

**Preliminary Drainage Report
For
Foundry Filing No. 1**

Prepared For:

Century Communities, LLC
2000 S Colorado Blvd Tower 1, Suite 1500
Denver, CO 80222
(303) 268-8364
Contact: Jerry Richmond

Prepared By:

JR Engineering, LLC
7200 S. Alton Way, Suite C400
Centennial, CO 80112
(303) 740-9393
Contact: Kurtis Williams

APPROVED FOR ONE YEAR FROM THIS DATE

Aurora Water Drainage

Date

October 26th , 2023

Engineer's Certification

I hereby affirm that this report and plan for the drainage design of the Foundry Filing No. 1 was prepared by me (or under my direct supervision) in accordance with the provision of the *City of Aurora Storm Drainage Design and Technical Criteria Manual* for the owners thereof.

Kurtis W. Williams, P.E
State of Colorado No. 34270
For and on Behalf of JR Engineering

Date

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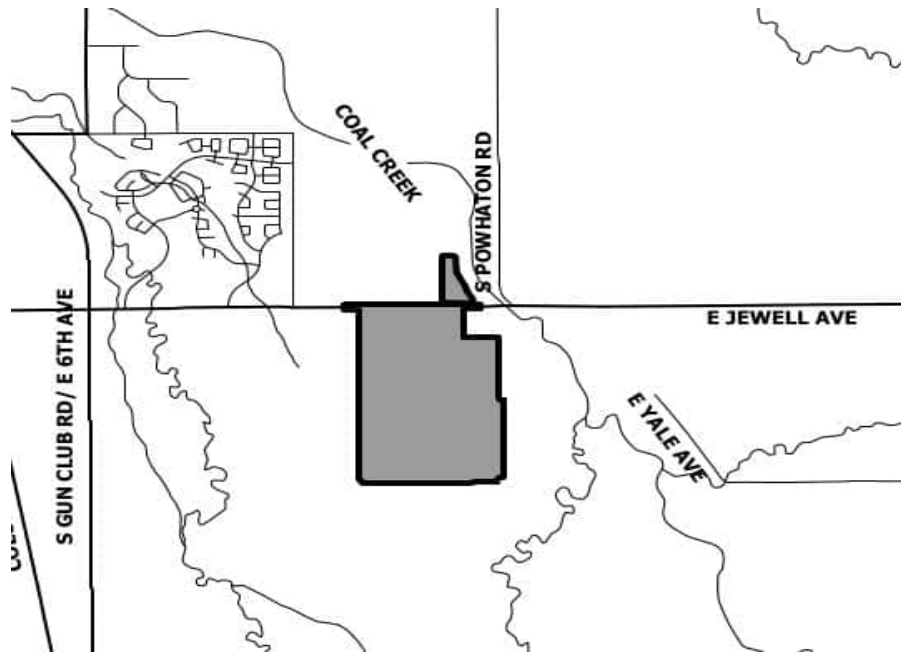
INTRODUCTION

1. Location

The site is bounded to the north by East Jewell Avenue, South Powhatan Road to the east, East Yale Avenue to the south, and Harvest Crossings to the west. Coal Creek lies northeast of the site, running under East Jewell Avenue. The Foundry development is approximately 416 acres, which includes the proposed site and future filings. The Filing 1 portion of this subdivision comprises approximately 150 acres.

The site is a parcel of land located in Section 29, Township 4 South, Range 65 West of the 6th Principal Meridian within the City of Aurora, Arapahoe County, Colorado.

A vicinity map is provided in Appendix A.



2. Proposed Development

Foundry Filing 1 is currently undeveloped, covered with native grass, and sparsely distributed brush. The site's topography has multiple ridges and has an existing drainageway, Foxtail Run, which runs from the south to north through the middle of the overall site and along the eastern edge of Filing 1. The existing Foxtail Run drainageway is conveyed east along the south side of Jewell Avenue and outfalls into Coal Creek. The existing topography generally slopes the northeast with slopes ranging from 1 to 5 percent. The drainage patterns will steer northeast into Foxtail Run running along the eastern edge of the Filing 1 site.

The proposed site will consist of proposed roads, single-family development, parks and tracts with proposed detention ponds.

3. Requested Variances

There are no variances from the SDTCM being requested.

HISTORIC DRAINAGE

1. Overall Basin Description

The soils for the site have been classified by the USDA-NRCS soil survey as Fondis Silt Loam, Weld-Deertrail Silt Loams, and Bresser-Truckton Sandy Loams. These soils are classified as Type C & D Soils. A soils map can be found in Appendix A.

The site historically drains off-site to the northeast towards the existing E. Jewell Street, where runoff is captured by an existing grassy channel, Foxtail Run. The runoff continues north where it ultimately outfalls into Coal Creek. The site is located within Zone X (areas outside of the 100-year floodplain) as defined by FEMA Flood Insurance Rate Map Panel 08005C0216M, dated October, 2020. The FEMA Firm panels can be found in Appendix A.

The portion of Coal Creek adjacent to the site was studied as part of a 2012 FHAD Study for Sand/ Coal Creek (Colfax to Yale). Floodplain limits and BFE's from the FHAD study were received from Mile High Flood District and used as the best available information for the floodplain along Coal Creek.

2. Drainage Patterns through Property

The Filing 1 site is east of Murphy Creek and west of Coal Creek. Filing 1 flows northeast to Foxtail Run and E. Jewell Avenue at a 2 to 4% slope.

3. Outfalls Downstream From Property

Runoff sheet flows northeast across the site to Foxtail Run and under E. Jewell Avenue via box culvert to Regional Pond C that outfalls to Coal Creek just north of E. Jewell Avenue.

4. Previously Approved Reports

Drainage for this site has been previously analyzed in the *Master Drainage Report for Foundry*, by Ware Malcomb, Revised February 24, 2023. The previous report analyzed the drainage characteristics of this site, and calculated the required detention and WQCV for the detention ponds. This preliminary drainage report has maintained drainage patterns and other various drainage design aspects from the master drainage report. Preliminary Drainage Report approval is required prior to Civil Plan Approval.

C. DESIGN CRITERIA

1. List References

1. *City of Aurora Storm Drainage Design and Technical Criteria*, City of Aurora, October 11, 2010
2. *Urban Storm Drainage Criteria Manual Volumes 1, 2, & 3, Mile High Flood District*, current version
3. *Master Drainage Report for Foundry*, by Ware Malcomb, Revised February 24, 2023

2. Hydrologic Criteria

Rainfall intensities were determined by the equations set forth in the Criteria Manual. P1 values were determined from the charts contained within the NOAA Atlas 14 and the *City of Aurora Storm Drainage Design & Technical Criteria Manual*. One-hour point precipitation values of 0.856 inches and 2.48 inches were used for the 2-Year and 100-year events respectively. The NOAA Atlas 14 point precipitation frequency can be found in Appendix A.

Water quality is to be provided for the entire site within Regional Pond C before outfalling into Coal Creek. Due to a watershed area larger than 90 acres for Regional Pond C, the 10-year and 100-year detention volumes were analyzed using Colorado Urban Hydrograph Procedure (CUHP) in conjunction with hydrograph and reservoir routing through EPA's Storm Water Management Model (SWMM) as per criteria from City of Aurora (COA) Storm Drainage Design & Technical Criteria (SDDTC)-Section 6.33. Regional Pond C's imperviousness and sizing was modified from the *Master Drainage Report* by Ware Malcomb due to lot and grading changes across the site. Thus, the CUHP/SWMM analysis was performed to verify Regional Pond C's required volume.

MHFD-Detention Workbook (Version 4.06, July 2022) was also utilized to complete the designs for the proposed detention pond. The outlet structure was also designed to target the 0.30 cfs/acre release rate for a 10-year storm, and the 1.00 cfs/acre release rate for the 100-year storm for Type C&D soils, as stated in Section 6.33 of the *City of Aurora Storm Drainage and Technical Criteria Manual*. 1 foot of freeboard above the computed 100-year water surface elevation, as it is being conveyed by the emergency overflow weir, was also provided per MHFD requirements.

The Rational Method was utilized to determine runoff values for the proposed site. These flows were used to size the storm inlets and storm pipes throughout the site. The minor storm was analyzed as the 2-year event. The major storm was analyzed as the 100-year event. All Rational Method calculations can be found in Appendix B.

3. Hydraulic Criteria

All inlets and pipes will be designed for the 100-year storm. The latest version of Mile High Flood District's workbook "MHFD-Inlet" shall be used to size the inlets. Street capacities shall also be calculated with the Mile High Flood District's workbook "MHFD-Inlet". These street capacities will be based on street geometry, allowable flow spread, and the maximum depth of flow at the street flow line. These street capacities and inlet calculations are included in Appendix C

GeoHECRAS software was utilized to verify the stabilization of the Foxtail Run Reach, and to calculate the 100-year WSEL within the channel to verify drainageway capacity and to ensure minimum finished floor elevations for the proposed lots along this drainageway could be met. The 100-year storm was modeled with the flows obtained from the SWMM Model. Manning's roughness coefficients were taken from the *City of Aurora Storm Drainage and Technical Criteria Manual*. Hydraulic calculations and results can be found in Appendix C.

All storm sewer for the proposed development will be public and maintained by the city. Ponds, swales, and the Type C inlets shall be private and maintained by the HOA. Cross sections of the swales have been analyzed and added to Appendix C. A minimum of one foot freeboard has been provided between the WSEL of the major storm event in the swales and the adjacent top of foundations.

Master Drainage Report for Foundry, prepared by Ware Malcomb, as well as the *City of Aurora Storm Drainage and Technical Criteria Manual* were also referenced in the preparation of this report.

Variance is being requested to use the NOAA Atlas 14 point rainfall depths with the Rational Method to be consistent with SWMM modeling and the master report prepared by Ware Malcomb. See Appendix A.

4. Stormwater Quality Control Plan

The project meets requirements set forth in Section 3.70 from COA SDDTC. Methods include, but are not limited to, detached sidewalk within public ROW to provide water quality treatment of runoff prior to stormwater flows entering the public ROW, roof drains discharged to grass lined swales between homes, and storm water will discharge into a full spectrum detention pond to provide additional stormwater treatment measures.

D. DRAINAGE PLAN

1. General Concept

All drainage patterns established with the *Master Drainage Report for Foundry* will remain as designed to the greatest extent possible.

Water quality and detention will be provided on-site in the proposed full spectrum detention pond.

2. Specific Details

Onsite Basins

Basin A

The runoff from the proposed Basin A will be collected by proposed storm sewer infrastructure. Flows from this basin will be routed through the site to the proposed Regional Pond C. The routing for Basin A can be found below.

Basin A1 (1.14 acres, 83% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 1. It will then be routed via storm sewer to Design Point 1.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 22.

Basin A2 (2.19 acres, 52% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 2. It will then be routed via storm sewer to Design Point 1.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 19.

Basin A3 (0.90 acres, 71% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 3. It will then be routed via storm sewer to Design Point 1.2. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 19.

Basin A4 (1.56 acres, 75% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 4. It will then be routed via storm sewer to Design Point 2.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 5.

Basin A5 (1.23 acres, 71% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 5. It will then be routed via storm sewer to Design Point 2.2.

Basin A6 (1.69 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 6. It will then be routed via storm sewer to Design Point 2.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 73.

Basin A7 (0.42 acres, 79% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 7. It will then be routed via storm sewer to Design Point 3.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 13.

Basin A8 (0.64 acres, 71% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 8. It will then be routed through Foxtail Run Reach 2.

Basin A9 (0.63 acres, 80% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 9. It will then be routed through Foxtail Run Reach 2.

Basin A10 (12.97 acres, 28% impervious) consists of a proposed recreation center, green space, roadways and tree lawns. The runoff from this sub-basin will be captured via overland flow by a stub at DP 10. It will then be routed via storm sewer to DP 3.1.

Basin A11 (0.88 acres, 88% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 11. It will then be routed via storm sewer to DP 3.6 and then through Foxtail Run Reach 1.

Basin A12 (1.39 acres, 72% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 12. It will then be routed via storm sewer to DP 3.6 and then through Foxtail Run Reach 1.

Basin A13 (0.48 acres, 80% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 13. It will then be routed via storm sewer to Design Point 3.4.

Basin A14 (1.93 acres, 48% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 14. It will then be routed via storm sewer to Design Point 2.6. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 15.

Basin A15 (1.70 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 15. It will then be routed via storm sewer to Design Point 2.5.

Basin A16 (0.19 acres, 79% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 16. It will then be routed via storm sewer to Design Point 3.2.

Basin A17 (0.55 acres, 75% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 17. It will then be routed via storm sewer to Design Point 2.3.

Basin A18 (1.85 acres, 71% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 18. It will then be routed via storm sewer to Design Point 2.4.

Basin A19 (0.44 acres, 77% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 19. It will then be routed via storm sewer to Design Point 1.5.

Basin A20 (0.33 acres, 71% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 20. It will then be routed via storm sewer to Design Point 1.6. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 19.

Basin A21 (0.20 acres, 80% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 21. It will then be routed via storm sewer to Design Point 1.5. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 24.

Basin A22 (0.41 acres, 79% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 22. It will then be routed via storm sewer to Design Point 1.3.

Basin A23 (0.69 acres, 75% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 23. It will then be routed via storm sewer to Design Point 1.4. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 55.

Basin A24 (1.74 acres, 71% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 24. It will then be routed via storm sewer to Design Point 1.7. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 55.

Basin A25 (17.12 acres, 52% impervious) consists of a proposed school site, green space, roadways and tree lawns. The runoff from this sub-basin will be captured via overland flow by a stub at DP 25. It will then be routed via storm sewer to DP 22.1.

Basin A26 (0.32 acres, 77% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 26. It will then be routed via storm sewer to Design Point 1.4. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 27.

Basin A27 (0.47 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 27. It will then be routed via storm sewer to Design Point 1.8. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 51.

Basin A28 (0.27 acres, 76% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway to inlet at DP 32. It will then be routed via storm sewer to Design Point 5.1.

Basin A29 (0.60 acres, 49% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 29. It will then be routed via storm sewer to Design Point 5.1.

Basin A30 (2.12 acres, 71% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 30. It will then be routed via storm sewer to Design Point 5.3. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 49.

Basin A31 (0.19 acres, 75% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 31. It will then be routed via storm sewer to Design Point 5.3. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 49.

Basin A32 (1.17 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 32. It will then be routed via storm sewer to Design Point 5.1.

Basin A33 (1.41 acres, 79% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 33. It will then be routed via storm sewer to Design Point 5.2.

If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 32.

Basin A34 (0.73 acres, 75% impervious) consists of proposed green space, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 34. It will then be routed via storm sewer offsite to Harvest Crossings detention Pond C. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 41.

Basin A35 (1.71 acres, 69% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 35. It will then be routed via storm sewer to Design Point 6.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 39.

Basin A36 (1.05 acres, 78% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 36. It will then be routed via storm sewer to Design Point 36.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 43.

Basin A37 (1.13 acres, 74% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 37. It will then be routed via storm sewer to Design Point 37.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 43.

Basin A38 (2.65 acres, 52% impervious) consists of a proposed residential area and green space. The runoff from this sub-basin will be captured via overland flow in park inlets at DP 38. It will then be routed via storm sewer to DP 5.4.

Basin A39 (1.81 acres, 79% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 39. It will then be routed via storm sewer to Design Point 6.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 42.

Basin A40 (2.06 acres, 40% impervious) consists of a proposed residential area and green space. The runoff from this sub-basin will be captured via overland flow by a stub at DP 40. It will then be routed via storm sewer to DP 6.3.

Basin A41 (2.40 acres, 49% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 41. It will then be routed via storm sewer to Design Point 41.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 42.

Basin A42 (0.56 acres, 77% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 42. It will then be routed via storm sewer to Design Point 6.2.

Basin A43 (2.00 acres, 74% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 43. It will then be routed via storm sewer to Design Point 5.5.

Basin A44 (0.42 acres, 75% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 44. It will then be routed via storm sewer to Design Point 6.2.

Basin A45 (2.50 acres, 62% impervious) consists of proposed green space, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 45. It will then be routed via storm sewer to Design Point 6.5. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 53.

Basin A46 (1.44 acres, 68% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 46. It will then be routed via storm sewer to Design Point 5.7. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 80.

Basin A47 (0.99 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 47. It will then be routed via storm sewer to Design Point 5.5.

Basin A48 (1.90 acres, 73% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 48. It will then be routed via storm sewer to Design Point 5.6.

Basin A49 (1.37 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 49. It will then be routed via storm sewer to Design Point 5.4. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 47.

Basin A50 (2.45 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R

inlet along the roadway at DP 50. It will then be routed via storm sewer to Design Point 5.6. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 74.

Basin A51 (2.33 acres, 73% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 51. It will then be routed via storm sewer to Design Point 5.8. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 75.

Basin A52 (1.18 acres, 84% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 80. It will then be routed via storm sewer to Design Point 6.1.

Basin A53 (2.89 acres, 70% impervious) consists of proposed residential area, green space, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 53. It will then be routed via storm sewer to Design Point 6.6.

Basin A54 (0.30 acres, 76% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 54. It will then be routed via storm sewer to Design Point 4.1.

Basin A55 (1.44 acres, 75% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 55. It will then be routed via storm sewer to Design Point 1.9. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 56.

Basin A56 (2.04 acres, 79% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 56. It will then be routed via storm sewer to Design Point 4.1.

Basin A57 (1.72 acres, 65% impervious) consists of a proposed residential area and green space. The runoff from this sub-basin will be captured via overland flow by an area inlet at DP 57. It will then be routed via storm sewer to DP 77.1.

Basin A58 (2.43 acres, 76% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 58. It will then be routed via storm sewer to Design Point 4.2. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 56.

Basin A59 (0.70 acres, 66% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 59. It will then be routed via storm sewer to Design Point 4.2. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 60.

Basin A60 (1.13 acres, 71% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 60. It will then be routed via storm sewer to Design Point 4.4.

Basin A61 (2.39 acres, 69% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 61. It will then be routed via storm sewer to Design Point 2.7.

Basin A62 (0.09 acres, 82% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 62. It will then be routed via storm sewer to Design Point 3.5. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 13.

Basin A63 (2.56 acres, 73% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 63. It will then be routed via storm sewer to Design Point 2.7.

Basin A64 (2.72 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 64. It will then be routed via storm sewer to Design Point 4.7. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 66.

Basin A65 (1.45 acres, 74% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 65. It will then be routed via storm sewer to Design Point 4.7. If this inlet clogs, developed runoff from this basin will overflow into the channel at Design Point 72.

Basin A66 (0.19 acres, 75% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 66. It will then be routed via storm sewer to Design Point 4.6.

Basin A67 (0.21 acres, 77% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 67. It will then be routed via storm sewer to Design Point 4.7.

Basin A68 (0.22 acres, 78% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 68. It will then be routed via storm sewer to Design Point 4.4.

Basin A69 (2.00 acres, 76% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 69. It will then be routed via storm sewer to Design Point 6.6.

Basin A70 (11.98 acres, 75% impervious) consists of a future residential area and green space. The runoff from this basin will be conveyed via overland flow to the proposed channel and Jewell Avenue in the interim proposed condition. In the ultimate future condition runoff from this basin will be collected in storm inlets and pipes around the residential site and conveyed to the proposed stub at DP70. It will then be routed via storm sewer to DP 6.9.

Basin A71 (1.00 acres, 90% impervious) consists of proposed roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 71. It will then be routed via storm sewer to Design Point 41.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 72.

Basin A72 (11.90 acres, 29% impervious) consists of proposed residential area, green space, grass lined-channel, roadways and tree lawns. The runoff from this sub-basin will be captured via overland flow in the grass-lined channel running through the basin. It will then be routed via storm sewer to Regional Pond C.

Basin A73 (1.69 acres, 72% impervious) consists of proposed residential area, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 73. It will then be routed via storm sewer to Design Point 3.2.

Basin A74 (0.78 acres, 72% impervious) consists of proposed residential areas, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 74. It will then be routed via storm sewer to Design Point 5.6.

Basin A75 (0.87 acres, 73% impervious) consists of proposed residential areas, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 75. It will then be routed via storm sewer to Design Point 5.9.

Basin A76 (0.92 acres, 73% impervious) consists of proposed residential areas, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 76. It will then be routed via storm sewer to Design Point

5.8. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 80.

Basin A77 (0.89 acres, 73% impervious) consists of proposed residential areas, roadways and tree lawns. The runoff from this sub-basin will be captured via gutter in a Type C inlet in the roadway at DP 77. It will then be routed via storm sewer to Design Point 58.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 56.

Basin A78 (0.98 acres, 36% impervious) consists of proposed residential areas and green space. The runoff from this sub-basin will be captured via overland flow to park inlets at DP 78. It will then be routed via storm sewer to Design Point 37.1.

Basin A79 (0.51 acres, 56% impervious) consists of proposed residential areas, green space, and roadways. The runoff from this sub-basin will be captured via gutter flow in a Type C sump inlet at DP 79. It will then be routed via storm sewer to Design Point 41.1.

Basin A80 (1.59 acres, 67% impervious) consists of proposed residential areas, green space, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R sump inlet along the roadway at DP 80. It will then be routed via storm sewer to Design Point 80.1.

Basin A81 (0.35 acres, 70% impervious) consists of proposed green space, roadways and tree lawns. The runoff from this sub-basin will be captured via curb and gutter in a Type R inlet along the roadway at DP 81. It will then be routed via storm sewer offsite to Design Point 34.1. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 34.

Basin D

The runoff from the proposed future Basin D will be collected by proposed storm sewer infrastructure. Flows from this basin will be routed through the site to a swale. The swale will combine flows from Basin D and the offsite basins before being piped into the channel where it will combine with Basin A flows. The routing for Basin D can be found below.

Basin D1 (1.10 acres, 83% impervious) consists of proposed roadway and tree lawn. The runoff from this sub-basin will be captured by Type R inlets located in the roadways at DP D1 and piped to DP 7.1 via storm sewer. It will then be routed via storm sewer before it outfalls into a swale. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point D2.

Basin D2 (0.32 acres, 83% impervious) consists of proposed roadway and tree lawn. The runoff from this sub-basin will be captured by Type R inlets located in the roadways at DP D2 and piped to DP 7.2 via storm sewer. It will then be routed via storm sewer at DP 7.3

before it outfalls into a swale. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point D3.

Basin D3 (0.59 acres, 82% impervious) consists of proposed roadway and tree lawn. The runoff from this sub-basin will be captured by Type R inlets located in the roadways at DP D3 and piped to DP 7.4 via storm sewer. It will then be routed via storm sewer at DP 7.5 before it outfalls into a swale. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 8.

Basin D4 (0.49 acres, 90% impervious) consists of proposed roadway and tree lawn. The runoff from this sub-basin will be captured by Type R inlets located in the roadways at DP D4 and piped to DP 7.4 via curb and gutter. It will then be routed via storm sewer at DP 7.5 before it outfalls into a swale. If this inlet clogs, developed runoff from this basin will overflow into the proposed inlet at Design Point 9.

Offsite Basins

Basin OS1 (8.23 acres, 75% impervious) is anticipated to be Multi-Family Residential with a 75% imperviousness. The runoff from this basin will follow historic drainage patterns and run southeast to a swale that leads to the channel. With the development of this basin, the offsite area will be provide 100-year detention to reduce the flows to historic conditions per City of Aurora drainage criteria via Regional Pond C. Overland flows will collect in a stub at DP OS1 before being piped to DP 7.1. From here, the runoff will be piped to the channel. It will then be routed via storm sewer infrastructure to Regional Pond C.

Basin OS2 (34.21 acres, 75% impervious) is anticipated to be Multi-Family Residential with a 75% imperviousness. The runoff from this basin will follow historic drainage patterns and run southeast to a swale that leads to the channel. With the development of this basin, the offsite area will be provide 100-year detention to reduce the flows to historic conditions per City of Aurora drainage criteria via Regional Pond C. Overland flows will collect in a stub at DP OS2 before being piped to DP 7.3. From here, the runoff will be piped to the channel. It will then be routed via storm sewer infrastructure to Regional Pond C.

Basin OS3 (12.88 acres, 75% impervious) is anticipated to be Multi-Family Residential with a 75% imperviousness. The runoff from this basin will follow historic drainage patterns and run southeast to a swale that leads to the channel. With the development of this basin, the offsite area will be provide 100-year detention to reduce the flows to historic conditions per City of Aurora drainage criteria via Regional Pond C. Overland flows will collect in a stub at DP OS3 before being piped to DP 7.5. From here, the runoff will be piped to the channel. It will then be routed via storm sewer infrastructure to Regional Pond C.

Basin OS4 (9.32 acres, 75% impervious) is anticipated to be Multi-Family Residential with a 75% imperviousness. The runoff from this basin will follow historic drainage patterns and is piped north to the channel. With the development of this basin, the offsite area will be provide 100-year detention to reduce the flows to historic conditions per City of Aurora

drainage criteria via Regional Pond C. Overland flows will collect in a Type R inlet at DP OS4 before being piped to DP 7.7. From here, the runoff will be piped to the channel. It will then be routed via storm sewer infrastructure to Regional Pond C.

Basin OS5 (11.58 acres, 75% impervious) is anticipated to be Single Family Residential with a 75% imperviousness. The runoff from this basin will follow historic drainage patterns and is piped north to the channel. With the development of this basin, the offsite area will provide 100-year detention to reduce the flows to historic conditions per City of Aurora drainage criteria via Regional Pond C. Overland flows will collect in a Type R inlet at DP OS5 before being piped to DP 7.7. From here, the runoff will be piped to the channel. It will then be routed via storm sewer infrastructure to Regional Pond C.

Basin OS6 (66.83 acres, 75% impervious) is anticipated to be Single-Family Residential with a 75% imperviousness and includes Regional Pond C. The runoff from this basin will follow historic drainage patterns and run east to Regional Pond C. With the development of this basin, the offsite area will provide 100-year detention to reduce the flows to historic conditions per City of Aurora drainage criteria Regional Pond C. Overland flows will collect in trickle channels in Regional Pond C at DP OS6. From here, the flows will outfall to Coal Creek.

Basin OS7 (14.99 acres, 15% impervious) is anticipated to be an open, grassy space with a 5% imperviousness. The runoff from this basin will follow historic drainage patterns and run southeast to a swale that leads to the channel. With the development of this basin, the offsite area will provide 100-year detention to reduce the flows to historic conditions per City of Aurora drainage criteria via Pond D and Regional Pond C. Overland flows will collect at DP OS3 in a proposed swale before being routed to DP 7.6. From here, the runoff will be conveyed via storm sewer infrastructure to the channel. It will then be routed via storm sewer infrastructure to Regional Pond C.

3. Detention Pond Design

Storm water flood detention and storm water quality management for this development will be provided within the proposed detention ponds denoted as Regional Pond C. The location of the pond can be found on the overall drainage map located in Appendix F. Sediment and erosion control, Best Management Practices, as presented in the Urban Storm Drainage Criteria Manual, Volume III, will be implemented for the site.

As previously stated, Regional Pond C was evaluated in this report using CUHP with SWMM routing, results for this analysis can be found in Appendix C. The storm inflow hydrographs that were generated in SWMM were then inputted into the MHFD-Detention workbook in order to properly size the outlet structure. The values for the pond stage, pond volume, and outflows for the pond was also designed using the latest MHFD-Detention workbooks. These pond designs and pond calculations can be found in Appendix D.

The total pond volumes have also been designed to detain the 100-year stormwater event as defined by the COA. For Regional Pond C, the 100-year water surface elevation is targeted to be at elevation 5620.01 and stage depth of 8.68 feet. The spillway will be installed at an

elevation of 5620.25; 2.8 inches higher than the 100-yr water surface elevation. The 100-year volume is 50.79 acre-feet using the CUHP/SWMM modeling.

The pond outlet structure was designed to target the allowable release rate for the 2-year and 100-year storm event. The proposed outlet structure release rates were designed to be equal to or lower than the allowable release rates provided. Regional Pond C's outlet structure will release into the existing Coal Creek north of the site. With a tributary area of 436.43 acres, Regional Pond C has a 2 year proposed release rate of 7.7 cfs and a 100 year proposed release rate of 417.42 cfs. Historic release rates for the pond can be found in previous reports compiled in Appendix E.

4. Maintenance

The city will be responsible for ensuring that stormwater facilities installed on their property are properly maintained and function as design. Preventative measures to reduce maintenance costs include but are not limited to educating residents to be aware of how their actions affect water quality, keeping properties, streets and gutters free of trash, sweep paved surfaces regularly, maintaining vegetative stabilization, and cleaning out storm inlets. All stormwater management facilities shall be inspected by a qualified individual at a minimum of once per year. See the *City of Aurora Storm Drainage Design & Technical Criteria Manual* for general guidelines for an inspector. Requirements for the inspection and maintenance of stormwater facilities, as well as reporting requirements will be included in the Stormwater Management Facility Inspection and Maintenance (I&M) Plan. Pond maintenance trails will provide access to all of the drainage structures within the proposed detention ponds to ensure easy access for maintenance. Swales, and Type C inlets shall be maintained by the HOA except for the regional detention pond. Maintenance of this infrastructure will include, but is not limited to scheduled mowing, trash pickup, removal of debris that may be clogging the outlet structure or inlet, weed control, and mosquito and algae treatment.

E. CONCLUSIONS

1. Compliance with Standards

This report is in compliance with the standards set forth in the *City of Aurora Storm Drainage Design and Technical Criteria Manual* as well as *Urban Storm Drainage Criteria Manual*, by Mile High Flood District. This preliminary drainage report must be approved prior to civil plan approval.

2. Summary of Concept

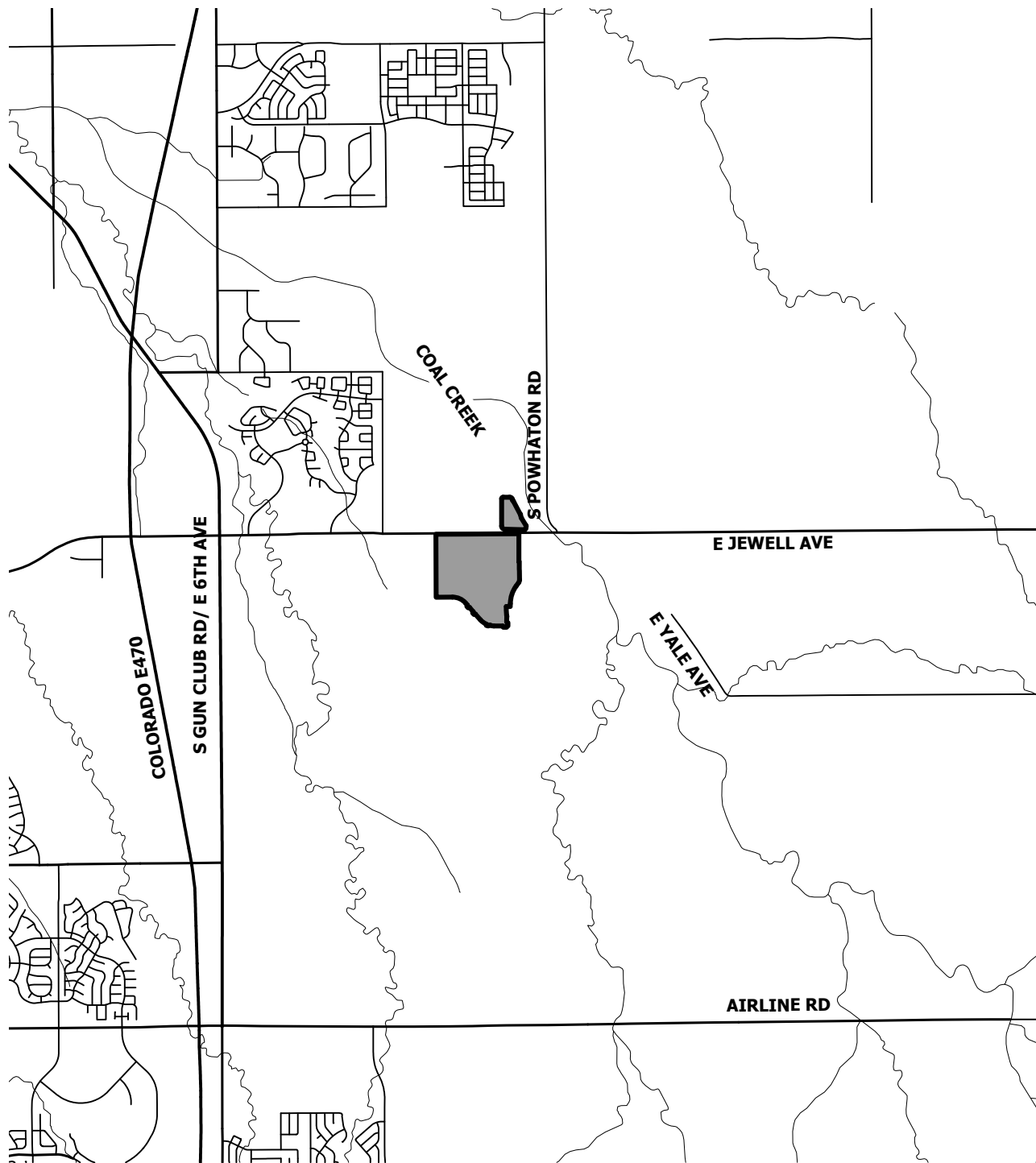
The proposed design has taken into account all flows from on-site and offsite tributary areas. All proposed drainage patterns conform to both historic and previously-approved patterns. Water quality and detention have been incorporated into the ponds located onsite. Adequate on-site drainage is provided by the streets, gutters, inlets, storm sewer pipes, and swales designed for the site.

The proposed project site will not have any adverse effects on the adjacent upstream or downstream areas. The drainage design generally follows the historic patterns and existing conveyances have been utilized wherever possible. This drainage report analyzed the site to show proposed development is in accordance with the previously-approved master drainage report, and is therefore in compliance with City of Aurora criteria.

REFERENCES

1. *City of Aurora Storm Drainage Design and Technical Criteria Manual*, City of Aurora, October 11, 2010.
2. *Federal Emergency Management Agency Flood Insurance Rate Map*, Community Panels 08005C0508K & 08005C0509K, Revised December 17, 2010.
3. *Urban Storm Drainage Criteria Manual, Volume 1, Volume 2. & Volume 3*, Mile High Flood District, Current Version.
4. *Master Drainage Report for Foundry*, by Ware Malcomb, Revised February 24, 2023

APPENDIX A
FIGURES AND EXHIBITS



VICINITY MAP

5000 2500 0 5000 10000



ORIGINAL SCALE: 1" = 5000'

FIGURE 1 – VACINITY MAP
 FOUNDRY FILING NO. 1
 JOB NO. 16146.00
 09/06/23
 SHEET 1 OF 1



J-R ENGINEERING

A Westrian Company

Centennial 303-740-9393 • Colorado Springs 719-593-2593
 Fort Collins 970-491-9888 • www.jrengineering.com









Hydrologic Soil Group—Arapahoe County, Colorado



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: Arapahoe County, Colorado
 Survey Area Data: Version 18, Sep 1, 2022

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
BvC	Bresser-Truckton sandy loams, 3 to 5 percent slopes	B	2.5	2.2%
BxC	Buick loam, 3 to 5 percent slopes	C	14.7	12.7%
FdB	Fondis silt loam, 1 to 3 percent slopes	C	53.1	45.9%
RhD	Renohill-Buick loams, 3 to 9 percent slopes	D	39.6	34.2%
WrB	Weld-Deertrail silt loams, 0 to 3 percent slopes	C	5.7	4.9%
Totals for Area of Interest			115.7	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Condition" first groups like attribute values for the components in a map unit. For each group, percent composition is set to the sum of the percent composition of all components participating in that group. These groups now represent "conditions" rather than components. The attribute value associated with the group with the highest cumulative percent composition is returned. If more than one group shares the highest cumulative percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher group value should be returned in the case of a percent composition tie. The result returned by this aggregation method represents the dominant condition throughout the map unit only when no tie has occurred.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Higher

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

National Flood Hazard Layer FIRMette



104°41'19"W 39°41'4"N



Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
OTHER FEATURES		Levee, Dike, or Floodwall
		Cross Sections with 1% Annual Chance Water Surface Elevation
MAP PANELS		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped



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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **4/17/2023 at 2:53 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

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

1:6,000

104°40'42"W 39°40'36"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020



NOAA Atlas 14, Volume 8, Version 2
Location name: Aurora, Colorado, USA*
Latitude: 39.6749°, Longitude: -104.6865°
Elevation: 5698.81 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 & aeriels](#)

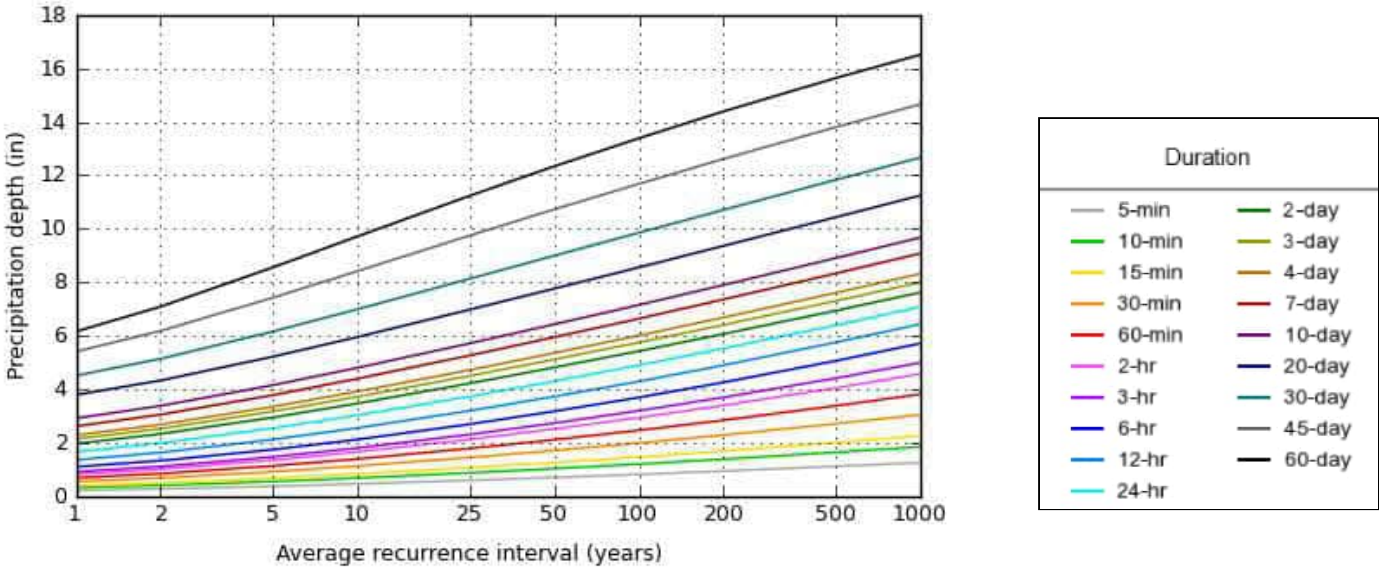
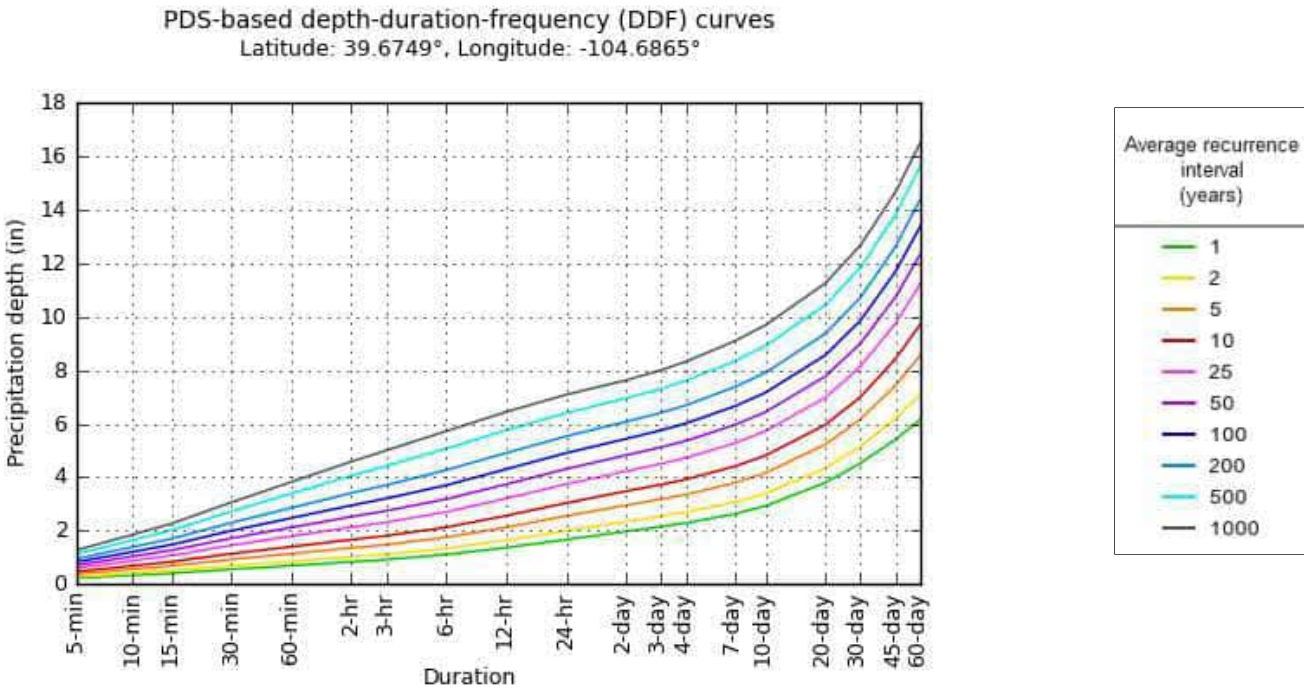
PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.229 (0.185-0.284)	0.284 (0.230-0.353)	0.383 (0.309-0.476)	0.471 (0.377-0.588)	0.602 (0.470-0.787)	0.711 (0.540-0.938)	0.827 (0.605-1.11)	0.951 (0.667-1.31)	1.13 (0.758-1.59)	1.27 (0.827-1.81)
10-min	0.335 (0.272-0.416)	0.417 (0.337-0.517)	0.560 (0.452-0.697)	0.689 (0.553-0.861)	0.881 (0.688-1.15)	1.04 (0.790-1.37)	1.21 (0.886-1.63)	1.39 (0.976-1.92)	1.65 (1.11-2.33)	1.86 (1.21-2.64)
15-min	0.409 (0.331-0.507)	0.508 (0.411-0.631)	0.683 (0.551-0.850)	0.841 (0.674-1.05)	1.08 (0.839-1.41)	1.27 (0.964-1.67)	1.48 (1.08-1.99)	1.70 (1.19-2.35)	2.01 (1.35-2.85)	2.26 (1.48-3.22)
30-min	0.557 (0.451-0.691)	0.691 (0.559-0.858)	0.927 (0.748-1.15)	1.14 (0.914-1.42)	1.46 (1.14-1.90)	1.72 (1.30-2.27)	2.00 (1.46-2.69)	2.30 (1.61-3.17)	2.72 (1.83-3.85)	3.06 (2.00-4.36)
60-min	0.695 (0.564-0.863)	0.856 (0.693-1.06)	1.14 (0.921-1.42)	1.40 (1.12-1.75)	1.79 (1.40-2.35)	2.12 (1.61-2.80)	2.47 (1.81-3.34)	2.85 (2.00-3.94)	3.39 (2.28-4.79)	3.82 (2.49-5.44)
2-hr	0.834 (0.680-1.03)	1.02 (0.831-1.26)	1.36 (1.10-1.68)	1.67 (1.34-2.06)	2.13 (1.68-2.77)	2.52 (1.93-3.31)	2.95 (2.17-3.95)	3.40 (2.40-4.67)	4.05 (2.75-5.69)	4.58 (3.01-6.47)
3-hr	0.921 (0.753-1.13)	1.12 (0.915-1.37)	1.48 (1.21-1.82)	1.81 (1.47-2.24)	2.32 (1.83-3.00)	2.74 (2.11-3.58)	3.20 (2.38-4.27)	3.70 (2.63-5.06)	4.42 (3.01-6.18)	5.00 (3.30-7.02)
6-hr	1.11 (0.914-1.35)	1.34 (1.10-1.63)	1.75 (1.43-2.14)	2.13 (1.73-2.61)	2.70 (2.15-3.47)	3.18 (2.46-4.12)	3.70 (2.76-4.89)	4.26 (3.05-5.77)	5.07 (3.48-7.02)	5.72 (3.81-7.96)
12-hr	1.37 (1.13-1.65)	1.64 (1.36-1.99)	2.13 (1.75-2.58)	2.56 (2.10-3.11)	3.20 (2.56-4.06)	3.74 (2.90-4.78)	4.30 (3.23-5.62)	4.91 (3.53-6.56)	5.76 (3.98-7.89)	6.44 (4.32-8.89)
24-hr	1.67 (1.39-2.00)	1.99 (1.66-2.39)	2.55 (2.12-3.06)	3.04 (2.50-3.66)	3.74 (3.00-4.68)	4.31 (3.37-5.45)	4.90 (3.70-6.33)	5.53 (4.00-7.31)	6.40 (4.45-8.66)	7.08 (4.79-9.69)
2-day	1.97 (1.66-2.35)	2.34 (1.96-2.78)	2.95 (2.46-3.52)	3.48 (2.89-4.16)	4.22 (3.40-5.22)	4.82 (3.79-6.03)	5.43 (4.13-6.94)	6.07 (4.42-7.94)	6.94 (4.87-9.30)	7.62 (5.20-10.3)
3-day	2.15 (1.81-2.55)	2.54 (2.13-3.00)	3.18 (2.66-3.77)	3.73 (3.11-4.44)	4.50 (3.64-5.54)	5.12 (4.04-6.37)	5.75 (4.39-7.31)	6.41 (4.69-8.34)	7.31 (5.15-9.73)	8.00 (5.49-10.8)
4-day	2.29 (1.93-2.70)	2.69 (2.27-3.17)	3.35 (2.82-3.97)	3.92 (3.28-4.66)	4.72 (3.83-5.79)	5.36 (4.24-6.64)	6.01 (4.60-7.61)	6.69 (4.91-8.66)	7.61 (5.38-10.1)	8.32 (5.73-11.2)
7-day	2.62 (2.23-3.08)	3.06 (2.59-3.59)	3.79 (3.20-4.45)	4.40 (3.70-5.20)	5.27 (4.29-6.40)	5.95 (4.73-7.31)	6.65 (5.11-8.34)	7.36 (5.44-9.46)	8.33 (5.93-11.0)	9.08 (6.29-12.1)
10-day	2.92 (2.49-3.41)	3.39 (2.88-3.96)	4.16 (3.52-4.87)	4.81 (4.05-5.65)	5.72 (4.67-6.91)	6.43 (5.13-7.87)	7.16 (5.52-8.94)	7.90 (5.86-10.1)	8.91 (6.36-11.7)	9.68 (6.74-12.8)
20-day	3.80 (3.25-4.40)	4.34 (3.71-5.03)	5.22 (4.45-6.07)	5.96 (5.05-6.95)	6.98 (5.73-8.35)	7.77 (6.24-9.40)	8.56 (6.65-10.6)	9.37 (6.99-11.8)	10.4 (7.51-13.5)	11.2 (7.89-14.8)
30-day	4.52 (3.88-5.21)	5.15 (4.42-5.94)	6.16 (5.28-7.13)	7.00 (5.96-8.12)	8.13 (6.69-9.66)	9.00 (7.25-10.8)	9.85 (7.68-12.1)	10.7 (8.03-13.5)	11.8 (8.54-15.2)	12.7 (8.94-16.6)
45-day	5.41 (4.67-6.21)	6.19 (5.34-7.11)	7.43 (6.38-8.55)	8.42 (7.20-9.73)	9.74 (8.03-11.5)	10.7 (8.67-12.8)	11.7 (9.14-14.2)	12.6 (9.49-15.7)	13.8 (10.0-17.6)	14.7 (10.4-19.0)
60-day	6.16 (5.33-7.05)	7.09 (6.13-8.12)	8.56 (7.37-9.82)	9.72 (8.33-11.2)	11.2 (9.27-13.2)	12.3 (9.98-14.6)	13.4 (10.5-16.2)	14.4 (10.8-17.8)	15.6 (11.4-19.8)	16.5 (11.7-21.4)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). 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. Please refer to NOAA Atlas 14 document for more information.

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PF graphical



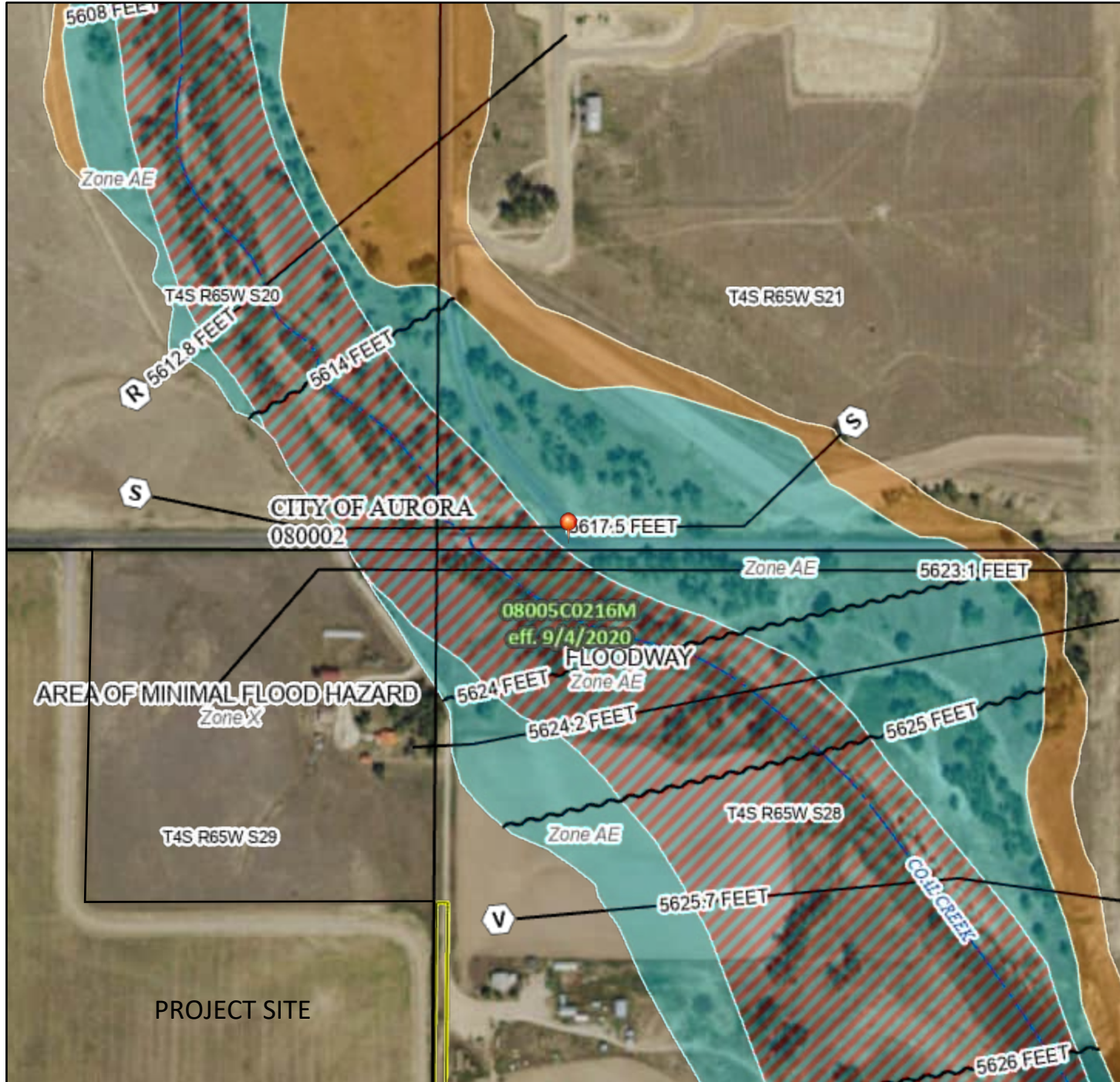
Maps & aerials

Small scale terrain

National Flood Hazard Layer FIRMette



104°40'57"W 39°41'9"N



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

1:6,000

104°40'20"W 39°40'42"N

Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020

Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
		Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance Water Surface Elevation
		17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
		Jurisdiction Boundary
OTHER FEATURES		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
MAP PANELS		Digital Data Available
		No Digital Data Available
		Unmapped



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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **4/5/2022 at 7:26 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

APPENDIX B
HYDROLOGIC CALCULATIONS

COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

Basin ID	Total Area (ac)	Paved Roads			Single Family Residential (70%)			Multi- Family Residential/ Attached/ Offsite (75%)			School (55%)			Rec Center (50%)			Landscaped Areas			Open Space			Neighborhood Parks			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
A1	1.14	100%	0.90	78.9%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.24	4.2%	5%	0.00	0.0%	15%	0.00	0.0%	83.2%
A2	2.19	100%	0.50	22.8%	70%	0.68	21.7%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.33	3.0%	5%	0.00	0.0%	15%	0.68	4.7%	52.2%
A3	0.90	100%	0.11	12.2%	70%	0.75	58.3%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.04	0.9%	5%	0.00	0.0%	15%	0.00	0.0%	71.4%
A4	1.56	100%	0.57	36.5%	70%	0.79	35.4%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.20	2.6%	5%	0.00	0.0%	15%	0.00	0.0%	74.6%
A5	1.23	100%	0.15	12.2%	70%	1.02	58.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.06	1.0%	5%	0.00	0.0%	15%	0.00	0.0%	71.2%
A6	1.69	100%	0.43	25.4%	70%	1.06	43.9%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.20	2.4%	5%	0.00	0.0%	15%	0.00	0.0%	71.7%
A73	1.69	100%	0.43	25.4%	70%	1.06	43.9%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.20	2.4%	5%	0.00	0.0%	15%	0.00	0.0%	71.7%
A7	0.42	100%	0.31	73.8%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.11	5.2%	5%	0.00	0.0%	15%	0.00	0.0%	79.0%
A8	0.64	100%	0.41	64.1%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.23	7.2%	5%	0.00	0.0%	15%	0.00	0.0%	71.3%
A9	0.63	100%	0.47	74.6%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.16	5.1%	5%	0.00	0.0%	15%	0.00	0.0%	79.7%
A10	12.97	100%	2.20	17.0%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	2.17	8.4%	20%	6.90	10.6%	5%	1.70	0.7%	15%	0.00	0.0%	28.3%
A11	0.88	100%	0.75	85.2%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.13	3.0%	5%	0.00	0.0%	15%	0.00	0.0%	88.2%
A12	1.39	100%	0.90	64.7%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.49	7.1%	5%	0.00	0.0%	15%	0.00	0.0%	71.8%
A13	0.48	100%	0.36	75.0%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.12	5.0%	5%	0.00	0.0%	15%	0.00	0.0%	80.0%
A14	1.93	100%	0.50	25.9%	70%	0.29	10.5%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	1.14	11.8%	5%	0.00	0.0%	15%	0.00	0.0%	48.2%
A15	1.70	100%	0.30	17.6%	70%	1.29	53.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.11	1.3%	5%	0.00	0.0%	15%	0.00	0.0%	72.1%
A16	0.19	100%	0.14	73.7%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.05	5.3%	5%	0.00	0.0%	15%	0.00	0.0%	78.9%
A17	0.55	100%	0.27	49.1%	70%	0.17	21.6%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.11	4.0%	5%	0.00	0.0%	15%	0.00	0.0%	74.7%
A18	1.85	100%	0.20	10.8%	70%	1.58	59.8%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.07	0.8%	5%	0.00	0.0%	15%	0.00	0.0%	71.4%
A19	0.44	100%	0.24	54.5%	70%	0.12	19.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.08	3.6%	5%	0.00	0.0%	15%	0.00	0.0%	77.3%
A20	0.33	100%	0.04	12.1%	70%	0.27	57.3%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.02	1.2%	5%	0.00	0.0%	15%	0.00	0.0%	70.6%
A21	0.20	100%	0.15	75.0%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.05	5.0%	5%	0.00	0.0%	15%	0.00	0.0%	80.0%
A22	0.41	100%	0.30	73.2%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.11	5.4%	5%	0.00	0.0%	15%	0.00	0.0%	78.5%
A23	0.69	100%	0.33	47.8%	70%	0.23	23.3%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.13	3.8%	5%	0.00	0.0%	15%	0.00	0.0%	74.9%
A24	1.74	100%	0.20	11.5%	70%	1.47	59.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.07	0.8%	5%	0.00	0.0%	15%	0.00	0.0%	71.4%
A25	17.12	100%	2.00	11.7%	70%	0.00	0.0%	75%	0.00	0.0%	55%	11.50	36.9%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	3.62	3.2%	51.8%
A26	0.32	100%	0.19	59.4%	70%	0.06	13.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.07	4.4%	5%	0.00	0.0%	15%	0.00	0.0%	76.9%
A27	0.47	100%	0.06	12.8%	70%	0.39	58.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.02	0.9%	5%	0.00	0.0%	15%	0.00	0.0%	71.7%
A28	0.27	100%	0.19	70.4%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.08	5.9%	5%	0.00	0.0%	15%	0.00	0.0%	76.3%
A29	0.60	100%	0.22	36.7%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.38	12.7%	5%	0.00	0.0%	15%	0.00	0.0%	49.3%
A30	2.12	100%	0.23	10.8%	70%	1.81	59.8%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.08	0.8%	5%	0.00	0.0%	15%	0.00	0.0%	71.4%
A31	0.19	100%	0.13	68.4%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.06	6.3%	5%	0.00	0.0%	15%	0.00	0.0%	74.7%
A32	1.17	100%	0.22	18.8%	70%	0.87	52.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.08	1.4%	5%	0.00	0.0%	15%	0.00	0.0%	72.2%
A33	1.41	100%	0.76	53.9%	70%	0.45	22.3%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.20	2.8%	5%	0.00	0.0%	15%	0.00	0.0%	79.1%
A34	0.73	100%	0.50	68.5%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.23	6.3%	5%	0.00	0.0%	15%	0.00	0.0%	74.8%
A81	0.35	100%	0.22	62.9%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.13	7.4%	5%	0.00	0.0%	15%	0.00	0.0%	70.3%
A35	1.71	100%	0.41	24.0%	70%	0.00	0.0%	75%	0.92	40.4%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.38	4.4%	5%	0.00	0.0%	15%	0.00	0.0%	68.8%
A36	1.05	100%	0.55	52.4%	70%	0.34	22.7%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.16	3.0%	5%	0.00	0.0%	15%	0.00	0.0%	78.1%
A37	1.13	100%	0.58	51.3%	70%	0.30	18.6%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.25	4.4%	5%	0.00	0.0%	15%	0.00	0.0%	74.3%
A38	2.65	100%	0.90	34.0%	70%	0.39	10.3%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	1.36	7.7%	52.0%
A78	0.98	100%	0.18	18.4%	70%	0.10	7.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.70	10.7%	36.2%

Basin ID	Total Area (ac)	Paved Roads			Single Family Residential (70%)			Multi- Family Residential/ Attached/ Offsite (75%)			School (55%)			Rec Center (50%)			Landscaped Areas			Open Space			Neighborhood Parks			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
A39	1.81	100%	0.65	35.9%	70%	0.00	0.0%	75%	1.00	41.4%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.16	1.8%	5%	0.00	0.0%	15%	0.00	0.0%	79.1%
A40	2.06	100%	0.30	14.6%	70%	0.00	0.0%	75%	0.44	16.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	1.32	9.6%	40.2%
A79	0.51	100%	0.07	13.7%	70%	0.00	0.0%	75%	0.25	36.8%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.19	5.6%	56.1%
A41	2.40	100%	0.87	36.3%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	1.53	12.8%	5%	0.00	0.0%	15%	0.00	0.0%	49.0%
A42	0.56	100%	0.28	50.0%	70%	0.00	0.0%	75%	0.17	22.8%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.10	3.6%	5%	0.00	0.0%	15%	0.01	0.3%	76.6%
A43	2.00	100%	0.60	30.0%	70%	1.21	42.4%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.19	1.9%	5%	0.00	0.0%	15%	0.00	0.0%	74.3%
A44	0.42	100%	0.17	40.5%	70%	0.00	0.0%	75%	0.17	30.4%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.07	3.3%	5%	0.00	0.0%	15%	0.01	0.4%	74.5%
A45	2.50	100%	1.38	55.2%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	-0.08	-0.6%	5%	0.00	0.0%	15%	1.20	7.2%	61.8%
A46	1.44	100%	0.41	28.5%	70%	0.00	0.0%	75%	0.65	33.9%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.38	5.3%	5%	0.00	0.0%	15%	0.00	0.0%	67.6%
A80	1.59	100%	0.42	26.4%	70%	0.38	16.7%	75%	0.40	18.9%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.38	4.8%	5%	0.00	0.0%	15%	0.01	0.1%	66.9%
A47	0.99	100%	0.14	14.1%	70%	0.80	56.6%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.05	1.0%	5%	0.00	0.0%	15%	0.00	0.0%	71.7%
A48	1.90	100%	0.51	26.8%	70%	1.18	43.5%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.21	2.2%	5%	0.00	0.0%	15%	0.00	0.0%	72.5%
A49	1.37	100%	0.27	19.7%	70%	1.00	51.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.10	1.5%	5%	0.00	0.0%	15%	0.00	0.0%	72.3%
A50	2.45	100%	0.36	14.7%	70%	1.97	56.3%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.12	1.0%	5%	0.00	0.0%	15%	0.00	0.0%	72.0%
A74	0.78	100%	0.13	16.7%	70%	0.60	53.8%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.05	1.3%	5%	0.00	0.0%	15%	0.00	0.0%	71.8%
A51	2.33	100%	0.53	22.7%	70%	1.60	48.1%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.20	1.7%	5%	0.00	0.0%	15%	0.00	0.0%	72.5%
A75	0.87	100%	0.24	27.6%	70%	0.53	42.6%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.10	2.3%	5%	0.00	0.0%	15%	0.00	0.0%	72.5%
A52	1.18	100%	0.54	45.8%	70%	0.64	38.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.00	0.0%	83.7%
A76	0.92	100%	0.24	26.1%	70%	0.60	45.7%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.08	1.7%	5%	0.00	0.0%	15%	0.00	0.0%	73.5%
A53	2.89	100%	1.21	41.9%	70%	0.97	23.5%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.70	4.8%	5%	0.00	0.0%	15%	0.01	0.1%	70.3%
A54	0.30	100%	0.18	60.0%	70%	0.05	11.7%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.07	4.7%	5%	0.00	0.0%	15%	0.00	0.0%	76.3%
A55	1.44	100%	0.56	38.9%	70%	0.00	0.0%	75%	0.63	32.8%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.25	3.5%	5%	0.00	0.0%	15%	0.00	0.0%	75.2%
A56	2.04	100%	0.64	31.4%	70%	0.00	0.0%	75%	1.24	45.6%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.16	1.6%	5%	0.00	0.0%	15%	0.00	0.0%	78.5%
A77	0.89	100%	0.22	24.7%	70%	0.00	0.0%	75%	0.54	45.5%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.13	2.9%	5%	0.00	0.0%	15%	0.00	0.0%	73.1%
A57	1.72	100%	1.00	58.1%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.75	6.5%	64.7%
A58	2.43	100%	0.85	35.0%	70%	0.00	0.0%	75%	1.25	38.6%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.33	2.7%	5%	0.00	0.0%	15%	0.00	0.0%	76.3%
A59	0.70	100%	0.32	45.7%	70%	0.00	0.0%	75%	0.12	12.9%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.26	7.4%	5%	0.00	0.0%	15%	0.00	0.0%	66.0%
A60	1.13	100%	0.44	38.9%	70%	0.00	0.0%	75%	0.40	26.5%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.29	5.1%	5%	0.00	0.0%	15%	0.00	0.0%	70.6%
A61	2.39	100%	0.75	31.4%	70%	0.00	0.0%	75%	1.04	32.6%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.60	5.0%	5%	0.00	0.0%	15%	0.02	0.1%	69.2%
A62	0.09	100%	0.07	77.8%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.02	4.4%	5%	0.00	0.0%	15%	0.00	0.0%	82.2%
A63	2.56	100%	0.56	21.9%	70%	1.81	49.5%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.19	1.5%	5%	0.00	0.0%	15%	0.00	0.0%	72.9%
A64	2.72	100%	0.50	18.4%	70%	2.05	52.8%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.17	1.3%	5%	0.00	0.0%	15%	0.00	0.0%	72.4%
A65	1.45	100%	0.57	39.3%	70%	0.65	31.4%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.23	3.2%	5%	0.00	0.0%	15%	0.00	0.0%	73.9%
A66	0.19	100%	0.13	68.4%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.06	6.3%	5%	0.00	0.0%	15%	0.00	0.0%	74.7%
A67	0.21	100%	0.15	71.4%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.06	5.7%	5%	0.00	0.0%	15%	0.00	0.0%	77.1%
A68	0.22	100%	0.16	72.7%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.06	5.5%	5%	0.00	0.0%	15%	0.00	0.0%	78.2%
A69	2.00	100%	0.80	40.0%	70%	0.00	0.0%	75%	0.89	33.4%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.31	3.1%	5%	0.00	0.0%	15%	0.00	0.0%	76.5%
A70	11.98	100%	0.00	0.0%	70%	0.00	0.0%	75%	11.98	75.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.00	0.0%	75.0%
A71	1.00	100%	0.87	87.0%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.13	2.6%	5%	0.00	0.0%	15%	0.00	0.0%	89.6%
A72	11.90	100%	0.55	4.6%	70%	1.81	10.6%	75%	1.05	6.6%	55%	0.00	0.0%	50%	0.00	0.0%	20%	3.16	5.3%	5%	5.33	2.2%	15%	0.00	0.0%	29.4%
D1	1.10	100%	0.86	78.2%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.24	4.4%	5%	0.00	0.0%	15%	0.00	0.0%	82.5%
D2	0.32	100%	0.25	78.1%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.07	4.4%	5%	0.00	0.0%	15%	0.00	0.0%	82.5%
D3	0.59	100%	0.46	78.0%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.13	4.4%	5%	0.00	0.0%	15%	0.00	0.0%	82.4%
D4	0.49	100%	0.43	87.8%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.06	2.4%	5%	0.00	0.0%	15%	0.00	0.0%	90.2%
OS1	8.23	100%	0.00	0.0%	70%	0.00	0.0%	75%	8.23	75.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.00	0.0%	75.0%
OS2	34.21	100%	0.00	0.0%	70%	0.00	0.0%	75%	34.21	75.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.00	0.0%	75.0%
OS3	12.88	100%	0.00	0.0%	70%	0.00	0.0%	75%	12.88	75.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.00	0.0%	75.0%
OS4	9.32	100%	0.00	0.0%	70%	0.00	0.0%	75%	9.32	75.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.00	0.0%	75.0%
OS5	11.58	100%	0.00	0.0%	70%	0.00	0.0%	75%	11.58	75.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.00	0.0%	75.0%

Basin ID	Total Area (ac)	Paved Roads			Single Family Residential (70%)			Multi- Family Residential/ Attached/ Offsite (75%)			School (55%)			Rec Center (50%)			Landscaped Areas			Open Space			Neighborhood Parks			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
OS7	14.99	100%	0.00	0.0%	70%	0.00	0.0%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	14.99	15.0%	15.0%
OS6	66.83	100%	12.19	18.2%	70%	54.64	57.2%	75%	0.00	0.0%	55%	0.00	0.0%	50%	0.00	0.0%	20%	0.00	0.0%	5%	0.00	0.0%	15%	0.00	0.0%	75.5%
TOTAL	308.98																								65.6%	

COMPOSITE RUNOFF COEFFICIENT CALCULATIONS

bdivision: FOUNDRY FILING NO. 1
Location: Aurora

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

Basin ID	Total Area (ac)	Basins Total Weighted	Hydrologic Soil Group			Hydrologic Soil Group			Minor Coefficients			Minor Coefficients			Major Coefficients			Basins Total Weighted C ₂	Basins Total Weighted C ₅	Basins Total Weighted C ₁₀₀
			Area A (ac)	Area B (ac)	Area C/D (ac)	% A (ac)	% B (ac)	% C/D (ac)	C _{2,A}	C _{2,B}	C _{2,C/D}	C _{5,A}	C _{5,B}	C _{5,C/D}	C _{100,A}	C _{100,B}	C _{100,C/D}			
A1	1.14	83.2%	0.00	0.00	1.14	0%	0%	100%	0.66	0.68	0.68	0.68	0.70	0.72	0.76	0.82	0.82	0.68	0.72	0.82
A2	2.19	52.2%	0.00	0.00	2.19	0%	0%	100%	0.36	0.39	0.40	0.38	0.42	0.46	0.52	0.67	0.70	0.40	0.46	0.70
A3	0.90	71.4%	0.00	0.00	0.90	0%	0%	100%	0.54	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A4	1.56	74.6%	0.00	0.00	1.56	0%	0%	100%	0.57	0.60	0.60	0.59	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
A5	1.23	71.2%	0.00	0.00	1.23	0%	0%	100%	0.54	0.56	0.57	0.56	0.59	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A6	1.69	71.7%	0.00	0.00	1.69	0%	0%	100%	0.55	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A73	1.69	71.7%	0.00	0.00	1.69	0%	0%	100%	0.55	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A7	0.42	79.0%	0.00	0.00	0.42	0%	0%	100%	0.62	0.64	0.64	0.64	0.67	0.68	0.73	0.80	0.81	0.64	0.68	0.81
A8	0.64	71.3%	0.00	0.00	0.64	0%	0%	100%	0.54	0.56	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A9	0.63	79.7%	0.00	0.00	0.63	0%	0%	100%	0.63	0.64	0.64	0.64	0.67	0.69	0.73	0.80	0.81	0.64	0.69	0.81
A10	12.97	28.3%	0.00	0.00	12.97	0%	0%	100%	0.16	0.19	0.20	0.17	0.22	0.27	0.33	0.56	0.60	0.20	0.27	0.60
A11	0.88	88.2%	0.00	0.00	0.88	0%	0%	100%	0.71	0.73	0.72	0.73	0.75	0.76	0.80	0.84	0.85	0.72	0.76	0.85
A12	1.39	71.8%	0.00	0.00	1.39	0%	0%	100%	0.55	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A13	0.48	80.0%	0.00	0.00	0.48	0%	0%	100%	0.63	0.65	0.65	0.65	0.68	0.69	0.73	0.80	0.81	0.65	0.69	0.81
A14	1.93	48.2%	0.00	0.00	1.93	0%	0%	100%	0.32	0.36	0.37	0.34	0.39	0.43	0.49	0.65	0.68	0.37	0.43	0.68
A15	1.70	72.1%	0.00	0.00	1.70	0%	0%	100%	0.55	0.57	0.57	0.57	0.60	0.63	0.67	0.76	0.78	0.57	0.63	0.78
A16	0.19	78.9%	0.00	0.00	0.19	0%	0%	100%	0.62	0.64	0.64	0.64	0.67	0.68	0.73	0.80	0.81	0.64	0.68	0.81
A17	0.55	74.7%	0.00	0.00	0.55	0%	0%	100%	0.57	0.60	0.60	0.59	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
A18	1.85	71.4%	0.00	0.00	1.85	0%	0%	100%	0.54	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A19	0.44	77.3%	0.00	0.00	0.44	0%	0%	100%	0.60	0.62	0.62	0.62	0.65	0.67	0.71	0.79	0.80	0.62	0.67	0.80
A20	0.33	70.6%	0.00	0.00	0.33	0%	0%	100%	0.53	0.56	0.56	0.55	0.59	0.61	0.66	0.76	0.77	0.56	0.61	0.77
A21	0.20	80.0%	0.00	0.00	0.20	0%	0%	100%	0.63	0.65	0.65	0.65	0.68	0.69	0.73	0.80	0.81	0.65	0.69	0.81
A22	0.41	78.5%	0.00	0.00	0.41	0%	0%	100%	0.61	0.63	0.63	0.63	0.66	0.68	0.72	0.80	0.81	0.63	0.68	0.81
A23	0.69	74.9%	0.00	0.00	0.69	0%	0%	100%	0.58	0.60	0.60	0.60	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
A24	1.74	71.4%	0.00	0.00	1.74	0%	0%	100%	0.54	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A25	17.12	51.8%	0.00	0.00	17.12	0%	0%	100%	0.36	0.39	0.40	0.37	0.42	0.46	0.51	0.67	0.70	0.40	0.46	0.70
A26	0.32	76.9%	0.00	0.00	0.32	0%	0%	100%	0.60	0.62	0.62	0.62	0.65	0.67	0.71	0.79	0.80	0.62	0.67	0.80
A27	0.47	71.7%	0.00	0.00	0.47	0%	0%	100%	0.55	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A28	0.27	76.3%	0.00	0.00	0.27	0%	0%	100%	0.59	0.61	0.61	0.61	0.64	0.66	0.70	0.79	0.80	0.61	0.66	0.80
A29	0.60	49.3%	0.00	0.00	0.60	0%	0%	100%	0.34	0.37	0.38	0.35	0.40	0.44	0.50	0.66	0.69	0.38	0.44	0.69
A30	2.12	71.4%	0.00	0.00	2.12	0%	0%	100%	0.54	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A31	0.19	74.7%	0.00	0.00	0.19	0%	0%	100%	0.57	0.60	0.60	0.59	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
A32	1.17	72.2%	0.00	0.00	1.17	0%	0%	100%	0.55	0.57	0.58	0.57	0.60	0.63	0.67	0.76	0.78	0.58	0.63	0.78
A33	1.41	79.1%	0.00	0.00	1.41	0%	0%	100%	0.62	0.64	0.64	0.64	0.67	0.68	0.73	0.80	0.81	0.64	0.68	0.81

A34	0.73	74.8%	0.00	0.00	0.73	0%	0%	100%	0.58	0.60	0.60	0.59	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
A81	0.35	70.3%	0.00	0.00	0.35	0%	0%	100%	0.53	0.56	0.56	0.55	0.59	0.61	0.66	0.76	0.77	0.56	0.61	0.77
A35	1.71	68.8%	0.00	0.00	1.71	0%	0%	100%	0.52	0.54	0.55	0.53	0.57	0.60	0.65	0.75	0.77	0.55	0.60	0.77
A36	1.05	78.1%	0.00	0.00	1.05	0%	0%	100%	0.61	0.63	0.63	0.63	0.66	0.68	0.72	0.79	0.80	0.63	0.68	0.80
A37	1.13	74.3%	0.00	0.00	1.13	0%	0%	100%	0.57	0.59	0.60	0.59	0.62	0.64	0.69	0.77	0.79	0.60	0.64	0.79
A38	2.65	52.0%	0.00	0.00	2.65	0%	0%	100%	0.36	0.39	0.40	0.37	0.42	0.46	0.51	0.67	0.70	0.40	0.46	0.70
A78	0.98	36.2%	0.00	0.00	0.98	0%	0%	100%	0.22	0.26	0.27	0.23	0.28	0.33	0.39	0.60	0.63	0.27	0.33	0.63
A39	1.81	79.1%	0.00	0.00	1.81	0%	0%	100%	0.62	0.64	0.64	0.64	0.67	0.68	0.73	0.80	0.81	0.64	0.68	0.81
A40	2.06	40.2%	0.00	0.00	2.06	0%	0%	100%	0.26	0.29	0.30	0.27	0.32	0.37	0.42	0.62	0.65	0.30	0.37	0.65
A79	0.51	56.1%	0.00	0.00	0.51	0%	0%	100%	0.40	0.43	0.43	0.41	0.46	0.50	0.55	0.69	0.71	0.43	0.50	0.71
A41	2.40	49.0%	0.00	0.00	2.40	0%	0%	100%	0.33	0.37	0.37	0.35	0.40	0.44	0.49	0.66	0.69	0.37	0.44	0.69
A42	0.56	76.6%	0.00	0.00	0.56	0%	0%	100%	0.59	0.62	0.62	0.61	0.64	0.66	0.71	0.79	0.80	0.62	0.66	0.80
A43	2.00	74.3%	0.00	0.00	2.00	0%	0%	100%	0.57	0.59	0.59	0.59	0.62	0.64	0.69	0.77	0.79	0.59	0.64	0.79
A44	0.42	74.5%	0.00	0.00	0.42	0%	0%	100%	0.57	0.60	0.60	0.59	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
A45	2.50	61.8%	0.00	0.00	2.50	0%	0%	100%	0.45	0.48	0.48	0.47	0.51	0.54	0.59	0.72	0.74	0.48	0.54	0.74
A46	1.44	67.6%	0.00	0.00	1.44	0%	0%	100%	0.50	0.53	0.54	0.52	0.56	0.59	0.64	0.74	0.76	0.54	0.59	0.76
A80	1.59	66.9%	0.00	0.00	1.59	0%	0%	100%	0.50	0.52	0.53	0.51	0.56	0.58	0.63	0.74	0.76	0.53	0.58	0.76
A47	0.99	71.7%	0.00	0.00	0.99	0%	0%	100%	0.55	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A48	1.90	72.5%	0.00	0.00	1.90	0%	0%	100%	0.55	0.58	0.58	0.57	0.61	0.63	0.68	0.77	0.78	0.58	0.63	0.78
A49	1.37	72.3%	0.00	0.00	1.37	0%	0%	100%	0.55	0.57	0.58	0.57	0.60	0.63	0.67	0.77	0.78	0.58	0.63	0.78
A50	2.45	72.0%	0.00	0.00	2.45	0%	0%	100%	0.55	0.57	0.57	0.56	0.60	0.63	0.67	0.76	0.78	0.57	0.63	0.78
A74	0.78	71.8%	0.00	0.00	0.78	0%	0%	100%	0.55	0.57	0.57	0.56	0.60	0.62	0.67	0.76	0.78	0.57	0.62	0.78
A51	2.33	72.5%	0.00	0.00	2.33	0%	0%	100%	0.55	0.58	0.58	0.57	0.61	0.63	0.68	0.77	0.78	0.58	0.63	0.78
A75	0.87	72.5%	0.00	0.00	0.87	0%	0%	100%	0.55	0.58	0.58	0.57	0.61	0.63	0.68	0.77	0.78	0.58	0.63	0.78
A52	1.18	83.7%	0.00	0.00	1.18	0%	0%	100%	0.67	0.68	0.68	0.69	0.71	0.72	0.76	0.82	0.83	0.68	0.72	0.83
A76	0.92	73.5%	0.00	0.00	0.92	0%	0%	100%	0.56	0.59	0.59	0.58	0.62	0.64	0.68	0.77	0.79	0.59	0.64	0.79
A53	2.89	70.3%	0.00	0.00	2.89	0%	0%	100%	0.53	0.56	0.56	0.55	0.59	0.61	0.66	0.76	0.77	0.56	0.61	0.77
A54	0.30	76.3%	0.00	0.00	0.30	0%	0%	100%	0.59	0.61	0.61	0.61	0.64	0.66	0.70	0.79	0.80	0.61	0.66	0.80
A55	1.44	75.2%	0.00	0.00	1.44	0%	0%	100%	0.58	0.60	0.60	0.60	0.63	0.65	0.70	0.78	0.79	0.60	0.65	0.79
A56	2.04	78.5%	0.00	0.00	2.04	0%	0%	100%	0.61	0.63	0.63	0.63	0.66	0.68	0.72	0.80	0.81	0.63	0.68	0.81
A77	0.89	73.1%	0.00	0.00	0.89	0%	0%	100%	0.56	0.58	0.58	0.58	0.61	0.63	0.68	0.77	0.78	0.58	0.63	0.78
A57	1.72	64.7%	0.00	0.00	1.72	0%	0%	100%	0.48	0.50	0.51	0.49	0.54	0.56	0.62	0.73	0.75	0.51	0.56	0.75
A58	2.43	76.3%	0.00	0.00	2.43	0%	0%	100%	0.59	0.61	0.61	0.61	0.64	0.66	0.70	0.78	0.80	0.61	0.66	0.80
A59	0.70	66.0%	0.00	0.00	0.70	0%	0%	100%	0.49	0.52	0.52	0.51	0.55	0.58	0.63	0.74	0.75	0.52	0.58	0.75
A60	1.13	70.6%	0.00	0.00	1.13	0%	0%	100%	0.53	0.56	0.56	0.55	0.59	0.61	0.66	0.76	0.77	0.56	0.61	0.77
A61	2.39	69.2%	0.00	0.00	2.39	0%	0%	100%	0.52	0.55	0.55	0.54	0.58	0.60	0.65	0.75	0.77	0.55	0.60	0.77
A62	0.09	82.2%	0.00	0.00	0.09	0%	0%	100%	0.65	0.67	0.67	0.67	0.69	0.71	0.75	0.81	0.82	0.67	0.71	0.82
A63	2.56	72.9%	0.00	0.00	2.56	0%	0%	100%	0.56	0.58	0.58	0.57	0.61	0.63	0.68	0.77	0.78	0.58	0.63	0.78
A64	2.72	72.4%	0.00	0.00	2.72	0%	0%	100%	0.55	0.58	0.58	0.57	0.61	0.63	0.68	0.77	0.78	0.58	0.63	0.78
A65	1.45	73.9%	0.00	0.00	1.45	0%	0%	100%	0.57	0.59	0.59	0.58	0.62	0.64	0.69	0.77	0.79	0.59	0.64	0.79
A66	0.19	74.7%	0.00	0.00	0.19	0%	0%	100%	0.57	0.60	0.60	0.59	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
A67	0.21	77.1%	0.00	0.00	0.21	0%	0%	100%	0.60	0.62	0.62	0.62	0.65	0.67	0.71	0.79	0.80	0.62	0.67	0.80
A68	0.22	78.2%	0.00	0.00	0.22	0%	0%	100%	0.61	0.63	0.63	0.63	0.66	0.68	0.72	0.79	0.81	0.63	0.68	0.81
A69	2.00	76.5%	0.00	0.00	2.00	0%	0%	100%	0.59	0.61	0.61	0.61	0.64	0.66	0.71	0.79	0.80	0.61	0.66	0.80
A70	11.98	75.0%	0.00	0.00	11.98	0%	0%	100%	0.58	0.60	0.60	0.60	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
A71	1.00	89.6%	0.00	0.00	1.00	0%	0%	100%	0.73	0.74	0.73	0.75	0.76	0.77	0.81	0.85	0.85	0.73	0.77	0.85
A72	11.90	29.4%	0.00	0.00	11.90	0%	0%	100%	0.17	0.20	0.21	0.18	0.23	0.28	0.34	0.56	0.61	0.21	0.28	0.61

D1	1.10	82.5%	0.00	0.00	1.10	0%	0%	100%	0.65	0.67	0.67	0.67	0.70	0.71	0.75	0.81	0.82	0.67	0.71	0.82
D2	0.32	82.5%	0.00	0.00	0.32	0%	0%	100%	0.65	0.67	0.67	0.67	0.70	0.71	0.75	0.81	0.82	0.67	0.71	0.82
D3	0.59	82.4%	0.00	0.00	0.59	0%	0%	100%	0.65	0.67	0.67	0.67	0.70	0.71	0.75	0.81	0.82	0.67	0.71	0.82
D4	0.49	90.2%	0.00	0.00	0.49	0%	0%	100%	0.73	0.75	0.74	0.75	0.77	0.77	0.81	0.85	0.85	0.74	0.77	0.85
OS1	8.23	75.0%	0.00	0.00	8.23	0%	0%	100%	0.58	0.60	0.60	0.60	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
OS2	34.21	75.0%	0.00	0.00	34.21	0%	0%	100%	0.58	0.60	0.60	0.60	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
OS3	12.88	75.0%	0.00	0.00	12.88	0%	0%	100%	0.58	0.60	0.60	0.60	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
OS4	9.32	75.0%	0.00	0.00	9.32	0%	0%	100%	0.58	0.60	0.60	0.60	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
OS5	11.58	75.0%	0.00	0.00	11.58	0%	0%	100%	0.58	0.60	0.60	0.60	0.63	0.65	0.69	0.78	0.79	0.60	0.65	0.79
OS7	14.99	15.0%	0.00	0.00	14.99	0%	0%	100%	0.07	0.09	0.10	0.08	0.11	0.16	0.23	0.50	0.55	0.10	0.16	0.55
OS6	66.83	75.5%	0.00	0.00	66.83	0%	0%	100%	0.58	0.61	0.61	0.60	0.63	0.65	0.70	0.78	0.79	0.61	0.65	0.79
TOTAL	308.98	65.6%	0.00	0.00	308.98	0%	0%	100%	---	---	---	---	---	---	---	---	---	0.52	0.57	0.75

Table 6-4. Runoff coefficient equations based on NRCS soil group and storm return period

NRCS Soil Group	Storm Return Period						
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	500-Year
A	$C_A = 0.84i^{1.302}$	$C_A = 0.86i^{1.276}$	$C_A = 0.87i^{1.232}$	$C_A = 0.84i^{1.124}$	$C_A = 0.85i+0.025$	$C_A = 0.78i+0.110$	$C_A = 0.65i+0.254$
B	$C_B = 0.84i^{1.169}$	$C_B = 0.86i^{1.088}$	$C_B = 0.81i+0.057$	$C_B = 0.63i+0.249$	$C_B = 0.56i+0.328$	$C_B = 0.47i+0.426$	$C_B = 0.37i+0.536$
C/D	$C_{CD} = 0.83i^{1.122}$	$C_{CD} = 0.82i+0.035$	$C_{CD} = 0.74i+0.132$	$C_{CD} = 0.56i+0.319$	$C_{CD} = 0.49i+0.393$	$C_{CD} = 0.41i+0.484$	$C_{CD} = 0.32i+0.588$

Where:

- i = % imperviousness (expressed as a decimal)
- C_A = Runoff coefficient for Natural Resources Conservation Service (NRCS) HSG A soils
- C_B = Runoff coefficient for NRCS HSG B soils
- C_{CD} = Runoff coefficient for NRCS HSG C and D soils.

STANDARD FORM SF-2 **TIME OF CONCENTRATION**

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

SUB-BASIN							INITIAL/OVERLAND			TRAVEL TIME					t _c CHECK			FINAL
DATA							(T _i)			(T _t)					(URBANIZED BASINS)			
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C ₂	C ₅	C ₁₀₀	L (ft)	S _o (%)	t _i (min)	L _t (ft)	S _t (%)	K	VEL. (ft/s)	t _t (min)	COMP. t _c (min)	TOTAL LENGTH (ft)	Urbanized t _c (min)	
A1	1.14	C/D	83%	0.68	0.72	0.82	33	4.5%	2.4	998	2.0%	20.0	2.8	5.9	8.3	1031.0	15.7	8.3
A2	2.19	C/D	52%	0.40	0.46	0.70	145	5.0%	8.1	498	2.0%	20.0	2.8	2.9	11.1	643.0	13.6	11.1
A3	0.90	C/D	71%	0.57	0.62	0.78	132	3.2%	6.8	159	2.0%	20.0	2.8	0.9	7.7	291.0	11.6	7.7
A4	1.56	C/D	75%	0.60	0.65	0.79	137	4.7%	5.8	355	2.0%	20.0	2.8	2.1	7.8	492.0	12.7	7.8
A5	1.23	C/D	71%	0.57	0.62	0.78	134	3.7%	6.5	194	2.0%	20.0	2.8	1.1	7.7	328.0	11.8	7.7
A6	1.69	C/D	72%	0.57	0.62	0.78	135	4.0%	6.3	361	2.0%	20.0	2.8	2.1	8.5	496.0	12.8	8.5
A73	1.69	C/D	72%	0.57	0.62	0.78	139	5.7%	5.7	361	2.0%	20.0	2.8	2.1	7.8	500.0	12.8	7.8
A7	0.42	C/D	79%	0.64	0.68	0.81	20	0.9%	3.5	406	2.0%	20.0	2.8	2.4	5.9	426.0	12.4	5.9
A8	0.64	C/D	71%	0.57	0.62	0.78	38	2.0%	4.3	350	2.0%	20.0	2.8	2.1	6.3	388.0	12.2	6.3
A9	0.63	C/D	80%	0.64	0.69	0.81	69	2.4%	4.6	280	2.0%	20.0	2.8	1.6	6.3	349.0	11.9	6.3
A10	12.97	C/D	28%	0.20	0.27	0.60	372	5.1%	16.9	606	2.5%	15.0	2.4	4.3	21.2	978.0	15.4	15.4
A11	0.88	C/D	88%	0.72	0.76	0.85	85	3.5%	3.8	805	2.0%	20.0	2.8	4.7	8.5	890.0	14.9	8.5
A12	1.39	C/D	72%	0.57	0.62	0.78	115	3.7%	6.0	823	2.0%	20.0	2.8	4.8	10.8	938.0	15.2	10.8
A13	0.48	C/D	80%	0.65	0.69	0.81	20	1.0%	3.3	503	2.0%	20.0	2.8	3.0	6.3	523.0	12.9	6.3
A14	1.93	C/D	48%	0.37	0.43	0.68	138	5.2%	8.3	671	2.0%	20.0	2.8	4.0	12.2	809.0	14.5	12.2
A15	1.70	C/D	72%	0.57	0.63	0.78	137	4.0%	6.3	434	2.0%	20.0	2.8	2.6	8.9	571.0	13.2	8.9
A16	0.19	C/D	79%	0.64	0.68	0.81	40	3.0%	3.3	172	2.0%	20.0	2.8	1.0	4.3	212.0	11.2	5.0
A17	0.55	C/D	75%	0.60	0.65	0.79	60	0.5%	7.9	435	2.0%	20.0	2.8	2.6	10.5	495.0	12.8	10.5
A18	1.85	C/D	71%	0.57	0.62	0.78	131	2.6%	7.2	294	2.0%	20.0	2.8	1.7	9.0	425.0	12.4	9.0
A19	0.44	C/D	77%	0.62	0.67	0.80	75	2.5%	5.0	312	2.0%	20.0	2.8	1.8	6.8	387.0	12.2	6.8
A20	0.33	C/D	71%	0.56	0.61	0.77	140	2.5%	7.7	47	2.0%	20.0	2.8	0.3	8.0	187.0	11.0	8.0
A21	0.20	C/D	80%	0.65	0.69	0.81	18	3.7%	2.0	184	2.0%	20.0	2.8	1.1	3.1	202.0	11.1	5.0
A22	0.41	C/D	79%	0.63	0.68	0.81	41	3.1%	3.4	313	2.0%	20.0	2.8	1.8	5.2	354.0	12.0	5.2
A23	0.69	C/D	75%	0.60	0.65	0.79	83	1.5%	6.5	493	2.0%	20.0	2.8	2.9	9.4	576.0	13.2	9.4
A24	1.74	C/D	71%	0.57	0.62	0.78	138	4.0%	6.4	319	2.0%	20.0	2.8	1.9	8.3	457.0	12.5	8.3
A25	17.12	C/D	52%	0.40	0.46	0.70	365	4.0%	14.0	781	2.0%	15.0	2.1	6.1	20.1	1146.0	16.4	16.4
A26	0.32	C/D	77%	0.62	0.67	0.80	79	0.2%	12.8	230	2.0%	20.0	2.8	1.4	14.1	309.0	11.7	11.7
A27	0.47	C/D	72%	0.57	0.62	0.78	129	4.8%	5.8	43	2.0%	20.0	2.8	0.3	6.1	172.0	11.0	6.1
A28	0.27	C/D	76%	0.61	0.66	0.80	18	3.8%	2.2	334	2.0%	20.0	2.8	2.0	4.1	352.0	12.0	5.0

STANDARD FORM SF-2 TIME OF CONCENTRATION

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

SUB-BASIN							INITIAL/OVERLAND			TRAVEL TIME					t _c CHECK			FINAL
DATA							(T _i)			(T _t)					(URBANIZED BASINS)			
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C ₂	C ₅	C ₁₀₀	L (ft)	S _o (%)	t _i (min)	L _t (ft)	S _t (%)	K	VEL. (ft/s)	t _t (min)	COMP. t _c (min)	TOTAL LENGTH (ft)	Urbanized t _c (min)	
A29	0.60	C/D	49%	0.38	0.44	0.69	60	0.1%	19.7	295	2.0%	20.0	2.8	1.7	21.5	355.0	12.0	12.0
A30	2.12	C/D	71%	0.57	0.62	0.78	136	1.4%	9.0	322	2.0%	20.0	2.8	1.9	10.9	458.0	12.5	10.9
A31	0.19	C/D	75%	0.60	0.65	0.79	18	2.6%	2.5	189	2.0%	20.0	2.8	1.1	3.6	207.0	11.2	5.0
A32	1.17	C/D	72%	0.58	0.63	0.78	135	4.1%	6.2	345	2.0%	20.0	2.8	2.0	8.3	480.0	12.7	8.3
A33	1.41	C/D	79%	0.64	0.68	0.81	50	5.4%	3.1	1158	2.0%	20.0	2.8	6.8	9.9	1208.0	16.7	9.9
A34	0.73	C/D	75%	0.60	0.65	0.79	32	1.9%	3.7	490	2.0%	20.0	2.8	2.9	6.6	522.0	12.9	6.6
A81	0.35	C/D	70%	0.56	0.61	0.77	46	2.6%	4.4	193	2.0%	20.0	2.8	1.1	5.5	239.0	11.3	5.5
A35	1.71	C/D	69%	0.55	0.60	0.77	92	3.6%	5.7	578	2.0%	20.0	2.8	3.4	9.1	670.0	13.7	9.1
A36	1.05	C/D	78%	0.63	0.68	0.80	93	2.6%	5.4	310	2.0%	20.0	2.8	1.8	7.2	403.0	12.2	7.2
A37	1.13	C/D	74%	0.60	0.64	0.79	41	2.9%	3.7	512	2.0%	20.0	2.8	3.0	6.7	553.0	13.1	6.7
A38	2.65	C/D	52%	0.40	0.46	0.70	72	2.0%	7.8	514	4.6%	15.0	3.2	2.7	10.5	586.0	13.3	10.5
A78	0.98	C/D	36%	0.27	0.33	0.63	64	1.1%	10.7	264	4.2%	15.0	3.1	1.4	12.2	328.0	11.8	11.8
A39	1.81	C/D	79%	0.64	0.68	0.81	90	3.4%	4.8	375	2.0%	20.0	2.8	2.2	7.0	465.0	12.6	7.0
A40	2.06	C/D	40%	0.30	0.37	0.65	62	2.0%	8.3	245	2.9%	15.0	2.6	1.6	9.9	307.0	11.7	9.9
A79	0.51	C/D	56%	0.43	0.50	0.71	93	2.7%	7.6	95	1.3%	20.0	2.3	0.7	8.3	188.0	11.0	8.3
A41	2.40	C/D	49%	0.37	0.44	0.69	70	3.2%	6.8	550	2.0%	20.0	2.8	3.2	10.1	620.0	13.4	10.1
A42	0.56	C/D	77%	0.62	0.66	0.80	16	2.4%	2.4	415	2.0%	20.0	2.8	2.4	4.8	431.0	12.4	5.0
A43	2.00	C/D	74%	0.59	0.64	0.79	90	2.5%	5.8	453	2.0%	20.0	2.8	2.7	8.4	543.0	13.0	8.4
A44	0.42	C/D	75%	0.60	0.65	0.79	74	0.9%	7.3	137	2.0%	20.0	2.8	0.8	8.1	211.0	11.2	8.1
A45	2.50	C/D	62%	0.48	0.54	0.74	82	6.1%	5.0	748	2.0%	20.0	2.8	4.4	9.4	830.0	14.6	9.4
A46	1.44	C/D	68%	0.54	0.59	0.76	44	0.8%	6.6	470	2.0%	20.0	2.8	2.8	9.4	514.0	12.9	9.4
A80	1.59	C/D	67%	0.53	0.58	0.76	85	0.6%	10.4	328	2.0%	20.0	2.8	1.9	12.4	413.0	12.3	12.3
A47	0.99	C/D	72%	0.57	0.62	0.78	148	3.0%	7.3	169	2.0%	20.0	2.8	1.0	8.3	317.0	11.8	8.3
A48	1.90	C/D	73%	0.58	0.63	0.78	125	2.8%	6.8	372	2.0%	20.0	2.8	2.2	9.0	497.0	12.8	9.0
A49	1.37	C/D	72%	0.58	0.63	0.78	41	3.5%	3.6	414	2.0%	20.0	2.8	2.4	6.0	455.0	12.5	6.0
A50	2.45	C/D	72%	0.57	0.63	0.78	135	5.2%	5.8	370	2.0%	20.0	2.8	2.2	8.0	505.0	12.8	8.0
A74	0.78	C/D	72%	0.57	0.62	0.78	127	3.5%	6.4	215	2.0%	20.0	2.8	1.3	7.7	342.0	11.9	7.7
A51	2.33	C/D	73%	0.58	0.63	0.78	132	3.1%	6.7	710	2.0%	20.0	2.8	4.2	10.9	842.0	14.7	10.9
A75	0.87	C/D	73%	0.58	0.63	0.78	135	4.3%	6.1	245	2.0%	20.0	2.8	1.4	7.5	380.0	12.1	7.5

STANDARD FORM SF-2 **TIME OF CONCENTRATION**

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

SUB-BASIN							INITIAL/OVERLAND			TRAVEL TIME					t _c CHECK			FINAL
DATA							(T _i)			(T _t)					(URBANIZED BASINS)			
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C ₂	C ₅	C ₁₀₀	L (ft)	S _o (%)	t _i (min)	L _t (ft)	S _t (%)	K	VEL. (ft/s)	t _t (min)	COMP. t _c (min)	TOTAL LENGTH (ft)	Urbanized t _c (min)	
A52	1.18	C/D	84%	0.68	0.72	0.83	45	0.3%	7.2	718	1.3%	20.0	2.3	5.2	12.5	763.0	14.2	12.5
A76	0.92	C/D	73%	0.59	0.64	0.79	84	1.5%	6.7	313	2.0%	20.0	2.8	1.8	8.5	397.0	12.2	8.5
A53	2.89	C/D	70%	0.56	0.61	0.77	97	0.3%	12.9	815	2.0%	20.0	2.8	4.8	17.7	912.0	15.1	15.1
A54	0.30	C/D	76%	0.61	0.66	0.80	40	0.2%	8.5	94	2.0%	20.0	2.8	0.6	9.1	134.0	10.7	9.1
A55	1.44	C/D	75%	0.60	0.65	0.79	18	3.7%	2.2	940	2.0%	20.0	2.8	5.5	7.8	958.0	15.3	7.8
A56	2.04	C/D	79%	0.63	0.68	0.81	95	3.9%	4.7	565	2.0%	20.0	2.8	3.3	8.1	660.0	13.7	8.1
A77	0.89	C/D	73%	0.58	0.63	0.78	91	4.7%	4.8	422	2.0%	20.0	2.8	2.5	7.3	513.0	12.9	7.3
A57	1.72	C/D	65%	0.51	0.56	0.75	94	5.0%	5.5	193	4.5%	15.0	3.2	1.0	6.5	287.0	11.6	6.5
A58	2.43	C/D	76%	0.61	0.66	0.80	18	3.7%	2.2	938	2.0%	20.0	2.8	5.5	7.7	956.0	15.3	7.7
A59	0.70	C/D	66%	0.52	0.58	0.75	25	3.2%	3.2	297	2.0%	20.0	2.8	1.8	5.0	322.0	11.8	5.0
A60	1.13	C/D	71%	0.56	0.61	0.77	90	0.6%	9.9	230	2.0%	20.0	2.8	1.4	11.2	320.0	11.8	11.2
A61	2.39	C/D	69%	0.55	0.60	0.77	15	4.0%	2.2	588	2.0%	20.0	2.8	3.5	5.7	603.0	13.4	5.7
A62	0.09	C/D	82%	0.67	0.71	0.82	25	4.0%	2.2	77	2.0%	20.0	2.8	0.5	2.7	102.0	10.6	5.0
A63	2.56	C/D	73%	0.58	0.63	0.78	133	4.2%	6.1	627	2.0%	20.0	2.8	3.7	9.8	760.0	14.2	9.8
A64	2.72	C/D	72%	0.58	0.63	0.78	133	1.6%	8.4	795	2.0%	20.0	2.8	4.7	13.1	928.0	15.2	13.1
A65	1.45	C/D	74%	0.59	0.64	0.79	67	2.6%	4.9	815	2.0%	20.0	2.8	4.8	9.8	882.0	14.9	9.8
A66	0.19	C/D	75%	0.60	0.65	0.79	40	2.4%	3.9	190	2.0%	20.0	2.8	1.1	5.0	230.0	11.3	5.0
A67	0.21	C/D	77%	0.62	0.67	0.80	17	2.8%	2.3	253	2.0%	20.0	2.8	1.5	3.8	270.0	11.5	5.0
A68	0.22	C/D	78%	0.63	0.68	0.81	17	2.8%	2.2	215	2.0%	20.0	2.8	1.3	3.5	232.0	11.3	5.0
A69	2.00	C/D	76%	0.61	0.66	0.80	238	1.0%	12.2	694	2.0%	20.0	2.8	4.1	16.3	932.0	15.2	15.2
A70	11.98	C/D	75%	0.60	0.65	0.79	263	1.8%	10.9	564	1.8%	10.0	1.3	7.0	17.9	827.0	14.6	14.6
A71	1.00	C/D	90%	0.73	0.77	0.85	29	3.3%	2.2	469	2.0%	20.0	2.8	2.8	4.9	498.0	12.8	5.0
A72	11.90	C/D	29%	0.21	0.28	0.61	190	8.9%	10.0	1913	1.0%	15.0	1.5	21.3	31.2	2103.0	21.7	21.7
D1	1.10	C/D	83%	0.67	0.71	0.82	48	2.5%	3.6	1072	2.0%	20.0	2.8	6.3	9.9	1120.0	16.2	9.9
D2	0.32	C/D	83%	0.67	0.71	0.82	38	0.5%	5.4	212	2.0%	20.0	2.8	1.2	6.7	250.0	11.4	6.7
D3	0.59	C/D	82%	0.67	0.71	0.82	38	0.5%	5.5	488	2.0%	20.0	2.8	2.9	8.3	526.0	12.9	8.3
D4	0.49	C/D	90%	0.74	0.77	0.85	44	2.2%	3.0	450	2.0%	20.0	2.8	2.7	5.7	494.0	12.7	5.7
OS1	8.23	C/D	75%	0.60	0.65	0.79	88	3.5%	5.0	1250	4.5%	20.0	4.2	4.9	10.0	1338.0	17.4	10.0
OS2	34.21	C/D	75%	0.60	0.65	0.79	142	2.8%	6.9	2120	4.2%	20.0	4.1	8.6	15.5	2262.0	22.6	15.5

STANDARD FORM SF-2 TIME OF CONCENTRATION

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

SUB-BASIN							INITIAL/OVERLAND			TRAVEL TIME					t _c CHECK			FINAL
DATA							(T _i)			(T _t)					(URBANIZED BASINS)			
BASIN ID	D.A. (ac)	Hydrologic Soils Group	Impervious (%)	C ₂	C ₅	C ₁₀₀	L (ft)	S _o (%)	t _i (min)	L _t (ft)	S _t (%)	K	VEL. (ft/s)	t _t (min)	COMP. t _c (min)	TOTAL LENGTH (ft)	Urbanized t _c (min)	
OS3	12.88	C/D	75%	0.60	0.65	0.79	142	2.6%	7.1	1260	4.0%	20.0	4.0	5.3	12.3	1402.0	17.8	12.3
OS4	9.32	C/D	75%	0.60	0.65	0.79	100	2.5%	6.0	1450	2.0%	20.0	2.8	8.5	14.5	1550.0	18.6	14.5
OS5	11.58	C/D	75%	0.60	0.65	0.79	150	2.6%	7.3	1200	2.0%	20.0	2.8	7.1	14.3	1350.0	17.5	14.3
OS7	14.99	C/D	15%	0.10	0.16	0.55	170	1.8%	18.3	970	2.0%	20.0	2.8	5.7	24.0	1140.0	16.3	16.3
OS6	66.83	C/D	75%	0.61	0.65	0.79	890	2.4%	18.0	1690	1.4%	20.0	2.4	11.9	29.9	2580.0	24.3	24.3

NOTES:

$$t_c = t_i + t_t \quad (5.2)$$

where t_c = time of concentration (minutes)
t_i = initial, inlet, or overland flow time (minutes)
t_t = travel time in the ditch, channel, gutter, storm sewer, etc. (minutes)

$$t_c = \frac{L'}{180} + 10 \quad (5.4)$$

Where t_c = time of concentration (minutes)

L' = length of flow to first design point from the most remote point (feet)

$$t_i = \frac{0.395(1.1 - C_s)\sqrt{L}}{\sqrt{S}}$$

where t_i = initial or overland flow time (minutes)
C_s = runoff coefficient for 5-year frequency
L = length of overland flow, (ft., 500 ft. max.)
S = average basin slope (ft/ft)

$$I = \frac{28.5 P_1}{(10 + T_c)^{0.786}} \quad (5.5)$$

Where:
I = rainfall intensity (inches per hour)
P₁ = one-hour rainfall depth (inches) from Figures RA-1 through RA-6 in USDCM, Volume 1
T_c = time of concentration (minutes).

t_c is lesser of Equation 5.2 and Equation 5.4

For Urbanized basins a minimum t_c of 5.0 minutes is required.

For non-urbanized basins a minimum t_c of 10.0 minutes is required.

$$t_t = \frac{L_t}{60K\sqrt{S_o}} = \frac{L_t}{60V_t}$$

Where:

t_t = channelized flow time (travel time, min)
L_t = waterway length (ft)
S_o = waterway slope (ft/ft)
V_t = travel time velocity (ft/sec) = K√S_o
K = NRCS conveyance factor (see Table 6-2).

Equation 6-4

Table 6-2. NRCS Conveyance factors, K

Type of Land Surface	Conveyance Factor, K
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
E. ADRIATIC PLACE	1	A1	1.14	0.68	8.3	0.77	2.48	1.9					0.0	0	2.8	1.9	0.77	1.0	24	370	3.3	1.8	ON GRADE INLET , CARRY OVER TO DP22 PIPED TO DP 1.1
E. ADRIATIC PLACE	2	A2	2.19	0.40	11.1	0.88	2.22	2.0					0.0	0	2.8	2.0	0.88	1.0	24	280	3.3	1.4	ON GRADE INLET ,CARRY OVER TO DP19 PIPED TO DP 1.1
S. LANGDALE ST	3	A3	0.90	0.57	7.7	0.51	2.55	1.3					0.0	0	2.8	1.3	0.51	1.0	24	280	3.3	1.4	ON GRADE INLET, CARRY OVER TO DP19 PIPED TO DP 1.2
E. ADRIATIC PLACE	1.1								11.1	1.65	2.22	3.7				3.7	1.65	1.0	24	48	5.2	0.2	SUM OF DP 1,2 PIPED TO DP 1.2
E. ADRIATIC PLACE	1.2								11.3	2.16	2.20	4.8				4.8	2.16	1.0	24	405	5.6	1.2	SUM OF DP 1,2 PIPED TO DP 1.3
E. BALTIC PLACE	4	A4	1.56	0.60	7.8	0.93	2.53	2.4					0.0	0	2.0	2.4	0.93	1.0	24	50	2.8	0.3	ON GRADE INLET, CARRY OVER TO DP 5 PIPED TO DP 2.1
E. LANGDALE ST	5	A5	1.23	0.57	7.7	0.70	2.55	1.8	8.1	0.70	2.50	1.8				1.9	0.76	1.0	24	65	4.3	0.3	PIPED TO DP 2.2
E. BALTIC PLACE	6	A6	1.69	0.57	8.5	0.97	2.47	2.4					0.0	0	1.6	2.4	0.97	1.0	24	180	2.5	1.2	ON GRADE INLET, CARRY OVER TO DP 73 PIPED TO DP 2.1
E. BALTIC PLACE	2.1								8.5	1.90	2.46	4.7				4.7	1.90	1.0	24	17	4.7	0.1	SUM OF DP 4,6 PIPED TO DP 2.2
S. LANGDALE ST	2.2								8.7	2.66	2.45	6.5				6.5	2.66	1.0	24	48	5.6	0.1	SUM OF DP 2.1,5 PIPED TO DP 2.3
E. ILIFF PLACE	10	A10	12.97	0.20	15.4	2.61	1.92	5.0								5.0	2.61	1.0	24	236	6.2	0.6	STUB PIPED TO DP 3.1
E. ILIFF PLACE	7	A7	0.42	0.64	5.9	0.27	2.78	0.8					0.0	0	2.5	0.8	0.27	1.0	24	47	5.8	0.1	ON GRADE INLET, CARRY OVER TO DP 13 PIPED TO DP 3.1
E. ILIFF PLACE	3.1								15.6	2.88	1.91	5.5				5.5	2.88	1.0	24	560	3.2	3.0	PIPED TO DP 3.3
E. CASPIAN AVE.	8	A8	0.64	0.57	6.3	0.36	2.72	1.0	11.8	0.78	2.16	1.7				1.7	0.78	1.0	24	17	5.8	0.0	SUMP INLET PIPED TO DP 9
E. CASPIAN AVE.	9	A9	0.63	0.64	6.3	0.41	2.72	1.1	9.2	1.58	2.40	3.8				3.8	1.58	1.0	24	40	4.2	0.2	SUMP INLET PIPED TO CHANNEL HEADWALL
S. MUSCADINE WAY	11	A11	0.88	0.72	8.5	0.63	2.46	1.5								1.5	0.63	1.0	24	90	5.3	0.3	SUMP INLET PIPED TO DP 3.6
S. MUSCADINE WAY	12	A12	1.39	0.57	10.8	0.80	2.24	1.8								1.8	0.80	1.0	24	34	4.0	0.1	SUMP INLET PIPED TO DP 3.6
S. MUSCADINE WAY	3.6								11.0	1.43	2.23	3.2				3.2	1.43	1.0	24	32	4.2	0.1	SUM OF DP 11,12 PIPED TO DP 3.7
E. ILIFF PLACE	13	A13	0.48	0.65	6.3	0.31	2.72	0.8	8.8	0.31	2.43	0.8				0.8	0.31	1.0	24	90	5.1	0.3	SUMP INLET PIPED TO DP 3.4

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1

Location: Aurora

Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1

Project No.: 16146.00

Calculated By: DIG

Checked By: RAB

Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS	
		Basin ID	Area (Ac)	Runoff Coeff.	t _c (min)	C*A (Ac)	γ (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	γ (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)		
S. MUSCADINE WAY	14	A14	1.93	0.37	12.2	0.71	2.13	1.5					0.0	0	0.5		1.5	0.71	1.0	24	50	1.4	0.6	ON GRADE INLET, CARRY OVER TO DP 15
E. BALTIC PLACE	15	A15	1.70	0.57	8.9	0.98	2.42	2.4	12.8	0.98	2.09	2.0					2.0	0.98	1.0	24	73	4.1	0.3	PIPED TO DP 2.6
S. LANGDALE ST	16	A16	0.19	0.64	5.0	0.12	2.90	0.3									0.3	0.12	1.0	24				SUMP INLET
S. LANGDALE ST	73	A73	1.69	0.57	7.8	0.97	2.53	2.5	9.6	0.97	2.35	2.3					2.3	0.97	1.0	24	17	2.5	0.1	PIPED TO DP 3.2
E. BALTIC PLACE	17	A17	0.55	0.60	10.5	0.33	2.27	0.7					0.0	0	2.0		0.7	0.33	1.0	24	50	2.8	0.3	ON GRADE INLET, CARRY OVER TO DP 18
E. BALTIC PLACE	2.3								10.6	2.99	2.26	6.8					6.8	2.99	1.0	24	17	3.3	0.1	PIPED TO DP 2.3
S. LANGDALE ST	3.2								9.7	1.09	2.34	2.6					2.6	1.09	1.0	24	48	6.3	0.1	SUMP INLET
E. ILIFF PLACE	3.3								15.6	3.97	1.91	7.6					7.6	3.97	1.0	24	78	4.7	0.3	SUMP OF DP 16,73
E. ILIFF PLACE	3.4								17.0	4.28	1.83	7.8					7.8	4.28	1.0	24	530	6.5	1.4	PIPED TO DP 3.3
S. MUSCADINE WAY	62	A62	0.09	0.67	5.0	0.06	2.90	0.2					0.0	0	0.7		0.2	0.06	1.0	24	56	6.5	0.1	SUMP OF DP 3.1,3.2
S. MUSCADINE WAY	3.5								17.1	4.34	1.82	7.9					7.9	4.34	1.0	24	56	6.5	0.1	PIPED TO DP 3.4
CHANNEL	3.7								17.4	5.77	1.81	10.4					10.4	5.77	1.0	24	25	2.0	0.2	SUMP OF DP 3.3,13
S. LITTLE RIVER ST	18	A18	1.85	0.57	9.0	1.05	2.41	2.5	10.8	1.05	2.25	2.4					10.8	1.05	1.0	24	56	6.5	0.1	PIPED TO DP 3.5
E. BALTIC PLACE	2.4								10.9	4.04	2.24	9.0					9.0	4.04	1.0	24	50	1.7	0.5	ON GRADE INLET, CARRY OVER TO DP 13
E. BALTIC PLACE	2.5								11.5	5.02	2.19	11.0					11.0	5.02	1.0	24	25	2.0	0.2	PIPED TO DP 3.5
E. BALTIC PLACE	2.6								12.5	5.73	2.11	12.1					12.1	5.73	1.0	24	109	6.5	0.3	SUMP OF DP 3.4,62
E. ADRIATIC PLACE	19	A19	0.44	0.62	6.8	0.27	2.65	0.7	9.8	0.27	2.33	0.6					9.8	0.27	1.0	24	34	7.0	0.1	PIPED TO DP 3.7
S. LITTLE RIVER ST	20	A20	0.33	0.56	8.0	0.19	2.52	0.5					0.0	0	2.5		0.5	0.19	1.0	24	109	6.5	0.3	SUMP OF DP 3.5,6
E. ADRIATIC PLACE	21	A21	0.20	0.65	5.0	0.13	2.90	0.4					0.0	0	2.5		0.4	0.13	1.0	24	34	7.0	0.1	PIPED TO CHANNEL HEADWALL
																					17	4.6	0.1	SUMP INLET
																					17	4.6	0.1	PIPED TO DP 2.4
																					246	6.8	0.6	SUMP OF DP 2.3, 18
																					56	7.1	0.1	PIPED TO DP 2.5
																					662	7.3	1.5	SUMP OF DP 2.4, 15
																					17	3.1	0.1	PIPED TO DP 2.6
																					17	2.7	0.1	SUMP OF DP 2.5, 14
																					350	3.2	1.8	ON GRADE INLET, CARRY OVER TO DP 24
																					65	2.7	0.4	PIPED TO DP 1.5
																					350	3.2	1.8	ON GRADE INLET, CARRY OVER TO DP 24
																					17	2.7	0.1	PIPED TO DP 1.5

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t _c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
E. ADRIATIC PLACE	1.5								9.9	0.40	2.33	0.9				0.9	0.40	1.0	24	45	3.5	0.2	SUM OF DP 19,21 PIPED TO DP 1.6
S. LITTLE RIVER ST	1.6								10.1	0.59	2.31	1.4				1.4	0.59	1.0	24	359	3.9	1.6	SUM OF DP 1.5,20 PIPED TO DP 1.7
SCHOOL	25	A25	17.12	0.40	16.4	6.80	1.86	12.6								12.6	6.80	1.0	24	48	7.4	0.1	STUB PIPED TO DP 22.1
S. LANGDALE ST	22	A22	0.41	0.63	5.2	0.26	2.87	0.7	10.1	0.26	2.30	0.6											SUMP INLET
S. LANGDALE ST	22.1								16.4	7.06	1.86	13.1				13.1	7.06	1.0	24	17	7.4	0.0	PIPED TO DP 1.3
E. PACIFIC WAY	23	A23	0.69	0.60	9.4	0.41	2.37	1.0					0.0	0	2.2	1.0	0.41	1.0	24	558	3.0	3.1	ON GRADE INLET, CARRY OVER TO DP55 PIPED TO DP 1.4
S. LITTLE RIVER ST	24	A24	1.74	0.57	8.3	0.99	2.48	2.5	8.3	0.99	2.48	2.5	0.8	0.3	2.2	1.7	0.69	1.0	24	558	3.0	3.1	ON GRADE INLET, CARRY OVER TO DP55 PIPED TO DP 1.7
S. LITTLE RIVER ST	1.7								11.7	1.28	2.18	2.8				2.8	1.28	1.0	24	46	4.8	0.2	SUM OF DP 1.6, 24 PIPED TO DP 1.8
S. LANGDALE ST	1.3								16.4	9.22	1.86	17.1				17.1	9.22	1.0	24	236	7.9	0.5	SUM OF DP 1.2, 22.1 PIPED TO DP 1.4
E. PACIFIC AVE	26	A26	0.32	0.62	11.7	0.20	2.17	0.4					0.0	0	2.2	0.4	0.20	1.0	24	50	3.0	0.3	ON GRADE INLET, CARRY OVER TO DP27 PIPED TO DP 1.4
E. PACIFIC AVE	1.4								16.9	9.83	1.83	18.0				18.0	9.83	1.0	24	48	8.0	0.1	SUM OF DP 1.3,23,26 PIPED TO DP 1.8
S. LITTLE RIVER ST	27	A27	0.47	0.57	6.1	0.27	2.75	0.7	12.0	0.27	2.15	0.6	0.0	0	1.5	0.6	0.27	1.0	24	850	2.4	5.8	ON GRADE INLET, CARRY OVER TO DP 51 PIPED TO DP 1.8
S. LITTLE RIVER ST	1.8								17.0	11.38	1.83	20.8				20.8	11.38	1.0	24	63	2.9	0.4	SUM OF DP 1.7, 27, 1.4 PIPED TO DP 1.9
S. LANGDALE ST	28	A28	0.27	0.61	5.0	0.17	2.90	0.5															BASIN 28 TO INLET AT DP 32
S. LANGDALE ST	29	A29	0.60	0.38	12.0	0.23	2.15	0.5								0.5	0.23	1.0	24	17	2.8	0.1	SUMP INLET PIPED TO DP 5.1
S. LITTLE RIVER ST	30	A30	2.12	0.57	10.9	1.20	2.23	2.7					0.0	0	2.2	2.7	1.20	1.0	24	270	3.0	1.5	ON GRADE INLET, CARRY OVER TO DP 49 PIPED TO DP 5.3
E. ASHBURY PLACE	31	A31	0.19	0.60	5.0	0.11	2.90	0.3					0.0	0	2.2	0.3	0.11	1.0	24	62	4.8	0.2	ON GRADE INLET, CARRY OVER TO DP 49 PIPED TO DP 5.3
S. LANGDALE ST	32	A32	1.17	0.58	8.3	0.67	2.49	1.7	11.6	0.84	2.18	1.8				1.8	0.84	1.0	24	65	2.5	0.4	SUMP INLET PIPED TO DP 5.1
S. LANGDALE ST	5.1								12.1	1.07	2.14	2.3				2.3	1.07	1.0	24	17	4.3	0.1	SUM OF DP 28, 29, 32 PIPED TO DP 5.2

STANDARD FORM SF-3

STORM DRAINAGE SYSTEM DESIGN

(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1

Location: Aurora

Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1

Project No.: 16146.00

Calculated By: DIG

Checked By: RAB

Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS		
		Basin ID	Area (Ac)	Runoff Coeff.	t _c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)			
E. ASHBURY ST	33	A33	1.41	0.64	9.9	0.90	2.33	2.1					0.0	0	3.0		2.1	0.90	1.0	24	350	3.5	1.7	ON GRADE INLET, CARRY OVER TO DP32	
E. ASHBURY ST	5.2								12.5	1.97	2.11	4.2				4.2	1.97	1.0	24	338	4.4	1.3	PIPED TO DP 5.2		
E. ASHBURY ST	31.1																							SUM OF DP 5.1,33	
E. ASHBURY ST	5.3								12.8	2.08	2.09	4.3				4.3	2.08	1.0	24	112	5.5	0.3	PIPED TO DP 5.3		
E. ASHBURY ST	31.1								12.8	2.08	2.09	4.3				4.3	2.08	1.0	24	48	5.5	0.1	SUM OF DP 31, 5.2		
E. ASHBURY ST	5.3								13.0	3.28	2.08	6.8				6.8	3.28	1.0	24	PIPED TO DP 5.3				SUM OF DP 5.2,30,31	
E. KEWAUNEE ST	34	A34	0.73	0.60	6.6	0.44	2.68	1.2								1.2	0.44	1.0	24	212	6.2	0.6	PIPED TO DP 5.4		
E. KEWAUNEE ST	81	A81	0.35	0.56	5.5	0.20	2.83	0.6								0.6	0.20	1.0	24	78	3.8	0.3	ON GRADE INLET, CARRY OVER TO 41		
E. KEWAUNEE ST	34.1								8.3	0.64	2.48	1.6				1.6	0.64	1.0	24	505	3.0	2.8	RUNOFF TO POND C		
HARVEST CROSSING	81.1							33.0																ON-GRADE INLET, CARRY OVER TO DP 34	
HARVEST CROSSING	34.2							24.9																PIPED TO 34.1	
E. KEWAUNEE ST	34.3											57.9								145	4.1	0.6		PIPED TO HARVEST CROSSING POND C	
HARVEST CROSSING	81.1																							HARVEST CROSSING POND B RELEASE	
HARVEST CROSSING	34.2																							HARVEST CROSSING POND C RELEASE	
E. KEWAUNEE ST	34.3												57.9												HARVEST CROSSING POND C&B RELEASE
S. KELLERMAN ST	35	A35	1.71	0.55	9.1	0.93	2.40	2.2					0.0	0	2.6		2.2	0.93	1.0	24	390	3.2	2.0	ON GRADE INLET, CARRY OVER TO DP 39	
E. ASHBURY ST	36	A36	1.05	0.63	7.2	0.66	2.60	1.7					0.0	0	2.2		1.7	0.66		24	372	4.5	1.4	PIPED TO DP 6.1	
E. ASHBURY ST	36	A36	1.05	0.63	7.2	0.66	2.60	1.7					0.0	0	2.2		1.7	0.66		24	480	3.0	2.7	ON GRADE INLET, CARRY OVER TO DP 43	
E. ATLANTIC AVE	37	A37	1.13	0.60	6.7	0.67	2.67	1.8					0.0	0	2.0		1.8	0.67			210	2.8	1.2	PIPED TO DP 36.1	
E. ATLANTIC AVE	37	A37	1.13	0.60	6.7	0.67	2.67	1.8					0.0	0	2.0		1.8	0.67						ON GRADE INLET, CARRY OVER TO DP 43	
OPEN SPACE	38	A38	2.65	0.40	10.5	1.05	2.28	2.4								2.4	1.05	1.0	24	PIPED TO DP 37.1				PIPED TO DP 37.1	
OPEN SPACE	38	A38	2.65	0.40	10.5	1.05	2.28	2.4								2.4	1.05	1.0	24	42	4.7	0.1	PARK INLETS		
E. ASHBURY PLACE	36.1								10.5	1.71	2.28	3.9				3.9	1.71	1.0	24					PIPED TO DP 36.1	
E. ASHBURY PLACE	36.1								10.5	1.71	2.28	3.9				3.9	1.71	1.0	24	17	5.3	0.1		PIPED TO DP 5.4	
E. ATLANTIC AVE	39	A39	1.81	0.64	7.0	1.15	2.64	3.0	11.1	1.15	2.22	2.6	0.0	0	2.8		2.6	1.15	1.0	24	410	3.3	2.0	ON GRADE INLET, CARRY OVER TO DP 42	
E. ATLANTIC AVE	39	A39	1.81	0.64	7.0	1.15	2.64	3.0	11.1	1.15	2.22	2.6	0.0	0	2.8		2.6	1.15	1.0	24	17	4.7	0.1	PIPED TO DP 6.1	
OPEN SPACE	78	A78	0.98	0.27	11.8	0.26	2.16	0.6								0.6	0.26							PARK INLETS	
OPEN SPACE	78	A78	0.98	0.27	11.8	0.26	2.16	0.6								0.6	0.26							PIPED TO DP 37.1	
E. ATLANTIC AVE	37.1								11.8	0.93	2.16	2.0					2.0	0.93	1.0	24	17	4.3	0.1		PIPED TO DP 6.1
E. ATLANTIC AVE	6.1								11.9	3.01	2.16	6.5					6.5	3.01	1.0	24	412	6.2	1.1		SUM OF DP 35,36,39,78
E. ATLANTIC AVE	6.1								11.9	3.01	2.16	6.5					6.5	3.01	1.0	24					PIPED TO DP 6.2

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
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Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t _c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t _{tc} (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
OPEN SPACE	40	A40	2.06	0.30	9.9	0.62	2.32	1.4								1.4	0.62	1.0	24	415	3.9	1.8	STUB PIPED TO DP 6.3
E. JEWELL AVE	34.4								11.7	0.62	2.17	59.2				59.2	0.62	1.0	24	342	18.9	0.3	SUM OF HC PONDS AND DP 40 PIPED TO DP 6.3
E. JEWELL AVE	41	A41	2.40	0.37	10.1	0.90	2.31	2.1					0.0	0	2.0	2.1	0.90			95	2.8	0.6	ON GRADE INLET, CARRY OVER TO DP 42 PIPED TO DP 41.1
OPEN SPACE	79	A79	0.51	0.43	8.3	0.22	2.49	0.5								0.5	0.22	1.0	24	50	2.9	0.3	TYPE C INLET PIPED TO DP 41.1
E. JEWELL AVE	41.1								10.1	1.12	2.31	2.6				2.6	1.12	1.0	24	44	4.7	0.2	PIPED TO DP 6.3
S. LANGDALE COURT	42	A42	0.56	0.62	5.0	0.34	2.90	1.0	13.1	0.34	2.06	0.7				0.7	0.34	1.0	24	25	3.1	0.1	SUMP INLET PIPED TO DP 6.2
E. ASHBURY PLACE	43	A43	2.00	0.59	8.4	1.19	2.47	2.9	9.9	1.19	2.32	2.8				2.8	1.19	1.0	24	17	4.8	0.1	SUMP INLET PIPED TO DP 5.5
S. LANGDALE COURT	44	A44	0.42	0.60	8.1	0.25	2.50	0.6								0.6	0.25	1.0	24	25	3.1	0.1	SUMP INLET PIPED TO DP 6.2
S. LANGDALE COURT	6.2								13.3	3.60	2.06	7.4				7.4	3.60	1.0	24	80	6.4	0.2	SUM OF DP 6.1,42,44 PIPED TO DP 6.4
POND C DISCHARGE																							
E. JEWELL AVE	6.3								12.0	1.74	2.15	3.7				3.7	1.74	1.0	24	103	5.3	0.3	SUM OF DP 40,41.1 PIPED TO DP 6.4
E. JEWELL AVE	6.4								13.5	5.34	2.04	10.9				10.9	5.34	1.0	24	890	7.1	2.1	SUM OF DP 6.2,6.3 PIPED TO DP 80.2
E. JEWELL AVE	45	A45	2.50	0.48	9.4	1.21	2.37	2.9					0.0	0	1.0	2.9	1.21	1.0	24	100	2.0	0.8	ON GRADE INLET, CARRY OVER TO DP 53
E. ATLANTIC AVE	46	A46	1.44	0.54	9.4	0.77	2.38	1.8					0.0	0	1.0	1.8	0.77	1.0	24	44	4.8	0.2	PIPED TO DP 6.5
E. ASHBURY PLACE	47	A47	0.99	0.57	8.3	0.57	2.48	1.4	13.6	0.57	2.03	1.2				1.2	0.57	1.0	24	220	2.0	1.8	ON GRADE INLET, carry over to dp 80
S. LITTLE RIVER COURT	48	A48	1.90	0.58	9.0	1.10	2.41	2.7								1.8	0.77	1.0	24	17	4.3	0.1	PIPED TO DP 5.7
S. LITTLE RIVER COURT	74	A74	0.78	0.57	7.7	0.45	2.55	1.1								1.2	0.57	1.0	24	17	3.7	0.1	SUMP INLET PIPED TO DP 5.5
E. ASHBURY PLACE	49	A49	1.37	0.58	6.0	0.79	2.75	2.2								1.2	0.57	1.0	24	17	4.7	0.1	SUMP INLET PIPED TO DP 5.6
E. ASHBURY PLACE	5.4								8.9	0.45	2.42	1.1				1.1	0.45	1.0	24	17	3.7	0.1	SUMP INLET PIPED TO DP 5.6
E. ASHBURY PLACE	49	A49	1.37	0.58	6.0	0.79	2.75	2.2	12.5	0.79	2.11	1.7	0.0	0	2.2	1.7	0.79	1.0	24	210	3.0	1.2	ON GRADE INLET, CARRY OVER TO DP 47
E. ASHBURY PLACE	5.4								12.5	0.79	2.11	1.7				1.7	0.79	1.0	24	17	4.2	0.1	PIPED TO DP 5.4
E. ASHBURY PLACE	5.4								13.5	5.78	2.04	11.8				11.8	5.78	1.0	24	205	7.2	0.5	SUM OF DP 5.3,38,36,49 PIPED TO DP 5.5

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t _c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
E. ASHBURY PLACE	5.5								14.0	7.54	2.01	15.2				15.2	7.54	1.0	24	378	7.7	0.8	SUM OF DP 5.4,43,47 PIPED TO DP 5.6
S. LITTLE RIVER COURT	50	A50	2.45	0.57	8.0	1.41	2.52	3.6					0.0	0	2.0	3.6	1.41	1.0	24	160	2.8	0.9	ON GRADE INLET , CARRY OVER TO DP 74
S. LITTLE RIVER COURT	5.6								9.0	2.96	2.41	7.1				7.1	2.96	1.0	24	192	5.2	0.6	PIPED TO DP 5.6
E. ATLANTIC AVE	5.7								14.8	11.27	1.95	22.0				22.0	11.27	1.0	24	98	6.3	0.3	SUM OF DP 50, 48,74 PIPED TO DP 5.7
S. MILLBROOK COURT	51	A51	2.33	0.58	10.9	1.35	2.24	3.0	17.8	1.35	1.79	2.4	0.0	0	2.2	2.4	1.35	1.0	24	225	8.2	0.5	SUM OF DP 5.5,5.6,46 PIPED TO DP 5.8
S. MILLBROOK COURT	76	A76	0.92	0.59	8.5	0.54	2.46	1.3					0.0	0	2.2	1.3	0.54	1.0	24	210	3.0	1.2	ON GRADE INLET, CARRY OVER TO DP 75
S. MILLBROOK COURT	5.8								17.8	2.34	1.79	4.2				4.2	2.34	1.0	24	17	4.6	0.1	PIPED TO DP 5.8
S. MILLBROOK COURT	52	A52	1.18	0.68	12.5	0.80	2.11	1.7												210	3.0	1.2	ON GRADE INLET, CARRY OVER TO DP 80
E. ATLANTIC AVE	75	A75	0.87	0.58	7.5	0.50	2.57	1.3	19.0	0.50	1.73	0.9				0.9	0.50	1.0	24	17	3.9	0.1	PIPED TO DP 5.8
E. ATLANTIC AVE	80	A80	1.59	0.53	12.3	0.84	2.13	1.8	12.5	1.64	2.11	3.5				3.5	1.64			305	5.4	0.9	SUM OF DP 51,76 PIPED TO DP 5.9
E. ATLANTIC AVE	5.9								19.0	14.11	1.73	24.4				24.4	14.11	1.0	24				STREET FLOW TO DP 80
OPEN SPACE	80.1								19.1	15.75	1.73	27.2				27.2	15.75	1.0	24	17	3.4	0.1	SUMP INLET
E. JEWELL AVE	80.2								19.5	21.09	1.71	36.1				36.1	21.09	1.0	24				PIPED TO DP 5.9
E. JEWELL AVE	6.5								19.9	22.30	1.69	37.7				37.7	22.30	1.0	24	17	7.8	0.0	SUMP INLET
S. MUSCADINE WAY	53	A53	2.89	0.56	15.1	1.62	1.94	3.1	12.5	1.64	2.11	3.5				3.5	1.64						PIPED TP DP 80.1
E. PACIFIC AVE	54	A54	0.30	0.61	9.1	0.18	2.40	0.4	19.0	14.11	1.73	24.4				24.4	14.11	1.0	24	17	7.8	0.0	SUM OF DP 5.7,5.8,75 PIPED TO DP 80.1
E. PACIFIC AVE	55	A55	1.44	0.60	7.8	0.87	2.54	2.2	12.5	1.17	2.11	2.5				1.2	0.42	1.0	24	232	8.7	0.4	PIPED TO DP 80.2
E. PACIFIC AVE	1.9								18.1	11.80	1.77	20.9				20.9	11.80	1.0	24	232	11.5	0.3	PIPED TO DP 6.5
E. PACIFIC AVE	56	A56	2.04	0.63	8.1	1.29	2.51	3.2	13.1	1.74	2.06	3.6				2.2	1.74	1.0	24	181	12.0	0.3	SUM OF DP 6.4,45 PIPED TO DP 6.7
													1.3	0.45	2.2	0.4	0.18	1.0	24	57	5.0	0.2	SUMP INLET
																0.4	0.18	1.0	24	17	2.6	0.1	PIPED TO DP 6.6
																1.2	0.42	1.0	24	110	3.0	0.6	SUMP INLET
																1.3	0.45	2.2		17	3.7	0.1	PIPED TO DP 4.1
																				17	3.7	0.1	ON GRADE INLET , CARRY OVER TO DP56
																				105	8.2	0.2	PIPED TO DP 1.9
																							SUM OF DP 1.8, 55 PIPED TO DP 4.1
																							SUMP INLET
																							PIPED TO DP 4.1

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
E. PACIFIC AVE	4.1								18.3	13.72	1.76	24.1				24.1	13.72	1.0	24	107	8.1	0.2	SUM OF DP 54,56 PIPED TO DP 4.3
OPEN SPACE	57	A57	1.72	0.51	6.5	0.88	2.69	2.4								2.4	0.88	1.0	24	92	4.6	0.3	AREA INLET PIPED TO DP 77.1
S. MUSCADINE WAY	58	A58	2.43	0.61	7.7	1.49	2.55	3.8					0.0	0	1.5	3.8	1.49	1.0	24	295	2.4	2.0	ON GRADE INLET, CARRY OVER TO DP 56 PIPED TO DP 4.2
S. MUSCADINE WAY	59	A59	0.70	0.52	5.0	0.36	2.90	1.0					0.0	0	1.5	1.0	0.36	1.0	24	295	2.4	2.0	ON GRADE INLET, CARRY OVER TO DP60 PIPED TO DP 4.2
ALLEY	77	A77	0.89	0.58	7.3	0.52	2.60	1.4					0.0	0	2.2	1.4	0.52			230	3.5	1.1	TYPE C INLET, CARRY OVER TO DP 56 PIPED TO DP 58.1
ALLEY	77.1								7.3	1.40	2.60	3.6				3.6	1.40	1.0	24	155	5.2	0.5	PIPED TO DP 58.1
S. MUSCADINE WAY	58.1								7.8	2.89	2.54	7.3				7.3	2.89	1.0	24	28	6.4	0.1	PIPED TO DP 4.2
S. MUSCADINE WAY	4.2								7.9	3.25	2.53	8.2				8.2	3.25	1.0	24	228	6.6	0.6	SUM OF DP 57,58,59,77 PIPED TO DP 4.3
S. MUSCADINE WAY	4.3								18.5	16.97	1.75	29.7				29.7	16.97	1.0	24	102	9.5	0.2	SUM OF DP 4.1,4.2 PIPED TO DP 4.4
E. PACIFIC WAY	60	A60	1.13	0.56	11.2	0.64	2.21	1.4	11.2	0.64	2.21	1.4				1.4	0.64	1.0	24	17	4.0	0.1	SUMP INLET PIPED TO DP 4.4
S. NEWBERRY WAY	61	A61	2.39	0.55	5.7	1.31	2.81	3.7								3.7	1.31	1.0	24	17	5.2	0.1	SUMP INLET PIPED TO DP 2.7
S. NEWBERRY WAY	63	A63	2.56	0.58	9.8	1.49	2.34	3.5								3.5	1.49	1.0	24	17	5.1	0.1	SUMP INLET PIPED TO DP 2.7
S. NEWBERRY WAY	2.7								14.0	8.53	2.01	17.1				17.1	8.53	1.0	24	55	7.9	0.1	SUM OF DP 61, 63, 2.6 PIPED TO DP
S. NEWCASTLE WAY	64	A64	2.72	0.58	13.1	1.57	2.07	3.2					0.0	0	1.0	3.2	1.57	1.0	24	80	2.0	0.7	ON GRADE INLET, CARRY OVER TO DP 66 PIPED TO DP 4.7
S. NEWCASTLE WAY	65	A65	1.45	0.59	9.8	0.86	2.34	2.0					0.0	0	1.0	2.0	0.86	1.0	24	80	2.0	0.7	ON GRADE INLET PIPED TO DP 4.7
S. NEWCASTLE WAY	4.7								1.6	2.43	3.55	8.6				8.6	2.43	1.0	24	60	6.7	0.1	SUM OF DP 64,65 PIPED TO DP 4.8
E. PACIFIC AVE	66	A66	0.19	0.60	5.0	0.11	2.90	0.3	13.7	0.11	2.02	0.2				0.2	0.11	1.0	24	17	2.3	0.1	SUMP INLET PIPED TO DP 4.6
E. PACIFIC WAY	67	A67	0.21	0.62	5.0	0.13	2.90	0.4								0.4	0.13	1.0	24	17	2.7	0.1	SUMP INLET PIPED TO DP 4.6
E. PACIFIC WAY	68	A68	0.22	0.63	5.0	0.14	2.90	0.4								0.4	0.14	1.0	24	17	2.7	0.1	SUMP INLET PIPED TO DP 4.4

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	\bar{I} (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	\bar{I} (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
E. PACIFIC WAY	4.4								18.7	17.75	1.74	30.9				30.9	17.75	1.0	24	240	9.8	0.4	SUM OF DP 4.3,60,68 PIPED TO DP 4.5
E. PACIFIC WAY	4.5								19.1	26.28	1.73	45.5				45.5	26.28	1.0	24	209	14.5	0.2	SUM OF DP 4.4,2.7 PIPED TO DP 4.6
E. PACIFIC WAY	4.6								19.3	26.52	1.71	45.3				45.3	26.52	1.0	24	75	14.4	0.1	SUM OF DP 66,67, DP 4.5 PIPED TO DP 4.8
E. PACIFIC WAY	4.8								19.4	28.95	1.71	49.5				49.5	28.95	1.0	24	185	15.8	0.2	SUM OF DP 4.6,4.7 PIPED TO CHANNEL
S. MUSCADINE WAY	69	A69	2.00	0.61	15.2	1.23	1.93	2.4								2.4	1.23	1.0	24	24	4.6	0.1	SUMP INLET PIPED TO DP 6.6
E. JEWELL AVE	6.6								15.3	2.85	1.93	5.5				5.5	2.85	1.0	24	80	5.8	0.2	SUM OF DP 53,69 PIPED TO DP 6.7
E. JEWELL AVE	6.7								20.1	25.15	1.68	42.3				42.3	25.15	1.0	24	558	13.5	0.7	SUM OF DP 6.5,6.6 PIPED TO DP 6.8
OPEN SPACE	70	A70	11.98	0.60	14.6	7.20	1.97	14.2								14.2	7.20	1.0	24	84	7.6	0.2	STUB PIPED TO DP 6.9
E. JEWELL AVE	71	A71	1.00	0.73	5.0	0.73	2.90	2.1					0.0	0	1.0	2.1	0.73	1.0	24	44	4.4	0.2	ON GRADE INLET PIPED TO DP 6.8
E. JEWELL AVE	6.8								20.8	25.88	1.65	42.7				42.7	25.88	1.0	24	43	13.6	0.1	SUM OF DP 6.7,71 PIPED TO DP 6.9
E. JEWELL AVE	6.9								20.9	33.08	1.65	54.6				54.6	33.08	1.0	24	203	17.4	0.2	SUM OF DP 6.8,70 PIPED TO CULVERT
CHANNEL	72	A72	11.90	0.21	21.7	2.50	1.61	4.0															PIPED THROUGH CHANNEL
E. WARREN AVE	D1	D1	1.10	0.82	9.9	0.90	2.32	2.1					0.3	0.12	1.0	1.8	0.78	1.0	24	280	2.0	2.3	ON GRADE INLET, CARRY OVER TO DP D2 PIPED TO DP 7.1
E. WARREN AVE	D2	D2	0.32	0.82	6.7	0.26	2.67	0.7	12.2	0.38	2.13	0.8	0.3	0.1	1.8	0.5	0.16	1.0	24	550	2.7	3.4	ON GRADE INLET, CARRY OVER TO DP D3 PIPED TO DP 7.2
E. CASPIAN AVE	D4	D4	0.49	0.85	5.7	0.42	2.81	1.2					0.1	0.03	1.0	1.1	0.39	1.0	24	420	2.0	3.5	ON GRADE INLET, CARRY OVER TO DP 9 PIPED TO DP 7.6
E. CASPIAN AVE	D3	D3	0.59	0.82	8.3	0.48	2.48	1.2	15.7	0.51	1.90	1.0	0.2	0.09	1.0	0.8	0.42	1.0	24	420	2.0	3.5	ON GRADE INLET, CARRY OVER TO DP 8 PIPED TO DP 7.6
FUTURE FILING	OS1	OS1	8.23	0.79	10.0	6.51	2.32	15.1	10.0	6.67	2.32	15.5				11.5	6.51	1.0	24	310	7.2	0.7	OFFSITE BASIN PIPED TO DP 7.5
E. WARREN AVE	7.1								11.1	7.29	2.22	16.2				11.0	7.29	1.0	24	245	7.1	0.6	SUM OF DP OS1,D1 PIPED TO DP 7.2
FUTURE FILING	OS2	OS2	34.21	0.79	15.5	27.06	1.91	51.7	15.8	62.38	1.90	118.5				49.1	27.06	1.0	24	25	15.6	0.0	SUM OF DP 7.5 AND OS2 PIPED TO DP 7.6

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 2-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (Ac)	Runoff Coeff.	t_c (min)	C*A (Ac)	I (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	I (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
E. WARREN AVE	7.2								11.7	7.44	2.17	16.2				16.2	7.44	1.0	24	48	7.8	0.1	SUM OF DP D2, 7.1 PIPED TO DP 7.3
E. CASPIAN AVE	7.3								15.5	34.50	1.91	65.9				65.9	34.50	1.0	24	48	21.0	0.0	SUM OF DP D2, 7.1 PIPED TO DP 7.3
E. CASPIAN AVE	7.4								15.8	35.32	1.90	67.1				67.1	35.32	1.0	24	65	21.4	0.1	SUM OF DP 7.3, D3, D4 PIPED TO DP OS2
FUTURE FILING	OS3	OS3	12.88	0.79	12.3	10.19	2.12	21.6	12.3	10.19	2.12	21.6											SUM OF DP 7.6 AND OS3 PIPED TO POND D
E. WARREN AVE	7.5								15.8	45.51	1.89	86.0				86.0	45.51	1.0	24	230	27.4	0.1	SUM OF DP 7.4, OS3 PIPED TO DP 7.6
FUTURE FILING	OS7	OS7	14.99	0.10	16.3	1.48	1.87	2.8								2.8	1.48	1.0	24	112	4.8	0.4	OFFSITE BASIN PIPED TO DP 7.6
FUTURE FILING	7.6								16.3	46.99	1.87	87.9				87.9	46.99	1.0	24	295	28.0	0.2	PIPED TO CHANNEL
FUTURE FILING	OS4	OS4	9.32	0.60	14.5	5.60	1.97	11.0								11.0	5.60	1.0	24	122	7.1	0.3	OFFSITE BASIN PIPED TO DP 7.7
FUTURE FILING	OS5	OS5	11.58	0.60	14.3	6.96	1.99	13.9								13.9	6.96	1.0	24	211	7.6	0.5	OFFSITE BASIN PIPED TO DP 7.7
E. CASPIAN AVE	7.7								14.8	12.56	1.95	24.5				24.5	12.56	1.0	24	170	7.8	0.4	SUM OF DP OS4, OS5 PIPED TO CHANNEL
PARKLANDS	OS6	OS6	66.83	0.61	24.3	40.43	1.51	61.0															OFFSITE BASIN PIPED TO REGIONAL POND C

Notes:
Street and Pipe C*A values are determined by Q/i using the catchment's intensity value.

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	γ (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	γ (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
E. ADRIATIC PLACE	1	A1	1.14	0.82	8.3	0.94	7.17	6.7					1.8	0.26	2.8	4.9	0.68	1.0	24	370 17	3.3 5.7	1.8 0.1	ON GRADE INLET , CARRY OVER TO DP22 PIPED TO DP 1.1
E. ADRIATIC PLACE	2	A2	2.19	0.70	11.1	1.53	6.41	9.8					2.9	0.45	2.8	6.9	1.08	1.0	24	280 17	3.3 6.3	1.4 0.0	ON GRADE INLET ,CARRY OVER TO DP19 PIPED TO DP 1.1
S. LANGDALE ST	3	A3	0.90	0.78	7.7	0.70	7.35	5.1					2.4	0.33	2.8	2.7	0.37	1.0	24	280 63	3.3 4.8	1.4 0.2	ON GRADE INLET ,CARRY OVER TO DP19 PIPED TO DP 1.2
E. ADRIATIC PLACE	1.1								11.1	1.76	6.40	11.3				11.3	1.76	1.0	24	48	7.2	0.1	SUM OF DP 1,2 PIPED TO DP 1.2
E. ADRIATIC PLACE	1.2								11.2	2.13	6.38	13.6				13.6	2.13	1.0	24	405	7.5	0.9	SUM OF DP 1,2 PIPED TO DP 1.3
E. BALTIC PLACE	4	A4	1.56	0.79	7.8	1.23	7.31	9.0					3.0	0.41	2.0	6.0	0.82	1.0	24	50 17	2.8 6.0	0.3 0.0	ON GRADE INLET, CARRY OVER TO DP 5 PIPED TO DP 2.1
E. LANGDALE ST	5	A5	1.23	0.78	7.7	0.95	7.37	7.0	8.1	1.36	7.21	9.8				6.4	0.89	1.0	24	65	6.2	0.2	SUMP INLET PIPED TO DP 2.2
E. BALTIC PLACE	6	A6	1.69	0.78	8.5	1.31	7.12	9.3					3.2	0.45	1.6	6.1	0.86	1.0	24	180 17	2.5 6.1	1.2 0.0	ON GRADE INLET, CARRY OVER TO DP 73 PIPED TO DP 2.1
E. BALTIC PLACE	2.1								8.5	1.68	7.10	11.9				11.9	1.68	1.0	24	48	7.3	0.1	SUM OF DP 4,6 PIPED TO DP 2.2
S. LANGDALE ST	2.2								8.6	2.57	7.07	18.1				18.1	2.57	1.0	24	236	8.0	0.5	SUM OF DP 2.1,5 PIPED TO DP 2.3
E. ILIFF PLACE	10	A10	12.97	0.60	15.4	7.78	5.53	43.0								43.0	7.78	1.0	24	47	13.7	0.1	STUB PIPED TO DP 3.1
E. ILIFF PLACE	7	A7	0.42	0.81	5.9	0.34	8.01	2.7					1.0	0.13	2.5	1.7	0.21	1.0	24	560 17	3.2 4.1	3.0 0.1	ON GRADE INLET, CARRY OVER TO DP 13 PIPED TO DP 3.1
E. ILIFF PLACE	3.1								15.5	7.99	5.52	44.1				44.1	7.99	1.0	24	17	14.1	0.0	PIPED TO DP 3.3
E. CASPIAN AVE.	8	A8	0.64	0.78	6.3	0.50	7.84	3.9	19.2	0.81	4.97	4.0				2.6	0.81	1.0	24	40	4.8	0.1	SUMP INLET PIPED TO DP 9
E. CASPIAN AVE.	9	A9	0.63	0.81	6.3	0.51	7.86	4.0	9.2	1.49	6.91	10.3				4.6	1.49	1.0	24	90	5.6	0.3	SUMP INLET PIPED TO CHANNEL HEADWALL
S. MUSCADINE WAY	11	A11	0.88	0.85	8.5	0.74	7.10	5.3								5.3	0.74	1.0	24	34	5.8	0.1	SUMP INLET PIPED TO DP 3.6
S. MUSCADINE WAY	12	A12	1.39	0.78	10.8	1.08	6.47	7.0								7.0	1.08	1.0	24	32	6.3	0.1	SUMP INLET PIPED TO DP 3.6
S. MUSCADINE WAY	3.6								10.9	1.82	6.45	11.7				11.7	1.82	1.0	24	90	7.2	0.2	SUM OF DP 11,12 PIPED TO DP 3.7
																							SUMP INLET

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t _c (min)	C*A (ac)	Q (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	Q (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
E. ILIFF PLACE	13	A13	0.48	0.81	6.3	0.39	7.86	3.1	8.8	0.52	7.01	3.6				1.8	0.52	1.0	24	73	4.2	0.3	PIPED TO DP 3.4
S. MUSCADINE WAY	14	A14	1.93	0.68	12.2	1.32	6.15	8.1					3.3	0.54	0.5	4.8	0.78	1.0	24	50	1.4	0.6	ON GRADE INLET, CARRY OVER TO DP 15
E. BALTIC PLACE	15	A15	1.70	0.78	8.9	1.32	6.99	9.2	12.8	1.86	6.03	11.2				5.9	1.86	1.0	24	17	6.0	0.0	SUMP INLET PIPED TO DP 2.5
S. LANGDALE ST	16	A16	0.19	0.81	5.0	0.15	8.38	1.3								1.3	0.15	1.0	24	17	3.9	0.1	SUMP INLET PIPED TO DP 3.2
S. LANGDALE ST	73	A73	1.69	0.78	7.8	1.31	7.31	9.6	9.6	1.76	6.78	12.0				12.0	1.76	1.0	24	17	7.2	0.0	SUMP INLET PIPED TO DP 3.2
E. BALTIC PLACE	17	A17	0.55	0.79	10.5	0.43	6.55	2.8					0.9	0.14	2.0	1.9	0.29	1.0	24	50	2.8	0.3	ON GRADE INLET, CARRY OVER TO DP 18
E. BALTIC PLACE	2.3								10.6	2.86	6.53	18.6				18.6	2.86	1.0	24	48	8.0	0.1	SUM OF DP 2.2, 17
																							PIPED TO DP 2.3
S. LANGDALE ST	3.2								9.7	1.91	6.77	13.0				13.0	1.91	1.0	24	78	7.4	0.2	SUM OF DP 16,73
																							PIPED TO DP 3.3
E. ILIFF PLACE	3.3								15.5	9.91	5.52	54.7				54.7	9.91	1.0	24	530	17.4	0.5	SUM OF DP 3.1,3.2
																							PIPED TO DP 3.4
E. ILIFF PLACE	3.4								16.0	10.42	5.43	56.6				56.6	10.42	1.0	24	56	18.0	0.1	SUM OF DP 3.3,13
																							PIPED TO DP 3.5
S. MUSCADINE WAY	62	A62	0.09	0.82	5.0	0.07	8.38	0.6					0.0	0	0.7	0.6	0.07	1.0	24	50	1.7	0.5	ON GRADE INLET, CARRY OVER TO DP 13
S. MUSCADINE WAY	3.5								16.1	10.49	5.43	57.0				57.0	10.49	1.0	24	109	18.2	0.1	SUM OF DP 3.4,62
																							PIPED TO DP 3.7
CHANNEL	3.7								16.2	12.31	5.41	66.6				66.6	12.31	1.0	24	34	21.2	0.0	SUM OF DP 3.5,3.6
																							PIPED TO CHANNEL HEADWALL
S. LITTLE RIVER ST	18	A18	1.85	0.78	9.0	1.44	6.97	10.0	10.8	1.58	6.48	10.2				6.1	1.58	1.0	24	17	6.1	0.0	SUMP INLET PIPED TO DP 2.4
E. BALTIC PLACE	2.4								10.9	4.44	6.47	28.7				28.7	4.44	1.0	24	246	9.1	0.4	PIPED TO DP 2.5
E. BALTIC PLACE	2.5								12.9	6.29	6.02	37.9				37.9	6.29	1.0	24	56	12.1	0.1	SUM OF DP 2.4, 15
																							PIPED TO DP 2.6
E. BALTIC PLACE	2.6								12.9	7.08	6.00	42.5				42.5	7.08	1.0	24	662	13.5	0.8	SUM OF DP 2.5, 14
																							PIPED TO DP 2.7
E. ADRIATIC PLACE	19	A19	0.44	0.80	6.8	0.35	7.66	2.7	9.8	0.35	6.74	2.4				2.4	0.35	1.0	24	17	4.6	0.1	SUMP INLET PIPED TO DP 1.5
S. LITTLE RIVER ST	20	A20	0.33	0.77	8.0	0.26	7.28	1.9					0.0	0	2.5	1.9	0.26	1.0	24	350	3.2	1.8	ON GRADE INLET , CARRY OVER TO DP 19
																				65	4.2	0.3	PIPED TO DP 1.6

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t _c (min)	C*A (ac)	y (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	y (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _r (min)	
E. ADRIATIC PLACE	21	A21	0.20	0.81	5.0	0.16	8.38	1.3					0.0	0	2.5	1.3	0.16	1.0	24	350 17	3.2 4.0	1.8 0.1	ON GRADE INLET , CARRY OVER TO DP 24 PIPED TO DP 1.5
E. ADRIATIC PLACE	1.5								9.9	0.51	6.72	3.4				3.4	0.51	1.0	24	45	5.1	0.1	SUM OF DP 19,21 PIPED TO DP 1.6
S. LITTLE RIVER ST	1.6								10.0	0.77	6.68	5.1				5.1	0.77	1.0	24	359	5.8	1.0	SUM OF DP 1.5,20 PIPED TO DP 1.7
SCHOOL	25	A25	17.12	0.70	16.4	11.92	5.38	64.1								64.1	11.92	1.0	24	48	20.4	0.0	STUB PIPED TO DP 22.1
S. LANGDALE ST	22	A22	0.41	0.81	5.2	0.33	8.29	2.7	10.1	0.59	6.65	3.9				1.4							SUMP INLET
S. LANGDALE ST	22.1								16.4	12.51	5.38	67.3				67.3	12.51	1.0	24	17	21.4	0.0	PIPED TO DP 1.3
E. PACIFIC WAY	23	A23	0.69	0.79	9.4	0.55	6.85	3.8					1.5	0.21	2.2	2.3	0.34	1.0	24	558 17	3.0 4.5	3.1 0.1	ON GRADE INLET , CARRY OVER TO DP55 PIPED TO DP 1.4
S. LITTLE RIVER ST	24	A24	1.74	0.78	8.3	1.35	7.16	9.7	8.3	1.35	7.16	9.7	6.0	0.83	2.2	3.7	0.52	1.0	24	558 17	3.0 5.3	3.1 0.1	ON GRADE INLET , CARRY OVER TO DP55 PIPED TO DP 1.7
S. LITTLE RIVER ST	1.7								11.0	1.29	6.42	8.3				8.3	1.29	1.0	24	46	6.6	0.1	SUM OF DP 1.6, 24 PIPED TO DP 1.8
S. LANGDALE ST	1.3								16.4	14.63	5.38	78.7				78.7	14.63	1.0	24	236	25.1	0.2	SUM OF DP 1.2 , 22.1 PIPED TO DP 1.4
E. PACIFIC AVE	26	A26	0.32	0.80	11.7	0.26	6.26	1.6					0.3	0.05	2.2	1.3	0.21	1.0	24	50 17	3.0 3.8	0.3 0.1	ON GRADE INLET , CARRY OVER TO DP27 PIPED TO DP 1.4
E. PACIFIC AVE	1.4								16.5	15.18	5.35	81.2				81.2	15.18	1.0	24	48	25.9	0.0	SUM OF DP 1.3,23,26 PIPED TO DP 1.8
S. LITTLE RIVER ST	27	A27	0.47	0.78	6.1	0.37	7.93	2.9	12.0	0.42	6.20	2.6	0.7	0.09	1.5	1.9	0.31	1.0	24	850 63	2.4 4.3	5.8 0.2	ON GRADE INLET , CARRY OVER TO DP 51 PIPED TO DP 1.8
S. LITTLE RIVER ST	1.8								16.6	16.77	5.35	89.7				89.7	16.77	1.0	24	520	28.6	0.3	SUM OF DP 1.7, 27,1.4 PIPED TO DP 1.9
S. LANGDALE ST	28	A28	0.27	0.80	5.0	0.22	8.38	1.8															BASIN 28 TO INLET AT DP 32
S. LANGDALE ST	29	A29	0.60	0.69	12.0	0.41	6.21	2.5								2.5	0.41	1.0	24	17	4.7	0.1	SUMP INLET PIPED TO DP 5.1
S. LITTLE RIVER ST	30	A30	2.12	0.78	10.9	1.65	6.44	10.6					4.0	0.63	2.2	6.6	1.02	1.0	24	270 62	3.0 6.3	1.5 0.2	ON GRADE INLET , CARRY OVER TO DP 49 PIPED TO DP 5.3
E. ASHBURY PLACE	31	A31	0.19	0.79	5.0	0.15	8.38	1.3					0.0	0	2.2	1.3	0.15	1.0	24	270 65	3.0 3.9	1.5 0.3	ON GRADE INLET , CARRY OVER TO DP 49 PIPED TO DP 5.3
																							SUMP INLET

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
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Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t _c (min)	C*A (ac)	W (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	W (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
S. LANGDALE ST	32	A32	1.17	0.78	8.3	0.91	7.18	6.5	11.6	1.42	6.30	9.0				9.0	1.42	1.0	24	17	6.7	0.0	PIPED TO DP 5.1
S. LANGDALE ST	5.1								12.0	1.83	6.19	11.3				11.3	1.83	1.0	24	112	7.2	0.3	SUM OF DP 28, 29, 32 PIPED TO DP 5.2
E. ASHBURY ST	33	A33	1.41	0.81	9.9	1.14	6.72	7.7					2.0	0.29	3.0	5.7	0.85	1.0	24	350	3.5	1.7	ON GRADE INLET, CARRY OVER TO DP32
E. ASHBURY ST	5.2								12.3	2.68	6.14	16.5				16.5	2.68	1.0	24	338	5.9	0.9	PIPED TO DP 5.2
E. ASHBURY ST	31.1								12.5	2.83	2.11	6.0				6.0	2.83	1.0	24				SUM OF DP 5.1,33 PIPED TO DP 5.3
E. ASHBURY ST	5.3								12.7	3.85	6.06	23.4				23.4	3.85	1.0	24	48	6.0	0.1	SUM OF DP 31, 5.2 PIPED TO DP 5.3
E. KEWAUNEE ST	34	A34	0.73	0.79	6.6	0.58	7.73	4.5								4.5	0.58	1.0	24	212	8.2	0.4	SUM OF DP 5.2,30,31 PIPED TO DP 5.4
E. KEWAUNEE ST	81	A81	0.35	0.77	5.5	0.27	8.16	2.2								2.2	0.27	1.0	24	78	5.5	0.2	ON GRADE INLET, CARRY OVER TO DP 41 RUNOFF TO POND C
E. KEWAUNEE ST	34.1								7.4	0.85	7.45	6.3				6.3	0.85	1.0	24	505	4.4	1.9	ON GRADE INLET, CARRY OVER TO DP 34 RUNOFF TO POND C
HARVEST CROSSING	81.1							33.0															PIPED TO HARVEST CROSSING POND C
HARVEST CROSSING	34.2							24.9															HARVEST CROSSING POND B RELEASE
E. KEWAUNEE ST	34.3											57.9				57.9	0.00	1.0	24				HARVEST CROSSING POND C RELEASE
S. KELLERMAN ST	35	A35	1.71	0.77	9.1	1.31	6.93	9.1					2.7	0.39	2.6	6.4	0.92	1.0	24	390	3.2	2.0	ON GRADE INLET, CARRY OVER TO DP 39 PIPED TO DP 6.1
E. ASHBURY ST	36	A36	1.05	0.80	7.2	0.84	7.51	6.3					0.0	0	2.2	6.3	0.84			372	6.2	1.0	ON GRADE INLET, CARRY OVER TO DP 43 PIPED TO DP 36.1
E. ATLANTIC AVE	37	A37	1.13	0.79	6.7	0.89	7.69	6.8					3.8	0.5	2.0	3.0	0.39			210	3.0	1.2	ON GRADE INLET, CARRY OVER TO DP 43 PIPED TO DP 37.1
OPEN SPACE	38	A38	2.65	0.70	10.5	1.85	6.57	12.2								12.2	1.85	1.0	24				PARK INLETS PIPED TO DP 36.1
E. ASHBURY PLACE	36.1								10.5	2.69	6.57	17.7				17.7	2.69	1.0	24	42	7.3	0.1	PIPED TO DP 5.4
E. ATLANTIC AVE	39	A39	1.81	0.81	7.0	1.46	7.60	11.1	11.1	1.85	6.41	11.8	4.8	0.64	2.8	7.0	1.09	1.0	24	17	3.3	2.0	ON GRADE INLET, CARRY OVER TO DP 42 PIPED TO DP 6.1
OPEN SPACE	78	A78	0.98	0.63	11.8	0.62	6.24	3.9								3.9	0.62						PARK INLETS PIPED TO DP 37.1

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t _c (min)	C*A (ac)	y (in/hr)	Q (cfs)	t _{tc} (min)	C*A (ac)	y (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
E. ATLANTIC AVE	37.1								11.8	1.01	2.16	2.2				2.2	1.01	1.0	24	17	4.6	0.1	PIPED TO DP 6.1
E. ATLANTIC AVE	6.1								11.9	3.03	6.23	18.8				18.8	3.03	1.0	24	412	8.0	0.9	SUM OF DP 35,36,39,78 PIPED TO DP 6.2
OPEN SPACE	40	A40	2.06	0.65	9.9	1.34	6.71	9.0								9.0	1.34	1.0	24	415	6.8	1.0	STUB PIPED TO DP 6.3
E. JEWELL AVE	34.4								10.9	1.34	6.45	66.5				66.5	1.34	1.0	24	342	21.2	0.3	SUM OF HC PONDS AND DP 40 PIPED TO DP 6.3
E. JEWELL AVE	41	A41	2.40	0.69	10.1	1.64	6.67	10.9					4.9	0.74	2.0	6.0	0.90			95	2.8	0.6	ON GRADE INLET, CARRY OVER TO DP 42 PIPED TO DP 41.1
OPEN SPACE	79	A79	0.51	0.71	8.3	0.36	7.17	2.6								2.6	0.36	1.0	24	50	4.7	0.2	TYPE C INLET PIPED TO DP 41.1
E. JEWELL AVE	41.1								10.1	1.26	6.67	8.4				8.4	1.26	1.0	24	44	6.6	0.1	PIPED TO DP 6.3
S. LANGDALE COURT	42	A42	0.56	0.80	5.0	0.45	8.38	3.8	13.1	1.83	5.96	10.9				3.8	1.83	1.0	24	25	5.3	0.1	SUMP INLET PIPED TO DP 6.2
E. ASHBURY PLACE	43	A43	2.00	0.79	8.4	1.58	7.12	11.2	8.4	2.08	7.12	14.8				9.9	2.08	1.0	24	17	6.9	0.0	SUMP INLET PIPED TO DP 5.5
S. LANGDALE COURT	44	A44	0.42	0.79	8.1	0.33	7.23	2.4								2.4	0.33	1.0	24	25	4.7	0.1	SUMP INLET PIPED TO DP 6.2
S. LANGDALE COURT	6.2								13.2	5.18	5.94	30.8				30.8	5.18	1.0	24	80	9.8	0.1	SUM OF DP 6.1,42,44 PIPED TO DP 6.4
POND C DISCHARGE																							
E. JEWELL AVE	6.3								11.2	2.60	6.38	41.5				41.5	2.60	1.0	24	103	13.2	0.1	SUM OF DP 40,41.1 PIPED TO DP 6.4
E. JEWELL AVE	6.4								13.4	7.78	5.91	46.0				46.0	7.78	1.0	24	890	14.7	1.0	SUM OF DP 6.2,6.3 PIPED TO DP 80.2
E. JEWELL AVE	45	A45	2.50	0.74	9.4	1.84	6.83	12.6					5.4	0.79	1.0	7.2	1.05	1.0	24	100	2.0	0.8	ON GRADE INLET, CARRY OVER TO DP 53
E. ATLANTIC AVE	46	A46	1.44	0.76	9.4	1.10	6.86	7.5					4.3	0.63	1.0	3.2	0.47	1.0	24	44	6.4	0.1	PIPED TO DP 6.5
E. ATLANTIC AVE	46	A46	1.44	0.76	9.4	1.10	6.86	7.5								3.2	0.47	1.0	24	220	2.0	1.8	ON GRADE INLET, carry over to dp 80
E. ATLANTIC AVE	46	A46	1.44	0.76	9.4	1.10	6.86	7.5								3.2	0.47	1.0	24	17	5.1	0.1	PIPED TO DP 5.7
E. ASHBURY PLACE	47	A47	0.99	0.78	8.3	0.77	7.16	5.5	13.6	1.42	5.86	8.3				3.6	1.42	1.0	24	17	5.3	0.1	SUMP INLET PIPED TO DP 5.5
S. LITTLE RIVER COURT	48	A48	1.90	0.78	9.0	1.48	6.96	10.3								10.3	1.48	1.0	24	17	7.0	0.0	SUMP INLET PIPED TO DP 5.6
																							SUMP INLET

STANDARD FORM SF-3
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STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS	
		Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	\bar{V} (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	\bar{V} (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)		
S. LITTLE RIVER COURT	74	A74	0.78	0.78	7.7	0.61	7.36	4.5	8.9	1.47	6.98	10.3	5.1	0.65	2.2	5.1	1.47	1.0	24	17	5.8	0.0	PIPED TO DP 5.6	
E. ASHBURY PLACE	49	A49	1.37	0.78	6.0	1.07	7.94	8.5	12.5	1.70	6.10	10.3				5.2	0.85	1.0	24	17	5.8	0.0	ON GRADE INLET, CARRY OVER TO DP 47 PIPED TO DP 5.4	
E. ASHBURY PLACE	5.4								13.1	7.40	5.97	44.2				44.2	7.40	1.0	24	205	14.1	0.2	SUM OF DP 5.3,38,36,49 PIPED TO DP 5.5	
E. ASHBURY PLACE	5.5								13.7	10.89	5.85	63.7				63.7	10.89	1.0	24	378	20.3	0.3	SUM OF DP 5.4,43,47 PIPED TO DP 5.6	
S. LITTLE RIVER COURT	50	A50	2.45	0.78	8.0	1.91	7.27	13.9					6.3	0.86	2.0	7.6	1.91	1.0	24	160	2.8	0.9	ON GRADE INLET, CARRY OVER TO DP 74	
S. LITTLE RIVER COURT	5.6								9.0	4.86	6.95	33.8				33.8	4.86	1.0	24	192	6.5	0.5	PIPED TO DP 5.6	
E. ATLANTIC AVE	5.7								14.0	16.23	5.79	93.9				93.9	16.23	1.0	24	98	10.8	0.2	SUM OF DP 50, 48,74 PIPED TO DP 5.7	
S. MILLBROOK COURT	51	A51	2.33	0.78	10.9	1.82	6.46	11.8	17.8	1.91	5.16	9.9	3.6	0.55	2.2	6.3	1.22	1.0	24	225	29.9	0.1	SUM OF DP 5.5,5.6,46 PIPED TO DP 5.8	
S. MILLBROOK COURT	76	A76	0.92	0.79	8.5	0.72	7.10	5.1					2.4	0.34	2.2	2.7	0.38	1.0	24	210	3.0	1.2	ON GRADE INLET, CARRY OVER TO DP 75 PIPED TO DP 5.8	
S. MILLBROOK COURT	5.8								17.8	3.08	5.15	15.8				15.8	3.08	1.0	24	17	4.8	0.1	ON GRADE INLET, CARRY OVER TO DP 80 PIPED TO DP 5.8	
																								SUM OF DP 51,76 PIPED TO DP 5.9

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t _c (min)	C*A (ac)	y (in/hr)	Q (cfs)	t _{tc} (min)	C*A (ac)	y (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
S. MILLBROOK COURT	52	A52	1.18	0.83	12.5	0.98	6.10	6.0															STREET FLOW TO DP 80
E. ATLANTIC AVE	75	A75	0.87	0.78	7.5	0.68	7.41	5.0	19.0	1.23	5.00	6.2				3.8	1.23	1.0	24	17	5.3	0.1	SUMP INLET PIPED TO DP 5.9
E. ATLANTIC AVE	80	A80	1.59	0.76	12.3	1.21	6.14	7.4	12.5	3.16	6.10	19.3				19.3	3.16						SUMP INLET PIPED TP DP 80.1
E. ATLANTIC AVE	5.9								19.0	20.53	4.99	102.5				102.5	20.53	1.0	24	17	32.6	0.0	SUM OF DP 5.7,5.8,75 PIPED TO DP 80.1
OPEN SPACE	80.1								19.0	23.70	4.99	118.2				118.2	23.70	1.0	24	232	37.7	0.1	PIPED TO DP 80.2
E. JEWELL AVE	80.2								19.1	31.48	4.97	156.4				156.4	31.48	1.0	24	232	49.8	0.1	PIPED TO DP 6.5
E. JEWELL AVE	6.5								19.2	32.53	4.96	161.4				161.4	32.53	1.0	24	181	51.4	0.1	SUM OF DP 6.4,45 PIPED TO DP 6.7
S. MUSCADINE WAY	53	A53	2.89	0.77	15.1	2.23	5.60	12.5	15.1	3.02	5.60	16.9				11.0	3.02	1.0	24	57	7.1	0.1	SUMP INLET PIPED TO DP 6.6
E. PACIFIC AVE	54	A54	0.30	0.80	9.1	0.24	6.93	1.7					6.6	0.57	2.2	1.7	0.24	1.0	24	17	4.2	0.1	SUMP INLET PIPED TO DP 4.1
E. PACIFIC AVE	55	A55	1.44	0.79	7.8	1.14	7.33	8.4	12.5	2.19	6.09	13.3				6.7	0.57	1.0	24	110	3.0	0.6	ON GRADE INLET , CARRY OVER TO DP56
E. PACIFIC AVE	1.9								16.9	17.34	5.30	91.9				91.9	17.34	1.0	24	17	6.2	0.0	PIPED TO DP 1.9
E. PACIFIC AVE	56	A56	2.04	0.81	8.1	1.64	7.24	11.9								9.7	3.18	1.0	24	105	29.3	0.1	SUM OF DP 1.8, 55 PIPED TO DP 4.1
E. PACIFIC AVE	4.1								13.1	3.18	5.96	19.0				9.7	3.18	1.0	24	17	6.9	0.0	SUMP INLET PIPED TO DP 4.1
E. PACIFIC AVE	4.1								16.9	20.76	5.29	109.8				109.8	20.76	1.0	24	107	35.0	0.1	SUM OF DP 54,56 PIPED TO DP 4.3
OPEN SPACE	57	A57	1.72	0.75	6.5	1.29	7.77	10.0								10.0	1.29	1.0	24				AREA INLET PIPED TO DP 77.1
S. MUSCADINE WAY	58	A58	2.43	0.80	7.7	1.94	7.35	14.3					7.2	0.97	1.5	7.1	0.97	1.0	24	295	2.4	2.0	ON GRADE INLET, CARRY OVER TO DP 56
S. MUSCADINE WAY	59	A59	0.70	0.75	5.0	0.53	8.38	4.4					1.9	0.23	1.5	2.5	0.30	1.0	24	25	6.4	0.1	PIPED TO DP 4.2
ALLEY	77	A77	0.89	0.78	7.3	0.70	7.49	5.2					1.9	0.23	1.5	2.5	0.30	1.0	24	295	2.4	2.0	ON GRADE INLET, CARRY OVER TO DP60
ALLEY	77.1												0.0	0	2.2	5.2	0.70			25	4.7	0.1	PIPED TO DP 4.2
ALLEY	77.1																			230	3.5	1.1	TYPE C INLET, CARRY OVER TO DP 56
ALLEY	77.1								7.3	1.99	7.49	14.9				14.9	1.99	1.0	24				PIPED TO DP 58.1

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t _c (min)	C*A (ac)	y (in/hr)	Q (cfs)	t _c (min)	C*A (ac)	y (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _r (min)	
S. MUSCADINE WAY	58.1								7.8	2.96	7.33	21.7				21.7	2.96	1.0	24	28	8.2	0.1	PIPED TO DP 4.2
S. MUSCADINE WAY	4.2								7.8	3.25	7.31	23.8				23.8	3.25	1.0	24	228	8.2	0.5	SUM OF DP 57,58,59,77 PIPED TO DP 4.3
S. MUSCADINE WAY	4.3								17.0	24.02	5.28	126.8				126.8	24.02	1.0	24	102	40.4	0.0	SUM OF DP 4.1,4.2 PIPED TO DP 4.4
E. PACIFIC WAY	60	A60	1.13	0.77	11.2	0.87	6.38	5.6	11.2	1.10	6.38	7.0				7.0	1.10	1.0	24	17	6.3	0.0	SUMP INLET PIPED TO DP 4.4
S. NEWBERRY WAY	61	A61	2.39	0.77	5.7	1.84	8.10	14.9								14.9	1.84	1.0	24	17	7.7	0.0	SUMP INLET PIPED TO DP 2.7
S. NEWBERRY WAY	63	A63	2.56	0.78	9.8	2.00	6.74	13.5								13.5	2.00	1.0	24	17	7.5	0.0	SUMP INLET PIPED TO DP 2.7
S. NEWBERRY WAY	2.7								13.7	10.92	5.84	63.7				63.7	10.92	1.0	24	55	20.3	0.0	SUM OF DP 61, 63, 2.6 PIPED TO DP
S. NEWCASTLE WAY	64	A64	2.72	0.78	13.1	2.12	5.97	12.7					5.4	0.9	1.0	7.3	1.22	1.0	24	80	2.0	0.7	ON GRADE INLET, CARRY OVER TO DP 66
S. NEWCASTLE WAY	65	A65	1.45	0.79	9.8	1.14	6.75	7.7					2.3	0.34	1.0	5.4	0.80	1.0	24	17	6.3	0.0	PIPED TO DP 4.7
S. NEWCASTLE WAY	65	A65	1.45	0.79	9.8	1.14	6.75	7.7								5.4	0.80	1.0	24	80	2.0	0.7	ON GRADE INLET PIPED TO DP 4.7
S. NEWCASTLE WAY	4.7								2.2	2.02	9.88	20.0				20.0	2.02	1.0	24	17	5.9	0.0	SUM OF DP 64,65 PIPED TO DP 4.8
E. PACIFIC AVE	66	A66	0.19	0.79	5.0	0.15	8.38	1.3	13.7	1.05	5.84	6.1				2.3	1.05	1.0	24	60	8.1	0.1	SUMP INLET PIPED TO DP 4.6
E. PACIFIC WAY	67	A67	0.21	0.80	5.0	0.17	8.38	1.4								1.4	0.17	1.0	24	17	4.5	0.1	SUMP INLET PIPED TO DP 4.6
E. PACIFIC WAY	68	A68	0.22	0.81	5.0	0.18	8.38	1.5								1.5	0.18	1.0	24	17	4.0	0.1	SUMP INLET PIPED TO DP 4.4
E. PACIFIC WAY	4.4								17.0	25.30	5.27	133.3				133.3	25.30	1.0	24	17	4.1	0.1	SUM OF DP 4.3,60,68 PIPED TO DP 4.5
E. PACIFIC WAY	4.5								17.1	36.22	5.26	190.5				190.5	36.22	1.0	24	240	42.5	0.1	SUM OF DP 4.4,2.7 PIPED TO DP 4.6
E. PACIFIC WAY	4.6								17.2	37.43	5.25	196.5				196.5	37.43	1.0	24	209	60.7	0.1	SUM OF DP 66,67, DP 4.5 PIPED TO DP 4.8
E. PACIFIC WAY	4.8								17.2	39.46	5.25	207.1				207.1	39.46	1.0	24	75	62.6	0.0	SUM OF DP 4.6,4.7 PIPED TO DP 4.8
S. MUSCADINE WAY	69	A69	2.00	0.80	15.2	1.60	5.58	8.9								8.9	1.60	1.0	24	185	66.0	0.0	SUMP INLET PIPED TO DP 6.6
E. JEWELL AVE	6.6								15.2	4.62	5.57	25.7				25.7	4.62	1.0	24	24	6.7	0.1	SUM OF DP 53,69 PIPED TO DP 6.7

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)

Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t _c (min)	C*A (ac)	y (in/hr)	Q (cfs)	t _{tc} (min)	C*A (ac)	y (in/hr)	Q (cfs)	Q _{street} (cfs)	C*A (ac)	Slope (%)	Q _{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t _t (min)	
E. JEWELL AVE	6.7								19.3	37.15	4.95	183.9				183.9	37.15	1.0	24	558	58.6	0.2	SUM OF DP 6.5,6.6 PIPED TO DP 6.8
OPEN SPACE	70	A70	11.98	0.79	14.6	9.48	5.68	53.8					1.7	0.21	1.0	53.8	9.48	1.0	24	84	17.2	0.1	STUB PIPED TO DP 6.9
E. JEWELL AVE	71	A71	1.00	0.85	5.0	0.85	8.38	7.1								5.4	0.64	1.0	24	44	5.9	0.1	ON GRADE INLET PIPED TO DP 6.8
E. JEWELL AVE	6.8								19.4	37.79	4.93	186.3				186.3	37.79	1.0	24	43	59.3	0.0	SUM OF DP 6.7,71 PIPED TO DP 6.9
E. JEWELL AVE	6.9								19.4	47.27	4.93	233.1				233.1	47.27	1.0	24	203	74.2	0.0	SUM OF DP 6.8,70 PIPED TO CULVERT
CHANNEL	72	A72	11.90	0.61	21.7	7.20	4.65	33.5								273.8	7.20	1.0	24				PIPED THROUGH CHANNEL
E. WARREN AVE	D1	D1	1.10	0.82	9.9	0.90	6.71	6.0					1.3	0.2	1.0	4.7	0.70	1.0	24	280	2.0	2.3	ON GRADE INLET, CARRY OVER TO DP D2 PIPED TO DP 7.1
E. WARREN AVE	D2	D2	0.32	0.82	6.7	0.26	7.70	2.0	12.2	0.46	6.15	2.8	1.6	0.15	1.8	1.2	0.11	1.0	24	550	2.7	3.4	ON GRADE INLET, CARRY OVER TO DP D3 PIPED TO DP 7.2
E. CASPIAN AVE	D4	D4	0.49	0.85	5.7	0.42	8.10	3.4					1.4	0.17	1.0	2.0	0.25	1.0	24	420	2.0	3.5	ON GRADE INLET, CARRY OVER TO DP 9 PIPED TO DP 7.6
E. CASPIAN AVE	D3	D3	0.59	0.82	8.3	0.48	7.16	3.4	15.7	0.65	5.49	3.6	1.7	0.31	1.0	1.9	0.35	1.0	24	420	2.0	3.5	ON GRADE INLET, CARRY OVER TO DP 8 PIPED TO DP 7.6
FUTURE FILING	OS1	OS1	8.23	0.79	10.0	6.51	6.70	43.6	10.0	6.62	6.70	44.4				43.6	6.51	1.0	24	310	13.9	0.4	OFFSITE BASIN PIPED TO DP 7.5
E. WARREN AVE	7.1								10.8	7.21	6.48	46.7				46.7	7.21	1.0	24	245	14.9	0.3	SUM OF DP OS1,D1 PIPED TO DP 7.2
FUTURE FILING	OS2	OS2	34.21	0.79	15.5	27.06	5.52	149.4	15.8	62.03	5.48	339.9				149.4	27.06	1.0	24	25	47.6	0.0	SUM OF DP 7.5 AND OS2 PIPED TO DP 7.6
E. WARREN AVE	7.2								11.1	7.32	6.41	46.9				46.9	7.32	1.0	24	48	15.0	0.1	SUM OF DP D2, 7.1 PIPED TO DP 7.3
E. CASPIAN AVE	7.3								15.5	34.38	5.52	189.8				189.8	34.38	1.0	24	48	60.5	0.0	SUM OF DP D2, 7.1 PIPED TO DP 7.3
E. CASPIAN AVE	7.4								15.8	34.97	5.48	191.7				191.7	34.97	1.0	24	65	61.0	0.0	SUM OF DP 7.3, D3, D4 PIPED TO DP OS2
FUTURE FILING	OS3	OS3	12.88	0.79	12.3	10.19	6.13	62.5	12.3	10.19	6.13	62.5											SUM OF DP 7.6 AND OS3 PIPED TO POND D
E. WARREN AVE	7.5								15.8	45.16	5.48	247.5				247.5	45.16	1.0	24	230	78.8	0.0	SUM OF DP 7.4, OS3 PIPED TO DP 7.6

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
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Subdivision: FOUNDRY FILING NO. 1
Location: Aurora
Design Storm: 100-Year

Project Name: FOUNDRY FILING NO. 1
Project No.: 16146.00
Calculated By: DIG
Checked By: RAB
Date: 11/17/23

STREET	Design Point	DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE				TRAVEL TIME			REMARKS
		Basin ID	Area (ac)	Runoff Coeff.	t_c (min)	C*A (ac)	$\frac{Q}{i}$ (in/hr)	Q (cfs)	t_c (min)	C*A (ac)	$\frac{Q}{i}$ (in/hr)	Q (cfs)	Q_{street} (cfs)	C*A (ac)	Slope (%)	Q_{pipe} (cfs)	C*A (ac)	Slope (%)	Pipe Size (inches)	Length (ft)	Velocity (fps)	t_t (min)	
FUTURE FILING	7.6								15.8	45.16	5.48	247.5				247.5	45.16	1.0	24	295	78.8	0.1	PIPED TO CHANNEL
FUTURE FILING	OS4	OS4	9.32	0.79	14.5	7.37	5.69	41.9								41.9	7.37	1.0	24	122	13.4	0.2	OFFSITE BASIN PIPED TO DP 7.7
FUTURE FILING	OS5	OS5	11.58	0.79	14.3	9.16	5.73	52.5								52.5	9.16	1.0	24	211	16.7	0.2	OFFSITE BASIN PIPED TO DP 7.7
FUTURE FILING	7.7								14.7	16.53	5.66	93.6				93.6	16.53	1.0	24	170	29.8	0.1	SUM OF DP OS4, OS5 PIPED TO CHANNEL
E. CASPIAN AVE	OS6	OS6	66.83	0.79	24.3	53.00	4.37	231.6															OFFSITE BASIN PIPED TO REGIONAL POND C
PARKLANDS																							

Notes:
Street and Pipe C*A values are determined by Q/i using the catchment's intensity value.

