



PHASE II DRAINAGE REPORT
FOR
TRACT F, DAWSON TRAILS FILING NO. 2

PREPARED FOR:

THE GARRETT COMPANIES, LLC
1051 GREENWOOD SPRINGS BLVD.
GREENWOOD, INDIANA 46143
CONTACT: SEAN REISMAN
PHONE: 720-434-9526

PREPARED BY:

TERRACINA DESIGN, LLC
10200 E. GIRARD AVENUE
BUILDING A, SUITE 314
DENVER, CO 80231
PHONE: 303-632-8867
CONTACT: MARTIN METSKER

SEPTEMBER 2026

Approval Blocks

ENGINEER'S STATEMENT:

"I affirm that this report and plan for the Phase II drainage design of Dawson Trails Tract F was prepared by me (or under my direct supervision) in accordance with the provisions of the Town of Castle Rock Drainage Design and Technical Criteria for the owners thereof. I understand that the Town of Castle Rock does not and will not assume liability for drainage facilities designed by others."

Martin Metsker, P.E.
Colorado Professional Engineer
License #41743

OWNER/DEVELOPER'S STATEMENT:

As Owner/Developer of land(s) identified within this report; I agree to proceed, implement and comply with all recommendations and requirements outlined herein.

The Garrett Companies, LLC

TOWN OF CASTLE ROCK APPROVALS:

Utilities Department Date

Development Services	Date
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terracedesign

Landscape Architecture, Planning & Engineering
10200 E. Girard Avenue, A-314. Denver, CO 80231 PH: 303.632.8867

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I. GENERAL LOCATION AND DESCRIPTION

A. Site Location

This Phase II Drainage Report provides remediation for changes in the drainage patterns resulting from the development of the proposed Dawson Trails Tract F, from here on known as "Site". The Site consist of 6 proposed residential buildings and a clubhouse that is approximately 12.67 acres within the Dawson Trails Filing 2 development.

The Site is bound on the north by Blanca Peak Parkway, on the east by Dawson Plaza, on the west by Dawson Trails Blvd, and on the south by North Dawson Tributary. The Site is in the West half of the West half of Section 27, and the South half of the North half and the South half of Section 28, Township 8 South, Range 67 West of the Sixth Principal Meridian, County of Douglas, State of Colorado. A vicinity map for the site can be found in Appendix A.

B. Description of Property

The Site is currently undeveloped with existing native vegetation, and the land uses according to the approved PD are Mixed Use. The Site has naturally occurring slopes ranging from 1 to 30 percent. The soils within the Site primarily consist of Klutch clay loam soil, which is within the hydrologic soil group D. A soils map has been provided and can be found in Appendix A.

The Site is not adjacent to an existing floodplain, and lies within Zone X, "Areas determined to be outside the 0.2% annual chance floodplain," as depicted on the FIRM Map 08035C0284G found in Appendix A. The Site will not propose modifications or improvements to the floodplain. The Site drainage will not adversely impact the surrounding existing drainage infrastructure.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

The Site lies within the North Dawson Tributary basin. Runoff generated within the Site will generally follow the drainage patterns set forth in the "Phase III Drainage Report for Dawson Trails Filing No.2" by EMK Consultants, approved October 2025, from here on known as "Approved Filing 2 Report". Runoff will be conveyed via existing and proposed pipe networks to the existing water quality only ponds before being discharged into the existing **Regional Flood Control Pond A1** to the east. Please see the Proposed Drainage Map found in Appendix E of this report for basin flow information.

The Site falls within Zone X, as shown on the FIRM Map 08035C0284G. The development will have no effect on the Zone X designation, where there are "Areas determined to be outside the 0.2% annual chance floodplain." The development will not have an effect on the Zone X designation and will remain the same. A FIRM map can be found in Appendix A.

B. Minor Drainage Basin

Minor Drainage Basins for the Site and adjacent lots have been delineated using the existing and proposed grading. The developed minor basins will include overland flow and storm sewer collection systems which will direct stormwater to the existing detention ponds. The site drainage will not be impacted by any irrigation facilities. Minor basins have been established for the site, and are described below:

Basin A1

Basin A1 encompasses the southwest corner of the site and is comprised of roofs, paved area, and landscape area. Runoff generated from this basin will flow southeast toward a proposed Sump Nyloplast Inlet at design point (DP) A1. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin B1.

Basin A2

Basin A2 encompasses a portion of the southwest building's roof and landscaped area. Runoff generated from this basin will be conveyed to a Sump Nyloplast Inlet at design point (DP) A2. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A7.

Basin A3

Basin A3 encompasses a portion of the southwest building's roof. Runoff generated from this basin will be conveyed through roof drains to a Nyloplast inlet near design point (DP) A3. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3.

Basin A4

Basin A4 encompasses a portion of the southwest building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) A4. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3.

Basin A5

Basin A5 encompasses a portion of landscaped area to the southwest of the site. Runoff generated from this basin will be conveyed to a Sump Nyloplast inlet at design point (DP) A5. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A8.

Basin A6

Basin A6 encompasses a portion of landscaped area to the southwest of the site. Runoff generated from this basin will be conveyed to a Sump Nyloplast inlet at design point (DP) A6. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A9.

Basin A7

Basin A7 encompasses the southwest corner of the parking lot and is comprised of paved area and landscape area. Runoff generated from this basin will flow south to a proposed Sump Type 16 inlet at design point (DP) A7. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A12.

Basin A8

Basin A8 encompasses the southwest corner of the parking lot and is comprised of roof, paved and landscape area. Runoff generated from this basin will be conveyed to the west to a Sump Type 16 inlet at Design Point (DP) A8. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A9.

Basin A9

Basin A9 encompasses the southwest corner of the parking lot and is comprised of roof, paved and landscape area. Runoff generated from this basin will be conveyed to the west to a Sump Type 16 inlet at Design Point (DP) A9. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A8.

Basin A10

Basin A10 encompasses the southwest corner of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the west to a Sump Type 16 inlet at Design Point (DP) A10. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A9.

Basin A11

Basin A11 encompasses a portion of the west building's roof. Runoff generated from this basin will be conveyed to a Sump Nyloplast inlet near design point (DP) A11. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A10.

Basin A12

Basin A12 encompasses the southwest corner of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the south to a Sump Type 16 inlet at Design Point (DP) A12. Captured flows will be conveyed south through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A7.

Basin B1

Basin B1 encompasses a portion of the southwest building's roof and landscaped area. Runoff generated from this basin will be conveyed to a Sump Nyloplast Inlet at design point (DP) B1. Captured flows will be conveyed west through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin A1.

Basin B2

Basin B2 encompasses a portion of the landscaped area to the west. Runoff generated from this basin will be conveyed to a Sump Type C Inlet at design point (DP) B2. Captured flows will be conveyed west through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin B1.

Basin B3

Basin B3 encompasses a portion of the west building's roof and landscaped area. Runoff generated from this basin will be conveyed to a Sump Nyloplast Inlet at design point (DP) B3. Captured flows will be conveyed west through the proposed then existing storm infrastructure to Pond D3. If the inlet were to become clogged, the overflow would be directed to basin B2.

Basin B4

Basin B4 encompasses a portion of the west building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) B4. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed west through the proposed then existing storm infrastructure to Pond D3.

Basin B5

Basin B5 encompasses a portion of the west building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) B5. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed west through the proposed then existing storm infrastructure to Pond D3.

Basin C1

Basin C1 encompasses a portion of the west building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) C1. The roof drains will be connected

to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin C2

Basin C2 encompasses a portion of the west building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) C2. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin C3

Basin C3 encompasses a portion of the west building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) C3. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin C4

Basin C4 encompasses a portion of the landscaped area to the west. Runoff generated from this basin will be conveyed to a Sump Nyloplast Inlet at design point (DP) C4. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin B3.

Basin C5

Basin C5 encompasses the west portion of the parking lot and is comprised of roof, paved, and landscape area. Runoff generated from this basin will be conveyed to the west to a Sump Type 16 inlet at Design Point (DP) C5. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C6.

Basin C6

Basin C6 encompasses the west portion of the parking lot and is comprised of roof, paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) C6. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C17.

Basin C7

Basin C7 encompasses the west entry road and is comprised of paved area. Runoff generated from this basin will be conveyed to the east to an On-Grade Type R inlet at Design Point (DP) C7. Captured flows will be conveyed through the proposed then existing storm infrastructure to Pond D1. Bypass flows will be conveyed to basin C17 where they will be fully captured.

Basin C8

Basin C8 encompasses the west entry road and is comprised of paved area. Runoff generated from this basin will be conveyed to the east to an On-Grade Type R inlet at Design Point (DP) C8. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. Bypass flows will be conveyed to basin C18 where they will be fully captured.

Basin C9

Basin C9 encompasses the south portion of the parking lot and is comprised of paved area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) C9. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin A12.

Basin C10

Basin C10 encompasses the south portion of the parking lot and is comprised of paved area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) C10. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C11.

Basin C11

Basin C11 encompasses the south portion of the parking lot and is comprised of paved area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) C11. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C12.

Basin C12

Basin C12 encompasses the south portion of the parking lot and is comprised of paved area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) C12. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C11.

Basin C13

Basin C13 encompasses a portion of amenity center to the south and is comprised of roof, paved and landscape area. Runoff generated from this basin will be conveyed to the north to a Sump Nyloplast inlet at Design Point (DP) C13. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C14.

Basin C14

Basin C14 encompasses the south portion of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the east to an On-Grade Type R inlet at Design Point (DP) C14. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. Bypass flows will be conveyed to basin C30 where they will be fully captured.

Basin C15

Basin C15 encompasses the east portion of the site, including the entry road, and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type R inlet at Design Point (DP) C15. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C30.

Basin C16

Basin C16 encompasses the east portion of the parking lot and is comprised of roof, paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) C16. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C14.

Basin C17

Basin C17 encompasses the east portion of the parking lot and is comprised of roof, paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) C17. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C16.

Basin C18

Basin C18 encompasses the north portion of the parking lot and is comprised of roof, paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) C18. Captured flows will be conveyed through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D18.

Basin C19

Basin C19 encompasses a portion of the amenity center to the south and is comprised of roof area. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) C19. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin C20

Basin C20 encompasses a portion of the amenity center to the south and comprised of landscape area. Runoff generated from this basin will be conveyed to a Sump Nyloplast inlet at design point (DP) C20. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C14.

Basin C21

Basin C21 encompasses a portion of the amenity center to the south and is comprised of roof area. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) C21. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin C22

Basin C22 encompasses a portion of the amenity center to the south and is comprised of roof area. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) C22. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin C23

Basin C23 encompasses a portion of the amenity center to the south and comprised of landscape area. Runoff generated from this basin will be conveyed to a Sump Nyloplast inlet at design point (DP) C23. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C14.

Basin C24

Basin C24 encompasses a portion of the amenity center to the south and comprised of landscape area. Runoff generated from this basin will be conveyed to a Sump Nyloplast inlet at design point (DP) C24. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin OS2.

Basin C25

Basin C25 encompasses a portion of the amenity center to the south and is comprised of roof area. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) C25. The roof drains will be connected to the subsurface storm infrastructure

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where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin C26

Basin C26 encompasses a portion of the amenity center to the south and is comprised of roof area. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) C26. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin C27

Basin C27 encompasses a portion of the amenity center to the south and is comprised of landscape area. Runoff generated from this basin will be conveyed to a Sump Nyloplast inlet at design point (DP) C27. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C29.

Basin C28

Basin C28 encompasses a portion of the amenity center to the south and is comprised of landscape and roof area. Runoff generated from this basin will be conveyed to a Sump Nyloplast inlet at design point (DP) C28. The roof drains will be connected to the subsurface storm infrastructure where captured east flows will be conveyed through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C29.

Basin C29

Basin C29 encompasses the southeast portion of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type R inlet at Design Point (DP) C29. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C30.

Basin C30

Basin C30 encompasses the east portion of the site including the entry road and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type R inlet at Design Point (DP) C30. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C15.

Basin D1

Basin D1 encompasses the northwest portion of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D1. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D10.

Basin D2

Basin D2 encompasses the northwest portion of the site and is comprised of landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Nyloplast inlet at Design Point (DP) D2. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D10.

Basin D3

Basin D3 encompasses a portion of the northwest building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D3. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D4

Basin D4 encompasses a portion of the northwest building and is comprised of landscape and roof area. Runoff generated from this basin will flow southeast toward a proposed Sump Nyloplast Inlet at design point (DP) D4. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D10.

Basin D5

Basin D5 encompasses a portion of the northwest building and is comprised of landscape and roof area. Runoff generated from this basin will flow southeast toward a proposed Sump Nyloplast Inlet at design point (DP) D5. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D2.

Basin D6

Basin D6 encompasses a portion of the northwest building and is comprised of landscape and roof area. Runoff generated from this basin will flow east toward a proposed Sump Nyloplast Inlet at design point (DP) D6. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D7.

Basin D7

Basin D7 encompasses a northwest portion of the site and is comprised of area. Runoff generated from this basin will flow east toward a proposed Sump Nyloplast Inlet at design point (DP) D7. The captured flow will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D8.

Basin D8

Basin D8 encompasses a northwest portion of the site and is comprised of area. Runoff generated from this basin will flow east toward a proposed Sump Nyloplast Inlet at design point (DP) D8. The captured flow will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D7.

Basin D9

Basin D9 encompasses a portion of the northwest building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D9. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D10

Basin D10 encompasses a portion of the northwest building and is comprised of landscape, paved and roof area. Runoff generated from this basin will flow east toward a proposed Sump Type 16 Inlet at design point (DP) D10. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D15.

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Basin D11

Basin D11 encompasses a portion of the northwest building and is comprised of landscape, paved, and roof area. Runoff generated from this basin will flow east toward a proposed Sump Type 16 Inlet at design point (DP) D11. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D15.

Basin D12

Basin D12 encompasses a portion of the northwest building and is comprised of landscape, paved and roof area. Runoff generated from this basin will flow east toward a proposed Sump Type 16 Inlet at design point (DP) D12. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D11.

Basin D13

Basin D13 encompasses a portion of the northwest building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D13. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D14

Basin D14 encompasses a northwest portion of the site and is comprised of area. Runoff generated from this basin will flow east toward a proposed Sump Nyloplast Inlet at design point (DP) D14. The captured flow will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin OS1.

Basin D15

Basin D15 encompasses the north portion of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D15. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D18.

Basin D16

Basin D16 encompasses a portion of the north building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D16. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D17

Basin D17 encompasses a portion of the north building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D17. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D18

Basin D18 encompasses the north portion of the parking lot and is comprised of paved, roof and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D18. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D15.

Basin D19

Basin D19 encompasses a portion of the north building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D19. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D20

Basin D20 encompasses the east portion of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the west to a Sump Type 16 inlet at Design Point (DP) D20. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C30.

Basin D21

Basin D21 encompasses the east portion of the parking lot and is comprised of paved, roof and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D21. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D22.

Basin D22

Basin D22 encompasses the east portion of the parking lot and is comprised of paved, roof and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D22. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D21.

Basin D23

Basin D23 encompasses the east portion of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the west to a Sump Type 16 inlet at Design Point (DP) D23. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D22.

Basin D24

Basin D24 encompasses the east portion of the parking lot and is comprised of paved, roof and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D24. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D23.

Basin D25

Basin D25 encompasses the east portion of the parking lot and is comprised of paved, roof and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D25. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D26.

Basin D26

Basin D26 encompasses the northeast portion of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D26. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D38.

Basin D27

Basin D27 encompasses a portion of the north building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D27. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D28

Basin D28 encompasses a portion of the north building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D28. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D29

Basin D29 encompasses a portion of the east building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D29. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D30

Basin D30 encompasses a portion of the east building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D30. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D31

Basin D31 encompasses a portion of the east building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D31. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D32

Basin D32 encompasses a portion of the east building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D32. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D33

Basin D33 encompasses a portion of the east building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D33. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D34

Basin D34 encompasses the east portion of the site and is comprised of paved, roof and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type C inlet at Design Point (DP) D34. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C15.

Basin D35

Basin D35 encompasses a portion of the east building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D35. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D36

Basin D36 encompasses the east portion of the site and is comprised of roof and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Nyloplast inlet at Design Point (DP) D36. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D26.

Basin D37

Basin D37 encompasses a portion of the east building's roof. Runoff generated from this basin will be conveyed via the roof drains at design point (DP) D37. The roof drains will be connected to the subsurface storm infrastructure where captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1.

Basin D38

Basin D38 encompasses the northeast portion of the parking lot and is comprised of paved and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type 16 inlet at Design Point (DP) D38. Captured flows will be conveyed east through the proposed then existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin D26.

Basin OS1

Basin OS1 encompasses the northern portion of the site and is comprised of roofs, paved, and landscape area. Runoff generated from this basin will be conveyed to the east to a Sump Type R inlet near Design Point (DP) OS1. Captured flows will be conveyed east through the existing storm infrastructure to Pond D1. If the inlet were to become clogged, the overflow would be directed to basin C15.

Basin OS2

Basin OS2 encompasses the southern portion of the site and is comprised of roofs, paved, and landscape area. Runoff generated from this basin will sheet flow south into Pond D3 near Design Point (DP) OS2.

Basin EX A4.1

Existing basin A4.1 is a portion of the A4 subbasin delineated in the "Phase III Drainage Report for Dawson Trails Filing No.2" by EMK Consultants, which was approved in October 2025. The basin sheet flows through open space and discharges into Pond D3, which ultimately discharges into the regional flood control Pond A1.

Basin EX A3.1

Existing basin A3.1 is a portion of the A3 subbasin delineated in the "Phase III Drainage Report for Dawson Trails Filing No.2" by EMK Consultants, which was approved in October 2025. The basin sheet flows through open space until reaching the existing storm infrastructure, which discharges into Pond D1. Ultimately, the runoff discharges into the regional flood control Pond A1.

Basin EX A3.2

Existing basin A3.2 is a portion of the A3 subbasin delineated in the "Phase III Drainage Report for Dawson Trails Filing No.2" by EMK Consultants, which was approved in October 2025. The basin sheet flows through open space until reaching the existing storm infrastructure, which discharges into Pond D1. Ultimately, the runoff discharges into the regional flood control Pond A1.

III. DRAINAGE DESIGN CRITERIA

A. Regulations

This Phase II Drainage Report is in accordance with the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual (Reference A), and the Mile High Flood District (MHFD) Storm Drainage Criteria Manual (Reference B). These manuals were used as a basis of design for the site. The report will analyze the minor (5-year) and major (100-year) storm events.

B. Drainage Studies, Master Plans, and Site Constraints

The "Phase III Drainage Report for Dawson Trails Filing No.2" by EMK Consultants, was approved in October 2025. This report was developed for the area within Dawson Trails Filing No.2 to the North of North Dawson Tributary and provides a more detailed drainage plan for the Dawson Trails Filing No.2 area. The report provides information on the existing topography and infrastructure that were created in anticipation of the full development of Dawson Trails Filing No.2. The proposed improvements conform with the approved report.

C. Hydrology

The Site and subsequent drainage sub-basins are less than 160 acres, so the Rational Method was used to determine the flow rates for the site. The sub-basins were delineated based on the existing and proposed topography developed for the project. Flow rates for each basin can be found in Appendix B.

The intensity-frequency curves used in the Rational Method calculations were taken from the Town of Castle Rock's Storm Drainage Design and Technical Criteria Manual. All drainage facilities were analyzed and designed for both the minor (5-year) and major (100-year) storm events. Time of concentration calculations were used to determine the rainfall intensity. These calculations can also be found in Appendix B.

D. Hydraulics

Hydraulic calculations for street and inlet capacity will be performed with final plat submittals and based on the design charts in Chapter 8 of the Town's Drainage Criteria, and design spreadsheets provided by the Town. Hydraulic Grade Lines (HGL) will be calculated in subsequent reports and will conform to the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual, and the Mile High Flood District (MHFD) Storm Drainage Criteria Manuals.

E. Storage and Water Quality Enhancements

Water quality measures were originally outlined in the Approved Filing 2 Report. Our current analysis indicates that the proposed Site has a higher imperviousness than initially anticipated in the Approved Filing 2 Report. To account for these increases, we recreated and analyzed the pond spreadsheets using the updated impervious values. The results confirm that the existing water quality only ponds were designed with sufficient capacity to manage the excess flows. Therefore, no further water quality enhancements or infrastructure upgrades will be necessary. MHFD detention spreadsheets have been included in Appendix C verifying these ponds will perform as designed with adequate volume and drain release times.

Step 1: Reduce Runoff Volume to the Maximum Extent Practicable

The Site described here in will try to reduce impervious area as much as possible. A portion of the roof runoff will be directed to areas around the building that include different types of permeable surfaces to allow infiltration before the runoff reaches the proposed storm network.

Step 2: Provide Water Quality Capture Volume and Flood Control Detention Via Full-Spectrum Detention

Water Quality Capture Volume (WQCV) and flood control detention are provided for the site through a comprehensive three-pond system designed by EMK Consultants in the Approved Filing 2 Report. Runoff from the western and central portions of the site (Basins A and B) is conveyed to Pond D1, while runoff from the eastern and perimeter portions (Basins C and OS) is conveyed to Pond D3. Both ponds provide initial water quality treatment and detention before discharging into the Regional Flood Control Pond A1. The proposed site improvements result in runoff characteristics that are consistent with the Approved Filing 2 Report; therefore, no additional flows beyond the expected design capacity will be added to either pond, and no additional water quality or detention infrastructure is required.

Step 3: Utilize Stream Channel Stabilization Techniques

This project will not utilize any channel stabilization techniques, but a brief description of channel stabilization has been included. Natural stream stabilization is the practice of stabilizing a channel against erosion without lining a channel with concrete. The main goal of natural stream stabilization is to create streams and floodplains that are stable, well-vegetated, and mimic its natural state. This goal is just as important as improving the water quality of runoff flowing off a development site and into a receiving stream.

Step 4: Undertake Source Control.

This project will not utilize any source control techniques, but a brief description of source control has been included. The implementation of source control measures on a development is used to stop potential pollutants from making it into our drainage ways. If the development has the potential for chemicals, oils, fertilizers, or other pollutants, additional measures shall be provided.

F. Variances from Criteria

No variances are being requested at this time.

IV. STORMWATER MANAGEMENT FACILITY DESIGN

A. Stormwater Conveyance Facilities

The site will generally follow the historic drainage patterns for the site with some minor rerouting due to the development of our site. Imperviousness for our proposed site is slightly more than what was expected in the Approved Filing 2 Report (Appendix D). Runoff generated from our site will drain towards the North Dawson Tributary. The proposed storm systems will tie into the existing storm system and outfall into the existing pond system located on the west and east sides of Dawson Trails Boulevard. The existing pond will outfall into the existing **Regional Flood Control Pond A1**.

B. Stormwater Storage Facilities

The Site will utilize the existing pond system located on the west and east sides of Dawson Trails Boulevard. Runoff will be conveyed via existing and proposed pipe networks to the existing water quality ponds before being discharged into the existing **Regional Flood Control Pond A1** to the east. It should be noted that the WQ ponds are strictly sized to treat the water quality capture volume. By design, these ponds operate as flow-through systems for major storm events. Runoff exceeding the 5-year event capacity will safely overtop the spillway to be conveyed downstream. The existing **Regional Flood Control Pond A1** provides the necessary peak flow attenuation for the higher intensity events. The existing outlet structure design for Pond D1 and D3 are capable of handling the additional imperviousness from our Site (Appendix C). The existing pond system calculations can be found in Appendix D, as detailed in the Approved Filing 2 Report.

Source	Pond D1 Imperviousness (%)	Pond D3 Imperviousness (%)
Anticipated EMK	70.8%	47.6%
Proposed Site	72.9%	47.9%

The proposed Site imperviousness values (72.9% for Pond D1 and 47.9% for Pond D3) were generally in line with the anticipated values in the previously approved drainage report (70.8% for Pond D1 and 47.6% for Pond D3). Despite the minor increase in watershed imperviousness, both ponds will function as designed in the Approved Filing 2 Report.

The existing water quality pond calculations have been updated accordingly and confirm adequate drain times of 43 and 45 hours for the 97% and 99% WQCV/EURV events, respectively. The approved pond spillway has a depth of 5.20', corresponding to a volume of 1.894 ac-ft, which exceeds the proposed required volume of 1.864 ac-ft (Appendix C). MHFD detention spreadsheets have been included in Appendix C verifying these ponds will perform as designed with adequate volume and drain release times.

C. Water Quality Enhancement Best Management Practices

Water quality measures are included in the existing full-spectrum pond system. The pond calculations can be found in Appendix C. Temporary sediment trap(s) or other approved BMPs will be used to treat flows in the interim condition until the future roadways are buildout.

D. Floodplain Modification

The proposed improvements are not located within a floodplain, as defined by the FEMA FIRM map panel number 08035C0284G dated May 16, 2016. A copy of the FIRM map can be found in Appendix A. East Plum Creek has a regulatory Zone AE floodplain with a floodway delineated in the project area as shown on the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) number 08035C0284G effective May 16, 2016. There are no proposed modifications to the floodplain with this development.

E. Additional Permitting Requirements

No additional permits are needed with this development.

F. General

All applicable tables, figures, and charts from the referenced reports and criteria manuals used in the drainage design of the site can be found in Appendix D. Additionally, excerpts from the referenced report have been included in the same Appendix D.

G. Operation and Maintenance

The Owner will be the responsible party for the operation and maintenance of the stormwater management facilities. EDBs have low to moderate maintenance requirements on a routine basis but may require significant maintenance once every 15 to 25 years.

V. CONCLUSIONS

A. Compliance with Standards

The drainage design for Dawson Trails Tract F conforms to the Town of Castle Rock's Storm Drainage Design and Technical Criteria Manual and the Mile High Flood Districts' Drainage Criteria Manual, where applicable. The drainage design is in conformance with the Approved Filing 2 Report.

B. Variances

No variances are being requested at this moment.

C. Drainage Concept

The Rational Method was used to determine the developed runoff values for the minor drainage basins throughout the site. These basins were delineated based on the natural site topography and the developed site plan. Once the runoff values were identified, storm sewer pipes and other drainage conveyances were designed to capture and transport runoff towards the existing detention pond. The storm sewer system has been designed to capture the minor (5-year) and major (100-year) storm events. The proposed development will not have any negative impacts to the downstream channel.

VI. REFERENCES

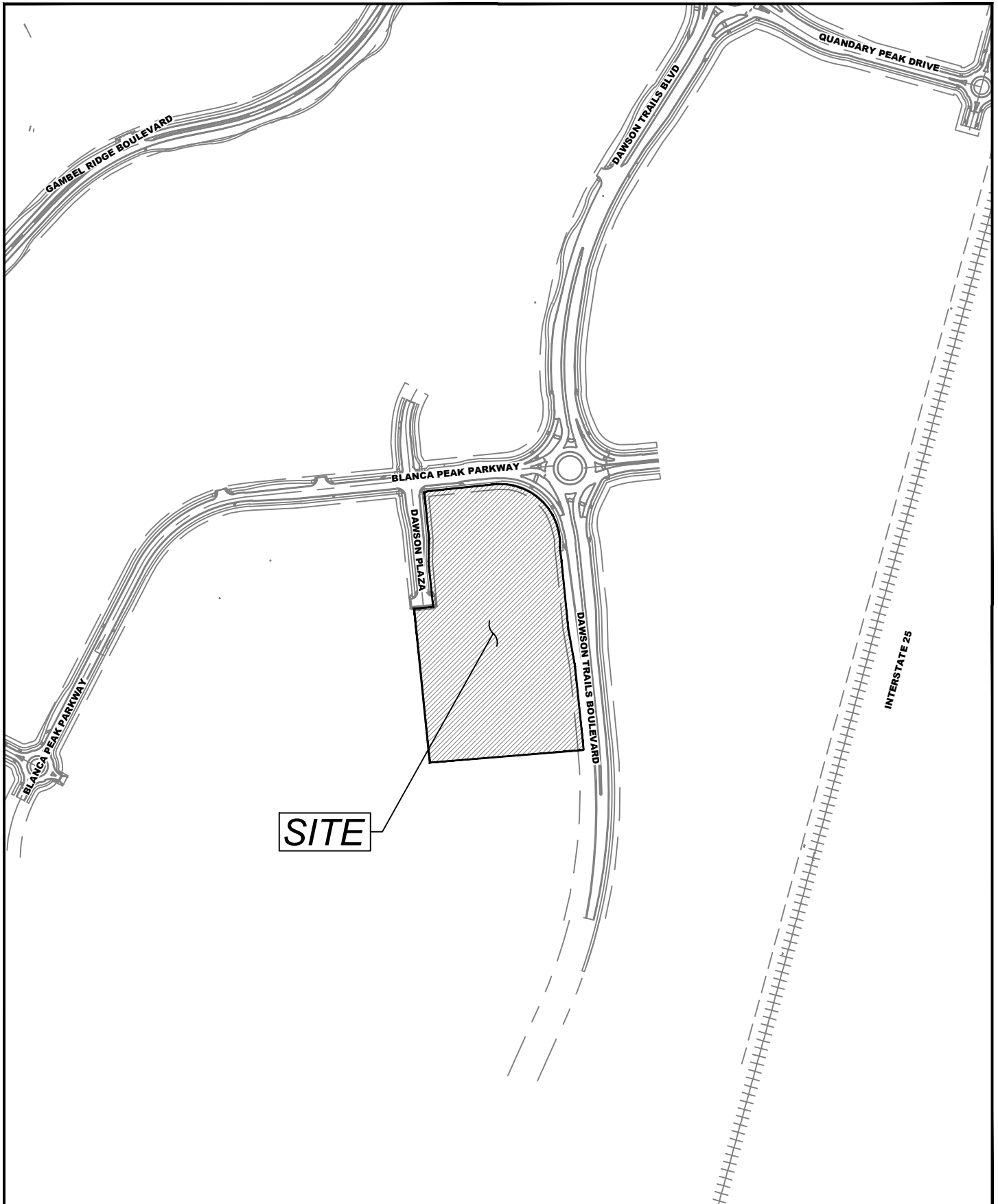
- A. Town of Castle Rock Storm Drainage Design and Technical Criteria Manual, September 2007, Revised June 2019.
- B. Drainage Criteria Manual, Volumes 1, 2, & 3, Urban Drainage and Flood Control District, Volumes 1 – Originally Published September 1969, Updated May 2017; Volumes 2 – Originally Published September 1969, Updated September 2017; Volume 3 – Originally published September 1992, Updated April 2018.
- C. Phase III Drainage Report for Dawson Trails Filing No.2 by EMK Consultants, which was approved in October 2025
- D. Public Improvement Construction Plans for Dawson Trails Filing 2 Infrastructure By EMK Consultants Dated April 2025

APPENDIX A

MAPS

Vicinity Map
Soil Map
Firm Map

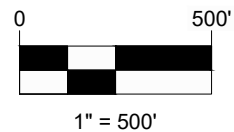
2/9/2026 12:55 PM ; X:\GARRETT - DAWSON TRAIL\DOCUMENTS\REPORTS\DRAINAGE\00 - PHASE 2\1 - MAPS (VIC-FEMA-SOILS)\VICINITYMAP.DWG;



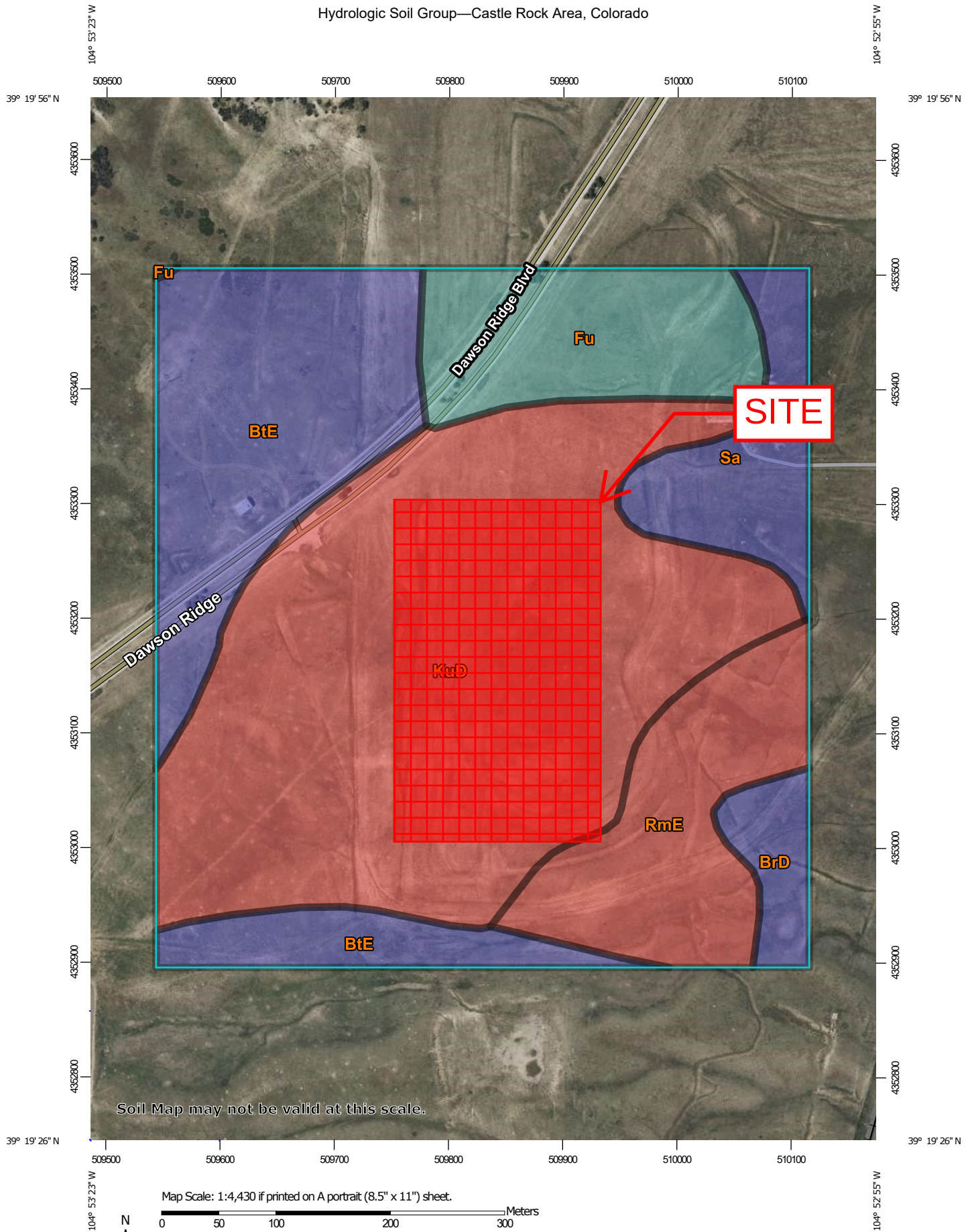
td terracina
design
10200 E. Girard Ave, A-314
Denver, CO 80231
ph: 303.632.8867

DAWSON TRAIL
VICINITY MAP

TOWN OF CASTLE ROCK DATE: 2/9/2026



Hydrologic Soil Group—Castle Rock Area, 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: Castle Rock Area, Colorado
 Survey Area Data: Version 18, Aug 29, 2025

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

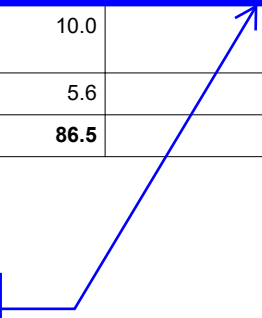
Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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
BrD	Bresser sandy loam, cool, 5 to 9 percent slopes	B	2.4	2.7%
BtE	Bresser-Truckton sandy loams, 5 to 25 percent slopes	B	18.5	21.4%
Fu	Fondis-Kutch association	C	8.7	10.1%
KuD	Kutch clay loam, 4 to 8 percent slopes	D	41.3	47.7%
RmE	Renohill-Buick complex, 5 to 25 percent slopes	D	10.0	11.5%
Sa	Sampson loam	B	5.6	6.5%
Totals for Area of Interest			86.5	100.0%

100% of Site



Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables shown on this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Floodway Data table shown on this FIRM.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was provided by the Douglas County GIS Department and the Town of Castle Rock GIS Department. Additional input was provided by the City of Lone Tree and Town of Parker. These data are current as of 2010.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

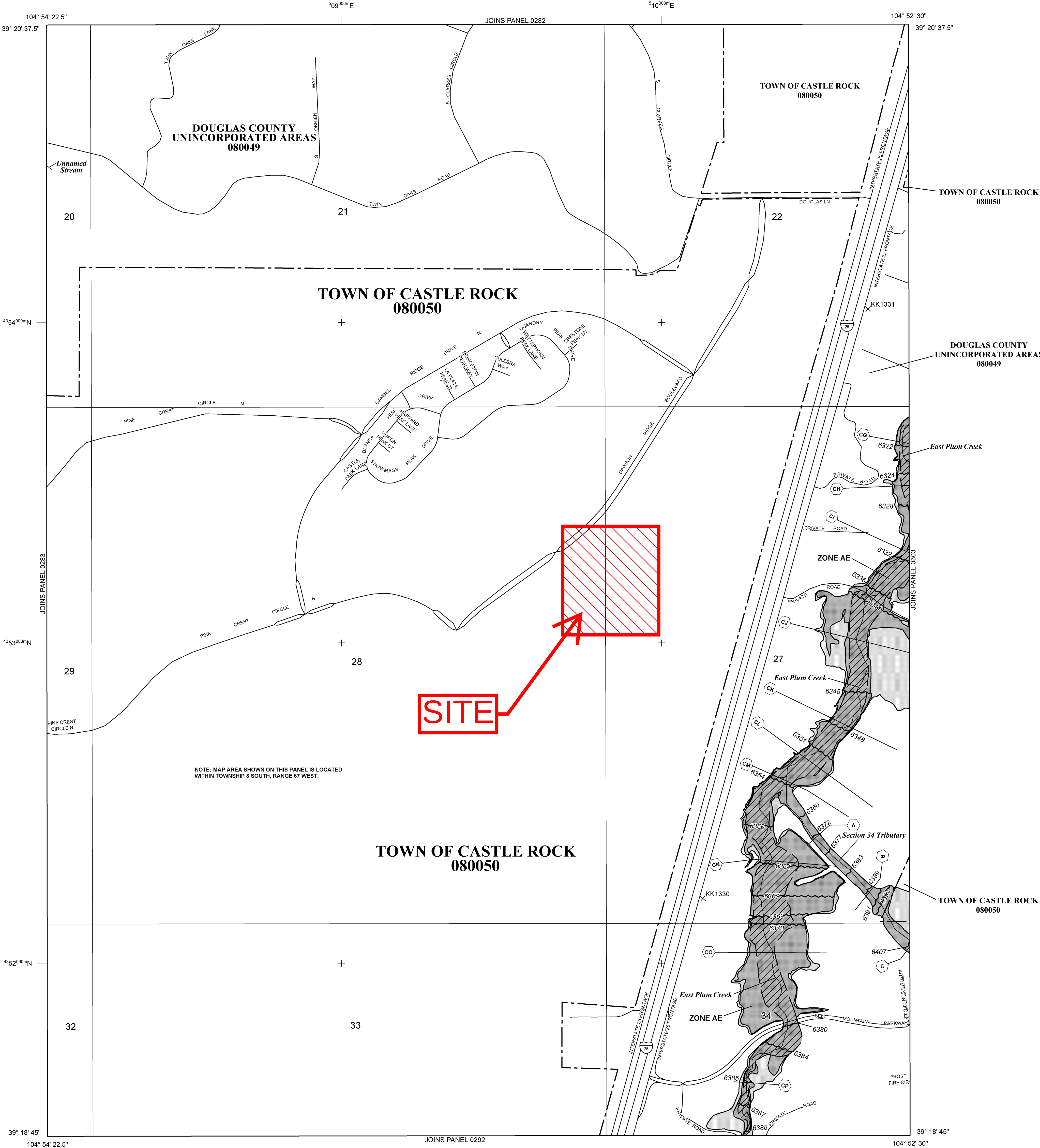
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations** and **floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

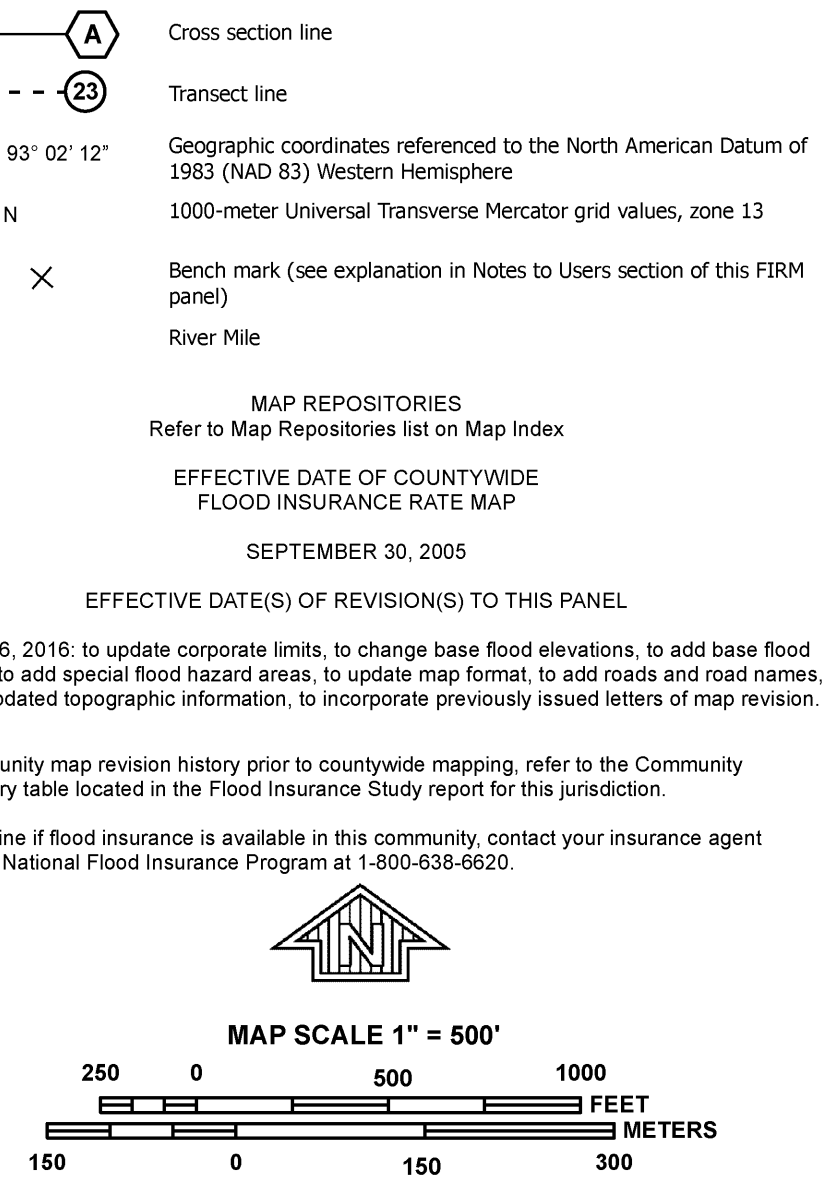
For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nflp>.



