

**PHASE III DRAINAGE REPORT  
RIDGEGATE EAST FILING NO. 5  
LONE TREE, CO**

**May 2025**

Prepared For:

Rampart Range Metropolitan District No. 5

Prepared By:



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Greenwood Village, CO 80111  
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Merrick Project No. 100959

## **PHASE III DRAINAGE REPORT RIDGEGATE EAST FILING NO. 5**

“This report (and plan) for the Phase III drainage design of *RidgeGate East Filing No. 5* was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Lone Tree Storm Drainage Design and Technical Criteria for the owners thereof. I understand that the City of Lone Tree does not and will not assume liability for drainage facilities designed by others.”



---

Carson Besgrove  
Registered Professional Engineer  
State of Colorado No. 44849



**PHASE III DRAINAGE REPORT  
RIDGEGATE EAST FILING NO. 5**

**TABLE OF CONTENTS**

|            |                                                                 |    |
|------------|-----------------------------------------------------------------|----|
| I.         | GENERAL LOCATION AND DESCRIPTION .....                          | 1  |
| A.         | Site Location .....                                             | 1  |
| B.         | Description of Property .....                                   | 1  |
| II.        | DRAINAGE BASINS AND SUB-BASINS .....                            | 2  |
| A.         | Major Drainage Basins .....                                     | 2  |
| B.         | Minor Drainage Basins .....                                     | 3  |
| III.       | DRAINAGE DESIGN CRITERIA .....                                  | 3  |
| A.         | Regulations .....                                               | 3  |
| B.         | Drainage Studies, Outfall Systems Plans, Site Constraints ..... | 3  |
| C.         | Hydrology .....                                                 | 4  |
| D.         | Hydraulics .....                                                | 5  |
| E.         | Water Quality Enhancement .....                                 | 6  |
| IV.        | STORMWATER MANAGEMENT FACILITY DESIGN .....                     | 7  |
| A.         | Stormwater Conveyance Facilities .....                          | 7  |
| B.         | Stormwater Storage Facilities .....                             | 7  |
| C.         | Floodplain Modification .....                                   | 9  |
| D.         | Additional Permitting Requirements .....                        | 9  |
| V.         | CONCLUSIONS .....                                               | 9  |
| A.         | Compliance with Standards .....                                 | 9  |
| B.         | Variances .....                                                 | 9  |
| C.         | Drainage Concept .....                                          | 10 |
| REFERENCES | .....                                                           | 11 |

## **APPENDICES**

Appendix A – Reference Materials

Appendix B – Hydrologic Calculations

Appendix C – Street and Inlet Capacity Calculations

Appendix D – Storm Sewer Calculations

Appendix E – Pond Design Calculations

Appendix F – CUHP / SWMM Calculations

Appendix G – Drainage Maps

## **LIST OF ABBREVIATIONS**

|        |                                                                                                                                         |
|--------|-----------------------------------------------------------------------------------------------------------------------------------------|
| cfs    | Cubic feet per second                                                                                                                   |
| CUHP   | Colorado Urban Hydrograph Procedure                                                                                                     |
| DC-DCM | Douglas County Drainage Design and Technical Criteria Manual                                                                            |
| EGL    | Energy Grade Line                                                                                                                       |
| FEMA   | Federal Emergency Management Agency                                                                                                     |
| FHAD   | Flood Hazard Area Delineation                                                                                                           |
| FIRM   | Flood Insurance Rate Map                                                                                                                |
| HGL    | Hydraulic Grade Line                                                                                                                    |
| HSG    | Hydrologic Soil Group                                                                                                                   |
| MHFD   | Mile High Flood District                                                                                                                |
| MDP-14 | <u>Happy Canyon Creek Major Drainageway Plan</u> , March 2014, by Muller Engineering Company, Inc.                                      |
| MDP-17 | <u>Master Drainage Plan for RidgeGate – Happy Canyon Creek and Badger Gulch Drainage Basins</u> , February 2017, by Merrick and Company |
| NRCS   | Natural Resources Conservation Service                                                                                                  |
| OSP    | Outfall Systems Plan                                                                                                                    |
| Pkwy   | Parkway                                                                                                                                 |
| RRMD   | Rampart Range Metropolitan District                                                                                                     |
| USDA   | United States Department of Agriculture                                                                                                 |
| SF-3   | Standard Form 3                                                                                                                         |
| SWMM   | Stormwater Management Model                                                                                                             |
| WQCV   | Water Quality Capture Volume                                                                                                            |

## **I. GENERAL LOCATION AND DESCRIPTION**

### **A. Site Location**

The proposed Site is a portion of *RidgeGate East Filing No. 5* and is located within the north half of Section 24, Township 6 South, Range 67 West, 6<sup>th</sup> Principal Meridian, City of Lone Tree, Douglas County, and State of Colorado. The Site is located north of westbound Ridgegate Pkwy at the High Note Ave intersection. Figure 1-1 presents a vicinity map showing the proposed Site location. Developments adjacent to and surrounding the Site include:

- RidgeGate East Filing 5 public right-of-way (ROW) and undeveloped land to the north
- RidgeGate East Filing 5 Lot 4 to the east
- RidgeGate East Filing 3 to the south (directly south of westbound Ridgegate Pkwy)
- RidgeGate East Filing 5 Lot 2 to the west

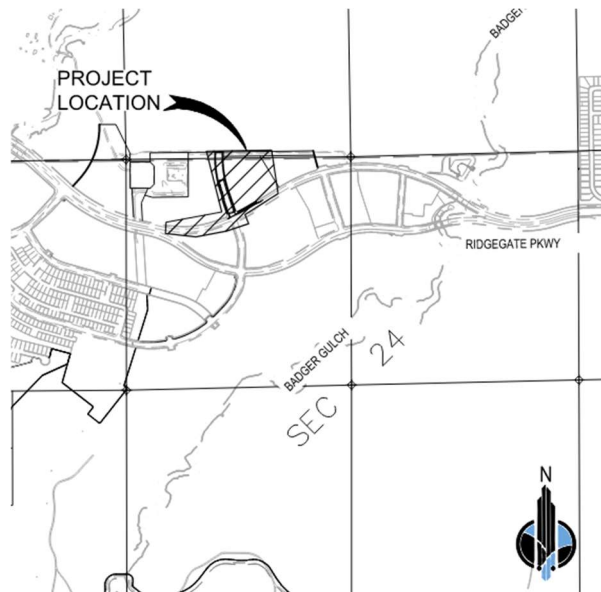


Figure 1-1: Project Vicinity Map

### **B. Description of Property**

The Site is approximately 1.2 acres of undeveloped land that appears to be a material stockpile from the construction of Ridgegate Pkwy in 2011. The ground cover consists of native grasses and generally drains east at approximately 25 percent slopes.

From the Soil Survey of Castle Rock Area, Colorado, performed by the USDA Natural Resources Conversation Service, the site and surrounding area consist of the following soil types:

- “FoB” Fondis clay loam, 1 to 3 percent slopes, HSG C
- “Ma” Manzanola clay loam, HSG C
- “NeE” Newlin gravelly sandy loam, 8 to 30 percent slopes, HSG B
- “RmE” Renohill-Buick complex, 5 to 25 percent slopes, HSG D

For this report and drainage analysis, the site is considered HSG C and D. The soil map can be found in Appendix A.

The Site is located within the Happy Canyon Creek drainage basin. Once developed, runoff within the Site will be redirected to the Badger Gulch drainage basin.

The FEMA FIRM panels presented in Appendix A depict the Special Flood Hazard Area (SFHA) subject to inundation by the 1% annual chance flood for the Happy Canyon Creek and Badger Gulch basins. The Site is outside the Happy Canyon Creek and Badger Gulch 100-year floodplain.

No existing irrigation canals or ditches exist within the site. There are no significant geologic features identified within the site.

The proposed land use consists of public roadway, utilities, and drainage improvements to support future development.

## **II. DRAINAGE BASINS AND SUB-BASINS**

### **A. Major Drainage Basins**

Once developed, the Site runoff will drain to the Badger Gulch Drainage Basin. The Badger Gulch Drainage Basin generally flows from southwest to northeast and joins Happy Canyon Creek downstream of the Site and directly south of Lincoln Avenue.

## B. Minor Drainage Basins

The on-site and off-site minor drainage basins were established with phase III drainage reports for Ridgegate Pkwy and RidgeGate East Filing No. 3 and 4. The drainage reports are identified in the References Section of this report. The Site is broken up into minor basins that are described in the table below and outlined in the drainage map provided in Appendix G.

**Table 2-1: Minor Drainage Basin Summary**

| Basin Name | Design Point | Area (ac) | Imperviousness (%) | Collection Point                    | Q <sub>s</sub> (cfs) | Q <sub>100</sub> (cfs) | Proposed Flow Pattern                       |
|------------|--------------|-----------|--------------------|-------------------------------------|----------------------|------------------------|---------------------------------------------|
| L1         | -            | 0.79      | 67.0%              | TYPE 13 COMBO INLET (ON-GRADE) - L1 | 1.4                  | 3.7                    | Runoff flows east via curb & gutter         |
| J2         | -            | 1.33      | 67.1%              | 15' TYPE R INLET (ON-GRADE) - J2    | 2.7                  | 7.2                    | Runoff flows south via curb & gutter        |
| JO         | -            | 0.90      | 20.0%              | AREA INLET (BY OTHERS)              | 0.5                  | 2.7                    | Runoff flows overland to the south and east |
| D2         | -            | 1.33      | 74.3%              | 15' TYPE R INLET (ON-GRADE) - K2    | 2.5                  | 6.3                    | Runoff flows east via curb & gutter         |
| D5         | -            | 0.59      | 61.5%              | EX 10' TYPE R INLET - D5            | 1.0                  | 2.8                    | Runoff flows east via curb & gutter         |
| D6         | -            | 1.00      | 61.4%              | EX 10' TYPE R INLET - D6            | 1.6                  | 4.6                    | Runoff flows east via curb & gutter         |

## III. DRAINAGE DESIGN CRITERIA

### A. Regulations

The Mile High Flood District (MHFD) Urban Storm Drainage Criteria Manual, and the Douglas County Drainage Design and Technical Criteria Manual (DC-DCM) were used in the preparation of this report.

### B. Drainage Studies, Outfall Systems Plans, Site Constraints

The following drainage studies and reports have been completed for the Site:

- Happy Canyon Creek Flood Hazard Area Delineation, prepared by Muller Engineering Company, dated July 2014 (FHAD-14). The FHAD-14 floodplain information was adopted by the City of Lone Tree effective February 17, 2017.
- Happy Canyon Creek Major Drainageway Plan (MDP-14), dated March 2014, by Muller

- Master Drainage Plan for RidgeGate – Happy Canyon Creek and Badger Gulch Drainage Basins (MDP-17), dated February 2017, by Merrick and Company. This report updated the MDP-14 to provide more detail related to the RidgeGate Development.
- Phase III Drainage Report for RidgeGate Parkway Expansion – Phase I (RGPE-I), dated October 2018, by Merrick & Company.
- Phase III Drainage Report for RidgeGate Parkway Expansion – Phase II (RGPE-II), dated October 2018, by Merrick & Company.
- Phase III Drainage Report for RidgeGate East Filing No. 3 and 4, dated January 2024, by Merrick & Company.

This report is in conformance with the six previously completed drainage reports. The RidgeGate East Filing No. 3 and 4 Report was the main governing document for ensuring conformance with the Pond 21 design.

### **C. Hydrology**

The Point Precipitation Frequency Estimates from the NOAA Atlas 14 were used to determine the 1-hour point rainfall depth for the different recurrence intervals. Based on the 60-minute duration, the 5-year and 100-year depths for Lone Tree are 1.10 inches and 2.27 inches. The same depths from the prior RGPE-I and -II reports were 1.43 inches and 2.60 inches, which accounts for some of the decreases in flows. The MHFD impervious values have changed from these prior reports and could also explain the differences in flows. The Point Precipitation Frequency Estimate for Lone Tree is provided in Appendix A.

The Rational Method was used to calculate runoff for the design of the inlets and storm sewer. Rational Method calculations are provided in Appendix B. Table 3-1 presents the flows at critical points design points.

**Table 3-1: RGPE-II Flow Comparisons at Key Design Points**

| Filing No. 5 Design Point | Filing No. 5 100-Yr Storm Event Flow (cfs) | RGPE-II Design Point | RGPE-II 100-Yr Storm Event Flow (cfs) |
|---------------------------|--------------------------------------------|----------------------|---------------------------------------|
| D2                        | 37.5                                       | D2                   | 36.9                                  |
| D3                        | 44.5                                       | D3                   | 40.8                                  |
| D4                        | 47.8                                       | D4                   | 44.3                                  |

The Hydraflow model of RGPE-II Storm D was updated to confirm the capacity of the existing system to handle the proposed changes. See Section III.D Hydraulics for more information.

The Colorado Urban Hydrograph Procedure (CUHP) was used to calculate runoff for the Badger Gulch sub-catchments to confirm conformance with the existing detention pond. The CUHP calculations can be found in Appendix F.

#### **D. Hydraulics**

Per Douglas County drainage design criteria, the 5-year and 100-year design storms were used in the design of stormwater conveyance facilities.

Street sections and storm drainage inlet capacities have been determined using the MHFD “MHFD-Inlet\_v5.03” excel spreadsheet (version 5.03, August 2023). Inlet calculations are provided in Appendix C. Table 3-2 provides the inlet flow comparison.

**Table 3-2: Inlet Flow Comparison to RGPE-II**

| Filing No. 5 Inlet | Filing No. 5 100-Yr Storm Event Flow (cfs) | RGPE-II Existing Inlet | RGPE-II 100-Yr Storm Event Flow (cfs) |
|--------------------|--------------------------------------------|------------------------|---------------------------------------|
| Inlet D5           | 2.8                                        | Inlet D5               | 5.5                                   |
| Inlet D6           | 4.6                                        | Inlet D6               | 4.7                                   |

The decrease in flow to Inlet D5 can be attributed to the decrease in Basin D5 area, due to the proposed inlet just upstream up Basin D5.



Storm sewer capacities and hydraulic grade line (HGL) calculations have been determined using the Hydraflow Storm Sewer Extension for Autodesk. Storm sewer and HGL calculations are provided in Appendix D.

### **E. Water Quality Enhancement**

Water quality for the Site will be provided by proposed Pond 21. Pond 21 was designed to provide water quality for the excess urban runoff volume (EURV) for the Site.

Pond 21 from Filing No. 3 was analyzed for impacts. With this project, a turn lane is added into the basin D2 area, and additional development has resulted in additional basins being tributary to Pond 21. The changes in watershed area and watershed imperviousness for Pond 21 are outlined below.

**Table 3-3: Pond 21 Comparison**

| Pond 21                  | Filing No. 3 | Filing No. 5 |
|--------------------------|--------------|--------------|
| Watershed Area (ac)      | 48.24        | 50.85        |
| Watershed Imperviousness | 76.3%        | 75.1%        |

With the change in area and imperviousness, the required water quality capture volume for Pond 21 increased from the RGPE-II Report. The following table presents the WQCV from the original design, and current report utilizing the as-built condition.

**Table 3-4: Pond 21 Design Summary**

|                    | Filing No. 3                     | Filing No. 5                     |
|--------------------|----------------------------------|----------------------------------|
| WQCV (ac-ft)       | 1.232 required<br>1.238 provided | 1.272 required<br>1.278 provided |
| EURV (ac-ft)       | 3.601 required<br>3.608 provided | 3.733 required<br>3.737 provided |
| 100-YR (ac-ft)*    | 6.46                             | 6.40                             |
| 100-YR Depth (ft)* | 9.00                             | 8.94                             |

\* From CUHP/SWMM Modeling

The proposed design does not increase the required water quality volume beyond the as-built existing pond's water quality capture volume. The proposed design does not require additional 100-year volume from the as-built condition. Therefore, there are no proposed improvements to Pond 21. Pond 21 calculations are included in Appendix E.

#### **IV. STORMWATER MANAGEMENT FACILITY DESIGN**

##### **A. Stormwater Conveyance Facilities**

The proposed drainage improvements will be in either public right-of-way, dedicated tracts of land, or in drainage easements dedicated to the City of Lone Tree. Upon acceptance by the City, in conformance with the terms of the Annexation Agreement, the storm drainage infrastructure (inlets, pipes and manholes) will become the City's responsibility for maintenance.

##### **B. Stormwater Storage Facilities**

Existing detention Pond 21 was designed to provide 100-year detention so that the peak flow rate of Badger Gulch is not increased.

Per the FHAD-14, "All runoff from developing areas within RidgeGate will be captured and attenuated in EURV-only ponds located offline from mainstem Happy Canyon Creek and Badger Gulch." The FHAD-14 goes on to state, "In addition to the sub-regional offline EURV ponds, the conceptual design plans call for 100-year online peak-skimming detention facilities." Since there are no other 100-year online peak-skimming detention facilities on Badger Gulch constructed to date, Pond 21 will provide flood detention in the interim.

Once 100-year online peak-skimming detention facilities are constructed on Badger Gulch it is anticipated that Pond 21 could be modified to provided EURV-only.

To confirm that the proposed development and Pond 21 discharge does not increase the 100-year peak flowrate in Badger Gulch, the CUHP/SWMM data from the FHAD-14 was used to model the proposed development and existing pond.

The FHAD-14 used CUHP version 1.3.3. Since 2014 there has been many software updates and the current version of CUHP is version 2.0.1. The original CUHP/SWMM data was entered into the new version of CUHP with the most current rainfall data to determine the 100-year flow in Badger Gulch prior to any improvements. The following Table presents the changes in runoff between versions of CUHP.

Table 4-1: FHAD-14 SWMM Results by CUHP

| CUHP Version                                       |           | V1.3.3 | V2.0.1 |
|----------------------------------------------------|-----------|--------|--------|
| 60-Minute Duration, 100-Year Recurrence Depth (in) |           | 2.58   | 2.27   |
| Location                                           | SWMM Node | (cfs)* | (cfs)  |
| Downstream of Pond 21                              | BG011     | 1,489  | 1,266  |
| Badger Gulch / Pond 21 Junction                    | BG010     | 1,362  | 1,172  |
| Upstream of Pond 21                                | BG009     | 1,321  | 1,142  |

\*FHAD-14, Appendix B, page B-15

The current version of CUHP combined with the current NOAA Atlas data resulted in a decrease in runoff of approximately 17 percent. Since the completion of the FHAD-14, the RidgeGate Parkway Expansion Project (Couplet) was completed within the Badger Gulch Basin. The Couplet reduced the area draining to Happy Canyon Creek and increased the area draining to the Badger Gulch Basin. The CUHP basins were updated to reflect the existing roadway. The following table presents the changes in runoff between the FHAD-14 (version 2.0.1) and the current existing condition.

Table 4-2: SWMM Results for the FHAD-14 and Existing Conditions

| Location                        | SWMM Node | 100-YR Existing (cfs) | 100-YR Existing Couplet (cfs) |
|---------------------------------|-----------|-----------------------|-------------------------------|
| Downstream of Pond 21           | BG011     | 1,266                 | 1,286                         |
| Badger Gulch / Pond 21 Junction | BG010     | 1,172                 | 1,194                         |
| Upstream of Pond 21             | BG009     | 1,142                 | 1,168                         |

The Couplet Project increased the runoff in Badger Gulch by approximately two percent. With the 100-year existing couplet baseline flow rate established, the CUHP Couplet Drainage Basin (E190) was then altered to represent the proposed development and Pond 21 as-built data was added to the model. Pond 21 discharges to SWMM node BG010, the following table presents the existing and developed runoff.

**Table 4-3: SWMM Results for Existing Couplet and Developed Couplet**

| Location                        | SWMM Node | 100-YR Existing Couplet (cfs) | 100-YR F3 Developed Couplet (cfs) | 100-YR F5 Developed Couplet (cfs) |
|---------------------------------|-----------|-------------------------------|-----------------------------------|-----------------------------------|
| Downstream of Pond 21           | BG011     | 1,286                         | 1,275                             | 1,278                             |
| Badger Gulch / Pond 21 Junction | BG010     | 1,194                         | 1,194                             | 1,189                             |
| Upstream of Pond 21             | BG009     | 1,168                         | 1,168                             | 1,168                             |

Based on the SWMM results the proposed development will not increase the 100-year peak runoff within Badger Gulch.

### **C. Floodplain Modification**

Badger Gulch is located inside a FEMA Zone A designated floodplain. All proposed improvements will remain outside the FEMA designated floodplain; therefore, no modifications are necessary.

### **D. Additional Permitting Requirements**

There are wetlands that exist along Badger Gulch; however, no wetlands will be impacted with this project.

## **V. CONCLUSIONS**

### **A. Compliance with Standards**

This Phase III Drainage Report is in compliance with the Douglas County and Mile High Flood District Standards.

### **B. Variances**

The Douglas County Standards specifies drop within a manhole from upstream pipe invert to downstream pipe invert normally not exceed 1-foot. Due to utility crossings, a drop greater than 1-foot was utilized along a lateral line to avoid utility conflicts. Therefore, a variance is requested to increase the manhole drop height requirement to greater than 1-foot.

### **C. Drainage Concept**

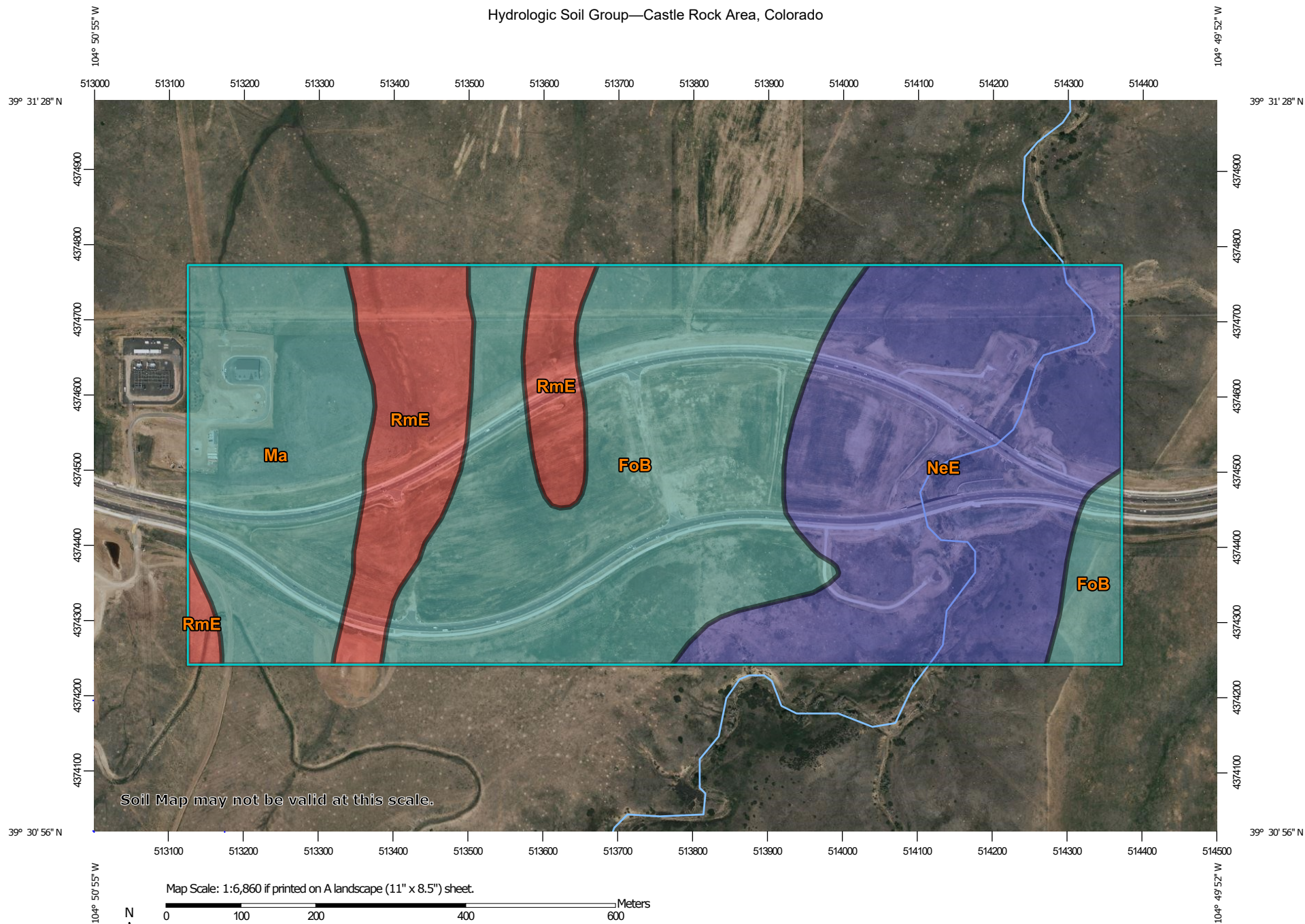
The drainage concept and proposed stormwater facilities are in substantial compliance with the FHAD, MDP-14, MDP-17, RGPE-I, RGPE-II, and Filing No. 3 and 4 Reports.

## **REFERENCES**

1. Douglas County. Douglas County Storm Drainage Design and Technical Criteria Manual. Amended July 8, 2008.
2. Federal Emergency Management Agency. F.E.M.A Flood Insurance Rate Map (FIRM), Douglas County, Colorado, Map Number 08035C0064J.
3. RidgeGate, 6<sup>th</sup> Amendment, Planned Development District. Recorded March 2018.
4. United States Department of Agriculture Natural Resources Conservation Service. Soil Survey of Castle Rock Area, Colorado.
5. Mile High Flood District. Urban Storm Drainage Criteria Manual Volumes 1-3. Revised March 2017.
6. Muller Engineering Company, Inc. Happy Canyon Flood Hazard Area Delineation. July 2014.
7. Muller Engineering Company, Inc. Happy Canyon Creek Major Drainageway Plan. March 2014.
8. Merrick & Company. Master Drainage Plan for RidgeGate – Happy Canyon Creek and Badger Gulch Drainage Basins. February 2017.
9. Merrick & Company. Phase III Drainage Report for RidgeGate Parkway Expansion – Phase I. October 2018.
10. Merrick & Company. Phase III Drainage Report for RidgeGate Parkway Expansion – Phase II. October 2018.
11. Merrick & Company. Phase III Drainage Report for RidgeGate East Filing No. 3 and 4. January 2024.

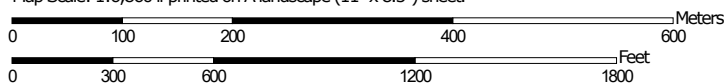
## **APPENDIX A – REFERENCE MATERIALS**

# Hydrologic Soil Group—Castle Rock Area, Colorado



Soil Map may not be valid at this scale.

Map Scale: 1:6,860 if printed on A landscape (11" x 8.5") sheet.



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



**Natural Resources  
Conservation Service**

Web Soil Survey  
National Cooperative Soil Survey

6/11/2022  
Page 1 of 4



## MAP LEGEND

### Area of Interest (AOI)

 Area of Interest (AOI)

### Soils

#### Soil Rating Polygons

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

#### Soil Rating Lines

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

#### Soil Rating Points

 A  
 A/D  
 B  
 B/D

 C  
 C/D  
 D  
 Not rated or not available

### Water Features

 Streams and Canals

### Transportation

 Rails  
 Interstate Highways  
 US Routes  
 Major Roads  
 Local Roads

### Background

 Aerial Photography

## MAP INFORMATION

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

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: Castle Rock Area, Colorado  
 Survey Area Data: Version 14, Aug 31, 2021

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

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

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

## Hydrologic Soil Group

| Map unit symbol                    | Map unit name                                      | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|----------------------------------------------------|--------|--------------|----------------|
| FoB                                | Fondis clay loam, 1 to 3 percent slopes            | C      | 60.6         | 36.8%          |
| Ma                                 | Manzanola clay loam                                | C      | 28.8         | 17.5%          |
| NeE                                | Newlin gravelly sandy loam, 8 to 30 percent slopes | B      | 53.3         | 32.4%          |
| RmE                                | Renohill-Buick complex, 5 to 25 percent slopes     | D      | 21.9         | 13.3%          |
| <b>Totals for Area of Interest</b> |                                                    |        | <b>164.5</b> | <b>100.0%</b>  |

## Description

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

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

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

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

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

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

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

## Rating Options

*Aggregation Method:* Dominant Condition

*Component Percent Cutoff:* None Specified

*Tie-break Rule:* Higher



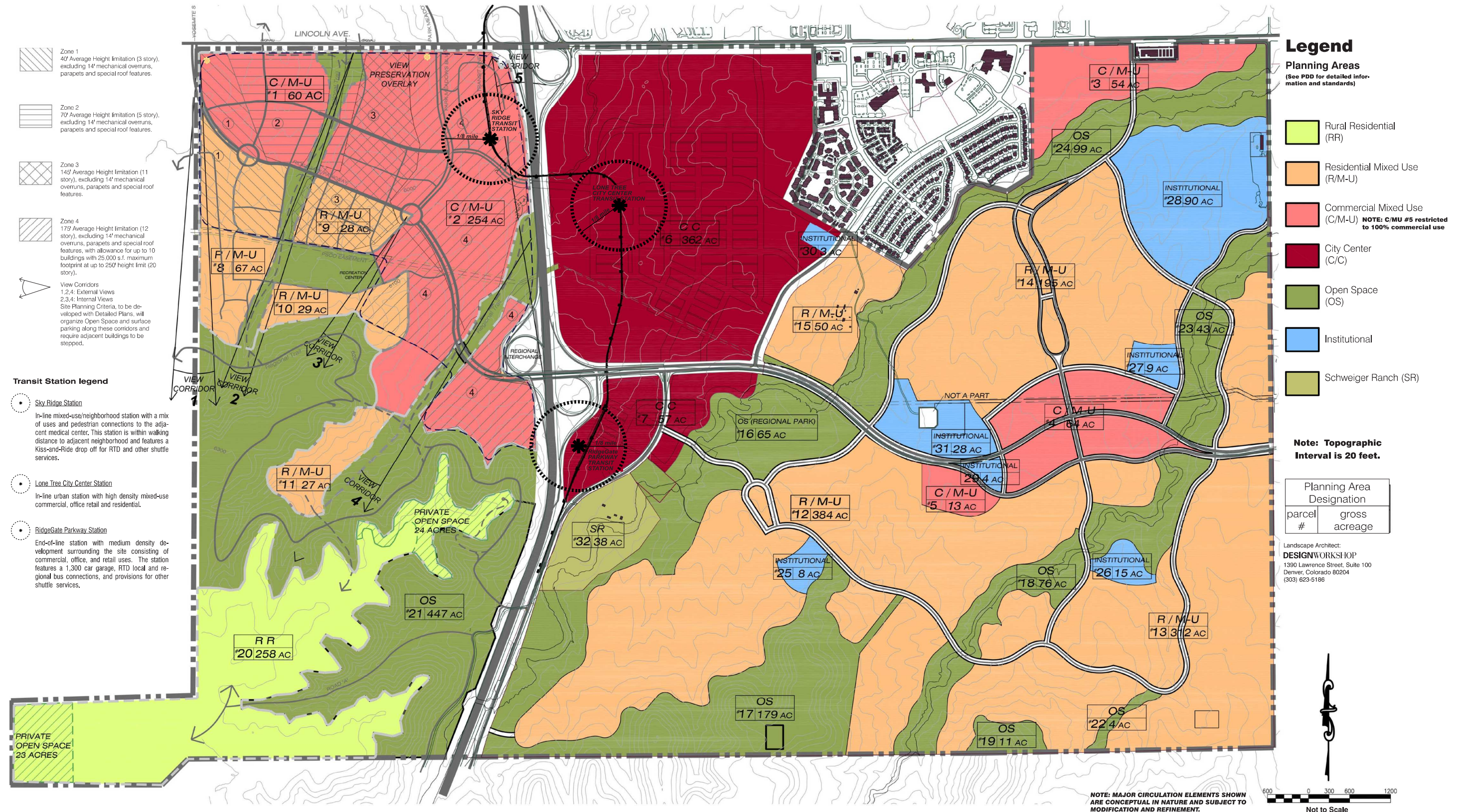


# RIDGEGATE, 6th Amendment

(an amendment to the PDD formerly known as RidgeGate, 5th Amendment, approved by the City of Lone Tree, and recorded at 201818230 on March 28, 2018)  
Sections 13, 14, 15, 22, 23, 24 and a portion of Section 21, Township 6 South, Range 67 West of the 6th Principal Meridian  
City of Lone Tree, State of Colorado (3,515 Acres)

Master Developer  
**Coventry Development Corp. – Colorado**  
10270 Commonwealth Street, Suite B  
Lone Tree, Colorado 80124

## Planned Development District







NOAA Atlas 14, Volume 8, Version 2  
Location name: Parker, Colorado, USA\*  
Latitude: 39.5204°, Longitude: -104.8413°  
Elevation: 6026 ft\*\*  
\* source: ESRI Maps  
\*\* source: USGS



## POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

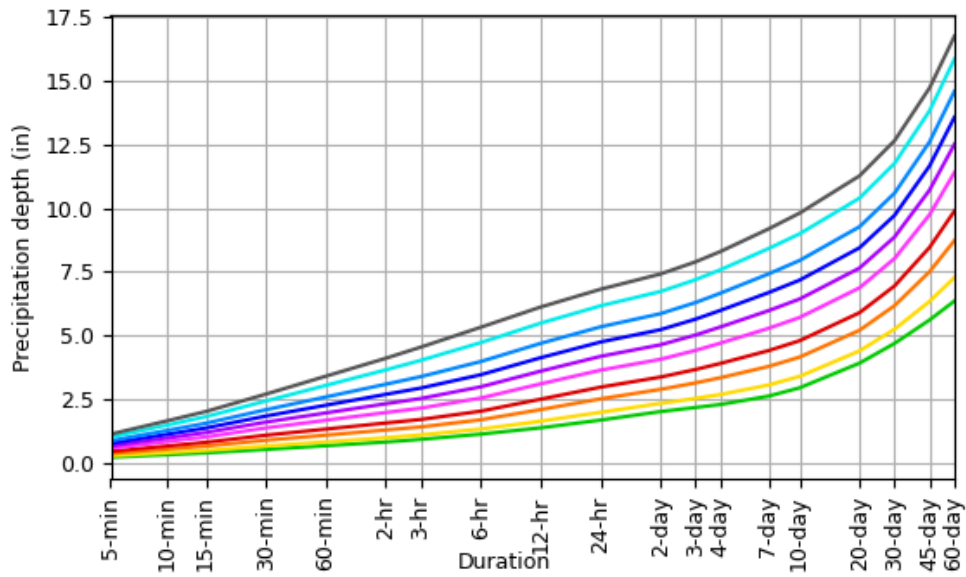
### PF tabular

| PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) <sup>1</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                     |                        |                        |                        |                        |                        |                       |                       |                      |                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|-----------------------|-----------------------|----------------------|----------------------|
| Duration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Average recurrence interval (years) |                        |                        |                        |                        |                        |                       |                       |                      |                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1                                   | 2                      | 5                      | 10                     | 25                     | 50                     | 100                   | 200                   | 500                  | 1000                 |
| 5-min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 0.222<br>(0.179-0.278)              | 0.278<br>(0.224-0.348) | 0.373<br>(0.299-0.469) | 0.456<br>(0.363-0.576) | 0.575<br>(0.443-0.760) | 0.671<br>(0.504-0.899) | 0.770<br>(0.558-1.06) | 0.875<br>(0.607-1.24) | 1.02<br>(0.679-1.49) | 1.13<br>(0.733-1.68) |
| 10-min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.325<br>(0.262-0.407)              | 0.407<br>(0.327-0.510) | 0.546<br>(0.438-0.687) | 0.667<br>(0.532-0.843) | 0.841<br>(0.649-1.11)  | 0.982<br>(0.738-1.32)  | 1.13<br>(0.818-1.55)  | 1.28<br>(0.889-1.82)  | 1.49<br>(0.994-2.18) | 1.66<br>(1.07-2.46)  |
| 15-min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.396<br>(0.319-0.497)              | 0.496<br>(0.399-0.622) | 0.666<br>(0.534-0.838) | 0.814<br>(0.648-1.03)  | 1.03<br>(0.792-1.36)   | 1.20<br>(0.900-1.60)   | 1.38<br>(0.997-1.89)  | 1.56<br>(1.08-2.22)   | 1.82<br>(1.21-2.66)  | 2.02<br>(1.31-3.00)  |
| 30-min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.532<br>(0.428-0.666)              | 0.666<br>(0.536-0.836) | 0.895<br>(0.717-1.12)  | 1.09<br>(0.870-1.38)   | 1.38<br>(1.06-1.82)    | 1.61<br>(1.21-2.15)    | 1.84<br>(1.34-2.54)   | 2.09<br>(1.45-2.97)   | 2.44<br>(1.62-3.56)  | 2.70<br>(1.75-4.01)  |
| 60-min                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.678<br>(0.546-0.850)              | 0.830<br>(0.668-1.04)  | 1.10<br>(0.878-1.38)   | 1.33<br>(1.06-1.68)    | 1.68<br>(1.30-2.23)    | 1.97<br>(1.48-2.64)    | 2.27<br>(1.65-3.13)   | 2.59<br>(1.80-3.69)   | 3.05<br>(2.03-4.46)  | 3.41<br>(2.20-5.05)  |
| 2-hr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.824<br>(0.669-1.02)               | 0.994<br>(0.805-1.24)  | 1.30<br>(1.05-1.62)    | 1.57<br>(1.26-1.97)    | 1.98<br>(1.55-2.62)    | 2.33<br>(1.77-3.11)    | 2.70<br>(1.98-3.70)   | 3.09<br>(2.17-4.36)   | 3.66<br>(2.46-5.31)  | 4.11<br>(2.68-6.03)  |
| 3-hr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.928<br>(0.756-1.15)               | 1.10<br>(0.896-1.36)   | 1.42<br>(1.15-1.76)    | 1.71<br>(1.38-2.13)    | 2.15<br>(1.70-2.84)    | 2.53<br>(1.94-3.37)    | 2.94<br>(2.17-4.02)   | 3.39<br>(2.39-4.76)   | 4.03<br>(2.73-5.83)  | 4.55<br>(2.98-6.63)  |
| 6-hr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 1.13<br>(0.929-1.39)                | 1.33<br>(1.09-1.64)    | 1.70<br>(1.39-2.09)    | 2.04<br>(1.65-2.52)    | 2.55<br>(2.02-3.33)    | 2.99<br>(2.30-3.94)    | 3.46<br>(2.58-4.69)   | 3.98<br>(2.84-5.54)   | 4.72<br>(3.23-6.76)  | 5.33<br>(3.52-7.68)  |
| 12-hr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1.38<br>(1.14-1.68)                 | 1.64<br>(1.35-2.00)    | 2.10<br>(1.72-2.56)    | 2.50<br>(2.05-3.07)    | 3.11<br>(2.47-3.99)    | 3.61<br>(2.79-4.69)    | 4.13<br>(3.09-5.51)   | 4.70<br>(3.36-6.44)   | 5.49<br>(3.77-7.74)  | 6.12<br>(4.09-8.73)  |
| 24-hr                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 1.68<br>(1.40-2.03)                 | 1.99<br>(1.66-2.40)    | 2.52<br>(2.09-3.05)    | 2.98<br>(2.45-3.62)    | 3.64<br>(2.91-4.62)    | 4.19<br>(3.26-5.37)    | 4.75<br>(3.57-6.25)   | 5.34<br>(3.85-7.23)   | 6.17<br>(4.27-8.59)  | 6.82<br>(4.59-9.61)  |
| 2-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.02<br>(1.69-2.41)                 | 2.34<br>(1.96-2.80)    | 2.89<br>(2.41-3.47)    | 3.37<br>(2.80-4.06)    | 4.07<br>(3.28-5.10)    | 4.64<br>(3.64-5.89)    | 5.23<br>(3.97-6.82)   | 5.86<br>(4.26-7.85)   | 6.73<br>(4.70-9.26)  | 7.42<br>(5.04-10.3)  |
| 3-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.18<br>(1.83-2.59)                 | 2.54<br>(2.13-3.02)    | 3.15<br>(2.64-3.75)    | 3.67<br>(3.06-4.40)    | 4.42<br>(3.57-5.50)    | 5.02<br>(3.96-6.33)    | 5.65<br>(4.30-7.30)   | 6.30<br>(4.60-8.37)   | 7.20<br>(5.05-9.83)  | 7.90<br>(5.39-10.9)  |
| 4-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.30<br>(1.94-2.72)                 | 2.69<br>(2.27-3.19)    | 3.35<br>(2.81-3.98)    | 3.91<br>(3.26-4.67)    | 4.71<br>(3.81-5.82)    | 5.34<br>(4.22-6.70)    | 5.99<br>(4.57-7.70)   | 6.67<br>(4.88-8.80)   | 7.59<br>(5.34-10.3)  | 8.30<br>(5.69-11.4)  |
| 7-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 2.63<br>(2.23-3.09)                 | 3.06<br>(2.60-3.61)    | 3.79<br>(3.21-4.48)    | 4.41<br>(3.71-5.23)    | 5.29<br>(4.30-6.49)    | 5.98<br>(4.76-7.44)    | 6.69<br>(5.14-8.52)   | 7.43<br>(5.47-9.72)   | 8.42<br>(5.97-11.3)  | 9.19<br>(6.34-12.5)  |
| 10-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 2.95<br>(2.52-3.46)                 | 3.40<br>(2.90-3.99)    | 4.16<br>(3.53-4.88)    | 4.80<br>(4.05-5.66)    | 5.71<br>(4.67-6.97)    | 6.44<br>(5.14-7.96)    | 7.18<br>(5.54-9.10)   | 7.95<br>(5.88-10.3)   | 9.00<br>(6.41-12.0)  | 9.81<br>(6.80-13.3)  |
| 20-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3.92<br>(3.37-4.55)                 | 4.40<br>(3.78-5.11)    | 5.21<br>(4.45-6.07)    | 5.90<br>(5.02-6.90)    | 6.88<br>(5.67-8.30)    | 7.65<br>(6.16-9.36)    | 8.45<br>(6.58-10.6)   | 9.28<br>(6.93-11.9)   | 10.4<br>(7.47-13.7)  | 11.3<br>(7.89-15.1)  |
| 30-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 4.70<br>(4.05-5.42)                 | 5.25<br>(4.53-6.07)    | 6.18<br>(5.30-7.16)    | 6.95<br>(5.94-8.09)    | 8.03<br>(6.64-9.61)    | 8.87<br>(7.17-10.8)    | 9.72<br>(7.60-12.1)   | 10.6<br>(7.94-13.5)   | 11.8<br>(8.49-15.4)  | 12.7<br>(8.90-16.8)  |
| 45-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5.62<br>(4.87-6.45)                 | 6.34<br>(5.49-7.29)    | 7.51<br>(6.48-8.66)    | 8.47<br>(7.26-9.80)    | 9.75<br>(8.07-11.6)    | 10.7<br>(8.68-12.9)    | 11.7<br>(9.14-14.4)   | 12.6<br>(9.48-15.9)   | 13.8<br>(10.0-17.9)  | 14.7<br>(10.4-19.5)  |
| 60-day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 6.36<br>(5.53-7.28)                 | 7.28<br>(6.32-8.34)    | 8.74<br>(7.56-10.0)    | 9.89<br>(8.51-11.4)    | 11.4<br>(9.44-13.4)    | 12.5<br>(10.2-14.9)    | 13.6<br>(10.6-16.6)   | 14.6<br>(11.0-18.3)   | 15.9<br>(11.5-20.4)  | 16.8<br>(11.9-22.0)  |
| <sup>1</sup> Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).<br>Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.<br>Please refer to NOAA Atlas 14 document for more information. |                                     |                        |                        |                        |                        |                        |                       |                       |                      |                      |

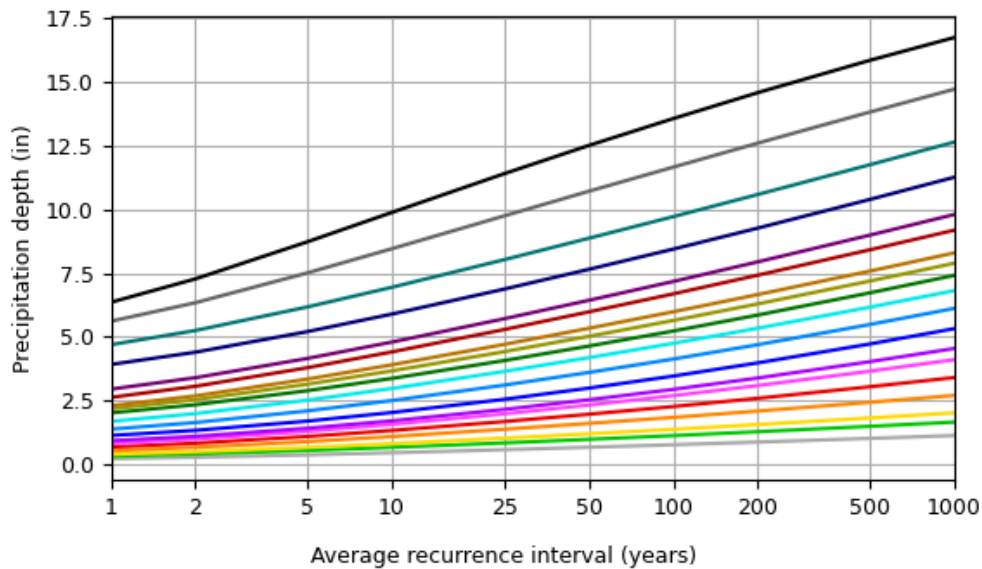
[Back to Top](#)

### PF graphical

PDS-based depth-duration-frequency (DDF) curves  
Latitude: 39.5204°, Longitude: -104.8413°



| Average recurrence interval (years) |
|-------------------------------------|
| 1                                   |
| 2                                   |
| 5                                   |
| 10                                  |
| 25                                  |
| 50                                  |
| 100                                 |
| 200                                 |
| 500                                 |
| 1000                                |

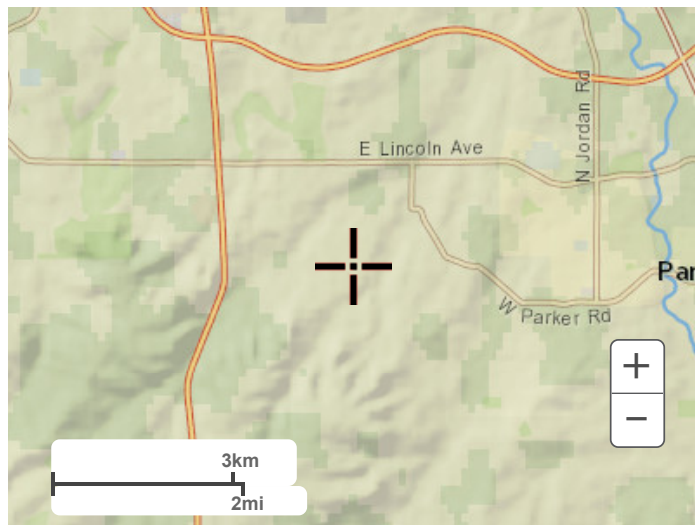


| Duration |
|----------|
| 5-min    |
| 10-min   |
| 15-min   |
| 30-min   |
| 60-min   |
| 2-hr     |
| 3-hr     |
| 6-hr     |
| 12-hr    |
| 24-hr    |
| 2-day    |
| 3-day    |
| 4-day    |
| 7-day    |
| 10-day   |
| 20-day   |
| 30-day   |
| 45-day   |
| 60-day   |

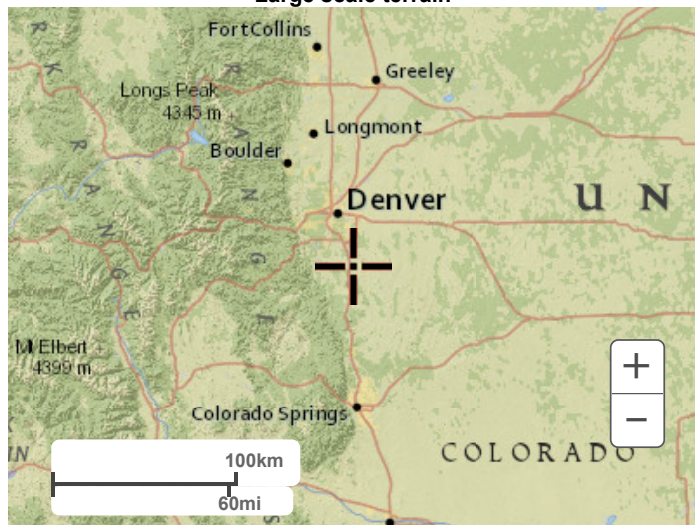
[Back to Top](#)

## Maps & aerals

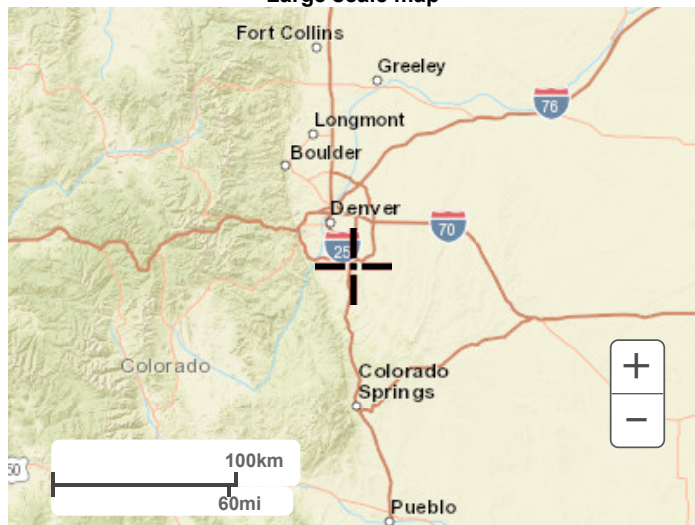
Small scale terrain



Large scale terrain

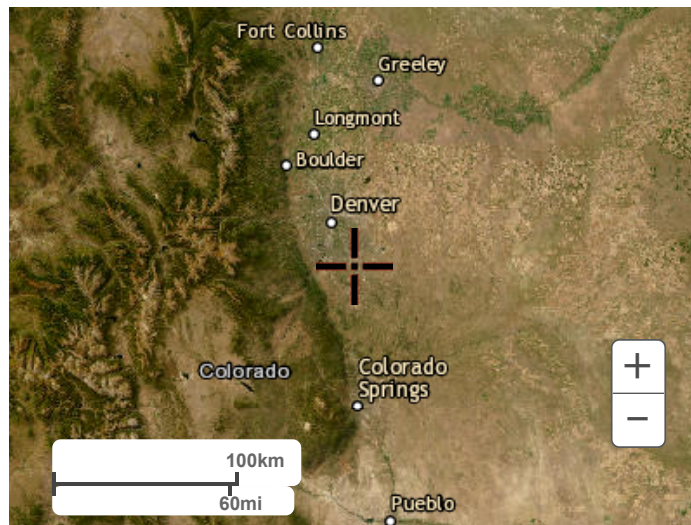


Large scale map



Large scale aerial





[Back to Top](#)

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[US Department of Commerce](#)  
[National Oceanic and Atmospheric Administration](#)  
[National Weather Service](#)  
[National Water Center](#)  
1325 East West Highway  
Silver Spring, MD 20910  
Questions?: [HDSC.Questions@noaa.gov](mailto:HDSC.Questions@noaa.gov)

[Disclaimer](#)

**PHASE III DRAINAGE REPORT  
FOR  
RIDGEGATE PARKWAY EXPANSION – PHASE II  
LONE TREE, CO**

**October 2018**

Prepared For:

City of Lone Tree  
9220 Kimmer Dr., Suite 100  
Lone Tree, Colorado 80124  
Phone: (720) 509-1241

Prepared By:



5970 Greenwood Plaza Blvd  
Greenwood Village, CO 80111  
Phone: (303) 751-0741

Merrick Job No. 65119564

City of Lone Tree Review & Approval is with respect To General Conformance with City Standards. Responsibility for the Design remains with the Professional(s) submitting and stamping the Document(s).



City of Lone Tree  
Public Works Department

**APPROVED**

BY:

A handwritten signature in black ink, appearing to read "Steve", written over a horizontal line.

DATE: 04/22/2019



**MERRICK  
& COMPANY**

**Merrick & Company**  
5970 Greenwood Plaza Blvd.  
Greenwood Village, CO 80111  
Ph: (303) 751-0741

Job Name: Ridgegate Parkway Expansion  
Job Number: 65119564  
Date: 10/5/2018  
By: A. Jenne

## Ridgegate Parkway Expansion

### Composite Runoff Coefficient Calculations

Location: Douglas County

Municipality: Douglas County

Minor Design Storm: 5

Major Design Storm: 100

Soil Type: C/D

Runoff Coefficient (UDFCD Vol 1, Chp 6, Sec. 2.5.1)

| NRCS Soil Group | Storm Return Period      |                          |                          |                          |               |               |
|-----------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------|---------------|
|                 | 2-Year                   | 5-Year                   | 10-Year                  | 25-Year                  | 50-Year       | 100-Year      |
| A               | C=0.84i <sup>1.302</sup> | C=0.86i <sup>1.276</sup> | C=0.87i <sup>1.232</sup> | C=0.84i <sup>1.124</sup> | C=0.85i+0.025 | C=0.78i+0.110 |
| B               | C=0.84i <sup>1.169</sup> | C=0.86i <sup>1.088</sup> | C=0.81i+0.057            | C=0.63i+0.249            | C=0.56i+0.328 | C=0.47i+0.426 |
| C/D             | C=0.83i <sup>1.122</sup> | C=0.82i+0.035            | C=0.74i+0.132            | C=0.56i+0.319            | C=0.49i+0.393 | C=0.41i+0.484 |

| Basin Design Data |              |                                 |                                |                               |                          |                          |                          |                                     |                                     |                         |                         |         |                |      |      |      |
|-------------------|--------------|---------------------------------|--------------------------------|-------------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------|-------------------------------------|-------------------------|-------------------------|---------|----------------|------|------|------|
|                   | I (%) =      | 100%                            | 90%                            | 85%                           | 75%                      | 55%                      | 45%                      | 2%                                  | 2%                                  |                         |                         | i (%)   | Runoff Coeff's |      |      |      |
| Basin Name        | Design Point | A <sub>paved streets</sub> (sf) | A <sub>drives/walks</sub> (sf) | A <sub>MU/COM/FIRE</sub> (sf) | A <sub>MF/RES</sub> (sf) | A <sub>MD RES</sub> (sf) | A <sub>LD RES</sub> (sf) | A <sub>Iscape (C/D soil)</sub> (sf) | A <sub>Iscape (C/D soil)</sub> (sf) | A <sub>Total</sub> (sf) | A <sub>Total</sub> (ac) | Imp (%) | C2             | C5   | C10  | C100 |
| D1-O              | -            |                                 |                                |                               |                          |                          |                          |                                     | 164,822                             | 164,822                 | 3.78                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| D2                | -            | 28,182                          | 15,185                         |                               |                          |                          |                          |                                     | 16,341                              | 59,708                  | 1.37                    | 70.6%   | 0.56           | 0.61 | 0.65 | 0.77 |
| D3-F              | -            |                                 |                                | 209,211                       |                          |                          |                          |                                     |                                     | 209,211                 | 4.80                    | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| D4-F              | -            | 26,651                          | 9,506                          |                               |                          |                          |                          |                                     | 14,651                              | 50,808                  | 1.17                    | 69.9%   | 0.56           | 0.61 | 0.65 | 0.77 |
| D34               | -            |                                 |                                |                               |                          |                          |                          | 260,019                             |                                     | 260,019                 | 5.97                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| D5                | -            | 13,370                          | 7,824                          |                               |                          |                          |                          |                                     | 8,091                               | 29,285                  | 0.67                    | 70.3%   | 0.56           | 0.61 | 0.65 | 0.77 |
| D6                | -            | 16,013                          | 9,830                          |                               |                          |                          |                          |                                     | 9,963                               | 35,806                  | 0.82                    | 70.0%   | 0.56           | 0.61 | 0.65 | 0.77 |
| D7                | -            |                                 |                                |                               |                          |                          |                          | 520,145                             |                                     | 520,145                 | 11.94                   | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| D7-F              | -            |                                 |                                | 722,994                       |                          |                          |                          |                                     |                                     | 722,994                 | 16.60                   | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| D8-F              | -            | 47,320                          | 21,359                         |                               |                          |                          |                          |                                     | 13,491                              | 82,170                  | 1.89                    | 81.3%   | 0.66           | 0.70 | 0.73 | 0.82 |
| D78               | -            |                                 |                                |                               |                          |                          |                          |                                     | 303,764                             | 303,764                 | 6.97                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| D9                | -            | 17,489                          | 10,208                         |                               |                          |                          |                          |                                     | 10,616                              | 38,313                  | 0.88                    | 70.2%   | 0.56           | 0.61 | 0.65 | 0.77 |
| D10               | -            |                                 |                                |                               |                          |                          |                          |                                     | 325,606                             | 325,606                 | 7.47                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| D10-F             | -            |                                 |                                | 347,081                       |                          |                          |                          |                                     |                                     | 347,081                 | 7.97                    | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| D11               | -            |                                 |                                |                               |                          |                          |                          |                                     | 342,431                             | 342,431                 | 7.86                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| D11-F             | -            |                                 |                                | 320,956                       |                          |                          |                          |                                     |                                     | 320,956                 | 7.37                    | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| D12               | -            | 11,260                          | 6,145                          |                               |                          |                          |                          |                                     | 7,440                               | 24,845                  | 0.57                    | 68.2%   | 0.54           | 0.59 | 0.64 | 0.76 |
| D13               | -            | 31,807                          | 14,019                         |                               |                          |                          |                          |                                     | 15,479                              | 61,305                  | 1.41                    | 73.0%   | 0.58           | 0.63 | 0.67 | 0.78 |
| D14-O             | -            |                                 |                                |                               |                          |                          |                          |                                     | 118,859                             | 118,859                 | 2.73                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| D15               | -            |                                 |                                |                               |                          |                          |                          |                                     | 114,509                             | 114,509                 | 2.63                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| WQ Pond D         |              | 192,092                         | 94,076                         | 1,600,242                     | 0                        | 0                        | 0                        | 0                                   | 210,581                             | 2,096,991               | 48.14                   | 78.3%   | 0.63           | 0.68 | 0.71 | 0.80 |



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Greenwood Village, CO 80111  
Ph: (303) 751-0741

Job Name: Ridgeway Parkway Expansion  
Job Number: 65119564  
Date: 10/5/2018  
By: A. Jenne

## Ridgeway Parkway Expansion

### Time of Concentration Calculations

Location: Douglas County  
Municipality: Douglas County  
Minor Design Storm: 5  
Major Design Storm: 100  
Soil Type: C/D

$$t_t = (0.395(1.1 - C_s)(L_t^{0.5})) / (S_o^{0.33})$$

$$t_t = L_t / (60V_t)$$

$$\text{Urban } t_c = (26 - 17i) + L_t / (60(14 + 9)(S_o^{0.5}))$$

| Sub-Basin Data |              |                         |       |                | Initial Overland Time (t <sub>i</sub> ) |           |                      | Travel Time (t <sub>t</sub> )<br>t <sub>t</sub> =Length/(Velocity x 60) |           |                                    |                |                |                      |                                                                  | t <sub>c</sub> Comp | t <sub>c</sub> Urbanized Check    ON |                      |                     | t <sub>c</sub> Final |
|----------------|--------------|-------------------------|-------|----------------|-----------------------------------------|-----------|----------------------|-------------------------------------------------------------------------|-----------|------------------------------------|----------------|----------------|----------------------|------------------------------------------------------------------|---------------------|--------------------------------------|----------------------|---------------------|----------------------|
| Basin Name     | Design Point | A <sub>Total</sub> (ac) | i (%) | C <sub>S</sub> | Upper most Length (ft)                  | Slope (%) | t <sub>i</sub> (min) | Length (ft)                                                             | Slope (%) | Type of Land Surface               | C <sub>v</sub> | Velocity (fps) | t <sub>t</sub> (min) | Time of Conc<br>t <sub>i</sub> + t <sub>t</sub> = t <sub>c</sub> | L <sub>t</sub> (ft) | S <sub>T</sub> (%)                   | Urban t <sub>c</sub> | M<br>t <sub>c</sub> |                      |
| D1-O           | -            | 3.78                    | 2.0%  | 0.05           | 45                                      | 16.0%     | 5.1                  | 721                                                                     | 1.0%      | Short Pasture and lawns            | 7              | 0.7            | 17.2                 | 22.3                                                             | 766.0               | 1.2%                                 | 38.0                 | 22.3                |                      |
| D2             | -            | 1.37                    | 70.6% | 0.61           | 54                                      | 2.0%      | 5.2                  | 779                                                                     | 0.9%      | Paved areas & shallow paved swales | 20             | 1.9            | 6.7                  | 11.9                                                             | 833.0               | 1.0%                                 | 21.4                 | 11.9                |                      |
| D3-F           | -            | 4.80                    | 85.0% | 0.73           | 100                                     | 2.0%      | 5.4                  | 394                                                                     | 3.0%      | Paved areas & shallow paved swales | 20             | 3.5            | 1.9                  | 7.3                                                              | 494.0               | 2.8%                                 | 13.9                 | 7.3                 |                      |
| D4-F           | -            | 1.17                    | 69.9% | 0.61           | 81                                      | 2.0%      | 6.4                  | 567                                                                     | 2.5%      | Paved areas & shallow paved swales | 20             | 3.2            | 3.0                  | 9.4                                                              | 648.0               | 2.4%                                 | 17.8                 | 9.4                 |                      |
| D34            | -            | 5.97                    | 2.0%  | 0.05           | 81                                      | 2.0%      | 13.7                 | 567                                                                     | 2.5%      | Short Pasture and lawns            | 7              | 1.1            | 8.5                  | 22.3                                                             | 648.0               | 2.4%                                 | 33.1                 | 22.3                |                      |
| D5             | -            | 0.67                    | 70.3% | 0.61           | 61                                      | 2.0%      | 5.6                  | 389                                                                     | 1.0%      | Paved areas & shallow paved swales | 20             | 2.0            | 3.2                  | 8.8                                                              | 450.0               | 1.1%                                 | 17.8                 | 8.8                 |                      |
| D6             | -            | 0.82                    | 70.0% | 0.61           | 58                                      | 2.0%      | 5.5                  | 300                                                                     | 0.6%      | Paved areas & shallow paved swales | 20             | 1.5            | 3.2                  | 8.7                                                              | 358.0               | 0.7%                                 | 17.8                 | 8.7                 |                      |
| D7             | -            | 11.94                   | 2.0%  | 0.05           | 459                                     | 2.4%      | 30.8                 | 599                                                                     | 1.4%      | Short Pasture and lawns            | 7              | 0.8            | 12.0                 | 42.7                                                             | 1058.0              | 1.8%                                 | 39.9                 | 39.9                |                      |
| D7-F           | -            | 16.60                   | 85.0% | 0.73           | 100                                     | 2.0%      | 5.4                  | 1213                                                                    | 1.8%      | Paved areas & shallow paved swales | 20             | 2.6            | 7.6                  | 13.0                                                             | 1313.0              | 1.8%                                 | 19.4                 | 13.0                |                      |
| D8-F           | -            | 1.89                    | 81.3% | 0.70           | 96                                      | 2.0%      | 5.7                  | 590                                                                     | 2.0%      | Paved areas & shallow paved swales | 20             | 2.8            | 3.5                  | 9.2                                                              | 686.0               | 2.0%                                 | 16.2                 | 9.2                 |                      |
| D78            | -            | 6.97                    | 2.0%  | 0.05           | 96                                      | 2.0%      | 15.0                 | 590                                                                     | 2.0%      | Short Pasture and lawns            | 7              | 1.0            | 10.0                 | 25.0                                                             | 686.0               | 2.0%                                 | 34.5                 | 25.0                |                      |
| D9             | -            | 0.88                    | 70.2% | 0.61           | 66                                      | 2.0%      | 5.8                  | 536                                                                     | 2.0%      | Paved areas & shallow paved swales | 20             | 2.8            | 3.2                  | 8.9                                                              | 602.0               | 2.0%                                 | 17.8                 | 8.9                 |                      |
| D10            | -            | 7.47                    | 2.0%  | 0.05           | 500                                     | 3.9%      | 27.4                 | 335                                                                     | 1.2%      | Short Pasture and lawns            | 7              | 0.8            | 7.3                  | 34.7                                                             | 835.0               | 2.5%                                 | 35.2                 | 34.7                |                      |
| D10-F          | -            | 7.97                    | 85.0% | 0.73           | 100                                     | 2.0%      | 5.4                  | 688                                                                     | 2.7%      | Paved areas & shallow paved swales | 20             | 3.3            | 3.5                  | 8.8                                                              | 788.0               | 2.6%                                 | 15.5                 | 8.8                 |                      |
| D11            | -            | 7.86                    | 2.0%  | 0.05           | 500                                     | 4.0%      | 27.1                 | 688                                                                     | 4.3%      | Short Pasture and lawns            | 7              | 1.4            | 7.9                  | 35.0                                                             | 1188.0              | 4.2%                                 | 36.1                 | 35.0                |                      |
| D11-F          | -            | 7.37                    | 85.0% | 0.73           | 100                                     | 2.0%      | 5.4                  | 731                                                                     | 4.0%      | Paved areas & shallow paved swales | 20             | 4.0            | 3.0                  | 8.4                                                              | 831.0               | 3.7%                                 | 15.0                 | 8.4                 |                      |
| D12            | -            | 0.57                    | 68.2% | 0.59           | 110                                     | 2.0%      | 7.7                  | 341                                                                     | 5.0%      | Paved areas & shallow paved swales | 20             | 4.5            | 1.3                  | 9.0                                                              | 493.0               | 3.8%                                 | 16.7                 | 9.0                 |                      |
| D13            | -            | 1.41                    | 73.0% | 0.63           | 152                                     | 2.0%      | 8.4                  | 492                                                                     | 2.5%      | Paved areas & shallow paved swales | 20             | 3.2            | 2.6                  | 11.0                                                             | 502.0               | 2.5%                                 | 16.4                 | 11.0                |                      |
| D14-O          | -            | 2.73                    | 2.0%  | 0.05           | 10                                      | 2.0%      | 4.8                  | 254                                                                     | 8.9%      | Short Pasture and lawns            | 7              | 2.1            | 2.0                  | 6.9                                                              | 601.0               | 4.0%                                 | 31.1                 | 6.9                 |                      |
| D15            | -            | 2.63                    | 2.0%  | 0.05           | 347                                     | 11.5%     | 15.9                 | 1                                                                       | 11.5%     | Short Pasture and lawns            | 7              | 2.4            | 0.0                  | 15.9                                                             | 1.0                 | 11.5%                                | 25.7                 | 15.9                |                      |

## Ridgeway Parkway Expansion

### Developed Storm Runoff Calculations

Design Storm :

**5 Year**

Point Hour Rainfall (P<sub>1</sub>) : **1.43**

$I = (28.5 P_1) / ((10 + TC)^{0.786})$

| Direct Runoff |              |           |              |                             |          |           |         | Total Runoff   |           |           |         | Inlets                |               |                                | Pipe                         |               |           |                 | Pipe/Swale Travel Time          |             |                |          |                  |                         |          |
|---------------|--------------|-----------|--------------|-----------------------------|----------|-----------|---------|----------------|-----------|-----------|---------|-----------------------|---------------|--------------------------------|------------------------------|---------------|-----------|-----------------|---------------------------------|-------------|----------------|----------|------------------|-------------------------|----------|
| Basin Name    | Design Point | Area (ac) | Runoff Coeff | tc (min)                    | C*A (ac) | I (in/hr) | Q (cfs) | Total tc (min) | ΣC*A (ac) | I (in/hr) | Q (cfs) | Inlet Type            | Q Intercepted | Q carryover (Q <sub>co</sub> ) | Pipe Size (in) or equivalent | Pipe Material | Slope (%) | Pipe Flow (cfs) | Approx. Max Pipe Capacity (cfs) | Length (ft) | Velocity (fps) | tt (min) | Total Time (min) | Notes                   |          |
| FUTURE        |              |           |              |                             |          |           |         |                |           |           |         |                       |               |                                |                              |               |           |                 |                                 |             |                |          |                  |                         |          |
| D1-O          | -            | 3.78      | 0.05         | 22.3                        | 0.19     | 2.65      | 0.5     |                |           |           |         | Swale                 | 0.5           | 0.0                            |                              |               |           |                 |                                 |             |                |          |                  | Flows conveyed offsite  |          |
| D3-F          | -            | 4.80      | 0.73         | 7.3                         | 3.52     | 4.34      | 15.2    |                |           |           |         | Fut. Connect          | 15.2          | 0.0                            |                              |               |           |                 |                                 |             |                |          |                  |                         |          |
| D4-F          | -            | 1.17      | 0.61         | 9.4                         | 0.71     | 3.96      | 2.8     |                |           |           |         | Fut. Connect          | 2.8           | 0.0                            |                              |               |           |                 |                                 |             |                |          |                  |                         |          |
|               | D1           |           |              | Combined Flows (D3-F-D4-F)  |          |           |         | 9.40           | 4.22      | 3.95      | 16.7    | Fut. Connect          |               |                                |                              | 30 in         | RCP       | 1.3%            | 16.7                            | 47.5        | 340            | 9.7      | 0.59             | 9.99                    |          |
| D2            | -            | 1.37      | 0.61         | 11.9                        | 0.75     | 3.60      | 2.7     |                |           |           |         | Inlet Type R L 10     | 2.7           | 0.0                            | 18 in                        | RCP           | 8.0%      | 2.7             | 29.7                            | 7.5         | 16.8           | 0.01     | 11.91            |                         |          |
|               | D2           |           |              | Combined Flows (D3-F-D2)    |          |           |         | 11.91          | 4.97      | 3.59      | 17.9    | Manhole Slab Base     |               |                                |                              | 36 in         | RCP       | 1.0%            | 17.9                            | 66.7        | 400            | 9.4      | 0.71             | 12.61                   |          |
| D5            | -            | 0.67      | 0.61         | 8.8                         | 0.75     | 4.06      | 3.0     |                |           |           |         | Inlet Type R L 10     | 3.0           | 0.0                            | 18 in                        | RCP           | 8.0%      | 3.0             | 29.7                            | 7.5         | 16.8           | 0.01     | 8.81             |                         |          |
|               | D3           |           |              | Combined Flows (D3-F-D5)    |          |           |         | 12.61          | 5.72      | 3.51      | 20.1    | Manhole Slab Base     |               |                                |                              | 36 in         | RCP       | 1.0%            | 20.1                            | 66.7        | 178            | 9.4      | 0.31             | 12.93                   |          |
| D6            | -            | 0.82      | 0.61         | 8.7                         | 0.50     | 4.08      | 2.0     |                |           |           |         | Inlet Type R L 5      | 2.1           | SUMP                           | 24 in                        | RCP           | 1.0%      | 2.1             | 22.6                            | 29.5        | 7.2            | 0.07     | 8.77             |                         |          |
|               | D4           |           |              | Combined Flows (D3-F-D6)    |          |           |         | 12.93          | 6.23      | 3.47      | 21.6    | Manhole Slab Base     |               |                                |                              | 36 in         | RCP       | 1.0%            | 21.6                            | 66.7        | 352            | 9.4      | 0.62             | 13.55                   |          |
| D7-F          | -            | 16.60     | 0.73         | 13.0                        | 12.15    | 3.47      | 42.1    |                |           |           |         | Fut. Connect          | 42.1          | 0.0                            |                              |               |           |                 |                                 |             |                |          |                  |                         |          |
| D8-F          | -            | 1.89      | 0.70         | 9.2                         | 1.32     | 3.99      | 5.3     |                |           |           |         | Fut. Connect          | 5.3           | 0.0                            |                              |               |           |                 |                                 |             |                |          |                  | Includes bypass from E1 |          |
|               | D5           |           |              | Combined Flows (D7-F-D8-F)  |          |           |         | 13.00          | 13.47     | 3.47      | 46.7    | Fut. Connect          |               |                                |                              | 42 in         | RCP       | 1.6%            | 46.7                            | 126.9       | 101            | 13.2     | 0.13             | 13.13                   |          |
|               | D6           |           |              | Combined Flows (D3-F-D8-F)  |          |           |         | 13.55          | 19.70     | 3.40      | 67.0    | Manhole Box Base      |               |                                |                              | 42 in         | RCP       | 1.0%            | 67.0                            | 100.6       | 690            | 10.5     | 1.10             | 14.65                   |          |
| D10-F         | -            | 7.97      | 0.73         | 8.8                         | 5.83     | 4.06      | 23.7    |                |           |           |         | Fut. Connect          | 23.7          | 0.0                            | 36 in                        | RCP           | 1.5%      | 23.7            | 80.9                            | 67          | 11.4           | 0.10     | 8.90             |                         |          |
|               | D7           |           |              | Combined Flows (D3-F-D10-F) |          |           |         | 14.65          | 25.53     | 3.28      | 83.8    | Manhole Box Base      |               |                                |                              | 42 in         | RCP       | 4.8%            | 83.8                            | 221.3       | 305            | 23.0     | 0.22             | 14.87                   |          |
| D9            | -            | 0.88      | 0.61         | 8.9                         | 0.54     | 4.04      | 2.2     |                |           |           |         | Ex. Inlet Type R L 10 | 2.2           | 0.0                            | 18 in                        | RCP           | 4.7%      | 2.2             | 22.8                            | 346         | 12.9           | 0.45     | 9.35             | Existing                |          |
| D12           | -            | 0.57      | 0.59         | 9.0                         | 0.34     | 4.03      | 1.4     |                |           |           |         | Ex. Inlet Type R L 10 | 1.4           | 0.0                            |                              |               |           |                 |                                 |             |                |          |                  | Existing                |          |
|               | D8           |           |              | Combined Flows (D9-D12)     |          |           |         | 9.35           | 0.88      | 3.97      | 3.5     | Ex. Inlet Type R L 10 |               |                                |                              | 24 in         | RCP       | 4.3%            | 3.5                             | 46.9        | 29.7           | 14.9     | 0.03             | 9.38                    | Existing |
|               | D9           |           |              | Combined Flows (D3-F-D12)   |          |           |         | 14.87          | 26.41     | 3.26      | 86.1    | Manhole Slab Base     |               |                                |                              | 48 in         | RCP       | 2.6%            | 86.1                            | 229.8       | 428            | 18.3     | 0.39             | 15.26                   |          |
| D11-F         | -            | 7.37      | 0.73         | 8.4                         | 5.39     | 4.13      | 22.3    |                |           |           |         | Fut. Connect          | 22.3          | 0.0                            | 36 in                        | RCP           | 1.0%      | 22.3            | 66.7                            | 67          | 9.4            | 0.12     | 8.52             |                         |          |
|               | D10          |           |              | Combined Flows (D3-F-D11-F) |          |           |         | 15.26          | 31.80     | 3.22      | 102.4   | Manhole Box Base      |               |                                |                              | 48 in         | RCP       | 5.8%            | 102.4                           | 344.7       | 83             | 27.4     | 0.05             | 15.31                   |          |
| D13           | -            | 1.41      | 0.63         | 11.0                        | 0.89     | 3.72      | 3.3     |                |           |           |         | Inlet Type R L 10     | 3.3           | SUMP                           | 18 in                        | RCP           | 8.0%      | 3.3             | 29.7                            | 30          | 16.8           | 0.03     | 11.03            |                         |          |
|               | D11          |           |              | Combined Flows (D3-F-D13)   |          |           |         | 15.31          | 32.69     | 3.21      | 105.1   | Manhole Box Base      |               |                                |                              | 54 in         | RCP       | 8.4%            | 105.1                           | 568.2       | 190            | 35.7     | 0.09             | 15.40                   |          |
| D14-O         | -            | 2.73      | 0.05         | 6.9                         | 0.14     | 4.42      | 0.6     |                |           |           |         | Badger Gulch          | 0.6           | 0.0                            |                              |               |           |                 |                                 |             |                |          |                  |                         |          |
| D15           | -            | 2.63      | 0.05         | 15.9                        | 0.14     | 3.16      | 0.4     |                |           |           |         | WQ Pond D             | 0.4           | 0.0                            |                              |               |           |                 |                                 |             |                |          |                  | Flows to WQ Pond D      |          |

