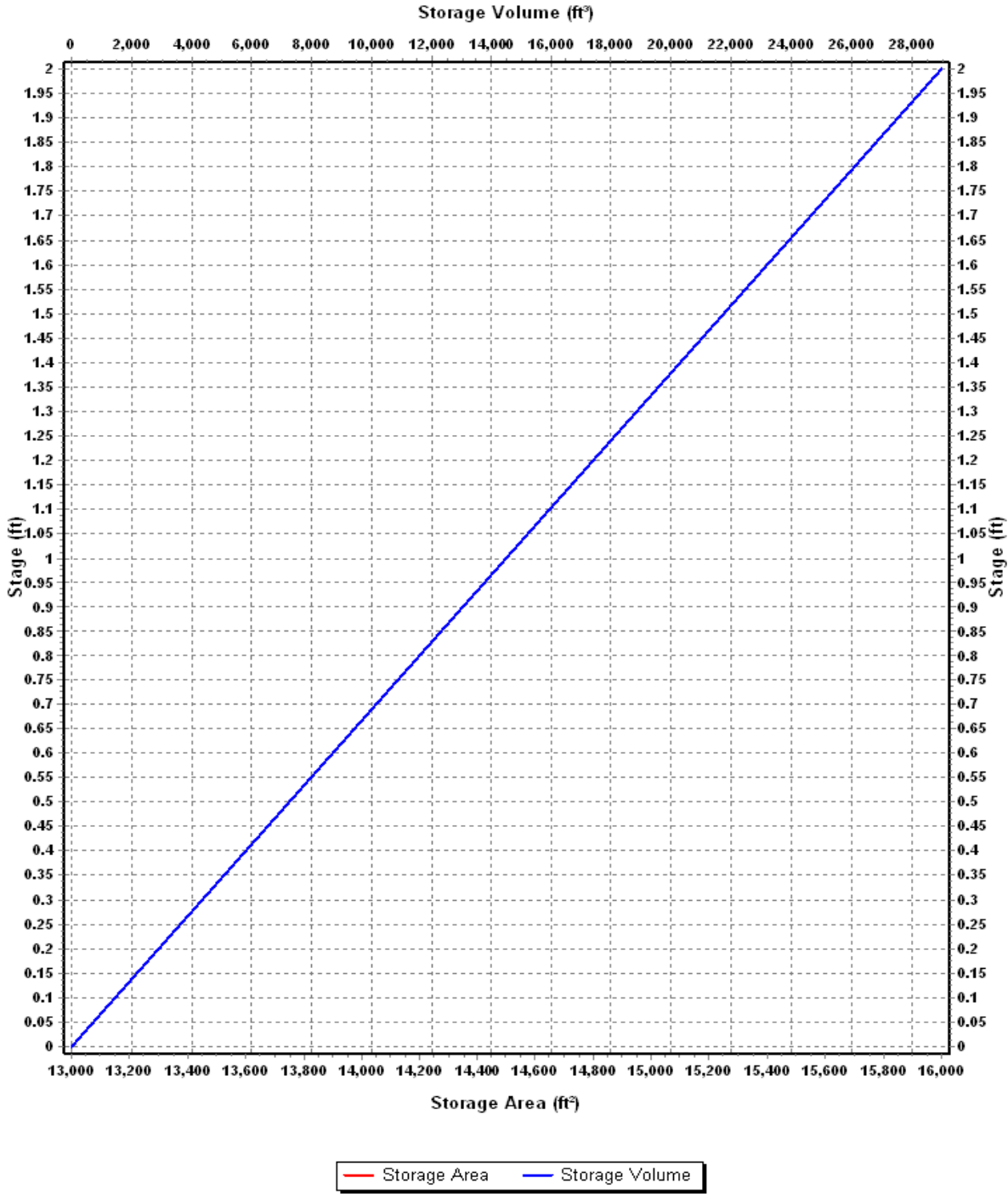
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-11

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	13000	0.000
2	16000	29000.00

Storage Area Volume Curves



Storage Node : LIDA-11 (continued)

Output Summary Results

Peak Inflow (cfs)	2.08
Peak Lateral Inflow (cfs)	2.08
Peak Outflow (cfs)	0.01
Peak Exfiltration Flow Rate (cfm)	10.18
Max HGL Elevation Attained (ft)	246.11
Max HGL Depth Attained (ft)	1.11
Average HGL Elevation Attained (ft)	245.62
Average HGL Depth Attained (ft)	0.62
Time of Max HGL Occurrence (days hh:mm)	0 23:39
Total Exfiltration Volume (1000-ft ³)	27.541
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-12

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

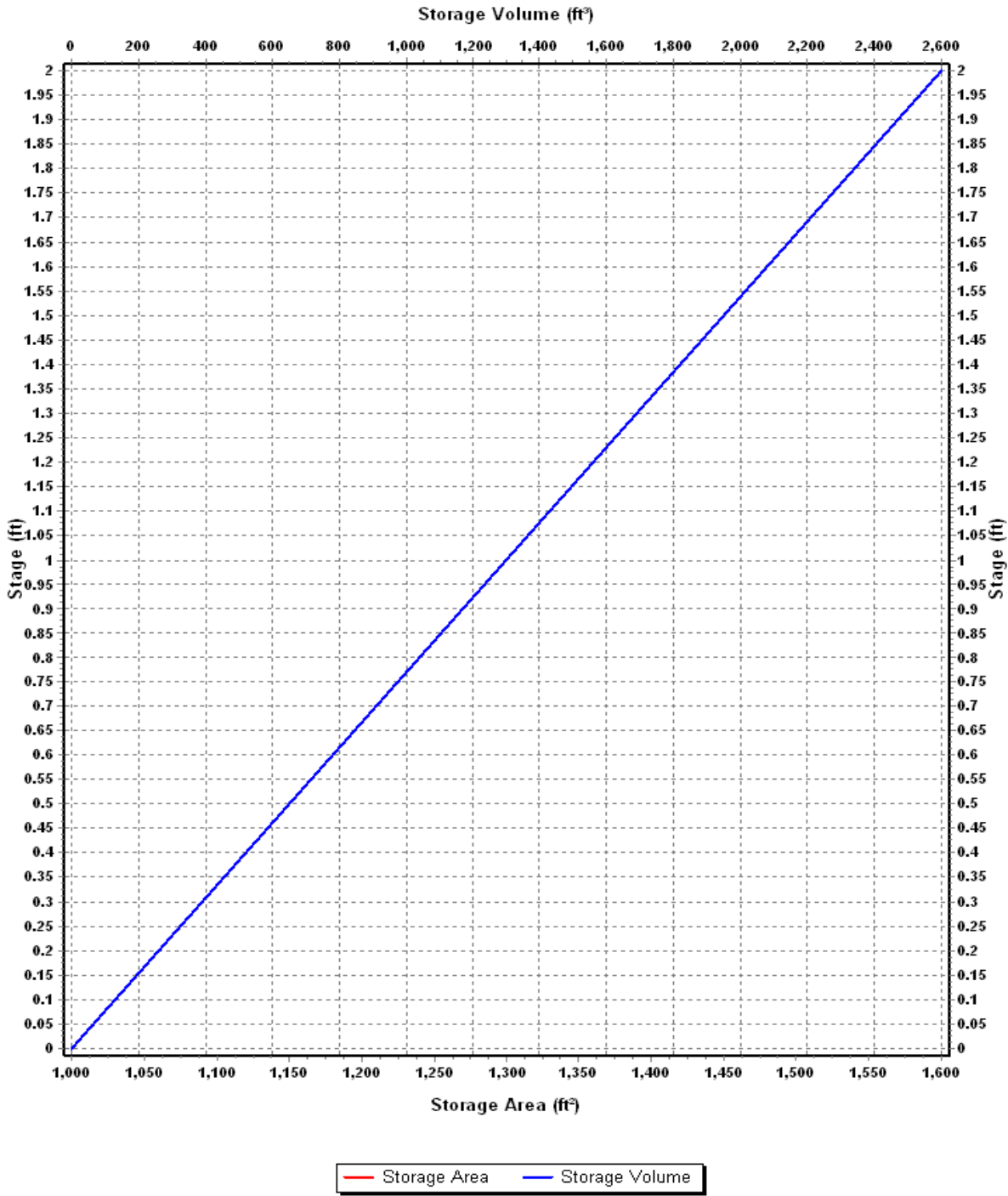
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-12

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	1000	0.000
2	1600	2600.00

Storage Area Volume Curves



Storage Node : LIDA-12 (continued)

Output Summary Results

Peak Inflow (cfs)	0.27
Peak Lateral Inflow (cfs)	0.27
Peak Outflow (cfs)	0.01
Peak Exfiltration Flow Rate (cfm)	3.28
Max HGL Elevation Attained (ft)	245.60
Max HGL Depth Attained (ft)	0.6
Average HGL Elevation Attained (ft)	245.10
Average HGL Depth Attained (ft)	0.1
Time of Max HGL Occurrence (days hh:mm)	0 10:00
Total Exfiltration Volume (1000-ft ³)	3.412
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 2-year storm

Storage Node : LIDA-8A

Input Data

Invert Elevation (ft) 256.00
Max (Rim) Elevation (ft) 258.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 256.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1777.00
Evaporation Loss 0.00

Infiltration/Exfiltration

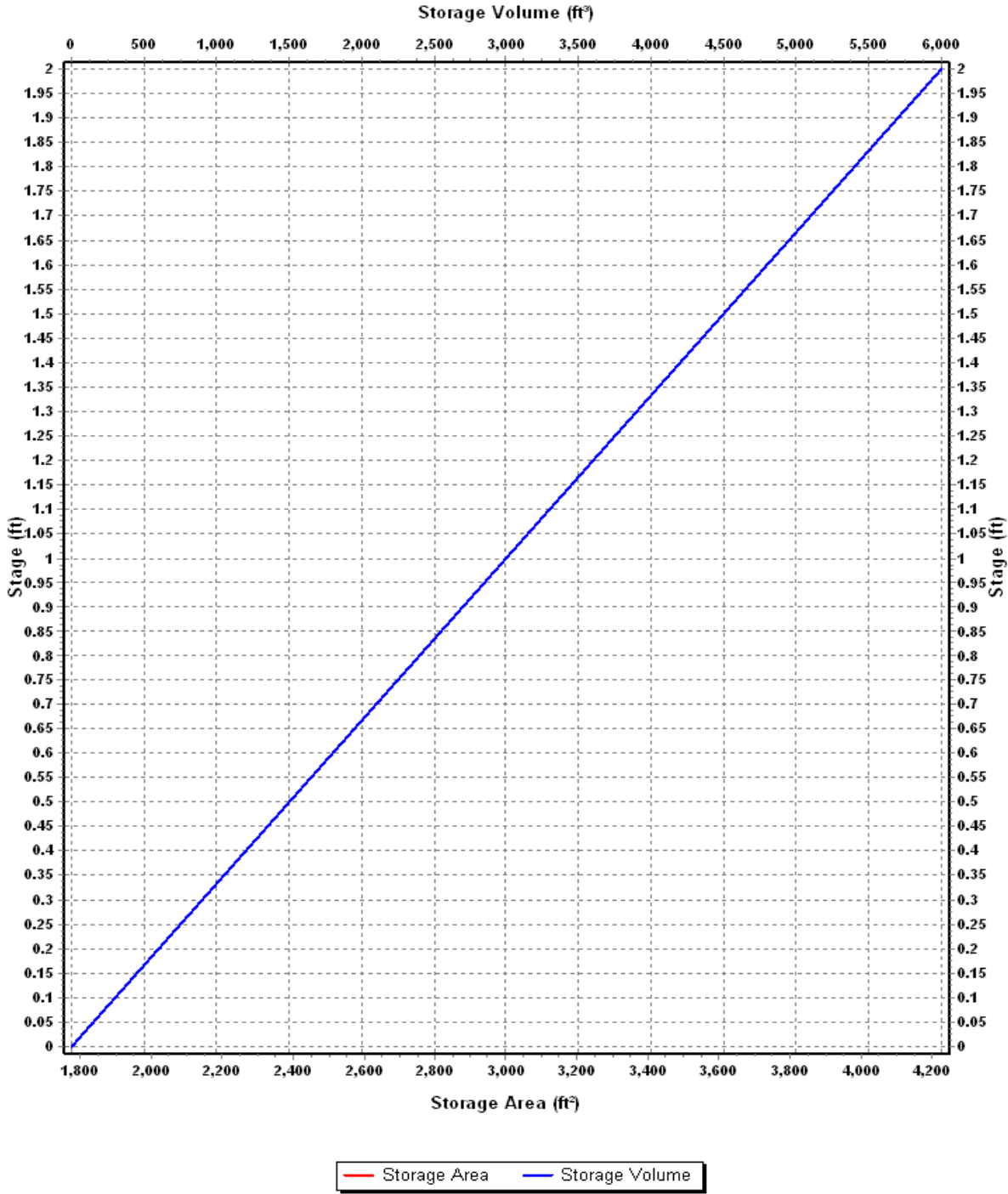
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-8A

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	1777	0.000
2	4226	6003.00

Storage Area Volume Curves



Storage Node : LIDA-8A (continued)

Output Summary Results

Peak Inflow (cfs)	1.22
Peak Lateral Inflow (cfs)	1.22
Peak Outflow (cfs)	0.83
Peak Exfiltration Flow Rate (cfm)	2.26
Max HGL Elevation Attained (ft)	257.21
Max HGL Depth Attained (ft)	1.21
Average HGL Elevation Attained (ft)	256.56
Average HGL Depth Attained (ft)	0.56
Time of Max HGL Occurrence (days hh:mm)	0 08:09
Total Exfiltration Volume (1000-ft ³)	4.742
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Project Description

File Name 20191126-POST-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 03, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	14
Nodes.....	62
<i>Junctions</i>	45
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	15
Links.....	67
<i>Channels</i>	36
<i>Pipes</i>	30
<i>Pumps</i>	1
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	5-yr	Intensity	inches	Oregon	Washington	5	3.10	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
5-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-LIDA_11	3.71	96.88	3.10	2.74	10.17	2.63	0 00:05:00
2	COF-LIDA_12	0.49	96.13	3.10	2.66	1.31	0.34	0 00:05:00
3	HED-LIDA_01	0.43	94.77	3.10	2.52	1.08	0.28	0 00:05:00
4	HED-LIDA_02	0.39	94.78	3.10	2.53	0.99	0.26	0 00:05:00
5	HED-LIDA_03	0.40	94.61	3.10	2.51	1.00	0.26	0 00:05:00
6	HED-LIDA_04	0.44	93.24	3.10	2.37	1.03	0.27	0 00:05:00
7	HED-LIDA_05	2.67	91.26	3.10	2.19	5.85	1.52	0 00:05:00
8	HED-LIDA_06A	5.95	89.16	3.10	2.00	11.93	3.05	0 00:05:00
9	HED-LIDA_06B	0.41	98.00	3.10	2.87	1.18	0.30	0 00:05:00
10	HED-LIDA_07	1.08	93.59	3.10	2.41	2.59	0.68	0 00:05:00
11	HED-LIDA_08B	2.25	94.33	3.10	2.48	5.58	1.46	0 00:05:00
12	HED-LIDA_09	0.23	95.64	3.10	2.61	0.60	0.16	0 00:05:00
13	HED-LIDA_10	0.32	95.08	3.10	2.56	0.82	0.21	0 00:05:00
14	HED-LIDA_8A	2.32	95.49	3.10	2.60	6.04	1.58	0 00:05:00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft ²)	Peak Inflow (cfs)	Max HGL Elevation (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	COF-01A	Junction	238.00	250.00	238.00	1000.00	12.00	0.12	238.11	0.00	11.89	0 00:00	0.00	0.00
2	COF-01B	Junction	244.00	247.00	244.00	1000.00	12.00	0.11	244.03	0.00	2.97	0 00:00	0.00	0.00
3	COF-01C	Junction	245.00	247.00	245.00	1000.00	12.00	0.11	246.51	0.00	1.99	0 00:00	0.00	0.00
4	COF-02A	Junction	244.00	247.00	244.00	1000.00	12.00	0.01	244.03	0.00	3.97	0 00:00	0.00	0.00
5	COF-02B	Junction	245.00	247.00	245.00	1000.00	12.00	0.01	245.93	0.00	1.07	0 00:00	0.00	0.00
6	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	0.41	152.04	0.00	7.96	0 00:00	0.00	0.00
7	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.31	157.05	0.00	7.95	0 00:00	0.00	0.00
8	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.31	158.01	0.00	6.99	0 00:00	0.00	0.00
9	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.31	177.19	0.00	4.06	0 00:00	0.00	0.00
10	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.31	181.15	0.00	10.85	0 00:00	0.00	0.00
11	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.31	223.10	0.00	5.90	0 00:00	0.00	0.00
12	HED-01G	Junction	226.00	229.00	226.00	1000.00	12.00	0.31	226.10	0.00	3.40	0 00:00	0.00	0.00
13	HED-01H	Junction	229.00	232.00	229.00	1000.00	12.00	0.31	229.18	0.00	2.82	0 00:00	0.00	0.00
14	HED-01I	Junction	230.00	233.00	230.00	1000.00	12.00	0.31	230.18	0.00	2.82	0 00:00	0.00	0.00
15	HED-01J	Junction	231.00	233.00	231.00	1000.00	12.00	0.31	232.78	0.00	1.97	0 00:00	0.00	0.00
16	HED-01K	Junction	226.50	229.00	226.50	1000.00	12.00	0.17	228.11	0.00	1.64	0 00:00	0.00	0.00
17	HED-01L	Junction	226.50	229.00	226.50	1000.00	12.00	0.08	226.61	0.00	2.89	0 00:00	0.00	0.00
18	HED-01M	Junction	224.00	230.00	224.00	1000.00	12.00	0.05	224.06	0.00	5.94	0 00:00	0.00	0.00
19	HED-01N	Junction	230.00	235.00	230.00	1000.00	12.00	0.05	230.19	0.00	4.81	0 00:00	0.00	0.00
20	HED-01O	Junction	234.00	238.00	234.00	1000.00	12.00	0.05	234.06	0.00	4.44	0 00:00	0.00	0.00
21	HED-01P	Junction	234.00	239.00	234.00	1000.00	12.00	0.00	234.00	0.00	5.50	0 00:00	0.00	0.00
22	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	0.10	171.02	0.00	7.98	0 00:00	0.00	0.00
23	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	0.10	171.43	0.00	5.57	0 00:00	0.00	0.00
24	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	0.10	173.61	0.00	4.39	0 00:00	0.00	0.00
25	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	0.10	174.80	0.00	10.94	0 00:00	0.00	0.00
26	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	0.10	180.62	0.00	7.38	0 00:00	0.00	0.00
27	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	0.11	181.85	0.00	6.11	0 00:00	0.00	0.00
28	HED-02G	Junction	235.00	237.00	235.00	1000.00	12.00	0.07	235.05	0.00	2.95	0 00:00	0.00	0.00
29	HED-02H	Junction	236.00	238.00	236.00	1000.00	12.00	0.07	236.11	0.00	1.89	0 00:00	0.00	0.00
30	HED-02I	Junction	237.00	239.00	237.00	1000.00	12.00	0.00	237.00	0.00	2.00	0 00:00	0.00	0.00
31	HED-02J	Junction	237.00	250.00	237.00	1000.00	12.00	0.07	237.10	0.00	12.90	0 00:00	0.00	0.00
32	HED-02K	Junction	255.00	257.00	255.00	1000.00	12.00	0.08	255.76	0.00	2.74	0 00:00	0.00	0.00
33	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.06	183.01	0.00	6.99	0 00:00	0.00	0.00
34	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.07	235.01	0.00	4.99	0 00:00	0.00	0.00
35	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.15	236.03	0.00	13.97	0 00:00	0.00	0.00
36	HED-03D	Junction	241.00	245.00	241.00	1000.00	12.00	0.18	241.05	0.00	3.95	0 00:00	0.00	0.00
37	HED-03E	Junction	250.00	251.00	250.00	1000.00	12.00	0.10	250.09	0.00	1.41	0 00:00	0.00	0.00
38	HED-03F	Junction	250.00	251.00	250.00	1000.00	12.00	0.07	250.07	0.00	1.68	0 00:00	0.00	0.00
39	HED-03G	Junction	242.00	245.00	242.00	1000.00	12.00	0.02	242.00	0.00	3.00	0 00:00	0.00	0.00
40	HED-03H	Junction	243.00	245.00	243.00	1000.00	12.00	0.02	243.94	0.00	2.56	0 00:00	0.00	0.00
41	HED-03I	Junction	244.00	247.00	244.00	1000.00	12.00	0.00	244.00	0.00	3.00	0 00:00	0.00	0.00
42	HED-03J	Junction	245.00	247.00	245.00	1000.00	12.00	0.00	245.00	0.00	3.50	0 00:00	0.00	0.00
43	HED-03K	Junction	256.00	258.00	256.00	1000.00	12.00	0.83	257.06	0.00	1.94	0 00:00	0.00	0.00
44	HED-03L	Junction	256.00	258.00	256.00	1000.00	12.00	0.83	256.22	0.00	1.78	0 00:00	0.00	0.00
45	HED-03t	Junction	238.00	243.00	238.00	1000.00	12.00	0.01	238.06	0.00	5.94	0 00:00	0.00	0.00
46	COF-01	Outfall	238.00					0.12	238.11					
47	HED-01	Outfall	150.00					0.40	150.04					
48	LIDA-01	Storage Node	228.00	229.00	228.00		938.00	0.28	228.53				0.00	0.00
49	LIDA-02	Storage Node	228.00	229.00	228.00		562.00	3.97	228.79				0.00	0.00
50	LIDA-03	Storage Node	237.00	238.00	237.00		875.00	0.26	237.52				0.00	0.00
51	LIDA-04	Storage Node	238.00	239.00	238.00		1875.00	0.27	238.20				0.00	0.00
52	LIDA-05	Storage Node	255.00	257.00	255.00		12000.00	1.52	255.76				0.00	0.00
53	LIDA-06A	Storage Node	231.00	233.00	231.00		10000.00	3.05	232.78				0.00	0.00
54	LIDA-06B	Storage Node	237.00	247.00	237.00		18000.00	0.30	237.11				0.00	0.00
55	LIDA-07	Storage Node	242.00	243.00	242.00		2812.00	0.68	242.53				0.00	0.00
56	LIDA-08B	Storage Node	245.00	247.00	245.00		5650.00	0.00	245.00				0.00	0.00
57	LIDA-08C	Storage Node	243.00	245.00	243.00		18650.00	2.29	243.94				0.00	0.00
58	LIDA-09	Storage Node	250.00	251.00	250.00		375.00	0.16	250.78				0.00	0.00
59	LIDA-10	Storage Node	250.00	251.00	250.00		657.00	0.21	250.54				0.00	0.00
60	LIDA-11	Storage Node	245.00	247.00	245.00		13000.00	2.63	246.51				0.00	0.00
61	LIDA-12	Storage Node	245.00	247.00	245.00		1000.00	0.34	245.93				0.00	0.00
62	LIDA-8A	Storage Node	256.00	258.00	256.00		1777.00	1.58	257.40				0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
5-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Reported (min)	Reported Condition
1	COF-01D	Pipe	COF-01C	COF-01B	1.00	245.00	244.00	100.0000	0.750	0.0130	0.02	0.02	0.96	10.57	0.04	0.71	0.00	Calculated
2	COF-2A	Pipe	COF-02A	COF-01A	400.00	244.00	238.00	1.5000	18.000	0.0150	0.01	11.15	0.00	0.81	0.07	0.05	0.00	Calculated
3	COF-2C	Pipe	COF-02B	COF-02A	1.00	245.00	244.00	100.0000	0.500	0.0130	0.01	0.01	1.09	6.40	0.04	0.87	0.00	> CAPACITY
4	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.31	20.90	0.02	3.62	0.13	0.06	0.00	Calculated
5	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.31	28.48	0.01	2.99	0.15	0.07	0.00	Calculated
6	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.31	7.14	0.04	4.46	0.15	0.15	0.00	Calculated
7	HED-01G	Pipe	HED-01G	HED-01F	20.00	226.00	223.00	15.0000	18.000	0.0130	0.31	40.68	0.01	7.36	0.10	0.07	0.00	Calculated
8	HED-01H	Pipe	HED-01L	HED-01G	50.00	226.50	226.00	1.0000	12.000	0.0130	0.08	3.56	0.02	2.07	0.09	0.09	0.00	Calculated
9	HED-01L	Pipe	HED-01M	HED-01F	47.37	224.00	223.00	2.1100	18.000	0.0130	0.05	15.26	0.00	1.51	0.07	0.05	0.00	Calculated
10	HED-01N	Pipe	HED-01O	HED-01N	75.00	234.00	230.00	5.3300	12.000	0.0130	0.05	8.23	0.01	2.43	0.12	0.12	0.00	Calculated
11	HED-01P	Pipe	HED-01P	HED-01N	65.00	234.00	230.00	6.1500	18.000	0.0130	0.00	26.06	0.00	0.00	0.10	0.06	0.00	Calculated
12	HED-01R	Pipe	HED-01I	HED-01H	50.00	230.00	229.00	2.0000	12.000	0.0130	0.31	5.04	0.06	3.27	0.18	0.18	0.00	Calculated
13	HED-01S	Pipe	HED-01H	HED-01G	100.00	229.00	228.00	1.0000	18.000	0.0130	0.31	10.50	0.03	2.61	0.18	0.12	0.00	Calculated
14	HED-01U	Pipe	HED-01J	HED-01I	1.00	231.00	230.00	100.0000	1.000	0.0130	0.05	0.05	1.11	9.75	0.08	1.00	527.00	SURCHARGED
15	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	0.10	40.58	0.00	2.07	0.07	0.02	0.00	Calculated
16	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	0.10	8.91	0.01	1.43	0.12	0.08	0.00	Calculated
17	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	0.10	4.04	0.02	0.99	0.16	0.10	0.00	Calculated
18	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	0.10	59.16	0.00	1.24	0.12	0.04	0.00	Calculated
19	HED-02H	Pipe	HED-02H	HED-02G	100.00	236.00	235.00	1.0000	12.000	0.0130	0.07	3.56	0.02	2.44	0.08	0.08	0.00	Calculated
20	HED-02I	Pipe	HED-02J	HED-02H	100.00	237.00	236.00	1.0000	12.000	0.0130	0.07	3.56	0.02	1.66	0.10	0.10	0.00	Calculated
21	HED-02J	Pipe	HED-02K	HED-02J	1.00	255.00	237.00	1800.0000	0.750	0.0130	0.07	0.09	0.77	23.64	0.06	1.00	1772.00	SURCHARGED
22	HED-03D	Pipe	HED-03I	HED-03B	500.00	238.00	235.00	0.6000	12.000	0.0130	0.01	2.76	0.00	1.56	0.03	0.03	0.00	Calculated
23	HED-03E	Pipe	LIDA-07	HED-03I	47.11	242.00	242.50	-1.0600	18.000	0.0130	0.01	10.82	0.00	0.06	0.28	0.19	0.00	Calculated
24	HED-03I	Pipe	HED-03I	LIDA-08C	200.00	244.00	243.50	0.2500	18.000	0.0130	0.00	5.25	0.00	0.00	0.22	0.15	0.00	Calculated
25	HED-03J	Pipe	HED-03L	LIDA-08C	200.00	256.00	243.00	6.5000	12.000	0.0130	0.83	9.08	0.09	8.57	0.51	0.51	0.00	Calculated
26	HED-03L	Pipe	HED-03F	HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0130	0.07	10.69	0.01	5.55	0.05	0.05	0.00	Calculated
27	HED-03N	Pipe	HED-03E	HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0150	0.10	9.26	0.01	5.94	0.06	0.06	0.00	Calculated
28	HED-03Q	Pipe	HED-03K	HED-03L	1.00	256.00	256.00	0.0000	0.750	0.0130	0.02	0.00	23.05	5.62	0.06	1.00	1054.00	SURCHARGED
29	HED-03T	Pipe	HED-03J	HED-03I	1.00	245.00	244.00	100.0000	0.750	0.0130	0.00	0.02	0.00	0.00	0.00	0.00	0.00	Calculated
30	HED-03V	Pipe	HED-03H	HED-03G	1.00	243.00	242.00	100.0000	0.750	0.0130	0.02	0.02	1.02	13.29	0.03	0.54	0.00	> CAPACITY
31	COF-1A	Channel	COF-01A	COF-01	10.00	238.00	238.00	0.0000	60.000	0.0320	0.12	42.77	0.00	0.10	0.11	0.02	0.00	
32	COF-1B	Channel	COF-01B	COF-01A	150.00	244.00	238.00	4.0000	12.000	0.0320	0.11	37.11	0.00	0.32	0.07	0.07	0.00	
33	COF-1C	Channel	COF-01C	COF-01B	1.00	246.50	244.00	250.0000	24.000	0.0320	0.09	224.13	0.00	2.29	0.02	0.01	0.00	
34	COF-1E	Channel	LIDA-11	COF-01C	5.00	245.00	245.00	0.0000	24.000	0.0320	0.11	7.05	0.02	0.04	1.51	0.76	0.00	
35	COF-2B	Channel	COF-02B	COF-02A	1.00	245.00	246.00	-100.0000	24.000	0.0320	0.00	141.75	0.00	0.00	0.46	0.23	0.00	
36	COF-2D	Channel	LIDA-12	COF-02B	5.00	245.00	245.00	0.0000	24.000	0.0320	0.01	2.00	0.01	0.08	0.93	0.46	0.00	
37	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	0.40	1512.53	0.00	0.62	0.04	0.01	0.00	
38	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.32	1082.72	0.00	0.47	0.05	0.01	0.00	
39	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.31	2813.13	0.00	1.84	0.13	0.02	0.00	
40	HED-01I	Channel	LIDA-01	HED-01L	5.00	228.00	228.50	-10.0000	12.000	0.0320	0.21	24.81	0.01	0.31	0.28	0.28	0.00	
41	HED-01J	Channel	HED-01K	HED-01G	20.00	227.00	228.00	-5.0000	12.000	0.0320	0.17	4.99	0.03	0.32	0.54	0.55	0.00	
42	HED-01K	Channel	LIDA-02	HED-01K	5.00	228.00	228.75	-15.0000	12.000	0.0320	3.93	30.39	0.13	3.05	0.41	0.52	0.00	
43	HED-01M	Channel	HED-01N	HED-01M	500.00	230.00	224.00	1.2000	24.000	0.0320	0.05	37.78	0.00	1.61	0.13	0.06	0.00	
44	HED-01O	Channel	LIDA-03	HED-01O	5.00	237.00	237.50	-10.0000	12.000	0.0320	0.13	24.81	0.01	0.20	0.27	0.27	0.00	
45	HED-01Q	Channel	LIDA-04	HED-01P	5.00	238.00	238.50	-10.0000	12.000	0.0320	0.00	24.81	0.00	0.00	0.10	0.10	0.00	
46	HED-01T	Channel	HED-01J	HED-01I	1.00	232.75	231.00	175.0000	24.000	0.0320	0.26	187.52	0.00	4.98	0.03	0.01	0.00	
47	HED-01V	Channel	LIDA-06A	HED-01J	5.00	231.00	231.00	0.0000	24.000	0.0320	0.31	16.66	0.02	0.04	1.78	0.89	0.00	
48	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	0.10	1963.65	0.00	0.33	0.03	0.00	0.00	
49	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	0.10	614.42	0.00	0.25	0.09	0.01	0.00	
50	HED-02G	Channel	HED-02G	HED-02F	1130.10	235.00	181.76	4.7100	36.000	0.0320	0.07	396.58	0.00	1.53	0.07	0.02	0.00	
51	HED-02K	Channel	HED-02K	HED-02J	1.00	256.50	237.00	1950.0000	24.000	0.0320	0.00	625.97	0.00	0.00	0.05	0.02	0.00	
52	HED-02L	Channel	HED-02I	HED-02H	44.02	237.00	236.00	2.2700	24.000	0.0320	0.00	55.99	0.00	0.00	0.06	0.03	0.00	
53	HED-02O	Channel	LIDA-05	HED-02K	5.00	255.00	255.00	0.0000	24.000	0.0320	0.06	16.66	0.00	0.11	0.76	0.38	0.00	
54	HED-03A	Channel	HED-02F	HED-03A	770.00	181.76	183.00	-0.1600	60.000	0.0300	0.04	443.56	0.00	0.03	0.05	0.01	0.00	
55	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.06	2403.19	0.00	0.26	0.01	0.00	0.00	
56	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.06	417.77	0.00	0.14	0.02	0.00	0.00	
57	HED-03F	Channel	HED-03D	HED-03C	400.00	241.00	236.00	1.2500	24.000	0.0320	0.15	131.71	0.00	0.50	0.03	0.01	0.00	
58	HED-03G	Channel	HED-03G	HED-03D	10.00	242.00	241.00	10.0000	24.000	0.0320	0.01	157.53	0.00	0.19	0.02	0.01	0.00	

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
5-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Reported Surcharged Condition (min)
59	HED-03H	Channel	HED-03H	HED-03G	1.00	244.50	242.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.00	0.00	0.00
60	HED-03K	Channel	LIDA-8A	HED-03K	5.00	256.00	256.00	0.0000	12.000	0.0320	0.83	0.83	1.00	0.41	1.00	1.00	1065.00
61	HED-03M	Channel	LIDA-09	HED-03F	5.00	250.00	250.75	-15.0000	12.000	0.0320	0.08	22.66	0.00	0.10	0.40	0.40	0.00
62	HED-03O	Channel	LIDA-10	HED-03E	5.00	250.00	250.50	-10.0000	12.000	0.0320	0.11	18.50	0.01	0.21	0.28	0.29	0.00
63	HED-03P	Channel	HED-03K	HED-03L	1.00	257.00	256.00	100.0000	24.000	0.0320	0.81	141.75	0.01	3.06	0.14	0.07	0.00
64	HED-03R	Channel	LIDA-08B	HED-03J	5.00	245.00	245.00	0.0000	24.000	0.0320	0.00	2.00	0.00	0.00	0.00	0.00	0.00
65	HED-03S	Channel	HED-03J	HED-03I	1.00	246.50	244.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.00	0.00	0.00
66	HED-03U	Channel	LIDA-08C	HED-03H	5.00	243.00	243.00	0.0000	24.000	0.0320	0.02	2.00	0.01	0.12	0.94	0.47	0.00
67	HED-02M	Pump	LIDA-06B	HED-02K		237.00	255.00				0.04						

Subbasin Hydrology

Subbasin : COF-LIDA_11

Input Data

Area (ac) 3.71
 Weighted Curve Number 96.88
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	3.48	C/D	98.00
Landscape	0.23	C/D	80.00
Composite Area & Weighted CN	3.71		96.88

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
 R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

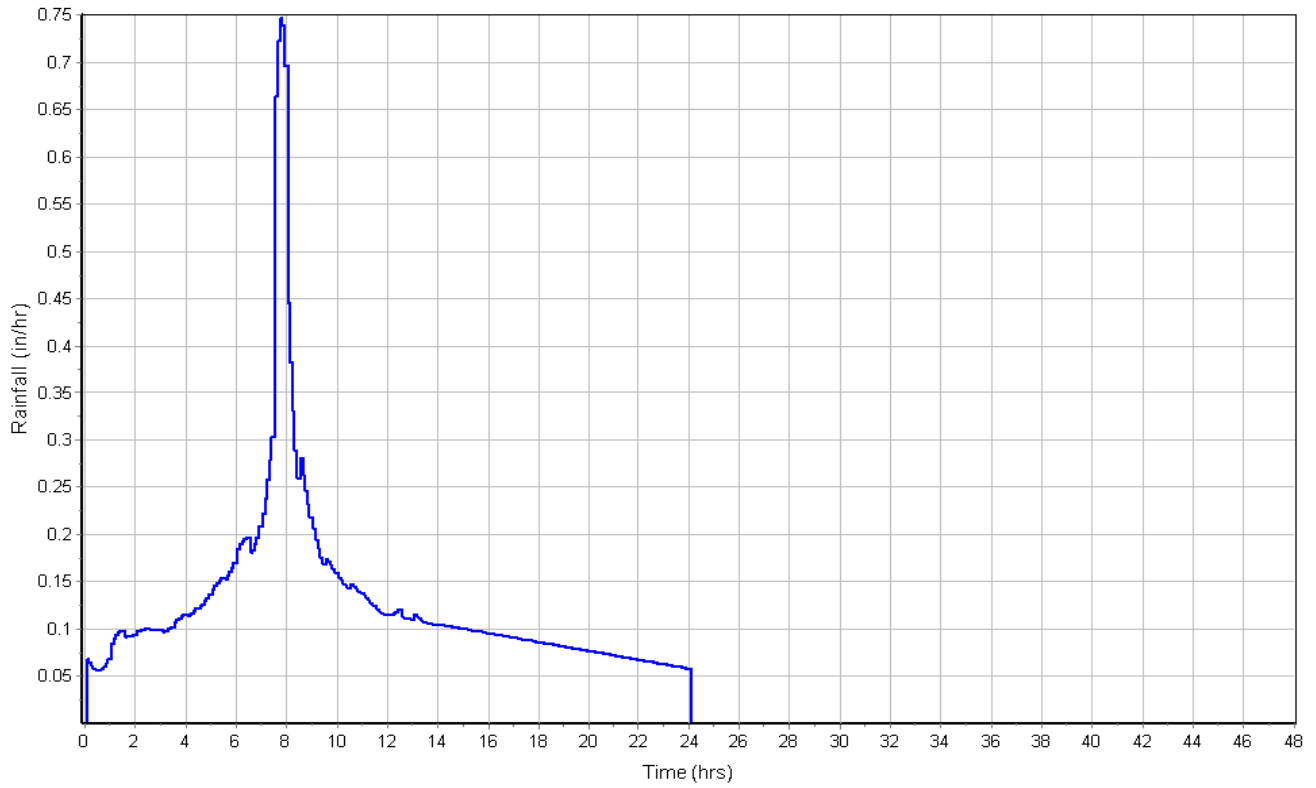
User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

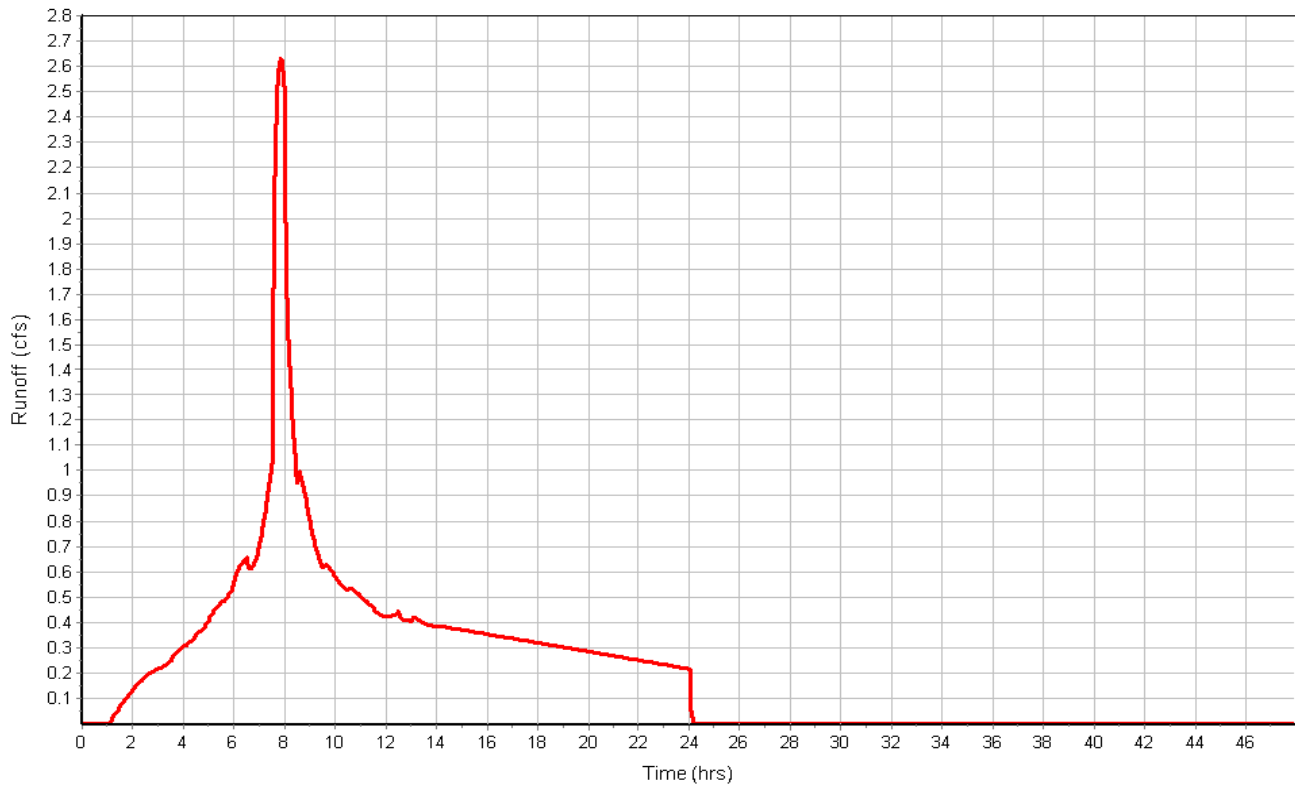
Total Rainfall (in) 3.10
 Total Runoff (in) 2.74
 Peak Runoff (cfs) 2.63
 Weighted Curve Number 96.88
 Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : COF-LIDA_11

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : COF-LIDA_12

Input Data

Area (ac) 0.49
Weighted Curve Number 96.13
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.44	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.49		96.13

Time of Concentration

User-Defined TOC override (minutes): 5

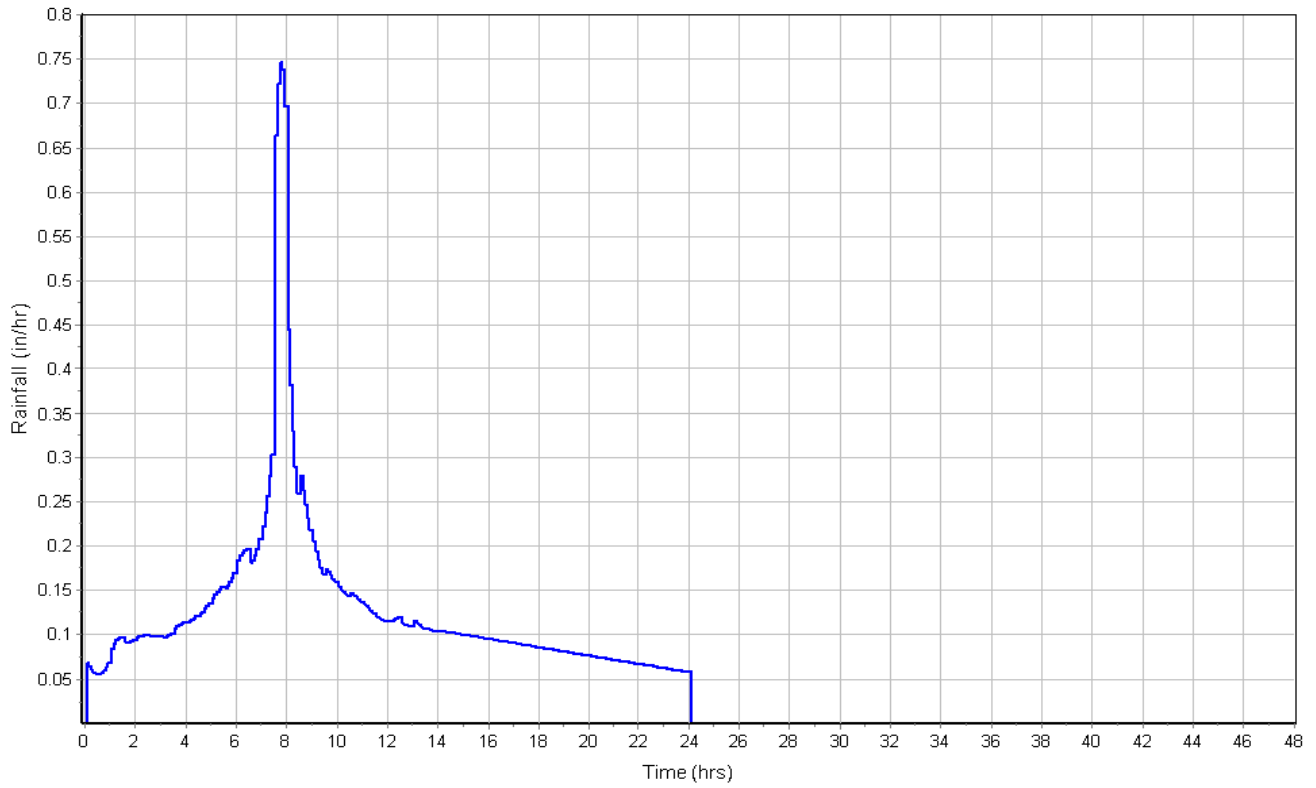
Subbasin Runoff Results

Total Rainfall (in) 3.10
Total Runoff (in) 2.66
Peak Runoff (cfs) 0.34
Weighted Curve Number 96.13
Time of Concentration (days hh:mm:ss) 0 00:05:00

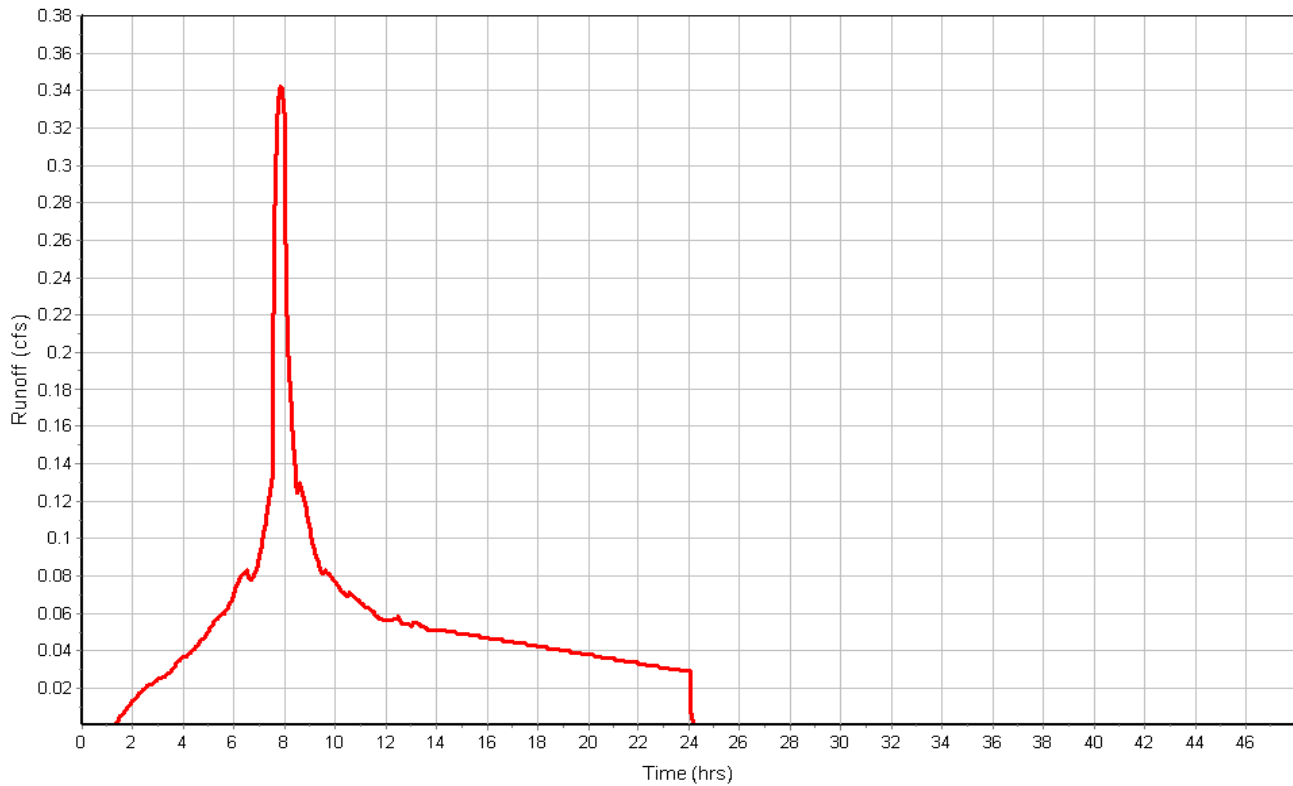
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : COF-LIDA_12

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_01

Input Data

Area (ac) 0.43
Weighted Curve Number 94.77
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.35	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.43		94.77

Time of Concentration

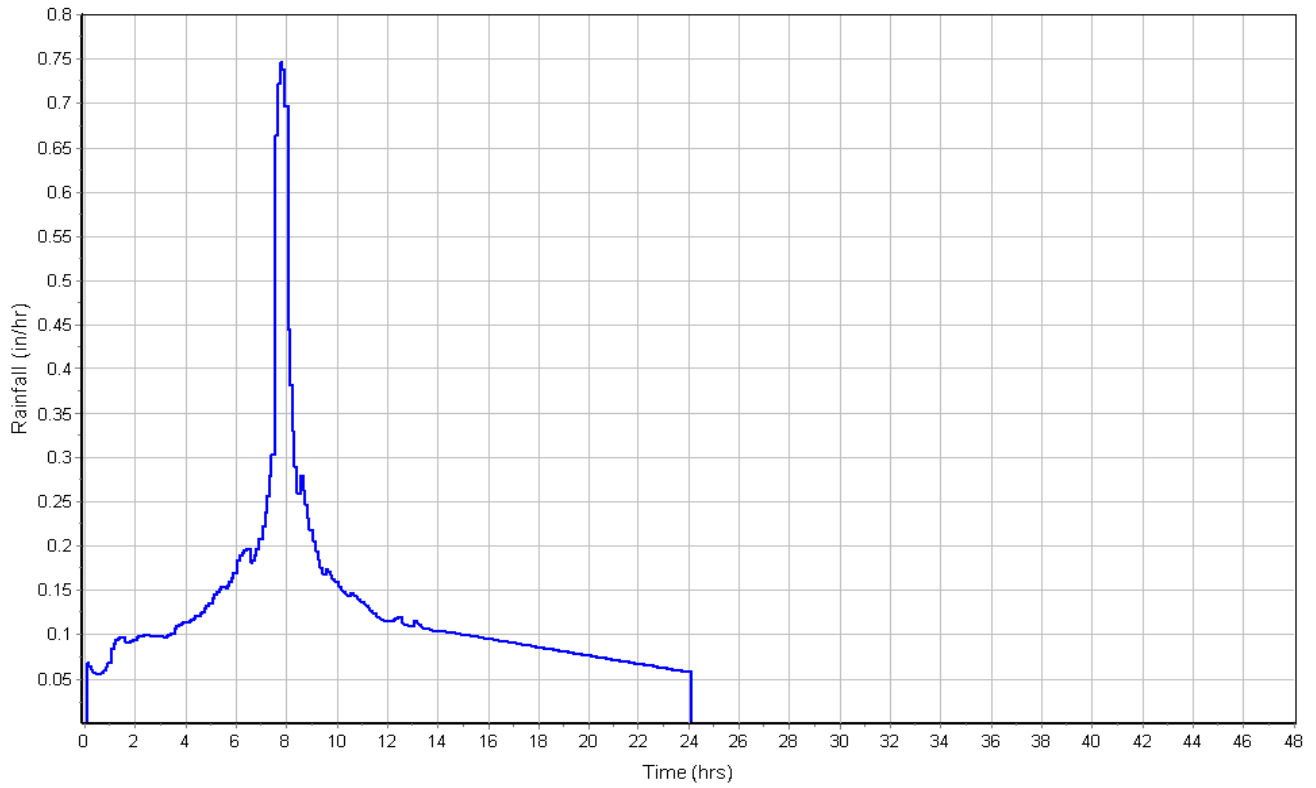
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

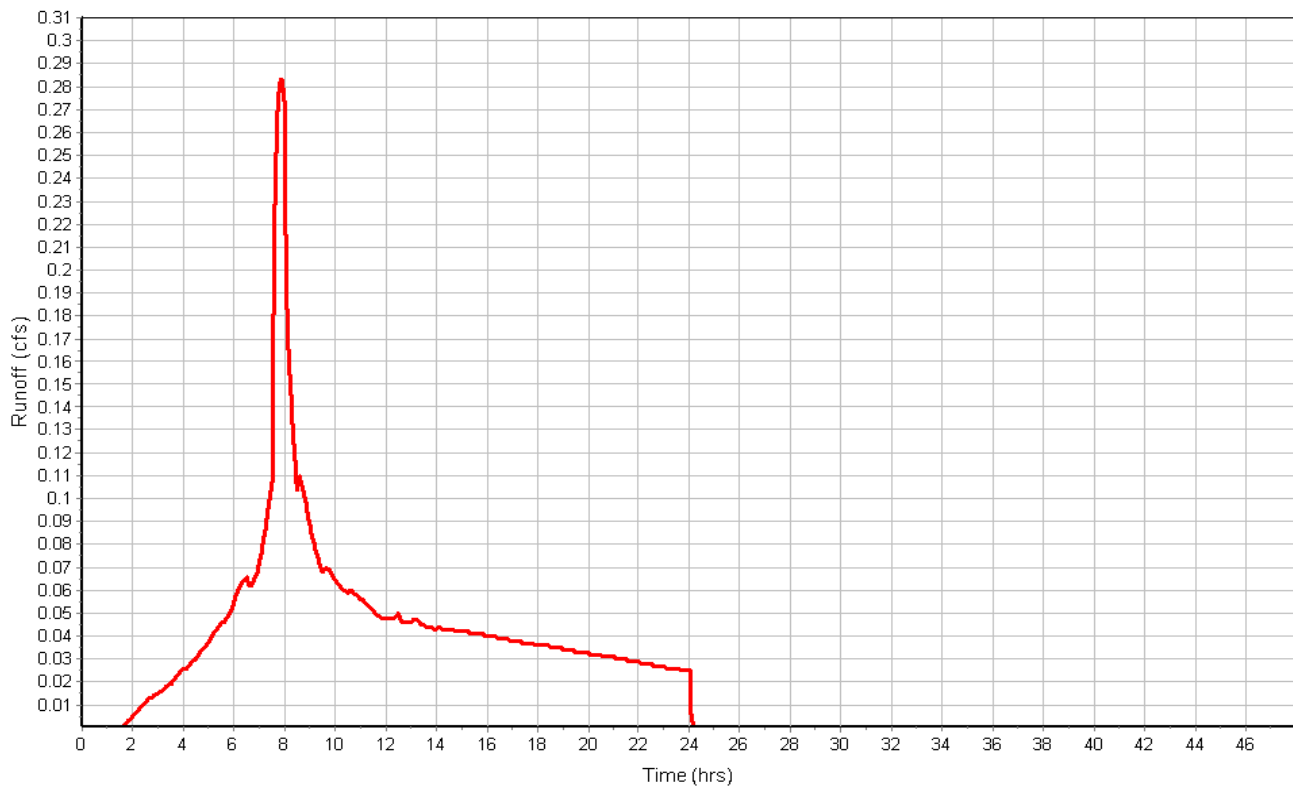
Total Rainfall (in) 3.10
Total Runoff (in) 2.52
Peak Runoff (cfs) 0.28
Weighted Curve Number 94.77
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_01

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_02

Input Data

Area (ac) 0.39
Weighted Curve Number 94.78
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.07	C/D	80.00
Composite Area & Weighted CN	0.39		94.78

Time of Concentration

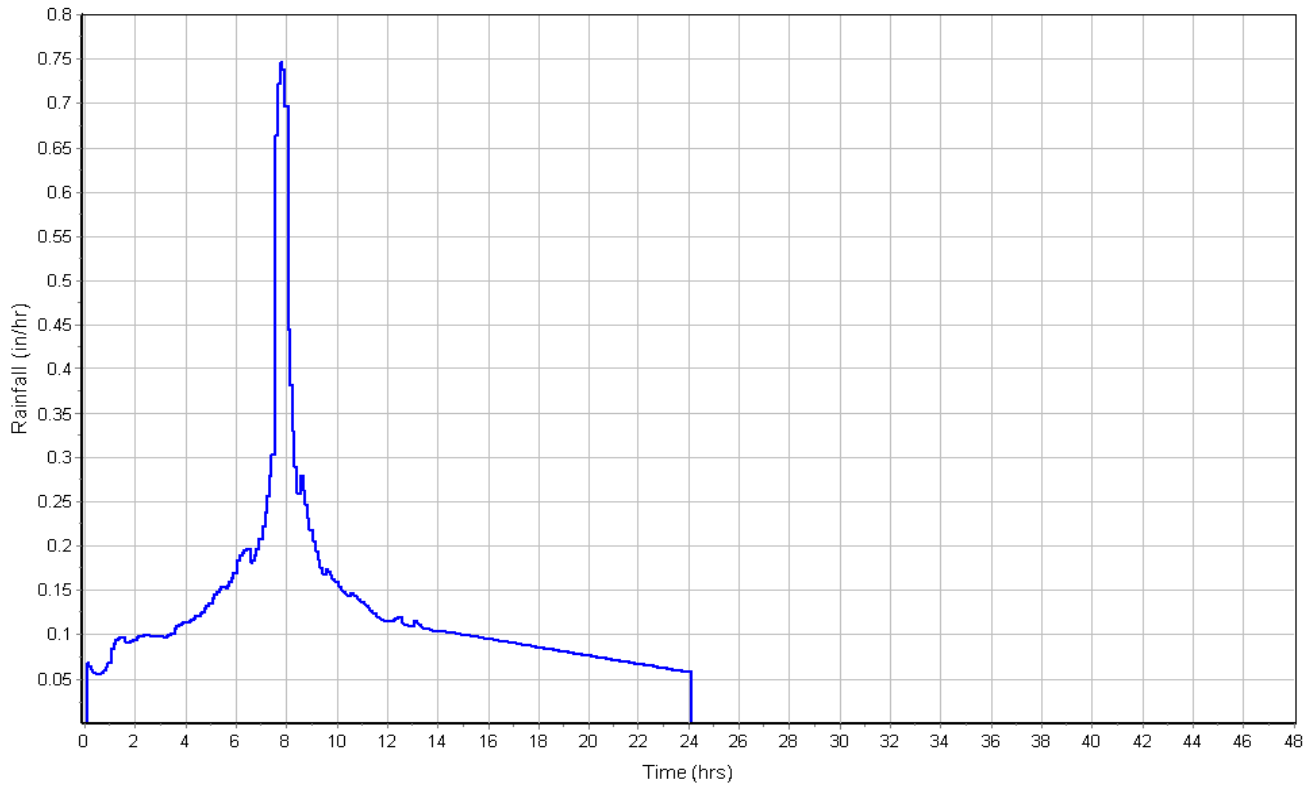
User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

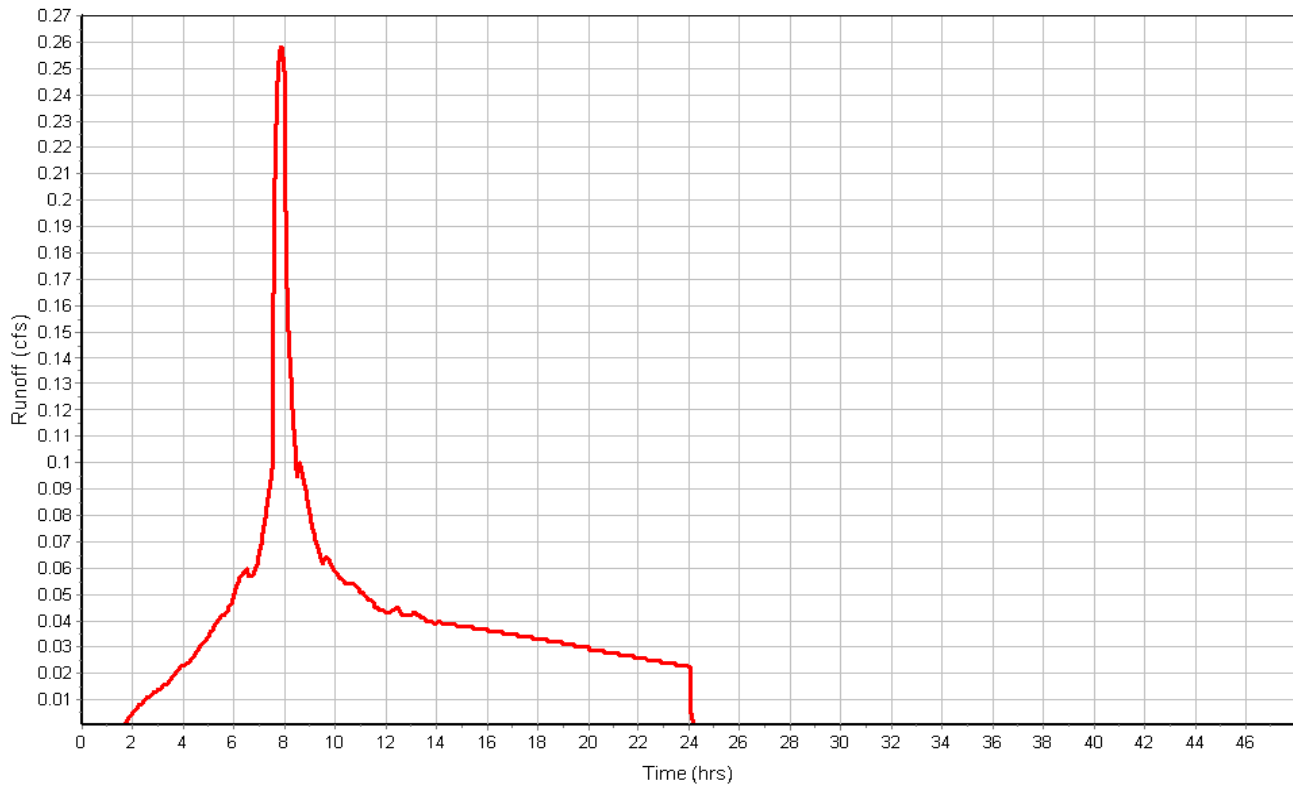
Total Rainfall (in) 3.10
Total Runoff (in) 2.53
Peak Runoff (cfs) 0.26
Weighted Curve Number 94.78
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_02

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_03

Input Data

Area (ac) 0.40
Weighted Curve Number 94.61
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.40		94.61

Time of Concentration

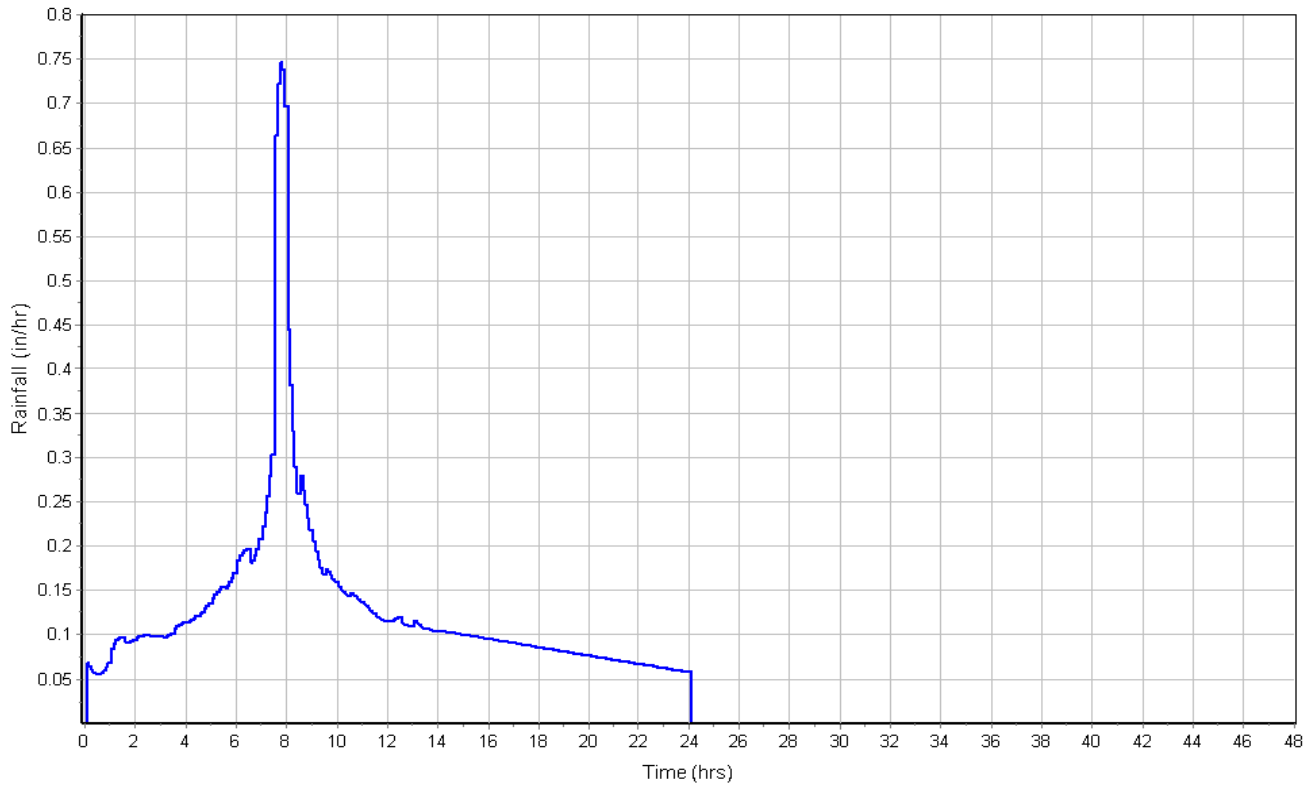
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

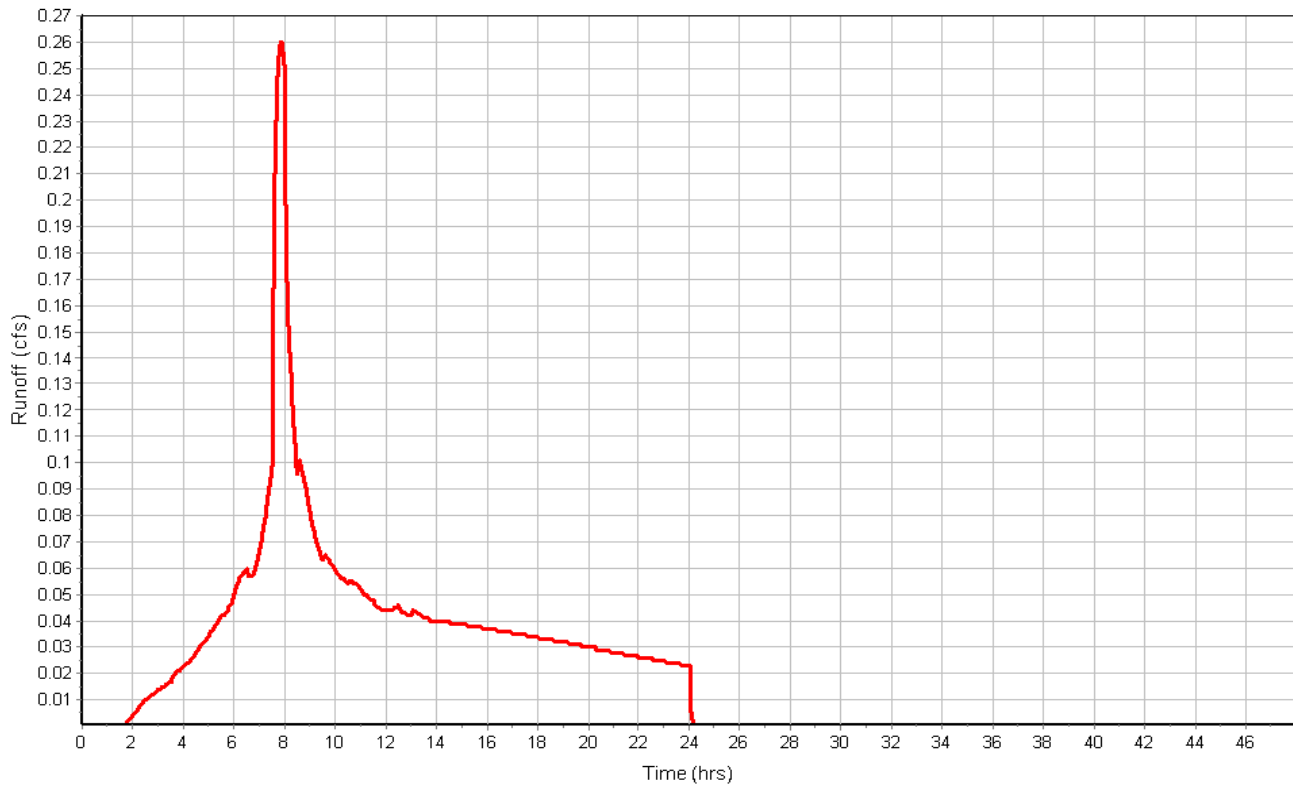
Total Rainfall (in) 3.10
Total Runoff (in) 2.51
Peak Runoff (cfs) 0.26
Weighted Curve Number 94.61
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_03

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_04

Input Data

Area (ac) 0.44
Weighted Curve Number 93.24
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	0.12	C/D	80.00
Pavement/roof	0.32	C/D	98.00
Composite Area & Weighted CN	0.44		93.24

Time of Concentration

User-Defined TOC override (minutes): 5

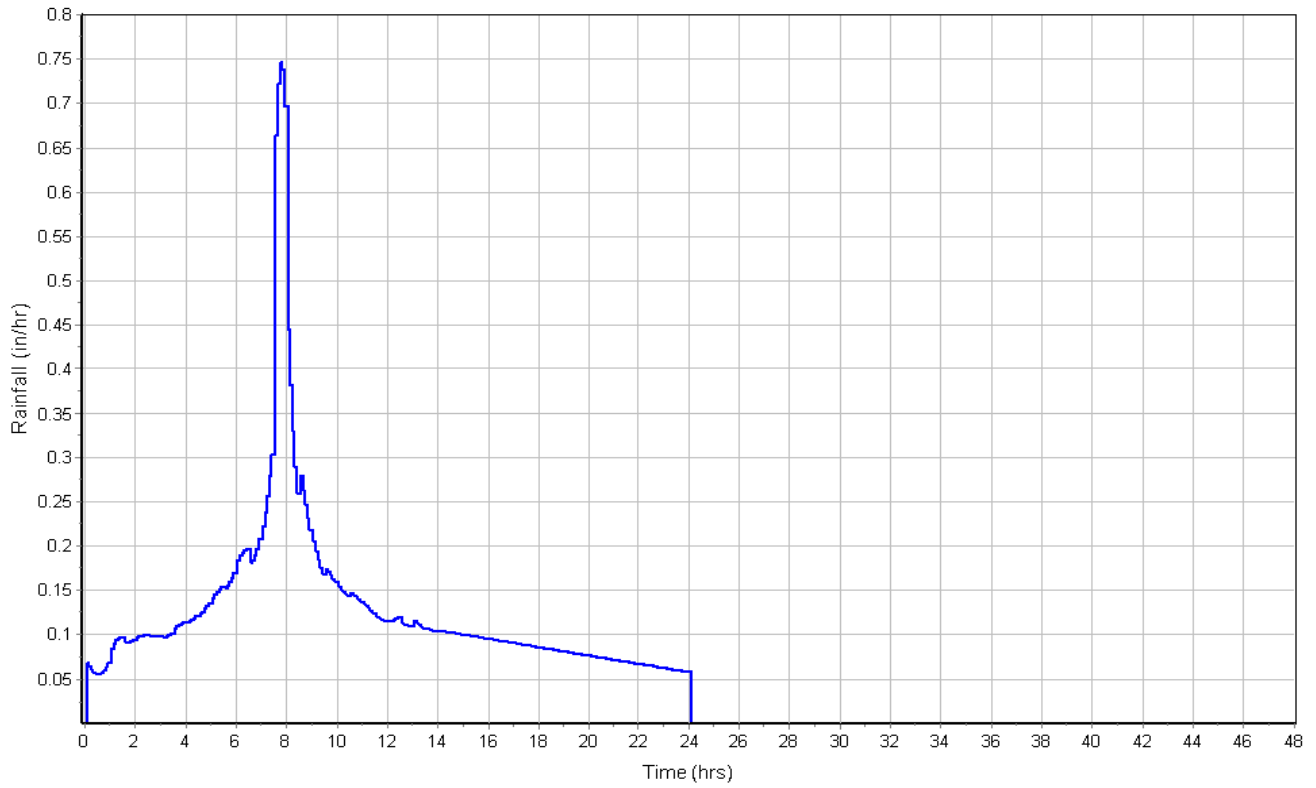
Subbasin Runoff Results

Total Rainfall (in) 3.10
Total Runoff (in) 2.37
Peak Runoff (cfs) 0.27
Weighted Curve Number 93.24
Time of Concentration (days hh:mm:ss) 0 00:05:00

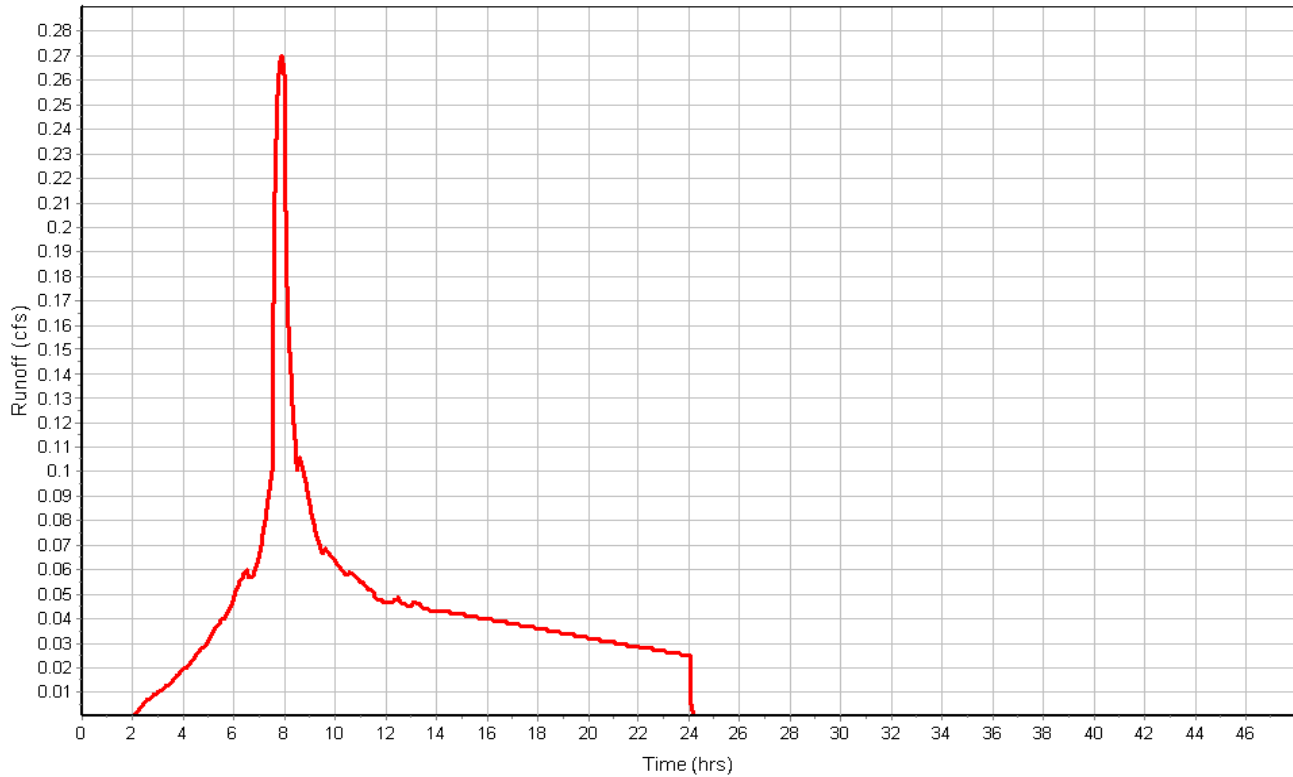
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_04

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_05

Input Data

Area (ac) 2.67
Weighted Curve Number 91.26
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.67	C/D	98.00
Landscape	1.00	C/D	80.00
Composite Area & Weighted CN	2.67		91.26

Time of Concentration

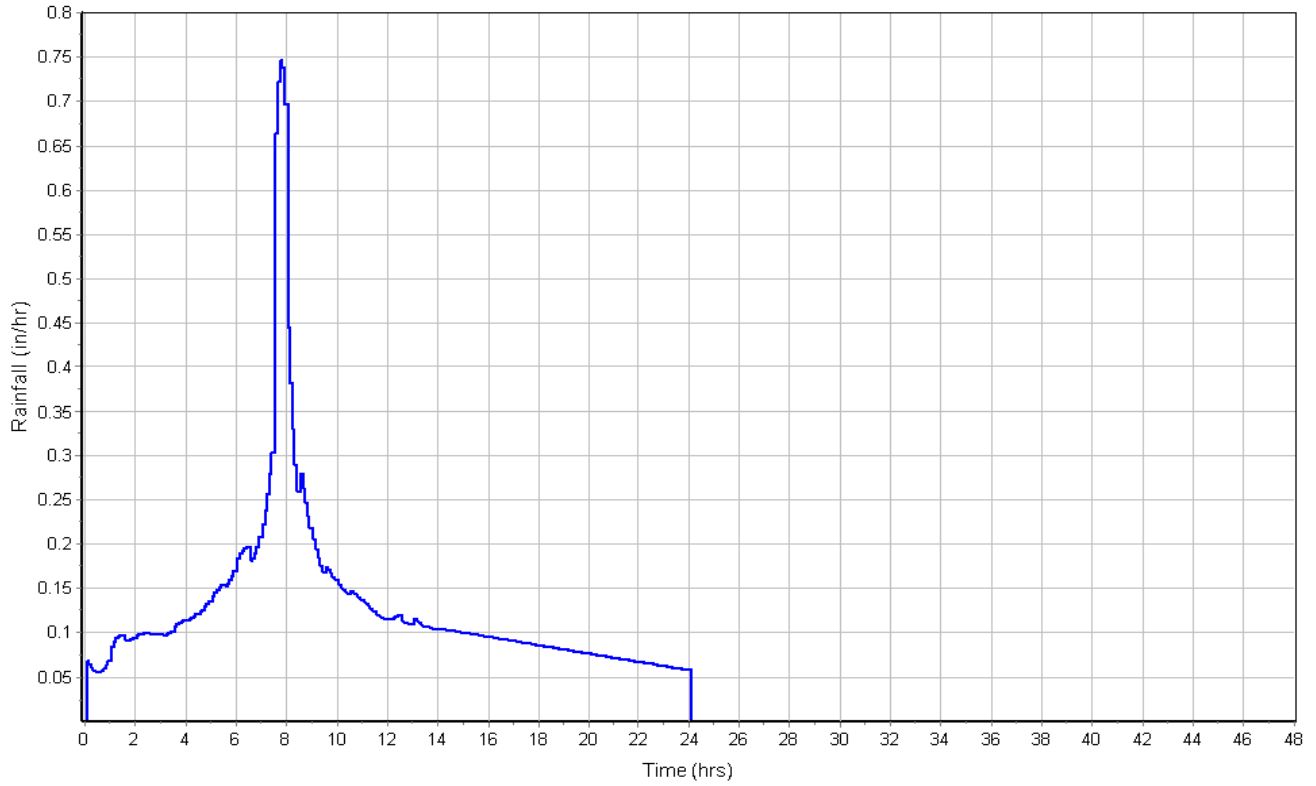
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

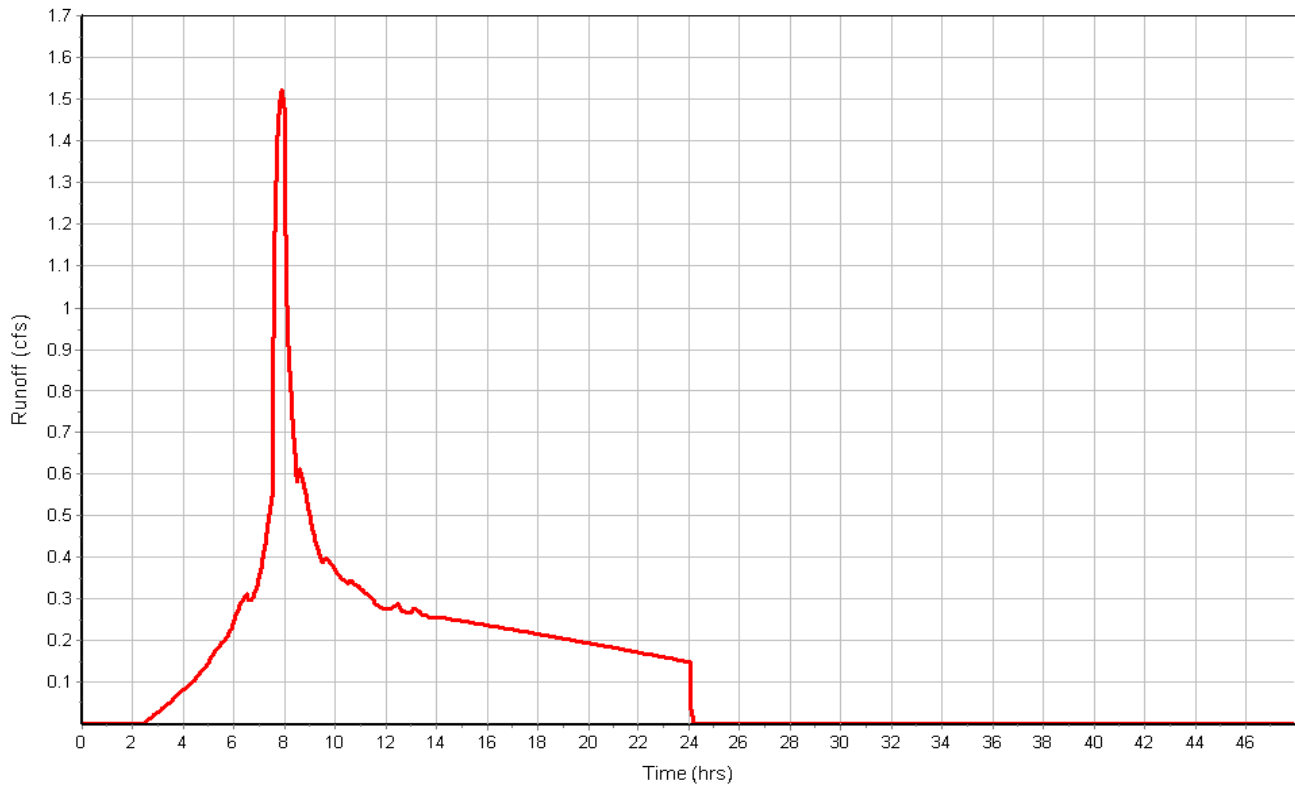
Total Rainfall (in) 3.10
Total Runoff (in) 2.19
Peak Runoff (cfs) 1.52
Weighted Curve Number 91.26
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_05

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_06A

Input Data

Area (ac) 5.95
Weighted Curve Number 89.16
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	2.92	C/D	80.00
Pavement/roof	3.03	C/D	98.00
Composite Area & Weighted CN	5.95		89.16

Time of Concentration

User-Defined TOC override (minutes): 5.00

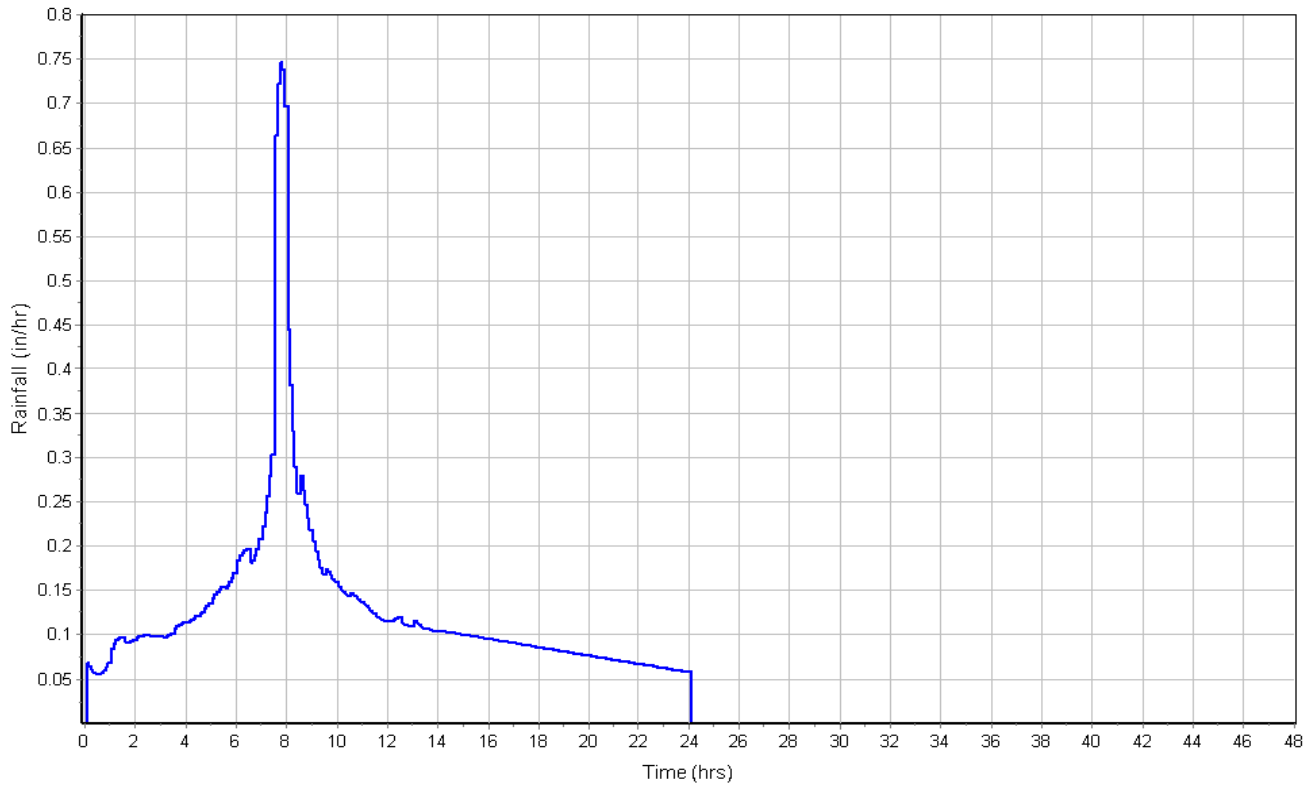
Subbasin Runoff Results

Total Rainfall (in) 3.10
Total Runoff (in) 2.00
Peak Runoff (cfs) 3.05
Weighted Curve Number 89.16
Time of Concentration (days hh:mm:ss) 0 00:05:00

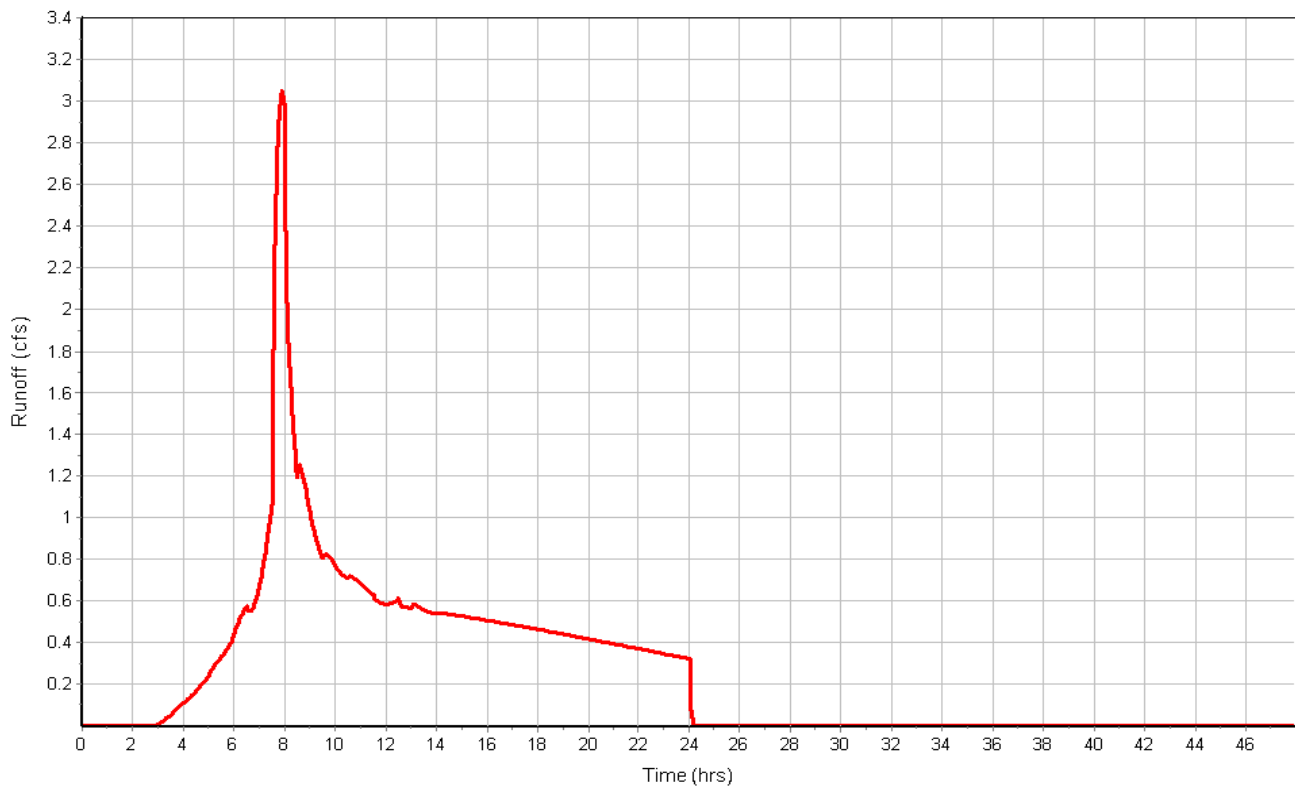
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_06A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_06B

