Phase II Drainage Report

Pine Canyon Filing 1
SDP 26-0021

Prepared for:

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September 2026
Project No. 250100

ENGINEER'S CERTIFICATION

"I affirm that this report and plan for the Phase II drainage design of Pine Canyon Filing 1, 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."

_____
Evan Rumney, P.E.
Registered Professional Engineer
State of Colorado No. 54401

Owner Approval:
JRW Family Limited Partnership, LLLP hereby certifies that the drainage facilities for Pine Canyon Filing 1 will be constructed according to the design presented in this report. I understand that the Town of Castle Rock does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that the Town of Castle Rock reviews drainage plans pursuant to the Municipal Code; but cannot, on behalf of Pine Canyon Filing 1 guarantee that final drainage design review will absolve JRW Family Limited Partnership, LLLP and/or their successors and/or assigns of future liability for improper design."

_____.
Name of Developer

_____.
Authorized Signature

Town of Castle Rock Approvals:

_____.
Utilities Department Date

_____.
Development Services Date

Table of Contents

Table of Contents 3
Introduction – General Location and Description 4
Site Location 4
Site Description 4
Proposed Project Description 5
Flood Hazard and Drainage Studies Relevant to the Site 5
Soil Type 5
Drainage Basin and Sub-Basins 5
Major Basins 5
Sub Basins 6
Drainage Design Criteria 16
Regulations, Drainage Studies, Development Criteria Reference and Constraints 16
Hydrological Criteria 17
Hydraulic Criteria 17
Water Quality Enhancement 17
Stormwater Management and Facility Design 18
Stormwater Conveyance Facilities 18
Stormwater Storage Facilities 18
Water Quality Enhancement Best Management Practices 19
Floodplain Modification 19
Geotechnical Investigation and Sub-surface Collection System Design 19
Operations and Maintenance 20
Additional Permitting Requirements 20
Conclusion 21
Compliance with the Town of Castle Rock Code 21
Variances 21
Drainage Concept 21
References 21

Appendix A – Vicinity Map, FIRM Maps, Soils Map
Appendix B – Hydrologic Calculations
Appendix C - Hydraulic Calculations
Appendix D – Reference Documents
Appendix E – Existing and Proposed Drainage Maps

Introduction – General Location and Description

INTRODUCTION

This Phase II Drainage Report presents an analysis for the proposed drainage patterns and requirements for the proposed Pine Canyon Filing 1, hereafter referred to as the Site.

Site Location

The Site is located in the Town of Castle Rock, Douglas County, Colorado, west of Founders Parkway and adjacent to Castle Oaks Filing No. 1. More specifically, the Site is located within portions of the southeastern quarter of Section 36, Township 7 South, as well as the northern half of the northeastern quarter of Section 1, Township 8 South, Range 67 West of the 6th P.M., in the County of Douglas, State of Colorado. The project is bounded generally by the undeveloped Pine Canyon property and the Castle Rock ridgeline to the west, Founders Parkway and Castle Oaks Estates to the east, and open space/residential areas to the north and south. Please see the vicinity map in Appendix A for further reference.

Site Description

The Pine Canyon Filing 1 site consists of roughly 65 acres of undeveloped land with native grasses and weeds covering the site. The Site generally drains from the west ridgeline to the east and southeast towards Founders Parkway at slopes between 1% and 33%. Downstream of Founders Parkway, stormwater is conveyed through Castle Oaks Estates and ultimately to McMurdo Gulch and Cherry Creek.

Per the Pine Canyon Phase I Drainage Report, prepared by CORE Consultants (September, 2025), there are four existing drainage basins within the Site area: EX14, EX16, EX17, and EX25. These basins generally drain east toward Founders Parkway and include culverts and flared end sections that receive runoff from the Site, conveying it to the existing Castle Oaks drainage system. No active irrigation ditches or canals were identified within the limits of the proposed Filing 1 improvements.

An existing water quality pond, owned and maintained by the Colorado Department of Transportation (CDOT) is located within the Founders Parkway right-of-way. This existing pond is proposed to be modified and expanded with the Pine Canyon Filing 1 improvements. At this time, the original design information and associated drainage report for the existing pond are unavailable. However, the tributary Founders Parkway right of way area has been included in the proposed pond calculations for Pond M2 so that the proposed design accounts for existing runoff generated within the CDOT right-of-way. The Pond M2 design and associated calculations will be updated as necessary upon receipt of the existing pond information from CDOT.

Proposed Project Description

The proposed development will include 133 single-family detached residential lots, local residential roadways, sidewalks, open space, landscape areas, storm sewer, swales, and three extended detention basins. The Site will be graded to generally maintain historic drainage patterns and not exceed the historic release rate for each existing basin.

Flood Hazard and Drainage Studies Relevant to the Site

Based on the FEMA FIRM Panel 08035C0189G, effective March 16, 2016, the proposed Filing 1 improvements are located within Zone X (Area of Minimal Flood Hazard) and are not located within a 100-year floodplain. No floodplain encroachment or FEMA floodplain modifications are proposed with this filing. Please refer to Appendix A for the associated FIRM Panel.

Soil Type

The Natural Resource Conservation Service (NRCS) soil survey site map indicates that the soil on site is primarily Fondis clay loam (3-9% slopes), whose hydrologic soil group is Type C and D, having a very slow infiltration rate. A soil map has been included in Appendix A for reference. For the purpose of this report, the entire site was assumed to be Type C/D soil coverage.

Drainage Basin and Sub-Basins

Existing Basins

The existing site area is divided into four primary historic drainage basins: EX14, EX16, EX17, and EX25. These basins contain approximately +/-63 acres and generally drains from the Pine Canyon ridgeline to the east and northeast, discharging toward the existing Founders Parkway roadside drainage system and the existing culvert crossings that convey runoff toward the Castle Oaks Estates drainage system, ultimately discharging to Cherry Creek.

Basin EX14 includes approximately 19.31 acres of undeveloped land and gravel road area. Runoff from this basin generally drains northeast toward Founders Parkway and outfalls to the north existing downstream drainage swale.

Basin EX16 includes approximately 5.89 acres of undeveloped area and drainage patterns follow the existing topography toward the east and is tributary to the existing Founders Parkway corridor. Runoff is then collected through the existing storm sewer, towards the existing Castle Oaks development.

Basin EX17 includes approximately 25.10 acres of undeveloped land and gravel road area. Runoff from this basin generally flows to the east via natural drainage swales and is routed under Founders Parkway, towards the existing Castle Oaks development.

Basin EX25 includes approximately 12.11 acres of existing undeveloped area and gravel road. Runoff generally drains east toward Founders Parkway and is conveyed via storm sewer to the existing Castle Oaks development.

Major Basins

The Site is located within the Cherry Creek major drainage basin. The Site lies east of the Castle Rock ridgeline major basin divide, and runoff from this filing is tributary to McMurdo Gulch and ultimately Cherry Creek. The Phase I Drainage Report for Pine Canyon identifies proposed Basins L and M as the eastern Pine Canyon basins that drain through Founders Parkway and Castle Oaks Estates to McMurdo Gulch. No major basin transfer is proposed, however, minor basin modifications are shown as a result of the final site layout, grading, and detention pond configuration. The overall discharge direction remains consistent with the historic drainage patterns.

The proposed Site is divided into three primary drainage basins: Basin L, Basin M1, and Basin M2, consistent with the Phase I Drainage Report for the Site. Land uses within these basins are predominantly residential and open space, with areas of undeveloped land. Pond L generally serves the northern portion of the Site, Pond M1 serves a central/eastern portion of the Site, and Pond M2 serves the southern and southeastern portion of the Site. Pond M2 also serves the additional tributary area that flow onto the Site via storm sewer from Founders Parkway.

	Tributary Area (ac)	Imp. (%)	WQCV (ac-ft)	EURV (ac-ft)	Total Detention (ac-ft)
Pond L	21.51	44%	0.342	0.887	1.918
Pond M1	7.89	47%	0.131	0.350	0.666
Pond M2	44.61	52%	0.790	2.203	4.117

Pond L, Pond M1, and Pond M2 discharge toward the existing Founders Parkway storm system and Castle Oaks development. The proposed detention ponds have been designed to release the 5-year and 100-year events below corresponding predevelopment peak flow rates identified by the MHFD detention routing calculations. Refer to Appendix B & C for full detention calculations.

Sub Basins

Pond L Sub Basins:

Basin L1 (0.79 Acres)

Basin L1 includes roadway, sidewalk, and open space. Runoff from the basin generally sheet flows to the northeast flowline of Street J where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 1. The flow is then conveyed via storm sewer to Pond L. In case of inlet clogging, emergency flows will overtop to the east, towards Founders Parkway. The basin is approximately 0.79 acres and has an imperviousness of 71%.

C5 = 0.62 C100 = 0.78

Q5 = 2.1 CFS Q100 = 4.8 CFS

Basin L2 (1.55 Acres)
Basin L2 includes roadway, sidewalks, and open space. Runoff from the basin generally sheet flows to the southeast flowline of Street J, where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2. Emergency overflow is conveyed overland in the direction of the proposed pond or adjacent downstream swale. The basin is approximately 1.55 acres and has an imperviousness of 62%.

C5 = 0.54 C100 = 0.74

Q5 = 3.3 CFS Q100 = 8.2 CFS

Basin L3 (1.06 Acres)
Basin L3 includes roadway, sidewalk, and open space. Runoff from the basin generally sheet flows to the east flowline of Street H where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 3. The flow is then conveyed via storm sewer to Pond L. In case of inlet clogging, emergency flows will overtop the sidewalk to the east and overland flow to Pond L. The basin is approximately 1.06 acres and has an imperviousness of 54%.

C5 = 0.48 C100 = 0.71

Q5 = 2.2 CFS Q100 = 5.9 CFS

Basin L4 (1.43 Acres)
Basin L4 includes single family lots, roadway, and sidewalk. Runoff from the basin generally sheet flows to the western flowline of Street H where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 4. The flow is then conveyed via storm sewer to Pond L. In case of inlet clogging, emergency flows will overtop the centerline of the road to basin L3, ultimately overtopping the sidewalk to the east and overland flowing to Pond L. The basin is approximately 1.43 acres and has an imperviousness of 45%.

C5 = 0.40 C100 = 0.67

Q5 = 2.3 CFS Q100 = 6.8 CFS

Basin L5 (3.42 Acres)
Basin L5 consists of undeveloped land and open space under the interim Filing 1 condition. Per the approved Pine Canyon PDP, this area is planned for future single family residential development at 3.5 DU/AC. Therefore, Basin L5 has been analyzed based on the future condition to ensure that the associated drainage infrastructure is sized for the anticipated future runoff. Runoff from Basin L5 generally sheet flows to the northeast, where it is collected

by a Type D area inlet located in a sump condition at Design Point 5. The flow is then conveyed via storm sewer to Pond L. In the event of inlet clogging, emergency flows will overtop the sidewalk to the east and follow the overland flow path through Basins L4 and L3 to Pond L. The basin is approximately 3.42 acres and has an imperviousness of 55%.

C5 = 0.49 C100 = 0.71

Q5 = 6.1 CFS Q100 = 16.1 CFS

Basin L6 (0.58 Acres)
Basin L6 includes roadway, walks, and open space. Runoff from the basin generally sheet flows to the southwestern flowline of Street H where it is collected in an on-grade Type 16 Combination Inlet at Design Point 6. The flow is then conveyed via storm sewer to Pond L. The basin is approximately 0.58 acres and has an imperviousness of 54%.

C5 = 0.48 C100 = 0.71

Q5 = 1.2 CFS Q100 = 3.2 CFS

Basin L7 (0.86 Acres)
Basin L7 includes single family lots, roadway, walks and open space. Runoff from the basin generally sheet flows to the southeastern flowline of Street H where it is collected in an on-grade Type 16 Combination Inlet at Design Point 7. The flow is then conveyed via storm sewer to Pond L. The basin is approximately 0.86 acres and has an imperviousness of 52%.

C5 = 0.46 C100 = 0.70

Q5 = 1.5 CFS Q100 = 4.0 CFS

Basin L8 (1.79 Acres)
Basin L8 includes single-family lots, roadway, sidewalk, and open space. Runoff from the basin generally sheet flows to the west flowline of Street G, where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 8. The flow is then conveyed via storm sewer to Pond L. In the event of inlet clogging, emergency flows will overtop Street G to the north and follow the Basin L3 overland flow path to Pond L. The basin is approximately 1.79 acres and has an imperviousness of 56%.

C5 = 0.49 C100 = 0.71

Q5 = 3.2 CFS Q100 = 8.4 CFS

Basin L9 (0.26 Acres)
Basin L9 includes single-family lots, roadway, sidewalk, and open space. Runoff from the basin generally sheet flows to the east flowline of Street G, where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 9. The flow is then conveyed

via storm sewer to Pond L. In the event of inlet clogging, emergency flows will overtop Street G to the north and follow the Basin L3 overland flow path to Pond L. The basin is approximately 0.26 acres and has an imperviousness of 71%.

C5 = 0.62 C100 = 0.78

Q5 = 0.8 CFS Q100 = 1.7 CFS

Basin L10 (0.68 Acres)
Basin L10 includes single-family lots, roadway, and open space. Runoff generally sheet flows to the southern flowline of Street C where it is collected in an on-grade Type 16 Combination Inlet at Design Point 10. The flow is then conveyed via storm sewer to Pond L. The basin is approximately 0.68 acres and has an imperviousness of 65%.

C5 = 0.57 C100 = 0.75

Q5 = 1.8 CFS Q100 = 4.2 CFS

Basin L11 (1.28 Acres)
Basin L11 includes single-family lots, roadway and open space. Runoff generally sheet flows to the northeastern cul-de-sac in Street C where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 11. The flow is then conveyed via storm sewer to Pond L. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the east and enter Basin L12, where it will be conveyed to Pond L. The basin is approximately 1.28 acres and has an imperviousness of 65%.

C5 = 0.57 C100 = 0.75

Q5 = 3.1 CFS Q100 = 7.4 CFS

Basin L12 (7.84 Acres)
Basin L12 includes open space, gravel road, and undeveloped land. Runoff generally sheet flows to the northeast and is routed to Pond L. The basin is approximately 7.84 acres and has an imperviousness of 21%.

C5 = 0.21 C100 = 0.57

Q5 = 4.7 CFS Q100 = 23.7 CFS

Pond M1 Sub Basins:
Basin M1.1 (1.08 Acres)
Basin M1.1 includes single family lots, roadway, and sidewalk. Runoff from the basin sheet flows to the northern flowline of Street F where it is collected in an on-grade Type 16 Combination Inlet at Design Point 1.1, where it will be conveyed to Pond M1. The basin is approximately 1.08 acres and has an imperviousness of 62%.

C5 = 0.54 C100 = 0.74

Q5 = 2.8 CFS Q100 = 6.9 CFS

Basin M1.2 (1.29 Acres)
Basin M1.2 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the southern flowline of Street F where it is collected in an on-grade Type 16 Combination Inlet at Design Point 1.2, where it will be conveyed to Pond M1. The basin is approximately 1.29 acres and has an imperviousness of 59%.

C5 = 0.52 C100 = 0.73

Q5 = 2.4 CFS Q100 = 6.0 CFS

Basin M1.3 (1.08 Acres)
Basin M1.3 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the southern flowline of Street F where it is collected in an on-grade Type 16 Combination Inlet at Design Point 1.3, where it will be conveyed to Pond M1. The basin is approximately 1.08 acres and has an imperviousness of 47%.

C5 = 0.42 C100 = 0.68

Q5 = 1.5 CFS Q100 = 4.5 CFS

Basin M1.4 (1.94 Acres)
Basin M1.4 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the east cul-de-sac in Street F where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 1.3. The flow is then conveyed via storm sewer to Pond M1. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the east and enter Basin M1.4, where it will be conveyed to Pond M1. The basin is approximately 1.94 acres and has an imperviousness of 59%.

C5 = 0.52 C100 = 0.73

Q5 = 3.6 CFS Q100 = 9.2 CFS

Basin M1.5 (2.46 Acres)
Basin M1.5 includes open space, gravel road, and undeveloped land. Runoff generally sheet flows to the east and is routed to Pond M1. The basin is approximately 2.46 acres and has an imperviousness of 23%.

C5 = 0.22 C100 = 0.58

Q5 = 1.8 CFS Q100 = 8.5 CFS

Pond M2 Sub Basins:

Basin M2.1 (0.31 Acres)

Basin M2.1 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the northern flowline of Street E where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.1 and conveyed to Pond M2 via storm sewer. The basin is approximately 0.31 acres and has an imperviousness of 81%.

C5 = 0.70 C100 = 0.82

Q5 = 1.0 CFS Q100 = 2.1 CFS

Basin M2.2 (0.52 Acres)

Basin M2.2 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the southern flowline of Street E where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.2 and conveyed to Pond M2 via storm sewer. The basin is approximately 0.52 acres and has an imperviousness of 60%.

C5 = 0.53 C100 = 0.73

Q5 = 1.1 CFS Q100 = 2.7 CFS

Basin M2.3 (1.87 Acres)

Basin M2.3 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the east cu-de-sac in Street E where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2.3. The flow is then conveyed via storm sewer to Pond M2. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the east and enter Basin M2.20, where it will be conveyed to Pond M2. The basin is approximately 1.87 acres and has an imperviousness of 59%.

C5 = 0.52 C100 = 0.73

Q5 = 3.7 CFS Q100 = 9.5 CFS

Basin M2.4 (0.15 Acres)

Basin M2.4 includes roadway and sidewalk. Runoff from the basin flows to the eastern flowline of Street C where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2.4 and conveyed to Pond M2 via storm sewer. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the east and be conveyed to Pond M2. The basin is approximately 0.15 acres and has an imperviousness of 95%.

C5 = 0.81 C100 = 0.87

Q5 = 0.6 CFS Q100 = 1.2 CFS

Basin M2.5 (4.48 Acres)

Basin M2.5 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin flows to the west flowline of Street C where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2.5 and conveyed to Pond M2 via storm sewer. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the east and be conveyed to Pond M2. The basin is approximately 4.48 acres and has an imperviousness of 53%.

C5 = 0.47 C100 = 0.70

Q5 = 6.8 CFS Q100 = 18.5 CFS

Basin M2.6 (2.39 Acres)

Basin M2.6 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin flows to the southeast cu-de-sac in Street D where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2.6. The flow is then conveyed via storm sewer to Pond M2. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the east and enter Basin M2.20, where it will be conveyed to Pond M2. The basin is approximately 2.39 acres and has an imperviousness of 62%.

C5 = 0.54 C100 = 0.74

Q5 = 5.0 CFS Q100 = 12.4 CFS

Basin M2.7 (0.86 Acres)

Basin M2.7 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the eastern flowline of Street C where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.7 and conveyed to Pond M2 via storm sewer. The basin is approximately 0.86 acres and has an imperviousness of 72%.

C5 = 0.62 C100 = 0.78

Q5 = 2.1 CFS Q100 = 4.8 CFS

Basin M2.8 (4.47 Acres)

Basin M2.8 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the western flowline of Street C where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.8 and conveyed to Pond M2 via storm sewer. The basin is approximately 4.47 acres and has an imperviousness of 49%.