## Ridgeway Parkway Expansion

### Developed Storm Runoff Calculations

Design Storm :

**100 Year**

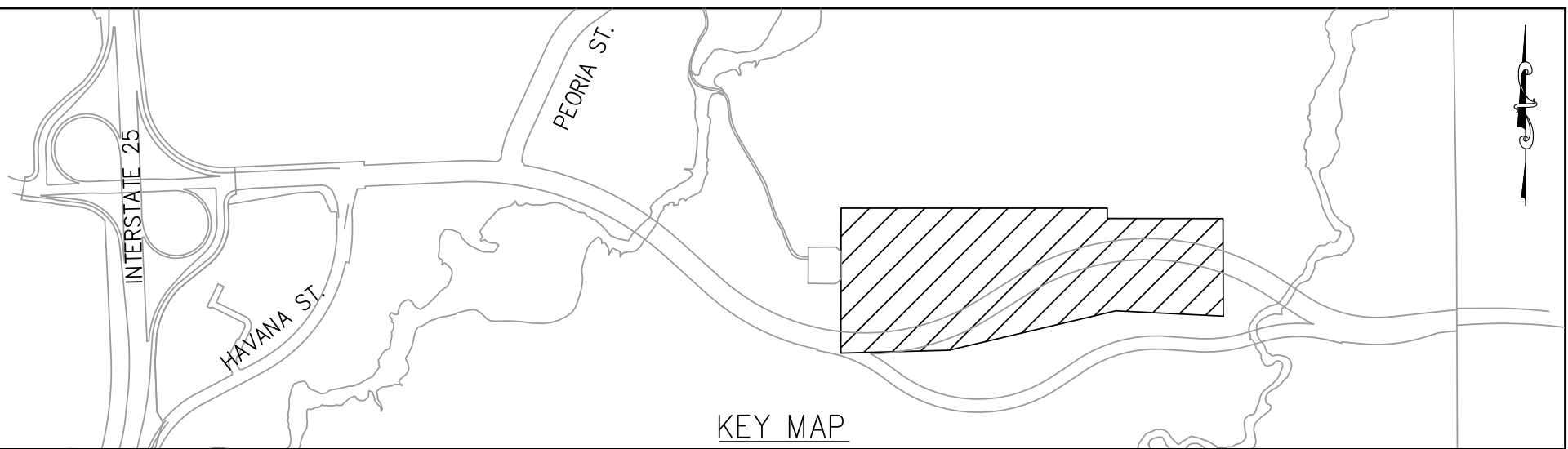
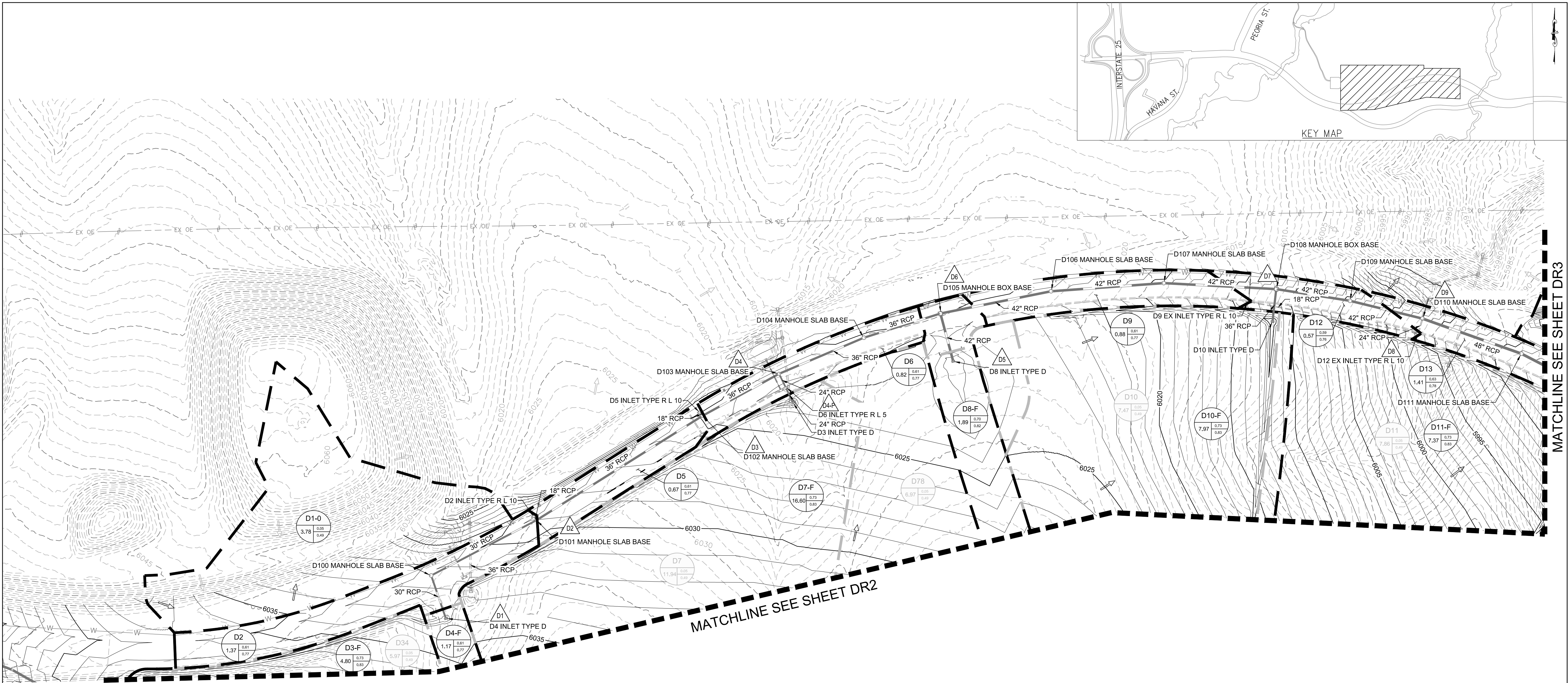
Point Hour Rainfall (P<sub>1</sub>) : **2.60**

$I = (28.5 P_1) / ((10 + TC)^{0.786})$

| Basin Name | Design Point | Area (ac) | Runoff Coeff | Direct Runoff               |          |           |         | Total Runoff   |           |           |         | Inlets                |               |                   | Pipe                         |               |           |                 | Pipe/Swale Travel Time          |             |                | Total Time (min) | Notes |                         |
|------------|--------------|-----------|--------------|-----------------------------|----------|-----------|---------|----------------|-----------|-----------|---------|-----------------------|---------------|-------------------|------------------------------|---------------|-----------|-----------------|---------------------------------|-------------|----------------|------------------|-------|-------------------------|
|            |              |           |              | tc (min)                    | C*A (ac) | I (in/hr) | Q (cfs) | Total tc (min) | ΣC*A (ac) | I (in/hr) | Q (cfs) | Inlet Type            | Q Intercepted | Q carryover (Qco) | Pipe Size (in) or equivalent | Pipe Material | Slope (%) | Pipe Flow (cfs) | Approx. Max Pipe Capacity (cfs) | Length (ft) | Velocity (fps) |                  |       | tt (min)                |
| FUTURE     |              |           |              |                             |          |           |         |                |           |           |         |                       |               |                   |                              |               |           |                 |                                 |             |                |                  |       |                         |
| D1-O       | -            | 3.78      | 0.49         | 22.3                        | 1.86     | 4.83      | 9.0     |                |           |           |         | Swale                 | 9.0           | 0.0               |                              |               |           |                 |                                 |             |                |                  |       | Flows conveyed offsite  |
| D3-F       | -            | 4.80      | 0.83         | 7.3                         | 4.00     | 7.88      | 31.5    |                |           |           |         | Fut. Connect          | 31.5          | 0.0               |                              |               |           |                 |                                 |             |                |                  |       |                         |
| D4-F       | -            | 1.17      | 0.77         | 9.4                         | 0.90     | 7.20      | 6.5     |                |           |           |         | Fut. Connect          | 6.5           | 0.0               |                              |               |           |                 |                                 |             |                |                  |       |                         |
|            | D1           |           |              | Combined Flows (D3-F-D4-F)  |          |           |         | 9.40           | 4.90      | 7.19      | 35.2    | Fut. Connect          |               |                   | 30 in                        | RCP           | 1.3%      | 35.2            | 47.5                            | 340         | 9.7            | 0.59             | 9.99  |                         |
| D2         | -            | 1.37      | 0.77         | 11.9                        | 0.75     | 6.55      | 4.9     |                |           |           |         | Inlet Type R L 10     | 4.6           | 0.3               | 18 in                        | RCP           | 8.0%      | 4.6             | 29.7                            | 7.5         | 16.8           | 0.01             | 11.91 |                         |
|            | D2           |           |              | Combined Flows (D3-F-D2)    |          |           |         | 11.91          | 5.65      | 6.53      | 36.9    | Manhole Slab Base     |               |                   | 36 in                        | RCP           | 1.0%      | 36.9            | 66.7                            | 400         | 9.4            | 0.71             | 12.61 |                         |
| D5         | -            | 0.67      | 0.77         | 8.8                         | 0.75     | 7.38      | 5.5     |                |           |           |         | Inlet Type R L 10     | 4.6           | 1.2               | 18 in                        | RCP           | 8.0%      | 4.6             | 29.7                            | 7.5         | 16.8           | 0.01             | 8.81  |                         |
|            | D3           |           |              | Combined Flows (D3-F-D5)    |          |           |         | 12.61          | 6.40      | 6.37      | 40.8    | Manhole Slab Base     |               |                   | 36 in                        | RCP           | 1.0%      | 40.8            | 66.7                            | 178         | 9.4            | 0.31             | 12.93 |                         |
| D6         | -            | 0.82      | 0.77         | 8.7                         | 0.63     | 7.42      | 4.7     |                |           |           |         | Inlet Type R L 5      | 5.9           | SUMP              | 24 in                        | RCP           | 1.0%      | 5.9             | 22.6                            | 29.5        | 7.2            | 0.07             | 8.77  |                         |
|            | D4           |           |              | Combined Flows (D3-F-D6)    |          |           |         | 12.93          | 7.03      | 6.30      | 44.3    | Manhole Slab Base     |               |                   | 36 in                        | RCP           | 1.0%      | 44.3            | 66.7                            | 352         | 9.4            | 0.62             | 13.55 |                         |
| D7-F       | -            | 16.60     | 0.83         | 13.0                        | 13.82    | 6.30      | 87.1    |                |           |           |         | Fut. Connect          | 87.1          | 0.0               |                              |               |           |                 |                                 |             |                |                  |       |                         |
| D8-F       | -            | 1.89      | 0.82         | 9.2                         | 1.54     | 7.26      | 11.2    |                |           |           |         | Fut. Connect          | 11.8          | 0.0               |                              |               |           |                 |                                 |             |                |                  |       | Includes bypass from E1 |
|            | D5           |           |              | Combined Flows (D7-F-D8-F)  |          |           |         | 13.00          | 15.36     | 6.30      | 96.8    | Fut. Connect          |               |                   | 42 in                        | RCP           | 1.6%      | 96.8            | 126.9                           | 101         | 13.2           | 0.13             | 13.13 |                         |
|            | D6           |           |              | Combined Flows (D3-F-D8-F)  |          |           |         | 13.55          | 22.39     | 6.19      | 138.5   | Manhole Box Base      |               |                   | 42 in                        | RCP           | 1.0%      | 138.5           | 100.6                           | 690         | 10.5           | 1.10             | 14.65 |                         |
| D10-F      | -            | 7.97      | 0.83         | 8.8                         | 6.63     | 7.38      | 49.0    |                |           |           |         | Fut. Connect          | 49.0          | 0.0               | 36 in                        | RCP           | 1.5%      | 49.0            | 80.9                            | 67          | 11.4           | 0.10             | 8.90  |                         |
|            | D7           |           |              | Combined Flows (D3-F-D10-F) |          |           |         | 14.65          | 29.02     | 5.97      | 173.2   | Manhole Box Base      |               |                   | 42 in                        | RCP           | 4.8%      | 173.2           | 221.3                           | 305         | 23.0           | 0.22             | 14.87 |                         |
| D9         | -            | 0.88      | 0.77         | 8.9                         | 0.68     | 7.35      | 5.0     |                |           |           |         | Ex. Inlet Type R L 10 | 4.7           | 0.2               | 18 in                        | RCP           | 4.7%      | 4.7             | 22.8                            | 346         | 12.9           | 0.45             | 9.35  | Existing                |
| D12        | -            | 0.57      | 0.76         | 9.0                         | 0.44     | 7.32      | 3.2     |                |           |           |         | Ex. Inlet Type R L 10 | 3.4           | 0.0               |                              |               |           |                 |                                 |             |                |                  |       | Existing                |
|            | D8           |           |              | Combined Flows (D9-D12)     |          |           |         | 9.35           | 1.11      | 7.22      | 8.0     | Ex. Inlet Type R L 10 |               |                   | 24 in                        | RCP           | 4.3%      | 8.0             | 46.9                            | 29.7        | 14.9           | 0.03             | 9.38  | Existing                |
|            | D9           |           |              | Combined Flows (D3-F-D12)   |          |           |         | 14.87          | 30.14     | 5.93      | 178.6   | Manhole Slab Base     |               |                   | 48 in                        | RCP           | 2.6%      | 178.6           | 229.8                           | 428         | 18.3           | 0.39             | 15.26 |                         |
| D11-F      | -            | 7.37      | 0.83         | 8.4                         | 6.13     | 7.51      | 46.1    |                |           |           |         | Fut. Connect          | 46.1          | 0.0               | 36 in                        | RCP           | 1.0%      | 46.1            | 66.7                            | 67          | 9.4            | 0.12             | 8.52  |                         |
|            | D10          |           |              | Combined Flows (D3-F-D11-F) |          |           |         | 15.26          | 36.27     | 5.85      | 212.4   | Manhole Box Base      |               |                   | 48 in                        | RCP           | 5.8%      | 212.4           | 344.7                           | 83          | 27.4           | 0.05             | 15.31 |                         |
| D13        | -            | 1.41      | 0.78         | 11.0                        | 1.10     | 6.77      | 7.5     |                |           |           |         | Inlet Type R L 10     | 7.5           | SUMP              | 18 in                        | RCP           | 8.0%      | 7.5             | 29.7                            | 30          | 16.8           | 0.03             | 11.03 |                         |
|            | D11          |           |              | Combined Flows (D3-F-D13)   |          |           |         | 15.31          | 37.37     | 5.85      | 218.5   | Manhole Box Base      |               |                   | 54 in                        | RCP           | 8.4%      | 218.5           | 568.2                           | 190         | 35.7           | 0.09             | 15.40 |                         |
| D14-O      | -            | 2.73      | 0.49         | 6.9                         | 1.34     | 8.03      | 10.8    |                |           |           |         | Badger Gulch          | 10.8          | 0.0               |                              |               |           |                 |                                 |             |                |                  |       |                         |
| D15        | -            | 2.63      | 0.49         | 15.9                        | 1.29     | 5.74      | 7.4     |                |           |           |         | WQ Pond D             | 7.4           | 0.0               |                              |               |           |                 |                                 |             |                |                  |       | Flows to WQ Pond D      |



File Location: Q:\DEN\Projects\5087-02-RRMD Overall East\Projects\9564-Ridgegate Pkwy Expansion\Design\Drainage\Basin Maps\PHASE II\9564 Dmap-CLEAN.dwg Plot Date: 2/1/2019 2:36 PM Last Saved By: CDAVIDS



#### LEGEND

|  |                             |  |                                  |  |                         |
|--|-----------------------------|--|----------------------------------|--|-------------------------|
|  | BASIN ID                    |  | PROPOSED FLOW OF WATER           |  | EXISTING MINOR CONTOUR  |
|  | 5-YEAR RUNOFF COEFFICIENT   |  | EXISTING FLOW OF WATER           |  | PROPOSED MAJOR CONTOUR  |
|  | 100-YEAR RUNOFF COEFFICIENT |  | PROPOSED MANHOLE AND STORM SEWER |  | PROPOSED MINOR CONTOUR  |
|  | BASIN AREA (ACRES)          |  | EXISTING MANHOLE AND STORM SEWER |  | FUTURE BASIN BOUNDARY   |
|  | DESIGN POINT                |  | EXISTING MAJOR CONTOUR           |  | PROPOSED BASIN BOUNDARY |



Know what's below.  
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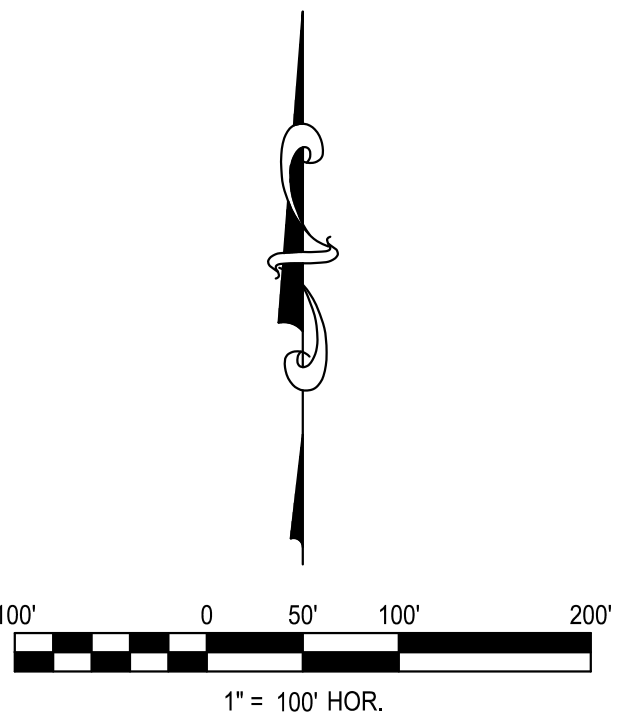
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City of Lone Tree

04/22/2019

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Engineering Division Acceptance Block



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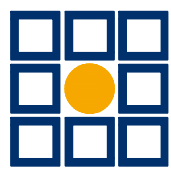
Print Date: 2/1/19  
Drawing File Name: 9564 Dmap-CLEAN.dwg  
Horiz. Scale: AS SHOWN Vert. Scale: AS SHOWN

#### Sheet Revisions

Date: Comments



CITY OF LONE TREE



5970 GREENWOOD PLAZA BLVD, GREENWOOD VILLAGE, CO 80111  
PH: (303) 751-0741  
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#### As Constructed

No Revisions:

Revised:

Void:

#### RIDGEGATE PARKWAY EXPANSION DRAINAGE MAP

Designer:

Detailer:

Sheet Subset:

QC Review:

Approved:

Subset Sheet:

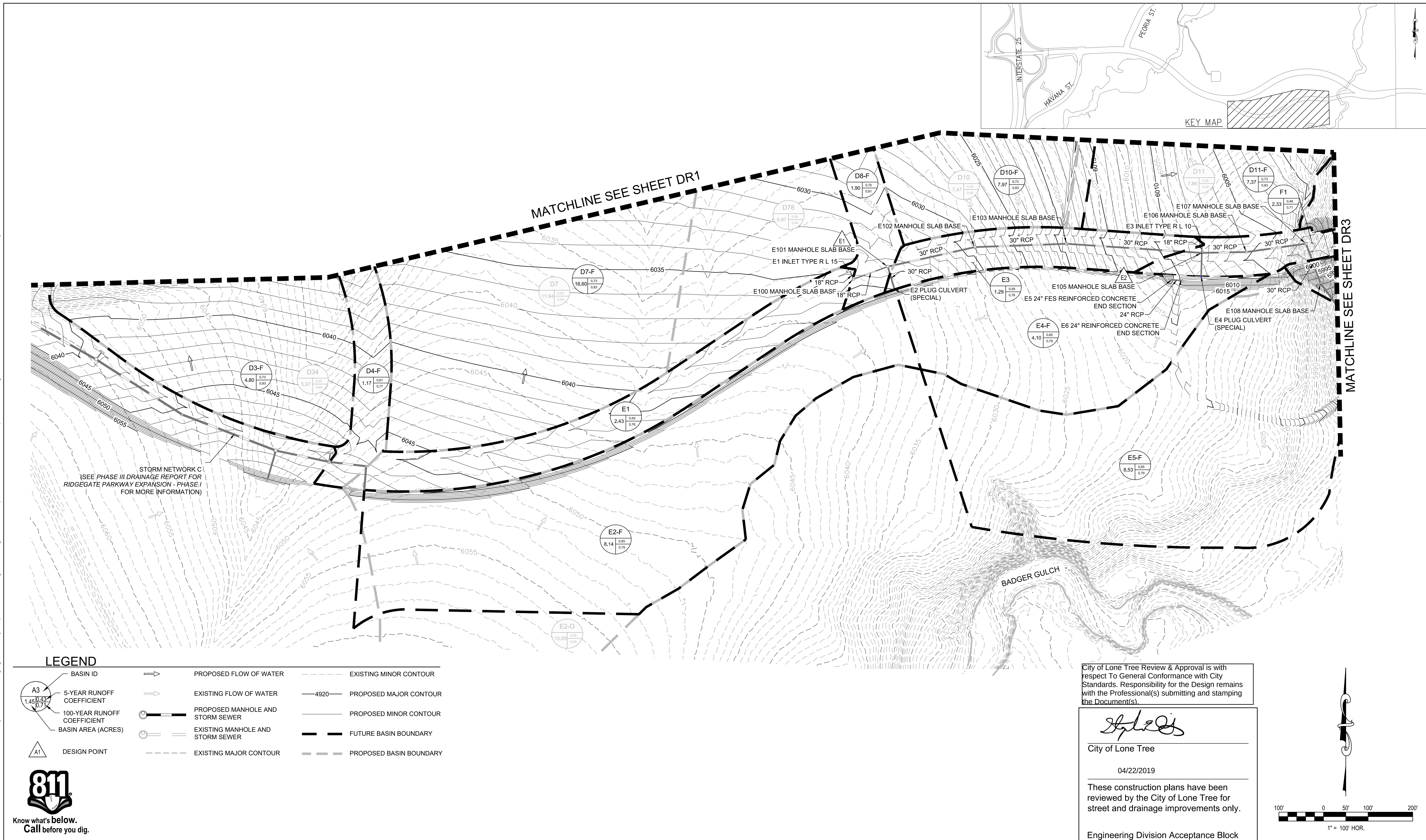
Project No./Code

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Sheet Number: DR1



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| LEGEND |                             |  |                                  |
|--------|-----------------------------|--|----------------------------------|
|        | BASIN ID                    |  | PROPOSED FLOW OF WATER           |
|        | 5-YEAR RUNOFF COEFFICIENT   |  | EXISTING FLOW OF WATER           |
|        | 100-YEAR RUNOFF COEFFICIENT |  | PROPOSED MANHOLE AND STORM SEWER |
|        | BASIN AREA (ACRES)          |  | EXISTING MANHOLE AND STORM SEWER |
|        | DESIGN POINT                |  | EXISTING MAJOR CONTOUR           |
|        |                             |  | PROPOSED MAJOR CONTOUR           |
|        |                             |  | PROPOSED MINOR CONTOUR           |
|        |                             |  | FUTURE BASIN BOUNDARY            |
|        |                             |  | PROPOSED BASIN BOUNDARY          |



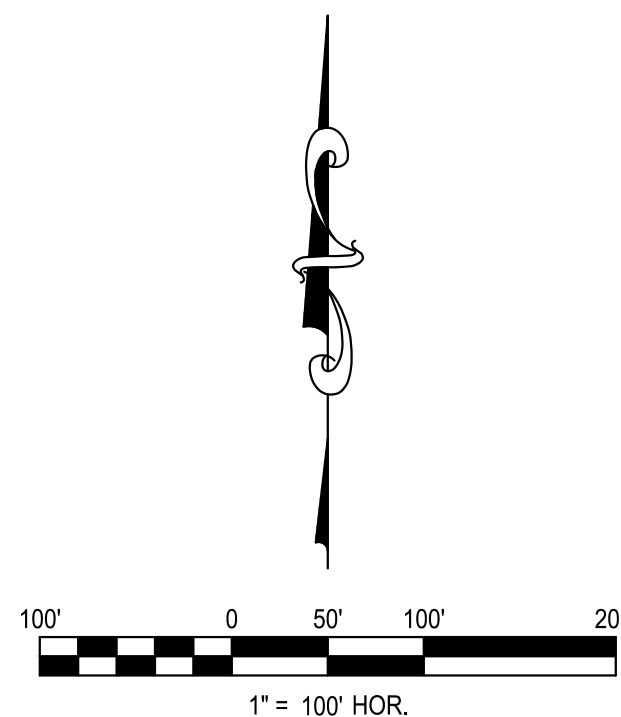
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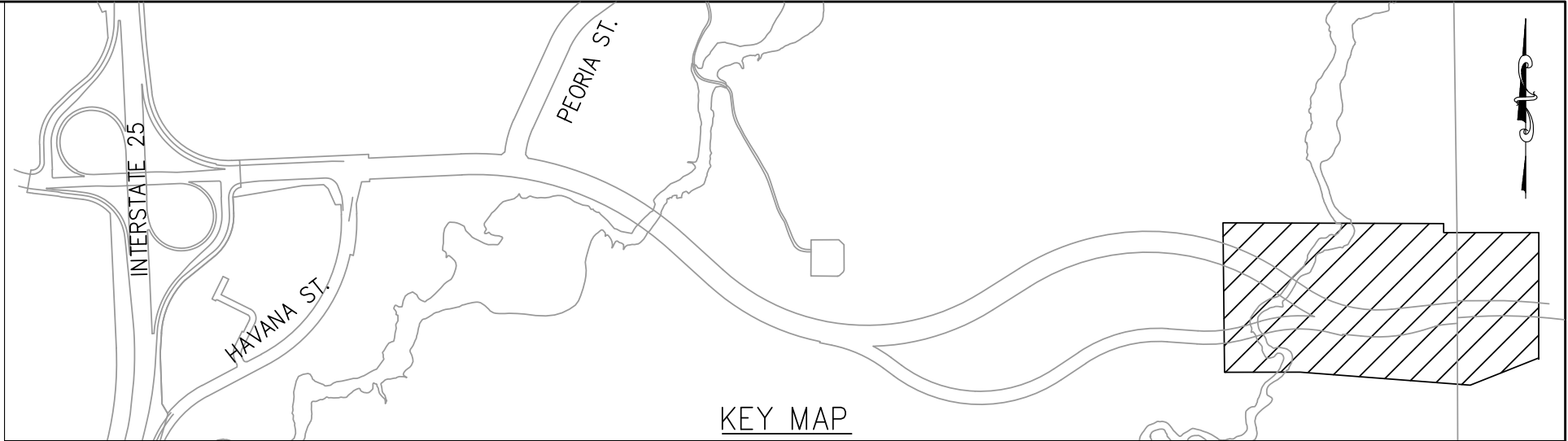
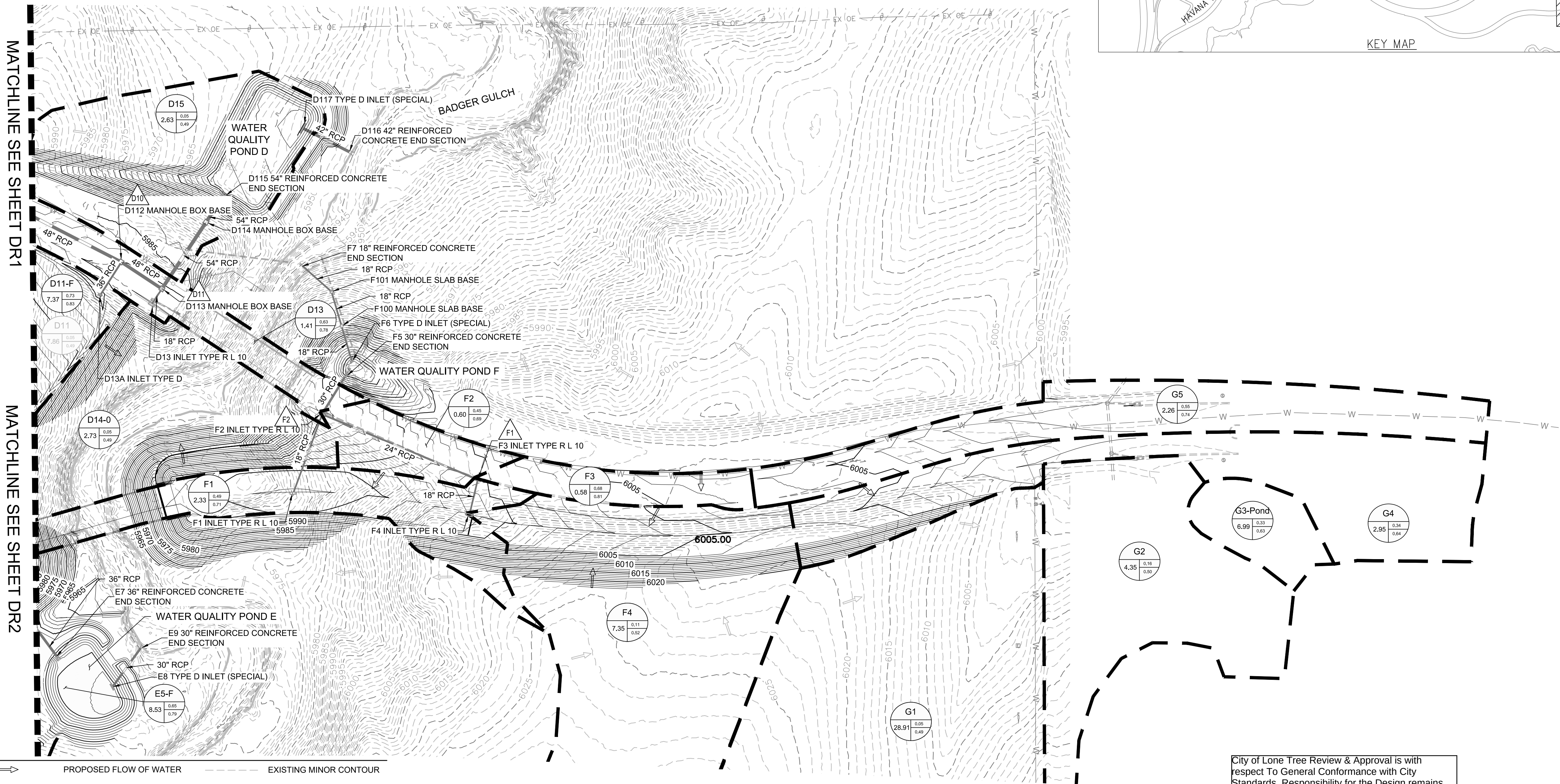
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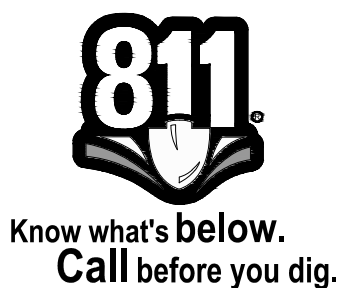
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|---------------------------------------------------|--|-------------------------------------------------------------|-----------------|----------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--|------------------------------------------|--|---------------|------------------|-------------------|--|
| Computer File Information                         |  | <div></div> <div></div> <div></div> <div></div> <div></div> | Sheet Revisions |          | <div></div> <div>CITY OF LONE TREE</div> | <div><div>5970 GREENWOOD PLAZA BLVD, GREENWOOD VILLAGE, CO 80111<br/>PH: (303) 751-6741</div><div>THIS AND ANY OTHER ELECTRONIC MEDIA COUNTERPART IS AN INSTRUMENT OF SERVICE PREPARED BY MERRICK AND COMPANY FOR A DEFINED PROJECT. IT IS NOT INTENDED OR REPRESENTED TO BE SUITABLE FOR REUSE IN WHOLE OR IN PART ON EXTENSIONS OF THE PROJECT OR ON ANY OTHER PROJECT, REUSE OR MODIFICATION OF ANY UTILIZATION IF NOT A FINISHED INSTRUMENT. WITHOUT THE PRIOR EXPRESS WRITTEN CONSENT OF MERRICK AND COMPANY SHALL BE AT THE SOLE RISK FOR THE UNAUTHORIZED USER WITHOUT LIABILITY OR LOSS EXPOSURE TO MERRICK AND COMPANY.</div></div> | As Constructed |  | RIDGEGATE PARKWAY EXPANSION DRAINAGE MAP |  |               | Project No./Code |                   |  |
| Print Date: 2/1/19                                |  |                                                             | Date:           | Comments |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | No Revisions:  |  |                                          |  |               | ----             |                   |  |
| Drawing File Name: 9564 Dmap-CLEAN.dwg            |  |                                                             |                 |          |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Revised:       |  | Designer:                                |  |               | QC Review:       |                   |  |
| Horiz. Scale: AS SHOWN      Vert. Scale: AS SHOWN |  |                                                             |                 |          |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Void:          |  | Detailer:                                |  |               | Approved:        |                   |  |
|                                                   |  |                                                             |                 |          |                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                |  | Sheet Subset:                            |  | Subset Sheet: |                  | Sheet Number: DR2 |  |



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- LEGEND**
- |  |                             |  |                                  |  |                         |
|--|-----------------------------|--|----------------------------------|--|-------------------------|
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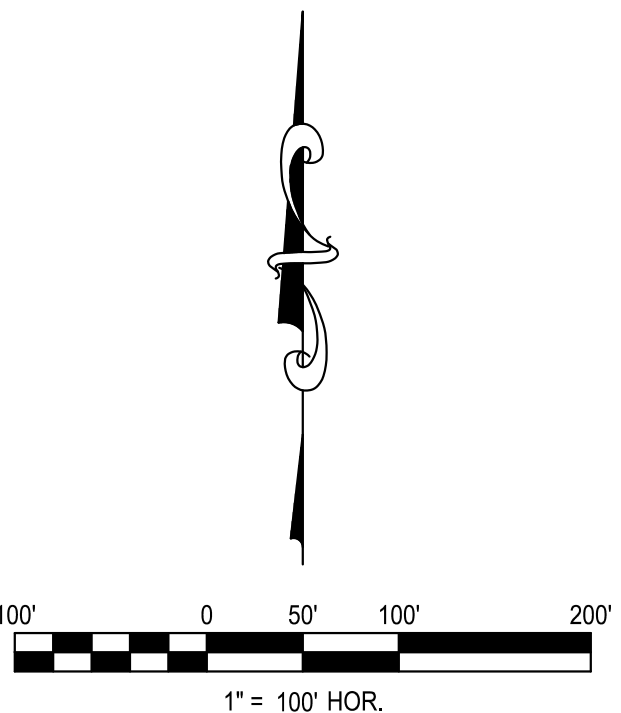
*[Signature]*

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| Computer File Information |                       | Sheet Revisions |          |  |  | As Constructed | RIDGEGATE PARKWAY EXPANSION DRAINAGE MAP |               | Project No./Code  |
|---------------------------|-----------------------|-----------------|----------|--|--|----------------|------------------------------------------|---------------|-------------------|
| Print Date:               | 2/1/19                | Date:           | Comments |  |  | No Revisions:  |                                          |               | ----              |
| Drawing File Name:        | 9564 Dmap-CLEAN.dwg   |                 |          |  |  | Revised:       | Designer:                                | QC Review:    |                   |
| Horiz. Scale: AS SHOWN    | Vert. Scale: AS SHOWN |                 |          |  |  | Void:          | Detailer:                                | Approved:     |                   |
|                           |                       |                 |          |  |  |                | Sheet Subset:                            | Subset Sheet: | Sheet Number: DR3 |



**PHASE III DRAINAGE REPORT  
RIDGEGATE EAST FILING NO. 3 AND 4  
LONE TREE, CO**

**January 2024**

Prepared For:

Rampart Range Metropolitan District No. 5

Prepared By:



5970 Greenwood Plaza Blvd  
Greenwood Village, CO 80111  
Phone: (303) 751-0741

Merrick Project No. 121240.00



**Merrick & Company**  
5970 Greenwood Plaza Blvd.  
Greenwood Village, CO 80111  
Ph: (303) 751-0741

Job Name: RidgeGate East Filing No. 3  
Job Number: 65121240  
Date: 11/9/2023  
By: CGB

## RidgeGate East Filing No. 3

### Composite Runoff Coefficient Calculations

Location: Douglas County  
Municipality: Douglas County  
Minor Design Storm: 5  
Major Design Storm: 100  
Soil Type: C/D

Runoff Coefficient (UDFCD Vol 1, Chp 6, Sec. 2.5.1)

| NRCS Soil Group | Storm Return Period |                   |                   |                   |                 |                 |
|-----------------|---------------------|-------------------|-------------------|-------------------|-----------------|-----------------|
|                 | 2-Year              | 5-Year            | 10-Year           | 25-Year           | 50-Year         | 100-Year        |
| A               | $C=0.84i^{1.302}$   | $C=0.86i^{1.276}$ | $C=0.87i^{1.232}$ | $C=0.84i^{1.124}$ | $C=0.85i+0.025$ | $C=0.78i+0.110$ |
| B               | $C=0.84i^{1.169}$   | $C=0.86i^{1.088}$ | $C=0.81i+0.057$   | $C=0.63i+0.249$   | $C=0.56i+0.328$ | $C=0.47i+0.426$ |
| C/D             | $C=0.83i^{1.122}$   | $C=0.82i+0.035$   | $C=0.74i+0.132$   | $C=0.56i+0.319$   | $C=0.49i+0.393$ | $C=0.41i+0.484$ |

#### Basin Design Data

|                                | I (%) =      | 100%                            | 90%                               | 85%                   | 40%                      | 10%                      | 25%                         | 2%                                | 2%                                  |                         |                         | i (%)   | Runoff Coeff's |      |      |      |
|--------------------------------|--------------|---------------------------------|-----------------------------------|-----------------------|--------------------------|--------------------------|-----------------------------|-----------------------------------|-------------------------------------|-------------------------|-------------------------|---------|----------------|------|------|------|
| Basin Name                     | Design Point | A <sub>paved</sub> streets (sf) | A <sub>sidewalk / conc</sub> (sf) | A <sub>IMU</sub> (sf) | A <sub>Gravel</sub> (sf) | A <sub>plygnd</sub> (sf) | A <sub>art. turf</sub> (sf) | A <sub>lscape (B soil)</sub> (sf) | A <sub>lscape (C/D soil)</sub> (sf) | A <sub>Total</sub> (sf) | A <sub>Total</sub> (ac) | Imp (%) | C2             | C5   | C10  | C100 |
| Z1 - E                         | -            |                                 |                                   |                       |                          |                          |                             | 204,849                           |                                     | 204,849                 | 4.70                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| Z1 - F                         | -            |                                 |                                   | 204,849               |                          |                          |                             |                                   |                                     | 204,849                 | 4.70                    | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| Z2                             | -            | 26,424                          | 6,237                             |                       |                          |                          |                             | 7,537                             |                                     | 40,198                  | 0.92                    | 80.1%   | 0.65           | 0.69 | 0.72 | 0.81 |
| Z3                             | -            | 16,971                          | 3,439                             |                       |                          |                          |                             | 5,361                             |                                     | 25,771                  | 0.59                    | 78.3%   | 0.63           | 0.68 | 0.71 | 0.80 |
| Y1                             | -            | 27,771                          | 6,192                             |                       |                          |                          |                             | 9,444                             |                                     | 43,407                  | 1.00                    | 77.3%   | 0.62           | 0.67 | 0.70 | 0.80 |
| Y2                             | -            | 27,629                          | 5,201                             |                       |                          |                          |                             | 8,236                             |                                     | 41,066                  | 0.94                    | 79.1%   | 0.64           | 0.68 | 0.72 | 0.81 |
| X1                             | -            | 12,173                          | 5,807                             |                       |                          |                          |                             | 6,233                             |                                     | 24,213                  | 0.56                    | 72.4%   | 0.58           | 0.63 | 0.67 | 0.78 |
| X2                             | -            |                                 |                                   | 194,278               |                          |                          |                             |                                   |                                     | 194,278                 | 4.46                    | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| X3                             | -            |                                 |                                   | 141,570               |                          |                          |                             |                                   |                                     | 141,570                 | 3.25                    | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| X4                             | -            | 17,033                          | 5,645                             |                       |                          |                          |                             | 9,850                             |                                     | 32,528                  | 0.75                    | 68.6%   | 0.54           | 0.60 | 0.64 | 0.77 |
| W1                             | -            |                                 |                                   | 104,108               |                          |                          |                             |                                   |                                     | 104,108                 | 2.39                    | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| W2                             | -            | 8,260                           | 5,637                             |                       |                          |                          |                             | 10,844                            |                                     | 24,741                  | 0.57                    | 54.8%   | 0.42           | 0.48 | 0.54 | 0.71 |
| W3                             | -            | 2,908                           | 10,901                            |                       |                          |                          |                             | 4,071                             |                                     | 17,880                  | 0.41                    | 71.6%   | 0.57           | 0.62 | 0.66 | 0.78 |
| W4                             | -            | 15,109                          | 3,900                             |                       |                          |                          |                             | 4,674                             |                                     | 23,683                  | 0.54                    | 79.0%   | 0.64           | 0.68 | 0.72 | 0.81 |
| V2                             | -            | 19,904                          | 10,744                            |                       |                          |                          |                             | 62,979                            |                                     | 93,627                  | 2.15                    | 32.9%   | 0.24           | 0.31 | 0.38 | 0.62 |
| U1                             | -            | 28,845                          | 15,369                            |                       |                          |                          |                             | 15,462                            |                                     | 59,676                  | 1.37                    | 72.0%   | 0.57           | 0.63 | 0.67 | 0.78 |
| T1                             | -            | 12,043                          | 6,189                             |                       |                          |                          |                             | 6,463                             |                                     | 24,695                  | 0.57                    | 71.8%   | 0.57           | 0.62 | 0.66 | 0.78 |
| S1                             | -            | 52,812                          | 28,960                            |                       |                          |                          |                             | 33,349                            |                                     | 115,121                 | 2.64                    | 69.1%   | 0.55           | 0.60 | 0.64 | 0.77 |
| RG PKWY BASINS                 |              |                                 |                                   |                       |                          |                          |                             |                                   |                                     |                         |                         |         |                |      |      |      |
| D2                             | -            | 36,682                          | 12,820                            |                       |                          |                          |                             | 15,076                            |                                     | 64,577                  | 1.48                    | 75.1%   | 0.60           | 0.65 | 0.69 | 0.79 |
| D5                             | -            | 13,370                          | 7,824                             |                       |                          |                          |                             | 8,091                             |                                     | 29,285                  | 0.67                    | 70.3%   | 0.56           | 0.61 | 0.65 | 0.77 |
| D6                             | -            | 16,013                          | 9,830                             |                       |                          |                          |                             | 9,963                             |                                     | 35,806                  | 0.82                    | 70.0%   | 0.56           | 0.61 | 0.65 | 0.77 |
| D7-F                           | -            |                                 |                                   | 701,659               |                          |                          |                             |                                   |                                     | 701,659                 | 16.11                   | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| D11-F                          | -            |                                 |                                   | 129,373               |                          |                          |                             |                                   |                                     | 129,373                 | 2.97                    | 85.0%   | 0.69           | 0.73 | 0.76 | 0.83 |
| D13                            | -            | 33,222                          | 14,643                            |                       |                          |                          |                             | 16,168                            |                                     | 64,033                  | 1.47                    | 73.0%   | 0.58           | 0.63 | 0.67 | 0.78 |
| D15                            | -            |                                 |                                   |                       |                          |                          |                             | 143,352                           |                                     | 143,352                 | 3.29                    | 2.0%    | 0.01           | 0.05 | 0.15 | 0.49 |
| Pond 21 (Basins D, W, X, Y, Z) |              | 238,456                         | 94,176                            | 1,475,837             | 0                        | 0                        | 0                           | 0                                 | 254,226                             | 2,062,694               | 47.35                   | 76.7%   | 0.62           | 0.66 | 0.70 | 0.80 |



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Job Name: RidgeGate East Filing No. 3  
Job Number: 65121240  
Date: 11/9/2023  
By: CGB

### RidgeGate East Filing No. 3

#### Time of Concentration Calculations

Location: Douglas County  
Municipality: Douglas County  
Minor Design Storm: 5  
Major Design Storm: 100  
Soil Type: C/D

$$t_t = (0.395(1.1 - C_o)(L_t^{0.5})) / (S_o^{0.33})$$
$$t_t = L_t / (60V_o)$$
$$\text{Urban } t_t = (26 - 17i) + L_t / (60(14 + 9)(S_o^{0.5}))$$

| Sub-Basin Data |              |                         |       |                | Initial Overland Time (t <sub>i</sub> ) |           |                      | Travel Time (t <sub>t</sub> )<br>t <sub>t</sub> = Length / (Velocity x 60) |           |                                    |                |                |                      | t <sub>c</sub> Comp                                           | t <sub>c</sub> Urbanized Check ON |                    |                      | t <sub>c</sub> Final |
|----------------|--------------|-------------------------|-------|----------------|-----------------------------------------|-----------|----------------------|----------------------------------------------------------------------------|-----------|------------------------------------|----------------|----------------|----------------------|---------------------------------------------------------------|-----------------------------------|--------------------|----------------------|----------------------|
| Basin Name     | Design Point | A <sub>Total</sub> (ac) | i (%) | C <sub>S</sub> | Upper most Length (ft)                  | Slope (%) | t <sub>i</sub> (min) | Length (ft)                                                                | Slope (%) | Type of Land Surface               | C <sub>v</sub> | Velocity (fps) | t <sub>t</sub> (min) | Time of Conc t <sub>i</sub> + t <sub>t</sub> = t <sub>c</sub> | L <sub>t</sub> (ft)               | S <sub>o</sub> (%) | Urban t <sub>c</sub> | Min t <sub>c</sub>   |
| Z1 - E         | -            | 4.70                    | 2.0%  | 0.05           | 300                                     | 1.5%      | 29.1                 | 115                                                                        | 1.5%      | Paved areas & shallow paved swales | 20             | 2.4            | 0.8                  | 29.9                                                          | 415.0                             | 1.5%               | 31.8                 | 29.9                 |
| Z1 - F         | -            | 4.70                    | 85.0% | 0.73           | 100                                     | 2.0%      | 5.4                  | 394                                                                        | 3.0%      | Paved areas & shallow paved swales | 20             | 3.5            | 1.9                  | 7.3                                                           | 494.0                             | 2.8%               | 13.9                 | 7.3                  |
| Z2             | -            | 0.92                    | 80.1% | 0.69           | 86                                      | 2.0%      | 5.5                  | 671                                                                        | 2.6%      | Paved areas & shallow paved swales | 20             | 3.2            | 3.5                  | 9.0                                                           | 757.0                             | 2.5%               | 16.3                 | 9.0                  |
| Z3             | -            | 0.59                    | 78.3% | 0.68           | 117                                     | 2.0%      | 6.7                  | 434                                                                        | 2.6%      | Paved areas & shallow paved swales | 20             | 3.2            | 2.2                  | 8.9                                                           | 551.0                             | 2.5%               | 15.6                 | 8.9                  |
| Y1             | -            | 1.00                    | 77.3% | 0.67           | 67                                      | 2.8%      | 4.6                  | 544                                                                        | 2.0%      | Paved areas & shallow paved swales | 20             | 2.8            | 3.2                  | 7.8                                                           | 611.0                             | 2.1%               | 16.4                 | 7.8                  |
| Y2             | -            | 0.94                    | 79.1% | 0.68           | 101                                     | 2.8%      | 5.4                  | 499                                                                        | 1.9%      | Paved areas & shallow paved swales | 20             | 2.8            | 3.0                  | 8.5                                                           | 600.0                             | 2.0%               | 16.1                 | 8.5                  |
| X1             | -            | 0.56                    | 72.4% | 0.63           | 92                                      | 2.0%      | 6.6                  | 228                                                                        | 1.1%      | Paved areas & shallow paved swales | 20             | 2.1            | 1.8                  | 8.4                                                           | 320.0                             | 1.3%               | 16.1                 | 8.4                  |
| X2             | -            | 4.46                    | 85.0% | 0.73           | 50                                      | 2.0%      | 3.8                  | 628                                                                        | 2.0%      | Paved areas & shallow paved swales | 20             | 2.8            | 3.7                  | 7.5                                                           | 678.0                             | 2.0%               | 15.4                 | 7.5                  |
| X3             | -            | 3.25                    | 85.0% | 0.73           | 50                                      | 2.0%      | 3.8                  | 572                                                                        | 2.0%      | Paved areas & shallow paved swales | 20             | 2.8            | 3.4                  | 7.2                                                           | 622.0                             | 2.0%               | 15.1                 | 7.2                  |
| X4             | -            | 0.75                    | 68.6% | 0.60           | 96                                      | 2.0%      | 7.2                  | 313                                                                        | 2.8%      | Paved areas & shallow paved swales | 20             | 3.3            | 1.6                  | 8.7                                                           | 409.0                             | 2.6%               | 16.6                 | 8.7                  |
| W1             | -            | 2.39                    | 85.0% | 0.73           | 50                                      | 2.0%      | 3.8                  | 327                                                                        | 2.0%      | Paved areas & shallow paved swales | 20             | 2.8            | 1.9                  | 5.7                                                           | 377.0                             | 2.0%               | 13.7                 | 5.7                  |
| W2             | -            | 0.57                    | 54.8% | 0.48           | 71                                      | 2.0%      | 7.6                  | 175                                                                        | 5.0%      | Paved areas & shallow paved swales | 20             | 4.5            | 0.7                  | 8.2                                                           | 246.0                             | 3.9%               | 17.9                 | 8.2                  |
| W3             | -            | 0.41                    | 71.6% | 0.62           | 57                                      | 3.0%      | 4.6                  | 190                                                                        | 1.2%      | Paved areas & shallow paved swales | 20             | 2.2            | 1.4                  | 6.0                                                           | 247.0                             | 1.5%               | 15.6                 | 6.0                  |
| W4             | -            | 0.54                    | 79.0% | 0.68           | 57                                      | 3.0%      | 4.0                  | 190                                                                        | 3.8%      | Paved areas & shallow paved swales | 20             | 3.9            | 0.8                  | 4.8                                                           | 247.0                             | 3.6%               | 13.7                 | 5.0                  |
| V2             | -            | 2.15                    | 32.9% | 0.31           | 300                                     | 2.0%      | 20.0                 | 434                                                                        | 1.5%      | Paved areas & shallow paved swales | 20             | 2.4            | 3.0                  | 23.0                                                          | 734.0                             | 1.7%               | 27.3                 | 23.0                 |
| U1             | -            | 1.37                    | 72.0% | 0.63           | 126                                     | 2.0%      | 7.7                  | 324                                                                        | 4.8%      | Paved areas & shallow paved swales | 20             | 4.4            | 1.2                  | 9.0                                                           | 450.0                             | 3.8%               | 15.8                 | 9.0                  |
| T1             | -            | 0.57                    | 71.8% | 0.62           | 85                                      | 2.0%      | 6.4                  | 270                                                                        | 4.8%      | Paved areas & shallow paved swales | 20             | 4.4            | 1.0                  | 7.4                                                           | 355.0                             | 3.9%               | 15.3                 | 7.4                  |
| S1             | -            | 2.64                    | 69.1% | 0.60           | 100                                     | 2.0%      | 7.3                  | 1125                                                                       | 1.0%      | Paved areas & shallow paved swales | 20             | 2.0            | 9.4                  | 16.6                                                          | 1225.0                            | 1.1%               | 24.9                 | 16.6                 |
| RG PKWY BASINS |              |                         |       |                |                                         |           |                      |                                                                            |           |                                    |                |                |                      |                                                               |                                   |                    |                      |                      |
| D2             | -            | 1.48                    | 75.1% | 0.65           | 54                                      | 2.0%      | 4.8                  | 779                                                                        | 0.9%      | Paved areas & shallow paved swales | 20             | 1.9            | 6.8                  | 11.6                                                          | 833.0                             | 0.9%               | 20.5                 | 11.6                 |
| D5             | -            | 0.67                    | 70.3% | 0.61           | 61                                      | 2.0%      | 5.6                  | 389                                                                        | 1.0%      | Paved areas & shallow paved swales | 20             | 2.0            | 3.2                  | 8.8                                                           | 450.0                             | 1.1%               | 17.8                 | 8.8                  |
| D6             | -            | 0.82                    | 70.0% | 0.61           | 58                                      | 2.0%      | 5.4                  | 300                                                                        | 0.6%      | Paved areas & shallow paved swales | 20             | 1.5            | 3.2                  | 8.7                                                           | 358.0                             | 0.7%               | 17.8                 | 8.7                  |
| D7-F           | -            | 16.11                   | 85.0% | 0.73           | 100                                     | 2.0%      | 5.4                  | 1213                                                                       | 1.8%      | Paved areas & shallow paved swales | 20             | 2.7            | 7.5                  | 12.9                                                          | 1313.0                            | 1.8%               | 19.3                 | 12.9                 |
| D13            | -            | 1.47                    | 73.0% | 0.63           | 80                                      | 3.3%      | 5.1                  | 489                                                                        | 2.4%      | Paved areas & shallow paved swales | 20             | 3.1            | 2.6                  | 7.8                                                           | 569.0                             | 2.5%               | 16.7                 | 7.8                  |
| D15            | -            | 3.29                    | 2.0%  | 0.05           | 65                                      | 8.0%      | 7.7                  | 450                                                                        | 3.0%      | Grassed waterway                   | 15             | 2.6            | 2.9                  | 10.6                                                          | 515.0                             | 3.4%               | 30.7                 | 10.6                 |

### RidgeGate East Filing No. 3

#### Developed Storm Runoff Calculations

Design Storm :

**100 Year**

Point Hour Rainfall (P<sub>1</sub>) : **2.27**

$I = (28.5 P_1) / ((10 + TC)^{0.786})$

| Basin Name | Design Point | Direct Runoff                                   |              |          |          |           |         | Total Runoff   |           |           |                    | Inlets     |               |                   | Pipe                         |               |           |                 |                                 | Pipe/Swale Travel Time |                |          | Total Time (min) | Notes                                        |
|------------|--------------|-------------------------------------------------|--------------|----------|----------|-----------|---------|----------------|-----------|-----------|--------------------|------------|---------------|-------------------|------------------------------|---------------|-----------|-----------------|---------------------------------|------------------------|----------------|----------|------------------|----------------------------------------------|
|            |              | Area (ac)                                       | Runoff Coeff | tc (min) | C*A (ac) | I (in/hr) | Q (cfs) | Total tc (min) | ΣC*A (ac) | I (in/hr) | Q (cfs)            | Inlet Type | Q Intercepted | Q carryover (Qco) | Pipe Size (in) or equivalent | Pipe Material | Slope (%) | Pipe Flow (cfs) | Approx. Max Pipe Capacity (cfs) | Length (ft)            | Velocity (fps) | tt (min) |                  |                                              |
| Z1 - E     | -            | 4.70                                            | 0.49         | 29.9     | 2.31     | 3.57      | 8.3     |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  | Used for Swale and Interim Inlet Sizing only |
| Z1 - F     | -            | 4.70                                            | 0.83         | 7.3      | 3.91     | 6.88      | 26.9    |                |           |           | Type C/Future Conn |            |               | 24 in             | RCP                          | 2.0%          | 26.9      | 32.0            | 28                              | 10.2                   | 0.05           | 7.35     |                  |                                              |
| Z2         | -            | 0.92                                            | 0.81         | 9.0      | 0.75     | 6.39      | 4.8     |                |           |           | Type R Inlet       |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
|            | Z1           | Inlet Z2 (Combined flow from Basins D3-F-Z1)    |              |          |          |           |         | 9.00           | 4.66      | 6.38      | 29.8               |            |               |                   | 24 in                        | RCP           | 2.0%      | 29.8            | 32.0                            | 27                     | 10.2           | 0.04     | 9.04             |                                              |
| Z3         | -            | 0.59                                            | 0.80         | 8.9      | 0.48     | 6.42      | 3.1     |                |           |           | Type R Inlet       |            |               | 18 in             | RCP                          | 1.0%          | 3.1       | 10.5            | 27                              | 5.9                    | 0.08           | 8.98     |                  |                                              |
|            | Z2           | MH Z100 (Combined flow from Basins D3-F, Z1-Z2) |              |          |          |           |         | 9.00           | 5.14      | 6.38      | 32.8               |            |               |                   | 30 in                        | RCP           | 2.1%      | 32.8            | 59.4                            | 93                     | 12.1           | 0.13     | 9.13             |                                              |
|            |              |                                                 |              |          |          |           |         |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
| D7-F       | -            | 16.11                                           | 0.83         | 12.9     | 13.41    | 5.52      | 74.0    |                |           |           | Stub               |            |               | 42 in             | RCP                          | 0.6%          | 74.0      | 77.9            | 196                             | 8.1                    | 0.40           | 13.30    |                  |                                              |
| Y1         | -            | 1.00                                            | 0.80         | 7.8      | 0.80     | 6.73      | 5.4     |                |           |           | Type R Inlet       |            |               | 30 in             | RCP                          | 5.0%          | 5.4       | 91.7            | 35                              | 18.7                   | 0.03           | 7.83     |                  |                                              |
| Y2         | -            | 0.94                                            | 0.81         | 8.5      | 0.76     | 6.53      | 5.0     |                |           |           | Type R Inlet       |            |               | 18 in             | RCP                          | 5.0%          | 5.0       | 23.5            | 27                              | 13.3                   | 0.03           | 8.53     |                  |                                              |
|            | Y1           | MH Y100 (Combined flow from Basins D7-F, Y2)    |              |          |          |           |         | 13.30          | 14.97     | 5.43      | 81.4               |            |               |                   | 42 in                        | RCP           | 1.0%      | 81.4            | 100.6                           | 93                     | 10.5           | 0.15     | 13.45            |                                              |
|            |              |                                                 |              |          |          |           |         |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
| X1         | -            | 0.56                                            | 0.78         | 8.4      | 0.43     | 6.56      | 2.8     |                |           |           | Type R Inlet       |            |               | 18 in             | RCP                          | 2.4%          | 2.8       | 16.3            | 66                              | 9.2                    | 0.12           | 8.52     |                  |                                              |
| X2         | -            | 4.46                                            | 0.83         | 7.5      | 3.71     | 6.82      | 25.3    |                |           |           | Stub               |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
| X3         | -            | 3.25                                            | 0.83         | 7.2      | 2.71     | 6.91      | 18.7    |                |           |           | Stub               |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
|            | X1           | MH X100 (Combined flow from Basins X2-X3)       |              |          |          |           |         | 7.50           | 6.42      | 6.81      | 43.7               |            |               |                   | 30 in                        | RCP           | 1.8%      | 43.7            | 55.0                            | 17                     | 11.2           | 0.03     | 7.53             |                                              |
|            | X2           | MH X101 (Combined flow from Basins X1-X3)       |              |          |          |           |         | 8.52           | 6.85      | 6.51      | 44.6               |            |               |                   | 30 in                        | RCP           | 2.1%      | 44.6            | 59.4                            | 275                    | 12.1           | 0.38     | 8.90             |                                              |
| X4         | -            | 0.75                                            | 0.77         | 8.7      | 0.57     | 6.47      | 3.7     |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
|            | X3           | Inlet X4 (Combined flow from Basins X1-X4)      |              |          |          |           |         | 8.90           | 7.42      | 6.41      | 47.6               |            |               |                   | 36 in                        | RCP           | 1.5%      | 47.6            | 81.7                            | 33                     | 11.6           | 0.05     | 8.95             |                                              |
|            |              |                                                 |              |          |          |           |         |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
| W1         | -            | 2.39                                            | 0.83         | 5.7      | 1.99     | 7.43      | 14.8    |                |           |           | Future Conn        |            |               | 18 in             | RCP                          | 2.0%          | 14.8      | 14.9            | 41                              | 8.4                    | 0.08           | 5.78     |                  |                                              |
| W2         | -            | 0.57                                            | 0.71         | 8.2      | 0.40     | 6.61      | 2.7     |                |           |           | Type R Inlet       |            |               | 18 in             | RCP                          | 2.9%          | 2.7       | 17.9            | 10                              | 10.1                   | 0.02           | 8.22     |                  |                                              |
| W3         | -            | 0.41                                            | 0.78         | 6.0      | 0.32     | 7.32      | 2.3     |                |           |           | Type R Inlet       |            |               | 24 in             | RCP                          | 0.6%          | 2.3       | 17.5            | 342                             | 5.6                    | 1.02           | 7.02     |                  |                                              |
| W4         | -            | 0.54                                            | 0.81         | 5.0      | 0.44     | 7.70      | 3.4     |                |           |           | Type R Inlet       |            |               | 24 in             | RCP                          | 4.0%          | 3.4       | 45.2            | 23                              | 14.4                   | 0.03           | 5.03     |                  |                                              |
|            | W2           | STMH-5 (Combined flow from Basins W1,W3)        |              |          |          |           |         | 7.02           | 2.31      | 6.96      | 16.1               |            |               |                   | 24 in                        | RCP           | 5.1%      | 16.1            | 51.1                            | 319                    | 16.3           | 0.33     | 7.35             |                                              |
|            | W1           | Inlet W2 (Combined flow from Basins W1-W3)      |              |          |          |           |         | 8.22           | 3.15      | 6.60      | 20.8               |            |               |                   | 30 in                        | RCP           | 1.8%      | 20.8            | 54.4                            | 32                     | 11.1           | 0.05     | 8.26             |                                              |
|            |              |                                                 |              |          |          |           |         |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
| V2         | -            | 2.15                                            | 0.62         | 23.0     | 1.33     | 4.14      | 5.5     |                |           |           | Type R Inlet       |            |               | 18 in             | RCP                          | 8.0%          | 5.5       | 29.7            | 30                              | 16.8                   | 0.03           | 23.03    |                  |                                              |
|            |              | Flow to existing MH C106 (RG Pkwy Ph 1)         |              |          |          |           |         | 23.03          | 1.33      | 4.13      | 5.5                |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
|            |              |                                                 |              |          |          |           |         |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
| S1         | -            | 2.64                                            | 0.77         | 16.6     | 2.03     | 4.91      | 10.0    |                |           |           | Type R Inlet       |            |               | 18 in             | RCP                          | 1.0%          | 10.0      | 10.5            | 76                              | 5.9                    | 0.21           | 16.81    |                  |                                              |
| T1         | -            | 0.57                                            | 0.78         | 7.4      | 0.44     | 6.85      | 3.0     |                |           |           | Type R Inlet       |            |               | 18 in             | RCP                          | 1.0%          | 3.0       | 10.5            | 77                              | 5.9                    | 0.22           | 7.62     |                  |                                              |
| U1         | -            | 1.37                                            | 0.78         | 9.0      | 1.07     | 6.39      | 6.8     |                |           |           | Type R Inlet       |            |               | 18 in             | RCP                          | 1.0%          | 6.8       | 10.5            | 78                              | 5.9                    | 0.22           | 9.22     |                  |                                              |
|            |              |                                                 |              |          |          |           |         |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |
| D2         | -            | 1.48                                            | 0.79         | 11.6     | 1.17     | 5.78      | 6.8     |                |           |           |                    |            |               |                   |                              |               |           |                 |                                 |                        |                |          |                  |                                              |



**RidgeGate East Filing No. 3**

**Developed Storm Runoff Calculations**

Design Storm :

**5 Year**

Point Hour Rainfall (P<sub>1</sub>) :

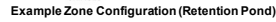
**1.10**

I = (28.5 P<sub>1</sub>) / ((10 + TC)<sup>0.786</sup>)

| Basin Name | Design Point | Direct Runoff                                   |              |          |          |           |         | Total Runoff   |           |           |         | Inlets             |               |                   | Pipe                         |               |           |                 |                                 | Pipe/Swale Travel Time |                |          | Total Time (min)                             | Notes |
|------------|--------------|-------------------------------------------------|--------------|----------|----------|-----------|---------|----------------|-----------|-----------|---------|--------------------|---------------|-------------------|------------------------------|---------------|-----------|-----------------|---------------------------------|------------------------|----------------|----------|----------------------------------------------|-------|
|            |              | Area (ac)                                       | Runoff Coeff | tc (min) | C*A (ac) | I (in/hr) | Q (cfs) | Total tc (min) | 3C*A (ac) | I (in/hr) | Q (cfs) | Inlet Type         | Q Intercepted | Q carryover (Qco) | Pipe Size (in) or equivalent | Pipe Material | Slope (%) | Pipe Flow (cfs) | Approx. Max Pipe Capacity (cfs) | Length (ft)            | Velocity (fps) | tt (min) |                                              |       |
| Z1 - E     | -            | 4.70                                            | 0.05         | 29.9     | 0.24     | 1.73      | 0.4     |                |           |           |         |                    |               |                   |                              |               |           |                 |                                 |                        |                |          | Used for Swale and Interim Inlet Sizing only |       |
| Z1 - F     | -            | 4.70                                            | 0.73         | 7.3      | 3.44     | 3.34      | 11.5    |                |           |           |         | Type C/Future Conn |               |                   | 24 in                        | RCP           | 2.0%      | 11.5            | 32.0                            | 28                     | 10.2           | 0.05     |                                              | 7.35  |
| Z2         | -            | 0.92                                            | 0.69         | 9.0      | 0.64     | 3.10      | 2.0     |                |           |           |         | Type R Inlet       |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
|            | Z1           | Inlet Z2 (Combined flow from Basins D3-F-Z1)    |              |          |          |           |         | 9.00           | 4.08      | 3.09      | 12.6    |                    |               |                   | 24 in                        | RCP           | 2.0%      | 12.6            | 32.0                            | 27                     | 10.2           | 0.04     | 9.04                                         |       |
| Z3         | -            | 0.59                                            | 0.68         | 8.9      | 0.40     | 3.11      | 1.2     |                |           |           |         | Type R Inlet       |               |                   | 18 in                        | RCP           | 1.0%      | 1.2             | 10.5                            | 27                     | 5.9            | 0.08     | 8.98                                         |       |
|            | Z2           | MH Z100 (Combined flow from Basins D3-F, Z1-Z2) |              |          |          |           |         | 9.00           | 4.48      | 3.09      | 13.9    |                    |               |                   | 30 in                        | RCP           | 2.1%      | 13.9            | 59.4                            | 93                     | 12.1           | 0.13     | 9.13                                         |       |
|            |              |                                                 |              |          |          |           |         |                |           |           |         |                    |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
| D7-F       | -            | 16.11                                           | 0.73         | 12.9     | 11.79    | 2.68      | 31.5    |                |           |           |         | Stub               |               |                   | 42 in                        | RCP           | 0.6%      | 31.5            | 77.9                            | 196                    | 8.1            | 0.40     | 13.30                                        |       |
| Y1         | -            | 1.00                                            | 0.67         | 7.8      | 0.67     | 3.26      | 2.2     |                |           |           |         | Type R Inlet       |               |                   | 30 in                        | RCP           | 5.0%      | 2.2             | 91.7                            | 35                     | 18.7           | 0.03     | 7.83                                         |       |
|            |              |                                                 |              |          |          |           |         |                |           |           |         |                    |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
| Y2         | -            | 0.94                                            | 0.68         | 8.5      | 0.64     | 3.16      | 2.0     |                |           |           |         | Type R Inlet       |               |                   | 18 in                        | RCP           | 5.0%      | 2.0             | 23.5                            | 27                     | 13.3           | 0.03     | 8.53                                         |       |
|            | Y1           | MH Y100 (Combined flow from Basins D7-F, Y2)    |              |          |          |           |         | 13.30          | 13.10     | 2.63      | 34.5    |                    |               |                   | 42 in                        | RCP           | 1.0%      | 34.5            | 100.6                           | 93                     | 10.5           | 0.15     | 13.45                                        |       |
|            |              |                                                 |              |          |          |           |         |                |           |           |         |                    |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
| X1         | -            | 0.56                                            | 0.63         | 8.4      | 0.35     | 3.18      | 1.1     |                |           |           |         | Type R Inlet       |               |                   | 18 in                        | RCP           | 2.4%      | 1.1             | 16.3                            | 66                     | 9.2            | 0.12     | 8.52                                         |       |
| X2         | -            | 4.46                                            | 0.73         | 7.5      | 3.26     | 3.31      | 10.8    |                |           |           |         | Stub               |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
| X3         | -            | 3.25                                            | 0.73         | 7.2      | 2.38     | 3.35      | 8.0     |                |           |           |         | Stub               |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
|            | X1           | MH X100 (Combined flow from Basins X2-X3)       |              |          |          |           |         | 7.50           | 5.64      | 3.30      | 18.6    |                    |               |                   | 30 in                        | RCP           | 1.8%      | 18.6            | 55.0                            | 17                     | 11.2           | 0.03     | 7.53                                         |       |
| X4         | -            | 0.75                                            | 0.60         | 8.7      | 0.45     | 3.14      | 1.4     |                |           |           |         |                    |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
|            | X3           | Inlet X4 (Combined flow from Basins X1-X4)      |              |          |          |           |         | 8.90           | 6.44      | 3.11      | 20.0    |                    |               |                   | 36 in                        | RCP           | 1.5%      | 20.0            | 81.7                            | 33                     | 11.6           | 0.05     | 8.95                                         |       |
|            |              |                                                 |              |          |          |           |         |                |           |           |         |                    |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
| W1         | -            | 2.39                                            | 0.73         | 5.7      | 1.75     | 3.60      | 6.3     |                |           |           |         | Future Conn        |               |                   | 18 in                        | RCP           | 2.0%      | 6.3             | 14.9                            | 41                     | 8.4            | 0.08     | 5.78                                         |       |
| W2         | -            | 0.57                                            | 0.48         | 8.2      | 0.27     | 3.20      | 0.9     |                |           |           |         | Type R Inlet       |               |                   | 18 in                        | RCP           | 2.9%      | 0.9             | 17.9                            | 10                     | 10.1           | 0.02     | 8.22                                         |       |
| W3         | -            | 0.41                                            | 0.62         | 6.0      | 0.26     | 3.55      | 0.9     |                |           |           |         | Type R Inlet       |               |                   | 24 in                        | RCP           | 0.6%      | 0.9             | 17.5                            | 342                    | 5.6            | 1.02     | 7.02                                         |       |
| W4         | -            | 0.54                                            | 0.68         | 5.0      | 0.37     | 3.73      | 1.4     |                |           |           |         | Type R Inlet       |               |                   | 24 in                        | RCP           | 4.0%      | 1.4             | 45.2                            | 23                     | 14.4           | 0.03     | 5.03                                         |       |
|            | W2           | STMH-5 (Combined flow from Basins W1,W3)        |              |          |          |           |         | 7.02           | 2.00      | 3.37      | 6.8     |                    |               |                   | 24 in                        | RCP           | 5.1%      | 6.8             | 51.1                            | 319                    | 16.3           | 0.33     | 7.35                                         |       |
|            | W1           | Inlet W2 (Combined flow from Basins W1-W3)      |              |          |          |           |         | 8.22           | 2.65      | 3.20      | 8.5     |                    |               |                   | 30 in                        | RCP           | 1.8%      | 8.5             | 54.4                            | 32                     | 11.1           | 0.05     | 8.26                                         |       |
|            |              |                                                 |              |          |          |           |         |                |           |           |         |                    |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
| V2         | -            | 2.15                                            | 0.31         | 23.0     | 0.66     | 2.01      | 1.3     |                |           |           |         | Type R Inlet       |               |                   | 18 in                        | RCP           | 8.0%      | 1.3             | 29.7                            | 30                     | 16.8           | 0.03     | 23.03                                        |       |
|            |              | Flow to existing MH C106 (RG Pkwy Ph 1)         |              |          |          |           |         | 23.03          | 0.66      | 2.00      | 1.3     |                    |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
|            |              |                                                 |              |          |          |           |         |                |           |           |         |                    |               |                   |                              |               |           |                 |                                 |                        |                |          |                                              |       |
| S1         | -            | 2.64                                            | 0.60         | 16.6     | 1.59     | 2.38      | 3.8     |                |           |           |         | Type R Inlet       |               |                   | 18 in                        | RCP           | 1.0%      | 3.8             | 10.5                            | 76                     | 5.9            | 0.21     | 16.81                                        |       |
| T1         | -            | 0.57                                            | 0.62         | 7.4      | 0.35     | 3.32      | 1.2     |                |           |           |         | Type R Inlet       |               |                   | 18 in                        | RCP           | 1.0%      | 1.2             | 10.5                            | 77                     | 5.9            | 0.22     | 7.62                                         |       |
| U1         | -            | 1.37                                            | 0.63         | 9.0      | 0.86     | 3.10      | 2.7     |                |           |           |         | Type R Inlet       |               |                   | 18 in                        | RCP           | 1.0%      | 2.7             | 10.5                            | 78                     | 5.9            | 0.22     | 9.22                                         |       |

*MHFD-Detention, Version 4.05 (January 2022)*

**Basin ID: Pond 21**

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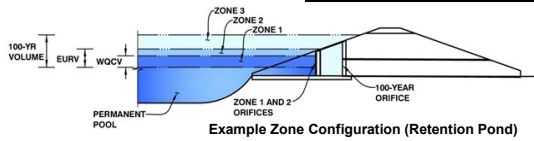
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# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)

Project: **RidgeGate East Filing No. 3**

Basin ID: **Pond 21**



Example Zone Configuration (Retention Pond)

|                   | Estimated Stage (ft) | Estimated Volume (ac-ft) | Outlet Type          |
|-------------------|----------------------|--------------------------|----------------------|
| Zone 1 (WQCV)     | 3.62                 | 1.232                    | Orifice Plate        |
| Zone 2 (EURV)     | 6.34                 | 2.369                    | Orifice Plate        |
| Zone 3 (100-year) | 8.06                 | 1.780                    | Weir&Pipe (Restrict) |
| Total (all zones) |                      | 5.382                    |                      |

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =  ft (distance below the filtration media surface)  
Underdrain Orifice Diameter =  inches

Calculated Parameters for Underdrain  
Underdrain Orifice Area =  ft<sup>2</sup>  
Underdrain Orifice Centroid =  feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =  0.00 ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  6.34 ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  N/A inches  
Orifice Plate: Orifice Area per Row =  5.47 sq. inches (use rectangular openings)

Calculated Parameters for Plate  
WQ Orifice Area per Row =  3.799E-02 ft<sup>2</sup>  
Elliptical Half-Width =  N/A feet  
Elliptical Slot Centroid =  N/A feet  
Elliptical Slot Area =  N/A ft<sup>2</sup>