Input Data

Area (ac) 0.41
Weighted Curve Number 98.00
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.41	C/D	98.00
Composite Area & Weighted CN	0.41		98.00

Time of Concentration

User-Defined TOC override (minutes): 5

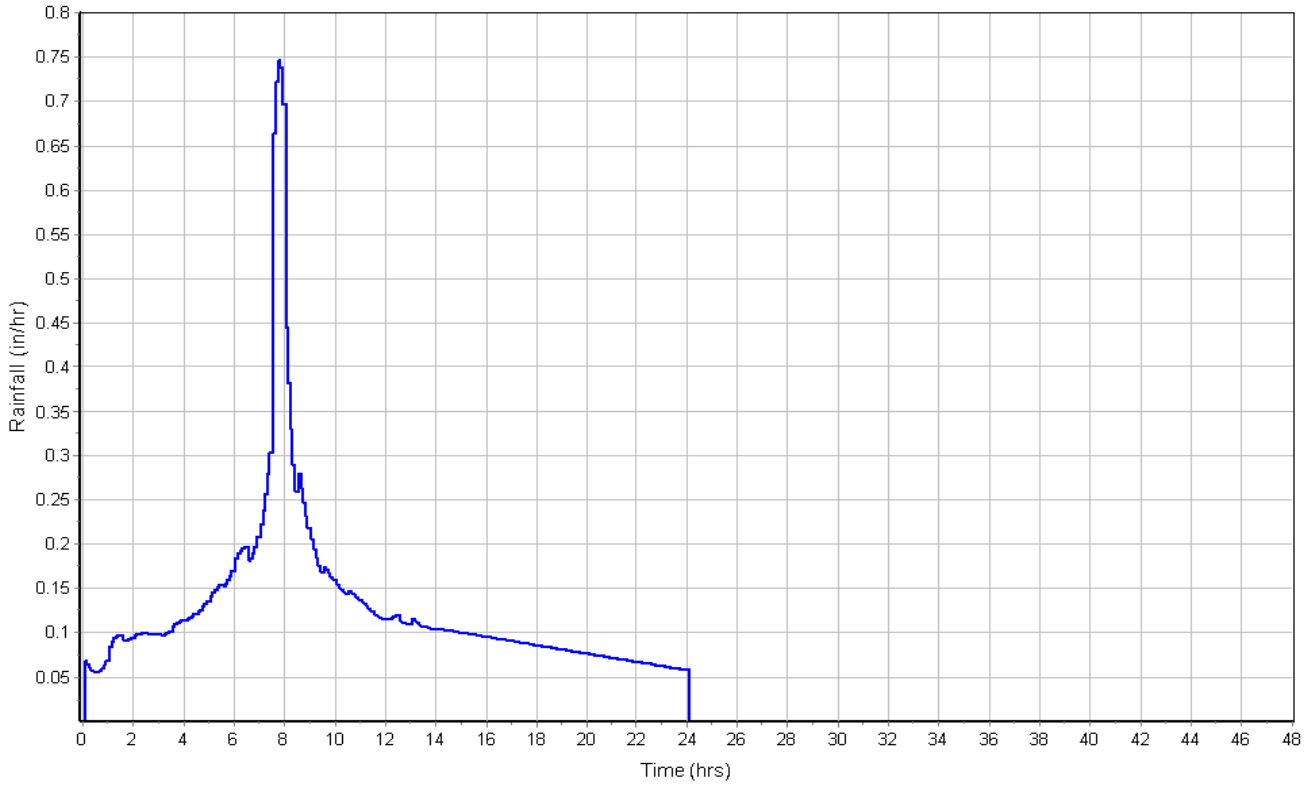
Subbasin Runoff Results

Total Rainfall (in) 3.10
Total Runoff (in) 2.87
Peak Runoff (cfs) 0.30
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

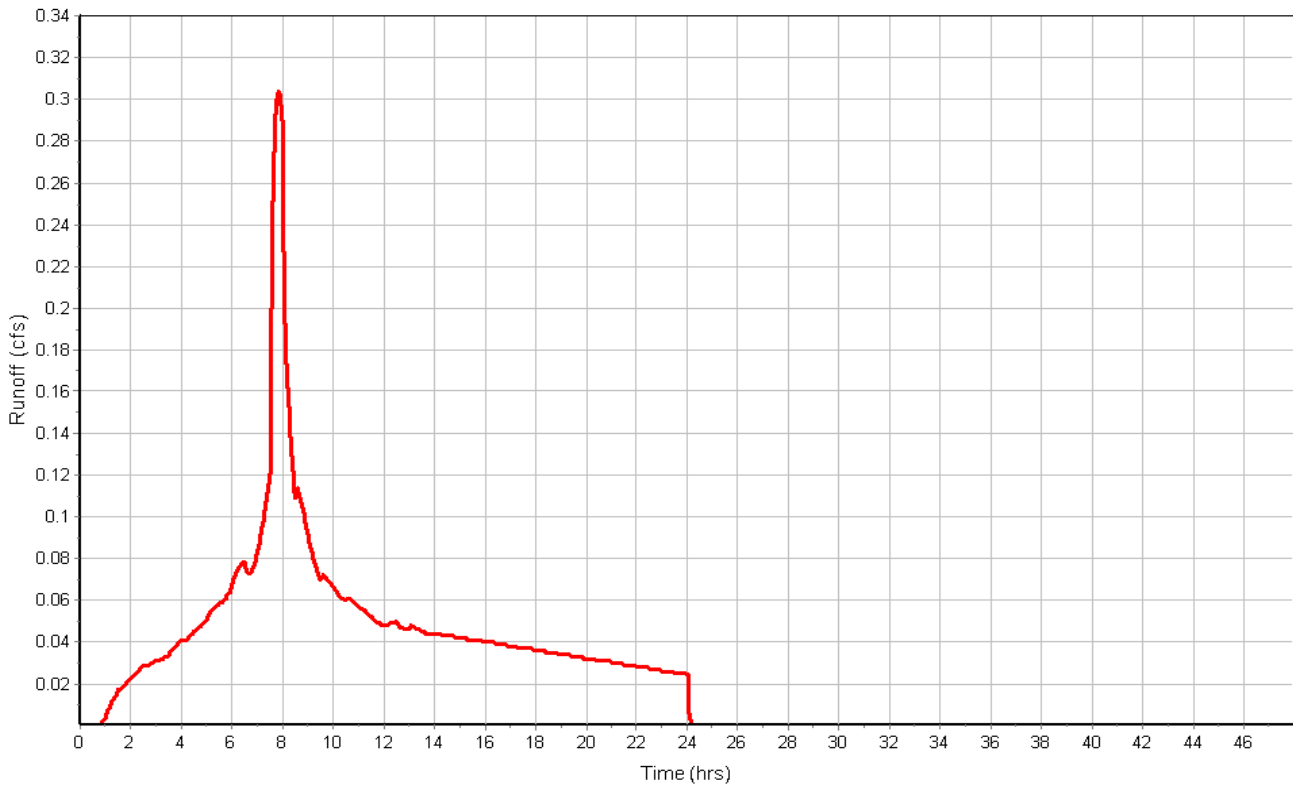
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_06B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_07

Input Data

Area (ac) 1.08
Weighted Curve Number 93.59
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.81	C/D	98.00
Landscape	0.26	C/D	80.00
Composite Area & Weighted CN	1.07		93.59

Time of Concentration

User-Defined TOC override (minutes): 5

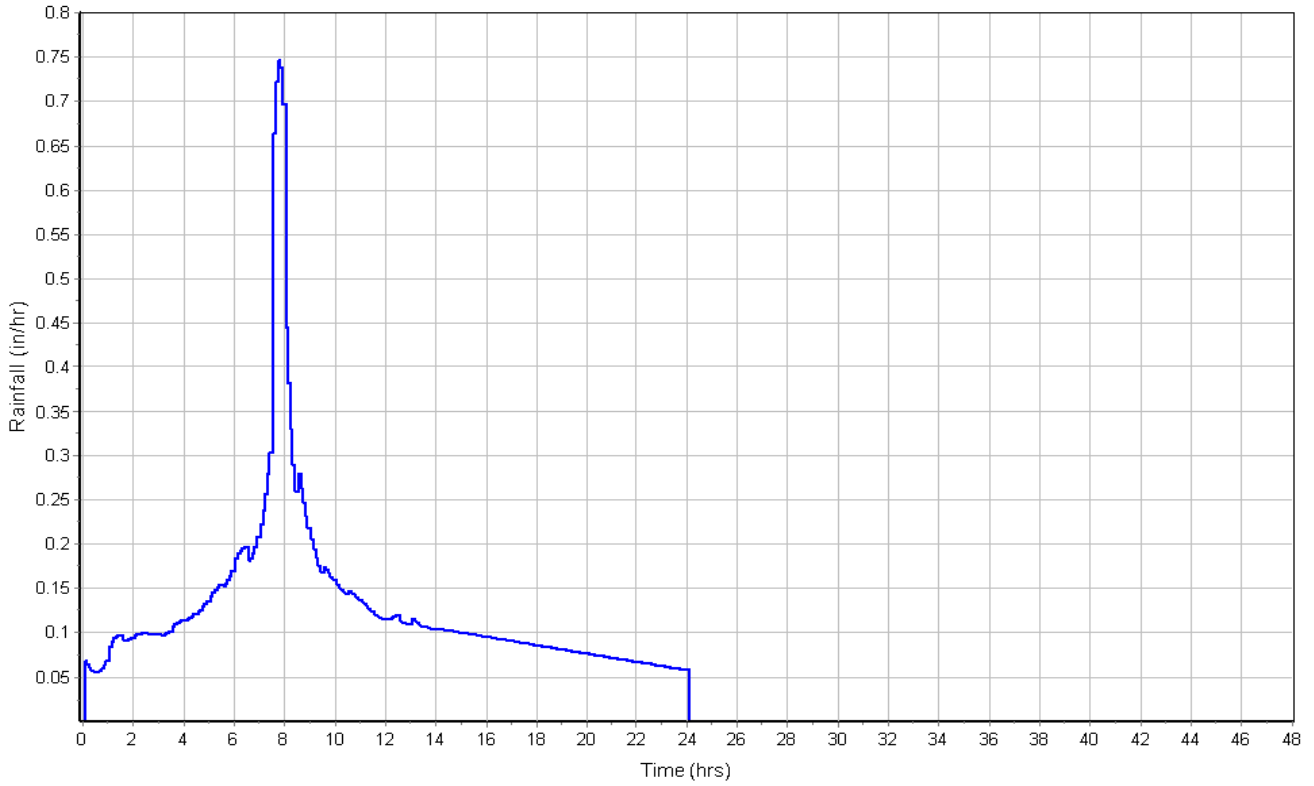
Subbasin Runoff Results

Total Rainfall (in) 3.10
Total Runoff (in) 2.41
Peak Runoff (cfs) 0.68
Weighted Curve Number 93.59
Time of Concentration (days hh:mm:ss) 0 00:05:00

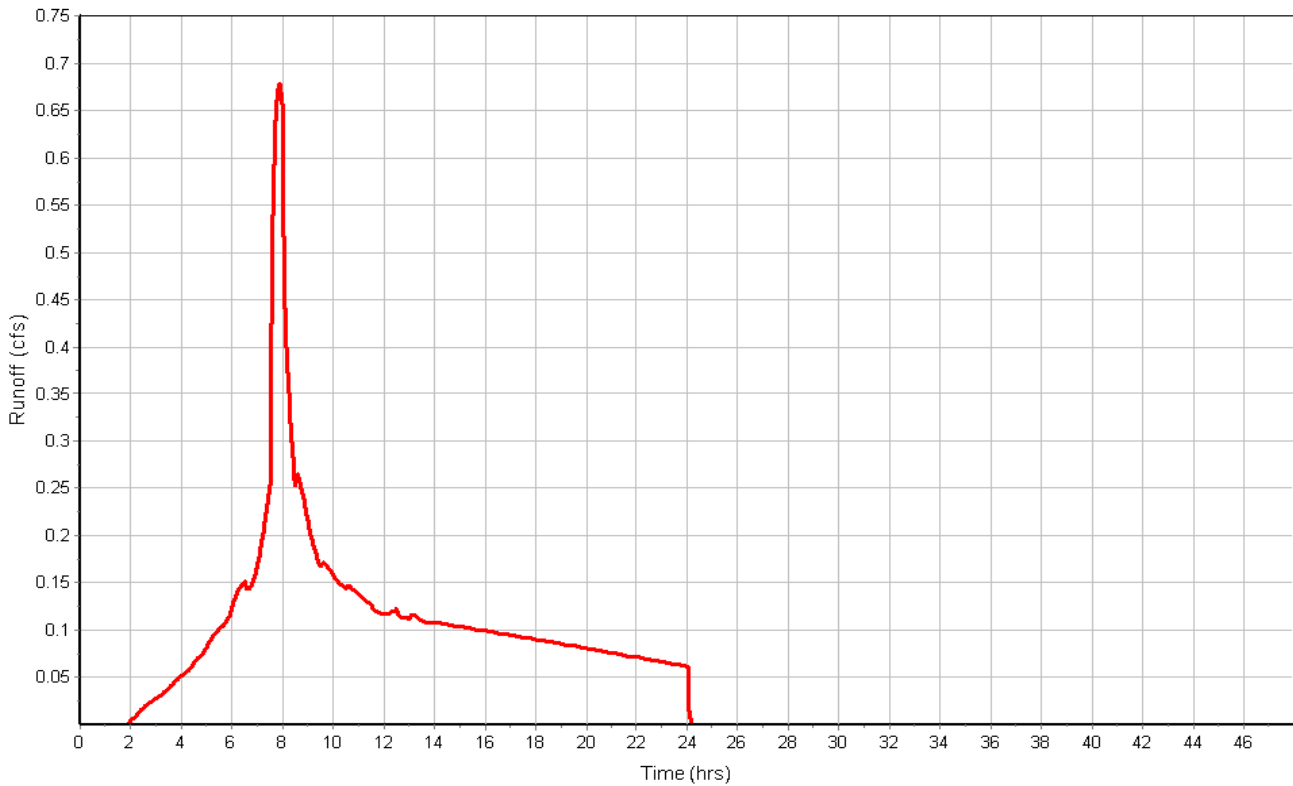
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_07

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_08B

Input Data

Area (ac) 2.25
Weighted Curve Number 94.33
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.79	C/D	98.00
Landscape	0.46	C/D	80.00
Composite Area & Weighted CN	2.25		94.33

Time of Concentration

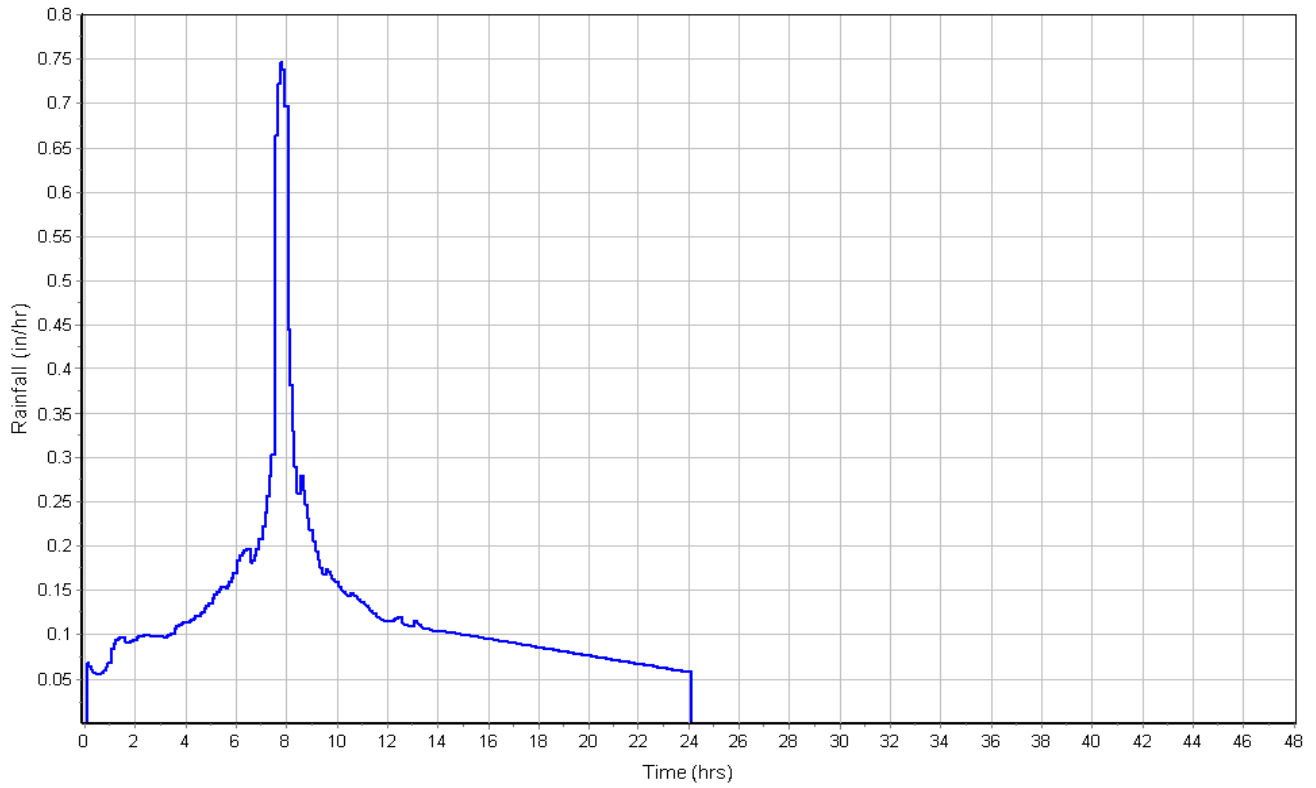
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

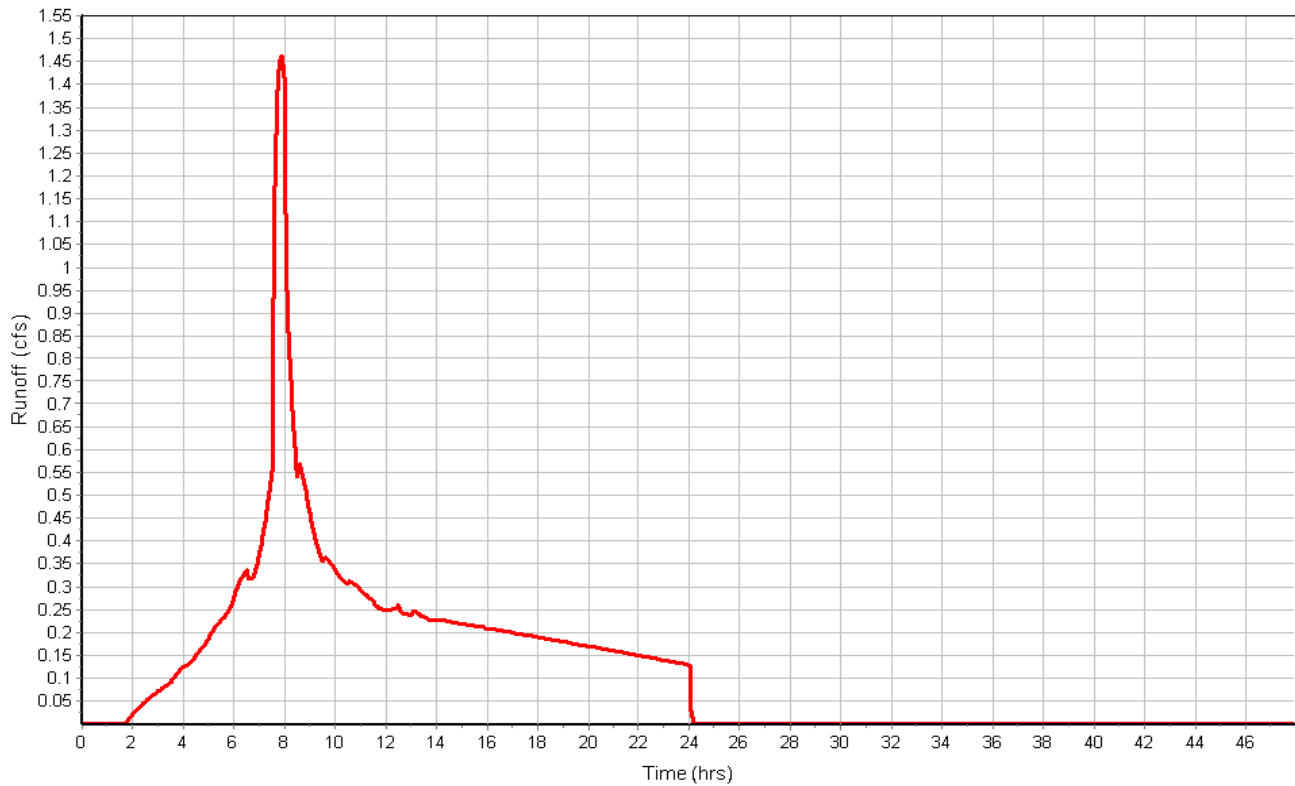
Total Rainfall (in) 3.10
Total Runoff (in) 2.48
Peak Runoff (cfs) 1.46
Weighted Curve Number 94.33
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_08B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_09

Input Data

Area (ac) 0.23
Weighted Curve Number 95.64
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.20	C/D	98.00
Landscape	0.03	C/D	80.00
Composite Area & Weighted CN	0.23		95.64

Time of Concentration

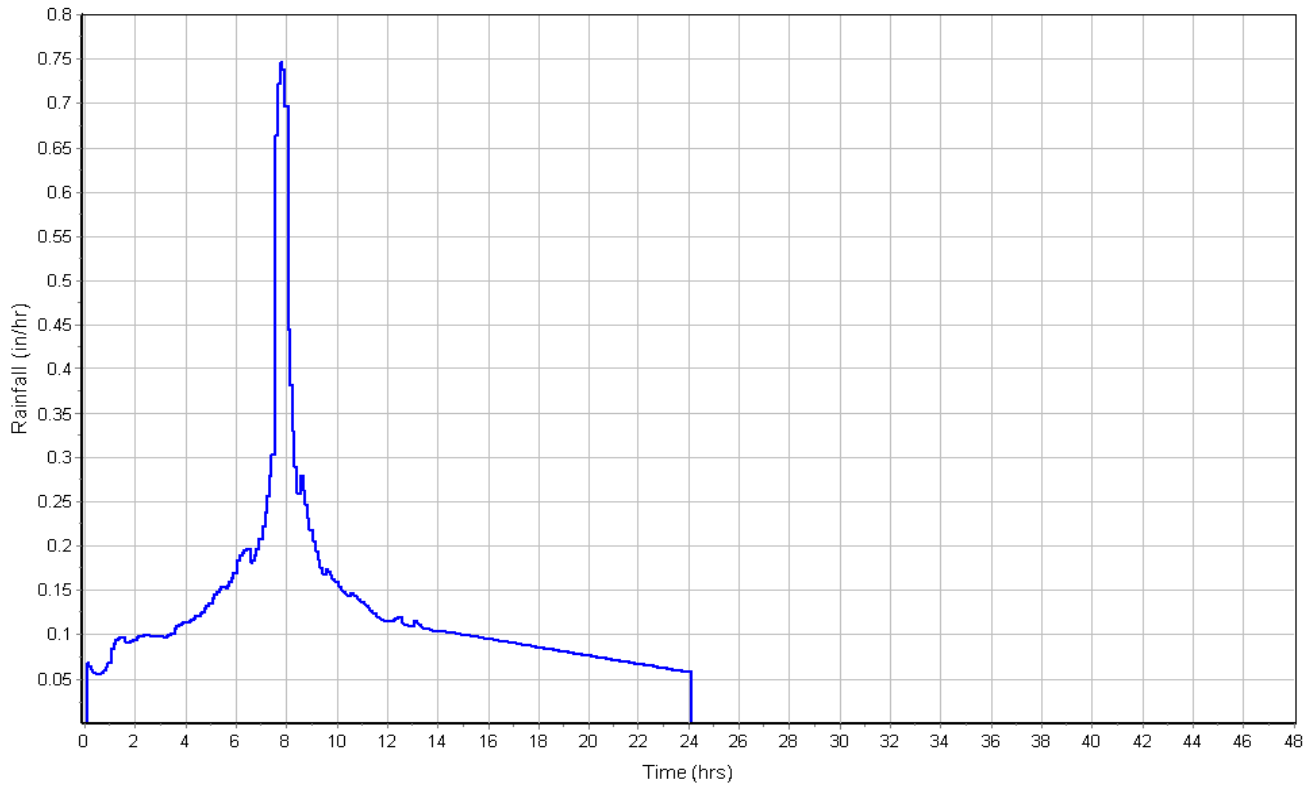
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

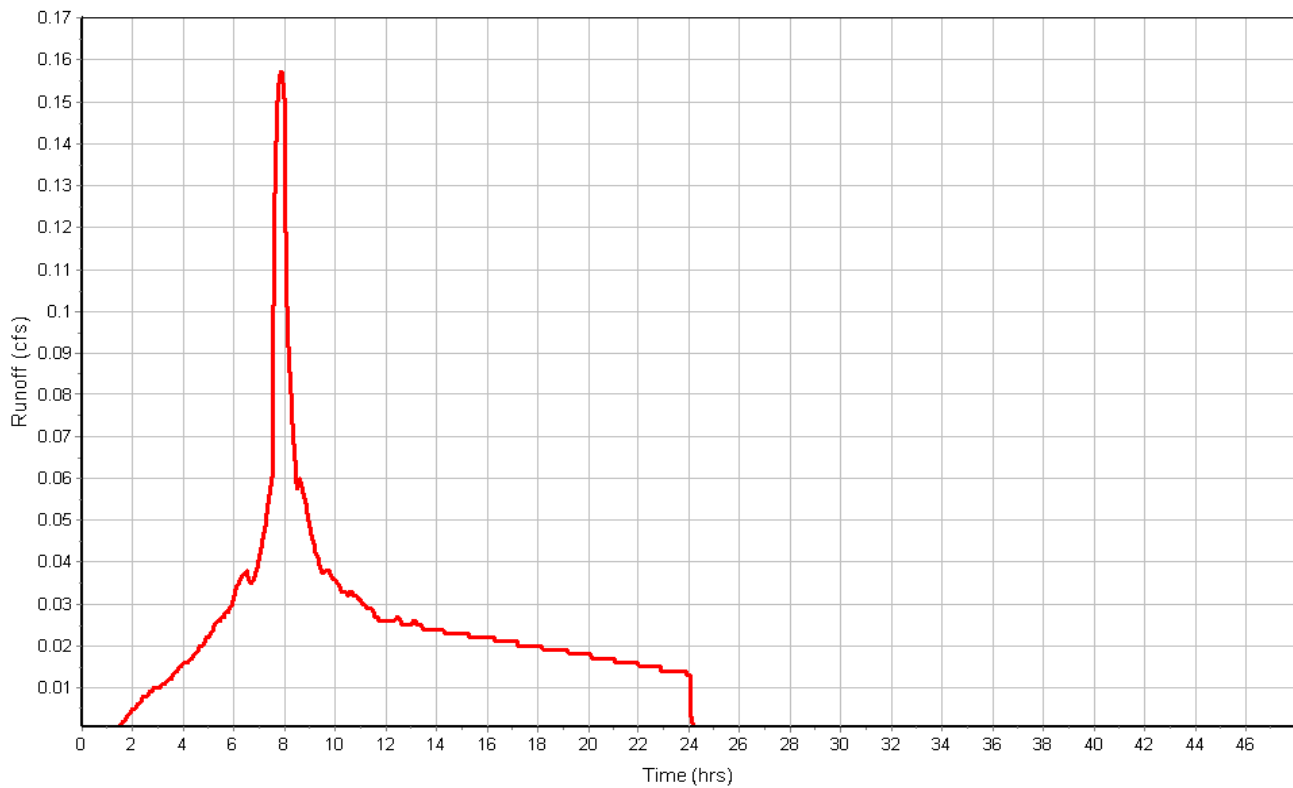
Total Rainfall (in) 3.10
Total Runoff (in) 2.61
Peak Runoff (cfs) 0.16
Weighted Curve Number 95.64
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_09

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_10

Input Data

Area (ac) 0.32
Weighted Curve Number 95.08
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.27	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.32		95.08

Time of Concentration

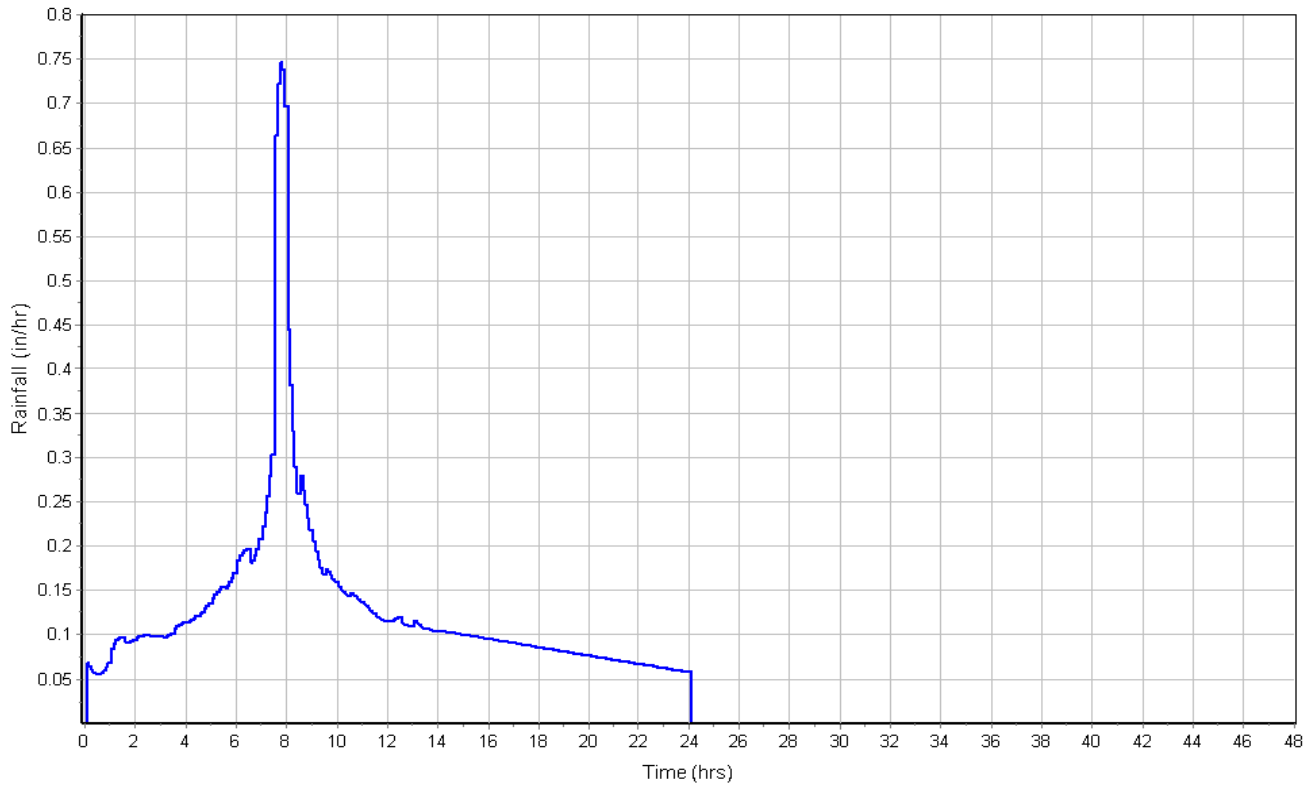
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

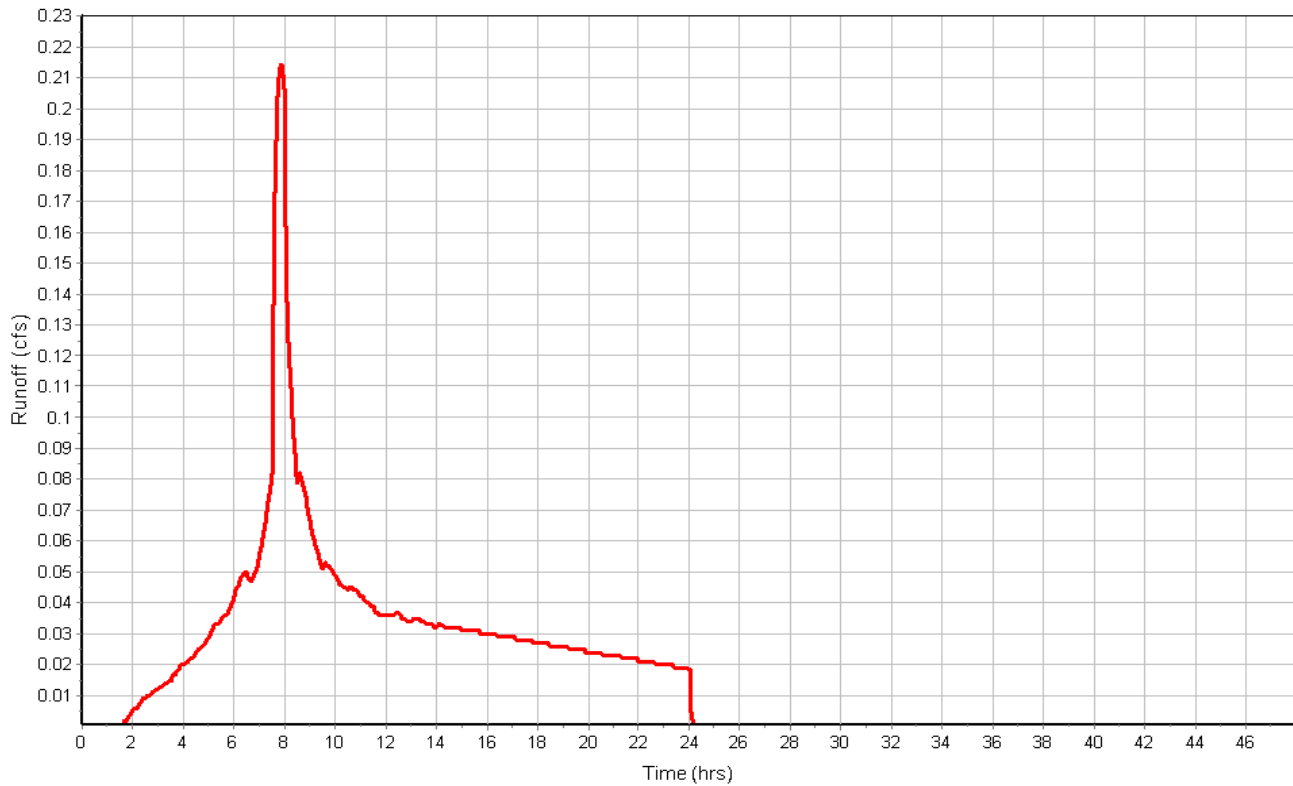
Total Rainfall (in) 3.10
Total Runoff (in) 2.56
Peak Runoff (cfs) 0.21
Weighted Curve Number 95.08
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_10

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_8A

Input Data

Area (ac) 2.32
Weighted Curve Number 95.49
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	2.00	C/D	98.00
Landscape	0.32	C/D	80.00
Composite Area & Weighted CN	2.32		95.49

Time of Concentration

User-Defined TOC override (minutes): 5

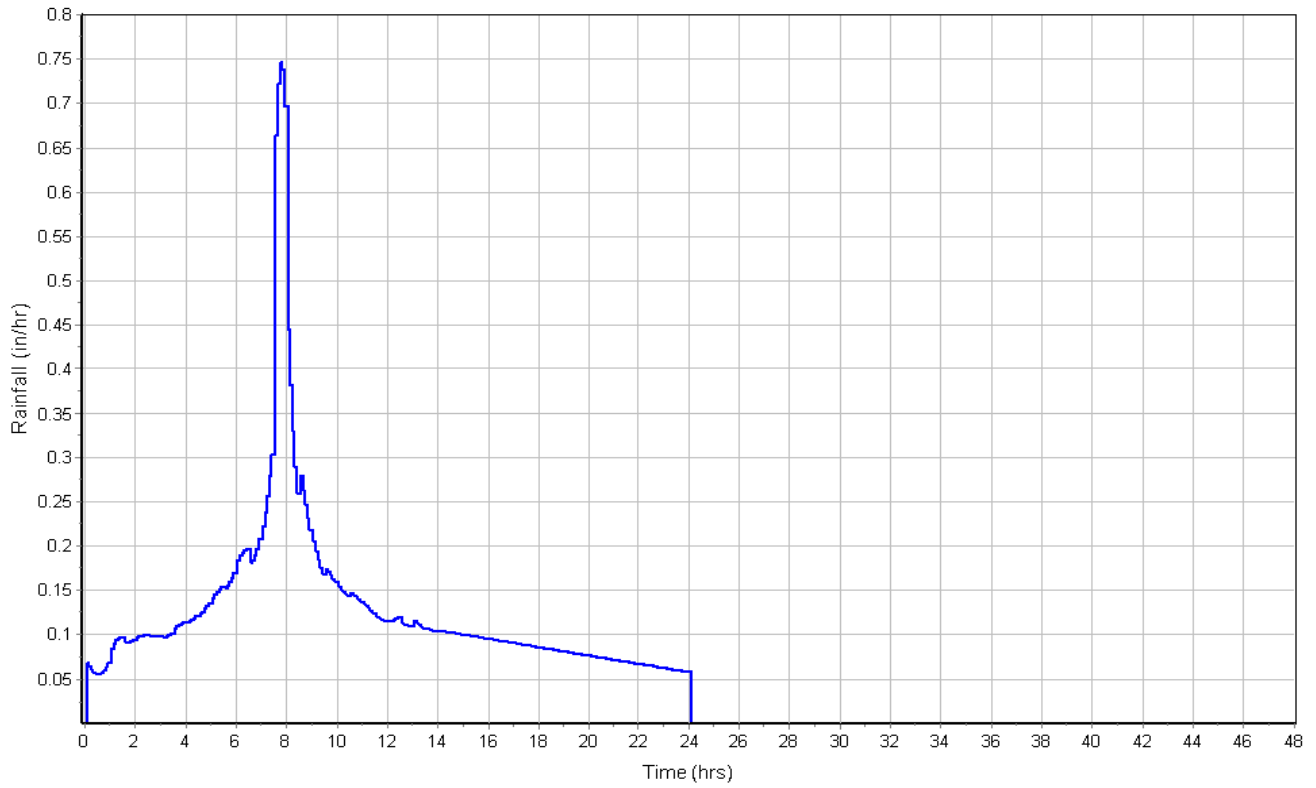
Subbasin Runoff Results

Total Rainfall (in) 3.10
Total Runoff (in) 2.60
Peak Runoff (cfs) 1.58
Weighted Curve Number 95.49
Time of Concentration (days hh:mm:ss) 0 00:05:00

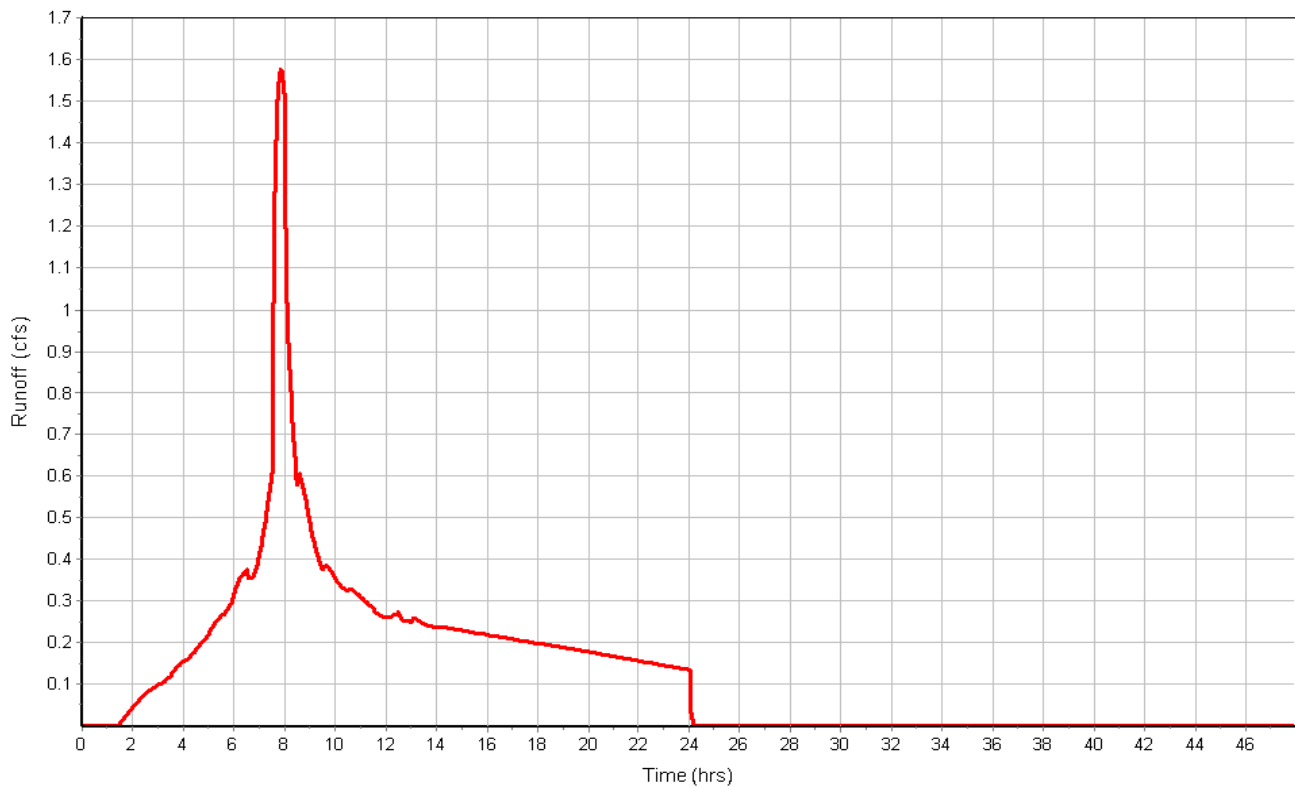
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Subbasin : HED-LIDA_8A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
5-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	COF-01A	238.00	250.00	12.00	238.00	0.00	1000.00	750.00	12.00	0.00
2	COF-01B	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
3	COF-01C	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
4	COF-02A	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
5	COF-02B	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
6	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
7	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
8	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
9	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
10	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
11	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
12	HED-01G	226.00	229.00	3.00	226.00	0.00	1000.00	771.00	12.00	0.00
13	HED-01H	229.00	232.00	3.00	229.00	0.00	1000.00	768.00	12.00	0.00
14	HED-01I	230.00	233.00	3.00	230.00	0.00	1000.00	767.00	12.00	0.00
15	HED-01J	231.00	233.00	2.00	231.00	0.00	1000.00	767.00	12.00	0.00
16	HED-01K	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
17	HED-01L	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
18	HED-01M	224.00	230.00	6.00	224.00	0.00	1000.00	770.00	12.00	0.00
19	HED-01N	230.00	235.00	5.00	230.00	0.00	1000.00	765.00	12.00	0.00
20	HED-01O	234.00	238.00	4.00	234.00	0.00	1000.00	762.00	12.00	0.00
21	HED-01P	234.00	239.00	5.00	234.00	0.00	1000.00	761.00	12.00	0.00
22	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
23	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
24	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
25	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
26	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
27	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
28	HED-02G	235.00	237.00	2.00	235.00	0.00	1000.00	763.00	12.00	0.00
29	HED-02H	236.00	238.00	2.00	236.00	0.00	1000.00	762.00	12.00	0.00
30	HED-02I	237.00	239.00	2.00	237.00	0.00	1000.00	761.00	12.00	0.00
31	HED-02J	237.00	250.00	13.00	237.00	0.00	1000.00	750.00	12.00	0.00
32	HED-02K	255.00	257.00	2.00	255.00	0.00	1000.00	743.00	12.00	0.00
33	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
34	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
35	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00
36	HED-03D	241.00	245.00	4.00	241.00	0.00	1000.00	755.00	12.00	0.00
37	HED-03E	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
38	HED-03F	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
39	HED-03G	242.00	245.00	3.00	242.00	0.00	1000.00	755.00	12.00	0.00
40	HED-03H	243.00	245.00	2.00	243.00	0.00	1000.00	755.00	12.00	0.00
41	HED-03I	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
42	HED-03J	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
43	HED-03K	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
44	HED-03L	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
45	HED-03t	238.00	243.00	5.00	238.00	0.00	1000.00	757.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
5-year storm

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surge Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	COF-01A	0.12	0.00	238.11	0.11	0.00	11.89	238.03	0.03	0 20:17	0 00:00	0.00	0.00
2	COF-01B	0.11	0.00	244.03	0.03	0.00	2.97	244.01	0.01	0 20:10	0 00:00	0.00	0.00
3	COF-01C	0.11	0.00	246.51	1.51	0.00	1.99	245.95	0.95	0 20:09	0 00:00	0.00	0.00
4	COF-02A	0.01	0.00	244.03	0.03	0.00	3.97	244.01	0.01	0 11:01	0 00:00	0.00	0.00
5	COF-02B	0.01	0.00	245.93	0.93	0.00	1.07	245.22	0.22	0 10:58	0 00:00	0.00	0.00
6	HED-01A	0.41	0.00	152.04	0.04	0.00	7.96	152.02	0.02	0 17:30	0 00:00	0.00	0.00
7	HED-01B	0.31	0.00	157.05	0.05	0.00	7.95	157.02	0.02	0 16:50	0 00:00	0.00	0.00
8	HED-01C	0.31	0.00	158.01	0.21	0.00	6.99	157.90	0.10	0 17:08	0 00:00	0.00	0.00
9	HED-01D	0.31	0.00	177.19	0.15	0.00	4.06	177.11	0.07	0 16:55	0 00:00	0.00	0.00
10	HED-01E	0.31	0.00	181.15	0.15	0.00	10.85	181.07	0.07	0 16:50	0 00:00	0.00	0.00
11	HED-01F	0.31	0.00	223.10	0.10	0.00	5.90	223.04	0.04	0 16:47	0 00:00	0.00	0.00
12	HED-01G	0.31	0.00	226.10	0.10	0.00	3.40	226.04	0.04	0 16:45	0 00:00	0.00	0.00
13	HED-01H	0.31	0.00	229.18	0.18	0.00	2.82	229.08	0.08	0 16:46	0 00:00	0.00	0.00
14	HED-01I	0.31	0.00	230.18	0.18	0.00	2.82	230.08	0.08	0 16:45	0 00:00	0.00	0.00
15	HED-01J	0.31	0.00	232.78	1.78	0.00	1.97	232.09	1.09	0 16:45	0 00:00	0.00	0.00
16	HED-01K	0.17	0.00	228.11	1.61	0.00	1.64	226.73	0.23	0 08:07	0 00:00	0.00	0.00
17	HED-01L	0.08	0.00	226.61	0.11	0.00	2.89	226.50	0.00	0 08:22	0 00:00	0.00	0.00
18	HED-01M	0.05	0.00	224.06	0.06	0.00	5.94	224.00	0.00	0 08:35	0 00:00	0.00	0.00
19	HED-01N	0.05	0.00	230.19	0.19	0.00	4.81	230.02	0.02	0 08:34	0 00:00	0.00	0.00
20	HED-01O	0.05	0.00	234.06	0.06	0.00	4.44	234.00	0.00	0 08:27	0 00:00	0.00	0.00
21	HED-01P	0.00	0.00	234.00	0.00	0.00	5.50	234.00	0.00	0 00:00	0 00:00	0.00	0.00
22	HED-02A	0.10	0.00	171.02	0.02	0.00	7.98	171.01	0.01	0 14:09	0 00:00	0.00	0.00
23	HED-02B	0.10	0.00	171.43	0.13	0.00	5.57	171.39	0.09	0 13:54	0 00:00	0.00	0.00
24	HED-02C	0.10	0.00	173.61	0.11	0.00	4.39	173.57	0.07	0 13:55	0 00:00	0.00	0.00
25	HED-02D	0.10	0.00	174.80	0.20	0.00	10.94	174.74	0.14	0 13:48	0 00:00	0.00	0.00
26	HED-02E	0.10	0.00	180.62	0.16	0.00	7.38	180.56	0.10	0 13:44	0 00:00	0.00	0.00
27	HED-02F	0.11	0.00	181.85	0.09	0.00	6.11	181.82	0.06	0 12:55	0 00:00	0.00	0.00
28	HED-02G	0.07	0.00	235.05	0.05	0.00	2.95	235.04	0.04	0 07:12	0 00:00	0.00	0.00
29	HED-02H	0.07	0.00	236.11	0.11	0.00	1.89	236.08	0.08	1 12:49	0 00:00	0.00	0.00
30	HED-02I	0.00	0.00	237.00	0.00	0.00	2.00	237.00	0.00	0 00:00	0 00:00	0.00	0.00
31	HED-02J	0.07	0.00	237.10	0.10	0.00	12.90	237.07	0.07	0 07:09	0 00:00	0.00	0.00
32	HED-02K	0.08	0.00	255.76	0.76	0.00	2.74	255.34	0.34	0 22:11	0 00:00	0.00	0.00
33	HED-03A	0.06	0.00	183.01	0.01	0.00	6.99	183.01	0.01	0 11:33	0 00:00	0.00	0.00
34	HED-03B	0.07	0.00	235.01	0.01	0.00	4.99	235.00	0.00	0 09:57	0 00:00	0.00	0.00
35	HED-03C	0.15	0.00	236.03	0.03	0.00	13.97	236.01	0.01	0 09:16	0 00:00	0.00	0.00
36	HED-03D	0.18	0.00	241.05	0.05	0.00	3.95	241.01	0.01	0 08:21	0 00:00	0.00	0.00
37	HED-03E	0.10	0.00	250.09	0.09	0.00	1.41	250.00	0.00	0 08:09	0 00:00	0.00	0.00
38	HED-03F	0.07	0.00	250.07	0.07	0.00	1.68	250.00	0.00	0 08:11	0 00:00	0.00	0.00
39	HED-03G	0.02	0.00	242.00	0.00	0.00	3.00	242.00	0.00	0 15:09	0 00:00	0.00	0.00
40	HED-03H	0.02	0.00	243.94	0.94	0.00	2.56	243.49	0.49	0 22:21	0 00:00	0.00	0.00
41	HED-03I	0.00	0.00	244.00	0.00	0.00	3.00	244.00	0.00	0 00:00	0 00:00	0.00	0.00
42	HED-03J	0.00	0.00	245.00	0.00	0.00	3.50	245.00	0.00	0 00:00	0 00:00	0.00	0.00
43	HED-03K	0.83	0.00	257.06	1.06	0.00	1.94	256.57	0.57	0 07:57	0 00:00	0.00	0.00
44	HED-03L	0.83	0.00	256.22	0.22	0.00	1.78	256.05	0.05	0 07:40	0 00:00	0.00	0.00
45	HED-03M	0.01	0.00	238.06	0.06	0.00	5.94	238.00	0.00	0 09:56	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
5-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	COF-1A	10.00	238.00	0.00	238.00	0.00	0.00	0.0000	Rectangular	5.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	COF-1B	150.00	244.00	0.00	238.00	0.00	6.00	4.0000	Rectangular	1.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	COF-1C	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	COF-1E	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	COF-2B	1.00	245.00	0.00	246.00	2.00	-1.00	-100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	COF-2D	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
7	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
8	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
9	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00	No
10	HED-01I	5.00	228.00	0.00	228.50	2.00	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
11	HED-01J	20.00	227.00	0.50	228.00	2.00	-1.00	-5.0000	Rectangular	1.000	1.000	0.0320	0.5000	0.5000	0.0000	0.00	No
12	HED-01K	5.00	228.00	0.00	228.75	2.25	-0.75	-15.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
13	HED-01M	500.00	230.00	0.00	224.00	0.00	6.00	1.2000	Triangular	2.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
14	HED-01O	5.00	237.00	0.00	237.50	3.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
15	HED-01Q	5.00	238.00	0.00	238.50	4.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
16	HED-01T	1.00	232.75	1.75	231.00	1.00	1.75	175.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
17	HED-01V	5.00	231.00	0.00	231.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
18	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
19	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00	No
20	HED-02G	1130.10	235.00	0.00	181.76	0.00	53.24	4.7100	Trapezoidal	3.000	19.000	0.0320	0.5000	0.5000	0.0000	0.00	No
21	HED-02K	1.00	256.50	1.50	237.00	0.00	19.50	1950.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
22	HED-02L	44.02	237.00	0.00	236.00	0.00	1.00	2.2700	Rectangular	2.000	4.000	0.0320	0.5000	0.5000	0.0000	0.00	No
23	HED-02O	5.00	255.00	0.00	255.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
24	HED-03A	770.00	181.76	0.00	183.00	0.00	-1.24	-0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
25	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
26	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
27	HED-03F	400.00	241.00	0.00	236.00	0.00	5.00	1.2500	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
28	HED-03G	10.00	242.00	0.00	241.00	0.00	1.00	10.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
29	HED-03H	1.00	244.50	1.50	242.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
30	HED-03K	5.00	256.00	0.00	256.00	0.00	0.00	0.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
31	HED-03M	5.00	250.00	0.00	250.75	0.75	-0.75	-15.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
32	HED-03O	5.00	250.00	0.00	250.50	0.50	-0.50	-10.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
33	HED-03P	1.00	257.00	1.00	256.00	0.00	1.00	100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
34	HED-03R	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
35	HED-03S	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
36	HED-03U	5.00	243.00	0.00	243.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
5-year storm

Channel Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	COF-1A	0.12	0 20:17	42.77	0.00	0.10	1.67	0.11	0.02	0.00		0.00
2	COF-1B	0.11	0 20:10	37.11	0.00	0.32	7.81	0.07	0.07	0.00		0.00
3	COF-1C	0.09	0 20:09	224.13	0.00	2.29	0.01	0.02	0.01	0.00		0.00
4	COF-1E	0.11	0 20:09	7.05	0.02	0.04	2.08	1.51	0.76	0.00		0.00
5	COF-2B	0.00	0 00:00	141.75	0.00	0.00		0.46	0.23	0.00		0.00
6	COF-2D	0.01	0 07:59	2.00	0.01	0.08	1.04	0.93	0.46	0.00		0.00
7	HED-01A	0.40	0 17:30	1512.53	0.00	0.62	4.44	0.04	0.01	0.00		0.00
8	HED-01B	0.32	0 17:06	1082.72	0.00	0.47	28.55	0.05	0.01	0.00		0.00
9	HED-01F	0.31	0 16:47	2813.13	0.00	1.84	5.60	0.13	0.02	0.00		0.00
10	HED-01I	0.21	0 10:56	24.81	0.01	0.31	0.27	0.28	0.28	0.00		0.00
11	HED-01J	0.17	0 08:07	4.99	0.03	0.32	1.04	0.54	0.55	0.00		0.00
12	HED-01K	3.93	0 13:40	30.39	0.13	3.05	0.03	0.41	0.52	0.00		0.00
13	HED-01M	0.05	0 08:34	37.78	0.00	1.61	5.18	0.13	0.06	0.00		0.00
14	HED-01O	0.13	0 10:26	24.81	0.01	0.20	0.42	0.27	0.27	0.00		0.00
15	HED-01Q	0.00	0 00:00	24.81	0.00	0.00		0.10	0.10	0.00		0.00
16	HED-01T	0.26	0 16:45	187.52	0.00	4.98	0.00	0.03	0.01	0.00		0.00
17	HED-01V	0.31	0 16:45	16.66	0.02	0.04	2.08	1.78	0.89	0.00		0.00
18	HED-02A	0.10	0 14:09	1963.65	0.00	0.33	46.97	0.03	0.00	0.00		0.00
19	HED-02E	0.10	0 13:44	614.42	0.00	0.25	32.40	0.09	0.01	0.00		0.00
20	HED-02G	0.07	0 07:16	396.58	0.00	1.53	12.31	0.07	0.02	0.00		0.00
21	HED-02K	0.00	0 00:00	625.97	0.00	0.00		0.05	0.02	0.00		0.00
22	HED-02L	0.00	0 00:00	55.99	0.00	0.00		0.06	0.03	0.00		0.00
23	HED-02O	0.06	1 06:11	16.66	0.00	0.11	0.76	0.76	0.38	0.00		0.00
24	HED-03A	0.04	0 11:33	443.56	0.00	0.03	427.78	0.05	0.01	0.00		0.00
25	HED-03B	0.06	0 10:00	2403.19	0.00	0.26	70.51	0.01	0.00	0.00		0.00
26	HED-03C	0.06	0 09:29	417.77	0.00	0.14	83.33	0.02	0.00	0.00		0.00
27	HED-03F	0.15	0 08:26	131.71	0.00	0.50	13.33	0.03	0.01	0.00		0.00
28	HED-03G	0.01	0 15:09	157.53	0.00	0.19	0.88	0.02	0.01	0.00		0.00
29	HED-03H	0.00	0 00:00	224.13	0.00	0.00		0.00	0.00	0.00		0.00
30	HED-03K	0.83	0 07:39	0.83	1.00	0.41	0.20	1.00	1.00	1065.00		0.00
31	HED-03M	0.08	0 11:49	22.66	0.00	0.10	0.83	0.40	0.40	0.00		0.00
32	HED-03O	0.11	0 11:17	18.50	0.01	0.21	0.40	0.28	0.29	0.00		0.00
33	HED-03P	0.81	0 07:39	141.75	0.01	3.06	0.01	0.14	0.07	0.00		0.00
34	HED-03R	0.00	0 00:00	2.00	0.00	0.00		0.00	0.00	0.00		0.00
35	HED-03S	0.00	0 00:00	224.13	0.00	0.00		0.00	0.00	0.00		0.00
36	HED-03U	0.02	0 22:21	2.00	0.01	0.12	0.69	0.94	0.47	0.00		0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Pipe Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	No. of Barrels
1	COF-01D	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	COF-2A	400.00	244.00	0.00	238.00	0.00	6.00	1.5000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	COF-2C	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.480	0.480	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5	HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6	HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7	HED-01G	20.00	226.00	0.00	223.00	0.00	3.00	15.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	HED-01H	50.00	226.50	0.00	226.00	0.00	0.50	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	HED-01L	47.37	224.00	0.00	223.00	0.00	1.00	2.1100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	HED-01N	75.00	234.00	0.00	230.00	0.00	4.00	5.3300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	HED-01P	65.00	234.00	0.00	230.00	0.00	4.00	6.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	HED-01R	50.00	230.00	0.00	229.00	0.00	1.00	2.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	HED-01S	100.00	229.00	0.00	228.00	2.00	1.00	1.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	HED-01U	1.00	231.00	0.00	230.00	0.00	1.00	100.0000	CIRCULAR	0.960	0.960	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
16	HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
17	HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
18	HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	HED-02H	100.00	236.00	0.00	235.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	HED-02I	100.00	237.00	0.00	236.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	HED-02J	1.00	255.00	0.00	237.00	0.00	18.00	1800.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	HED-03D	500.00	238.00	0.00	235.00	0.00	3.00	0.6000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	HED-03E	47.11	242.00	0.00	242.50	4.50	-0.50	-1.0600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	HED-03I	200.00	244.00	0.00	243.50	0.50	0.50	0.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	HED-03J	200.00	256.00	0.00	243.00	0.00	13.00	6.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	HED-03L	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	HED-03N	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
28	HED-03Q	1.00	256.00	0.00	256.00	0.00	0.00	0.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	HED-03T	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	HED-03V	1.00	243.00	0.00	242.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	COF-01D	0.02	0 20:10	0.02	0.96	10.57	0.00	0.04	0.71	0.00		Calculated
2	COF-2A	0.01	0 11:01	11.15	0.00	0.81	8.23	0.07	0.05	0.00		Calculated
3	COF-2C	0.01	0 10:59	0.01	1.09	6.40	0.00	0.04	0.87	0.00		> CAPACITY
4	HED-01C	0.31	0 16:56	20.90	0.02	3.62	0.43	0.13	0.06	0.00		Calculated
5	HED-01D	0.31	0 16:55	28.48	0.01	2.99	6.70	0.15	0.07	0.00		Calculated
6	HED-01E	0.31	0 16:50	7.14	0.04	4.46	0.35	0.15	0.15	0.00		Calculated
7	HED-01G	0.31	0 16:46	40.68	0.01	7.36	0.05	0.10	0.07	0.00		Calculated
8	HED-01H	0.08	0 08:21	3.56	0.02	2.07	0.40	0.09	0.09	0.00		Calculated
9	HED-01L	0.05	0 08:35	15.26	0.00	1.51	0.52	0.07	0.05	0.00		Calculated
10	HED-01N	0.05	0 08:27	8.23	0.01	2.43	0.51	0.12	0.12	0.00		Calculated
11	HED-01P	0.00	0 00:00	26.06	0.00	0.00		0.10	0.06	0.00		Calculated
12	HED-01R	0.31	0 16:45	5.04	0.06	3.27	0.25	0.18	0.18	0.00		Calculated
13	HED-01S	0.31	0 16:46	10.50	0.03	2.61	0.64	0.18	0.12	0.00		Calculated
14	HED-01U	0.05	0 15:30	0.05	1.11	9.75	0.00	0.08	1.00	527.00		SURCHARGED
15	HED-02B	0.10	0 13:57	40.58	0.00	2.07	0.65	0.07	0.02	0.00		Calculated
16	HED-02C	0.10	0 13:55	8.91	0.01	1.43	3.57	0.12	0.08	0.00		Calculated
17	HED-02D	0.10	0 13:50	4.04	0.02	0.99	12.54	0.16	0.10	0.00		Calculated
18	HED-02F	0.10	0 12:55	59.16	0.00	1.24	2.22	0.12	0.04	0.00		Calculated
19	HED-02H	0.07	0 07:10	3.56	0.02	2.44	0.68	0.08	0.08	0.00		Calculated
20	HED-02I	0.07	0 07:09	3.56	0.02	1.66	1.00	0.10	0.10	0.00		Calculated
21	HED-02J	0.07	1 12:46	0.09	0.77	23.64	0.00	0.06	1.00	1772.00		SURCHARGED
22	HED-03D	0.01	0 09:56	2.76	0.00	1.56	5.34	0.03	0.03	0.00		Calculated
23	HED-03E	0.01	0 09:52	10.82	0.00	0.06	13.09	0.28	0.19	0.00		Calculated
24	HED-03I	0.00	0 00:00	5.25	0.00	0.00		0.22	0.15	0.00		Calculated
25	HED-03J	0.83	0 07:44	9.08	0.09	8.57	0.39	0.51	0.51	0.00		Calculated
26	HED-03L	0.07	0 08:12	10.69	0.01	5.55	0.30	0.05	0.05	0.00		Calculated
27	HED-03N	0.10	0 08:11	9.26	0.01	5.94	0.28	0.06	0.06	0.00		Calculated
28	HED-03Q	0.02	1 00:09	0.00	23.05	5.62	0.00	0.06	1.00	1054.00		SURCHARGED
29	HED-03T	0.00	0 00:00	0.02	0.00	0.00		0.00	0.00	0.00		Calculated
30	HED-03V	0.02	0 22:22	0.02	1.02	13.29	0.00	0.03	0.54	0.00		> CAPACITY

Storage Nodes

Storage Node : LIDA-01

Input Data

Invert Elevation (ft) 228.00
 Max (Rim) Elevation (ft) 229.00
 Max (Rim) Offset (ft) 1.00
 Initial Water Elevation (ft) 228.00
 Initial Water Depth (ft) 0.00
 Ponded Area (ft²) 938.00
 Evaporation Loss 0.00

Infiltration/Exfiltration

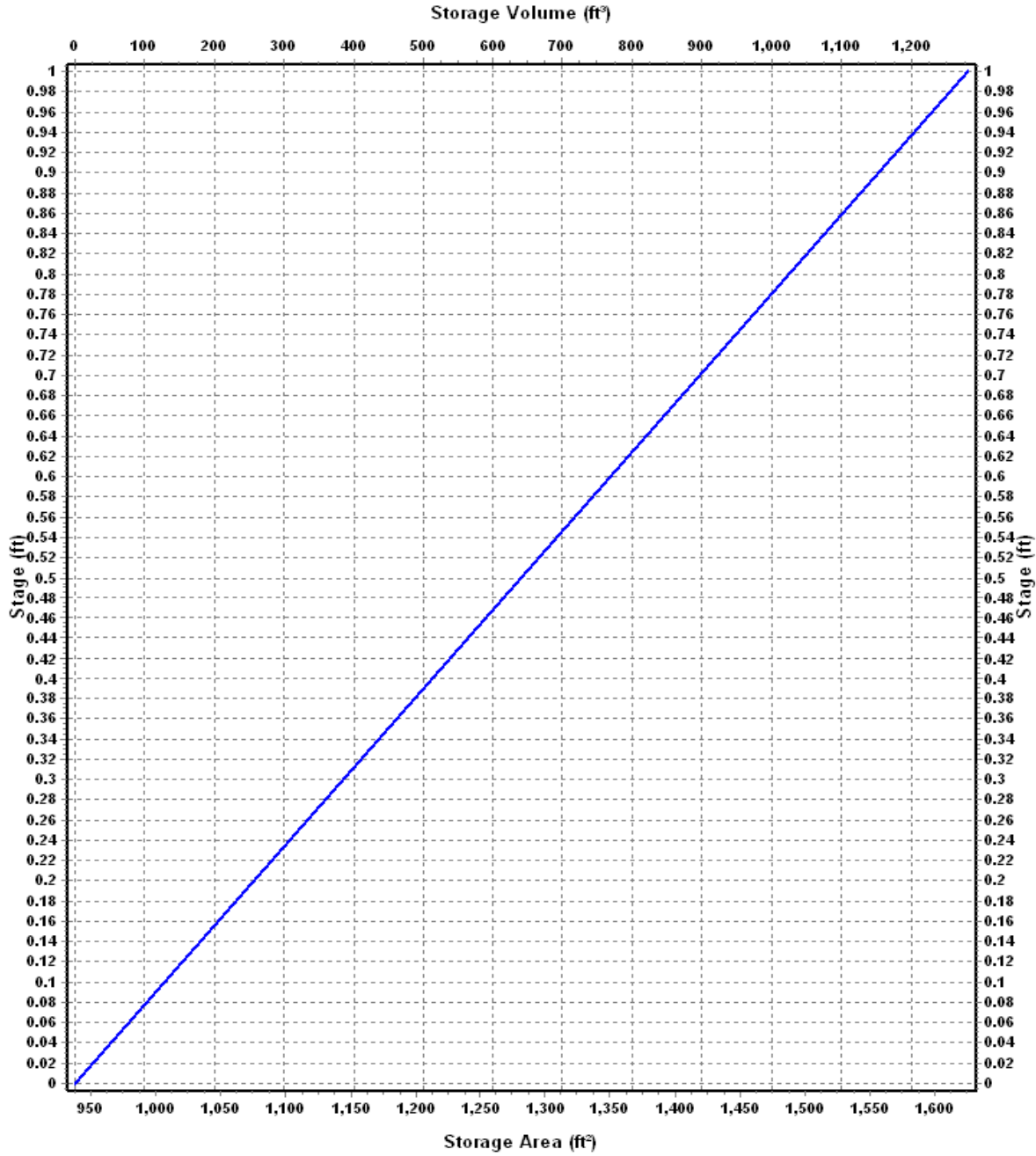
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-01

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	938	0.000
1	1625	1281.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-01 (continued)

Output Summary Results

Peak Inflow (cfs)	0.28
Peak Lateral Inflow (cfs)	0.28
Peak Outflow (cfs)	0.08
Peak Exfiltration Flow Rate (cfm)	3.61
Max HGL Elevation Attained (ft)	228.53
Max HGL Depth Attained (ft)	0.53
Average HGL Elevation Attained (ft)	228.09
Average HGL Depth Attained (ft)	0.09
Time of Max HGL Occurrence (days hh:mm)	0 08:21
Total Exfiltration Volume (1000-ft ³)	3.693
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-02

Input Data

Invert Elevation (ft) 228.00
Max (Rim) Elevation (ft) 229.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 228.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 562.00
Evaporation Loss 0.00

Infiltration/Exfiltration

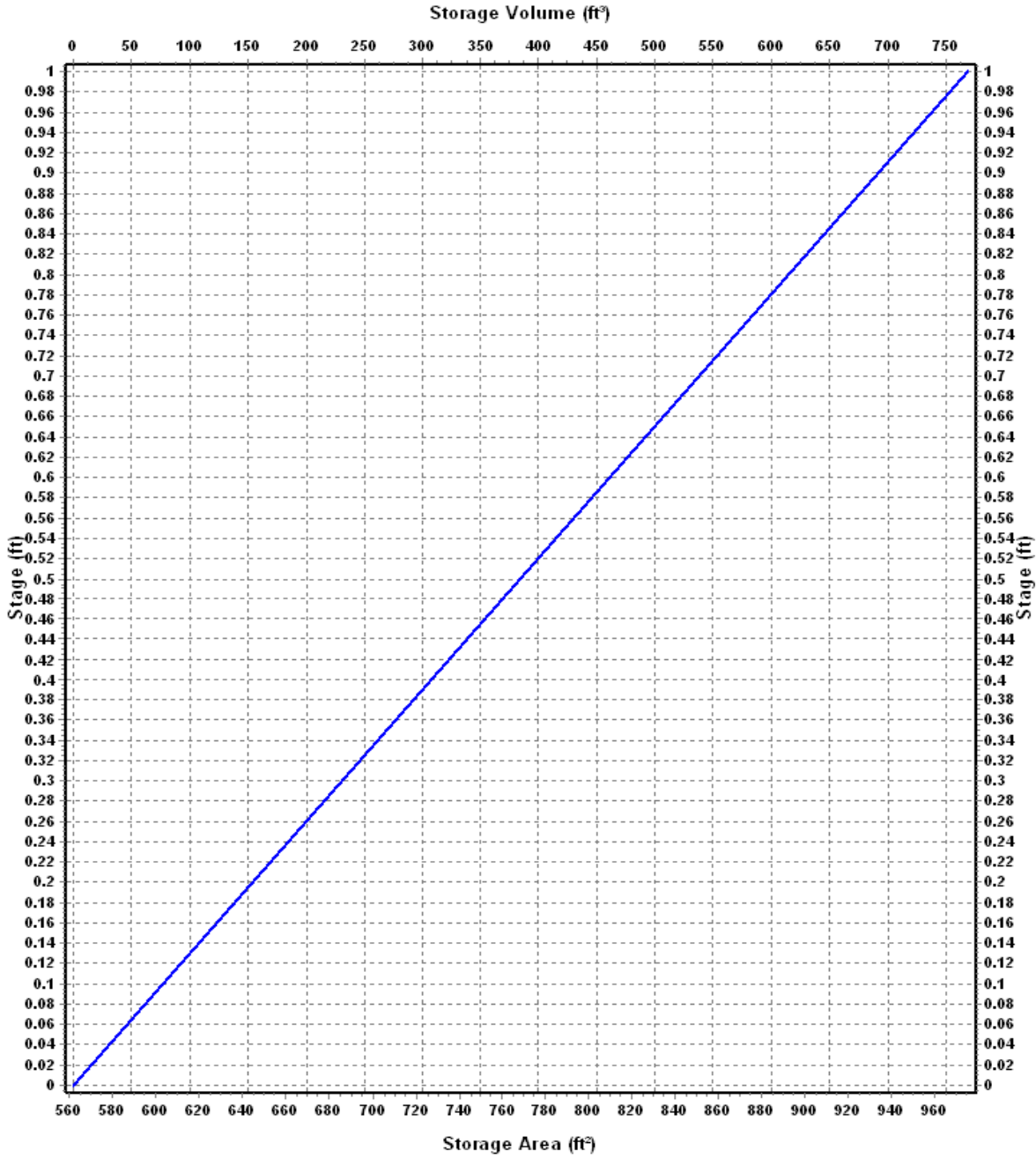
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-02

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	562	0.000
1	975	768.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-02 (continued)

Output Summary Results

Peak Inflow (cfs)	3.97
Peak Lateral Inflow (cfs)	0.26
Peak Outflow (cfs)	0.17
Peak Exfiltration Flow Rate (cfm)	2.47
Max HGL Elevation Attained (ft)	228.79
Max HGL Depth Attained (ft)	0.79
Average HGL Elevation Attained (ft)	228.25
Average HGL Depth Attained (ft)	0.25
Time of Max HGL Occurrence (days hh:mm)	0 08:07
Total Exfiltration Volume (1000-ft ³)	3.122
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-03

Input Data

Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 238.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

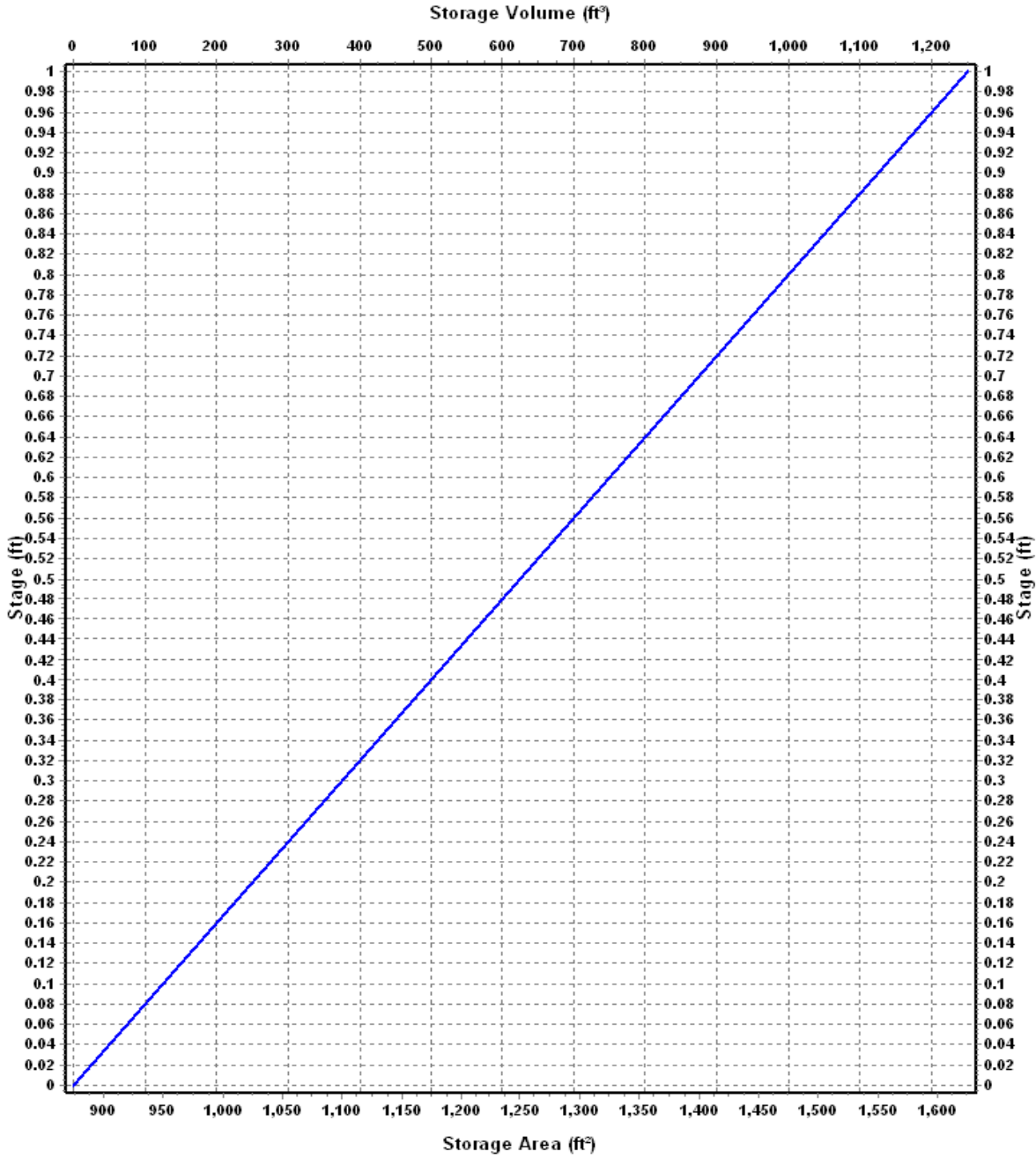
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-03

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	875	0.000
1	1625	1250.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-03 (continued)

Output Summary Results

Peak Inflow (cfs)	0.26
Peak Lateral Inflow (cfs)	0.26
Peak Outflow (cfs)	0.05
Peak Exfiltration Flow Rate (cfm)	3.52
Max HGL Elevation Attained (ft)	237.52
Max HGL Depth Attained (ft)	0.52
Average HGL Elevation Attained (ft)	237.08
Average HGL Depth Attained (ft)	0.08
Time of Max HGL Occurrence (days hh:mm)	0 08:27
Total Exfiltration Volume (1000-ft ³)	3.445
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-04

Input Data

Invert Elevation (ft) 238.00
Max (Rim) Elevation (ft) 239.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 238.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

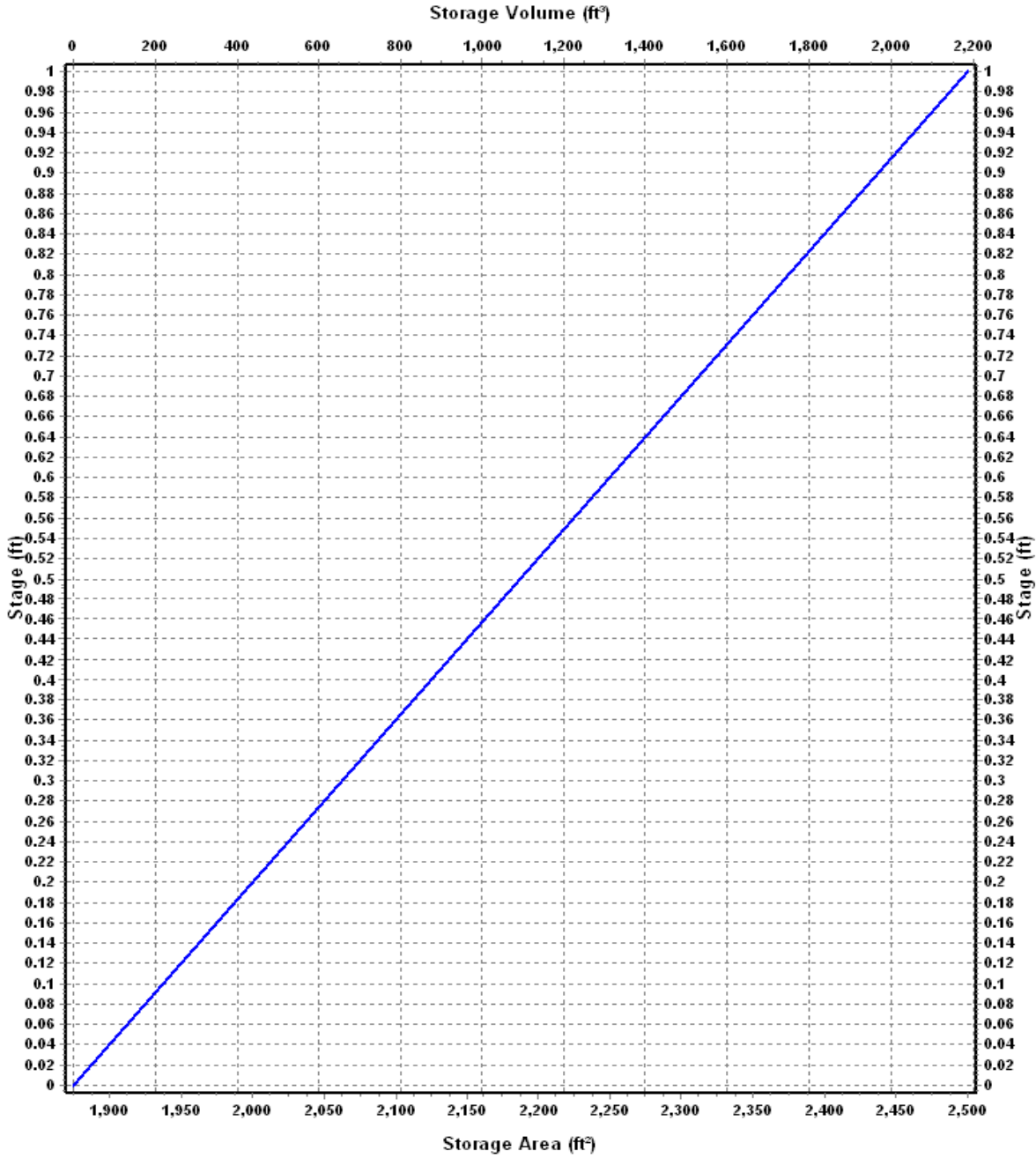
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-04

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	1875	0.000
1	2500	2187.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-04 (continued)

Output Summary Results

Peak Inflow (cfs)	0.27
Peak Lateral Inflow (cfs)	0.27
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	5.55
Max HGL Elevation Attained (ft)	238.20
Max HGL Depth Attained (ft)	0.2
Average HGL Elevation Attained (ft)	238.01
Average HGL Depth Attained (ft)	0.009999999999999999
Time of Max HGL Occurrence (days hh:mm)	0 08:58
Total Exfiltration Volume (1000-ft³)	3.747
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-05

Input Data

Invert Elevation (ft) 255.00
Max (Rim) Elevation (ft) 257.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 255.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 12000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

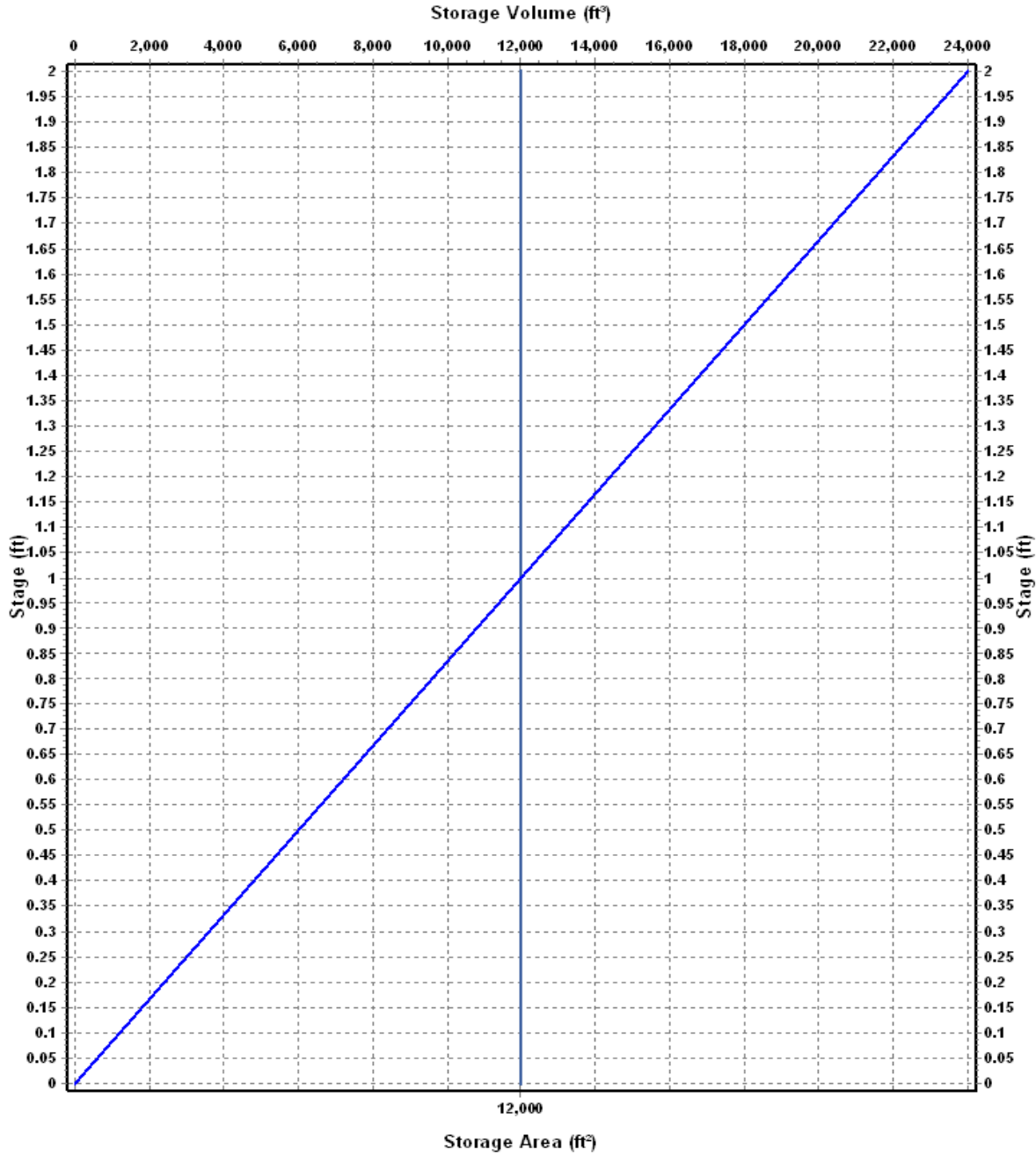
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-05

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	12000	0.000
2	12000	24000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-05 (continued)

Output Summary Results

Peak Inflow (cfs)	1.52
Peak Lateral Inflow (cfs)	1.52
Peak Outflow (cfs)	0.06
Peak Exfiltration Flow Rate (cfm)	8.33
Max HGL Elevation Attained (ft)	255.76
Max HGL Depth Attained (ft)	0.76
Average HGL Elevation Attained (ft)	255.33
Average HGL Depth Attained (ft)	0.33
Time of Max HGL Occurrence (days hh:mm)	0 22:11
Total Exfiltration Volume (1000-ft ³)	17.282
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-06A

Input Data

Invert Elevation (ft) 231.00
Max (Rim) Elevation (ft) 233.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 231.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 10000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