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
- ZONE A** No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently deteriorated. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
- FLOODWAY AREAS IN ZONE AE**
- The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.
- OTHER FLOOD AREAS**
- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
OTHER AREAS
ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.
- COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
OTHERWISE PROTECTED AREAS (OPAs)
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*
*Referenced to the North American Vertical Datum of 1988
- Cross section line**
Transect line
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
1000-meter Universal Transverse Mercator grid values, zone 13
Bench mark (see explanation in Notes to Users section of this FIRM panel)
River Mile
- MAP REPOSITORIES**
Refer to Map Repositories list on Map Index
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
SEPTEMBER 30, 2005
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
MARCH 16, 2016: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to update map format, to add roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision.
- For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0284G

FIRM
FLOOD INSURANCE RATE MAP
DOUGLAS COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 284 OF 495
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0284	G
DOUGLAS COUNTY	080049	0284	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08035C0284G
MAP REVISED
MARCH 16, 2016
Federal Emergency Management Agency

APPENDIX B

HYDROLOGIC COMPUTATIONS

Percent Imperviousness
Runoff Coefficient
Time of Concentration
Minor Storm Rational Method
Major Storm Rational Method

Project Name: Dawson Trails
Prepared By: SC

Percent Impervious Calculations

Basin Id	Design Point	Basin Area (Ac)	Historic Flow Area	Paved Street, Roof, Drives, Walks Area	Newly Graded Areas Area	Weighted % Impervious
			5%	95%	20%	
A01	A01	0.418		0.171	0.247	50.7%
A02	A02	0.019		0.019		95.0%
A03	A03	0.114		0.114		95.0%
A04	A04	0.017		0.017		95.0%
A05	A05	0.009		0.000	0.008	21.8%
A06	A06	0.008		0.000	0.008	20.9%
A07	A07	0.113		0.079	0.034	72.3%
A08	A08	0.106		0.104	0.003	93.2%
A09	A09	0.100		0.098	0.002	93.6%
A10	A10	0.213		0.193	0.020	87.9%
A11	A11	0.019		0.019		95.0%
A12	A12	0.088		0.081	0.007	88.8%
B01	B01	0.472		0.206	0.266	52.8%
B02	B02	0.089		0.018	0.071	35.5%
B03	B03	0.106		0.027	0.079	39.2%
B04	B04	0.087		0.087		95.0%
B05	B05	0.068		0.047	0.021	71.4%
C01	C01	0.136		0.136		95.0%
C02	C02	0.017		0.017		95.0%
C03	C03	0.019		0.019		95.0%
C04	C04	0.037		0.000	0.037	20.0%
C05	C05	0.259		0.249	0.010	92.2%
C06	C06	0.296		0.265	0.031	87.2%
C07	C07	0.087		0.087		95.0%
C08	C08	0.086		0.086		95.0%
C09	C09	0.115		0.114	0.001	94.3%
C10	C10	0.090		0.088	0.002	93.1%
C11	C11	0.172		0.163	0.009	91.0%
C12	C12	0.103		0.099	0.004	91.9%
C13	C13	0.217		0.026	0.191	29.0%
C14	C14	0.681		0.601	0.081	86.1%
C15	C15	1.771		0.889	0.882	57.7%
C16	C16	0.266		0.255	0.012	91.7%
C17	C17	0.500		0.408	0.092	81.3%
C18	C18	0.255		0.246	0.009	92.3%
C19	C19	0.025		0.025		95.0%
C20	C20	0.006		0.001	0.005	26.5%
C21	C21	0.043		0.043		95.0%
C22	C22	0.041		0.041		95.0%

Project Name: Dawson Trails
Prepared By: SC



Percent Impervious Calculations

Basin Id	Design Point	Basin Area (Ac)	Historic Flow Area	Paved Street, Roof, Drives, Walks Area	Newly Graded Areas Area	Weighted % Impervious
			5%	95%	20%	
C23	C23	0.013		0.002	0.011	28.9%
C24	C24	0.019		0.001	0.018	22.8%
C25	C25	0.028		0.028		95.0%
C26	C26	0.017		0.017		95.0%
C27	C27	0.018		0.002	0.017	26.1%
C28	C28	0.007		0.005	0.002	74.2%
C29	C29	0.142		0.129	0.013	88.4%
C30	C30	0.707		0.284	0.424	50.1%
D01	D01	0.256		0.195	0.060	77.3%
D02	D02	0.036		0.000	0.036	20.2%
D03	D03	0.034		0.034		95.0%
D04	D04	0.019		0.019		95.0%
D05	D05	0.189		0.081	0.109	52.0%
D06	D06	0.079		0.046	0.033	63.8%
D07	D07	0.021		0.000	0.021	20.0%
D08	D08	0.023		0.000	0.023	20.0%
D09	D09	0.049		0.049		95.0%
D10	D10	0.414		0.390	0.024	90.6%
D11	D11	0.158		0.155	0.003	93.5%
D12	D12	0.140		0.125	0.015	86.9%
D13	D13	0.036		0.036		95.0%
D14	D14	0.115		0.000	0.115	20.0%
D15	D15	0.247		0.239	0.008	92.4%
D16	D16	0.019		0.019		95.0%
D17	D17	0.038		0.038		95.0%
D18	D18	0.456		0.393	0.063	84.7%
D19	D19	0.114		0.114		95.0%
D20	D20	0.109		0.095	0.014	85.2%
D21	D21	0.128		0.114	0.014	86.8%
D22	D22	0.133		0.111	0.022	82.8%
D23	D23	0.209	0.000	0.191	0.018	88.6%
D24	D24	0.249		0.245	0.004	93.9%
D25	D25	0.230		0.224	0.006	93.1%
D26	D26	0.236		0.214	0.022	88.0%
D27	D27	0.017		0.017		95.0%
D28	D28	0.036		0.036		95.0%
D29	D29	0.036		0.036		95.0%
D30	D30	0.017		0.017		95.0%
D31	D31	0.136		0.136		95.0%

Project Name: Dawson Trails
Prepared By: SC



Percent Impervious Calculations

Basin Id	Design Point	Basin Area (Ac)	Historic Flow	Paved Street, Roof, Drives, Walks Area	Newly Graded Areas Area	Weighted % Impervious
			Area	5%95%	20%	
D32	D32	0.155		0.155		95.0%
D33	D33	0.019		0.019		95.0%
D34	D34	0.136		0.079	0.057	63.5%
D35	D35	0.174		0.174		95.0%
D36	D36	0.019		0.019		95.0%
D37	D37	0.034		0.034		95.0%
D38	D38	0.054		0.052	0.001	93.0%
OS1	OS1	0.499		0.147	0.352	42.1%
OS2	OS2	0.796		0.072	0.724	26.8%

Project Name: Dawson Trails
Prepared By: SC

Runoff Coefficient (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area (Ac)	Runoff Coefficients, C							Weighted Coefficients, C						
						5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
A01	50.7%	0.51	A	0.00	0.42	0.36	0.35	0.36	0.38	0.41	0.46	0.51	0.45	0.39	0.45	0.50	0.60	0.64	0.69
			B	0.00		0.41	0.38	0.41	0.47	0.57	0.61	0.66							
			C/D	0.42		0.45	0.39	0.45	0.50	0.60	0.64	0.69							
A02	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
A03	95.0%	0.95	A	0.00	0.11	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.11		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
A04	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
A05	21.8%	0.22	A	0.00	0.01	0.12	0.12	0.12	0.13	0.16	0.21	0.28	0.21	0.15	0.21	0.29	0.44	0.50	0.57
			B	0.00		0.16	0.14	0.16	0.23	0.39	0.45	0.53							
			C/D	0.01		0.21	0.15	0.21	0.29	0.44	0.50	0.57							
A06	20.9%	0.21	A	0.00	0.01	0.12	0.11	0.12	0.13	0.15	0.20	0.27	0.21	0.14	0.21	0.29	0.44	0.50	0.57
			B	0.00		0.16	0.13	0.16	0.23	0.38	0.44	0.52							
			C/D	0.01		0.21	0.14	0.21	0.29	0.44	0.50	0.57							
A07	72.3%	0.72	A	0.00	0.11	0.57	0.55	0.57	0.59	0.61	0.64	0.67	0.62	0.58	0.62	0.66	0.72	0.75	0.78
			B	0.00		0.60	0.57	0.60	0.64	0.70	0.73	0.76							
			C/D	0.11		0.62	0.58	0.62	0.66	0.72	0.75	0.78							
A08	93.2%	0.93	A	0.00	0.11	0.79	0.77	0.79	0.80	0.82	0.82	0.84	0.79	0.77	0.79	0.82	0.84	0.85	0.87
			B	0.00		0.79	0.77	0.79	0.81	0.83	0.85	0.86							
			C/D	0.11		0.79	0.77	0.79	0.82	0.84	0.85	0.87							
A09	93.6%	0.94	A	0.00	0.10	0.79	0.77	0.79	0.80	0.82	0.82	0.84	0.80	0.77	0.80	0.82	0.84	0.86	0.87
			B	0.00		0.80	0.77	0.80	0.81	0.84	0.85	0.86							
			C/D	0.10		0.80	0.77	0.80	0.82	0.84	0.86	0.87							
A10	87.9%	0.88	A	0.00	0.21	0.73	0.71	0.73	0.75	0.77	0.78	0.79	0.75	0.72	0.75	0.78	0.81	0.83	0.84
			B	0.00		0.75	0.72	0.75	0.77	0.80	0.82	0.83							
			C/D	0.21		0.75	0.72	0.75	0.78	0.81	0.83	0.84							
A11	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
A12	88.8%	0.89	A	0.00	0.09	0.74	0.72	0.74	0.75	0.77	0.78	0.80	0.76	0.73	0.76	0.78	0.82	0.83	0.85
			B	0.00		0.75	0.73	0.75	0.77	0.81	0.82	0.84							
			C/D	0.09		0.76	0.73	0.76	0.78	0.82	0.83	0.85							
B01	52.8%	0.53	A	0.00	0.47	0.38	0.37	0.38	0.40	0.43	0.48	0.52	0.47	0.41	0.47	0.52	0.61	0.65	0.70
			B	0.00		0.43	0.40	0.43	0.48	0.58	0.62	0.67							
			C/D	0.47		0.47	0.41	0.47	0.52	0.61	0.65	0.70							

Project Name: Dawson Trails
Prepared By: SC

Runoff Coefficient (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area (Ac)	Runoff Coefficients, C							Weighted Coefficients, C						
						5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
B02	35.5%	0.35	A	0.00	0.09	0.23	0.22	0.23	0.24	0.28	0.33	0.39	0.32	0.26	0.32	0.39	0.52	0.57	0.63
			B	0.00		0.28	0.25	0.28	0.34	0.47	0.53	0.59							
			C/D	0.09		0.32	0.26	0.32	0.39	0.52	0.57	0.63							
B03	39.2%	0.39	A	0.00	0.11	0.26	0.25	0.26	0.28	0.31	0.36	0.42	0.35	0.29	0.35	0.42	0.54	0.59	0.64
			B	0.00		0.31	0.28	0.31	0.37	0.50	0.55	0.61							
			C/D	0.11		0.35	0.29	0.35	0.42	0.54	0.59	0.64							
B04	95.0%	0.95	A	0.00	0.09	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.09		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
B05	71.4%	0.71	A	0.00	0.07	0.56	0.54	0.56	0.58	0.61	0.64	0.67	0.62	0.57	0.62	0.66	0.72	0.75	0.78
			B	0.00		0.59	0.56	0.59	0.63	0.70	0.73	0.76							
			C/D	0.07		0.62	0.57	0.62	0.66	0.72	0.75	0.78							
C01	95.0%	0.95	A	0.00	0.14	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.14		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C02	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C03	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C04	20.0%	0.20	A	0.00	0.04	0.11	0.10	0.11	0.12	0.14	0.20	0.27	0.20	0.14	0.20	0.28	0.43	0.49	0.57
			B	0.00		0.15	0.13	0.15	0.22	0.37	0.44	0.52							
			C/D	0.04		0.20	0.14	0.20	0.28	0.43	0.49	0.57							
C05	92.2%	0.92	A	0.00	0.26	0.78	0.76	0.78	0.79	0.81	0.81	0.83	0.79	0.76	0.79	0.81	0.84	0.85	0.86
			B	0.00		0.78	0.76	0.78	0.80	0.83	0.84	0.85							
			C/D	0.26		0.79	0.76	0.79	0.81	0.84	0.85	0.86							
C06	87.2%	0.87	A	0.00	0.30	0.72	0.70	0.72	0.74	0.76	0.77	0.79	0.75	0.71	0.75	0.77	0.81	0.82	0.84
			B	0.00		0.74	0.71	0.74	0.76	0.80	0.81	0.83							
			C/D	0.30		0.75	0.71	0.75	0.77	0.81	0.82	0.84							
C07	95.0%	0.95	A	0.00	0.09	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.09		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C08	95.0%	0.95	A	0.00	0.09	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.09		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C09	94.3%	0.94	A	0.00	0.11	0.80	0.78	0.80	0.81	0.83	0.83	0.84	0.80	0.78	0.80	0.83	0.85	0.86	0.87
			B	0.00		0.80	0.78	0.80	0.82	0.84	0.85	0.86							
			C/D	0.11		0.80	0.78	0.80	0.83	0.85	0.86	0.87							

Project Name: Dawson Trails
Prepared By: SC

Runoff Coefficient (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area (Ac)	Runoff Coefficients, C							Weighted Coefficients, C						
						5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
C10	93.1%	0.93	A	0.00	0.09	0.79	0.77	0.79	0.80	0.82	0.82	0.84	0.79	0.77	0.79	0.82	0.84	0.85	0.86
			B	0.00		0.79	0.77	0.79	0.81	0.83	0.85	0.86							
			C/D	0.09		0.79	0.77	0.79	0.82	0.84	0.85	0.86							
C11	91.0%	0.91	A	0.00	0.17	0.76	0.74	0.76	0.78	0.79	0.80	0.82	0.78	0.75	0.78	0.80	0.83	0.84	0.86
			B	0.00		0.77	0.75	0.77	0.79	0.82	0.84	0.85							
			C/D	0.17		0.78	0.75	0.78	0.80	0.83	0.84	0.86							
C12	91.9%	0.92	A	0.00	0.10	0.77	0.75	0.77	0.79	0.80	0.81	0.83	0.78	0.76	0.78	0.81	0.83	0.85	0.86
			B	0.00		0.78	0.76	0.78	0.80	0.83	0.84	0.85							
			C/D	0.10		0.78	0.76	0.78	0.81	0.83	0.85	0.86							
C13	29.0%	0.29	A	0.00	0.22	0.18	0.17	0.18	0.19	0.22	0.27	0.34	0.27	0.21	0.27	0.34	0.48	0.54	0.60
			B	0.00		0.22	0.20	0.22	0.29	0.43	0.49	0.56							
			C/D	0.22		0.27	0.21	0.27	0.34	0.48	0.54	0.60							
C14	86.1%	0.86	A	0.00	0.68	0.71	0.69	0.71	0.73	0.75	0.76	0.78	0.74	0.71	0.74	0.76	0.80	0.82	0.84
			B	0.00		0.73	0.70	0.73	0.75	0.79	0.81	0.83							
			C/D	0.68		0.74	0.71	0.74	0.76	0.80	0.82	0.84							
C15	57.7%	0.58	A	0.00	1.77	0.43	0.41	0.43	0.44	0.48	0.52	0.56	0.50	0.45	0.50	0.56	0.64	0.68	0.72
			B	0.00		0.47	0.44	0.47	0.52	0.61	0.65	0.69							
			C/D	1.77		0.50	0.45	0.50	0.56	0.64	0.68	0.72							
C16	91.7%	0.92	A	0.00	0.27	0.77	0.75	0.77	0.79	0.80	0.81	0.82	0.78	0.76	0.78	0.81	0.83	0.85	0.86
			B	0.00		0.78	0.75	0.78	0.80	0.83	0.84	0.85							
			C/D	0.27		0.78	0.76	0.78	0.81	0.83	0.85	0.86							
C17	81.3%	0.81	A	0.00	0.50	0.66	0.64	0.66	0.68	0.70	0.72	0.74	0.70	0.66	0.70	0.73	0.77	0.79	0.82
			B	0.00		0.68	0.66	0.68	0.71	0.76	0.78	0.80							
			C/D	0.50		0.70	0.66	0.70	0.73	0.77	0.79	0.82							
C18	92.3%	0.92	A	0.00	0.25	0.78	0.76	0.78	0.79	0.81	0.81	0.83	0.79	0.76	0.79	0.81	0.84	0.85	0.86
			B	0.00		0.79	0.76	0.79	0.80	0.83	0.84	0.86							
			C/D	0.25		0.79	0.76	0.79	0.81	0.84	0.85	0.86							
C19	95.0%	0.95	A	0.00	0.03	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.03		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C20	26.5%	0.26	A	0.00	0.01	0.16	0.15	0.16	0.17	0.20	0.25	0.32	0.25	0.19	0.25	0.33	0.47	0.52	0.59
			B	0.00		0.20	0.18	0.20	0.27	0.42	0.48	0.55							
			C/D	0.01		0.25	0.19	0.25	0.33	0.47	0.52	0.59							
C21	95.0%	0.95	A	0.00	0.04	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.04		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C22	95.0%	0.95	A	0.00	0.04	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.04		0.81	0.79	0.81	0.83	0.85	0.86	0.87							

Project Name: Dawson Trails
Prepared By: SC

Runoff Coefficient (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area (Ac)	Runoff Coefficients, C							Weighted Coefficients, C						
						5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
C23	28.9%	0.29	A	0.00	0.01	0.18	0.17	0.18	0.19	0.22	0.27	0.34	0.27	0.21	0.27	0.34	0.48	0.54	0.60
			B	0.00		0.22	0.20	0.22	0.29	0.43	0.49	0.56							
			C/D	0.01		0.27	0.21	0.27	0.34	0.48	0.54	0.60							
C24	22.8%	0.23	A	0.00	0.02	0.13	0.12	0.13	0.14	0.17	0.22	0.29	0.22	0.16	0.22	0.30	0.45	0.51	0.58
			B	0.00		0.17	0.15	0.17	0.24	0.39	0.46	0.53							
			C/D	0.02		0.22	0.16	0.22	0.30	0.45	0.51	0.58							
C25	95.0%	0.95	A	0.00	0.03	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.03		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C26	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
C27	26.1%	0.26	A	0.00	0.02	0.16	0.15	0.16	0.17	0.20	0.25	0.31	0.25	0.19	0.25	0.32	0.47	0.52	0.59
			B	0.00		0.20	0.17	0.20	0.27	0.41	0.47	0.55							
			C/D	0.02		0.25	0.19	0.25	0.32	0.47	0.52	0.59							
C28	74.2%	0.74	A	0.00	0.01	0.59	0.57	0.59	0.60	0.63	0.66	0.69	0.64	0.60	0.64	0.68	0.73	0.76	0.79
			B	0.00		0.62	0.59	0.62	0.66	0.71	0.74	0.77							
			C/D	0.01		0.64	0.60	0.64	0.68	0.73	0.76	0.79							
C29	88.4%	0.88	A	0.00	0.14	0.74	0.72	0.74	0.75	0.77	0.78	0.80	0.76	0.73	0.76	0.78	0.81	0.83	0.85
			B	0.00		0.75	0.72	0.75	0.77	0.80	0.82	0.84							
			C/D	0.14		0.76	0.73	0.76	0.78	0.81	0.83	0.85							
C30	50.1%	0.50	A	0.00	0.71	0.36	0.34	0.36	0.37	0.41	0.45	0.50	0.44	0.38	0.44	0.50	0.60	0.64	0.69
			B	0.00		0.40	0.37	0.40	0.46	0.56	0.61	0.66							
			C/D	0.71		0.44	0.38	0.44	0.50	0.60	0.64	0.69							
D01	77.3%	0.77	A	0.00	0.26	0.62	0.60	0.62	0.64	0.66	0.69	0.71	0.66	0.62	0.66	0.70	0.75	0.77	0.80
			B	0.00		0.65	0.62	0.65	0.68	0.73	0.76	0.79							
			C/D	0.26		0.66	0.62	0.66	0.70	0.75	0.77	0.80							
D02	20.2%	0.20	A	0.00	0.04	0.11	0.10	0.11	0.12	0.15	0.20	0.27	0.20	0.14	0.20	0.28	0.43	0.49	0.57
			B	0.00		0.15	0.13	0.15	0.22	0.38	0.44	0.52							
			C/D	0.04		0.20	0.14	0.20	0.28	0.43	0.49	0.57							
D03	95.0%	0.95	A	0.00	0.03	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.03		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D04	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D05	52.0%	0.52	A	0.00	0.19	0.37	0.36	0.37	0.39	0.42	0.47	0.52	0.46	0.40	0.46	0.51	0.61	0.65	0.70
			B	0.00		0.42	0.39	0.42	0.48	0.58	0.62	0.67							
			C/D	0.19		0.46	0.40	0.46	0.51	0.61	0.65	0.70							

Project Name: Dawson Trails
Prepared By: SC

Runoff Coefficient (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area (Ac)	Runoff Coefficients, C							Weighted Coefficients, C						
						5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
D06	63.8%	0.64	A	0.00	0.08	0.49	0.47	0.49	0.50	0.53	0.57	0.61	0.56	0.50	0.56	0.60	0.68	0.71	0.74
			B	0.00		0.53	0.49	0.53	0.57	0.65	0.68	0.72							
			C/D	0.08		0.56	0.50	0.56	0.60	0.68	0.71	0.74							
D07	20.0%	0.20	A	0.00	0.02	0.11	0.10	0.11	0.12	0.14	0.20	0.27	0.20	0.14	0.20	0.28	0.43	0.49	0.57
			B	0.00		0.15	0.13	0.15	0.22	0.37	0.44	0.52							
			C/D	0.02		0.20	0.14	0.20	0.28	0.43	0.49	0.57							
D08	20.0%	0.20	A	0.00	0.02	0.11	0.10	0.11	0.12	0.14	0.20	0.27	0.20	0.14	0.20	0.28	0.43	0.49	0.57
			B	0.00		0.15	0.13	0.15	0.22	0.37	0.44	0.52							
			C/D	0.02		0.20	0.14	0.20	0.28	0.43	0.49	0.57							
D09	95.0%	0.95	A	0.00	0.05	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.05		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D10	90.6%	0.91	A	0.00	0.41	0.76	0.74	0.76	0.77	0.79	0.80	0.82	0.77	0.75	0.77	0.80	0.83	0.84	0.85
			B	0.00		0.77	0.74	0.77	0.79	0.82	0.83	0.85							
			C/D	0.41		0.77	0.75	0.77	0.80	0.83	0.84	0.85							
D11	93.5%	0.94	A	0.00	0.16	0.79	0.77	0.79	0.80	0.82	0.82	0.84	0.80	0.77	0.80	0.82	0.84	0.85	0.87
			B	0.00		0.80	0.77	0.80	0.81	0.84	0.85	0.86							
			C/D	0.16		0.80	0.77	0.80	0.82	0.84	0.85	0.87							
D12	86.9%	0.87	A	0.00	0.14	0.72	0.70	0.72	0.73	0.76	0.77	0.79	0.74	0.71	0.74	0.77	0.81	0.82	0.84
			B	0.00		0.74	0.71	0.74	0.76	0.79	0.81	0.83							
			C/D	0.14		0.74	0.71	0.74	0.77	0.81	0.82	0.84							
D13	95.0%	0.95	A	0.00	0.04	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.04		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D14	20.0%	0.20	A	0.00	0.11	0.11	0.10	0.11	0.12	0.14	0.20	0.27	0.20	0.14	0.20	0.28	0.43	0.49	0.57
			B	0.00		0.15	0.13	0.15	0.22	0.37	0.44	0.52							
			C/D	0.11		0.20	0.14	0.20	0.28	0.43	0.49	0.57							
D15	92.4%	0.92	A	0.00	0.25	0.78	0.76	0.78	0.79	0.81	0.81	0.83	0.79	0.76	0.79	0.81	0.84	0.85	0.86
			B	0.00		0.79	0.76	0.79	0.80	0.83	0.84	0.86							
			C/D	0.25		0.79	0.76	0.79	0.81	0.84	0.85	0.86							
D16	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D17	95.0%	0.95	A	0.00	0.04	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.04		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D18	84.7%	0.85	A	0.00	0.46	0.70	0.68	0.70	0.71	0.73	0.75	0.77	0.73	0.69	0.73	0.75	0.79	0.81	0.83
			B	0.00		0.72	0.69	0.72	0.74	0.78	0.80	0.82							
			C/D	0.46		0.73	0.69	0.73	0.75	0.79	0.81	0.83							

Project Name: Dawson Trails
Prepared By: SC

Runoff Coefficient (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area (Ac)	Runoff Coefficients, C							Weighted Coefficients, C						
						5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
D19	95.0%	0.95	A	0.00	0.11	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.11		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D20	85.2%	0.85	A	0.00	0.11	0.70	0.68	0.70	0.72	0.74	0.75	0.77	0.73	0.70	0.73	0.76	0.80	0.81	0.83
			B	0.00		0.72	0.69	0.72	0.74	0.78	0.80	0.82							
			C/D	0.11		0.73	0.70	0.73	0.76	0.80	0.81	0.83							
D21	86.8%	0.87	A	0.00	0.13	0.72	0.70	0.72	0.73	0.75	0.77	0.79	0.74	0.71	0.74	0.77	0.81	0.82	0.84
			B	0.00		0.73	0.71	0.73	0.76	0.79	0.81	0.83							
			C/D	0.13		0.74	0.71	0.74	0.77	0.81	0.82	0.84							
D22	82.8%	0.83	A	0.00	0.13	0.68	0.66	0.68	0.69	0.71	0.73	0.75	0.71	0.67	0.71	0.74	0.78	0.80	0.82
			B	0.00		0.70	0.67	0.70	0.73	0.77	0.79	0.81							
			C/D	0.13		0.71	0.67	0.71	0.74	0.78	0.80	0.82							
D23	88.6%	0.89	A	0.00	0.21	0.74	0.72	0.74	0.75	0.77	0.78	0.80	0.76	0.73	0.76	0.78	0.82	0.83	0.85
			B	0.00		0.75	0.72	0.75	0.77	0.81	0.82	0.84							
			C/D	0.21		0.76	0.73	0.76	0.78	0.82	0.83	0.85							
D24	93.9%	0.94	A	0.00	0.25	0.79	0.77	0.79	0.81	0.82	0.83	0.84	0.80	0.78	0.80	0.82	0.84	0.86	0.87
			B	0.00		0.80	0.78	0.80	0.81	0.84	0.85	0.86							
			C/D	0.25		0.80	0.78	0.80	0.82	0.84	0.86	0.87							
D25	93.1%	0.93	A	0.00	0.23	0.79	0.77	0.79	0.80	0.82	0.82	0.84	0.79	0.77	0.79	0.82	0.84	0.85	0.86
			B	0.00		0.79	0.77	0.79	0.81	0.83	0.85	0.86							
			C/D	0.23		0.79	0.77	0.79	0.82	0.84	0.85	0.86							
D26	88.0%	0.88	A	0.00	0.24	0.73	0.71	0.73	0.75	0.77	0.78	0.80	0.75	0.72	0.75	0.78	0.81	0.83	0.84
			B	0.00		0.75	0.72	0.75	0.77	0.80	0.82	0.84							
			C/D	0.24		0.75	0.72	0.75	0.78	0.81	0.83	0.84							
D27	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D28	95.0%	0.95	A	0.00	0.04	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.04		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D29	95.0%	0.95	A	0.00	0.04	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.04		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D30	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D31	95.0%	0.95	A	0.00	0.14	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.14		0.81	0.79	0.81	0.83	0.85	0.86	0.87							

Project Name: Dawson Trails
Prepared By: SC

Runoff Coefficient (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area (Ac)	Runoff Coefficients, C							Weighted Coefficients, C						
						5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year	5-Year	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
D32	95.0%	0.95	A	0.00	0.15	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.15		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D33	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D34	63.5%	0.64	A	0.00	0.14	0.48	0.47	0.48	0.50	0.53	0.57	0.61	0.55	0.50	0.55	0.60	0.67	0.71	0.74
			B	0.00		0.52	0.49	0.52	0.57	0.65	0.68	0.72							
			C/D	0.14		0.55	0.50	0.55	0.60	0.67	0.71	0.74							
D35	95.0%	0.95	A	0.00	0.17	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.17		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D36	95.0%	0.95	A	0.00	0.02	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.02		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D37	95.0%	0.95	A	0.00	0.03	0.81	0.79	0.81	0.82	0.83	0.84	0.85	0.81	0.79	0.81	0.83	0.85	0.86	0.87
			B	0.00		0.81	0.79	0.81	0.82	0.85	0.86	0.87							
			C/D	0.03		0.81	0.79	0.81	0.83	0.85	0.86	0.87							
D38	93.0%	0.93	A	0.00	0.05	0.78	0.76	0.78	0.80	0.81	0.82	0.83	0.79	0.77	0.79	0.82	0.84	0.85	0.86
			B	0.00		0.79	0.77	0.79	0.81	0.83	0.85	0.86							
			C/D	0.05		0.79	0.77	0.79	0.82	0.84	0.85	0.86							
OS1	42.1%	0.42	A	0.00	0.50	0.29	0.27	0.29	0.30	0.33	0.38	0.44	0.38	0.32	0.38	0.44	0.55	0.60	0.66
			B	0.00		0.33	0.30	0.33	0.40	0.51	0.56	0.62							
			C/D	0.50		0.38	0.32	0.38	0.44	0.55	0.60	0.66							
OS2	26.8%	0.27	A	0.00	0.80	0.16	0.15	0.16	0.17	0.20	0.25	0.32	0.25	0.19	0.25	0.33	0.47	0.53	0.59
			B	0.00		0.20	0.18	0.20	0.27	0.42	0.48	0.55							
			C/D	0.80		0.25	0.19	0.25	0.33	0.47	0.53	0.59							

Project Name: Dawson Trails
Prepared By: SC



Time of Concentration Calculations (T_c)

Sub-Basin Data			Initial or Overland Flow Time				Channelized Flow Time				T _c Check (Urbanized Basins)					
Basin Id	Basin Area (Ac)	C(5)	Length (ft)	Elev Change	Slope (%)	T _i (min)	Length (ft)	Elev Change	Slope (%)	NRCS Coeff. K	Velocity (FPS)	T _t (min)	Comp. T _c	Percent Imperv.	MHFD Eq. 6.5	Final T _c (min)
A01	0.42	0.45	38	3	8.9	3.51	183	4	2.1	20.0	2.91	1.1	4.6	50.7%	18.7	5.0
A02	0.02	0.81	34	1	2.0	2.46	7	0	3.8	20.0	3.90	0.0	2.5	95.0%	9.9	5.0
A03	0.11	0.81	42	0	0.5	4.34	30	0	0.7	20.0	1.64	0.3	4.6	95.0%	10.1	5.0
A04	0.02	0.81	33	0	0.6	3.56	16	0	1.2	20.0	2.20	0.1	3.7	95.0%	10.0	5.0
A05	0.01	0.21	5	0	7.1	1.81	29	1	2.1	20.0	2.90	0.2	2.0	21.8%	22.6	5.0
A06	0.01	0.21	5	0	5.5	2.07	21	0	2.1	20.0	2.89	0.1	2.2	20.9%	22.6	5.0
A07	0.11	0.62	14	1	5.2	1.86	71	2	2.4	20.0	3.13	0.4	2.2	72.3%	14.1	5.0
A08	0.11	0.79	40	1	1.7	2.96	25	0	1.8	20.0	2.68	0.2	3.1	93.2%	10.3	5.0
A09	0.10	0.80	40	1	1.3	3.20	25	1	2.1	20.0	2.91	0.1	3.3	93.6%	10.2	5.0
A10	0.21	0.75	29	1	2.1	2.66	65	1	1.5	20.0	2.43	0.4	3.1	87.9%	11.5	5.0
A11	0.02	0.81	33	0	0.4	4.12	7	1	10.4	20.0	6.45	0.0	4.1	95.0%	9.9	5.0
A12	0.09	0.76	54	1	2.5	3.34	49	0	0.2	20.0	0.91	0.9	4.2	88.8%	11.7	5.0
B01	0.47	0.47	37	3	9.4	3.34	119	3	2.1	20.0	2.93	0.7	4.0	52.8%	17.9	5.0
B02	0.09	0.32	35	6	18.2	3.18	53	1	1.6	20.0	2.54	0.3	3.5	35.5%	20.5	5.0
B03	0.11	0.35	31	6	19.2	2.83	35	1	1.9	20.0	2.72	0.2	3.1	39.2%	19.6	5.0
B04	0.09	0.81	34	1	1.6	2.65	51	0	0.8	20.0	1.76	0.5	3.1	95.0%	10.3	5.0
B05	0.07	0.62	31	1	1.7	4.05	57	0	0.7	20.0	1.68	0.6	4.6	71.4%	14.4	5.0
C01	0.14	0.81	35	1	1.5	2.71	69	0	0.6	20.0	1.53	0.7	3.5	95.0%	10.5	5.0
C02	0.02	0.81	30	1	2.1	2.27	9	0	3.3	20.0	3.61	0.0	2.3	95.0%	9.9	5.0
C03	0.02	0.81	28	1	1.9	2.23	16	0	2.5	20.0	3.15	0.1	2.3	95.0%	9.9	5.0
C04	0.04	0.20	28	6	22.7	3.08	26	0	1.9	20.0	2.77	0.2	3.2	20.0%	22.9	5.0
C05	0.26	0.79	22	0	2.2	2.05	59	1	1.6	20.0	2.52	0.4	2.4	92.2%	10.7	5.0
C06	0.30	0.75	16	1	6.5	1.37	193	1	0.6	20.0	1.57	2.0	3.4	87.2%	13.1	5.0
C07	0.09	0.81	6	1	11.8	0.58	154	7	4.6	20.0	4.27	0.6	1.2	95.0%	10.4	5.0
C08	0.09	0.81	6	0	7.8	0.66	154	7	4.6	20.0	4.27	0.6	1.3	95.0%	10.4	5.0
C09	0.11	0.80	48	1	1.8	3.03	29	0	1.5	20.0	2.42	0.2	3.2	94.3%	10.1	5.0
C10	0.09	0.79	47	1	1.9	3.08	20	0	2.0	20.0	2.86	0.1	3.2	93.1%	10.3	5.0

Project Name: Dawson Trails
Prepared By: SC



Time of Concentration Calculations (T_c)

Sub-Basin Data			Initial or Overland Flow Time				Channelized Flow Time				T _c Check (Urbanized Basins)					
Basin Id	Basin Area (Ac)	C(5)	Length (ft)	Elev Change	Slope (%)	T _i (min)	Length (ft)	Elev Change	Slope (%)	NRCS Coeff. K	Velocity (FPS)	T _t (min)	Comp. T _c	Percent Imperv.	MHFD Eq. 6.5	Final T _c (min)
C11	0.17	0.78	17	0	1.2	2.27	51	1	1.1	20.0	2.11	0.4	2.7	91.0%	10.9	5.0
C12	0.10	0.78	30	1	2.5	2.33	51	1	1.2	20.0	2.15	0.4	2.7	91.9%	10.7	5.0
C13	0.22	0.27	59	1	2.1	9.02	90	4	4.9	20.0	4.43	0.3	9.4	29.0%	21.6	9.4
C14	0.68	0.74	39	3	6.5	2.21	99	0	0.1	20.0	0.58	2.9	5.1	86.1%	14.1	5.1
C15	1.77	0.50	55	7	13.2	3.40	652	7	1.0	20.0	2.04	5.3	8.7	57.7%	22.4	5.0
C16	0.27	0.78	70	3	4.3	2.98	98	2	2.3	20.0	3.01	0.5	3.5	91.7%	10.9	5.0
C17	0.50	0.70	68	4	5.3	3.44	142	2	1.7	20.0	2.58	0.9	4.4	81.3%	13.1	5.0
C18	0.25	0.79	41	1	2.4	2.69	40	1	3.0	20.0	3.44	0.2	2.9	92.3%	10.5	5.0
C19	0.03	0.81	8	0	3.6	0.99	24	0	1.2	20.0	2.22	0.2	1.2	95.0%	10.0	5.0
C20	0.01	0.25	13	0	1.5	4.94	10	1	10.1	20.0	6.35	0.0	5.0	26.5%	21.5	5.0
C21	0.04	0.81	22	0	0.4	3.32	33	1	1.5	20.0	2.49	0.2	3.5	95.0%	10.0	5.0
C22	0.04	0.81	21				33	1	1.8	20.0	2.69	0.2		95.0%	10.0	10.0
C23	0.01	0.27	9	1	8.1	2.27	16	1	3.6	20.0	3.77	0.1	2.3	28.9%	21.2	5.0
C24	0.02	0.22	9	1	9.0	2.28	21	0	2.2	20.0	2.97	0.1	2.4	22.8%	22.3	5.0
C25	0.03	0.81	11	0	2.6	1.29	15	0	1.9	20.0	2.78	0.1	1.4	95.0%	9.9	5.0
C26	0.02	0.81	14	0	2.2	1.50	14	0	2.1	20.0	2.89	0.1	1.6	95.0%	9.9	5.0
C27	0.02	0.25	11	0	2.9	3.60	15	1	7.1	20.0	5.33	0.0	3.6	26.1%	21.6	5.0
C28	0.01	0.64	13	0	1.2	2.80	9	1	6.4	20.0	5.05	0.0	2.8	74.2%	13.4	5.0
C29	0.14	0.76	14	0	3.3	1.59	81	1	1.7	20.0	2.63	0.5	2.1	88.4%	11.5	5.0
C30	0.71	0.44	78	8	10.3	4.86	193	0	0.2	20.0	0.82	3.9	8.8	50.1%	22.4	8.8
D01	0.26	0.66	21	4	20.9	1.32	117	4	3.6	20.0	3.78	0.5	1.8	77.3%	13.4	5.0
D02	0.04	0.20	16	1	3.7	4.28	50	1	2.1	20.0	2.89	0.3	4.6	20.2%	23.1	5.0
D03	0.03	0.81	23	1	2.7	1.82	29	1	1.7	20.0	2.64	0.2	2.0	95.0%	10.0	5.0
D04	0.02	0.81	30	0	1.1	2.73	5	1	11.4	20.0	6.74	0.0	2.7	95.0%	9.9	5.0
D05	0.19	0.46	21	11	54.0	1.41	93	2	1.9	20.0	2.78	0.6	2.0	52.0%	17.8	5.0
D06	0.08	0.56	19	11	56.5	1.15	30	1	2.0	20.0	2.85	0.2	1.3	63.8%	15.3	5.0
D07	0.02	0.20	18	9	54.0	1.83	12	0	1.4	20.0	2.40	0.1	1.9	20.0%	22.7	5.0

Project Name: Dawson Trails
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Time of Concentration Calculations (T_c)

Sub-Basin Data			Initial or Overland Flow Time				Channelized Flow Time				T _c Check (Urbanized Basins)					
Basin Id	Basin Area (Ac)	C(5)	Length (ft)	Elev Change	Slope (%)	T _i (min)	Length (ft)	Elev Change	Slope (%)	NRCS Coeff. K	Velocity (FPS)	T _t (min)	Comp. T _c	Percent Imperv.	MHFD Eq. 6.5	Final T _c (min)
D08	0.02	0.20	18	8	46.7	1.93	15	0	3.2	20.0	3.58	0.1	2.0	20.0%	22.7	5.0
D09	0.05	0.81	31	0	1.1	2.82	22	0	1.3	20.0	2.32	0.2	3.0	95.0%	10.0	5.0
D10	0.41	0.77	48	1	1.7	3.39	136	2	1.4	20.0	2.35	1.0	4.4	90.6%	11.5	5.0
D11	0.16	0.80	57	2	2.8	2.94	27	0	1.0	20.0	2.04	0.2	3.2	93.5%	10.3	5.0
D12	0.14	0.74	52	2	3.8	2.99	38	0	1.2	20.0	2.22	0.3	3.3	86.9%	11.5	5.0
D13	0.04	0.81	18	0	1.9	1.80	33	0	0.9	20.0	1.92	0.3	2.1	95.0%	10.1	5.0
D14	0.11	0.20	33	4	12.0	4.15	50	1	2.0	20.0	2.83	0.3	4.4	20.0%	23.1	5.0
D15	0.25	0.79	49	1	1.2	3.66	155	2	1.3	20.0	2.26	1.1	4.8	92.4%	11.3	5.0
D16	0.02	0.81	19	0	1.6	1.94	15	1	3.3	20.0	3.62	0.1	2.0	95.0%	9.9	5.0
D17	0.04	0.81	19	0	1.6	1.98	31	0	0.8	20.0	1.81	0.3	2.3	95.0%	10.1	5.0
D18	0.46	0.73	57	2	2.7	3.67	68	1	1.7	20.0	2.62	0.4	4.1	84.7%	12.0	5.0
D19	0.11	0.81	26	0	1.2	2.51	58	0	0.4	20.0	1.31	0.7	3.2	95.0%	10.5	5.0
D20	0.11	0.73	10	1	8.8	1.05	96	3	3.3	20.0	3.64	0.4	1.5	85.2%	11.9	5.0
D21	0.13	0.74	27	1	3.3	2.26	32	1	1.6	20.0	2.51	0.2	2.5	86.8%	11.4	5.0
D22	0.13	0.71	31	1	2.6	2.84	37	1	1.4	20.0	2.34	0.3	3.1	82.8%	12.2	5.0
D23	0.21	0.76	25	1	3.6	2.01	51	1	2.7	20.0	3.29	0.3	2.3	88.6%	11.2	5.0
D24	0.25	0.80	21	1	3.2	1.68	42	1	1.7	20.0	2.61	0.3	1.9	93.9%	10.3	5.0
D25	0.23	0.79	24	0	2.0	2.16	40	1	1.5	20.0	2.44	0.3	2.4	93.1%	10.4	5.0
D26	0.24	0.75	42	1	2.2	3.14	69	1	1.6	20.0	2.51	0.5	3.6	88.0%	11.5	5.0
D27	0.02	0.81	14	0	2.1	1.57	17	0	1.5	20.0	2.42	0.1	1.7	95.0%	10.0	5.0
D28	0.04	0.81	16	0	1.9	1.71	32	1	2.3	20.0	3.06	0.2	1.9	95.0%	10.0	5.0
D29	0.04	0.81	25	1	2.0	2.08	20	1	2.4	20.0	3.13	0.1	2.2	95.0%	9.9	5.0
D30	0.02	0.81	19	1	2.7	1.63	11	1	4.7	20.0	4.33	0.0	1.7	95.0%	9.9	5.0
D31	0.14	0.81	27	1	1.8	2.26	38	1	1.3	20.0	2.29	0.3	2.5	95.0%	10.1	5.0
D32	0.15	0.81	31	1	1.6	2.48	61	1	0.8	20.0	1.81	0.6	3.0	95.0%	10.4	5.0
D33	0.02	0.81	19	1	2.6	1.66	19	1	2.6	20.0	3.22	0.1	1.8	95.0%	9.9	5.0
D34	0.14	0.55	20	1	5.4	2.53	47	1	3.0	20.0	3.45	0.2	2.8	63.5%	15.5	5.0

Project Name: Dawson Trails
Prepared By: SC



Time of Concentration Calculations (T_c)

Sub-Basin Data			Initial or Overland Flow Time				Channelized Flow Time				T _c Check (Urbanized Basins)					
Basin Id	Basin Area (Ac)	C(5)	Length (ft)	Elev Change	Slope (%)	T _i (min)	Length (ft)	Elev Change	Slope (%)	NRCS Coeff. K	Velocity (FPS)	T _t (min)	Comp. T _c	Percent Imperv.	MHFD Eq. 6.5	Final T _c (min)
D35	0.17	0.81	24	0	1.7	2.18	112	0	0.3	20.0	1.03	1.8	4.0	95.0%	11.5	5.0
D36	0.02	0.81	15	0	2.7	1.46	26	0	1.2	20.0	2.16	0.2	1.7	95.0%	10.0	5.0
D37	0.03	0.81	23	0	1.8	2.08	23	0	1.3	20.0	2.28	0.2	2.3	95.0%	10.0	5.0
D38	0.05	0.79	12	1	6.0	1.04	56	1	2.1	20.0	2.88	0.3	1.4	93.0%	10.5	5.0
OS1	0.50	0.38	72	5	6.3	6.00	179	4	2.2	20.0	2.96	1.0	7.0	42.1%	20.2	7.0
OS2	0.80	0.25	86	7	8.6	6.95	127	1	1.0	20.0	2.03	1.0	8.0	26.8%	23.1	8.0

Project Name: Dawson Trails

Prepared By: SC

Peak Runoff Rational Method (5-Year)

Rainfall Depth-Duration-Frequency (1-hr) =							1.43
Design Point	Basin ID	Basin Area (Ac)	Runoff Coeff (5-Year)	T_c (min)	C X A	I (in/hr)	Q (cfs)
A01	A01	0.42	0.45	5.0	0.19	4.85	0.91
A02	A02	0.02	0.81	5.0	0.01	4.85	0.07
A03	A03	0.11	0.81	5.0	0.09	4.85	0.45
A04	A04	0.02	0.81	5.0	0.01	4.85	0.07
A05	A05	0.01	0.21	5.0	0.00	4.85	0.01
A06	A06	0.01	0.21	5.0	0.00	4.85	0.01
A07	A07	0.11	0.62	5.0	0.07	4.85	0.34
A08	A08	0.11	0.79	5.0	0.08	4.85	0.41
A09	A09	0.10	0.80	5.0	0.08	4.85	0.39
A10	A10	0.21	0.75	5.0	0.16	4.85	0.78
A11	A11	0.02	0.81	5.0	0.02	4.85	0.07
A12	A12	0.09	0.76	5.0	0.07	4.85	0.33
B01	B01	0.47	0.47	5.0	0.22	4.85	1.06
B02	B02	0.09	0.32	5.0	0.03	4.85	0.14
B03	B03	0.11	0.35	5.0	0.04	4.85	0.18
B04	B04	0.09	0.81	5.0	0.07	4.85	0.34
B05	B05	0.07	0.62	5.0	0.04	4.85	0.20
C01	C01	0.14	0.81	5.0	0.11	4.85	0.54
C02	C02	0.02	0.81	5.0	0.01	4.85	0.07
C03	C03	0.02	0.81	5.0	0.02	4.85	0.07
C04	C04	0.04	0.20	5.0	0.01	4.85	0.04
C05	C05	0.26	0.79	5.0	0.20	4.85	0.99
C06	C06	0.30	0.75	5.0	0.22	4.85	1.07
C07	C07	0.09	0.81	5.0	0.07	4.85	0.34
C08	C08	0.09	0.81	5.0	0.07	4.85	0.34
C09	C09	0.11	0.80	5.0	0.09	4.85	0.45
C10	C10	0.09	0.79	5.0	0.07	4.85	0.35
C11	C11	0.17	0.78	5.0	0.13	4.85	0.65
C12	C12	0.10	0.78	5.0	0.08	4.85	0.39
C13	C13	0.22	0.27	9.4	0.06	3.97	0.23
C14	C14	0.68	0.74	5.1	0.50	4.83	2.42
C15	C15	1.77	0.50	5.0	0.89	4.85	4.34
C16	C16	0.27	0.78	5.0	0.21	4.85	1.01
C17	C17	0.50	0.70	5.0	0.35	4.85	1.69
C18	C18	0.25	0.79	5.0	0.20	4.85	0.97
C19	C19	0.03	0.81	5.0	0.02	4.85	0.10
C20	C20	0.01	0.25	5.0	0.00	4.85	0.01
C21	C21	0.04	0.81	5.0	0.04	4.85	0.17
C22	C22	0.04	0.81	10.0	0.03	3.86	0.13

Project Name: Dawson Trails

Prepared By: SC

Peak Runoff Rational Method (5-Year)

Rainfall Depth-Duration-Frequency (1-hr) =							1.43
Design Point	Basin ID	Basin Area (Ac)	Runoff Coeff (5-Year)	T_c (min)	C X A	I (in/hr)	Q (cfs)
C23	C23	0.01	0.27	5.0	0.00	4.85	0.02
C24	C24	0.02	0.22	5.0	0.00	4.85	0.02
C25	C25	0.03	0.81	5.0	0.02	4.85	0.11
C26	C26	0.02	0.81	5.0	0.01	4.85	0.07
C27	C27	0.02	0.25	5.0	0.00	4.85	0.02
C28	C28	0.01	0.64	5.0	0.00	4.85	0.02
C29	C29	0.14	0.76	5.0	0.11	4.85	0.52
C30	C30	0.71	0.44	8.8	0.31	4.07	1.27
D01	D01	0.26	0.66	5.0	0.17	4.85	0.82
D02	D02	0.04	0.20	5.0	0.01	4.85	0.03
D03	D03	0.03	0.81	5.0	0.03	4.85	0.13
D04	D04	0.02	0.81	5.0	0.02	4.85	0.07
D05	D05	0.19	0.46	5.0	0.09	4.85	0.42
D06	D06	0.08	0.56	5.0	0.04	4.85	0.21
D07	D07	0.02	0.20	5.0	0.00	4.85	0.02
D08	D08	0.02	0.20	5.0	0.00	4.85	0.02
D09	D09	0.05	0.81	5.0	0.04	4.85	0.19
D10	D10	0.41	0.77	5.0	0.32	4.85	1.55
D11	D11	0.16	0.80	5.0	0.13	4.85	0.61
D12	D12	0.14	0.74	5.0	0.10	4.85	0.50
D13	D13	0.04	0.81	5.0	0.03	4.85	0.14
D14	D14	0.11	0.20	5.0	0.02	4.85	0.11
D15	D15	0.25	0.79	5.0	0.19	4.85	0.95
D16	D16	0.02	0.81	5.0	0.02	4.85	0.07
D17	D17	0.04	0.81	5.0	0.03	4.85	0.15
D18	D18	0.46	0.73	5.0	0.33	4.85	1.60
D19	D19	0.11	0.81	5.0	0.09	4.85	0.45
D20	D20	0.11	0.73	5.0	0.08	4.85	0.39
D21	D21	0.13	0.74	5.0	0.10	4.85	0.46
D22	D22	0.13	0.71	5.0	0.09	4.85	0.46
D23	D23	0.21	0.76	5.0	0.16	4.85	0.77
D24	D24	0.25	0.80	5.0	0.20	4.85	0.96
D25	D25	0.23	0.79	5.0	0.18	4.85	0.89
D26	D26	0.24	0.75	5.0	0.18	4.85	0.86
D27	D27	0.02	0.81	5.0	0.01	4.85	0.07
D28	D28	0.04	0.81	5.0	0.03	4.85	0.14
D29	D29	0.04	0.81	5.0	0.03	4.85	0.14
D30	D30	0.02	0.81	5.0	0.01	4.85	0.07
D31	D31	0.14	0.81	5.0	0.11	4.85	0.54

Project Name: Dawson Trails

Prepared By: SC

Peak Runoff Rational Method (5-Year)

Rainfall Depth-Duration-Frequency (1-hr) =							1.43
Design Point	Basin ID	Basin Area (Ac)	Runoff Coeff (5-Year)	T_c (min)	C X A	I (in/hr)	Q (cfs)
D32	D32	0.15	0.81	5.0	0.13	4.85	0.61
D33	D33	0.02	0.81	5.0	0.02	4.85	0.07
D34	D34	0.14	0.55	5.0	0.08	4.85	0.37
D35	D35	0.17	0.81	5.0	0.14	4.85	0.68
D36	D36	0.02	0.81	5.0	0.02	4.85	0.07
D37	D37	0.03	0.81	5.0	0.03	4.85	0.13
D38	D38	0.05	0.79	5.0	0.04	4.85	0.21
OS1	OS1	0.50	0.38	7.0	0.19	4.39	0.83
OS2	OS2	0.80	0.25	8.0	0.20	4.20	0.85

Project Name: Dawson Trails

Prepared By: SC

Peak Runoff Rational Method (100-Year)