APPENDIX C
HYDRAULIC CALCULATIONS

CUHP COMPOSITE % IMPERVIOUS CALCULATIONS

Subdivision: _____
 Location: Aurora

Project Name: FOUNDRY FILING NO. 1
 Project No.: 16146.00
 Calculated By: DIG
 Checked By: RAB
 Date: 6/7/23

Basin ID	Total Area (ac)	Meduim Density SFH and MFH (75%)			School			Developed Parks			Less Developed Parks			Basins Total Weighted % Imp.
		% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	% Imp.	Area (ac)	Weighted % Imp.	
A1	23.54	75%	23.54	75.0%	55%	0.00	0.0%	30%	0.00	0.0%	10%	0.00	0.0%	75.0%
A2	83.78	75%	66.78	59.8%	55%	17.00	11.2%	30%	0.00	0.0%	10%	0.00	0.0%	70.9%
A3	54.01	75%	44.11	61.3%	55%	0.00	0.0%	30%	0.00	0.0%	10%	9.90	1.8%	63.1%
A4	47.52	75%	42.02	66.3%	55%	0.00	0.0%	30%	0.00	0.0%	10%	5.50	1.2%	67.5%
A5	21.21	75%	21.21	75.0%	55%	0.00	0.0%	30%	0.00	0.0%	10%	0.00	0.0%	75.0%
A6	13.31	75%	2.81	15.8%	55%	0.00	0.0%	30%	10.50	23.7%	10%	0.00	0.0%	39.5%
B1	29.80	75%	21.80	54.9%	55%	0.00	0.0%	30%	0.00	0.0%	10%	8.00	2.7%	57.6%
C1	21.83	75%	19.23	66.1%	55%	0.00	0.0%	30%	0.00	0.0%	10%	2.60	1.2%	67.3%
D1	103.52	75%	87.12	63.1%	55%	0.00	0.0%	30%	0.00	0.0%	10%	16.40	1.6%	64.7%
D2	22.67	75%	20.67	68.4%	55%	0.00	0.0%	30%	0.00	0.0%	10%	2.00	0.9%	69.3%
OS1	24.84	75%	23.04	69.6%	55%	0.00	0.0%	30%	0.00	0.0%	10%	1.80	0.7%	70.3%
OS2	30.08	75%	27.08	67.5%	55%	0.00	0.0%	30%	0.00	0.0%	10%	3.00	1.0%	68.5%
OS3	66.87	75%	48.87	54.8%	55%	0.00	0.0%	30%	0.00	0.0%	10%	18.00	2.7%	57.5%
TOTAL	542.98													65.5%

Summary of CUHP Input Parameters (Version 2.0.1)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in./hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con't Imperv. Fraction	Receiv. Perv. Fraction	
A1	A1	2-YR	0.037	0.129	0.294	0.020	75.0	0.35	0.10	3.00	0.50	0.0018	0.00	0.93	0.32	73.29
A2	A2	2-YR	0.131	0.359	0.572	0.020	70.9	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.30	69.07
A3	A3	2-YR	0.084	0.329	0.388	0.010	63.1	0.35	0.10	3.00	0.50	0.0018	0.00	0.91	0.28	61.10
A4	A4	2-YR	0.074	0.225	0.404	0.020	67.5	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.29	65.59
A5	A5	2-YR	0.033	0.131	0.258	0.030	75.0	0.35	0.10	3.00	0.50	0.0018	0.00	0.93	0.32	73.29
A6	A6	2-YR	0.021	0.098	0.181	0.020	39.5	0.35	0.10	3.00	0.50	0.0018	0.00	0.79	0.20	36.83
D1	D1	2-YR	0.162	0.240	0.402	0.030	64.8	0.35	0.10	3.00	0.50	0.0018	0.00	0.91	0.28	62.83
D2	D2	2-YR	0.035	0.118	0.203	0.030	69.3	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.30	67.43
OS1	OS1	2-YR	0.039	0.116	0.282	0.020	70.3	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.30	68.45
OS2	OS2	2-YR	0.047	0.226	0.398	0.050	68.5	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.30	66.61
OS3	OS3	2-YR	0.104	0.219	0.484	0.010	57.5	0.35	0.10	3.00	0.50	0.0018	0.00	0.89	0.26	55.32

2YR OUTPUT

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

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
A1		0.079	0.142	13.9	3.01	7.2	2.13	5.0	80	85,450	0.59	50,512	30.0	20	49,171	0.84
A2		0.080	0.247	18.2	4.96	9.5	3.51	8.3	215	304,121	0.56	169,091	30.0	57	168,183	0.68
A3		0.083	0.195	22.5	4.87	11.7	3.44	8.1	112	196,056	0.49	96,055	35.0	28	95,689	0.52
A4		0.082	0.188	16.4	3.88	8.5	2.74	6.5	136	172,512	0.53	90,927	30.0	33	90,534	0.70
A5		0.079	0.135	12.5	2.80	6.5	1.98	4.7	80	77,004	0.59	45,519	30.0	19	43,807	0.89
A6		0.095	0.081	20.3	2.76	10.5	1.95	4.6	31	48,310	0.29	13,946	30.0	4	13,658	0.34
D1		0.083	0.264	11.1	3.75	5.8	2.65	6.2	437	375,778	0.50	189,485	30.0	86	186,016	0.83
D2		0.081	0.136	10.8	2.63	5.6	1.86	4.4	98	82,281	0.54	44,626	30.0	20	42,867	0.88
OS1		0.081	0.143	13.1	2.94	6.8	2.08	4.9	89	90,165	0.55	49,670	30.0	20	48,007	0.81
OS2		0.081	0.154	16.0	3.39	8.3	2.40	5.7	88	109,197	0.54	58,482	30.0	22	57,991	0.72
OS3		0.086	0.206	20.1	4.68	10.4	3.30	7.8	156	242,738	0.44	107,277	30.0	34	106,471	0.50

Summary of CUHP Input Parameters (Version 2.0.1)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in./hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con't Imperv. Fraction	Receiv. Perv. Fraction	
A1	A1	100-YEAR	0.037	0.129	0.294	0.020	75.0	0.35	0.10	3.00	0.50	0.0018	0.00	0.93	0.32	74.34
A2	A2	100-YEAR	0.131	0.359	0.572	0.020	70.9	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.30	70.19
A3	A3	100-YEAR	0.084	0.329	0.388	0.010	63.1	0.35	0.10	3.00	0.50	0.0018	0.00	0.91	0.28	62.32
A4	A4	100-YEAR	0.074	0.225	0.404	0.020	67.5	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.29	66.75
A5	A5	100-YEAR	0.033	0.131	0.258	0.030	75.0	0.35	0.10	3.00	0.50	0.0018	0.00	0.93	0.32	74.34
A6	A6	100-YEAR	0.021	0.098	0.181	0.020	39.5	0.35	0.10	3.00	0.50	0.0018	0.00	0.79	0.20	38.46
D1	D1	100-YEAR	0.162	0.240	0.402	0.030	44.8	0.35	0.10	3.00	0.50	0.0018	0.00	0.91	0.28	64.03
D2	D2	100-YEAR	0.035	0.118	0.203	0.030	49.3	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.30	68.57
OS1	OS1	100-YEAR	0.039	0.116	0.282	0.020	70.3	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.30	69.58
OS2	OS2	100-YEAR	0.047	0.226	0.398	0.050	68.5	0.35	0.10	3.00	0.50	0.0018	0.00	0.92	0.30	67.76
OS3	OS3	100-YEAR	0.104	0.219	0.484	0.010	57.5	0.35	0.10	3.00	0.50	0.0018	0.00	0.89	0.26	56.65

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	CT	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
A1		0.079	0.142	13.8	3.01	7.2	2.12	5.0	80	85,450	2.32	198,299	35.0	79	192,788	3.34
A2		0.080	0.248	18.1	4.94	9.4	3.49	8.2	217	304,121	2.27	691,065	35.0	241	687,544	2.88
A3		0.083	0.196	22.3	4.85	11.6	3.43	8.1	114	196,056	2.18	427,547	40.0	133	425,560	2.47
A4		0.081	0.190	16.2	3.86	8.4	2.73	6.4	137	172,512	2.23	385,109	35.0	146	383,505	3.08
A5		0.079	0.136	12.4	2.79	6.4	1.97	4.7	80	77,004	2.32	178,698	35.0	74	171,869	3.50
A6		0.094	0.083	19.6	2.74	10.2	1.94	4.6	32	48,310	1.91	92,111	35.0	32	90,134	2.40
D1		0.082	0.265	11.0	3.74	5.7	2.64	6.2	442	375,778	2.20	826,961	35.0	385	811,928	3.72
D2		0.081	0.137	10.7	2.62	5.6	1.85	4.4	99	82,281	2.25	185,421	35.0	84	177,922	3.69
OS1		0.080	0.143	13.0	2.93	6.8	2.07	4.9	90	90,165	2.27	204,249	35.0	84	197,380	3.38
OS2		0.081	0.155	15.8	3.38	8.2	2.39	5.6	89	109,197	2.24	245,050	35.0	94	242,838	3.12
OS3		0.085	0.208	19.7	4.65	10.3	3.29	7.8	159	242,738	2.12	513,472	40.0	172	509,408	2.57

2YR Report

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

Element Count

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Number of rain gages ..... 0
Number of subcatchments ... 0
Number of nodes ..... 23
Number of links ..... 22
Number of pollutants ..... 0
Number of land uses ..... 0

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Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
D2	JUNCTION	5760.00	10.00	0.0	
D1	JUNCTION	5730.00	0.00	0.0	
FoxTailRun_US	JUNCTION	5672.00	20.00	0.0	
3	JUNCTION	5648.00	10.00	0.0	
A2	JUNCTION	5660.00	0.00	0.0	
A1	JUNCTION	5670.00	0.00	0.0	
A3	JUNCTION	5622.00	0.00	0.0	
5	JUNCTION	5640.00	4.00	0.0	
2	JUNCTION	5620.40	23.60	0.0	
OS3	JUNCTION	5615.00	0.00	0.0	
4	JUNCTION	5685.05	76.75	0.0	
A6	JUNCTION	5680.00	0.00	0.0	
A5	JUNCTION	5720.00	0.00	0.0	
A4	JUNCTION	5720.00	0.00	0.0	
OS1	JUNCTION	5686.00	0.00	0.0	
OS2	JUNCTION	5740.00	0.00	0.0	
7	JUNCTION	5655.00	19.00	0.0	
8	JUNCTION	5616.00	6.00	0.0	
toCoalCreek	OUTFALL	5610.00	0.00	0.0	
PondD	STORAGE	5676.00	9.00	0.0	
RegionalPondC	STORAGE	5610.75	10.00	0.0	
PondC1	STORAGE	5670.00	5.00	0.0	
PondC3	STORAGE	5700.00	5.00	0.0	

2YR Report

Link Summary

Name Roughness	From Node	To Node	Type	Length	%Slope

1_DUMMY 0.0100	D1	4	CONDUIT	2125.0	2.1158
Reach4 0.0350	D2	4	CONDUIT	540.0	0.5000
Reach3 0.0350	4	PondD	CONDUIT	930.0	0.5000
Reach2 0.0350	FoxTailRun_US	7	CONDUIT	700.0	0.5000
Reach1 0.0350	3	2	CONDUIT	2000.0	0.5000
7_DUMMY 0.0100	A2	3	CONDUIT	3020.0	0.3974
8_DUMMY 0.0100	A1	3	CONDUIT	1553.0	1.4168
9_DUMMY 0.0100	A3	5	CONDUIT	4110.0	-0.4380
E_Jewell_Avenue_Pipe 5 0.0130		2	CONDUIT	800.0	2.4507
E_Jewell_Culvert 2 0.0130		8	CONDUIT	200.0	2.2005
10_DUMMY 0.0100	OS3	RegionalPondC	CONDUIT	2555.0	0.1663
9 0.0100	A6	FoxTailRun_US	CONDUIT	708.0	1.1300
10 0.0100	A5	FoxTailRun_US	CONDUIT	400.0	12.0873
11 0.0130	A4	3	CONDUIT	1550.0	4.6502
12 0.0100	OS1	PondC1	CONDUIT	400.0	4.0032
13 0.0100	OS2	PondC3	CONDUIT	400.0	10.0504
LouisianaCulvert 7 0.0130		3	CONDUIT	240.0	2.9179
14 0.0100	8	RegionalPondC	CONDUIT	400.0	1.3126
PondC1	PondC1	5	ORIFICE		
PondC3	PondC3	5	ORIFICE		
Outlet_to_CoalCreek_100yr	RegionalPondC	toCoalCreek	OUTLET		
PondD_Outlet	PondD	FoxTailRun_US	OUTLET		

2YR Report

 Cross Section Summary

Full Conduit Flow	Shape	Full Depth	Full Area	Hyd. Rad.	Max. Width	No. of Barrels

1_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
Reach4	TRAPEZOIDAL	4.50	162.00	2.94	54.00	1
998.05						
Reach3	TRAPEZOIDAL	5.50	258.50	3.67	69.00	1
1847.90						
Reach2	TRAPEZOIDAL	5.50	269.50	3.72	71.00	1
1944.14						
Reach1	TRAPEZOIDAL	6.00	312.00	4.03	76.00	1
2370.90						
7_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
8_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
9_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
E_Jewell_Avenue_Pipe	CIRCULAR	4.00	12.57	1.00	4.00	1
224.87						
E_Jewell_Culvert	RECT_CLOSED	6.00	54.00	1.80	9.00	2
1354.92						
10_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
9	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
10	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
11	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
12	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
13	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
LouisianaCulvert	RECT_CLOSED	5.00	35.00	1.46	7.00	1
878.85						
14	DUMMY	0.00	0.00	0.00	0.00	1
0.00						

 Analysis Options

Flow Units CFS
 Process Models:
 Rainfall/Runoff NO
 RDII NO
 Snowmelt NO

2YR Report

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Groundwater ..... NO
Flow Routing ..... YES
Ponding Allowed ..... NO
Water Quality ..... NO
Flow Routing Method ..... KINWAVE
Starting Date ..... 02/10/2023 00:00:00
Ending Date ..... 02/15/2023 00:00:00
Antecedent Dry Days ..... 0.0
Report Time Step ..... 00:05:00
Routing Time Step ..... 20.00 sec
  
```

	Volume acre-feet	Volume 10 ⁶ gal
Flow Routing Continuity	-----	-----
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	20.715	6.750
External Outflow	20.952	6.827
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-1.142	

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*****
Highest Flow Instability Indexes
*****
Link PondD_Outlet (6)
Link Reach2 (6)
Link LouisianaCulvert (6)
Link Reach1 (6)
Link 14 (5)
  