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

|                                | Row 1 (required) | Row 2 (optional) | Row 3 (optional) | Row 4 (optional) | Row 5 (optional) | Row 6 (optional) | Row 7 (optional) | Row 8 (optional) |
|--------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Stage of Orifice Centroid (ft) | 0.00             | 2.08             | 4.08             |                  |                  |                  |                  |                  |
| Orifice Area (sq. inches)      | 5.47             | 5.47             | 5.47             |                  |                  |                  |                  |                  |

|                                | Row 9 (optional) | Row 10 (optional) | Row 11 (optional) | Row 12 (optional) | Row 13 (optional) | Row 14 (optional) | Row 15 (optional) | Row 16 (optional) |
|--------------------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Stage of Orifice Centroid (ft) |                  |                   |                   |                   |                   |                   |                   |                   |
| Orifice Area (sq. inches)      |                  |                   |                   |                   |                   |                   |                   |                   |

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice =  Not Selected  Not Selected ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Vertical Orifice =  N/A  N/A ft (relative to basin bottom at Stage = 0 ft)  
Vertical Orifice Diameter =  N/A  N/A inches

Calculated Parameters for Vertical Orifice  
Vertical Orifice Area =  Not Selected  Not Selected ft<sup>2</sup>  
Vertical Orifice Centroid =  N/A  N/A feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

Overflow Weir Front Edge Height, H<sub>o</sub> =  7.75  Not Selected ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length =  11.00  N/A feet  
Overflow Weir Grate Slope =  0.00  N/A H:V  
Horiz. Length of Weir Sides =  2.92  N/A feet  
Overflow Grate Type =  Type C Grate  N/A  
Debris Clogging % =  50%  N/A %

Calculated Parameters for Overflow Weir  
Height of Grate Upper Edge, H<sub>g</sub> =  7.75  Not Selected ft  
Overflow Weir Slope Length =  2.92  N/A feet  
Grate Open Area / 100-yr Orifice Area =  12.73  N/A  
Overflow Grate Open Area w/o Debris =  22.36  N/A ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris =  11.18  N/A ft<sup>2</sup>

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

Depth to Invert of Outlet Pipe =  0.47  Not Selected ft (distance below basin bottom at Stage = 0 ft)  
Outlet Pipe Diameter =  42.00  N/A inches  
Restrictor Plate Height Above Pipe Invert =  10.00  N/A inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate  
Outlet Orifice Area =  1.76  Not Selected ft<sup>2</sup>  
Outlet Orifice Centroid =  0.49  Not Selected feet  
Half-Central Angle of Restrictor Plate on Pipe =  1.02  Not Selected radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =  9.00 ft (relative to basin bottom at Stage = 0 ft)  
Spillway Crest Length =  15.00 feet  
Spillway End Slopes =  4.00 H:V  
Freeboard above Max Water Surface =  1.00 feet

Calculated Parameters for Spillway  
Spillway Design Flow Depth =  1.48 feet  
Stage at Top of Freeboard =  11.48 feet  
Basin Area at Top of Freeboard =  1.40 acres  
Basin Volume at Top of Freeboard =  9.66 acre-ft

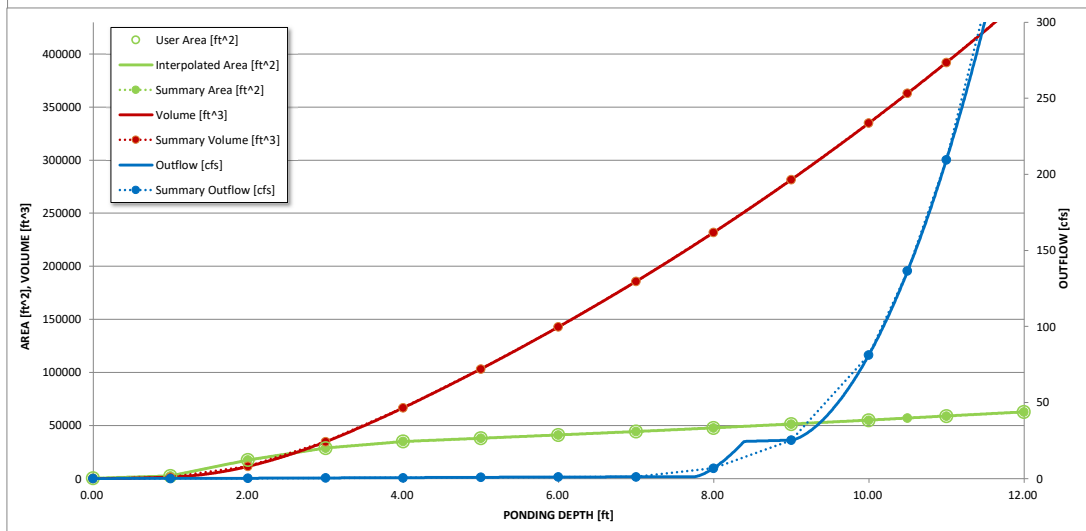
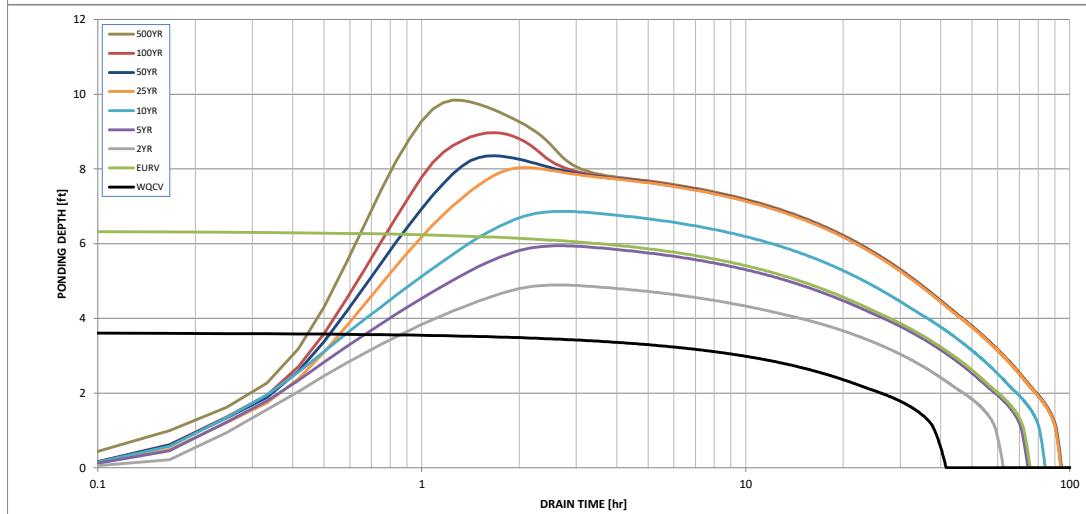
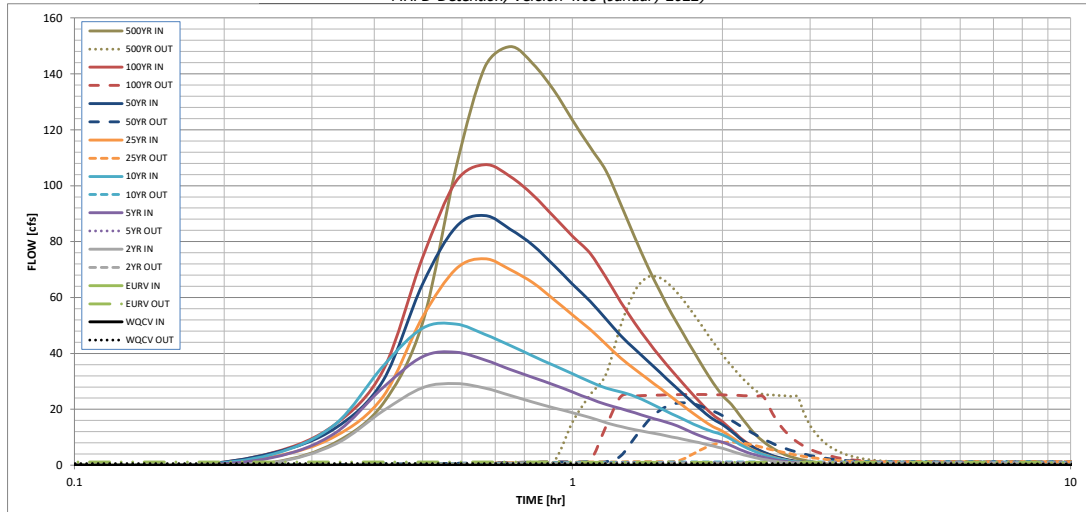
## Routed Hydrograph Results

The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

|                                                 | WQCV  | EURV  | 2 Year | 5 Year | 10 Year | 25 Year         | 50 Year         | 100 Year       | 500 Year |
|-------------------------------------------------|-------|-------|--------|--------|---------|-----------------|-----------------|----------------|----------|
| Design Storm Return Period =                    | N/A   | N/A   | 0.84   | 1.10   | 1.33    | 1.68            | 1.97            | 2.28           | 3.07     |
| One-Hour Rainfall Depth (in) =                  | 1.232 | 3.602 | 2.433  | 3.420  | 4.346   | 5.908           | 7.146           | 8.544          | 11.979   |
| CUHP Runoff Volume (acre-ft) =                  | N/A   | N/A   | 2.433  | 3.420  | 4.346   | 5.908           | 7.146           | 8.544          | 11.979   |
| Inflow Hydrograph Volume (acre-ft) =            | N/A   | N/A   | 0.3    | 2.7    | 7.3     | 19.8            | 27.2            | 37.5           | 59.1     |
| CUHP Predevelopment Peak Q (cfs) =              | N/A   | N/A   |        |        |         |                 |                 |                |          |
| OPTIONAL Override Predevelopment Peak Q (cfs) = | N/A   | N/A   |        |        |         |                 |                 |                |          |
| Predevelopment Unit Peak Flow, q (cfs/acre) =   | N/A   | N/A   | 0.01   | 0.06   | 0.15    | 0.41            | 0.56            | 0.78           | 1.22     |
| Peak Inflow Q (cfs) =                           | N/A   | N/A   | 29.2   | 40.4   | 50.5    | 73.9            | 89.4            | 107.5          | 149.8    |
| Peak Outflow Q (cfs) =                          | 0.6   | 1.1   | 0.9    | 1.1    | 1.2     | 8.3             | 22.4            | 25.3           | 67.3     |
| Ratio Peak Outflow to Predevelopment Q =        | N/A   | N/A   | N/A    | 0.4    | 0.2     | 0.4             | 0.8             | 0.7            | 1.1      |
| Structure Controlling Flow =                    | Plate | Plate | Plate  | Plate  | Plate   | Overflow Weir 1 | Overflow Weir 1 | Outlet Plate 1 | Spillway |
| Max Velocity through Grate 1 (fps) =            | N/A   | N/A   | N/A    | N/A    | N/A     | 0.3             | 0.9             | 1.1            | 1.1      |
| Max Velocity through Grate 2 (fps) =            | N/A   | N/A   | N/A    | N/A    | N/A     | N/A             | N/A             | N/A            | N/A      |
| Time to Drain 97% of Inflow Volume (hours) =    | 38    | 68    | 57     | 67     | 75      | 83              | 81              | 79             | 75       |
| Time to Drain 99% of Inflow Volume (hours) =    | 40    | 72    | 60     | 71     | 80      | 89              | 89              | 88             | 86       |
| Maximum Ponding Depth (ft) =                    | 3.62  | 6.34  | 4.89   | 5.94   | 6.86    | 8.04            | 8.35            | 8.97           | 9.84     |
| Area at Maximum Ponding Depth (acres) =         | 0.75  | 0.97  | 0.87   | 0.94   | 1.01    | 1.10            | 1.13            | 1.18           | 1.25     |
| Maximum Volume Stored (acre-ft) =               | 1.238 | 3.608 | 2.276  | 3.226  | 4.123   | 5.357           | 5.713           | 6.417          | 7.474    |

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.05 (January 2022)



| S-A-V-D Chart Axis Override | X-axis | Left Y-Axis | Right Y-Axis |
|-----------------------------|--------|-------------|--------------|
| minimum bound               |        |             |              |
| maximum bound               |        |             |              |



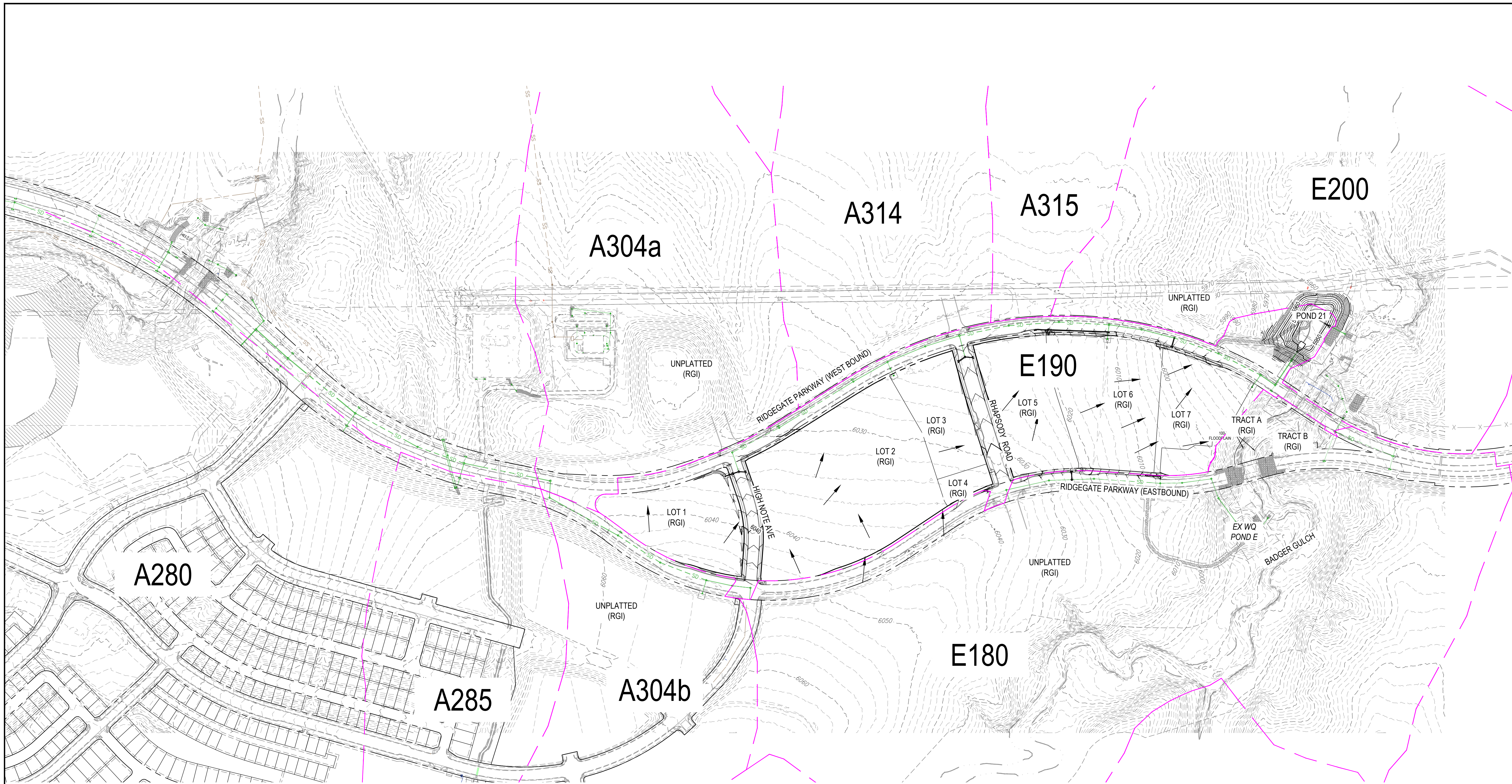
*MHFD-Detention, Version 4.05 (January 2022)*

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically. The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).





0 200' 400'

DRAINAGE LEGEND

- CUHP BASIN LIMITS
- FLOW DIRECTION

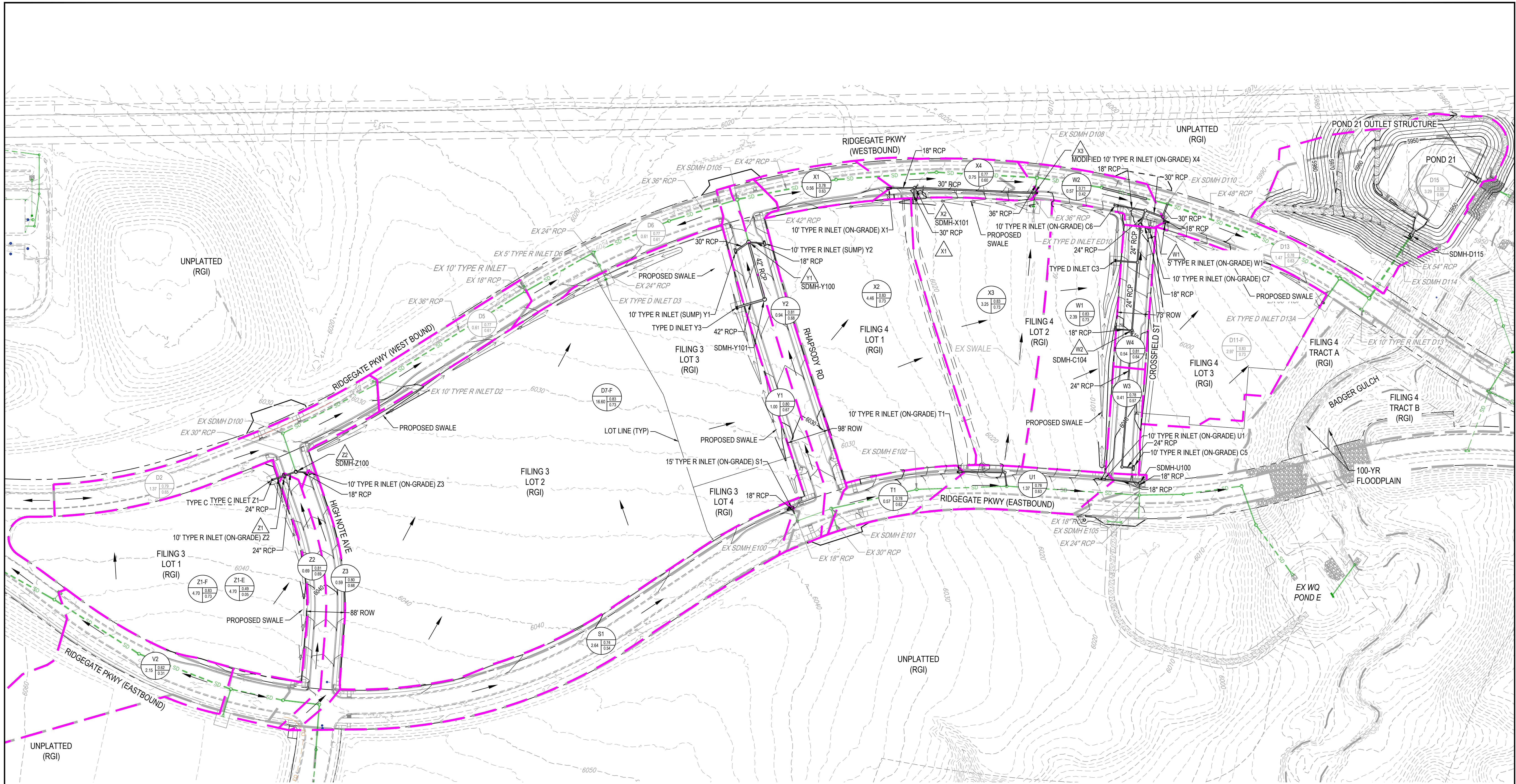


RIDGEGATE EAST FILING NO. 3  
CUHP DRAINAGE MAP

DATE: 3/3/2023

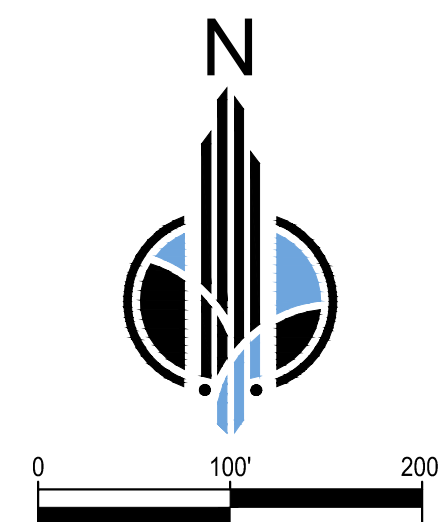
SHEET: 1 OF 1





DRAINAGE LEGEND

- DESIGN POINT
- BASIN NAME
- 100 YEAR RUNOFF COEFFICIENT
- 5 YEAR RUNOFF COEFFICIENT
- AREA, IN ACRES
- PROPOSED BASIN LIMITS
- EXISTING BASIN LIMITS
- FLOW DIRECTION



RIDGEGATE EAST FILING NO. 3 AND 4  
DRAINAGE MAP

DATE: 12/14/2023

SHEET: 1 OF 1



## **APPENDIX B – HYDROLOGIC CALCULATIONS**



## High Note Ave

### Composite Runoff Coefficient Calculations

Location: Douglas County  
Municipality: Douglas County  
Minor Design Storm: 5  
Major Design Storm: 100  
Soil Type: C/D

Runoff Coefficient (UDFCD Vol 1, Chp 6, Sec. 2.5.1)

| NRCS Soil Group | Storm Return Period      |                          |                          |                          |               |               |
|-----------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------|---------------|
|                 | 2-Year                   | 5-Year                   | 10-Year                  | 25-Year                  | 50-Year       | 100-Year      |
| A               | C=0.84i <sup>1.302</sup> | C=0.86i <sup>1.276</sup> | C=0.87i <sup>1.232</sup> | C=0.84i <sup>1.124</sup> | C=0.85i+0.025 | C=0.78i+0.110 |
| B               | C=0.84i <sup>1.169</sup> | C=0.86i <sup>1.088</sup> | C=0.81i+0.057            | C=0.63i+0.249            | C=0.56i+0.328 | C=0.47i+0.426 |
| C/D             | C=0.83i <sup>1.122</sup> | C=0.82i+0.035            | C=0.74i+0.132            | C=0.56i+0.319            | C=0.49i+0.393 | C=0.41i+0.484 |

| Basin Design Data              |              | PREVIOUS CRITERIA FOR EXISTING BASINS |                                   |                      |                          |                          |                             |                                   |                                     | CURRENT CRITERIA FOR PROPOSED BASINS |                                   |                        |                                     |                         |                         |         | i (%) | Runoff Coeff's |      |      |      |
|--------------------------------|--------------|---------------------------------------|-----------------------------------|----------------------|--------------------------|--------------------------|-----------------------------|-----------------------------------|-------------------------------------|--------------------------------------|-----------------------------------|------------------------|-------------------------------------|-------------------------|-------------------------|---------|-------|----------------|------|------|------|
|                                | I (%) =      | 100%                                  | 90%                               | 85%                  | 40%                      | 10%                      | 25%                         | 2%                                | 2%                                  | 95%                                  | 95%                               | 95%                    | 20%                                 |                         |                         |         |       |                |      |      |      |
| Basin Name                     | Design Point | A <sub>paved</sub> streets (sf)       | A <sub>sidewalk / conc</sub> (sf) | A <sub>MU</sub> (sf) | A <sub>Gravel</sub> (sf) | A <sub>plygnd</sub> (sf) | A <sub>art. turf</sub> (sf) | A <sub>lscape</sub> (B soil) (sf) | A <sub>lscape</sub> (C/D soil) (sf) | A <sub>paved</sub> streets (sf)      | A <sub>sidewalk / conc</sub> (sf) | A <sub>Roof</sub> (sf) | A <sub>lscape</sub> (C/D soil) (sf) | A <sub>Total</sub> (sf) | A <sub>Total</sub> (ac) | Imp (%) |       | C2             | C5   | C10  | C100 |
| Z1 - F                         | -            |                                       |                                   | 204,849              |                          |                          |                             |                                   |                                     |                                      |                                   |                        |                                     | 204,849                 | 4.70                    | 85.0%   |       | 0.69           | 0.73 | 0.76 | 0.83 |
| Z2                             | -            | 26,424                                | 6,237                             |                      |                          |                          |                             |                                   | 7,537                               |                                      |                                   |                        |                                     | 40,198                  | 0.92                    | 80.1%   |       | 0.65           | 0.69 | 0.72 | 0.81 |
| Z3                             | -            | 16,971                                | 3,439                             |                      |                          |                          |                             |                                   | 5,361                               |                                      |                                   |                        |                                     | 25,771                  | 0.59                    | 78.3%   |       | 0.63           | 0.68 | 0.71 | 0.80 |
| Y1                             | -            | 27,771                                | 6,192                             |                      |                          |                          |                             |                                   | 9,444                               |                                      |                                   |                        |                                     | 43,407                  | 1.00                    | 77.3%   |       | 0.62           | 0.67 | 0.70 | 0.80 |
| Y2                             | -            | 27,629                                | 5,201                             |                      |                          |                          |                             |                                   | 8,236                               |                                      |                                   |                        |                                     | 41,066                  | 0.94                    | 79.1%   |       | 0.64           | 0.68 | 0.72 | 0.81 |
| X1                             | -            | 12,173                                | 5,807                             |                      |                          |                          |                             |                                   | 6,233                               |                                      |                                   |                        |                                     | 24,213                  | 0.56                    | 72.4%   |       | 0.58           | 0.63 | 0.67 | 0.78 |
| X2                             | -            |                                       |                                   | 194,278              |                          |                          |                             |                                   |                                     |                                      |                                   |                        |                                     | 194,278                 | 4.46                    | 85.0%   |       | 0.69           | 0.73 | 0.76 | 0.83 |
| X3                             | -            |                                       |                                   | 141,570              |                          |                          |                             |                                   |                                     |                                      |                                   |                        |                                     | 141,570                 | 3.25                    | 85.0%   |       | 0.69           | 0.73 | 0.76 | 0.83 |
| X4                             | -            | 17,033                                | 5,645                             |                      |                          |                          |                             |                                   | 9,850                               |                                      |                                   |                        |                                     | 32,528                  | 0.75                    | 68.6%   |       | 0.54           | 0.60 | 0.64 | 0.77 |
| W1                             | -            |                                       |                                   | 104,108              |                          |                          |                             |                                   |                                     |                                      |                                   |                        |                                     | 104,108                 | 2.39                    | 85.0%   |       | 0.69           | 0.73 | 0.76 | 0.83 |
| W2                             | -            | 8,260                                 | 5,637                             |                      |                          |                          |                             |                                   | 10,844                              |                                      |                                   |                        |                                     | 24,741                  | 0.57                    | 54.8%   |       | 0.42           | 0.48 | 0.54 | 0.71 |
| W3                             | -            | 2,908                                 | 10,901                            |                      |                          |                          |                             |                                   | 4,071                               |                                      |                                   |                        |                                     | 17,880                  | 0.41                    | 71.6%   |       | 0.57           | 0.62 | 0.66 | 0.78 |
| W4                             | -            | 15,109                                | 3,900                             |                      |                          |                          |                             |                                   | 4,674                               |                                      |                                   |                        |                                     | 23,683                  | 0.54                    | 79.0%   |       | 0.64           | 0.68 | 0.72 | 0.81 |
| RG PKWY BASINS                 |              |                                       |                                   |                      |                          |                          |                             |                                   |                                     |                                      |                                   |                        |                                     |                         |                         |         |       |                |      |      |      |
| L1                             | -            |                                       |                                   |                      |                          |                          |                             |                                   |                                     | 15,563                               | 5,948                             |                        | 12,829                              | 34,339                  | 0.79                    | 67.0%   |       | 0.53           | 0.58 | 0.63 | 0.76 |
| J2                             | -            |                                       |                                   |                      |                          |                          |                             |                                   |                                     | 25,743                               | 10,546                            |                        | 21,516                              | 57,805                  | 1.33                    | 67.1%   |       | 0.53           | 0.59 | 0.63 | 0.76 |
| JO                             | -            |                                       |                                   |                      |                          |                          |                             |                                   |                                     |                                      |                                   |                        | 39,019                              | 39,019                  | 0.90                    | 20.0%   |       | 0.14           | 0.20 | 0.28 | 0.57 |
| D2                             | -            |                                       |                                   |                      |                          |                          |                             |                                   |                                     | 29,650                               | 12,413                            |                        | 15,999                              | 58,061                  | 1.33                    | 74.3%   |       | 0.60           | 0.64 | 0.68 | 0.79 |
| D5                             | -            |                                       |                                   |                      |                          |                          |                             |                                   |                                     | 8,774                                | 5,420                             |                        | 11,489                              | 25,683                  | 0.59                    | 61.5%   |       | 0.48           | 0.54 | 0.59 | 0.74 |
| D6                             | -            |                                       |                                   |                      |                          |                          |                             |                                   |                                     | 16,023                               | 8,009                             |                        | 19,484                              | 43,516                  | 1.00                    | 61.4%   |       | 0.48           | 0.54 | 0.59 | 0.74 |
| D7-F                           | -            |                                       |                                   | 701,659              |                          |                          |                             |                                   |                                     |                                      |                                   |                        |                                     | 701,659                 | 16.11                   | 85.0%   |       | 0.69           | 0.73 | 0.76 | 0.83 |
| D11-F                          | -            |                                       |                                   | 129,373              |                          |                          |                             |                                   |                                     |                                      |                                   |                        |                                     | 129,373                 | 2.97                    | 85.0%   |       | 0.69           | 0.73 | 0.76 | 0.83 |
| D13                            | -            | 33,222                                | 14,643                            |                      |                          |                          |                             |                                   | 16,168                              |                                      |                                   |                        |                                     | 64,033                  | 1.47                    | 73.0%   |       | 0.58           | 0.63 | 0.67 | 0.78 |
| D15                            | -            |                                       |                                   |                      |                          |                          |                             |                                   | 143,352                             |                                      |                                   |                        |                                     | 143,352                 | 3.29                    | 2.0%    |       | 0.01           | 0.05 | 0.15 | 0.49 |
| Pond 21 (Basins D, W, X, Y, Z) |              | 187,500                               | 67,602                            | 1,475,837            | 0                        | 0                        | 0                           | 0                                 | 225,770                             | 95,753                               | 42,335                            | 0                      | 120,336                             | 2,215,133               | 50.85                   | 75.1%   |       | 0.60           | 0.65 | 0.69 | 0.79 |



**Merrick & Company**  
5970 Greenwood Plaza Blvd.  
Greenwood Village, CO 80111  
Ph: (303) 751-0741

Job Name: High Note Ave  
Job Number: 65121240  
Date: 5/5/2025  
By: MAS

## High Note Ave

### Time of Concentration Calculations

Location: Douglas County  
Municipality: Douglas County  
Minor Design Storm: 5  
Major Design Storm: 100  
Soil Type: C/D

$$t_t = (0.395(1.1 - C_o)(L_t^{0.5})) / (S_o^{0.33})$$
$$t_t = L_t / (60V_t)$$
$$\text{Urban } t_c = (26 - 17i) + L_t / (60(14 + 9) * (S_o^{0.5}))$$

| Sub-Basin Data |              |                         |       |      | Initial Overland Time (t <sub>i</sub> ) |           |                      | Travel Time (t <sub>t</sub> )<br>t <sub>t</sub> =Length/(Velocity x 60) |           |                                    |                |                |                      |                                                                  | t <sub>c</sub> Comp | t <sub>c</sub> Urbanized Check    ON |                      |                    | t <sub>c</sub> Final |
|----------------|--------------|-------------------------|-------|------|-----------------------------------------|-----------|----------------------|-------------------------------------------------------------------------|-----------|------------------------------------|----------------|----------------|----------------------|------------------------------------------------------------------|---------------------|--------------------------------------|----------------------|--------------------|----------------------|
| Basin Name     | Design Point | A <sub>Total</sub> (ac) | i (%) | C5   | Upper most Length (ft)                  | Slope (%) | t <sub>i</sub> (min) | Length (ft)                                                             | Slope (%) | Type of Land Surface               | C <sub>v</sub> | Velocity (fps) | t <sub>t</sub> (min) | Time of Conc<br>t <sub>i</sub> + t <sub>t</sub> = t <sub>c</sub> | L <sub>t</sub> (ft) | S <sub>O</sub> (%)                   | Urban t <sub>c</sub> | Min t <sub>c</sub> |                      |
| L1             | -            | 0.79                    | 67.0% | 0.58 | 75                                      | 2.0%      | 6.5                  | 415                                                                     | 0.9%      | Paved areas & shallow paved swales | 20             | 1.9            | 3.6                  | 10.1                                                             | 490.0               | 1.0%                                 | 19.0                 | 10.1               |                      |
| J2             | -            | 1.33                    | 67.1% | 0.59 | 20                                      | 2.0%      | 3.4                  | 480                                                                     | 1.6%      | Paved areas & shallow paved swales | 20             | 2.5            | 3.2                  | 6.5                                                              | 500.0               | 1.6%                                 | 18.2                 | 6.5                |                      |
| JO             | -            | 0.90                    | 20.0% | 0.20 | 100                                     | 10.0%     | 7.7                  | 550                                                                     | 0.5%      | Paved areas & shallow paved swales | 20             | 1.4            | 6.5                  | 14.1                                                             | 650.0               | 0.9%                                 | 32.1                 | 14.1               |                      |
| D2             | -            | 1.33                    | 74.3% | 0.64 | 130                                     | 2.0%      | 7.6                  | 330                                                                     | 0.9%      | Paved areas & shallow paved swales | 20             | 1.9            | 2.9                  | 10.5                                                             | 460.0               | 1.1%                                 | 17.1                 | 10.5               |                      |
| D5             | -            | 0.59                    | 61.5% | 0.54 | 75                                      | 2.0%      | 7.1                  | 225                                                                     | 1.0%      | Paved areas & shallow paved swales | 20             | 2.0            | 1.9                  | 8.9                                                              | 300.0               | 1.2%                                 | 18.1                 | 8.9                |                      |
| D6             | -            | 1.00                    | 61.4% | 0.54 | 58                                      | 2.0%      | 6.2                  | 300                                                                     | 0.6%      | Paved areas & shallow paved swales | 20             | 1.5            | 3.2                  | 9.4                                                              | 358.0               | 0.7%                                 | 19.5                 | 9.4                |                      |

## High Note Ave

### Developed Storm Runoff Calculations

Design Storm :

**100 Year**

Point Hour Rainfall (P<sub>1</sub>) : **2.27**

$$I = (28.5 P_1) / ((10 + TC)^{0.786})$$

| Basin Name | Design Point                                                     | Direct Runoff                                           |                                                 |                              |                            |           |         | Total Runoff   |           |           |         | Inlets              |               |                   | Pipe                         |               |           |                 |                                 | Pipe/Swale Travel Time |                |          | Total Time (min)     | Notes                |
|------------|------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------|------------------------------|----------------------------|-----------|---------|----------------|-----------|-----------|---------|---------------------|---------------|-------------------|------------------------------|---------------|-----------|-----------------|---------------------------------|------------------------|----------------|----------|----------------------|----------------------|
|            |                                                                  | Area (ac)                                               | Runoff Coeff                                    | tc (min)                     | C*A (ac)                   | I (in/hr) | Q (cfs) | Total tc (min) | ΣC*A (ac) | I (in/hr) | Q (cfs) | Inlet Type          | Q intercepted | Q carryover (Qco) | Pipe Size (in) or equivalent | Pipe Material | Slope (%) | Pipe Flow (cfs) | Approx. Max Pipe Capacity (cfs) | Length (ft)            | Velocity (fps) | tt (min) |                      |                      |
| Z1 - F     | -                                                                | 4.70                                                    | 0.83                                            | 7.3                          | 3.91                       | 6.88      | 26.9    |                |           |           |         | Type C/Future Conn  |               |                   | 24 in                        | RCP           | 2.0%      | 26.9            | 32.0                            | 28                     | 10.2           | 0.05     | 7.35                 | From F3 and 4 Report |
| Z2         | -                                                                | 0.92                                                    | 0.81                                            | 9.0                          | 0.75                       | 6.39      | 4.8     |                |           |           |         | Type R Inlet        |               |                   |                              |               |           |                 |                                 |                        |                |          |                      | From F3 and 4 Report |
|            | Z1                                                               |                                                         | Inlet Z2 (Combined flow from Basins D3-F-Z1)    |                              |                            |           |         | 9.00           | 4.66      | 6.38      | 29.8    |                     |               |                   | 24 in                        | RCP           | 2.0%      | 29.8            | 32.0                            | 27                     | 10.2           | 0.04     | 9.04                 | From F3 and 4 Report |
| Z3         | -                                                                | 0.59                                                    | 0.80                                            | 8.9                          | 0.48                       | 6.42      | 3.1     |                |           |           |         | Type R Inlet        |               |                   | 18 in                        | RCP           | 1.0%      | 3.1             | 10.5                            | 27                     | 5.9            | 0.08     | 8.98                 | From F3 and 4 Report |
|            | Z2                                                               |                                                         | MH Z100 (Combined flow from Basins D3-F, Z1-Z2) |                              |                            |           |         | 9.00           | 5.14      | 6.38      | 32.8    |                     |               |                   | 30 in                        | RCP           | 2.1%      | 32.8            | 59.4                            | 93                     | 12.1           | 0.13     | 9.13                 | From F3 and 4 Report |
| J2         | -                                                                | 1.33                                                    | 0.76                                            | 6.5                          | 1.01                       | 7.14      | 7.2     |                |           |           |         | Type R Inlet        |               |                   | 18 in                        | RCP           | 0.8%      | 7.2             | 9.1                             | 39                     | 5.1            | 0.13     | 6.63                 |                      |
|            | J1                                                               |                                                         |                                                 |                              | MH J1 (Flow from Basin J2) |           |         | 6.63           | 1.01      | 7.09      | 7.1     |                     |               |                   | 18 in                        | RCP           | 0.8%      | 7.1             | 9.1                             | 64                     | 5.1            | 0.21     | 6.83                 |                      |
| JO         | -                                                                | 0.90                                                    | 0.57                                            | 14.1                         | 0.51                       | 5.30      | 2.7     |                |           |           |         | Area Inlet (Others) |               |                   | 18 in                        | RCP           | 0.5%      | 2.7             | 7.4                             | 30                     | 4.2            | 0.12     | 14.22                |                      |
| L1         | -                                                                | 0.79                                                    | 0.76                                            | 10.1                         | 0.60                       | 6.12      | 3.7     |                |           |           |         | Type 13 Combo Inlet |               |                   |                              |               |           |                 |                                 |                        |                |          |                      |                      |
|            | Subsurface Flow at Inlet L1 (Combined flow from Basin JO and L1) |                                                         |                                                 |                              |                            |           |         | 14.22          | 1.11      | 5.27      | 5.8     |                     |               |                   | 18 in                        | RCP           | 2.0%      | 5.8             | 14.9                            | 71                     | 8.4            | 0.14     | 14.36                |                      |
|            | J2                                                               | EX MH D100 (Combined flow from DP J1, Z2, and Inlet L1) |                                                 |                              |                            |           | 14.36   | 7.25           | 5.25      | 38.1      |         |                     |               | 30 in             | RCP                          | 1.0%          | 38.1      | 41.0            | 242                             | 8.4                    | 0.48           | 14.84    |                      |                      |
|            | D2                                                               |                                                         |                                                 | EX MH D101 (Flow from DP J2) |                            |           |         | 14.84          | 7.25      | 5.17      | 37.5    |                     |               |                   | 36 in                        | RCP           | 1.0%      | 37.5            | 66.7                            | 139                    | 9.4            | 0.25     | 15.09                | RGPE-II Design Point |
| D2         | -                                                                | 1.33                                                    | 0.79                                            | 10.5                         | 1.05                       | 6.02      | 6.3     |                |           |           |         | Type R Inlet        |               |                   | 18 in                        | RCP           | 1.1%      | 6.3             | 10.8                            | 10                     | 6.1            | 0.03     | 10.53                |                      |
|            | K1                                                               | MH K1 (Combined flow from Basin D2 and DP D2)           |                                                 |                              |                            |           | 14.84   | 8.30           | 5.17      | 42.9      |         |                     |               | 36 in             | RCP                          | 1.0%          | 42.9      | 66.7            | 260                             | 9.4                    | 0.46           | 15.30    |                      |                      |
| D5         | -                                                                | 0.59                                                    | 0.74                                            | 8.9                          | 0.43                       | 6.42      | 2.8     |                |           |           |         | EX Type R Inlet     |               |                   | 18 in                        | RCP           | 8.0%      | 2.8             | 29.7                            | 8                      | 16.8           | 0.01     | 8.91                 |                      |
|            | D3                                                               | EX MH D102 (Combined flow from Basin D5 and DP K1)      |                                                 |                              |                            |           | 15.30   | 8.74           | 5.09      | 44.5      |         |                     |               | 36 in             | RCP                          | 1.0%          | 44.5      | 66.7            | 180                             | 9.4                    | 0.32           | 15.62    | RGPE-II Design Point |                      |
| D6         | -                                                                | 1.00                                                    | 0.74                                            | 9.4                          | 0.74                       | 6.29      | 4.6     |                |           |           |         | EX Type R Inlet     |               |                   | 24 in                        | RCP           | 1.0%      | 4.6             | 22.4                            | 30                     | 7.1            | 0.07     | 9.47                 |                      |
|            | D4                                                               | EX MH D103 (Combined flow from Basin D6 and DP D3)      |                                                 |                              |                            |           | 15.62   | 9.47           | 5.04      | 47.8      |         |                     |               |                   |                              |               |           |                 |                                 |                        |                |          |                      | RGPE-II Design Point |



## High Note Ave

### Developed Storm Runoff Calculations

Design Storm :

**5 Year**

Point Hour Rainfall (P<sub>1</sub>) : **1.10**

$I = (28.5 P_1) / ((10 + TC)^{0.786})$

| Basin Name | Design Point                                                     | Area (ac)                                               | Direct Runoff                                |                              |          |           |         | Total Runoff   |           |           |         | Inlets              |               |                   | Pipe                         |               |           |                 |                                 | Pipe/Swale Travel Time |                |          | Total Time (min)     | Notes                |
|------------|------------------------------------------------------------------|---------------------------------------------------------|----------------------------------------------|------------------------------|----------|-----------|---------|----------------|-----------|-----------|---------|---------------------|---------------|-------------------|------------------------------|---------------|-----------|-----------------|---------------------------------|------------------------|----------------|----------|----------------------|----------------------|
|            |                                                                  |                                                         | Runoff Coeff                                 | tc (min)                     | C*A (ac) | I (in/hr) | Q (cfs) | Total tc (min) | ΣC*A (ac) | I (in/hr) | Q (cfs) | Inlet Type          | Q intercepted | Q carryover (Qco) | Pipe Size (in) or equivalent | Pipe Material | Slope (%) | Pipe Flow (cfs) | Approx. Max Pipe Capacity (cfs) | Length (ft)            | Velocity (fps) | tt (min) |                      |                      |
| Z1 - F     | -                                                                | 4.70                                                    | 0.73                                         | 7.3                          | 3.44     | 3.34      | 11.5    |                |           |           |         | Type C/Future Conn  |               |                   | 24 in                        | RCP           | 2.0%      | 11.5            | 32.0                            | 28                     | 10.2           | 0.05     | 7.35                 | From F3 and 4 Report |
| Z2         | -                                                                | 0.92                                                    | 0.69                                         | 9.0                          | 0.64     | 3.10      | 2.0     |                |           |           |         | Type R Inlet        |               |                   |                              |               |           |                 |                                 |                        |                |          |                      | From F3 and 4 Report |
|            | Z1                                                               |                                                         | Inlet Z2 (Combined flow from Basins D3-F-Z1) |                              |          |           |         | 9.00           | 4.08      | 3.09      | 12.6    |                     |               |                   | 24 in                        | RCP           | 2.0%      | 12.6            | 32.0                            | 27                     | 10.2           | 0.04     | 9.04                 | From F3 and 4 Report |
| Z3         | -                                                                | 0.59                                                    | 0.68                                         | 8.9                          | 0.40     | 3.11      | 1.2     |                |           |           |         | Type R Inlet        |               |                   | 18 in                        | RCP           | 1.0%      | 1.2             | 10.5                            | 27                     | 5.9            | 0.08     | 8.98                 | From F3 and 4 Report |
|            | Z2                                                               | MH Z100 (Combined flow from Basins D3-F, Z1-Z2)         |                                              |                              |          |           | 9.00    | 4.48           | 3.09      | 13.9      |         |                     |               | 30 in             | RCP                          | 2.1%          | 13.9      | 59.4            | 93                              | 12.1                   | 0.13           | 9.13     | From F3 and 4 Report |                      |
| J2         | -                                                                | 1.33                                                    | 0.59                                         | 6.5                          | 0.78     | 3.46      | 2.7     |                |           |           |         | Type R Inlet        |               |                   | 18 in                        | RCP           | 0.8%      | 2.7             | 9.1                             | 39                     | 5.1            | 0.13     | 6.63                 |                      |
|            | J1                                                               |                                                         |                                              | MH J1 (Flow from Basin J2)   |          |           |         | 6.63           | 0.78      | 3.43      | 2.7     |                     |               |                   | 18 in                        | RCP           | 0.8%      | 2.7             | 9.1                             | 64                     | 5.1            | 0.21     | 6.83                 |                      |
| JO         | -                                                                | 0.90                                                    | 0.20                                         | 14.1                         | 0.18     | 2.57      | 0.5     |                |           |           |         | Area Inlet (Others) |               |                   | 18 in                        | RCP           | 0.5%      | 0.5             | 7.4                             | 30                     | 4.2            | 0.12     | 14.22                |                      |
| L1         | -                                                                | 0.79                                                    | 0.58                                         | 10.1                         | 0.46     | 2.96      | 1.4     |                |           |           |         | Type 13 Combo Inlet |               |                   |                              |               |           |                 |                                 |                        |                |          |                      |                      |
|            | Subsurface Flow at Inlet L1 (Combined flow from Basin JO and L1) |                                                         |                                              |                              |          |           |         | 14.22          | 0.64      | 2.55      | 1.6     |                     |               |                   | 18 in                        | RCP           | 2.0%      | 1.6             | 14.9                            | 71                     | 8.4            | 0.14     | 14.36                |                      |
|            | J2                                                               | EX MH D100 (Combined flow from DP J1, Z2, and Inlet L1) |                                              |                              |          |           | 14.36   | 5.90           | 2.54      | 15.0      |         |                     |               | 30 in             | RCP                          | 1.0%          | 15.0      | 41.0            | 242                             | 8.4                    | 0.48           | 14.84    |                      |                      |
|            | D2                                                               |                                                         |                                              | EX MH D101 (Flow from DP J2) |          |           |         | 14.84          | 5.90      | 2.50      | 14.8    |                     |               |                   | 36 in                        | RCP           | 1.0%      | 14.8            | 66.7                            | 139                    | 9.4            | 0.25     | 15.09                | RGPE-II Design Point |
| D2         | -                                                                | 1.33                                                    | 0.64                                         | 10.5                         | 0.86     | 2.92      | 2.5     |                |           |           |         | Type R Inlet        |               |                   | 18 in                        | RCP           | 1.1%      | 2.5             | 10.8                            | 10                     | 6.1            | 0.03     | 10.53                |                      |
|            | K1                                                               | MH K1 (Combined flow from Basin D2 and DP D2)           |                                              |                              |          |           | 14.84   | 6.76           | 2.50      | 16.9      |         |                     |               | 36 in             | RCP                          | 1.0%          | 16.9      | 66.7            | 260                             | 9.4                    | 0.46           | 15.30    |                      |                      |
| D5         | -                                                                | 0.59                                                    | 0.54                                         | 8.9                          | 0.32     | 3.11      | 1.0     |                |           |           |         | EX Type R Inlet     |               |                   | 18 in                        | RCP           | 8.0%      | 1.0             | 29.7                            | 8                      | 16.8           | 0.01     | 8.91                 |                      |
|            | D3                                                               | EX MH D102 (Combined flow from Basin D5 and DP K1)      |                                              |                              |          |           | 15.30   | 7.07           | 2.47      | 17.5      |         |                     |               | 36 in             | RCP                          | 1.0%          | 17.5      | 66.7            | 180                             | 9.4                    | 0.32           | 15.62    | RGPE-II Design Point |                      |
| D6         | -                                                                | 1.00                                                    | 0.54                                         | 9.4                          | 0.54     | 3.05      | 1.6     |                |           |           |         | EX Type R Inlet     |               |                   | 24 in                        | RCP           | 1.0%      | 1.6             | 22.4                            | 30                     | 7.1            | 0.07     | 9.47                 |                      |
|            | D4                                                               | EX MH D103 (Combined flow from Basin D6 and DP D3)      |                                              |                              |          |           | 15.62   | 7.61           | 2.44      | 18.6      |         |                     |               |                   |                              |               |           |                 |                                 |                        |                |          |                      | RGPE-II Design Point |

## **APPENDIX C – STREET AND INLET CAPACITY CALCULATIONS**

**INLET MANAGEMENT**

Worksheet Protected

| INLET NAME                         | L1                         | J2                       | K2                       |
|------------------------------------|----------------------------|--------------------------|--------------------------|
| Site Type (Urban or Rural)         | URBAN                      | URBAN                    | URBAN                    |
| Inlet Application (Street or Area) | STREET                     | STREET                   | STREET                   |
| Hydraulic Condition                | On Grade                   | On Grade                 | On Grade                 |
| Inlet Type                         | CDOT/Denver 13 Combination | CDOT Type R Curb Opening | CDOT Type R Curb Opening |

**USER-DEFINED INPUT****User-Defined Design Flows**

|                         |     |     |     |
|-------------------------|-----|-----|-----|
| Minor $Q_{Known}$ (cfs) | 1.4 | 2.7 | 2.5 |
| Major $Q_{Known}$ (cfs) | 3.4 | 7.2 | 6.3 |

**Bypass (Carry-Over) Flow from Upstream** Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

|                                         |                         |                         |              |
|-----------------------------------------|-------------------------|-------------------------|--------------|
| Receive Bypass Flow from:               | No Bypass Flow Received | No Bypass Flow Received | User-Defined |
| Minor Bypass Flow Received, $Q_b$ (cfs) | 0.0                     | 0.0                     | 0.0          |
| Major Bypass Flow Received, $Q_b$ (cfs) | 0.0                     | 0.0                     | 0.3          |

BYPASS FROM L1 &amp; J2

**Watershed Characteristics**

|                           |  |  |  |
|---------------------------|--|--|--|
| Subcatchment Area (acres) |  |  |  |
| Percent Impervious        |  |  |  |
| NRCS Soil Type            |  |  |  |

**Watershed Profile**

|                        |  |  |  |
|------------------------|--|--|--|
| Overland Slope (ft/ft) |  |  |  |
| Overland Length (ft)   |  |  |  |
| Channel Slope (ft/ft)  |  |  |  |
| Channel Length (ft)    |  |  |  |

**Minor Storm Rainfall Input**

|                                           |  |  |  |
|-------------------------------------------|--|--|--|
| Design Storm Return Period, $T_r$ (years) |  |  |  |
| One-Hour Precipitation, $P_1$ (inches)    |  |  |  |

**Major Storm Rainfall Input**

|                                           |  |  |  |
|-------------------------------------------|--|--|--|
| Design Storm Return Period, $T_r$ (years) |  |  |  |
| One-Hour Precipitation, $P_1$ (inches)    |  |  |  |

**CALCULATED OUTPUT**

|                                                           |            |            |            |
|-----------------------------------------------------------|------------|------------|------------|
| <b>Minor Total Design Peak Flow, <math>Q</math> (cfs)</b> | <b>1.4</b> | <b>2.7</b> | <b>2.5</b> |
| <b>Major Total Design Peak Flow, <math>Q</math> (cfs)</b> | <b>3.4</b> | <b>7.2</b> | <b>6.6</b> |
| Minor Flow Bypassed Downstream, $Q_b$ (cfs)               | 0.0        | 0.0        | 0.0        |
| Major Flow Bypassed Downstream, $Q_b$ (cfs)               | 0.2        | 0.1        | 0.0        |



**INLET MANAGEMENT**

Worksheet Protected

| INLET NAME                         | D5                       | D6                       |
|------------------------------------|--------------------------|--------------------------|
| Site Type (Urban or Rural)         | URBAN                    | URBAN                    |
| Inlet Application (Street or Area) | STREET                   | STREET                   |
| Hydraulic Condition                | On Grade                 | In Sump                  |
| Inlet Type                         | CDOT Type R Curb Opening | CDOT Type R Curb Opening |

**USER-DEFINED INPUT****User-Defined Design Flows**

|                         |     |     |
|-------------------------|-----|-----|
| Minor $Q_{Known}$ (cfs) | 1.0 | 1.6 |
| Major $Q_{Known}$ (cfs) | 2.8 | 4.6 |

**Bypass (Carry-Over) Flow from Upstream**

|                                         |     |     |
|-----------------------------------------|-----|-----|
| Receive Bypass Flow from:               | K2  | D5  |
| Minor Bypass Flow Received, $Q_b$ (cfs) | 0.0 | 0.0 |
| Major Bypass Flow Received, $Q_b$ (cfs) | 0.0 | 0.0 |

**Watershed Characteristics**

|                           |  |  |
|---------------------------|--|--|
| Subcatchment Area (acres) |  |  |
| Percent Impervious        |  |  |
| NRCS Soil Type            |  |  |

**Watershed Profile**

|                        |  |  |
|------------------------|--|--|
| Overland Slope (ft/ft) |  |  |
| Overland Length (ft)   |  |  |
| Channel Slope (ft/ft)  |  |  |
| Channel Length (ft)    |  |  |

**Minor Storm Rainfall Input**

|                                           |  |  |
|-------------------------------------------|--|--|
| Design Storm Return Period, $T_r$ (years) |  |  |
| One-Hour Precipitation, $P_1$ (inches)    |  |  |

**Major Storm Rainfall Input**

|                                           |  |  |
|-------------------------------------------|--|--|
| Design Storm Return Period, $T_r$ (years) |  |  |
| One-Hour Precipitation, $P_1$ (inches)    |  |  |

**CALCULATED OUTPUT**

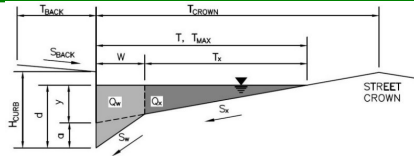
|                                             |     |     |
|---------------------------------------------|-----|-----|
| Minor Total Design Peak Flow, $Q$ (cfs)     | 1.0 | 1.6 |
| Major Total Design Peak Flow, $Q$ (cfs)     | 2.8 | 4.6 |
| Minor Flow Bypassed Downstream, $Q_b$ (cfs) | 0.0 | N/A |
| Major Flow Bypassed Downstream, $Q_b$ (cfs) | 0.0 | N/A |

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: RidgeGate Filing 5 - High Note Avenue

Inlet ID: L1

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

|            |   |       |       |
|------------|---|-------|-------|
| $T_{BACK}$ | = | 18.0  | ft    |
| $S_{BACK}$ | = | 0.020 | ft/ft |
| $n_{BACK}$ | = | 0.020 |       |

|              |   |       |        |
|--------------|---|-------|--------|
| $H_{CURB}$   | = | 6.00  | inches |
| $T_{CROWN}$  | = | 59.0  | ft     |
| $W$          | = | 2.00  | ft     |
| $S_x$        | = | 0.020 | ft/ft  |
| $S_o$        | = | 0.083 | ft/ft  |
| $S_o$        | = | 0.009 | ft/ft  |
| $n_{STREET}$ | = | 0.016 |        |

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

|           | Minor Storm              | Major Storm              |      |        |
|-----------|--------------------------|--------------------------|------|--------|
| $T_{MAX}$ | =                        | 39.0                     | 59.0 | ft     |
| $d_{MAX}$ | =                        | 6.0                      | 10.3 | inches |
|           | <input type="checkbox"/> | <input type="checkbox"/> |      |        |

MINOR STORM Allowable Capacity is based on Depth Criterion

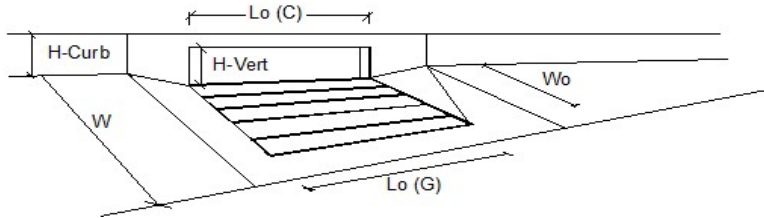
MAJOR STORM Allowable Capacity is based on Depth Criterion

|             | Minor Storm | Major Storm |      |     |
|-------------|-------------|-------------|------|-----|
| $Q_{allow}$ | =           | 13.1        | 82.5 | cfs |

**Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.40 cfs on sheet 'Inlet Management'****Major storm max. allowable capacity GOOD - greater than the design peak flow of 3.37 cfs on sheet 'Inlet Management'**

# INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



| Design Information (Input)                                                |                            | MINOR                |                            | MAJOR |        |
|---------------------------------------------------------------------------|----------------------------|----------------------|----------------------------|-------|--------|
| Type of Inlet                                                             | CDOT/Denver 13 Combination | Type =               | CDOT/Denver 13 Combination |       |        |
| Local Depression (additional to continuous gutter depression 'a')         |                            | a <sub>LOCAL</sub> = | 2.0                        | 2.0   | inches |
| Total Number of Units in the Inlet (Grate or Curb Opening)                |                            | No =                 | 3                          | 3     |        |
| Length of a Single Unit Inlet (Grate or Curb Opening)                     |                            | L <sub>o</sub> =     | 3.00                       | 3.00  | ft     |
| Width of a Unit Grate (cannot be greater than W, Gutter Width)            |                            | W <sub>o</sub> =     | 1.73                       | 1.73  | ft     |
| Clogging Factor for a Single Unit Grate (typical min. value = 0.5)        |                            | C <sub>f</sub> (G) = | 0.50                       | 0.50  |        |
| Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1) |                            | C <sub>f</sub> (C) = | 0.10                       | 0.10  |        |
| Street Hydraulics: OK - Q < Allowable Street Capacity                     |                            |                      |                            |       |        |
| Total Inlet Interception Capacity                                         |                            | Q =                  | 1.4                        | 3.2   | cfs    |
| Total Inlet Carry-Over Flow (flow bypassing inlet)                        |                            | Q <sub>b</sub> =     | 0.0                        | 0.2   | cfs    |
| Capture Percentage = Q <sub>i</sub> /Q <sub>a</sub>                       |                            | C% =                 | 100                        | 94    | %      |

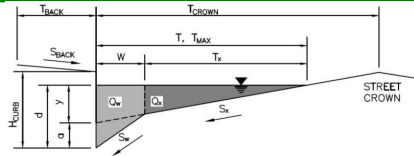


**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: RidgeGate Filing 5 - High Note Avenue

Inlet ID: J2

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

|              |       |       |
|--------------|-------|-------|
| $T_{BACK} =$ | 16.0  | ft    |
| $S_{BACK} =$ | 0.020 | ft/ft |
| $n_{BACK} =$ | 0.020 |       |

|                |       |        |
|----------------|-------|--------|
| $H_{CURB} =$   | 6.00  | inches |
| $T_{CROWN} =$  | 26.5  | ft     |
| $W =$          | 2.00  | ft     |
| $S_x =$        | 0.020 | ft/ft  |
| $S_w =$        | 0.083 | ft/ft  |
| $S_o =$        | 0.016 | ft/ft  |
| $n_{STREET} =$ | 0.016 |        |

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

|             | Minor Storm              | Major Storm              |        |
|-------------|--------------------------|--------------------------|--------|
| $T_{MAX} =$ | 21.5                     | 26.5                     | ft     |
| $d_{MAX} =$ | 6.0                      | 9.8                      | inches |
|             | <input type="checkbox"/> | <input type="checkbox"/> |        |

MINOR STORM Allowable Capacity is based on Depth Criterion

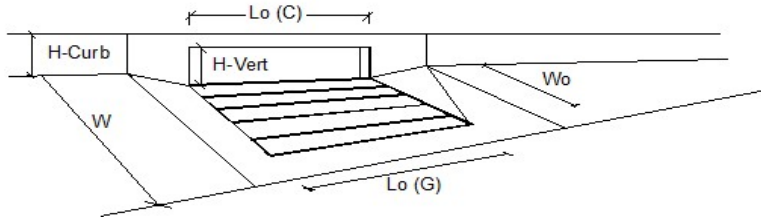
MAJOR STORM Allowable Capacity is based on Spread Criterion

|               | Minor Storm | Major Storm |     |
|---------------|-------------|-------------|-----|
| $Q_{allow} =$ | 17.4        | 43.7        | cfs |

**Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.70 cfs on sheet 'Inlet Management'****Major storm max. allowable capacity GOOD - greater than the design peak flow of 7.20 cfs on sheet 'Inlet Management'**

# INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



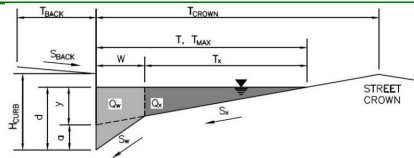
| Design Information (Input)                                                |                          | MINOR         |                          | MAJOR |        |
|---------------------------------------------------------------------------|--------------------------|---------------|--------------------------|-------|--------|
| Type of Inlet                                                             | CDOT Type R Curb Opening | Type =        | CDOT Type R Curb Opening |       |        |
| Local Depression (additional to continuous gutter depression 'a')         |                          | $a_{LOCAL}$ = | 3.0                      | 3.0   | inches |
| Total Number of Units in the Inlet (Grate or Curb Opening)                |                          | $N_o$ =       | 3                        | 3     |        |
| Length of a Single Unit Inlet (Grate or Curb Opening)                     |                          | $L_o$ =       | 5.00                     | 5.00  | ft     |
| Width of a Unit Grate (cannot be greater than W, Gutter Width)            |                          | $W_o$ =       | N/A                      | N/A   | ft     |
| Clogging Factor for a Single Unit Grate (typical min. value = 0.5)        |                          | $C_f (G)$ =   | N/A                      | N/A   |        |
| Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1) |                          | $C_f (C)$ =   | 0.10                     | 0.10  |        |
| Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$            |                          |               |                          |       |        |
| Total Inlet Interception Capacity                                         |                          | $Q$ =         | 2.7                      | 7.1   | cfs    |
| Total Inlet Carry-Over Flow (flow bypassing inlet)                        |                          | $Q_o$ =       | 0.0                      | 0.1   | cfs    |
| Capture Percentage = $Q_o/Q_o$                                            |                          | $C\%$ =       | 100                      | 99    | %      |

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: RidgeGate Filing 5 - High Note Avenue

Inlet ID: K2

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

|            |   |       |       |
|------------|---|-------|-------|
| $T_{BACK}$ | = | 18.0  | ft    |
| $S_{BACK}$ | = | 0.020 | ft/ft |
| $n_{BACK}$ | = | 0.020 |       |

|              |   |       |        |
|--------------|---|-------|--------|
| $H_{CURB}$   | = | 6.00  | inches |
| $T_{CROWN}$  | = | 59.0  | ft     |
| $W$          | = | 2.00  | ft     |
| $S_x$        | = | 0.020 | ft/ft  |
| $S_w$        | = | 0.083 | ft/ft  |
| $S_o$        | = | 0.009 | ft/ft  |
| $n_{STREET}$ | = | 0.016 |        |

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

|           | Minor Storm              | Major Storm              |        |
|-----------|--------------------------|--------------------------|--------|
| $T_{MAX}$ | 39.0                     | 59.0                     | ft     |
| $d_{MAX}$ | 6.0                      | 10.3                     | inches |
|           | <input type="checkbox"/> | <input type="checkbox"/> |        |

MINOR STORM Allowable Capacity is based on Depth Criterion

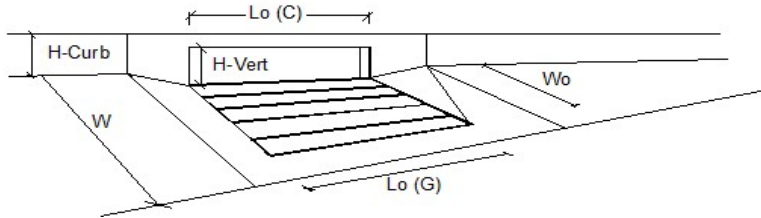
MAJOR STORM Allowable Capacity is based on Depth Criterion

|             | Minor Storm | Major Storm |     |
|-------------|-------------|-------------|-----|
| $Q_{allow}$ | 13.1        | 82.5        | cfs |

**Minor storm max. allowable capacity GOOD - greater than the design peak flow of 2.50 cfs on sheet 'Inlet Management'****Major storm max. allowable capacity GOOD - greater than the design peak flow of 6.60 cfs on sheet 'Inlet Management'**

# INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



| Design Information (Input)                                                |                          | MINOR         |                          | MAJOR |        |
|---------------------------------------------------------------------------|--------------------------|---------------|--------------------------|-------|--------|
| Type of Inlet                                                             | CDOT Type R Curb Opening | Type =        | CDOT Type R Curb Opening |       |        |
| Local Depression (additional to continuous gutter depression 'a')         |                          | $a_{LOCAL}$ = | 3.0                      | 3.0   | inches |
| Total Number of Units in the Inlet (Grate or Curb Opening)                |                          | No =          | 3                        | 3     |        |
| Length of a Single Unit Inlet (Grate or Curb Opening)                     |                          | $L_o$ =       | 5.00                     | 5.00  | ft     |
| Width of a Unit Grate (cannot be greater than W, Gutter Width)            |                          | $W_o$ =       | N/A                      | N/A   | ft     |
| Clogging Factor for a Single Unit Grate (typical min. value = 0.5)        |                          | $C_f (G)$ =   | N/A                      | N/A   |        |
| Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1) |                          | $C_f (C)$ =   | 0.10                     | 0.10  |        |
| Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$            |                          |               |                          |       |        |
| Total Inlet Interception Capacity                                         |                          | $Q$ =         | 2.5                      | 6.6   | cfs    |
| Total Inlet Carry-Over Flow (flow bypassing inlet)                        |                          | $Q_o$ =       | 0.0                      | 0.0   | cfs    |
| Capture Percentage = $Q_i/Q_o$                                            |                          | $C\%$ =       | 100                      | 100   | %      |

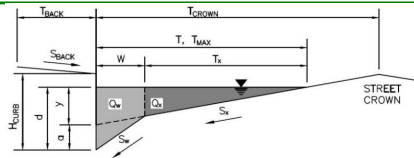


**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: RidgeGate Filing 5 - High Note Avenue

Inlet ID: D5

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

|              |       |       |
|--------------|-------|-------|
| $T_{BACK} =$ | 23.0  | ft    |
| $S_{BACK} =$ | 0.020 | ft/ft |
| $n_{BACK} =$ | 0.020 |       |

|                |       |        |
|----------------|-------|--------|
| $H_{CURB} =$   | 6.00  | inches |
| $T_{CROWN} =$  | 37.0  | ft     |
| $W =$          | 2.00  | ft     |
| $S_x =$        | 0.008 | ft/ft  |
| $S_w =$        | 0.083 | ft/ft  |
| $S_o =$        | 0.011 | ft/ft  |
| $n_{STREET} =$ | 0.016 |        |

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Allow Flow Depth at Street Crown (check box for yes, leave blank for no)

|             | Minor Storm              | Major Storm              |        |
|-------------|--------------------------|--------------------------|--------|
| $T_{MAX} =$ | 17.0                     | 37.0                     | ft     |
| $d_{MAX} =$ | 6.0                      | 11.5                     | inches |
|             | <input type="checkbox"/> | <input type="checkbox"/> |        |

MINOR STORM Allowable Capacity is based on Spread Criterion

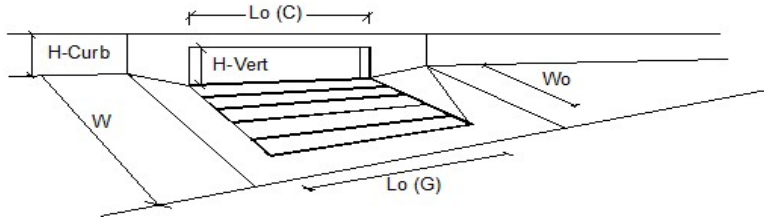
MAJOR STORM Allowable Capacity is based on Spread Criterion

|               | Minor Storm | Major Storm |     |
|---------------|-------------|-------------|-----|
| $Q_{allow} =$ | 2.8         | 17.6        | cfs |

**Minor storm max. allowable capacity GOOD - greater than the design peak flow of 1.00 cfs on sheet 'Inlet Management'****Major storm max. allowable capacity GOOD - greater than the design peak flow of 2.81 cfs on sheet 'Inlet Management'**

# INLET ON A CONTINUOUS GRADE

MHFD-Inlet, Version 5.03 (August 2023)



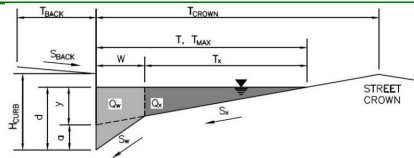
| Design Information (Input)                                                |                          | MINOR                    | MAJOR  |        |
|---------------------------------------------------------------------------|--------------------------|--------------------------|--------|--------|
| Type of Inlet                                                             | CDOT Type R Curb Opening | CDOT Type R Curb Opening |        |        |
| Local Depression (additional to continuous gutter depression 'a')         |                          | $a_{LOCAL} = 3.0$        | $3.0$  | inches |
| Total Number of Units in the Inlet (Grate or Curb Opening)                |                          | $No = 2$                 | $2$    |        |
| Length of a Single Unit Inlet (Grate or Curb Opening)                     |                          | $L_o = 5.00$             | $5.00$ | ft     |
| Width of a Unit Grate (cannot be greater than W, Gutter Width)            |                          | $W_o = N/A$              | $N/A$  | ft     |
| Clogging Factor for a Single Unit Grate (typical min. value = 0.5)        |                          | $C_f (G) = N/A$          | $N/A$  |        |
| Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1) |                          | $C_r (C) = 0.10$         | $0.10$ |        |
| Street Hydraulics: OK - $Q < \text{Allowable Street Capacity}$            |                          |                          |        |        |
| Total Inlet Interception Capacity                                         |                          | $Q = 1.0$                | $2.8$  | cfs    |
| Total Inlet Carry-Over Flow (flow bypassing inlet)                        |                          | $Q_o = 0.0$              | $0.0$  | cfs    |
| Capture Percentage = $Q_i/Q_o$                                            |                          | $C\% = 100$              | $100$  | %      |

**ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)**

(Based on Regulated Criteria for Maximum Allowable Flow Depth and Spread)

Project: RidgeGate Filing 5 - High Note Avenue

Inlet ID: D6

**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb

Side Slope Behind Curb (leave blank for no conveyance credit behind curb)

Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)

Street Longitudinal Slope - Enter 0 for sump condition

Manning's Roughness for Street Section (typically between 0.012 and 0.020)

|              |       |       |
|--------------|-------|-------|
| $T_{BACK} =$ | 19.0  | ft    |
| $S_{BACK} =$ | 0.020 | ft/ft |
| $n_{BACK} =$ | 0.020 |       |

|                |       |        |
|----------------|-------|--------|
| $H_{CURB} =$   | 6.00  | inches |
| $T_{CROWN} =$  | 37.0  | ft     |
| $W =$          | 2.00  | ft     |
| $S_X =$        | 0.022 | ft/ft  |
| $S_W =$        | 0.083 | ft/ft  |
| $S_O =$        | 0.000 | ft/ft  |
| $n_{STREET} =$ | 0.016 |        |

Max. Allowable Spread for Minor &amp; Major Storm

Max. Allowable Depth at Gutter Flowline for Minor &amp; Major Storm

Check boxes are not applicable in SUMP conditions

|             | Minor Storm              | Major Storm              |        |
|-------------|--------------------------|--------------------------|--------|
| $T_{MAX} =$ | 17.0                     | 37.0                     | ft     |
| $d_{MAX} =$ | 6.0                      | 10.5                     | inches |
|             | <input type="checkbox"/> | <input type="checkbox"/> |        |

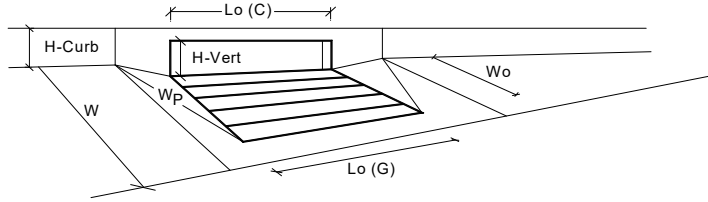
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

|               | Minor Storm | Major Storm |     |
|---------------|-------------|-------------|-----|
| $Q_{allow} =$ | SUMP        | SUMP        | cfs |

# INLET IN A SUMP OR SAG LOCATION

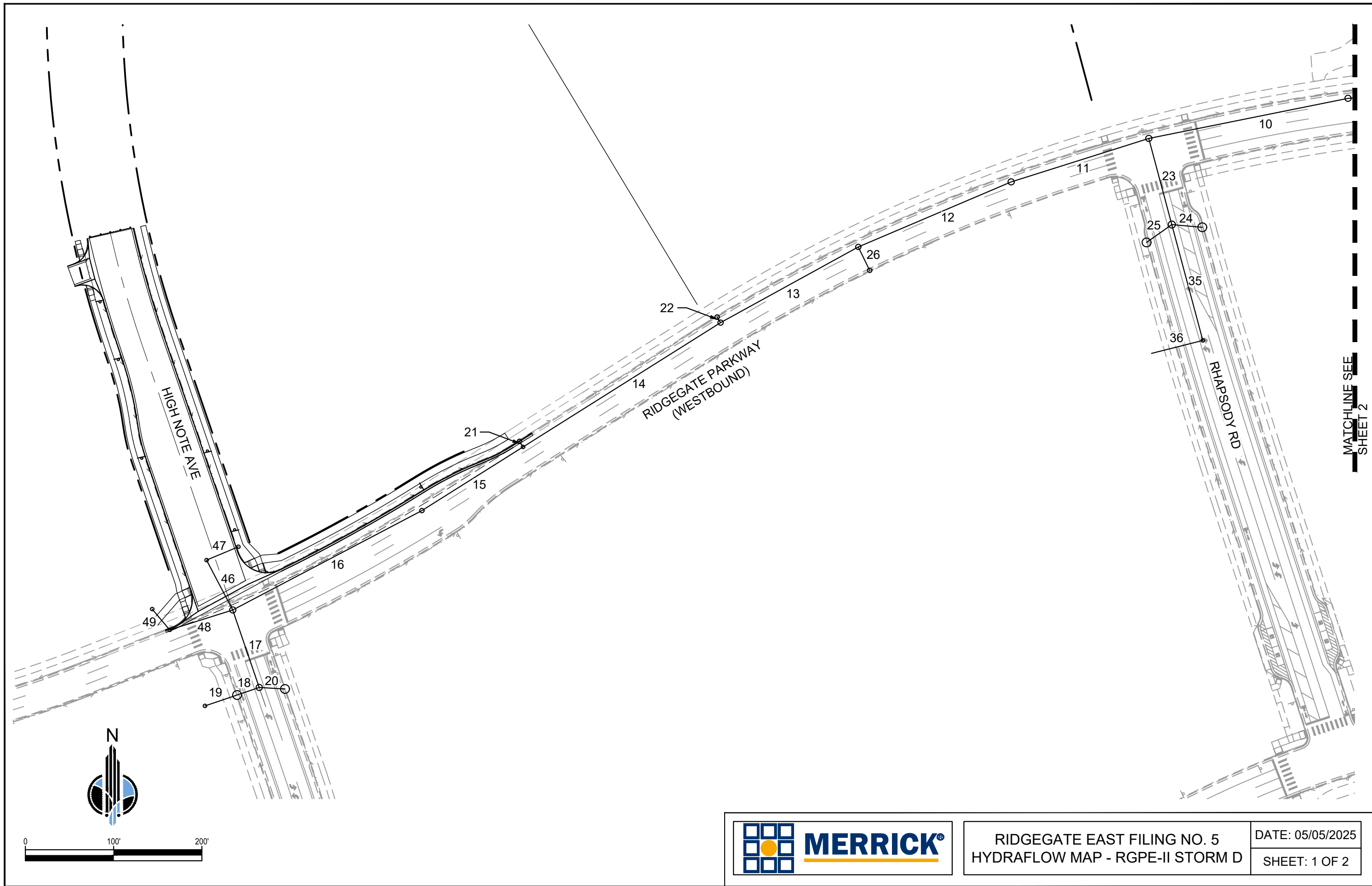
MHFD-Inlet, Version 5.03 (August 2023)