Rainfall Depth-Duration-Frequency (1-hr) =							2.60
Design Point	Basin ID	Basin Area (Ac)	Runoff Coeff (100-Year)	T_c (min)	C X A	I (in/hr)	Q (cfs)
A01	A01	0.42	0.69	5.0	0.29	8.82	2.55
A02	A02	0.02	0.87	5.0	0.02	8.82	0.14
A03	A03	0.11	0.87	5.0	0.10	8.82	0.88
A04	A04	0.02	0.87	5.0	0.02	8.82	0.13
A05	A05	0.01	0.57	5.0	0.00	8.82	0.04
A06	A06	0.01	0.57	5.0	0.00	8.82	0.04
A07	A07	0.11	0.78	5.0	0.09	8.82	0.78
A08	A08	0.11	0.87	5.0	0.09	8.82	0.81
A09	A09	0.10	0.87	5.0	0.09	8.82	0.77
A10	A10	0.21	0.84	5.0	0.18	8.82	1.58
A11	A11	0.02	0.87	5.0	0.02	8.82	0.14
A12	A12	0.09	0.85	5.0	0.07	8.82	0.66
B01	B01	0.47	0.70	5.0	0.33	8.82	2.91
B02	B02	0.09	0.63	5.0	0.06	8.82	0.49
B03	B03	0.11	0.64	5.0	0.07	8.82	0.60
B04	B04	0.09	0.87	5.0	0.08	8.82	0.67
B05	B05	0.07	0.78	5.0	0.05	8.82	0.47
C01	C01	0.14	0.87	5.0	0.12	8.82	1.05
C02	C02	0.02	0.87	5.0	0.02	8.82	0.13
C03	C03	0.02	0.87	5.0	0.02	8.82	0.14
C04	C04	0.04	0.57	5.0	0.02	8.82	0.18
C05	C05	0.26	0.86	5.0	0.22	8.82	1.97
C06	C06	0.30	0.84	5.0	0.25	8.82	2.19
C07	C07	0.09	0.87	5.0	0.08	8.82	0.67
C08	C08	0.09	0.87	5.0	0.07	8.82	0.66
C09	C09	0.11	0.87	5.0	0.10	8.82	0.88
C10	C10	0.09	0.86	5.0	0.08	8.82	0.69
C11	C11	0.17	0.86	5.0	0.15	8.82	1.30
C12	C12	0.10	0.86	5.0	0.09	8.82	0.78
C13	C13	0.22	0.60	9.4	0.13	7.22	0.94
C14	C14	0.68	0.84	5.1	0.57	8.78	5.00
C15	C15	1.77	0.72	5.0	1.28	8.82	11.24
C16	C16	0.27	0.86	5.0	0.23	8.82	2.02
C17	C17	0.50	0.82	5.0	0.41	8.82	3.60
C18	C18	0.25	0.86	5.0	0.22	8.82	1.94
C19	C19	0.03	0.87	5.0	0.02	8.82	0.19
C20	C20	0.01	0.59	5.0	0.00	8.82	0.03
C21	C21	0.04	0.87	5.0	0.04	8.82	0.33
C22	C22	0.04	0.87	10.0	0.04	7.02	0.25

Project Name: Dawson Trails

Prepared By: SC

Peak Runoff Rational Method (100-Year)

Rainfall Depth-Duration-Frequency (1-hr) =							2.60
Design Point	Basin ID	Basin Area (Ac)	Runoff Coeff (100-Year)	T_c (min)	C X A	I (in/hr)	Q (cfs)
C23	C23	0.01	0.60	5.0	0.01	8.82	0.07
C24	C24	0.02	0.58	5.0	0.01	8.82	0.09
C25	C25	0.03	0.87	5.0	0.02	8.82	0.22
C26	C26	0.02	0.87	5.0	0.02	8.82	0.13
C27	C27	0.02	0.59	5.0	0.01	8.82	0.10
C28	C28	0.01	0.79	5.0	0.01	8.82	0.05
C29	C29	0.14	0.85	5.0	0.12	8.82	1.06
C30	C30	0.71	0.69	8.8	0.49	7.39	3.60
D01	D01	0.26	0.80	5.0	0.20	8.82	1.80
D02	D02	0.04	0.57	5.0	0.02	8.82	0.18
D03	D03	0.03	0.87	5.0	0.03	8.82	0.26
D04	D04	0.02	0.87	5.0	0.02	8.82	0.14
D05	D05	0.19	0.70	5.0	0.13	8.82	1.16
D06	D06	0.08	0.74	5.0	0.06	8.82	0.52
D07	D07	0.02	0.57	5.0	0.01	8.82	0.10
D08	D08	0.02	0.57	5.0	0.01	8.82	0.12
D09	D09	0.05	0.87	5.0	0.04	8.82	0.38
D10	D10	0.41	0.85	5.0	0.35	8.82	3.12
D11	D11	0.16	0.87	5.0	0.14	8.82	1.21
D12	D12	0.14	0.84	5.0	0.12	8.82	1.03
D13	D13	0.04	0.87	5.0	0.03	8.82	0.27
D14	D14	0.11	0.57	5.0	0.06	8.82	0.57
D15	D15	0.25	0.86	5.0	0.21	8.82	1.88
D16	D16	0.02	0.87	5.0	0.02	8.82	0.14
D17	D17	0.04	0.87	5.0	0.03	8.82	0.29
D18	D18	0.46	0.83	5.0	0.38	8.82	3.34
D19	D19	0.11	0.87	5.0	0.10	8.82	0.88
D20	D20	0.11	0.83	5.0	0.09	8.82	0.80
D21	D21	0.13	0.84	5.0	0.11	8.82	0.95
D22	D22	0.13	0.82	5.0	0.11	8.82	0.96
D23	D23	0.21	0.85	5.0	0.18	8.82	1.56
D24	D24	0.25	0.87	5.0	0.22	8.82	1.90
D25	D25	0.23	0.86	5.0	0.20	8.82	1.76
D26	D26	0.24	0.84	5.0	0.20	8.82	1.76
D27	D27	0.02	0.87	5.0	0.02	8.82	0.13
D28	D28	0.04	0.87	5.0	0.03	8.82	0.27
D29	D29	0.04	0.87	5.0	0.03	8.82	0.27
D30	D30	0.02	0.87	5.0	0.02	8.82	0.13
D31	D31	0.14	0.87	5.0	0.12	8.82	1.05

Project Name: Dawson Trails

Prepared By: SC

Peak Runoff Rational Method (100-Year)

Rainfall Depth-Duration-Frequency (1-hr) =							2.60
Design Point	Basin ID	Basin Area (Ac)	Runoff Coeff (100-Year)	T_c (min)	C X A	I (in/hr)	Q (cfs)
D32	D32	0.15	0.87	5.0	0.14	8.82	1.19
D33	D33	0.02	0.87	5.0	0.02	8.82	0.14
D34	D34	0.14	0.74	5.0	0.10	8.82	0.89
D35	D35	0.17	0.87	5.0	0.15	8.82	1.34
D36	D36	0.02	0.87	5.0	0.02	8.82	0.14
D37	D37	0.03	0.87	5.0	0.03	8.82	0.26
D38	D38	0.05	0.86	5.0	0.05	8.82	0.41
OS1	OS1	0.50	0.66	7.0	0.33	7.99	2.62
OS2	OS2	0.80	0.59	8.0	0.47	7.64	3.61

Project Name: Dawson Trails

Prepared By: SC

Runoff Summary Table

Design Point	Basin ID	Imper vious ness %	Basin Area (Ac)	5-Year Runoff (CFS)	100-Year Runoff (CFS)
A01	A01	50.71%	0.42	0.91	2.55
A02	A02	95.00%	0.02	0.07	0.14
A03	A03	95.00%	0.11	0.45	0.88
A04	A04	95.00%	0.02	0.07	0.13
A05	A05	21.80%	0.01	0.01	0.04
A06	A06	20.93%	0.01	0.01	0.04
A07	A07	72.28%	0.11	0.34	0.78
A08	A08	93.19%	0.11	0.41	0.81
A09	A09	93.56%	0.10	0.39	0.77
A10	A10	87.93%	0.21	0.78	1.58
A11	A11	95.00%	0.02	0.07	0.14
A12	A12	88.80%	0.09	0.33	0.66
B01	B01	52.79%	0.47	1.06	2.91
B02	B02	35.47%	0.09	0.14	0.49
B03	B03	39.19%	0.11	0.18	0.60
B04	B04	95.00%	0.09	0.34	0.67
B05	B05	71.45%	0.07	0.20	0.47
C01	C01	95.00%	0.14	0.54	1.05
C02	C02	95.00%	0.02	0.07	0.13
C03	C03	95.00%	0.02	0.07	0.14
C04	C04	20.00%	0.04	0.04	0.18
C05	C05	92.21%	0.26	0.99	1.97
C06	C06	87.16%	0.30	1.07	2.19
C07	C07	95.00%	0.09	0.34	0.67
C08	C08	95.00%	0.09	0.34	0.66
C09	C09	94.34%	0.11	0.45	0.88
C10	C10	93.14%	0.09	0.35	0.69
C11	C11	90.97%	0.17	0.65	1.30
C12	C12	91.86%	0.10	0.39	0.78
C13	C13	28.95%	0.22	0.23	0.94
C14	C14	86.11%	0.68	2.42	5.00
C15	C15	57.65%	1.77	4.34	11.24
C16	C16	91.74%	0.27	1.01	2.02
C17	C17	81.26%	0.50	1.69	3.60
C18	C18	92.28%	0.25	0.97	1.94
C19	C19	95.00%	0.03	0.10	0.19
C20	C20	26.48%	0.01	0.01	0.03
C21	C21	95.00%	0.04	0.17	0.33
C22	C22	95.00%	0.04	0.13	0.25
C23	C23	28.94%	0.01	0.02	0.07

Project Name: Dawson Trails

Prepared By: SC

Runoff Summary Table

Design Point	Basin ID	Imper vious ness %	Basin Area (Ac)	5-Year Runoff (CFS)	100-Year Runoff (CFS)
C24	C24	22.79%	0.02	0.02	0.09
C25	C25	95.00%	0.03	0.11	0.22
C26	C26	95.00%	0.02	0.07	0.13
C27	C27	26.15%	0.02	0.02	0.10
C28	C28	74.20%	0.01	0.02	0.05
C29	C29	88.36%	0.14	0.52	1.06
C30	C30	50.08%	0.71	1.27	3.60
D01	D01	77.29%	0.26	0.82	1.80
D02	D02	20.20%	0.04	0.03	0.18
D03	D03	95.00%	0.03	0.13	0.26
D04	D04	95.00%	0.02	0.07	0.14
D05	D05	52.01%	0.19	0.42	1.16
D06	D06	63.81%	0.08	0.21	0.52
D07	D07	20.00%	0.02	0.02	0.10
D08	D08	19.97%	0.02	0.02	0.12
D09	D09	95.00%	0.05	0.19	0.38
D10	D10	90.60%	0.41	1.55	3.12
D11	D11	93.51%	0.16	0.61	1.21
D12	D12	86.93%	0.14	0.50	1.03
D13	D13	95.00%	0.04	0.14	0.27
D14	D14	20.01%	0.11	0.11	0.57
D15	D15	92.43%	0.25	0.95	1.88
D16	D16	95.00%	0.02	0.07	0.14
D17	D17	95.00%	0.04	0.15	0.29
D18	D18	84.69%	0.46	1.60	3.34
D19	D19	95.00%	0.11	0.45	0.88
D20	D20	85.18%	0.11	0.39	0.80
D21	D21	86.81%	0.13	0.46	0.95
D22	D22	82.79%	0.13	0.46	0.96
D23	D23	88.58%	0.21	0.77	1.56
D24	D24	93.88%	0.25	0.96	1.90
D25	D25	93.10%	0.23	0.89	1.76
D26	D26	88.01%	0.24	0.86	1.76
D27	D27	95.00%	0.02	0.07	0.13
D28	D28	95.00%	0.04	0.14	0.27
D29	D29	95.00%	0.04	0.14	0.27
D30	D30	95.00%	0.02	0.07	0.13
D31	D31	95.00%	0.14	0.54	1.05
D32	D32	95.00%	0.15	0.61	1.19
D33	D33	95.00%	0.02	0.07	0.14

Project Name: Dawson Trails

Prepared By: SC

Runoff Summary Table

Design Point	Basin ID	Imperiousness %	Basin Area (Ac)	5-Year Runoff (CFS)	100-Year Runoff (CFS)
D34	D34	63.55%	0.14	0.37	0.89
D35	D35	95.00%	0.17	0.68	1.34
D36	D36	95.00%	0.02	0.07	0.14
D37	D37	95.00%	0.03	0.13	0.26
D38	D38	92.99%	0.05	0.21	0.41
OS1	OS1	42.09%	0.50	0.83	2.62
OS2	OS2	26.80%	0.80	0.85	3.61
A	ALL		1.22	3.83	8.53
B	ALL		0.82	1.93	5.14
C	ALL		6.17	18.41	41.52
D	ALL		4.57	15.95	33.34
OSP	ALL		1.30	1.68	6.23
TOTAL	ALL		14.08	41.79	94.75

APPENDIX C

DETENTION BASIN/ WATER QUALITY ENHANCEMENT BMP'S

Pond Percent Imperviousness Calculations

Pond D1 Verification – MHFD-Detention_v4.07

Pond D3 Verification – MHFD-Detention_v4.07

Project Name: Dawson Trails
Prepared By: SC



Percent Impervious Calculations

Basin Id	Design Point	Basin Area (Ac)	Historic Flow Area	Paved Street, Roof, Drives, Walks Area	Newly Graded Areas Area	Weighted % Impervious
			5%	95%	20%	
Pond D1 (Excluding Site)		15.26		See Phase III Drainage Report for Dawson Trails Filing No. 2 by EMK Consultants approved		70.8%
C01	C01	0.14		0.14	0.25	95.0%
C02	C02	0.02		0.02		95.0%
C03	C03	0.02		0.02		95.0%
C04	C04	0.04		0.00		20.0%
C05	C05	0.26		0.25	0.01	92.2%
C06	C06	0.30		0.27	0.01	87.2%
C07	C07	0.09		0.09	0.03	95.0%
C08	C08	0.09		0.09	0.00	95.0%
C09	C09	0.11		0.11	0.00	94.3%
C10	C10	0.09		0.09	0.02	93.1%
C11	C11	0.17		0.16		91.0%
C12	C12	0.10		0.10	0.01	91.9%
C13	C13	0.22		0.03	0.27	29.0%
C14	C14	0.68		0.60	0.07	86.1%
C15	C15	1.77		0.89	0.08	57.7%
C16	C16	0.27		0.25		91.7%
C17	C17	0.50		0.41	0.02	81.3%
C18	C18	0.25		0.25		92.3%
C19	C19	0.03		0.03		95.0%
C20	C20	0.01		0.00		26.5%
C21	C21	0.04		0.04	0.04	95.0%
C22	C22	0.04		0.04	0.01	95.0%
C23	C23	0.01		0.00	0.03	28.9%
C24	C24	0.02		0.00		22.8%
C25	C25	0.03		0.03		95.0%
C26	C26	0.02		0.02	0.00	95.0%
C27	C27	0.02		0.00	0.00	26.1%
C28	C28	0.01		0.01	0.01	74.2%
C29	C29	0.14		0.13	0.00	88.4%
C30	C30	0.71		0.28	0.19	50.1%
D01	D01	0.26		0.20	0.08	77.3%
D02	D02	0.04		0.00	0.88	20.2%
D03	D03	0.03		0.03	0.01	95.0%

Project Name: Dawson Trails
Prepared By: SC



Percent Impervious Calculations

Basin Id	Design Point	Basin Area (Ac)	Historic Flow	Paved Street, Roof, Drives, Walks Area	Newly Graded Areas Area	Weighted % Impervious
			Area			
			5%	95%	20%	
D04	D04	0.02		0.02	0.09	95.0%
D05	D05	0.19		0.08	0.01	52.0%
D06	D06	0.08		0.05		63.8%
D07	D07	0.02		0.00	0.01	20.0%
D08	D08	0.02		0.00		20.0%
D09	D09	0.05		0.05		95.0%
D10	D10	0.41		0.39	0.01	90.6%
D11	D11	0.16		0.16	0.02	93.5%
D12	D12	0.14		0.12		86.9%
D13	D13	0.04		0.04		95.0%
D14	D14	0.11		0.00	0.02	20.0%
D15	D15	0.25		0.24	0.00	92.4%
D16	D16	0.02		0.02	0.01	95.0%
D17	D17	0.04		0.04	0.42	95.0%
D18	D18	0.46		0.39	0.06	84.7%
D19	D19	0.11		0.11	0.04	95.0%
D20	D20	0.11		0.09		85.2%
D21	D21	0.13		0.11		86.8%
D22	D22	0.13		0.11	0.11	82.8%
D23	D23	0.21		0.19	0.03	88.6%
D24	D24	0.25		0.24	0.02	93.9%
D25	D25	0.23		0.22	0.02	93.1%
D26	D26	0.24		0.21		88.0%
D27	D27	0.02		0.02	0.02	95.0%
D28	D28	0.04		0.04	0.00	95.0%
D29	D29	0.04		0.04	0.02	95.0%
D30	D30	0.02		0.02		95.0%
D31	D31	0.14		0.14	0.11	95.0%
D32	D32	0.15		0.15	0.01	95.0%
D33	D33	0.02		0.02		95.0%
D34	D34	0.14		0.08		63.5%
D35	D35	0.17		0.17	0.06	95.0%
D36	D36	0.02		0.02		95.0%
D37	D37	0.03		0.03	0.01	95.0%
D38	D38	0.05		0.05	0.01	93.0%

Project Name: Dawson Trails
Prepared By: SC



Percent Impervious Calculations

Basin Id	Design Point	Basin Area (Ac)	Historic Flow Area	Paved Street, Roof, Drives, Walks Area	Newly Graded Areas Area	Weighted % Impervious
			5%	95%	20%	
OS1	OS1	0.50	0.00	0.15	0.02	42.1%
Pond D1		26.50				72.9%

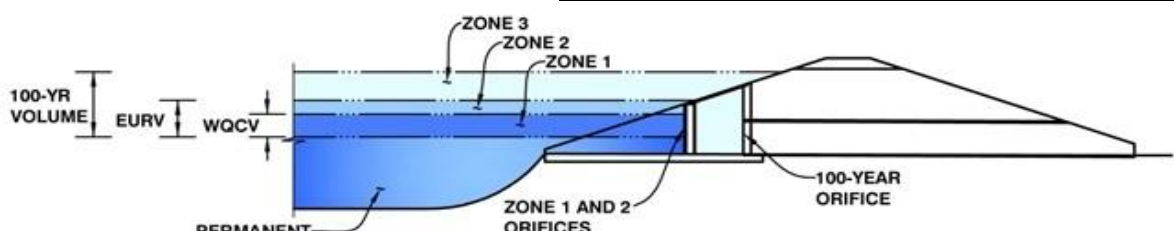
Pond D3 (Excluding Site)		86.95		See Phase III Drainage Report for Dawson Trails Filing No. 2 by EMK Consultants approved 10/21/2025		47.6%
A01	A01	0.42		0.17	0.25	50.7%
A02	A02	0.02		0.02		95.0%
A03	A03	0.11		0.11		95.0%
A04	A04	0.02		0.02		95.0%
A05	A05	0.01		0.00	0.01	21.8%
A06	A06	0.01		0.00	0.01	20.9%
A07	A07	0.11		0.08	0.03	72.3%
A08	A08	0.11		0.10	0.00	93.2%
A09	A09	0.10		0.10	0.00	93.6%
A10	A10	0.21		0.19	0.02	87.9%
A11	A11	0.02		0.02		95.0%
A12	A12	0.09		0.08	0.01	88.8%
B01	B01	0.47		0.21	0.27	52.8%
B02	B02	0.09		0.02	0.07	35.5%
B03	B03	0.11		0.03	0.08	39.2%
B04	B04	0.09		0.09		95.0%
B05	B05	0.07		0.05	0.02	71.4%
OS2	OS2	0.80		0.07		26.8%
Pond D3		89.79				47.9%

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)

Project: Dawson Trails

Basin ID: Pond D1 Verification



Example Zone Configuration (Retention Pond

Watershed Information

Selected SCM Type =	EDB	
Watershed Area =	26.50	acres
Watershed Length =	1,731	ft
Watershed Length to Centroid =	715	ft
Watershed Slope =	0.016	ft/ft
Watershed Imperviousness =	72.90%	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 = 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) =	0.638	acre-feet
Excess Urban Runoff Volume (EURV) =	1.894	acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.707	acre-feet
5-yr Runoff Volume (P1 = 1.43 in.) =	2.516	acre-feet
10-yr Runoff Volume (P1 = 1.66 in.) =	3.038	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	3.862	acre-feet
50-yr Runoff Volume (P1 = 2.26 in.) =	4.470	acre-feet
100-yr Runoff Volume (P1 = 2.6 in.) =	5.306	acre-feet
500-yr Runoff Volume (P1 = 3.2 in.) =	6.718	acre-feet
Approximate 2-yr Detention Volume =	1.511	acre-feet
Approximate 5-yr Detention Volume =	2.240	acre-feet
Approximate 10-yr Detention Volume =	2.558	acre-feet
Approximate 25-yr Detention Volume =	2.865	acre-feet
Approximate 50-yr Detention Volume =	2.953	acre-feet
Approximate 100-yr Detention Volume =	3.254	acre-feet

Optional User Overrides

	acre-feet
	acre-feet
1.06	inches
1.43	inches
1.66	inches
2.00	inches
2.26	inches
2.60	inches
3.20	inches

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.638	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.246	acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	1.884	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 _{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	

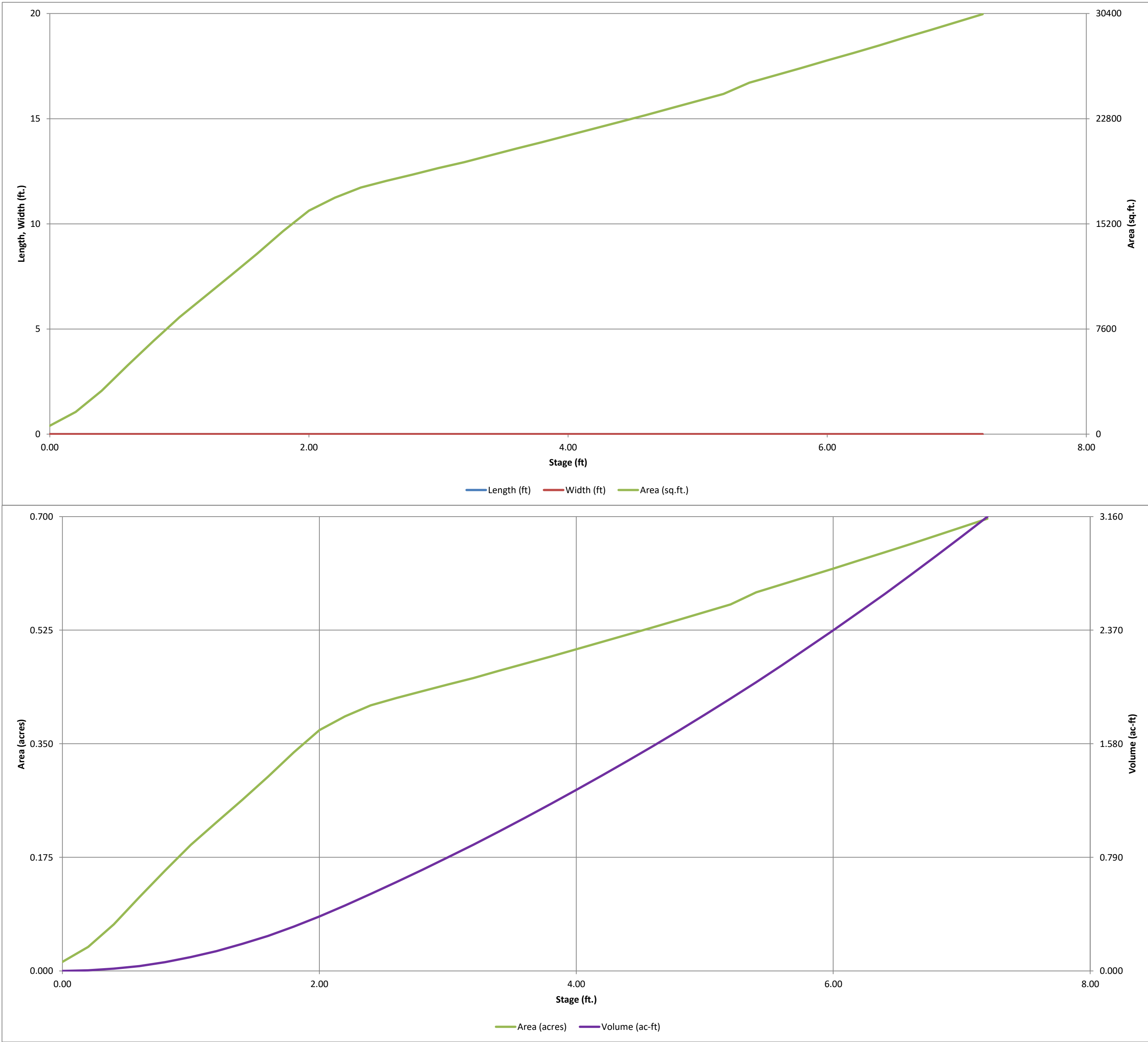
Total detention volume is less than 100-year volume.

Initial Surcharge Area (A_{ISV}) =	user	ft ²
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft ²
Volume of Basin Floor (V_{FLOOR}) =	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 4.07 (June 2025)

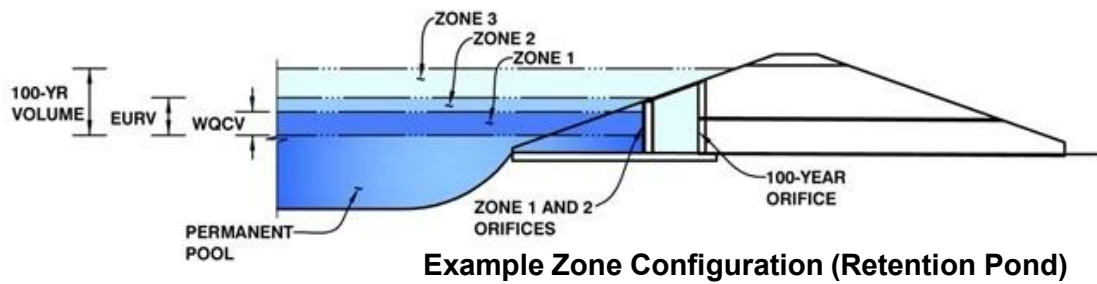


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: Dawson Trails

Basin ID: Pond D1 Verification



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.65	0.638	Orifice Plate
Zone 2 (EURV)	5.19	1.246	Orifice Plate
Zone 3			
Total (all zones)		1.884	

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

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 SCM)

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 5.17 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = N/A inches
Orifice Plate: Orifice Area per Row = N/A sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row = N/A 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	2.50						
Orifice Area (sq. inches)	4.00	9.00						

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

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice = 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

Calculated Parameters for Vertical Orifice

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

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

Overflow Weir Front Edge Height, H_o = Not Selected ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = Not Selected feet
Overflow Weir Gate Slope = Not Selected H:V
Horiz. Length of Weir Sides = Not Selected feet
Overflow Gate Type = Not Selected
Debris Clogging % = Not Selected %

Calculated Parameters for Overflow Weir

Height of Gate Upper Edge, H_g = Not Selected feet
Overflow Weir Slope Length = Not Selected feet
Gate Open Area / 100-yr Orifice Area = Not Selected
Overflow Gate Open Area w/o Debris = Not Selected ft²
Overflow Gate Open Area w/ Debris = Not Selected ft²

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

Depth to Invert of Outlet Pipe = Not Selected ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter = Not Selected inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Outlet Orifice Area = Not Selected ft²
Outlet Orifice Centroid = Not Selected feet
Half-Central Angle of Restrictor Plate on Pipe = Not Selected radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = 5.20 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 27.00 feet
Spillway End Slopes = 10.00 H:V
Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway

Spillway Design Flow Depth = 0.91 feet
Stage at Top of Freeboard = 7.11 feet
Basin Area at Top of Freeboard = 0.69 acres
Basin Volume at Top of Freeboard = 3.10 acre-ft

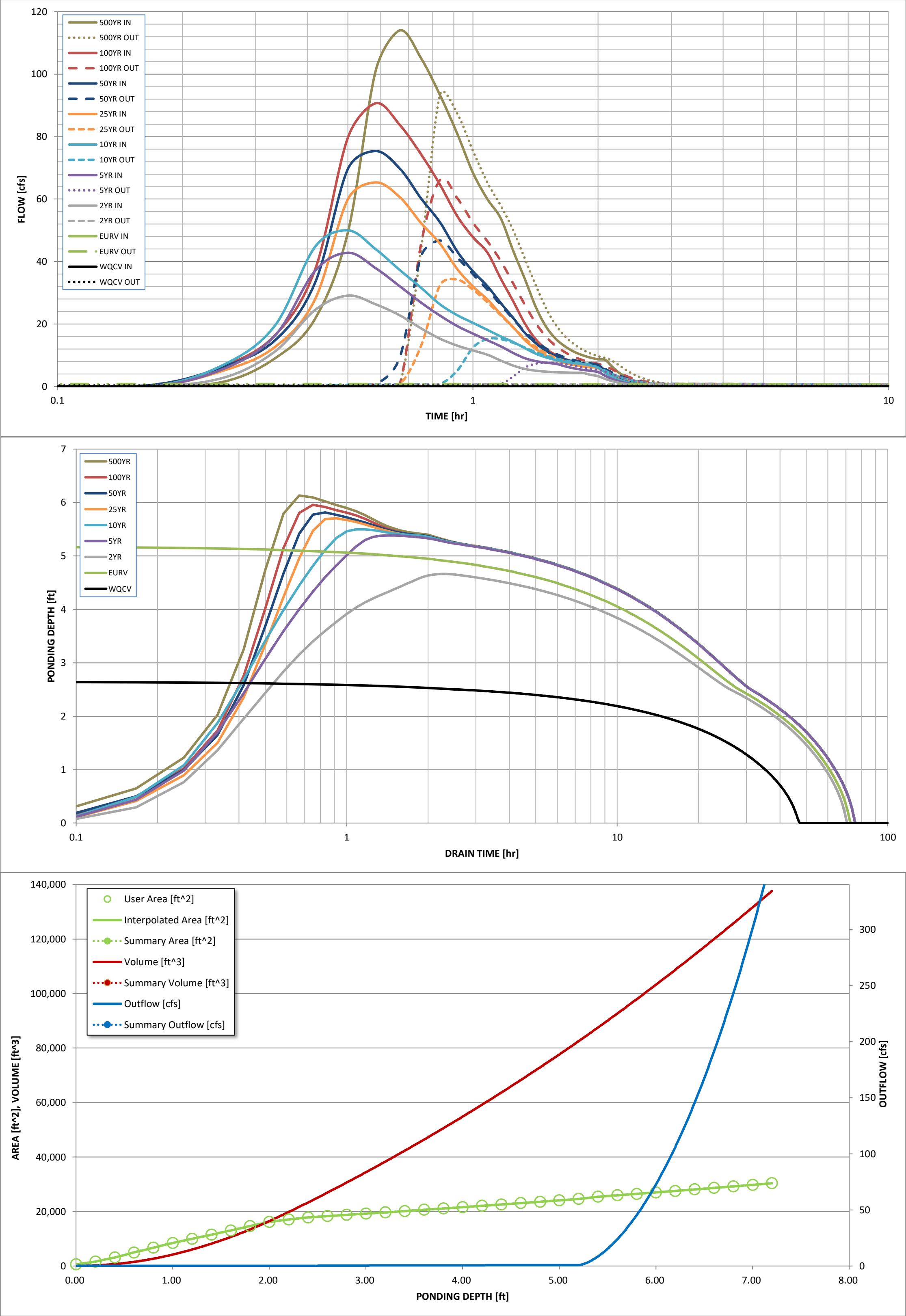
Routed Hydrograph Results

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	1.06	1.43	1.66	2.00	2.26	2.60	3.20
One-Hour Rainfall Depth (in) =	0.638	1.884	1.707	2.516	3.038	3.862	4.470	5.306	6.718
CUHP Runoff Volume (acre-ft) =	N/A	N/A	1.707	2.516	3.038	3.862	4.470	5.306	6.718
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	3.0	9.7	13.3	23.3	28.8	37.4	50.2
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	0.11	0.37	0.50	0.88	1.09	1.41	1.90
Peak Inflow Q (cfs) =	N/A	N/A	29.1	42.8	50.0	65.3	75.4	90.7	114.0
Peak Outflow Q (cfs) =	0.3	0.8	0.7	7.6	15.2	34.2	46.7	66.1	93.5
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.8	1.1	1.5	1.6	1.8	1.9
Structure Controlling Flow =	Plate	Plate	Plate	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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) =	43	65	63	66	64	62	61	59	55
Time to Drain 99% of Inflow Volume (hours) =	45	69	67	71	71	70	69	68	67
Maximum Ponding Depth (ft) =	2.65	5.19	4.66	5.38	5.50	5.70	5.81	5.96	6.13
Area at Maximum Ponding Depth (acres) =	0.42	0.56	0.53	0.58	0.59	0.60	0.61	0.62	0.63
Maximum Volume Stored (acre-ft) =	0.639	1.888	1.598	1.997	2.061	2.186	2.253	2.339	2.444

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)



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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0	0.00	0.00	0.00	0.00	0.00	0.44	0.21	1.47
	0:15:00	0	0.00	2.74	5.53	6.84	5.03	6.29	6.44	8.95
	0:20:00	0	0.00	11.13	16.19	19.38	12.57	14.67	16.30	21.62
	0:25:00	0	0.00	24.47	36.95	44.66	27.85	33.13	37.29	49.31
	0:30:00	0	0.00	29.09	42.80	50.00	59.93	69.64	79.66	101.07
	0:35:00	0	0.00	26.31	37.88	43.97	65.33	75.39	90.68	114.03
	0:40:00	0	0.00	22.78	32.09	37.29	60.62	69.78	83.76	105.14
	0:45:00	0	0.00	18.62	26.87	31.63	52.34	60.23	74.37	93.26
	0:50:00	0	0.00	15.29	22.69	26.29	45.71	52.55	64.60	80.95
	0:55:00	0	0.00	13.09	19.35	22.83	37.59	43.25	54.55	68.42
	1:00:00	0	0.00	11.54	16.93	20.37	32.02	36.88	47.81	60.00
	1:05:00	0	0.00	10.17	14.80	18.13	27.87	32.12	42.89	53.82
	1:10:00	0	0.00	8.30	12.85	16.01	23.15	26.71	34.53	43.42
	1:15:00	0	0.00	6.69	10.73	14.24	18.98	21.95	27.28	34.40
	1:20:00	0	0.00	5.62	9.05	12.27	14.84	17.15	20.14	25.43
	1:25:00	0	0.00	5.05	8.13	10.50	12.00	13.86	15.09	19.11
	1:30:00	0	0.00	4.75	7.61	9.30	9.85	11.39	12.00	15.22
	1:35:00	0	0.00	4.59	7.26	8.48	8.44	9.76	10.09	12.81
	1:40:00	0	0.00	4.49	6.45	7.89	7.50	8.67	8.78	11.15
	1:45:00	0	0.00	4.41	5.81	7.49	6.88	7.95	7.90	10.03
	1:50:00	0	0.00	4.35	5.36	7.20	6.46	7.46	7.27	9.24
	1:55:00	0	0.00	3.76	5.02	6.77	6.17	7.12	6.86	8.72
	2:00:00	0	0.00	3.29	4.63	6.05	5.98	6.91	6.66	8.46
	2:05:00	0	0.00	2.41	3.38	4.38	4.38	5.05	4.88	6.20
	2:10:00	0	0.00	1.70	2.38	3.07	3.07	3.55	3.45	4.37
	2:15:00	0	0.00	1.19	1.66	2.16	2.16	2.49	2.44	3.10
	2:20:00	0	0.00	0.82	1.13	1.49	1.50	1.73	1.70	2.15
	2:25:00	0	0.00	0.55	0.74	1.00	1.01	1.16	1.14	1.45
	2:30:00	0	0.00	0.35	0.50	0.67	0.69	0.79	0.78	0.99
	2:35:00	0	0.00	0.21	0.31	0.41	0.44	0.50	0.49	0.63
	2:40:00	0	0.00	0.10	0.17	0.22	0.24	0.28	0.27	0.35
	2:45:00	0	0.00	0.04	0.07	0.09	0.11	0.12	0.12	0.15
	2:50:00	0	0.00	0.01	0.02	0.02	0.02	0.03	0.03	0.03
	2:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

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.

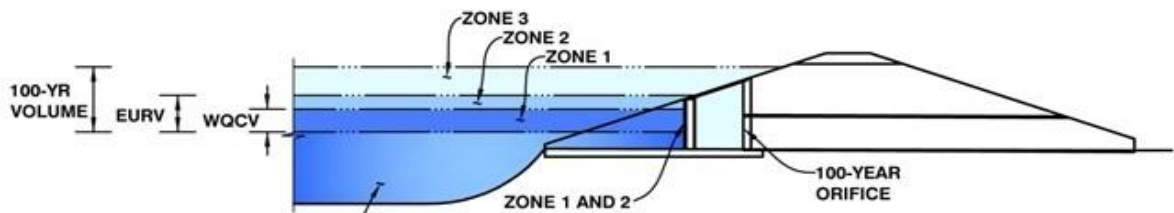
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DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)

Project: Dawson Trails

Basin ID: Pond D3 Verification



Example Zone Configuration (Retention Pond)

Watershed Information

Selected SCM Type =	EDB	
Watershed Area =	89.79	acres
Watershed Length =	3,991	ft
Watershed Length to Centroid =	2,182	ft
Watershed Slope =	0.047	ft/ft
Watershed Imperviousness =	47.90%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	25.0%	percent
Percentage Hydrologic Soil Groups C/D =	75.0%	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) =	1.501	acre-feet
Excess Urban Runoff Volume (EURV) =	4.187	acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	3.841	acre-feet
5-yr Runoff Volume (P1 = 1.43 in.) =	6.285	acre-feet
10-yr Runoff Volume (P1 = 1.66 in.) =	7.948	acre-feet
25-yr Runoff Volume (P1 = 2 in.) =	10.851	acre-feet
50-yr Runoff Volume (P1 = 2.26 in.) =	12.861	acre-feet
100-yr Runoff Volume (P1 = 2.6 in.) =	15.814	acre-feet
500-yr Runoff Volume (P1 = 3.2 in.) =	20.570	acre-feet
Approximate 2-yr Detention Volume =	3.152	acre-feet
Approximate 5-yr Detention Volume =	4.966	acre-feet
Approximate 10-yr Detention Volume =	5.852	acre-feet
Approximate 25-yr Detention Volume =	6.716	acre-feet
Approximate 50-yr Detention Volume =	7.011	acre-feet
Approximate 100-yr Detention Volume =	8.203	acre-feet

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.501	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.686	acre-feet
Select Zone 3 Storage Volume (Optional) =		acre-feet
Total Detention Basin Volume =	4.187	acre-feet
Initial Surcharge Volume (ISV) =	user	ft ³
Initial Surcharge 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 Surge Area (A_{ISV}) =	user	ft ²
Surge Volume Length (L_{ISV}) =	user	ft
Surge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user	ft ²
Volume of Basin Floor (V_{FLOOR}) =	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

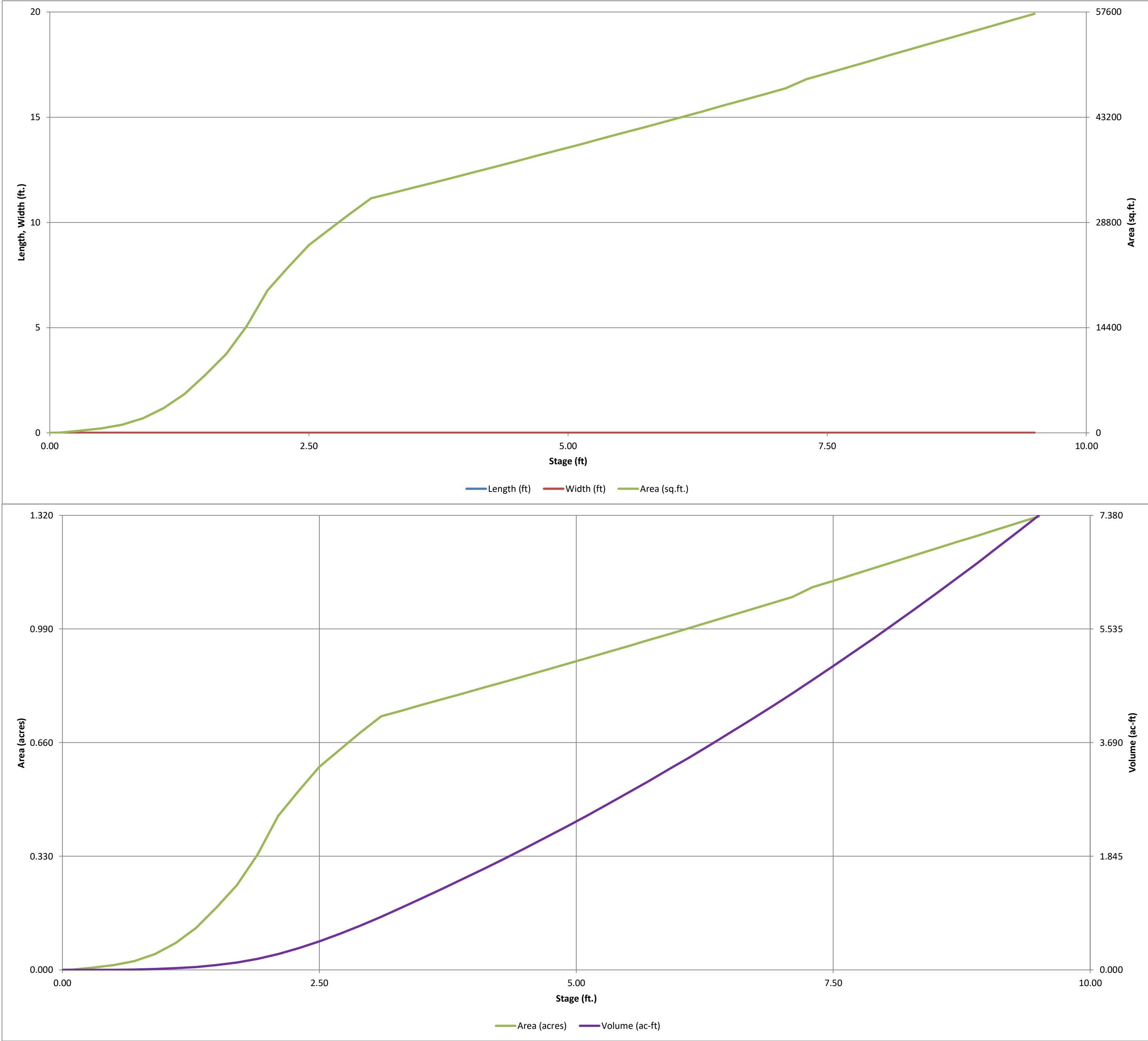
	acre-feet
	acre-feet
1.06	inches
1.43	inches
1.66	inches
2.00	inches
2.26	inches
2.60	inches
3.20	inches

Total detention volume is less than 100-year volume.