```

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*****
Routing Time Step Summary
*****
Minimum Time Step      : 20.00 sec
Average Time Step      : 20.00 sec
Maximum Time Step      : 20.00 sec
% of Time in Steady State : 0.00
Average Iterations per Step : 1.00
% of Steps Not Converging : 0.00
  
```

2YR Report

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
D2	JUNCTION	0.00	0.54	5760.54	0 00:30	0.54
D1	JUNCTION	0.00	0.00	5730.00	0 00:00	0.00
FoxTailRun_US	JUNCTION	0.01	1.14	5673.14	0 00:38	1.14
3	JUNCTION	0.02	1.61	5649.61	0 00:37	1.60
A2	JUNCTION	0.00	0.00	5660.00	0 00:00	0.00
A1	JUNCTION	0.00	0.00	5670.00	0 00:00	0.00
A3	JUNCTION	0.00	0.00	5622.00	0 00:00	0.00
5	JUNCTION	0.03	1.09	5641.09	0 00:40	1.09
2	JUNCTION	17.62	19.17	5639.57	0 00:44	19.17
OS3	JUNCTION	0.00	0.00	5615.00	0 00:00	0.00
4	JUNCTION	72.25	72.78	5757.83	0 00:32	72.76
A6	JUNCTION	0.00	0.00	5680.00	0 00:00	0.00
A5	JUNCTION	0.00	0.00	5720.00	0 00:00	0.00
A4	JUNCTION	0.00	0.00	5720.00	0 00:00	0.00
OS1	JUNCTION	0.00	0.00	5686.00	0 00:00	0.00
OS2	JUNCTION	0.00	0.00	5740.00	0 00:00	0.00
7	JUNCTION	13.51	14.64	5669.64	0 00:40	14.64
8	JUNCTION	0.01	0.91	5616.91	0 00:44	0.91
toCoalCreek	OUTFALL	0.00	0.00	5610.00	0 00:00	0.00
PondD	STORAGE	0.02	2.90	5678.90	0 00:39	2.90
RegionalPondC	STORAGE	2.16	5.77	5616.52	0 03:03	5.77
PondC1	STORAGE	0.03	1.20	5671.20	0 00:57	1.20
PondC3	STORAGE	0.03	1.14	5701.14	0 01:10	1.14

2YR Report

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
D2	JUNCTION	19.97	19.97	0 00:30	0.321	0.321	0.000
D1	JUNCTION	86.10	86.10	0 00:30	1.39	1.39	0.000
FoxTailRun_US	JUNCTION	0.00	107.73	0 00:38	0	2.16	0.000
3	JUNCTION	0.00	202.75	0 00:37	0	4.47	0.000
A2	JUNCTION	56.70	56.70	0 00:30	1.26	1.26	0.000
A1	JUNCTION	19.82	19.82	0 00:30	0.368	0.368	0.000
A3	JUNCTION	28.07	28.07	0 00:35	0.716	0.716	0.000
5	JUNCTION	0.00	36.27	0 00:40	0	1.51	0.000
2	JUNCTION	0.00	230.43	0 00:44	0	6.03	0.000
OS3	JUNCTION	33.55	33.55	0 00:30	0.796	0.796	0.000
4	JUNCTION	0.00	104.36	0 00:30	0	1.71	0.000
A6	JUNCTION	4.49	4.49	0 00:30	0.102	0.102	0.000
A5	JUNCTION	18.82	18.82	0 00:30	0.328	0.328	0.000
A4	JUNCTION	33.31	33.31	0 00:30	0.677	0.677	0.000
OS1	JUNCTION	20.07	20.07	0 00:30	0.359	0.359	0.000
OS2	JUNCTION	21.71	21.71	0 00:30	0.434	0.434	0.000
7	JUNCTION	0.00	107.22	0 00:40	0	2.16	0.000
8	JUNCTION	0.00	230.44	0 00:44	0	6.03	0.000
toCoalCreek	OUTFALL	0.00	7.67	0 03:03	0	6.83	0.000
PondD	STORAGE	0.00	99.95	0 00:33	0	1.73	0.072
RegionalPondC	STORAGE	0.00	258.15	0 00:44	0	6.83	0.005
PondC1	STORAGE	0.00	20.07	0 00:30	0	0.359	0.122
PondC3	STORAGE	0.00	21.71	0 00:30	0	0.434	0.075

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 ft³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
PondD	0.060	0.0	0.0	0.0	15.355	3.3	0 00:39	89.26
RegionalPondC	179.711	6.3	0.0	0.0	827.710	29.2	0 03:03	7.67
PondC1	0.453	0.4	0.0	0.0	21.661	19.2	0 00:57	7.60
PondC3	0.839	0.5	0.0	0.0	29.790	18.8	0 01:10	7.03

2YR Report

 Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
toCoalCreek	55.27	3.82	7.67	6.827
System	55.27	3.82	7.67	6.827

 Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1_DUMMY	DUMMY	86.10	0 00:30			
Reach4	CONDUIT	19.39	0 00:32	1.87	0.02	0.12
Reach3	CONDUIT	99.95	0 00:33	3.03	0.05	0.21
Reach2	CONDUIT	107.22	0 00:40	3.00	0.06	0.21
Reach1	CONDUIT	194.69	0 00:44	3.73	0.08	0.26
7_DUMMY	DUMMY	56.70	0 00:30			
8_DUMMY	DUMMY	19.82	0 00:30			
9_DUMMY	DUMMY	28.07	0 00:35			
E_Jewell_Avenue_Pipe	CONDUIT	36.25	0 00:41	13.14	0.16	0.27
E_Jewell_Culvert	CONDUIT	230.44	0 00:44	14.08	0.09	0.15
10_DUMMY	DUMMY	33.55	0 00:30			
9	DUMMY	4.49	0 00:30			
10	DUMMY	18.82	0 00:30			
11	DUMMY	33.31	0 00:30			
12	DUMMY	20.07	0 00:30			
13	DUMMY	21.71	0 00:30			
LouisianaCulvert	CONDUIT	107.21	0 00:40	16.09	0.12	0.19
14	DUMMY	230.44	0 00:44			
PondC1	ORIFICE	7.60	0 00:57			0.00
PondC3	ORIFICE	7.03	0 01:10			0.00
Outlet_to_CoalCreek_100yr	DUMMY	7.67	0 03:03			
PondD_Outlet	DUMMY	89.26	0 00:39			

 Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Tue Nov 14 09:53:25 2023
 Analysis ended on: Tue Nov 14 09:53:25 2023
 Total elapsed time: < 1 sec

100 YR Report

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.2 (Build 5.2.3)

Element Count

Number of rain gages 0
 Number of subcatchments ... 0
 Number of nodes 23
 Number of links 22
 Number of pollutants 0
 Number of land uses 0

Node Summary

Name	Type	Invert Elev.	Max. Depth	Ponded Area	External Inflow
D2	JUNCTION	5760.00	10.00	0.0	
D1	JUNCTION	5730.00	0.00	0.0	
FoxTailRun_US	JUNCTION	5672.00	20.00	0.0	
3	JUNCTION	5648.00	10.00	0.0	
A2	JUNCTION	5660.00	0.00	0.0	
A1	JUNCTION	5670.00	0.00	0.0	
A3	JUNCTION	5622.00	0.00	0.0	
5	JUNCTION	5640.00	4.00	0.0	
2	JUNCTION	5620.40	23.60	0.0	
OS3	JUNCTION	5615.00	0.00	0.0	
4	JUNCTION	5685.05	76.75	0.0	
A6	JUNCTION	5680.00	0.00	0.0	
A5	JUNCTION	5720.00	0.00	0.0	
A4	JUNCTION	5720.00	0.00	0.0	
OS1	JUNCTION	5686.00	0.00	0.0	
OS2	JUNCTION	5740.00	0.00	0.0	
7	JUNCTION	5655.00	19.00	0.0	
8	JUNCTION	5616.00	6.00	0.0	
toCoalCreek	OUTFALL	5610.00	0.00	0.0	
PondD	STORAGE	5676.00	9.00	0.0	
RegionalPondC	STORAGE	5610.75	10.00	0.0	
PondC1	STORAGE	5670.00	5.00	0.0	
PondC3	STORAGE	5700.00	5.00	0.0	

100 YR Report

Link Summary

Name	From Node	To Node	Type	Length	%Slope	Roughness
1_DUMMY	D1	4	CONDUIT	2125.0	2.1158	0.0100
Reach4	D2	4	CONDUIT	540.0	0.5000	0.0350
Reach3	4	PondD	CONDUIT	930.0	0.5000	0.0350
Reach2	FoxTailRun_US	7	CONDUIT	700.0	0.5000	0.0350
Reach1	3	2	CONDUIT	2000.0	0.5000	0.0350
7_DUMMY	A2	3	CONDUIT	3020.0	0.3974	0.0100
8_DUMMY	A1	3	CONDUIT	1553.0	1.4168	0.0100
9_DUMMY	A3	5	CONDUIT	4110.0	-0.4380	0.0100
E_Jewell_Avenue_Pipe	5	2	CONDUIT	800.0	2.4507	0.0130
E_Jewell_Culvert	2	8	CONDUIT	200.0	2.2005	0.0130
10_DUMMY	OS3	RegionalPondC	CONDUIT	2555.0	0.1663	0.0100
9	A6	FoxTailRun_US	CONDUIT	708.0	1.1300	0.0100
10	A5	FoxTailRun_US	CONDUIT	400.0	12.0873	0.0100
11	A4	3	CONDUIT	1550.0	4.6502	0.0130
12	OS1	PondC1	CONDUIT	400.0	4.0032	0.0100
13	OS2	PondC3	CONDUIT	400.0	10.0504	0.0100
LouisianaCulvert	7	3	CONDUIT	240.0	2.9179	0.0130
14	8	RegionalPondC	CONDUIT	400.0	1.3126	0.0100
PondC1	PondC1	5	ORIFICE			
PondC3	PondC3	5	ORIFICE			
Outlet_to_CoalCreek_100yr	RegionalPondC	toCoalCreek	OUTLET			
PondD_Outlet	PondD	FoxTailRun_US	OUTLET			

Cross Section Summary

Full		Full	Full	Hyd.	Max.	No. of
Conduit	Shape	Depth	Area	Rad.	Width	Barrels
Flow						

1_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
Reach4	TRAPEZOIDAL	4.50	162.00	2.94	54.00	1
998.05						
Reach3	TRAPEZOIDAL	5.50	258.50	3.67	69.00	1
1847.90						
Reach2	TRAPEZOIDAL	5.50	269.50	3.72	71.00	1
1944.14						
Reach1	TRAPEZOIDAL	6.00	312.00	4.03	76.00	1
2370.90						
7_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
8_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
9_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
E_Jewell_Avenue_Pipe	CIRCULAR	4.00	12.57	1.00	4.00	1
224.87						
E_Jewell_Culvert	RECT_CLOSED	6.00	54.00	1.80	9.00	2
1354.92						
10_DUMMY	DUMMY	0.00	0.00	0.00	0.00	1
0.00						

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9	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
10	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
11	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
12	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
13	DUMMY	0.00	0.00	0.00	0.00	1
0.00						
LouisianaCulvert	RECT_CLOSED	5.00	35.00	1.46	7.00	1
878.85						
14	DUMMY	0.00	0.00	0.00	0.00	1
0.00						

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 02/10/2023 00:00:00

Ending Date 02/15/2023 00:00:00

Antecedent Dry Days 0.0

Report Time Step 00:05:00

Routing Time Step 20.00 sec

Flow Routing Continuity

	Volume acre-feet	Volume 10^6 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	89.319	29.106
External Outflow	89.481	29.159
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	0.000	0.000
Continuity Error (%)	-0.182	

Highest Flow Instability Indexes

Link PondD_Outlet (6)

Link Reach2 (6)

Link LouisianaCulvert (6)

100 YR Report

Link Reach1 (6)

Routing Time Step Summary

Minimum Time Step : 20.00 sec
 Average Time Step : 20.00 sec
 Maximum Time Step : 20.00 sec
 % of Time in Steady State : 0.00
 Average Iterations per Step : 1.01
 % of Steps Not Converging : 0.00

Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
D2	JUNCTION	0.01	1.22	5761.22	0 00:35	1.22
D1	JUNCTION	0.00	0.00	5730.00	0 00:00	0.00
FoxTailRun_US	JUNCTION	0.03	1.96	5673.96	0 00:44	1.96
3	JUNCTION	0.04	3.25	5651.25	0 00:38	3.25
A2	JUNCTION	0.00	0.00	5660.00	0 00:00	0.00
A1	JUNCTION	0.00	0.00	5670.00	0 00:00	0.00
A3	JUNCTION	0.00	0.00	5622.00	0 00:00	0.00
5	JUNCTION	0.06	2.68	5642.68	0 00:41	2.68
2	JUNCTION	17.64	20.82	5641.22	0 00:43	20.81
OS3	JUNCTION	0.00	0.00	5615.00	0 00:00	0.00
4	JUNCTION	72.26	73.47	5758.52	0 00:36	73.46
A6	JUNCTION	0.00	0.00	5680.00	0 00:00	0.00
A5	JUNCTION	0.00	0.00	5720.00	0 00:00	0.00
A4	JUNCTION	0.00	0.00	5720.00	0 00:00	0.00
OS1	JUNCTION	0.00	0.00	5686.00	0 00:00	0.00
OS2	JUNCTION	0.00	0.00	5740.00	0 00:00	0.00
7	JUNCTION	13.53	15.46	5670.46	0 00:46	15.46
8	JUNCTION	0.03	2.23	5618.23	0 00:43	2.23
toCoalCreek	OUTFALL	0.00	0.00	5610.00	0 00:00	0.00
PondD	STORAGE	0.08	7.75	5683.75	0 01:00	7.75
RegionalPondC	STORAGE	2.94	8.78	5619.53	0 01:34	8.78
PondC1	STORAGE	0.07	4.50	5674.50	0 01:07	4.49
PondC3	STORAGE	0.09	4.40	5704.40	0 01:15	4.40

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***** Node Inflow Summary *****

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
D2	JUNCTION	83.66	83.66	0 00:35	1.33	1.33	0.000
D1	JUNCTION	384.78	384.78	0 00:35	6.07	6.07	0.000
FoxTailRun_US	JUNCTION	0.00	279.36	0 00:44	0	9.39	0.000
3	JUNCTION	0.00	721.93	0 00:38	0	18.8	0.000
A2	JUNCTION	241.44	241.44	0 00:35	5.14	5.14	0.000
A1	JUNCTION	78.64	78.64	0 00:35	1.44	1.44	0.000
A3	JUNCTION	133.22	133.22	0 00:40	3.18	3.18	0.000
5	JUNCTION	0.00	177.80	0 00:41	0	6.47	0.000
2	JUNCTION	0.00	888.15	0 00:43	0	25.4	0.000
OS3	JUNCTION	172.11	172.11	0 00:40	3.81	3.81	0.000
4	JUNCTION	0.00	466.94	0 00:35	0	7.41	0.000
A6	JUNCTION	31.99	31.99	0 00:35	0.674	0.674	0.000
A5	JUNCTION	74.34	74.34	0 00:35	1.29	1.29	0.000
A4	JUNCTION	146.47	146.47	0 00:35	2.87	2.87	0.000
OS1	JUNCTION	84.04	84.04	0 00:35	1.48	1.48	0.000
OS2	JUNCTION	93.91	93.91	0 00:35	1.82	1.82	0.000
7	JUNCTION	0.00	279.27	0 00:46	0	9.39	0.000
8	JUNCTION	0.00	888.13	0 00:43	0	25.4	0.000
toCoalCreek	OUTFALL	0.00	418.05	0 01:34	0	29.2	0.000
PondD	STORAGE	0.00	460.06	0 00:37	0	7.43	0.005
RegionalPondC	STORAGE	0.00	1053.21	0 00:43	0	29.2	0.099
PondC1	STORAGE	0.00	84.04	0 00:35	0	1.48	0.046
PondC3	STORAGE	0.00	93.91	0 00:35	0	1.82	0.057

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

No nodes were flooded.

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

Storage Unit	Average Volume 1000 ft³	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft³	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
PondD	2.435	0.5	0.0	0.0	331.349	70.9	0 01:00	205.84
RegionalPondC	326.189	11.5	0.0	0.0	2223.222	78.4	0 01:34	418.05
PondC1	1.418	1.3	0.0	0.0	98.684	87.6	0 01:07	30.67
PondC3	2.513	1.6	0.0	0.0	135.140	85.4	0 01:15	30.20

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 Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
toCoalCreek	66.72	13.52	418.05	29.157
System	66.72	13.52	418.05	29.157

 Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
1_DUMMY	DUMMY	384.78	0 00:35			
Reach4	CONDUIT	83.29	0 00:36	3.03	0.08	0.27
Reach3	CONDUIT	460.06	0 00:37	4.88	0.25	0.49
Reach2	CONDUIT	279.27	0 00:46	4.09	0.14	0.36
Reach1	CONDUIT	710.50	0 00:43	5.46	0.30	0.54
7_DUMMY	DUMMY	241.44	0 00:35			
8_DUMMY	DUMMY	78.64	0 00:35			
9_DUMMY	DUMMY	133.22	0 00:40			
E_Jewell_Avenue_Pipe	CONDUIT	177.79	0 00:42	19.84	0.79	0.67
E_Jewell_Culvert	CONDUIT	888.13	0 00:43	22.13	0.33	0.37
10_DUMMY	DUMMY	172.11	0 00:40			
9	DUMMY	31.99	0 00:35			
10	DUMMY	74.34	0 00:35			
11	DUMMY	146.47	0 00:35			
12	DUMMY	84.04	0 00:35			
13	DUMMY	93.91	0 00:35			
LouisianaCulvert	CONDUIT	279.27	0 00:46	21.99	0.32	0.36
14	DUMMY	888.13	0 00:43			
PondC1	ORIFICE	30.67	0 01:07			0.00
PondC3	ORIFICE	30.20	0 01:15			0.00
Outlet_to_CoalCreek_100yr	DUMMY	418.05	0 01:34			
PondD_Outlet	DUMMY	205.84	0 01:00			






 Conduit Surcharge Summary

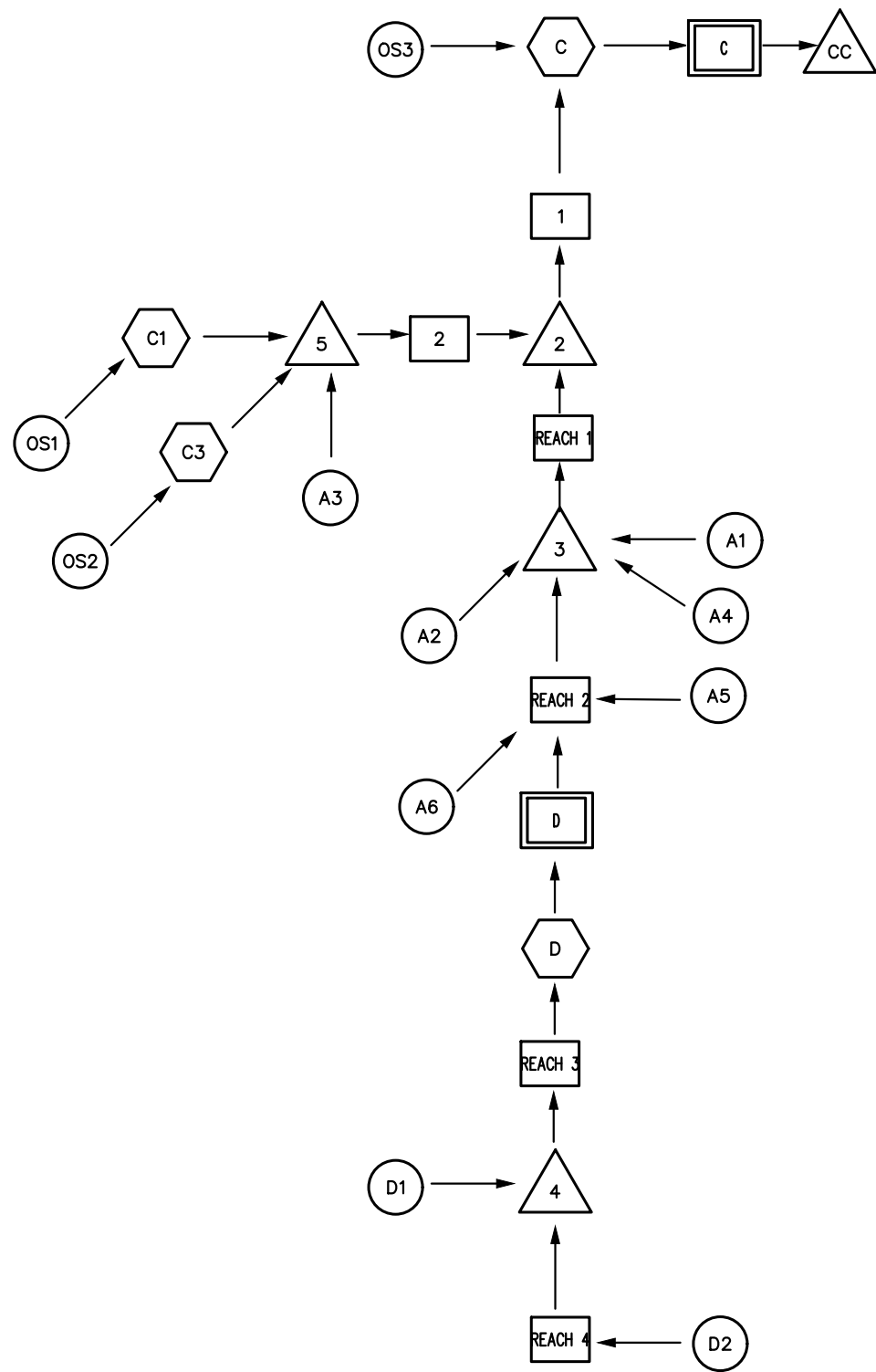
No conduits were surcharged.

Analysis begun on: Tue Nov 14 11:30:07 2023
 Analysis ended on: Tue Nov 14 11:30:07 2023
 Total elapsed time: < 1 sec

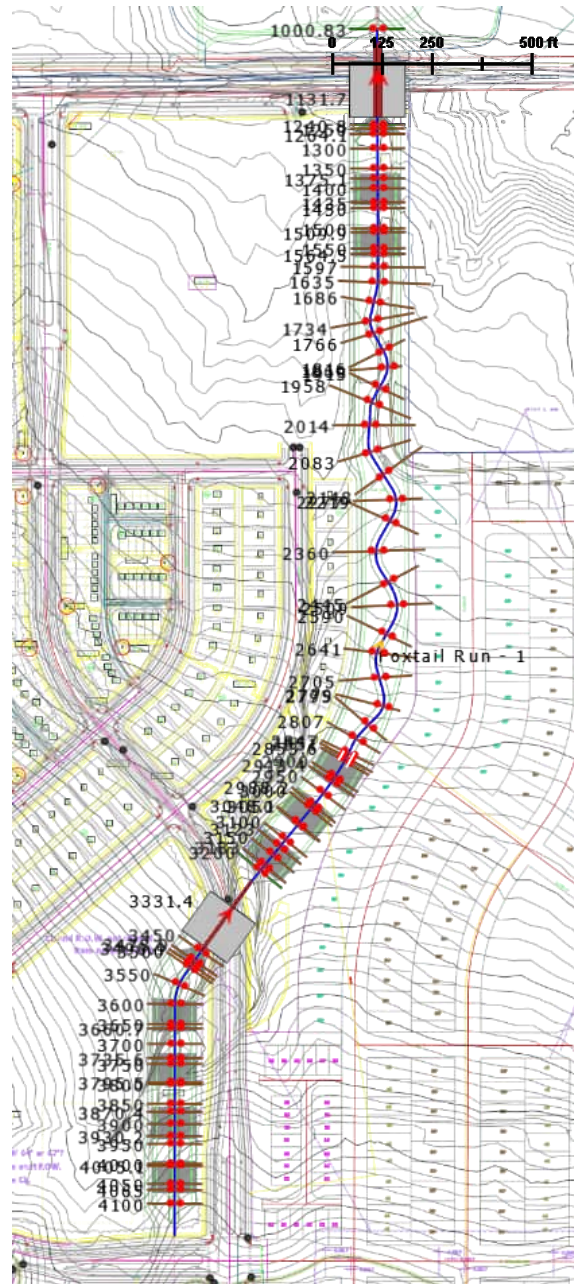
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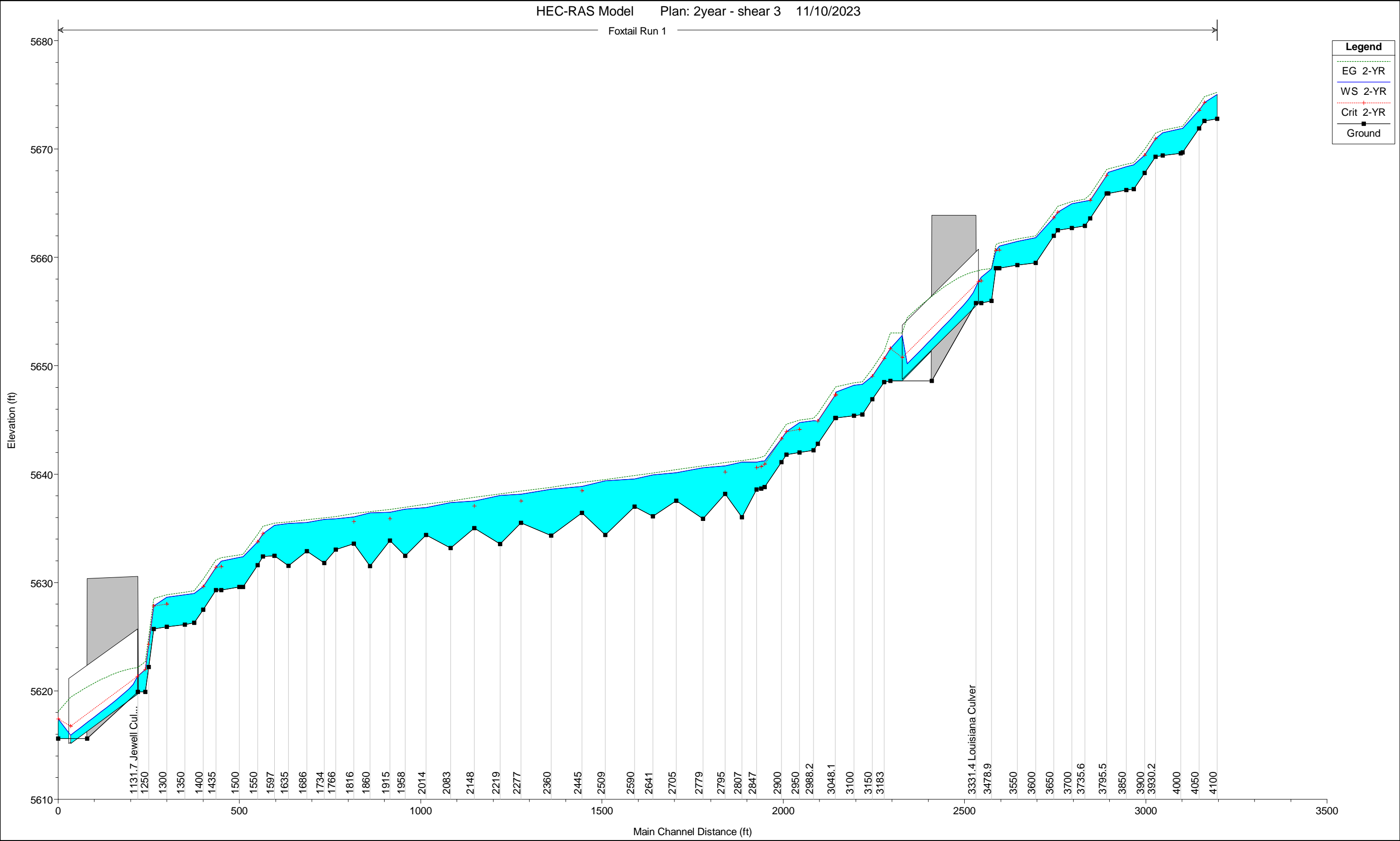
LEGEND

	SUB-WATERSHED
	OUTFALL
	DETENTION POND
	ROUTING ELEMENT
	POND OUTLET STRUCTURE



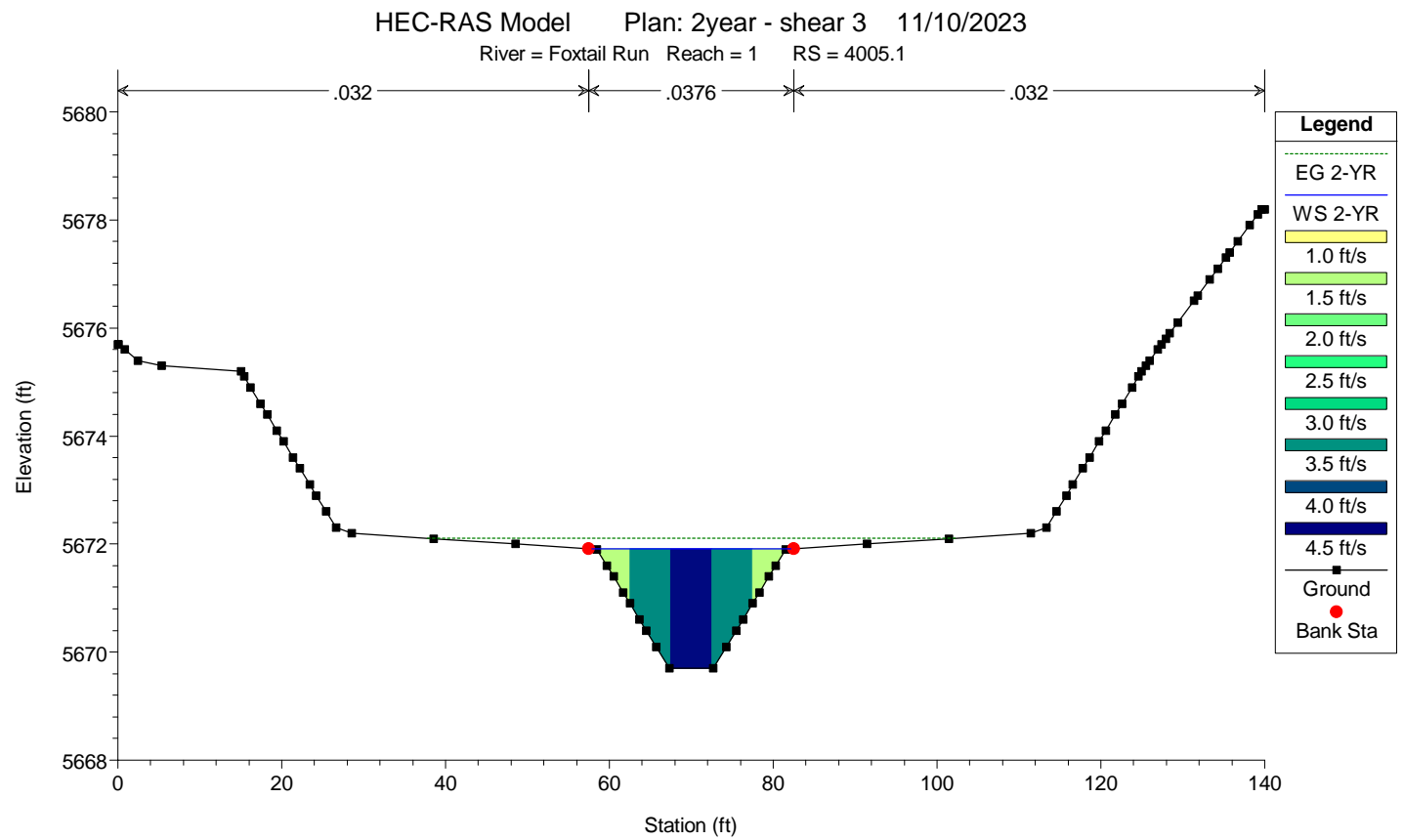
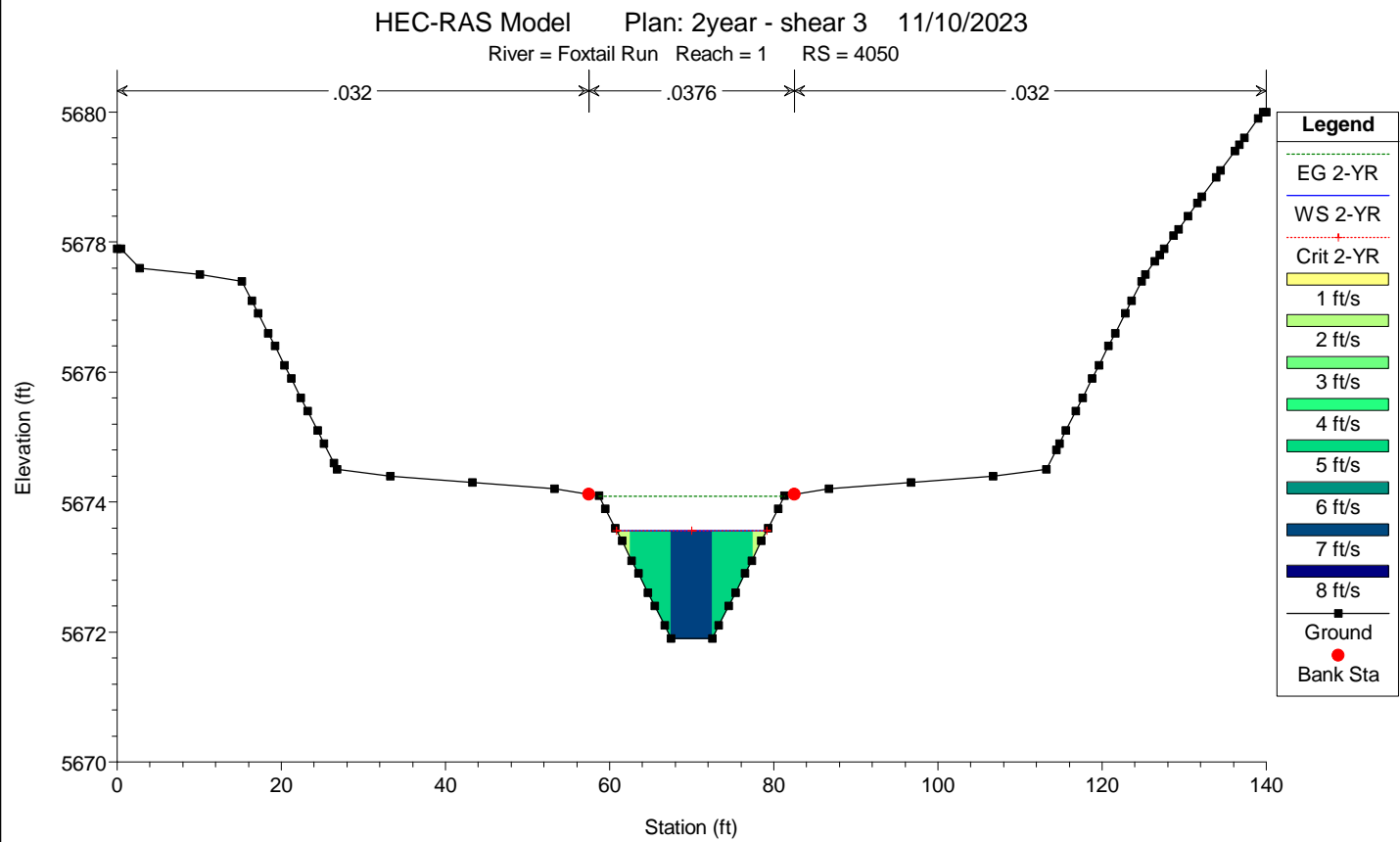
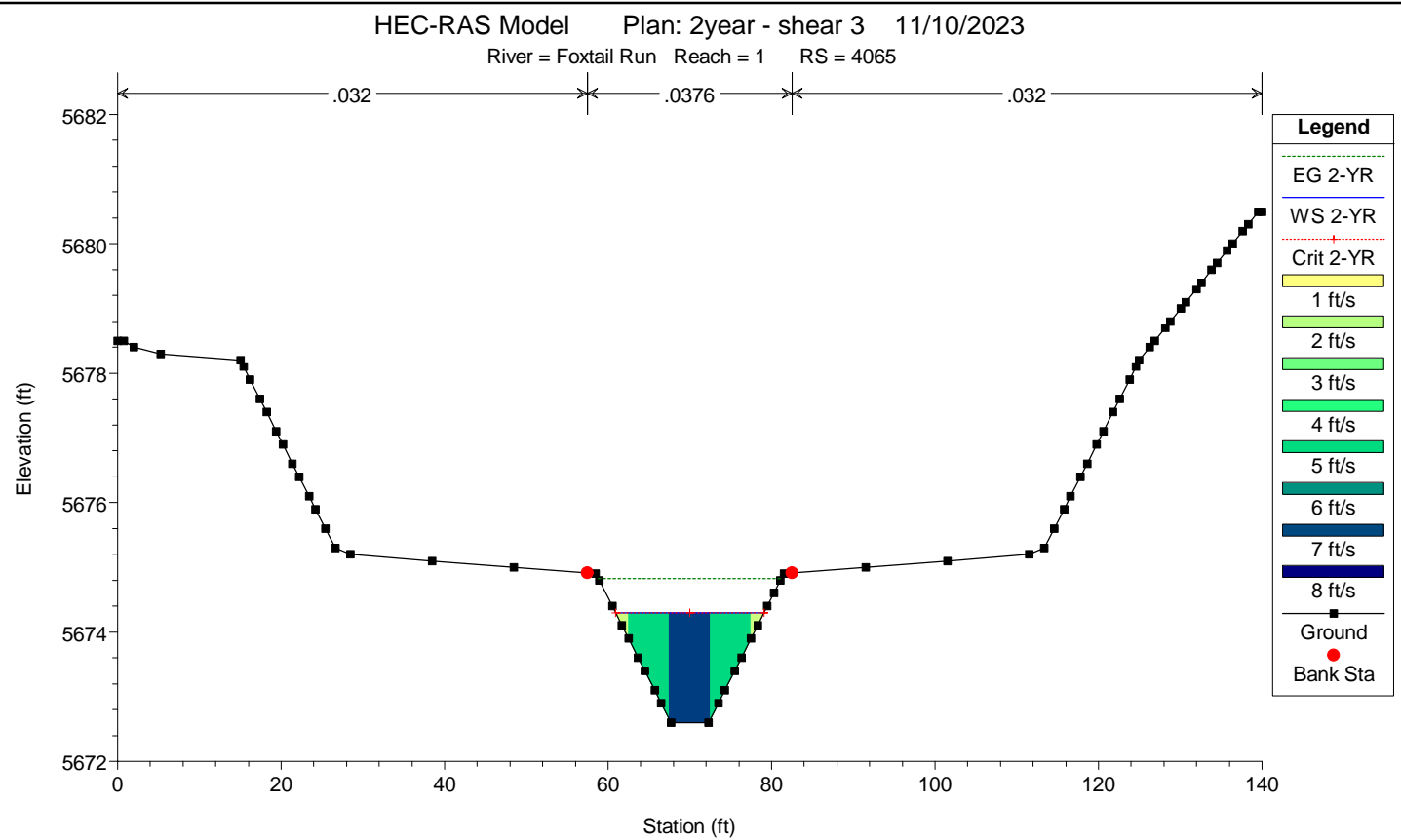
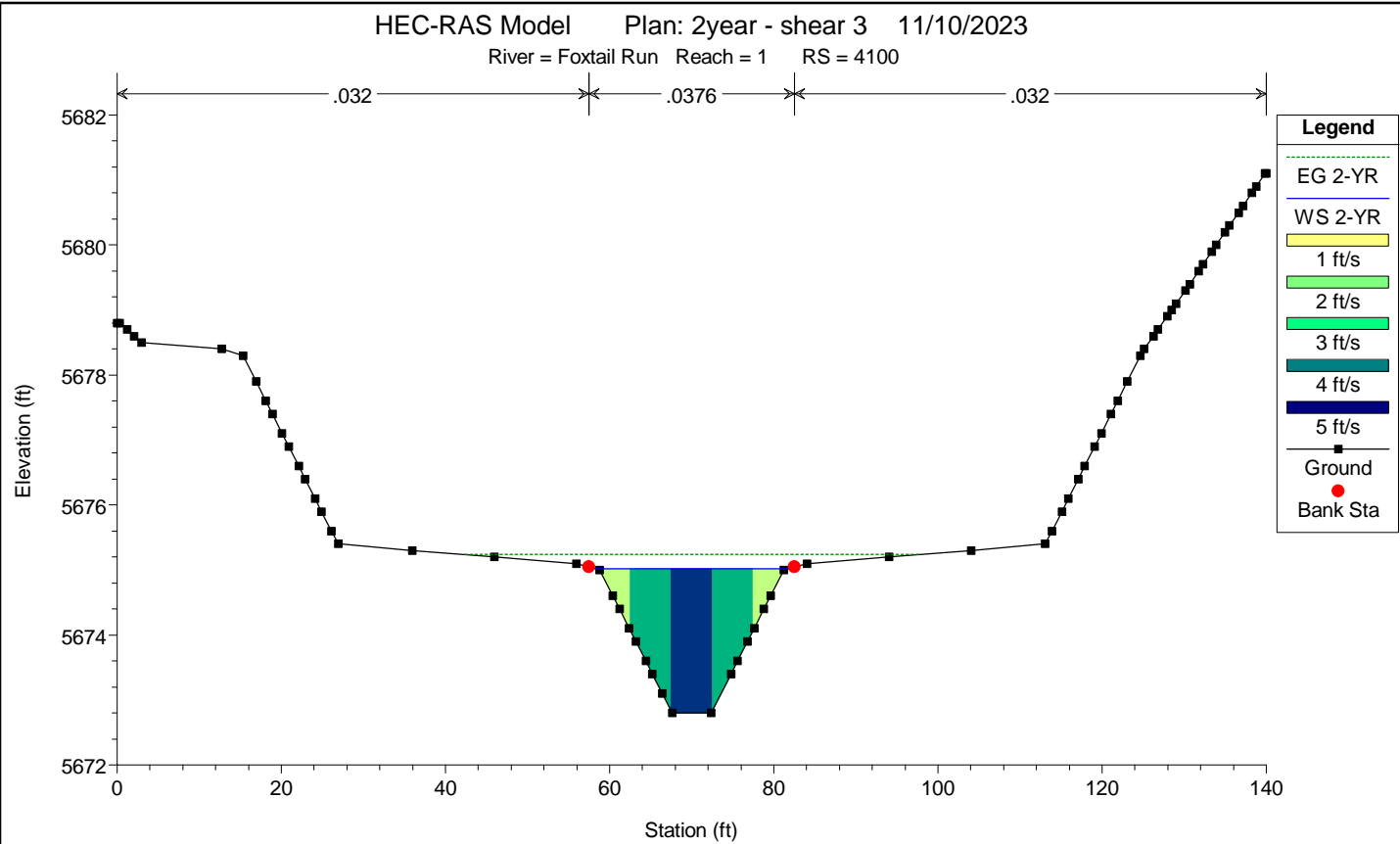
SWMM MODEL
SCHEMATICS
FOUNDRY
JOB NO. 16146.00
6/14/23
SHEET 1 OF 1

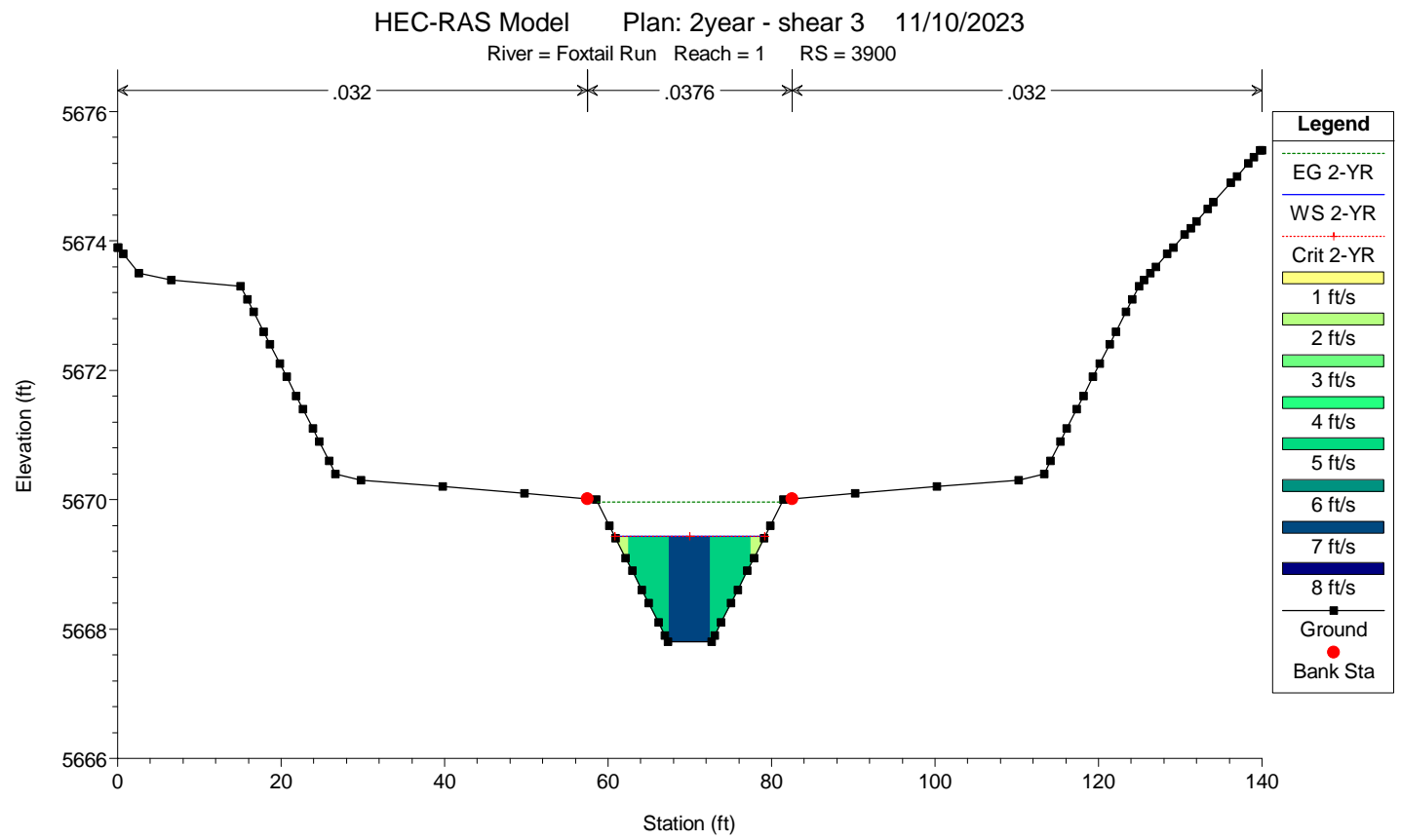
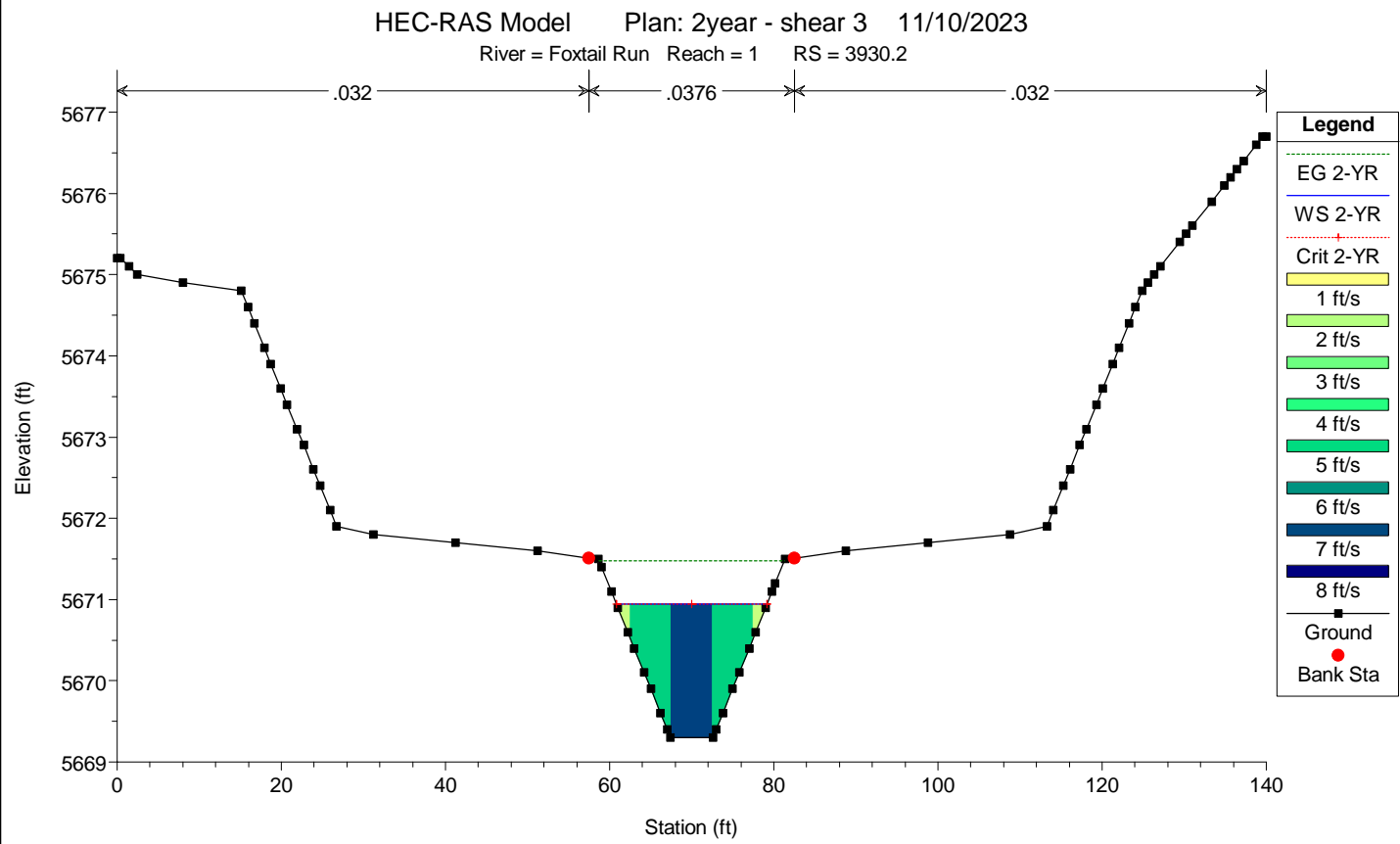
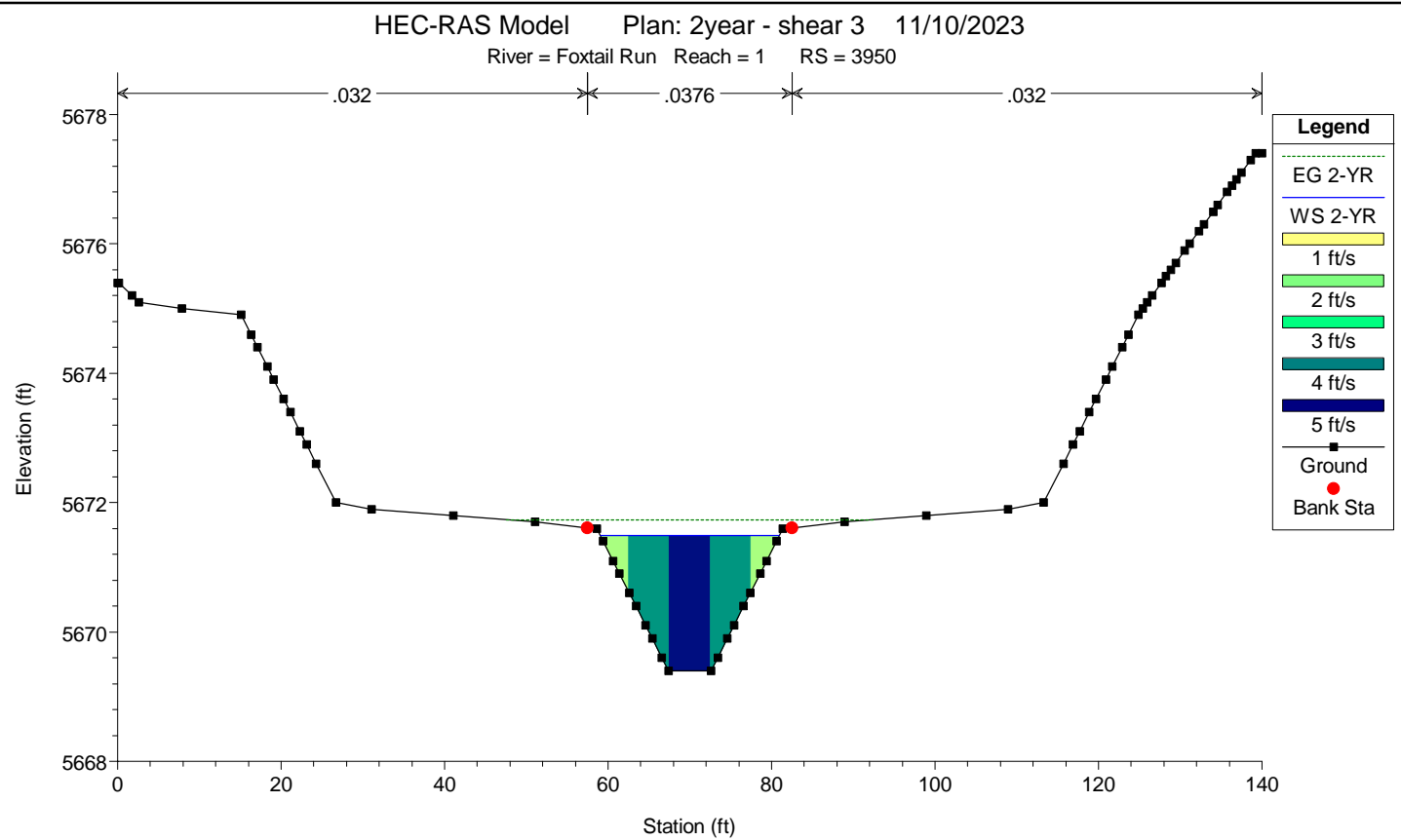
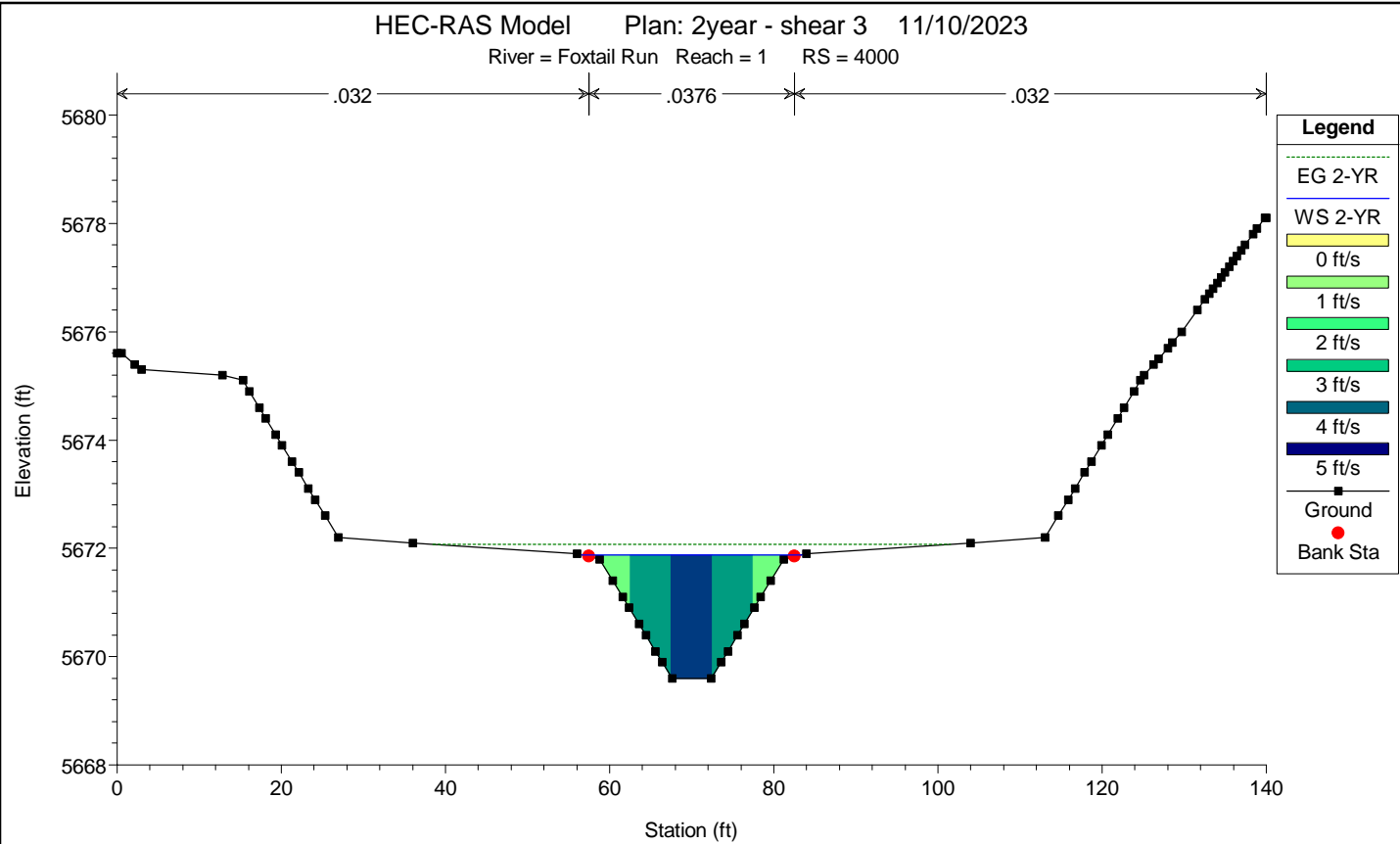


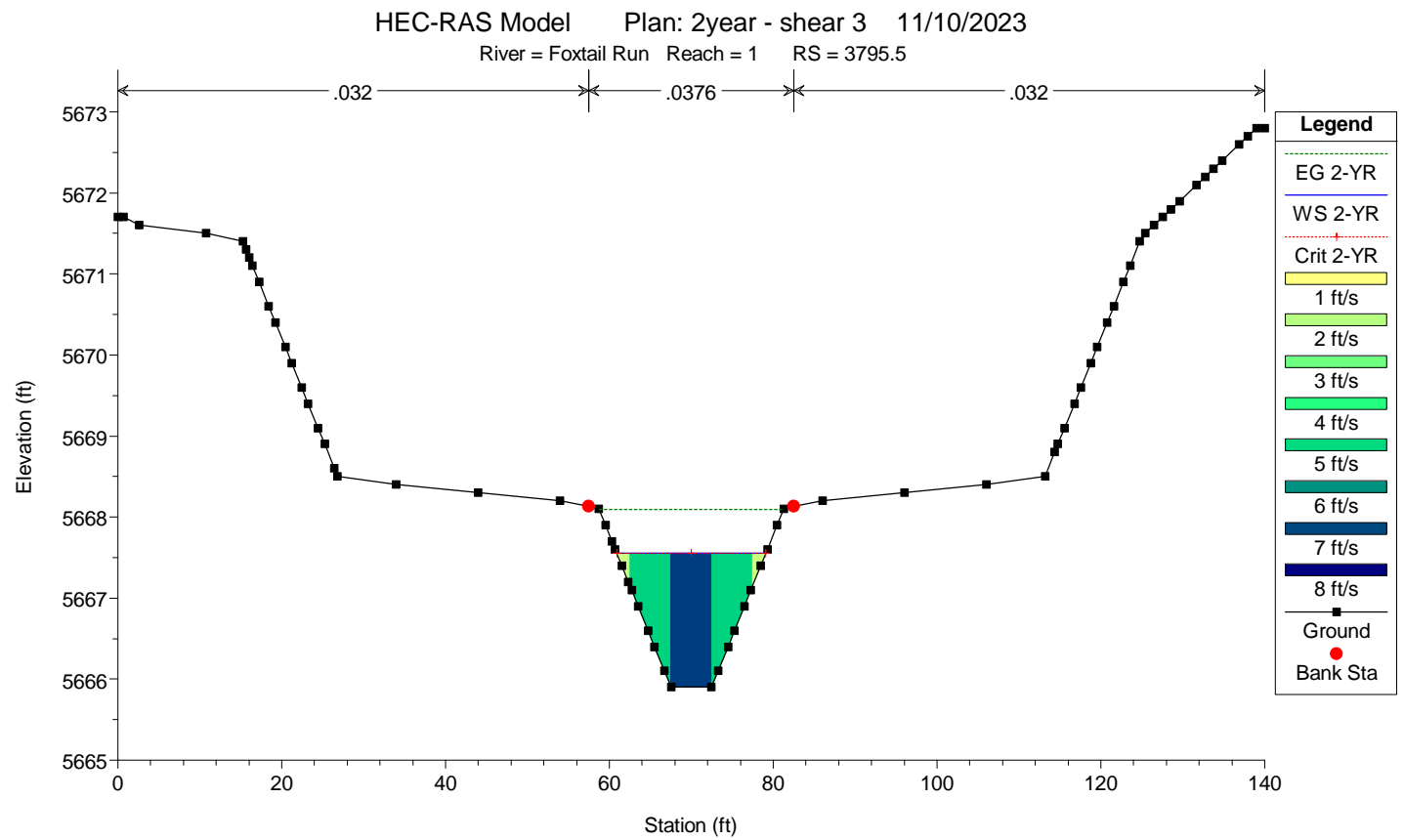
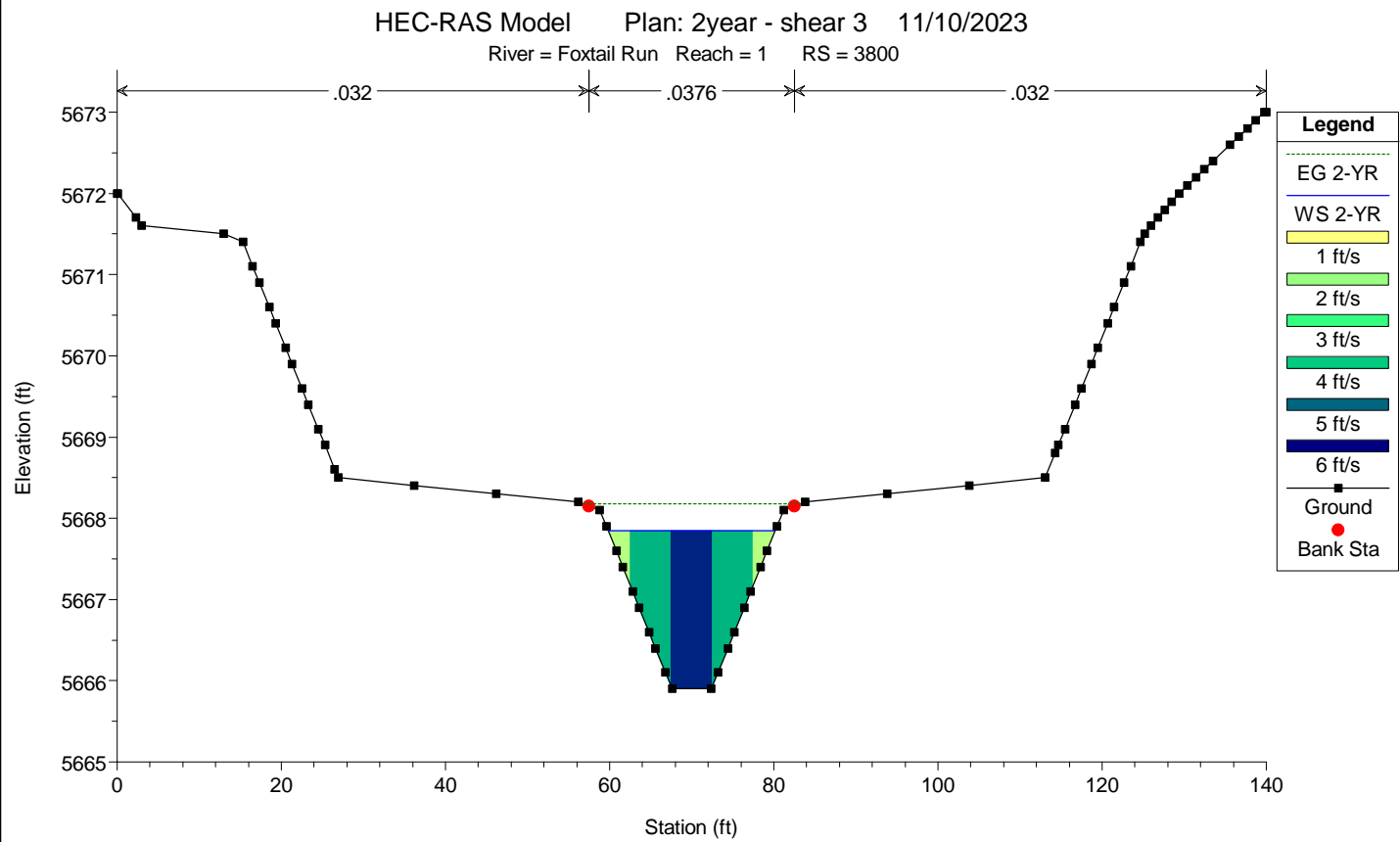
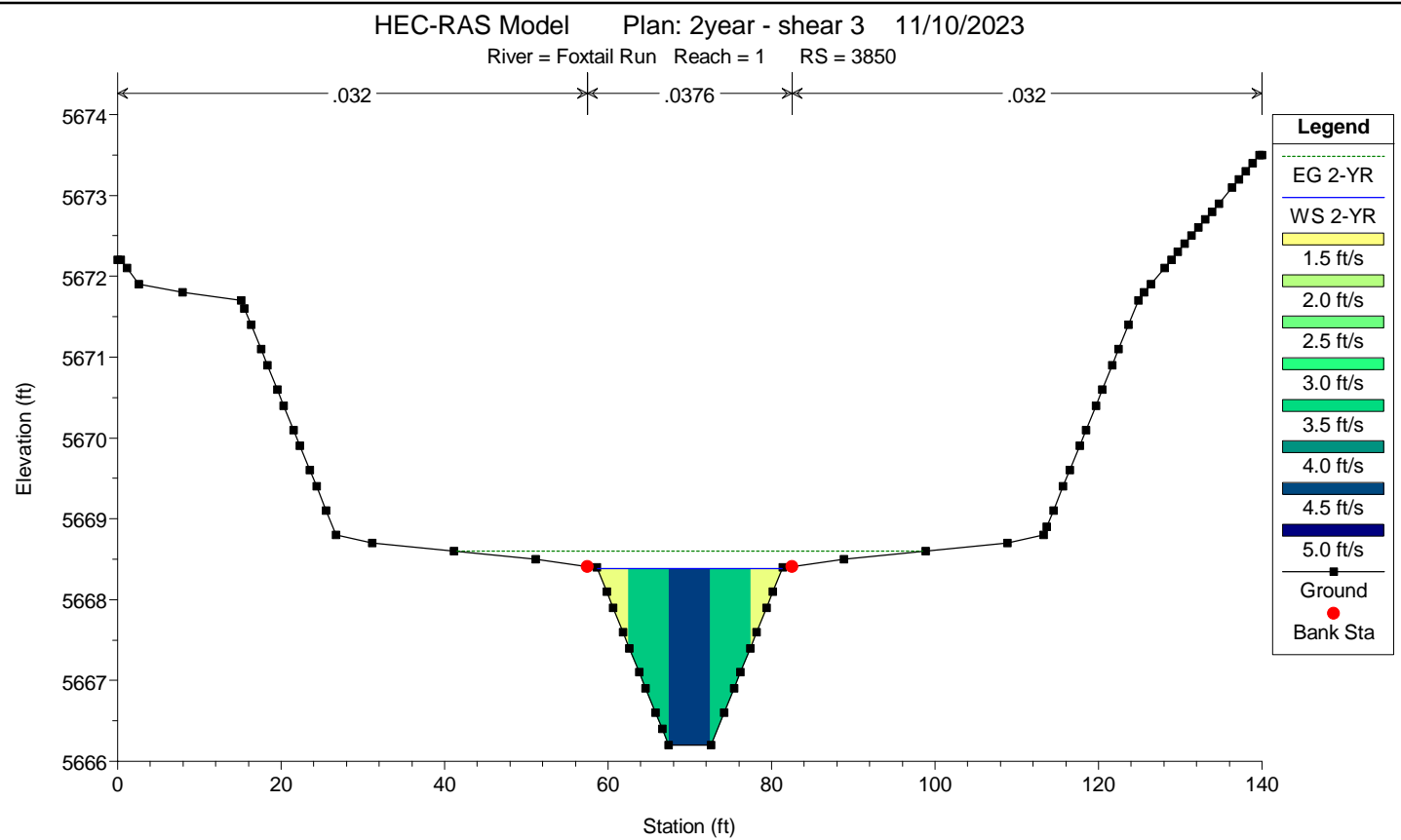
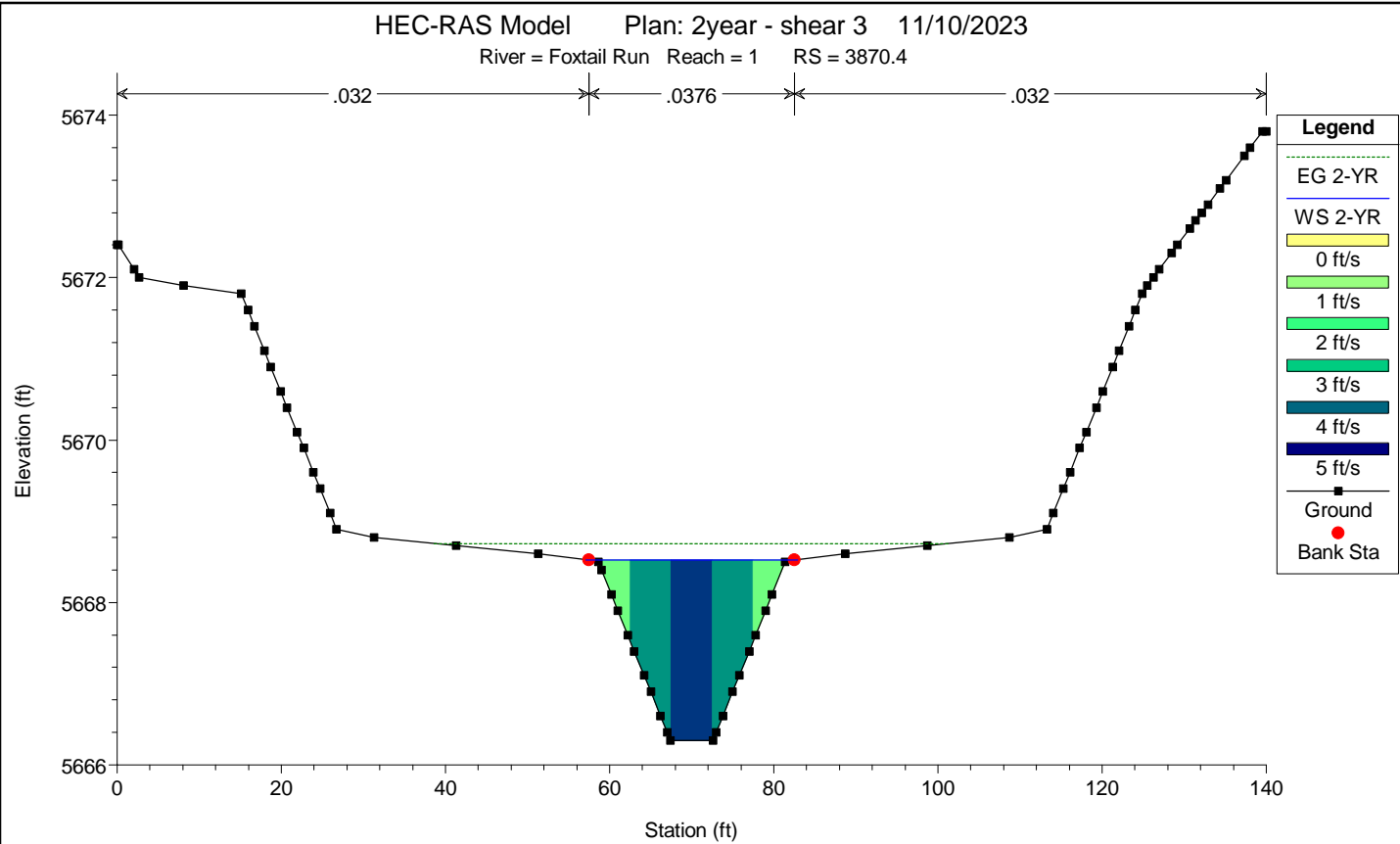


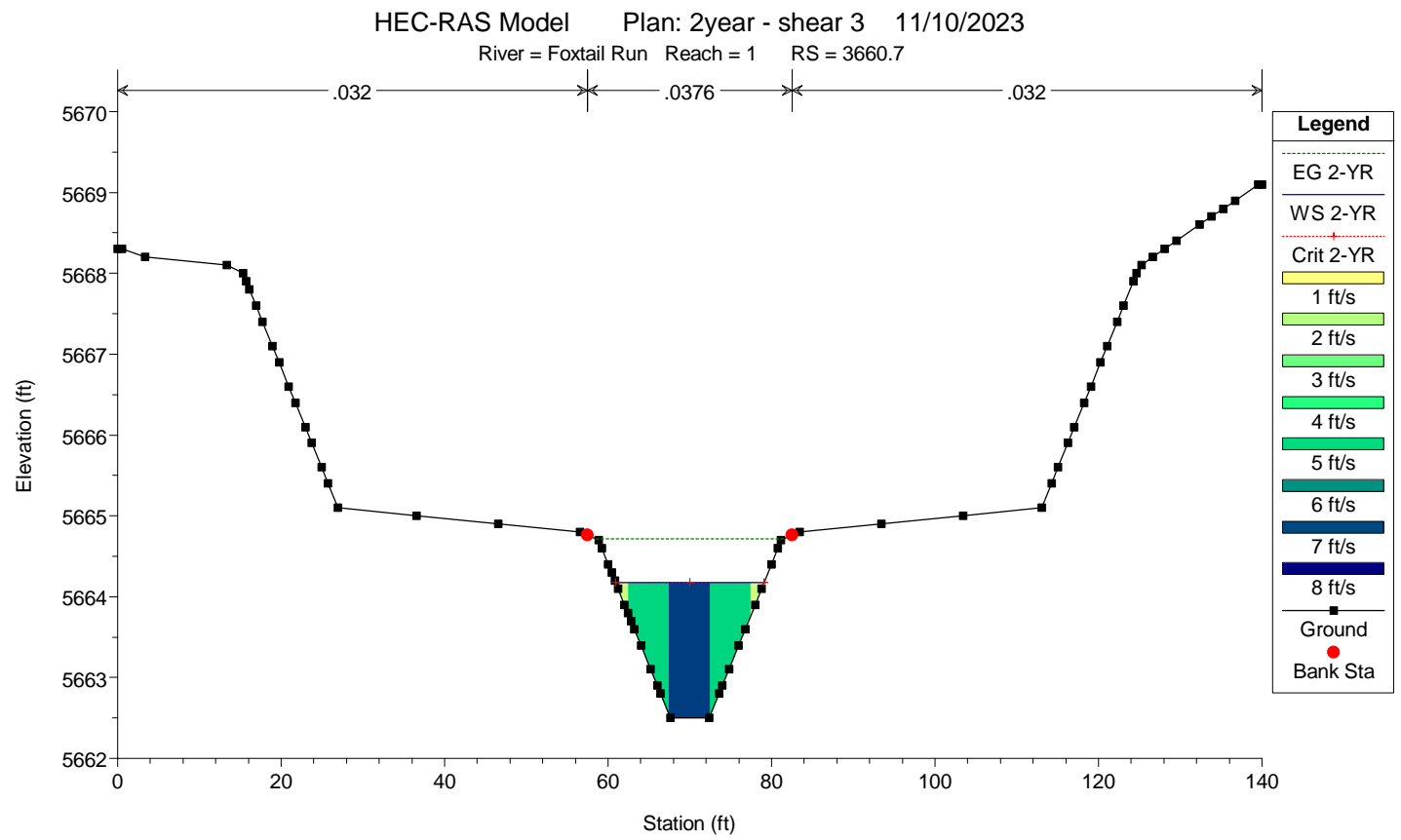
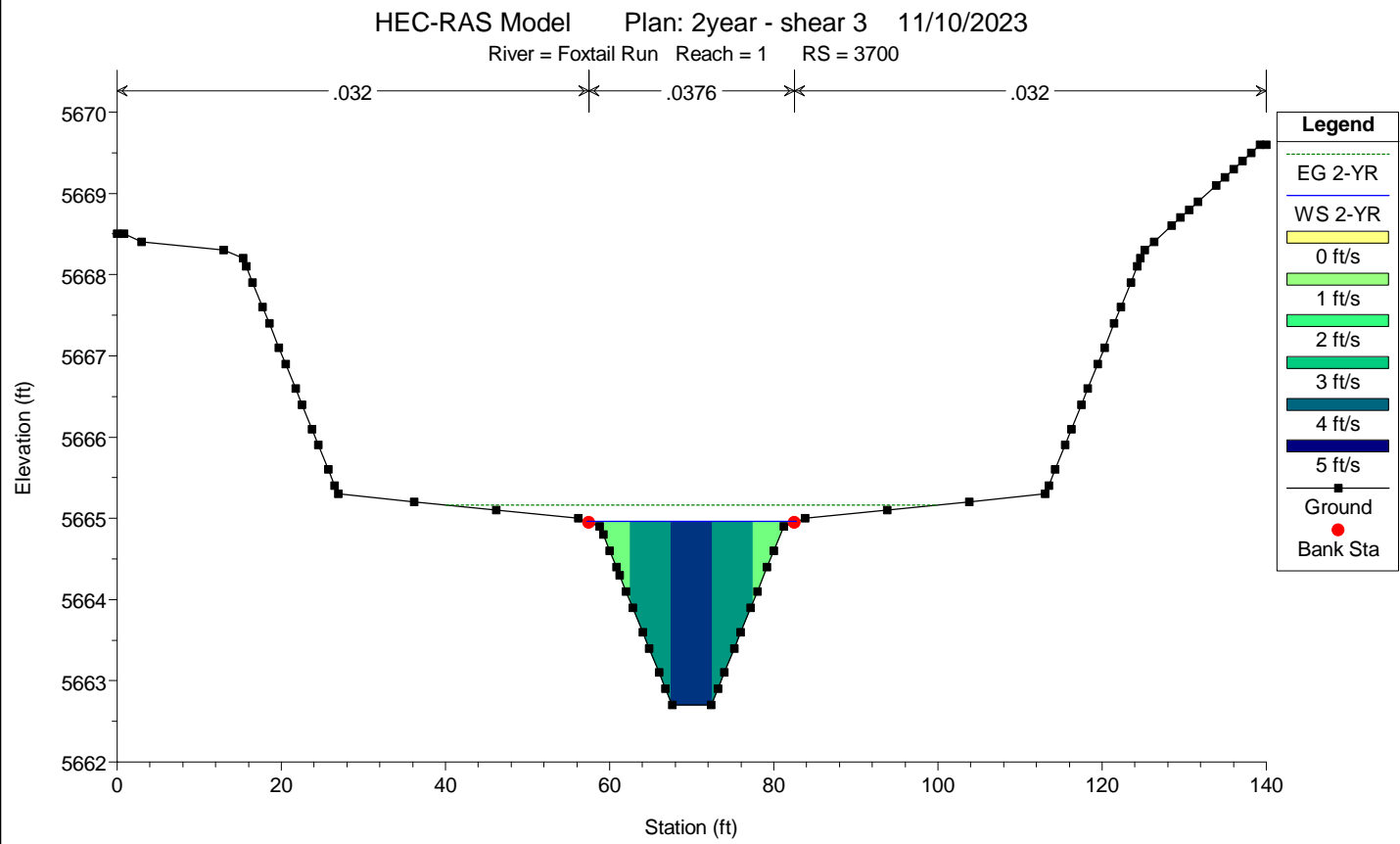
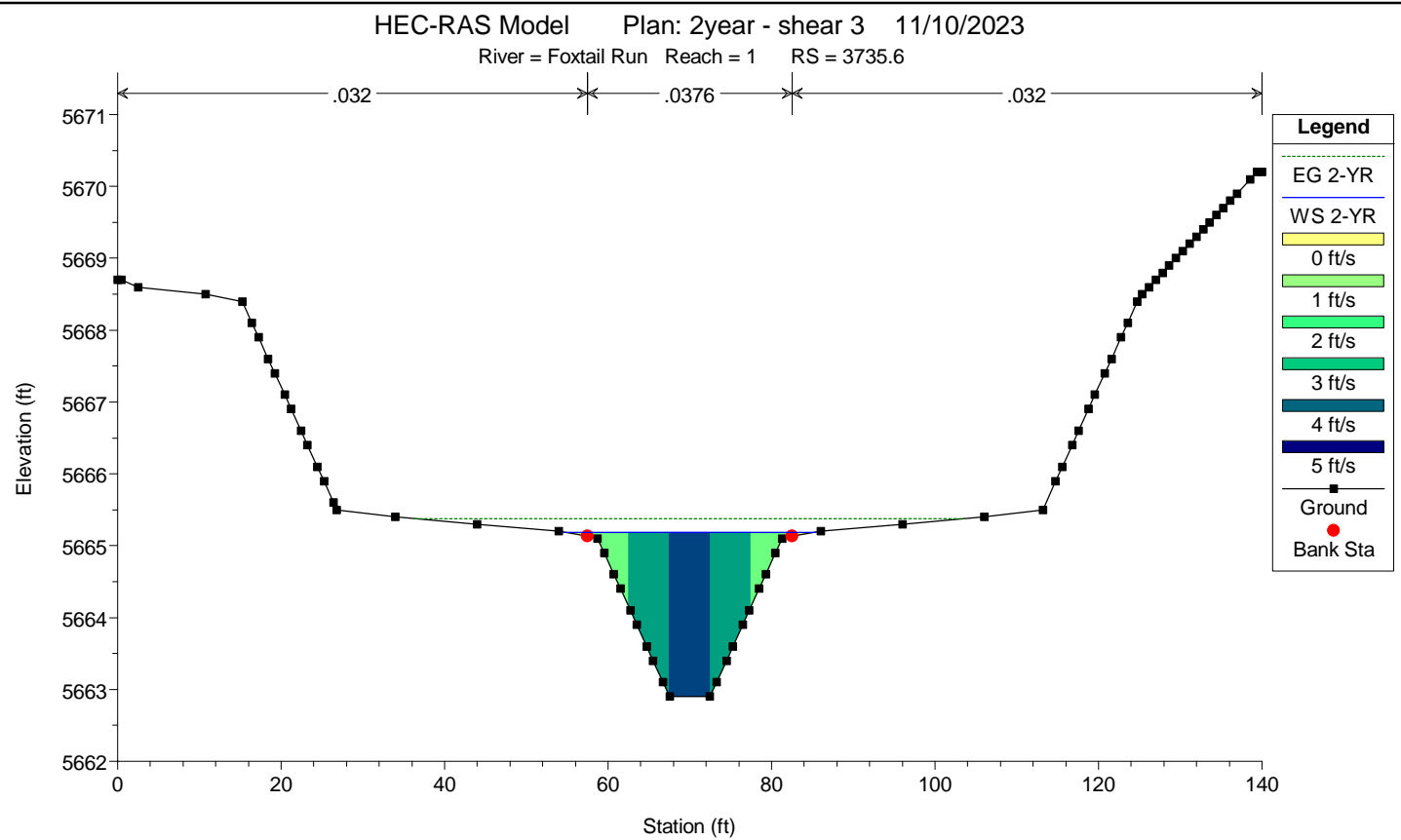
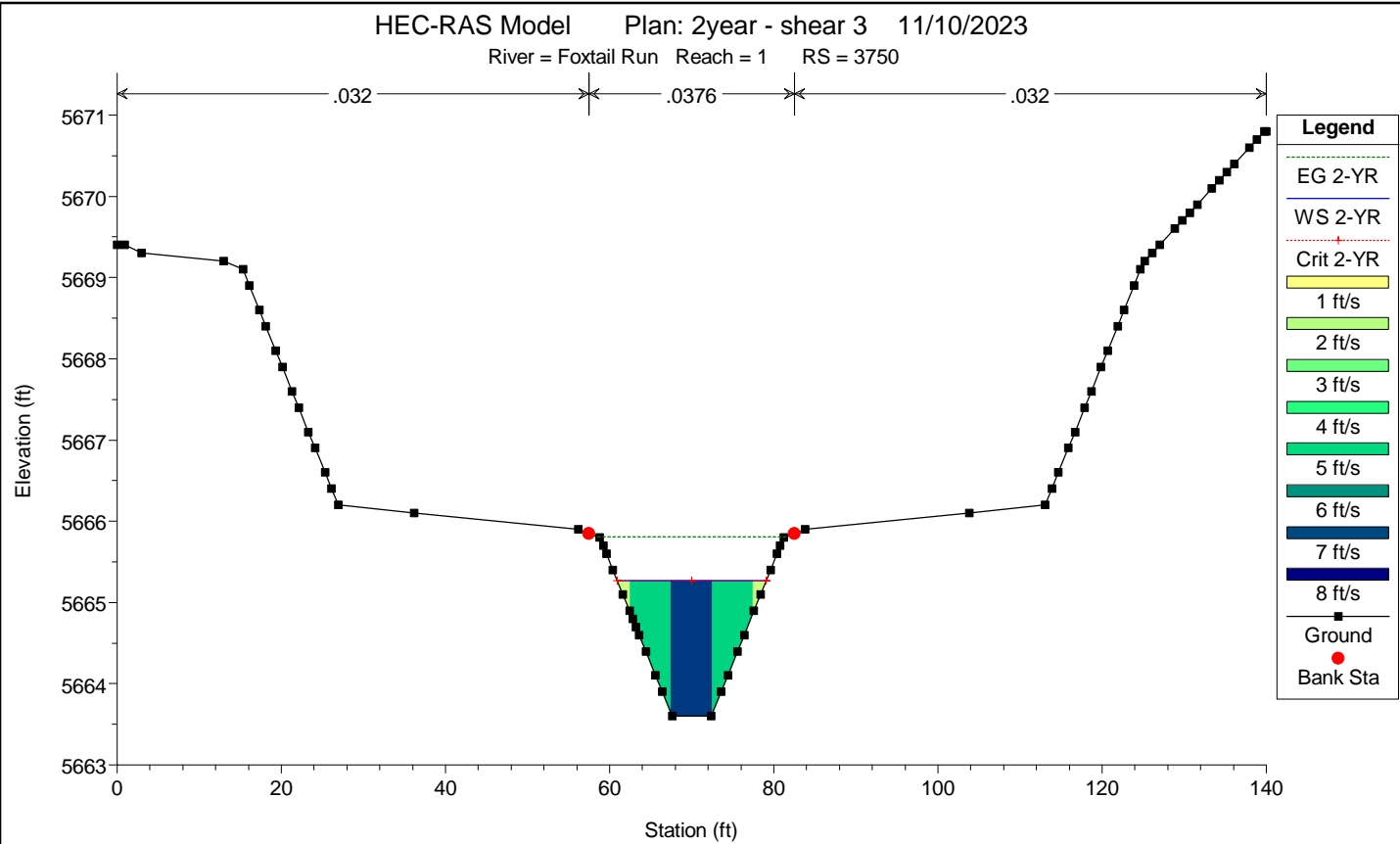
HEC-RAS Plan: 2year - shear 3 River: Foxtail Run Reach: 1 Profile: 2-YR

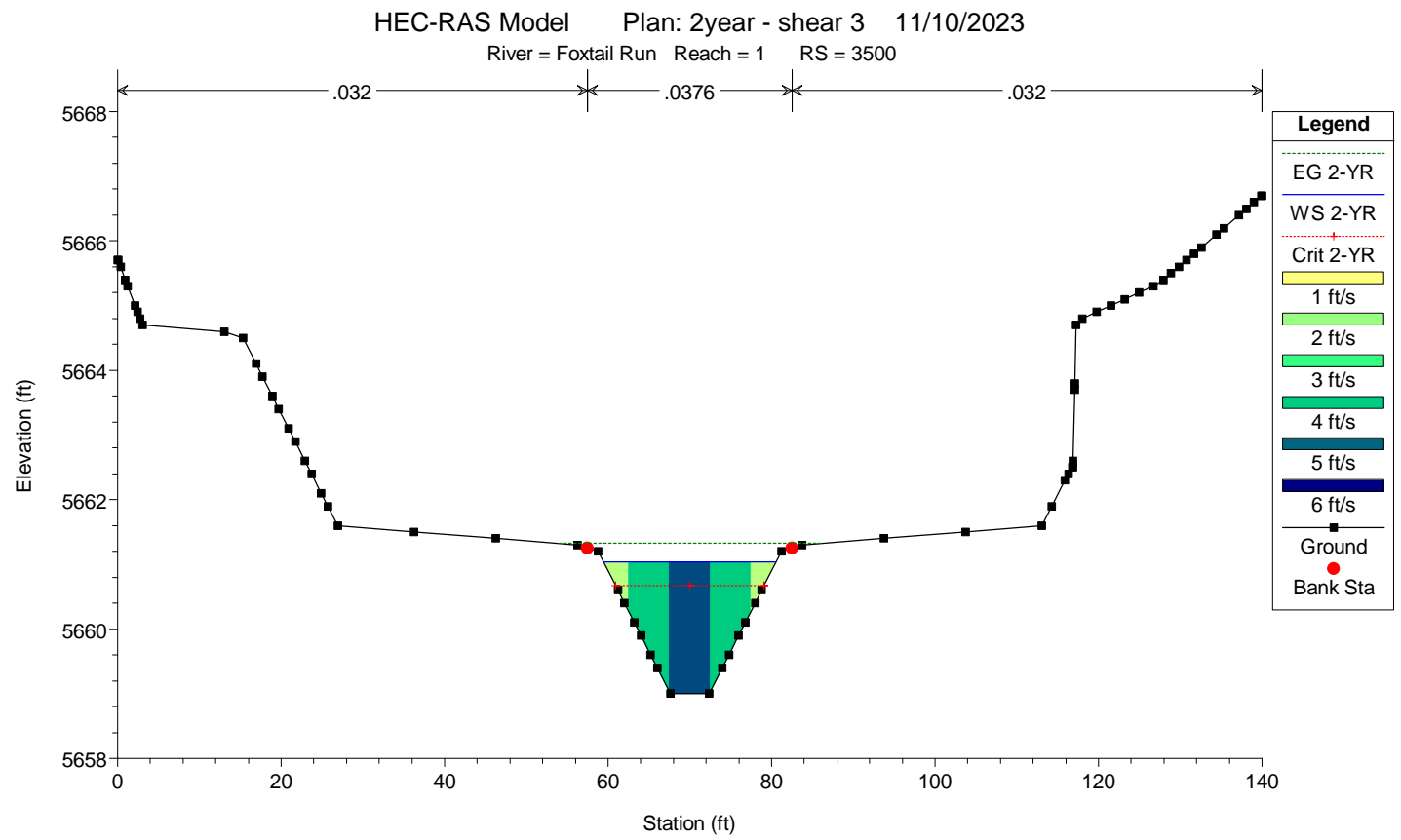
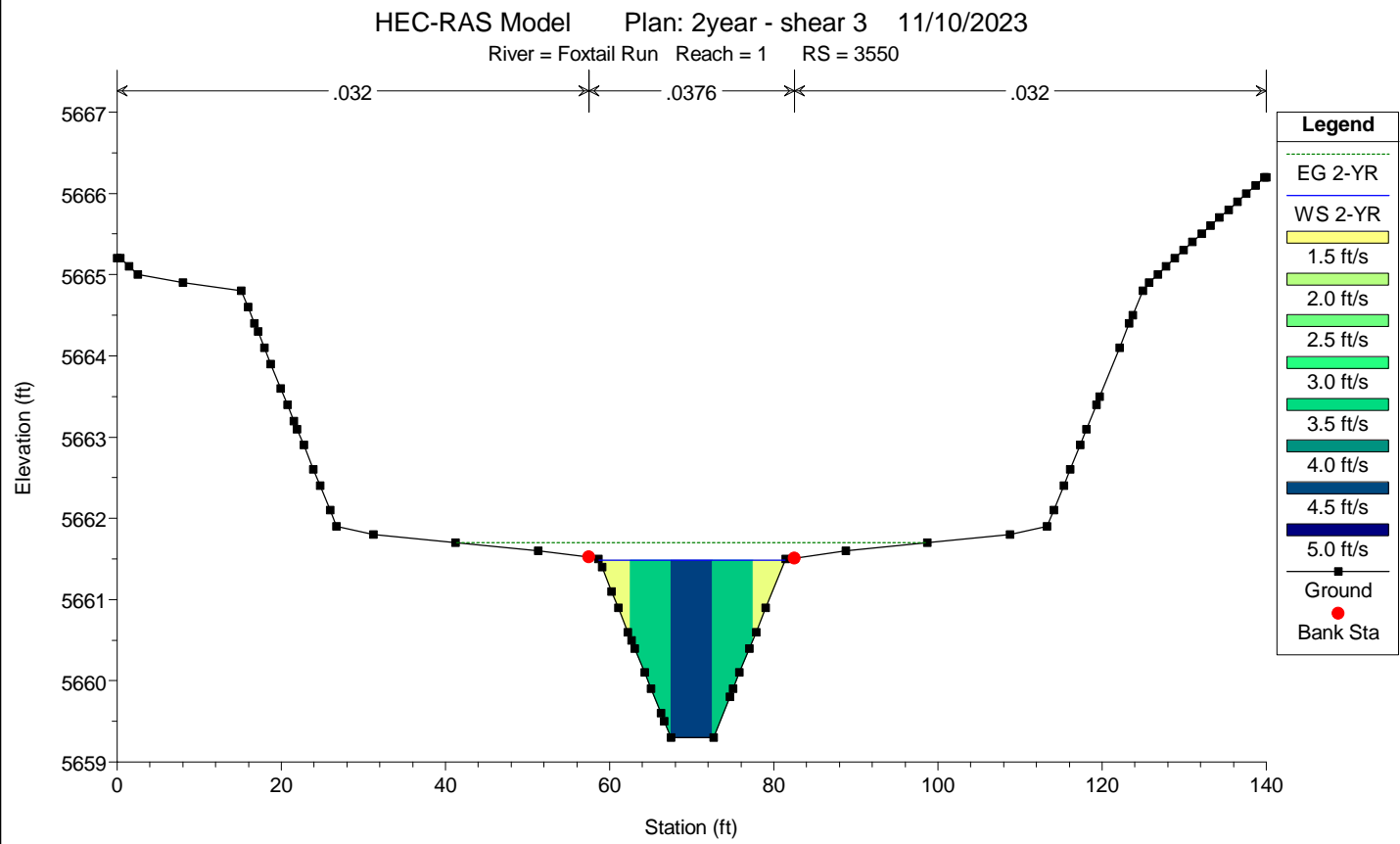
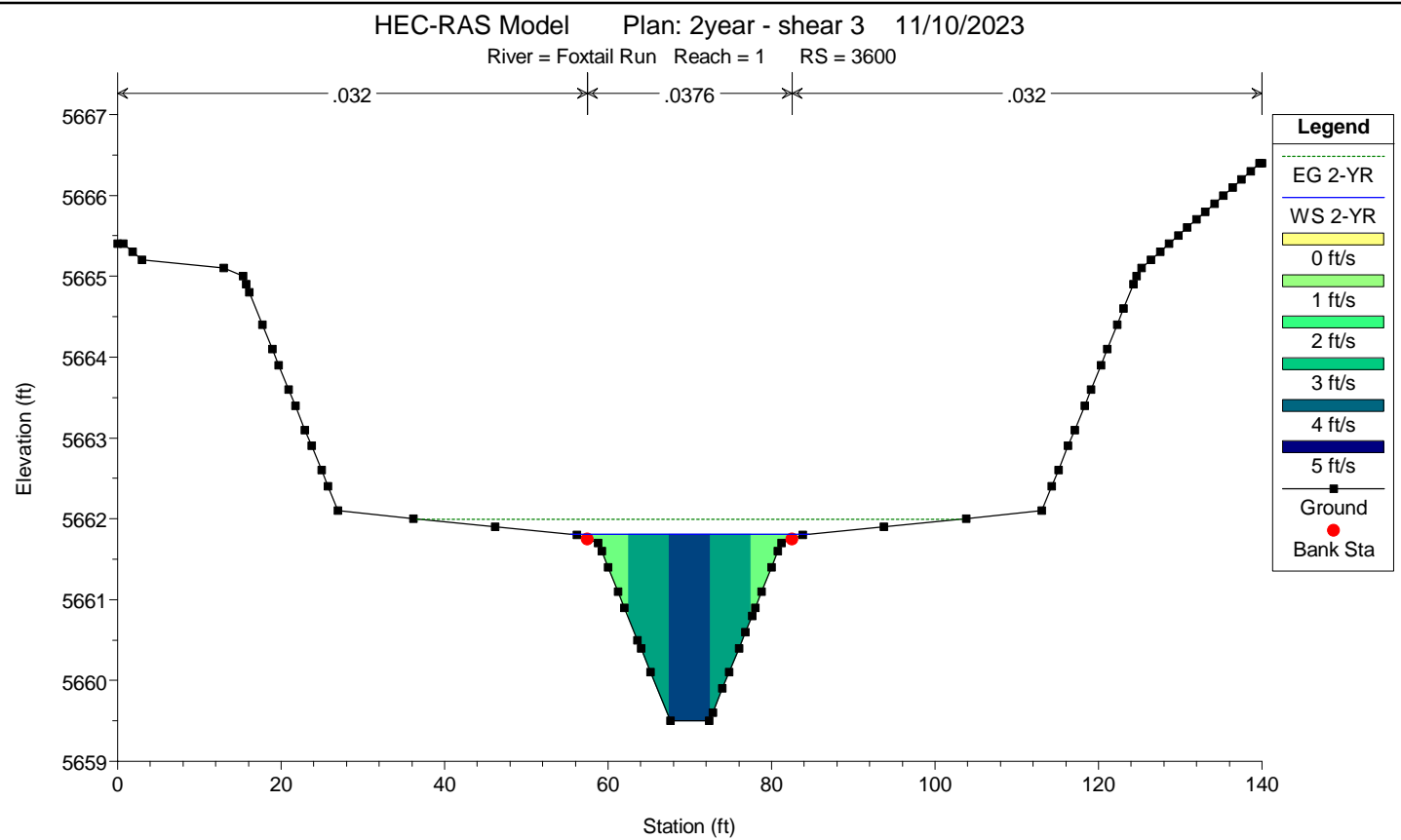
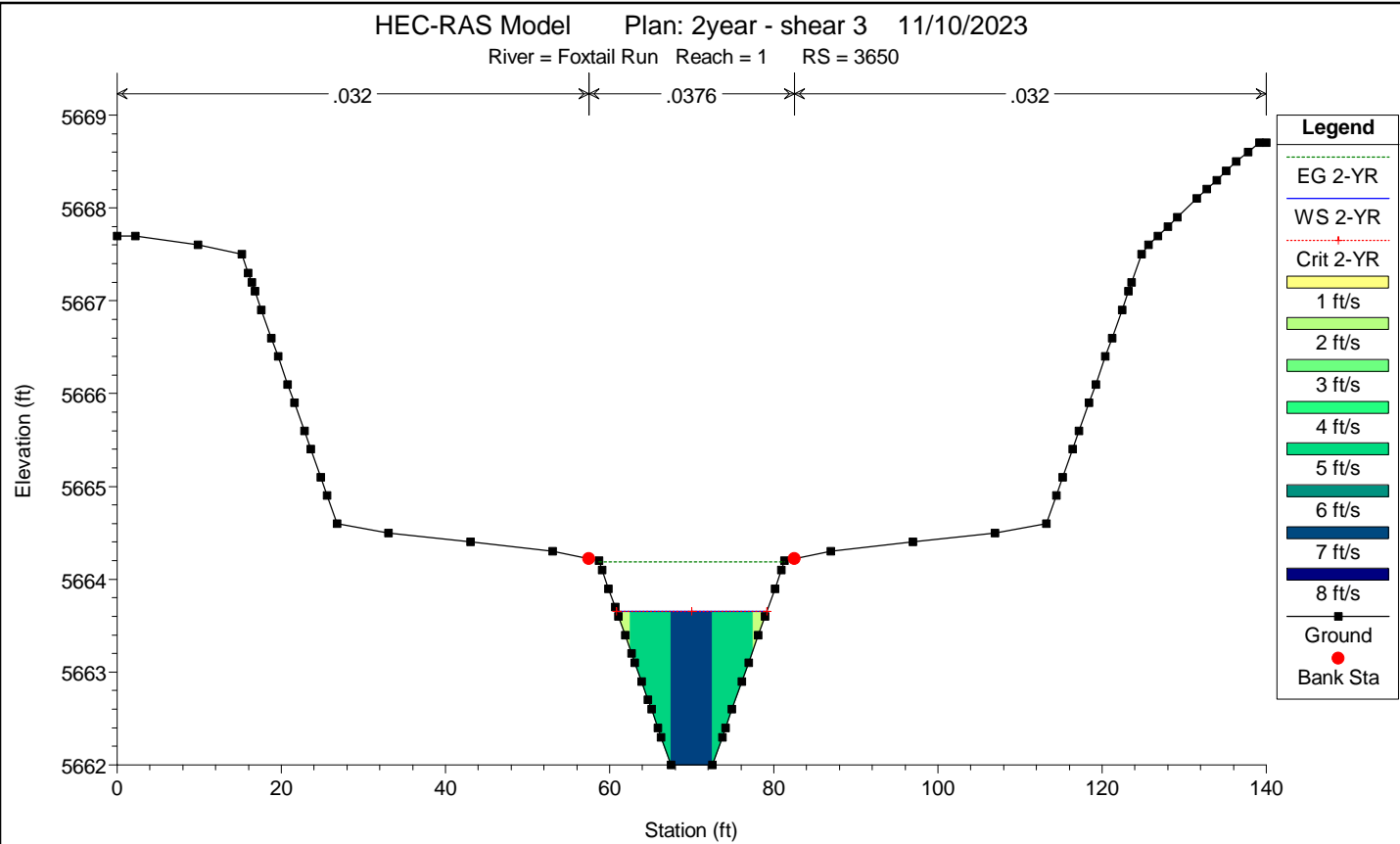
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	Shear Total (lb/sq ft)
1	4100	2-YR	112.90	5672.80	5675.02		5675.24	0.006458	3.71	30.43	23.55	0.58		0.51		0.51
1	4065	2-YR	112.90	5672.60	5674.29	5674.29	5674.83	0.020947	5.86	19.26	18.15	1.00		1.36		1.36
1	4050	2-YR	112.90	5671.90	5673.56	5673.56	5674.09	0.020919	5.84	19.32	18.28	1.00		1.35		1.35
1	4005.1	2-YR	112.90	5669.70	5671.91		5672.11	0.006069	3.60	31.40	24.33	0.56		0.48		0.48
1	4000	2-YR	112.90	5669.60	5671.88		5672.08	0.005993	3.54	31.88	26.79	0.55	0.01	0.47	0.01	0.44
1	3950	2-YR	112.90	5669.40	5671.49		5671.74	0.007475	3.99	28.29	21.90	0.62		0.59		0.59
1	3930.2	2-YR	112.90	5669.30	5670.94	5670.94	5671.47	0.021049	5.85	19.30	18.32	1.00		1.35		1.35
1	3900	2-YR	112.90	5667.80	5669.43	5669.43	5669.96	0.020966	5.84	19.34	18.37	1.00		1.35		1.35
1	3870.4	2-YR	112.90	5666.30	5668.53		5668.73	0.006306	3.60	31.37	25.83	0.57		0.48		0.47
1	3850	2-YR	112.90	5666.20	5668.38		5668.60	0.006207	3.72	30.31	22.62	0.57		0.51		0.51
1	3800	2-YR	112.90	5665.90	5667.85		5668.18	0.011044	4.62	24.43	20.34	0.74		0.81		0.81
1	3795.5	2-YR	112.90	5665.90	5667.56	5667.56	5668.09	0.021244	5.88	19.20	18.22	1.01		1.37		1.37
1	3750	2-YR	112.90	5663.60	5665.27	5665.27	5665.81	0.021512	5.91	19.09	18.12	1.02		1.38		1.38
1	3735.6	2-YR	112.90	5662.90	5665.19		5665.38	0.005636	3.48	32.61	30.87	0.54	0.01	0.45	0.01	0.37
1	3700	2-YR	112.90	5662.70	5664.96		5665.16	0.006356	3.61	31.30	25.49	0.57		0.49		0.48
1	3660.7	2-YR	112.90	5662.50	5664.18	5664.18	5664.71	0.021073	5.87	19.24	18.18	1.01		1.36		1.36
1	3650	2-YR	112.90	5662.00	5663.66	5663.66	5664.19	0.020903	5.84	19.33	18.29	1.00		1.35		1.35
1	3600	2-YR	112.90	5659.50	5661.81		5662.00	0.005599	3.47	32.60	29.19	0.54	0.01	0.44	0.01	0.38
1	3550	2-YR	112.90	5659.30	5661.49		5661.70	0.006143	3.71	30.42	22.65	0.56		0.50		0.50
1	3500	2-YR	112.90	5659.00	5661.04	5660.68	5661.32	0.009040	4.29	26.32	21.07	0.68		0.69		0.69
1	3490.9	2-YR	112.90	5659.00	5660.65	5660.65	5661.18	0.021086	5.85	19.28	18.31	1.01		1.36		1.36
1	3478.9	2-YR	112.90	5656.00	5658.95		5658.99	0.000839	1.77	77.27	74.72	0.22	0.03	0.10	0.03	0.05
1	3450	2-YR	112.90	5655.80	5658.17	5657.82	5658.86	0.009434	6.67	16.94	25.27	0.77		1.35		1.35
1	3331.4 Louisiana Culvert	Culvert														
1	3200	2-YR	209.50	5648.60	5651.59	5651.59	5653.04	0.014114	9.66	21.68	76.74	0.99		2.60		2.60
1	3183	2-YR	209.50	5648.50	5650.67	5650.67	5651.36	0.019516	6.66	31.44	23.18	1.01		1.62		1.62
1	3150	2-YR	209.50	5646.90	5649.03	5649.03	5649.72	0.019716	6.67	31.39	23.27	1.01		1.62		1.62
1	3123	2-YR	209.50	5645.50	5648.29		5648.53	0.004668	4.05	62.58	90.25	0.52	0.07	0.54	0.07	0.20
1	3100	2-YR	209.50	5645.40	5648.20		5648.42	0.004419	3.97	64.50	90.59	0.51	0.07	0.51	0.07	0.20
1	3050	2-YR	209.50	5645.20	5647.56	5647.32	5648.05	0.012209	5.62	37.53	33.54	0.81	0.02	1.11	0.02	0.84
1	3048.1	2-YR	209.50	5645.20	5647.31	5647.31	5648.00	0.019625	6.66	31.47	23.35	1.01		1.62		1.62
1	3000	2-YR	209.50	5642.80	5644.91	5644.91	5645.59	0.019462	6.63	31.59	23.42	1.01		1.60		1.60
1	2988.2	2-YR	209.50	5642.20	5644.92		5645.16	0.004873	4.11	61.74	90.41	0.53	0.07	0.55	0.07	0.21
1	2950	2-YR	209.50	5642.00	5644.74	5644.12	5644.97	0.004613	4.02	63.39	90.51	0.52	0.07	0.53	0.07	0.20
1	2913.4	2-YR	209.50	5641.80	5643.03	5643.93	5644.62	0.019720	6.68	31.38	23.27	1.01		1.62		1.62
1	2900	2-YR	209.50	5641.10	5643.26	5643.26	5643.94	0.019279	6.63	31.61	23.28	1.00		1.60		1.60
1	2853.6	2-YR	209.50	5638.80	5641.21	5640.94	5641.68	0.011208	5.47	38.86	37.53	0.78	0.04	1.05	0.04	0.71
1	2851	2-YR	209.50	5638.67	5641.20	5640.69	5641.56	0.007286	4.79	45.40	58.80	0.64	0.03	0.77	0.03	0.35
1	2847	2-YR	209.50	5638.58	5641.12	5640.60	5641.46	0.007334	4.67	45.70	50.10	0.64	0.02	0.74	0.02	0.41
1	2807	2-YR	209.50	5636.01	5641.12		5641.25	0.002195	2.94	76.93	76.72	0.35	0.02	0.27	0.02	0.13
1	2795	2-YR	209.50	5638.18	5640.76	5640.19	5641.07	0.006552	4.44	49.54	73.64	0.61	0.02	0.67	0.03	0.27
1	2779	2-YR	209.50	5635.89	5640.58		5640.76	0.003191	3.38	66.31	76.44	0.41	0.02	0.37	0.02	0.17
1	2705	2-YR	209.50	5637.54	5640.13		5640.43	0.006277	4.36	48.95	45.73	0.59	0.03	0.64	0.02	0.41
1	2641	2-YR	209.50	5636.11	5639.94		5640.12	0.003093	3.38	66.46	76.51	0.42	0.02	0.37	0.02	0.16
1	2590	2-YR	209.50	5637.00	5639.55		5639.87	0.006993	4.54	46.64	41.50	0.62	0.02	0.70	0.02	0.48
1	2509	2-YR	209.50	5634.40	5639.37		5639.51	0.002371	3.02	73.05	64.52	0.36	0.02	0.29	0.03	0.16
1	2445	2-YR	209.50	5636.44	5638.88	5638.45	5639.23	0.008451	4.80	44.74	63.44	0.68	0.02	0.80	0.02	0.37
1	2360	2-YR	209.50	5634.32	5638.62		5638.78	0.002923	3.27	68.27	80.36	0.41	0.02	0.35	0.02	0.15
1	2277	2-YR	209.50	5635.51	5638.15	5637.51	5638.43	0.005882	4.29	51.01	69.00	0.58	0.02	0.62	0.03	0.27
1	2219	2-YR	209.50	5633.56	5638.02		5638.17	0.002633	3.14	71.49	76.30	0.39	0.02	0.32	0.03	0.15
1	2148	2-YR	209.50	5635.03	5637.51	5637.05	5637.85	0.007925	4.71	45.40	52.90	0.66	0.02	0.77	0.02	0.42
1	2083	2-YR	209.50	5633.18	5637.37		5637.52	0.002624	3.18	71.06	80.00	0.39	0.03	0.32	0.02	0.14
1	2014	2-YR	209.50	5634.38	5636.90		5637.23	0.007102	4.56	46.74	45.79	0.63	0.02	0.71	0.02	0.45
1	1958	2-YR	209.50	5632.47	5636.77		5636.93	0.002877	3.20	70.48	82.54	0.40	0.03	0.33	0.02	0.15
1	1915	2-YR	209.50	5633.86	5636.47	5635.87	5636.75	0.005898	4.27	53.94	80.49	0.58	0.05	0.61	0.03	0.24
1	1860	2-YR	209.50	5631.50	5636.41		5636.53	0.001928	2.81	84.28	83.96	0.33	0.03	0.25	0.02	0.12
1	1816	2-YR	209.50	5633.59	5636.04	5635.61	5636.36	0.007517	4.59	50.91	84.72	0.64	0.05	0.73	0.07	0.28
1	1766	2-YR	209.50	5633.04	5635.87		5636.07	0.003699	3.66	65.18	82.89	0.46	0.04	0.43	0.05	0.18
1	1734	2-YR	209.50	5631.79	5635.83		5635.96	0.002256	2.97	80.37	84.51	0.36	0.02	0.28	0.04	0.13
1	1686	2-YR	209.50	5632.88	5635.54		5635.79	0.005122	4.08	56.76	74.30	0.54	0.04	0.55	0.05	0.24
1	1635	2-YR	209.50	5631.53	5635.45		5635.59	0.002299	3.04	78.42	86.01	0.37	0.03	0.29	0.04	0.13
1	1597	2-YR	209.50	5632.45	5635.28		5635.47	0.003614	3.68	68.35	90.29	0.46	0.06	0.43	0.06	0.17
1	1564.5	2-YR	209.50	5632.40	5634.51	5634.51	5635.20	0.019628	6.65	31.48	23.37	1.01		1.61		1.61
1	1550	2-YR	209.50	5631.60	5633.75	5633.75	5634.45	0.019711	6.68	31.34	23.17	1.01		1.63		1.63
1	1509.9	2-YR	209.50	5629.60	5632.38		5632.61	0.004730	4.07	62.35	90.40	0.52	0.07	0.54	0.07	0.20
1	1500	2-YR	209.50	5629.60	5632.32		5632.56	0.004941	4.13	61.24	90.35	0.53	0.07	0.56	0.07	0.21
1	1450	2-YR	209.50	5629.30	5631.97	5631.45	5632.28	0.006305	4.52	53.18	84.17	0.60	0.06	0.68	0.06	0.25
1	1435	2-YR	209.50	5629.30	5631.41	5631.41	5632.09	0.019332	6.61	31.67	23.46	1.00		1.59		1.59
1	1400	2-YR	209.50	5627.50	5629.63	5629.63	5630.32	0.019655	6.67	31.42	23.27	1.01		1.62		1.62
1	1375.1	2-YR	209.50	5626.30	5628.98		5629.24	0.005129	4.18	60.18	89.54	0.54	0.07	0.58	0.07	0.21
1	1350	2-YR	209.50	5626.10	5628.87		5629.11	0.004793	4.09	61.96	90.38	0.53	0.07	0.55	0.07	0.20
1	1300	2-YR	209.50	5625.90	5628.64	5628.02	5628.87	0.004695	4.05	62.87	90.50	0.52	0.07	0.54	0.07	0.20
1	1264.1	2-YR	209.50	5625.70	5627.84	5627.84	5628.52	0.019261	6.62	31.66	23.36	1.00		1.59		1.59
1	1250	2-YR	209.5													

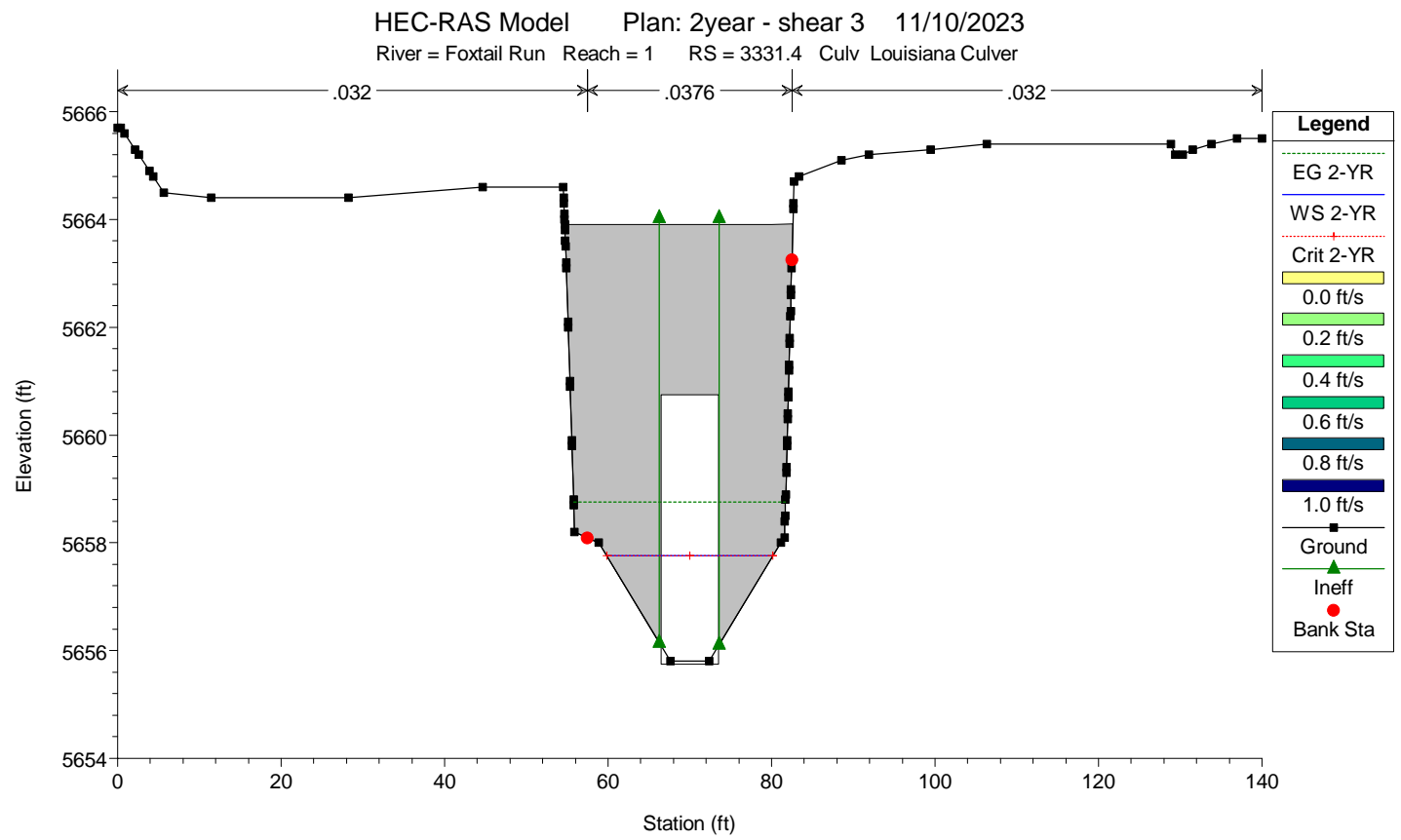
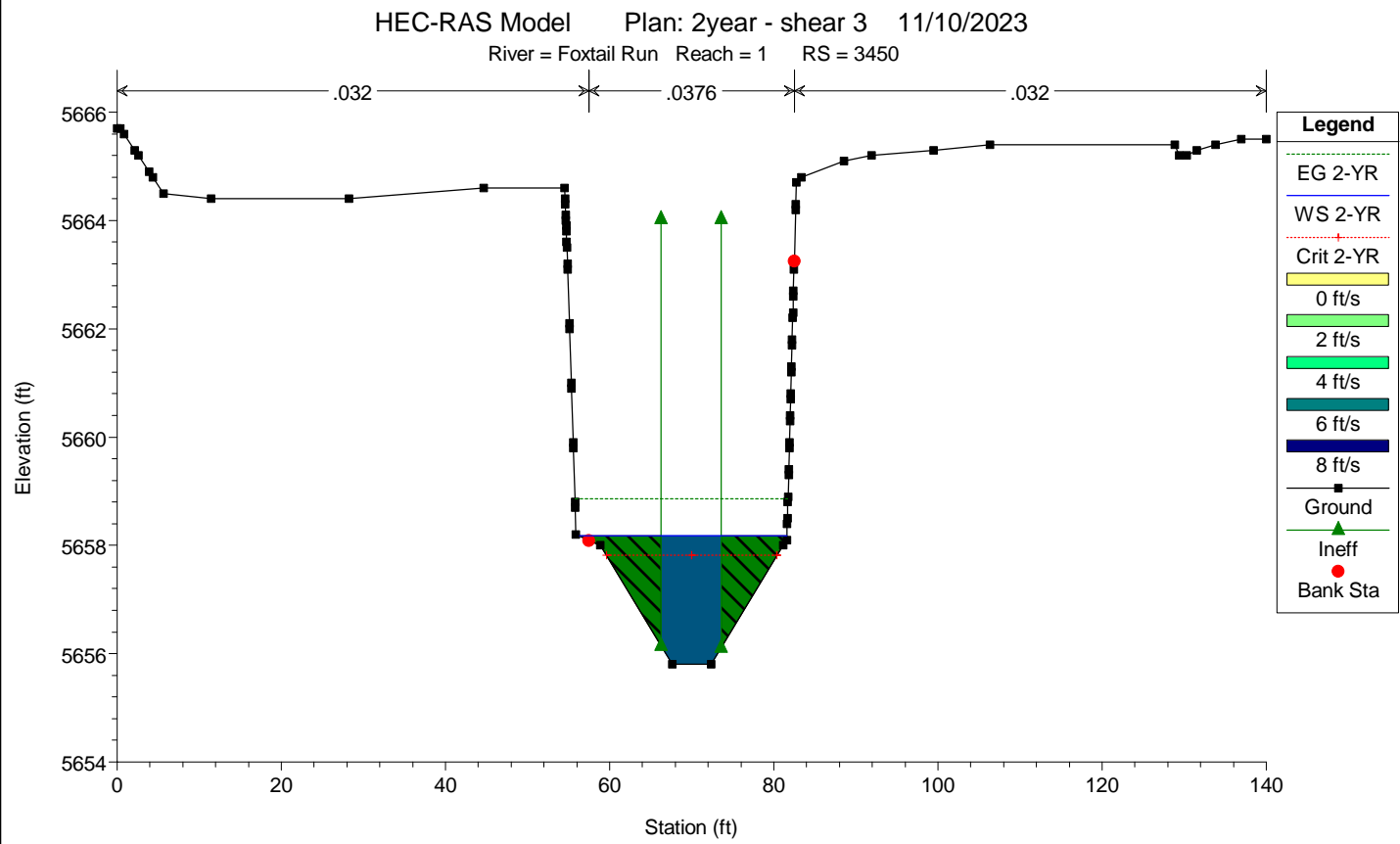
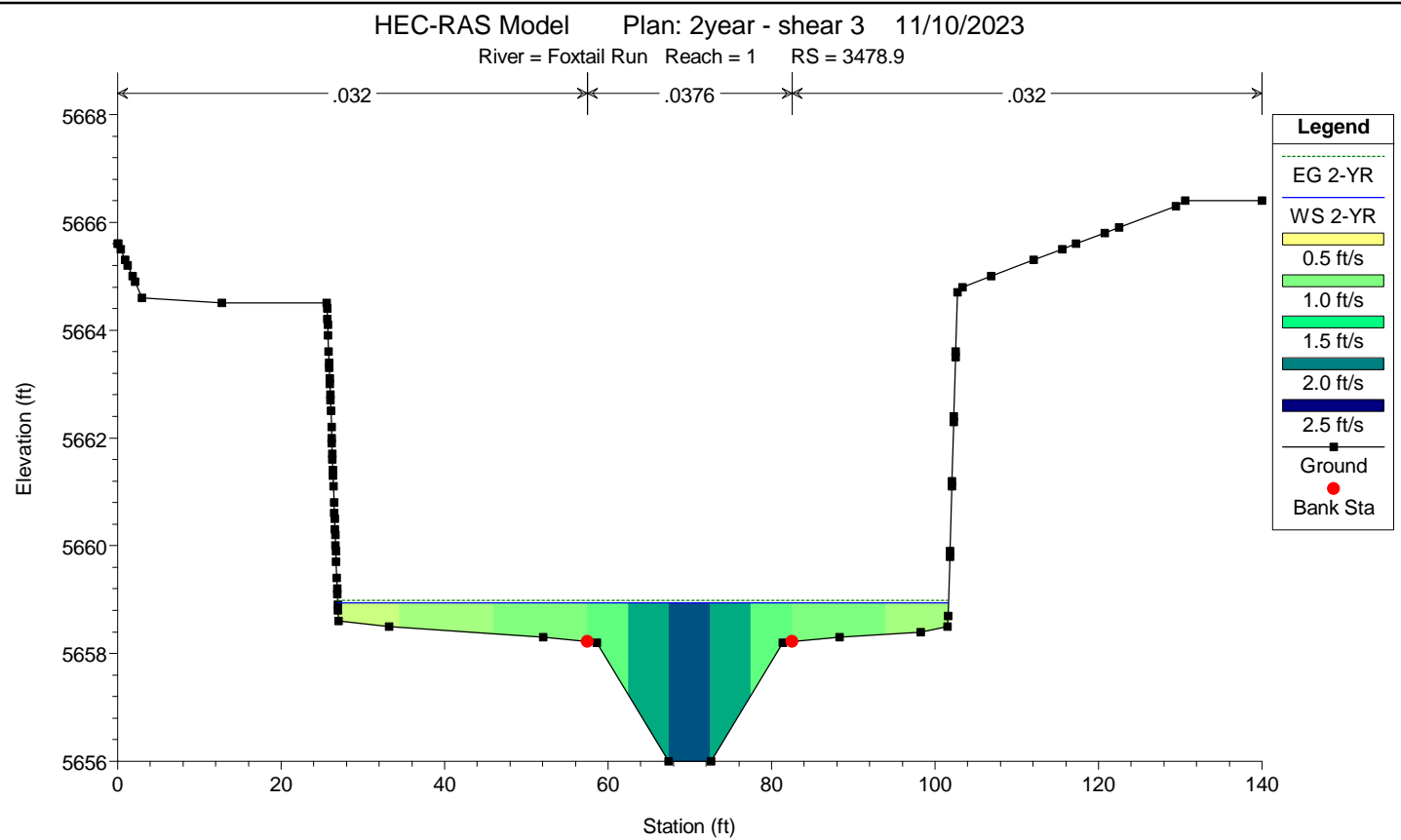
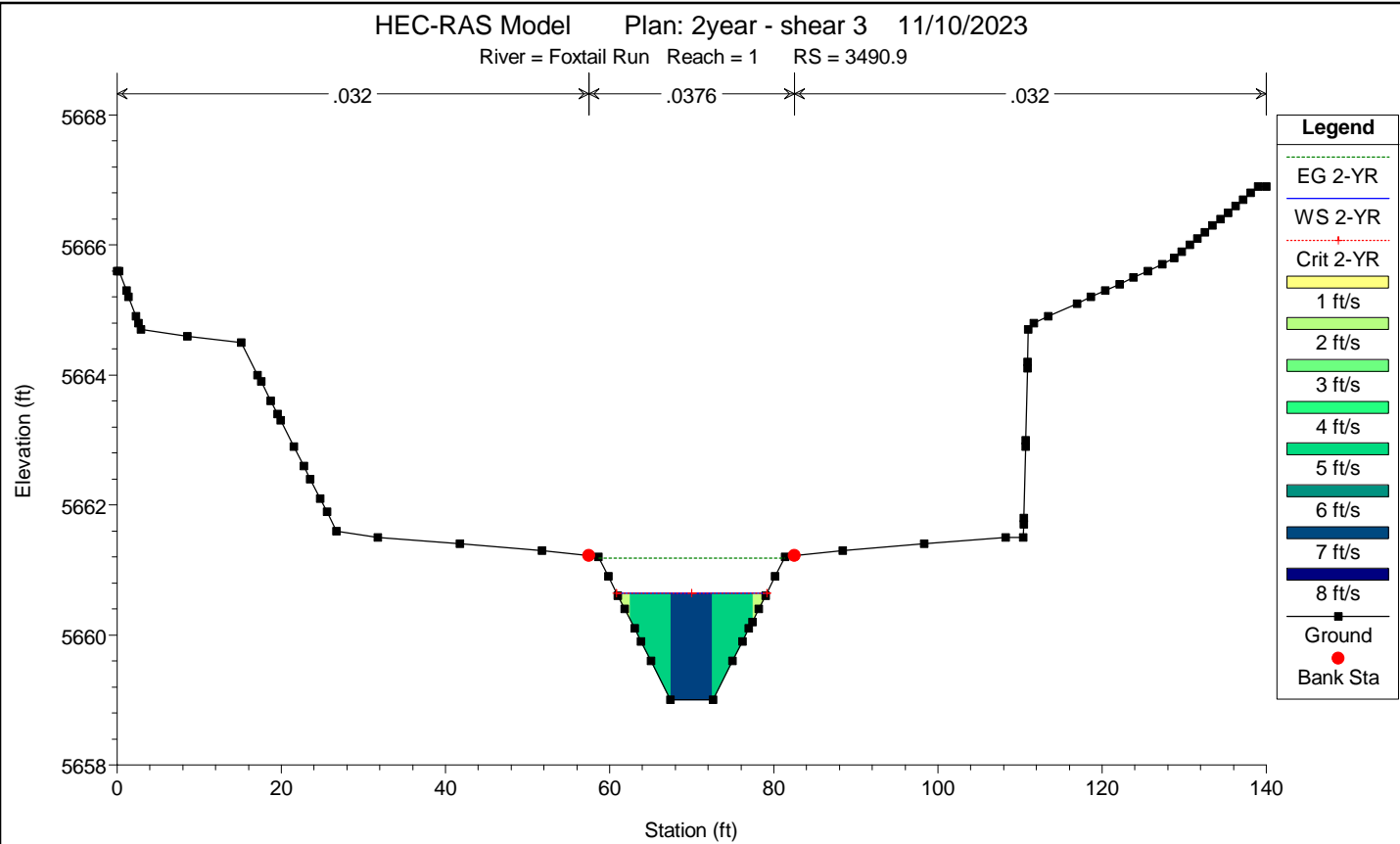


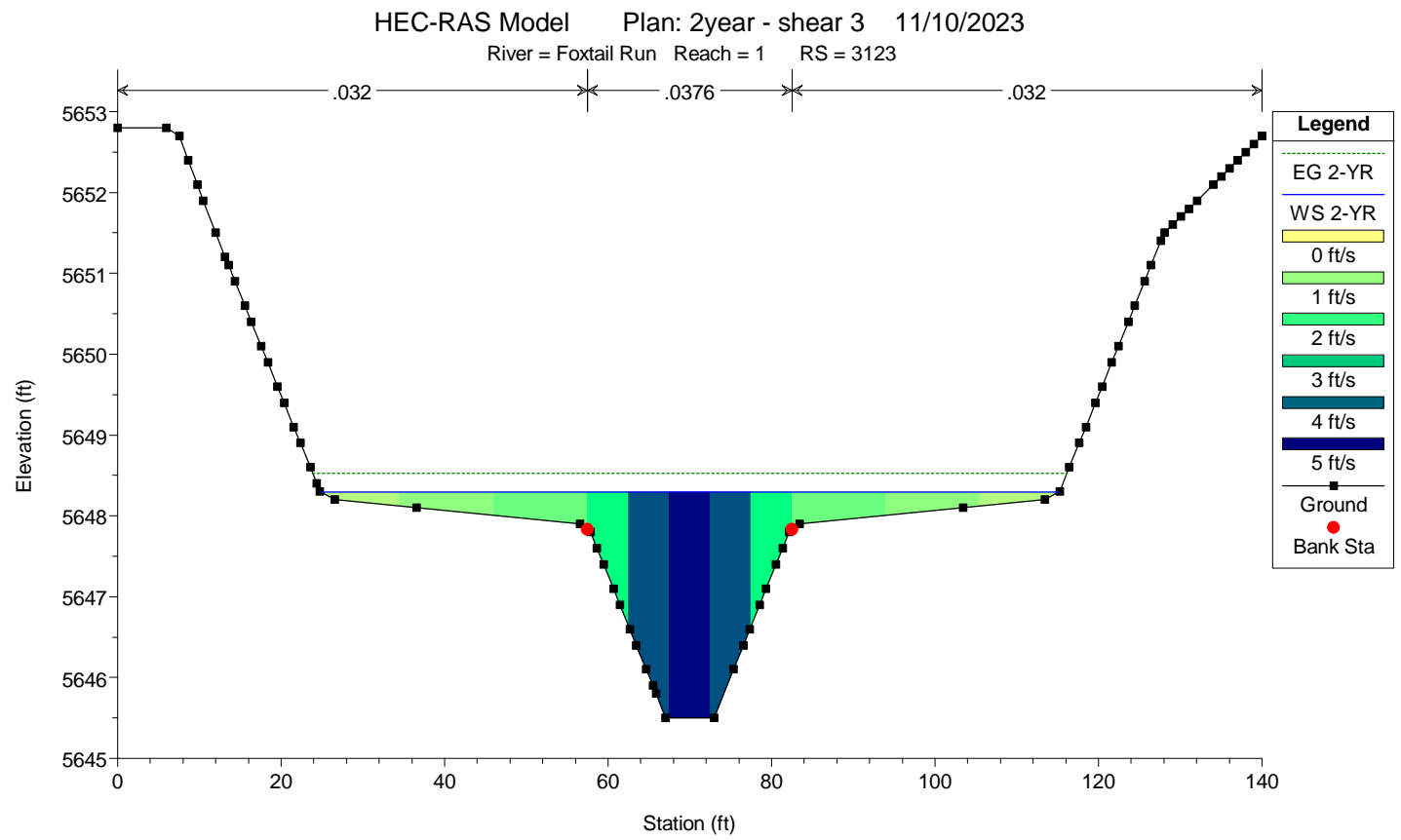
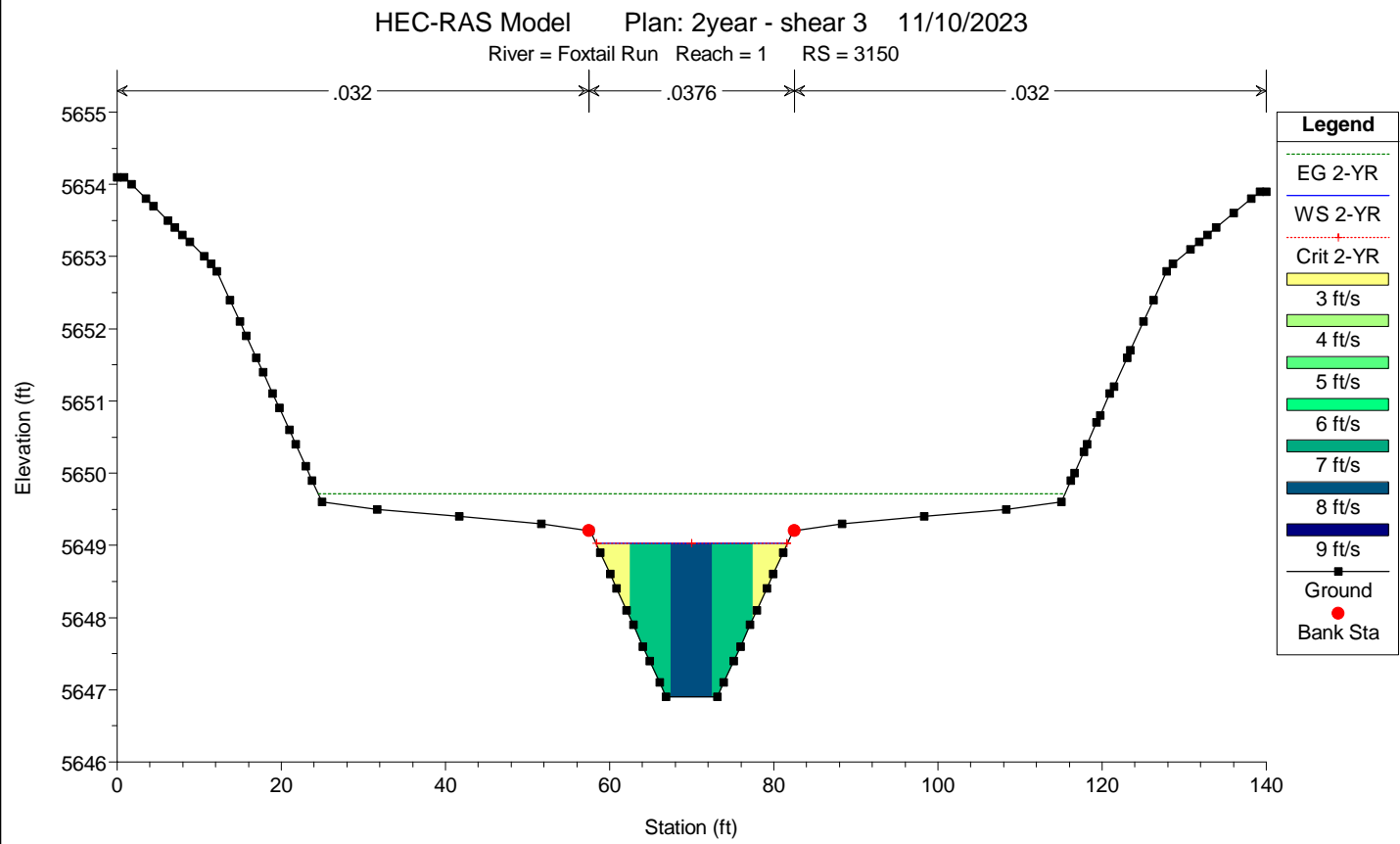
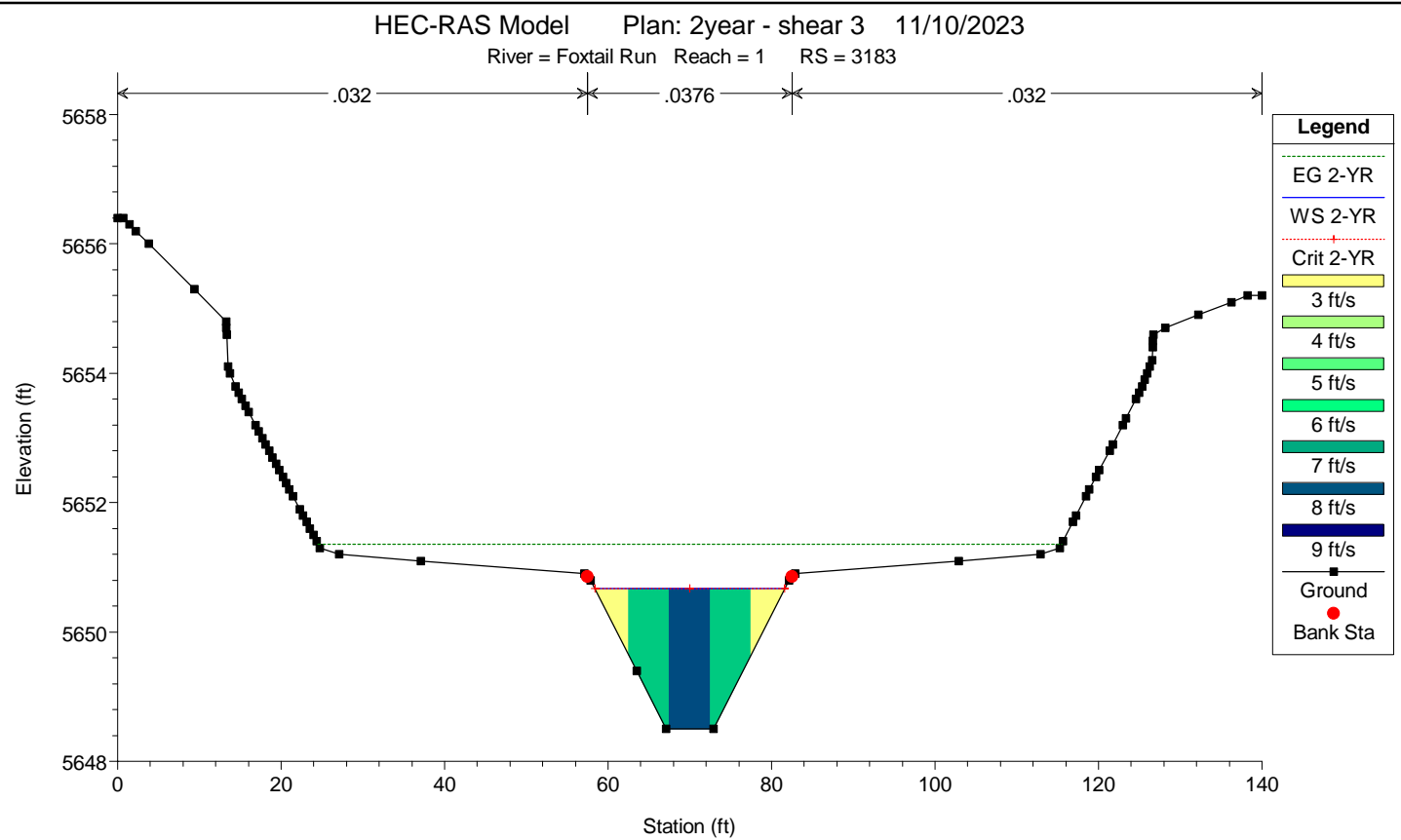
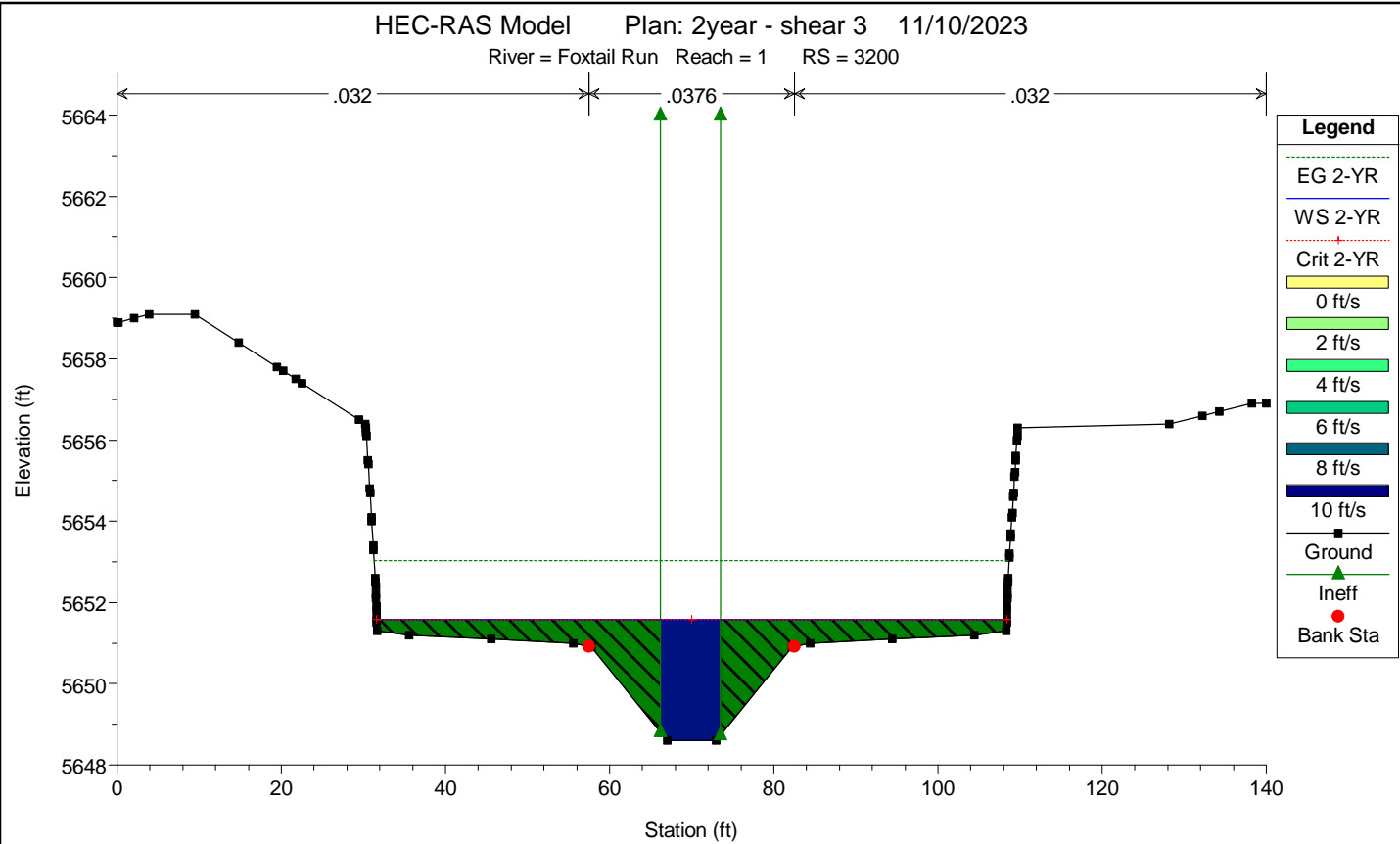


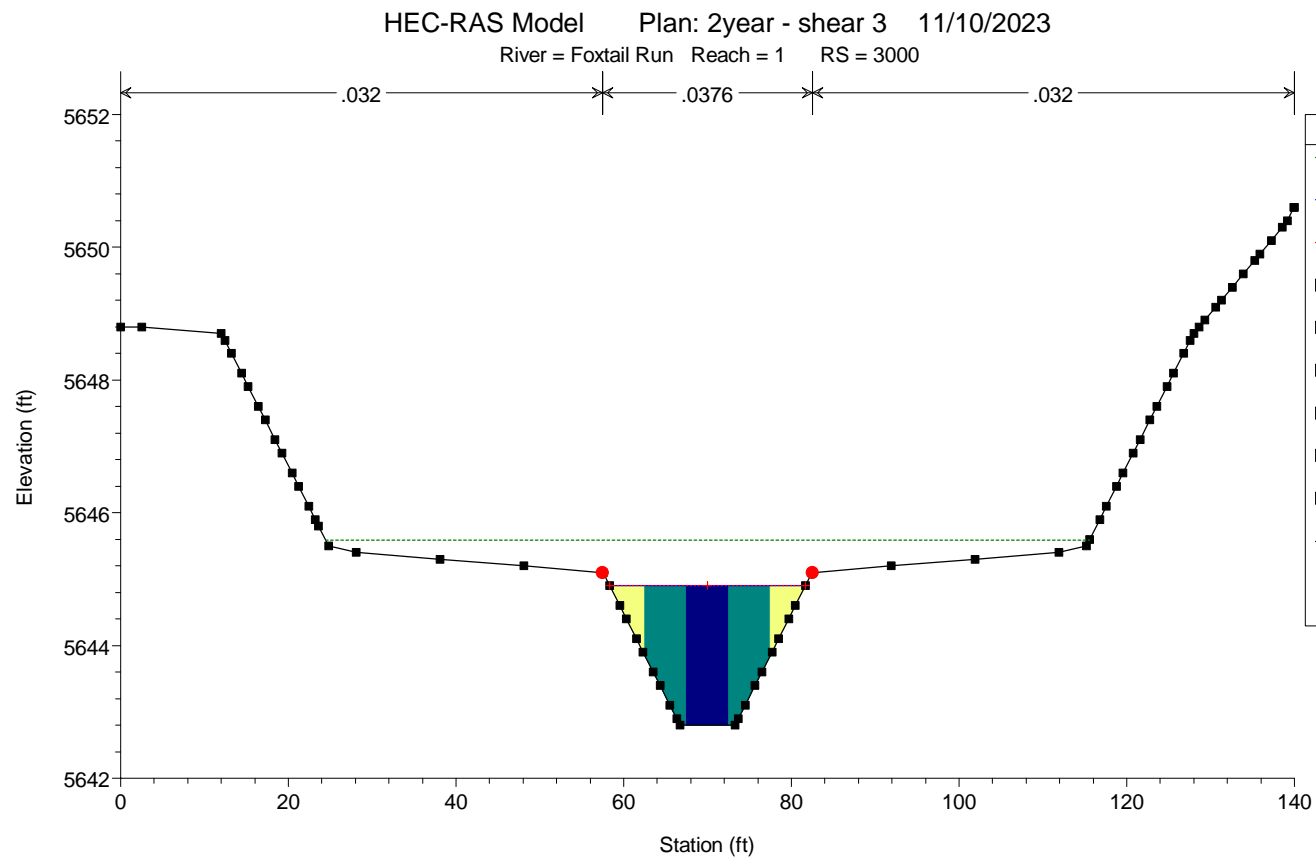
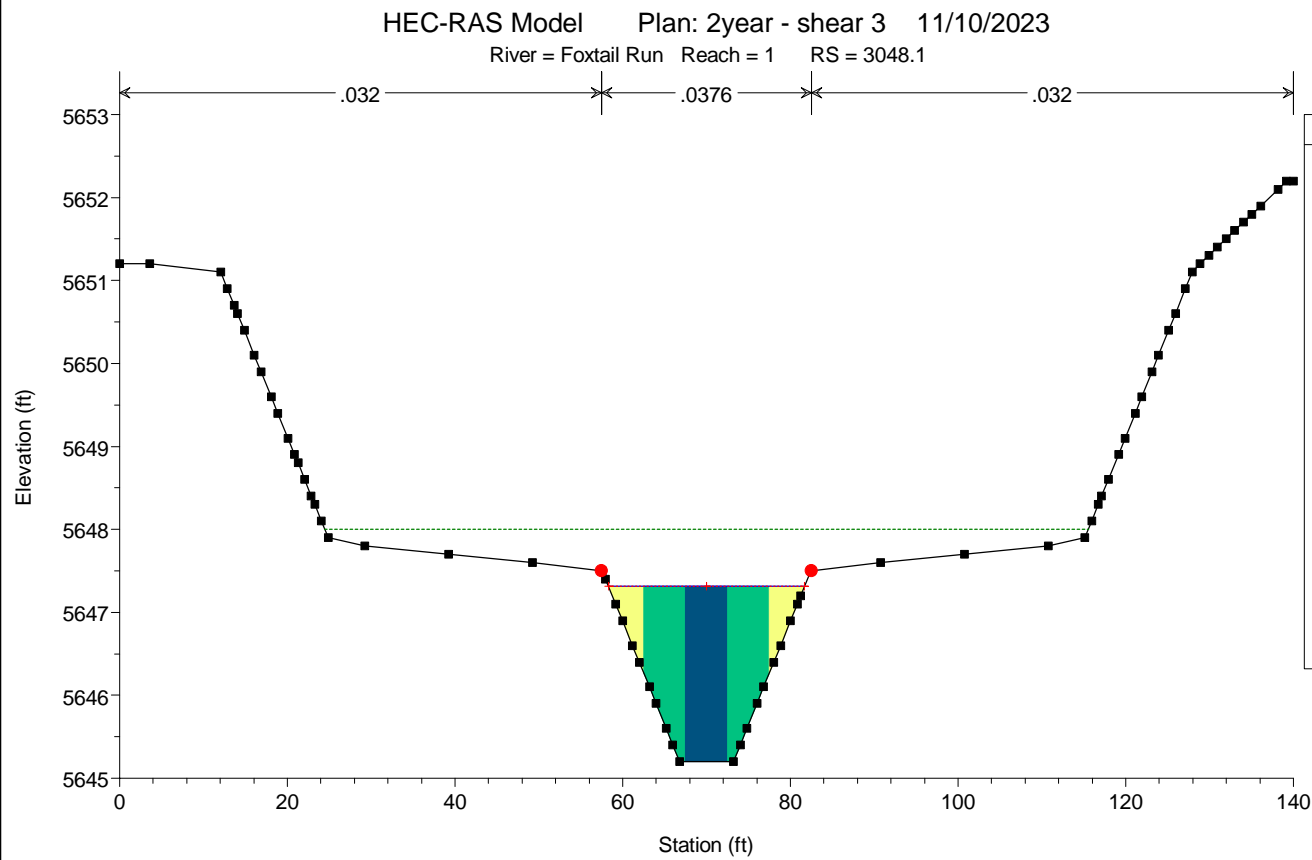
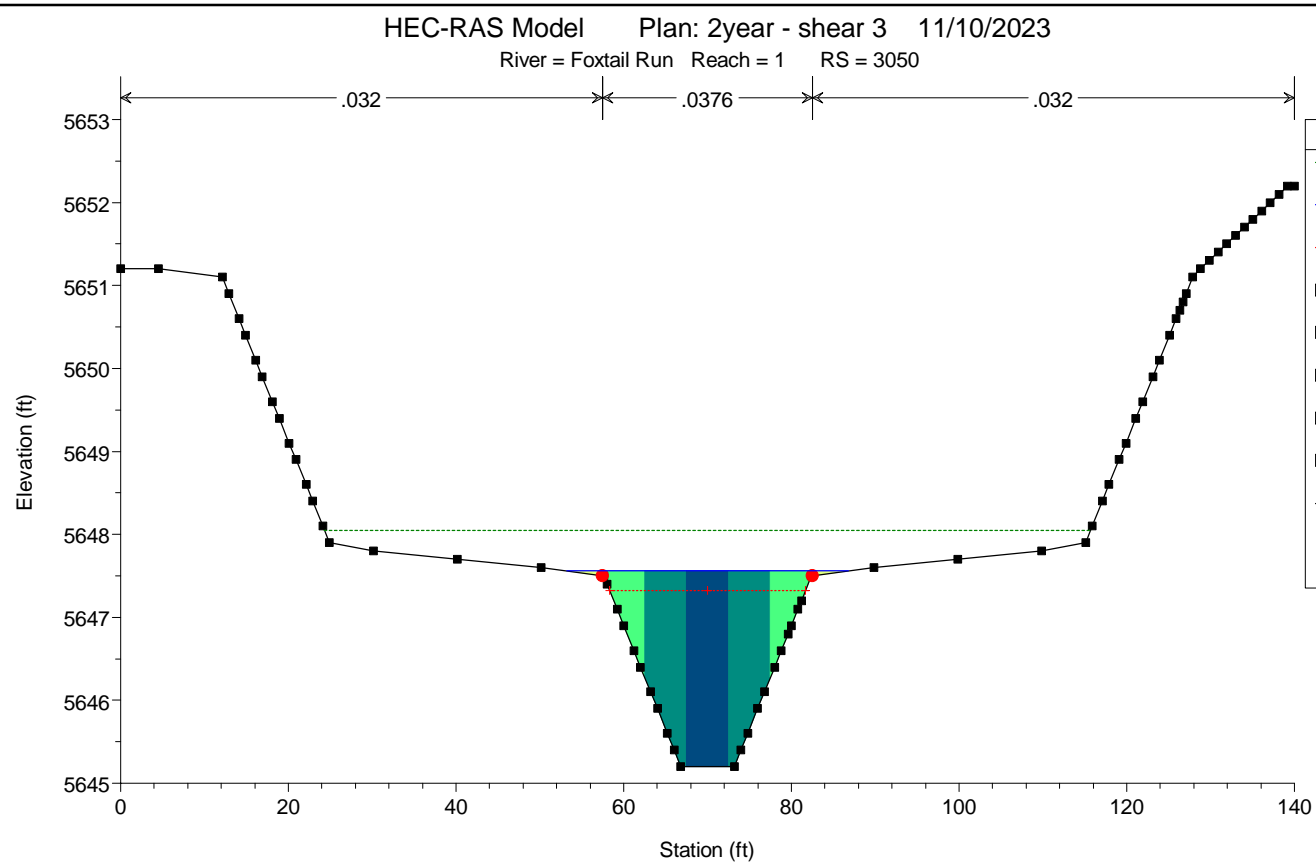
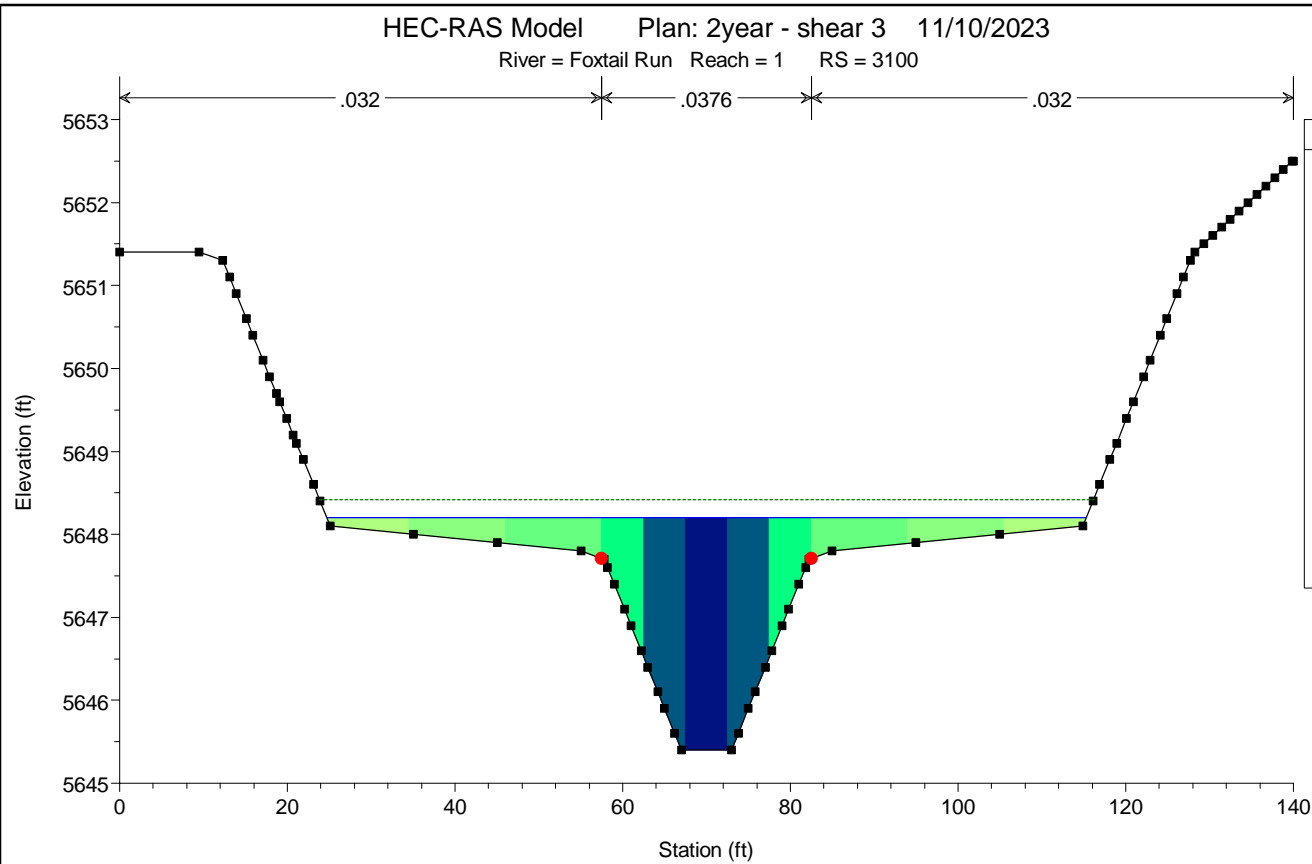


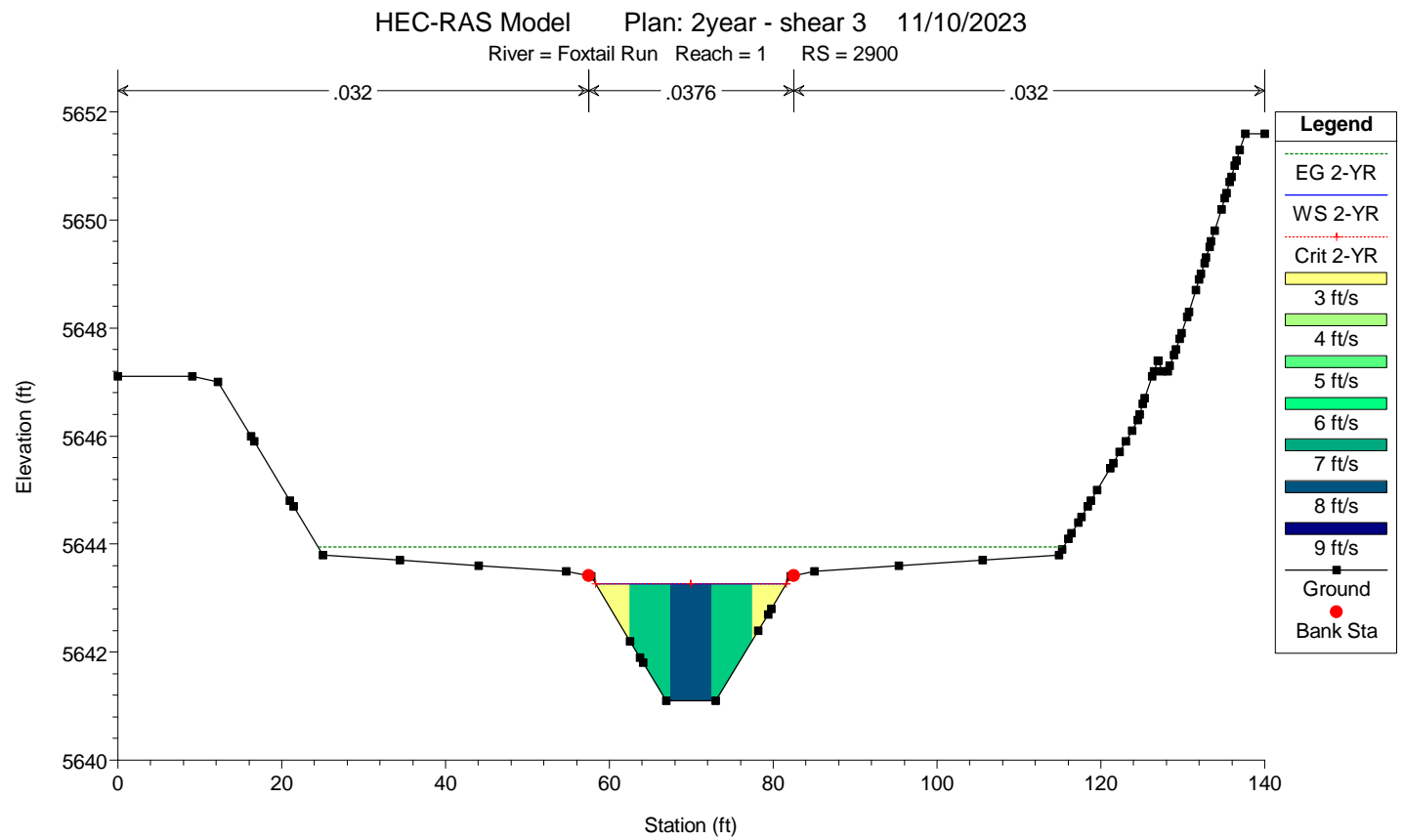
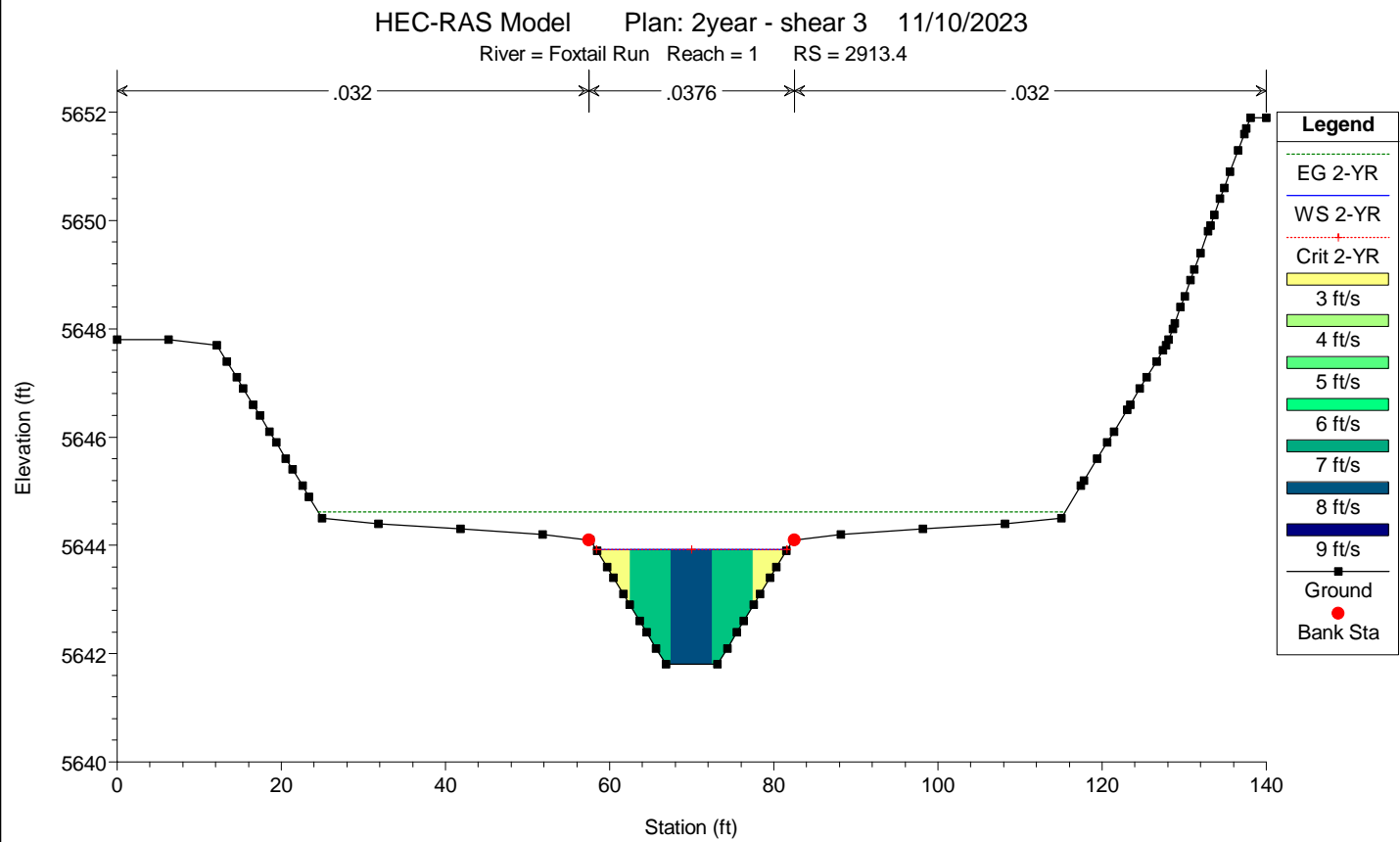
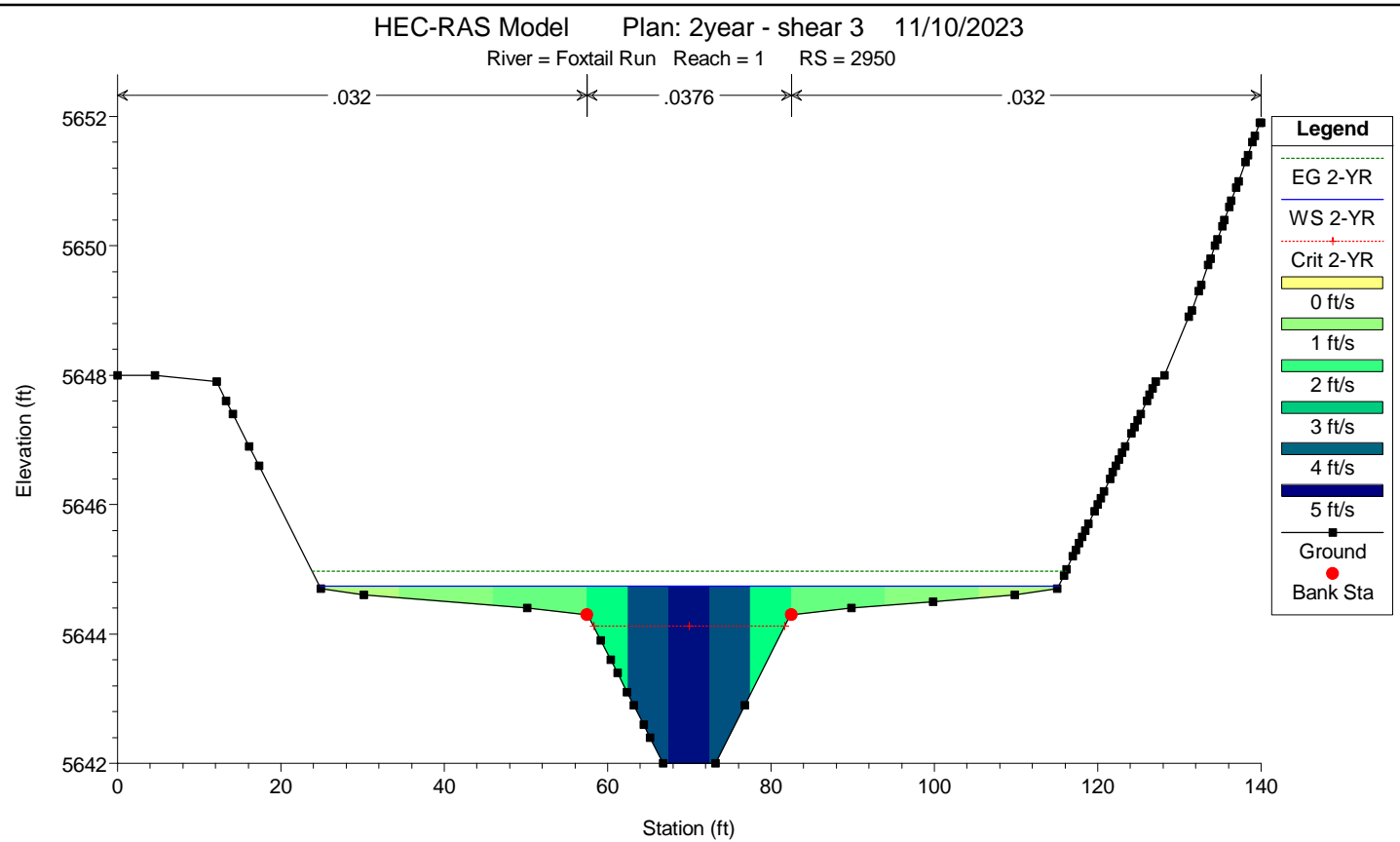
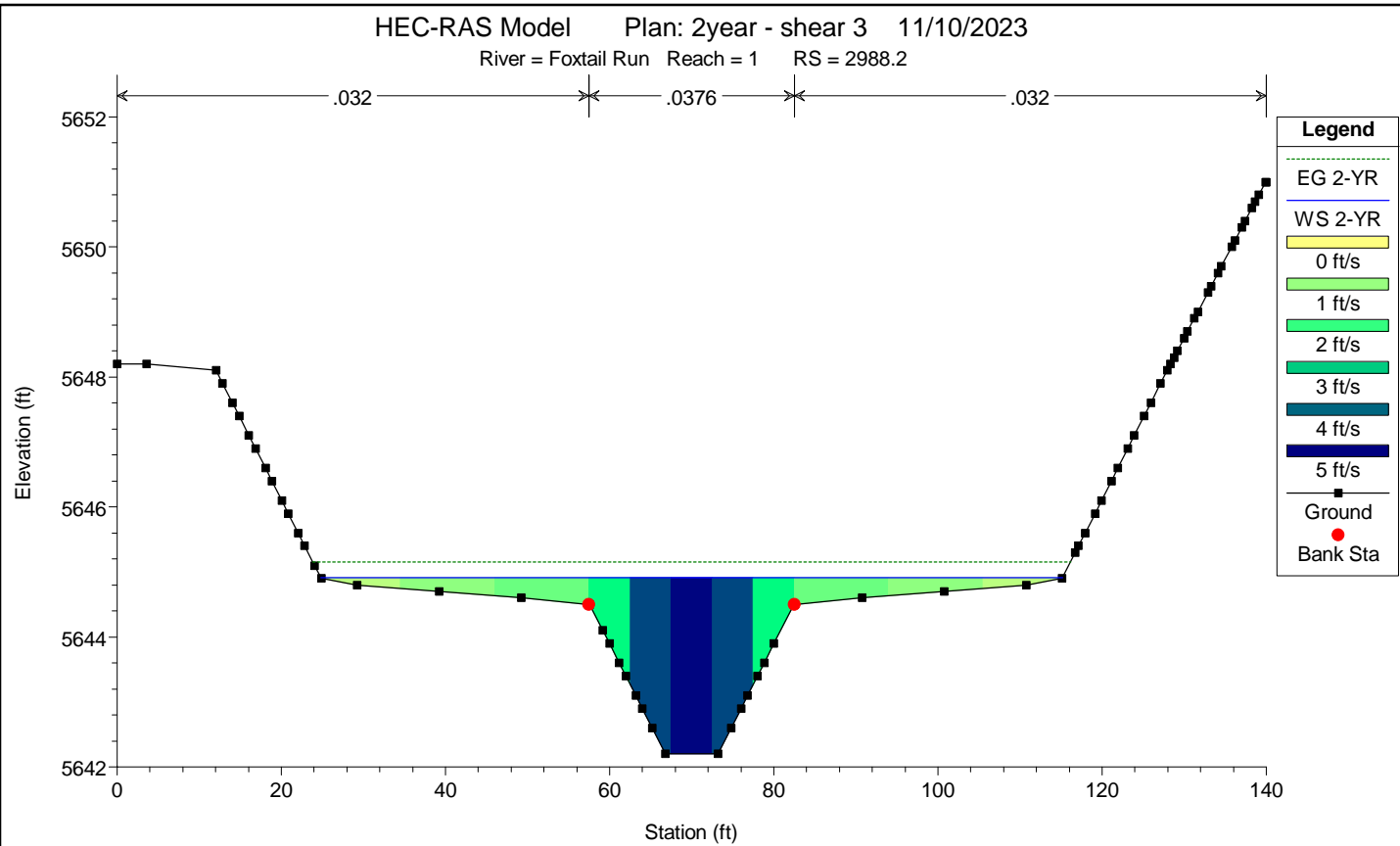


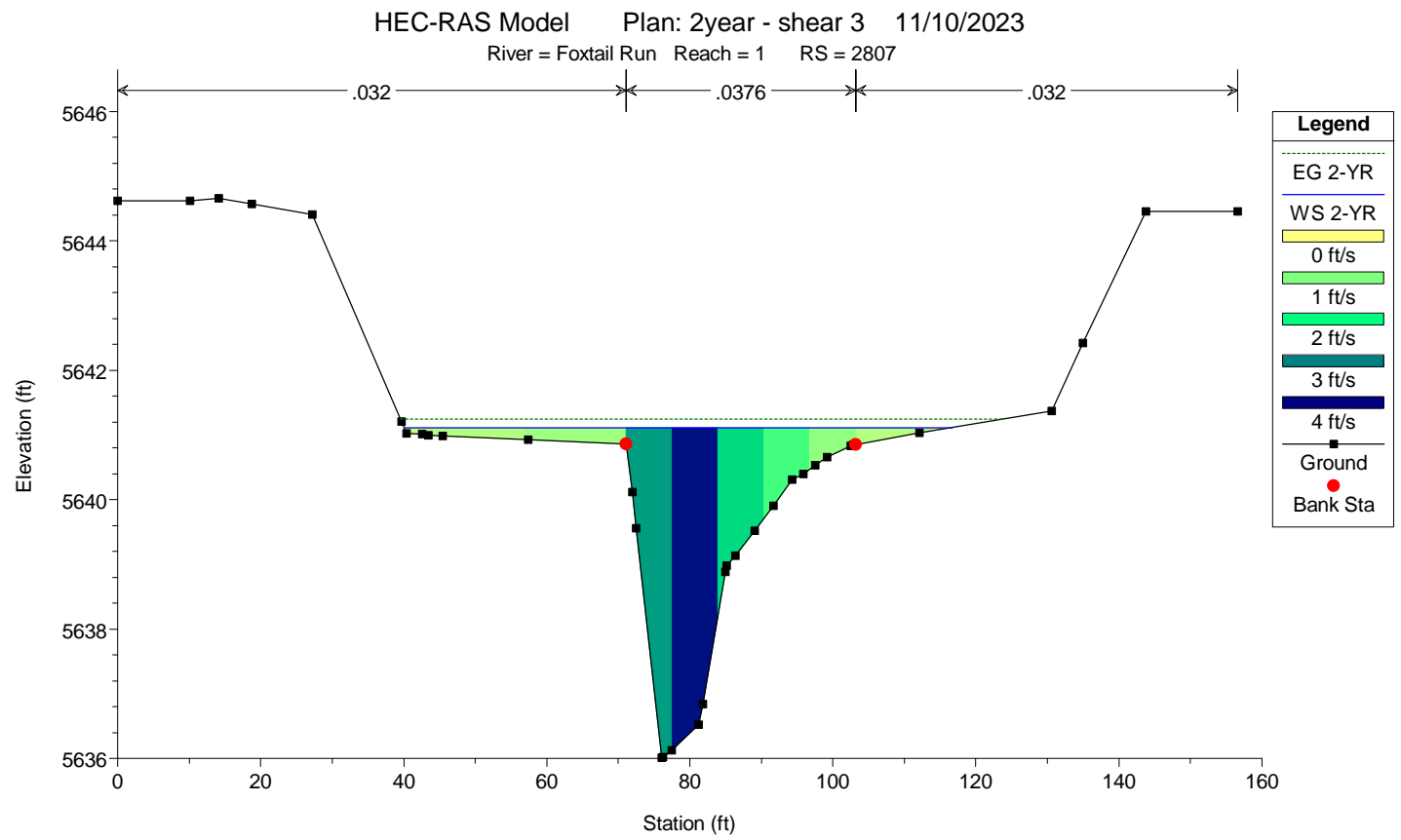
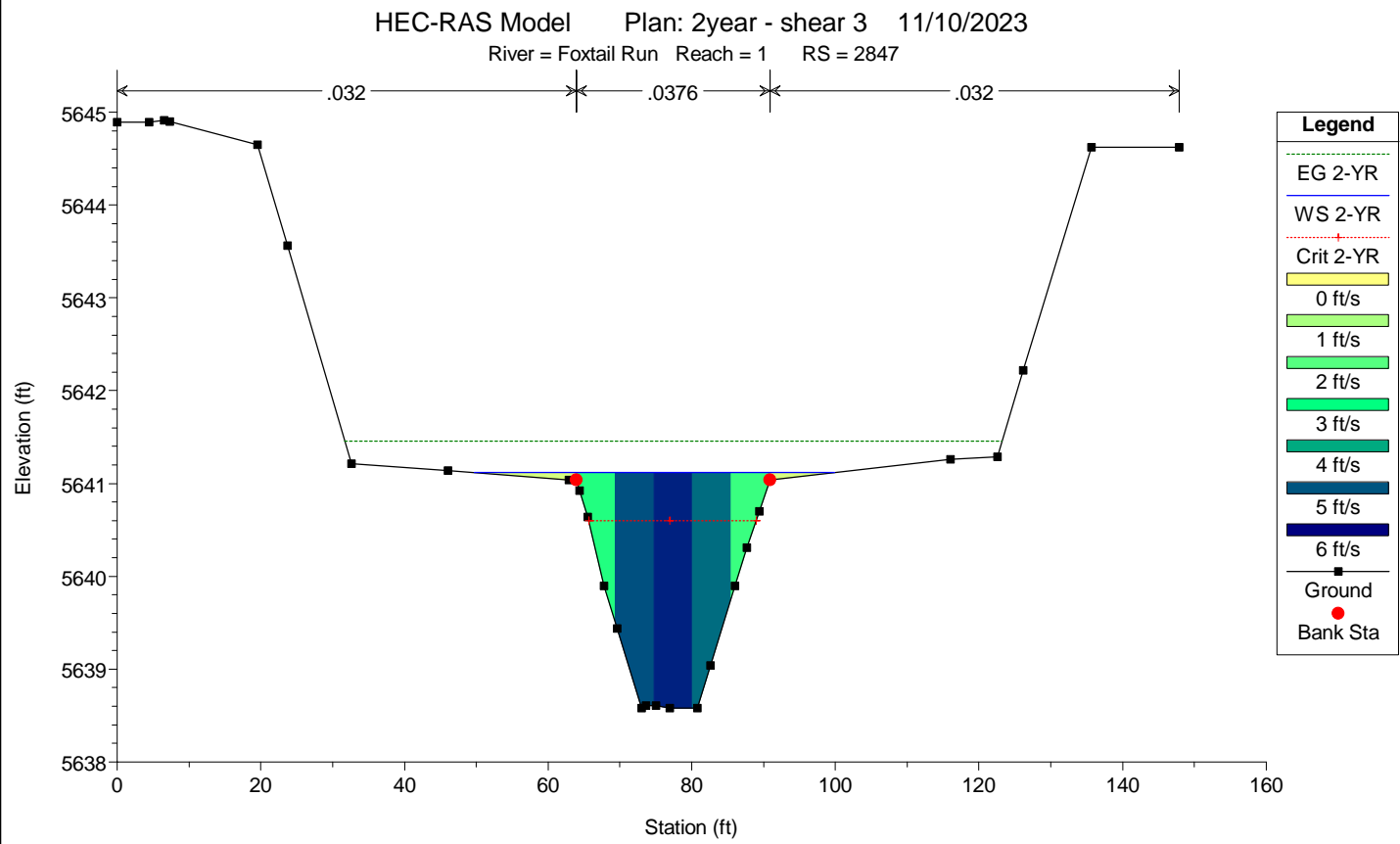
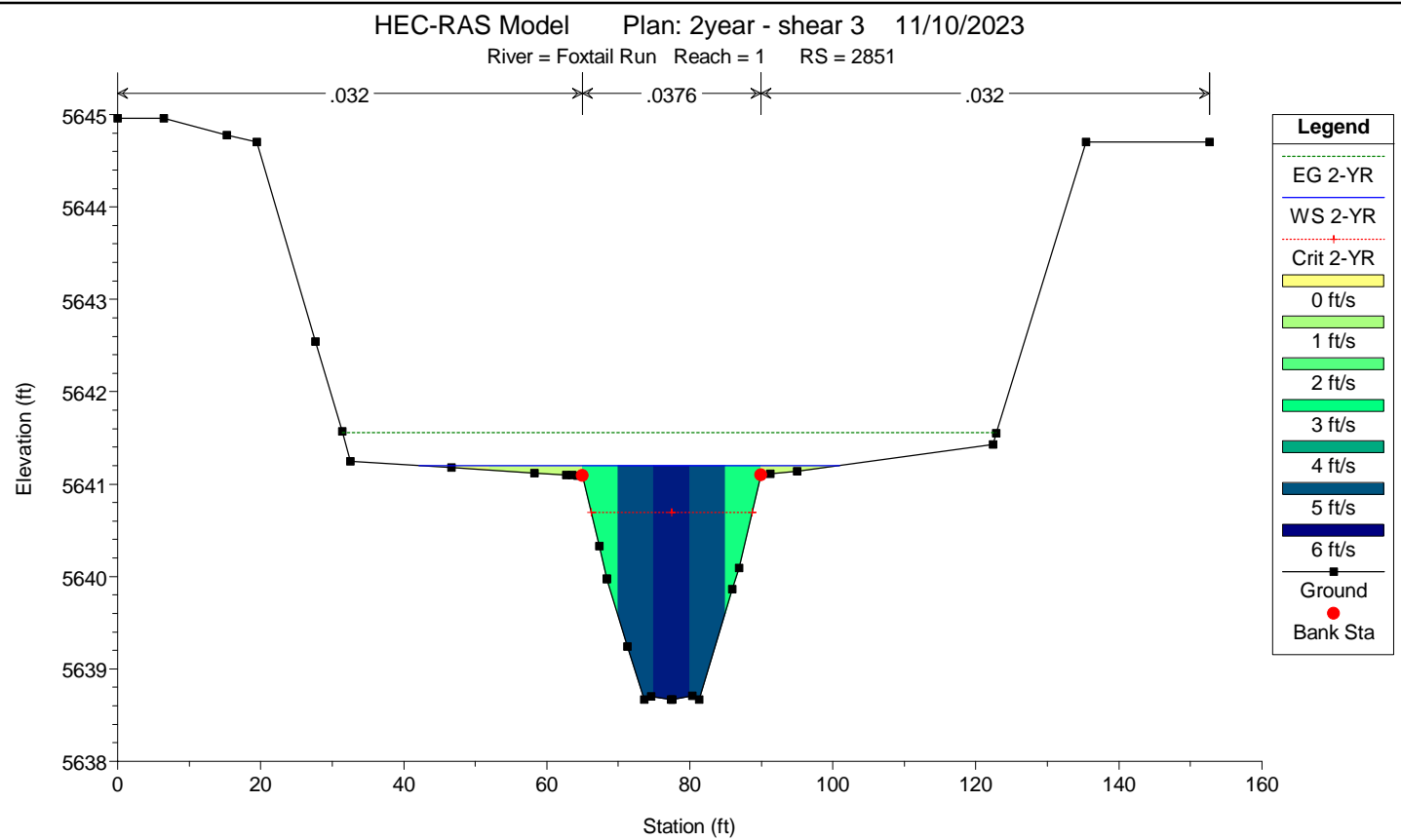
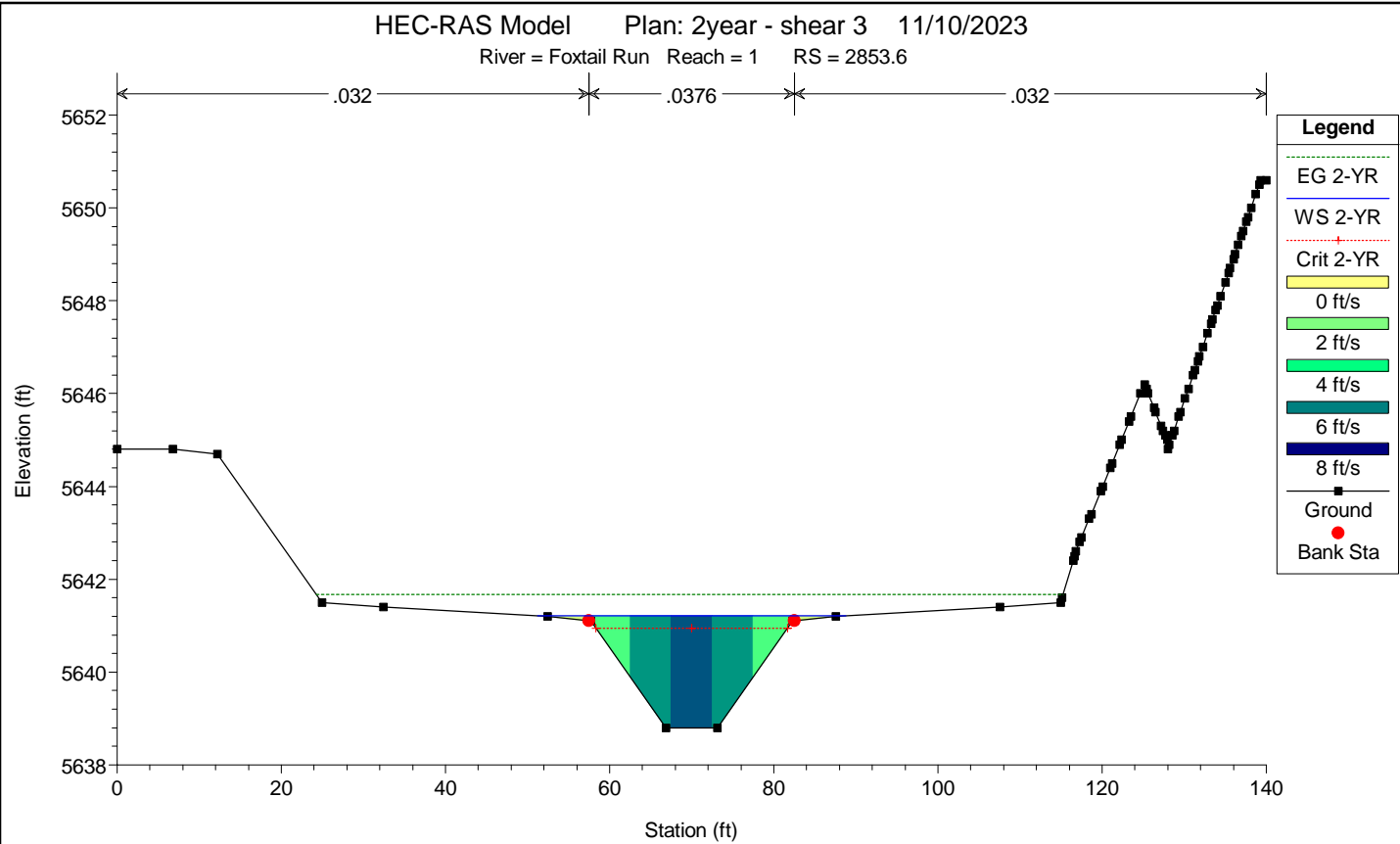


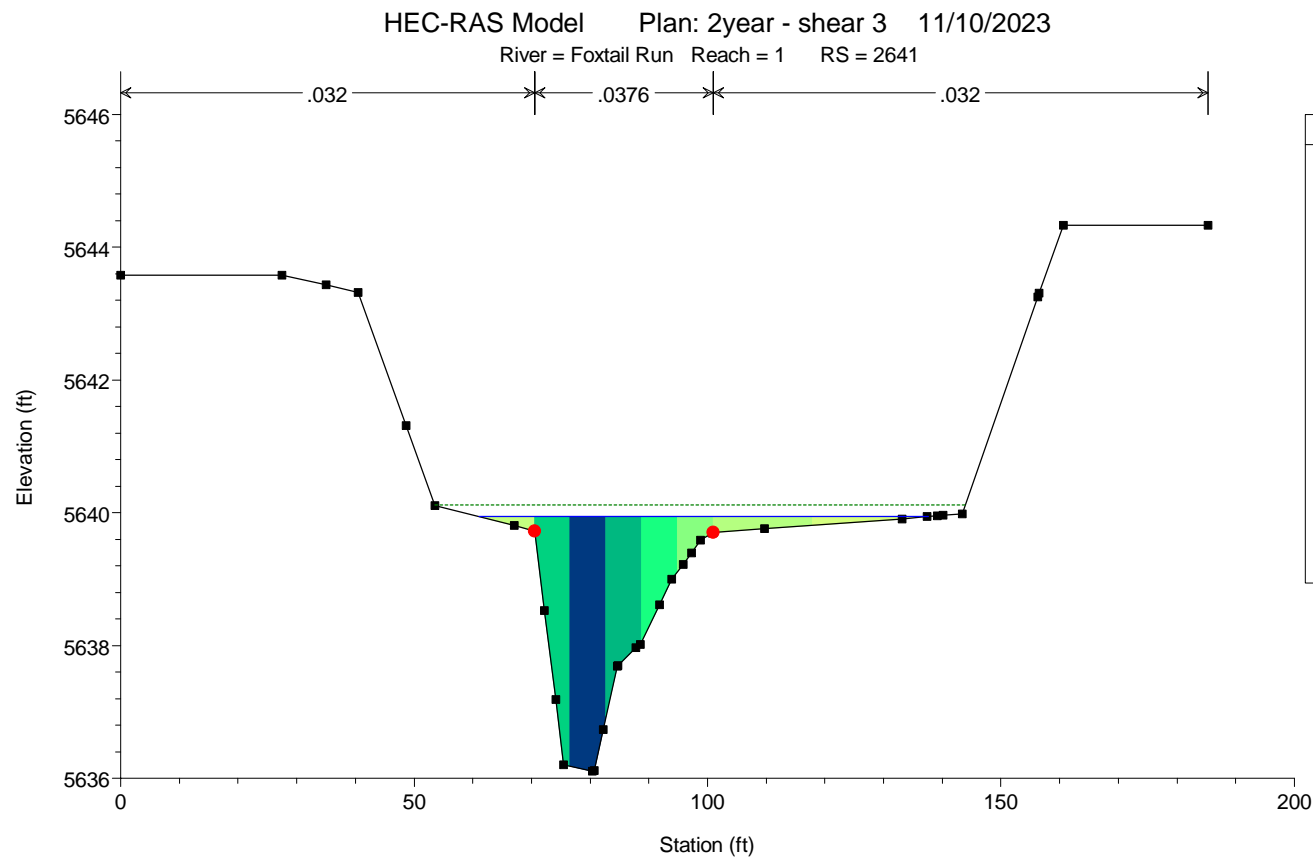
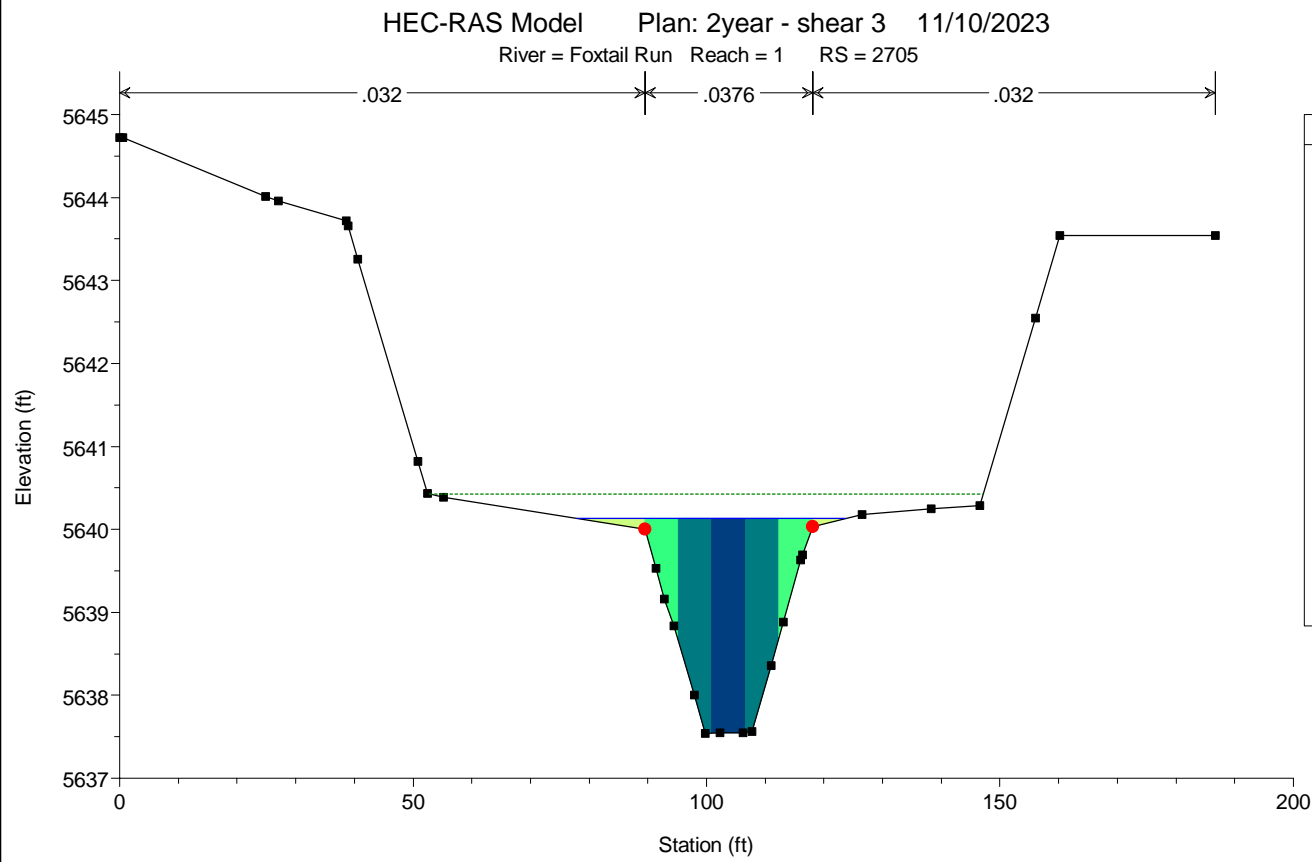
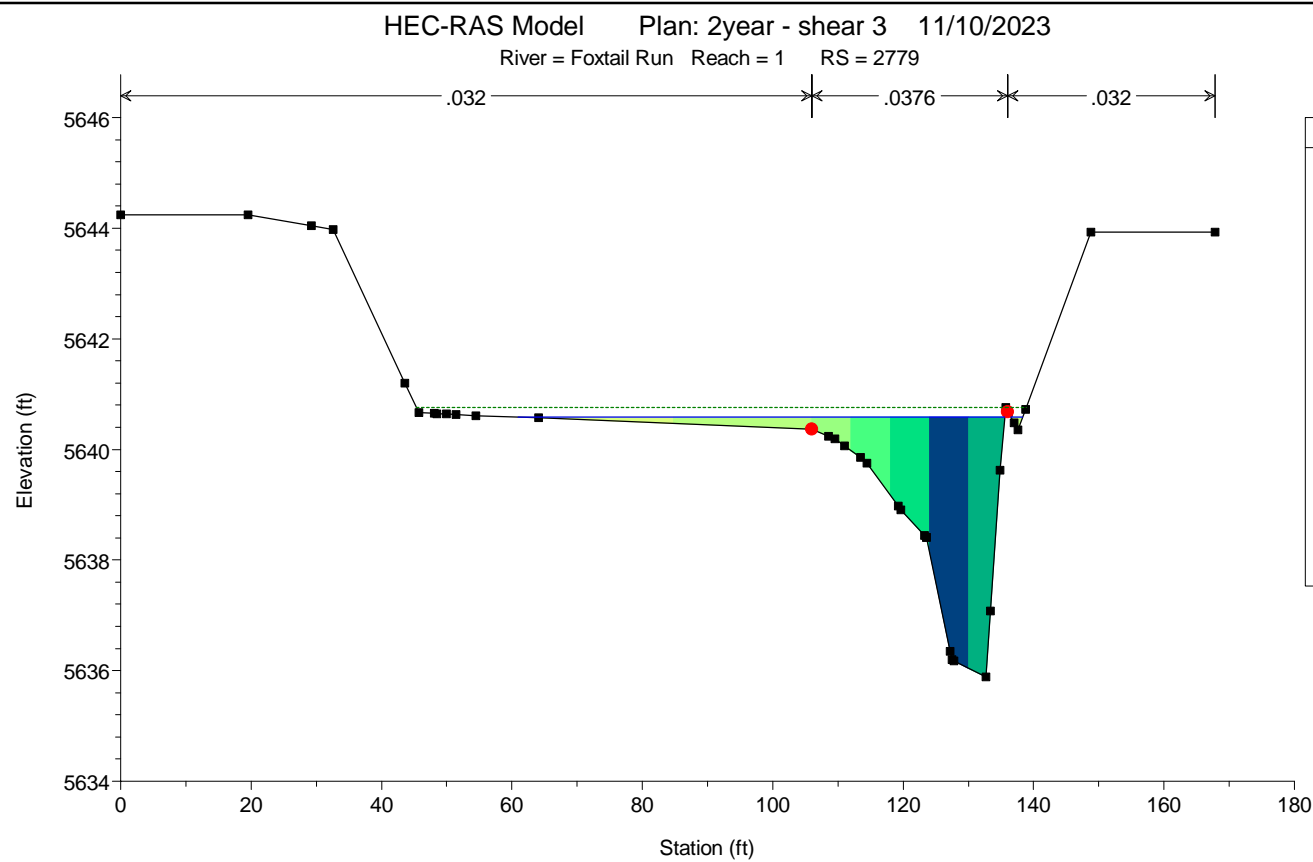
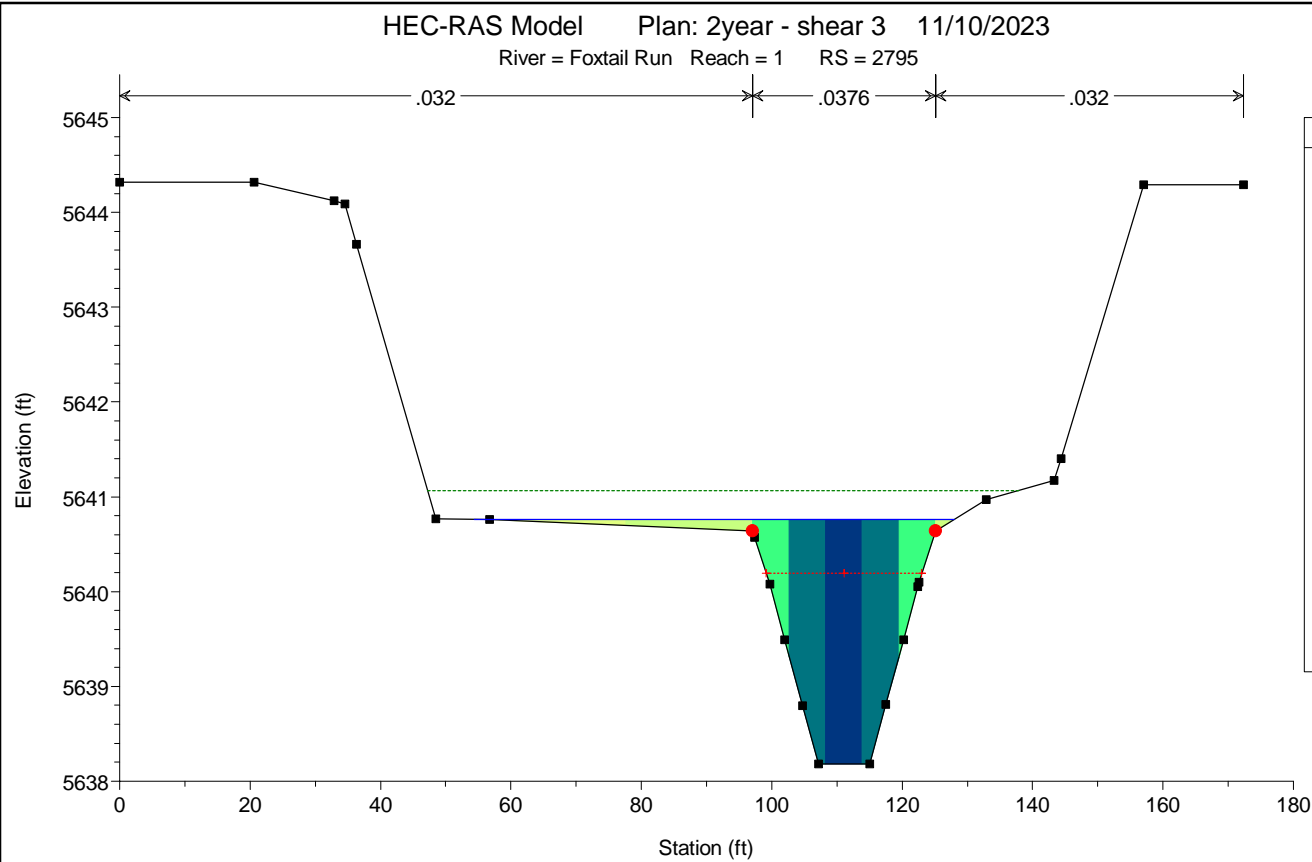


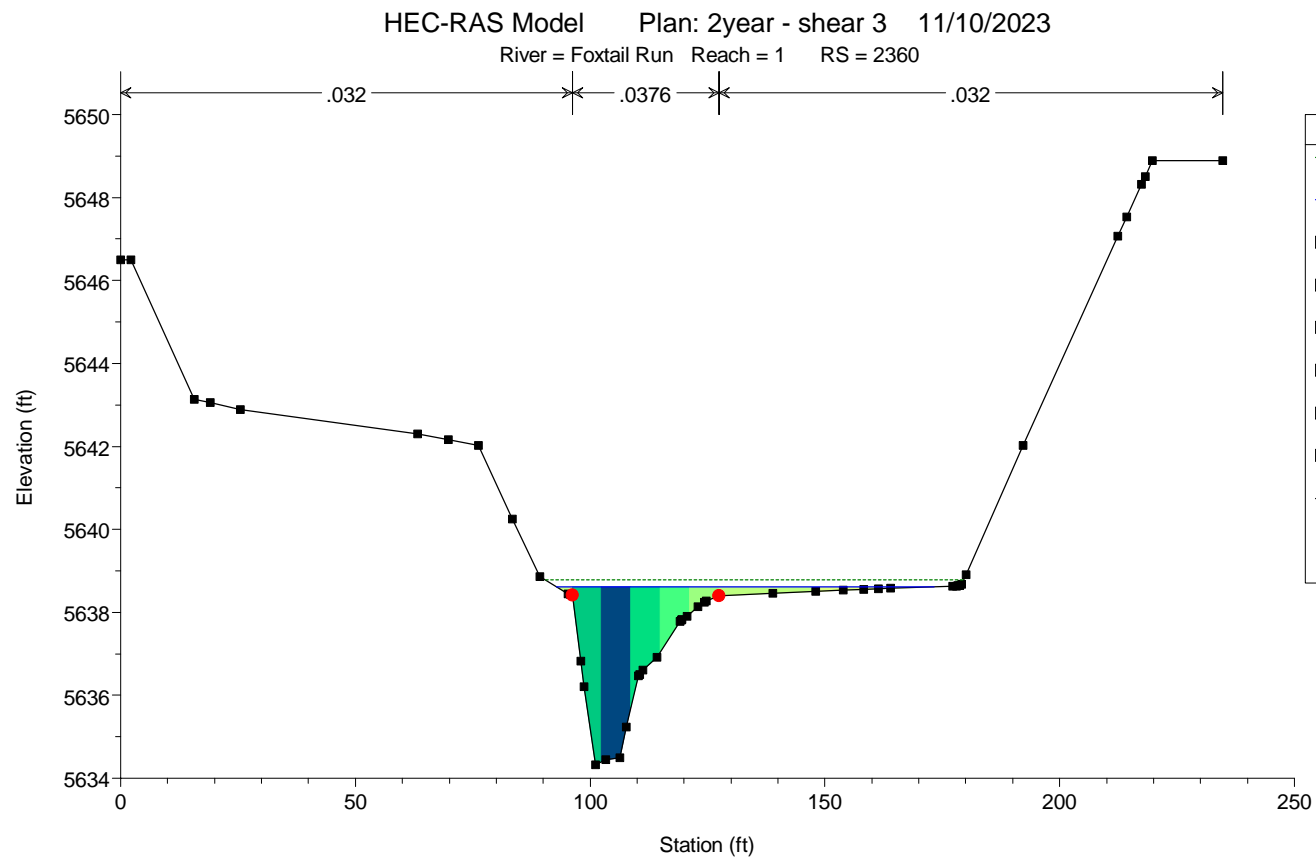
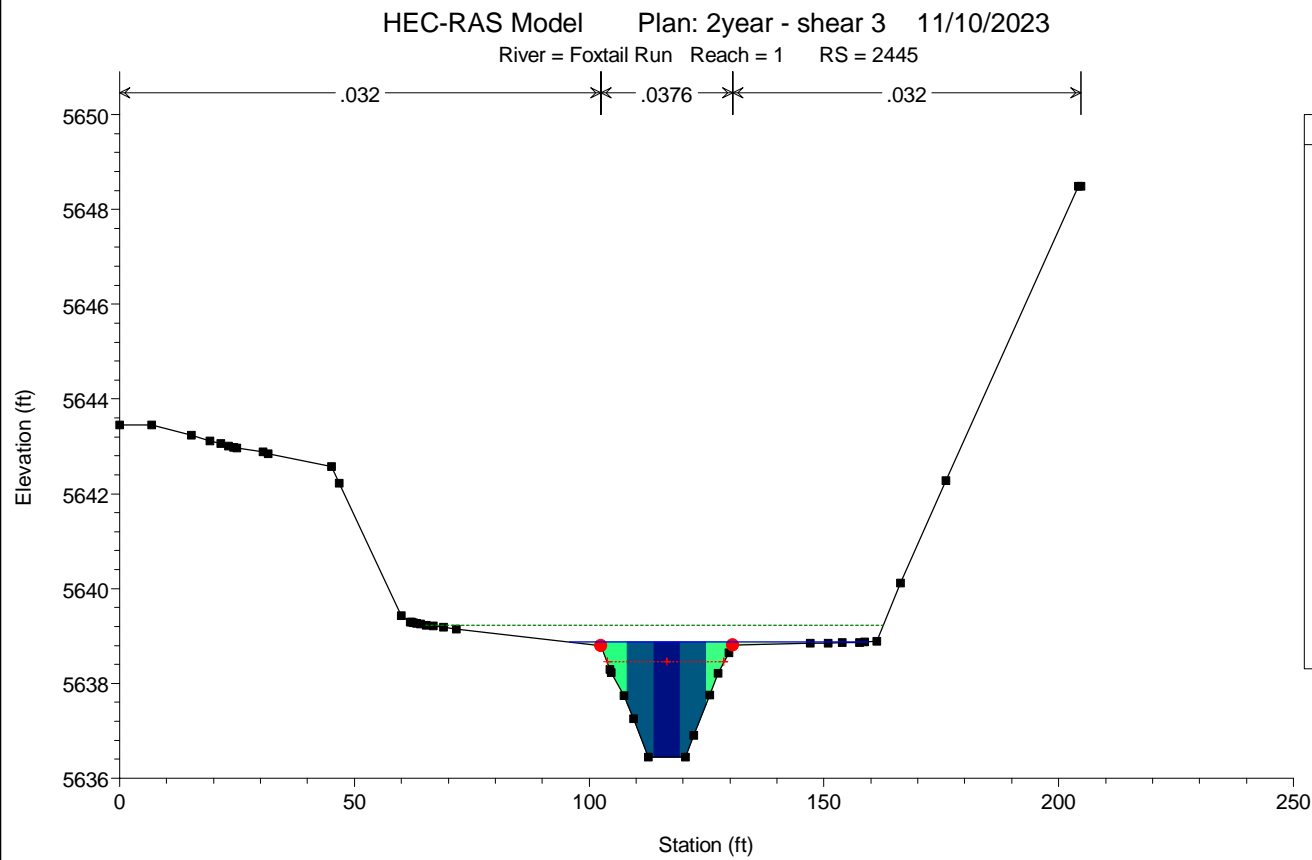
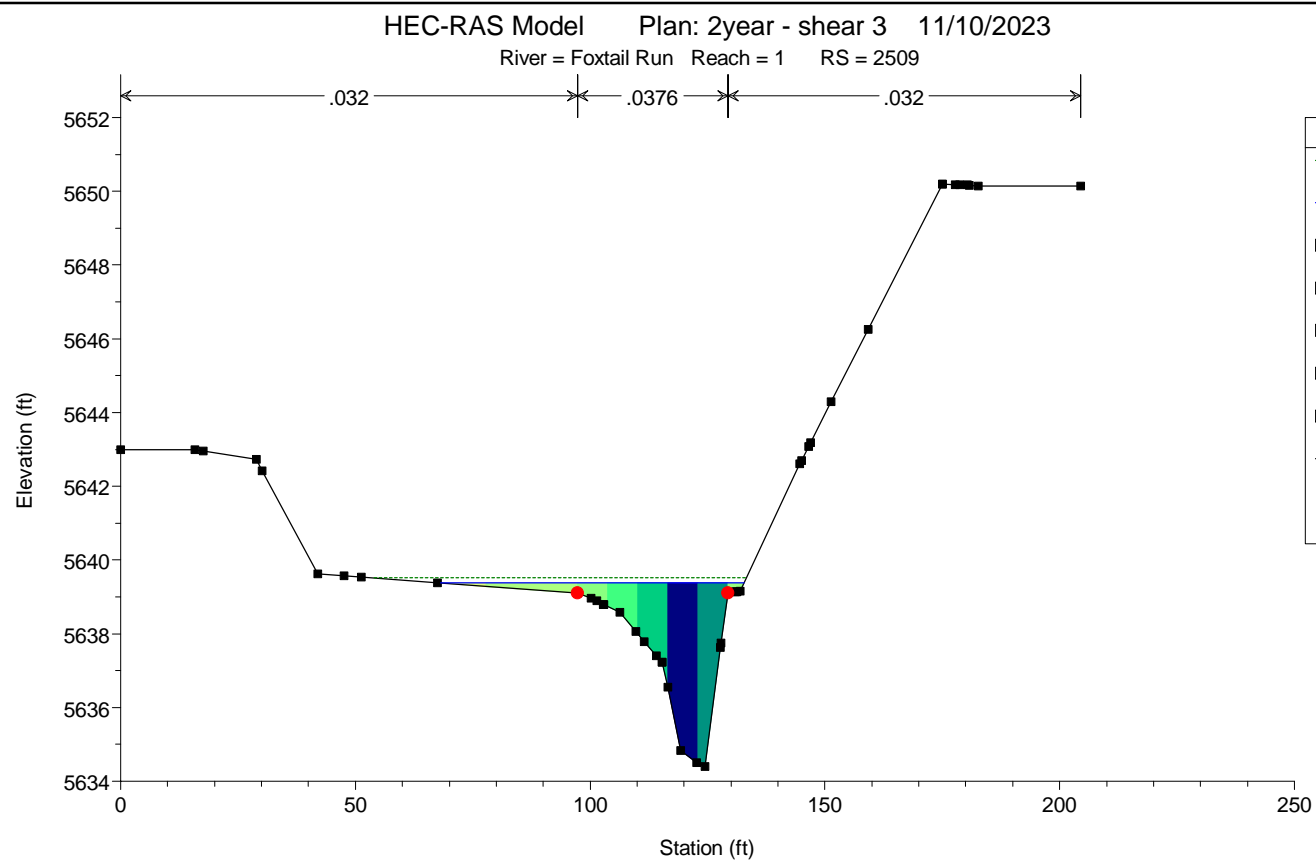
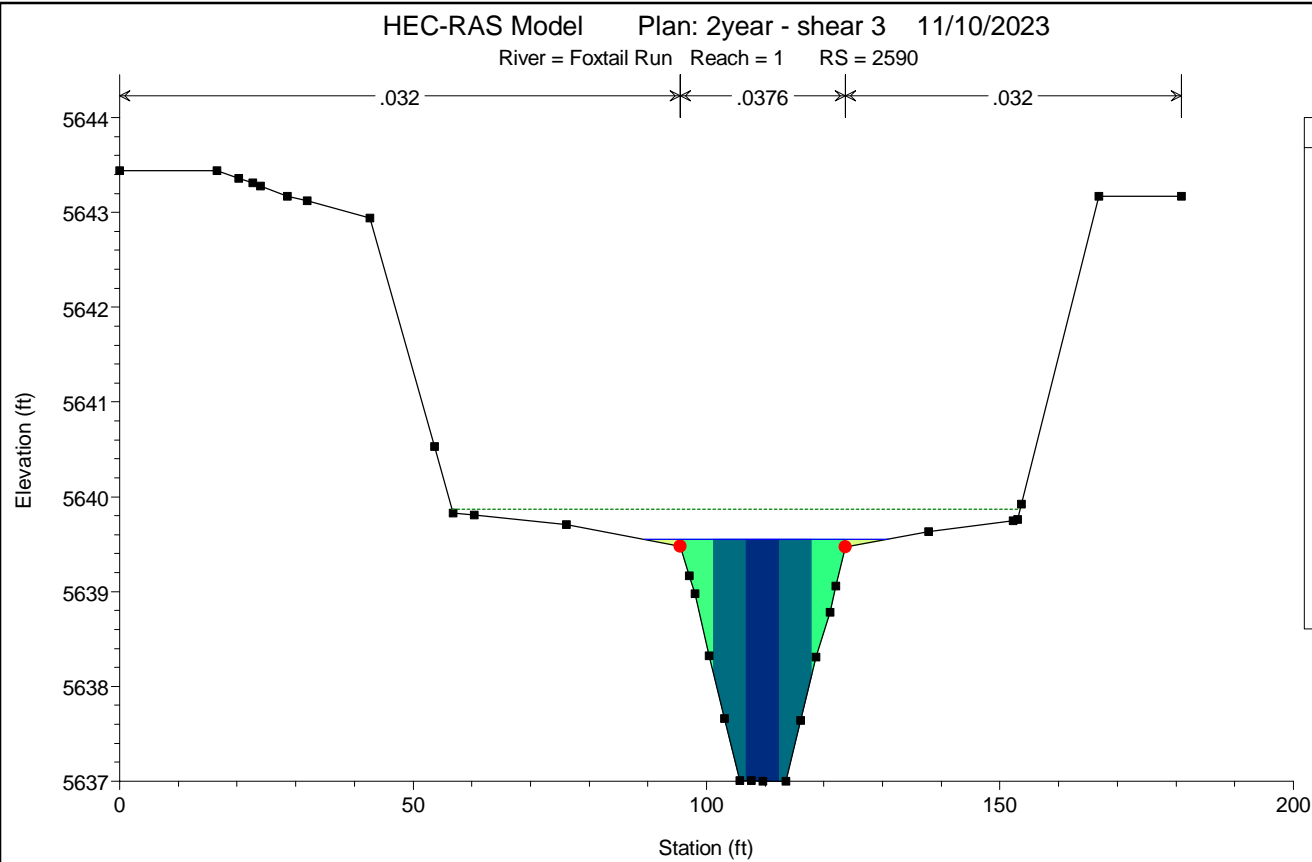


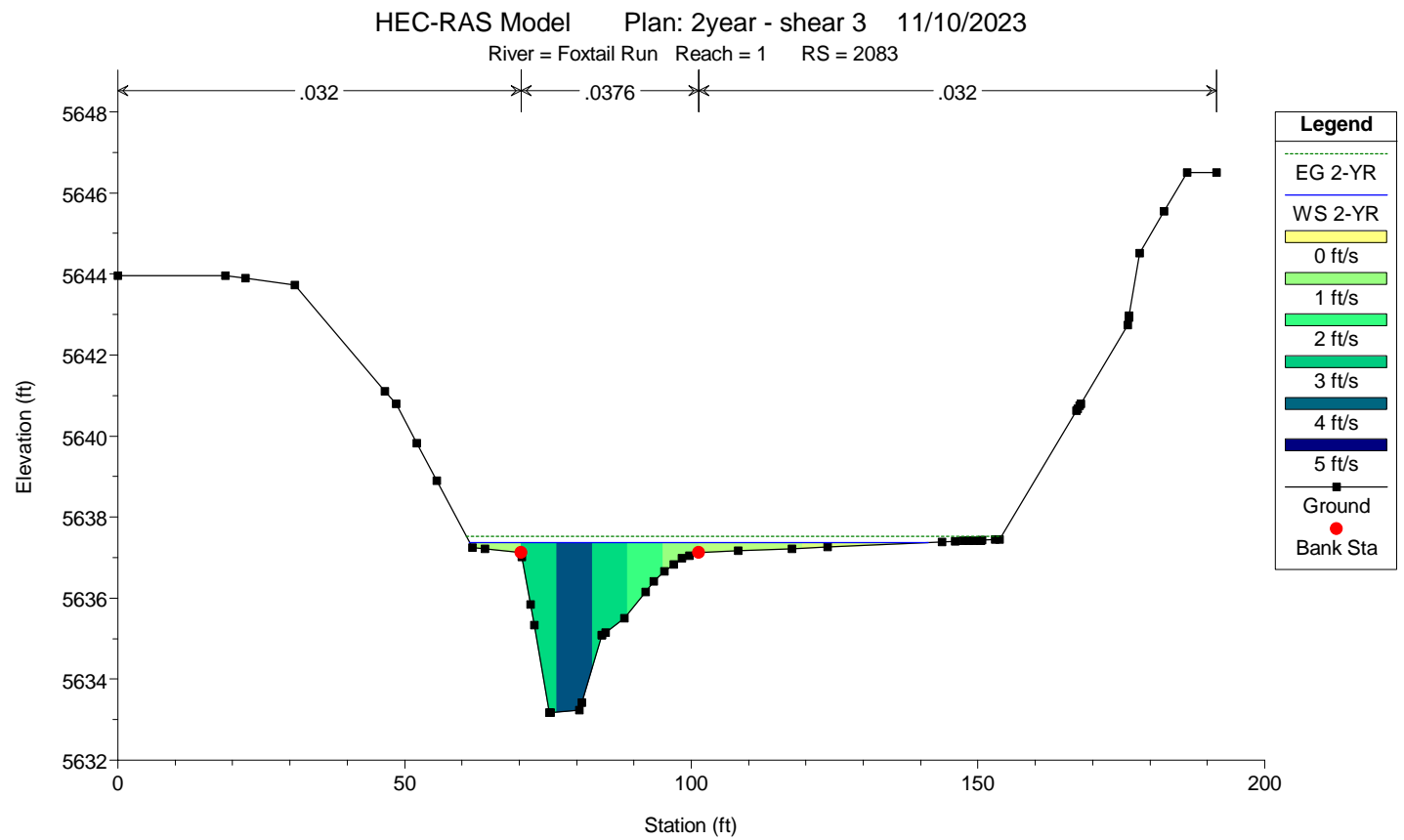
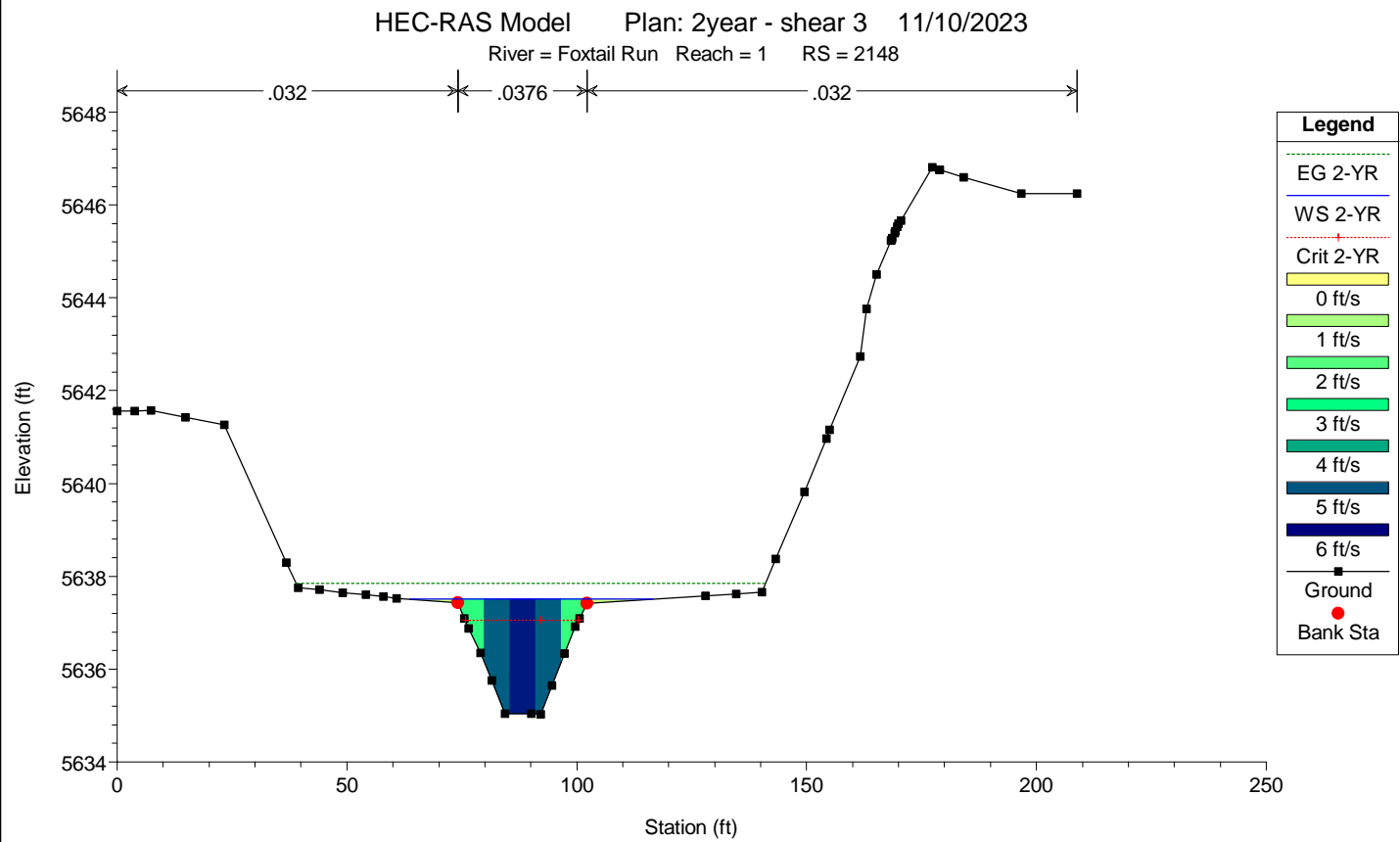
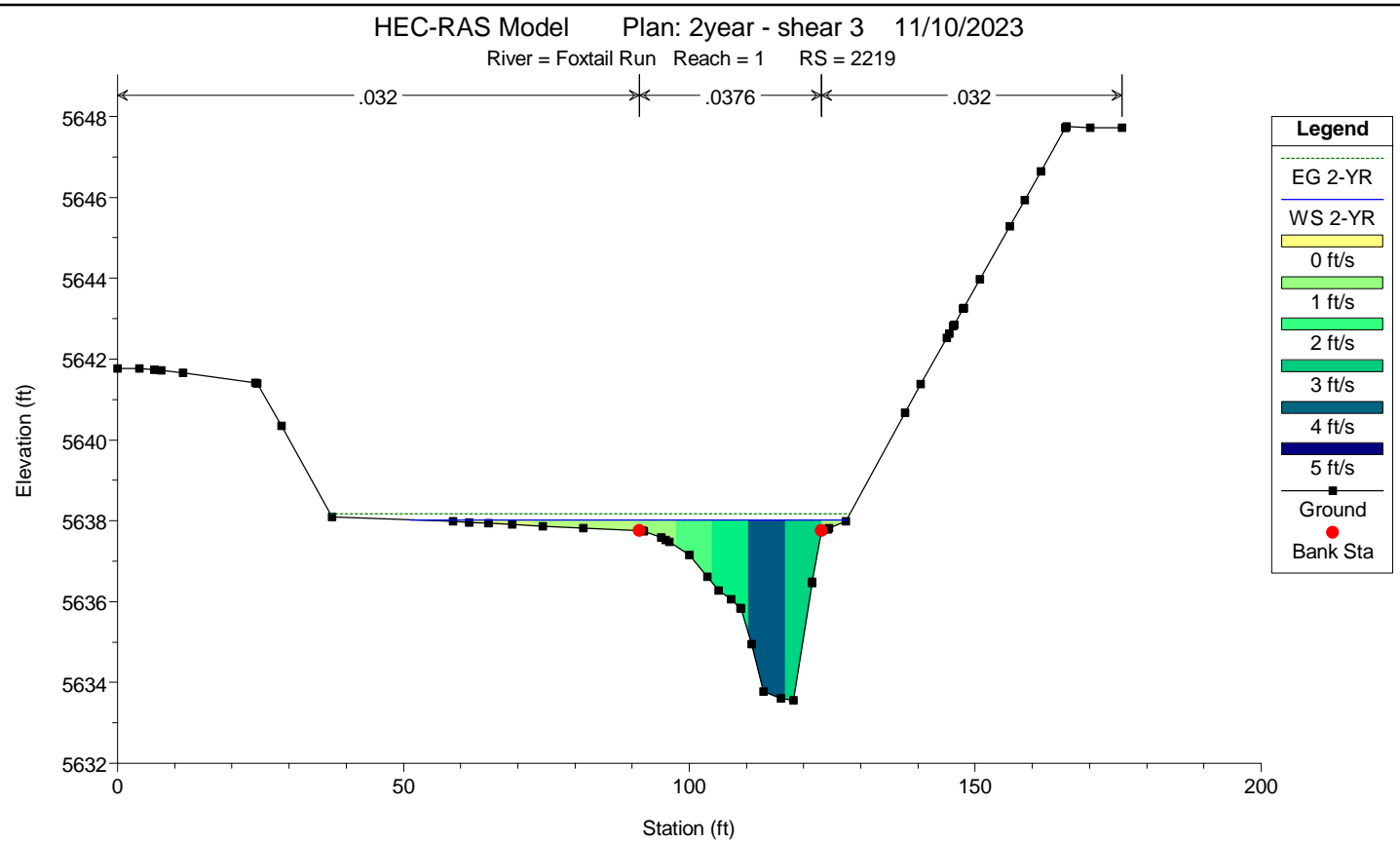
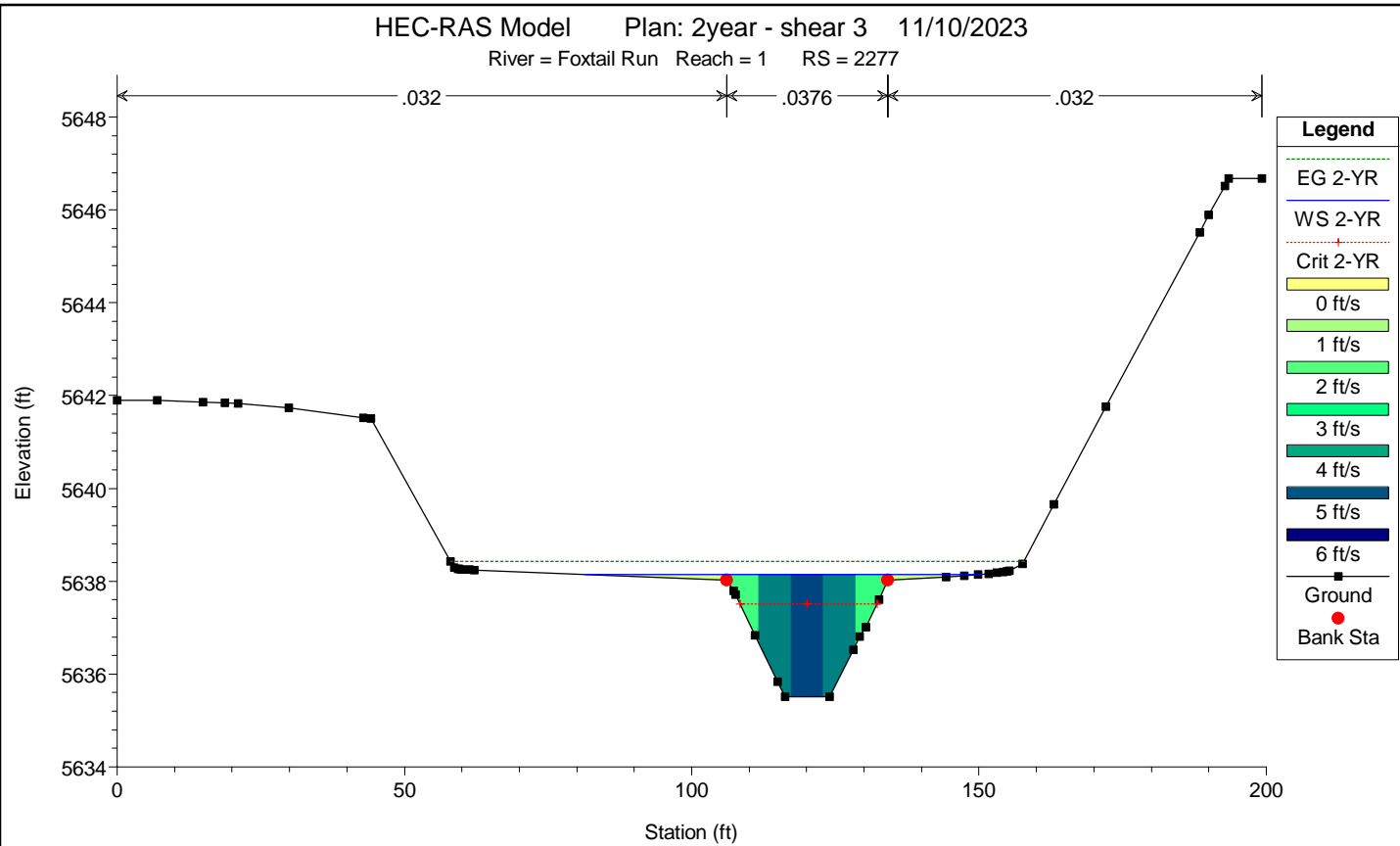


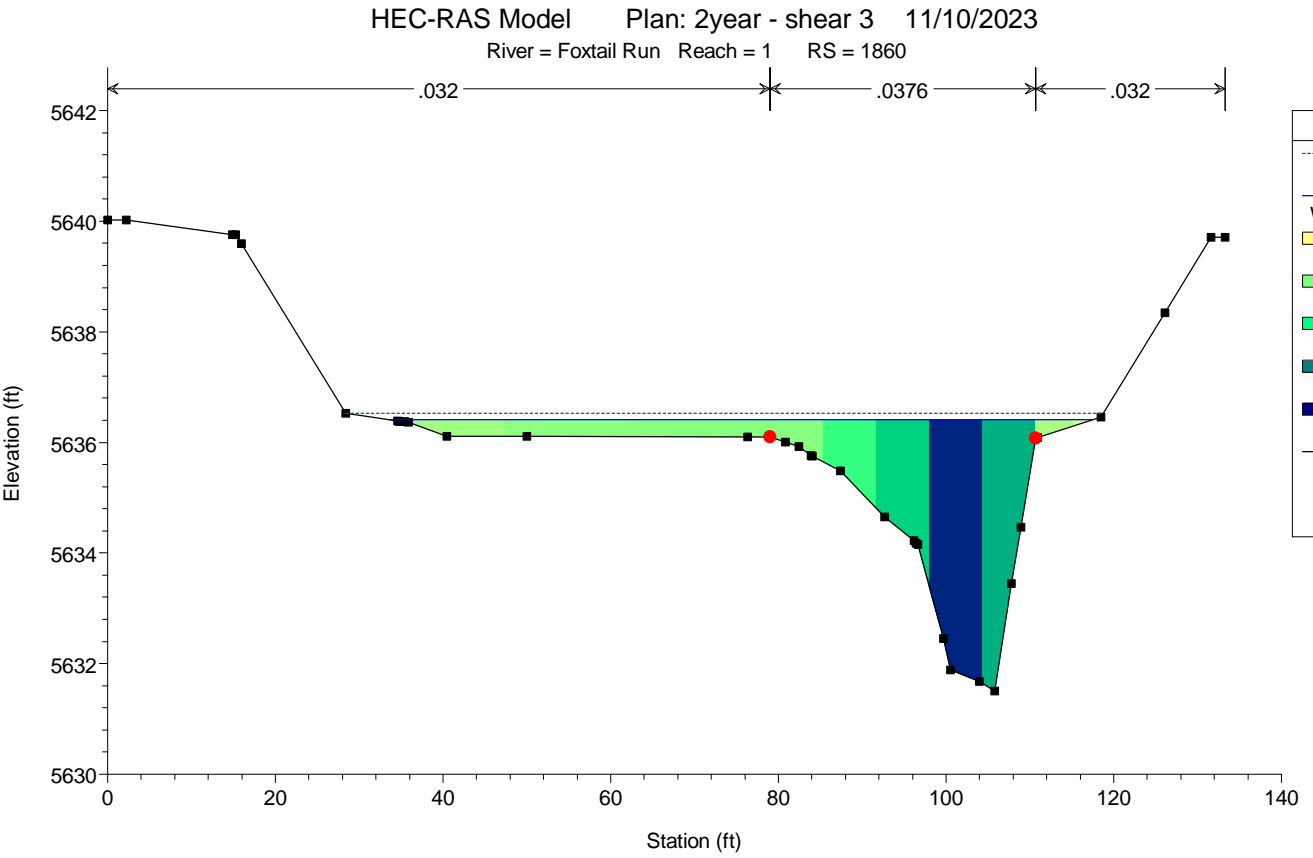
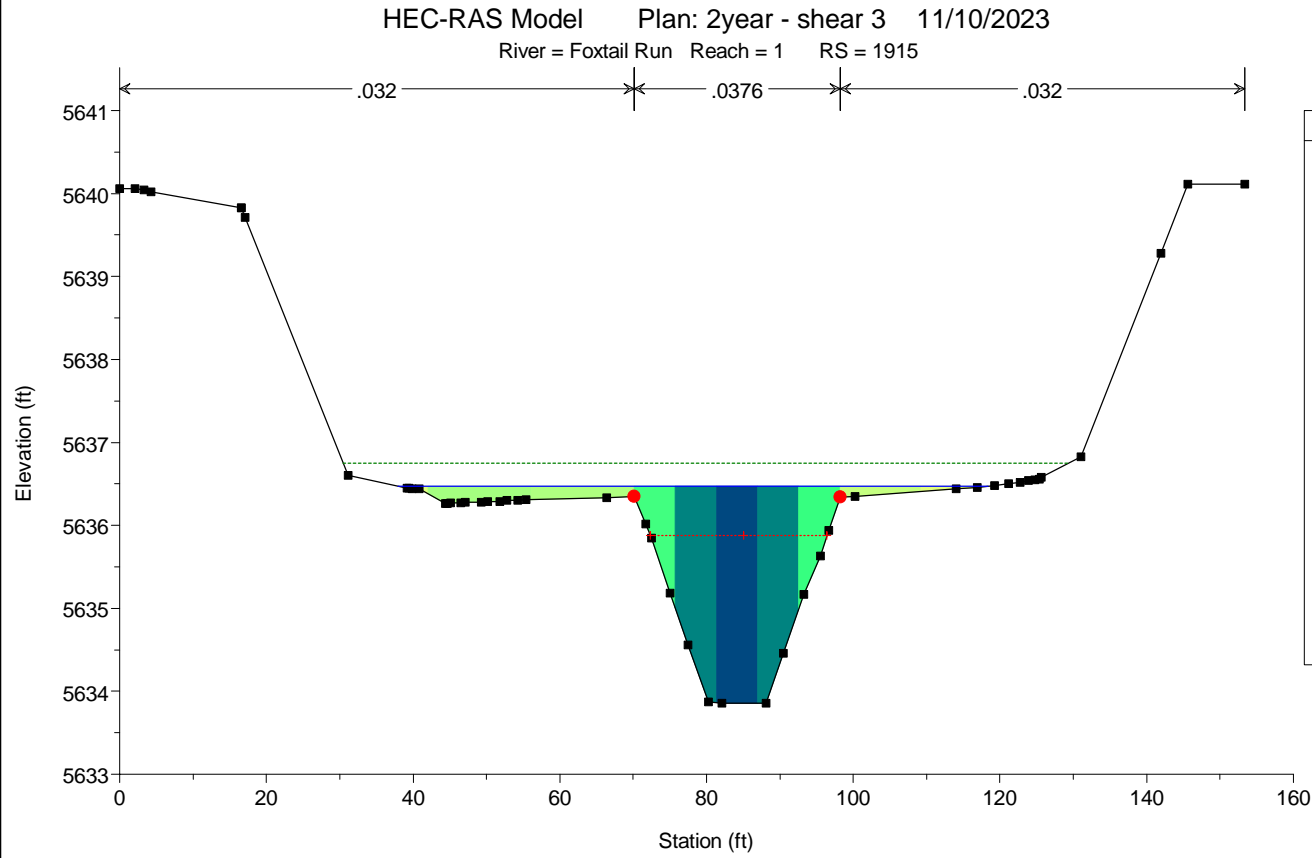
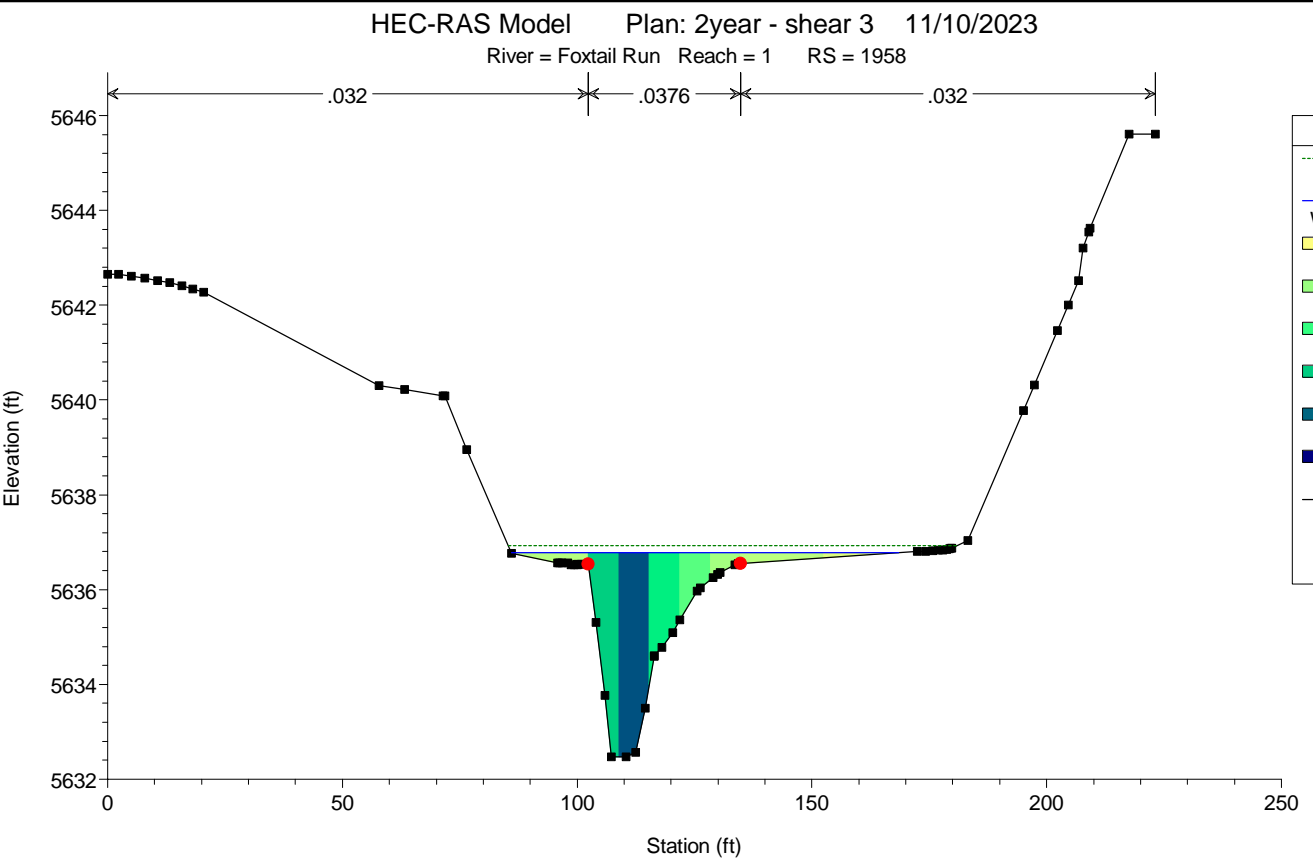
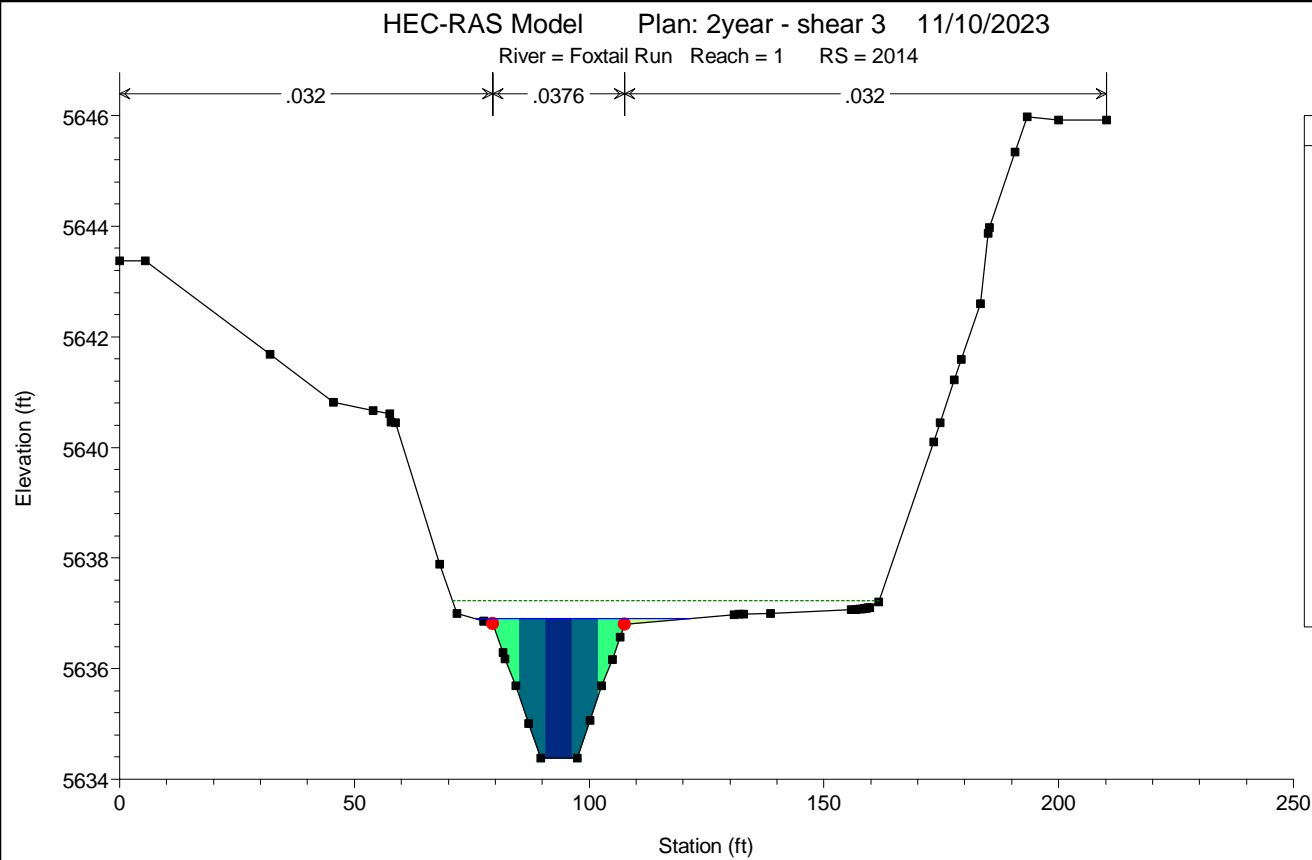


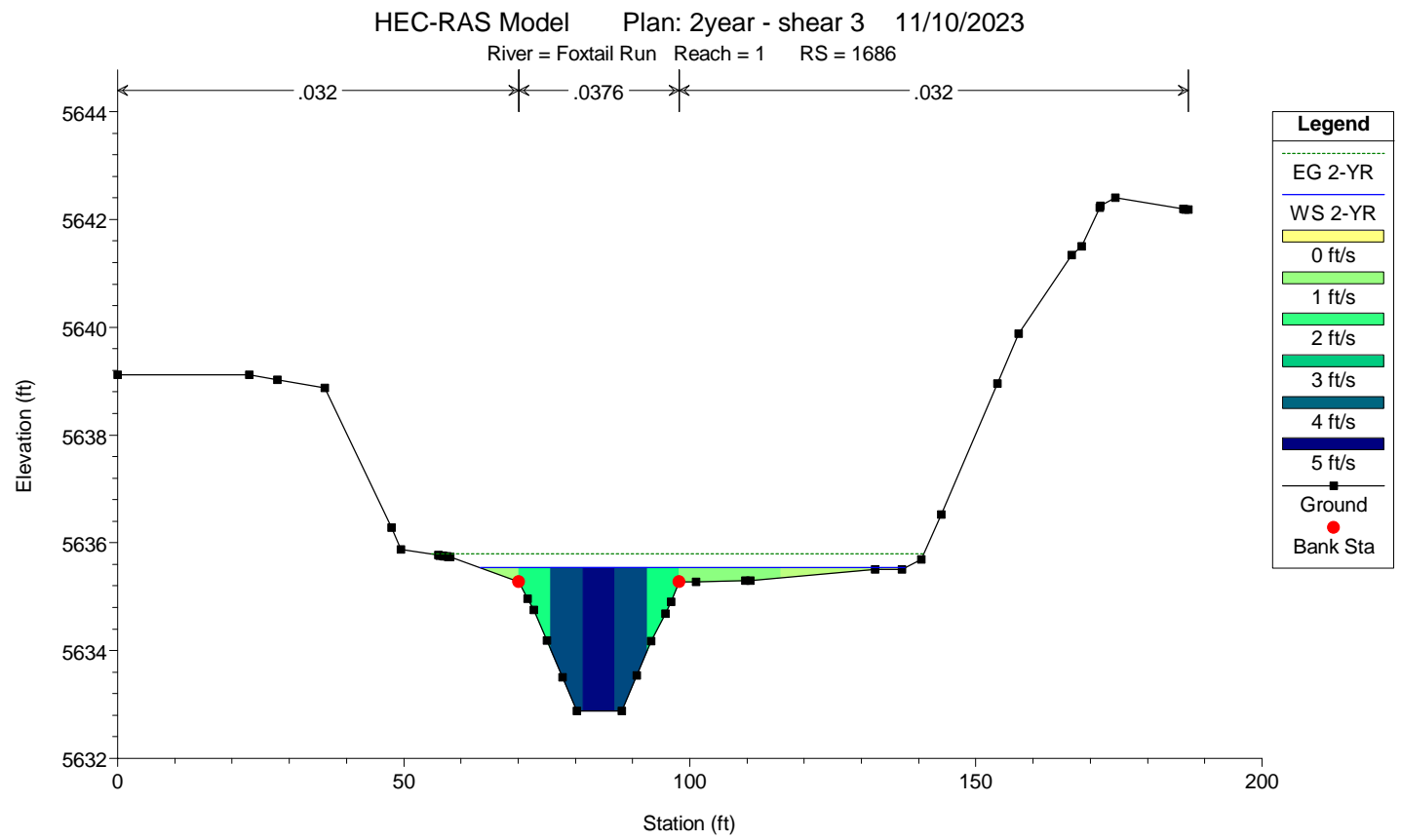
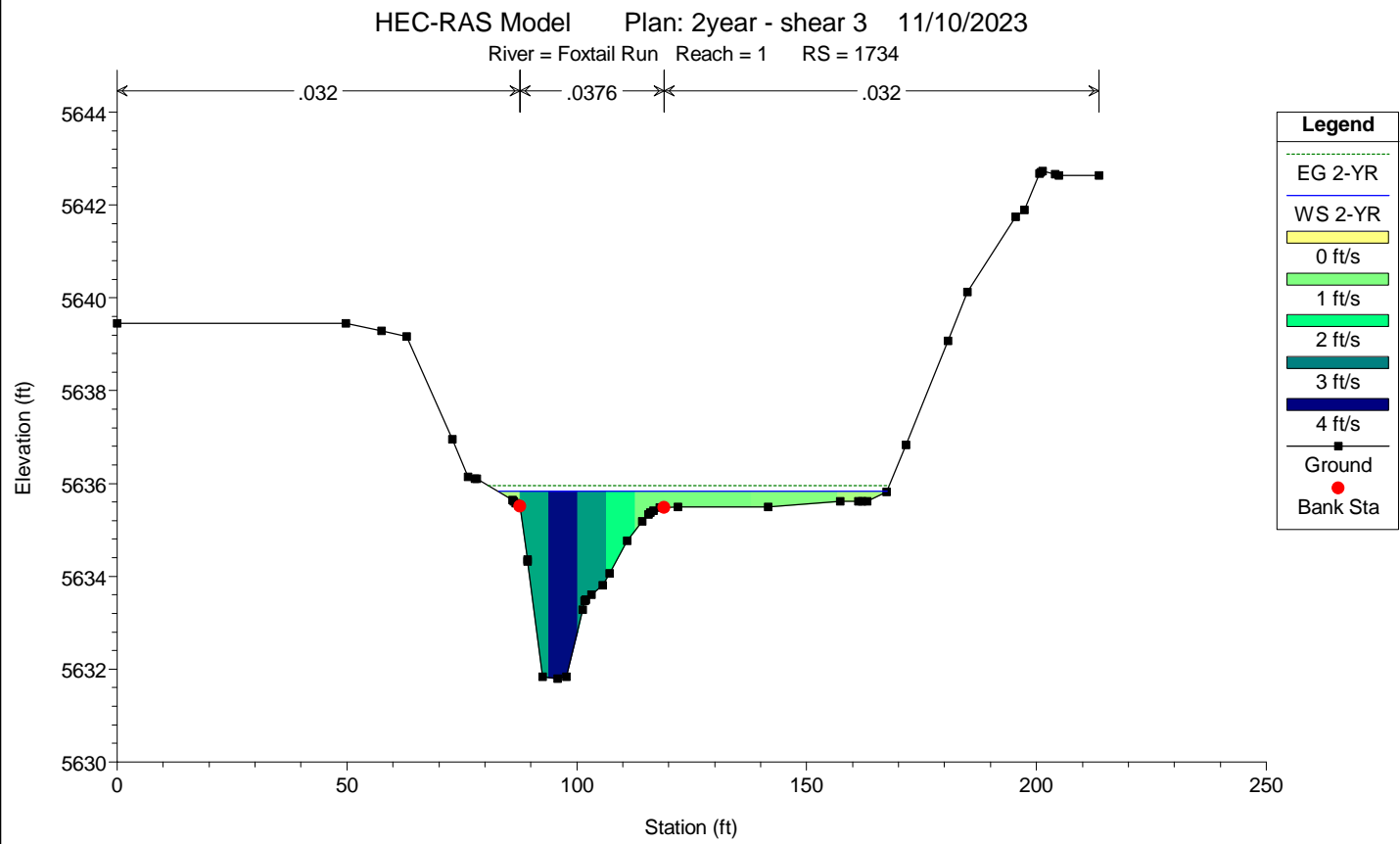
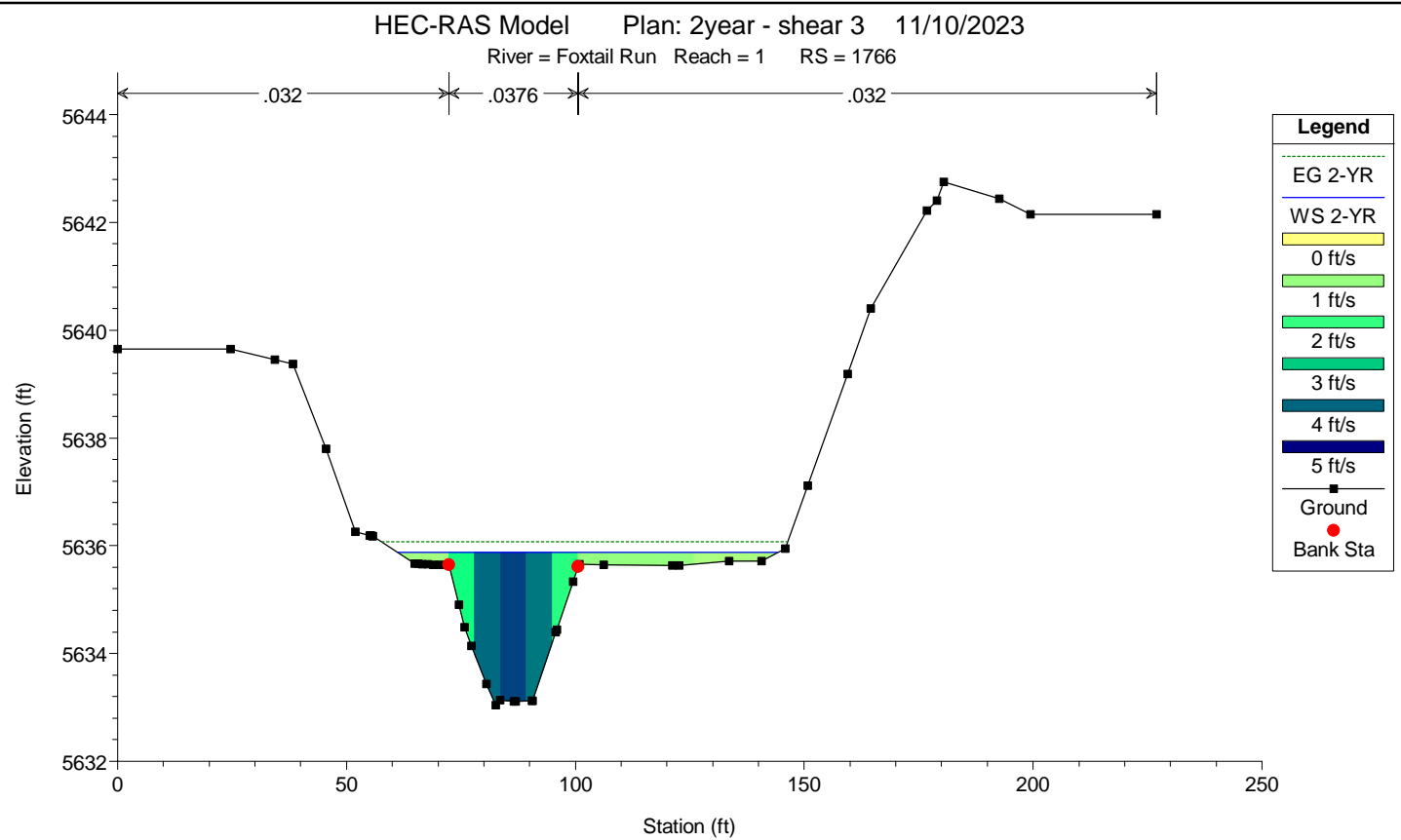
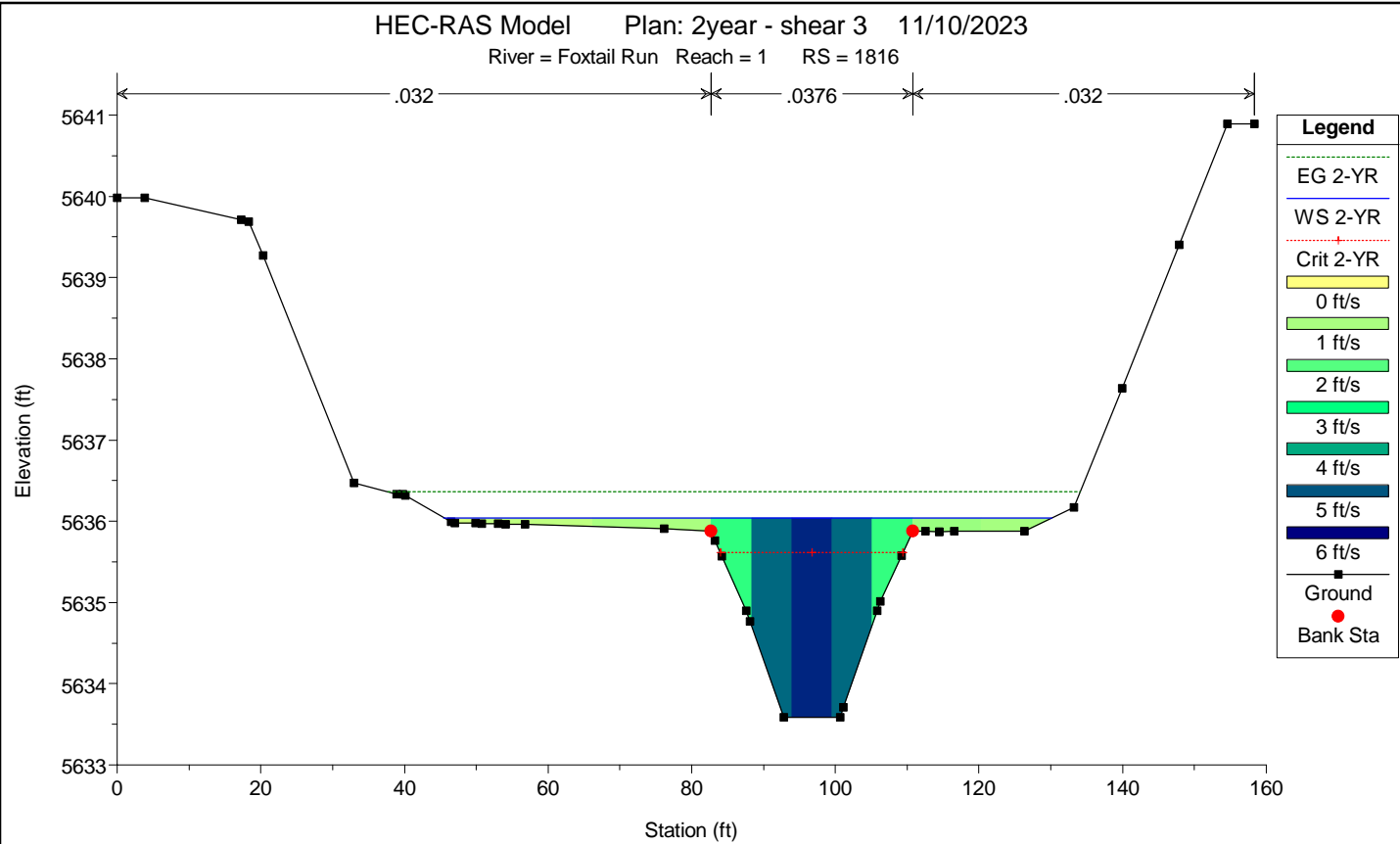


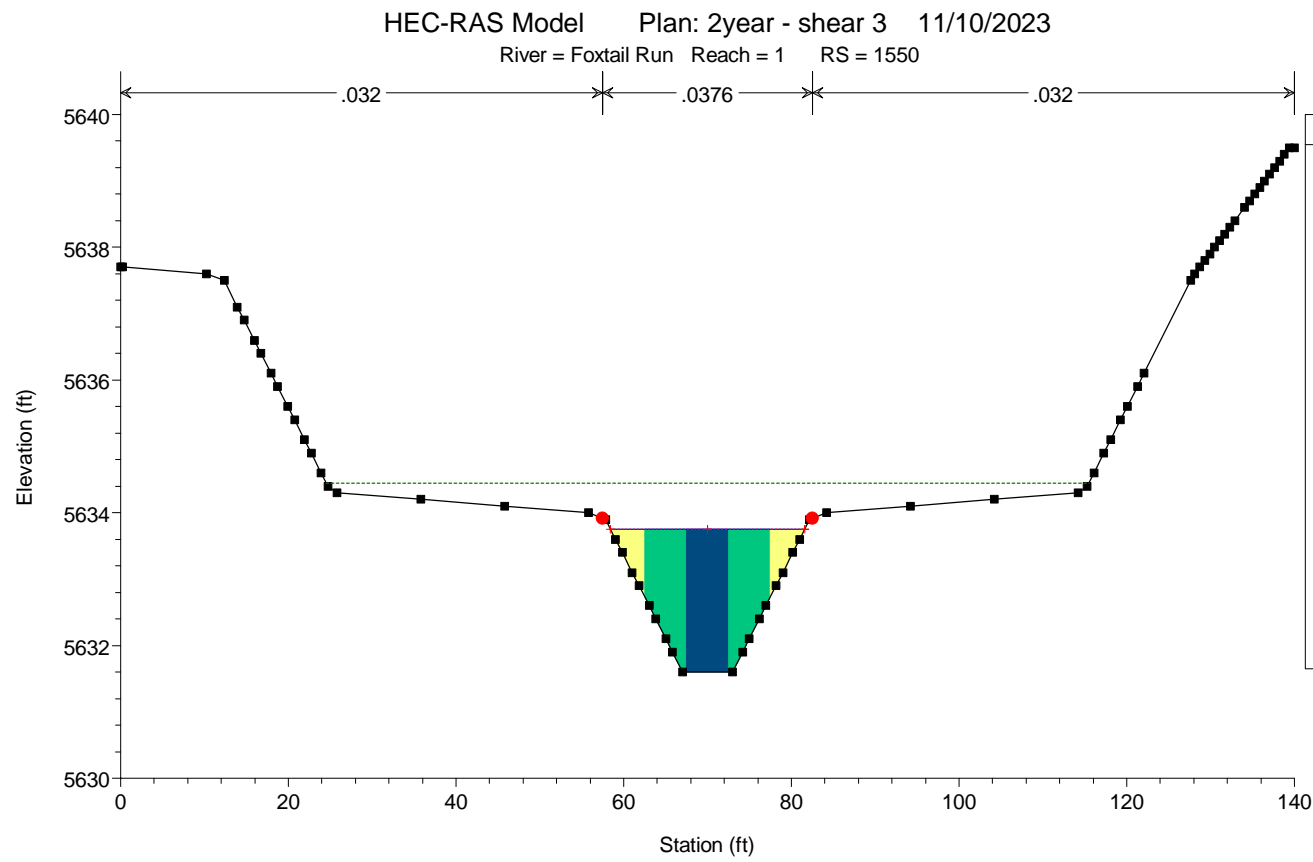
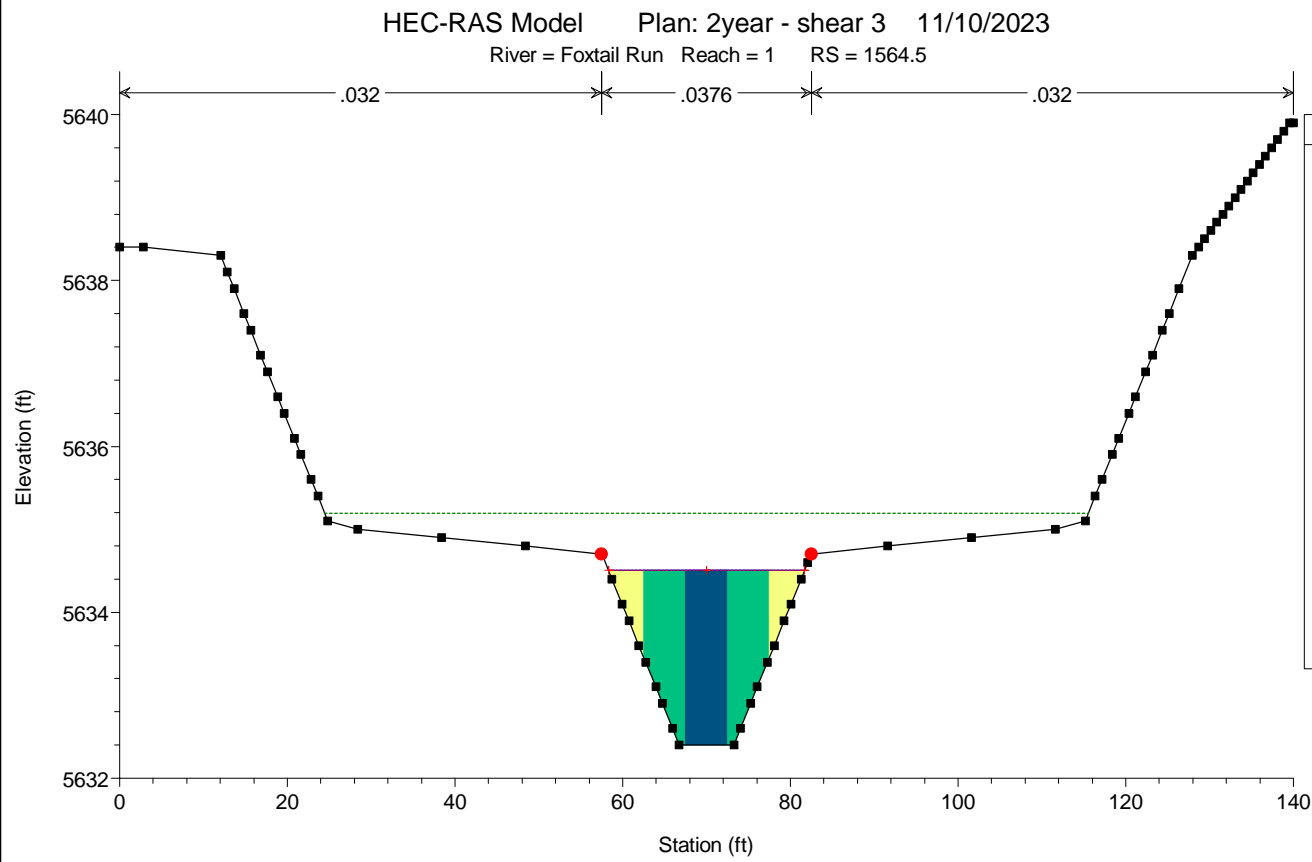
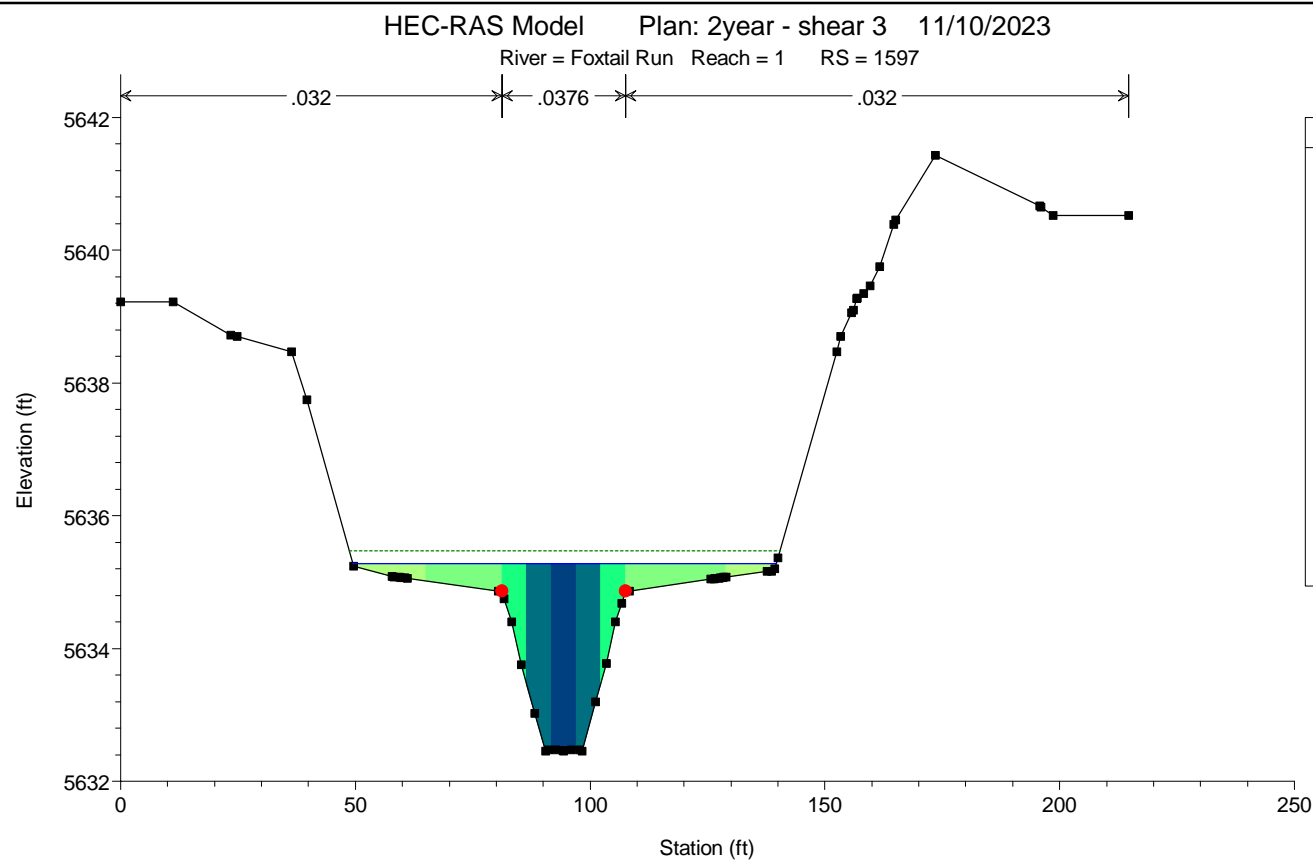
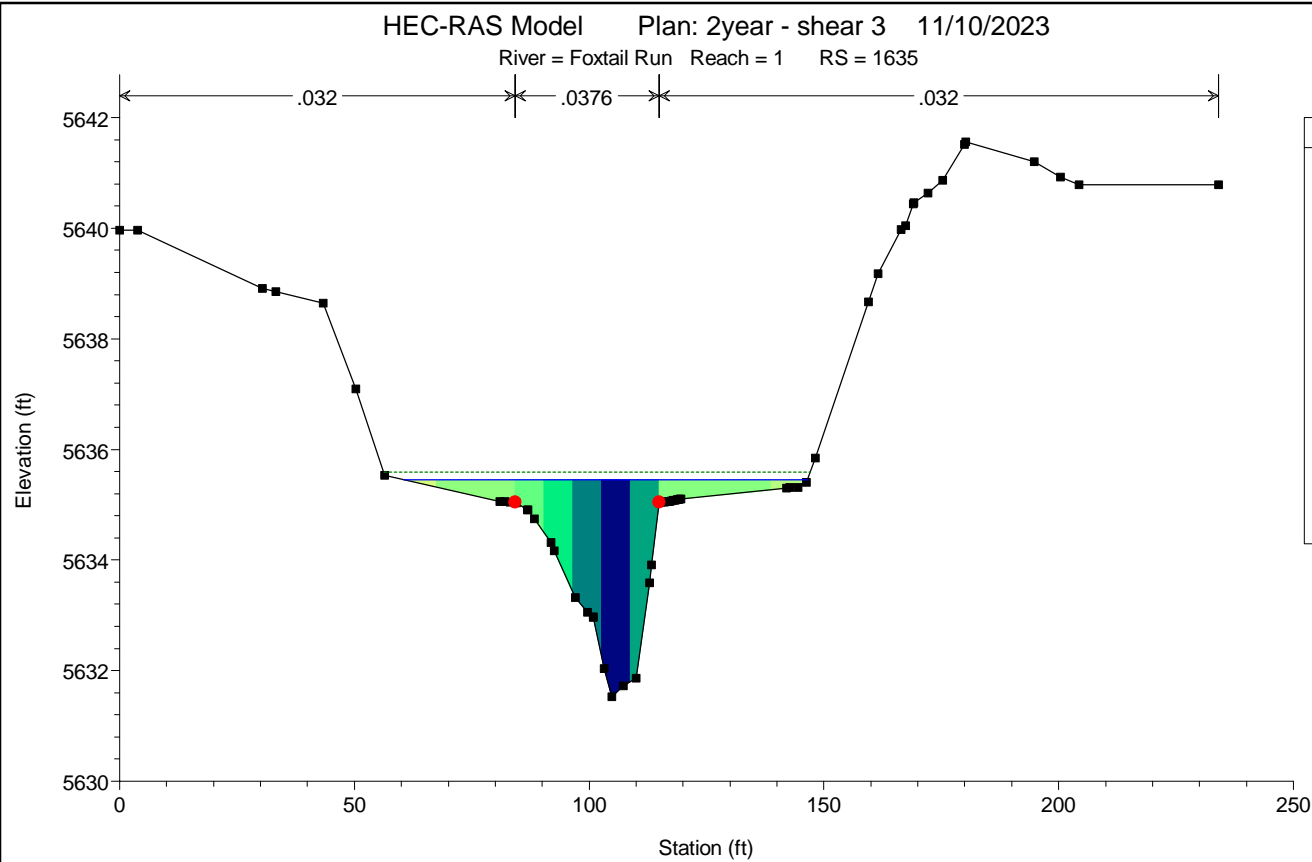


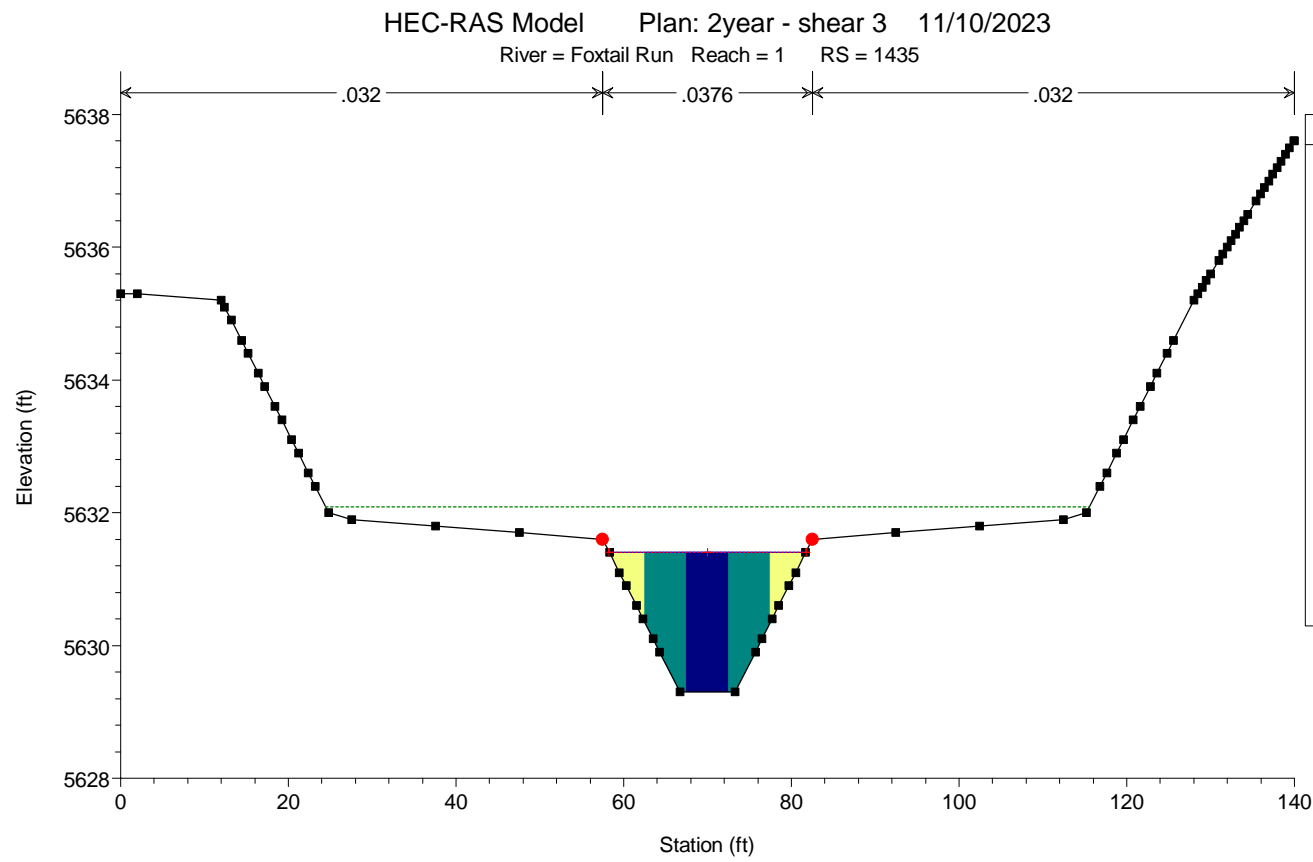
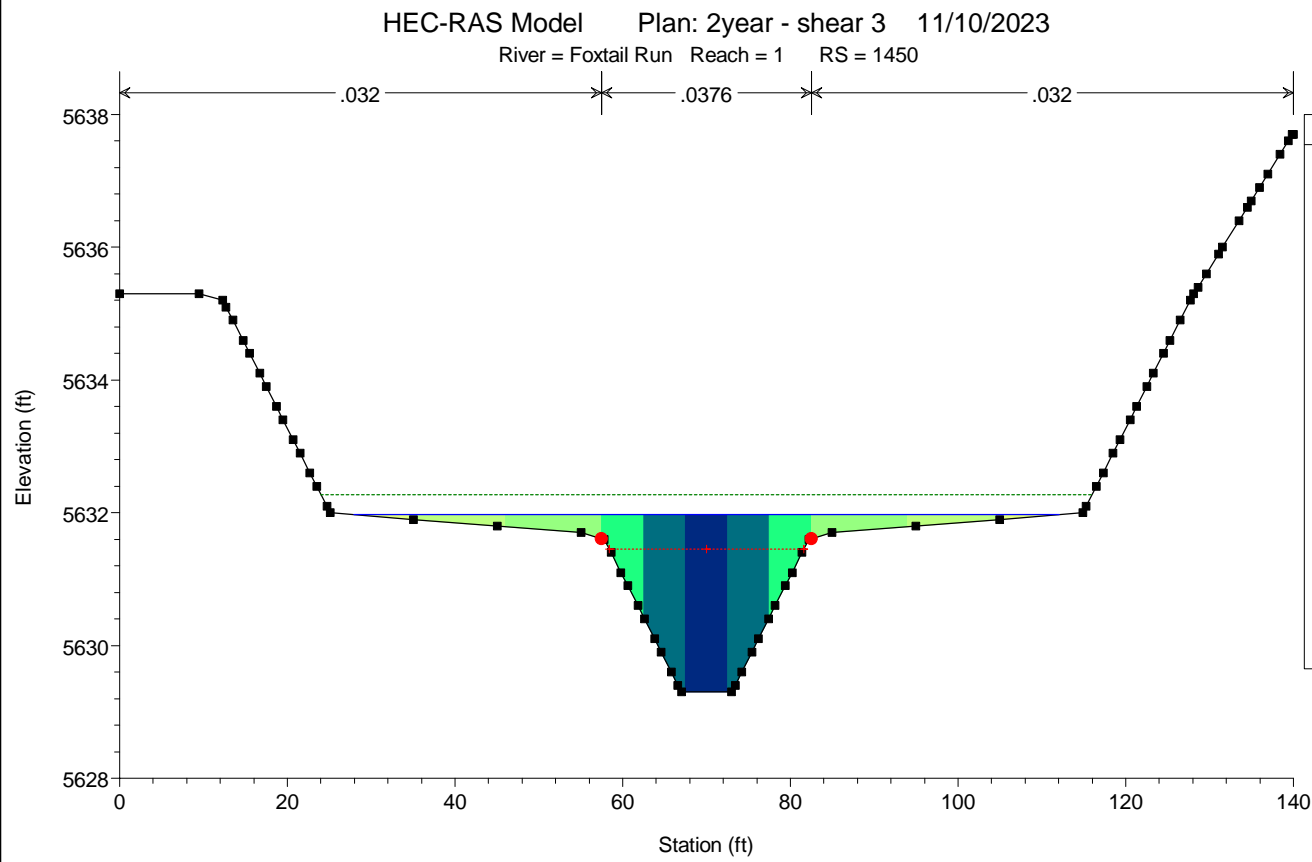
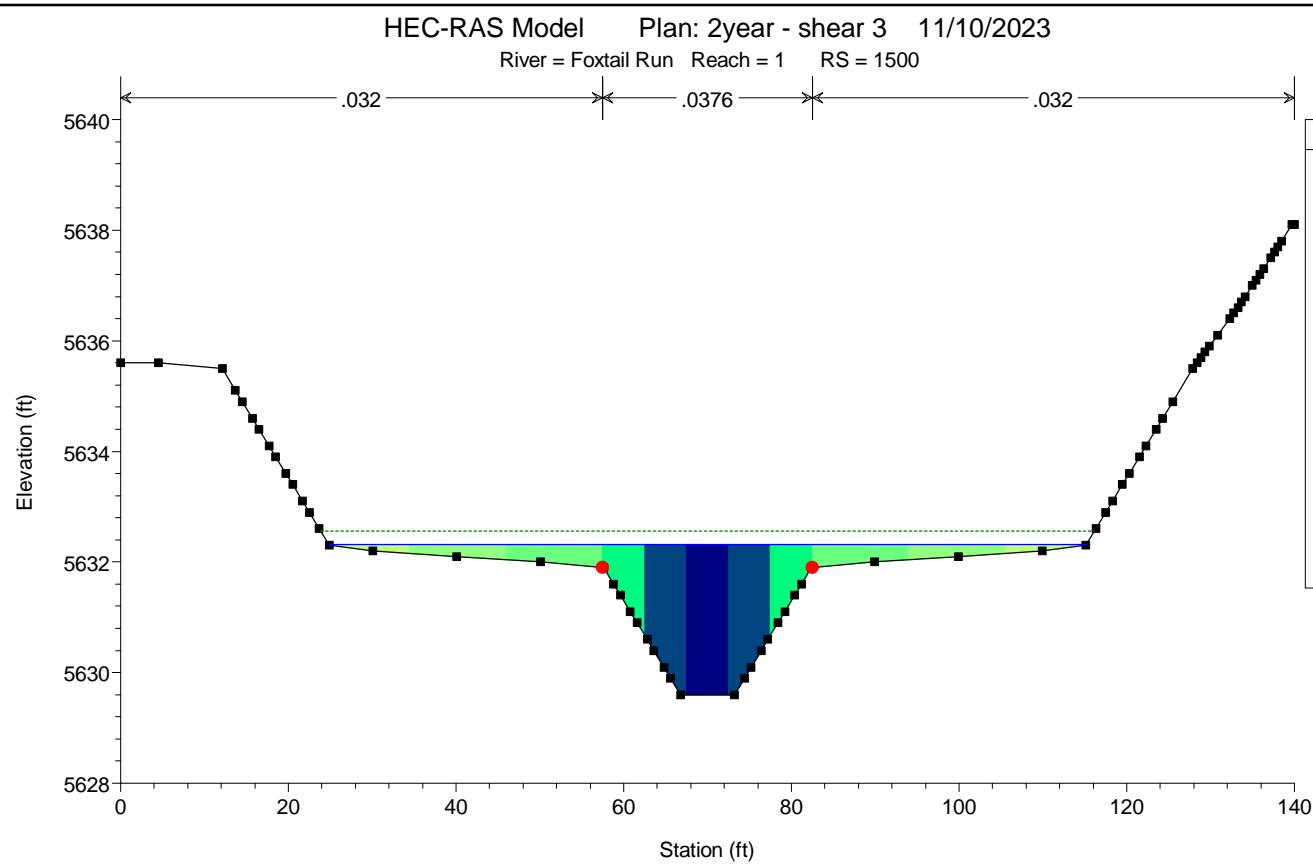
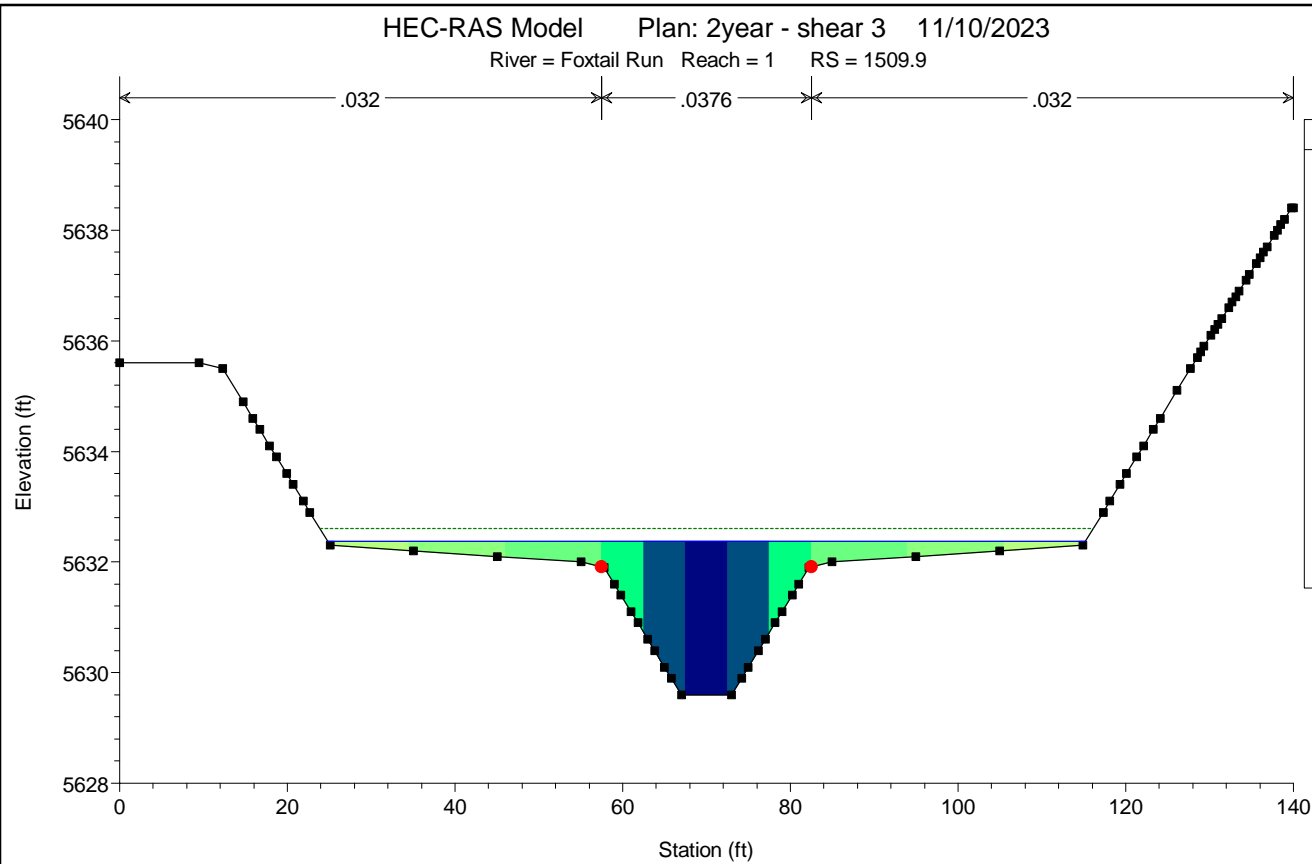


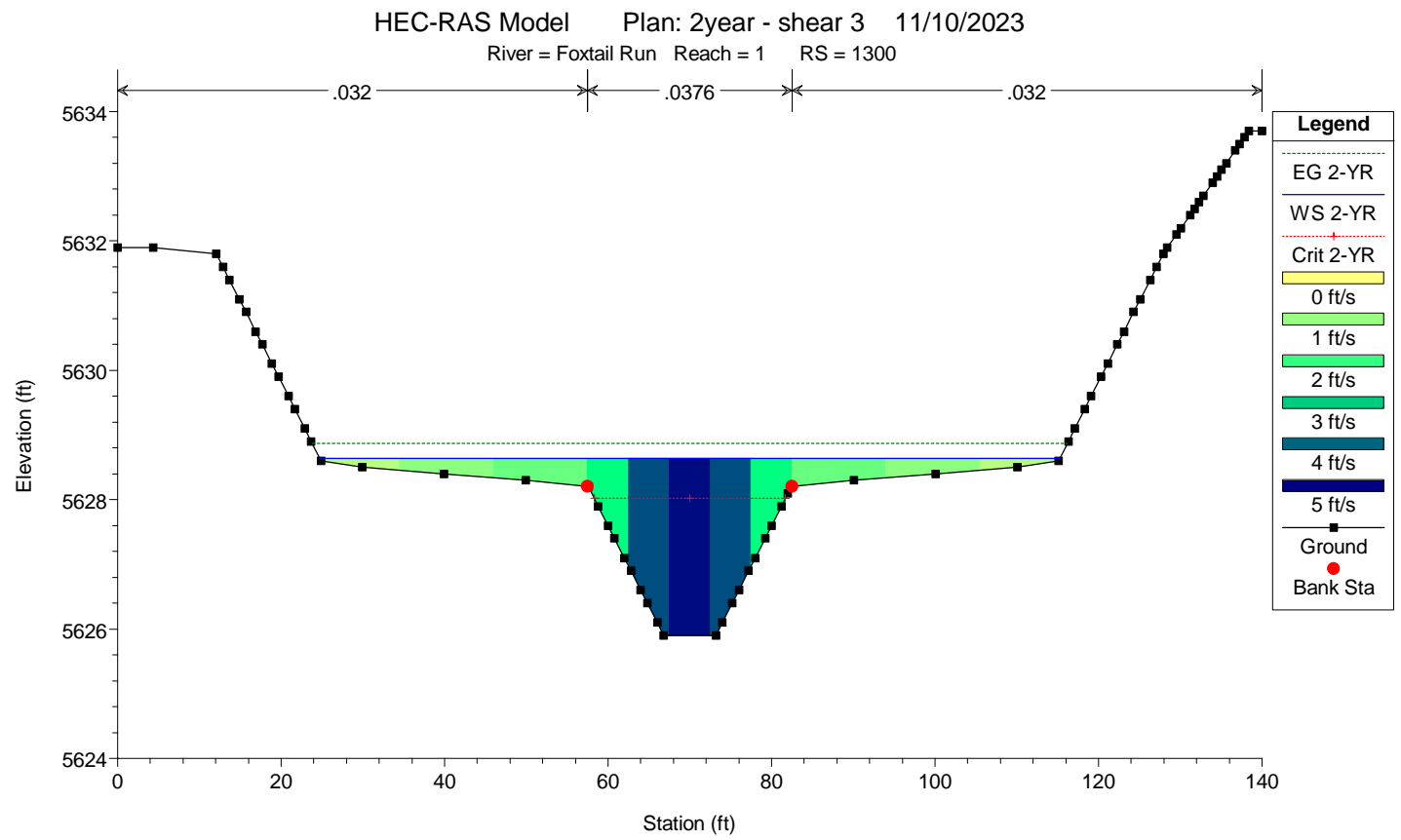
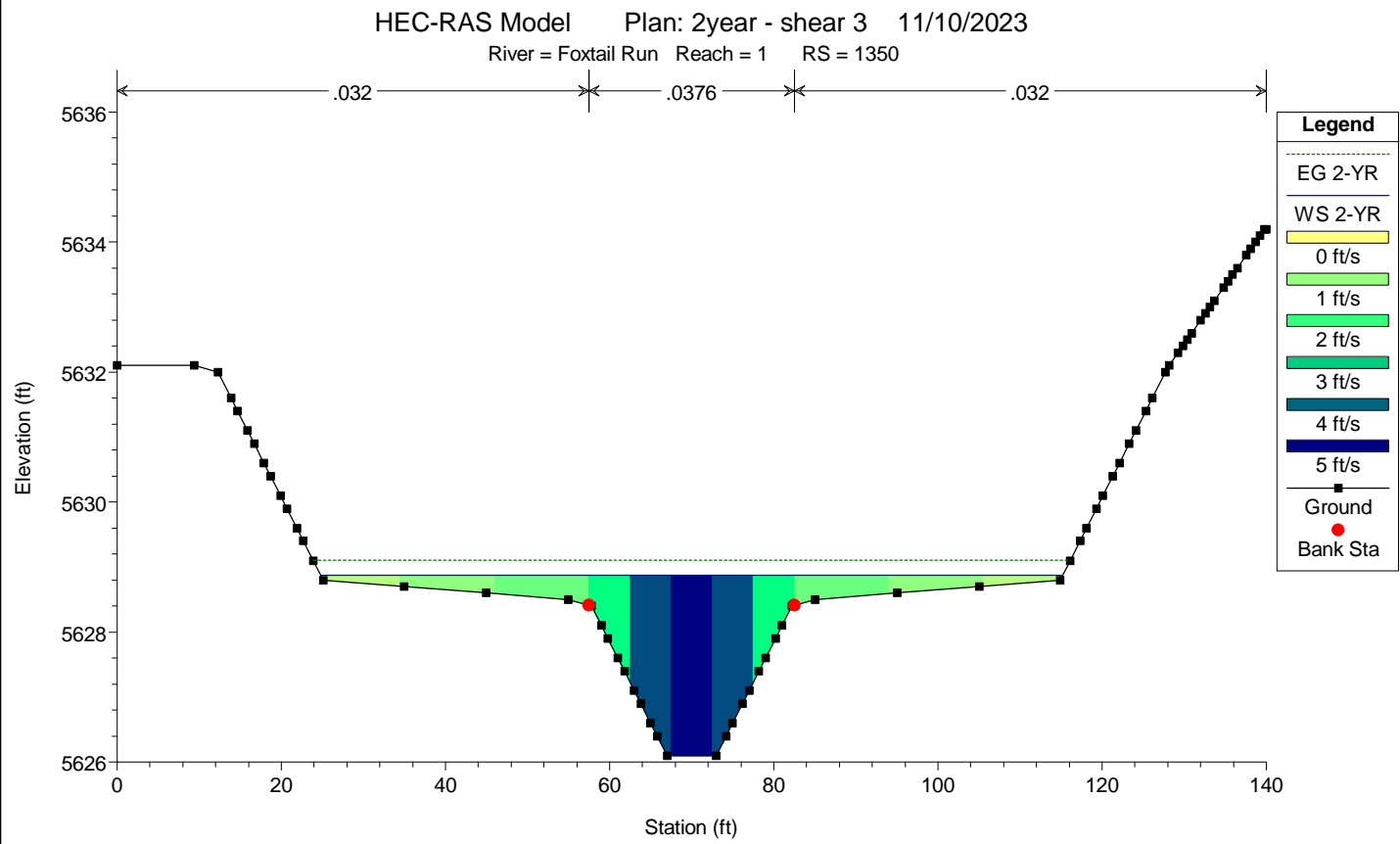
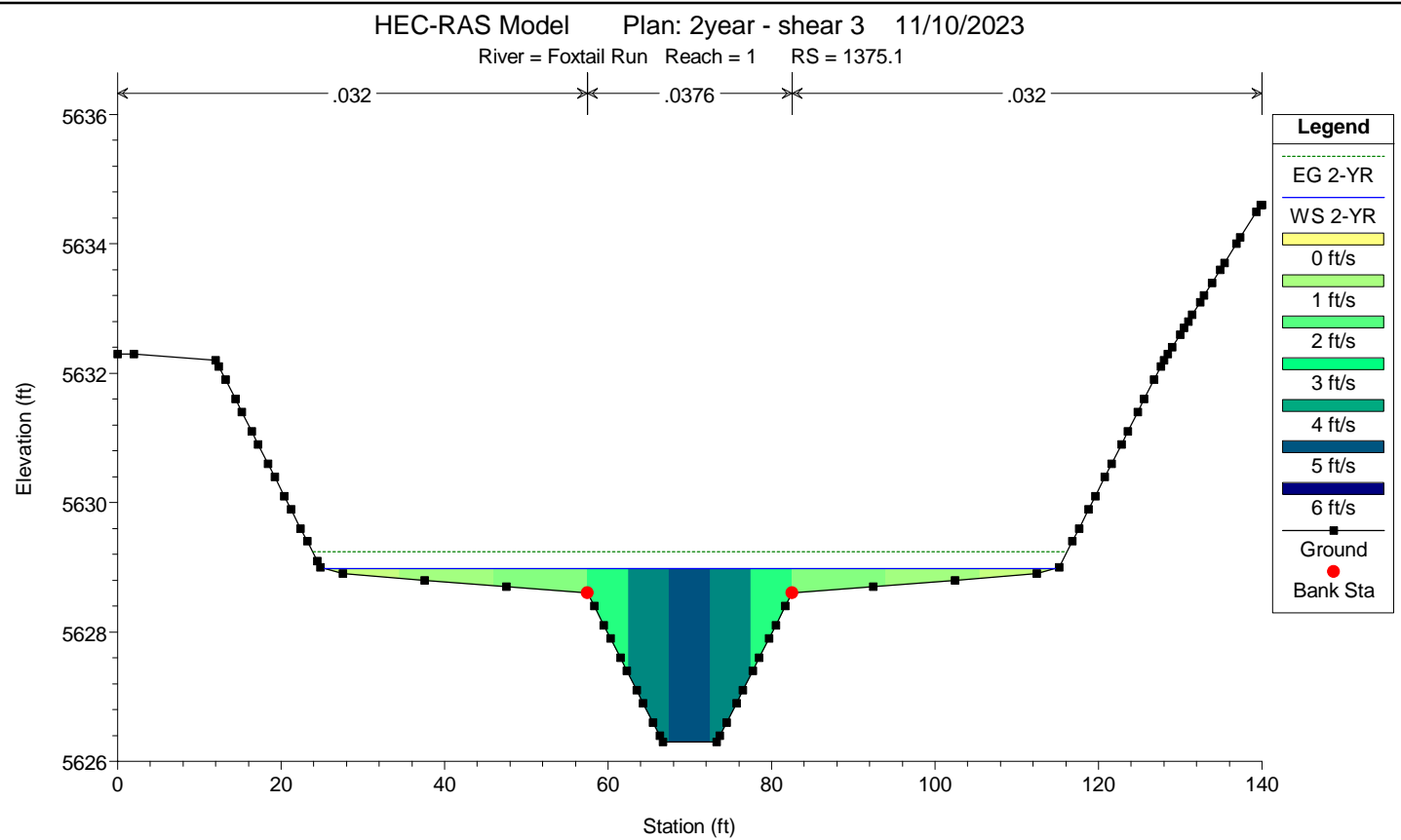
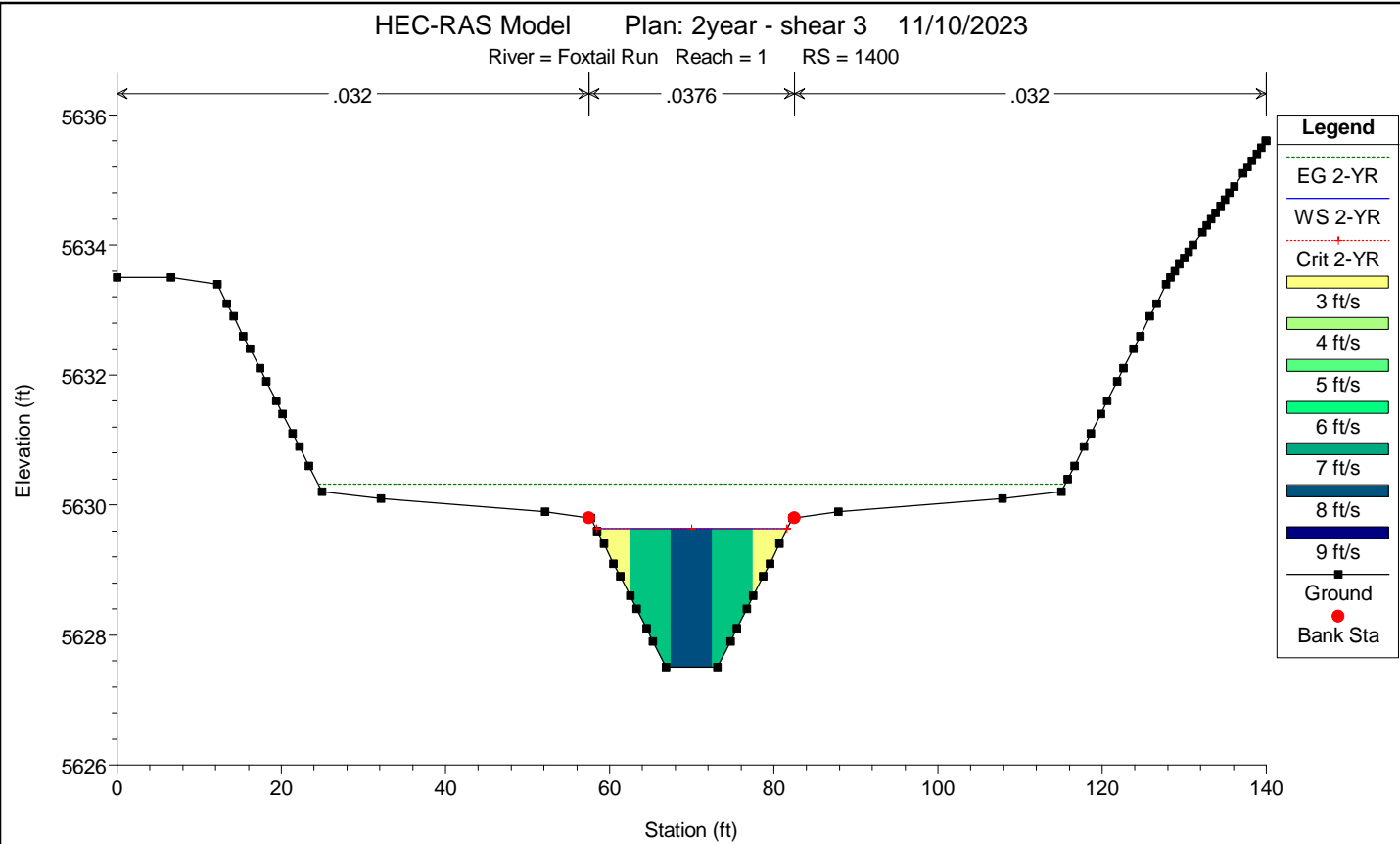


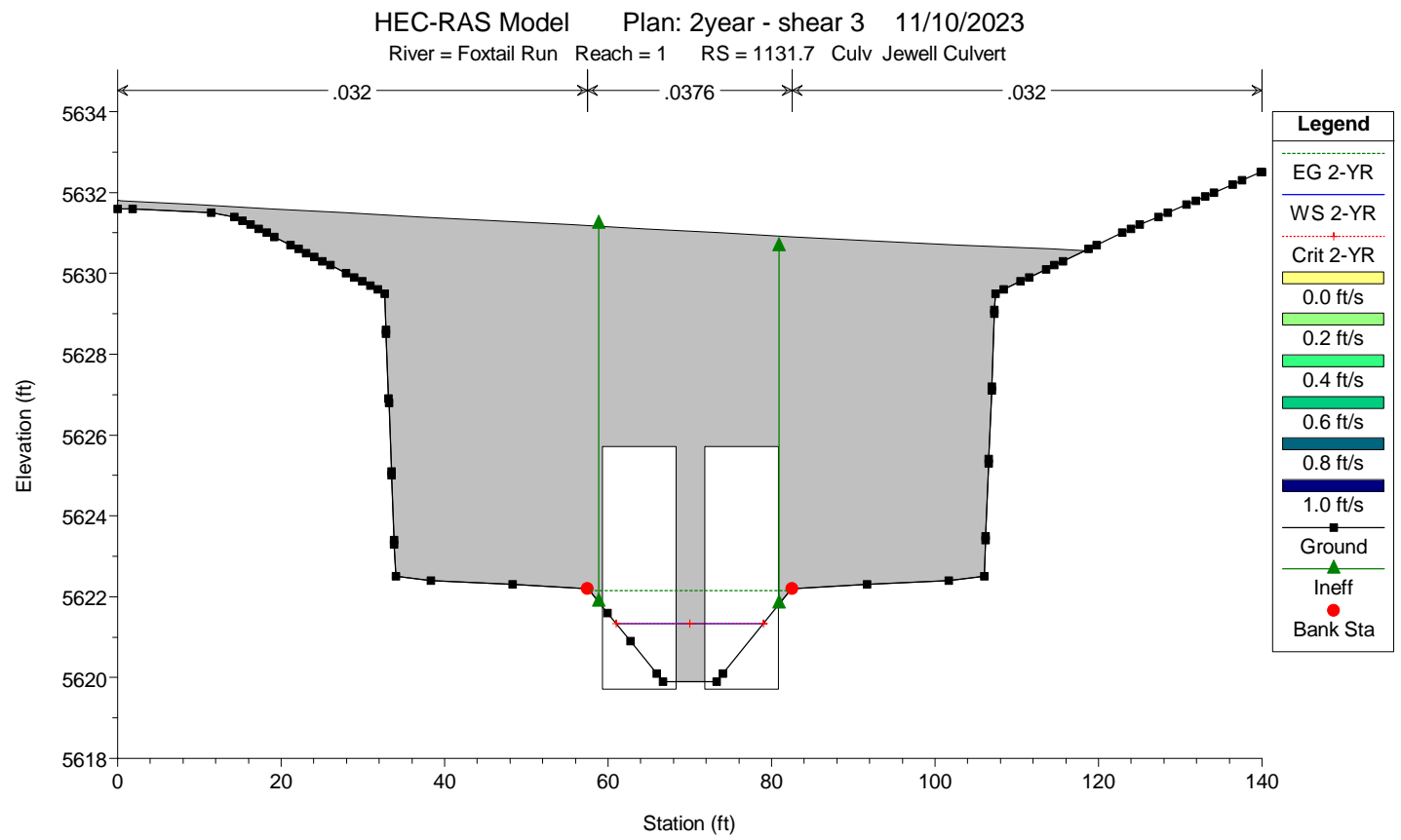
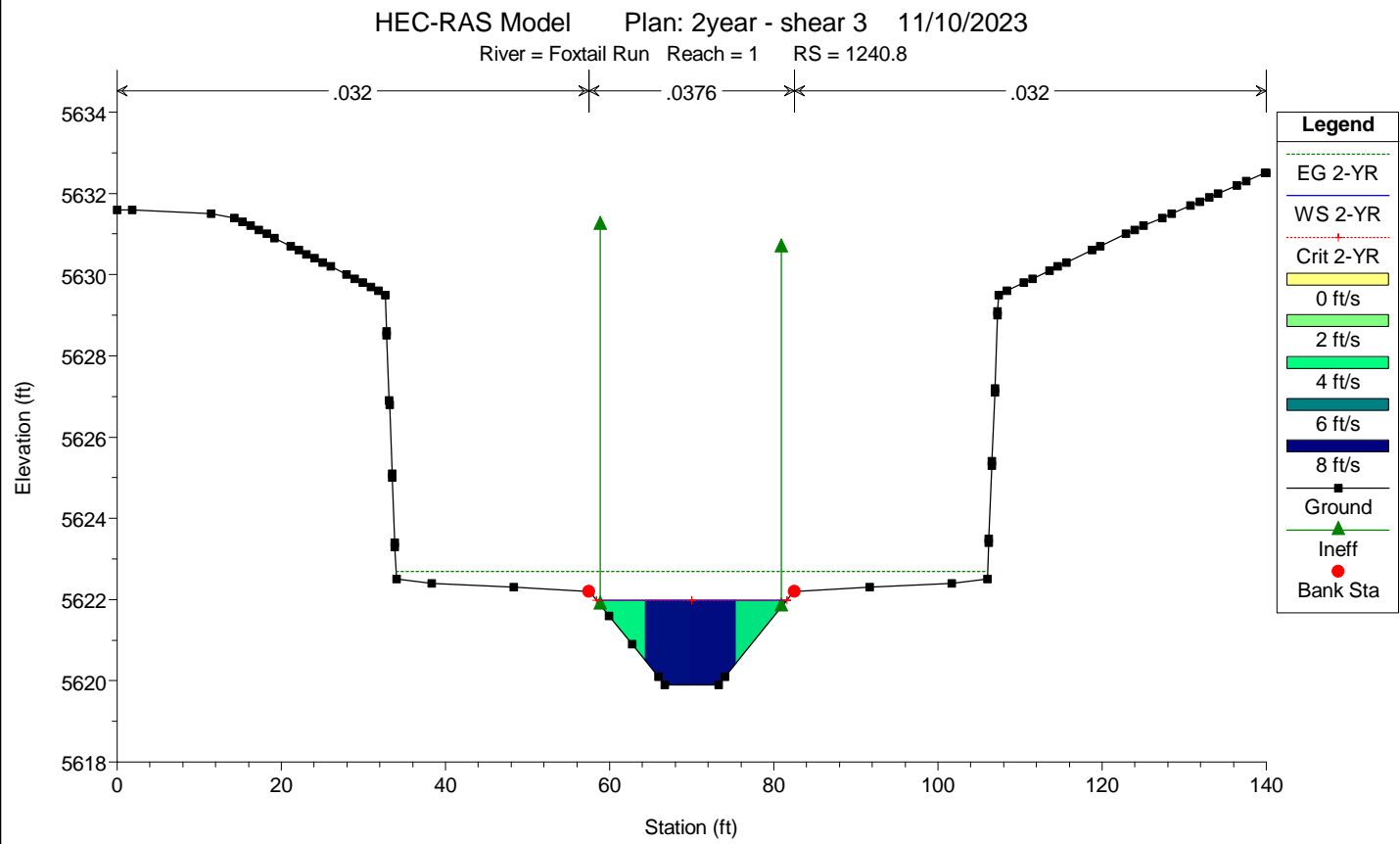
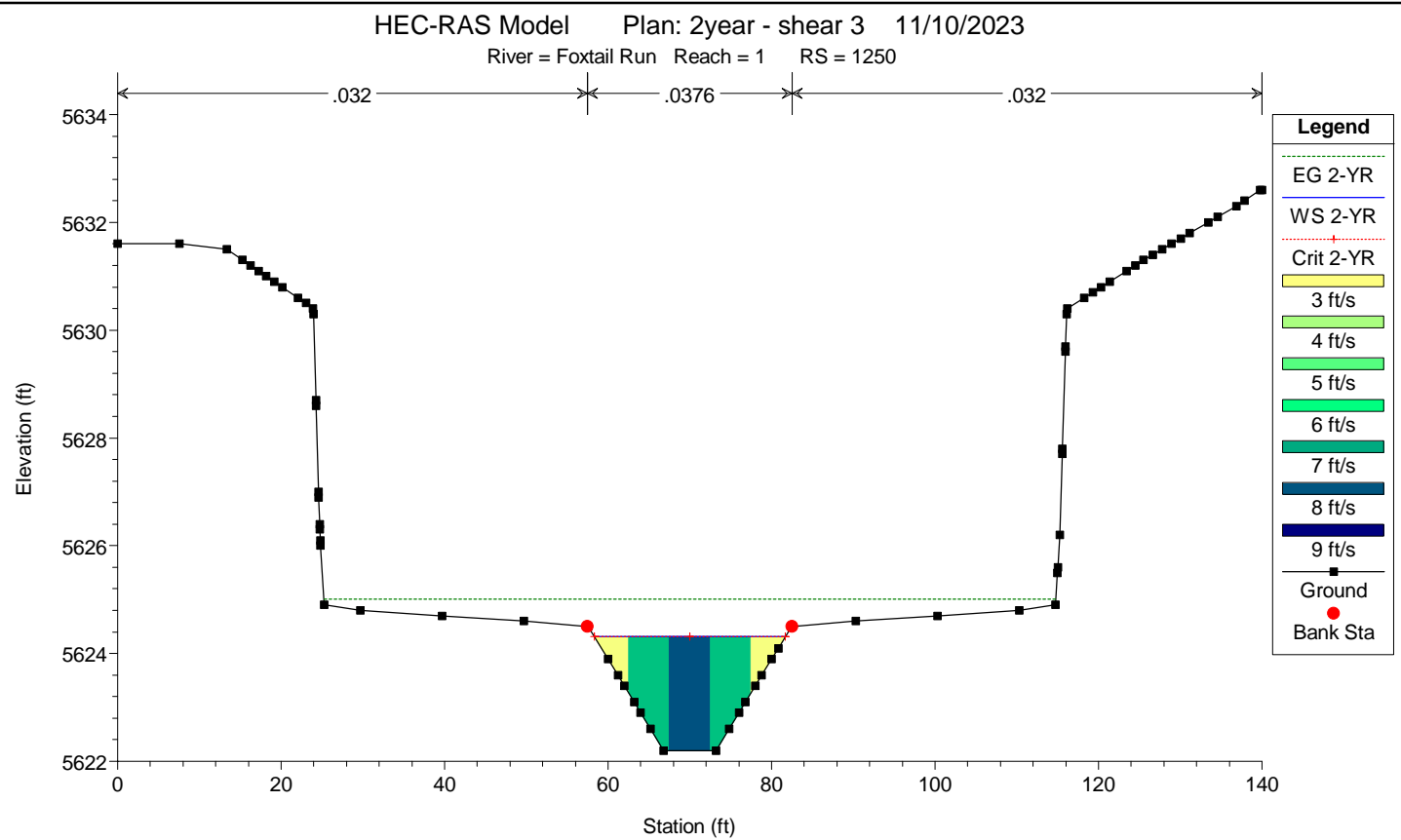
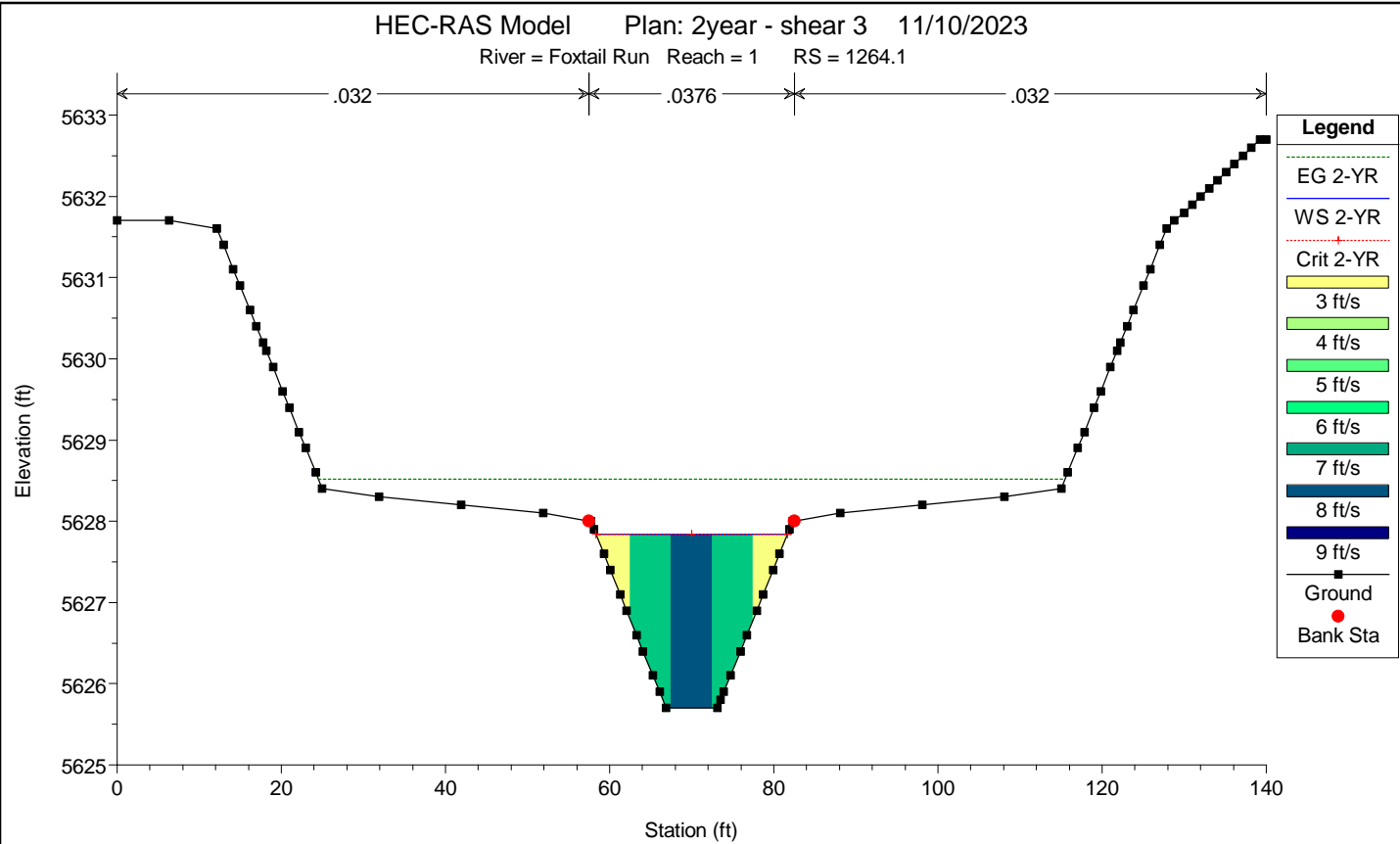


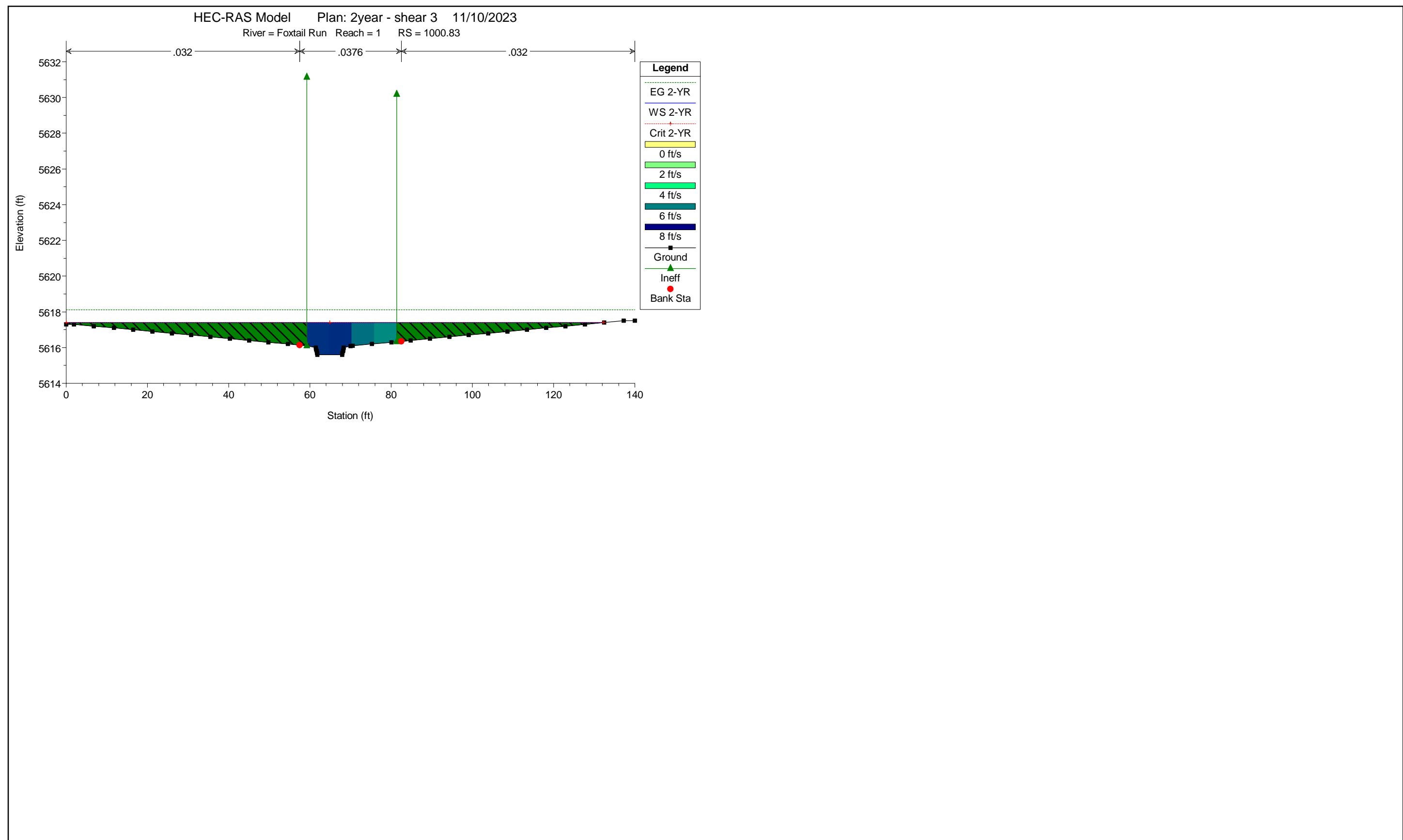


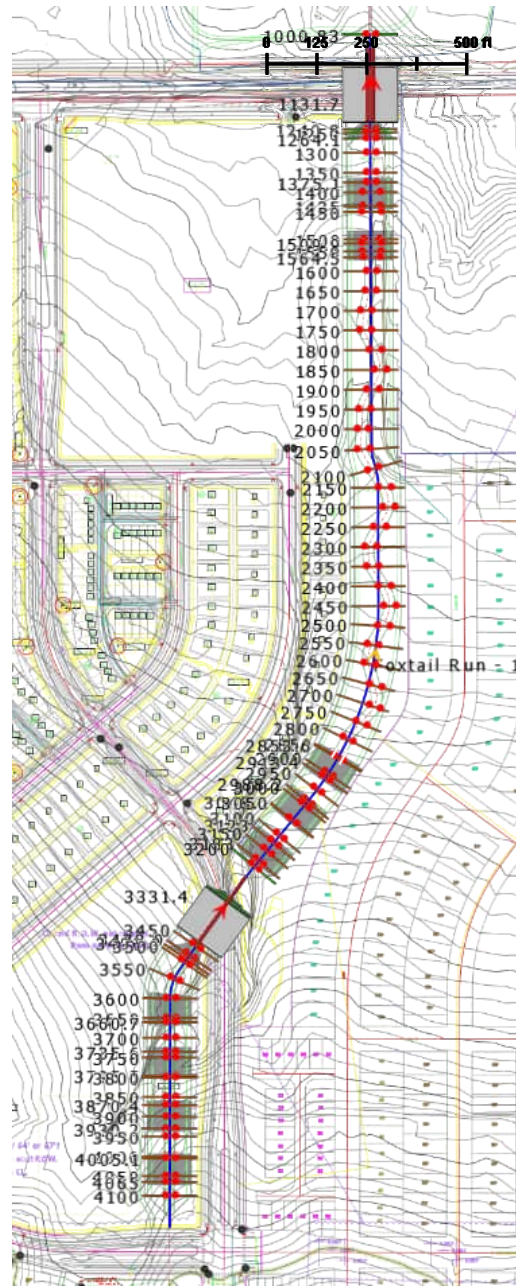


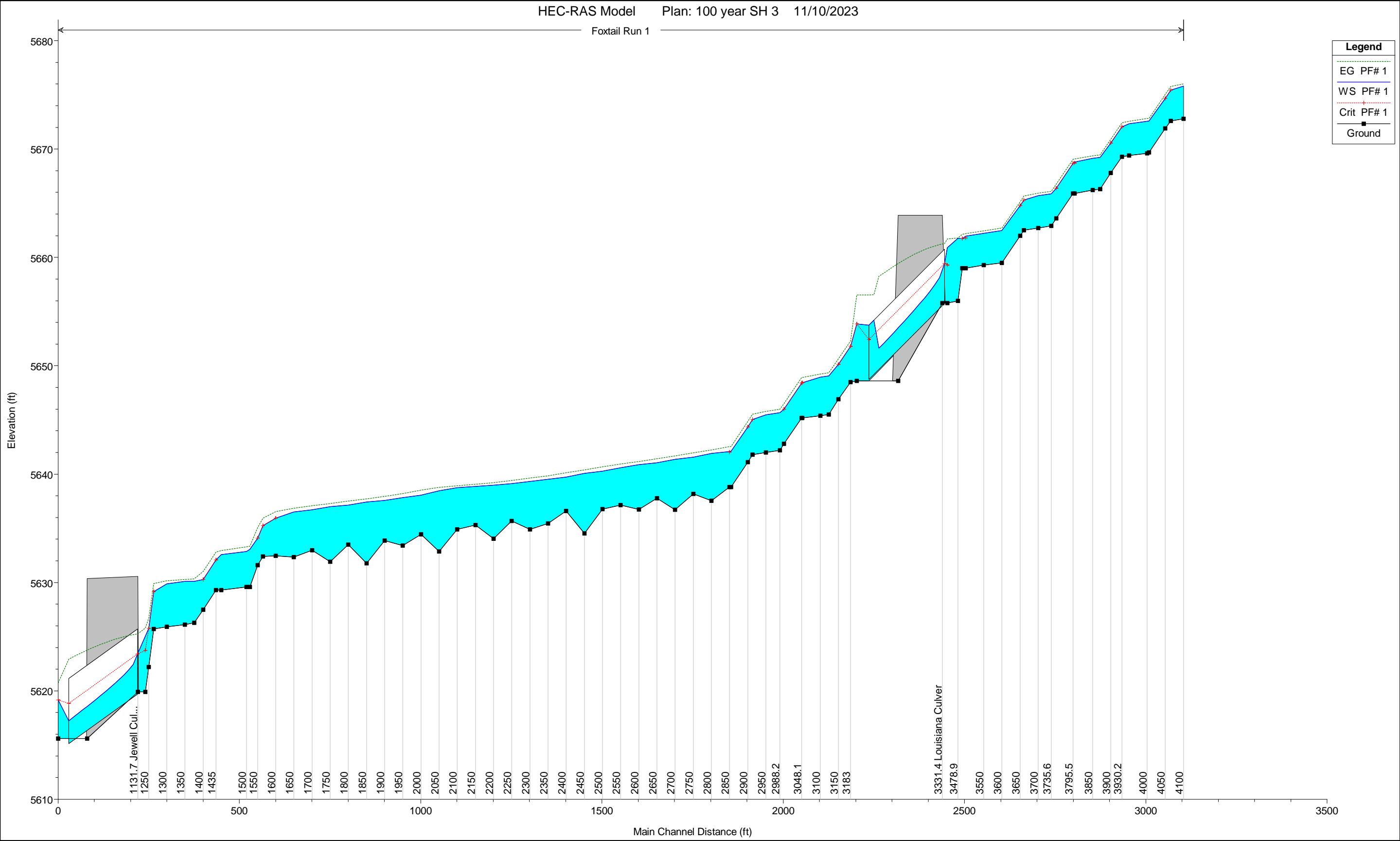






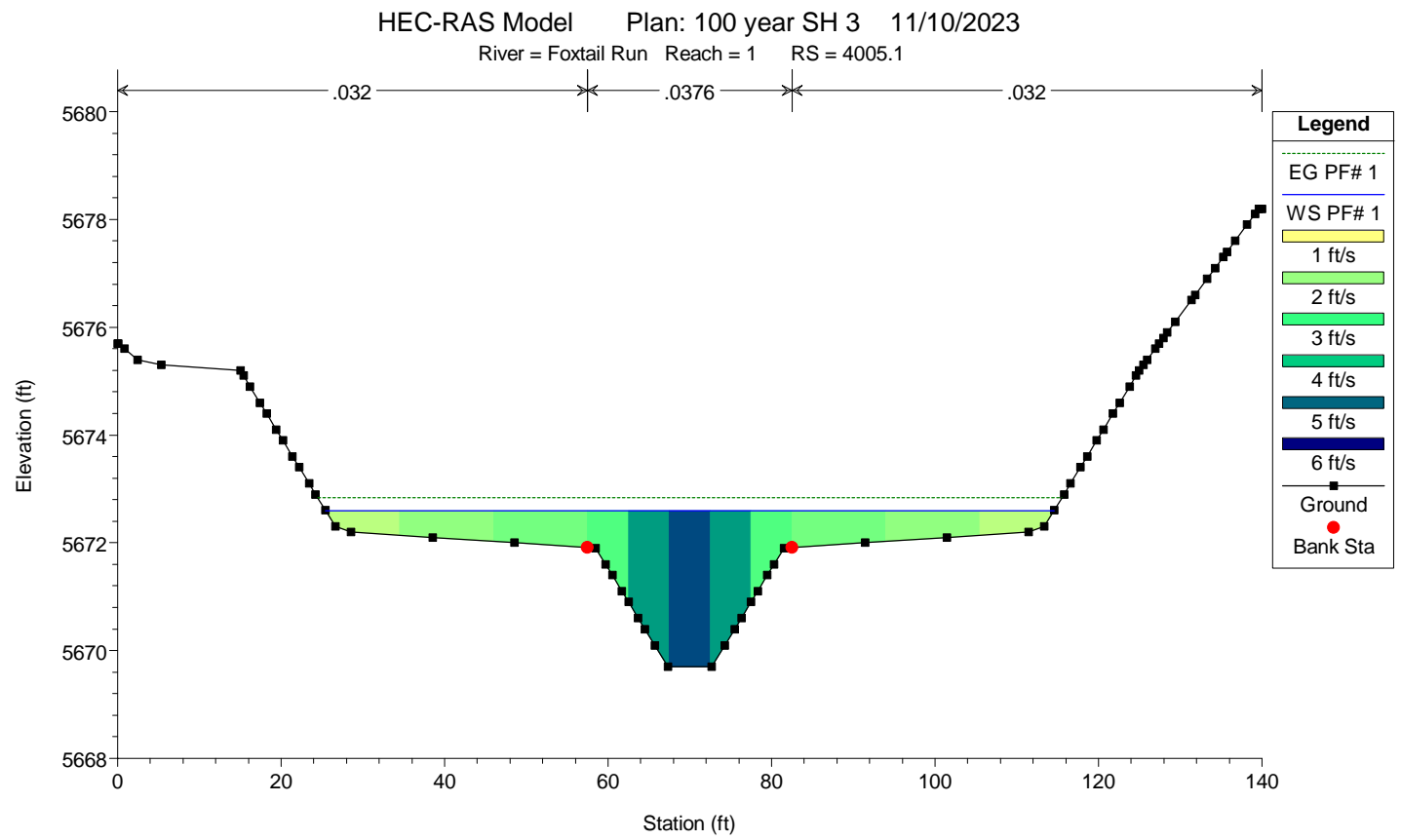
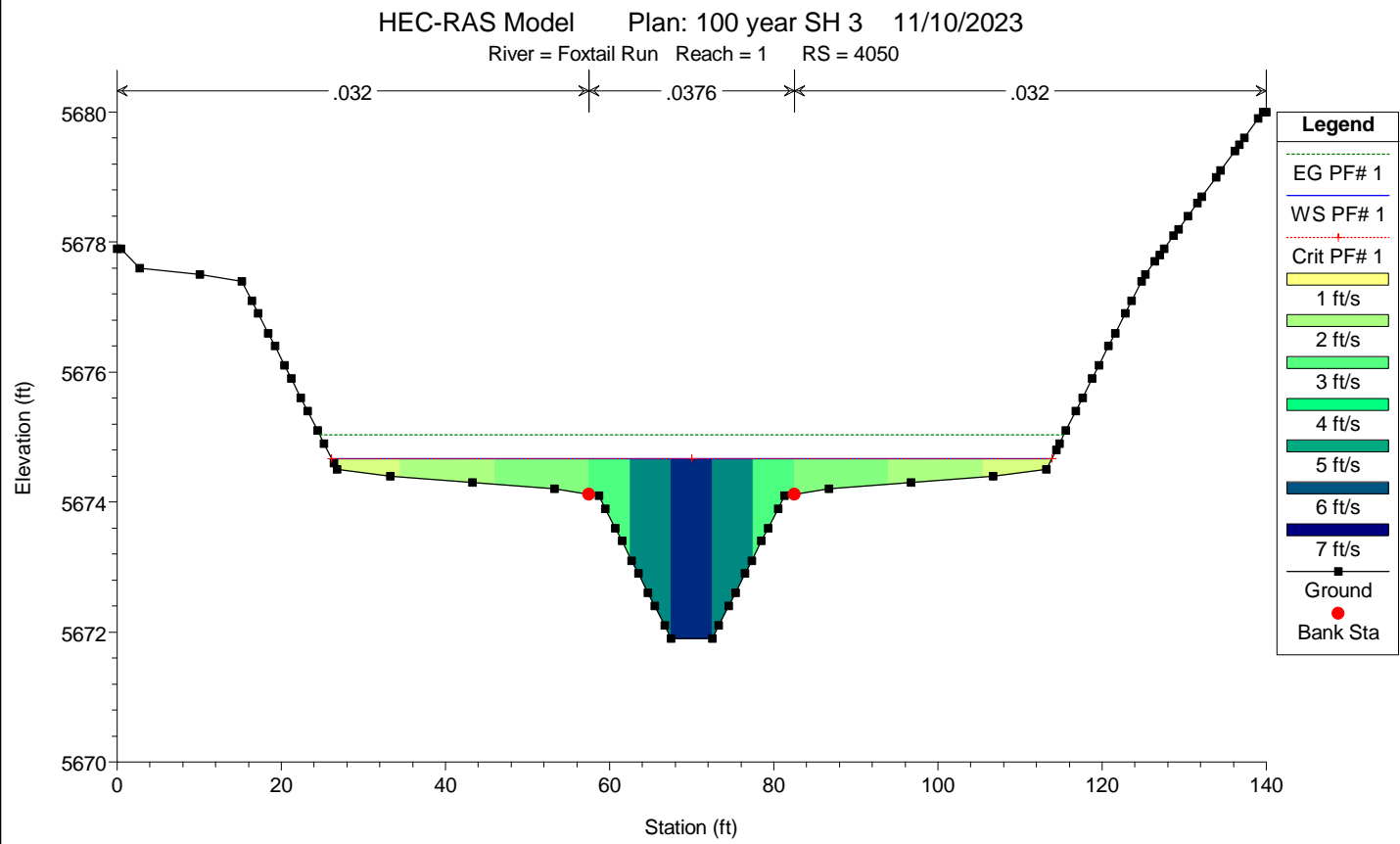
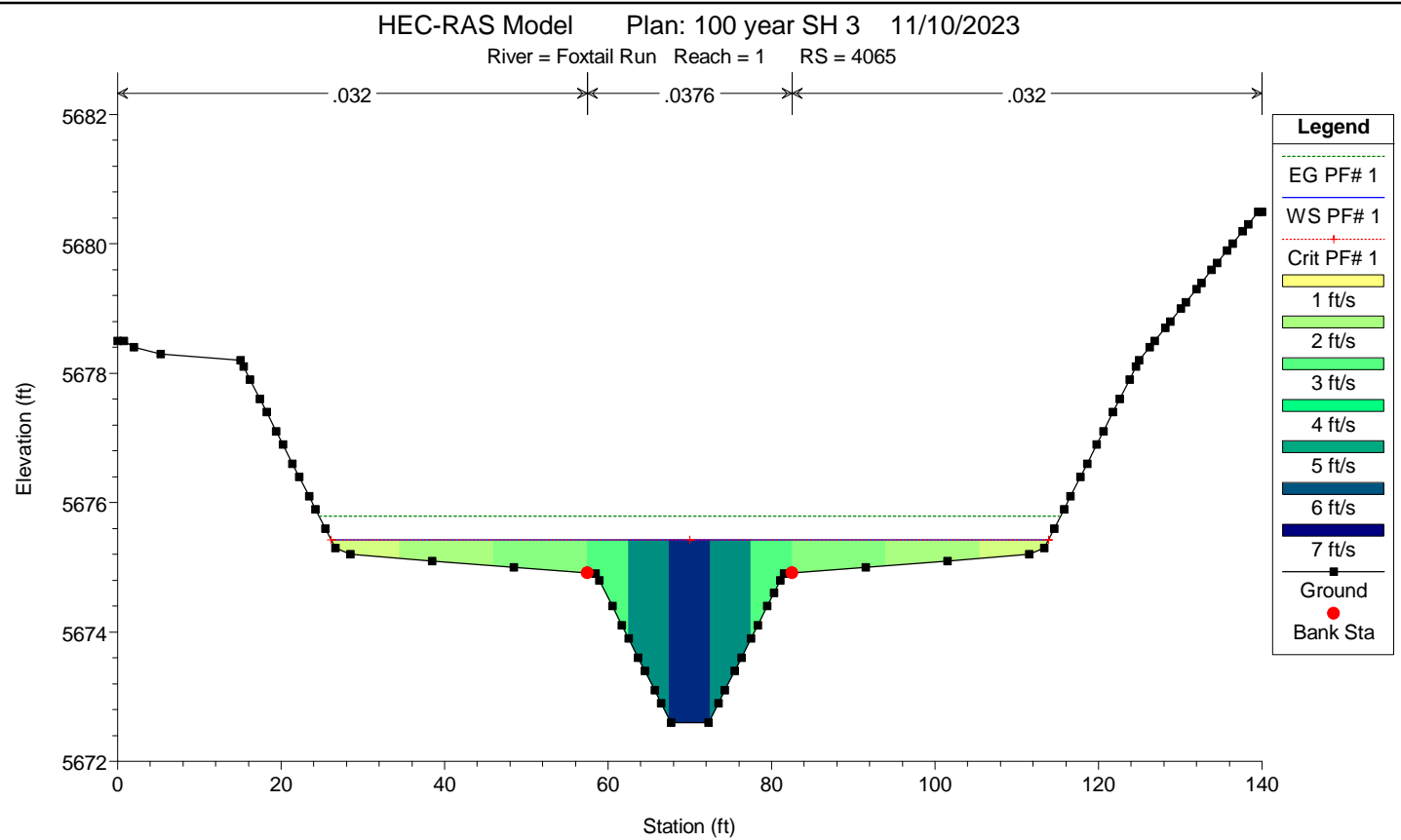
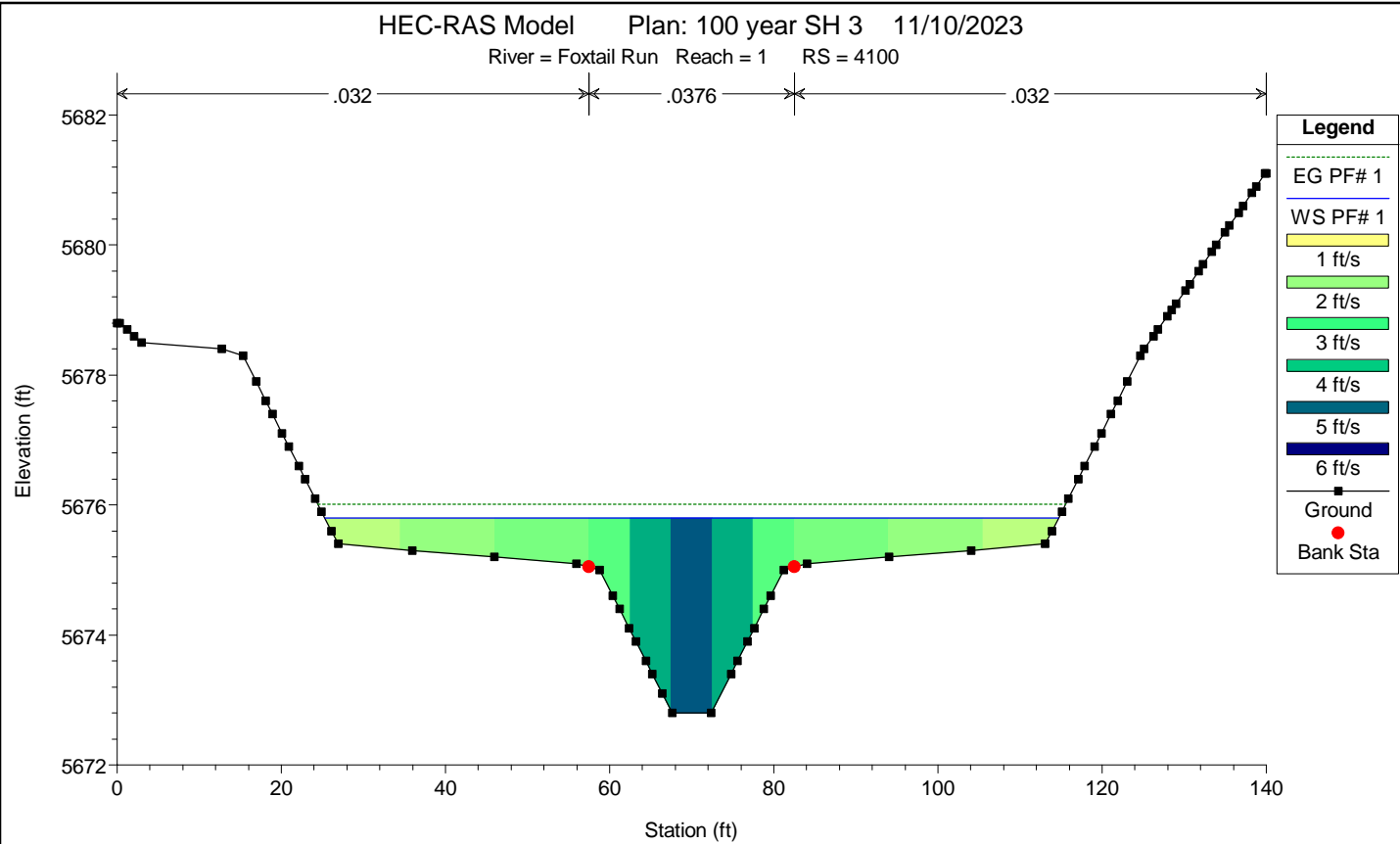


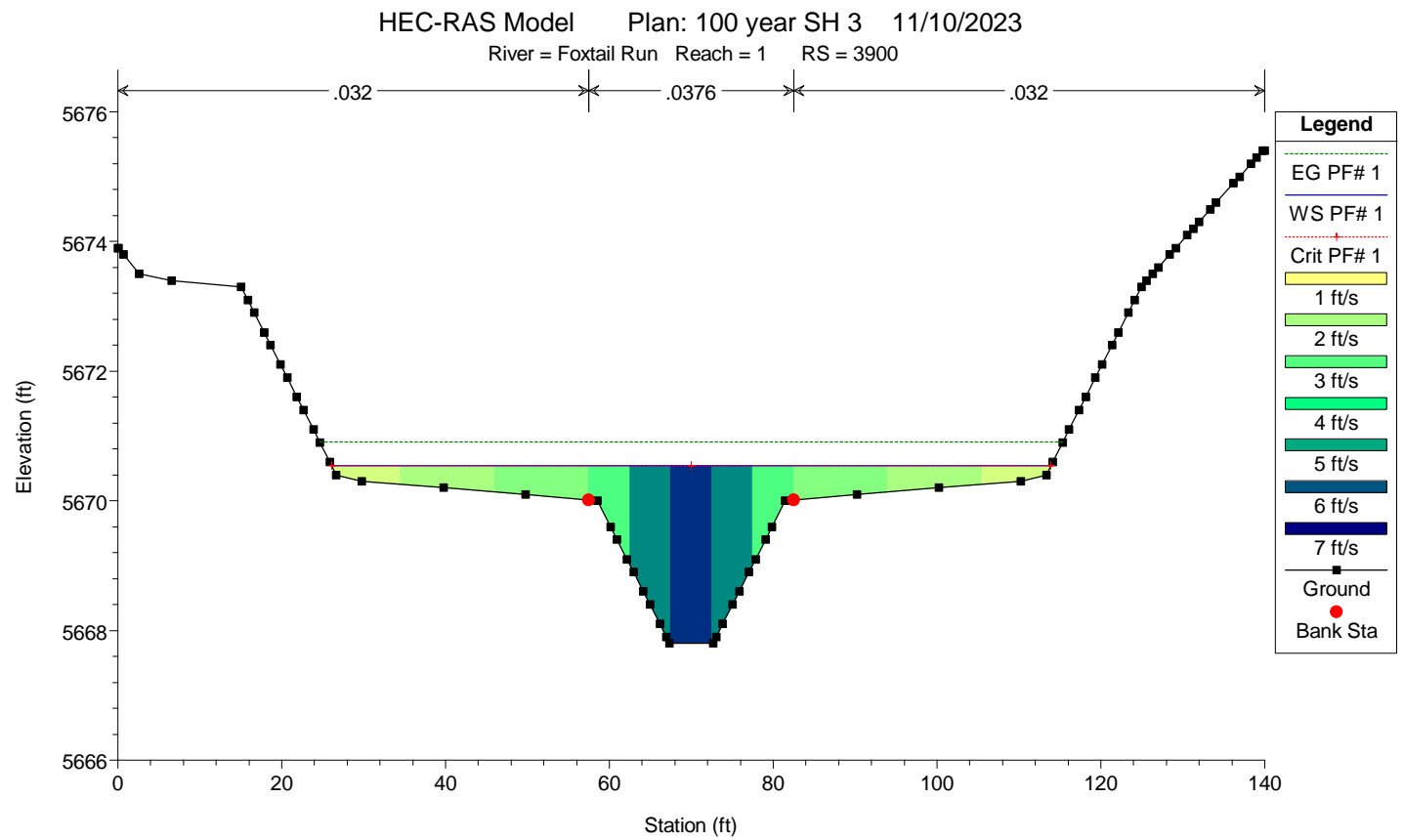
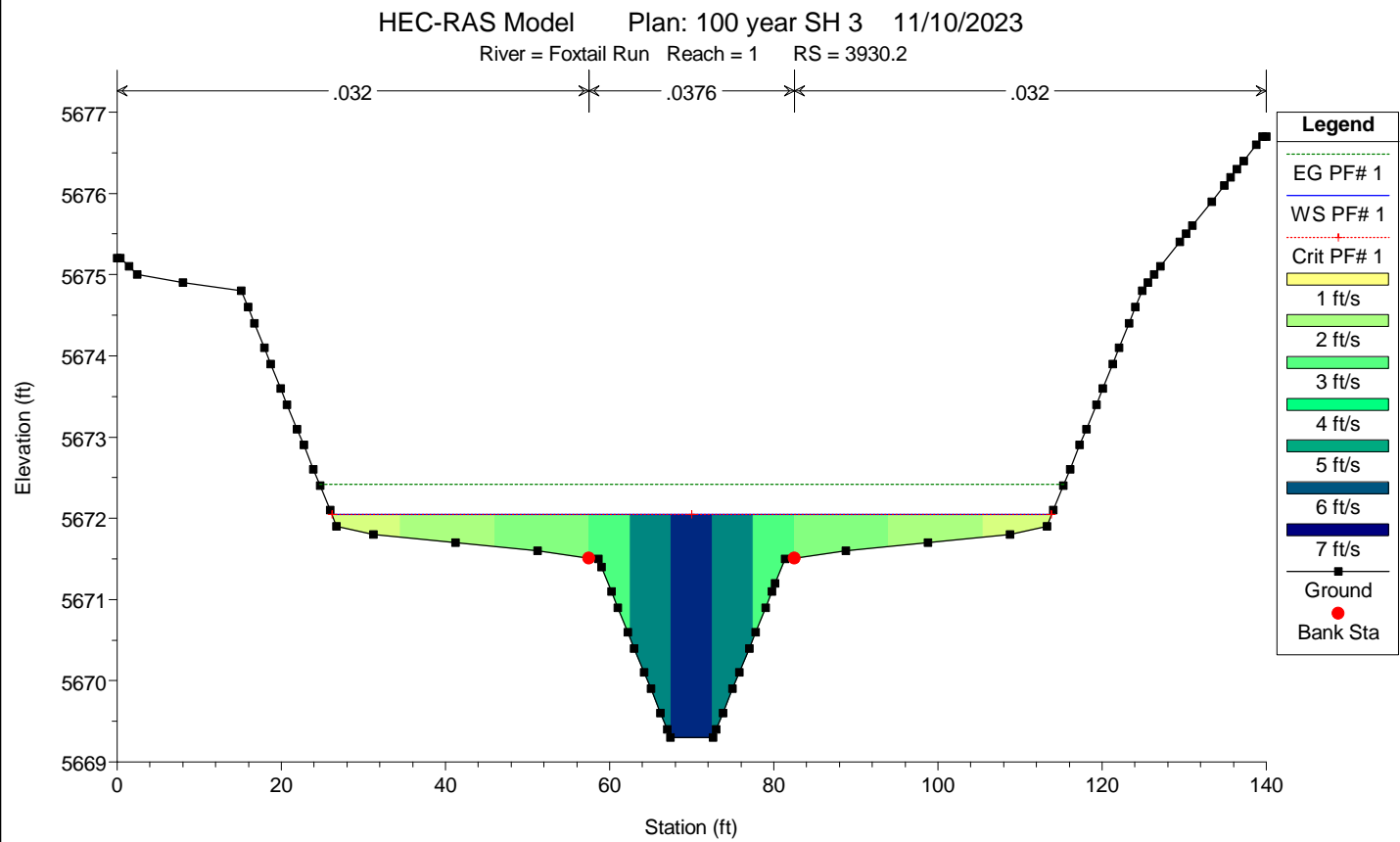
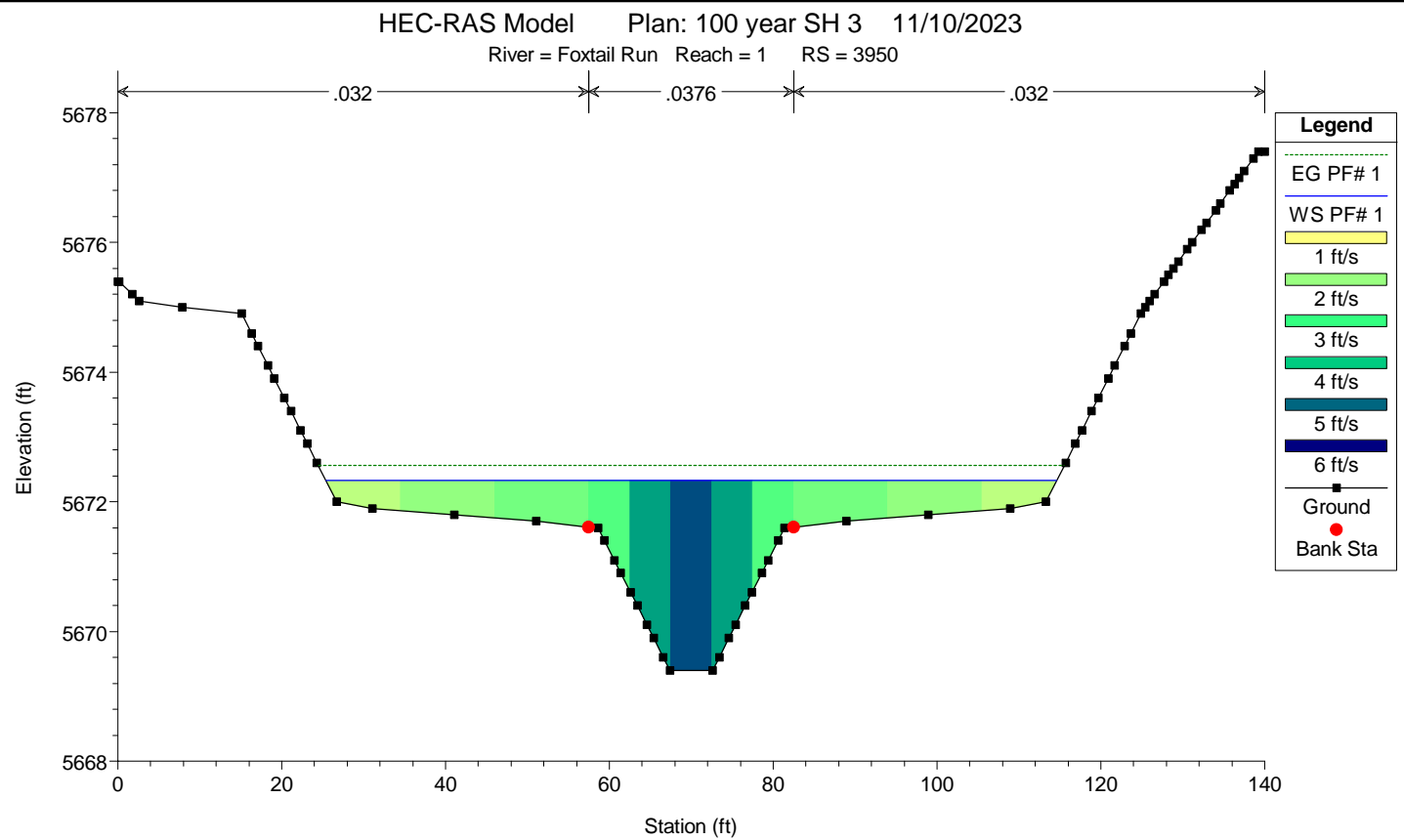
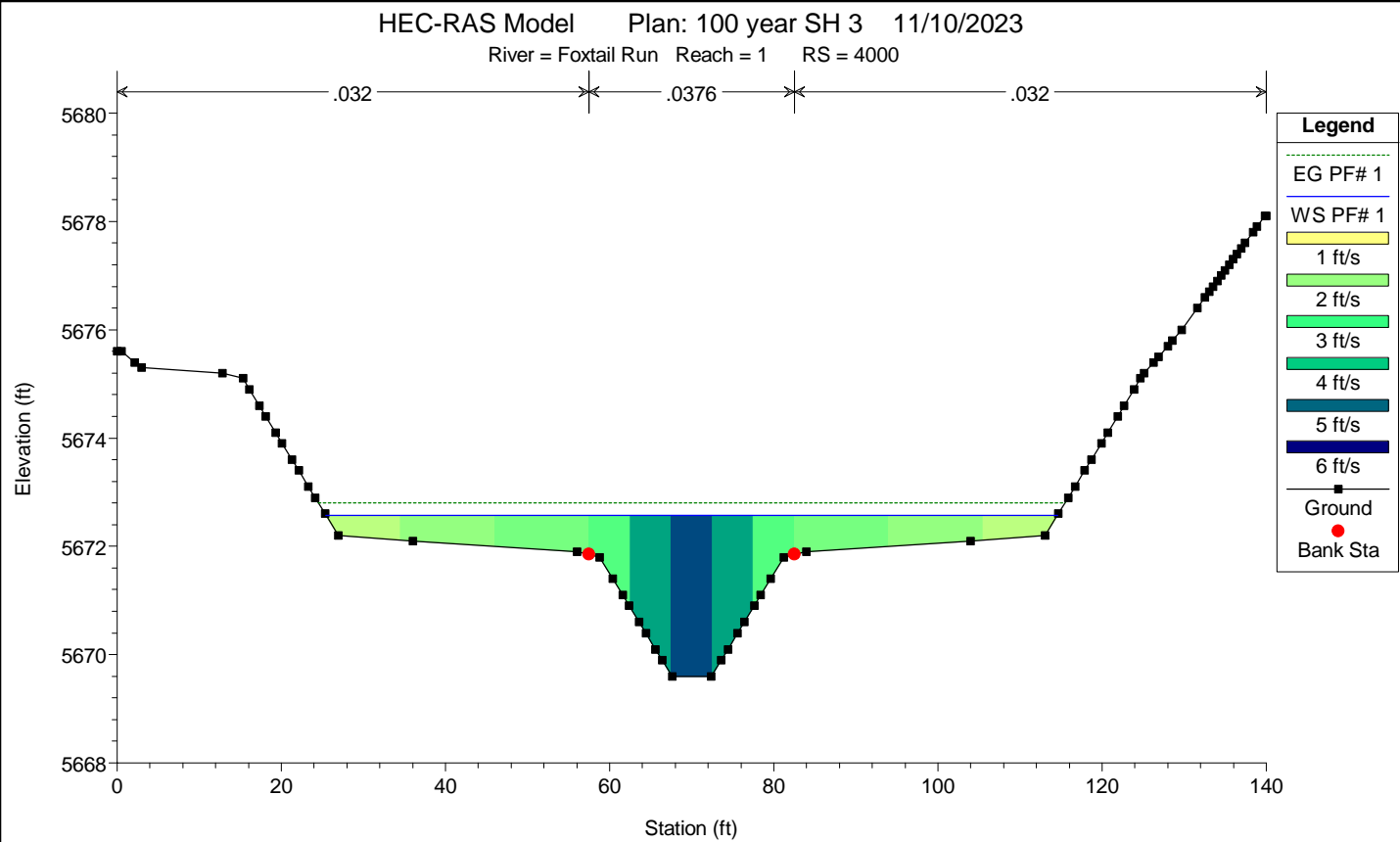


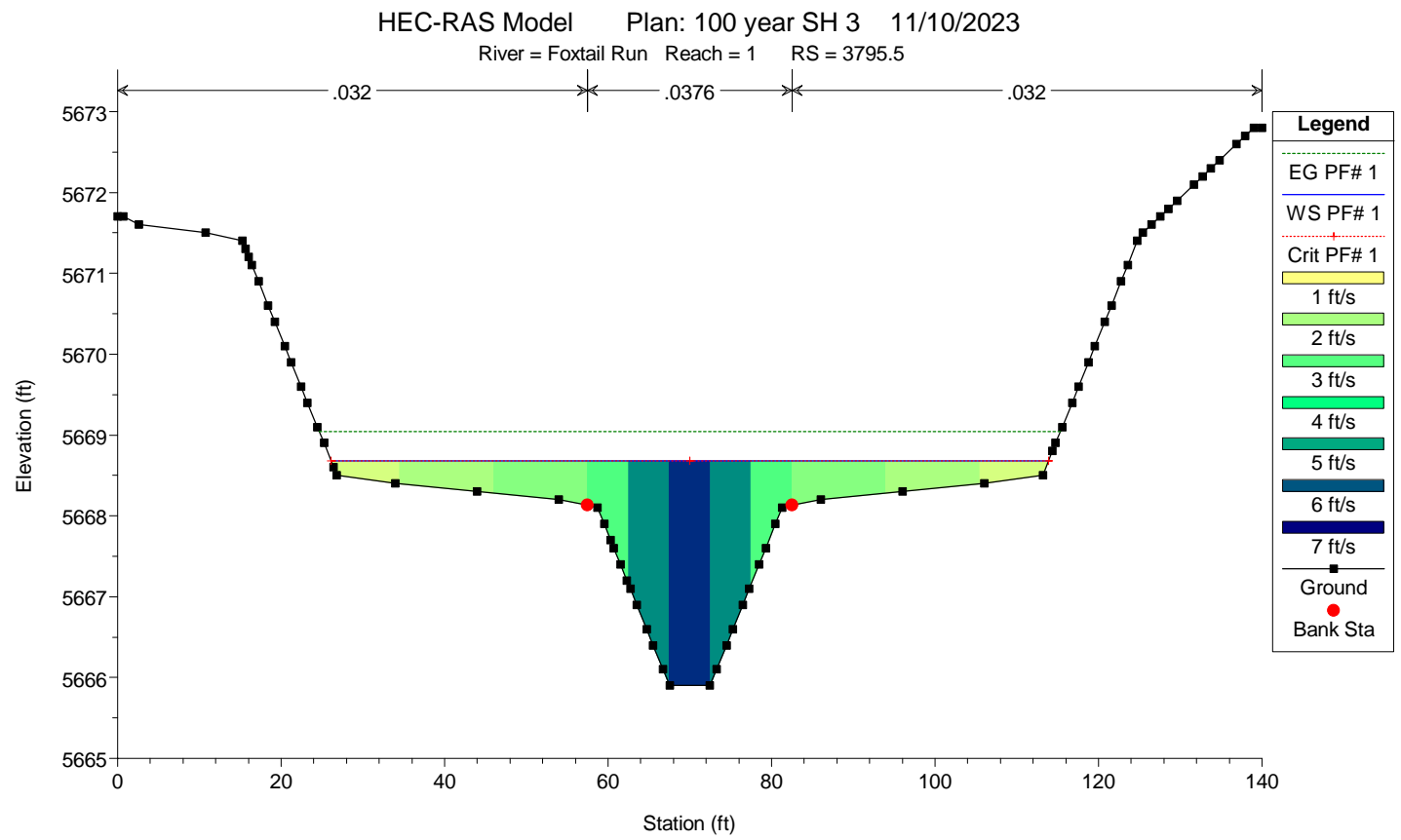
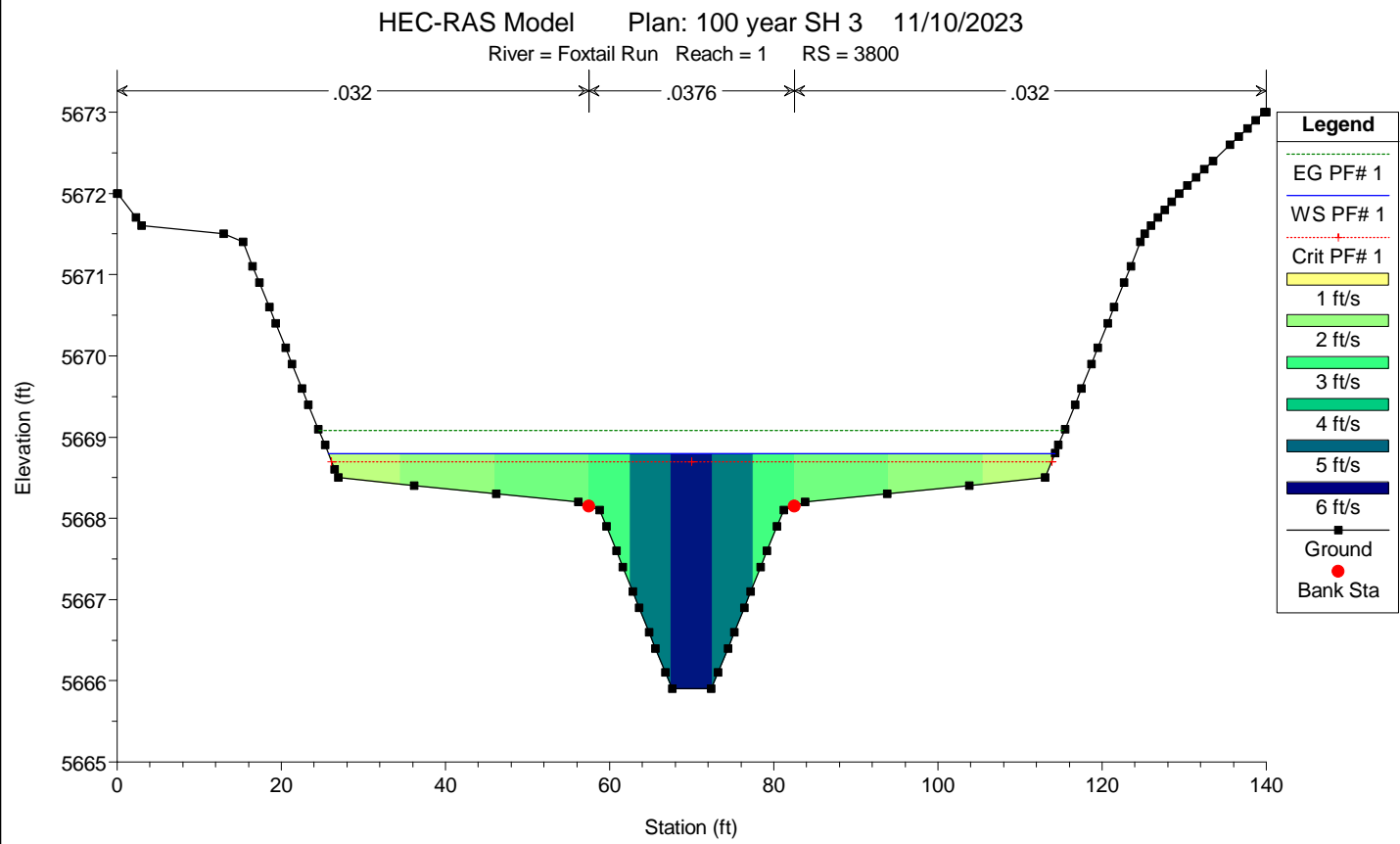
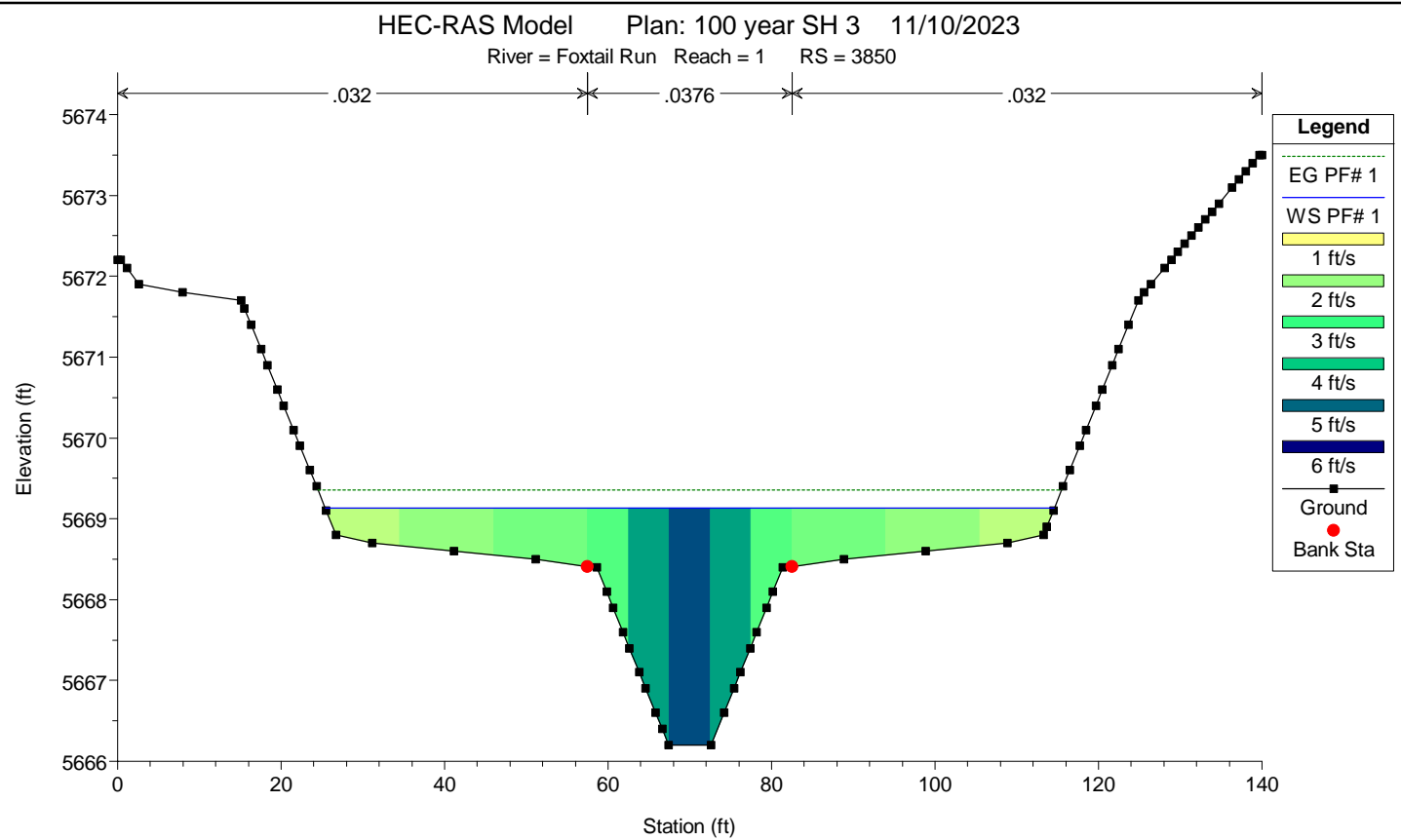
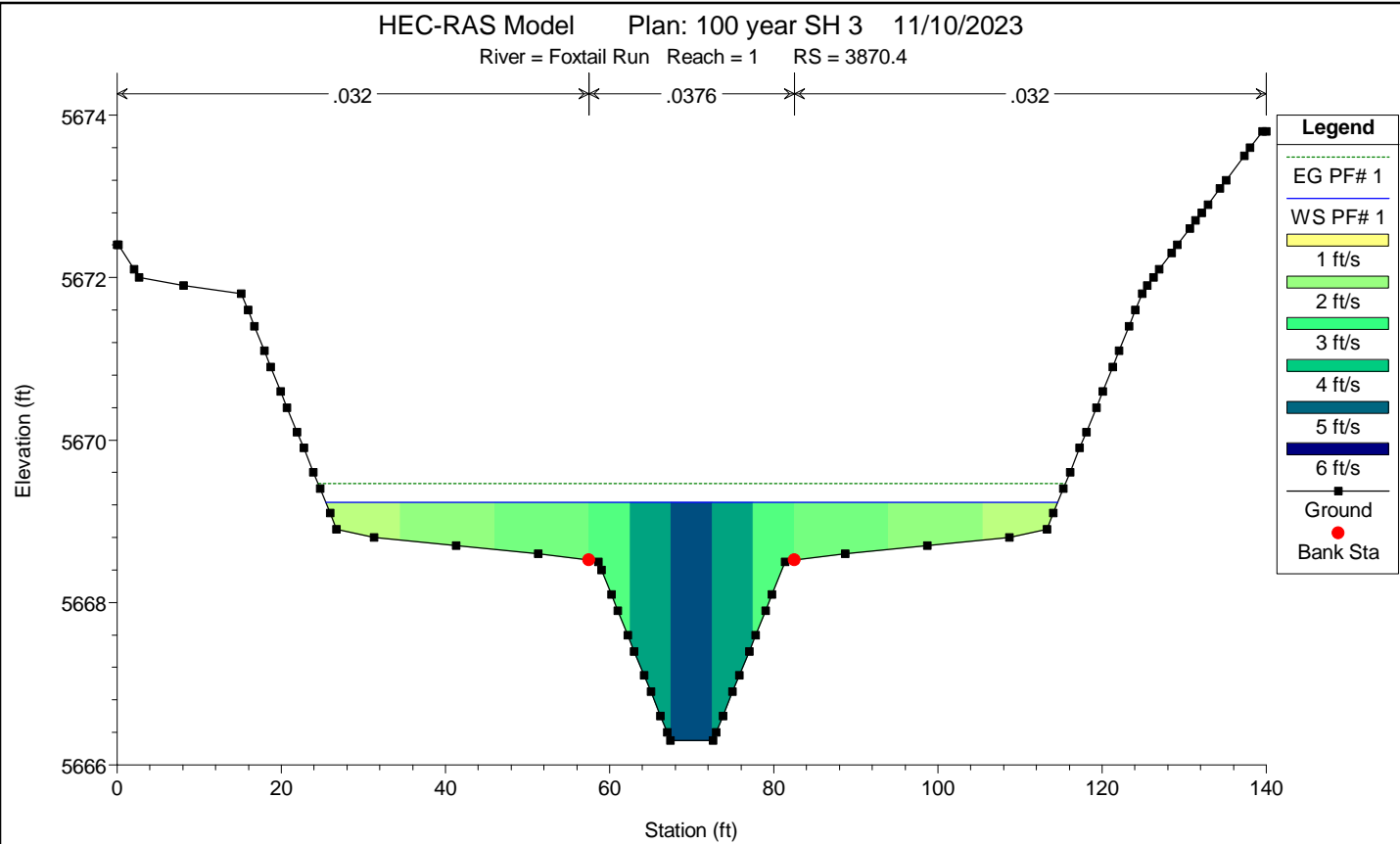


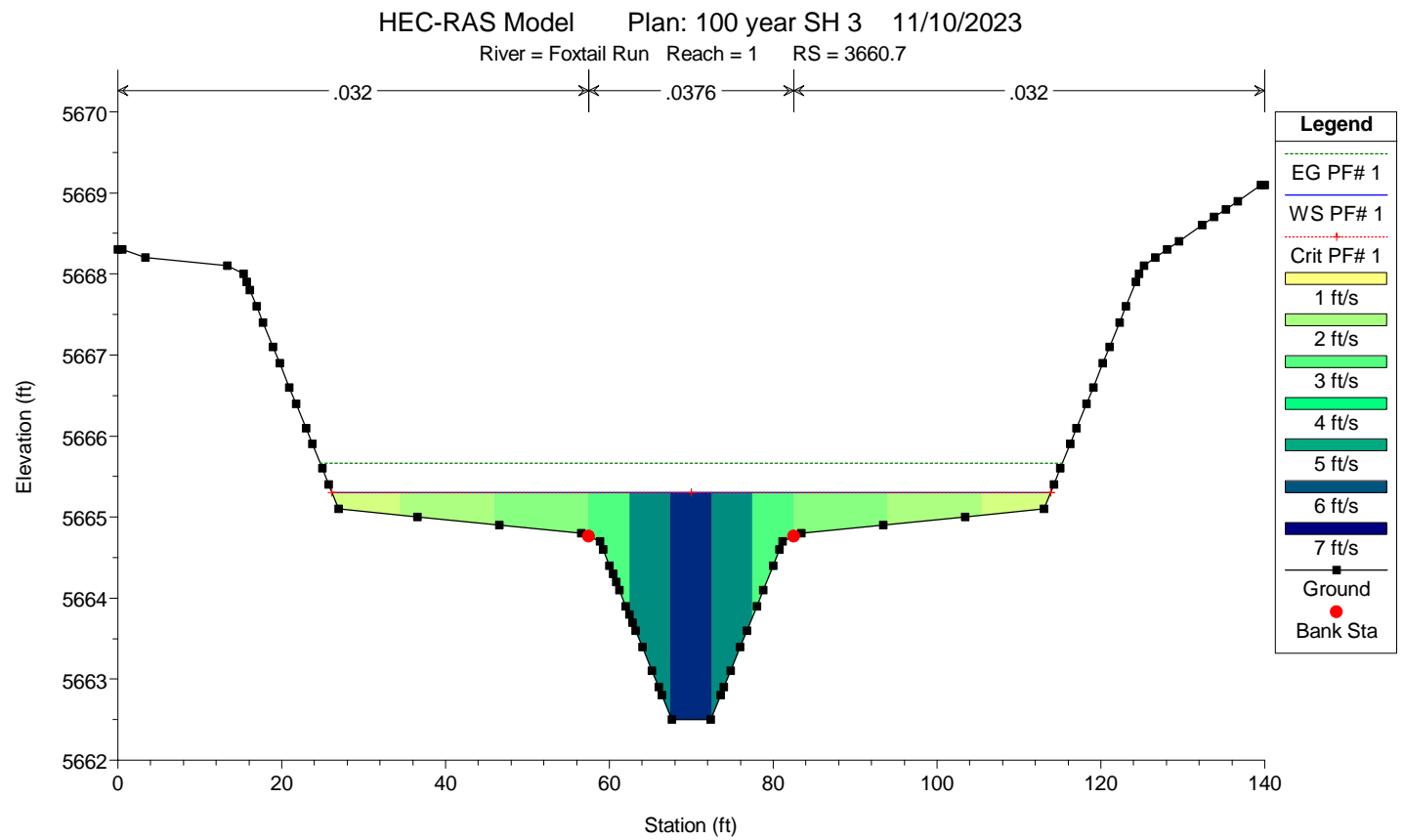
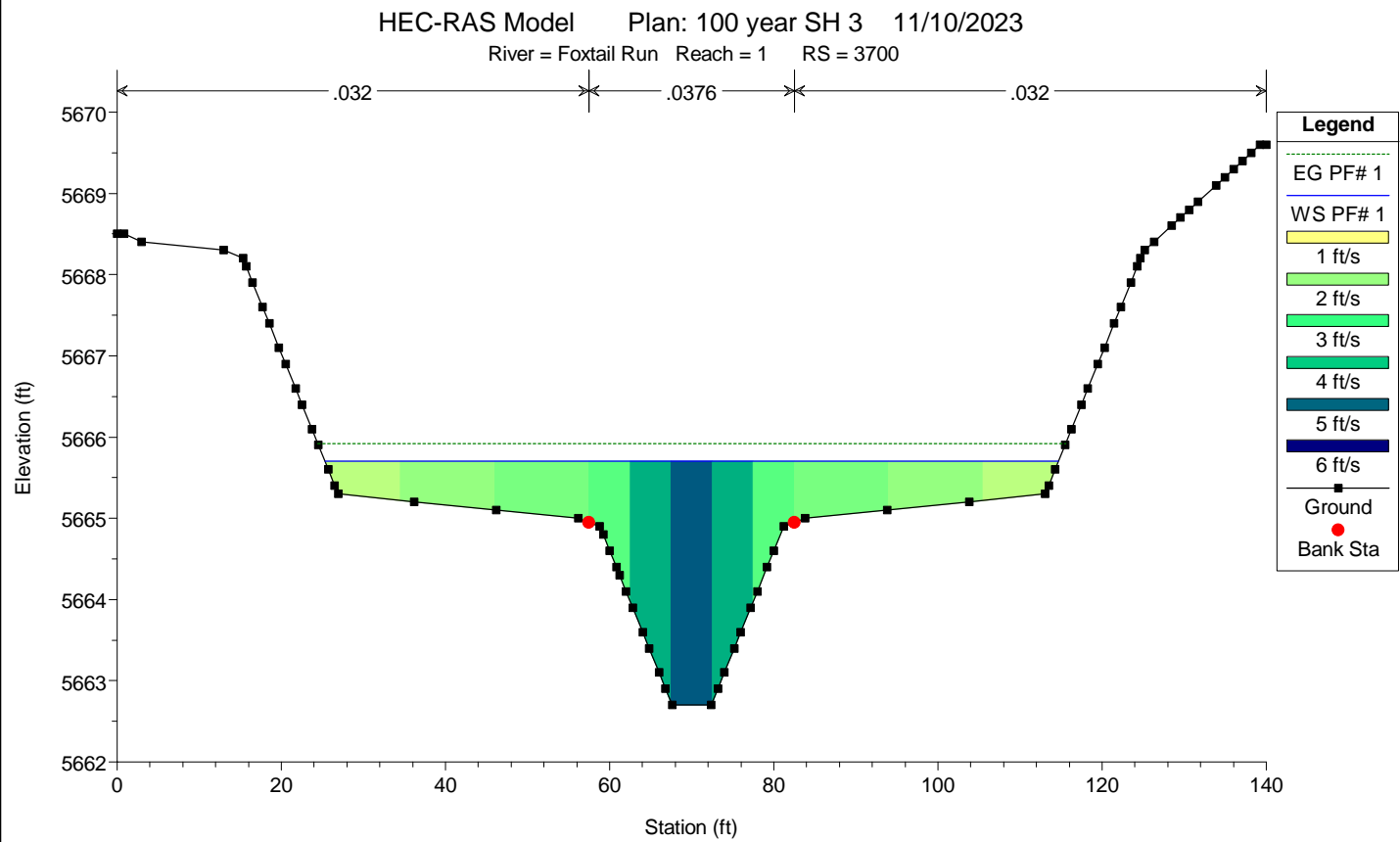
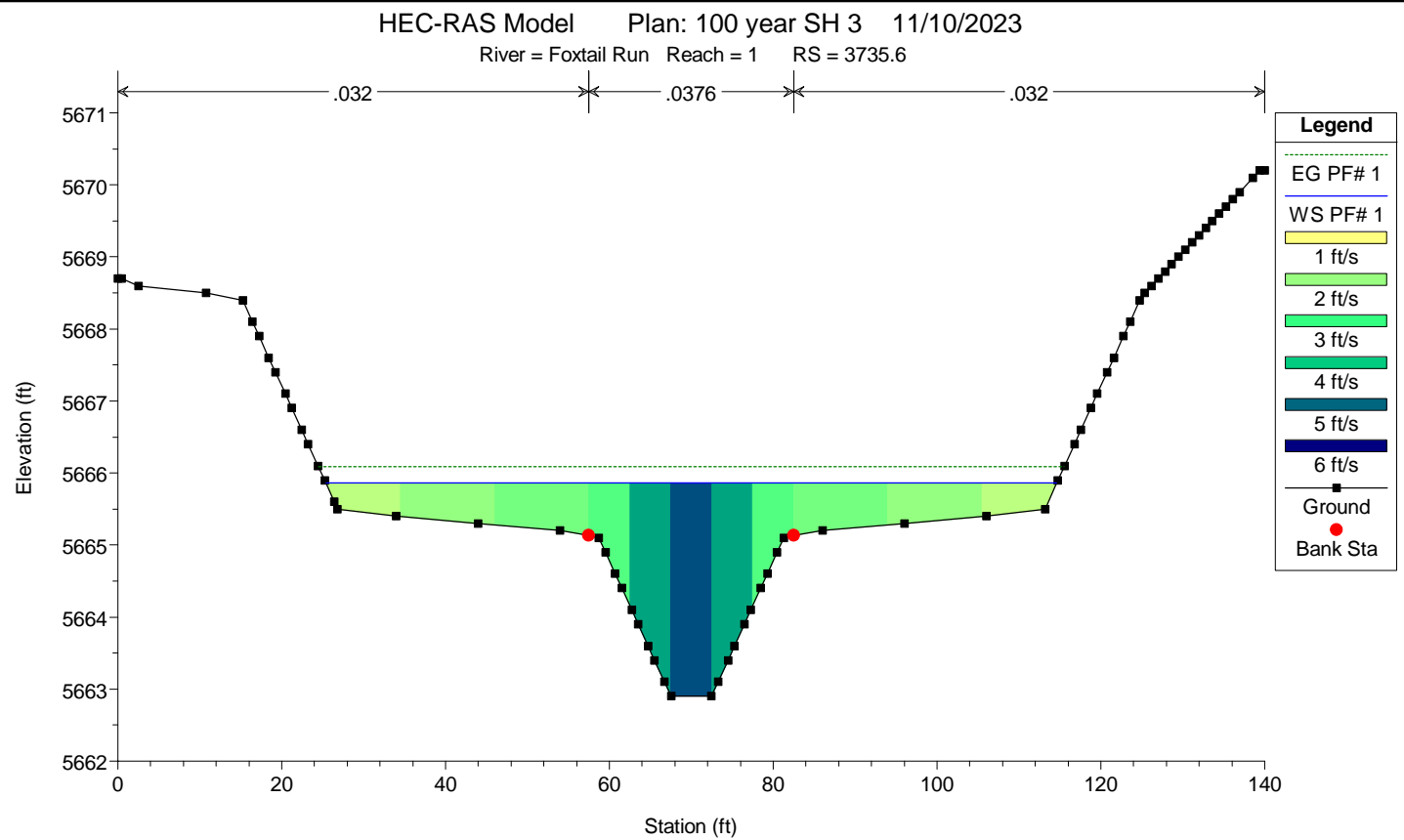
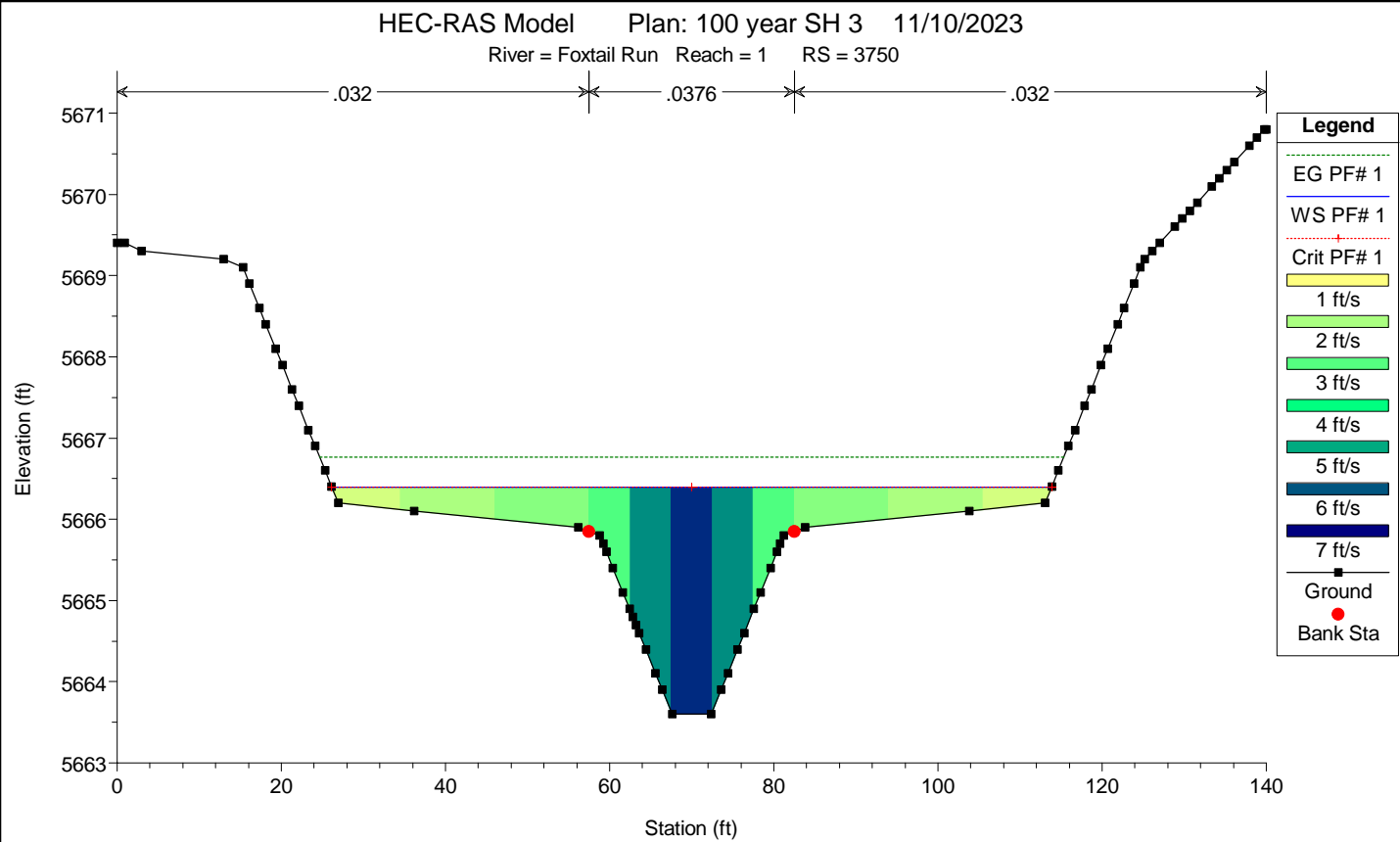
HEC-RAS Plan: 100 year SH 3 River: Foxtail Run Reach: 1 Profile: PF# 1

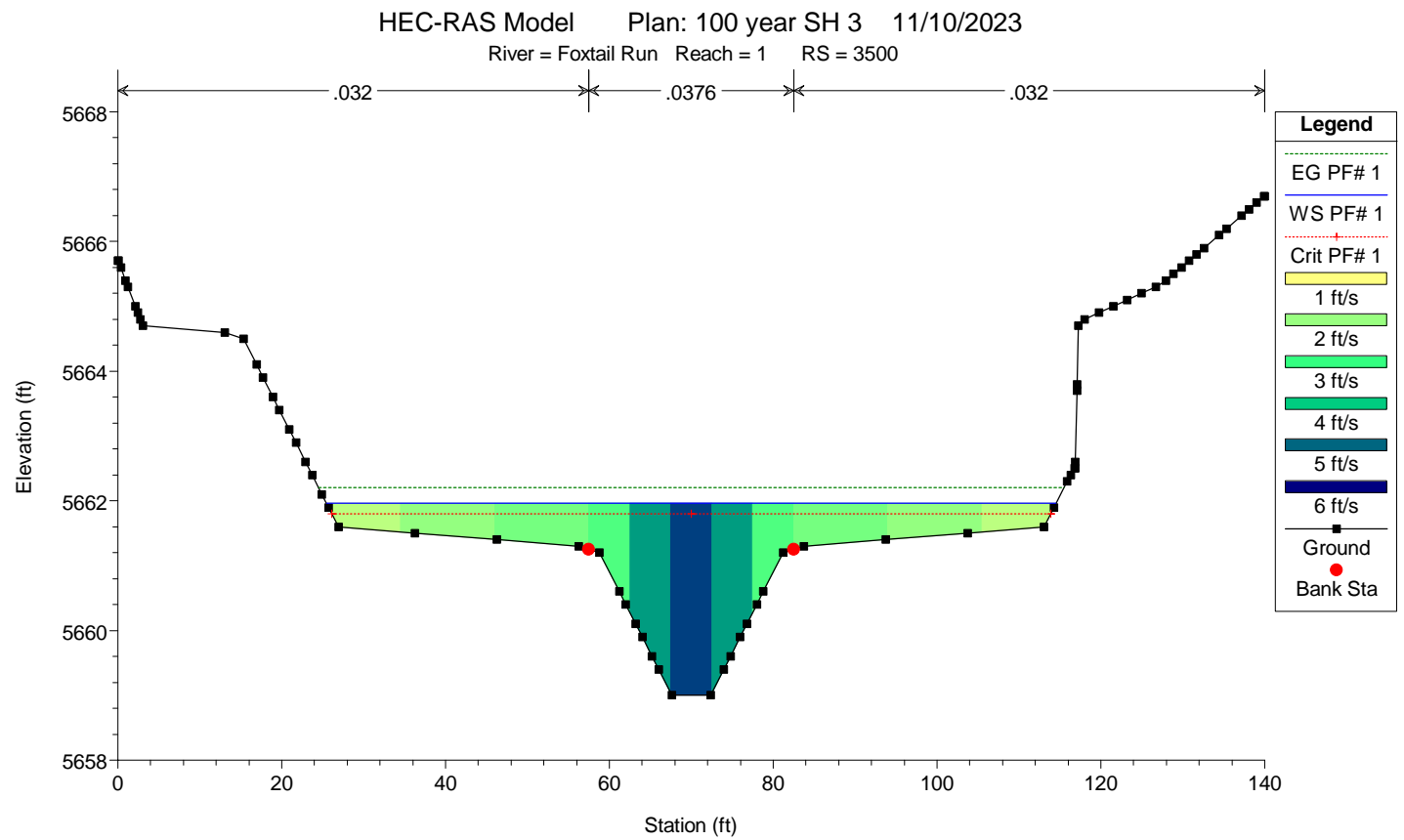
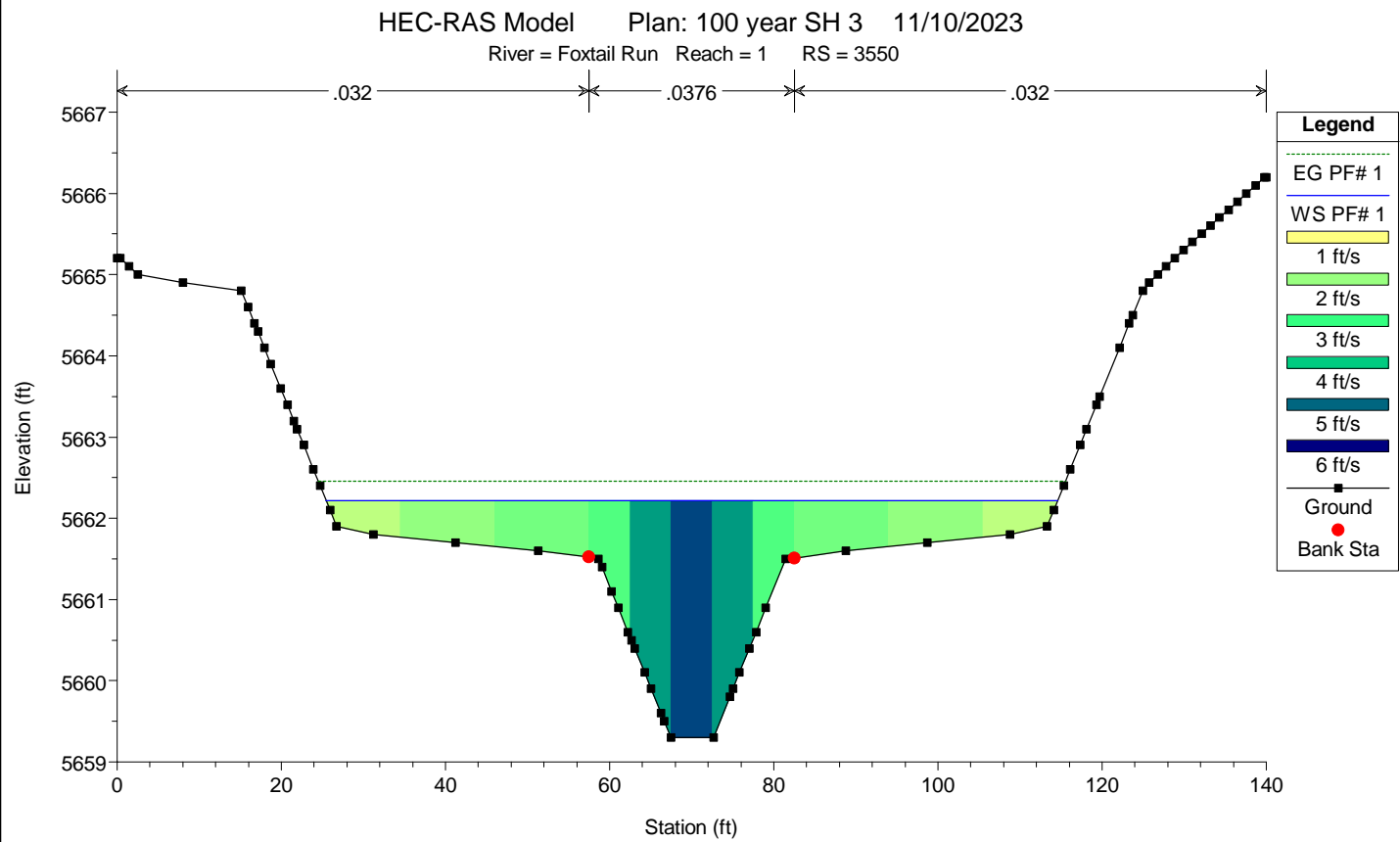
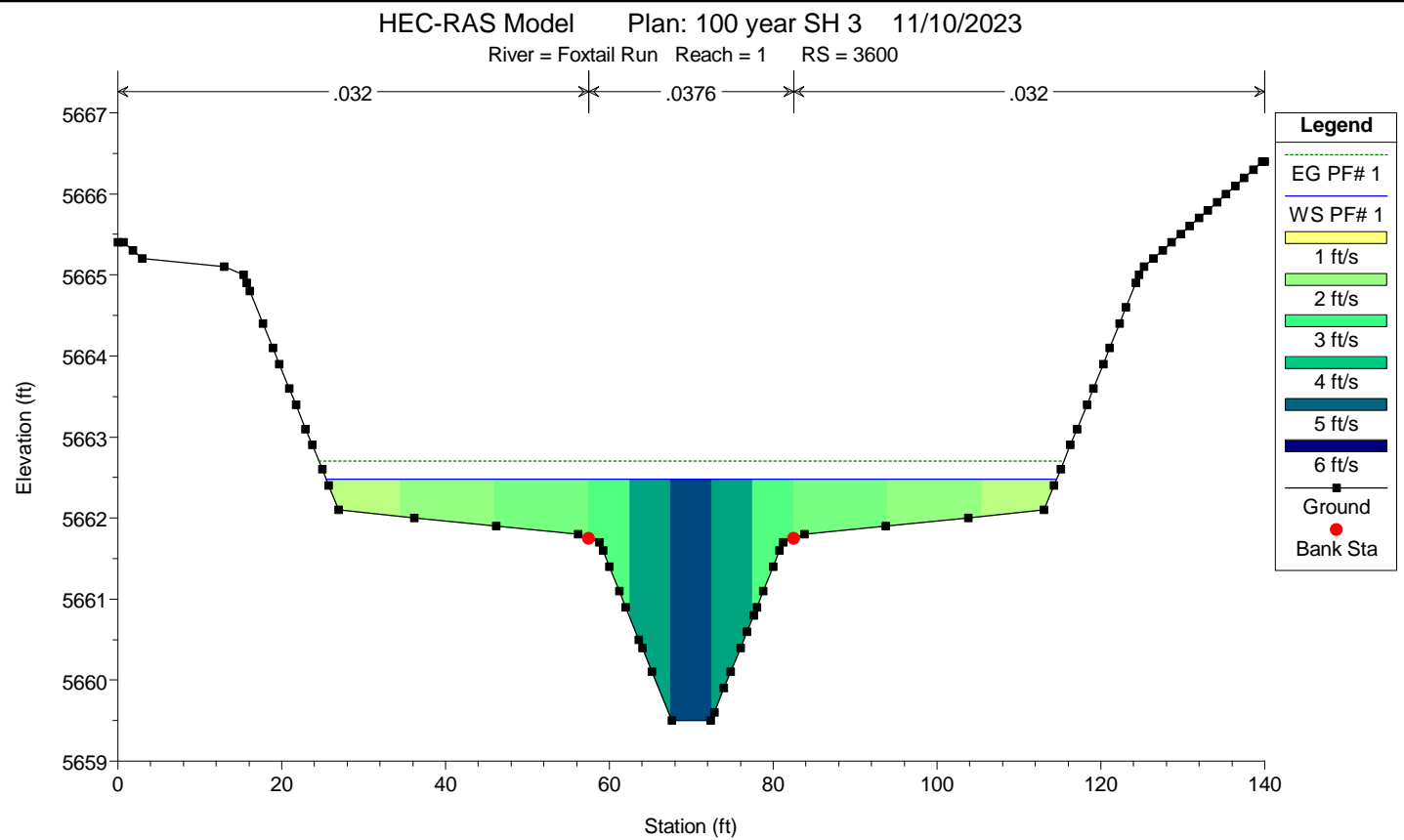
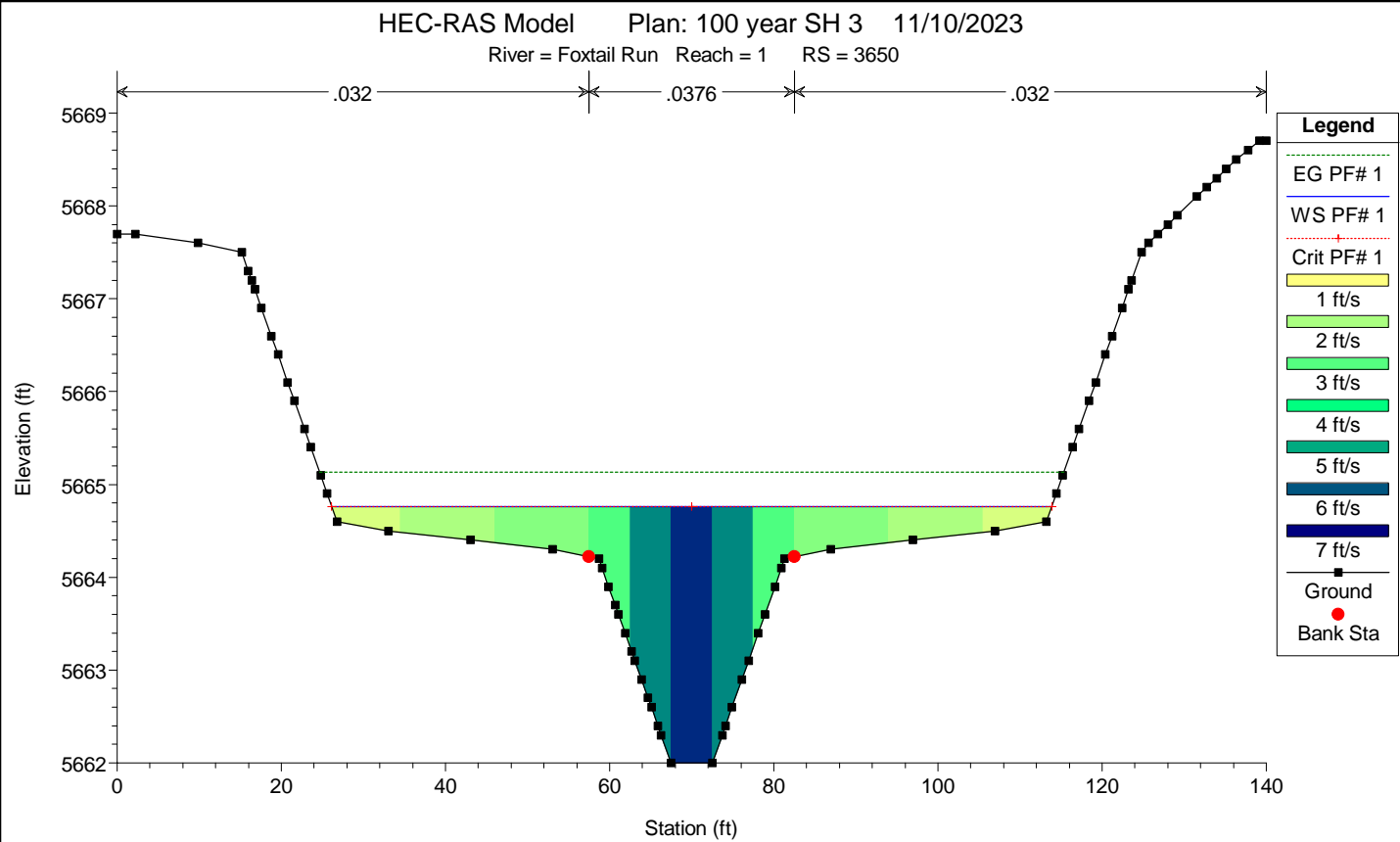
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl	Shear LOB (lb/sq ft)	Shear Chan (lb/sq ft)	Shear ROB (lb/sq ft)	Shear Total (lb/sq ft)
1	4100	PF# 1	280.50	5672.80	5675.80		5676.02	0.004587	4.18	84.59	89.36	0.52	0.15	0.56	0.15	0.27
1	4065	PF# 1	280.50	5672.60	5675.42	5675.42	5675.79	0.008292	5.23	66.80	87.76	0.69	0.18	0.91	0.18	0.39
1	4050	PF# 1	280.50	5671.90	5674.67	5674.67	5675.04	0.008421	5.26	66.47	87.74	0.69	0.18	0.92	0.18	0.40
1	4005.1	PF# 1	280.50	5669.70	5672.60		5672.83	0.005065	4.32	81.73	89.16	0.55	0.16	0.60	0.16	0.29
1	4000	PF# 1	280.50	5669.60	5672.57		5672.81	0.004892	4.28	82.55	89.17	0.54	0.16	0.59	0.16	0.28
1	3950	PF# 1	280.50	5669.40	5672.33		5672.56	0.004931	4.28	82.47	89.20	0.54	0.16	0.59	0.16	0.28
1	3930.2	PF# 1	280.50	5669.30	5672.04	5672.04	5672.42	0.008585	5.29	66.05	87.71	0.70	0.19	0.93	0.19	0.40
1	3900	PF# 1	280.50	5667.80	5670.54	5670.54	5670.91	0.008391	5.24	66.75	87.79	0.69	0.19	0.91	0.19	0.40
1	3870.4	PF# 1	280.50	5666.30	5669.23		5669.46	0.004886	4.27	82.75	89.23	0.54	0.16	0.59	0.16	0.28
1	3850	PF# 1	280.50	5666.20	5669.13		5669.36	0.004833	4.28	82.47	89.19	0.54	0.16	0.59	0.16	0.28
1	3800	PF# 1	280.50	5665.90	5668.80	5668.70	5669.08	0.006166	4.67	75.43	88.53	0.60	0.17	0.71	0.17	0.33
1	3795.5	PF# 1	280.50	5665.90	5668.68	5668.68	5669.04	0.008305	5.23	66.84	87.77	0.69	0.18	0.91	0.18	0.39
1	3750	PF# 1	280.50	5663.60	5666.40	5666.40	5666.76	0.008319	5.24	66.71	87.74	0.69	0.18	0.91	0.18	0.39
1	3735.6	PF# 1	280.50	5662.90	5665.86		5666.09	0.004832	4.26	83.01	89.23	0.53	0.16	0.58	0.16	0.28
1	3700	PF# 1	280.50	5662.70	5665.70		5665.92	0.004540	4.16	84.92	89.38	0.52	0.15	0.55	0.15	0.27
1	3660.7	PF# 1	280.50	5662.50	5665.30	5665.30	5665.67	0.008322	5.24	66.68	87.72	0.69	0.18	0.91	0.18	0.39
1	3650	PF# 1	280.50	5662.00	5664.76	5664.76	5665.14	0.008477	5.27	66.30	87.73	0.70	0.18	0.92	0.18	0.40
1	3600	PF# 1	280.50	5659.50	5662.48		5662.71	0.004896	4.28	82.52	89.16	0.54	0.16	0.59	0.16	0.28
1	3550	PF# 1	280.50	5659.30	5662.22		5662.46	0.005082	4.33	81.52	89.13	0.55	0.16	0.61	0.16	0.29
1	3500	PF# 1	280.50	5659.00	5661.96	5661.80	5662.20	0.005138	4.36	81.00	89.03	0.55	0.16	0.61	0.16	0.29
1	3490.9	PF# 1	280.50	5659.00	5661.74	5661.74	5662.13	0.008940	5.37	64.43	84.23	0.71	0.19	0.96	0.20	0.42
1	3478.9	PF# 1	280.50	5656.00	5661.77		5661.79	0.000088	1.04	290.37	75.93	0.08	0.02	0.03	0.02	0.02
1	3450	PF# 1	280.50	5655.80	5660.90	5659.30	5661.70	0.003923	7.20	38.96	26.73	0.57		1.21		1.21
1	3331.4 Louisiana Culvert	Culvert														
1	3200	PF# 1	545.00	5648.60	5653.87	5653.87	5656.52	0.012097	13.05	41.77	77.87	1.00		3.93		3.93
1	3183	PF# 1	545.00	5648.50	5651.79	5651.79	5652.29	0.008661	6.44	107.55	94.45	0.74	0.38	1.25	0.38	0.61
1	3150	PF# 1	545.00	5646.90	5650.13	5650.13	5650.64	0.008736	6.44	107.39	94.30	0.74	0.38	1.26	0.38	0.62
1	3123	PF# 1	545.00	5645.50	5649.05		5649.36	0.004743	5.12	133.45	96.49	0.56	0.28	0.76	0.28	0.41
1	3100	PF# 1	545.00	5645.40	5648.95		5649.25	0.004659	5.08	134.35	96.56	0.55	0.28	0.75	0.28	0.40
1	3050	PF# 1	545.00	5645.20	5648.44	5648.42	5648.92	0.008400	6.34	109.01	94.49	0.73	0.37	1.21	0.37	0.60
1	3048.1	PF# 1	545.00	5645.20	5648.41	5648.41	5648.91	0.008752	6.44	107.40	94.36	0.74	0.38	1.26	0.38	0.62
1	3000	PF# 1	545.00	5642.80	5646.00	5646.00	5646.50	0.008760	6.44	107.37	94.36	0.74	0.38	1.26	0.38	0.62
1	2988.2	PF# 1	545.00	5642.20	5645.67		5645.98	0.004943	5.18	131.75	96.40	0.57	0.29	0.79	0.29	0.42
1	2950	PF# 1	545.00	5642.00	5645.46		5645.79	0.004860	5.16	132.25	96.25	0.56	0.28	0.78	0.29	0.42
1	2913.4	PF# 1	545.00	5641.80	5645.03	5645.03	5645.54	0.008730	6.44	107.40	94.33	0.74	0.38	1.26	0.38	0.62
1	2900	PF# 1	545.00	5641.10	5644.36	5644.36	5644.86	0.008757	6.45	107.23	94.24	0.74	0.38	1.26	0.38	0.62
1	2853.6	PF# 1	545.00	5638.80	5642.12		5642.55	0.007183	5.98	114.87	93.50	0.67	0.35	1.07	0.35	0.55
1	2850	PF# 1	545.00	5638.80	5642.09	5642.02	5642.53	0.007519	6.08	113.02	93.38	0.69	0.36	1.11	0.36	0.56
1	2800	PF# 1	545.00	5637.56	5641.90		5642.22	0.004262	5.03	134.45	95.22	0.53	0.23	0.72	0.21	0.37
1	2750	PF# 1	545.00	5638.19	5641.57		5641.96	0.006008	5.51	120.82	94.40	0.62	0.29	0.91	0.23	0.48
1	2700	PF# 1	545.00	5636.70	5641.38		5641.68	0.004237	4.89	136.96	97.32	0.51	0.22	0.69	0.15	0.36
1	2650	PF# 1	545.00	5637.77	5641.06		5641.43	0.005828	5.34	122.97	94.46	0.61	0.27	0.86	0.24	0.47
1	2600	PF# 1	545.00	5636.74	5640.88		5641.18	0.003809	4.84	138.01	95.05	0.50	0.18	0.66	0.19	0.34
1	2550	PF# 1	545.00	5637.14	5640.59		5640.95	0.005488	5.34	125.02	94.86	0.59	0.24	0.84	0.28	0.45
1	2500	PF# 1	545.00	5636.78	5640.27		5640.66	0.005608	5.45	121.44	94.47	0.60	0.21	0.88	0.27	0.45
1	2450	PF# 1	545.00	5634.53	5640.08		5640.40	0.004264	4.91	133.39	95.03	0.51	0.18	0.70	0.17	0.36
1	2400	PF# 1	545.00	5636.61	5639.73		5640.13	0.006736	5.54	118.04	94.07	0.65	0.30	0.94	0.30	0.52
1	2350	PF# 1	545.00	5635.45	5639.54		5639.85	0.004003	4.88	135.66	94.31	0.51	0.18	0.68	0.19	0.36
1	2300	PF# 1	545.00	5634.90	5639.33		5639.64	0.004326	4.90	134.99	94.77	0.53	0.18	0.70	0.23	0.38
1	2250	PF# 1	545.00	5635.67	5639.13		5639.42	0.004293	4.77	137.26	95.29	0.53	0.22	0.67	0.25	0.38
1	2200	PF# 1	545.00	5634.04	5638.97		5639.22	0.003090	4.42	149.96	96.11	0.45	0.17	0.55	0.15	0.29
1	2150	PF# 1	545.00	5635.31	5638.86		5639.06	0.002871	4.06	159.26	97.88	0.44	0.20	0.48	0.18	0.29
1	2100	PF# 1	545.00	5634.89	5638.74		5638.93	0.002381	3.91	168.58	98.89	0.40	0.18	0.43	0.17	0.25
1	2050	PF# 1	726.10	5632.86	5638.46		5638.77	0.003634	4.91	176.37	98.48	0.49	0.23	0.67	0.26	0.40
1	2000	PF# 1	726.10	5634.44	5638.06		5638.52	0.006453	6.13	145.55	97.24	0.65	0.36	1.08	0.41	0.60
1	1950	PF# 1	726.10	5633.42	5637.82		5638.21	0.005215	5.59	156.35	97.08	0.59	0.30	0.89	0.35	0.52
1	1900	PF# 1	726.10	5633.86	5637.58		5637.95	0.004934	5.45	159.24	96.82	0.57	0.33	0.85	0.33	0.50
1	1850	PF# 1	726.10	5631.76	5637.42		5637.72	0.003582	4.91	176.45	97.21	0.48	0.27	0.67	0.20	0.40
1	1800	PF# 1	726.10	5633.51	5637.15		5637.51	0.004832	5.34	161.29	96.78	0.57	0.35	0.82	0.33	0.50
1	1750	PF# 1	726.10	5631.93	5637.01		5637.29	0.003163	4.79	182.04	97.28	0.46	0.19	0.63	0.25	0.36
1	1700	PF# 1	726.10	5632.98	5636.73		5637.09	0.004860	5.47	160.00	96.96	0.57	0.28	0.85	0.37	0.50
1	1650	PF# 1	726.10	5632.36	5636.52		5636.86	0.003982	5.30	168.27	97.45	0.52	0.26	0.77	0.29	0.42
1	1600	PF# 1	726.10	5632.47	5635.94	5635.94	5636.55	0.009198	7.07	128.20	95.38	0.77	0.49	1.46	0.49	0.77
1	1564.5	PF# 1	726.10	5632.40	5635.24	5635.24	5635.95	0.010088	6.91	115.33	91.42	0.80	0.19	1.45	0.19	0.79
1	1550	PF# 1	726.10	5631.60	5634.09	5634.09	5635.08	0.017683	7.97	91.09	48.23	1.02		2.06		2.06
1	1509.9	PF# 1	726.10	5629.60	5633.06		5633.35	0.003338	4.54	177.92	95.86	0.48	0.16	0.58	0.16	0.38
1	1500	PF# 1	726.10	5629.60	5632.86		5633.29	0.005188	5.60	149.90	94.67	0.59	0.22	0.89	0.22	0.51
1	1450	PF# 1	726.10	5629.30	5632.58		5632.94	0.004367	4.98	161.33	94.46	0.54	0.17	0.72	0.17	0.46
1	1435	PF# 1	726.10	5629.30	5632.09	5632.09	5632.81	0.010505	6.92	113.88	91.13	0.81	0.18	1.46	0.18	0.81
1	1400	PF# 1	726.10	5627.50	5630.28	5630.28	5631.01	0.010736	6.96	112.08	90.68	0.82	0.15	1.48	0.15	0.82
1	1375.1	PF# 1	726.10	5626.30	5630.12		5630.33	0.010146	4.26	211.96	99.36	0.38	0.19	0.46	0.19	0.26
1	1350	PF# 1	726.10	5626.10												

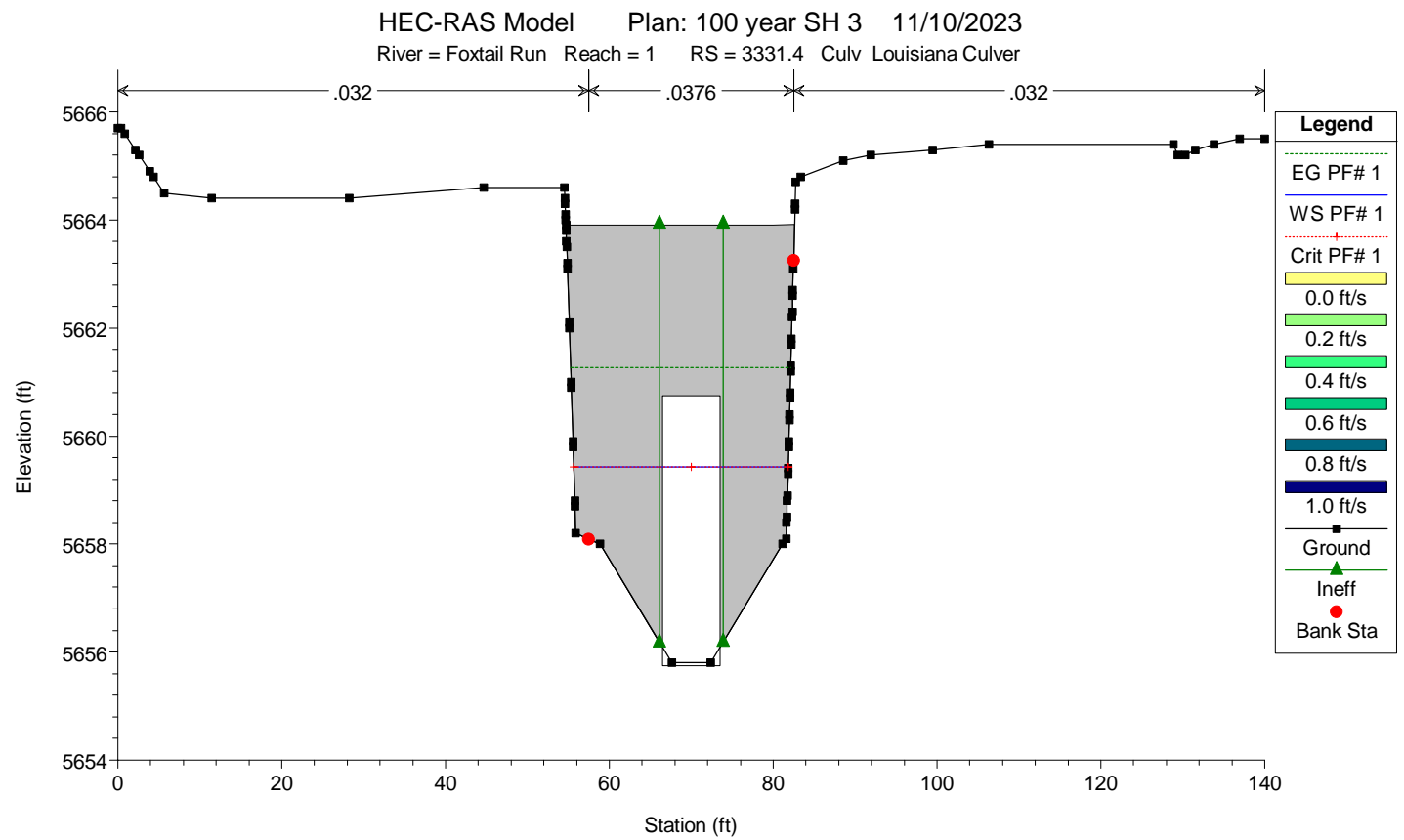
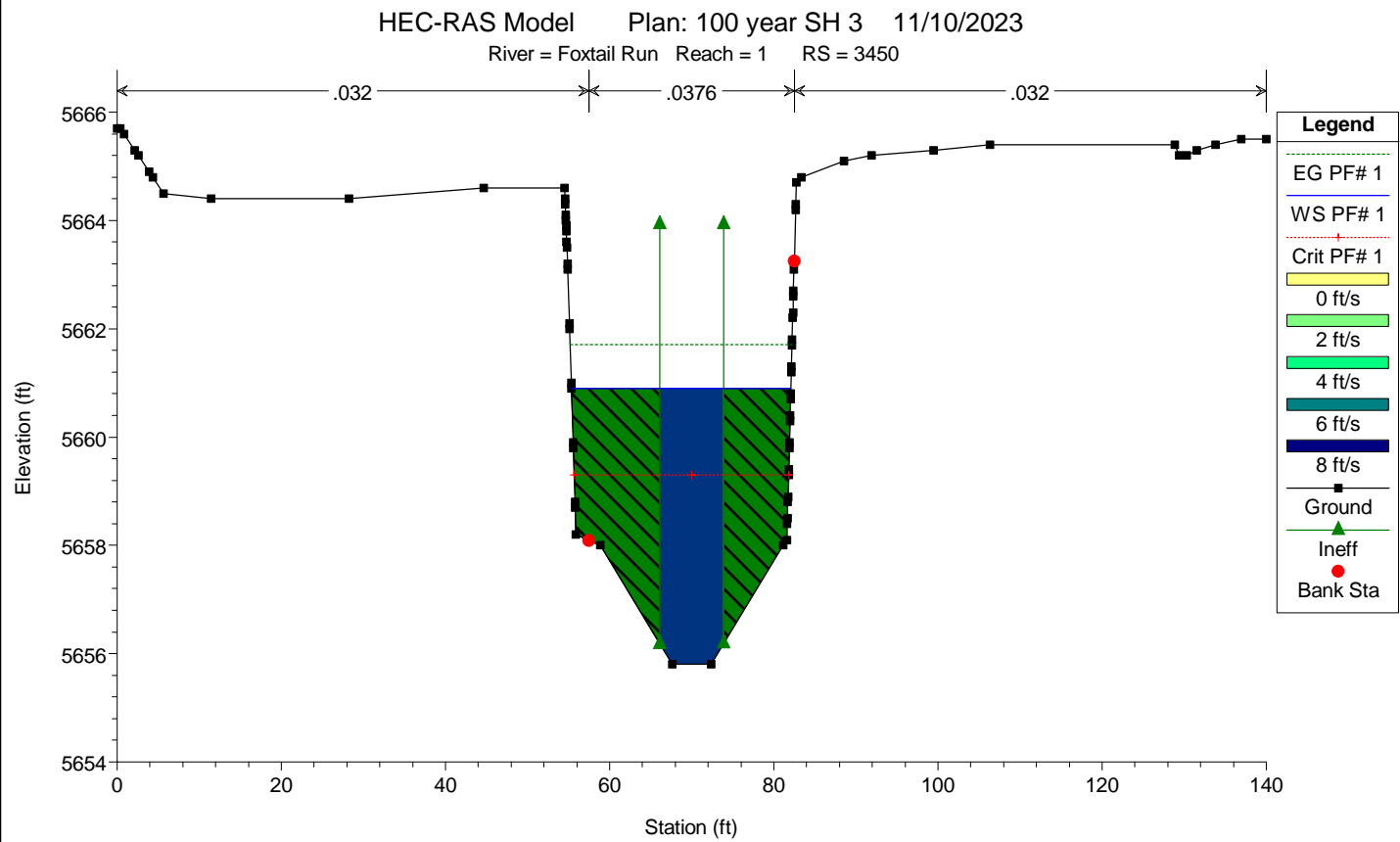
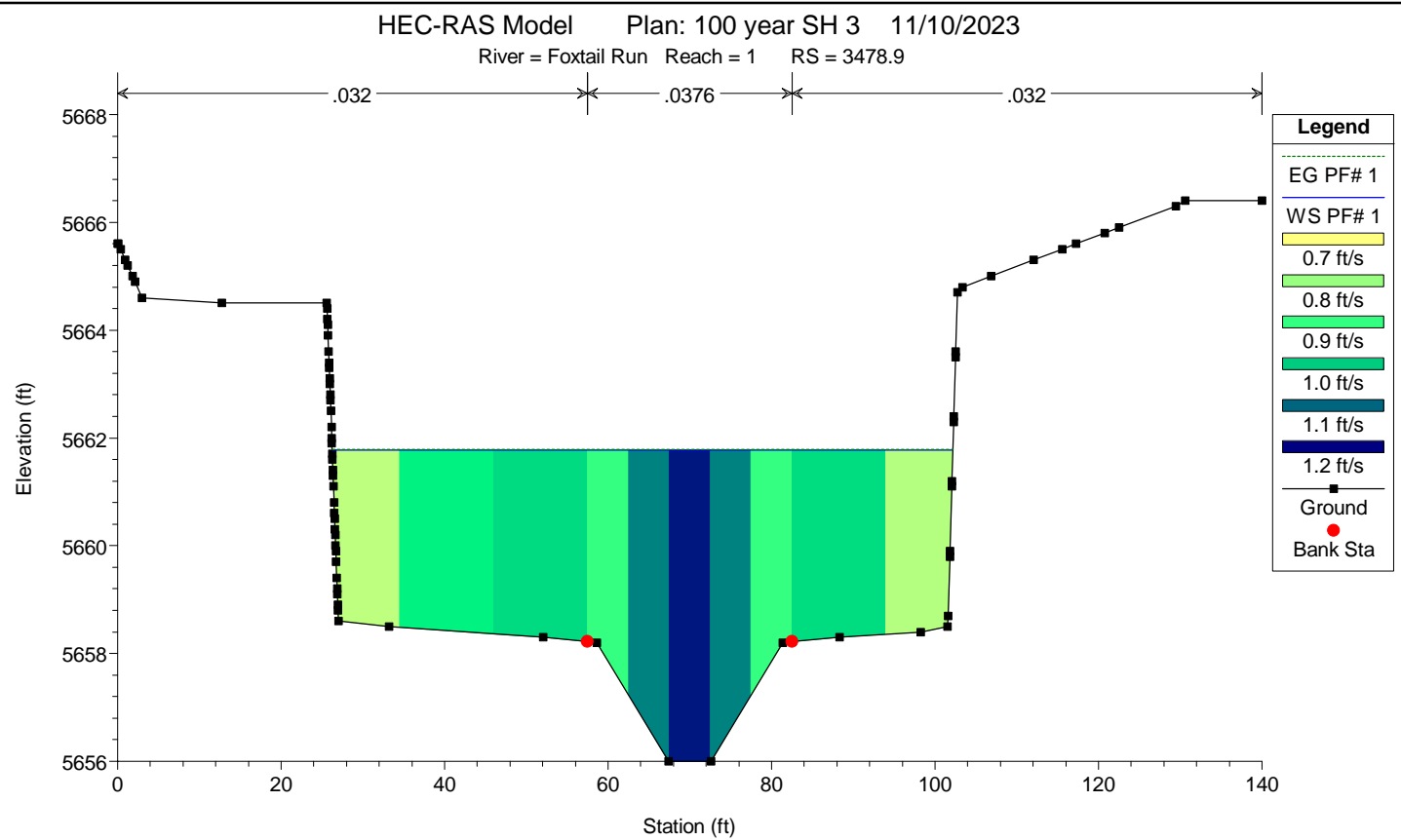
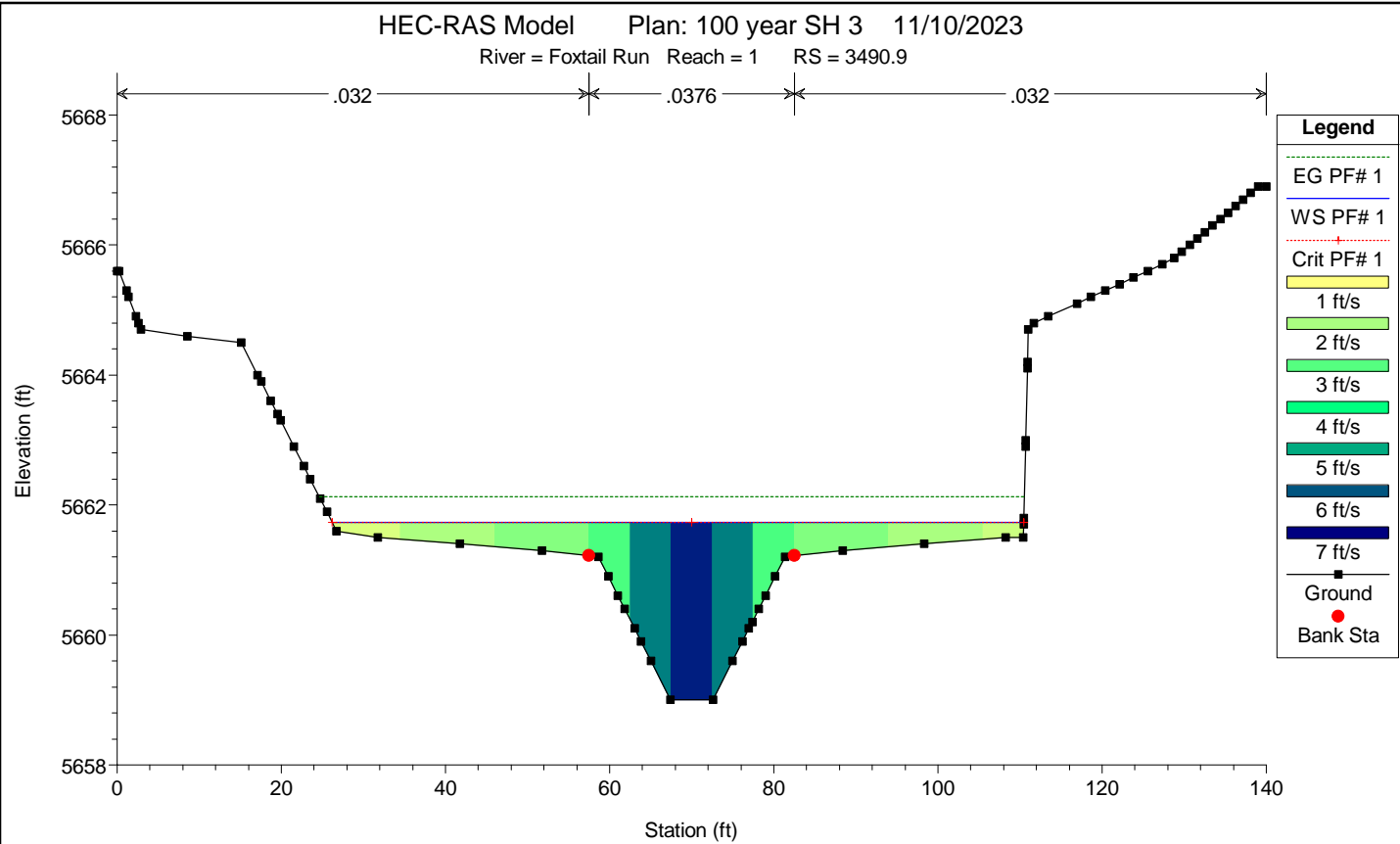


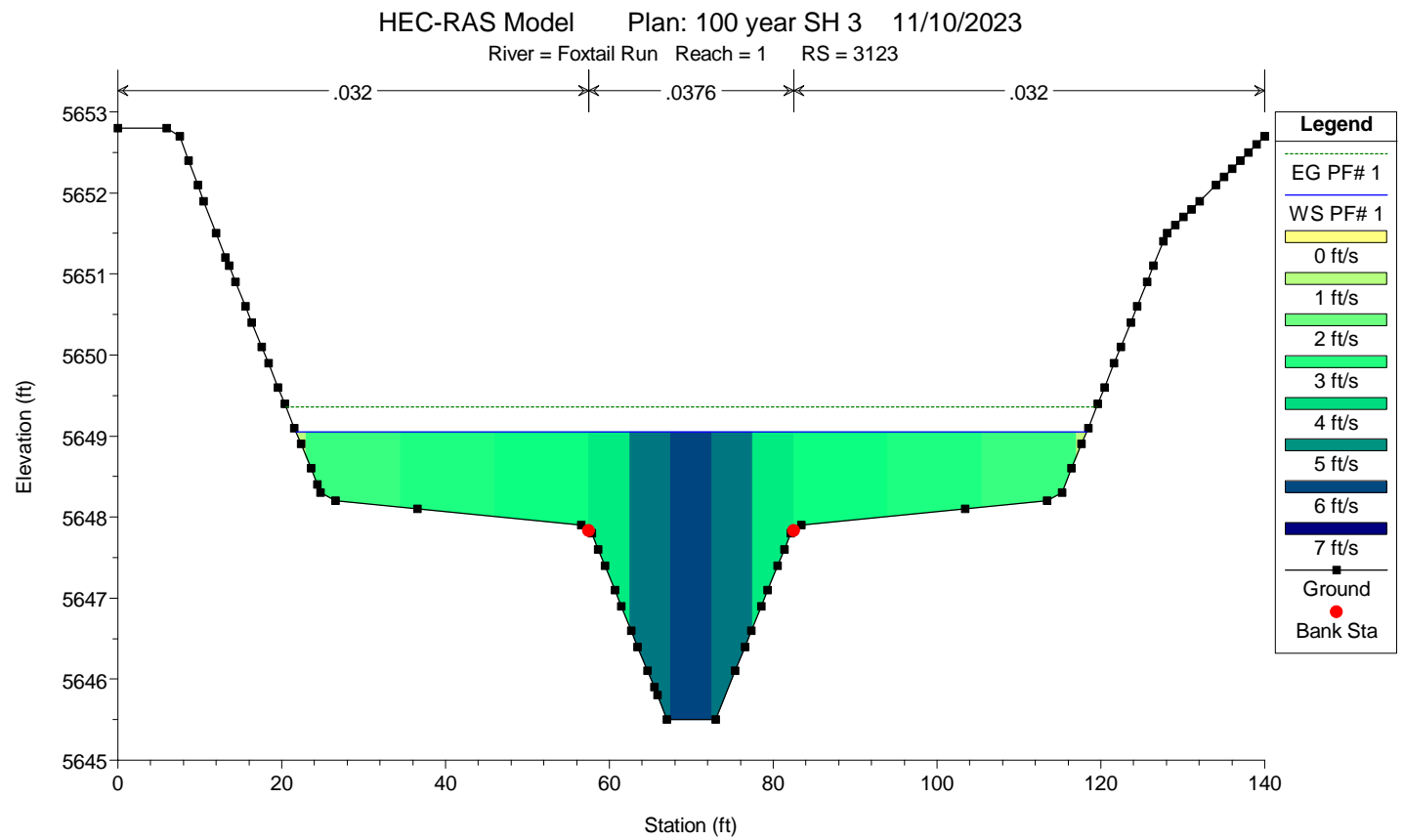
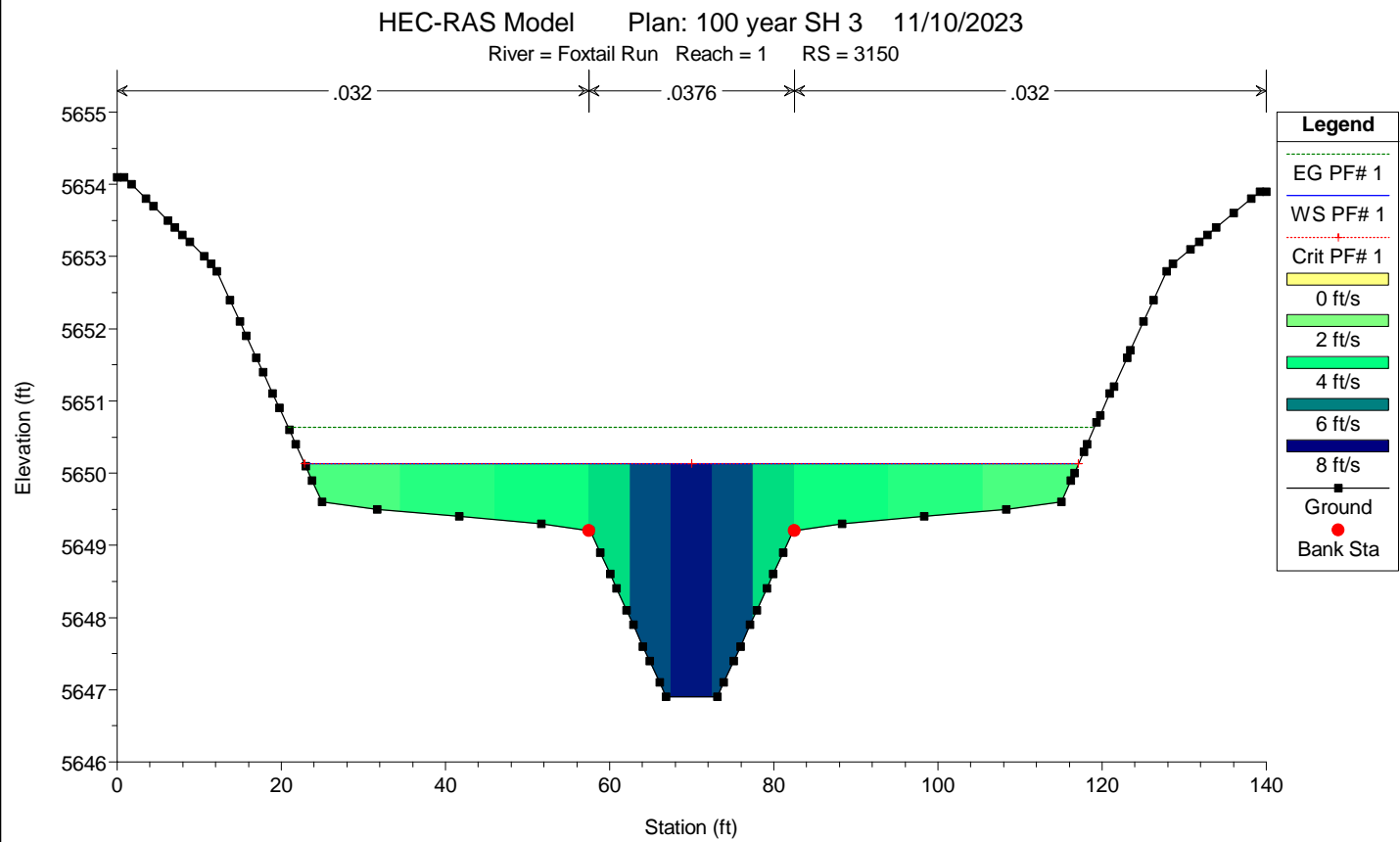
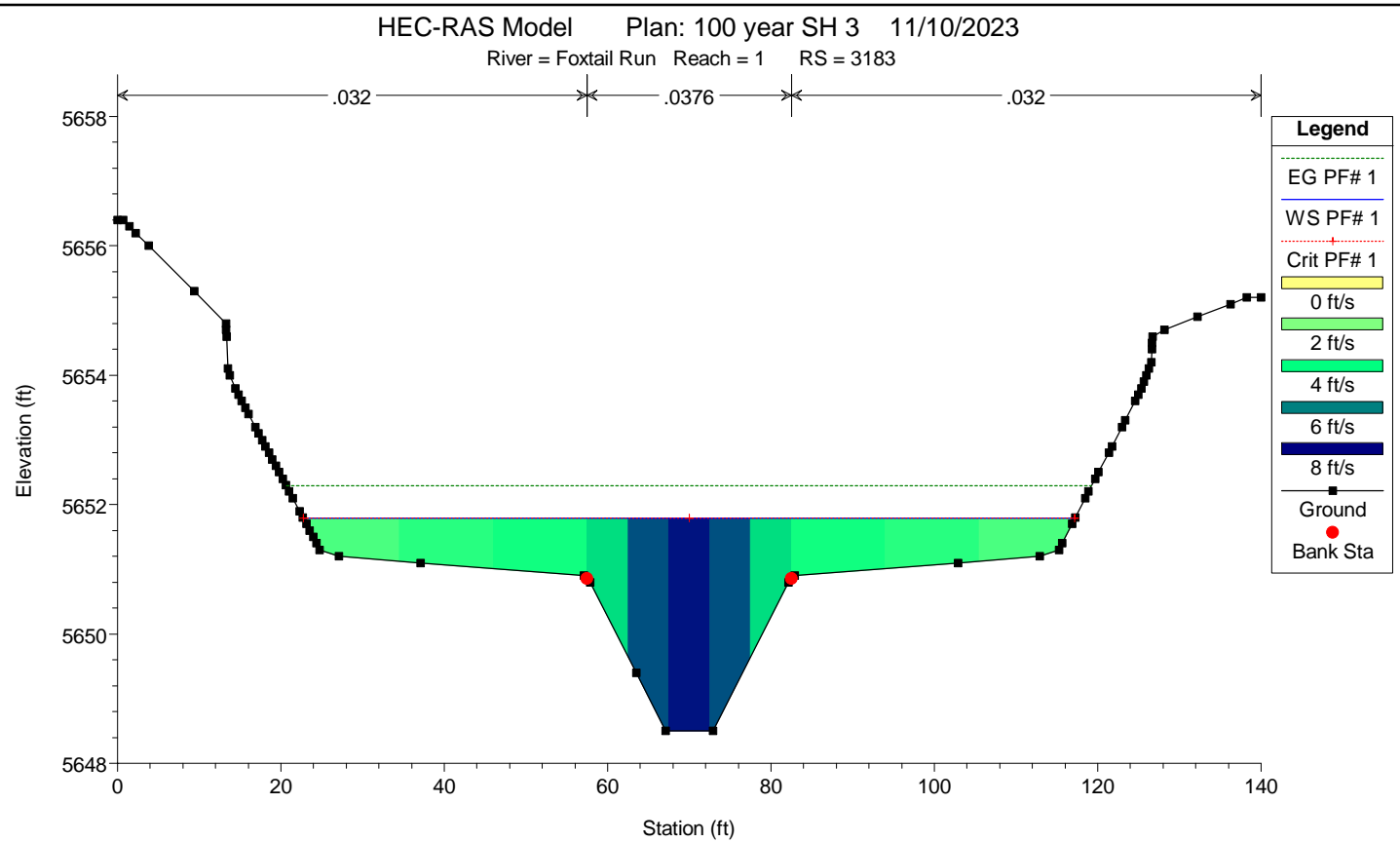
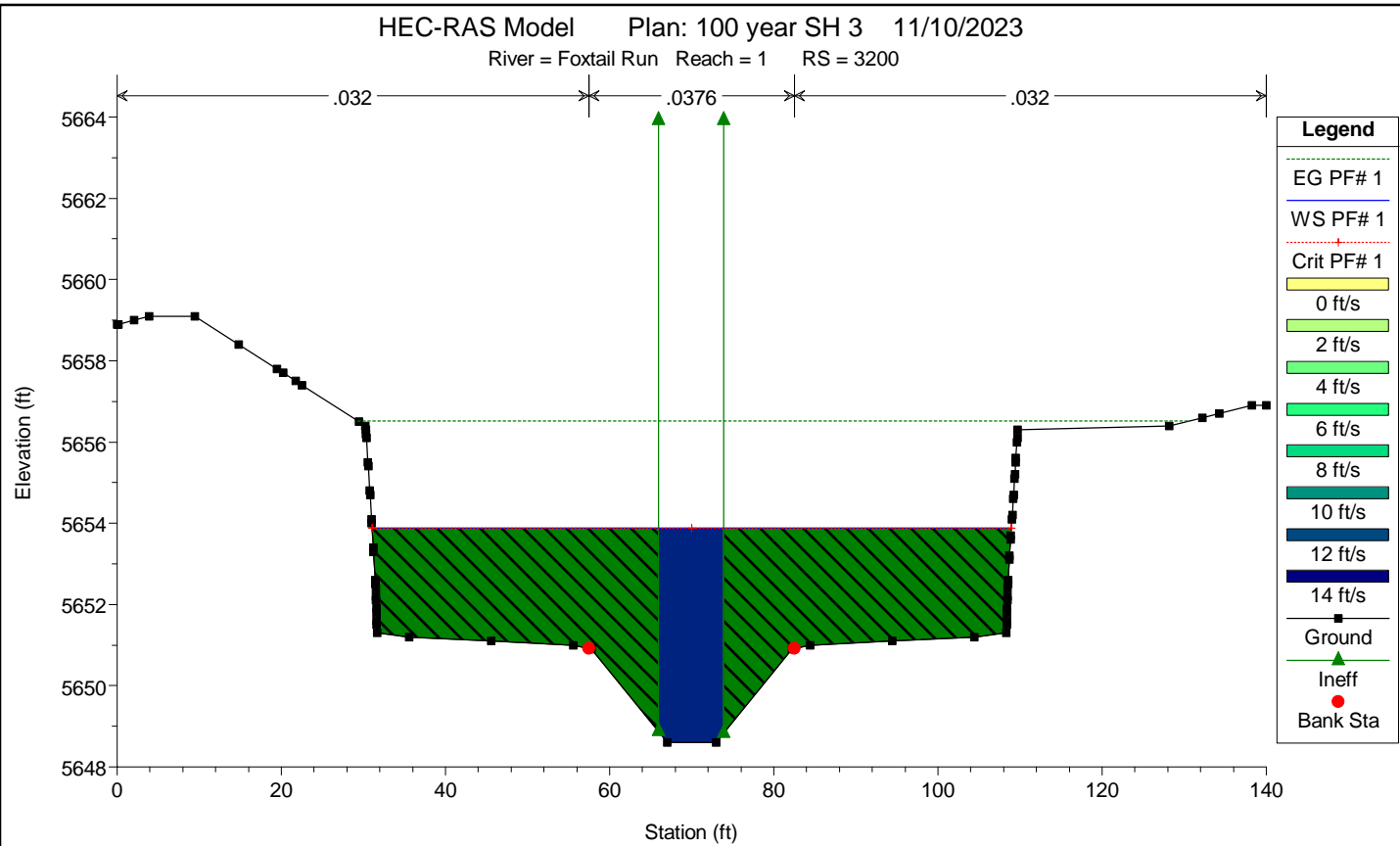


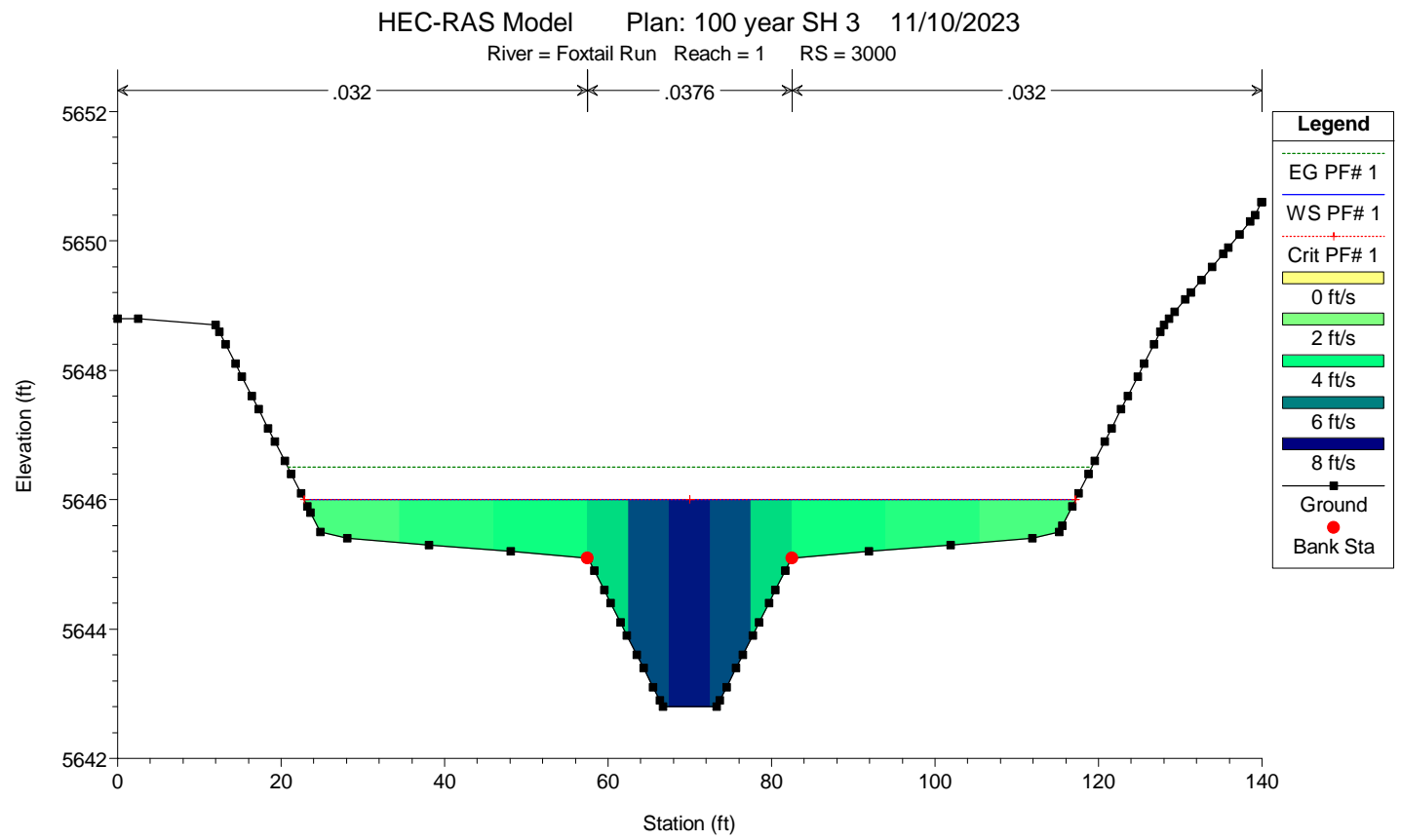
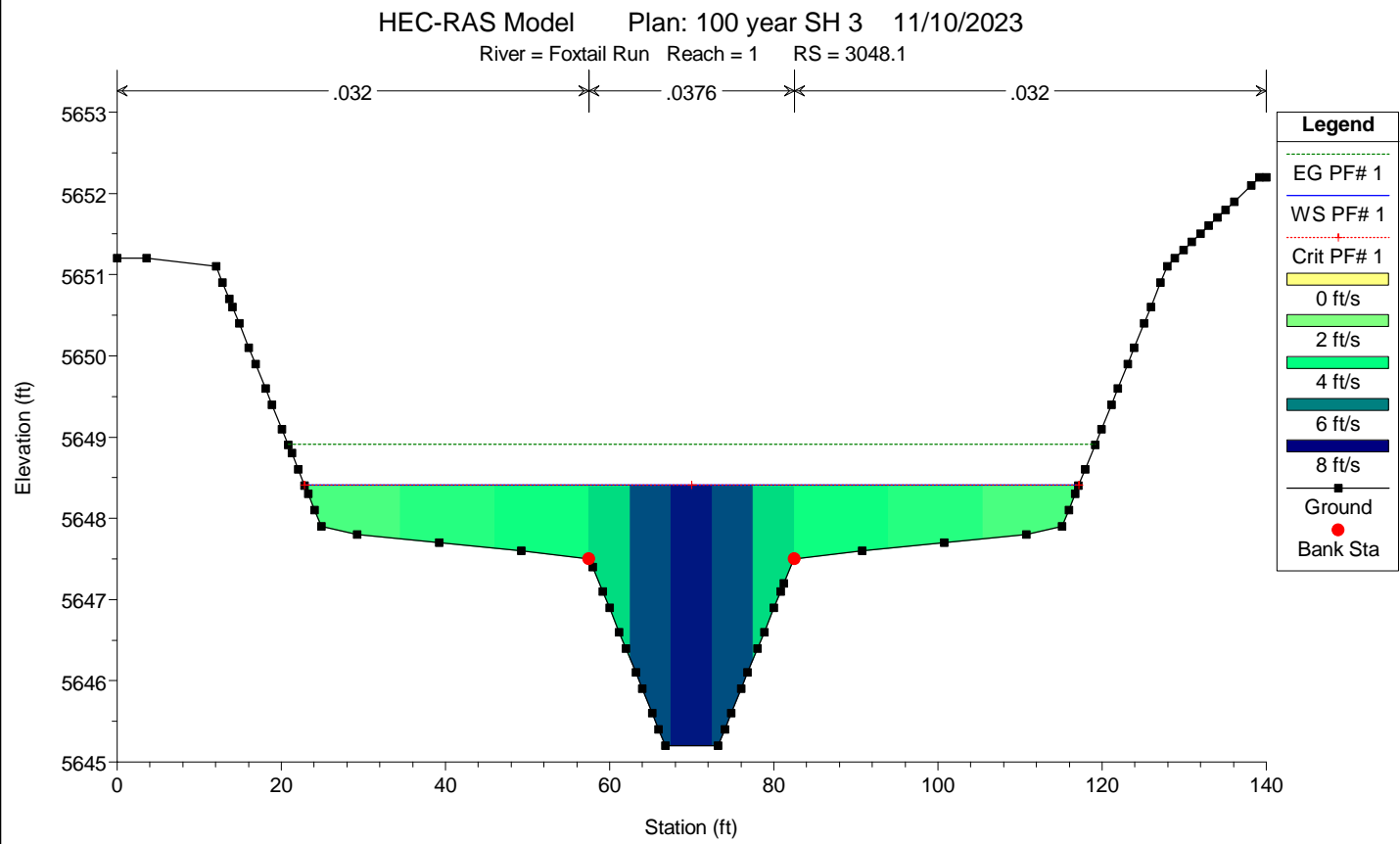
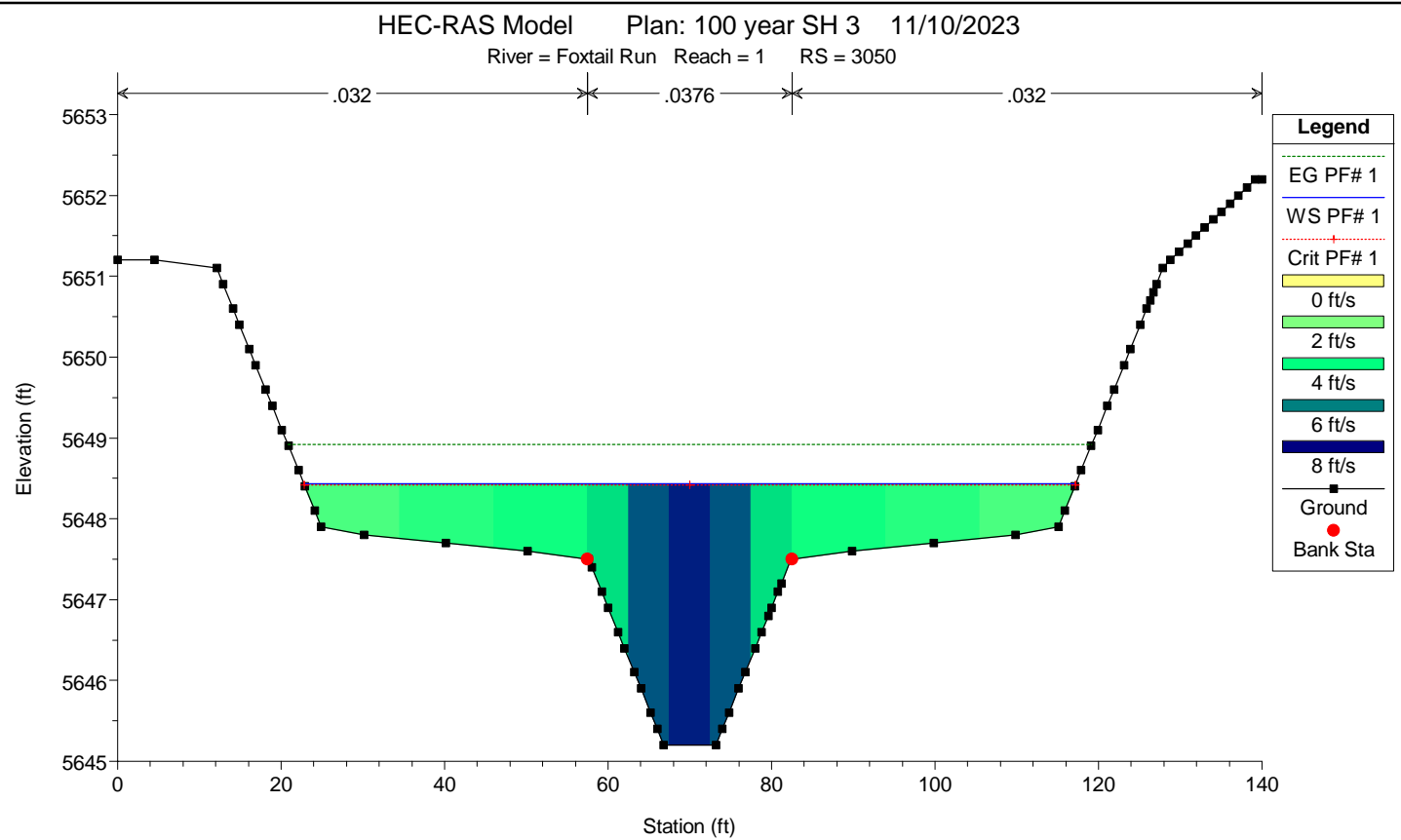
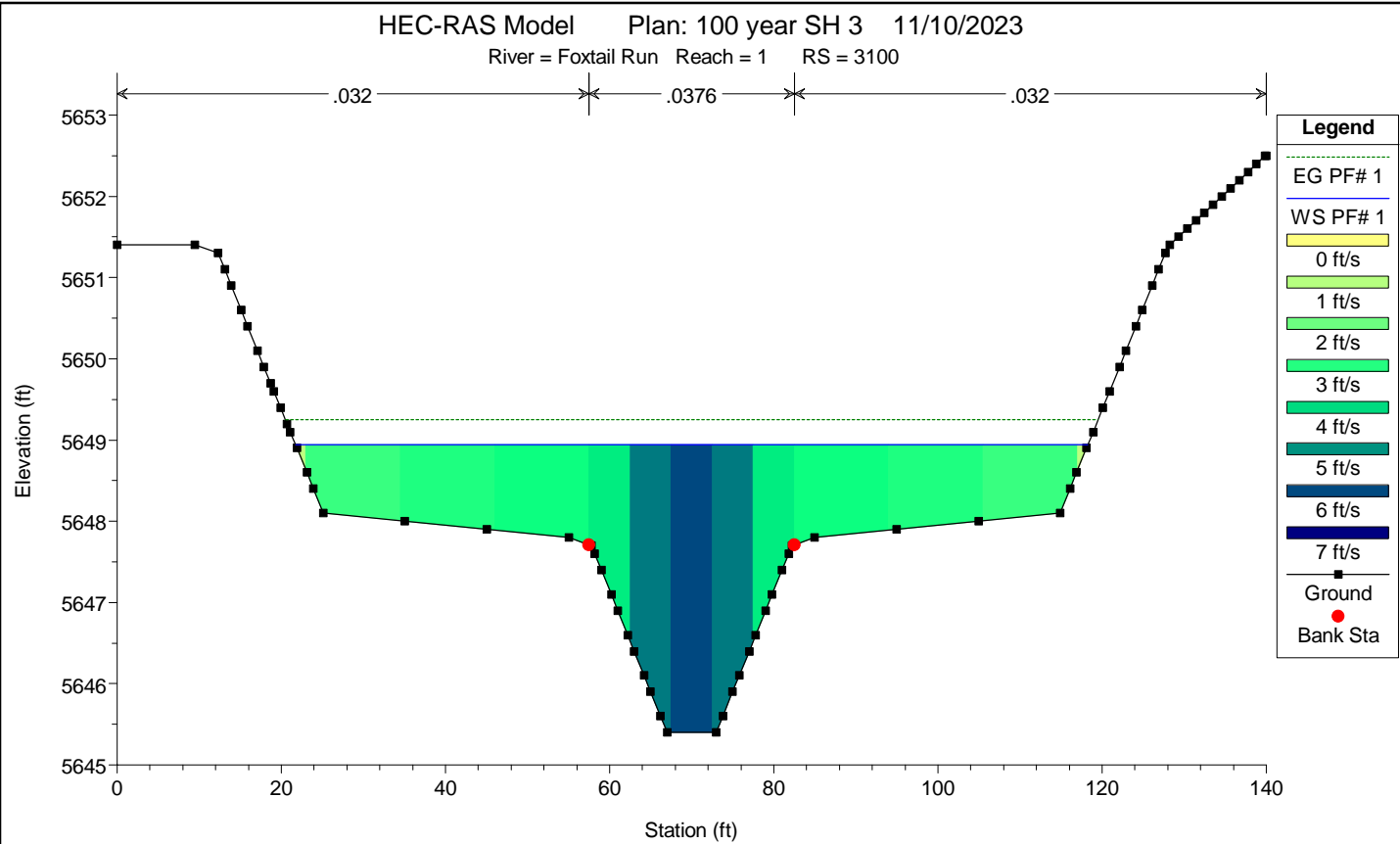


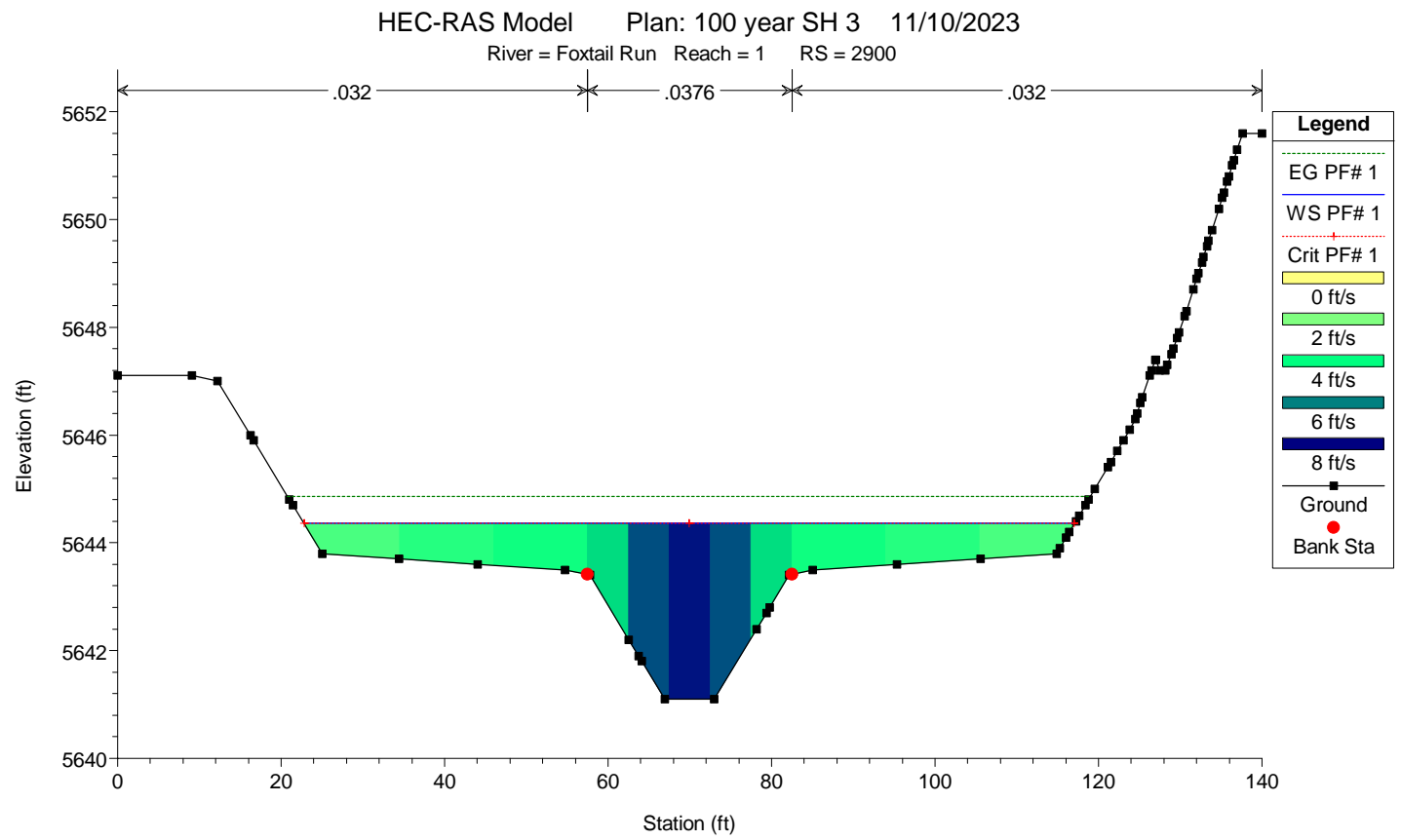
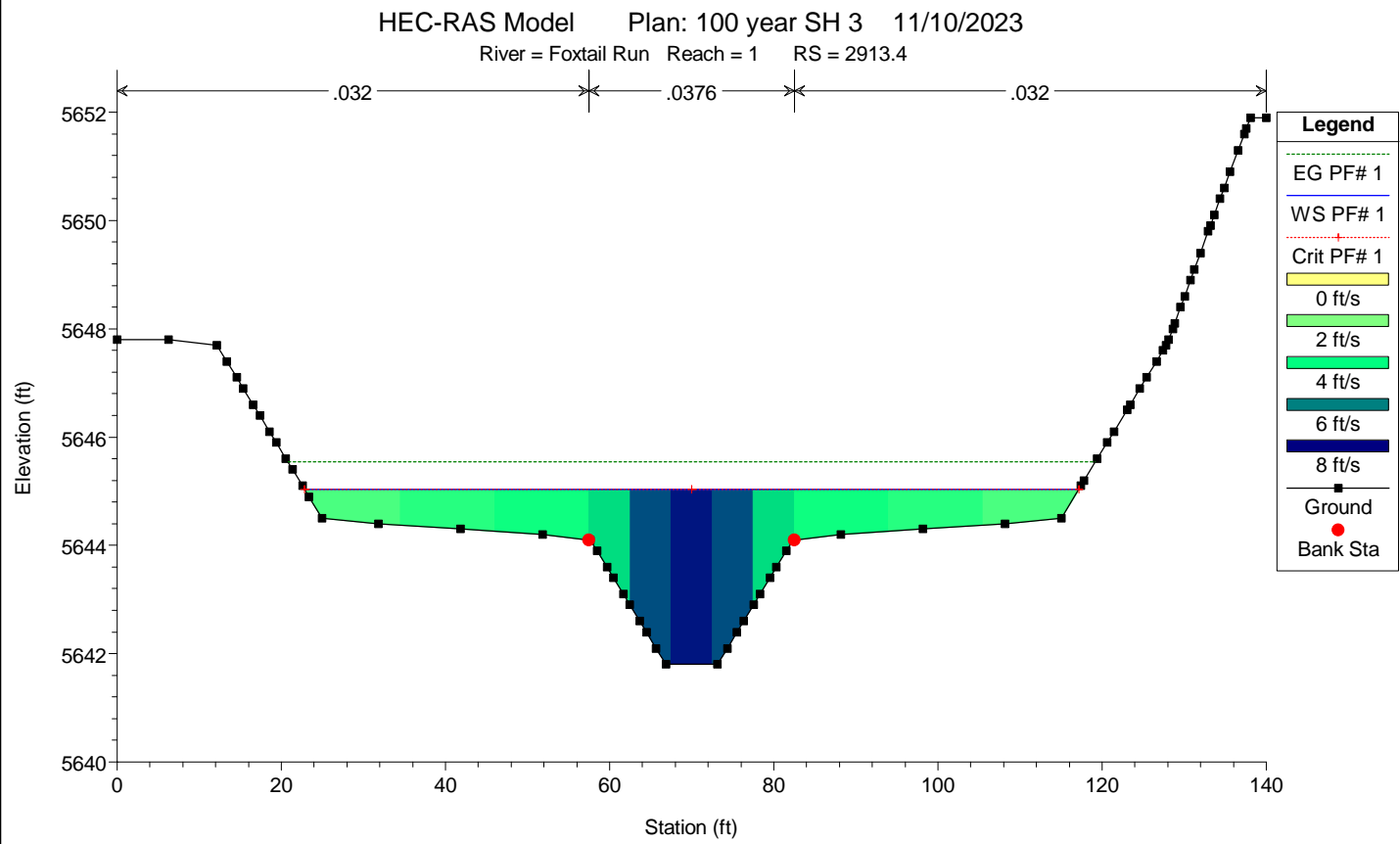
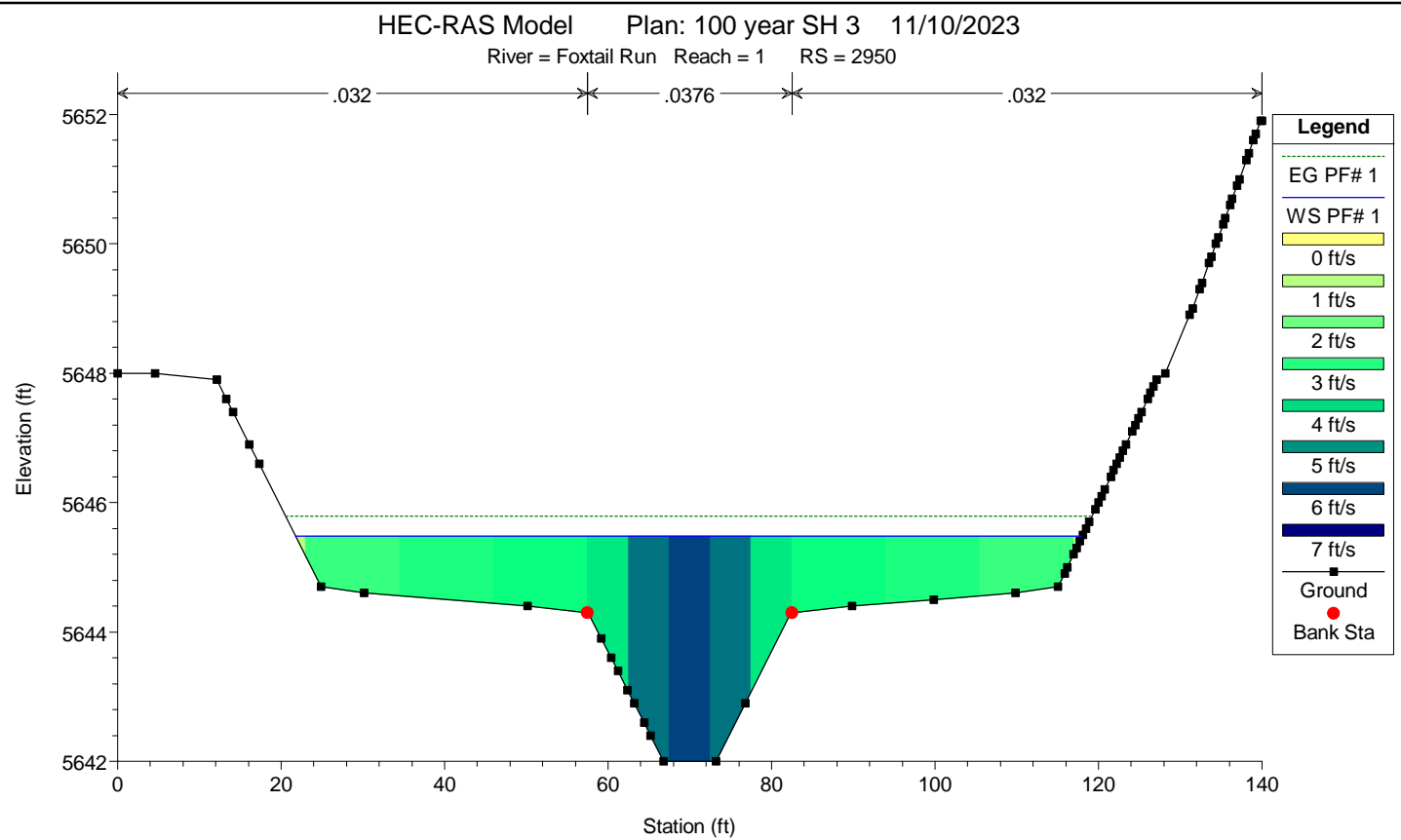
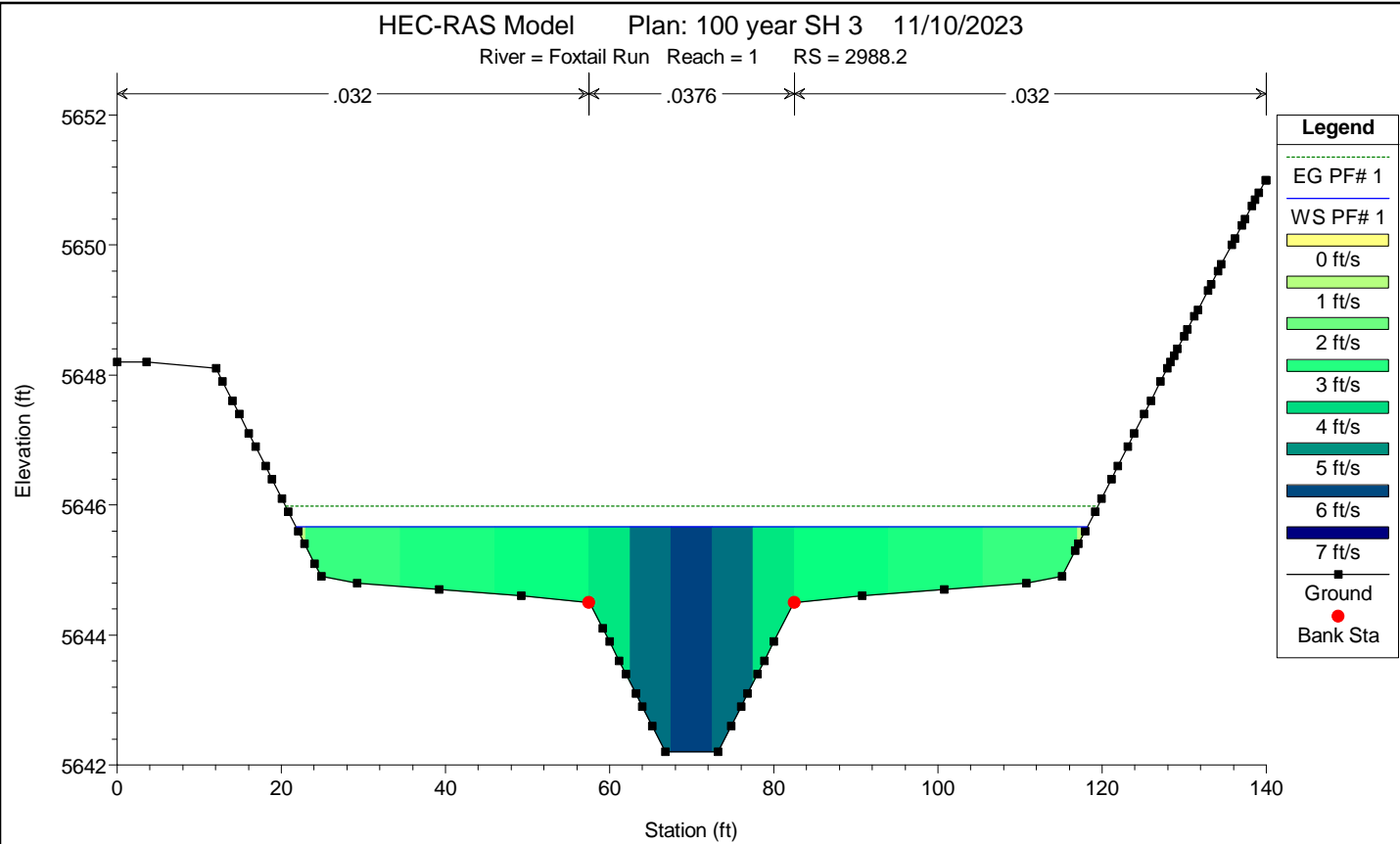


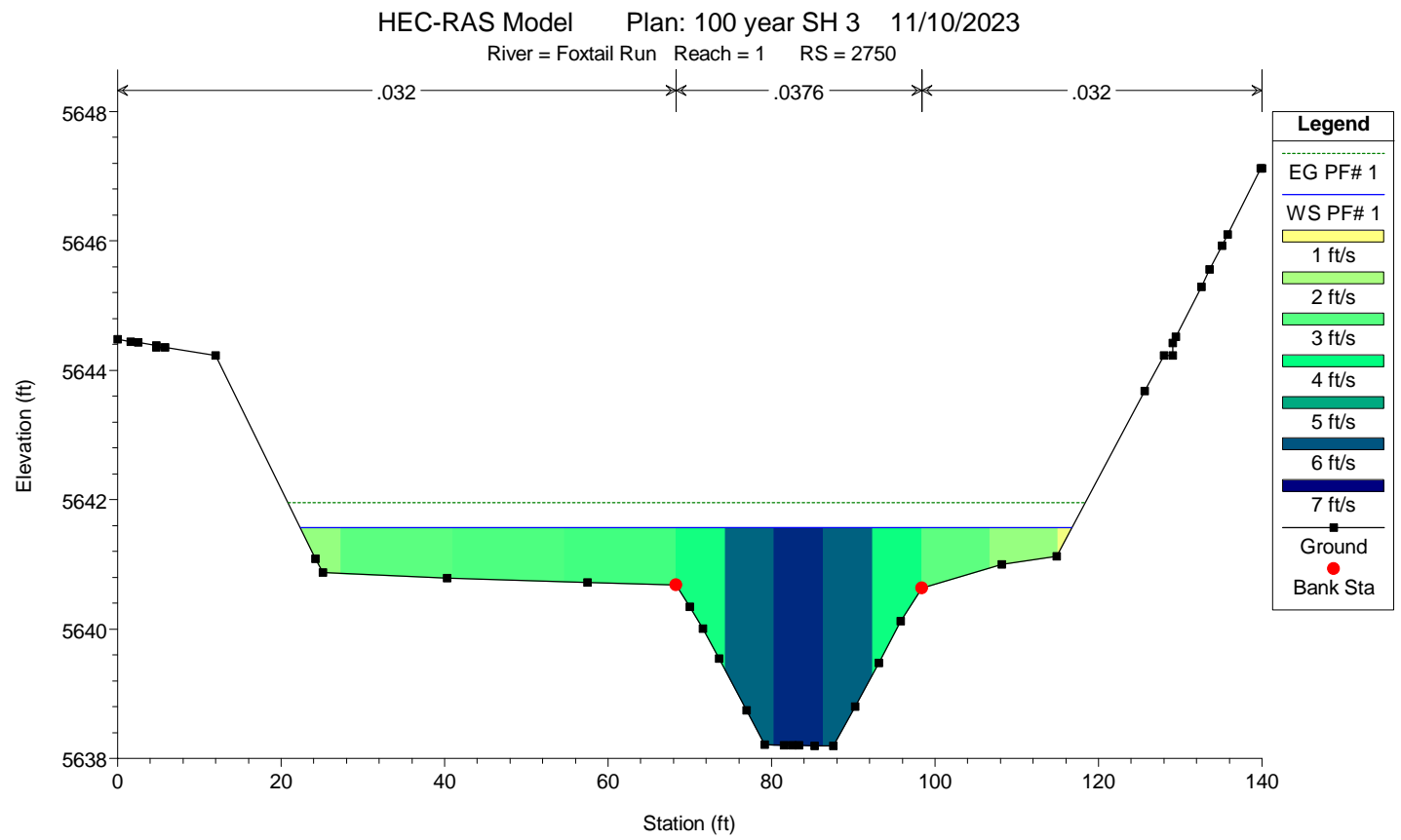
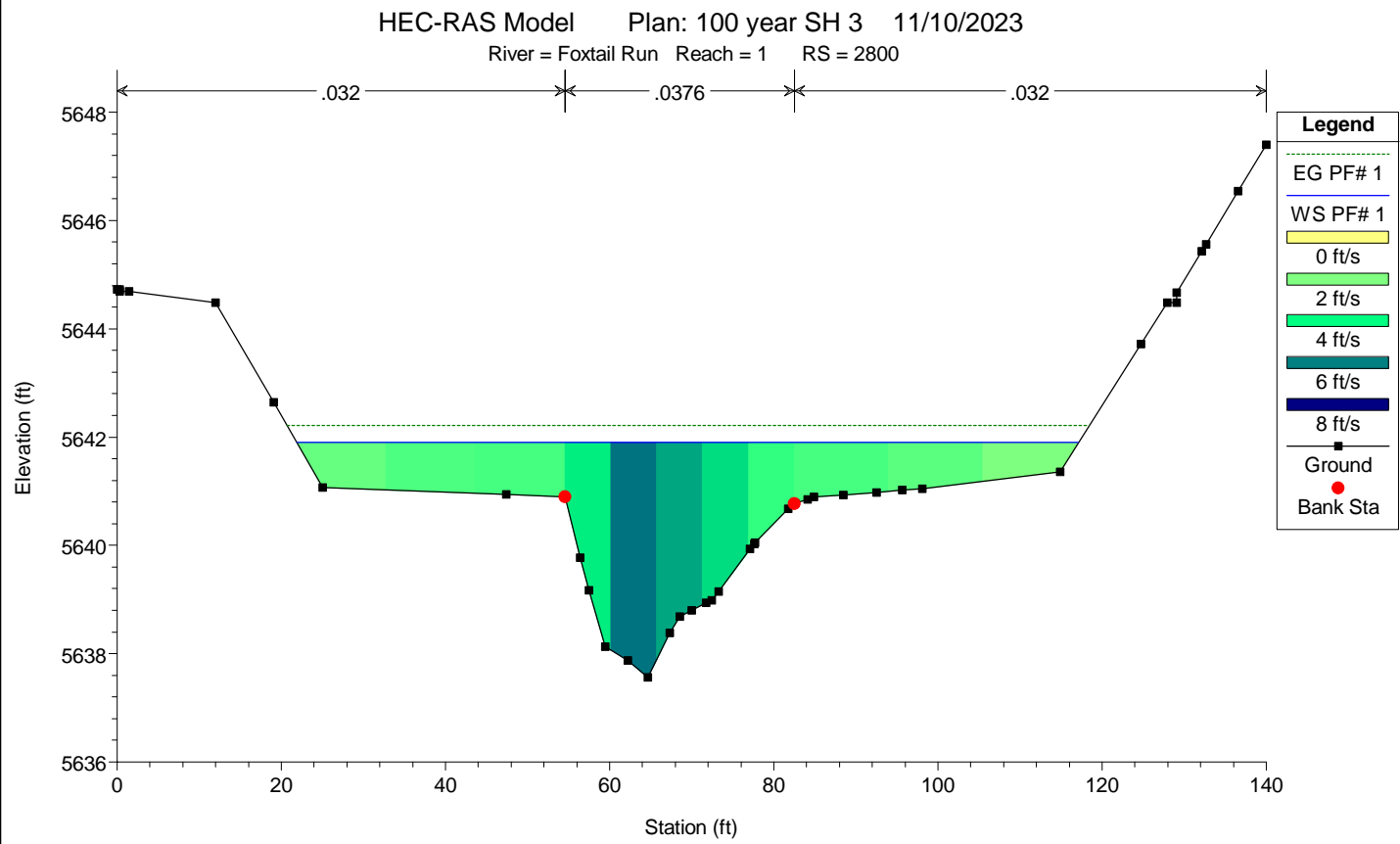
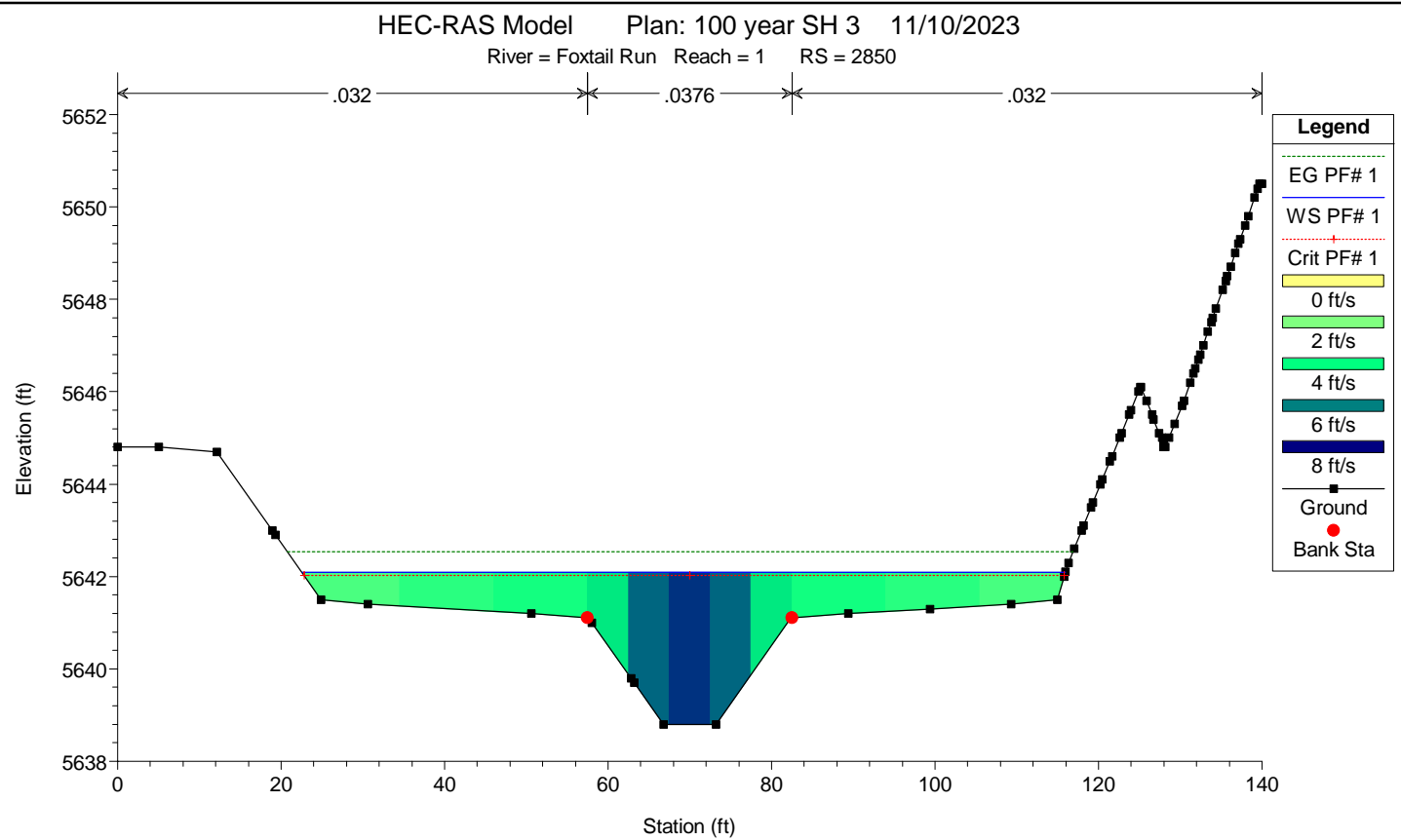
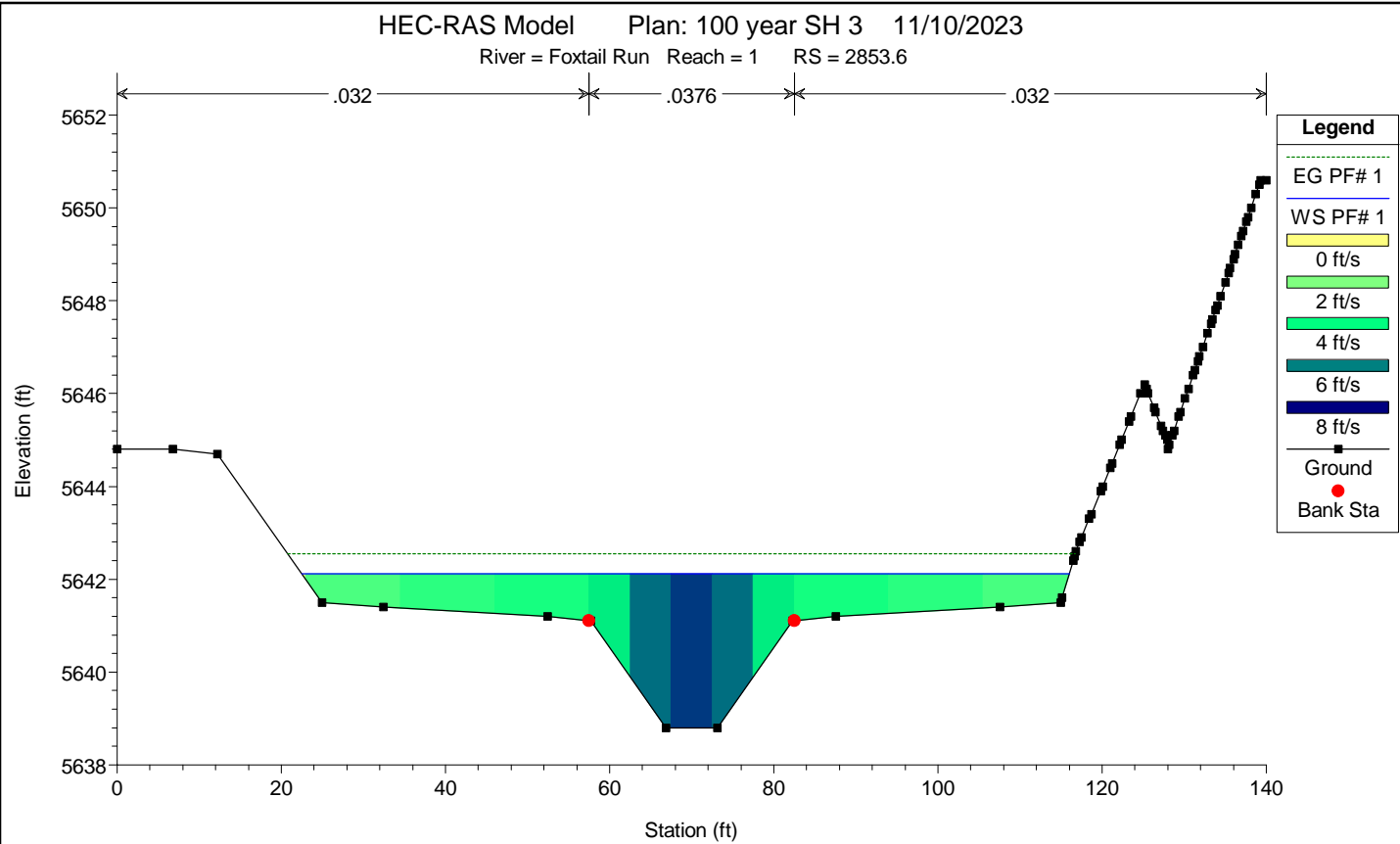


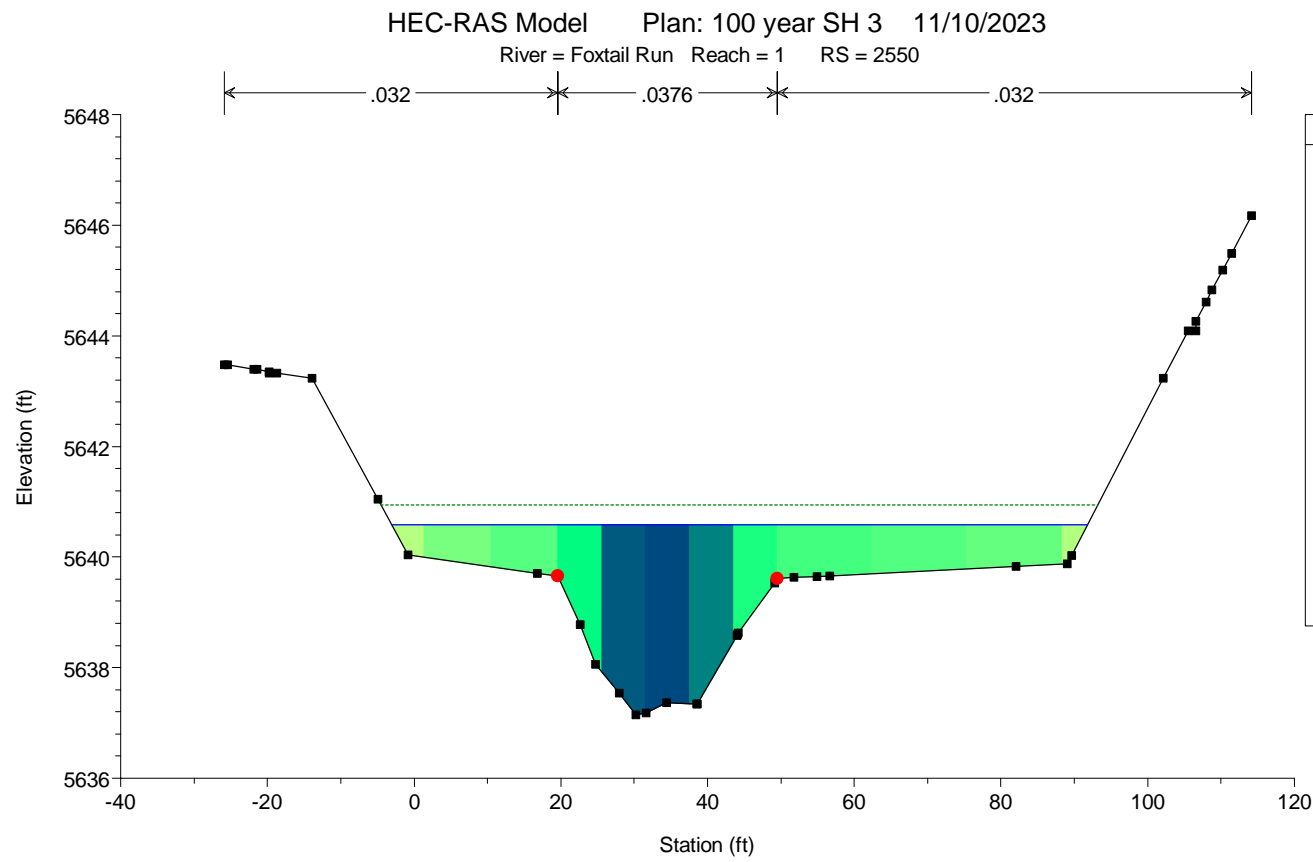
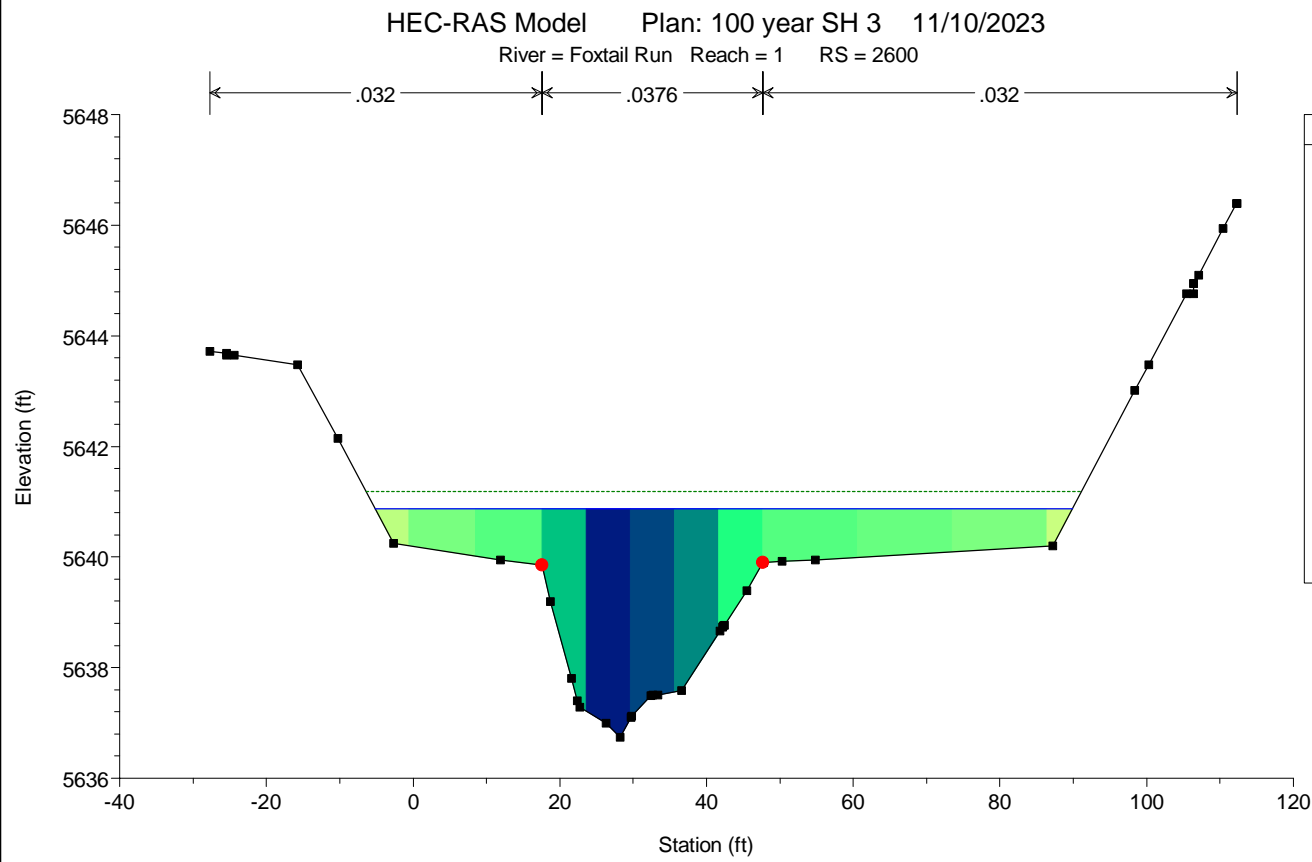
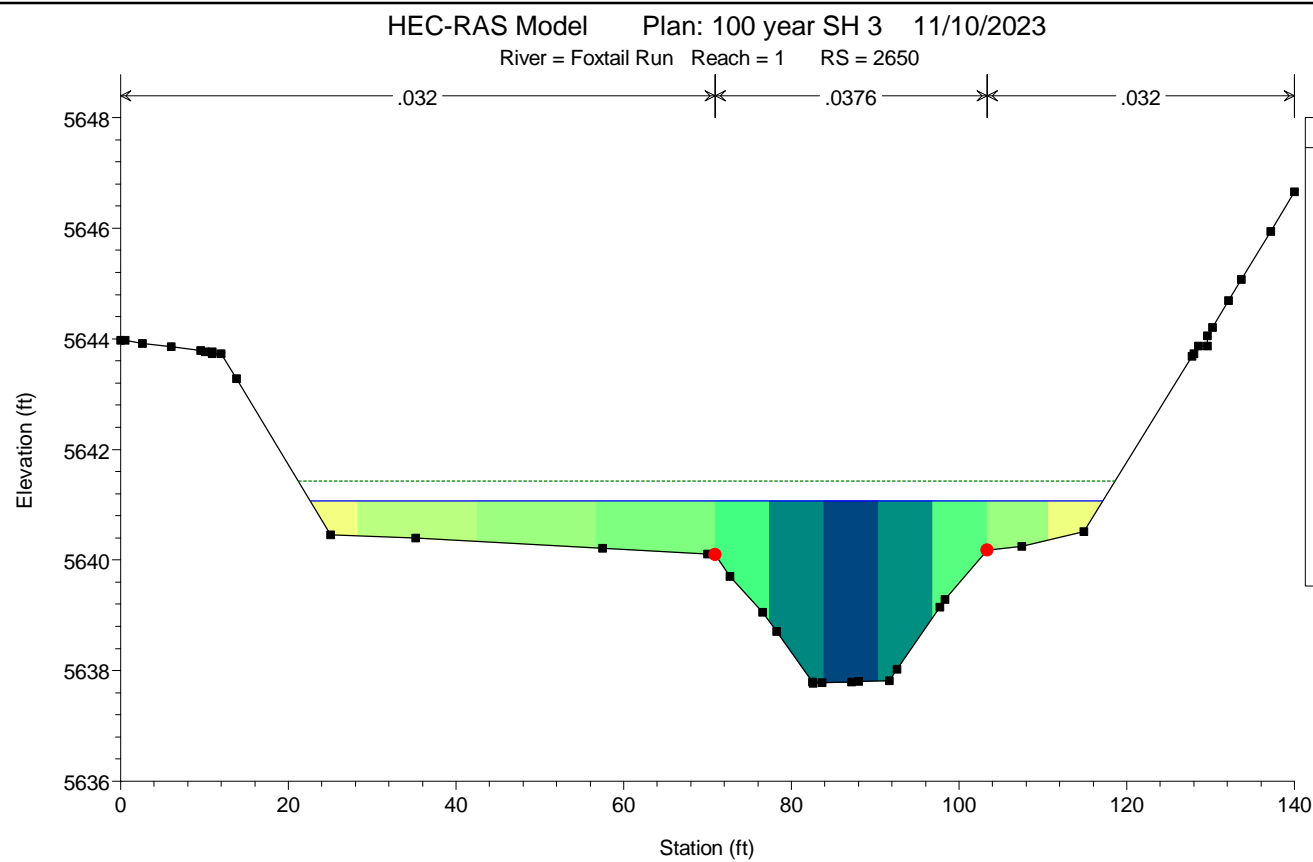
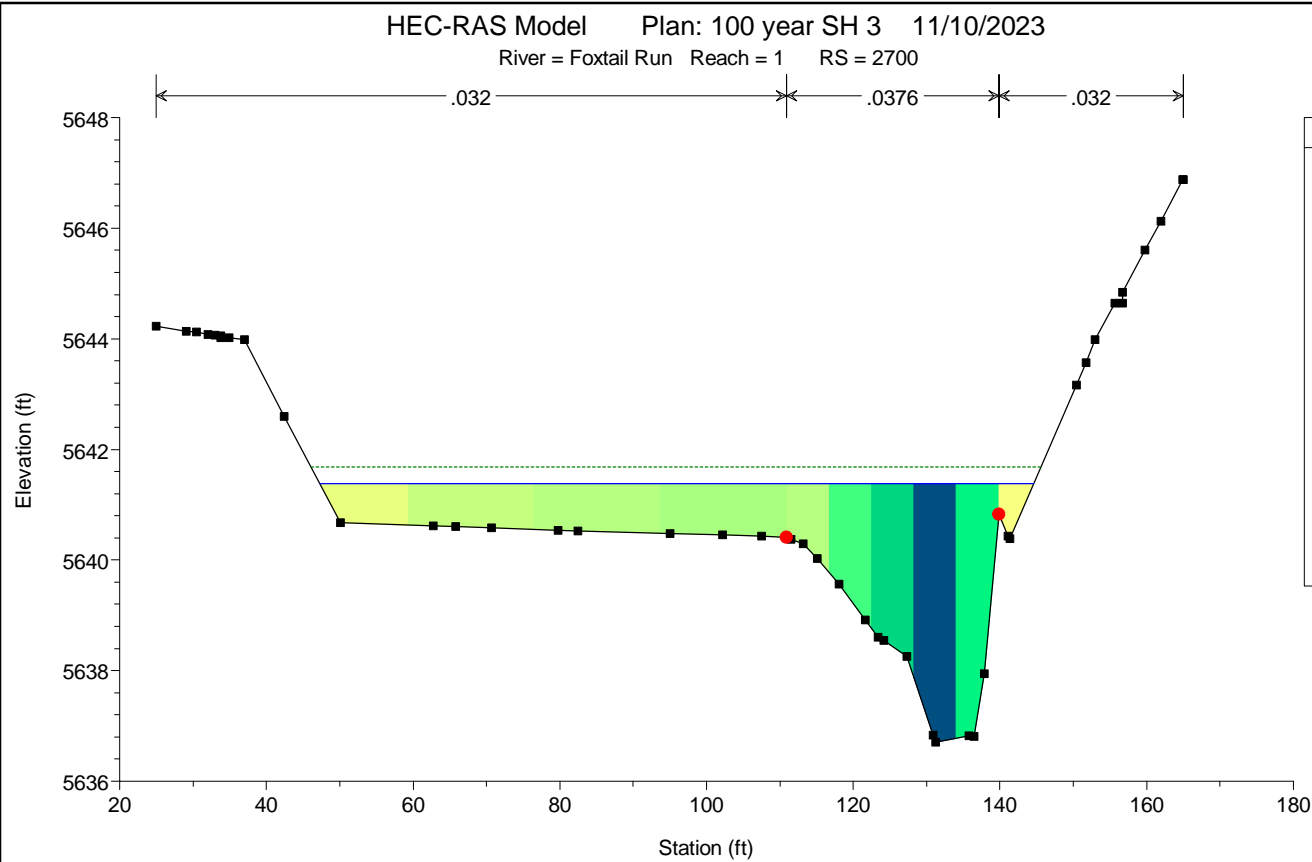


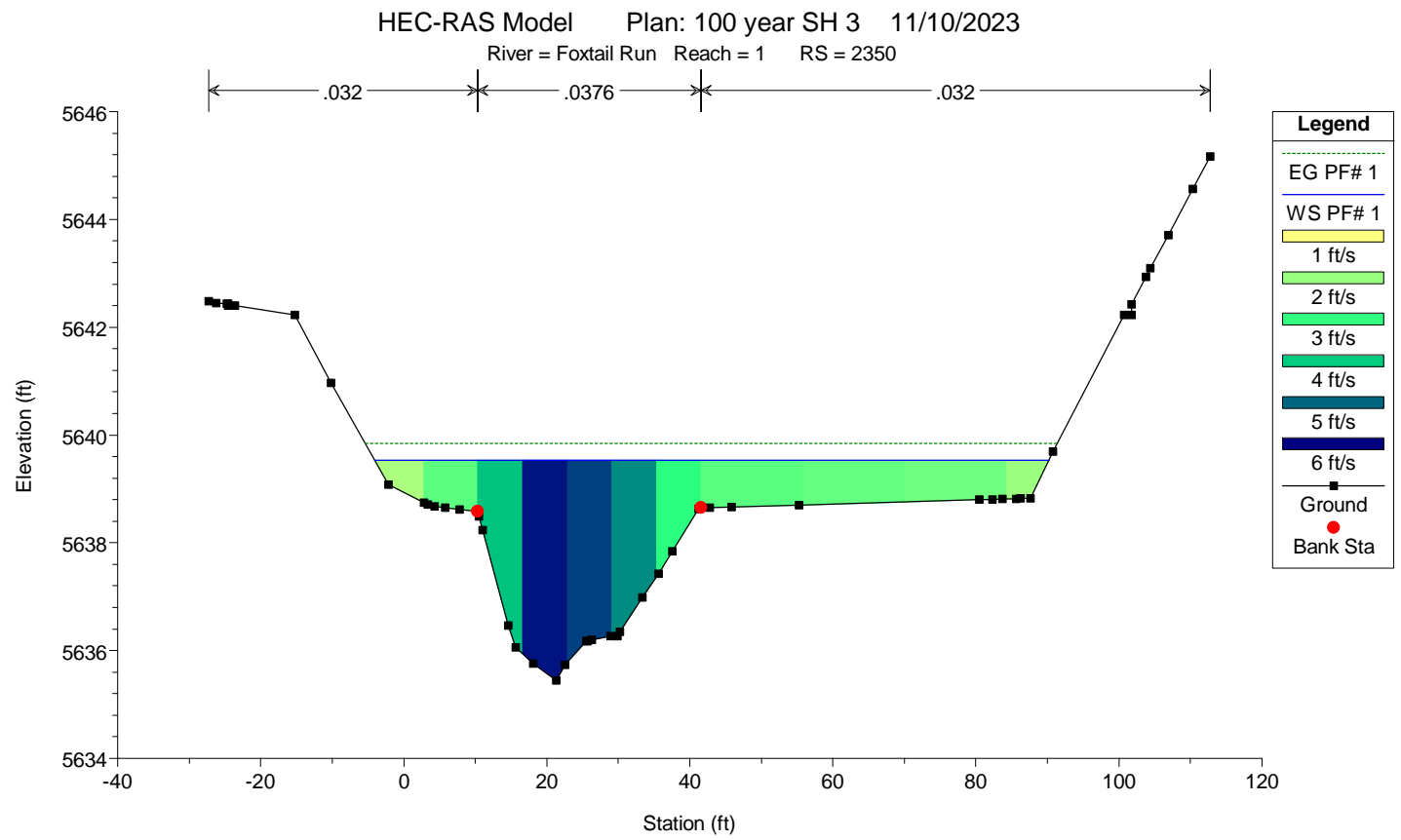
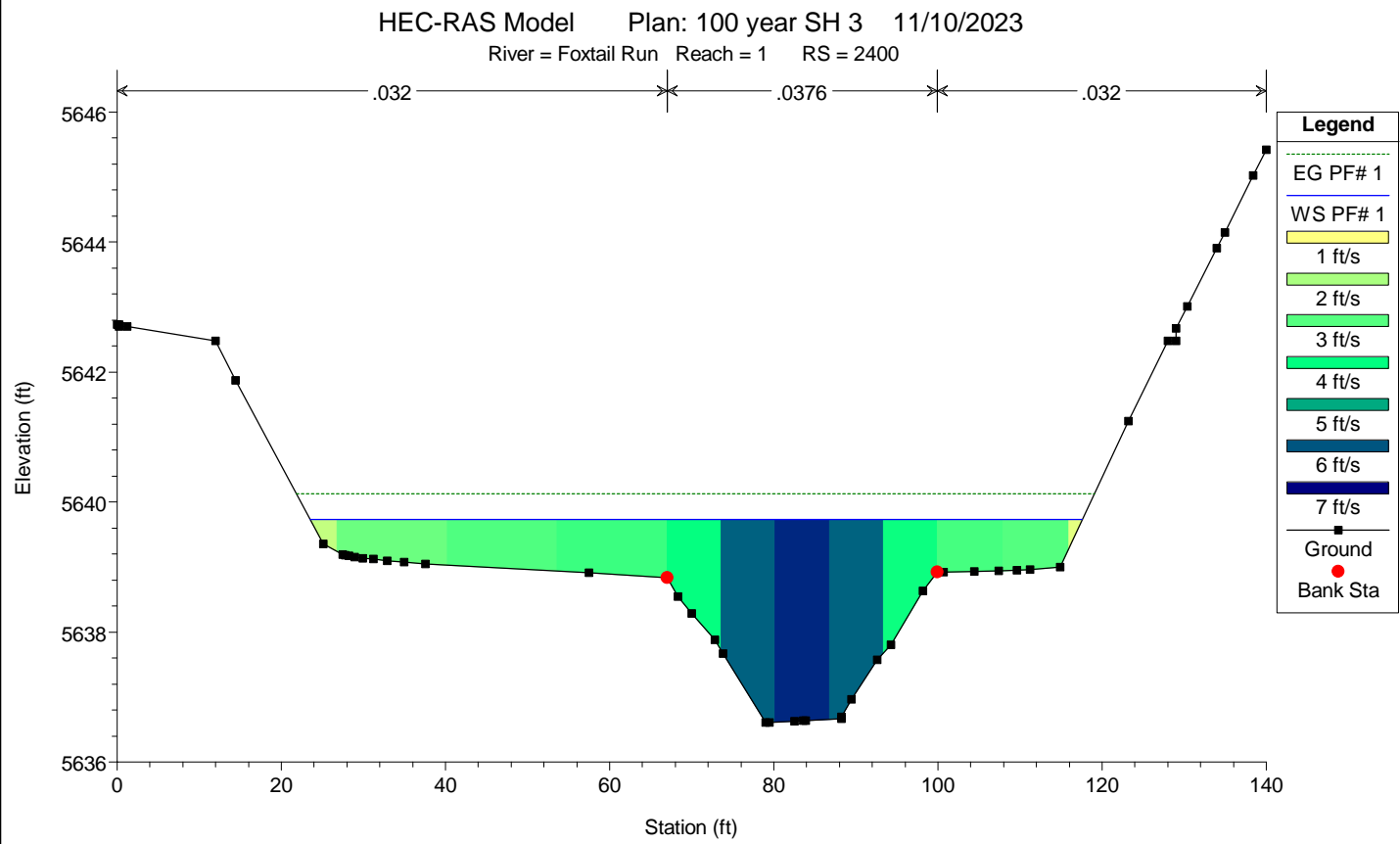
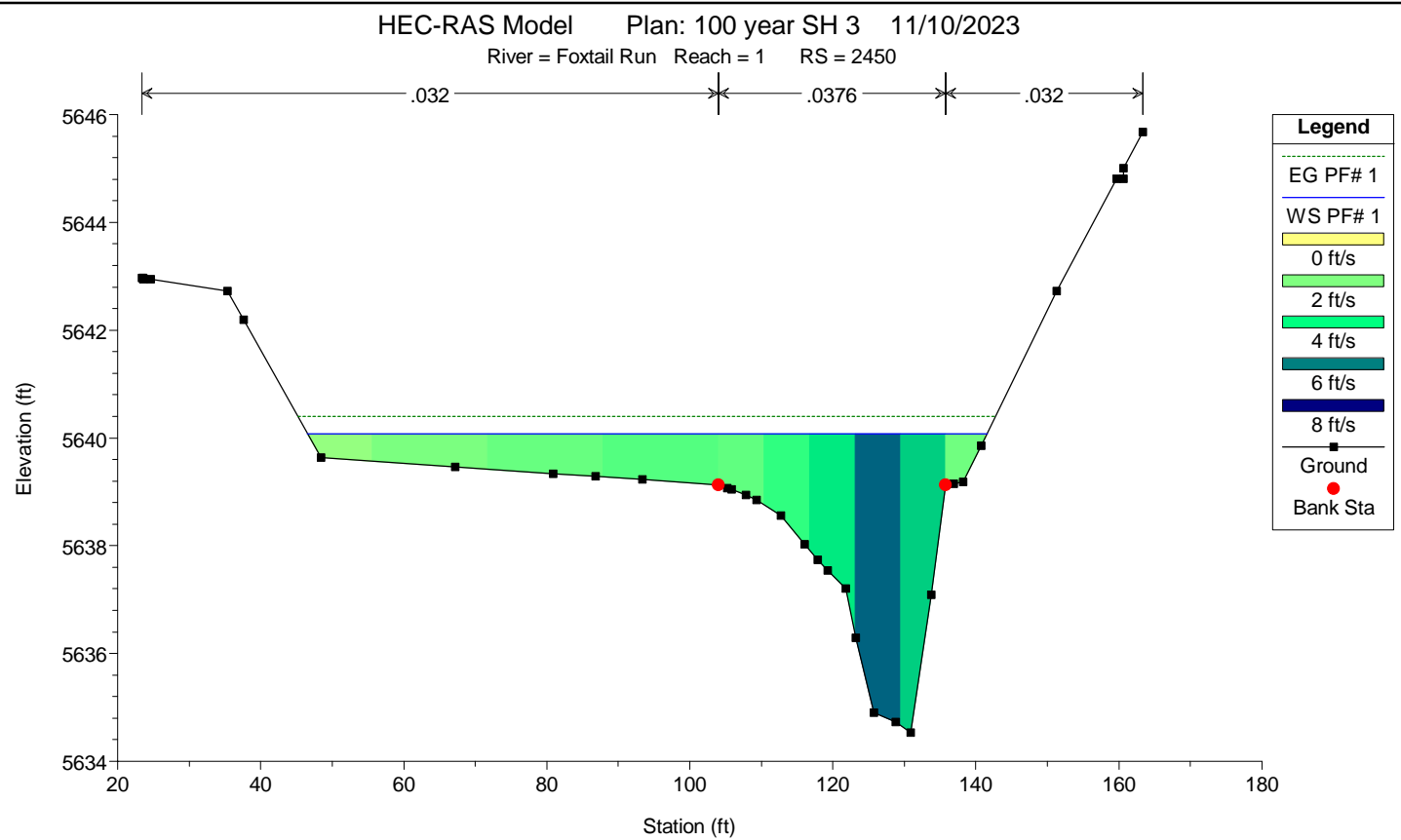
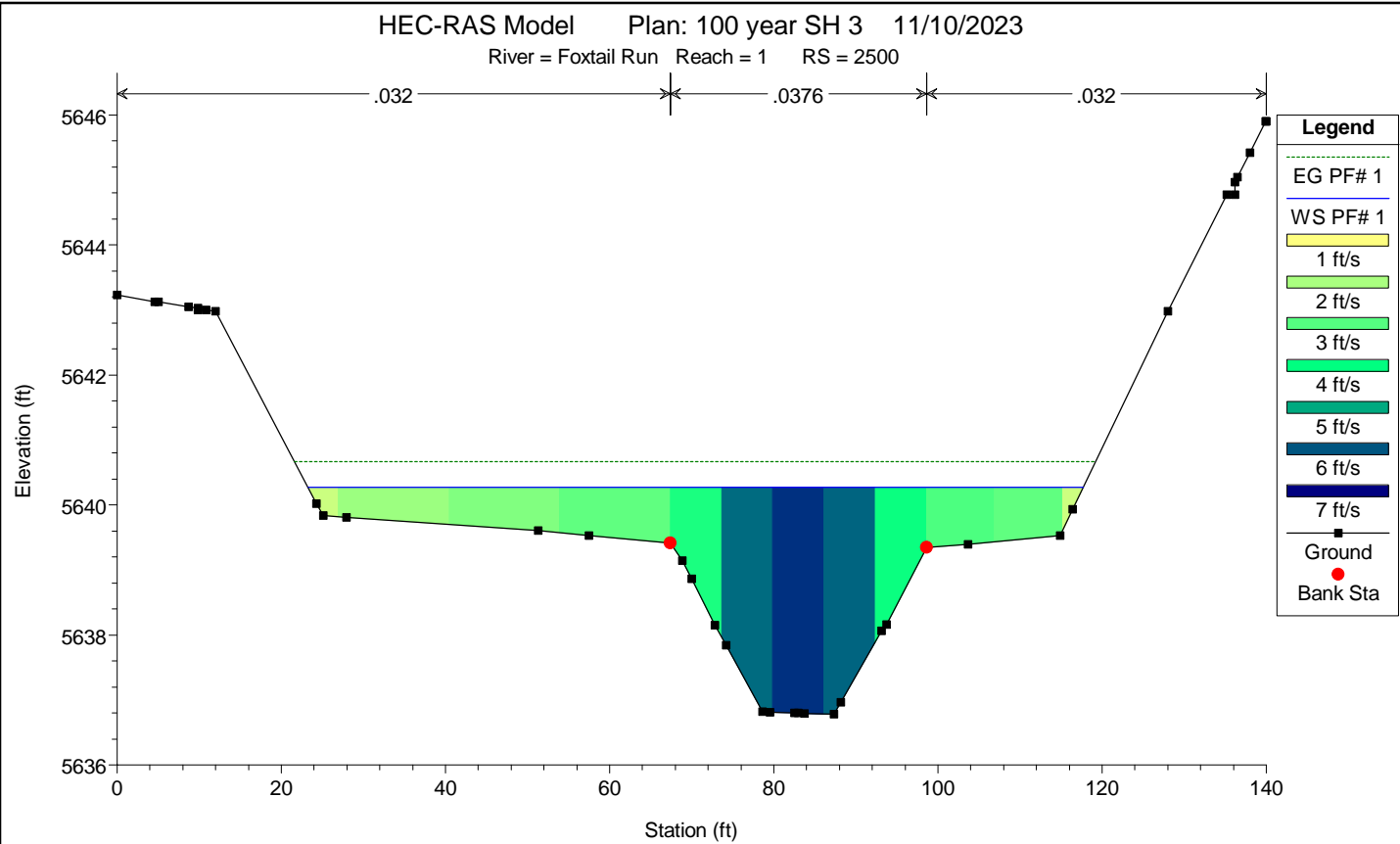


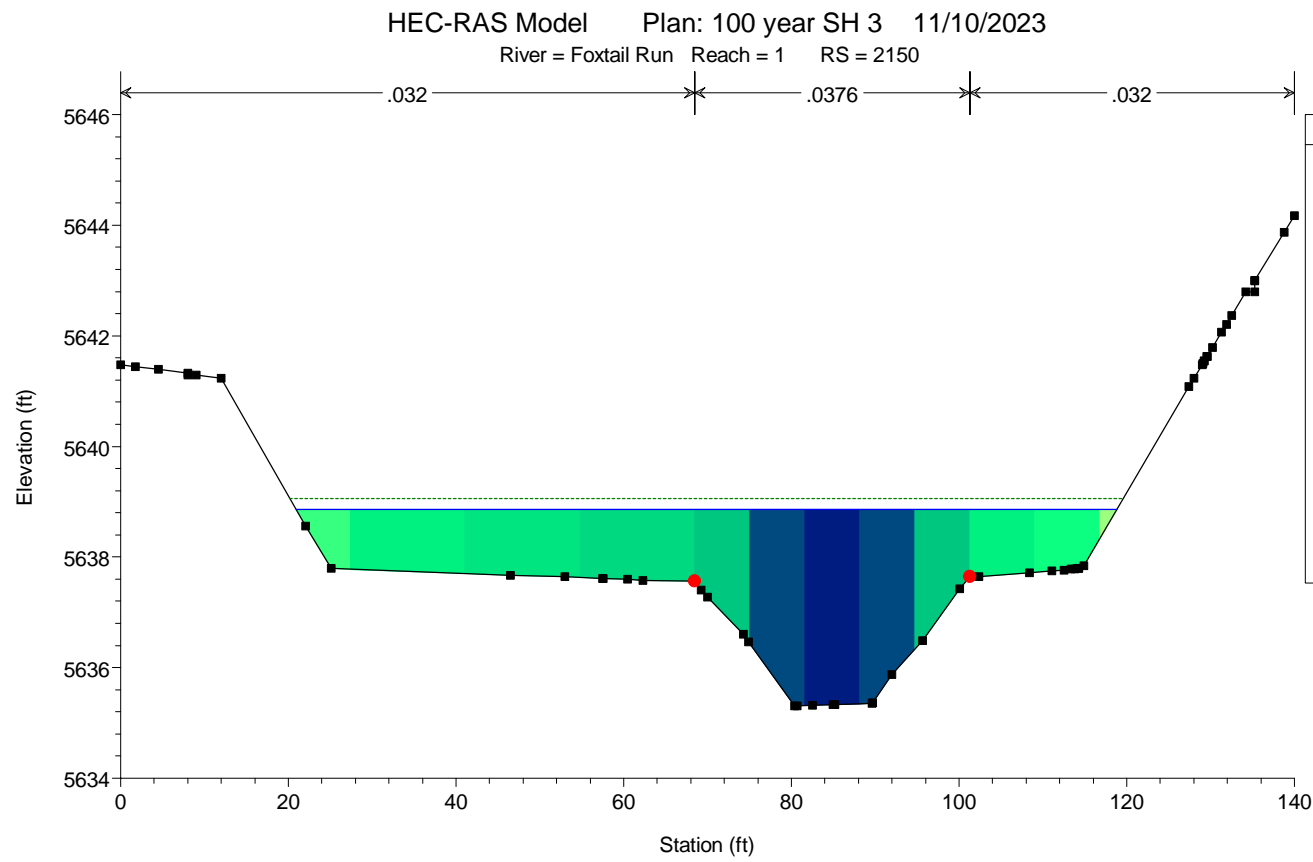
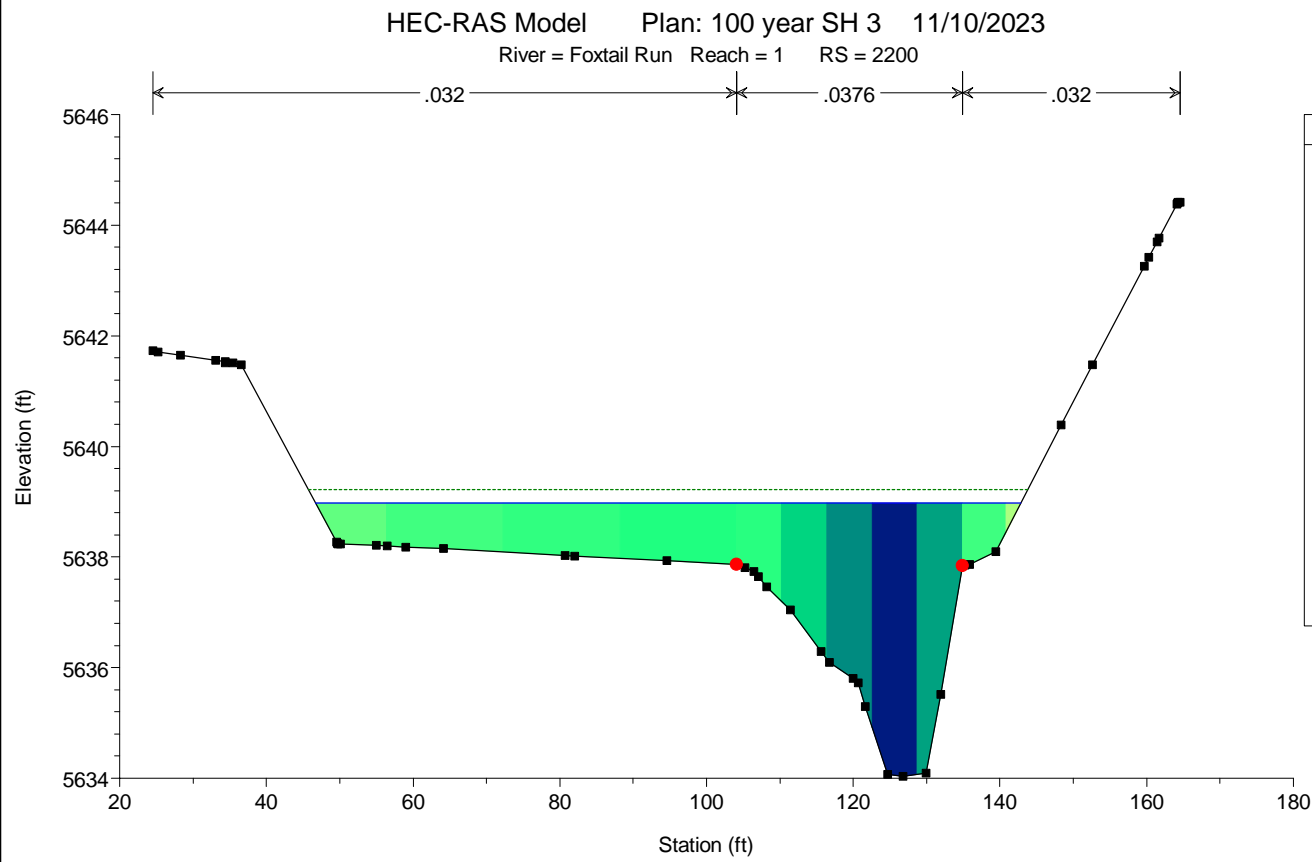
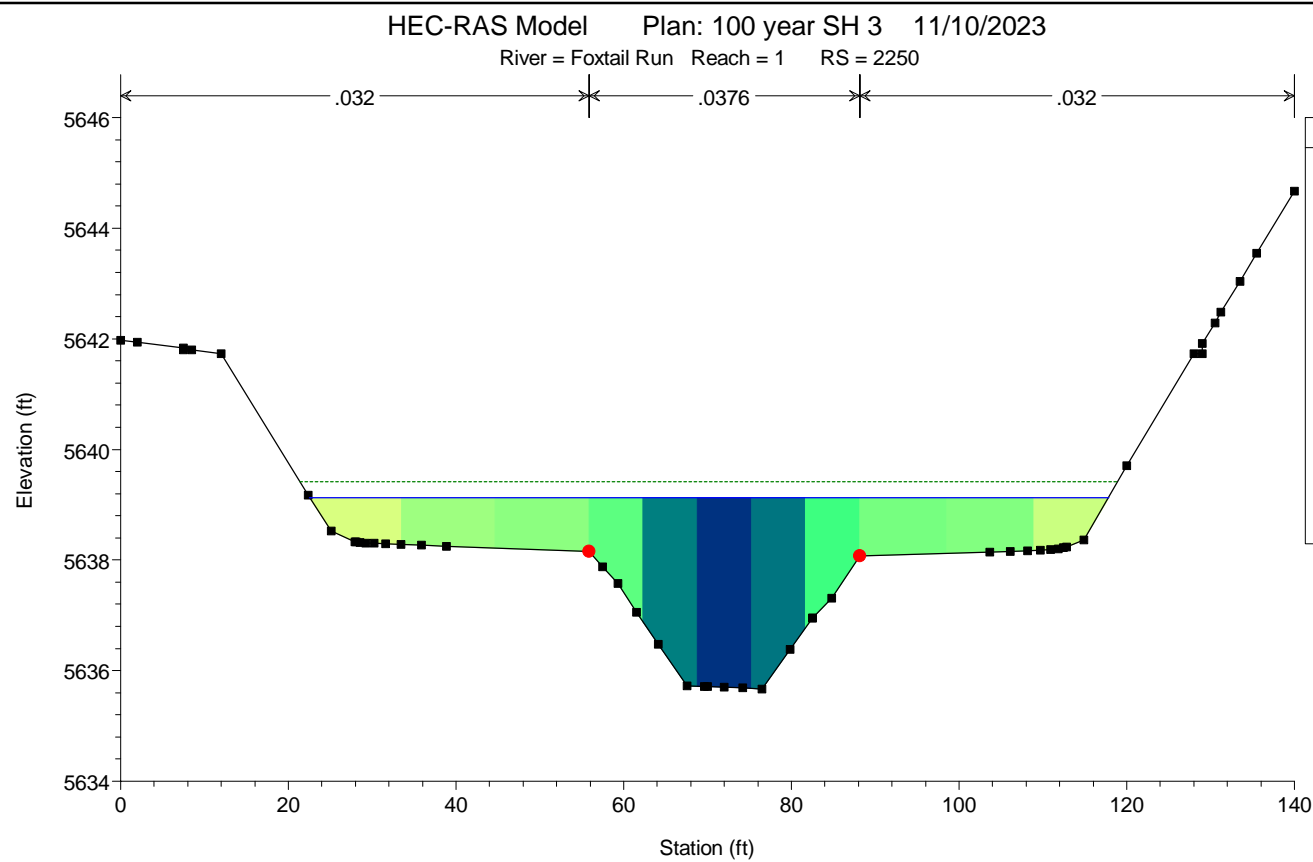
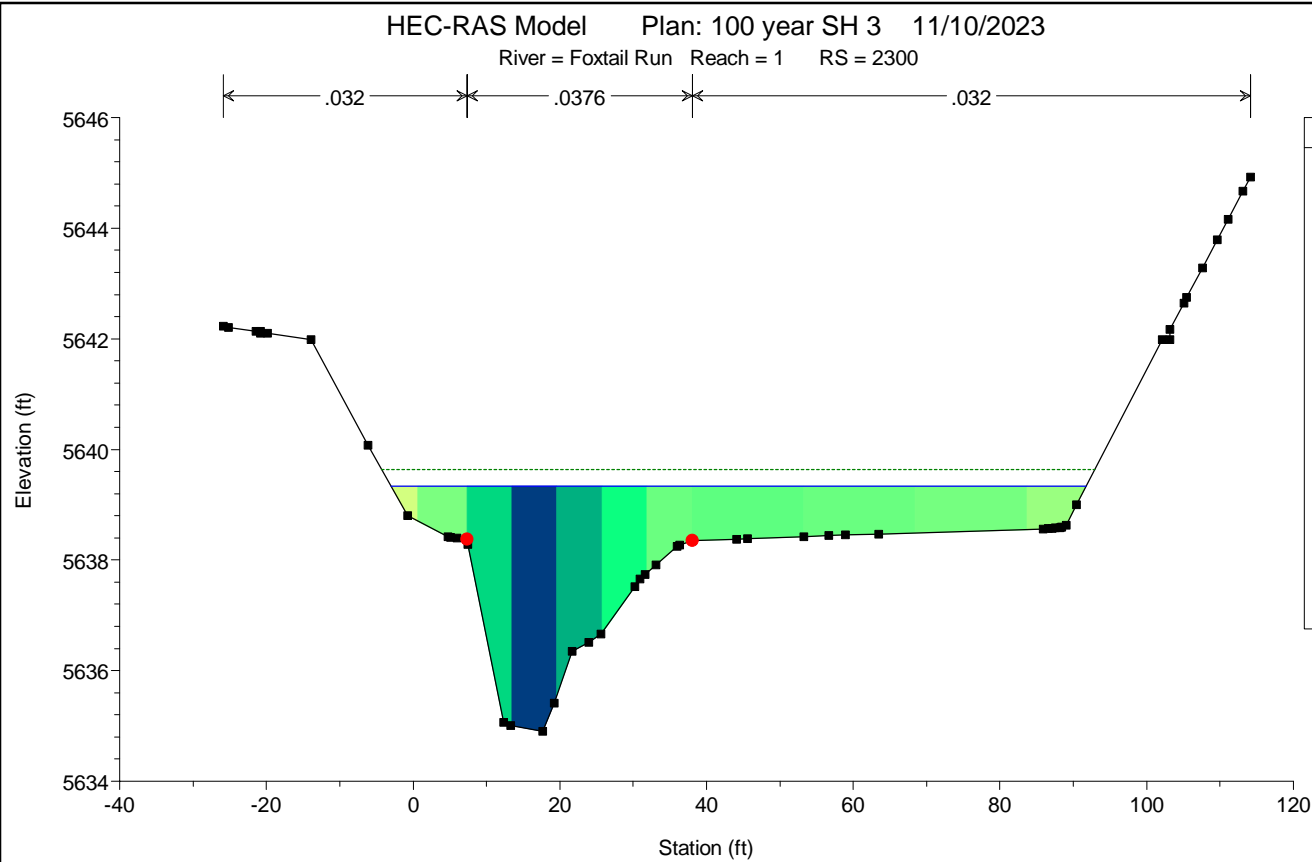


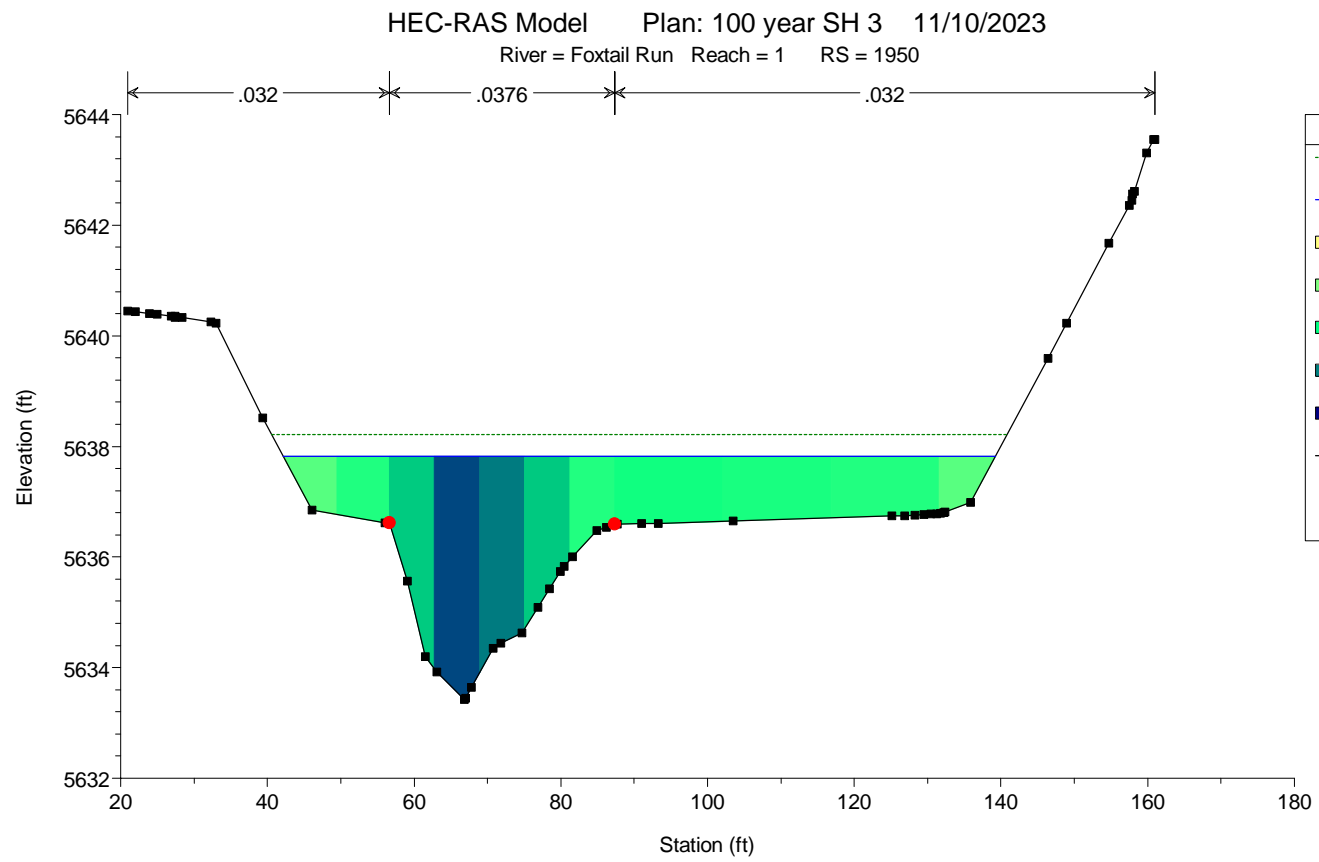
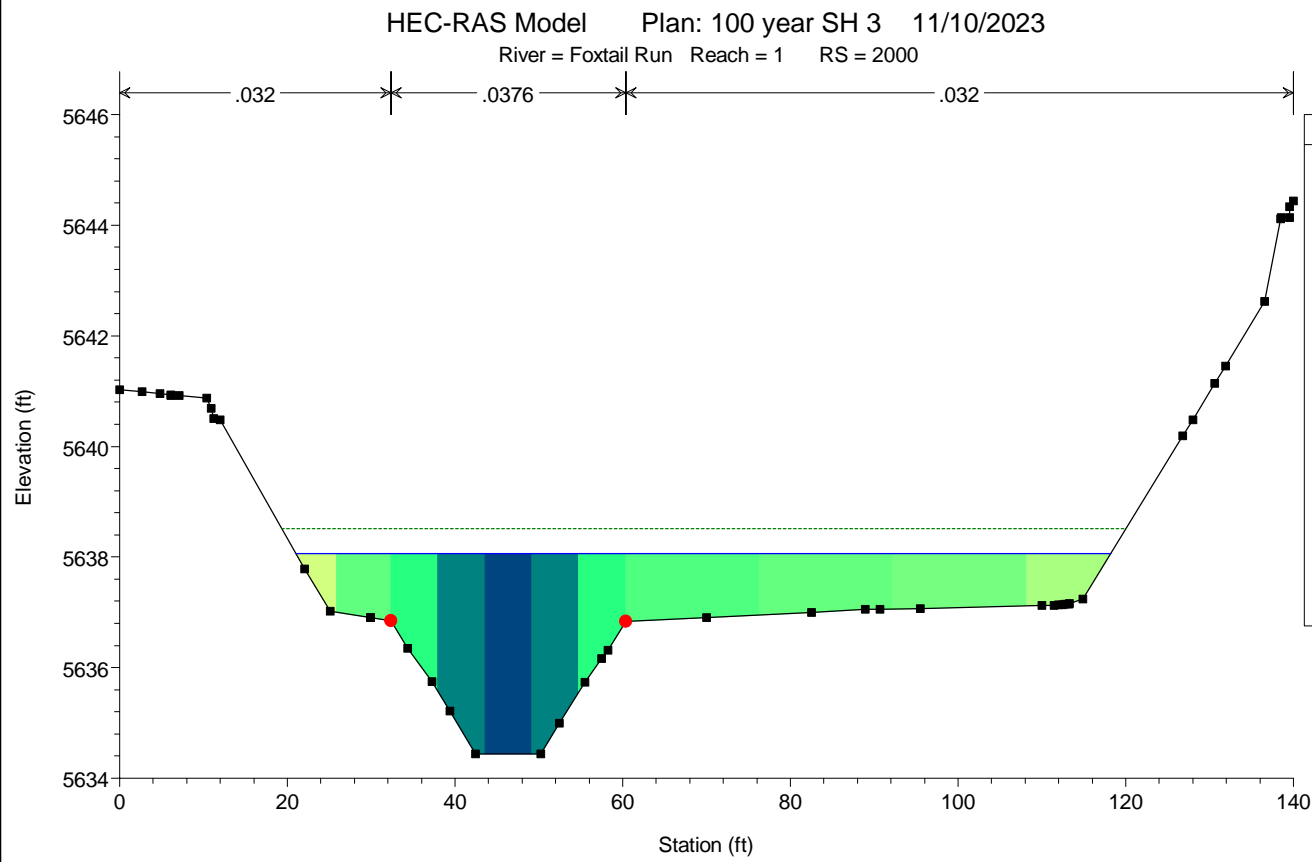
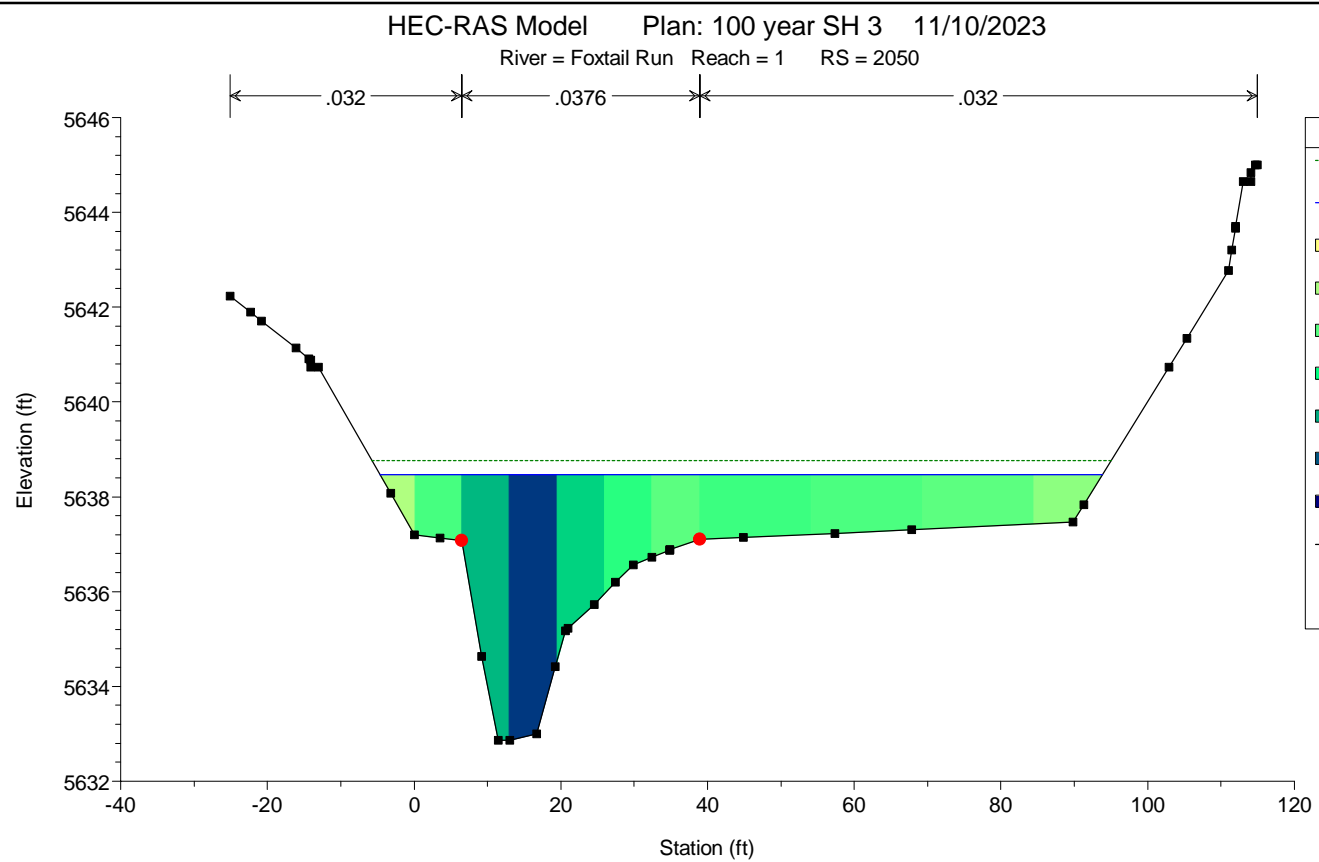
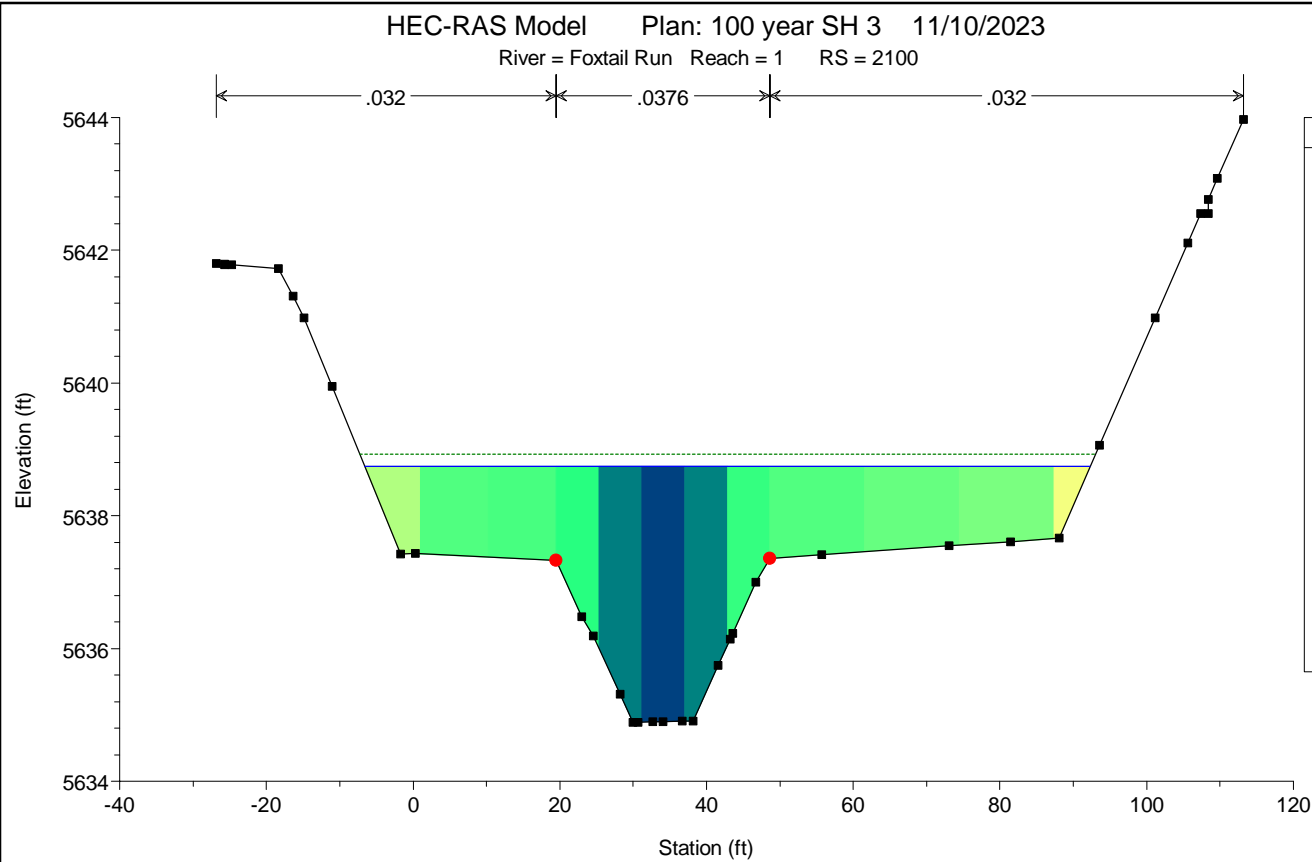


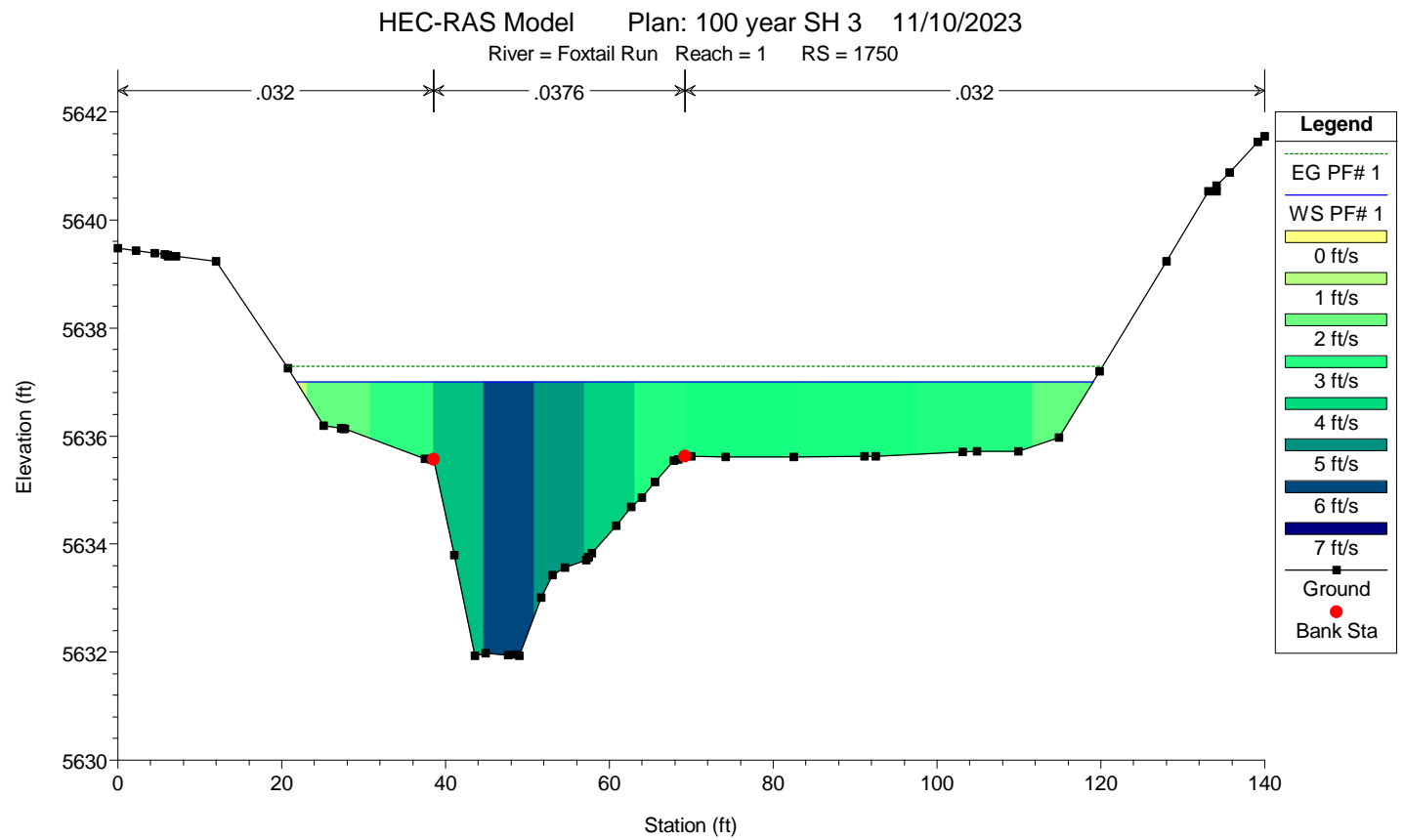
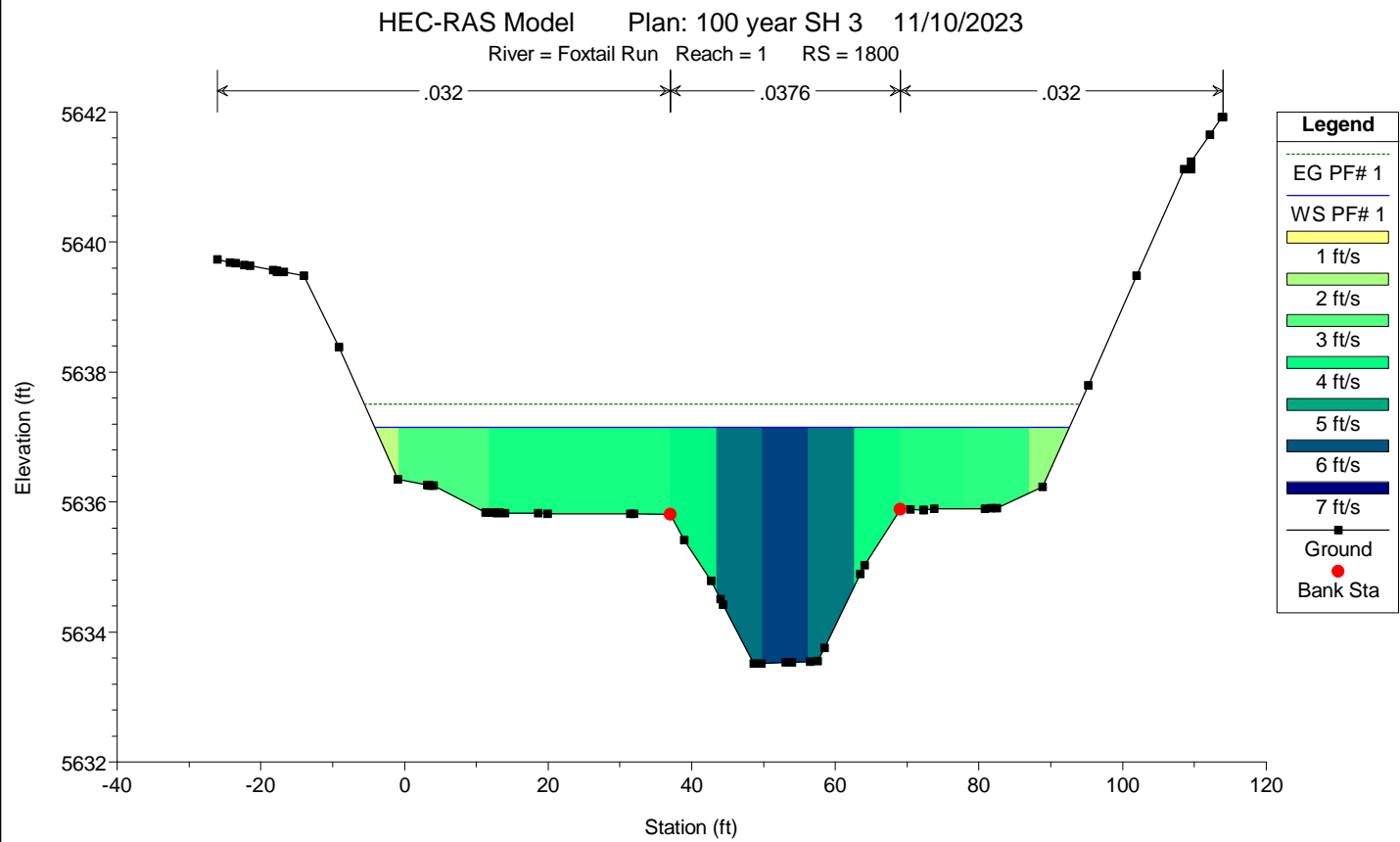
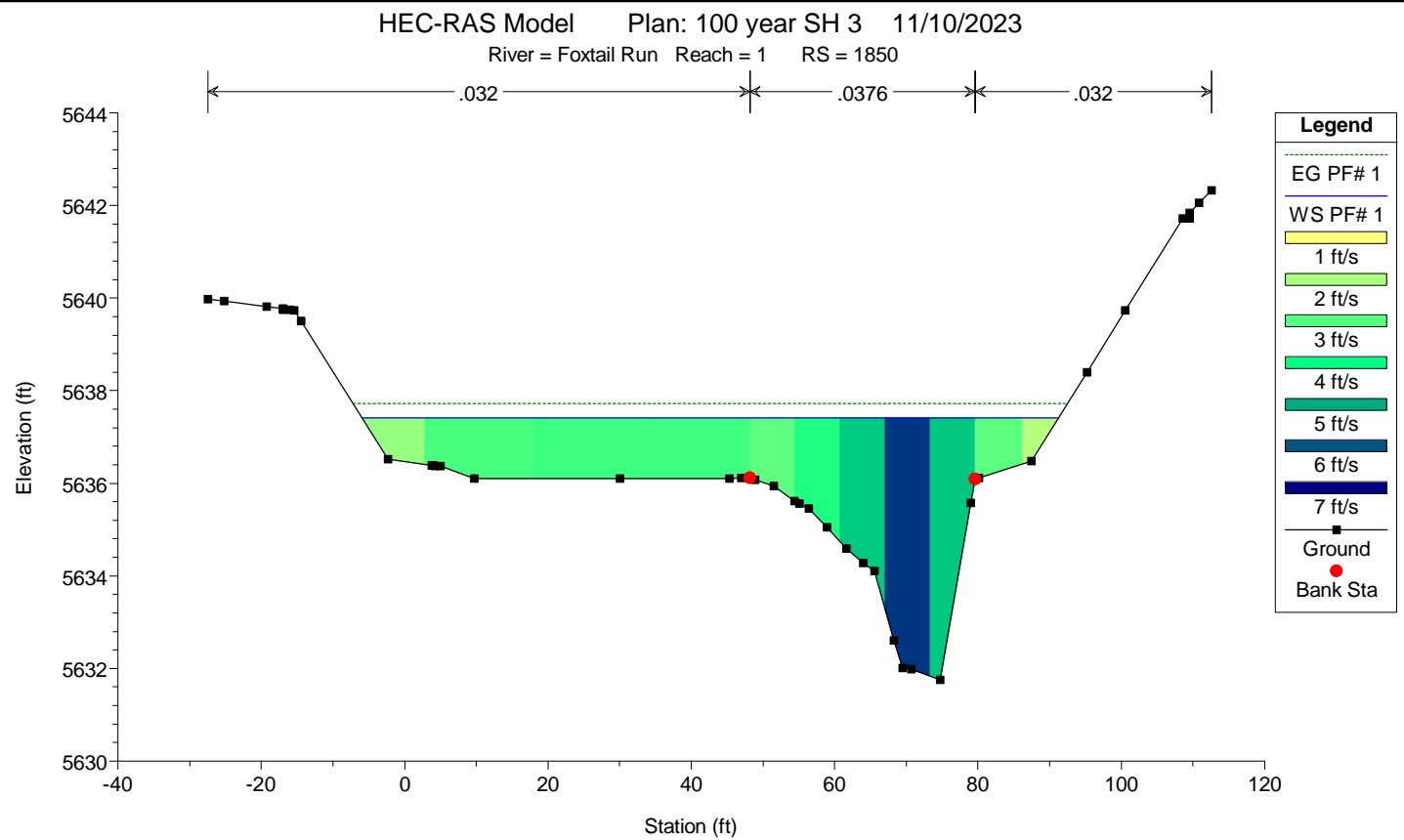
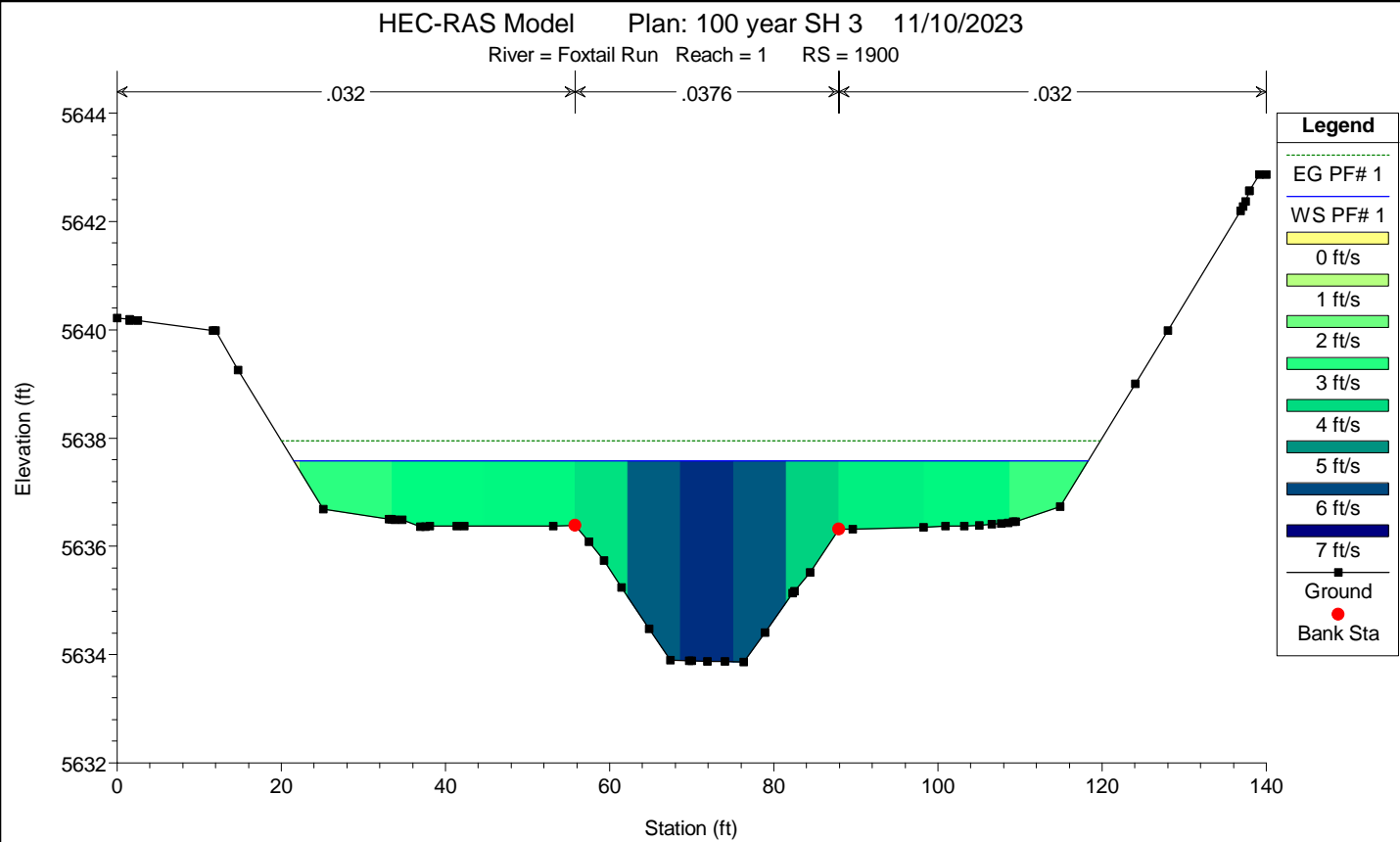


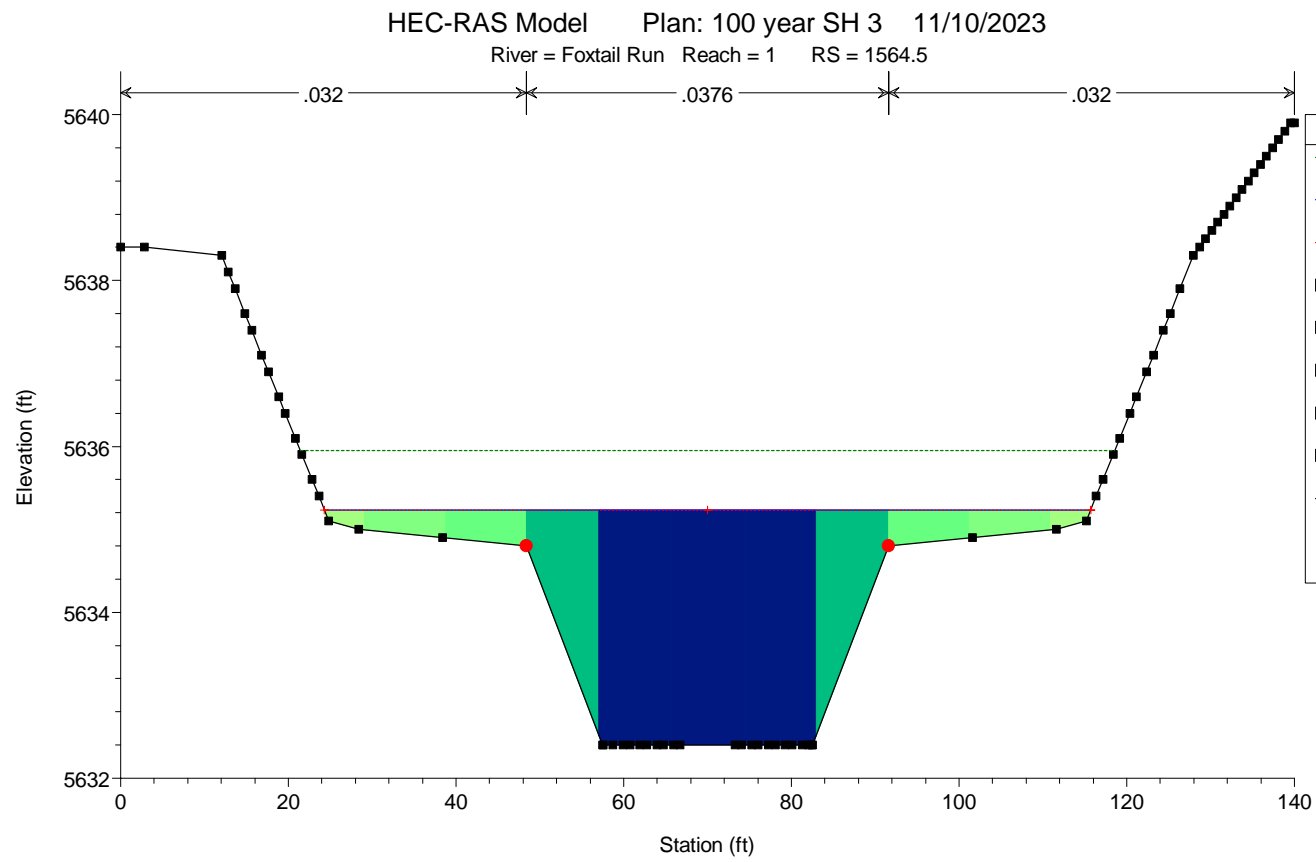
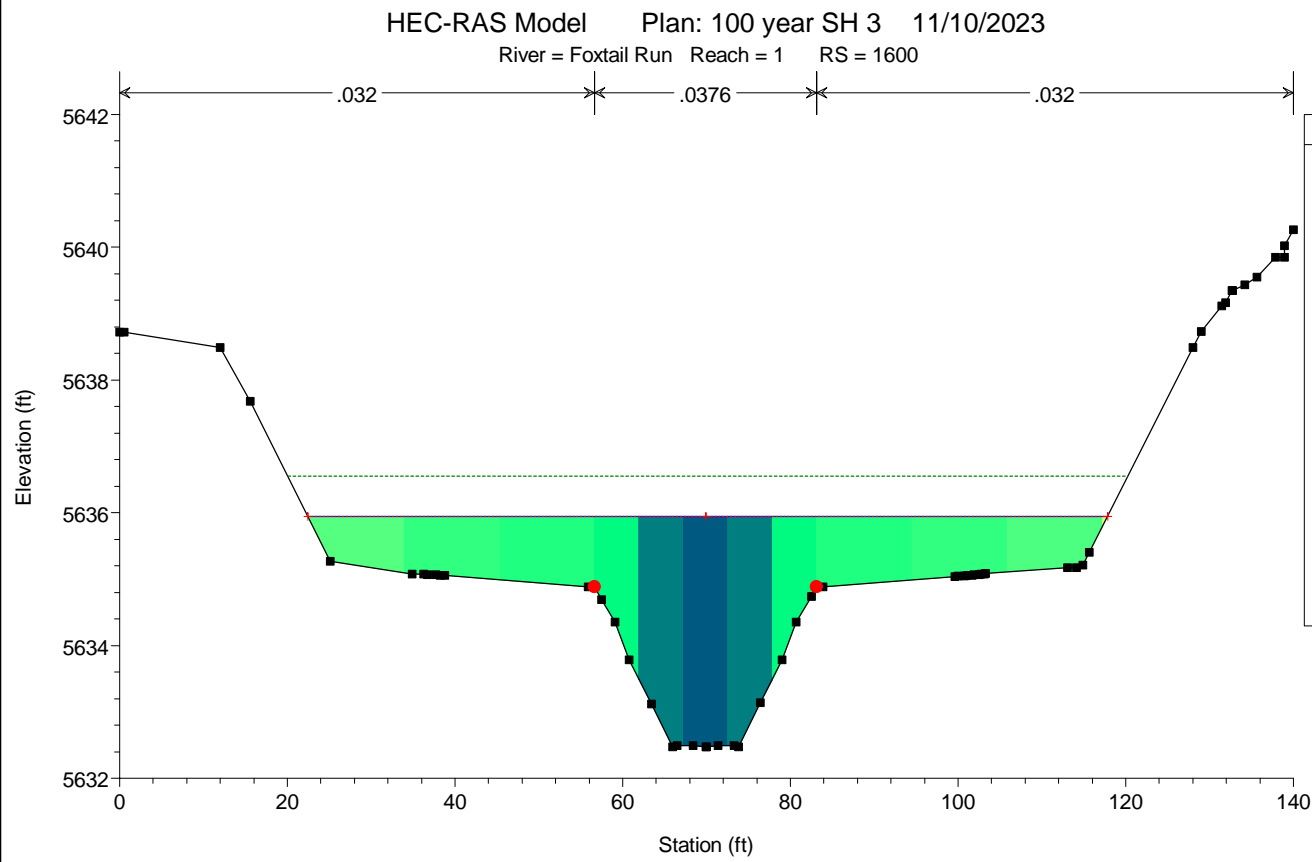
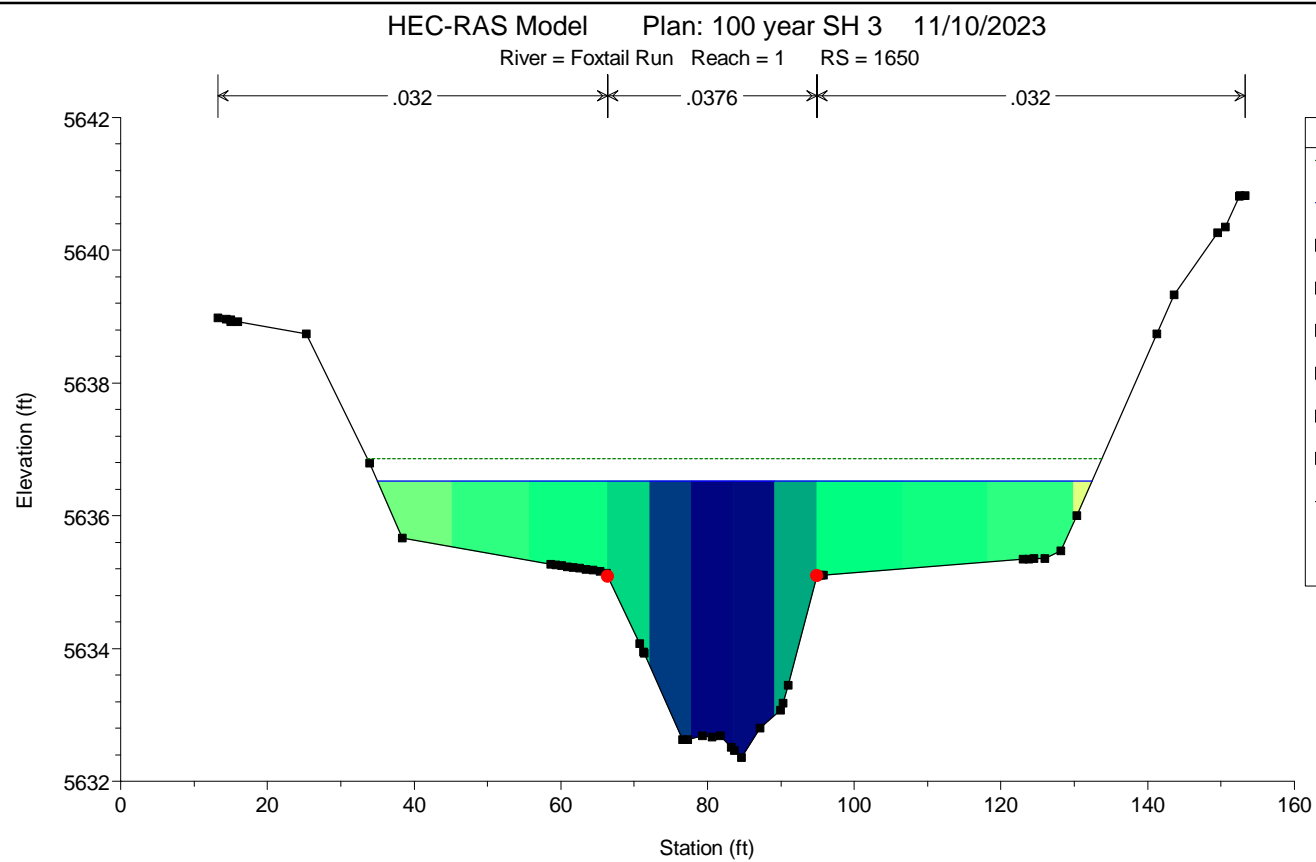
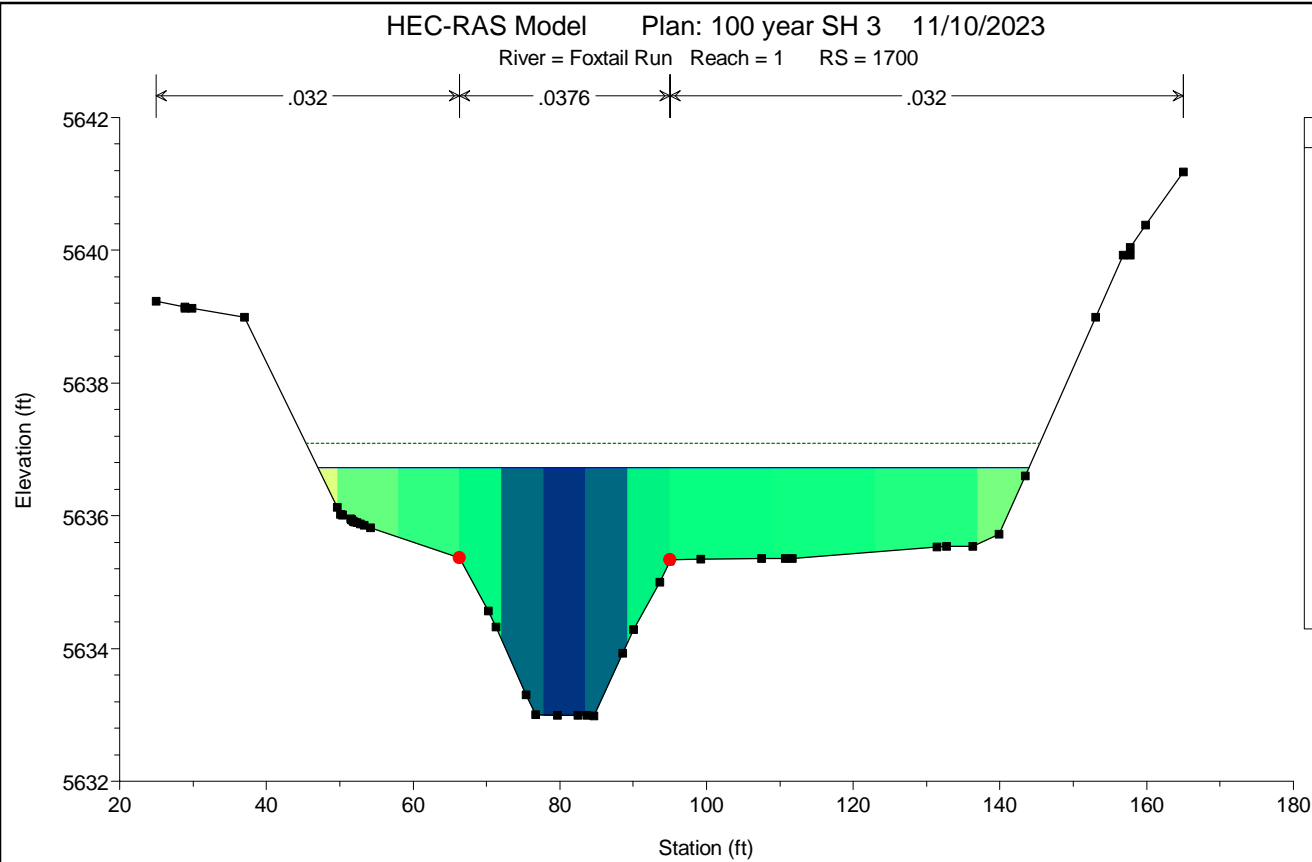


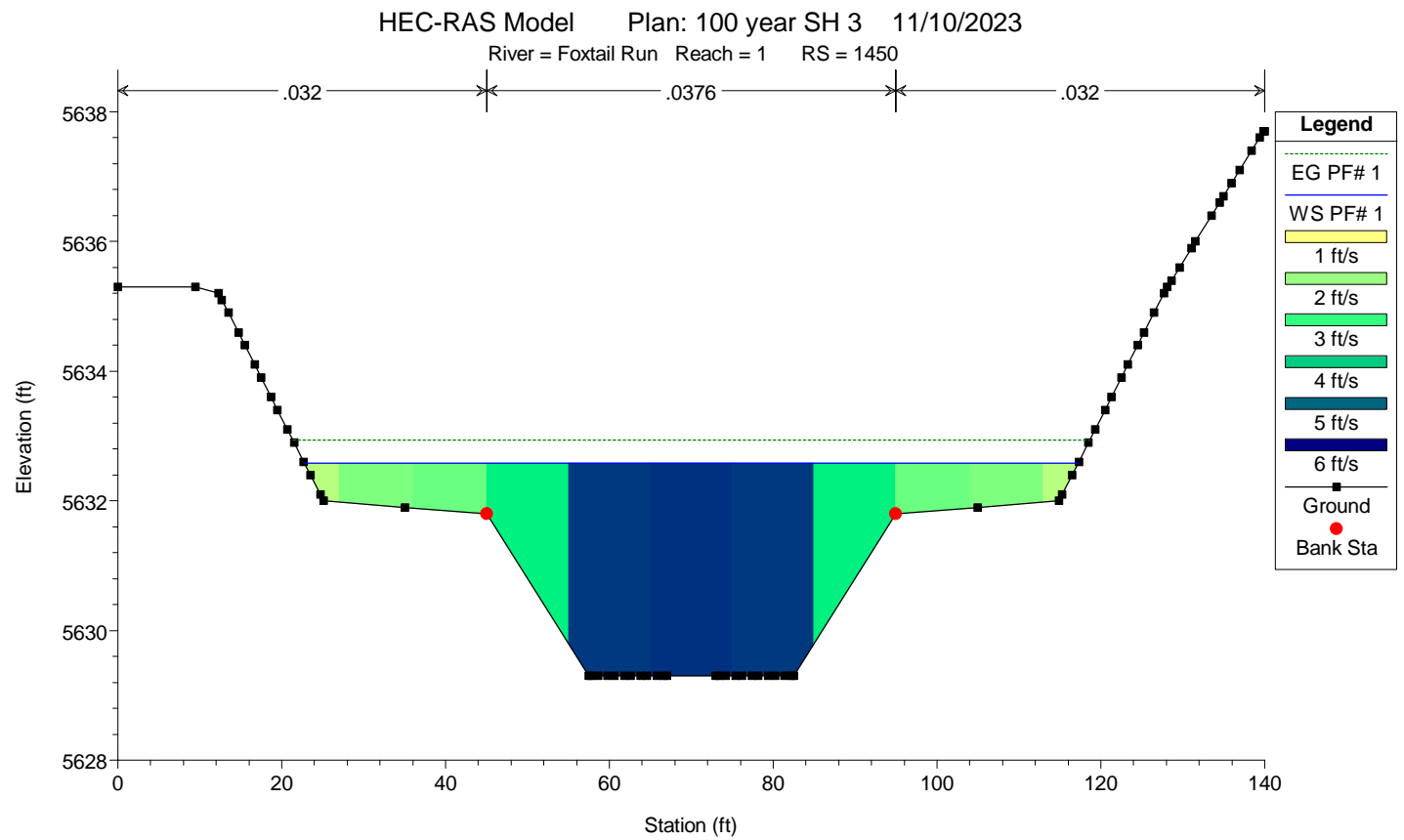
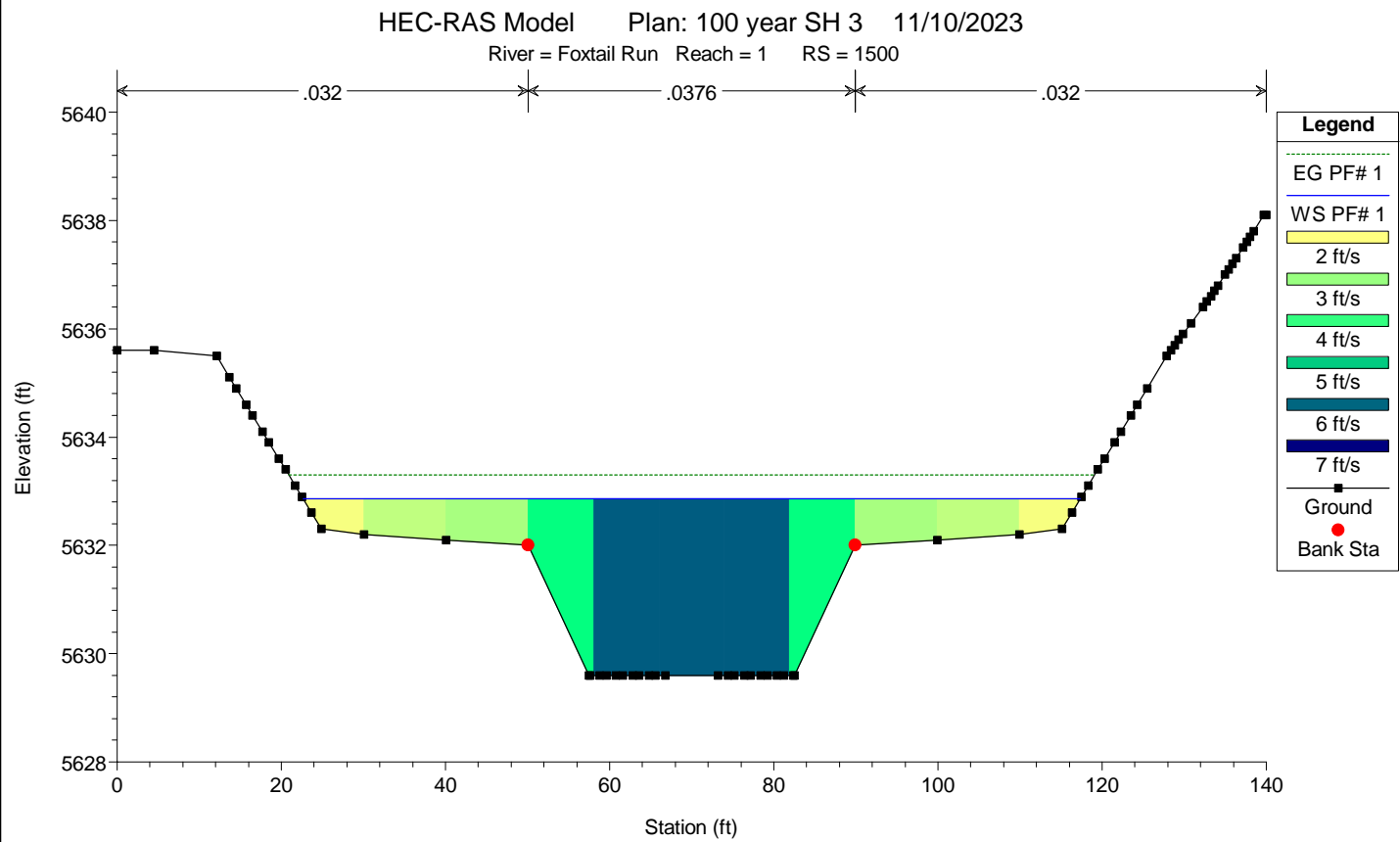
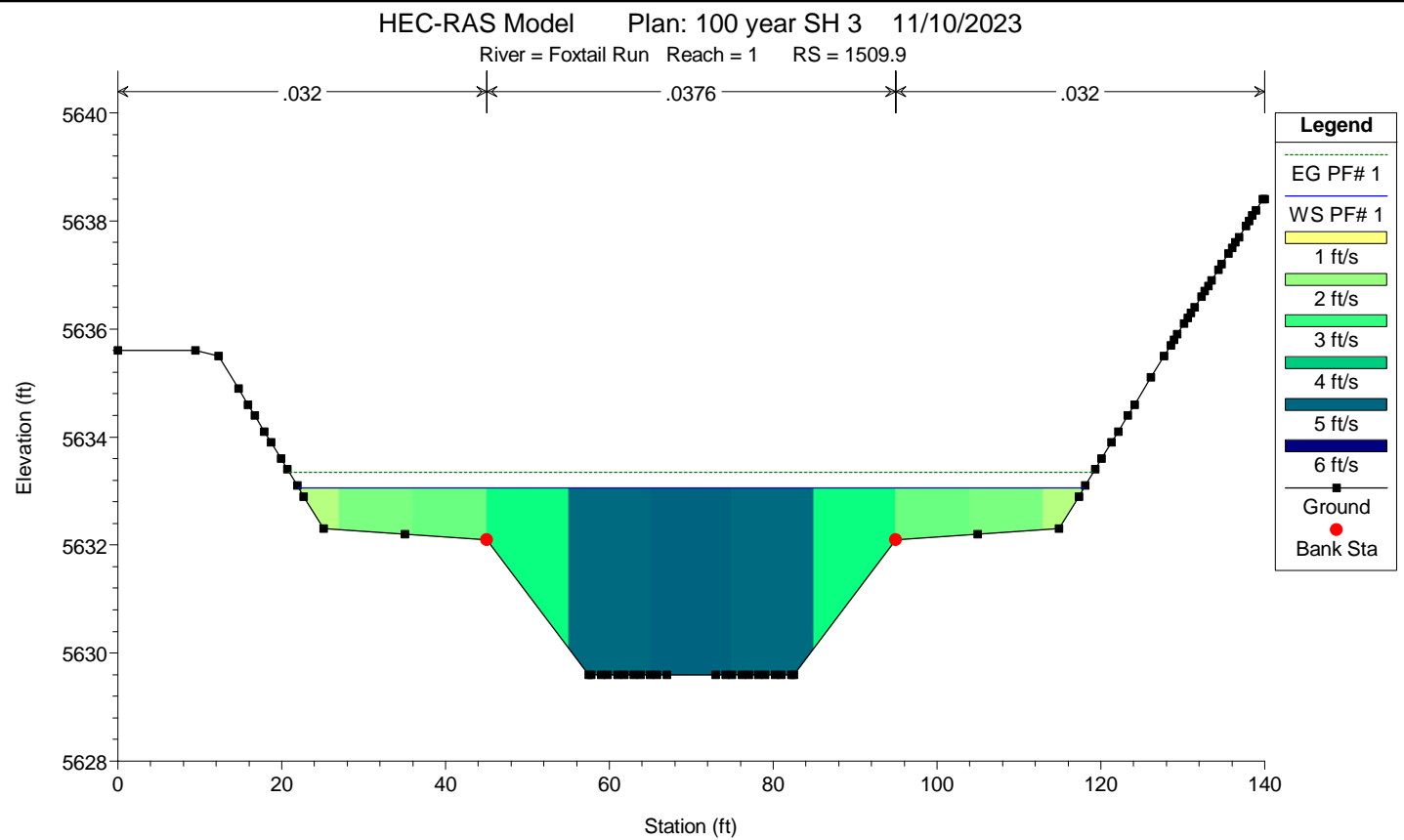
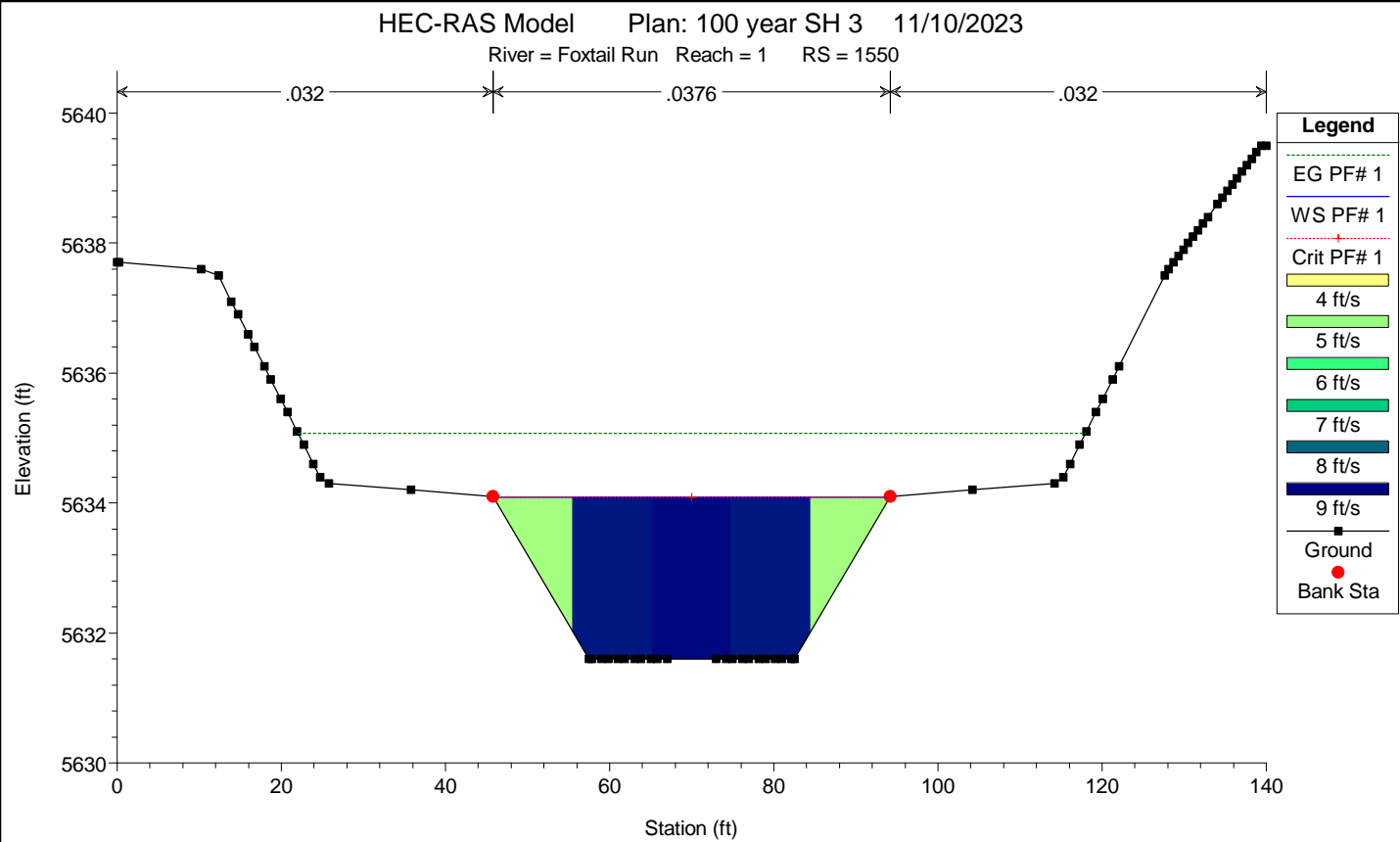


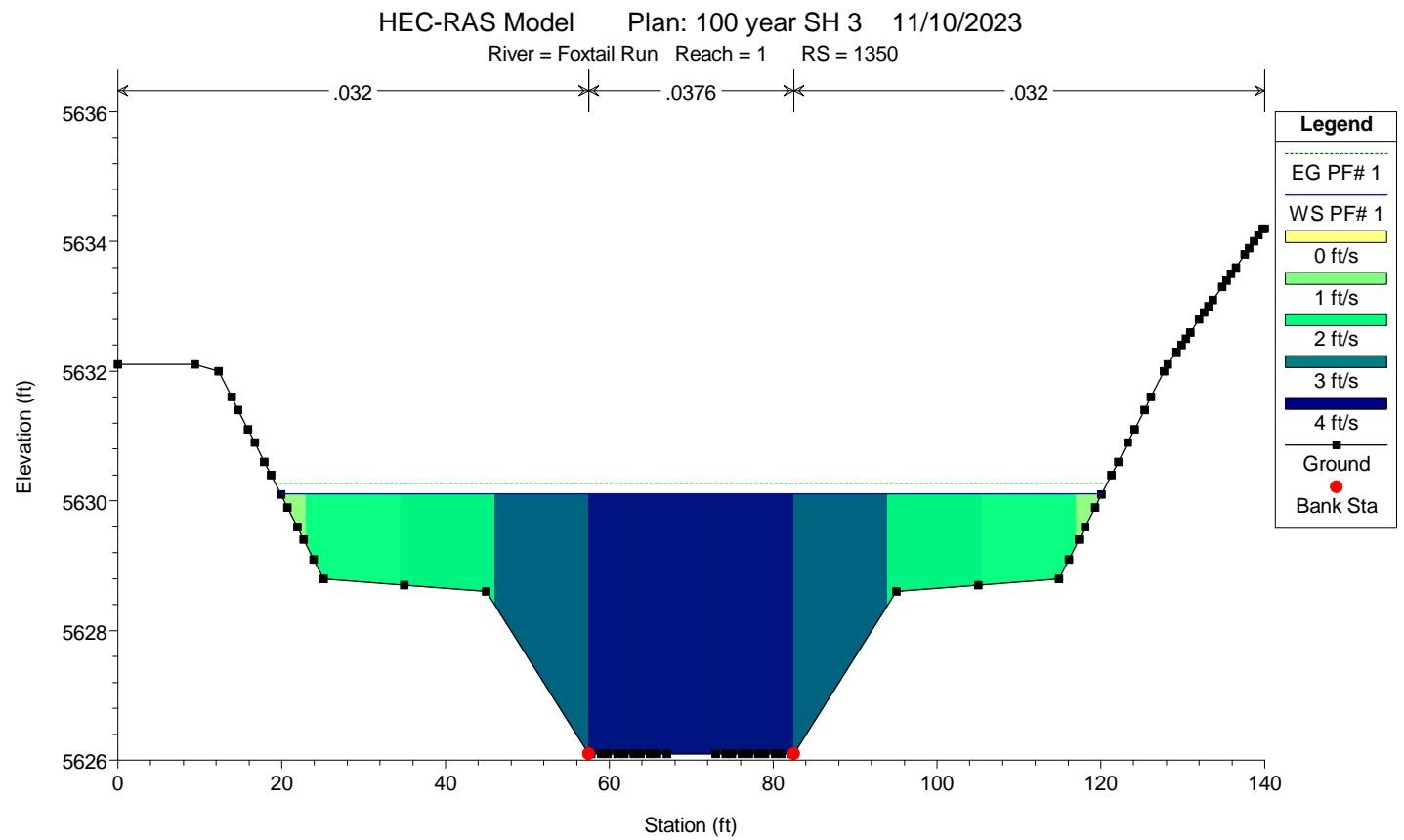
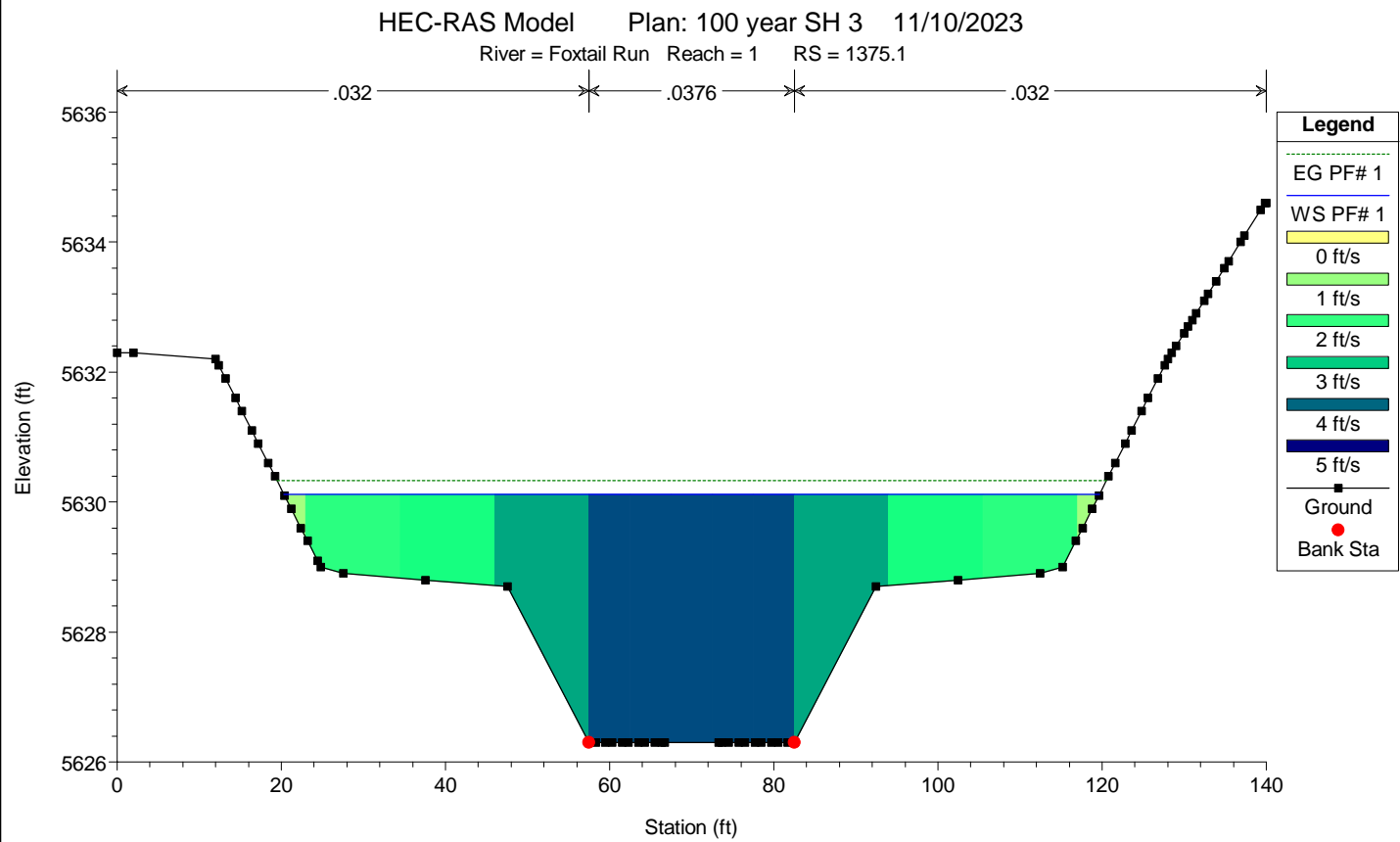
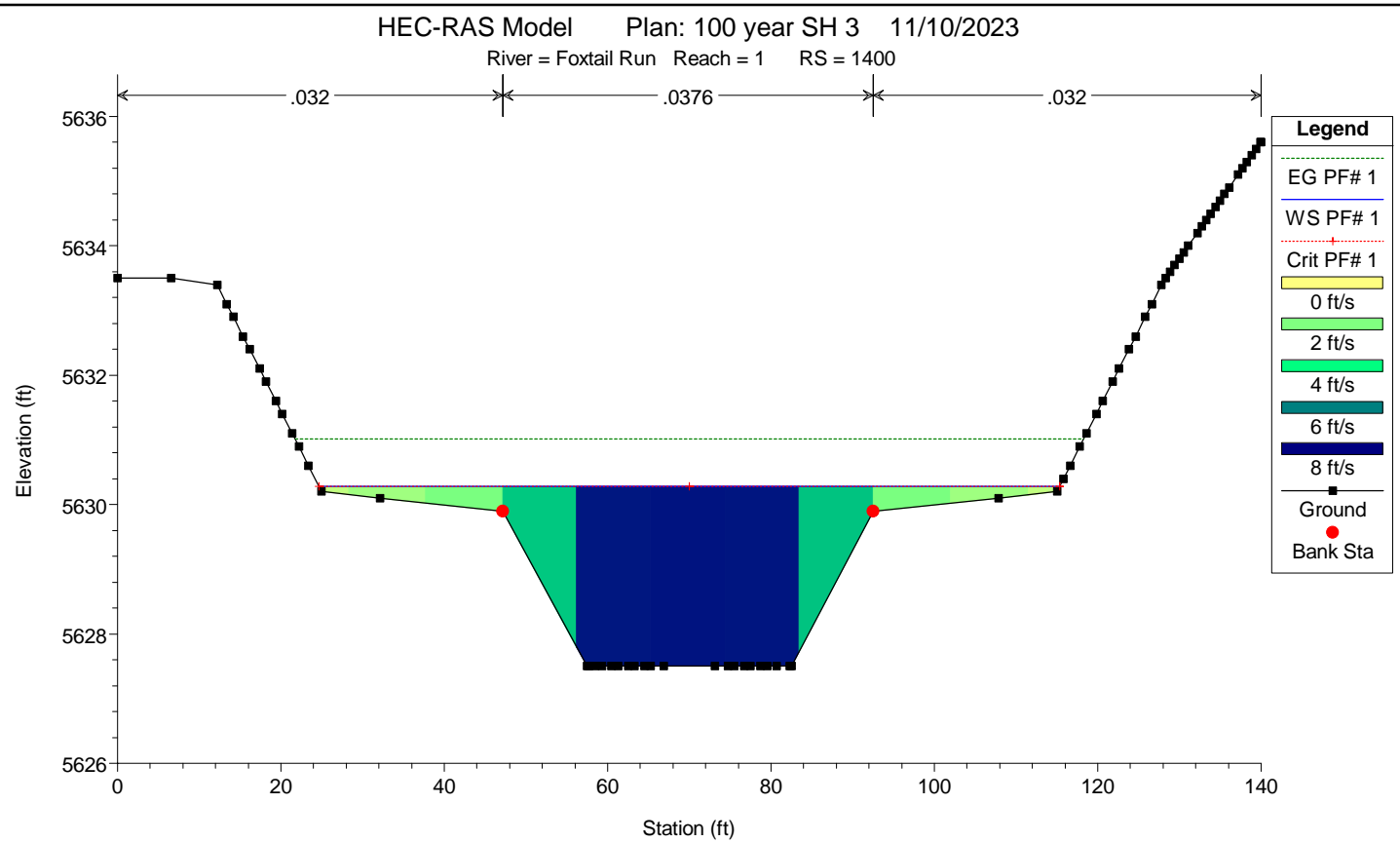
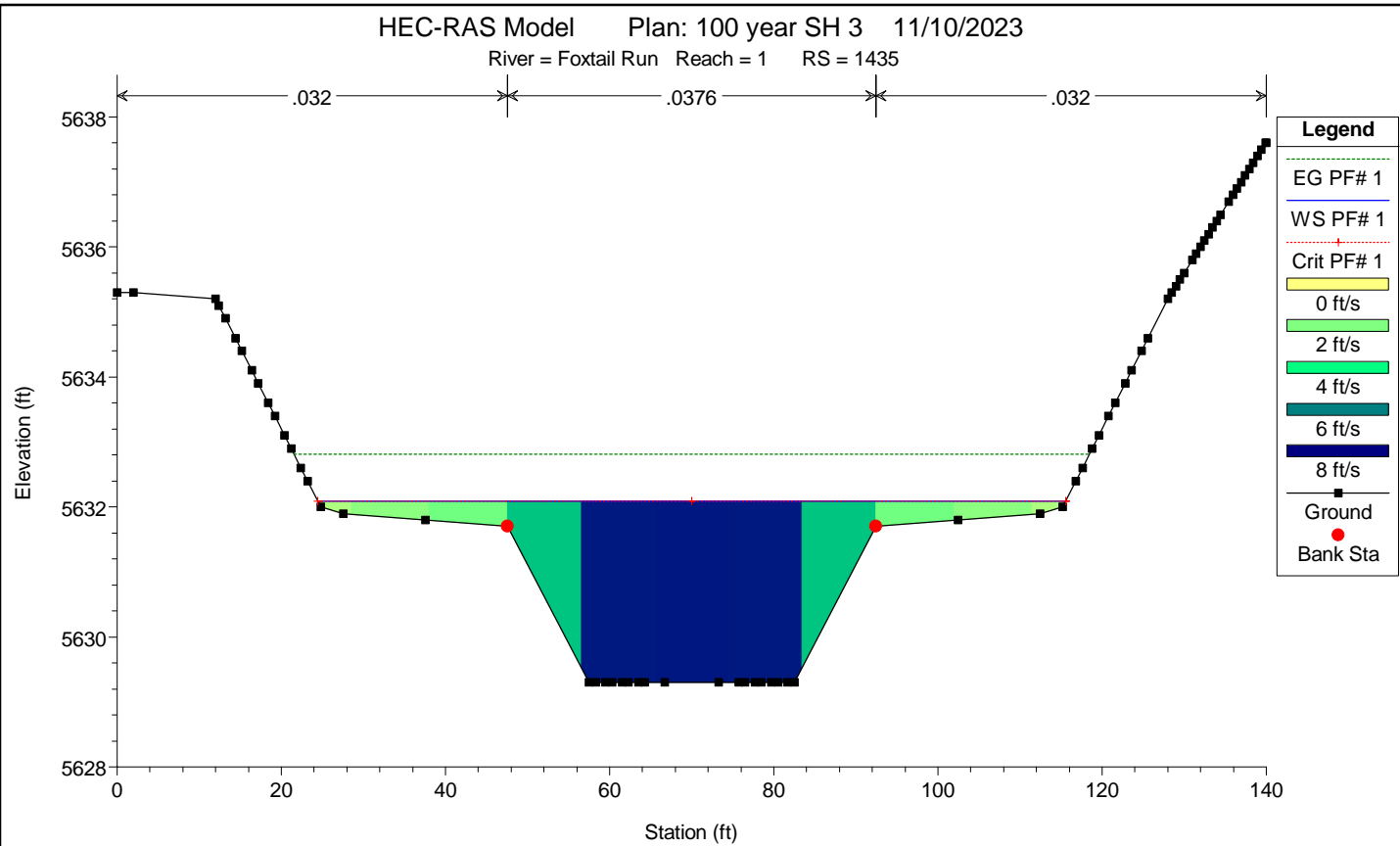


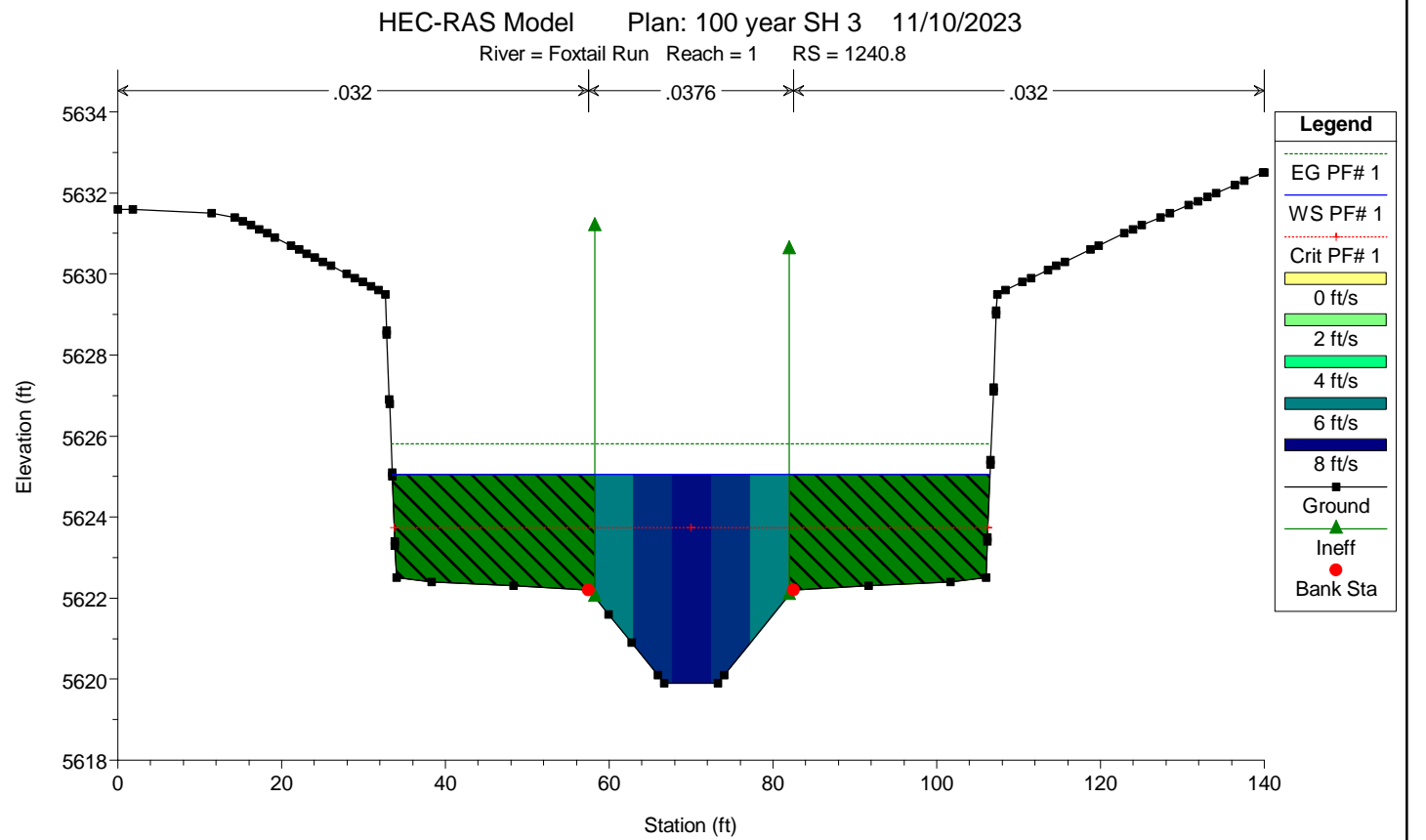
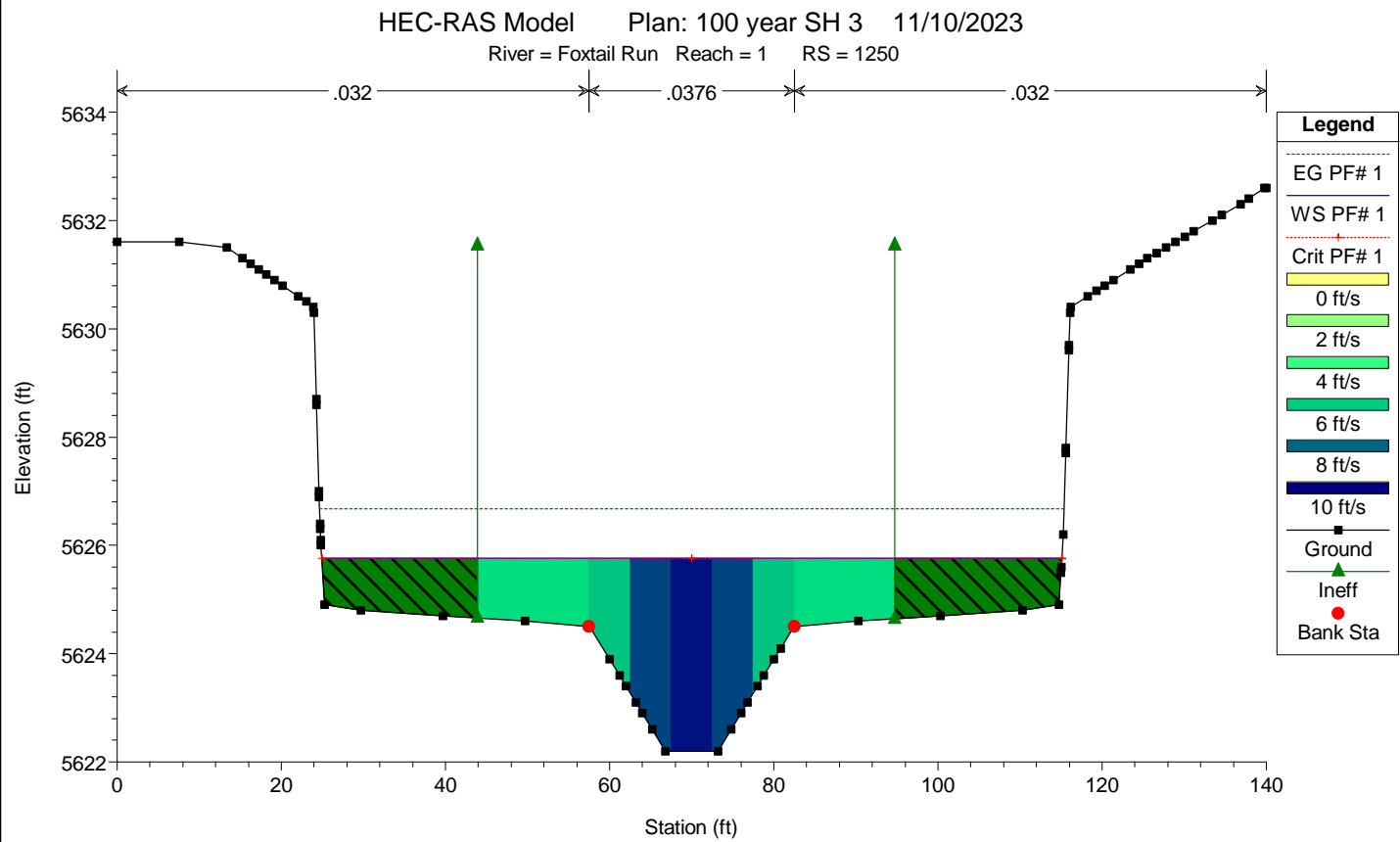
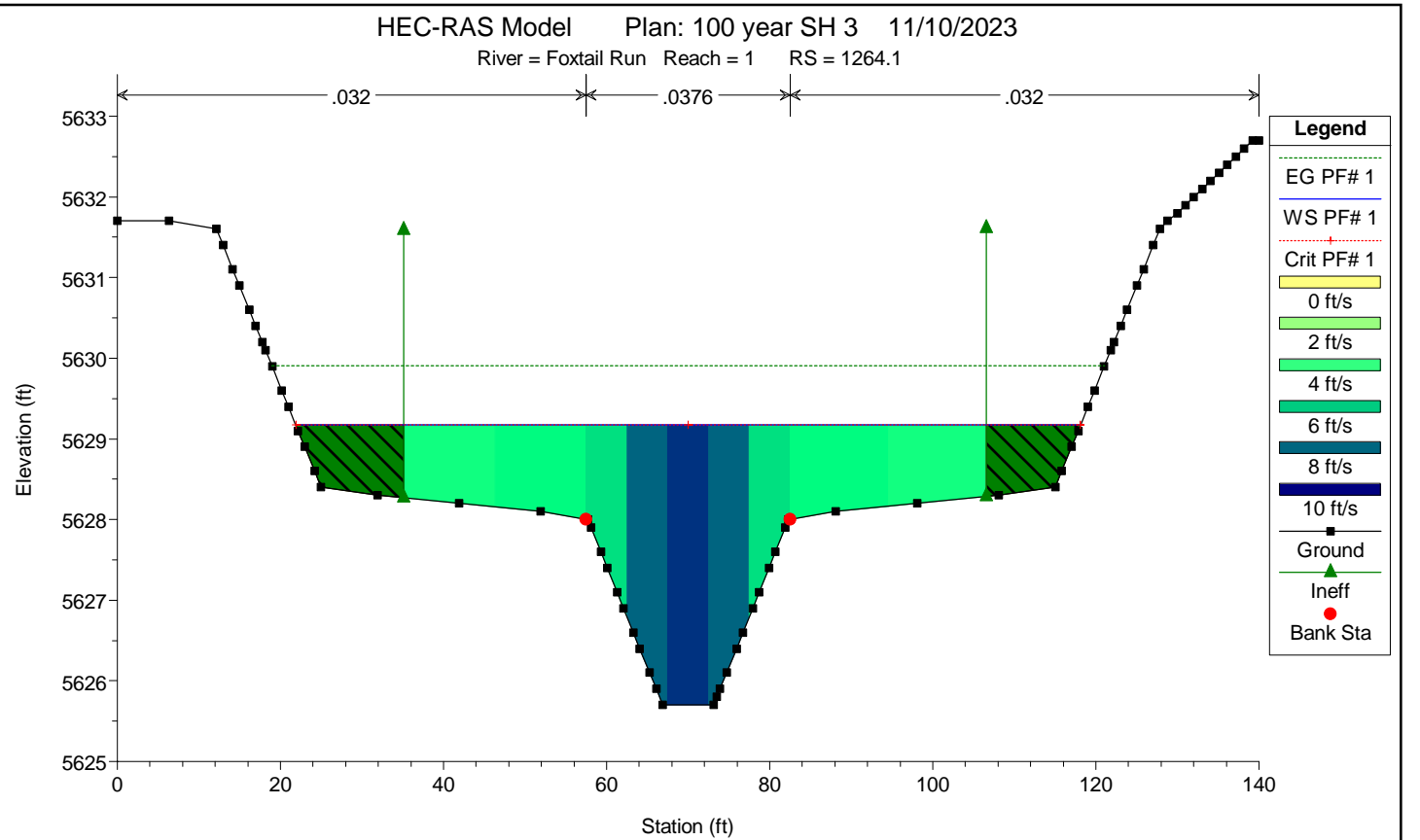
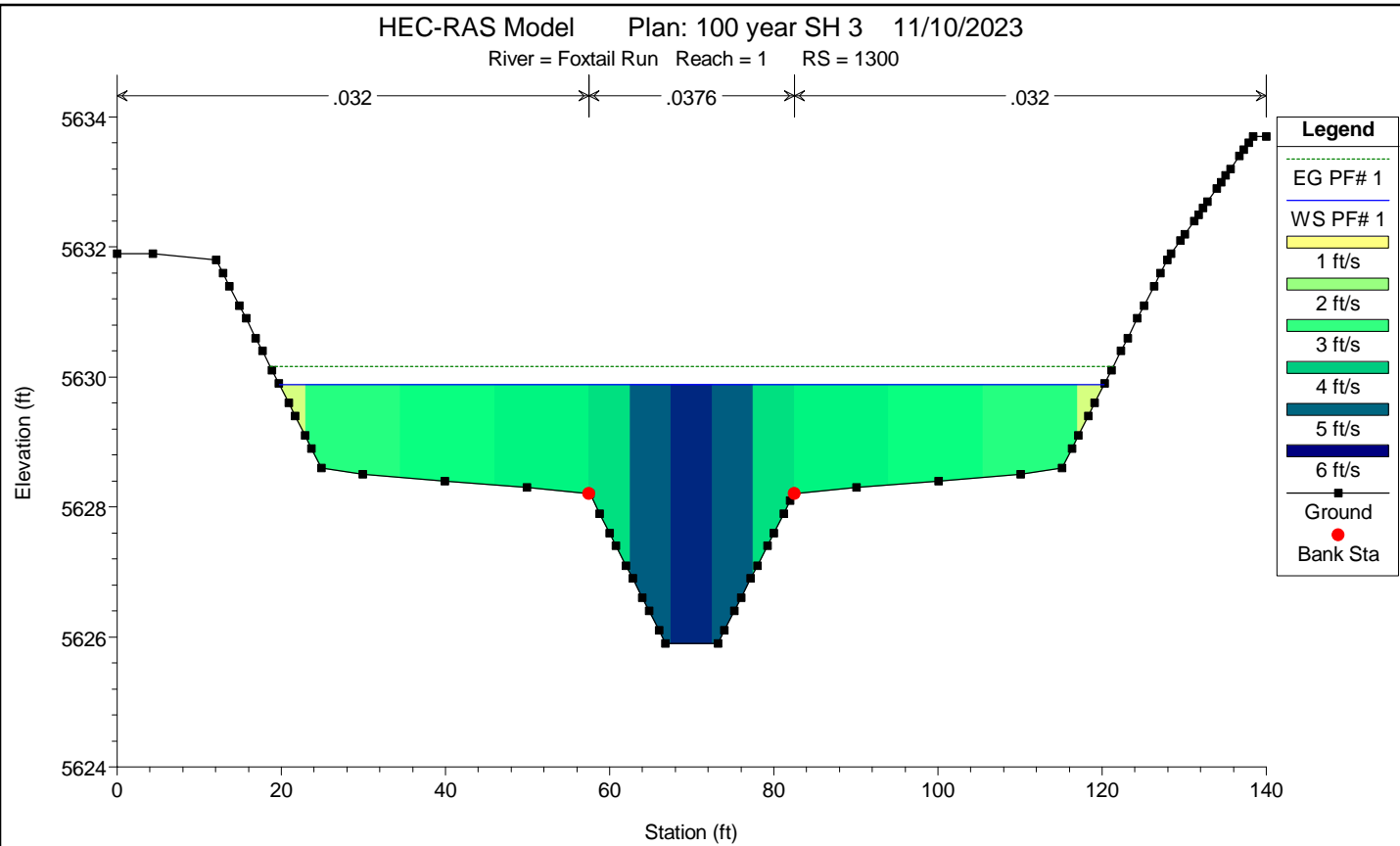


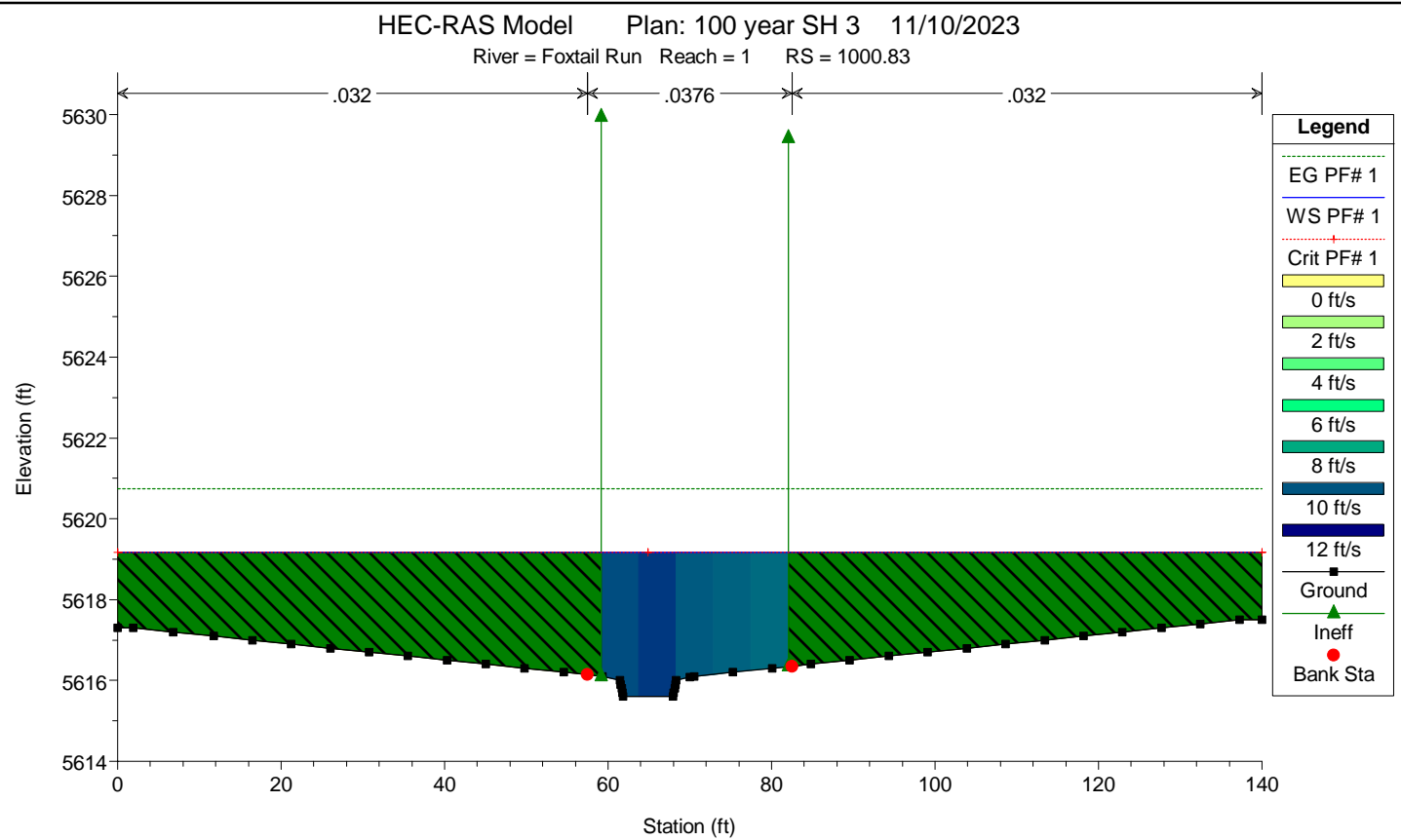
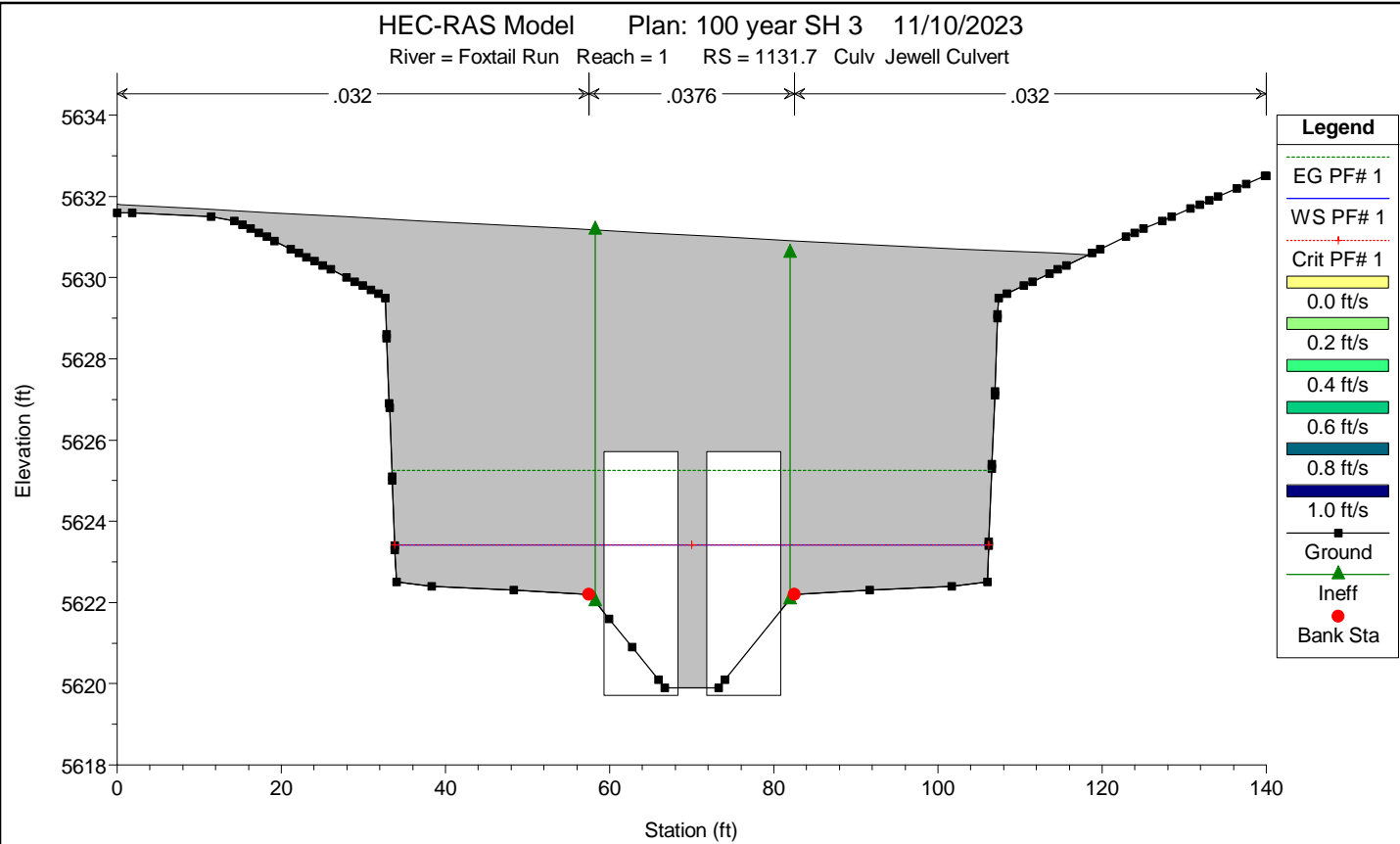












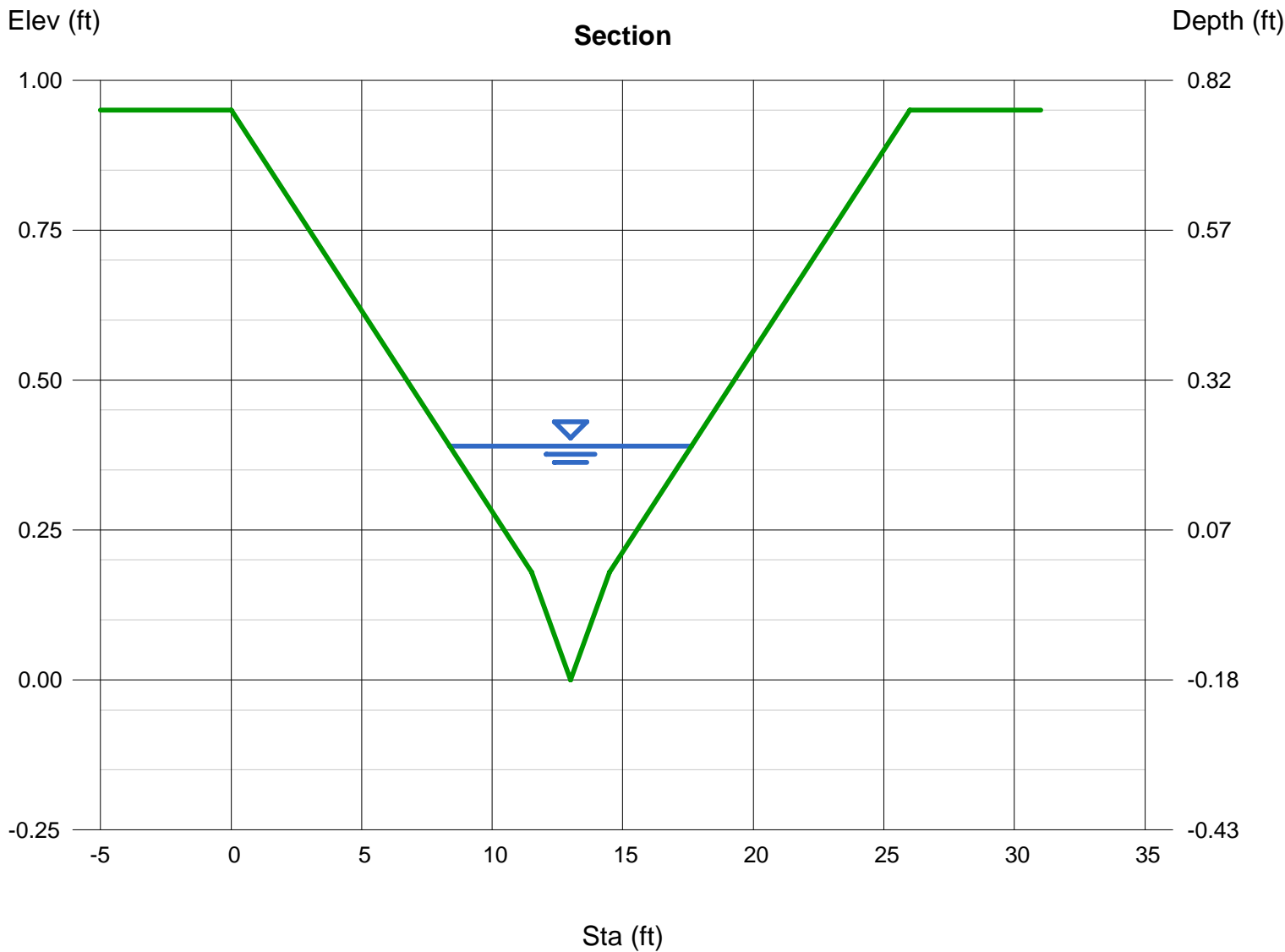
Channel Report

ALLEY CROSS-SECTION DP 52

User-defined		Highlighted	
Invert Elev (ft)	= 0.18	Depth (ft)	= 0.21
Slope (%)	= 2.00	Q (cfs)	= 6.000
N-Value	= 0.016	Area (sqft)	= 1.56
Calculations		Velocity (ft/s)	= 3.85
		Wetted Perim (ft)	= 9.31
		Crit Depth, Yc (ft)	= 0.29
		Top Width (ft)	= 9.27
		EGL (ft)	= 0.44
Compute by: Known Q			
Known Q (cfs) = 6.00			

(Sta, El, n)-(Sta, El, n)...

(0.00, 0.95)-(11.50, 0.18, 0.016)-(14.50, 0.18, 0.016)-(26.00, 0.95, 0.016)



Channel Report

ALLEY CROSS-SECTION DP 56

User-defined

Invert Elev (ft) = 0.18
Slope (%) = 2.00
N-Value = 0.016

Calculations

Compute by: Known Q
Known Q (cfs) = 8.00

Highlighted

Depth (ft) = 0.25
Q (cfs) = 8.000
Area (sqft) = 1.95
Velocity (ft/s) = 4.10
Wetted Perim (ft) = 10.51
Crit Depth, Yc (ft) = 0.34
Top Width (ft) = 10.47
EGL (ft) = 0.51

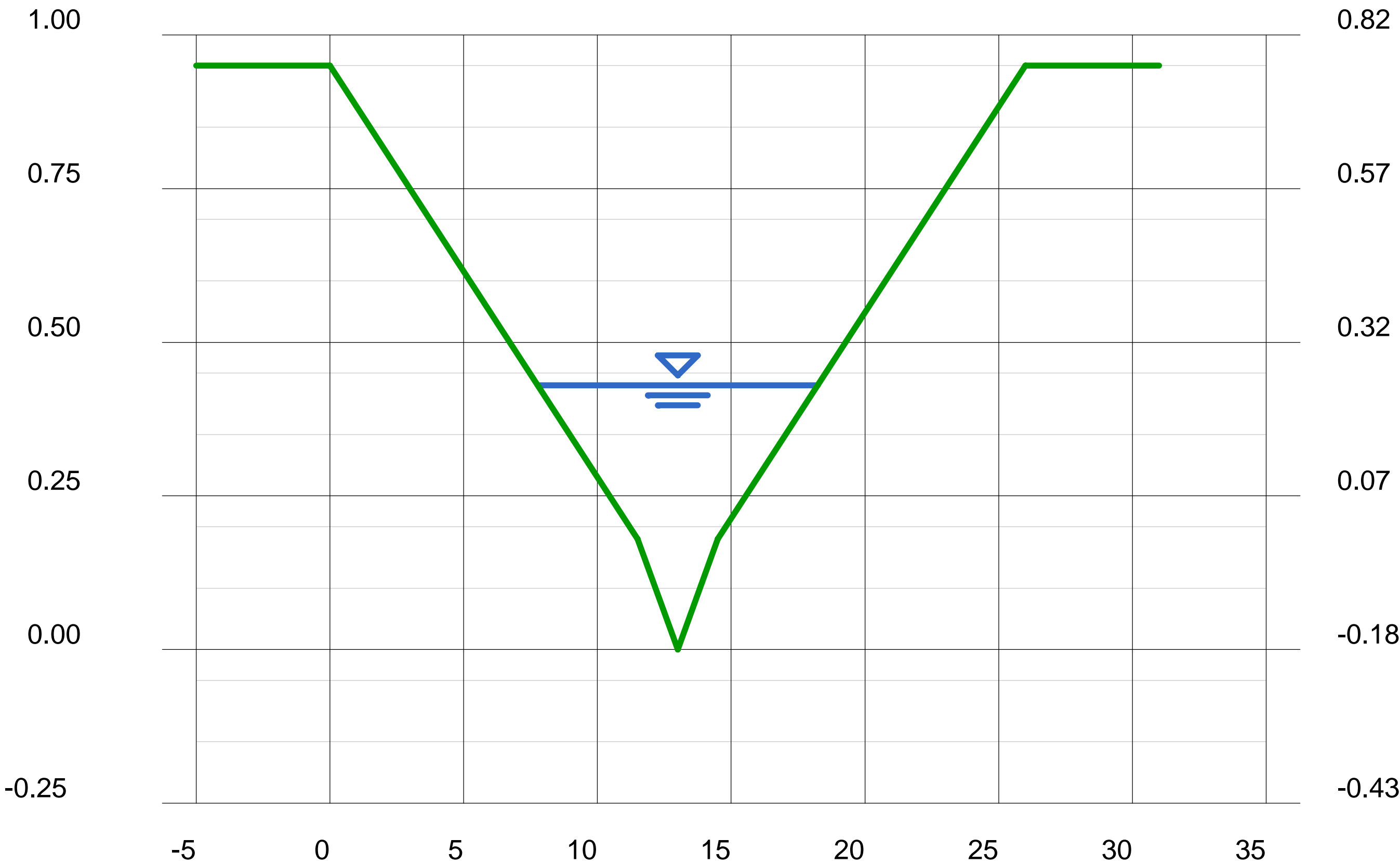
(Sta, El, n)-(Sta, El, n)...

(0.00, 0.95)-(11.50, 0.18, 0.016)-(14.50, 0.18, 0.016)-(26.00, 0.95, 0.016)

Elev (ft)

Depth (ft)

Section



Sta (ft)

Channel Report

Swale A (2-Year)

Triangular

Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 1.50

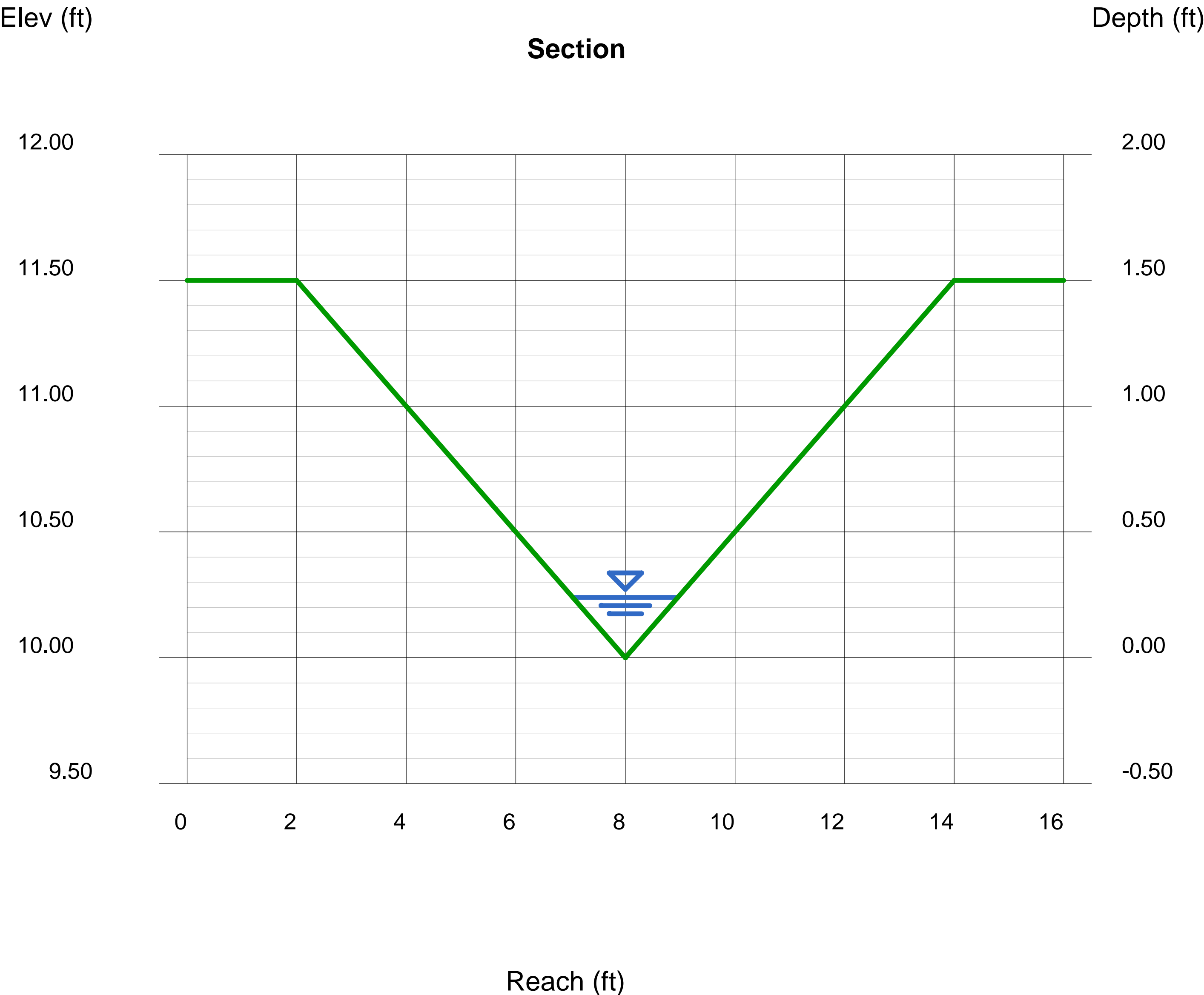
Invert Elev (ft) = 10.00
Slope (%) = 2.60
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 0.40

Highlighted

Depth (ft) = 0.24
Q (cfs) = 0.400
Area (sqft) = 0.23
Velocity (ft/s) = 1.74
Wetted Perim (ft) = 1.98
Crit Depth, Yc (ft) = 0.23
Top Width (ft) = 1.92
EGL (ft) = 0.29



Channel Report

SWALE A (100-YEAR)

Triangular

Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 1.50

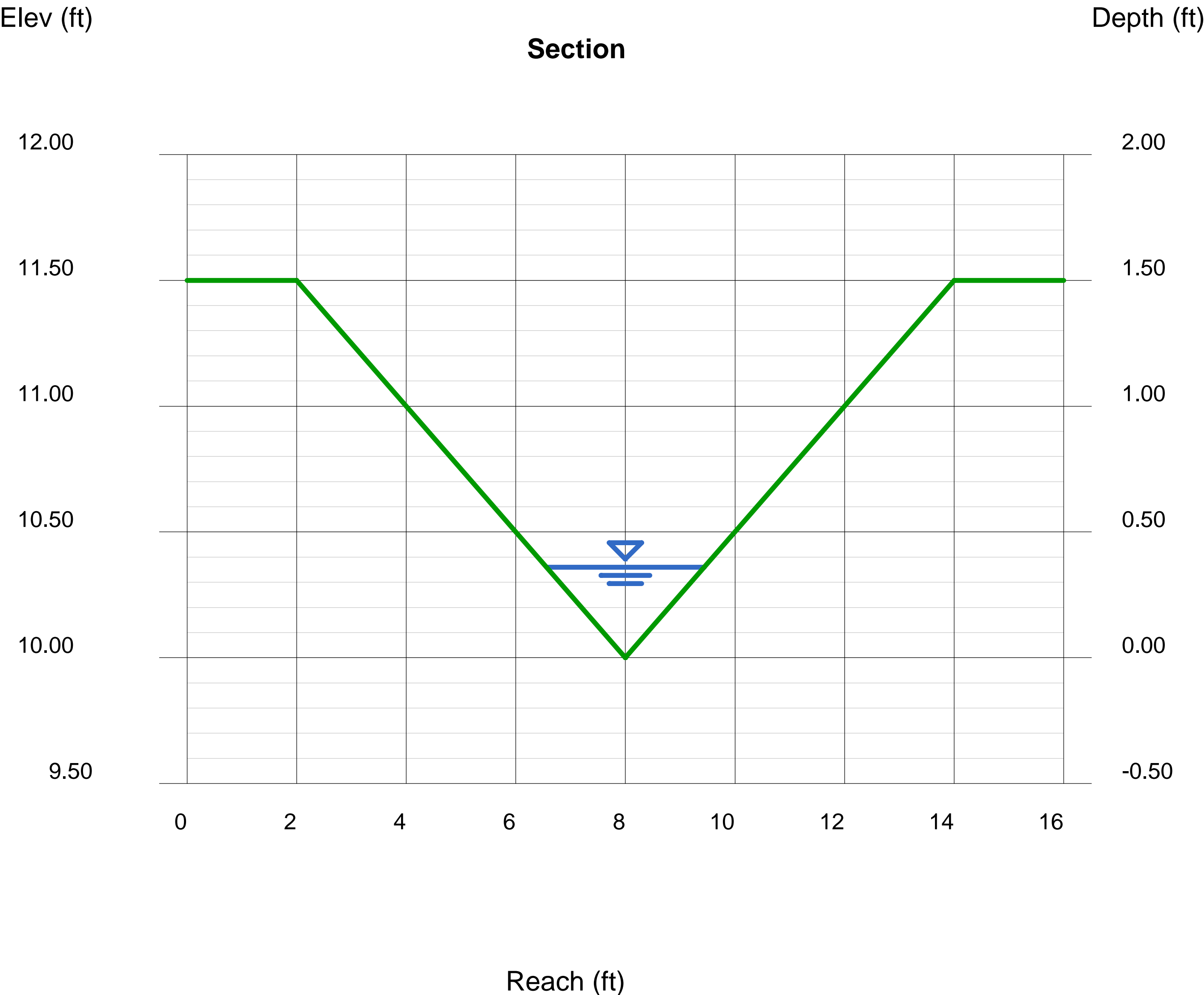
Invert Elev (ft) = 10.00
Slope (%) = 2.60
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 1.20

Highlighted

Depth (ft) = 0.36
Q (cfs) = 1.200
Area (sqft) = 0.52
Velocity (ft/s) = 2.31
Wetted Perim (ft) = 2.97
Crit Depth, Yc (ft) = 0.36
Top Width (ft) = 2.88
EGL (ft) = 0.44



Channel Report

SWALE B (2-YEAR)

Triangular

Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 1.50

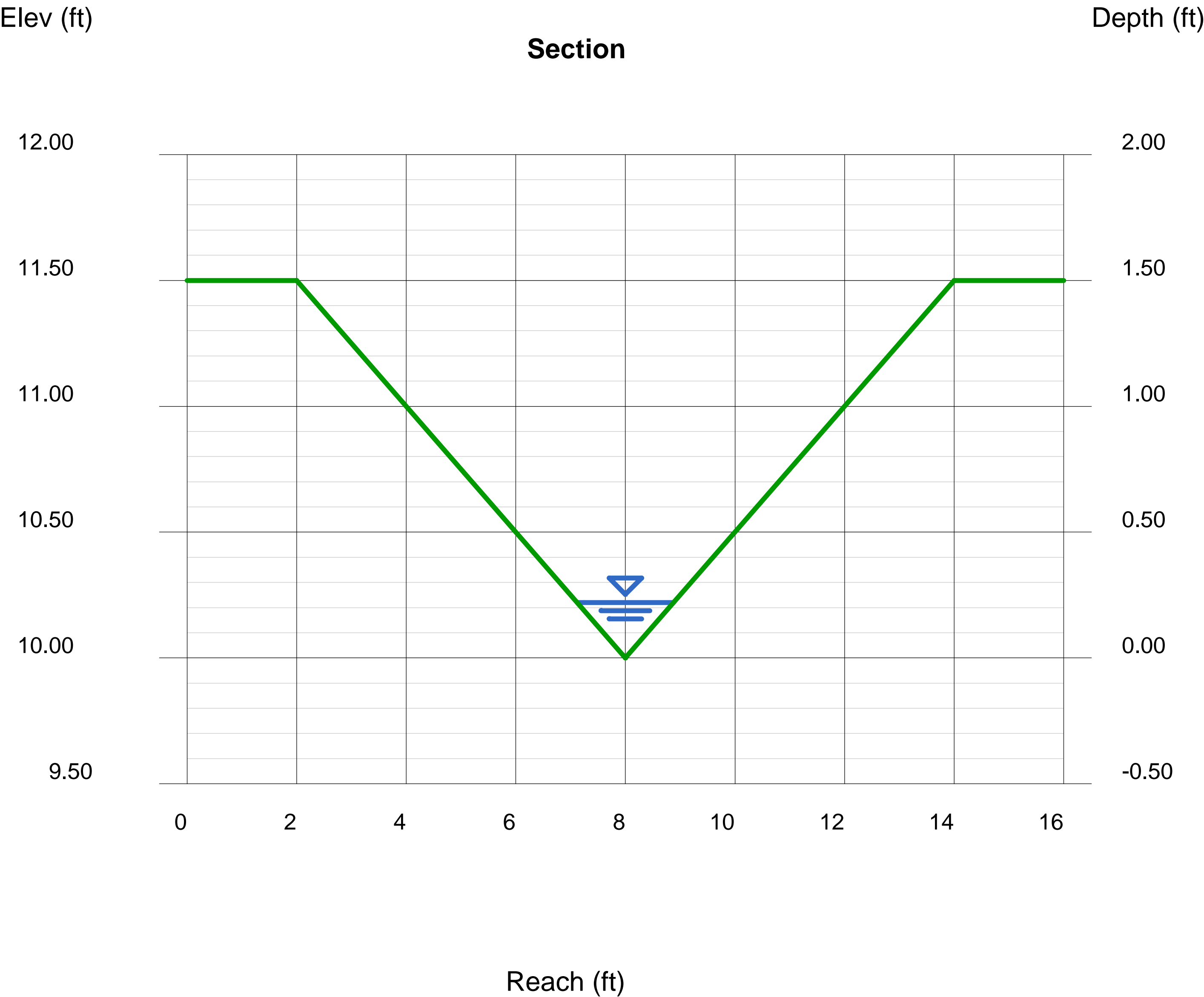
Invert Elev (ft) = 10.00
Slope (%) = 4.10
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 0.40

Highlighted

Depth (ft) = 0.22
Q (cfs) = 0.400
Area (sqft) = 0.19
Velocity (ft/s) = 2.07
Wetted Perim (ft) = 1.81
Crit Depth, Yc (ft) = 0.23
Top Width (ft) = 1.76
EGL (ft) = 0.29



Channel Report

SWALE B (100-YEAR)

Triangular

Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 1.50

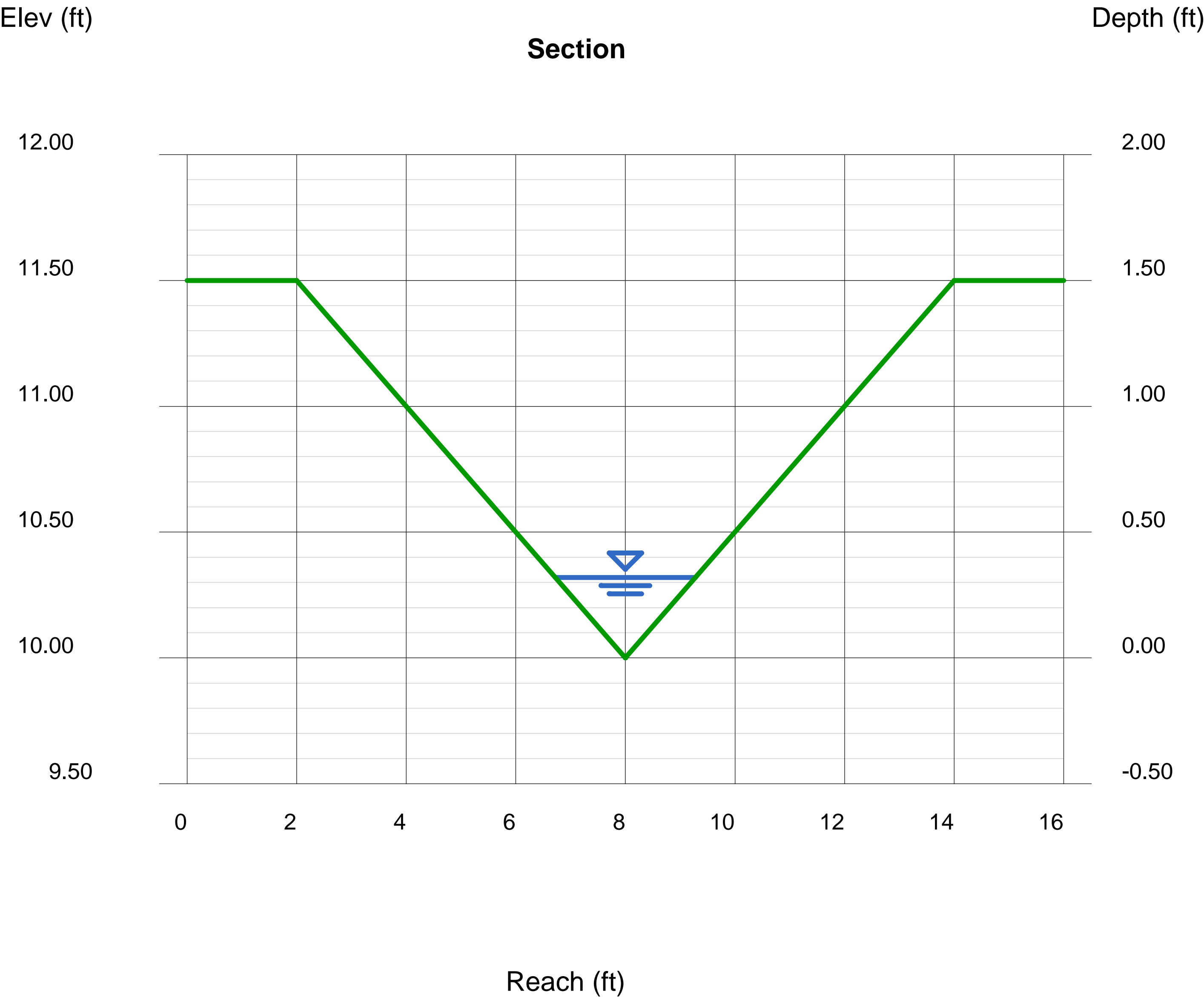
Invert Elev (ft) = 10.00
Slope (%) = 4.10
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 1.16

Highlighted

Depth (ft) = 0.32
Q (cfs) = 1.160
Area (sqft) = 0.41
Velocity (ft/s) = 2.83
Wetted Perim (ft) = 2.64
Crit Depth, Yc (ft) = 0.35
Top Width (ft) = 2.56
EGL (ft) = 0.44



Channel Report

SWALE C (2-YEAR)

Triangular

Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 1.50

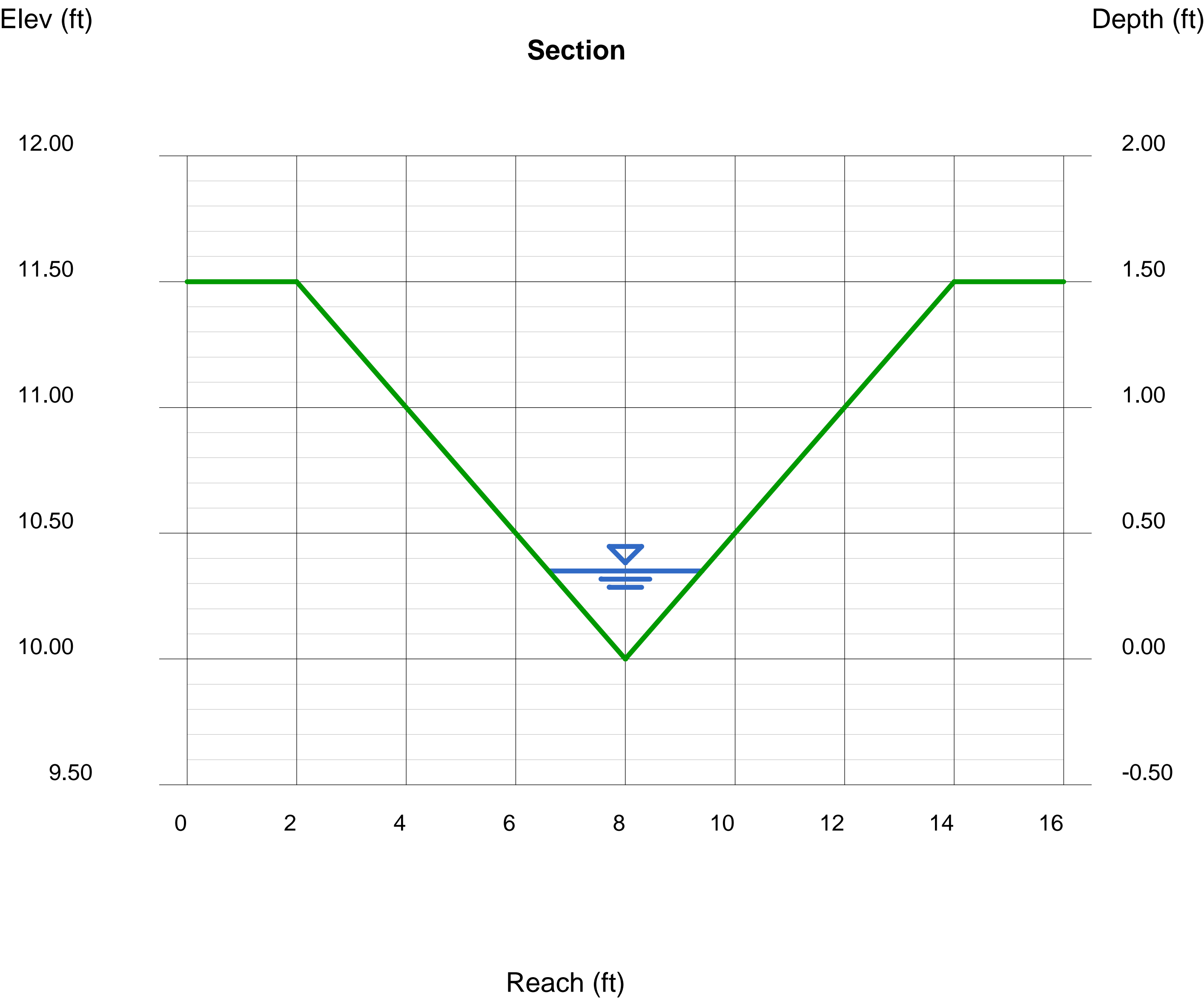
Invert Elev (ft) = 10.00
Slope (%) = 2.50
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 1.10

Highlighted

Depth (ft) = 0.35
Q (cfs) = 1.100
Area (sqft) = 0.49
Velocity (ft/s) = 2.24
Wetted Perim (ft) = 2.89
Crit Depth, Yc (ft) = 0.35
Top Width (ft) = 2.80
EGL (ft) = 0.43



Channel Report

SWALE C (100-YEAR)

Triangular

Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 1.50

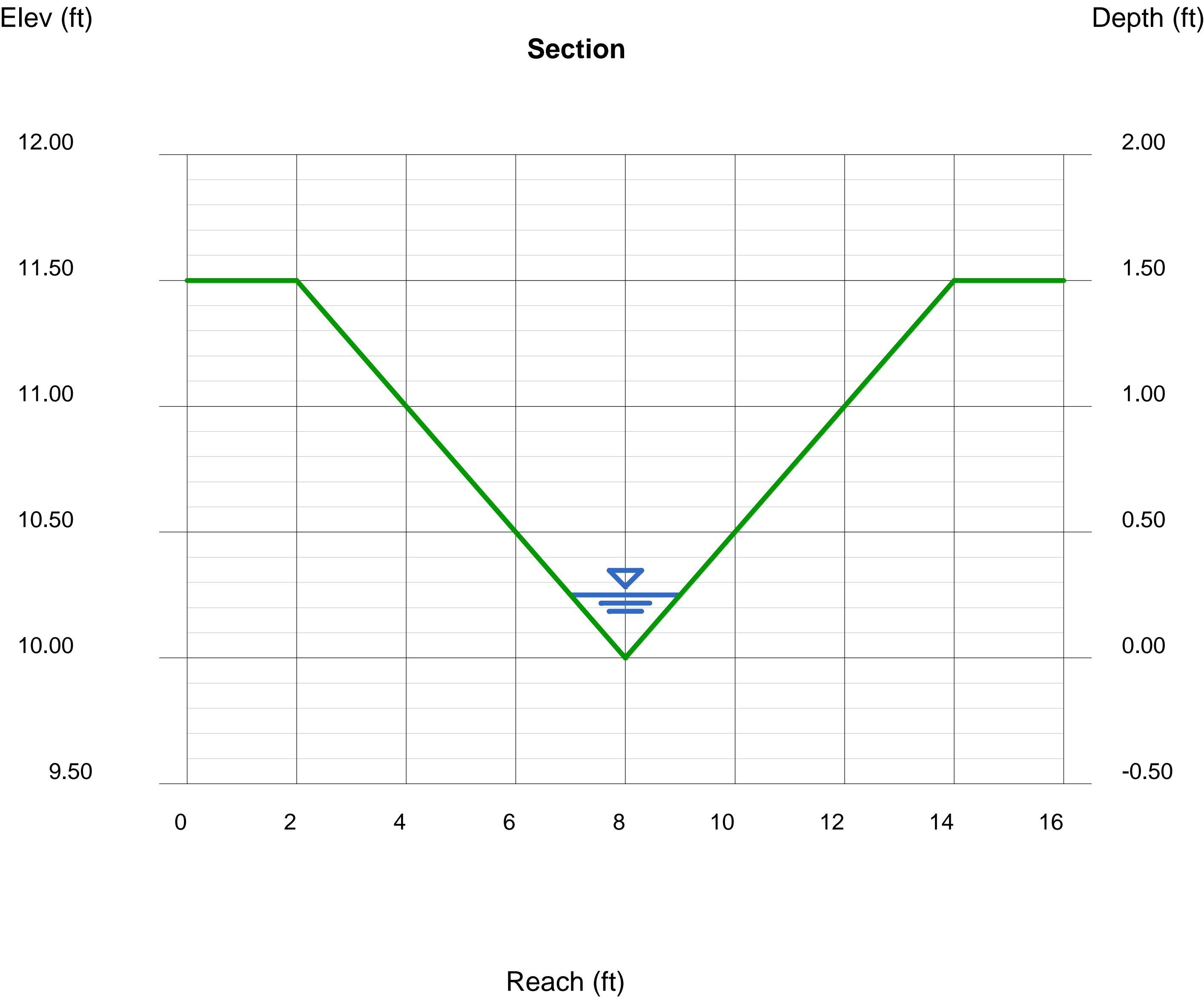
Invert Elev (ft) = 10.00
Slope (%) = 2.50
N-Value = 0.003

Calculations

Compute by: Known Q
Known Q (cfs) = 4.30

Highlighted

Depth (ft) = 0.25
Q (cfs) = 4.300
Area (sqft) = 0.25
Velocity (ft/s) = 17.20
Wetted Perim (ft) = 2.06
Crit Depth, Yc (ft) = 0.60
Top Width (ft) = 2.00
EGL (ft) = 4.85



Channel Report

SWALE D (2-YEAR)

Triangular

Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 5.00

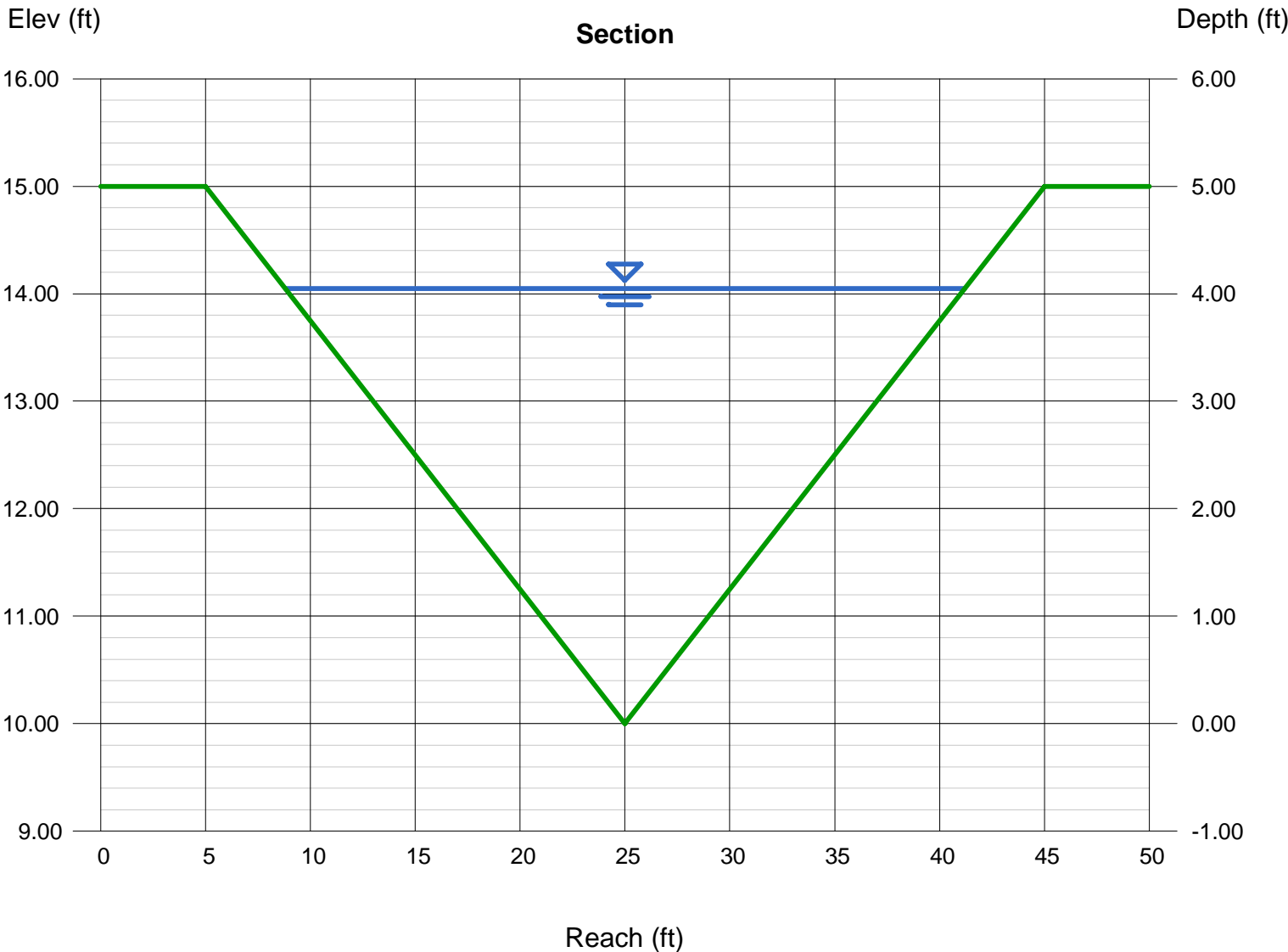
Invert Elev (ft) = 10.00
Slope (%) = 0.03
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 87.90

Highlighted

Depth (ft) = 4.05
Q (cfs) = 87.90
Area (sqft) = 65.61
Velocity (ft/s) = 1.34
Wetted Perim (ft) = 33.40
Crit Depth, Yc (ft) = 1.98
Top Width (ft) = 32.40
EGL (ft) = 4.08



Channel Report

SWALE D (100-YEAR)

Triangular

Side Slopes (z:1) = 4.00, 4.00
Total Depth (ft) = 5.00

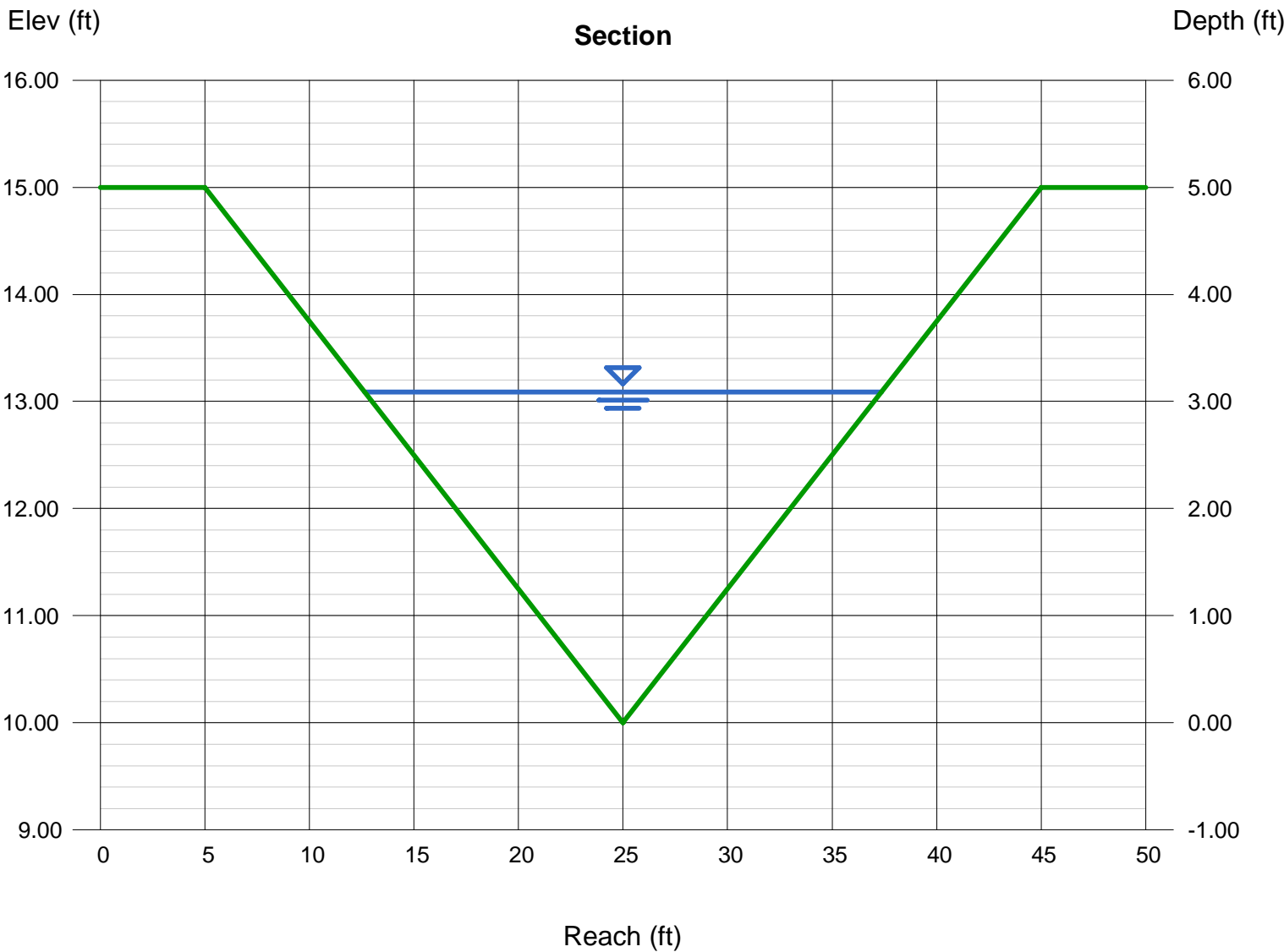
Invert Elev (ft) = 10.00
Slope (%) = 1.00
N-Value = 0.030

Calculations

Compute by: Known Q
Known Q (cfs) = 247.50

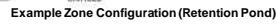
Highlighted

Depth (ft) = 3.09
Q (cfs) = 247.50
Area (sqft) = 38.19
Velocity (ft/s) = 6.48
Wetted Perim (ft) = 25.48
Crit Depth, Yc (ft) = 2.99
Top Width (ft) = 24.72
EGL (ft) = 3.74



APPENDIX D
DETENTION POND CALCULATIONS

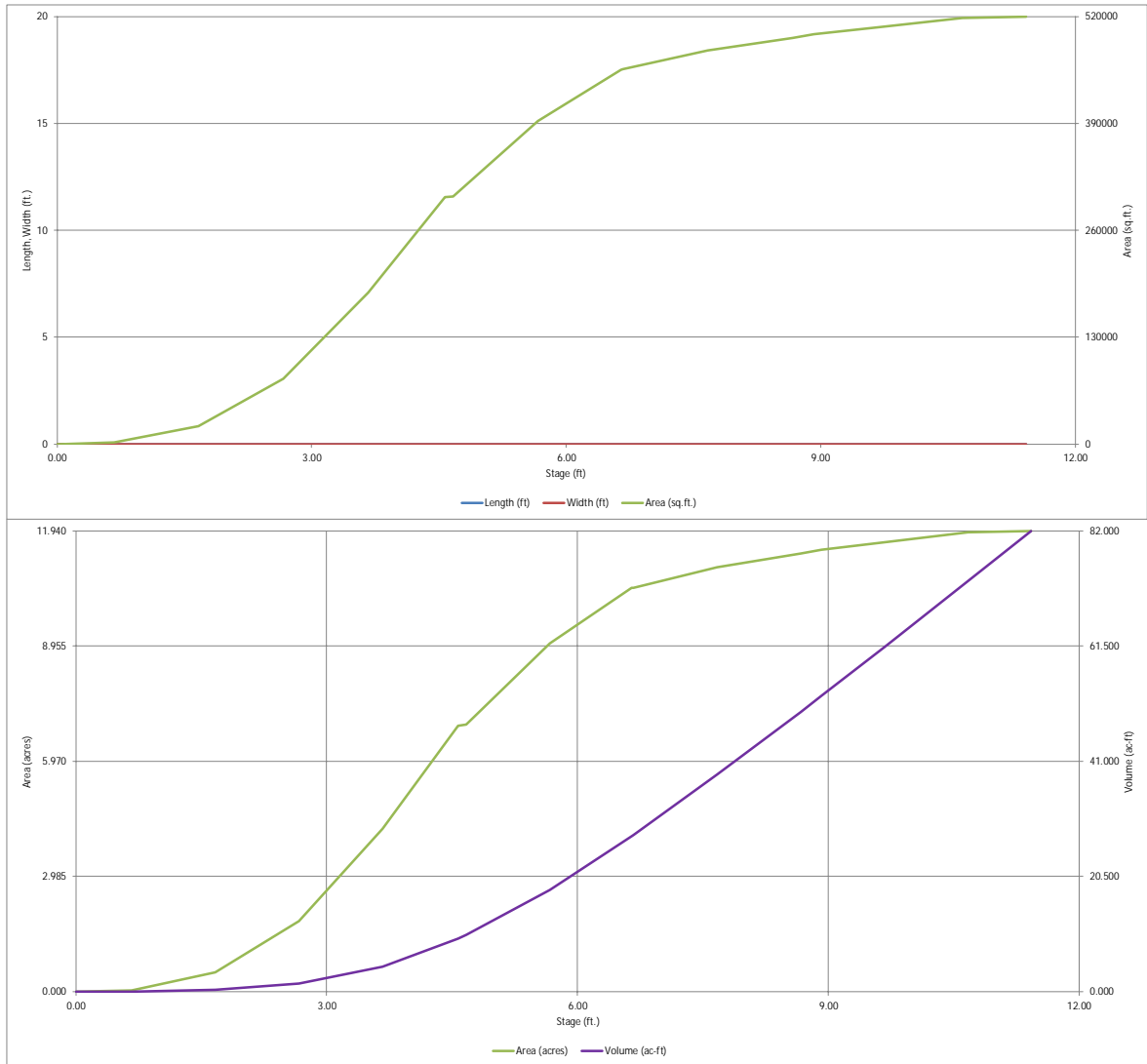
MHFD-Detention, Version 4.06 (July 2022)

Basin I D: Regional Pond C

11/14/2023, 12:22 PM

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

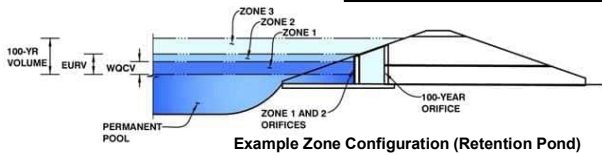


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Foundry Filing No. 1**

Basin ID: **Regional Pond C**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.55	9.285	Orifice Plate
Zone 2 (EURV)	6.65	18.326	Rectangular Orifice
Zone 3 (100-year)	8.44	19.457	Weir&Pipe (Rect.)
Total (all zones)		47.068	

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 = ft²
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 = 4.62 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = 19.00 inches
Orifice Plate: Orifice Area per Row = 23.79 sq. inches (use rectangular openings)

Calculated Parameters for Plate
WQ Orifice Area per Row = 1.652E-01 ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

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	1.60	3.20					
Orifice Area (sq. inches)	23.79	23.79	23.79					

	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 = 4.62 Not Selected ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = 6.91 Not Selected ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height = 8.00 Not Selected inches
Vertical Orifice Width = 12.00 Not Selected inches

Calculated Parameters for Vertical Orifice
Zone 2 Rectangular Not Selected
Vertical Orifice Area = 0.67 Not Selected ft²
Vertical Orifice Centroid = 0.33 Not Selected 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_o = 6.91 Not Selected ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = 40.00 Not Selected feet
Overflow Weir Grate Slope = 0.00 Not Selected H:V
Horiz. Length of Weir Sides = 7.00 Not Selected feet
Overflow Grate Type = Close Mesh Grate Not Selected
Debris Clogging % = 0% Not Selected %

Calculated Parameters for Overflow Weir
Zone 3 Weir Not Selected
Height of Grate Upper Edge, H_u = 6.91 Not Selected feet
Overflow Weir Slope Length = 7.00 Not Selected feet
Grate Open Area / 100-yr Orifice Area = 6.92 Not Selected
Overflow Grate Open Area w/o Debris = 221.48 Not Selected ft²
Overflow Grate Open Area w/ Debris = 221.48 Not Selected ft²

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

Depth to Invert of Outlet Pipe = 0.58 Not Selected ft (distance below basin bottom at Stage = 0 ft)
Rectangular Orifice Width = 96.00 Not Selected inches
Rectangular Orifice Height = 48.00 Not Selected inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Zone 3 Rectangular Not Selected
Outlet Orifice Area = 32.00 Not Selected ft²
Outlet Orifice Centroid = 2.00 Not Selected feet
Half-Central Angle of Restrictor Plate on Pipe = N/A Not Selected radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = 8.92 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 190.00 feet
Spillway End Slopes = 4.00 H:V
Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway
Spillway Design Flow Depth = 1.47 feet
Stage at Top of Freeboard = 11.39 feet
Basin Area at Top of Freeboard = 11.94 acres
Basin Volume at Top of Freeboard = 81.64 acre-ft

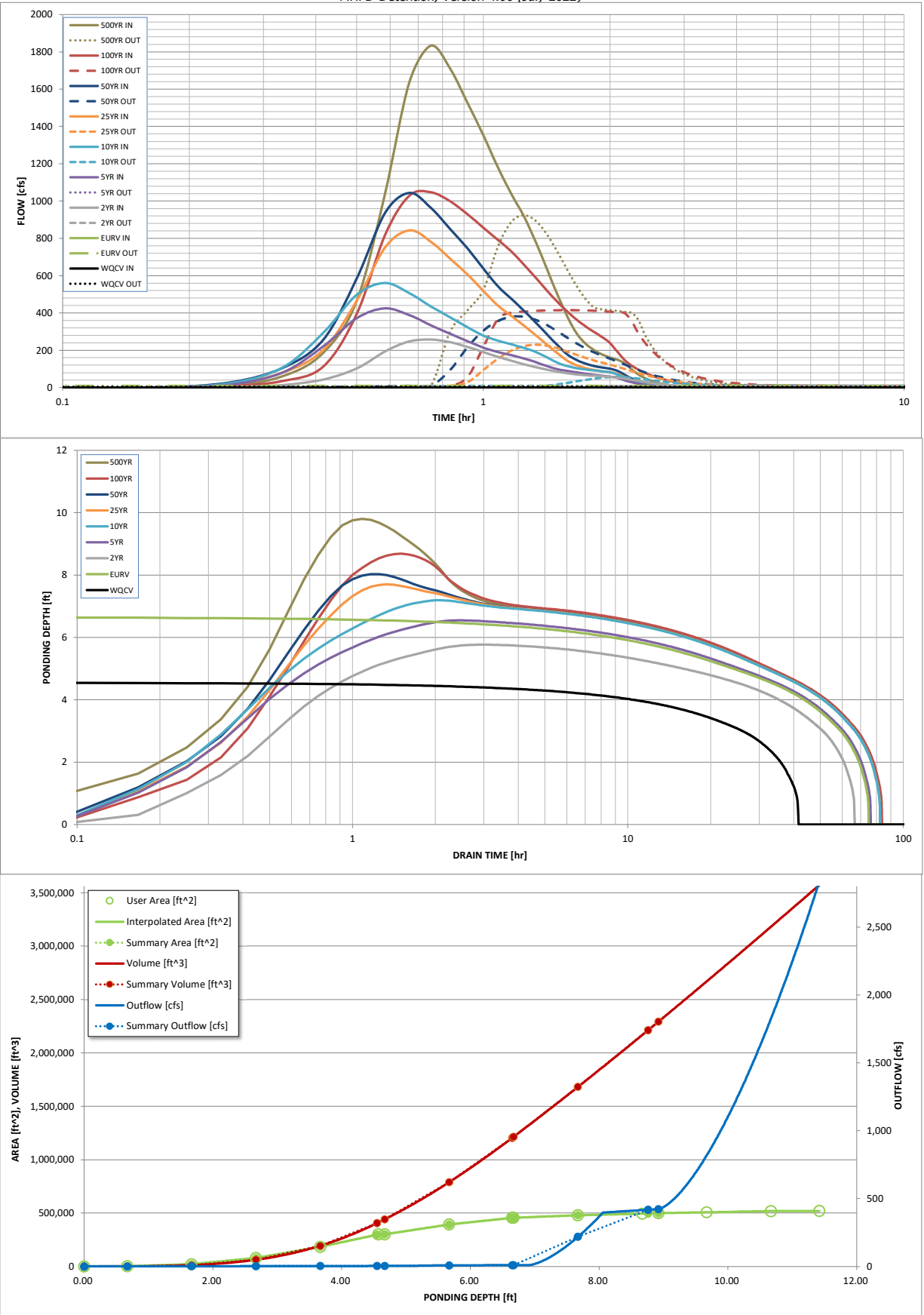
Routed Hydrograph Results

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	0.86	1.14	1.40	1.79	2.12	2.48	3.40
One-Hour Rainfall Depth (in) =	N/A	N/A	0.86	1.14	1.40	1.79	2.12	2.48	3.40
CUHP Runoff Volume (acre-ft) =	9.285	27.611	19.286	28.066	37.262	53.032	65.696	80.518	116.503
User Override Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	20.816	28.066	37.262	53.032	65.696	89.347	116.503
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	4.1	45.9	115.1	285.7	394.5	535.3	843.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.11	0.26	0.65	0.90	1.23	1.93
Peak Inflow Q (cfs) =	N/A	N/A	257.6	424.8	560.5	842.5	1043.5	1047.5	1832.5
Peak Outflow Q (cfs) =	4.0	9.5	7.7	9.3	57.2	229.8	379.6	415.2	923.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.5	0.8	1.0	0.8	1.1
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.2	1.0	1.7	1.8	2.0
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	67	60	68	73	70	68	66	61
Time to Drain 99% of Inflow Volume (hours) =	40	71	64	72	78	77	76	75	73
Maximum Ponding Depth (ft) =	4.55	6.65	5.77	6.55	7.19	7.70	8.03	8.68	9.80
Area at Maximum Ponding Depth (acres) =	6.83	10.46	9.15	10.30	10.74	11.00	11.12	11.35	11.68
Maximum Volume Stored (acre-ft) =	9.316	27.656	18.930	26.514	33.381	38.818	42.468	49.883	62.680

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	USER	CUHP	CUHP	CUHP	CUHP	USER	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	0.44	0.00	9.04
	0:15:00	0.00	0.00	1.15	16.05	23.68	18.90	27.60	8.91	60.32
	0:20:00	0.00	0.00	13.61	80.75	107.47	79.77	105.32	34.69	186.98
	0:25:00	0.00	0.00	43.11	220.91	294.03	202.51	256.60	112.90	464.13
	0:30:00	0.00	0.00	102.13	371.44	496.58	465.07	584.24	393.68	1035.42
	0:35:00	0.00	0.00	193.10	424.78	560.49	748.97	935.16	815.79	1634.87
	0:40:00	0.00	0.00	247.58	388.75	506.87	842.51	1043.53	1028.18	1832.53
	0:45:00	0.00	0.00	257.55	333.70	435.63	782.51	963.95	1047.50	1711.12
	0:50:00	0.00	0.00	242.93	288.34	377.07	691.40	850.41	998.82	1527.30
	0:55:00	0.00	0.00	218.15	248.89	323.85	606.76	746.66	929.98	1352.45
	1:00:00	0.00	0.00	189.91	213.92	278.74	517.83	637.63	856.59	1179.43
	1:05:00	0.00	0.00	164.14	190.09	251.17	439.39	542.03	791.33	1036.18
	1:10:00	0.00	0.00	143.13	173.21	231.15	383.60	474.56	728.54	916.06
	1:15:00	0.00	0.00	125.00	156.05	212.22	331.27	411.07	657.63	777.83
	1:20:00	0.00	0.00	109.46	135.67	189.76	279.66	347.55	587.30	634.33
	1:25:00	0.00	0.00	96.22	114.85	161.43	229.69	285.14	519.60	498.88
	1:30:00	0.00	0.00	85.20	98.23	132.78	183.78	227.38	459.48	380.86
	1:35:00	0.00	0.00	76.53	88.80	114.76	143.53	177.32	407.22	289.53
	1:40:00	0.00	0.00	70.26	81.91	104.28	119.23	147.21	363.21	234.76
	1:45:00	0.00	0.00	65.94	74.20	96.98	104.08	128.23	327.93	201.04
	1:50:00	0.00	0.00	63.09	67.65	91.67	94.20	115.75	297.76	177.22
	1:55:00	0.00	0.00	60.74	62.96	87.38	87.27	107.00	270.90	160.98
	2:00:00	0.00	0.00	57.56	58.97	81.66	82.77	101.23	238.87	149.22
	2:05:00	0.00	0.00	53.66	51.24	70.03	73.28	89.45	191.18	129.61
	2:10:00	0.00	0.00	48.19	39.36	53.36	56.45	68.79	147.68	98.46
	2:15:00	0.00	0.00	42.15	28.58	38.48	40.69	49.48	118.52	70.77
	2:20:00	0.00	0.00	36.10	20.87	27.87	29.53	35.85	96.60	51.45
	2:25:00	0.00	0.00	30.39	15.16	20.25	21.57	26.16	79.69	37.88
	2:30:00	0.00	0.00	25.32	10.65	14.47	15.31	18.57	66.10	27.07
	2:35:00	0.00	0.00	20.98	7.34	10.19	10.78	13.06	54.93	19.04
	2:40:00	0.00	0.00	17.41	5.11	7.15	7.70	9.32	45.59	13.56
	2:45:00	0.00	0.00	14.51	3.39	4.65	5.13	6.21	37.91	9.00
	2:50:00	0.00	0.00	12.11	2.03	2.69	3.08	3.72	31.58	5.37
	2:55:00	0.00	0.00	10.14	1.01	1.27	1.54	1.85	26.38	2.65
	3:00:00	0.00	0.00	8.54	0.34	0.40	0.51	0.61	22.15	0.87
	3:05:00	0.00	0.00	7.26	0.02	0.01	0.00	0.00	18.70	0.00
	3:10:00	0.00	0.00	6.24	0.00	0.00	0.00	0.00	15.96	0.00
	3:15:00	0.00	0.00	5.45	0.00	0.00	0.00	0.00	13.82	0.00
	3:20:00	0.00	0.00	4.82	0.00	0.00	0.00	0.00	12.09	0.00
	3:25:00	0.00	0.00	4.30	0.00	0.00	0.00	0.00	10.71	0.00
	3:30:00	0.00	0.00	3.87	0.00	0.00	0.00	0.00	9.54	0.00
	3:35:00	0.00	0.00	3.51	0.00	0.00	0.00	0.00	8.55	0.00
	3:40:00	0.00	0.00	3.19	0.00	0.00	0.00	0.00	7.69	0.00
	3:45:00	0.00	0.00	2.92	0.00	0.00	0.00	0.00	6.96	0.00
	3:50:00	0.00	0.00	2.69	0.00	0.00	0.00	0.00	6.33	0.00
	3:55:00	0.00	0.00	2.46	0.00	0.00	0.00	0.00	5.76	0.00
	4:00:00	0.00	0.00	2.29	0.00	0.00	0.00	0.00	5.27	0.00
	4:05:00	0.00	0.00	2.11	0.00	0.00	0.00	0.00	4.81	0.00
	4:10:00	0.00	0.00	1.98	0.00	0.00	0.00	0.00	4.43	0.00
	4:15:00	0.00	0.00	1.83	0.00	0.00	0.00	0.00	4.07	0.00
	4:20:00	0.00	0.00	1.72	0.00	0.00	0.00	0.00	3.77	0.00
	4:25:00	0.00	0.00	1.61	0.00	0.00	0.00	0.00	3.48	0.00
	4:30:00	0.00	0.00	1.51	0.00	0.00	0.00	0.00	3.24	0.00
	4:35:00	0.00	0.00	1.41	0.00	0.00	0.00	0.00	3.00	0.00
	4:40:00	0.00	0.00	1.34	0.00	0.00	0.00	0.00	2.80	0.00
	4:45:00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	2.60	0.00
	4:50:00	0.00	0.00	1.19	0.00	0.00	0.00	0.00	2.43	0.00
	4:55:00	0.00	0.00	1.12	0.00	0.00	0.00	0.00	2.27	0.00
	5:00:00	0.00	0.00	1.06	0.00	0.00	0.00	0.00	2.13	0.00
	5:05:00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.99	0.00
	5:10:00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	1.88	0.00