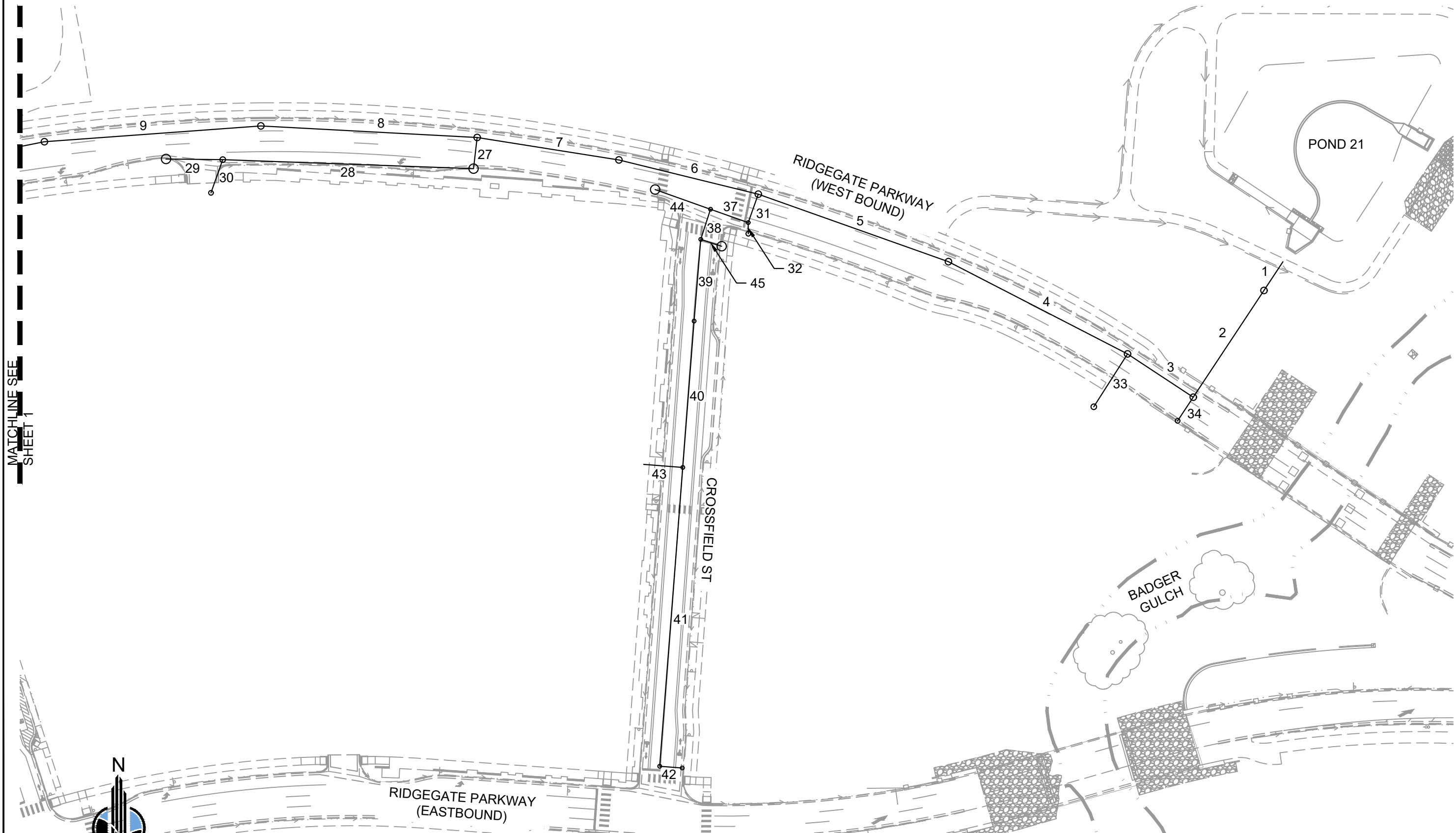
| Design Information (Input)                                                   |                          | MINOR                        |                          | MAJOR |         |
|------------------------------------------------------------------------------|--------------------------|------------------------------|--------------------------|-------|---------|
| Type of Inlet                                                                | CDOT Type R Curb Opening | Type =                       | CDOT Type R Curb Opening |       |         |
| Local Depression (additional to continuous gutter depression 'a' from above) |                          | a <sub>local</sub> =         | 3.00                     | 3.00  | inches  |
| Number of Unit Inlets (Grate or Curb Opening)                                |                          | No =                         | 1                        | 1     |         |
| Water Depth at Flowline (outside of local depression)                        |                          | Ponding Depth =              | 6.0                      | 10.5  | inches  |
| <b>Grate Information</b>                                                     |                          | MINOR                        |                          | MAJOR |         |
| Length of a Unit Grate                                                       |                          | L <sub>o</sub> (G) =         | N/A                      | N/A   | feet    |
| Width of a Unit Grate                                                        |                          | W <sub>o</sub> =             | N/A                      | N/A   | feet    |
| Open Area Ratio for a Grate (typical values 0.15-0.90)                       |                          | A <sub>ratio</sub> =         | N/A                      | N/A   |         |
| Clogging Factor for a Single Grate (typical value 0.50 - 0.70)               |                          | C <sub>f</sub> (G) =         | N/A                      | N/A   |         |
| Grate Weir Coefficient (typical value 2.15 - 3.60)                           |                          | C <sub>w</sub> (G) =         | N/A                      | N/A   |         |
| Grate Orifice Coefficient (typical value 0.60 - 0.80)                        |                          | C <sub>o</sub> (G) =         | N/A                      | N/A   |         |
| <b>Curb Opening Information</b>                                              |                          | MINOR                        |                          | MAJOR |         |
| Length of a Unit Curb Opening                                                |                          | L <sub>o</sub> (C) =         | 5.00                     | 5.00  | feet    |
| Height of Vertical Curb Opening in Inches                                    |                          | H <sub>vert</sub> =          | 6.00                     | 6.00  | inches  |
| Height of Curb Orifice Throat in Inches                                      |                          | H <sub>throat</sub> =        | 6.00                     | 6.00  | inches  |
| Angle of Throat                                                              |                          | Theta =                      | 63.40                    | 63.40 | degrees |
| Side Width for Depression Pan (typically the gutter width of 2 feet)         |                          | W <sub>p</sub> =             | 2.00                     | 2.00  | feet    |
| Clogging Factor for a Single Curb Opening (typical value 0.10)               |                          | C <sub>f</sub> (C) =         | 0.10                     | 0.10  |         |
| Curb Opening Weir Coefficient (typical value 2.3-3.7)                        |                          | C <sub>w</sub> (C) =         | 3.60                     | 3.60  |         |
| Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)                 |                          | C <sub>o</sub> (C) =         | 0.67                     | 0.67  |         |
| <b>Low Head Performance Reduction (Calculated)</b>                           |                          | MINOR                        |                          | MAJOR |         |
| Depth for Grate Midwidth                                                     |                          | d <sub>Grate</sub> =         | N/A                      | N/A   | ft      |
| Depth for Curb Opening Weir Equation                                         |                          | d <sub>Curb</sub> =          | 0.33                     | 0.71  | ft      |
| Grated Inlet Performance Reduction Factor for Long Inlets                    |                          | RF <sub>Grate</sub> =        | N/A                      | N/A   |         |
| Curb Opening Performance Reduction Factor for Long Inlets                    |                          | RF <sub>Curb</sub> =         | 1.00                     | 1.00  |         |
| Combination Inlet Performance Reduction Factor for Long Inlets               |                          | RF <sub>Combination</sub> =  | N/A                      | N/A   |         |
| Total Inlet Interception Capacity (assumes clogged condition)                |                          | MINOR                        |                          | MAJOR |         |
|                                                                              |                          | Q <sub>a</sub> =             | 5.3                      | 11.5  | cfs     |
| <b>Inlet Capacity IS GOOD for Minor and Major Storms (&gt;Q Peak)</b>        |                          | Q <sub>PEAK REQUIRED</sub> = | 1.6                      | 4.6   | cfs     |



## **APPENDIX D – STORM SEWER CALCULATIONS**



|                                                                |                  |
|----------------------------------------------------------------|------------------|
| RIDGEGATE EAST FILING NO. 5<br>HYDRAFLOW MAP - RGPE-II STORM D | DATE: 05/05/2025 |
|                                                                | SHEET: 1 OF 2    |



MATCHLINE SEE  
SHEET 1



RIDGEGATE EAST FILING NO. 5  
HYDRAFLOW MAP - RGPE-II STORM D

DATE: 05/05/2025

SHEET: 2 OF 2

| Line No. | Line ID         | Drng Area | Runoff Coeff | Tc    | Flow Rate | Line Size | Line Slope | Invert Up | Invert Dn | Gnd/Rim El Up | Gnd/Rim El Dn | HGL Up    | HGL Dn  | Vel Ave |  |
|----------|-----------------|-----------|--------------|-------|-----------|-----------|------------|-----------|-----------|---------------|---------------|-----------|---------|---------|--|
|          |                 | (ac)      | (C)          | (min) | (cfs)     | (in)      | (%)        | (ft)      | (ft)      | (ft)          | (ft)          | (ft)      | (ft)    | (ft/s)  |  |
| 1        | EX D114         | 0.00      | 0.00         | 31.6  | 61.05     | 54        | 0.96       | 5953.79   | 5953.44   | 5973.34       | 5966.14       | 5958.00   | 5957.98 | 3.89    |  |
| 2        | EX D113         | 0.00      | 0.00         | 31.1  | 61.71     | 54        | 2.00       | 5965.23   | 5962.51   | 5984.60       | 5973.34       | 5967.51   | 5963.95 | 10.84   |  |
| 3        | EX D112         | 0.00      | 0.00         | 30.8  | 60.53     | 48        | 1.00       | 5974.14   | 5973.31   | 5985.00       | 5984.60       | 5976.48   | 5975.13 | 9.42    |  |
| 4        | EX D111         | 0.00      | 0.00         | 30.0  | 52.22     | 48        | 1.43       | 5977.39   | 5974.34   | 5988.89       | 5985.00       | 5979.56   | 5976.48 | 7.56    |  |
| 5        | EX D110         | 0.00      | 0.00         | 29.2  | 53.05     | 48        | 3.61       | 5985.31   | 5977.59   | 5997.01       | 5988.89       | 5987.50   | 5979.56 | 8.08    |  |
| 6        | EX D109         | 0.00      | 0.00         | 28.7  | 48.60     | 42        | 4.76       | 5992.92   | 5985.67   | 6004.42       | 5997.01       | 5995.10   | 5987.50 | 8.65    |  |
| 7        | EX D108         | 0.00      | 0.00         | 28.2  | 49.06     | 42        | 4.59       | 6000.11   | 5993.12   | 6011.94       | 6004.42       | 6002.30   | 5995.10 | 8.26    |  |
| 8        | EX D107         | 0.00      | 0.00         | 27.3  | 38.30     | 42        | 1.00       | 6002.60   | 6000.31   | 6019.33       | 6011.94       | 6004.52 j | 6002.30 | 6.94    |  |
| 9        | EX D106         | 0.00      | 0.00         | 26.5  | 39.01     | 42        | 1.00       | 6005.11   | 6002.80   | 6023.25       | 6019.33       | 6007.05   | 6004.52 | 7.70    |  |
| 10       | EX D105         | 0.00      | 0.00         | 25.6  | 39.73     | 42        | 1.00       | 6007.61   | 6005.31   | 6025.00       | 6023.25       | 6009.57   | 6007.05 | 7.75    |  |
| 11       | EX D104         | 0.00      | 0.00         | 24.5  | 14.75     | 36        | 1.00       | 6009.74   | 6008.11   | 6024.79       | 6025.00       | 6010.96 j | 6009.57 | 4.89    |  |
| 12       | EX D103         | 0.00      | 0.00         | 23.1  | 15.21     | 36        | 1.00       | 6011.83   | 6009.94   | 6023.43       | 6024.79       | 6013.07   | 6010.96 | 6.32    |  |
| 13       | EX D102         | 0.00      | 0.00         | 21.8  | 14.58     | 36        | 1.00       | 6013.81   | 6012.03   | 6024.93       | 6023.43       | 6015.03   | 6013.07 | 6.05    |  |
| 14       | EX D101         | 0.00      | 0.00         | 19.9  | 14.63     | 36        | 1.00       | 6016.65   | 6014.01   | 6027.83       | 6024.93       | 6017.87   | 6015.03 | 6.19    |  |
| 15       | EX D101(2)      | 0.00      | 0.00         | 18.8  | 13.17     | 36        | 1.00       | 6018.00   | 6016.65   | 6029.02       | 6027.83       | 6019.15 j | 6017.87 | 5.08    |  |
| 16       | EX D100         | 0.00      | 0.00         | 17.4  | 13.68     | 30        | 1.00       | 6020.93   | 6018.51   | 6031.43       | 6029.02       | 6022.17   | 6019.50 | 6.56    |  |
| 17       | EX PIPE D4/Z100 | 0.00      | 0.00         | 9.6   | 13.51     | 30        | 2.10       | 6023.08   | 6021.13   | 6033.43       | 6031.43       | 6024.32   | 6022.17 | 6.28    |  |
| 18       | Z2              | 0.92      | 0.69         | 9.0   | 12.60     | 24        | 2.00       | 6023.81   | 6023.28   | 6033.74       | 6033.43       | 6025.09   | 6024.32 | 6.82    |  |
| 19       | Z1              | 4.70      | 0.73         | 7.3   | 11.44     | 24        | 1.97       | 6024.77   | 6024.01   | 6034.01       | 6033.74       | 6025.98   | 6025.09 | 6.19    |  |
| 20       | Z3              | 0.59      | 0.68         | 8.9   | 1.25      | 18        | 0.99       | 6023.57   | 6023.28   | 6033.54       | 6033.43       | 6023.99   | 6024.32 | 2.03    |  |
| 21       | EX D2           | 1.33      | 0.64         | 10.5  | 2.48      | 18        | 10.00      | 6019.07   | 6018.12   | 6027.93       | 6027.83       | 6019.67   | 6018.40 | 7.41    |  |
| 22       | EX D5           | 0.59      | 0.54         | 8.9   | 0.99      | 18        | 8.00       | 6019.89   | 6019.29   | 6024.89       | 6024.93       | 6020.26   | 6019.48 | 5.33    |  |
| 23       | EX D8 PIPE/Y100 | 0.00      | 0.00         | 13.9  | 34.77     | 42        | 1.59       | 6013.10   | 6011.49   | 6023.83       | 6025.00       | 6014.93   | 6012.74 | 9.04    |  |

Project File: REV03-5YR.stm

Number of lines: 49

Date: 5/5/2025

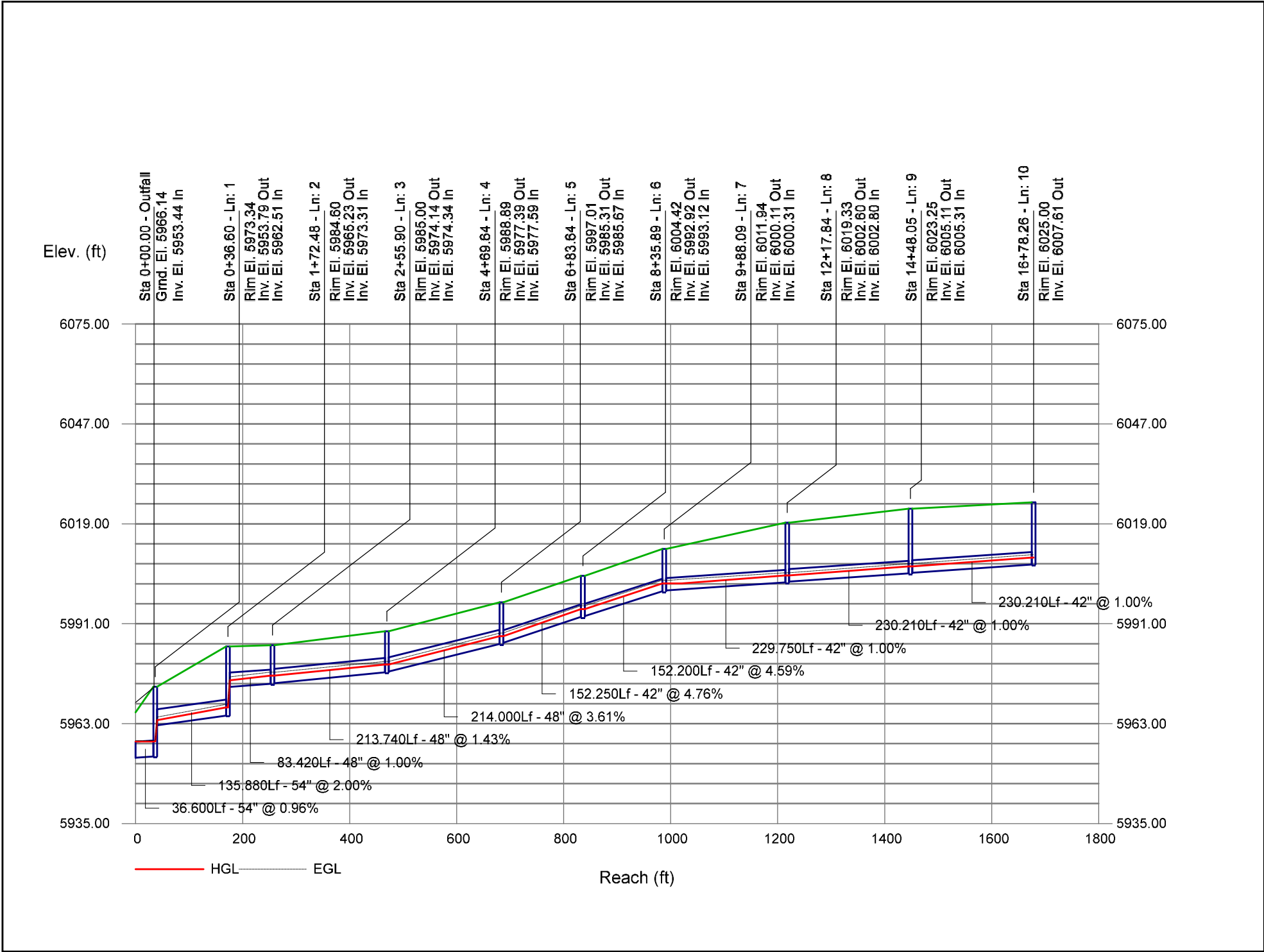
NOTES: \*\* Critical depth



| Line No.                    | Line ID   | Drng Area | Runoff Coeff | Tc    | Flow Rate | Line Size | Line Slope | Invert Up | Invert Dn | Gnd/Rim El Up | Gnd/Rim El Dn | HGL Up              | HGL Dn  | Vel Ave        |  |
|-----------------------------|-----------|-----------|--------------|-------|-----------|-----------|------------|-----------|-----------|---------------|---------------|---------------------|---------|----------------|--|
|                             |           | (ac)      | (C)          | (min) | (cfs)     | (in)      | (%)        | (ft)      | (ft)      | (ft)          | (ft)          | (ft)                | (ft)    | (ft/s)         |  |
| 24                          | Y2        | 0.94      | 0.68         | 8.5   | 2.02      | 18        | 5.00       | 6016.83   | 6015.10   | 6023.66       | 6023.83       | 6017.37             | 6015.40 | 5.84           |  |
| 25                          | Y1        | 1.00      | 0.67         | 7.8   | 2.19      | 30        | 4.97       | 6015.84   | 6014.10   | 6023.53       | 6023.83       | 6016.32 j           | 6014.93 | 2.42           |  |
| 26                          | EX D6     | 1.00      | 0.54         | 9.4   | 1.65      | 24        | 0.98       | 6013.08   | 6012.79   | 6022.72       | 6023.43       | 6013.52             | 6013.16 | 3.67           |  |
| 27                          | EX D10/X4 | 0.75      | 0.60         | 11.1  | 18.25     | 36        | 1.47       | 6001.30   | 6000.81   | 6011.61       | 6011.94       | 6002.67             | 6002.30 | 5.52           |  |
| 28                          | X101      | 0.00      | 0.00         | 10.0  | 17.75     | 30        | 1.79       | 6006.66   | 6001.90   | 6020.34       | 6011.61       | 6008.09             | 6002.88 | 8.05           |  |
| 29                          | X1        | 0.56      | 0.63         | 8.4   | 1.12      | 18        | 8.80       | 6012.96   | 6007.66   | 6021.56       | 6020.34       | 6013.36 j           | 6008.09 | 2.87           |  |
| 30                          | X100      | 7.68      | 0.73         | 7.5   | 18.53     | 30        | 1.02       | 6007.24   | 6006.86   | 6011.58       | 6020.34       | 6008.70             | 6008.09 | 6.99           |  |
| 31                          | W1        | 0.00      | 0.00         | 28.6  | 4.97      | 30        | 1.75       | 5986.79   | 5986.23   | 5996.93       | 5997.01       | 5987.53 j           | 5987.50 | 3.06           |  |
| 32                          | W2        | 0.17      | 0.48         | 5.0   | 0.30      | 18        | 2.19       | 5988.06   | 5987.80   | 5996.91       | 5996.93       | 5988.26             | 5987.95 | 2.78           |  |
| 33                          | EX D11    | 7.37      | 0.73         | 8.4   | 17.10     | 36        | 1.01       | 5976.01   | 5975.34   | 5985.00       | 5985.00       | 5977.33             | 5976.48 | 6.31           |  |
| 34                          | EX D13    | 1.41      | 0.63         | 11.0  | 2.54      | 18        | 7.93       | 5978.91   | 5976.53   | 5983.89       | 5984.60       | 5979.51             | 5976.83 | 7.03           |  |
| 35                          | Y101      | 0.00      | 0.00         | 13.2  | 32.10     | 42        | 0.60       | 6014.12   | 6013.30   | 6025.36       | 6023.83       | 6015.87             | 6014.93 | 7.00           |  |
| 36                          | D7-F      | 16.60     | 0.73         | 12.9  | 32.42     | 42        | 0.60       | 6014.58   | 6014.22   | 6023.57       | 6025.36       | 6016.34             | 6015.87 | 6.98           |  |
| 37                          | W3        | 0.00      | 0.00         | 28.2  | 4.87      | 30        | 1.44       | 5987.65   | 5987.04   | 5996.82       | 5996.93       | 5988.38             | 5987.57 | 5.24           |  |
| 38                          | W4        | 0.00      | 0.00         | 28.0  | 4.38      | 24        | 2.89       | 5989.12   | 5988.15   | 5999.63       | 5996.82       | 5989.86             | 5988.61 | 6.15           |  |
| 39                          | W5        | 0.00      | 0.00         | 27.2  | 3.65      | 24        | 6.22       | 5994.73   | 5989.32   | 6003.10       | 5999.63       | 5995.40             | 5989.86 | 4.68           |  |
| 40                          | W6        | 0.00      | 0.00         | 26.0  | 3.75      | 24        | 0.60       | 5996.71   | 5995.78   | 6009.77       | 6003.10       | 5997.39             | 5996.41 | 4.21           |  |
| 41                          | W7        | 0.00      | 0.00         | 7.4   | 0.84      | 24        | 0.59       | 5998.79   | 5996.91   | 6008.72       | 6009.77       | 5999.11 j           | 5997.39 | 2.06           |  |
| 42                          | W8        | 0.41      | 0.62         | 6.0   | 0.90      | 24        | 0.62       | 5999.14   | 5998.99   | 6008.23       | 6008.72       | 5999.47             | 5999.30 | 2.83           |  |
| 43                          | W9        | 2.39      | 0.73         | 5.7   | 6.28      | 18        | 2.00       | 6002.00   | 6001.17   | 6010.75       | 6009.77       | 6002.97             | 6001.85 | 6.63           |  |
| 44                          | W10       | 0.40      | 0.71         | 5.0   | 1.06      | 18        | 6.14       | 5992.48   | 5988.65   | 6002.18       | 5996.82       | 5992.86             | 5988.85 | 5.30           |  |
| 45                          | W11       | 0.54      | 0.81         | 5.0   | 1.63      | 18        | 2.74       | 5990.26   | 5989.62   | 5998.39       | 5999.63       | 5990.74             | 5989.92 | 4.94           |  |
| 46                          | J1        | 0.00      | 0.00         | 6.9   | 2.66      | 18        | 0.75       | 6021.68   | 6021.20   | 6031.65       | 6031.43       | 6022.30 j           | 6022.17 | 3.03           |  |
| Project File: REV03-5YR.stm |           |           |              |       |           |           |            |           |           |               |               | Number of lines: 49 |         | Date: 5/5/2025 |  |
| NOTES: ** Critical depth    |           |           |              |       |           |           |            |           |           |               |               |                     |         |                |  |

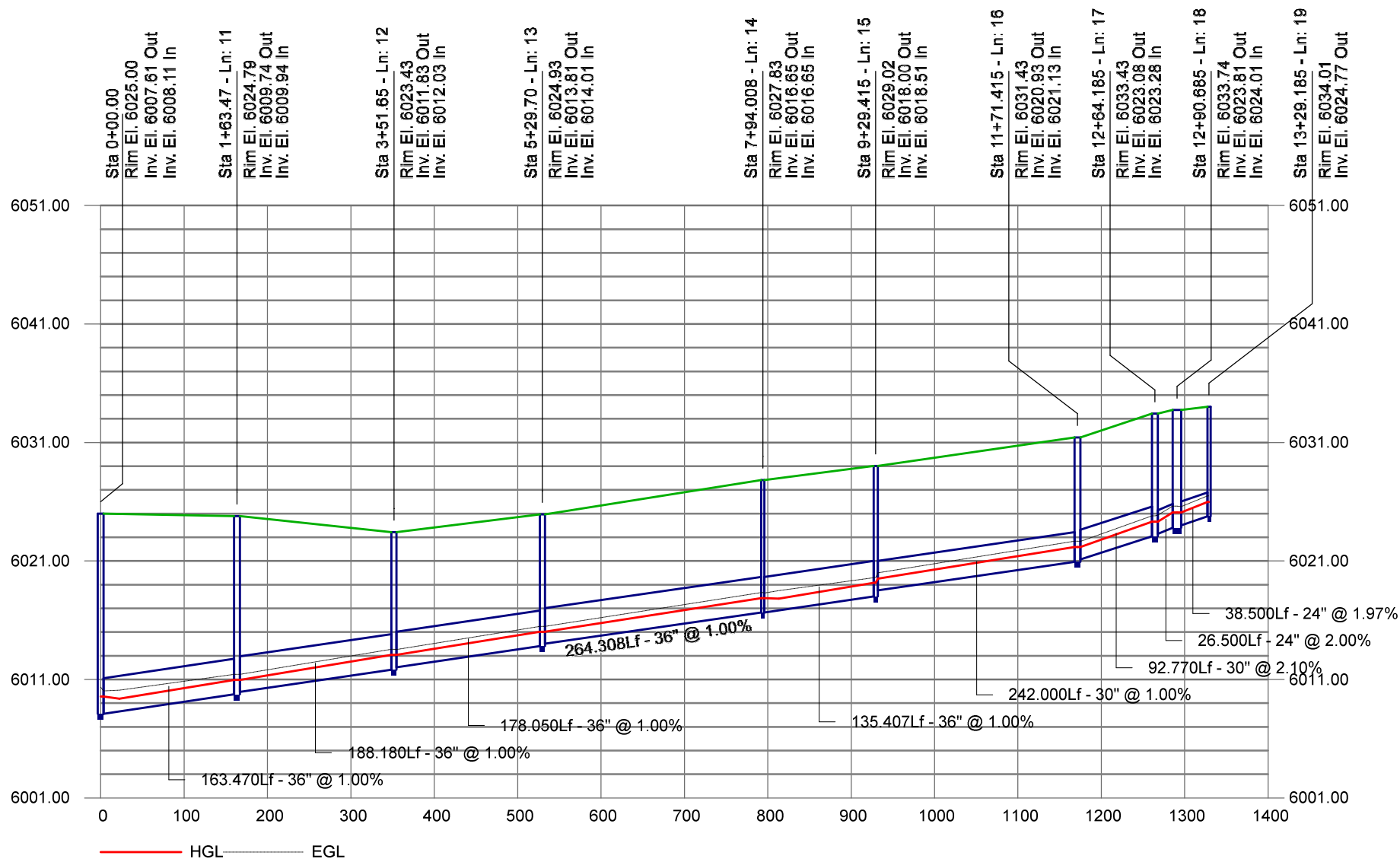
| Line No.                    | Line ID | Drng Area<br>(ac) | Runoff Coeff<br>(C) | Tc<br>(min) | Flow Rate<br>(cfs) | Line Size<br>(in) | Line Slope<br>(%) | Invert Up<br>(ft) | Invert Dn<br>(ft) | Gnd/Rim El Up<br>(ft) | Gnd/Rim El Dn<br>(ft) | HGL Up<br>(ft) | HGL Dn<br>(ft) | Vel Ave<br>(ft/s) |  |  |
|-----------------------------|---------|-------------------|---------------------|-------------|--------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|-----------------------|----------------|----------------|-------------------|--|--|
| 47                          | J2      | 1.33              | 0.59                | 6.5         | 2.72               | 18                | 0.74              | 6022.17           | 6021.88           | 6031.42               | 6031.65               | 6022.79        | 6022.42        | 4.32              |  |  |
| 48                          | L1      | 0.79              | 0.58                | 16.1        | 1.54               | 18                | 2.00              | 6024.13           | 6022.63           | 6032.43               | 6031.43               | 6024.60        | 6022.96        | 4.36              |  |  |
| 49                          | JO      | 0.90              | 0.20                | 14.1        | 0.46               | 18                | 0.52              | 6024.49           | 6024.33           | 6032.01               | 6032.43               | 6024.74 j      | 6024.60        | 2.28              |  |  |
| Project File: REV03-5YR.stm |         |                   |                     |             |                    |                   |                   |                   |                   |                       | Number of lines: 49   |                |                | Date: 5/5/2025    |  |  |
| NOTES: ** Critical depth    |         |                   |                     |             |                    |                   |                   |                   |                   |                       |                       |                |                |                   |  |  |

Storm Sewer Profile



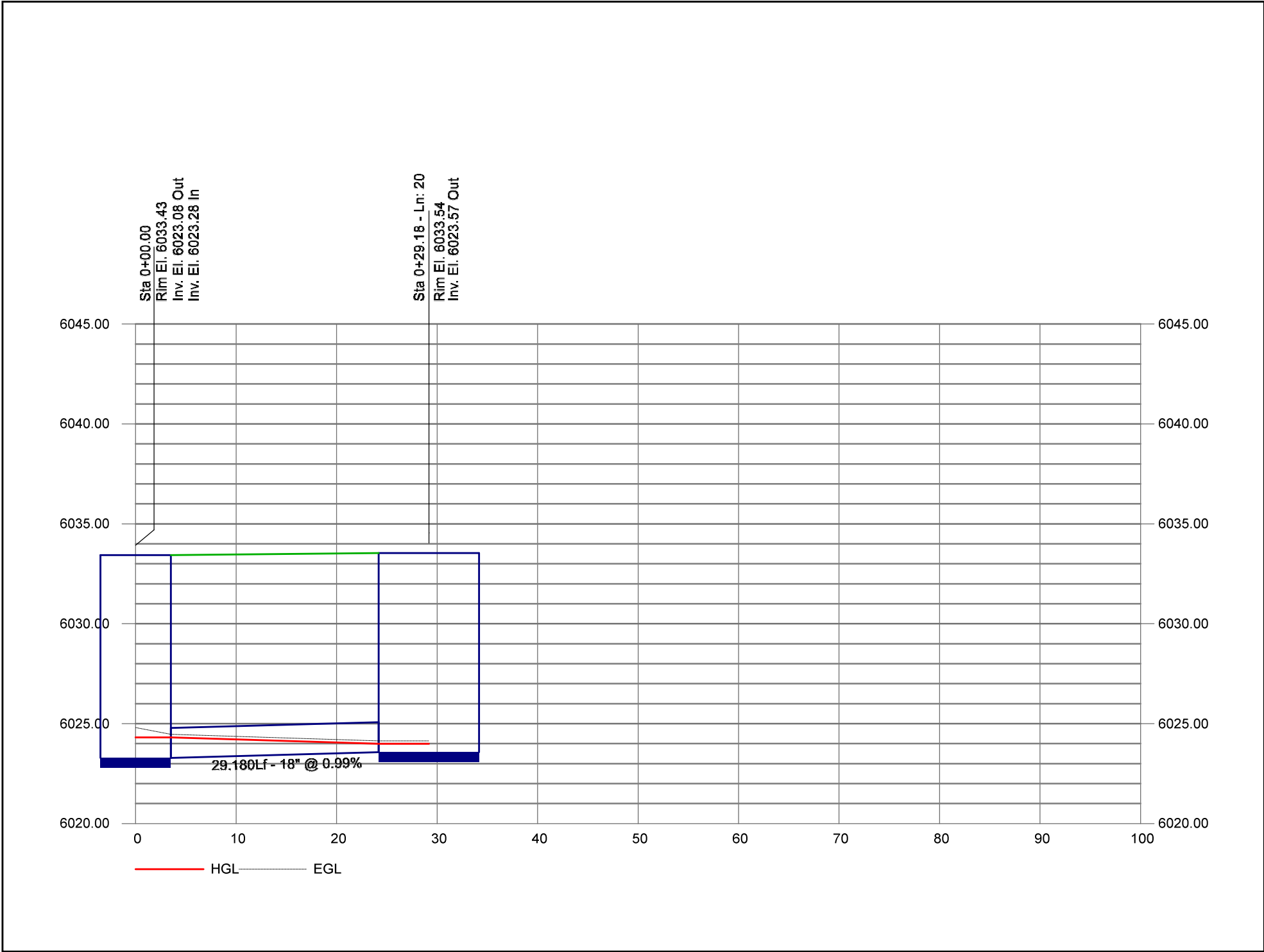
# Storm Sewer Profile

Proj. file: REV03-5YR.stm

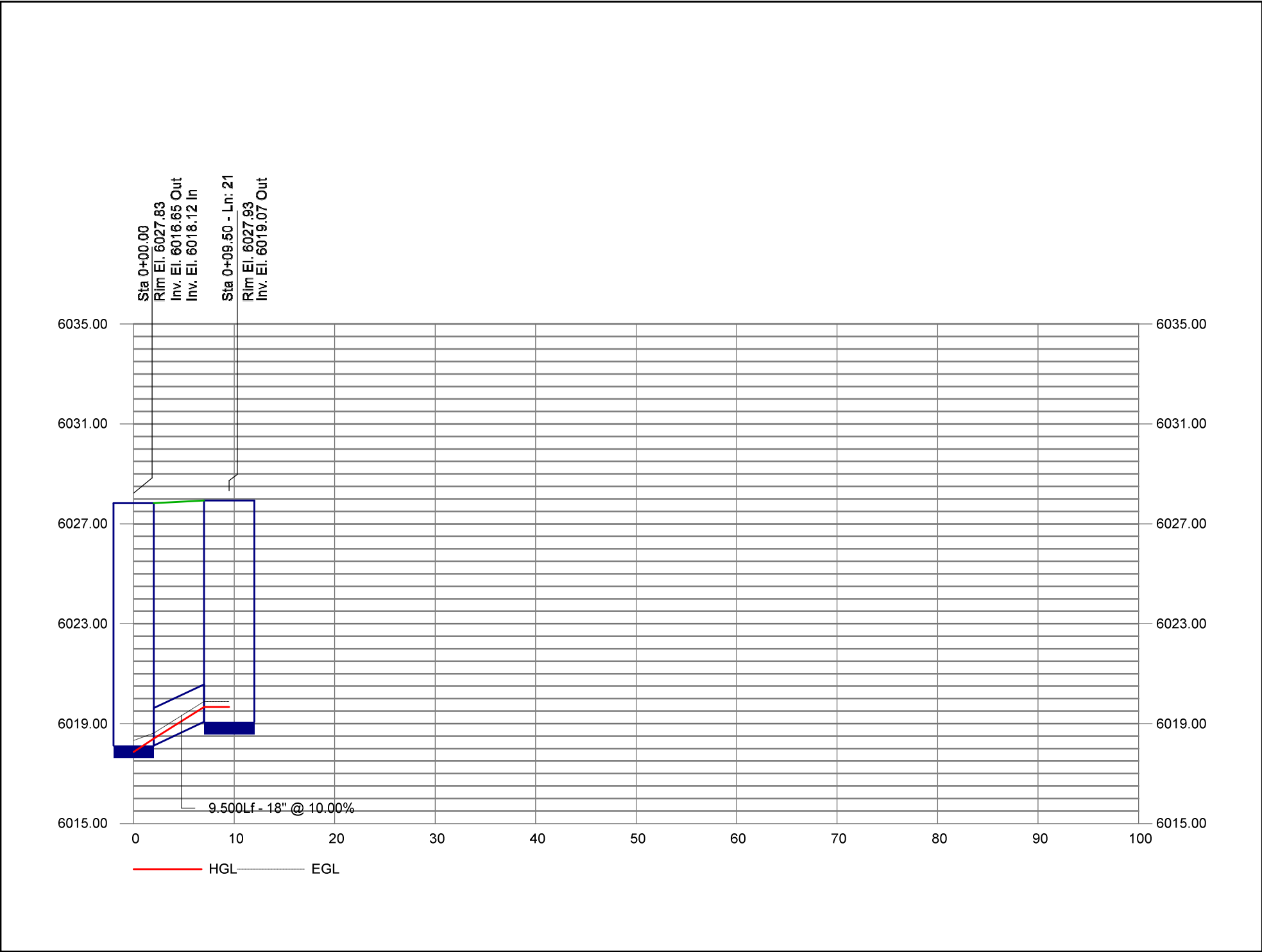




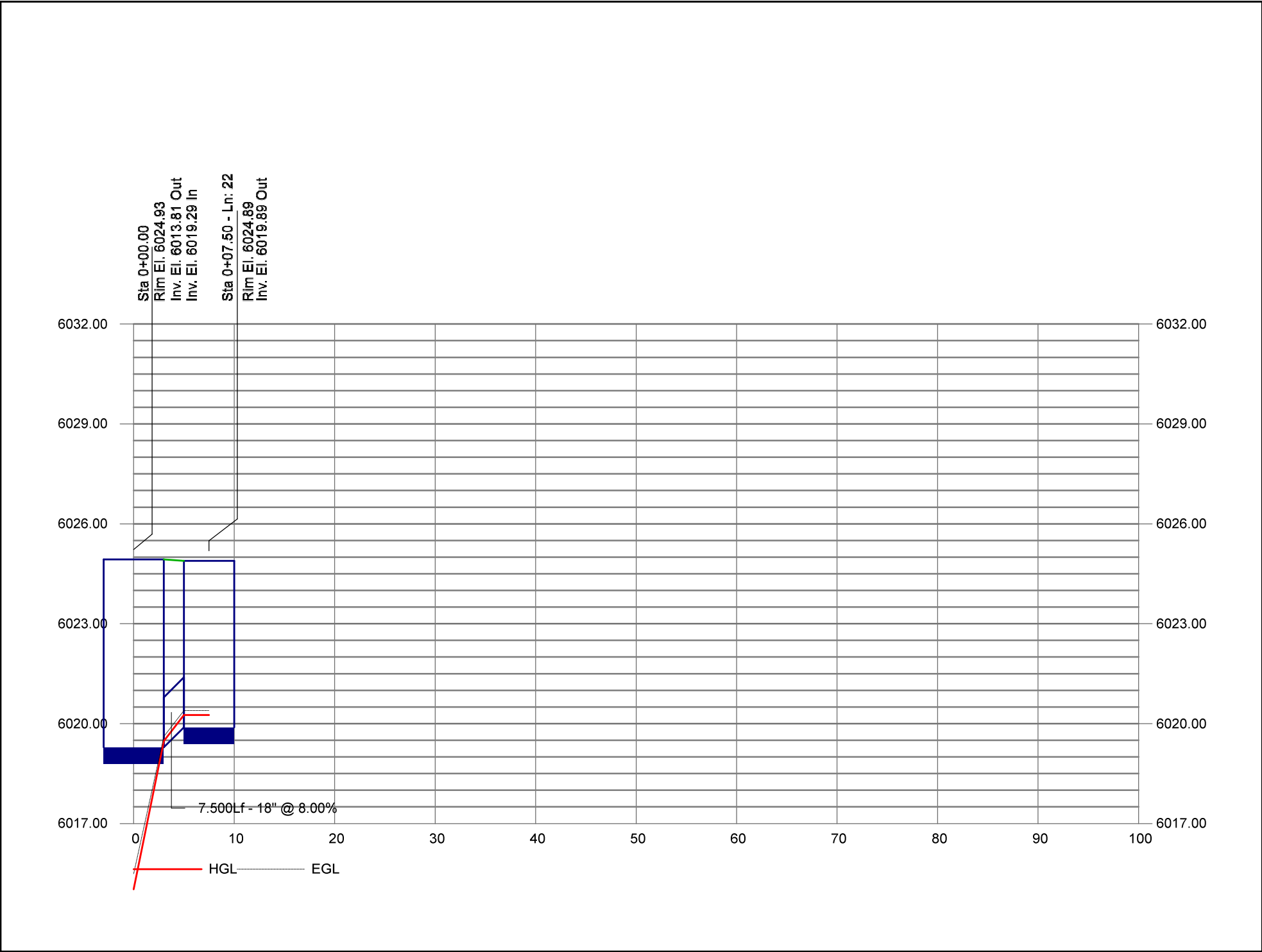
Storm Sewer Profile



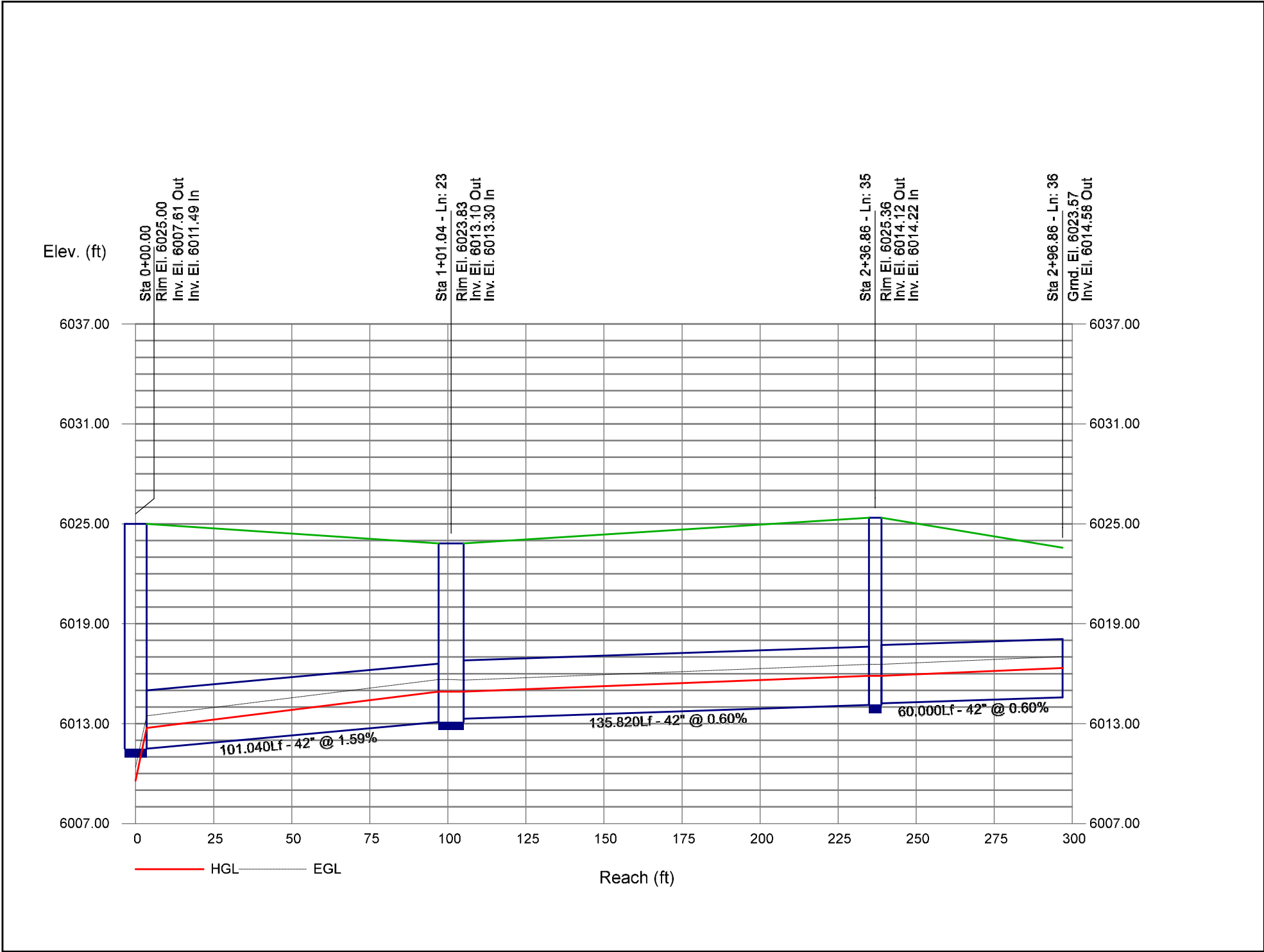
Storm Sewer Profile



# Storm Sewer Profile

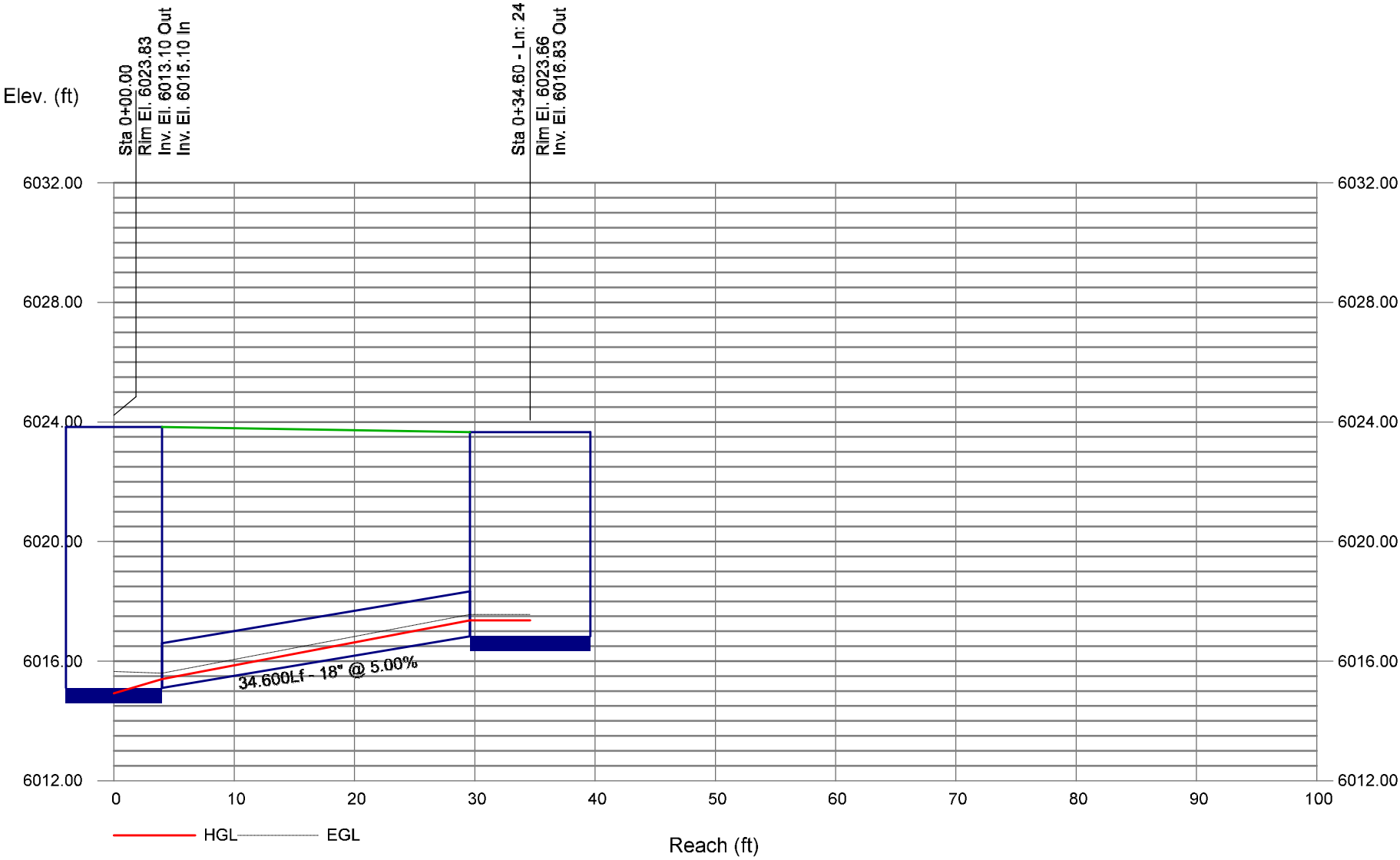


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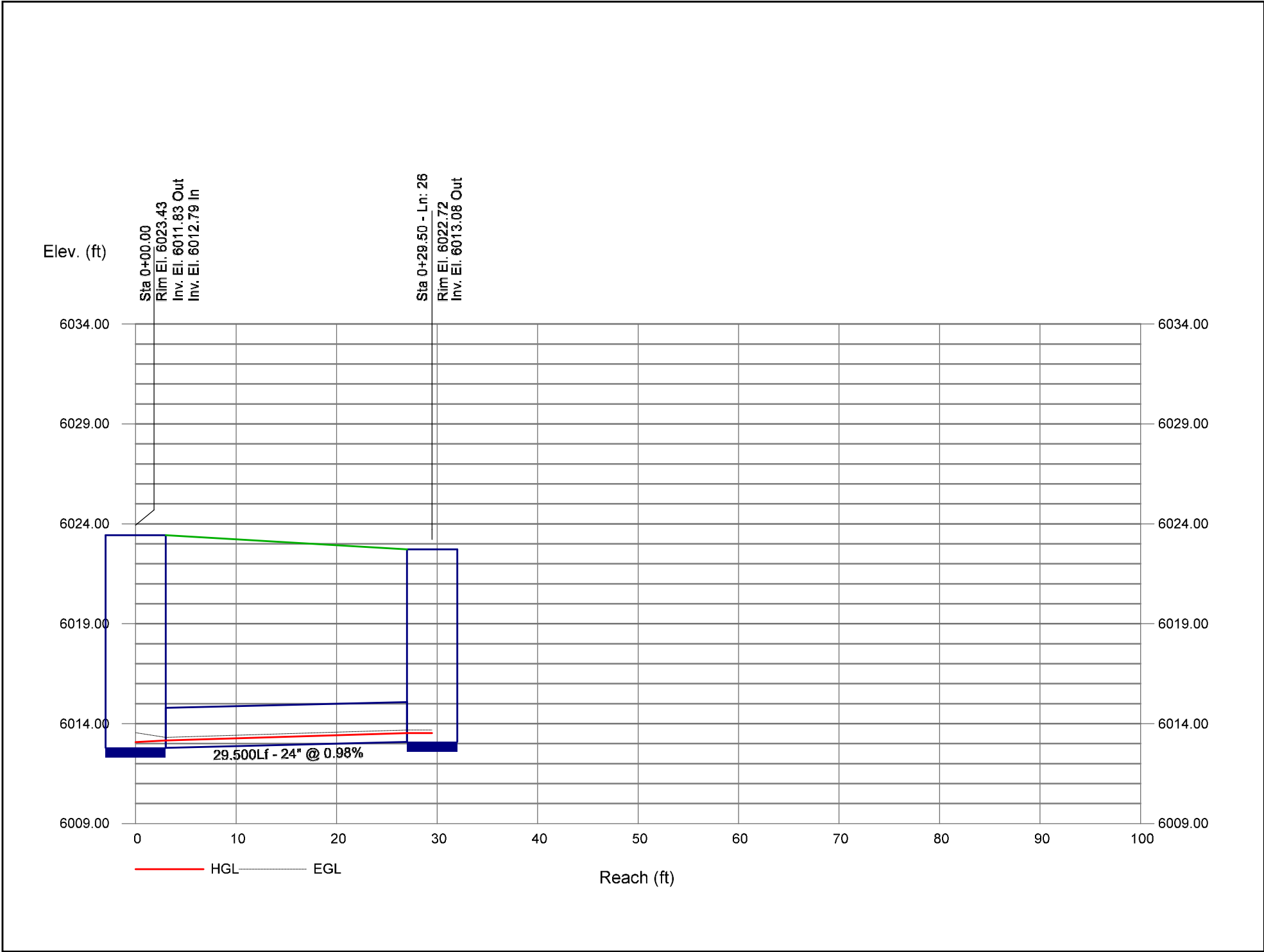




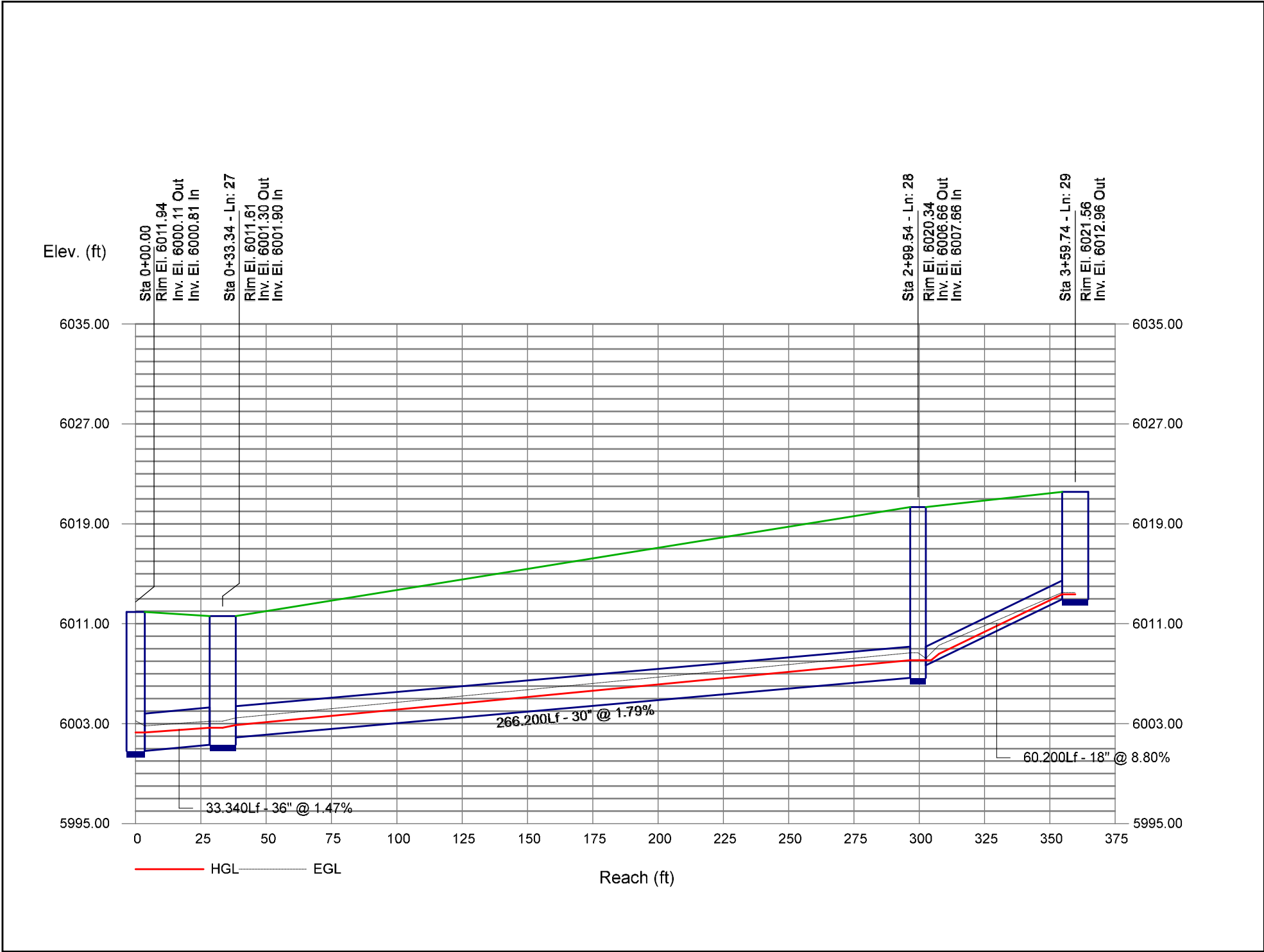
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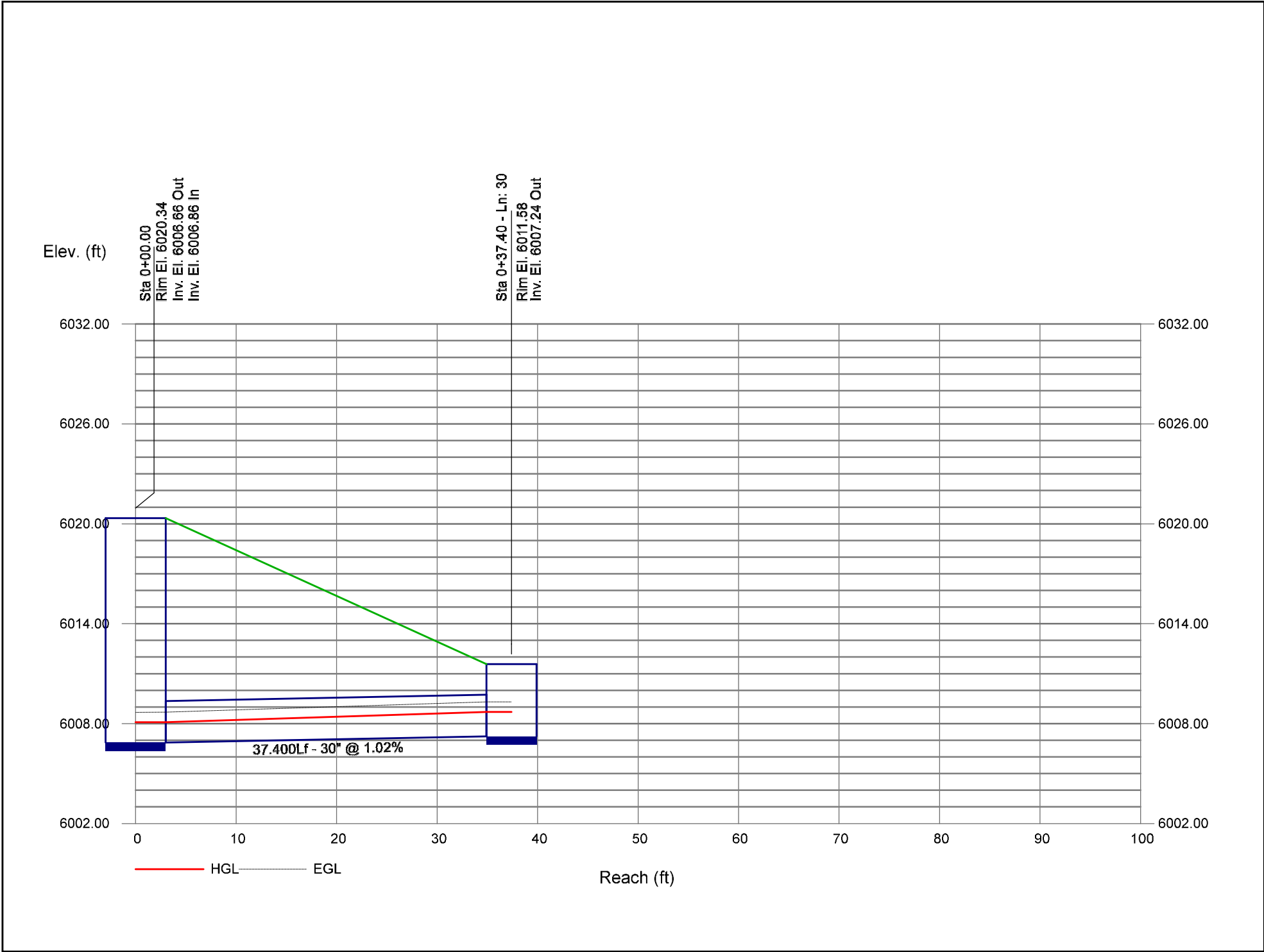
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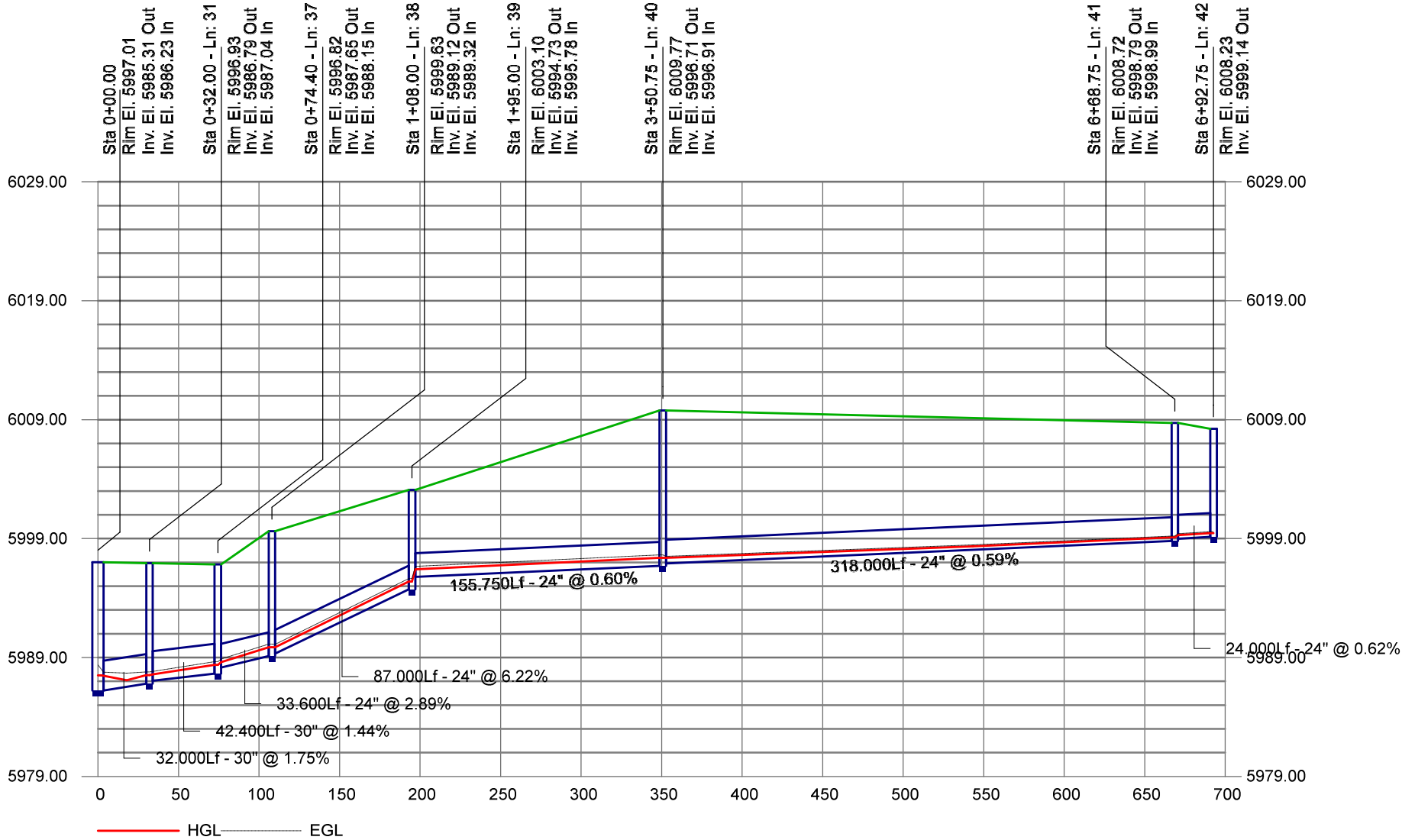
Storm Sewer Profile



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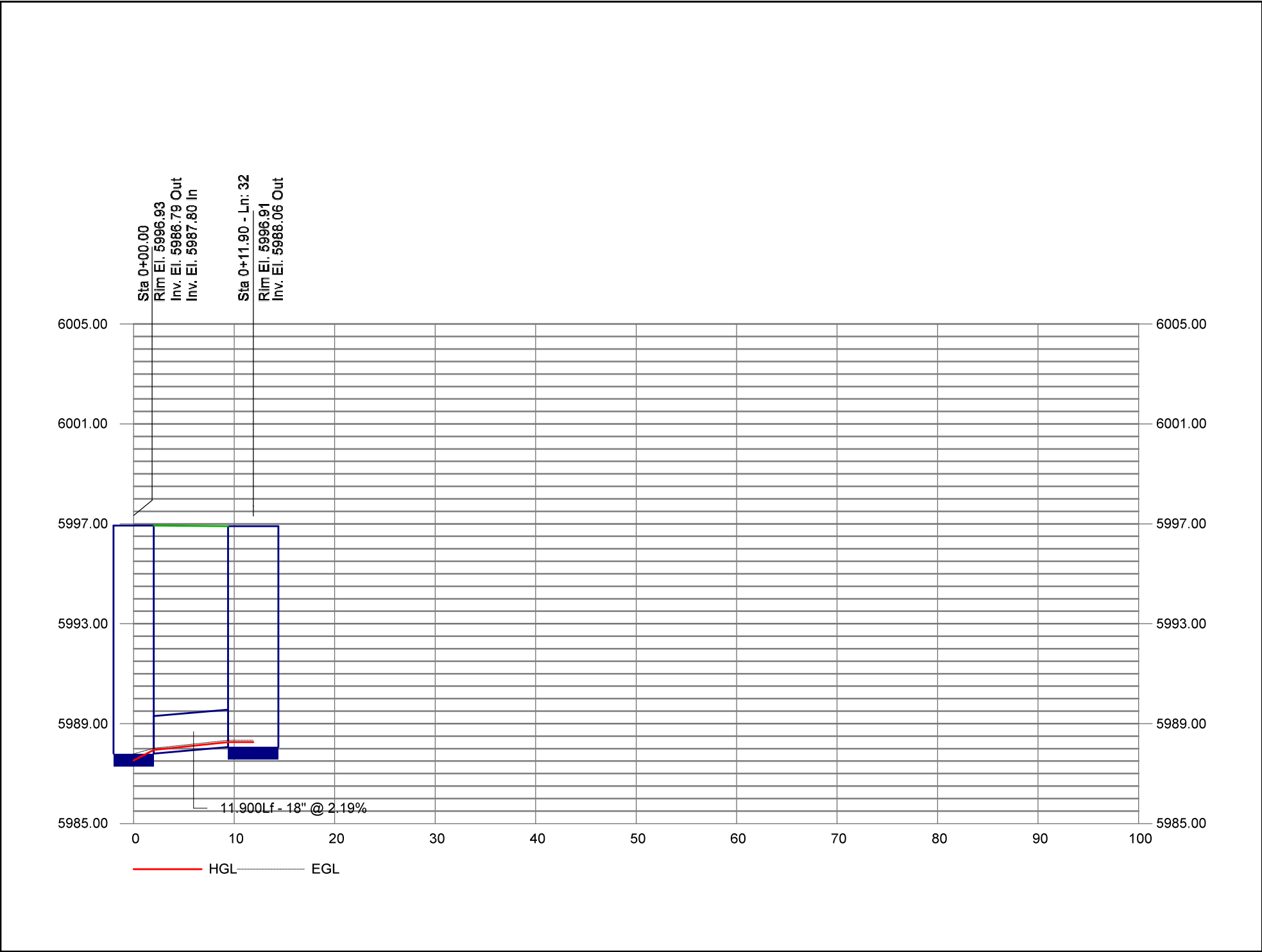


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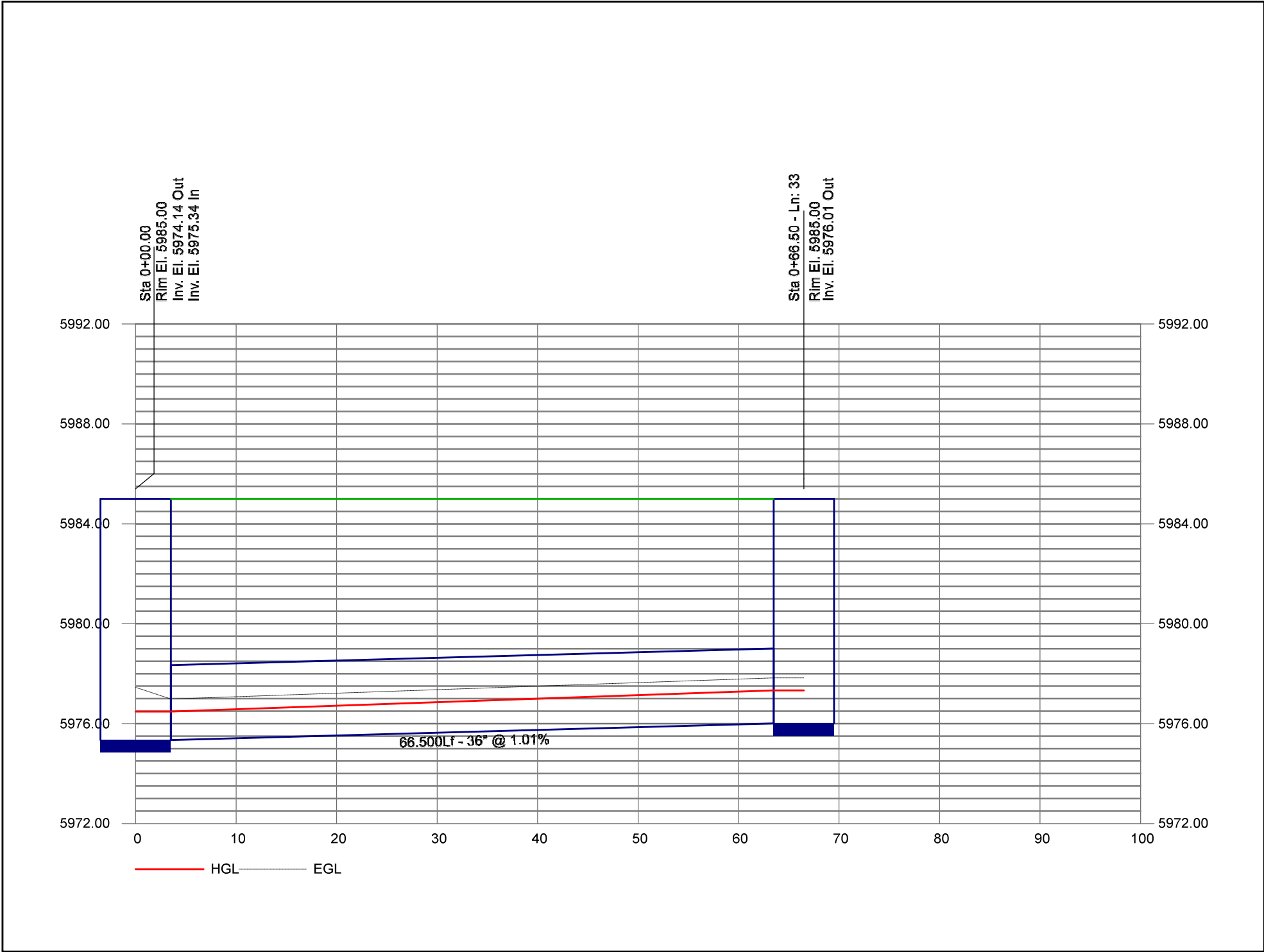