C5 = 0.44 C100 = 0.69

Q5 = 7.2 CFS Q100 = 20.5 CFS

Basin M2.9 (3.69 Acres)

Basin M2.9 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the northwestern flowline of Street B where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.9 and conveyed to Pond M2 via storm sewer. The basin is approximately 3.69 acres and has an imperviousness of 53%.

C5 = 0.47 C100 = 0.70

Q5 = 6.0 CFS Q100 = 16.5 CFS

Basin M2.10 (0.74 Acres)

Basin M2.10 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin sheet flows to the northeastern flowline of Street B where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.10 and conveyed to Pond M2 via storm sewer. The basin is approximately 0.74 acres and has an imperviousness of 68%.

C5 = 0.60 C100 = 0.76

Q5 = 2.0 CFS Q100 = 4.5 CFS

Basin M2.11 (2.50 Acres)

Basin M2.11 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin flows to the north cu-de-sac in Street B where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2.11. The flow is then conveyed via storm sewer to Pond M2. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the north and enter Basin M2.20, where it will be conveyed to Pond M2. The basin is approximately 2.50 acres and has an imperviousness of 43%.

C5 = 0.39 C100 = 0.66

Q5 = 3.3 CFS Q100 = 10.2 CFS

Basin M2.12 (0.30 Acres)

Basin M2.12 includes roadway, sidewalk, and open space. Runoff from the basin flows to the north flowline of Street A where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2.12 and conveyed to Pond M2 via storm sewer. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the north and be conveyed to Pond M2. The basin is approximately 0.30 acres and has an imperviousness of 88%.

C5 = 0.75 C100 = 0.84

Q5 = 1.1 CFS Q100 = 2.2 CFS

Basin M2.13 (0.35 Acres)

Basin M2.13 includes roadway, sidewalk, and open space. Runoff from the basin flows to the south flowline of Street A where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2.13 and conveyed to Pond M2 via storm sewer. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the south and be conveyed to the adjacent swale and storm sewer at Design Point 2.19. The basin is approximately 0.35 acres and has an imperviousness of 86%.

C5 = 0.74 C100 = 0.84

Q5 = 1.3 CFS Q100 = 2.6 CFS

Basin M2.14 (0.53 Acres)

Basin M2.14 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin flows to the northwestern flowline of Street I where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.14 and conveyed to Pond M2 via storm sewer and swales. The basin is approximately 0.53 acres and has an imperviousness of 65%.

C5 = 0.57 C100 = 0.75
Q5 = 1.5 CFS Q100 = 3.5 CFS

Basin M2.15 (0.63 Acres)

Basin M2.15 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin flows to the southeastern flowline of Street I where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.15 and conveyed to Pond M2 via storm sewer and swales. The basin is approximately 0.63 acres and has an imperviousness of 68%.

C5 = 0.60 C100 = 0.76

Q5 = 1.5 CFS Q100 = 3.6 CFS

Basin M2.16 (1.50 Acres)

Basin M2.16 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin flows to the north cu-de-sac in Street I where it is collected in a Type 16 Combination Inlet located in a sump condition at Design Point 2.16. The flow is then conveyed via storm sewer to Pond M2. In case of inlet clogging, emergency flows will overtop the curb and sidewalk to the northeast and will be conveyed overland to Pond M2. The basin is approximately 1.50 acres and has an imperviousness of 56%.

C5 = 0.50 C100 = 0.72

Q5 = 2.9 CFS Q100 = 7.7 CFS

Basin M2.17 (1.16 Acres)

Basin M2.17 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin flows to the western flowline of Street B, where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.17 and conveyed to Pond M2 via storm sewer and swales. The basin is approximately 1.16 acres and has an imperviousness of 56%.

C5 = 0.49 C100 = 0.71

Q5 = 2.7 CFS Q100 = 7.2 CFS

Basin M2.18 (0.78 Acres)

Basin M2.18 includes single family lots, roadway, sidewalk, and open space. Runoff from the basin flows to the eastern flowline of Street B, where it is collected in an on-grade Type 16 Combination Inlet at Design Point 2.18 and conveyed to Pond M2 via storm sewer and swales. The basin is approximately 0.78 acres and has an imperviousness of 57%.

C5 = 0.51 C100 = 0.72

Q5 = 1.8 CFS Q100 = 4.6 CFS

Basin M2.19 (6.21 Acres)

Basin M2.19 includes open space, gravel road, and undeveloped land. Runoff generally sheet flows to the northeast and is routed to Pond M2 via storm sewer and swales at Design Point 2.19. The basin is approximately 6.21 acres and has an imperviousness of 24%.

C5 = 0.23 C100 = 0.58

Q5 = 4.0 CFS Q100 = 18.3 CFS

Basin M2.20 (5.93 Acres)

Basin M2.20 includes open space and a gravel road. Runoff generally sheet flows to the east and is routed to Pond M2. The basin is approximately 5.93 acres and has an imperviousness of 26%.

C5 = 0.25 C100 = 0.59

Q5 = 4.4 CFS Q100 = 19.0 CFS

Basin OF1 (2.05 Acres)

Basin OF1 includes the portion of Founders Parkway pavement that is tributary to the Site under existing conditions. Runoff is collected by Type R inlets within Founders Parkway and conveyed south through the existing storm sewer system, ultimately outfalling to Pond M2. The basin is approximately 2.05 acres and has an imperviousness of 95%.

C5 = 0.81 C100 = 0.87

Q5 = 6.4 CFS Q100 = 12.4 CFS

Basin OF2 (3.19 Acres)
Basin OF2 includes the portion of Founders Parkway pavement that is tributary to the Site under existing conditions. Runoff is collected by Type R inlets within Founders Parkway and conveyed north through the existing storm sewer system, ultimately outfalling to Pond M2. The basin is approximately 3.19 acres and has an imperviousness of 95%.

C5 = 0.81 C100 = 0.87

Q5 = 10.0 CFS Q100 = 19.4 CFS

Basin K1 (0.20 Acres)
Basin K1 includes the rear portions of single-family lots and adjacent open space. This basin is undetained under the Filing 1 condition and is tributary to future Pond K, which will be constructed with a subsequent Pine Canyon filing. Runoff from Basin K1 generally flows west to existing swales that ultimately drain to the East Plum Creek major drainage basin. The basin is approximately 0.20 acres and has an imperviousness of 55%.

C5 = 0.49 C100 = 0.71

Q5 = 0.4 CFS Q100 = 1.2 CFS

Drainage Design Criteria

Regulations, Drainage Studies, Development Criteria Reference and Constraints

This Phase II Drainage Report is in accordance with the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual dated February 2025, and the Mile High Flood District (MHFD) Storm Drainage Criteria Manual Volumes 1, 2, and 3. These manuals were used as a basis of design for the Site.

This Site is within the Cherry Creek Major Basin and is subject to the Department of Public Health and Environment Water Quality Control Commission Cherry Creek Reservoir Control Regulation 5 CCR 1002-72.

There are no existing drainage studies for the Site. A Phase I Drainage Report was completed for the overall Pine Canyon development (CORE, Sept 2025) which references the adjacent Castle Oaks Estates drainage information where downstream drainage patterns are affected by the proposed improvements.

The primary drainage constraint for the Site is maintaining the historic discharge pattern to Founders Parkway and the Castle Oaks Estates drainage system, while providing on-site water

quality and detention for the developed runoff. The proposed grading and storm sewer system have been designed to minimize drainage across residential lots, route runoff to the proposed drainage facilities, and preserve emergency overflow paths to the proposed detention basins and downstream outfalls.

Hydrological Criteria

The hydrologic design was computed using the Rational Method as defined by the Mile High Flood District. The 5-year storm was used as the minor storm event, while the 100-year storm was used as the major event. The one-hour point rainfall depth used for the 5-year storm was 1.43 inches and 2.6 inches for the 100-year event. The Rational Method was used to analyze the proposed condition, and calculations can be found in Appendix B and D. Impervious values are based on Tables 6-2 and 6-3 of Chapter 6 of the MHFD Criteria Manual Volume 1.

Hydraulic Criteria

Preliminary street and inlet capacity calculations were completed using MHFD Inlet spreadsheet, Version 6.00. These calculations are included under Appendix C.

Channel Hydraulics are evaluated using the Hydraflow Express Extension for Autodesk Civil 3D. This method utilizes Manning's equation to compute flow rates at varying depths of flow.

$$Q = \frac{1.49}{n} A R^{2/3} \sqrt{S}$$

Where:

Q = Flow rate in cfs
n = Roughness coefficient
A = Cross-sectional area in sqft
R = Hydraulic radius
S = Channel slope in ft/ft

Water Quality Enhancement

The three extended detention basins for the Site provide water quality enhancement as well as volume control. The proposed detention ponds are designed as an extended detention basin which incorporates structures that release flows for the water quality capture volume (WQCV), excess urban runoff volume (EURV), and the 100-year storm event. The ponds have been sized for the 100-year detention volume and the WQCV for the developed flows of the Site. The design information for the proposed detention ponds and these structures can be found in Appendix C.

Water Quality Exclusions

Some of the proposed land disturbances are not treated by the proposed extended detention basin due to grading constraints. These areas include disturbances to undeveloped land that will remain undeveloped, and trail construction, all of which are

automatic exclusions as allowed by the Town's MS4 requirements and Cherry Creek Regulation No. 72.

There is approximately 5.13 acres of land that will be disturbed but remain undeveloped and runoff from said areas will leave the site untreated. These areas comprise fill conditions that runoff the site and are not able to be captured and directed to the proposed detention pond. Excluded disturbed areas will be permanently stabilized and revegetated in accordance with the approved grading, erosion control, and landscape restoration plans.

Refer to Appendix A for the completed Water Quality Conformance Form and supporting exhibit showing the excluded areas for the entire development. Additionally, see the Variances section of this report for the basis and total requested exclusion area

Stormwater Management and Facility Design

Stormwater Conveyance Facilities

Stormwater conveyance for the Site will rely on runoff sheet flowing to the curb and gutter and will be collected into stormwater inlets at necessary intervals. Swales will also be used to collect runoff generated from the Site improvements. The storm sewer will then convey the runoff to the on-site detention ponds. The detention ponds will release into the existing channels within the Founders Parkway storm sewer system and the downstream Castle Oaks Estates drainage facilities. Outfalls and spillways will include stabilization and energy dissipation measures as required to protect downstream channels, roadside ditches, and public infrastructure.

Stormwater Storage Facilities

Stormwater storage for the Site is provided by three Extended Detention Basins (EDBs). Pond L, Pond M1, and Pond M2 are proposed and designed to provide water quality treatment, EURV storage, and 100-year detention. Castle Rock regulations require that the stored 100-year volume is equal to the calculated 100-year volume plus half the WQCV. The ponds also include forebays to encourage settling of sediment and concrete trickle channels to aid in maintenance. Calculations for the sizing of all three ponds are included in Appendix C. The approved Castle Oaks Estates Drainage Report was used to determine the capacity of downstream conveyance to the Castle Oaks development. Please see Appendix C & D for calculations and reference documents.

Total Detention Basin Summary

	Design Point	Storage Volume (acre-ft)	100-yr Release Rate (cfs)
Pond L	12	1.918	24.4
Pond M1	1.5	0.666	14.1
Pond M2	2.20	4.117	79.0

For the emergency overflow condition, each pond has been designed to include a separate modified type D inlet structure to provide redundant emergency conveyance in the event the primary outlet structure becomes clogged. These inlets are placed downstream of the pond outlet structure and set at the 100-Yr HWL elevation so that the emergency overflow condition can be contained within the downstream storm sewer outfall pipe rather than discharging emergency discharge towards Founders Parkway. The emergency inlet and downstream conveyance system has been evaluated for the developed 100-yr peak inflow for each individual pond. Please refer to Appendix C for the associated emergency overflow capacity calculations.

Water Quality Enhancement Best Management Practices

As part of the water quality enhancement design, the Four Step Process for Stormwater Quality Design as defined in Section 14.1 of the Town of Castle Rock Storm Drainage Criteria Manual has been utilized for this Site. Step 1 of the process highlights the utilization of grass buffers and swales to reduce directly connected impervious areas (DCIA). As proposed with this application, swales are provided with flatter side slopes (5:1) as recommended by MHFD. This reduces the depth of flow and encourages infiltration. Step 2 is to provide water quality capture volume and flood control via full-spectrum detention. Water quality and detention measures are accounted for in the proposed detention ponds. The proposed detention ponds are designed to incorporate structures that release flows for the water quality capture volume (WQCV), excess urban runoff volume (EURV), and the 100-year storm event. The total pond volumes are design to the 100-year plus one half the WQCV volumes, as required by the Town. The record information and design information of these structures can be found in Appendix C. Step 3 is to utilize stream stabilization techniques. No stream impacts are anticipated with the Site improvements. All on-site swales will be stabilized with proper lining to decrease the chance of erosion. Step 4 is to undertake source control if the Site has potential for chemical, oil, fertilizer, or other pollutants to discharge into the stormwater system. Potential pollutant sources common in residential developments are fertilizers and other landscape chemicals, as well as pet waste. Source controls that can mitigate these pollutants are proper landscape management of fertilizer application and handling, and pet waste stations.

Floodplain Modification

No FEMA floodplain modification is proposed with Pine Canyon Filing 1. The proposed drainage improvements are located outside mapped Special Flood Hazard Areas, and the project does not propose a CLOMR or LOMR. If subsequent design modifications create impacts to jurisdictional floodplains, appropriate floodplain permitting will be completed prior to construction. Floodplain maps can be found in Appendix A.

Geotechnical Investigation and Sub-surface Collection System Design

A Geologic and Preliminary Geotechnical Investigation for the Site was completed by CTL Thompson dated August 19, 2021. Conclusions summarized within the report include the presence of expansive soils and shallow bedrock. Groundwater was encountered at a depth below 20 ft. No groundwater mitigation is anticipated unless deep excavation is required.

Based on Sections 3.1.5 and 3.3.3 of the Town of Castle Rock criteria, underdrains will be implemented at the back of sidewalk within the public right-of-way where lot to lot drainage occurs. Underdrain locations, typical installation details, discharge points, and coordination with adjacent storm drainage infrastructure are shown on the construction plans.

Operations and Maintenance

The Pine Canyon Metropolitan District will be responsible for the operation and maintenance of the water quality enhancement control measures and stormwater management facilities.

The Town of Castle Rock or designee shall be responsible for the maintenance of all drainage facilities including inlets, pipes, culverts, channels, ditches, hydraulic structures, and detention basins located in public right-of-way.

It is recommended all stormwater management facilities shall be inspected by a qualified individual at a minimum of one time per year. Inspections should follow the inspection guidance found in the SOPs located in Appendix A of the Stormwater Management Facility Operation and Maintenance General Guidelines by the Castle Rock Stormwater Division.

Stormwater Management Facility Maintenance Programs are separated into three broad categories of work. The categories are separated based upon the magnitude and type of the maintenance activities performed. A description of each category follows:

1. Routine Work
   The majority of this work consists of regularly scheduled mowing, trash and debris pickups, removal of debris/material that may be clogging the outlet structure well screens and trash racks, weed control, mosquito treatment and algae treatment. These activities normally will be performed numerous times during the year.
2. Minor Work
   This work consists of a variety of isolated or small-scale maintenance/operational problems. Most of this work can be completed by a small crew, hand tools, and small equipment. These items require notification to Castle Rock Water at least 7 days prior to the start of work.
3. Major Work
   This work consists of larger maintenance/operational problems and failures within the stormwater management facilities. All of this work requires notification to Castle Rock at least 14 days prior to the start of work. Some of this work requires engineering staff review and may also require more specialized maintenance equipment, design/details, surveying, or assistance through private contractors and consultants.

Additional Permitting Requirements

No additional permits are anticipated with the proposed development.

Conclusion

Compliance with the Town of Castle Rock Code

The drainage design for Pine Canyon Filing 1 conforms to the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual, with supplemental information developed from the Mile High Flood District Storm Drainage Criteria Manuals. This analysis demonstrates that the proposed facilities are developed in compliance with the appropriate criteria and constraints for the relevant development needs for the project.

Variances

A variance is requested for Water Quality Exclusion per Section 13.1.5 of the Storm Drainage Design and Technical Criteria Manual. As discussed above there are portions of the site that are not feasible to be collected and conveyed to the on-site detention pond. These areas include disturbed areas that are to remain undeveloped and areas for trail construction. All these activities qualify for Water Quality Exclusion, as detailed in the Water Quality Exclusion Forms included in Appendix A of this report. The total area requested for exclusion is 5.13 acres, including 0.72 acres for undeveloped land, 4.02 acres for utilities, 0.17 acres for single family residential lot, and 0.22 acres for trail construction.

Drainage Concept

The increased stormwater runoff produced as a result of the proposed improvements will be captured in a storm sewer system and conveyed to three on-site detention ponds for treatment. The ponds will provide volume control as well as water quality treatment and will be released at or below historic peak flow rates toward the existing Founders Parkway drainage system. The drainage design maintains the Site's historic eastern drainage pattern, provides water quality treatment for developed runoff, and limits downstream impacts to Castle Oaks Estates and the McMurdo Gulch/Cherry Creek drainage system. The proposed stormwater facilities are designed for the minor (5-year) and major (100-year) storm events.