	5:15:00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	1.76	0.00
	5:20:00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	1.66	0.00
	5:25:00	0.00	0.00	0.82	0.00	0.00	0.00	0.00	1.56	0.00
	5:30:00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	1.48	0.00
	5:35:00	0.00	0.00	0.74	0.00	0.00	0.00	0.00	1.39	0.00
	5:40:00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	1.32	0.00
	5:45:00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	1.24	0.00
	5:50:00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	1.18	0.00
	5:55:00	0.00	0.00	0.62	0.00	0.00	0.00	0.00	1.12	0.00
	6:00:00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	1.07	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.

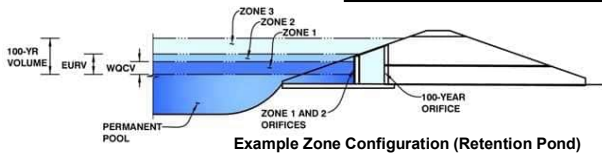
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DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: **Foundry Filing No. 1**

Basin ID: **Regional Pond C**



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.55	9.285	Orifice Plate
Zone 2 (EURV)	6.65	18.326	Rectangular Orifice
Zone 3 (100-year)	8.44	19.457	Weir&Pipe (Rect.)
Total (all zones)		47.068	

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

Calculated Parameters for Underdrain

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

Underdrain Orifice Area = ft²

Underdrain Orifice Diameter = inches

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)

Calculated Parameters for Plate

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)

WQ Orifice Area per Row = 1.652E-01 ft²

Depth at top of Zone using Orifice Plate = 4.62 ft (relative to basin bottom at Stage = 0 ft)

Elliptical Half-Width = N/A feet

Orifice Plate: Orifice Vertical Spacing = 19.00 inches

Elliptical Slot Centroid = N/A feet

Orifice Plate: Orifice Area per Row = 23.79 sq. inches (use rectangular openings)

Elliptical Slot Area = N/A ft²

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	1.60	3.20					
Orifice Area (sq. inches)	23.79	23.79	23.79					

	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)

Calculated Parameters for Vertical Orifice

Invert of Vertical Orifice = 4.62 Not Selected ft (relative to basin bottom at Stage = 0 ft)

Vertical Orifice Area = 0.67 ft²

Depth at top of Zone using Vertical Orifice = 6.91 Not Selected ft (relative to basin bottom at Stage = 0 ft)

Vertical Orifice Centroid = 0.33 feet

Vertical Orifice Height = 8.00 inches

Vertical Orifice Width = 12.00 inches

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

Calculated Parameters for Overflow Weir

Overflow Weir Front Edge Height, H_o = 6.91 Not Selected ft (relative to basin bottom at Stage = 0 ft)

Height of Grate Upper Edge, H_u = 6.91 ft

Overflow Weir Front Edge Length = 40.00 feet

Overflow Weir Slope Length = 7.00 feet

Overflow Weir Grate Slope = 0.00 Not Selected H:V

Grate Open Area / 100-yr Orifice Area = 6.92

Horiz. Length of Weir Sides = 7.00 feet

Overflow Grate Open Area w/o Debris = 221.48 ft²

Overflow Grate Type = Close Mesh Grate Not Selected

Overflow Grate Open Area w/ Debris = 110.74 ft²

Debris Clogging % = 50% Not Selected %

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Depth to Invert of Outlet Pipe = 0.58 Not Selected ft (distance below basin bottom at Stage = 0 ft)

Outlet Orifice Area = 32.00 ft²

Rectangular Orifice Width = 96.00 inches

Outlet Orifice Centroid = 2.00 feet

Rectangular Orifice Height = 48.00 inches

Half-Central Angle of Restrictor Plate on Pipe = N/A radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage = 8.92 ft (relative to basin bottom at Stage = 0 ft)

Spillway Design Flow Depth = 1.47 feet

Spillway Crest Length = 190.00 feet

Stage at Top of Freeboard = 11.39 feet

Spillway End Slopes = 4.00 H:V

Basin Area at Top of Freeboard = 11.94 acres

Freeboard above Max Water Surface = 1.00 feet

Basin Volume at Top of Freeboard = 81.64 acre-ft

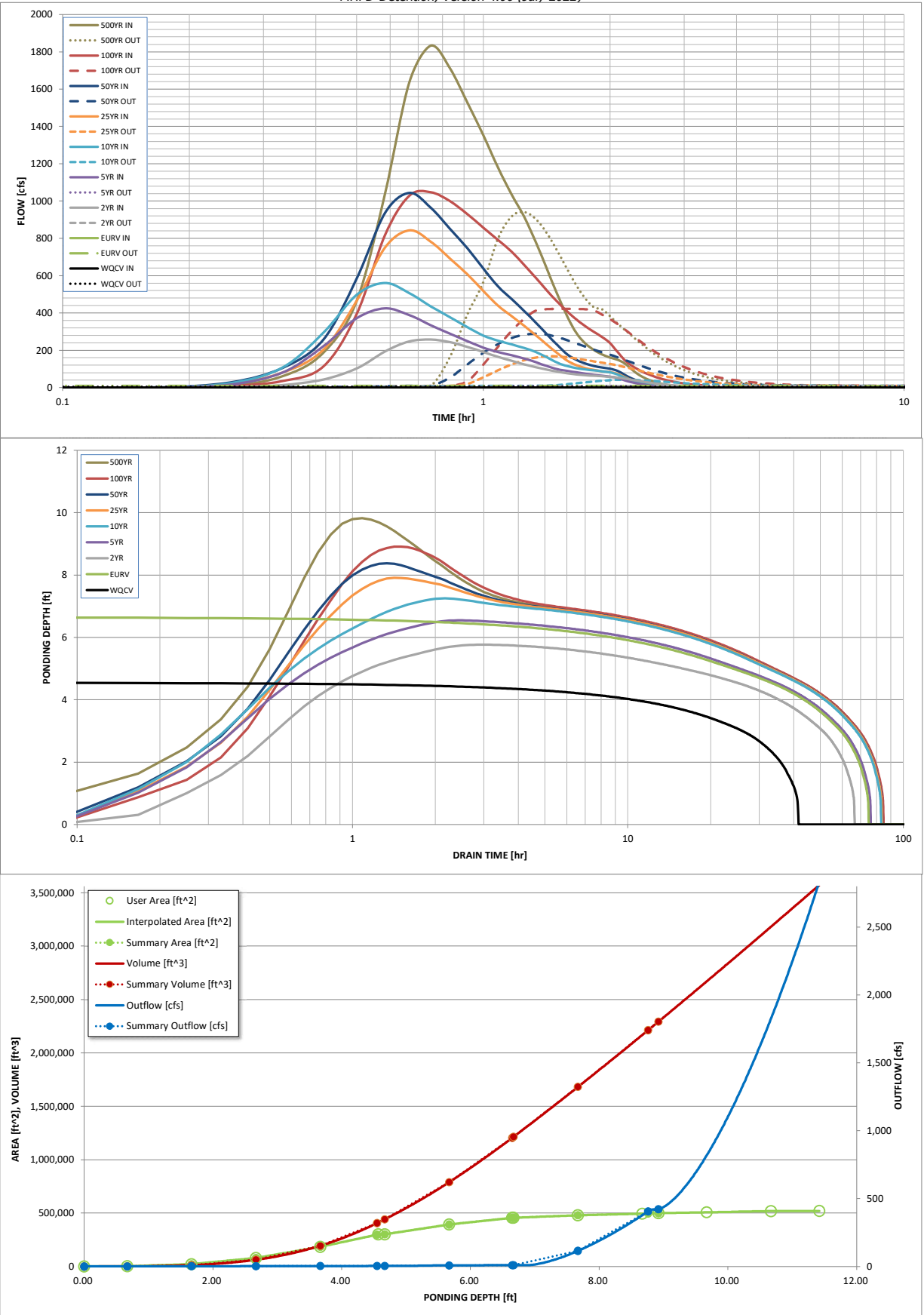
Routed Hydrograph Results

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	0.86	1.14	1.40	1.79	2.12	2.48	3.40
One-Hour Rainfall Depth (in) =	N/A	N/A	0.86	1.14	1.40	1.79	2.12	2.48	3.40
CUHP Runoff Volume (acre-ft) =	9.285	27.611	19.286	28.066	37.262	53.032	65.696	80.518	116.503
User Override Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	20.816	28.066	37.262	53.032	65.696	89.347	116.503
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	4.1	45.9	115.1	285.7	394.5	535.3	843.6
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.11	0.26	0.65	0.90	1.23	1.93
Peak Inflow Q (cfs) =	N/A	N/A	257.6	424.8	560.5	842.5	1043.5	1047.5	1832.5
Peak Outflow Q (cfs) =	4.0	9.5	7.7	9.3	41.9	167.4	288.7	421.8	940.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.2	0.4	0.6	0.7	0.8	1.1
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.1	0.7	1.2	1.8	2.0
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	67	60	68	73	71	69	67	62
Time to Drain 99% of Inflow Volume (hours) =	40	71	64	72	79	78	77	77	74
Maximum Ponding Depth (ft) =	4.55	6.65	5.77	6.55	7.25	7.91	8.37	8.91	9.82
Area at Maximum Ponding Depth (acres) =	6.83	10.46	9.15	10.30	10.77	11.08	11.24	11.45	11.68
Maximum Volume Stored (acre-ft) =	9.316	27.656	18.930	26.514	34.026	41.136	46.381	52.505	63.030

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	USER	CUHP	CUHP	CUHP	CUHP	USER	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	0.44	0.00	9.04
	0:15:00	0.00	0.00	1.15	16.05	23.68	18.90	27.60	8.91	60.32
	0:20:00	0.00	0.00	13.61	80.75	107.47	79.77	105.32	34.69	186.98
	0:25:00	0.00	0.00	43.11	220.91	294.03	202.51	256.60	112.90	464.13
	0:30:00	0.00	0.00	102.13	371.44	496.58	465.07	584.24	393.68	1035.42
	0:35:00	0.00	0.00	193.10	424.78	560.49	748.97	935.16	815.79	1634.87
	0:40:00	0.00	0.00	247.58	388.75	506.87	842.51	1043.53	1028.18	1832.53
	0:45:00	0.00	0.00	257.55	333.70	435.63	782.51	963.95	1047.50	1711.12
	0:50:00	0.00	0.00	242.93	288.34	377.07	691.40	850.41	998.82	1527.30
	0:55:00	0.00	0.00	218.15	248.89	323.85	606.76	746.66	929.98	1352.45
	1:00:00	0.00	0.00	189.91	213.92	278.74	517.83	637.63	856.59	1179.43
	1:05:00	0.00	0.00	164.14	190.09	251.17	439.39	542.03	791.33	1036.18
	1:10:00	0.00	0.00	143.13	173.21	231.15	383.60	474.56	728.54	916.06
	1:15:00	0.00	0.00	125.00	156.05	212.22	331.27	411.07	657.63	777.83
	1:20:00	0.00	0.00	109.46	135.67	189.76	279.66	347.55	587.30	634.33
	1:25:00	0.00	0.00	96.22	114.85	161.43	229.69	285.14	519.60	498.88
	1:30:00	0.00	0.00	85.20	98.23	132.78	183.78	227.38	459.48	380.86
	1:35:00	0.00	0.00	76.53	88.80	114.76	143.53	177.32	407.22	289.53
	1:40:00	0.00	0.00	70.26	81.91	104.28	119.23	147.21	363.21	234.76
	1:45:00	0.00	0.00	65.94	74.20	96.98	104.08	128.23	327.93	201.04
	1:50:00	0.00	0.00	63.09	67.65	91.67	94.20	115.75	297.76	177.22
	1:55:00	0.00	0.00	60.74	62.96	87.38	87.27	107.00	270.90	160.98
	2:00:00	0.00	0.00	57.56	58.97	81.66	82.77	101.23	238.87	149.22
	2:05:00	0.00	0.00	53.66	51.24	70.03	73.28	89.45	191.18	129.61
	2:10:00	0.00	0.00	48.19	39.36	53.36	56.45	68.79	147.68	98.46
	2:15:00	0.00	0.00	42.15	28.58	38.48	40.69	49.48	118.52	70.77
	2:20:00	0.00	0.00	36.10	20.87	27.87	29.53	35.85	96.60	51.45
	2:25:00	0.00	0.00	30.39	15.16	20.25	21.57	26.16	79.69	37.88
	2:30:00	0.00	0.00	25.32	10.65	14.47	15.31	18.57	66.10	27.07
	2:35:00	0.00	0.00	20.98	7.34	10.19	10.78	13.06	54.93	19.04
	2:40:00	0.00	0.00	17.41	5.11	7.15	7.70	9.32	45.59	13.56
	2:45:00	0.00	0.00	14.51	3.39	4.65	5.13	6.21	37.91	9.00
	2:50:00	0.00	0.00	12.11	2.03	2.69	3.08	3.72	31.58	5.37
	2:55:00	0.00	0.00	10.14	1.01	1.27	1.54	1.85	26.38	2.65
	3:00:00	0.00	0.00	8.54	0.34	0.40	0.51	0.61	22.15	0.87
	3:05:00	0.00	0.00	7.26	0.02	0.01	0.00	0.00	18.70	0.00
	3:10:00	0.00	0.00	6.24	0.00	0.00	0.00	0.00	15.96	0.00
	3:15:00	0.00	0.00	5.45	0.00	0.00	0.00	0.00	13.82	0.00
	3:20:00	0.00	0.00	4.82	0.00	0.00	0.00	0.00	12.09	0.00
	3:25:00	0.00	0.00	4.30	0.00	0.00	0.00	0.00	10.71	0.00
	3:30:00	0.00	0.00	3.87	0.00	0.00	0.00	0.00	9.54	0.00
	3:35:00	0.00	0.00	3.51	0.00	0.00	0.00	0.00	8.55	0.00
	3:40:00	0.00	0.00	3.19	0.00	0.00	0.00	0.00	7.69	0.00
	3:45:00	0.00	0.00	2.92	0.00	0.00	0.00	0.00	6.96	0.00
	3:50:00	0.00	0.00	2.69	0.00	0.00	0.00	0.00	6.33	0.00
	3:55:00	0.00	0.00	2.46	0.00	0.00	0.00	0.00	5.76	0.00
	4:00:00	0.00	0.00	2.29	0.00	0.00	0.00	0.00	5.27	0.00
	4:05:00	0.00	0.00	2.11	0.00	0.00	0.00	0.00	4.81	0.00
	4:10:00	0.00	0.00	1.98	0.00	0.00	0.00	0.00	4.43	0.00
	4:15:00	0.00	0.00	1.83	0.00	0.00	0.00	0.00	4.07	0.00
	4:20:00	0.00	0.00	1.72	0.00	0.00	0.00	0.00	3.77	0.00
	4:25:00	0.00	0.00	1.61	0.00	0.00	0.00	0.00	3.48	0.00
	4:30:00	0.00	0.00	1.51	0.00	0.00	0.00	0.00	3.24	0.00
	4:35:00	0.00	0.00	1.41	0.00	0.00	0.00	0.00	3.00	0.00
	4:40:00	0.00	0.00	1.34	0.00	0.00	0.00	0.00	2.80	0.00
	4:45:00	0.00	0.00	1.25	0.00	0.00	0.00	0.00	2.60	0.00
	4:50:00	0.00	0.00	1.19	0.00	0.00	0.00	0.00	2.43	0.00
	4:55:00	0.00	0.00	1.12	0.00	0.00	0.00	0.00	2.27	0.00
	5:00:00	0.00	0.00	1.06	0.00	0.00	0.00	0.00	2.13	0.00
	5:05:00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.99	0.00
	5:10:00	0.00	0.00	0.96	0.00	0.00	0.00	0.00	1.88	0.00
	5:15:00	0.00	0.00	0.90	0.00	0.00	0.00	0.00	1.76	0.00
	5:20:00	0.00	0.00	0.86	0.00	0.00	0.00	0.00	1.66	0.00
	5:25:00	0.00	0.00	0.82	0.00	0.00	0.00	0.00	1.56	0.00
	5:30:00	0.00	0.00	0.78	0.00	0.00	0.00	0.00	1.48	0.00
	5:35:00	0.00	0.00	0.74	0.00	0.00	0.00	0.00	1.39	0.00
	5:40:00	0.00	0.00	0.71	0.00	0.00	0.00	0.00	1.32	0.00
	5:45:00	0.00	0.00	0.67	0.00	0.00	0.00	0.00	1.24	0.00
	5:50:00	0.00	0.00	0.65	0.00	0.00	0.00	0.00	1.18	0.00
	5:55:00	0.00	0.00	0.62	0.00	0.00	0.00	0.00	1.12	0.00
	6:00:00	0.00	0.00	0.59	0.00	0.00	0.00	0.00	1.07	0.00

MHFD-Detention, Version 4.06 (July 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.

St	St	Stage	Area	Area	Volume	Volume	Total
----	----	-------	------	------	--------	--------	-------

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).

REGIONAL POND C FOREBAY VOLUME REQUIREMENTS

Equation 3-1 $WQCV = a(0.91I^{.3} - 1.19I^{.2} + 0.781I)$
 $a=1$ (40 hour drain time)

Regional Pond C $I = .653$ $WQCV = 0.25530$ in

Equation 3-3 $V = (WQCV/12)A$
 Regional Pond C $A = 436.43$ Acres $V = 9.29137$ ac-ft

$3\% \text{ OF } WQCV$
 FOREBAY TOTAL VOLUME = $.03(V)$

VOLUME REQUIRED FOR POND C FOREBAY = 0.2787 AC-FT 12142 CF

VOLUME PROVIDED FOR POND C FOREBAY = 0.2890 AC-FT 12588 CF

Q_{100} Discharges 2% OF Q_{100}

Q_{100} BASIN A = .02 * 906 CFS = 18.12 CFS

Weir Report

Regional Pond C Forebay Notch

Rectangular Weir

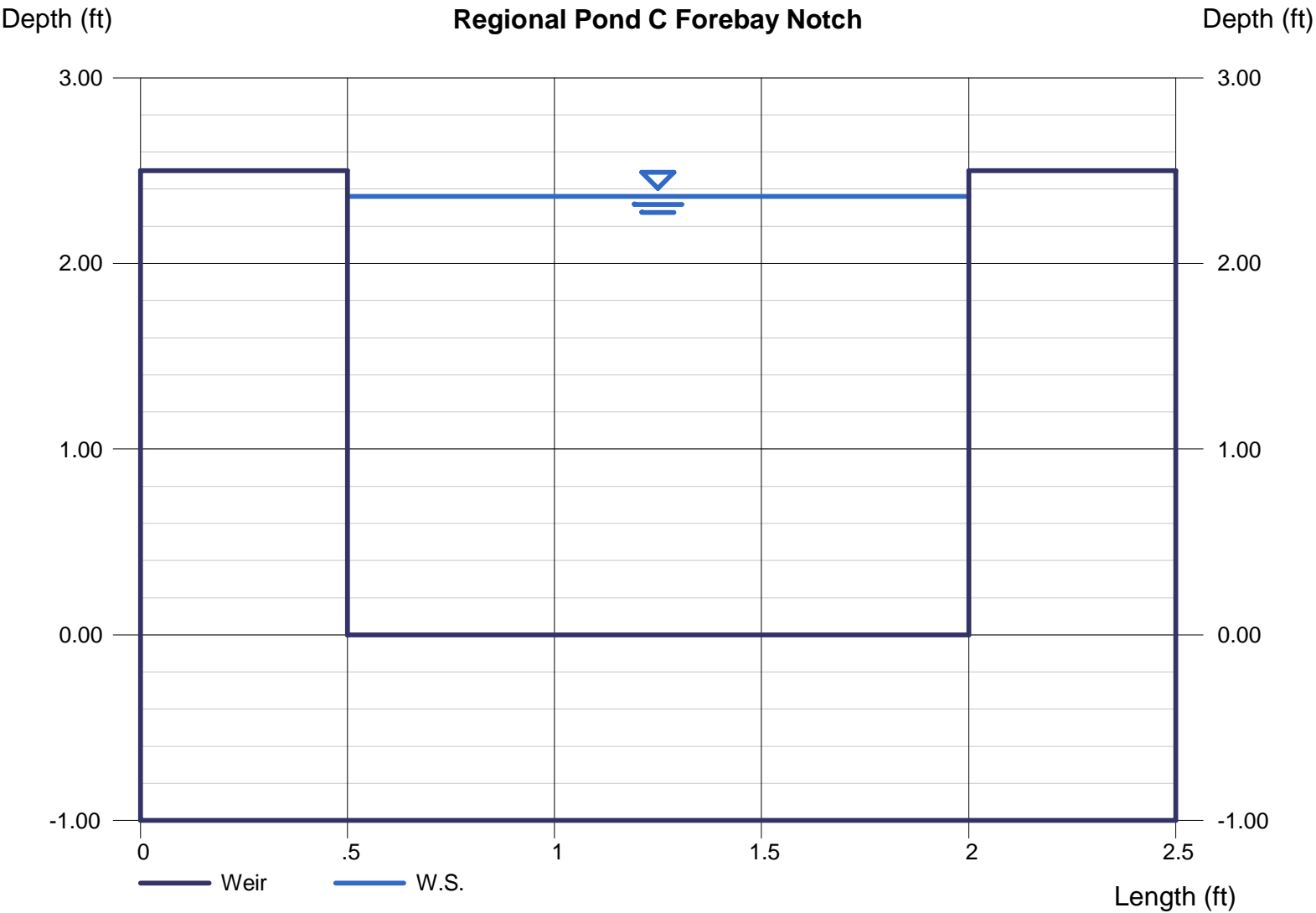
Crest = Sharp
Bottom Length (ft) = 1.50
Total Depth (ft) = 2.50

Calculations

Weir Coeff. Cw = 3.33
Compute by: Known Q
Known Q (cfs) = 18.12

Highlighted

Depth (ft) = 2.36
Q (cfs) = 18.12
Area (sqft) = 3.54
Velocity (ft/s) = 5.11
Top Width (ft) = 1.50



Channel Report

Regional Pond C Trickle Channel

Rectangular

Bottom Width (ft) = 6.00
Total Depth (ft) = 1.00

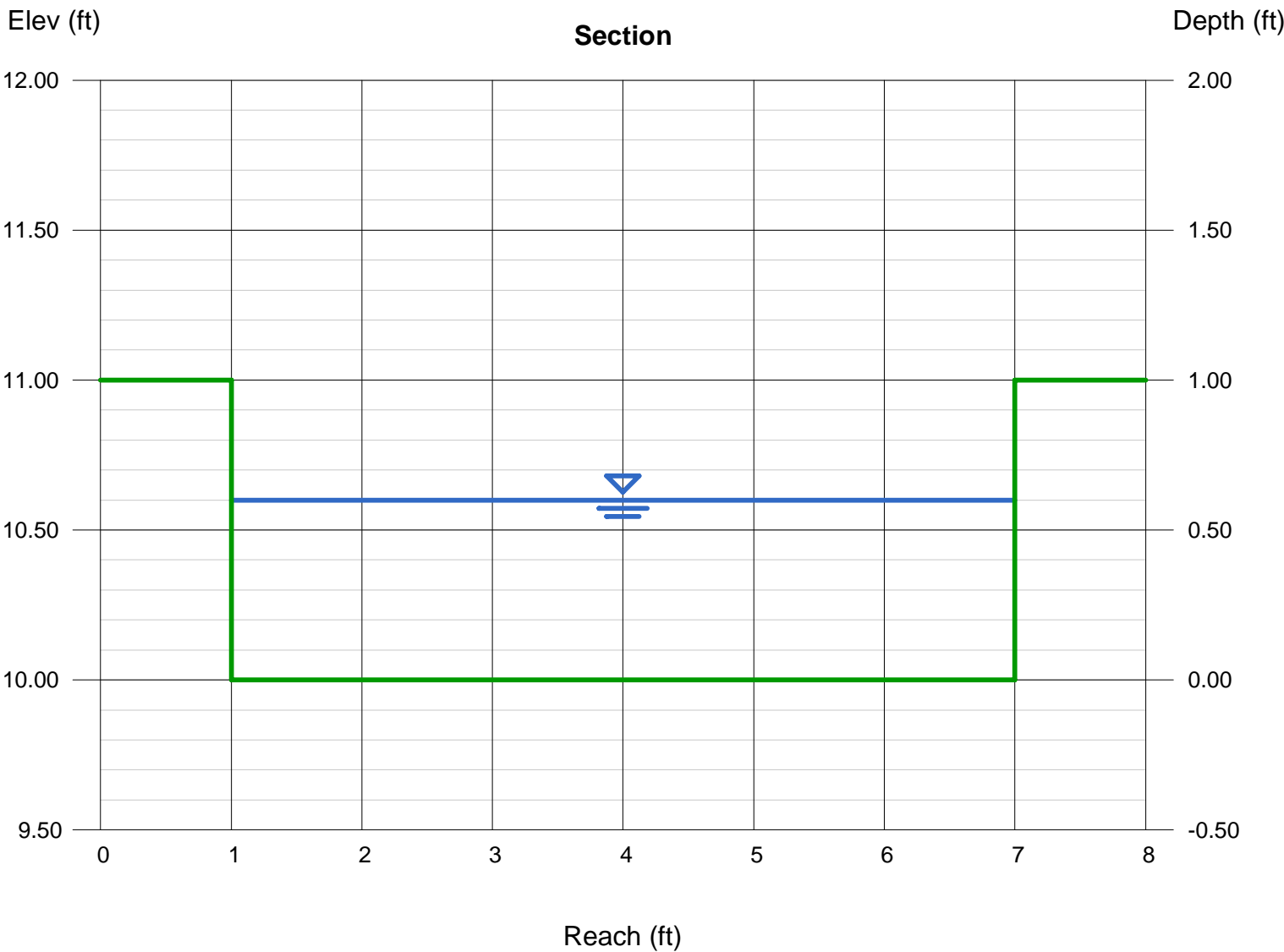
Invert Elev (ft) = 10.00
Slope (%) = 0.50
N-Value = 0.013

Calculations

Compute by: Known Q
Known Q (cfs) = 18.12

Highlighted

Depth (ft) = 0.60
Q (cfs) = 18.12
Area (sqft) = 3.60
Velocity (ft/s) = 5.03
Wetted Perim (ft) = 7.20
Crit Depth, Yc (ft) = 0.66
Top Width (ft) = 6.00
EGL (ft) = 0.99



Weir Report

Regional Pond C Spillway

Trapezoidal Weir

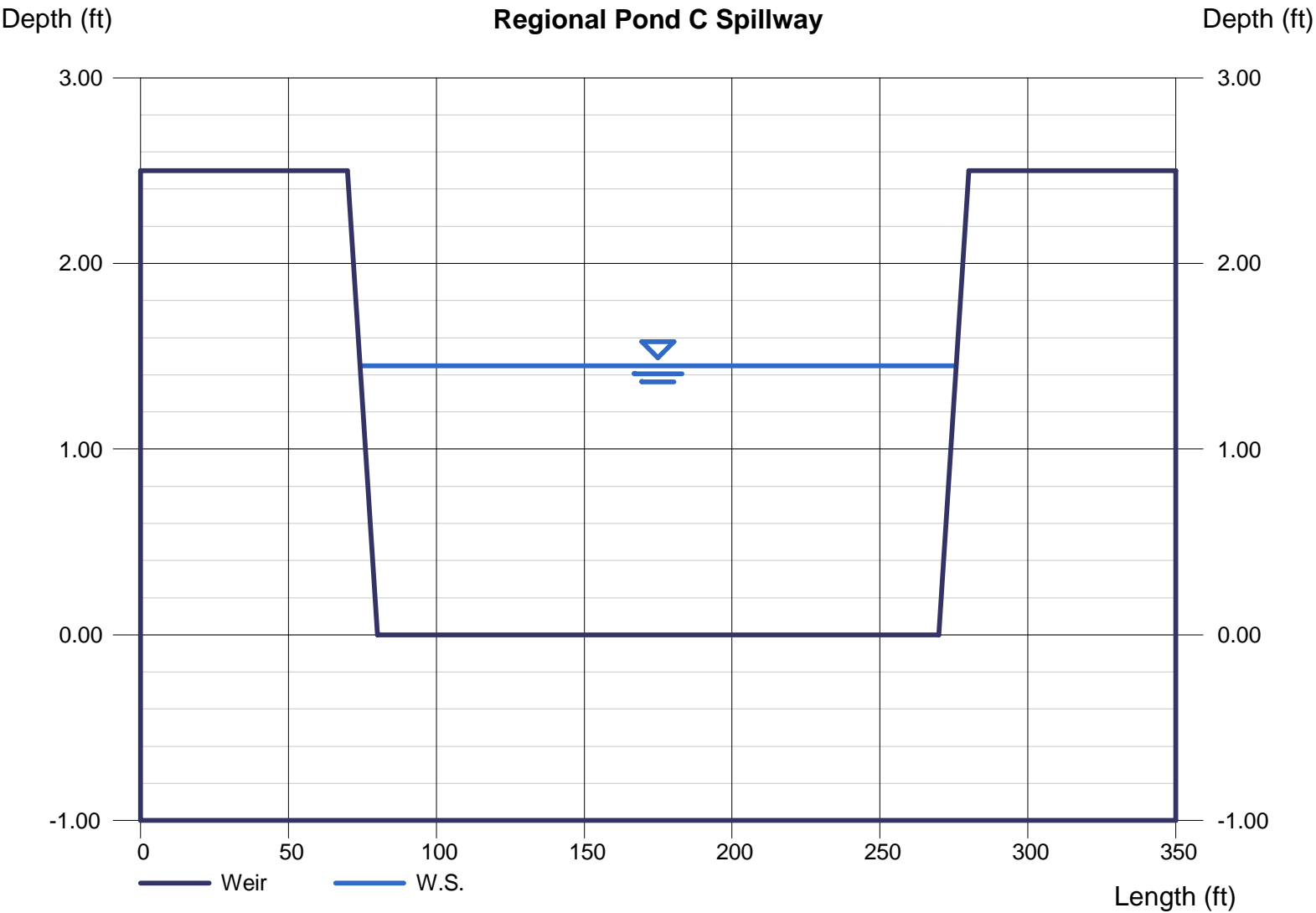
Crest = Sharp
Bottom Length (ft) = 190.00
Total Depth (ft) = 2.50
Side Slope (z:1) = 4.00

Highlighted

Depth (ft) = 1.45
Q (cfs) = 1044.40
Area (sqft) = 283.91
Velocity (ft/s) = 3.68
Top Width (ft) = 201.60

Calculations

Weir Coeff. Cw = 3.10
Compute by: Known Q
Known Q (cfs) = 1044.40



September 18, 2023

Dan Osoba
City of Aurora – Planning Department
15151 E. Alameda Parkway, Suite 2300
Aurora, Colorado 80012

Re: The Parklands Village 1 – Letter of Authorization

Dear Dan:

Authorization:

This letter is being submitted on behalf of **NL Village 1 Land Co., LLC**, the "Property Owner", and hereby authorizes Integrity Land Ventures LLC and Norris Design to submit planning and entitlement documents on behalf of the Property Owner to allow for the construction of regional drainage improvements by Century Land Holdings, LLC (Integrity Land Ventures LLC and Norris Design are authorized representatives for Century Land Holdings, LLC as authorized by the Letter of Authorization included with this letter) on the property known by parcel ID 1977-20-2-00-004 within Arapahoe County, Colorado.

Please note that, upon completion of the appropriate reviews and prior to submittal of approved documents, the Property Owner will sign the formal documents before any recordation of these planning and entitlement documents occurs.

Please feel free to contact me if you have any questions or concerns.

Sincerely,



Tom Clark
NL Village 1 Land Co., LLC

APPENDIX E
REFERENCE MATERIAL

MASTER DRAINAGE REPORT

FOR

Parklands Development
AURORA, COLORADO
CASE NO. 1583556

Prepared for:

NL Parklands, LLC
8678 Concord Center Drive, #200
Englewood, CO 80112
Contact: Mark Nickless
Phone: 303-346-7006

Prepared by:



CORE Consultants, Inc.
3473 South Broadway
Englewood, CO 80113
Contact: Rob Hansen, PE
Phone: 303-703-4444
CORE Project Number: 20-226

February 18, 2023

FACSIMILE

THIS ELECTRONIC PLAN IS A FACSIMILE
OF THE SIGNED AND SEALED PDF SET.


ROBERT D. HANSEN, PE, CFM 2/19/2023
DATE

APPROVED FOR ONE YEAR FROM THIS DATE	
<hr/>	
City Engineer	Date
Aurora Water Department	Date

IV. DRAINAGE PLAN

A. General Concept

The general drainage concept for the Parklands Development is to convey flows adequately and efficiently through the site in accordance with Aurora's stormwater regulations, the previous Eastern Hills Master Drainage Plan, and all other surrounding approved Master Drainage Plans. All surrounding MDP tie-ins are summarized on the Existing MDP Discharge Tie-Ins Map included in Appendix F.

The proposed drainage design for the developed site aims to generally maintain historic flow patterns, as well as analyze subbasins similar to those originally considered for the developed condition of the Eastern Hills MDP. All subbasin delineations for this study are based on the City of Aurora 2013 LiDAR and are described in detail below.

Developed Subbasin A-1 is located in the southwest portion of the site and consists of 117.7 acres of single-family residential, neighborhood business, multi-family, school, park, undeveloped, Pond A water quality capture volume (WQCV), and paved land uses. The calculated percent imperviousness for this subbasin is 56.7%. Runoff from this subbasin will ultimately flow north via curb and gutter, closed conduit, and open channel to Pond A, which will be an online full-spectrum detention (FSD) pond located at the northern end of the subbasin. The open channel designed within this subbasin will be designed as a regional HFLM, maintenance eligible channel.

Developed Subbasin A-2 is located in the southwest corner of the site just south of Developed Subbasin A-1 and consists of 89.2 acres of single-family residential, multi-family residential, park, undeveloped, commercial, and paved land uses. The calculated percent imperviousness for this subbasin is 80.8%. Runoff from this subbasin will ultimately flow north via curb and gutter, closed conduit, and open channel to Pond A.

Developed Subbasin B-1 is located in the in the southwest portion of the site, just east of Developed Subbasins A-1 and A-2. This subbasin consists of 68.2 acres of single-family residential, park, undeveloped, Pond B WQCV, and paved land uses, resulting in a calculated percent imperviousness value of 45.2%. Runoff from this subbasin will ultimately flow north via curb and gutter and closed conduit towards Pond B, which will be an offline FSD detention pond located within the subbasin.

Developed Subbasin B-2 is located in the in the southwest portion of the site, just south of Developed Subbasin B-1. This subbasin consists of 85.6 acres of single-family residential, park, undeveloped, school, and paved land uses, resulting in a calculated percent imperviousness value of 57.8%. Runoff from this subbasin will ultimately flow north via curb and gutter and closed conduit towards Pond B.

Developed Subbasin C is located in the in the southwest corner of the site, just east of Developed Subbasin A-2 and south of Developed Subbasin B-2. This subbasin consists of 68.2 acres of single-family residential, park, undeveloped, Pond C WQCV, and paved land uses, resulting in a calculated percent

imperviousness value of 54.8%. Runoff from this subbasin will ultimately flow east via curb and gutter towards Pond C, which will be an offline FSD detention pond located within the subbasin.

Developed Subbasin D is located near the center of the site, abutting the Harmony Development. This subbasin consists of 64.1 acres of single-family residential, oil and gas, parks, and paved land uses, resulting in a calculated percent imperviousness value of 56.5%. Runoff from this subbasin will generally flow southwest via curb and gutter towards the proposed culvert crossing under the future Powhaton Road alignment. Flows will then be conveyed south via a closed conduit system to Pond E, which will be an offline FSD pond located in Sub-basin E-1. The closed conduit storm drain system is necessary to convey flows from the future low point in Powhaton Rd. The storm drain is anticipated to cross developable area, hopefully within roadways, in order to reach Pond E and may have depths of around 20feet.

Developed Subbasin E-1 is located in the south-central portion of the site and consists of 54.4 acres of single-family residential, park, Pond E WQCV and open space land uses. The calculated percent imperviousness for this subbasin is 28.5%. Runoff from this subbasin will generally flow south via curb and gutter to Pond E, which will be an offline FSD pond located within the subbasin.

Developed Subbasin E-2 is located in the center of the site, just northeast of Developed Subbasin E-1. This subbasin consists of 59.4 acres of single-family residential, paved, and park land uses, resulting in a calculated percent imperviousness value of 60.6%. Runoff from this subbasin will generally flow west via curb and gutter and buried pipe to Developed Subbasin E-1 before ultimately reaching Pond E.

Developed Subbasin E-3 is located directly west of Developed Subbasins E-1 and E-2. This subbasin consists of 187.5 acres of commercial, multi-family residential, undeveloped, parks, and paved land uses, resulting in a calculated percent imperviousness value of 79.9%. Runoff from this subbasin will generally flow west via curb and gutter, open channel, and closed conduit to Pond E. The open channel designed within this subbasin will be designed as a regional HFLM, maintenance eligible channel.

Developed Subbasin E-4 is located directly south of Developed Subbasins M-3 and north of E-3. This subbasin consists of 27.0 acres of commercial, multi-family residential, undeveloped, parks, and paved land uses, resulting in a calculated percent imperviousness value of 60.5%. Runoff from this subbasin will generally flow southwest via curb and gutter, open channel, and closed conduit to Pond E.

Developed Subbasin F is located in the central portion of the site, just west of Developed Subbasin D. This subbasin consists of 24.4 acres of single-family residential land use, resulting in a calculated percent imperviousness value of 60.0%. Runoff from this subbasin will be conveyed northwest via curb and gutter and buried pipe to Pond L, which will be an offline pond located within Developed Subbasin L. Subbasin F sits above the aforementioned erosional feature identified in the *Sand Creek Fluvial Hazard Mapping* study. During the site

Offsite Subbasin OS-8 is located south of development, just south of Developed Subbasin C and surrounds Offsite Subbasin OS-7. This subbasin consists of 263.7 acres of land, which was assigned a future impervious percentage of 54.8% according to the 2013 Sand Creek Colfax to Yale. Runoff from this subbasin flows north via closed conduit directly to Pond C. The open channel that will be designed within this subbasin will be designed as a regional HFLM, maintenance eligible channel.

Offsite Subbasin VMC_C is located south of the development, just south of Developed Subbasin A-2 and west of Offsite Subbasin OS-8. This subbasin falls within the future Villages at Murphy Creek development and was assigned a future impervious percentage of 63.0% according to the approved Master Drainage Plan for the development. Flows from VMC_C will be conveyed to Pond C through a closed conduit or a swale, mostly like a closed conduit in Jewell Ave. The Village at Murphy Creek MDR shows two future detention ponds, C1 and C3, to attenuate flows. Future undetained flow rates were calculated for offsite subbasin VMC_C to reflect the emergency overflows that will need to be accommodated from Villages at Murphy Creek. Additionally, the Village at Murphy Creek MDR states that Eastern Hills is to provide surface conveyance for emergency overflows and that future analysis will be required by Villages of Murphy Creek for the connection to Coal Creek.

Offsite Subbasin TR-O1 is located north of the development within the Traditions subdivision. This subbasin was adopted from the Traditions Filing 4 Final Drainage Report and Construction Plans, encompasses 1.5 acres of paved roadway along S. Harvest Road, and was therefore assigned an impervious percentage of 100%. Runoff from this subbasin will flow south via curb and gutter to a 30" RCP under Alameda Avenue, which will convey flows to Subbasin I, within the Parklands development.

Offsite Subbasin TR-O3 is located north of the development within the Traditions subdivision. This subbasin was adopted from the Traditions Filing 4 Final Drainage Report and Construction Plans, encompasses 2.2 acres of paved roadway along Alameda Avenue, and was therefore assigned an impervious percentage of 100%. Runoff from this subbasin will flow west via curb and gutter to a 30" RCP under Alameda Avenue, which will convey flows to Subbasin I within the Parklands development.

A subbasin for the area of Coal Creek that is not being developed has not been defined as this area is not going to be developed and will remain open/stream space. The flow rates for Coal Creek have been referenced from the FHAD.

B. Specific Details

As previously discussed, CUHP 2005 v. 2.0.1 models were developed for both the existing and proposed site conditions this Master Drainage Plan. The resulting hydrographs and peak flow rates were then utilized to design the necessary stormwater detention infrastructure to manage the increase in runoff associated with the development.

Detailed summaries of each proposed stormwater detention facility are provided below. Preliminary design calculations and a summary table of the pond

characteristics are provided in Appendix A and on the Master Drainage Plan Maps.

Detention Pond A is a private online FSD pond that serves a total tributary area of 206.9 acres, which includes Developed Subbasins A-1 and A-2. This area includes single-family residential, commercial, multi-family residential, school, park, neighborhood business, WQCV, and paved land uses and was subsequently assigned a weighted impervious percentage of 67.1%. Specifically, the pond will be designed as an online EDB located at the northern end of Developed Subbasin A-1. The required 100-year volume is 25.35 ac-ft and the 100-year peak discharge rate is 199 cfs. Pond A will discharge to Coal Creek.

Detention Pond B is a private offline FSD pond that serves a total tributary area of 153.8 acres, which includes Developed Subbasins B-1 and B-2. This area includes single-family residential, school, park, undeveloped, and paved land uses and was subsequently assigned a weighted impervious percentage of 52.5%. Specifically, the pond will be designed as an offline EDB located at the northern end of Developed Subbasin B-1. The required 100-year volume is 15.28 ac-ft and the 100-year peak discharge rate is 147 cfs. Pond B will discharge to Coal Creek.

Detention Pond C is a public regional offline FSD pond that serves a total tributary area of 419.4 acres, which includes Developed Subbasins C, VMC_C, OS-7, and OS-8. This area includes single-family residential, school, park, and paved land uses and was subsequently assigned a weighted impervious percentage of 56.1%. This area includes single-family residential, park, paved, and undeveloped land uses, as well as the future Eastern Hills Village 2 development and the Villages at Murphy Creek development. Specifically, the pond will be designed as an offline EDB located at the eastern edge of Developed Subbasin C. The required 100-year volume is 43.89 ac-ft and the 100-year peak discharge rate is 416cfs. Pond C will discharge to Coal Creek.

Detention basin sizing was completed assuming undetained flows from the Villages at Murphy Creek (VMC_C) which includes plans for two local detention ponds. Impacts on detention basin sizing for regional Pond C should be explored. The current approach is conservative as it assumes the Villages at Murphy Creek detention is incapacitated. However, undetained or emergency flow conveyance from Villages at Murphy Creek to Detention Pond C will need to be considered with future Preliminary Drainage Reports.

Detention Pond E is a public regional offline FSD pond that serves a total tributary area of 482.6 acres, which includes Developed Subbasins D, E-1, E-2, E-3, E-4, and OS-3. This area includes single-family residential, multi-family residential, commercial, school, park, undeveloped, WQCV, and paved land uses and a portion of Eastern Hills Village 5. Therefore, this tributary area was assigned a weighted impervious percentage of 62.8%. Specifically, the pond will be designed as an offline EDB located at the western edge of Developed Subbasin E-1. The required 100-year volume is 55.92 ac-ft and the 100-year peak discharge rate is 416cfs. Pond E will discharge to Coal Creek via a large diameter pipe or small box culvert that will outfall to the existing floodplain terrace.

Proposed Condition CUHP and SWMM

CUHP INPUTS - DEVELOPED CONDITION

Columns with this color heading are for required user-input
 Columns with this color heading are for optional override values
 Columns with this color heading are for program-calculated values

								Maximum Depression Storage (Watershed inches)		Horton's Infiltration Parameters			DCIA
Subcatchment Name	EPA SWMM Target Node	Raingage	Area (mi²)	Length to Centroid (mi)	Length (mi)	Slope (ft/ft)	Percent Imperviousness	Pervious	Impervious	Initial Rate (in/hr)	Decay Coefficient (1/seconds)	Final Rate (in/hr)	Level 0, 1, or 2
A-1	A-1	Design Storm	0.18395135	0.267613636	0.6948864	0.013	56.73544035	0.35	0.1	3.2902	0.0018	0.5193	0
A-2	A-2	Design Storm	0.139372177	0.364015152	0.6378788	0.041	80.77189383	0.35	0.1	3	0.0018	0.5	0
B-1	B-1	Design Storm	0.106497549	0.262386364	0.5547348	0.006	45.21761268	0.35	0.1	3.2124	0.0018	0.5142	0
B-2	B-2	Design Storm	0.133756585	0.159375	0.5222159	0.016	57.76615395	0.35	0.1	3.1039	0.0018	0.5069	0
C	C	Design Storm	0.106574456	0.175167049	0.5570806	0.016653942	54.82635906	0.35	0.1	3.1081	0.001775549	0.5154	0
D	D	Design Storm	0.100219851	0.121022727	0.3545455	0.007478632	56.50176125	0.35	0.1	4.6804	0.001403017	0.7444	0
E-1	E-1	Design Storm	0.085041026	0.293560606	0.4721591	0.023265142	28.45078052	0.35	0.1	4.5122	0.001773213	0.6097	0
E-2	E-2	Design Storm	0.092783274	0.220516862	0.4287209	0.017	60.61503929	0.35	0.1	4.5	0.0018	0.6	0
E-3	E-3	Design Storm	0.292994724	0.408269896	0.8213311	0.018530793	79.85660016	0.35	0.1	4.5072	0.001784262	0.6057	0
E-4	E-4	Design Storm	0.042138064	0.071104816	0.2793284	0.032	60.51362105	0.35	0.1	4.5	0.0018	0.6	0
F	F	Design Storm	0.038163399	0.075132576	0.2429924	0.0109119	60	0.35	0.1	4.6061	0.001566554	0.6849	0
G	G	Design Storm	0.066507404	0.207102273	0.4327083	0.029	79.13083083	0.35	0.1	4.124	0.00171415	0.604	0
H	H	Design Storm	0.152586545	0.198125	0.6585795	0.022	52.1284921	0.35	0.1	4.281	0.00163129	0.642	0
I	I	Design Storm	0.117582389	0.260679415	0.5662304	0.023805959	56.18043091	0.35	0.1	4.442	0.001787148	0.6004	0
J	J	Design Storm	0.125223668	0.263257576	0.6712121	0.007336	57.23840188	0.35	0.1	4.0165	0.0018	0.5678	0
K	K	Design Storm	0.174025267	0.242679173	0.7243992	0.01091235	65.79469476	0.35	0.1	3.7607	0.0018	0.5507	0
L	L	Design Storm	0.222893384	0.23037816	0.6650995	0.016367488	50.64571825	0.35	0.1	4.5381	0.001712076	0.6318	0
M-1	M-1	Design Storm	0.211201837	0.291089157	0.7892694	0.012115453	68.63171756	0.35	0.1	4.5	0.0018	0.6	0
M-2	M-2	Design Storm	0.053977071	0.197381847	0.4225727	0.017550858	66.70343426	0.35	0.1	4.5	0.0018	0.6	0
M-3	M-3	Design Storm	0.265888487	0.371041667	0.6112689	0.018	58.80164792	0.35	0.1	4.5006	0.0017986	0.6005	0
N	N	Design Storm	0.036305435	0.094507576	0.2043561	0.01668	70.06039072	0.35	0.1	4.8441	0.00104308	0.8752	0
P	P	Design Storm	0.074006201	0.30719697	0.4471591	0.0233	4.538365103	0.35	0.1	4.3347	0.001797849	0.5897	0
OS-1	OS-1	Design Storm	0.208307045	0.383750607	0.7579679	0.015967564	60	0.35	0.1	4.5	0.0018	0.6	0
OS-2	OS-2	Design Storm	0.065500969	0.274176533	0.4729072	0.02022913	50	0.35	0.1	4.5	0.0018	0.6	0
OS-3	OS-3	Design Storm	0.14090041	0.278553426	0.6076836	0.014024808	54.7	0.35	0.1	4.5	0.0018	0.6	0
OS-5	OS-5	Design Storm	0.024653885	0.108910728	0.2212936	0.026068548	90	0.35	0.05	4.6069	0.001564917	0.6855	0
OS-6	OS-6	Design Storm	0.018192438	0.106987904	0.2059354	0.031451349	80	0.35	0.1	4.7835	0.001176262	0.8268	0
OS-7	OS-7	Design Storm	0.031475401	0.114048349	0.2491322	0.011496015	55	0.35	0.1	3	0.0018	0.5	0
OS-8	OS-8	Design Storm	0.412464527	0.66904182	1.1335828	0.025156284	54.8	0.35	0.1	3.0079	0.0018	0.5005	0
VMC_C	VMC_C	Design Storm	0.105232304	0.142434857	0.405605	0.017035578	63	0.35	0.1	3	0.0018	0.5	0
TR-O1	TR-O1	Design Storm	0.002343750	0.047159091	0.113447	0.0182	100	0.35	0.1	4.5	0.0018	0.6	0
TR-O3	TR-O3	Design Storm	0.003437500	0.099621212	0.2361742	0.0181	100	0.35	0.1	4.5	0.0018	0.6	0

Proposed SWMM 100yr Input

EPA STORM WATER MANAGEMENT MODEL - VERSION 5.1 (Build 5.1.012)

NOTE: The summary statistics displayed in this report are
based on results found at every computational time step,
not just on results from each reporting time step.

***** 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 08/13/2021 00:00:00

Ending Date 08/14/2021 12:00:00

Antecedent Dry Days 0.0

Report Time Step 00:05:00

Routing Time Step 15.00 sec

*****	Volume	Volume
Flow Routing Continuity	acre-feet	10^6 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	424.563	138.350
External Outflow	367.495	119.754
Flooding Loss	0.000	0.000
Evaporation Loss	0.000	0.000
Exfiltration Loss	0.000	0.000
Initial Stored Volume	0.000	0.000
Final Stored Volume	57.721	18.809
Continuity Error (%)	-0.154	

***** Highest Flow Instability Indexes

All links are stable.

***** Routing Time Step Summary

Minimum Time Step : 15.00 sec

Average Time Step : 15.00 sec

Maximum Time Step : 15.00 sec

Percent in Steady State : 0.00

Average Iterations per Step : 1.04

Percent Not Converging : 0.00

***** Node Depth Summary

Node	Type	Average Depth Feet	Maximum Depth Feet	Maximum HGL Feet	Time of Max Occurrence days hr:min	Reported Max Depth Feet
A-2	JUNCTION	0.06	2.55	5622.55	0 00:35	2.53
A-1	JUNCTION	5.53	6.64	5596.14	0 00:40	6.64
B-2	JUNCTION	7.03	8.34	5609.84	0 00:35	8.33
B-1	JUNCTION	0.00	0.00	5607.00	0 00:00	0.00
C	JUNCTION	0.00	0.00	5630.00	0 00:00	0.00
OS-7	JUNCTION	0.07	2.28	5641.28	0 00:35	2.27
OS-8	JUNCTION	0.00	0.00	5683.00	0 00:00	0.00
VMC_C	JUNCTION	0.04	1.37	5643.87	0 00:35	1.36
E-2	JUNCTION	0.08	2.85	5675.85	0 00:35	2.83
E-3	JUNCTION	0.00	0.00	5677.60	0 00:00	0.00
E-4	JUNCTION	0.05	2.14	5704.64	0 00:35	2.14
OS-3	JUNCTION	0.08	2.46	5713.46	0 00:40	2.46
M-3	JUNCTION	0.12	3.78	5674.28	0 00:40	3.77
M-1	JUNCTION	0.00	0.00	5670.00	0 00:00	0.00
OS-2	JUNCTION	0.09	2.32	5692.82	0 00:40	2.31
OS-1	JUNCTION	0.06	2.13	5680.13	0 00:40	2.13
N	JUNCTION	0.00	0.00	5667.10	0 00:00	0.00
JewellAve_CulvUS	JUNCTION	0.09	2.74	5635.74	0 00:40	2.73
PowhatanRd_Culv2US	JUNCTION	0.09	2.84	5660.54	0 00:36	2.78
MonaghanRd_Culv3DS	JUNCTION	0.08	2.46	5711.96	0 00:40	2.46
E-3_CulvUS	JUNCTION	0.07	2.14	5687.14	0 00:35	2.13
E-3_CulvDS	JUNCTION	0.06	1.87	5685.37	0 00:42	1.85
MonaghanRd_Culv1DS	JUNCTION	0.06	2.13	5678.13	0 00:40	2.12
D	JUNCTION	0.04	1.52	5658.62	0 00:35	1.51
MonaghanRd_Culv2DS	JUNCTION	0.09	2.32	5691.32	0 00:40	2.31
SFlatrockTrl_CulvDS	JUNCTION	0.06	2.54	5621.79	0 00:35	2.52
E-1	JUNCTION	0.00	0.00	5645.00	0 00:00	0.00
K	JUNCTION	0.00	0.00	5626.00	0 00:00	0.00
J	JUNCTION	0.00	0.00	5627.50	0 00:00	0.00
P	JUNCTION	0.00	0.00	5605.00	0 00:00	0.00
G	JUNCTION	0.08	3.28	5581.53	0 00:35	3.27
I	JUNCTION	1.53	2.52	5597.52	0 00:35	2.52
H	JUNCTION	0.00	0.00	5604.00	0 00:00	0.00
F_PipeUS	JUNCTION	0.05	1.92	5655.02	0 00:35	1.91
OS-5	JUNCTION	0.07	2.56	5637.81	0 00:35	2.56
OS-6	JUNCTION	0.05	1.84	5642.34	0 00:35	1.84
L	JUNCTION	0.00	0.00	5637.00	0 00:00	0.00
F	JUNCTION	0.00	0.00	5657.25	0 00:00	0.00
I_CulvUS	JUNCTION	0.07	2.71	5593.96	0 00:37	2.69
I_CulvDS	JUNCTION	0.07	2.71	5592.46	0 00:37	2.69
PowhatanRd_CulvDS	JUNCTION	0.08	2.72	5657.82	0 00:35	2.70
TR	JUNCTION	0.04	0.89	5603.76	0 00:35	0.89
TR-01	JUNCTION	0.00	0.00	5605.00	0 00:00	0.00
TR-03	JUNCTION	0.00	0.00	5605.00	0 00:00	0.00
M-2	JUNCTION	0.00	0.00	5665.00	0 00:00	0.00
Pond_AOutfall	OUTFALL	0.00	0.00	5570.90	0 00:00	0.00
Pond_BOutfall	OUTFALL	0.00	0.00	5579.50	0 00:00	0.00
Pond_COutfall	OUTFALL	0.00	0.00	5607.00	0 00:00	0.00
Pond_EOutfall	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Pond_M1Outfall	OUTFALL	0.00	0.00	5652.00	0 00:00	0.00
N_Outfall	OUTFALL	0.00	0.00	5656.00	0 00:00	0.00
Pond_JOutfall	OUTFALL	0.00	0.00	5616.00	0 00:00	0.00
Pond_KOutfall	OUTFALL	0.00	0.00	5614.00	0 00:00	0.00
P_Outfall	OUTFALL	0.00	0.00	5575.00	0 00:00	0.00
Pond_GOutfall	OUTFALL	0.00	0.00	5569.00	0 00:00	0.00
Pond_HOutfall	OUTFALL	0.00	0.00	0.00	0 00:00	0.00
Pond_LOutfall	OUTFALL	0.00	0.00	5585.00	0 00:00	0.00
Pond_M2Outfall	OUTFALL	0.00	0.00	5646.00	0 00:00	0.00
Pond_C	STORAGE	5.06	7.23	5628.23	0 01:20	7.23
Pond_B	STORAGE	4.26	7.38	5601.38	0 01:16	7.38
Pond_A	STORAGE	4.66	7.41	5590.41	0 01:21	7.41
Pond_E	STORAGE	5.11	7.14	5638.84	0 01:23	7.14
Pond_M1(8175)	STORAGE	4.60	7.13	5659.63	0 01:28	7.13
Pond_J	STORAGE	4.23	7.53	5624.53	0 01:28	7.53

Pond_K	STORAGE	4.31	7.41	5621.91	0	01:21	7.41
Pond_G	STORAGE	3.46	5.21	5582.21	0	01:11	5.21
Pond_H	STORAGE	4.48	7.87	5582.87	0	01:19	7.87
Pond_L	STORAGE	4.61	6.87	5629.87	0	01:17	6.86
Pond_M2	STORAGE	0.34	7.16	5670.16	0	00:58	7.15
Pond_N	STORAGE	3.40	8.52	5666.52	0	01:17	8.51

Node Inflow Summary

Node	Type	Maximum Lateral Inflow CFS	Maximum Total Inflow CFS	Time of Max Occurrence days hr:min	Lateral Inflow Volume 10^6 gal	Total Inflow Volume 10^6 gal	Flow Balance Error Percent
A-2	JUNCTION	310.09	310.09	0 00:35	5.79	5.79	-0.000
A-1	JUNCTION	312.09	607.37	0 00:40	6.67	12.5	0.000
B-2	JUNCTION	281.40	281.40	0 00:35	4.91	4.91	0.000
B-1	JUNCTION	126.71	126.71	0 00:45	3.64	3.64	0.000
C	JUNCTION	193.89	193.89	0 00:35	3.83	3.83	0.000
OS-7	JUNCTION	55.35	289.62	0 00:35	1.13	5.03	0.000
OS-8	JUNCTION	585.24	585.24	0 00:45	15	15	0.000
VMC_C	JUNCTION	235.93	235.93	0 00:35	3.9	3.9	0.000
E-2	JUNCTION	171.75	171.75	0 00:35	3.36	3.36	0.000
E-3	JUNCTION	588.86	588.86	0 00:35	11.9	11.9	0.000
E-4	JUNCTION	98.75	98.75	0 00:35	1.46	1.46	0.000
OS-3	JUNCTION	221.43	221.43	0 00:40	4.91	4.91	0.000
M-3	JUNCTION	478.50	503.16	0 00:40	9.5	11.8	0.000
M-1	JUNCTION	376.65	376.65	0 00:40	8.03	8.03	0.000
OS-2	JUNCTION	88.40	88.40	0 00:40	2.21	2.21	0.000
OS-1	JUNCTION	338.45	338.45	0 00:40	7.54	7.54	0.000
N	JUNCTION	78.22	78.22	0 00:35	1.25	1.25	0.000
JewellAve_CulvUS	JUNCTION	0.00	862.08	0 00:40	0	20	0.000
PowhatonRd_Culv2US	JUNCTION	0.00	964.54	0 00:41	0	21.7	0.000
MonaghanRd_Culv3DS	JUNCTION	0.00	221.20	0 00:40	0	4.91	0.000
E-3_CulvUS	JUNCTION	0.00	288.13	0 00:42	0	6.4	0.000
E-3_CulvDS	JUNCTION	0.00	288.05	0 00:42	0	6.4	0.000
MonaghanRd_Culv1DS	JUNCTION	0.00	338.07	0 00:40	0	7.54	0.000
D	JUNCTION	191.92	191.92	0 00:35	3.34	3.34	0.000
MonaghanRd_Culv2DS	JUNCTION	0.00	88.35	0 00:40	0	2.21	0.000
SFlatrockTrl_CulvDS	JUNCTION	0.00	309.68	0 00:35	0	5.79	0.000
E-1	JUNCTION	79.26	79.26	0 00:45	2.44	2.44	0.000
K	JUNCTION	314.30	314.30	0 00:35	6.58	6.58	0.000
J	JUNCTION	178.47	178.47	0 00:40	4.49	4.49	0.000
P	JUNCTION	50.60	50.60	0 00:50	1.77	1.77	0.000
G	JUNCTION	144.70	144.70	0 00:35	2.67	2.67	0.000
I	JUNCTION	200.88	209.91	0 00:35	4.13	4.39	0.000
H	JUNCTION	273.76	273.76	0 00:35	5.15	5.15	0.000
F_PipeUS	JUNCTION	0.00	77.46	0 00:35	0	1.3	0.000
OS-5	JUNCTION	59.41	97.22	0 00:35	1.03	1.71	-0.000
OS-6	JUNCTION	38.72	38.72	0 00:35	0.684	0.684	0.000
L	JUNCTION	386.27	386.27	0 00:35	7.44	7.44	0.000
F	JUNCTION	77.46	77.46	0 00:35	1.3	1.3	0.000
I_CulvUS	JUNCTION	0.00	209.37	0 00:37	0	4.39	0.000
I_CulvDS	JUNCTION	0.00	209.37	0 00:37	0	4.39	0.000
PowhatonRd_CulvDS	JUNCTION	0.00	191.66	0 00:35	0	3.34	0.000
TR	JUNCTION	0.00	9.62	0 00:35	0	0.256	0.000
TR-01	JUNCTION	4.71	4.71	0 00:35	0.102	0.102	0.000
TR-03	JUNCTION	5.02	5.02	0 00:40	0.154	0.154	0.000
M-2	JUNCTION	94.34	94.34	0 00:35	2.03	2.03	0.000
Pond_AOutfall	OUTFALL	0.00	199.17	0 01:21	0	10.6	0.000
Pond_BOutfall	OUTFALL	0.00	146.86	0 01:16	0	7.51	0.000
Pond_COutfall	OUTFALL	0.00	415.57	0 01:20	0	20.9	0.000
Pond_EOutfall	OUTFALL	0.00	396.85	0 01:23	0	22.5	0.000
Pond_M1Outfall	OUTFALL	0.00	216.82	0 01:28	0	13.1	0.000
N_Outfall	OUTFALL	0.00	12.09	0 01:17	0	1.23	0.000

Pond_JOutfall	OUTFALL	0.00	67.44	0	01:28	0	3.9	0.000
Pond_KOutfall	OUTFALL	0.00	94.88	0	01:21	0	5.61	0.000
P_Outfall	OUTFALL	0.00	50.60	0	00:50	0	1.77	0.000
Pond_GOutfall	OUTFALL	0.00	47.98	0	01:11	0	2.21	0.000
Pond_HOutfall	OUTFALL	0.00	149.25	0	01:19	0	8.22	0.000
Pond_LOutfall	OUTFALL	0.00	163.31	0	01:17	0	8.3	0.000
Pond_M2Outfall	OUTFALL	0.00	441.22	0	00:58	0	13.8	0.000
Pond_C	STORAGE	0.00	1048.21	0	00:40	0	23.9	0.069
Pond_B	STORAGE	0.00	391.60	0	00:35	0	8.55	0.064
Pond_A	STORAGE	0.00	607.36	0	00:40	0	12.5	0.064
Pond_E	STORAGE	0.00	1223.25	0	00:41	0	27.4	0.056
Pond_M1(8175)	STORAGE	0.00	662.22	0	00:44	0	15.7	0.059
Pond_J	STORAGE	0.00	178.47	0	00:40	0	4.49	0.042
Pond_K	STORAGE	0.00	314.30	0	00:35	0	6.58	0.054
Pond_G	STORAGE	0.00	144.49	0	00:35	0	2.67	0.059
Pond_H	STORAGE	0.00	477.75	0	00:37	0	9.54	0.049
Pond_L	STORAGE	0.00	556.52	0	00:36	0	10.4	0.061
Pond_M2	STORAGE	0.00	594.27	0	00:40	0	13.9	0.042
Pond_N	STORAGE	0.00	78.22	0	00:35	0	1.25	0.036

Node Flooding Summary

No nodes were flooded.

Storage Volume Summary

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
Pond_C	724.357	15	0	0	1911.684	39	0 01:20	415.57
Pond_B	251.903	18	0	0	665.738	48	0 01:16	146.86
Pond_A	446.544	19	0	0	1104.434	47	0 01:20	199.17
Pond_E	1098.631	18	0	0	2436.045	41	0 01:23	396.85
Pond_M1(8175)	607.270	20	0	0	1387.979	45	0 01:28	216.82
Pond_J	140.837	19	0	0	358.332	49	0 01:28	67.44
Pond_K	232.688	19	0	0	589.859	48	0 01:21	94.88
Pond_G	111.691	16	0	0	243.872	35	0 01:11	47.98
Pond_H	305.319	22	0	0	820.264	60	0 01:19	149.25
Pond_L	414.826	18	0	0	928.819	41	0 01:17	163.31
Pond_M2	13.749	2	0	0	424.487	61	0 00:58	441.22
Pond_N	23.355	15	0	0	118.895	78	0 01:17	12.09

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
Pond_AOutfall	99.50	11.02	199.17	10.628
Pond_BOutfall	99.51	7.79	146.86	7.515
Pond_COutfall	99.51	21.70	415.57	20.934
Pond_EOutfall	99.50	23.31	396.85	22.487
Pond_M1Outfall	99.53	13.55	216.82	13.077
N_Outfall	99.53	1.28	12.09	1.233
Pond_JOutfall	99.51	4.04	67.44	3.900
Pond_KOutfall	99.53	5.82	94.88	5.613
P_Outfall	12.71	14.40	50.60	1.774

Pond_GOutfall	99.49	2.29	47.98	2.212
Pond_HOutfall	99.53	8.52	149.25	8.223
Pond_LOutfall	99.55	8.60	163.31	8.301
Pond_M2Outfall	80.02	17.85	441.22	13.849

System	91.34	140.19	2324.20	119.745

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth

ELouisiana_Culvert1	CONDUIT	607.36	0 00:40	37.96	0.14	0.21
Dummy_B1	DUMMY	126.71	0 00:45			
Dummy_C	DUMMY	193.89	0 00:35			
Dummy_M1	DUMMY	376.65	0 00:40			
ELouisiana_Culvert2	CONDUIT	281.16	0 00:35	42.09	0.28	0.33
Channel_A	CONDUIT	295.52	0 00:40	4.99	0.18	0.36
JewellAve_Swale2	CONDUIT	234.51	0 00:35	9.11	0.23	0.54
JewellAve_Swale1	CONDUIT	283.58	0 00:38	4.40	0.78	0.90
JewellAve_Culvert	CONDUIT	862.00	0 00:40	18.54	0.50	0.50
Dummy_OS8	DUMMY	585.24	0 00:45			
Dummy_E3	DUMMY	588.86	0 00:35			
PowhatanRd_Culvert2	CONDUIT	964.54	0 00:42	16.75	0.47	0.48
MonaghanRD_Culvert3	CONDUIT	221.20	0 00:40	12.42	0.58	0.55
E-3_Culvert	CONDUIT	288.05	0 00:42	15.43	0.39	0.41
Channel_E-3_2	CONDUIT	214.32	0 00:44	3.67	0.09	0.24
Channel_E-3_1	CONDUIT	281.16	0 00:47	4.14	0.37	0.55
E-4_Pipe	CONDUIT	98.82	0 00:35	16.19	0.69	0.61
E-2_Pipe	CONDUIT	170.41	0 00:36	17.92	0.85	0.71
MonaghaRd_Culvert1	CONDUIT	338.07	0 00:40	14.44	0.55	0.53
Channel_M1	CONDUIT	319.61	0 00:47	4.30	0.24	0.42
Dummy_N	DUMMY	78.22	0 00:35			
PowhatanRd_Culvert1	CONDUIT	191.66	0 00:35	12.65	0.18	0.25
MississippiAve_Culvert	CONDUIT	502.83	0 00:40	9.52	0.87	0.76
Channel_M-3_1	CONDUIT	76.32	0 00:57	2.28	0.07	0.20
MonaghanRd_Culvert2	CONDUIT	88.35	0 00:40	11.72	0.64	0.58
SFlatrockTrl_Culvert	CONDUIT	309.68	0 00:35	12.19	0.59	0.56
Dummy_E1	DUMMY	79.26	0 00:45			
Dummy_K	DUMMY	314.30	0 00:35			
Dummy_J	DUMMY	178.47	0 00:40			
SHarvestRd_Culvert	CONDUIT	144.49	0 00:35	9.81	0.96	0.82
SHarvestRd_Culert	DUMMY	273.76	0 00:35			
Channe_I_1	CONDUIT	209.37	0 00:37	5.53	0.31	0.51
Dummy_L	DUMMY	386.27	0 00:35			
OS-6_Pipe	CONDUIT	38.35	0 00:36	8.58	0.69	0.61
F_Pipe	CONDUIT	76.16	0 00:36	14.42	0.57	0.54
Dummy_F	DUMMY	77.46	0 00:35			
OS-5,OS-6_Pipe	CONDUIT	96.24	0 00:37	11.59	0.73	0.63
I_Culvert	CONDUIT	209.37	0 00:37	14.06	0.64	0.60
Channel_I_2	CONDUIT	209.09	0 00:38	4.95	0.37	0.56
Pipe_D	CONDUIT	181.92	0 00:40	8.87	0.55	0.53
TR_Pipe	CONDUIT	9.52	0 00:38	6.16	0.27	0.35
Dummy_TR-01	DUMMY	4.71	0 00:35			
Dummy_TR-03	DUMMY	5.02	0 00:40			
P_Dummy	DUMMY	50.60	0 00:50			
M2_Dummy	DUMMY	94.34	0 00:35			
Pond_AOutfallStructure	DUMMY	199.17	0 01:21			
Pond_BOutfallStructure	DUMMY	146.86	0 01:16			
Pond_COutfallStructure	DUMMY	415.57	0 01:20			
Pond_EOutfallStructure	DUMMY	396.85	0 01:23			
Pond_M1OutfallStructure	DUMMY	216.82	0 01:28			
Pond_JOutfallStructure	DUMMY	67.44	0 01:28			
Pond_KOutfallStructure	DUMMY	94.88	0 01:21			

Pond_GOutfallStructure DUMMY	47.98	0	01:11
Pond_HOutfallStructure DUMMY	149.25	0	01:19
Pond_LOutfallStructure DUMMY	163.31	0	01:17
Pond_M2_OutfallStructure DUMMY	441.22	0	00:58
Pond_N_OutfallStructure DUMMY	12.09	0	01:17

Conduit Surcharge Summary

No conduits were surcharged.

Analysis begun on: Fri Feb 17 15:35:47 2023

Analysis ended on: Fri Feb 17 15:35:47 2023

Total elapsed time: < 1 sec

APPENDIX B

HYDRAULIC COMPUTATIONS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

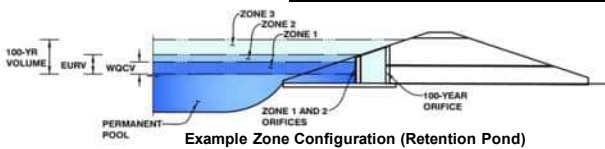
MHFD-Detention, Version 4.04 (February 2021)

Project: **Parklands Development MDP**

Basin ID: **Pond C (Subbasins C, OS-7, OS-8, VMC_C)**

POND C

Pond sheets are only used for storage curves, rating curves, WQCV volumes and EURV volumes and are not for final design



Watershed Information

Selected BMP Type =	EDB
Watershed Area =	419.40 acres
Watershed Length =	5,901 ft
Watershed Length to Centroid =	2,876 ft
Watershed Slope =	0.021 ft/ft
Watershed Imperviousness =	56.1% percent
Percentage Hydrologic Soil Group A =	0.4% percent
Percentage Hydrologic Soil Group B =	1.0% percent
Percentage Hydrologic Soil Groups C/D =	98.6% percent
Target WQCV Drain Time =	40.0 hours
Location for 1-hr Rainfall Depths =	User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) =	7.819 acre-feet
Excess Urban Runoff Volume (EURV) =	22.517 acre-feet
2-yr Runoff Volume (P1 = 0.86 in.) =	15.682 acre-feet
5-yr Runoff Volume (P1 = 1.14 in.) =	23.475 acre-feet
10-yr Runoff Volume (P1 = 1.4 in.) =	31.998 acre-feet
25-yr Runoff Volume (P1 = 1.79 in.) =	47.234 acre-feet
50-yr Runoff Volume (P1 = 2.12 in.) =	59.266 acre-feet
100-yr Runoff Volume (P1 = 2.48 in.) =	73.632 acre-feet
500-yr Runoff Volume (P1 = 3.4 in.) =	107.980 acre-feet
Approximate 2-yr Detention Volume =	14.410 acre-feet
Approximate 5-yr Detention Volume =	22.038 acre-feet
Approximate 10-yr Detention Volume =	26.497 acre-feet
Approximate 25-yr Detention Volume =	31.874 acre-feet
Approximate 50-yr Detention Volume =	34.680 acre-feet
Approximate 100-yr Detention Volume =	40.484 acre-feet

Optional User Overrides

	acre-feet
0.86	inches
1.14	inches
1.40	inches
1.79	inches
2.12	inches
2.48	inches
3.40	inches

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	7.819 acre-feet
Zone 2 Volume (EURV - Zone 1) =	14.697 acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	17.968 acre-feet
Total Detention Basin Volume =	40.484 acre-feet
Initial Surge Volume (ISV) =	1,022 ft ³
Initial Surge Depth (ISD) =	0.33 ft
Total Available Detention Depth (H _{total}) =	7.00 ft
Depth of Trickle Channel (H _{TC}) =	0.50 ft
Slope of Trickle Channel (S _{TC}) =	0.005 ft/ft
Slopes of Main Basin Sides (S _{main}) =	4 H:V
Basin Length-to-Width Ratio (R _{L/W}) =	2
Initial Surge Area (A _{ISV}) =	3,096 ft ²
Surcharge Volume Length (L _{ISV}) =	55.6 ft
Surcharge Volume Width (W _{ISV}) =	55.6 ft
Depth of Basin Floor (H _{FLOOR}) =	4.93 ft
Length of Basin Floor (L _{FLOOR}) =	1,061.4 ft
Width of Basin Floor (W _{FLOOR}) =	548.6 ft
Area of Basin Floor (A _{FLOOR}) =	582,314 ft ²
Volume of Basin Floor (V _{FLOOR}) =	1,031,806 ft ³
Depth of Main Basin (H _{MAIN}) =	1.24 ft
Length of Main Basin (L _{MAIN}) =	1,071.3 ft
Width of Main Basin (W _{MAIN}) =	558.6 ft
Area of Main Basin (A _{MAIN}) =	598,384 ft ²
Volume of Main Basin (V _{MAIN}) =	732,010 ft ³
Calculated Total Basin Volume (V _{total}) =	40.551 acre-feet

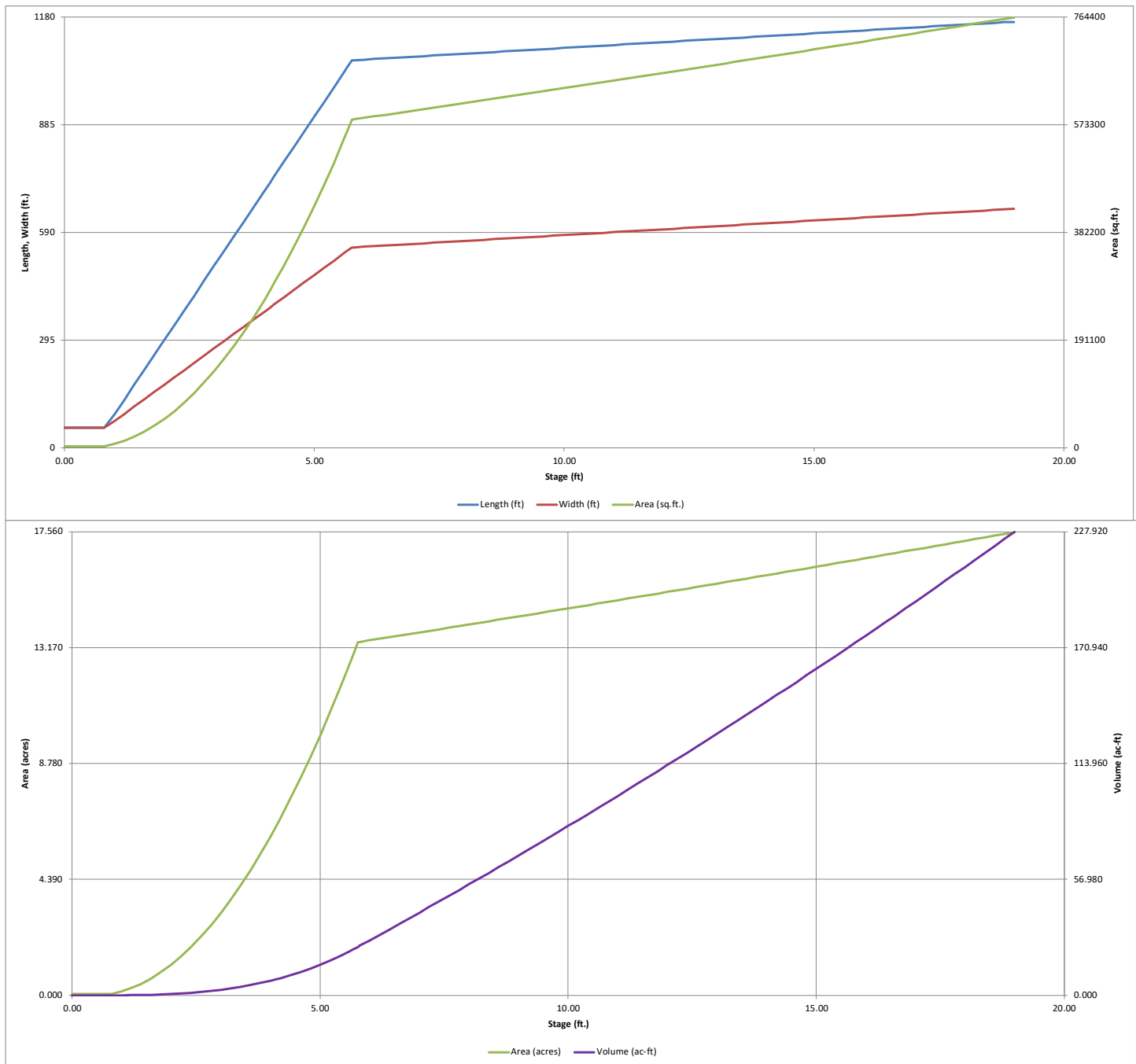
Depth Increment =	0.20	ft							
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft ²)	Optional Override Area (ft ²)	Area (acre)	Volume (ft ³)	Volume (ac-ft)
Top of Micropool	0.00		55.6	55.6	3,096		0.071		
ISV	0.33		55.6	55.6	3,096		0.071	1,022	0.023
	0.40		55.6	55.6	3,096		0.071	1,239	0.028
	0.60		55.6	55.6	3,096		0.071	1,858	0.043
	0.80		55.6	55.6	3,096		0.071	2,477	0.057
	1.00		90.3	72.6	6,562		0.151	3,374	0.077
	1.20		131.1	92.6	12,148		0.279	5,218	0.120
	1.40		171.9	112.6	19,367		0.445	8,342	0.192
	1.60		212.7	132.6	28,217		0.648	13,074	0.300
	1.80		253.5	152.6	38,700		0.888	19,738	0.453
	2.00		294.3	172.6	50,814		1.167	28,662	0.658
	2.20		335.1	192.6	64,561		1.482	40,173	0.922
	2.40		375.9	212.6	79,939		1.835	54,595	1.253