Depth Increment =		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	--	--	--	1	0.000		
	--	0.10	--	--	--	29	0.001	1	0.000
	--	0.30	--	--	--	297	0.007	34	0.001
	--	0.50	--	--	--	605	0.014	124	0.003
	--	0.70	--	--	--	1,106	0.025	295	0.007
	--	0.90	--	--	--	2,020	0.046	608	0.014
	--	1.10	--	--	--	3,380	0.078	1,148	0.026
	--	1.30	--	--	--	5,328	0.122	2,019	0.046
	--	1.50	--	--	--	7,896	0.181	3,341	0.077
	--	1.70	--	--	--	10,745	0.247	5,205	0.119
	--	1.90	--	--	--	14,586	0.335	7,738	0.178
	--	2.10	--	--	--	19,487	0.447	11,146	0.256
	--	2.30	--	--	--	22,649	0.520	15,359	0.353
	--	2.50	--	--	--	25,687	0.590	20,193	0.464
	--	2.70	--	--	--	27,857	0.640	25,547	0.586
	--	2.90	--	--	--	30,033	0.689	31,336	0.719
	--	3.10	--	--	--	32,093	0.737	37,549	0.862
	--	3.30	--	--	--	32,807	0.753	44,039	1.011
	--	3.50	--	--	--	33,525	0.770	50,672	1.163
	--	3.70	--	--	--	34,248	0.786	57,449	1.319
	--	3.90	--	--	--	34,974	0.803	64,371	1.478
	--	4.10	--	--	--	35,704	0.820	71,439	1.640
	--	4.30	--	--	--	36,439	0.837	78,654	1.806
	--	4.50	--	--	--	37,178	0.853	86,015	1.975
	--	4.70	--	--	--	37,921	0.871	93,525	2.147
	--	4.90	--	--	--	38,688	0.888	101,186	2.323
	--	5.10	--	--	--	39,419	0.905	108,997	2.502
	--	5.30	--	--	--	40,174	0.922	116,956	2.685
	--	5.50	--	--	--	40,934	0.940	125,067	2.871
	--	5.70	--	--	--	41,698	0.957	133,330	3.061
	--	5.90	--	--	--	42,466	0.975	141,746	3.254
	--	6.10	--	--	--	43,239	0.993	150,317	3.451
	--	6.30	--	--	--	44,015	1.010	159,042	3.651
	--	6.50	--	--	--	44,796	1.028	167,923	3.855
	--	6.70	--	--	--	45,582	1.046	176,961	4.062
	--	6.90	--	--	--	46,371	1.065	186,157	4.274
	--	7.10	--	--	--	47,166	1.083	195,510	4.488
	--	7.30	--	--	--	48,415	1.111	205,068	4.708
	--	7.50	--	--	--	49,218	1.130	214,832	4.932
	--	7.70	--	--	--	50,027	1.148	224,756	5.160
	--	7.90	--	--	--	50,843	1.167	234,843	5.391
	--	8.10	--	--	--	51,661	1.186	245,093	5.627
	--	8.30	--	--	--	52,481	1.205	255,508	5.866
	--	8.50	--	--	--	53,302	1.224	266,086	6.108
	--	8.70	--	--	--	54,115	1.242	276,828	6.355
	--	8.90	--	--	--	54,925	1.261	287,732	6.605
	--	9.10	--	--	--	55,735	1.279	298,798	6.859
	--	9.30	--	--	--	56,545	1.298	310,026	7.117
	--	9.50	--	--	--	57,355	1.317	321,416	7.379
	--		--	--	--				
	--		--	--	--				
	--		--						

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-*Detention*, Version 4.07 (June 2025)

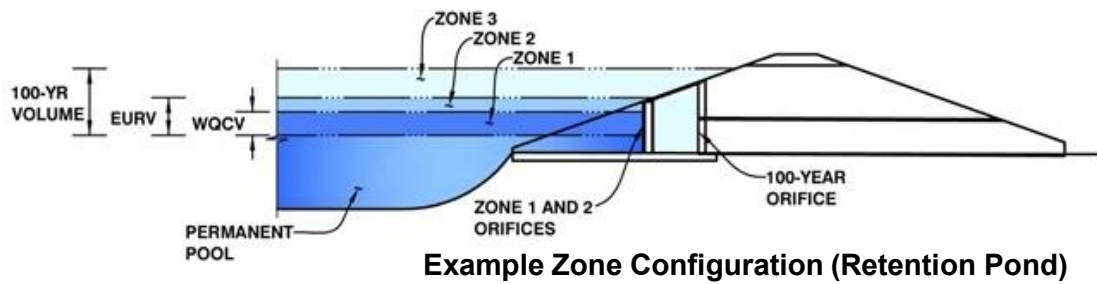


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: Dawson Trails

Basin ID: Pond D3 Verification



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.93	1.501	Orifice Plate
Zone 2 (EURV)	6.82	2.686	Rectangular Orifice
Zone 3			
Total (all zones)		4.187	

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

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 SCM)

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 6.49 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = N/A inches
Orifice Plate: Orifice Area per Row = N/A sq. inches

Calculated Parameters for Plate

WQ Orifice Area per Row = N/A 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							
Orifice Area (sq. inches)	7.00							

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

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice = 3.48 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = 6.49 ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height = 8.00 inches
Vertical Orifice Width = 8.00 inches

Calculated Parameters for Vertical Orifice

Vertical Orifice Area = 0.44 ft²
Vertical Orifice Centroid = 0.33 feet

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

Overflow Weir Front Edge Height, H_o = 7.00 ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Gate Slope = H:V
Horiz. Length of Weir Sides = feet
Overflow Gate Type =
Debris Clogging % = %

Calculated Parameters for Overflow Weir

Height of Gate Upper Edge, H_u = feet
Overflow Weir Slope Length = feet
Gate Open Area / 100-yr Orifice Area =
Overflow Gate Open Area w/o Debris = ft²
Overflow Gate Open Area w/ Debris = ft²

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

Depth to Invert of Outlet Pipe = feet (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter = inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = N/A radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = 7.25 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 50.00 feet
Spillway End Slopes = 10.00 H:V
Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway

Spillway Design Flow Depth = 1.15 feet
Stage at Top of Freeboard = 9.40 feet
Basin Area at Top of Freeboard = 1.31 acres
Basin Volume at Top of Freeboard = 7.25 acre-ft

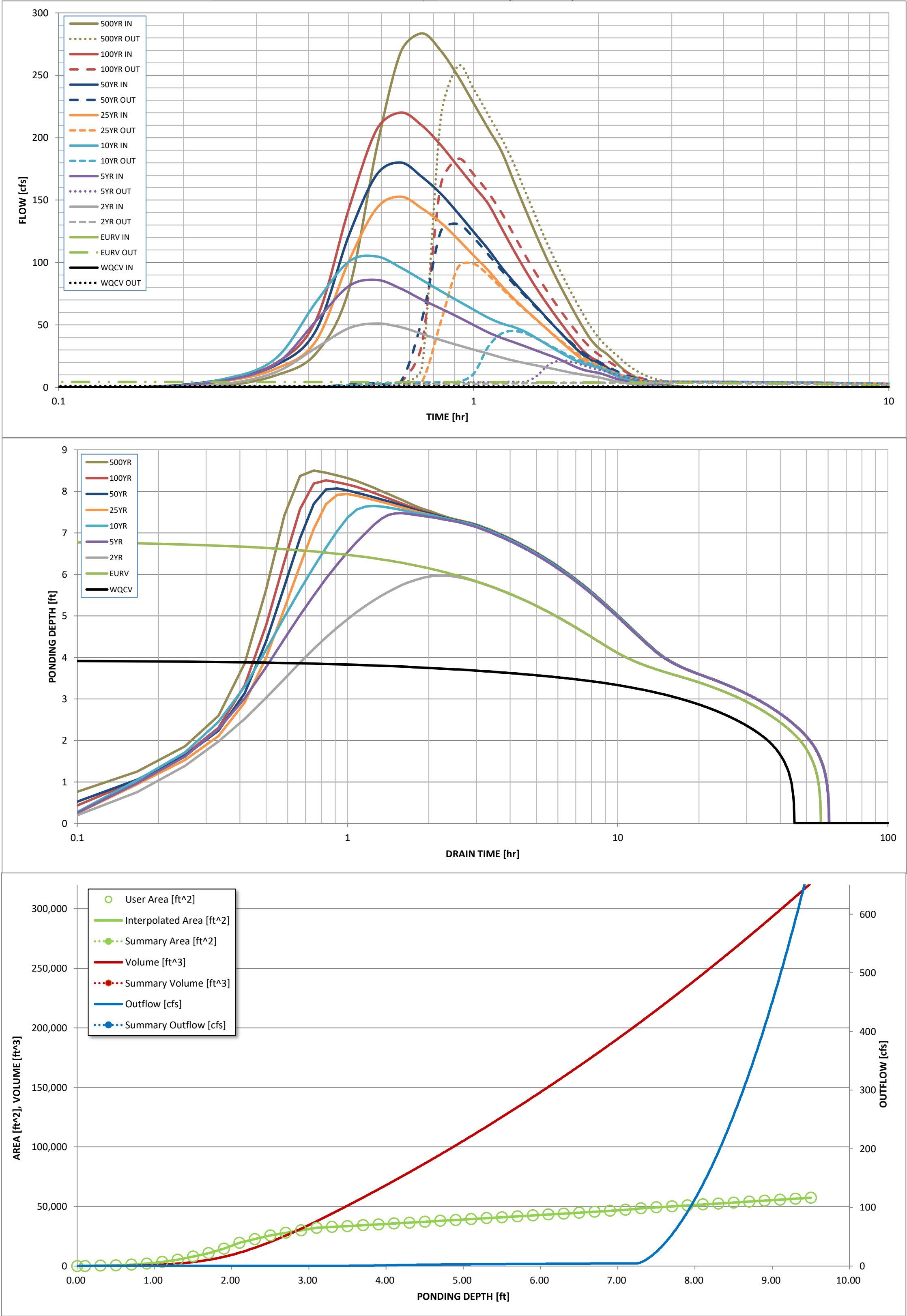
Routed Hydrograph Results

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	1.06	1.43	1.66	2.00	2.26	2.60	3.20
One-Hour Rainfall Depth (in) =	1.501	4.187	3.841	6.285	7.948	10.851	12.861	15.814	20.570
CUHP Runoff Volume (acre-ft) =	N/A	N/A	3.841	6.285	7.948	10.851	12.861	15.814	20.570
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	7.4	27.1	38.7	71.1	88.1	115.1	155.6
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	0.08	0.30	0.43	0.79	0.98	1.28	1.73
Peak Inflow Q (cfs) =	N/A	N/A	51.1	86.1	104.9	152.7	180.1	220.1	283.6
Peak Outflow Q (cfs) =	1.1	4.3	3.7	21.3	45.2	98.9	130.9	183.0	257.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.8	1.2	1.4	1.5	1.6	1.7
Structure Controlling Flow =	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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) =	43	51	51	52	51	47	45	43	38
Time to Drain 99% of Inflow Volume (hours) =	44	54	54	57	57	55	55	54	52
Maximum Ponding Depth (ft) =	3.93	6.82	5.97	7.48	7.65	7.93	8.07	8.26	8.50
Area at Maximum Ponding Depth (acres) =	0.81	1.06	0.98	1.13	1.14	1.17	1.18	1.20	1.22
Maximum Volume Stored (acre-ft) =	1.502	4.189	3.323	4.898	5.091	5.426	5.579	5.818	6.108

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)



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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0	0.00	0.00	0.00	0.00	0.00	0.43	0.21	1.44
	0:15:00	0	0.00	2.64	5.37	6.65	4.91	6.38	6.42	9.54
	0:20:00	0	0.00	12.12	18.52	23.03	14.84	17.64	19.26	27.02
	0:25:00	0	0.00	31.50	52.91	68.02	36.96	45.37	53.53	77.62
	0:30:00	0	0.00	47.32	81.00	100.58	100.81	121.29	142.61	190.76
	0:35:00	0	0.00	51.14	86.08	104.87	143.26	170.13	206.18	268.18
	0:40:00	0	0.00	48.25	79.17	96.00	152.75	180.09	220.12	283.61
	0:45:00	0	0.00	42.91	70.34	86.12	143.43	168.70	209.90	269.74
	0:50:00	0	0.00	37.89	63.13	77.14	132.01	155.17	194.09	249.32
	0:55:00	0	0.00	33.77	56.41	69.32	118.64	139.63	177.03	227.56
	1:00:00	0	0.00	30.20	49.95	62.22	105.65	124.53	161.41	207.51
	1:05:00	0	0.00	27.02	44.06	55.84	93.84	110.73	147.22	189.24
	1:10:00	0	0.00	23.91	39.61	51.23	81.39	96.32	127.81	164.88
	1:15:00	0	0.00	21.35	36.12	48.26	71.06	84.50	109.64	142.33
	1:20:00	0	0.00	19.30	32.73	44.46	62.20	74.05	93.51	121.66
	1:25:00	0	0.00	17.52	29.45	39.47	54.37	64.63	79.41	103.24
	1:30:00	0	0.00	15.87	26.38	34.43	46.83	55.58	67.18	87.22
	1:35:00	0	0.00	14.24	23.47	29.78	39.75	47.13	56.30	72.98
	1:40:00	0	0.00	12.64	20.08	25.55	33.23	39.36	46.32	59.96
	1:45:00	0	0.00	11.19	16.74	21.83	27.26	32.25	37.23	48.13
	1:50:00	0	0.00	10.11	14.17	19.13	22.05	26.09	29.49	38.24
	1:55:00	0	0.00	9.00	12.65	17.34	18.37	21.83	24.08	31.49
	2:00:00	0	0.00	7.99	11.58	15.69	16.18	19.29	20.73	27.26
	2:05:00	0	0.00	6.66	9.74	13.14	13.30	15.88	16.74	22.06
	2:10:00	0	0.00	5.34	7.75	10.46	10.35	12.35	12.76	16.84
	2:15:00	0	0.00	4.22	6.08	8.22	7.95	9.49	9.55	12.62
	2:20:00	0	0.00	3.34	4.78	6.42	6.14	7.31	7.13	9.43
	2:25:00	0	0.00	2.62	3.75	4.97	4.71	5.60	5.32	7.03
	2:30:00	0	0.00	2.05	2.89	3.79	3.59	4.27	4.02	5.31
	2:35:00	0	0.00	1.60	2.20	2.86	2.72	3.22	3.05	4.01
	2:40:00	0	0.00	1.23	1.66	2.16	2.05	2.43	2.33	3.06
	2:45:00	0	0.00	0.94	1.25	1.65	1.57	1.86	1.80	2.37
	2:50:00	0	0.00	0.70	0.93	1.24	1.19	1.41	1.37	1.80
	2:55:00	0	0.00	0.50	0.66	0.90	0.87	1.03	1.00	1.31
	3:00:00	0	0.00	0.33	0.45	0.61	0.60	0.71	0.69	0.90
	3:05:00	0	0.00	0.20	0.29	0.37	0.39	0.45	0.44	0.57
	3:10:00	0	0.00	0.10	0.16	0.20	0.22	0.25	0.24	0.31
	3:15:00	0	0.00	0.04	0.07	0.08	0.09	0.11	0.10	0.13
	3:20:00	0	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.03
	3:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:40:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:45:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4:25:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	4:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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	5:50:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Summary Stage-Area-Volume-Discharge Relationships

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

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

[illegible]

APPENDIX D

REFERENCES

Excerpts from "Public Improvement Construction Plans for Dawson Trails Filing 2 Infrastructure" By EMK Consultants, dated April 2025.

Excerpts from "Phase III Drainage Report for Dawson Trails Filing No.2" by EMK Consultants, approved October 2025

PUBLIC IMPROVEMENT CONSTRUCTION PLANS

DAWSON TRAILS FILING 2 INFRASTRUCTURE

LOCATED IN PORTIONS OF SECTIONS 21, 22, 27 AND 28, TOWNSHIP 8 SOUTH,

RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, TOWN OF CASTLE ROCK, COUNTY OF DOUGLAS, STATE OF COLORADO.

TOWN OF CASTLE ROCK PROJECT NO. CD23-0045

CONTACTS

DEVELOPER / OWNER
ACM DAWSON TRAILS VII JV LLC
4100 E. MISSISSIPPI AVE, STE. 500
GLENDALE, CO 80246
CONTACT: LAWRENCE JACOBSON
(303) 984-9800
LJACOBSON@WESTSIDEINV.COM

ENGINEER
EMK CONSULTANTS, INC.
7006 S. ALTON WAY, BLDG F
CENTENNIAL, CO 80112
CONTACT: GARY WALTER
303-694-1520
EMAIL: GWALTER@EMKC.COM

SURVEYOR
EMK CONSULTANTS, INC.
7006 S. ALTON WAY, BLDG F
CENTENNIAL, CO 80112
CONTACT: SAM GALLUCCI
303-694-1520
EMAIL: SGALLUCCI@EMKC.COM

PLANNER / ARCHITECT
NORRIS DESIGN
1101 BANNOCK ST.
DENVER, CO 80204
CONTACT: STACEY WEAKS
SWEAKS@NORRIS-DESIGN.COM

TOWN OF CASTLE ROCK
TOWN OF CASTLE ROCK
DEVELOPMENT SERVICES DEPARTMENT
100 WILCOX ST.
CASTLE ROCK, CO 80104
(720) 733-2200

UTILITY SERVICE PROVIDERS

WATER & SEWER

CASTLE ROCK WATER
175 KELLOGG COURT
CASTLE ROCK, CO 80104
PHONE: (720) 733-6000
FAX: (303) 688-0437

CABLE

COMCAST
118 WILCOX ST., UNIT B
CASTLE ROCK, CO 80104
PHONE (303) 930-2000

ELECTRIC

CORE ELECTRIC
5496 N. U.S. HWY 85
P.O. DRAWER A
SEDALIA, MO 64135
PHONE: (303) 688-3100

PHONE

LUMEN TECHNOLOGIES
931 14TH STREET
DENVER, CO 80202
PHONE: (800) 244-1111

GAS

BLACK HILLS ENERGY
1515 WYNKOOP ST., 5TH FLOOR
DENVER, CO 80202
PHONE (888) 890-5554

NOTES

- CONTRACTOR TO VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO CONSTRUCTION.
- CONTRACTOR SHALL FIELD VERIFY THE LOCATION AND DEPTH OF ALL UTILITY CROSSINGS PRIOR TO CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE DESIGN ENGINEER OF ANY CONFLICTS OR DISCREPANCIES WHICH WOULD IMPACT THE CONSTRUCTION OF THE PROPOSED UTILITIES PRIOR TO THE START OF CONSTRUCTION.

Sheet List Table

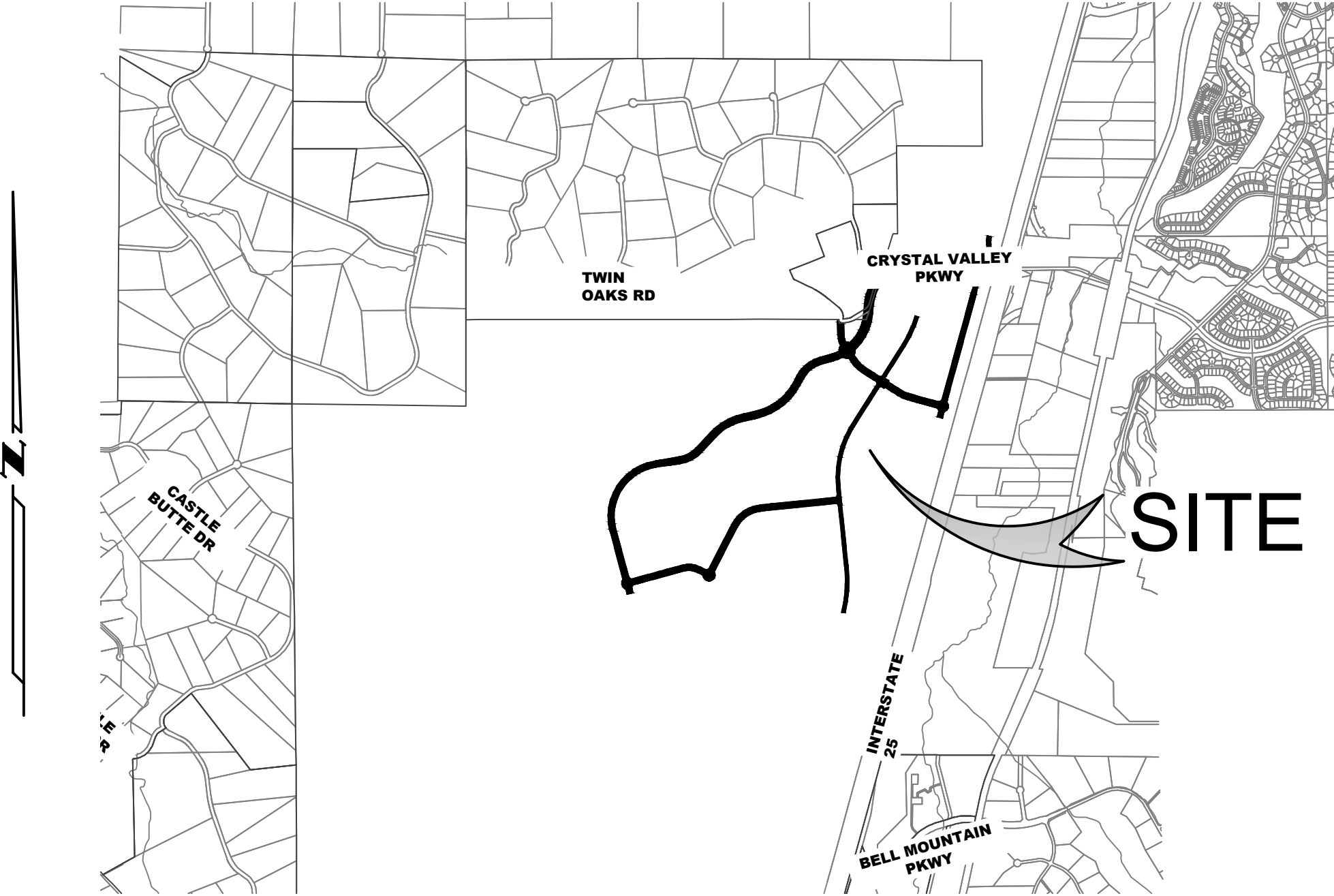
Sheet Number	Sheet Title
1	COVER SHEET
2	TOWN NOTES
3	GENERAL NOTES
4	ROAD SECTIONS
5	HORIZONTAL CONTROL PLAN (1 OF 7)
6	HORIZONTAL CONTROL PLAN (2 OF 7)
7	HORIZONTAL CONTROL PLAN (3 OF 7)
8	HORIZONTAL CONTROL PLAN (4 OF 7)
9	HORIZONTAL CONTROL PLAN (5 OF 7)
10	HORIZONTAL CONTROL PLAN (6 OF 7)
11	HORIZONTAL CONTROL PLAN (7 OF 7)
12	DETAILED GRADING INDEX & PHASING PLAN
13	DETAILED GRADING PLAN (1 OF 14)
14	DETAILED GRADING PLAN (2 OF 14)
15	DETAILED GRADING PLAN (3 OF 14)
16	DETAILED GRADING PLAN (4 OF 14)
17	DETAILED GRADING PLAN (5 OF 14)
18	DETAILED GRADING PLAN (6 OF 14)
19	DETAILED GRADING PLAN (7 OF 14)
20	DETAILED GRADING PLAN (8 OF 14)
21	DETAILED GRADING PLAN (9 OF 14)
22	DETAILED GRADING PLAN (10 OF 14)
23	DETAILED GRADING PLAN (11 OF 14)
24	DETAILED GRADING PLAN (12 OF 14)
25	DETAILED GRADING PLAN (13 OF 14)
26	DETAILED GRADING PLAN (14 OF 14)
27	ROAD P&P INDEX
28	ROAD P&P - GAMBEL RIDGE BLVD (1 OF 7)
29	ROAD P&P - GAMBEL RIDGE BLVD (2 OF 7)
30	ROAD P&P - GAMBEL RIDGE BLVD (3 OF 7)
31	ROAD P&P - GAMBEL RIDGE BLVD (4 OF 7)
32	ROAD P&P - GAMBEL RIDGE BLVD (5 OF 7)
33	ROAD P&P - GAMBEL RIDGE BLVD (6 OF 7)
34	ROAD P&P - GAMBEL RIDGE BLVD (7 OF 7)
35	ROAD P&P - DAWSON TRAILS BLVD (1 OF 4)
36	ROAD P&P - DAWSON TRAILS BLVD (2 OF 4)
37	ROAD P&P - DAWSON TRAILS BLVD (3 OF 4)
38	ROAD P&P - DAWSON TRAILS BLVD (4 OF 4)
39	ROAD P&P - IKE STREET (1 OF 2)
40	ROAD P&P - IKE STREET (2 OF 2)
41	ROAD P&P - QUANDARY PEAK DRIVE (1 OF 2)
42	ROAD P&P - QUANDARY PEAK DRIVE (2 OF 2)
43	ROAD P&P - SCHROEDER DRIVE (1 OF 2)
44	ROAD P&P - SCHROEDER DRIVE (2 OF 2) & DAWSON PLAZA
45	ROAD P&P - BLANCA PEAK (1 OF 3)
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47	ROAD P&P - BLANCA PEAK (3 OF 3)
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50	ROADWAY DETAILS (3 OF 3)
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52	ROUNDABOUT - GAMBEL RIDGE & QUANDARY PEAK(2 OF 3)
53	ROUNDABOUT - GAMBEL RIDGE & QUANDARY PEAK(3 OF 3)
54	ROUNDABOUT - DAWSON TRAILS & QUANDARY PEAK (1 OF 6)

55	ROUNDABOUT - DAWSON TRAILS & QUANDARY PEAK (2 OF 6)
56	ROUNDABOUT - DAWSON TRAILS & QUANDARY PEAK (3 OF 6)
57	ROUNDABOUT - DAWSON TRAILS & QUANDARY PEAK (4 OF 6)
58	ROUNDABOUT - DAWSON TRAILS & QUANDARY PEAK (5 OF 6)
59	ROUNDABOUT - DAWSON TRAILS & QUANDARY PEAK (6 OF 6)
60	ROUNDABOUT - DAWSON TRAILS & BLANCA PEAK (1 OF 7)
61	ROUNDABOUT - DAWSON TRAILS & BLANCA PEAK (2 OF 7)
62	ROUNDABOUT - DAWSON TRAILS & BLANCA PEAK (3 OF 7)
63	ROUNDABOUT - DAWSON TRAILS & BLANCA PEAK (4 OF 7)
64	ROUNDABOUT - DAWSON TRAILS & BLANCA PEAK (5 OF 7)
65	ROUNDABOUT - DAWSON TRAILS & BLANCA PEAK (6 OF 7)
66	ROUNDABOUT - DAWSON TRAILS & BLANCA PEAK (7 OF 7)
67	ROUNDABOUT - GAMBEL RIDGE & SHROEDER DRIVE (1 OF 1)
68	ROUNDABOUT - SHROEDER DRIVE & BLANCA PEAK (1 OF 1)
69	ROUNDABOUT - QUANDARY PEAK & IKE STREET (1 OF 1)
70	INTERSECTION P&P (1 OF 4)
71	INTERSECTION P&P (2 OF 4)
72	INTERSECTION P&P (3 OF 4)
73	INTERSECTION P&P (4 OF 4)
74	OVERALL UTILITY PLAN INDEX
75	OVERALL UTILITY PLAN (1 of 12)
76	OVERALL UTILITY PLAN (2 of 12)
77	OVERALL UTILITY PLAN (3 of 12)
78	OVERALL UTILITY PLAN (4 of 12)
79	OVERALL UTILITY PLAN (5 of 12)
80	OVERALL UTILITY PLAN (6 of 12)
81	OVERALL UTILITY PLAN (7 of 12)
82	OVERALL UTILITY PLAN (8 of 12)
83	OVERALL UTILITY PLAN (9 of 12)
84	OVERALL UTILITY PLAN (10 of 12)
85	OVERALL UTILITY PLAN (11 of 12)
86	OVERALL UTILITY PLAN (12 of 12)
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95	STORM P&P (8 OF 19)
96	STORM P&P (9 OF 19)
97	STORM P&P (10 OF 19)
98	STORM P&P (11 OF 19)
99	STORM P&P (12 OF 19)
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101	STORM P&P (14 OF 19)
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105	STORM P&P (18 OF 19)

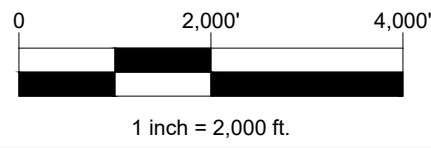
106	STORM P&P (19 OF 19)
107	STORM DETAILS (1 OF 1)
108	N. DAWSON TRIBUTARY CHANNEL P&P INDEX
109	N. DAWSON TRIBUTARY CHANNEL P&P (1 of 3)
110	N. DAWSON TRIBUTARY CHANNEL P&P (2 of 3)
111	N. DAWSON TRIBUTARY CHANNEL P&P (3 of 3)
112	CHANNEL P&P - NORTH DAWSON TRIBUTARY - 106
113	N. DAWSON TRIBUTARY CHANNEL DETAILS (1 OF 8)
114	N. DAWSON TRIBUTARY CHANNEL DETAILS (2 OF 8)
115	N. DAWSON TRIBUTARY CHANNEL DETAILS (3 OF 8)
116	N. DAWSON TRIBUTARY CHANNEL DETAILS (4 OF 8)
117	N. DAWSON TRIBUTARY CHANNEL DETAILS (5 OF 8)
118	N. DAWSON TRIBUTARY CHANNEL DETAILS (6 OF 8)
119	N. DAWSON TRIBUTARY CHANNEL DETAILS (7 OF 8)
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123	POND B1 - FOREBAY GRADING & DETAILS
124	POND B1 - OUTLET STRUCTURE
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127	POND D3 - PLAN
128	POND D3 - FOREBAY GRADING & DETAILS
129	POND D3 - OUTLET STRUCTURE
130	POND D4 - PLAN
131	POND D4 - FOREBAY GRADING & DETAILS
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133	POND D5 - PLAN
134	POND D5 - FOREBAY GRADING & DETAILS
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138	WATER P&P (2 OF 20)
139	WATER P&P (3 OF 20)
140	WATER P&P (4 OF 20)
141	WATER P&P (5 OF 20)
142	WATER P&P (6 OF 20)
143	WATER P&P (7 OF 20)
144	WATER P&P (8 OF 21)
145	WATER P&P (9 OF 21)
146	WATER P&P (10 OF 21)
147	WATER P&P (11 OF 21)
148	WATER P&P (12 OF 21)
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154	WATER P&P (18 OF 21)
155	WATER P&P (19 OF 21)
156	WATER P&P (20 OF 21)
157	WATER P&P (21 OF 21)
158	WATER DETAILS (1 OF 3)
159	WATER DETAILS (2 OF 3)
160	WATER DETAILS (3 OF 3)
161	SANITARY P&P INDEX
162	SANITARY P&P (1 OF 13)
163	SANITARY P&P (3 OF 13)
164	SANITARY P&P (2 OF 13)
165	SANITARY P&P (4 OF 13)
166	SANITARY P&P (5 OF 13)
167	SANITARY P&P (6 OF 13)
168	SANITARY P&P (7 OF 13)
169	SANITARY P&P (8 OF 13)

170	SANITARY P&P (9 OF 13)
171	SANITARY P&P (10 OF 13)
172	SANITARY P&P (11 OF 13)
173	SANITARY P&P (12 OF 13)
174	SANITARY P&P (13 OF 13)
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181	SIGNAGE & STRIPING ROUNDABOUT-2 (4 OF 15)
182	SIGNAGE & STRIPING (5 OF 15)
183	SIGNAGE & STRIPING ROUNDABOUT-3 (6 OF 15)
184	SIGNAGE & STRIPING (7 OF 15)
185	SIGNAGE & STRIPING (8 OF 15)
186	SIGNAGE & STRIPING ROUNDABOUT-4 (9 OF 15)
187	SIGNAGE & STRIPING (10 OF 15)
188	SIGNAGE & STRIPING ROUNDABOUT-5 (11 OF 15)
189	SIGNAGE & STRIPING (12 OF 15)
190	SIGNAGE & STRIPING (13 OF 15)
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251	OVERALL IRRIGATION
252 - 298	IRRIGATION PLAN
299 - 301	IRRIGATION DETAILS



VICINITY MAP



VARIANCE REQUESTS

Variance No.	Description	Approval Date
TCV24-0044	HORIZONTAL SEPARATION BETWEEN SANITARY SEWER AND STORM SEWER LESS THAN 10' ALONG BLANCA PEAK	
TCV24-0043	INTERSECTION SPACING ALONG BLANCA PEAK PARKWAY BETWEEN DAWSON TRAILS BLVD AND DAWSON PLAZA LESS THAN 660'.	10/4/2024
TCV25-0001	HORIZONTAL SEPARATION BETWEEN SANITARY SEWER AND STORM SEWER LESS THAN 10' ALONG GAMBEL RIDGE DRIVE	
TCV25-0002	INTERSECTION SPACING ALONG QUANDARY PEAK DRIVER LESS THAN 660'.	2/12/2025

INDEMNIFICATION AND ADHERENCE TO STANDARDS STATEMENT

THESE PLANS HAVE BEEN REVIEWED BY THE TOWN OF CASTLE ROCK FOR CONCEPT ONLY. THE REVIEW DOES NOT IMPLY RESPONSIBILITY BY THE REVIEWING DEPARTMENT, THE TOWN ENGINEER, OR THE TOWN OF CASTLE ROCK FOR ACCURACY AND CORRECTNESS OF THE CALCULATIONS. FURTHERMORE, THE REVIEW DOES NOT IMPLY THAT QUANTITIES OF ITEMS ON THE PLANS ARE THE FINAL QUANTITIES REQUIRED. THE REVIEW SHALL NOT BE CONSTRUED FOR ANY REASON AS ACCEPTANCE OF FINANCIAL RESPONSIBILITY BY THE TOWN FOR ADDITIONAL QUANTITIES OF ITEMS SHOWN THAT MAY BE REQUIRED DURING THE CONSTRUCTION PHASE.

ALL WORK SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE TOWN OF CASTLE ROCK MUNICIPAL CODE, TECHNICAL MANUALS, AND/OR OTHER TOWN-APPROVED APPLICABLE STANDARDS.

BENCHMARK:

THE ELEVATION AND CONTOURS SHOWN HEREON ARE BASED UPON NGS STATION X 396 (PD KK1331). BEING A STANDARD NGS STEEL DEEPCD, WITH A PUNCHMARK, IN A STANDARD NGS LOGO CAP SET IN A CONCRETE SLEEVE, FLUSH TO THE GROUND. MONUMENT LIES 0.25 MI SOUTH OF THE INTERSECTION OF DOUGLAS LANE LEADING EAST, 121.1 FT EAST OF THE CENTERLINE OF THE NORTHBOUND LANES OF INTERSTATE 25, 86.6 FT SOUTH OF THE CENTER OF A PRIVATE DRIVE LEADING EAST TO A FRAME HOUSE, 38.1 FT EAST OF THE CENTERLINE OF THE EAST FRONTAGE ROAD OF INTERSTATE 25, 5.6 FT NORTH OF A UTILITY POLE, ABOUT LEVEL WITH THE HIGHWAY, AND 1 FT WEST OF A FIBERGLASS WITNESS POST AND SHEEP FENCE. PUBLISHED ELEVATION = 6355.09' NAVD88

BASIS OF COORDINATES:

BASIS OF COORDINATES: PROJECT COORDINATES (GROUND) ARE DERIVED FROM A MODIFIED NAD83 (2011) COLORADO STATE PLANE CENTRAL ZONE COORDINATES (0502) IN U.S. SURVEY FEET, COMBINED SCALE FACTOR = 1.0003644180 AND IS SCALED FROM THE MAPPING ZONE ORIGIN (N: 0FT, E: 0FT)

BASIS OF BEARING:

BEARINGS FOR THIS DESCRIPTION ARE BASED UPON THE NORTH LINE OF THE SOUTHEAST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 21, TOWNSHIP 8 SOUTH, RANGE 67 WEST OF THE SIXTH PRINCIPAL MERIDIAN, BEING ASSUMED TO BEAR N 89°55'56" W, FROM THE SOUTH SIXTEENTH CORNER COMMON TO SECTIONS 21 & 22, BEING MONUMENTED BY A 1" DIAMETER PIPE WITH A 2" DIAMETER ALUMINUM CAP STAMPED "LS 6935 1988", TO THE SOUTHEAST SIXTEENTH CORNER OF SAID SECTION 21, BEING MONUMENTED BY A #5 REBAR WITH A 1-1/2 INCH DIAMETER ALUMINUM CAP STAMPED "LS 10377", WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO.

PROFESSIONAL ENGINEER CERTIFICATION

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE TOWN OF CASTLE ROCK AND STATE OF COLORADO STANDARDS AND STATUTES, RESPECTIVELY, AND THAT I AM FULLY RESPONSIBLE FOR ALL DESIGN AND REVISIONS RELATIVE TO SAID PLANS.

GARY A. WALTER
STATE OF COLORADO # 42246

DATE

TOWN APPROVAL BLOCK

TOWN OF CASTLE ROCK APPROVAL
PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF DEVELOPMENT SERVICES APPROVAL.

APPROVED BY:

DESIGNED BY: DO
DRAWN BY: DL
CHECKED BY: GAW

DEVELOPMENT SERVICES

DATE

DAWSON TRAILS - FILING 2 INFRASTRUCTURE

CASTLE ROCK, COLORADO

CONSTRUCTION DOCUMENTS

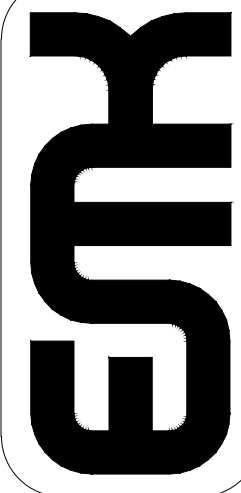
COVER SHEET



JOB NO.
13466.00

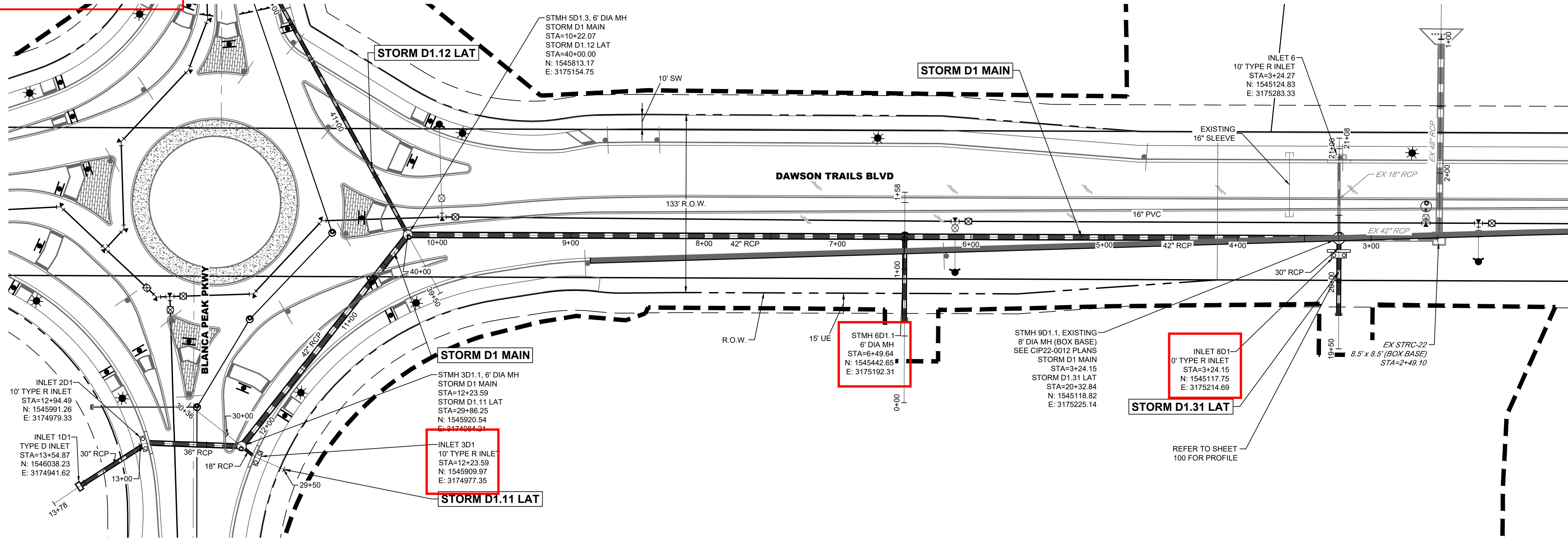
SHEET
1 OF 301

EMK CONSULTANTS, INC.
ENGINEERING/SURVEYING
LAND DEVELOPMENT
SERVICES AND SOLUTIONS
7006 S. ALTON WAY, BLDG. F
CENTENNIAL, COLORADO 80112-2019
(303) 694-1520
WWW.EMKC.COM

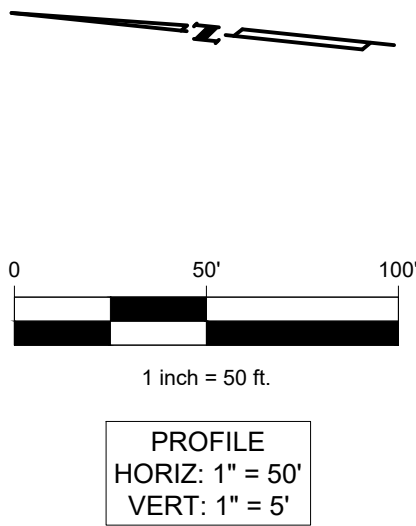
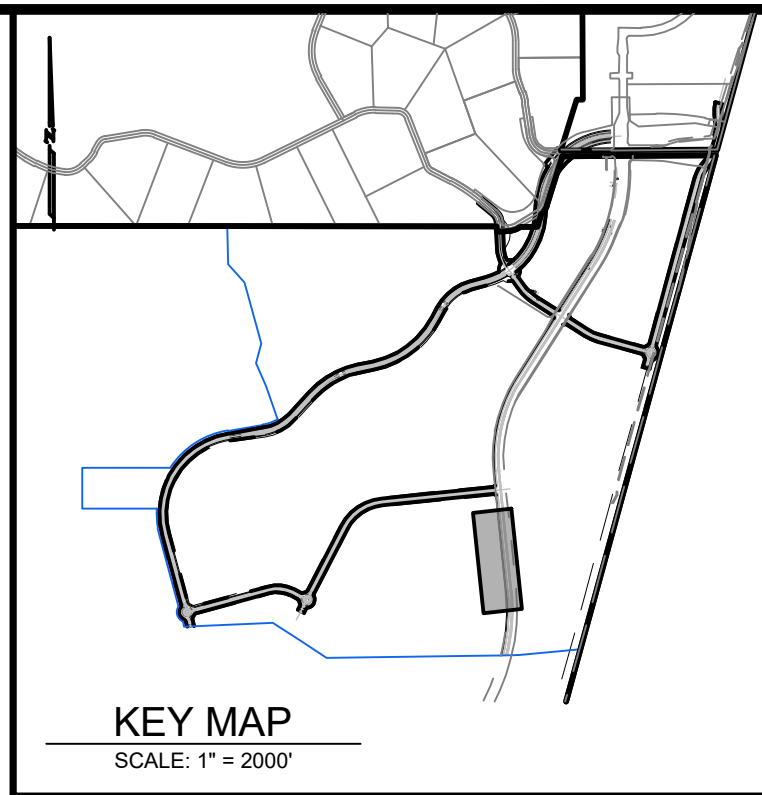
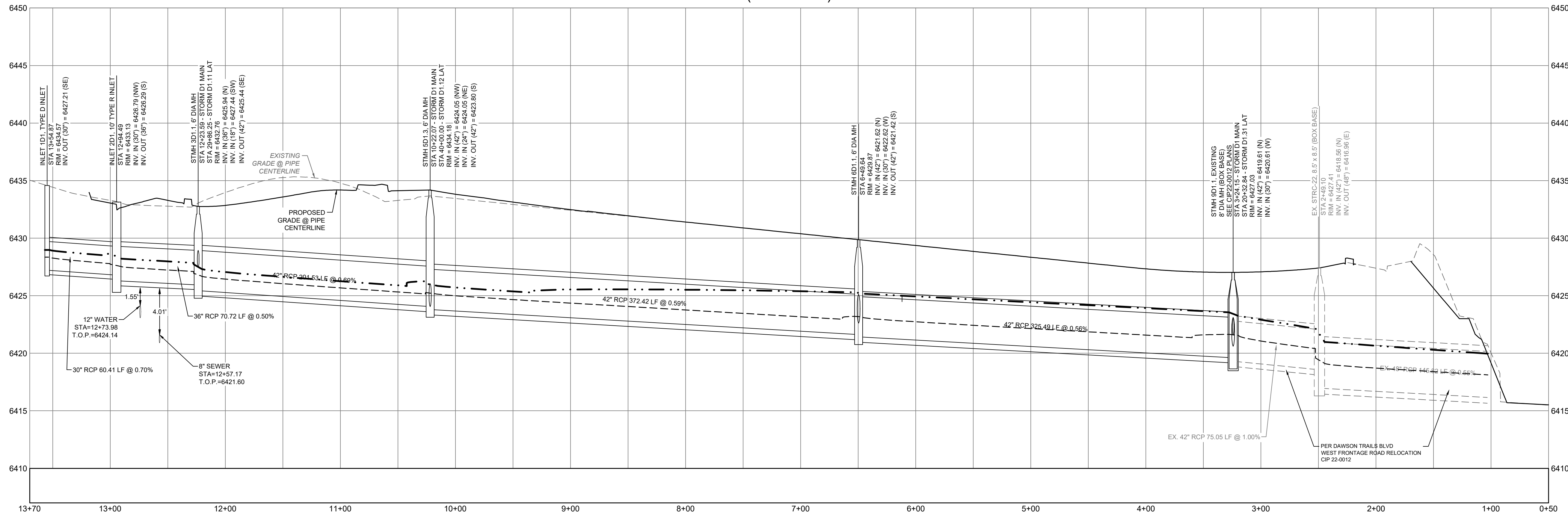


#	REVISION DESCRIPTION	DATE	BY
1	1ST SUBMITTAL	10/31/23	JF
2	2ND SUBMITTAL	8/23/24	BG
3	3RD SUBMITTAL	12/20/24	GW
4	4TH SUBMITTAL	4/30/25	GW

EXCERPTS FROM "PUBLIC IMPROVEMENT CONSTRUCTION PLANS FRO
DAWSON TRAILS FILING 2 INFRASTRUCTURE" BY EMK CONSULTANTS
DATED 04/30/2025.



STORM D1 MAIN (13+70-0+50)



LEGEND

- EASEMENT
- RIGHT OF WAY (R.O.W.)
- CENTERLINE
- LIMITS OF CONSTRUCTION
- PROPOSED CURB & GUTTER
- PROPOSED SANITARY & STUB OUT
- EXISTING SANITARY & STUB OUT
- SANITARY SERVICE
- WATER SERVICE
- PROPOSED WATER & STUB OUT
- EXISTING WATER & STUB OUT
- PROPOSED STORM & STUB OUT
- EXISTING STORM & STUB OUT
- FUTURE STORM & STUB OUT
- STORM MAJOR HGL
- STORM MINOR HGL
- STORM UNDERDRAIN
- EXISTING STORM MANHOLES
- PROPOSED STORM MANHOLES
- STORM INLETS
- FES, FOREBAY, & TRICKLE CHANNEL
- OUTLET STRUCTURE
- CRUSHER FINES
- MAINTENANCE ACCESS
- RIPRAP
- BLOCK NUMBER
- 100 YEAR FLOODPLAIN
- WETLAND

BASIS OF BEARINGS

SEE COVER SHEET FOR BASIS OF BEARINGS & BENCHMARK.

PROFESSIONAL ENGINEER CERTIFICATION

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE TOWN OF CASTLE ROCK AND STATE OF COLORADO STANDARDS AND STATUTES, RESPECTIVELY; AND THAT I AM FULLY RESPONSIBLE FOR ALL DESIGN AND REVISIONS RELATIVE TO SAID PLANS.

GARY A. WALTER
STATE OF COLORADO # 42246

TOWN APPROVAL BLOCK

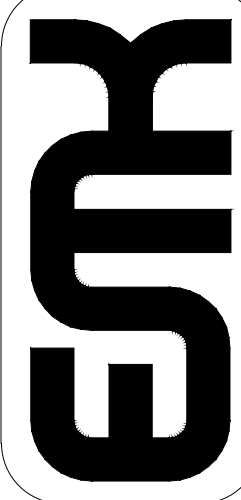
TOWN OF CASTLE ROCK APPROVAL
PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM
DATE OF DEVELOPMENT SERVICES APPROVAL.