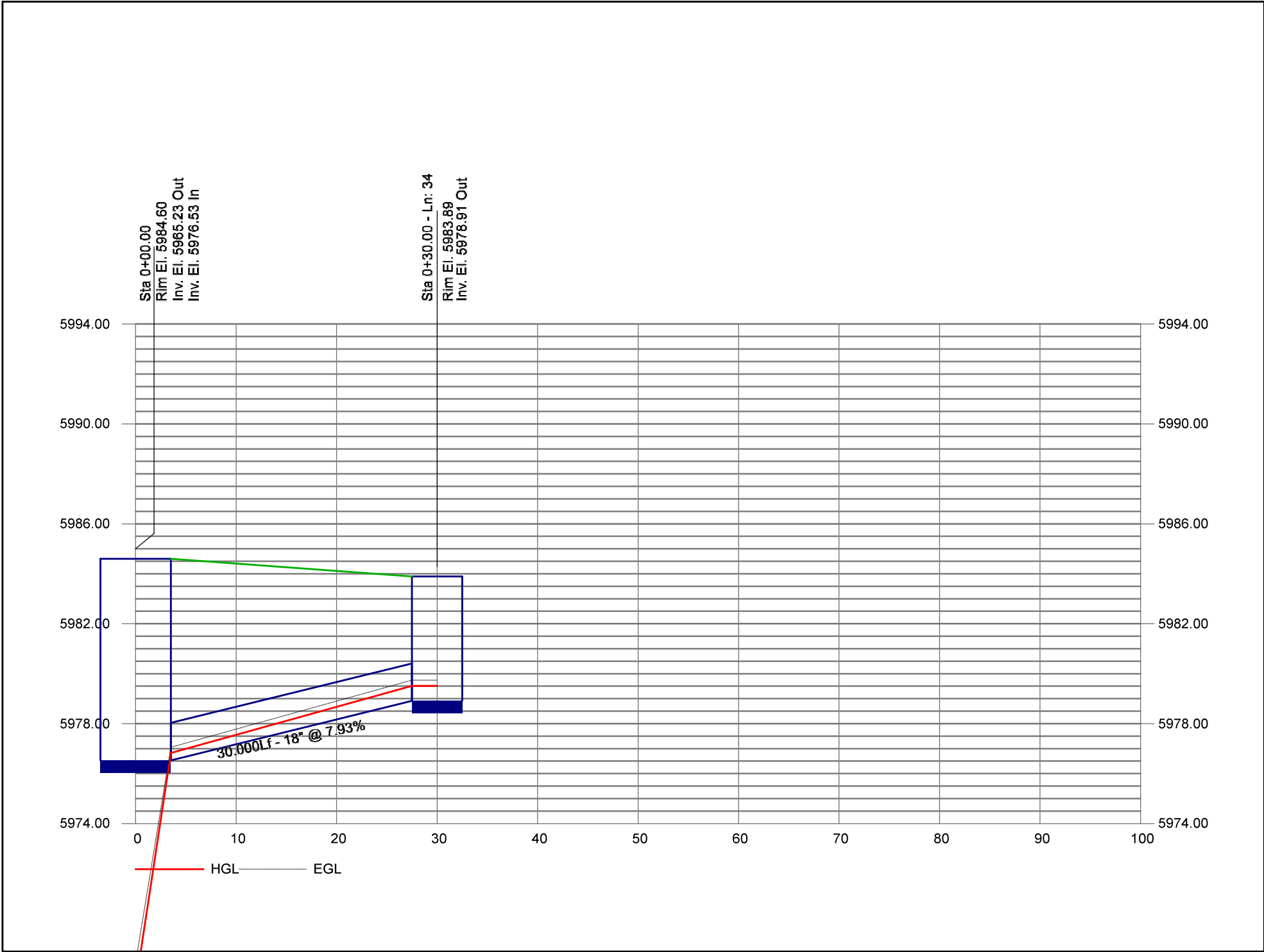
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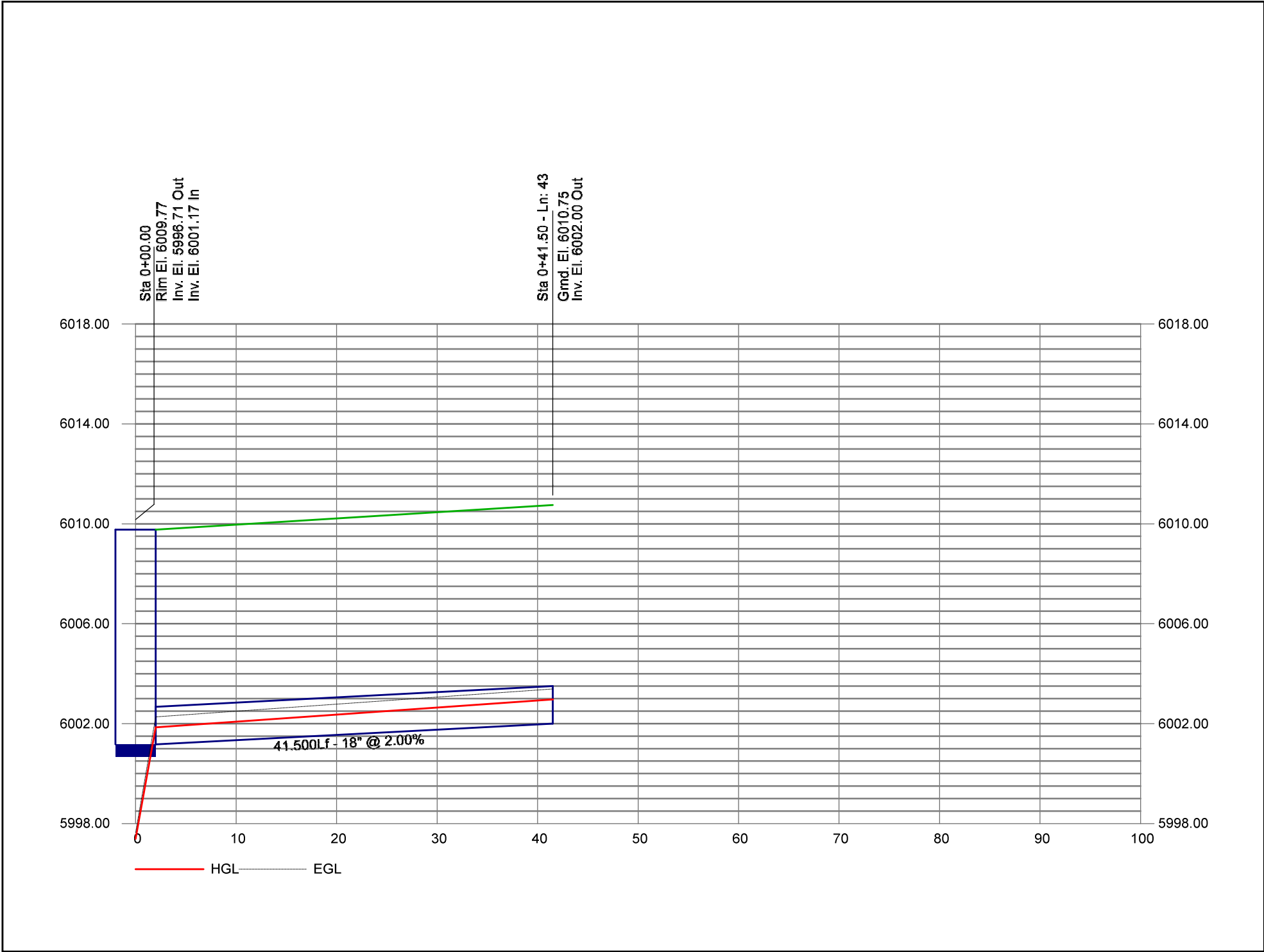
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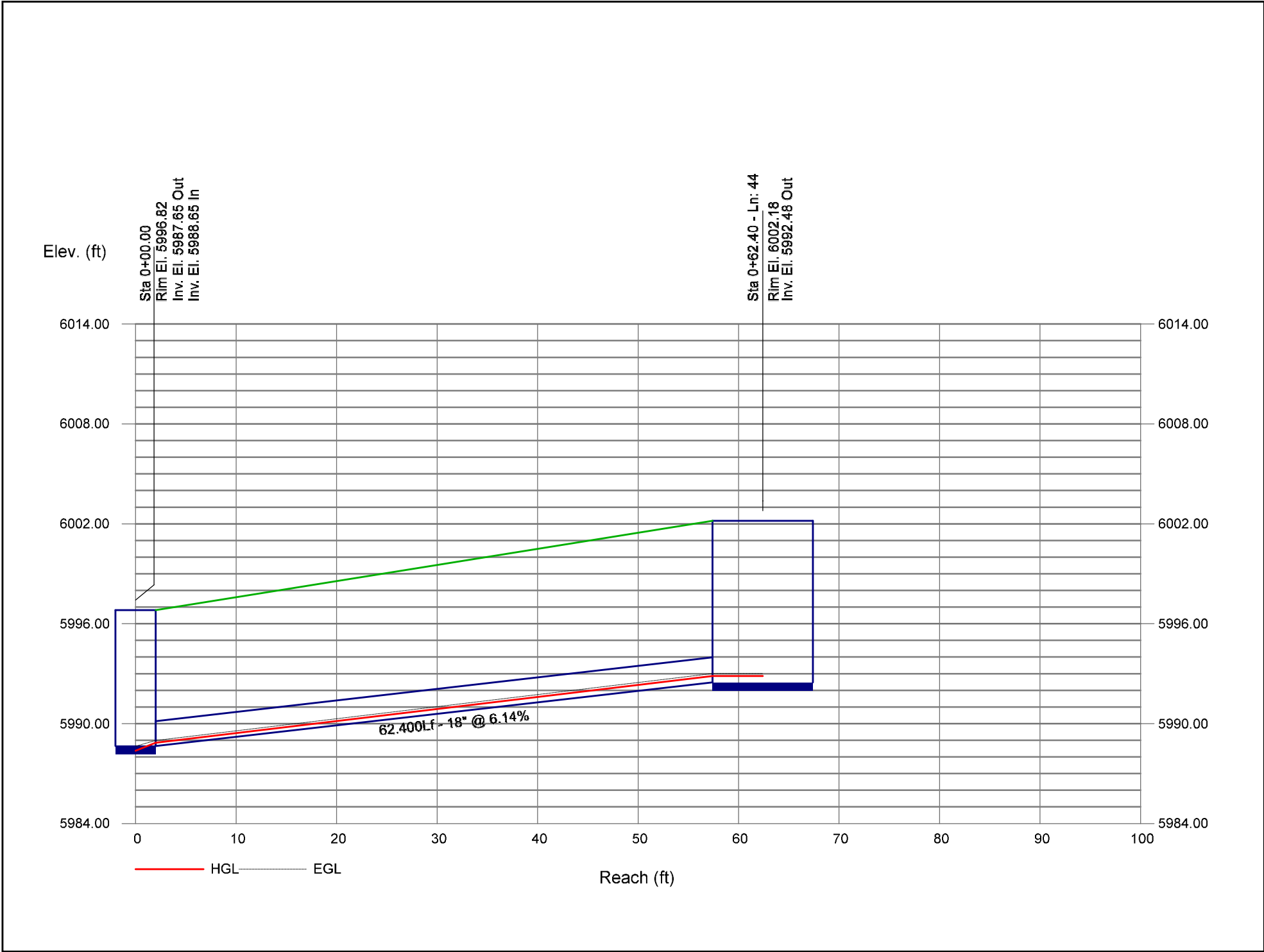
Storm Sewer Profile



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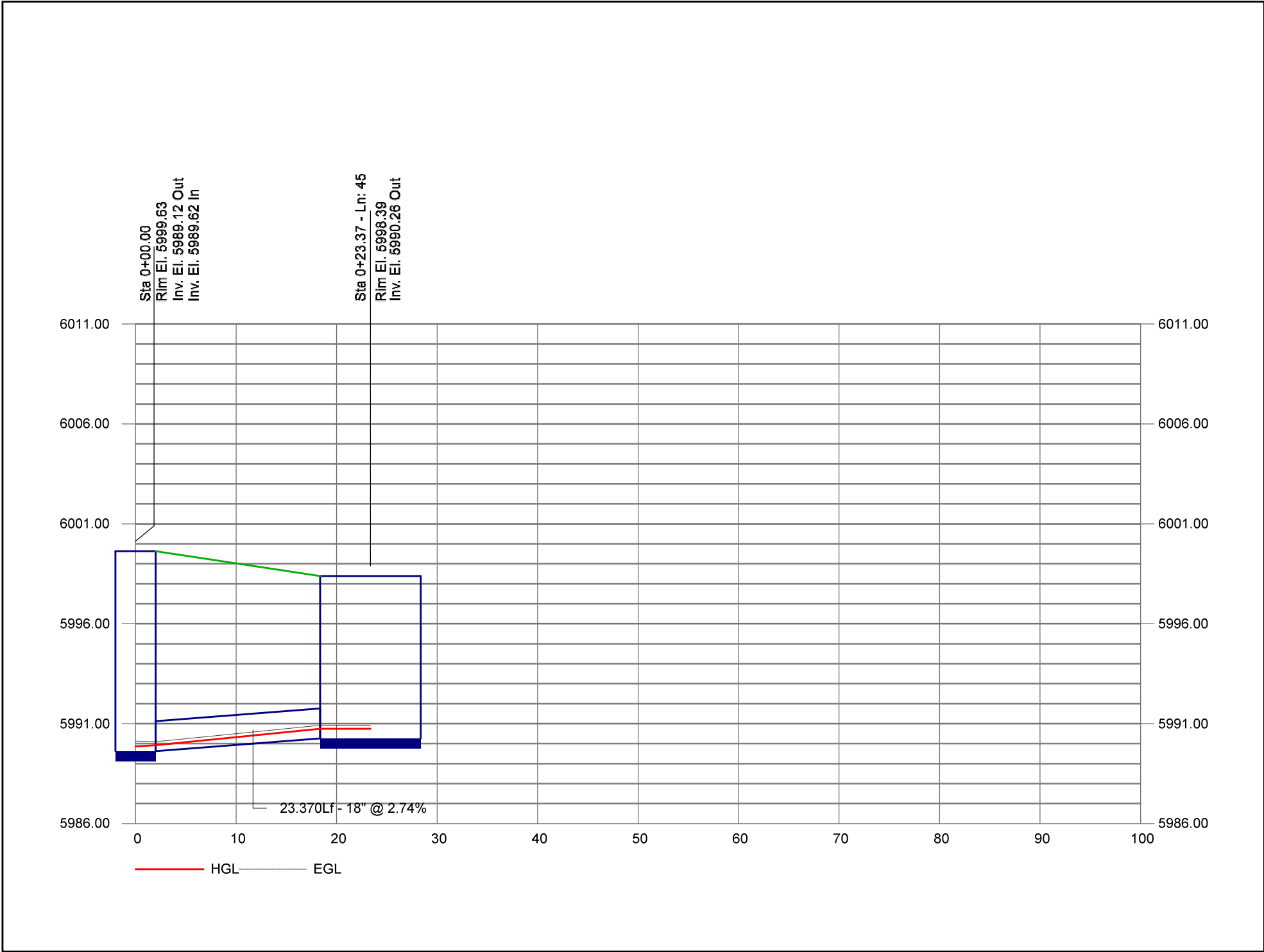


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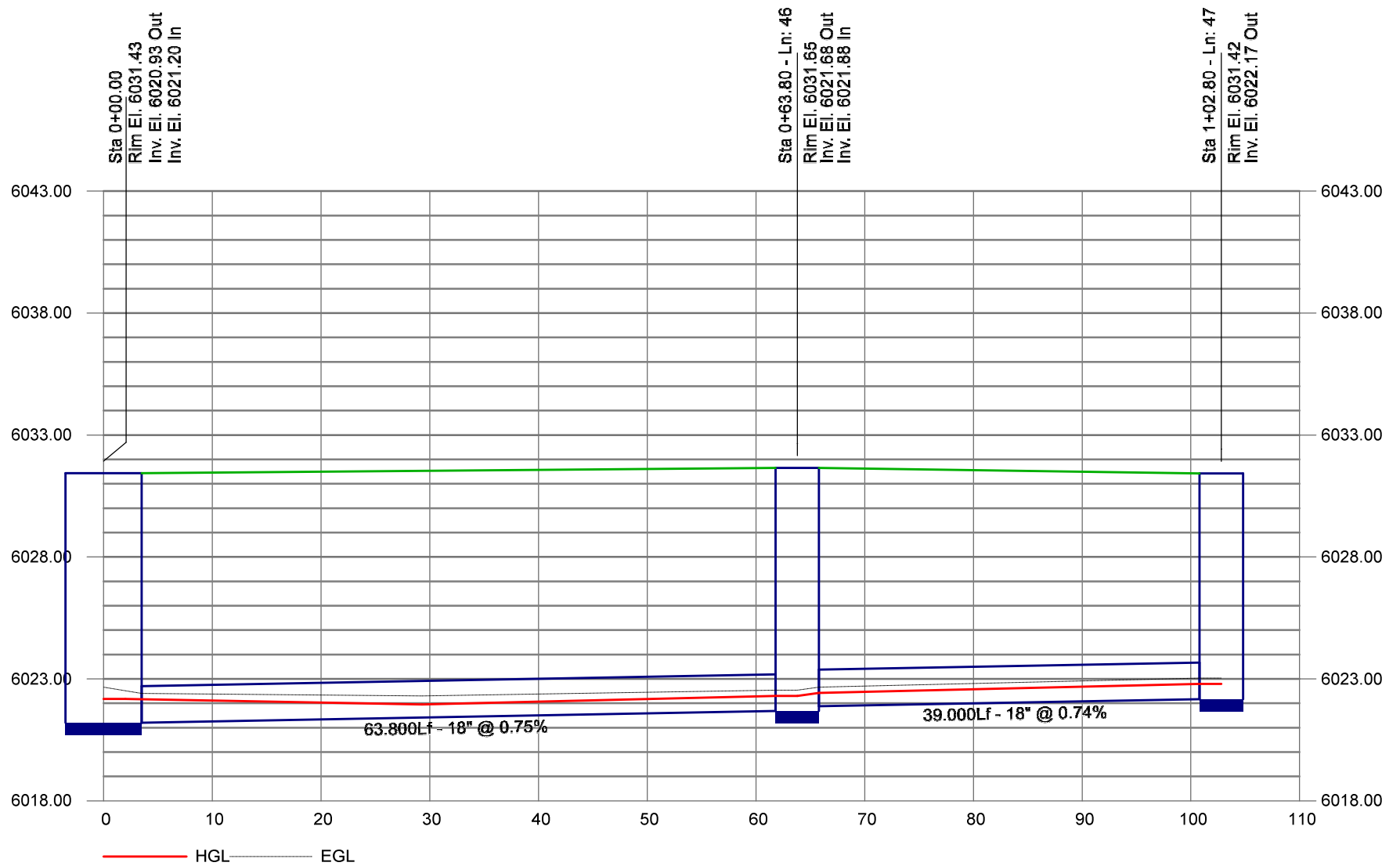


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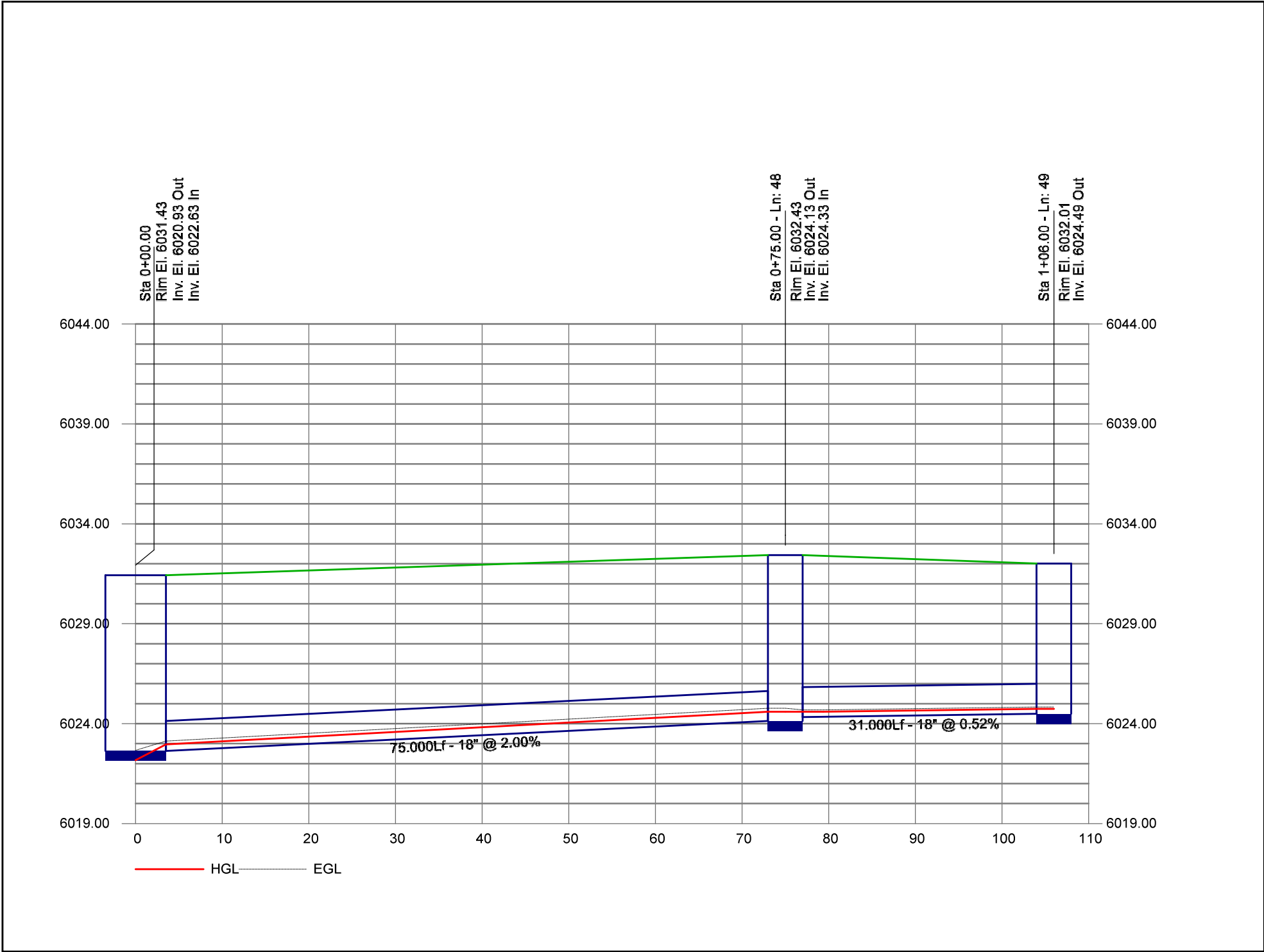


# Storm Sewer Profile

Proj. file: REV03-5YR.stm



Storm Sewer Profile



| Line No. | Line ID         | Drng Area | Runoff Coeff | Tc    | Flow Rate | Line Size | Line Slope | Invert Up | Invert Dn | Gnd/Rim El Up | Gnd/Rim El Dn | HGL Up  | HGL Dn  | Vel Ave |  |
|----------|-----------------|-----------|--------------|-------|-----------|-----------|------------|-----------|-----------|---------------|---------------|---------|---------|---------|--|
|          |                 | (ac)      | (C)          | (min) | (cfs)     | (in)      | (%)        | (ft)      | (ft)      | (ft)          | (ft)          | (ft)    | (ft)    | (ft/s)  |  |
| 1        | EX D114         | 0.00      | 0.00         | 20.5  | 187.55    | 54        | 0.96       | 5953.79   | 5953.44   | 5973.34       | 5966.14       | 5958.29 | 5957.98 | 11.79   |  |
| 2        | EX D113         | 0.00      | 0.00         | 20.3  | 188.69    | 54        | 2.00       | 5965.23   | 5962.51   | 5984.60       | 5973.34       | 5969.18 | 5965.23 | 15.77   |  |
| 3        | EX D112         | 0.00      | 0.00         | 20.2  | 184.37    | 48        | 1.00       | 5974.14   | 5973.31   | 5985.00       | 5984.60       | 5978.69 | 5977.31 | 14.67   |  |
| 4        | EX D111         | 0.00      | 0.00         | 19.8  | 158.58    | 48        | 1.43       | 5977.39   | 5974.34   | 5988.89       | 5985.00       | 5984.64 | 5982.03 | 12.62   |  |
| 5        | EX D110         | 0.00      | 0.00         | 19.5  | 159.99    | 48        | 3.61       | 5985.31   | 5977.59   | 5997.01       | 5988.89       | 5988.98 | 5985.04 | 13.00   |  |
| 6        | EX D109         | 0.00      | 0.00         | 19.3  | 146.51    | 42        | 4.76       | 5992.92   | 5985.67   | 6004.42       | 5997.01       | 5996.30 | 5988.98 | 15.49   |  |
| 7        | EX D108         | 0.00      | 0.00         | 19.1  | 147.27    | 42        | 4.59       | 6000.11   | 5993.12   | 6011.94       | 6004.42       | 6003.49 | 5996.30 | 15.77   |  |
| 8        | EX D107         | 0.00      | 0.00         | 18.7  | 114.61    | 42        | 1.00       | 6002.60   | 6000.31   | 6019.33       | 6011.94       | 6006.79 | 6003.81 | 11.91   |  |
| 9        | EX D106         | 0.00      | 0.00         | 18.4  | 115.73    | 42        | 1.00       | 6005.11   | 6002.80   | 6023.25       | 6019.33       | 6010.17 | 6007.12 | 12.03   |  |
| 10       | EX D105         | 0.00      | 0.00         | 18.0  | 116.84    | 42        | 1.00       | 6007.61   | 6005.31   | 6025.00       | 6023.25       | 6013.62 | 6010.51 | 12.15   |  |
| 11       | EX D104         | 0.00      | 0.00         | 17.6  | 45.18     | 36        | 1.00       | 6009.74   | 6008.11   | 6024.79       | 6025.00       | 6016.66 | 6015.91 | 6.39    |  |
| 12       | EX D103         | 0.00      | 0.00         | 17.1  | 45.86     | 36        | 1.00       | 6011.83   | 6009.94   | 6023.43       | 6024.79       | 6017.65 | 6016.76 | 6.49    |  |
| 13       | EX D102         | 0.00      | 0.00         | 16.5  | 42.91     | 36        | 1.00       | 6013.81   | 6012.03   | 6024.93       | 6023.43       | 6019.04 | 6018.30 | 6.07    |  |
| 14       | EX D101         | 0.00      | 0.00         | 15.8  | 41.72     | 36        | 1.00       | 6016.65   | 6014.01   | 6027.83       | 6024.93       | 6020.65 | 6019.61 | 5.90    |  |
| 15       | EX D101(2)      | 0.00      | 0.00         | 15.3  | 36.93     | 36        | 1.00       | 6018.00   | 6016.65   | 6029.02       | 6027.83       | 6021.60 | 6021.19 | 5.23    |  |
| 16       | EX D100         | 0.00      | 0.00         | 14.8  | 37.55     | 30        | 1.00       | 6020.93   | 6018.51   | 6031.43       | 6029.02       | 6023.69 | 6021.67 | 7.65    |  |
| 17       | EX PIPE D4/Z100 | 0.00      | 0.00         | 9.2   | 32.48     | 30        | 2.10       | 6023.08   | 6021.13   | 6033.43       | 6031.43       | 6025.02 | 6024.60 | 7.28    |  |
| 18       | Z2              | 0.92      | 0.81         | 9.0   | 29.71     | 24        | 2.00       | 6023.81   | 6023.28   | 6033.74       | 6033.43       | 6025.67 | 6025.02 | 10.00   |  |
| 19       | Z1              | 4.70      | 0.83         | 7.3   | 26.85     | 24        | 1.97       | 6024.77   | 6024.01   | 6034.01       | 6033.74       | 6026.57 | 6025.67 | 9.32    |  |
| 20       | Z3              | 0.59      | 0.80         | 8.9   | 3.03      | 18        | 0.99       | 6023.57   | 6023.28   | 6033.54       | 6033.43       | 6025.04 | 6025.02 | 1.72    |  |
| 21       | EX D2           | 1.33      | 0.79         | 10.5  | 6.33      | 18        | 10.00      | 6019.07   | 6018.12   | 6027.93       | 6027.83       | 6021.22 | 6021.19 | 3.58    |  |
| 22       | EX D5           | 0.59      | 0.74         | 8.9   | 2.80      | 18        | 8.00       | 6019.89   | 6019.29   | 6024.89       | 6024.93       | 6020.53 | 6019.61 | 7.06    |  |
| 23       | EX D8 PIPE/Y100 | 0.00      | 0.00         | 13.3  | 83.50     | 42        | 1.59       | 6013.10   | 6011.49   | 6023.83       | 6025.00       | 6016.59 | 6015.91 | 8.68    |  |

Project File: REV03-100YR.stm

Number of lines: 49

Date: 5/5/2025

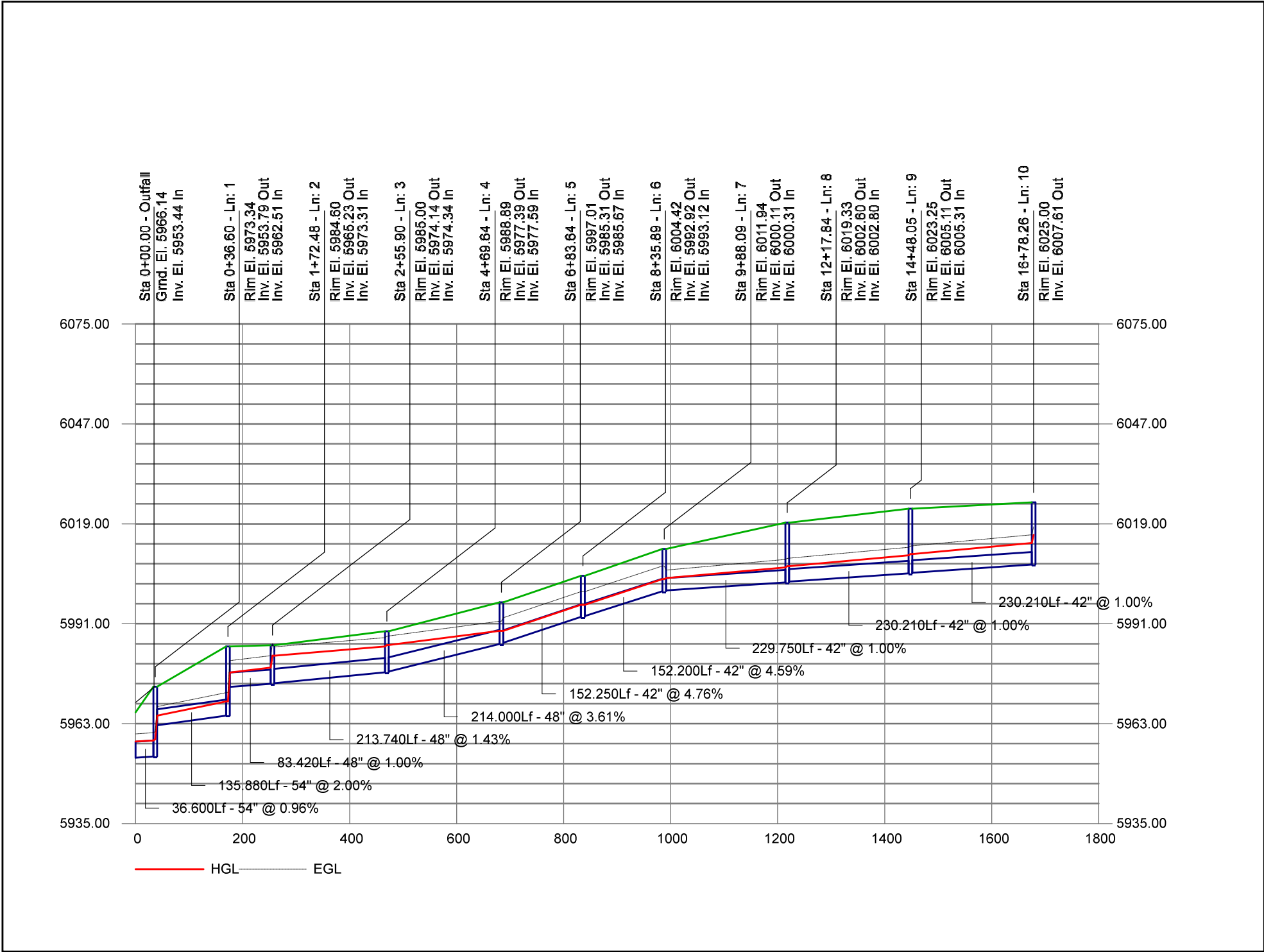
NOTES: \*\* Critical depth

| Line No.                      | Line ID   | Drng Area | Runoff Coeff | Tc    | Flow Rate | Line Size | Line Slope | Invert Up | Invert Dn | Gnd/Rim El Up | Gnd/Rim El Dn | HGL Up              | HGL Dn  | Vel Ave        |  |
|-------------------------------|-----------|-----------|--------------|-------|-----------|-----------|------------|-----------|-----------|---------------|---------------|---------------------|---------|----------------|--|
|                               |           | (ac)      | (C)          | (min) | (cfs)     | (in)      | (%)        | (ft)      | (ft)      | (ft)          | (ft)          | (ft)                | (ft)    | (ft/s)         |  |
| 24                            | Y2        | 0.94      | 0.81         | 8.5   | 4.97      | 18        | 5.00       | 6016.83   | 6015.10   | 6023.66       | 6023.83       | 6017.69             | 6017.70 | 3.79           |  |
| 25                            | Y1        | 1.00      | 0.80         | 7.8   | 5.38      | 30        | 4.97       | 6015.84   | 6014.10   | 6023.53       | 6023.83       | 6017.70             | 6017.70 | 1.24           |  |
| 26                            | EX D6     | 1.00      | 0.74         | 9.4   | 4.65      | 24        | 0.98       | 6013.08   | 6012.79   | 6022.72       | 6023.43       | 6018.31             | 6018.30 | 1.48           |  |
| 27                            | EX D10/X4 | 0.75      | 0.77         | 9.5   | 46.26     | 36        | 1.47       | 6001.30   | 6000.81   | 6011.61       | 6011.94       | 6003.51 j           | 6003.49 | 7.61           |  |
| 28                            | X101      | 0.00      | 0.00         | 9.0   | 43.52     | 30        | 1.79       | 6006.66   | 6001.90   | 6020.34       | 6011.61       | 6008.86             | 6003.58 | 10.96          |  |
| 29                            | X1        | 0.56      | 0.78         | 8.4   | 2.86      | 18        | 8.80       | 6012.96   | 6007.66   | 6021.56       | 6020.34       | 6013.60 j           | 6008.86 | 2.93           |  |
| 30                            | X100      | 7.68      | 0.83         | 7.5   | 43.48     | 30        | 1.02       | 6007.24   | 6006.86   | 6011.58       | 6020.34       | 6009.44             | 6009.05 | 9.53           |  |
| 31                            | W1        | 0.00      | 0.00         | 14.8  | 16.30     | 30        | 1.75       | 5986.79   | 5986.23   | 5996.93       | 5997.01       | 5989.00             | 5988.98 | 3.44           |  |
| 32                            | W2        | 0.17      | 0.71         | 5.0   | 0.93      | 18        | 2.19       | 5988.06   | 5987.80   | 5996.91       | 5996.93       | 5988.42             | 5989.19 | 1.70           |  |
| 33                            | EX D11    | 7.37      | 0.83         | 8.4   | 40.11     | 36        | 1.01       | 5976.01   | 5975.34   | 5985.00       | 5985.00       | 5982.27             | 5982.03 | 5.68           |  |
| 34                            | EX D13    | 1.41      | 0.78         | 11.0  | 6.50      | 18        | 7.93       | 5978.91   | 5976.53   | 5983.89       | 5984.60       | 5979.90             | 5977.01 | 9.35           |  |
| 35                            | Y101      | 0.00      | 0.00         | 13.0  | 75.74     | 42        | 0.60       | 6014.12   | 6013.30   | 6025.36       | 6023.83       | 6018.47             | 6017.70 | 7.87           |  |
| 36                            | D7-F      | 16.60     | 0.83         | 12.9  | 76.07     | 42        | 0.60       | 6014.58   | 6014.22   | 6023.57       | 6025.36       | 6019.78             | 6019.43 | 7.91           |  |
| 37                            | W3        | 0.00      | 0.00         | 14.6  | 15.77     | 30        | 1.44       | 5987.65   | 5987.04   | 5996.82       | 5996.93       | 5988.99 j           | 5989.19 | 4.70           |  |
| 38                            | W4        | 0.00      | 0.00         | 14.5  | 14.34     | 24        | 2.89       | 5989.12   | 5988.15   | 5999.63       | 5996.82       | 5990.48             | 5989.00 | 8.81           |  |
| 39                            | W5        | 0.00      | 0.00         | 14.2  | 12.17     | 24        | 6.22       | 5994.73   | 5989.32   | 6003.10       | 5999.63       | 5995.98             | 5990.48 | 6.15           |  |
| 40                            | W6        | 0.00      | 0.00         | 13.7  | 12.38     | 24        | 0.60       | 5996.71   | 5995.78   | 6009.77       | 6003.10       | 5997.97             | 5997.02 | 5.98           |  |
| 41                            | W7        | 0.00      | 0.00         | 6.5   | 2.28      | 24        | 0.59       | 5998.79   | 5996.91   | 6008.72       | 6009.77       | 5999.32 j           | 5997.97 | 2.41           |  |
| 42                            | W8        | 0.41      | 0.78         | 6.0   | 2.34      | 24        | 0.62       | 5999.14   | 5998.99   | 6008.23       | 6008.72       | 5999.67             | 5999.48 | 3.71           |  |
| 43                            | W9        | 2.39      | 0.83         | 5.7   | 14.74     | 18        | 2.00       | 6002.00   | 6001.17   | 6010.75       | 6009.77       | 6003.40             | 6002.39 | 9.08           |  |
| 44                            | W10       | 0.40      | 0.71         | 5.0   | 2.19      | 18        | 6.14       | 5992.48   | 5988.65   | 6002.18       | 5996.82       | 5993.04             | 5988.99 | 5.47           |  |
| 45                            | W11       | 0.54      | 0.81         | 5.0   | 3.37      | 18        | 2.74       | 5990.26   | 5989.62   | 5998.39       | 5999.63       | 5990.96 j           | 5990.48 | 3.69           |  |
| 46                            | J1        | 0.00      | 0.00         | 6.7   | 7.17      | 18        | 0.75       | 6021.68   | 6021.20   | 6031.65       | 6031.43       | 6024.86             | 6024.60 | 4.06           |  |
| Project File: REV03-100YR.stm |           |           |              |       |           |           |            |           |           |               |               | Number of lines: 49 |         | Date: 5/5/2025 |  |
| NOTES: ** Critical depth      |           |           |              |       |           |           |            |           |           |               |               |                     |         |                |  |



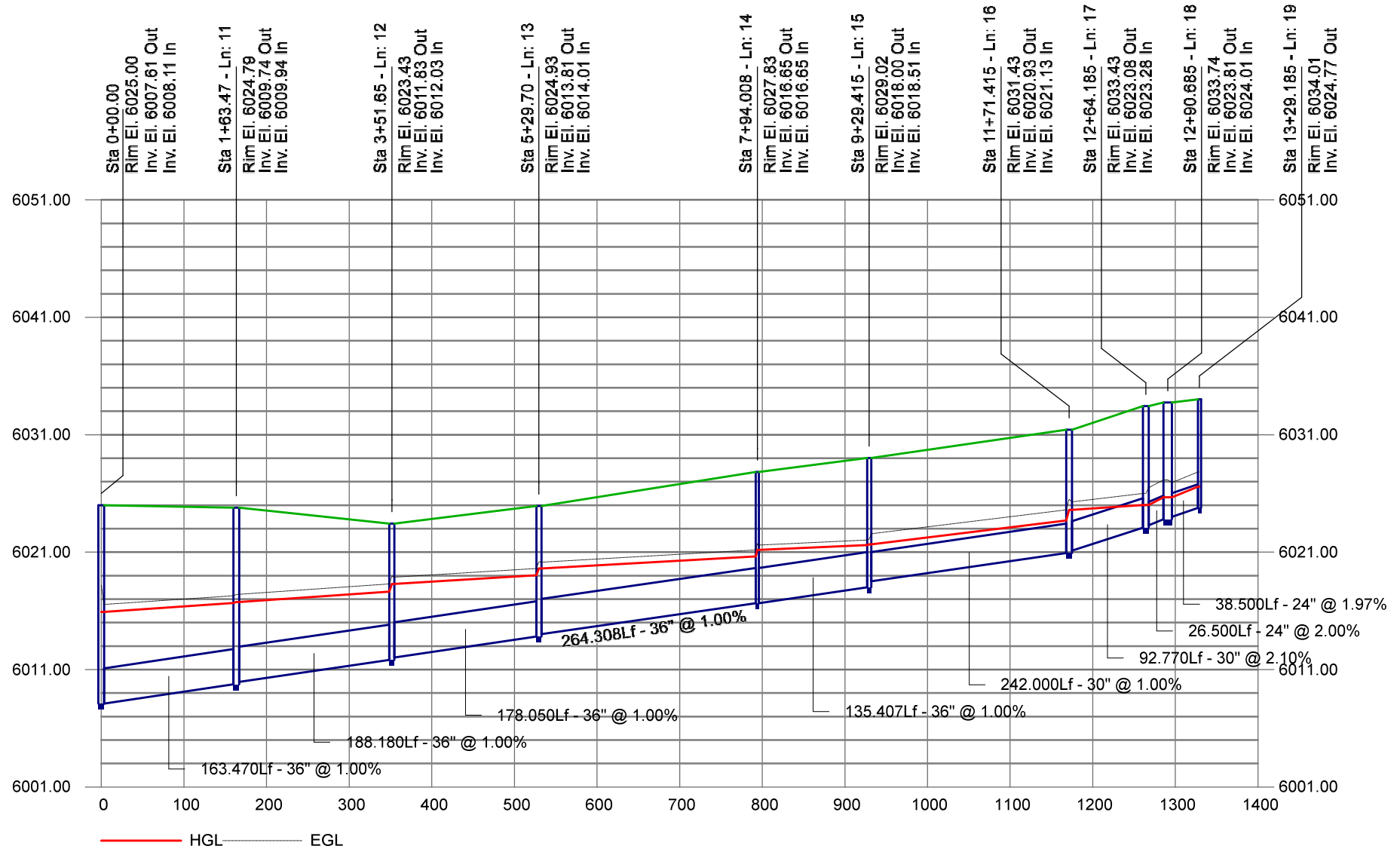
| Line No.                      | Line ID | Drng Area<br>(ac) | Runoff Coeff<br>(C) | Tc<br>(min) | Flow Rate<br>(cfs) | Line Size<br>(in) | Line Slope<br>(%) | Invert Up<br>(ft) | Invert Dn<br>(ft) | Gnd/Rim El Up<br>(ft) | Gnd/Rim El Dn<br>(ft) | HGL Up<br>(ft) | HGL Dn<br>(ft) | Vel Ave<br>(ft/s) |  |  |
|-------------------------------|---------|-------------------|---------------------|-------------|--------------------|-------------------|-------------------|-------------------|-------------------|-----------------------|-----------------------|----------------|----------------|-------------------|--|--|
| 47                            | J2      | 1.33              | 0.76                | 6.5         | 7.22               | 18                | 0.74              | 6022.17           | 6021.88           | 6031.42               | 6031.65               | 6025.27        | 6025.11        | 4.09              |  |  |
| 48                            | L1      | 0.79              | 0.76                | 14.4        | 5.84               | 18                | 2.00              | 6024.13           | 6022.63           | 6032.43               | 6031.43               | 6025.06 j      | 6024.60        | 4.18              |  |  |
| 49                            | JO      | 0.90              | 0.57                | 14.1        | 2.72               | 18                | 0.52              | 6024.49           | 6024.33           | 6032.01               | 6032.43               | 6025.12 j      | 6025.06        | 3.54              |  |  |
| Project File: REV03-100YR.stm |         |                   |                     |             |                    |                   |                   |                   |                   |                       | Number of lines: 49   |                |                | Date: 5/5/2025    |  |  |
| NOTES: ** Critical depth      |         |                   |                     |             |                    |                   |                   |                   |                   |                       |                       |                |                |                   |  |  |

Storm Sewer Profile

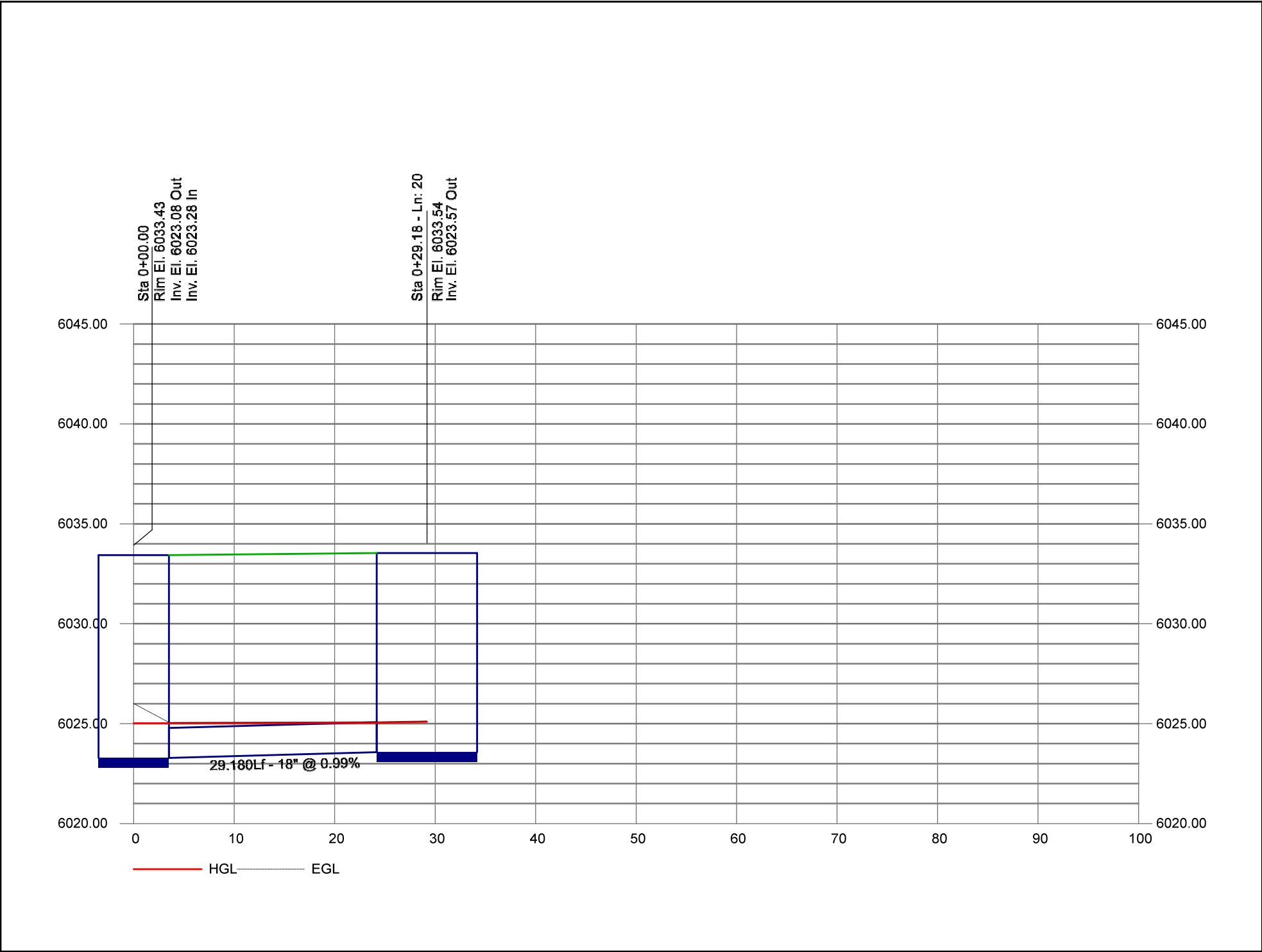


# Storm Sewer Profile

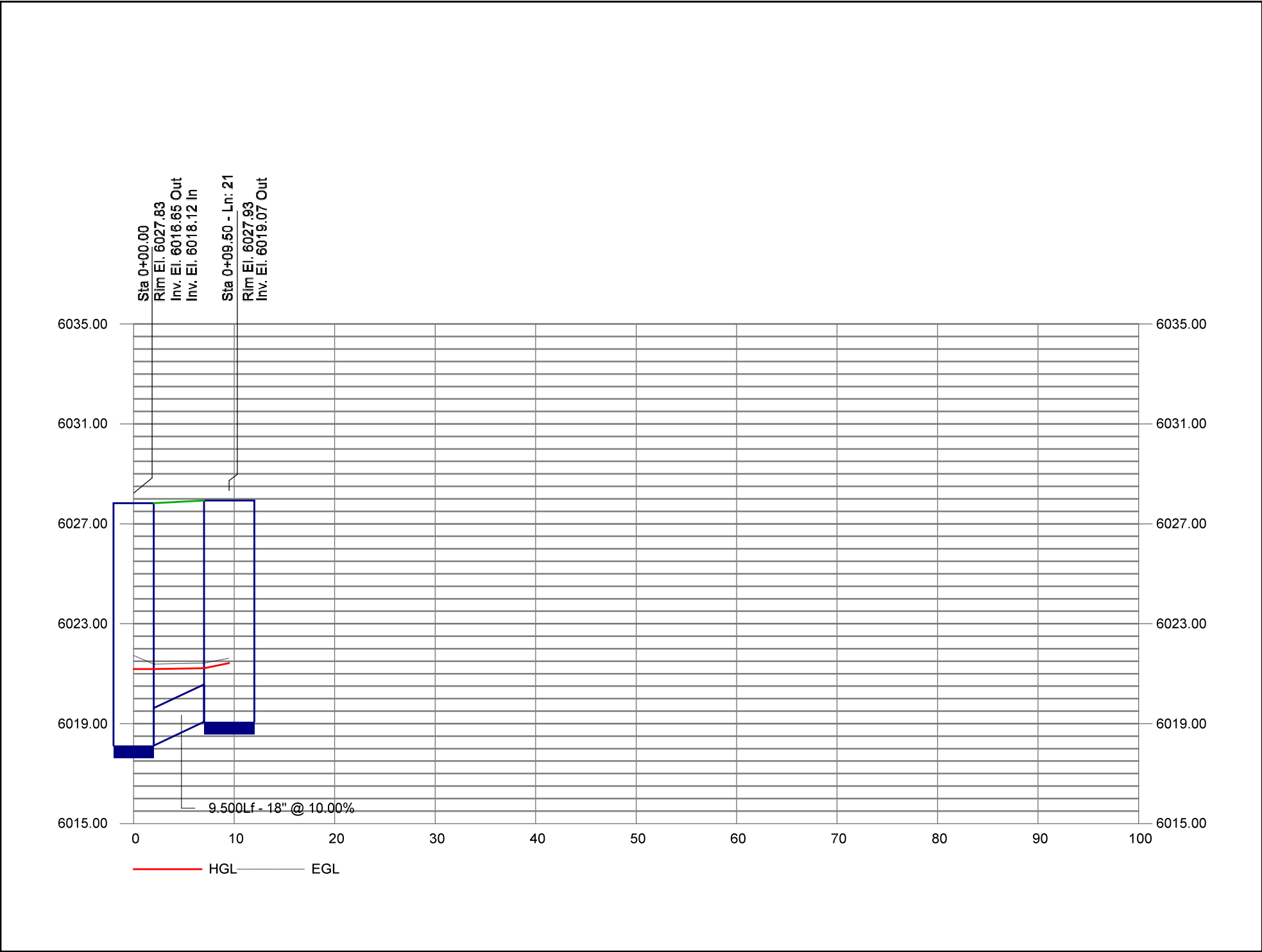
Proj. file: REV03-100YR.stm



Storm Sewer Profile

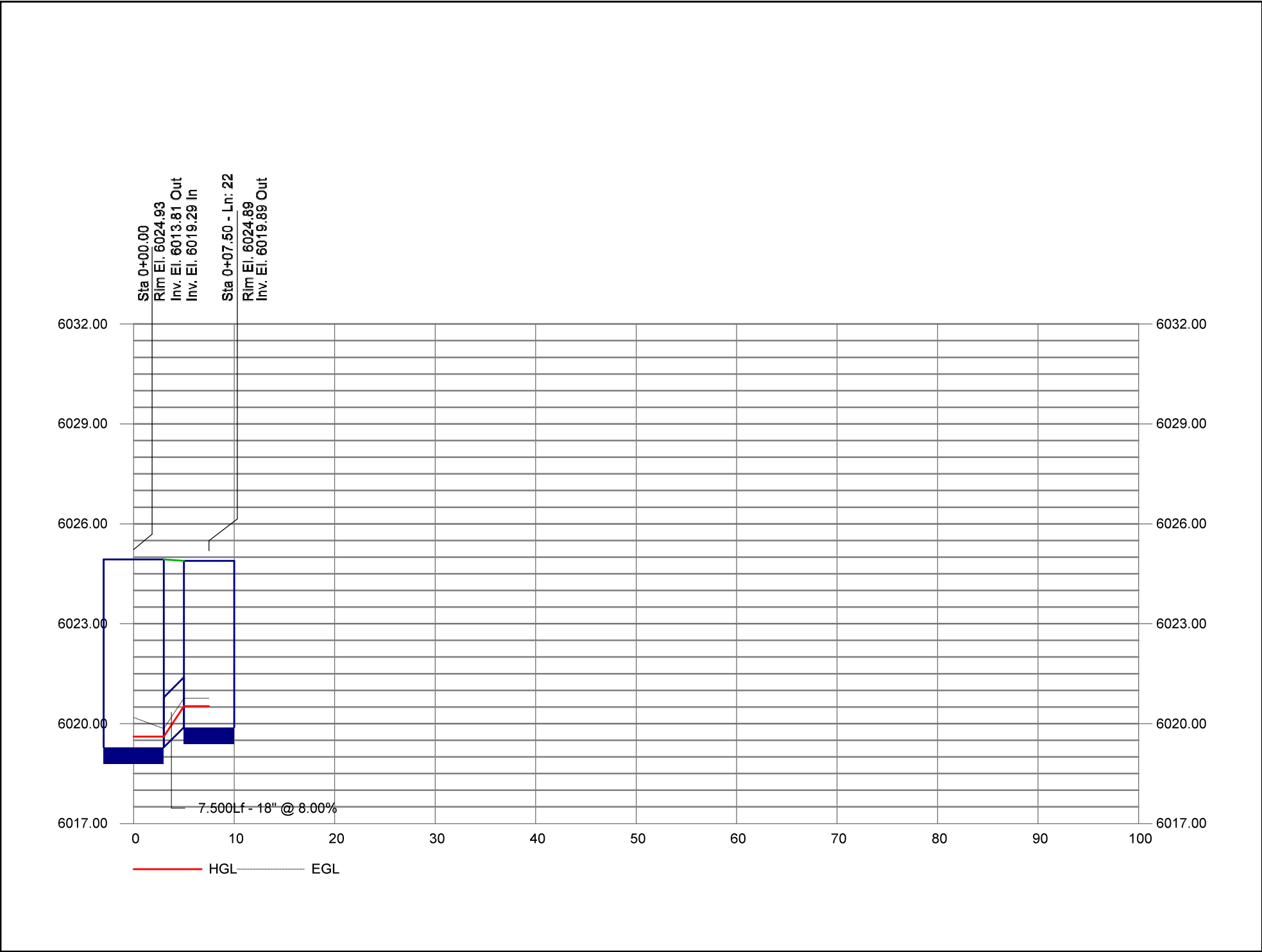


# Storm Sewer Profile

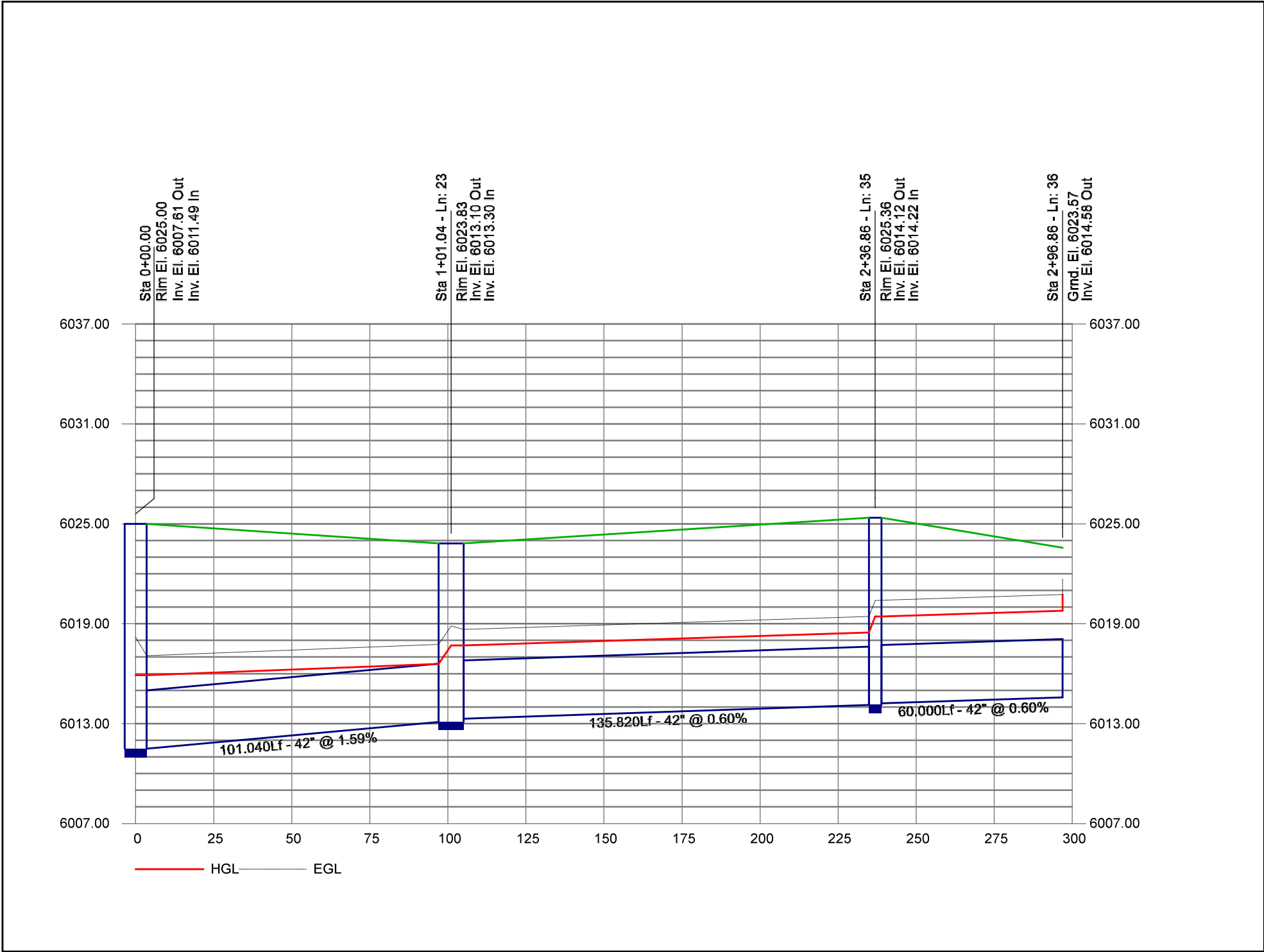




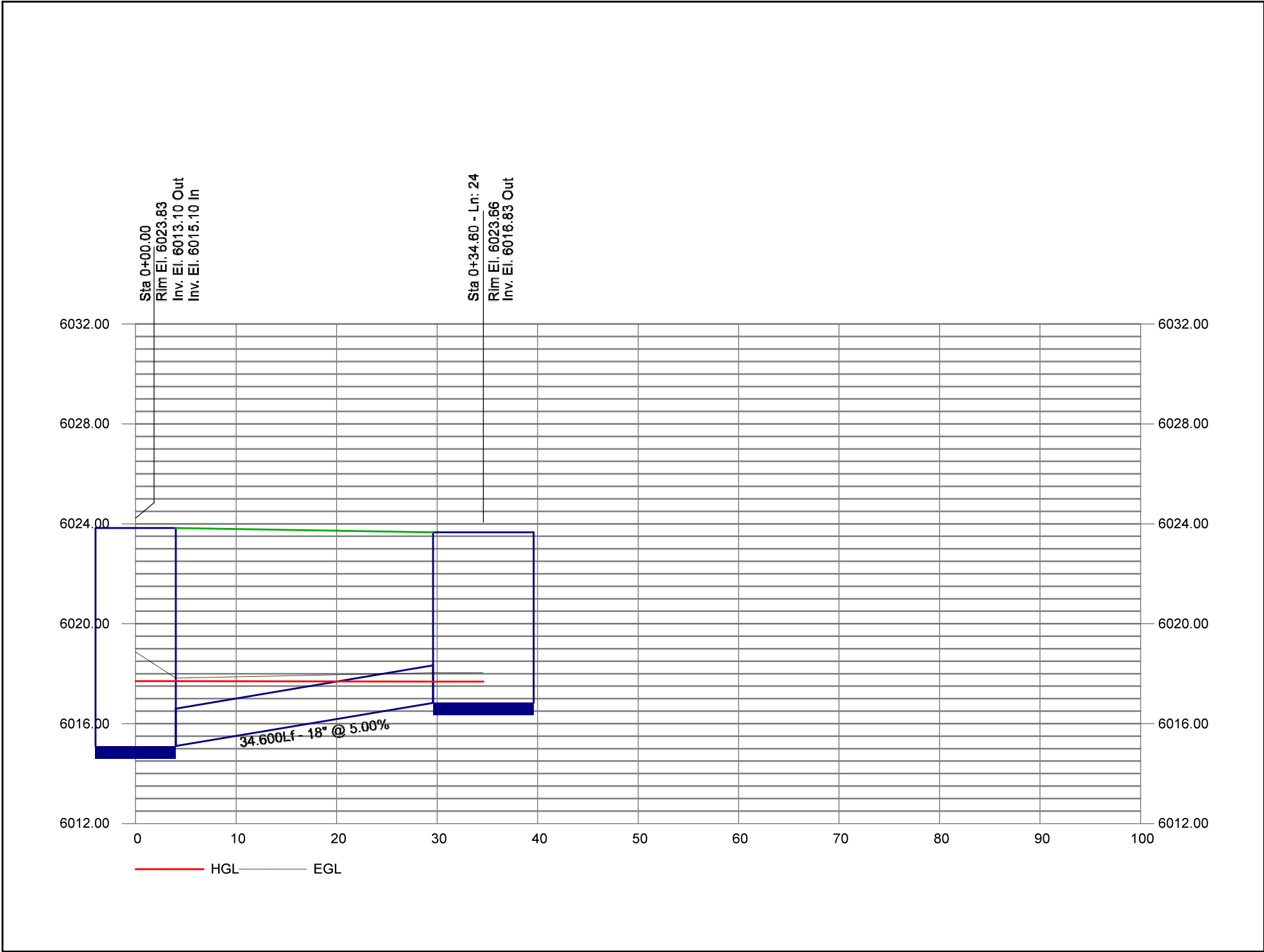
# Storm Sewer Profile



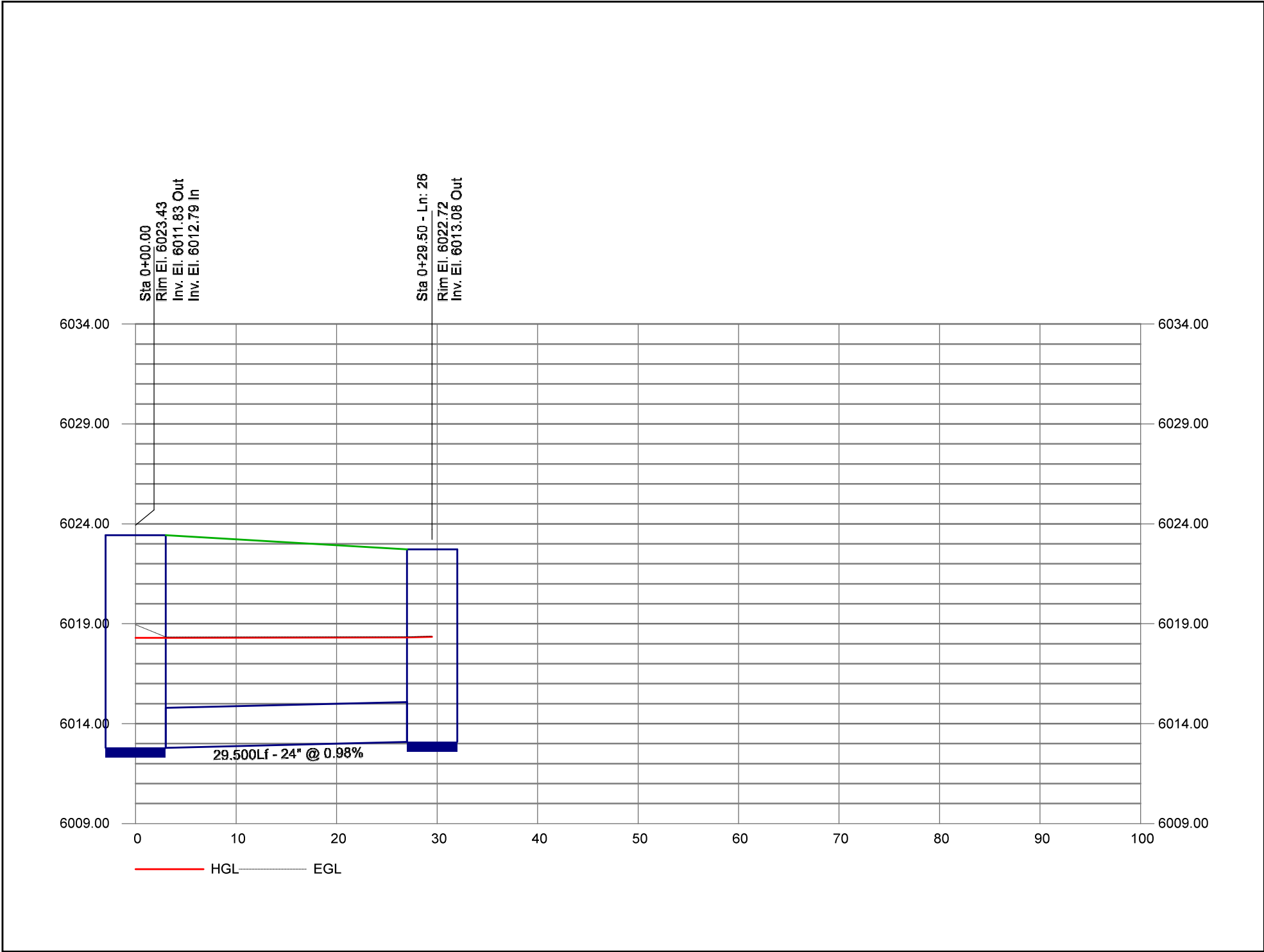
Storm Sewer Profile



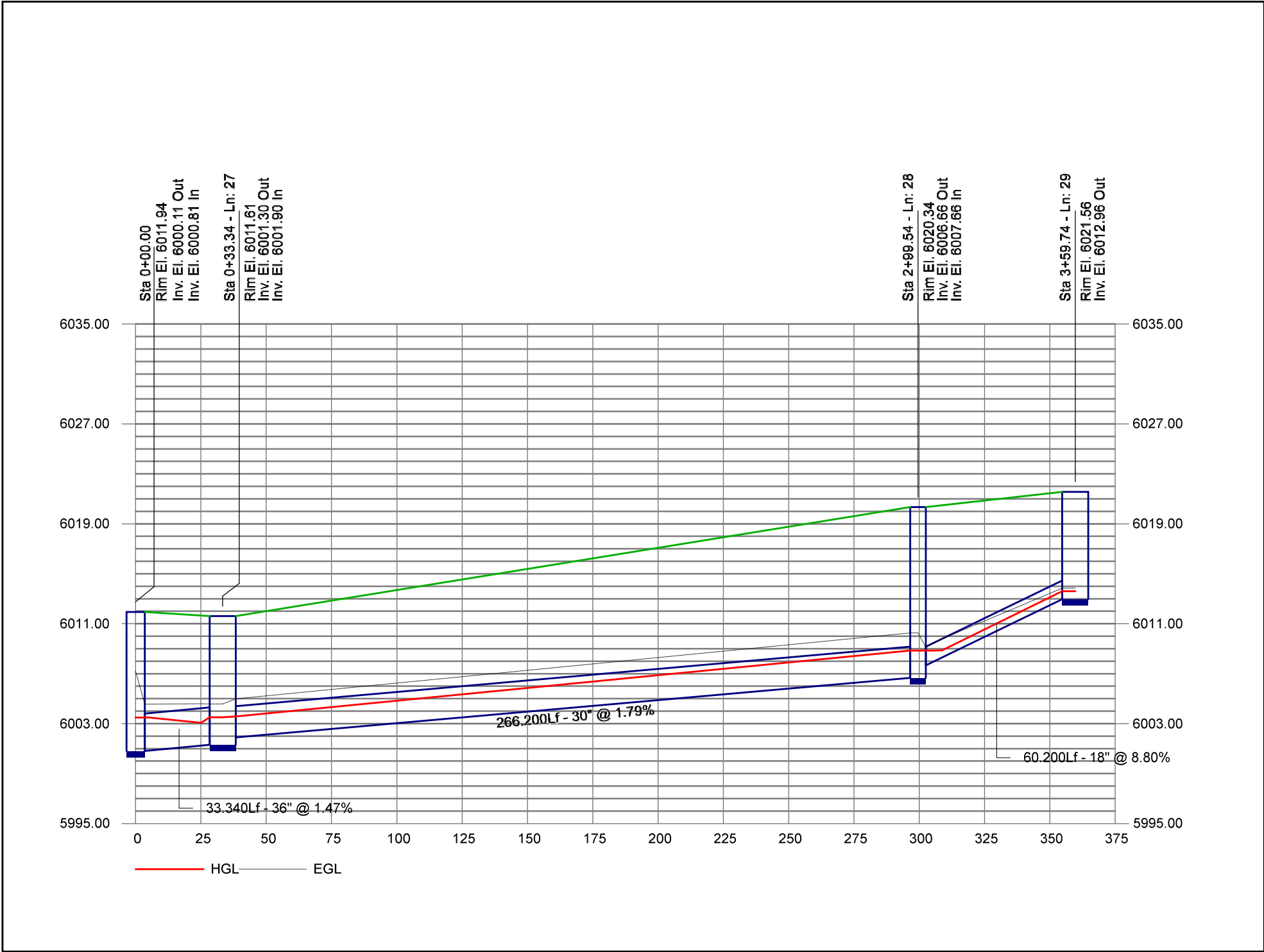
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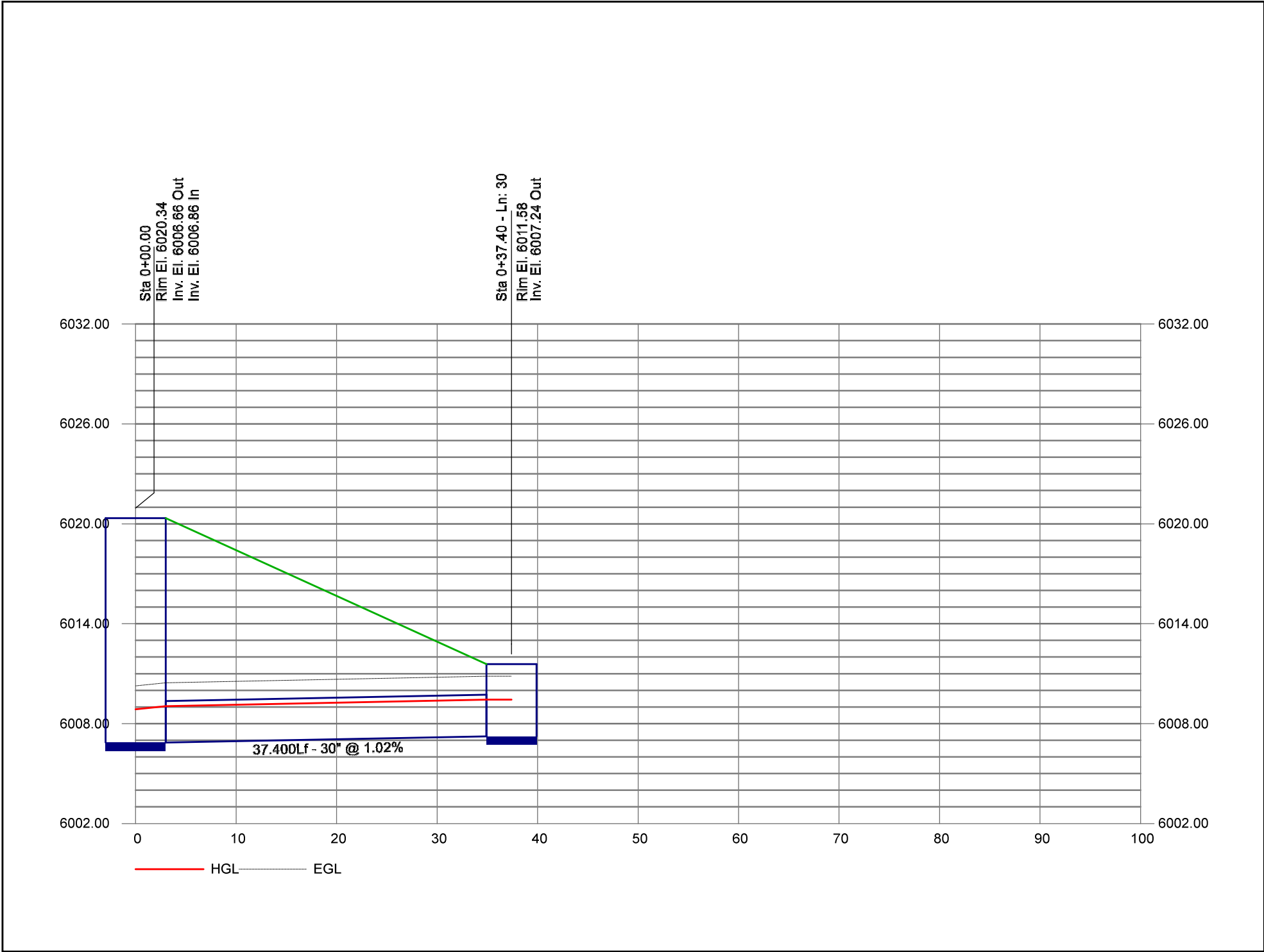
Storm Sewer Profile