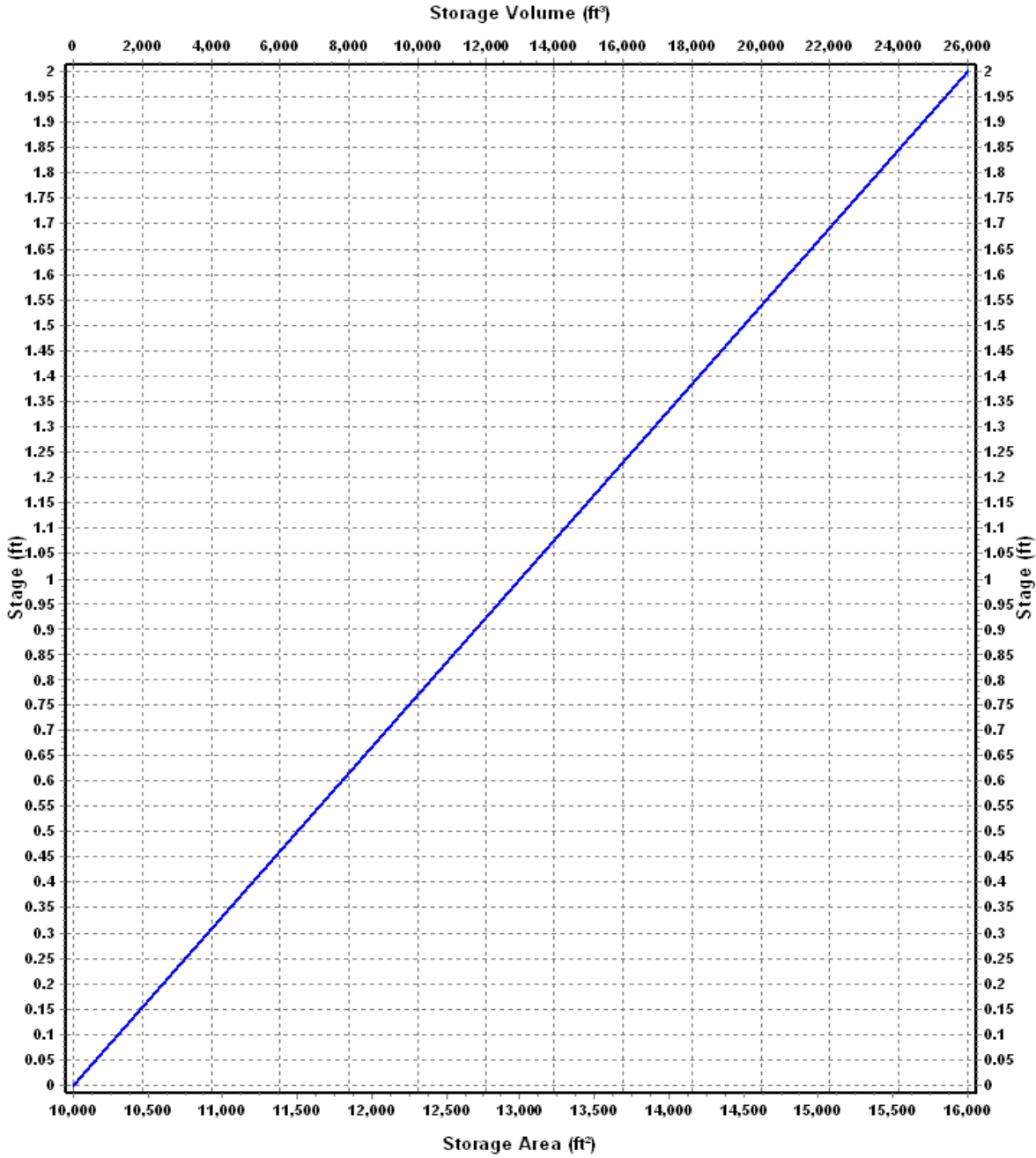
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-06A

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	10000	0.000
2	16000	26000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-06A (continued)

Output Summary Results

Peak Inflow (cfs)	3.05
Peak Lateral Inflow (cfs)	3.05
Peak Outflow (cfs)	0.31
Peak Exfiltration Flow Rate (cfm)	10.65
Max HGL Elevation Attained (ft)	232.78
Max HGL Depth Attained (ft)	1.78
Average HGL Elevation Attained (ft)	232.09
Average HGL Depth Attained (ft)	1.09
Time of Max HGL Occurrence (days hh:mm)	0 16:45
Total Exfiltration Volume (1000-ft ³)	27.113
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-06B

Input Data

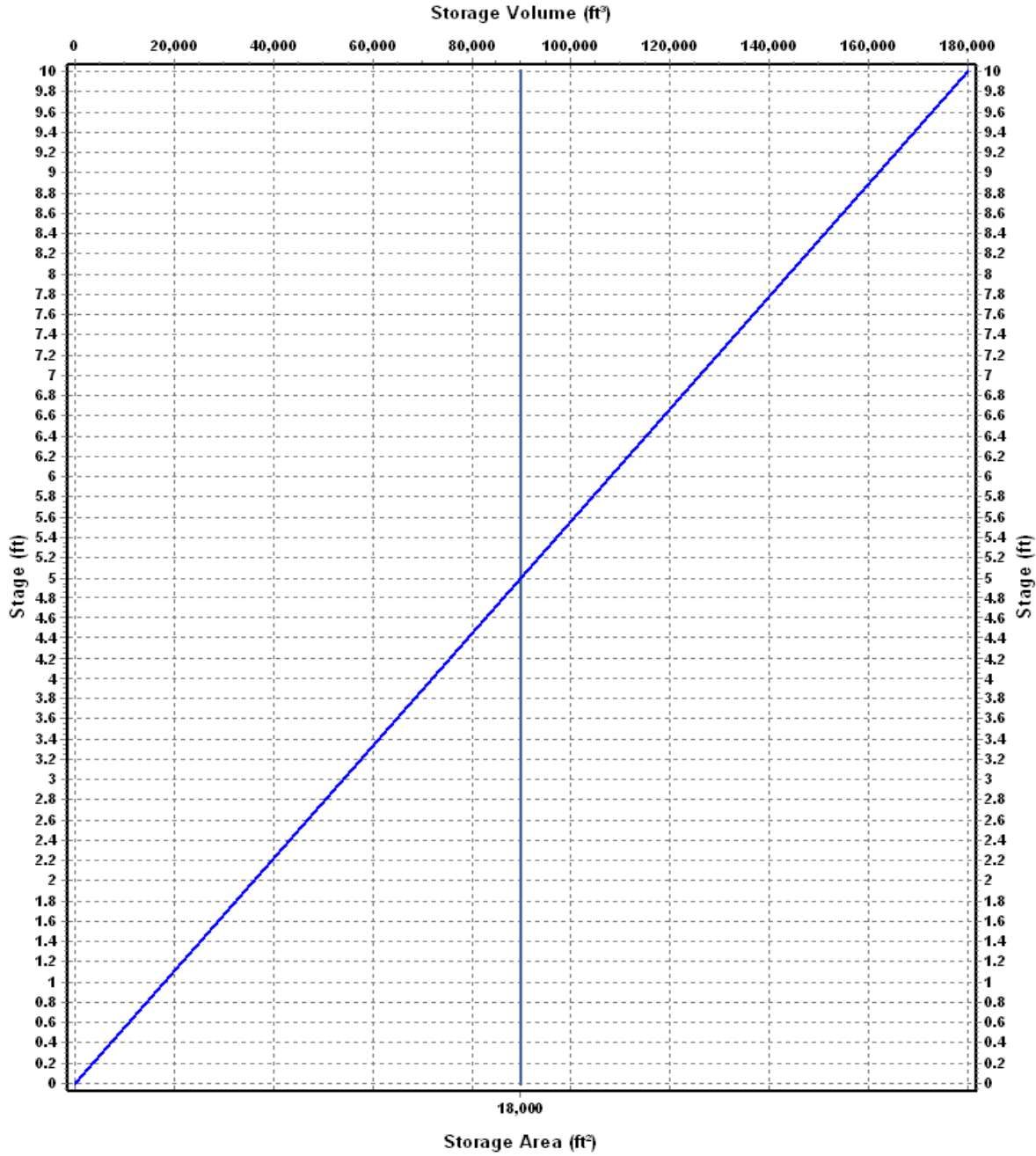
Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 10.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18000.00
Evaporation Loss 0.00

Storage Area Volume Curves

Storage Curve : LIDA-06B

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	18000	0.000
10	18000	180000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-06B (continued)

Output Summary Results

Peak Inflow (cfs)	0.30
Peak Lateral Inflow (cfs)	0.30
Peak Outflow (cfs)	0.04
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	237.11
Max HGL Depth Attained (ft)	0.11
Average HGL Elevation Attained (ft)	237.06
Average HGL Depth Attained (ft)	0.06
Time of Max HGL Occurrence (days hh:mm)	0 16:00
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-07

Input Data

Invert Elevation (ft) 242.00
Max (Rim) Elevation (ft) 243.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 242.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 2812.00
Evaporation Loss 0.00

Infiltration/Exfiltration

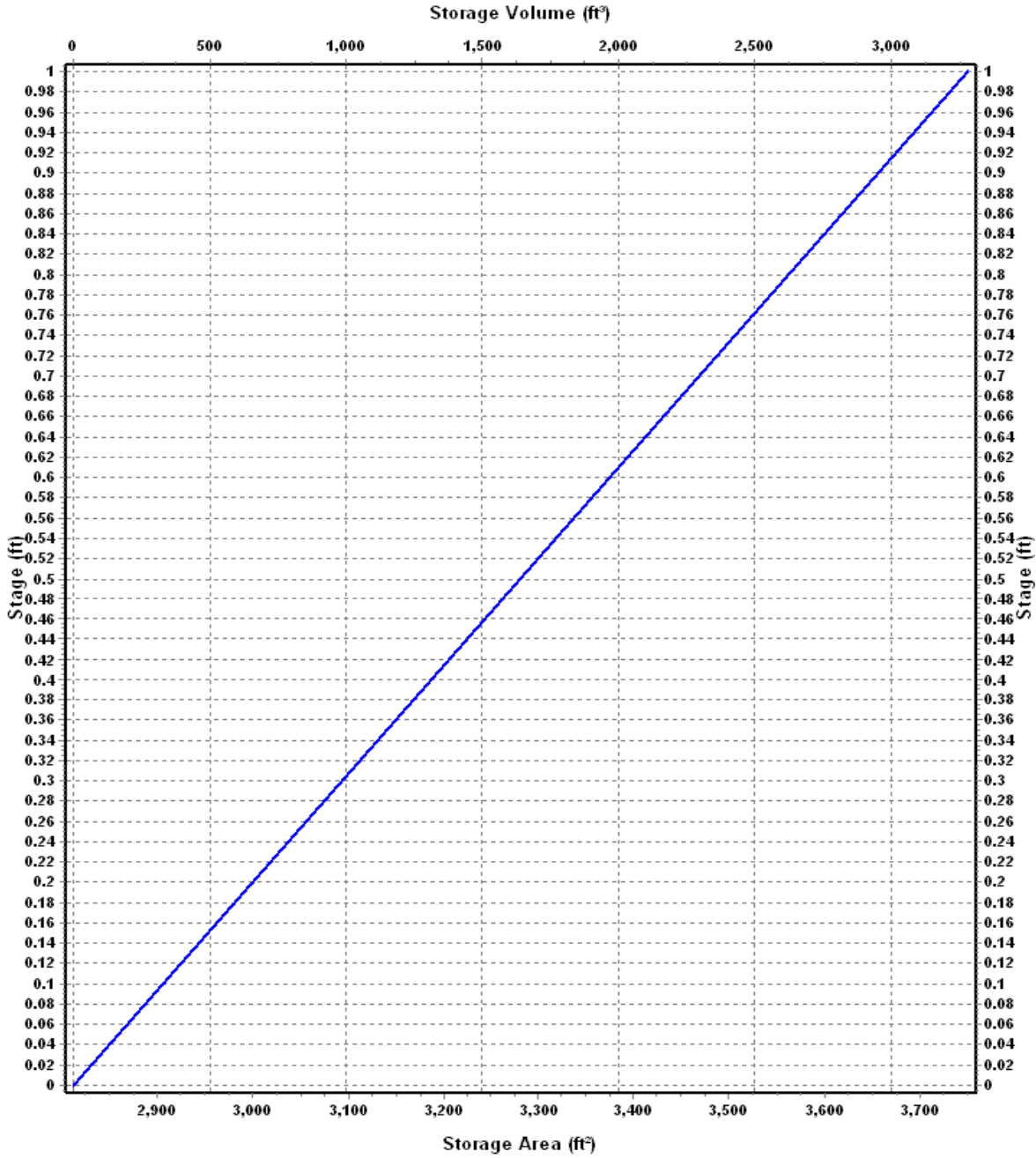
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-07

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	2812	0.000
1	3750	3281.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-07 (continued)

Output Summary Results

Peak Inflow (cfs)	0.68
Peak Lateral Inflow (cfs)	0.68
Peak Outflow (cfs)	0.01
Peak Exfiltration Flow Rate (cfm)	9.19
Max HGL Elevation Attained (ft)	242.53
Max HGL Depth Attained (ft)	0.53
Average HGL Elevation Attained (ft)	242.09
Average HGL Depth Attained (ft)	0.09
Time of Max HGL Occurrence (days hh:mm)	0 09:52
Total Exfiltration Volume (1000-ft ³)	9.319
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-08B

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 5650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

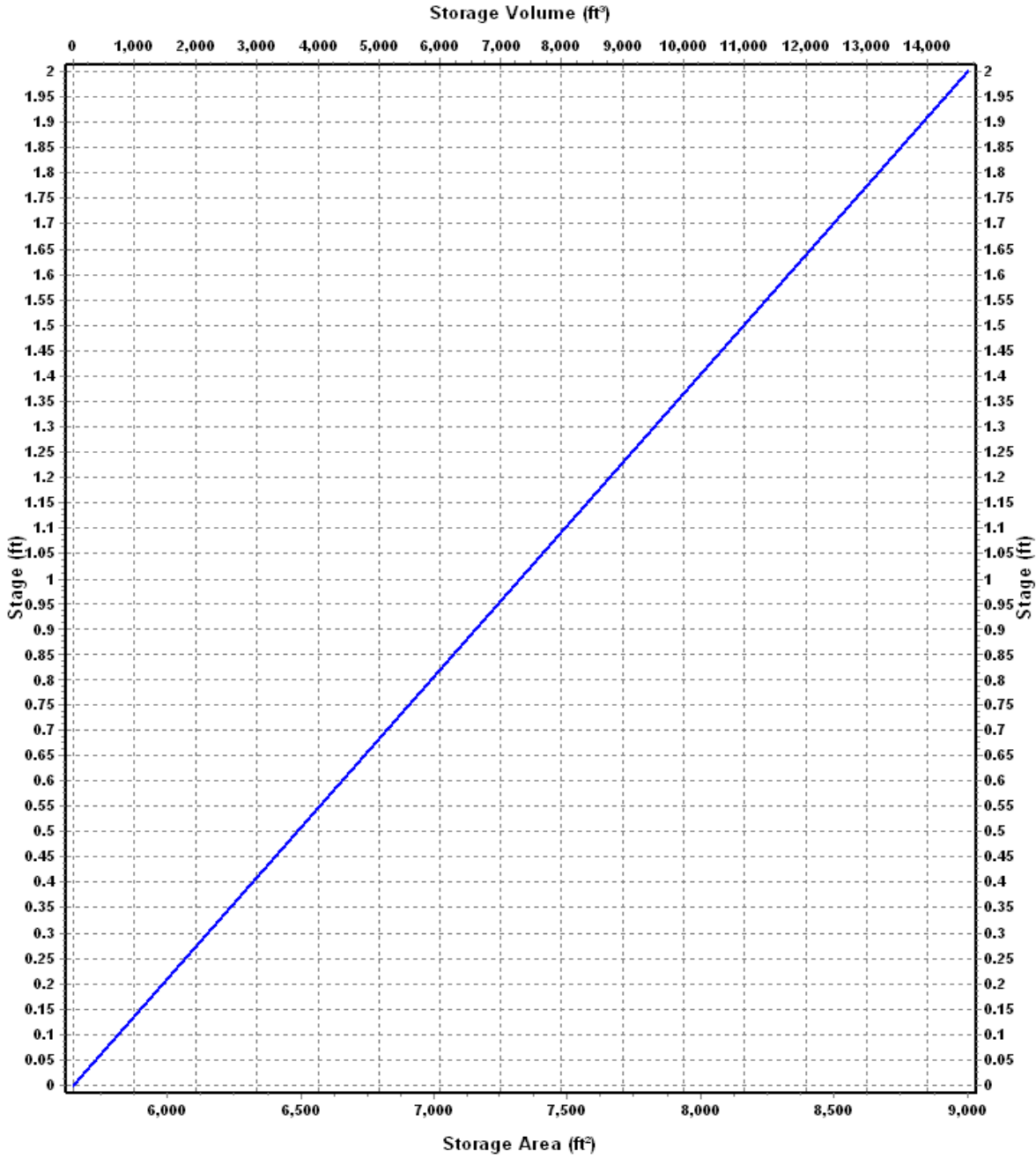
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08B

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	5650	0.000
2	9000	14650.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-08B (continued)

Output Summary Results

Peak Inflow (cfs)	0.00
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	3.92
Max HGL Elevation Attained (ft)	245.00
Max HGL Depth Attained (ft)	0
Average HGL Elevation Attained (ft)	245.00
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 00:00
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-08C

Input Data

Invert Elevation (ft) 243.00
Max (Rim) Elevation (ft) 245.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 243.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

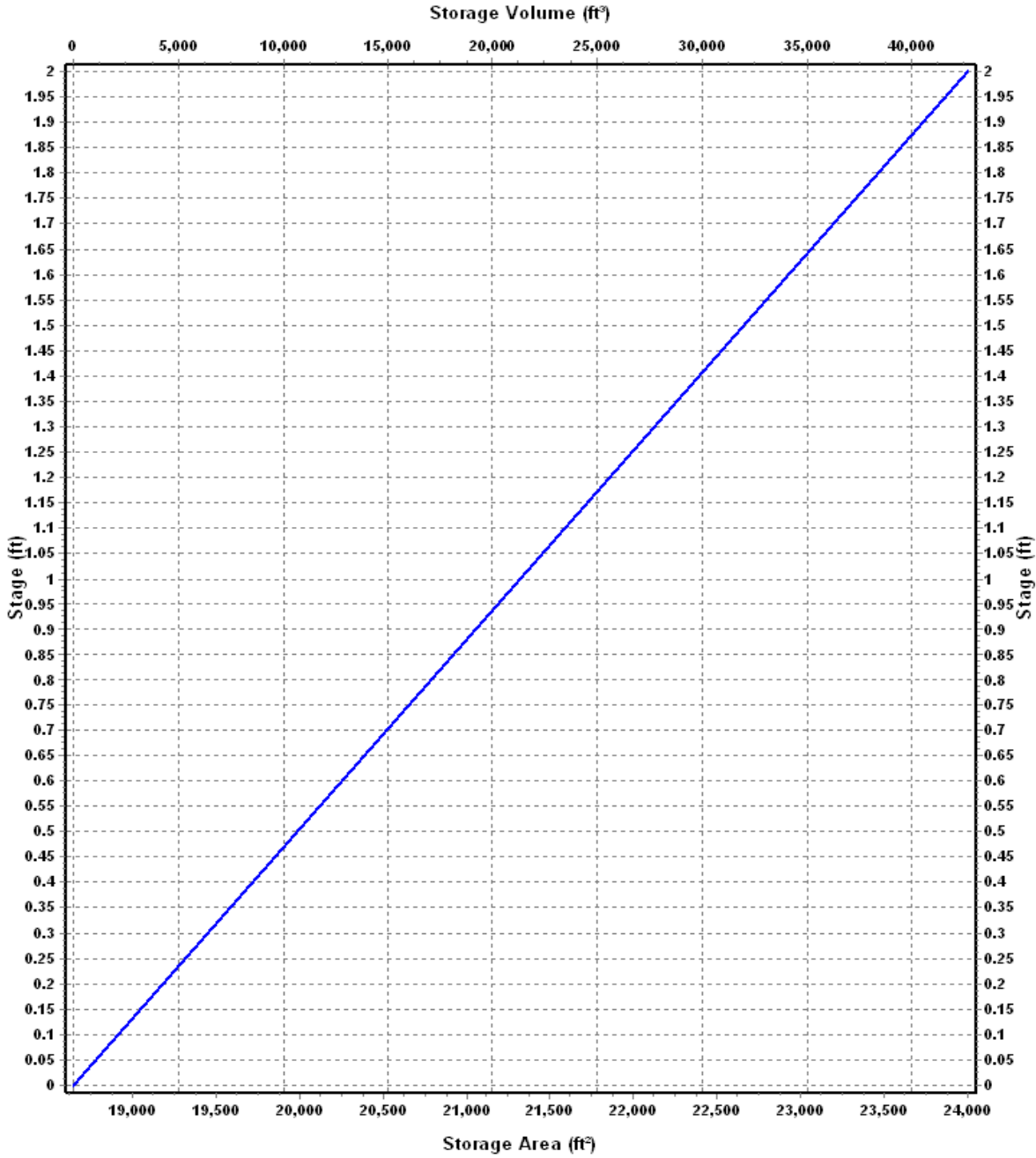
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08C

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	18650	0.000
2	24000	42650.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-08C (continued)

Output Summary Results

Peak Inflow (cfs)	2.29
Peak Lateral Inflow (cfs)	1.46
Peak Outflow (cfs)	0.02
Peak Exfiltration Flow Rate (cfm)	14.70
Max HGL Elevation Attained (ft)	243.94
Max HGL Depth Attained (ft)	0.94
Average HGL Elevation Attained (ft)	243.49
Average HGL Depth Attained (ft)	0.49
Time of Max HGL Occurrence (days hh:mm)	0 22:40
Total Exfiltration Volume (1000-ft ³)	35.903
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-09

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 375.00
Evaporation Loss 0.00

Infiltration/Exfiltration

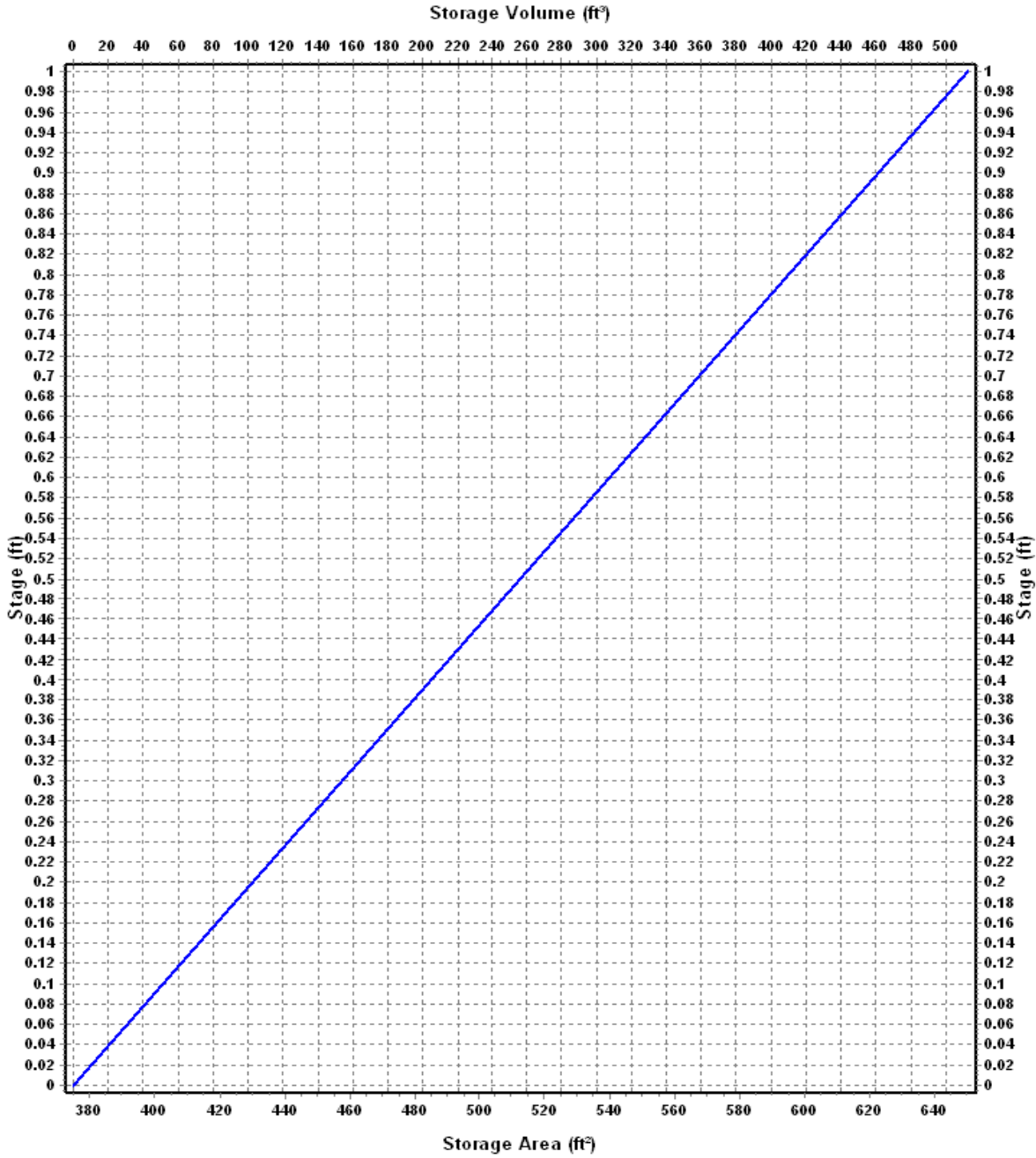
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-09

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	375	0.000
1	650	512.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-09 (continued)

Output Summary Results

Peak Inflow (cfs)	0.16
Peak Lateral Inflow (cfs)	0.16
Peak Outflow (cfs)	0.07
Peak Exfiltration Flow Rate (cfm)	1.63
Max HGL Elevation Attained (ft)	250.78
Max HGL Depth Attained (ft)	0.78
Average HGL Elevation Attained (ft)	250.21
Average HGL Depth Attained (ft)	0.21
Time of Max HGL Occurrence (days hh:mm)	0 08:11
Total Exfiltration Volume (1000-ft ³)	1.962
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-10

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 657.00
Evaporation Loss 0.00

Infiltration/Exfiltration

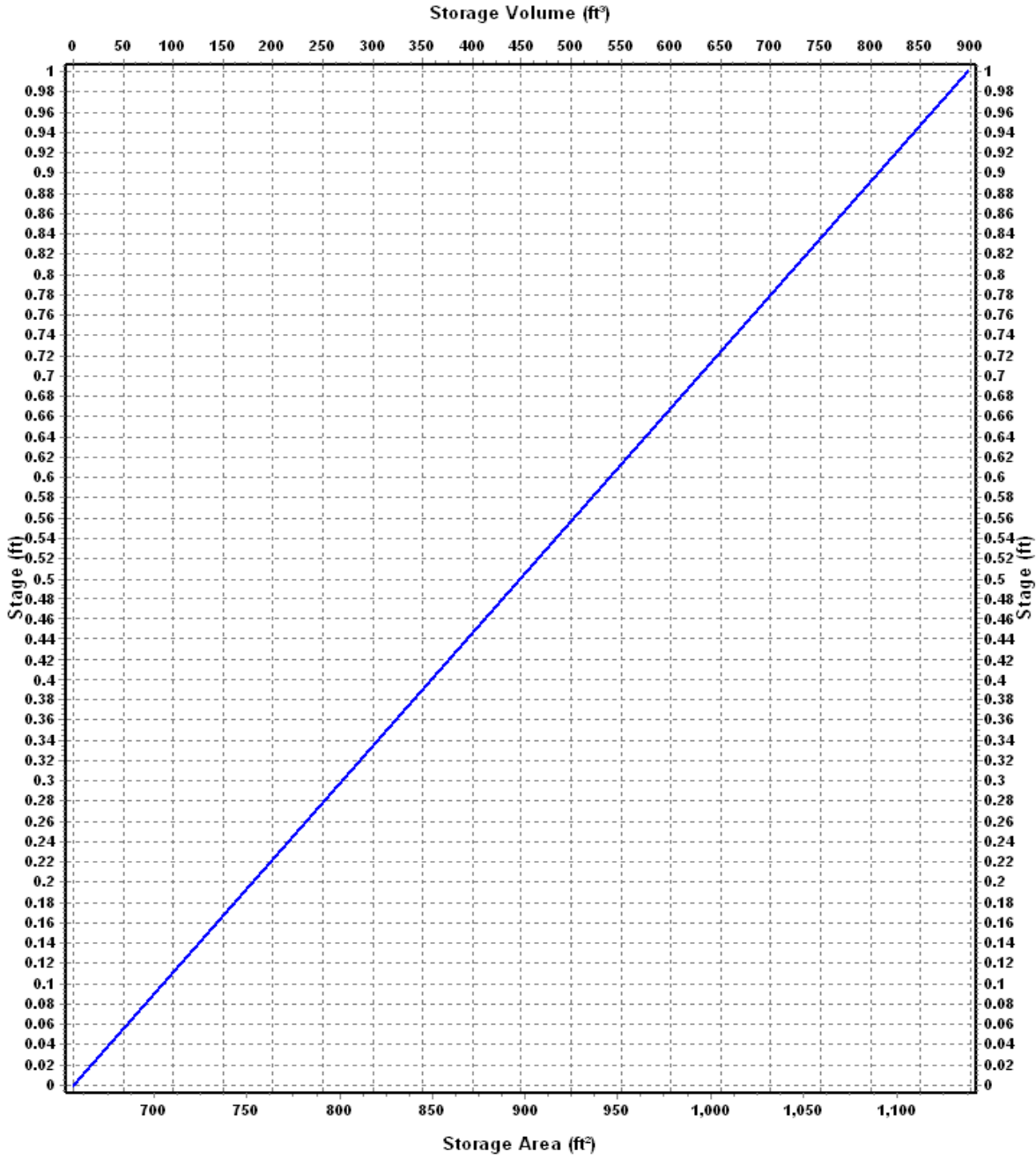
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-10

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	657	0.000
1	1138	897.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-10 (continued)

Output Summary Results

Peak Inflow (cfs)	0.21
Peak Lateral Inflow (cfs)	0.21
Peak Outflow (cfs)	0.10
Peak Exfiltration Flow Rate (cfm)	2.54
Max HGL Elevation Attained (ft)	250.54
Max HGL Depth Attained (ft)	0.54
Average HGL Elevation Attained (ft)	250.10
Average HGL Depth Attained (ft)	0.1
Time of Max HGL Occurrence (days hh:mm)	0 08:11
Total Exfiltration Volume (1000-ft ³)	2.702
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-11

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 13000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

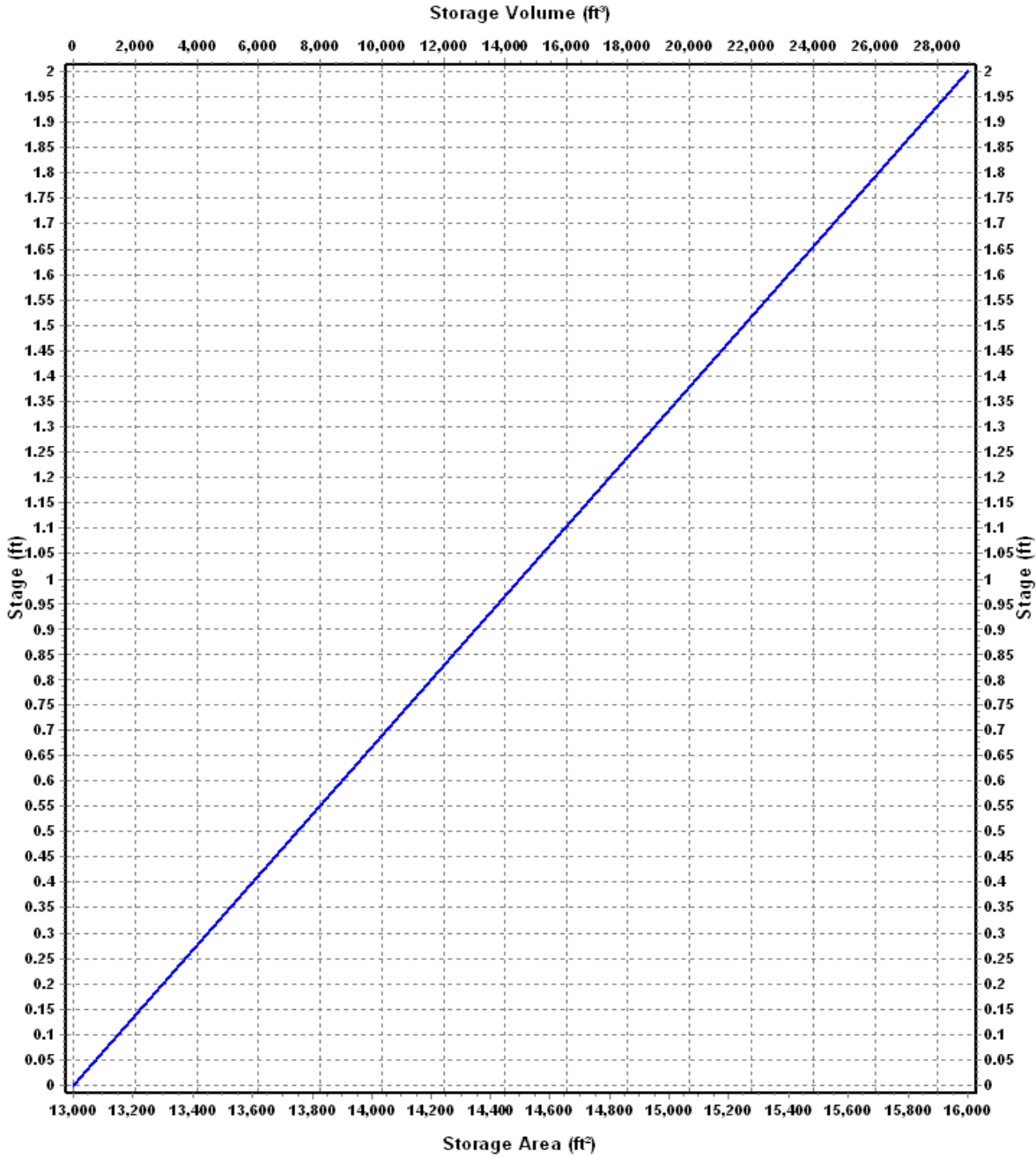
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-11

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	13000	0.000
2	16000	29000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-11 (continued)

Output Summary Results

Peak Inflow (cfs)	2.63
Peak Lateral Inflow (cfs)	2.63
Peak Outflow (cfs)	0.11
Peak Exfiltration Flow Rate (cfm)	10.60
Max HGL Elevation Attained (ft)	246.51
Max HGL Depth Attained (ft)	1.51
Average HGL Elevation Attained (ft)	245.95
Average HGL Depth Attained (ft)	0.95
Time of Max HGL Occurrence (days hh:mm)	0 20:09
Total Exfiltration Volume (1000-ft ³)	28.774
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-12

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

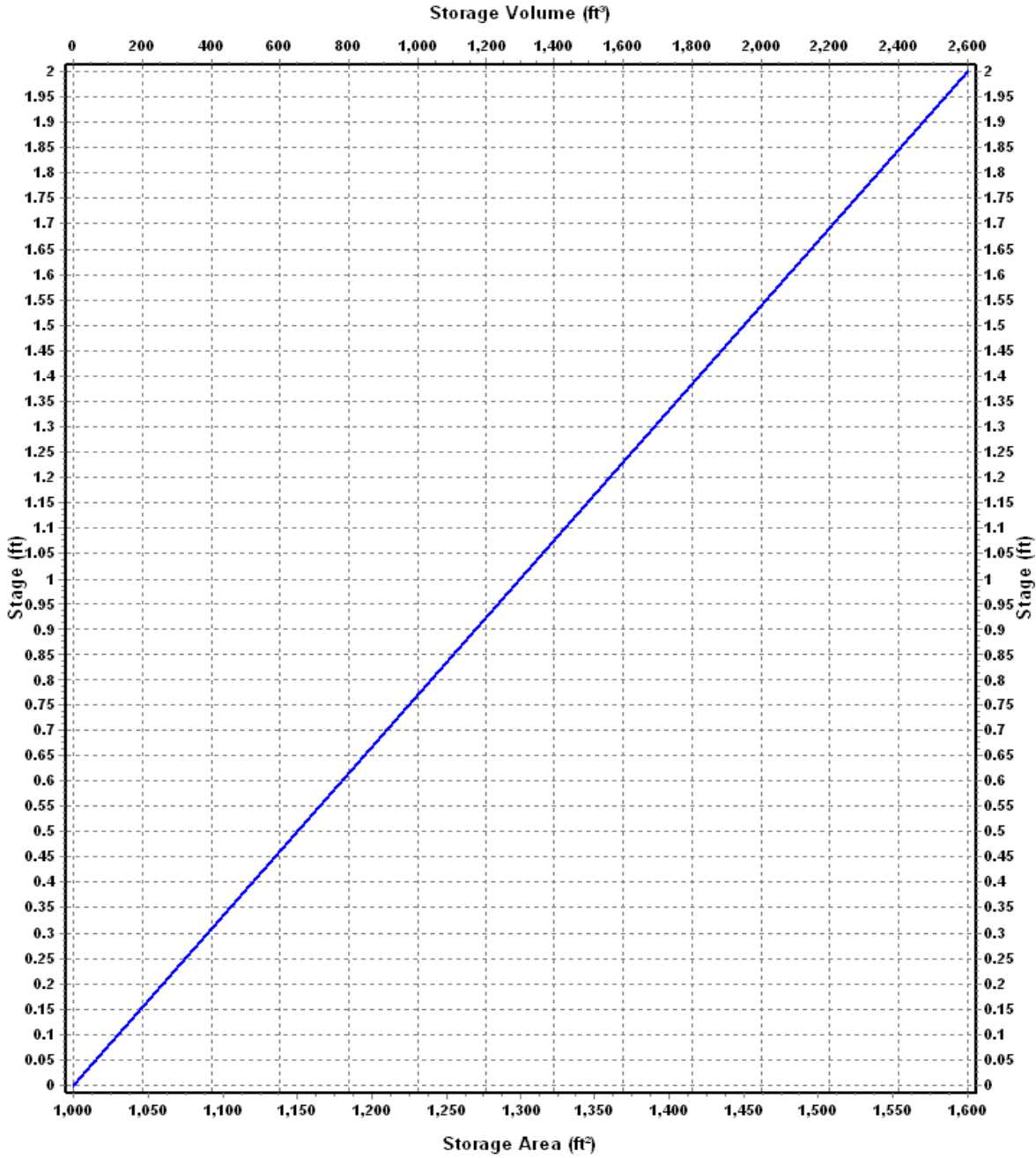
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-12

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	1000	0.000
2	1600	2600.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-12 (continued)

Output Summary Results

Peak Inflow (cfs)	0.34
Peak Lateral Inflow (cfs)	0.34
Peak Outflow (cfs)	0.01
Peak Exfiltration Flow Rate (cfm)	3.55
Max HGL Elevation Attained (ft)	245.93
Max HGL Depth Attained (ft)	0.93
Average HGL Elevation Attained (ft)	245.22
Average HGL Depth Attained (ft)	0.22
Time of Max HGL Occurrence (days hh:mm)	0 10:58
Total Exfiltration Volume (1000-ft ³)	4.291
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 5-year storm

Storage Node : LIDA-8A

Input Data

Invert Elevation (ft) 256.00
Max (Rim) Elevation (ft) 258.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 256.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1777.00
Evaporation Loss 0.00

Infiltration/Exfiltration

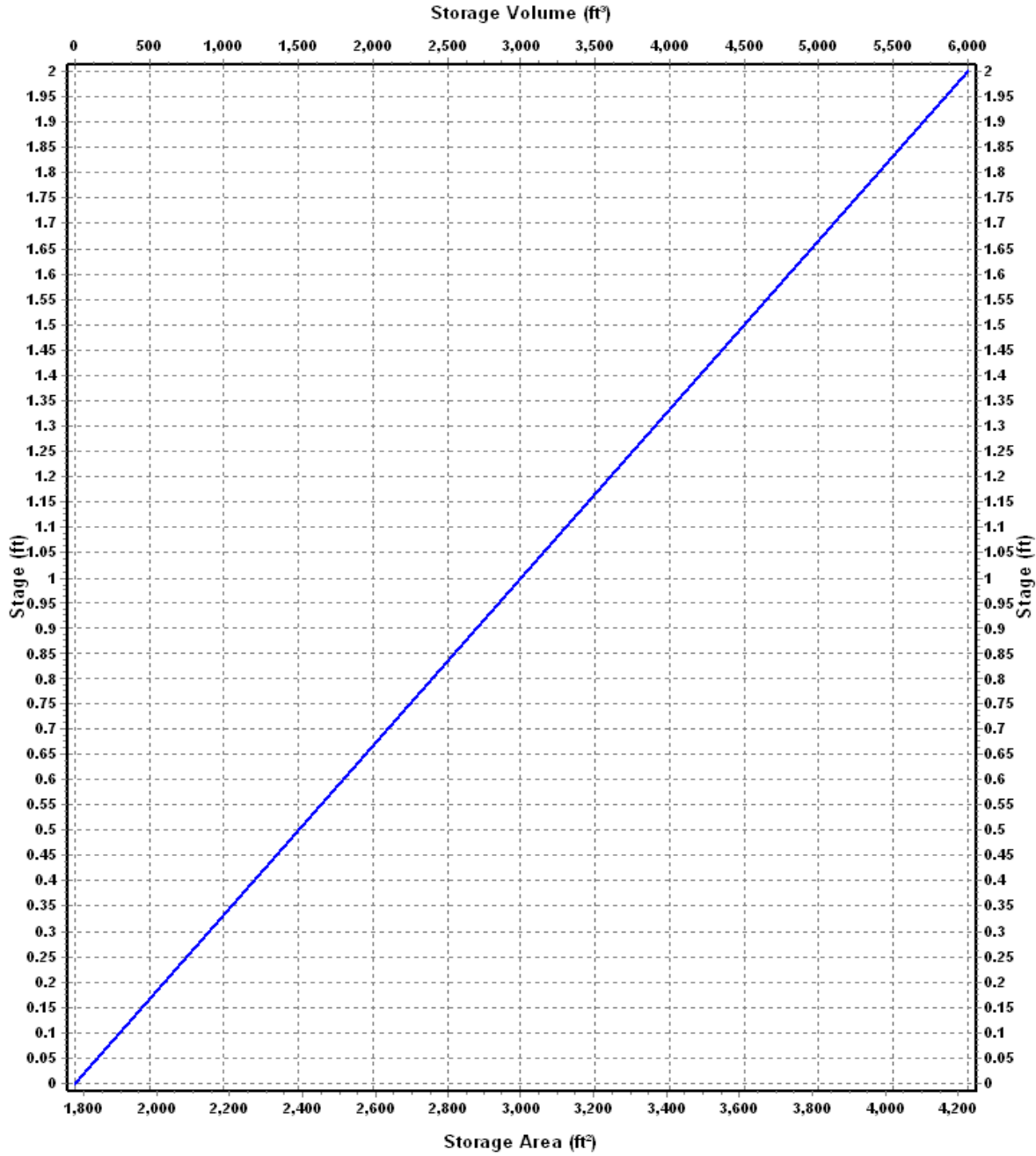
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-8A

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	1777	0.000
2	4226	6003.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-8A (continued)

Output Summary Results

Peak Inflow (cfs)	1.58
Peak Lateral Inflow (cfs)	1.58
Peak Outflow (cfs)	0.83
Peak Exfiltration Flow Rate (cfm)	2.43
Max HGL Elevation Attained (ft)	257.40
Max HGL Depth Attained (ft)	1.4
Average HGL Elevation Attained (ft)	256.58
Average HGL Depth Attained (ft)	0.58
Time of Max HGL Occurrence (days hh:mm)	0 08:16
Total Exfiltration Volume (1000-ft ³)	5.003
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Project Description

File Name 20191126-POST-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 03, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	14
Nodes.....	62
<i>Junctions</i>	45
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	15
Links.....	67
<i>Channels</i>	36
<i>Pipes</i>	30
<i>Pumps</i>	1
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	10-yr	Intensity	inches	Oregon	Washington	10	3.45	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-LIDA_11	3.71	96.88	3.45	3.09	11.45	2.96	0 00:05:00
2	COF-LIDA_12	0.49	96.13	3.45	3.01	1.48	0.39	0 00:05:00
3	HED-LIDA_01	0.43	94.77	3.45	2.87	1.23	0.32	0 00:05:00
4	HED-LIDA_02	0.39	94.78	3.45	2.87	1.12	0.29	0 00:05:00
5	HED-LIDA_03	0.40	94.61	3.45	2.85	1.13	0.30	0 00:05:00
6	HED-LIDA_04	0.44	93.24	3.45	2.71	1.18	0.31	0 00:05:00
7	HED-LIDA_05	2.67	91.26	3.45	2.52	6.73	1.76	0 00:05:00
8	HED-LIDA_06A	5.95	89.16	3.45	2.33	13.84	3.57	0 00:05:00
9	HED-LIDA_06B	0.41	98.00	3.45	3.22	1.33	0.34	0 00:05:00
10	HED-LIDA_07	1.08	93.59	3.45	2.75	2.96	0.77	0 00:05:00
11	HED-LIDA_08B	2.25	94.33	3.45	2.82	6.35	1.66	0 00:05:00
12	HED-LIDA_09	0.23	95.64	3.45	2.96	0.68	0.18	0 00:05:00
13	HED-LIDA_10	0.32	95.08	3.45	2.90	0.93	0.24	0 00:05:00
14	HED-LIDA_8A	2.32	95.49	3.45	2.94	6.83	1.78	0 00:05:00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation	Max Surcharge Depth Attained	Min Freeboard	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft ²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	COF-01A	Junction	238.00	250.00	238.00	1000.00	12.00	0.24	238.17	0.00	11.83	0 00:00	0.00	0.00
2	COF-01B	Junction	244.00	247.00	244.00	1000.00	12.00	0.24	244.04	0.00	2.96	0 00:00	0.00	0.00
3	COF-01C	Junction	245.00	247.00	245.00	1000.00	12.00	0.24	246.52	0.00	1.98	0 00:00	0.00	0.00
4	COF-02A	Junction	244.00	247.00	244.00	1000.00	12.00	0.34	244.08	0.00	3.92	0 00:00	0.00	0.00
5	COF-02B	Junction	245.00	247.00	245.00	1000.00	12.00	1.30	246.06	0.00	0.94	0 00:00	0.00	0.00
6	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	0.62	152.06	0.00	7.94	0 00:00	0.00	0.00
7	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.48	157.07	0.00	7.93	0 00:00	0.00	0.00
8	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.48	158.06	0.00	6.94	0 00:00	0.00	0.00
9	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.48	177.22	0.00	4.03	0 00:00	0.00	0.00
10	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.48	181.18	0.00	10.82	0 00:00	0.00	0.00
11	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.48	223.13	0.00	5.87	0 00:00	0.00	0.00
12	HED-01G	Junction	226.00	229.00	226.00	1000.00	12.00	0.48	226.12	0.00	3.38	0 00:00	0.00	0.00
13	HED-01H	Junction	229.00	232.00	229.00	1000.00	12.00	0.47	229.22	0.00	2.78	0 00:00	0.00	0.00
14	HED-01I	Junction	230.00	233.00	230.00	1000.00	12.00	0.47	230.22	0.00	2.78	0 00:00	0.00	0.00
15	HED-01J	Junction	231.00	233.00	231.00	1000.00	12.00	0.47	232.79	0.00	1.96	0 00:00	0.00	0.00
16	HED-01K	Junction	226.50	229.00	226.50	1000.00	12.00	0.24	228.14	0.00	1.61	0 00:00	0.00	0.00
17	HED-01L	Junction	226.50	229.00	226.50	1000.00	12.00	0.18	226.67	0.00	2.83	0 00:00	0.00	0.00
18	HED-01M	Junction	224.00	230.00	224.00	1000.00	12.00	0.12	224.10	0.00	5.90	0 00:00	0.00	0.00
19	HED-01N	Junction	230.00	235.00	230.00	1000.00	12.00	0.14	230.27	0.00	4.73	0 00:00	0.00	0.00
20	HED-01O	Junction	234.00	238.00	234.00	1000.00	12.00	0.14	234.09	0.00	4.41	0 00:00	0.00	0.00
21	HED-01P	Junction	234.00	239.00	234.00	1000.00	12.00	0.00	234.00	0.00	5.50	0 00:00	0.00	0.00
22	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	0.15	171.02	0.00	7.98	0 00:00	0.00	0.00
23	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	0.15	171.46	0.00	5.54	0 00:00	0.00	0.00
24	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	0.15	173.63	0.00	4.37	0 00:00	0.00	0.00
25	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	0.15	174.85	0.00	10.89	0 00:00	0.00	0.00
26	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	0.15	180.66	0.00	7.34	0 00:00	0.00	0.00
27	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	0.17	181.87	0.00	6.09	0 00:00	0.00	0.00
28	HED-02G	Junction	235.00	237.00	235.00	1000.00	12.00	0.07	235.05	0.00	2.95	0 00:00	0.00	0.00
29	HED-02H	Junction	236.00	238.00	236.00	1000.00	12.00	0.07	236.11	0.00	1.89	0 00:00	0.00	0.00
30	HED-02I	Junction	237.00	239.00	237.00	1000.00	12.00	0.00	237.00	0.00	2.00	0 00:00	0.00	0.00
31	HED-02J	Junction	237.00	250.00	237.00	1000.00	12.00	0.07	237.10	0.00	12.90	0 00:00	0.00	0.00
32	HED-02K	Junction	255.00	257.00	255.00	1000.00	12.00	0.08	256.00	0.00	2.50	0 00:00	0.00	0.00
33	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.17	183.03	0.00	6.97	0 00:00	0.00	0.00
34	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.18	235.01	0.00	4.99	0 00:00	0.00	0.00
35	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.27	236.05	0.00	13.95	0 00:00	0.00	0.00
36	HED-03D	Junction	241.00	245.00	241.00	1000.00	12.00	0.33	241.06	0.00	3.94	0 00:00	0.00	0.00
37	HED-03E	Junction	250.00	251.00	250.00	1000.00	12.00	0.18	250.11	0.00	1.39	0 00:00	0.00	0.00
38	HED-03F	Junction	250.00	251.00	250.00	1000.00	12.00	0.14	250.09	0.00	1.66	0 00:00	0.00	0.00
39	HED-03G	Junction	242.00	245.00	242.00	1000.00	12.00	0.02	242.00	0.00	3.00	0 00:00	0.00	0.00
40	HED-03H	Junction	243.00	245.00	243.00	1000.00	12.00	0.14	244.16	0.00	2.34	0 00:00	0.00	0.00
41	HED-03I	Junction	244.00	247.00	244.00	1000.00	12.00	0.00	244.16	0.00	2.84	0 00:00	0.00	0.00
42	HED-03J	Junction	245.00	247.00	245.00	1000.00	12.00	0.00	245.00	0.00	3.50	0 00:00	0.00	0.00
43	HED-03K	Junction	256.00	258.00	256.00	1000.00	12.00	0.83	257.06	0.00	1.94	0 00:00	0.00	0.00
44	HED-03L	Junction	256.00	258.00	256.00	1000.00	12.00	0.83	256.21	0.00	1.79	0 00:00	0.00	0.00
45	HED-03t	Junction	238.00	243.00	238.00	1000.00	12.00	0.08	238.15	0.00	5.85	0 00:00	0.00	0.00
46	COF-01	Outfall	238.00					0.24	238.17					
47	HED-01	Outfall	150.00					0.61	150.06					
48	LIDA-01	Storage Node	228.00	229.00	228.00		938.00	0.32	228.55				0.00	0.00
49	LIDA-02	Storage Node	228.00	229.00	228.00		562.00	3.97	228.80				0.00	0.00
50	LIDA-03	Storage Node	237.00	238.00	237.00		875.00	0.30	237.54				0.00	0.00
51	LIDA-04	Storage Node	238.00	239.00	238.00		1875.00	0.31	238.26				0.00	0.00
52	LIDA-05	Storage Node	255.00	257.00	255.00		12000.00	1.76	256.00				0.00	0.00
53	LIDA-06A	Storage Node	231.00	233.00	231.00		10000.00	3.57	232.79				0.00	0.00
54	LIDA-06B	Storage Node	237.00	247.00	237.00		18000.00	0.34	237.13				0.00	0.00
55	LIDA-07	Storage Node	242.00	243.00	242.00		2812.00	0.77	242.60				0.00	0.00
56	LIDA-08B	Storage Node	245.00	247.00	245.00		5650.00	0.00	245.00				0.00	0.00
57	LIDA-08C	Storage Node	243.00	245.00	243.00		18650.00	2.49	244.16				0.00	0.00
58	LIDA-09	Storage Node	250.00	251.00	250.00		375.00	0.18	250.79				0.00	0.00
59	LIDA-10	Storage Node	250.00	251.00	250.00		657.00	0.24	250.56				0.00	0.00
60	LIDA-11	Storage Node	245.00	247.00	245.00		13000.00	2.96	246.52				0.00	0.00
61	LIDA-12	Storage Node	245.00	247.00	245.00		1000.00	1.58	246.01				0.00	0.00
62	LIDA-8A	Storage Node	256.00	258.00	256.00		1777.00	1.78	257.52				0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Reported (min)	Reported Condition
1	COF-01D	Pipe	COF-01C	COF-01B	1.00	245.00	244.00	100.0000	0.750	0.0130	0.02	0.02	1.10	10.57	0.05	0.84	0.00	> CAPACITY
2	COF-2A	Pipe	COF-02A	COF-01A	400.00	244.00	238.00	1.5000	18.000	0.0150	0.06	11.15	0.01	2.01	0.10	0.06	0.00	Calculated
3	COF-2C	Pipe	COF-02B	COF-02A	1.00	245.00	244.00	100.0000	0.500	0.0130	0.01	0.01	1.26	11.91	0.04	1.00	138.00	SURCHARGED
4	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.48	20.90	0.02	4.04	0.16	0.08	0.00	Calculated
5	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.48	28.48	0.02	3.37	0.18	0.09	0.00	Calculated
6	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.48	7.14	0.07	4.99	0.18	0.18	0.00	Calculated
7	HED-01G	Pipe	HED-01G	HED-01F	20.00	226.00	223.00	15.0000	18.000	0.0130	0.48	40.68	0.01	7.73	0.13	0.08	0.00	Calculated
8	HED-01H	Pipe	HED-01L	HED-01G	50.00	226.50	226.00	1.0000	12.000	0.0130	0.18	3.56	0.05	2.73	0.14	0.14	0.00	Calculated
9	HED-01L	Pipe	HED-01M	HED-01F	47.37	224.00	223.00	2.1100	18.000	0.0130	0.12	15.26	0.01	2.09	0.11	0.07	0.00	Calculated
10	HED-01N	Pipe	HED-01O	HED-01N	75.00	234.00	230.00	5.3300	12.000	0.0130	0.14	8.23	0.02	3.33	0.18	0.18	0.00	Calculated
11	HED-01P	Pipe	HED-01P	HED-01N	65.00	234.00	230.00	6.1500	18.000	0.0130	0.00	26.06	0.00	0.00	0.13	0.09	0.00	Calculated
12	HED-01R	Pipe	HED-01I	HED-01H	50.00	230.00	229.00	2.0000	12.000	0.0130	0.47	5.04	0.09	3.64	0.22	0.22	0.00	Calculated
13	HED-01S	Pipe	HED-01H	HED-01G	100.00	229.00	228.00	1.0000	18.000	0.0130	0.47	10.50	0.04	2.92	0.22	0.15	0.00	Calculated
14	HED-01U	Pipe	HED-01J	HED-01I	1.00	231.00	230.00	100.0000	1.000	0.0130	0.05	0.05	1.11	9.75	0.08	1.00	727.00	SURCHARGED
15	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	0.15	40.58	0.00	2.29	0.09	0.03	0.00	Calculated
16	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	0.15	8.91	0.02	1.61	0.15	0.10	0.00	Calculated
17	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	0.15	4.04	0.04	1.13	0.19	0.13	0.00	Calculated
18	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	0.15	59.16	0.00	1.25	0.15	0.05	0.00	Calculated
19	HED-02H	Pipe	HED-02H	HED-02G	100.00	236.00	235.00	1.0000	12.000	0.0130	0.07	3.56	0.02	2.44	0.08	0.08	0.00	Calculated
20	HED-02I	Pipe	HED-02J	HED-02H	100.00	237.00	236.00	1.0000	12.000	0.0130	0.07	3.56	0.02	1.66	0.10	0.10	0.00	Calculated
21	HED-02J	Pipe	HED-02K	HED-02J	1.00	255.00	237.00	1800.0000	0.750	0.0130	0.07	0.09	0.77	23.64	0.06	1.00	2079.00	SURCHARGED
22	HED-03D	Pipe	HED-03I	HED-03B	500.00	238.00	235.00	0.6000	12.000	0.0130	0.08	2.76	0.03	2.70	0.08	0.08	0.00	Calculated
23	HED-03E	Pipe	LIDA-07	HED-03I	47.11	242.00	242.50	-1.0600	18.000	0.0130	0.08	10.82	0.01	0.26	0.35	0.23	0.00	Calculated
24	HED-03I	Pipe	HED-03I	LIDA-08C	200.00	244.00	243.50	0.2500	18.000	0.0130	0.00	5.25	0.00	0.01	0.41	0.27	0.00	Calculated
25	HED-03J	Pipe	HED-03L	LIDA-08C	200.00	256.00	243.00	6.5000	12.000	0.0130	0.83	9.08	0.09	8.83	0.55	0.55	0.00	Calculated
26	HED-03L	Pipe	HED-03F	HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0130	0.14	10.69	0.01	6.70	0.07	0.07	0.00	Calculated
27	HED-03N	Pipe	HED-03E	HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0150	0.18	9.26	0.02	6.55	0.08	0.08	0.00	Calculated
28	HED-03Q	Pipe	HED-03K	HED-03L	1.00	256.00	256.00	0.0000	0.750	0.0130	0.02	0.00	23.04	5.62	0.06	1.00	1079.00	SURCHARGED
29	HED-03T	Pipe	HED-03J	HED-03I	1.00	245.00	244.00	100.0000	0.750	0.0130	0.00	0.02	0.00	0.00	0.03	0.50	0.00	Calculated
30	HED-03V	Pipe	HED-03H	HED-03G	1.00	243.00	242.00	100.0000	0.750	0.0130	0.02	0.02	1.09	14.19	0.03	0.54	0.00	> CAPACITY
31	COF-1A	Channel	COF-01A	COF-01	10.00	238.00	238.00	0.0000	60.000	0.0320	0.24	42.77	0.01	0.14	0.17	0.03	0.00	
32	COF-1B	Channel	COF-01B	COF-01A	150.00	244.00	238.00	4.0000	12.000	0.0320	0.24	37.11	0.01	0.45	0.11	0.11	0.00	
33	COF-1C	Channel	COF-01C	COF-01B	1.00	246.50	244.00	250.0000	24.000	0.0320	0.22	224.13	0.00	3.46	0.03	0.02	0.00	
34	COF-1E	Channel	LIDA-11	COF-01C	5.00	245.00	245.00	0.0000	24.000	0.0320	0.24	7.05	0.03	0.04	1.52	0.76	0.00	
35	COF-2B	Channel	COF-02B	COF-02A	1.00	245.00	246.00	-100.0000	24.000	0.0320	1.15	141.75	0.01	1.01	0.54	0.28	0.00	
36	COF-2D	Channel	LIDA-12	COF-02B	5.00	245.00	245.00	0.0000	24.000	0.0320	1.52	2.00	0.76	0.74	1.02	0.51	0.00	
37	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	0.61	1512.53	0.00	0.74	0.06	0.01	0.00	
38	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.49	1082.72	0.00	0.55	0.06	0.01	0.00	
39	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.48	2813.13	0.00	2.18	0.16	0.03	0.00	
40	HED-01I	Channel	LIDA-01	HED-01L	5.00	228.00	228.50	-10.0000	12.000	0.0320	0.18	24.81	0.01	0.25	0.30	0.30	0.00	
41	HED-01J	Channel	HED-01K	HED-01G	20.00	227.00	228.00	-5.0000	12.000	0.0320	0.24	4.99	0.05	0.44	0.56	0.56	0.00	
42	HED-01K	Channel	LIDA-02	HED-01K	5.00	228.00	228.75	-15.0000	12.000	0.0320	3.93	30.39	0.13	3.05	0.42	0.52	0.00	
43	HED-01M	Channel	HED-01N	HED-01M	500.00	230.00	224.00	1.2000	24.000	0.0320	0.12	37.78	0.00	1.86	0.18	0.09	0.00	
44	HED-01O	Channel	LIDA-03	HED-01O	5.00	237.00	237.50	-10.0000	12.000	0.0320	0.14	24.81	0.01	0.20	0.29	0.29	0.00	
45	HED-01Q	Channel	LIDA-04	HED-01P	5.00	238.00	238.50	-10.0000	12.000	0.0320	0.00	24.81	0.00	0.00	0.13	0.13	0.00	
46	HED-01T	Channel	HED-01J	HED-01I	1.00	232.75	231.00	175.0000	24.000	0.0320	0.42	187.52	0.00	5.88	0.04	0.02	0.00	
47	HED-01V	Channel	LIDA-06A	HED-01J	5.00	231.00	231.00	0.0000	24.000	0.0320	0.47	16.66	0.03	0.04	1.79	0.89	0.00	
48	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	0.15	1963.65	0.00	0.40	0.04	0.00	0.00	
49	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	0.15	614.42	0.00	0.29	0.12	0.02	0.00	
50	HED-02G	Channel	HED-02G	HED-02F	1130.10	235.00	181.76	4.7100	36.000	0.0320	0.07	396.58	0.00	1.56	0.08	0.03	0.00	
51	HED-02K	Channel	HED-02K	HED-02J	1.00	256.50	237.00	1950.0000	24.000	0.0320	0.00	625.97	0.00	0.00	0.05	0.02	0.00	
52	HED-02L	Channel	HED-02I	HED-02H	44.02	237.00	236.00	2.2700	24.000	0.0320	0.00	55.99	0.00	0.00	0.06	0.03	0.00	
53	HED-02O	Channel	LIDA-05	HED-02K	5.00	255.00	255.00	0.0000	24.000	0.0320	0.07	16.66	0.00	0.11	1.00	0.50	0.00	
54	HED-03A	Channel	HED-02F	HED-03A	770.00	181.76	183.00	-0.1600	60.000	0.0300	0.10	443.56	0.00	0.08	0.07	0.01	0.00	
55	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.17	2403.19	0.00	0.67	0.02	0.00	0.00	
56	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.10	417.77	0.00	0.18	0.03	0.01	0.00	
57	HED-03F	Channel	HED-03D	HED-03C	400.00	241.00	236.00	1.2500	24.000	0.0320	0.27	131.71	0.00	0.71	0.04	0.02	0.00	
58	HED-03G	Channel	HED-03G	HED-03D	10.00	242.00	241.00	10.0000	24.000	0.0320	0.01	157.53	0.00	0.19	0.03	0.02	0.00	

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Reported Surcharged Condition (min)
59	HED-03H	Channel	HED-03H	HED-03G	1.00	244.50	242.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.00	0.00	0.00
60	HED-03K	Channel	LIDA-8A	HED-03K	5.00	256.00	256.00	0.0000	12.000	0.0320	0.83	0.83	1.00	0.41	1.00	1.00	1089.00
61	HED-03M	Channel	LIDA-09	HED-03F	5.00	250.00	250.75	-15.0000	12.000	0.0320	0.14	22.66	0.01	0.17	0.41	0.41	0.00
62	HED-03O	Channel	LIDA-10	HED-03E	5.00	250.00	250.50	-10.0000	12.000	0.0320	0.18	18.50	0.01	0.29	0.30	0.30	0.00
63	HED-03P	Channel	HED-03K	HED-03L	1.00	257.00	256.00	100.0000	24.000	0.0320	0.81	141.75	0.01	3.06	0.14	0.07	0.00
64	HED-03R	Channel	LIDA-08B	HED-03J	5.00	245.00	245.00	0.0000	24.000	0.0320	0.00	2.00	0.00	0.00	0.00	0.00	0.00
65	HED-03S	Channel	HED-03J	HED-03I	1.00	246.50	244.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.08	0.04	0.00
66	HED-03U	Channel	LIDA-08C	HED-03H	5.00	243.00	243.00	0.0000	24.000	0.0320	0.14	2.00	0.07	0.12	1.16	0.58	0.00
67	HED-02M	Pump	LIDA-06B	HED-02K		237.00	255.00				0.04						

Subbasin Hydrology

Subbasin : COF-LIDA_11

Input Data

Area (ac) 3.71
 Weighted Curve Number 96.88
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	3.48	C/D	98.00
Landscape	0.23	C/D	80.00
Composite Area & Weighted CN	3.71		96.88

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
 R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

User-Defined TOC override (minutes): 5.00

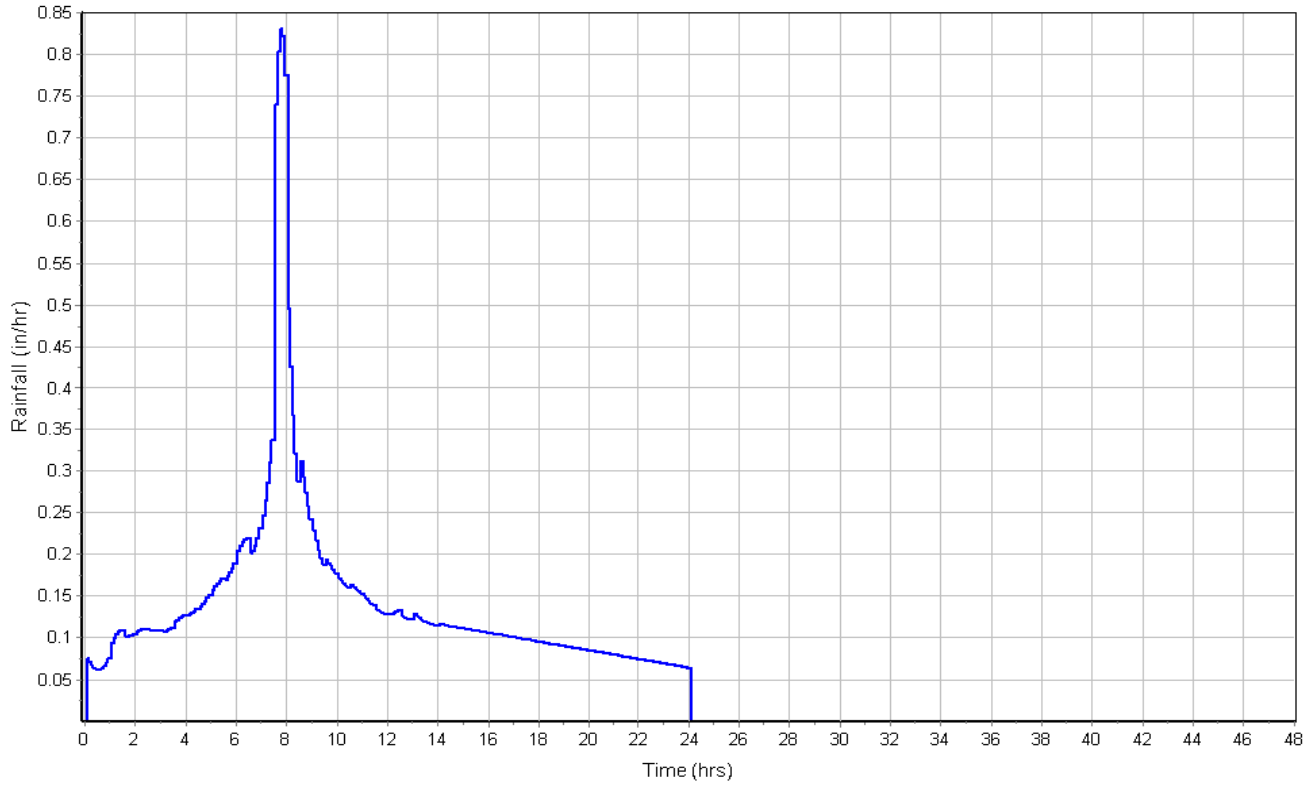
Subbasin Runoff Results

Total Rainfall (in) 3.45
 Total Runoff (in) 3.09
 Peak Runoff (cfs) 2.96
 Weighted Curve Number 96.88
 Time of Concentration (days hh:mm:ss) 0 00:05:00

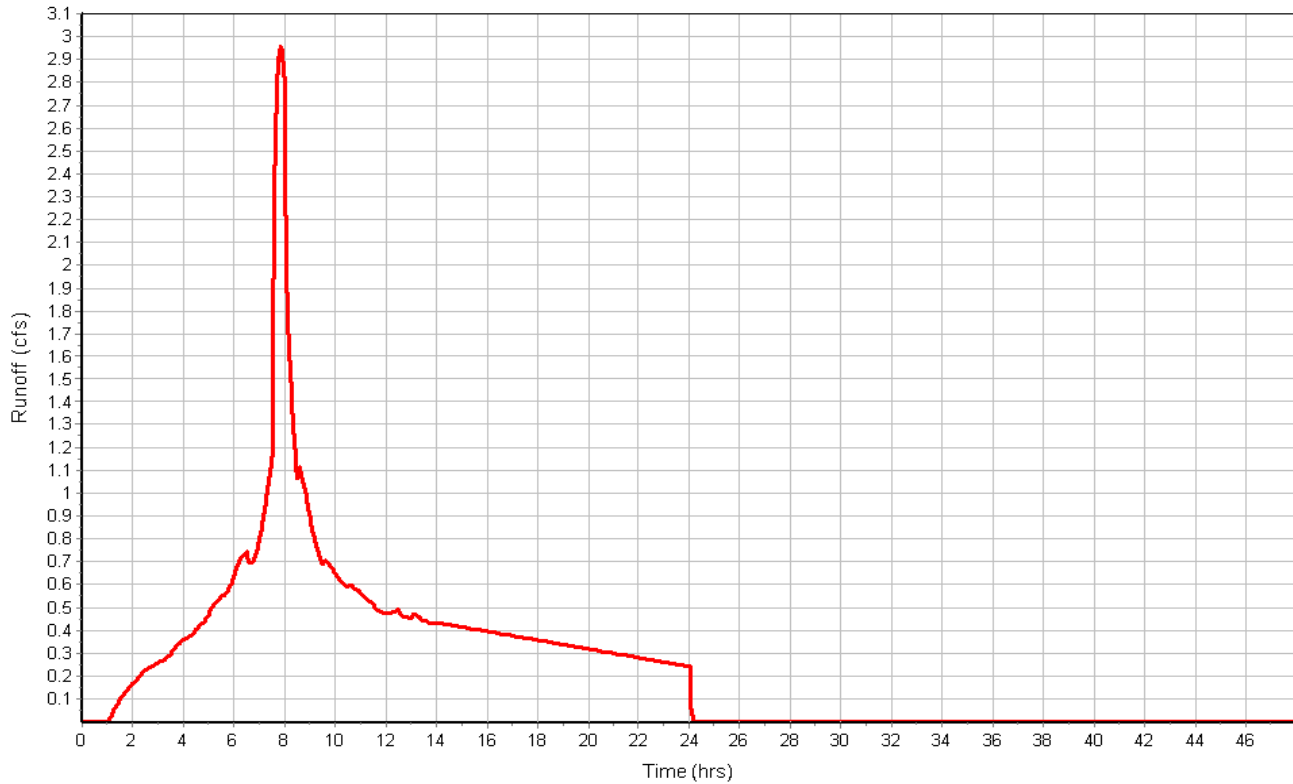
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : COF-LIDA_11

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : COF-LIDA_12

Input Data

Area (ac) 0.49
Weighted Curve Number 96.13
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.44	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.49		96.13

Time of Concentration

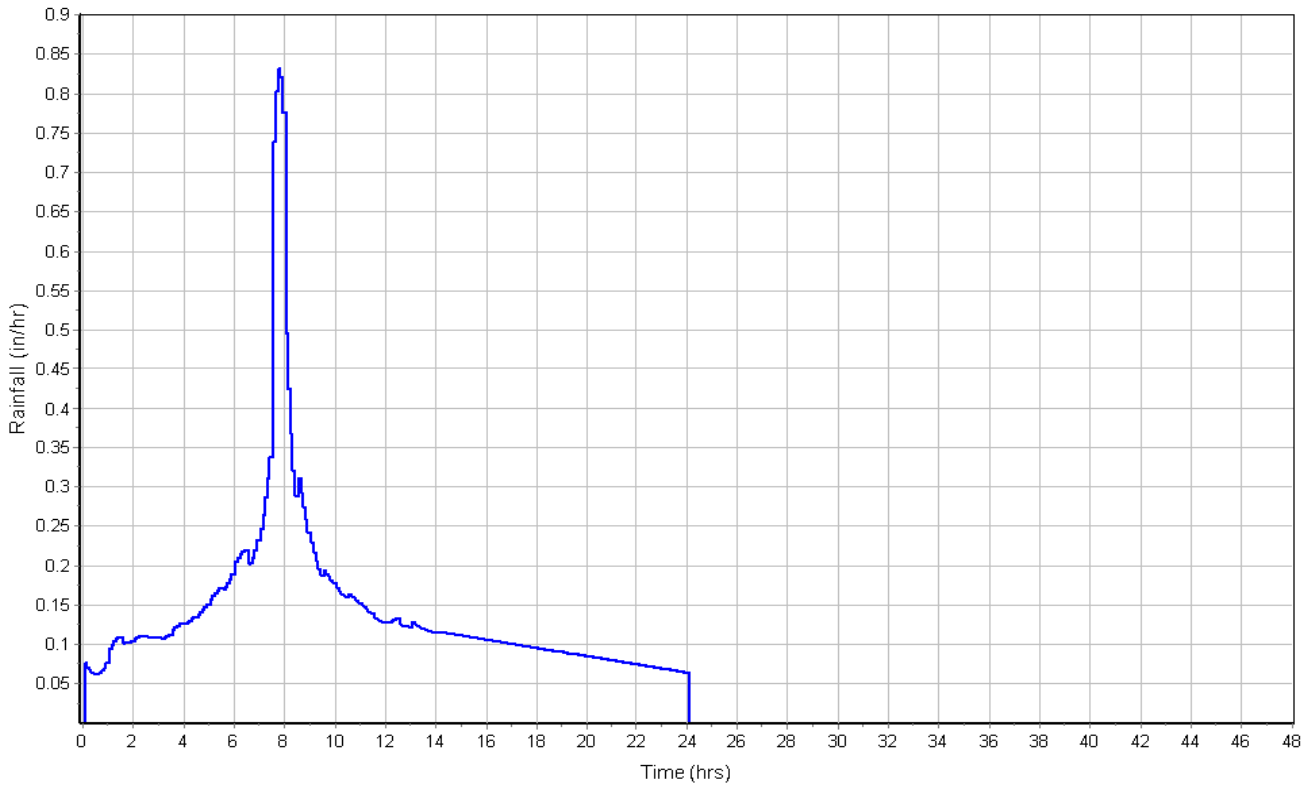
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

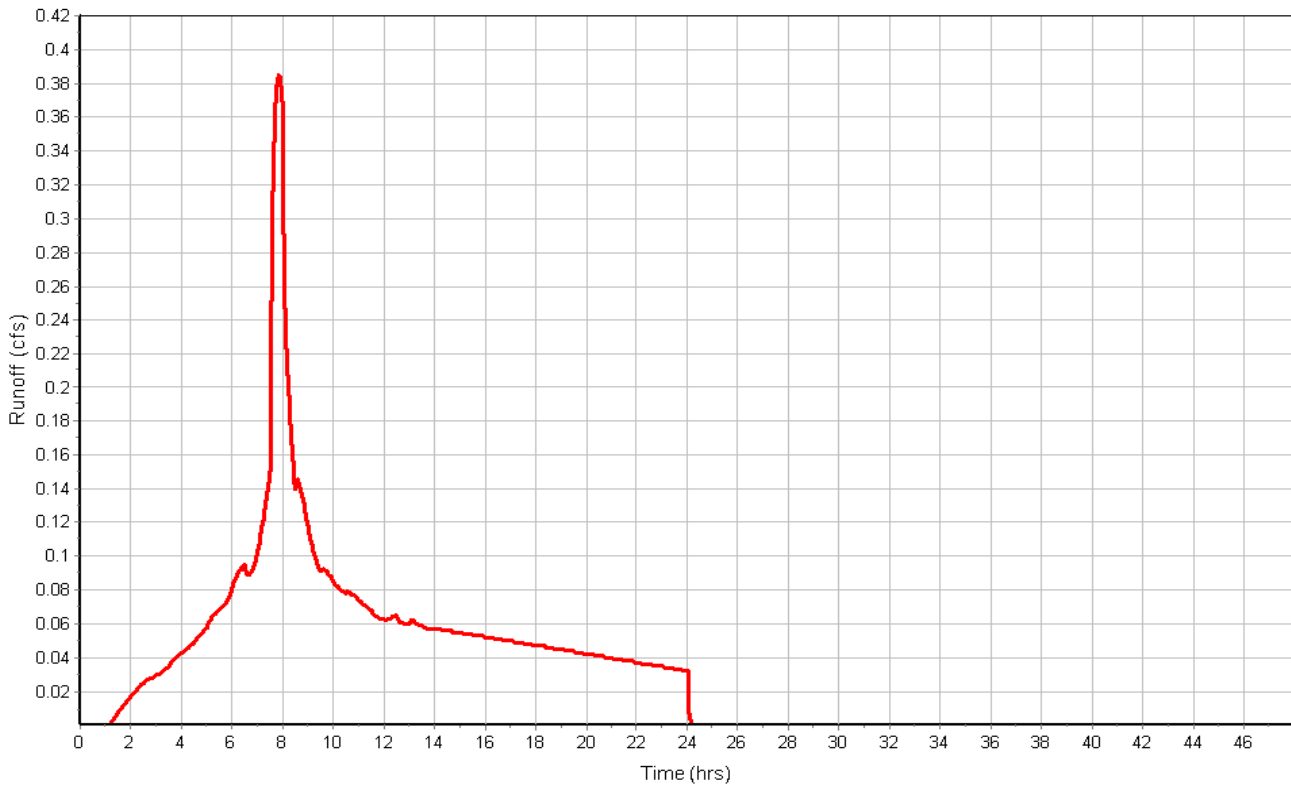
Total Rainfall (in) 3.45
Total Runoff (in) 3.01
Peak Runoff (cfs) 0.39
Weighted Curve Number 96.13
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : COF-LIDA_12

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_01

Input Data

Area (ac) 0.43
Weighted Curve Number 94.77
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.35	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.43		94.77

Time of Concentration

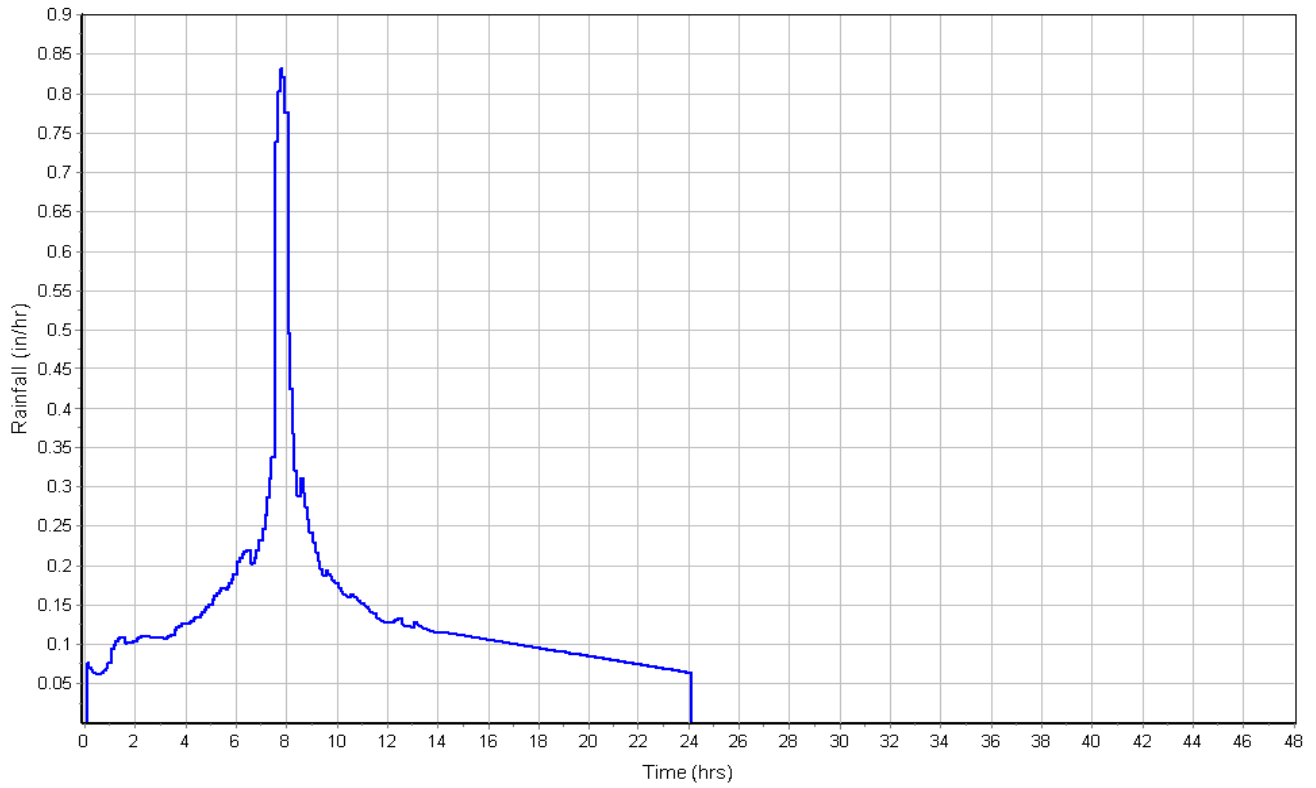
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

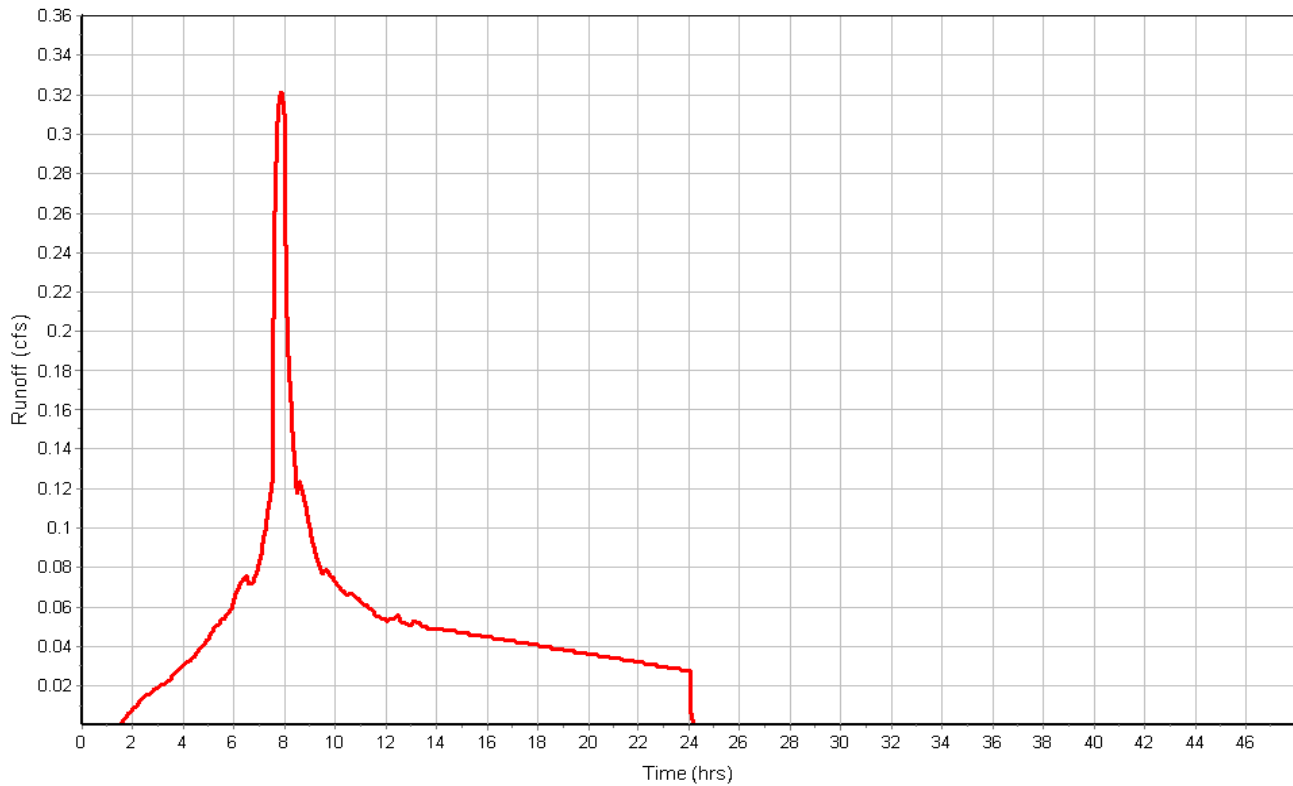
Total Rainfall (in) 3.45
Total Runoff (in) 2.87
Peak Runoff (cfs) 0.32
Weighted Curve Number 94.77
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_01

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_02

Input Data

Area (ac) 0.39
Weighted Curve Number 94.78
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.07	C/D	80.00
Composite Area & Weighted CN	0.39		94.78

Time of Concentration

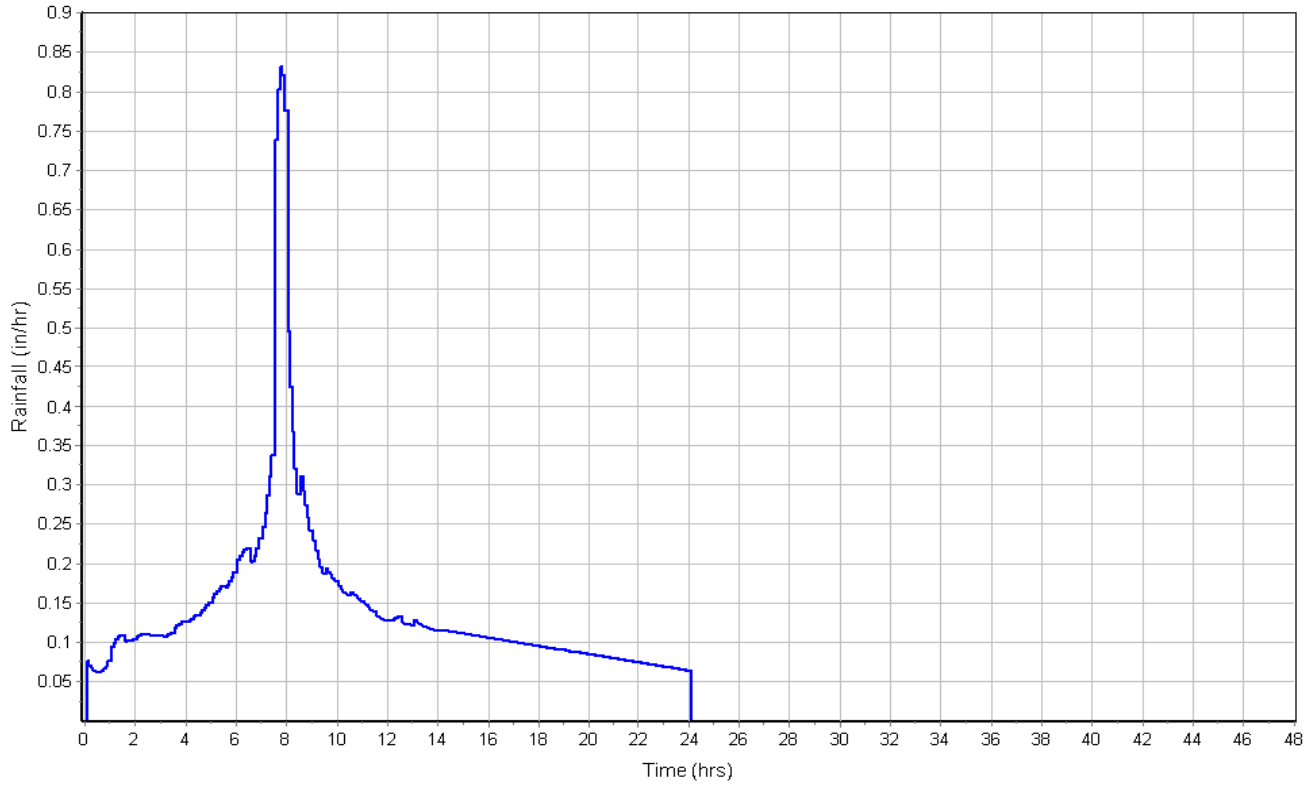
User-Defined TOC override (minutes): 5.00