References

REFERENCES

1. Town of Castle Rock, Storm Drainage Design and Technical Criteria Manual, February 18, 2025.

2. Mile High Flood District, Denver, Colorado, Urban Storm Drainage Criteria Manual, Volume 1-3, latest online addition.

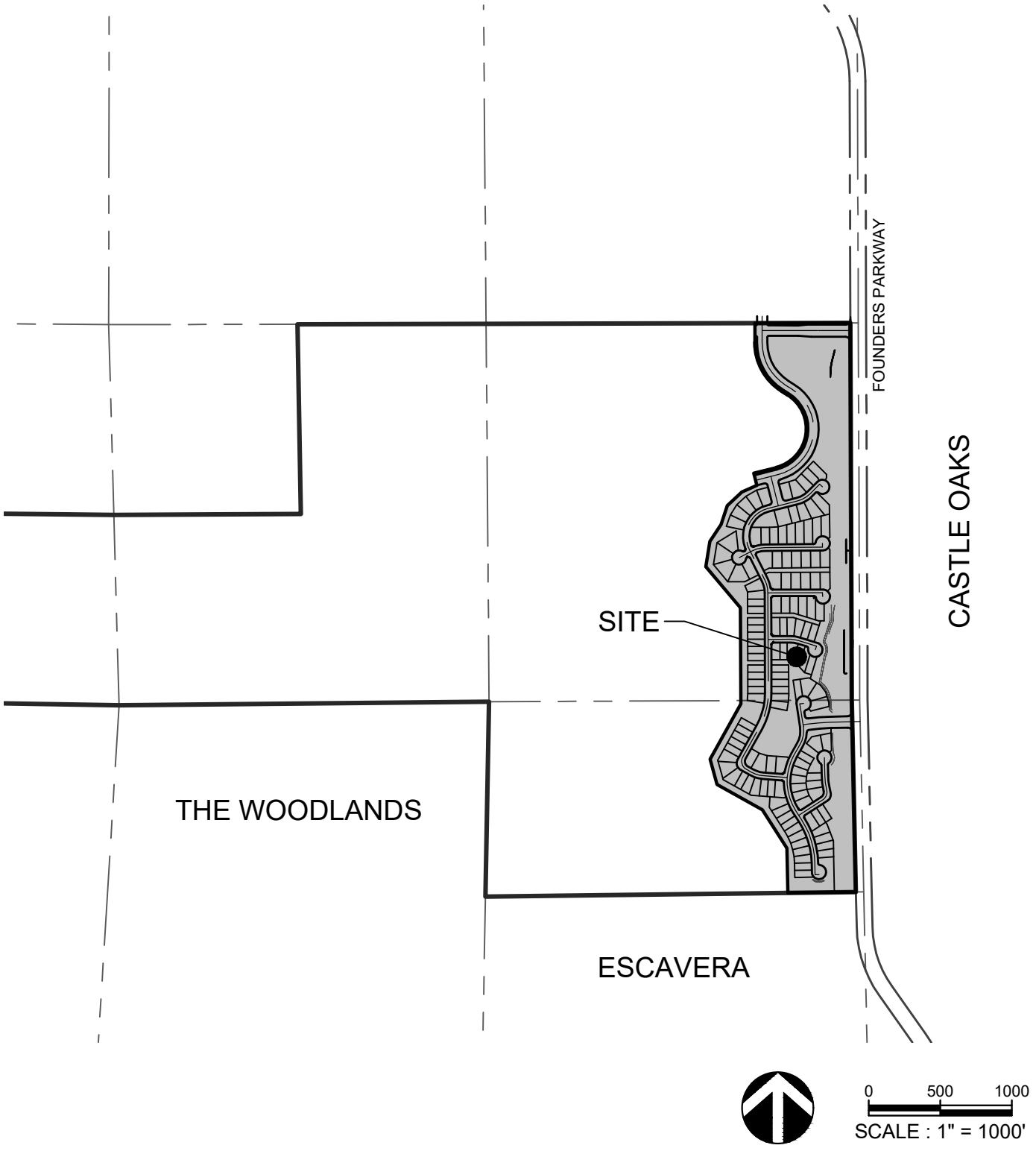
3. Phase I Drainage Report for Pine Canyon, Castle Rock, Colorado, CORE Consultants dated. April 2025 / September 2025

4. Phase III Drainage Report for Castle Oaks Estates Filing 1, Nolte & Associates dated. September 2003 / June 2006

5. Stormwater Management Facility Operation and Maintenance (O&M) General Guidelines, Castle Rock Water, Stormwater Division dated December 12, 2012.

6. Department of Public Health and Environment Water Quality Control Commission Cherry Creek Reservoir Control Regulation 5 CCR 1002-72.

Appendix A - Vicinity Map, FIRM Map, Soils Map



VICINITY MAP

PINE CANYON FILING 1

CASTLE ROCK, COLORADO

Redland
WHERE GREAT PLACES BEGIN
720.283.6783
REDLAND.COM
▪ Land Planning ▪ Landscape Architecture
▪ Civil Engineering ▪ Construction Management

PROJECT NO: 250100

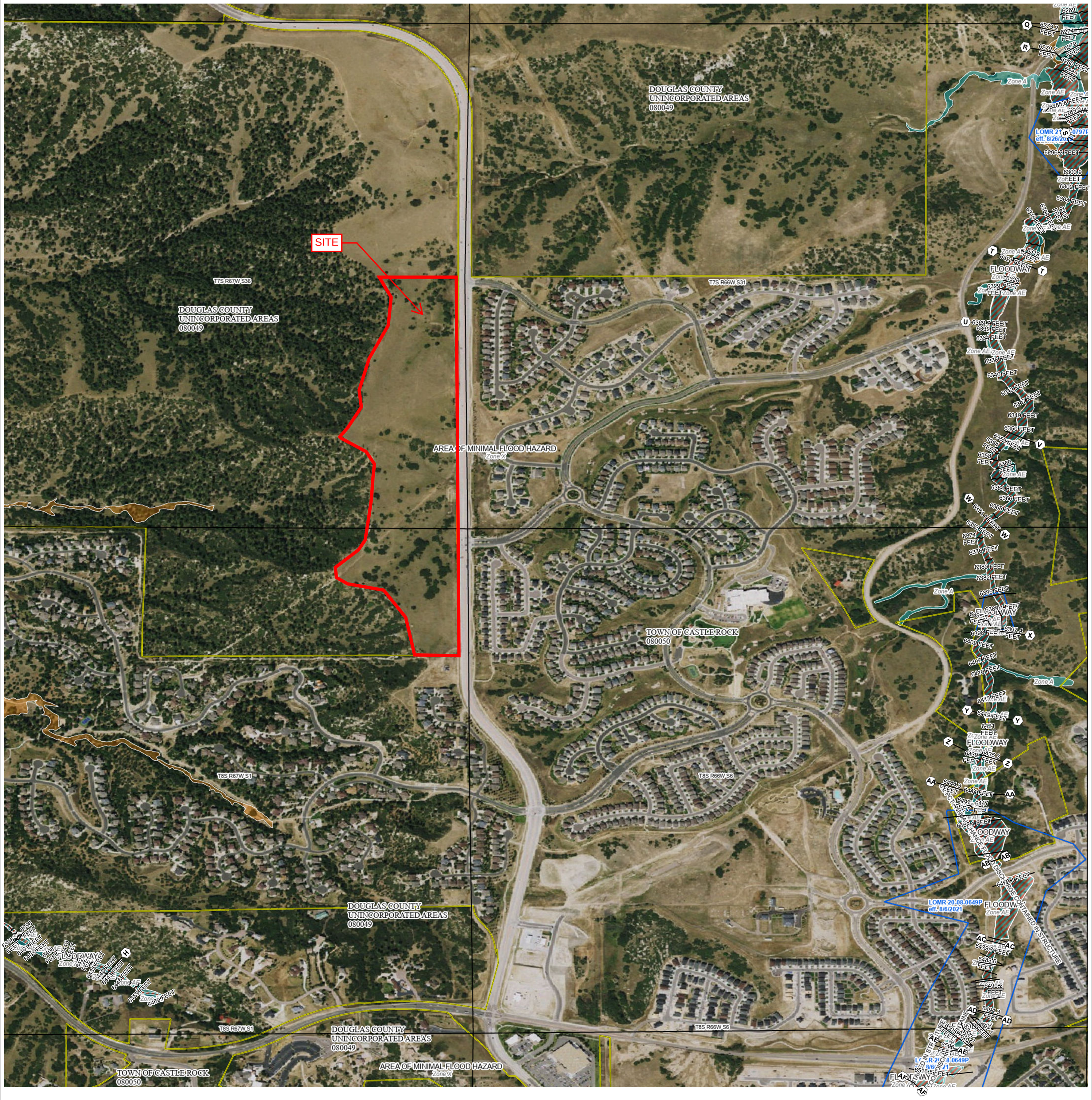
DATE: 05/08/2026

DRAWING NO:

VIC

C:\Program Files\Autodesk\AutoCAD 2024\Drawing2.dwg tab: Layout1 May 01, 2026 - 9:28am gandenson

104°50'37.96"W 39°24'29.11"N



104°48'44.61"W 39°22'23.43"N

FLOOD HAZARD INFORMATION

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

SPECIAL FLOOD HAZARD AREAS

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

OTHER AREAS OF FLOOD HAZARD

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

OTHER AREAS

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

GENERAL STRUCTURES

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

OTHER FEATURES

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

NOTES TO USERS

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

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

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

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Basemap information shown on this FIRM was provided in digital format by USDA, Farm Service Agency (FSA). This information was derived from NAIP, dated April 11, 2018.

This map was exported from FEMA's National Flood Hazard Layer (NFHL) on **4/28/2026 7:16 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time. For additional information, please see the Flood Hazard Mapping Updates Overview Fact Sheet at https://www.fema.gov/media-library/assets/documents/118418

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards. This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date.

SCALE

Map Projection:
GCS, Geodetic Reference System 1980;
Vertical Datum: NAVD88

For information about the specific vertical datum for elevation features, datum conversions, or vertical monuments used to create this map, please see the Flood Insurance Study (FIS) Report for your community at https://msc.fema.gov

N

1 inch = 500 feet 1:6,000

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

0 50 100 200 300 400 Meters

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

PANEL **189** OF **461**

Panel Contains:

COMMUNITY	NUMBER	PANEL
DOUGLAS COUNTY	080049	0189
TOWN OF CASTLE ROCK	080050	0189

MAP NUMBER
08035C0189G
EFFECTIVE DATE
March 16, 2016

Hydrologic Soil Group—Castle Rock Area, Colorado



Map Scale: 1:7,560 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 350 700 1400 2100

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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
FoD	Fondis clay loam, 3 to 9 percent slopes	C	17.6	7.0%
Fu	Fondis-Kutch association	C	46.3	18.4%
KtE	Kutch sandy loam, 5 to 20 percent slopes	D	7.5	3.0%
KwF	Kutch-Newlin-Stapleton complex, 8 to 40 percent slopes	D	156.2	62.3%
SsE	Stapleton loamy sand, 6 to 30 percent slopes	A	23.3	9.3%
Totals for Area of Interest			**251.0**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Permanent Water Quality Determination Worksheet (Taken from 2019 SDDTCM Sections 13.1.4 and 13.1.5)

Project: **Project #:** **Applicant:**

1	Non-applicable Sites		
Section	**Question**	**Response**	**Instructions**
1.1	Will the project result in a temporary disturbance of greater than one acre?	No	Proceed to section 1.2.
.		Yes	Proceed to section 2.
1.2	Is the project part of a larger common plan of development or sale where multiple separate and distinct construction activities may be taking place at different times on different schedules, but remain related and are within 1/4 mile of each other? (A common plan of development will generally be documented on a site development plan, master plan, or equivalent, for the property/project)	No	Proceed to section 1.3.
.		Yes	Proceed to section 2.
1.3	Is the project within the Cherry Creek Watershed?	Yes	Permanent water quality control measures may be required. Refer to Water Qualtiy Control Regulation 72.7 for details and allowable exclusions.
.		No	Permanent water quality control measures are not required.
2	**Applicable Site Types and Exclusions by Variance**		
Section	**Question**	**Response**	**Instructions**
2.1	Does the project have more than 35% impervious area on the existing site?	No	Project is an applicable Development Site. Proceed to section 3.
.		Yes	Proceed to 2.2.
2.2	Does the project have greater than 75% impervious area on the existing site?	No	Project is an applicable Redevelopment Site. Proceed to section 3.
.		Yes	Project is an applicable Constrainted Redevelopment Site. Proceed to 2.3.
2.3	Will 100% of the runoff from the existing and proposed site be captured and treated using one or more of the allowable design standards for permanent water quality?	Yes	No further action required.
.		No	Proceed to 2.4.
2.4	Do any other water quality exclusions apply to the site?	No	Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for **variance** for Constrained Redevelopment Sites.
.		Yes	Proceed to section 3. Following approval of other exclusions, design remaining site in accordance with Constrained Redevelopment standards and apply for **variance** for Constrained Redevelopment Sites.

3	**Applicable Sites with Other Exclusions by Variance**		
3.1	**Category 1: Roadways, bridges and trails only**		
3.1.1	Is the project a bike or pedestrian trail?	Yes	Proceed to next line.
		No	Proceed to 3.1.2.
	Is the trail for a roadway?	Yes	Proceed to 3.1.2.
.		No	Project is excluded. Submit **variance** for Trails Excluded from Permanent Water Quality Requirements.
3.1.2	Is the project primarily used for parking or access to parking?	Yes	This exclusion does not apply. Permanent water quality is required.
.		No	Proceed to 3.1.3.
3.1.3	Does the project add impervious area?	No	Project is excluded. Submit **variance** for Pavement Management Sites Excluded from Permanent Water Quality Requirements.
.		Yes	Proceed to 3.1.4.
3.1.4	Does the project add more than 8.25 feet of paved width at any location to the existing roadway?	No	Project is excluded. Submit **variance** for Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements.
.		Yes	Proceed to next line.
.	Does the project add more than one acre of paved area per mile to an existing roadway?	No	Project is excluded. Submit **variance** for Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements.
.		Yes	Proceed to next line.
.	Does the project increase the width by two times or more, on average, of the original roadway area?	No	Existing areas of site are excluded only. Submit **variance** for Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements.
.		Yes	This exclusion does not apply. Permanent water quality is required.
3.2	**Category 2: Non-residential and non-commercial projects only**		
3.2.1	Is the project associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities, including activities necessary to prepare a site for drilling and the movement and placement of drilling equipment?	Yes	Project is excluded. Submit **variance** for Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements.
.		No	Proceed to 3.2.2.
3.2.2	Is the project for stream stabilization?	Yes	Project is excluded. Submit **variance** for Stream Stabilization Sites Excluded from Permanent Water Quality Requirements.
		No	Proceed to 3.2.3.
3.2.3	Is the project for installation or maintenance of aboveground or underground utilities or infrastructure that does not permanently alter the terrain, ground cover, or drainage patterns from those present prior to the construction activity including activities to install, replace or maintain utilities under roadways or other paved areas that return the surface to the same condition?	Yes	Project is excluded. Submit **variance** for Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements.
.		No	Proceed to 3.2.4.
3.2.4	Is the project on undeveloped land (land with no human-made structures such as buildings or pavement) that will remain undeveloped after the project?	Yes	Project is excluded. Submit **variance** for Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements.
.		No	Proceed to 3.2.5.
3.2.5	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No	Project is excluded. Submit **study** along with **variance** for Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements.
.		Yes	This exclusion does not apply. Permanent water quality is required.

Section	Question	Response	Instructions
3.3	**Category 3: Residential, Agricultural and Commercial projects**		
3.3.1	Is the project a single-family residential lot, or agricultural zoned lands, greater than or equal to 2.5 acres in size per dwelling unit?	Yes	Proceed to next line.
.		No	Proceed to 3.3.2.
.	Is the project site greater than 10% impervious?	No	Project is excluded. Submit **variance** for Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements.
.		Yes	Proceed to next line.
.	Is the project site greater than 20% impervious?	Yes	This exclusion does not apply. Permanent water quality is required.
.		No	Proceed to next line.
.	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No	Project is excluded. Submit **study** along with **variance** for Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements.
.		Yes	This exclusion does not apply. Permanent water quality is required.
3.3.2	Will 100% of the runoff from the residential or commercial site be captured?	Yes	This exclusion does not apply. Permanent water quality is required.
.		No	Proceed to next line.
.	Is all or a portion of the site undeveloped or will it remain undeveloped after construction?	Yes	This portion of the project is excluded. Submit **variance** for Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements. Proceed to next line.
.		No	Proceed to next line.
.	Is the remaining untreated impervious area greater than 20% of the site?	Yes	This exclusion does not apply. Permanent water quality is required.
.		No	Proceed to next line.
.	Is the remaining untreated impervious area greater than one acre?	Yes	This exclusion does not apply. Permanent water quality is required.
.		No	Proceed to next line.
.	Is it practicable to capture runoff from portions of the site that will not drain to a control measure?	No	Document justification demonstrating that it is not practicable to capture runoff from this portion of the site in the **drainage report**. No further action is needed.
.		Yes	TA36:D72his exclusion does not apply. Permanent water quality is required.

Summary of Water Quality Conformance to MS4 Permit

The purpose of this worksheet is to document conformance with the Town of Castle Rock's MS4 permit with regard to permanent water quality on land disturbance projects.

Project Name Pine Canyon Filing 1

Project Owner JRW FAMILY LIMITED

Project Location 39°23'40.22"N, 104°49'52.74"W

ToCR Project Number SDP26-XXXX

Total Site Area 63.945 **acres**

Total Size of Common Plan of Development 568.6 **acres**

Check all that apply:

- ☐ **Project within Plum Creek Basin**
- ☑ **Project within Cherry Creek Basin**

Estimated construction completion date September 2028

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1. The water quality control measure(s) for applicable development sites shall meet one of the following base design standards as per the SDDTCM Section 14.4. Please select all design standards that were applied to meet conformance with the MS4 on this site.

   - ☑ WQCV standard
   - ☐ Pollutant removal standard
   - ☐ Runoff reduction standard
   - ☐ Applicable site draining to regional WQVC control measure (accepts drainage prior to discharging to WOTS)
   - ☐ Applicable site draining to regional WQVC control facility (with receiving pervious area control measure upstream of WOTS)
   - ☐ Constrained redevelopment sites standard
     - Imperviousness of existing site _____/_____(Imp. Ac/Site Ac) =____%
     - Variance required TCV No. _____
   - ☐ Existing control measure with WQCV per previous criteria standards
     - Reference Construction Permit No. _____
   - ☑ Cherry Creek Basin only, choose one: ☐ Tier 1 ☐ Tier 2 ☑ Tier 3
   - ☐ No control measures provided (See Permanent WQ Worksheet for applicability)

Summary of Water Quality Conformance to MS4 Permit

2. Was an exclusion to water quality applied as per SDDTCM Section 13.1.5? ☑ Yes ☐ No

   i. If yes, please select all that apply, provide total excluded impervious area(s) and submit variance, as applicable: TCV No. _____

   - ☐ Pavement management site
     Excluded impervious area: _____ acres
   - ☐ Excluded roadway redevelopment
     Excluded impervious area: _____ acres
   - ☐ Excluded existing roadway areas
     Excluded impervious area: _____ acres
   - ☑ Above ground and below ground utilities
   - ☑ Large lot single family home
   - ☐ Non-residential and non-commercial infiltration
     Excluded impervious area: _____ acres
   - ☑ Land disturbance for land to remain undeveloped
     Excluded impervious area: 0.72 acres
   - ☐ Stream Stabilization Sites
     Excluded impervious area: _____ acres
   - ☑ Trails
     Excluded impervious area: 0.22 acres
   - ☐ Oil and Gas Exploration

3. For Development and Redevelopment sites, following any exclusions claimed above, was any portion of the site excluded up to 20% of the site and not to exceed one acre? ☑ Yes ☐ No

   If yes, complete the following:

   Excluded area: 0.20 acres

   Total Site area: 63.945 acres, 0.3 % site excluded

4. For Constrained sites, was any portion of the site excluded up to 50% of the site and not to exceed 50% of the impervious area? ☐ Yes ☐ No

   If yes, complete the following:

   Excluded area: _____ acres

   Excluded impervious area: _____ acres

   Total Site area: _____ acres, _____ % site excluded

   Total Impervious area: _____ acres, _____ % impervious excluded

Development Services
100 N. Wilcox Street
Castle Rock, CO 80104
720-733-2200 FAX 720-733-2231

NO.
Project NO.
WQE NO.

DATE 05/08/202

WATER QUALITY EXCLUSION APPLICATION

DEVELOPMENT DESCRIPTION:

133 single family residential lots with associated streets, parks, and trails.