Storm Sewer Profile

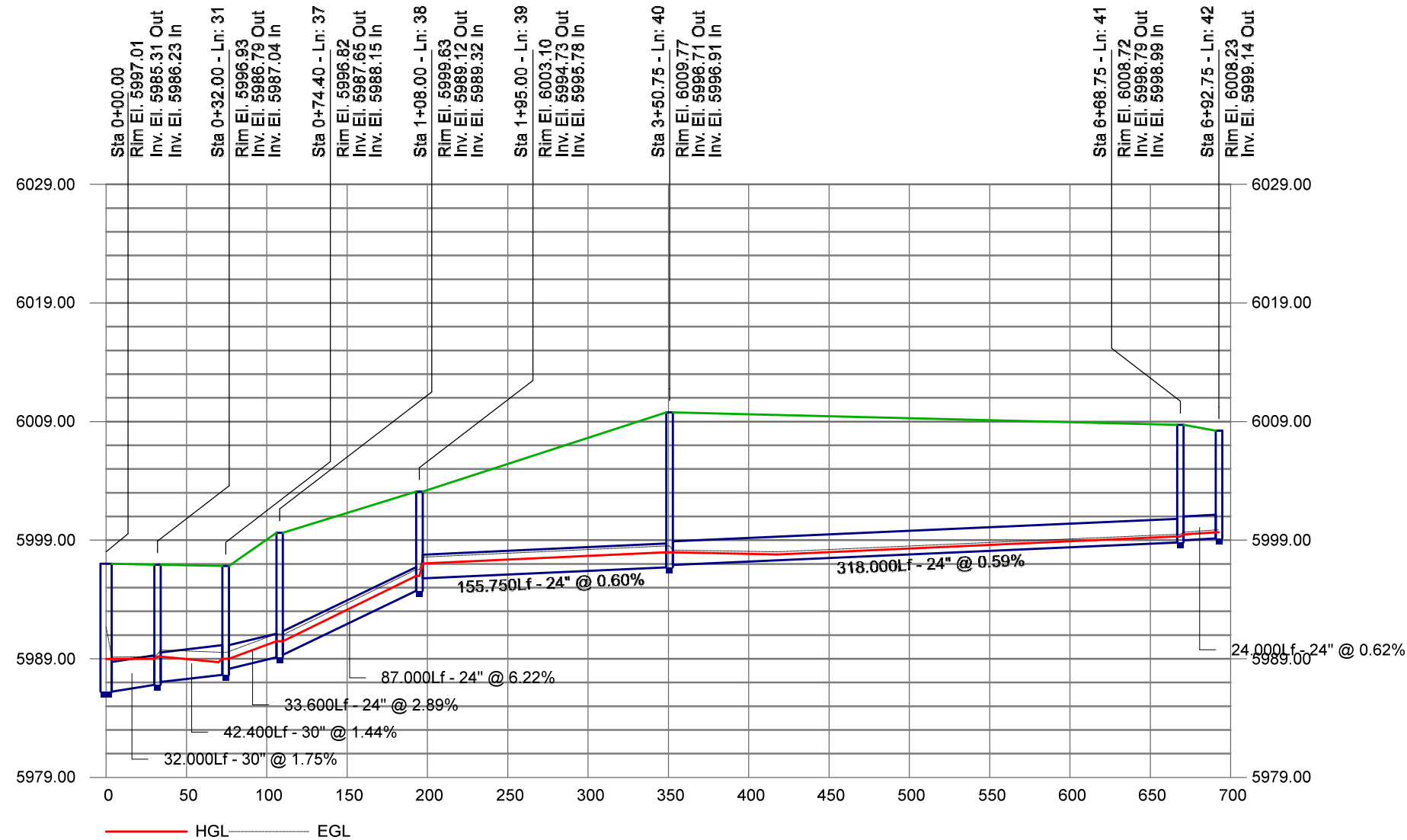


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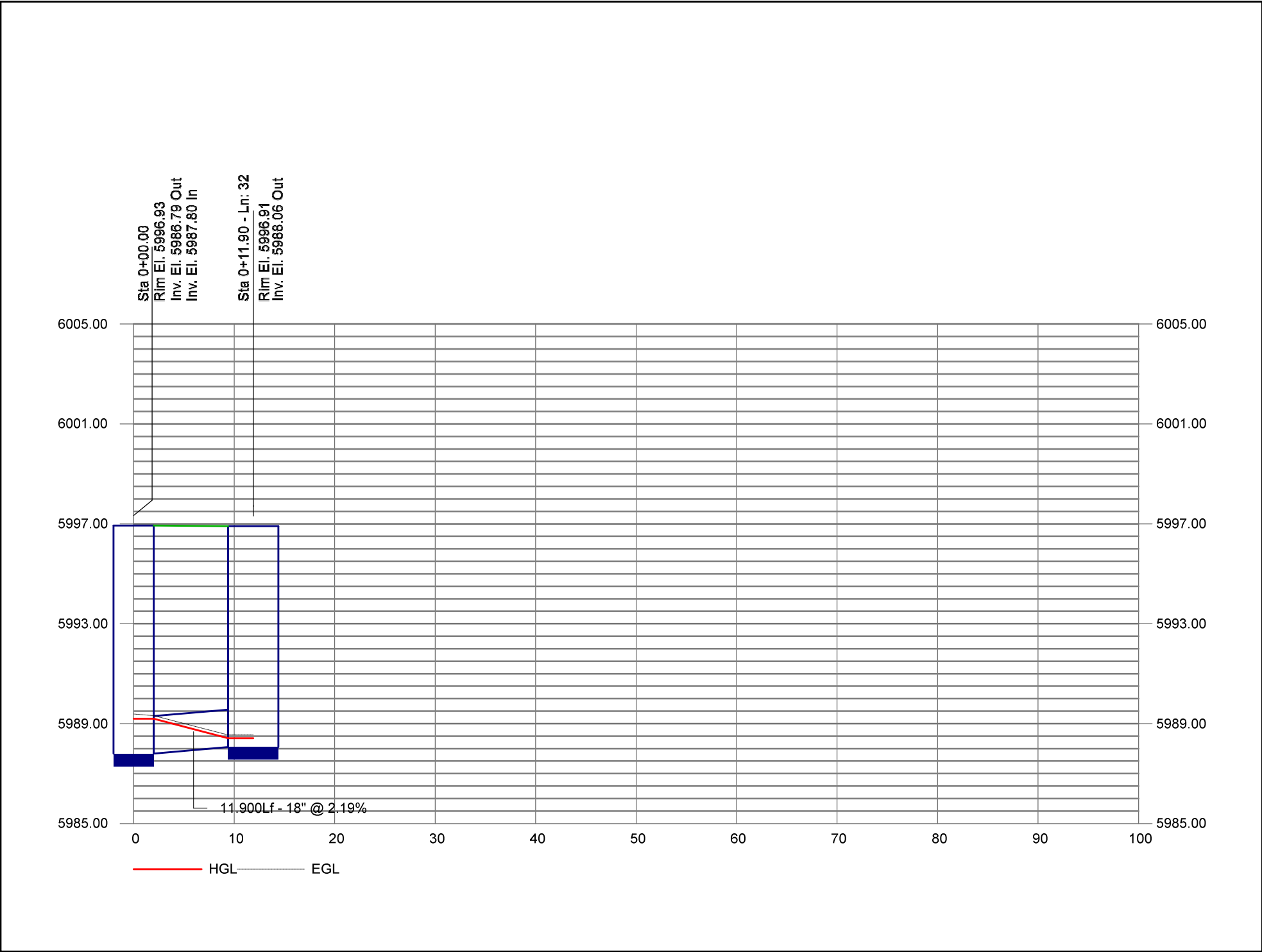




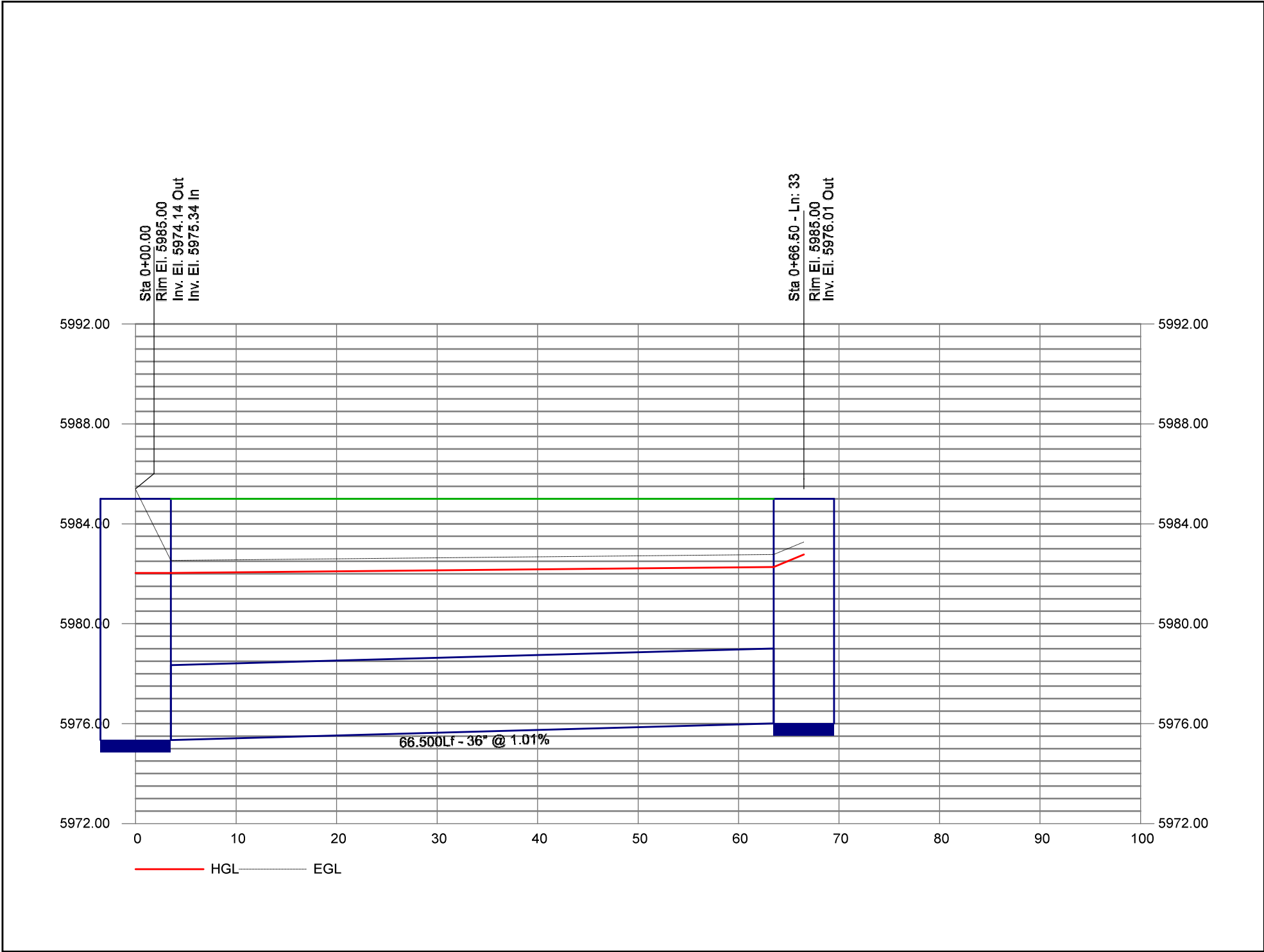
Storm Sewer Profile



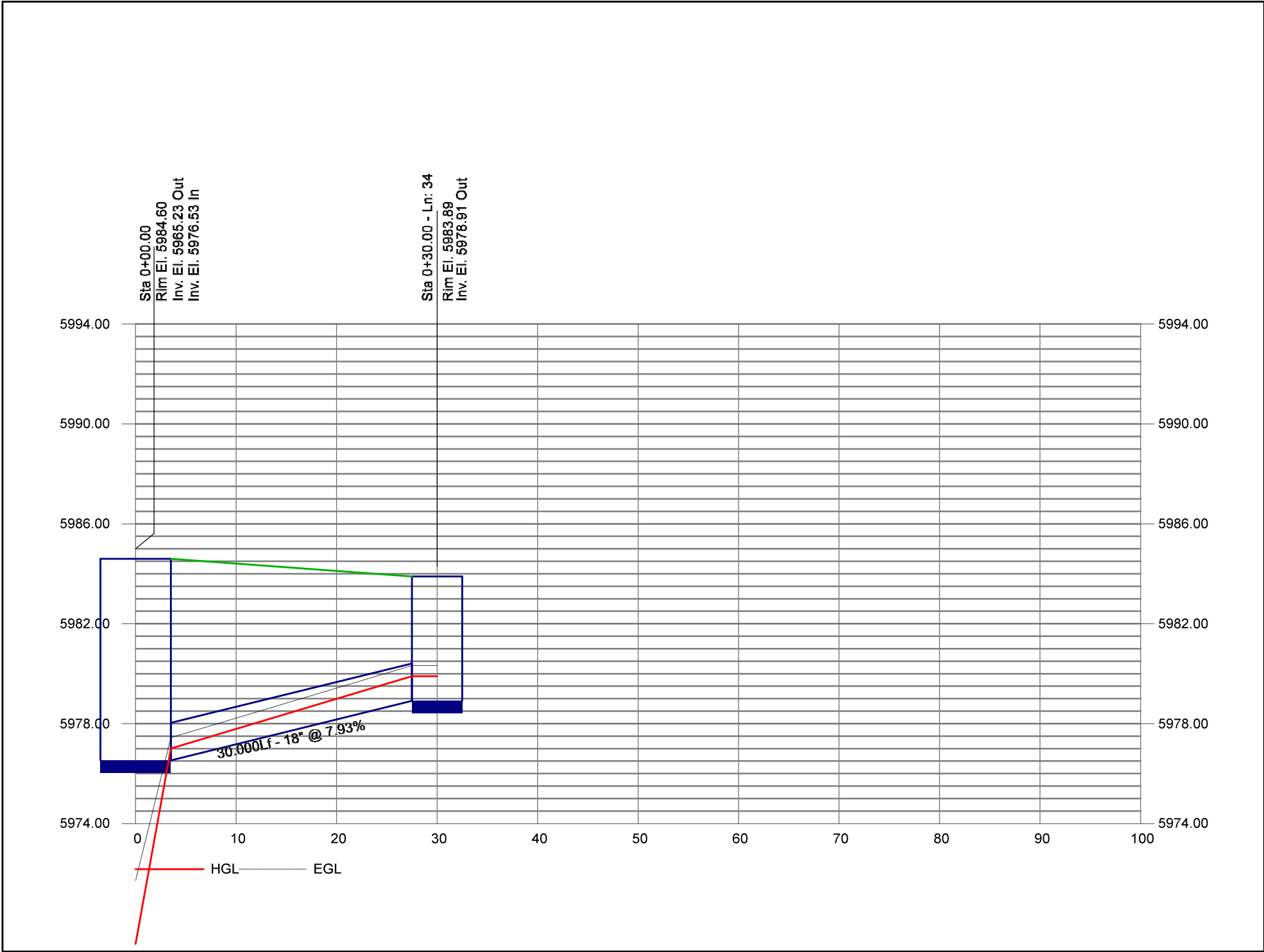
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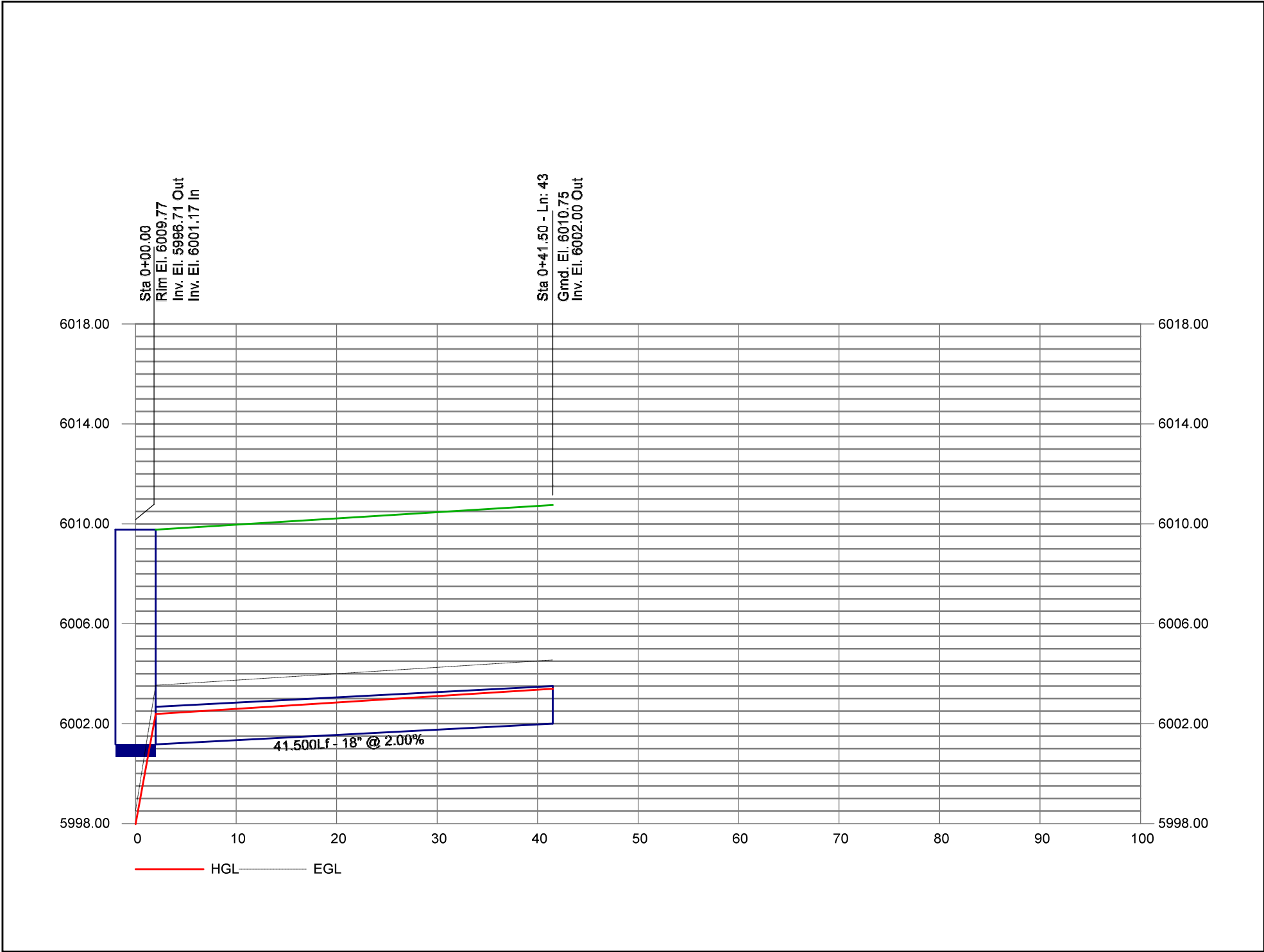
Storm Sewer Profile



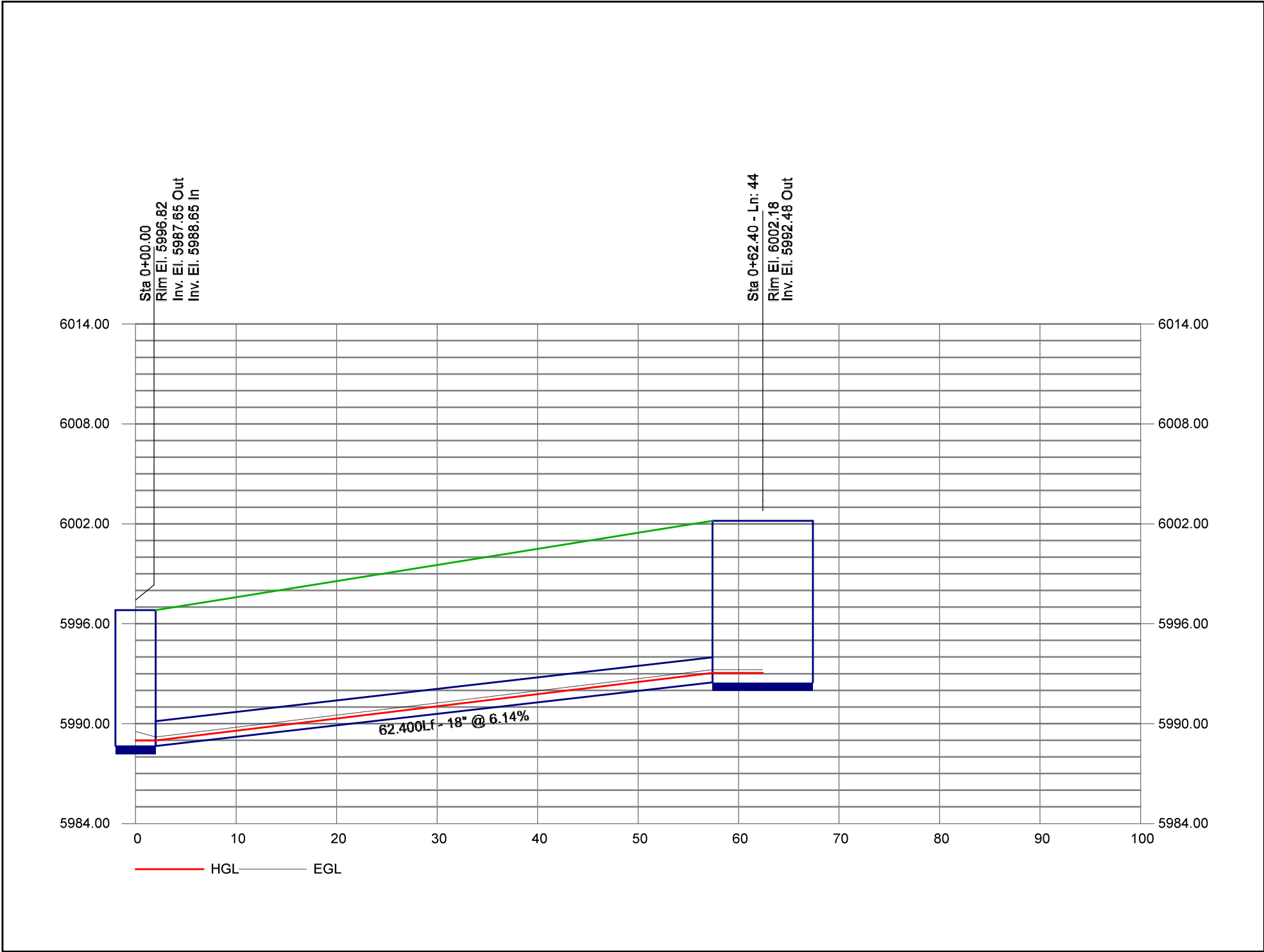
Storm Sewer Profile



Storm Sewer Profile

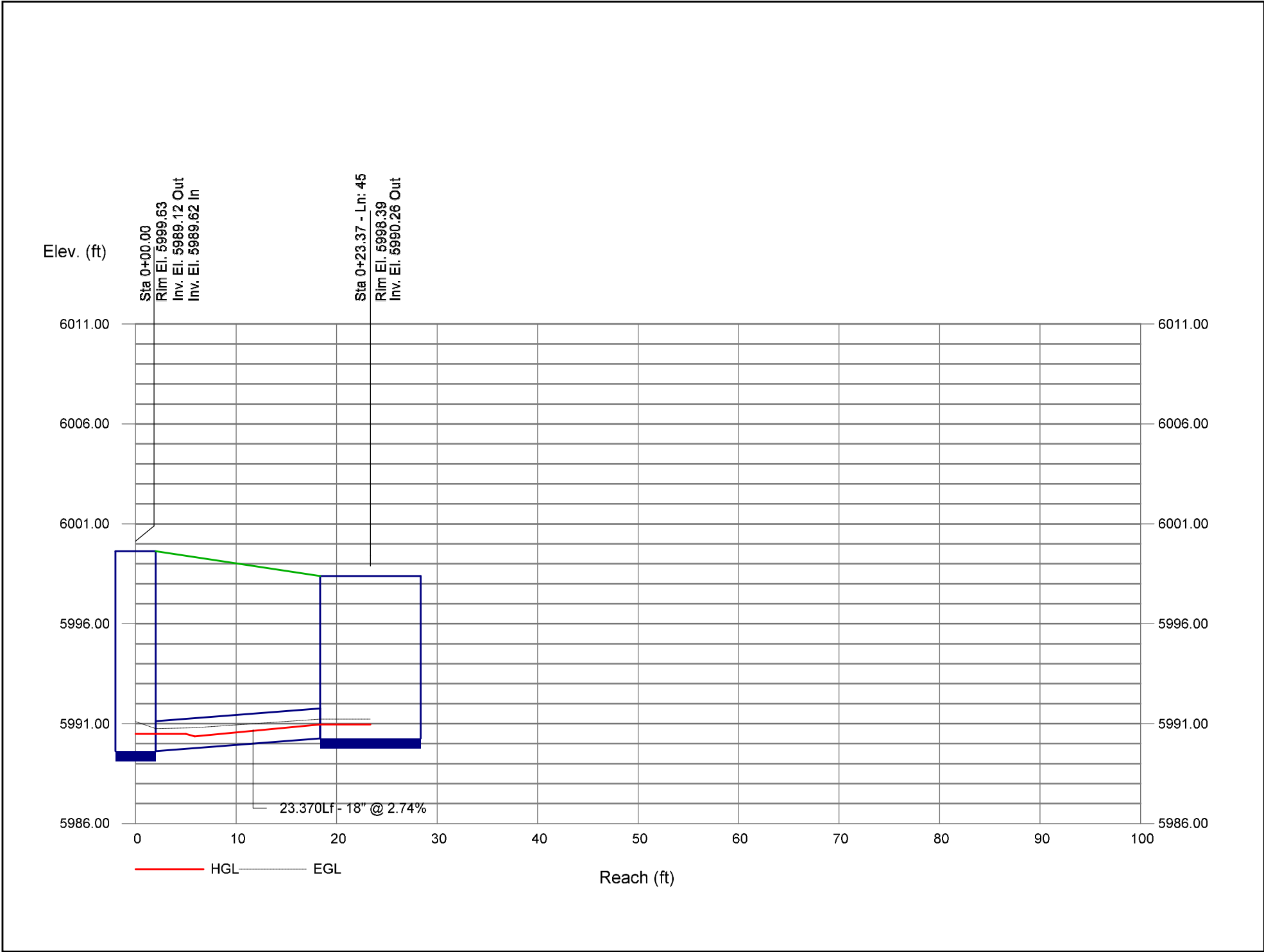


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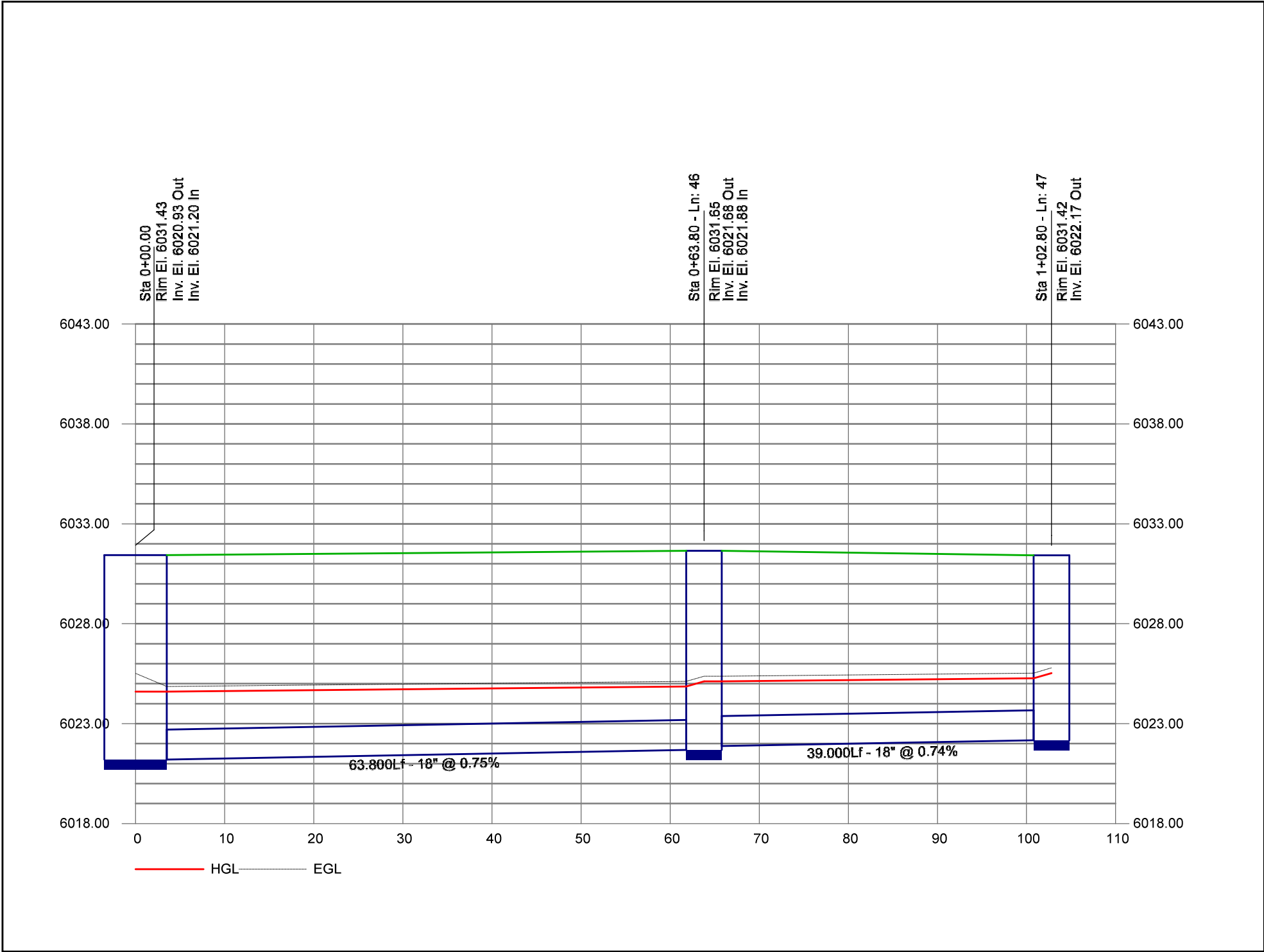




Storm Sewer Profile

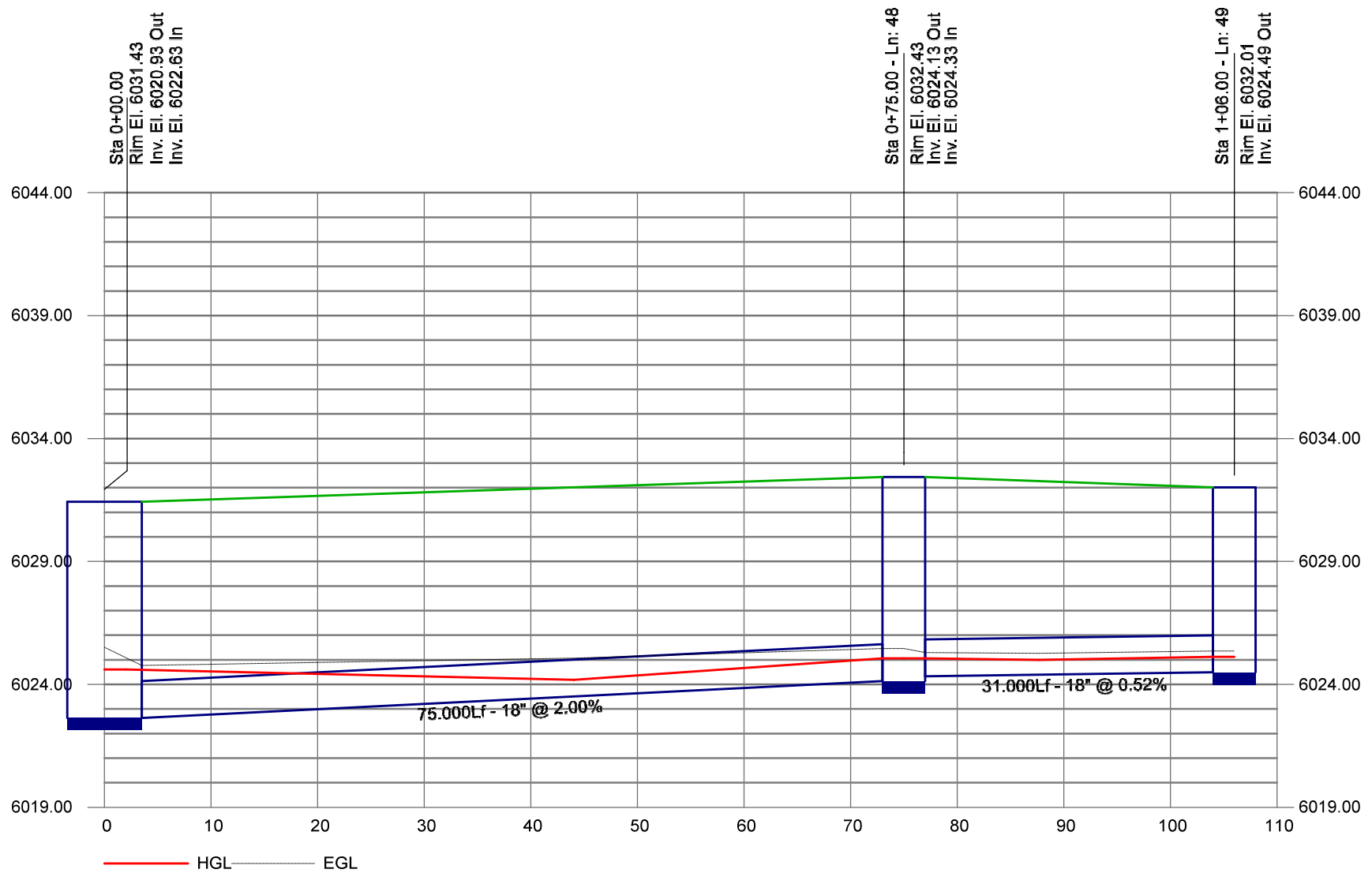


Storm Sewer Profile



# Storm Sewer Profile

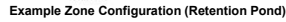
Proj. file: REV03-100YR.stm



## **APPENDIX E – POND DESIGN CALCULATIONS**

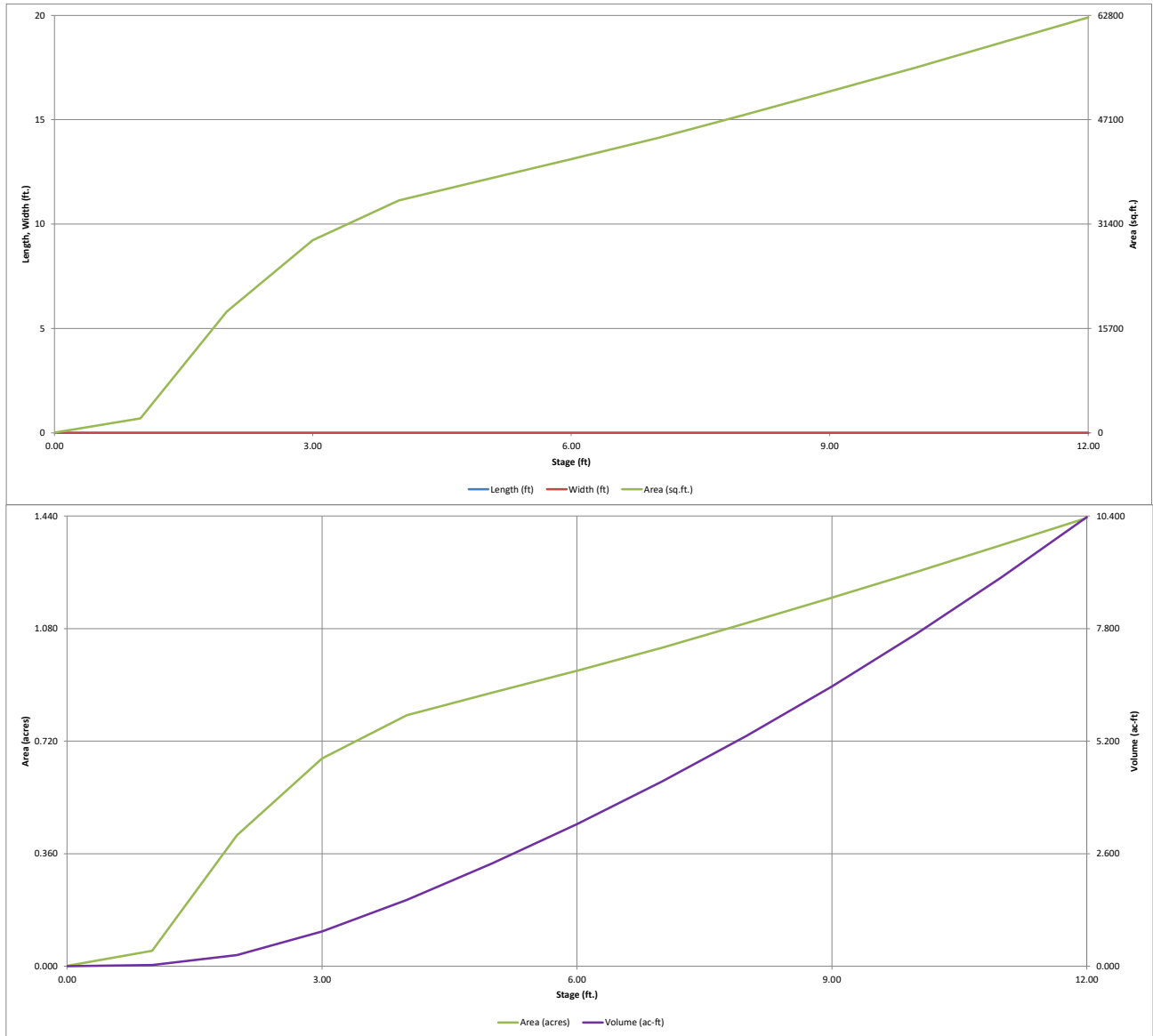
*MHFD-Detention, Version 4.06 (July 2022)*

**Basin ID: Pond 21 - As-built Storage and Outlet Structure**



# DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



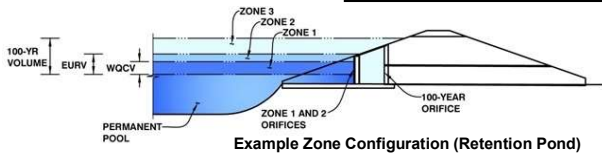


# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **RidgeGate East - Filing No. 5**

Basin ID: **Pond 21 - As-built Storage and Outlet Structure**



Example Zone Configuration (Retention Pond)

|                   | Estimated Stage (ft) | Estimated Volume (ac-ft) | Outlet Type          |
|-------------------|----------------------|--------------------------|----------------------|
| Zone 1 (WQCV)     | 3.67                 | 1.272                    | Orifice Plate        |
| Zone 2 (EURV)     | 6.47                 | 2.461                    | Orifice Plate        |
| Zone 3 (100-year) | 8.26                 | 1.871                    | Weir&Pipe (Restrict) |
| Total (all zones) |                      | 5.604                    |                      |

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =  ft (distance below the filtration media surface)  
Underdrain Orifice Diameter =  inches

Calculated Parameters for Underdrain  
Underdrain Orifice Area =  ft<sup>2</sup>  
Underdrain Orifice Centroid =  feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Centroid of Lowest Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Orifice Plate =  ft (relative to basin bottom at Stage = 0 ft)  
Orifice Plate: Orifice Vertical Spacing =  inches  
Orifice Plate: Orifice Area per Row =  sq. inches

Calculated Parameters for Plate  
WQ Orifice Area per Row =  ft<sup>2</sup>  
Elliptical Half-Width =  feet  
Elliptical Slot Centroid =  feet  
Elliptical Slot Area =  ft<sup>2</sup>

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

|                                | Row 1 (required) | Row 2 (optional) | Row 3 (optional) | Row 4 (optional) | Row 5 (optional) | Row 6 (optional) | Row 7 (optional) | Row 8 (optional) |
|--------------------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| Stage of Orifice Centroid (ft) | 0.00             | 1.93             | 4.14             |                  |                  |                  |                  |                  |
| Orifice Area (sq. inches)      | 6.00             | 3.50             | 6.00             |                  |                  |                  |                  |                  |

|                                | Row 9 (optional) | Row 10 (optional) | Row 11 (optional) | Row 12 (optional) | Row 13 (optional) | Row 14 (optional) | Row 15 (optional) | Row 16 (optional) |
|--------------------------------|------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Stage of Orifice Centroid (ft) |                  |                   |                   |                   |                   |                   |                   |                   |
| Orifice Area (sq. inches)      |                  |                   |                   |                   |                   |                   |                   |                   |

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Depth at top of Zone using Vertical Orifice =  ft (relative to basin bottom at Stage = 0 ft)  
Vertical Orifice Diameter =  inches

Calculated Parameters for Vertical Orifice  
Vertical Orifice Area =  ft<sup>2</sup>  
Vertical Orifice Centroid =  feet

User Input: Overflow Weir (Dropbox with Flat or Sloped Grate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

Overflow Weir Front Edge Height, H<sub>o</sub> =  ft (relative to basin bottom at Stage = 0 ft)  
Overflow Weir Front Edge Length =  feet  
Overflow Weir Grate Slope =  H:V  
Horiz. Length of Weir Sides =  feet  
Overflow Grate Type =   
Debris Clogging % =

Calculated Parameters for Overflow Weir  
Height of Grate Upper Edge, H<sub>u</sub> =  feet  
Overflow Weir Slope Length =  feet  
Grate Open Area / 100-yr Orifice Area =   
Overflow Grate Open Area w/o Debris =  ft<sup>2</sup>  
Overflow Grate Open Area w/ Debris =  ft<sup>2</sup>

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

Depth to Invert of Outlet Pipe =  ft (distance below basin bottom at Stage = 0 ft)  
Outlet Pipe Diameter =  inches  
Restrictor Plate Height Above Pipe Invert =  inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate  
Outlet Orifice Area =  ft<sup>2</sup>  
Outlet Orifice Centroid =  feet  
Half-Central Angle of Restrictor Plate on Pipe =  radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage =  ft (relative to basin bottom at Stage = 0 ft)  
Spillway Crest Length =  feet  
Spillway End Slopes =  H:V  
Freeboard above Max Water Surface =  feet

Calculated Parameters for Spillway  
Spillway Design Flow Depth =  feet  
Stage at Top of Freeboard =  feet  
Basin Area at Top of Freeboard =  acres  
Basin Volume at Top of Freeboard =  acre-ft

Routed Hydrograph Results

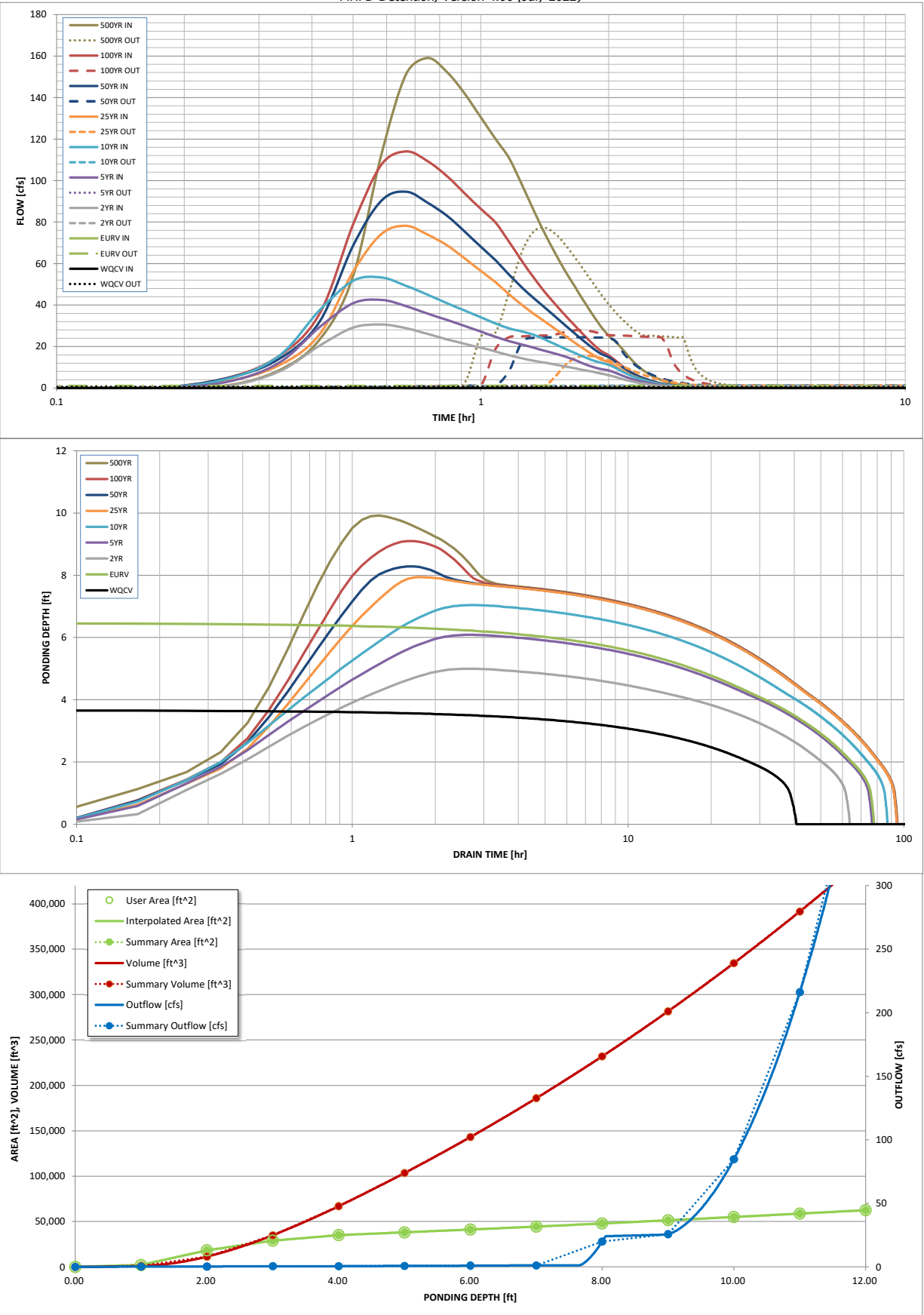
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

|                                                 | WQCV  | EURV  | 2 Year | 5 Year | 10 Year | 25 Year         | 50 Year        | 100 Year | 500 Year |
|-------------------------------------------------|-------|-------|--------|--------|---------|-----------------|----------------|----------|----------|
| Design Storm Return Period =                    | N/A   | N/A   | 0.84   | 1.10   | 1.33    | 1.68            | 1.97           | 2.28     | 3.07     |
| One-Hour Rainfall Depth (in) =                  | 1.272 | 3.733 | 2.522  | 3.553  | 4.524   | 6.173           | 7.476          | 8.951    | 12.570   |
| CUHP Runoff Volume (acre-ft) =                  | N/A   | N/A   | 2.522  | 3.553  | 4.524   | 6.173           | 7.476          | 8.951    | 12.570   |
| Inflow Hydrograph Volume (acre-ft) =            | N/A   | N/A   | 0.3    | 2.9    | 7.9     | 21.3            | 29.3           | 40.2     | 63.4     |
| CUHP Predevelopment Peak Q (cfs) =              | N/A   | N/A   |        |        |         |                 |                |          |          |
| OPTIONAL Override Predevelopment Peak Q (cfs) = | N/A   | N/A   |        |        |         |                 |                |          |          |
| Predevelopment Unit Peak Flow, q (cfs/acre) =   | N/A   | N/A   | 0.01   | 0.06   | 0.16    | 0.42            | 0.58           | 0.79     | 1.25     |
| Peak Inflow Q (cfs) =                           | N/A   | N/A   | 30.6   | 42.5   | 53.3    | 78.2            | 94.6           | 114.0    | 159.1    |
| Peak Outflow Q (cfs) =                          | 0.5   | 1.1   | 0.8    | 1.0    | 1.1     | 15.5            | 24.4           | 27.8     | 77.2     |
| Ratio Peak Outflow to Predevelopment Q =        | N/A   | N/A   | N/A    | 0.3    | 0.1     | 0.7             | 0.8            | 0.7      | 1.2      |
| Structure Controlling Flow =                    | Plate | Plate | Plate  | Plate  | Plate   | Overflow Weir 1 | Outlet Plate 1 | Spillway | Spillway |
| Max Velocity through Grate 1 (fps) =            | N/A   | N/A   | N/A    | N/A    | N/A     | 0.6             | 1.0            | 1.1      | 1.1      |
| Max Velocity through Grate 2 (fps) =            | N/A   | N/A   | N/A    | N/A    | N/A     | N/A             | N/A            | N/A      | N/A      |
| Time to Drain 97% of Inflow Volume (hours) =    | 38    | 71    | 59     | 70     | 80      | 84              | 83             | 81       | 78       |
| Time to Drain 99% of Inflow Volume (hours) =    | 40    | 75    | 62     | 74     | 84      | 90              | 90             | 89       | 88       |
| Maximum Ponding Depth (ft) =                    | 3.67  | 6.47  | 5.00   | 6.09   | 7.04    | 7.94            | 8.29           | 9.10     | 9.92     |
| Area at Maximum Ponding Depth (acres) =         | 0.76  | 0.98  | 0.87   | 0.95   | 1.02    | 1.09            | 1.12           | 1.19     | 1.25     |
| Maximum Volume Stored (acre-ft) =               | 1.278 | 3.737 | 2.366  | 3.361  | 4.308   | 5.260           | 5.636          | 6.582    | 7.571    |

**THIS MHFD DETENTION SPREADSHEET WAS USED TO PRODUCE STORAGE AND RATING CURVES ONLY.**

# DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



| S-A-V-D Chart Axis Override | X-axis | Left Y-Axis | Right Y-Axis |
|-----------------------------|--------|-------------|--------------|
| minimum bound               |        |             |              |
| maximum bound               |        |             |              |

# DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

## Inflow Hydrographs

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

|               | SOURCE  | CUHP       | CUHP       | CUHP         | CUHP         | CUHP          | CUHP          | CUHP          | CUHP           | CUHP           |
|---------------|---------|------------|------------|--------------|--------------|---------------|---------------|---------------|----------------|----------------|
| Time Interval | TIME    | WQCV [cfs] | EURV [cfs] | 2 Year [cfs] | 5 Year [cfs] | 10 Year [cfs] | 25 Year [cfs] | 50 Year [cfs] | 100 Year [cfs] | 500 Year [cfs] |
| 5.00 min      | 0:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 0:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 0:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 1.12           |
|               | 0:15:00 | 0.00       | 0.00       | 0.98         | 2.85         | 4.15          | 3.16          | 4.56          | 4.71           | 8.43           |
|               | 0:20:00 | 0.00       | 0.00       | 7.80         | 12.00        | 15.27         | 10.79         | 13.79         | 15.22          | 23.25          |
|               | 0:25:00 | 0.00       | 0.00       | 20.39        | 29.27        | 37.42         | 25.80         | 31.92         | 35.71          | 53.84          |
|               | 0:30:00 | 0.00       | 0.00       | 29.12        | 40.87        | 51.68         | 55.99         | 68.59         | 78.73          | 112.77         |
|               | 0:35:00 | 0.00       | 0.00       | 30.62        | 42.48        | 53.27         | 74.28         | 90.35         | 107.69         | 151.30         |
|               | 0:40:00 | 0.00       | 0.00       | 28.85        | 39.45        | 49.28         | 78.18         | 94.64         | 114.01         | 159.05         |
|               | 0:45:00 | 0.00       | 0.00       | 26.04        | 35.80        | 44.93         | 73.85         | 89.21         | 109.30         | 152.14         |
|               | 0:50:00 | 0.00       | 0.00       | 23.44        | 32.76        | 40.85         | 68.73         | 82.95         | 102.02         | 141.87         |
|               | 0:55:00 | 0.00       | 0.00       | 21.31        | 29.95        | 37.33         | 62.43         | 75.35         | 93.78          | 130.39         |
|               | 1:00:00 | 0.00       | 0.00       | 19.42        | 27.20        | 34.08         | 56.40         | 68.10         | 86.31          | 120.01         |
|               | 1:05:00 | 0.00       | 0.00       | 17.62        | 24.65        | 31.11         | 50.92         | 61.52         | 79.65          | 110.72         |
|               | 1:10:00 | 0.00       | 0.00       | 15.79        | 22.61        | 28.73         | 45.18         | 54.62         | 70.40          | 98.00          |
|               | 1:15:00 | 0.00       | 0.00       | 14.33        | 20.99        | 27.27         | 40.03         | 48.46         | 61.20          | 85.49          |
|               | 1:20:00 | 0.00       | 0.00       | 13.19        | 19.42        | 25.62         | 35.78         | 43.32         | 53.15          | 74.35          |
|               | 1:25:00 | 0.00       | 0.00       | 12.19        | 17.89        | 23.37         | 32.06         | 38.78         | 46.23          | 64.64          |
|               | 1:30:00 | 0.00       | 0.00       | 11.28        | 16.48        | 21.03         | 28.42         | 34.33         | 40.21          | 56.18          |
|               | 1:35:00 | 0.00       | 0.00       | 10.39        | 15.13        | 18.87         | 24.97         | 30.10         | 34.90          | 48.71          |
|               | 1:40:00 | 0.00       | 0.00       | 9.49         | 13.44        | 16.84         | 21.77         | 26.19         | 29.99          | 41.82          |
|               | 1:45:00 | 0.00       | 0.00       | 8.61         | 11.69        | 14.97         | 18.80         | 22.58         | 25.46          | 35.48          |
|               | 1:50:00 | 0.00       | 0.00       | 7.87         | 10.20        | 13.40         | 16.12         | 19.32         | 21.40          | 29.83          |
|               | 1:55:00 | 0.00       | 0.00       | 7.00         | 9.19         | 12.25         | 13.89         | 16.61         | 18.04          | 25.20          |
|               | 2:00:00 | 0.00       | 0.00       | 6.22         | 8.46         | 11.23         | 12.41         | 14.85         | 15.77          | 22.11          |
|               | 2:05:00 | 0.00       | 0.00       | 5.21         | 7.19         | 9.52          | 10.36         | 12.39         | 12.99          | 18.25          |
|               | 2:10:00 | 0.00       | 0.00       | 4.21         | 5.80         | 7.69          | 8.22          | 9.84          | 10.17          | 14.31          |
|               | 2:15:00 | 0.00       | 0.00       | 3.37         | 4.61         | 6.15          | 6.45          | 7.71          | 7.85           | 11.05          |
|               | 2:20:00 | 0.00       | 0.00       | 2.70         | 3.68         | 4.90          | 5.09          | 6.08          | 6.07           | 8.54           |
|               | 2:25:00 | 0.00       | 0.00       | 2.14         | 2.93         | 3.88          | 4.00          | 4.77          | 4.66           | 6.56           |
|               | 2:30:00 | 0.00       | 0.00       | 1.69         | 2.30         | 3.04          | 3.12          | 3.71          | 3.57           | 5.03           |
|               | 2:35:00 | 0.00       | 0.00       | 1.32         | 1.78         | 2.34          | 2.41          | 2.86          | 2.75           | 3.86           |
|               | 2:40:00 | 0.00       | 0.00       | 1.04         | 1.37         | 1.79          | 1.84          | 2.19          | 2.11           | 2.97           |
|               | 2:45:00 | 0.00       | 0.00       | 0.80         | 1.05         | 1.38          | 1.42          | 1.68          | 1.64           | 2.30           |
|               | 2:50:00 | 0.00       | 0.00       | 0.62         | 0.80         | 1.07          | 1.10          | 1.31          | 1.29           | 1.81           |
|               | 2:55:00 | 0.00       | 0.00       | 0.45         | 0.59         | 0.80          | 0.83          | 0.99          | 0.98           | 1.37           |
|               | 3:00:00 | 0.00       | 0.00       | 0.32         | 0.42         | 0.57          | 0.61          | 0.72          | 0.71           | 0.99           |
|               | 3:05:00 | 0.00       | 0.00       | 0.21         | 0.28         | 0.38          | 0.41          | 0.49          | 0.48           | 0.68           |
|               | 3:10:00 | 0.00       | 0.00       | 0.12         | 0.17         | 0.23          | 0.26          | 0.31          | 0.30           | 0.42           |
|               | 3:15:00 | 0.00       | 0.00       | 0.06         | 0.09         | 0.12          | 0.14          | 0.16          | 0.16           | 0.22           |
|               | 3:20:00 | 0.00       | 0.00       | 0.02         | 0.04         | 0.05          | 0.06          | 0.07          | 0.06           | 0.09           |
|               | 3:25:00 | 0.00       | 0.00       | 0.00         | 0.01         | 0.01          | 0.01          | 0.01          | 0.01           | 0.01           |
|               | 3:30:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 3:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:15:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:20:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:25:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:30:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 4:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:05:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:10:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:15:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:20:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:25:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:30:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:35:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:40:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:45:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:50:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 5:55:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |
|               | 6:00:00 | 0.00       | 0.00       | 0.00         | 0.00         | 0.00          | 0.00          | 0.00          | 0.00           | 0.00           |

## DETENTION BASIN OUTLET STRUCTURE DESIGN

*MHFD-Detention, Version 4.06 (July 2022)*

### Summary Stage-Area-Volume-Discharge Relationships

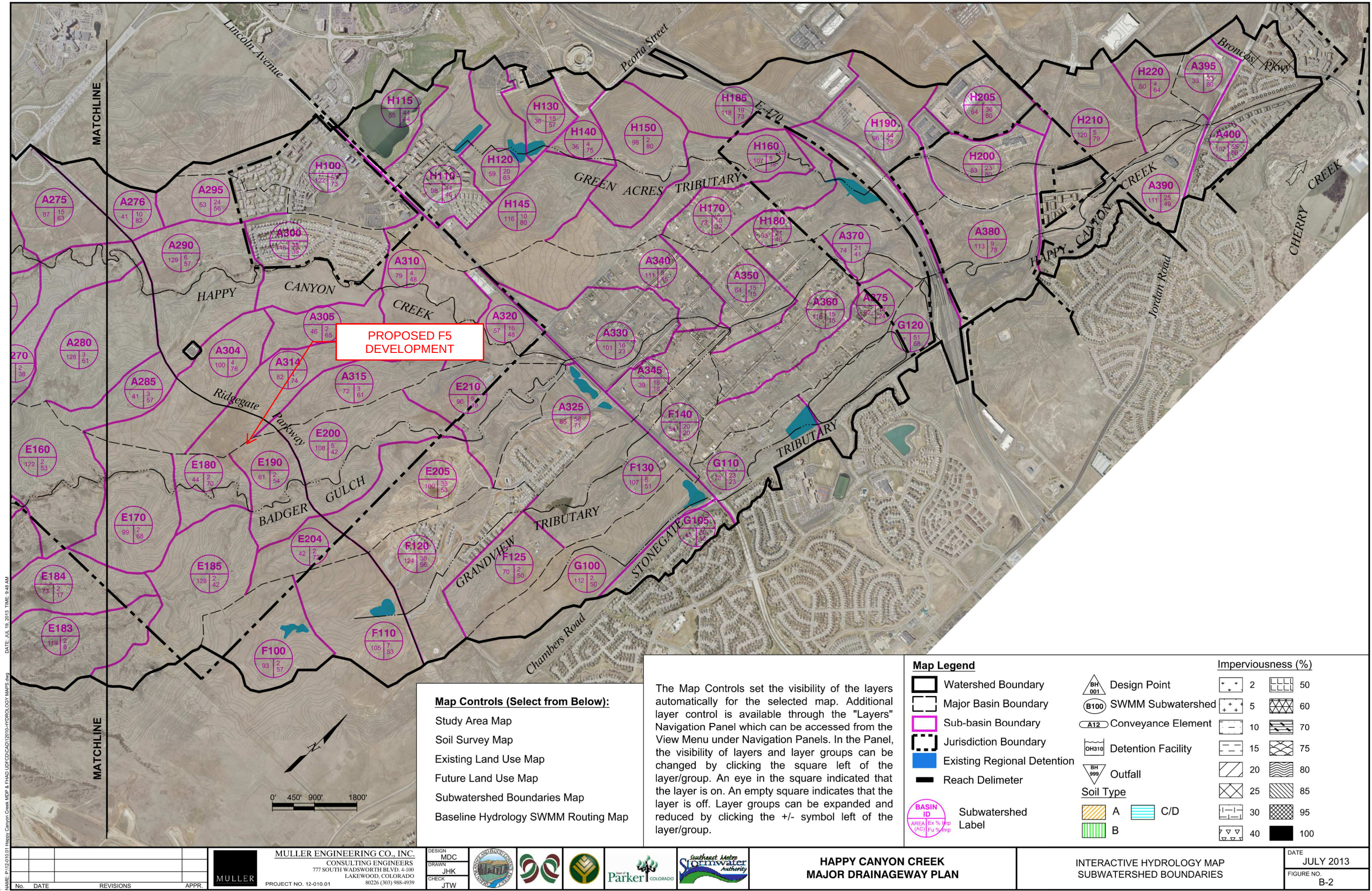
The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

[illegible]

## **APPENDIX F – CUHP / SWMM CALCULATIONS**







|               |               |                                                                                                           |  |
|---------------|---------------|-----------------------------------------------------------------------------------------------------------|--|
| Comment       | Lone Tree, CO |                                                                                                           |  |
| 1Hr Depth     | 2.27          | NOAA Atlas 14 Point Precipitation Frequency Estimates: CO (Note: Use 60-minute recurrence interval depth) |  |
| Return Period | 100           | Years                                                                                                     |  |
| Time          | Depth         | CurveValue                                                                                                |  |
| 0:05          | 0.023         | 0.01                                                                                                      |  |
| 0:10          | 0.068         | 0.03                                                                                                      |  |
| 0:15          | 0.104         | 0.046                                                                                                     |  |
| 0:20          | 0.182         | 0.08                                                                                                      |  |
| 0:25          | 0.318         | 0.14                                                                                                      |  |
| 0:30          | 0.568         | 0.25                                                                                                      |  |
| 0:35          | 0.318         | 0.14                                                                                                      |  |
| 0:40          | 0.182         | 0.08                                                                                                      |  |
| 0:45          | 0.141         | 0.062                                                                                                     |  |
| 0:50          | 0.114         | 0.05                                                                                                      |  |
| 0:55          | 0.091         | 0.04                                                                                                      |  |
| 1:00          | 0.091         | 0.04                                                                                                      |  |
| 1:05          | 0.091         | 0.04                                                                                                      |  |
| 1:10          | 0.045         | 0.02                                                                                                      |  |
| 1:15          | 0.045         | 0.02                                                                                                      |  |
| 1:20          | 0.027         | 0.012                                                                                                     |  |
| 1:25          | 0.027         | 0.012                                                                                                     |  |
| 1:30          | 0.027         | 0.012                                                                                                     |  |
| 1:35          | 0.027         | 0.012                                                                                                     |  |
| 1:40          | 0.027         | 0.012                                                                                                     |  |
| 1:45          | 0.027         | 0.012                                                                                                     |  |
| 1:50          | 0.027         | 0.012                                                                                                     |  |
| 1:55          | 0.027         | 0.012                                                                                                     |  |
| 2:00          | 0.027         | 0.012                                                                                                     |  |
| 2:05          | 0             |                                                                                                           |  |



**Summary of CUHP Input Parameters (Version 2.0.1)**

| Catchment Name/ID | SWMM Node/ID | Raingage Name/ID | Area<br>(sq.mi.) | Dist. to<br>Centroid<br>(miles) | Length<br>(miles) | Slope<br>(ft./ft.) | Percent<br>Imperv. | Depression Storage   |                     | Horton's Infiltration Parameters |                         |                             | DCIA Level and Fractions |                                   |                              | Percent Eff.<br>Imperv. |
|-------------------|--------------|------------------|------------------|---------------------------------|-------------------|--------------------|--------------------|----------------------|---------------------|----------------------------------|-------------------------|-----------------------------|--------------------------|-----------------------------------|------------------------------|-------------------------|
|                   |              |                  |                  |                                 |                   |                    |                    | Pervious<br>(inches) | Imperv.<br>(inches) | Initial Rate<br>(in./hr.)        | Final Rate<br>(in./hr.) | Decay<br>Coeff.<br>(1/sec.) | DCIA Level               | Dir. Con't<br>Imperv.<br>Fraction | Receiv.<br>Perv.<br>Fraction |                         |
| A100              | A100         | 100YR-1HR        | 0.114            | 0.256                           | 0.670             | 0.053              | 43.1               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.82                              | 0.21                         | 42.02                   |
| A105              | A105         | 100YR-1HR        | 0.172            | 0.619                           | 1.018             | 0.045              | 20.3               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.41                              | 0.13                         | 18.95                   |
| A110              | A110         | 100YR-1HR        | 0.121            | 0.098                           | 0.413             | 0.046              | 48.0               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.84                              | 0.22                         | 46.95                   |
| A120              | A120         | 100YR-1HR        | 0.170            | 0.130                           | 0.703             | 0.036              | 48.0               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.84                              | 0.22                         | 46.95                   |
| A125              | A125         | 100YR-1HR        | 0.117            | 0.251                           | 0.534             | 0.035              | 48.0               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.84                              | 0.22                         | 46.95                   |
| A130              | A130         | 100YR-1HR        | 0.073            | 0.137                           | 0.424             | 0.034              | 28.0               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.56                              | 0.16                         | 26.57                   |
| A134              | A134         | 100YR-1HR        | 0.186            | 0.295                           | 0.667             | 0.047              | 29.0               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.58                              | 0.17                         | 27.58                   |
| A135              | A135         | 100YR-1HR        | 0.160            | 0.370                           | 0.835             | 0.041              | 32.0               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.64                              | 0.18                         | 30.62                   |
| A140              | A140         | 100YR-1HR        | 0.182            | 0.237                           | 0.772             | 0.045              | 31.7               | 0.50                 | 0.10                | 3.08                             | 0.51                    | 0.0018                      | 0.00                     | 0.63                              | 0.18                         | 30.29                   |
| A150              | A150         | 100YR-1HR        | 0.180            | 0.144                           | 0.746             | 0.043              | 16.0               | 0.50                 | 0.10                | 3.15                             | 0.51                    | 0.0018                      | 0.00                     | 0.32                              | 0.12                         | 14.72                   |
| A160              | A160         | 100YR-1HR        | 0.167            | 0.210                           | 0.598             | 0.049              | 11.0               | 0.50                 | 0.10                | 3.23                             | 0.52                    | 0.0018                      | 0.00                     | 0.22                              | 0.10                         | 9.91                    |
| A170              | A170         | 100YR-1HR        | 0.136            | 0.275                           | 0.537             | 0.041              | 9.0                | 0.50                 | 0.10                | 3.23                             | 0.52                    | 0.0018                      | 0.00                     | 0.18                              | 0.09                         | 8.05                    |
| A180              | A180         | 100YR-1HR        | 0.133            | 0.158                           | 0.761             | 0.038              | 7.2                | 0.50                 | 0.10                | 3.38                             | 0.53                    | 0.0018                      | 0.00                     | 0.14                              | 0.07                         | 6.39                    |
| A190              | A190         | 100YR-1HR        | 0.139            | 0.143                           | 0.595             | 0.047              | 8.5                | 0.50                 | 0.10                | 3.30                             | 0.52                    | 0.0018                      | 0.00                     | 0.17                              | 0.09                         | 7.58                    |
| A195              | A195         | 100YR-1HR        | 0.118            | 0.503                           | 0.884             | 0.040              | 13.9               | 0.50                 | 0.10                | 3.15                             | 0.51                    | 0.0018                      | 0.00                     | 0.28                              | 0.11                         | 12.70                   |
| A200              | A200         | 100YR-1HR        | 0.140            | 0.171                           | 0.620             | 0.042              | 14.0               | 0.50                 | 0.10                | 3.15                             | 0.51                    | 0.0018                      | 0.00                     | 0.28                              | 0.11                         | 12.79                   |
| A210              | A210         | 100YR-1HR        | 0.130            | 0.456                           | 0.808             | 0.033              | 19.8               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.40                              | 0.13                         | 18.46                   |
| A215              | A215         | 100YR-1HR        | 0.184            | 0.456                           | 0.831             | 0.052              | 7.0                | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.14                              | 0.07                         | 6.27                    |
| A220              | A220         | 100YR-1HR        | 0.150            | 0.203                           | 0.916             | 0.036              | 6.4                | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.13                              | 0.06                         | 5.72                    |
| A230              | A230         | 100YR-1HR        | 0.047            | 0.068                           | 0.329             | 0.040              | 10.4               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.21                              | 0.10                         | 9.39                    |
| A234              | A234         | 100YR-1HR        | 0.133            | 0.288                           | 0.500             | 0.054              | 2.0                | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.04                              | 0.02                         | 1.77                    |
| A235              | A235         | 100YR-1HR        | 0.151            | 0.255                           | 0.641             | 0.052              | 2.8                | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.06                              | 0.03                         | 2.48                    |
| A240              | A240         | 100YR-1HR        | 0.136            | 0.137                           | 0.756             | 0.052              | 10.0               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.20                              | 0.10                         | 9.01                    |
| A245              | A245         | 100YR-1HR        | 0.052            | 0.154                           | 0.339             | 0.062              | 10.2               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.20                              | 0.10                         | 9.20                    |
| A250              | A250         | 100YR-1HR        | 0.064            | 0.243                           | 0.526             | 0.035              | 11.2               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.22                              | 0.10                         | 10.15                   |
| A260              | A260         | 100YR-1HR        | 0.144            | 0.340                           | 0.612             | 0.023              | 9.1                | 0.50                 | 0.10                | 3.23                             | 0.52                    | 0.0018                      | 0.00                     | 0.18                              | 0.09                         | 8.14                    |
| A263              | A263         | 100YR-1HR        | 0.121            | 0.405                           | 0.790             | 0.052              | 2.0                | 0.50                 | 0.10                | 3.15                             | 0.51                    | 0.0018                      | 0.00                     | 0.04                              | 0.02                         | 1.76                    |
| A264              | A264         | 100YR-1HR        | 0.153            | 0.525                           | 1.027             | 0.049              | 2.0                | 0.50                 | 0.10                | 3.23                             | 0.52                    | 0.0018                      | 0.00                     | 0.04                              | 0.02                         | 1.76                    |
| A265              | A265         | 100YR-1HR        | 0.080            | 0.255                           | 0.656             | 0.053              | 2.0                | 0.50                 | 0.10                | 3.38                             | 0.53                    | 0.0018                      | 0.00                     | 0.04                              | 0.02                         | 1.75                    |
| A270              | A270         | 100YR-1HR        | 0.182            | 0.538                           | 1.056             | 0.028              | 2.4                | 0.50                 | 0.10                | 3.08                             | 0.51                    | 0.0018                      | 0.00                     | 0.05                              | 0.02                         | 2.12                    |
| A275              | A275         | 100YR-1HR        | 0.131            | 0.365                           | 0.631             | 0.055              | 53.1               | 0.50                 | 0.10                | 3.08                             | 0.51                    | 0.0018                      | 0.00                     | 0.87                              | 0.24                         | 52.10                   |
| A276              | A276         | 100YR-1HR        | 0.060            | 0.120                           | 0.357             | 0.039              | 10.0               | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.20                              | 0.10                         | 9.01                    |
| A280              | A280         | 100YR-1HR        | 0.200            | 0.345                           | 0.797             | 0.051              | 3.0                | 0.50                 | 0.10                | 3.23                             | 0.52                    | 0.0018                      | 0.00                     | 0.06                              | 0.03                         | 2.65                    |
| A285              | A285         | 100YR-1HR        | 0.064            | 0.227                           | 0.600             | 0.047              | 3.0                | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.06                              | 0.03                         | 2.66                    |
| A290              | A290         | 100YR-1HR        | 0.202            | 0.318                           | 0.745             | 0.026              | 6.2                | 0.50                 | 0.10                | 3.60                             | 0.54                    | 0.0018                      | 0.00                     | 0.12                              | 0.06                         | 5.47                    |
| A295              | A295         | 100YR-1HR        | 0.083            | 0.112                           | 0.379             | 0.034              | 23.6               | 0.50                 | 0.10                | 3.38                             | 0.53                    | 0.0018                      | 0.00                     | 0.47                              | 0.14                         | 22.09                   |
| A300              | A300         | 100YR-1HR        | 0.181            | 0.316                           | 0.677             | 0.023              | 38.0               | 0.50                 | 0.10                | 3.53                             | 0.54                    | 0.0018                      | 0.00                     | 0.76                              | 0.19                         | 36.69                   |
| A304              | A304         | 100YR-1HR        | 0.156            | 0.414                           | 0.972             | 0.031              | 4.4                | 0.50                 | 0.10                | 3.00                             | 0.50                    | 0.0018                      | 0.00                     | 0.09                              | 0.04                         | 3.92                    |
| A305              | A305         | 100YR-1HR        | 0.072            | 0.301                           | 0.665             | 0.031              | 2.0                | 0.50                 | 0.10                | 3.23                             | 0.52                    | 0.0018                      | 0.00                     | 0.04                              | 0.02                         | 1.76                    |
| A310              | A310         | 100YR-1HR        | 0.123            | 0.250                           | 0.720             | 0.016              | 3.7                | 0.50                 | 0.10                | 4.05                             | 0.57                    | 0.0018                      | 0.00                     | 0.07                              | 0.04                         | 3.21                    |
| A314              | A314         | 100YR-1HR        | 0.129            | 0.573                           | 1.055             | 0.028              | 4.3                | 0.50                 | 0.10                | 3.15                             | 0.51                    | 0.0018                      | 0.00                     | 0.09                              | 0.04                         | 3.81                    |
| A315              | A315         | 100YR-1HR        | 0.112            | 0.407                           | 1.038             | 0.030              | 2.7                | 0.50                 | 0.10                | 4.13                             | 0.58                    | 0.0018                      | 0.00                     | 0.05                              | 0.03                         | 2.33                    |
| A320              | A320         | 100YR-1HR        | 0.089            | 0.277                           | 0.727             | 0.016              | 15.8               | 0.50                 | 0.10                | 4.05                             | 0.57                    | 0.0018                      | 0.00                     | 0.32                              | 0.12                         | 14.31                   |
| A325              | A325         | 100YR-1HR        | 0.133            | 0.248                           | 0.650             | 0.022              | 58.4               | 0.50                 | 0.10                | 3.75                             | 0.55                    | 0.0018                      | 0.00                     | 0.89                              | 0.26                         | 57.38                   |
| A330              | A330         | 100YR-1HR        | 0.158            | 0.259                           | 0.948             | 0.019              | 16.2               | 0.50                 | 0.10                | 3.90                             | 0.56                    | 0.0018                      | 0.00                     | 0.32                              | 0.12                         | 14.73                   |
| A340              | A340         | 100YR-1HR        | 0.174            | 0.555                           | 1.134             | 0.019              | 9.0                | 0.50                 | 0.10                | 3.23                             | 0.52                    | 0.0018                      | 0.00                     | 0.18                              | 0.09                         | 8.05                    |
| A345              | A345         | 100YR-1HR        | 0.061            | 0.341                           | 0.662             | 0.015              | 17.8               | 0.50                 | 0.10                | 4.43                             | 0.60                    | 0.0018                      | 0.00                     | 0.36                              | 0.12                         | 16.15                   |
| A350              | A350         | 100YR-1HR        | 0.100            | 0.205                           | 0.706             | 0.020              | 15.0               | 0.50                 | 0.10                | 3.75                             | 0.55                    | 0.0018                      | 0.00                     | 0.30                              | 0.12                         | 13.62                   |