Subbasin Runoff Results

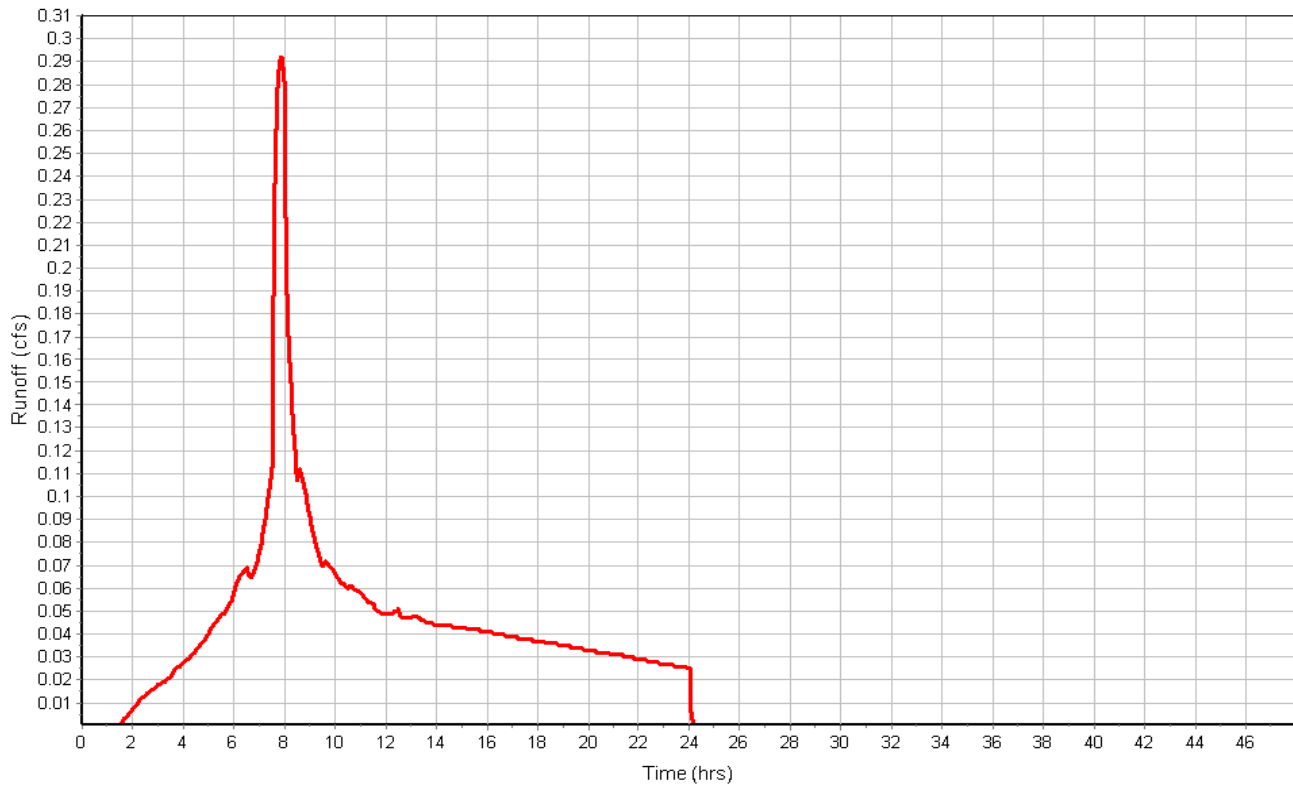
Total Rainfall (in) 3.45
Total Runoff (in) 2.87
Peak Runoff (cfs) 0.29
Weighted Curve Number 94.78
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_02

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_03

Input Data

Area (ac) 0.40
Weighted Curve Number 94.61
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.40		94.61

Time of Concentration

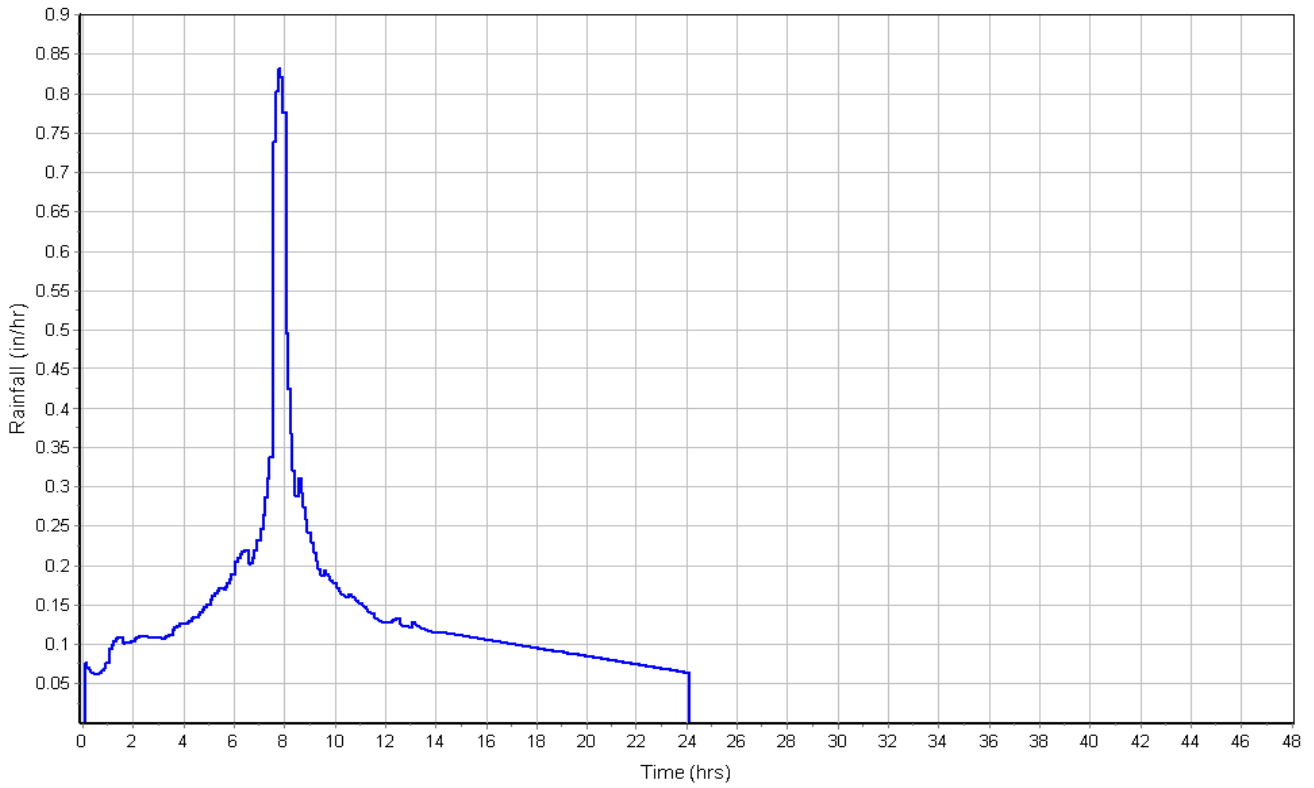
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

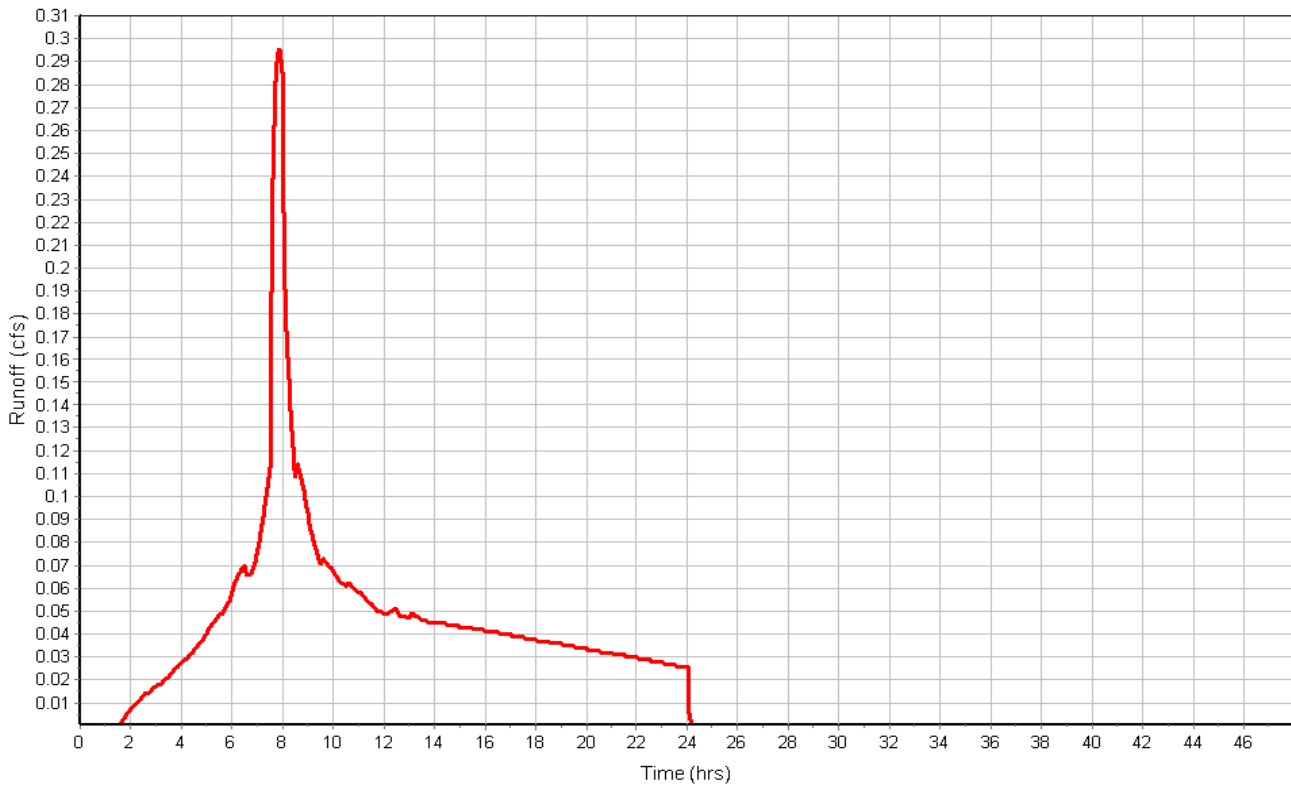
Total Rainfall (in) 3.45
Total Runoff (in) 2.85
Peak Runoff (cfs) 0.30
Weighted Curve Number 94.61
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_03

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_04

Input Data

Area (ac) 0.44
Weighted Curve Number 93.24
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	0.12	C/D	80.00
Pavement/roof	0.32	C/D	98.00
Composite Area & Weighted CN	0.44		93.24

Time of Concentration

User-Defined TOC override (minutes): 5

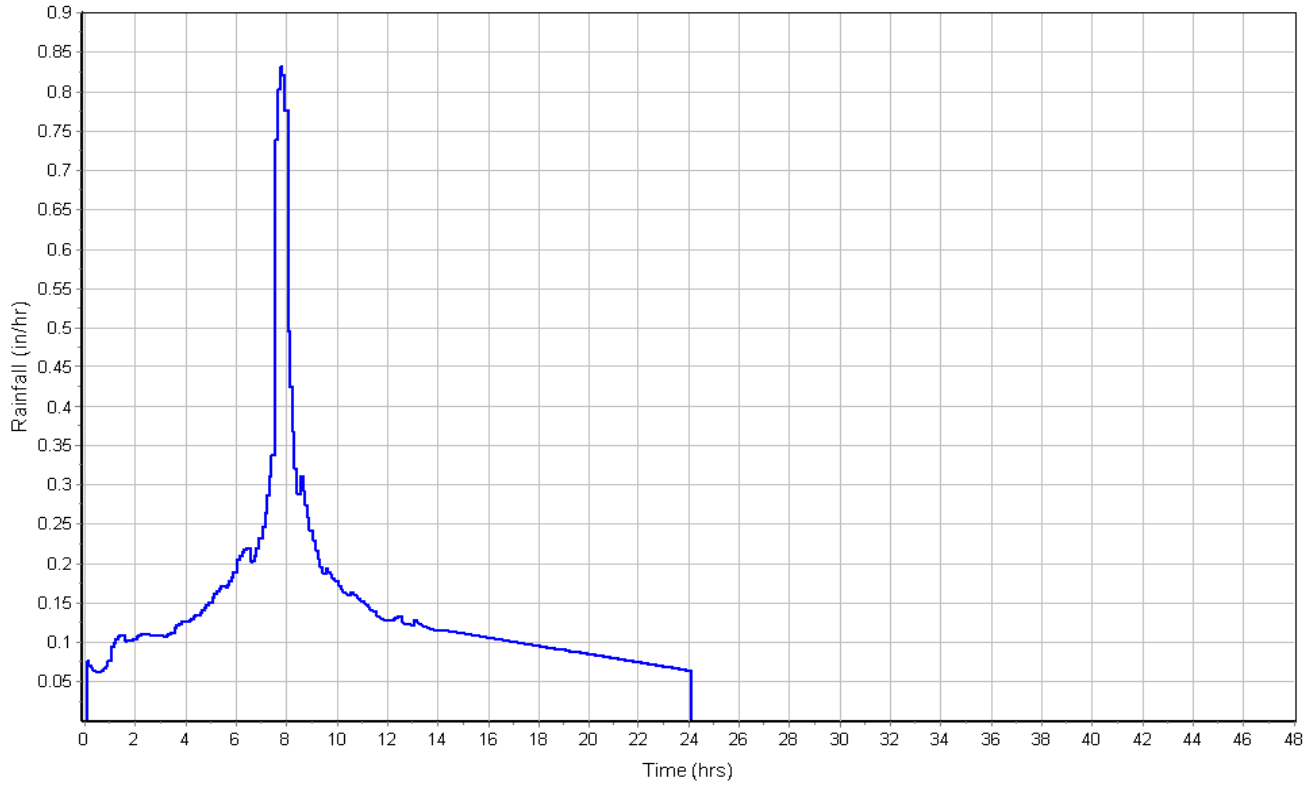
Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 2.71
Peak Runoff (cfs) 0.31
Weighted Curve Number 93.24
Time of Concentration (days hh:mm:ss) 0 00:05:00

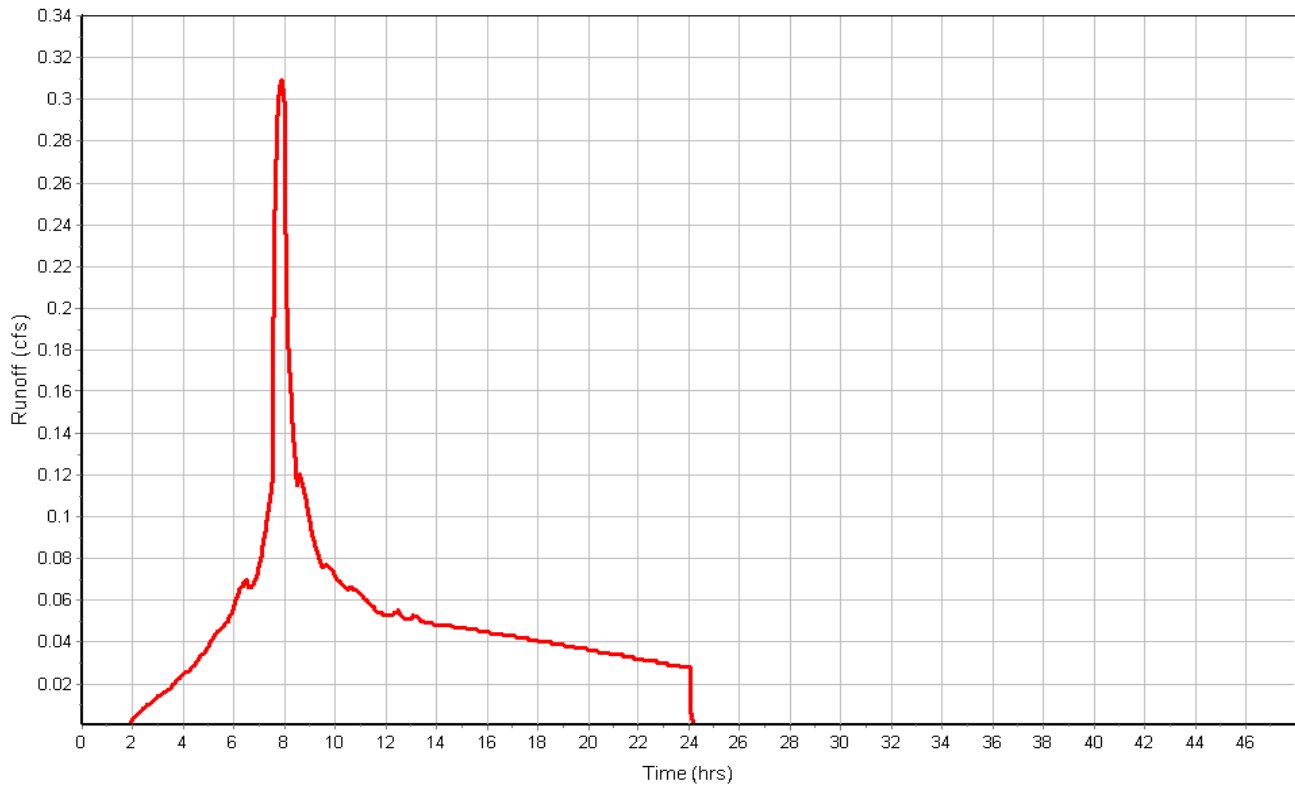
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_04

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_05

Input Data

Area (ac) 2.67
Weighted Curve Number 91.26
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.67	C/D	98.00
Landscape	1.00	C/D	80.00
Composite Area & Weighted CN	2.67		91.26

Time of Concentration

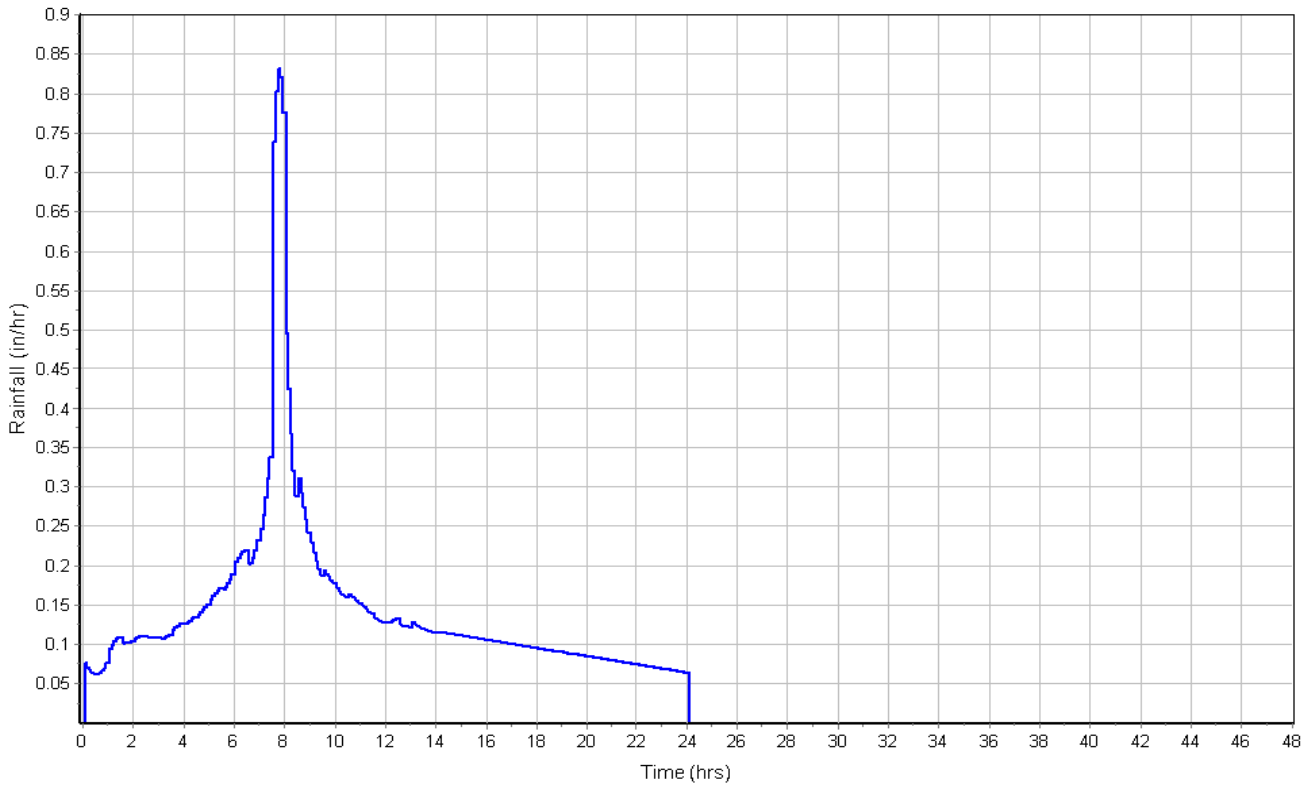
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

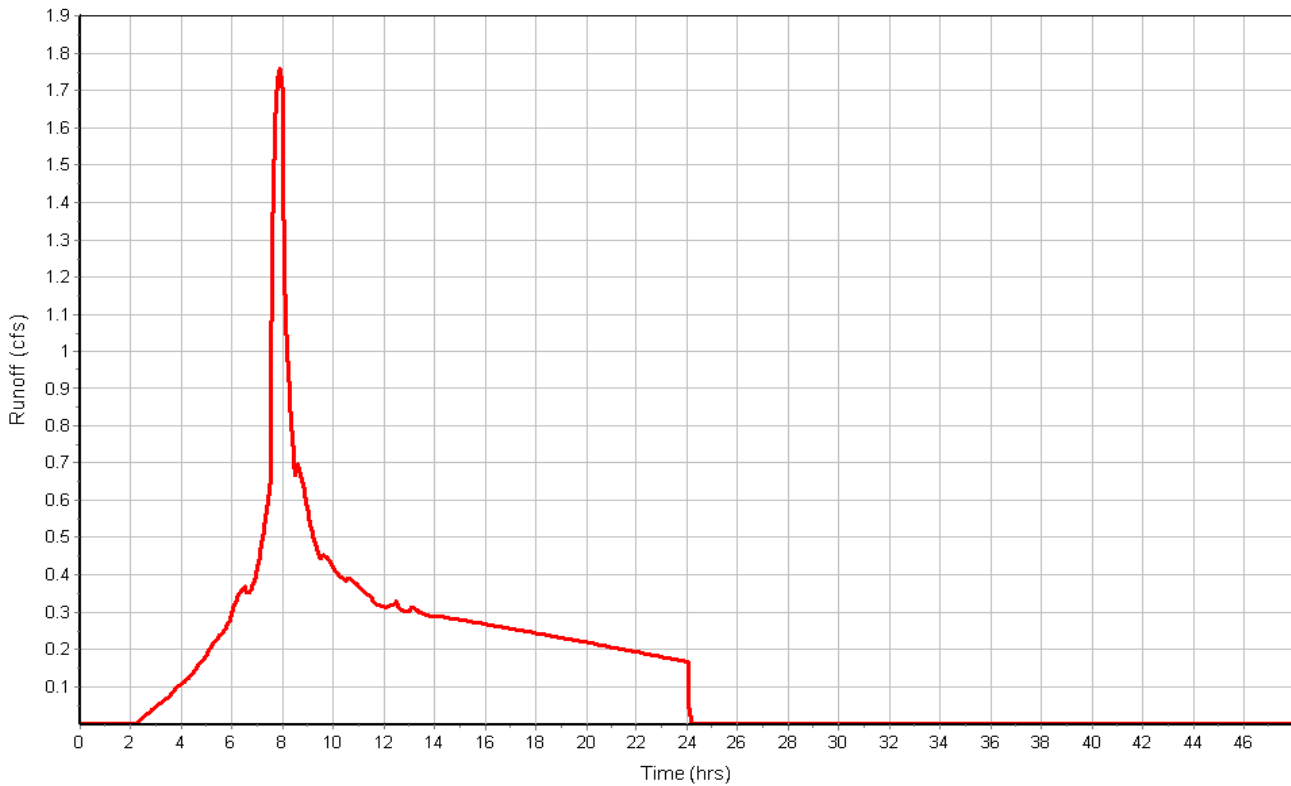
Total Rainfall (in) 3.45
Total Runoff (in) 2.52
Peak Runoff (cfs) 1.76
Weighted Curve Number 91.26
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_05

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_06A

Input Data

Area (ac) 5.95
Weighted Curve Number 89.16
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	2.92	C/D	80.00
Pavement/roof	3.03	C/D	98.00
Composite Area & Weighted CN	5.95		89.16

Time of Concentration

User-Defined TOC override (minutes): 5.00

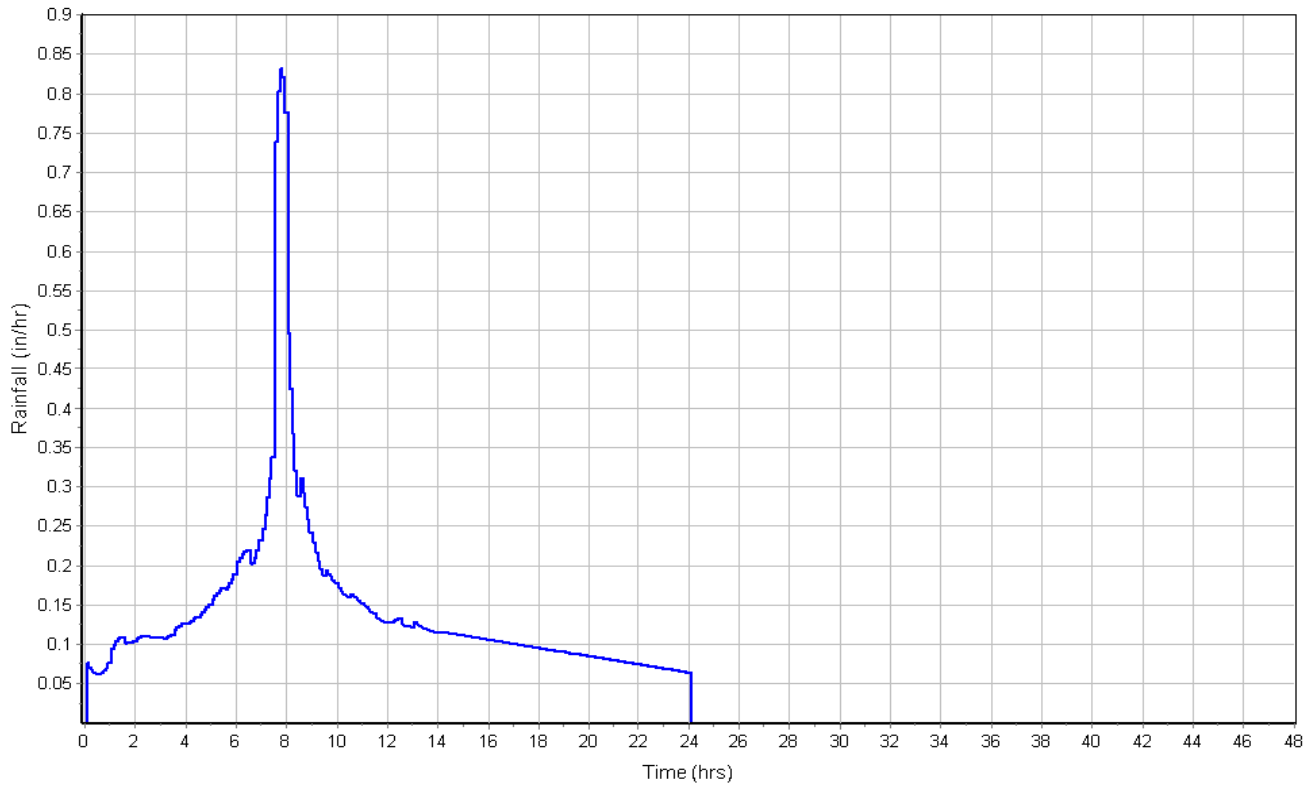
Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 2.33
Peak Runoff (cfs) 3.57
Weighted Curve Number 89.16
Time of Concentration (days hh:mm:ss) 0 00:05:00

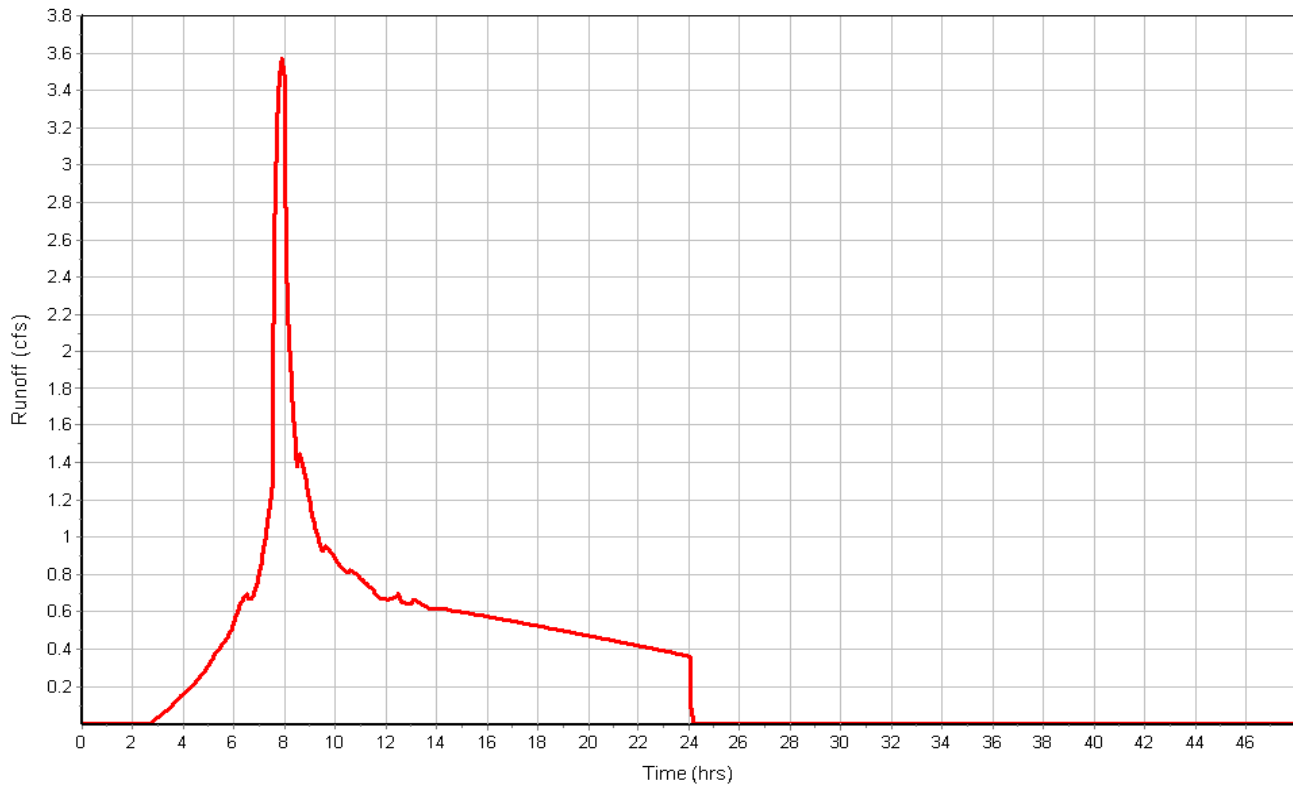
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_06A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_06B

Input Data

Area (ac) 0.41
Weighted Curve Number 98.00
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.41	C/D	98.00
Composite Area & Weighted CN	0.41		98.00

Time of Concentration

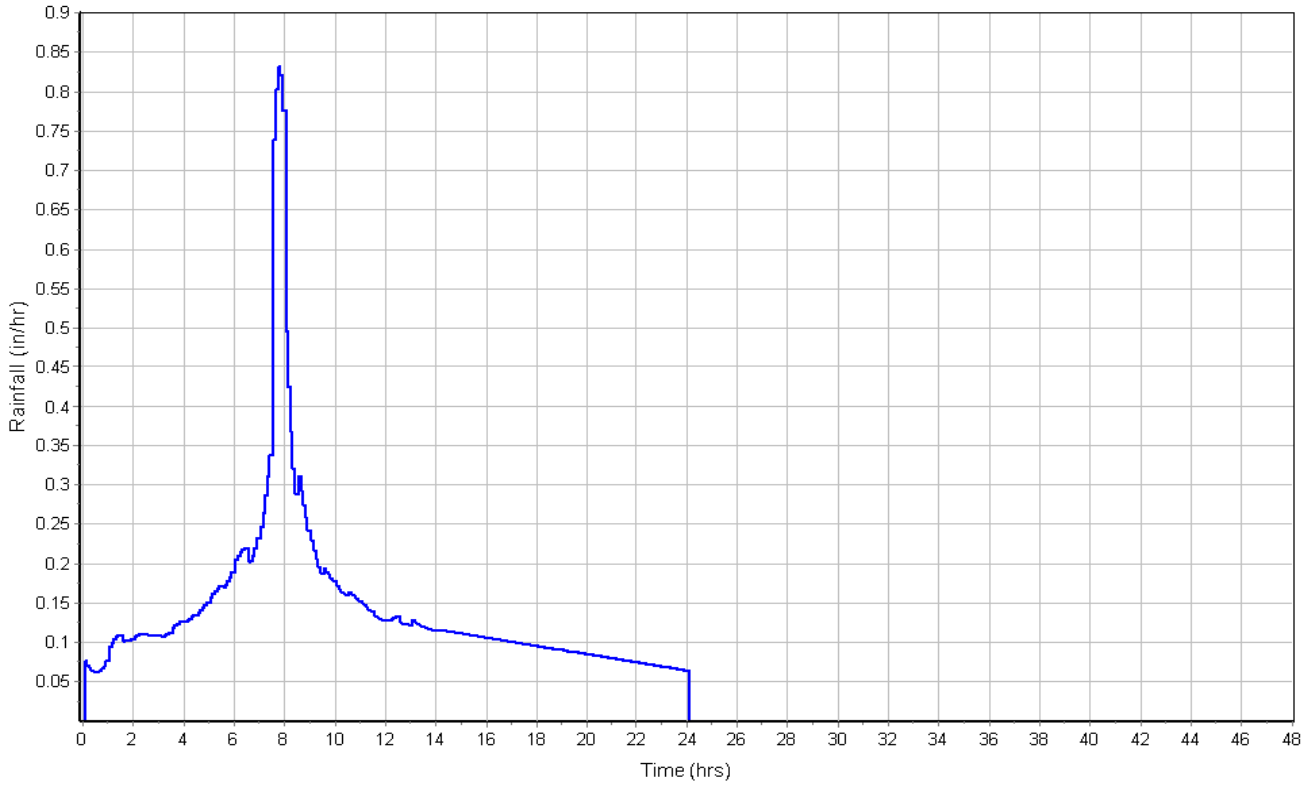
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

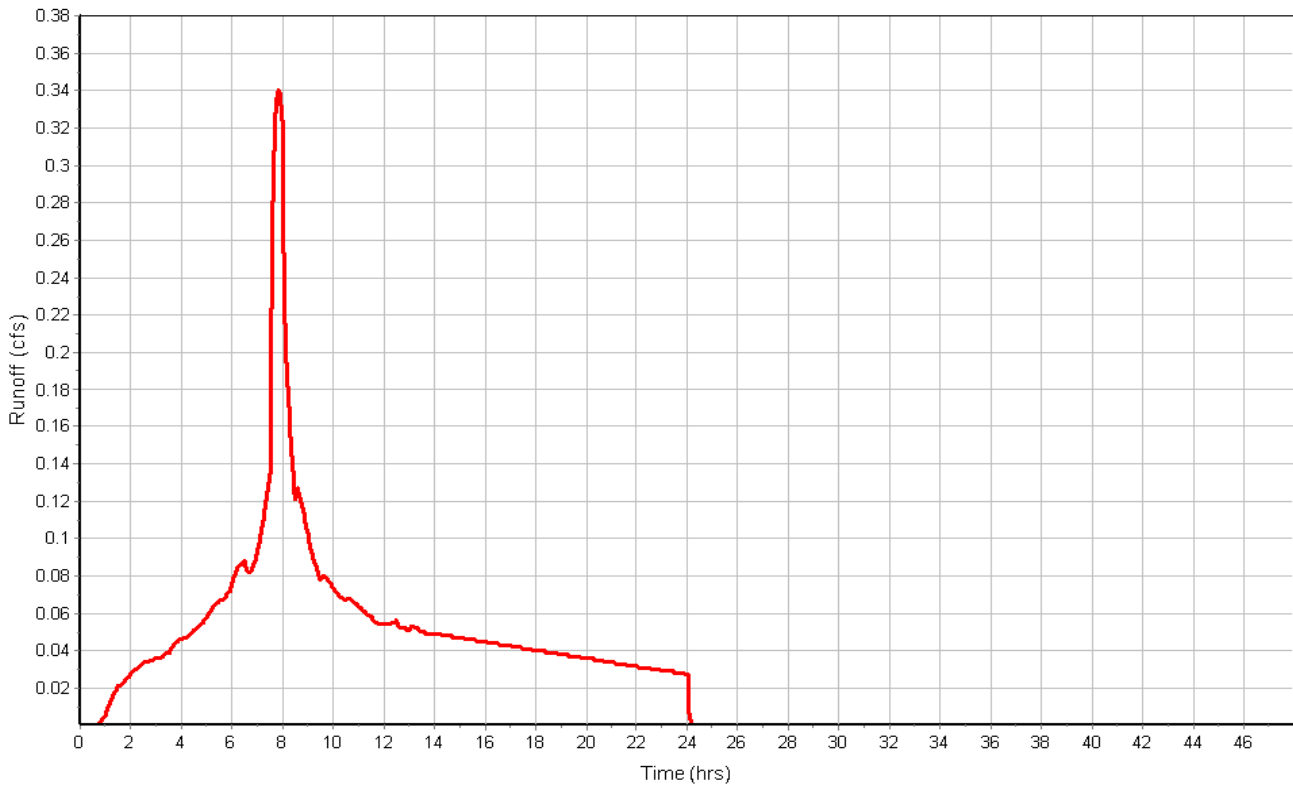
Total Rainfall (in) 3.45
Total Runoff (in) 3.22
Peak Runoff (cfs) 0.34
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_06B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_07

Input Data

Area (ac) 1.08
Weighted Curve Number 93.59
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.81	C/D	98.00
Landscape	0.26	C/D	80.00
Composite Area & Weighted CN	1.07		93.59

Time of Concentration

User-Defined TOC override (minutes): 5

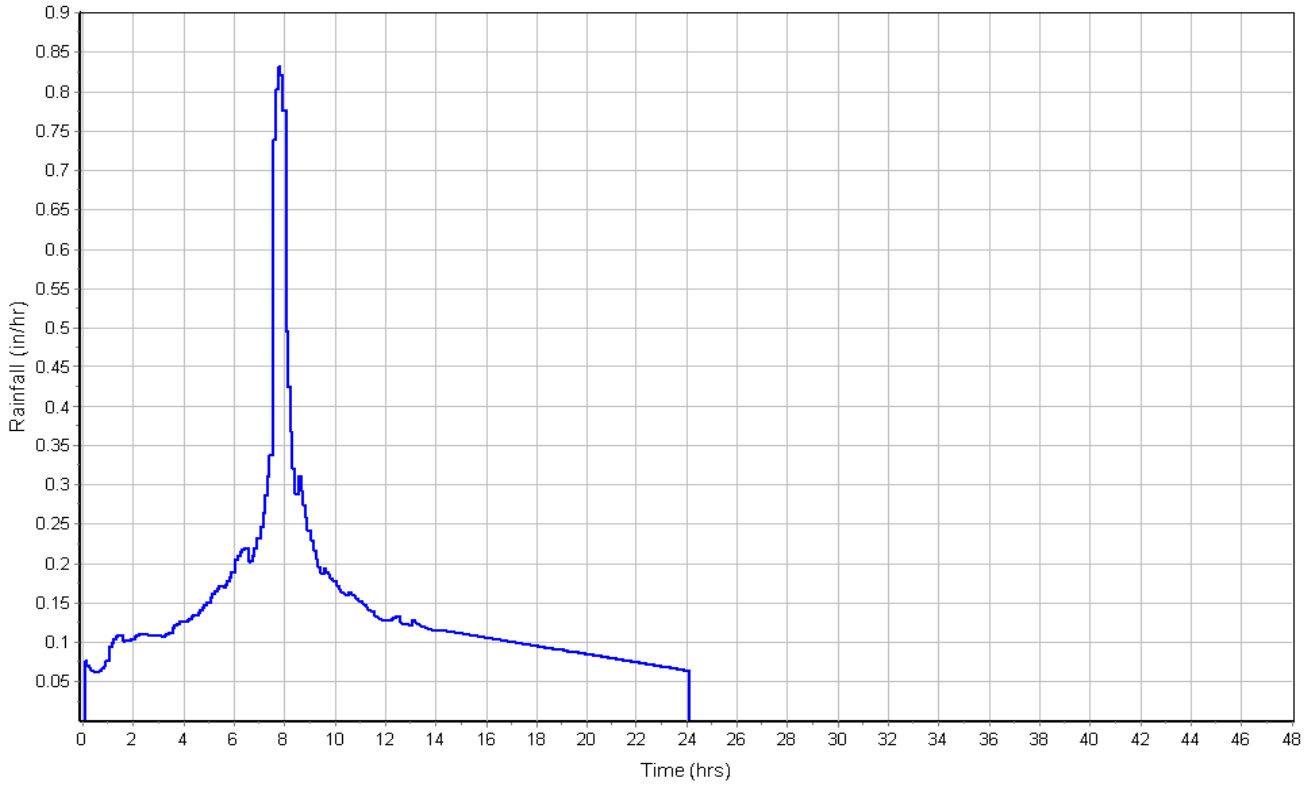
Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 2.75
Peak Runoff (cfs) 0.77
Weighted Curve Number 93.59
Time of Concentration (days hh:mm:ss) 0 00:05:00

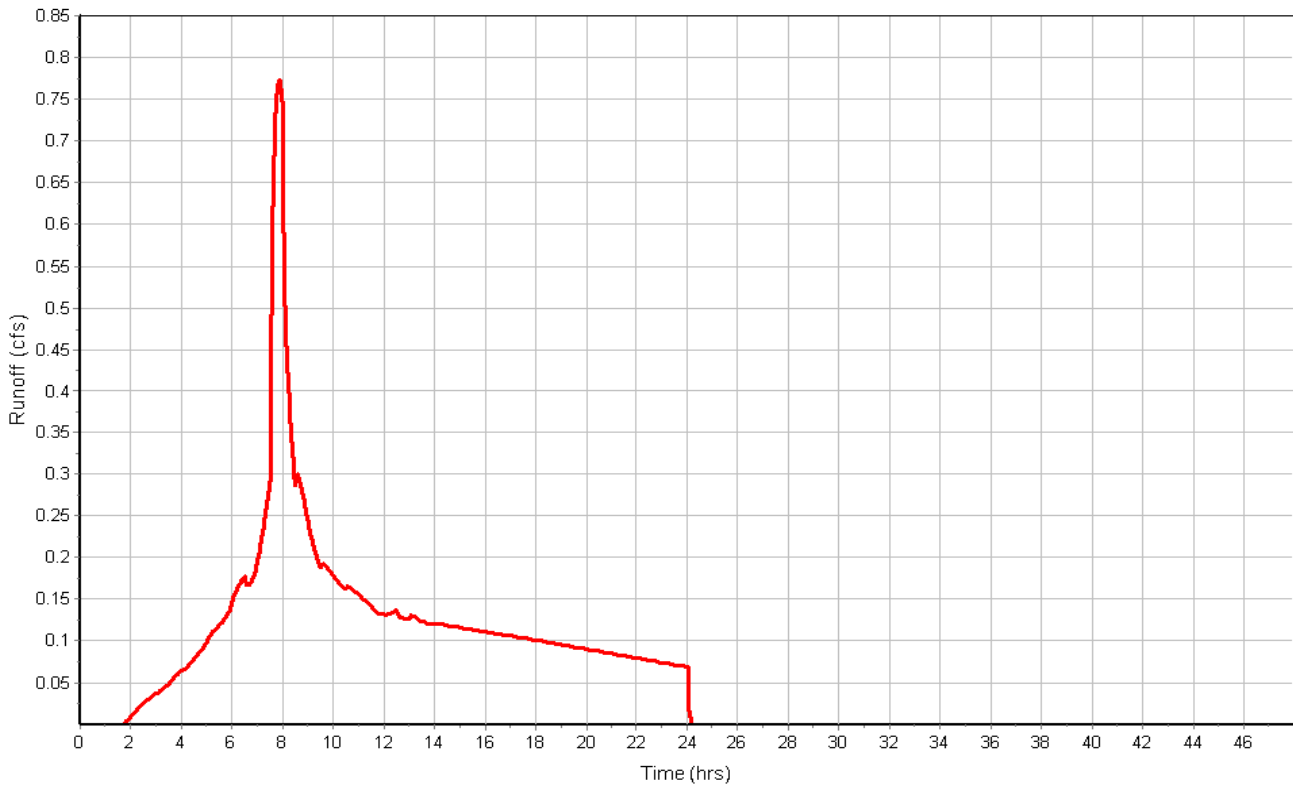
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_07

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_08B

Input Data

Area (ac) 2.25
Weighted Curve Number 94.33
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.79	C/D	98.00
Landscape	0.46	C/D	80.00
Composite Area & Weighted CN	2.25		94.33

Time of Concentration

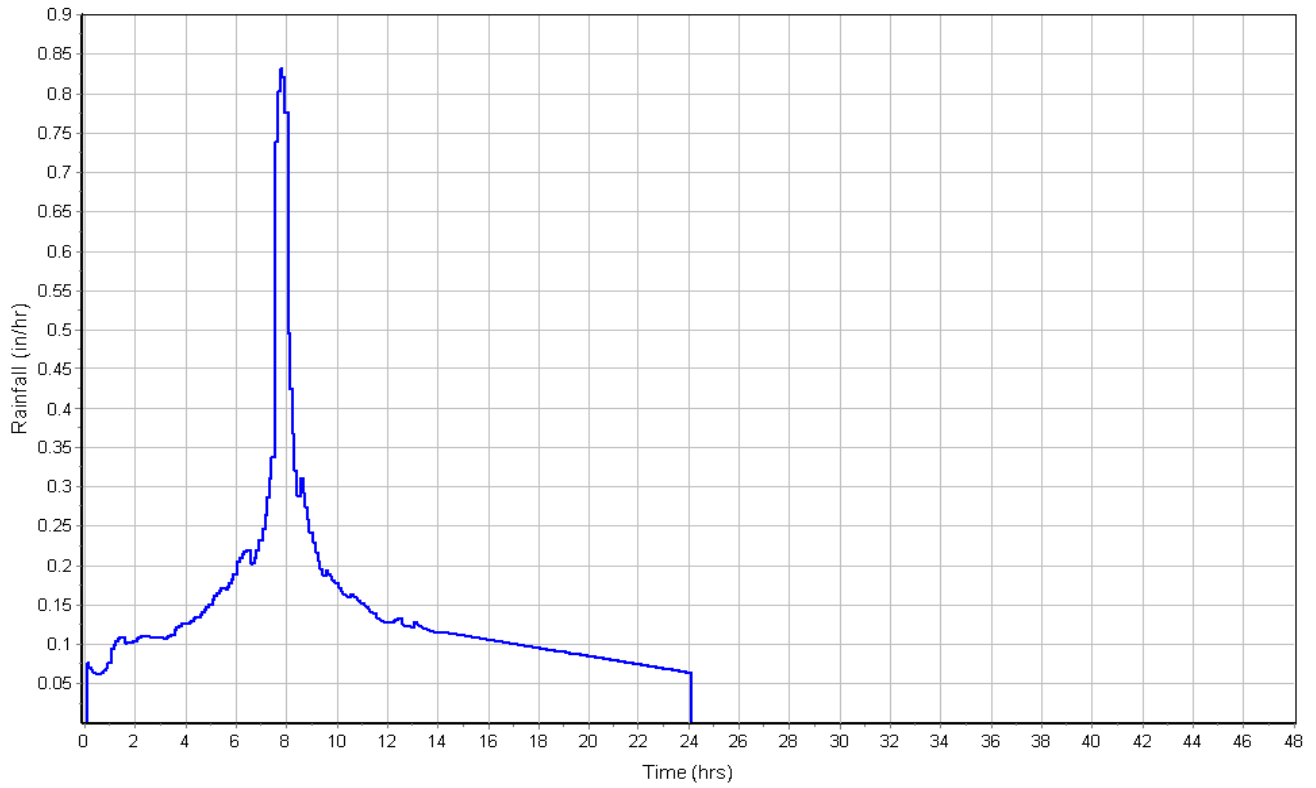
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

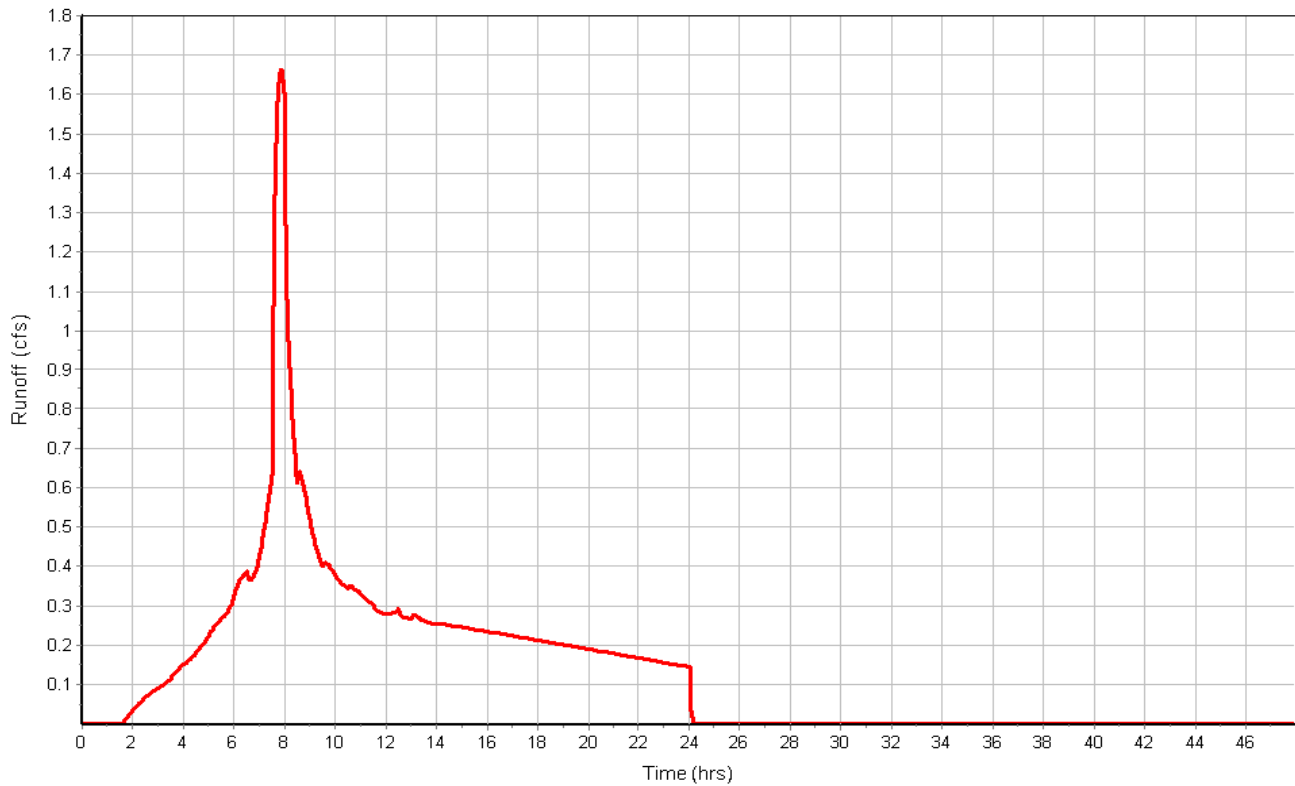
Total Rainfall (in) 3.45
Total Runoff (in) 2.82
Peak Runoff (cfs) 1.66
Weighted Curve Number 94.33
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_08B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_09

Input Data

Area (ac) 0.23
Weighted Curve Number 95.64
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.20	C/D	98.00
Landscape	0.03	C/D	80.00
Composite Area & Weighted CN	0.23		95.64

Time of Concentration

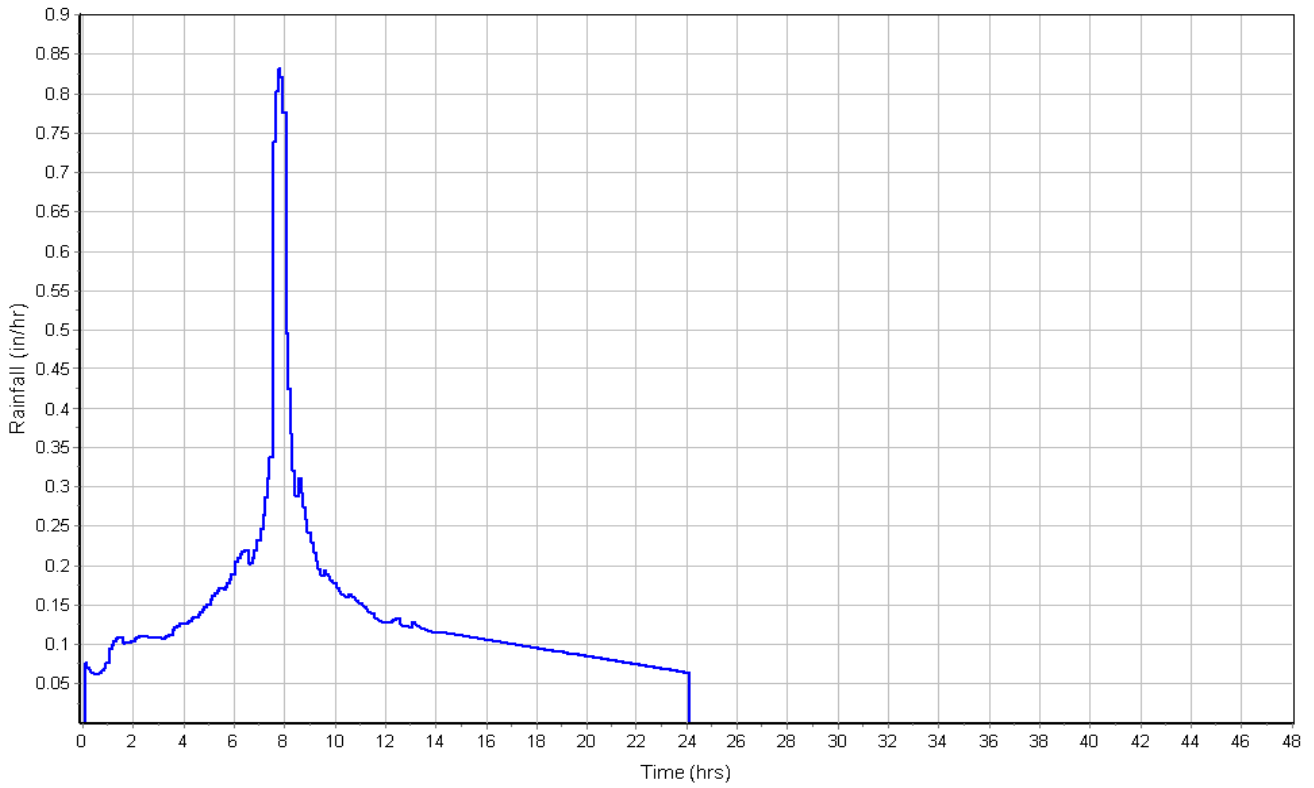
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

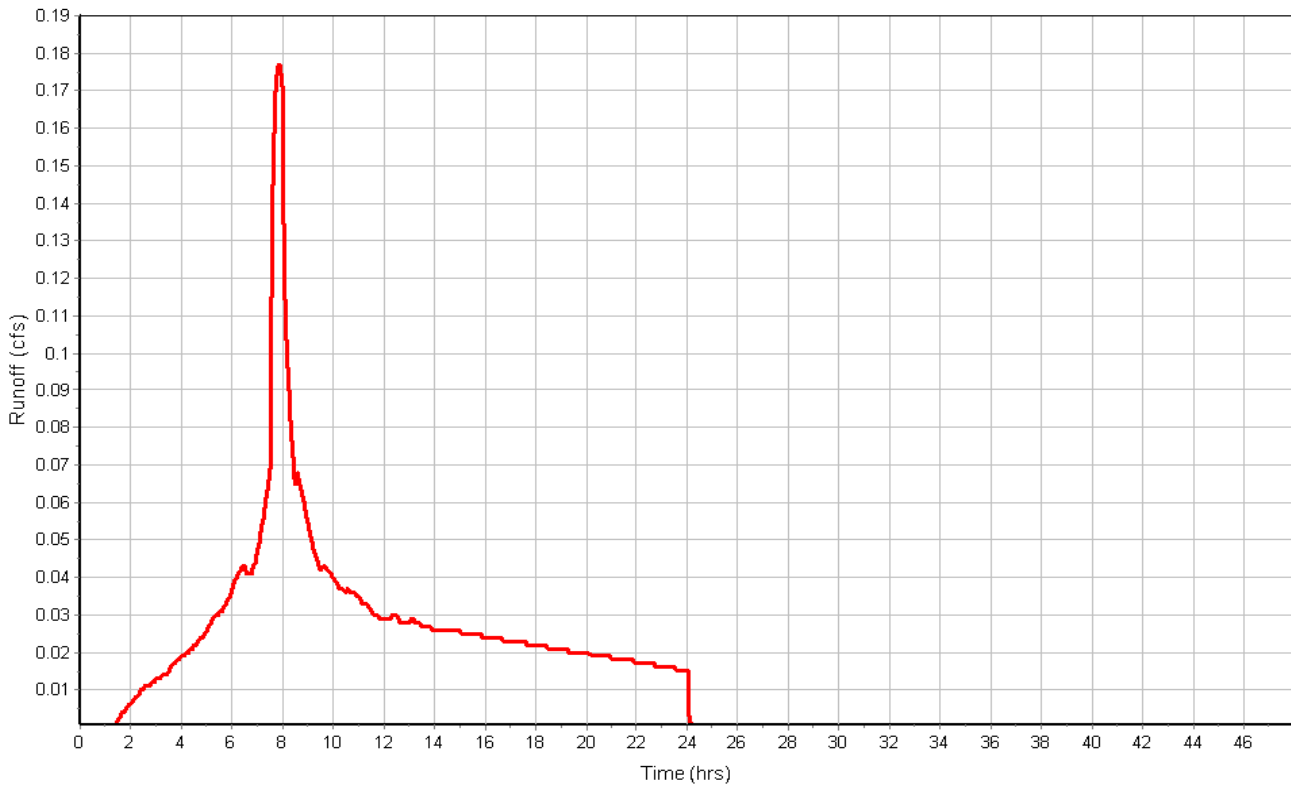
Total Rainfall (in) 3.45
Total Runoff (in) 2.96
Peak Runoff (cfs) 0.18
Weighted Curve Number 95.64
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_09

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_10

Input Data

Area (ac) 0.32
Weighted Curve Number 95.08
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.27	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.32		95.08

Time of Concentration

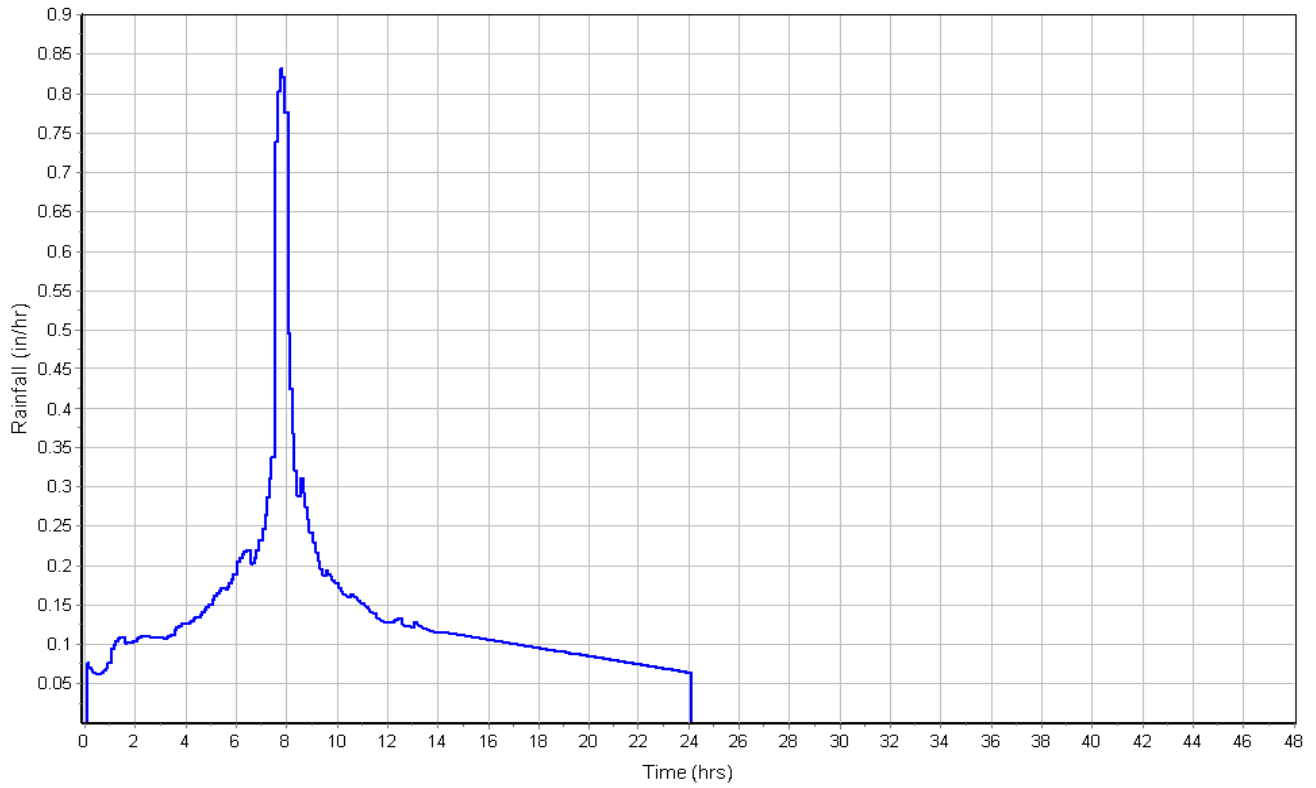
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

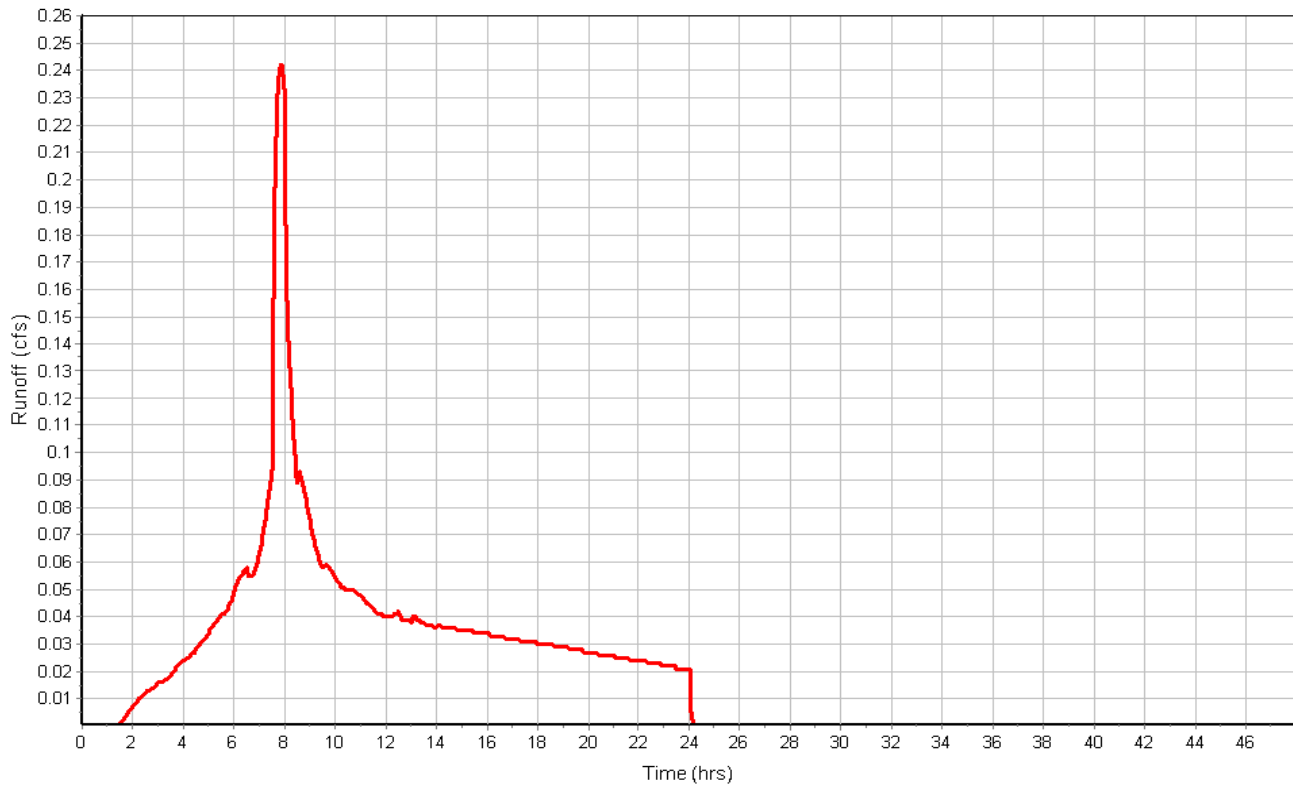
Total Rainfall (in) 3.45
Total Runoff (in) 2.90
Peak Runoff (cfs) 0.24
Weighted Curve Number 95.08
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_10

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_8A

Input Data

Area (ac) 2.32
Weighted Curve Number 95.49
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	2.00	C/D	98.00
Landscape	0.32	C/D	80.00
Composite Area & Weighted CN	2.32		95.49

Time of Concentration

User-Defined TOC override (minutes): 5

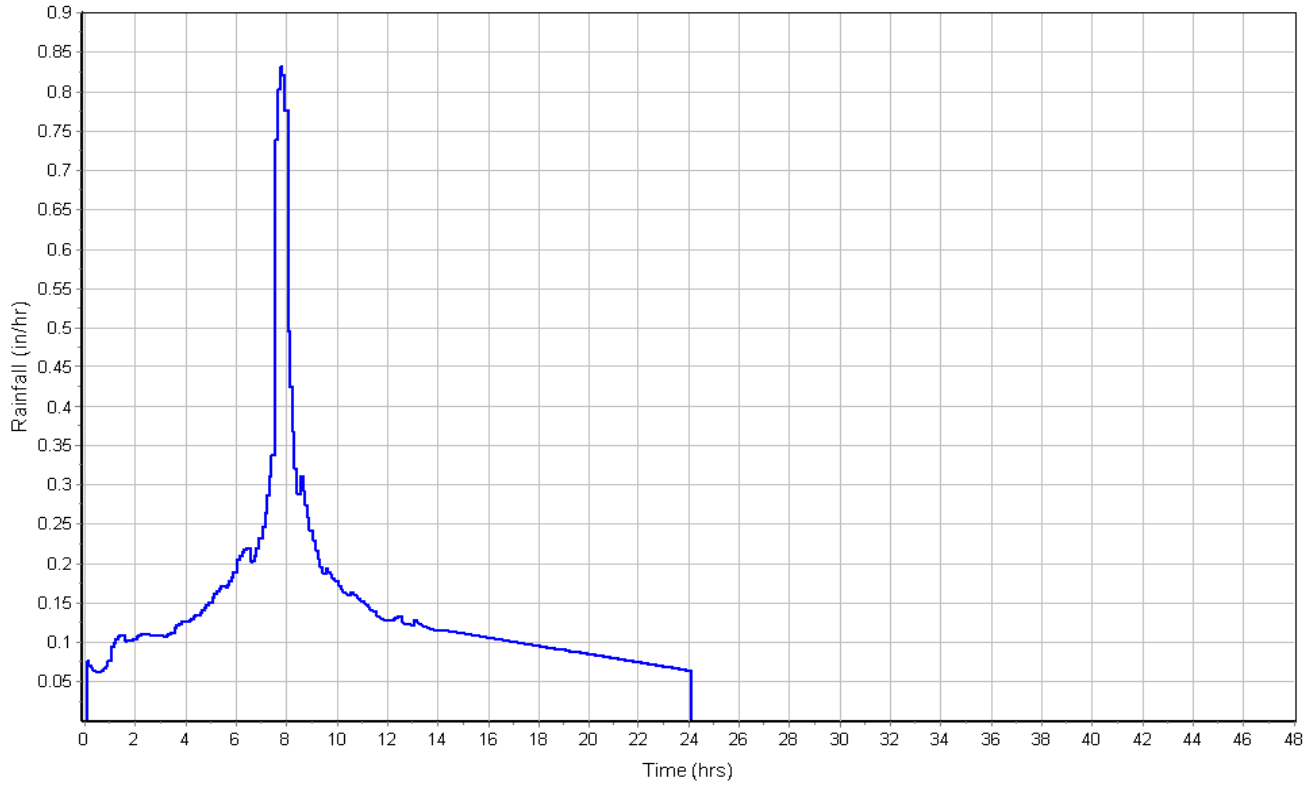
Subbasin Runoff Results

Total Rainfall (in) 3.45
Total Runoff (in) 2.94
Peak Runoff (cfs) 1.78
Weighted Curve Number 95.49
Time of Concentration (days hh:mm:ss) 0 00:05:00

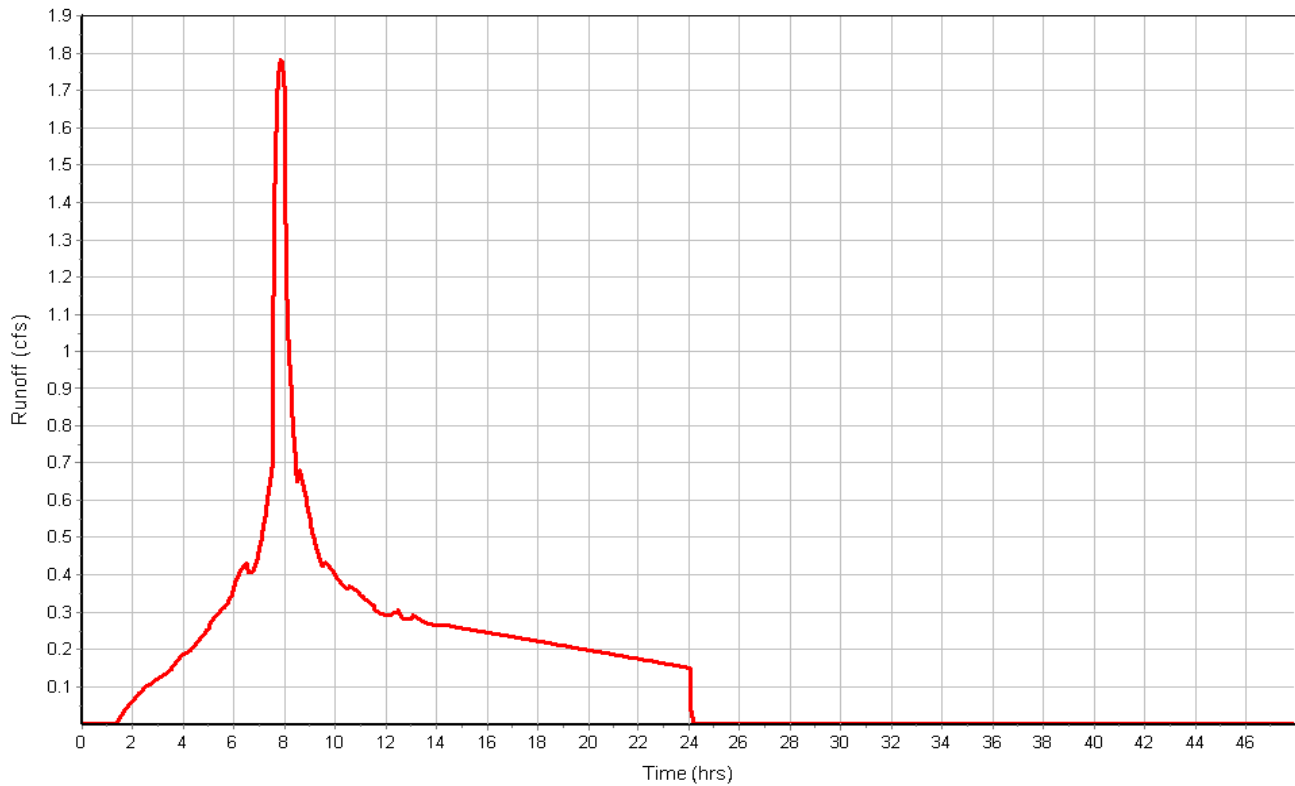
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Subbasin : HED-LIDA_8A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	COF-01A	238.00	250.00	12.00	238.00	0.00	1000.00	750.00	12.00	0.00
2	COF-01B	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
3	COF-01C	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
4	COF-02A	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
5	COF-02B	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
6	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
7	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
8	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
9	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
10	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
11	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
12	HED-01G	226.00	229.00	3.00	226.00	0.00	1000.00	771.00	12.00	0.00
13	HED-01H	229.00	232.00	3.00	229.00	0.00	1000.00	768.00	12.00	0.00
14	HED-01I	230.00	233.00	3.00	230.00	0.00	1000.00	767.00	12.00	0.00
15	HED-01J	231.00	233.00	2.00	231.00	0.00	1000.00	767.00	12.00	0.00
16	HED-01K	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
17	HED-01L	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
18	HED-01M	224.00	230.00	6.00	224.00	0.00	1000.00	770.00	12.00	0.00
19	HED-01N	230.00	235.00	5.00	230.00	0.00	1000.00	765.00	12.00	0.00
20	HED-01O	234.00	238.00	4.00	234.00	0.00	1000.00	762.00	12.00	0.00
21	HED-01P	234.00	239.00	5.00	234.00	0.00	1000.00	761.00	12.00	0.00
22	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
23	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
24	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
25	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
26	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
27	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
28	HED-02G	235.00	237.00	2.00	235.00	0.00	1000.00	763.00	12.00	0.00
29	HED-02H	236.00	238.00	2.00	236.00	0.00	1000.00	762.00	12.00	0.00
30	HED-02I	237.00	239.00	2.00	237.00	0.00	1000.00	761.00	12.00	0.00
31	HED-02J	237.00	250.00	13.00	237.00	0.00	1000.00	750.00	12.00	0.00
32	HED-02K	255.00	257.00	2.00	255.00	0.00	1000.00	743.00	12.00	0.00
33	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
34	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
35	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00
36	HED-03D	241.00	245.00	4.00	241.00	0.00	1000.00	755.00	12.00	0.00
37	HED-03E	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
38	HED-03F	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
39	HED-03G	242.00	245.00	3.00	242.00	0.00	1000.00	755.00	12.00	0.00
40	HED-03H	243.00	245.00	2.00	243.00	0.00	1000.00	755.00	12.00	0.00
41	HED-03I	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
42	HED-03J	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
43	HED-03K	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
44	HED-03L	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
45	HED-03t	238.00	243.00	5.00	238.00	0.00	1000.00	757.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Junction Results

SN	Element ID	Peak Inflow	Peak Lateral Inflow	Max HGL Elevation Attained	Max HGL Depth Attained	Max Surcharge Depth Attained	Min Freeboard Attained	Average HGL Elevation Attained	Average HGL Depth Attained	Time of Max HGL Occurrence	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
		(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(days hh:mm)	(days hh:mm)	(ac-in)	(min)
1	COF-01A	0.24	0.00	238.17	0.17	0.00	11.83	238.05	0.05	0 14:52	0 00:00	0.00	0.00
2	COF-01B	0.24	0.00	244.04	0.04	0.00	2.96	244.01	0.01	0 14:47	0 00:00	0.00	0.00
3	COF-01C	0.24	0.00	246.52	1.52	0.00	1.98	245.99	0.99	0 14:46	0 00:00	0.00	0.00
4	COF-02A	0.34	0.00	244.08	0.08	0.00	3.92	244.01	0.01	0 09:03	0 00:00	0.00	0.00
5	COF-02B	1.30	0.00	246.06	1.06	0.00	0.94	245.31	0.31	0 08:52	0 00:00	0.00	0.00
6	HED-01A	0.62	0.00	152.06	0.06	0.00	7.94	152.02	0.02	0 13:55	0 00:00	0.00	0.00
7	HED-01B	0.48	0.00	157.07	0.07	0.00	7.93	157.02	0.02	0 08:36	0 00:00	0.00	0.00
8	HED-01C	0.48	0.00	158.06	0.26	0.00	6.94	157.91	0.11	0 13:34	0 00:00	0.00	0.00
9	HED-01D	0.48	0.00	177.22	0.18	0.00	4.03	177.12	0.08	0 13:32	0 00:00	0.00	0.00
10	HED-01E	0.48	0.00	181.18	0.18	0.00	10.82	181.08	0.08	0 13:28	0 00:00	0.00	0.00
11	HED-01F	0.48	0.00	223.13	0.13	0.00	5.87	223.05	0.05	0 13:26	0 00:00	0.00	0.00
12	HED-01G	0.48	0.00	226.12	0.12	0.00	3.38	226.05	0.05	0 13:24	0 00:00	0.00	0.00
13	HED-01H	0.47	0.00	229.22	0.22	0.00	2.78	229.09	0.09	0 13:25	0 00:00	0.00	0.00
14	HED-01I	0.47	0.00	230.22	0.22	0.00	2.78	230.09	0.09	0 13:25	0 00:00	0.00	0.00
15	HED-01J	0.47	0.00	232.79	1.79	0.00	1.96	232.13	1.13	0 13:25	0 00:00	0.00	0.00
16	HED-01K	0.24	0.00	228.14	1.64	0.00	1.61	226.81	0.31	0 08:03	0 00:00	0.00	0.00
17	HED-01L	0.18	0.00	226.67	0.17	0.00	2.83	226.50	0.00	0 08:09	0 00:00	0.00	0.00
18	HED-01M	0.12	0.00	224.10	0.10	0.00	5.90	224.00	0.00	0 08:18	0 00:00	0.00	0.00
19	HED-01N	0.14	0.00	230.27	0.27	0.00	4.73	230.02	0.02	0 08:16	0 00:00	0.00	0.00
20	HED-01O	0.14	0.00	234.09	0.09	0.00	4.41	234.00	0.00	0 08:10	0 00:00	0.00	0.00
21	HED-01P	0.00	0.00	234.00	0.00	0.00	5.50	234.00	0.00	0 00:00	0 00:00	0.00	0.00
22	HED-02A	0.15	0.00	171.02	0.02	0.00	7.98	171.01	0.01	0 12:41	0 00:00	0.00	0.00
23	HED-02B	0.15	0.00	171.46	0.16	0.00	5.54	171.40	0.10	0 12:28	0 00:00	0.00	0.00
24	HED-02C	0.15	0.00	173.63	0.13	0.00	4.37	173.58	0.08	0 12:29	0 00:00	0.00	0.00
25	HED-02D	0.15	0.00	174.85	0.25	0.00	10.89	174.76	0.16	0 12:23	0 00:00	0.00	0.00
26	HED-02E	0.15	0.00	180.66	0.20	0.00	7.34	180.58	0.12	0 12:20	0 00:00	0.00	0.00
27	HED-02F	0.17	0.00	181.87	0.11	0.00	6.09	181.83	0.07	0 11:38	0 00:00	0.00	0.00
28	HED-02G	0.07	0.00	235.05	0.05	0.00	2.95	235.04	0.04	0 06:44	0 00:00	0.00	0.00
29	HED-02H	0.07	0.00	236.11	0.11	0.00	1.89	236.09	0.09	1 17:27	0 00:00	0.00	0.00
30	HED-02I	0.00	0.00	237.00	0.00	0.00	2.00	237.00	0.00	0 00:00	0 00:00	0.00	0.00
31	HED-02J	0.07	0.00	237.10	0.10	0.00	12.90	237.08	0.08	0 06:39	0 00:00	0.00	0.00
32	HED-02K	0.08	0.00	256.00	1.00	0.00	2.50	255.49	0.49	0 23:49	0 00:00	0.00	0.00
33	HED-03A	0.17	0.00	183.03	0.03	0.00	6.97	183.01	0.01	0 10:33	0 00:00	0.00	0.00
34	HED-03B	0.18	0.00	235.01	0.01	0.00	4.99	235.00	0.00	0 09:21	0 00:00	0.00	0.00
35	HED-03C	0.27	0.00	236.05	0.05	0.00	13.95	236.01	0.01	0 08:52	0 00:00	0.00	0.00
36	HED-03D	0.33	0.00	241.06	0.06	0.00	3.94	241.01	0.01	0 08:10	0 00:00	0.00	0.00
37	HED-03E	0.18	0.00	250.11	0.11	0.00	1.39	250.00	0.00	0 08:04	0 00:00	0.00	0.00
38	HED-03F	0.14	0.00	250.09	0.09	0.00	1.66	250.00	0.00	0 08:02	0 00:00	0.00	0.00
39	HED-03G	0.02	0.00	242.00	0.00	0.00	3.00	242.00	0.00	0 17:25	0 00:00	0.00	0.00
40	HED-03H	0.14	0.00	244.16	1.16	0.00	2.34	243.66	0.66	0 23:44	0 00:00	0.00	0.00
41	HED-03I	0.00	0.00	244.16	0.16	0.00	2.84	244.03	0.03	0 23:45	0 00:00	0.00	0.00
42	HED-03J	0.00	0.00	245.00	0.00	0.00	3.50	245.00	0.00	0 00:00	0 00:00	0.00	0.00
43	HED-03K	0.83	0.00	257.06	1.06	0.00	1.94	256.58	0.58	0 07:47	0 00:00	0.00	0.00
44	HED-03L	0.83	0.00	256.21	0.21	0.00	1.79	256.05	0.05	0 07:39	0 00:00	0.00	0.00
45	HED-03M	0.08	0.00	238.15	0.15	0.00	5.85	238.01	0.01	0 09:09	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	COF-1A	10.00	238.00	0.00	238.00	0.00	0.00	0.0000	Rectangular	5.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	COF-1B	150.00	244.00	0.00	238.00	0.00	6.00	4.0000	Rectangular	1.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	COF-1C	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	COF-1E	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	COF-2B	1.00	245.00	0.00	246.00	2.00	-1.00	-100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	COF-2D	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
7	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
8	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
9	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00	No
10	HED-01I	5.00	228.00	0.00	228.50	2.00	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
11	HED-01J	20.00	227.00	0.50	228.00	2.00	-1.00	-5.0000	Rectangular	1.000	1.000	0.0320	0.5000	0.5000	0.0000	0.00	No
12	HED-01K	5.00	228.00	0.00	228.75	2.25	-0.75	-15.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
13	HED-01M	500.00	230.00	0.00	224.00	0.00	6.00	1.2000	Triangular	2.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
14	HED-01O	5.00	237.00	0.00	237.50	3.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
15	HED-01Q	5.00	238.00	0.00	238.50	4.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
16	HED-01T	1.00	232.75	1.75	231.00	1.00	1.75	175.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
17	HED-01V	5.00	231.00	0.00	231.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
18	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
19	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00	No
20	HED-02G	1130.10	235.00	0.00	181.76	0.00	53.24	4.7100	Trapezoidal	3.000	19.000	0.0320	0.5000	0.5000	0.0000	0.00	No
21	HED-02K	1.00	256.50	1.50	237.00	0.00	19.50	1950.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
22	HED-02L	44.02	237.00	0.00	236.00	0.00	1.00	2.2700	Rectangular	2.000	4.000	0.0320	0.5000	0.5000	0.0000	0.00	No
23	HED-02O	5.00	255.00	0.00	255.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
24	HED-03A	770.00	181.76	0.00	183.00	0.00	-1.24	-0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
25	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
26	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
27	HED-03F	400.00	241.00	0.00	236.00	0.00	5.00	1.2500	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
28	HED-03G	10.00	242.00	0.00	241.00	0.00	1.00	10.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
29	HED-03H	1.00	244.50	1.50	242.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
30	HED-03K	5.00	256.00	0.00	256.00	0.00	0.00	0.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
31	HED-03M	5.00	250.00	0.00	250.75	0.75	-0.75	-15.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
32	HED-03O	5.00	250.00	0.00	250.50	0.50	-0.50	-10.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
33	HED-03P	1.00	257.00	1.00	256.00	0.00	1.00	100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
34	HED-03R	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
35	HED-03S	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
36	HED-03U	5.00	243.00	0.00	243.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Channel Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	COF-1A	0.24	0 14:52	42.77	0.01	0.14	1.19	0.17	0.03			0.00
2	COF-1B	0.24	0 14:47	37.11	0.01	0.45	5.56	0.11	0.11			0.00
3	COF-1C	0.22	0 14:46	224.13	0.00	3.46	0.00	0.03	0.02			0.00
4	COF-1E	0.24	0 14:46	7.05	0.03	0.04	2.08	1.52	0.76			0.00
5	COF-2B	1.15	0 08:52	141.75	0.01	1.01	0.02	0.54	0.28			0.00
6	COF-2D	1.52	0 12:39	2.00	0.76	0.74	0.11	1.02	0.51			0.00
7	HED-01A	0.61	0 13:55	1512.53	0.00	0.74	3.72	0.06	0.01			0.00
8	HED-01B	0.49	0 13:40	1082.72	0.00	0.55	24.39	0.06	0.01			0.00
9	HED-01F	0.48	0 13:26	2813.13	0.00	2.18	4.73	0.16	0.03			0.00
10	HED-01I	0.18	0 08:08	24.81	0.01	0.25	0.33	0.30	0.30			0.00
11	HED-01J	0.24	0 08:03	4.99	0.05	0.44	0.76	0.56	0.56			0.00
12	HED-01K	3.93	0 16:18	30.39	0.13	3.05	0.03	0.42	0.52			0.00
13	HED-01M	0.12	0 08:17	37.78	0.00	1.86	4.48	0.18	0.09			0.00
14	HED-01O	0.14	0 08:10	24.81	0.01	0.20	0.42	0.29	0.29			0.00
15	HED-01Q	0.00	0 00:00	24.81	0.00	0.00		0.13	0.13			0.00
16	HED-01T	0.42	0 13:25	187.52	0.00	5.88	0.00	0.04	0.02			0.00
17	HED-01V	0.47	0 13:25	16.66	0.03	0.04	2.08	1.79	0.89			0.00
18	HED-02A	0.15	0 12:41	1963.65	0.00	0.40	38.75	0.04	0.00			0.00
19	HED-02E	0.15	0 12:20	614.42	0.00	0.29	27.93	0.12	0.02			0.00
20	HED-02G	0.07	0 23:57	396.58	0.00	1.56	12.07	0.08	0.03			0.00
21	HED-02K	0.00	0 00:00	625.97	0.00	0.00		0.05	0.02			0.00
22	HED-02L	0.00	0 00:00	55.99	0.00	0.00		0.06	0.03			0.00
23	HED-02O	0.07	1 16:31	16.66	0.00	0.11	0.76	1.00	0.50			0.00
24	HED-03A	0.10	0 10:33	443.56	0.00	0.08	160.42	0.07	0.01			0.00
25	HED-03B	0.17	0 09:21	2403.19	0.00	0.67	27.36	0.02	0.00			0.00
26	HED-03C	0.10	0 09:06	417.77	0.00	0.18	64.81	0.03	0.01			0.00
27	HED-03F	0.27	0 08:12	131.71	0.00	0.71	9.39	0.04	0.02			0.00
28	HED-03G	0.01	0 17:25	157.53	0.00	0.19	0.88	0.03	0.02			0.00
29	HED-03H	0.00	0 00:00	224.13	0.00	0.00		0.00	0.00			0.00
30	HED-03K	0.83	0 07:38	0.83	1.00	0.41	0.20	1.00	1.00	1089.00		0.00
31	HED-03M	0.14	0 08:05	22.66	0.01	0.17	0.49	0.41	0.41			0.00
32	HED-03O	0.18	0 08:06	18.50	0.01	0.29	0.29	0.30	0.30			0.00
33	HED-03P	0.81	0 07:38	141.75	0.01	3.06	0.01	0.14	0.07			0.00
34	HED-03R	0.00	0 00:00	2.00	0.00	0.00		0.00	0.00			0.00
35	HED-03S	0.00	0 00:00	224.13	0.00	0.00		0.08	0.04			0.00
36	HED-03U	0.14	0 18:43	2.00	0.07	0.12	0.69	1.16	0.58			0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Pipe Input

SN	Element ID	Length	Inlet Invert Elevation	Inlet Invert Offset	Outlet Invert Elevation	Outlet Invert Offset	Total Drop	Average Pipe Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	No. of Barrels
		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(%)		(in)	(in)					(cfs)		
1	COF-01D	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	COF-2A	400.00	244.00	0.00	238.00	0.00	6.00	1.5000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	COF-2C	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.480	0.480	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5	HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6	HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7	HED-01G	20.00	226.00	0.00	223.00	0.00	3.00	15.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	HED-01H	50.00	226.50	0.00	226.00	0.00	0.50	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	HED-01L	47.37	224.00	0.00	223.00	0.00	1.00	2.1100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	HED-01N	75.00	234.00	0.00	230.00	0.00	4.00	5.3300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	HED-01P	65.00	234.00	0.00	230.00	0.00	4.00	6.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	HED-01R	50.00	230.00	0.00	229.00	0.00	1.00	2.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	HED-01S	100.00	229.00	0.00	228.00	2.00	1.00	1.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	HED-01U	1.00	231.00	0.00	230.00	0.00	1.00	100.0000	CIRCULAR	0.960	0.960	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
16	HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
17	HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
18	HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	HED-02H	100.00	236.00	0.00	235.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	HED-02I	100.00	237.00	0.00	236.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	HED-02J	1.00	255.00	0.00	237.00	0.00	18.00	1800.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	HED-03D	500.00	238.00	0.00	235.00	0.00	3.00	0.6000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	HED-03E	47.11	242.00	0.00	242.50	4.50	-0.50	-1.0600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	HED-03I	200.00	244.00	0.00	243.50	0.50	0.50	0.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	HED-03J	200.00	256.00	0.00	243.00	0.00	13.00	6.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	HED-03L	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	HED-03N	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
28	HED-03Q	1.00	256.00	0.00	256.00	0.00	0.00	0.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	HED-03T	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	HED-03V	1.00	243.00	0.00	242.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
10-year storm