LEGAL DESCRIPTION OF SUBJECT PROPERTY:

Legal description too long for this area, please see cover of SDP

IS THE PROJECT WITHIN THE PLUM CREEK BASIN? ☐ YES ☑ NO

IS THE PROJECT WITHIN THE CHERRY CREEK BASIN? ☑ YES ☐ NO

☐ Tier 2 Development/Redevelopment ☑ Tier 3 Development/Redevelopment

AREA OF PROJECT RECIEVING THE EXCLUSION? 5.13 acres

IS THE PROJECT A CONSTRAINED SITE REQUIRING A WQ EXCLUSION? ☐ YES ☑ NO

VARIANCE REQUESTED (SELECT ONE):

*Applicable exclusions for projects **outside** of the Cherry Creek Basin*

- ☐ Trails Exclusion
- ☐ Management Sites Exclusion
- ☐ Roadway Redevelopment Sites Exclusion
- ☐ Existing Roadway Areas Exclusion
- ☐ Stream Stabilization Sites Exclusion
- ☐ Aboveground and Underground Utilities Exclusion
- ☐ Large Lot Single Family Sites Exclusion
- ☐ Oil and Gas Exploration Sites Exclusion
- ☐ Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Exclusion
- ☐ Non-residential and Non-commercial Infiltration Conditions Exclusion
- ☐ Constrained Site Exclusion

*Applicable exclusions for projects **within** the Cherry Creek Basin*

- ☐ Agricultural Activities Exclusion
- ☐ Routine Maintenance Sites Exclusion
- ☐ Excluded Roadway Project Exclusion
- ☐ Sidewalks and Driveways Exclusion
- ☑ Underground Utilities Exclusion
- ☐ Emergency Operations Sites Exclusion
- ☐ Large Lot Single Family Development using Runoff Reduction Exclusion
- ☐ Rural Roadway Construction and Maintenance Exclusion
- ☐ Residential or Commercial Subdivisions with Existing Adequate Post Construction BMPs Exclusion
- ☑ Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Exclusion
- ☑ Trails Construction Exclusion

PROPERTY OWNER

Name: JRW Family Limited Partnership, LLLP

Address: 5975 East Jamison Pl.
Centennial, CO 80112

Phone #: 303.589.0102

Fax #:

APPLICANT'S REPRESENTATIVE (if applicable)

Name: Evan Rumney, P.E.

Address: 1500 W. Canal Ct.
Littleton, CO 80120

Phone #: 720-283-6783 ext.135

Fax #:

Signature of Applicant

For Staff Use Only

Staff Recommendation: Approved ☐ YES ☐ NO

Signature
Director of Castle Rock Water

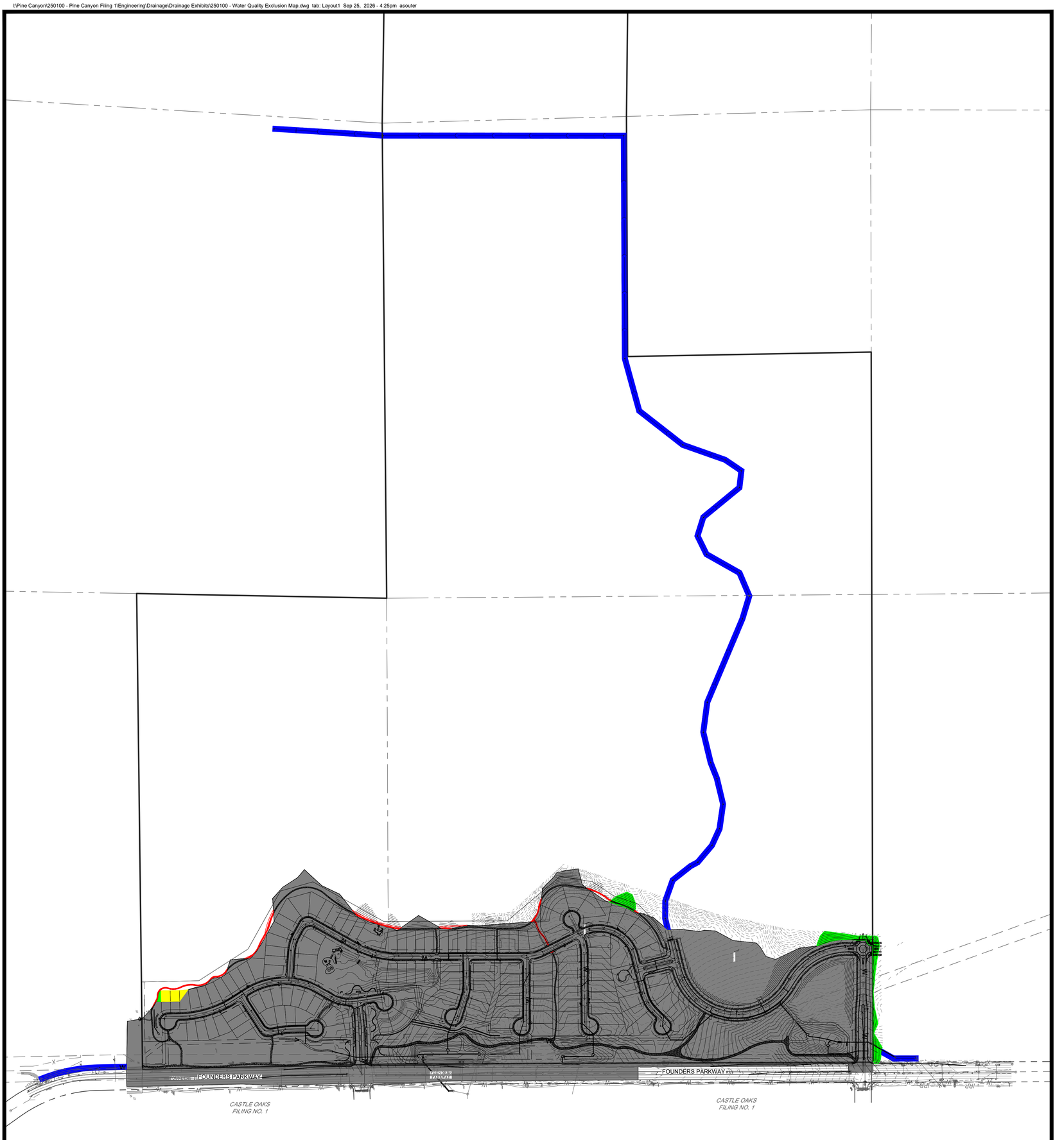
Date

Comments

Attachments:

☐ Water Quality Conformance Form
☑ Drainage Maps

Conditions of Acceptance



LEGEND

SITE AREA INCLUDED IN DETENTION/WQ CALCULATIONS

EXCLUDED AREA: UNDEVELOPED = 0.72 AC

EXCLUDED AREA: UNDERGROUND UTILITIES = 4.02 AC

EXCLUDED AREA: TRAILS = 0.22 AC

EXCLUDED AREA: SINGLE FAMILY LOT = 0.17 AC

TOTAL EXCLUDED AREA = 5.13 AC

SCALE: 1" = 250'

0 125 250 500

N

SHEET
1 OF 1

PINE CANYON FILING 1

CASTLE ROCK, COLORADO

WATER QUALITY EXCLUSION MAP

PROJECT NO:	250100.001	
DATE	NO.	NOTES

DATE	NO.	NOTES

NOT FOR CONSTRUCTION

Redland
WHERE GREAT PLACES BEGIN
720.283.6783 REDLAND.COM
▪ Land Planning ▪ Civil Engineering ▪ Landscape Architecture ▪ Construction Management

Appendix B - Hydrologic Calculations

set of one hour design point rainfall values, indicated in Table 6-1, apply to the Town.

TABLE 6-1
1-HOUR POINT RAINFALL VALUES FOR
THE TOWN OF CASTLE ROCK (INCHES)

2- YR	5-YR	10-YR	50-YR	100-YR
1.06	1.43	1.66	2.26	2.60

The one-hour rainfall depths are the basis of the Town's intensity-duration rainfall curves and are used to formulate design storm distributions.

6.1.2 Intensity-Duration Curves. Rainfall intensity based on storm duration for a variety of storm return periods can be found on Figure 6-1 at the end of this chapter. These curves were developed using distribution factors provided in the NOAA Atlas and also provided in Table RA-4 of the UDFCD Manual. These Intensity-Duration curves are based on Equation RA-3 in the Rainfall Section of the UDFCD Manual.

6.1.3 Six-hour Rainfall. In order to use the Colorado Urban Hydrograph Procedure (CUHP), two, three or six-hour rainfall distributions are required, depending on watershed area. Table RA-1 in the UDFCD Manual summarizes storm durations, area adjustments, and incremental rainfall depths to be used in CUHP based on watershed area. The UD-Raincurve Spreadsheet included in the UDFCD Manual shall be used to generate the rainfall distribution curves necessary for a CUHP model. In order to generate these distribution curves, the one-hour and six-hour rainfall depths for the design return periods are necessary. Since the Town of Castle Rock is not located within UDFCD boundaries, the rainfall depth-duration-frequency curves provided in the UDFCD Manual do not provide rainfall values for the entire Town. Therefore these values are provided in these Criteria. The 1-hour point values can be found in Table 6-1 of this chapter. The six-hour point values are as follows:

TABLE 6-2
6-HOUR POINT RAINFALL VALUES FOR
THE TOWN OF CASTLE ROCK (INCHES)

2- YR	5-YR	10-YR	50-YR	100-YR
1.5	2.0	2.2	3.0	3.4

The UD-Raincurve spreadsheet shall be used for all portions of the Town. Once the rainfall distribution curves are generated using the UDFCD UD-Raincurve Spreadsheet, the CUHP model is to be set up following the procedures provided in the Runoff chapter in Volume 1 of the UDFCD Manual.

Redland

STANDARD FORM SF-1 - EXISTING
RUNOFF COEFFICIENTS

PROJECT NAME: Pine Canyon Filing 1
PROJECT NUMBER: 250100
CALCULATED BY: AMS
CHECKED BY: EBR

DATE: 5/5/2026
JURISDICTION: USER DEFINED

LAND USE:		Undeveloped Land	Gravel Road											
IMPERVIOUSNESS		5%	60%										NRCS SOIL TYPE: TYPE D	

OVERALL SITE STUDY AREA

DESIGN BASIN	DESIGN POINT	Undeveloped Land (AC)	Gravel Road (AC)	(AC)	(AC)	(AC)	(AC)	(AC)	TOTAL AREA (AC)	$C_d(2)$	$C_d(5)$	$C_d(10)$	$C_d(100)$	Imp (%)
EX14	14	19.06	0.25						19.31	0.03	0.08	0.17	0.51	6%
EX16	16	5.88	0.01						5.89	0.03	0.08	0.17	0.50	5%
EX17	17	24.87	0.23						25.10	0.03	0.08	0.17	0.51	6%
EX25	25	11.93	0.18						12.11	0.03	0.08	0.18	0.51	6%
Total Site		61.74	0.67						62.41	0.03	0.08	0.17	0.51	6%
		98.9%	1.1%						100.0%					

Redland

STANDARD FORM SF-2 - EXISTING
TIME OF CONCENTRATION

PROJECT NAME: Pine Canyon Filing 1
PROJECT NUMBER: 250100
CALCULATED BY: AMS
CHECKED BY: EBR

DATE: 5/5/2026
JURISDICTION: USER DEFINED

SUB-BASIN DATA			INITIAL TIME (T_i)			TRAVEL TIME (T_t)						tc CHECK (URBANIZED BASINS)			FINAL Tc	RUNOFF COEFFICIENT	
DESIGN BASIN	AREA (AC)	C_5	LENGTH* (FT)	SLOPE (%)	T_i (MINUTES)	LENGTH (FT)	SLOPE (%)	C_v	Land Surface	VEL (FPS)	T_t (MINUTES)	COMP. t_c	TOTAL LENGTH	REGIONAL tc	Min. t_c	C_5	C_{100}
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)			
EX14	19.31	0.08	300	6.0%	18	1250	6.1%	15.0	Grassed Waterway	3.7	5.6	23.4	1550	25.7	23.4	0.08	0.51
EX16	5.89	0.08	300	6.0%	17.9	425	9.2%	15.0	Grassed Waterway	4.5	1.6	19.4	725	25.3	19.4	0.08	0.50
EX17	25.10	0.08	200	9.5%	12.5	1180	7.2%	7.0	Short Pasture/Lawn	1.9	10.5	23.0	1380	25.6	23.0	0.08	0.51
EX25	12.11	0.08	300	9.0%	15.5	685	2.5%	7.0	Short Pasture/Lawn	1.1	10.3	25.8	985	25.6	25.6	0.08	0.51

* L = 500' max for non-urban land uses and 300' max for urban land uses

$$T_i = \frac{0.395(1.1-C)L^{1/2}}{S^{1/3}}$$

$$T_t = \frac{L}{60V} \qquad V = C_v S_w^{0.5}$$

$$t_c = \frac{L}{180} + 10$$

$$t_c = (26 - 17i) + \frac{L_t}{60(14i+9)\sqrt{S_t}}$$

Table RO-2—Conveyance Coefficient, C_v

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

Redland

STANDARD FORM SF-3 - EXISTING
STORM DRAINAGE DESIGN - RATIONAL METHOD 100 YEAR EVENT

PROJECT NAME: Pine Canyon Filing 1
PROJECT NUMBER: 250100
CALCULATED BY: AMS
CHECKED BY: EBR

P_1 (1-Hour Rainfall) = 2.60

DATE: 5/5/2026
JURISDICTION: USER DEFINED

STORM LINE	DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		DESIGN BASIN	AREA (AC)	RUNOFF COEFF C_{100}	t_o (minutes)	C*A(ac)	I (in/hr)	Q (cfs)	t_o(minutes)	S(C*A) (ac)	I (in/hr)	Q (cfs)	SLOPE (%)	STREET FLOW(cfs)	DESIGN FLOW(cfs)	SLOPE (%)	PIPE SIZE (in)	LENGTH (ft)	VELOCITY (fps)	t_t (minutes)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	14	EX14	19.3	0.51	23.4	9.8	4.70	46.0	23.42	9.80	4.70	46.04									
	16	EX16	5.9	0.50	19.4	3.0	5.19	15.4	19.44	2.97	5.19	15.43									
	17	EX17	25.1	0.51	23.0	12.7	4.75	60.4	22.96	12.71	4.75	60.40									
	25	EX25	12.1	0.51	25.6	6.2	4.47	27.5	25.58	6.15	4.47	27.51									

Redland

PROJECT NAME:	Pine Canyon Filing 1	DATE:	5/5/2026
PROJECT NUMBER:	250100.00	JURISDICTION:	USER DEFINED
CALCULATED BY:	AMS		
CHECKED BY:	EBR		

Existing Basin Summary Table

Basin	Area (AC)	Runoff Coefficients		I (%)	Peak Flows (cfs)	
		C_5	C_{100}		Q_5	Q_{100}
EX14	19.31	0.08	0.51	6%	4.1	46.0
EX16	5.89	0.08	0.50	5%	1.3	15.4
EX17	25.10	0.08	0.51	6%	5.3	60.4
EX25	12.11	0.08	0.51	6%	2.5	27.5

Redland

STANDARD FORM SF-1 - DEVELOPED RUNOFF COEFFICIENTS

PROJECT NAME: Pine Canyon Filing 1
PROJECT NUMBER: 250100
CALCULATED BY: AMS
CHECKED BY: EBR

8/6/2026
DICTION: USER DEFINED

LAND USE:	SFH Low/Medium Density (3-5 DU/AC)	Paved Road/Walk	Drive/Walk	Gravel Road	Lawn	Park	Undeveloped Land
IMPERVIOUSNESS	55%	95%	95%	60%	20%	25%	5%

NRCS SOIL TYPE: TYPE C

OVERALL SITE STUDY AREA

DESIGN BASIN	DESIGN POINT	SFH Low/Medium Density (3-5 DU/AC) (AC)	Paved Road/Walk (AC)	Drive/Walk (AC)	Gravel Road (AC)	Lawn (AC)	Park (AC)	Undeveloped Land (AC)	TOTAL AREA (AC)	$C_d(5)$	$C_d(100)$	Imp (%)
L1	1	0.00	0.54			0.25			0.79	0.62	0.78	71%
L2	2	0.00	0.87			0.68			1.55	0.54	0.74	62%
L3	3	0.00	0.48			0.58			1.06	0.48	0.71	54%
L4	4	0.00	0.47			0.96			1.43	0.40	0.67	45%
L5	5	3.42	0.00			0.00			3.42	0.49	0.71	55%
L6	6	0.00	0.26			0.32			0.58	0.48	0.71	54%
L7	7	0.36	0.20			0.30			0.86	0.46	0.70	52%
L8	8	0.99	0.37		0.03	0.40			1.79	0.49	0.71	56%
L9	9	0.08	0.14			0.04			0.26	0.62	0.78	71%
L10	10	0.45	0.20			0.03			0.68	0.57	0.75	65%
L11	11	0.78	0.41			0.09			1.28	0.57	0.75	65%
L12	12	0.08	0.00		0.14	7.62			7.84	0.21	0.57	21%
BASIN L		**6.16**	**3.94**		**0.17**	**11.27**			**21.54**	0.40	0.66	**44%**
		28.6%	**18.3%**		**0.8%**	**52.3%**			**100.0%**			
M1.1	1.1	0.91	0.18			0.00			1.08	0.54	0.74	62%
M1.2	1.2	1.15	0.14			0.00			1.29	0.52	0.73	59%
M1.3	1.3	0.55	0.13			0.40			1.08	0.42	0.68	47%
M1.4	1.4	1.58	0.27			0.09			1.94	0.52	0.73	59%
M1.5	1.5	0.07			0.10	2.29			2.46	0.22	0.58	23%
BASIN M1		**4.26**	**0.72**		**0.10**	**2.78**			**7.85**	0.41	0.67	**46%**
		54.3%	**9.1%**		**1.3%**	**35.4%**			**100.0%**			
M2.1	2.1	0.11	0.20			0.00			0.31	0.70	0.82	81%
M2.2	2.2	0.45	0.07			0.00			0.52	0.53	0.73	60%
M2.3	2.3	1.25	0.40			0.22			1.87	0.52	0.73	59%
M2.4	2.4	0.00	0.15			0.00			0.15	0.81	0.87	95%
M2.5	2.5	2.76	0.62		0.16	0.94			4.48	0.47	0.70	53%
M2.6	2.6	1.75	0.52			0.12			2.39	0.54	0.74	62%
M2.7	2.7	0.28	0.46			0.12			0.86	0.62	0.78	72%
M2.8	2.8	2.37	0.56		0.16	1.38			4.47	0.44	0.69	49%
M2.9	2.9	2.21	0.58			0.90			3.69	0.47	0.70	53%
M2.10	2.10	0.38	0.30			0.06			0.74	0.60	0.76	68%
M2.11	2.11	0.65	0.44		0.03	1.38			2.50	0.39	0.66	43%

Redland

STANDARD FORM SF-1 - DEVELOPED RUNOFF COEFFICIENTS

PROJECT NAME: Pine Canyon Filing 1
PROJECT NUMBER: 250100
CALCULATED BY: AMS
CHECKED BY: EBR

8/6/2026
DICTION: USER DEFINED

LAND USE:	SFH Low/Medium Density (3-5 DU/AC)	Paved Road/Walk	Drive/Walk	Gravel Road	Lawn	Park	Undeveloped Land
IMPERVIOUSNESS	55%	95%	95%	60%	20%	25%	5%