|      |      |           |       |       |       |       |      |      |      |      |      |        |      |      |      |       |
|------|------|-----------|-------|-------|-------|-------|------|------|------|------|------|--------|------|------|------|-------|
| A360 | A360 | 100YR-1HR | 0.181 | 0.390 | 0.989 | 0.015 | 14.6 | 0.50 | 0.10 | 4.20 | 0.58 | 0.0018 | 0.00 | 0.29 | 0.11 | 13.13 |
| A370 | A370 | 100YR-1HR | 0.116 | 0.127 | 0.657 | 0.018 | 20.7 | 0.50 | 0.10 | 4.28 | 0.59 | 0.0018 | 0.00 | 0.41 | 0.13 | 19.01 |
| A375 | A375 | 100YR-1HR | 0.143 | 0.595 | 1.231 | 0.022 | 14.0 | 0.50 | 0.10 | 3.90 | 0.56 | 0.0018 | 0.00 | 0.28 | 0.11 | 12.63 |
| A380 | A380 | 100YR-1HR | 0.177 | 0.268 | 0.768 | 0.014 | 8.6  | 0.50 | 0.10 | 4.53 | 0.68 | 0.0016 | 0.00 | 0.17 | 0.09 | 7.36  |
| A390 | A390 | 100YR-1HR | 0.173 | 0.446 | 0.963 | 0.016 | 24.7 | 0.50 | 0.10 | 4.08 | 0.65 | 0.0016 | 0.00 | 0.49 | 0.15 | 22.79 |
| A395 | A395 | 100YR-1HR | 0.051 | 0.100 | 0.266 | 0.026 | 23.0 | 0.50 | 0.10 | 4.50 | 0.60 | 0.0018 | 0.00 | 0.46 | 0.14 | 21.20 |
| A400 | A400 | 100YR-1HR | 0.166 | 0.281 | 0.742 | 0.026 | 55.4 | 0.50 | 0.10 | 3.60 | 0.54 | 0.0018 | 0.00 | 0.88 | 0.25 | 54.34 |
| B100 | B100 | 100YR-1HR | 0.113 | 0.151 | 0.376 | 0.047 | 44.4 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.82 | 0.21 | 43.32 |
| B110 | B110 | 100YR-1HR | 0.129 | 0.199 | 0.530 | 0.048 | 28.5 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.57 | 0.16 | 27.07 |
| B120 | B120 | 100YR-1HR | 0.119 | 0.199 | 0.637 | 0.041 | 24.8 | 0.50 | 0.10 | 3.08 | 0.51 | 0.0018 | 0.00 | 0.50 | 0.15 | 23.36 |
| B130 | B130 | 100YR-1HR | 0.112 | 0.234 | 0.911 | 0.037 | 9.5  | 0.50 | 0.10 | 3.23 | 0.52 | 0.0018 | 0.00 | 0.19 | 0.10 | 8.51  |
| B134 | B134 | 100YR-1HR | 0.038 | 0.036 | 0.293 | 0.015 | 40.3 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.80 | 0.20 | 39.21 |
| B135 | B135 | 100YR-1HR | 0.196 | 0.416 | 0.847 | 0.040 | 15.4 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.31 | 0.12 | 14.18 |
| C100 | C100 | 100YR-1HR | 0.151 | 0.240 | 0.508 | 0.045 | 2.5  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.05 | 0.03 | 2.22  |
| C110 | C110 | 100YR-1HR | 0.164 | 0.168 | 0.631 | 0.050 | 9.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.18 | 0.09 | 8.09  |
| C120 | C120 | 100YR-1HR | 0.103 | 0.275 | 0.678 | 0.037 | 13.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.26 | 0.11 | 11.87 |
| C125 | C125 | 100YR-1HR | 0.176 | 0.413 | 0.859 | 0.043 | 8.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.16 | 0.08 | 7.18  |
| C130 | C130 | 100YR-1HR | 0.174 | 0.222 | 0.629 | 0.033 | 36.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.72 | 0.19 | 34.73 |
| C140 | C140 | 100YR-1HR | 0.085 | 0.117 | 0.585 | 0.038 | 26.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.52 | 0.15 | 24.57 |
| C150 | C150 | 100YR-1HR | 0.091 | 0.272 | 0.631 | 0.024 | 2.8  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.06 | 0.03 | 2.48  |
| C153 | C153 | 100YR-1HR | 0.195 | 0.250 | 0.712 | 0.044 | 33.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.66 | 0.18 | 31.64 |
| C154 | C154 | 100YR-1HR | 0.152 | 0.212 | 0.537 | 0.040 | 43.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.82 | 0.21 | 41.92 |
| C155 | C155 | 100YR-1HR | 0.119 | 0.312 | 0.651 | 0.045 | 31.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.62 | 0.17 | 29.60 |
| C159 | C159 | 100YR-1HR | 0.172 | 0.240 | 0.684 | 0.049 | 29.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.58 | 0.17 | 27.58 |
| C160 | C160 | 100YR-1HR | 0.179 | 0.123 | 0.541 | 0.050 | 7.5  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.15 | 0.08 | 6.72  |
| C170 | C170 | 100YR-1HR | 0.169 | 0.296 | 0.865 | 0.032 | 11.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.22 | 0.10 | 9.96  |
| C175 | C175 | 100YR-1HR | 0.157 | 0.346 | 0.799 | 0.045 | 8.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.16 | 0.08 | 7.18  |
| C180 | C180 | 100YR-1HR | 0.069 | 0.129 | 0.622 | 0.041 | 14.8 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.30 | 0.11 | 13.60 |
| C185 | C185 | 100YR-1HR | 0.174 | 0.414 | 0.816 | 0.049 | 7.7  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.15 | 0.08 | 6.90  |
| C190 | C190 | 100YR-1HR | 0.119 | 0.269 | 0.766 | 0.031 | 10.7 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.21 | 0.10 | 9.67  |
| D100 | D100 | 100YR-1HR | 0.187 | 0.282 | 0.680 | 0.040 | 9.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.18 | 0.09 | 8.09  |
| D110 | D110 | 100YR-1HR | 0.175 | 0.283 | 0.619 | 0.030 | 11.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.22 | 0.10 | 9.96  |
| D120 | D120 | 100YR-1HR | 0.115 | 0.104 | 0.607 | 0.047 | 10.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.20 | 0.10 | 9.01  |
| D130 | D130 | 100YR-1HR | 0.125 | 0.282 | 0.592 | 0.050 | 24.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.48 | 0.15 | 22.59 |
| E100 | E100 | 100YR-1HR | 0.151 | 0.294 | 0.702 | 0.030 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E105 | E105 | 100YR-1HR | 0.082 | 0.212 | 0.480 | 0.039 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E110 | E110 | 100YR-1HR | 0.129 | 0.196 | 0.468 | 0.045 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E120 | E120 | 100YR-1HR | 0.121 | 0.202 | 0.661 | 0.042 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E125 | E125 | 100YR-1HR | 0.115 | 0.304 | 0.574 | 0.050 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E130 | E130 | 100YR-1HR | 0.129 | 0.145 | 0.691 | 0.045 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E135 | E135 | 100YR-1HR | 0.159 | 0.329 | 0.676 | 0.048 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E140 | E140 | 100YR-1HR | 0.142 | 0.137 | 0.530 | 0.034 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E150 | E150 | 100YR-1HR | 0.104 | 0.182 | 0.537 | 0.052 | 2.0  | 0.50 | 0.10 | 3.08 | 0.51 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E155 | E155 | 100YR-1HR | 0.198 | 0.464 | 0.859 | 0.051 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E160 | E160 | 100YR-1HR | 0.191 | 0.275 | 0.659 | 0.038 | 2.0  | 0.50 | 0.10 | 3.83 | 0.56 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.74  |
| E170 | E170 | 100YR-1HR | 0.155 | 0.236 | 0.541 | 0.060 | 2.0  | 0.50 | 0.10 | 3.90 | 0.56 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.73  |
| E180 | E180 | 100YR-1HR | 0.169 | 0.694 | 0.980 | 0.025 | 6.2  | 0.50 | 0.10 | 4.20 | 0.58 | 0.0018 | 0.00 | 0.12 | 0.06 | 5.39  |
| E183 | E183 | 100YR-1HR | 0.187 | 0.477 | 0.855 | 0.054 | 2.0  | 0.50 | 0.10 | 3.38 | 0.53 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.75  |
| E184 | E184 | 100YR-1HR | 0.114 | 0.331 | 0.728 | 0.053 | 2.0  | 0.50 | 0.10 | 3.75 | 0.55 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.74  |
| E185 | E185 | 100YR-1HR | 0.199 | 0.358 | 1.043 | 0.039 | 2.0  | 0.50 | 0.10 | 3.60 | 0.54 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.74  |
| E190 | E190 | 100YR-1HR | 0.079 | 0.426 | 0.685 | 0.026 | 75.1 | 0.50 | 0.10 | 3.75 | 0.55 | 0.0018 | 0.00 | 0.93 | 0.32 | 74.29 |
| E200 | E200 | 100YR-1HR | 0.168 | 0.543 | 0.870 | 0.023 | 5.4  | 0.50 | 0.10 | 3.75 | 0.55 | 0.0018 | 0.00 | 0.11 | 0.05 | 4.73  |
| E204 | E204 | 100YR-1HR | 0.066 | 0.202 | 0.481 | 0.029 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| E205 | E205 | 100YR-1HR | 0.156 | 0.369 | 0.798 | 0.032 | 35.2 | 0.50 | 0.10 | 3.15 | 0.51 | 0.0018 | 0.00 | 0.70 | 0.19 | 33.86 |
| E210 | E210 | 100YR-1HR | 0.150 | 0.507 | 1.092 | 0.016 | 9.2  | 0.50 | 0.10 | 3.83 | 0.56 | 0.0018 | 0.00 | 0.18 | 0.09 | 8.13  |

|      |      |           |       |       |       |       |      |      |      |      |      |        |      |      |      |       |
|------|------|-----------|-------|-------|-------|-------|------|------|------|------|------|--------|------|------|------|-------|
| F100 | F100 | 100YR-1HR | 0.145 | 0.152 | 0.511 | 0.031 | 2.0  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| F110 | F110 | 100YR-1HR | 0.164 | 0.167 | 0.424 | 0.023 | 6.5  | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.13 | 0.07 | 5.81  |
| F120 | F120 | 100YR-1HR | 0.194 | 0.377 | 0.668 | 0.028 | 38.3 | 0.50 | 0.10 | 3.08 | 0.51 | 0.0018 | 0.00 | 0.77 | 0.19 | 37.11 |
| F125 | F125 | 100YR-1HR | 0.109 | 0.254 | 0.623 | 0.025 | 2.0  | 0.50 | 0.10 | 3.68 | 0.55 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.74  |
| F130 | F130 | 100YR-1HR | 0.167 | 0.287 | 0.624 | 0.022 | 4.7  | 0.50 | 0.10 | 3.68 | 0.55 | 0.0018 | 0.00 | 0.09 | 0.05 | 4.12  |
| F140 | F140 | 100YR-1HR | 0.085 | 0.380 | 0.782 | 0.022 | 19.6 | 0.50 | 0.10 | 4.05 | 0.57 | 0.0018 | 0.00 | 0.39 | 0.13 | 17.99 |
| G100 | G100 | 100YR-1HR | 0.176 | 0.586 | 1.270 | 0.015 | 2.0  | 0.50 | 0.10 | 3.08 | 0.51 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.77  |
| G105 | G105 | 100YR-1HR | 0.067 | 0.231 | 0.584 | 0.019 | 50.0 | 0.50 | 0.10 | 3.83 | 0.56 | 0.0018 | 0.00 | 0.85 | 0.23 | 48.82 |
| G110 | G110 | 100YR-1HR | 0.115 | 0.302 | 0.646 | 0.023 | 22.8 | 0.50 | 0.10 | 4.05 | 0.57 | 0.0018 | 0.00 | 0.46 | 0.14 | 21.12 |
| G120 | G120 | 100YR-1HR | 0.136 | 0.457 | 0.934 | 0.022 | 50.5 | 0.50 | 0.10 | 4.50 | 0.60 | 0.0018 | 0.00 | 0.85 | 0.23 | 49.21 |
| H100 | H100 | 100YR-1HR | 0.191 | 0.255 | 1.013 | 0.012 | 51.2 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.86 | 0.23 | 50.18 |
| H110 | H110 | 100YR-1HR | 0.154 | 0.240 | 0.571 | 0.020 | 44.4 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.82 | 0.21 | 43.32 |
| H115 | H115 | 100YR-1HR | 0.086 | 0.131 | 0.290 | 0.013 | 44.4 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.82 | 0.21 | 43.32 |
| H120 | H120 | 100YR-1HR | 0.092 | 0.290 | 0.473 | 0.017 | 19.5 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.39 | 0.13 | 18.16 |
| H130 | H130 | 100YR-1HR | 0.057 | 0.153 | 0.400 | 0.017 | 15.2 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.30 | 0.12 | 13.98 |
| H140 | H140 | 100YR-1HR | 0.056 | 0.331 | 0.578 | 0.024 | 3.5  | 0.50 | 0.10 | 3.38 | 0.53 | 0.0018 | 0.00 | 0.07 | 0.04 | 3.08  |
| H145 | H145 | 100YR-1HR | 0.182 | 0.465 | 1.088 | 0.017 | 10.2 | 0.50 | 0.10 | 3.08 | 0.51 | 0.0018 | 0.00 | 0.20 | 0.10 | 9.19  |
| H150 | H150 | 100YR-1HR | 0.153 | 0.121 | 0.491 | 0.032 | 2.0  | 0.50 | 0.10 | 3.60 | 0.54 | 0.0018 | 0.00 | 0.04 | 0.02 | 1.74  |
| H160 | H160 | 100YR-1HR | 0.167 | 0.655 | 1.321 | 0.017 | 5.2  | 0.50 | 0.10 | 3.68 | 0.55 | 0.0018 | 0.00 | 0.10 | 0.05 | 4.56  |
| H170 | H170 | 100YR-1HR | 0.115 | 0.360 | 0.820 | 0.021 | 10.0 | 0.50 | 0.10 | 3.75 | 0.55 | 0.0018 | 0.00 | 0.20 | 0.10 | 8.87  |
| H180 | H180 | 100YR-1HR | 0.145 | 0.207 | 0.744 | 0.019 | 21.1 | 0.50 | 0.10 | 3.75 | 0.55 | 0.0018 | 0.00 | 0.42 | 0.13 | 19.53 |
| H185 | H185 | 100YR-1HR | 0.185 | 0.350 | 0.966 | 0.022 | 19.0 | 0.50 | 0.10 | 3.00 | 0.50 | 0.0018 | 0.00 | 0.38 | 0.13 | 17.68 |
| H190 | H190 | 100YR-1HR | 0.150 | 0.106 | 0.543 | 0.035 | 43.8 | 0.50 | 0.10 | 3.38 | 0.53 | 0.0018 | 0.00 | 0.82 | 0.21 | 42.65 |
| H200 | H200 | 100YR-1HR | 0.130 | 0.234 | 0.691 | 0.019 | 23.4 | 0.50 | 0.10 | 3.90 | 0.56 | 0.0018 | 0.00 | 0.47 | 0.14 | 21.75 |
| H205 | H205 | 100YR-1HR | 0.101 | 0.155 | 0.360 | 0.035 | 35.8 | 0.50 | 0.10 | 3.75 | 0.55 | 0.0018 | 0.00 | 0.72 | 0.19 | 34.34 |
| H210 | H210 | 100YR-1HR | 0.187 | 0.288 | 0.629 | 0.022 | 4.9  | 0.50 | 0.10 | 3.80 | 0.59 | 0.0017 | 0.00 | 0.10 | 0.05 | 4.25  |
| H220 | H220 | 100YR-1HR | 0.079 | 0.290 | 0.472 | 0.027 | 4.4  | 0.50 | 0.10 | 3.55 | 0.61 | 0.0016 | 0.00 | 0.09 | 0.04 | 3.80  |

Note: Basin E190 revised to reflect the development of RidgeGate Filing 5

**Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 2.0.1)**

| Catchment Name/ID | Unit Hydrograph Parameters and Results |       |               |                       |               |                       |                           |            |                  | Excess Precip.     |                  | Storm Hydrograph          |                    |                           |                                       |
|-------------------|----------------------------------------|-------|---------------|-----------------------|---------------|-----------------------|---------------------------|------------|------------------|--------------------|------------------|---------------------------|--------------------|---------------------------|---------------------------------------|
|                   | CT                                     | Cp    | W50<br>(min.) | W50<br>Before<br>Peak | W75<br>(min.) | W75<br>Before<br>Peak | Time to<br>Peak<br>(min.) | Peak (cfs) | Volume<br>(c.f.) | Excess<br>(inches) | Excess<br>(c.f.) | Time to<br>Peak<br>(min.) | Peak Flow<br>(cfs) | Total<br>Volume<br>(c.f.) | Runoff per<br>Unit Area<br>(cfs/acre) |
| A100              | 0.092                                  | 0.188 | 19.9          | 3.48                  | 10.4          | 2.46                  | 5.8                       | 172        | 265,542          | 1.65               | 438,776          | 40.0                      | 149                | 438,325                   | 2.03                                  |
| A105              | 0.112                                  | 0.166 | 53.4          | 7.39                  | 27.8          | 5.22                  | 12.3                      | 97         | 400,194          | 1.36               | 544,950          | 56.0                      | 101                | 544,951                   | 0.92                                  |
| A110              | 0.090                                  | 0.204 | 9.3           | 2.05                  | 4.8           | 1.45                  | 3.4                       | 391        | 280,317          | 1.72               | 480,910          | 34.0                      | 247                | 480,081                   | 3.20                                  |
| A120              | 0.090                                  | 0.238 | 12.4          | 2.87                  | 6.5           | 2.03                  | 4.8                       | 410        | 394,526          | 1.72               | 676,845          | 36.0                      | 299                | 676,905                   | 2.75                                  |
| A125              | 0.090                                  | 0.201 | 17.8          | 3.35                  | 9.2           | 2.37                  | 5.6                       | 198        | 271,954          | 1.72               | 466,562          | 40.0                      | 167                | 466,068                   | 2.23                                  |
| A130              | 0.103                                  | 0.117 | 23.8          | 2.73                  | 12.4          | 1.93                  | 4.6                       | 92         | 169,524          | 1.46               | 247,327          | 42.0                      | 77                 | 247,393                   | 1.66                                  |
| A134              | 0.102                                  | 0.182 | 25.1          | 4.10                  | 13.0          | 2.90                  | 6.8                       | 222        | 432,231          | 1.47               | 636,081          | 42.0                      | 194                | 635,885                   | 1.63                                  |
| A135              | 0.099                                  | 0.181 | 31.5          | 4.98                  | 16.4          | 3.52                  | 8.3                       | 152        | 371,991          | 1.51               | 561,661          | 46.0                      | 146                | 561,724                   | 1.43                                  |
| A140              | 0.099                                  | 0.191 | 22.7          | 3.92                  | 11.8          | 2.77                  | 6.5                       | 241        | 423,473          | 1.50               | 635,177          | 42.0                      | 205                | 634,931                   | 1.76                                  |
| A150              | 0.118                                  | 0.172 | 23.4          | 3.69                  | 12.2          | 2.61                  | 6.2                       | 230        | 417,549          | 1.29               | 539,745          | 42.0                      | 179                | 539,484                   | 1.56                                  |
| A160              | 0.126                                  | 0.173 | 26.0          | 4.06                  | 13.5          | 2.87                  | 6.8                       | 193        | 388,904          | 1.22               | 474,871          | 44.0                      | 150                | 474,720                   | 1.40                                  |
| A170              | 0.133                                  | 0.165 | 32.5          | 4.72                  | 16.9          | 3.33                  | 7.9                       | 125        | 315,491          | 1.20               | 377,423          | 46.0                      | 103                | 377,404                   | 1.18                                  |
| A180              | 0.139                                  | 0.170 | 30.5          | 4.59                  | 15.9          | 3.24                  | 7.6                       | 131        | 309,985          | 1.16               | 359,340          | 46.0                      | 103                | 359,271                   | 1.21                                  |
| A190              | 0.135                                  | 0.168 | 23.9          | 3.70                  | 12.4          | 2.61                  | 6.2                       | 174        | 323,273          | 1.18               | 382,289          | 42.0                      | 128                | 382,021                   | 1.44                                  |
| A195              | 0.121                                  | 0.145 | 57.6          | 6.99                  | 29.9          | 4.94                  | 11.7                      | 62         | 275,020          | 1.27               | 348,114          | 56.0                      | 62                 | 348,105                   | 0.82                                  |
| A200              | 0.121                                  | 0.156 | 26.5          | 3.78                  | 13.8          | 2.67                  | 6.3                       | 158        | 324,737          | 1.27               | 411,459          | 44.0                      | 126                | 411,395                   | 1.41                                  |
| A210              | 0.112                                  | 0.146 | 50.8          | 6.31                  | 26.4          | 4.46                  | 10.5                      | 77         | 301,737          | 1.36               | 408,975          | 54.0                      | 78                 | 408,954                   | 0.94                                  |
| A215              | 0.140                                  | 0.170 | 49.4          | 7.03                  | 25.7          | 4.97                  | 11.7                      | 112        | 427,469          | 1.20               | 511,329          | 54.0                      | 104                | 511,302                   | 0.88                                  |
| A220              | 0.142                                  | 0.165 | 40.1          | 5.67                  | 20.9          | 4.01                  | 9.5                       | 112        | 349,316          | 1.19               | 415,390          | 50.0                      | 98                 | 415,288                   | 1.02                                  |
| A230              | 0.128                                  | 0.138 | 15.2          | 2.21                  | 7.9           | 1.56                  | 3.7                       | 92         | 108,703          | 1.24               | 134,409          | 40.0                      | 59                 | 134,160                   | 1.96                                  |
| A234              | 0.156                                  | 0.162 | 36.1          | 5.09                  | 18.8          | 3.59                  | 8.5                       | 111        | 309,381          | 1.14               | 352,051          | 48.0                      | 90                 | 352,029                   | 1.06                                  |
| A235              | 0.154                                  | 0.165 | 37.2          | 5.31                  | 19.4          | 3.75                  | 8.8                       | 122        | 351,616          | 1.15               | 403,374          | 48.0                      | 101                | 403,354                   | 1.05                                  |
| A240              | 0.130                                  | 0.162 | 25.6          | 3.79                  | 13.3          | 2.68                  | 6.3                       | 159        | 316,188          | 1.23               | 389,367          | 44.0                      | 124                | 389,296                   | 1.42                                  |
| A245              | 0.129                                  | 0.140 | 20.3          | 2.79                  | 10.6          | 1.97                  | 4.7                       | 76         | 120,249          | 1.23               | 148,383          | 42.0                      | 54                 | 148,399                   | 1.65                                  |
| A250              | 0.126                                  | 0.145 | 33.8          | 4.36                  | 17.6          | 3.08                  | 7.3                       | 56         | 147,546          | 1.25               | 183,928          | 46.0                      | 48                 | 183,889                   | 1.18                                  |
| A260              | 0.133                                  | 0.166 | 43.8          | 6.19                  | 22.8          | 4.37                  | 10.3                      | 98         | 333,588          | 1.20               | 399,471          | 52.0                      | 89                 | 399,423                   | 0.96                                  |
| A263              | 0.156                                  | 0.159 | 54.3          | 7.24                  | 28.2          | 5.12                  | 12.1                      | 67         | 280,689          | 1.12               | 314,877          | 56.0                      | 61                 | 314,874                   | 0.78                                  |
| A264              | 0.156                                  | 0.165 | 68.2          | 9.24                  | 35.5          | 6.53                  | 15.4                      | 67         | 354,497          | 1.11               | 394,818          | 64.0                      | 64                 | 394,806                   | 0.66                                  |
| A265              | 0.156                                  | 0.150 | 42.0          | 5.44                  | 21.9          | 3.84                  | 9.1                       | 57         | 185,926          | 1.10               | 204,076          | 50.0                      | 47                 | 204,064                   | 0.92                                  |
| A270              | 0.155                                  | 0.165 | 79.5          | 10.65                 | 41.3          | 7.52                  | 17.7                      | 69         | 422,822          | 1.13               | 479,697          | 68.0                      | 69                 | 479,681                   | 0.60                                  |
| A275              | 0.087                                  | 0.162 | 25.0          | 3.71                  | 13.0          | 2.62                  | 6.2                       | 158        | 305,268          | 1.78               | 542,475          | 42.0                      | 156                | 542,302                   | 1.85                                  |
| A276              | 0.130                                  | 0.145 | 20.2          | 2.85                  | 10.5          | 2.01                  | 4.7                       | 89         | 139,276          | 1.23               | 171,510          | 42.0                      | 63                 | 171,492                   | 1.65                                  |
| A280              | 0.153                                  | 0.172 | 46.0          | 6.67                  | 23.9          | 4.72                  | 11.1                      | 130        | 463,571          | 1.13               | 521,726          | 52.0                      | 113                | 521,689                   | 0.89                                  |
| A285              | 0.153                                  | 0.145 | 39.6          | 5.00                  | 20.6          | 3.54                  | 8.3                       | 49         | 149,335          | 1.15               | 171,664          | 50.0                      | 41                 | 171,673                   | 1.00                                  |
| A290              | 0.143                                  | 0.172 | 46.6          | 6.76                  | 24.2          | 4.78                  | 11.3                      | 130        | 468,961          | 1.12               | 527,519          | 54.0                      | 113                | 527,525                   | 0.88                                  |

|      |       |       |      |       |      |      |      |     |         |      |         |      |     |         |      |
|------|-------|-------|------|-------|------|------|------|-----|---------|------|---------|------|-----|---------|------|
| A295 | 0.108 | 0.151 | 16.6 | 2.52  | 8.6  | 1.78 | 4.2  | 151 | 193,592 | 1.37 | 265,154 | 40.0 | 106 | 265,270 | 1.99 |
| A300 | 0.095 | 0.169 | 31.1 | 4.64  | 16.1 | 3.28 | 7.7  | 175 | 421,266 | 1.55 | 652,066 | 44.0 | 169 | 651,936 | 1.46 |
| A304 | 0.148 | 0.166 | 62.7 | 8.57  | 32.6 | 6.05 | 14.3 | 75  | 362,652 | 1.17 | 422,780 | 62.0 | 73  | 422,775 | 0.73 |
| A305 | 0.156 | 0.147 | 53.1 | 6.61  | 27.6 | 4.67 | 11.0 | 41  | 167,874 | 1.11 | 186,969 | 56.0 | 36  | 186,955 | 0.79 |
| A310 | 0.151 | 0.160 | 52.5 | 7.03  | 27.3 | 4.97 | 11.7 | 70  | 285,707 | 1.05 | 300,793 | 56.0 | 60  | 300,771 | 0.76 |
| A314 | 0.149 | 0.161 | 80.5 | 10.54 | 41.9 | 7.45 | 17.6 | 48  | 298,810 | 1.15 | 343,240 | 68.0 | 49  | 343,216 | 0.59 |
| A315 | 0.154 | 0.158 | 70.6 | 9.14  | 36.7 | 6.46 | 15.2 | 48  | 261,035 | 1.03 | 269,857 | 64.0 | 43  | 269,855 | 0.60 |
| A320 | 0.119 | 0.149 | 47.2 | 5.98  | 24.5 | 4.23 | 10.0 | 56  | 205,696 | 1.21 | 248,490 | 52.0 | 52  | 248,455 | 0.91 |
| A325 | 0.085 | 0.162 | 25.5 | 3.77  | 13.3 | 2.66 | 6.3  | 157 | 309,892 | 1.82 | 562,519 | 42.0 | 158 | 562,403 | 1.85 |
| A330 | 0.118 | 0.149 | 49.0 | 6.19  | 25.5 | 4.37 | 10.3 | 97  | 367,414 | 1.23 | 450,619 | 54.0 | 91  | 450,584 | 0.90 |
| A340 | 0.133 | 0.153 | 84.5 | 10.53 | 43.9 | 7.44 | 17.6 | 62  | 404,446 | 1.20 | 483,841 | 68.0 | 66  | 483,811 | 0.59 |
| A345 | 0.116 | 0.126 | 58.3 | 6.24  | 30.3 | 4.41 | 10.4 | 31  | 141,901 | 1.20 | 170,761 | 56.0 | 30  | 170,745 | 0.77 |
| A350 | 0.120 | 0.139 | 41.2 | 4.99  | 21.4 | 3.52 | 8.3  | 73  | 232,552 | 1.22 | 284,503 | 50.0 | 65  | 284,493 | 1.01 |
| A360 | 0.121 | 0.151 | 64.3 | 8.08  | 33.5 | 5.71 | 13.5 | 84  | 419,663 | 1.18 | 494,589 | 60.0 | 82  | 494,552 | 0.71 |
| A370 | 0.112 | 0.142 | 29.6 | 3.82  | 15.4 | 2.70 | 6.4  | 118 | 270,118 | 1.26 | 339,321 | 44.0 | 96  | 339,258 | 1.29 |
| A375 | 0.121 | 0.145 | 84.6 | 10.01 | 44.0 | 7.07 | 16.7 | 51  | 332,636 | 1.20 | 398,097 | 68.0 | 54  | 398,086 | 0.58 |
| A380 | 0.136 | 0.169 | 48.9 | 6.94  | 25.5 | 4.90 | 11.6 | 108 | 410,695 | 0.97 | 396,583 | 54.0 | 84  | 396,546 | 0.74 |
| A390 | 0.107 | 0.168 | 53.8 | 7.55  | 28.0 | 5.34 | 12.6 | 96  | 401,844 | 1.24 | 497,351 | 56.0 | 93  | 497,354 | 0.84 |
| A395 | 0.109 | 0.140 | 15.3 | 2.25  | 8.0  | 1.59 | 3.7  | 100 | 118,901 | 1.27 | 150,952 | 40.0 | 64  | 150,740 | 1.95 |
| A400 | 0.086 | 0.166 | 27.6 | 4.11  | 14.3 | 2.90 | 6.8  | 181 | 386,673 | 1.78 | 688,345 | 42.0 | 185 | 688,090 | 1.74 |
| B100 | 0.091 | 0.190 | 11.9 | 2.33  | 6.2  | 1.65 | 3.9  | 287 | 263,637 | 1.67 | 440,045 | 34.0 | 199 | 439,570 | 2.74 |
| B110 | 0.102 | 0.152 | 22.1 | 3.19  | 11.5 | 2.25 | 5.3  | 175 | 299,948 | 1.47 | 439,509 | 42.0 | 145 | 439,228 | 1.75 |
| B120 | 0.106 | 0.139 | 28.6 | 3.65  | 14.9 | 2.58 | 6.1  | 124 | 275,415 | 1.41 | 388,837 | 44.0 | 109 | 388,742 | 1.44 |
| B130 | 0.131 | 0.150 | 43.2 | 5.57  | 22.5 | 3.93 | 9.3  | 78  | 260,477 | 1.20 | 313,161 | 52.0 | 70  | 313,101 | 0.97 |
| B134 | 0.094 | 0.110 | 12.2 | 1.63  | 6.3  | 1.15 | 2.7  | 94  | 88,677  | 1.62 | 143,332 | 34.0 | 64  | 142,740 | 2.62 |
| B135 | 0.119 | 0.177 | 41.5 | 6.23  | 21.6 | 4.40 | 10.4 | 142 | 455,812 | 1.30 | 592,397 | 50.0 | 134 | 592,322 | 1.06 |
| C100 | 0.155 | 0.153 | 36.2 | 4.86  | 18.8 | 3.44 | 8.1  | 125 | 350,106 | 1.14 | 400,423 | 48.0 | 102 | 400,413 | 1.06 |
| C110 | 0.133 | 0.155 | 28.2 | 3.95  | 14.6 | 2.79 | 6.6  | 174 | 379,959 | 1.22 | 463,422 | 44.0 | 138 | 463,299 | 1.32 |
| C120 | 0.123 | 0.145 | 39.1 | 4.94  | 20.3 | 3.49 | 8.2  | 79  | 239,824 | 1.27 | 304,411 | 48.0 | 72  | 304,422 | 1.08 |
| C125 | 0.136 | 0.169 | 49.1 | 6.96  | 25.5 | 4.92 | 11.6 | 108 | 409,255 | 1.21 | 494,342 | 54.0 | 101 | 494,291 | 0.89 |
| C130 | 0.096 | 0.168 | 23.6 | 3.65  | 12.3 | 2.58 | 6.1  | 221 | 404,678 | 1.56 | 631,751 | 42.0 | 196 | 631,368 | 1.76 |
| C140 | 0.105 | 0.151 | 19.8 | 2.89  | 10.3 | 2.04 | 4.8  | 129 | 196,914 | 1.43 | 282,303 | 40.0 | 100 | 282,314 | 1.85 |
| C150 | 0.154 | 0.153 | 49.5 | 6.40  | 25.7 | 4.52 | 10.7 | 55  | 211,249 | 1.15 | 242,344 | 54.0 | 50  | 242,315 | 0.85 |
| C153 | 0.098 | 0.182 | 23.3 | 3.87  | 12.1 | 2.73 | 6.4  | 251 | 454,046 | 1.52 | 691,366 | 42.0 | 218 | 690,963 | 1.75 |
| C154 | 0.092 | 0.141 | 23.4 | 3.14  | 12.2 | 2.22 | 5.2  | 195 | 353,382 | 1.65 | 583,466 | 42.0 | 178 | 583,298 | 1.83 |
| C155 | 0.100 | 0.155 | 29.5 | 4.11  | 15.3 | 2.91 | 6.9  | 121 | 275,415 | 1.50 | 412,321 | 44.0 | 112 | 412,208 | 1.48 |
| C159 | 0.102 | 0.164 | 25.3 | 3.78  | 13.1 | 2.67 | 6.3  | 204 | 400,311 | 1.47 | 589,105 | 42.0 | 178 | 588,945 | 1.62 |
| C160 | 0.138 | 0.159 | 22.7 | 3.37  | 11.8 | 2.38 | 5.6  | 237 | 416,643 | 1.20 | 500,821 | 42.0 | 173 | 500,613 | 1.51 |
| C170 | 0.126 | 0.146 | 48.1 | 6.01  | 25.0 | 4.24 | 10.0 | 105 | 391,506 | 1.24 | 487,055 | 52.0 | 99  | 487,003 | 0.92 |
| C175 | 0.136 | 0.150 | 48.2 | 6.16  | 25.1 | 4.36 | 10.3 | 98  | 364,557 | 1.21 | 440,350 | 54.0 | 91  | 440,310 | 0.90 |
| C180 | 0.120 | 0.130 | 27.9 | 3.37  | 14.5 | 2.38 | 5.6  | 74  | 159,395 | 1.29 | 205,948 | 44.0 | 60  | 205,826 | 1.38 |
| C185 | 0.137 | 0.161 | 49.1 | 6.66  | 25.6 | 4.71 | 11.1 | 106 | 403,679 | 1.20 | 486,185 | 54.0 | 99  | 486,129 | 0.89 |

|             |              |              |             |             |             |             |            |           |                |             |                |             |            |                |             |
|-------------|--------------|--------------|-------------|-------------|-------------|-------------|------------|-----------|----------------|-------------|----------------|-------------|------------|----------------|-------------|
| C190        | 0.127        | 0.150        | 42.9        | 5.53        | 22.3        | 3.91        | 9.2        | 83        | 275,299        | 1.24        | 341,446        | 50.0        | 76         | 341,413        | 1.00        |
| D100        | 0.133        | 0.170        | 36.0        | 5.30        | 18.7        | 3.74        | 8.8        | 156       | 435,391        | 1.22        | 531,029        | 48.0        | 135        | 530,955        | 1.12        |
| D110        | 0.126        | 0.168        | 35.3        | 5.16        | 18.3        | 3.65        | 8.6        | 149       | 406,165        | 1.24        | 505,292        | 48.0        | 129        | 505,302        | 1.15        |
| D120        | 0.130        | 0.158        | 21.3        | 3.18        | 11.1        | 2.25        | 5.3        | 162       | 266,773        | 1.23        | 328,516        | 42.0        | 118        | 328,273        | 1.60        |
| D130        | 0.107        | 0.160        | 27.3        | 3.95        | 14.2        | 2.79        | 6.6        | 138       | 290,795        | 1.41        | 409,544        | 44.0        | 119        | 409,319        | 1.49        |
| E100        | 0.156        | 0.165        | 48.3        | 6.71        | 25.1        | 4.74        | 11.2       | 94        | 350,826        | 1.14        | 399,213        | 54.0        | 84         | 399,198        | 0.86        |
| E105        | 0.156        | 0.150        | 35.5        | 4.70        | 18.5        | 3.32        | 7.8        | 70        | 191,501        | 1.14        | 217,914        | 48.0        | 56         | 217,915        | 1.07        |
| E110        | 0.156        | 0.161        | 30.4        | 4.36        | 15.8        | 3.08        | 7.3        | 128       | 300,808        | 1.14        | 342,296        | 46.0        | 99         | 342,179        | 1.19        |
| E120        | 0.156        | 0.159        | 37.5        | 5.19        | 19.5        | 3.67        | 8.6        | 97        | 281,967        | 1.14        | 320,856        | 48.0        | 80         | 320,860        | 1.03        |
| E125        | 0.156        | 0.158        | 41.2        | 5.60        | 21.4        | 3.96        | 9.3        | 84        | 266,727        | 1.14        | 303,514        | 50.0        | 71         | 303,484        | 0.97        |
| E130        | 0.156        | 0.161        | 31.8        | 4.53        | 16.5        | 3.20        | 7.5        | 122       | 299,205        | 1.14        | 340,472        | 46.0        | 96         | 340,458        | 1.16        |
| E135        | 0.156        | 0.166        | 44.5        | 6.27        | 23.1        | 4.43        | 10.4       | 107       | 369,226        | 1.14        | 420,151        | 52.0        | 93         | 420,128        | 0.92        |
| E140        | 0.156        | 0.163        | 28.6        | 4.19        | 14.9        | 2.96        | 7.0        | 149       | 330,243        | 1.14        | 375,791        | 44.0        | 113        | 375,726        | 1.24        |
| E150        | 0.156        | 0.156        | 31.4        | 4.36        | 16.3        | 3.08        | 7.3        | 100       | 242,751        | 1.13        | 274,275        | 46.0        | 78         | 274,224        | 1.16        |
| E155        | 0.156        | 0.172        | 56.1        | 7.99        | 29.1        | 5.64        | 13.3       | 106       | 460,783        | 1.14        | 524,336        | 58.0        | 98         | 524,306        | 0.78        |
| E160        | 0.157        | 0.171        | 41.6        | 6.06        | 21.7        | 4.28        | 10.1       | 138       | 443,522        | 1.05        | 467,258        | 52.0        | 110        | 467,196        | 0.90        |
| E170        | 0.157        | 0.165        | 32.5        | 4.73        | 16.9        | 3.34        | 7.9        | 143       | 360,096        | 1.05        | 376,838        | 46.0        | 106        | 376,822        | 1.07        |
| E180        | 0.143        | 0.146        | 92.0        | 10.93       | 47.9        | 7.72        | 18.2       | 55        | 392,481        | 1.07        | 419,581        | 70.0        | 54         | 419,580        | 0.50        |
| E183        | 0.156        | 0.170        | 56.5        | 7.97        | 29.4        | 5.63        | 13.3       | 99        | 433,649        | 1.10        | 475,982        | 58.0        | 89         | 475,954        | 0.75        |
| E184        | 0.157        | 0.158        | 47.5        | 6.36        | 24.7        | 4.49        | 10.6       | 72        | 264,659        | 1.06        | 280,682        | 54.0        | 60         | 280,666        | 0.82        |
| E185        | 0.157        | 0.172        | 58.1        | 8.26        | 30.2        | 5.84        | 13.8       | 103       | 463,246        | 1.07        | 497,904        | 58.0        | 92         | 497,837        | 0.72        |
| <b>E190</b> | <b>0.079</b> | <b>0.201</b> | <b>24.4</b> | <b>4.37</b> | <b>12.7</b> | <b>3.09</b> | <b>7.3</b> | <b>98</b> | <b>184,594</b> | <b>2.05</b> | <b>377,624</b> | <b>42.0</b> | <b>107</b> | <b>377,596</b> | <b>2.10</b> |
| E200        | 0.145        | 0.167        | 70.3        | 9.63        | 36.5        | 6.81        | 16.1       | 72        | 391,180        | 1.10        | 430,746        | 64.0        | 69         | 430,729        | 0.64        |
| E204        | 0.156        | 0.145        | 38.4        | 4.89        | 20.0        | 3.45        | 8.1        | 52        | 153,447        | 1.14        | 174,611        | 48.0        | 43         | 174,613        | 1.01        |
| E205        | 0.097        | 0.166        | 34.7        | 5.01        | 18.1        | 3.54        | 8.4        | 135       | 362,884        | 1.54        | 558,547        | 46.0        | 135        | 558,561        | 1.35        |
| E210        | 0.133        | 0.164        | 77.0        | 10.33       | 40.0        | 7.30        | 17.2       | 58        | 347,458        | 1.14        | 396,146        | 66.0        | 58         | 396,114        | 0.61        |
| F100        | 0.156        | 0.170        | 29.1        | 4.41        | 15.1        | 3.11        | 7.3        | 149       | 337,120        | 1.14        | 383,616        | 44.0        | 114        | 383,517        | 1.23        |
| F110        | 0.141        | 0.163        | 28.1        | 4.12        | 14.6        | 2.91        | 6.9        | 175       | 380,494        | 1.19        | 452,910        | 44.0        | 137        | 452,760        | 1.31        |
| F120        | 0.095        | 0.171        | 31.5        | 4.73        | 16.4        | 3.35        | 7.9        | 184       | 449,632        | 1.59        | 712,692        | 44.0        | 182        | 712,718        | 1.47        |
| F125        | 0.157        | 0.157        | 46.7        | 6.23        | 24.3        | 4.40        | 10.4       | 70        | 252,625        | 1.07        | 269,694        | 52.0        | 58         | 269,665        | 0.84        |
| F130        | 0.148        | 0.167        | 45.5        | 6.44        | 23.6        | 4.55        | 10.7       | 110       | 388,369        | 1.10        | 427,102        | 52.0        | 94         | 427,054        | 0.88        |
| F140        | 0.113        | 0.132        | 56.5        | 6.32        | 29.4        | 4.46        | 10.5       | 45        | 197,681        | 1.26        | 249,054        | 56.0        | 45         | 249,036        | 0.82        |
| G100        | 0.156        | 0.168        | 102.9       | 13.91       | 53.5        | 9.83        | 23.2       | 51        | 407,815        | 1.13        | 460,774        | 74.0        | 54         | 460,771        | 0.48        |
| G105        | 0.089        | 0.146        | 28.1        | 3.75        | 14.6        | 2.65        | 6.2        | 71        | 154,655        | 1.69        | 262,054        | 42.0        | 70         | 261,952        | 1.65        |
| G110        | 0.109        | 0.146        | 39.5        | 5.04        | 20.6        | 3.56        | 8.4        | 87        | 266,030        | 1.30        | 346,697        | 48.0        | 80         | 346,710        | 1.09        |
| G120        | 0.089        | 0.160        | 43.3        | 5.93        | 22.5        | 4.19        | 9.9        | 94        | 316,722        | 1.67        | 528,162        | 50.0        | 106        | 528,063        | 1.22        |
| H100        | 0.088        | 0.171        | 36.4        | 5.37        | 18.9        | 3.79        | 8.9        | 158       | 444,358        | 1.76        | 780,692        | 46.0        | 176        | 780,508        | 1.44        |
| H110        | 0.091        | 0.168        | 25.0        | 3.83        | 13.0        | 2.71        | 6.4        | 185       | 357,448        | 1.67        | 596,627        | 42.0        | 175        | 596,456        | 1.78        |
| H115        | 0.091        | 0.151        | 16.7        | 2.54        | 8.7         | 1.79        | 4.2        | 154       | 199,284        | 1.67        | 332,631        | 38.0        | 124        | 332,780        | 2.25        |
| H120        | 0.113        | 0.147        | 37.1        | 4.79        | 19.3        | 3.39        | 8.0        | 74        | 212,968        | 1.35        | 287,846        | 48.0        | 69         | 287,803        | 1.17        |
| H130        | 0.119        | 0.142        | 27.3        | 3.58        | 14.2        | 2.53        | 6.0        | 62        | 131,400        | 1.30        | 170,442        | 44.0        | 51         | 170,364        | 1.41        |
| H140        | 0.152        | 0.142        | 55.6        | 6.67        | 28.9        | 4.71        | 11.1       | 30        | 130,819        | 1.12        | 145,904        | 56.0        | 27         | 145,899        | 0.76        |



|      |       |       |       |       |      |      |      |     |         |      |         |      |     |         |      |
|------|-------|-------|-------|-------|------|------|------|-----|---------|------|---------|------|-----|---------|------|
| H145 | 0.129 | 0.169 | 68.7  | 9.54  | 35.7 | 6.74 | 15.9 | 79  | 422,195 | 1.23 | 517,711 | 64.0 | 82  | 517,715 | 0.71 |
| H150 | 0.157 | 0.165 | 26.1  | 3.91  | 13.6 | 2.76 | 6.5  | 175 | 355,031 | 1.07 | 381,593 | 44.0 | 124 | 381,510 | 1.27 |
| H160 | 0.146 | 0.166 | 102.1 | 13.61 | 53.1 | 9.62 | 22.7 | 49  | 387,068 | 1.11 | 427,987 | 74.0 | 50  | 427,984 | 0.47 |
| H170 | 0.130 | 0.142 | 60.0  | 7.16  | 31.2 | 5.06 | 11.9 | 57  | 266,355 | 1.16 | 308,103 | 58.0 | 54  | 308,091 | 0.74 |
| H180 | 0.111 | 0.156 | 35.1  | 4.81  | 18.3 | 3.40 | 8.0  | 124 | 337,840 | 1.30 | 440,856 | 46.0 | 110 | 440,848 | 1.19 |
| H185 | 0.114 | 0.170 | 46.6  | 6.68  | 24.2 | 4.72 | 11.1 | 119 | 429,188 | 1.35 | 577,367 | 52.0 | 118 | 577,371 | 1.00 |
| H190 | 0.092 | 0.165 | 14.9  | 2.48  | 7.7  | 1.75 | 4.1  | 304 | 349,595 | 1.64 | 571,850 | 36.0 | 229 | 571,471 | 2.37 |
| H200 | 0.108 | 0.161 | 34.1  | 4.81  | 17.7 | 3.40 | 8.0  | 114 | 300,878 | 1.32 | 398,193 | 46.0 | 101 | 398,164 | 1.22 |
| H205 | 0.096 | 0.155 | 16.3  | 2.54  | 8.5  | 1.79 | 4.2  | 185 | 233,737 | 1.50 | 351,174 | 40.0 | 137 | 351,235 | 2.12 |
| H210 | 0.147 | 0.170 | 44.6  | 6.42  | 23.2 | 4.54 | 10.7 | 126 | 434,183 | 1.04 | 451,589 | 52.0 | 102 | 451,582 | 0.85 |
| H220 | 0.149 | 0.149 | 42.8  | 5.51  | 22.3 | 3.90 | 9.2  | 55  | 182,813 | 1.01 | 184,018 | 50.0 | 43  | 184,002 | 0.85 |

## HAPPY CANYON CREEK MDP & FHAD

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.4)

-----

HAPPY CANYON CREEK MDP & FHAD  
BASELINE HYDROLOGY SWMM MODEL  
xxx-YR, x-HR STORM, EXISTING/FUTURE DEVELOPMENT  
WARNING 08: elevation drop exceeds length for Conduit A320-DF

\*\*\*\*\*

### Analysis Options

\*\*\*\*\*

Flow Units ..... CFS

### Process Models:

Rainfall/Runoff ..... NO

RDII ..... NO

Snowmelt ..... NO

Groundwater ..... NO

Flow Routing ..... YES

Ponding Allowed ..... NO

Water Quality ..... NO

Flow Routing Method ..... KINWAVE

Starting Date ..... 01/01/2005 00:00:00

Ending Date ..... 01/05/2005 00:00:00

Antecedent Dry Days ..... 0.0

Report Time Step ..... 00:05:00

Routing Time Step ..... 30.00 sec

\*\*\*\*\*

### Flow Routing Continuity

\*\*\*\*\*

|                          | Volume<br>acre-feet | Volume<br>10 <sup>6</sup> gal |
|--------------------------|---------------------|-------------------------------|
|                          | -----               | -----                         |
| Dry Weather Inflow ..... | 0.000               | 0.000                         |
| Wet Weather Inflow ..... | 0.000               | 0.000                         |
| Groundwater Inflow ..... | 0.000               | 0.000                         |
| RDII Inflow .....        | 0.000               | 0.000                         |
| External Inflow .....    | 1205.043            | 392.681                       |
| External Outflow .....   | 1223.444            | 398.677                       |
| Flooding Loss .....      | 0.000               | 0.000                         |
| Evaporation Loss .....   | 0.000               | 0.000                         |
| Exfiltration Loss .....  | 0.000               | 0.000                         |

## HAPPY CANYON CREEK MDP & FHAD

|                            |        |       |
|----------------------------|--------|-------|
| Initial Stored Volume .... | 0.000  | 0.000 |
| Final Stored Volume .....  | 3.162  | 1.030 |
| Continuity Error (%) ..... | -1.789 |       |

```

*****
Highest Flow Instability Indexes
*****
Link GA350-OUT (96)
Link H18 (95)
Link H19 (95)
Link H20 (95)
Link H22 (95)
  
```

```

*****
Routing Time Step Summary
*****
Minimum Time Step      : 30.00 sec
Average Time Step      : 30.00 sec
Maximum Time Step      : 30.00 sec
% of Time in Steady State : 0.00
Average Iterations per Step : 1.00
% of Steps Not Converging : 0.00
  
```

```

*****
Node Depth Summary
*****
  
```

| Node | Type     | Average<br>Depth<br>Feet | Maximum<br>Depth<br>Feet | Maximum<br>HGL<br>Feet | Time of Max<br>Occurrence<br>days hr:min | Reported<br>Max Depth<br>Feet |
|------|----------|--------------------------|--------------------------|------------------------|------------------------------------------|-------------------------------|
| A100 | JUNCTION | 0.00                     | 0.00                     | 6401.00                | 0 00:00                                  | 0.00                          |
| A105 | JUNCTION | 0.00                     | 0.00                     | 6401.00                | 0 00:00                                  | 0.00                          |
| A110 | JUNCTION | 0.00                     | 0.00                     | 6386.00                | 0 00:00                                  | 0.00                          |
| A120 | JUNCTION | 0.00                     | 0.00                     | 6347.00                | 0 00:00                                  | 0.00                          |
| A125 | JUNCTION | 0.00                     | 0.00                     | 6361.00                | 0 00:00                                  | 0.00                          |
| A130 | JUNCTION | 0.00                     | 0.00                     | 6319.00                | 0 00:00                                  | 0.00                          |

## HAPPY CANYON CREEK MDP & FHAD

|      |          |      |      |         |   |       |      |
|------|----------|------|------|---------|---|-------|------|
| A134 | JUNCTION | 0.00 | 0.00 | 6387.00 | 0 | 00:00 | 0.00 |
| A135 | JUNCTION | 0.00 | 0.00 | 6319.00 | 0 | 00:00 | 0.00 |
| A140 | JUNCTION | 0.00 | 0.00 | 6306.00 | 0 | 00:00 | 0.00 |
| A150 | JUNCTION | 0.00 | 0.00 | 6281.00 | 0 | 00:00 | 0.00 |
| A160 | JUNCTION | 0.00 | 0.00 | 6258.00 | 0 | 00:00 | 0.00 |
| A170 | JUNCTION | 0.00 | 0.00 | 6239.00 | 0 | 00:00 | 0.00 |
| A180 | JUNCTION | 0.00 | 0.00 | 6201.00 | 0 | 00:00 | 0.00 |
| A190 | JUNCTION | 0.00 | 0.00 | 6190.00 | 0 | 00:00 | 0.00 |
| A195 | JUNCTION | 0.00 | 0.00 | 6190.00 | 0 | 00:00 | 0.00 |
| A200 | JUNCTION | 0.00 | 0.00 | 6161.00 | 0 | 00:00 | 0.00 |
| A210 | JUNCTION | 0.00 | 0.00 | 6109.00 | 0 | 00:00 | 0.00 |
| A215 | JUNCTION | 0.00 | 0.00 | 6095.00 | 0 | 00:00 | 0.00 |
| A220 | JUNCTION | 0.00 | 0.00 | 6095.00 | 0 | 00:00 | 0.00 |
| A230 | JUNCTION | 0.00 | 0.00 | 6086.00 | 0 | 00:00 | 0.00 |
| A234 | JUNCTION | 0.00 | 0.00 | 6084.00 | 0 | 00:00 | 0.00 |
| A235 | JUNCTION | 0.00 | 0.00 | 6069.00 | 0 | 00:00 | 0.00 |
| A240 | JUNCTION | 0.00 | 0.00 | 6068.00 | 0 | 00:00 | 0.00 |
| A245 | JUNCTION | 0.00 | 0.00 | 6047.00 | 0 | 00:00 | 0.00 |
| A250 | JUNCTION | 0.00 | 0.00 | 6051.00 | 0 | 00:00 | 0.00 |
| A260 | JUNCTION | 0.00 | 0.00 | 5991.00 | 0 | 00:00 | 0.00 |
| A263 | JUNCTION | 0.00 | 0.00 | 6066.00 | 0 | 00:00 | 0.00 |
| A264 | JUNCTION | 0.00 | 0.00 | 6066.00 | 0 | 00:00 | 0.00 |
| A265 | JUNCTION | 0.00 | 0.00 | 6006.00 | 0 | 00:00 | 0.00 |
| A270 | JUNCTION | 0.00 | 0.00 | 5966.00 | 0 | 00:00 | 0.00 |
| A275 | JUNCTION | 0.00 | 0.00 | 5971.00 | 0 | 00:00 | 0.00 |
| A276 | JUNCTION | 0.00 | 0.00 | 5971.00 | 0 | 00:00 | 0.00 |
| A280 | JUNCTION | 0.00 | 0.00 | 5961.00 | 0 | 00:00 | 0.00 |
| A285 | JUNCTION | 0.00 | 0.00 | 6016.00 | 0 | 00:00 | 0.00 |
| A290 | JUNCTION | 0.00 | 0.00 | 5929.00 | 0 | 00:00 | 0.00 |
| A295 | JUNCTION | 0.02 | 1.66 | 5994.66 | 0 | 00:40 | 1.66 |
| A300 | JUNCTION | 0.00 | 0.00 | 5886.00 | 0 | 00:00 | 0.00 |
| A304 | JUNCTION | 0.00 | 0.00 | 5971.00 | 0 | 00:00 | 0.00 |
| A305 | JUNCTION | 0.00 | 0.00 | 5891.00 | 0 | 00:00 | 0.00 |
| A310 | JUNCTION | 0.00 | 0.00 | 5870.00 | 0 | 00:00 | 0.00 |
| A314 | JUNCTION | 0.00 | 0.00 | 5916.00 | 0 | 00:00 | 0.00 |
| A315 | JUNCTION | 0.00 | 0.00 | 5870.00 | 0 | 00:00 | 0.00 |
| A320 | JUNCTION | 0.00 | 0.00 | 5870.00 | 0 | 00:00 | 0.00 |
| A325 | JUNCTION | 0.00 | 0.00 | 5836.00 | 0 | 00:00 | 0.00 |
| A330 | JUNCTION | 0.00 | 0.00 | 5815.00 | 0 | 00:00 | 0.00 |
| A340 | JUNCTION | 0.00 | 0.00 | 5809.00 | 0 | 00:00 | 0.00 |
| A345 | JUNCTION | 0.00 | 0.00 | 5809.00 | 0 | 00:00 | 0.00 |

## HAPPY CANYON CREEK MDP & FHAD

|       |          |      |      |         |   |       |      |
|-------|----------|------|------|---------|---|-------|------|
| A350  | JUNCTION | 0.00 | 0.00 | 5795.00 | 0 | 00:00 | 0.00 |
| A360  | JUNCTION | 0.00 | 0.00 | 5781.00 | 0 | 00:00 | 0.00 |
| A370  | JUNCTION | 0.00 | 0.00 | 5760.00 | 0 | 00:00 | 0.00 |
| A375  | JUNCTION | 0.00 | 0.00 | 5760.00 | 0 | 00:00 | 0.00 |
| A380  | JUNCTION | 0.00 | 0.00 | 5737.00 | 0 | 00:00 | 0.00 |
| A390  | JUNCTION | 0.00 | 0.00 | 5698.00 | 0 | 00:00 | 0.00 |
| A395  | JUNCTION | 0.00 | 0.00 | 5696.00 | 0 | 00:00 | 0.00 |
| A400  | JUNCTION | 0.00 | 0.00 | 5668.00 | 0 | 00:00 | 0.00 |
| B100  | JUNCTION | 0.00 | 0.00 | 6381.00 | 0 | 00:00 | 0.00 |
| B110  | JUNCTION | 0.00 | 0.00 | 6316.00 | 0 | 00:00 | 0.00 |
| B120  | JUNCTION | 0.00 | 0.00 | 6301.00 | 0 | 00:00 | 0.00 |
| B130  | JUNCTION | 0.00 | 0.00 | 6239.00 | 0 | 00:00 | 0.00 |
| B134  | JUNCTION | 0.00 | 0.00 | 6361.00 | 0 | 00:00 | 0.00 |
| B135  | JUNCTION | 0.00 | 0.00 | 6239.00 | 0 | 00:00 | 0.00 |
| BG001 | JUNCTION | 0.04 | 2.35 | 6277.35 | 0 | 00:52 | 2.35 |
| BG002 | JUNCTION | 0.05 | 2.84 | 6242.84 | 0 | 00:56 | 2.84 |
| BG003 | JUNCTION | 0.07 | 3.57 | 6198.57 | 0 | 00:59 | 3.57 |
| BG004 | JUNCTION | 0.09 | 4.23 | 6164.23 | 0 | 01:03 | 4.23 |
| BG005 | JUNCTION | 0.10 | 4.49 | 6129.49 | 0 | 01:06 | 4.48 |
| BG006 | JUNCTION | 0.11 | 4.95 | 6089.95 | 0 | 01:09 | 4.95 |
| BG007 | JUNCTION | 0.12 | 5.15 | 6050.15 | 0 | 01:14 | 5.15 |
| BG008 | JUNCTION | 0.13 | 5.34 | 6020.34 | 0 | 01:17 | 5.33 |
| BG009 | JUNCTION | 0.16 | 5.81 | 5980.81 | 0 | 01:22 | 5.80 |
| BG010 | JUNCTION | 0.21 | 5.80 | 5951.70 | 0 | 01:25 | 5.80 |
| BG011 | JUNCTION | 0.21 | 5.30 | 5890.30 | 0 | 01:37 | 5.29 |
| BG109 | JUNCTION | 0.06 | 2.73 | 6057.73 | 0 | 00:56 | 2.73 |
| BG111 | JUNCTION | 0.03 | 1.81 | 5948.81 | 0 | 00:48 | 1.81 |
| BG999 | JUNCTION | 0.21 | 5.27 | 5840.27 | 0 | 01:46 | 5.26 |
| BH001 | JUNCTION | 0.02 | 2.35 | 6382.35 | 0 | 00:34 | 2.35 |
| BH002 | JUNCTION | 0.03 | 2.27 | 6317.27 | 0 | 00:44 | 2.26 |
| BH003 | JUNCTION | 0.04 | 2.45 | 6302.45 | 0 | 00:48 | 2.45 |
| BH100 | JUNCTION | 0.00 | 0.38 | 6360.38 | 0 | 00:34 | 0.38 |
| BH999 | JUNCTION | 0.04 | 2.38 | 6240.38 | 0 | 00:59 | 2.38 |
| C100  | JUNCTION | 0.00 | 0.00 | 6441.00 | 0 | 00:00 | 0.00 |
| C110  | JUNCTION | 0.00 | 0.00 | 6396.00 | 0 | 00:00 | 0.00 |
| C120  | JUNCTION | 0.00 | 0.00 | 6351.00 | 0 | 00:00 | 0.00 |
| C125  | JUNCTION | 0.00 | 0.00 | 6351.00 | 0 | 00:00 | 0.00 |
| C130  | JUNCTION | 0.00 | 0.00 | 6311.00 | 0 | 00:00 | 0.00 |
| C140  | JUNCTION | 0.00 | 0.00 | 6283.00 | 0 | 00:00 | 0.00 |
| C150  | JUNCTION | 0.00 | 0.00 | 6246.00 | 0 | 00:00 | 0.00 |
| C153  | JUNCTION | 0.00 | 0.00 | 6376.00 | 0 | 00:00 | 0.00 |

## HAPPY CANYON CREEK MDP & FHAD

|      |          |      |      |         |   |       |      |
|------|----------|------|------|---------|---|-------|------|
| C154 | JUNCTION | 0.00 | 0.00 | 6307.00 | 0 | 00:00 | 0.00 |
| C155 | JUNCTION | 0.00 | 0.00 | 6256.00 | 0 | 00:00 | 0.00 |
| C159 | JUNCTION | 0.00 | 0.00 | 6246.00 | 0 | 00:00 | 0.00 |
| C160 | JUNCTION | 0.00 | 0.00 | 6216.00 | 0 | 00:00 | 0.00 |
| C170 | JUNCTION | 0.00 | 0.00 | 6171.00 | 0 | 00:00 | 0.00 |
| C175 | JUNCTION | 0.00 | 0.00 | 6171.00 | 0 | 00:00 | 0.00 |
| C180 | JUNCTION | 0.00 | 0.00 | 6150.00 | 0 | 00:00 | 0.00 |
| C185 | JUNCTION | 0.00 | 0.00 | 6150.00 | 0 | 00:00 | 0.00 |
| C190 | JUNCTION | 0.00 | 0.00 | 6109.00 | 0 | 00:00 | 0.00 |
| D100 | JUNCTION | 0.00 | 0.00 | 6281.00 | 0 | 00:00 | 0.00 |
| D110 | JUNCTION | 0.00 | 0.00 | 6221.00 | 0 | 00:00 | 0.00 |
| D120 | JUNCTION | 0.00 | 0.00 | 6196.00 | 0 | 00:00 | 0.00 |
| D130 | JUNCTION | 0.00 | 0.00 | 6109.00 | 0 | 00:00 | 0.00 |
| E100 | JUNCTION | 0.00 | 0.00 | 6276.00 | 0 | 00:00 | 0.00 |
| E105 | JUNCTION | 0.00 | 0.00 | 6276.00 | 0 | 00:00 | 0.00 |
| E110 | JUNCTION | 0.00 | 0.00 | 6241.00 | 0 | 00:00 | 0.00 |
| E120 | JUNCTION | 0.00 | 0.00 | 6196.00 | 0 | 00:00 | 0.00 |
| E125 | JUNCTION | 0.00 | 0.00 | 6196.00 | 0 | 00:00 | 0.00 |
| E130 | JUNCTION | 0.00 | 0.00 | 6161.00 | 0 | 00:00 | 0.00 |
| E135 | JUNCTION | 0.00 | 0.00 | 6161.00 | 0 | 00:00 | 0.00 |
| E140 | JUNCTION | 0.00 | 0.00 | 6126.00 | 0 | 00:00 | 0.00 |
| E150 | JUNCTION | 0.00 | 0.00 | 6086.00 | 0 | 00:00 | 0.00 |
| E155 | JUNCTION | 0.00 | 0.00 | 6086.00 | 0 | 00:00 | 0.00 |
| E160 | JUNCTION | 0.00 | 0.00 | 6046.00 | 0 | 00:00 | 0.00 |
| E170 | JUNCTION | 0.00 | 0.00 | 6021.00 | 0 | 00:00 | 0.00 |
| E180 | JUNCTION | 0.00 | 0.00 | 5981.00 | 0 | 00:00 | 0.00 |
| E183 | JUNCTION | 0.00 | 0.00 | 6056.00 | 0 | 00:00 | 0.00 |
| E184 | JUNCTION | 0.00 | 0.00 | 6056.00 | 0 | 00:00 | 0.00 |
| E185 | JUNCTION | 0.00 | 0.00 | 5981.00 | 0 | 00:00 | 0.00 |
| E190 | JUNCTION | 0.00 | 0.00 | 5960.00 | 0 | 00:00 | 0.00 |
| E200 | JUNCTION | 0.00 | 0.00 | 5891.00 | 0 | 00:00 | 0.00 |
| E204 | JUNCTION | 0.00 | 0.00 | 5948.00 | 0 | 00:00 | 0.00 |
| E205 | JUNCTION | 0.00 | 0.00 | 5886.00 | 0 | 00:00 | 0.00 |
| E210 | JUNCTION | 0.00 | 0.00 | 5836.00 | 0 | 00:00 | 0.00 |
| F100 | JUNCTION | 0.00 | 0.00 | 6008.00 | 0 | 00:00 | 0.00 |
| F110 | JUNCTION | 0.00 | 0.00 | 5978.00 | 0 | 00:00 | 0.00 |
| F120 | JUNCTION | 0.00 | 0.00 | 5906.00 | 0 | 00:00 | 0.00 |
| F125 | JUNCTION | 0.00 | 0.00 | 5906.00 | 0 | 00:00 | 0.00 |
| F130 | JUNCTION | 0.00 | 0.00 | 5853.00 | 0 | 00:00 | 0.00 |
| F140 | JUNCTION | 0.00 | 0.00 | 5809.00 | 0 | 00:00 | 0.00 |
| G100 | JUNCTION | 0.00 | 0.00 | 5887.00 | 0 | 00:00 | 0.00 |



## HAPPY CANYON CREEK MDP & FHAD

|       |          |      |      |         |   |       |      |
|-------|----------|------|------|---------|---|-------|------|
| G105  | JUNCTION | 0.00 | 0.00 | 5885.00 | 0 | 00:00 | 0.00 |
| G110  | JUNCTION | 0.00 | 0.00 | 5842.00 | 0 | 00:00 | 0.00 |
| G120  | JUNCTION | 0.00 | 0.00 | 5760.00 | 0 | 00:00 | 0.00 |
| GA001 | JUNCTION | 0.05 | 2.63 | 5952.63 | 0 | 00:46 | 2.62 |
| GA002 | JUNCTION | 0.07 | 3.61 | 5919.61 | 0 | 01:13 | 3.61 |
| GA003 | JUNCTION | 0.07 | 1.78 | 5894.78 | 0 | 02:02 | 1.78 |
| GA004 | JUNCTION | 0.16 | 1.98 | 5889.98 | 0 | 02:03 | 1.98 |
| GA005 | JUNCTION | 0.18 | 2.25 | 5866.25 | 0 | 01:37 | 2.25 |
| GA006 | JUNCTION | 0.19 | 2.24 | 5845.24 | 0 | 01:50 | 2.24 |
| GA007 | JUNCTION | 0.20 | 2.60 | 5794.60 | 0 | 02:00 | 2.60 |
| GA008 | JUNCTION | 0.14 | 2.75 | 5782.75 | 0 | 02:03 | 2.75 |
| GA009 | JUNCTION | 0.17 | 3.04 | 5775.04 | 0 | 01:20 | 3.04 |
| GA010 | JUNCTION | 0.18 | 3.23 | 5765.23 | 0 | 01:12 | 3.23 |
| GA011 | JUNCTION | 0.20 | 3.77 | 5739.77 | 0 | 00:56 | 3.77 |
| GA012 | JUNCTION | 0.20 | 3.97 | 5724.97 | 0 | 01:04 | 3.97 |
| GA999 | JUNCTION | 0.20 | 3.97 | 5710.97 | 0 | 01:11 | 3.97 |
| GV001 | JUNCTION | 0.03 | 1.78 | 6008.78 | 0 | 01:17 | 1.78 |
| GV002 | JUNCTION | 0.16 | 1.67 | 5974.67 | 0 | 01:40 | 1.67 |
| GV003 | JUNCTION | 0.20 | 2.84 | 5907.84 | 0 | 00:46 | 2.83 |
| GV999 | JUNCTION | 0.27 | 3.50 | 5811.50 | 0 | 00:43 | 3.50 |
| H100  | JUNCTION | 0.00 | 0.00 | 5951.00 | 0 | 00:00 | 0.00 |
| H110  | JUNCTION | 0.00 | 0.00 | 5919.00 | 0 | 00:00 | 0.00 |
| H115  | JUNCTION | 0.00 | 0.00 | 5919.00 | 0 | 00:00 | 0.00 |
| H120  | JUNCTION | 0.00 | 0.00 | 5896.00 | 0 | 00:00 | 0.00 |
| H130  | JUNCTION | 0.00 | 0.00 | 5892.00 | 0 | 00:00 | 0.00 |
| H140  | JUNCTION | 0.00 | 0.00 | 5865.00 | 0 | 00:00 | 0.00 |
| H145  | JUNCTION | 0.00 | 0.00 | 5865.00 | 0 | 00:00 | 0.00 |
| H150  | JUNCTION | 0.00 | 0.00 | 5844.00 | 0 | 00:00 | 0.00 |
| H160  | JUNCTION | 0.00 | 0.00 | 5793.00 | 0 | 00:00 | 0.00 |
| H170  | JUNCTION | 0.00 | 0.00 | 5783.00 | 0 | 00:00 | 0.00 |
| H180  | JUNCTION | 0.00 | 0.00 | 5783.00 | 0 | 00:00 | 0.00 |
| H185  | JUNCTION | 0.04 | 2.12 | 5818.12 | 0 | 00:52 | 2.12 |
| H190  | JUNCTION | 0.00 | 0.00 | 5763.00 | 0 | 00:00 | 0.00 |
| H200  | JUNCTION | 0.00 | 0.00 | 5737.00 | 0 | 00:00 | 0.00 |
| H205  | JUNCTION | 0.02 | 1.75 | 5738.75 | 0 | 00:40 | 1.75 |
| H210  | JUNCTION | 0.00 | 0.00 | 5722.00 | 0 | 00:00 | 0.00 |
| H220  | JUNCTION | 0.00 | 0.00 | 5708.00 | 0 | 00:00 | 0.00 |
| HC001 | JUNCTION | 0.07 | 3.37 | 6403.37 | 0 | 00:44 | 3.37 |
| HC002 | JUNCTION | 0.07 | 3.37 | 6388.37 | 0 | 00:48 | 3.37 |
| HC003 | JUNCTION | 0.07 | 3.51 | 6343.51 | 0 | 01:05 | 3.51 |
| HC004 | JUNCTION | 0.08 | 3.52 | 6321.52 | 0 | 00:54 | 3.51 |

## HAPPY CANYON CREEK MDP & FHAD

|       |          |      |       |         |   |       |       |
|-------|----------|------|-------|---------|---|-------|-------|
| HC005 | JUNCTION | 0.13 | 5.70  | 6305.70 | 0 | 01:09 | 5.70  |
| HC006 | JUNCTION | 0.13 | 5.70  | 6285.70 | 0 | 01:10 | 5.70  |
| HC007 | JUNCTION | 0.09 | 4.34  | 6261.34 | 0 | 01:13 | 4.33  |
| HC008 | JUNCTION | 0.05 | 2.52  | 6240.52 | 0 | 01:17 | 2.52  |
| HC009 | JUNCTION | 0.09 | 4.33  | 6241.33 | 0 | 01:14 | 4.32  |
| HC010 | JUNCTION | 0.09 | 4.31  | 6204.31 | 0 | 01:19 | 4.31  |
| HC011 | JUNCTION | 0.11 | 5.10  | 6194.10 | 0 | 01:20 | 5.10  |
| HC012 | JUNCTION | 0.12 | 5.24  | 6165.24 | 0 | 01:22 | 5.23  |
| HC013 | JUNCTION | 0.12 | 5.24  | 6113.24 | 0 | 01:27 | 5.23  |
| HC014 | JUNCTION | 0.33 | 9.78  | 6116.78 | 0 | 01:26 | 9.77  |
| HC015 | JUNCTION | 0.33 | 9.78  | 6103.78 | 0 | 01:29 | 9.78  |
| HC016 | JUNCTION | 0.30 | 8.53  | 6093.53 | 0 | 01:30 | 8.53  |
| HC017 | JUNCTION | 0.27 | 7.50  | 6074.50 | 0 | 01:32 | 7.49  |
| HC018 | JUNCTION | 0.15 | 5.72  | 6050.72 | 0 | 01:34 | 5.72  |
| HC019 | JUNCTION | 0.39 | 12.01 | 6012.01 | 0 | 01:38 | 12.00 |
| HC020 | JUNCTION | 0.47 | 12.00 | 5977.00 | 0 | 01:42 | 11.99 |
| HC021 | JUNCTION | 0.44 | 10.49 | 5965.49 | 0 | 01:43 | 10.48 |
| HC022 | JUNCTION | 0.22 | 6.60  | 5929.60 | 0 | 01:46 | 6.59  |
| HC023 | JUNCTION | 0.20 | 5.69  | 5890.69 | 0 | 01:51 | 5.69  |
| HC024 | JUNCTION | 0.19 | 5.11  | 5869.11 | 0 | 01:55 | 5.11  |
| HC025 | JUNCTION | 0.18 | 5.02  | 5840.02 | 0 | 01:59 | 5.02  |
| HC026 | JUNCTION | 0.45 | 9.07  | 5843.07 | 0 | 01:56 | 9.06  |
| HC027 | JUNCTION | 0.45 | 9.06  | 5823.06 | 0 | 02:01 | 9.06  |
| HC028 | JUNCTION | 0.41 | 9.06  | 5817.06 | 0 | 02:03 | 9.05  |
| HC029 | JUNCTION | 0.39 | 9.10  | 5816.10 | 0 | 02:02 | 9.09  |
| HC030 | JUNCTION | 0.40 | 9.10  | 5803.10 | 0 | 02:04 | 9.10  |
| HC031 | JUNCTION | 0.36 | 7.06  | 5787.06 | 0 | 02:08 | 7.05  |
| HC032 | JUNCTION | 0.31 | 6.78  | 5765.78 | 0 | 02:12 | 6.78  |
| HC033 | JUNCTION | 0.42 | 8.04  | 5766.04 | 0 | 02:12 | 8.03  |
| HC034 | JUNCTION | 0.43 | 8.53  | 5744.53 | 0 | 02:17 | 8.52  |
| HC035 | JUNCTION | 0.42 | 8.48  | 5714.48 | 0 | 02:26 | 8.48  |
| HC036 | JUNCTION | 0.00 | 0.00  | 5698.00 | 0 | 00:00 | 0.00  |
| HC037 | JUNCTION | 0.34 | 6.74  | 5701.74 | 0 | 02:25 | 6.74  |
| HC103 | JUNCTION | 0.02 | 1.85  | 6361.85 | 0 | 00:40 | 1.85  |
| HC104 | JUNCTION | 0.03 | 1.97  | 6387.97 | 0 | 00:42 | 1.96  |
| HC116 | JUNCTION | 0.04 | 2.70  | 6085.70 | 0 | 00:48 | 2.69  |
| HC117 | JUNCTION | 0.05 | 2.64  | 6070.64 | 0 | 01:00 | 2.64  |
| HC119 | JUNCTION | 0.06 | 2.51  | 6067.51 | 0 | 01:00 | 2.51  |
| HC122 | JUNCTION | 0.03 | 1.58  | 6016.58 | 0 | 00:50 | 1.58  |
| HC123 | JUNCTION | 0.05 | 2.02  | 5972.02 | 0 | 01:02 | 2.02  |
| HC124 | JUNCTION | 0.03 | 0.95  | 5915.95 | 0 | 01:08 | 0.95  |

## HAPPY CANYON CREEK MDP & FHAD

|            |          |      |       |         |   |       |       |
|------------|----------|------|-------|---------|---|-------|-------|
| HC999      | JUNCTION | 0.34 | 6.73  | 5673.73 | 0 | 02:30 | 6.73  |
| MT100      | JUNCTION | 0.01 | 0.73  | 6375.73 | 0 | 00:42 | 0.72  |
| MT110      | JUNCTION | 0.06 | 2.21  | 6302.21 | 0 | 01:14 | 2.21  |
| OH001      | JUNCTION | 0.02 | 1.37  | 6441.37 | 0 | 00:48 | 1.37  |
| OH002      | JUNCTION | 0.05 | 2.98  | 6397.98 | 0 | 00:51 | 2.98  |
| OH003      | JUNCTION | 0.07 | 3.74  | 6353.74 | 0 | 00:56 | 3.73  |
| OH004      | JUNCTION | 0.08 | 3.21  | 6312.21 | 0 | 01:28 | 3.21  |
| OH005      | JUNCTION | 0.10 | 3.92  | 6284.92 | 0 | 01:12 | 3.92  |
| OH006      | JUNCTION | 0.15 | 5.05  | 6260.05 | 0 | 01:15 | 5.05  |
| OH007      | JUNCTION | 0.15 | 5.05  | 6250.05 | 0 | 01:18 | 5.05  |
| OH008      | JUNCTION | 0.14 | 4.49  | 6219.49 | 0 | 01:15 | 4.49  |
| OH009      | JUNCTION | 0.15 | 4.58  | 6174.58 | 0 | 01:23 | 4.58  |
| OH010      | JUNCTION | 0.14 | 4.58  | 6153.58 | 0 | 01:25 | 4.58  |
| OH999      | JUNCTION | 0.13 | 3.94  | 6111.94 | 0 | 01:30 | 3.94  |
| OR001      | JUNCTION | 0.03 | 2.15  | 6282.15 | 0 | 00:48 | 2.15  |
| OR002      | JUNCTION | 0.04 | 2.09  | 6222.09 | 0 | 01:03 | 2.09  |
| OR003      | JUNCTION | 0.08 | 4.09  | 6199.09 | 0 | 01:00 | 4.09  |
| OR999      | JUNCTION | 0.09 | 4.05  | 6112.05 | 0 | 01:09 | 4.05  |
| SG001      | JUNCTION | 0.21 | 0.80  | 5885.80 | 0 | 04:03 | 0.80  |
| SG002      | JUNCTION | 0.23 | 1.83  | 5885.83 | 0 | 00:44 | 1.83  |
| SG003      | JUNCTION | 0.24 | 1.42  | 5840.42 | 0 | 01:49 | 1.42  |
| SG999      | JUNCTION | 0.24 | 1.42  | 5760.42 | 0 | 01:54 | 1.42  |
| HC-OUTFALL | OUTFALL  | 0.00 | 0.00  | 5666.00 | 0 | 00:00 | 0.00  |
| GV004      | DIVIDER  | 0.27 | 3.50  | 5855.50 | 0 | 00:39 | 3.50  |
| GA309      | STORAGE  | 0.15 | 8.19  | 5925.19 | 0 | 01:13 | 8.18  |
| GA310      | STORAGE  | 0.29 | 9.73  | 5903.73 | 0 | 02:02 | 9.72  |
| GA311      | STORAGE  | 2.57 | 6.34  | 5895.34 | 0 | 02:03 | 6.34  |
| GA350      | STORAGE  | 0.08 | 2.57  | 5783.57 | 0 | 02:03 | 2.56  |
| HC310      | STORAGE  | 0.18 | 13.80 | 6358.80 | 0 | 01:05 | 13.80 |
| HC320      | STORAGE  | 0.14 | 9.62  | 6310.62 | 0 | 01:09 | 9.62  |
| MT300      | STORAGE  | 0.33 | 8.24  | 6309.24 | 0 | 01:14 | 8.24  |
| OH310      | STORAGE  | 0.40 | 17.62 | 6327.62 | 0 | 01:28 | 17.61 |
| OH320      | STORAGE  | 0.31 | 10.94 | 6292.94 | 0 | 01:12 | 10.94 |
| SG310      | STORAGE  | 2.68 | 6.89  | 5892.89 | 0 | 04:03 | 6.89  |
| SG320      | STORAGE  | 2.18 | 6.61  | 5846.61 | 0 | 01:49 | 6.61  |
| HC326      | STORAGE  | 1.01 | 6.32  | 5844.32 | 0 | 01:55 | 6.32  |
| GV301      | STORAGE  | 0.08 | 4.49  | 6011.99 | 0 | 01:17 | 4.49  |
| GV302      | STORAGE  | 1.13 | 3.66  | 5977.16 | 0 | 01:40 | 3.66  |
| Pond 21    | STORAGE  | 3.71 | 8.94  | 5954.94 | 0 | 01:47 | 8.94  |
| TOD_Pond   | STORAGE  | 3.44 | 8.05  | 5978.05 | 0 | 01:07 | 8.05  |