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	COF-01D	0.02	0 14:47	0.02	1.10	10.57	0.00	0.05	0.84	0.00		> CAPACITY
2	COF-2A	0.06	0 09:04	11.15	0.01	2.01	3.32	0.10	0.06	0.00		Calculated
3	COF-2C	0.01	0 15:36	0.01	1.26	11.91	0.00	0.04	1.00	138.00		SURCHARGED
4	HED-01C	0.48	0 13:33	20.90	0.02	4.04	0.39	0.16	0.08	0.00		Calculated
5	HED-01D	0.48	0 13:33	28.48	0.02	3.37	5.94	0.18	0.09	0.00		Calculated
6	HED-01E	0.48	0 13:28	7.14	0.07	4.99	0.31	0.18	0.18	0.00		Calculated
7	HED-01G	0.48	0 13:25	40.68	0.01	7.73	0.04	0.13	0.08	0.00		Calculated
8	HED-01H	0.18	0 08:08	3.56	0.05	2.73	0.31	0.14	0.14	0.00		Calculated
9	HED-01L	0.12	0 08:18	15.26	0.01	2.09	0.38	0.11	0.07	0.00		Calculated
10	HED-01N	0.14	0 08:10	8.23	0.02	3.33	0.38	0.18	0.18	0.00		Calculated
11	HED-01P	0.00	0 00:00	26.06	0.00	0.00		0.13	0.09	0.00		Calculated
12	HED-01R	0.47	0 13:25	5.04	0.09	3.64	0.23	0.22	0.22	0.00		Calculated
13	HED-01S	0.47	0 13:25	10.50	0.04	2.92	0.57	0.22	0.15	0.00		Calculated
14	HED-01U	0.05	1 00:20	0.05	1.11	9.75	0.00	0.08	1.00	727.00		SURCHARGED
15	HED-02B	0.15	0 12:30	40.58	0.00	2.29	0.59	0.09	0.03	0.00		Calculated
16	HED-02C	0.15	0 12:29	8.91	0.02	1.61	3.17	0.15	0.10	0.00		Calculated
17	HED-02D	0.15	0 12:25	4.04	0.04	1.13	10.99	0.19	0.13	0.00		Calculated
18	HED-02F	0.15	0 11:38	59.16	0.00	1.25	2.20	0.15	0.05	0.00		Calculated
19	HED-02H	0.07	0 06:41	3.56	0.02	2.44	0.68	0.08	0.08	0.00		Calculated
20	HED-02I	0.07	0 06:39	3.56	0.02	1.66	1.00	0.10	0.10	0.00		Calculated
21	HED-02J	0.07	1 17:23	0.09	0.77	23.64	0.00	0.06	1.00	2079.00		SURCHARGED
22	HED-03D	0.08	0 09:10	2.76	0.03	2.70	3.09	0.08	0.08	0.00		Calculated
23	HED-03E	0.08	0 09:08	10.82	0.01	0.26	3.02	0.35	0.23	0.00		Calculated
24	HED-03I	0.00	1 00:21	5.25	0.00	0.01	333.33	0.41	0.27	0.00		Calculated
25	HED-03J	0.83	0 07:43	9.08	0.09	8.83	0.38	0.55	0.55	0.00		Calculated
26	HED-03L	0.14	0 08:05	10.69	0.01	6.70	0.25	0.07	0.07	0.00		Calculated
27	HED-03N	0.18	0 08:06	9.26	0.02	6.55	0.25	0.08	0.08	0.00		Calculated
28	HED-03Q	0.02	0 06:11	0.00	23.04	5.62	0.00	0.06	1.00	1079.00		SURCHARGED
29	HED-03T	0.00	0 00:00	0.02	0.00	0.00		0.03	0.50	0.00		Calculated
30	HED-03V	0.02	0 23:44	0.02	1.09	14.19	0.00	0.03	0.54	0.00		> CAPACITY

Storage Nodes

Storage Node : LIDA-01

Input Data

Invert Elevation (ft) 228.00
 Max (Rim) Elevation (ft) 229.00
 Max (Rim) Offset (ft) 1.00
 Initial Water Elevation (ft) 228.00
 Initial Water Depth (ft) 0.00
 Ponded Area (ft²) 938.00
 Evaporation Loss 0.00

Infiltration/Exfiltration

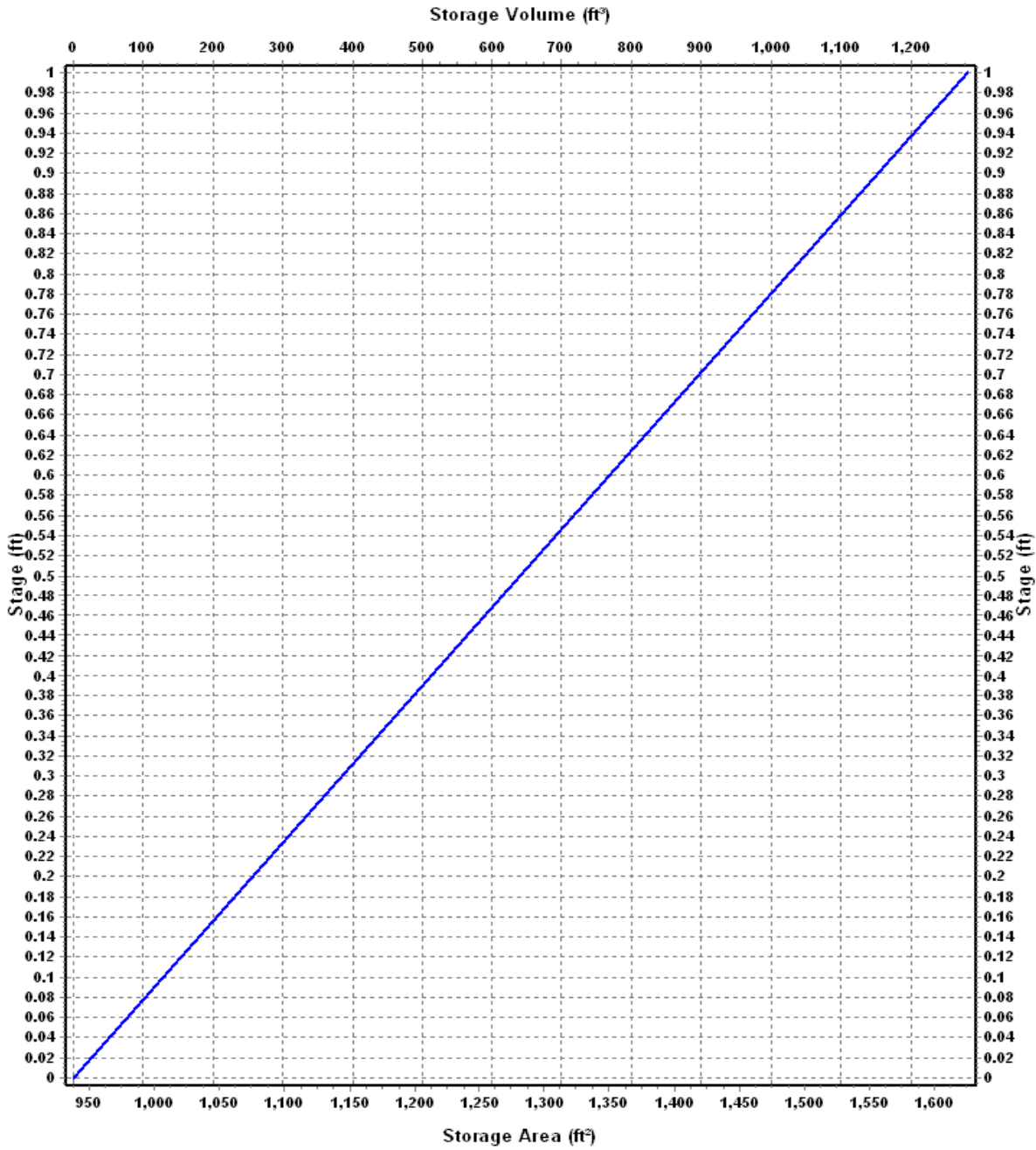
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-01

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	938	0.000
1	1625	1281.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-01 (continued)

Output Summary Results

Peak Inflow (cfs)	0.32
Peak Lateral Inflow (cfs)	0.32
Peak Outflow (cfs)	0.18
Peak Exfiltration Flow Rate (cfm)	3.66
Max HGL Elevation Attained (ft)	228.55
Max HGL Depth Attained (ft)	0.55
Average HGL Elevation Attained (ft)	228.11
Average HGL Depth Attained (ft)	0.11
Time of Max HGL Occurrence (days hh:mm)	0 08:08
Total Exfiltration Volume (1000-ft ³)	3.988
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-02

Input Data

Invert Elevation (ft) 228.00
Max (Rim) Elevation (ft) 229.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 228.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 562.00
Evaporation Loss 0.00

Infiltration/Exfiltration

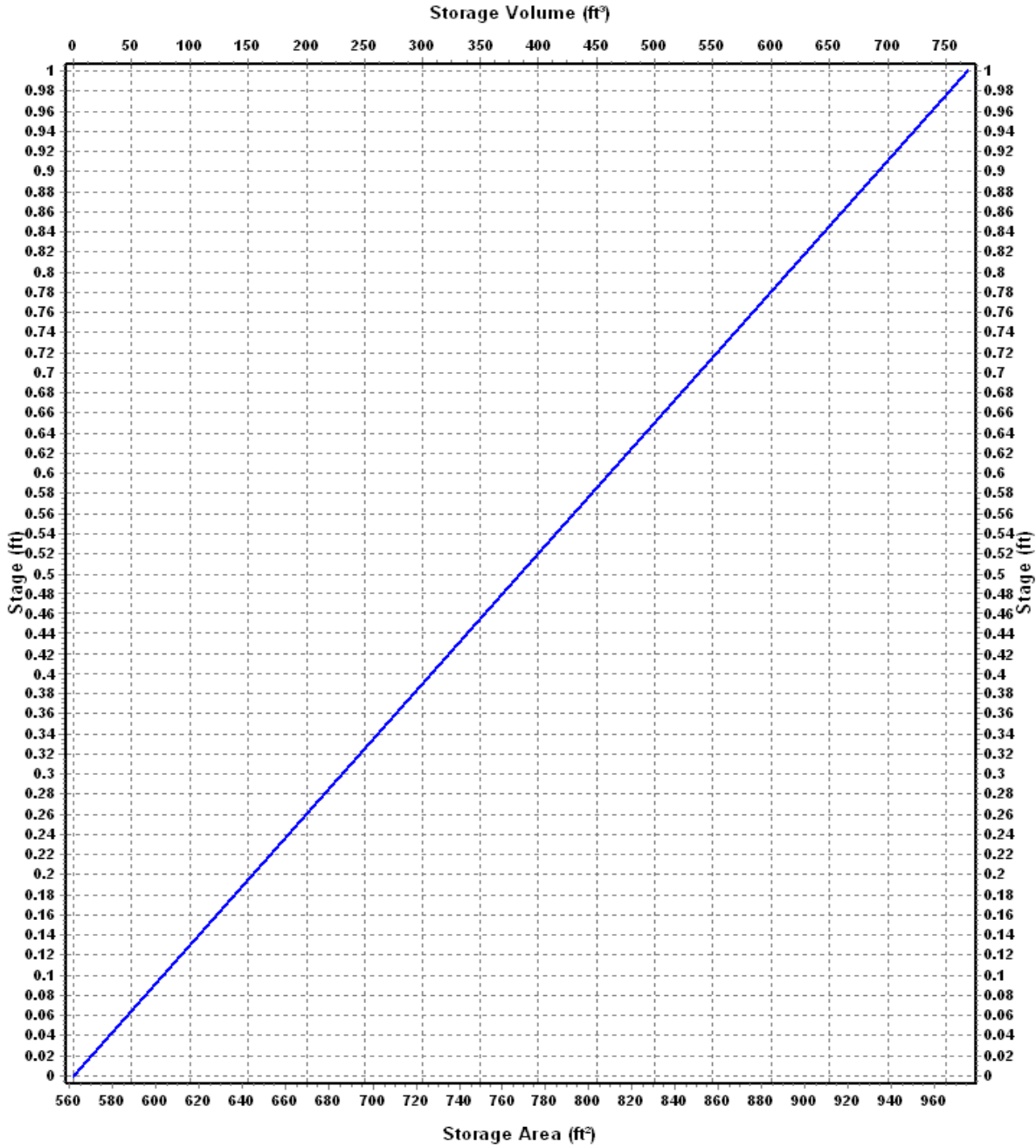
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-02

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	562	0.000
1	975	768.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-02 (continued)

Output Summary Results

Peak Inflow (cfs)	3.97
Peak Lateral Inflow (cfs)	0.29
Peak Outflow (cfs)	0.24
Peak Exfiltration Flow Rate (cfm)	2.48
Max HGL Elevation Attained (ft)	228.80
Max HGL Depth Attained (ft)	0.8
Average HGL Elevation Attained (ft)	228.28
Average HGL Depth Attained (ft)	0.28
Time of Max HGL Occurrence (days hh:mm)	0 08:03
Total Exfiltration Volume (1000-ft ³)	3.296
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-03

Input Data

Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 238.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

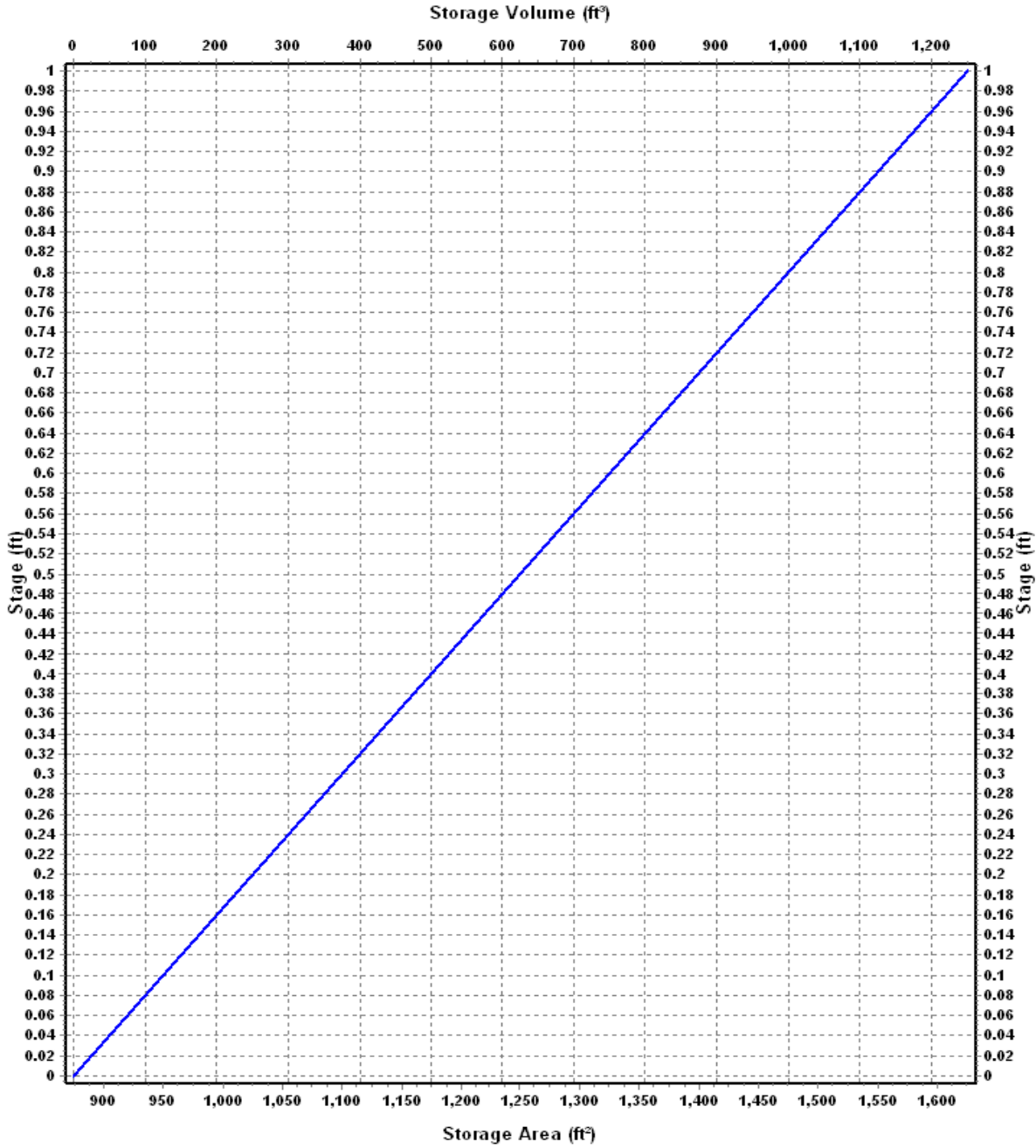
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-03

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	875	0.000
1	1625	1250.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-03 (continued)

Output Summary Results

Peak Inflow (cfs)	0.30
Peak Lateral Inflow (cfs)	0.30
Peak Outflow (cfs)	0.14
Peak Exfiltration Flow Rate (cfm)	3.56
Max HGL Elevation Attained (ft)	237.54
Max HGL Depth Attained (ft)	0.54
Average HGL Elevation Attained (ft)	237.10
Average HGL Depth Attained (ft)	0.1
Time of Max HGL Occurrence (days hh:mm)	0 08:10
Total Exfiltration Volume (1000-ft ³)	3.729
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-04

Input Data

Invert Elevation (ft) 238.00
Max (Rim) Elevation (ft) 239.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 238.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

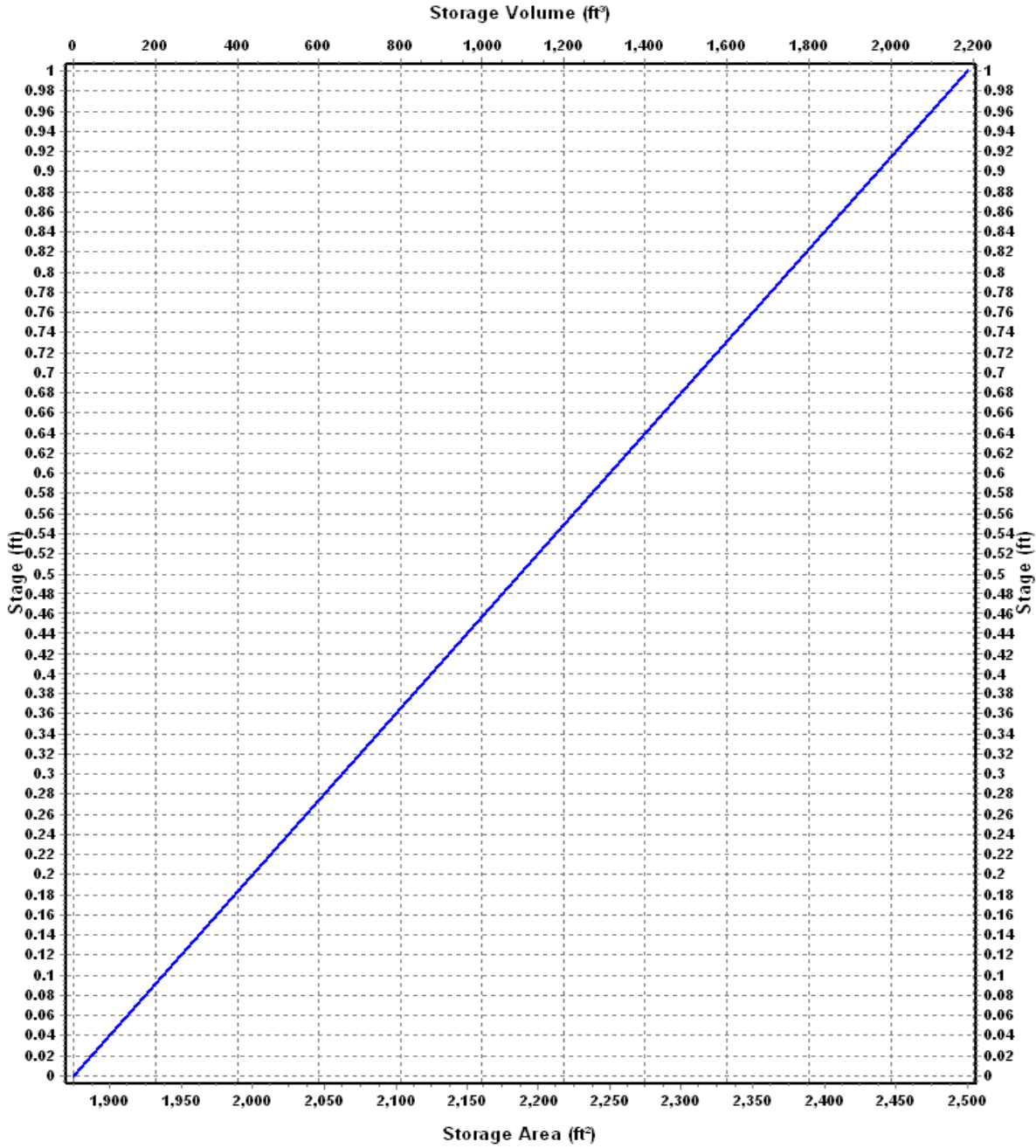
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-04

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	1875	0.000
1	2500	2187.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-04 (continued)

Output Summary Results

Peak Inflow (cfs)	0.31
Peak Lateral Inflow (cfs)	0.31
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	5.66
Max HGL Elevation Attained (ft)	238.26
Max HGL Depth Attained (ft)	0.26
Average HGL Elevation Attained (ft)	238.02
Average HGL Depth Attained (ft)	0.02
Time of Max HGL Occurrence (days hh:mm)	0 09:07
Total Exfiltration Volume (1000-ft ³)	4.285
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-05

Input Data

Invert Elevation (ft) 255.00
Max (Rim) Elevation (ft) 257.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 255.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 12000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

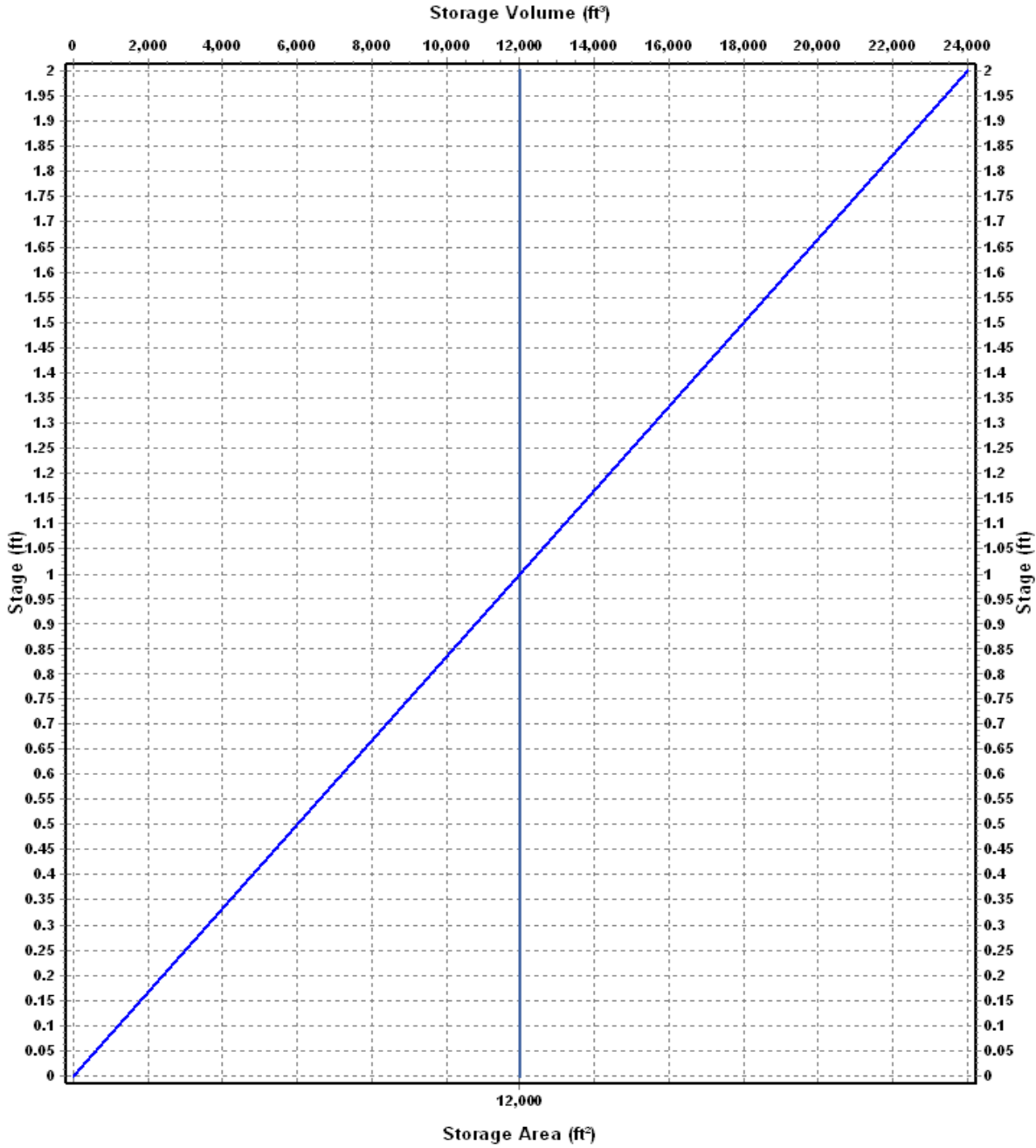
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-05

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	12000	0.000
2	12000	24000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-05 (continued)

Output Summary Results

Peak Inflow (cfs)	1.76
Peak Lateral Inflow (cfs)	1.76
Peak Outflow (cfs)	0.07
Peak Exfiltration Flow Rate (cfm)	8.33
Max HGL Elevation Attained (ft)	256.00
Max HGL Depth Attained (ft)	1
Average HGL Elevation Attained (ft)	255.48
Average HGL Depth Attained (ft)	0.48
Time of Max HGL Occurrence (days hh:mm)	0 23:49
Total Exfiltration Volume (1000-ft ³)	19.695
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-06A

Input Data

Invert Elevation (ft) 231.00
Max (Rim) Elevation (ft) 233.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 231.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 10000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

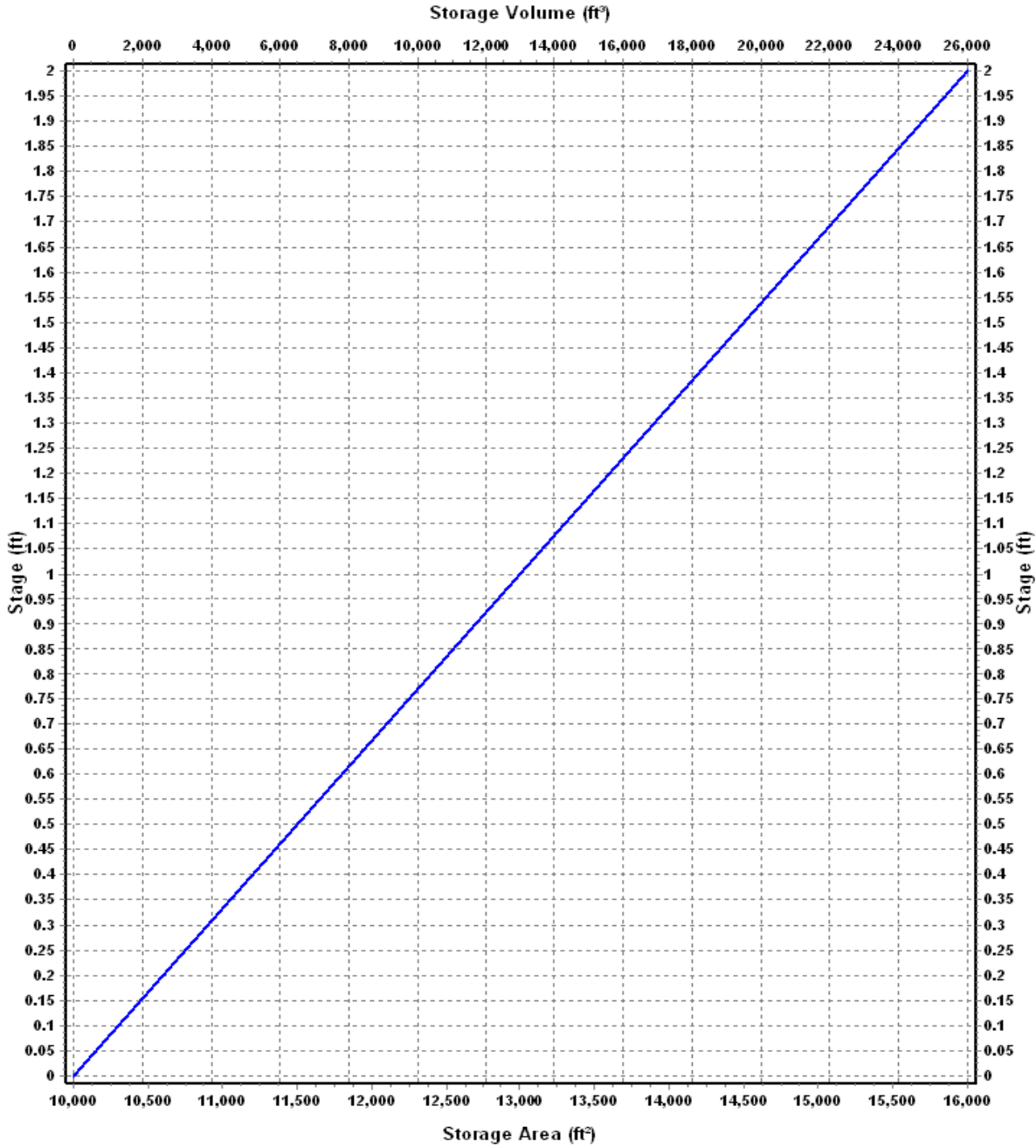
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-06A

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	10000	0.000
2	16000	26000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-06A (continued)

Output Summary Results

Peak Inflow (cfs)	3.57
Peak Lateral Inflow (cfs)	3.57
Peak Outflow (cfs)	0.47
Peak Exfiltration Flow Rate (cfm)	10.67
Max HGL Elevation Attained (ft)	232.79
Max HGL Depth Attained (ft)	1.79
Average HGL Elevation Attained (ft)	232.13
Average HGL Depth Attained (ft)	1.13
Time of Max HGL Occurrence (days hh:mm)	0 13:25
Total Exfiltration Volume (1000-ft ³)	27.499
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-06B

Input Data

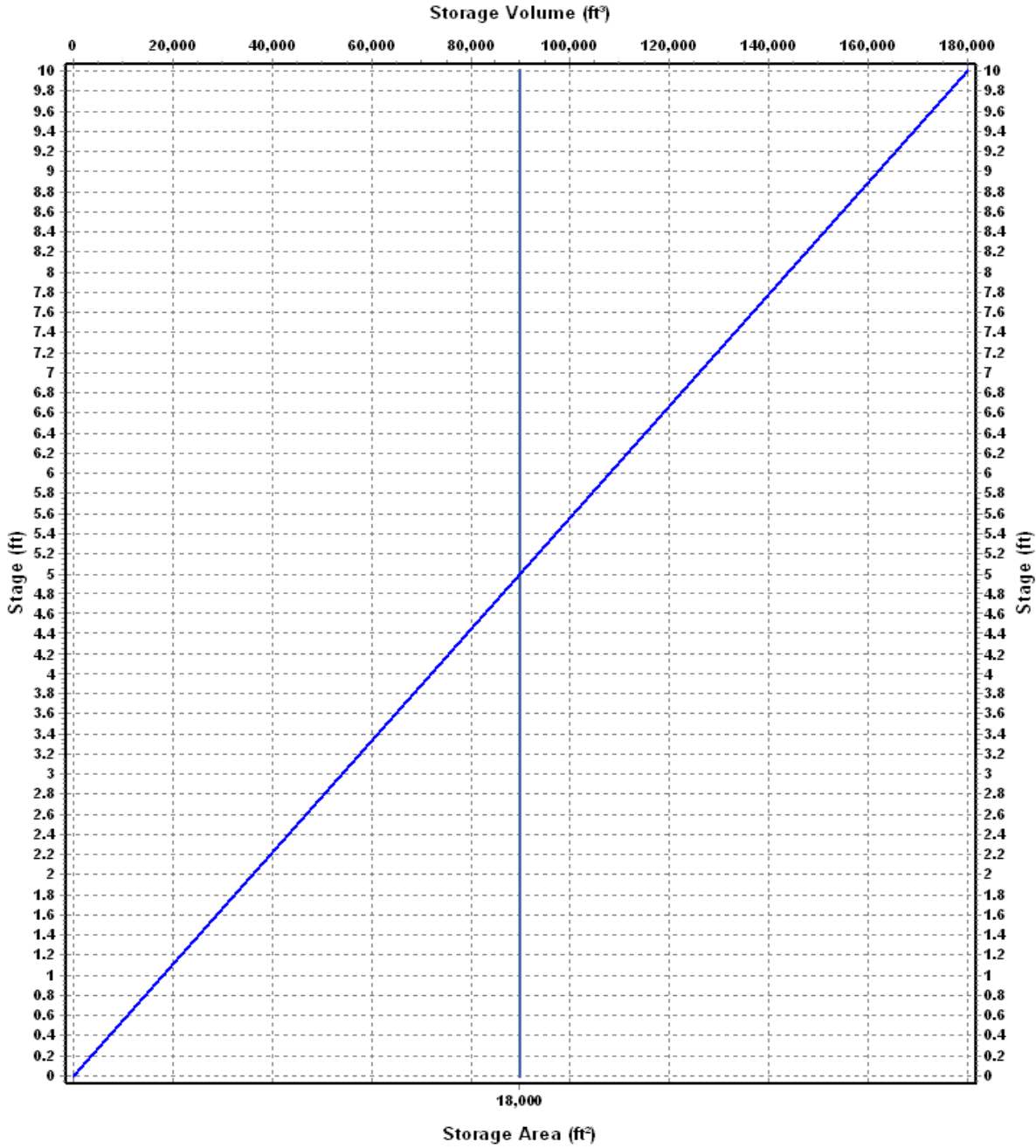
Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 10.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18000.00
Evaporation Loss 0.00

Storage Area Volume Curves

Storage Curve : LIDA-06B

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	18000	0.000
10	18000	180000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-06B (continued)

Output Summary Results

Peak Inflow (cfs)	0.34
Peak Lateral Inflow (cfs)	0.34
Peak Outflow (cfs)	0.04
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	237.13
Max HGL Depth Attained (ft)	0.13
Average HGL Elevation Attained (ft)	237.07
Average HGL Depth Attained (ft)	0.07
Time of Max HGL Occurrence (days hh:mm)	0 18:05
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-07

Input Data

Invert Elevation (ft) 242.00
Max (Rim) Elevation (ft) 243.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 242.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 2812.00
Evaporation Loss 0.00

Infiltration/Exfiltration

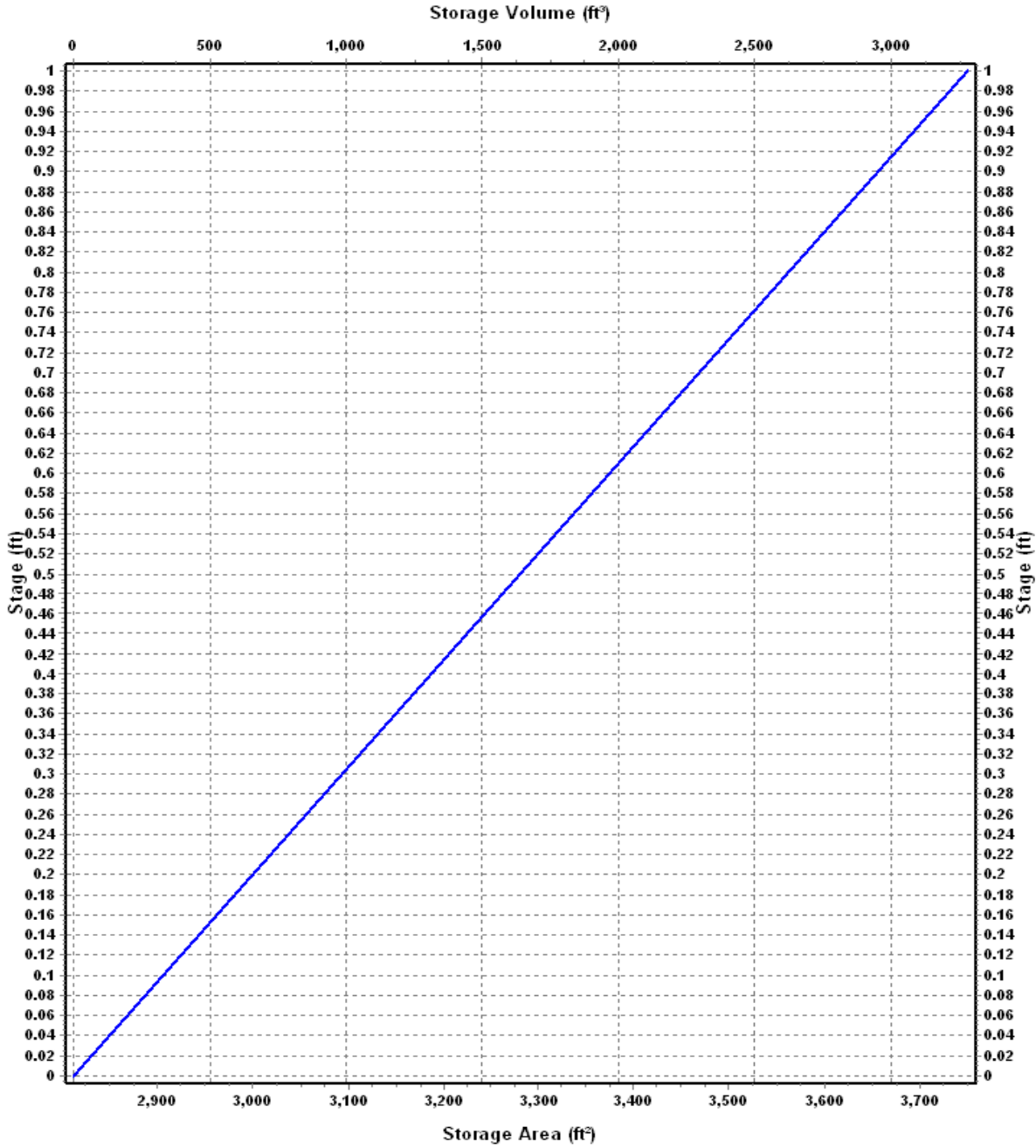
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-07

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	2812	0.000
1	3750	3281.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-07 (continued)

Output Summary Results

Peak Inflow (cfs)	0.77
Peak Lateral Inflow (cfs)	0.77
Peak Outflow (cfs)	0.08
Peak Exfiltration Flow Rate (cfm)	9.38
Max HGL Elevation Attained (ft)	242.60
Max HGL Depth Attained (ft)	0.6
Average HGL Elevation Attained (ft)	242.11
Average HGL Depth Attained (ft)	0.11
Time of Max HGL Occurrence (days hh:mm)	0 09:08
Total Exfiltration Volume (1000-ft ³)	10.155
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-08B

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 5650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

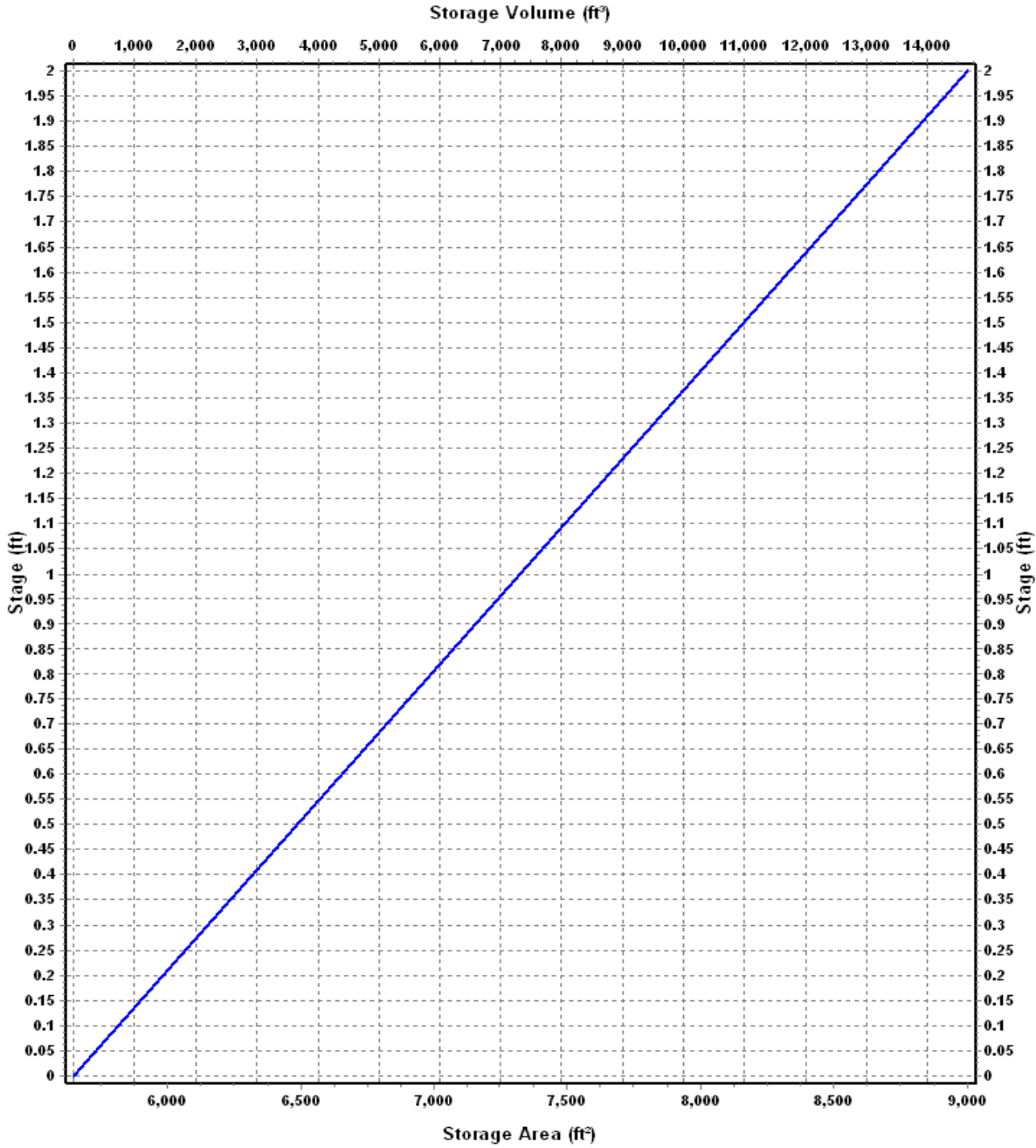
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08B

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	5650	0.000
2	9000	14650.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-08B (continued)

Output Summary Results

Peak Inflow (cfs)	0.00
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	3.92
Max HGL Elevation Attained (ft)	245.00
Max HGL Depth Attained (ft)	0
Average HGL Elevation Attained (ft)	245.00
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 00:00
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-08C

Input Data

Invert Elevation (ft) 243.00
Max (Rim) Elevation (ft) 245.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 243.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

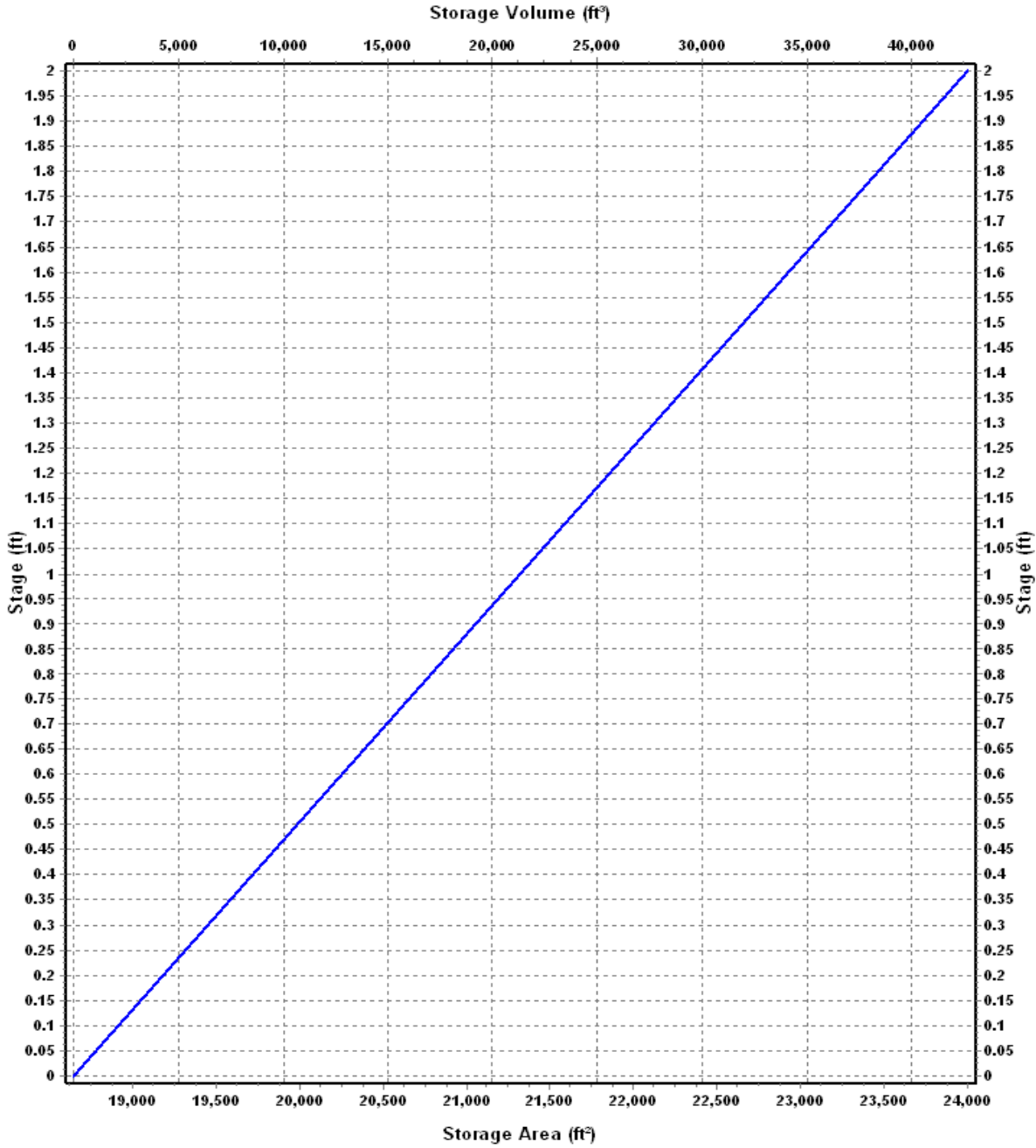
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08C

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	18650	0.000
2	24000	42650.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-08C (continued)

Output Summary Results

Peak Inflow (cfs)	2.49
Peak Lateral Inflow (cfs)	1.66
Peak Outflow (cfs)	0.14
Peak Exfiltration Flow Rate (cfm)	15.11
Max HGL Elevation Attained (ft)	244.16
Max HGL Depth Attained (ft)	1.16
Average HGL Elevation Attained (ft)	243.66
Average HGL Depth Attained (ft)	0.66
Time of Max HGL Occurrence (days hh:mm)	0 23:44
Total Exfiltration Volume (1000-ft ³)	39.681
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-09

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 375.00
Evaporation Loss 0.00

Infiltration/Exfiltration

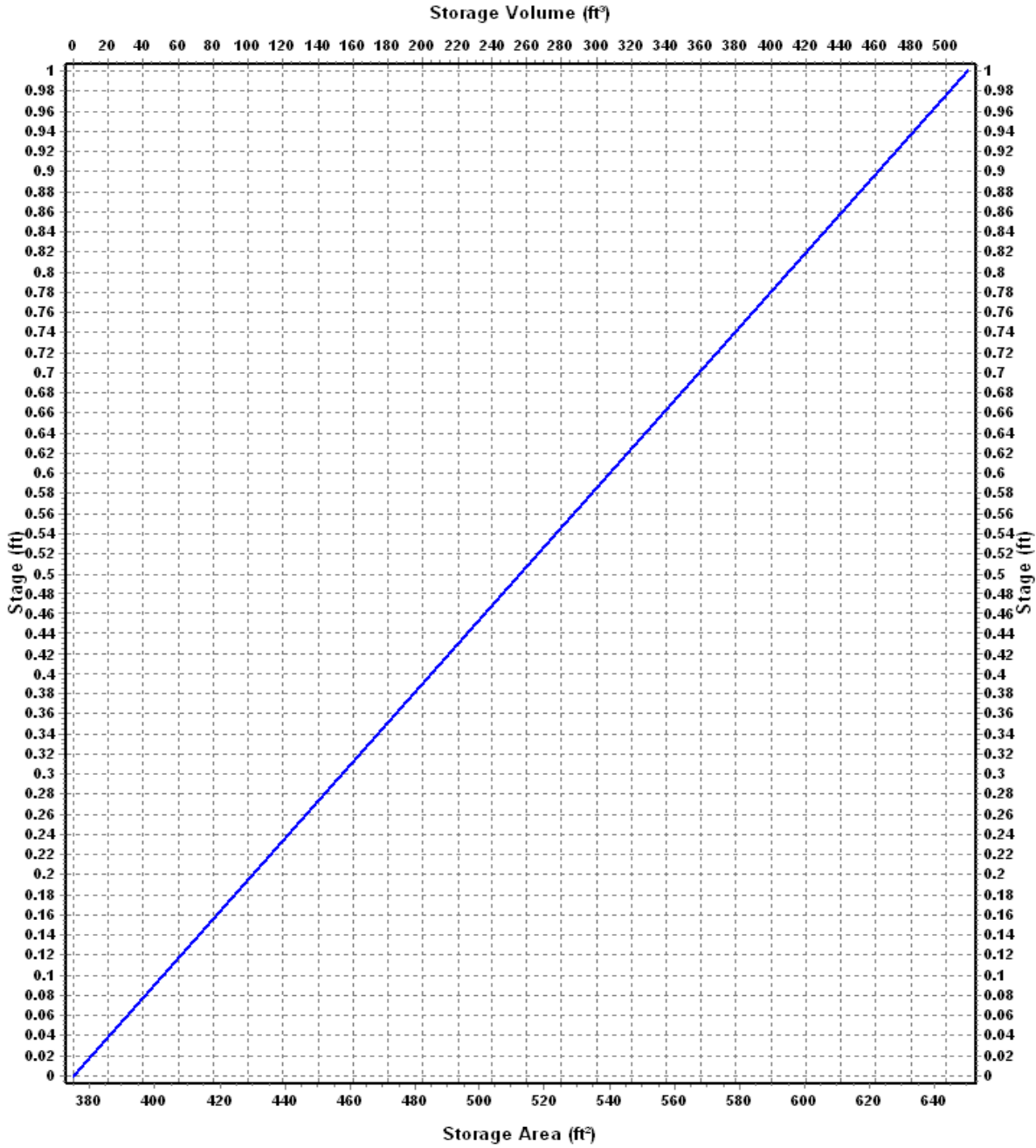
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-09

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	375	0.000
1	650	512.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-09 (continued)

Output Summary Results

Peak Inflow (cfs)	0.18
Peak Lateral Inflow (cfs)	0.18
Peak Outflow (cfs)	0.14
Peak Exfiltration Flow Rate (cfm)	1.65
Max HGL Elevation Attained (ft)	250.79
Max HGL Depth Attained (ft)	0.79
Average HGL Elevation Attained (ft)	250.24
Average HGL Depth Attained (ft)	0.24
Time of Max HGL Occurrence (days hh:mm)	0 08:05
Total Exfiltration Volume (1000-ft ³)	2.096
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-10

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 657.00
Evaporation Loss 0.00

Infiltration/Exfiltration

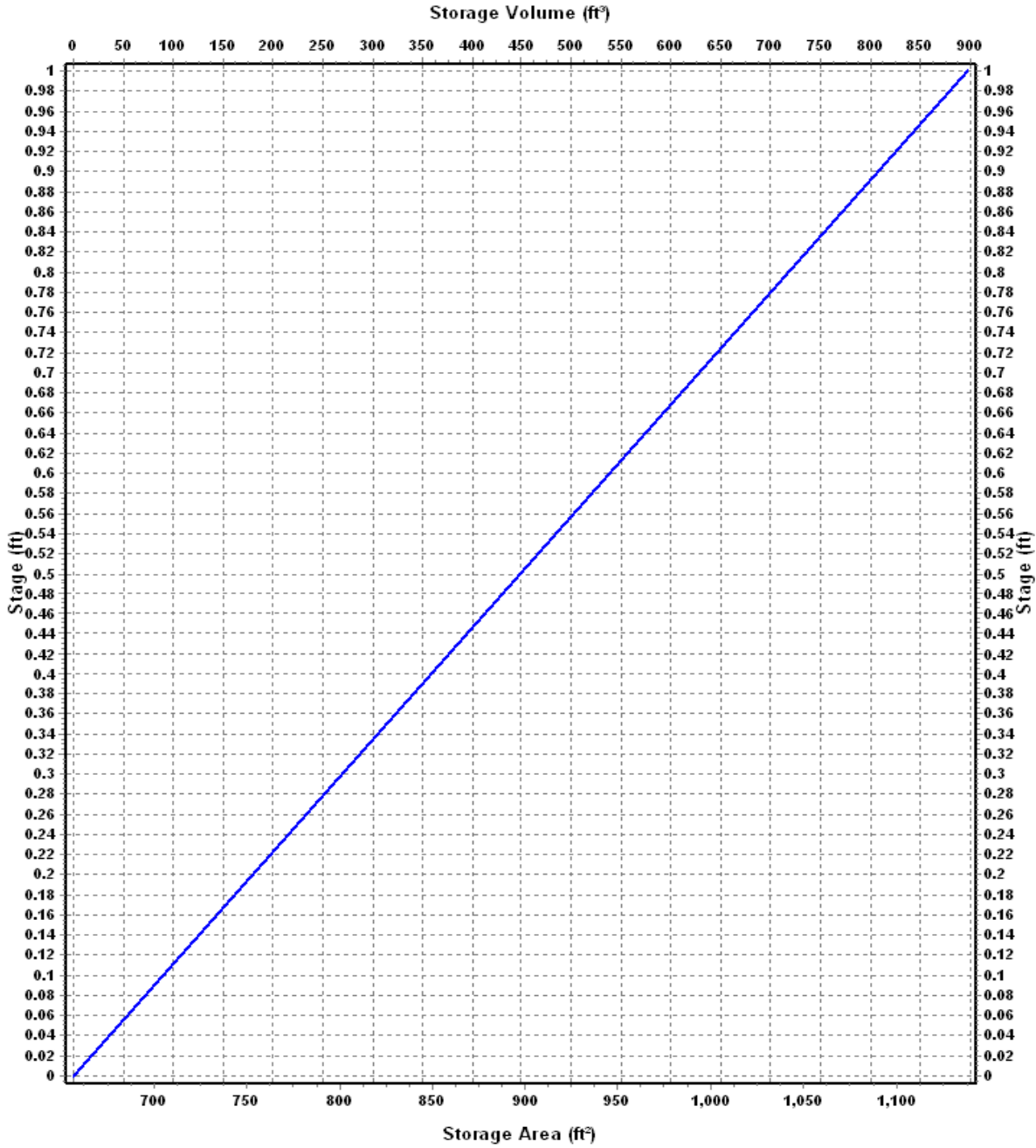
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-10

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	657	0.000
1	1138	897.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-10 (continued)

Output Summary Results

Peak Inflow (cfs)	0.24
Peak Lateral Inflow (cfs)	0.24
Peak Outflow (cfs)	0.18
Peak Exfiltration Flow Rate (cfm)	2.57
Max HGL Elevation Attained (ft)	250.56
Max HGL Depth Attained (ft)	0.56
Average HGL Elevation Attained (ft)	250.12
Average HGL Depth Attained (ft)	0.12
Time of Max HGL Occurrence (days hh:mm)	0 08:06
Total Exfiltration Volume (1000-ft ³)	2.912
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-11

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 13000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

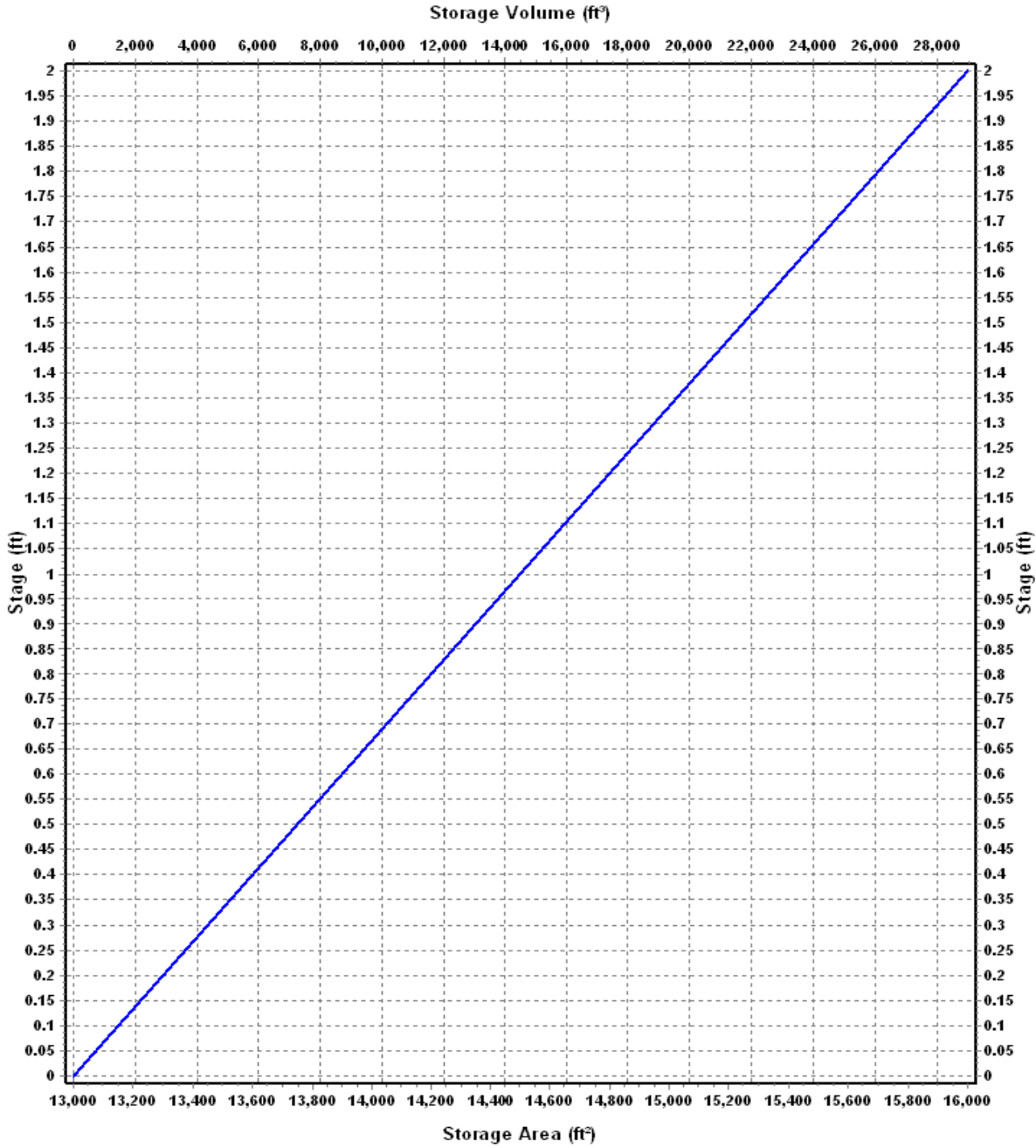
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-11

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	13000	0.000
2	16000	29000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-11 (continued)

Output Summary Results

Peak Inflow (cfs)	2.96
Peak Lateral Inflow (cfs)	2.96
Peak Outflow (cfs)	0.24
Peak Exfiltration Flow Rate (cfm)	10.61
Max HGL Elevation Attained (ft)	246.52
Max HGL Depth Attained (ft)	1.52
Average HGL Elevation Attained (ft)	245.99
Average HGL Depth Attained (ft)	0.99
Time of Max HGL Occurrence (days hh:mm)	0 14:46
Total Exfiltration Volume (1000-ft ³)	28.996
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-12

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

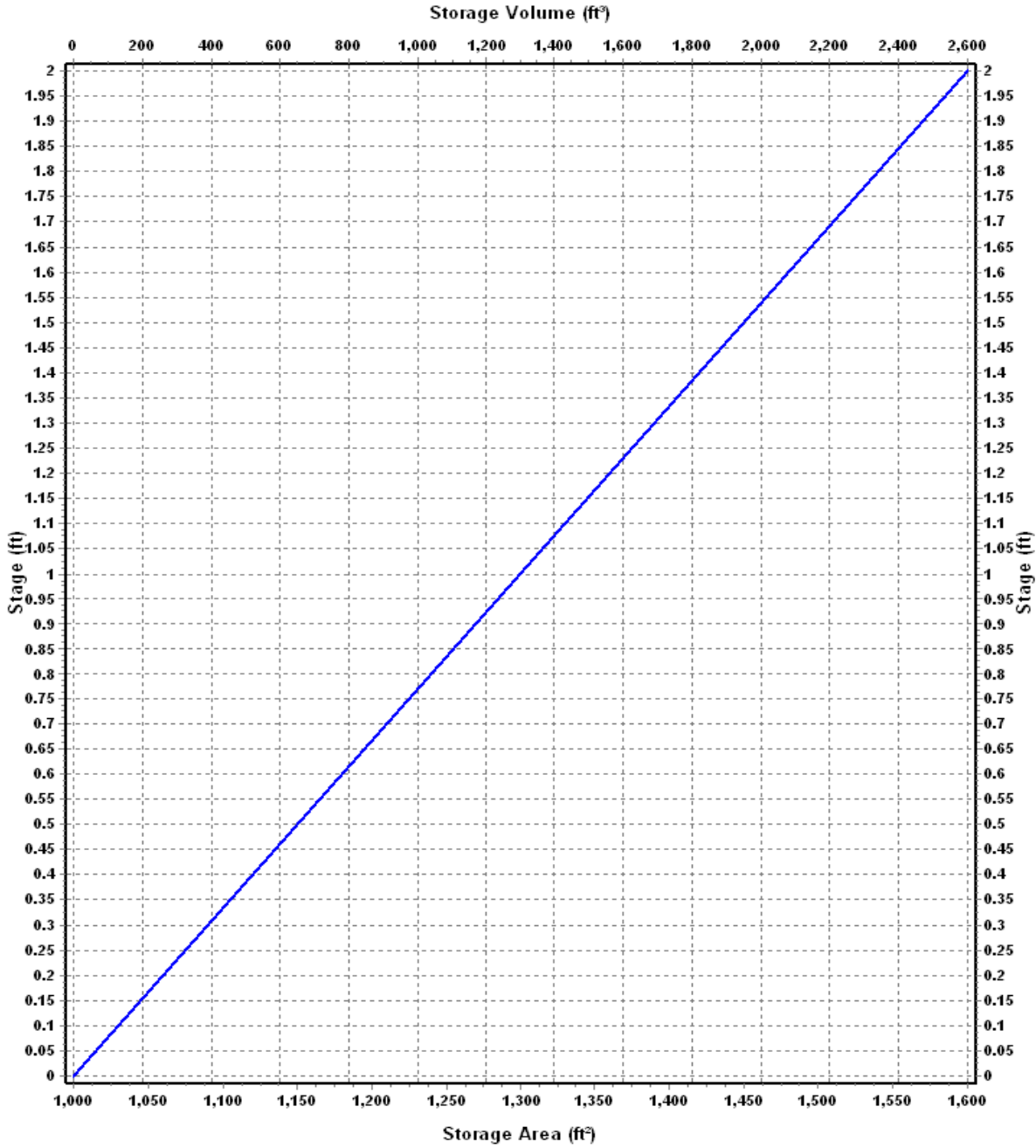
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-12

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	1000	0.000
2	1600	2600.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-12 (continued)

Output Summary Results

Peak Inflow (cfs)	1.58
Peak Lateral Inflow (cfs)	0.39
Peak Outflow (cfs)	1.30
Peak Exfiltration Flow Rate (cfm)	3.62
Max HGL Elevation Attained (ft)	246.01
Max HGL Depth Attained (ft)	1.01
Average HGL Elevation Attained (ft)	245.31
Average HGL Depth Attained (ft)	0.31
Time of Max HGL Occurrence (days hh:mm)	0 09:02
Total Exfiltration Volume (1000-ft ³)	4.816
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 10-year storm

Storage Node : LIDA-8A

Input Data

Invert Elevation (ft) 256.00
Max (Rim) Elevation (ft) 258.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 256.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1777.00
Evaporation Loss 0.00

Infiltration/Exfiltration

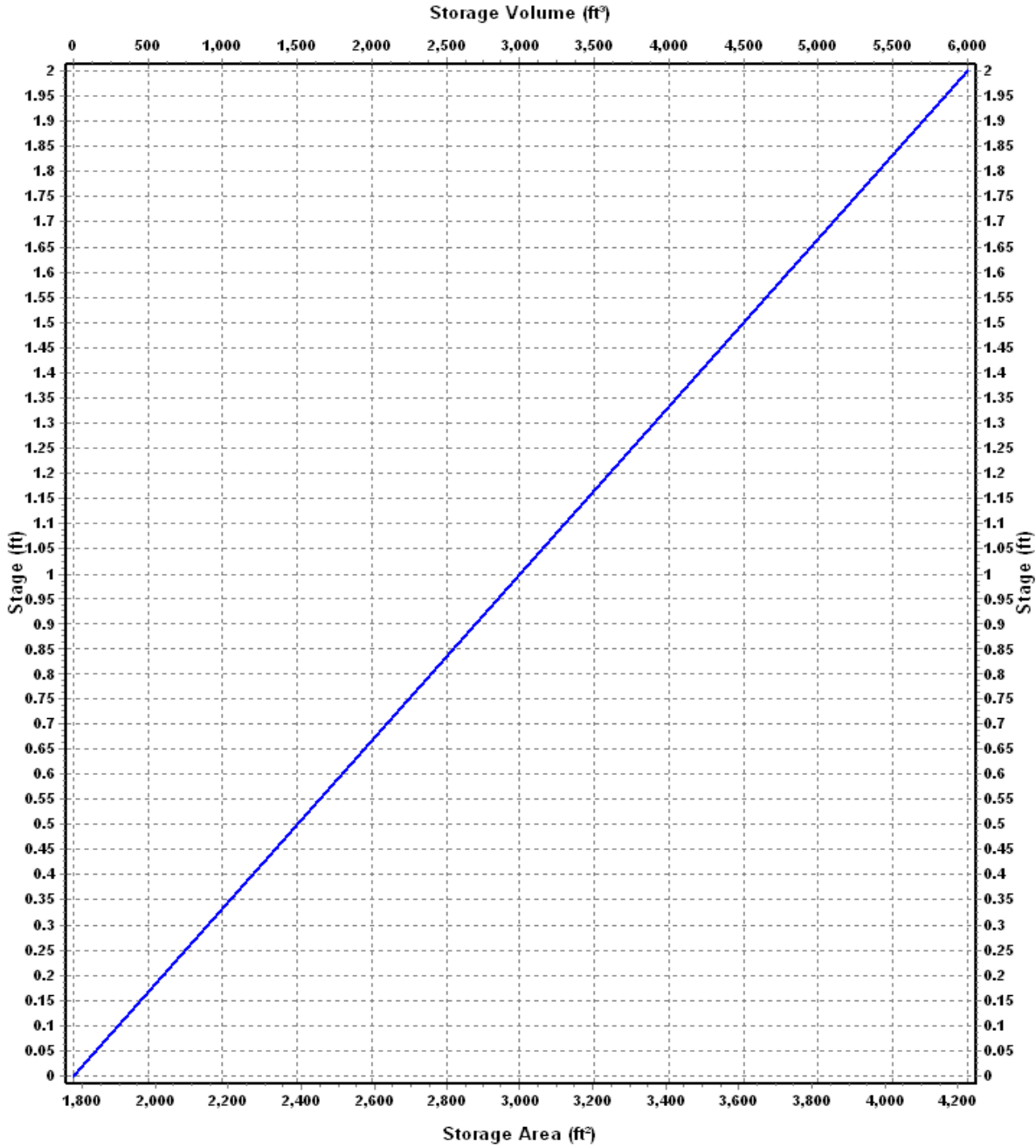
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-8A

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	1777	0.000
2	4226	6003.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-8A (continued)

Output Summary Results

Peak Inflow (cfs)	1.78
Peak Lateral Inflow (cfs)	1.78
Peak Outflow (cfs)	0.83
Peak Exfiltration Flow Rate (cfm)	2.53
Max HGL Elevation Attained (ft)	257.52
Max HGL Depth Attained (ft)	1.52
Average HGL Elevation Attained (ft)	256.59
Average HGL Depth Attained (ft)	0.59
Time of Max HGL Occurrence (days hh:mm)	0 08:21
Total Exfiltration Volume (1000-ft ³)	5.153
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Project Description

File Name 20191126-POST-DEV_CWS.SPF

Project Options

Flow Units CFS
 Elevation Type Elevation
 Hydrology Method SCS TR-55
 Time of Concentration (TOC) Method SCS TR-55
 Link Routing Method Hydrodynamic
 Enable Overflow Ponding at Nodes YES
 Skip Steady State Analysis Time Periods YES

Analysis Options

Start Analysis On Feb 01, 1949 00:00:00
 End Analysis On Feb 03, 1949 00:00:00
 Start Reporting On Feb 01, 1949 00:00:00
 Antecedent Dry Days 0 days
 Runoff (Dry Weather) Time Step 0 01:00:00 days hh:mm:ss
 Runoff (Wet Weather) Time Step 0 00:05:00 days hh:mm:ss
 Reporting Time Step 0 00:05:00 days hh:mm:ss
 Routing Time Step 1 seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins.....	14
Nodes.....	62
<i>Junctions</i>	45
<i>Outfalls</i>	2
<i>Flow Diversions</i>	0
<i>Inlets</i>	0
<i>Storage Nodes</i>	15
Links.....	67
<i>Channels</i>	36
<i>Pipes</i>	30
<i>Pumps</i>	1
<i>Orifices</i>	0
<i>Weirs</i>	0
<i>Outlets</i>	0
Pollutants	0
Land Uses	0

Rainfall Details

SN	Rain Gage ID	Data Source	Data Source ID	Rainfall Type	Rain Units	State	County	Return Period (years)	Rainfall Depth (inches)	Rainfall Distribution
1	Rain Gage-01	Time Series	25-yr	Intensity	inches	Oregon	Washington	25	3.90	SCS Type IA 24-hr

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	COF-LIDA_11	3.71	96.88	3.90	3.54	13.11	3.37	0 00:05:00
2	COF-LIDA_12	0.49	96.13	3.90	3.46	1.70	0.44	0 00:05:00
3	HED-LIDA_01	0.43	94.77	3.90	3.31	1.42	0.37	0 00:05:00
4	HED-LIDA_02	0.39	94.78	3.90	3.31	1.29	0.34	0 00:05:00
5	HED-LIDA_03	0.40	94.61	3.90	3.29	1.31	0.34	0 00:05:00
6	HED-LIDA_04	0.44	93.24	3.90	3.15	1.37	0.36	0 00:05:00
7	HED-LIDA_05	2.67	91.26	3.90	2.95	7.87	2.06	0 00:05:00
8	HED-LIDA_06A	5.95	89.16	3.90	2.74	16.34	4.24	0 00:05:00
9	HED-LIDA_06B	0.41	98.00	3.90	3.67	1.51	0.39	0 00:05:00
10	HED-LIDA_07	1.08	93.59	3.90	3.18	3.43	0.90	0 00:05:00
11	HED-LIDA_08B	2.25	94.33	3.90	3.26	7.34	1.92	0 00:05:00
12	HED-LIDA_09	0.23	95.64	3.90	3.40	0.78	0.20	0 00:05:00
13	HED-LIDA_10	0.32	95.08	3.90	3.34	1.07	0.28	0 00:05:00
14	HED-LIDA_8A	2.32	95.49	3.90	3.39	7.87	2.04	0 00:05:00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Node Summary

SN	Element ID	Element Type	Invert Elevation	Ground/Rim (Max) Elevation	Initial Water Elevation	Surcharge Elevation	Ponded Area	Peak Inflow	Max HGL Elevation	Max Surcharge Depth Attained	Min Freeboard	Time of Peak Flooding Occurrence	Total Flooded Volume	Total Time Flooded
			(ft)	(ft)	(ft)	(ft)	(ft ²)	(cfs)	(ft)	(ft)	(ft)	(days hh:mm)	(ac-in)	(min)
1	COF-01A	Junction	238.00	250.00	238.00	1000.00	12.00	0.45	238.25	0.00	11.75	0 00:00	0.00	0.00
2	COF-01B	Junction	244.00	247.00	244.00	1000.00	12.00	0.43	244.06	0.00	2.94	0 00:00	0.00	0.00
3	COF-01C	Junction	245.00	247.00	245.00	1000.00	12.00	0.43	246.53	0.00	1.97	0 00:00	0.00	0.00
4	COF-02A	Junction	244.00	247.00	244.00	1000.00	12.00	0.38	244.13	0.00	3.87	0 00:00	0.00	0.00
5	COF-02B	Junction	245.00	247.00	245.00	1000.00	12.00	1.60	246.06	0.00	0.94	0 00:00	0.00	0.00
6	HED-01A	Junction	152.00	160.00	152.00	1000.00	12.00	1.05	152.08	0.00	7.92	0 00:00	0.00	0.00
7	HED-01B	Junction	157.00	165.00	157.00	165.00	12.00	0.80	157.10	0.00	7.90	0 00:00	0.00	0.00
8	HED-01C	Junction	157.80	165.00	157.80	159.80	12.00	0.80	158.13	0.00	6.87	0 00:00	0.00	0.00
9	HED-01D	Junction	177.04	181.25	177.04	179.04	12.00	0.80	177.27	0.00	3.98	0 00:00	0.00	0.00
10	HED-01E	Junction	181.00	192.00	181.00	1000.00	12.00	0.81	181.24	0.00	10.76	0 00:00	0.00	0.00
11	HED-01F	Junction	223.00	225.00	223.00	225.00	12.00	0.82	223.17	0.00	5.83	0 00:00	0.00	0.00
12	HED-01G	Junction	226.00	229.00	226.00	1000.00	12.00	0.79	226.16	0.00	3.34	0 00:00	0.00	0.00
13	HED-01H	Junction	229.00	232.00	229.00	1000.00	12.00	0.75	229.28	0.00	2.72	0 00:00	0.00	0.00
14	HED-01I	Junction	230.00	233.00	230.00	1000.00	12.00	0.75	230.28	0.00	2.72	0 00:00	0.00	0.00
15	HED-01J	Junction	231.00	233.00	231.00	1000.00	12.00	0.75	232.80	0.00	1.95	0 00:00	0.00	0.00
16	HED-01K	Junction	226.50	229.00	226.50	1000.00	12.00	0.29	228.17	0.00	1.58	0 00:00	0.00	0.00
17	HED-01L	Junction	226.50	229.00	226.50	1000.00	12.00	0.29	226.71	0.00	2.79	0 00:00	0.00	0.00
18	HED-01M	Junction	224.00	230.00	224.00	1000.00	12.00	0.24	224.13	0.00	5.87	0 00:00	0.00	0.00
19	HED-01N	Junction	230.00	235.00	230.00	1000.00	12.00	0.25	230.34	0.00	4.66	0 00:00	0.00	0.00
20	HED-01O	Junction	234.00	238.00	234.00	1000.00	12.00	0.25	234.12	0.00	4.38	0 00:00	0.00	0.00
21	HED-01P	Junction	234.00	239.00	234.00	1000.00	12.00	0.00	234.00	0.00	5.50	0 00:00	0.00	0.00
22	HED-02A	Junction	171.00	177.00	171.00	1000.00	1000.00	0.23	171.03	0.00	7.97	0 00:00	0.00	0.00
23	HED-02B	Junction	171.30	177.00	171.30	1000.00	12.00	0.23	171.51	0.00	5.49	0 00:00	0.00	0.00
24	HED-02C	Junction	173.50	178.00	173.50	1000.00	12.00	0.23	173.67	0.00	4.33	0 00:00	0.00	0.00
25	HED-02D	Junction	174.60	184.00	174.60	1000.00	100.00	0.23	174.90	0.00	10.84	0 00:00	0.00	0.00
26	HED-02E	Junction	180.46	188.00	180.46	1000.00	12.00	0.25	180.72	0.00	7.28	0 00:00	0.00	0.00
27	HED-02F	Junction	181.76	187.96	181.76	1000.00	100.00	0.29	181.90	0.00	6.06	0 00:00	0.00	0.00
28	HED-02G	Junction	235.00	237.00	235.00	1000.00	12.00	0.07	235.05	0.00	2.95	0 00:00	0.00	0.00
29	HED-02H	Junction	236.00	238.00	236.00	1000.00	12.00	0.07	236.11	0.00	1.89	0 00:00	0.00	0.00
30	HED-02I	Junction	237.00	239.00	237.00	1000.00	12.00	0.00	237.00	0.00	2.00	0 00:00	0.00	0.00
31	HED-02J	Junction	237.00	250.00	237.00	1000.00	12.00	0.07	237.10	0.00	12.90	0 00:00	0.00	0.00
32	HED-02K	Junction	255.00	257.00	255.00	1000.00	12.00	0.09	256.32	0.00	2.18	0 00:00	0.00	0.00
33	HED-03A	Junction	183.00	190.00	183.00	1000.00	12.00	0.34	183.04	0.00	6.96	0 00:00	0.00	0.00
34	HED-03B	Junction	235.00	240.00	235.00	1000.00	12.00	0.35	235.02	0.00	4.98	0 00:00	0.00	0.00
35	HED-03C	Junction	236.00	250.00	236.00	1000.00	12.00	0.42	236.06	0.00	13.94	0 00:00	0.00	0.00
36	HED-03D	Junction	241.00	245.00	241.00	1000.00	12.00	0.41	241.07	0.00	3.93	0 00:00	0.00	0.00
37	HED-03E	Junction	250.00	251.00	250.00	1000.00	12.00	0.23	250.12	0.00	1.38	0 00:00	0.00	0.00
38	HED-03F	Junction	250.00	251.00	250.00	1000.00	12.00	0.18	250.10	0.00	1.65	0 00:00	0.00	0.00
39	HED-03G	Junction	242.00	245.00	242.00	1000.00	12.00	0.03	242.00	0.00	3.00	0 00:00	0.00	0.00
40	HED-03H	Junction	243.00	245.00	243.00	1000.00	12.00	0.14	244.45	0.00	2.05	0 00:00	0.00	0.00
41	HED-03I	Junction	244.00	247.00	244.00	1000.00	12.00	0.00	244.45	0.00	2.55	0 00:00	0.00	0.00
42	HED-03J	Junction	245.00	247.00	245.00	1000.00	12.00	0.00	245.00	0.00	3.50	0 00:00	0.00	0.00
43	HED-03K	Junction	256.00	258.00	256.00	1000.00	12.00	0.83	257.06	0.00	1.94	0 00:00	0.00	0.00
44	HED-03L	Junction	256.00	258.00	256.00	1000.00	12.00	0.83	256.20	0.00	1.80	0 00:00	0.00	0.00
45	HED-03t	Junction	238.00	243.00	238.00	1000.00	12.00	0.18	238.22	0.00	5.78	0 00:00	0.00	0.00
46	COF-01	Outfall	238.00					0.45	238.25					
47	HED-01	Outfall	150.00					1.03	150.08					
48	LIDA-01	Storage Node	228.00	229.00	228.00		938.00	0.37	228.57				0.00	0.00
49	LIDA-02	Storage Node	228.00	229.00	228.00		562.00	3.97	228.81				0.00	0.00
50	LIDA-03	Storage Node	237.00	238.00	237.00		875.00	0.34	237.56				0.00	0.00
51	LIDA-04	Storage Node	238.00	239.00	238.00		1875.00	0.36	238.35				0.00	0.00
52	LIDA-05	Storage Node	255.00	257.00	255.00		12000.00	2.06	256.32				0.00	0.00
53	LIDA-06A	Storage Node	231.00	233.00	231.00		10000.00	4.24	232.80				0.00	0.00
54	LIDA-06B	Storage Node	237.00	247.00	237.00		18000.00	0.39	237.16				0.00	0.00
55	LIDA-07	Storage Node	242.00	243.00	242.00		2812.00	0.90	242.66				0.00	0.00
56	LIDA-08B	Storage Node	245.00	247.00	245.00		5650.00	0.00	245.00				0.00	0.00
57	LIDA-08C	Storage Node	243.00	245.00	243.00		18650.00	2.75	244.45				0.00	0.00
58	LIDA-09	Storage Node	250.00	251.00	250.00		375.00	0.20	250.80				0.00	0.00
59	LIDA-10	Storage Node	250.00	251.00	250.00		657.00	0.28	250.57				0.00	0.00
60	LIDA-11	Storage Node	245.00	247.00	245.00		13000.00	3.37	246.53				0.00	0.00
61	LIDA-12	Storage Node	245.00	247.00	245.00		1000.00	1.81	246.03				0.00	0.00
62	LIDA-8A	Storage Node	256.00	258.00	256.00		1777.00	2.04	257.69				0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Reported (min)	Reported Condition
1	COF-01D	Pipe	COF-01C	COF-01B	1.00	245.00	244.00	100.0000	0.750	0.0130	0.03	0.02	1.17	10.57	0.06	0.99	0.00	> CAPACITY
2	COF-2A	Pipe	COF-02A	COF-01A	400.00	244.00	238.00	1.5000	18.000	0.0150	0.16	11.15	0.01	2.83	0.15	0.10	0.00	Calculated
3	COF-2C	Pipe	COF-02B	COF-02A	1.00	245.00	244.00	100.0000	0.500	0.0130	0.01	0.01	1.32	12.46	0.04	1.00	217.00	SURCHARGED
4	HED-01C	Pipe	HED-01C	HED-01B	93.73	157.80	157.00	0.8500	24.000	0.0130	0.80	20.90	0.04	4.55	0.21	0.10	0.00	Calculated
5	HED-01D	Pipe	HED-01D	HED-01C	1201.66	177.04	158.00	1.5800	24.000	0.0130	0.80	28.48	0.03	3.96	0.23	0.12	0.00	Calculated
6	HED-01E	Pipe	HED-01E	HED-01D	93.57	181.00	177.24	4.0200	12.000	0.0130	0.80	7.14	0.11	5.77	0.23	0.23	0.00	Calculated
7	HED-01G	Pipe	HED-01G	HED-01F	20.00	226.00	223.00	15.0000	18.000	0.0130	0.79	40.68	0.02	7.88	0.16	0.11	0.00	Calculated
8	HED-01H	Pipe	HED-01L	HED-01G	50.00	226.50	226.00	1.0000	12.000	0.0130	0.29	3.56	0.08	3.17	0.17	0.17	0.00	Calculated
9	HED-01L	Pipe	HED-01M	HED-01F	47.37	224.00	223.00	2.1100	18.000	0.0130	0.23	15.26	0.02	2.55	0.15	0.10	0.00	Calculated
10	HED-01N	Pipe	HED-01O	HED-01N	75.00	234.00	230.00	5.3300	12.000	0.0130	0.25	8.23	0.03	3.53	0.23	0.23	0.00	Calculated
11	HED-01P	Pipe	HED-01P	HED-01N	65.00	234.00	230.00	6.1500	18.000	0.0130	0.00	26.06	0.00	0.00	0.17	0.11	0.00	Calculated
12	HED-01R	Pipe	HED-01I	HED-01H	50.00	230.00	229.00	2.0000	12.000	0.0130	0.75	5.04	0.15	4.10	0.28	0.28	0.00	Calculated
13	HED-01S	Pipe	HED-01H	HED-01G	100.00	229.00	228.00	1.0000	18.000	0.0130	0.75	10.50	0.07	3.32	0.28	0.19	0.00	Calculated
14	HED-01U	Pipe	HED-01J	HED-01I	1.00	231.00	230.00	100.0000	1.000	0.0130	0.05	0.05	1.11	9.75	0.08	1.00	862.00	SURCHARGED
15	HED-02B	Pipe	HED-02B	HED-02A	81.05	171.30	171.00	0.3700	36.000	0.0130	0.23	40.58	0.01	2.58	0.12	0.04	0.00	Calculated
16	HED-02C	Pipe	HED-02C	HED-02B	306.01	173.50	171.30	0.7200	18.000	0.0130	0.23	8.91	0.03	1.84	0.19	0.12	0.00	Calculated
17	HED-02D	Pipe	HED-02D	HED-02C	744.87	174.60	173.50	0.1500	18.000	0.0130	0.23	4.04	0.06	1.32	0.23	0.16	0.00	Calculated
18	HED-02F	Pipe	HED-02F	HED-02E	165.26	181.76	180.46	0.7900	36.000	0.0130	0.25	59.16	0.00	1.46	0.20	0.07	0.00	Calculated
19	HED-02H	Pipe	HED-02H	HED-02G	100.00	236.00	235.00	1.0000	12.000	0.0130	0.07	3.56	0.02	2.44	0.08	0.08	0.00	Calculated
20	HED-02I	Pipe	HED-02J	HED-02H	100.00	237.00	236.00	1.0000	12.000	0.0130	0.07	3.56	0.02	1.66	0.10	0.10	0.00	Calculated
21	HED-02J	Pipe	HED-02K	HED-02J	1.00	255.00	237.00	1800.0000	0.750	0.0130	0.07	0.09	0.77	23.64	0.06	1.00	2470.00	SURCHARGED
22	HED-03D	Pipe	HED-03I	HED-03B	500.00	238.00	235.00	0.6000	12.000	0.0130	0.18	2.76	0.06	3.33	0.12	0.12	0.00	Calculated
23	HED-03E	Pipe	LIDA-07	HED-03I	47.11	242.00	242.50	-1.0600	18.000	0.0130	0.18	10.82	0.02	0.47	0.40	0.27	0.00	Calculated
24	HED-03I	Pipe	HED-03I	LIDA-08C	200.00	244.00	243.50	0.2500	18.000	0.0130	0.00	5.25	0.00	0.01	0.70	0.46	0.00	Calculated
25	HED-03J	Pipe	HED-03L	LIDA-08C	200.00	256.00	243.00	6.5000	12.000	0.0130	0.83	9.08	0.09	8.65	0.58	0.58	0.00	Calculated
26	HED-03L	Pipe	HED-03F	HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0130	0.18	10.69	0.02	7.15	0.08	0.08	0.00	Calculated
27	HED-03N	Pipe	HED-03E	HED-03D	100.00	250.00	241.00	9.0000	12.000	0.0150	0.23	9.26	0.02	6.73	0.10	0.10	0.00	Calculated
28	HED-03Q	Pipe	HED-03K	HED-03L	1.00	256.00	256.00	0.0000	0.750	0.0130	0.02	0.00	23.05	5.62	0.06	1.00	1109.00	SURCHARGED
29	HED-03T	Pipe	HED-03J	HED-03I	1.00	245.00	244.00	100.0000	0.750	0.0130	0.00	0.02	0.00	0.00	0.03	0.50	0.00	Calculated
30	HED-03V	Pipe	HED-03H	HED-03G	1.00	243.00	242.00	100.0000	0.750	0.0130	0.03	0.02	1.17	15.30	0.03	0.54	0.00	> CAPACITY
31	COF-1A	Channel	COF-01A	COF-01	10.00	238.00	238.00	0.0000	60.000	0.0320	0.45	42.77	0.01	0.18	0.25	0.05	0.00	
32	COF-1B	Channel	COF-01B	COF-01A	150.00	244.00	238.00	4.0000	12.000	0.0320	0.43	37.11	0.01	0.55	0.16	0.16	0.00	
33	COF-1C	Channel	COF-01C	COF-01B	1.00	246.50	244.00	250.0000	24.000	0.0320	0.41	224.13	0.00	4.49	0.05	0.02	0.00	
34	COF-1E	Channel	LIDA-11	COF-01C	5.00	245.00	245.00	0.0000	24.000	0.0320	0.43	7.05	0.06	0.06	1.53	0.76	0.00	
35	COF-2B	Channel	COF-02B	COF-02A	1.00	245.00	246.00	-100.0000	24.000	0.0320	1.60	141.75	0.01	1.43	0.54	0.28	0.00	
36	COF-2D	Channel	LIDA-12	COF-02B	5.00	245.00	245.00	0.0000	24.000	0.0320	1.75	2.00	0.87	0.86	1.03	0.52	0.00	
37	HED-01A	Channel	HED-01A	HED-01	165.00	152.00	150.00	1.2100	96.000	0.0320	1.03	1512.53	0.00	0.91	0.08	0.01	0.00	
38	HED-01B	Channel	HED-01B	HED-01A	805.00	157.00	152.00	0.6200	96.000	0.0320	0.83	1082.72	0.00	0.68	0.08	0.01	0.00	
39	HED-01F	Channel	HED-01F	HED-01E	618.36	223.00	181.00	6.7900	72.000	0.0320	0.81	2813.13	0.00	2.48	0.21	0.03	0.00	
40	HED-01I	Channel	LIDA-01	HED-01L	5.00	228.00	228.50	-10.0000	12.000	0.0320	0.29	24.81	0.01	0.37	0.31	0.31	0.00	
41	HED-01J	Channel	HED-01K	HED-01G	20.00	227.00	228.00	-5.0000	12.000	0.0320	0.29	4.99	0.06	0.52	0.56	0.56	0.00	
42	HED-01K	Channel	LIDA-02	HED-01K	5.00	228.00	228.75	-15.0000	12.000	0.0320	3.93	30.39	0.13	3.05	0.43	0.51	0.00	
43	HED-01M	Channel	HED-01N	HED-01M	500.00	230.00	224.00	1.2000	24.000	0.0320	0.24	37.78	0.01	2.13	0.23	0.12	0.00	
44	HED-01O	Channel	LIDA-03	HED-01O	5.00	237.00	237.50	-10.0000	12.000	0.0320	0.25	24.81	0.01	0.33	0.31	0.31	0.00	
45	HED-01Q	Channel	LIDA-04	HED-01P	5.00	238.00	238.50	-10.0000	12.000	0.0320	0.00	24.81	0.00	0.00	0.18	0.18	0.00	
46	HED-01T	Channel	HED-01J	HED-01I	1.00	232.75	231.00	175.0000	24.000	0.0320	0.70	187.52	0.00	6.95	0.05	0.03	0.00	
47	HED-01V	Channel	LIDA-06A	HED-01J	5.00	231.00	231.00	0.0000	24.000	0.0320	0.75	16.66	0.05	0.04	1.80	0.90	0.00	
48	HED-02A	Channel	HED-02A	HED-01A	930.00	171.00	152.00	2.0400	96.000	0.0320	0.23	1963.65	0.00	0.34	0.05	0.01	0.00	
49	HED-02E	Channel	HED-02E	HED-02D	486.00	180.46	178.24	0.4600	90.000	0.0800	0.23	614.42	0.00	0.35	0.15	0.02	0.00	
50	HED-02G	Channel	HED-02G	HED-02F	1130.10	235.00	181.76	4.7100	36.000	0.0320	0.07	396.58	0.00	1.56	0.09	0.03	0.00	
51	HED-02K	Channel	HED-02K	HED-02J	1.00	256.50	237.00	1950.0000	24.000	0.0320	0.00	625.97	0.00	0.00	0.05	0.02	0.00	
52	HED-02L	Channel	HED-02I	HED-02H	44.02	237.00	236.00	2.2700	24.000	0.0320	0.00	55.99	0.00	0.00	0.06	0.03	0.00	
53	HED-02O	Channel	LIDA-05	HED-02K	5.00	255.00	255.00	0.0000	24.000	0.0320	0.07	16.66	0.00	0.11	1.32	0.66	0.00	
54	HED-03A	Channel	HED-02F	HED-03A	770.00	181.76	183.00	-0.1600	60.000	0.0300	0.22	443.56	0.00	0.14	0.09	0.02	0.00	
55	HED-03B	Channel	HED-03B	HED-03A	1100.00	235.00	183.00	4.7300	60.000	0.0300	0.34	2403.19	0.00	0.89	0.03	0.01	0.00	
56	HED-03C	Channel	HED-03C	HED-03B	700.00	236.00	235.00	0.1400	60.000	0.0300	0.17	417.77	0.00	0.22	0.04	0.01	0.00	
57	HED-03F	Channel	HED-03D	HED-03C	400.00	241.00	236.00	1.2500	24.000	0.0320	0.42	131.71	0.00	0.81	0.05	0.03	0.00	
58	HED-03G	Channel	HED-03G	HED-03D	10.00	242.00	241.00	10.0000	24.000	0.0320	0.01	157.53	0.00	0.19	0.04	0.02	0.00	