NRCS SOIL TYPE: TYPE C

OVERALL SITE STUDY AREA

DESIGN BASIN	DESIGN POINT	SFH Low/Medium Density (3-5 DU/AC) (AC)	Paved Road/Walk (AC)	Drive/Walk (AC)	Gravel Road (AC)	Lawn (AC)	Park (AC)	Undeveloped Land (AC)	TOTAL AREA (AC)	$C_d(5)$	$C_d(100)$	Imp (%)
M2.12	2.12	0.00	0.27			0.03			**0.30**	0.75	0.84	88%
M2.13	2.13	0.00	0.31			0.04			**0.35**	0.74	0.84	86%
M2.14	2.14	0.38	0.14			0.01			**0.53**	0.57	0.75	65%
M2.15	2.15	0.42	0.21			0.00			**0.63**	0.60	0.76	68%
M2.16	2.16	0.83	0.34			0.33			**1.50**	0.50	0.72	56%
M2.17	2.17	0.71	0.22		0.01	0.22			**1.16**	0.49	0.71	56%
M2.18	2.18	0.32	0.24			0.22			**0.78**	0.51	0.72	57%
M2.19	2.19	0.55	0.00		0.08	5.58			**6.21**	0.23	0.58	24%
M2.20	2.20	0.65	0.00		0.34	4.94			**5.93**	0.25	0.59	26%
OF-1	0-1	0.00	2.05		0.00	0.00			**2.05**	0.81	0.87	95%
OF-2	0-2	0.00	3.19		0.00	0.00			**3.19**	0.81	0.87	95%
BASIN M2		**16.07**	**11.27**		**0.78**	**16.49**			**44.61**	0.46	0.70	**52%**
		36.0%	**25.3%**		**1.7%**	**37.0%**			**100.0%**			

Redland

STANDARD FORM SF-2 - DEVELOPED TIME OF CONCENTRATION

PROJECT NAME: Pine Canyon Filing 1
PROJECT NUMBER: 250100
CALCULATED BY: AMS
CHECKED BY: EBR

DATE: 8/6/2026
JURISDICTION: USER DEFINED

SUB-BASIN DATA			INITIAL TIME (T_i)			TRAVEL TIME (T_t)						tc CHECK (URBANIZED BASINS)			FINAL Tc	RUNOFF COEFFICIENT	
DESIGN BASIN (1)	AREA (AC) (2)	C_5 (3)	LENGTH* (FT) (4)	SLOPE (%) (5)	T_i (MINUTES) (6)	LENGTH (FT) (7)	SLOPE (%) (8)	C_v (9)	Land Surface (10)	VEL (FPS) (11)	T_t (MINUTES) (12)	COMP. t_c (13)	TOTAL LENGTH (14)	REGIONAL tc (15)	Min. t_c	C_5	C_{100}
L1	0.79	0.62	42	1.0%	5.7	535	6.0%	20.0	Paved Areas	4.9	1.8	7.5	577	14.2	7.5	0.62	0.78
L2	1.55	0.54	165	4.5%	7.9	505	6.0%	20.0	Paved Areas	4.9	1.7	9.6	670	15.7	9.6	0.54	0.74
L3	1.06	0.48	25	2.0%	4.5	325	1.0%	20.0	Paved Areas	2.0	2.7	7.2	350	17.2	7.2	0.48	0.71
L4	1.43	0.40	45	2.0%	6.8	335	1.0%	20.0	Paved Areas	2.0	2.8	9.6	380	18.8	9.6	0.40	0.67
L5	3.42	0.49	350	7.2%	10.9	60	5.0%	7.0	Short Pasture/Lawn	1.6	0.6	11.5	410	16.7	11.5	0.49	0.71
L6	0.58	0.48	50	2.0%	6.4	402	6.0%	20.0	Paved Areas	4.9	1.4	1.6	452	17.0	7.8	0.48	0.71
L7	0.86	0.46	160	2.5%	10.9	190	6.0%	20.0	Paved Areas	4.9	0.6	11.5	350	17.2	11.5	0.46	0.70
L8	1.79	0.49	130	2.5%	9.4	380	2.0%	20.0	Paved Areas	2.8	2.2	11.6	510	16.9	11.6	0.49	0.71
L9	0.26	0.62	58	2.5%	4.9	30	2.0%	20.0	Paved Areas	2.8	0.2	5.1	88	13.9	5.1	0.62	0.78
L10	0.68	0.57	74	5.0%	4.9	250	2.0%	20.0	Paved Areas	2.8	1.5	6.4	324	15.1	6.4	0.57	0.75
L11	1.28	0.57	70	2.5%	6.0	325	2.0%	20.0	Paved Areas	2.8	1.9	7.9	395	15.2	7.9	0.57	0.75
L12	7.84	0.21	300	4.5%	17.2	545	8.5%	20.0	Paved Areas	5.8	1.6	18.7	845	22.7	18.7	0.21	0.57
M1.1	1.08	0.54	25	2.0%	4.1	300	5.0%	20.0	Paved Areas	4.47	1.1	5.2	325	15.7	5.2	0.54	0.74
M1.2	1.29	0.52	230	2.5%	11.8	190	5.0%	20.0	Paved Areas	4.5	0.7	12.6	420	16.0	12.6	0.52	0.73
M1.3	1.08	0.42	200	2.5%	13.0	160	5.0%	20.0	Paved Areas	4.5	0.6	13.6	360	18.1	13.6	0.42	0.68
M1.4	1.94	0.52	200	2.5%	11.1	250	5.0%	20.0	Paved Areas	4.5	0.9	12.0	450	16.1	12.0	0.52	0.73
M1.5	2.46	0.22	265	6.5%	14.1	60	25.0%	7.0	Short Pasture/Lawn	3.5	0.3	14.4	325	22.2	14.4	0.22	0.58
M2.1	0.31	0.70	40	2.0%	3.7	340	1.0%	20.0	Paved Areas	2.0	2.8	1.1	380	12.7	6.5	0.70	0.82
M2.2	0.52	0.53	150	2.5%	9.4	115	2.7%	20.0	Paved Areas	3.3	0.6	1.3	265	15.8	10.0	0.53	0.73
M2.3	1.87	0.52	160	2.5%	9.9	120	6.0%	20.0	Paved Areas	4.9	0.4	1.9	280	16.0	10.3	0.52	0.73
M2.4	0.15	0.81	7	2.0%	1.1	30	1.0%	20.0	Paved Areas	2.0	0.3	2.5	37	9.9	5.0	0.81	0.87
M2.5	4.48	0.47	290	5.0%	11.5	450	1.0%	20.0	Paved Areas	2.0	3.8	15.2	740	17.5	15.2	0.47	0.70
M2.6	2.39	0.54	140	2.5%	8.9	335	6.0%	20.0	Paved Areas	4.9	1.1	10.0	475	15.6	10.0	0.54	0.74
M2.7	0.86	0.62	45	2.5%	4.3	905	2.0%	20.0	Paved Areas	2.8	5.3	9.7	950	14.6	9.7	0.62	0.78
M2.8	4.47	0.44	130	3.5%	9.1	390	2.0%	20.0	Paved Areas	2.8	2.3	11.4	520	18.0	11.4	0.44	0.69
M2.9	3.69	0.47	130	2.5%	9.7	710	4.0%	20.0	Paved Areas	4.0	3.0	12.7	840	17.5	12.7	0.47	0.70
M2.10	0.74	0.60	45	2.5%	4.6	550	4.0%	20.0	Paved Areas	4.0	2.3	6.9	595	14.7	6.9	0.60	0.76
M2.11	2.50	0.39	300	6.0%	12.5	260	4.0%	20.0	Paved Areas	4.0	1.1	13.6	560	18.9	13.6	0.39	0.66
M2.12	0.30	0.75	15	2.0%	2.0	240	6.0%	20.0	Paved Areas	4.9	0.8	2.8	255	11.2	5.0	0.75	0.84
M2.13	0.35	0.74	20	2.0%	2.3	305	6.0%	20.0	Paved Areas	4.9	1.0	3.4	325	11.5	5.0	0.74	0.84
M2.14	0.53	0.57	20	2.5%	3.2	253	6.0%	20.0	Paved Areas	4.9	0.9	4.1	273	15.1	5.0	0.57	0.75
M2.15	0.63	0.60	125	2.5%	7.6	250	6.0%	20.0	Paved Areas	4.9	0.9	8.5	375	14.5	8.5	0.60	0.76
M2.16	1.50	0.50	115	2.5%	8.7	230	6.0%	20.0	Paved Areas	4.9	0.8	9.5	345	16.5	9.5	0.50	0.72
M2.17	1.16	0.49	95	18.0%	4.1	365	6.0%	20.0	Paved Areas	4.9	1.2	5.4	460	16.7	5.4	0.49	0.71
M2.18	0.78	0.51	82	6.5%	5.3	370	6.0%	20.0	Paved Areas	4.9	1.3	6.5	452	16.4	6.5	0.51	0.72
M2.19	6.21	0.23	180	7.4%	11.0	1010	6.7%	7.0	Short Pasture/Lawn	1.8	9.3	20.3	1190	22.5	20.3	0.23	0.58
M2.20	5.93	0.25	300	6.1%	14.8	412	10.0%	7.0	Short Pasture/Lawn	2.2	3.1	17.9	712	21.7	17.9	0.25	0.59
OF-1	2.05	0.81	300	1.2%	8.5	655	2.0%	20.0	Paved Areas	2.8	3.9	12.4	955	10.4	10.4	0.81	0.87
OF-2	3.19	0.81	300	1.5%	7.9	705	5.0%	20.0	Paved Areas	4.5	2.6	10.6	1005	10.2	10.2	0.81	0.87

Redland

STANDARD FORM SF-3 - DEVELOPED
STORM DRAINAGE DESIGN - RATIONAL METHOD 5 YEAR EVENT

PROJECT NAME: Pine Canyon Filing 1
PROJECT NUMBER: 250100
CALCULATED BY: AMS
CHECKED BY: EBR

P_1 (1-Hour Rainfall) = 1.43

DATE: 8/6/2026
JURISDICTION: USER DEFINE

STORM LINE	DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		DESIGN BASIN	AREA (AC)	RUNOFF COEFF C_5	t_o (minutes)	C*A(AC)	I (in/hr)	Q (cfs)	t_c(minutes)	S(C*A) (ac)	I (in/hr)	Q (cfs)	SLOPE (%)	STREET FLOW(cfs)	DESIGN FLOW(cfs)	SLOPE (%)	PIPE SIZE (in)	LENGTH (ft)	VELOCITY (fps)	t_t (Minutes)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	1	L1	0.8	0.62	7.5	0.5	4.29	2.1													
	2	L2	1.6	0.54	9.6	0.8	3.92	3.3													
	3	L3	1.1	0.48	7.2	0.5	4.35	2.2													
	4	L4	1.4	0.40	9.6	0.6	3.93	2.3													
	5	L5	3.4	0.49	11.5	1.7	3.65	6.1													
	6	L6	0.6	0.48	7.8	0.3	4.25	1.2													
	7	L7	0.9	0.46	11.5	0.4	3.65	1.5													
	8	L8	1.8	0.49	11.6	0.9	3.64	3.2													
	9	L9	0.3	0.62	5.1	0.2	4.82	0.8													
	10	L10	0.7	0.57	6.4	0.4	4.53	1.8													
	11	L11	1.3	0.57	7.9	0.7	4.22	3.1													
	12	L12	7.8	0.21	18.7	1.6	2.91	4.7													
	1.1	M1.1	1.1	0.54	5.2	0.6	4.80	2.8													
	1.2	M1.2	1.3	0.52	12.6	0.7	3.52	2.4													
	1.3	M1.3	1.1	0.42	13.6	0.5	3.40	1.5													
	1.4	M1.4	1.9	0.52	12.0	1.0	3.58	3.6													
	1.5	M1.5	2.5	0.22	14.4	0.5	3.31	1.8													
	2.1	M2.1	0.3	0.70	6.5	0.2	4.49	1.0													
	2.2	M2.2	0.5	0.53	10.0	0.3	3.87	1.1													
	2.3	M2.3	1.9	0.52	10.3	1.0	3.83	3.7													
	2.4	M2.4	0.2	0.81	5.0	0.1	4.85	0.6													
	2.5	M2.5	4.5	0.47	15.2	2.1	3.23	6.8													
	2.6	M2.6	2.4	0.54	10.0	1.3	3.86	5.0													
	2.7	M2.7	0.9	0.62	9.7	0.5	3.92	2.1													
	2.8	M2.8	4.5	0.44	11.4	2.0	3.67	7.2													
	2.9	M2.9	3.7	0.47	12.7	1.7	3.50	6.0													
	2.1	M2.10	0.7	0.60	6.9	0.4	4.42	2.0													
	2.11	M2.11	2.5	0.39	13.6	1.0	3.40	3.3													
	2.12	M2.12	0.3	0.75	5.0	0.2	4.85	1.1													
	2.13	M2.13	0.4	0.74	5.0	0.3	4.85	1.3													
	2.14	M2.14	0.5	0.57	5.0	0.3	4.85	1.5													
	2.15	M2.15	0.6	0.60	8.5	0.4	4.12	1.5													
	2.16	M2.16	1.5	0.50	9.5	0.7	3.94	2.9													
	2.17	M2.17	1.2	0.49	5.4	0.6	4.76	2.7													
	2.18	M2.18	0.8	0.51	6.5	0.4	4.49	1.8													
	2.19	M2.19	6.2	0.23	20.3	1.4	2.79	4.0													
	2.2	M2.20	5.9	0.25	17.9	1.5	2.98	4.4													
	0-1	0F-1	2.1	0.81	10.4	1.7	3.81	6.4													
	0-2	0F-2	3.2	0.81	10.2	2.6	3.83	10.0													

Redland

STANDARD FORM SF-3 - DEVELOPED
STORM DRAINAGE DESIGN - RATIONAL METHOD 100 YEAR EVENT

PROJECT NAME: Pine Canyon Filing 1
PROJECT NUMBER: 250100
CALCULATED BY: AMS
CHECKED BY: EBR

P_1 (1-Hour Rainfall) = 2.60

DATE: 8/6/2026
JURISDICTION: USER DEFINEI

STORM LINE	DESIGN POINT	DIRECT RUNOFF							TOTAL RUNOFF				STREET		PIPE			TRAVEL TIME			REMARKS
		DESIGN BASIN	AREA (AC)	RUNOFF COEFF C_{100}	t_c (minutes)	C*A(ac)	I (in/hr)	Q (cfs)	t_c(minutes)	S(C*A) (ac)	I (in/hr)	Q (cfs)	SLOPE (%)	STREET FLOW(cfs)	DESIGN FLOW(cfs)	SLOPE (%)	PIPE SIZE (in)	LENGTH (ft)	VELOCITY (fps)	t_t (minutes)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
	1	L1	0.79	0.78	7.5	0.6	7.80	4.8													
	2	L2	1.55	0.74	9.6	1.1	7.13	8.2	9.65	1.76	7.13	12.54									L1-L2, FOREBAY L-1
	3	L3	1.06	0.71	7.2	0.7	7.91	5.9													
	4	L4	1.43	0.67	9.6	1.0	7.14	6.8													
	5	L5	3.42	0.71	11.5	2.4	6.63	16.1													
	6	L6	0.58	0.71	7.8	0.4	7.72	3.2													
	7	L7	0.86	0.70	11.5	0.6	6.63	4.0													
	8	L8	1.79	0.71	11.6	1.3	6.61	8.4													
	9	L9	0.26	0.78	5.1	0.2	8.76	1.7													
	10	L10	0.68	0.75	6.4	0.5	8.24	4.2													
	11	L11	1.28	0.75	7.9	1.0	7.68	7.4	11.63	8.08	6.61	53.46									L3-L11, FOREBAY L-2
	12	L12	7.84	0.57	18.7	4.5	5.29	23.7													
	1.1	M1.1	1.08	0.74	5.2	0.8	8.73	6.9													
	1.2	M1.2	1.29	0.73	12.6	0.9	6.40	6.0													
	1.3	M1.3	1.08	0.68	13.6	0.7	6.18	4.5													
	1.4	M1.4	1.94	0.73	12.0	1.4	6.52	9.2	13.60	3.08	6.18	19.00									M1.1-M1.4, FOREBAY M-1
	1.5	M1.5	2.46	0.58	14.4	1.4	6.03	8.5													
	2.1	M2.1	0.31	0.82	6.5	0.3	8.17	2.1													
	2.2	M2.2	0.52	0.73	10.0	0.4	7.03	2.7													
	2.3	M2.3	1.87	0.73	10.3	1.4	6.96	9.5	10.28	1.99	1.08	2.15									M2.1-M2.3, FOREBAY M2-1
	2.4	M2.4	0.15	0.87	5.0	0.1	8.82	1.2													
	2.5	M2.5	4.48	0.70	15.2	3.1	5.87	18.5													
	2.6	M2.6	2.39	0.74	10.0	1.8	7.02	12.4													
	2.7	M2.7	0.86	0.78	9.7	0.7	7.13	4.8													
	2.8	M2.8	4.47	0.69	11.4	3.1	6.67	20.5													
	2.9	M2.9	3.69	0.70	12.7	2.6	6.37	16.5	15.20	11.36	5.87	66.66									M2.4-M2-8, FOREBAY M2-2
	2.10	M2.10	0.74	0.76	6.9	0.6	8.04	4.5													
	2.11	M2.11	2.50	0.66	13.6	1.6	6.18	10.2													
	2.12	M2.12	0.30	0.84	5.0	0.3	8.82	2.2													
	2.13	M2.13	0.35	0.84	5.0	0.3	8.82	2.6													
	2.14	M2.14	0.53	0.75	5.0	0.4	8.82	3.5													
	2.15	M2.15	0.63	0.76	8.5	0.5	7.49	3.6													
	2.16	M2.16	1.50	0.72	9.5	1.1	7.17	7.7													
	2.17	M2.17	1.16	0.71	5.4	0.8	8.65	7.2													
	2.18	M2.18	0.78	0.72	6.5	0.6	8.17	4.6													
	2.19	M2.19	6.21	0.58	20.3	3.6	5.08	18.3													
	2.20	M2.20	5.93	0.59	17.9	3.5	5.42	19.0	20.29	13.21	5.08	67.07									M2.9-M2-19, FOREBAY M2-3
	0-1	0F-1	2.05	0.87	10.4	1.8	6.92	12.4													
	0-2	0F-2	3.19	0.87	10.2	2.8	6.97	19.4													

Redland

PROJECT NAME:	Pine Canyon Filing 1	DATE:	8/6/2026
PROJECT NUMBER:	250100	JURISDICTION:	USER DEFINED
CALCULATED BY:	AMS		
CHECKED BY:	EBR		