APPROVED BY:

DEVELOPMENT SERVICES

DATE

EMK CONSULTANTS, INC.
ENGINEERING/SURVEYING
LAND DEVELOPMENT
SERVICES AND SOLUTIONS
7006 SOUTH ALTON WAY, BLDG. F
DENVER, COLORADO 80221-2019
(303)694-1520
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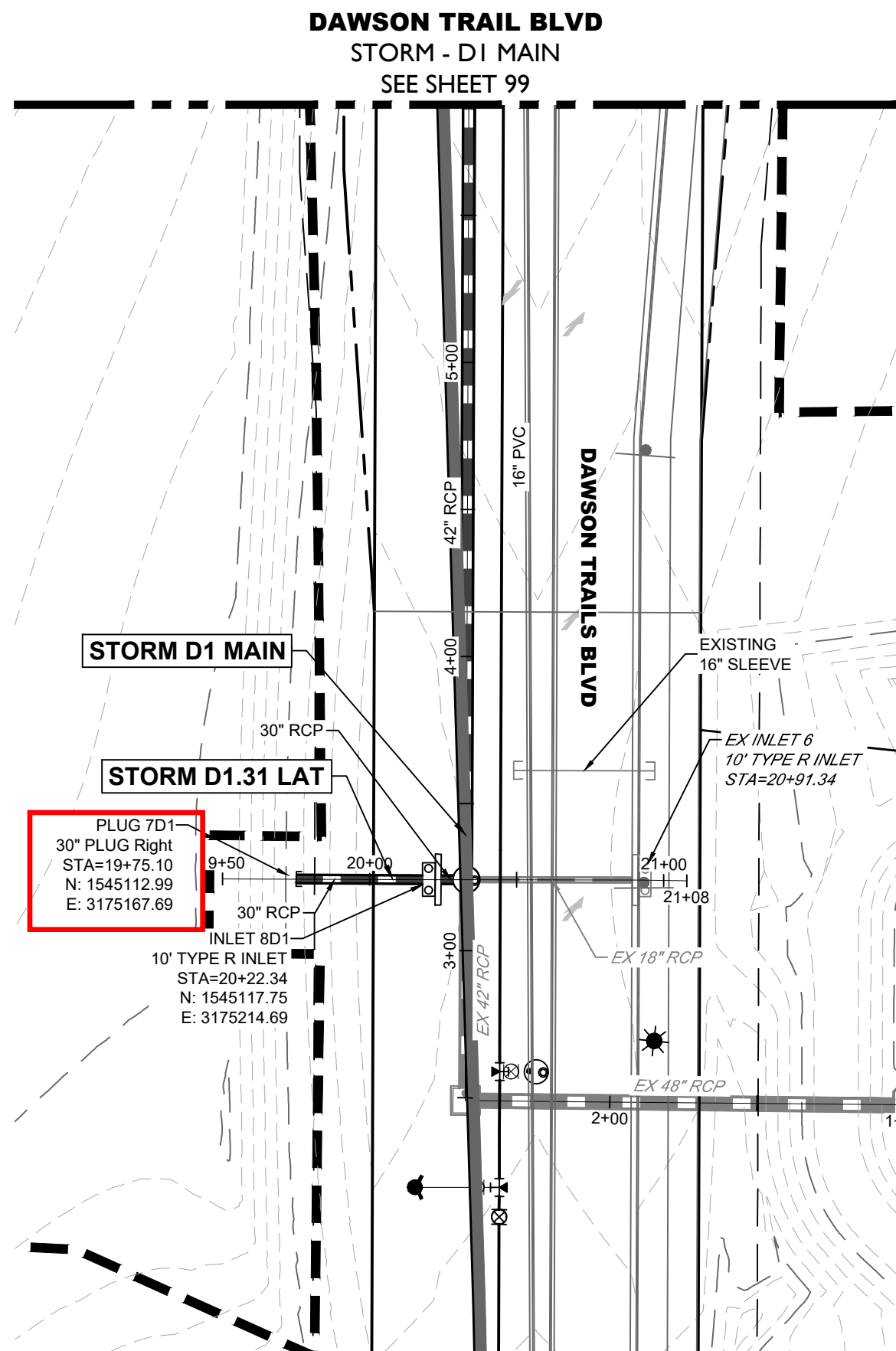
#	REVISION DESCRIPTION	DATE	BY
1	1ST SUBMITTAL	10/31/23	JF
2	2ND SUBMITTAL	8/23/24	BC
3	3RD SUBMITTAL	12/20/24	GW
4	4TH SUBMITTAL	4/30/25	GW

DAWSON TRAILS - FILING 2 INFRASTRUCTURE
CASTLE ROCK, COLORADO
CONSTRUCTION DOCUMENTS
STORM P&P (12 OF 19)

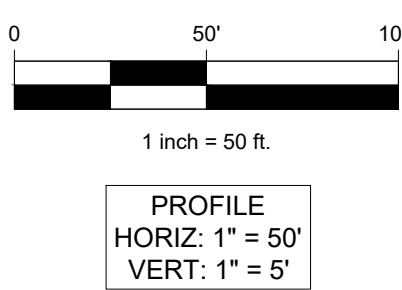
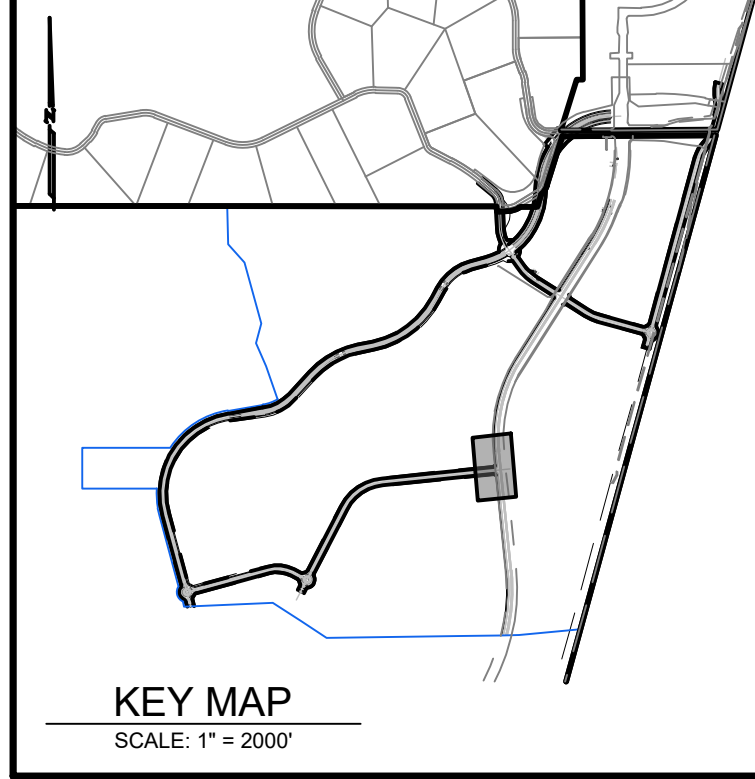
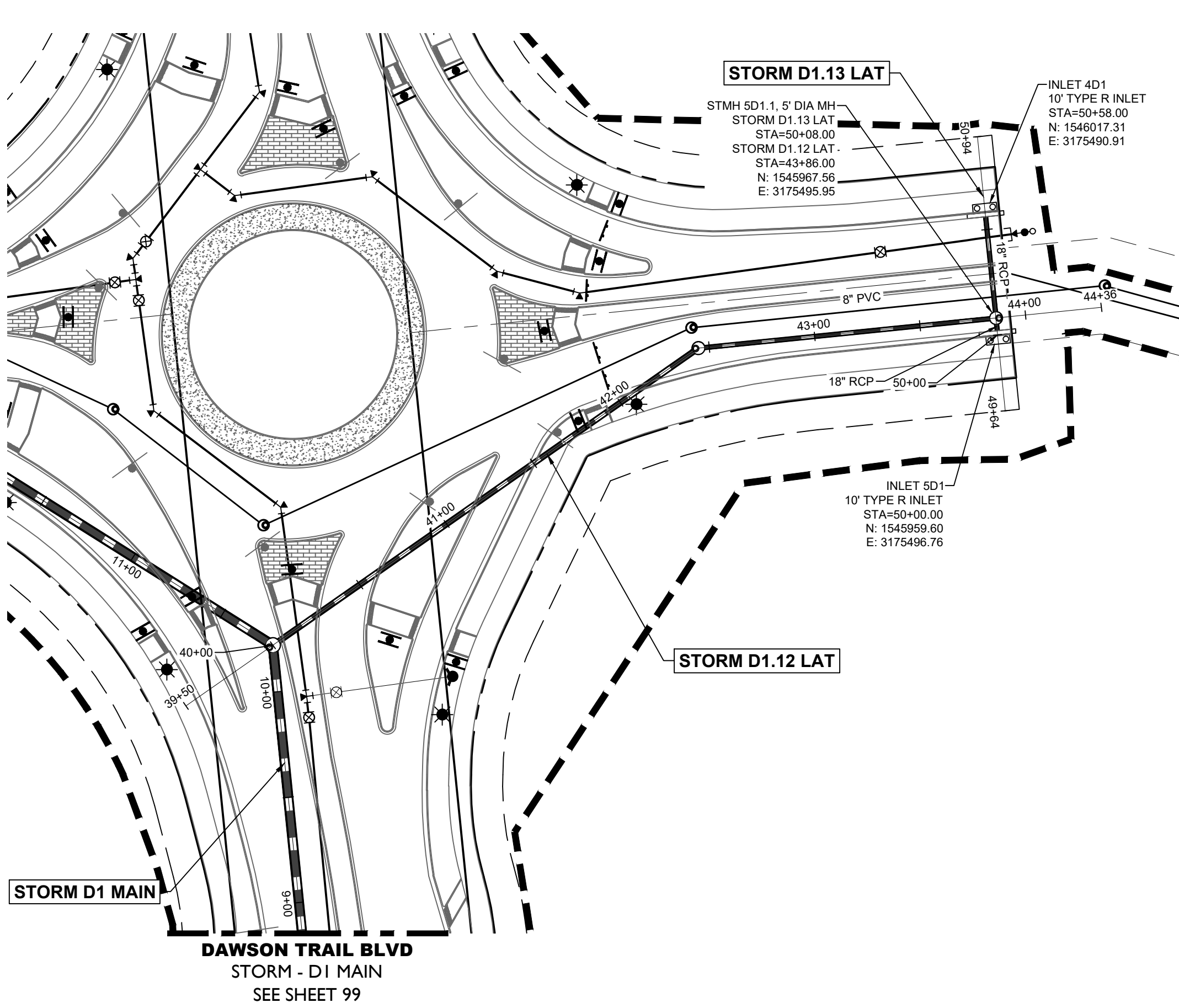
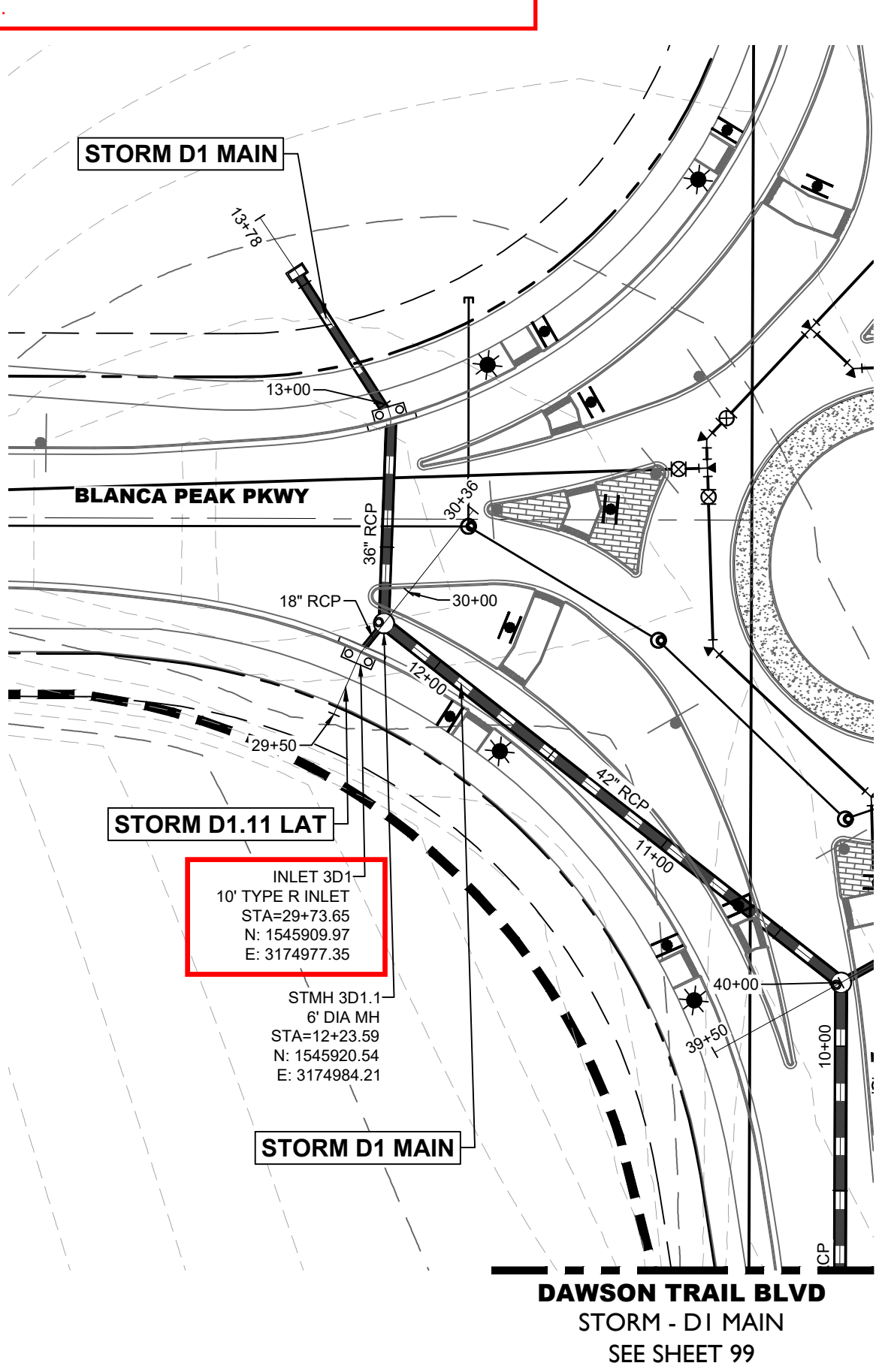


DESIGNED BY: DO
DRAWN BY: DL
CHECKED BY: GAW

JOB NO.
13466.00
SHEET
99 OF 301



EXCERPTS FROM "PUBLIC IMPROVEMENT CONSTRUCTION PLANS FRO
DAWSON TRAILS FILING 2 INFRASTRUCTURE" BY EMK CONSULTANTS
DATED 04/30/2025.



LEGEND

- EASEMENT
 - RIGHT OF WAY (R.O.W.)
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 - RIPRAP
 - BLOCK NUMBER
 - 100 YEAR FLOODPLAIN
 - WETLAND

BASIS OF BEARINGS

SEE COVER SHEET FOR BASIS OF BEARINGS & BENCHMARK.

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GARY A. WALTER
STATE OF COLORADO # 42246

TOWN APPROVAL BLOCK

TOWN OF CASTLE ROCK APPROVAL
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APPROVED BY:

DEVELOPMENT SERVICES

DATE

DAWSON TRAILS - FILING 2 INFRASTRUCTURE

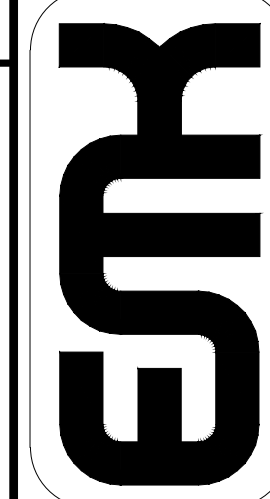
CASTLE ROCK, COLORADO

CONSTRUCTION DOCUMENTS

STORM P&P (13 OF 19)

EMK CONSULTANTS, INC.
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#	REVISION	DESCRIPTION	DATE	BY
1	1ST SUBMITTAL	103123 JF	10/31/23	JF
2	2ND SUBMITTAL	8/2324 BG	8/23/24	BG
3	3RD SUBMITTAL	12/2024 GW	12/20/24	GW
4	4TH SUBMITTAL	4/3025	4/30/25	GW



DESIGNED BY: DO
DRAWN BY: DL
CHECKED BY: GAW

JOB NO.
13466.00
SHEET
100 OF 301

PHASE III DRAINAGE REPORT FOR

DAWSON TRAILS FILING NO. 2
TOWN OF CASTLE ROCK, COLORADO
PROJECT NO. CD23-0045

Prepared for:

ACM Dawson Trails JV LLC
4100 Mississippi Ave, Ste 500
Glendale, CO 80246
Contact: Lawrence Jacobson
Phone: 303-984-9800



Prepared by:



EMK Consultants, Inc.
7006 S. Alton Way, Bldg F
Centennial, CO 80112
Contact: Eric R. McDaniel
Phone: 303-694-1520
EMK Job No 13466

September 9, 2025



will be detained to historic flowrates before exiting the project site via existing storm conveyance elements beneath the BNSF Railroad and eventually drain to East Plum Creek.

Basin A-2 (23.4 acre | 48% Impervious | Q100 = 35.5 cfs)

Major Basin A-2 is bounded by development parcels to the north, the future Regional Flood Control Pond E1 to the west, future development parcels to the south, and Dawson Trails Boulevard to the east. Major Basin A-2 contains the North Dawson Tributary drainageway and associated open space. Basin A-2 is located within the planning area OSP-3 in the development plan. This area has an anticipated use of open space and landscape features. The area is assigned a build out imperviousness of 48% for hydrologic analysis. Flows from this basin will exit to the east and drain to the proposed Regional Flood Control Pond A1.

Basin A-3 (47.0 acre | 87% Impervious | Q100 = 179 cfs)

Major Basin A-3 is bounded by development parcels to the north, future development parcels to the west, the Regional Flood Control Pond A1 to the south and the BNSF railroad to the east. Major Basin A-3 contains roadway right-of-way, future single family, multifamily, and commercial land use. Basin A-3 is located within the planning area D and G-1 in the development plan. The area is assigned a build out imperviousness of 87% for hydrologic analysis. Flows from this basin will be treated in a private Water Quality (WQ) and Excess Urban Runoff Volume (EURV) pond before discharging into the Regional Flood Control Pond A1.

Basin A-4 (89.1 acre | 68% Impervious | Q100 = 326 cfs)

Major Basin A-4 is bounded by development parcels to the north, future development parcels to the west, the North Dawson Tributary drainageway to the south and Dawson Trails Boulevard to the east. Major Basin A-4 contains roadway right-of-way, future single family, and multifamily land use. Basin A-4 is located within the planning area D in the development plan. The area is assigned a build out imperviousness of 68% for hydrologic analysis. Flows from this basin will be treated in a private Water Quality (WQ) and Excess Urban Runoff Volume (EURV) pond before discharging into the North Dawson Tributary immediately south.

Basin A-5 (28.2 acre | 60% Impervious | Q100 = 90.3 cfs)

Major Basin A-5 is bounded by development parcels to the north, future development parcels to the west, the North Dawson Tributary drainageway to the south and future development parcels to the east. Major Basin A-5 contains roadway right-of-way, future single family, and multifamily land use. Basin A-5 is located within the planning area D and C-2 in the development plan. The area is assigned a build out imperviousness of 60% for hydrologic analysis. Flows from this basin will be treated in a private Water Quality (WQ) and Excess Urban Runoff Volume (EURV) pond before discharging into the North Dawson Tributary immediately south.

Basin A-6 (8.36 acre | 60% Impervious | Q100 = 30.3 cfs)

Major Basin A-6 is bounded by development parcels to the north, future development parcels to the west, the North Dawson Tributary drainageway to the south and future development parcels to the east. Major Basin A-6 contains roadway right-of-way, future single family, and multifamily land use. Basin A-6 is located within the planning area C-1 and C-2 in the development plan. The area is assigned a build out imperviousness of 60% for hydrologic analysis. Flows from this basin will be treated in a private Water Quality

PERCENT IMPERVIOUS CALCULATIONS
PROPOSED CONDITIONS - DAWSON TRAILS - FILING 2 - POND D1

Note: Dawson Trails Filing 2 is grandfathered into the previous MHFD impervious values (pre June 2024). In some instances the new, higher values have been used to match surrounding filings.

Basin	Total Area	Asphalt/ Poned Water	Roof/ Concrete	Commercial - Medium to High Density	MFH - High Density MFH (>20 du/ac)	SFH - High-density (5-20 du/ac) and Commercial - Low-density	SFH - Low & Medium-density (5-20 du/ac)	Community Parks/ Extended Detention Basins	Neighborhood Parks	Open Space - Undisturbed Native Grass, Landscaping	Composite Percent Impervious
%IMP	(acres)	100% (acres)	90% (acres)	80% (acres)	70% (acres)	65% (acres)	55% (acres)	25% (acres)	15% (acres)	2% (acres)	
D1-1	5.11				5.11						70.0%
D1-2	1.36	0.94	0.20							0.22	82.7%
D1-3	0.73	0.50	0.10							0.13	81.2%
D1-4	1.17	0.79	0.15							0.23	79.5%
D1-5	0.41	0.05	0.29							0.07	76.2%
D1-6	4.79				4.79						70.0%
D1-7	5.87				5.87						70.0%
D1-8a	1.43	0.91	0.20							0.32	76.7%
D1-8b	0.54	0.29	0.10							0.15	70.9%
D1-9a	1.43	0.90	0.20							0.33	76.0%
D1-9b	0.56	0.29	0.10							0.17	68.5%
D1-10	0.85							0.85			75.0%
Pond D1	24.25	4.67	1.34		15.77			0.85		1.62	70.8%

Runoff

Chapter 6

Table 6-3. Recommended percentage imperviousness values	
Land Use or Surface Characteristics	Percentage Imperviousness (%)
Business:	
Downtown Areas	95
Suburban Areas	75
Residential lots (lot area only):	
Single-family	
2.5 acres or larger	12
0.75 – 2.5 acres	20
0.25 – 0.75 acres	30
0.25 acres or less	45
Apartments	75
Industrial:	
Light areas	80
Heavy areas	90
Parks, cemeteries	10
Playgrounds	25
Schools	55
Railroad yard areas	50
Undeveloped Areas:	
Historic flow analysis	2
Greenbelts, agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and walks	90
Roofs	90
Lawns, sandy soil	2
Lawns, clayey soil	2

TABLE 6-2. RECOMMENDED IMPERVIOUSNESS BY LAND USE

LAND USE/DENSITY	IMPERVIOUSNESS
Residential	
Single-family Housing (SFH) – Rural (0 – 3 du/ac)	35%
SFH – Low & Medium-density (3 – 5 du/ac)	55%
SFH – High-density (5 - 20 du/ac)	65%
Manufactured Housing (>= 10 du/ac)	65%
Multi-family Housing (MFH) – Medium-density (5 – 20 du/ac)	65%
MFH – High-density MFH (>20 du/ac)	70%
Commercial	
Commercial – Low-density	65%
Commercial – Medium- to High-density	80%
Commercial – Urban Core	90%
Industrial/Institutional	
Schools	55%
Office/Institutional	65%
Industrial Areas	75%
Solar Fields, Gravel Cover ^{1,2}	60%
Solar Fields, Grass Cover ^{1,2}	45%
Parks and Open Space	
Open Space, Undisturbed Native Grasses	5%
Community Parks	25%
Neighborhood Parks	15%
Golf Courses	30%
Cemeteries	25%

Note: Recommended imperviousness values shown in the table are the minimum imperviousness values for a specific land use. It is the engineer's responsibility to select imperviousness values that appropriately reflect the actual density of the proposed development.

¹ Use these values at the master planning scale or when the specific layout of panels is not known. Use values from the surface type (Table 6-3) at the site planning and design stage when panel width, panel spacing, and panel orientation relative to contours are known.

² Assumes 1:1 ratio of panels to aisles. See MHFD's technical memorandum regarding Determination of Solar Panel Field Runoff Coefficients and Imperviousness Values for additional information on procedures to reflect other impervious areas such as roads and pads that may be part of a solar field and layouts with wider inter-panel spacing.

TABLE 6-3. RECOMMENDED IMPERVIOUSNESS BY SURFACE TYPES

SURFACE TYPES		IMPERVIOUSNESS
Roadways and Paved Streets		95%
Concrete Driveways and Walks		95%
Roofs		95%
Gravel	No Traffic (Pedestrian Use)	40%
	Low-traffic Areas (Maintenance Paths and Substations)	60%
	High-traffic Areas (Roadways and Parking)	80%
Disturbed Soil (Including Lawns, Managed/Active Turf, Landscaped Areas with Water-Wise Vegetation, and Uncompacted Gravel/Mulch Planting Beds)		20%
Undisturbed or Decompacted Soil (Native Grasses and Open Space Areas)		5%
Artificial Turfs ¹	Landscape Applications (without Subgrade Drainage Layer)	25% – 45%
	Sport Fields (with Underdrain Pipe System)	60% – 80%
Water Surfaces (Lakes/Reservoirs/Irrigation Ponds)		100%
Solar Fields ²	Grass Cover (Varies with Panel Orientation Relative to Ground Contours)	10% – 45%
	Gravel Cover (Varies with Panel Orientation Relative to Ground Contours)	50% – 75%
Historic Flow Analysis, Greenbelts, Agricultural		5%
Newly Graded Areas		65%
Stormwater Control Measures ³	Retention Ponds & Constructed Wetland Ponds	100%
	Rooftop Systems – Blue Roofs	95%
	Rooftop Systems – Green Roofs (extensive)	65%
	Rooftop Systems – Green Roofs (intensive)	50%
	Permeable Pavement – CGP/PGP/RGP	55%
	Permeable Pavement – PICP	45%
	Extended Detention Basins	25%
	Receiving Pervious Areas (incl. Grass Buffers & Grass Swales)	20%
	Bioretention & Sand Filters	10%

¹ Consult with the manufacturer to get a recommended value.

² Assumes 1:1 ratio of panels to aisles. See MHFD's technical memorandum regarding Determination of Solar Panel Field Runoff Coefficients and Imperviousness Values for additional information on procedures for determining percent imperviousness based on panel width, panel spacing, and panel orientation relative to ground contours and how to reflect other impervious areas such as roads and pads that may be part of a solar field and layouts with wider inter-panel spacing.

³ See MHFD's technical memorandum regarding Evaluation of Percent Imperviousness for Stormwater Control Measures for background information.

JOB NO: 13301.00
PROJECT: Dawson Trails - Filing 2, Pond D1
DSGN STRM: 5-year
CALC BY: DJO

RATIONAL METHOD
(5-YEAR DEVELOPED CONDITION)

DATE: 4/25/25 $I=28.5 \cdot P^{.1} / ((10+T)^{.0.786})$

1 HR STORM= 1.43				Direct RUNOFF				TOTAL RUNOFF				TRAVEL TIME				PIPE FLOW		Notes
Design Point	Basin	Ac	C	Tc	A°C	I	Q	Tc	A°C	I	Q	Length	Vel.	Time	From	A°C	Q	
1D1	D1-1	5.11	0.61	10.29	3.09	3.8	11.8					60	10	0.1	1D1 TO 2D1	3.09	11.8	DIRECT/ PIPE FLOW
	D1-2	1.36	0.71	5.91	0.96	4.6	4.5											DIRECT
2D1	DP 1D1 + D1-2							10.4	4.06	3.8	15.5	60	10	0.1	2D1 TO 3D1.1	4.06	15.5	COMBINED
3D1	D1-3	0.73	0.70	5.00	0.51	4.9	2.5									0.51	2.5	DIRECT/ PIPE FLOW
3D1.1	DP 2D1 + DP 3D1							10.5	4.57	3.8	17.3	200	10	0.3	3D1.1 TO 5D1.2	4.57	17.3	COMBINED
4D1	D1-4	1.17	0.68	7.44	0.80	4.3	3.4									0.80	3.4	DIRECT/ PIPE FLOW
5D1	D1-5	0.41	0.66	5.00	0.27	4.9	1.3									0.27	1.3	DIRECT/ PIPE FLOW
5D1.1	DP 4D1 + DP 5D1							7.4	1.07	4.3	4.6					1.07	4.6	COMBINED
5D1.3	DP 5D1.1 + DP 3D1.1							10.8	5.63	3.7	21.1	370	10	0.6	5D1.3 TO 6D1.1	5.63	21.1	COMBINED
6D1	D1-6	4.79	0.61	10.71	2.90	3.8	10.9									2.90	10.9	DIRECT/ PIPE FLOW
6D1.1	DP 5D1.3 + DP 6D1							11.4	8.53	3.7	31.3	330	10	0.6	6D1.1 TO 9D1.1	8.53	31.3	COMBINED
7D1	D1-7	5.87	0.61	9.65	3.55	3.9	13.9									3.55	13.9	DIRECT/ PIPE FLOW
	D1-8a	1.43	0.66	6.66	0.94	4.0	3.6											DIRECT
	D1-8b	0.54	0.61	5.54	0.33	4.7	1.6											DIRECT
	D1-8a + D1-8b							8.9	1.27	4.0	5.2							DIRECT
8D1	DP 7D1+D1-8a+D1-8b							9.6	4.83	3.9	18.9					4.83	18.9	COMBINED
	D1-9a	1.43	0.65	8.91	0.94	4.0	3.8											DIRECT
	D1-9b	0.56	0.59	5.66	0.33	4.7	1.6											DIRECT
9D1	D1-9a + D1-9b							8.9	1.27	4.0	5.1					1.27	5.1	COMBINED
9D1.1	DP 6D1.1 + DP 8D1 + DP 9D1							12.0	14.63	3.6	52.5					14.63	52.5	COMBINED

JOB NO: 13301.00

PROJECT: Dawson Trails - Filing 2, Pond D1

DSGN STRM: 100-year

CALC BY: DJO

RATIONAL METHOD (100-YEAR DEVELOPED CONDITION)

DATE: 4/25/25

$$I=28.5 \cdot P1 / (10+T)^{0.786}$$

1 HR STORM= 2.60				DIRECT RUNOFF				TOTAL RUNOFF				TRAVEL TIME				PIPE FLOW		Notes
Design Point	Basin	Ac	C	Tc	A°C	I	Q	Tc	A°C	I	Q	Length	Vel.	Time (Min.)	From To	A°C	Q	
1D1	D1-1	5.11	0.77	10.29	3.94	7.0	27.4									3.94	27.4	DIRECT/ PIPE FLOW
	D1-2	1.36	0.82	5.91	1.12	8.4	9.4											DIRECT
2D1	DP 1D1 + D1-2							10.3	5.05	7.0	35.2					5.05	35.2	COMBINED
3D1	D1-3	0.73	0.82	5.00	0.60	8.8	5.3									0.60	5.3	DIRECT/ PIPE FLOW
3D1.1	DP 2D1 + DP 3D1							10.3	5.65	7.0	39.3	600	10	1.0	2D3 TO 3D3	5.65	39.3	COMBINED
4D1	D1-4	1.17	0.81	7.44	0.95	7.8	7.4									0.95	7.4	DIRECT/ PIPE FLOW
5D1	D1-5	0.41	0.80	5.00	0.33	8.8	2.9					100	10	0.2	3D3 TO 4D3	0.33	2.9	DIRECT/ PIPE FLOW
5D1.1	DP 4D1 + DP 5D1							7.4	1.27	7.8	10.0					1.27	10.0	COMBINED
5D1.3	DP 5D1.1 + DP 3D1.1							11.3	6.92	6.7	46.4					6.92	46.4	COMBINED
6D1	D1-6	4.79	0.77	10.71	3.69	6.8	25.2					80	10	0.13	4D3 TO 5D3	3.69	25.2	DIRECT/ PIPE FLOW
6D1.1	DP 5D1.3 + DP 6D1							11.3	10.61	6.7	71.1					10.61	71.1	COMBINED
7D1	D1-7	5.87	0.77	9.65	4.52	7.1	32.3					290	10	0.483	5D3 TO 6D3	4.52	32.3	DIRECT/ PIPE FLOW
	D1-8a	1.43	0.80	8.88	1.14	7.4	8.4											DIRECT
	D1-8b	0.54	0.77	5.54	0.42	8.6	3.6											DIRECT
	D1-8a + D1-8b							8.9	1.56	7.4	11.5	80	10	0.13	6D3 TO 7D3			DIRECT
8D1	DP 7D1+D1-8a+D1-8b							9.6	6.08	7.1	43.4					6.08	43.4	COMBINED
	D1-9a	1.43	0.79	8.91	1.14	7.4	8.4					140	10	0.2	7D3 TO 8D3			DIRECT
	D1-9b	0.56	0.76	5.66	0.43	8.5	3.6											DIRECT
9D1	D1-9a + D1-9b							8.9	1.56	7.4	11.5					1.56	11.5	COMBINED
9D1.1	DP 6D1.1 + DP 8D1 + DP 9D1							11.3	18.26	6.7	122.3	105	10	0.2	8D3 TO 9D3	18.26	122.3	COMBINED

PERCENT IMPERVIOUS CALCULATIONS
PROPOSED CONDITIONS - DAWSON TRAILS - FILING 2 - POND D3

Note: Dawson Trails Filing 2 is grandfathered into the previous MHFD impervious values (pre June 2024). In some instances the new, higher values have been used to match surrounding filings.

Basin	Total Area	Asphalt/ Poned Water	Roof/ Concrete	Commercial - Medium to High Density	MFH - High Density MFH (>20 du/ac)	SFH - High-density (5-20 du/ac) and Commercial - Low-density	SFH - Low & Medium-density (5-20 du/ac)	Community Parks/ Extended Detention Basins	Neighborhood Parks	Open Space - Undisturbed Native Grass, Landscaping	Composite Percent Impervious
%IMP	(acres)	100% (acres)	90% (acres)	80% (acres)	70% (acres)	65% (acres)	55% (acres)	25% (acres)	15% (acres)	2% (acres)	
D3.0	12.30				7.50					4.80	43.5%
D3.10	0.67	0.33	0.09							0.25	62.1%
D3.11	0.64	0.29	0.13							0.22	64.3%
D3.12	3.03	0.29	0.14							2.60	15.4%
D3.13	0.62	0.28	0.13							0.21	64.7%
D3.15	0.83	0.28	0.07							0.48	42.5%
D3.16	0.50	0.14	0.07							0.29	41.8%
D3.18	0.32	0.15	0.07							0.10	67.2%
D3.19	1.12	0.15	0.07							0.90	20.6%
D3.20	0.47	0.32								0.15	68.7%
D3.21	0.55	0.25								0.30	46.5%
D3.22	0.25	0.25									100.0%
D3.2a	11.70									11.70	2.0%
D3.2b	3.00					3.00					65.0%
D3.2c	7.61					7.61					65.0%
D3.2d	2.90									2.90	2.0%
D3.2e	1.70					1.70					65.0%
D3.2f	1.10			1.10							80.0%
D3.3a	26.07					26.07					65.0%
D3.3b	7.89					7.89					65.0%
D3.4	2.90					2.90					65.0%
D3.6	4.45							4.45			25.0%
D3.2d + D3.2e	4.60					1.70				2.90	25.3%
Pond D3	90.62	2.73	0.77	1.10	7.50	49.17		4.45	0.00	24.90	47.6%

Runoff

Chapter 6

Table 6-3. Recommended percentage imperviousness values	
Land Use or Surface Characteristics	Percentage Imperviousness (%)
Business:	
Downtown Areas	95
Suburban Areas	75
Residential lots (lot area only):	
Single-family	
2.5 acres or larger	12
0.75 – 2.5 acres	20
0.25 – 0.75 acres	30
0.25 acres or less	45
Apartments	75
Industrial:	
Light areas	80
Heavy areas	90
Parks, cemeteries	10
Playgrounds	25
Schools	55
Railroad yard areas	50
Undeveloped Areas:	
Historic flow analysis	2
Greenbelts, agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and walks	90
Roofs	90
Lawns, sandy soil	2
Lawns, clayey soil	2

TABLE 6-2. RECOMMENDED IMPERVIOUSNESS BY LAND USE

LAND USE/DENSITY	IMPERVIOUSNESS
Residential	
Single-family Housing (SFH) – Rural (0 – 3 du/ac)	35%
SFH – Low & Medium-density (3 – 5 du/ac)	55%
SFH – High-density (5 – 20 du/ac)	65%
Manufactured Housing (>= 10 du/ac)	65%
Multi-family Housing (MFH) – Medium-density (5 – 20 du/ac)	65%
MFH – High-density MFH (>20 du/ac)	70%
Commercial	
Commercial – Low-density	65%
Commercial – Medium- to High-density	80%
Commercial – Urban Core	90%
Industrial/Institutional	
Schools	55%
Office/institutional	65%
Industrial Areas	75%
Solar Fields, Gravel Cover ^{1,2}	60%
Solar Fields, Grass Cover ^{1,2}	45%
Parks and Open Space	
Open Space, Undisturbed Native Grasses	5%
Community Parks	25%
Neighborhood Parks	15%
Golf Courses	30%
Cemeteries	25%

Note: Recommended imperviousness values shown in the table are the minimum imperviousness values for a specific land use. It is the engineer's responsibility to select imperviousness values that appropriately reflect the actual density of the proposed development.

¹ Use these values at the master planning scale or when the specific layout of panels is not known. Use values from the surface type (Table 6-3) at the site planning and design stage when panel width, panel spacing, and panel orientation relative to contours are known.

² Assumes 1:1 ratio of panels to aisles. See MHFD's technical memorandum regarding Determination of Solar Panel Field Runoff Coefficients and Imperviousness Values for additional information on procedures to reflect other impervious areas such as roads and pads that may be part of a solar field and layouts with wider inter-panel spacing.

TABLE 6-3. RECOMMENDED IMPERVIOUSNESS BY SURFACE TYPES

SURFACE TYPES		IMPERVIOUSNESS
Roadways and Paved Streets		95%
Concrete Driveways and Walks		95%
Roofs		95%
Gravel	No Traffic (Pedestrian Use)	40%
	Low-traffic Areas (Maintenance Paths and Substations)	60%
	High-traffic Areas (Roadways and Parking)	80%
Disturbed Soil (Including Lawns, Managed/Active Turf, Landscaped Areas with Water-Wise Vegetation, and Uncompacted Gravel/Mulch Planting Beds)		20%
Undisturbed or Decompacted Soil (Native Grasses and Open Space Areas)		5%
Artificial Turfs ¹	Landscape Applications (without Subgrade Drainage Layer)	25% – 45%
	Sport Fields (with Underdrain Pipe System)	60% – 80%
Water Surfaces (Lakes/Reservoirs/Irrigation Ponds)		100%
Solar Fields ²	Grass Cover (Varies with Panel Orientation Relative to Ground Contours)	10% – 45%
	Gravel Cover (Varies with Panel Orientation Relative to Ground Contours)	50% – 75%
Historic Flow Analysis, Greenbelts, Agricultural		5%
Newly Graded Areas		65%
Stormwater Control Measures ³	Retention Ponds & Constructed Wetland Ponds	100%
	Rooftop Systems – Blue Roofs	95%
	Rooftop Systems – Green Roofs (extensive)	65%
	Rooftop Systems – Green Roofs (intensive)	50%
	Permeable Pavement – CGP/PGP/RGP	55%
	Permeable Pavement – PICP	45%
	Extended Detention Basins	25%
	Receiving Pervious Areas (incl. Grass Buffers & Grass Swales)	20%
	Bioretention & Sand Filters	10%

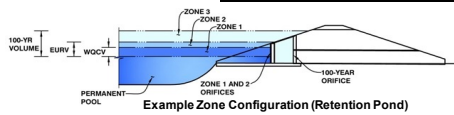
¹ Consult with the manufacturer to get a recommended value.

² Assumes 1:1 ratio of panels to aisles. See MHFD's technical memorandum regarding Determination of Solar Panel Field Runoff Coefficients and Imperviousness Values for additional information on procedures for determining percent imperviousness based on panel width, panel spacing, and panel orientation relative to ground contours and how to reflect other impervious areas such as roads and pads that may be part of a solar field and layouts with wider inter-panel spacing.

³ See MHFD's technical memorandum regarding Evaluation of Percent Imperviousness for Stormwater Control Measures for background information.

MHFD-Detention, Version 4.06 (July 2022)

Basin ID: Pond A1 (Stage 0.00 = 6399.50) 235 cfs is the max release rate under railroad



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

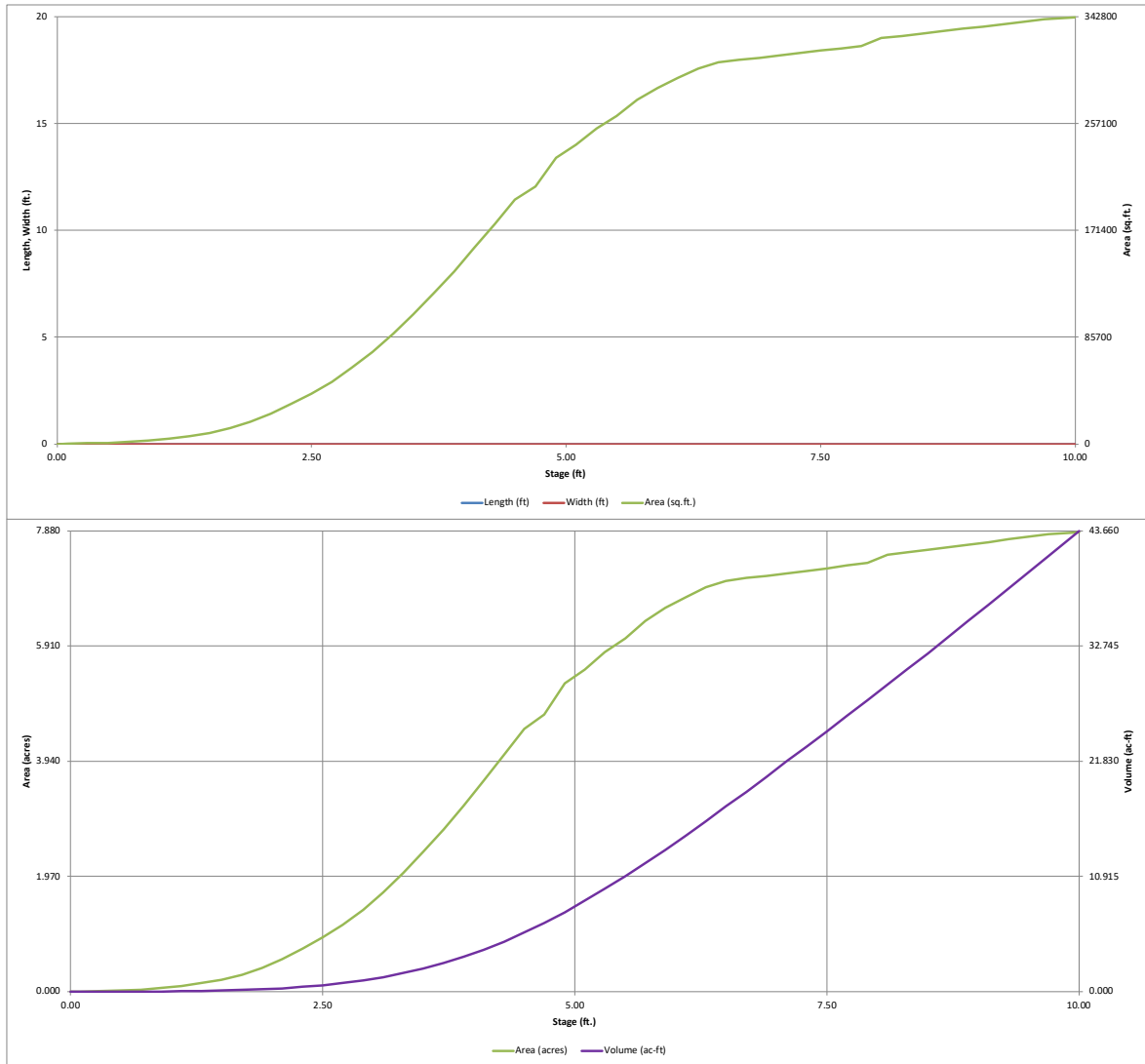
Zone 1 Volume (100-year)	=	25.146	acre-feet
Select Zone 2 Storage Volume (Optional)	=		acre-feet
Select Zone 3 Storage Volume (Optional)	=		acre-feet
Total Detention Basin Volume	=	25.146	acre-feet
Initial Surcharge Volume (ISV)	=	N/A	ft ³
Initial Surcharge Depth (ISD)	=	N/A	ft
Total Available Detention 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 (S_{main})	=	user	H:V
Basin Length-to-Width Ratio (R_{LW})	=	user	

Initial Surcharge Area (A_{SV})	=	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

4/30/2025, 7:27 AM

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

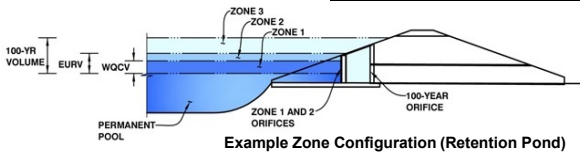


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Dawson Trails Filing 2

Basin ID: Pond A1 (Stage 0.00 = 6399.50) 235 cfs is the max release rate under railroad



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (100-year)	7.57	25.146	Weir&Pipe (Restrict)
Zone 2			
Zone 3			
Total (all zones)		25.146	

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV 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 WOCV and/or EURV in a sedimentation BMP)

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

Calculated Parameters for Plate
WQ Orifice Area per Row = ft²
Elliptical Half-Width = feet
Elliptical Slot Centroid = feet
Elliptical Slot Area = ft²

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

	Row 1 (optional)	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice
Vertical Orifice Area = ft²
Vertical Orifice Centroid = feet

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

Overflow Weir Front Edge Height, Ho = ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Gate Slope = H:V
Horiz. Length of Weir Sides = feet
Overflow Gate Type =
Debris Clogging % = %

Calculated Parameters for Overflow Weir
Height of Gate Upper Edge, H_g = feet
Overflow Weir Slope Length = feet
Grate Open Area / 100-yr Orifice Area =
Overflow Gate Open Area w/o Debris = ft²
Overflow Gate Open Area w/ Debris = ft²

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

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

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

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

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

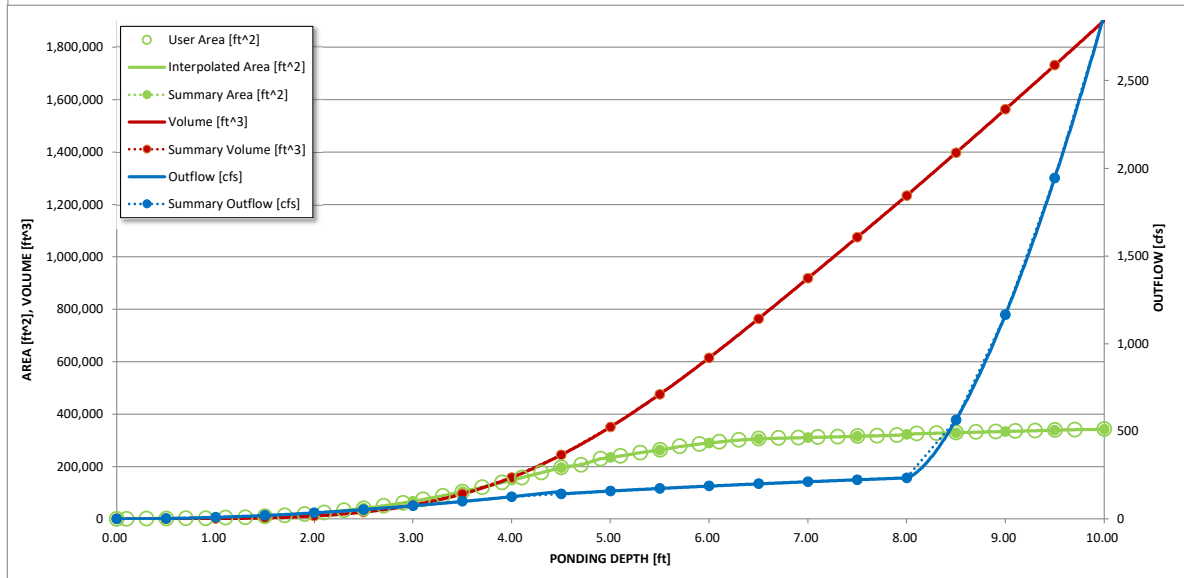
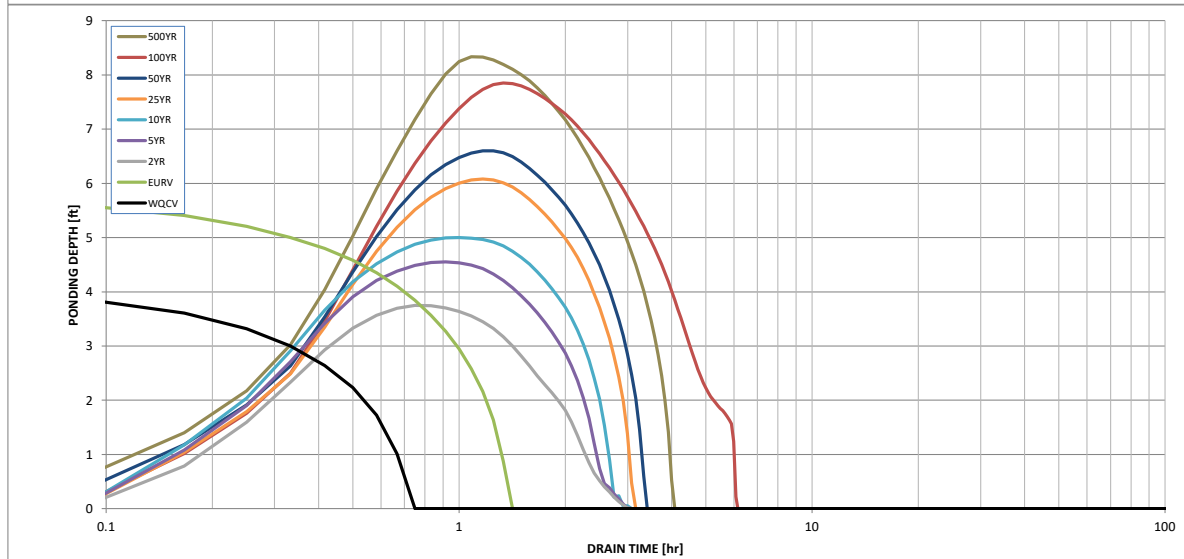
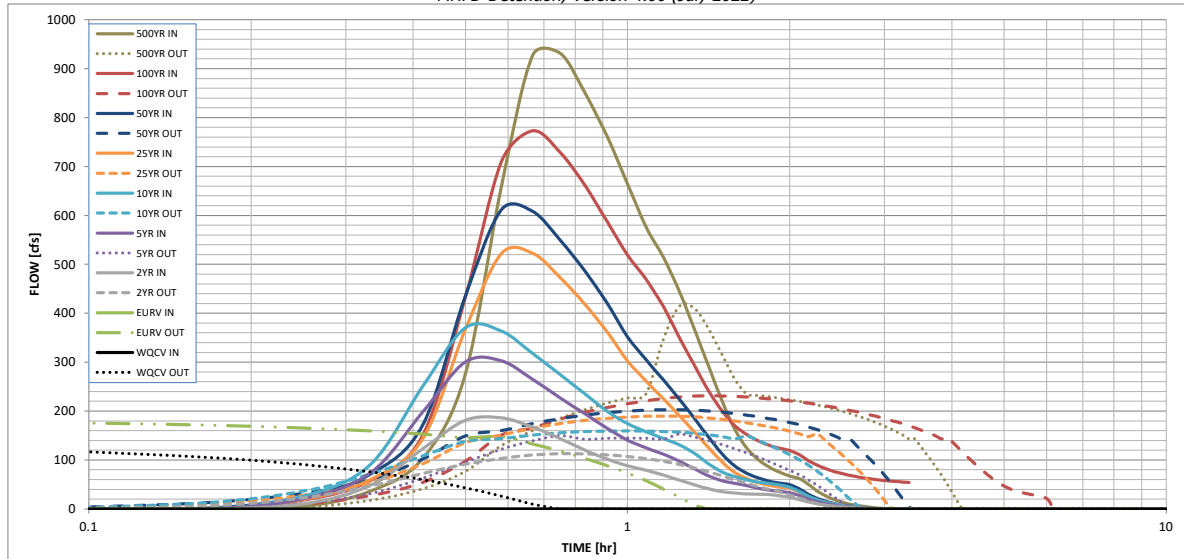
Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period =	N/A	N/A	1.06	1.43	1.66	2.01	2.26	2.60	3.14
One-Hour Rainfall Depth (in) =	4.578	13.399	11.983	19.066	23.829	32.263	37.779	46.114	58.319
CUHP Runoff Volume (acre-ft) =	N/A	N/A	11.983	19.066	23.829	32.263	37.779	67.254	58.319
User Override Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	18.2	84.0	122.6	232.6	286.2	375.5	495.4
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A							
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.07	0.33	0.48	0.91	1.12	1.47	1.94
Peak Inflow Q (cfs) =	N/A	N/A	186.2	302.7	369.9	522.7	611.3	772.7	931.4
Peak Outflow Q (cfs) =	135.1	182.3	112.8	152.6	159.3	189.7	202.8	231.3	414.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.8	1.3	0.8	0.7	0.6	0.8
Structure Controlling Flow =	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway
Max Velocity through Gate 1 (fps) =	1.03	1.34	0.82	1.1	1.2	1.4	1.5	1.7	1.8
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) =	1	1	2	2	2	3	3	4	4
Time to Drain 99% of Inflow Volume (hours) =	1	1	2	2	3	3	3	5	4
Maximum Ponding Depth (ft) =	4.26	5.90	3.74	4.55	5.00	6.08	6.60	7.85	8.33
Area at Maximum Ponding Depth (acres) =	3.96	6.56	2.85	4.54	5.38	6.72	7.05	7.32	7.52
Maximum Volume Stored (acre-ft) =	4.585	13.448	2.818	5.781	8.004	14.577	18.172	27.148	30.793