	2.60		416.7	232.6	96,950		2.226	72,257	1.659
	2.80		457.5	252.6	115,592		2.654	93,484	2.146
	3.00		498.3	272.6	135,867		3.119	118,603	2.723
	3.20		539.1	292.6	157,773		3.622	147,939	3.396
	3.40		579.9	312.6	181,311		4.162	181,821	4.174
	3.60		620.7	332.6	206,482		4.740	220,573	5.064
	3.80		661.5	352.6	233,284		5.355	264,522	6.073
	4.00		702.3	372.6	261,719		6.008	313,995	7.208
Zone 1 (WQCV)	4.11		724.8	383.6	278,054		6.383	343,678	7.890
	4.20		743.1	392.6	291,785		6.698	369,319	8.478
	4.40		783.9	412.6	323,484		7.426	430,818	9.890
	4.60		824.7	432.6	356,814		8.191	498,821	11.451
	4.80		865.5	452.6	391,777		8.994	573,653	13.169
	5.00		906.3	472.6	428,371		9.834	655,640	15.051
	5.20		947.1	492.6	466,598		10.712	745,110	17.105
	5.40		987.9	512.6	506,456		11.627	842,388	19.339
	5.60		1,028.7	532.6	547,947		12.579	947,801	21.759
Zone 2 (EURV)	5.67		1,043.0	539.6	562,854		12.921	986,678	22.651
Floor	5.76		1,061.4	548.6	582,314		13.368	1,038,208	23.834
	5.80		1,061.7	549.0	582,829		13.380	1,061,511	24.369
	6.00		1,063.3	550.6	585,409		13.439	1,178,335	27.051
	6.20		1,064.9	552.2	587,994		13.498	1,295,675	29.745
	6.40		1,066.5	553.8	590,584		13.558	1,413,533	32.450
	6.60		1,068.1	555.4	593,179		13.618	1,531,909	35.168
	6.80		1,069.7	557.0	595,779		13.677	1,650,805	37.897
Zone 3 (100-year)	7.00		1,071.3	558.6	598,384		13.737	1,770,221	40.639
	7.20		1,072.9	560.2	600,994		13.797	1,890,159	43.392
	7.40		1,074.5	561.8	603,610		13.857	2,010,619	46.157
	7.60		1,076.1	563.4	606,230		13.917	2,131,603	48.935
	7.80		1,077.7	565.0	608,856		13.977	2,253,111	51.724
	8.00		1,079.3	566.6	611,487		14.038	2,375,145	54.526
	8.20		1,080.9	568.2	614,123		14.098	2,497,706	57.339
	8.40		1,082.5	569.8	616,764		14.159	2,620,795	60.165
	8.60		1,084.1	571.4	619,410		14.220	2,744,412	63.003
	8.80		1,085.7	573.0	622,061		14.281	2,868,559	65.853
	9.00		1,087.3	574.6	624,717		14.342	2,993,237	68.715
	9.20		1,088.9	576.2	627,379		14.403	3,118,446	71.590
	9.40		1,090.5	577.8	630,046		14.464	3,244,189	74.476
	9.60		1,092.1	579.4	632,717		14.525	3,370,465	77.375
	9.80		1,093.7	581.0	635,394		14.587	3,497,276	80.286
	10.00		1,095.3	582.6	638,076		14.648	3,624,623	83.210
	10.20		1,096.9	584.2	640,763		14.710	3,752,507	86.146
	10.40		1,098.5	585.8	643,456		14.772	3,880,929	89.094
	10.60		1,100.1	587.4	646,153		14.834	4,009,890	92.054
	10.80		1,101.7	589.0	648,856		14.896	4,139,390	95.027

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

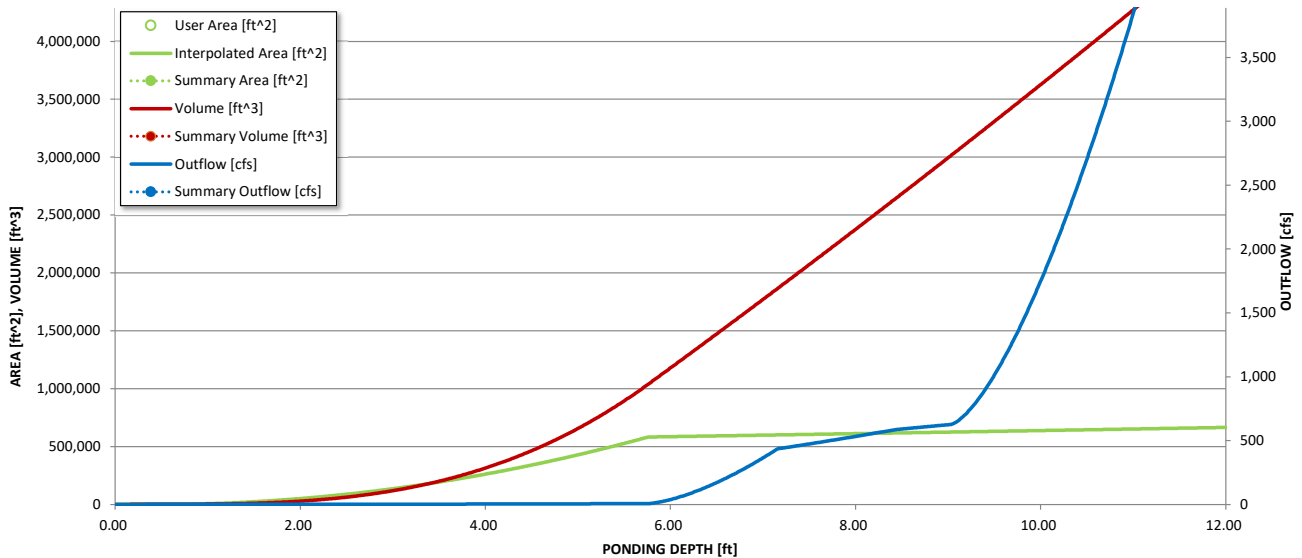
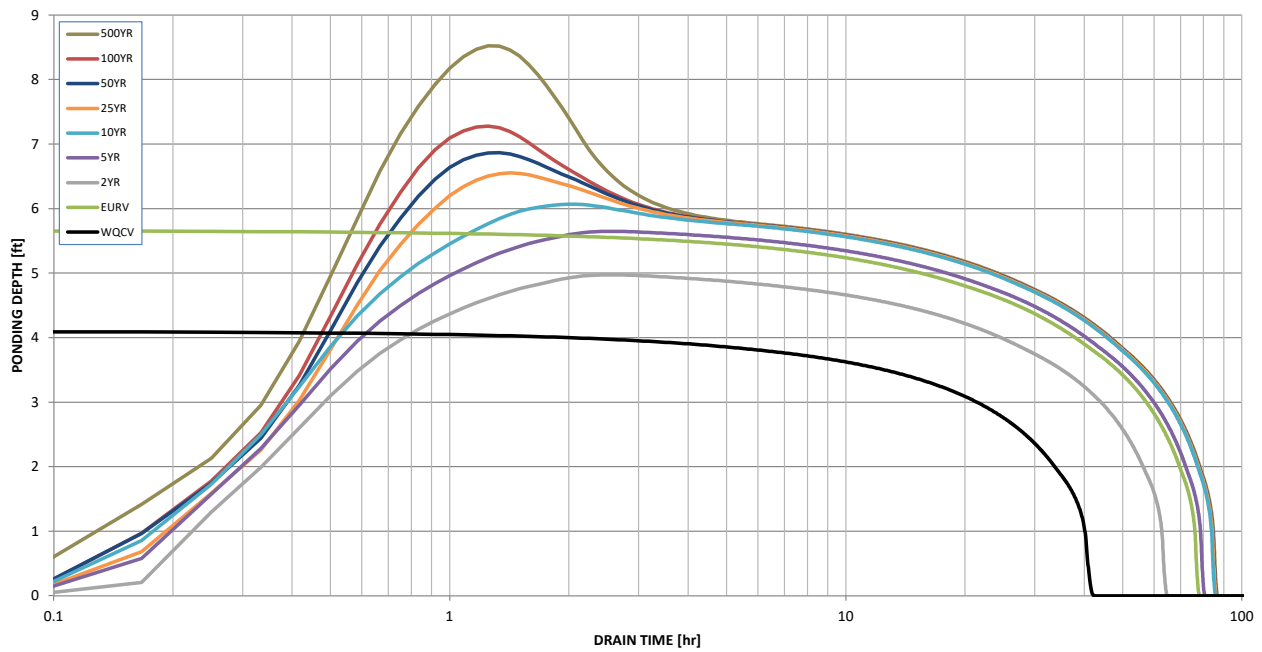
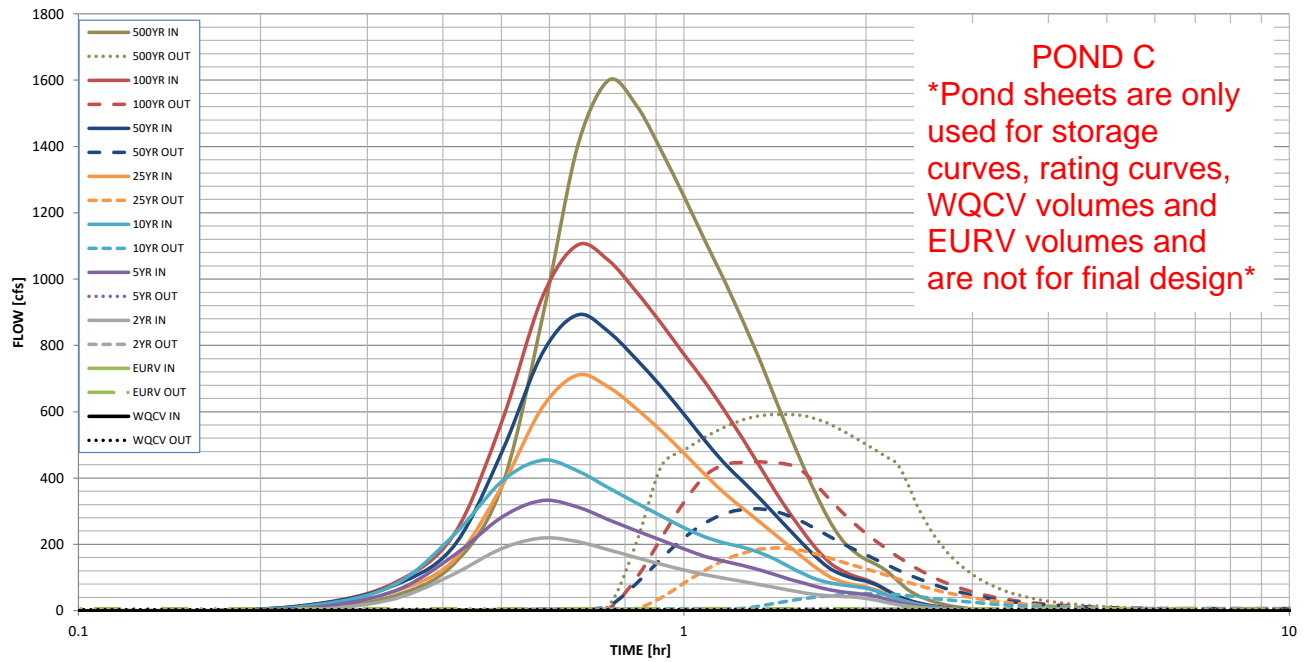
POND C

Pond sheets are only used for storage curves, rating curves, WQCV volumes and EURV volumes and are not for final design



DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)



Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc.

Saturday, Feb 18 2023

Culvert C - Pond C Out

Invert Elev Dn (ft) = 5631.00
Pipe Length (ft) = 150.00
Slope (%) = 1.33
Invert Elev Up (ft) = 5633.00
Rise (in) = 72.0
Shape = Box
Span (in) = 84.0
No. Barrels = 1
n-Value = 0.013
Culvert Type = Flared Wingwalls
Culvert Entrance = 30D to 75D wingwall flares
Coeff. K,M,c,Y,k = 0.026, 1, 0.0347, 0.81, 0.4

Embankment

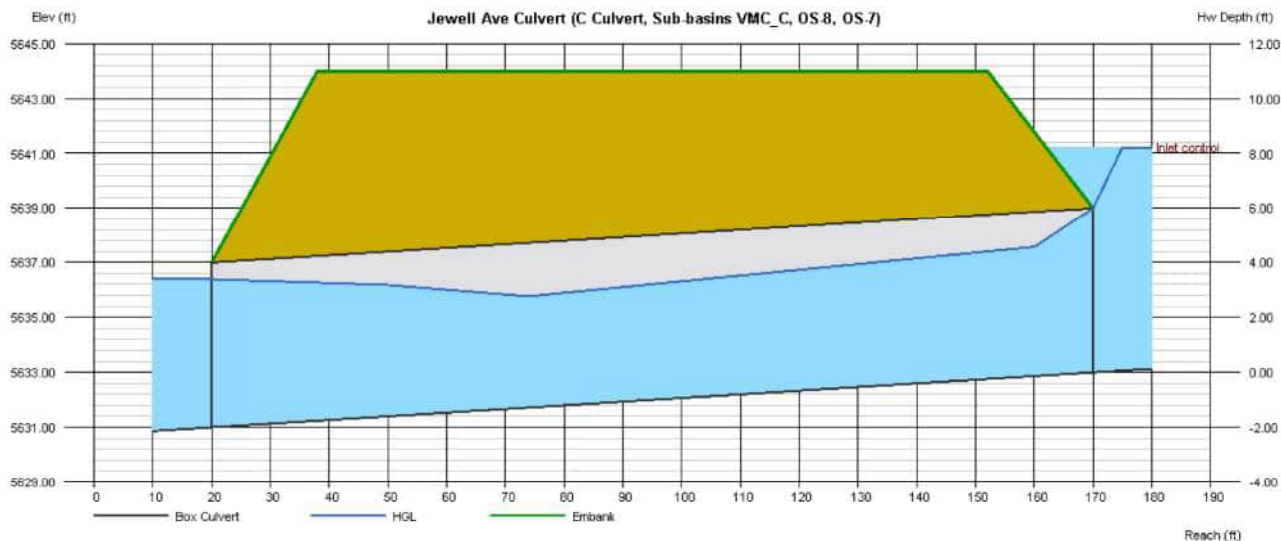
Top Elevation (ft) = 5644.00
Top Width (ft) = 114.00
Crest Width (ft) = 100.00

Calculations

Qmin (cfs) = 416.00
Qmax (cfs) = 416.00
Tailwater Elev (ft) = (dc+D)/2

Highlighted

Qtotal (cfs) = 416.00
Qpipe (cfs) = 416.00
Qovertop (cfs) = 0.00
Veloc Dn (ft/s) = 11.02
Veloc Up (ft/s) = 12.43
HGL Dn (ft) = 5636.39
HGL Up (ft) = 5637.78
Hw Elev (ft) = 5641.22
Hw/D (ft) = 1.37
Flow Regime = Inlet Control



PARKLANDS DEVELOPMENT

MASTER DRAINAGE MAPS

SITUATED IN PORTIONS OF SECTION 21, 20, 17 & A PORTION OF THE SOUTH EAST QUARTER OF SECTION 16, TOWNSHIP 4 SOUTH, RANGE 65 WEST OF THE SIXTH PRINCIPAL OF THE SIXTH PRINCIPAL MERIDIAN, CITY OF AURORA, COUNTY OF ARAPAHOE, STATE OF COLORADO

CULVERT DESIGN FLOW SUMMARY TABLE

Node ID	Description	Contributing Subbasins	Total Tributary Area (ac)	100-Year Peak Flow Rate (cfs)
A-2	S. Flatrock Trail Culvert Crossing	A-2	89.2	310
A-1	E. Louisiana Culvert Crossing #1	A-1, A-2	207.8	607
PondA_Outfall	Pond A Outfall	A-1, A-2	207.8	199
B-2	E. Louisiana Culvert Crossing #2	B-2	85.6	281
PondB_Outfall	Pond B Outfall	B-1, B-2	144.9	147
JewellAve_CulvUS	Jewell Ave Culvert Crossing	VMC_C, OS-7, OS-8	351.5	862
PondC_Outfall	Pond C Outfall	VMC_C, OS-7, OS-8, C	420.2	416
PowhatanRd_CulvD3	Powhatan Road Culvert Crossing #1	D	64.1	192
MonaghanRd_Culv3	Monaghan Road Culvert Crossing #3	OS-3	90.2	221
E-4	E-4 Closed Conduit	E-4	27.0	99
E-3_CulvUS	E-3 (Road 2) Culvert Crossing	E-4, OS-3	117.1	288
E-2	E-2 Closed Conduit	E-2	59.4	172
PowhatanRd_Culv2US	Powhatan Road Culvert Crossing #2	E-2, E-3, E-4, OS-3	364.0	965
Pipe_D	Closed Conduit to Pond E	D	64.1	192
PondE_Outfall	Pond E Outfall	E-1, E-2, E-3, E-4, OS-3	418.5	397
G	S Harvest Road Culvert Crossing	G	42.6	145
PondG_Outfall	Pond G Outfall	G	42.6	48
I_Culv	I Closed Conduit and Culvert Crossing	I, TR-O1, TR-O3	78.9	210
PondH_Outfall	Pond H Outfall	H, I, TR-O1, TR-O3	176.6	149
PondJ_Outfall	Pond J Outfall	J	88.3	67
PondK_Outfall	Pond K Outfall	K	107.6	95
OS-6_Pipe	OS-6 Closed Conduit	OS-6	12.0	39
OS-5 & OS-6_Pipe	OS-5 & OS-6 Buried Pipe	OS-5, OS-6	31.8	97
F_Pipe	F Closed Conduit to Pond L	F	24.4	77
PondL_Outfall	Pond L Outfall	F, L, OS-5, OS-6	194.5	163
PondN_Outfall	Discharge Into Harmony	N	23.2	12
MonaghanRd_Culv2	Monaghan Road Culvert Crossing #2	OS-2	41.9	88
M3	Mississippi Ave Culvert Crossing	M-3, OS-2	212.1	503
PondM2_Outfall	Pond M2 Outfall (Discharge Into Harmony)	M-2, M-3, OS-2	246.6	441
MonaghanRd_Culv1	Monaghan Road Culvert Crossing #1	OS-1	133.3	338
PondM1_Outfall	Pond M1 Outfall	M-1, OS-1	268.5	217

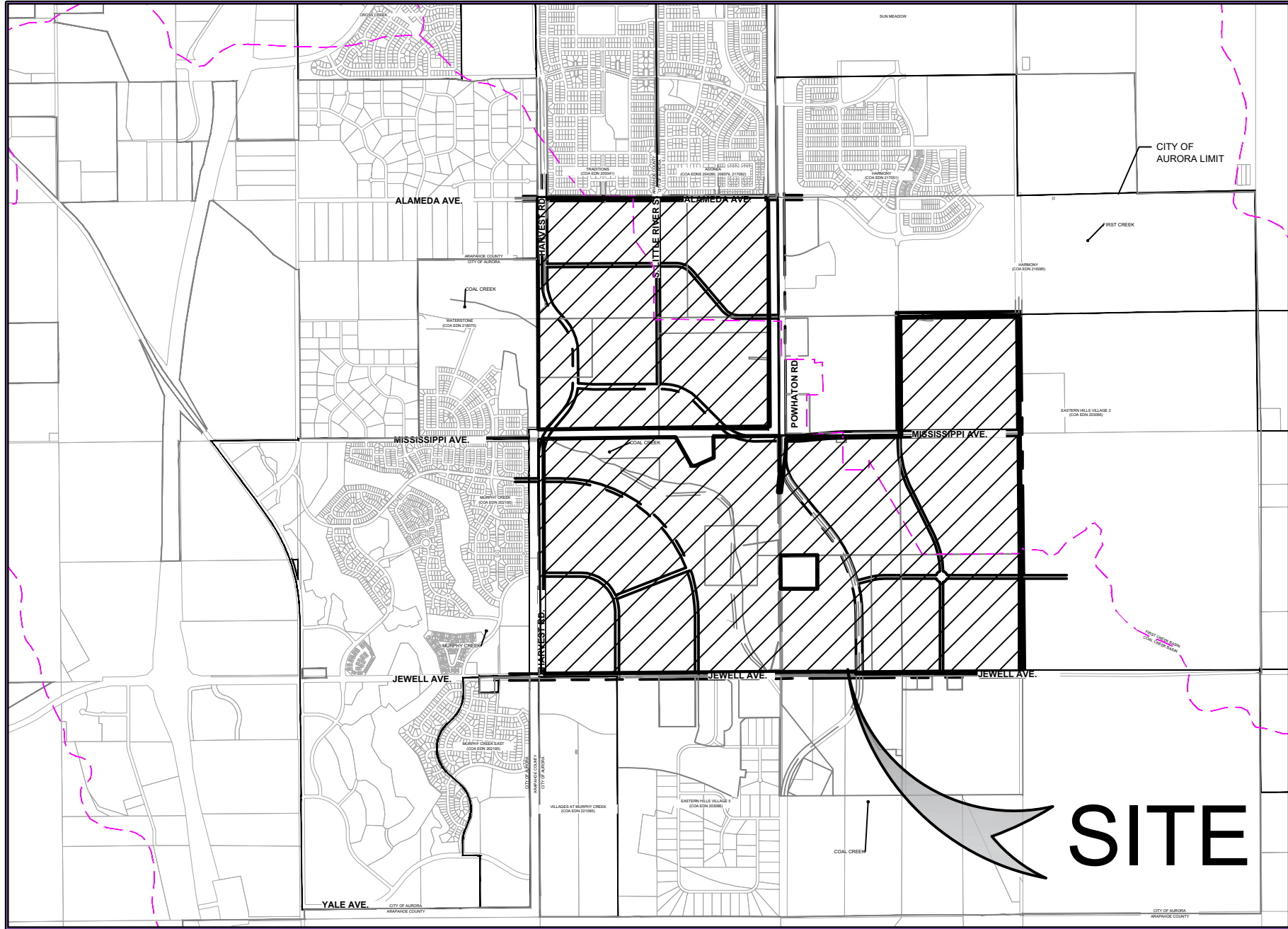
NOTE: Future prelim drainage plans shall evaluate existing condition flows to culverts and assure that culverts are designed for the higher of existing and proposed condition flows.

TABLE OF PEAK FLOW SUMMARY (PROPOSED)

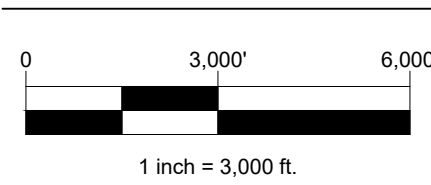
Subbasin ID	Peak Flow Rate (cfs)	
	2-Year	100-Year
A-1	63	312
A-2	85	310
B-1	20	127
B-2	58	281
C	38	194
D	39	192
E-1	8	79
E-2	37	172
E-3	158	589
E-4	22	99
F	17	77
G	39	145
H	51	274
I	40	201
J	36	178
K	72	314
L	69	386
M-1	89	377
M-2	22	94
M-3	98	478
N	20	78
P	1	51
OS-1	71	338
OS-2	16	88
OS-3	43	221
OS-5	19	59
OS-6	11	39
OS-7	11	55
OS-8	113	585
VMC_C	53	236
TR-O1	2	5
TR-O3	2	5

TABLE OF PEAK FLOW SUMMARY (EXISTING)

Subbasin ID	Peak Flow Rate (cfs)	
	2-Year	100-Year
A-1	2	242
A-2	0	78
A-3	2	208
A-4	1	171
A-5	2	234
A-6	1	151
A-7	0	50
B-1	1	74
C-1	3	100
D-1	0	9
E-1	1	173
E-2	1	115
F-1	0	9
G-1	0	13
H-1	0	5
OS-1	1	134
OS-2	0	40
OS-3	1	99
OS-4, -5, -6	0	36
OS-7	1	27
OS-8	2	267
OS-9	1	79
OS-10	0	8



VICINITY MAP



SHEET LIST TABLE	
SHEET NUMBER	SHEET TITLE
1	COVER SHEET
2	EXISTING SHEET INDEX
3	EXISTING BASIN 1 OF 4
4	EXISTING BASIN 2 OF 4
5	EXISTING BASIN 3 OF 4
6	EXISTING BASIN 4 OF 4
7	PROPOSED SHEET INDEX
8	PROPOSED BASIN 1 OF 4
9	PROPOSED BASIN 2 OF 4
10	PROPOSED BASIN 3 OF 4
11	PROPOSED BASIN 4 OF 4

CHANNEL DESIGN SUMMARY TABLE

Channel ID	Contributing Basins	Tributary Area (ac)	Width (ft)		Source	Maintenance Responsibility
			@ 100-Yr WSEL	with 2ft Freeboard + 12' Access Path		
A	A-1, A-2	207.8	80.88	109	MHFD SMC	Private, Metro District
E	E-3, E-4, OS-3	364.0	137.20	166	MHFD SMC	Public, Aurora Water, MEP Eligible
M-1	M-1, OS-1	268.5	101.50	130	MHFD SMC	Public, Aurora Water, MEP Eligible
M-2 & M-3	M-2, M-3, OS-2	246.6	101.70	130	MHFD SMC	Public, Aurora Water, MEP Eligible
L*	Pond L Outfall	194.5	40.48	69	Calculation	Public, Aurora Water, MEP Eligible
Coal Creek	--	--	Varies, minimum of 725ft		Floodplain	Public, Aurora Water, MEP Eligible

Channel widths are conceptual and will be further designed and finalized in preliminary and final drainage reports.
* Pond L outfall type, closed conduit or open channel, will need to be determined at Preliminary Drainage Report.

PROPOSED STORMWATER DETENTION POND SUMMARY TABLE

Detention Basin	Type	Watershed	Contributing Basins	Area Served	Impervious	Predominant HSG	COA Sect 6.33 Allowable 100-Year Peak Outflow	WQCV	EURV	100-Yr Volume	100-Year Discharge	MEP Eligible?	Ownership and Maintenance Responsibility
				(ac)	(%)		(cfs)	(ac-ft)	(ac-ft)	(ac-ft)	(cfs)		
A	FSD	Coal Creek	A-1, A-2	206.9	67.1%	C/D	207	4.52	13.63	25.35	199	No	Private, MD
B	FSD	Coal Creek	B-1, B-2	153.8	52.2%	C/D	154	2.73	7.72	15.28	147	No	Private, MD
C	FSD	Coal Creek	C, OS-7, OS-8, VMC_C	419.4	56.1%	C/D	419	7.82	22.51	43.89	416	Yes	Public, Aurora Water
E	FSD	Coal Creek	E-1, E-2, E-3, E-4, OS-3, D	482.6	62.8%	B	410	N/A	N/A	55.92	397	Yes	Public, Aurora Water
G	FSD	Coal Creek	G (WQ ONLY)	42.6**	79.1%	B	76	1.14	3.67	5.60	48	No	Private, Metro District (MD)
H	FSD	Coal Creek	G, P (100-Year Volume)	89.9	39.8%								
J	FSD	First Creek	H, I, TR-O1, TR-O2	176.6	54.9%	B	150	3.24	10.38	18.83	149	No	Private, MD
K	FSD	First Creek	J	80.1	57.2%	B	68	1.52	4.77	8.11	67	Yes	Private, MD
L	FSD	First Creek	K	111.4	65.8%	B	95	2.38	7.53	13.54	95	No	Private, MD
L****	FSD	Coal Creek	F, L, OS-5, OS-6	194.5	56.8%	B	165	3.67	12.13	21.32	163	Yes	Public, Aurora Water
M1 (8175)	FSD (offline WQ)	First Creek	M-1, OS-1	268.5	64.3%	B	219*	N/A	19.02	31.86	217	Yes	Public, Aurora Water
M2***	Flood Control	First Creek	M-2, M-3, OS-2	246.6	58.4%	B	445***	N/A	N/A	9.74	441	Yes	Public, Aurora Water
N	FSD	First Creek	N	23.2	70.1%	A	12	0.53	1.99	2.73	12	No	Private, MD

* The calculated allowable discharge per the Aurora Sect. 6.33 is greater than allowable discharge as detailed by the 2021 Harmony Master Drainage Plan 2nd Amendment. Therefore, the lower flow from the MDR 2nd Amendment has been adopted as the governing flow rate.
** Area treated for WQ
*** Pond M2 is 100-yr flood control only. Allowable peak outflow is per Harmony Filing 15 PDR channel design flow.
**** Pond L outfall type, closed conduit or open channel, will need to be determined at Preliminary Drainage Report. This may also impact if online WQCV and EURV is allowed or if it needs to be treated offline.
Note: Maintenance eligibility with MHFD and public versus private maintenance for ponds may be re-evaluated at time of Preliminary Drainage Report.
Note: WQCV and EURV columns with N/A indicate that those elements will be provided off-line or in separate facilities.
Blue Hatch indicates Public and MEP Eligible

AT THE TIME OF THIS MASTER DRAINAGE REPORT THE CITY OF AURORA IS CONSIDERING UPDATES TO THE DRAINAGE MANUAL WHICH WOULD IMPACT IMPERVIOUS VALUES WHICH IN TURN WOULD IMPACT FACILITY SIZING. ALL PRELIMINARY DRAINAGE REPORTS ARE REQUIRED TO DESIGN TO CURRENT CITY OF AURORA STANDARDS AT THE TIME OF SUBMITTAL WHICH COULD IMPACT THE FACILITY SIZES AS SHOWN IN THIS MDR.

NOTES:

- CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
- STORM SEWER SYSTEM IN COMBINATION WITH THE STREETS WILL BE SIZED FOR THE 100 YEAR STORM EVENT.
- PONDS SHOWN HEREIN ARE SCHEMATIC ONLY. ACTUAL SIZE, SHAPE, AND LOCATION WILL VARY AS SITE DESIGN PROGRESSES. THIS MASTER DRAINAGE PLAN HAS BEEN PREPARED BASED UPON THE BEST AVAILABLE INFORMATION AT THIS TIME. CONCEPTS, DRAINAGE PATTERNS, AND OFFSITE FACILITIES SHALL BE CONFIRMED IN THE SUBSEQUENT PRELIMINARY AND FINAL DRAINAGE PLANS FOR THE PROPERTY.

BENCHMARK

COA ID 4S6517SE002

ELEVATION US FEET 5679.43 (NAVD 88)

3" DIAM. BRASS CAP STAMPED (C.O.A., BM, 23-60) ATOP THE CONC. BASE FOR THE EAST MOST LEG OF THE ANGLE POINT POWER TOWER ON THE WEST SIDE OF POWHATAN ROAD. POWER LINE PROCEEDING WEST, SAID PWR. TWR. NEAR THE MISSISSIPPI LANDLINE. NOTE: ELEVATION TAKEN AT PUNCH MARK AT CENTER

DEVELOPER
NL PARKLANDS, LLC
8678 CONCORD CENTER DRIVE, #200
ENGLEWOOD, CO 80112
TEL: 303-346-7006
CONTACT: MARK NICKLESS


ENGINEER
CORE CONSULTANTS, INC.
3473 S. BROADWAY
ENGLEWOOD, CO 80113
(303) 703-4444
CONTACT: ROB HANSEN
EMAIL: RHANSEN@LIVEYOURCORE.COM

SURVEYOR
AZTEC CONSULTANTS, INC.
300 EAST MINERAL AVE, SUITE 1
LITTLETON, CO 80122
(303) 713-1898
CONTACT: TONY PEALL
EMAIL: TPEALL@AZTECCONSULTANTS.COM

PLANNER / ARCHITECT
TERRACINA DESIGN
10200 E. GIRARD AVE, STE A-314
DENVER, CO 80231
CONTACT: LAYLA ROSALES
(303) 632-8867
EMAIL: LROSALAS@TERRACINADISEGN.COM

CITY / TOWN
CITY OF AURORA
AURORA, CO 80016

ENGINEER'S STATEMENT
PREPARED UNDER MY SUPERVISION

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ROBERT D. HANSEN, P.E., CFM 2/19/2023 DATE

ROBERT D. HANSEN, P.E. DATE
COLORADO P.E. 50417
FOR AND ON BEHALF OF CORE CONSULTANTS LLC

APPROVED FOR ONE YEAR FROM THIS DATE

CITY ENGINEER DATE

WATER DEPARTMENT DATE

PARKLANDS DEVELOPMENT

AURORA, CO

COVER SHEET

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20-226

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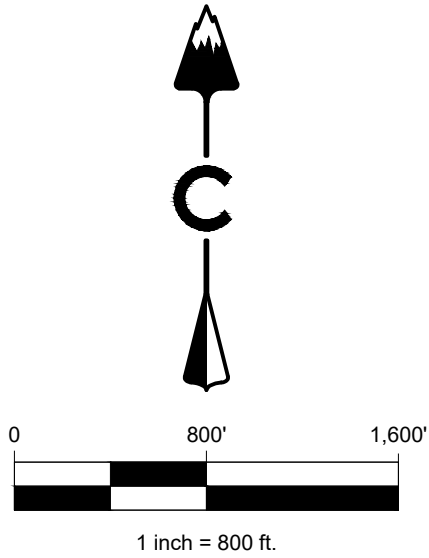
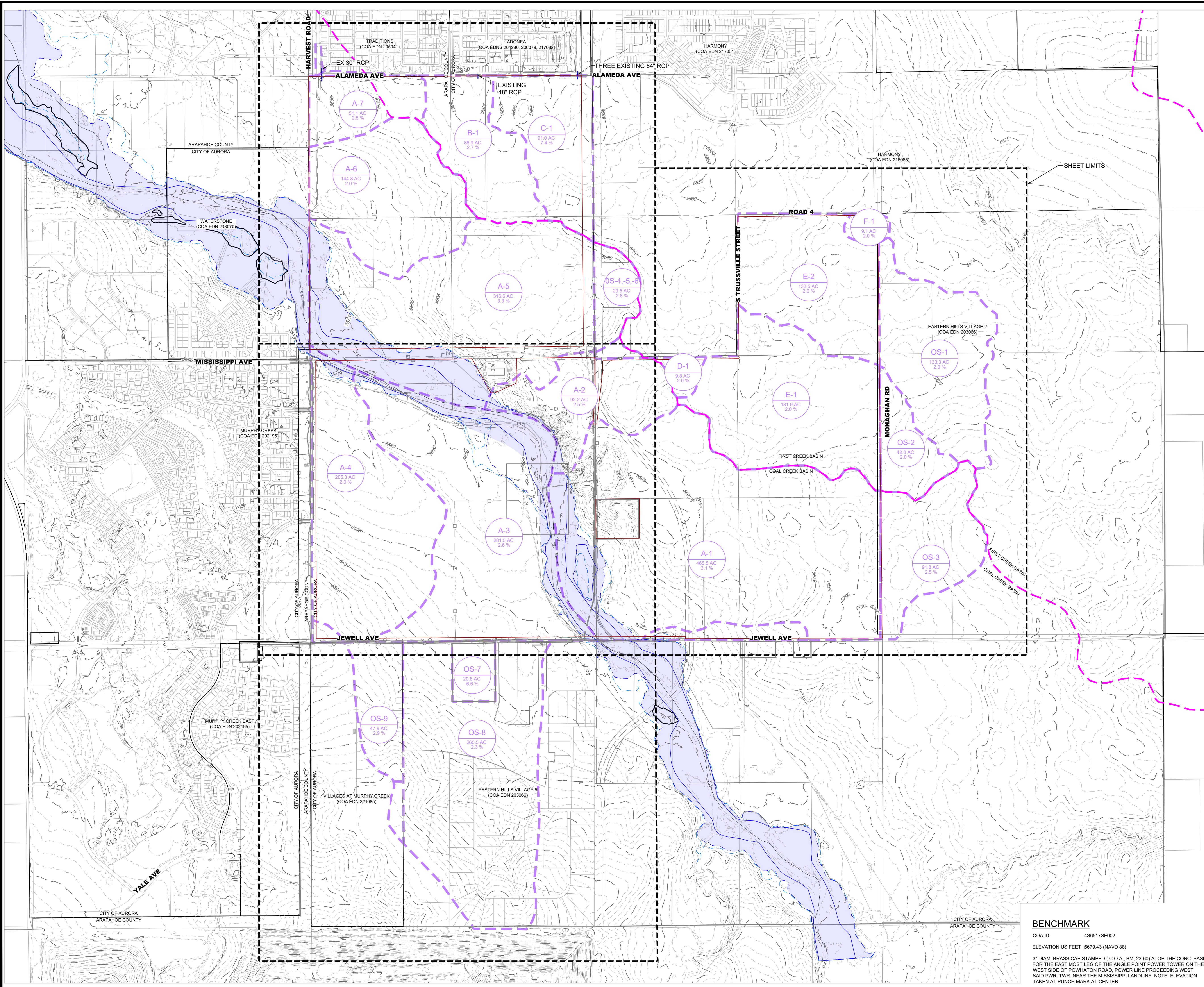
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LEGEND

- | | | |
|----------|----------|---|
| EXISTING | PROPOSED | |
| | | BASIN DESIGNATION |
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FIRM PANEL: 08005C0212K

EFFECTIVE DATE: 12/17/2010

FIRM PANEL: 08005C0216L

EFFECTIVE DATE: 4/18/2018

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ROBERT D. HANSEN, P.E.
COLORADO P.E. 50417
FOR AND ON BEHALF OF CORE CONSULTANTS LLC

DATE

PARKLANDS DEVELOPMENT
AURORA, CO

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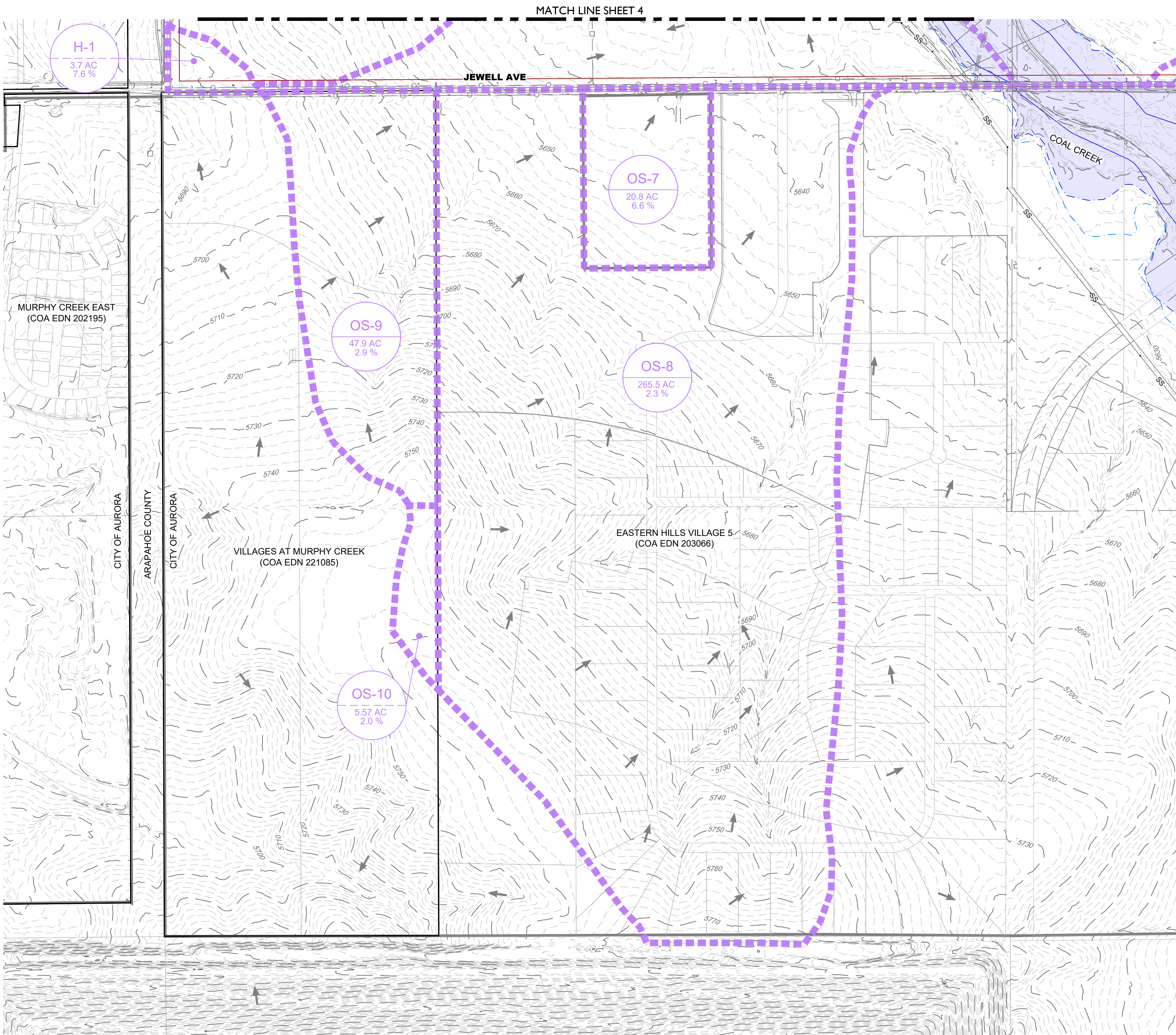


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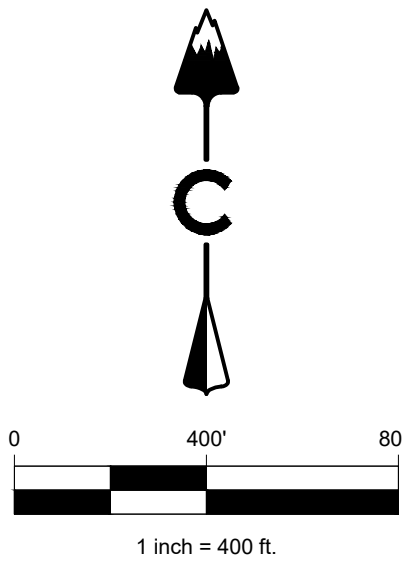
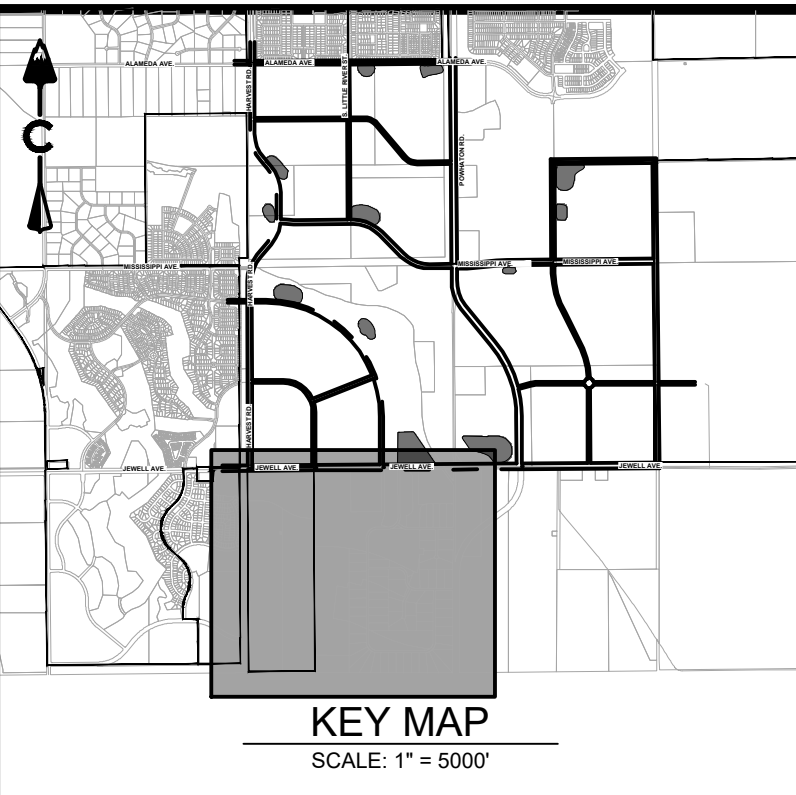
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BENCHMARK

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DATE

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COLORADO P.E. 50417
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PARKLANDS DEVELOPMENT
AURORA, CO

EXISTING BASIN 3 OF 4

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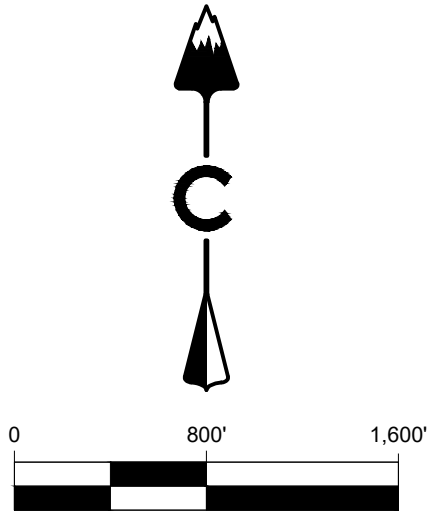
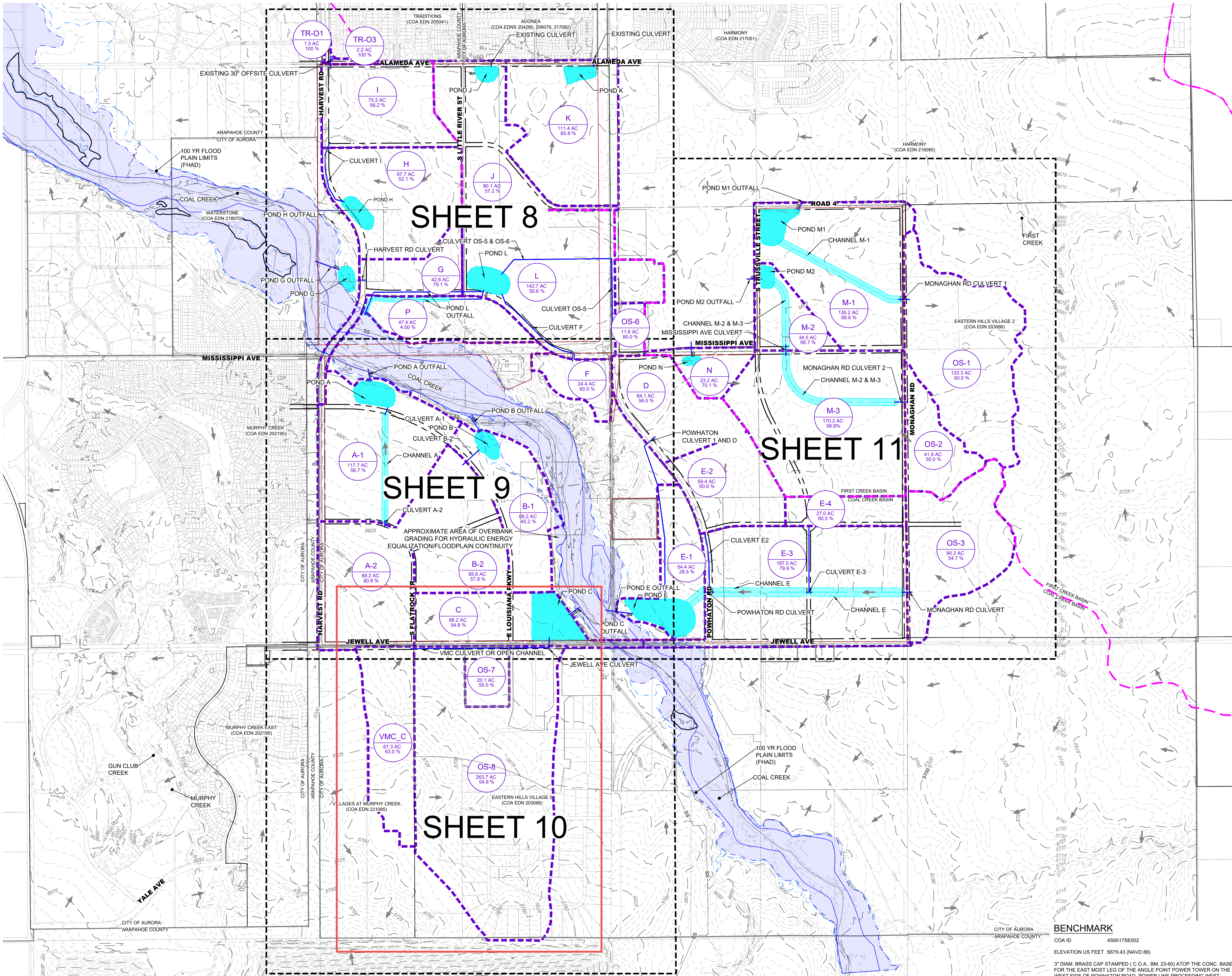
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COLORADO P.E. 50417
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PARKLANDS DEVELOPMENT

AURORA, CO

PROPOSED SHEET INDEX

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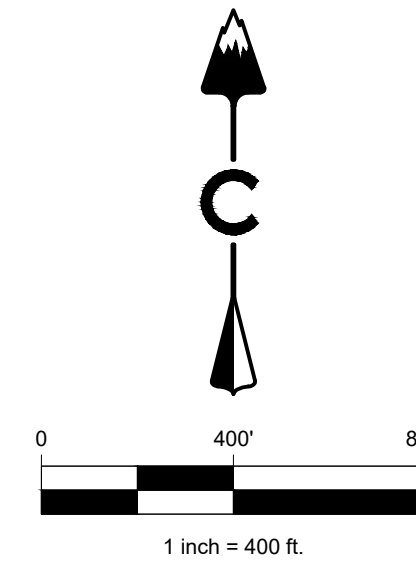
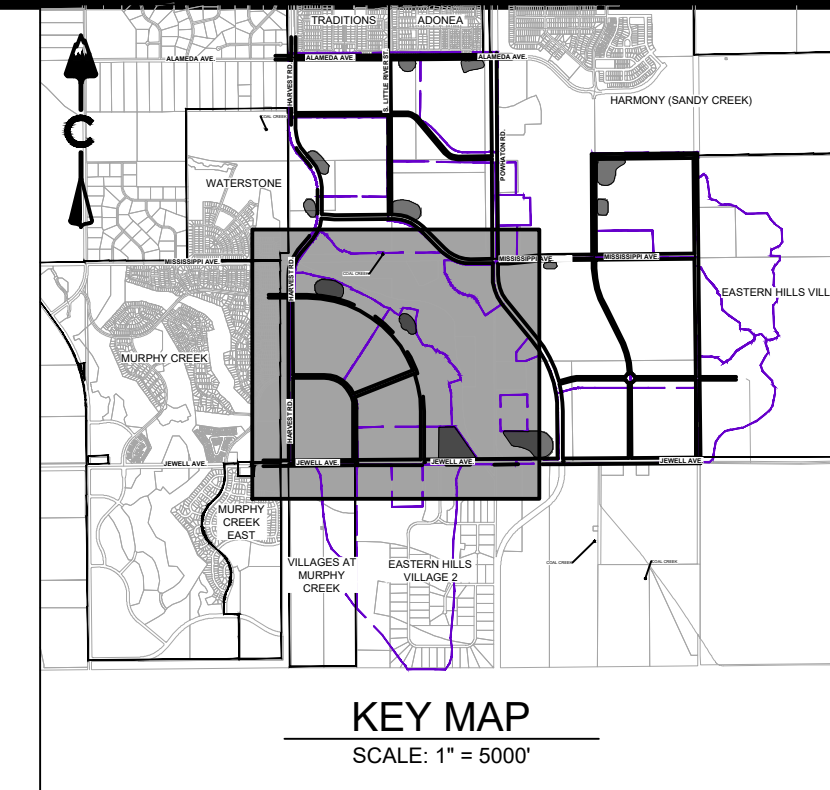
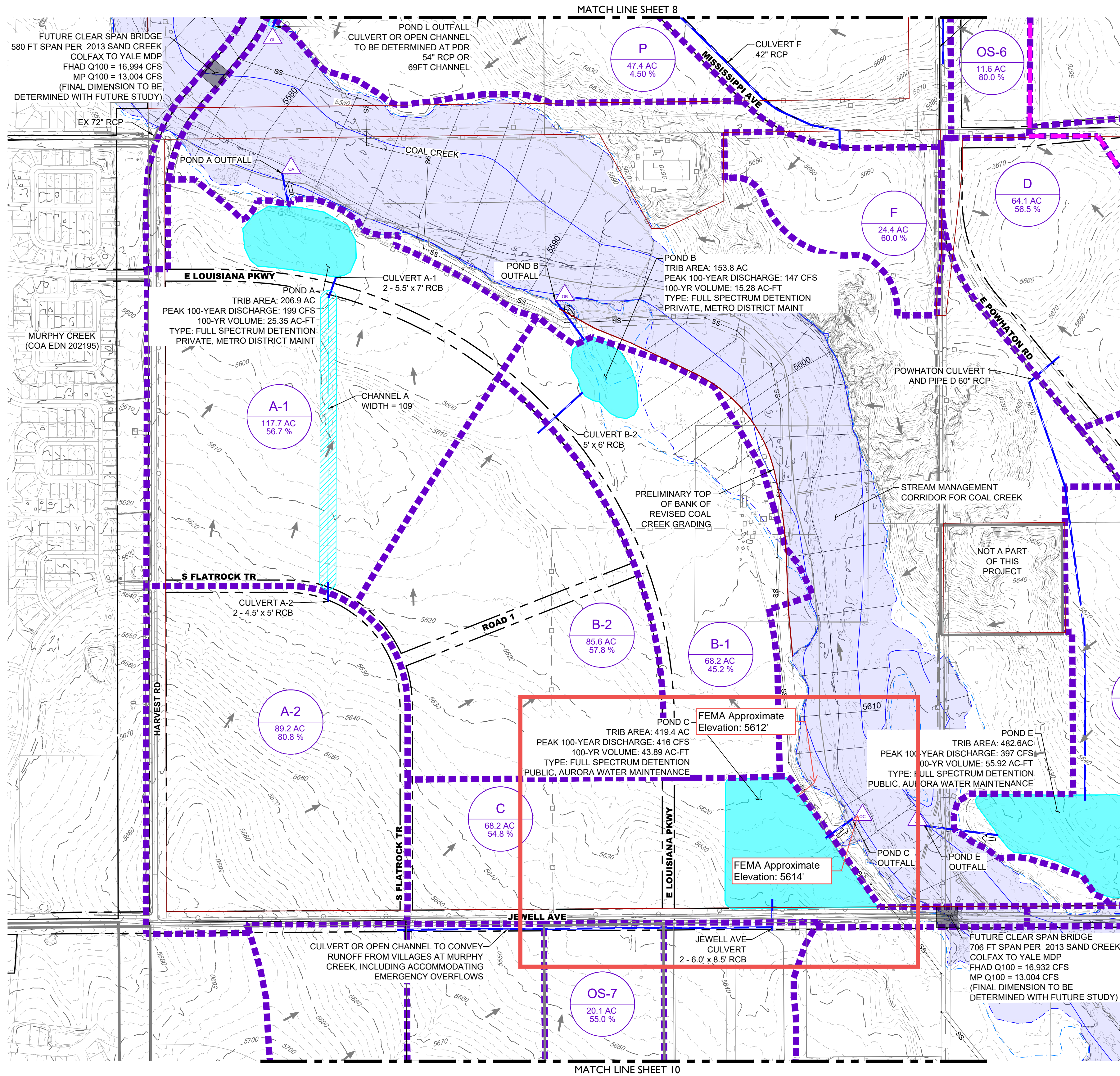


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LEGEND

EXISTING	PROPOSED	
X	X	BASIN DESIGNATION
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PARKLANDS DEVELOPMENT
AURORA, CO

PROPOSED BASIN 2 OF 4

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MASTER DRAINAGE REPORT


A PARCEL OF LAND BEING LOCATED IN SECTION 29, TOWNSHIP 4 SOUTH, RANGE 65
WEST OF THE 6TH PRINCIPAL MERIDIAN, CITY OF AURORA, COUNTY OF ARAPAHOE,
STATE OF COLORADO

FOUNDRY

Prepared: March 24th, 2022
Rev.: October 21st, 2022
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WM: DCS21-9005

Prepared for:
CENTURY COMMUNITIES, LLC
2000 S Colorado Blvd Tower 1, Suite 1500
Denver, CO 80222
P: (303)-268-8364
Contact: c/o Jerry B. Richmond III

Prepared by:
Ware Malcomb
900 South Broadway Suite 320
Denver, CO 80209
P: 303.561.3333
F: 303.561.3339
Contact: Jason Mann
Email: jmann@waremalcomb.com

APPROVED FOR ONE YEAR FROM THIS DATE	
09/06/2023	
GGG 	09/06/2023
WATER DEPARTMENT	DATE

Jason Mann, PE No. 0042735

2. Hydrologic Criteria

- a. Hydrologic calculations for the anticipated onsite drainage patterns were performed using CUHP and in accordance with the SDDTC and USDCM.
- b. Hydraulic calculations for the detention and water quality ponds were performed in accordance with SDDTC and USDCM using SWMM and the current MHFD-Detention_v4-06 Excel spreadsheet.
- c. The future preliminary and final hydrologic analyses for development within the project site will be based on the SDDTC and USDCM. The 2-year and 100-year storm events will be used as the minor and major storm events, respectively. The corresponding rainfall depths for the minor and major storm events are 0.856" and 2.47", respectively. See NOAA Atlas 14 figures in Appendix A.

3. Hydraulic Criteria

- a. Hydraflow (ACAD Civil 3D) was utilized to analyze flows through culverts along the proposed Foxtail Run corridor.

The future preliminary and final hydraulic analyses for development within the project site will follow the hydraulic design criteria per SDDTC and USDCM and be designed using StormCAD, HY-8, or other industry standard software.

4. Variances

- a. Request a variance to design the proposed FSD ponds (i.e., Pond B and Pond C) with the WQCV and EURV included in the estimated 100-year storage volume.

D. DRAINAGE PLAN

1. General Concept

- a. Drainage Concept:
The Foundry developed conditions drainage design will generally follow the historic drainage patterns. See below for additional details.

Approximately 419.4-acres of the project site, consisting of the A- and D-basins (including Basin B2 which has been re-routed through Basin A1), will drain to the re-aligned Foxtail Run drainageway (proposed). Ultimately, this drainageway will convey flows north towards E. Jewell Avenue where they will pass underneath the road in a proposed RCBC (to be designed in Foundry Phase I improvements) to a regional Full Spectrum Detention (FSD) pond identified in the Parklands MDR as Pond C (CORE 2023). This regional pond was originally designed to have a storage capacity of ± 43.9 acre-feet and a 100-Year Peak Discharge of ± 415.6 cfs. Based on discussions with the City of Aurora, the Regional Pond has been re-calculated as a part of this master drainage report to include an additional 69 acres of tributary area from Basin B2. The final design for Regional Pond C will

necessitate a total storage capacity of +/- 53.6 acre-feet with an allowable 100-Year Peak Discharge of 489 cfs. It is understood that the construction of the regional pond will be completed by Foundry if the construction has not yet been completed.

Prior to the approval of the Preliminary Drainage Report, the City of Aurora will require a letter of acknowledgement from the property owner of the Parklands Development regarding the increased area. A dedication of a drainage easement for the regional pond will also be required prior to approval of the Civil Construction Documents.

Approximately 34.5-acres along the eastern boundary of the site, consisting of sub-basin B1 will be tributary Pond B, which will be designed as FSD and outfall into Coal Creek. In the existing condition, this corner of the project site outfalls to Coal Creek through four-(4) 18" pipes (CUHP predevelopment flows of $Q_2=0.3$ cfs and $Q_{100}=40.0$ cfs).

Approximately 21.2-acres in the southwest corner of the site will drain to proposed Pond C, which will be designed as FSD pond and outfall into the Harvest Crossing storm sewer system in PA-5. This system is still being designed. See appendix C for email communications with the engineer for the Harvest Crossing system.

Approximately 134.33-acres are tributary to Pond D. This Pond is located centrally within the project site and intended to reduce the peak rate (i.e., flood-control only) in the revised Foxtail Run alignment. Due to site constraints, the Pond is limited to a volume of 8.0 acre-feet, with an outflow rate of 218.8 cfs. Water Quality and EURV for this tributary area are included in the updated design for Regional Pond C discussed above. Refer to Appendix B for CUHP/SWMM analysis.

b. Impacts from Off-site Basins:

In the existing condition, a ±55.6-acre portion (i.e., basins C1, C2, and C3 in the Harvest Crossing report) of the Harvest Crossing/Villages at Murphy Creek development sheds runoff onto the project site from the west. When that property develops, runoff from basins OS-C1, OR-C2, and OSC3 will be tributary to proposed on-site detention ponds. More specifically, basins C1 and C2 will be tributary to Harvest Crossing Pond C3 and basin C3 will be tributary to Harvest Crossing Pond C1. In the fully developed condition, the detention pond outfall system in Kewaunee Street will direct stormwater north and into the roadside ditch along E. Jewell Avenue. If Pond C3 is completed ahead of Pond C1, outflow will need to be managed on the east side of Kewaunee Street (the street will block flows from moving east per historic). Likewise, emergency overflow from the two proposed detention ponds in Harvest Crossing/Villages at Murphy Creek near Kewaunee Street will be carried by Kewaunee Street to the north to the E. Jewell Avenue Right-of-Way which will convey it east to Coal Creek.

The proposed Foxtail Run channel will be $\pm 5150'$ long and have $\pm 145'$ of elevation change. Grade control concepts and channel profile will be established in the Preliminary Drainage Report.

The following is presently proposed for conceptual grade control along Foxtail Run: Bankfull channel – Rock riffles installed intermittently within the bankfull channel to provide approximately 9" of drop per riffle structure, using Type 'M' riprap ($D_{50} = 12$ inches).

Floodplain buried grade control – Rock sills constructed below grade and extended out to approximately the 10-yr floodplain to protect against headcuts forming and advancing in the channel. The sills would be approximately 2.5 ft deep and 4.0 ft wide, using Type 'M' riprap, and buried with 4 – 6 inches of soil above the top of the sill. The extent of the sill would angle downstream (forming a V-shape) so that if exposed, the sill would direct flows toward the center of the channel.

f. Content Presented in the Report:

This Master Drainage Plan is a representation of the drainage basins located on the Foundry project site and tributary off-site basins.

2. Specific Details

a. Problems Encountered and Solutions:

No problems encountered at this time.

b. Plans for Existing Drainageways or Creeks:

The improvements to the existing Foxtail Run drainageway will include proposed geomorphology per MHFD's High Functioning Low Maintenance (HFLM), road crossings, and riffle boulder structures. Foxtail run will be channelized and designed per MHFD criteria. The drainageway will also be protected from scour with added riprap at storm sewer outfalls. The overall design will be developed from MHFD open channel criteria.

c. Detention Ponding Plan:

On-site stormwater detention will be provided for Basin B1 in Pond B (i.e., FSD), for Basin C1 in Pond C (i.e., FSD), and for Basins D2 and D3 in Pond D (i.e., flood control only). The preliminary Pond B presented herein will have ± 3.36 ac-ft of capacity and release ± 29.76 cfs in the 100-year event. Pond C will have ± 2.5 ac-ft capacity and release ± 21.2 cfs in the 100-year event. Ponds B and C are being designed as Full Spectrum Detention (FSD) basins using the SDDTC and USDCM criteria. Preliminary designs for these ponds were prepared using the MHFD-Detention v4.06. Refer to Appendix B.

The remainder of the runoff for this project will be conveyed by the revised Foxtail Run drainageway to the proposed regional detention pond (i.e., Regional Pond C,

CORE 2023) on the north side of E. Jewell Avenue. The CUHP/SWMM analysis presented in Appendix B includes the diversion of additional area noted above and illustrated on the Existing Conditions Drainage Plan (Appendix C) into Regional Pond C (CORE 2023). Pond D will be constructed within the Foxtail Run drainageway to reduce the flow entering Regional Pond C. Pond D provides only flood control (i.e. Peak shaving) and will have a capacity of ± 8.0 ac-ft and release ± 218.80 CFS.

d. Water Quality BMP Plan:

Stormwater quality for two-thirds of the project site will be handled in the regional detention pond on the north side of E. Jewell Avenue. This pond will be augmented by water quality enhancements provided on-site in the proposed parks and open space areas. These enhancements will be designed with each phase of development. In addition, Ponds B and C will be designed as FSD basins and provide Water Quality Capture Volume (WQCV) and Excess Urban Runoff Volume (EURV) treatment for their respective tributary basins.

Included with this report is an analysis of the proposed basins that are conveyed from the site to Regional Pond C. True interim alternatives are not included herein due to the range of possible outcomes. Stakeholder groups are working through a solution which will likely be interim Regional Pond C improvements (e.g., WQCV/EURV/100-year detention) if the Foundry is constructed first. If Foundry construction proceeds before the installation of Pond C by the Parklands Development, Foundry will be responsible for the construction of the pond. Additionally, an agreement will be worked out to address any additional outlet structure requirements for the Foundry.

e. On-site/Off-site Right of Way/ Easement Requirements:

As a part of this development, an open space tract and drainage easement will be dedicated along the Foxtail Run alignment to allow access to the drainageway for inspections and maintenance. The width of the tract shown will vary between 105' and 190' wide ($w/S=0.002$ ft/ft). Additionally, drainage tracts will be platted around the proposed Ponds B, C, and D to allow access for inspections and maintenance. Drainage easements associated with these tracts will be dedicated to the City of Aurora (CoA) per SDDTC. Dedication of a drainage easement around Regional Pond C within the Parklands property will be required prior to the approval of the civil construction plans.

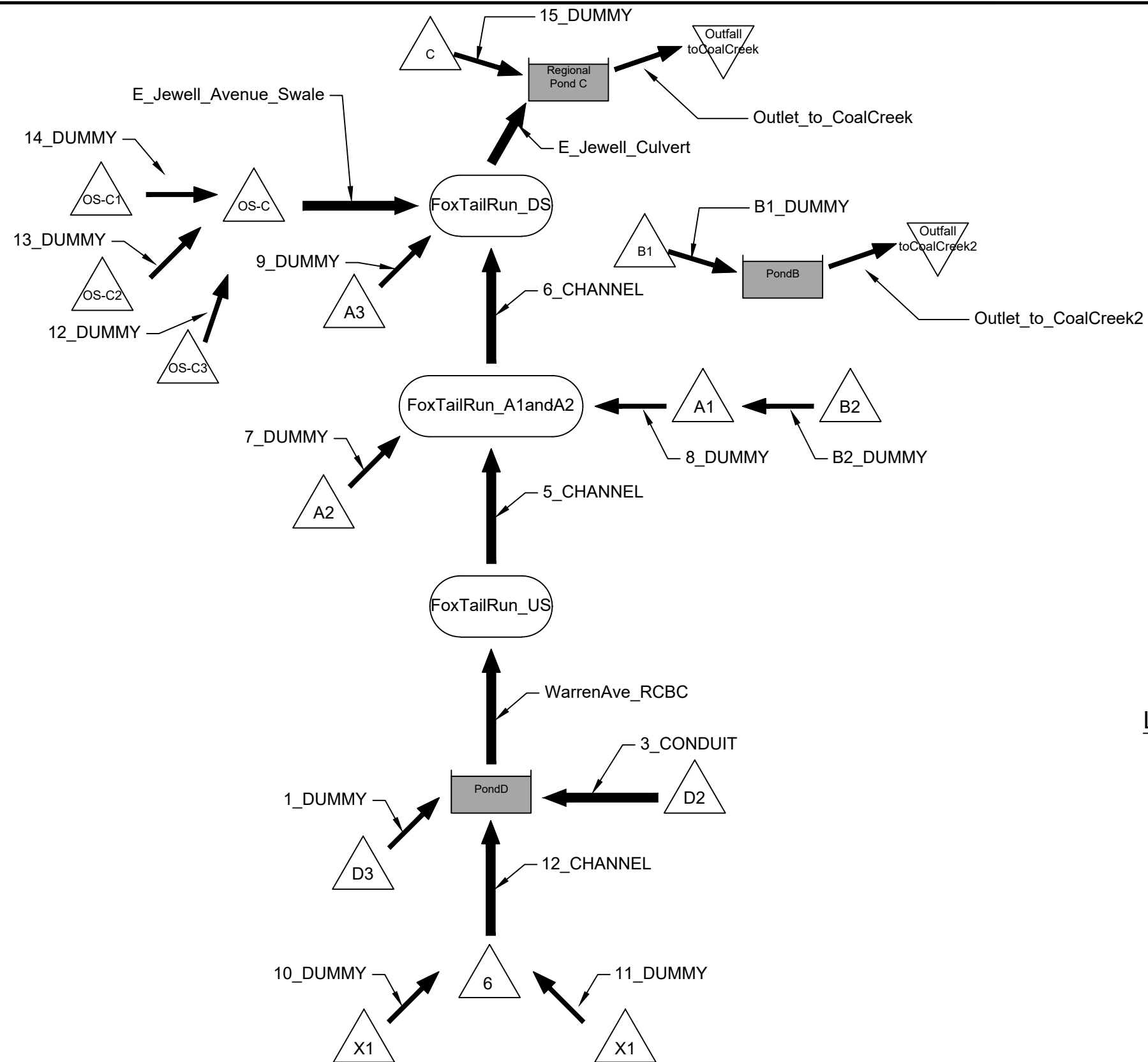
f. Maintenance Responsibilities:

Maintenance responsibilities for the Foxtail Run channel are still being worked out. Maintenance eligibility (MEP) with MHFD is being considered. The channel maintenance will be per agreements with the Homeowners Association (HOA/Metro District) once the improvements are constructed. Maintenance responsibilities for the detention ponds B, C, and D will be provided by the

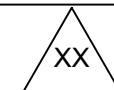
CUHP/SWMM Modeling

Summary of CUHP 100Yr Input Parameters (Version 2.0.1)

Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Depression Storage			Horton's Infiltration Parameters			DCIA Level and Fractions			Percent Eff. Imperv.
								Pervious (inches)	Imperv. (inches)		Initial Rate (in./hr.)	Final Rate (in./hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con't Imperv. Fraction	Receiv. Perv. Fraction	
A1	A1	100-YEAR	0.031	0.129	0.294	0.025	69.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.92	0.30	68.27	
A2	A2	100-YEAR	0.108	0.368	0.438	0.025	58.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.89	0.26	57.16	
A3	A3	100-YEAR	0.110	0.425	0.565	0.025	67.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.91	0.29	66.25	
B1	B1	100-YEAR	0.054	0.218	0.205	0.025	57.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.89	0.26	56.14	
B2	B2	100-YEAR	0.108	0.255	0.412	0.025	67.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.91	0.29	66.25	
C1		100-YEAR	0.033	0.096	0.185	0.025	67.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.91	0.29	66.25	
D2	D2	100-YEAR	0.036	0.118	0.203	0.025	64.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.91	0.28	63.22	
D3	D3	100-YEAR	0.174	0.357	0.529	0.025	65.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.91	0.29	64.23	
OS-C1	OS-C1	100-YEAR	0.039	0.108	0.216	0.025	79.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.94	0.33	78.40	
OS-C2	OS-C2	100-YEAR	0.026	0.090	0.180	0.025	50.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.85	0.23	49.05	
OS-C3	OS-C3	100-YEAR	0.022	0.159	0.317	0.025	50.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.85	0.23	49.05	
C	C	100-YEAR CORE	0.107	0.175	0.557	0.017	54.8	0.35	0.10	3.11	0.52	0.00018	0.00	0.87	0.25	53.91	
X1	X1	100-YEAR	0.002	0.148	0.296	0.100	10.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.20	0.10	9.09	
X2	X2	100-YEAR	0.003	0.156	0.311	0.100	10.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.20	0.10	9.09	
EX1		100-YEAR	0.437	0.704	0.938	0.026	5.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.10	0.05	4.50	
EX2		100-YEAR	0.175	0.443	0.715	0.033	5.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.10	0.05	4.50	
EX3		100-YEAR	0.037	0.120	0.178	0.041	5.0	0.35	0.10	3.00	0.50	0.00018	0.00	0.10	0.05	4.50	



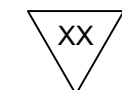
LEGEND:



JUNCTION



DETENTION POND



POND OUTFALL

900 south broadway
suite 320
denver, co 80209
p 303.561.3333
waremalcomb.com

WARE MALCOMB
CIVIL ENGINEERING & SURVEYING

FOUNDRY
CUHP/SWMM ROUTING MAP

NO.	DATE	REMARKS

JOB NO.:	DCS21-9005
PA / PM:	M. NUNO
DRAWN BY:	M. NUNO
DATE:	08/09/2023

SHEET

1

Storage Unit	Average Volume 1000 ft3	Avg Pcnt Full	Evap Pcnt Loss	Exfil Pcnt Loss	Maximum Volume 1000 ft3	Max Pcnt Full	Time of Max Occurrence days hr:min	Maximum Outflow CFS
PondD	2.809	0	0	0	347.617	69	0 01:04	205.43
RegionalPondC	392.422	14	0	0	2256.860	81	0 01:25	448.73
PondB	13.654	9	0	0	146.818	100	0 00:54	33.68

Outfall Loading Summary

Outfall Node	Flow Freq Pcnt	Avg Flow CFS	Max Flow CFS	Total Volume 10^6 gal
toCoalCreek	70.91	12.43	448.73	28.471
Outfall_to_CoalCreek2	52.87	1.06	33.68	1.809
System	61.89	13.48	481.90	30.280

Link Flow Summary

Link	Type	Maximum Flow CFS	Time of Max Occurrence days hr:min	Maximum Veloc ft/sec	Max/ Full Flow	Max/ Full Depth
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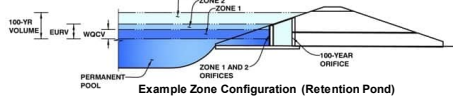
Pond B (Full Spectrum Detention)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

Project: DCS21-9005 | Foundry

Basin ID: Basin B1



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB
Watershed Area =	34.50 acres
Watershed Length =	1,821 ft
Watershed Length to Centroid =	900 ft
Watershed Slope =	0.025 ft/ft
Watershed Imperviousness =	57% percent
Percentage Hydrologic Soil Group A =	0.0% percent
Percentage Hydrologic Soil Group B =	0.0% percent
Percentage Hydrologic Soil Groups C/D =	100% percent
Target WQCV Drain Time =	40.0 hours
Location for 1-hr Rainfall Depths =	User Input

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) =	0.651 acre-feet
Excess Urban Runoff Volume (EURV) =	1.880 acre-feet
2-yr Runoff Volume (P1 = 0.86 in.) =	1.298 acre-feet
5-yr Runoff Volume (P1 = 1.14 in.) =	1.951 acre-feet
10-yr Runoff Volume (P1 = 1.4 in.) =	2.651 acre-feet
25-yr Runoff Volume (P1 = 1.79 in.) =	3.894 acre-feet
50-yr Runoff Volume (P1 = 2.12 in.) =	4.878 acre-feet
100-yr Runoff Volume (P1 = 2.47 in.) =	6.019 acre-feet
500-yr Runoff Volume (P1 = 3.39 in.) =	8.824 acre-feet
Approximate 2-yr Detention Volume =	1.202 acre-feet
Approximate 5-yr Detention Volume =	1.843 acre-feet
Approximate 10-yr Detention Volume =	2.213 acre-feet
Approximate 25-yr Detention Volume =	2.658 acre-feet
Approximate 50-yr Detention Volume =	2.890 acre-feet
Approximate 100-yr Detention Volume =	3.353 acre-feet

Optional User Overrides

	acre-feet
	acre-feet
0.86	inches
1.14	inches
1.40	inches
1.79	inches
2.12	inches
2.47	inches
3.39	inches

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.651 acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.229 acre-feet
Zone 3 Volume (100-yr - Zones 1 & 2) =	1.473 acre-feet
Total Detention Basin Volume =	3.353 acre-feet
Initial Surge Volume (ISV) =	219 ft ³
Initial Surge Depth (ISD) =	0.50 ft
Total Available Detention Depth (H _{total}) =	8.00 ft
Depth of Trickle Channel (H _{TC}) =	0.50 ft
Slope of Trickle Channel (S _{TC}) =	0.005 ft/ft
Slopes of Main Basin Sides (S _{mb}) =	4 H:V
Basin Length-to-Width Ratio (R _{L/W}) =	2

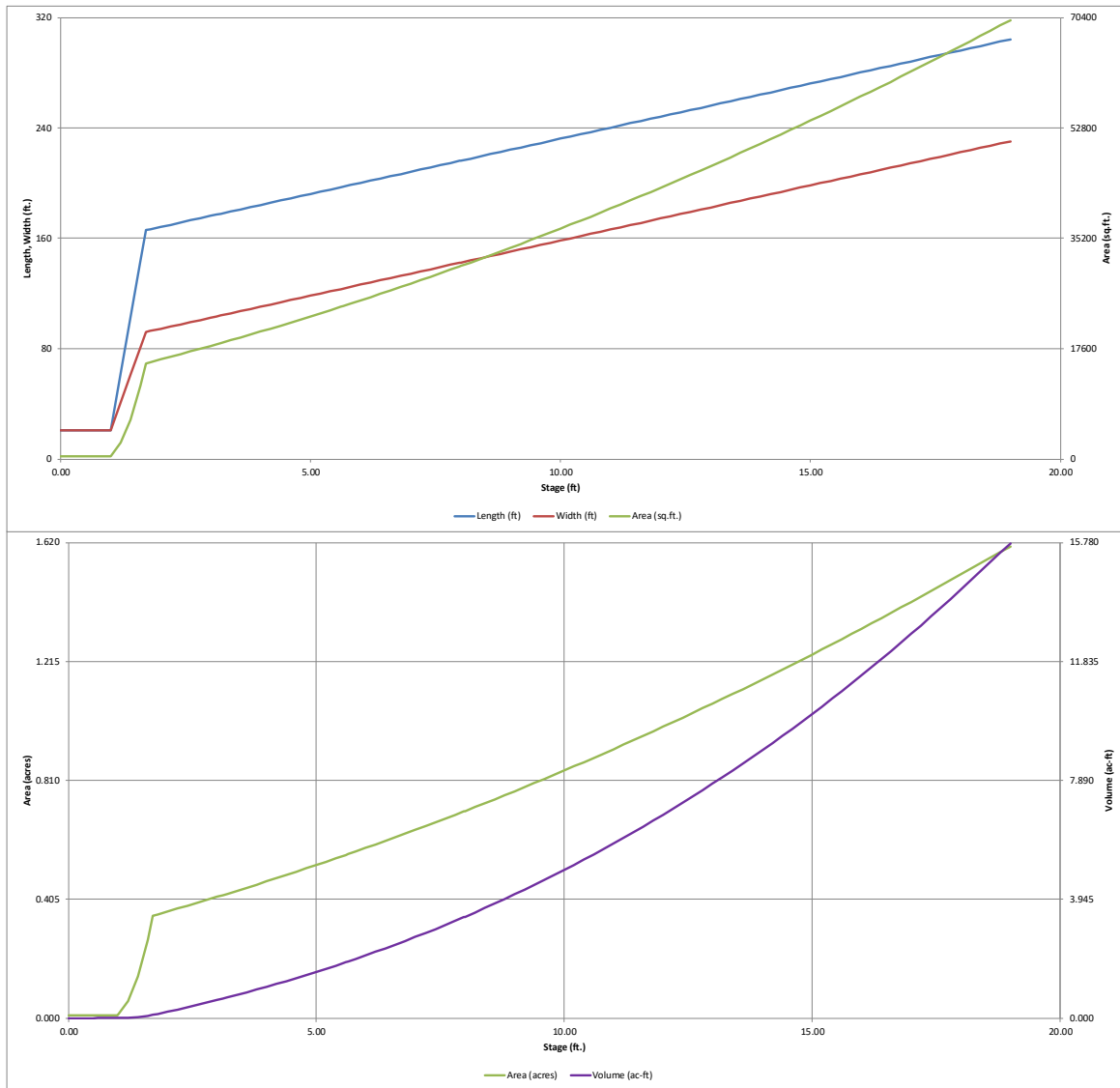
Initial Surge Area (A _{ISV}) =	438 ft ²
Surge Volume Length (L _{ISV}) =	20.9 ft
Surge Volume Width (W _{ISV}) =	20.9 ft
Depth of Basin Floor (H _{floor}) =	0.71 ft
Length of Basin Floor (L _{floor}) =	165.8 ft
Width of Basin Floor (W _{floor}) =	91.9 ft
Area of Basin Floor (A _{floor}) =	15,239 ft ²
Volume of Basin Floor (V _{floor}) =	4,322 ft ³
Depth of Main Basin (H _{mb}) =	6.29 ft
Length of Main Basin (L _{mb}) =	216.1 ft
Width of Main Basin (W _{mb}) =	142.2 ft
Area of Main Basin (A _{mb}) =	30,738 ft ²
Volume of Main Basin (V _{mb}) =	141,777 ft ³
Calculated Total Basin Volume (V _{total}) =	3.364 acre-feet

Depth Increment = 0.20 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft ²)	Optional Override Area (ft ²)	Area (acre)	Volume (ft ³)	Volume (ac-ft)
Top of Micropool	0.00		20.9	20.9	438		0.010		
ISV	0.50		20.9	20.9	438		0.010	219	0.005
	0.60		20.9	20.9	438		0.010	263	0.006
	0.80		20.9	20.9	438		0.010	350	0.008
	1.00		20.9	20.9	438		0.010	438	0.010
	1.20		61.7	40.9	2,526		0.058	707	0.016
	1.40		102.5	60.9	6,247		0.143	1,557	0.036
	1.60		143.3	80.9	11,599		0.266	3,315	0.076
Floor	1.71		165.8	91.9	15,239		0.350	4,786	0.110
	1.80		166.5	92.6	15,425		0.354	6,166	0.142
	2.00		168.1	94.2	15,842		0.364	9,293	0.213
	2.20		169.7	95.8	16,264		0.373	12,503	0.287
	2.40		171.3	97.4	16,692		0.383	15,799	0.363
	2.60		172.9	99.0	17,124		0.393	19,180	0.440
	2.80		174.5	100.6	17,562		0.403	22,649	0.520
	3.00		176.1	102.2	18,005		0.413	26,206	0.602
Zone 1 (WQCV)	3.12		177.0	103.2	18,273		0.419	28,382	0.652
	3.20		177.7	103.8	18,453		0.424	29,851	0.685
	3.40		179.3	105.4	18,906		0.434	33,587	0.771
	3.60		180.9	107.0	19,364		0.445	37,414	0.859
	3.80		182.5	108.6	19,827		0.455	41,333	0.949
	4.00		184.1	110.2	20,295		0.466	45,345	1.041
	4.20		185.7	111.8	20,769		0.477	49,451	1.135
	4.40		187.3	113.4	21,248		0.488	53,653	1.232
	4.60		188.9	115.0	21,731		0.499	57,951	1.330
	4.80		190.5	116.6	22,220		0.510	62,346	1.431
	5.00		192.1	118.2	22,714		0.521	66,839	1.534
	5.20		193.7	119.8	23,213		0.533	71,432	1.640
	5.40		195.3	121.4	23,717		0.544	76,125	1.748
	5.60		196.9	123.0	24,227		0.556	80,919	1.858
Zone 2 (EURV)	5.65		197.3	123.4	24,355		0.559	82,134	1.886
	5.80		198.5	124.6	24,741		0.568	85,816	1.970
	6.00		200.1	126.2	25,261		0.580	90,816	2.085
	6.20		201.7	127.8	25,786		0.592	95,921	2.202
	6.40		203.3	129.4	26,315		0.604	101,131	2.322
	6.60		204.9	131.0	26,850		0.616	106,447	2.444
	6.80		206.5	132.6	27,390		0.629	111,871	2.568
	7.00		208.1	134.2	27,936		0.641	117,404	2.695
	7.20		209.7	135.8	28,486		0.654	123,046	2.825
	7.40		211.3	137.4	29,041		0.667	128,798	2.957
	7.60		212.9	139.0	29,602		0.680	134,662	3.091
	7.80		214.5	140.6	30,167		0.693	140,639	3.229
Zone 3 (100-year)	7.98		215.9	142.1	30,681		0.704	146,116	3.354
	8.00		216.1	142.2	30,738		0.706	146,730	3.368
	8.20		217.7	143.8	31,314		0.719	152,935	3.511
	8.40		219.3	145.4	31,895		0.732	159,256	3.656
	8.60		220.9	147.0	32,481		0.746	165,693	3.804
	8.80		222.5	148.6	33,073		0.759	172,249	3.954
	9.00		224.1	150.2	33,669		0.773	178,923	4.108
	9.20		225.7	151.8	34,270		0.787	185,717	4.263
	9.40		227.3	153.4	34,877		0.801	192,631	4.422
	9.60		228.9	155.0	35,489		0.815	199,668	4.584
	9.80		230.5	156.6	36,106		0.829	206,827	4.748
	10.00		232.1	158.2	36,728		0.843	214,110	4.915
	10.20		233.7	159.8	37,355		0.858	221,519	5.085
	10.40		235.3	161.4	37,987		0.872	229,053	5.258
	10.60		236.9	163.0	38,624		0.887	236,714	5.434
	10.80		238.5	164.6	39,267		0.901	244,503	5.613
	11.00		240.1	166.2	39,914		0.916	252,421	5.795
	11.20		241.7	167.8	40,567		0.931	260,469	5.980
	11.40		243.3	169.4	41,225		0.946	268,648	6.167
	11.60		244.9	171.0	41,888		0.962	276,959	6.358
	11.80		246.5	172.6	42,556		0.977	285,403	6.552
	12.00		248.1	174.2	43,229		0.992	293,982	6.749
	12.20		249.7	175.8	43,907		1.008	302,695	6.949
	12.40		251.3	177.4	44,591		1.024	311,545	7.152
	12.60		252.9	179.0	45,279		1.039	320,532	7.358
	12.80		254.5	180.6	45,973		1.055	329,657	7.568
	13.00		256.1	182.2	46,672		1.071	338,921	7.781
	13.20		257.7	183.8	47,376		1.088	348,326	7.996
	13.40		259.3	185.4	48,085		1.104	357,872	8.216
	13.60		260.9	187.0	48,799		1.120	367,560	8.438
	13.80		262.5	188.6	49,518		1.137	377,392	8.664
	14.00		264.1	190.2	50,242		1.153	387,368	8.893
	14.20		265.7	191.8	50,972		1.170	397,489	9.125
	14.40		267.3	193.4	51,707		1.187	407,757	9.361
	14.60		268.9	195.0	52,446		1.204	418,172	9.600
	14.80		270.5	196.6	53,191		1.221	428,736	9.842
	15.00		272.1	198.2	53,941		1.238	439,449	10.088
	15.20		273.7	199.8	54,696		1.256	450,313	10.338
	15.40		275.3	201.4	55,456		1.273	461,328	10.591
	15.60		276.9	203.0	56,222		1.291	472,495	10.847
	15.80		278.5	204.6	56,992		1.308	483,817	11.107
	16.00		280.1	206.2	57,768		1.326	495,293	11.370
	16.20		281.7	207.8	58,549		1.344	506,924	11.637
	16.40		283.3	209.4	59,334		1.362	518,712	11.908
	16.60		284.9	211.0	60,125		1.380	530,658	12.182
	16.80		286.5	212.6	60,921		1.399	542,763	12.460
	17.00		288.1	214.2	61,723		1.417	555,027	12.742
	17.20		289.7	215.8	62,529		1.435	567,452	13.027
	17.40		291.3	217.4	63,340		1.454	580,039	13.316
	17.60		292.9	219.0	64,157		1.473	592,789	13.609
	17.80		294.5	220.6	64,978		1.492	605,702	13.905
	18.00		296.1	222.2	65,805		1.511	618,780	14.205
	18.20		297.7	223.8	66,637		1.530	632,025	14.509
	18.40		299.3	225.4	67,474		1.549	645,436	14.817
	18.60		300.9	227.0	68,316		1.568	659,015	15.129
	18.80		302.5	228.6	69,164		1.588	672,762	15.444
	19.00		304.1	230.2	70,016		1.607	686,680	15.764

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



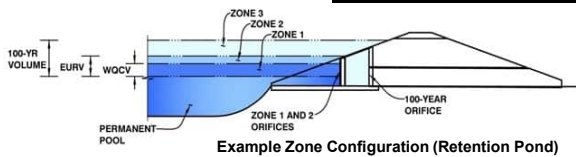
NOTE: Outlet structure and orifice sizing are preliminary and not approved with this submittal

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: DCS21-9005 | Foundry

Basin ID: Basin B1



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.12	0.651	Orifice Plate
Zone 2 (EURV)	5.65	1.229	Rectangular Orifice
Zone 3 (100-year)	7.98	1.473	Weir&Pipe (Restrict)
Total (all zones)		3.353	

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area = N/A ft²
Underdrain Orifice Centroid = N/A 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)

Calculated Parameters for Plate

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 3.30 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = 15.00 inches
Orifice Plate: Orifice Area per Row = 2.27 sq. inches (diameter = 1-11/16 inches)

WQ Orifice Area per Row = 1.576E-02 ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

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	1.20	2.40					
Orifice Area (sq. inches)	2.27	2.27	2.27					

	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)

Calculated Parameters for Vertical Orifice

	Zone 2 Rectangular	Not Selected			Zone 2 Rectangular	Not Selected
Invert of Vertical Orifice =	3.12	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	0.36	N/A
Depth at top of Zone using Vertical Orifice =	5.65	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	0.63	N/A
Vertical Orifice Height =	15.00	N/A	inches			
Vertical Orifice Width =	3.44		inches			

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

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected
Overflow Weir Front Edge Height, H _o =	8.75	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H _u =	8.75	N/A
Overflow Weir Front Edge Length =	7.00	N/A	feet	Overflow Weir Slope Length =	7.00	N/A
Overflow Weir Grate Slope =	0.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	14.76	N/A
Horiz. Length of Weir Sides =	7.00	N/A	feet	Overflow Grate Open Area w/o Debris =	38.76	N/A
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	19.38	N/A
Debris Clogging % =	50%	N/A	%			

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected
Depth to Invert of Outlet Pipe =	2.50	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	2.63	N/A
Outlet Pipe Diameter =	24.00	N/A	inches	Outlet Orifice Centroid =	0.86	N/A
Restrictor Plate Height Above Pipe Invert =	18.70		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.16	N/A

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage =	9.90	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth =	0.93	feet
Spillway Crest Length =	33.00	feet	Stage at Top of Freeboard =	11.83	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.98	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	6.58	acre-ft

Routed Hydrograph Results

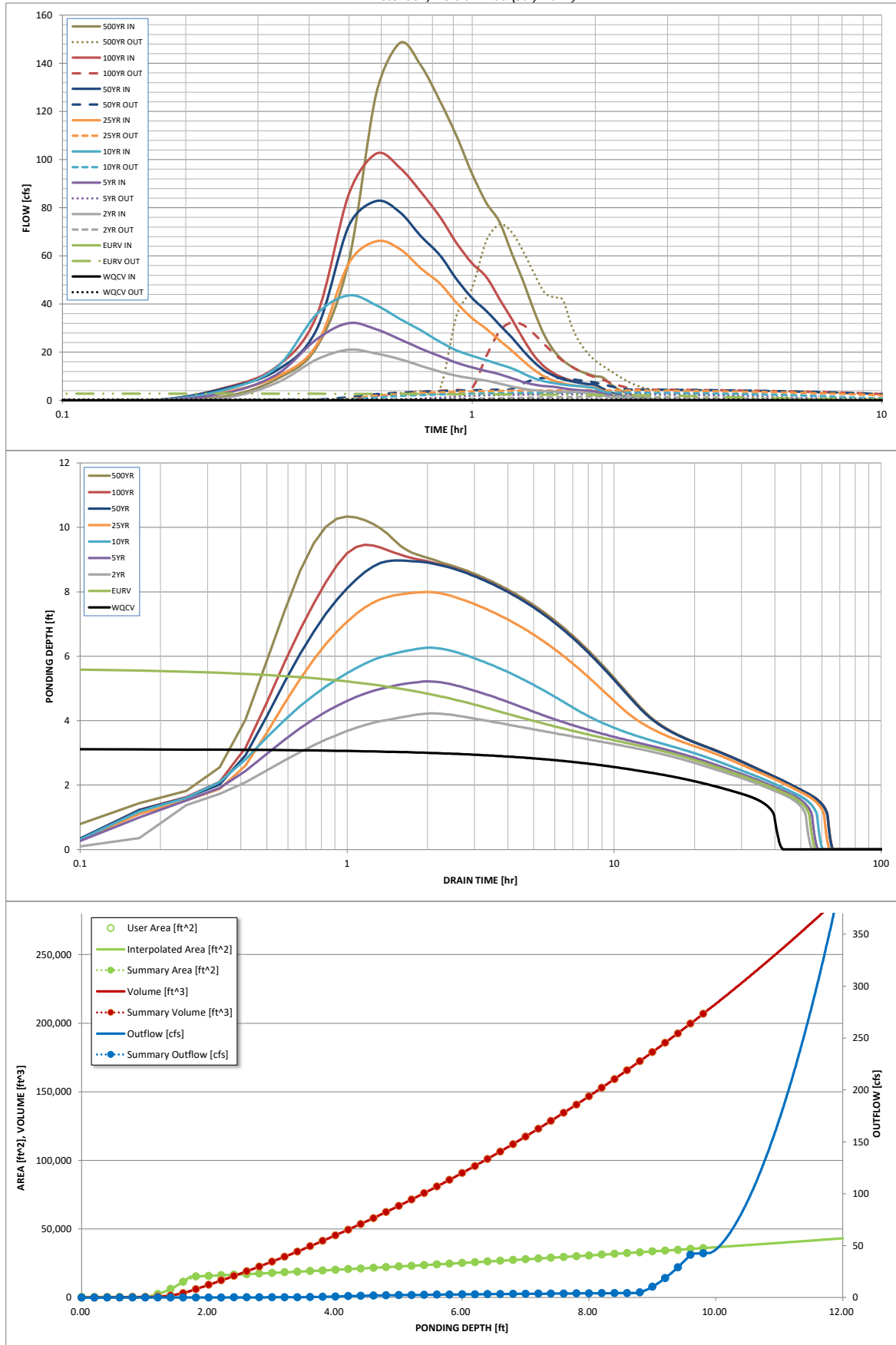
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	0.86	1.14	1.40	1.79	2.12	2.47	3.39
One-Hour Rainfall Depth (in) =	0.651	1.880	1.298	1.951	2.651	3.894	4.878	6.019	8.824
CUHP Runoff Volume (acre-ft) =	N/A	N/A	1.298	1.951	2.651	3.894	4.878	6.019	8.824
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.4	4.5	10.8	25.7	35.5	47.6	75.0
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	0.13	0.31	0.75	1.03	1.38	2.17
Peak Inflow Q (cfs) =	N/A	N/A	21.0	32.1	43.6	66.0	82.8	102.5	148.5
Peak Outflow Q (cfs) =	0.3	2.8	1.5	2.5	3.2	4.1	9.4	32.3	73.0
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	0.3	0.2	0.3	0.7	1.0
Structure Controlling Flow =	Plate	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	0.1	0.7	1.0
Max Velocity through Gate 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) =	39	49	49	50	51	52	51	49	43
Time to Drain 99% of Inflow Volume (hours) =	41	53	52	54	56	58	59	58	56
Maximum Ponding Depth (ft) =	3.12	5.65	4.22	5.22	6.26	7.99	8.97	9.46	10.33
Area at Maximum Ponding Depth (acres) =	0.42	0.56	0.48	0.53	0.59	0.70	0.77	0.80	0.87
Maximum Volume Stored (acre-ft) =	0.65	1.89	1.14	1.65	2.23	3.36	4.08	4.46	5.20

NOTE: Outlet structure and orifice sizing are preliminary and not approved with this submittal

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			

NOTE: Outlet structure and orifice sizing are preliminary and not approved with this submittal

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	0.08	0.00	1.68
	0:15:00	0.00	0.00	1.07	2.98	4.41	3.53	5.04	5.28	8.83
	0:20:00	0.00	0.00	7.28	10.76	13.72	9.84	12.42	13.97	21.94
	0:25:00	0.00	0.00	16.91	25.30	35.70	22.87	29.28	34.99	57.99
	0:30:00	0.00	0.00	21.04	32.10	43.61	56.96	72.53	85.78	127.23
	0:35:00	0.00	0.00	19.43	29.50	39.47	66.05	82.81	102.49	148.46
	0:40:00	0.00	0.00	17.09	25.32	33.82	62.80	78.12	96.52	139.07
	0:45:00	0.00	0.00	14.31	21.48	29.06	54.86	68.14	86.56	124.58
	0:50:00	0.00	0.00	11.96	18.36	24.39	48.65	60.38	76.40	109.76
	0:55:00	0.00	0.00	10.21	15.57	20.77	40.52	50.34	65.34	93.98
	1:00:00	0.00	0.00	9.06	13.65	18.45	34.06	42.44	56.87	82.06
	1:05:00	0.00	0.00	8.16	12.19	16.65	29.73	37.17	51.28	74.05
	1:10:00	0.00	0.00	6.94	10.84	14.92	24.94	31.32	42.05	61.05
	1:15:00	0.00	0.00	5.77	9.19	13.28	20.67	26.10	33.74	49.32
	1:20:00	0.00	0.00	4.81	7.58	11.14	16.29	20.52	25.40	37.07
	1:25:00	0.00	0.00	4.17	6.51	9.15	12.65	15.88	18.51	27.11
	1:30:00	0.00	0.00	3.83	5.93	7.91	9.88	12.40	13.95	20.59
	1:35:00	0.00	0.00	3.66	5.60	7.13	8.14	10.21	11.19	16.62
	1:40:00	0.00	0.00	3.57	5.02	6.57	7.05	8.81	9.41	14.00
	1:45:00	0.00	0.00	3.51	4.55	6.17	6.31	7.86	8.18	12.19
	1:50:00	0.00	0.00	3.46	4.21	5.90	5.83	7.23	7.33	10.94
	1:55:00	0.00	0.00	3.03	3.96	5.56	5.49	6.79	6.72	10.04
	2:00:00	0.00	0.00	2.66	3.67	5.01	5.26	6.49	6.34	9.46
	2:05:00	0.00	0.00	2.00	2.75	3.73	3.95	4.86	4.74	7.06
	2:10:00	0.00	0.00	1.45	1.98	2.66	2.83	3.47	3.39	5.03
	2:15:00	0.00	0.00	1.05	1.43	1.91	2.03	2.49	2.45	3.64
	2:20:00	0.00	0.00	0.75	1.01	1.36	1.45	1.78	1.76	2.61
	2:25:00	0.00	0.00	0.52	0.69	0.95	1.01	1.24	1.23	1.82
	2:30:00	0.00	0.00	0.35	0.47	0.65	0.70	0.86	0.85	1.26
	2:35:00	0.00	0.00	0.23	0.32	0.44	0.48	0.58	0.58	0.86
	2:40:00	0.00	0.00	0.13	0.20	0.27	0.30	0.36	0.36	0.53
	2:45:00	0.00	0.00	0.07	0.11	0.14	0.16	0.20	0.19	0.28
	2:50:00	0.00	0.00	0.03	0.04	0.05	0.07	0.08	0.08	0.11
	2:55:00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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

NOTE: Outlet structure and orifice sizing are preliminary and not approved with this submittal

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.

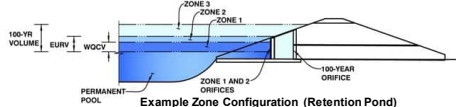
The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

[illegible]

Pond C (Full Spectrum Detention)

MHFD-Detention, Version 4.06 (July 2022)

Basin ID: Pond C



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	EDB	
Watershed Area =	21.17	acres
Watershed Length =	975	ft
Watershed Length to Centroid =	504	ft
Watershed Slope =	0.025	ft/ft
Watershed Imperviousness =	67%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100%	percent
Target WQVC Drain Time =	40.0	hours
Location for 1-hr Rainfall Depth =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) =	0.462	acre-feet
Excess Urban Runoff Volume (EURV) =	1.974	acre-feet
2-yr Runoff Volume ($P1 = 0.86$ in.) =	1.314	acre-feet
5-yr Runoff Volume ($P1 = 1.14$ in.) =	1.333	acre-feet
10-yr Runoff Volume ($P1 = 1.4$ in.) =	1.763	acre-feet
25-yr Runoff Volume ($P1 = 1.79$ in.) =	2.492	acre-feet
50-yr Runoff Volume ($P1 = 2.12$ in.) =	3.080	acre-feet
100-yr Runoff Volume ($P1 = 2.47$ in.) =	3.746	acre-feet
500-yr Runoff Volume ($P1 = 3.39$ in.) =	5.411	acre-feet
Approximate 2-yr Detention Volume =	0.886	acre-feet
Approximate 5-yr Detention Volume =	1.317	acre-feet
Approximate 10-yr Detention Volume =	1.586	acre-feet
Approximate 25-yr Detention Volume =	1.891	acre-feet
Approximate 50-yr Detention Volume =	2.048	acre-feet
Approximate 100-yr Detention Volume =	2.316	acre-feet

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.462	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.911	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.942	acre-feet
Total Detention Basin Volume =	2.316	acre-feet
Initial Surge Volume (ISV) =	user	ft ³
Initial Surge Depth (ISD) =	user	ft
Total Available Detention Depth (H _{total}) =	user	ft
Depth of Trickle Channel (H _{trickle}) =	user	ft
Slope of Trickle Channel (S _{trickle}) =	user	ft/ft
Slopes of Main Basin Sides (S _{main}) =	user	H-V
Basin Length-to-Width Ratio (R _{L/W}) =	user	

Initial Surcharge Area (A_{ISV})	=	user	ft ²
Surcharge Volume Length (L_{SV})	=	user	ft
Surcharge Volume Width (W_{SV})	=	user	ft
Depth of Basin Floor (H_{LFLOOR})	=	user	ft
Length of Basin Floor (L_{LFLOOR})	=	user	ft
Width of Basin Floor (W_{LFLOOR})	=	user	ft
Area of Basin Floor (A_{LFLOOR})	=	user	ft ²
Volume of Basin Floor (V_{LFLOOR})	=	user	ft ³
Depth of Main Basin (H_{MAIN})	=	user	ft
Length of Main Basin (L_{MAIN})	=	user	ft
Width of Main Basin (W_{MAIN})	=	user	ft
Area of Main Basin (A_{MAIN})	=	user	ft ²
Volume of Main Basin (V_{MAIN})	=	user	ft ³
Calculated Total Basin Volume (V_{TOTAL})	=	user	acre-feet

Optional User Overrides

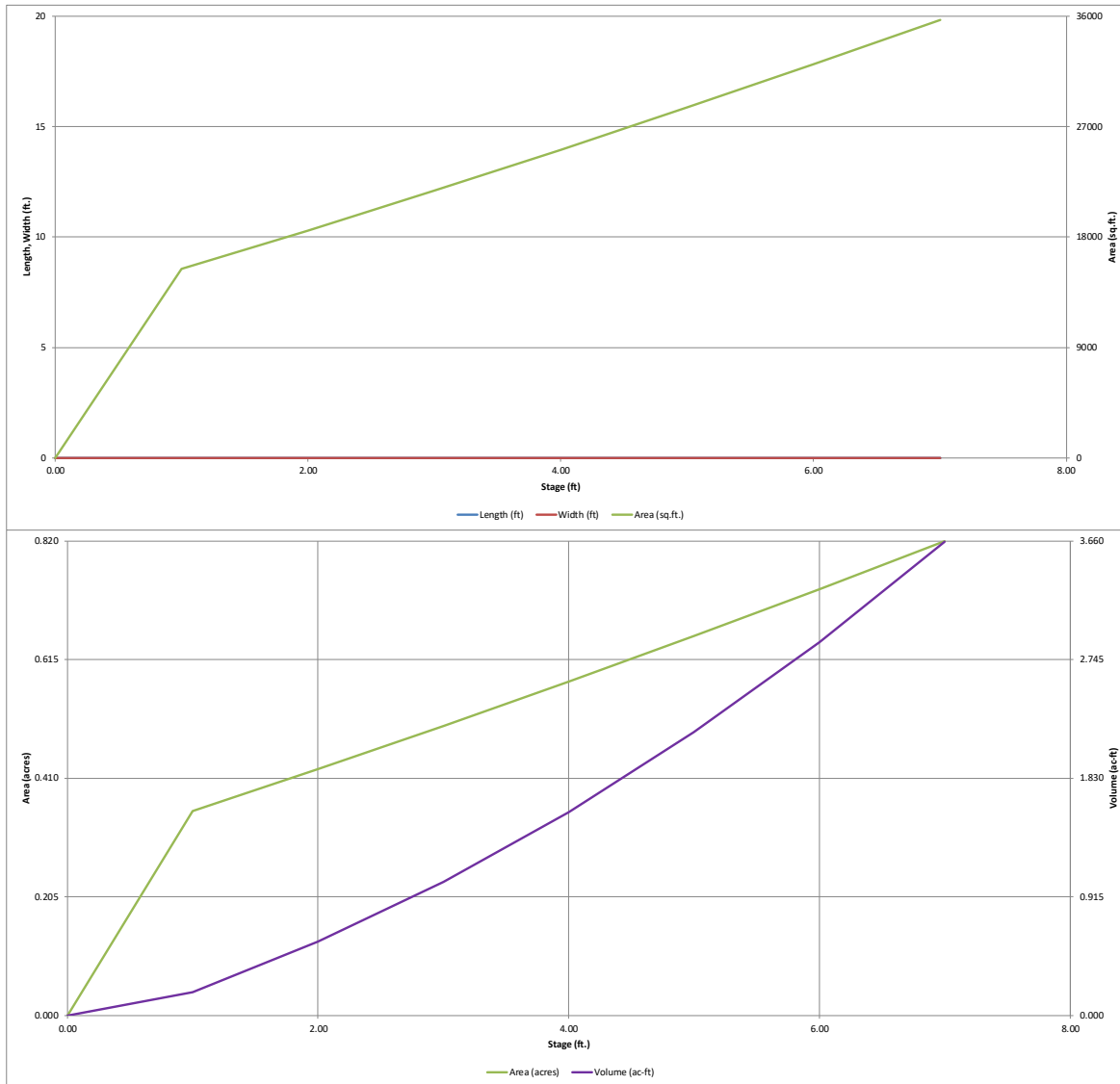
	acre-feet
	acre-feet
0.856	inches
1.14	inches
1.40	inches
1.79	inches
2.12	inches
2.47	inches
3.39	inches

Depth Increment = ft

7/9/2023, 6:07 PM

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

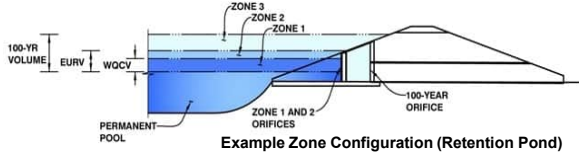