Basin Summary Table

Basin	Area (AC)	Runoff Coefficients		I (%)	Peak Flows (cfs)	
		C_5	C_{100}		Q_5	Q_{100}
L1	0.79	0.62	0.78	71%	2.1	4.8
L2	1.55	0.54	0.74	62%	3.3	8.2
L3	1.06	0.48	0.71	54%	2.2	5.9
L4	1.43	0.40	0.67	45%	2.3	6.8
L5	3.42	0.49	0.71	55%	6.1	16.1
L6	0.58	0.48	0.71	54%	1.2	3.2
L7	0.86	0.46	0.70	52%	1.5	4.0
L8	1.79	0.49	0.71	56%	3.2	8.4
L9	0.26	0.62	0.78	71%	0.8	1.7
L10	0.68	0.57	0.75	65%	1.8	4.2
L11	1.28	0.57	0.75	65%	3.1	7.4
L12	7.84	0.21	0.57	21%	4.7	23.7
M1.1	1.08	0.54	0.74	62%	2.8	6.9
M1.2	1.29	0.52	0.73	59%	2.4	6.0
M1.3	1.08	0.42	0.68	47%	1.5	4.5
M1.4	1.94	0.52	0.73	59%	3.6	9.2
M1.5	2.46	0.22	0.58	23%	1.8	8.5
M2.1	0.31	0.70	0.82	81%	1.0	2.1
M2.2	0.52	0.53	0.73	60%	1.1	2.7
M2.3	1.87	0.52	0.73	59%	3.7	9.5
M2.4	0.15	0.81	0.87	95%	0.6	1.2
M2.5	4.48	0.47	0.70	53%	6.8	18.5
M2.6	2.39	0.54	0.74	62%	5.0	12.4
M2.7	0.86	0.62	0.78	72%	2.1	4.8
M2.8	4.47	0.44	0.69	49%	7.2	20.5
M2.9	3.69	0.47	0.70	53%	6.0	16.5
M2.10	0.74	0.60	0.76	68%	2.0	4.5
M2.11	2.50	0.39	0.66	43%	3.3	10.2
M2.12	0.30	0.75	0.84	88%	1.1	2.2
M2.13	0.35	0.74	0.84	86%	1.3	2.6
M2.14	0.53	0.57	0.75	65%	1.5	3.5
M2.15	0.63	0.60	0.76	68%	1.5	3.6
M2.16	1.50	0.50	0.72	56%	2.9	7.7
M2.17	1.16	0.49	0.71	56%	2.7	7.2
M2.18	0.78	0.51	0.72	57%	1.8	4.6
M2.19	6.21	0.23	0.58	24%	4.0	18.3
M2.20	5.93	0.25	0.59	26%	4.4	19.0
OF-1	2.05	0.81	0.87	95%	6.4	12.4
OF-2	3.19	0.81	0.87	95%	10.0	19.4

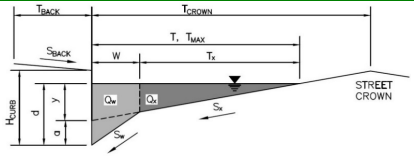
Appendix C - Hydraulic Calculations

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

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

Project: **Pine Canyon**

Inlet ID: **Local - 1%**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.010	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.4	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**4.2**	**12.0**	**cfs**

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

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

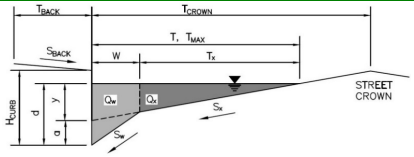
MHFD-Inlet, Version 6.00 (August 2025)

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

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

Project: **Pine Canyon**

Inlet ID: **Local - 2%**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.020	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.4	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**5.9**	**17.0**	**cfs**

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

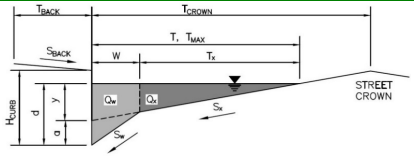
Major storm max. allowable capacity GOOD - greater than the design peak flow of 1.00 cfs on sheet 'Inlet Management'

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

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

Project: **Pine Canyon**

Inlet ID: **Local - 4%**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.040	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.4	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**8.3**	**17.5**	**cfs**

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

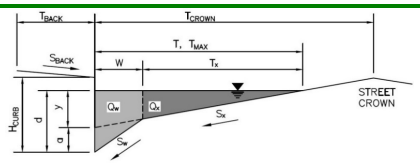
Major storm max. allowable capacity GOOD - greater than the design peak flow of 1.00 cfs on sheet 'Inlet Management'

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

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

Project: **Pine Canyon**

Inlet ID: **Collector - 6%**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	19.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	17.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.060	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	12.0	17.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	10.6	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Spread Criterion				
MAJOR STORM Allowable Capacity is based on Spread Criterion	**Q_{allow} =**	**14.2**	**32.7**	**cfs**

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

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

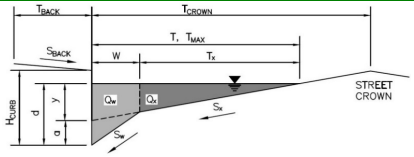
MHFD-Inlet, Version 6.00 (August 2025)

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

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

Project: **Pine Canyon**

Inlet ID: **Local - 6%**



Gutter Geometry:			
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.060	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.013	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.3	inches
Allow Flow Depth at Street Crown (check box for yes, leave blank for no)		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**10.2**	**15.5**	**cfs**

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

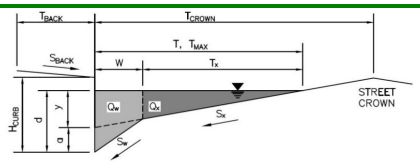
Major storm max. allowable capacity GOOD - greater than the design peak flow of 1.00 cfs on sheet 'Inlet Management'

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

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

Project: **Pine Canyon**

Inlet ID: **Local - Sump**



Gutter Geometry:

Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	6.5	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.020	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.016	
Height of Curb at Gutter Flow Line	H_{CURB} =	4.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	16.0	ft
Gutter Width	W =	2.00	ft
Street Transverse Slope	S_X =	0.020	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	16.0	16.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	4.0	5.4	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

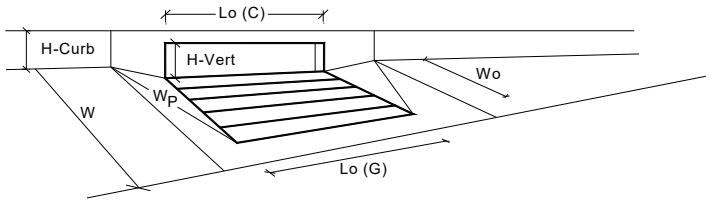
MINOR STORM Allowable Capacity is not applicable to Sump Condition

MAJOR STORM Allowable Capacity is not applicable to Sump Condition

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

INLET IN A SUMP OR SAG LOCATION

MHFD-Inlet, Version 6.00 (August 2025)



Design Information (Input)		MINOR	MAJOR	
Type of Inlet (Denver No. 16 Combination)	Type =	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	a_{local} =	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	3	3	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	4.0	5.4	inches
Grate Information		MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate	L_o (G) =	3.00	3.00	feet
Width of a Unit Grate	W_o =	1.73	1.73	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} =	0.31	0.31	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C_f (G) =	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C_w (G) =	3.60	3.60	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C_o (G) =	0.60	0.60	
Curb Opening Information		MINOR	MAJOR	
Length of a Unit Curb Opening	L_o (C) =	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} =	4.50	4.50	inches
Height of Curb Orifice Throat in Inches	H_{throat} =	5.25	5.25	inches
Angle of Throat	Theta =	0.00	0.00	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) =	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C_o (C) =	0.66	0.66	

Low Head Performance Reduction (Calculated)		MINOR	MAJOR	
Depth for Grate Midwidth	d_{Grate} =	0.36	0.47	ft
Depth for Curb Opening Weir Equation	d_{Curb} =	0.17	0.28	ft
Grated Inlet Performance Reduction Factor for Long Inlets	RF_{Grate} =	0.38	0.50	
Curb Opening Performance Reduction Factor for Long Inlets	RF_{Curb} =	N/A	N/A	
Combination Inlet Performance Reduction Factor for Long Inlets	$RF_{Combination}$ =	0.38	0.50	

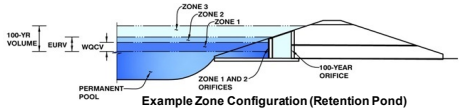
		MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**2.7**	**6.3**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms (>Q Peak)	$Q_{PEAK\ REQUIRED}$ =	1.0	1.0	cfs

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)

Project: 250100 Pine Canyon F1

Basin ID: Pond L - Top of MP: 6468.66



Example Zone Configuration (Retention Pond)

Watershed Information

Selected SCM Type =	**EDB**	
Watershed Area =	21.51	acres
Watershed Length =	1,600	ft
Watershed Length to Centroid =	670	ft
Watershed Slope =	0.008	ft/ft
Watershed Imperviousness =	44.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	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.

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.341	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	0.886	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	0.871	acre-feet	1.06 inches
5-yr Runoff Volume (P1 = 1.43 in.) =	1.459	acre-feet	1.43 inches
10-yr Runoff Volume (P1 = 1.66 in.) =	1.860	acre-feet	1.66 inches
25-yr Runoff Volume (P1 = 1.72 in.) =	2.042	acre-feet	1.72 inches
50-yr Runoff Volume (P1 = 2.26 in.) =	3.035	acre-feet	2.26 inches
100-yr Runoff Volume (P1 = 2.6 in.) =	3.744	acre-feet	2.60 inches
500-yr Runoff Volume (P1 = 3.11 in.) =	4.707	acre-feet	3.11 inches
Approximate 2-yr Detention Volume =	0.692	acre-feet	
Approximate 5-yr Detention Volume =	1.133	acre-feet	
Approximate 10-yr Detention Volume =	1.288	acre-feet	
Approximate 25-yr Detention Volume =	1.274	acre-feet	
Approximate 50-yr Detention Volume =	1.546	acre-feet	
Approximate 100-yr Detention Volume =	1.842	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.341	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.545	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.126	acre-feet
Total Detention Basin Volume =	2.012	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	

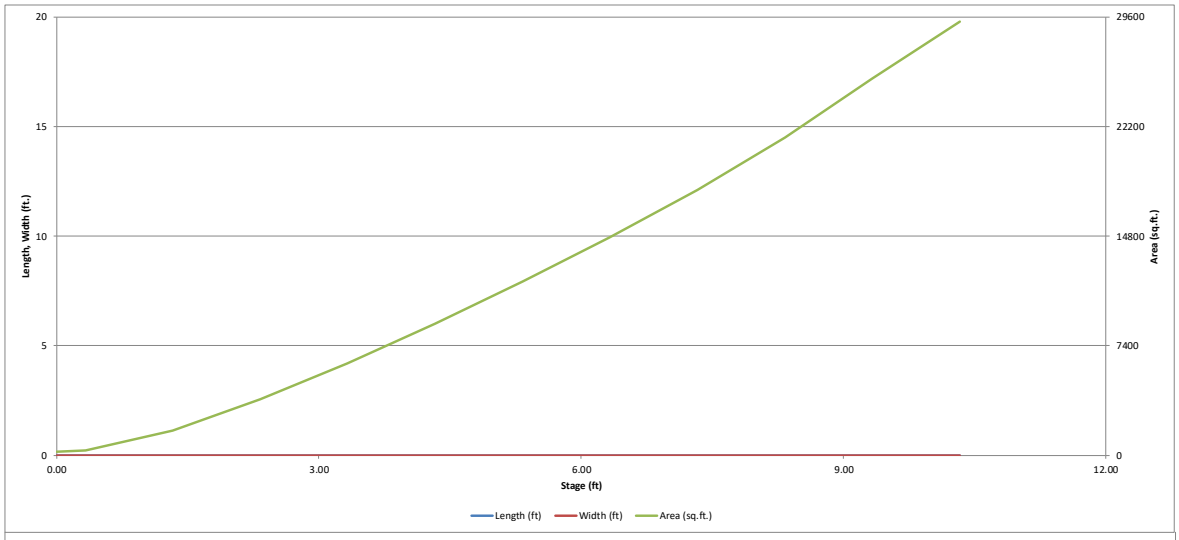
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

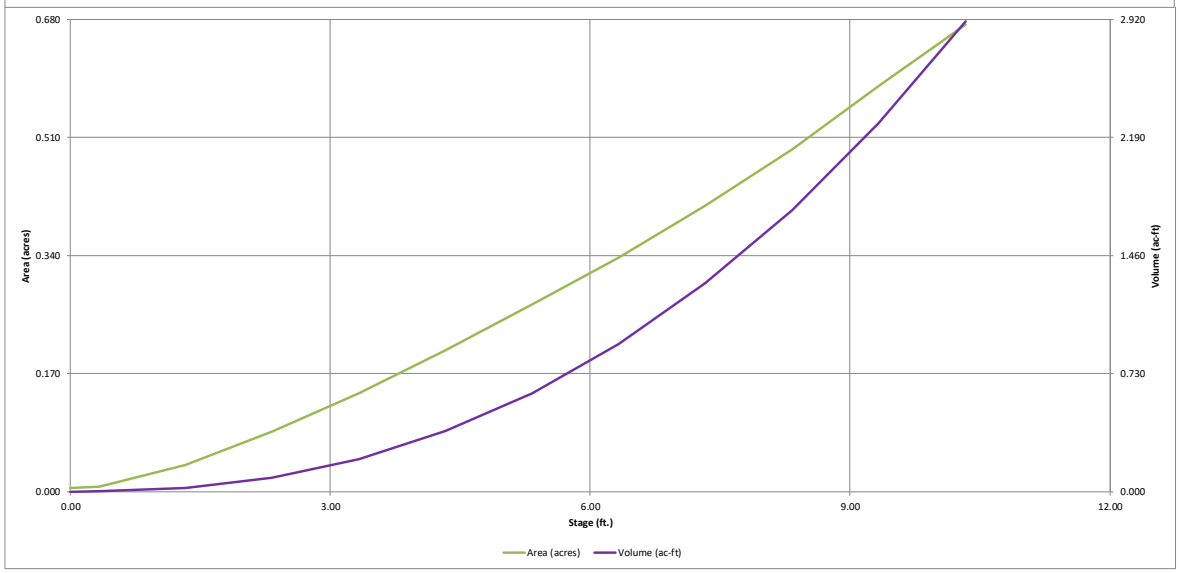
Depth Increment = 1.00 ft

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	--	--	--	250	0.006		
ISV - 6469	--	0.33	--	--	--	300	0.007	91	0.002
6470	--	1.33	--	--	--	1,665	0.038	1,073	0.025
6471	--	2.33	--	--	--	3,775	0.087	3,793	0.087
6472	--	3.33	--	--	--	6,181	0.142	8,772	0.201
6473	--	4.33	--	--	--	8,857	0.203	16,291	0.374
6474	--	5.33	--	--	--	11,746	0.270	26,593	0.610
6475	--	6.33	--	--	--	14,699	0.337	39,815	0.914
6476	--	7.33	--	--	--	17,926	0.412	56,128	1.289
6477	--	8.33	--	--	--	21,445	0.492	75,813	1.740
6478	--	9.33	--	--	--	25,439	0.584	99,255	2.279
6479	--	10.33	--	--	--	29,299	0.673	126,624	2.907

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)



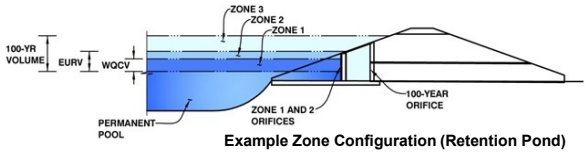


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: 250100 Pine Canyon F1

Basin ID: Pond L - Top of MP: 6468.66



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	4.17	0.341	Orifice Plate
Zone 2 (EURV)	6.25	0.545	Orifice Plate
3 (100+1/2WQCV)	8.86	1.126	Weir&Pipe (Restrict)
Total (all zones)		2.012	

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 Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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)	WQ Orifice Area per Row =	9.375E-03	ft^2
Depth at top of Zone using Orifice Plate =	6.30	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	1.35	sq. inches (diameter = 1-5/16 inches)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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	2.00	4.00					
Orifice Area (sq. inches)	1.35	1.35	1.35					

	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)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	6.30	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	8.80	N/A	feet
Overflow Weir Front Edge Length =	2.00	N/A	feet	Overflow Weir Slope Length =	10.31	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	8.03	N/A	
Horiz. Length of Weir Sides =	10.00	N/A	feet	Overflow Grate Open Area w/o Debris =	14.35	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	7.17	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.79	N/A	ft^2
Outlet Pipe Diameter =	24.00	N/A	inches	Outlet Orifice Centroid =	0.63	N/A	feet
Restrictor Plate Height Above Pipe Invert =	13.30		inches	Half-Central Angle of Restrictor Plate on Pipe =	1.68	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	8.70	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	1.10	feet
Spillway Crest Length =	10.00	feet	Stage at Top of Freeboard =	10.80	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.67	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	2.91	acre-ft

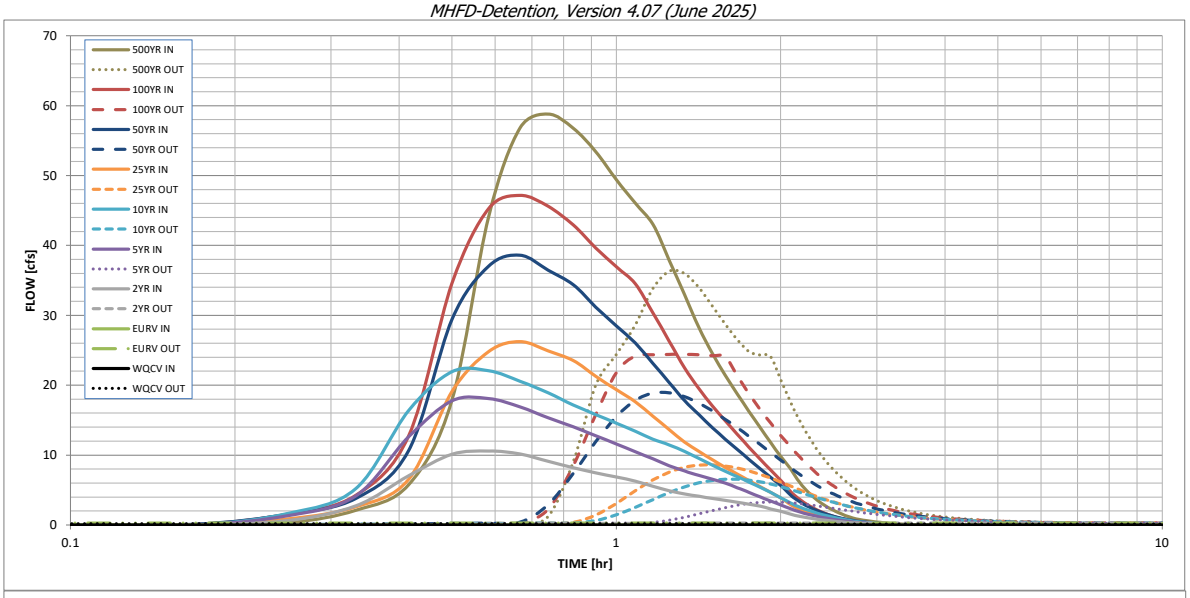
Calculated Parameters for Spillway

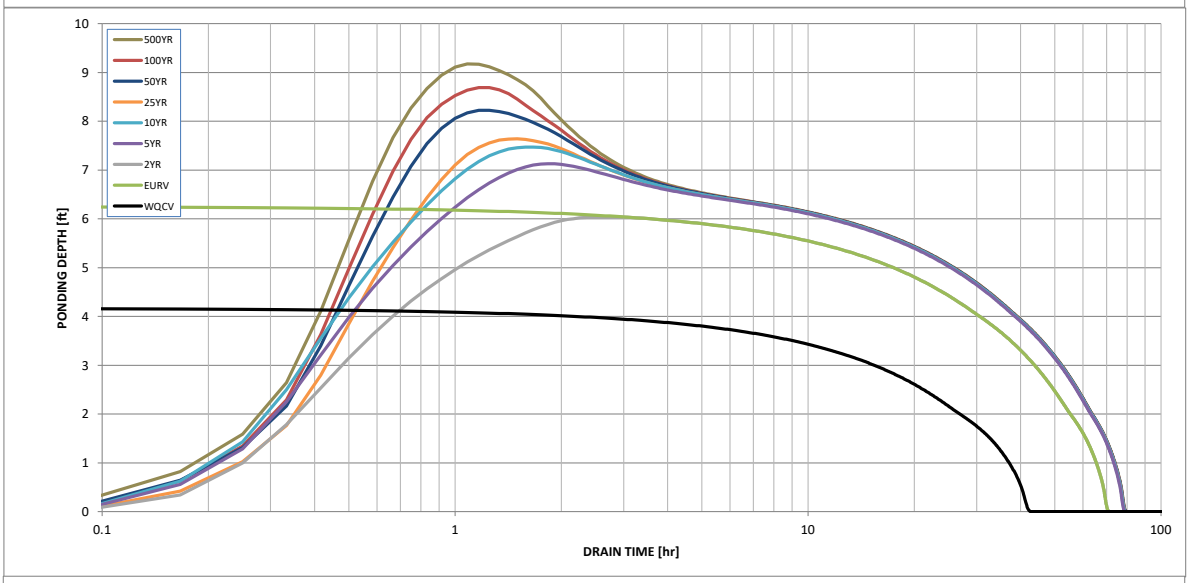
Routed Hydrograph Results *The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).*