## HAPPY CANYON CREEK MDP & FHAD

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Node Inflow Summary  
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| Node | Type     | Maximum<br>Lateral<br>Inflow<br>CFS | Maximum<br>Total<br>Inflow<br>CFS | Time of Max<br>Occurrence<br>days hr:min | Lateral<br>Inflow<br>Volume<br>10^6 gal | Total<br>Inflow<br>Volume<br>10^6 gal | Flow<br>Balance<br>Error<br>Percent |
|------|----------|-------------------------------------|-----------------------------------|------------------------------------------|-----------------------------------------|---------------------------------------|-------------------------------------|
| A100 | JUNCTION | 148.50                              | 148.50                            | 0 00:40                                  | 3.28                                    | 3.28                                  | 0.000                               |
| A105 | JUNCTION | 100.98                              | 100.98                            | 0 00:56                                  | 4.08                                    | 4.08                                  | 0.000                               |
| A110 | JUNCTION | 247.47                              | 247.47                            | 0 00:34                                  | 3.59                                    | 3.59                                  | 0.000                               |
| A120 | JUNCTION | 299.29                              | 299.29                            | 0 00:36                                  | 5.06                                    | 5.06                                  | 0.000                               |
| A125 | JUNCTION | 166.94                              | 166.94                            | 0 00:40                                  | 3.49                                    | 3.49                                  | 0.000                               |
| A130 | JUNCTION | 77.45                               | 77.45                             | 0 00:42                                  | 1.85                                    | 1.85                                  | 0.000                               |
| A134 | JUNCTION | 194.13                              | 194.13                            | 0 00:42                                  | 4.76                                    | 4.76                                  | 0.000                               |
| A135 | JUNCTION | 146.36                              | 146.36                            | 0 00:46                                  | 4.2                                     | 4.2                                   | 0.000                               |
| A140 | JUNCTION | 205.49                              | 205.49                            | 0 00:42                                  | 4.75                                    | 4.75                                  | 0.000                               |
| A150 | JUNCTION | 179.16                              | 179.16                            | 0 00:42                                  | 4.04                                    | 4.04                                  | 0.000                               |
| A160 | JUNCTION | 149.79                              | 149.79                            | 0 00:44                                  | 3.55                                    | 3.55                                  | 0.000                               |
| A170 | JUNCTION | 102.96                              | 102.96                            | 0 00:46                                  | 2.82                                    | 2.82                                  | 0.000                               |
| A180 | JUNCTION | 103.07                              | 103.07                            | 0 00:46                                  | 2.69                                    | 2.69                                  | 0.000                               |
| A190 | JUNCTION | 128.27                              | 128.27                            | 0 00:42                                  | 2.86                                    | 2.86                                  | 0.000                               |
| A195 | JUNCTION | 61.92                               | 61.92                             | 0 00:56                                  | 2.6                                     | 2.6                                   | 0.000                               |
| A200 | JUNCTION | 126.22                              | 126.22                            | 0 00:44                                  | 3.08                                    | 3.08                                  | 0.000                               |
| A210 | JUNCTION | 78.30                               | 78.30                             | 0 00:54                                  | 3.06                                    | 3.06                                  | 0.000                               |
| A215 | JUNCTION | 104.15                              | 104.15                            | 0 00:54                                  | 3.82                                    | 3.82                                  | 0.000                               |
| A220 | JUNCTION | 98.17                               | 98.17                             | 0 00:50                                  | 3.11                                    | 3.11                                  | 0.000                               |
| A230 | JUNCTION | 58.67                               | 58.67                             | 0 00:40                                  | 1                                       | 1                                     | 0.000                               |
| A234 | JUNCTION | 90.39                               | 90.39                             | 0 00:48                                  | 2.63                                    | 2.63                                  | 0.000                               |
| A235 | JUNCTION | 101.28                              | 101.28                            | 0 00:48                                  | 3.02                                    | 3.02                                  | 0.000                               |
| A240 | JUNCTION | 123.72                              | 123.72                            | 0 00:44                                  | 2.91                                    | 2.91                                  | 0.000                               |
| A245 | JUNCTION | 54.50                               | 54.50                             | 0 00:42                                  | 1.11                                    | 1.11                                  | 0.000                               |
| A250 | JUNCTION | 48.07                               | 48.07                             | 0 00:46                                  | 1.38                                    | 1.38                                  | 0.000                               |
| A260 | JUNCTION | 88.62                               | 88.62                             | 0 00:52                                  | 2.99                                    | 2.99                                  | 0.000                               |
| A263 | JUNCTION | 60.53                               | 60.53                             | 0 00:56                                  | 2.36                                    | 2.36                                  | 0.000                               |
| A264 | JUNCTION | 64.26                               | 64.26                             | 0 01:04                                  | 2.95                                    | 2.95                                  | 0.000                               |
| A265 | JUNCTION | 47.33                               | 47.33                             | 0 00:50                                  | 1.53                                    | 1.53                                  | 0.000                               |
| A270 | JUNCTION | 69.36                               | 69.36                             | 0 01:08                                  | 3.59                                    | 3.59                                  | 0.000                               |

## HAPPY CANYON CREEK MDP & FHAD

|       |          |        |         |   |       |      |      |       |
|-------|----------|--------|---------|---|-------|------|------|-------|
| A275  | JUNCTION | 155.93 | 155.93  | 0 | 00:42 | 4.06 | 4.06 | 0.000 |
| A276  | JUNCTION | 63.38  | 63.38   | 0 | 00:42 | 1.28 | 1.28 | 0.000 |
| A280  | JUNCTION | 113.33 | 113.33  | 0 | 00:52 | 3.9  | 3.9  | 0.000 |
| A285  | JUNCTION | 41.12  | 41.12   | 0 | 00:50 | 1.28 | 1.28 | 0.000 |
| A290  | JUNCTION | 113.44 | 113.44  | 0 | 00:54 | 3.95 | 3.95 | 0.000 |
| A295  | JUNCTION | 106.03 | 106.03  | 0 | 00:40 | 1.98 | 1.98 | 0.000 |
| A300  | JUNCTION | 169.32 | 169.32  | 0 | 00:44 | 4.88 | 4.88 | 0.000 |
| A304  | JUNCTION | 72.54  | 72.54   | 0 | 01:02 | 3.16 | 3.16 | 0.000 |
| A305  | JUNCTION | 36.49  | 36.49   | 0 | 00:56 | 1.4  | 1.4  | 0.000 |
| A310  | JUNCTION | 59.87  | 59.87   | 0 | 00:56 | 2.25 | 2.25 | 0.000 |
| A314  | JUNCTION | 48.92  | 48.92   | 0 | 01:08 | 2.57 | 2.57 | 0.000 |
| A315  | JUNCTION | 43.11  | 43.11   | 0 | 01:04 | 2.02 | 2.02 | 0.000 |
| A320  | JUNCTION | 51.57  | 51.57   | 0 | 00:52 | 1.86 | 1.86 | 0.000 |
| A325  | JUNCTION | 158.08 | 158.08  | 0 | 00:42 | 4.21 | 4.21 | 0.000 |
| A330  | JUNCTION | 90.66  | 90.66   | 0 | 00:54 | 3.37 | 3.37 | 0.000 |
| A340  | JUNCTION | 65.70  | 65.70   | 0 | 01:08 | 3.62 | 3.62 | 0.000 |
| A345  | JUNCTION | 30.09  | 30.09   | 0 | 00:56 | 1.28 | 1.28 | 0.000 |
| A350  | JUNCTION | 64.75  | 64.75   | 0 | 00:50 | 2.13 | 2.13 | 0.000 |
| A360  | JUNCTION | 82.02  | 82.02   | 0 | 01:00 | 3.7  | 3.7  | 0.000 |
| A370  | JUNCTION | 96.13  | 96.13   | 0 | 00:44 | 2.54 | 2.54 | 0.000 |
| A375  | JUNCTION | 53.59  | 53.59   | 0 | 01:08 | 2.98 | 2.98 | 0.000 |
| A380  | JUNCTION | 83.99  | 83.99   | 0 | 00:54 | 2.97 | 2.97 | 0.000 |
| A390  | JUNCTION | 92.59  | 92.59   | 0 | 00:56 | 3.72 | 3.72 | 0.000 |
| A395  | JUNCTION | 63.96  | 63.96   | 0 | 00:40 | 1.13 | 1.13 | 0.000 |
| A400  | JUNCTION | 185.29 | 185.29  | 0 | 00:42 | 5.15 | 5.15 | 0.000 |
| B100  | JUNCTION | 199.28 | 199.28  | 0 | 00:34 | 3.29 | 3.29 | 0.000 |
| B110  | JUNCTION | 144.63 | 144.63  | 0 | 00:42 | 3.29 | 3.29 | 0.000 |
| B120  | JUNCTION | 109.36 | 109.36  | 0 | 00:44 | 2.91 | 2.91 | 0.000 |
| B130  | JUNCTION | 69.66  | 69.66   | 0 | 00:52 | 2.34 | 2.34 | 0.000 |
| B134  | JUNCTION | 64.04  | 64.04   | 0 | 00:34 | 1.07 | 1.07 | 0.000 |
| B135  | JUNCTION | 133.52 | 133.52  | 0 | 00:50 | 4.43 | 4.43 | 0.000 |
| BG001 | JUNCTION | 0.00   | 139.10  | 0 | 00:52 | 0    | 4.62 | 0.000 |
| BG002 | JUNCTION | 0.00   | 226.38  | 0 | 00:56 | 0    | 7.23 | 0.000 |
| BG003 | JUNCTION | 0.00   | 367.17  | 0 | 00:59 | 0    | 11.9 | 0.000 |
| BG004 | JUNCTION | 0.00   | 535.15  | 0 | 01:03 | 0    | 17.7 | 0.000 |
| BG005 | JUNCTION | 0.00   | 621.63  | 0 | 01:06 | 0    | 20.6 | 0.000 |
| BG006 | JUNCTION | 0.00   | 771.93  | 0 | 01:09 | 0    | 26.6 | 0.000 |
| BG007 | JUNCTION | 0.00   | 854.01  | 0 | 01:14 | 0    | 30.2 | 0.000 |
| BG008 | JUNCTION | 0.00   | 918.42  | 0 | 01:17 | 0    | 33   | 0.000 |
| BG009 | JUNCTION | 0.00   | 1168.27 | 0 | 01:22 | 0    | 45.7 | 0.000 |
| BG010 | JUNCTION | 0.00   | 1188.69 | 0 | 01:25 | 0    | 48.6 | 0.000 |

## HAPPY CANYON CREEK MDP & FHAD

|       |          |        |         |   |       |      |      |       |
|-------|----------|--------|---------|---|-------|------|------|-------|
| BG011 | JUNCTION | 0.00   | 1278.45 | 0 | 01:37 | 0    | 57.9 | 0.000 |
| BG109 | JUNCTION | 0.00   | 148.84  | 0 | 00:56 | 0    | 5.66 | 0.000 |
| BG111 | JUNCTION | 0.00   | 42.80   | 0 | 00:48 | 0    | 1.31 | 0.000 |
| BG999 | JUNCTION | 0.00   | 1301.72 | 0 | 01:46 | 0    | 61.1 | 0.000 |
| BH001 | JUNCTION | 0.00   | 199.28  | 0 | 00:34 | 0    | 3.29 | 0.000 |
| BH002 | JUNCTION | 0.00   | 330.29  | 0 | 00:43 | 0    | 6.6  | 0.000 |
| BH003 | JUNCTION | 0.00   | 428.62  | 0 | 00:48 | 0    | 9.54 | 0.000 |
| BH100 | JUNCTION | 0.00   | 64.04   | 0 | 00:34 | 0    | 1.07 | 0.000 |
| BH999 | JUNCTION | 0.00   | 632.78  | 0 | 00:57 | 0    | 17.5 | 0.000 |
| C100  | JUNCTION | 102.29 | 102.29  | 0 | 00:48 | 3    | 3    | 0.000 |
| C110  | JUNCTION | 138.50 | 138.50  | 0 | 00:44 | 3.47 | 3.47 | 0.000 |
| C120  | JUNCTION | 71.58  | 71.58   | 0 | 00:48 | 2.28 | 2.28 | 0.000 |
| C125  | JUNCTION | 100.85 | 100.85  | 0 | 00:54 | 3.7  | 3.7  | 0.000 |
| C130  | JUNCTION | 195.93 | 195.93  | 0 | 00:42 | 4.72 | 4.72 | 0.000 |
| C140  | JUNCTION | 100.45 | 100.45  | 0 | 00:40 | 2.11 | 2.11 | 0.000 |
| C150  | JUNCTION | 49.62  | 49.62   | 0 | 00:54 | 1.81 | 1.81 | 0.000 |
| C153  | JUNCTION | 218.37 | 218.37  | 0 | 00:42 | 5.17 | 5.17 | 0.000 |
| C154  | JUNCTION | 178.02 | 178.02  | 0 | 00:42 | 4.36 | 4.36 | 0.000 |
| C155  | JUNCTION | 112.11 | 112.11  | 0 | 00:44 | 3.08 | 3.08 | 0.000 |
| C159  | JUNCTION | 178.38 | 178.38  | 0 | 00:42 | 4.41 | 4.41 | 0.000 |
| C160  | JUNCTION | 173.30 | 173.30  | 0 | 00:42 | 3.74 | 3.74 | 0.000 |
| C170  | JUNCTION | 99.48  | 99.48   | 0 | 00:52 | 3.64 | 3.64 | 0.000 |
| C175  | JUNCTION | 90.61  | 90.61   | 0 | 00:54 | 3.29 | 3.29 | 0.000 |
| C180  | JUNCTION | 60.49  | 60.49   | 0 | 00:44 | 1.54 | 1.54 | 0.000 |
| C185  | JUNCTION | 99.02  | 99.02   | 0 | 00:54 | 3.64 | 3.64 | 0.000 |
| C190  | JUNCTION | 75.81  | 75.81   | 0 | 00:50 | 2.55 | 2.55 | 0.000 |
| D100  | JUNCTION | 134.70 | 134.70  | 0 | 00:48 | 3.97 | 3.97 | 0.000 |
| D110  | JUNCTION | 129.08 | 129.08  | 0 | 00:48 | 3.78 | 3.78 | 0.000 |
| D120  | JUNCTION | 117.57 | 117.57  | 0 | 00:42 | 2.46 | 2.46 | 0.000 |
| D130  | JUNCTION | 119.46 | 119.46  | 0 | 00:44 | 3.06 | 3.06 | 0.000 |
| E100  | JUNCTION | 83.59  | 83.59   | 0 | 00:54 | 2.99 | 2.99 | 0.000 |
| E105  | JUNCTION | 56.48  | 56.48   | 0 | 00:48 | 1.63 | 1.63 | 0.000 |
| E110  | JUNCTION | 98.78  | 98.78   | 0 | 00:46 | 2.56 | 2.56 | 0.000 |
| E120  | JUNCTION | 80.21  | 80.21   | 0 | 00:48 | 2.4  | 2.4  | 0.000 |
| E125  | JUNCTION | 71.04  | 71.04   | 0 | 00:50 | 2.27 | 2.27 | 0.000 |
| E130  | JUNCTION | 95.50  | 95.50   | 0 | 00:46 | 2.55 | 2.55 | 0.000 |
| E135  | JUNCTION | 93.39  | 93.39   | 0 | 00:52 | 3.14 | 3.14 | 0.000 |
| E140  | JUNCTION | 113.20 | 113.20  | 0 | 00:44 | 2.81 | 2.81 | 0.000 |
| E150  | JUNCTION | 77.62  | 77.62   | 0 | 00:46 | 2.05 | 2.05 | 0.000 |
| E155  | JUNCTION | 98.43  | 98.43   | 0 | 00:58 | 3.92 | 3.92 | 0.000 |
| E160  | JUNCTION | 110.46 | 110.46  | 0 | 00:52 | 3.49 | 3.49 | 0.000 |



## HAPPY CANYON CREEK MDP & FHAD

|       |          |        |        |   |       |      |      |        |
|-------|----------|--------|--------|---|-------|------|------|--------|
| E170  | JUNCTION | 106.03 | 106.03 | 0 | 00:46 | 2.82 | 2.82 | 0.000  |
| E180  | JUNCTION | 53.89  | 53.89  | 0 | 01:10 | 3.14 | 3.14 | 0.000  |
| E183  | JUNCTION | 89.36  | 89.36  | 0 | 00:58 | 3.56 | 3.56 | 0.000  |
| E184  | JUNCTION | 60.11  | 60.11  | 0 | 00:54 | 2.1  | 2.1  | 0.000  |
| E185  | JUNCTION | 91.86  | 91.86  | 0 | 00:58 | 3.72 | 3.72 | 0.000  |
| E190  | JUNCTION | 106.58 | 106.58 | 0 | 00:42 | 2.82 | 2.82 | 0.000  |
| E200  | JUNCTION | 68.54  | 68.54  | 0 | 01:04 | 3.22 | 3.22 | 0.000  |
| E204  | JUNCTION | 42.80  | 42.80  | 0 | 00:48 | 1.31 | 1.31 | 0.000  |
| E205  | JUNCTION | 135.05 | 135.05 | 0 | 00:46 | 4.18 | 4.18 | 0.000  |
| E210  | JUNCTION | 58.33  | 58.33  | 0 | 01:06 | 2.96 | 2.96 | 0.000  |
| F100  | JUNCTION | 114.33 | 114.33 | 0 | 00:44 | 2.87 | 2.87 | 0.000  |
| F110  | JUNCTION | 136.80 | 136.80 | 0 | 00:44 | 3.39 | 3.39 | 0.000  |
| F120  | JUNCTION | 182.47 | 182.47 | 0 | 00:44 | 5.33 | 5.33 | 0.000  |
| F125  | JUNCTION | 58.37  | 58.37  | 0 | 00:52 | 2.02 | 2.02 | 0.000  |
| F130  | JUNCTION | 93.92  | 93.92  | 0 | 00:52 | 3.19 | 3.19 | 0.000  |
| F140  | JUNCTION | 44.52  | 44.52  | 0 | 00:56 | 1.86 | 1.86 | 0.000  |
| G100  | JUNCTION | 53.92  | 53.92  | 0 | 01:14 | 3.45 | 3.45 | 0.000  |
| G105  | JUNCTION | 70.26  | 70.26  | 0 | 00:42 | 1.96 | 1.96 | 0.000  |
| G110  | JUNCTION | 79.63  | 79.63  | 0 | 00:48 | 2.59 | 2.59 | 0.000  |
| G120  | JUNCTION | 106.27 | 106.27 | 0 | 00:50 | 3.95 | 3.95 | 0.000  |
| GA001 | JUNCTION | 0.00   | 176.17 | 0 | 00:46 | 0    | 5.84 | 0.000  |
| GA002 | JUNCTION | 0.00   | 308.32 | 0 | 01:13 | 0    | 12.8 | 0.000  |
| GA003 | JUNCTION | 0.00   | 187.77 | 0 | 02:02 | 0    | 14.9 | 0.000  |
| GA004 | JUNCTION | 0.00   | 193.91 | 0 | 02:03 | 0    | 16   | 0.000  |
| GA005 | JUNCTION | 0.00   | 259.95 | 0 | 01:37 | 0    | 21   | 0.000  |
| GA006 | JUNCTION | 0.00   | 281.87 | 0 | 01:43 | 0    | 23.9 | 0.000  |
| GA007 | JUNCTION | 0.00   | 308.20 | 0 | 02:00 | 0    | 27.4 | 0.000  |
| GA008 | JUNCTION | 0.00   | 359.09 | 0 | 02:03 | 0    | 32.3 | 0.000  |
| GA009 | JUNCTION | 0.00   | 431.97 | 0 | 01:20 | 0    | 36.6 | -0.000 |
| GA010 | JUNCTION | 0.00   | 496.67 | 0 | 01:12 | 0    | 40.9 | 0.000  |
| GA011 | JUNCTION | 0.00   | 640.26 | 0 | 00:56 | 0    | 46.6 | 0.000  |
| GA012 | JUNCTION | 0.00   | 730.25 | 0 | 01:04 | 0    | 50.1 | 0.000  |
| GA999 | JUNCTION | 0.00   | 767.32 | 0 | 01:07 | 0    | 51.5 | 0.000  |
| GV001 | JUNCTION | 0.00   | 71.08  | 0 | 01:17 | 0    | 2.87 | -0.000 |
| GV002 | JUNCTION | 0.00   | 103.75 | 0 | 01:40 | 0    | 5.78 | 0.000  |
| GV003 | JUNCTION | 0.00   | 237.67 | 0 | 00:46 | 0    | 13.1 | 0.000  |
| GV999 | JUNCTION | 0.00   | 327.70 | 0 | 01:27 | 0    | 18.7 | 0.000  |
| H100  | JUNCTION | 176.17 | 176.17 | 0 | 00:46 | 5.84 | 5.84 | 0.000  |
| H110  | JUNCTION | 174.94 | 174.94 | 0 | 00:42 | 4.46 | 4.46 | 0.000  |
| H115  | JUNCTION | 123.55 | 123.55 | 0 | 00:38 | 2.49 | 2.49 | 0.000  |
| H120  | JUNCTION | 68.81  | 68.81  | 0 | 00:48 | 2.15 | 2.15 | 0.000  |

## HAPPY CANYON CREEK MDP & FHAD

|       |          |        |         |   |       |      |      |       |
|-------|----------|--------|---------|---|-------|------|------|-------|
| H130  | JUNCTION | 50.88  | 50.88   | 0 | 00:44 | 1.27 | 1.27 | 0.000 |
| H140  | JUNCTION | 27.43  | 27.43   | 0 | 00:56 | 1.09 | 1.09 | 0.000 |
| H145  | JUNCTION | 82.20  | 82.20   | 0 | 01:04 | 3.87 | 3.87 | 0.000 |
| H150  | JUNCTION | 123.84 | 123.84  | 0 | 00:44 | 2.85 | 2.85 | 0.000 |
| H160  | JUNCTION | 50.36  | 50.36   | 0 | 01:14 | 3.2  | 3.2  | 0.000 |
| H170  | JUNCTION | 54.20  | 54.20   | 0 | 00:58 | 2.3  | 2.3  | 0.000 |
| H180  | JUNCTION | 110.42 | 110.42  | 0 | 00:46 | 3.3  | 3.3  | 0.000 |
| H185  | JUNCTION | 118.49 | 118.49  | 0 | 00:52 | 4.32 | 4.32 | 0.000 |
| H190  | JUNCTION | 228.56 | 228.56  | 0 | 00:36 | 4.27 | 4.27 | 0.000 |
| H200  | JUNCTION | 101.49 | 101.49  | 0 | 00:46 | 2.98 | 2.98 | 0.000 |
| H205  | JUNCTION | 136.56 | 136.56  | 0 | 00:40 | 2.63 | 2.63 | 0.000 |
| H210  | JUNCTION | 101.91 | 101.91  | 0 | 00:52 | 3.38 | 3.38 | 0.000 |
| H220  | JUNCTION | 42.78  | 42.78   | 0 | 00:50 | 1.38 | 1.38 | 0.000 |
| HC001 | JUNCTION | 0.00   | 234.42  | 0 | 00:44 | 0    | 7.35 | 0.000 |
| HC002 | JUNCTION | 0.00   | 428.19  | 0 | 00:40 | 0    | 10.9 | 0.000 |
| HC003 | JUNCTION | 0.00   | 436.17  | 0 | 01:05 | 0    | 16   | 0.000 |
| HC004 | JUNCTION | 0.00   | 941.01  | 0 | 00:54 | 0    | 30.4 | 0.000 |
| HC005 | JUNCTION | 0.00   | 1026.85 | 0 | 01:09 | 0    | 35.2 | 0.000 |
| HC006 | JUNCTION | 0.00   | 1140.83 | 0 | 01:09 | 0    | 39.3 | 0.000 |
| HC007 | JUNCTION | 0.00   | 1226.22 | 0 | 01:13 | 0    | 42.9 | 0.000 |
| HC008 | JUNCTION | 0.00   | 1286.94 | 0 | 01:16 | 0    | 45.8 | 0.000 |
| HC009 | JUNCTION | 0.00   | 1788.59 | 0 | 01:14 | 0    | 63.3 | 0.000 |
| HC010 | JUNCTION | 0.00   | 1840.15 | 0 | 01:18 | 0    | 66.3 | 0.000 |
| HC011 | JUNCTION | 0.00   | 1947.43 | 0 | 01:20 | 0    | 71.8 | 0.000 |
| HC012 | JUNCTION | 0.00   | 2001.66 | 0 | 01:22 | 0    | 74.9 | 0.000 |
| HC013 | JUNCTION | 0.00   | 2053.42 | 0 | 01:27 | 0    | 78.2 | 0.000 |
| HC014 | JUNCTION | 0.00   | 3545.62 | 0 | 01:26 | 0    | 149  | 0.000 |
| HC015 | JUNCTION | 0.00   | 3673.91 | 0 | 01:28 | 0    | 156  | 0.000 |
| HC016 | JUNCTION | 0.00   | 3677.80 | 0 | 01:30 | 0    | 157  | 0.000 |
| HC017 | JUNCTION | 0.00   | 3825.83 | 0 | 01:31 | 0    | 165  | 0.000 |
| HC018 | JUNCTION | 0.00   | 3853.01 | 0 | 01:34 | 0    | 168  | 0.000 |
| HC019 | JUNCTION | 0.00   | 4007.86 | 0 | 01:38 | 0    | 178  | 0.000 |
| HC020 | JUNCTION | 0.00   | 4108.48 | 0 | 01:41 | 0    | 187  | 0.000 |
| HC021 | JUNCTION | 0.00   | 4164.43 | 0 | 01:42 | 0    | 191  | 0.000 |
| HC022 | JUNCTION | 0.00   | 4241.48 | 0 | 01:46 | 0    | 199  | 0.000 |
| HC023 | JUNCTION | 0.00   | 4347.98 | 0 | 01:50 | 0    | 208  | 0.000 |
| HC024 | JUNCTION | 0.00   | 4419.16 | 0 | 01:55 | 0    | 216  | 0.000 |
| HC025 | JUNCTION | 0.00   | 4430.36 | 0 | 01:59 | 0    | 218  | 0.000 |
| HC026 | JUNCTION | 0.00   | 5677.90 | 0 | 01:56 | 0    | 283  | 0.000 |
| HC027 | JUNCTION | 0.00   | 5695.33 | 0 | 02:01 | 0    | 286  | 0.000 |
| HC028 | JUNCTION | 0.00   | 5747.50 | 0 | 02:02 | 0    | 291  | 0.000 |

## HAPPY CANYON CREEK MDP & FHAD

|            |          |      |         |   |       |   |      |        |
|------------|----------|------|---------|---|-------|---|------|--------|
| HC029      | JUNCTION | 0.00 | 6022.54 | 0 | 02:02 | 0 | 310  | 0.000  |
| HC030      | JUNCTION | 0.00 | 6036.85 | 0 | 02:04 | 0 | 312  | 0.000  |
| HC031      | JUNCTION | 0.00 | 6063.09 | 0 | 02:08 | 0 | 316  | 0.000  |
| HC032      | JUNCTION | 0.00 | 6091.83 | 0 | 02:12 | 0 | 321  | 0.000  |
| HC033      | JUNCTION | 0.00 | 6181.49 | 0 | 02:12 | 0 | 333  | 0.000  |
| HC034      | JUNCTION | 0.00 | 6177.45 | 0 | 02:17 | 0 | 337  | 0.000  |
| HC035      | JUNCTION | 0.00 | 6133.73 | 0 | 02:26 | 0 | 341  | 0.000  |
| HC036      | JUNCTION | 0.00 | 6587.09 | 0 | 02:25 | 0 | 392  | 0.000  |
| HC037      | JUNCTION | 0.00 | 6587.36 | 0 | 02:25 | 0 | 393  | 0.000  |
| HC103      | JUNCTION | 0.00 | 166.94  | 0 | 00:40 | 0 | 3.49 | 0.000  |
| HC104      | JUNCTION | 0.00 | 194.13  | 0 | 00:42 | 0 | 4.76 | 0.000  |
| HC116      | JUNCTION | 0.00 | 90.39   | 0 | 00:48 | 0 | 2.63 | -0.000 |
| HC117      | JUNCTION | 0.00 | 183.31  | 0 | 00:56 | 0 | 5.71 | 0.000  |
| HC119      | JUNCTION | 0.00 | 123.81  | 0 | 01:00 | 0 | 5.31 | 0.000  |
| HC122      | JUNCTION | 0.00 | 41.12   | 0 | 00:50 | 0 | 1.28 | 0.000  |
| HC123      | JUNCTION | 0.00 | 72.54   | 0 | 01:02 | 0 | 3.16 | 0.000  |
| HC124      | JUNCTION | 0.00 | 48.92   | 0 | 01:08 | 0 | 2.57 | 0.000  |
| HC999      | JUNCTION | 0.00 | 6577.64 | 0 | 02:30 | 0 | 399  | 0.000  |
| MT100      | JUNCTION | 0.00 | 218.37  | 0 | 00:42 | 0 | 5.17 | 0.000  |
| MT110      | JUNCTION | 0.00 | 225.46  | 0 | 01:14 | 0 | 9.53 | 0.000  |
| OH001      | JUNCTION | 0.00 | 102.29  | 0 | 00:48 | 0 | 3    | 0.000  |
| OH002      | JUNCTION | 0.00 | 232.80  | 0 | 00:51 | 0 | 6.49 | 0.000  |
| OH003      | JUNCTION | 0.00 | 399.02  | 0 | 00:56 | 0 | 12.5 | 0.000  |
| OH004      | JUNCTION | 0.00 | 362.87  | 0 | 01:28 | 0 | 17.3 | 0.000  |
| OH005      | JUNCTION | 0.00 | 400.74  | 0 | 01:12 | 0 | 19.4 | 0.000  |
| OH006      | JUNCTION | 0.00 | 694.79  | 0 | 01:15 | 0 | 32   | 0.000  |
| OH007      | JUNCTION | 0.00 | 840.30  | 0 | 01:13 | 0 | 38.3 | 0.000  |
| OH008      | JUNCTION | 0.00 | 921.77  | 0 | 01:15 | 0 | 42   | 0.000  |
| OH009      | JUNCTION | 0.00 | 1040.32 | 0 | 01:23 | 0 | 49.2 | 0.000  |
| OH010      | JUNCTION | 0.00 | 1139.30 | 0 | 01:24 | 0 | 54.4 | 0.000  |
| OH999      | JUNCTION | 0.00 | 1177.04 | 0 | 01:30 | 0 | 57.1 | 0.000  |
| OR001      | JUNCTION | 0.00 | 134.70  | 0 | 00:48 | 0 | 3.97 | 0.000  |
| OR002      | JUNCTION | 0.00 | 245.62  | 0 | 00:58 | 0 | 7.86 | 0.000  |
| OR003      | JUNCTION | 0.00 | 330.24  | 0 | 01:00 | 0 | 10.4 | 0.000  |
| OR999      | JUNCTION | 0.00 | 413.92  | 0 | 01:07 | 0 | 13.5 | 0.000  |
| SG001      | JUNCTION | 0.00 | 11.92   | 0 | 04:03 | 0 | 3.45 | 0.000  |
| SG002      | JUNCTION | 0.00 | 70.69   | 0 | 00:44 | 0 | 5.41 | 0.000  |
| SG003      | JUNCTION | 0.00 | 58.89   | 0 | 01:49 | 0 | 8.04 | 0.000  |
| SG999      | JUNCTION | 0.00 | 119.14  | 0 | 01:28 | 0 | 12   | 0.000  |
| HC-OUTFALL | OUTFALL  | 0.00 | 6577.64 | 0 | 02:30 | 0 | 399  | 0.000  |
| GV004      | DIVIDER  | 0.00 | 308.81  | 0 | 01:03 | 0 | 16.5 | 0.000  |

## HAPPY CANYON CREEK MDP & FHAD

|          |         |      |         |   |       |   |      |       |
|----------|---------|------|---------|---|-------|---|------|-------|
| GA309    | STORAGE | 0.00 | 460.93  | 0 | 00:43 | 0 | 12.8 | 0.009 |
| GA310    | STORAGE | 0.00 | 363.13  | 0 | 01:10 | 0 | 14.9 | 0.000 |
| GA311    | STORAGE | 0.00 | 194.51  | 0 | 01:58 | 0 | 16.2 | 0.098 |
| GA350    | STORAGE | 0.00 | 360.72  | 0 | 01:59 | 0 | 33   | 2.331 |
| HC310    | STORAGE | 0.00 | 677.25  | 0 | 00:43 | 0 | 16.1 | 0.543 |
| HC320    | STORAGE | 0.00 | 1110.92 | 0 | 00:55 | 0 | 35.2 | 0.030 |
| MT300    | STORAGE | 0.00 | 395.32  | 0 | 00:43 | 0 | 9.53 | 0.019 |
| OH310    | STORAGE | 0.00 | 548.93  | 0 | 00:59 | 0 | 17.3 | 0.003 |
| OH320    | STORAGE | 0.00 | 401.13  | 0 | 01:08 | 0 | 19.4 | 0.047 |
| SG310    | STORAGE | 0.00 | 53.92   | 0 | 01:14 | 0 | 3.45 | 0.012 |
| SG320    | STORAGE | 0.00 | 140.72  | 0 | 00:56 | 0 | 8.05 | 0.077 |
| HC326    | STORAGE | 0.00 | 158.08  | 0 | 00:42 | 0 | 4.21 | 0.066 |
| GV301    | STORAGE | 0.00 | 114.33  | 0 | 00:44 | 0 | 2.87 | 0.001 |
| GV302    | STORAGE | 0.00 | 186.51  | 0 | 00:52 | 0 | 6.25 | 0.165 |
| Pond 21  | STORAGE | 0.00 | 106.58  | 0 | 00:42 | 0 | 2.82 | 0.063 |
| TOD_Pond | STORAGE | 0.00 | 155.93  | 0 | 00:42 | 0 | 4.06 | 0.297 |

\*\*\*\*\*  
Node Flooding Summary  
\*\*\*\*\*

No nodes were flooded.

\*\*\*\*\*  
Storage Volume Summary  
\*\*\*\*\*

| Storage Unit | Average<br>Volume<br>1000 ft <sup>3</sup> | Avg<br>Pcnt<br>Full | Evap<br>Pcnt<br>Loss | Exfil<br>Pcnt<br>Loss | Maximum<br>Volume<br>1000 ft <sup>3</sup> | Max<br>Pcnt<br>Full | Time of Max<br>Occurrence<br>days hr:min | Maximum<br>Outflow<br>CFS |
|--------------|-------------------------------------------|---------------------|----------------------|-----------------------|-------------------------------------------|---------------------|------------------------------------------|---------------------------|
| GA309        | 5.081                                     | 0.7                 | 0.0                  | 0.0                   | 412.097                                   | 54.5                | 0 01:13                                  | 308.32                    |
| GA310        | 19.173                                    | 1.1                 | 0.0                  | 0.0                   | 884.953                                   | 50.1                | 0 02:02                                  | 187.77                    |
| GA311        | 86.747                                    | 15.4                | 0.0                  | 0.0                   | 339.607                                   | 60.2                | 0 02:03                                  | 193.91                    |
| GA350        | 0.717                                     | 0.1                 | 0.0                  | 0.0                   | 36.166                                    | 3.5                 | 0 02:03                                  | 359.09                    |
| HC310        | 3.075                                     | 0.2                 | 0.0                  | 0.0                   | 379.322                                   | 29.1                | 0 01:05                                  | 436.17                    |
| HC320        | 7.251                                     | 0.7                 | 0.0                  | 0.0                   | 629.985                                   | 62.3                | 0 01:09                                  | 1026.85                   |
| MT300        | 13.287                                    | 1.0                 | 0.0                  | 0.0                   | 574.621                                   | 44.8                | 0 01:14                                  | 225.46                    |

## HAPPY CANYON CREEK MDP & FHAD

|          |         |      |     |     |         |      |   |       |        |
|----------|---------|------|-----|-----|---------|------|---|-------|--------|
| OH310    | 9.364   | 1.1  | 0.0 | 0.0 | 599.558 | 72.3 | 0 | 01:28 | 362.87 |
| OH320    | 2.235   | 0.3  | 0.0 | 0.0 | 103.904 | 12.4 | 0 | 01:12 | 400.74 |
| SG310    | 74.444  | 6.5  | 0.0 | 0.0 | 334.477 | 29.4 | 0 | 04:03 | 11.92  |
| SG320    | 62.080  | 5.9  | 0.0 | 0.0 | 359.322 | 34.3 | 0 | 01:49 | 58.89  |
| HC326    | 31.261  | 2.9  | 0.0 | 0.0 | 419.153 | 38.4 | 0 | 01:55 | 30.37  |
| GV301    | 1.516   | 0.3  | 0.0 | 0.0 | 120.331 | 25.7 | 0 | 01:17 | 71.08  |
| GV302    | 121.962 | 8.5  | 0.0 | 0.0 | 449.226 | 31.4 | 0 | 01:40 | 103.75 |
| Pond 21  | 69.987  | 15.5 | 0.0 | 0.0 | 278.654 | 61.6 | 0 | 01:47 | 25.38  |
| TOD_Pond | 78.311  | 19.5 | 0.0 | 0.0 | 276.440 | 68.7 | 0 | 01:07 | 114.16 |

\*\*\*\*\*  
 Outfall Loading Summary  
 \*\*\*\*\*

| Outfall Node | Flow<br>Freq<br>Pcnt | Avg<br>Flow<br>CFS | Max<br>Flow<br>CFS | Total<br>Volume<br>10^6 gal |
|--------------|----------------------|--------------------|--------------------|-----------------------------|
| HC-OUTFALL   | 99.82                | 154.49             | 6577.64            | 398.648                     |
| System       | 99.82                | 154.49             | 6577.64            | 398.648                     |

\*\*\*\*\*  
 Link Flow Summary  
 \*\*\*\*\*

| Link    | Type    | Maximum<br> Flow <br>CFS | Time of Max<br>Occurrence<br>days hr:min | Maximum<br> Veloc <br>ft/sec | Max/<br>Full<br>Flow | Max/<br>Full<br>Depth |
|---------|---------|--------------------------|------------------------------------------|------------------------------|----------------------|-----------------------|
| A100-DF | DUMMY   | 148.50                   | 0 00:40                                  |                              |                      |                       |
| A105-DF | DUMMY   | 100.98                   | 0 00:56                                  |                              |                      |                       |
| A11     | CONDUIT | 233.95                   | 0 00:48                                  | 3.77                         | 0.07                 | 0.34                  |
| A110-DF | DUMMY   | 247.47                   | 0 00:34                                  |                              |                      |                       |
| A12     | CONDUIT | 417.65                   | 0 00:46                                  | 4.06                         | 0.07                 | 0.26                  |
| A120-DF | DUMMY   | 299.29                   | 0 00:36                                  |                              |                      |                       |
| A125-DF | DUMMY   | 166.94                   | 0 00:40                                  |                              |                      |                       |

## HAPPY CANYON CREEK MDP & FHAD

|         |         |         |   |       |      |      |      |
|---------|---------|---------|---|-------|------|------|------|
| A13     | CONDUIT | 435.83  | 0 | 01:09 | 4.42 | 0.08 | 0.35 |
| A130    | CONDUIT | 163.43  | 0 | 00:45 | 3.33 | 0.03 | 0.18 |
| A130-DF | DUMMY   | 77.45   | 0 | 00:42 |      |      |      |
| A134-DF | DUMMY   | 194.13  | 0 | 00:42 |      |      |      |
| A135    | CONDUIT | 177.34  | 0 | 00:57 | 2.95 | 0.02 | 0.19 |
| A135-DF | DUMMY   | 146.36  | 0 | 00:46 |      |      |      |
| A14     | CONDUIT | 939.15  | 0 | 00:57 | 4.92 | 0.11 | 0.35 |
| A140-DF | DUMMY   | 205.49  | 0 | 00:42 |      |      |      |
| A15     | CONDUIT | 1025.62 | 0 | 01:10 | 5.88 | 0.25 | 0.57 |
| A150-DF | DUMMY   | 179.16  | 0 | 00:42 |      |      |      |
| A16     | CONDUIT | 1130.89 | 0 | 01:13 | 5.56 | 0.19 | 0.43 |
| A160-DF | DUMMY   | 149.79  | 0 | 00:44 |      |      |      |
| A17     | CONDUIT | 1216.54 | 0 | 01:17 | 4.22 | 0.08 | 0.25 |
| A170-DF | DUMMY   | 102.96  | 0 | 00:46 |      |      |      |
| A18     | CONDUIT | 1777.06 | 0 | 01:19 | 5.85 | 0.19 | 0.43 |
| A180-DF | DUMMY   | 103.07  | 0 | 00:46 |      |      |      |
| A19     | CONDUIT | 1837.67 | 0 | 01:20 | 5.04 | 0.14 | 0.35 |
| A190-DF | DUMMY   | 128.27  | 0 | 00:42 |      |      |      |
| A195-DF | DUMMY   | 61.92   | 0 | 00:56 |      |      |      |
| A20     | CONDUIT | 1943.35 | 0 | 01:23 | 6.64 | 0.27 | 0.51 |
| A200-DF | DUMMY   | 126.22  | 0 | 00:44 |      |      |      |
| A21     | CONDUIT | 1996.47 | 0 | 01:27 | 6.93 | 0.29 | 0.52 |
| A210-DF | DUMMY   | 78.30   | 0 | 00:54 |      |      |      |
| A215-DF | DUMMY   | 104.15  | 0 | 00:54 |      |      |      |
| A22     | CONDUIT | 3543.11 | 0 | 01:29 | 8.23 | 0.16 | 0.49 |
| A220-DF | DUMMY   | 98.17   | 0 | 00:50 |      |      |      |
| A23     | CONDUIT | 3672.09 | 0 | 01:30 | 7.14 | 0.11 | 0.43 |
| A230-DF | DUMMY   | 58.67   | 0 | 00:40 |      |      |      |
| A234-DF | DUMMY   | 90.39   | 0 | 00:48 |      |      |      |
| A235    | CONDUIT | 86.72   | 0 | 01:00 | 3.28 | 0.05 | 0.26 |
| A235-DF | DUMMY   | 101.28  | 0 | 00:48 |      |      |      |
| A24     | CONDUIT | 3675.14 | 0 | 01:32 | 6.77 | 0.08 | 0.38 |
| A240-DF | DUMMY   | 123.72  | 0 | 00:44 |      |      |      |
| A245-DF | DUMMY   | 54.50   | 0 | 00:42 |      |      |      |
| A25     | CONDUIT | 3821.92 | 0 | 01:34 | 6.48 | 0.06 | 0.26 |
| A250-DF | DUMMY   | 48.07   | 0 | 00:46 |      |      |      |
| A26     | CONDUIT | 3846.54 | 0 | 01:39 | 7.30 | 0.09 | 0.29 |
| A260-DF | DUMMY   | 88.62   | 0 | 00:52 |      |      |      |
| A263-DF | DUMMY   | 60.53   | 0 | 00:56 |      |      |      |
| A264-DF | DUMMY   | 64.26   | 0 | 01:04 |      |      |      |
| A265    | CONDUIT | 123.08  | 0 | 01:09 | 3.33 | 0.04 | 0.25 |

## HAPPY CANYON CREEK MDP & FHAD

|         |         |         |   |       |       |      |      |
|---------|---------|---------|---|-------|-------|------|------|
| A265-DF | DUMMY   | 47.33   | 0 | 00:50 |       |      |      |
| A27     | CONDUIT | 4003.28 | 0 | 01:42 | 9.87  | 0.30 | 0.60 |
| A270-DF | DUMMY   | 69.36   | 0 | 01:08 |       |      |      |
| A275-DF | DUMMY   | 155.93  | 0 | 00:42 |       |      |      |
| A276-DF | DUMMY   | 63.38   | 0 | 00:42 |       |      |      |
| A28     | CONDUIT | 4107.44 | 0 | 01:43 | 8.40  | 0.21 | 0.52 |
| A280-DF | DUMMY   | 113.33  | 0 | 00:52 |       |      |      |
| A285-DF | DUMMY   | 41.12   | 0 | 00:50 |       |      |      |
| A29     | CONDUIT | 4158.27 | 0 | 01:46 | 7.94  | 0.12 | 0.33 |
| A290    | CONDUIT | 37.87   | 0 | 01:11 | 2.41  | 0.01 | 0.15 |
| A290-DF | DUMMY   | 113.44  | 0 | 00:54 |       |      |      |
| A295    | CONDUIT | 105.93  | 0 | 00:41 | 21.47 | 0.36 | 0.42 |
| A30     | CONDUIT | 4231.59 | 0 | 01:51 | 7.28  | 0.09 | 0.28 |
| A300-DF | DUMMY   | 169.32  | 0 | 00:44 |       |      |      |
| A304-DF | DUMMY   | 72.54   | 0 | 01:02 |       |      |      |
| A305    | CONDUIT | 70.43   | 0 | 01:15 | 2.81  | 0.02 | 0.20 |
| A305-DF | DUMMY   | 36.49   | 0 | 00:56 |       |      |      |
| A31     | CONDUIT | 4335.70 | 0 | 01:55 | 6.06  | 0.06 | 0.26 |
| A310-DF | DUMMY   | 59.87   | 0 | 00:56 |       |      |      |
| A314-DF | DUMMY   | 48.92   | 0 | 01:08 |       |      |      |
| A315    | CONDUIT | 48.86   | 0 | 01:11 | 5.86  | 0.00 | 0.10 |
| A315-DF | DUMMY   | 43.11   | 0 | 01:04 |       |      |      |
| A32     | CONDUIT | 4411.36 | 0 | 01:59 | 6.77  | 0.08 | 0.25 |
| A320-DF | DUMMY   | 51.57   | 0 | 00:52 |       |      |      |
| A325-DF | DUMMY   | 158.08  | 0 | 00:42 |       |      |      |
| A33     | CONDUIT | 5661.15 | 0 | 02:01 | 7.54  | 0.15 | 0.45 |
| A330-DF | DUMMY   | 90.66   | 0 | 00:54 |       |      |      |
| A34     | CONDUIT | 5693.71 | 0 | 02:03 | 7.87  | 0.16 | 0.45 |
| A340-DF | DUMMY   | 65.70   | 0 | 01:08 |       |      |      |
| A345-DF | DUMMY   | 30.09   | 0 | 00:56 |       |      |      |
| A35     | CONDUIT | 6018.78 | 0 | 02:04 | 8.67  | 0.19 | 0.45 |
| A350-DF | DUMMY   | 64.75   | 0 | 00:50 |       |      |      |
| A36     | CONDUIT | 6024.56 | 0 | 02:08 | 6.34  | 0.08 | 0.35 |
| A360-DF | DUMMY   | 82.02   | 0 | 01:00 |       |      |      |
| A37     | CONDUIT | 6051.57 | 0 | 02:12 | 6.82  | 0.09 | 0.34 |
| A370-DF | DUMMY   | 96.13   | 0 | 00:44 |       |      |      |
| A375-DF | DUMMY   | 53.59   | 0 | 01:08 |       |      |      |
| A38     | CONDUIT | 6155.98 | 0 | 02:17 | 7.42  | 0.12 | 0.40 |
| A380-DF | DUMMY   | 83.99   | 0 | 00:54 |       |      |      |
| A39     | CONDUIT | 6107.85 | 0 | 02:26 | 7.25  | 0.15 | 0.42 |
| A390-DF | DUMMY   | 92.59   | 0 | 00:56 |       |      |      |



## HAPPY CANYON CREEK MDP & FHAD

|          |         |         |   |       |       |      |      |
|----------|---------|---------|---|-------|-------|------|------|
| A395-DF  | DUMMY   | 63.96   | 0 | 00:40 |       |      |      |
| A40      | CONDUIT | 6569.56 | 0 | 02:30 | 7.33  | 0.10 | 0.34 |
| A400-DF  | DUMMY   | 185.29  | 0 | 00:42 |       |      |      |
| B100-DF  | DUMMY   | 199.28  | 0 | 00:34 |       |      |      |
| B11      | CONDUIT | 186.44  | 0 | 00:44 | 3.58  | 0.04 | 0.23 |
| B110-DF  | DUMMY   | 144.63  | 0 | 00:42 |       |      |      |
| B12      | CONDUIT | 321.55  | 0 | 00:49 | 3.05  | 0.03 | 0.21 |
| B120-DF  | DUMMY   | 109.36  | 0 | 00:44 |       |      |      |
| B13      | CONDUIT | 398.15  | 0 | 00:59 | 3.03  | 0.03 | 0.24 |
| B130-DF  | DUMMY   | 69.66   | 0 | 00:52 |       |      |      |
| B134-DF  | DUMMY   | 64.04   | 0 | 00:34 |       |      |      |
| B135     | CONDUIT | 62.64   | 0 | 00:39 | 13.16 | 0.00 | 0.04 |
| B135-DF  | DUMMY   | 133.52  | 0 | 00:50 |       |      |      |
| BG999-DF | DUMMY   | 1301.72 | 0 | 01:46 |       |      |      |
| BH999-DF | DUMMY   | 632.78  | 0 | 00:57 |       |      |      |
| C100-DF  | DUMMY   | 102.29  | 0 | 00:48 |       |      |      |
| C11      | CONDUIT | 100.85  | 0 | 00:55 | 2.53  | 0.01 | 0.14 |
| C110-DF  | DUMMY   | 138.50  | 0 | 00:44 |       |      |      |
| C12      | CONDUIT | 229.18  | 0 | 00:57 | 4.16  | 0.07 | 0.30 |
| C120-DF  | DUMMY   | 71.58   | 0 | 00:48 |       |      |      |
| C125-DF  | DUMMY   | 100.85  | 0 | 00:54 |       |      |      |
| C13      | CONDUIT | 393.94  | 0 | 01:02 | 5.07  | 0.11 | 0.37 |
| C130-DF  | DUMMY   | 195.93  | 0 | 00:42 |       |      |      |
| C14      | CONDUIT | 362.81  | 0 | 01:31 | 4.65  | 0.09 | 0.32 |
| C140-DF  | DUMMY   | 100.45  | 0 | 00:40 |       |      |      |
| C150-DF  | DUMMY   | 49.62   | 0 | 00:54 |       |      |      |
| C153-DF  | DUMMY   | 218.37  | 0 | 00:42 |       |      |      |
| C154     | CONDUIT | 217.95  | 0 | 00:43 | 18.98 | 0.00 | 0.07 |
| C154-DF  | DUMMY   | 178.02  | 0 | 00:42 |       |      |      |
| C155     | CONDUIT | 224.14  | 0 | 01:20 | 3.72  | 0.03 | 0.22 |
| C155-DF  | DUMMY   | 112.11  | 0 | 00:44 |       |      |      |
| C159-DF  | DUMMY   | 178.38  | 0 | 00:42 |       |      |      |
| C15A     | CONDUIT | 400.29  | 0 | 01:17 | 4.71  | 0.12 | 0.39 |
| C15B     | CONDUIT | 694.21  | 0 | 01:18 | 5.48  | 0.21 | 0.50 |
| C16      | CONDUIT | 836.67  | 0 | 01:17 | 4.47  | 0.09 | 0.36 |
| C160-DF  | DUMMY   | 173.30  | 0 | 00:42 |       |      |      |
| C17      | CONDUIT | 901.01  | 0 | 01:25 | 5.02  | 0.14 | 0.44 |
| C170-DF  | DUMMY   | 99.48   | 0 | 00:52 |       |      |      |
| C175-DF  | DUMMY   | 90.61   | 0 | 00:54 |       |      |      |
| C18      | CONDUIT | 1039.25 | 0 | 01:25 | 5.94  | 0.19 | 0.46 |
| C180-DF  | DUMMY   | 60.49   | 0 | 00:44 |       |      |      |

## HAPPY CANYON CREEK MDP & FHAD

|         |         |         |   |       |      |      |      |
|---------|---------|---------|---|-------|------|------|------|
| C185-DF | DUMMY   | 99.02   | 0 | 00:54 |      |      |      |
| C19     | CONDUIT | 1130.54 | 0 | 01:30 | 4.65 | 0.10 | 0.39 |
| C190-DF | DUMMY   | 75.81   | 0 | 00:50 |      |      |      |
| D100-DF | DUMMY   | 134.70  | 0 | 00:48 |      |      |      |
| D11     | CONDUIT | 126.77  | 0 | 01:03 | 3.09 | 0.03 | 0.21 |
| D110-DF | DUMMY   | 129.08  | 0 | 00:48 |      |      |      |
| D12     | CONDUIT | 243.76  | 0 | 01:04 | 2.94 | 0.03 | 0.21 |
| D120-DF | DUMMY   | 117.57  | 0 | 00:42 |      |      |      |
| D13     | CONDUIT | 323.83  | 0 | 01:09 | 4.80 | 0.12 | 0.40 |
| D130-DF | DUMMY   | 119.46  | 0 | 00:44 |      |      |      |
| E100-DF | DUMMY   | 83.59   | 0 | 00:54 |      |      |      |
| E105-DF | DUMMY   | 56.48   | 0 | 00:48 |      |      |      |
| E11     | CONDUIT | 136.50  | 0 | 01:00 | 3.08 | 0.04 | 0.23 |
| E110-DF | DUMMY   | 98.78   | 0 | 00:46 |      |      |      |
| E12     | CONDUIT | 224.49  | 0 | 01:02 | 3.74 | 0.06 | 0.28 |
| E120-DF | DUMMY   | 80.21   | 0 | 00:48 |      |      |      |
| E125-DF | DUMMY   | 71.04   | 0 | 00:50 |      |      |      |
| E13     | CONDUIT | 364.66  | 0 | 01:05 | 4.27 | 0.09 | 0.36 |
| E130-DF | DUMMY   | 95.50   | 0 | 00:46 |      |      |      |
| E135-DF | DUMMY   | 93.39   | 0 | 00:52 |      |      |      |
| E14     | CONDUIT | 532.29  | 0 | 01:08 | 4.74 | 0.14 | 0.42 |
| E140-DF | DUMMY   | 113.20  | 0 | 00:44 |      |      |      |
| E15     | CONDUIT | 618.46  | 0 | 01:11 | 5.00 | 0.16 | 0.45 |
| E150-DF | DUMMY   | 77.62   | 0 | 00:46 |      |      |      |
| E155-DF | DUMMY   | 98.43   | 0 | 00:58 |      |      |      |
| E16     | CONDUIT | 765.99  | 0 | 01:15 | 5.30 | 0.19 | 0.49 |
| E160-DF | DUMMY   | 110.46  | 0 | 00:52 |      |      |      |
| E17     | CONDUIT | 850.12  | 0 | 01:18 | 5.46 | 0.21 | 0.51 |
| E170-DF | DUMMY   | 106.03  | 0 | 00:46 |      |      |      |
| E18     | CONDUIT | 909.82  | 0 | 01:23 | 5.56 | 0.23 | 0.53 |
| E180-DF | DUMMY   | 53.89   | 0 | 01:10 |      |      |      |
| E183-DF | DUMMY   | 89.36   | 0 | 00:58 |      |      |      |
| E184-DF | DUMMY   | 60.11   | 0 | 00:54 |      |      |      |
| E185    | CONDUIT | 144.97  | 0 | 01:09 | 3.52 | 0.04 | 0.27 |
| E185-DF | DUMMY   | 91.86   | 0 | 00:58 |      |      |      |
| E19     | CONDUIT | 1164.83 | 0 | 01:25 | 6.09 | 0.28 | 0.58 |
| E20     | CONDUIT | 1141.26 | 0 | 01:39 | 4.69 | 0.12 | 0.41 |
| E200-DF | DUMMY   | 68.54   | 0 | 01:04 |      |      |      |
| E204-DF | DUMMY   | 42.80   | 0 | 00:48 |      |      |      |
| E205    | CONDUIT | 37.58   | 0 | 01:17 | 2.08 | 0.02 | 0.17 |
| E205-DF | DUMMY   | 135.05  | 0 | 00:46 |      |      |      |

## HAPPY CANYON CREEK MDP & FHAD

|              |         |         |   |       |       |      |      |
|--------------|---------|---------|---|-------|-------|------|------|
| E21          | CONDUIT | 1261.61 | 0 | 01:46 | 5.95  | 0.25 | 0.53 |
| E210-DF      | DUMMY   | 58.33   | 0 | 01:06 |       |      |      |
| F100-DF      | DUMMY   | 114.33  | 0 | 00:44 |       |      |      |
| F11          | CONDUIT | 71.06   | 0 | 01:19 | 11.33 | 0.27 | 0.36 |
| F110-DF      | DUMMY   | 136.80  | 0 | 00:44 |       |      |      |
| F12          | CONDUIT | 103.62  | 0 | 01:43 | 12.79 | 0.08 | 0.19 |
| F120-DF      | DUMMY   | 182.47  | 0 | 00:44 |       |      |      |
| F125-DF      | DUMMY   | 58.37   | 0 | 00:52 |       |      |      |
| F13          | CONDUIT | 230.67  | 0 | 01:23 | 3.52  | 0.05 | 0.28 |
| F130-DF      | DUMMY   | 93.92   | 0 | 00:52 |       |      |      |
| F14          | CONDUIT | 108.41  | 0 | 02:49 | 12.59 | 1.08 | 1.00 |
| F140-DF      | DUMMY   | 44.52   | 0 | 00:56 |       |      |      |
| F14-Overflow | CONDUIT | 196.04  | 0 | 01:33 | 5.55  | 0.01 | 0.19 |
| G10          | CONDUIT | 11.92   | 0 | 04:03 | 5.33  | 0.04 | 0.13 |
| G100-DF      | DUMMY   | 53.92   | 0 | 01:14 |       |      |      |
| G105-DF      | DUMMY   | 70.26   | 0 | 00:42 |       |      |      |
| G11          | CONDUIT | 64.43   | 0 | 01:00 | 2.30  | 0.02 | 0.17 |
| G110-DF      | DUMMY   | 79.63   | 0 | 00:48 |       |      |      |
| G12          | CONDUIT | 58.84   | 0 | 01:54 | 11.51 | 0.12 | 0.24 |
| G120-DF      | DUMMY   | 106.27  | 0 | 00:50 |       |      |      |
| GA999-DF     | DUMMY   | 767.32  | 0 | 01:07 |       |      |      |
| GV999-DF     | DUMMY   | 327.70  | 0 | 01:27 |       |      |      |
| H100-DF      | DUMMY   | 176.17  | 0 | 00:46 |       |      |      |
| H11          | CONDUIT | 175.81  | 0 | 00:49 | 14.76 | 0.40 | 0.44 |
| H110-DF      | DUMMY   | 174.94  | 0 | 00:42 |       |      |      |
| H115-DF      | DUMMY   | 123.55  | 0 | 00:38 |       |      |      |
| H12          | CONDUIT | 308.22  | 0 | 01:14 | 17.33 | 0.68 | 0.60 |
| H120-DF      | DUMMY   | 68.81   | 0 | 00:48 |       |      |      |
| H13          | CONDUIT | 187.74  | 0 | 02:04 | 4.33  | 0.01 | 0.18 |
| H130-DF      | DUMMY   | 50.88   | 0 | 00:44 |       |      |      |
| H14          | CONDUIT | 193.80  | 0 | 02:09 | 2.47  | 0.02 | 0.20 |
| H140-DF      | DUMMY   | 27.43   | 0 | 00:56 |       |      |      |
| H145-DF      | DUMMY   | 82.20   | 0 | 01:04 |       |      |      |
| H15          | CONDUIT | 257.42  | 0 | 01:50 | 2.64  | 0.02 | 0.22 |
| H150-DF      | DUMMY   | 123.84  | 0 | 00:44 |       |      |      |
| H16          | CONDUIT | 273.09  | 0 | 02:02 | 2.52  | 0.02 | 0.21 |
| H160-DF      | DUMMY   | 50.36   | 0 | 01:14 |       |      |      |
| H17          | CONDUIT | 307.75  | 0 | 02:05 | 3.61  | 0.06 | 0.26 |
| H170-DF      | DUMMY   | 54.20   | 0 | 00:58 |       |      |      |
| H18          | CONDUIT | 359.04  | 0 | 02:04 | 17.27 | 0.22 | 0.28 |
| H180-DF      | DUMMY   | 110.42  | 0 | 00:46 |       |      |      |

## HAPPY CANYON CREEK MDP & FHAD

|                 |         |         |   |       |       |      |      |
|-----------------|---------|---------|---|-------|-------|------|------|
| H185            | CONDUIT | 118.25  | 0 | 00:55 | 14.95 | 0.37 | 0.42 |
| H19             | CONDUIT | 431.67  | 0 | 01:22 | 4.18  | 0.10 | 0.30 |
| H190-DF         | DUMMY   | 228.56  | 0 | 00:36 |       |      |      |
| H20             | CONDUIT | 495.56  | 0 | 01:18 | 4.48  | 0.11 | 0.32 |
| H200-DF         | DUMMY   | 101.49  | 0 | 00:46 |       |      |      |
| H205            | CONDUIT | 136.26  | 0 | 00:41 | 3.42  | 0.01 | 0.17 |
| H21             | CONDUIT | 639.64  | 0 | 01:11 | 4.70  | 0.15 | 0.38 |
| H210-DF         | DUMMY   | 101.91  | 0 | 00:52 |       |      |      |
| H22             | CONDUIT | 729.81  | 0 | 01:11 | 4.99  | 0.16 | 0.40 |
| H220-DF         | DUMMY   | 42.78   | 0 | 00:50 |       |      |      |
| HC008-DF        | DUMMY   | 1286.94 | 0 | 01:16 |       |      |      |
| HC013-DF        | DUMMY   | 2053.42 | 0 | 01:27 |       |      |      |
| HC025-DF        | DUMMY   | 4430.36 | 0 | 01:59 |       |      |      |
| HC028-DF        | DUMMY   | 5747.50 | 0 | 02:02 |       |      |      |
| HC032-DF        | DUMMY   | 6091.83 | 0 | 02:12 |       |      |      |
| HC035-DF        | DUMMY   | 6133.73 | 0 | 02:26 |       |      |      |
| HC036-DF        | DUMMY   | 6587.09 | 0 | 02:25 |       |      |      |
| HC117-DF        | DUMMY   | 183.31  | 0 | 00:56 |       |      |      |
| HC999-DF        | DUMMY   | 6577.64 | 0 | 02:30 |       |      |      |
| OH999-DF        | DUMMY   | 1177.04 | 0 | 01:30 |       |      |      |
| OR999-DF        | DUMMY   | 413.92  | 0 | 01:07 |       |      |      |
| SG999-DF        | DUMMY   | 119.14  | 0 | 01:28 |       |      |      |
| E190-DF         | DUMMY   | 106.58  | 0 | 00:42 |       |      |      |
| GA309-OUT       | DUMMY   | 308.32  | 0 | 01:13 |       |      |      |
| GA310-OUT       | DUMMY   | 187.77  | 0 | 02:02 |       |      |      |
| GA311-OUT       | DUMMY   | 193.91  | 0 | 02:03 |       |      |      |
| GA350-OUT       | DUMMY   | 359.09  | 0 | 02:03 |       |      |      |
| GV301-OUT       | DUMMY   | 71.08   | 0 | 01:17 |       |      |      |
| GV302-OUT       | DUMMY   | 103.75  | 0 | 01:40 |       |      |      |
| HC310-OUT       | DUMMY   | 436.17  | 0 | 01:05 |       |      |      |
| HC320-OUT       | DUMMY   | 1026.85 | 0 | 01:09 |       |      |      |
| HC326-OUT       | DUMMY   | 30.37   | 0 | 01:55 |       |      |      |
| MT300-OUT       | DUMMY   | 225.46  | 0 | 01:14 |       |      |      |
| OH310-OUT       | DUMMY   | 362.87  | 0 | 01:28 |       |      |      |
| OH320-OUT       | DUMMY   | 400.74  | 0 | 01:12 |       |      |      |
| SG310-OUT       | DUMMY   | 11.92   | 0 | 04:03 |       |      |      |
| SG320-OUT       | DUMMY   | 58.89   | 0 | 01:49 |       |      |      |
| TOD_Pond_Outlet | DUMMY   | 114.16  | 0 | 01:07 |       |      |      |
| Pond_21_Outfall | DUMMY   | 25.38   | 0 | 01:47 |       |      |      |

## HAPPY CANYON CREEK MDP & FHAD

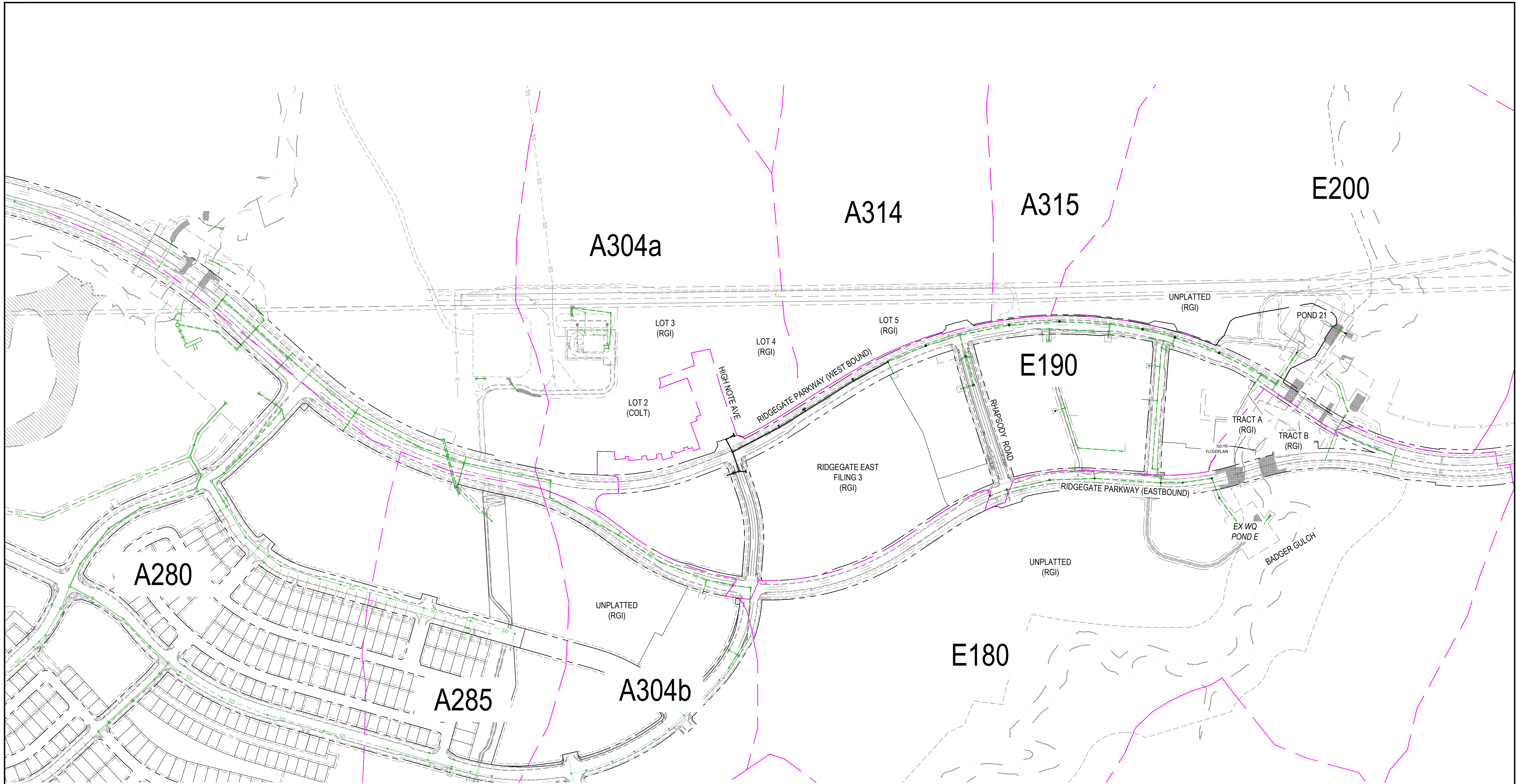
\*\*\*\*\*  
Conduit Surcharge Summary  
\*\*\*\*\*

| Conduit | -----<br>Both Ends | Hours Full<br>Upstream | -----<br>Dnstream | Hours<br>Above Full<br>Normal Flow | Hours<br>Capacity<br>Limited |
|---------|--------------------|------------------------|-------------------|------------------------------------|------------------------------|
| F14     | 2.12               | 2.12                   | 2.12              | 2.17                               | 2.12                         |

Analysis begun on: Mon May 5 13:53:25 2025  
Analysis ended on: Mon May 5 13:53:26 2025  
Total elapsed time: 00:00:01

## **APPENDIX G – DRAINAGE MAPS**



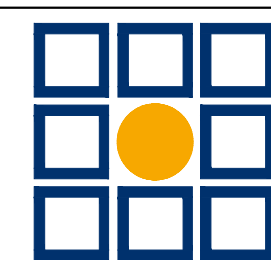


DRAINAGE LEGEND

— CUHP BASIN LIMITS



0 200' 400'



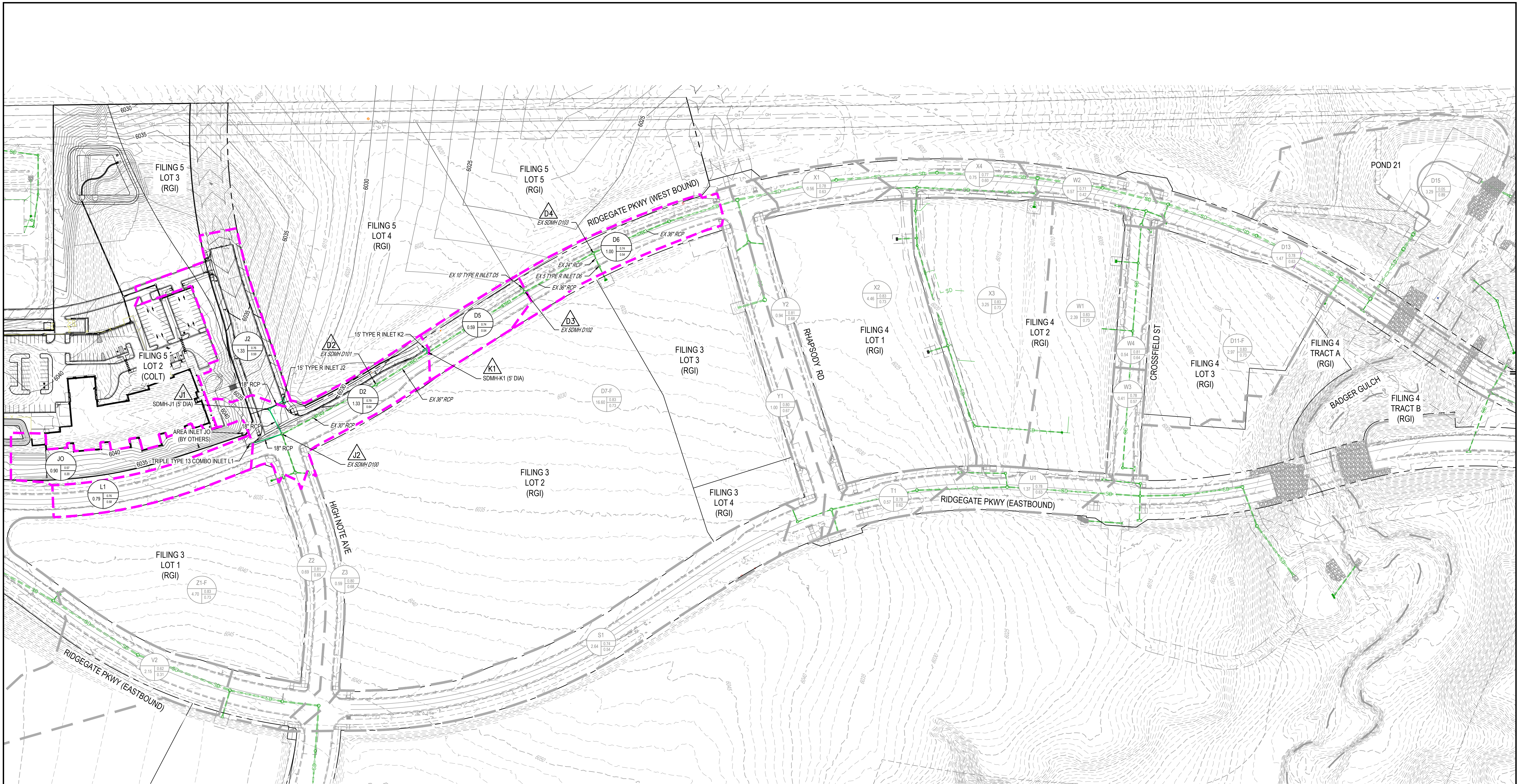
**MERRICK®**

RIDGEGATE EAST FILING NO. 5  
CUHP DRAINAGE MAP

DATE: 04/08/2025

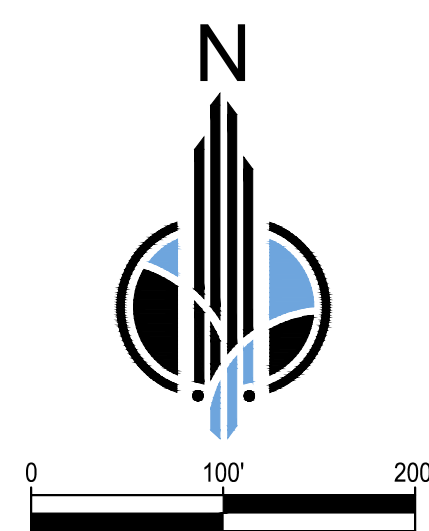
SHEET: 1 OF 1





DRAINAGE LEGEND

- △ DESIGN POINT
- Z1-F BASIN NAME
- 4.81 100 YEAR RUNOFF COEFFICIENT
- 0.50 5 YEAR RUNOFF COEFFICIENT
- 0.06 AREA, IN ACRES
- PROPOSED BASIN LIMITS
- EXISTING BASIN LIMITS



RIDGEGATE EAST FILING NO. 5  
DRAINAGE MAP

DATE: 05/05/2025

SHEET: 1 OF 1