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: DCS21-9005 | Foundry

Basin ID: Pond C



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	1.76	0.462	Orifice Plate
Zone 2 (EURV)	3.66	0.911	Orifice Plate
Zone 3 (100-year)	5.21	0.942	Weir&Pipe (Restrict)
Total (all zones)		2.316	

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

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

Calculated Parameters for Underdrain

Underdrain Orifice Area = N/A ft²
Underdrain Orifice Centroid = N/A 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)

Calculated Parameters for Plate

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 3.66 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = 14.60 inches
Orifice Plate: Orifice Area per Row = 3.65 sq. inches (use rectangular openings)

WQ Orifice Area per Row = 2.535E-02 ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

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	1.22	2.44					
Orifice Area (sq. inches)	3.65	3.65	3.65					

	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)

Calculated Parameters for Vertical Orifice

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

Vertical Orifice Area = Not Selected ft²
Vertical Orifice Centroid = Not Selected feet

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

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected		Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, H _o =	3.66	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H _u =	5.16	N/A feet
Overflow Weir Front Edge Length =	4.00	N/A	feet	Overflow Weir Slope Length =	6.18	N/A feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	9.59	N/A
Horiz. Length of Weir Sides =	6.00	N/A	feet	Overflow Grate Open Area w/o Debris =	19.57	N/A ft ²
Overflow Grate Type =	Close Mesh Grate	N/A		Overflow Grate Open Area w/ Debris =	19.57	N/A ft ²
Debris Clogging % =	0%	N/A	%			

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected		Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	2.04	N/A ft ²
Outlet Pipe Diameter =	24.00	N/A	inches	Outlet Orifice Centroid =	0.70	N/A feet
Restrictor Plate Height Above Pipe Invert =	14.85		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.81	N/A radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

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

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

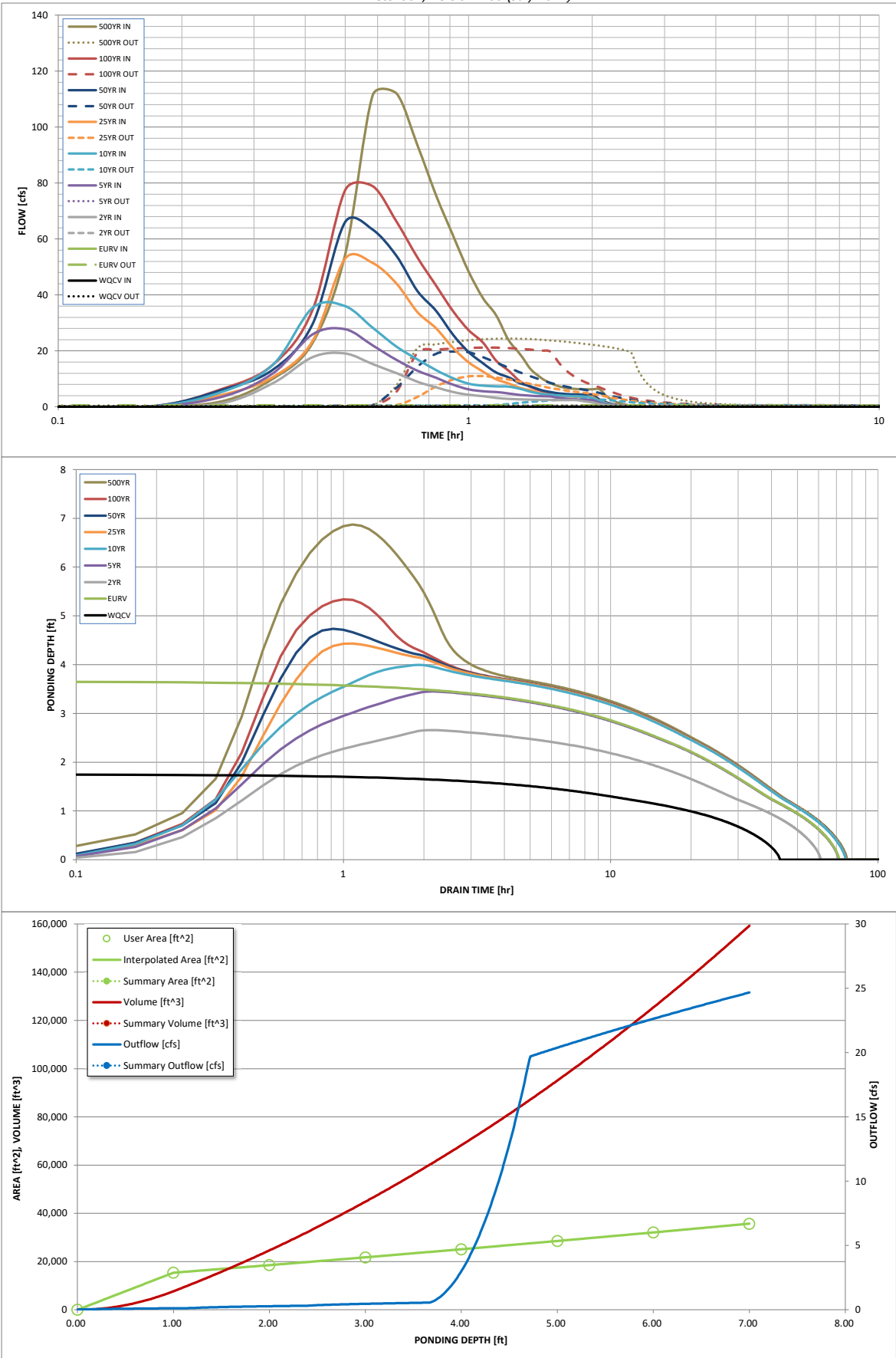
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =									
One-Hour Rainfall Depth (in) =	N/A	N/A	0.86	1.14	1.40	1.79	2.12	2.47	3.39
CUHP Runoff Volume (acre-ft) =	0.462	1.374	0.914	1.333	1.763	2.492	3.080	3.746	5.411
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.914	1.333	1.763	2.492	3.080	3.746	5.411
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	0.3	3.8	8.8	20.6	28.4	37.3	58.7
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.01	0.18	0.42	0.97	1.34	1.76	2.77
Peak Inflow Q (cfs) =	N/A	N/A	19.1	27.7	36.0	53.0	66.1	78.9	112.0
Peak Outflow Q (cfs) =	0.3	0.6	0.4	0.5	2.9	11.0	19.7	21.2	24.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.1	0.3	0.5	0.7	0.6	0.4
Structure Controlling Flow =	Plate	Overflow Weir 1	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	0.1	0.5	1.0	1.0	1.2
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) =	40	64	55	64	66	64	62	60	55
Time to Drain 99% of Inflow Volume (hours) =	42	68	59	68	72	71	70	69	67
Maximum Ponding Depth (ft) =	1.76	3.66	2.66	3.45	3.99	4.43	4.73	5.34	6.87
Area at Maximum Ponding Depth (acres) =	0.41	0.55	0.47	0.53	0.58	0.61	0.63	0.68	0.81
Maximum Volume Stored (acre-ft) =	0.47	1.37	0.86	1.26	1.56	1.82	2.01	2.40	3.54

NOTE: Outlet structure and orifice sizing are preliminary and not approved with this submittal

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

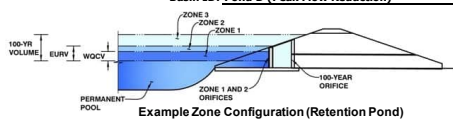
The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	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	0.10	0.00	2.00
	0:15:00	0.00	0.00	1.29	3.58	5.29	4.23	6.01	6.32	10.02
	0:20:00	0.00	0.00	8.43	11.97	15.04	10.65	13.24	15.01	22.86
	0:25:00	0.00	0.00	17.78	25.93	35.37	23.53	29.62	34.65	54.51
	0:30:00	0.00	0.00	19.08	27.73	35.96	52.97	66.11	77.44	111.34
	0:35:00	0.00	0.00	15.27	21.96	28.28	51.44	63.32	78.88	112.00
	0:40:00	0.00	0.00	12.07	16.80	21.56	44.10	53.97	66.27	93.63
	0:45:00	0.00	0.00	8.98	12.94	16.98	33.92	41.44	53.44	75.49
	0:50:00	0.00	0.00	6.94	10.38	13.13	28.05	34.26	43.25	61.16
	0:55:00	0.00	0.00	5.34	7.90	10.22	20.98	25.71	34.16	48.32
	1:00:00	0.00	0.00	4.30	6.26	8.27	15.95	19.58	27.40	38.84
	1:05:00	0.00	0.00	3.85	5.54	7.54	12.60	15.54	22.97	32.77
	1:10:00	0.00	0.00	3.23	5.31	7.32	9.86	12.30	16.51	23.90
	1:15:00	0.00	0.00	2.88	4.80	7.23	8.39	10.56	12.90	18.94
	1:20:00	0.00	0.00	2.69	4.29	6.45	6.79	8.49	9.17	13.48
	1:25:00	0.00	0.00	2.58	3.98	5.39	5.89	7.31	7.08	10.39
	1:30:00	0.00	0.00	2.50	3.80	4.72	4.89	6.03	5.75	8.42
	1:35:00	0.00	0.00	2.46	3.69	4.31	4.28	5.26	4.95	7.26
	1:40:00	0.00	0.00	2.43	3.17	4.06	3.92	4.79	4.54	6.63
	1:45:00	0.00	0.00	2.43	2.85	3.90	3.73	4.55	4.39	6.40
	1:50:00	0.00	0.00	2.43	2.66	3.81	3.63	4.41	4.33	6.30
	1:55:00	0.00	0.00	1.96	2.56	3.63	3.58	4.36	4.33	6.30
	2:00:00	0.00	0.00	1.66	2.37	3.21	3.56	4.33	4.33	6.30
	2:05:00	0.00	0.00	0.99	1.42	1.94	2.16	2.62	2.62	3.80
	2:10:00	0.00	0.00	0.59	0.83	1.15	1.29	1.56	1.56	2.26
	2:15:00	0.00	0.00	0.32	0.47	0.64	0.73	0.88	0.88	1.27
	2:20:00	0.00	0.00	0.16	0.26	0.35	0.41	0.49	0.49	0.71
	2:25:00	0.00	0.00	0.07	0.12	0.15	0.19	0.23	0.23	0.33
	2:30:00	0.00	0.00	0.02	0.03	0.04	0.06	0.07	0.07	0.09
	2:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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
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	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

Pond D (Flood Control Only)

MHFD-Detention, Version 4.06 (July 2022)

Basin ID: Pond D (Peak Flow Reduction)



Flood Control Only

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Optional User Overrides

	acre-feet
	acre-feet
0.86	inches
1.14	inches
1.40	inches
1.79	inches
2.12	inches
2.47	inches
3.39	inches

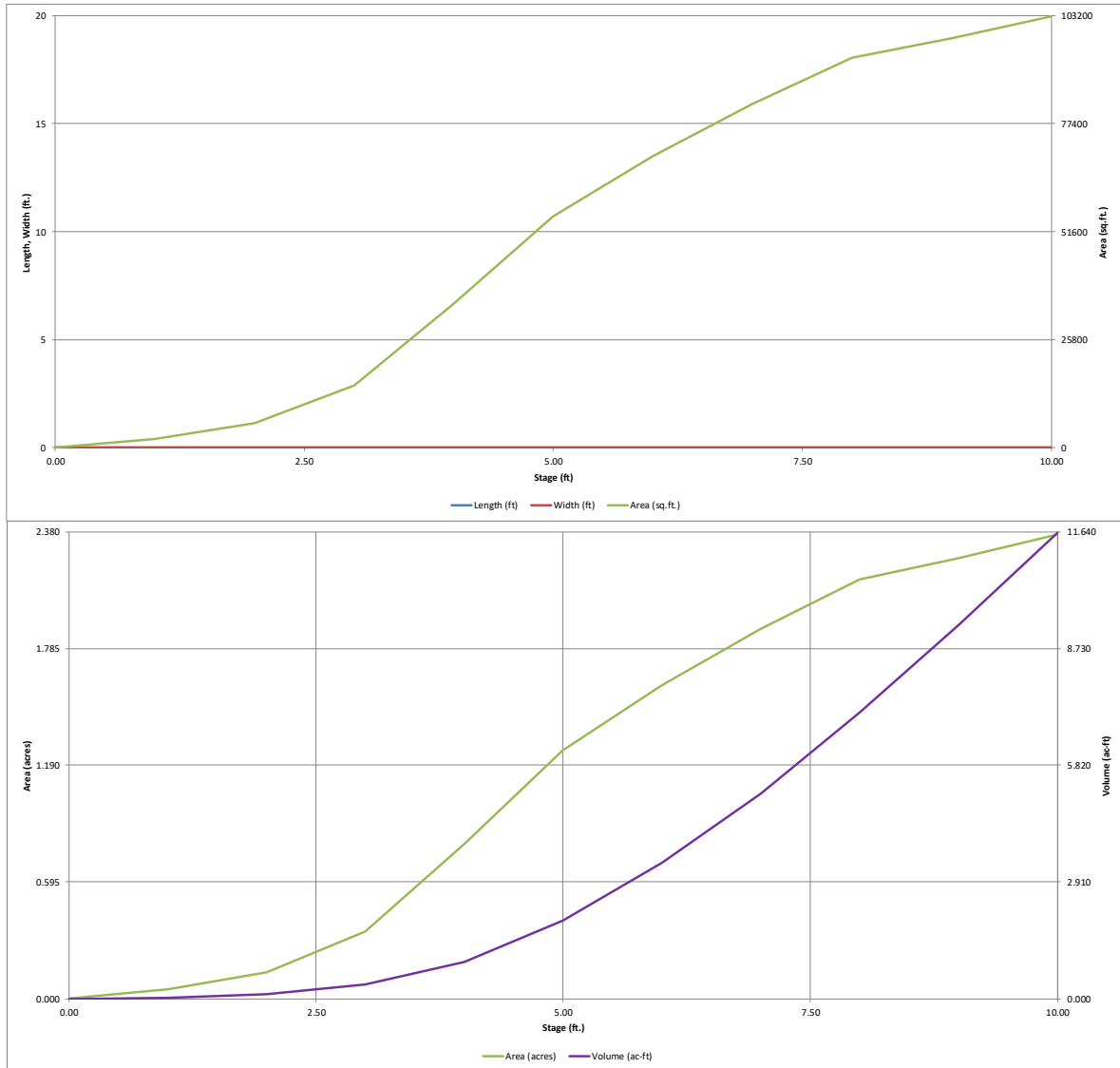
Total detention volume is less than 100-year volume.

Initial Surcharge Area (A_{ISV})	=	user	ft ²
Surcharge Volume Length (L_{SV})	=	user	ft
Surcharge Volume Width (W_{SV})	=	user	ft
Depth of Basin Floor (H_{LFLOOR})	=	user	ft
Length of Basin Floor (L_{LFLOOR})	=	user	ft
Width of Basin Floor (W_{LFLOOR})	=	user	ft
Area of Basin Floor (A_{LFLOOR})	=	user	ft ²
Volume of Basin Floor (V_{LFLOOR})	=	user	ft ³
Depth of Main Basin (H_{MAIN})	=	user	ft
Length of Main Basin (L_{MAIN})	=	user	ft
Width of Main Basin (W_{MAIN})	=	user	ft
Area of Main Basin (A_{MAIN})	=	user	ft ²
Volume of Main Basin (V_{MAIN})	=	user	ft ³
Calculated Total Basin Volume (V_{TOTAL})	=	user	acre-feet

[illegible]

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



APPENDIX D

Existing Conditions Drainage Plans

900 south broadway
suite 320
denver, co 80209
p 303.561.3333
waremalcomb.com

FOR AND ON BEHALF
OF WARE MALCOMB

FOUNDRY
MASTER DRAINAGE PLAN
E. JEWELL AVE. & POWHATON RD.
AURORA, CO 80018

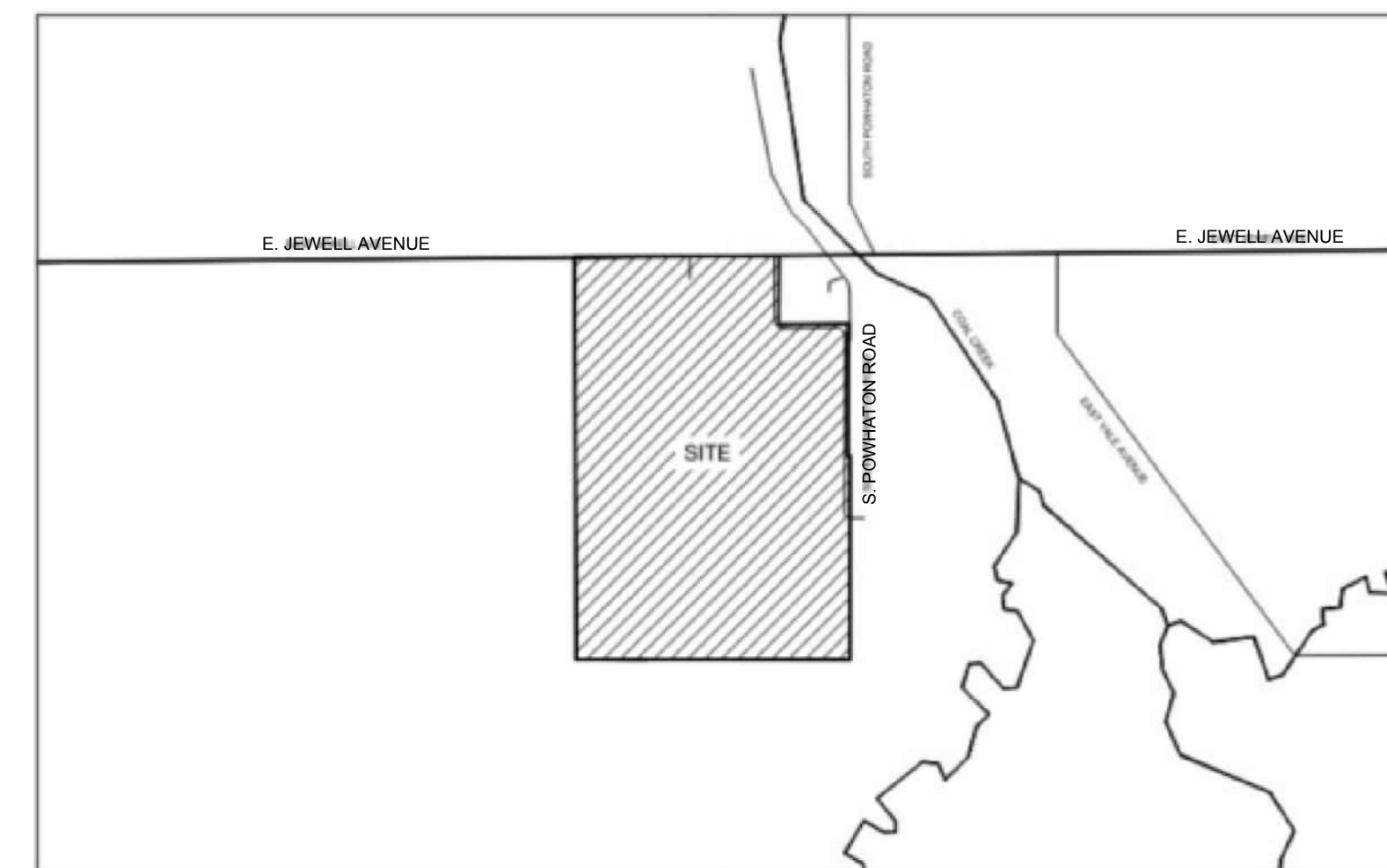
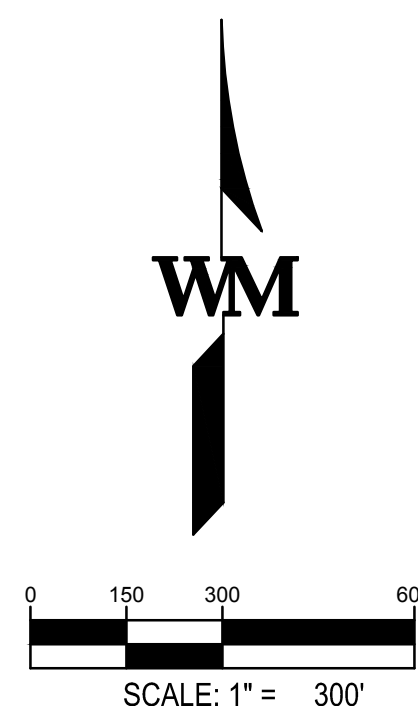
[illegible]

JOB NO.:	DCS21-9005
PA / PM:	BJ
DESIGNED:	AA
DATE:	04/08/2022
PLOT DATE:	07/07/23

SHEET

1





Sheet 1 of 1



VICINITY MAP

SCALE: 1" = 2000'

LEGEND

EXISTING		PROPOSED
	BOUNDARY	
	EASEMENT	
	CENTERLINE	
 --(5280)--	MAJOR CONTOUR	 5280
--(5278)--	MINOR CONTOUR	5278
	STORM DRAIN	

DRAINAGE LEGEND

MAJOR BASIN BOUNDARY

MINOR BASIN BOUNDARY

A - BASIN DESIGNATION

B - BASIN AREA (AC)

C - % IMPERVIOUS

D - NOT USED

A - HISTORIC BASIN DESIGNATION

B - BASIN AREA (AC)

C - 2-YR RUNOFF COEFFICIENT

D - 100-YR RUNOFF COEFFICIENT

DESIGN POINT

OVERLAND FLOW DIRECTION

EMERGENCY OVERFLOW DIRECTION

Proposed Conditions Drainage Plans

NOT FOR CONSTRUCTION



0 150 300 600

SCALE: 1" = 300'

THE PARKLANDS
Master Plan - Aurora, Colorado

NOT FOR CONSTRUCTION

Owner:
Century Homes

CIVIL ENGINEER:

Issue Date

Sheet Title
LAND USE
MAP

Sheet Number

XX

LEGEND

- PROPERTY BOUNDARY
- EXISTING/PROPOSED RIGHT OF WAY
- WHELEN SIREN SERVICE RADIUS
- 1/2 MILE NBRHD PARK SERVICE RADIUS
- NEIGHBORHOOD BOUNDARY
- PLANNING AREA BOUNDARY
- PROPOSED TRAIL
- SINGLE FAMILY
- MULTIFAMILY
- OPEN SPACE/DETENTION
- NEIGHBORHOOD PARK
- RECREATION CENTER
- SCHOOL

NOTES:
1) APPROXIMATELY 4.5 ACRES OF POCKET PARKS WILL BE LOCATED WITHIN THE PARKLANDS PROPERTY BOUNDARY TO SERVE A 1/2 MILE WALKABLE SERVICE RADIUS. LOCATIONS SHOWN IN THIS MASTER PLAN ARE CONCEPTUAL. FINAL SIZE (GENERALLY .05 - 3 ACRES) AND LOCATION SHALL BE REFLECTED IN FUTURE CSP SUBMITTALS AND SHALL NOT TRIGGER A MASTER PLAN AMENDMENT IF POCKET PARK LOCATION CHANGES. THE DISTRICT SHALL OWN AND MAINTAIN ALL POCKET PARKS.
2) PLANNING AREAS NOTED AS RESIDENTIAL MAY INCLUDE THE FOLLOWING TYPES OF HOUSING: SINGLE-FAMILY DETACHED STANDARD (SFD-STAND), SINGLE-FAMILY DETACHED SMALL (SFD-SMALL), TWO-FAMILY (2-FAMILY), SINGLE-FAMILY ATTACHED TOWNHOMES (SF-TH) OR MULTI-FAMILY (MF-SMALL/MF-MED)

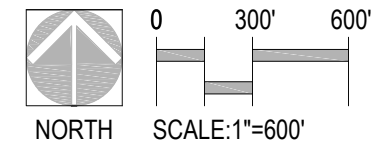
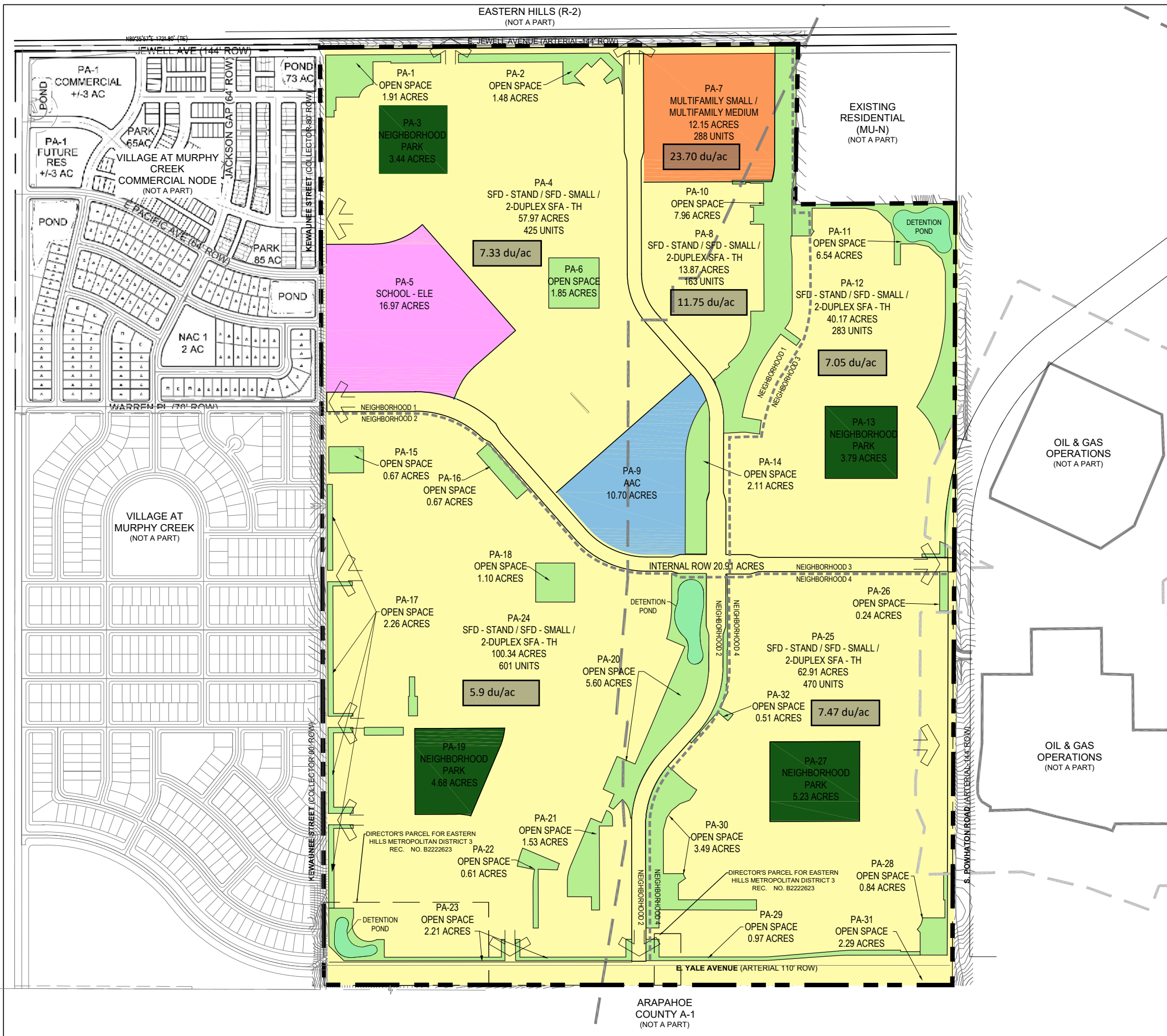



Table 5-4. Land Use Based Imperviousness Values for Master Planning

Land Use (Including Roadways)	Corresponding Zoning	Density	Imperviousness
Residential			
Low-Density Single-Family Home (SFH)*	R-1, PD, APZ^, MU-A^	3 du/acre	70%
Medium-Density SFH*	R-2, MU-A^	5 du/acre	75%
Rural	R-R	0-3 du/acre	30%
Trailer Parks	R-MH	Manufactured: 10 du/ac; cohousing/cottage: 12 du/ac; tiny houses: 15 du/ac	65%
Medium-Density MFH	R-3	N/A	75%
High-Density MFH	R-4, MU-TOD	Core: 60 du/ac, min.; Edge: 20 du/ac, min.	80%
Commercial			
Low-Density Commercial	MU-N	16 du/ac max	70%
Medium- to High-Density Commercial	MU-R, MU-FB, MU-C, AD^, MU-A^	25 du/ac min	80%
Urban Core Commercial	MU-OA	5 - 25 du/ac	90%
Industrial/Institutional			
Schools	MU-OI	N/A	55%
Office/Institutional	MU-OI (non-school)	N/A	75%
Industrial, Light Areas	I-1, AD^	N/A	80%
Industrial, Heavy Areas	I-2	N/A	90%
Solar Farm, Gravel Cover	N/A	N/A	60%
Solar Farm, Grass Cover	N/A	N/A	40%
Parks and Open Space			
Open Space	POS, APZ^	N/A	2%
Less Developed Parks	POS	N/A	10%
Cemeteries	POS	N/A	25%
Developed Parks	POS	N/A	30%
<p>*If development is compliant before a turf ordinance limiting lawns to 500 sf was enacted, decrease imperviousness by 10%.</p> <p>^Use corresponding value for appropriate land use; if land-use is unknown at time of master planning, use the highest imperviousness category. For example, if an area zoned as MU-A, the impervious value for master planning would be 80% (Medium- to High- Density Commercial).</p> <p>du/ac = Dwelling per acre</p>			



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signed and sealed pdf set

 Date: 03/31/2021
Tess Hogan, PE

Master Drainage Report

Harvest Crossing/
Villages at Murphy Creek
Aurora, Colorado

Project No. 1008-18

Submittal: 1st: August 24, 2020
2nd: November 13, 2020
3rd: February 5, 2021
4th: March 31, 2021

Approved For One Year From This Date

04/05/2021

GGS 


City Engineer

04/05/2021
Date


Water Department

04/05/2021
Date

Prepared For:

Richmond American Homes
4350 S. Monaco St.
Denver, CO 80237
(970) 977-3841

Prepared By:

Innovative Land Consultants, Inc.
12071 Tejon Street, Suite 470
Westminster, CO 80234
(303) 421-4224

The site is on the edge of the Coal Creek watershed and Basin 88 was assumed to have a future imperviousness of 59.3% within the Sand Creek Colfax to Yale Major Drainageway Plan. There is no approved Outfall Systems Plan for Coal Creek. Refer to the Sand Creek Colfax to Yale Major Drainageway Plan which discusses that portion of the site within Coal Creek.

The site is within flood zone "X" which are areas outside the FEMA regulated floodplain, according to the FEMA FIRM 08005C0212K, dated December 17, 2010. The FEMA FIRM map may be found in Appendix C.

e. Existing Drainage Patterns Through Property

The proposed site is east of Murphy Creek and west of Coal Creek. Harvest Gulch drainageway is located near the south boundary of the project. The westerly portion of the site drains generally to the northwest to Murphy Creek. The easterly portion of the site drains generally to the northeast to Coal Creek. The existing land is undeveloped.

f. Outfalls Downstream from Property

Runoff from the western portion of the site generally flows to the northwest and outfalls to Murphy Creek. The northern portion of the site within the Murphy Creek watershed outfalls to Harvest Road south of E. Jewell Avenue. The southern portion of the site mostly drains to Harvest Gulch which confluent with Murphy Creek. Runoff from the eastern portion of the site outfalls into grassed channels, which ultimately outfall into Coal Creek.

III. Design Criteria

1. List References

- ◆ *Master Drainage Report for Villages at Murphy Creek* as prepared by Peak Civil Consultants Civil Engineering and Land Development Services, dated February, 2006 and approved by the City of Aurora on May 31, 2006 (COA EDN 206111);
- ◆ *Master Drainage Report for Eastern Hills*, as prepared by Stantec Consulting, Inc. and revised February 2003 (COA EDN 203066);
- ◆ *Murphy Creek East (Harvest Ridge) Subdivision Filing No. 1 & 2 Final Drainage Report*, as prepared by CVL Consultants of Colorado, Inc. and dated December 2020 (Under Review);
- ◆ *Murphy Creek East (Harvest Ridge) Subdivision Filing No. 1, 2, 3, 4 Master Drainage Report* as prepared by CVL Consultants of Colorado, Inc., dated November 2020 and approved by the City of Aurora on November 30, 2020 (COA EDN 220220);

to Harvest Road. Runoff is conveyed overland and in street gutters to proposed storm sewer and detention/water quality Pond B2 located at Design Point 2. Runoff will be conveyed to a low point in Harvest Road near Design Point 1 via a storm sewer system in Harvest Road and to the west into the East Murphy Creek drainageway. The amount of the major storm collected and conveyed within the storm sewer will be determined within the preliminary drainage report for this basin. Detention/water quality Pond B1 collects runoff from Basin B1 and is located at a natural low point in the topography. Pond B1 has been designed for water quality treatment and detention of the upstream tributary basins including PA-1 (Commercial). Pond B2 has been designed for water quality treatment and detention of the upstream tributary basins. The Murphy Creek East Master Drainage Report has sized the pipe system under Harvest Road for historic 100-year storm event flows at this location. Ponds B1 and B2 will be sized to ensure the combined flow rate from the ponds will be at the historic flow rate or less. Subsequent drainage reports will confirm the sizing of the Harvest Road storm system. Emergency overflow for Ponds B1 and B2 will be to the west over Harvest Road and into the East Murphy Creek drainage, as anticipated within the Final Drainage Report for Murphy Creek Metropolitan District. Discharge for Ponds B1 and B2 will be to the proposed storm sewer system within Harvest Road and into the East Murphy Creek drainage.

Basin B3 consists of runoff from a single family detached area along the east side of Harvest Road, which is tributary to Murphy Creek. Flows are conveyed overland and in street gutters to a proposed detention pond, labeled Pond B4 on the Master Drainage Plan, at Design Point 3. The pond outlets to storm sewer to be constructed in Harvest Road which is further detailed in the Murphy Creek East Master Drainage Report. If future grades for Harvest Road result in a sump condition at this location, Murphy Creek East will have to provide surface conveyance of emergency flows through their site. Pond B4 will discharge at historic rates (or City-allowable release rates whichever is less). The final location, size, and outfall location for Pond B4 will be verified in subsequent drainage reports for this project.

Basin C consists of approximately 55.6 acres and contains the northeastern third of the project. Basin C1 consists of runoff from the east side of the commercial parcel (PA-1) and the single family attached parcel (PA-2) in the northeast corner of the site that are tributary to Pond C1. Major and minor storm runoff is conveyed overland and in street gutters to detention/water quality Pond C1 at Design Point 8.

The Master Drainage Report for Eastern Hills assumed all of the Harvest Crossing Coal Creek basins could be discharged at Design Point 9 into a 60" RCP. However, taking into account the existing topography, Design Point 8 is considerably lower than Design Point 9 so back draining the northwest corner of the project site south to Design Point 9 will not be possible. Instead it is proposed to outfall all of Basin C to Design Point 8, collecting upstream basins C2 and C3 in a storm sewer in Louisiana Street. From Design Point 8, the runoff

will outfall to an existing drainage swale south of E. Jewell Avenue as it does in the current conditions. The existing draw located at Design Point 9 also outfalls to the south Jewell drainage swale.

The entire Basin C1 area is commercial and single family attached; detention and water quality for the entire basin is proposed within Pond C1. Discharge for the pond will be to the existing swale at Design Point 8 and eventually to storm sewer within Jewell Avenue with the future street build-out. Emergency overflow for Pond C1 will be to the east across Louisiana Street into the south swale along Jewell Avenue. Future design reports will consider the upstream watershed and discharge to existing concentrated flow paths as appropriate. Stability of the existing Jewell Avenue swale and capacity of downstream culverts to the confluence with Coal Creek will be evaluated with the associated final drainage report. The design of culverts and erosion protection needed for conveyance will be provided with the Construction Documents (CD's).

Basins C2 and C3 consist of runoff from single family detached areas that are tributary to Pond C3. Runoff from Basin C3 is conveyed overland and in street gutters to proposed storm sewer located at Design Point 11. Flows are then conveyed to Pond C3. Runoff from Basin C2 is conveyed overland and in street gutters to Pond C3 at Design Point 12. Pond C3 has been designed for detention and water quality treatment of all upstream tributary basins. Emergency overflow for Pond C3 will be to the north in the Louisiana Street gutters.

Pond information with the allowable release rates is shown in the table below.

Description	Impervious (%)	Area (ac)	WQCV* (ac-ft)	EURV* (ac-ft)	100-year V = KA (ac-ft)	Required Volume** (ac-ft)	Historic 100-yr Rate (cfs)	Aurora Release Rate (cfs)	Allowable Release Rate (cfs)
Pond A1	55	54.8	1.21	2.87	5.38	6.81	80.5	72.2	72.2
Pond A4	75	6.9	0.20	0.51	0.91	1.16			
Pond B1	94	14.1	0.61	1.32	2.29	2.95	18.4	14.1	14.1
Pond B2	48	40.9	0.83	1.85	3.51	4.44	40.9	40.9	40.9
Pond B4	43	21.7	0.41	0.87	1.67	2.11	27.5	21.7	21.7
Pond C1	79	24.9	0.80	1.93	3.45	4.41	23.6	24.9	23.6
Pond C3	50	30.7	0.64	1.45	2.74	3.47	44.2	30.7	30.7

*Obtained from MHFD-Detention Version 4.03 and multiplied by 1.2 per City criteria.

**Required Volume is half EURV plus the 100-year V = KA volume.

b. Conveyance of Offsite Drainage

The off-site Basin OS-911 runoff from Eastern Hills flows onto the site near the southwest corner of Eastern Hills, according to the Master Drainage Report for Eastern Hills. Future off-site Pond M is assumed to provide detention and water quality treatment for the developed Basin OS-911. Accommodation has been made for routing developed detained runoff from Pond M through

Discharges from conceptual Ponds C1 and C3 onsite will detain to historic levels (or allowable release rates per the City of Aurora criteria, whichever is lower) and be conveyed to Coal Creek in existing swales. Subsequent Harvest Crossing Preliminary and Final Drainage Reports will evaluate the stability of those swales, capacity of downstream culverts, and provide erosion protection and adequate culverts as needed.

- f. Discussion of Content of Tables, Charts, Figures, Plates or Drawings Presented
The Basin Weighted Runoff Coefficient Calculations within Appendix A uses areas contained within a conceptual layout that is not approved by this report update nor plan update.

MHFD-Detention, Version 4.03 within Appendix B was used to calculate required WQCV and Excess Urban Runoff Volume for the conceptual layout and conceptual ponds. Subsequent drainage reports within the area developing will be required to provide site-specific calculations, as these are for conceptual use only.

Reference information within Appendix C includes the Master Drainage Plans for the Villages at Murphy Creek of which this update is based upon. These Master Drainage Plans reflect some of the adjacent drainage report information. This Master Drainage Plan update uses consistent nomenclature to the Master Drainage Plans for the Villages at Murphy Creek for ease of comparison.

2. Specific Details

- a. Drainage Details Encountered and Associated Solutions
The Master Drainage Report for the Villages at Murphy Creek didn't include detention for low-density areas based upon previous criteria. The Harvest Crossing Master Drainage Report update includes detention for all development areas within the Villages at Murphy Creek, now known as Harvest Crossing.
- b. Plan for Existing Drainageways or Creeks
Mile High Flood District has indicated that the Harvest Gulch drainageway may require improvements be installed to mitigate degradation of the existing channel. Depending on the ultimate development Basin A and offsite Basin OS-911, the channel will need to be evaluated to determine what, if any, channel improvements are necessary. To allow for any future Harvest Gulch improvements, a 123' wide by 705' long section around the existing channel flowline has been set aside. This area may decrease in size with a more detailed analysis of the channel conditions and proposed development. This Harvest Crossing Master Drainage Report update proposes Pond A1 capture and detain Basins A1-A3 and A5 to facilitate the potential PA-5 development ahead of PA-8. The final design of the Harvest Gulch conveyance, if any, will be detailed within the final drainage report prepared for the respective development planning areas.

c. Detention Pond Plan

Detention is required for all developments in the City of Aurora per current City of Aurora criteria. The allowable pond release rates are limited to 1 cfs per contributory acre or historic flow rates, whichever is lower.

This Harvest Crossing Master Drainage Report update includes seven detention pond to treat for WQCV, EURV and 100-yr detention; refer to Appendix A for conceptual pond volumes.

- Pond A1: Treats Basins A1, A2, and A3. Runoff will be piped from the respective basins through Yale Avenue to Pond A1, located in PA-8. Pond A1 outfalls to Harvest Gulch and leaves the site at Design Point 7. From this design point, the runoff outlets to Murphy Creek East.
- Pond A4: Treats Basin A4 and will be located in PA-8. Pond A4 outfalls to Harvest Gulch and leaves the site at Design Point 7.
- Pond B1: Treats Basin B1 located in the northwest corner of the project in PA-1. Pond B1 outfalls at Design Point 1 to storm sewer in Harvest Road.
- Pond B2: Treats Basin B2 located in PA-4. Pond B2 outfalls to storm sewer at Design Point 2 in Harvest Road; the storm connects to the outfall from Pond B1 and outlets to Murphy Creek East.
- Pond B4: Treats Basin B3 located in PA-5. Pond B4 outfalls to a culvert at Design Point 3 to Murphy Creek East.
- Pond C1: Treats Basin C1 and outlets to Design Point 8 in PA-2. Pond C1 outfalls across Louisiana Street to the existing roadside ditch south of E. Jewell Avenue.
- Pond C3: Treats Basins C2 and C3 located in PA-4 at Design Point 12. Basin C3 will be conveyed via storm sewer and surface flow in Louisiana Street to the pond. Runoff from Pond C3 will be piped north in Louisiana Street to join with the outlet from Pond C1 to the existing roadside ditch south of E. Jewell Avenue.

Ponds are shown in a conceptual location on the Harvest Crossing Master Drainage Plan update and will be placed in subsequent drainage reports when the parcels develop. All ponds are sized as extended dry detention basins (EDB) as the largest water quality volume requirement. Subsequent detailed design for the individual planning areas may determine an alternative water quality treatment option that is more suitable for their layout.

d. Water Quality BMP Plan

The ponds have been preliminarily sized according to the City of Aurora criteria and Urban Storm Drainage Criteria Manual, Volume 3; sizing information can be found in the appendices of this report using the empirical formula method from the City of Aurora criteria and the MHFD-Detention, Version 4.03. The outlet structure for water quality ponds will convey the minor storm runoff and up to the major storm runoff to a storm sewer system. The outlet structure for the detention/water quality ponds will effectively be a three-stage release

APPENDIX A

Hydrologic Computations

Pond Peak Runoff Calculations - Direct Runoff

Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Weighted Imp. I (%)	Peak Flow (cfs)	
				C ₂	C ₁₀₀		Q ₂	Q ₁₀₀
Pond A1	7	54.80	15.0	0.44	0.62	55%	54.35	206.19
Pond A4	7	6.90	5.0	0.60	0.80	75%	13.90	49.99
Pond B1	1	14.10	5.0	0.86	0.88	94%	40.90	112.84
Pond B2	2	40.90	16.4	0.39	0.60	48%	34.07	143.01
Pond B4	3	21.70	17.2	0.36	0.61	43%	16.30	74.86
Pond C1	8	24.90	5.2	0.66	0.82	79%	54.33	183.00
Pond C3	12	30.70	19.4	0.40	0.60	50%	24.28	98.24

NOTES: Final drainage reports shall provide actual 100-yr routed runoff to ponds.

Detention volume (minimum) shall be determined using the following equation:

$$V = KA$$

Where:

$K = (1.78I - 0.002I^2 - 3.56)/900$ for the 100-year storm event

V = Required volume for the 100-year storm (acre-feet)

I = Developed basin imperviousness (%)

A = Tributary area (acres)

Per the City of Aurora criteria, the calculated release rates in the 100-year storm event are:

1.00 cfs/acre for Hydrologic Soil Group C/D (or historic release rate whichever is less)

Description	Impervious (%)	Area (ac)	WQCV* (ac-ft)	EURV* (ac-ft)	100-year V = KA (ac-ft)	Required Volume** (ac-ft)	Historic 100-yr Rate (cfs)	Aurora Release Rate (cfs)	Allowable Release Rate (cfs)
Pond A1	55	54.8	1.21	2.87	5.38	6.81	80.5	72.2	72.2
Pond A4	75	6.9	0.20	0.51	0.91	1.16			
Pond B1	94	14.1	0.61	1.32	2.29	2.95	18.4	14.1	14.1
Pond B2	48	40.9	0.83	1.85	3.51	4.44	40.9	40.9	40.9
Pond B4	43	21.7	0.41	0.87	1.67	2.11	27.5	21.7	21.7
Pond C1	79	24.9	0.80	1.93	3.45	4.41	23.6	24.9	23.6
Pond C3	50	30.7	0.64	1.45	2.74	3.47	44.2	30.7	30.7

*Obtained from MHFD-Detention Version 4.03 and multiplied by 1.2 per City criteria.

**Required Volume is half EURV plus the 100-year V = KA volume.

Note:

Ponds with A or B in the description are located in the Murphy Creek watershed.

Ponds with C in the description are located in the Coal Creek watershed.

The A Basin's release rates are based on the entire historic A Basin which includes Basins A1-A5. All A ponds release to Design Point 7.

A Basin ponds are conceptualized as follows: Pond A1 includes Basins A1, A2, A3 and A5. Pond A4 includes Basin A4 Sub Development.

B Basin ponds are conceptualized as follows: Pond B1 includes Basin B1. Pond B2 includes Basin B2. Pond B4 includes Basin B3.

C Basin ponds are conceptualized as follows: Pond C1 includes Basin C1. Pond C3 includes Basins C2 and C3.

APPENDIX B

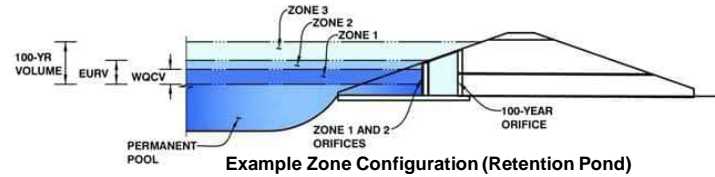
Hydraulic Computations

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Master Drainage Update

Basin ID: Pond C1



Watershed Information

Selected BMP Type = **EDB**

Watershed Area =	24.90	acres
------------------	-------	-------

Watershed Length =	1,200	ft
--------------------	-------	----

Watershed Length to Centroid =	660	ft
--------------------------------	-----	----

Watershed Slope =	0.040	ft/ft
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Watershed Imperviousness = 79.00% percent

Percentage Hydrologic Soil Group A = 0.0% percent

Percentage Hydrologic Soil Group B = 0.0% percent

Percentage Hydrologic Soil Groups C/D = 100.0% percent

Target WQCV Drain Time = 40.0 hours

Location for 1-hr Rainfall Depths = Aurora - Municipal Center

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) =	0.669	acre-feet
---------------------------------------	-------	-----------

Excess Urban Runoff Volume (EURV) = 1.930 acre-feet

Optional User Overrides

acre-feet

acre-feet

Depth Increment =		ft
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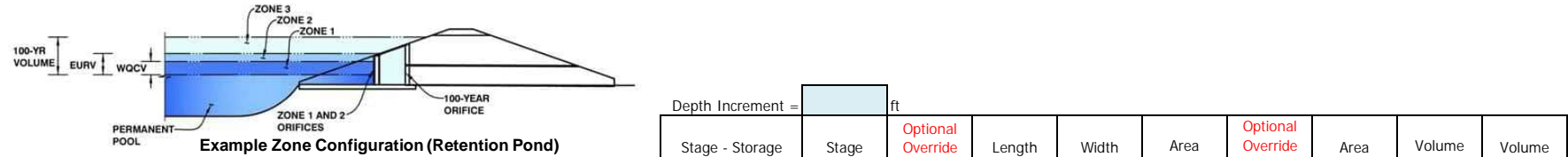
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DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.03 (May 2020)

Project: Master Drainage Update

Basin ID: Pond C3



<u>Watershed Information</u>	Top of Micropool								
------------------------------	------------------	--	--	--	--	--	--	--	--

Selected BMP Type =	EDB									
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[illegible][illegible][illegible][illegible]

Watershed Imperviousness =	50.00%	percent								
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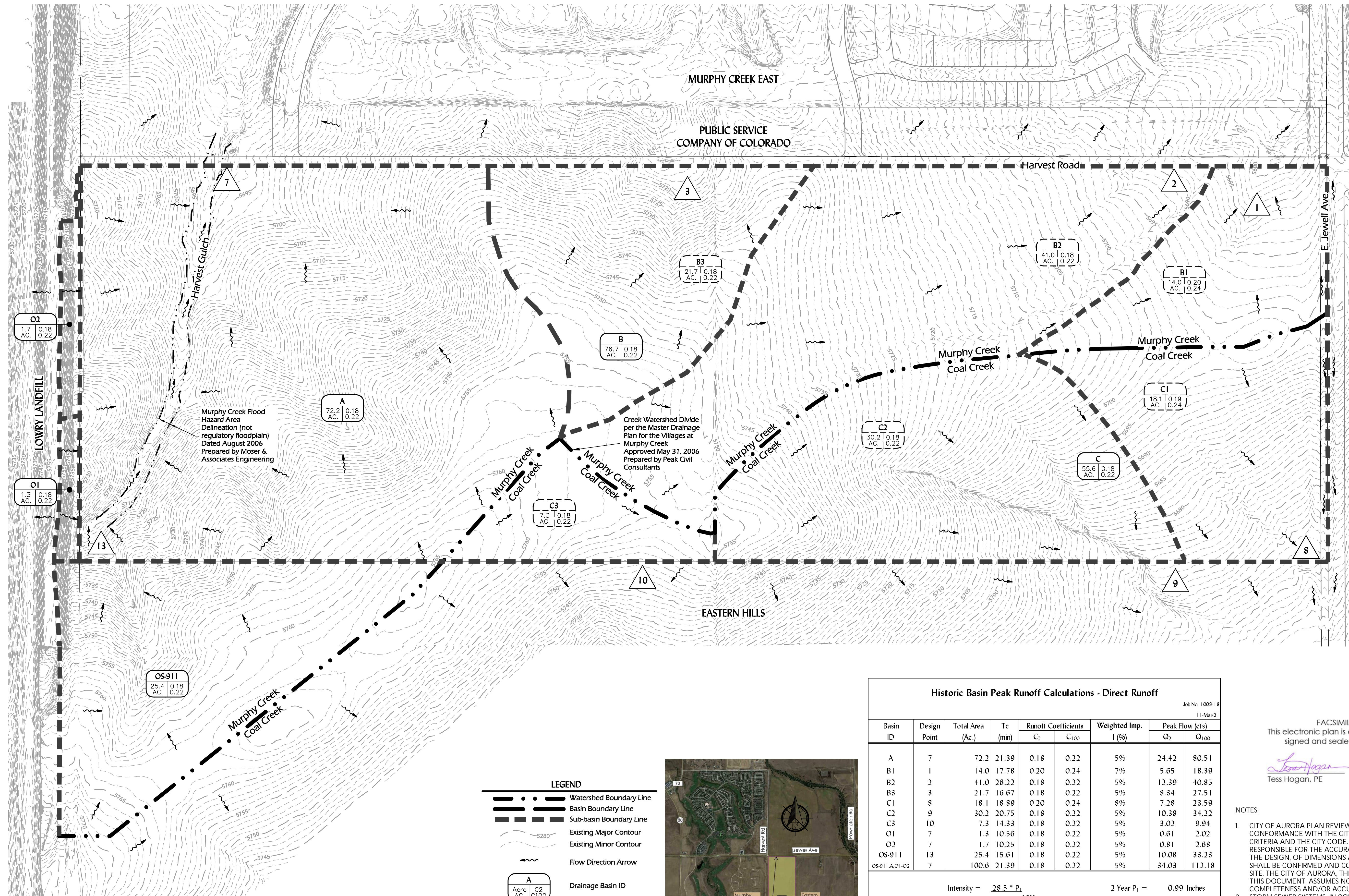
Percentage Hydrologic Soil Group B =	0.0%	percent
--------------------------------------	------	---------

Percentage Hydrologic Soil Groups C/D =	100.0%	percent
---	--------	---------

Target WQCV Drain Time =	40.0	hours
--------------------------	------	-------

Location for 1-hr Rainfall Depths = Aurora - Municipal Center

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LEGEND

- Watershed Boundary Line
- Basin Boundary Line
- Sub-basin Boundary Line
- Existing Minor Contour
- Flow Direction Arrow
- Drainage Basin ID
- Drainage Sub-basin ID



Historic Basin Peak Runoff Calculations - Direct Runoff									
Job No. 1008-18 11-Mar-21									
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Weighted Imp. I (%)	Peak Flow (cfs)		
				C ₂	C ₁₀₀		Q ₂	Q ₁₀₀	
A	7	72.2	21.39	0.18	0.22	5%	24.42	80.51	
B1	1	14.0	17.78	0.20	0.24	7%	5.65	18.39	
B2	2	41.0	26.22	0.18	0.22	5%	12.39	40.85	
B3	3	21.7	16.67	0.18	0.22	5%	8.34	27.51	
C1	8	18.1	18.89	0.20	0.24	8%	7.28	23.59	
C2	9	30.2	20.75	0.18	0.22	5%	10.38	34.22	
C3	10	7.3	14.33	0.18	0.22	5%	3.02	9.94	
O1	7	1.3	10.56	0.18	0.22	5%	0.61	2.02	
O2	7	1.7	10.25	0.18	0.22	5%	0.81	2.68	
O5-911	13	25.4	15.61	0.18	0.22	5%	10.08	33.23	
O5-911, A, O1-O2	7	100.6	21.39	0.18	0.22	5%	34.03	112.18	
Intensity = $28.5 \cdot P_1$ $(10 + T_c)^{0.786}$							2 Year P ₁ = 0.99 Inches		
							100 Year P ₁ = 2.67 Inches		

FACSIMILE
This electronic plan is a facsimile of the signed and sealed pdf set

Tess Hogan Date: 03/31/2021
Tess Hogan, PE

NOTES:

- CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
- STORM SEWER SYSTEMS, IN COMBINATION WITH THE STREETS, WILL BE SIZED FOR THE 100 YEAR STORM EVENT.

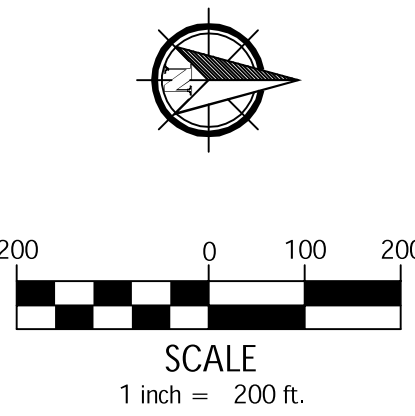
PROJECT BENCHMARK:
CITY OF AURORA BENCHMARK #456518SW001 (AZTEC #407). RECOVERED A 3" BRASS CAP STAMPED "M-095" LOCATED ON THE NORTH SIDE OF E. MISSISSIPPI AVE. 300' MORE OR LESS EAST OF S. COOLIDGE ST.
NAVD88 = 5603.65'

Approved For One Year From This Date
04/05/2021

Veronica A. Adam
City Engineer
Water Department

04/05/2021
Date

04/05/2021
Date



12071 Tejon Street, Suite 470
Westminster, CO 80234
303.421.4224
www.innovativelandinc.com

Revision Type		Revision Type	
No.	Rev. Date	No.	Rev. Date
1		2	
3		4	
5		6	

Designed By: ACS
Prepared By: ACS
Approved By: TRH

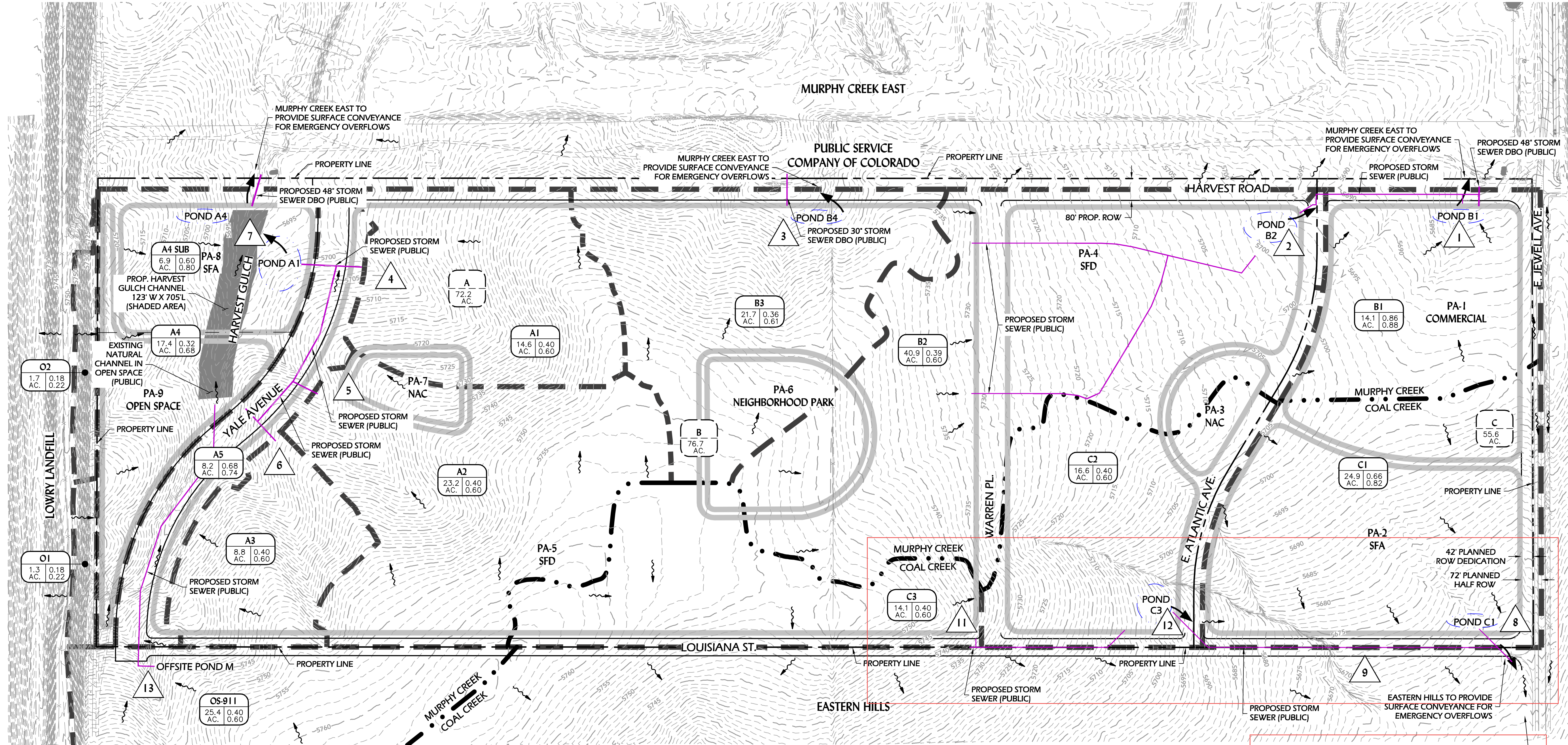
Date: March 31, 2021
Sheet: 1 of 2
Job No.: 1008-18
Horiz. Scale: 1" = 200'
Vert. Scale: N/A

Harvest Crossing/The Villages at Murphy Creek
Aurora, CO
Master Drainage Report Update
Master Historic Drainage Plan

Proj. Name:
Location:
Plan Set:
Sheet Name:



Know what's below.
Call before you dig.



Basin Peak Runoff Calculations - Direct Runoff

Job No. 1008-18
11-Mar-21

Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Weighted Imp. I (%)	Peak Flow (cfs)	
				C ₂	C ₁₀₀		Q ₂	Q ₁₀₀
A1	4	14.60	14.0	0.40	0.60	50%	13.56	54.84
A2	5	23.20	12.8	0.40	0.60	50%	22.41	90.66
A3	6	8.80	11.6	0.40	0.60	50%	8.87	35.89
A4	7	17.40	16.0	0.32	0.68	35%	12.19	69.50
A5	7	8.20	15.0	0.68	0.74	82%	12.51	36.95
B1	1	14.10	5.0	0.86	0.88	94%	40.90	112.84
B2	2	40.90	16.4	0.39	0.60	48%	34.07	143.01
B3	3	21.70	17.2	0.36	0.61	43%	16.30	74.86
C1	8	24.90	5.2	0.66	0.82	79%	54.33	183.00
C2	12	16.60	14.2	0.40	0.60	50%	15.32	61.97
C3	11	14.10	19.4	0.40	0.60	50%	11.15	45.12
O1	7	1.30	10.6	0.18	0.22	5%	0.61	2.02
O2	7	1.70	10.3	0.18	0.22	5%	0.81	2.68
OS-911	13	25.40	9.4	0.40	0.60	50%	27.85	112.67
OS-911A, O1, O2	7	100.60	16.0	0.40	0.61	49%	88.28	363.16

$$\text{Intensity} = \frac{28.5 \cdot P_1}{(10 + T_c)^{0.786}}$$

2 Year P₁ = 0.99 Inches
100 Year P₁ = 2.67 Inches

Pond Peak Runoff Calculations - Direct Runoff

Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Weighted Imp. I (%)	Peak Flow (cfs)	
				C ₂	C ₁₀₀		Q ₂	Q ₁₀₀
Pond A1	7	54.80	15.0	0.44	0.62	55%	54.35	206.19
Pond A4	7	6.90	5.0	0.60	0.80	75%	13.90	49.99
Pond B1	1	14.10	5.0	0.86	0.88	94%	40.90	112.84
Pond B2	2	40.90	16.4	0.39	0.60	48%	34.07	143.01
Pond B4	3	21.70	17.2	0.36	0.61	43%	16.30	74.86
Pond C1	8	24.90	5.2	0.66	0.82	79%	54.33	183.00
Pond C3	12	30.70	19.4	0.40	0.60	50%	24.28	98.24

NOTES: Final drainage reports shall provide actual 100-yr routed runoff to ponds.

Description	Impervious (%)	Area (ac)	WQCV** (ac-ft)	EURV** (ac-ft)	100-year V = KA (ac-ft)	Required Volume** (ac-ft)	Historic 100-yr Rate (cfs)	Aurora Release Rate (cfs)	Allowable Release Rate (cfs)
Pond A1	55	54.8	1.21	2.87	5.38	6.81	80.5	72.2	72.2
Pond A4	75	6.9	0.20	0.51	0.91	1.16	18.4	14.1	14.1
Pond B1	94	14.1	0.61	1.32	2.29	2.95	40.9	40.9	40.9
Pond B2	48	40.9	0.83	1.85	3.51	4.44	40.9	40.9	40.9
Pond B4	43	21.7	0.41	0.87	1.67	2.11	27.5	21.7	21.7
Pond C1	79	24.9	0.80	1.93	3.45	4.41	23.6	24.9	23.6
Pond C3	50	30.7	0.64	1.45	2.74	3.47	44.2	30.7	30.7

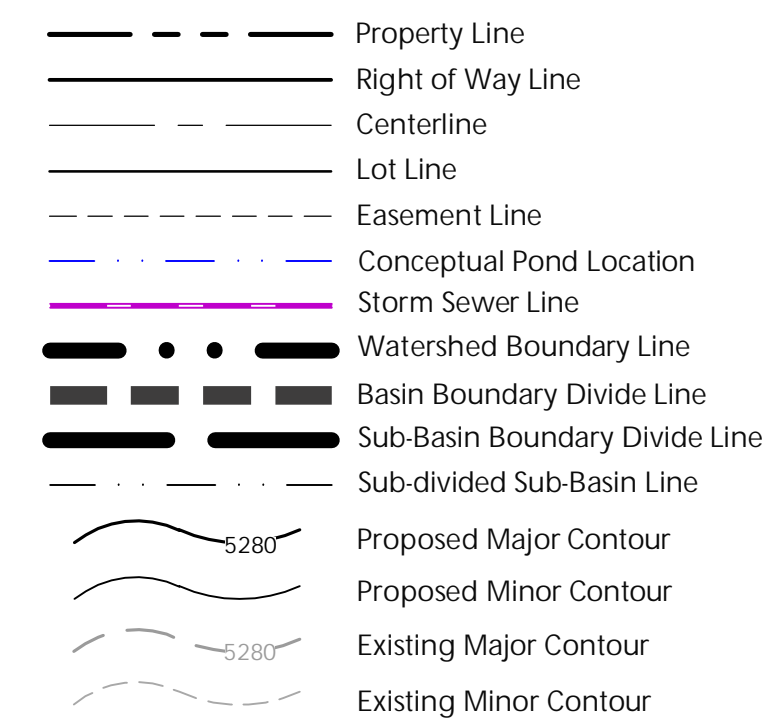
*Obtained from MHPD-Detention Version 4.03 and multiplied by 1.2 per City criteria.

**Required Volume is half EURV plus the 100-year V = KA volume.

Notes:

- Ponds with A or B in the description are located in the Murphy Creek watershed.
- Ponds with C in the description are located in the Coal Creek watershed.
- The A Basin's release rates are based on the entire Historic A Basin which includes Basins A1-A5. All A ponds release to Design Point 7.
- A Basin ponds are conceptualized as follows: Pond A1 includes Basins A1, A2, A3 and A5. Pond A4 includes Basin A4 Sub Development.
- B Basin ponds are conceptualized as follows: Pond B1 includes Basin B1. Pond B2 includes Basin B2. Pond B4 includes Basin B3.
- C Basin ponds are conceptualized as follows: Pond C1 includes Basin C1. Pond C3 includes Basins C2 and C3.

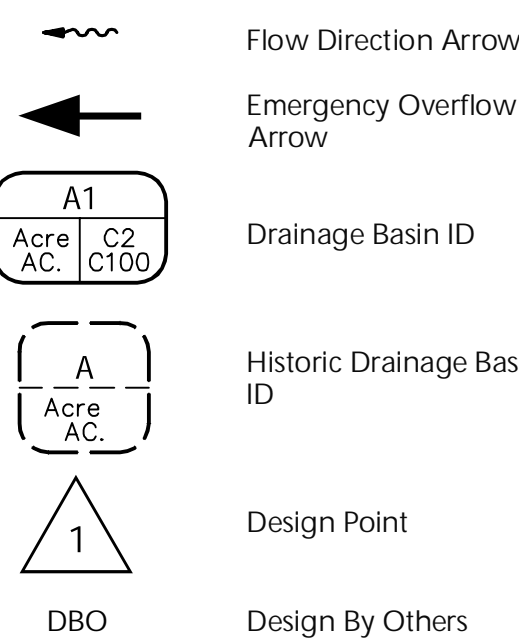
LEGEND

FACSIMILE
This electronic plan is a facsimile of the signed and sealed pdf setTess Hogan, PE
Date: 03/31/2021

PROJECT BENCHMARK:

CITY OF AURORA BENCHMARK #456518SW001 (AZTEC #407). RECOVERED A 3" BRASS CAP STAMPED "M-095" LOCATED ON THE NORTH SIDE OF E. MISSISSIPPI AVE. 300' MORE OR LESS EAST OF S. COOLIDGE ST.

NAVD88 = 5603.65'

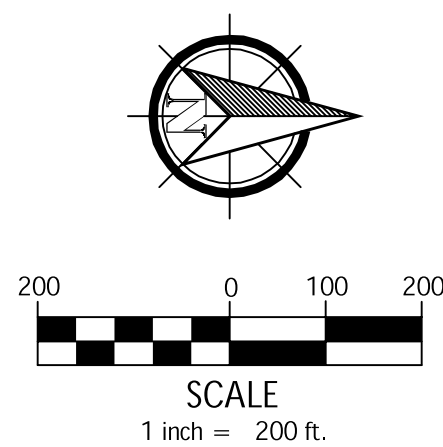


MASTER DRAINAGE PLAN NOTES:

- PONDS SHOWN HEREON ARE SCHEMATIC ONLY. ACTUAL SIZE, SHAPE AND LOCATION WILL VARY AS SITE DESIGN PROGRESSES. ALL PONDS WILL BE PRIVATE PONDS.
- THE LOCAL STREET ALIGNMENT SHOWN HEREON IS NOT APPROVED BY THIS PLAN.
- ANY CULVERTS INSTALLED WITHIN HARVEST ROAD FOR THE ASSOCIATED MURPHY CREEK EAST DEVELOPMENT WILL BE EXTENDED UNDER THE EAST HALF OF THE ROAD DURING THE ASSOCIATED HARVEST CROSSING DEVELOPMENT.
- RUNOFF FROM HISTORIC BASINS O1 AND O2 FROM THE LOWRY LANDFILL ARE DIVERTED WEST (110± ACRES) TO LANDFILL PONDS NEAR MURPHY CREEK IN THE EXISTING AND FINAL CLOSURE DRAINAGE PLANS FOR THE LANDFILL. REFER TO THE DADS DRAINAGE MAPS INCLUDED IN THE MASTER DRAINAGE REPORT FOR ADDITIONAL INFORMATION. BASINS O1 AND O2 DRAIN 3 ACRES ONTO THE SITE.
- THIS MASTER DRAINAGE PLAN HAS BEEN PREPARED BASED UPON THE BEST AVAILABLE INFORMATION AVAILABLE AT THE TIME. CONCEPTS, DRAINAGE PATTERNS, AND OFFSITE FACILITIES PRESENTED ON THIS PLAN SHALL BE CONFIRMED IN THE SUBSEQUENT PRELIMINARY AND FINAL DRAINAGE PLANS FOR THIS PROPERTY.

NOTES:

- CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
- STORM SEWER SYSTEMS, IN COMBINATION WITH THE STREETS, WILL BE SIZED FOR THE 100 YEAR STORM EVENT.



No.	Rev.	Date:	Revision Type:
1	1		
2	2		
3	3		
4	4		
5	5		
6	6		

Designed By: ACS	Date: March 31, 2021	Sheet: 2 of 2
Prepared By: ACS	Horiz. Scale: 1" = 200'	Job No.: 1008-18
Approved By: TRH	Vert. Scale: N/A	

Proj. Name:	Harvest Crossing/The Villages at Murphy Creek
Location:	Aurora, CO
Plan Set:	Master Drainage Report Update
Sheet Name:	Master Drainage Plan

Harvest Crossing Subdivision Filing No. 1

Final Drainage Report

Aurora, Colorado

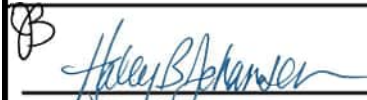

Project No. 1002-84

Submittal: 1st: November 18th, 2021
2nd: February 28th, 2022
3rd: June 8th, 2022
4th: July 27th, 2022

Approved For One Year From This Date

08/19/2022

ARR

	08/19/2022
City Engineer	Date
	08/12/2022
Water Department	Date

Prepared For:

Richmond American Homes
4350 S. Monaco St.
Denver, CO 80237
(970) 977-3841
Contact: Jason Pock
Jason.Pock@mdch.com

Prepared By:

Innovative Land Consultants, Inc.
12071 Tejon Street, Suite 470
Westminster, CO 80234
(303) 421-4224
Contact: Xylina Warren-Laird
xylina@innovativelandinc.com

We are requesting a variance from Section 6.44 Hydraulic Design at the proposed 15 foot type R inlet C2-2 located within Harvest Road. The inlet is located in Harvest Road to the west of proposed temporary pond T at the low point of the road. The storm sewer cannot be raised in this area without causes issues with the cover over the storm pipe in the street.

The proposed temporary pond T will provide detention to the surrounding areas, including the storm flows within the Harvest Road. The 100 year pond Water Surface Elevation (WSE) for pond T is at an elevation of 5681.4. The elevation of the bottom of the pond is limited by the tie in location to the existing storm system that will be constructed with the Murphy Creek East project. The proposed Inlet C2-2 is located at the low point of the Harvest Road with the flowline elevation of 5682.16. Because there is less than 1' between the 100 year pond WSE and the inlet flowline elevation, it is not possible to provide the standard 1' separation between the surface and the Hydraulic Grade Line. Per the StormCAD model, the proposed Hydraulic Grade line in the inlet is 5681.56, providing 0.6' of separation between the flowline and the surface.

Due to these constraints, a variance is requested for the one foot separation between the surface and the Hydraulic Grade Line at inlet C2-2.

5. City of Aurora Storm Drainage Criteria – Stormwater Quality Control – reduce runoff and maximize stormwater infiltration to the extent possible.

Per Section 3.61 "On-site detention is required for all new development, expansion, and redevelopment" and Per Section 3.70 of the City of Aurora Storm Drainage Criteria Manual is states that "...reduce runoff and maximize stormwater infiltration to the extent possible..."

We are requesting a variance from requirement in Section 3.70 for the location downstream of the site where the existing conditions outside of the project dictate the elevations for the site.

The proposed area of concern is located northeast of Detention Pond B, adjacent to the intersection of E. Pacific Ave. and S. Kewaunee St. and is lower in elevation than the detention water surface of the pond in a 100 year storm – making the capture of the flows into the said pond impossible. Due to this constraint we are requesting a variance to release the portion of the site without capturing it within the pond and providing detention and water quality treatment first.

The uncaptured area of the right of way is represented by Basin C-1 of the drainage plan. This area is 0.41 Acres in size and will generate 0.93

cfs of flow in a 2 year storm and 2.75 cfs in a 100 year storm. The uncaptured flows will continue to the north into the proposed water quality ditch that is provided for these flows. The water quality ditch was sized using the Mile High standard spreadsheet for water quality ditch sizing. This ditch also serves as conveyance ditch for the flows released from the proposed Detention Pond B. In case of storm system clogging the ditch will serve as an energy dissipation ditch for all emergency overflows from this pond in a 100 year storm. In the future the proposed S. Kewaunee Street will be continued to the north into the next development. The flows from Basin C-1 shall be captured and treated for detention and water quality within the Master Drainage Plan Pond C1 of Harvest Crossing/ The Villages at Murphy Creek master planned development.

6. City of Aurora Storm Drainage Criteria – adding ½ EURV to the 100 year detention volume – for Detention Ponds A and B.

Aurora criteria currently requires that ½ of the Excess Urban Runoff Volume (EURV) be added to the 100 year detention volume (V = KA method) for a total required detention volume. However, the criteria is in the process of being updated to eliminate the requirement to add the EURV to the detention volume. Both Detention Ponds A and B are unable to provide the ½ EURV in the ponds without encroaching into the 1' freeboard between the 100 year + ½ EURV water surface elevation and the emergency overflow weir. Instead, the ponds are providing the volume as required per the MHFD-Detention spreadsheet to limit the allowable release rates to the Aurora required flow rates. This volume is higher in both ponds than the V = KA required storage volume and provides the required freeboard to the emergency overflow weir in both ponds. For these reasons, a variance is requested.

II. Historic Drainage

1. Overall Basin Description

a. Offsite Basins

Offsite flows from future filings sheet flow from the south boundary of Harvest Crossing Filing No. 1. That portion entering the site along the west half of the site is within the Murphy Creek watershed. The eastern portion entering the site is within the Coal Creek watershed. Offsite basins generally slope to the northwest. According to the NRCS soil survey map, predominant soils are Fondis silt loam, 1 to 3 percent slopes (Map unit symbol FdB) which are considered Hydrologic Soil Group C. Offsite soils to a lesser extent are Renohill-Buick loams, 3 to 9 percent slopes (Map unit symbol RhD) which are considered Hydrologic Soil Group D. The offsite basins are of the same soil types as the site.

b. Major Drainageways

There are no major drainageways located on or adjacent to the project site.

The project site is not within a FEMA regulated floodplain. It is located within unshaded Zone X as shown on the FEMA Firm 08005C0212K, dated December 17, 2010, located in Appendix C.

2. Drainage Patterns Through Property

The proposed site is east of Murphy Creek and west of Coal Creek. There are no major drainageways that run through the project. Approximately the west half of the site drains generally to the northwest at an approximately 2% overall slope. Approximately the east half of the site drains generally to the northeast at an approximately 4% overall slope.

3. Outfalls Downstream from Property

Runoff from the western portion of the site generally sheet flows to the northwest and outfalls to Harvest Road south of E. Jewell Avenue. Runoff from the eastern portion of the site outfalls into an existing grassed channel, which ultimately outfalls into Coal Creek.

III. Design Criteria

1. List of References

- ◆ *Master Drainage Report for Villages at Murphy Creek* as prepared by Peak Civil Consultants Civil Engineering and Land Development Services, dated February 2006 and approved by the City of Aurora on May 31, 2006, COA# 206111;
- ◆ *Murphy Creek East (Harvest Ridge) Subdivision Filing No. 1, 2, 3, 4 Master Drainage Report* as prepared by CVL Consultants of Colorado, Inc., dated November 2020 and approved by the City of Aurora on November 30, 2020 (COA EDN 220220);
- ◆ *Master Drainage Report Harvest Crossing/Villages at Murphy Creek* as prepared by Innovative Land Consultants, Inc., dated March 31, 2021, and approved by the City of Aurora on April 5, 2021 (COA EDN 221085);
- ◆ *City of Aurora Storm Drainage Design and Technical Criteria*, City of Aurora, October 11, 2010;
- ◆ *Mile High Flood District, aka Urban Drainage and Flood Control District, Urban Storm Drainage Criteria Manual* Volumes 1, 2, & 3, current version;
- ◆ *Natural Resources Conservation Service Web Soil Survey*, United States Department of Agriculture, site visited May 22, 2020;
- ◆ *Federal Emergency Management Agency Flood Insurance Rate Map*, Community-Panel Number 08005C0212K; revised December 17, 2010;

IV. Drainage Plan

1. General Concept

a. Conveyance of Offsite Drainage; Proposed Downstream Outfall

Based on the proposed grading, runoff from the east half of Harvest Road and the remaining surrounding streets will contribute to onsite drainage facilities. To the south, in the interim condition, offsite runoff will be captured via temporary private swales and private Type D sump inlets and conveyed via the public storm system to the proposed detention ponds. The private inlets will be sized to capture this interim offsite condition. Upon development of E. Warren Ave. and the site directly south of Filing 1, the private inlets and swales will be removed, and the future storm system will tie into the proposed public storm sewer system.

The proposed private full spectrum detention ponds will be located at the northeast and northwest corners of the site. Additionally, a private, interim temporary full-spectrum detention pond is proposed off-site along S. Harvest Rd. within PA-1 at the low point of Harvest. The existing topography within the Murphy Creek watershed generally slopes toward the northwest. The existing topography within the Coal Creek watershed generally slopes toward the northeast. This design proposes to connect the northwest ponds to storm sewer, designed by others (COA Civil RSN 1506586). This private storm system in Harvest Road will outlet to the existing dual 5'x5' box culverts under E. Jewell Avenue, ultimately connecting to Murphy Creek. For the northeast pond, this design proposes to outfall into an existing grassed channel, south of E. Jewell Avenue, which ultimately outfalls to Coal Creek.