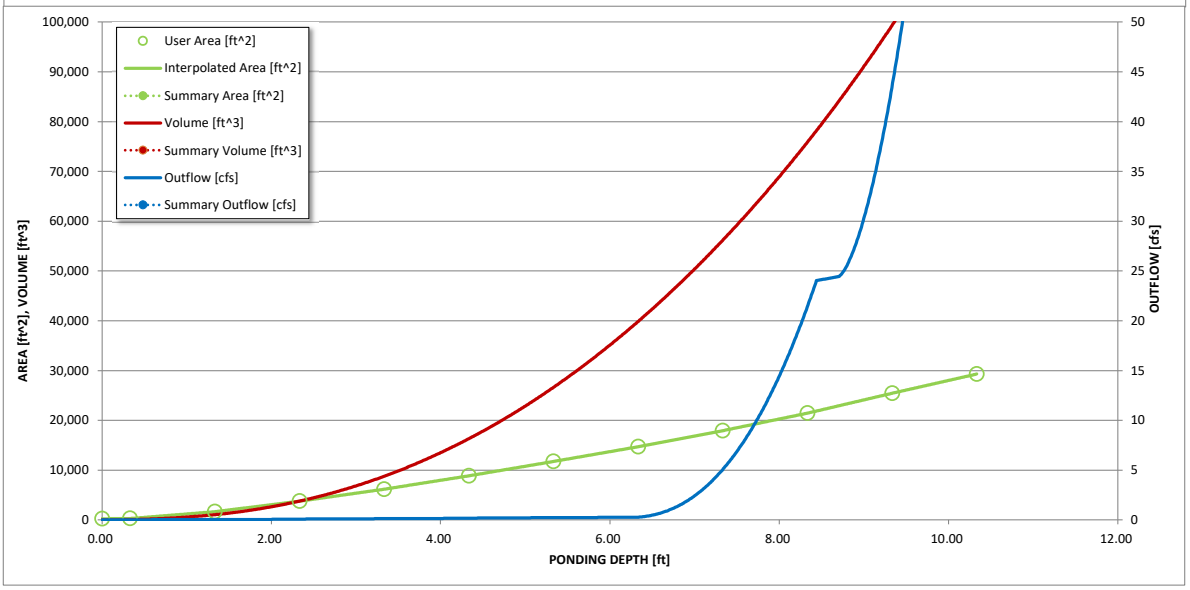
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.06	1.43	1.66	1.72	2.26	2.60	3.11
CUHP Runoff Volume (acre-ft) =	0.341	0.886	0.871	1.459	1.860	2.042	3.035	3.744	4.707
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.871	1.459	1.860	2.042	3.035	3.744	4.707
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	2.1	6.7	9.2	12.3	20.3	26.3	34.0
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.10	0.31	0.43	0.57	0.94	1.22	1.58
Peak Inflow Q (cfs) =	N/A	N/A	10.6	18.1	22.1	26.2	38.6	47.1	58.8
Peak Outflow Q (cfs) =	0.2	0.3	0.3	3.3	6.5	8.6	18.9	24.4	36.3
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.5	0.7	0.7	0.9	0.9	1.1
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.2	0.4	0.6	1.3	1.7	1.7
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	62	63	67	65	64	59	57	54
Time to Drain 99% of Inflow Volume (hours) =	**40**	67	67	73	73	72	70	69	67
Maximum Ponding Depth (ft) =	4.17	6.25	6.04	7.13	7.47	7.64	8.22	8.68	9.17
Area at Maximum Ponding Depth (acres) =	0.19	0.33	0.32	0.40	0.42	0.44	0.48	0.52	0.57
Maximum Volume Stored (acre-ft) =	0.342	0.887	0.819	1.204	1.343	1.416	1.687	1.918	2.186

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)







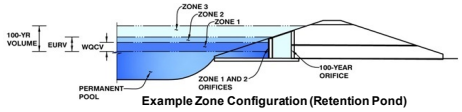
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)

Project: 250100 Pine Canyon F1

Basin ID: Pond M1 - Top of MP: 6504.77



Example Zone Configuration (Retention Pond)

Watershed Information

Selected SCM Type =	EDB	
Watershed Area =	7.89	acres
Watershed Length =	700	ft
Watershed Length to Centroid =	320	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	47.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	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.

			Optional User Overrides
Water Quality Capture Volume (WQCV) =	0.130	acre-feet	acre-feet
Excess Urban Runoff Volume (EURV) =	0.349	acre-feet	acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	0.320	acre-feet	1.06 inches
5-yr Runoff Volume (P1 = 1.43 in.) =	0.526	acre-feet	1.43 inches
10-yr Runoff Volume (P1 = 1.66 in.) =	0.665	acre-feet	1.66 inches
25-yr Runoff Volume (P1 = 1.72 in.) =	0.727	acre-feet	1.72 inches
50-yr Runoff Volume (P1 = 2.26 in.) =	1.071	acre-feet	2.26 inches
100-yr Runoff Volume (P1 = 2.6 in.) =	1.316	acre-feet	2.60 inches
500-yr Runoff Volume (P1 = 3.11 in.) =	1.650	acre-feet	3.11 inches
Approximate 2-yr Detention Volume =	0.274	acre-feet	
Approximate 5-yr Detention Volume =	0.442	acre-feet	
Approximate 10-yr Detention Volume =	0.501	acre-feet	
Approximate 25-yr Detention Volume =	0.494	acre-feet	
Approximate 50-yr Detention Volume =	0.598	acre-feet	
Approximate 100-yr Detention Volume =	0.706	acre-feet	

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.130	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.219	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	0.422	acre-feet
Total Detention Basin Volume =	0.771	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	

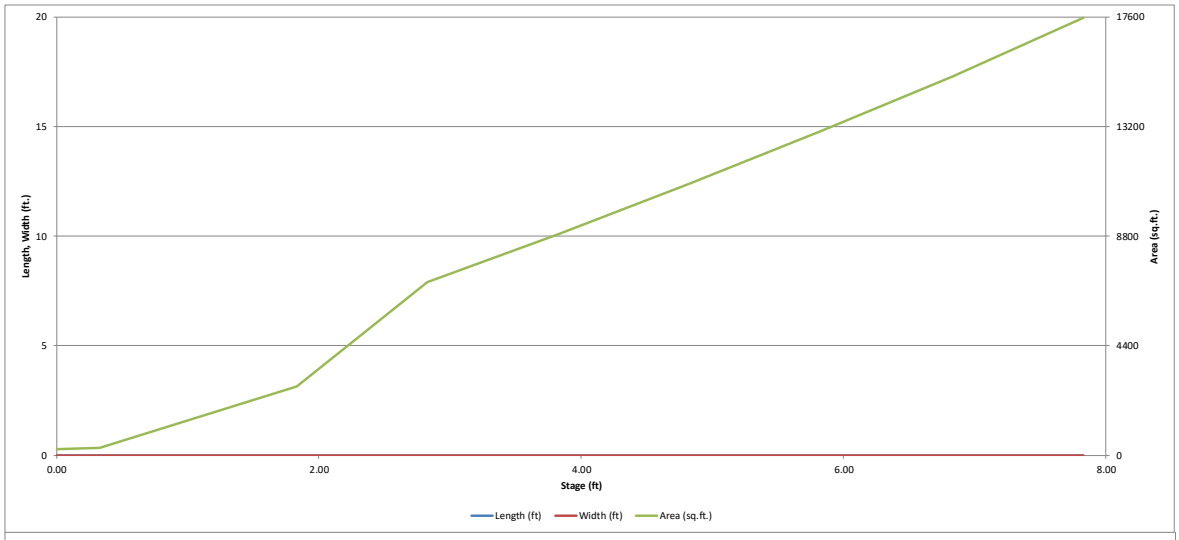
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

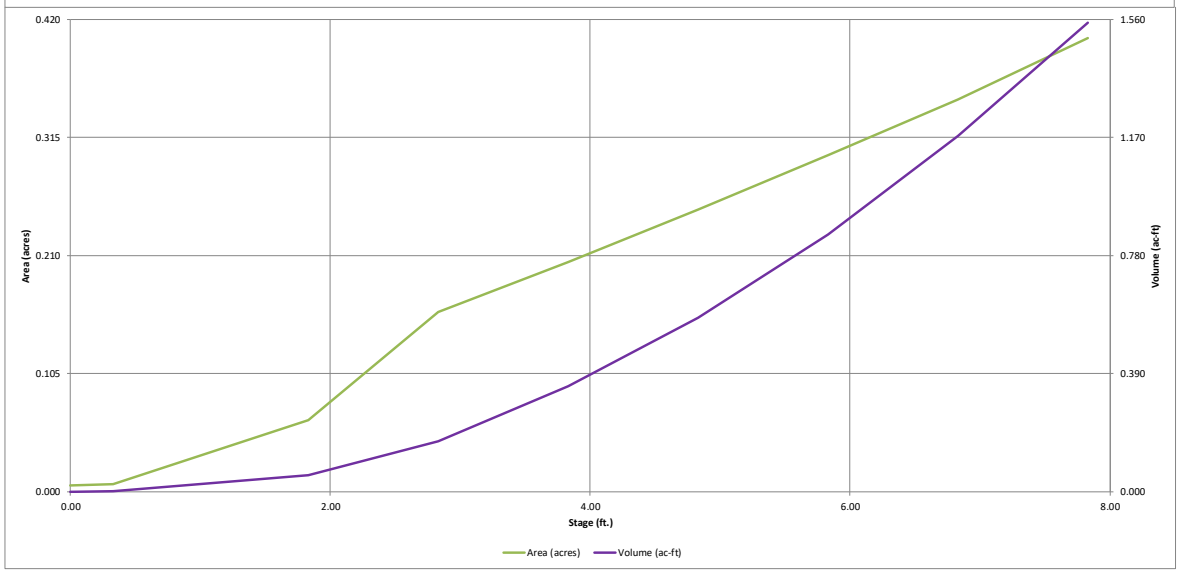
Depth Increment = 1.00 ft

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	--	--	--	250	0.006		
ISV - 6505.1	--	0.33	--	--	--	290	0.007	89	0.002
6506	--	1.83	--	--	--	2,766	0.064	2,381	0.055
6507	--	2.83	--	--	--	6,962	0.160	7,245	0.166
6508	--	3.83	--	--	--	8,884	0.204	15,168	0.348
6509	--	4.83	--	--	--	10,918	0.251	25,069	0.576
6510	--	5.83	--	--	--	13,028	0.299	37,042	0.850
6511	--	6.83	--	--	--	15,197	0.349	51,155	1.174
6512	--	7.83	--	--	--	17,593	0.404	67,550	1.551

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)



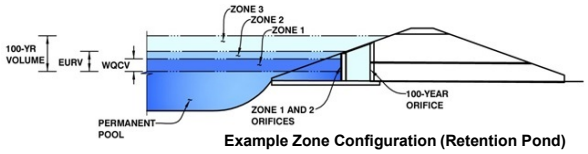


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: 250100 Pine Canyon F1

Basin ID: Pond M1 - Top of MP: 6504.77



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.59	0.130	Orifice Plate
Zone 2 (EURV)	3.84	0.219	Orifice Plate
3 (100+1/2WQCV)	5.56	0.422	Weir&Pipe (Restrict)
Total (all zones)		0.771	

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 Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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)	WQ Orifice Area per Row =	5.903E-03	ft^2
Depth at top of Zone using Orifice Plate =	6.73	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	N/A	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	0.85	sq. inches (diameter = 1 inch)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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	2.25	4.50					
Orifice Area (sq. inches)	0.85	0.85	0.85					

	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)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	3.85	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	4.58	N/A	feet
Overflow Weir Front Edge Length =	7.00	N/A	feet	Overflow Weir Slope Length =	3.01	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	10.48	N/A	
Horiz. Length of Weir Sides =	2.92	N/A	feet	Overflow Grate Open Area w/o Debris =	14.66	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	7.33	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	1.40	N/A	ft^2
Outlet Pipe Diameter =	18.00	N/A	inches	Outlet Orifice Centroid =	0.61	N/A	feet
Restrictor Plate Height Above Pipe Invert =	13.30		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.07	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	5.25	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.55	feet
Spillway Crest Length =	20.00	feet	Stage at Top of Freeboard =	6.80	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	0.35	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	1.16	acre-ft

Calculated Parameters for Spillway

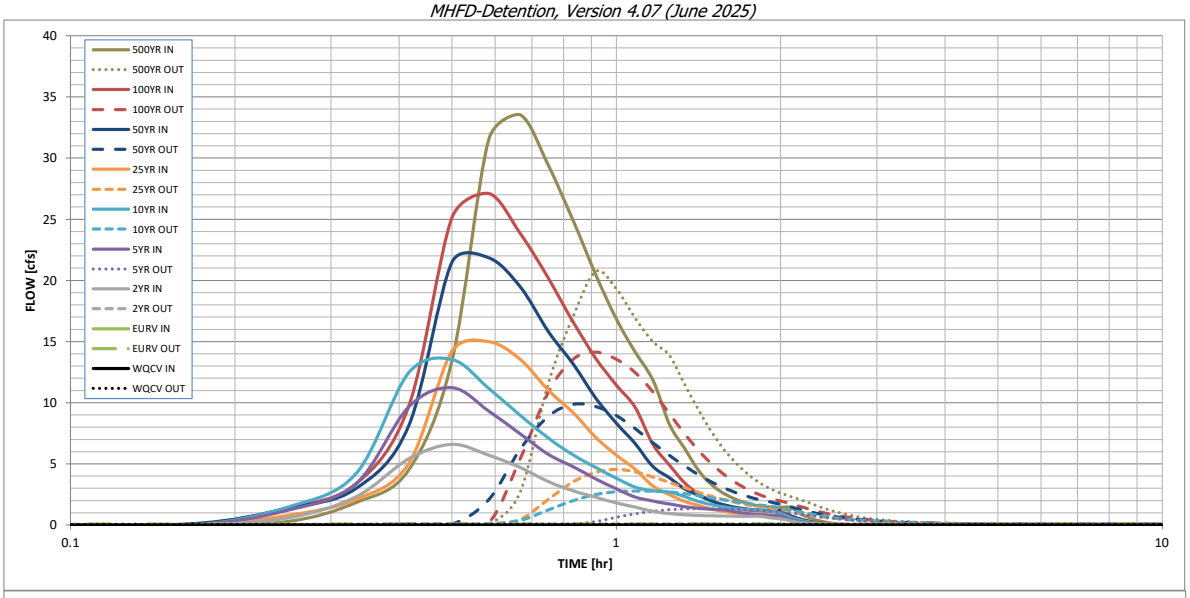
Routed Hydrograph Results

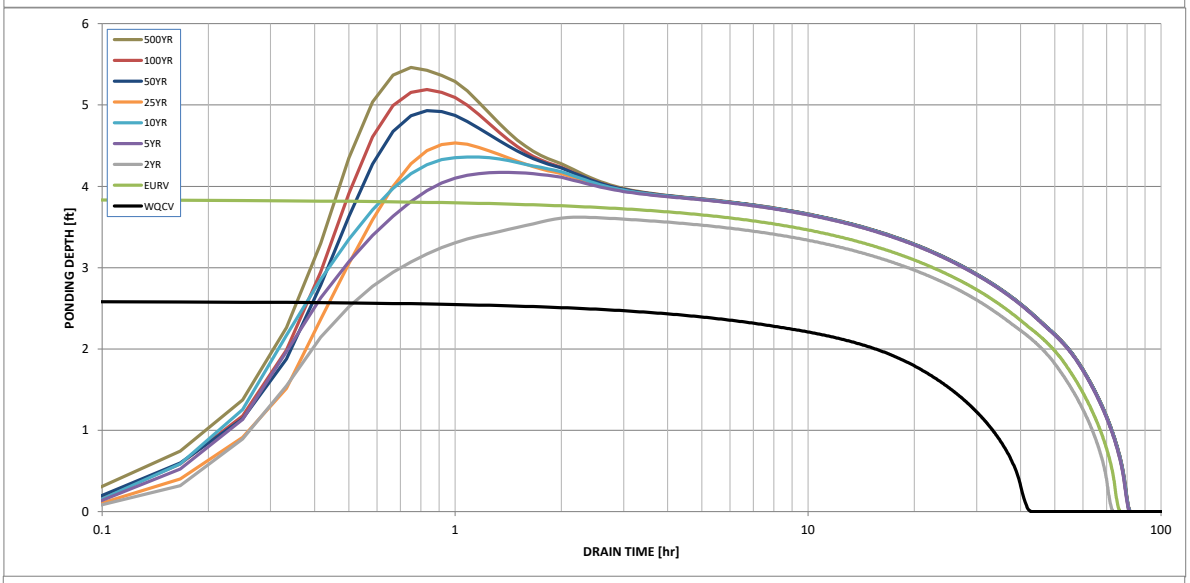
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