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	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	1.67	0.08	5.08
	0:15:00	0.00	0.00	10.20	20.71	25.65	19.10	24.81	17.90	36.25
	0:20:00	0.00	0.00	48.23	73.87	90.93	60.30	70.97	57.85	103.02
	0:25:00	0.00	0.00	122.82	197.70	250.20	143.05	171.38	150.50	274.62
	0:30:00	0.00	0.00	181.07	300.27	369.88	365.92	433.96	431.46	658.47
	0:35:00	0.00	0.00	186.22	302.72	363.61	521.77	611.29	709.56	927.35
	0:40:00	0.00	0.00	167.44	264.73	317.57	522.65	608.28	772.74	931.39
	0:45:00	0.00	0.00	143.48	226.68	274.71	472.72	549.16	728.68	851.07
	0:50:00	0.00	0.00	120.20	194.50	235.32	418.74	486.40	661.87	761.07
	0:55:00	0.00	0.00	101.60	164.72	199.40	361.72	420.27	587.16	664.73
	1:00:00	0.00	0.00	87.99	140.65	174.27	302.41	351.96	518.97	575.53
	1:05:00	0.00	0.00	78.72	124.51	157.70	260.95	304.57	468.77	513.96
	1:10:00	0.00	0.00	68.92	111.52	143.86	224.79	263.20	413.15	443.06
	1:15:00	0.00	0.00	58.43	97.29	130.36	190.14	223.50	349.27	364.72
	1:20:00	0.00	0.00	49.01	81.42	112.76	156.25	183.77	291.41	289.55
	1:25:00	0.00	0.00	40.93	67.18	91.53	124.27	145.74	240.03	219.01
	1:30:00	0.00	0.00	35.25	57.52	75.19	95.40	111.79	199.25	162.00
	1:35:00	0.00	0.00	32.21	52.43	65.62	74.32	87.39	170.11	123.74
	1:40:00	0.00	0.00	30.73	47.35	59.42	61.72	72.71	151.41	100.69
	1:45:00	0.00	0.00	29.92	42.16	54.97	53.65	63.23	138.93	85.36
	1:50:00	0.00	0.00	29.40	38.44	51.88	48.20	56.81	130.07	74.80
	1:55:00	0.00	0.00	26.93	35.69	48.75	44.54	52.48	123.82	67.36
	2:00:00	0.00	0.00	23.55	33.05	44.27	42.06	49.51	119.28	62.01
	2:05:00	0.00	0.00	18.99	26.99	35.58	34.73	40.83	110.76	50.25
	2:10:00	0.00	0.00	14.08	19.81	25.92	25.27	29.66	98.87	36.25
	2:15:00	0.00	0.00	10.41	14.52	18.78	18.38	21.54	89.40	26.36
	2:20:00	0.00	0.00	7.60	10.55	13.57	13.36	15.64	82.18	19.29
	2:25:00	0.00	0.00	5.49	7.50	9.75	9.58	11.22	76.55	13.94
	2:30:00	0.00	0.00	3.88	5.19	6.90	6.75	7.89	72.12	9.83
	2:35:00	0.00	0.00	2.67	3.58	4.83	4.79	5.60	68.60	6.97
	2:40:00	0.00	0.00	1.75	2.42	3.24	3.30	3.85	65.71	4.77
	2:45:00	0.00	0.00	1.04	1.53	1.98	2.08	2.42	63.24	2.99
	2:50:00	0.00	0.00	0.52	0.84	1.03	1.14	1.33	61.18	1.62
	2:55:00	0.00	0.00	0.21	0.36	0.41	0.49	0.56	59.50	0.66
	3:00:00	0.00	0.00	0.05	0.08	0.09	0.10	0.12	58.11	0.12
	3:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	56.93	0.00
	3:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	55.88	0.00
	3:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	54.86	0.00
	3:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	53.85	0.00
	3:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	52.82	0.00
	3:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	51.80	0.00
	3:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	50.79	0.00
	3:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	49.79	0.00
	3:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	48.80	0.00
	3:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	47.85	0.00
	3:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.93	0.00
	4:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.03	0.00
	4:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	45.11	0.00
	4:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	44.19	0.00
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	43.29	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	42.41	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	41.50	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	40.57	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	39.66	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	38.77	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	37.85	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	36.90	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.96	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	35.03	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.16	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	33.15	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	31.98	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.80	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	29.64	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	28.52	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.54	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	26.09	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	24.36	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	22.62	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.98	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	19.45	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

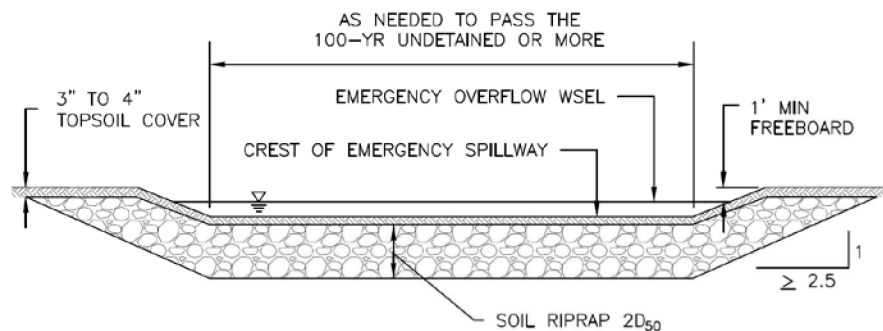
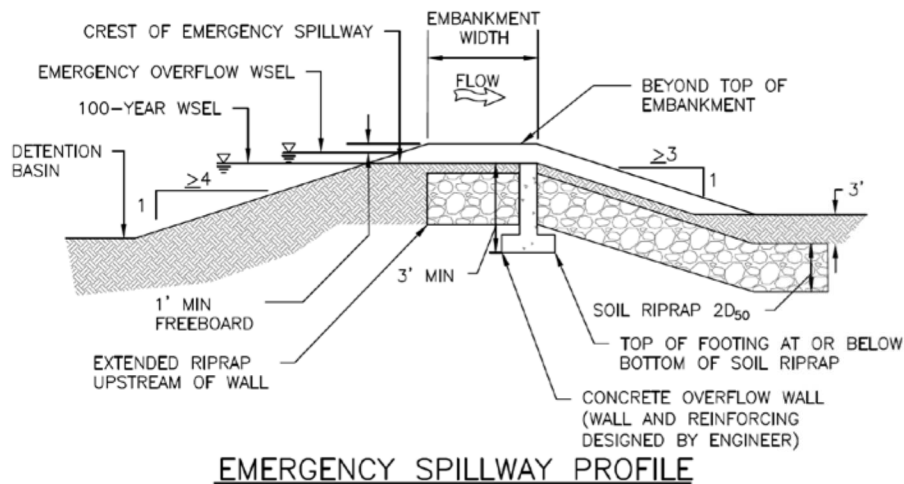
The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

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

[illegible]

FLOOD CONTROL POND A1 SPILLWAY & IMPACT BASIN RIPRAP CALCULATION

Chapter 12



SPILLWAY:

100-Year Peak Inflow¹ = 874 cfs

Spillway Crest Length¹ = 284.0 ft

Longitudinal Slope = 25%

Unit Discharge = $874/284 = 3.07$ cfs/ft

¹ From MHFD Detention Workbook

IMPACT BASIN:

100-Year Peak Inflow¹ = 200 cfs

Spillway Crest Length¹ = 15.0 ft

Longitudinal Slope = 5%

Unit Discharge = $200/15 = 13.33$ cfs/ft

¹ From MHFD Detention Workbook

RIPRAP DESIGNATION

VL ($D_{50} = 6$ IN)
L ($D_{50} = 9$ IN)
M ($D_{50} = 12$ IN)
H ($D_{50} = 18$ IN)
VH ($D_{50} = 24$ IN)

* If Type VL Riprap is calculated, use Type L (typical per USDCM Vol. 2, Ch. 9, Figure 9-38).

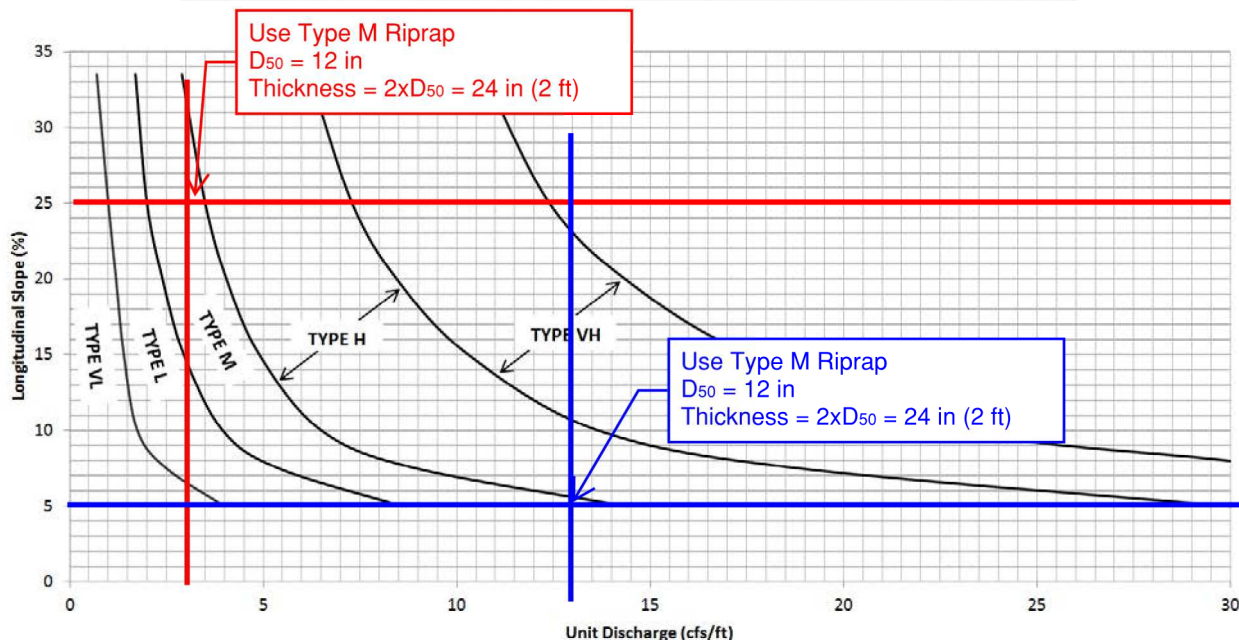
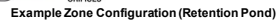


Figure 12-21. Embankment protection details and rock sizing chart (adapted from Arapahoe County)

Basin ID: Pond A1 (Stage 0.00 = 6399.50) 235 cfs is the max release rate under the railroad, 31% impervious in A1 basins, 5% impervious in E1 basins



Flood Control Only

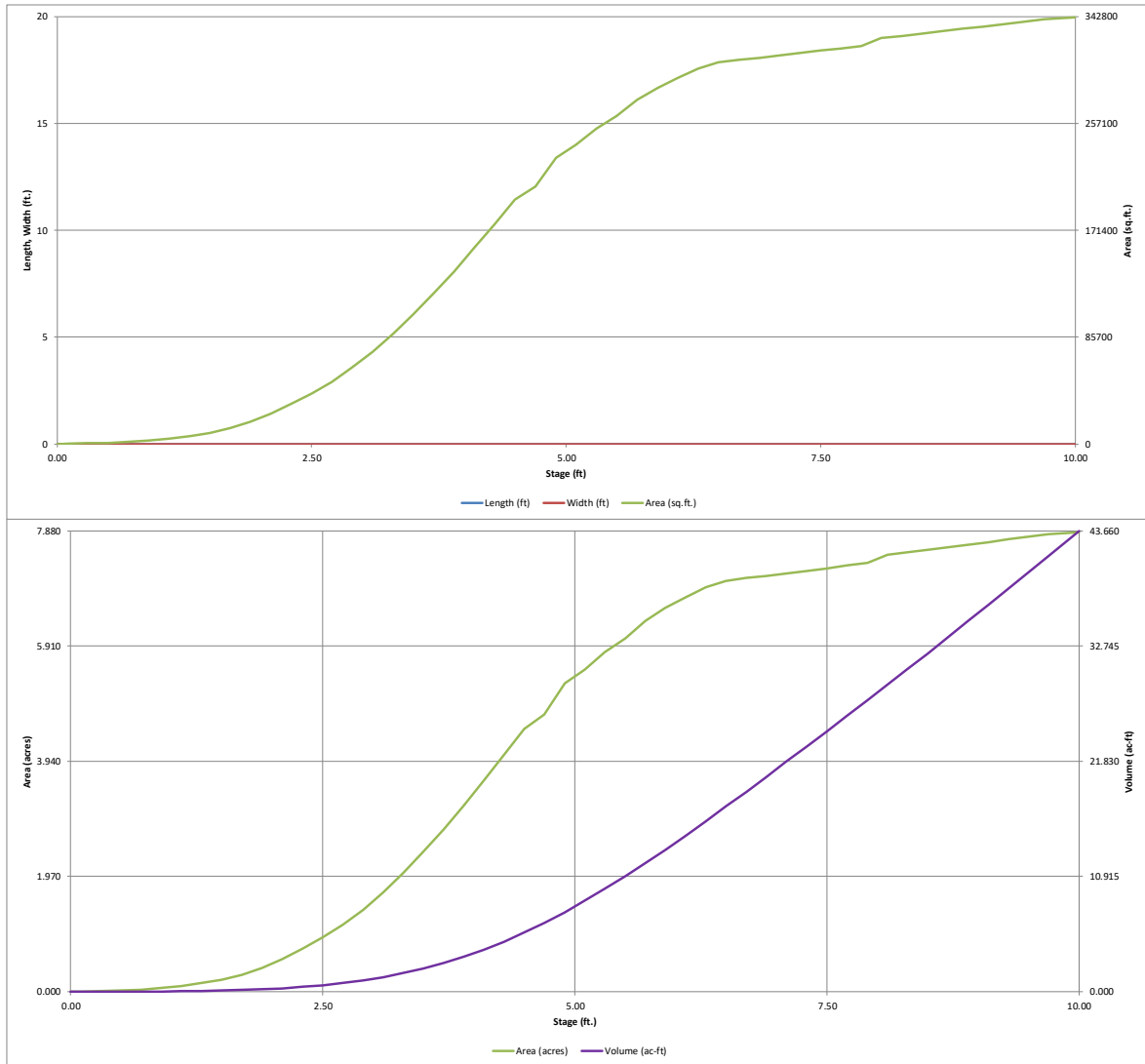
Optional User Overrides

7/10/2025, 3:14 PM

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)

TRIGGER CALC TO BUILD POND E1

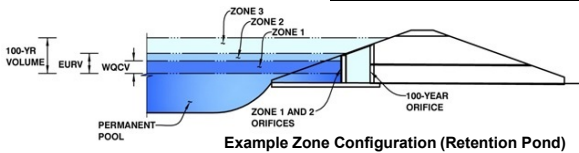


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Dawson Trails Filing 2

Basin ID: Pond A1 (Stage 0.00 = 6399.50) 235 cfs is the max release rate under the railroad, 31% impervious in A1 basins, 5% impervious in E1 basins



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1	7.17	22.287	Weir&Pipe (Restrict)
Zone 2			
Zone 3			
Total (all zones)		22.287	

User Input: Orifice at Underdrain Outlet (typically used to drain WOCV 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 WOCV and/or EURV in a sedimentation BMP)

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

Calculated Parameters for Plate
WQ Orifice Area per Row = N/A 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 (optional)	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	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)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Orifice Area (sq. inches)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

User Input: Vertical Orifice (Circular or Rectangular)

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

Calculated Parameters for Vertical Orifice
Vertical Orifice Area = Not Selected ft²
Vertical Orifice Centroid = Not Selected feet

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

Overflow Weir Front Edge Height, H_o = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = 8.00 feet
Overflow Weir Gate Slope = 4.00 H:V
Horiz. Length of Weir Sides = 24.00 feet
Overflow Gate Type = Type C Gate
Debris Clogging % = 50% %

Calculated Parameters for Overflow Weir
Height of Gate Upper Edge, H_u = 6.00 feet
Overflow Weir Slope Length = 24.74 feet
Grate Open Area / 100-yr Orifice Area = 6.68
Overflow Gate Open Area w/o Debris = 137.74 ft²
Overflow Gate Open Area w/ Debris = 68.87 ft²

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

Depth to Invert of Outlet Pipe = 0.00 ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter = 66.00 inches
Restrictor Plate Height Above Pipe Invert = 53.50 inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
Outlet Orifice Area = 20.63 ft²
Outlet Orifice Centroid = 2.43 feet
Half-Central Angle of Restrictor Plate on Pipe = 2.24 radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage = 8.00 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 300.00 feet
Spillway End Slopes = 4.00 H:V
Freeboard above Max Water Surface = 1.00 feet

Calculated Parameters for Spillway
Spillway Design Flow Depth = 0.83 feet
Stage at Top of Freeboard = 9.83 feet
Basin Area at Top of Freeboard = 7.84 acres
Basin Volume at Top of Freeboard = 42.32 acre-ft

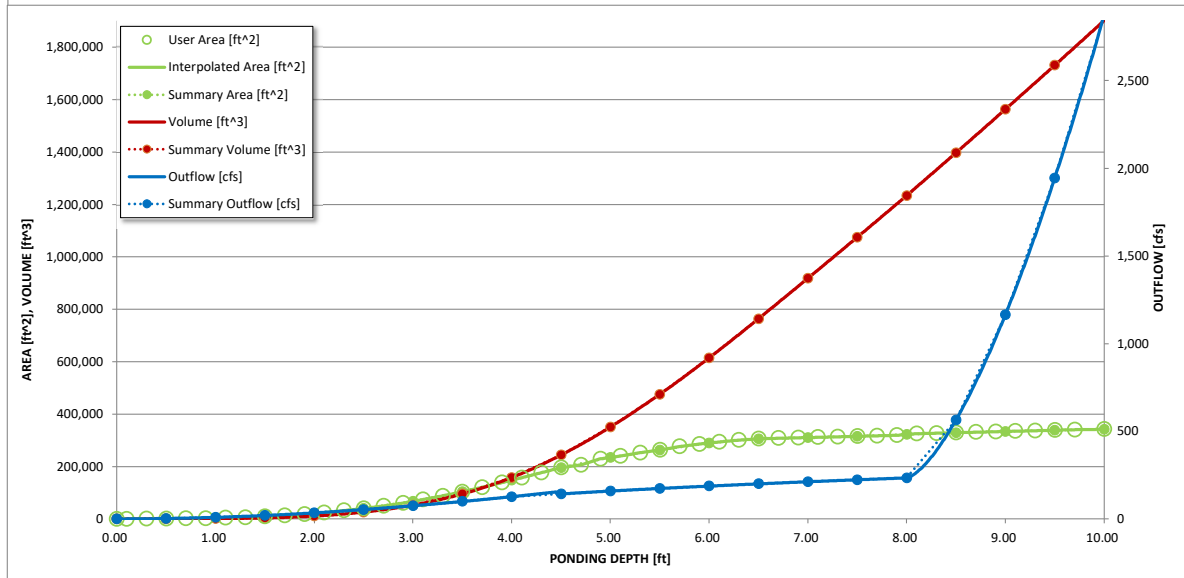
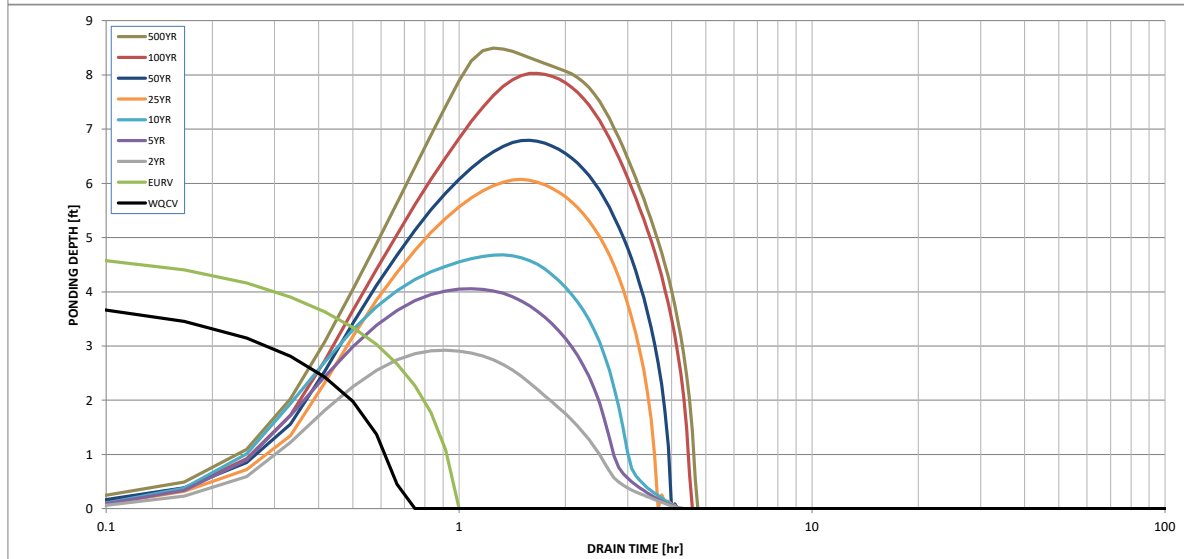
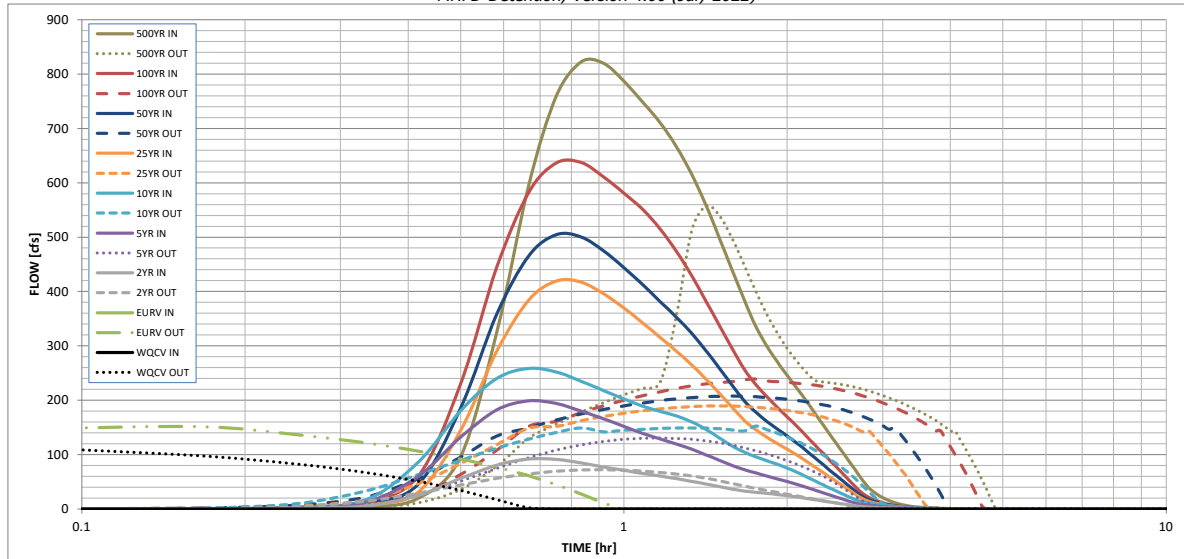
Routed Hydrograph Results

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	1.06	1.43	1.66	2.01	2.26	2.60	3.14
One-Hour Rainfall Depth (in) =	4.062	7.781	8.336	17.947	24.964	38.264	46.536	59.907	78.250
CUHP Runoff Volume (acre-ft) =	N/A	N/A	8.336	17.947	24.964	38.264	46.536	59.907	78.250
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	32.6	131.6	188.2	343.9	424.8	553.1	729.7
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	0.08	0.33	0.48	0.87	1.08	1.40	1.85
Peak Inflow Q (cfs) =	N/A	N/A	91.5	198.7	258.4	419.1	504.3	637.3	822.2
Peak Outflow Q (cfs) =	127.1	154.5	72.0	130.2	152.3	189.6	207.5	238.8	557.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	1.0	0.8	0.6	0.5	0.4	0.8
Structure Controlling Flow =	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Outlet Plate 1	Spillway	Spillway
Max Velocity through Gate 1 (fps) =	0.98	1.15	0.52	0.9	1.1	1.4	1.5	1.7	1.8
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) =	1	1	2	2	3	3	4	4	4
Time to Drain 99% of Inflow Volume (hours) =	1	1	2	3	3	3	4	4	4
Maximum Ponding Depth (ft) =	4.13	4.95	2.92	4.05	4.68	6.07	6.79	8.03	8.49
Area at Maximum Ponding Depth (acres) =	3.68	5.33	1.43	3.50	4.70	6.71	7.09	7.42	7.56
Maximum Volume Stored (acre-ft) =	4.089	7.790	1.096	3.802	6.382	14.510	19.515	28.472	31.999

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)



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

DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename: _____

Inflow Hydrographs

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

	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.08	0.51
	0:15:00	0.00	0.00	1.00	2.05	2.55	1.90	2.57	2.53	3.92
	0:20:00	0.00	0.00	5.33	12.29	16.27	7.39	10.50	12.78	19.01
	0:25:00	0.00	0.00	24.50	59.42	84.93	30.51	44.49	59.45	96.45
	0:30:00	0.00	0.00	56.06	132.08	180.73	144.55	185.64	230.64	325.76
	0:35:00	0.00	0.00	80.77	182.26	240.33	290.90	358.79	445.46	593.72
	0:40:00	0.00	0.00	91.48	198.67	258.39	383.45	465.07	581.29	758.68
	0:45:00	0.00	0.00	90.98	193.91	252.11	419.08	504.32	636.20	822.23
	0:50:00	0.00	0.00	84.37	180.24	234.88	417.24	500.38	637.28	820.27
	0:55:00	0.00	0.00	77.16	165.84	217.89	395.82	474.84	611.15	786.90
	1:00:00	0.00	0.00	70.82	151.74	202.34	369.47	444.01	580.88	748.29
	1:05:00	0.00	0.00	65.37	138.82	189.11	342.19	412.30	550.81	710.50
	1:10:00	0.00	0.00	60.50	128.53	179.31	315.43	381.56	514.88	666.28
	1:15:00	0.00	0.00	55.58	119.29	170.91	290.27	352.70	473.71	615.48
	1:20:00	0.00	0.00	50.65	109.65	160.25	265.03	322.86	429.01	558.94
	1:25:00	0.00	0.00	45.78	99.58	146.25	238.90	291.11	382.42	498.63
	1:30:00	0.00	0.00	41.04	89.52	130.71	212.78	259.11	337.49	439.91
	1:35:00	0.00	0.00	36.58	80.03	115.53	187.11	227.72	295.20	384.64
	1:40:00	0.00	0.00	33.03	72.32	104.33	162.99	198.66	256.90	335.94
	1:45:00	0.00	0.00	30.53	66.08	96.04	145.75	178.03	229.11	300.17
	1:50:00	0.00	0.00	28.56	60.46	88.90	132.03	161.40	206.85	271.18
	1:55:00	0.00	0.00	26.59	55.27	82.21	120.38	147.19	187.30	245.66
	2:00:00	0.00	0.00	24.42	50.32	75.30	109.78	134.23	169.66	222.58
	2:05:00	0.00	0.00	22.01	45.21	67.57	99.20	121.21	152.21	199.59
	2:10:00	0.00	0.00	19.44	39.84	59.40	88.04	107.45	134.49	176.14
	2:15:00	0.00	0.00	16.91	34.52	51.37	76.99	93.84	117.42	153.53
	2:20:00	0.00	0.00	14.51	29.40	43.76	66.41	80.82	101.43	132.30
	2:25:00	0.00	0.00	12.20	24.49	36.62	56.23	68.33	85.92	111.80
	2:30:00	0.00	0.00	9.99	19.76	29.91	46.43	56.36	70.89	92.04
	2:35:00	0.00	0.00	7.85	15.21	23.52	36.89	44.70	56.13	72.65
	2:40:00	0.00	0.00	5.86	11.02	17.62	27.64	33.46	41.84	54.08
	2:45:00	0.00	0.00	4.28	8.04	13.57	19.14	23.31	29.09	38.25
	2:50:00	0.00	0.00	3.25	6.27	10.92	13.83	17.12	21.01	28.00
	2:55:00	0.00	0.00	2.59	5.06	8.88	10.27	12.84	15.47	20.82
	3:00:00	0.00	0.00	2.11	4.10	7.21	7.75	9.76	11.31	15.36
	3:05:00	0.00	0.00	1.74	3.31	5.84	5.83	7.36	8.18	11.21
	3:10:00	0.00	0.00	1.43	2.68	4.69	4.47	5.65	5.86	8.09
	3:15:00	0.00	0.00	1.17	2.17	3.72	3.43	4.32	4.15	5.78
	3:20:00	0.00	0.00	0.95	1.72	2.89	2.62	3.29	2.98	4.18
	3:25:00	0.00	0.00	0.78	1.34	2.21	2.04	2.55	2.34	3.24
	3:30:00	0.00	0.00	0.63	1.03	1.68	1.59	1.96	1.83	2.52
	3:35:00	0.00	0.00	0.50	0.77	1.29	1.24	1.54	1.46	2.01
	3:40:00	0.00	0.00	0.38	0.56	0.98	0.95	1.18	1.14	1.56
	3:45:00	0.00	0.00	0.28	0.39	0.72	0.71	0.89	0.85	1.17
	3:50:00	0.00	0.00	0.19	0.26	0.50	0.51	0.63	0.61	0.83
	3:55:00	0.00	0.00	0.12	0.17	0.32	0.34	0.42	0.41	0.55
	4:00:00	0.00	0.00	0.07	0.10	0.18	0.21	0.26	0.24	0.33
	4:05:00	0.00	0.00	0.03	0.05	0.08	0.11	0.13	0.12	0.16
	4:10:00	0.00	0.00	0.01	0.02	0.03	0.04	0.04	0.04	0.05
	4:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:20:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:25:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:30:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:35:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:40:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:45:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:50:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Summary Stage-Area-Volume-Discharge Relationships

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

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

[illegible]

Scenario: 100-YR
Current Time Step: 0.000 h
FlexTable: Conduit Table

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Length (Scaled) (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/s)
P-491	3.3a	310-MH (DP 13D3)	6,443.38	6,442.21	0.025	46.5	117.80	36.0	16.67
P-492	D3.2f	321-MH (DP 8D3)	6,449.00	6,445.17	0.050	76.5	6.60	18.0	11.41
P-519	3.3b	300-MH (DP 15D3)	6,427.17	6,424.70	0.011	231.4	39.10	24.0	12.45
P300	300-MH (DP 15D3)	O-300	6,421.70	6,420.92	0.010	78.0	259.80	60.0	15.12
P301	301-MH	STRC-313 (DP 14D3)	6,430.70	6,428.90	0.007	257.6	229.70	60.0	12.55
P301(1)	STRC-313 (DP 14D3)	300-MH (DP 15D3)	6,426.40	6,424.88	0.010	152.5	234.90	60.0	15.01
P310	310-MH (DP 13D3)	301-MH	6,432.88	6,430.96	0.007	275.0	229.70	60.0	12.58
P311	311-MH (DP 12D3)	310-MH (DP 13D3)	6,433.83	6,433.38	0.005	89.8	140.90	54.0	9.96
P311.1	311.1-INLET D3.21	311-MH (DP 12D3)	6,443.35	6,443.29	0.004	14.0	2.80	18.0	3.69
P311.2	311.2-INLET D3.22	311-MH (DP 12D3)	6,443.18	6,443.08	0.005	20.0	2.00	18.0	3.57
P312	312-MH (DP 11D3)	311-MH (DP 12D3)	6,435.71	6,434.08	0.005	326.0	139.90	54.0	9.96
P312.1	312.1-INLET D3.19A	312-MH (DP 11D3)	6,442.11	6,440.25	0.077	24.0	4.10	18.0	11.65
P312.2	312.2-INLET D3.22	312-MH (DP 11D3)	6,440.44	6,440.25	0.006	31.0	2.00	18.0	3.80
P313	313-MH (DP 10D3)	312-MH (DP 11D3)	6,436.70	6,436.21	0.010	48.9	138.50	48.0	13.02
P313.1	313.1-INLET D3.20A	313-MH (DP 10D3)	6,441.53	6,439.80	0.025	74.4	2.90	18.0	7.05
P313.2	313.2-INLET D3.20	313.1-INLET D3.20A	6,442.30	6,441.73	0.025	22.9	2.90	18.0	7.06
P320	320-MH (DP 9D3)	313-MH (DP 10D3)	6,438.21	6,437.21	0.023	43.8	134.60	42.0	13.99
P320.1	320.1-INLET D3.19	320-MH (DP 9D3)	6,439.80	6,439.71	0.010	8.5	4.10	24.0	1.31
P320.2	320.2-INLET D3.18	320-MH (DP 9D3)	6,441.96	6,440.21	0.049	35.6	2.10	18.0	1.19
P321	330-MH (DP 7D3)	321-MH (DP 8D3)	6,449.77	6,445.92	0.028	137.7	119.30	36.0	17.70
P321(1)	321-MH (DP 8D3)	320-MH (DP 9D3)	6,442.39	6,439.96	0.023	105.4	131.10	42.0	17.83
P330.1	D3.2c	330-MH (DP 7D3)	6,455.84	6,454.77	0.017	61.5	36.30	30.0	11.81
P331	331-MH (DP 6D3)	330-MH (DP 7D3)	6,455.32	6,453.06	0.028	80.8	93.60	36.0	17.68
P331.1	331.1-INLET D3.16	331-MH (DP 6D3)	6,460.18	6,460.07	0.013	8.5	2.10	18.0	5.09
P331.2	331.2-INLET D3.15	331-MH (DP 6D3)	6,460.72	6,460.07	0.018	35.5	3.60	18.0	6.71
P340	340-MH (DP 5D3)	332-MH	6,470.07	6,465.82	0.029	146.5	90.70	36.0	17.84
P340(2)	332-MH	331-MH (DP 6D3)	6,462.85	6,458.57	0.029	146.5	90.70	36.0	17.89
P340.1	D3.2b	340-MH (DP 5D3)	6,475.36	6,473.87	0.029	50.9	15.90	30.0	11.55
P341	341-MH (DP 4D3)	340-MH (DP 5D3)	6,475.79	6,473.37	0.030	80.4	80.50	36.0	17.66
P341.1	341.1-INLET D3.13	341-MH (DP 4D3)	6,479.15	6,479.07	0.010	7.9	3.60	24.0	5.27
P341.2	341.2-INLET D3.12	341-MH (DP 4D3)	6,479.86	6,479.57	0.011	26.1	9.50	18.0	7.04
P342	342-MH (DP 3D3)	341-MH (DP 4D3)	6,481.36	6,478.57	0.029	95.0	71.40	30.0	16.31
P342.1	342.1-INLET D3.12A	342-MH (DP 3D3)	6,483.45	6,482.11	0.015	89.1	34.00	30.0	6.93
P343	343-MH	342-MH (DP 3D3)	6,484.08	6,481.61	0.027	90.6	44.90	30.0	14.75
P344	344-MH	343-MH	6,486.45	6,484.34	0.020	105.8	44.90	30.0	13.05
P350	350-MH	344-MH	6,492.69	6,486.70	0.020	299.6	44.90	30.0	13.05
P350.1	350.1-INLET D3.0	351.2-INLET D3.10 (DP 1D3)	6,498.70	6,495.32	0.040	84.4	40.10	30.0	16.61
P351	351-MH (DP 2D3)	350-MH	6,494.55	6,492.93	0.015	108.0	44.90	30.0	11.57
P351.1	351.1-INLET D3.11	351-MH (DP 2D3)	6,495.87	6,495.80	0.010	7.1	4.20	18.0	2.38
P351.2	351.2-INLET D3.10 (DP 1D3)	351-MH (DP 2D3)	6,495.07	6,494.80	0.010	26.9	42.50	30.0	8.66

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Scenario: 5-YR
Current Time Step: 0.000 h
FlexTable: Conduit Table

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Length (Scaled) (ft)	Flow (cfs)	Diameter (in)	Velocity (ft/s)
P-491	3.3a	310-MH (DP 13D3)	6,443.38	6,442.21	0.025	46.5	48.80	36.0	14.63
P-492	D3.2f	321-MH (DP 8D3)	6,449.00	6,445.17	0.050	76.5	3.10	18.0	9.21
P-519	3.3b	300-MH (DP 15D3)	6,427.17	6,424.70	0.011	231.4	16.20	24.0	8.03
P300	300-MH (DP 15D3)	O-300	6,421.70	6,420.92	0.010	78.0	89.70	60.0	12.04
P301	301-MH	STRC-313 (DP 14D3)	6,430.70	6,428.90	0.007	257.6	76.70	60.0	10.13
P301(1)	STRC-313 (DP 14D3)	300-MH (DP 15D3)	6,426.40	6,424.88	0.010	152.5	79.30	60.0	11.64
P310	310-MH (DP 13D3)	301-MH	6,432.88	6,430.96	0.007	275.0	76.70	60.0	10.13
P311	311-MH (DP 12D3)	310-MH (DP 13D3)	6,433.83	6,433.38	0.005	89.8	39.90	54.0	7.55
P311.1	311.1-INLET D3.21	311-MH (DP 12D3)	6,443.35	6,443.29	0.004	14.0	0.90	18.0	2.69
P311.2	311.2-INLET D3.22	311-MH (DP 12D3)	6,443.18	6,443.08	0.005	20.0	1.00	18.0	2.93
P312	312-MH (DP 11D3)	311-MH (DP 12D3)	6,435.71	6,434.08	0.005	326.0	39.90	54.0	7.55
P312.1	312.1-INLET D3.19A	312-MH (DP 11D3)	6,442.11	6,440.25	0.077	24.0	0.80	18.0	7.18
P312.2	312.2-INLET D3.22	312-MH (DP 11D3)	6,440.44	6,440.25	0.006	31.0	1.00	18.0	3.11
P313	313-MH (DP 10D3)	312-MH (DP 11D3)	6,436.70	6,436.21	0.010	48.9	38.70	48.0	9.70
P313.1	313.1-INLET D3.20A	313-MH (DP 10D3)	6,441.53	6,439.80	0.025	74.4	1.20	18.0	5.45
P313.2	313.2-INLET D3.20	313.1-INLET D3.20A	6,442.30	6,441.73	0.025	22.9	1.20	18.0	5.46
P320	320-MH (DP 9D3)	313-MH (DP 10D3)	6,438.21	6,437.21	0.023	43.8	36.80	42.0	13.05
P320.1	320.1-INLET D3.19	320-MH (DP 9D3)	6,439.80	6,439.71	0.010	8.5	0.80	24.0	3.39
P320.2	320.2-INLET D3.18	320-MH (DP 9D3)	6,441.96	6,440.21	0.049	35.6	0.90	18.0	6.36
P321	330-MH (DP 7D3)	321-MH (DP 8D3)	6,449.77	6,445.92	0.028	137.7	33.40	36.0	13.79
P321(1)	321-MH (DP 8D3)	320-MH (DP 9D3)	6,442.39	6,439.96	0.023	105.4	35.30	42.0	12.90
P330.1	D3.2c	330-MH (DP 7D3)	6,455.84	6,454.77	0.017	61.5	14.70	30.0	9.37
P331	331-MH (DP 6D3)	330-MH (DP 7D3)	6,455.32	6,453.06	0.028	80.8	22.90	36.0	12.42
P331.1	331.1-INLET D3.16	331-MH (DP 6D3)	6,460.18	6,460.07	0.013	8.5	0.60	18.0	3.52
P331.2	331.2-INLET D3.15	331-MH (DP 6D3)	6,460.72	6,460.07	0.018	35.5	1.10	18.0	4.77
P340	340-MH (DP 5D3)	332-MH	6,470.07	6,465.82	0.029	146.5	22.00	36.0	12.43
P340(2)	332-MH	331-MH (DP 6D3)	6,462.85	6,458.57	0.029	146.5	22.00	36.0	12.46
P340.1	D3.2b	340-MH (DP 5D3)	6,475.36	6,473.87	0.029	50.9	6.40	30.0	8.89
P341	341-MH (DP 4D3)	340-MH (DP 5D3)	6,475.79	6,473.37	0.030	80.4	17.80	36.0	11.84
P341.1	341.1-INLET D3.13	341-MH (DP 4D3)	6,479.15	6,479.07	0.010	7.9	1.40	24.0	4.00
P341.2	341.2-INLET D3.12	341-MH (DP 4D3)	6,479.86	6,479.57	0.011	26.1	1.20	18.0	4.10
P342	342-MH (DP 3D3)	341-MH (DP 4D3)	6,481.36	6,478.57	0.029	95.0	16.10	30.0	11.61
P342.1	342.1-INLET D3.12A	342-MH (DP 3D3)	6,483.45	6,482.11	0.015	89.1	1.90	30.0	4.91
P343	343-MH	342-MH (DP 3D3)	6,484.08	6,481.61	0.027	90.6	14.90	30.0	11.06
P344	344-MH	343-MH	6,486.45	6,484.34	0.020	105.8	14.90	30.0	9.90
P350	350-MH	344-MH	6,492.69	6,486.70	0.020	299.6	14.90	30.0	9.90
P350.1	350.1-INLET D3.0	351.2-INLET D3.10 (DP 1D3)	6,498.70	6,495.32	0.040	84.4	13.00	30.0	12.21
P351	351-MH (DP 2D3)	350-MH	6,494.55	6,492.93	0.015	108.0	14.90	30.0	8.92
P351.1	351.1-INLET D3.11	351-MH (DP 2D3)	6,495.87	6,495.80	0.010	7.1	1.70	18.0	4.37
P351.2	351.2-INLET D3.10 (DP 1D3)	351-MH (DP 2D3)	6,495.07	6,494.80	0.010	26.9	13.90	30.0	7.55

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Scenario: 100-YR
Current Time Step: 0.000 h
FlexTable: Conduit Table

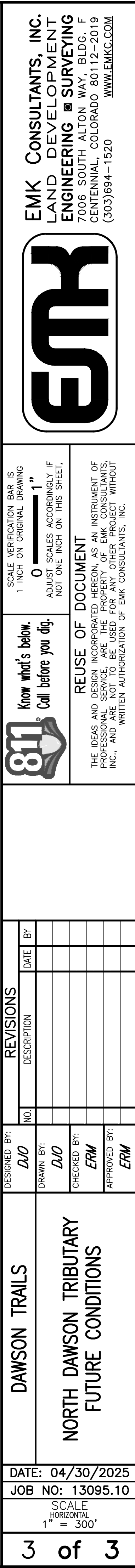
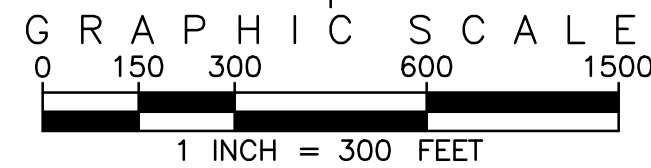
Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Length (Scaled) (ft)	Manning's n	Flow (cfs)	Diameter (in)	Velocity (ft/s)
P-16	STRC-22 (EXISTING)	O-1	6,416.97	6,416.17	0.005	145.8	0.013	122.30	48.0	9.73
P-19	STMH 9D1.1 (EXISTING)	STRC-22 (EXISTING)	6,419.32	6,418.57	0.010	75.1	0.013	122.30	42.0	12.71
P-21	INLET 9D1 (EXISTING INLET 6)	STMH 9D1.1 (EXISTING)	6,422.45	6,421.57	0.015	58.5	0.013	11.50	18.0	6.51
P-520	PLUG 6D1	STMH 6D1.1	6,423.27	6,422.63	0.010	63.7	0.013	25.20	30.0	5.13
P-521	PLUG 7D1	INLET 8D1	6,421.46	6,420.98	0.010	47.2	0.013	32.30	30.0	6.58
P220.1	INLET 8D1	STMH 9D1.1 (EXISTING)	6,420.73	6,420.62	0.010	10.5	0.013	43.40	30.0	8.84
P221	STMH 6D1.1	STMH 9D1.1 (EXISTING)	6,421.43	6,419.62	0.006	325.5	0.013	71.10	42.0	7.39
P222	STMH 5D1.3	STMH 6D1.1	6,423.81	6,421.63	0.006	372.4	0.013	46.40	42.0	8.38
P230	STMH 3D1.1	STMH 5D1.3	6,425.45	6,424.07	0.007	201.5	0.013	39.30	42.0	8.54
P230.1	INLET 3D1	STMH 3D1.1	6,427.52	6,427.45	0.005	12.6	0.013	5.30	18.0	4.56
P231	INLET 2D1	STMH 3D1.1	6,426.30	6,425.95	0.005	70.9	0.013	35.20	36.0	7.32
P232	INLET 1D1	INLET 2D1	6,427.22	6,426.80	0.007	60.2	0.013	27.40	30.0	7.76
P240	STMH 5D1.2	STMH 5D1.3	6,425.58	6,424.06	0.006	244.9	0.013	10.00	24.0	5.84
P242	STMH 5D1.1	STMH 5D1.2	6,426.68	6,425.83	0.006	141.1	0.013	10.00	18.0	5.66
P242.1	INLET 4D1	STMH 5D1.1	6,427.23	6,426.93	0.006	50.0	0.013	7.40	18.0	4.19
P242.2	INLET 5D1	STMH 5D1.1	6,427.01	6,426.93	0.010	8.0	0.013	2.90	18.0	1.64

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Scenario: 5-YR
Current Time Step: 0.000 h
FlexTable: Conduit Table

Label	Start Node	Stop Node	Invert (Start) (ft)	Invert (Stop) (ft)	Slope (Calculated) (ft/ft)	Length (Scaled) (ft)	Manning's n	Flow (cfs)	Diameter (in)	Velocity (ft/s)
P-16	STRC-22 (EXISTING)	O-1	6,416.97	6,416.17	0.005	145.8	0.013	52.50	48.0	8.45
P-19	STMH 9D1.1 (EXISTING)	STRC-22 (EXISTING)	6,419.32	6,418.57	0.010	75.1	0.013	52.50	42.0	10.57
P-21	INLET 9D1 (EXISTING INLET 6)	STMH 9D1.1 (EXISTING)	6,422.45	6,421.57	0.015	58.5	0.013	5.10	18.0	6.86
P-520	PLUG 6D1	STMH 6D1.1	6,423.27	6,422.63	0.010	63.7	0.013	10.90	30.0	7.06
P-521	PLUG 7D1	INLET 8D1	6,421.46	6,420.98	0.010	47.2	0.013	13.90	30.0	7.55
P220.1	INLET 8D1	STMH 9D1.1 (EXISTING)	6,420.73	6,420.62	0.010	10.5	0.013	18.90	30.0	8.19
P221	STMH 6D1.1	STMH 9D1.1 (EXISTING)	6,421.43	6,419.62	0.006	325.5	0.013	31.30	42.0	7.45
P222	STMH 5D1.3	STMH 6D1.1	6,423.81	6,421.63	0.006	372.4	0.013	21.10	42.0	6.83
P230	STMH 3D1.1	STMH 5D1.3	6,425.45	6,424.07	0.007	201.5	0.013	18.40	42.0	6.96
P230.1	INLET 3D1	STMH 3D1.1	6,427.52	6,427.45	0.005	12.6	0.013	2.50	18.0	3.79
P231	INLET 2D1	STMH 3D1.1	6,426.30	6,425.95	0.005	70.9	0.013	15.50	36.0	5.98
P232	INLET 1D1	INLET 2D1	6,427.22	6,426.80	0.007	60.2	0.013	11.80	30.0	6.34
P240	STMH 5D1.2	STMH 5D1.3	6,425.58	6,424.06	0.006	244.9	0.013	4.60	24.0	4.76
P242	STMH 5D1.1	STMH 5D1.2	6,426.68	6,425.83	0.006	141.1	0.013	4.60	18.0	4.75
P242.1	INLET 4D1	STMH 5D1.1	6,427.23	6,426.93	0.006	50.0	0.013	3.40	18.0	4.40
P242.2	INLET 5D1	STMH 5D1.1	6,427.01	6,426.93	0.010	8.0	0.013	1.30	18.0	4.04

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MHFD-Inlet, Version 5.02 (August 2022)

INLET MANAGEMENT

Worksheet Protected

INLET NAME	INLET 2D1-Sump	INLET 3D1-Sump	INLET 4D1	INLET 5D1	INLET 8D1-Sump
Site Type (Urban or Rural)	URBAN	URBAN	URBAN	URBAN	URBAN
Inlet Application (Street or Area)	STREET	STREET	STREET	STREET	STREET
Hydraulic Condition	In Sump	In Sump	On Grade	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening	CDOT Type R Curb Opening

USER-DEFINED INPUT

D1-2

D1-3

D1-4

D1-5

User-Defined Design Flows

D1-8a + D1-8b

Minor Q_{Known} (cfs)	4.5	2.5	3.4	1.3	5.2
Major Q_{Known} (cfs)	9.4	5.3	7.4	2.9	11.5

Bypass (Carry-Over) Flow from Upstream

Inlets must be organized from upstream (left) to downstream (right) in order for bypass flows to be linked.