The proposed storm sewer combined with the street is designed to convey the 100-yr storm event.

b. Coordination with Surrounding Developments

Considerable effort has been given to ensure the proposed drainage design does not negatively impact surrounding developments and imposes minimal changes to historical drainage conditions. At the time of this report, coordination of the Murphy Creek East Offsite CDs (COA EDN forthcoming) for storm sewer in S. Harvest Rd. is ongoing.

c. Detention Ponding/Water Quality BMP Plan & Maintenance Responsibilities

Detention Ponding/Water Quality & Maintenance Responsibilities:

Detention and Water Quality are provided in the proposed onsite water quality and detention ponds, located in the northeast and northwest corners of the project site. Additional water quality and detention is provided in the off-site interim full-spectrum detention pond along S. Harvest Rd. within PA-1. The proposed ponds (Pond A, Pond B, and Pond T) will be private ponds maintained by the Homeowners Association.

Basin A14 consists of proposed single family residential subdivision in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin A17. Total calculated developed peak runoff is expected to be 1.60 cfs in a 2-year storm event and 5.57 cfs in a 100-year storm event.

Basin A15 consists of a portion of proposed E. Pacific Ave. in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin D2. Total calculated developed peak runoff is expected to be 0.72 cfs in a 2-year storm event and 2.15 cfs in a 100-year storm event.

Basin A16 consists of proposed single family residential subdivision in PA-4. A sump inlet is proposed to collect stormwater and expected to overflow to Basin A17 in an emergency condition. Total calculated developed peak runoff is expected to be 4.08 cfs in a 2-year storm event and 14.36 cfs in a 100-year storm event.

Basin A17 consists of proposed portion of S. Irving St. in PA-4. A sump inlet is proposed to collect stormwater and expected to overflow to Basin A18 in an emergency condition. Total calculated developed peak runoff is expected to be 0.48 cfs in a 2-year storm event and 1.43 cfs in a 100-year storm event.

Basin A18 consists of proposed single family residential subdivision and proposed Detention Pond A in PA-4. An outlet structure is proposed to collect stormwater and expected to overflow to Basin D1 in an emergency condition. Total calculated developed peak runoff is expected to be 3.41 cfs in a 2-year storm event and 11.16 cfs in a 100-year storm event.

Basin A19 consists of proposed single family residential subdivision and a portion of S. Harvest Rd. in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin D1. Total calculated developed peak runoff is expected to be 2.78 cfs in a 2-year storm event and 9.19 cfs in a 100-year storm event.

Basin B consists of all onsite drainage area tributary to Detention Pond B (Master Drainage Pond C3) within the Coal Creek watershed. Land use within Basin B consists of single family detached residential. The residential lots will drain to the adjacent street and be routed to the downstream storm sewer inlets. Some proposed inlets are "minor sump" inlets formed by the geometry of intersecting streets. Should the storm sewer inlets become plugged, the stormwater will continue generally northeast down the street to the detention pond at the low point in the basin. The low point in the street adjacent to the detention pond will overflow into the detention pond, should the sump inlets become plugged.

Basin B1 consists of portions of proposed E. Warren Ave and S. Kewaunee St. in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin B2-a. Total calculated developed peak runoff

is expected to be 0.87 cfs in a 2-year storm event and 2.63 cfs in a 100-year storm event.

Basin B1-a consists of a future portion of E. Warren Ave. in PA-5, located south of the ultimate centerline of Warren Ave. Total calculated developed peak runoff is expected to be 0.07 cfs in a 2-year storm event and 0.28 cfs in a 100-year storm event. In the future developed condition, the inlet shall be replaced and storm system extended (by others.)

In the interim condition, runoff will be captured in the proposed Swale E and directed to the temporary sump inlet located on the south side of E. Warren Street. The proposed temporary inlet shall be sized to capture undeveloped flows from basin B1-a, as well as undeveloped flows of interim basin OB (As represented on the offsite exhibit included in the back of the report.) Calculated peak runoff flows collected by this inlet will be 0.43 cfs in a 2-year storm event and 1.64 cfs in a 100-year storm event.

The storm system from the described inlet, continuing north into S. Kewaunee Street, shall be sized for 100-year developed conditions of basin B1-a and future 100-year flows from developed Basin OB. Basin OB flows were calculated using the imperviousness from the Master Drainage study for this area. Developed Basin OB was delineated based on the master study and is represented in the Final Drainage Plan. Total calculated developed peak runoff for these basins in the future conditions are expected to be 15.03 cfs in a 2-year storm event and 61.97 cfs in a 100-year storm event. These ultimate flows will be used in the sizing of downstream storm.

Basin B2 consists of proposed single family residential subdivision in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin B2-a. Total calculated developed peak runoff is expected to be 3.58 cfs in a 2-year storm event and 13.24 cfs in a 100-year storm event.

Basin B2-a consists of proposed single family residential subdivision in PA-4. A minor sump inlet is proposed to collect stormwater and expected to overflow to Basin B5 in an emergency condition. Total calculated developed peak runoff is expected to be 0.39 cfs in a 2-year storm event and 1.24 cfs in a 100-year storm event.

Basin B3 consists of proposed single family residential subdivision in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin B4. Total calculated developed peak runoff is expected to be 1.66 cfs in a 2-year storm event and 5.43 cfs in a 100-year storm event.

Basin B4 consists of proposed single family residential subdivision in PA-4 and Neighborhood Activity Center (NAC) in PA-3. A minor sump inlet is proposed to collect stormwater and expected to overflow to Basin B5 in an emergency condition. Total calculated developed peak runoff is expected to be 3.08 cfs in a 2-year storm event and 15.25 cfs in a 100-year storm event. Swale H is

located within this basin and has been sized to carry contributing flows from around the proposed lots. The purpose of Swale H is to carry the flows around the lots without entering the proposed lots. Sub-basin B4-s was created to calculate the maximum flow that will enter this swale and is represented in the calculations in Appendix A of this report. Swale H sizing is included in the Appendix B of this report.

Basin B5 consists of proposed single family residential subdivision in PA-4. A sump inlet is proposed to collect stormwater and expected to overflow to Basin B12 in an emergency condition. Total calculated developed peak runoff is expected to be 1.50 cfs in a 2-year storm event and 5.06 cfs in a 100-year storm event.

Basin B6 consists of portions of proposed E. Pacific Ave. and S. Kewaunee St. in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin C2. Total calculated developed peak runoff is expected to be 0.43 cfs in a 2-year storm event and 1.28 cfs in a 100-year storm event.

Basin B7 consists of proposed single family residential subdivision in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin B7-a. Total calculated developed peak runoff is expected to be 0.44 cfs in a 2-year storm event and 1.45 cfs in a 100-year storm event. Any uncaptured bypass at this inlet is expected to overflow to Basin B9

Basin B8 consists of proposed single family residential subdivision in PA-4. A minor sump inlet is proposed to collect stormwater and expected to overflow to Basin B9 in an emergency condition. Total calculated developed peak runoff is expected to be 1.23 cfs in a 2-year storm event and 4.65 cfs in a 100-year storm event. Any uncaptured bypass at this inlet is expected to overflow to Basin B9

Basin B9 consists of proposed single family residential subdivision in PA-4 and NAC in PA-3. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin B11. Total calculated developed peak runoff is expected to be 1.78 cfs in a 2-year storm event and 5.44 cfs in a 100-year storm event.

Basin B10 consists of a portion of proposed E. Pacific Ave. in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin C1. Total calculated developed peak runoff is expected to be 1.03 cfs in a 2-year storm event and 3.05 cfs in a 100-year storm event.

Basin B11 consists of proposed single family residential subdivision in PA-4. An on-grade inlet is proposed to collect stormwater and any bypass is expected to continue to Basin C2. Total calculated developed peak runoff is expected to be 1.83 cfs in a 2-year storm event and 6.88 cfs in a 100-year storm event.

Basin B12 consists of proposed single family residential subdivision in PA-4. An outlet structure is proposed to collect stormwater and expected to overflow to Basin B6 in an emergency condition. Total calculated developed peak runoff is expected to be 2.23 cfs in a 2-year storm event and 7.14 cfs in a 100-year storm event.

Basin C1 consists of a portion of proposed E. Pacific Ave. in PA-4. No method is proposed to collect stormwater and runoff is expected to flow to the existing grassed channel within the Coal Creek watershed in PA-2. Total calculated developed peak runoff is expected to be 0.93 cfs in a 2-year storm event and 2.75 cfs in a 100-year storm event. The proposed interim swale downstream of the Kewaunee Street is proposed as a water quality provision. Additional water quality is provided by flowing the flows in their historic ditch north of the site. The site will be developed in the future and per Master Plan for Harvest Crossing will have another detention and Water Quality pond. This pond will provide Water quality for Basin C1 in the future as part of the development.

As the collection of these flows is impossible due to this basin being in a low point of the site and the site grades tying into lower elevations downstream of this point, the stormwater and runoff is expected to flow to the existing grassed channel within the Coal Creek watershed in PA-2. It will first flow through Swale F, proposed water quality swale, that will carry the flows to the natural channel. Total calculated developed peak runoff is expected to be 0.93 cfs in a 2-year storm event and 2.75 cfs in a 100-year storm event. As these flows are impossible to capture within proposed detention ponds due to site topography, but to account for the released flows basin OC shall be captured and detained on site. The future development downstream of the site will provide the path for the storm flows and with it will capture the mentioned flows. The flows will be directed to Pond C (per master plan) and will have water quality provisions for this basin.

Basin OC consists of the east portion of proposed S. Kewaunee St. in PA-4. This basin lies outside of the proposed master planed area of the site. This basin consists of 0.54 acres of right of way and flows 1.21 cfs in a 2-year storm and 3.59 cfs in a 100 year storm. As the east half of the road is being developed with the site, an inlet is proposed to fully capture the flows and to divert them into Pond B. The proposed pond will provide additional water quality, EURV, and detention for these flows to account for undetained flows released from basins C1 and C2.

Per Inlet Calculations for inlet B4-4 performed using the MHFD-Inlet sizing spreadsheet the entirety of the offsite basin will be captured within this inlet and treated by the pond. Uncaptured flows from basin C1 and C2 add up to 0.89 cfs in a 2 year storm. Additional capture from basin OC in this event is 1.21 cfs. Uncaptured flows from basin C1 and C2 add up to 2.63 cfs in a 100 year storm. Additional capture from basin OC in this event is 3.59 cfs. The over capture of the offsite basin ensures that the uncaptured flows from Basin C1 and C2 will not negatively impact the future Pond C of the Master Plan and

The capacity of the street was calculated using the MHFD-Inlet and Street capacity spreadsheet and the results are included in Appendix B of this report.

In the interim condition, Basin OA1 sheet flows into Basin A7 and is collected with runoff from that basin. A temporary private swale is proposed within Basin A7 to collect the undeveloped runoff that will be collected from Basins OA1 and A7. A temporary private inlet shall collect the flows from this ditch and connect to the storm system running north in S. Irvington street. This storm system is designed to carry fully developed 100 year flows from basin OA1 and A7 in the future. The flows and basin delineation for the sizing of this storm sewer are based on the master drainage plan for Harvest Crossing/ The Village at Murphy Creek. (Refer to description of Basin A7). In emergency conditions the storm flows will overtop E. Warren Avenue and will flow north within Irvington Street Right of Way. Irvington right of way has the capacity to carry 61.0 cfs of flow. The capacity of the street was calculated using the MHFD-Inlet and Street capacity spreadsheet and the results are included in Appendix B of this report.

In the interim condition, Basin OB sheet flows into Basin B1 and is collected with runoff from that basin. In the developed condition, runoff from Basin OB is intended to be conveyed to Pond B via the storm sewer system in S. Kewaunee St. (to be designed by others). (Refer to description of Basin B1-a.) In emergency conditions the storm flows will overtop E. Warren Avenue and will flow north within Kewaunee Street Right of Way. Kewaunee right of way has the capacity to carry 107.4 cfs of flow.

The pre-development watershed line delineating Murphy Creek and Coal Creek watersheds is slightly shifted through Basins A and B. Within Murphy Creek, Basin A pre-development area of 23.21 acres is approximately unchanged as Basin A post-development area of 23.14 acres. Within Coal Creek, Basin B pre-development area of 17.17 acres is approximately the same as the Basin B post-development area of 17.3 acres. During the off-site development, the overall watershed acreage will remain as it is now.

The ponds with a regional approach of treating the offsite area are being sized for the overall watershed pre-development area with the post-development 48% imperviousness in Master Drainage Pond B2, referred to as Pond A of this report, (with 2 acres of NAC park) and 50% imperviousness in Master Drainage Pond C3, referred to as Pond B of this report, throughout the watershed. Temporary pond T is being constructed to provide the necessary water quality and detention for the interim condition and shall be replaced by construction of the Master Drainage Pond B1 in the future. Pond T is designed for the interim conditions and is not sized for future proposed 94% impervious contribution reflected in the Master Drainage Report.

A table with the detailed private detention ponds for the project is provided below.

Pond Volumes Table			
Description	Pond A	Pond B	Pond T
1.2*WQCV	0.803 ac-ft	0.672 ac-ft	0.147 ac-ft
EURV	1.809 ac-ft	1.527 ac-ft	0.206 ac-ft
100-yr (+ 1/2 EURV Pond T)	3.724 ac-ft	3.119 ac-ft	0.965 ac-ft
Bottom Elevation	5689.2	5689.3	5677.5
100-yr (+ 1/2 EURV Pond T) WSE	5695.1	5696.5	5681.4
Overflow Weir Elevation	5696.2	5697.5	5683.5
Top of Berm	5698.0	5699.0	5685.1
Tributary Basin Properties			
Area	40 acres	33 acres	14.7 acres
Impervious	48%	49%	16%
Calculated Release Rates			
100-yr	40 cfs	33 cfs	14.5 cfs
Max Ponding (ft)	5.9	7.2	3.9
Max Available Depth (ft)	7.0	8.2	6.0
Allowable Release Rates (per Master Plan)			
100-yr	39.7 cfs	33.0 cfs	14.7 cfs

All proposed storm conveyance facilities, a combination of street and storm sewer, will be sized to capture and convey the 100-year storm event.

- b. TOD and Urban Center Development Interception & Conveyance of Upstream Runoff
Not applicable.

- c. Detention Pond Location and Outfall

Detention for this project is provided by two proposed private onsite full-spectrum detention ponds located in the northeast and northwest corners of the project site. Additional water quality and detention is provided in the private off-site interim full-spectrum detention pond along S. Harvest Rd. within PA-1. Detention Pond A (Master Drainage Pond B2), in the northwest corner of the site, and off-site Interim Detention Pond T (Master Drainage Pond B1) will outlet to proposed storm sewer within Harvest Road and discharge to the existing dual 5'x5' box culverts under E. Jewell Avenue, which ultimately outfalls into Murphy Creek. Detention Pond B (Master Drainage Pond C3), in the northeast corner, is proposed to outfall into an existing grassed channel. An interim swale is proposed to the existing channel, which continues to the northeast to E. Jewell Avenue and ultimately outfalls into Coal Creek. Based on recent topography of E. Jewell Ave., the roadside swale currently conveys the

existing minor storm runoff east; however, in the 100-year storm event, existing runoff overtops E. Jewell Ave. (approximately 0.5 mi. east of S. Harvest Rd.) and continues north/northeast to Coal Creek. The development of Harvest Crossing Filing 1 will reduce the minor storm runoff due to proposed Pond B, and the E. Jewell Ave existing swale will continue to convey runoff east; although the major storm runoff will also be reduced with the detention ponds, runoff will continue to cross E. Jewell Ave. as it has historically in an emergency condition.

d. Emergency Overflow Paths

The existing and proposed storm sewer systems, in combination with the streets, are designed to convey the major storm event. In an emergency condition, if an inlet were to become blocked, runoff from each of the proposed minor sump inlets would flow away from proposed structures or lots. However, if the proposed sump inlets adjacent to the detention ponds were to become clogged, excess runoff would overtop the curb and flow into the respective detention pond prior to impacting nearby lots.

Though the pond design and sizing was performed using the UD_Detention sizing spreadsheet, the emergency overflow was designed and sized using the rational method calculations performed for the entire basin draining to each individual pond. The rational Method calculations are presented in Appendix A and resulted in larger flow than the peak inflow into the pond calculated by the UD_Detention spreadsheet. For conservative sizing the greater flow was used in emergency overflow sizing. The overflow sizing is included in the pond detention section of Appendix C. Emergency overflow riprap sizing used the same flows as the ones used for the overflow sizing.

Emergency overflow for Pond A (Master Drainage Pond B2) is provided at the southeast corner of Harvest Road and E. Pacific Avenue. In case of complete clogging the pond, being a lowest point of it's basin, shall act as a retention pond. Once full it shall spill through the emergency spillway into Harvest road and continue north in the natural direction of the storm flow pattern. The flows will be carried to the north to the low point of Harvest road and then spill to the west into the channel of Murphy Creek East located directly west of the proposed temporary pond T. The routed calculated Rational Method peak 100 year flow expected at this lowest point of its basin will be 109.11 cfs. The capacity of Harvest Crossing downstream of this point has been evaluated and the capacity within the right of way was found to be 152 cfs, which will accommodate the full emergency flow from the basin of Pond A. The street capacity evaluation was performed using the UDFCD Street Capacity spreadsheet and is included with the pond sizing information in Appendix B.

Emergency overflow for Pond B (Master Drainage Pond C3) is provided at the southwest corner of E. Pacific Avenue and Kewaunee Street. In case of complete clogging the pond, being a lowest point of it's basin, shall act as a retention pond. Once full it shall spill through the emergency spillway into Pacific Avenue where it will pond and once the crown is overtopped the flows will continue north within the Kewaunee right of way. They will be carried to the

north into open space where the flows from this basin currently go in their natural direction of the storm flow pattern. The routed calculated Rational Method peak 100 year flow expected at this lowest point of its basin will be 94.99 cfs.

Emergency overflow for Pond T (Master Drainage Pond B1) is provided along S. Harvest Road. In case of complete clogging this pond, being a lowest point of it's basin, shall act as a retention pond. Once full it shall spill through the emergency spillway into Harvest Road where it will pond and once the crown is overtopped the flows will continue west into the Murphy Creek East channel. With the development of the property south of proposed site and prior to development and replacement of temporary pond T, the routed calculated Rational Method peak 100 year flows that will be seen at this point in emergency conditions will be 136.30 cfs.

The downstream channel will be designed and constructed per the approved master plan for this area and is sized for the flows per master plan report. Per the report for Murphy Creek East Subdivision the channel will be designed to flow 215 cfs of flow and the actual proposed channel capacity will be 229.12 cfs. The conformance to this is stated in the letter provided by the downstream property. These references are included in the appendix C of this report.

- e. Solutions to Problems Encountered
Not applicable.
- f. Proposed Permanent BMPs
The proposed onsite ponds, located in the northeast and northwest corner of the site, will provide permanent water quality treatment.
- g. Phasing of Construction and Provisions for Drainage
The proposed improvements will all be constructed in one phase.
- h. Open Channel Concepts
All proposed swales will be designed to convey the 100-yr flows from respective tributary basins. Downstream of the proposed ponds, the respective proposed storm sewer will outlet to riprap erosion protection to preserve the existing channel.
- i. Stabilization Requirements for Roadside Ditches
A temporary swale is proposed along Harvest Road running south to north from the E. Pacific Avenue carrying flows captured from Basins D1 and D2 as well as any surface flows from Basin OD. The proposed swale is a temporary swale and will be replaced with the future development of the parcel north of E. Pacific Ave. The temporary swale shall be lined with concrete as the proposed swale slope is shallow (1.00%) The swale will empty directly into the Proposed Pond T.

Temporary swales are proposed along the south side of E. Warren Avenue to capture the offsite undeveloped flows of basins OA1, OA2 and OB. The swales were sized and directed to the proposed temporary inlets that will collect the undeveloped flows. The flows from Basin OA1 will be collected by Swales A and

B, while the flows from Basin OA2 will be collected by Swales C and D. The flows from OA1 and OA2 will be directed to Pond A. Flows from Basin OB shall enter the storm system via Swale E and outfall to Pond B. The proposed storm systems are designed to carry fully developed future flows from these basins and thus will have plenty of capacity for undeveloped flows of current basins south of Warren Avenue. The StormCad evaluation results including full 100 year offsite flows through the storm system are included in Appendix B.

j. Compliance with Approved Outfall Systems Plan

The site is on the edge of the Murphy Creek watershed and was assumed to have a future imperviousness of 85% within the approved Murphy Creek Outfall Systems Plan. Site imperviousness (51%) as proposed is lower than that projected, and no improvements are shown on nor adjacent to the property.

This project follows the approved Murphy Creek Outfall Systems Plan. The site is on the edge of the Coal Creek watershed and Basin 88 was assumed to have a future imperviousness of 59.3% within the Sand Creek Colfax to Yale Major Drainageway Plan. There is no approved Outfall Systems Plan for Coal Creek. Refer to the Sand Creek Colfax to Yale Major Drainageway Plan which discusses that portion of the site within Coal Creek.

k. Additional Information

The pond information has been posted to the Colorado Stormwater Detention and Infiltration Facilities portal per request from the City of Aurora. The Storm Detention and Infiltration Facility Notifications are also included in the detention pond portion of Appendix C.

V. Conclusions

1. Compliance with Standards

This preliminary drainage report is in conformance with the *City of Aurora Storm Drainage Design and Technical Criteria*, *Mile High Flood District Urban Storm Drainage Criteria Manuals*, and master drainage reports.

2. Summary of Concept

a. Degree of Protection to Existing Site

The site is designed so that the residential units are the high point, with all grading directed away. Runoff generally sheet flows to adjacent street curb & gutter before being conveyed to proposed inlets located throughout the site.

b. Measures Taken to Provide Adequate Onsite Drainage and Water Quality

Storm sewer has been sized and extended to the south for the future development upstream of the project. The sized storm will carry full 100 year flows from these basins. The flows are routed to the detention and water quality ponds where water quality, EURV and detention are provided for the future development of the upstream basins.

APPENDIX A

Hydrologic Computations

Harvest Crossing Basin Weighted Runoff Coefficient Calculations															
Land Use Is Comprised of 3 Surface Characteristics:															
NRCS Soil Group: C & D					Imperviousness	C ₂	C ₃	C ₁₀₀							
A	SFR				45%	0.40	0.45	0.60							
B	ROW (Local Street)				74%	0.67	0.68	0.74							
C	ROW (Collector)				79%	0.71	0.72	0.79							
D	ROW (Arterial)				85%	0.76	0.77	0.85							
E	Concrete				96%	0.87	0.87	0.89							
F	SFR (Off-site: from MDP)				50%	0.40	0.45	0.60							
G	Lawns, Clay Soil (C & D Soils; 2-7% slope)				5%	0.25	0.27	0.35							
H	Park/Playground Area				10%	0.15	0.25	0.65							
I	Streets, Paved				100%	0.87	0.88	0.93							
												Project No.:	1008-18		
												Date:	6/8/2022		
Basin ID	Total Area (Ac.)	A Area (Ac.)	B Area (Ac.)	C Area (Ac.)	D Area (Ac.)	E Area (Ac.)	F Area (Ac.)	G Area (Ac.)	H Area (Ac.)	I Area (Ac.)	Weighted Imp. I (%)	Weighted Runoff Coefficients			
												C ₂	C ₃	C ₁₀₀	
OA-1a	0.55	0.00	0.00	0.00	0.00	0.00	0.00	0.55	0.00	0.00	5%	0.25	0.27	0.35	
OA-1a + A7-a	0.62	0.00	0.00	0.00	0.00	0.00	0.00	0.62	0.00	0.00	5%	0.25	0.27	0.35	
OA-1b	4.34	0.00	0.00	0.00	0.00	0.00	0.00	4.34	0.00	0.00	5%	0.25	0.27	0.35	
OA-1b + A7-b	4.51	0.00	0.00	0.00	0.00	0.02	0.00	4.49	0.00	0.00	5%	0.25	0.27	0.35	
OA-2a	1.48	0.00	0.00	0.00	0.00	0.00	0.00	1.48	0.00	0.00	5%	0.25	0.27	0.35	
OA-2a + A1-a	1.53	0.00	0.00	0.00	0.00	0.01	0.00	1.53	0.00	0.00	5%	0.25	0.27	0.35	
OA-2b	17.59	0.00	0.00	0.00	0.00	0.04	0.00	17.59	0.00	0.00	5%	0.25	0.27	0.35	
OA-2b + A1-b	17.87	0.00	0.00	0.00	0.00	0.07	0.00	17.84	0.00	0.00	5%	0.25	0.27	0.35	
OB	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	5%	0.25	0.27	0.35	
OB + B1-a	0.71	0.00	0.00	0.00	0.00	0.00	0.00	0.71	0.00	0.00	5%	0.25	0.27	0.35	
OC	0.54	0.00	0.54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74%	0.67	0.68	0.74	
OD	1.39	0.00	0.00	0.00	0.00	0.00	0.00	1.39	0.00	0.00	5%	0.25	0.27	0.35	
OE	0.89	0.00	0.00	0.81	0.00	0.00	0.00	0.08	0.00	0.00	72%	0.67	0.68	0.75	
OF	1.00	0.00	0.00	0.00	0.62	0.00	0.00	0.38	0.00	0.00	55%	0.57	0.58	0.66	
OG	10.96	0.00	0.00	0.00	0.00	0.01	0.00	10.73	0.00	0.21	7%	0.26	0.28	0.36	
Off-site Developed Condition															
OA1	3.93	0.00	0.00	0.00	0.00	0.00	3.93	0.00	0.00	0.00	50%	0.40	0.45	0.60	
OA1 + A7	4.17	0.00	0.00	0.00	0.00	0.02	3.93	0.22	0.00	0.0	48%	0.39	0.44	0.59	
OA2	13.03	0.00	0.00	0.00	0.00	0.00	9.29	0.00	3.74	0.00	39%	0.33	0.39	0.61	
OA2 + A1	13.37	0.00	0.00	0.00	0.00	0.04	9.29	0.30	3.74	0.0	38%	0.33	0.39	0.61	
OB	16.04	0.00	0.00	0.00	0.00	0.00	15.60	0.00	0.44	0.00	49%	0.39	0.44	0.60	
OB + B1-a	16.14	0.00	0.00	0.00	0.00	0.00	15.60	0.10	0.44	0.00	49%	0.39	0.44	0.60	
OC	0.52	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	74%	0.67	0.68	0.74	
OD	Not Applicable - Shall be reevaluated upon site development in the future														
OE	0.81	0.00	0.00	0.81	0.00	0.00	0.00	0.00	0.00	0.00	79%	0.71	0.72	0.79	
OF	1.00	0.00	0.00	0.00	0.62	0.00	0.00	0.38	0.00	0.00	55%	0.57	0.58	0.66	
OG	Not Applicable - Shall be reevaluated upon site development in the future														
Historic/Existing Condition															
OC	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.60	0.00	0.00	5%	0.25	0.27	0.35	
OD	1.39	0.00	0.00	0.00	0.00	0.00	0.00	1.39	0.00	0.00	5%	0.25	0.27	0.35	
OE	0.81	0.00	0.00	0.00	0.00	0.00	0.00	0.81	0.00	0.00	5%	0.25	0.27	0.35	
OF	0.97	0.00	0.00	0.00	0.20	0.00	0.00	0.77	0.00	0.00	21%	0.36	0.37	0.45	
Existing Imp.	3.77	0.00	0.00	0.00	0.20	0.00	0.00	3.57	0.00	0.00	9%	0.28	0.30	0.38	
Ponds															
On-site Area															
Pond A	23.00	11.67	5.99	1.71	0.00	0.12	0.00	2.76	0.00	0.75	52%	0.49	0.53	0.63	
Pond B	16.43	7.47	4.80	0.18	0.00	0.22	0.00	1.73	1.53	0.50	49%	0.46	0.50	0.64	
Pond T	0.47	0.00	0.36	0.11	0.00	0.00	0.00	0.00	0.00	0.00	75%	0.68	0.69	0.75	
Off-site Contributing Area (Interim)															
Pond A (Int. OS)	2.03	0.00	0.00	0.00	0.00	0.00	0.00	2.03	0.00	0.00	5%	0.25	0.27	0.35	
Pond B (Int. OS)	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.61	0.00	0.00	5%	0.25	0.27	0.35	
Pond T (Int. OS)	14.24	0.00	0.00	0.81	0.62	0.01	0.00	12.58	0.00	0.21	14%	0.31	0.33	0.41	
Emergency Overflow Weir Contributing Area (Interim)															
Pond A (Int. Total)	25.04	11.67	5.99	1.71	0.00	0.12	0.00	4.79	0.00	0.00	46%	0.45	0.48	0.58	
Pond B (Int. Total)	17.05	7.47	4.80	0.18	0.00	0.22	0.00	2.34	1.53	0.00	44%	0.43	0.47	0.60	
Pond T (Int. Total)	14.71	0.00	0.36	0.92	0.62	0.01	0.00	12.58	0.00	0.21	16%	0.32	0.34	0.42	
Off-site Contributing Area (Developed)															
Pond A (Dev. OS)	16.96	0.00	0.00	0.00	0.00	0.00	13.22	0.00	3.74	0.00	41%	0.34	0.41	0.61	
Pond B (Dev. OS)	16.56	0.00	0.52	0.00	0.00	0.00	15.60	0.00	0.44	0.00	50%	0.40	0.45	0.61	
Pond T (Dev. OS)	Not Applicable - Shall be reevaluated upon site development in the future. Pond T is a temporary pond and is not affected by upstream developments south of the site														
Emergency Overflow Weir Contributing Area (Developed)															
Pond A (Dev. Total)	39.96	11.67	5.99	1.71	0.00	0.12	13.22	2.76	3.74	0.75	48%	0.43	0.47	0.62	
Pond B (Dev. Total)	33.00	7.47	5.32	0.18	0.00	0.22	15.60	1.73	1.97	0.50	49%	0.43	0.48	0.62	
Pond T (Dev. Total)	Not Applicable - Use Emergency Overflow Interim conditions for Temporary Pond T														

Basin Runoff Calculations - Direct Runoff

Project No.: 1008-18

8-Jun-22

Basin ID	Design Point	Total Area (Ac.)	Imp (%)	Tc (min)	Runoff Coeff.							
					C ₂	C ₅	C ₁₀₀	I ₂	I ₅	I ₁₀₀	Q ₂	Q ₁₀₀
Off-site Interim Condition												
OA-1a	A2-38 (Int.)	0.55	5%	12.2	0.25	0.27	0.35	2.47	3.44	6.65	0.34	1.28
OA-1a + A7-a	A2-38 (Int.)	0.62	5%	13.1	0.25	0.27	0.35	2.40	3.34	6.46	0.37	1.40
OA-1b	A2-38 (Int.)	4.34	5%	16.1	0.25	0.27	0.35	2.18	3.03	5.87	2.36	8.92
OA-1b + A7-b	A2-38 (Int.)	4.51	5%	16.1	0.25	0.27	0.35	2.18	3.03	5.87	2.48	9.33
OA-2a	A2-31 (Int.)	1.48	5%	14.4	0.25	0.27	0.35	2.29	3.19	6.17	0.85	3.20
OA-2a + A1-a	A2-31 (Int.)	1.53	5%	14.4	0.25	0.27	0.35	2.29	3.19	6.18	0.89	3.34
OA-2b	A2-31 (Int.)	17.59	5%	22.4	0.25	0.27	0.35	1.83	2.55	4.94	8.11	30.57
OA-2b + A1-b	A2-31 (Int.)	17.87	5%	22.4	0.25	0.27	0.35	1.83	2.55	4.94	8.28	31.14
OB	B3-14 (Int.)	0.61	5%	12.2	0.25	0.27	0.35	2.47	3.44	6.65	0.38	1.43
OB + B1-a	B3-14 (Int.)	0.71	5%	12.6	0.25	0.27	0.35	2.43	3.39	6.56	0.43	1.64
OC	B4-4	0.54	74%	5.3	0.67	0.68	0.74	3.30	4.60	8.90	1.21	3.59
OD	Pond T	1.39	5%	13.4	0.25	0.27	0.35	2.37	3.30	6.38	0.82	3.11
OE	C2-2	0.89	72%	6.5	0.67	0.68	0.75	3.11	4.34	8.40	1.86	5.62
OF	C2-5	1.00	55%	9.4	0.57	0.58	0.66	2.74	3.83	7.40	1.56	4.90
OG	Pond T	10.96	7%	15.2	0.26	0.28	0.36	2.23	3.11	6.02	6.42	23.85

Off-site Developed Condition												
OA1	PA	3.93	50%	15.2	0.40	0.45	0.60	2.23	3.11	6.02	3.51	14.18
OA1 + A7	PA	4.17	48%	15.2	0.39	0.44	0.59	2.23	3.11	6.02	3.67	14.75
OA2	PA	13.03	39%	11.9	0.33	0.39	0.61	2.50	3.48	6.73	10.68	53.90
OA2 + A1	PA	13.37	38%	11.9	0.33	0.39	0.61	2.49	3.48	6.73	10.94	54.79
OB	PA	16.04	49%	13.3	0.39	0.44	0.60	2.37	3.31	6.40	14.98	61.77
OB + B1-a	PA	16.14	49%	13.3	0.39	0.44	0.60	2.37	3.31	6.40	15.03	61.97
OC	B1-4	0.52	74%	5.1	0.67	0.68	0.74	3.34	4.66	9.01	1.18	3.50
OD	PT	Not Applicable - Same as Interim										
OE	C2-2	0.81	79%	6.2	0.71	0.72	0.79	3.17	4.41	8.54	1.83	5.48
OF	C2-5	1.00	55%	7.5	0.57	0.58	0.66	2.98	4.15	8.03	1.70	5.32
OG	PT	Not Applicable - Same as Interim										

Existing												
OC		0.60	5%	8.3	0.25	0.27	0.35	2.87	4.00	7.74	0.43	1.63
OD		1.39	5%	11.4	0.25	0.27	0.35	2.54	3.54	6.85	0.88	3.33
OE		0.81	5%	7.0	0.25	0.27	0.35	3.04	4.24	8.20	0.62	2.32
OF		0.97	21%	8.9	0.36	0.37	0.45	2.81	3.91	7.57	0.97	3.32

Emergency Overflow Contributing Flows (Developed Condition)												
Pond A inflow		39.96	48%	27.8	0.43	0.47	0.62	1.62	2.26	4.38	27.94	109.11
Pond B inflow		33.00	49%	25.1	0.43	0.48	0.62	1.72	2.40	4.64	24.59	94.99
Pond T inflow		14.71	16%	15.2	0.32	0.34	0.42	2.23	3.11	6.02	10.52	36.94
Pond T + Pond A		54.68	39%	27.8	0.40	0.44	0.57	1.62	2.26	4.38	35.60	135.97

$$\text{Intensity} = \frac{28.5 * P_1}{(10 + T_c)^{0.786}}$$

2 Year P ₁ =	0.99	inches
5 Year P ₁ =	1.38	inches
100 Year P ₁ =	2.67	inches

APPENDIX B

Hydraulic Computations:

Detention Ponds and Pond Structures – p. 38

Storm Inlets and Street Capacity – p. 100

Storm Water System Design – p. 181

Offsite Swales – p. 229

Site Swales – p. 245

Storage Volume Calculations (Type C & D soils)

Project: Harvest Crossing F1
Note: Pond B

Date: 5/12/2022
By: RAA

Site Information:

Area: 33 acre
Percent Impervious: 49 %

10-Yr Release Rate: 0.30 cfs/ac
100-Yr Release Rate: 1.00 cfs/ac
 Q_{10A} : 9.90 cfs Q_{100A} : 33.00 cfs

Water Quality: WQCV = $a (0.91i^3 - 1.19i^2 + .78i) * 1.2$ 20% increase in vol for sedimentation

a: 1 (based on drain time)
I: 0.490 Percent Impervious

1.2*WQCV: 0.244 watershed in.
1.2*WQCV: 0.672 ac-ft
1.2*WQCV: 29,259 cf

EURV: $EURV = 1.20I^{1.08}$

I: 0.490
EURV: 0.555 watershed in.
EURV: 1.527 ac-ft
EURV: 66,529 cf

100 Year Detention: $V_{100} = K_{100}A$

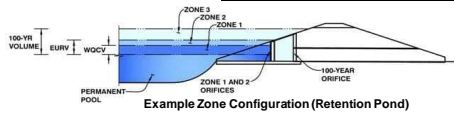
$$K_{100} = (1.78I - 0.002I^2 - 3.56) / 900$$

I: 49
 K_{100} : 0.088

V_{100} : 2.891 ac-ft
 V_{100} : 125,952 cf
 $V_{100} + 1/2 \text{ EURV}$: 159,217 cf
 $V_{100} + 1/2 \text{ EURV}$: 3.655 ac-ft

Variance requested to not provide 1/2 EURV with the detention volume. Instead the MHFD-Detention spreadsheet volume will be used as it's higher than the 100-yr volume calculated here with the V=KA method

MHFD-Detention, Version 4.04 (February 2021)

Basin ID: Pond B (Master Plan Pond C3)

Selected BMP Type =	EDB	
Watershed Area =	33.00	acres
Watershed Length =	2,725	ft
Watershed Length to Controid =	1,092	ft
Watershed Slope =	0.028	ft/ft
Watershed Imperviousness =	49.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WOCV Drain Time =	40.0	hours

Location for 1-hr Rainfall Depths = Aurora - Municipal Center

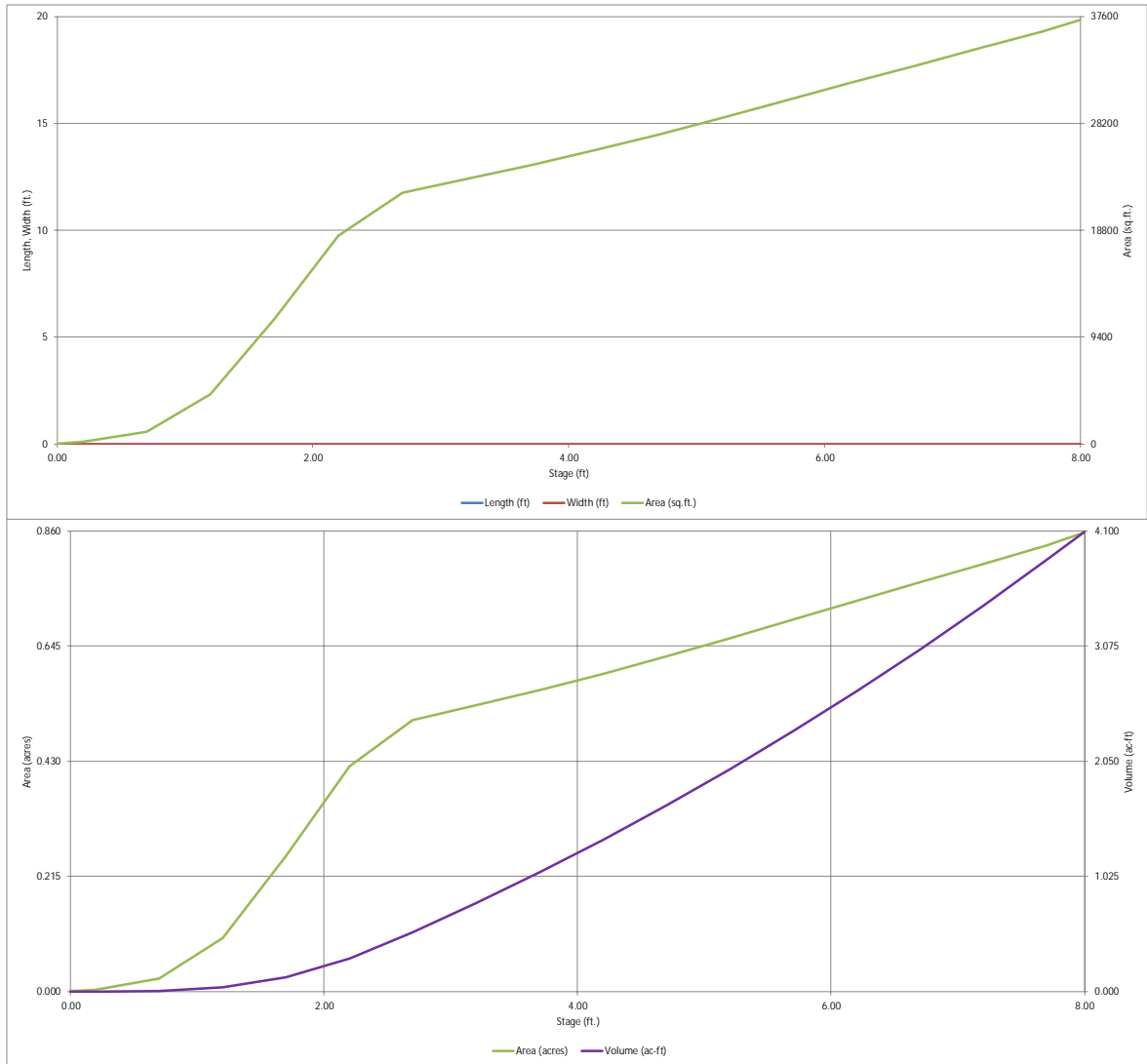
After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

Water Quality Capture Volume (WQCV) =	0.672	acre-feet
Excess Urban Runoff Volume (EURV) =	1.527	acre-feet
2-yr Runoff Volume ($P1 = 0.99$ in.) =	1.305	acre-feet
5-yr Runoff Volume ($P1 = 1.38$ in.) =	2.264	acre-feet
10-yr Runoff Volume ($P1 = 1.62$ in.) =	2.909	acre-feet
25-yr Runoff Volume ($P1 = 1.99$ in.) =	4.049	acre-feet
50-yr Runoff Volume ($P1 = 2.32$ in.) =	4.996	acre-feet
100-yr Runoff Volume ($P1 = 2.67$ in.) =	6.109	acre-feet
500-yr Runoff Volume ($P1 = 3.3$ in.) =	7.941	acre-feet
Approximate 2-yr Detention Volume =	1.120	acre-feet
Approximate 5-yr Detention Volume =	1.854	acre-feet
Approximate 10-yr Detention Volume =	2.127	acre-feet
Approximate 25-yr Detention Volume =	2.476	acre-feet
Approximate 50-yr Detention Volume =	2.660	acre-feet
Approximate 100-yr Detention Volume =	3.119	acre-feet

Zone 1 Volume (WOCV) =	0.672	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.855	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	1.592	acre-feet
Total Detention Basin Volume =	3.119	acre-feet
Initial Surgeback Volume (ISV) =	user	ft ³
Initial Surgeback Depth (ISD) =	user	ft
Total Available Detention Depth (H_{total}) =	user	ft
Depth of Trickle Channel (H_{TC}) =	user	ft
Slope of Trickle Channel (S_{TC}) =	user	ft/ft
Slopes of Main Basin Sides (S_{main}) =	user	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	user	

Initial Surcharge Area (A_{E1})	=	user	ft ²
Surcharge Volume Length (L_{E1})	=	user	ft
Surcharge Volume Width (W_{E1})	=	user	ft
Depth of Basin Floor (H_{1LOD})	=	user	ft
Length of Basin Floor (L_{1LOD})	=	user	ft
Width of Basin Floor (W_{1LOD})	=	user	ft
Area of Basin Floor (A_{1LOD})	=	user	ft ²
Volume of Basin Floor (V_{1LOD})	=	user	ft ³
Depth of Main Basin (H_{MAIN})	=	user	ft
Length of Main Basin (L_{MAIN})	=	user	ft
Width of Main Basin (W_{MAIN})	=	user	ft
Area of Main Basin (A_{MAIN})	=	user	ft ²
Volume of Main Basin (V_{MAIN})	=	user	ft ³
Calculated Total Basin Volume (V_{TOTAL})	=	US ER	acre-feet

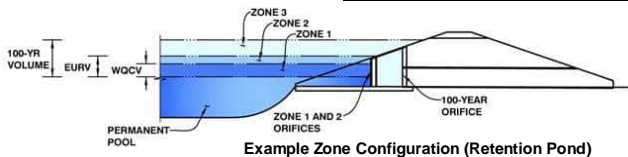
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DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)

Project: Harvest Crossing
Basin ID: Pond B (Master Plan Pond C3)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.99	0.672	Orifice Plate
Zone 2 (EURV)	4.50	0.855	Orifice Plate
Zone 3 (100-year)	6.80	1.592	Weir&Pipe (Restrict)
Total (all zones)		3.119	

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

Calculated Parameters for Underdrain

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

Underdrain Orifice Area = N/A ft²
Underdrain Orifice Centroid = N/A 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)

Calculated Parameters for Plate

Invert of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 4.40 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = N/A inches
Orifice Plate: Orifice Area per Row = 2.24 sq. inches (diameter = 1-11/16 inches)

WQ Orifice Area per Row = 1.553E-02 ft²
Elliptical Half-Width = N/A feet
Elliptical Slot Centroid = N/A feet
Elliptical Slot Area = N/A ft²

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	1.00	2.00	3.00				
Orifice Area (sq. inches)	2.24	2.24	2.24	2.24				

	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)

Calculated Parameters for Vertical Orifice

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

Vertical Orifice Area = N/A ft²
Vertical Orifice Centroid = N/A feet

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

Calculated Parameters for Overflow Weir

Overflow Weir Front Edge Height, H_o = 4.50 ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = 5.00 ft
Overflow Weir Grate Slope = 4.00 H:V
Horiz. Length of Weir Sides = 10.00 ft
Overflow Grate Type = Close Mesh Grate
Debris Clogging % = 50%

Height of Grate Upper Edge, H_u = 7.00 ft
Overflow Weir Slope Length = 10.31 ft
Grate Open Area / 100-yr Orifice Area = 15.21
Overflow Grate Open Area w/o Debris = 40.77 ft²
Overflow Grate Open Area w/ Debris = 20.38 ft²

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Depth to Invert of Outlet Pipe = 0.25 ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter = 24.00 inches
Restrictor Plate Height Above Pipe Invert = 19.10 inches

Outlet Orifice Area = 2.68 ft²
Outlet Orifice Centroid = 0.87 feet
Half-Central Angle of Restrictor Plate on Pipe = 2.20 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Calculated Parameters for Spillway

Spillway Invert Stage = 8.20 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 85.00 feet
Spillway End Slopes = 4.00 H:V
Freeboard above Max Water Surface = 1.00 feet

Spillway Design Flow Depth = 0.45 feet
Stage at Top of Freeboard = 9.65 feet
Basin Area at Top of Freeboard = 0.86 acres
Basin Volume at Top of Freeboard = 4.10 acre-ft

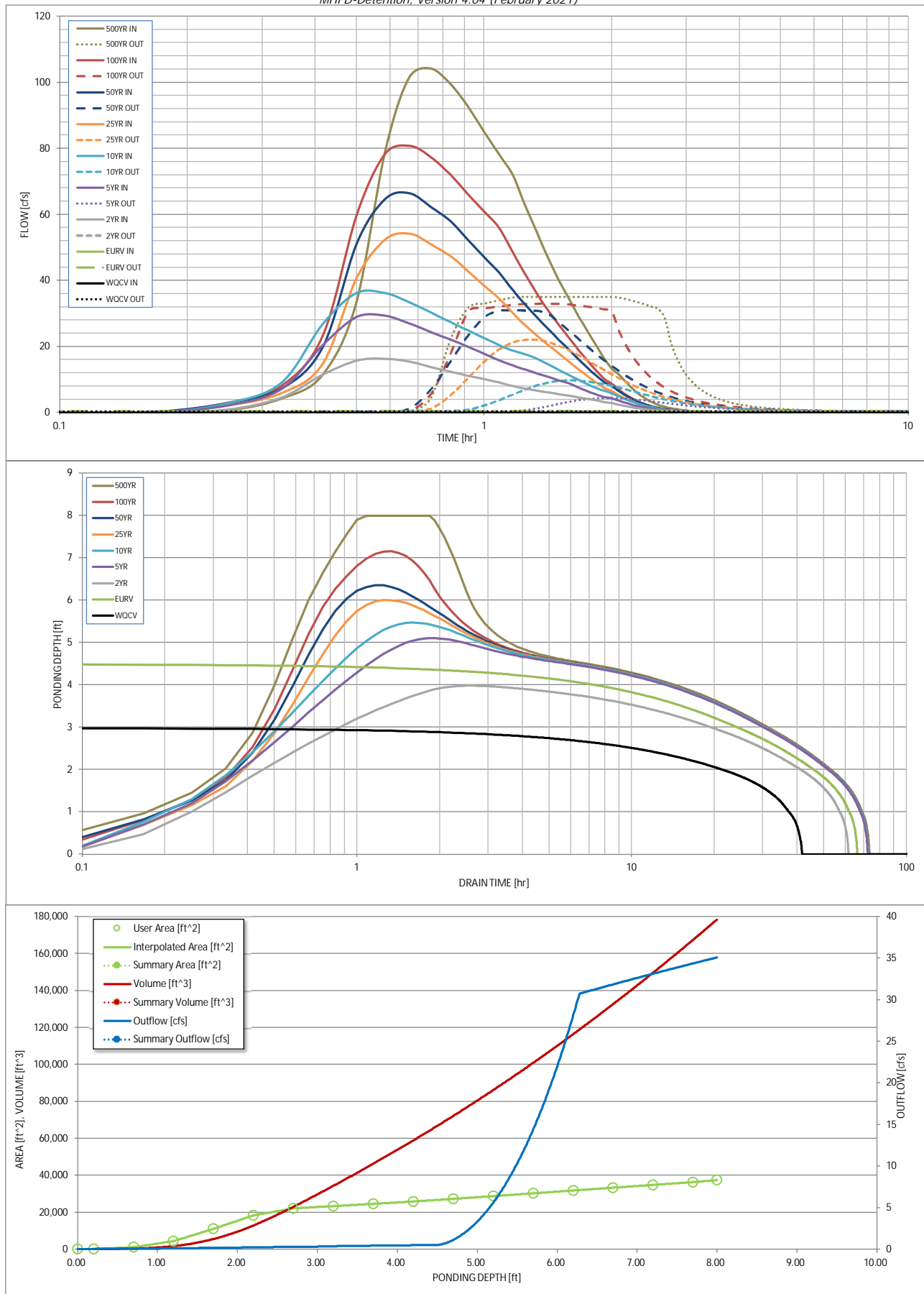
Routed Hydrograph Results

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	0.99	1.38	1.62	1.99	2.32	2.67	3.30
One-Hour Rainfall Depth (in)	N/A	N/A	0.99	1.38	1.62	1.99	2.32	2.67	3.30
CUHP Runoff Volume (acre-ft)	0.672	1.527	1.305	2.264	2.909	4.049	4.996	6.109	7.941
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	1.305	2.264	2.909	4.049	4.996	6.109	7.941
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	1.2	8.6	12.8	24.5	32.1	41.8	56.6
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	0.04	0.26	0.39	0.74	0.97	1.27	1.72
Peak Inflow Q (cfs)	N/A	N/A	16.3	29.3	36.2	54.2	66.4	80.8	104.2
Peak Outflow Q (cfs)	0.3	0.5	0.5	4.4	9.8	22.1	30.9	33.0	35.1
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	N/A	0.5	0.8	0.9	1.0	0.8	0.6
Structure Controlling Flow	Plate	Overflow Weir 1	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Outlet Plate 1	N/A
Max Velocity through Grate 1 (fps)	N/A	N/A	N/A	0.1	0.2	0.5	0.7	0.8	0.8
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	59	55	63	62	59	57	55	52
Time to Drain 99% of Inflow Volume (hours)	40	63	59	68	67	66	65	64	63
Maximum Ponding Depth (ft)	2.99	4.50	3.98	5.10	5.47	6.00	6.35	7.16	8.00
Area at Maximum Ponding Depth (acres)	0.52	0.61	0.58	0.65	0.68	0.72	0.74	0.79	0.86
Maximum Volume Stored (acre-ft)	0.676	1.531	1.222	1.910	2.150	2.526	2.780	3.394	4.095

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.04 (February 2021)



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.

Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	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	0.26	0.16	0.74
	0:15:00	0.00	0.00	0.96	2.24	2.85	2.17	2.94	2.99	4.29
	0:20:00	0.00	0.00	4.59	7.22	9.16	5.98	7.35	8.25	11.54
	0:25:00	0.00	0.00	11.51	20.51	26.89	14.86	19.87	23.33	33.47
	0:30:00	0.00	0.00	15.73	28.92	36.20	40.61	51.02	59.56	78.77
	0:35:00	0.00	0.00	16.30	29.33	36.21	52.31	64.56	78.34	101.60
	0:40:00	0.00	0.00	15.43	27.06	33.34	54.24	66.45	80.81	104.17
	0:45:00	0.00	0.00	13.81	24.32	30.29	50.91	62.24	77.32	99.46
	0:50:00	0.00	0.00	12.37	22.10	27.36	47.40	57.90	71.99	92.58
	0:55:00	0.00	0.00	11.19	19.89	24.86	42.72	52.27	66.04	84.98
	1:00:00	0.00	0.00	10.13	17.80	22.57	38.44	47.10	60.80	78.25
	1:05:00	0.00	0.00	9.15	15.86	20.45	34.58	42.41	56.02	72.07
	1:10:00	0.00	0.00	8.09	14.27	18.75	30.18	37.12	48.59	62.71
	1:15:00	0.00	0.00	7.27	13.00	17.71	26.43	32.69	41.90	54.39
	1:20:00	0.00	0.00	6.63	11.85	16.31	23.24	28.75	35.95	46.72
	1:25:00	0.00	0.00	6.09	10.78	14.57	20.51	25.33	30.90	40.14
	1:30:00	0.00	0.00	5.60	9.79	12.91	17.88	22.05	26.56	34.46
	1:35:00	0.00	0.00	5.11	8.85	11.38	15.44	19.02	22.69	29.40
	1:40:00	0.00	0.00	4.62	7.66	9.94	13.20	16.24	19.11	24.74
	1:45:00	0.00	0.00	4.15	6.50	8.61	11.11	13.65	15.80	20.43
	1:50:00	0.00	0.00	3.74	5.48	7.46	9.20	11.27	12.81	16.54
	1:55:00	0.00	0.00	3.23	4.77	6.60	7.54	9.26	10.30	13.36
	2:00:00	0.00	0.00	2.84	4.30	5.89	6.50	8.02	8.70	11.36
	2:05:00	0.00	0.00	2.34	3.55	4.86	5.19	6.43	6.87	9.01
	2:10:00	0.00	0.00	1.89	2.85	3.91	4.06	5.02	5.27	6.92
	2:15:00	0.00	0.00	1.52	2.27	3.12	3.15	3.91	4.01	5.28
	2:20:00	0.00	0.00	1.22	1.81	2.48	2.46	3.05	3.04	4.00
	2:25:00	0.00	0.00	0.97	1.44	1.95	1.91	2.36	2.28	3.01
	2:30:00	0.00	0.00	0.76	1.13	1.51	1.47	1.81	1.71	2.25
	2:35:00	0.00	0.00	0.60	0.87	1.15	1.12	1.38	1.30	1.71
	2:40:00	0.00	0.00	0.47	0.66	0.87	0.85	1.05	1.00	1.31
	2:45:00	0.00	0.00	0.37	0.51	0.67	0.66	0.81	0.78	1.02
	2:50:00	0.00	0.00	0.28	0.39	0.52	0.51	0.62	0.61	0.79
	2:55:00	0.00	0.00	0.21	0.28	0.39	0.38	0.47	0.46	0.60
	3:00:00	0.00	0.00	0.15	0.20	0.27	0.28	0.34	0.33	0.43
	3:05:00	0.00	0.00	0.10	0.13	0.18	0.19	0.23	0.22	0.29
	3:10:00	0.00	0.00	0.06	0.08	0.11	0.12	0.14	0.14	0.18
	3:15:00	0.00	0.00	0.03	0.04	0.05	0.06	0.07	0.07	0.09
	3:20:00	0.00	0.00	0.01	0.02	0.02	0.02	0.03	0.03	0.03
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	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

Worksheet for Pond B Emergency Spillway

Project Description	
Friction Method	Manning
Solve For	Formula Normal Depth
Input Data	
Roughness Coefficient	0.069
Channel Slope	0.050 ft/ft
Left Side Slope	0.250 ft/ft
Right Side Slope	0.250 ft/ft
Bottom Width	85.00 ft
Discharge	94.99 cfs
Results	
Normal Depth	4.98 in
Flow Area	36.0 ft ²
Wetted Perimeter	88.4 ft
Hydraulic Radius	4.88 in
Top Width	88.32 ft
Critical Depth	4.04 in
Critical Slope	0.100 ft/ft
Velocity	2.64 ft/s
Velocity Head	0.11 ft
Specific Energy	0.52 ft
Froude Number	0.730
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.00 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.00 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	4.98 in
Critical Depth	4.04 in
Channel Slope	0.050 ft/ft
Critical Slope	0.100 ft/ft

RIRPAP FOR SPILWAY

Design Point Pond B

Spilway Info

Height 1.60 ft
 Width 85.00 ft
 Flow Depth 0.42 ft
 Velocity 3.61 ft/s
 Runoff 94.99 cfs

Freeboard above Spilway
 WSE = 1.19 ft

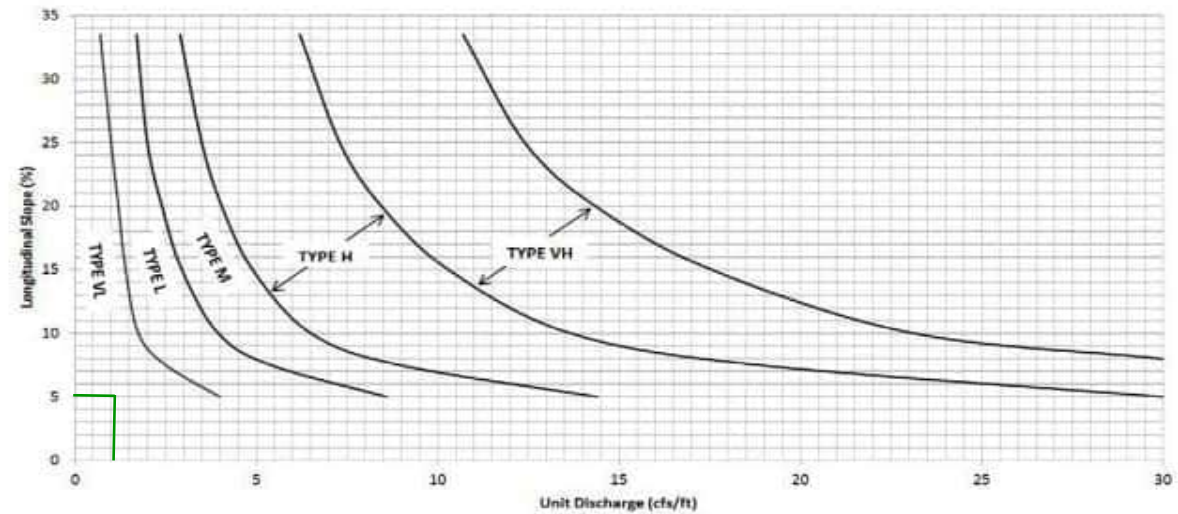


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)

Riprap Design

Unit Discharge 1.12 cfs/ft
 Max Longitudinal Slope 5 %

(from site design)

Riprap size (required): 6 in
 Riprap size (proposed): 12 in

per Fig. HS-20c

Type	D ₅₀
VL	6"
L	9"
M	12"
H	18"
B18	18"

Worksheet for Kewaunee Street Emergency Spillway (DP 1)

Project Description		
Friction Method	Manning	
Solve For	Formula	
	Normal Depth	
Input Data		