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length (ft)	Inlet Invert Elevation (ft)	Outlet Invert Elevation (ft)	Average Slope (%)	Diameter or Height (in)	Manning's Roughness	Peak Flow (cfs)	Design Flow Capacity (cfs)	Peak Flow/ Design Flow Ratio	Peak Flow Velocity (ft/sec)	Peak Flow Depth (ft)	Peak Flow Depth/ Total Depth Ratio	Total Time Reported Surcharged Condition (min)
59	HED-03H	Channel	HED-03H	HED-03G	1.00	244.50	242.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.00	0.00	0.00
60	HED-03K	Channel	LIDA-8A	HED-03K	5.00	256.00	256.00	0.0000	12.000	0.0320	0.83	0.83	1.00	0.41	1.00	1.00	1119.00
61	HED-03M	Channel	LIDA-09	HED-03F	5.00	250.00	250.75	-15.0000	12.000	0.0320	0.18	22.66	0.01	0.21	0.42	0.42	0.00
62	HED-03O	Channel	LIDA-10	HED-03E	5.00	250.00	250.50	-10.0000	12.000	0.0320	0.23	18.50	0.01	0.36	0.31	0.31	0.00
63	HED-03P	Channel	HED-03K	HED-03L	1.00	257.00	256.00	100.0000	24.000	0.0320	0.81	141.75	0.01	3.08	0.13	0.07	0.00
64	HED-03R	Channel	LIDA-08B	HED-03J	5.00	245.00	245.00	0.0000	24.000	0.0320	0.00	2.00	0.00	0.00	0.00	0.00	0.00
65	HED-03S	Channel	HED-03J	HED-03I	1.00	246.50	244.00	250.0000	24.000	0.0320	0.00	224.13	0.00	0.00	0.22	0.11	0.00
66	HED-03U	Channel	LIDA-08C	HED-03H	5.00	243.00	243.00	0.0000	24.000	0.0320	0.14	2.00	0.07	0.12	1.45	0.72	0.00
67	HED-02M	Pump	LIDA-06B	HED-02K		237.00	255.00				0.04						

Subbasin Hydrology

Subbasin : COF-LIDA_11

Input Data

Area (ac) 3.71
 Weighted Curve Number 96.88
 Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	3.48	C/D	98.00
Landscape	0.23	C/D	80.00
Composite Area & Weighted CN	3.71		96.88

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

$$T_c = (0.007 * ((n * L_f)^{0.8})) / ((P^{0.5}) * (S_f^{0.4}))$$

Where :

T_c = Time of Concentration (hr)
 n = Manning's roughness
 L_f = Flow Length (ft)
 P = 2 yr, 24 hr Rainfall (inches)
 S_f = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (S_f^{0.5}) (unpaved surface)
 V = 20.3282 * (S_f^{0.5}) (paved surface)
 V = 15.0 * (S_f^{0.5}) (grassed waterway surface)
 V = 10.0 * (S_f^{0.5}) (nearly bare & untilled surface)
 V = 9.0 * (S_f^{0.5}) (cultivated straight rows surface)
 V = 7.0 * (S_f^{0.5}) (short grass pasture surface)
 V = 5.0 * (S_f^{0.5}) (woodland surface)
 V = 2.5 * (S_f^{0.5}) (forest w/heavy litter surface)
 T_c = (L_f / V) / (3600 sec/hr)

Where:

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^{2/3}) * (S_f^{0.5})) / n
 R = A_q / W_p
 T_c = (L_f / V) / (3600 sec/hr)

Where :

T_c = Time of Concentration (hr)
 L_f = Flow Length (ft)
 R = Hydraulic Radius (ft)
 A_q = Flow Area (ft²)
 W_p = Wetted Perimeter (ft)
 V = Velocity (ft/sec)
 S_f = Slope (ft/ft)
 n = Manning's roughness

User-Defined TOC override (minutes): 5.00

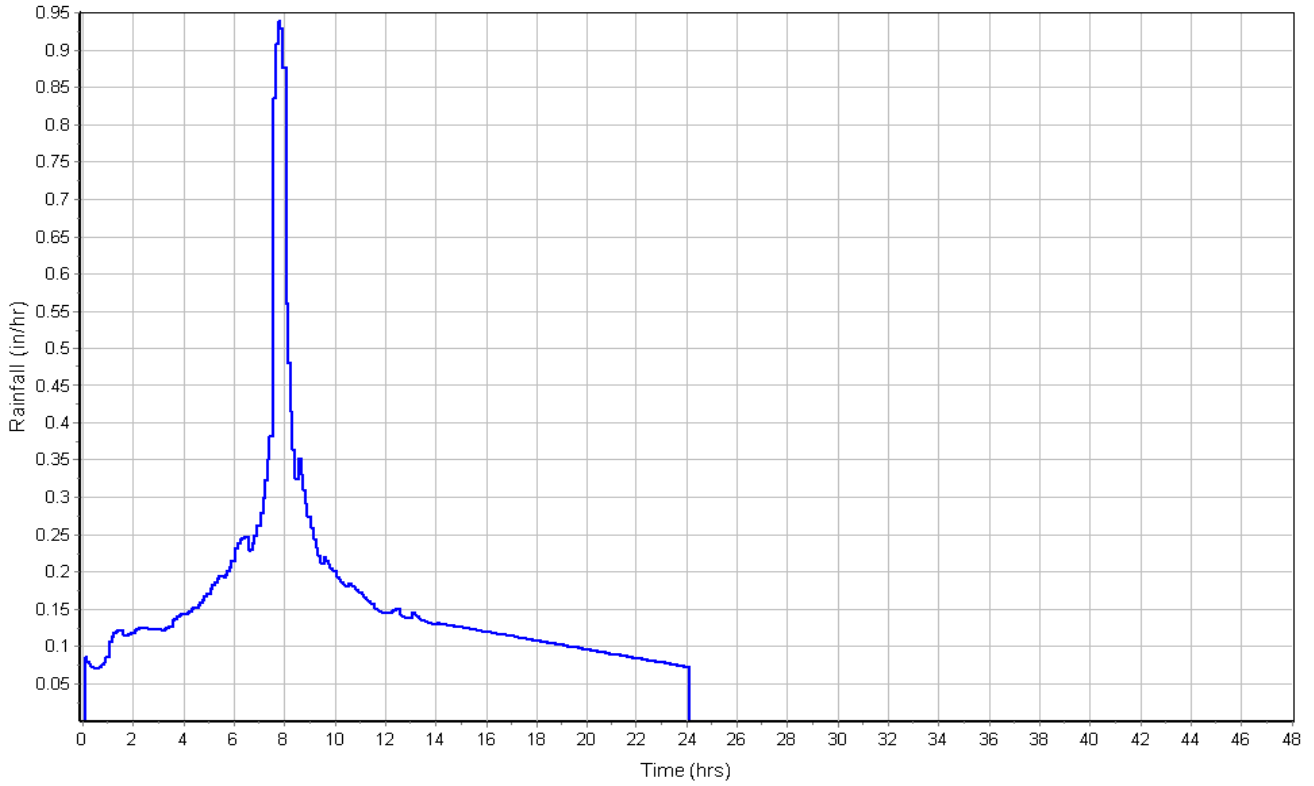
Subbasin Runoff Results

Total Rainfall (in) 3.90
 Total Runoff (in) 3.54
 Peak Runoff (cfs) 3.37
 Weighted Curve Number 96.88
 Time of Concentration (days hh:mm:ss) 0 00:05:00

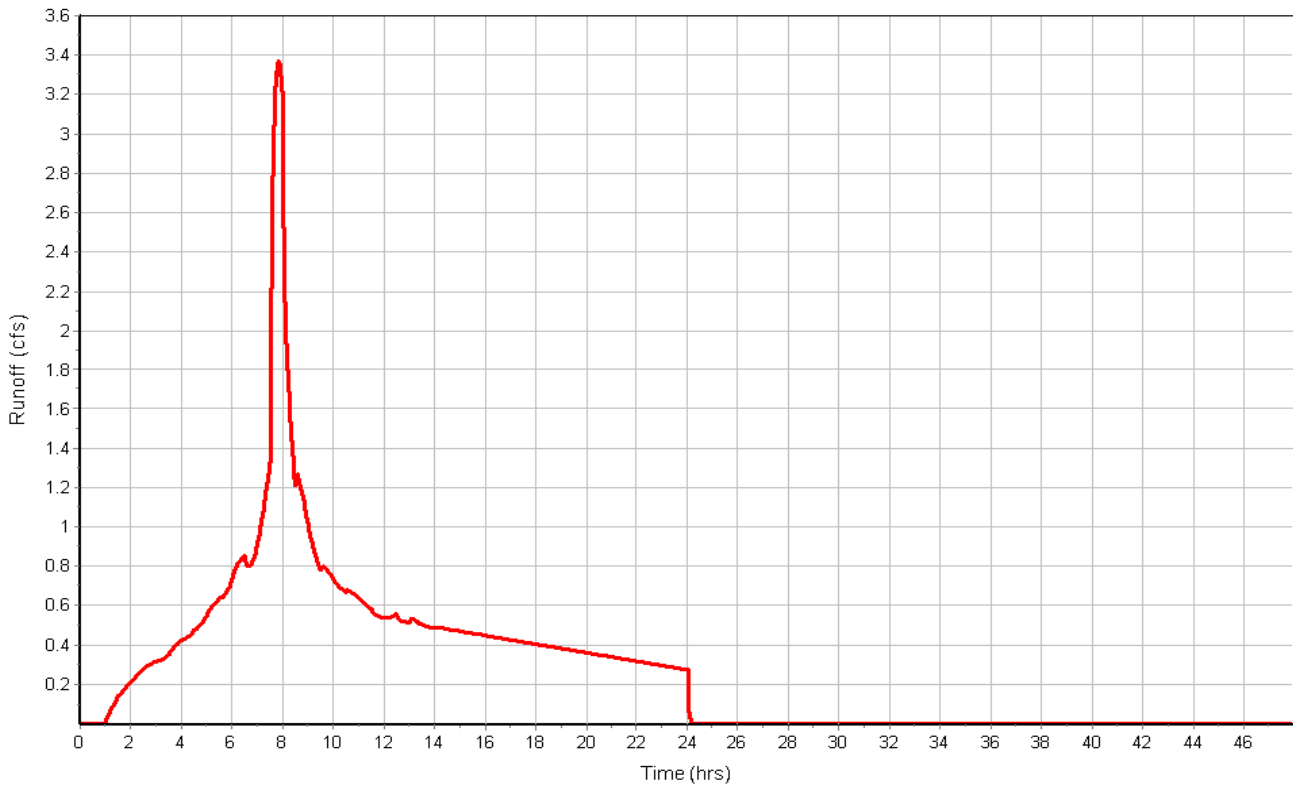
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : COF-LIDA_11

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : COF-LIDA_12

Input Data

Area (ac) 0.49
Weighted Curve Number 96.13
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.44	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.49		96.13

Time of Concentration

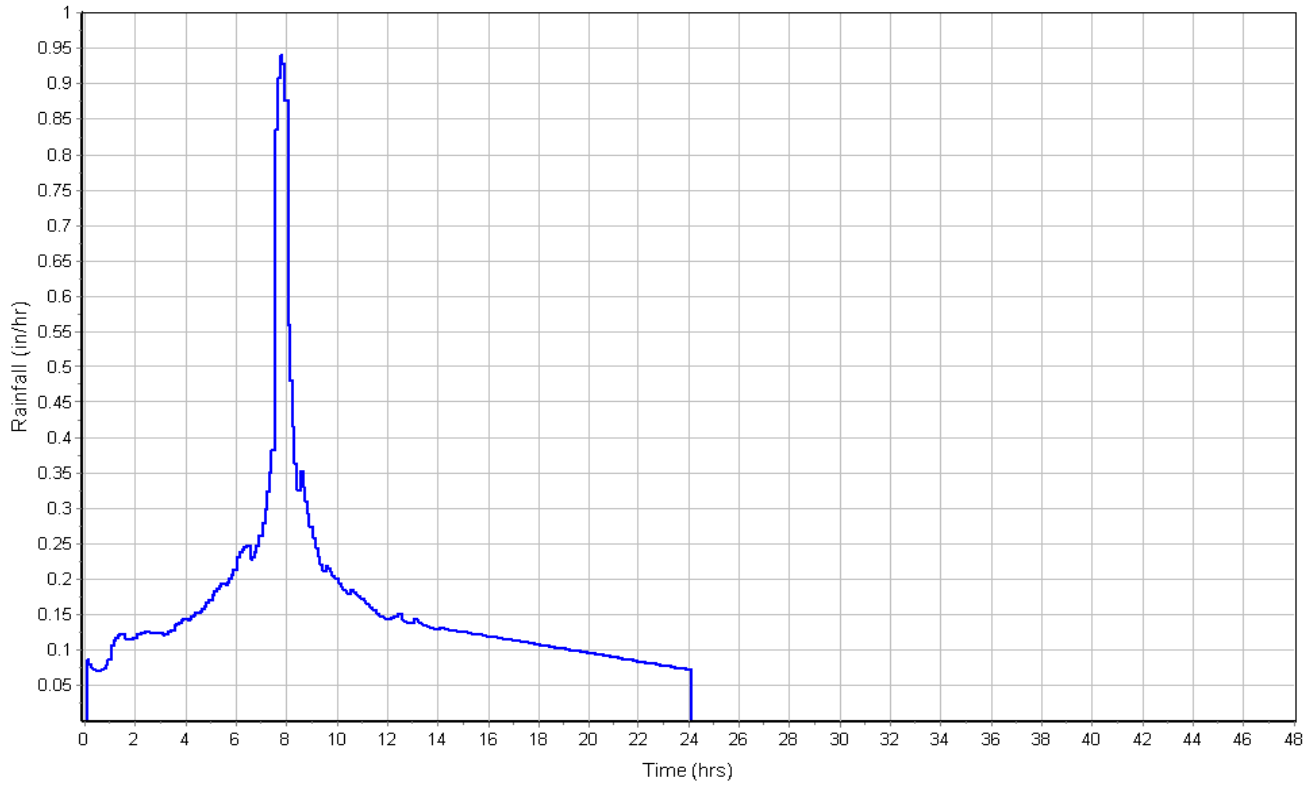
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

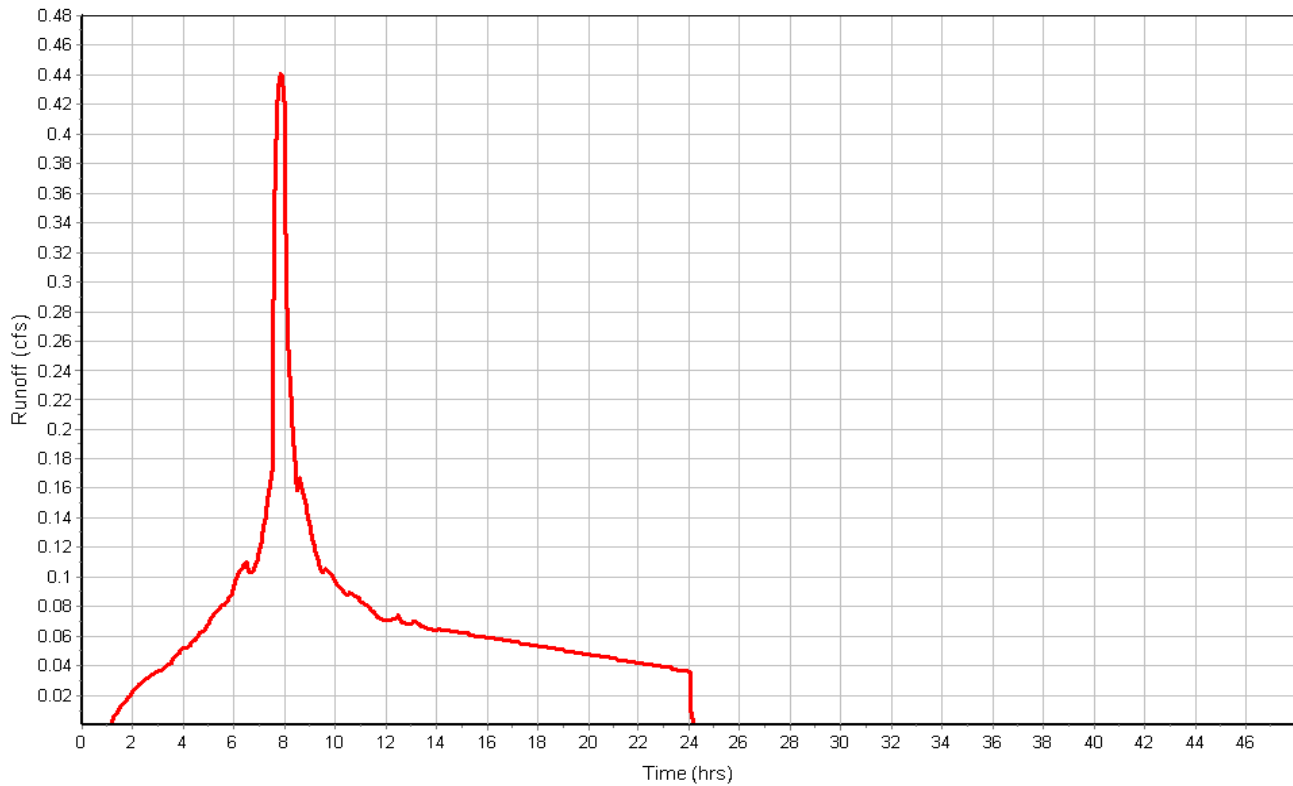
Total Rainfall (in) 3.90
Total Runoff (in) 3.46
Peak Runoff (cfs) 0.44
Weighted Curve Number 96.13
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : COF-LIDA_12

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_01

Input Data

Area (ac) 0.43
Weighted Curve Number 94.77
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.35	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.43		94.77

Time of Concentration

User-Defined TOC override (minutes): 5

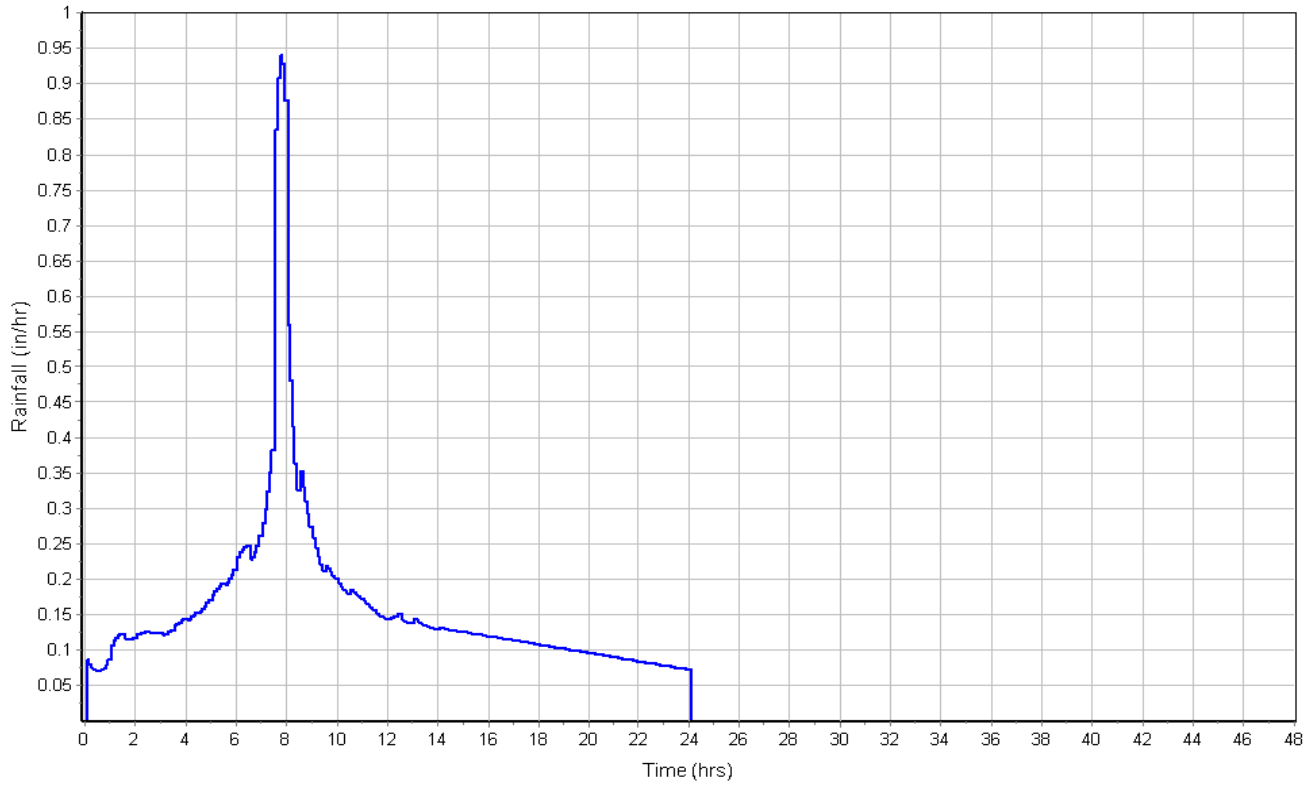
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 3.31
Peak Runoff (cfs) 0.37
Weighted Curve Number 94.77
Time of Concentration (days hh:mm:ss) 0 00:05:00

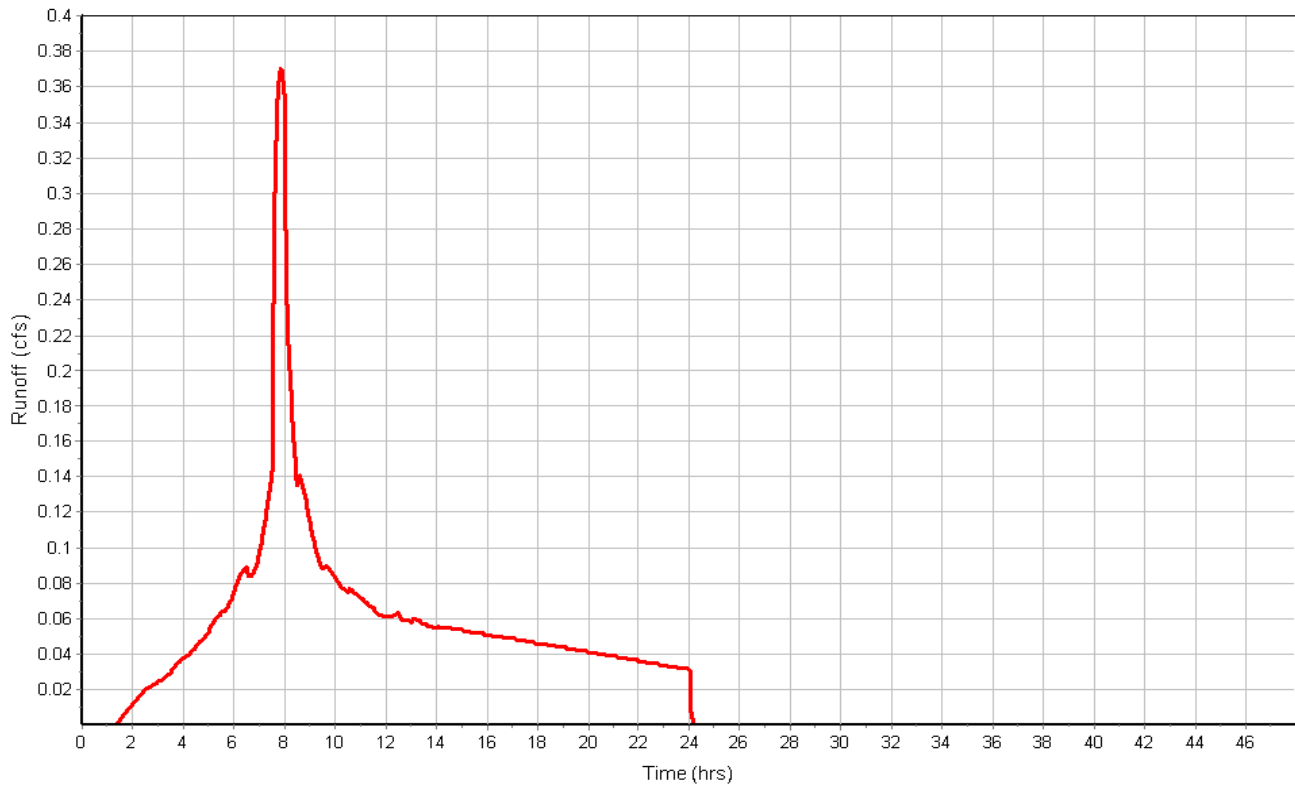
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_01

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_02

Input Data

Area (ac) 0.39
Weighted Curve Number 94.78
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.07	C/D	80.00
Composite Area & Weighted CN	0.39		94.78

Time of Concentration

User-Defined TOC override (minutes): 5.00

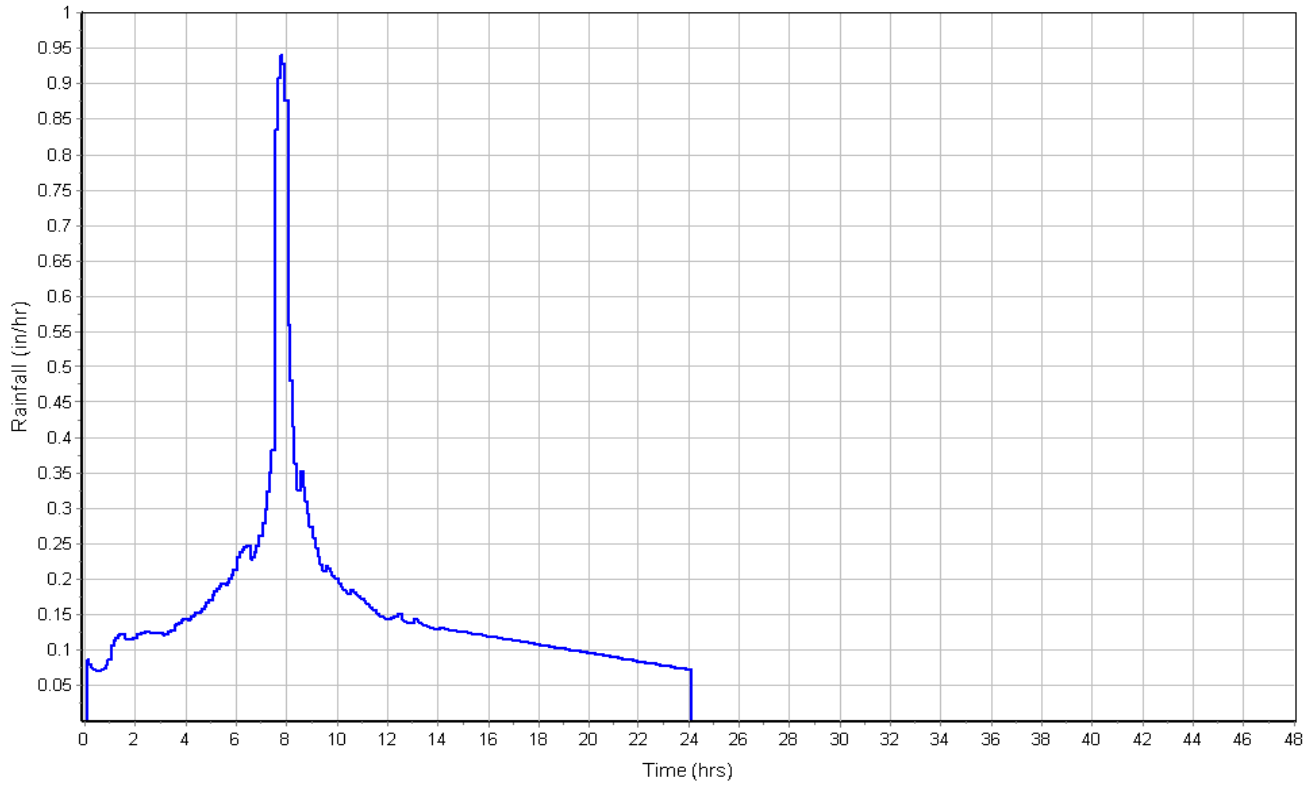
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 3.31
Peak Runoff (cfs) 0.34
Weighted Curve Number 94.78
Time of Concentration (days hh:mm:ss) 0 00:05:00

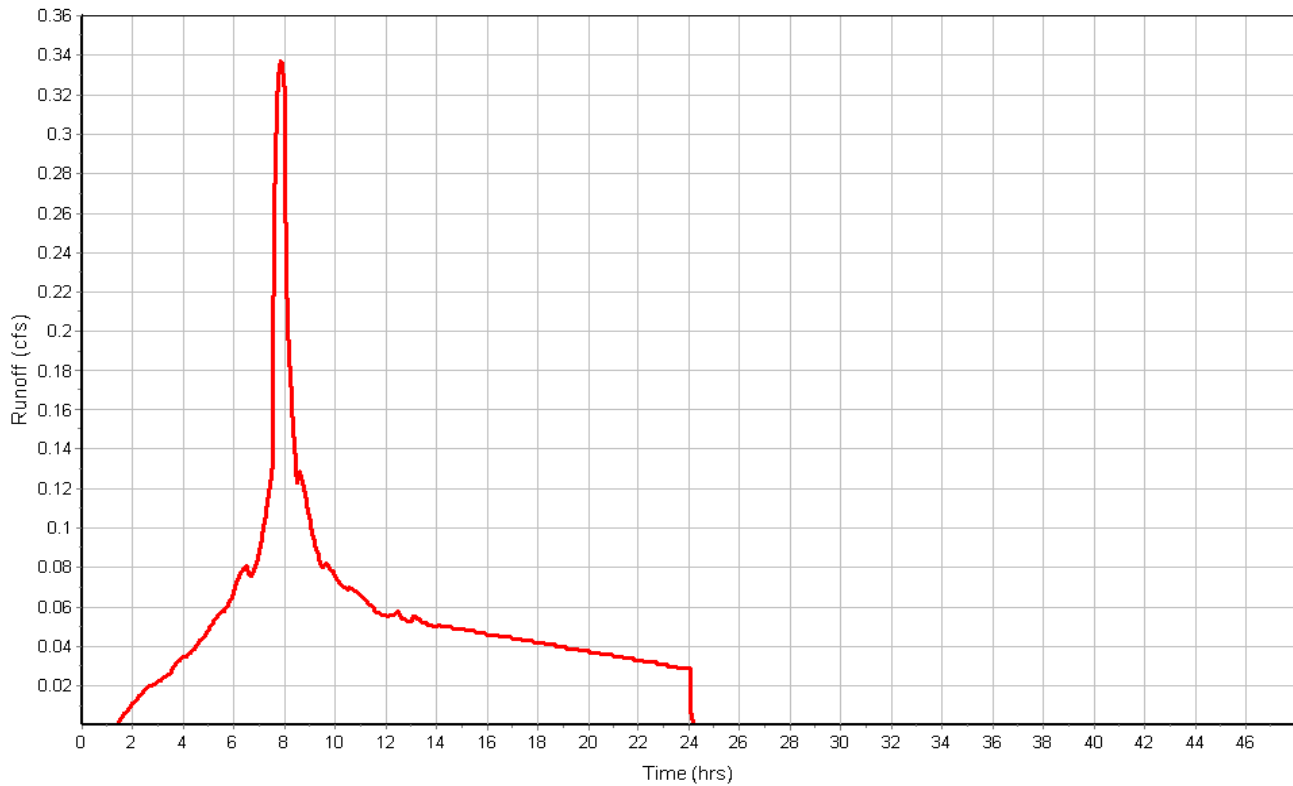
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_02

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_03

Input Data

Area (ac) 0.40
Weighted Curve Number 94.61
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.32	C/D	98.00
Landscape	0.08	C/D	80.00
Composite Area & Weighted CN	0.40		94.61

Time of Concentration

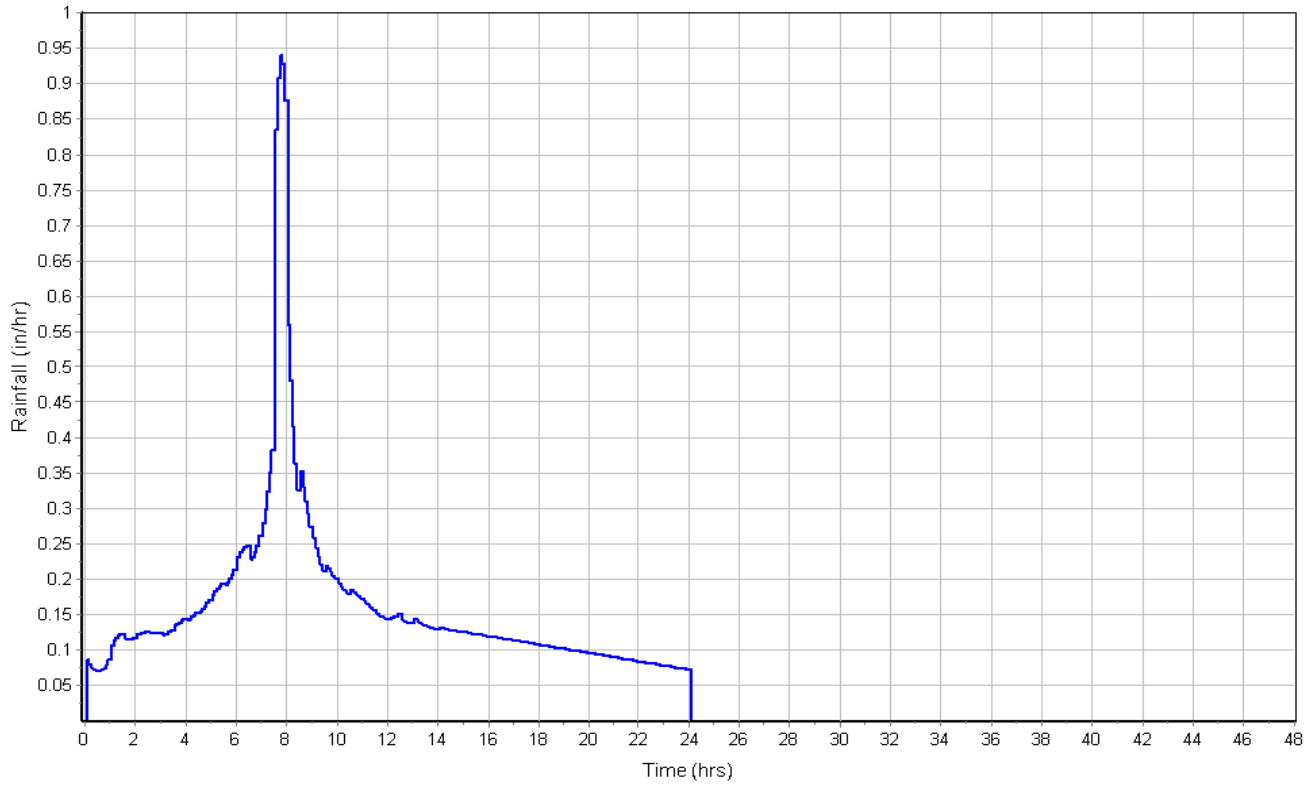
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

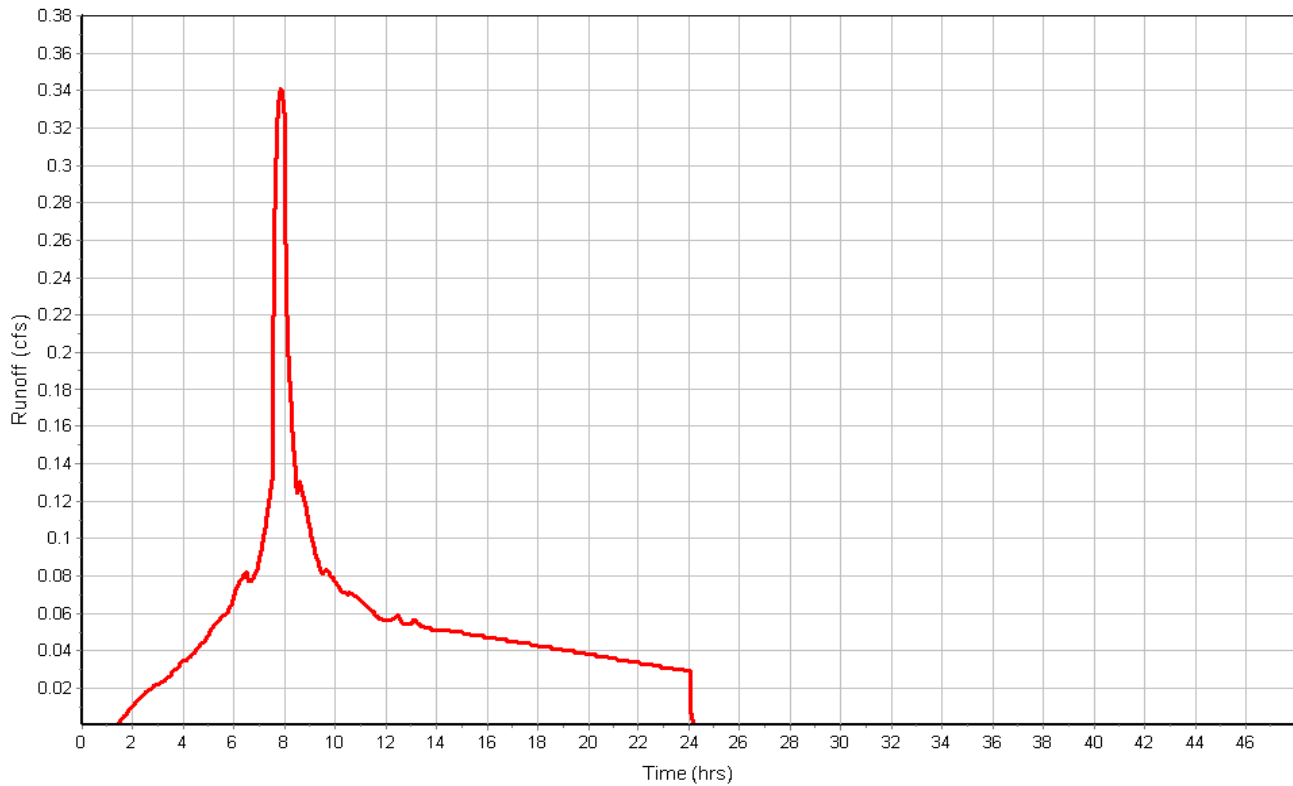
Total Rainfall (in) 3.90
Total Runoff (in) 3.29
Peak Runoff (cfs) 0.34
Weighted Curve Number 94.61
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_03

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_04

Input Data

Area (ac) 0.44
Weighted Curve Number 93.24
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	0.12	C/D	80.00
Pavement/roof	0.32	C/D	98.00
Composite Area & Weighted CN	0.44		93.24

Time of Concentration

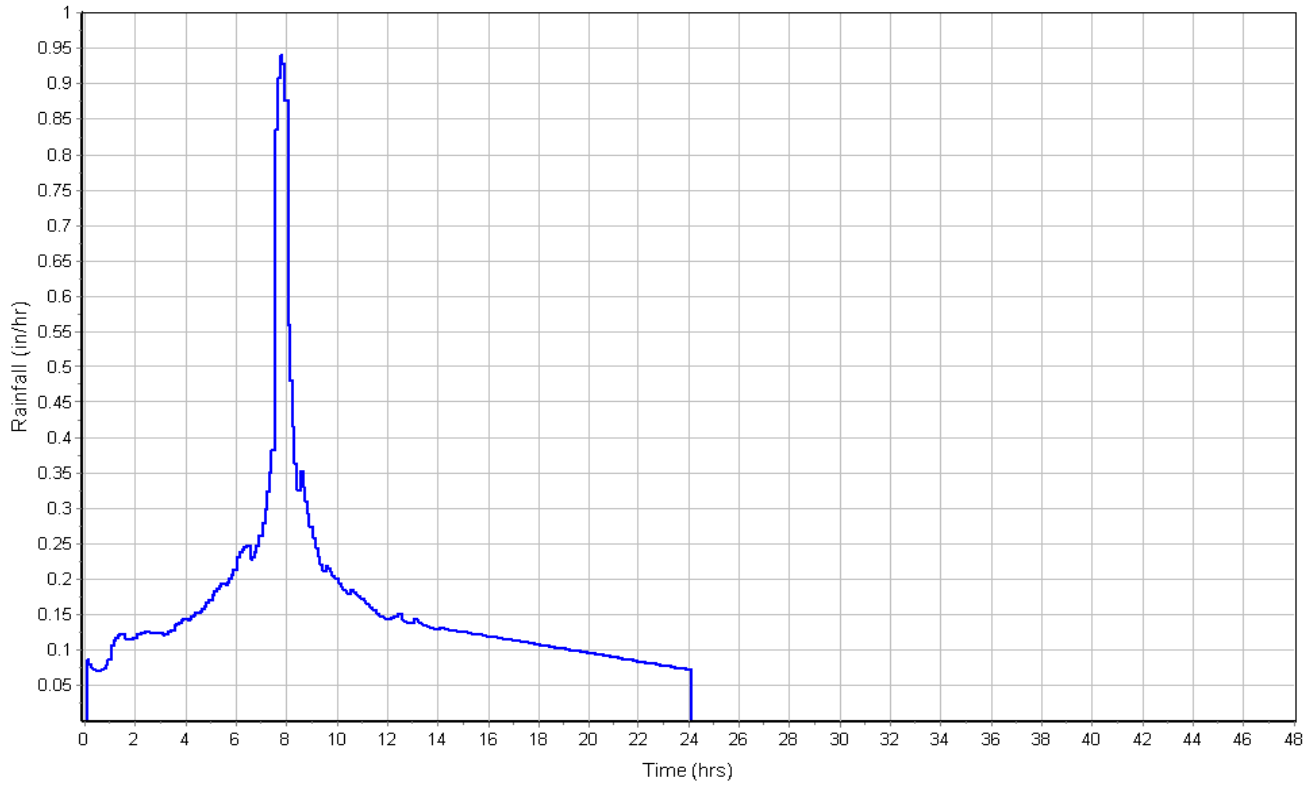
User-Defined TOC override (minutes): 5

Subbasin Runoff Results

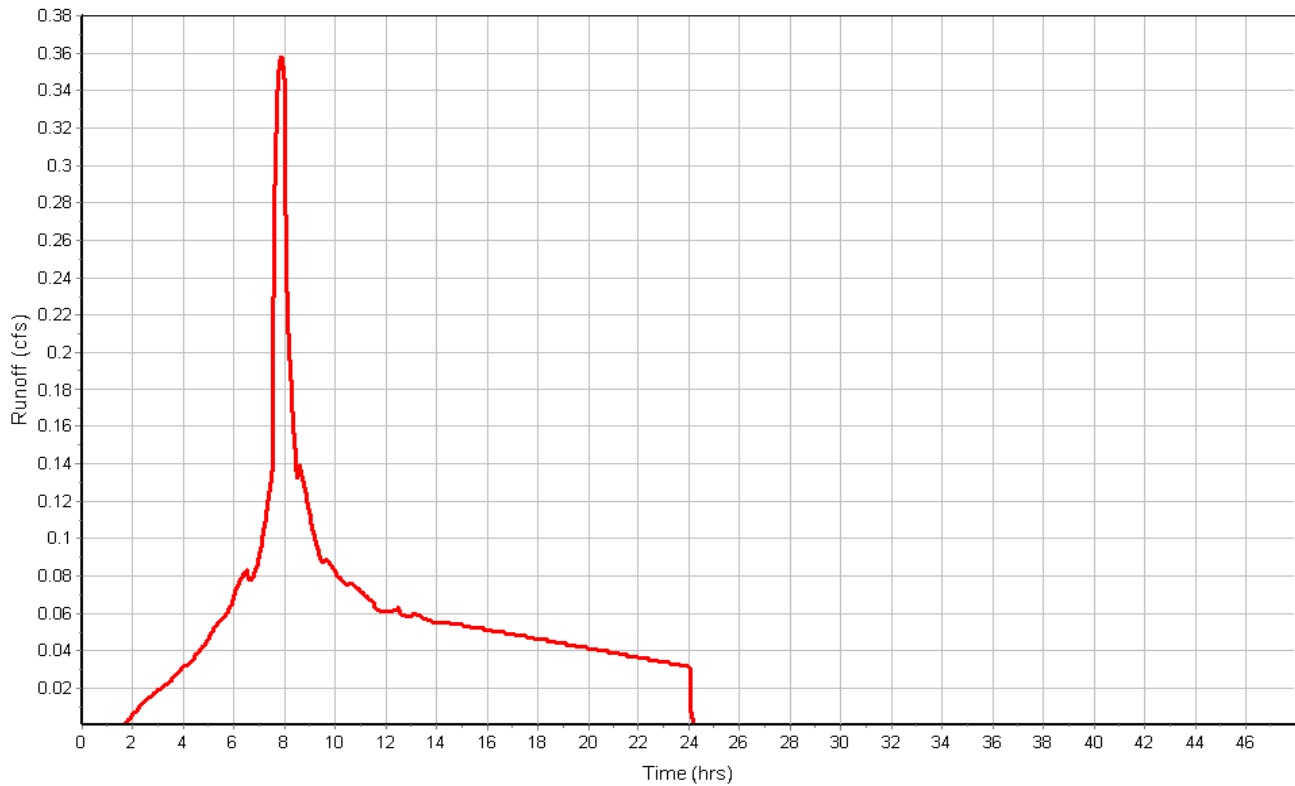
Total Rainfall (in) 3.90
Total Runoff (in) 3.15
Peak Runoff (cfs) 0.36
Weighted Curve Number 93.24
Time of Concentration (days hh:mm:ss) 0 00:05:00

Subbasin : HED-LIDA_04

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_05

Input Data

Area (ac) 2.67
Weighted Curve Number 91.26
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.67	C/D	98.00
Landscape	1.00	C/D	80.00
Composite Area & Weighted CN	2.67		91.26

Time of Concentration

User-Defined TOC override (minutes): 5

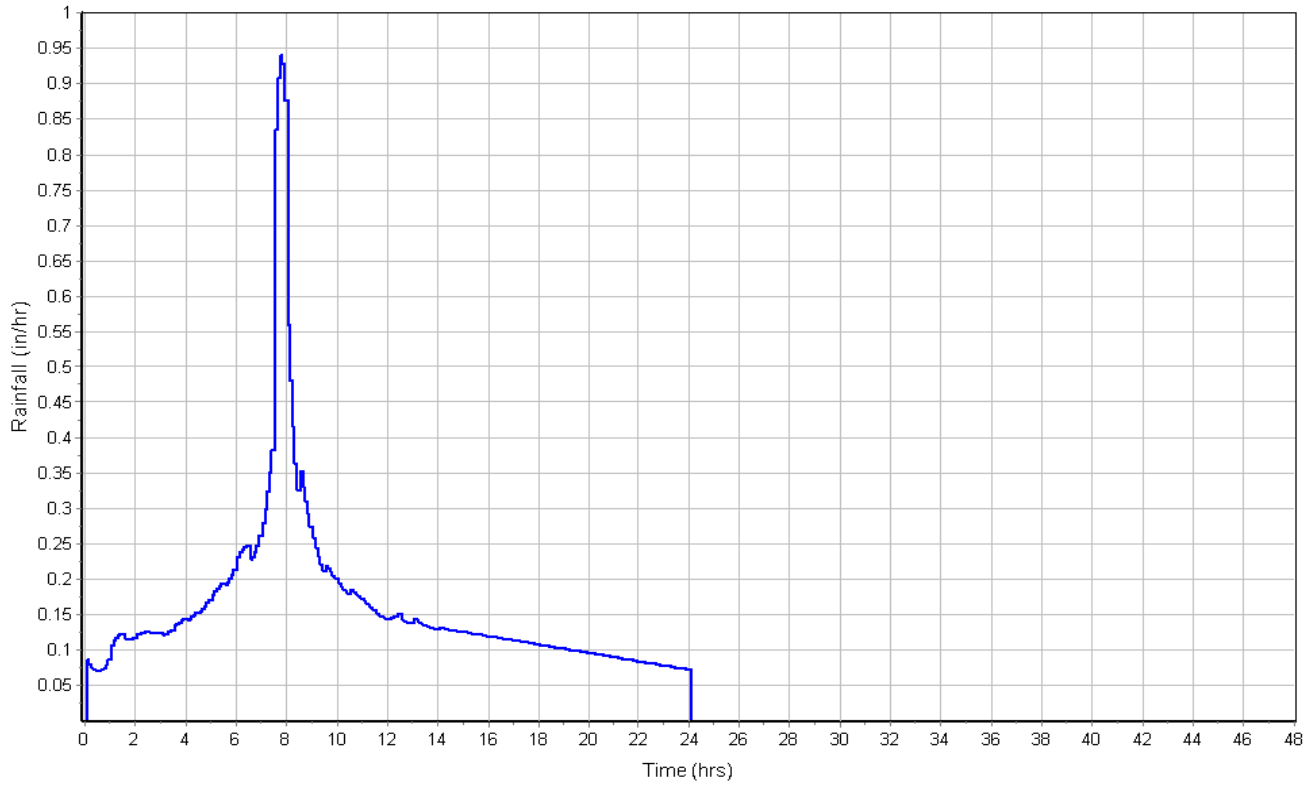
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 2.95
Peak Runoff (cfs) 2.06
Weighted Curve Number 91.26
Time of Concentration (days hh:mm:ss) 0 00:05:00

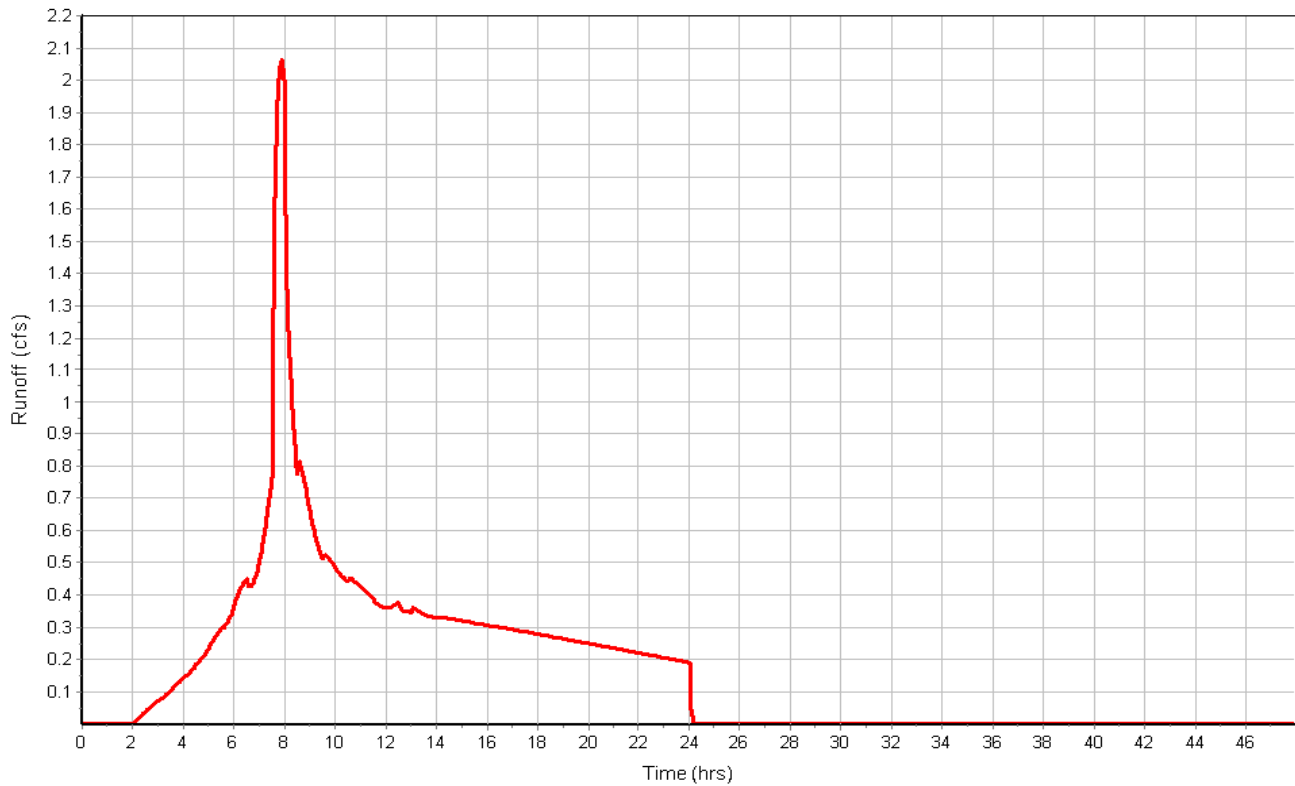
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_05

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_06A

Input Data

Area (ac) 5.95
Weighted Curve Number 89.16
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Landscape	2.92	C/D	80.00
Pavement/roof	3.03	C/D	98.00
Composite Area & Weighted CN	5.95		89.16

Time of Concentration

User-Defined TOC override (minutes): 5.00

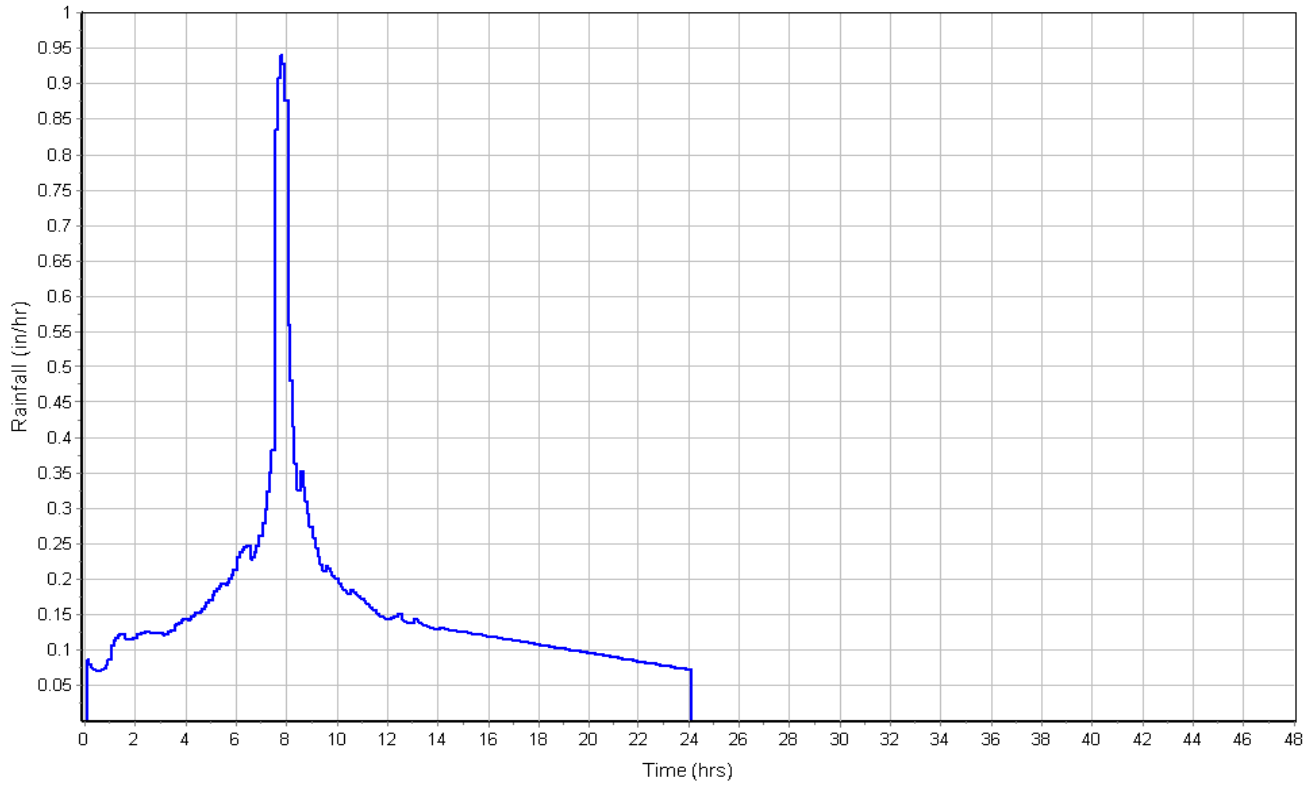
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 2.74
Peak Runoff (cfs) 4.24
Weighted Curve Number 89.16
Time of Concentration (days hh:mm:ss) 0 00:05:00

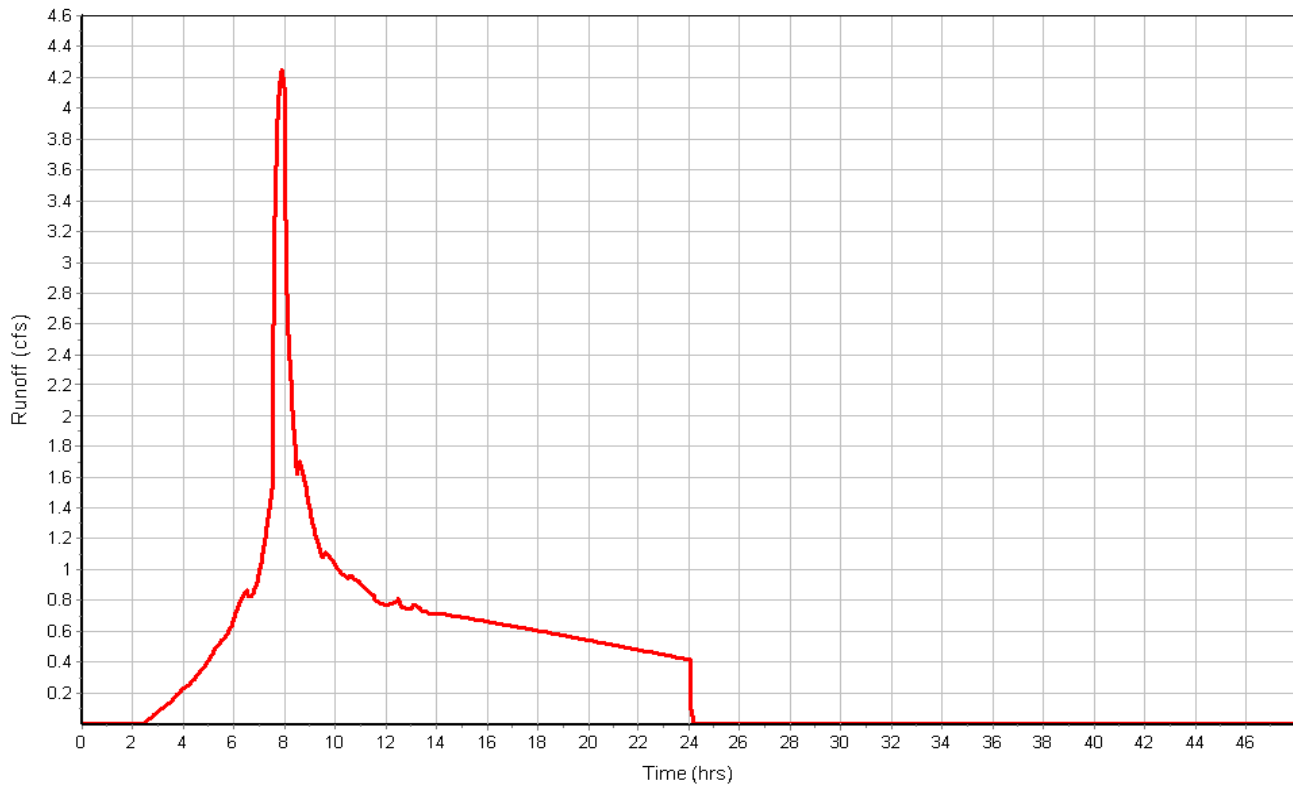
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_06A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_06B

Input Data

Area (ac) 0.41
Weighted Curve Number 98.00
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.41	C/D	98.00
Composite Area & Weighted CN	0.41		98.00

Time of Concentration

User-Defined TOC override (minutes): 5

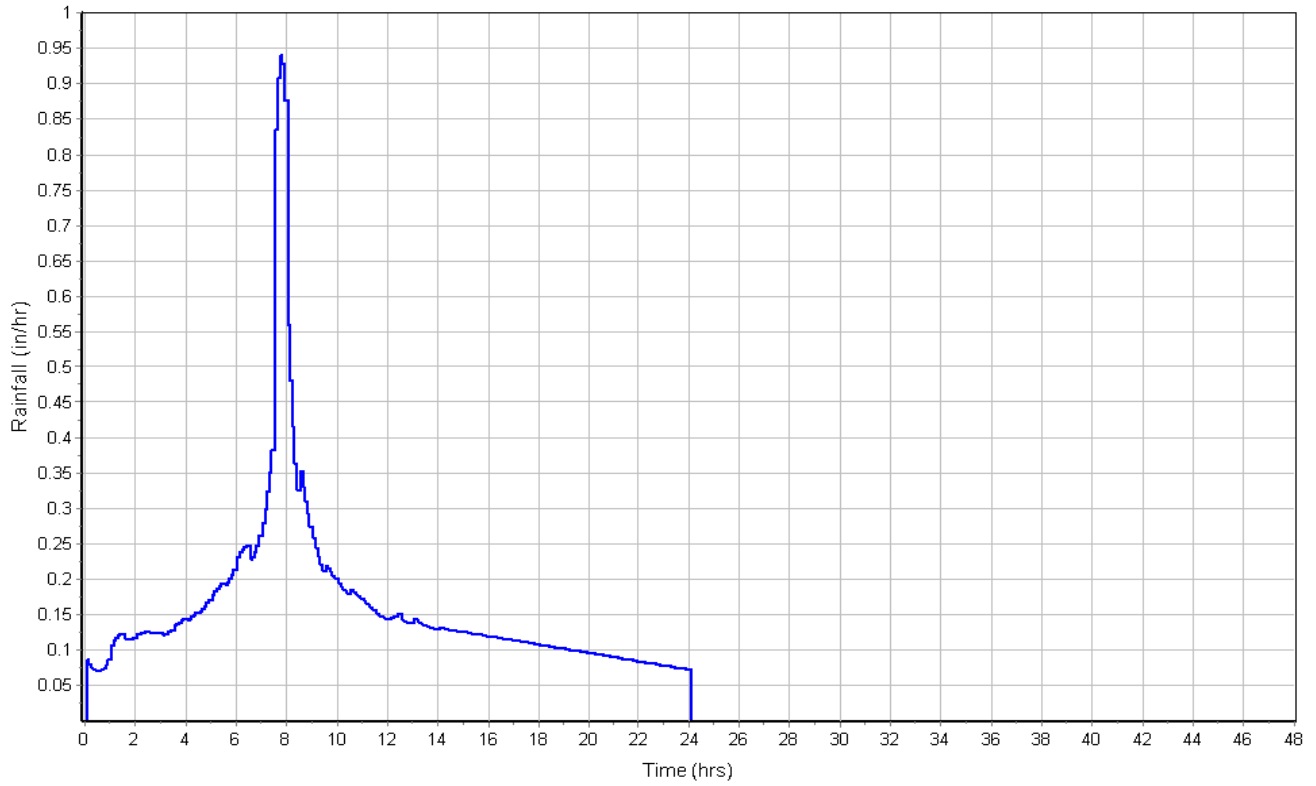
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 3.67
Peak Runoff (cfs) 0.39
Weighted Curve Number 98.00
Time of Concentration (days hh:mm:ss) 0 00:05:00

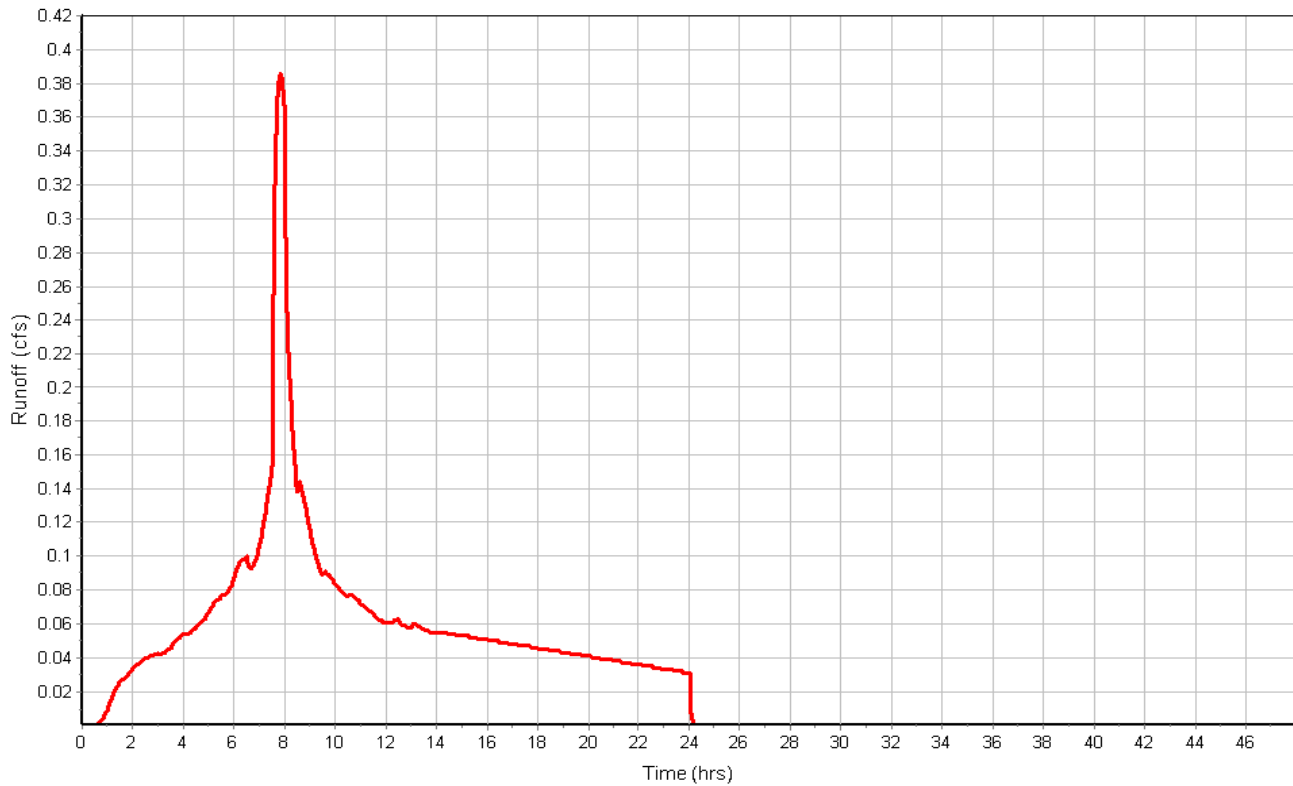
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_06B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_07

Input Data

Area (ac) 1.08
Weighted Curve Number 93.59
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.81	C/D	98.00
Landscape	0.26	C/D	80.00
Composite Area & Weighted CN	1.07		93.59

Time of Concentration

User-Defined TOC override (minutes): 5

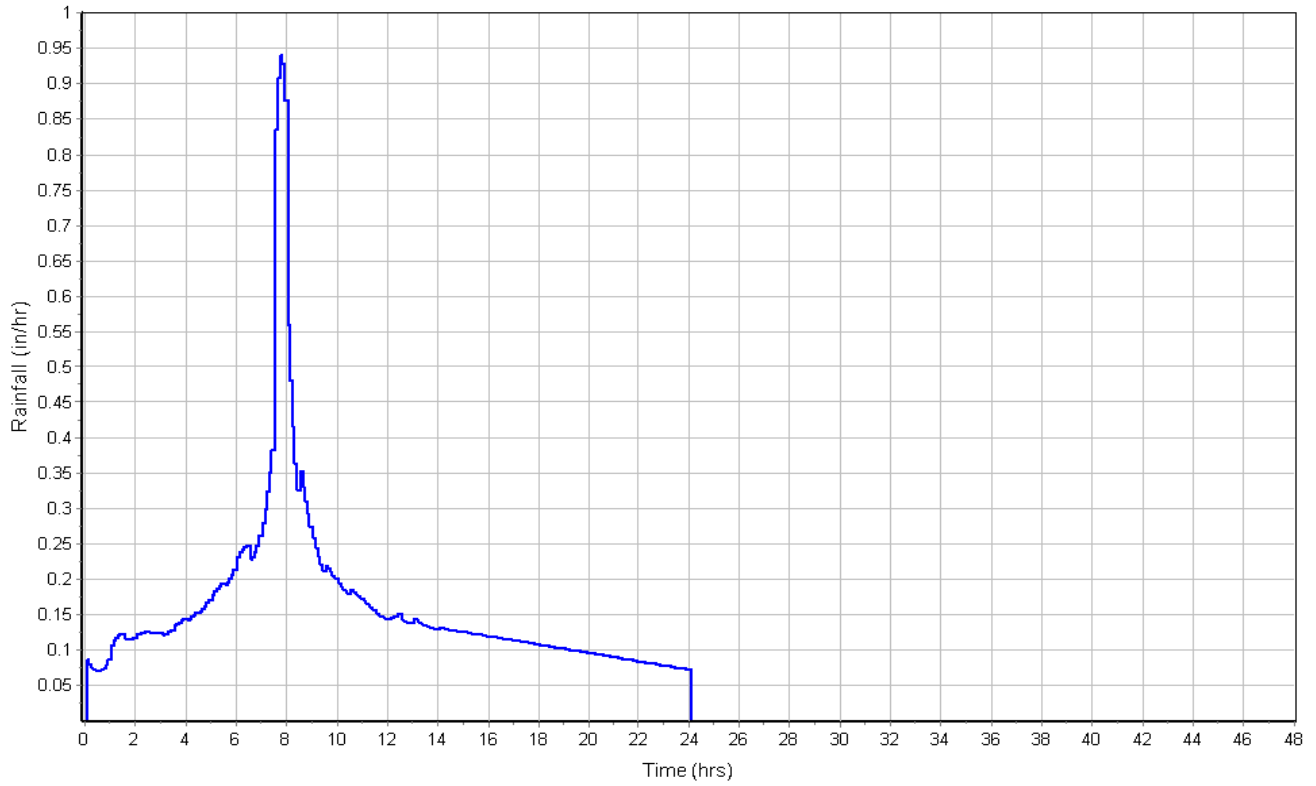
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 3.18
Peak Runoff (cfs) 0.90
Weighted Curve Number 93.59
Time of Concentration (days hh:mm:ss) 0 00:05:00

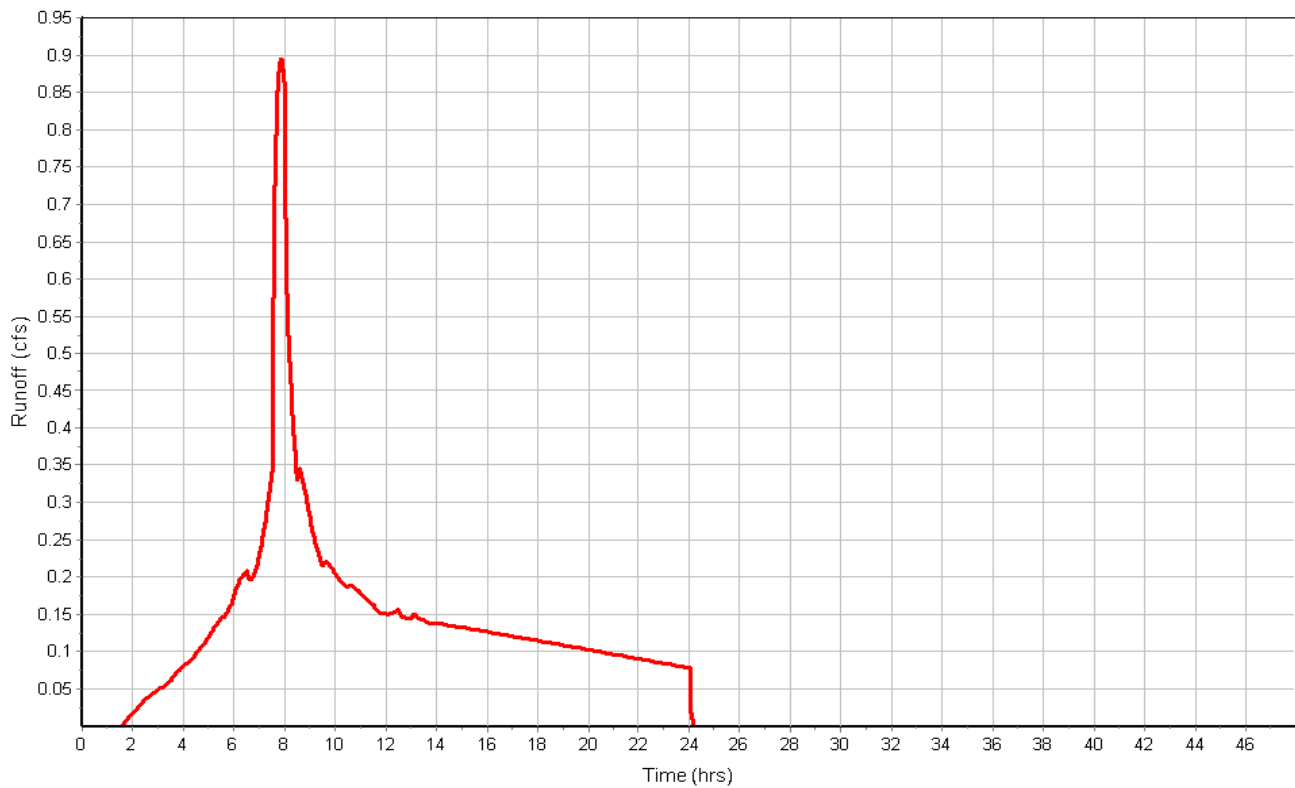
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_07

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_08B

Input Data

Area (ac) 2.25
Weighted Curve Number 94.33
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	1.79	C/D	98.00
Landscape	0.46	C/D	80.00
Composite Area & Weighted CN	2.25		94.33

Time of Concentration

User-Defined TOC override (minutes): 5

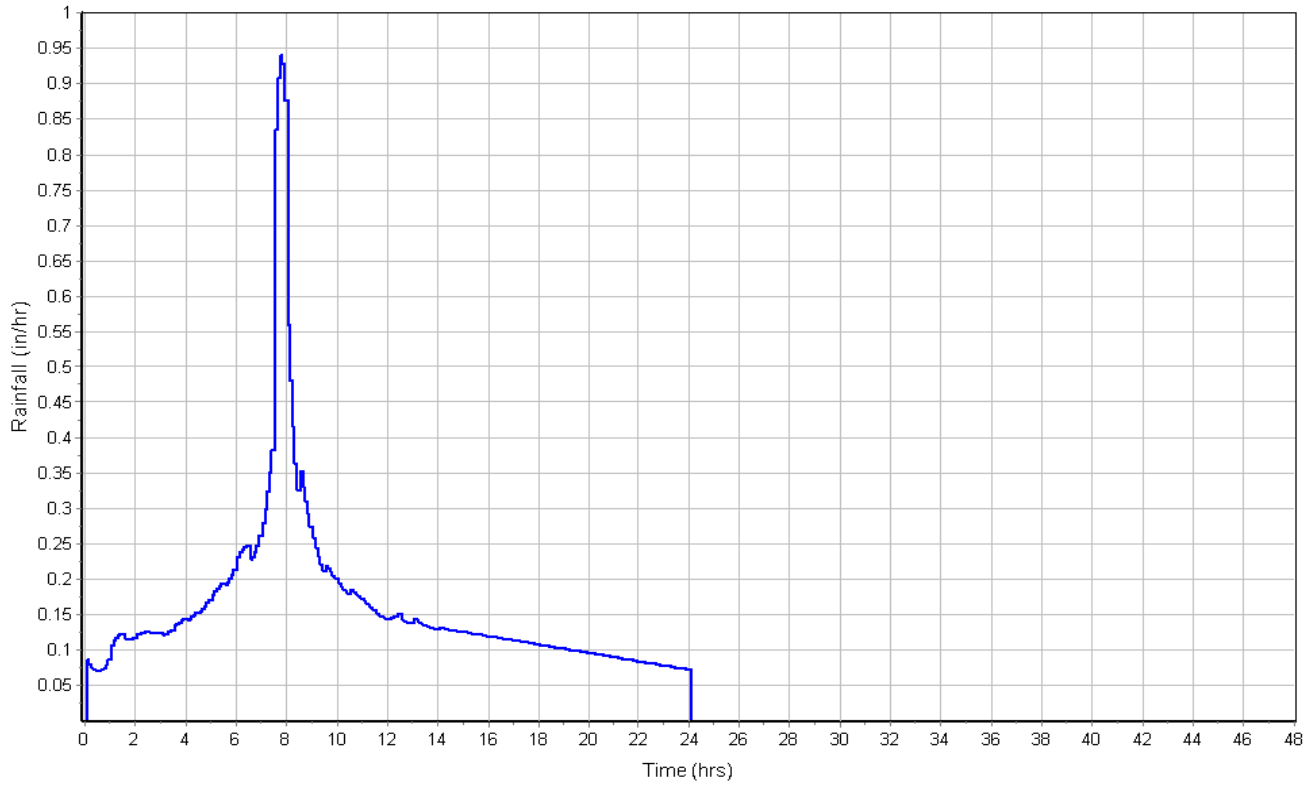
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 3.26
Peak Runoff (cfs) 1.92
Weighted Curve Number 94.33
Time of Concentration (days hh:mm:ss) 0 00:05:00

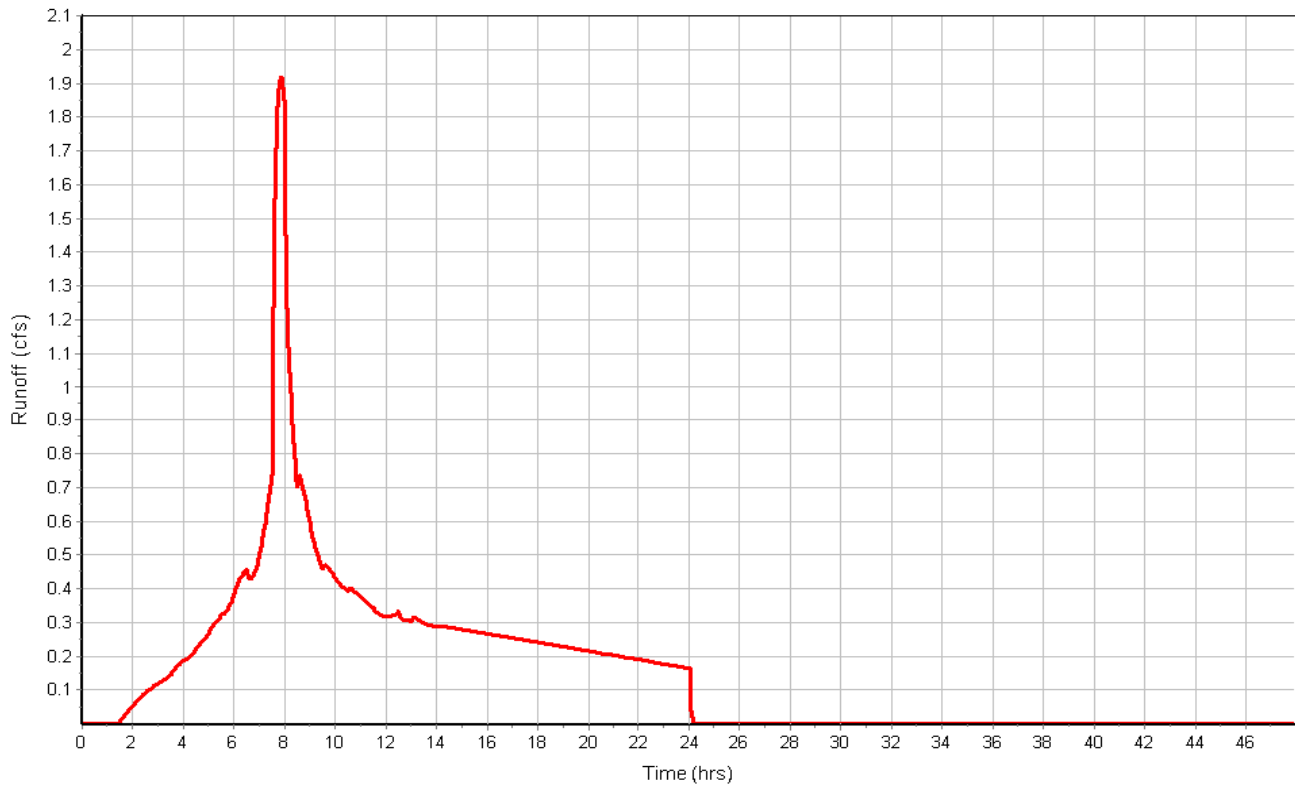
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_08B

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_09

Input Data

Area (ac) 0.23
Weighted Curve Number 95.64
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.20	C/D	98.00
Landscape	0.03	C/D	80.00
Composite Area & Weighted CN	0.23		95.64

Time of Concentration

User-Defined TOC override (minutes): 5

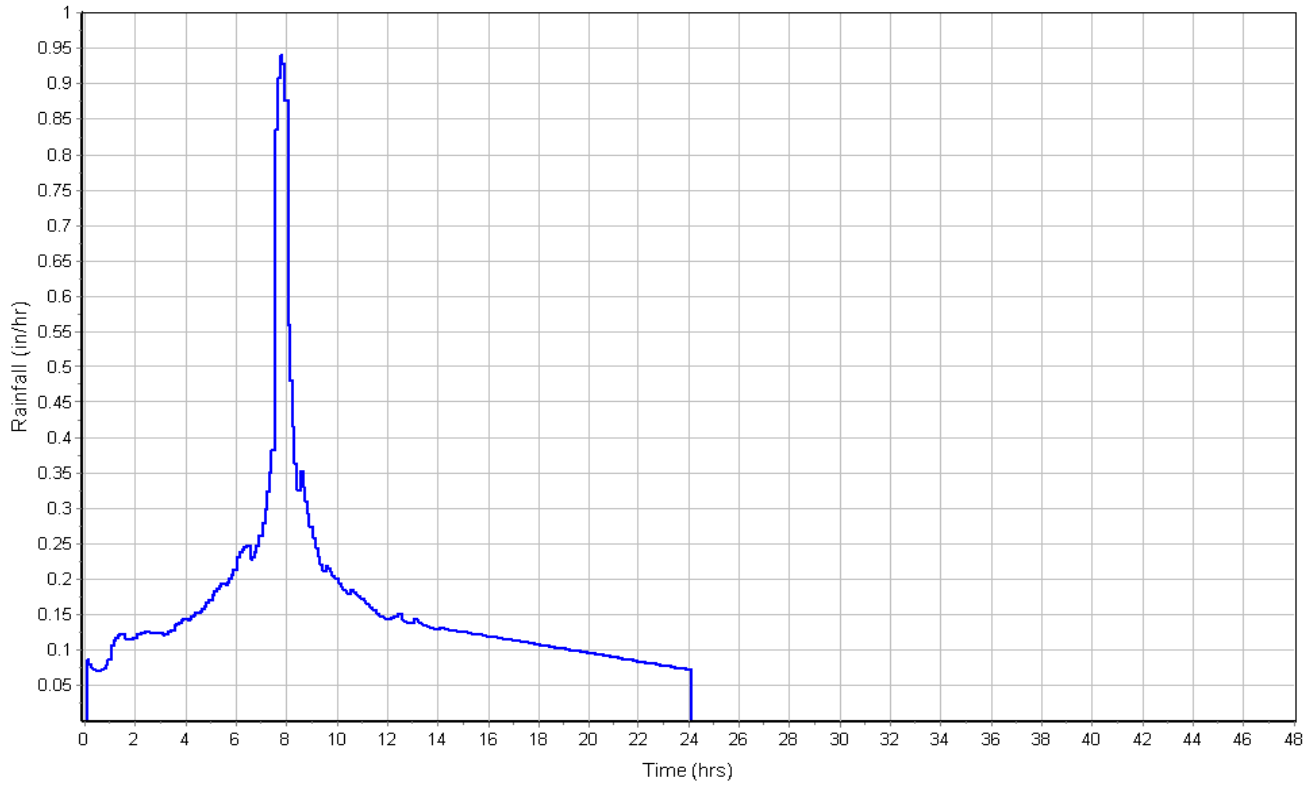
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 3.40
Peak Runoff (cfs) 0.20
Weighted Curve Number 95.64
Time of Concentration (days hh:mm:ss) 0 00:05:00