Receive Bypass Flow from:	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received	No Bypass Flow Received
Minor Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0
Major Bypass Flow Received, Q_b (cfs)	0.0	0.0	0.0	0.0	0.0

Watershed Characteristics

Subcatchment Area (acres)					
Percent Impervious					
NRCS Soil Type					

Watershed Profile

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

Minor Storm Rainfall Input

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

Major Storm Rainfall Input

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

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	4.5	2.5	3.4	1.3	5.2
Major Total Design Peak Flow, Q (cfs)	9.4	5.3	7.4	2.9	11.5
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	0.0	0.0	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A	1.5	0.0	N/A

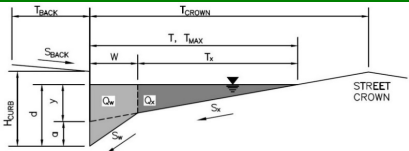
MHFD-Inlet, Version 5.02 (August 2022)

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

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

Project:

Inlet ID: INLET 3D1-Sump



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)
Height of Curb at Gutter Flow Line
Distance from Curb Face to Street Crown
Gutter Width
Street Transverse Slope
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)
Street Longitudinal Slope - Enter 0 for sump condition
Manning's Roughness for Street Section (typically between 0.012 and 0.020)

T_{BACK}	=	18.0	ft
S_{BACK}	=	0.020	ft/ft
n_{BACK}	=	0.020	
H_{CURB}	=	6.00	inches
T_{CROWN}	=	17.0	ft
W	=	2.00	ft
S_x	=	0.020	ft/ft
S_w	=	0.083	ft/ft
S_o	=	0.000	ft/ft
n_{STREET}	=	0.016	

Max. Allowable Spread for Minor & Major Storm
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm
Check boxes are not applicable in SUMP conditions

	Minor Storm	Major Storm	
T_{MAX}	12.0	17.0	ft
d_{MAX}	6.0	10.3	inches
	☐	☐	

Maximum Capacity for 1/2 Street based On Allowable Spread

Water Depth without Gutter Depression ($T * S_x * 12$)
Vertical Depth between Gutter Lip and Gutter Flowline ($W * S_w * 12$)
Gutter Depression ($d_c - (W * S_x * 12)$)
Water Depth at Gutter Flowline ($y + a$)
Allowable Spread for Discharge outside the Gutter Section ($T - W$)
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)
Discharge outside the Gutter Section, carried in Section T_x
Discharge within the Gutter Section ($Q_T - Q_x - Q_{BACK}$)
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)
Maximum Flow Based On Allowable Spread
Flow Velocity within the Gutter Section
 $V*d$ Product: Flow Velocity times Gutter Flowline Depth

	Minor Storm	Major Storm	
y	2.88	4.08	inches
d_c	2.0	2.0	inches
a	1.51	1.51	inches
d	4.39	5.59	inches
T_x	10.0	15.0	ft
E_o	0.491	0.350	
Q_x	0.0	0.0	cfs
Q_w	0.0	0.0	cfs
Q_{BACK}	0.0	0.0	cfs
Q_T	SUMP	SUMP	cfs
V	0.0	0.0	fps
$V*d$	0.0	0.0	

Maximum Capacity for 1/2 Street based on Allowable Depth

Theoretical Water Spread
Theoretical Spread for Discharge outside the Gutter Section ($T - W$)
Gutter Flow to Design Flow Ratio by FHWA HEC-22 method (Eq. 7-7)
Theoretical Discharge outside the Gutter Section, carried in Section T_{XTH}
Actual Discharge outside the Gutter Section, (limited by distance T_{CROWN})
Discharge within the Gutter Section ($Q_d - Q_x$)
Discharge Behind the Curb (e.g., sidewalk, driveways, & lawns)
Total Discharge for Major & Minor Storm (Pre-Safety Factor)
Average Flow Velocity Within the Gutter Section
 $V*d$ Product: Flow Velocity Times Gutter Flowline Depth
Slope-Based Safety Factor for Minor/Major Storm depth reduction, $d \geq 6"$
Max Flow based on Allowable Depth (Safety Factor Applied)
Resultant Flow Depth at Gutter Flowline (Safety Factor Applied)
Resultant Flow Depth at Street Crown (Safety Factor Applied)

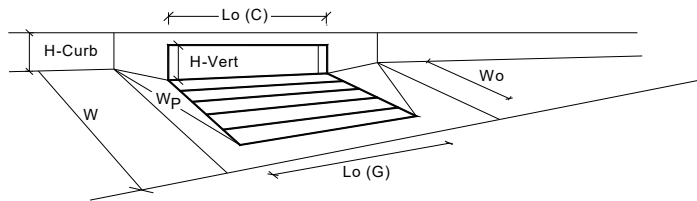
	Minor Storm	Major Storm	
T_{TH}	18.7	36.6	ft
T_{XTH}	16.7	34.6	ft
E_o	0.318	0.157	
Q_{XTH}	0.0	0.0	cfs
Q_x	0.0	0.0	cfs
Q_w	0.0	0.0	cfs
Q_{BACK}	0.0	0.0	cfs
Q	SUMP	SUMP	cfs
V	0.0	0.0	fps
$V*d$	0.0	0.0	
R	SUMP	SUMP	
Q_d	SUMP	SUMP	cfs
d			inches
d_{CROWN}			inches

MINOR STORM Allowable Capacity is not applicable to Sump Condition
MAJOR STORM Allowable Capacity is not applicable to Sump Condition

	Minor Storm	Major Storm	
Q_{allow}	SUMP	SUMP	cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)



Design Information (Input)		MINOR		MAJOR	
Type of Inlet	CDOT Type R Curb Opening	Type =			
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local}	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth	4.4	5.6	inches
Grate Information		MINOR		MAJOR	
Length of a Unit Grate		$L_o (G)$	N/A	N/A	feet
Width of a Unit Grate		W_o	N/A	N/A	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)		A_{ratio}	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		$C_f (G)$	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		$C_w (G)$	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		$C_o (G)$	N/A	N/A	
Curb Opening Information		MINOR		MAJOR	
Length of a Unit Curb Opening		$L_o (C)$	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert}	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat}	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		$C_f (C)$	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		$C_w (C)$	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		$C_o (C)$	0.67	0.67	
Low Head Performance Reduction (Calculated)		MINOR		MAJOR	
Depth for Grate Midwidth		d_{Grate}	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb}	0.20	0.30	ft
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate}	N/A	N/A	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb}	0.82	0.91	
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$	N/A	N/A	
Total Inlet Interception Capacity (assumes clogged condition)		MINOR		MAJOR	
		Q_s	3.4	6.9	cfs
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)		$Q_{PEAK REQUIRED}$	2.5	5.3	cfs

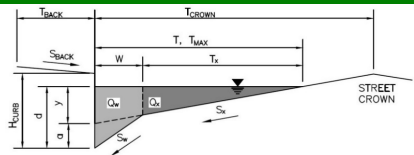
MHFD-Inlet, Version 5.02 (August 2022)

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

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

Project:

Inlet ID: INLET 8D1-Sump



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb

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

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

Height of Curb at Gutter Flow Line

Distance from Curb Face to Street Crown

Gutter Width

Street Transverse Slope

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

Street Longitudinal Slope - Enter 0 for sump condition

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

Max. Allowable Spread for Minor & Major Storm

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

Check boxes are not applicable in SUMP conditions

MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

T_{BACK} = 21.0 ft
S_{BACK} = 0.020 ft/ft
n_{BACK} = 0.020

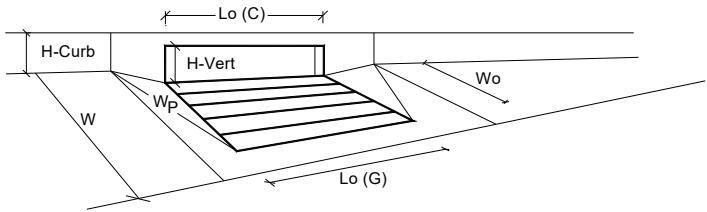
H_{CURB} = 6.00 inches
T_{CROWN} = 34.0 ft
W = 2.00 ft
S_x = 0.020 ft/ft
S_w = 0.083 ft/ft
S_o = 0.000 ft/ft
n_{STREET} = 0.016

Minor Storm Major Storm
T_{MAX} = 18.7 34.0 ft
d_{MAX} = 6.0 11.0 inches
☐ ☐

Minor Storm Major Storm
Q_{allow} = SUMP SUMP cfs

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 5.02 (August 2022)

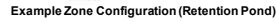


Design Information (Input)	
Type of Inlet	CDOT Type R Curb Opening
Local Depression (additional to continuous gutter depression 'a' from above)	
Number of Unit Inlets (Grate or Curb Opening)	
Water Depth at Flowline (outside of local depression)	
Grate Information	
Length of a Unit Grate	
Width of a Unit Grate	
Open Area Ratio for a Grate (typical values 0.15-0.90)	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	
Grate Weir Coefficient (typical value 2.15 - 3.60)	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	
Curb Opening Information	
Length of a Unit Curb Opening	
Height of Vertical Curb Opening in Inches	
Height of Curb Orifice Throat in Inches	
Angle of Throat (see USDCM Figure ST-5)	
Side Width for Depression Pan (typically the gutter width of 2 feet)	
Clogging Factor for a Single Curb Opening (typical value 0.10)	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	
Low Head Performance Reduction (Calculated)	
Depth for Grate Midwidth	
Depth for Curb Opening Weir Equation	
Grated Inlet Performance Reduction Factor for Long Inlets	
Curb Opening Performance Reduction Factor for Long Inlets	
Combination Inlet Performance Reduction Factor for Long Inlets	
Total Inlet Interception Capacity (assumes clogged condition)	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	

	MINOR	MAJOR	
Type =	CDOT Type R Curb Opening		
a _{local} =	3.00	3.00	inches
No =	1	1	
Ponding Depth =	6.0	9.7	inches
	MINOR	MAJOR	☐ Override Depths
L _o (G) =	N/A	N/A	
W _o =	N/A	N/A	feet
A _{ratio} =	N/A	N/A	
C _f (G) =	N/A	N/A	
C _w (G) =	N/A	N/A	
C _o (G) =	N/A	N/A	
	MINOR	MAJOR	
L _o (C) =	10.00	10.00	feet
H _{vert} =	6.00	6.00	inches
H _{throat} =	6.00	6.00	inches
Theta =	63.40	63.40	degrees
W _p =	2.00	2.00	feet
C _f (C) =	0.10	0.10	
C _w (C) =	3.60	3.60	
C _o (C) =	0.67	0.67	
	MINOR	MAJOR	
d _{Grate} =	N/A	N/A	ft
d _{Curb} =	0.33	0.64	ft
RF _{Grate} =	N/A	N/A	
RF _{Curb} =	0.93	1.00	
RF _{Combination} =	N/A	N/A	
	MINOR	MAJOR	
Q _s =	8.3	21.6	cfs
Q _{PEAK REQUIRED} =	5.2	11.5	cfs

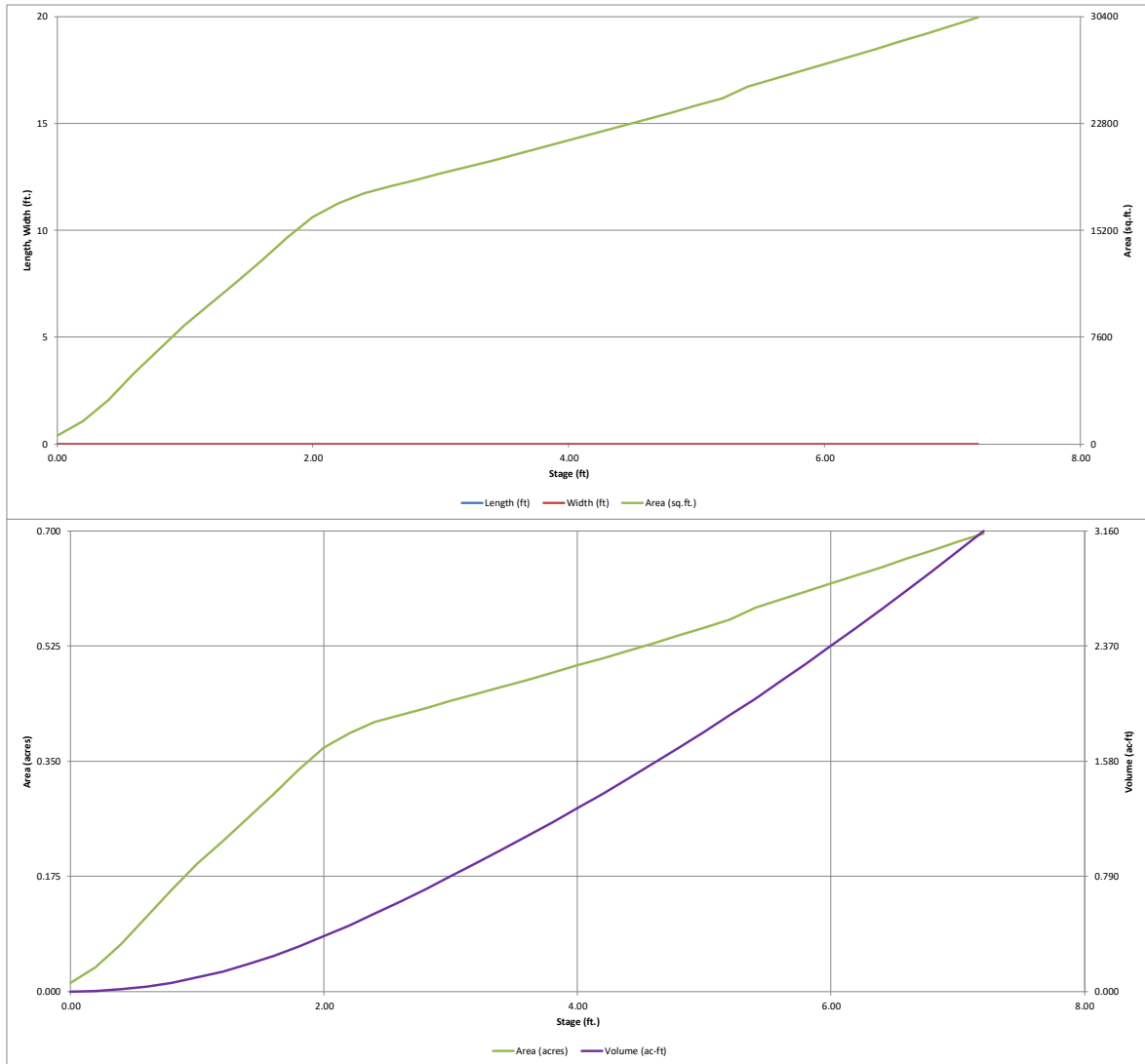
MHFD-Detention, Version 4.06 (July 2022)

Basin ID: Pond D1 (Stage 0.00 = 6414.80)



DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



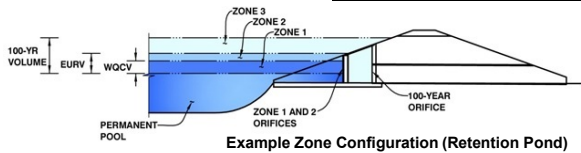
EXCERPTS FROM "PHASE III DRAINAGE REPORT FOR DAWSON TRAILS
FILING NO. 2" BY EMK CONSULTANTS APPROVED 10/21/2025.

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Dawson Trails Filing 2

Basin ID: Pond D1 (Stage 0.00 = 6414.80)



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.48	0.564	Orifice Plate
Zone 2 (EURV)	4.81	1.109	Orifice Plate
Zone 3			
Total (all zones)		1.674	

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

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)

Centroid of Lowest Orifice = 0.00 ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate = 4.81 ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing = N/A inches
Orifice Plate: Orifice Area per Row = N/A sq. inches

WQ Orifice Area per Row = N/A 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	2.50						
Orifice Area (sq. inches)	4.00	9.00						

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

User Input: Vertical Orifice (Circular or Rectangular)

Invert of Vertical Orifice = 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 Gate and Outlet Pipe OR Rectangular/Trapezoidal Weir and No Outlet Pipe)

Overflow Weir Front Edge Height, H_o = Not Selected ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = Not Selected feet
Overflow Weir Gate Slope = Not Selected H:V
Horiz. Length of Weir Sides = Not Selected feet
Overflow Gate Type = Not Selected
Debris Clogging % = Not Selected %

Height of Gate Upper Edge, H_u = Not Selected feet
Overflow Weir Slope Length = Not Selected feet
Gate Open Area / 100-yr Orifice Area = Not Selected
Overflow Gate Open Area w/o Debris = Not Selected ft²
Overflow Gate Open Area w/ Debris = Not Selected ft²

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

Depth to Invert of Outlet Pipe = 0.39 ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter = 18.00 inches

Outlet Orifice Area = 1.77 ft²
Outlet Orifice Centroid = 0.75 feet
Half-Central Angle of Restrictor Plate on Pipe = N/A radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

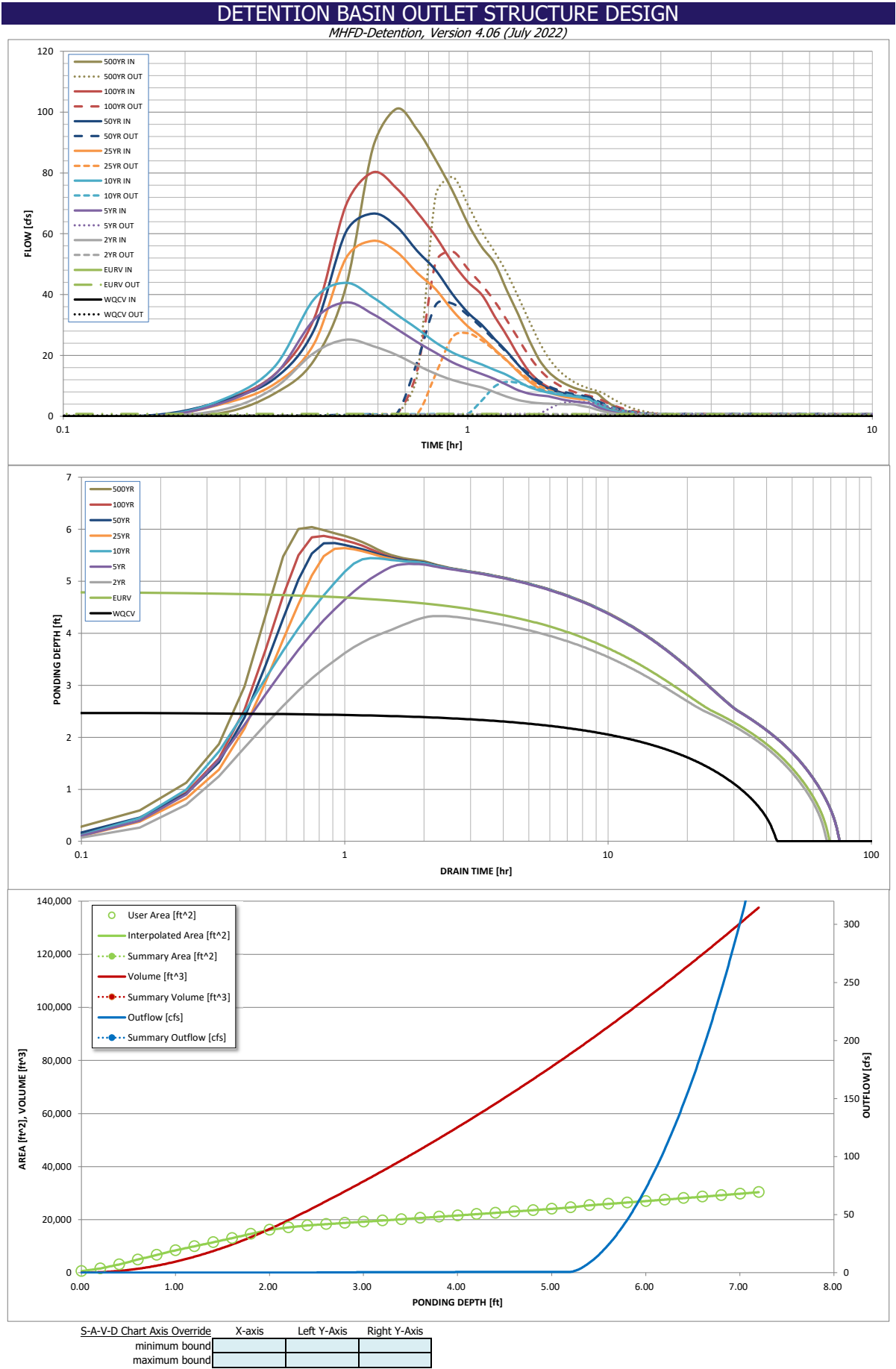
Spillway Invert Stage = 5.20 ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = 27.00 feet
Spillway End Slopes = 10.00 H:V
Freeboard above Max Water Surface = 1.00 feet

Spillway Design Flow Depth = 0.85 feet
Stage at Top of Freeboard = 7.05 feet
Basin Area at Top of Freeboard = 0.69 acres
Basin Volume at Top of Freeboard = 3.06 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	1.06	1.43	1.66	2.00	2.26	2.60	3.20
One-Hour Rainfall Depth (in) =	N/A	N/A	1.06	1.43	1.66	2.00	2.26	2.60	3.20
CUHP Runoff Volume (acre-ft) =	0.564	1.674	1.527	2.264	2.742	3.501	4.059	4.830	6.126
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	1.527	2.264	2.742	3.501	4.059	4.830	6.126
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	2.2	8.1	11.4	20.2	25.2	32.8	44.3
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.09	0.33	0.47	0.83	1.04	1.35	1.82
Peak Inflow Q (cfs) =	N/A	N/A	25.2	37.4	43.9	57.7	66.7	80.2	101.1
Peak Outflow Q (cfs) =	0.2	0.7	0.7	4.8	11.3	27.3	37.0	54.2	78.8
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.6	1.0	1.3	1.5	1.7	1.8
Structure Controlling Flow =	Plate	Plate	Plate	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway
Max Velocity through Gate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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) =	41	62	61	67	65	63	62	60	57
Time to Drain 99% of Inflow Volume (hours) =	42	66	65	72	71	70	70	69	67
Maximum Ponding Depth (ft) =	2.48	4.81	4.33	5.33	5.44	5.64	5.73	5.87	6.04
Area at Maximum Ponding Depth (acres) =	0.41	0.54	0.51	0.58	0.59	0.60	0.60	0.61	0.62
Maximum Volume Stored (acre-ft) =	0.568	1.678	1.420	1.962	2.032	2.145	2.205	2.290	2.388



DETENTION BASIN OUTLET STRUCTURE DESIGN

Outflow Hydrograph Workbook Filename:

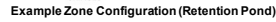
Inflow Hydrographs

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	0.37	0.18	1.23
	0:15:00	0.00	0.00	2.29	4.63	5.72	4.21	5.28	5.40	7.53
	0:20:00	0.00	0.00	9.37	13.65	16.39	10.64	12.43	13.76	18.34
	0:25:00	0.00	0.00	20.81	31.72	38.48	23.73	28.34	32.01	42.58
	0:30:00	0.00	0.00	25.17	37.42	43.86	51.98	60.56	69.38	88.29
	0:35:00	0.00	0.00	23.07	33.55	39.06	57.66	66.67	80.21	101.08
	0:40:00	0.00	0.00	20.19	28.73	33.48	54.10	62.38	74.96	94.25
	0:45:00	0.00	0.00	16.77	24.39	28.79	47.15	54.36	67.11	84.33
	0:50:00	0.00	0.00	13.95	20.87	24.27	41.72	48.05	59.08	74.18
	0:55:00	0.00	0.00	11.92	17.75	20.97	34.83	40.14	50.56	63.52
	1:00:00	0.00	0.00	10.55	15.59	18.81	29.61	34.17	44.25	55.65
	1:05:00	0.00	0.00	9.44	13.86	17.00	26.00	30.02	39.94	50.23
	1:10:00	0.00	0.00	7.89	12.22	15.22	21.94	25.38	32.79	41.33
	1:15:00	0.00	0.00	6.46	10.31	13.58	18.35	21.26	26.47	33.45
	1:20:00	0.00	0.00	5.33	8.51	11.47	14.56	16.85	20.01	25.27
	1:25:00	0.00	0.00	4.66	7.46	9.65	11.51	13.31	14.82	18.76
	1:30:00	0.00	0.00	4.31	6.90	8.50	9.30	10.76	11.56	14.68
	1:35:00	0.00	0.00	4.12	6.56	7.73	7.86	9.11	9.58	12.18
	1:40:00	0.00	0.00	4.02	5.84	7.18	6.94	8.04	8.26	10.51
	1:45:00	0.00	0.00	3.95	5.26	6.78	6.30	7.29	7.35	9.36
	1:50:00	0.00	0.00	3.89	4.85	6.51	5.88	6.81	6.72	8.56
	1:55:00	0.00	0.00	3.39	4.55	6.12	5.58	6.46	6.27	7.99
	2:00:00	0.00	0.00	2.97	4.19	5.49	5.38	6.23	5.99	7.64
	2:05:00	0.00	0.00	2.21	3.11	4.04	4.01	4.64	4.47	5.69
	2:10:00	0.00	0.00	1.60	2.23	2.88	2.86	3.31	3.20	4.06
	2:15:00	0.00	0.00	1.14	1.59	2.06	2.05	2.37	2.31	2.94
	2:20:00	0.00	0.00	0.81	1.12	1.46	1.46	1.68	1.65	2.10
	2:25:00	0.00	0.00	0.56	0.76	1.01	1.01	1.16	1.14	1.45
	2:30:00	0.00	0.00	0.37	0.51	0.69	0.70	0.80	0.79	1.00
	2:35:00	0.00	0.00	0.24	0.34	0.45	0.47	0.54	0.53	0.67
	2:40:00	0.00	0.00	0.13	0.20	0.26	0.29	0.33	0.32	0.41
	2:45:00	0.00	0.00	0.06	0.10	0.13	0.15	0.17	0.17	0.21
	2:50:00	0.00	0.00	0.02	0.04	0.04	0.05	0.06	0.06	0.08
	2:55:00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01
	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
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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
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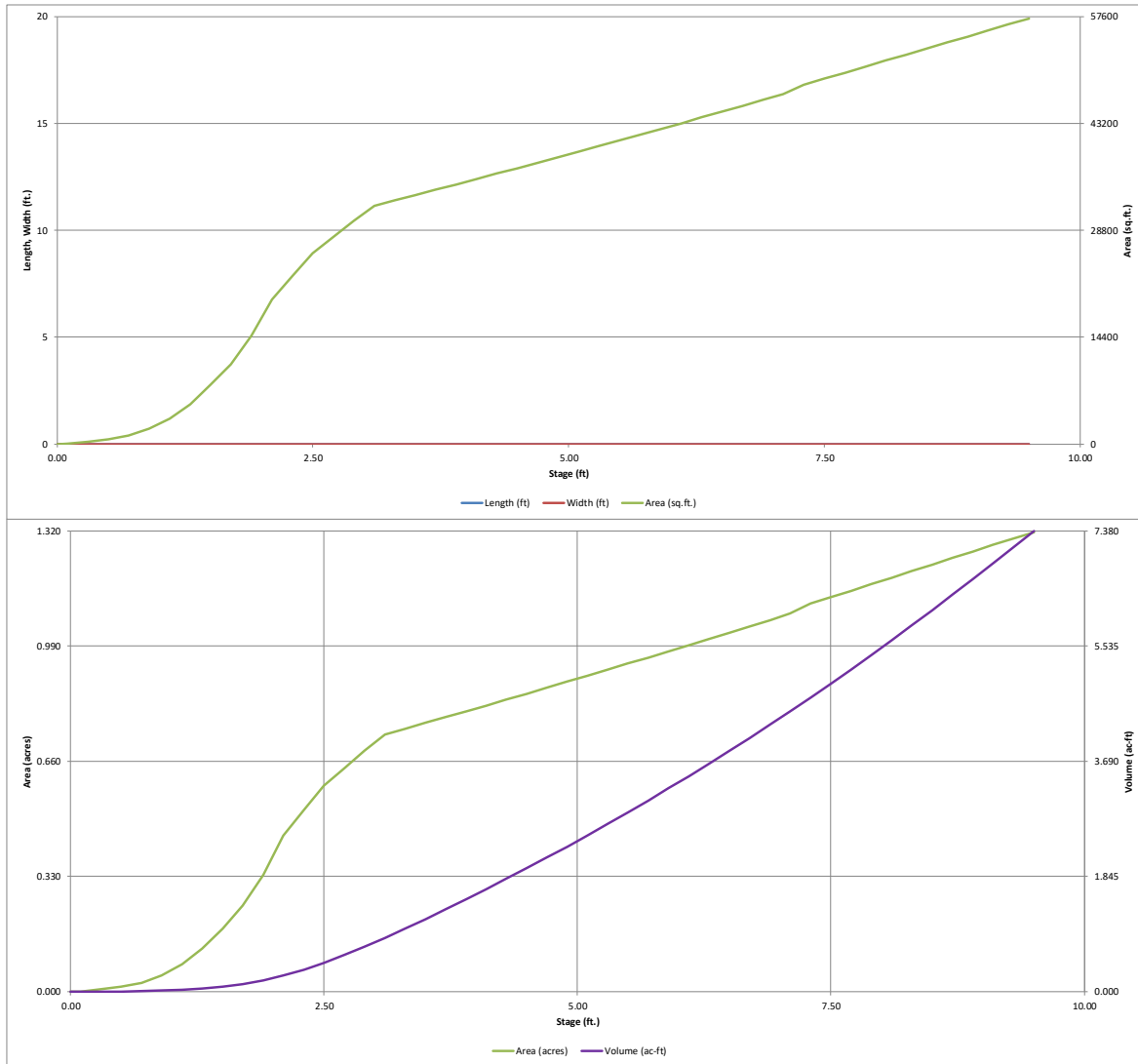
MHFD-Detention, Version 4.06 (July 2022)

Basin ID: Pond D3 (Stage 0.00 = 6417.50, 100-yr crest = 6424.75', 100-yr WS = 6425.91, top of berm = 6427.00')



DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.06 (July 2022)



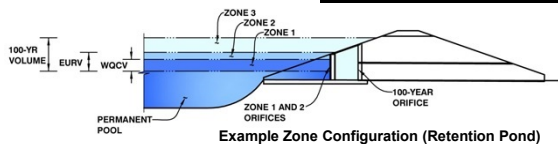
EXCERPTS FROM "PHASE III DRAINAGE REPORT FOR DAWSON TRAILS
FILING NO. 2" BY EMK CONSULTANTS APPROVED 10/21/2025.

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.06 (July 2022)

Project: Pond D3

Basin ID: Pond D3 (Stage 0.00 = 6417.50, 100-yr crest = 6424.75', 100-yr WS = 6425.91, top of berm = 6427.00')



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	3.95	1.512	Orifice Plate
Zone 2 (EURV)	6.84	2.693	Rectangular Orifice
Zone 3			
Total (all zones)		4.205	

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

Calculated Parameters for Plate
WQ Orifice Area per Row = ft²
Elliptical Half-Width = feet
Elliptical Slot Centroid = feet
Elliptical Slot Area = 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							
Orifice Area (sq. inches)	7.00							

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

User Input: Vertical Orifice (Circular or Rectangular)

Zone 2 Rectangular ☐ Not Selected ☐
Invert of Vertical Orifice = ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice = ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Height = inches
Vertical Orifice Width = inches

Calculated Parameters for Vertical Orifice
Zone 2 Rectangular ft²
Vertical Orifice Area = ft²
Vertical Orifice Centroid = feet

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

☐ Not Selected ☐ Not Selected
Overflow Weir Front Edge Height, H_o = ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length = feet
Overflow Weir Grate Slope = H:V
Horiz. Length of Weir Sides = feet
Overflow Grate Type =
Debris Clogging % = %

Calculated Parameters for Overflow Weir
 feet
Height of Grate Upper Edge, H_g = feet
Overflow Weir Slope Length = feet
Grate Open Area / 100-yr Orifice Area =
Overflow Grate Open Area w/o Debris = ft²
Overflow Grate Open Area w/ Debris = ft²

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

☐ Not Selected ☐ Not Selected
Depth to Invert of Outlet Pipe = ft (distance below basin bottom at Stage = 0 ft)
Circular Orifice Diameter = inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate
 ft²
Outlet Orifice Area = ft²
Outlet Orifice Centroid = feet
Half-Central Angle of Restrictor Plate on Pipe = radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

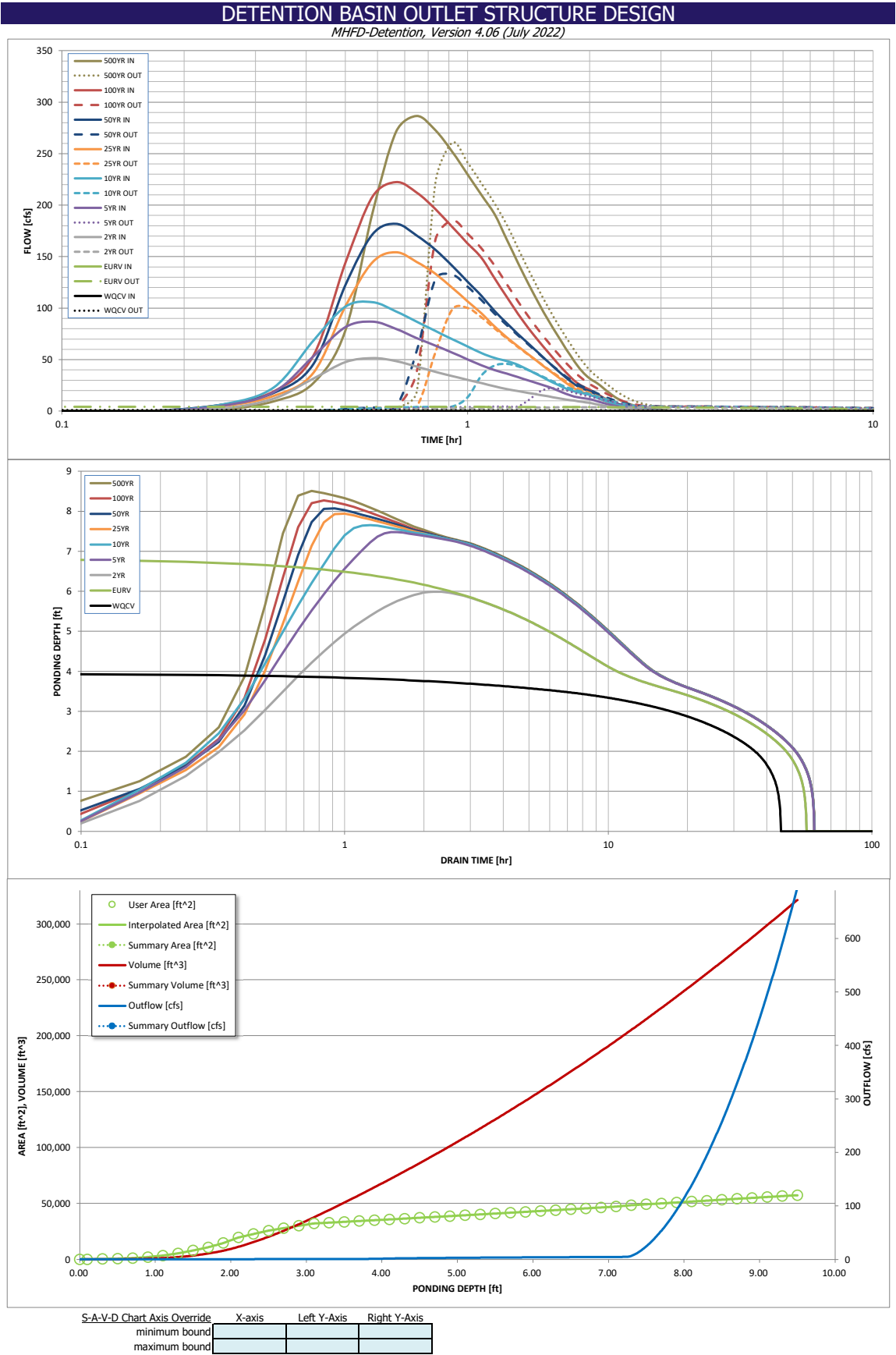
Spillway Invert Stage = ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length = feet
Spillway End Slopes = H:V
Freeboard above Max Water Surface = feet

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

Routed Hydrograph Results

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

	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
Design Storm Return Period	N/A	N/A	1.06	1.43	1.66	2.00	2.26	2.60	3.20
One-Hour Rainfall Depth (in)	N/A	N/A	3.861	6.329	8.009	10.945	12.978	15.965	20.773
CUHP Runoff Volume (acre-ft)	N/A	N/A	3.861	6.329	8.009	10.945	12.978	15.965	20.773
Inflow Hydrograph Volume (acre-ft)	N/A	N/A	5.8	25.8	37.6	70.5	87.7	115.1	156.3
CUHP Predevelopment Peak Q (cfs)	N/A	N/A	0.06	0.28	0.41	0.78	0.97	1.27	1.72
OPTIONAL Override Predevelopment Peak Q (cfs)	N/A	N/A	51.4	86.8	105.8	154.2	181.9	222.4	286.6
Predevelopment Unit Peak Flow, q (cfs/acre)	N/A	N/A	3.7	21.9	45.8	100.2	132.5	185.3	260.6
Peak Inflow Q (cfs)	1.1	4.3	0.8	1.2	1.4	1.5	1.6	1.7	
Peak Outflow Q (cfs)	N/A	N/A	0.8	1.2	1.4	1.5	1.6	1.7	
Ratio Peak Outflow to Predevelopment Q	N/A	N/A	0.8	1.2	1.4	1.5	1.6	1.7	
Structure Controlling Flow	Vertical Orifice 1	Vertical Orifice 1	Vertical Orifice 1	Spillway	Spillway	Spillway	Spillway	Spillway	Spillway
Max Velocity through Grate 1 (fps)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
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)	43	51	51	52	50	47	45	42	38
Time to Drain 99% of Inflow Volume (hours)	44	54	54	57	57	55	55	54	52
Maximum Ponding Depth (ft)	3.95	6.84	5.99	7.48	7.65	7.94	8.08	8.27	8.51
Area at Maximum Ponding Depth (acres)	0.81	1.06	0.98	1.13	1.14	1.17	1.18	1.20	1.22
Maximum Volume Stored (acre-ft)	1.518	4.210	3.342	4.898	5.102	5.426	5.591	5.829	6.121



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.