Channel Slope	0.049 ft/ft	<div style="border: 1px solid blue; padding: 5px;"> <p>Design Peak Flow = Pond B rational method peak flow + Basins C1 & C2 peak flows:</p> <p>$Q = 94.99 + 0.88 + 1.88 = 97.75$</p> </div>
Discharge	97.75 cfs	

Section Definitions

Station (ft)	Elevation (ft)
0+00	1.00
0+01	0.99
0+06	0.88
0+15	0.71
0+15	0.21
0+17	0.38
0+32	0.68
0+47	0.38
0+49	0.21
0+50	0.71
0+58	0.88
0+64	0.99
0+64	1.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 1.00)	(0+01, 0.99)	0.035
(0+01, 0.99)	(0+06, 0.88)	0.015
(0+06, 0.88)	(0+15, 0.71)	0.035
(0+15, 0.71)	(0+17, 0.38)	0.015
(0+17, 0.38)	(0+47, 0.38)	0.016
(0+47, 0.38)	(0+50, 0.71)	0.015
(0+50, 0.71)	(0+58, 0.88)	0.035
(0+58, 0.88)	(0+64, 0.99)	0.015
(0+64, 0.99)	(0+64, 1.00)	0.035

Options		
Current Roughness Weighted Method	Pavlovskii's Method	
Open Channel Weighting Method	Pavlovskii's Method	
Closed Channel Weighting Method	Pavlovskii's Method	

Results		
Normal Depth	8.30 in	

Worksheet for Kewaunee Street Emergency Spillway (DP 1)

Results

Roughness Coefficient	0.024
Elevation	0.90 ft
Elevation Range	0.2 to 1.0 ft
Flow Area	15.9 ft ²
Wetted Perimeter	54.6 ft
Hydraulic Radius	3.51 in
Top Width	54.14 ft
Normal Depth	8.30 in
Critical Depth	10.40 in
Critical Slope	0.011 ft/ft
Velocity	6.13 ft/s
Velocity Head	0.58 ft
Specific Energy	1.28 ft
Froude Number	1.991
Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data

Upstream Depth	0.00 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.30 in
Critical Depth	10.40 in
Channel Slope	0.049 ft/ft
Critical Slope	0.011 ft/ft

RIRPAP Rundown

Design Point DP-1

Rundown Info

Width 48.00 ft
 Flow Depth 0.63 ft
 Velocity 5.96 ft/s
 Runoff 97.75 cfs

Design Peak Flow = Pond B rational method peak flow + Basins C1 & C2 peak flows:

$$Q = 94.99 + 0.88 + 1.88 = 97.75$$

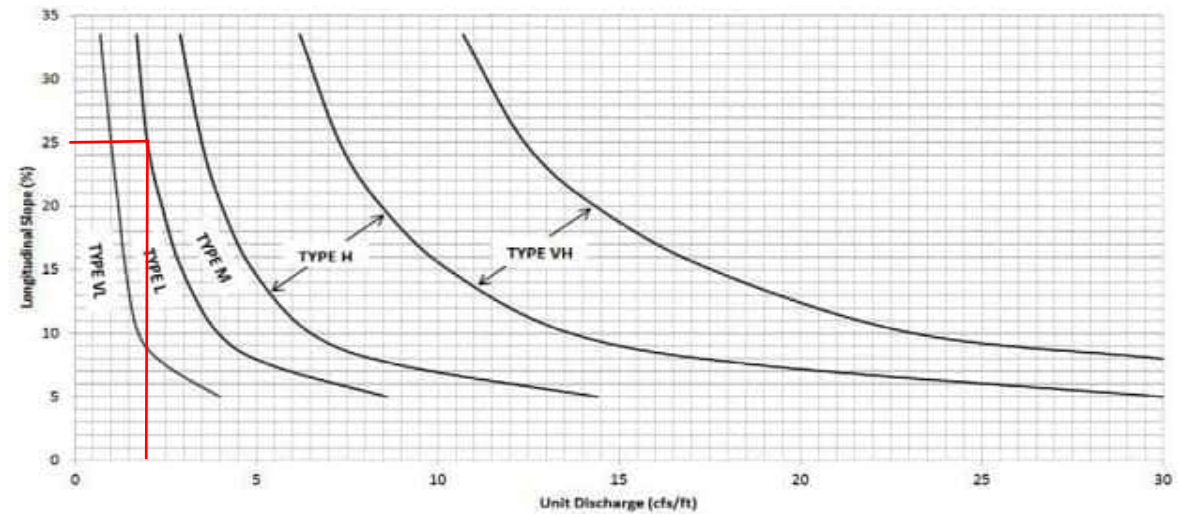


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)

Riprap Design

Unit Discharge 2.04 cfs/ft
 Max Longitudinal Slope 25 %

(from site design)

Riprap size (required): 9 in
 Riprap size (proposed): 12 in

per Fig. HS-20c

Type	D ₅₀
VL	6"
L	9"
M	12"
H	18"
B18	18"

Worksheet for Private Temporary Swale G (Outfall Pond B + C1 + C2)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth

Input Data	
Roughness Coefficient	0.035
Channel Slope	1.700 %
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	17.00 ft
Discharge	97.75 cfs

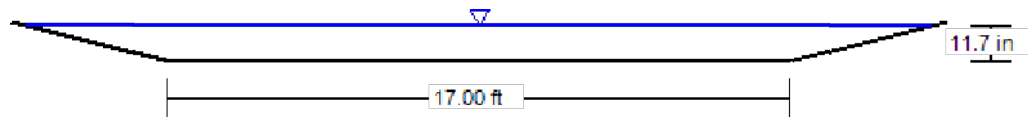
Results	
Normal Depth	11.7 in
Flow Area	20.3 ft ²
Wetted Perimeter	25.0 ft
Hydraulic Radius	9.7 in
Top Width	24.78 ft
Critical Depth	11.2 in
Critical Slope	1.954 %
Velocity	4.81 ft/s
Velocity Head	0.36 ft
Specific Energy	1.33 ft
Froude Number	0.938
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	11.7 in
Critical Depth	11.2 in
Channel Slope	1.700 %
Critical Slope	1.954 %

Cross Section for Private Temporary Swale G (Outfall Pond B + C1 + C2)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.035
Channel Slope	1.700 %
Normal Depth	11.7 in
Left Side Slope	4.000 H:V
Right Side Slope	4.000 H:V
Bottom Width	17.00 ft
Discharge	97.75 cfs



V: 1
H: 1

RIRPAP Rundown

Design Point DP-2

Rundown Info

Width 17.00 ft
 Flow Depth 0.85 ft
 Velocity 4.41 ft/s
 Runoff 97.75 cfs

Design Peak Flow = Pond B rational method peak flow + Basins C1 & C2 peak flows:

$$Q = 94.99 + 0.88 + 1.88 = 97.75$$

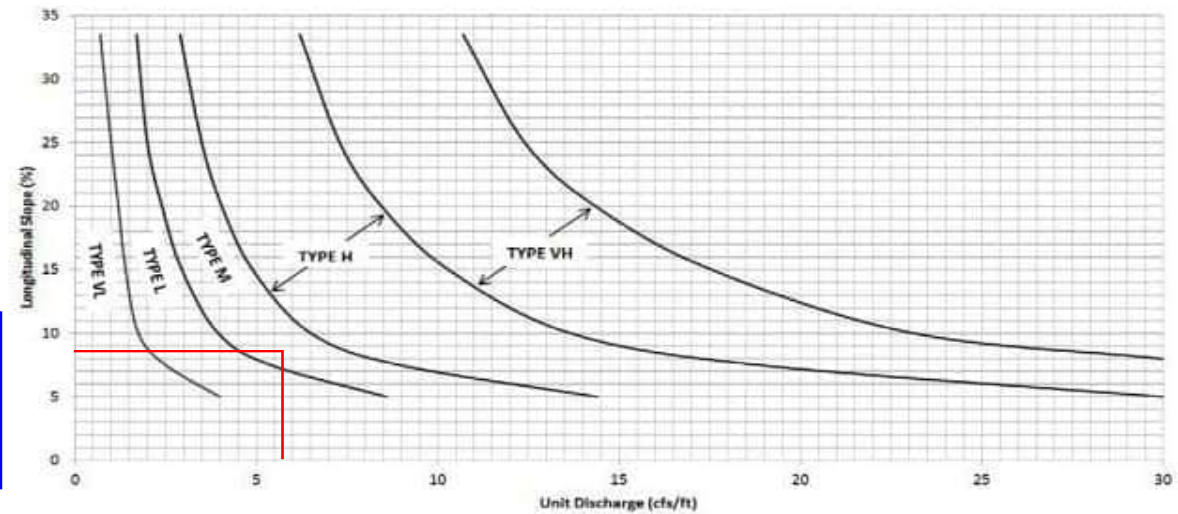


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)

Riprap Design

Unit Discharge 5.75 cfs/ft
 Max Longitudinal Slope 9.34 %

(from site design)

Riprap size (required): 12 in
 Riprap size (proposed): 12 in

per Fig. HS-20c

Type	D ₅₀
VL	6"
L	9"
M	12"
H	18"
B18	18"

5. **Vegetation:** Select durable, dense, and drought tolerant grasses. Turf grasses, such as Kentucky bluegrass, are often selected due to these qualities¹. Native turf grasses may also be selected where a more natural look is desirable. This will also provide the benefit of lower irrigation requirements, once established. Turf grass is a general term for any grasses that will form a turf or mat as opposed to bunch grass, which will grow in clumplike fashion. Grass selection should consider both short-term (for establishment) and long-term maintenance requirements, given that some varieties have higher maintenance requirements than others. Follow criteria in the *Revegetation* Chapter of Volume 2, with regard to seed mix selection, planting, and ground preparation.
6. **Design Velocity:** Maximum flow velocity in the swale should not exceed one foot per second. Use the Soil Conservation Service (now the NRCS) vegetal retardance curves for the Manning coefficient (Chow 1959). Determining the retardance coefficient is an iterative process that the UD-BMP workbook automates. When starting the swale vegetation from sod, curve "D" (low retardance) should be used. When starting vegetation from seed, use the "E" curve (very low vegetal retardance).
7. **Design Flow Depth:** Maximum flow depth should not exceed one foot at the 2-year peak flow rate. Check the conditions for the 100-year flow to ensure that drainage is being handled without flooding critical areas, structures, or adjacent streets.

Native grasses provide a more natural aesthetic and require less water once established.

Table GS-1. Grass Swale Design Summary for Water Quality

Design Flow	Maximum Froude Number	Maximum Velocity	Maximum Flow Depth
2-year event	0.5	1 ft/s	1 ft

Use of Grass Swales

Vegetated conveyance elements provide some benefit in pollutant removal and volume reduction even when the geometry of the BMP does not meet the criteria provided in this Fact Sheet. These criteria provide a design procedure that should be used when possible; however, when site constraints are limiting, vegetated conveyance elements designed for stability are still encouraged.

¹ Although Kentucky bluegrass has relatively high irrigation requirements to maintain a lush, green aesthetic, it also withstands drought conditions by going dormant. Over-irrigation of Kentucky bluegrass is a common problem along the Colorado Front Range. It can be healthy, although less lush, with much less irrigation than is typically applied.

Design Procedure Form: Grass Swale (GS)

UD-BMP (Version 3.07, March 2018)

Sheet 1 of 1

Designer: RAA
Company: ILC
Date: May 18, 2022
Project: Harvest Crossing F1
Location: WQ in Ex. Swale to Jewell Ave

1. Design Discharge for 2-Year Return Period	$Q_2 = 0.93$ cfs
2. Hydraulic Residence Time A) : Length of Grass Swale B) Calculated Residence Time (based on design velocity below)	$L_S = 1,200.0$ ft $T_{HR} = 24.2$ minutes
3. Longitudinal Slope (vertical distance per unit horizontal) A) Available Slope (based on site constraints) B) Design Slope	$S_{avail} = 0.030$ ft / ft $S_D = 0.030$ ft / ft
4. Swale Geometry A) Channel Side Slopes ($Z = 4$ min., horiz. distance per unit vertical) B) Bottom Width of Swale (enter 0 for triangular section)	$Z = 4.00$ ft / ft $W_B = 0.00$ ft
5. Vegetation A) Type of Planting (seed vs. sod, affects vegetal retardance factor)	Choose One <input type="radio"/> Grass From Seed <input checked="" type="radio"/> Grass From Sod
6. Design Velocity (1 ft / s maximum)	$V_2 = 0.83$ ft / s
7. Design Flow Depth (1 foot maximum) A) Flow Area B) Top Width of Swale C) Froude Number (0.50 maximum) D) Hydraulic Radius E) Velocity-Hydraulic Radius Product for Vegetal Retardance F) Manning's n (based on SCS vegetal retardance curve D for sodded grass) G) Cumulative Height of Grade Control Structures Required	$D_2 = 0.53$ ft $A_2 = 1.1$ sq ft $W_T = 4.2$ ft $F = 0.28$ $R_H = 0.26$ $VR = 0.21$ $n = 0.129$ $H_D = 0.00$ ft
8. Underdrain (Is an underdrain necessary?)	Choose One <input checked="" type="radio"/> YES <input type="radio"/> NO
9. Soil Preparation (Describe soil amendment)	_____ _____ _____
10. Irrigation	Choose One <input type="radio"/> Temporary <input type="radio"/> Permanent

Notes:

Temporary Water Quality treatment for Basins C1 and C2 are provided by existing swale to the north. Pond B includes over-detention for these basins as well as reduced outlet flowrate to account for these basins free-releasing

Worksheet for Existing Swale (Downstream of Pond B and Swale G)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	0.030 ft/ft
Discharge	0.93 cfs

Section Definitions

Station (ft)	Elevation (in)
0+00	5,683.00
0+13	5,682.00
0+19	5,681.00
0+23	5,680.00
0+27	5,679.00
0+31	5,680.00
0+35	5,681.00
0+43	5,682.00
0+63	5,683.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5,683.00)	(0+63, 5,683.00)	0.035

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	1.5 in
Roughness Coefficient	0.035
Elevation	5,680.54 in
Elevation Range	5,679.0 to 5,683.0 in
Flow Area	0.8 ft ²
Wetted Perimeter	147.6 in
Hydraulic Radius	0.8 in
Top Width	147.55 in
Normal Depth	1.5 in
Critical Depth	1.4 in
Critical Slope	0.046 ft/ft
Velocity	1.18 ft/s

Worksheet for Existing Swale (Downstream of Pond B and Swale G)

Results

Velocity Head	0.26 in
Specific Energy	0.15 ft
Froude Number	0.823
Flow Type	Subcritical

GVF Input Data

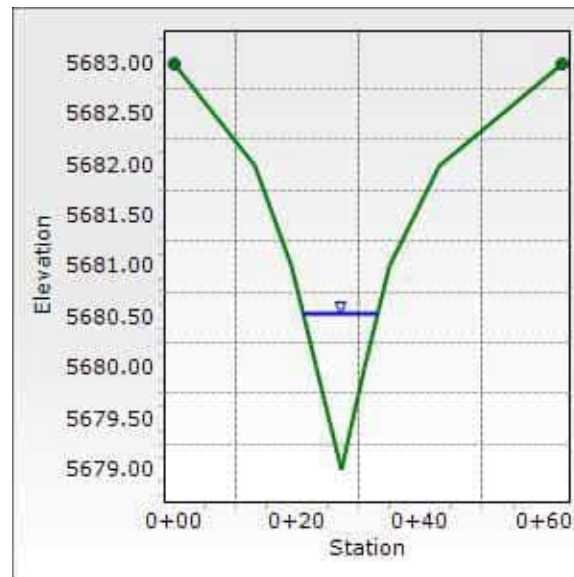
Downstream Depth	0.0 in
Length	0.0 in
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	1.5 in
Critical Depth	1.4 in
Channel Slope	0.030 ft/ft
Critical Slope	0.046 ft/ft

Cross Section for Existing Swale (Downstream of Pond B and Swale G)

Project Description	
Friction Method	Manning
	Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.030 ft/ft
Normal Depth	1.5 in
Discharge	0.93 cfs



Worksheet for Existing Swale (Downstream of Pond B and Swale G)

Project Description	
Friction Method	Manning
Solve For	Formula
	Normal Depth
Input Data	
Channel Slope	0.030 ft/ft
Discharge	97.75 cfs

Section Definitions

Station (ft)	Elevation (in)
0+00	5,686.40
0+40	5,683.00
0+53	5,682.00
0+59	5,681.00
0+63	5,680.00
0+67	5,679.00
0+71	5,680.00
0+75	5,681.00
0+83	5,682.00
1+03	5,683.00
1+45	5,687.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5,686.40)	(1+45, 5,687.00)	0.035

Options	
Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results	
Normal Depth	7.2 in
Roughness Coefficient	0.035
Elevation	5,686.21 in
Elevation Range	5,679.0 to 5,687.0 in
Flow Area	33.6 ft ²
Wetted Perimeter	1,614.1 in
Hydraulic Radius	3.0 in
Top Width	134.50 ft
Normal Depth	7.2 in
Critical Depth	7.3 in

Worksheet for Existing Swale (Downstream of Pond B and Swale G)

Results

Critical Slope	0.028 ft/ft
Velocity	2.91 ft/s
Velocity Head	1.58 in
Specific Energy	0.73 ft
Froude Number	1.028
Flow Type	Supercritical

GVF Input Data

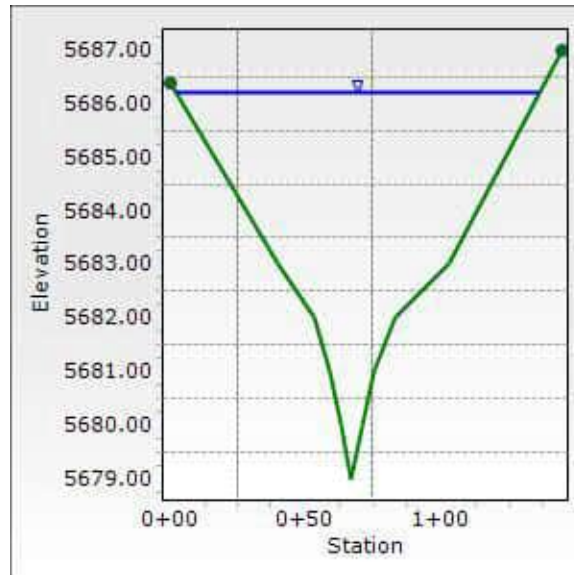
Downstream Depth	0.0 in
Length	0.0 in
Number Of Steps	0

GVF Output Data

Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	7.2 in
Critical Depth	7.3 in
Channel Slope	0.030 ft/ft
Critical Slope	0.028 ft/ft

Cross Section for Existing Swale (Downstream of Pond B and Swale G)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Channel Slope	0.030 ft/ft
Normal Depth	7.2 in
Discharge	97.75 cfs



On-site Required Volumes Only
(See Master Drainage Ponds for Total Volumes)

Detention volume (minimum) shall be determined using the following equation:

$$V = KA$$

Where:

$K = (1.78I - 0.002I^2 - 3.56)/900$ for the 100-year storm event

V = Required volume for the 100-year storm (acre-feet)

I = Developed basin imperviousness (%)

A = Tributary area (acres)

Per the City of Aurora criteria, the calculated release rates in the 100-year storm event are:
1.00 cfs/acre for Hydrologic Soil Group C/D (or historic release rate whichever is less)

Description	Impervious (%)	Area (ac)	WQCV* (ac-ft)	EURV* (ac-ft)	100-year V = KA (ac-ft)	Required Volume** (ac-ft)	Aurora Release Rate (cfs)
Basin A	50	23.82	0.49	1.13	2.13	2.69	24
Basin B	50	16.57	0.35	0.78	1.48	1.87	17

*Obtained from MHFD-Detention Version 4.03 and multiplied by 1.2 per City criteria.

**Required Volume is half EURV plus the 100-year V = KA volume.

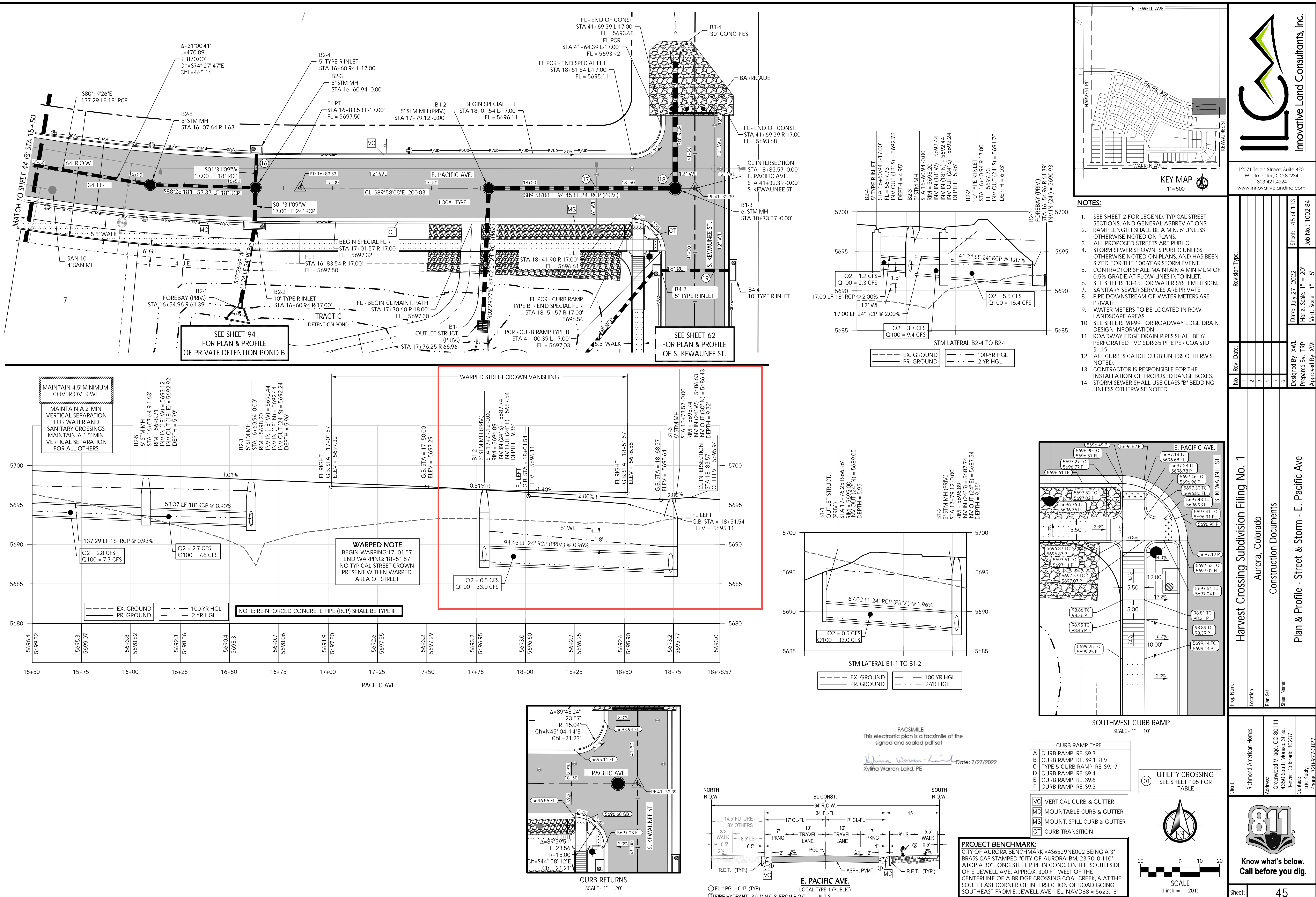
Note:

Basin A is located in the west half of the site and drains to Murphy Creek.

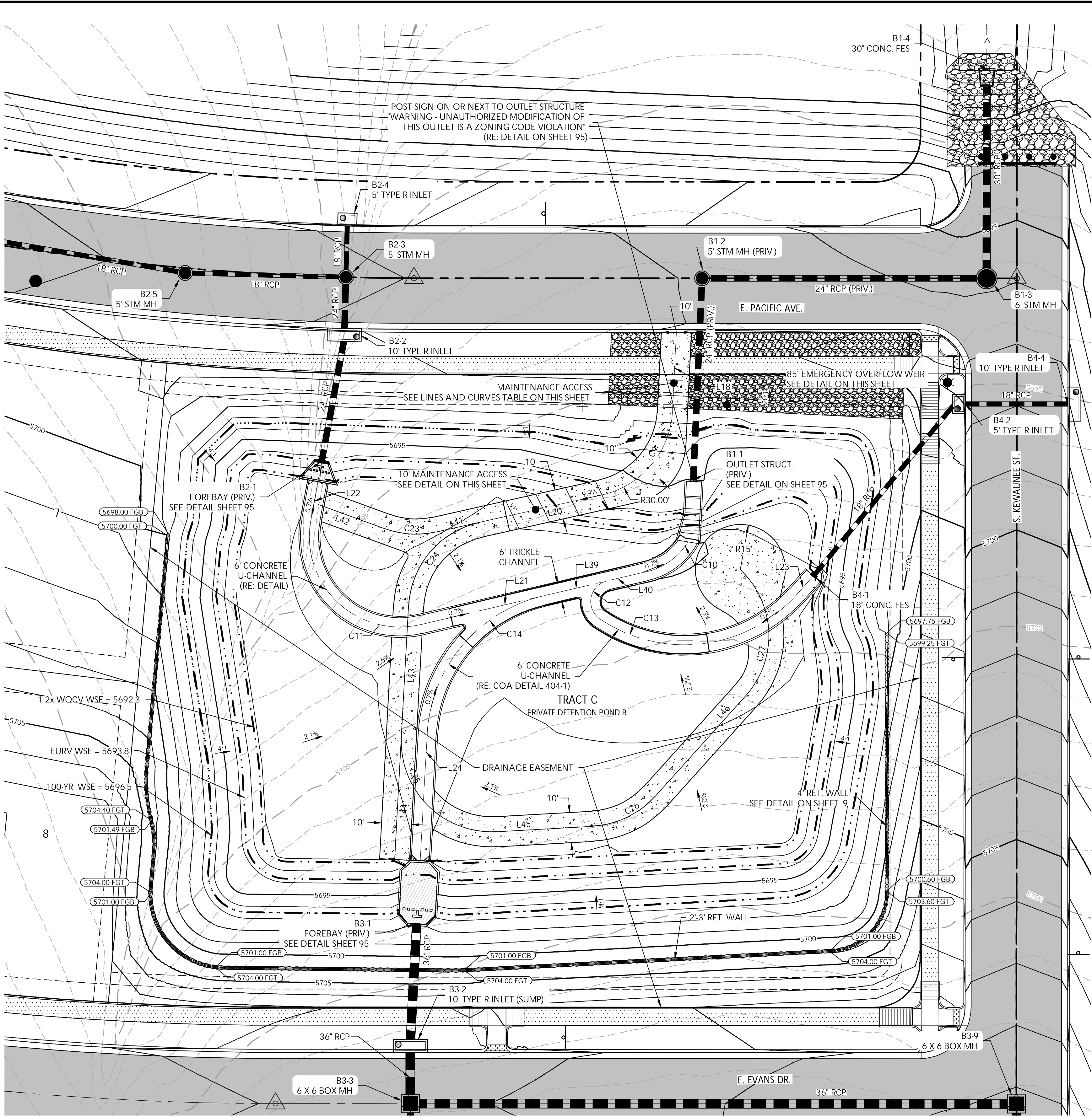
Basin B is located in the east half of the site and drains to Coal Creek.

Information from the Harvest
Crossing/Villages at Murphy
Creek Master Drainage Report

COA EDN 221085

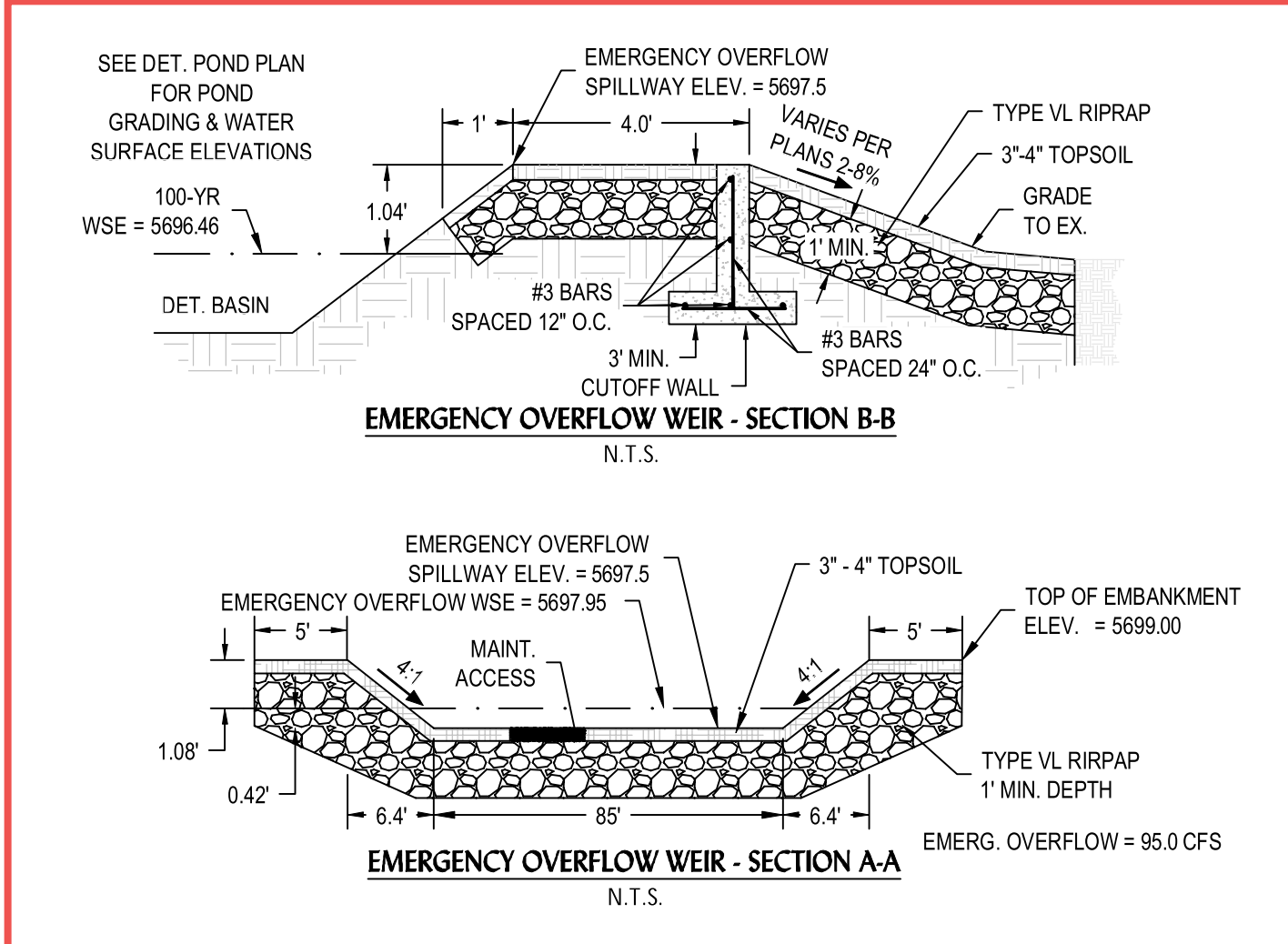
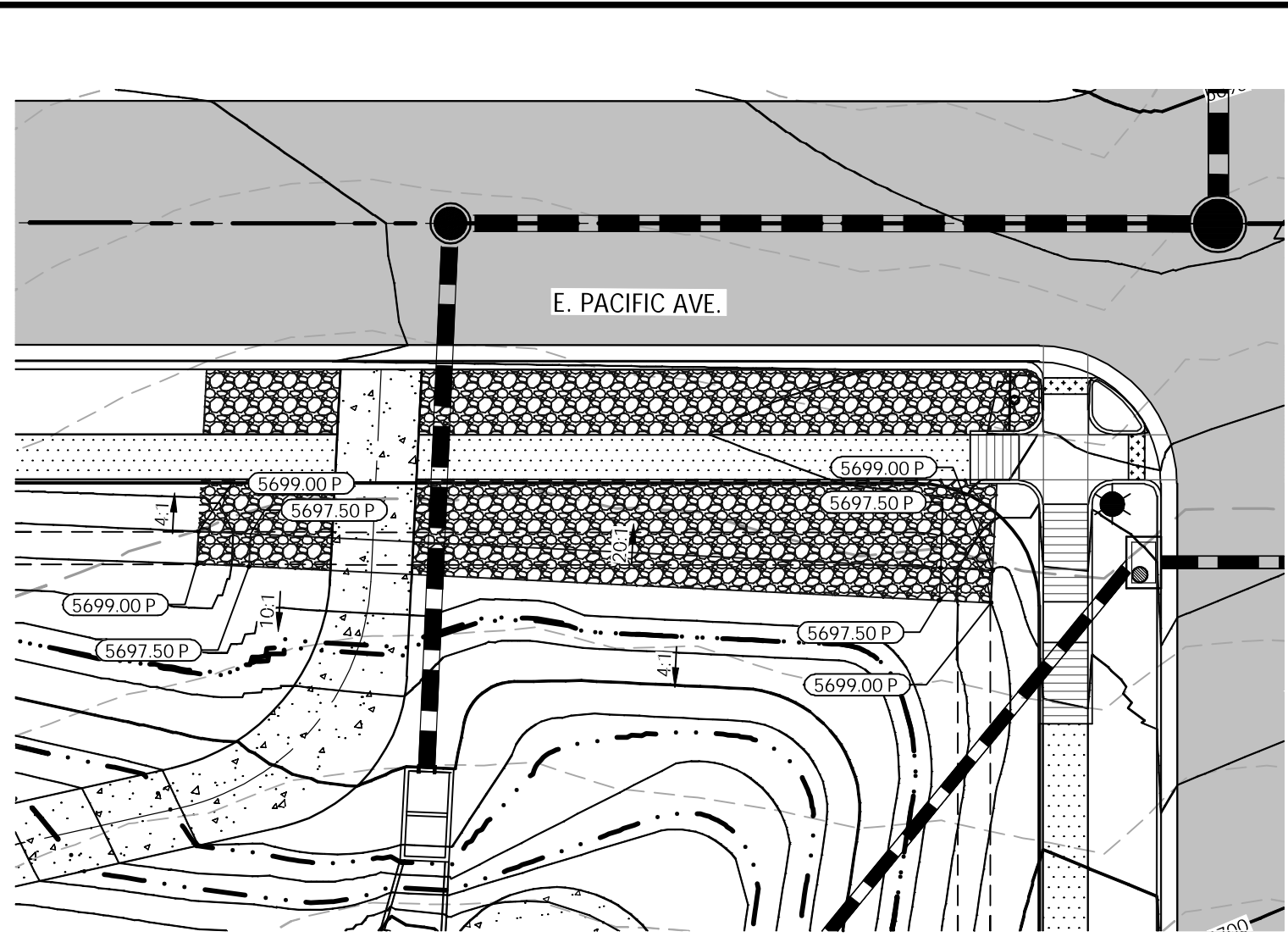


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LINE TABLE						
NO.	LENGTH	DIRECTION	START NORTHING	START EASTING	END NORTHING	END EASTING
L21	41.88'	S76°49'43"W	8657.53	16836.91	8647.99	16796.13
L22	13.06'	S10°26'59"W	8695.49	16762.16	8682.64	16759.79
L23	8.51'	N41°58'52"E	8657.85	16920.89	8664.18	16926.58
L24	44.14'	N03°07'56"E	8569.59	16796.08	8613.66	16798.49
L39	21.72'	S76°49'43"W	8662.48	16858.06	8657.53	16836.91
L40	13.53'	S76°49'43"W	8665.57	16871.23	8662.48	16858.06

CURVE TABLE								
NO.	DELTA	LENGTH	RADIUS	CHORD	CH. LENGTH	START NORTHING	START EASTING	END NORTHING
C10	045°14'21"	17.37'	22.00'	N54°12'33"E	16.92'	8665.57	16871.23	8675.46
C11	113°37'16"	59.49'	30.00'	S46°21'39"E	50.21'	8682.64	16759.79	8647.99
C12	132°47'07"	16.22'	7.00'	S10°26'10"W	12.83'	8662.48	16858.06	8649.87
C13	082°12'31"	71.64'	49.93'	N83°00'44"E	65.65'	8649.87	16855.73	8657.85
C14	071°08'56"	62.24'	50.12'	S41°12'30"W	58.32'	8657.53	16836.91	8613.66



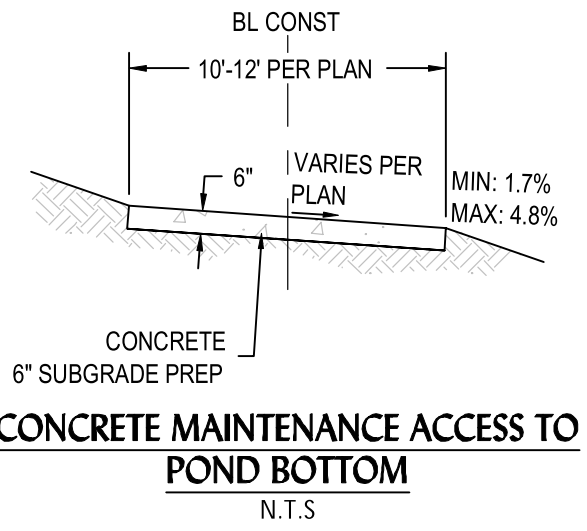
CURVE TABLE								
NO.	DELTA	LENGTH	RADIUS	CHORD	CH. LENGTH	START NORTHING	START EASTING	END NORTHING
C9	074°33'41"	39.04'	30.00'	N40°04'59"E	36.34'	8691.07	16856.39	8718.87
C23	032°40'13"	17.11'	30.00'	S86°18'04"E	16.88'	8679.79	16784.41	8678.70
C24	074°16'21"	38.87'	29.99'	S40°14'53"W	36.21'	8681.92	16815.60	8654.29
C25	096°23'19"	50.47'	30.00'	S45°03'43"E	44.72'	8610.82	16789.82	8579.23
C26	044°45'45"	23.44'	30.00'	N64°21'45"E	22.85'	8581.05	16853.46	8590.94
C27	088°51'57"	46.53'	30.00'	N02°27'06"W	42.00'	8624.33	16904.10	8666.30

LINE TABLE					
NO.	LENGTH	DIRECTION	START NORTHING	START EASTING	END EASTING
L18	26.11'	S02°48'09"W	8744.95	16881.07	8718.87
L20	41.81'	S77°21'50"W	8691.07	16856.39	8681.92
L41	14.70'	S77°21'50"W	8681.92	16815.60	8678.70
L42	23.55'	N69°57'57"W	8679.79	16784.41	8687.86
L43	43.53'	S03°07'56"W	8654.29	16792.20	8610.82
L44	40.83'	S03°07'56"W	8610.82	16789.82	8570.05
L45	32.03'	N86°44'37"E	8579.23	16821.48	8581.05
L46	44.92'	N41°58'52"E	8590.94	16874.06	8624.33

Detention Pond B Volume Table			
	Required Vol. (ac-ft.)	Elevation (ft)	Depth (ft)
Bottom of Pond	N/A	5689.30	0.0
1.2"WQCV	0.672	5692.29	3.0
EURV	1.527	5693.80	4.5
100-yr	3.119	5696.46	7.2
Emergency Overflow Weir	N/A	5697.50	8.2
Emergency Overflow WSE	N/A	5697.95	8.65
Freeboard / Top of Pond	N/A	5699.00	9.7

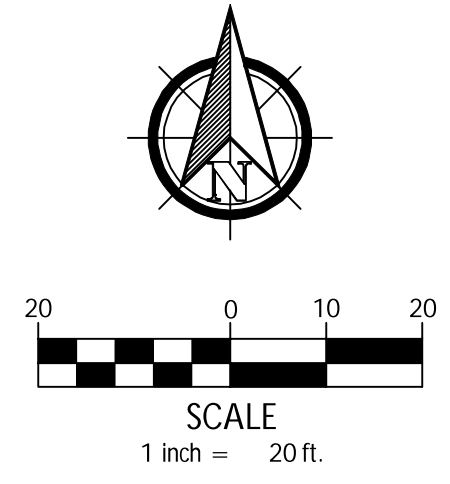
1.2"WQCV Release = 0.3cfs
EURV Release = 0.5 cfs
100 Yr Pond Release Rate = 33 cfs
100 Yr Inflow into the Pond = 95.0 cfs

- NOTES:**
- ALL DETENTION PONDS, INCLUDING OUTLET STRUCTURES, ARE PRIVATE AND WILL BE MAINTAINED BY THE HOA.
 - WQCV = 1.2 X WQV
 - DEPTH IN VOLUME TABLE IS BASED ON 0' FOR POND BOTTOM
 - THE DEVELOPER SHALL HAVE A LICENSED PROFESSIONAL ENGINEER CERTIFY EACH STORMWATER DETENTION POND AND/OR WATER QUALITY BMP IS BUILT ACCORDING TO THE APPROVED PLANS AND SPECIFICATIONS AND THE REQUIRED DETENTION VOLUME, INCLUDING THE WQCV WHEN USED, IS MET. THE CERTIFICATION SHALL ALSO VERIFY ALL PERTINENT DIMENSIONS, ELEVATIONS, REQUIRED OUTLET ORIFICE PLATES FOR DETENTION AND WQCV AND OTHER PERMANENT BMPS REQUIREMENTS ARE INSTALLED PER THE APPROVED PLANS AND SPECIFICATIONS, AND SHALL SHOW THE AS-BUILT DESIGN VOLUMES (WQCV, 10- YEAR, 100 YEAR, EURV) AND OTHER PERTINENT DIMENSIONS, ELEVATIONS AND CAPACITY REQUIREMENTS ASSOCIATED WITH THE WQ BMP USED. THE CERTIFICATION SHALL BE PROVIDED TO THE CITY OF AURORA ENGINEERING CONTROL SECTION SENIOR PRINCIPAL ENGINEER. AN APPROVED POND CERTIFICATE SHALL BE REQUIRED PRIOR TO THE RETURN OF ANY FISCAL SECURITY DEPOSIT (AS WELL AS SATISFYING OTHER CONDITIONS OF THE STORMWATER PERMIT) FOR SITES THAT DO NOT REQUIRE A CERTIFICATE OF OCCUPANCY. EXAMPLES OF THESE SITES INCLUDE BUT ARE NOT LIMITED TO: SITES WITHOUT VERTICAL CONSTRUCTION, OIL AND GAS WELL PADS, OUTDOOR STORAGE, AND TOW YARDS. AN APPROVED POND CERTIFICATE SHALL BE REQUIRED PRIOR TO COMMENCEMENT OF BUSINESS OPERATIONS IN NO CASE SHALL A CERTIFICATE OF OCCUPANCY OF TEMPORARY CERTIFICATE OF OCCUPANCY BE ISSUED WITHOUT AN APPROVED POND CERTIFICATE.



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Xylina Warren-Laird Date: 7/27/2022
Xylina Warren-Laird, PE

PROJECT BENCHMARK:
CITY OF AURORA BENCHMARK #456529NE002 BEING A 3" BRASS CAP STAMPED "CITY OF AURORA BM 23-70.0-110" ATOP A 30" LONG STEEL PIPE IN CONC. ON THE SOUTH SIDE OF E. JEWELL AVE. APPROX. 300 FT. WEST OF THE CENTERLINE OF A BRIDGE CROSSING COAL CREEK, & AT THE SOUTHEAST CORNER OF INTERSECTION OF ROAD GOING SOUTHEAST FROM E. JEWELL AVE. EL. NAVD88 = 5623.18'



12071 Tejon Street, Suite 470
Westminster, CO 80234
303.421.4224
www.innovativelandinc.com

Revision Type:

No.	1	2	3	4	5	6
Rev. Date:						

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No.	1	2	3	4	5	6
Rev. Date:						

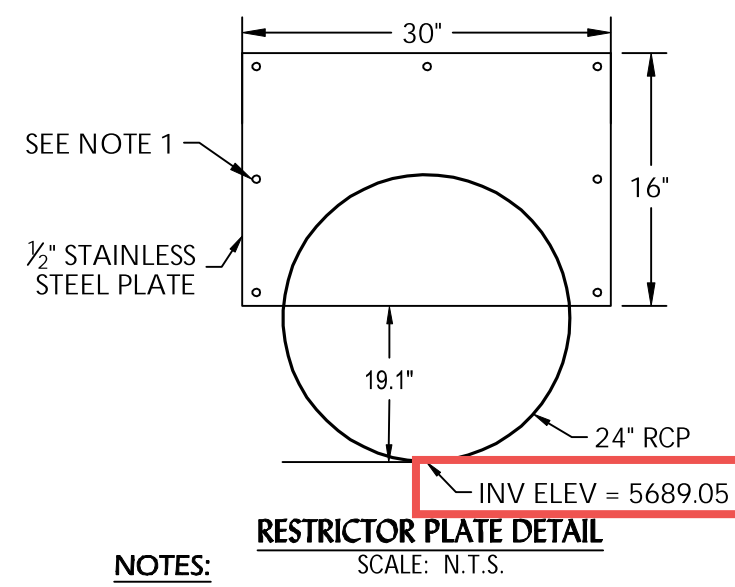
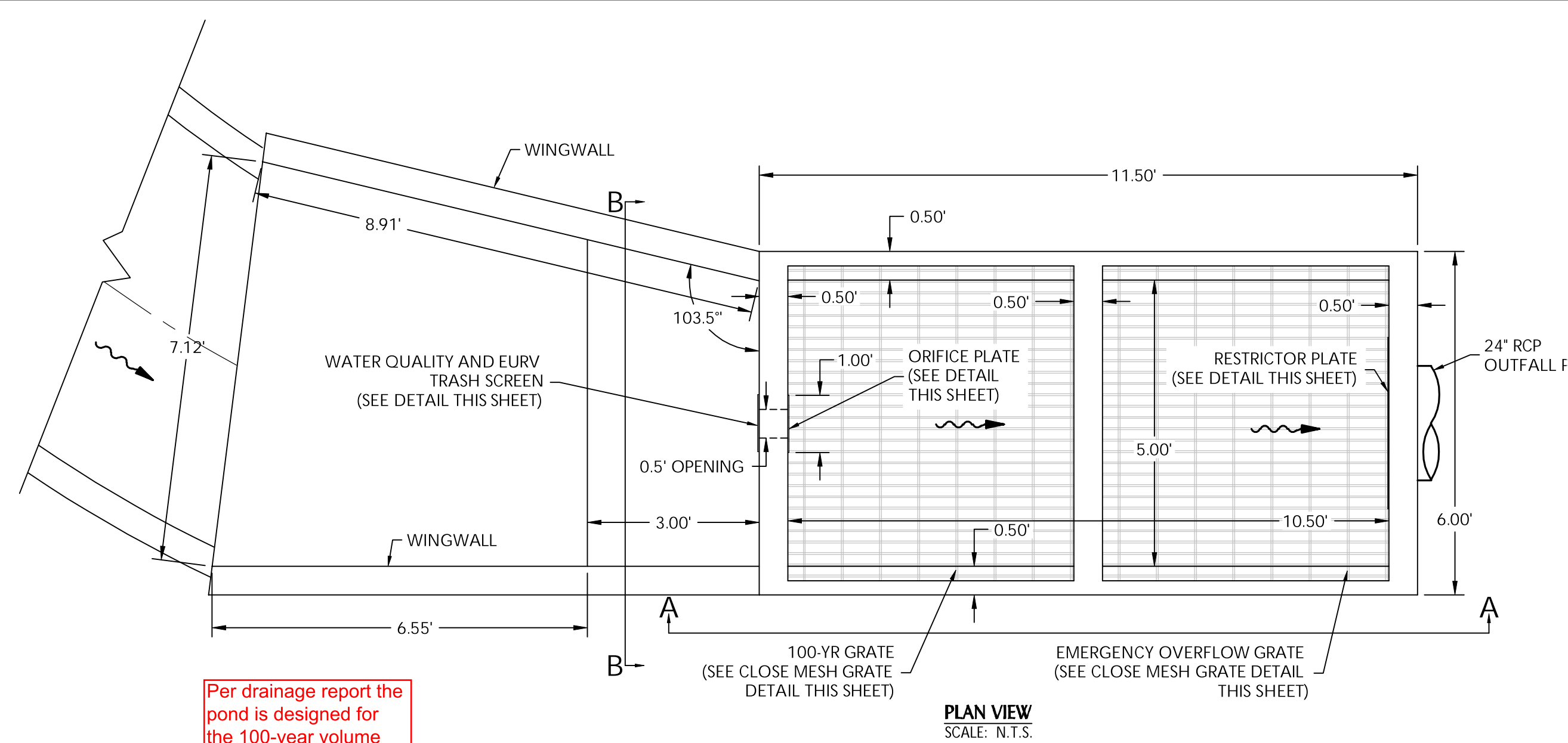
Harvest Crossing Subdivision Filing No. 1
Aurora, Colorado
Construction Documents
Private Detention Pond B

Client: Richmond American Homes
Address: Greenwood Village, CO 80111
4350 South Monaco Street
Denver, Colorado 80237
Contact: Eric Kulby
Phone: 720.977.3827

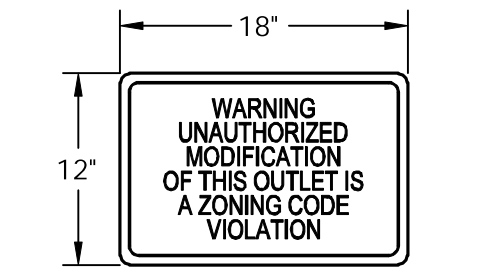
811
Know what's below.
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Sheet: 94

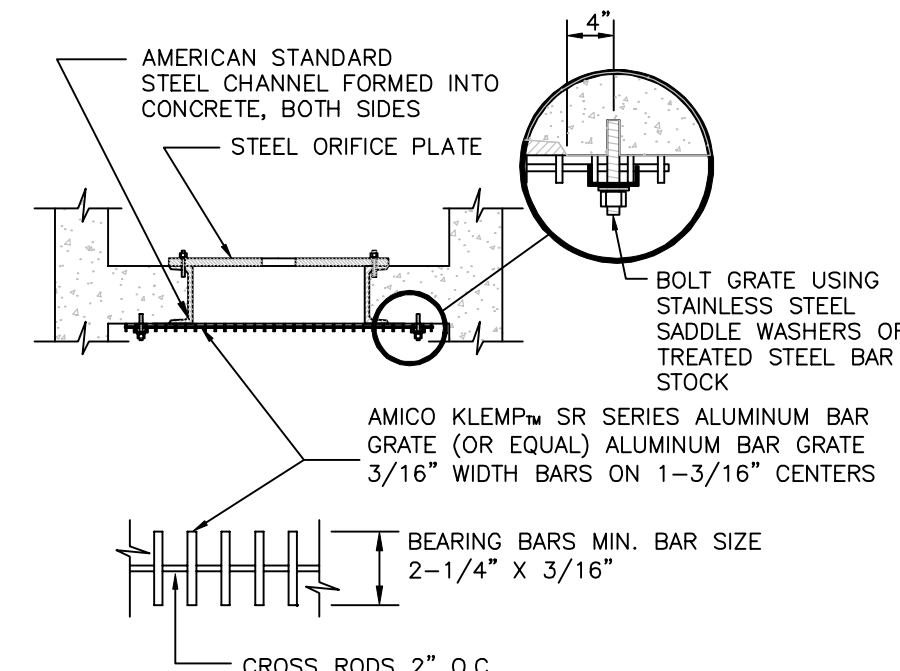
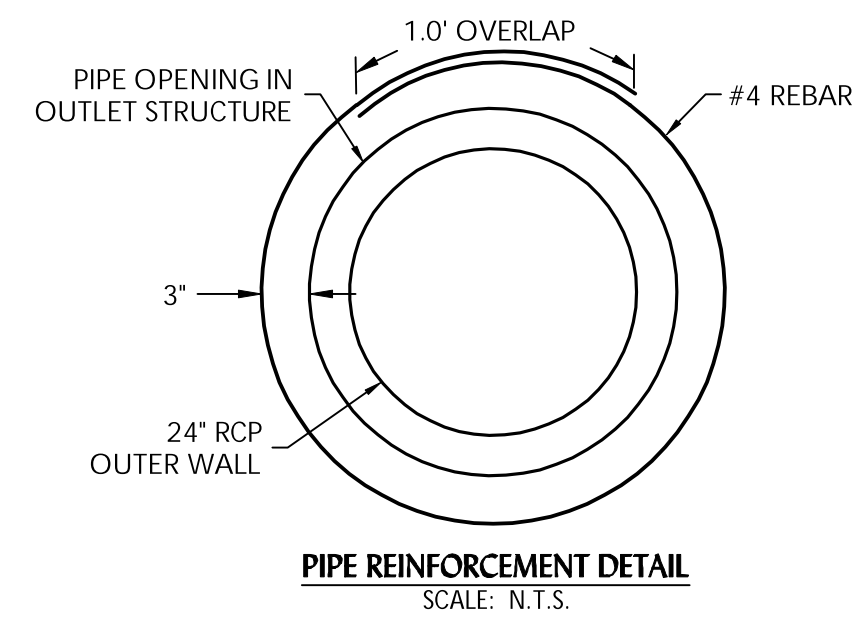
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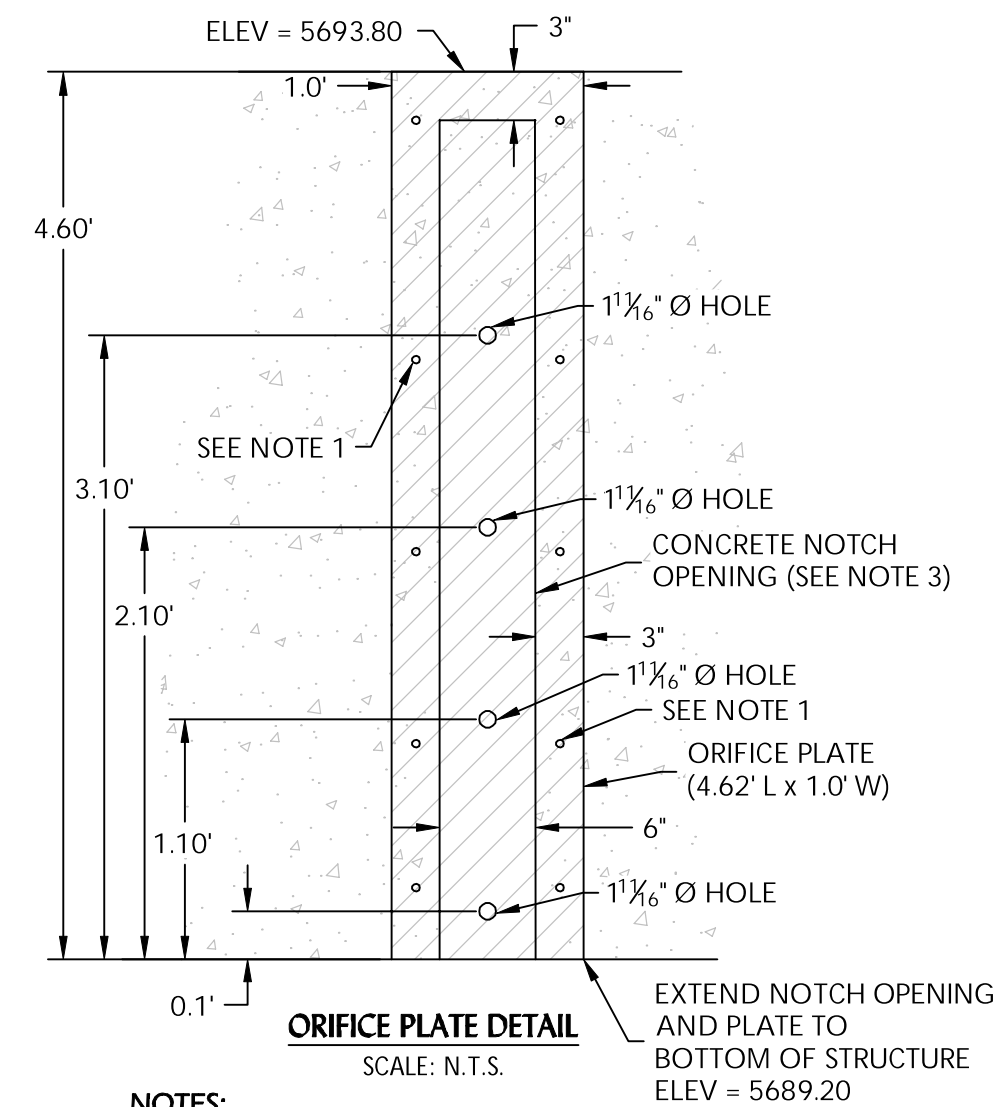
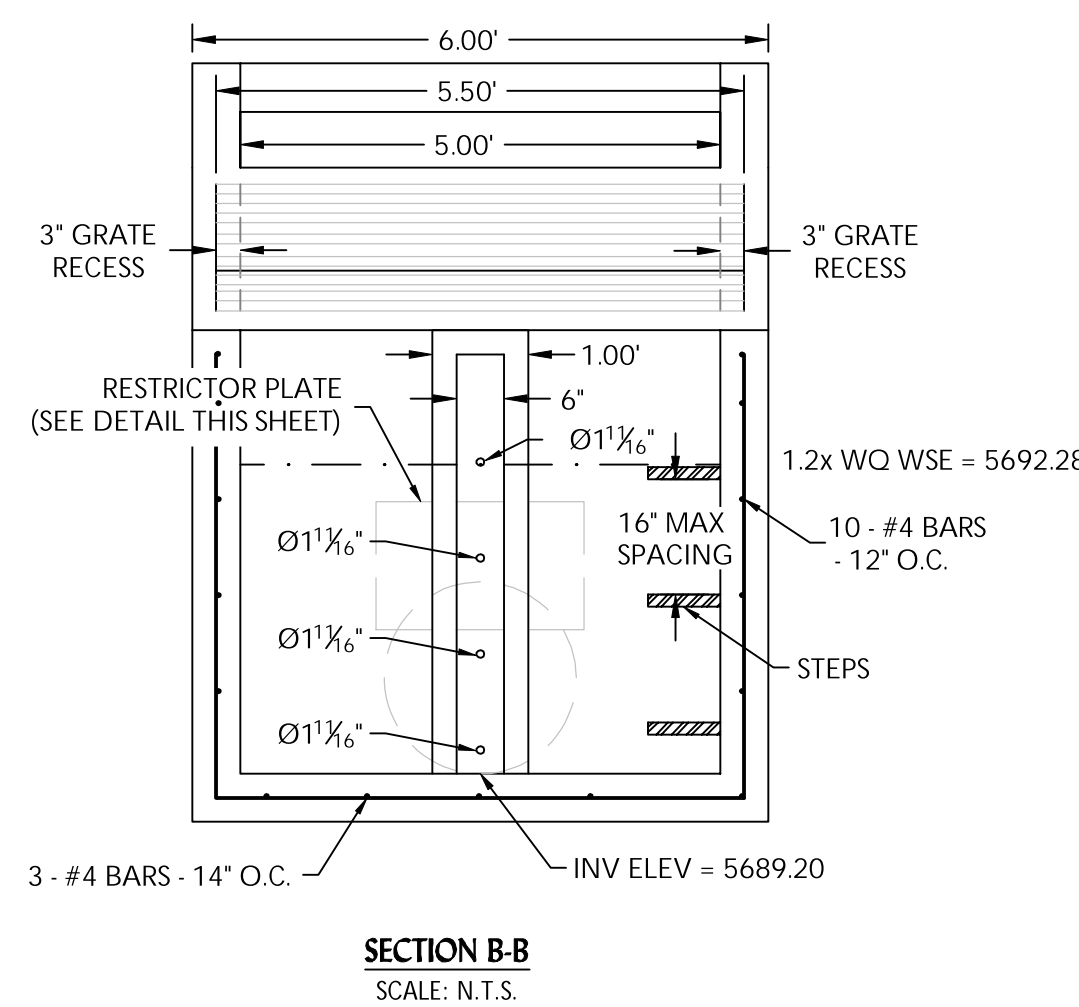
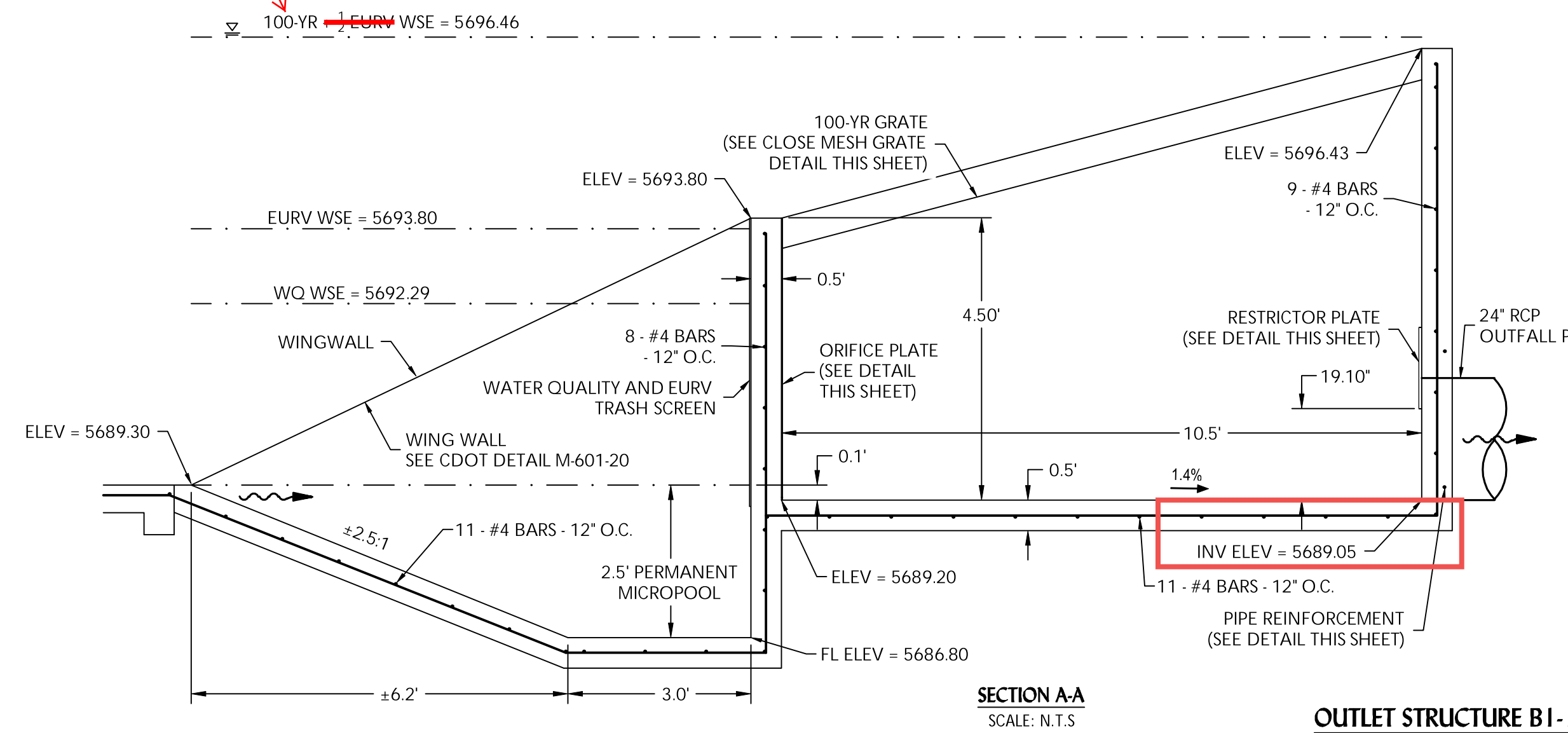
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1. USE 12 - 3/8\"/>



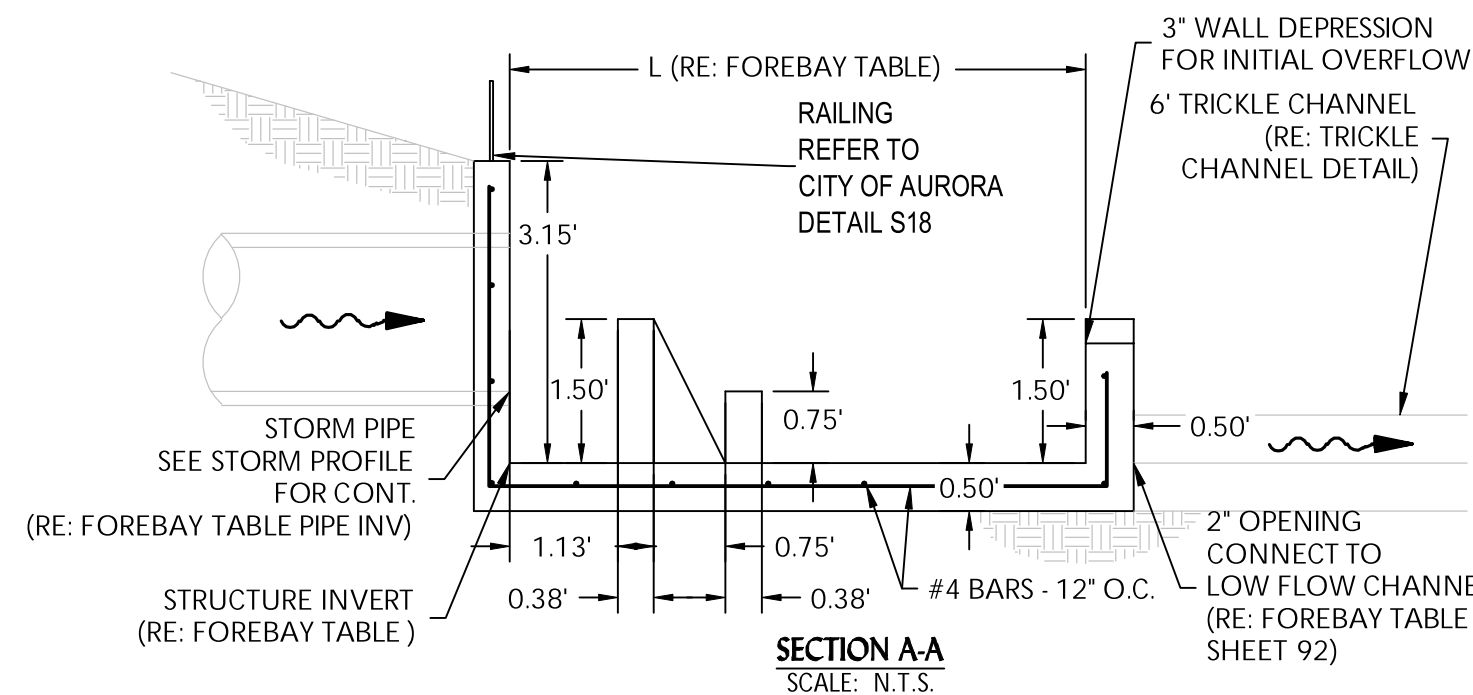
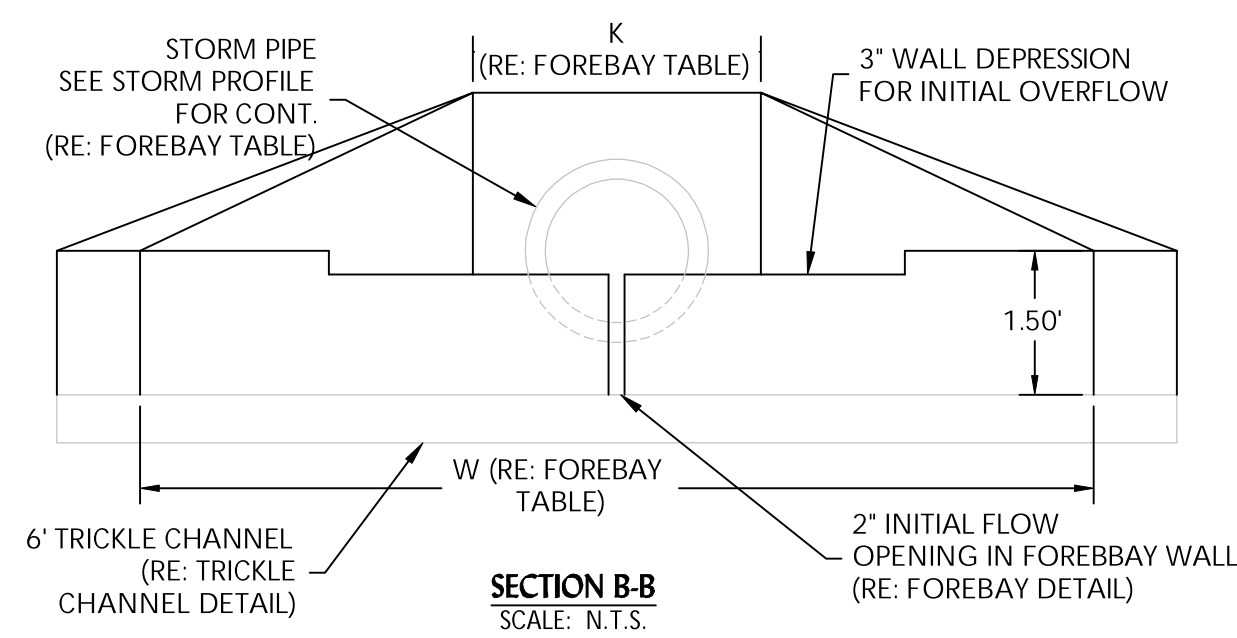
OUTLET STRUCTURE SIGN



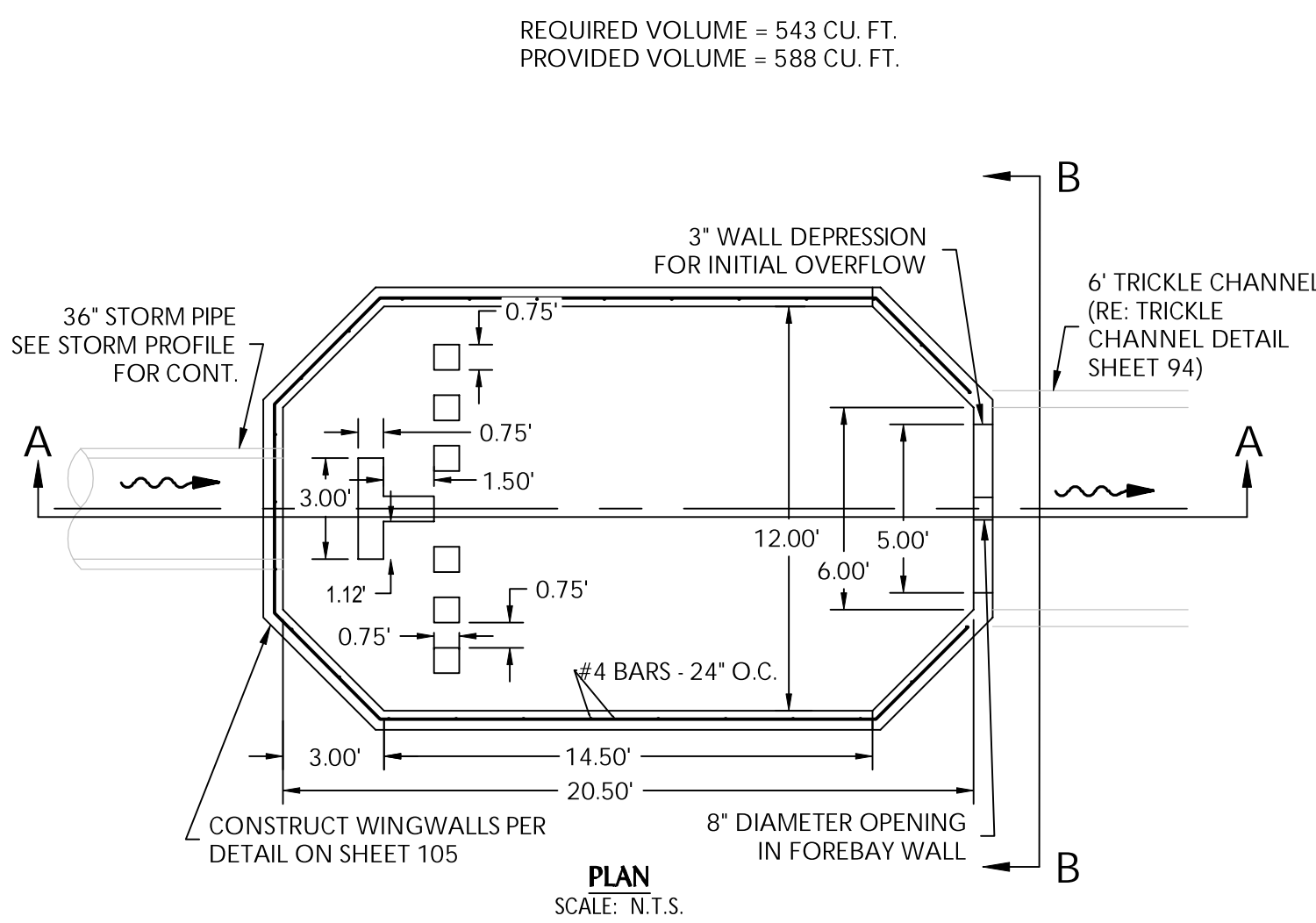
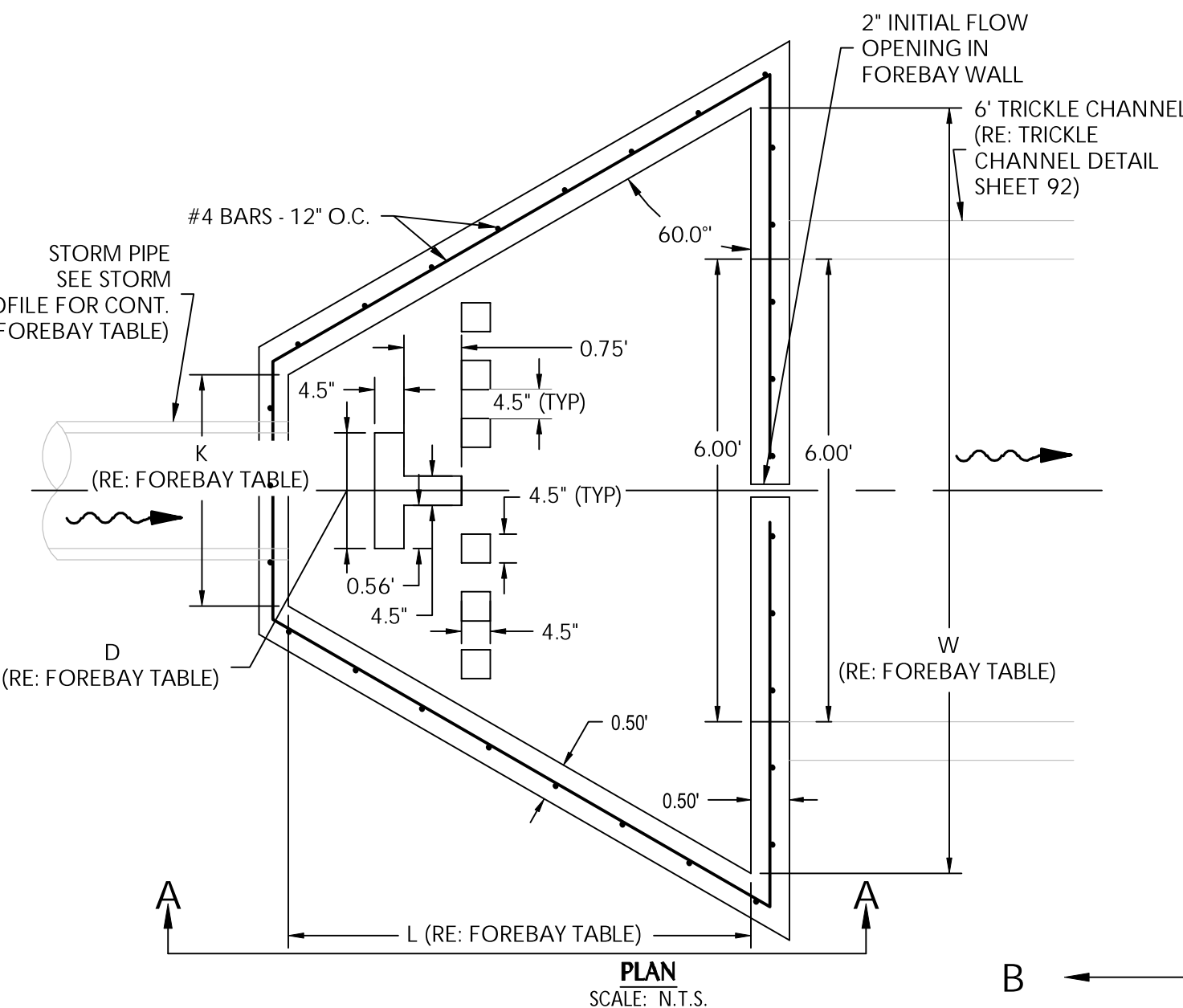
WATER QUALITY TRASH SCREEN DETAIL



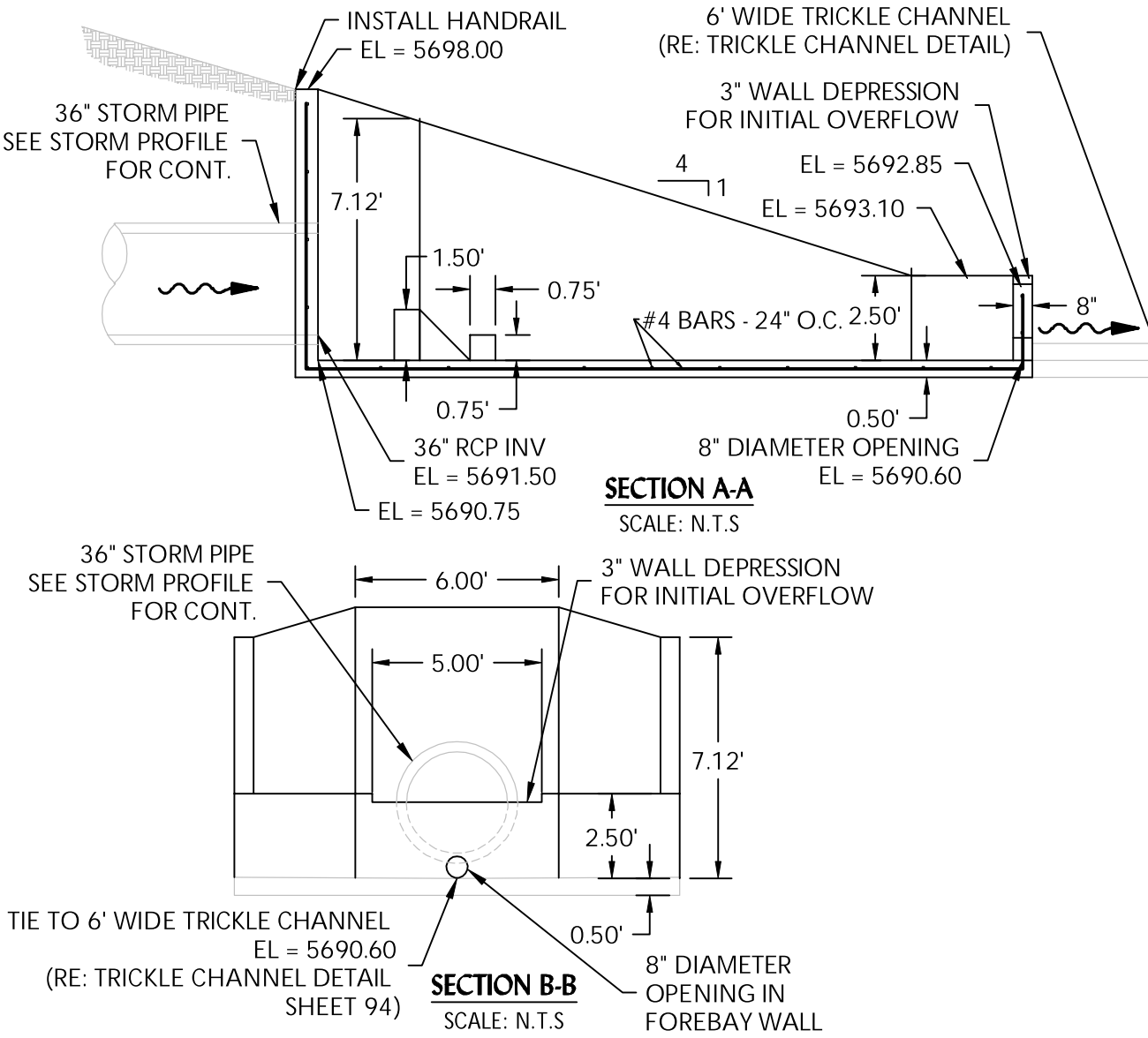
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1. USE 16 - 3/8\"/>



FOREBAY B2-I



FOREBAY B3-I



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Xylina Warren-Laird Date: 7/27/2022

FOREBAY NAME	FOREBAY PIPE DIAMETER (D)	FOREBAY WALL WIDTH (K)	FOREBAY WIDTH (W)	FOREBAY LENGTH (L)	PIPE INVERT (ELEV)	STRUCTURE INVERT (ELEV)	LOW FLOW CHANNEL CONNECTION (ELEV)	Req'd Volume (CU. FT.)	Provided Volume (CU. FT.)
B2-1	24	4	11.25	6.25	5691.75	5690.64	5690.59	64	71.5

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Revision Type:	1	2	3	4	5	6
Rev. Date:						

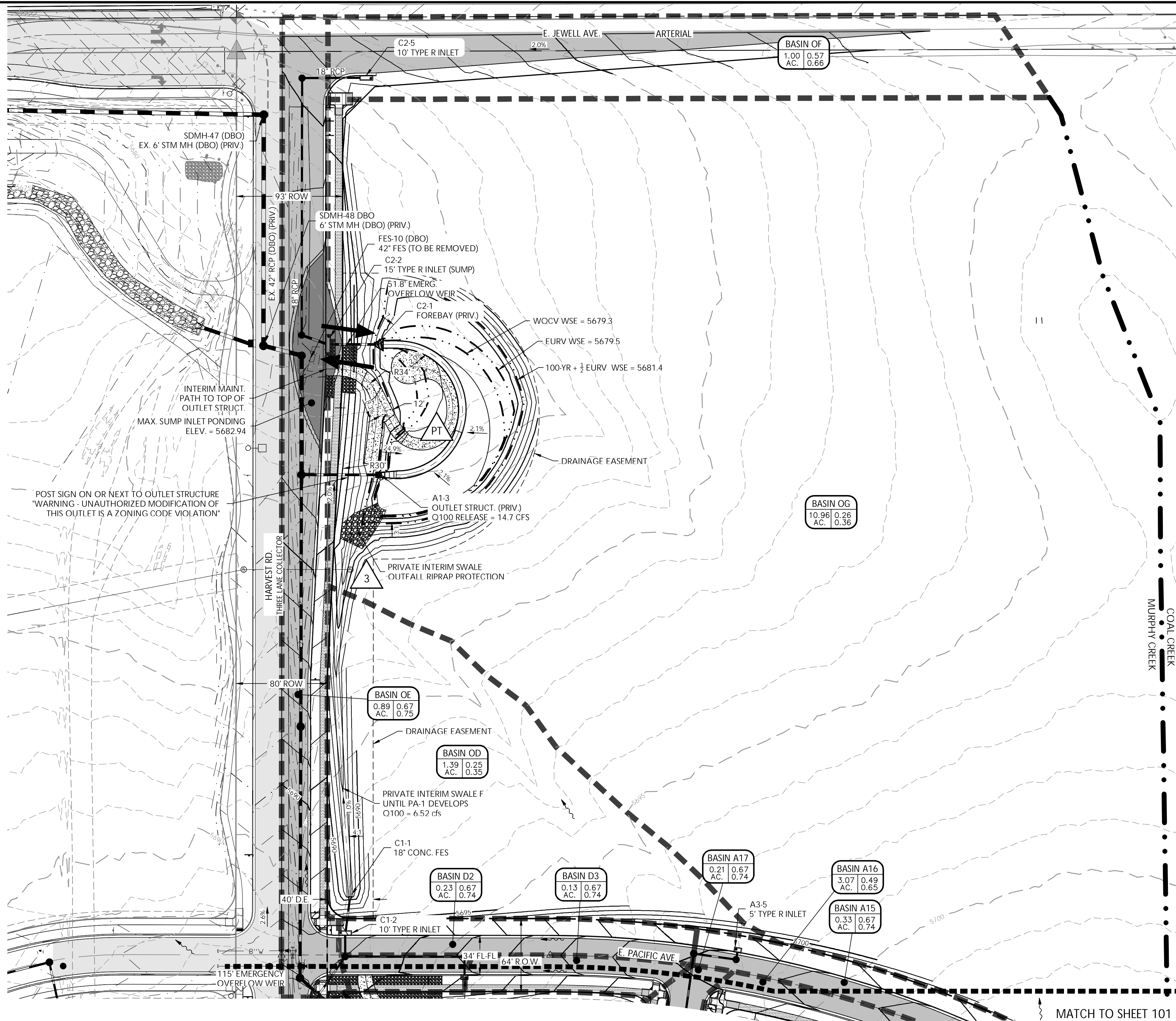
Sheet: 95 of 113
Date: July 27, 2022
Horiz. Scale: N/A
Vert. Scale: N/A
Designed By: XWL
Prepared By: CWS
Approved By: XWL

Harvest Crossing Subdivision Filing No. 1
Aurora, Colorado
Construction Documents
Private Detention Pond B Details

Client: Richmond American Homes
Address: Greenwood Village, CO 80111
4350 South Monaco Street
Denver, Colorado 80237
Contact: Eric Kubay
Phone: 720.977.3827

811
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Sheet: 95



Calculated Proposed Runoff Rates						
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)
				C ₂	C ₁₀₀	Q ₂ Q ₁₀₀
A1	A2-31 (Int.)	0.34	14.0	0.32	0.41	0.25 0.87
A2	A2-29	1.26	9.1	0.52	0.61	1.83 5.79
A3	A2-23	1.21	11.1	0.49	0.65	1.51 5.40
A4	A2-21A	0.41	8.4	0.50	0.65	0.59 2.06
A5	A2-20A	1.14	11.7	0.47	0.64	1.35 4.91
A6	A2-17	2.15	13.2	0.49	0.65	2.52 8.98
A7	A2-38 (Int.)	0.24	12.3	0.30	0.39	0.18 0.62
A8	A2-36	1.17	8.5	0.50	0.65	1.67 5.83
A9	A2-37	0.64	7.8	0.53	0.66	1.00 3.39
A10	A2-33B	0.85	10.8	0.47	0.64	1.04 3.80
A11	A2-12A	2.45	13.2	0.45	0.63	2.62 9.85
A12	A2-11	1.56	10.1	0.54	0.67	2.23 7.53
A14	A2-2	1.19	9.7	0.49	0.64	1.60 5.57
A15	A3-5	0.33	5.9	0.67	0.74	0.72 2.15

(Int.) Indicates Interim Condition (D, B, O.) Indicates Designed by Others

Calculated Proposed Runoff Rates							
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)	
				C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
A16	A3-4	3.26	11.7	0.50	0.65	4.08	14.36
A17	A3-2	0.21	5.0	0.67	0.74	0.48	1.43
A18	A1-6	2.56	8.4	0.47	0.57	3.41	11.16
A19	A4-2	2.03	11.6	0.54	0.67	2.78	9.19
B1	B3-11	0.57	12.3	0.62	0.70	0.87	2.63
B1-a	B3-14 (Int.)	0.10	8.1	0.25	0.35	0.07	0.28
B2	B3-7	3.67	14.2	0.42	0.58	3.58	13.24
B2-a	B3-8	0.20	5.3	0.60	0.70	0.39	1.24
B3	B3-5	1.02	8.1	0.56	0.68	1.66	5.43
B4	B3-6	3.76	13.9	0.35	0.64	3.08	15.25
B5	B3-2	1.08	11.6	0.54	0.67	1.46	4.92
B6	B4-2	0.17	9.0	0.67	0.74	0.32	0.96
B7	B2-13	0.25	6.3	0.55	0.68	0.44	1.45
B8	B2-12	1.12	12.3	0.45	0.62	1.23	4.65
B9	B2-9	0.89	6.4	0.64	0.72	1.78	5.44

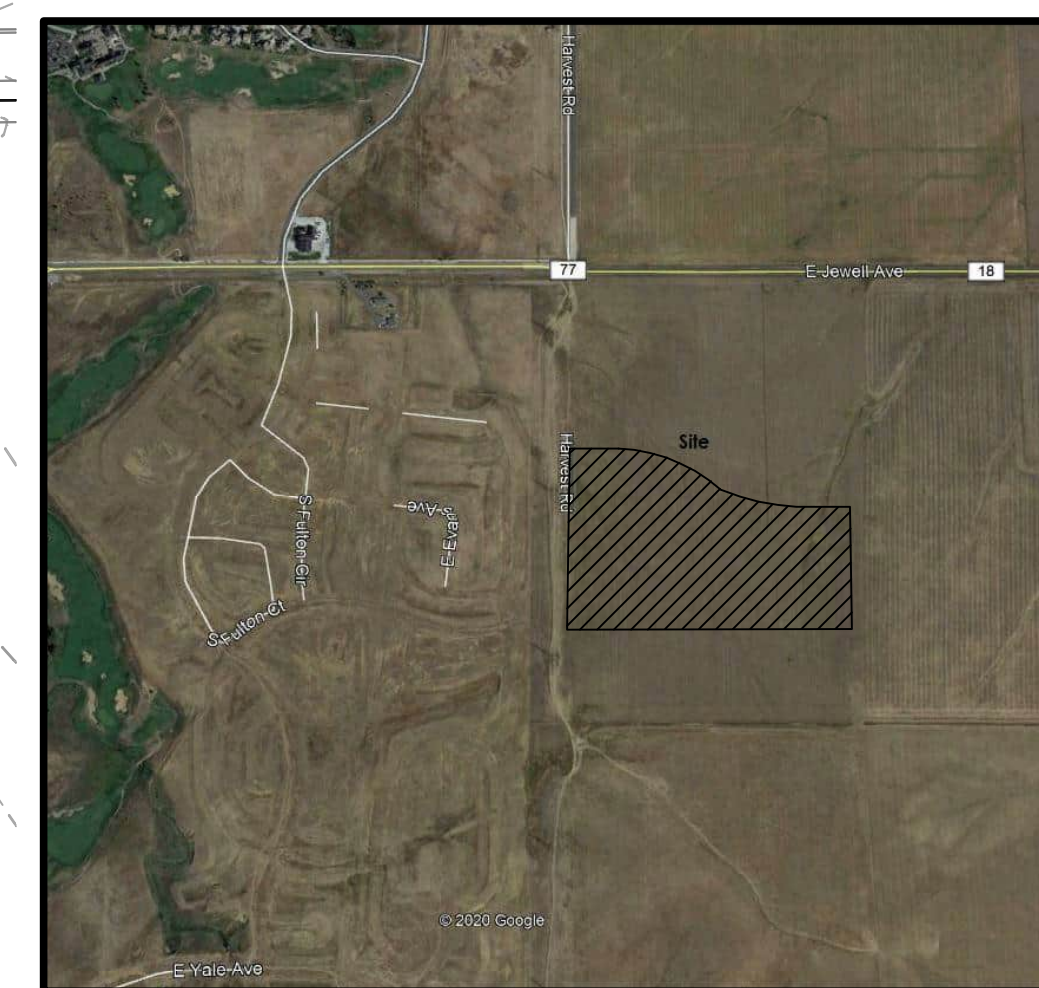
(Int.) Indicates Interim Condition

(D.B.O.) Indicates Designed by Others

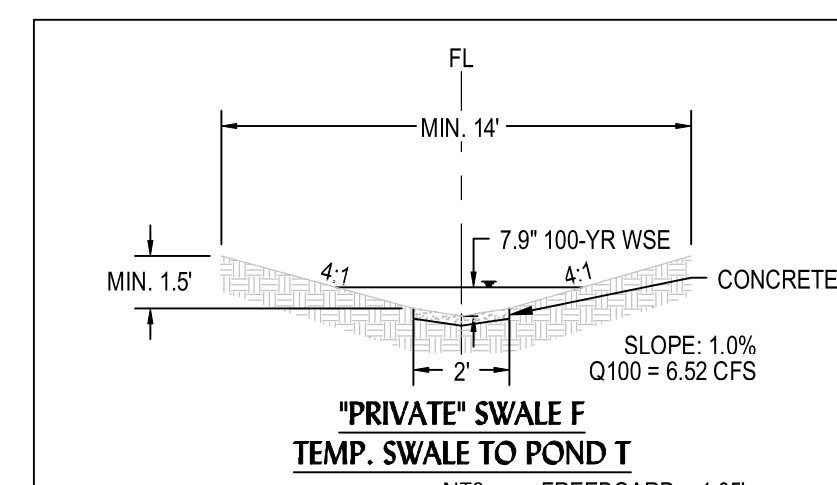
Calculated Proposed Runoff Rates							
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)	
				C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
B10	B2-4	0.55	9.1	0.67	0.74	1.03	3.05
B11	B2-2	1.70	13.0	0.45	0.62	1.83	6.88
B12	B1-1	1.35	5.0	0.49	0.58	2.23	7.14
C1	B1-2B	0.41	5.0	0.67	0.74	0.93	2.75
D1	C1-4	0.11	5.0	0.71	0.79	0.27	0.80
D2	C1-2	0.23	5.0	0.67	0.74	0.52	1.54
OA-1a	A2-38 (Int.)	0.55	12.2	0.25	0.35	0.34	1.28
OA-2a	A2-31 (Int.)	1.48	14.4	0.25	0.35	0.85	3.20
OB	B3-14 (Int.)	0.61	6.7	0.25	0.35	0.38	1.43
OC	B4-4	0.54	5.3	0.67	0.74	1.21	3.59
OD	Pond T	1.39	13.4	0.25	0.35	0.82	3.11
OE	C2-2	0.89	6.5	0.67	0.75	1.86	5.62
OF	C2-5	1.00	9.4	0.57	0.66	1.56	4.90
OG	Pond T	10.96	15.2	0.26	0.36	6.42	23.85

(Int.) Indicates Interim Condition

(D.B.O.) Indicates Designed by Others



Vicinity Map
Scale: NTS



	Required Vol. (ac-ft.)	Elevation (ft)	Depth (ft)
Bottom of Pond	N/A	5677.50	0.0
1.2"WQCV	0.147	5679.26	1.8
EURV	0.206	5679.47	2.0
100-yr + 1/2 EURV	0.965	5681.40	3.9
Emergency Overflow Weir	N/A	5683.50	6.0
Emergency Overflow WSE	N/A	5683.96	6.5
Freeboard / Top of Pond	N/A	5685.10	7.6

1.2"WQCV Release = 0.10cfs
EURV Release = 0.10 cfs
100 Yr Pond Release Rate = 14.7 cfs
100 Yr Inflow into the Pond = 36.9 cfs

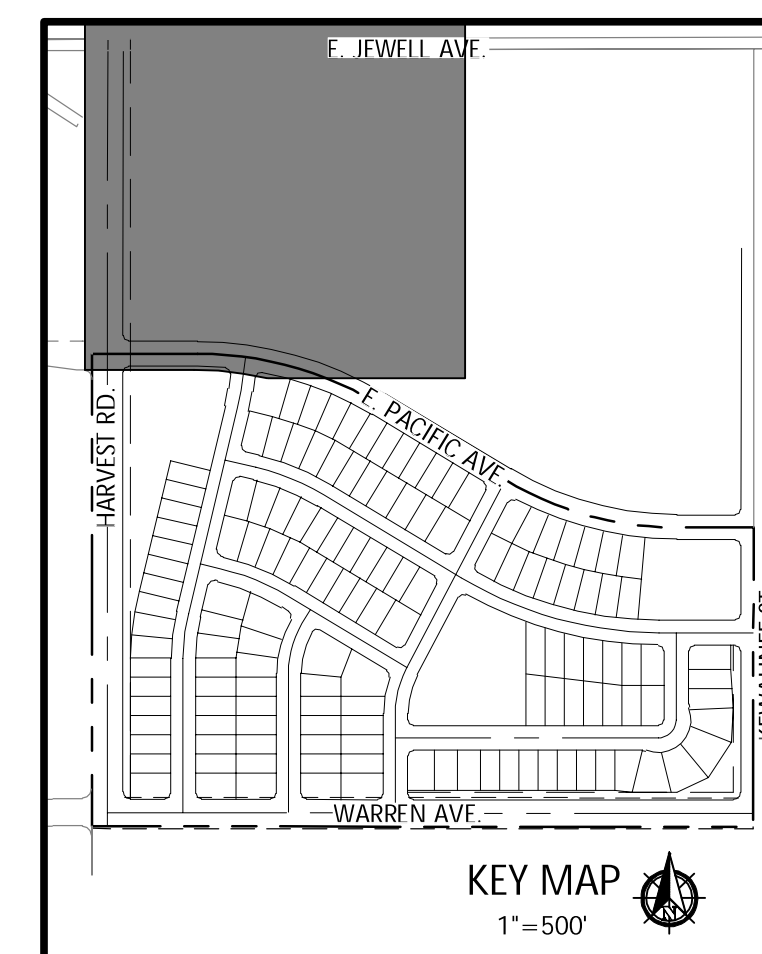
DESIGN BY OTHER NOTE
IMPROVEMENTS LABELED AS DESIGNED BY OTHERS (DBC) ARE PER THE MURPHY CREEK EAST (MCE) SUBDIVISION FILING NO. 1 OFFSITE CONSTRUCTION PLANS (COA EDN 221064) BY WESTWOOD PROFESSIONAL SERVICES, INC. AND NOT PART OF THESE PLANS.

PRIVATE SWALE NOTE:

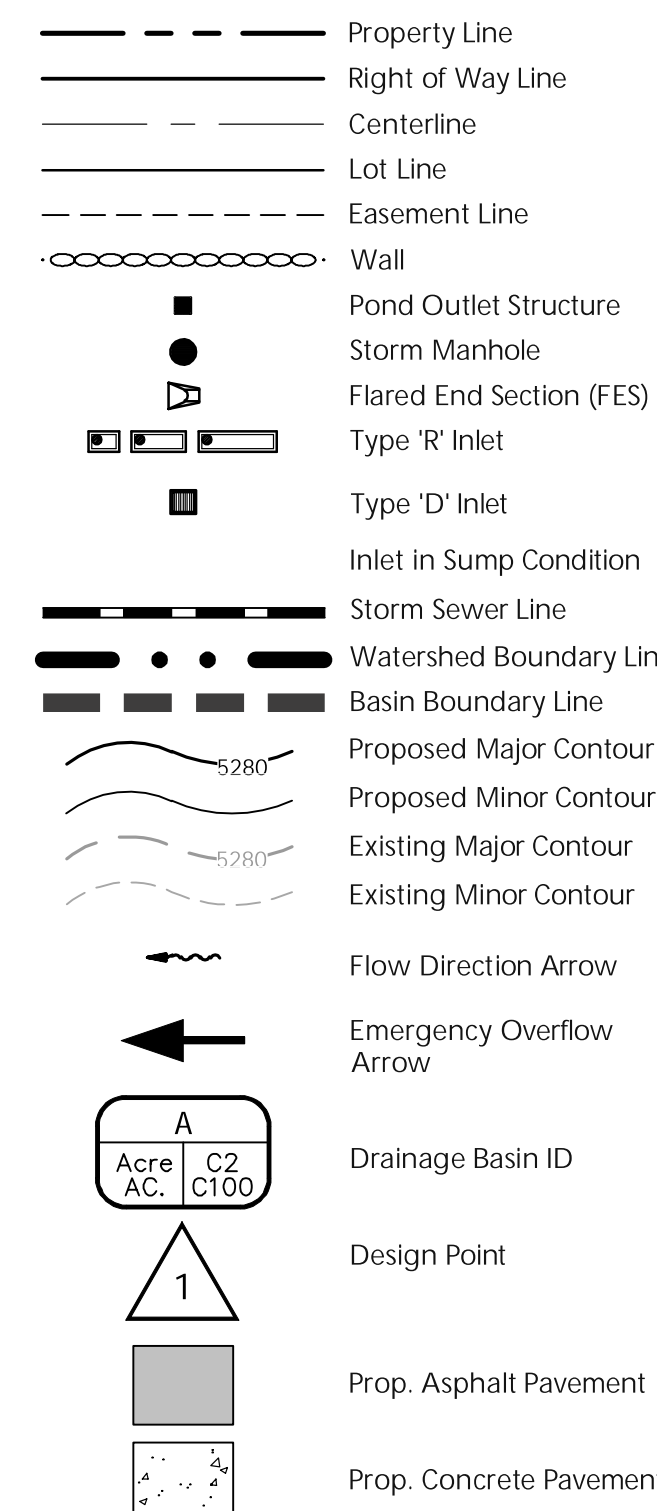
1. PRIVATE INTERIM SWALES SHALL BE MAINTAINED BY THE HOA. THE SWALES (B, D, & G) WITH SLOPE OF LESS THAN 2% PERMITTED FOR UP TO 36 MONTHS.
2. OTHERWISE REVISIONS SHALL BE SUBMITTED FOR CONCRETE LINING. IN ADDITION, THE CITY RESERVES THE RIGHT, PRIOR TO 36 MONTHS, TO REQUIRE THE SWALE TO BE CONCRETE LINED SHOULD THERE BE ISSUES WITH REDUCED CAPACITY, SEDIMENTATION, PONDING, OR OTHER ITEMS IDENTIFIED BY THE CITY ENGINEER.

NOTES:

1. CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETELY AND/OR ACCURACY OF THIS DOCUMENT.
2. ALL STORM SEWER, INCLUDING ALL DETENTION POND FACILITIES, AND OTHER ASSOCIATED STORM STRUCTURES ARE PUBLIC UNLESS OTHERWISE NOTED.
3. DETENTION PONDS ARE PRIVATE UNLESS OTHERWISE NOTED AND MAINTAINED BY THE HOA.
4. THE STORM SEWER SYSTEM, IN COMBINATION WITH THE STREET, IS SIZED FOR THE 100 YEAR STORM EVENT.
5. ROADWAY PAVING WILL NOT BE PERMITTED AND CERTIFICATES OF OCCUPANCY WILL NOT BE ISSUED UNTIL DOWNSTREAM PIPE AND OUTFALL HAVE BEEN CONSTRUCTED IN HARVEST ROAD AND INITIALLY ACCEPTED.
6. FLOOD ADJACENT DOWNSTREAM DEVELOPMENT IS REQUIRED TO PROVIDE CONVEYANCE FOR EMERGENCY OVERFLOWS. CITY RECOMMENDS PRIVATE DRAINAGE EASEMENTS TO BE OBTAINED FOR ANY EMERGENCY FLOW PATHS NOT WITHIN ROW.



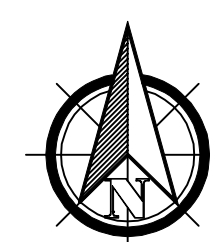
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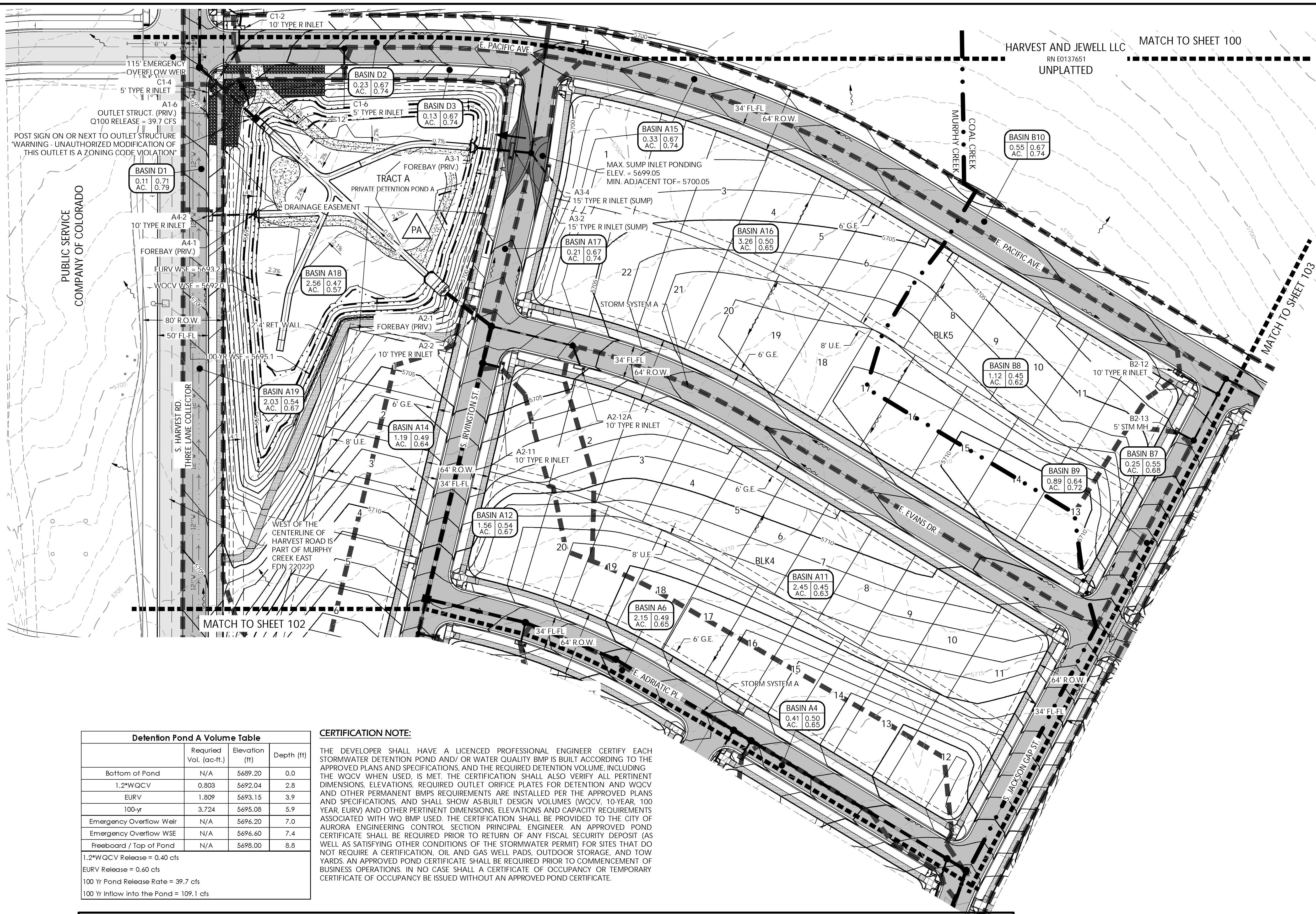


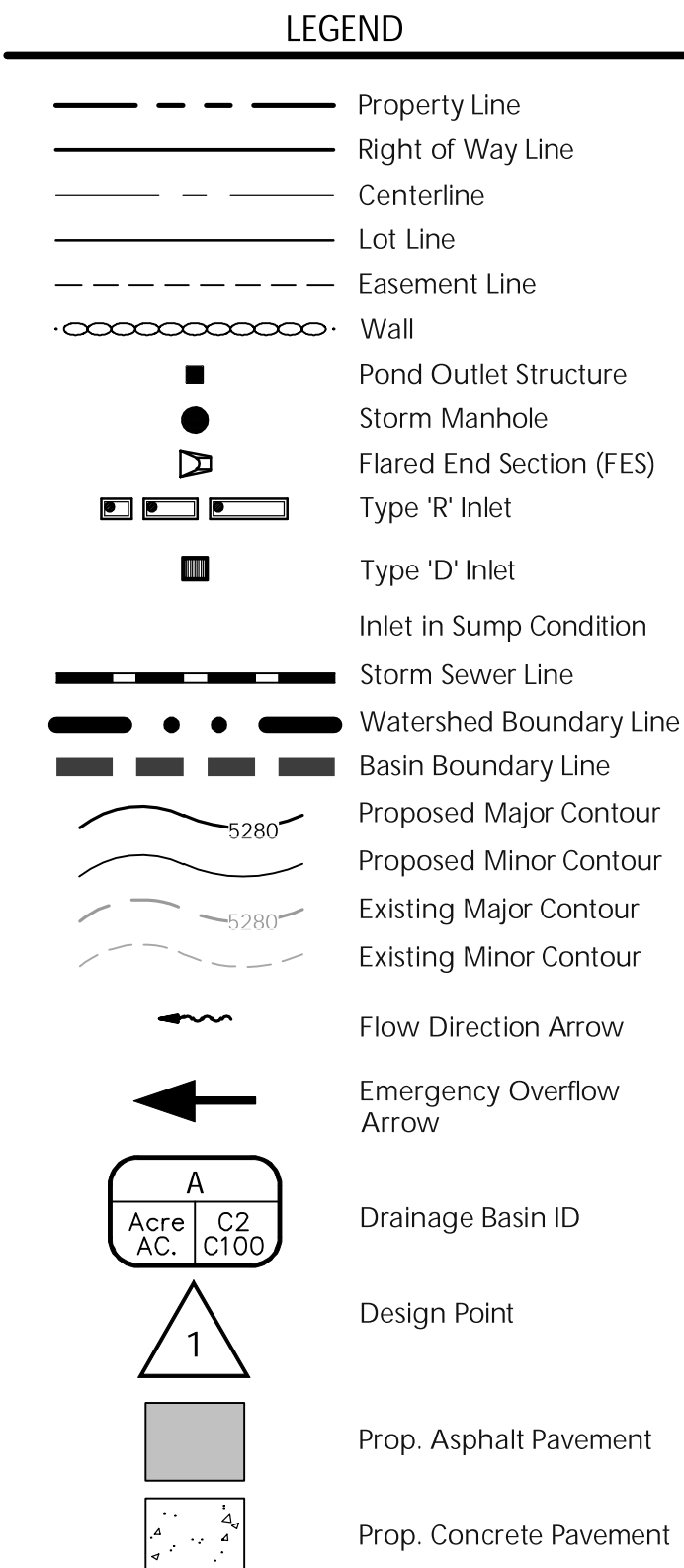
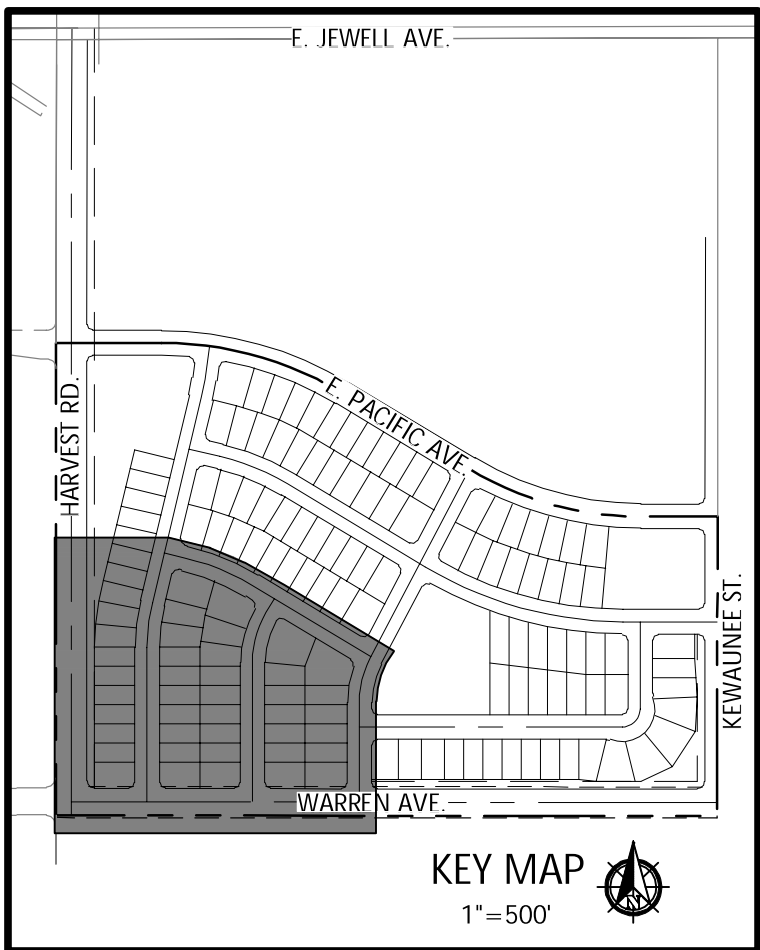
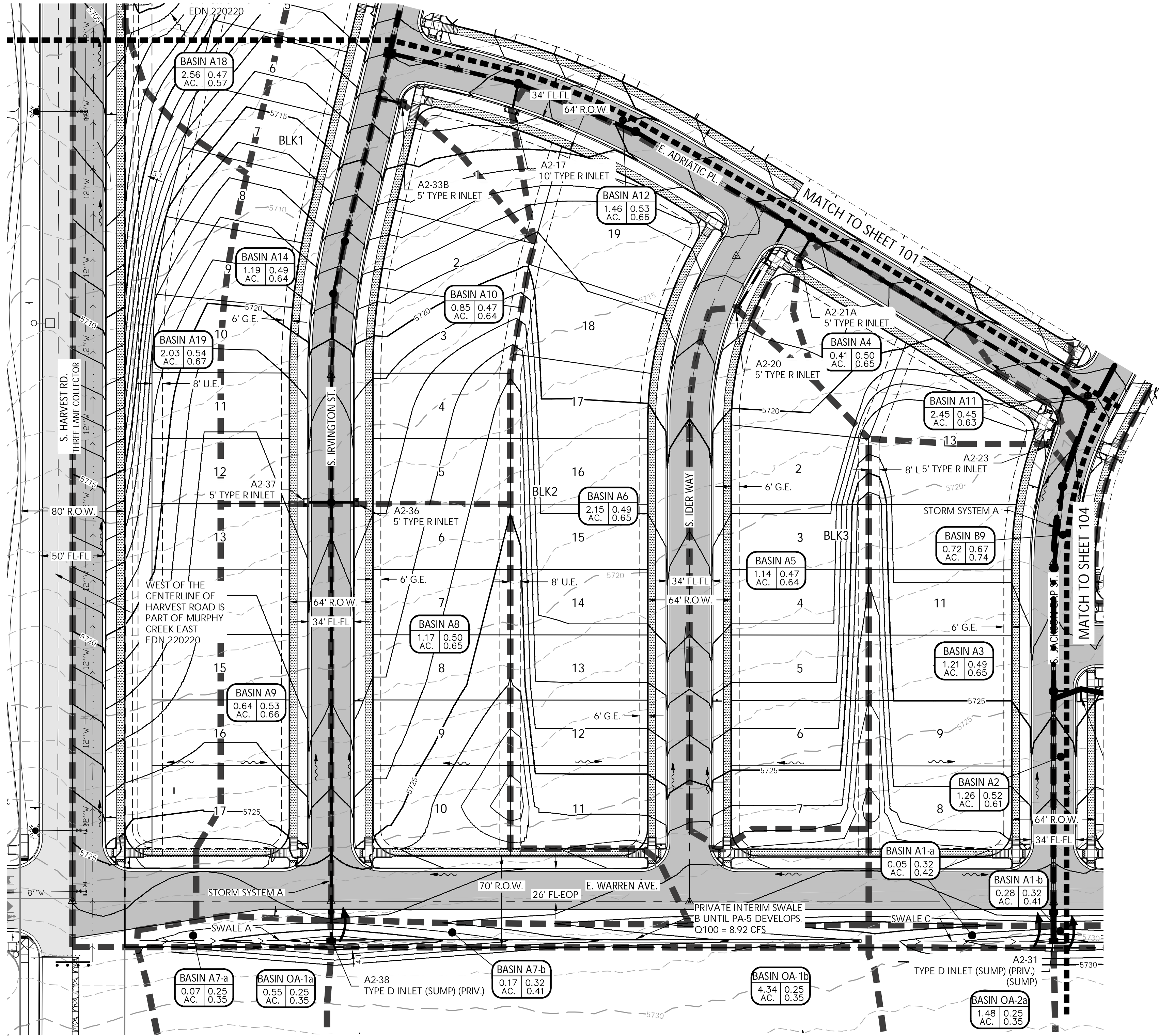
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signed and sealed pdf set

Xylina Warren-Laird Date: 7/27/2022
Xylina Warren-Laird, PE

PROJECT BENCHMARK:
CITY OF AURORA BENCHMARK #45629NE002 BEING A 3" BRASS CAP STAMPED "CITY OF AURORA, BM, 23-70, 0-110" ATOP A 30" LONG STEEL PIPE IN CONC. ON THE SOUTH SIDE OF E. JEWELL AVE. APPROX. 300 FT. WEST OF THE CENTERLINE OF A BRIDGE CROSSING COAL CREEK, & AT THE SOUTHEAST CORNER OF INTERSECTION OF ROAD GOING SOUTHEAST FROM E. JEWELL AVE. EL. NAVD83 = 5623.18'







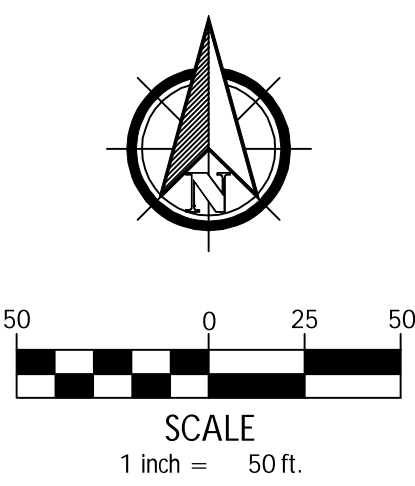
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- 3. DETENTION PONDS ARE PRIVATE UNLESS OTHERWISE NOTED AND MAINTAINED BY THE HOA.
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Calculated Proposed Runoff Rates						
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)
				C ₂	C ₁₀₀	Q ₂ Q ₁₀₀
A1	A2-31 (Int.)	0.34	14.0	0.32	0.41	0.25 0.87
A2	A2-29	1.26	9.1	0.52	0.61	1.83 5.79
A3	A2-23	1.21	11.1	0.49	0.65	1.51 5.40
A4	A2-21A	0.41	8.4	0.50	0.65	0.59 2.06
A5	A2-20	1.14	11.7	0.47	0.64	1.35 4.91
A6	A2-17	2.15	13.2	0.49	0.65	2.52 8.98
A7	A2-38 (Int.)	0.24	12.3	0.30	0.39	0.18 0.62
A8	A2-36	1.17	8.5	0.50	0.65	1.67 5.83
A9	A2-37	0.64	7.8	0.53	0.66	1.00 3.39
A10	A2-33B	0.85	10.8	0.47	0.64	1.04 3.80
A11	A2-12A	2.45	13.2	0.45	0.63	2.62 9.85
A12	A2-11	1.56	10.1	0.54	0.67	2.23 7.53
A14	A2-2	1.19	9.7	0.49	0.64	1.60 5.57
A15	A3-5	0.33	5.9	0.67	0.74	0.72 2.15
(Int.) Indicates Interim Condition		(D.B.O.) Indicates Designed by Others				

Calculated Proposed Runoff Rates						
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)
				C ₂	C ₁₀₀	Q ₂ Q ₁₀₀
A16	A3-4	3.26	11.7	0.50	0.65	4.08 14.36
A17	A3-2	0.21	5.0	0.67	0.74	0.48 1.43
A18	A1-6	2.56	8.4	0.47	0.57	3.41 11.16
A19	A4-2	2.03	11.6	0.54	0.67	2.78 9.19
B1	B3-11	0.57	12.3	0.62	0.70	0.87 2.63
B1-a	B3-14 (Int.)	0.10	8.1	0.25	0.35	0.07 0.28
B2	B3-7	3.67	14.2	0.42	0.58	3.58 13.24
B2-a	B3-8	0.20	5.3	0.60	0.70	0.39 1.24
B3	B3-5	1.02	8.1	0.56	0.68	1.66 5.43
B4	B3-6	3.76	13.9	0.35	0.64	3.08 15.25
B5	B3-2	1.08	11.6	0.54	0.67	1.46 4.92
B6	B4-2	0.17	9.0	0.67	0.74	0.32 0.96
B7	B2-13	0.25	6.3	0.55	0.68	0.44 1.45
B8	B2-12	1.12	12.3	0.45	0.62	1.23 4.65
B9	B2-9	0.89	6.4	0.64	0.72	1.78 5.44
(Int.) Indicates Interim Condition		(D.B.O.) Indicates Designed by Others				

Calculated Proposed Runoff Rates						
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)
				C ₂	C ₁₀₀	Q ₂ Q ₁₀₀
B10	B2-4	0.55	9.1	0.67	0.74	1.03 3.05
B11	B2-2	1.70	13.0	0.45	0.62	1.83 6.88
B12	B1-1	1.35	5.0	0.49	0.58	2.23 7.14
C1	B1-2B	0.41	5.0	0.67	0.74	0.93 2.75
D1	C1-4	0.11	5.0	0.71	0.79	0.27 0.80
D2	C1-2	0.23	5.0	0.67	0.74	0.52 1.54
OA-1a	A2-38 (Int.)	0.55	12.2	0.25	0.35	0.34 1.28
OA-2a	A2-31 (Int.)	1.48	14.4	0.25	0.35	0.85 3.20
OB	B3-14 (Int.)	0.61	6.7	0.25	0.35	0.38 1.43
OC	B4-4	0.54	5.3	0.67	0.74	1.21 3.59
OD	Pond T	1.39	13.4	0.25	0.35	0.82 3.11
OE	C2-2	0.89	6.5	0.67	0.75	1.86 5.62
OF	C2-5	1.00	9.4	0.57	0.66	1.56 4.90
OG	Pond T	10.96	15.2	0.26	0.36	6.42 23.85
(Int.) Indicates Interim Condition		(D.B.O.) Indicates Designed by Others				



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Revision Type		Revision		Revision	
No.	Rev.	Date	By	Appr.	Scale
1					
2					
3					
4					
5					
6					

Harvest Crossing Subdivision Filing No. 1
Aurora, Colorado
Construction Documents
Final Drainage Plan
Proj. Name: Location: Plan Set: Sheet Name: No. 102 of 113 Date: July 21, 2022 Horiz. Scale: 1" = 50' Vert. Scale: N/A

Client: Richmond American Homes
Address: Greenwood Village, CO 80111
4350 South Monaco Street
Denver, Colorado 80237
Contact: Eric Kubby
Phone: 720.977.3827



Know what's below.
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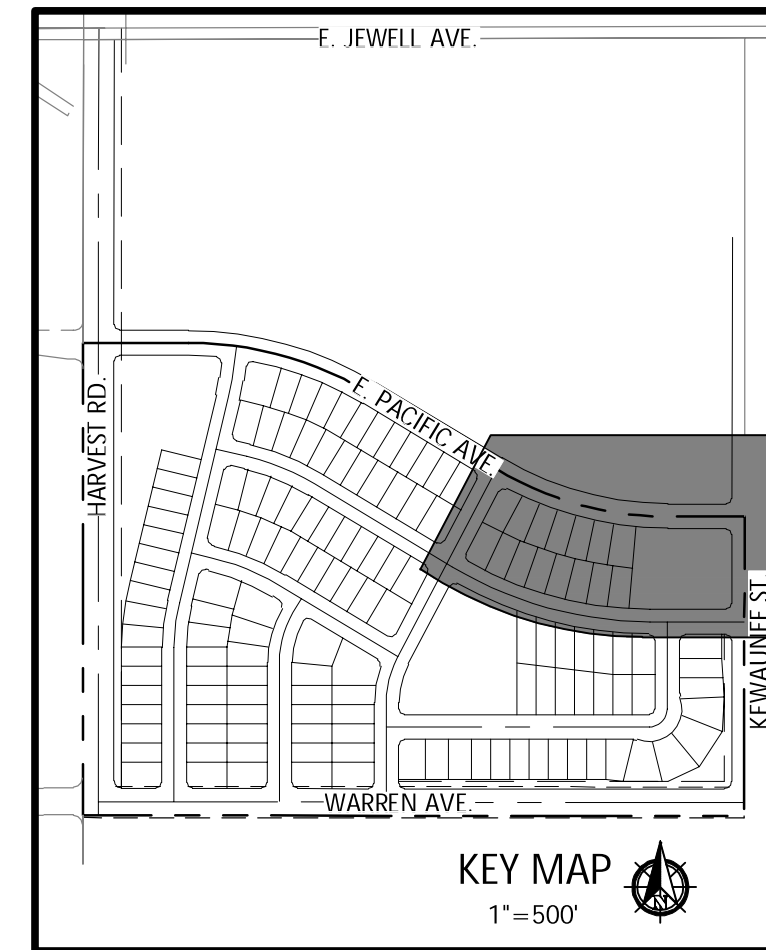
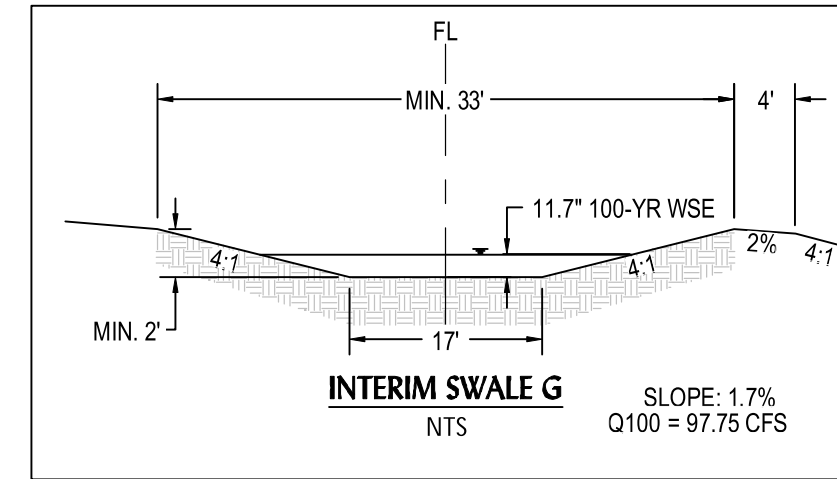
Calculated Proposed Runoff Rates							
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)	
				C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
A1	A2-31 (Int.)	0.34	14.0	0.32	0.41	0.25	0.87
A2	A2-29	1.26	9.1	0.52	0.61	1.83	5.79
A3	A2-23	1.21	11.1	0.49	0.65	1.51	5.40
A4	A2-21A	0.41	8.4	0.50	0.65	0.59	2.06
A5	A2-20	1.14	11.7	0.47	0.64	1.35	4.91
A6	A2-17	2.15	13.2	0.49	0.65	2.52	8.98
A7	A2-38 (Int.)	0.24	12.3	0.30	0.39	0.18	0.62
A8	A2-36	1.17	8.5	0.50	0.65	1.67	5.83
A9	A2-37	0.64	7.8	0.53	0.66	1.00	3.39
A10	A2-33B	0.85	10.8	0.47	0.64	1.04	3.80
A11	A2-12A	2.45	13.2	0.45	0.63	2.62	9.85
A12	A2-11	1.56	10.1	0.54	0.67	2.23	7.53
A14	A2-2	1.19	9.7	0.49	0.64	1.60	5.57
A15	A3-5	0.33	5.9	0.67	0.74	0.72	2.15
(Int.) indicates Interim Condition				(D.B.O.) indicates Designed by Others			

Calculated Proposed Runoff Rates							
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)	
				C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
A16	A3-4	3.26	11.7	0.50	0.65	4.08	14.36
A17	A3-2	0.21	5.0	0.67	0.74	0.48	1.43
A18	A1-6	2.56	8.4	0.47	0.57	3.41	11.16
A19	A4-2	2.03	11.6	0.54	0.67	2.78	9.19
B1	B3-11	0.57	12.3	0.62	0.70	0.87	2.63
B1-a	B3-14 (Int.)	0.10	8.1	0.25	0.35	0.07	0.28
B2	B3-7	3.67	14.2	0.42	0.58	3.58	13.24
B2-a	B3-8	0.20	5.3	0.60	0.70	0.39	1.24
B3	B3-5	1.02	8.1	0.56	0.68	1.66	5.43
B4	B3-6	3.76	13.9	0.35	0.64	3.08	15.25
B5	B3-2	1.08	11.6	0.54	0.67	1.46	4.92
B6	B4-2	0.17	9.0	0.67	0.74	0.32	0.96
B7	B2-13	0.25	6.3	0.55	0.68	0.44	1.45
B8	B2-12	1.12	12.3	0.45	0.62	1.23	4.65
B9	B2-9	0.89	6.4	0.64	0.72	1.78	5.44
(Int.) indicates Interim Condition				(D.B.O.) indicates Designed by Others			

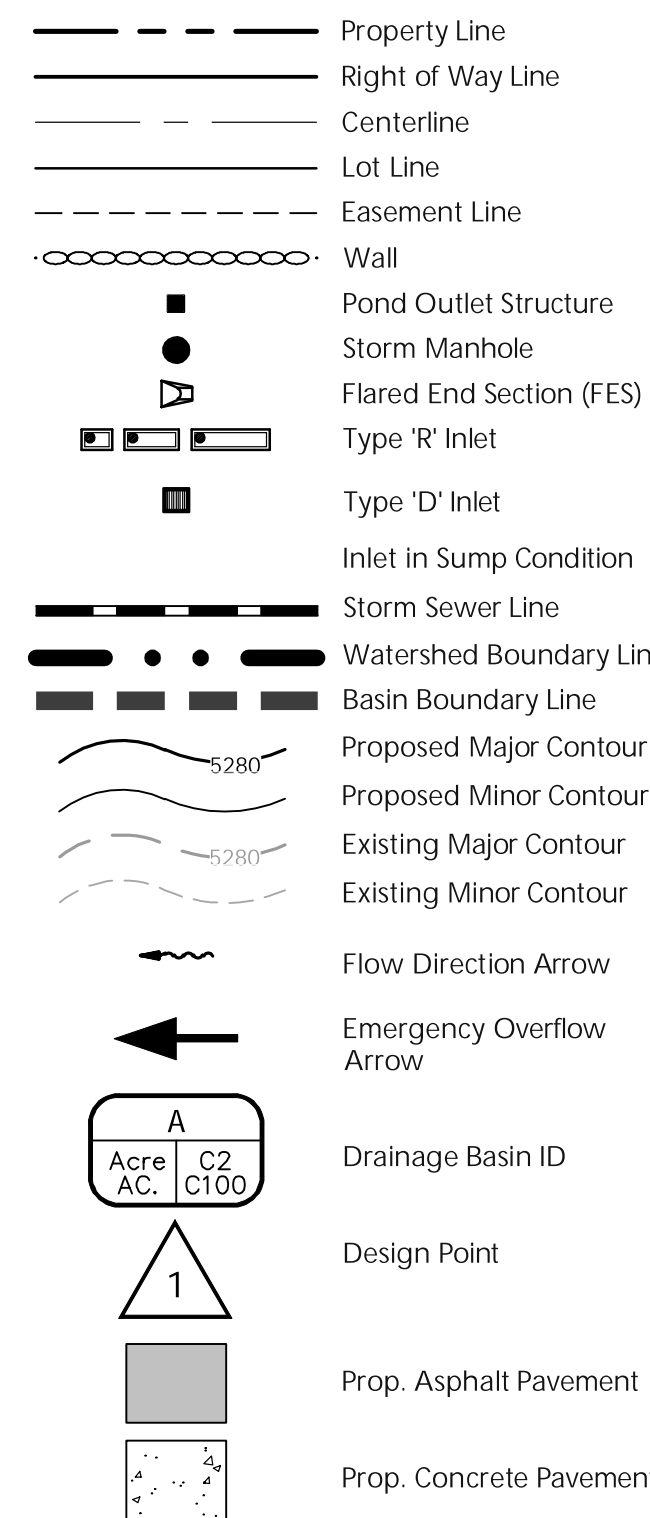
Calculated Proposed Runoff Rates							
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)	
				C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
B10	B2-4	0.55	9.1	0.67	0.74	1.03	3.05
B11	B2-2	1.70	13.0	0.45	0.62	1.83	6.88
B12	B1-1	1.35	5.0	0.49	0.58	2.23	7.14
C1	B1-2B	0.41	5.0	0.67	0.74	0.93	2.75
D1	C1-4	0.11	5.0	0.71	0.79	0.27	0.80
D2	C1-2	0.23	5.0	0.67	0.74	0.52	1.54
OA-1a	A2-38 (Int.)	0.55	12.2	0.25	0.35	0.34	1.28
OA-2a	A2-31 (Int.)	1.48	14.4	0.25	0.35	0.85	3.20
OB	B3-14 (Int.)	0.61	6.7	0.25	0.35	0.38	1.43
OC	B4-4	0.54	5.3	0.67	0.74	1.21	3.59
OD	Pond T	1.39	13.4	0.25	0.35	0.82	3.11
OE	C2-2	0.89	6.5	0.67	0.75	1.86	5.62
OF	C2-5	1.00	9.4	0.57	0.66	1.56	4.90
OG	Pond T	10.96	15.2	0.26	0.36	6.42	23.85
(Int.) indicates Interim Condition				(D.B.O.) indicates Designed by Others			

NOTE:

- PRIVATE INTERIM SWALES SHALL BE MAINTAINED BY THE HOA. THE SWALES (B, D, & G) WITH SLOPE OF LESS THAN 2% PERMITTED FOR UP TO 36 MONTHS. OTHERWISE REVISIONS SHALL BE SUBMITTED FOR CONCRETE LINING. IN ADDITION, THE CITY RESERVES THE RIGHT, PRIOR TO 36 MONTHS, TO REQUIRE THE SWALE TO BE CONCRETE LINED SHOULD THERE BE ISSUES WITH REDUCED CAPACITY, SEDIMENTATION, PONDING, OR OTHER ITEMS IDENTIFIED BY THE CITY ENGINEER.
- THE EXISTING SWALE IS PROVIDING WATER QUALITY FOR BASIN C1 & C2 IN THE INTERIM CONDITION UNTIL THE DOWNSTREAM POND IS CONSTRUCTED. IF RUNOFF FROM THESE BASINS IS MIXED WITH DISCHARGE FROM POND B, THE ENTIRETY OF THE MIXED RUNOFF WILL NEED TO BE TREATED IN THE DOWNSTREAM POND.
- BASIN C1 SHALL BE TREATED FOR BOTH DETENTION AND WATER QUALITY BY THE DOWNSTREAM POND, REFERRED TO AS POND C1 IN THE APPROVED MASTER DRAINAGE PLAN FOR HARVEST CROSSING/THE VILLAGES AT MURPHY CREEK, APPROVED 4/5/2021.



LEGEND



Detention Pond B Volume Table

	Required Vol. (ac-ft.)	Elevation (ft)	Depth (ft)
Bottom of Pond	N/A	5689.30	0.0
1.2"WQCV	0.672	5692.29	3.0
EURV	1.527	5693.80	4.5
100-yr	3.119	5696.46	7.2
Emergency Overflow Weir	N/A	5697.50	8.2
Emergency Overflow WSE	N/A	5697.95	8.65
Freeboard / Top of Pond	N/A	5699.00	9.7

1.2"WQCV Release = 0.3cfs
EURV Release = 0.5 cfs
100 Yr Pond Release Rate = 33 cfs
100 Yr Inflow into the Pond = 95.0 cfs

CERTIFICATION NOTE:

THE DEVELOPER SHALL HAVE A LICENCED PROFESSIONAL ENGINEER CERTIFY EACH STORMWATER DETENTION POND AND/OR WATER QUALITY BMP IS BUILT ACCORDING TO THE APPROVED PLANS AND SPECIFICATIONS, AND THE REQUIRED DETENTION VOLUME, INCLUDING THE WQCV WHEN USED, IS MET. THE CERTIFICATION SHALL ALSO VERIFY ALL PERTINENT DIMENSIONS, ELEVATIONS, REQUIRED OUTLET ORIFICE PLATES FOR DETENTION AND WQCV AND OTHER PERMANENT BMPS REQUIREMENTS ARE INSTALLED PER THE APPROVED PLANS AND SPECIFICATIONS, AND SHALL SHOW AS-BUILT DESIGN VOLUMES (WQCV, 10-YEAR, 100 YEAR, EURV) AND OTHER PERTINENT DIMENSIONS, ELEVATIONS AND CAPACITY REQUIREMENTS ASSOCIATED WITH WQCV BMP USED. THE CERTIFICATION SHALL BE PROVIDED TO THE CITY OF AURORA ENGINEERING CONTROL SECTION PRINCIPAL ENGINEER. AN APPROVED POND CERTIFICATE SHALL BE REQUIRED PRIOR TO RETURN OF ANY FISCAL SECURITY DEPOSIT (AS WELL AS SATISFYING OTHER CONDITIONS OF THE STORMWATER PERMIT) FOR SITES THAT DO NOT REQUIRE A CERTIFICATION, OIL AND GAS WELL PADS, OUTDOOR STORAGE, AND TOW YARDS. AN APPROVED POND CERTIFICATE SHALL BE REQUIRED PRIOR TO COMMENCEMENT OF BUSINESS OPERATIONS. IN NO CASE SHALL A CERTIFICATE OF OCCUPANCY OR TEMPORARY CERTIFICATE OF OCCUPANCY BE ISSUED WITHOUT AN APPROVED POND CERTIFICATE.

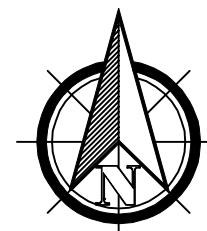
FACSIMILE
This electronic plan is a facsimile of the
signed and sealed pdf set

Xylia Warren-Laird Date: 7/27/2022
Xylia Warren-Laird, PE

NOTES:

- CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETENESS AND/OR ACCURACY OF THIS DOCUMENT.
- ALL STORM SEWER, INCLUDING ALL DETENTION POND FACILITIES, AND OTHER ASSOCIATED STRUCTURES ARE PUBLIC UNLESS OTHERWISE NOTED.
- DETENTION PONDS ARE PRIVATE UNLESS OTHERWISE NOTED AND MAINTAINED BY THE HOA.
- THE STORM SEWER SYSTEM, IN COMBINATION WITH THE STREET, IS SIZED FOR THE 100 YEAR STORM EVENT. ROADWAY PAVING WILL NOT BE PERMITTED AND CERTIFICATES OF OCCUPANCY WILL NOT BE ISSUED UNTIL DOWNSTREAM PIPE AND OUTFALL HAVE BEEN CONSTRUCTED IN HARVEST ROAD AND INITIALLY ACCEPTED.
- FURTHER ADJACENT DOWNSTREAM DEVELOPMENT IS REQUIRED TO PROVIDE CONVEYANCE FOR EMERGENCY OVERFLOWS. CITY RECOMMENDS PRIVATE DRAINAGE EASEMENTS TO BE OBTAINED FOR ANY EMERGENCY FLOW PATHS NOT WITHIN ROW.

PROJECT BENCHMARK:
CITY OF AURORA BENCHMARK #456529NE002 BEING A 3" BRASS CAP STAMPED "CITY OF AURORA BM 23.70, 0.110" ATOP A 30" LONG STEEL PIPE IN CONC. ON THE SOUTH SIDE OF E. JEWELL AVE. APPROX. 300 FT. WEST OF THE CENTERLINE OF A BRIDGE CROSSING COAL CREEK, & AT THE SOUTHEAST CORNER OF INTERSECTION OF ROAD GOING SOUTHEAST FROM E. JEWELL AVE. EL. NAVD88 = 5623.18'



50 0 25 50
SCALE
1 inch = 50 ft.



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Revision Type		Revision		Revision	
No.	Rev. Date	1	2	3	4
1		2	3	4	5
2		3	4	5	6
3		4	5	6	7
4		5	6	7	8
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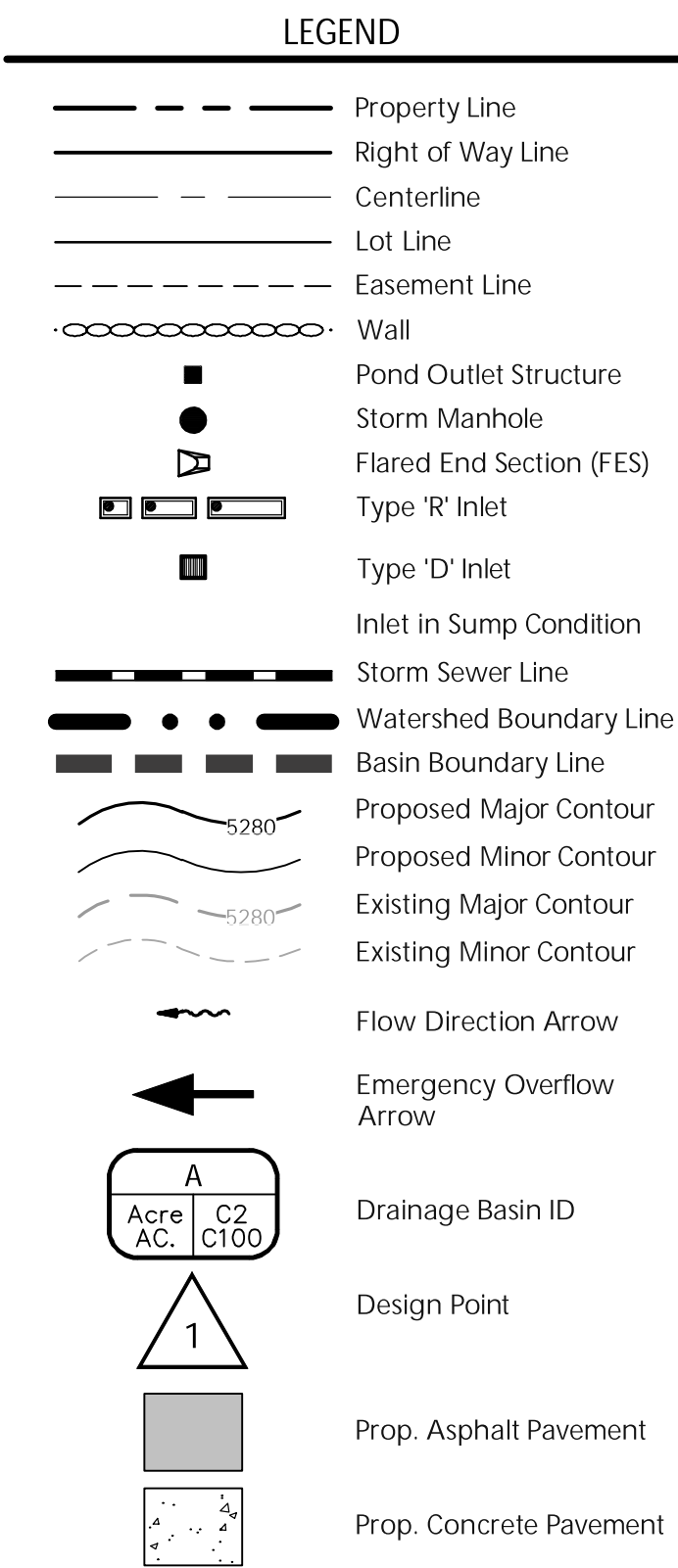
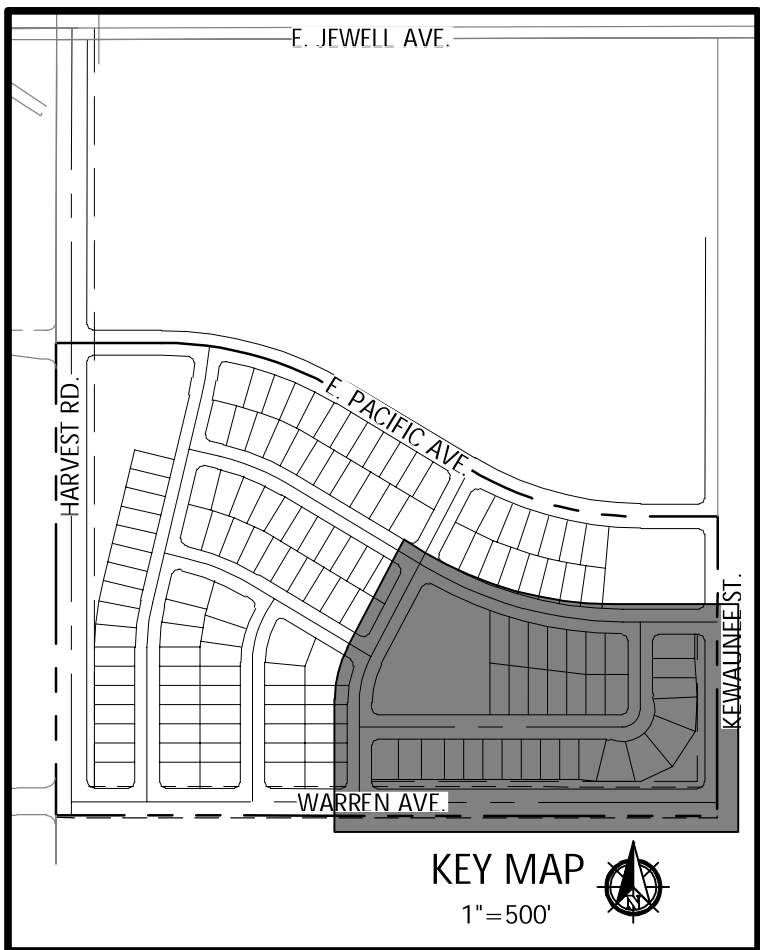
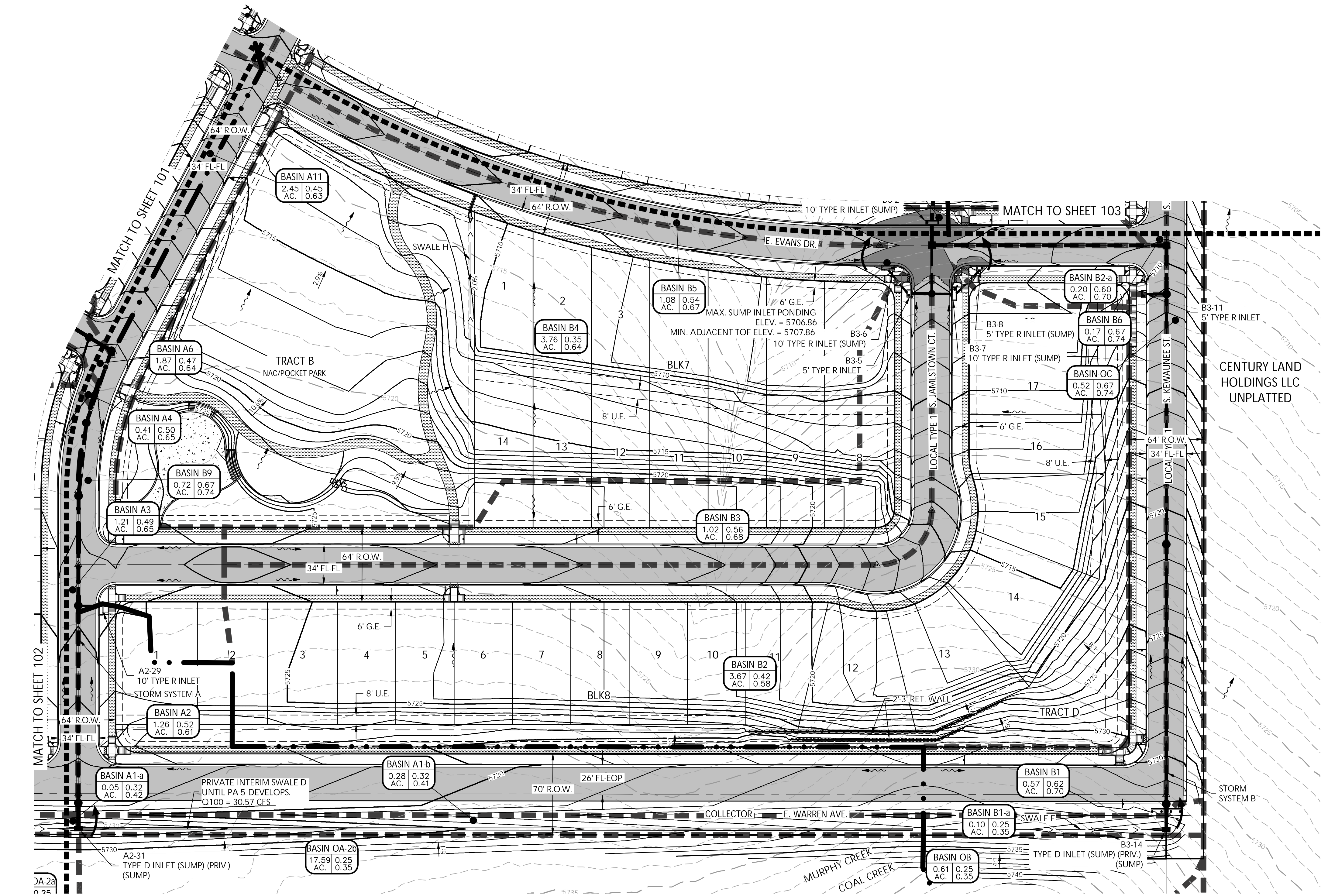
Harvest Crossing Subdivision Filing No. 1
Aurora, Colorado
Construction Documents
Final Drainage Plan

Client: Richmond American Homes
Address: Greenwood Village, CO 80111
4350 South Monaco Street
Denver, Colorado 80237
Contact: Eric Kubby
Phone: 720.977.3827

Project Name: Harvest Crossing Subdivision Filing No. 1
Location: Aurora, Colorado
Plan Set: Construction Documents
Sheet Name: Final Drainage Plan

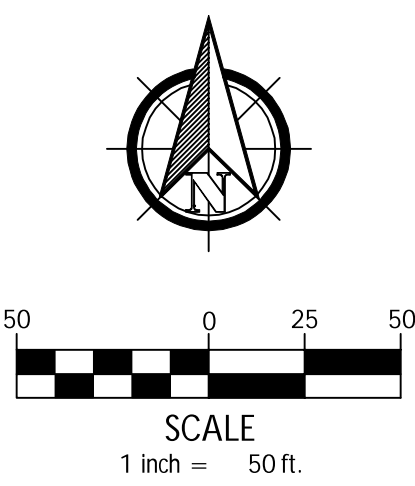
811
Know what's below.
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Sheet: 103

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- NOTES:**
- CITY OF AURORA PLAN REVIEW IS ONLY FOR GENERAL CONFORMANCE WITH THE CITY OF AURORA DESIGN CRITERIA AND THE CITY CODE. THE CITY IS NOT RESPONSIBLE FOR THE ACCURACY AND ADEQUACY OF THE DESIGN, OF DIMENSIONS AND ELEVATIONS WHICH SHALL BE CONFIRMED AND CORRELATED AT THE JOB SITE. THE CITY OF AURORA, THROUGH THE APPROVAL OF THIS DOCUMENT, ASSUMES NO RESPONSIBILITY FOR THE COMPLETELY AND/OR ACCURACY OF THIS DOCUMENT.
 - ALL STORM SEWER, INCLUDING ALL DETENTION POND FACILITIES, AND OTHER ASSOCIATED STORM STRUCTURES ARE PUBLIC UNLESS OTHERWISE NOTED.
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This electronic plan is a facsimile of the signed and sealed pdf set
Xylina Warren-Laird Date: 7/27/2022
Xylina Warren-Laird, PE

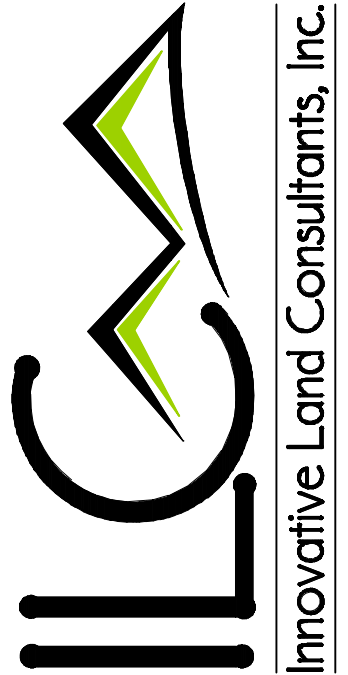


Calculated Proposed Runoff Rates							
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)	
				C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
A1	A2-31 (Int.)	0.34	14.0	0.32	0.41	0.25	0.87
A2	A2-29	1.26	9.1	0.52	0.61	1.83	5.79
A3	A2-23	1.21	11.1	0.49	0.65	1.51	5.40
A4	A2-21A	0.41	8.4	0.50	0.65	0.59	2.06
A5	A2-20	1.14	11.7	0.47	0.64	1.35	4.91
A6	A2-17	2.15	13.2	0.49	0.65	2.52	8.98
A7	A2-38 (Int.)	0.24	12.3	0.30	0.39	0.18	0.62
A8	A2-36	1.17	8.5	0.50	0.65	1.67	5.83
A9	A2-37	0.64	7.8	0.53	0.66	1.00	3.39
A10	A2-33B	0.85	10.8	0.47	0.64	1.04	3.80
A11	A2-12A	2.45	13.2	0.45	0.63	2.62	9.85
A12	A2-11	1.56	10.1	0.54	0.67	2.23	7.53
A14	A2-2	1.19	9.7	0.49	0.64	1.60	5.57
A15	A3-5	0.33	5.9	0.67	0.74	0.72	2.15
(Int.) Indicates Interim Condition				(D.B.O.) Indicates Designed by Others			

Calculated Proposed Runoff Rates							
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)	
				C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
A16	A3-4	3.26	11.7	0.50	0.65	4.08	14.36
A17	A3-2	0.21	5.0	0.67	0.74	0.48	1.43
A18	A1-6	2.56	8.4	0.47	0.57	3.41	11.16
A19	A4-2	2.03	11.6	0.54	0.67	2.78	9.19
B1	B3-11	0.57	12.3	0.62	0.70	0.87	2.63
B1-a	B3-14 (Int.)	0.10	8.1	0.25	0.35	0.07	0.28
B2	B3-7	3.67	14.2	0.42	0.58	3.58	13.24
B2-a	B3-8	0.20	5.3	0.60	0.70	0.39	1.24
B3	B3-5	1.02	8.1	0.56	0.68	1.66	5.43
B4	B3-6	3.76	13.9	0.35	0.64	3.08	15.25
B5	B3-2	1.08	11.6	0.54	0.67	1.46	4.92
B6	B4-2	0.17	9.0	0.67	0.74	0.32	0.96
B7	B2-13	0.25	6.3	0.55	0.68	0.44	1.45
B8	B2-12	1.12	12.3	0.45	0.62	1.23	4.65
B9	B2-9	0.89	6.4	0.64	0.72	1.78	5.44
(Int.) Indicates Interim Condition				(D.B.O.) Indicates Designed by Others			

Calculated Proposed Runoff Rates							
Basin ID	Design Point	Total Area (Ac.)	Tc (min)	Runoff Coefficients		Peak Flow (cfs)	
				C ₂	C ₁₀₀	Q ₂	Q ₁₀₀
B10	B2-4	0.55	9.1	0.67	0.74	1.03	3.05
B11	B2-2	1.70	13.0	0.45	0.62	1.83	6.88
B12	B1-1	1.35	5.0	0.49	0.58	2.23	7.14
C1	B1-2B	0.41	5.0	0.67	0.74	0.93	2.75
D1	C1-4	0.11	5.0	0.71	0.79	0.27	0.80
D2	C1-2	0.23	5.0	0.67	0.74	0.52	1.54
OA-1a	A2-38 (Int.)	0.55	12.2	0.25	0.35	0.34	1.28
OA-2a	A2-31 (Int.)	1.48	14.4	0.25	0.35	0.85	3.20
OB	B3-14 (Int.)	0.61	6.7	0.25	0.35	0.38	1.43
OC	B4-4	0.54	5.3	0.67	0.74	1.21	3.59
OD	Pond T	1.39	13.4	0.25	0.35	0.82	3.11
OE	C2-2	0.89	6.5	0.67	0.75	1.86	5.62
OF	C2-5	1.00	9.4	0.57	0.66	1.56	4.90
OG	Pond T	10.96	15.2	0.26	0.36	6.42	23.85
(Int.) Indicates Interim Condition				(D.B.O.) Indicates Designed by Others			

PROJECT BENCHMARK:
CITY OF AURORA BENCHMARK #456529NE002 BEING A 3" BRASS CAP STAMPED "CITY OF AURORA BM 23-70, 0-110" ATOP A 30" LONG STEEL PIPE IN CONC. ON THE SOUTH SIDE OF E. JEWELL AVE. APPROX. 300 FT. WEST OF THE CENTERLINE OF A BRIDGE CROSSING COAL CREEK, & AT THE SOUTHEAST CORNER OF INTERSECTION OF ROAD GOING SOUTHEAST FROM E. JEWELL AVE. EL. NAVD88 = 5623.18'



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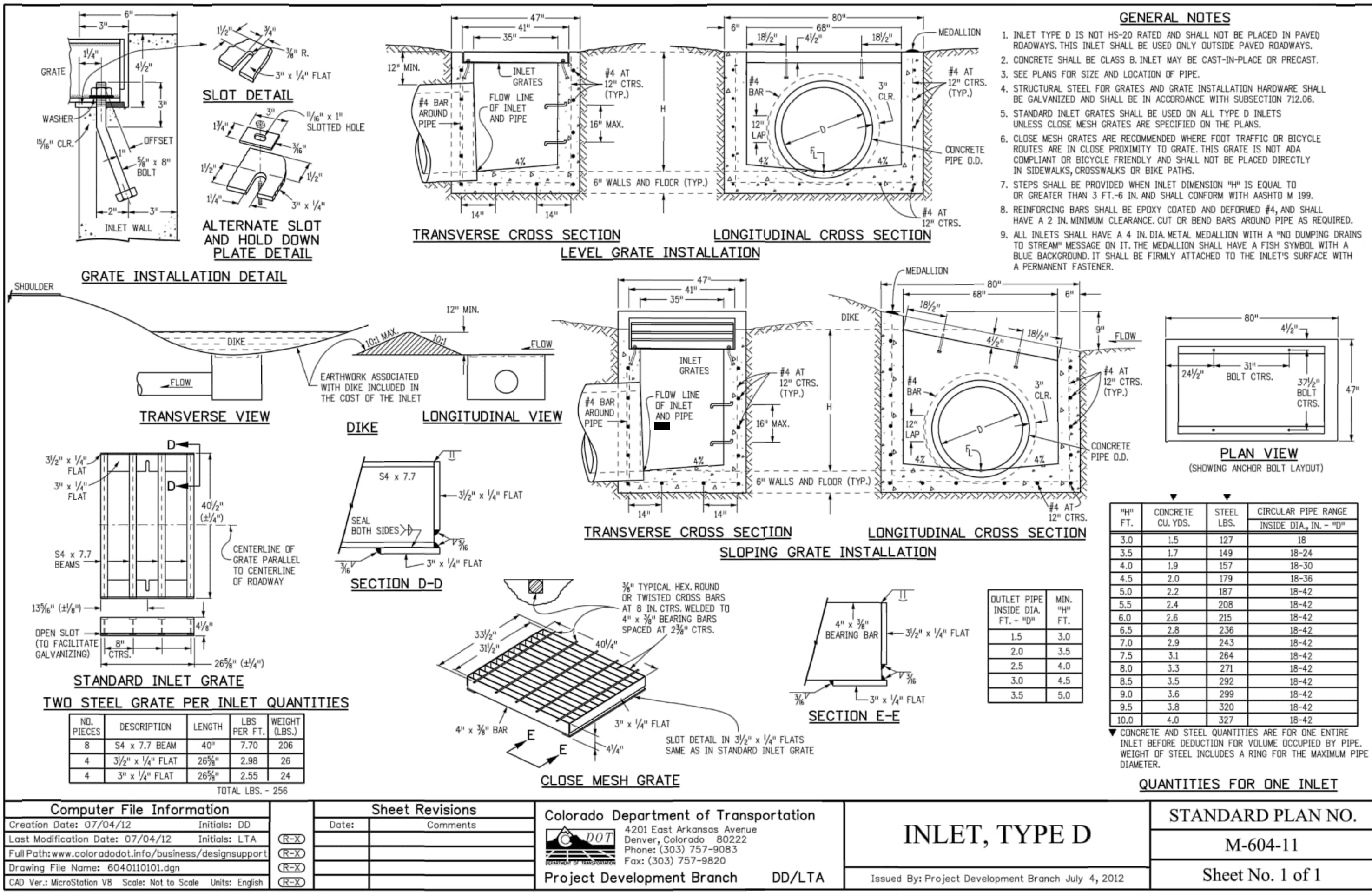
Revision Type		Revision No.		Revision Date	
1		2		3	
4		5		6	
Designed By: XWL		Date: July 21, 2022		Sheet: 104 of 113	
Prepared By: AA		Horiz. Scale: 1" = 50'		Job No.: 1002-84	
Approved By: XWL		Vert. Scale: N/A			

Harvest Crossing Subdivision Filing No. 1
Aurora, Colorado
Construction Documents
Final Drainage Plan

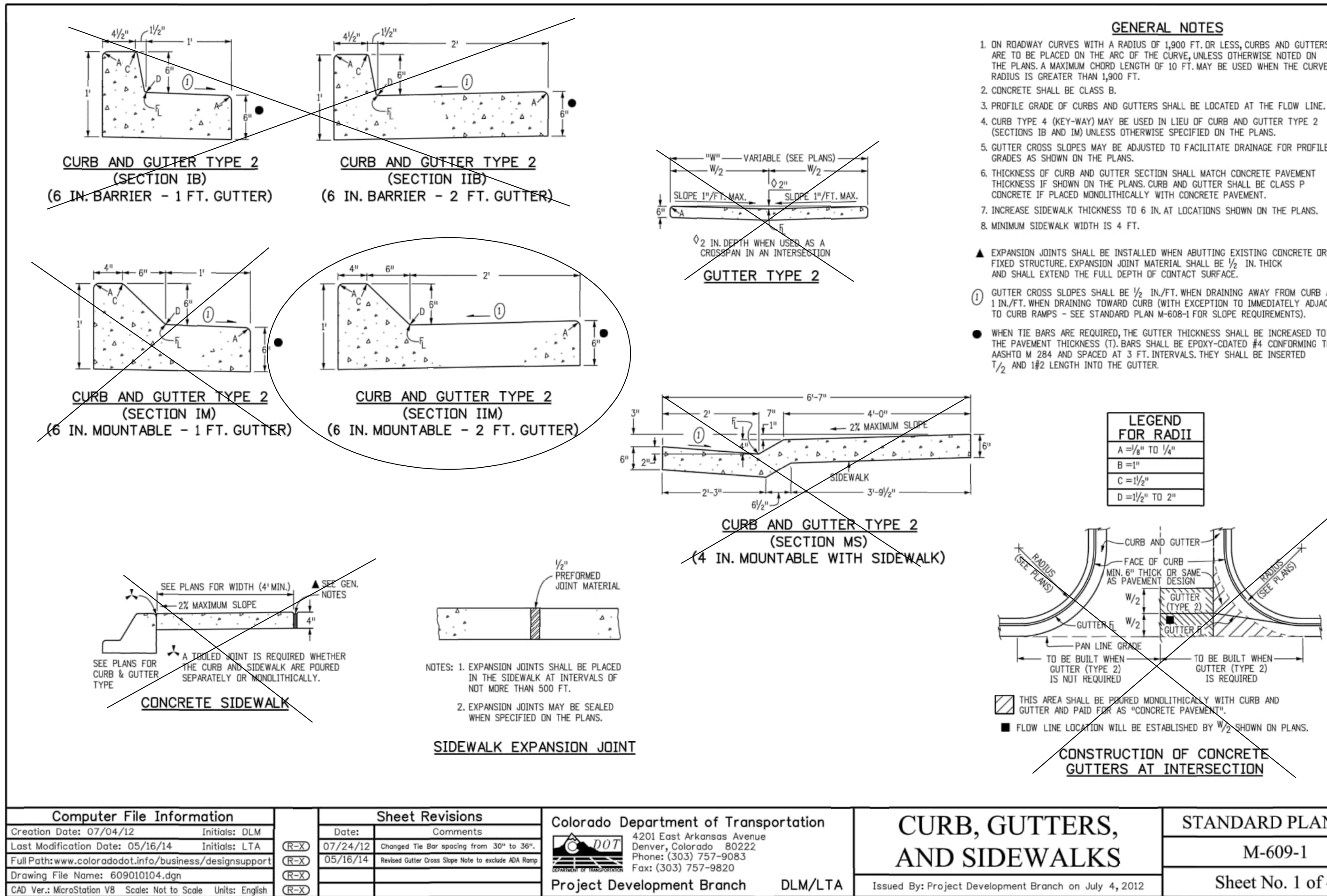
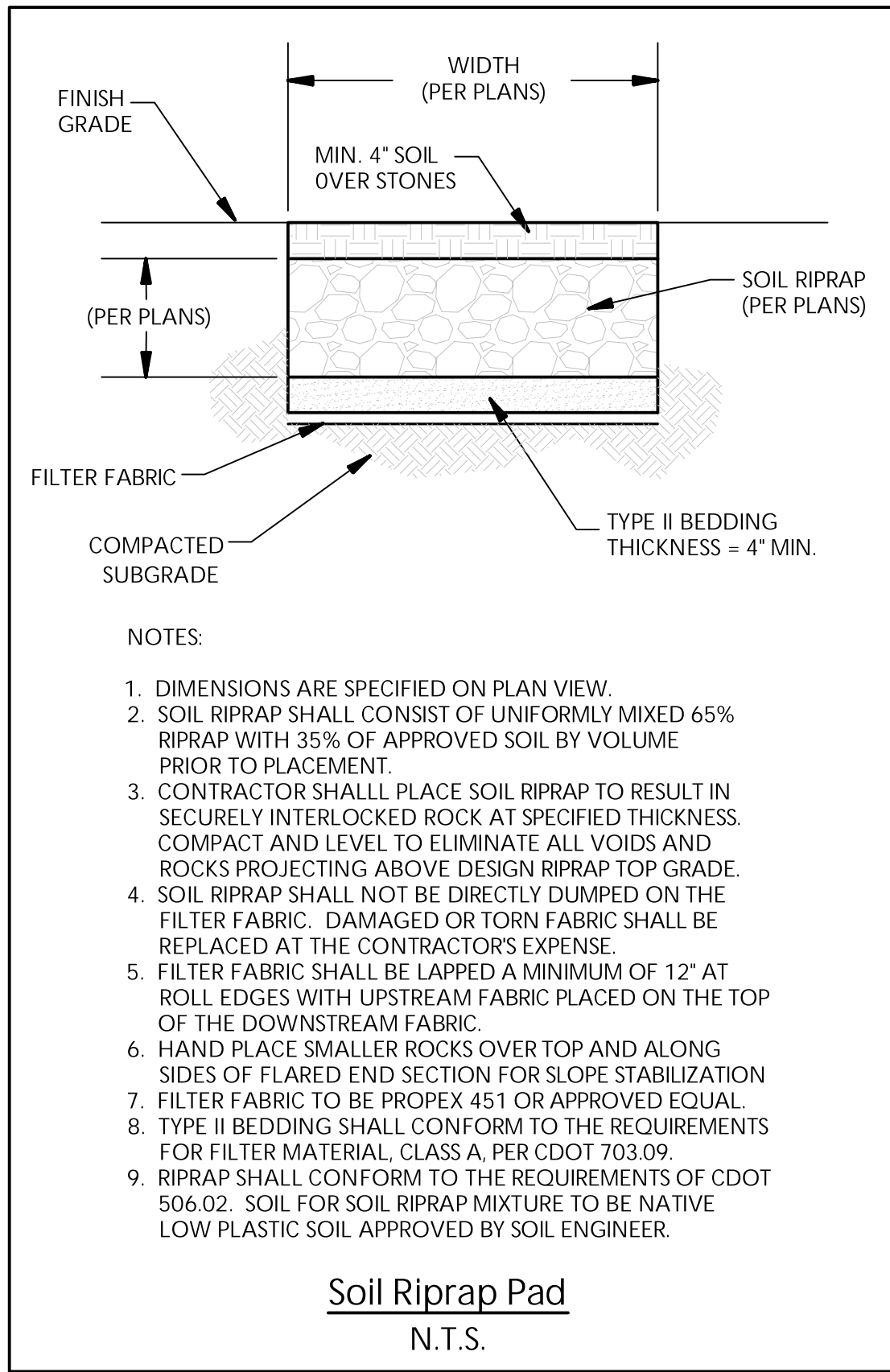
Client:	Richmond American Homes
Location:	Greenwood Village, CO 80111
Plan Set:	4350 South Monaco Street
Sheet Name:	Denver, Colorado 80237
Contact:	Eric Kubly
Phone:	720.977.3827



Sheet:	104
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UTILITY CROSSING TABLE						
XING. NUM.	TOP PIPE	B.O.P. ELEV.	BOTTOM PIPE	T.O.P. ELEV.	CLEAR	DEFLECT
1	30" RCP	5676.76	6" WL	5675.26	1.5'	YES
2	30" RCP	5678.02	8" EX. SL	5673.34	4.7'	NO
3	12" WL	5679.92	8" EX. SL	5673.24	6.7'	NO
4	30" RCP	5678.41	12" WL	5676.91	1.5'	YES
5	30" RCP	5683.91	12" WL	5682.41	1.5'	YES
6	30" RCP	5684.14	8" DBO SL	5681.33	2.8'	NO
7	18" RCP	5688.56	12" WL	5687.06	1.5'	YES
8	18" RCP	5689.26	8" SL	5681.46	7.8'	NO
9	18" RCP	5693.48	12" WL	5691.98	1.5'	YES
10	18" RCP	5693.38	8" SL	5683.20	10.2'	NO
11	8" WL	5694.90	8" SL	5683.24	11.7'	NO
12	6" WL	5697.04	8" SL	5684.34	12.7'	NO
13	18" RCP	5697.48	8" SL	5687.45	10.0'	NO
14	18" RCP	5696.60	8" WL	5695.10	1.5'	YES
15	8" RCP	5697.24	8" SL	5687.36	9.9'	NO
16	18" RCP	5692.41	12" WL	5690.91	1.5'	YES
17	6" WL	5691.13	24" RCP	5689.29	1.8'	NO
18	30" RCP	5686.05	12" WL	5684.55	1.5'	YES
19	18" RCP	5692.65	12" WL	5691.15	1.5'	YES
20	24" RCP	5692.23	8" SL	5686.41	5.8'	NO
21	8" WL	5697.07	8" SL	5691.32	5.8'	NO
22	42" RCP	5692.60	8" SL	5690.28	2.3'	NO
23	42" RCP	5693.52	8" SL	5691.09	2.4'	NO
24	24" RCP	5696.51	8" WL	5695.01	1.5'	YES
25	24" RCP	5703.96	8" SL	5701.21	2.7'	NO
26	36" RCP	5702.49	8" WL	5700.99	1.5'	YES
27	8" WL	5707.20	8" SL	5701.30	5.9'	NO
28	18" RCP	5705.84	8" WL	5704.34	1.5'	YES
29	18" RCP	5712.39	8" SL	5710.24	2.1'	NO
30	8" WL	5716.62	18" RCP	5714.21	2.4'	NO
31	18" RCP	5698.66	8" SL	5693.15	5.5'	NO
32	18" RCP	5710.20	8" SL	5706.53	3.7'	NO
33	8" WL	5705.87	8" SL	5692.52	13.4'	NO
34	8" WL	5705.88	8" SL	5693.12	12.8'	NO
35	18" RCP	5710.57	8" SL	5706.85	3.7'	NO
36	8" WL	5711.80	8" SL	5706.32	5.5'	NO
37	18" RCP	5714.10	8" SL	5710.55	3.6'	NO
38	8" WL	5722.10	8" SL	5715.13	7.0'	NO
39	18" RCP	5718.14	8" WL	5716.64	1.5'	YES
40	36" RCP	5717.89	8" WL	5716.39	1.5'	YES
41	8" WL	5722.46	8" SL	5715.21	7.3'	NO
42	6" WL	5703.27	8" SL	5695.15	8.1'	NO
43	8" WL	5701.68	36" RCP	5698.80	2.9'	NO
44	8" WL	5701.72	36" RCP	5700.26	1.5'	NO
45	18" RCP	5700.56	8" WL	5699.06	1.5'	YES
46	24" RCP	5700.44	8" SL	5697.41	3.0'	NO
47	8" WL	5710.16	8" SL	5704.15	6.0'	NO
48	8" WL	5725.99	30" RCP	5723.82	2.2'	NO
49	18" RCP	5696.45	8" SL	5687.48	9.0'	NO
50	18" RCP	5692.87	8" WL	5691.37	1.5'	YES
51	8" WL	5720.20	8" SL	5713.62	6.6'	NO
52	8" WL	5720.20	24" RCP	5718.47	1.7'	NO
53	42" RCP	5707.62	8" WL	5706.12	1.5'	YES
54	8" WL	5690.84	18" RCP	5689.34	1.5'	NO
55	8" WL	5722.08	8" SL	5715.11	7.0'	NO
56	36" RCP	5717.81	8" WL	5714.31	1.5'	YES
57	8" WL	5725.56	30" RCP	5723.55	2.0'	NO
58	18" RCP	5691.26	8" SL	5681.91	9.4'	NO
59	18" RCP	5689.94	30" RCP	5688.97	1.0'	NO
60	18" RCP	5693.45	8" WL	5691.95	1.5'	YES
61	6" WL	5717.60	24" RCP	5715.94	1.7'	NO
62	6" WL	5717.60	8" SL	5711.10	6.5'	NO
63	18" RCP	5706.70	8" SL	5702.39	4.3'	NO
64	18" RCP	5697.08	8" SL	5688.49	8.6'	NO
65	18" RCP	5697.03	8" SL	5687.32	9.7'	NO
66	18" RCP	5695.33	8" WL	5693.83	1.5'	YES



FACSIMILE
This electronic plan is a facsimile of the signed and sealed pdf set
Xylina Warren-Laird Date: 7/27/2022
Xylina Warren-Laird, PE

Daniel Clark

From: Daniel Clark
Sent: Wednesday, June 21, 2023 1:04 PM
To: submittals@mhfd.org
Cc: dclark@mhfd.org; Kurtis Williams
Subject: Foundry Filing No. 1 PDR - City of Aurora - Requested Referral

Good afternoon,

Please find the below Dropbox link to our PDR submittal for the City of Aurora. This includes both Preliminary Drainage Report and Plans for your review.

<https://www.dropbox.com/sh/8a7kg9lxzi15hzc/AAAKvsilMTgy0Mfppp1FucVOa?dl=0>

Aurora project tracking numbers for reference: DA-2315-01, RSN 1716246.

Thank you,

Daniel Clark, P.E.

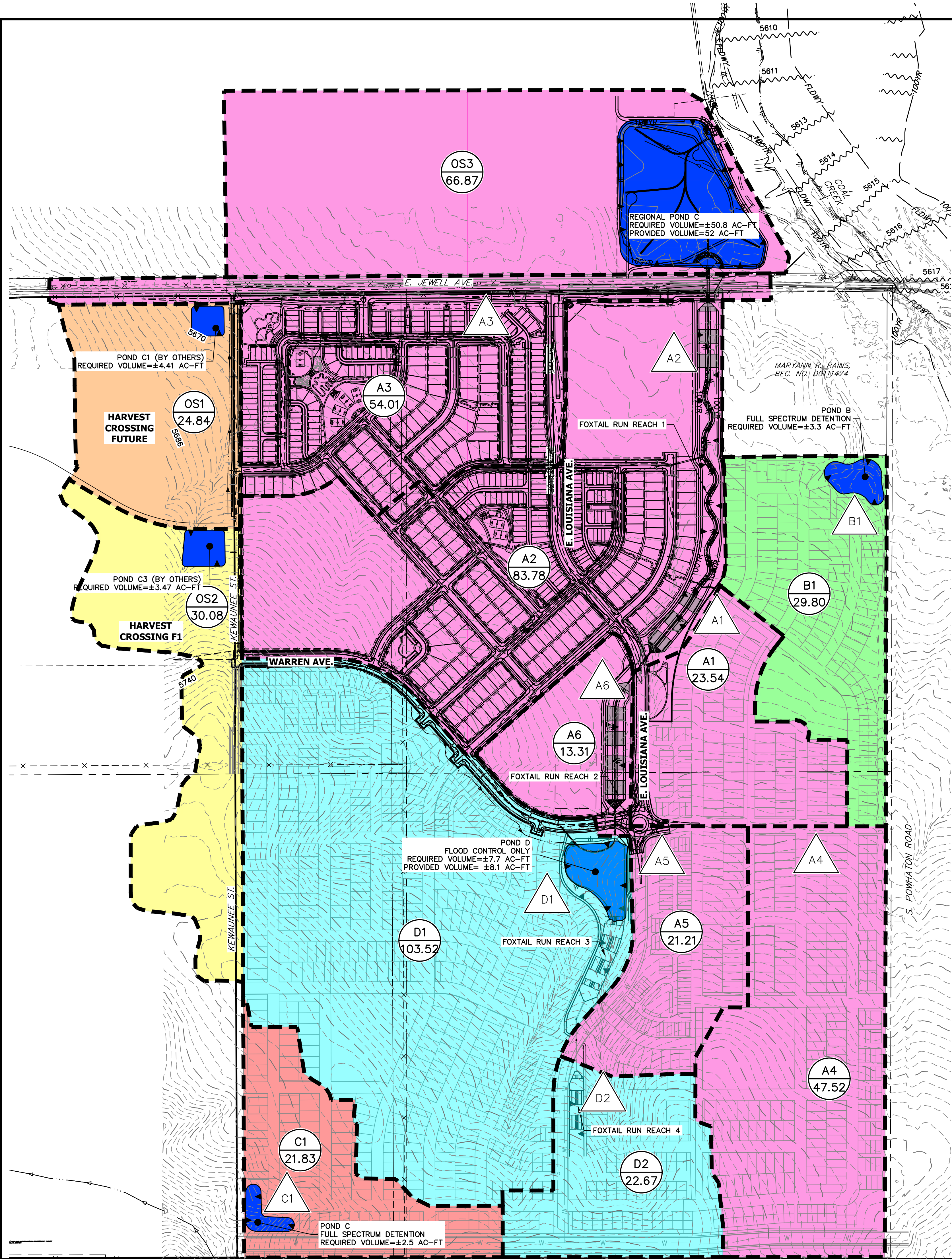
JR Engineering

25188 Genesee Trail Rd, Suite 110, Golden, CO 80401

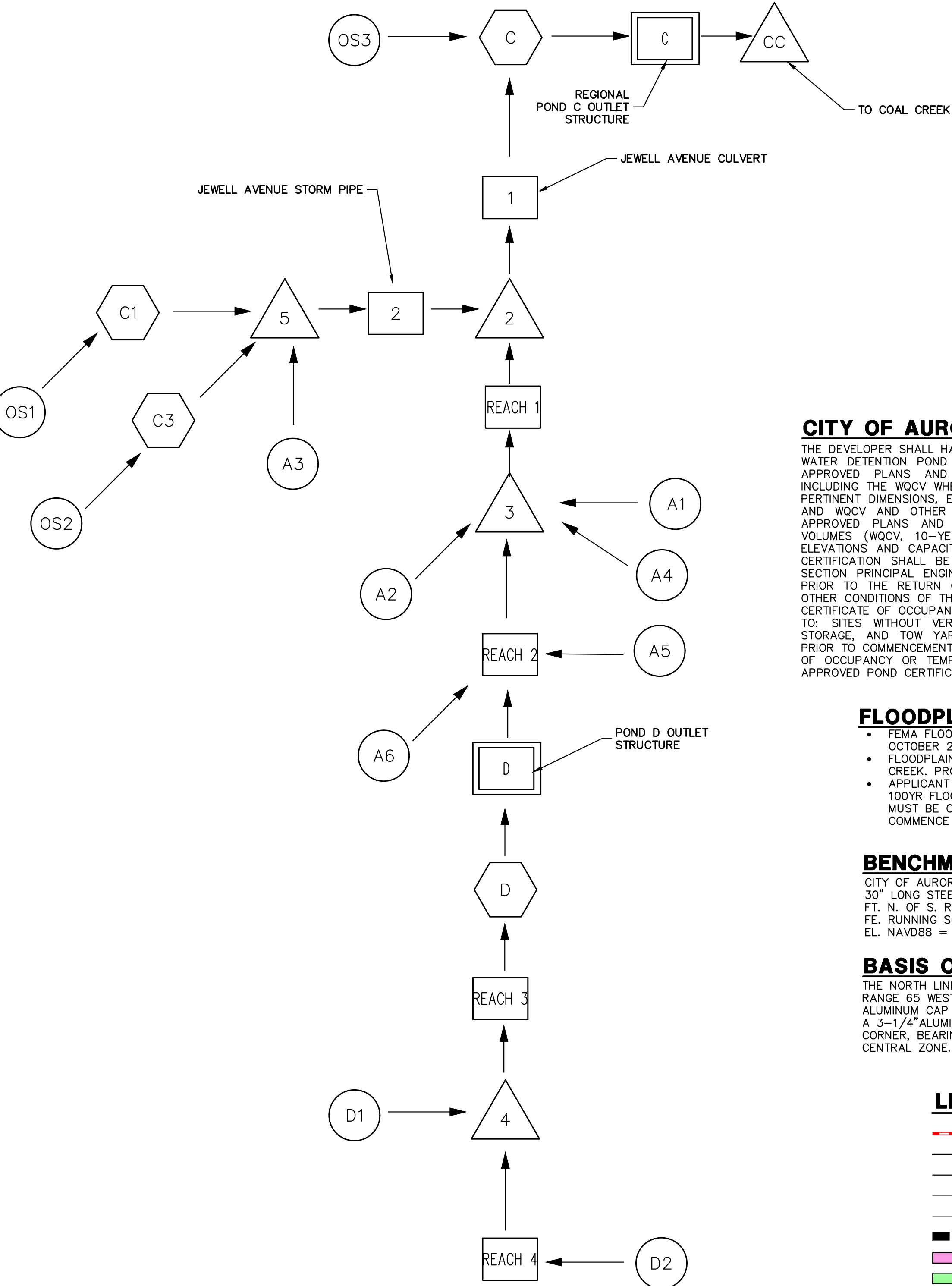
P:303.267.6222



APPENDIX F
DRAINAGE MAP



CUHP/ SWMM SCHEMATIC



POND ID	AREA SERVICED (AC)	IMPERVIOUS %
REGIONAL POND C	436.43	65.4%
POND B	29.80	57.6%
POND C	21.83	67.3%
POND D	126.19	65.5%
TOTAL	542.98	

CITY OF AURORA POND CERTIFICATION NOTE.

THE DEVELOPER SHALL HAVE A LICENSED PROFESSIONAL ENGINEER CERTIFY EACH STORM WATER DETENTION POND AND/OR WATER QUALITY BMP IS BUILT ACCORDING TO THE APPROVED PLANS AND SPECIFICATIONS AND THE REQUIRED DETENTION VOLUME, INCLUDING THE WQCV WHEN USED, IS MET. THE CERTIFICATION SHALL ALSO VERIFY ALL PERTINENT DIMENSIONS, ELEVATIONS, REQUIRED OUTLET ORIFICE PLATES FOR DETENTION AND WQCV AND OTHER PERMANENT BMPs REQUIREMENTS ARE INSTALLED PER THE APPROVED PLANS AND SPECIFICATIONS, AND SHALL SHOW THE AS-BUILT DESIGN VOLUMES (WQCV, 10-YEAR, 100-YEAR, EURV) AND OTHER PERTINENT DIMENSIONS, ELEVATIONS AND CAPACITY REQUIREMENTS ASSOCIATED WITH THE WQ BMP USED. THE CERTIFICATION SHALL BE PROVIDED TO THE CITY OF AURORA ENGINEERING CONTROL SECTION PRINCIPAL ENGINEER. AN APPROVED POND CERTIFICATE SHALL BE REQUIRED PRIOR TO THE RETURN OF ANY FISCAL SECURITY DEPOSIT (AS WELL AS SATISFYING OTHER CONDITIONS OF THE STORM WATER PERMIT) FOR SITES THAT DO NOT REQUIRE A CERTIFICATE OF OCCUPANCY. EXAMPLES OF THESE SITES INCLUDE BUT ARE NOT LIMITED TO: SITES WITHOUT VERTICAL CONSTRUCTION, OIL AND GAS WELL PADS, OUTDOOR STORAGE, AND TOW YARDS. AN APPROVED POND CERTIFICATE SHALL BE REQUIRED PRIOR TO COMMENCEMENT OF BUSINESS OPERATIONS. IN NO CASE SHALL A CERTIFICATE OF OCCUPANCY OR TEMPORARY CERTIFICATE OF OCCUPANCY BE ISSUED WITHOUT AN APPROVED POND CERTIFICATE.

FLOODPLAIN NOTES:

- FEMA FLOODPLAIN INFORMATION: FIRM PANEL E08005C0216M, DATED OCTOBER 2020
- FLOODPLAIN LIMITS AND BFE'S FROM 2010 FHAD STUDY FOR SAND/COAL CREEK, PROVIDED BY MILE HIGH FLOOD DISTRICT
- APPLICANT UNDERSTANDS THAT CONSTRUCTION OR GRADING IN THE 100YR FLOODPLAIN REQUIRES FLOODPLAIN DEVELOPMENT PERMIT, WHICH MUST BE OBTAINED PRIOR TO GRADING OR CONSTRUCTION CAN COMMENCE

BENCHMARK:

CITY OF AURORA BENCHMARK #456529N001 BEING 3" BRASS CAP ATOP A 30" LONG STEEL PIPE IN CONC. ON SOUTH SIDE OF E. JEWELL AVE. BEING 1 FT. N. OF S. R/W FE. LINE & 4 FT. E. OF INTERS. OF SD. R/W FE. N-S FE. RUNNING SOUTH IN VICINITY OF 1/4 COR. TO SECS. 20/29, T4S, R65W. EL. NAVD88 = 5,643.37'

BASIS OF BEARINGS:

THE NORTH LINE OF THE NORTHWEST 1/4 OF SECTION 29, TOWNSHIP 4 SOUTH, RANGE 65 WEST OF THE 6TH P.M., BEING MONUMENTED BY A 2-1/2" ALUMINUM CAP STAMPED "PLS 13155" AT THE NORTHWEST CORNER, AND BY A 3-1/4" ALUMINUM CAP STAMPED "LS 15244" AT THE NORTH QUARTER CORNER, BEARING N89°35'54"E AS REFERENCED TO COLORADO STATE PLANE CENTRAL ZONE.

LEGEND:

- PROPOSED STORM SEWER
- 6100 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 6100 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- DRAINAGE BASIN
- BASIN TRIBUTARY TO POND A
- BASIN TRIBUTARY TO POND B
- BASIN TRIBUTARY TO POND C
- BASIN TRIBUTARY TO POND D
- OFFSITE BASIN TRIBUTARY TO POND C1
- OFFSITE BASIN TRIBUTARY TO POND C3
- PROPOSED POND

- A = BASIN DESIGNATION
- B = AREA IN ACRES
- DESIGN OUTLET

OVERALL DRAINAGE PLAN
FOUNDRY FILING NO.1
JOB NO. 16146.00
11/03/2023
SHEET 1 OF 1



Centennial 303-740-9393 • Colorado Springs 719-593-2593
Fort Collins 970-491-9888 • www.jrengineering.com