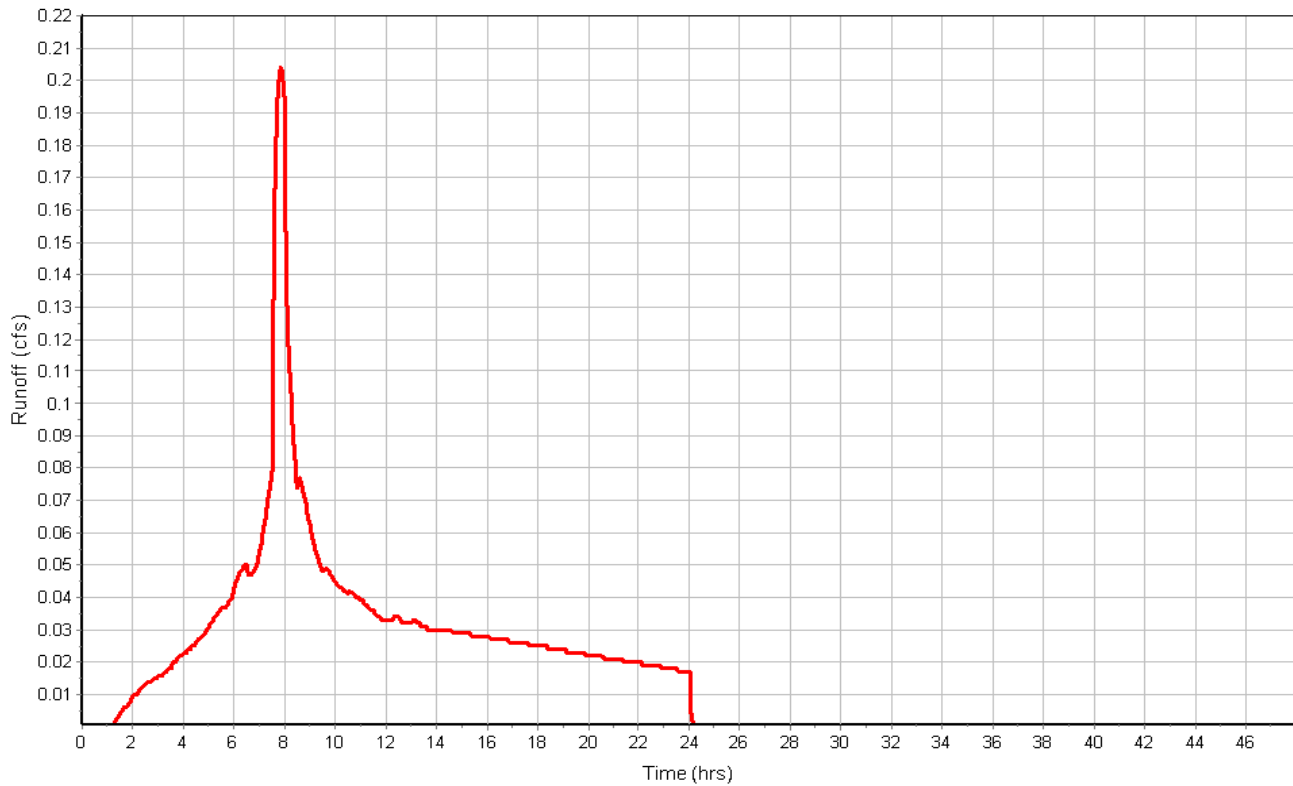
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_09

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_10

Input Data

Area (ac) 0.32
Weighted Curve Number 95.08
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	0.27	C/D	98.00
Landscape	0.05	C/D	80.00
Composite Area & Weighted CN	0.32		95.08

Time of Concentration

User-Defined TOC override (minutes): 5

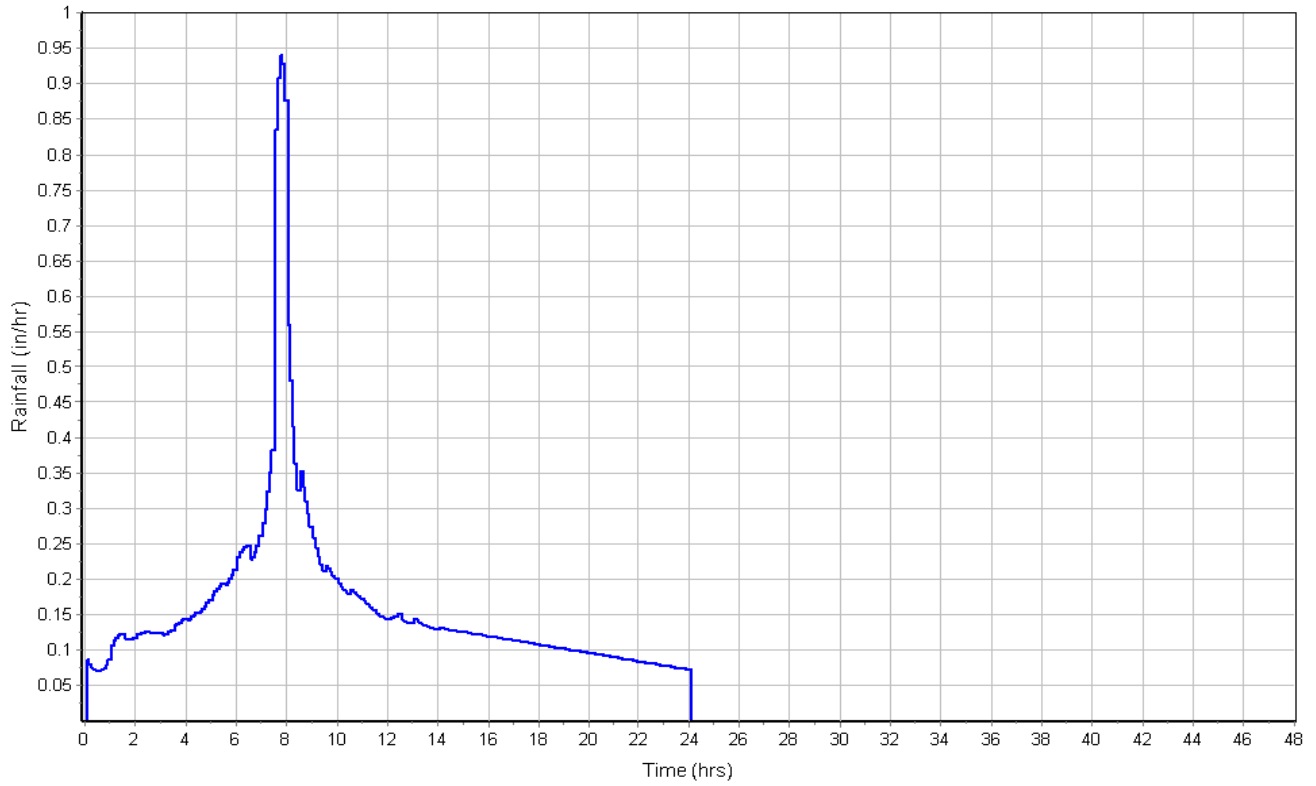
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 3.34
Peak Runoff (cfs) 0.28
Weighted Curve Number 95.08
Time of Concentration (days hh:mm:ss) 0 00:05:00

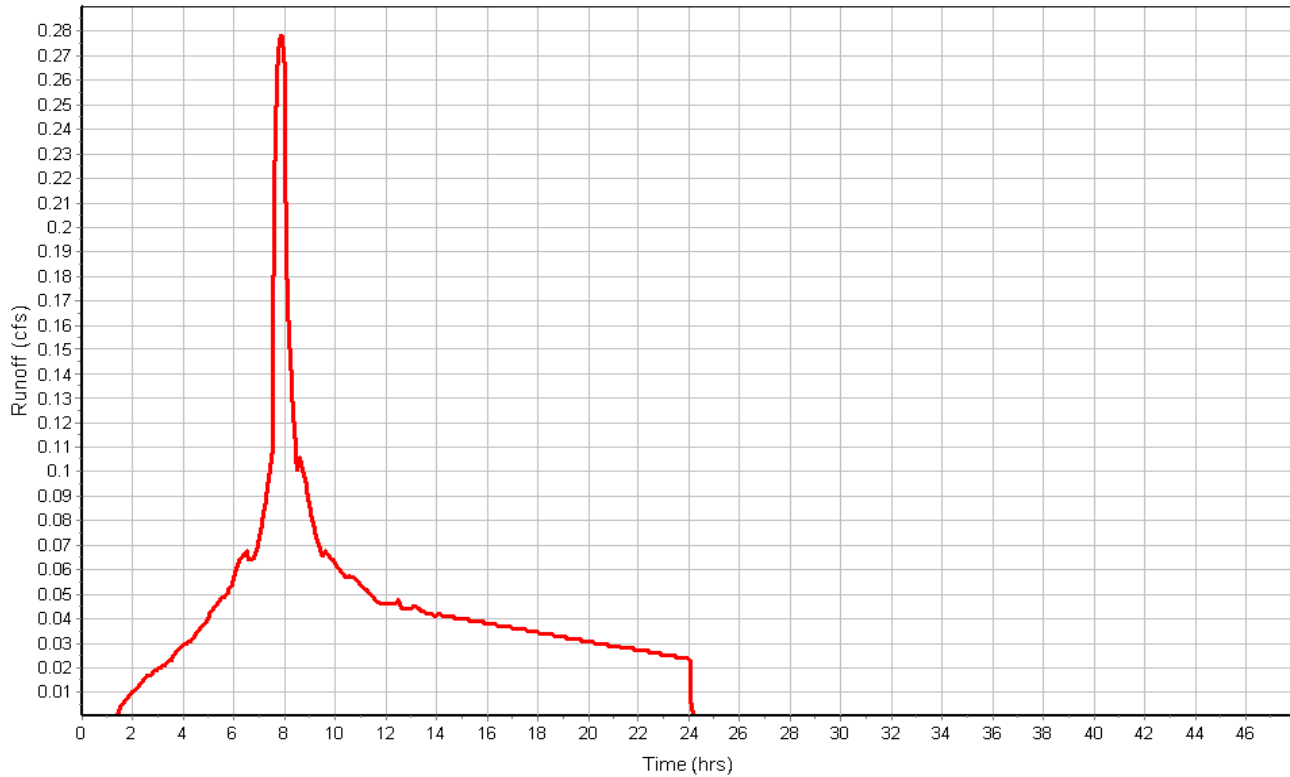
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_10

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_8A

Input Data

Area (ac) 2.32
Weighted Curve Number 95.49
Rain Gage ID Rain Gage-01

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Pavement/roof	2.00	C/D	98.00
Landscape	0.32	C/D	80.00
Composite Area & Weighted CN	2.32		95.49

Time of Concentration

User-Defined TOC override (minutes): 5

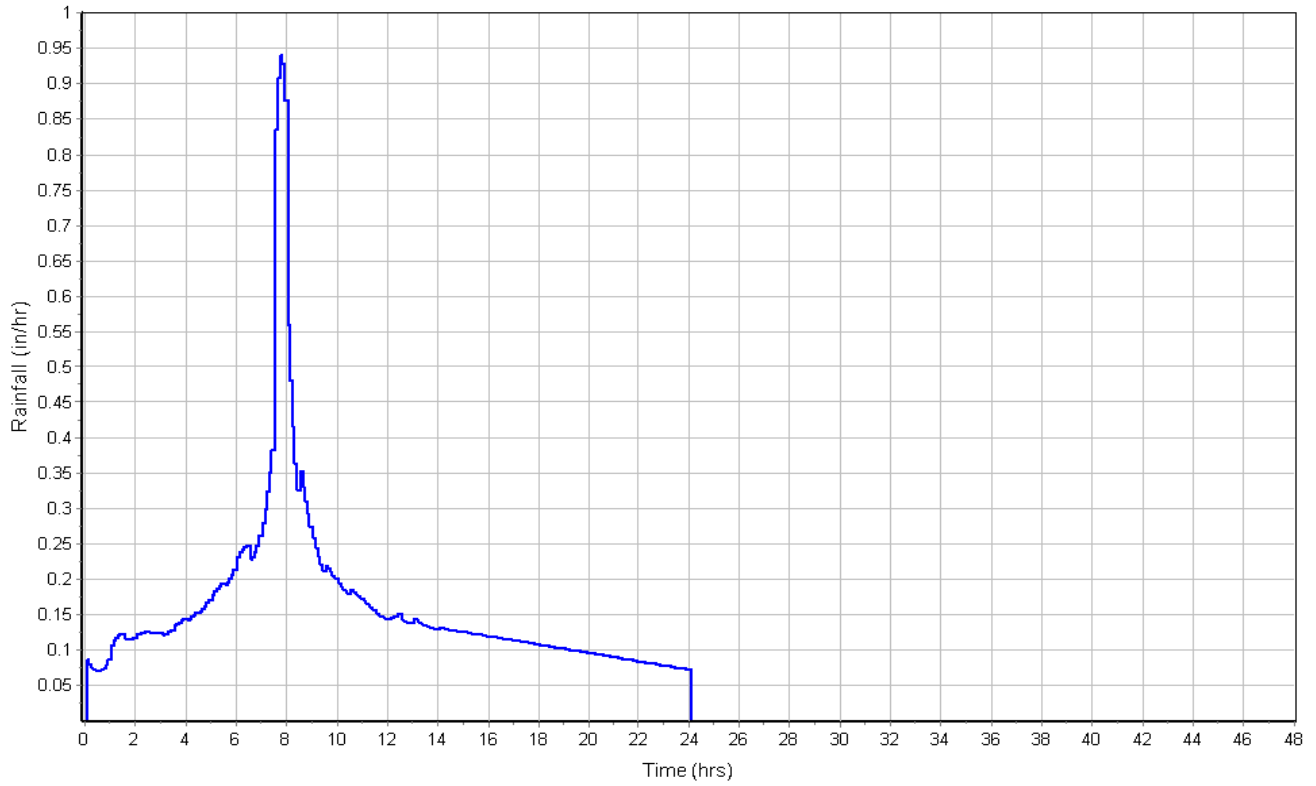
Subbasin Runoff Results

Total Rainfall (in) 3.90
Total Runoff (in) 3.39
Peak Runoff (cfs) 2.04
Weighted Curve Number 95.49
Time of Concentration (days hh:mm:ss) 0 00:05:00

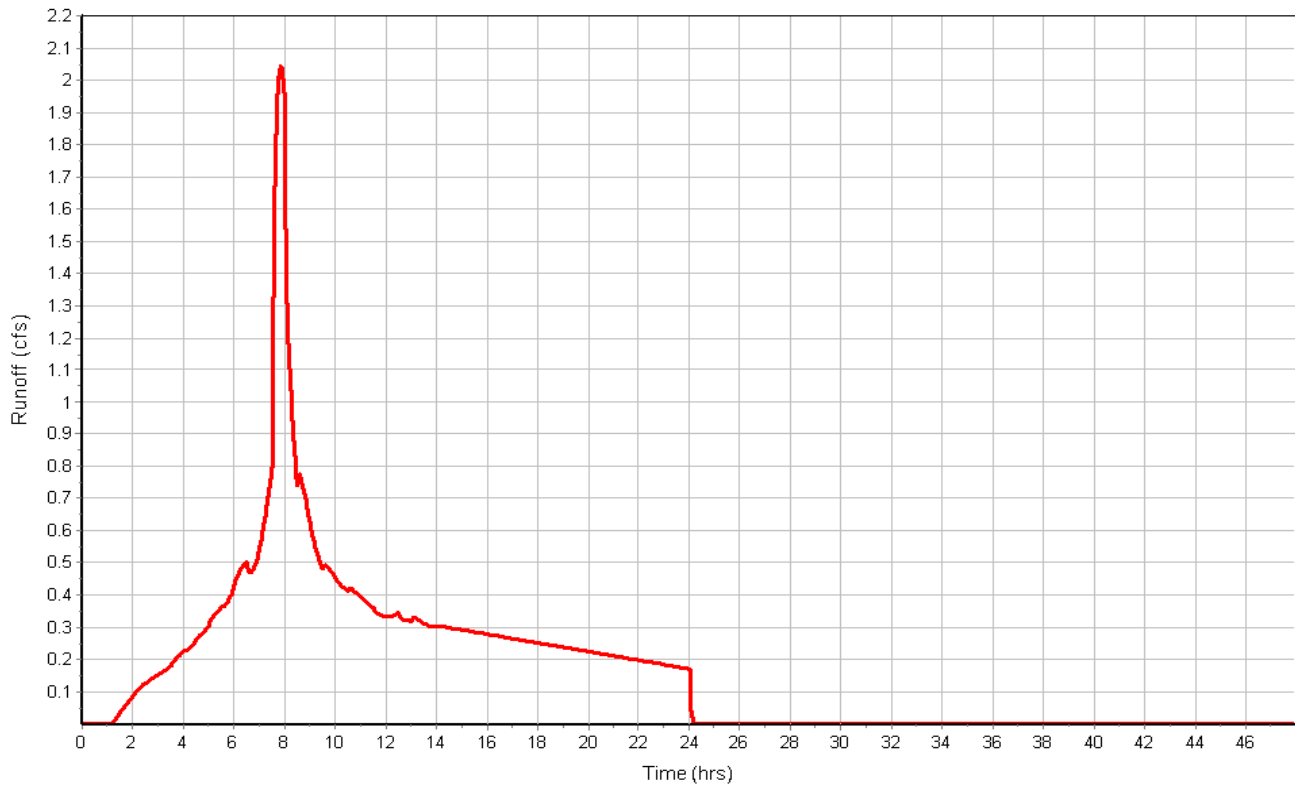
FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Subbasin : HED-LIDA_8A

Rainfall Intensity Graph



Runoff Hydrograph



FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Junction Input

SN	Element ID	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Ground/Rim (Max) Offset (ft)	Initial Water Elevation (ft)	Initial Water Depth (ft)	Surcharge Elevation (ft)	Surcharge Depth (ft)	Ponded Area (ft ²)	Minimum Pipe Cover (in)
1	COF-01A	238.00	250.00	12.00	238.00	0.00	1000.00	750.00	12.00	0.00
2	COF-01B	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
3	COF-01C	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
4	COF-02A	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
5	COF-02B	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
6	HED-01A	152.00	160.00	8.00	152.00	0.00	1000.00	840.00	12.00	0.00
7	HED-01B	157.00	165.00	8.00	157.00	0.00	165.00	0.00	12.00	0.00
8	HED-01C	157.80	165.00	7.20	157.80	0.00	159.80	-5.20	12.00	0.00
9	HED-01D	177.04	181.25	4.21	177.04	0.00	179.04	-2.21	12.00	0.00
10	HED-01E	181.00	192.00	11.00	181.00	0.00	1000.00	808.00	12.00	0.00
11	HED-01F	223.00	225.00	2.00	223.00	0.00	225.00	0.00	12.00	0.00
12	HED-01G	226.00	229.00	3.00	226.00	0.00	1000.00	771.00	12.00	0.00
13	HED-01H	229.00	232.00	3.00	229.00	0.00	1000.00	768.00	12.00	0.00
14	HED-01I	230.00	233.00	3.00	230.00	0.00	1000.00	767.00	12.00	0.00
15	HED-01J	231.00	233.00	2.00	231.00	0.00	1000.00	767.00	12.00	0.00
16	HED-01K	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
17	HED-01L	226.50	229.00	2.50	226.50	0.00	1000.00	771.00	12.00	0.00
18	HED-01M	224.00	230.00	6.00	224.00	0.00	1000.00	770.00	12.00	0.00
19	HED-01N	230.00	235.00	5.00	230.00	0.00	1000.00	765.00	12.00	0.00
20	HED-01O	234.00	238.00	4.00	234.00	0.00	1000.00	762.00	12.00	0.00
21	HED-01P	234.00	239.00	5.00	234.00	0.00	1000.00	761.00	12.00	0.00
22	HED-02A	171.00	177.00	6.00	171.00	0.00	1000.00	823.00	1000.00	0.00
23	HED-02B	171.30	177.00	5.70	171.30	0.00	1000.00	823.00	12.00	0.00
24	HED-02C	173.50	178.00	4.50	173.50	0.00	1000.00	822.00	12.00	0.00
25	HED-02D	174.60	184.00	9.40	174.60	0.00	1000.00	816.00	100.00	0.00
26	HED-02E	180.46	188.00	7.54	180.46	0.00	1000.00	812.00	12.00	0.00
27	HED-02F	181.76	187.96	6.20	181.76	0.00	1000.00	812.04	100.00	0.00
28	HED-02G	235.00	237.00	2.00	235.00	0.00	1000.00	763.00	12.00	0.00
29	HED-02H	236.00	238.00	2.00	236.00	0.00	1000.00	762.00	12.00	0.00
30	HED-02I	237.00	239.00	2.00	237.00	0.00	1000.00	761.00	12.00	0.00
31	HED-02J	237.00	250.00	13.00	237.00	0.00	1000.00	750.00	12.00	0.00
32	HED-02K	255.00	257.00	2.00	255.00	0.00	1000.00	743.00	12.00	0.00
33	HED-03A	183.00	190.00	7.00	183.00	0.00	1000.00	810.00	12.00	0.00
34	HED-03B	235.00	240.00	5.00	235.00	0.00	1000.00	760.00	12.00	0.00
35	HED-03C	236.00	250.00	14.00	236.00	0.00	1000.00	750.00	12.00	0.00
36	HED-03D	241.00	245.00	4.00	241.00	0.00	1000.00	755.00	12.00	0.00
37	HED-03E	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
38	HED-03F	250.00	251.00	1.00	250.00	0.00	1000.00	749.00	12.00	0.00
39	HED-03G	242.00	245.00	3.00	242.00	0.00	1000.00	755.00	12.00	0.00
40	HED-03H	243.00	245.00	2.00	243.00	0.00	1000.00	755.00	12.00	0.00
41	HED-03I	244.00	247.00	3.00	244.00	0.00	1000.00	753.00	12.00	0.00
42	HED-03J	245.00	247.00	2.00	245.00	0.00	1000.00	753.00	12.00	0.00
43	HED-03K	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
44	HED-03L	256.00	258.00	2.00	256.00	0.00	1000.00	742.00	12.00	0.00
45	HED-03t	238.00	243.00	5.00	238.00	0.00	1000.00	757.00	12.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Junction Results

SN	Element ID	Peak Inflow (cfs)	Peak Lateral Inflow (cfs)	Max HGL Elevation Attained (ft)	Max HGL Depth Attained (ft)	Max Surchage Depth Attained (ft)	Min Freeboard Attained (ft)	Average HGL Elevation Attained (ft)	Average HGL Depth Attained (ft)	Time of Max HGL Occurrence (days hh:mm)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	COF-01A	0.45	0.00	238.25	0.25	0.00	11.75	238.07	0.07	0 11:24	0 00:00	0.00	0.00
2	COF-01B	0.43	0.00	244.06	0.06	0.00	2.94	244.02	0.02	0 11:21	0 00:00	0.00	0.00
3	COF-01C	0.43	0.00	246.53	1.53	0.00	1.97	246.02	1.02	0 11:21	0 00:00	0.00	0.00
4	COF-02A	0.38	0.00	244.13	0.13	0.00	3.87	244.01	0.01	0 08:19	0 00:00	0.00	0.00
5	COF-02B	1.60	0.00	246.06	1.06	0.00	0.94	245.36	0.36	0 08:11	0 00:00	0.00	0.00
6	HED-01A	1.05	0.00	152.08	0.08	0.00	7.92	152.03	0.03	0 11:27	0 00:00	0.00	0.00
7	HED-01B	0.80	0.00	157.10	0.10	0.00	7.90	157.03	0.03	0 08:24	0 00:00	0.00	0.00
8	HED-01C	0.80	0.00	158.13	0.33	0.00	6.87	157.93	0.13	0 08:11	0 00:00	0.00	0.00
9	HED-01D	0.80	0.00	177.27	0.23	0.00	3.98	177.13	0.09	0 11:03	0 00:00	0.00	0.00
10	HED-01E	0.81	0.00	181.24	0.24	0.00	10.76	181.09	0.09	0 10:59	0 00:00	0.00	0.00
11	HED-01F	0.82	0.00	223.17	0.17	0.00	5.83	223.06	0.06	0 08:08	0 00:00	0.00	0.00
12	HED-01G	0.79	0.00	226.16	0.16	0.00	3.34	226.06	0.06	0 10:56	0 00:00	0.00	0.00
13	HED-01H	0.75	0.00	229.28	0.28	0.00	2.72	229.11	0.11	0 10:57	0 00:00	0.00	0.00
14	HED-01I	0.75	0.00	230.28	0.28	0.00	2.72	230.10	0.10	0 10:57	0 00:00	0.00	0.00
15	HED-01J	0.75	0.00	232.80	1.80	0.00	1.95	232.16	1.16	0 10:57	0 00:00	0.00	0.00
16	HED-01K	0.29	0.00	228.17	1.67	0.00	1.58	226.89	0.39	0 08:00	0 00:00	0.00	0.00
17	HED-01L	0.29	0.00	226.71	0.21	0.00	2.79	226.51	0.01	0 08:05	0 00:00	0.00	0.00
18	HED-01M	0.24	0.00	224.13	0.13	0.00	5.87	224.00	0.00	0 08:10	0 00:00	0.00	0.00
19	HED-01N	0.25	0.00	230.34	0.34	0.00	4.66	230.03	0.03	0 08:09	0 00:00	0.00	0.00
20	HED-01O	0.25	0.00	234.12	0.12	0.00	4.38	234.00	0.00	0 08:05	0 00:00	0.00	0.00
21	HED-01P	0.00	0.00	234.00	0.00	0.00	5.50	234.00	0.00	0 00:00	0 00:00	0.00	0.00
22	HED-02A	0.23	0.00	171.03	0.03	0.00	7.97	171.01	0.01	0 11:39	0 00:00	0.00	0.00
23	HED-02B	0.23	0.00	171.51	0.21	0.00	5.49	171.41	0.11	0 11:28	0 00:00	0.00	0.00
24	HED-02C	0.23	0.00	173.67	0.17	0.00	4.33	173.59	0.09	0 11:28	0 00:00	0.00	0.00
25	HED-02D	0.23	0.00	174.90	0.30	0.00	10.84	174.77	0.17	0 11:24	0 00:00	0.00	0.00
26	HED-02E	0.25	0.00	180.72	0.26	0.00	7.28	180.59	0.13	0 11:21	0 00:00	0.00	0.00
27	HED-02F	0.29	0.00	181.90	0.14	0.00	6.06	181.84	0.08	0 10:44	0 00:00	0.00	0.00
28	HED-02G	0.07	0.00	235.05	0.05	0.00	2.95	235.05	0.05	0 06:15	0 00:00	0.00	0.00
29	HED-02H	0.07	0.00	236.11	0.11	0.00	1.89	236.10	0.10	1 00:07	0 00:00	0.00	0.00
30	HED-02I	0.00	0.00	237.00	0.00	0.00	2.00	237.00	0.00	0 00:00	0 00:00	0.00	0.00
31	HED-02J	0.07	0.00	237.10	0.10	0.00	12.90	237.09	0.09	0 06:11	0 00:00	0.00	0.00
32	HED-02K	0.09	0.00	256.32	1.32	0.00	2.18	255.72	0.72	1 00:05	0 00:00	0.00	0.00
33	HED-03A	0.34	0.00	183.04	0.04	0.00	6.96	183.01	0.01	0 09:51	0 00:00	0.00	0.00
34	HED-03B	0.35	0.00	235.02	0.02	0.00	4.98	235.00	0.00	0 08:52	0 00:00	0.00	0.00
35	HED-03C	0.42	0.00	236.06	0.06	0.00	13.94	236.01	0.01	0 08:31	0 00:00	0.00	0.00
36	HED-03D	0.41	0.00	241.07	0.07	0.00	3.93	241.01	0.01	0 08:05	0 00:00	0.00	0.00
37	HED-03E	0.23	0.00	250.12	0.12	0.00	1.38	250.00	0.00	0 08:01	0 00:00	0.00	0.00
38	HED-03F	0.18	0.00	250.10	0.10	0.00	1.65	250.00	0.00	0 07:53	0 00:00	0.00	0.00
39	HED-03G	0.03	0.00	242.00	0.00	0.00	3.00	242.00	0.00	0 19:51	0 00:00	0.00	0.00
40	HED-03H	0.14	0.00	244.45	1.45	0.00	2.05	243.89	0.89	1 00:06	0 00:00	0.00	0.00
41	HED-03I	0.00	0.00	244.45	0.45	0.00	2.55	244.13	0.13	1 00:06	0 00:00	0.00	0.00
42	HED-03J	0.00	0.00	245.00	0.00	0.00	3.50	245.00	0.00	0 00:00	0 00:00	0.00	0.00
43	HED-03K	0.83	0.00	257.06	1.06	0.00	1.94	256.58	0.58	0 07:37	0 00:00	0.00	0.00
44	HED-03L	0.83	0.00	256.20	0.20	0.00	1.80	256.06	0.06	0 07:43	0 00:00	0.00	0.00
45	HED-03M	0.18	0.00	238.22	0.22	0.00	5.78	238.01	0.01	0 08:29	0 00:00	0.00	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Channel Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Slope (%)	Shape	Height (ft)	Width (ft)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow (cfs)	Flap Gate
1	COF-1A	10.00	238.00	0.00	238.00	0.00	0.00	0.0000	Rectangular	5.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
2	COF-1B	150.00	244.00	0.00	238.00	0.00	6.00	4.0000	Rectangular	1.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
3	COF-1C	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
4	COF-1E	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
5	COF-2B	1.00	245.00	0.00	246.00	2.00	-1.00	-100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
6	COF-2D	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
7	HED-01A	165.00	152.00	0.00	150.00	0.00	2.00	1.2100	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
8	HED-01B	805.00	157.00	0.00	152.00	0.00	5.00	0.6200	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
9	HED-01F	618.36	223.00	0.00	181.00	0.00	42.00	6.7900	Trapezoidal	6.000	37.000	0.0320	0.5000	0.5000	0.0000	0.00	No
10	HED-01I	5.00	228.00	0.00	228.50	2.00	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
11	HED-01J	20.00	227.00	0.50	228.00	2.00	-1.00	-5.0000	Rectangular	1.000	1.000	0.0320	0.5000	0.5000	0.0000	0.00	No
12	HED-01K	5.00	228.00	0.00	228.75	2.25	-0.75	-15.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
13	HED-01M	500.00	230.00	0.00	224.00	0.00	6.00	1.2000	Triangular	2.000	8.000	0.0320	0.5000	0.5000	0.0000	0.00	No
14	HED-01O	5.00	237.00	0.00	237.50	3.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
15	HED-01Q	5.00	238.00	0.00	238.50	4.50	-0.50	-10.0000	Rectangular	1.000	2.500	0.0320	0.5000	0.5000	0.0000	0.00	No
16	HED-01T	1.00	232.75	1.75	231.00	1.00	1.75	175.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
17	HED-01V	5.00	231.00	0.00	231.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
18	HED-02A	930.00	171.00	0.00	152.00	0.00	19.00	2.0400	Rectangular	8.000	15.000	0.0320	0.5000	0.5000	0.0000	0.00	No
19	HED-02E	486.00	180.46	0.00	178.24	3.64	2.22	0.4600	Trapezoidal	7.500	49.000	0.0800	0.5000	0.8000	0.0000	0.00	No
20	HED-02G	1130.10	235.00	0.00	181.76	0.00	53.24	4.7100	Trapezoidal	3.000	19.000	0.0320	0.5000	0.5000	0.0000	0.00	No
21	HED-02K	1.00	256.50	1.50	237.00	0.00	19.50	1950.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
22	HED-02L	44.02	237.00	0.00	236.00	0.00	1.00	2.2700	Rectangular	2.000	4.000	0.0320	0.5000	0.5000	0.0000	0.00	No
23	HED-02O	5.00	255.00	0.00	255.00	0.00	0.00	0.0000	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
24	HED-03A	770.00	181.76	0.00	183.00	0.00	-1.24	-0.1600	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
25	HED-03B	1100.00	235.00	0.00	183.00	0.00	52.00	4.7300	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
26	HED-03C	700.00	236.00	0.00	235.00	0.00	1.00	0.1400	Rectangular	5.000	20.000	0.0300	0.5000	0.5000	0.0000	0.00	No
27	HED-03F	400.00	241.00	0.00	236.00	0.00	5.00	1.2500	Rectangular	2.000	10.000	0.0320	0.5000	0.5000	0.0000	0.00	No
28	HED-03G	10.00	242.00	0.00	241.00	0.00	1.00	10.0000	Rectangular	2.000	5.000	0.0320	0.5000	0.5000	0.0000	0.00	No
29	HED-03H	1.00	244.50	1.50	242.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
30	HED-03K	5.00	256.00	0.00	256.00	0.00	0.00	0.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
31	HED-03M	5.00	250.00	0.00	250.75	0.75	-0.75	-15.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
32	HED-03O	5.00	250.00	0.00	250.50	0.50	-0.50	-10.0000	Rectangular	1.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
33	HED-03P	1.00	257.00	1.00	256.00	0.00	1.00	100.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
34	HED-03R	5.00	245.00	0.00	245.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
35	HED-03S	1.00	246.50	1.50	244.00	0.00	2.50	250.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No
36	HED-03U	5.00	243.00	0.00	243.00	0.00	0.00	0.0000	Rectangular	2.000	2.000	0.0320	0.5000	0.5000	0.0000	0.00	No

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Channel Results

SN	Element ID	Peak Flow (cfs)	Time of Peak Flow Occurrence (days hh:mm)	Design Flow Capacity (cfs)	Peak Flow/Design Flow Ratio	Peak Flow Velocity (ft/sec)	Travel Time (min)	Peak Flow Depth (ft)	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged (min)	Froude Number	Reported Condition
1	COF-1A	0.45	0 11:24	42.77	0.01	0.18	0.93	0.25	0.05	0.00		
2	COF-1B	0.43	0 11:21	37.11	0.01	0.55	4.55	0.16	0.16	0.00		
3	COF-1C	0.41	0 11:21	224.13	0.00	4.49	0.00	0.05	0.02	0.00		
4	COF-1E	0.43	0 11:21	7.05	0.06	0.06	1.39	1.53	0.76	0.00		
5	COF-2B	1.60	0 15:29	141.75	0.01	1.43	0.01	0.54	0.28	0.00		
6	COF-2D	1.75	0 15:29	2.00	0.87	0.86	0.10	1.03	0.52	0.00		
7	HED-01A	1.03	0 11:27	1512.53	0.00	0.91	3.02	0.08	0.01	0.00		
8	HED-01B	0.83	0 11:09	1082.72	0.00	0.68	19.73	0.08	0.01	0.00		
9	HED-01F	0.81	0 08:08	2813.13	0.00	2.48	4.16	0.21	0.03	0.00		
10	HED-01I	0.29	0 08:05	24.81	0.01	0.37	0.23	0.31	0.31	0.00		
11	HED-01J	0.29	0 08:00	4.99	0.06	0.52	0.64	0.56	0.56	0.00		
12	HED-01K	3.93	0 18:46	30.39	0.13	3.05	0.03	0.43	0.51	0.00		
13	HED-01M	0.24	0 08:09	37.78	0.01	2.13	3.91	0.23	0.12	0.00		
14	HED-01O	0.25	0 08:05	24.81	0.01	0.33	0.25	0.31	0.31	0.00		
15	HED-01Q	0.00	0 00:00	24.81	0.00	0.00		0.18	0.18	0.00		
16	HED-01T	0.70	0 10:57	187.52	0.00	6.95	0.00	0.05	0.03	0.00		
17	HED-01V	0.75	0 10:57	16.66	0.05	0.04	2.08	1.80	0.90	0.00		
18	HED-02A	0.23	0 11:39	1963.65	0.00	0.34	45.59	0.05	0.01	0.00		
19	HED-02E	0.23	0 11:21	614.42	0.00	0.35	23.14	0.15	0.02	0.00		
20	HED-02G	0.07	1 00:10	396.58	0.00	1.56	12.07	0.09	0.03	0.00		
21	HED-02K	0.00	0 00:00	625.97	0.00	0.00		0.05	0.02	0.00		
22	HED-02L	0.00	0 00:00	55.99	0.00	0.00		0.06	0.03	0.00		
23	HED-02O	0.07	1 20:56	16.66	0.00	0.11	0.76	1.32	0.66	0.00		
24	HED-03A	0.22	0 09:51	443.56	0.00	0.14	91.67	0.09	0.02	0.00		
25	HED-03B	0.34	0 08:53	2403.19	0.00	0.89	20.60	0.03	0.01	0.00		
26	HED-03C	0.17	0 08:40	417.77	0.00	0.22	53.03	0.04	0.01	0.00		
27	HED-03F	0.42	0 08:08	131.71	0.00	0.81	8.23	0.05	0.03	0.00		
28	HED-03G	0.01	0 19:51	157.53	0.00	0.19	0.88	0.04	0.02	0.00		
29	HED-03H	0.00	0 00:00	224.13	0.00	0.00		0.00	0.00	0.00		
30	HED-03K	0.83	0 07:37	0.83	1.00	0.41	0.20	1.00	1.00	1119.00		
31	HED-03M	0.18	0 08:00	22.66	0.01	0.21	0.40	0.42	0.42	0.00		
32	HED-03O	0.23	0 08:02	18.50	0.01	0.36	0.23	0.31	0.31	0.00		
33	HED-03P	0.81	0 07:37	141.75	0.01	3.08	0.01	0.13	0.07	0.00		
34	HED-03R	0.00	0 00:00	2.00	0.00	0.00		0.00	0.00	0.00		
35	HED-03S	0.00	0 00:00	224.13	0.00	0.00		0.22	0.11	0.00		
36	HED-03U	0.14	0 12:28	2.00	0.07	0.12	0.69	1.45	0.72	0.00		

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Pipe Input

SN	Element ID	Length (ft)	Inlet Invert Elevation (ft)	Inlet Invert Offset (ft)	Outlet Invert Elevation (ft)	Outlet Invert Offset (ft)	Total Drop (ft)	Average Pipe Slope (%)	Pipe Shape	Pipe Diameter or Height (in)	Pipe Width (in)	Manning's Roughness	Entrance Losses	Exit/Bend Losses	Additional Losses	Initial Flow	Flap Gate	No. of Barrels
1	COF-01D	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
2	COF-2A	400.00	244.00	0.00	238.00	0.00	6.00	1.5000	CIRCULAR	18.000	18.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
3	COF-2C	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.480	0.480	0.0130	0.5000	0.5000	0.0000	0.00	No	1
4	HED-01C	93.73	157.80	0.00	157.00	0.00	0.80	0.8500	CIRCULAR	24.000	24.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
5	HED-01D	1201.66	177.04	0.00	158.00	0.20	19.04	1.5800	CIRCULAR	24.000	24.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
6	HED-01E	93.57	181.00	0.00	177.24	0.20	3.76	4.0200	CIRCULAR	12.000	12.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
7	HED-01G	20.00	226.00	0.00	223.00	0.00	3.00	15.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
8	HED-01H	50.00	226.50	0.00	226.00	0.00	0.50	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
9	HED-01L	47.37	224.00	0.00	223.00	0.00	1.00	2.1100	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
10	HED-01N	75.00	234.00	0.00	230.00	0.00	4.00	5.3300	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
11	HED-01P	65.00	234.00	0.00	230.00	0.00	4.00	6.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
12	HED-01R	50.00	230.00	0.00	229.00	0.00	1.00	2.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
13	HED-01S	100.00	229.00	0.00	228.00	2.00	1.00	1.0000	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
14	HED-01U	1.00	231.00	0.00	230.00	0.00	1.00	100.0000	CIRCULAR	0.960	0.960	0.0130	0.5000	0.5000	0.0000	0.00	No	1
15	HED-02B	81.05	171.30	0.00	171.00	0.00	0.30	0.3700	CIRCULAR	36.000	36.000	0.0130	0.5000	0.6000	0.0000	0.00	No	1
16	HED-02C	306.01	173.50	0.00	171.30	0.00	2.20	0.7200	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
17	HED-02D	744.87	174.60	0.00	173.50	0.00	1.10	0.1500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.8000	0.0000	0.00	No	1
18	HED-02F	165.26	181.76	0.00	180.46	0.00	1.30	0.7900	CIRCULAR	36.000	36.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
19	HED-02H	100.00	236.00	0.00	235.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
20	HED-02I	100.00	237.00	0.00	236.00	0.00	1.00	1.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
21	HED-02J	1.00	255.00	0.00	237.00	0.00	18.00	1800.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
22	HED-03D	500.00	238.00	0.00	235.00	0.00	3.00	0.6000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
23	HED-03E	47.11	242.00	0.00	242.50	4.50	-0.50	-1.0600	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
24	HED-03I	200.00	244.00	0.00	243.50	0.50	0.50	0.2500	CIRCULAR	18.000	18.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
25	HED-03J	200.00	256.00	0.00	243.00	0.00	13.00	6.5000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
26	HED-03L	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0130	0.5000	0.5000	0.0000	0.00	No	1
27	HED-03N	100.00	250.00	0.00	241.00	0.00	9.00	9.0000	CIRCULAR	12.000	12.000	0.0150	0.5000	0.5000	0.0000	0.00	No	1
28	HED-03Q	1.00	256.00	0.00	256.00	0.00	0.00	0.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
29	HED-03T	1.00	245.00	0.00	244.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1
30	HED-03V	1.00	243.00	0.00	242.00	0.00	1.00	100.0000	CIRCULAR	0.720	0.720	0.0130	0.5000	0.5000	0.0000	0.00	No	1

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Pipe Results

SN	Element ID	Peak Flow	Time of Peak Flow Occurrence	Design Flow Capacity	Peak Flow/Design Flow Ratio	Peak Flow Velocity	Travel Time	Peak Flow Depth	Peak Flow Depth/Total Depth Ratio	Total Time Surcharged	Froude Number	Reported Condition
		(cfs)	(days hh:mm)	(cfs)		(ft/sec)	(min)	(ft)		(min)		
1	COF-01D	0.03	0 11:21	0.02	1.17	10.57	0.00	0.06	0.99	0.00		> CAPACITY
2	COF-2A	0.16	0 08:21	11.15	0.01	2.83	2.36	0.15	0.10	0.00		Calculated
3	COF-2C	0.01	0 18:14	0.01	1.32	12.46	0.00	0.04	1.00	217.00		SURCHARGED
4	HED-01C	0.80	0 11:03	20.90	0.04	4.55	0.34	0.21	0.10	0.00		Calculated
5	HED-01D	0.80	0 11:03	28.48	0.03	3.96	5.06	0.23	0.12	0.00		Calculated
6	HED-01E	0.80	0 10:59	7.14	0.11	5.77	0.27	0.23	0.23	0.00		Calculated
7	HED-01G	0.79	0 10:56	40.68	0.02	7.88	0.04	0.16	0.11	0.00		Calculated
8	HED-01H	0.29	0 08:05	3.56	0.08	3.17	0.26	0.17	0.17	0.00		Calculated
9	HED-01L	0.23	0 08:10	15.26	0.02	2.55	0.31	0.15	0.10	0.00		Calculated
10	HED-01N	0.25	0 08:05	8.23	0.03	3.53	0.35	0.23	0.23	0.00		Calculated
11	HED-01P	0.00	0 00:00	26.06	0.00	0.00		0.17	0.11	0.00		Calculated
12	HED-01R	0.75	0 10:57	5.04	0.15	4.10	0.20	0.28	0.28	0.00		Calculated
13	HED-01S	0.75	0 10:58	10.50	0.07	3.32	0.50	0.28	0.19	0.00		Calculated
14	HED-01U	0.05	1 00:22	0.05	1.11	9.75	0.00	0.08	1.00	862.00		SURCHARGED
15	HED-02B	0.23	0 11:30	40.58	0.01	2.58	0.52	0.12	0.04	0.00		Calculated
16	HED-02C	0.23	0 11:28	8.91	0.03	1.84	2.77	0.19	0.12	0.00		Calculated
17	HED-02D	0.23	0 11:25	4.04	0.06	1.32	9.40	0.23	0.16	0.00		Calculated
18	HED-02F	0.25	0 10:44	59.16	0.00	1.46	1.89	0.20	0.07	0.00		Calculated
19	HED-02H	0.07	1 00:07	3.56	0.02	2.44	0.68	0.08	0.08	0.00		Calculated
20	HED-02I	0.07	0 06:11	3.56	0.02	1.66	1.00	0.10	0.10	0.00		Calculated
21	HED-02J	0.07	1 23:26	0.09	0.77	23.64	0.00	0.06	1.00	2470.00		SURCHARGED
22	HED-03D	0.18	0 08:46	2.76	0.06	3.33	2.50	0.12	0.12	0.00		Calculated
23	HED-03E	0.18	0 08:46	10.82	0.02	0.47	1.67	0.40	0.27	0.00		Calculated
24	HED-03I	0.00	0 10:50	5.25	0.00	0.01	333.33	0.70	0.46	0.00		Calculated
25	HED-03J	0.83	0 07:43	9.08	0.09	8.65	0.39	0.58	0.58	0.00		Calculated
26	HED-03L	0.18	0 08:00	10.69	0.02	7.15	0.23	0.08	0.08	0.00		Calculated
27	HED-03N	0.23	0 08:02	9.26	0.02	6.73	0.25	0.10	0.10	0.00		Calculated
28	HED-03Q	0.02	0 05:42	0.00	23.05	5.62	0.00	0.06	1.00	1109.00		SURCHARGED
29	HED-03T	0.00	0 00:00	0.02	0.00	0.00		0.03	0.50	0.00		Calculated
30	HED-03V	0.03	1 00:13	0.02	1.17	15.30	0.00	0.03	0.54	0.00		> CAPACITY

Storage Nodes

Storage Node : LIDA-01

Input Data

Invert Elevation (ft) 228.00
 Max (Rim) Elevation (ft) 229.00
 Max (Rim) Offset (ft) 1.00
 Initial Water Elevation (ft) 228.00
 Initial Water Depth (ft) 0.00
 Ponded Area (ft²) 938.00
 Evaporation Loss 0.00

Infiltration/Exfiltration

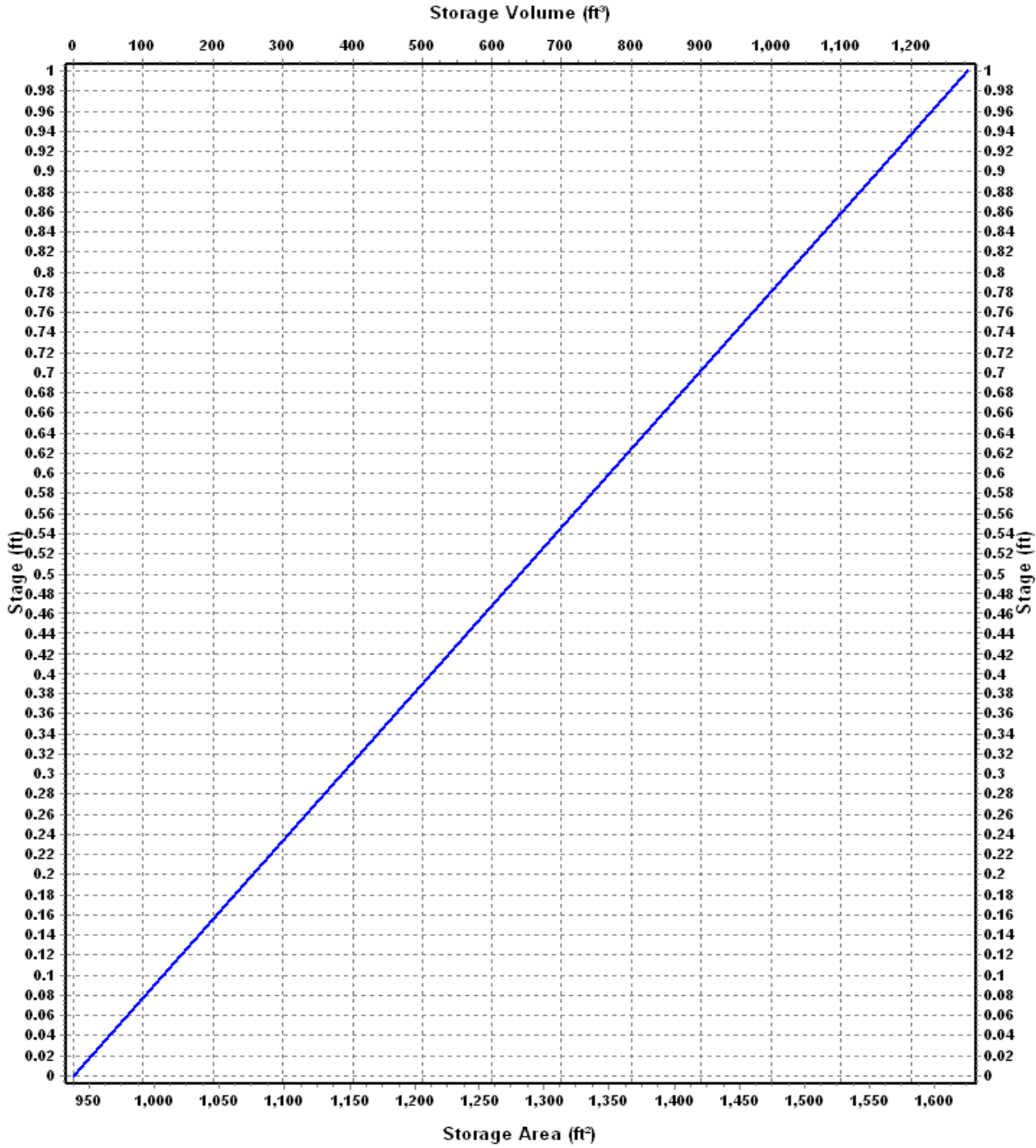
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-01

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	938	0.000
1	1625	1281.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-01 (continued)

Output Summary Results

Peak Inflow (cfs)	0.37
Peak Lateral Inflow (cfs)	0.37
Peak Outflow (cfs)	0.29
Peak Exfiltration Flow Rate (cfm)	3.69
Max HGL Elevation Attained (ft)	228.57
Max HGL Depth Attained (ft)	0.57
Average HGL Elevation Attained (ft)	228.13
Average HGL Depth Attained (ft)	0.13
Time of Max HGL Occurrence (days hh:mm)	0 08:05
Total Exfiltration Volume (1000-ft ³)	4.331
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-02

Input Data

Invert Elevation (ft) 228.00
Max (Rim) Elevation (ft) 229.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 228.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 562.00
Evaporation Loss 0.00

Infiltration/Exfiltration

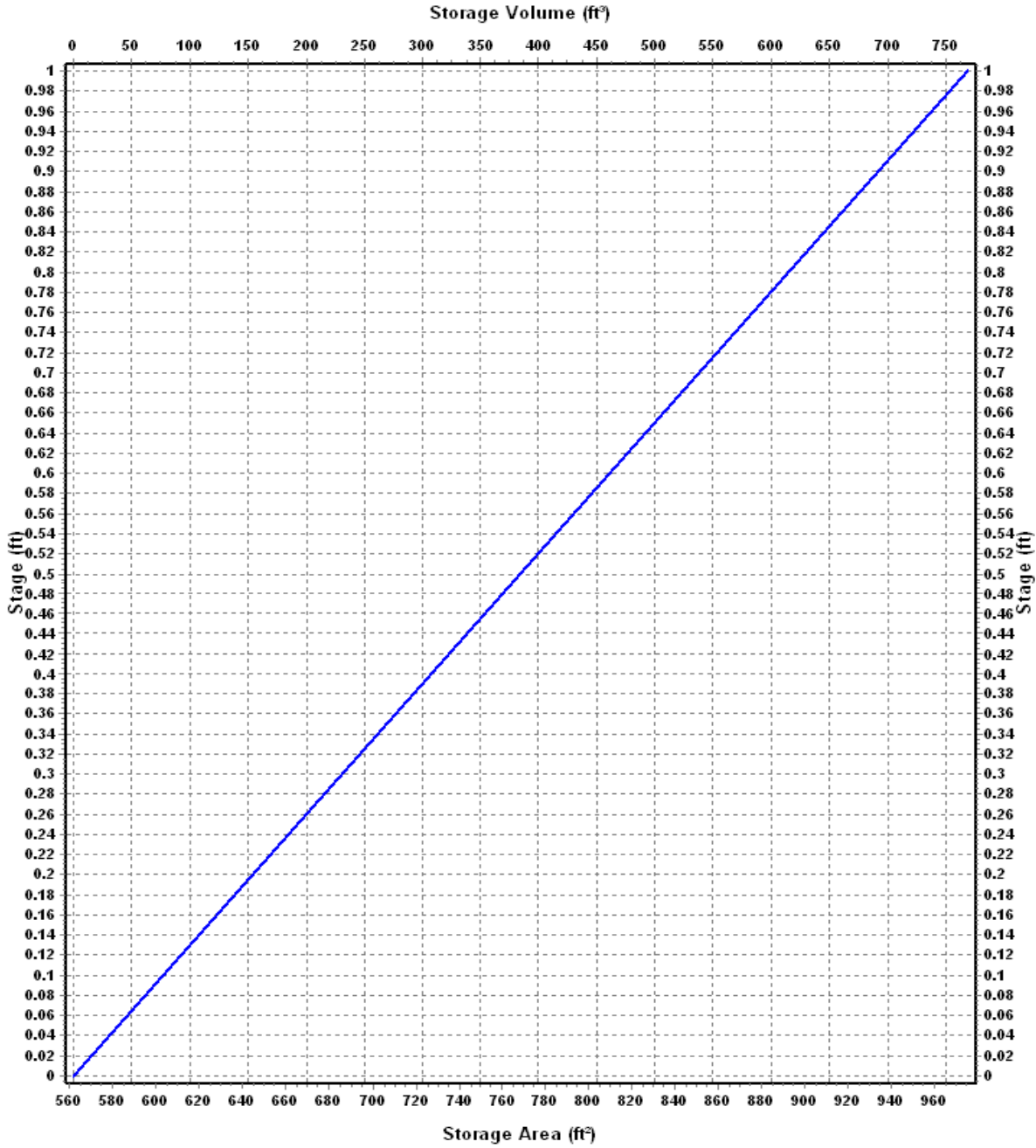
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-02

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	562	0.000
1	975	768.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-02 (continued)

Output Summary Results

Peak Inflow (cfs)	3.97
Peak Lateral Inflow (cfs)	0.34
Peak Outflow (cfs)	0.29
Peak Exfiltration Flow Rate (cfm)	2.49
Max HGL Elevation Attained (ft)	228.81
Max HGL Depth Attained (ft)	0.81
Average HGL Elevation Attained (ft)	228.30
Average HGL Depth Attained (ft)	0.3
Time of Max HGL Occurrence (days hh:mm)	0 08:00
Total Exfiltration Volume (1000-ft ³)	3.462
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-03

Input Data

Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 238.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

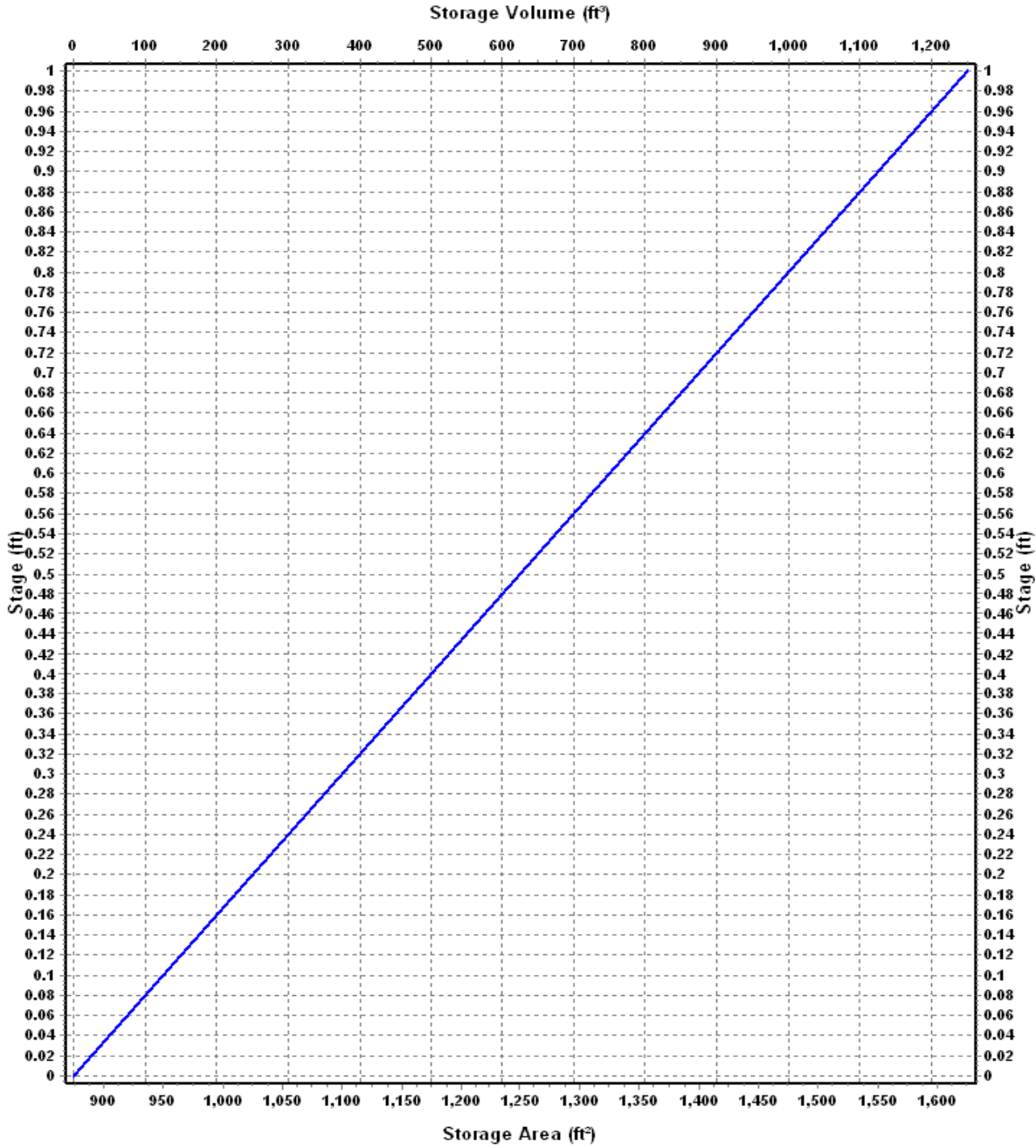
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-03

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	875	0.000
1	1625	1250.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-03 (continued)

Output Summary Results

Peak Inflow (cfs)	0.34
Peak Lateral Inflow (cfs)	0.34
Peak Outflow (cfs)	0.25
Peak Exfiltration Flow Rate (cfm)	3.61
Max HGL Elevation Attained (ft)	237.56
Max HGL Depth Attained (ft)	0.56
Average HGL Elevation Attained (ft)	237.12
Average HGL Depth Attained (ft)	0.12
Time of Max HGL Occurrence (days hh:mm)	0 08:05
Total Exfiltration Volume (1000-ft ³)	4.063
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-04

Input Data

Invert Elevation (ft) 238.00
Max (Rim) Elevation (ft) 239.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 238.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1875.00
Evaporation Loss 0.00

Infiltration/Exfiltration

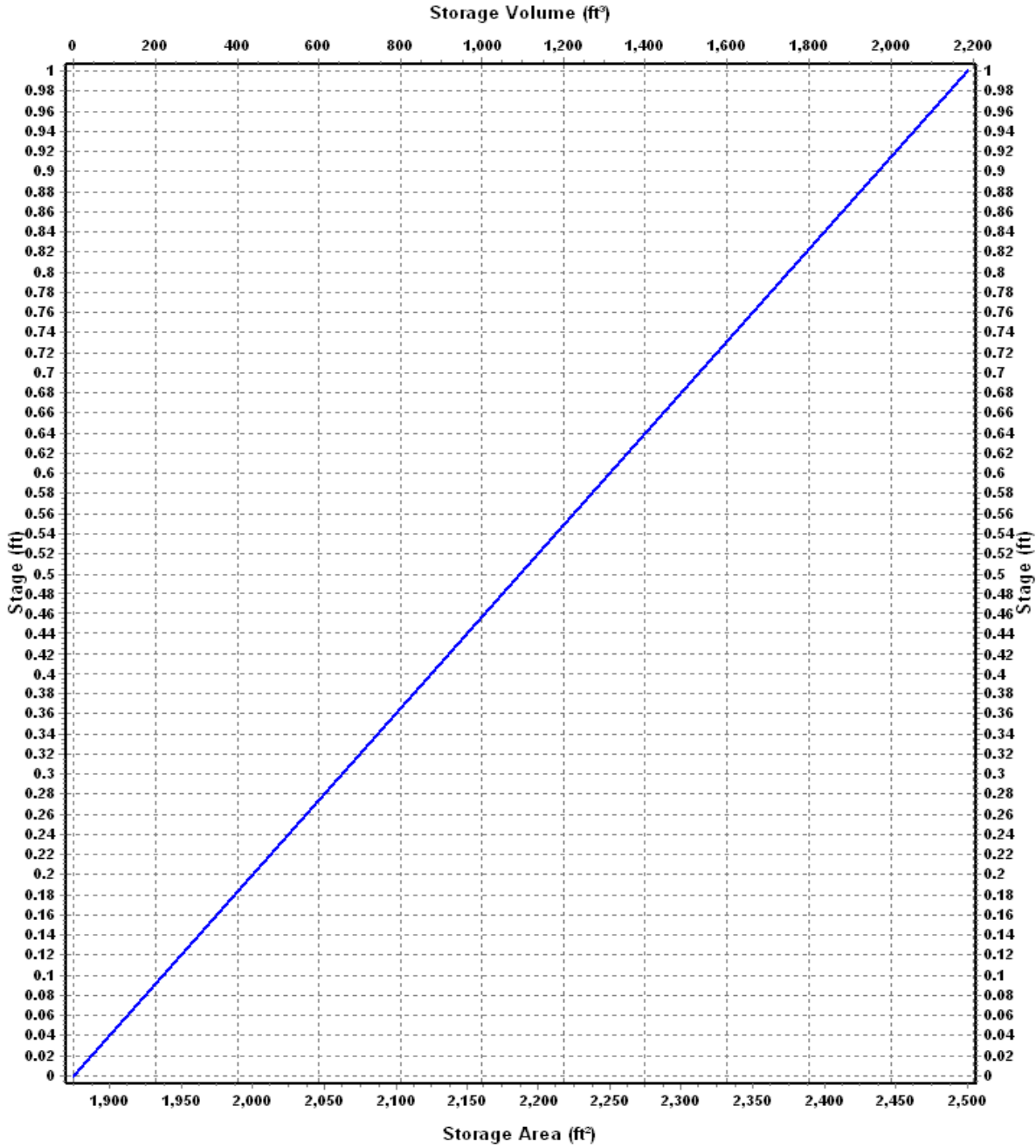
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-04

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	1875	0.000
1	2500	2187.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-04 (continued)

Output Summary Results

Peak Inflow (cfs)	0.36
Peak Lateral Inflow (cfs)	0.36
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	5.82
Max HGL Elevation Attained (ft)	238.35
Max HGL Depth Attained (ft)	0.35
Average HGL Elevation Attained (ft)	238.04
Average HGL Depth Attained (ft)	0.04
Time of Max HGL Occurrence (days hh:mm)	0 09:21
Total Exfiltration Volume (1000-ft ³)	4.971
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-05

Input Data

Invert Elevation (ft) 255.00
Max (Rim) Elevation (ft) 257.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 255.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 12000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

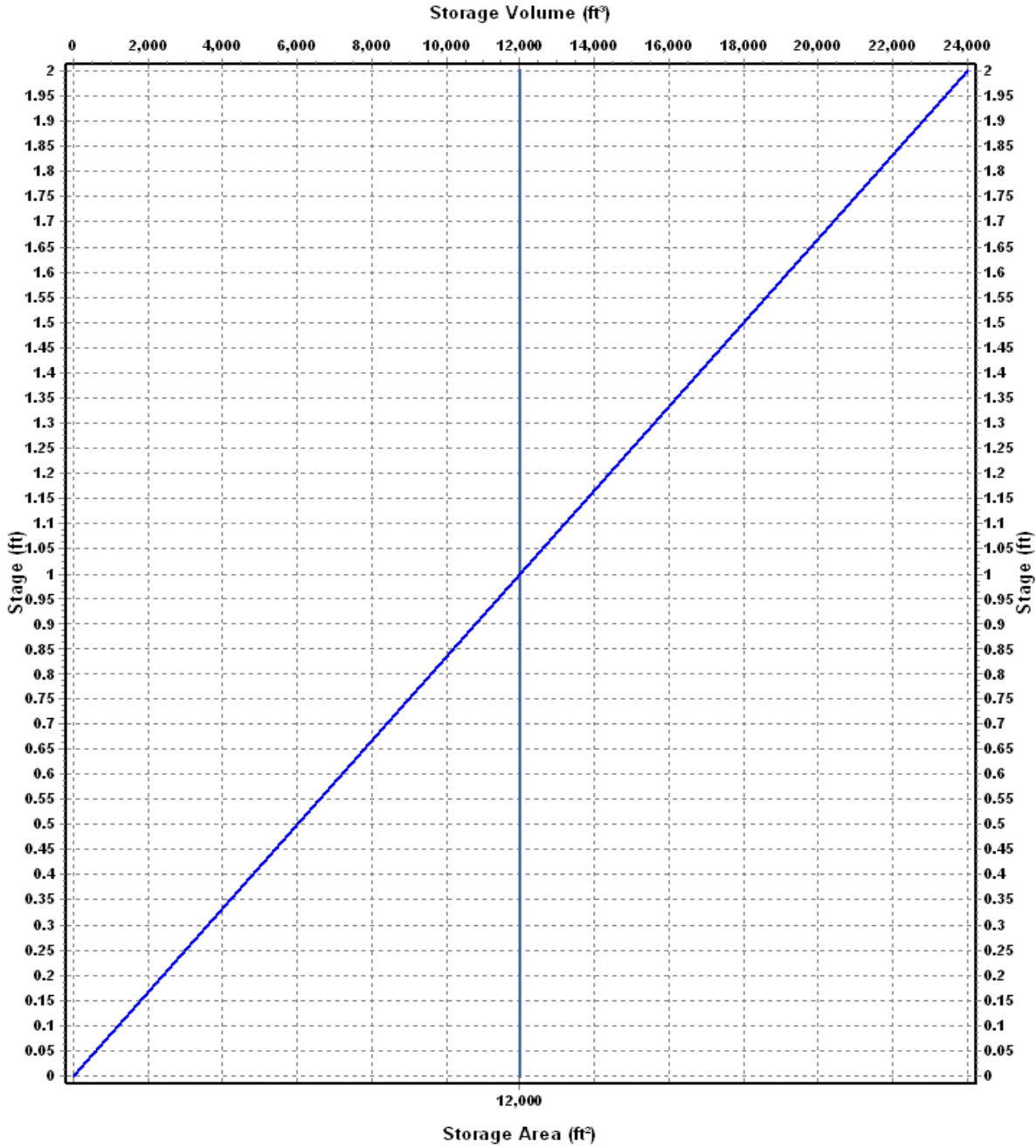
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-05

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	12000	0.000
2	12000	24000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-05 (continued)

Output Summary Results

Peak Inflow (cfs)	2.06
Peak Lateral Inflow (cfs)	2.06
Peak Outflow (cfs)	0.07
Peak Exfiltration Flow Rate (cfm)	8.33
Max HGL Elevation Attained (ft)	256.32
Max HGL Depth Attained (ft)	1.32
Average HGL Elevation Attained (ft)	255.72
Average HGL Depth Attained (ft)	0.72
Time of Max HGL Occurrence (days hh:mm)	1 00:05
Total Exfiltration Volume (1000-ft ³)	22.526
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-06A

Input Data

Invert Elevation (ft) 231.00
Max (Rim) Elevation (ft) 233.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 231.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 10000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

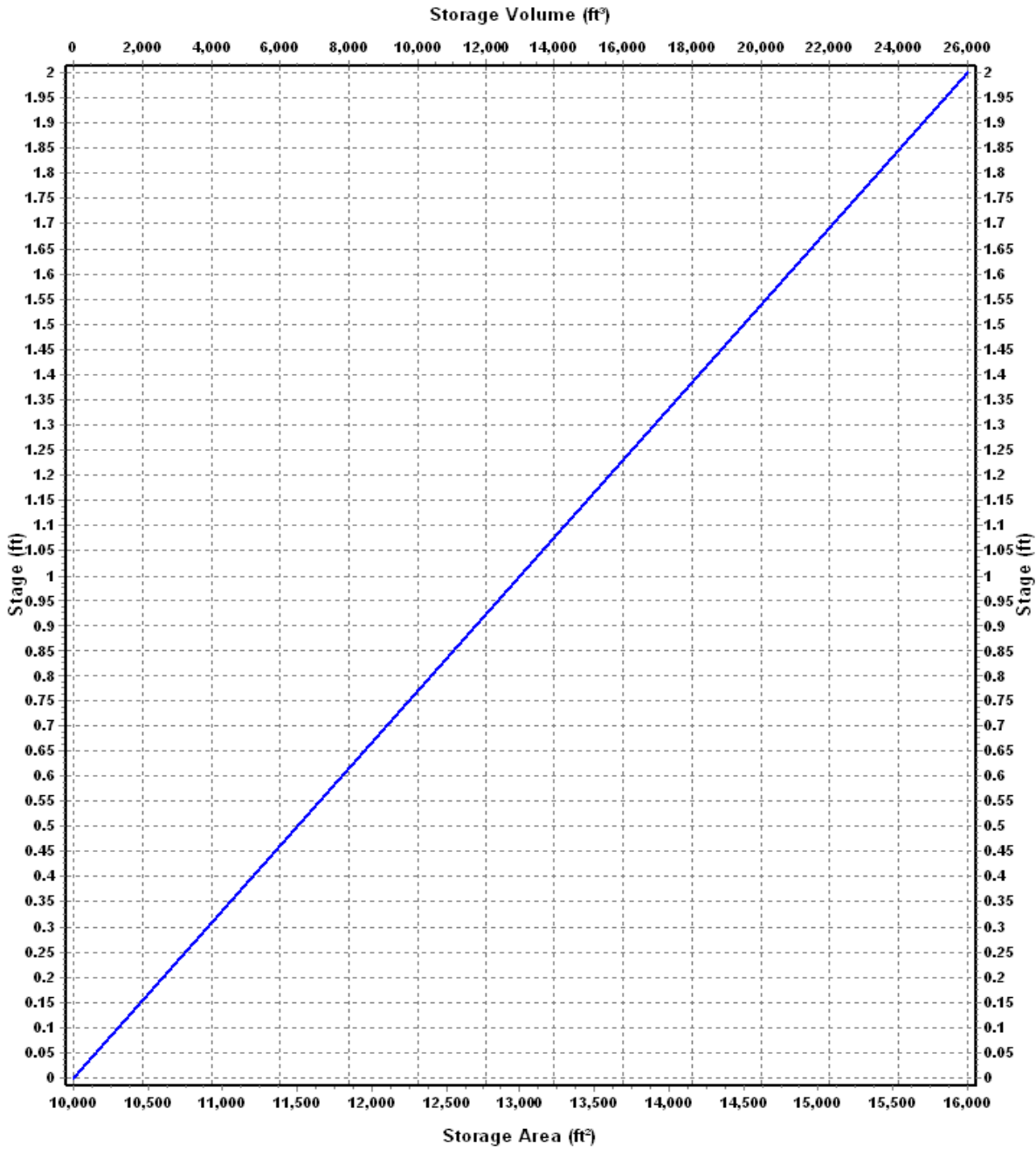
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-06A

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	10000	0.000
2	16000	26000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-06A (continued)

Output Summary Results

Peak Inflow (cfs)	4.24
Peak Lateral Inflow (cfs)	4.24
Peak Outflow (cfs)	0.75
Peak Exfiltration Flow Rate (cfm)	10.70
Max HGL Elevation Attained (ft)	232.80
Max HGL Depth Attained (ft)	1.8
Average HGL Elevation Attained (ft)	232.16
Average HGL Depth Attained (ft)	1.16
Time of Max HGL Occurrence (days hh:mm)	0 10:57
Total Exfiltration Volume (1000-ft ³)	27.875
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-06B

Input Data

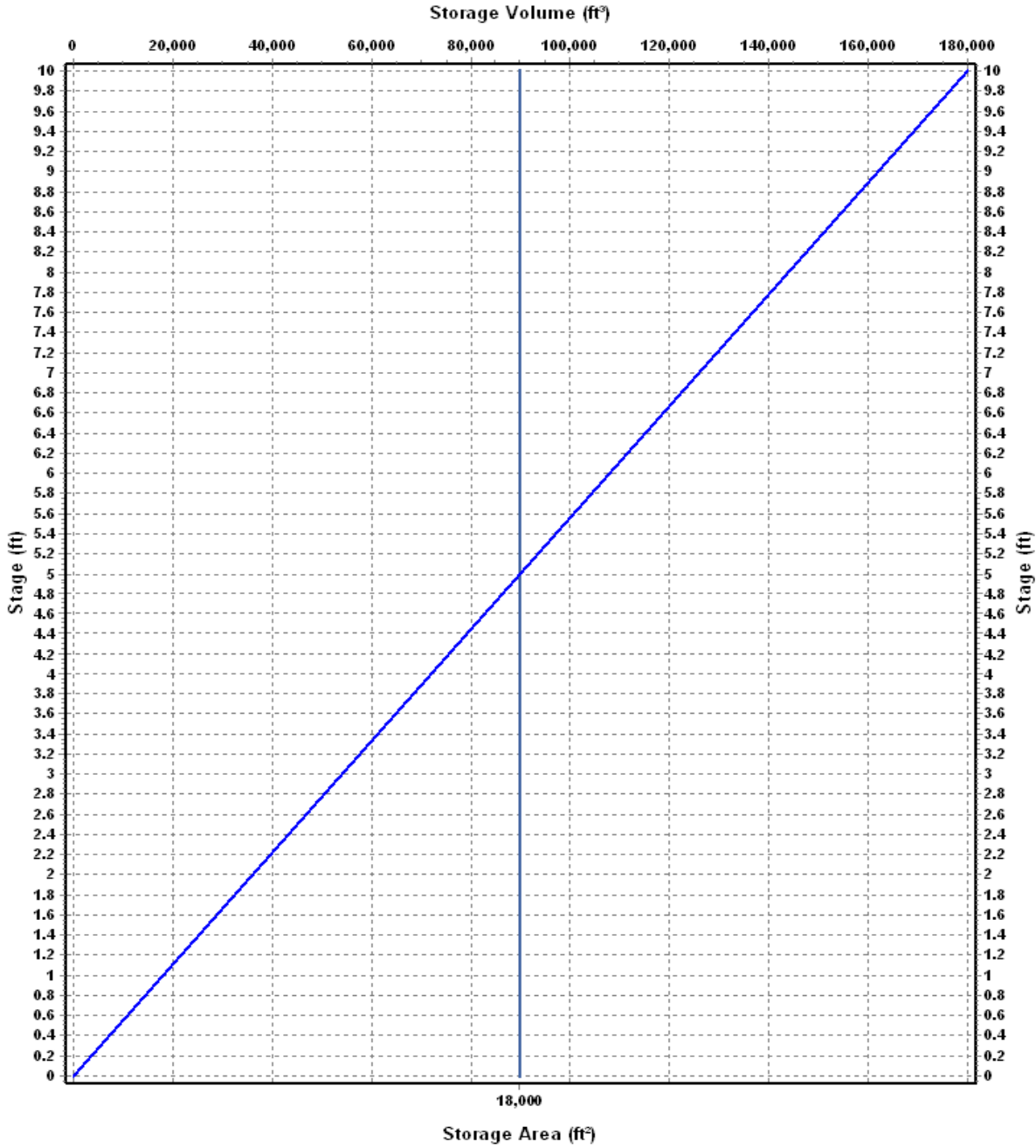
Invert Elevation (ft) 237.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 10.00
Initial Water Elevation (ft) 237.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18000.00
Evaporation Loss 0.00

Storage Area Volume Curves

Storage Curve : LIDA-06B

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	18000	0.000
10	18000	180000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-06B (continued)

Output Summary Results

Peak Inflow (cfs)	0.39
Peak Lateral Inflow (cfs)	0.39
Peak Outflow (cfs)	0.04
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	237.16
Max HGL Depth Attained (ft)	0.16
Average HGL Elevation Attained (ft)	237.09
Average HGL Depth Attained (ft)	0.09
Time of Max HGL Occurrence (days hh:mm)	0 20:15
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-07

Input Data

Invert Elevation (ft) 242.00
Max (Rim) Elevation (ft) 243.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 242.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 2812.00
Evaporation Loss 0.00

Infiltration/Exfiltration

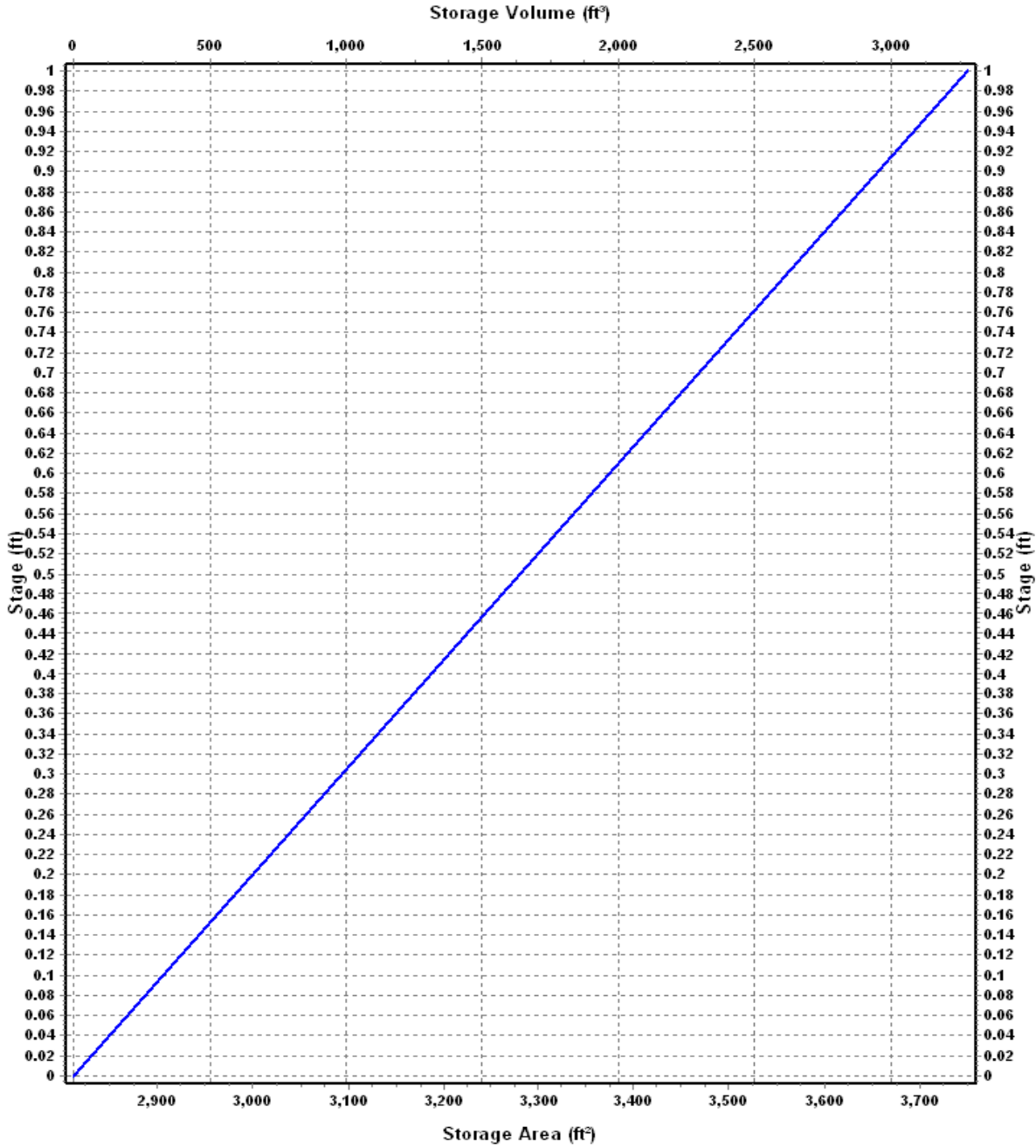
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-07

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	2812	0.000
1	3750	3281.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-07 (continued)

Output Summary Results

Peak Inflow (cfs)	0.90
Peak Lateral Inflow (cfs)	0.90
Peak Outflow (cfs)	0.18
Peak Exfiltration Flow Rate (cfm)	9.53
Max HGL Elevation Attained (ft)	242.66
Max HGL Depth Attained (ft)	0.66
Average HGL Elevation Attained (ft)	242.14
Average HGL Depth Attained (ft)	0.14
Time of Max HGL Occurrence (days hh:mm)	0 08:46
Total Exfiltration Volume (1000-ft ³)	11.051
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-08B

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 5650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

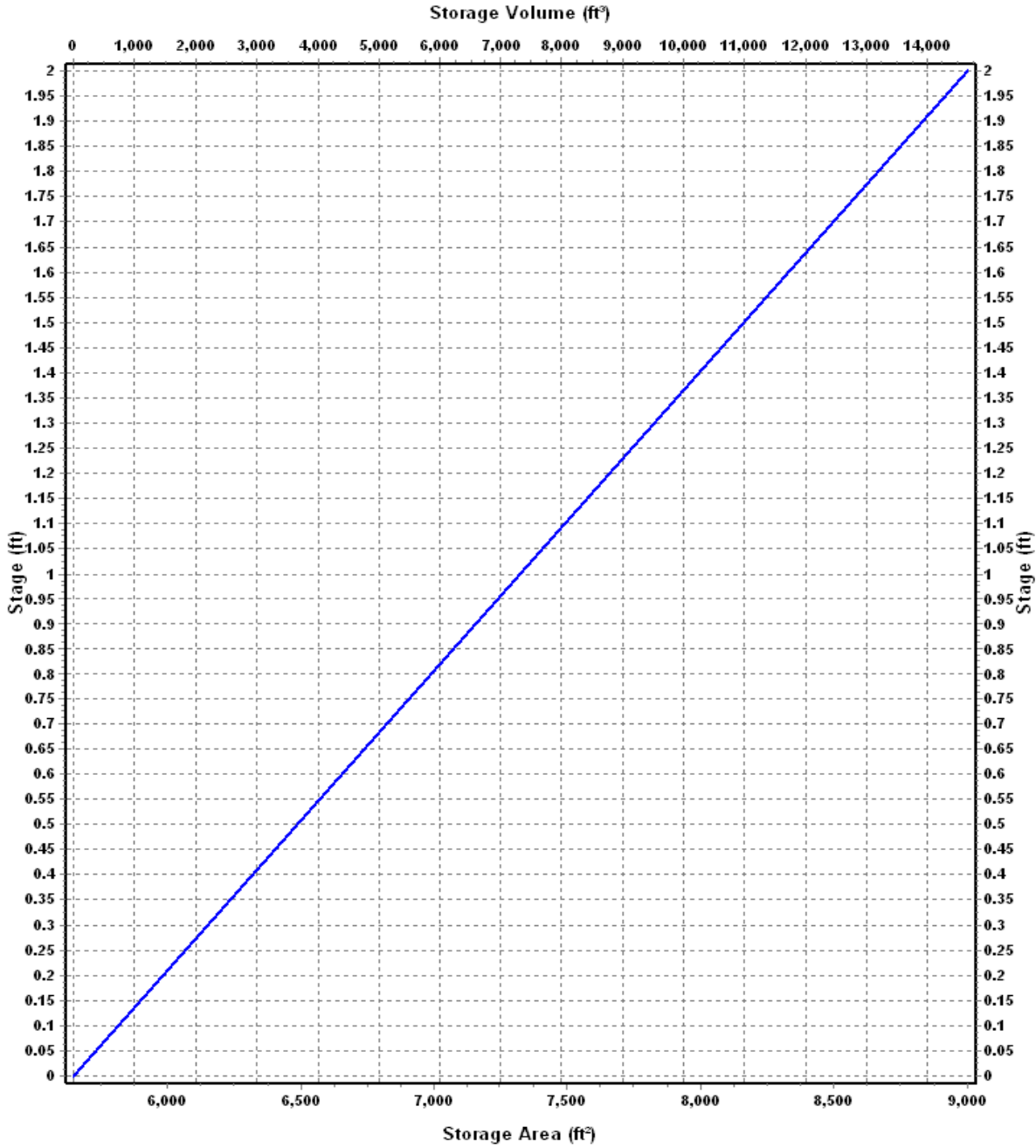
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08B

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	5650	0.000
2	9000	14650.00

Storage Area Volume Curves



Storage Area Storage Volume

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-08B (continued)

Output Summary Results

Peak Inflow (cfs)	0.00
Peak Lateral Inflow (cfs)	0.00
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	3.92
Max HGL Elevation Attained (ft)	245.00
Max HGL Depth Attained (ft)	0
Average HGL Elevation Attained (ft)	245.00
Average HGL Depth Attained (ft)	0
Time of Max HGL Occurrence (days hh:mm)	0 00:00
Total Exfiltration Volume (1000-ft ³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-08C

Input Data

Invert Elevation (ft) 243.00
Max (Rim) Elevation (ft) 245.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 243.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 18650.00
Evaporation Loss 0.00

Infiltration/Exfiltration

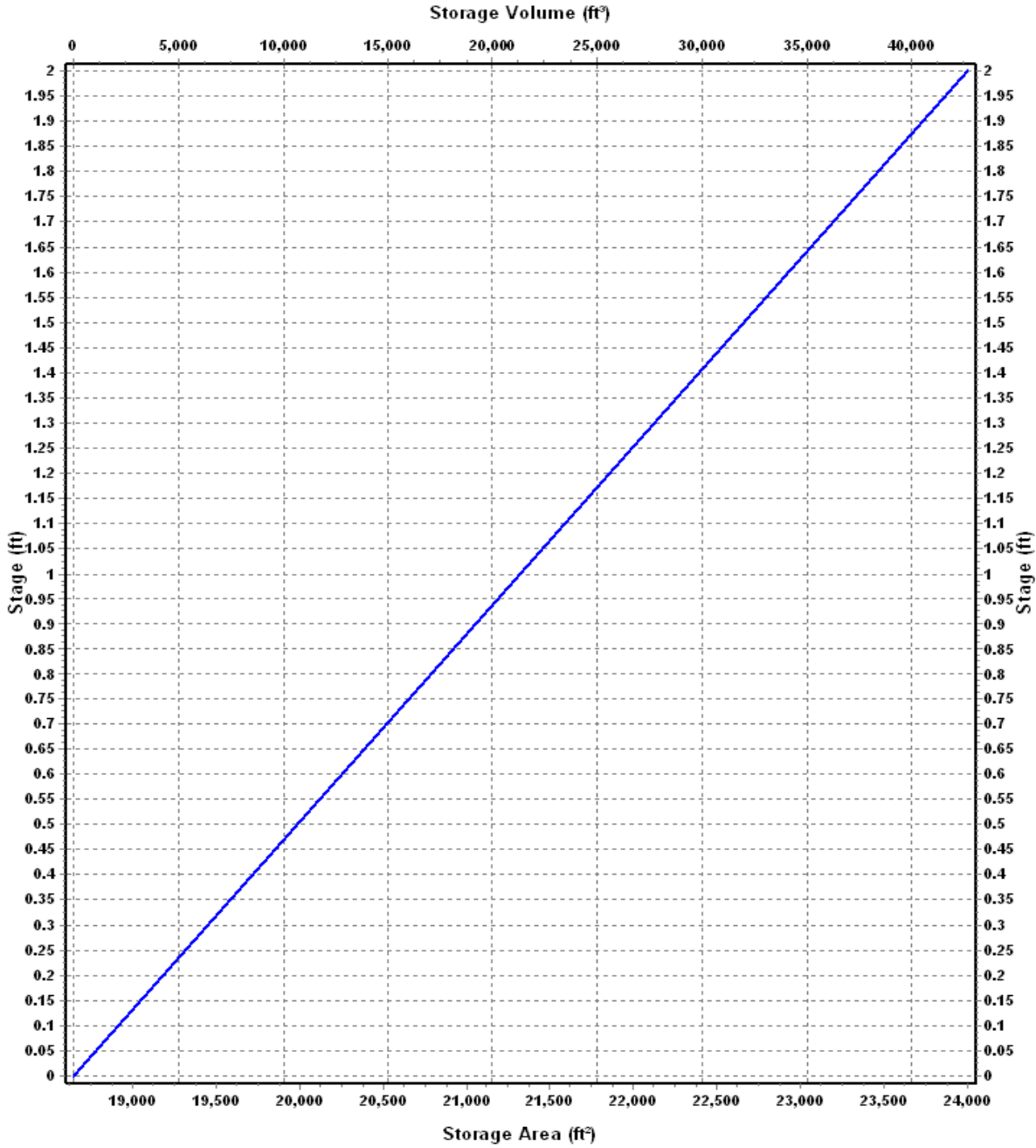
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-08C