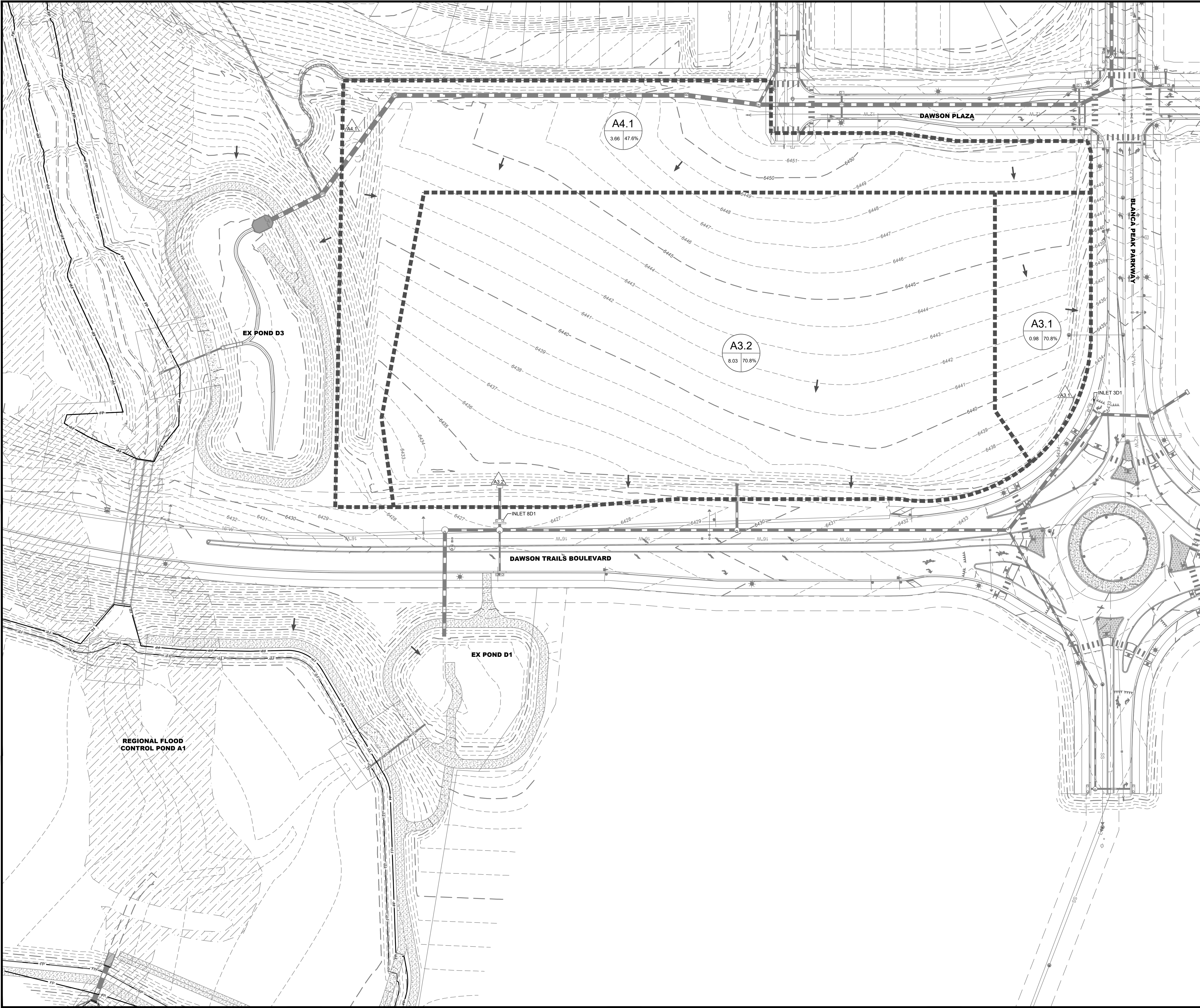
Time Interval	SOURCE	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP	CUHP
	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.00 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:10:00	0.00	0.00	0.00	0.00	0.00	0.00	0.44	0.21	1.45
	0:15:00	0.00	0.00	2.65	5.38	6.67	4.92	6.39	6.44	9.57
	0:20:00	0.00	0.00	12.14	18.57	23.10	14.88	17.68	19.32	27.12
	0:25:00	0.00	0.00	31.62	53.21	68.47	37.12	45.59	53.84	78.17
	0:30:00	0.00	0.00	47.56	81.61	101.42	101.60	122.30	143.87	192.56
	0:35:00	0.00	0.00	51.44	86.80	105.80	144.60	171.78	208.25	270.96
	0:40:00	0.00	0.00	48.54	79.84	96.85	154.25	181.91	222.42	286.64
	0:45:00	0.00	0.00	43.17	70.92	86.87	144.84	170.41	212.09	272.63
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	1:05:00	0.00	0.00	27.17	44.38	56.30	94.73	111.82	148.72	191.22
	1:10:00	0.00	0.00	24.04	39.89	51.64	82.15	97.24	129.09	166.60
	1:15:00	0.00	0.00	21.46	36.36	48.64	71.69	85.29	110.72	143.78
	1:20:00	0.00	0.00	19.39	32.94	44.80	62.74	74.73	94.42	122.89
	1:25:00	0.00	0.00	17.61	29.64	39.77	54.83	65.21	80.16	104.26
	1:30:00	0.00	0.00	15.94	26.54	34.68	47.21	56.06	67.80	88.05
	1:35:00	0.00	0.00	14.30	23.61	29.99	40.07	47.52	56.80	73.66
	1:40:00	0.00	0.00	12.69	20.19	25.71	33.48	39.67	46.72	60.49
	1:45:00	0.00	0.00	11.24	16.82	21.96	27.46	32.49	37.53	48.53
	1:50:00	0.00	0.00	10.15	14.23	19.23	22.19	26.26	29.70	38.54
	1:55:00	0.00	0.00	9.03	12.70	17.43	18.47	21.96	24.24	31.71
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	2:10:00	0.00	0.00	5.36	7.78	10.51	10.40	12.42	12.82	16.94
	2:15:00	0.00	0.00	4.24	6.10	8.25	7.99	9.54	9.60	12.69
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	2:35:00	0.00	0.00	1.60	2.21	2.87	2.73	3.23	3.06	4.03
	2:40:00	0.00	0.00	1.24	1.67	2.17	2.06	2.44	2.33	3.07
	2:45:00	0.00	0.00	0.94	1.26	1.66	1.57	1.86	1.81	2.38
	2:50:00	0.00	0.00	0.71	0.93	1.25	1.20	1.41	1.38	1.81
	2:55:00	0.00	0.00	0.50	0.66	0.90	0.88	1.04	1.01	1.32
	3:00:00	0.00	0.00	0.33	0.45	0.61	0.61	0.72	0.69	0.90
	3:05:00	0.00	0.00	0.20	0.29	0.37	0.39	0.45	0.44	0.57
	3:10:00	0.00	0.00	0.10	0.16	0.20	0.22	0.25	0.24	0.31
	3:15:00	0.00	0.00	0.04	0.07	0.08	0.09	0.11	0.10	0.13
	3:20:00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	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
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	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
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	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
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	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

APPENDIX E

DRAINAGE MAPS

Proposed Drainage Map
Existing Drainage Map
Runoff Transfer Map

9/31/2021 1:15 PM JARROD FERRAN X:\GARRETT - DAWSON TRAIL\CAD\REF\RAINAGE\EXDR.DWG



LEGEND

	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	PROPOSED DRAINAGE BASIN MAJOR
	PROPOSED DRAINAGE BASIN MINOR
	EXISTING DRAINAGE BASIN MAJOR
	EXISTING DRAINAGE BASIN MINOR
	STORM (FES, MH, & INLET)

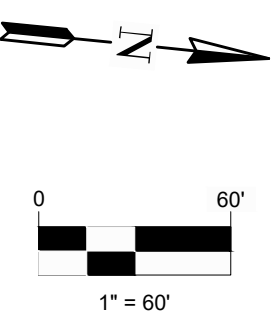
	EXISTING		PROPOSED
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	EX-1		PR-1	BASIN DESIGNATION
AREA X.XX (AC)	0.XX 0.XX	AREA X.XX (AC)	0.XX 0.XX	MINOR RUNOFF (CFS)
				MAJOR RUNOFF (CFS)

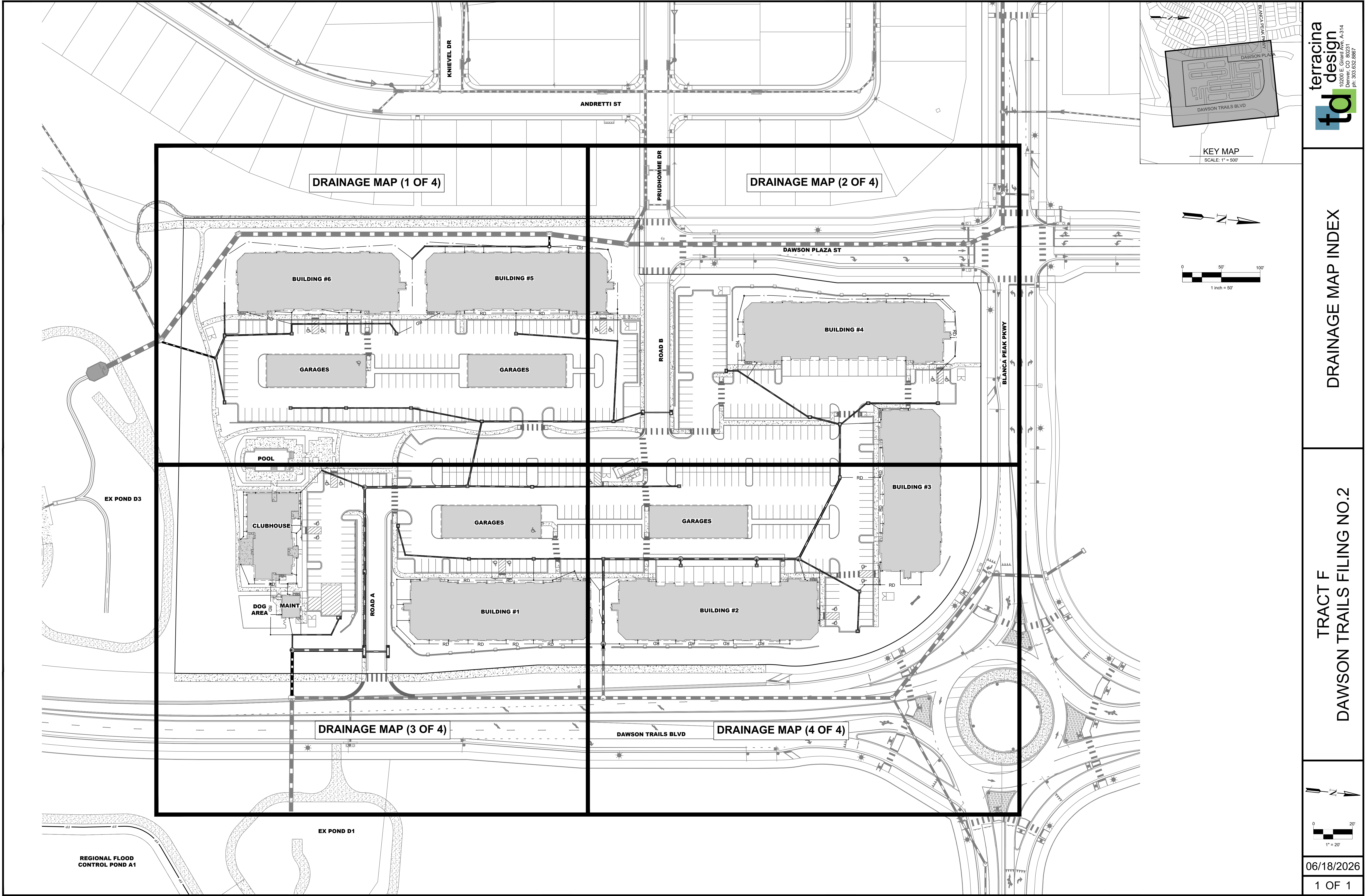
	DIRECTIONAL FLOW ARROW
	DESIGN POINT

EXISTING DRAINAGE MAP

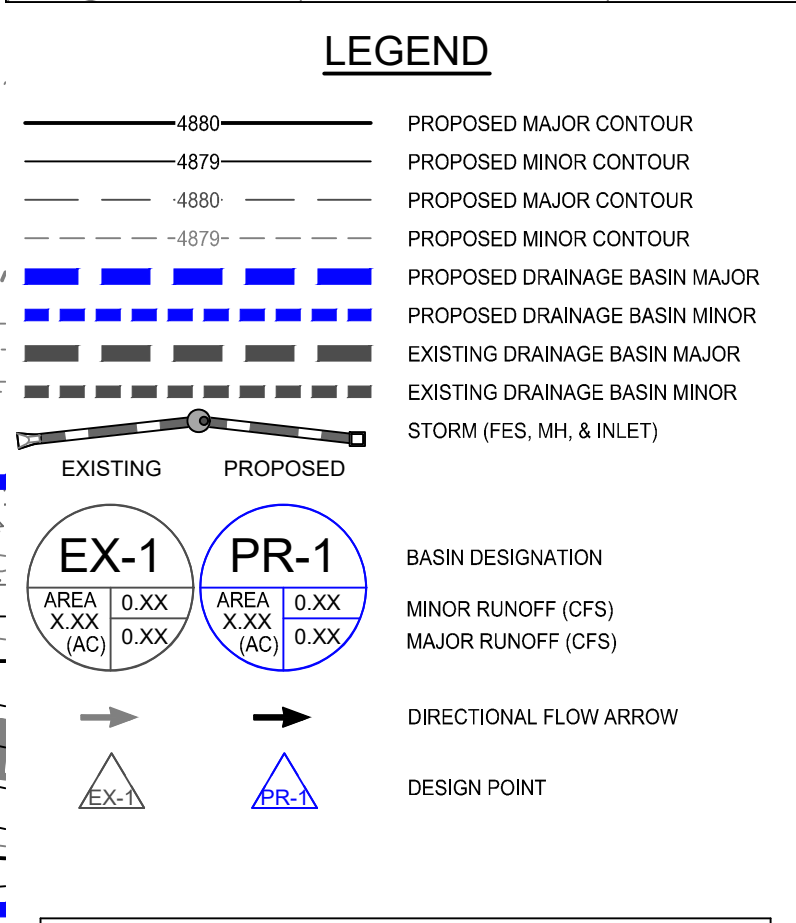
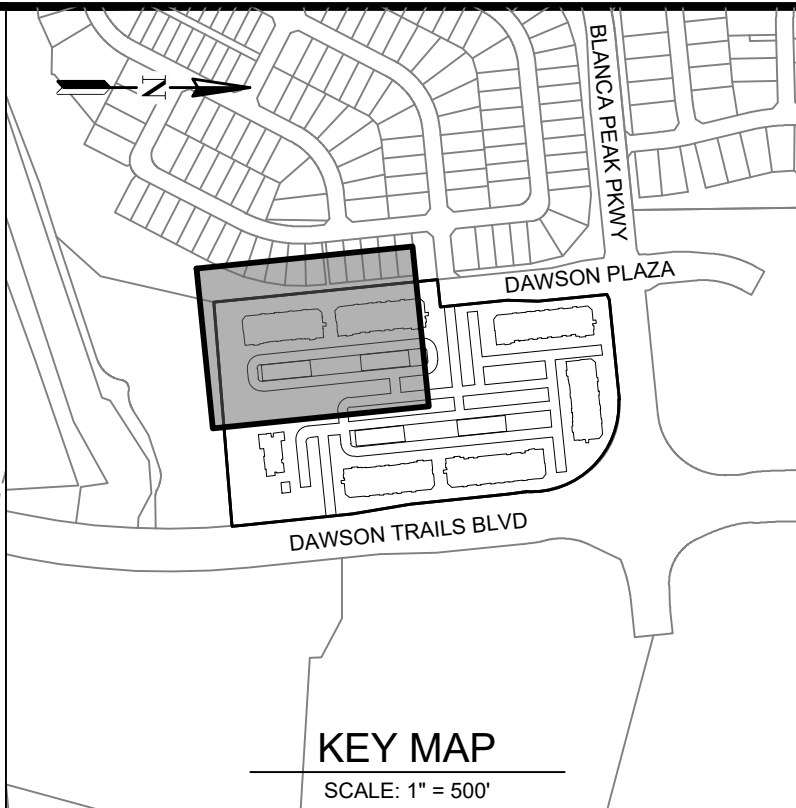
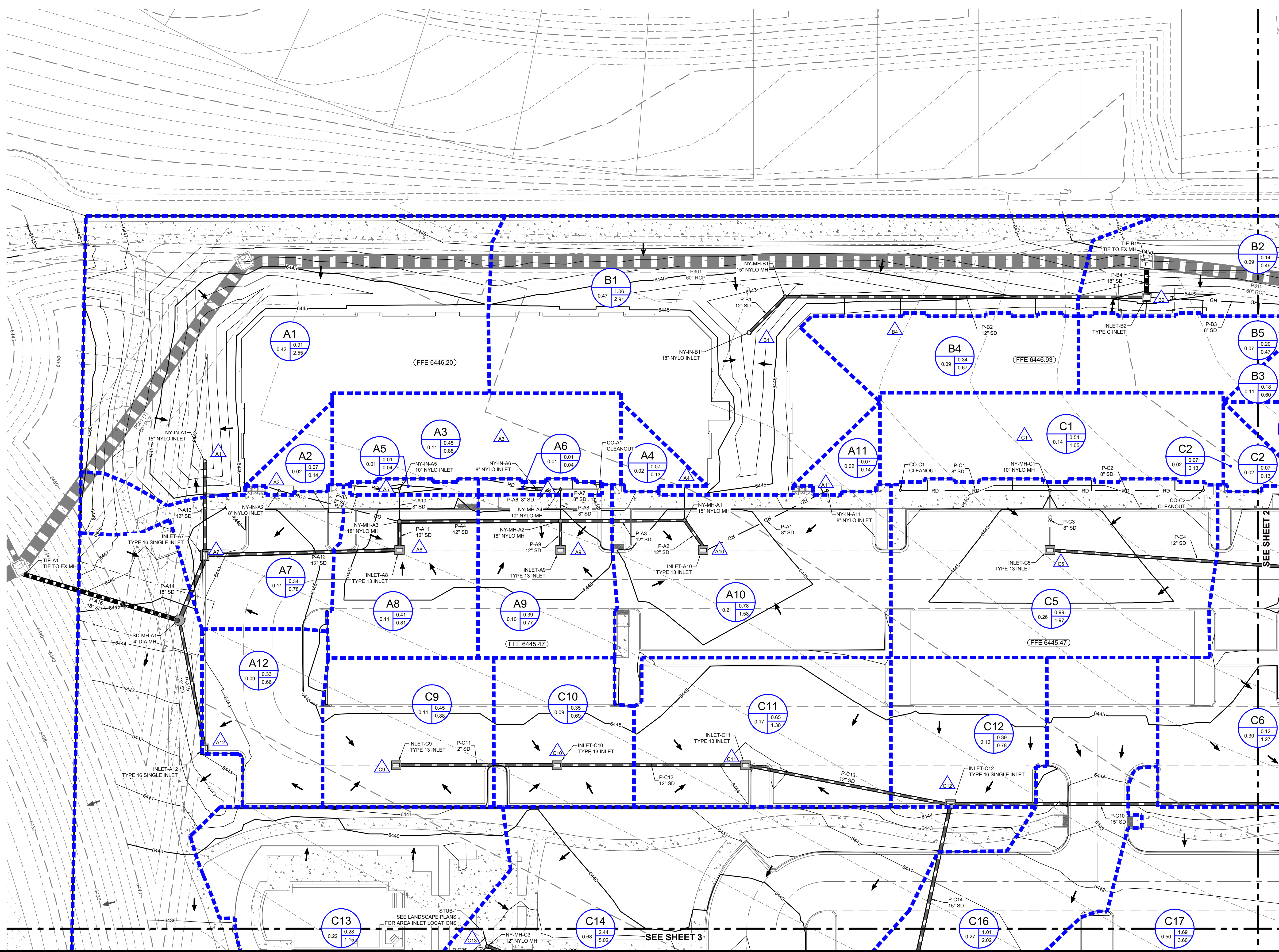
DAWSON TRAIL



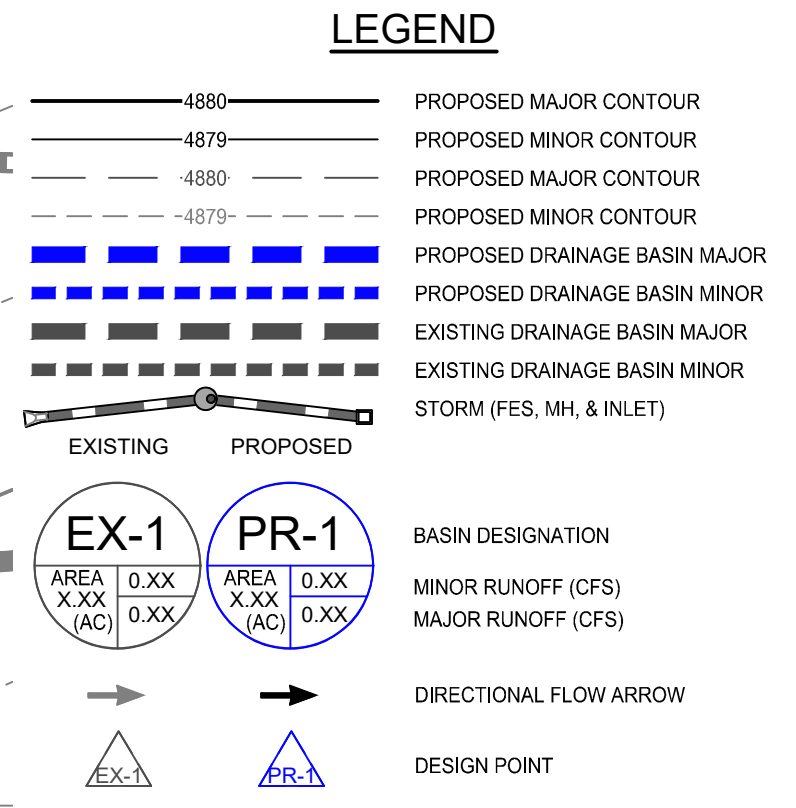
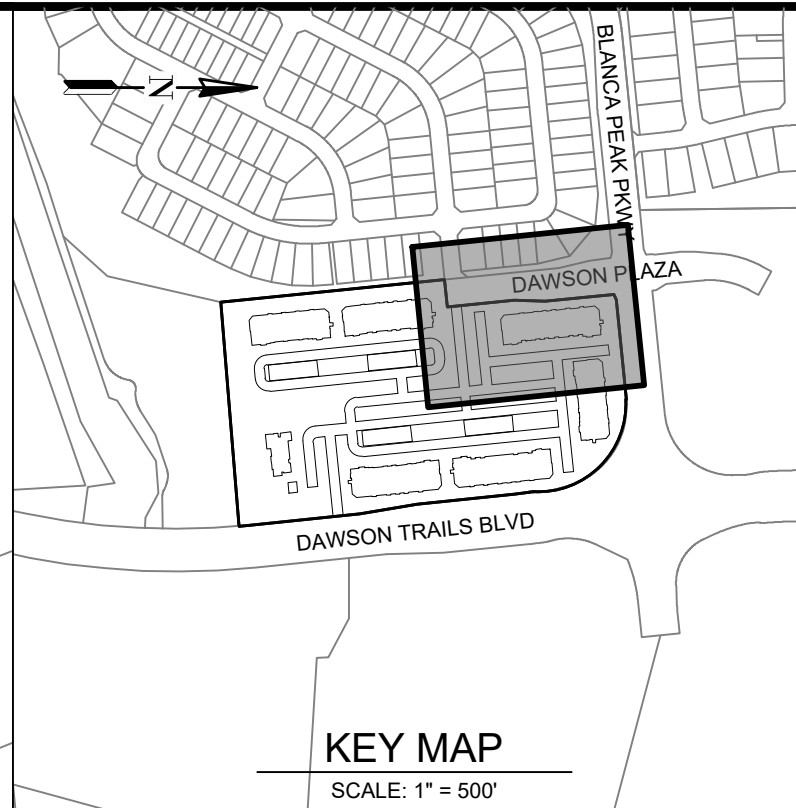
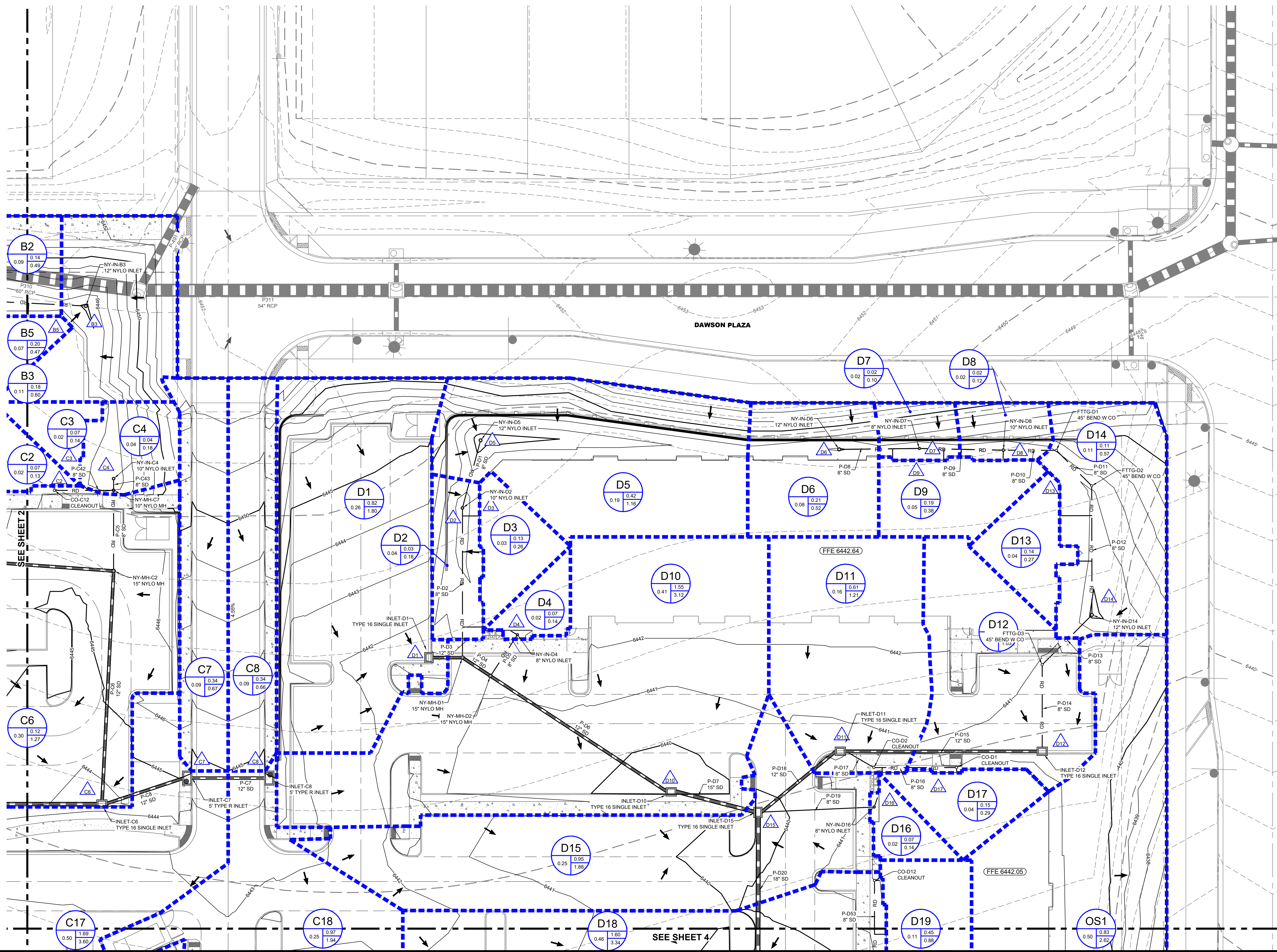
06/16/2026



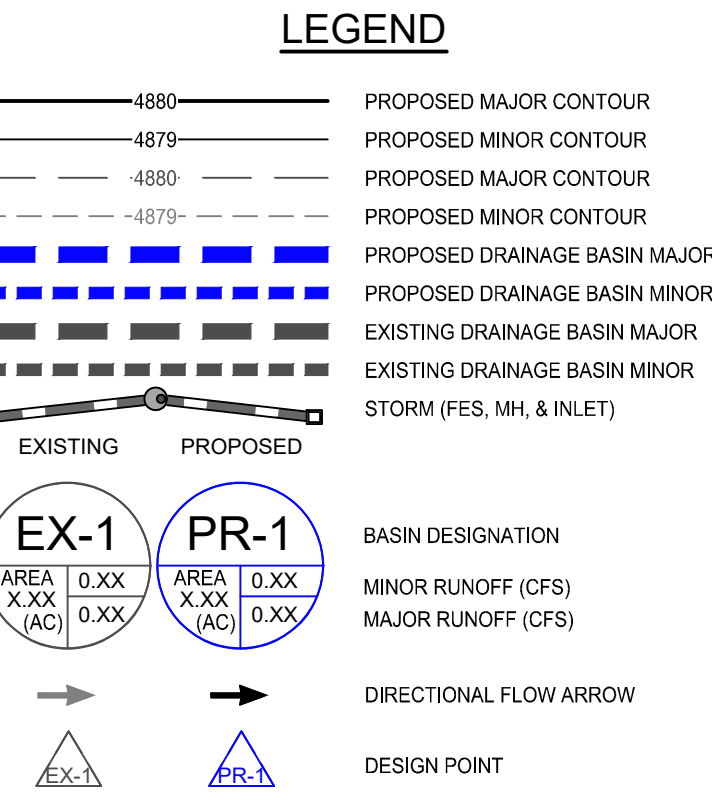
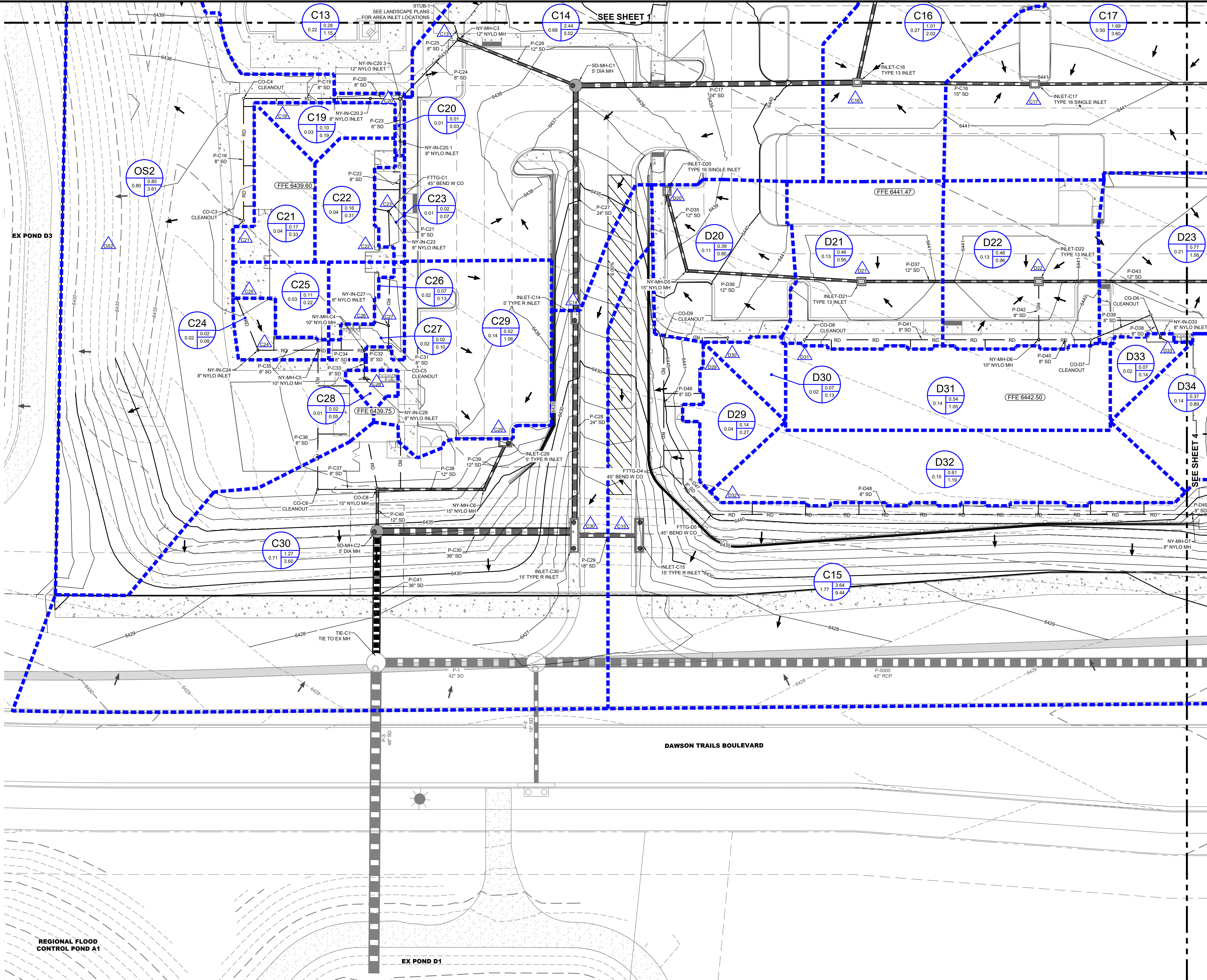
9/31/2021 1:15 PM X:\GARRETT - DAWSON TRAILS\DOCUMENTS\REPORTS\DRAINAGE\00 - PHASE 3\F - DRAINAGE MAPS\PROPOSED DRAINAGE MAPS.DWG JARROD FERRAN



RUNOFF SUMMARY TABLE				
Basin ID & Design Point	Imperv	Basin Area (Ac)	5-Year Runoff (CFS)	100-Year Runoff (CFS)
A01	50.7%	0.42	0.91	2.55
A02	95.0%	0.02	0.07	0.14
A03	95.0%	0.11	0.45	0.88
A04	95.0%	0.02	0.07	0.13
A05	21.8%	0.01	0.01	0.04
A06	20.9%	0.01	0.01	0.04
A07	72.3%	0.11	0.34	0.78
A08	93.2%	0.11	0.41	0.81
A09	93.6%	0.10	0.39	0.77
A10	87.9%	0.21	0.78	1.58
A11	95.0%	0.02	0.07	0.14
A12	88.8%	0.09	0.33	0.66
B01	52.8%	0.47	1.06	2.91
B02	35.5%	0.09	0.14	0.49
B03	39.2%	0.11	0.18	0.60
B04	95.0%	0.09	0.34	0.67
B05	71.4%	0.07	0.20	0.47
C01	95.0%	0.14	0.54	1.05
C02	95.0%	0.02	0.07	0.13
C05	92.2%	0.26	0.99	1.97
C06	87.2%	0.30	1.07	2.19
C09	94.3%	0.11	0.45	0.88
C10	93.1%	0.09	0.35	0.69
C11	91.0%	0.17	0.65	1.30
C12	91.9%	0.10	0.39	0.78
C13	29.0%	0.22	0.23	0.94
C14	86.1%	0.68	2.42	5.00
C16	91.7%	0.27	1.01	2.02
C17	81.3%	0.50	1.69	3.60



RUNOFF SUMMARY TABLE				
Basin ID & Design Point	Imperv	Basin Area (Ac)	5-Year Runoff (CFS)	100-Year Runoff (CFS)
B02	35.5%	0.09	0.14	0.49
B03	39.2%	0.11	0.18	0.60
B05	71.4%	0.07	0.20	0.47
C02	95.0%	0.02	0.07	0.13
C03	95.0%	0.02	0.07	0.14
C06	87.2%	0.30	1.07	2.19
C07	95.0%	0.09	0.34	0.67
C08	95.0%	0.09	0.34	0.66
C17	81.3%	0.50	1.69	3.60
C18	92.3%	0.25	0.97	1.94
D01	77.3%	0.26	0.82	1.80
D02	20.2%	0.04	0.03	0.18
D03	95.0%	0.03	0.13	0.26
D04	95.0%	0.02	0.07	0.14
D05	52.0%	0.19	0.42	1.16
D06	63.8%	0.08	0.21	0.52
D07	20.0%	0.02	0.02	0.10
D08	20.0%	0.02	0.02	0.12
D09	95.0%	0.05	0.19	0.38
D10	90.6%	0.41	1.55	3.12
D11	93.5%	0.16	0.61	1.21
D12	86.9%	0.14	0.50	1.03
D13	95.0%	0.04	0.14	0.27
D14	20.0%	0.11	0.11	0.57
D15	92.4%	0.25	0.95	1.88
D16	95.0%	0.02	0.07	0.14
D17	95.0%	0.04	0.15	0.29
D18	84.7%	0.46	1.60	3.34
D19	95.0%	0.11	0.45	0.88
OS1	42.1%	0.50	0.83	2.62

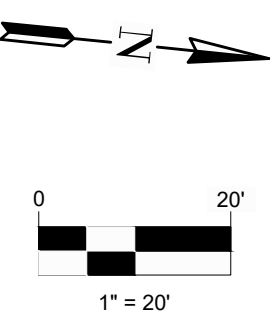


RUNOFF SUMMARY TABLE				
Basin ID & Design Point	Imperv	Basin Area (Ac)	5-Year Runoff (CFS)	100-Year Runoff (CFS)
C13	29.0%	0.22	0.23	0.94
C14	86.1%	0.68	2.42	5.00
C15	57.7%	1.77	4.34	11.24
C16	91.7%	0.27	1.01	2.02
C17	81.3%	0.50	1.69	3.60
C19	95.0%	0.03	0.10	0.19
C20	26.5%	0.01	0.01	0.03
C21	95.0%	0.04	0.17	0.33
C22	95.0%	0.04	0.13	0.25
C23	28.9%	0.01	0.02	0.07
C24	22.8%	0.02	0.02	0.09
C25	95.0%	0.03	0.11	0.22
C26	95.0%	0.02	0.07	0.13
C27	26.1%	0.02	0.02	0.10
C28	74.2%	0.01	0.02	0.05
C29	88.4%	0.14	0.52	1.06
C30	50.1%	0.71	1.27	3.60
D20	85.2%	0.11	0.39	0.80
D21	86.8%	0.13	0.46	0.95
D22	82.8%	0.13	0.46	0.96
D23	88.6%	0.21	0.77	1.56
D29	95.0%	0.04	0.14	0.27
D30	95.0%	0.02	0.07	0.13
D31	95.0%	0.14	0.54	1.05
D32	95.0%	0.15	0.61	1.19
D33	95.0%	0.02	0.07	0.14
D34	63.5%	0.14	0.37	0.89
OS2	26.8%	0.80	0.85	3.61

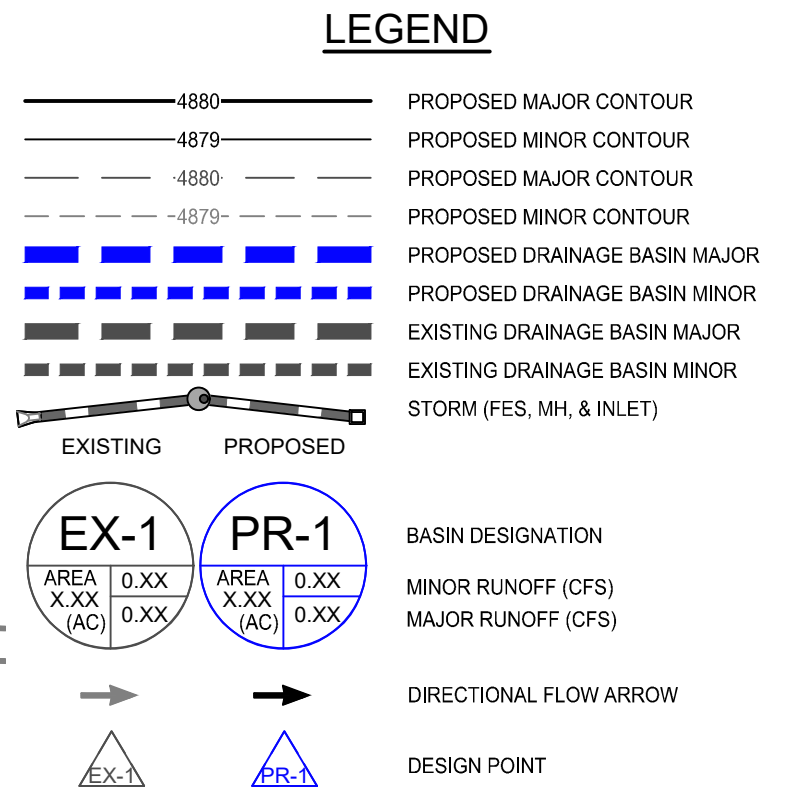
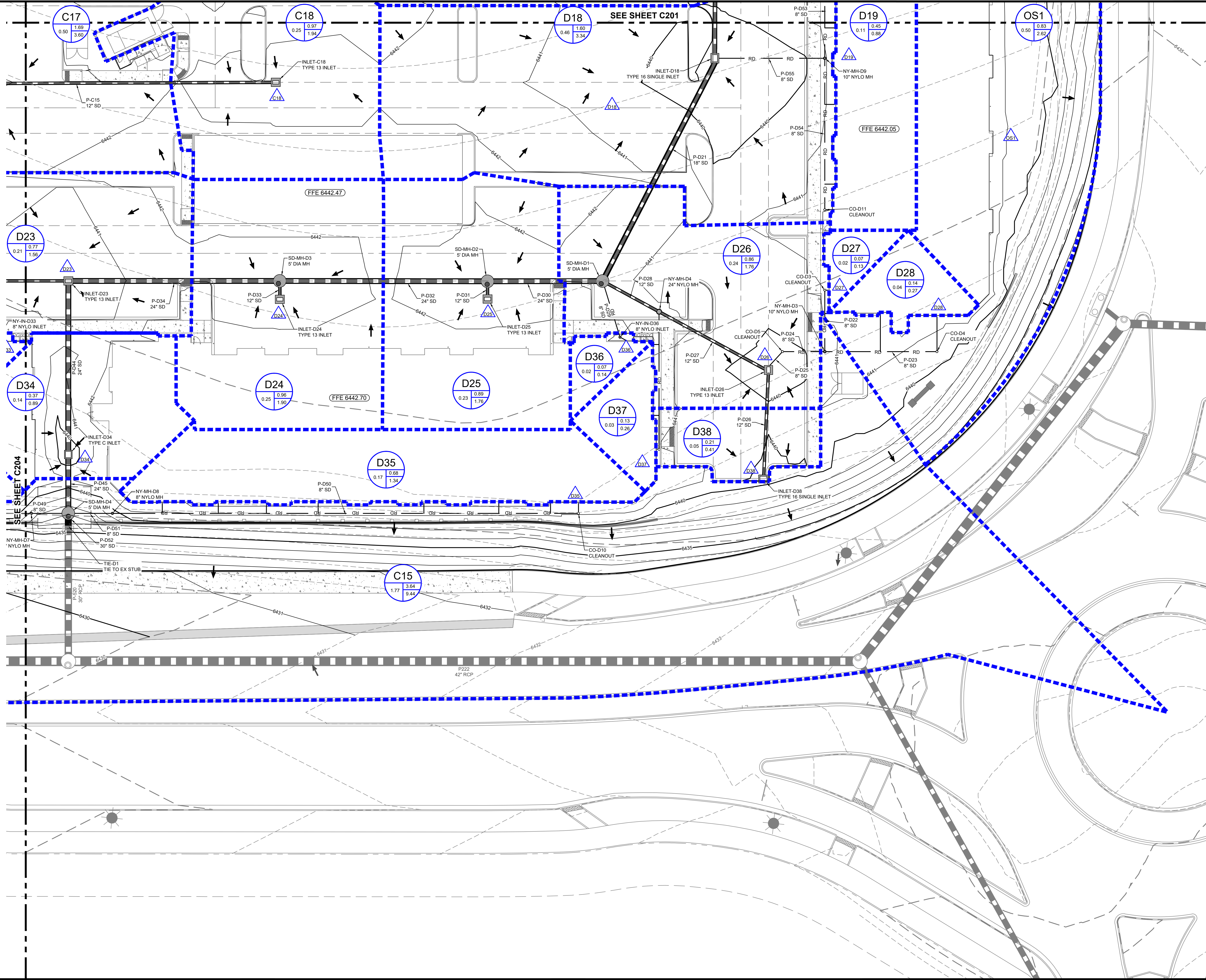


PROPOSED DRAINAGE MAPS

TRACT F
DAWSON TRAILS FILING NO.2

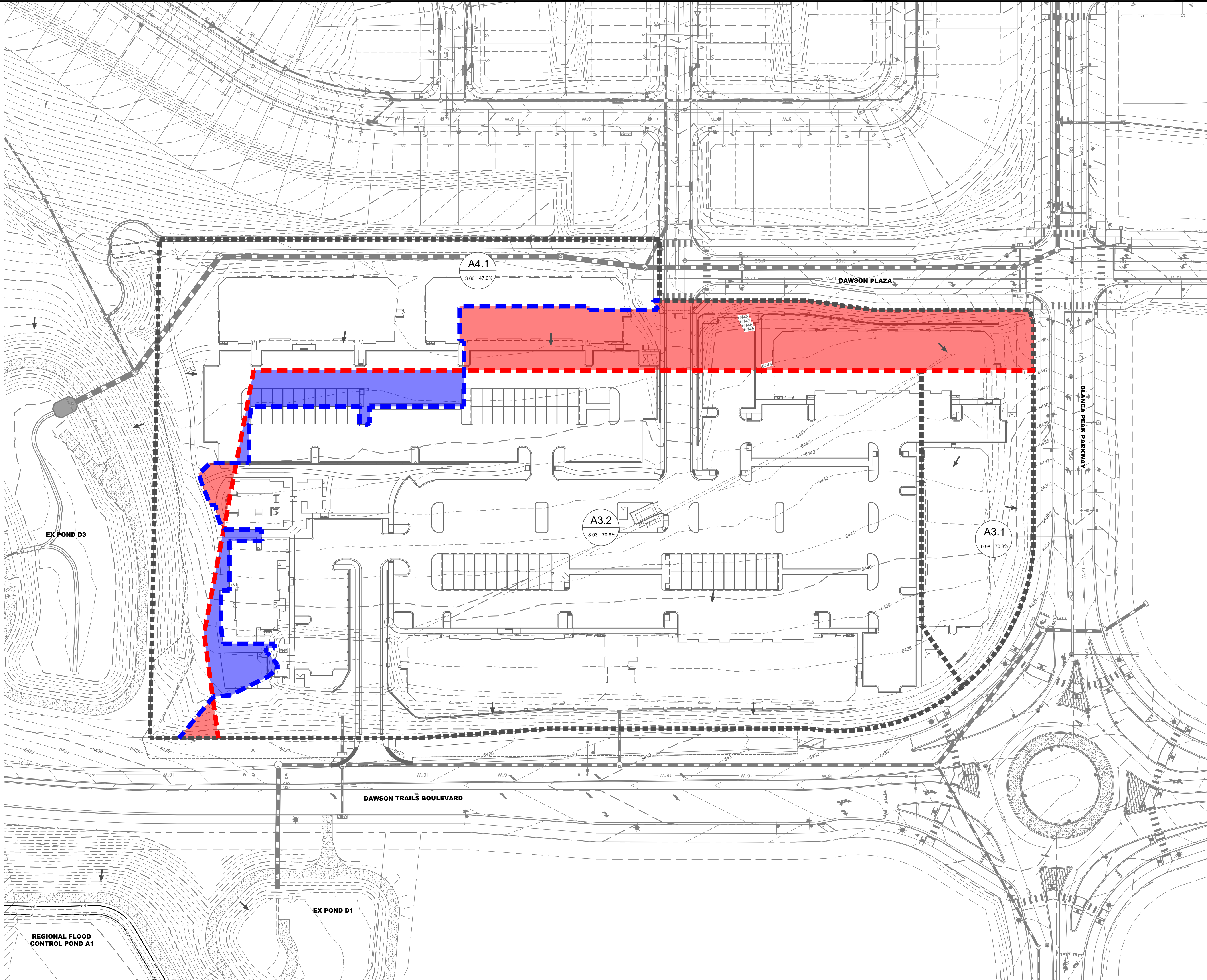


9/31/2021 1:15 PM JARROD FERRAN X:\GARRETT - DAWSON TRAIL\DOCUMENTS\REPORTS\DRAINAGE\00 - PHASE 3\F - DRAINAGE MAPS\PROPOSED DRAINAGE MAPS.DWG



RUNOFF SUMMARY TABLE				
Basin ID & Design Point	Imperv	Basin Area (Ac)	5-Year Runoff (CFS)	100-Year Runoff (CFS)
C15	57.7%	1.77	4.34	11.24
C17	81.3%	0.50	1.69	3.60
C18	92.3%	0.25	0.97	1.94
D18	84.7%	0.46	1.60	3.34
D19	95.0%	0.11	0.45	0.88
D23	88.6%	0.21	0.77	1.56
D24	93.9%	0.25	0.96	1.90
D25	93.1%	0.23	0.89	1.76
D26	88.0%	0.24	0.86	1.76
D27	95.0%	0.02	0.07	0.13
D28	95.0%	0.04	0.14	0.27
D34	63.5%	0.14	0.37	0.89
D35	95.0%	0.17	0.68	1.34
D36	95.0%	0.02	0.07	0.14
D37	95.0%	0.03	0.13	0.26
D38	93.0%	0.05	0.21	0.41
OS1	42.1%	0.50	0.83	2.62

9/31/2021 1:15 PM SEAN COCHRANE X:\GARRETT - DAWSON TRAIL\CAD\REF\RAINAGE\BASIN\CHANGE\MAP.DWG



LEGEND

— 4880 — PROPOSED MAJOR CONTOUR
— 4879 — PROPOSED MINOR CONTOUR
— 4880 — PROPOSED MAJOR CONTOUR
— 4879 — PROPOSED MINOR CONTOUR
--- EXISTING DRAINAGE BASIN MAJOR
--- EXISTING POND D1 - POND D3 RIDGE
--- PROPOSED POND D1 - POND D3 RIDGE
--- STORM (FES, MH, & INLET)

EXISTING PROPOSED

EX-1 AREA XXX.XX% (AC)
PR-1 AREA XXX.XX% (AC)

BASIN DESIGNATION
IMPERVIOUSNESS %

AREA TO POND D1
AREA TO POND D3

AREA COMPARISON CHART

AREA TYPE	POND D1	POND D3
ANTICIPATED AREA	9.01 AC	3.66 AC
PROPOSED AREA	11.24 AC	2.84 AC
NET AREA Δ	2.23 AC	-0.82 AC

IMPERVIOUS COMPARISON CHART

IMPERVIOUS TYPE	POND D1	POND D3
ANTICIPATED IMPERVIOUS	70.80%	47.60%
PROPOSED IMPERVIOUS	72.90%	47.90%
NET IMPERVIOUS Δ	2.10%	0.30%

VOLUME COMPARISON CHART

VOLUME TYPE	POND D1	POND D3
ANTICIPATED VOLUME	1.674 AC-FT	4.205 AC-FT
PROPOSED VOLUME	1.884 AC-FT	4.187 AC-FT
NET VOLUME Δ	0.210 AC-FT	-0.018 AC-FT

EXISTING BASIN EXCHANGE CHART

BASIN	POND D1	POND D3
A4.1	1.23 AC	2.43 AC
A3.1	0.98 AC	0 AC
A3.2	7.62 AC	0.41 AC