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	18650	0.000
2	24000	42650.00

Storage Area Volume Curves



— Storage Area — Storage Volume

FOR LAND USE PERMITTING (EXHIBIT B)

Post-Development
25-year storm

Storage Node : LIDA-08C (continued)

Output Summary Results

Peak Inflow (cfs)	2.75
Peak Lateral Inflow (cfs)	1.92
Peak Outflow (cfs)	0.14
Peak Exfiltration Flow Rate (cfm)	15.64
Max HGL Elevation Attained (ft)	244.45
Max HGL Depth Attained (ft)	1.45
Average HGL Elevation Attained (ft)	243.89
Average HGL Depth Attained (ft)	0.89
Time of Max HGL Occurrence (days hh:mm)	1 00:05
Total Exfiltration Volume (1000-ft ³)	41.177
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-09

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 375.00
Evaporation Loss 0.00

Infiltration/Exfiltration

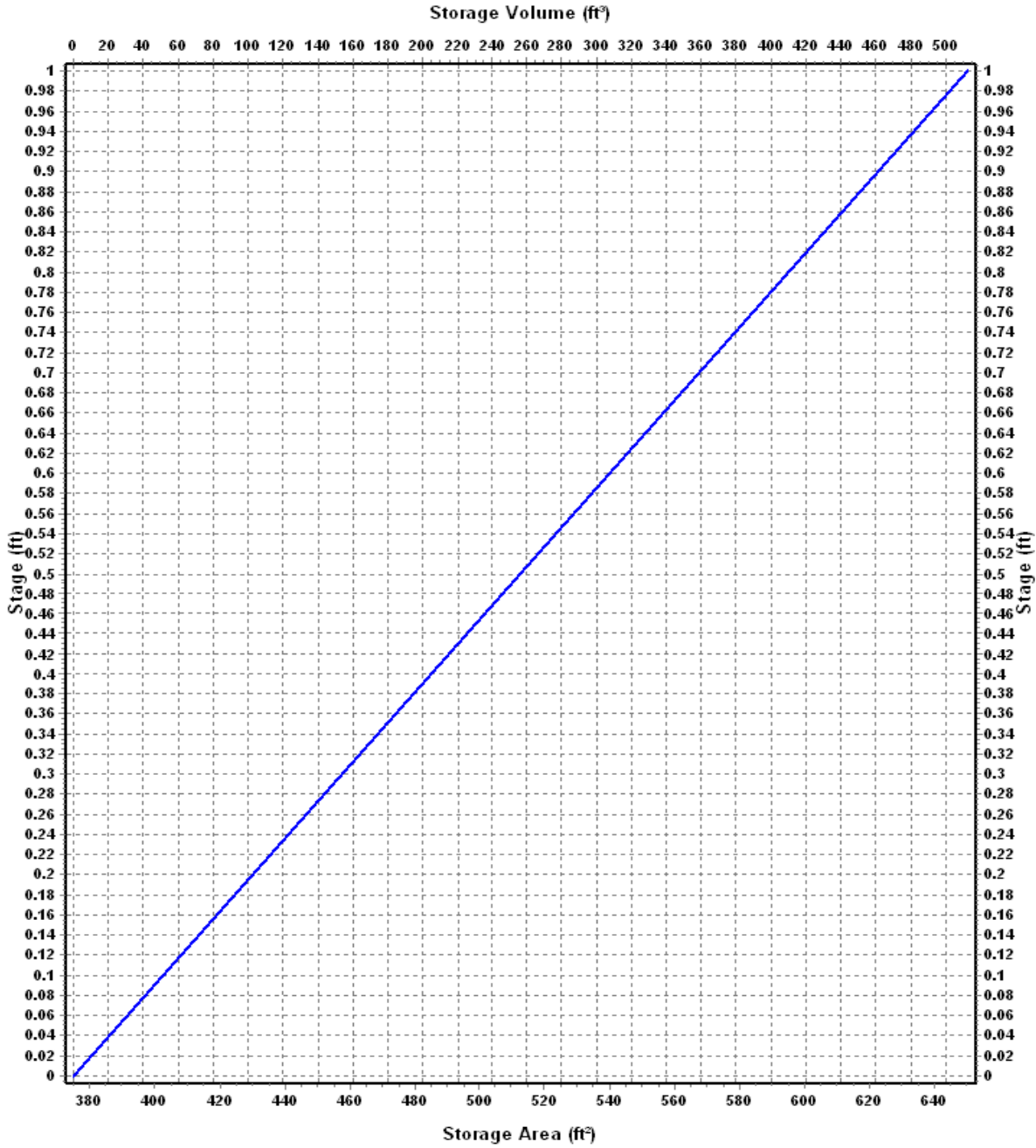
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-09

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	375	0.000
1	650	512.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-09 (continued)

Output Summary Results

Peak Inflow (cfs)	0.20
Peak Lateral Inflow (cfs)	0.20
Peak Outflow (cfs)	0.18
Peak Exfiltration Flow Rate (cfm)	1.65
Max HGL Elevation Attained (ft)	250.80
Max HGL Depth Attained (ft)	0.8
Average HGL Elevation Attained (ft)	250.28
Average HGL Depth Attained (ft)	0.28
Time of Max HGL Occurrence (days hh:mm)	0 08:00
Total Exfiltration Volume (1000-ft ³)	2.229
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-10

Input Data

Invert Elevation (ft) 250.00
Max (Rim) Elevation (ft) 251.00
Max (Rim) Offset (ft) 1.00
Initial Water Elevation (ft) 250.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 657.00
Evaporation Loss 0.00

Infiltration/Exfiltration

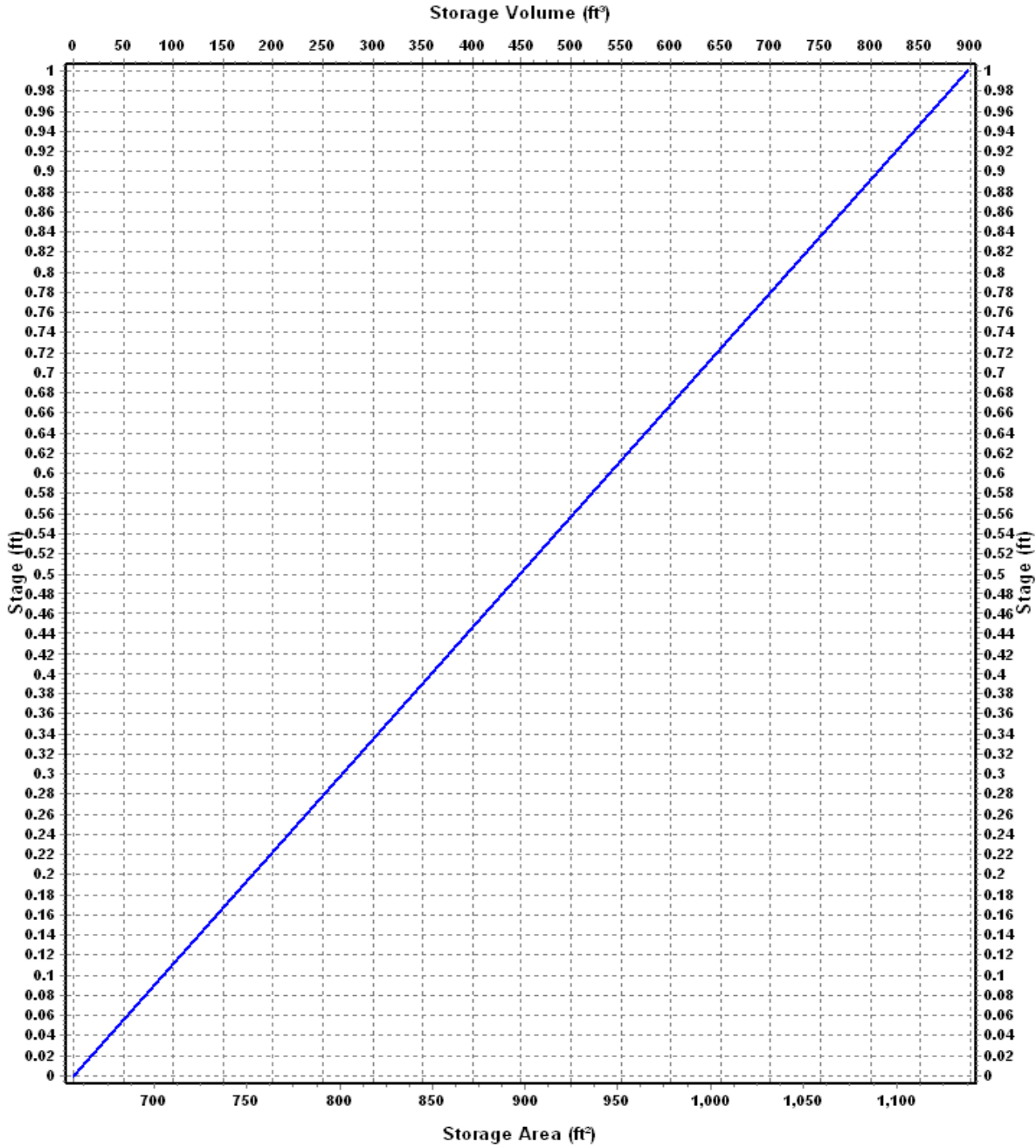
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-10

Stage	Storage Area	Storage Volume
(ft)	(ft ²)	(ft ³)
0	657	0.000
1	1138	897.50

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-10 (continued)

Output Summary Results

Peak Inflow (cfs)	0.28
Peak Lateral Inflow (cfs)	0.28
Peak Outflow (cfs)	0.23
Peak Exfiltration Flow Rate (cfm)	2.59
Max HGL Elevation Attained (ft)	250.57
Max HGL Depth Attained (ft)	0.57
Average HGL Elevation Attained (ft)	250.15
Average HGL Depth Attained (ft)	0.15
Time of Max HGL Occurrence (days hh:mm)	0 08:02
Total Exfiltration Volume (1000-ft ³)	3.150
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-11

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 13000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

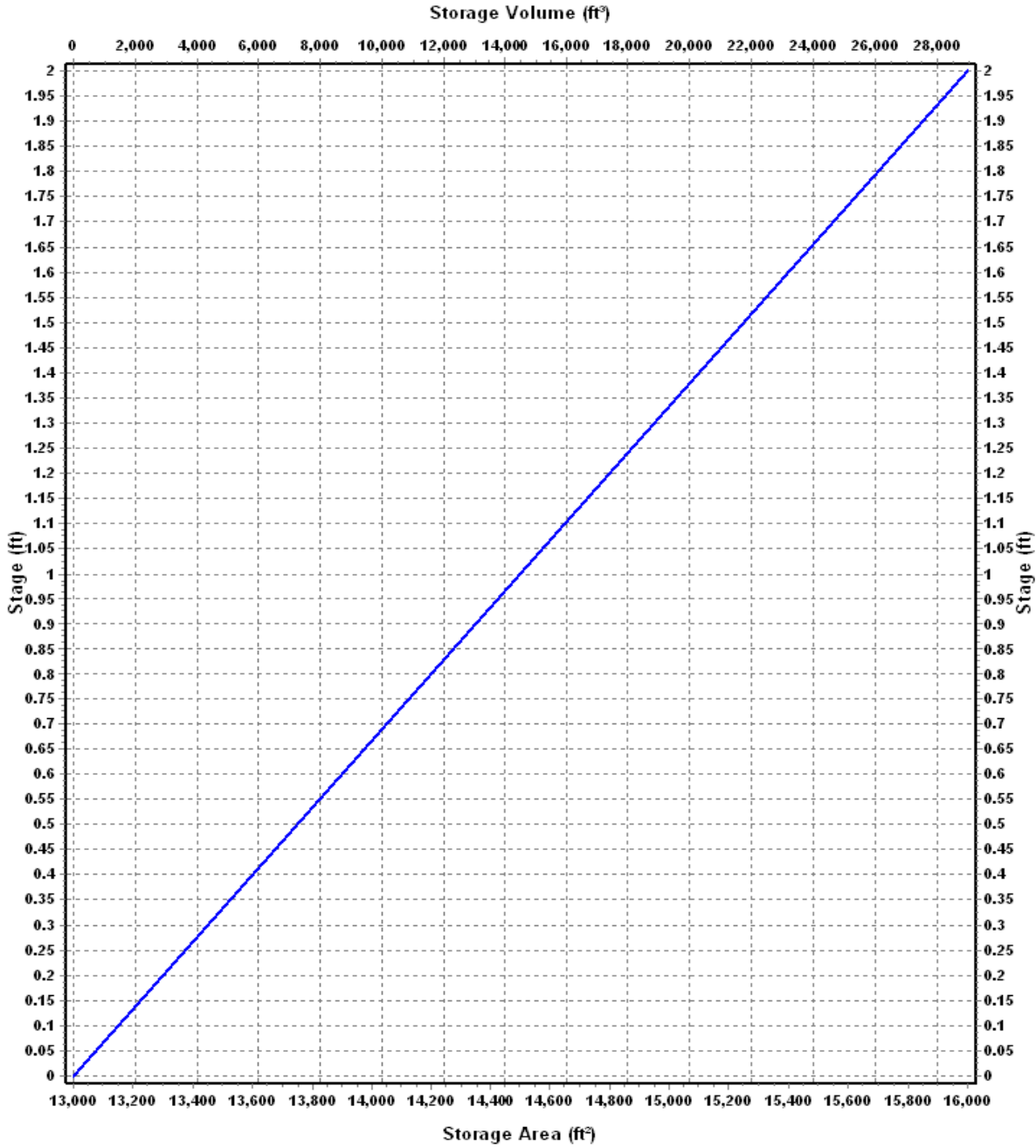
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-11

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	13000	0.000
2	16000	29000.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-11 (continued)

Output Summary Results

Peak Inflow (cfs)	3.37
Peak Lateral Inflow (cfs)	3.37
Peak Outflow (cfs)	0.43
Peak Exfiltration Flow Rate (cfm)	10.62
Max HGL Elevation Attained (ft)	246.53
Max HGL Depth Attained (ft)	1.53
Average HGL Elevation Attained (ft)	246.02
Average HGL Depth Attained (ft)	1.02
Time of Max HGL Occurrence (days hh:mm)	0 11:21
Total Exfiltration Volume (1000-ft ³)	29.184
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-12

Input Data

Invert Elevation (ft) 245.00
Max (Rim) Elevation (ft) 247.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 245.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1000.00
Evaporation Loss 0.00

Infiltration/Exfiltration

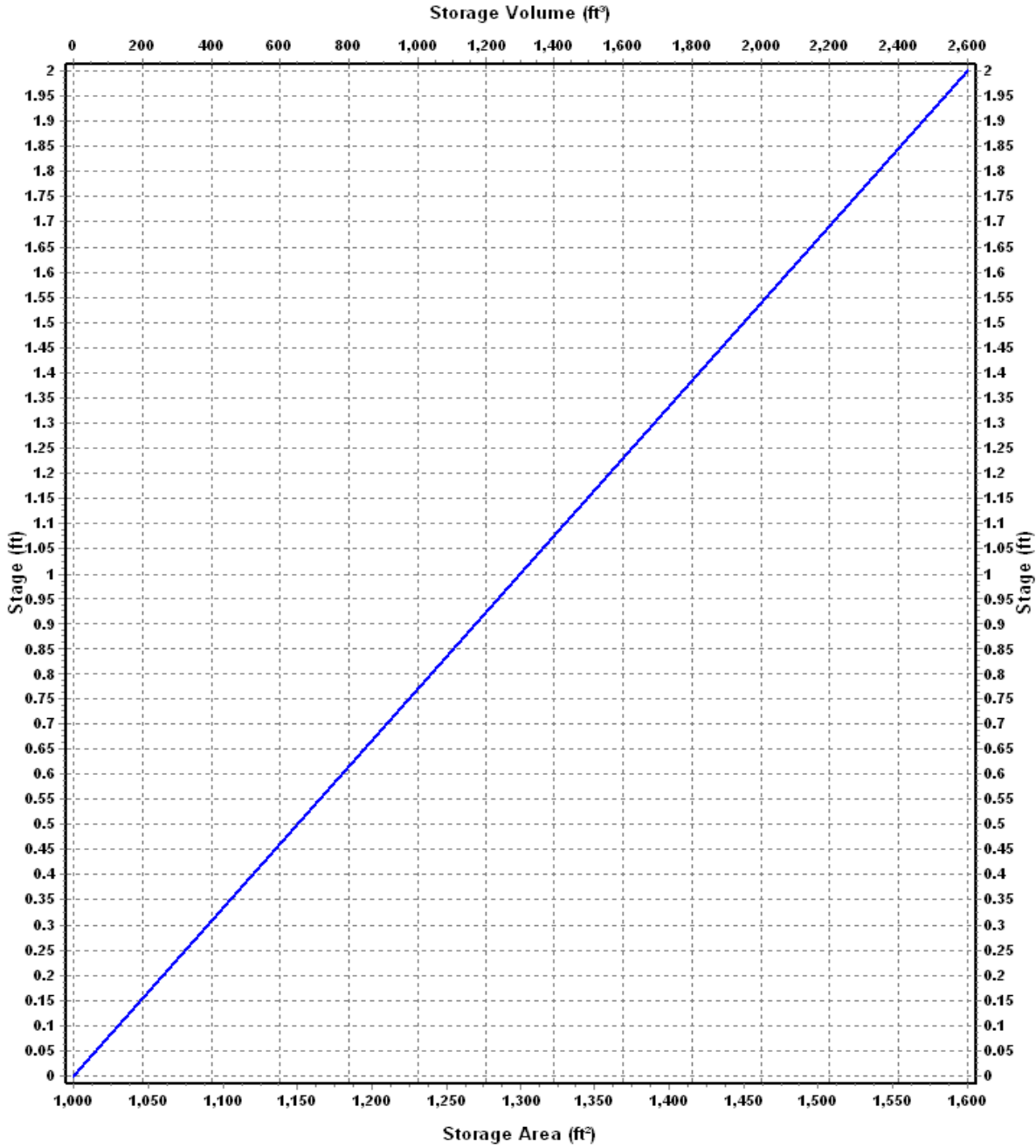
Exfiltration Rate (in/hr) 2.0000

Storage Area Volume Curves

Storage Curve : LIDA-12

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	1000	0.000
2	1600	2600.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-12 (continued)

Output Summary Results

Peak Inflow (cfs)	1.81
Peak Lateral Inflow (cfs)	0.44
Peak Outflow (cfs)	1.44
Peak Exfiltration Flow Rate (cfm)	3.63
Max HGL Elevation Attained (ft)	246.03
Max HGL Depth Attained (ft)	1.03
Average HGL Elevation Attained (ft)	245.36
Average HGL Depth Attained (ft)	0.36
Time of Max HGL Occurrence (days hh:mm)	0 08:19
Total Exfiltration Volume (1000-ft ³)	5.143
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B) Post-Development 25-year storm

Storage Node : LIDA-8A

Input Data

Invert Elevation (ft) 256.00
Max (Rim) Elevation (ft) 258.00
Max (Rim) Offset (ft) 2.00
Initial Water Elevation (ft) 256.00
Initial Water Depth (ft) 0.00
Ponded Area (ft²) 1777.00
Evaporation Loss 0.00

Infiltration/Exfiltration

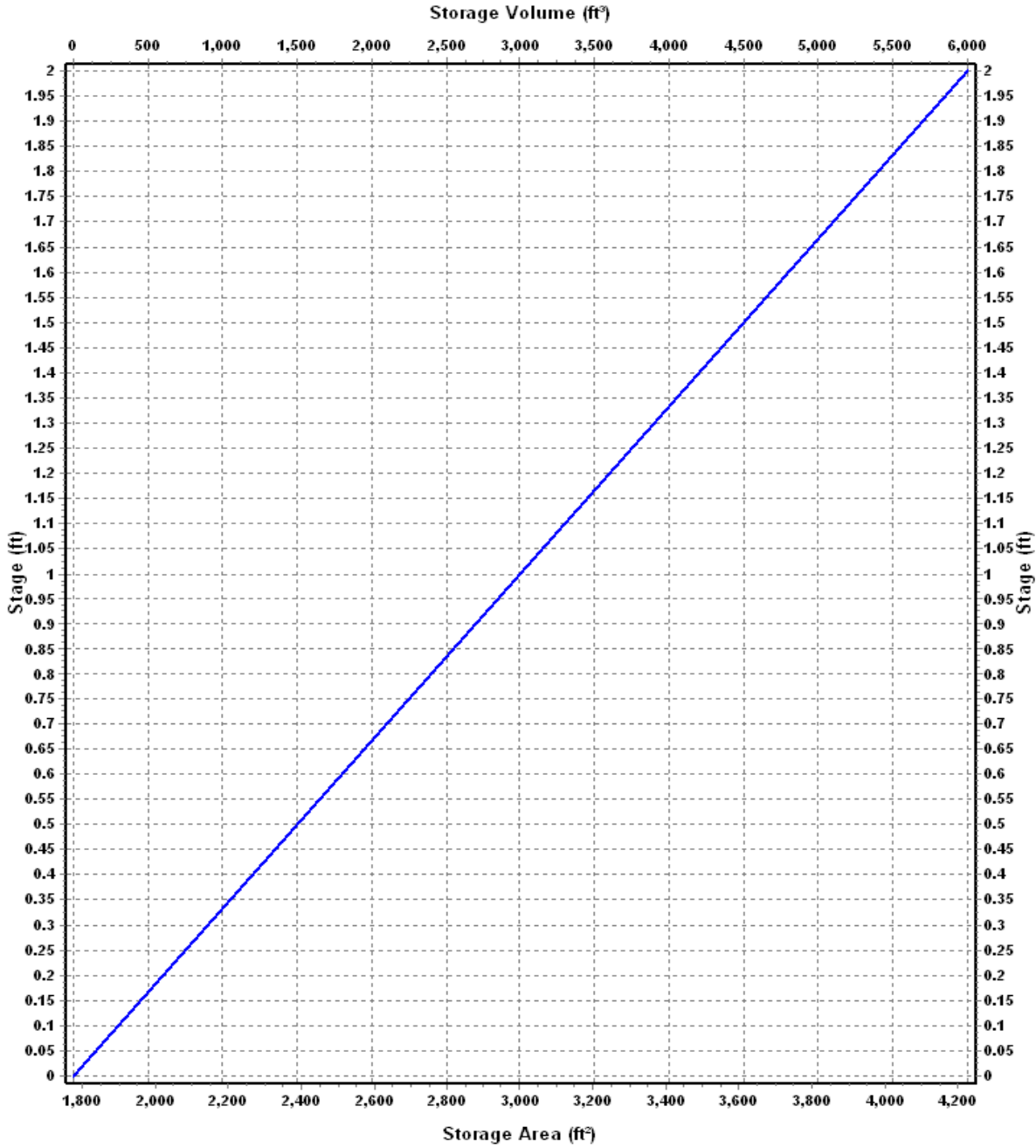
Exfiltration Rate (in/hr) 0.5000

Storage Area Volume Curves

Storage Curve : LIDA-8A

Stage (ft)	Storage Area (ft ²)	Storage Volume (ft ³)
0	1777	0.000
2	4226	6003.00

Storage Area Volume Curves



— Storage Area — Storage Volume

Storage Node : LIDA-8A (continued)

Output Summary Results

Peak Inflow (cfs)	2.04
Peak Lateral Inflow (cfs)	2.04
Peak Outflow (cfs)	0.83
Peak Exfiltration Flow Rate (cfm)	2.67
Max HGL Elevation Attained (ft)	257.69
Max HGL Depth Attained (ft)	1.69
Average HGL Elevation Attained (ft)	256.60
Average HGL Depth Attained (ft)	0.6
Time of Max HGL Occurrence (days hh:mm)	0 08:27
Total Exfiltration Volume (1000-ft ³)	5.335
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

FOR LAND USE PERMITTING (EXHIBIT B)

**OPERATIONS, MAINTENANCE,
CONTINGENCY, & REPAIR PLAN**

FOR THE

*Willamette Water Supply Project: Water Treatment
Plant*

Project No. 18-2281

Washington County, Oregon

For the stormwater treatment facilities to continue operating at acceptable levels, regular maintenance and inspection are required. This plan provides instructions for how to do this.

Prepared by: NJM

Murraysmith, Inc.

888 SW 5th Ave, Suite 1170

Portland, OR 97204

December 2019

Project No. 18-2281.0406

E.1 Responsibility

The stormwater management facilities are to be maintained by the Willamette Water Supply Partnership (WWSP) and City of Sherwood. The preparer has worked with the owner's designated personnel to design a system that can be easily maintained by maintenance staff. A copy of this plan shall be provided to all applicable maintenance personnel.

E.2 Description

The stormwater system collects and conveys all runoff within the site and treats drainage from impervious surfaces. All runoff will either infiltrate into the ground or be collected by **ditches** and/or **catch basins** discharging into storm-only management facilities. The ditch/pipe conveyance systems discharge to **riprap outfalls** upstream of either **extended dry basins** or **rain gardens**. Stormwater in these facilities is either (1) infiltrated through the soil or taken up by plants, providing a level of treatment, or (2) conveyed through the facility in route to an outfall or downstream conveyance channel. Runoff originating from impervious surfaces throughout the project area will be treated by these facilities, which function as vegetated reservoirs. Any facility unable to absorb drainage during high flow events will overflow and continue as either surface flow or piped flow towards the respective outfall, either Hedges Creek to the north or Coffee Lake Creek to the south.

Definitions

Riprap outfalls are rock lined depressions installed where pipes daylight to reduce scour at the discharge location.

Rain Gardens are depressed landscaped reservoirs used to collect, filter, infiltrate, and convey stormwater runoff. Their primary purpose is to treat stormwater runoff as it passes through the vegetation, and 18 inches of engineered growing medium. These facilities also provide storage for stormwater runoff and slowly release it over extended periods of time.

Catch basins are inlet structures with a sump for sediment and debris storage and a turned down elbow on the outlet pipe. They collect surface stormwater and convey it to the storm system.

Extended dry basins are shallow landscaped depression with a flat bottom that collects and holds stormwater runoff, allowing pollutants to settle and filter out as the water infiltrates into the ground or is discharged to an approved location.

Table E1
Stormwater Facility Summary

LIDA Facility No.	Base Area (sq.ft.)	Maintenance Responsibility	Discharge Point	10-Year Storm Poned Depth (feet)	Freeboard (inch)	Impervious Area Managed (acres)	Tributary Basin	WQ Drawdown (hour)	Facility Type
LIDA-01	938	City	Hedges Creek	0.55	2	0.352	HED-LIDA_01	16	Street-side Planter
LIDA-02	562	City	Hedges Creek	0.80	2	0.321	HED-LIDA_02	23	Street-side Planter
LIDA-03	875	City	Hedges Creek	0.54	2	0.323	HED-LIDA_03	16	Street-side Planter
LIDA-04	1,875	City	Hedges Creek	0.26	2	0.320	HED-LIDA_04	11	Street-side Planter
LIDA-05	12,000	WWSP	Hedges Creek	1.00	12	1.672	HED-LIDA_05	30	Ext. Dry Basin
LIDA-06A	10,000	WWSP	Hedges Creek	1.79	12	3.030	HED-LIDA_06A	48	Ext. Dry Basin
LIDA-07	2,812	City	Hedges Creek	0.60	2	0.813	HED-LIDA_07	15	Street-side Planter
LIDA-08A	2,775	WWSP	LIDA-08B	1.47	12	2.000	HED-LIDA_08A	42	Ext. Dry Basin
LIDA-08B	18,650	WWSP	Hedges Creek	1.16	12	1.793	HED-LIDA_08B	29	Ext. Dry Basin
LIDA-09	375	City	Hedges Creek	0.79	2	0.199	HED-LIDA_09	21	Street-side Planter
LIDA-10	657	City	Hedges Creek	0.56	2	0.269	HED-LIDA_10	18	Street-side Planter
LIDA-11	13,000	WWSP	Coffee Lake Creek	1.52	12	3.475	COF-LIDA_11	48	Ext. Dry Basin
LIDA-12	1,000	WWSP	Coffee Lake Creek	1.01	12	0.440	COF-LIDA_12	19	Rain Garden

E.3 Schedule

The entire system shall be inspected and maintained both (1) quarterly, and (2) within 24 hours following every major storm event. A major storm event is defined as 1.0 inch of rain over a 24-hour period, or more, or this O&M Plan. All components of the storm system, as described below, must be inspected and maintained frequently or they will cease to function effectively. The facility owner must keep a log recording all inspection dates, observations, and maintenance activities. Receipts shall be saved when maintenance is performed and there is record of expense.

E.4 Procedure

The following items shall be inspected and maintained, as stated:

Riprap Outfalls

Facilities shall be inspected for debris and sediment buildup, which shall be removed upon discovery. If necessary, sources of potential sediment and debris, such as discarded landscape clippings, shall be identified and prevented.

Inspect outfalls and adjacent landscaping areas for areas of erosion, scouring, undercutting, and slumping. Fill eroded area with compacted soil and cover with mulch, riprap, seed, sod, or other erosion prevention materials.

Rain Gardens, Extended Dry Basins, and Street-side Planters

Fallen leaves and debris from deciduous plant foliage shall be raked and removed biannually.

Nuisance and prohibited vegetation of all species shall be removed biannually. Invasive vegetation shall be removed and replaced.

Dead vegetation shall be removed to maintain less than 10% of area coverage or when planter function is impaired. Vegetation shall be replaced to maintain cover density and control erosion where soils are exposed.

The facilities shall fully drain within 48 hours after a storm event. If water continues to pond after that time, sources of possible clogging shall be identified and corrected. If necessary, the topsoil layers shall be tilled and amended with compost; if this is not sufficient, they shall be removed and replaced with new freely draining growing medium.

Inlets and outlets shall be inspected quarterly and after any large rain event.

Any trash or debris that collects in the planters may inhibit function and shall be removed quarterly.

Use of pesticides and/or herbicides is not recommended.

Catch Basins and Piped Storm System

Quarterly inspection for clogging shall be performed.

Shall be inspected for cracks or leaks during each inspection. Area drains, overflow structures and manholes shall be cleaned out at a minimum of once per year or more frequently if inspections deem it necessary. Cleanout shall be done in a manner to minimize the amount of

FOR LAND USE PERMITTING (EXHIBIT B)

DRAFT

sediment and trapped oil entering the outlet pipe. Any valves on outlet pipes shall be closed or plugged prior to cleanout.

Water, oil, and sediment in sumps shall be removed, tested, and disposed of in accordance with federal and state regulations. Grit and sediment that has settled to the bottom of drainage structures shall be removed during each cleaning.

Cleaning shall be done without use of detergents or surfactants. A pressure washer may be used if necessary.

Source Control measures prevent pollutants from mixing with stormwater. Typical non-structural control measures include raking and removing leaves, street sweeping, vacuum sweeping, controlled application of pesticides and fertilizers, and other good housekeeping practices.

Source control measures shall be inspected and maintained (where applicable).

Spill Prevention measures shall be exercised when handling substances that can contaminate stormwater. It is important to exercise caution when handling substances that can contaminate stormwater. Activities that pose the chance of hazardous material spills shall not take place near collection facilities.

Contact facility owner immediately if spill is observed.

Releases of pollutants shall be corrected as soon as identified.

Insects & Rodents shall not be harbored in the any part of the storm system.

Pest control measures shall be taken when insects/rodents are found to be present.

If sprays are considered, then a mosquito larvicide, such as Bacillus thurendensis or Altoside formulations can be applied only if absolutely necessary and shall not be used where there is the potential to enter groundwater or come into contact with standing water. Sprays shall be applied only by a licensed individual or contractor.

Holes in the ground located in and around the storm system shall be filled.

Outfalls draining into stormwater planters shall be inspected and cleaned regularly to insure no rodent activity which would clog or decrease the efficiency of the storm system.

Access to the storm system is required for efficient maintenance.

Egress and ingress routes adjacent to stormwater facilities shall be opened for maintenance. Traffic control may be necessary to safety perform maintenance activities.

E.5 Inspection & Maintenance

Maintenance staff shall complete inspection and maintenance logs. The logs shall be produced for:

Proper Conveyance – All facilities shall drain within 48 hours. Date, time, weather, and site conditions when ponding occurs shall be recorded.

Pollution Prevention – All sites shall implement best management practices to prevent hazardous wastes, litter, or excessive oil and sediment from contaminating stormwater. Contact City of Portland Spill Prevention & Citizen Response at (503) 823-7180 for immediate assistance and guidance with responding to spills. Record date, time, weather, and site conditions if activities are found to contaminate stormwater.

Vectors (mosquitoes and rodents) – Stormwater facilities shall not harbor mosquito larvae or rats that pose a threat to public health or that undermine the facility structure. Monitor standing water for small wiggling sticks perpendicular to the water's surface. Note holes/burrows in and around facilities. Call Washington County Vector Control at (503) 846-8722 for immediate assistance with eradicating vectors. Record date, time, weather, and site conditions when vector activity is observed.

Maintenance – Record date, description, and contractor (if applicable) for all structural repairs, landscape maintenance, and facility cleanout activities.

E.6 Sample O&M Logs

The following is an example of an O&M log:

Date: 2/22/2019	Time: 13:30	Initials: TCW
Weather & Site Conditions:	Overcast.	
Work Performed By:	City of Sherwood Public Works Department, Maintenance Personnel.	
Work Performed:	Re-planted street-side planter, LIDA-04, with sedges and rushes.	
Details	*Work order on file and available by request.	

E.7 O&M Log Sheet

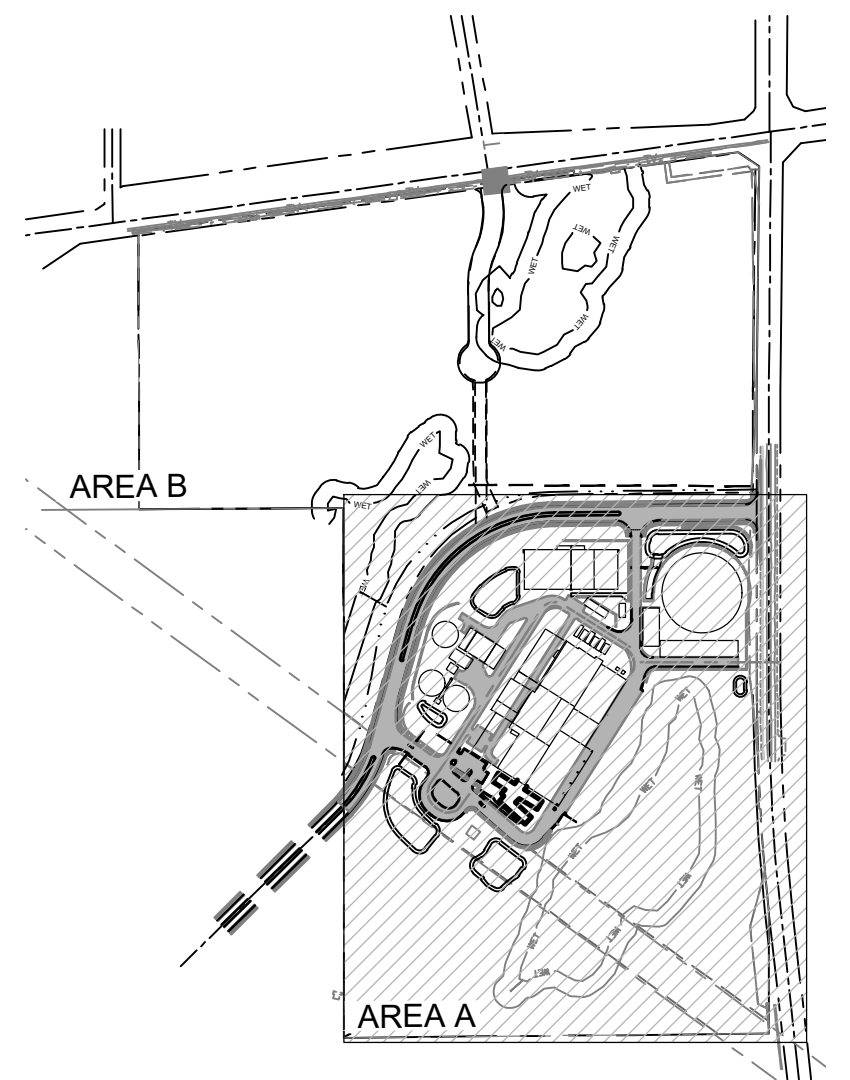
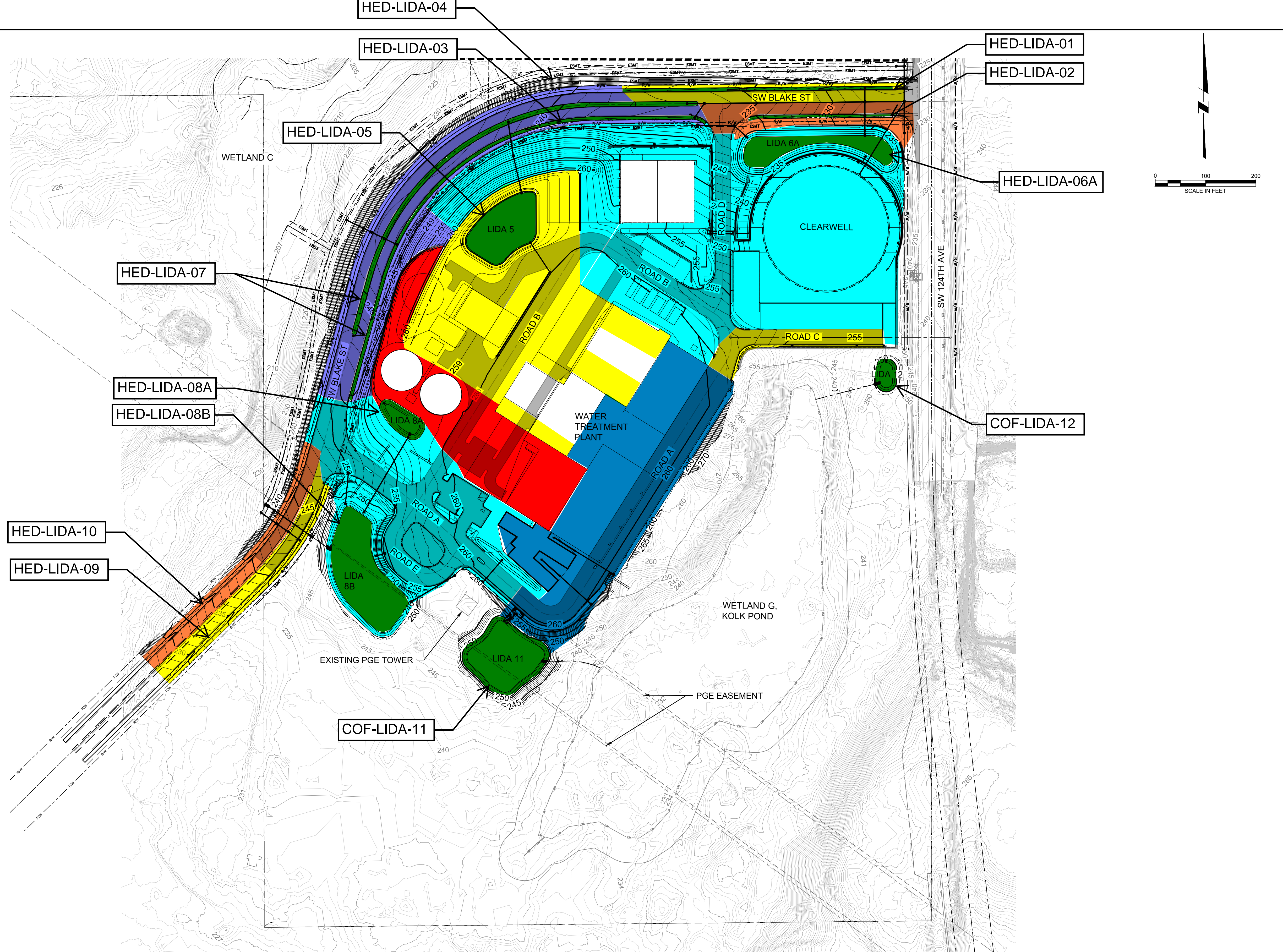
Date:	Time:	Initials:
Weather & Site Conditions:		
Work Performed By:		
Work Performed:		
Details		

Date:	Time:	Initials:
Weather & Site Conditions:		
Work Performed By:		
Work Performed:		
Details		

E.8 Appendix – Exhibits

Exhibit A: Post-Developed Drainage Basin Map

FOR LAND USE PERMITTING (EXHIBIT B)



KEY MAP
NTS

DSGN	K USAGAWA					
DR	M ESTEP					
CHK	B FOSTER					
APVD	M HICKEY	NO.	DATE	REVISION	BY	APVD

VERIFY SCALE
BAR IS ONE INCH ON
ORIGINAL DRAWING.
IF NOT ONE INCH ON
THIS SHEET, ADJUST
SCALES ACCORDINGLY.



Willamette Water Supply
Our Reliable Water
WILLAMETTE WATER SUPPLY PROGRAM
WATER TREATMENT PLANT_1.0

CDM Smith
1220 SW Morrison Street, Suite 200
Portland, OR 97205
Tel: (503) 232-1800

SITE
GRADING
GRADING, PAVING AND DRAINAGE OVERALL PLAN
AREA A

SHEET	DWG	03-GR-20001
DATE	FEBRUARY 2020	
PROJ	WTP_1.0	

60% DESIGN - NOT FOR CONSTRUCTION

BY: BEN FOSTER
PLOT DATE: Wednesday, May 25, 2016 1:37:44 PM
DWG FILE: C:\cdm\ben.foster@murraysmith.us\0274278\WTP1-03-GR-20001.dwg

FOR LAND USE PERMITTING (EXHIBIT B)

FOR LAND USE PERMITTING (EXHIBIT B)

TECHNICAL MEMORANDUM

DATE: December 2, 2015

PROJECT: Villa Road Improvements, Haworth to Crestview
City of Newberg | Project No. 702163

TO: Jason Wuertz, PE
City of Newberg

FROM: Sven MacAller
Murray, Smith & Associates, Inc.

RE: Rainfall Frequency Analysis and Design Storm Development

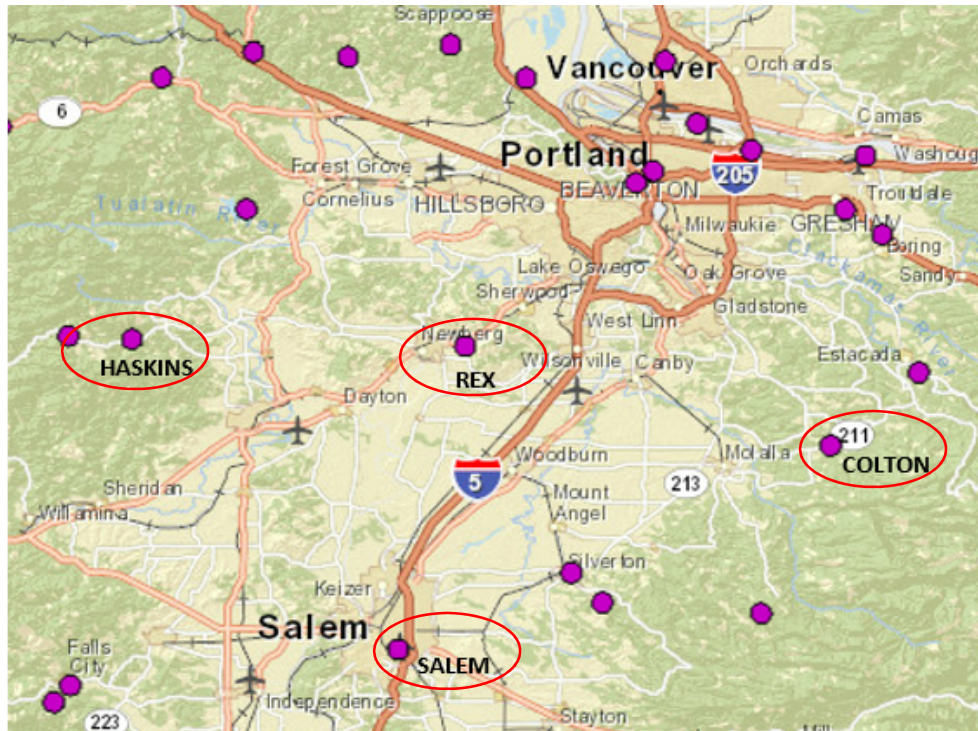
A rainfall frequency analysis was completed to validate the NOAA Atlas precipitation maps for the Newberg Area. Ultimately the frequency analysis was used to select a design rainfall event that was appropriately conservative for the design of the Newberg Villa Road stormwater improvements. Four rainfall gages were used and a frequency analysis was performed on each data set to provide insight into spatial variability of rainfall in the area. The four precipitation gage locations are shown in Figure 1 and include Rex Hill, Colton, Haskins Dam, and Salem McNary Field. General gage information is summarized in Table 1.

Table 1
Precipitation Gage Information

Gage	COOP ID	Elevation (feet)	Data Set Start Date	Data Set End Date	Data Set Duration (years)
Colton	351365	670	10/1/1948	2/28/1963	16
Salem McNary Field	357500	205	7/5/1948	12/31/2013	66
Haskins Dam	353705	756	8/16/1948	1/1/2014	66
Rex Hill	357127	515	8/1/1948	12/23/2014	66

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Figure 1
Rain gage locations used for City of Newberg Rainfall Frequency Analysis



To perform the rainfall frequency analysis, maximum annual 24 hour rainfall events were compiled in a list and ranked by total rainfall depth starting with the largest event. This procedure was repeated for each gage. The ranked data points for each gage were fit to a Gumbel distribution to develop a probability distribution function for each data set (the probability distribution for Rex Hill is shown in Figure 2 as an example). This probability function describes the probability of exceeding a rainfall depth during a rainfall event in any given year. For example, the probability of a 24 hour rainfall event in a given year exceeding 1.5 inches is much greater than exceeding 4 inches. The probability distribution function can then be used to estimate the rainfall depth for storm events of a given recurrence interval (5 year, 20 year etc.). A summary of the frequency analysis results are shown in Table 2. The rainfall histogram for the Rex Hill gage (Figure 3) shows the rank of each maximum annual rainfall event recorded. The shape of this histogram is similar to that of the probability distribution function but overall depth is compared to the rank of the storm for the period of record instead of probability of exceedance.

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Figure 2
Probability Distribution Function for Rex Hill Gage.

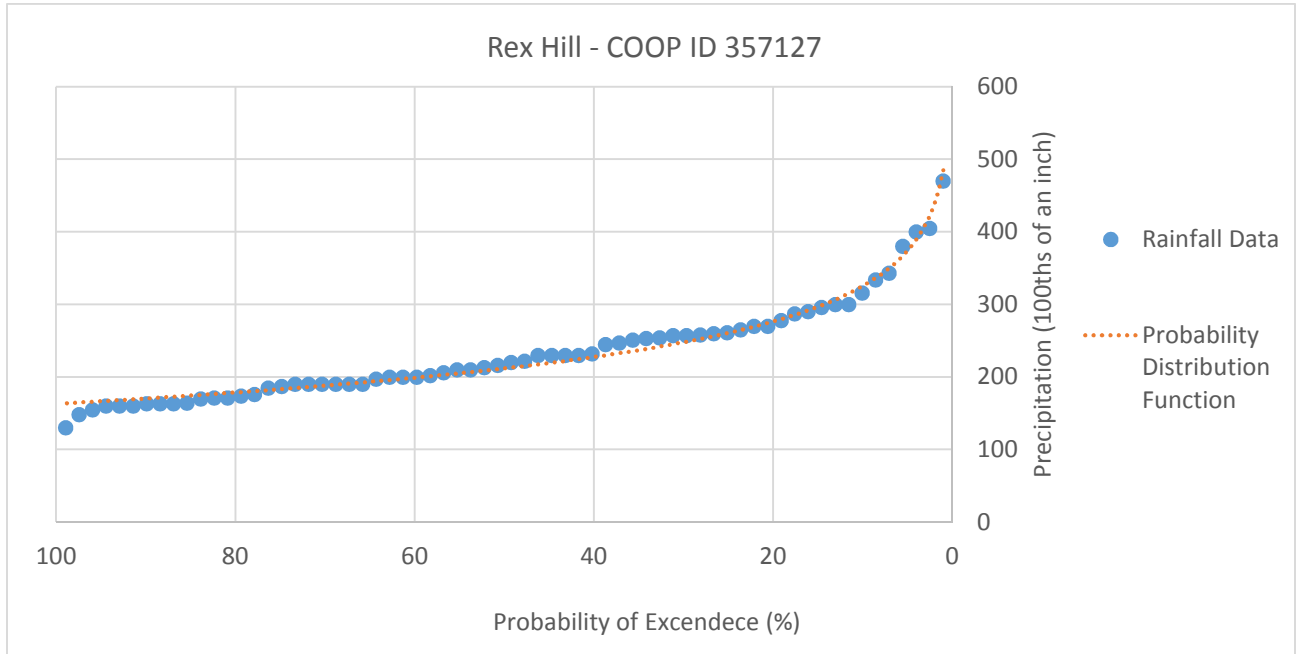
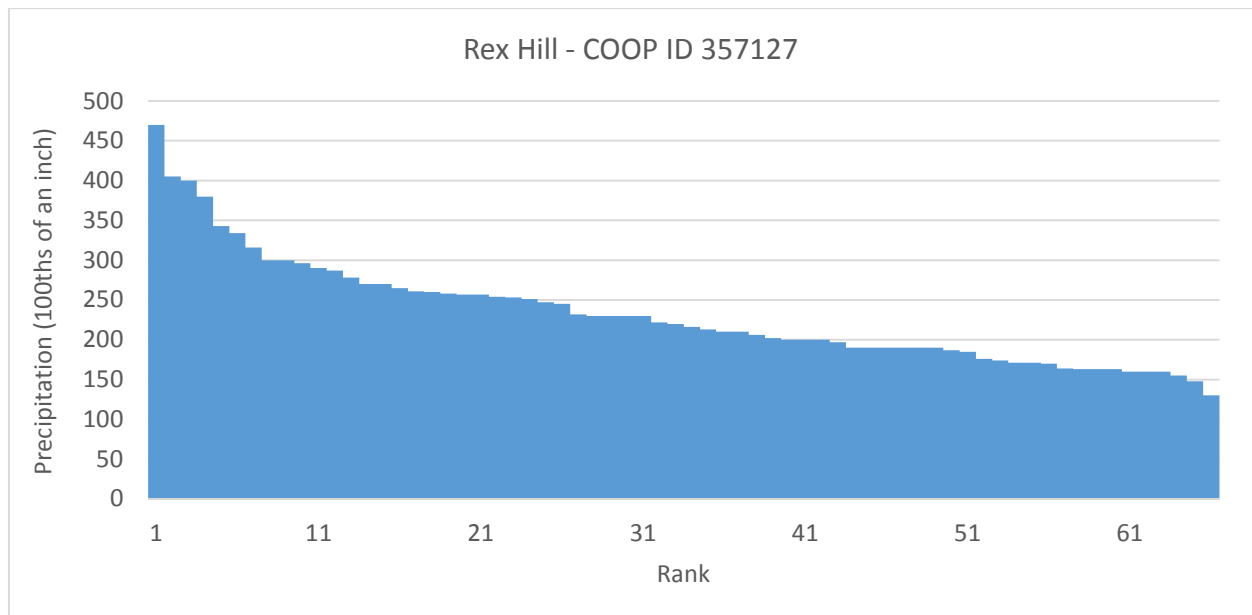


Figure 3
Rainfall Histogram for Rex Hill Gage.



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Table 2
Rainfall Frequency Analysis Result for City of Newberg
(Rainfall depth in 100ths of an inch)

24 Hour Rainfall Event Recurrence Interval	Approximate NOAA Atlas Storm Depth (24 hour)	Colton¹	Salem McNary Field	Haskins Dam	Rex Hill
2 year	250	237	208	376	212
5 year	300	439	266	515	277
10 year	350	591	309	620	326
25 year	400	793	366	758	390
50 year	450	945	410	863	439
100 year	500	1098	453	968	488

1 – The Colton Gage only has 16 years of data and results of the frequency analysis are not as reliable for predicting events with longer return periods as gages with longer periods of record.

Discussion

The rainfall record in the Newberg area is reasonably long, with records going back to 1948 at several locations. There was significant spatial variability in rainfall between the four gages. The Colton and Haskins gages are located at a higher elevation and may provide a better representation of the weather pattern of the Coast Range and Cascade foothills, while the Salem and Rex Hill gages provide a better representation of the Willamette Valley Climate. The Rex and Salem gages are also more consistent with the rainfall depth presented in the NOAA rainfall depth maps and likely provide the best approximation for rain in Newberg. Following the frequency analysis, the traditional NOAA Atlas depth of 3.5 inches, was selected as the design storm. This rainfall depth also correlates to the design requirement stated in the City’s current *Design and Construction Standards*. If a project specific design storm was required, the 3.26 inch 10 year storm developed using the Rex Hill rain gage is recommended.

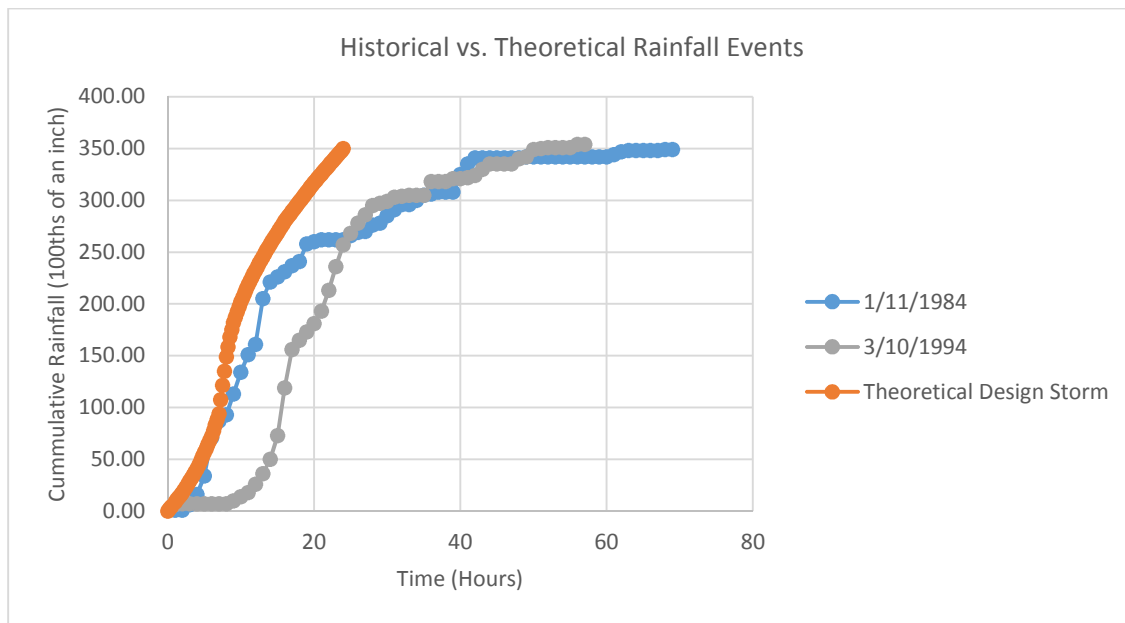
Comparison of Design Storm Event and Historical Data

To evaluate the suitability of the National Resources Conservation Service (NRCS) Type 1A storm distribution, historical rain events were evaluated for peak intensity, duration and overall volume, with individual events being delineated by at minimum dry period of 24 hours. Historical events were compared to a theoretical 10 year, 24 hour event with a Type 1A distribution. Based on the NOAA Atlas II, the overall depth is 3.5 inches, and using a Type 1A distribution, peak intensity is 0.55 inches per hour (NOAA Atlas 2, Volume 10, Precipitation Frequency Atlas of the Western United States, 1973).

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Using the theoretical peak intensity and depth listed above, the historical record was examined for similar rainfall events. A number of events were found that matched both intensity and overall depth, however none of them were of the same duration as the design storm (24 hours). All historical events that had an overall depth of at least 3.5 inches and a peak intensity of at least 0.55 inches per hour, were longer than 24 hours. The shortest event at the Rex gage site that was at least 3.5 inches was 42 hours long, while the shortest 3.5 inch event at the Salem gage was 57 hours. Storm events at the Rex and Salem gage locations that had a peak intensity of at least 0.55 inches per hour ranged from 1 hour to 12 days, and total rainfall event depth for these events ranged from 0.5 inches to 9 inches. Based on the data review, the NRCS Type 1A distribution has a more conservative intensity than the historic record and results in a higher peak flow for the 24 hour design storm.

Figure 4
Comparison of historical and theoretical rainfall events.



Extended Period Simulation

The City of Newberg uses a theoretical design storm for developing stormwater facility design, however the design developed using a theoretical event was confirmed using a number of longer historical rainfall events to develop an understanding of how conservative the theoretical design storm method is compared to an extended period simulation (EPS). For this analysis five extended period intervals were selected provide a range of different conditions.

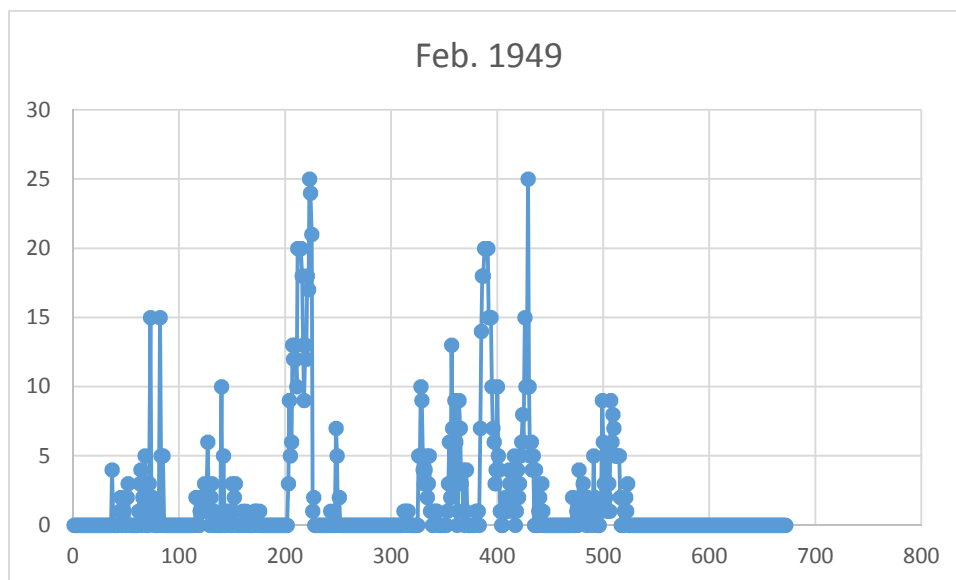
An EPS models runoff for some of the historical rainfall record and develops a long-term runoff hydrograph based on the results. This type of analysis more accurately reflects the

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impact that successive rain events may have, regardless of the return period of the individual events. Instead of designing storm water facilities based on a theoretical design storm and the runoff that is generated by this single event, stormwater facility parameters are adjusted to minimize the differential between the pre and post development runoff hydrographs evaluated using the EPS. It is not reasonable to expect that a stormwater facility can accommodate any runoff rate, and designs are typically developed to accommodate events in the ½ of a 2 year runoff to a 10 year runoff. Using this method the facility is sized to accommodate any combination of rainfall events that result in a runoff in the ½ of a 2 year to 10 year flow range (this is based on compliance requirements of the USACE/NMFS SLOPES V reporting standards).

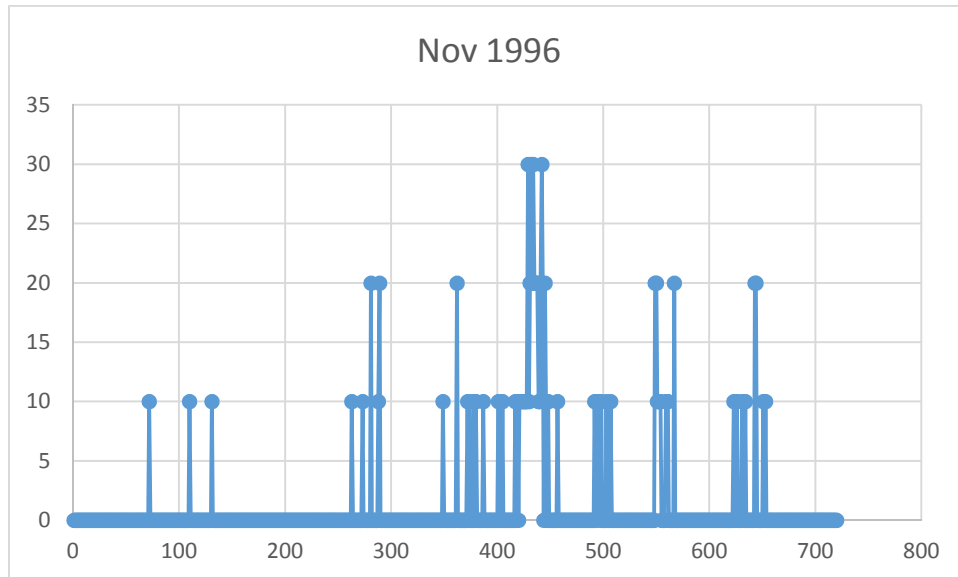
The first two are an entire month of precipitation data, February 1949 and November 1996. Both of these months contain multiple rainfall events, including a 10 year rainfall event. The data sets are shown in Figures 5 and 6.

Figure 5
February 1949



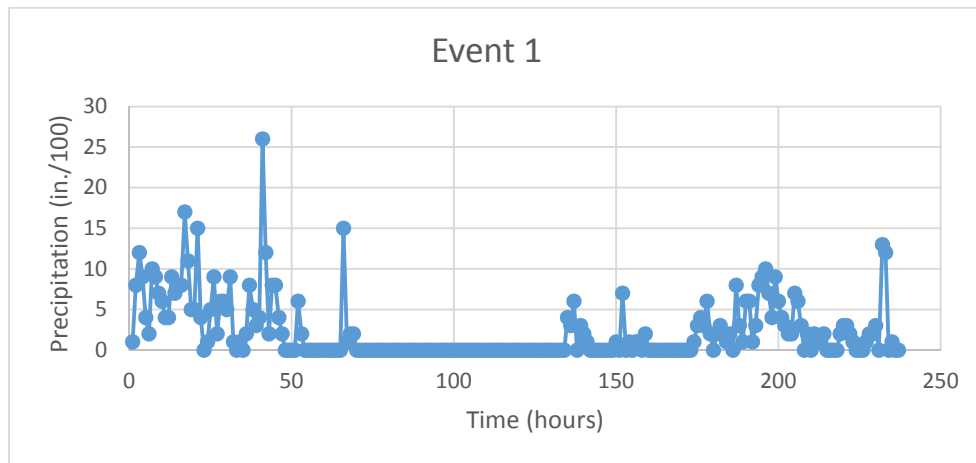
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Figure 6
November 1996



The three other time periods are between 144 and 250 hours and contain one large event (9-17 return period), and a successive rainfall event. The three events are shown in Figures 6 – 8 and are described below.

Figure 6
EPS Event 1, November 1954



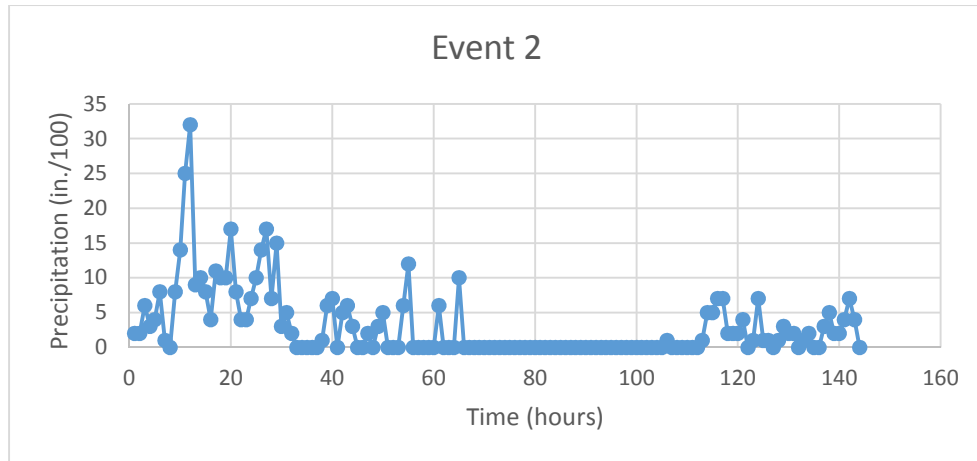
Event 1 –

This rainfall series includes two events. The primary event has a total depth of 3.22 inches, followed by a 65 hour dry period, followed by a 2.22 inch rain vent. The primary event has a

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return period of approximately 9.5 years, and the secondary event has a return period of approximately 2.3 years. The peak intensity during this event is 0.26 inches per hour.

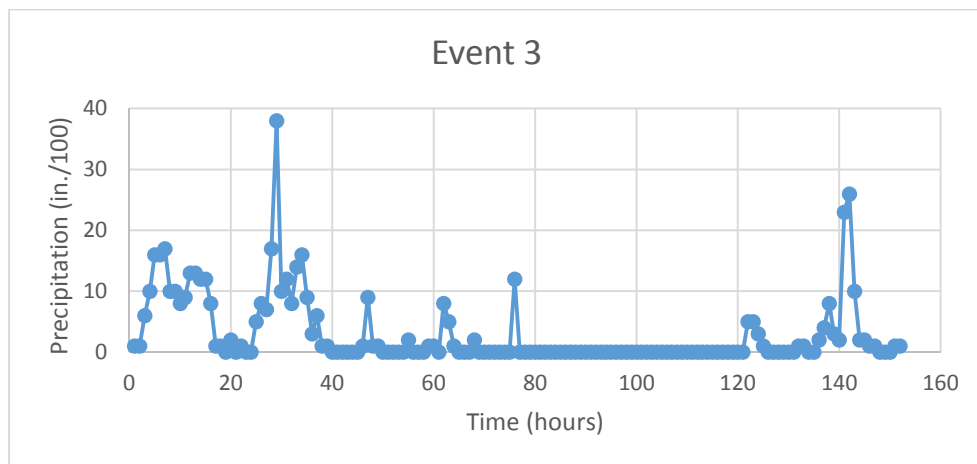
Figure 7
EPS Event 2, January 1981



Event 2 –

This rainfall series also includes two events. The primary event has a total depth of 3.52 inches and a return period of approximately 14.5 years. The peak intensity during the primary event is 0.57 inches per hour. A second rain event occurs 40 hours later and has a total depth of approximately 0.84 inches, which is less than a one year event.

Figure 8
EPS Event 3, November 1962



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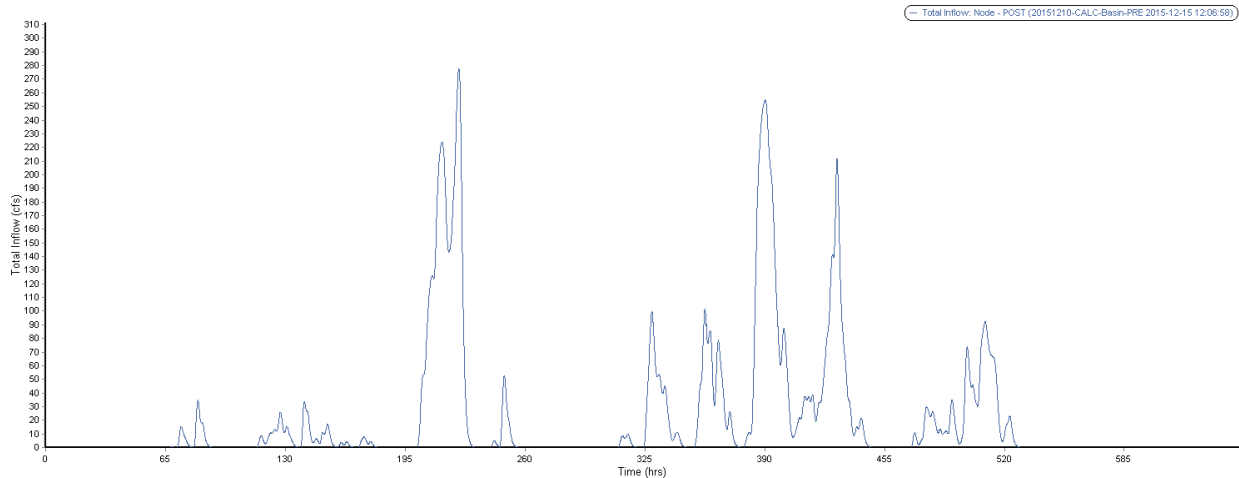
Event 3 –

The third time series also includes two events. The primary rain event is 3.66 inches (17 year return period) followed by 45 hours of dry weather and finally a 6 month event. The peak intensity during this event is 0.48 inches per hour.

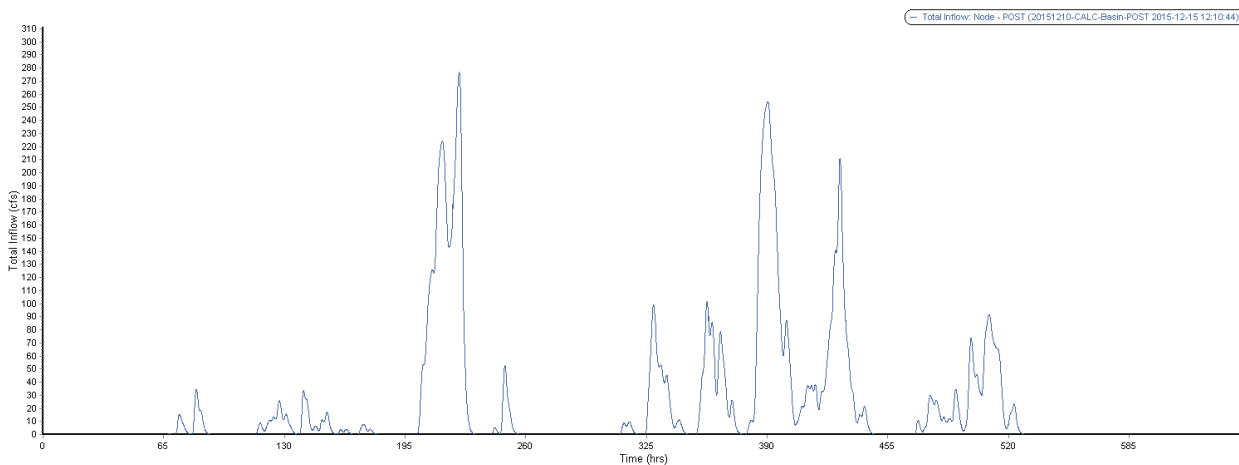
Runoff Hydrograph Discussion –

The five extended period rainfall datasets were simulated and the pre and post development runoff was compared. The results are presented in Figures 9 – 13.

Figure 9
February 1949



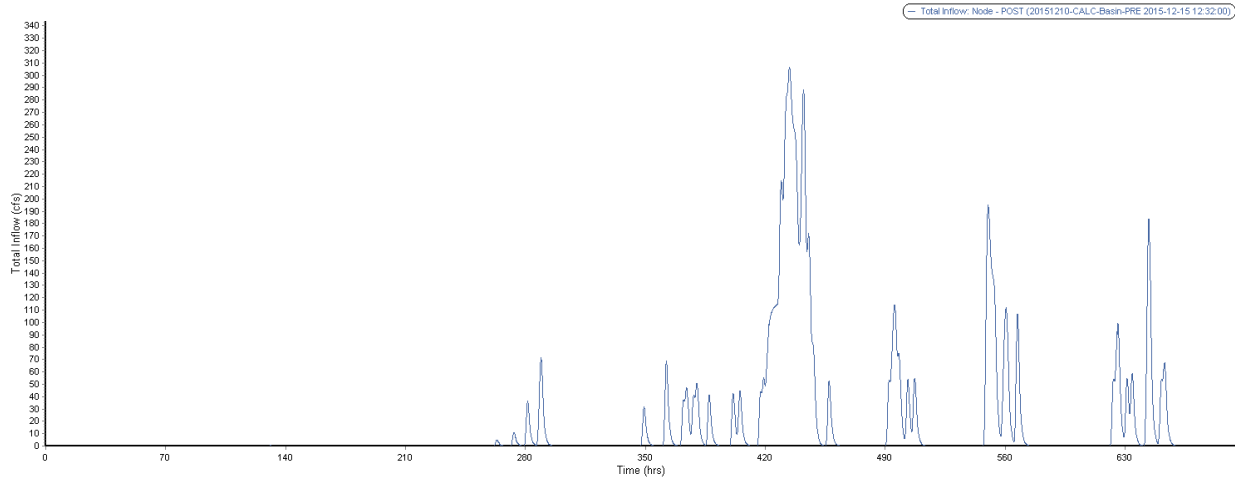
February 1949 Pre-developed Event Mean Total Flow = 20.47 cfs; Peak Flow = 277.39 cfs



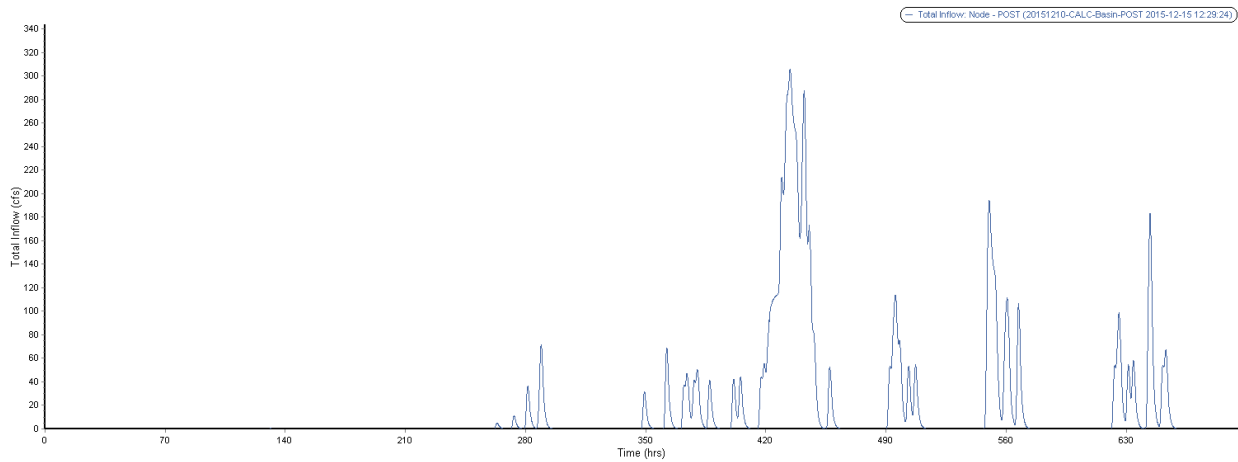
February 1949 Post-developed Event Mean Total Flow = 20.41 cfs; Peak Flow = 277.20 cfs

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Figure 10
November 1996



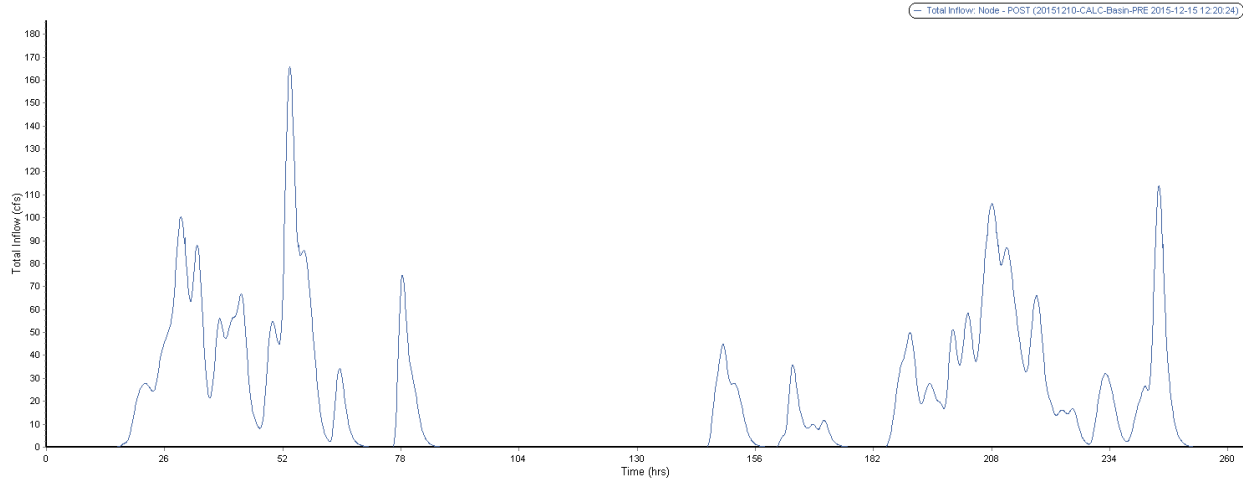
November 1996 Pre-developed Event Mean Total Flow = 15.54 cfs: Peak Flow = 306.28 cfs



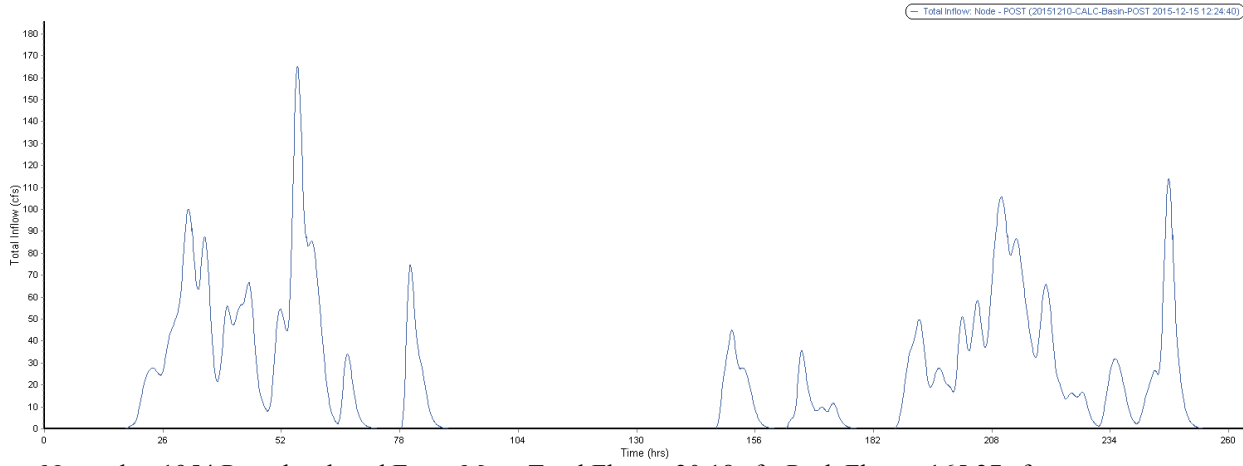
November 1996 Post-developed Event Mean Total Flow = 15.50 cfs: Peak Flow = 306.15 cfs

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Figure 11
2/11/1954 through 2/14/1954



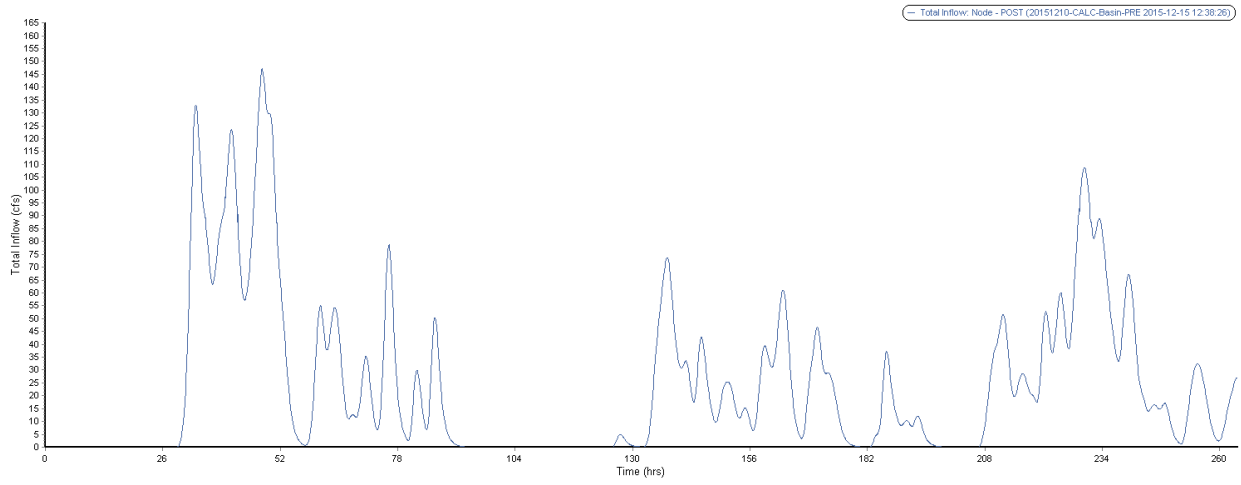
November 1954 Pre-developed Event Mean Total Flow = 20.24 cfs: Peak Flow = 165.67 cfs



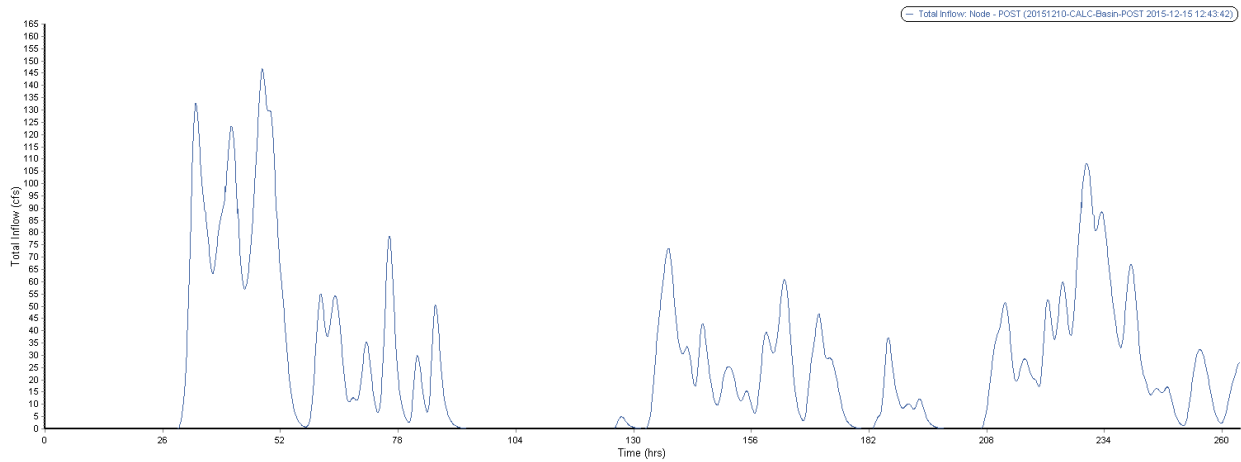
November 1954 Post-developed Event Mean Total Flow = 20.18 cfs: Peak Flow = 165.27 cfs

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Figure 12
12/4/1981 through 12/7/1981



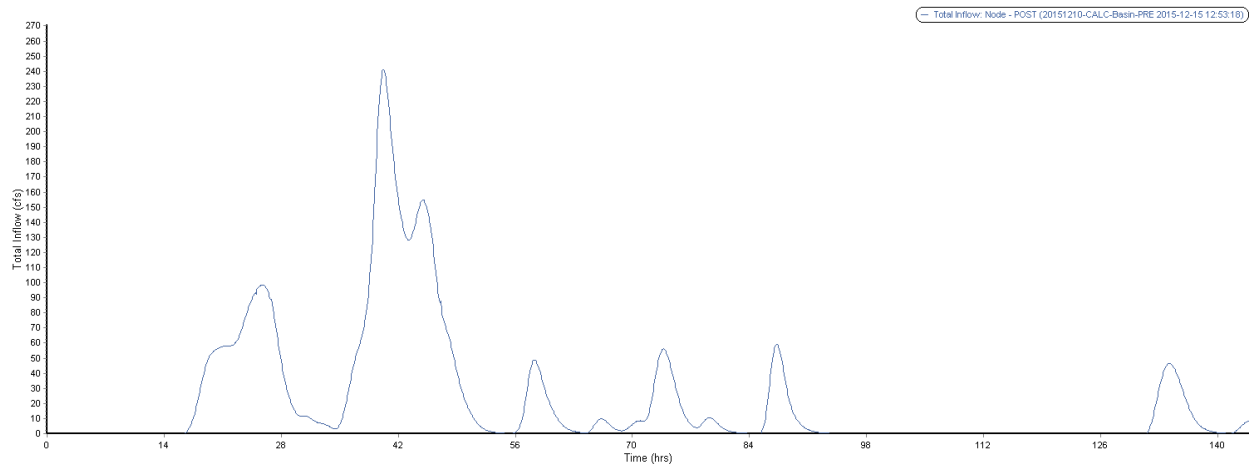
December 1981 Pre-developed Event Mean Total Flow = 12.86 cfs: Peak Flow = 147.11 cfs



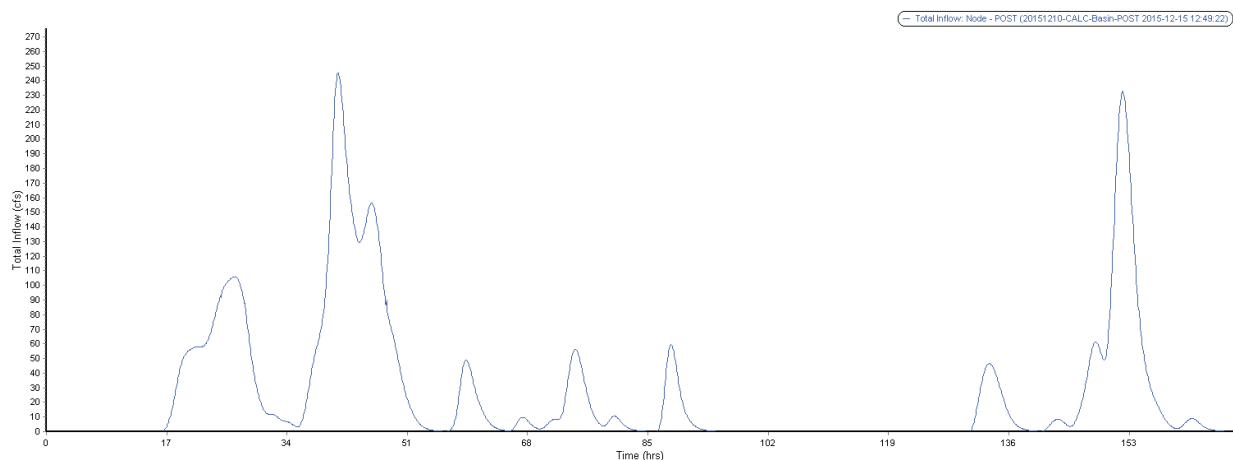
December 1981 Post-developed Event Mean Total Flow = 10.84 cfs: Peak Flow = 146.96

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Figure 13
11/24/1962 through 11/27/1962



November 1962 Pre-developed Event Mean Total Flow = 25.18 cfs: Peak Flow = 241.17 cfs



November 1962 Post-developed Event Mean Total Flow = 26.08 cfs: Peak Flow = 245.46 cfs

Discussion –

The design of the storm water facility was able to reduce post development peak and mean total flow compared to pre development peak and mean total flow for all of the EPS scenarios except for one. The EPS scenarios provided a range of rainfall events (0.5 – 17 year return periods) and also contained successive rainfall events. The only simulation where the facility failed to reduce runoff to below pre development conditions included a 17.4 year rainfall event. The facility was successful in reducing the runoff of a 14.5 year event. Peak flow was also reduced in all of the simulations except for the November 1962 event (17.4 year return period).

The comparison of the traditional design storm approach and the EPS simulation approach was performed to determine if the traditional design storm method was adequately conservative. Because the storm water facility was designed using a traditional 10 year, 24

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hour Type 1A design storm, but was capable of handling a wide range of EPS simulations including successive rainfall events (some including a greater than 10 year return period event), the facility sizing is conservative.

SAM:sjr:njm