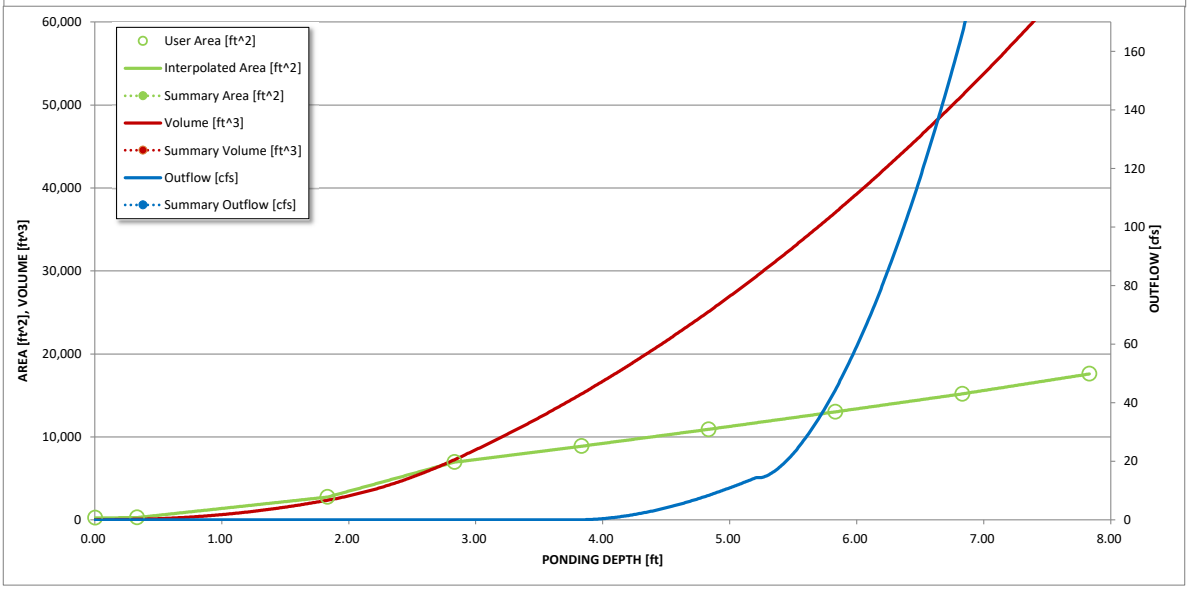
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.06	1.43	1.66	1.72	2.26	2.60	3.11
CUHP Runoff Volume (acre-ft) =	0.130	0.349	0.320	0.526	0.665	0.727	1.071	1.316	1.650
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	0.320	0.526	0.665	0.727	1.071	1.316	1.650
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	1.4	4.3	6.0	7.6	12.4	15.8	20.4
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A							
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.17	0.55	0.76	0.97	1.58	2.01	2.58
Peak Inflow Q (cfs) =	N/A	N/A	6.6	11.2	13.5	15.0	21.9	27.1	33.5
Peak Outflow Q (cfs) =	0.1	0.1	0.1	1.3	2.8	4.5	9.9	14.1	20.7
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.5	0.6	0.8	0.9	1.0
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.1	0.2	0.3	0.7	1.0	1.0
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	39	69	66	72	70	70	66	63	60
Time to Drain 99% of Inflow Volume (hours) =	**41**	73	70	77	76	76	74	73	72
Maximum Ponding Depth (ft) =	2.59	3.84	3.62	4.17	4.36	4.53	4.93	5.19	5.46
Area at Maximum Ponding Depth (acres) =	0.14	0.20	0.19	0.22	0.23	0.24	0.26	0.27	0.28
Maximum Volume Stored (acre-ft) =	0.131	0.350	0.304	0.418	0.461	0.502	0.598	0.666	0.740

DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)







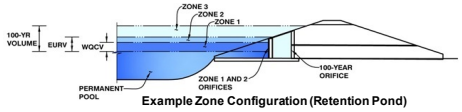
S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)

Project: 250100 Pine Canyon F1

Basin ID: Pond M2 - Top of MP: 6486.70



Example Zone Configuration (Retention Pond)

Watershed Information

Selected SCM Type =	**EDB**	
Watershed Area =	44.61	acres
Watershed Length =	1,550	ft
Watershed Length to Centroid =	685	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	52.00%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	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.

		Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.787 acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	2.201 acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	2.051 acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	3.280 acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	4.102 acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.72 in.) =	4.448 acre-feet	1.72	inches
50-yr Runoff Volume (P1 = 2.26 in.) =	6.468 acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	7.882 acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.11 in.) =	9.835 acre-feet	3.11	inches
Approximate 2-yr Detention Volume =	1.735 acre-feet		
Approximate 5-yr Detention Volume =	2.744 acre-feet		
Approximate 10-yr Detention Volume =	3.112 acre-feet		
Approximate 25-yr Detention Volume =	3.046 acre-feet		
Approximate 50-yr Detention Volume =	3.682 acre-feet		
Approximate 100-yr Detention Volume =	4.277 acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.787	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.414	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	2.469	acre-feet
Total Detention Basin Volume =	4.671	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	

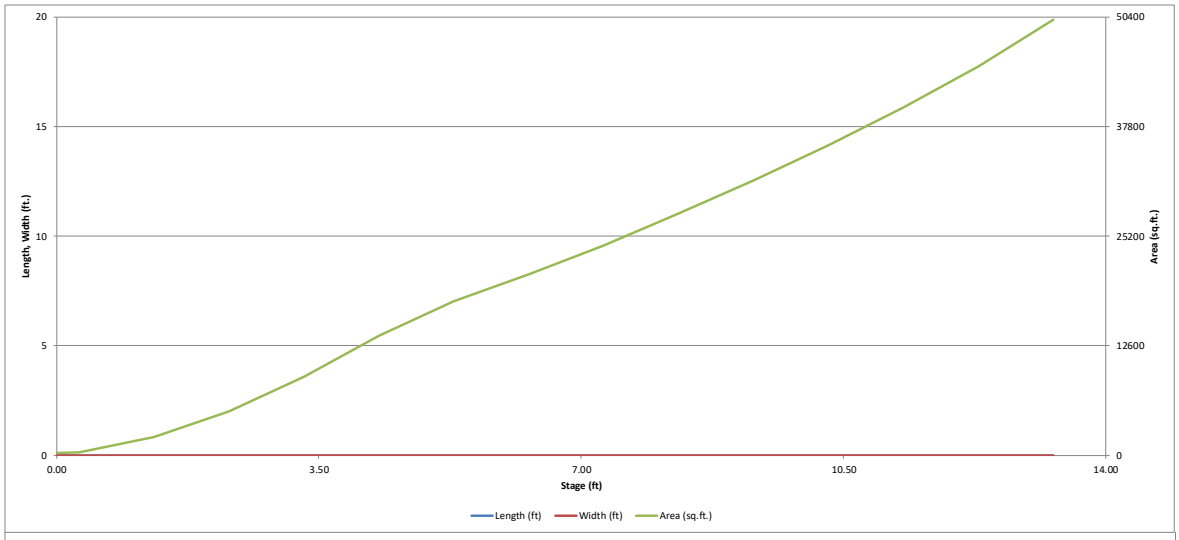
Initial Surcharge Area (A_{ISV}) =	user	ft^2
Surcharge Volume Length (L_{ISV}) =	user	ft
Surcharge Volume Width (W_{ISV}) =	user	ft
Depth of Basin Floor (H_{FLOOR}) =	user	ft
Length of Basin Floor (L_{FLOOR}) =	user	ft
Width of Basin Floor (W_{FLOOR}) =	user	ft
Area of Basin Floor (A_{FLOOR}) =	user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

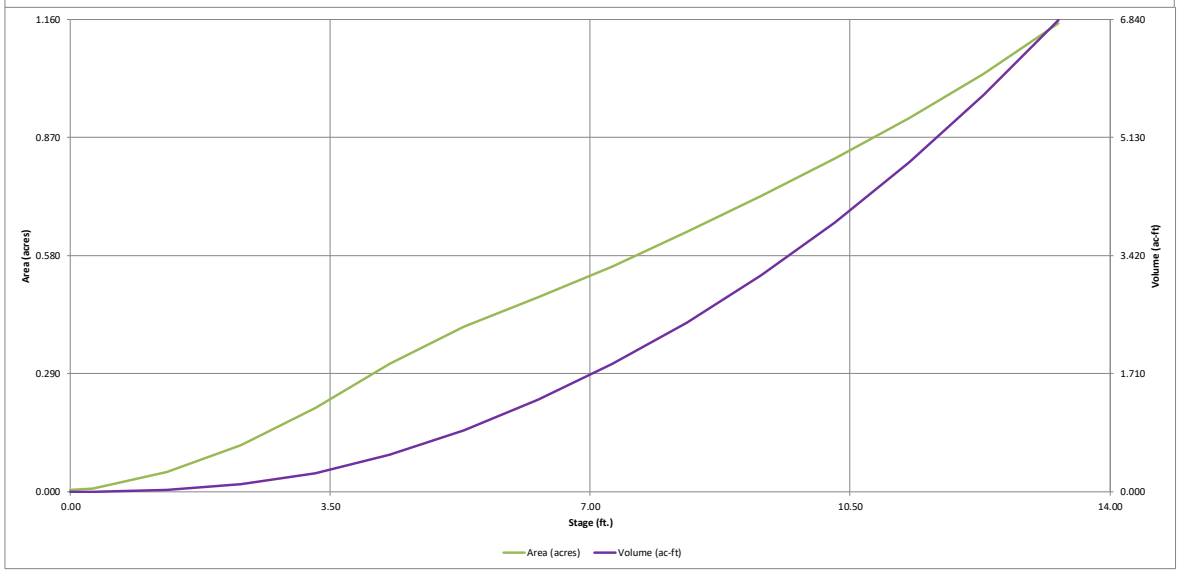
Depth Increment = 1.00 ft

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	--	--	--	250	0.006		
6487	--	0.30	--	--	--	325	0.007	86	0.002
6488	--	1.30	--	--	--	2,089	0.048	1,293	0.030
6489	--	2.30	--	--	--	4,994	0.115	4,835	0.111
6490	--	3.30	--	--	--	8,991	0.206	11,828	0.272
6491	--	4.30	--	--	--	13,701	0.315	23,174	0.532
6492	--	5.30	--	--	--	17,678	0.406	38,863	0.892
6493	--	6.30	--	--	--	20,811	0.478	58,107	1.334
6494	--	7.30	--	--	--	24,119	0.554	80,572	1.850
6495	--	8.30	--	--	--	27,808	0.638	106,535	2.446
6496	--	9.30	--	--	--	31,637	0.726	136,258	3.128
6497	--	10.30	--	--	--	35,682	0.819	169,917	3.901
6498	--	11.30	--	--	--	39,994	0.918	207,755	4.769
6499	--	12.30	--	--	--	44,701	1.026	250,102	5.742
6500	--	13.30	--	--	--	50,120	1.151	297,513	6.830

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.07 (June 2025)



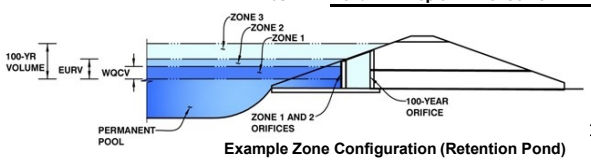


DETENTION BASIN OUTLET STRUCTURE DESIGN

MHFD-Detention, Version 4.07 (June 2025)

Project: 250100 Pine Canyon F1

Basin ID: Pond M2 - Top of MP: 6486.70



Example Zone Configuration (Retention Pond)

	Estimated Stage (ft)	Estimated Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	5.04	0.787	Orifice Plate
Zone 2 (EURV)	7.91	1.414	Orifice Plate
3 (100+1/2WQCV)	11.20	2.469	Weir&Pipe (Restrict)
Total (all zones)		4.671	

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 Area =	N/A	ft^2
Underdrain Orifice Diameter =	N/A	inches	Underdrain Orifice Centroid =	N/A	feet

Calculated Parameters for Underdrain

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)	WQ Orifice Area per Row =	2.000E-02	ft^2
Depth at top of Zone using Orifice Plate =	7.95	ft (relative to basin bottom at Stage = 0 ft)	Elliptical Half-Width =	N/A	feet
Orifice Plate: Orifice Vertical Spacing =	22.30	inches	Elliptical Slot Centroid =	N/A	feet
Orifice Plate: Orifice Area per Row =	2.88	sq. inches (diameter = 1-7/8 inches)	Elliptical Slot Area =	N/A	ft^2

Calculated Parameters for Plate

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	2.65	5.30					
Orifice Area (sq. inches)	2.88	2.88	2.88					

	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)

	Not Selected	Not Selected			Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Area =	N/A	N/A	ft^2
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)	Vertical Orifice Centroid =	N/A	N/A	feet
Vertical Orifice Diameter =	N/A	N/A	inches				

Calculated Parameters for Vertical Orifice

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

	Zone 3 Weir	Not Selected			Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	7.95	N/A	ft (relative to basin bottom at Stage = 0 ft)	Height of Grate Upper Edge, H_t =	8.68	N/A	feet
Overflow Weir Front Edge Length =	19.00	N/A	feet	Overflow Weir Slope Length =	3.01	N/A	feet
Overflow Weir Grate Slope =	4.00	N/A	H:V	Grate Open Area / 100-yr Orifice Area =	7.43	N/A	
Horiz. Length of Weir Sides =	2.92	N/A	feet	Overflow Grate Open Area w/o Debris =	39.80	N/A	ft^2
Overflow Grate Type =	Type C Grate	N/A		Overflow Grate Open Area w/ Debris =	19.90	N/A	ft^2
Debris Clogging % =	50%	N/A	%				

Calculated Parameters for Overflow Weir

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

	Zone 3 Restrictor	Not Selected			Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	0.00	N/A	ft (distance below basin bottom at Stage = 0 ft)	Outlet Orifice Area =	5.35	N/A	ft^2
Outlet Pipe Diameter =	36.00	N/A	inches	Outlet Orifice Centroid =	1.18	N/A	feet
Restrictor Plate Height Above Pipe Invert =	25.50		inches	Half-Central Angle of Restrictor Plate on Pipe =	2.00	N/A	radians

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	10.75	ft (relative to basin bottom at Stage = 0 ft)	Spillway Design Flow Depth=	0.96	feet
Spillway Crest Length =	57.00	feet	Stage at Top of Freeboard =	12.71	feet
Spillway End Slopes =	4.00	H:V	Basin Area at Top of Freeboard =	1.08	acres
Freeboard above Max Water Surface =	1.00	feet	Basin Volume at Top of Freeboard =	6.17	acre-ft

Calculated Parameters for Spillway

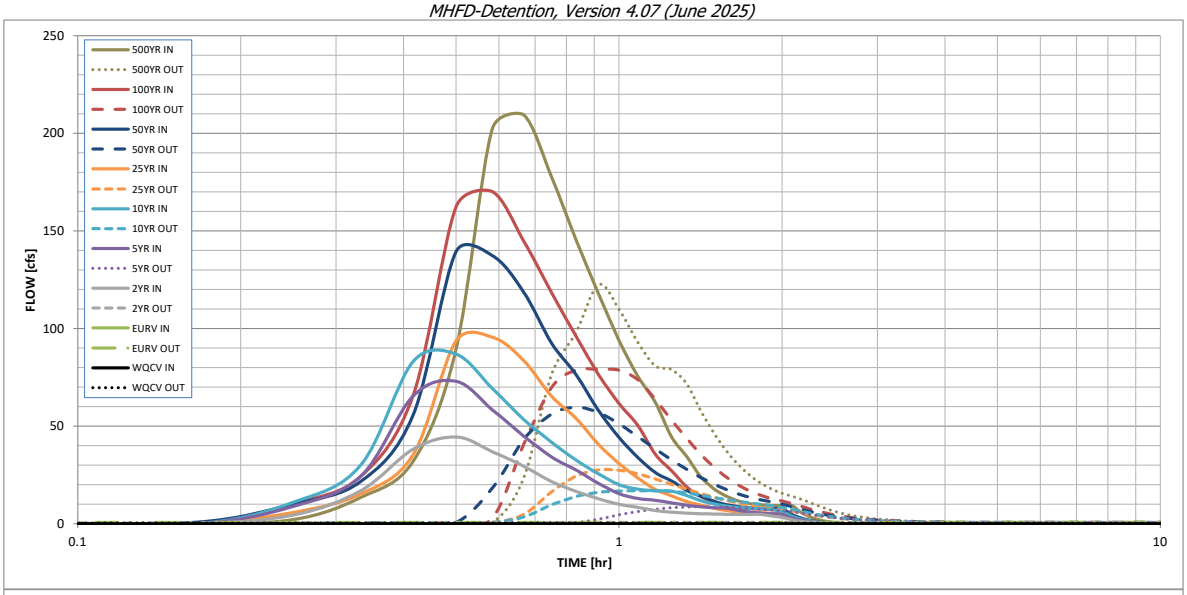
Routed Hydrograph Results

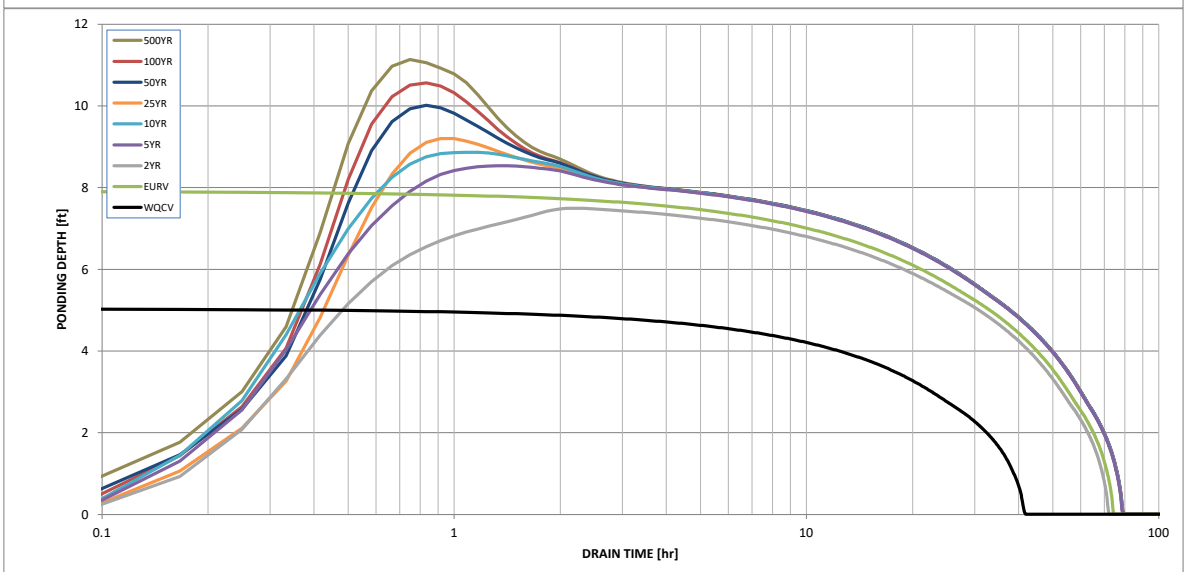
The user can override the default CUHP hydrographs and runoff volumes by entering new values in the Inflow Hydrographs table (Columns W through AF).

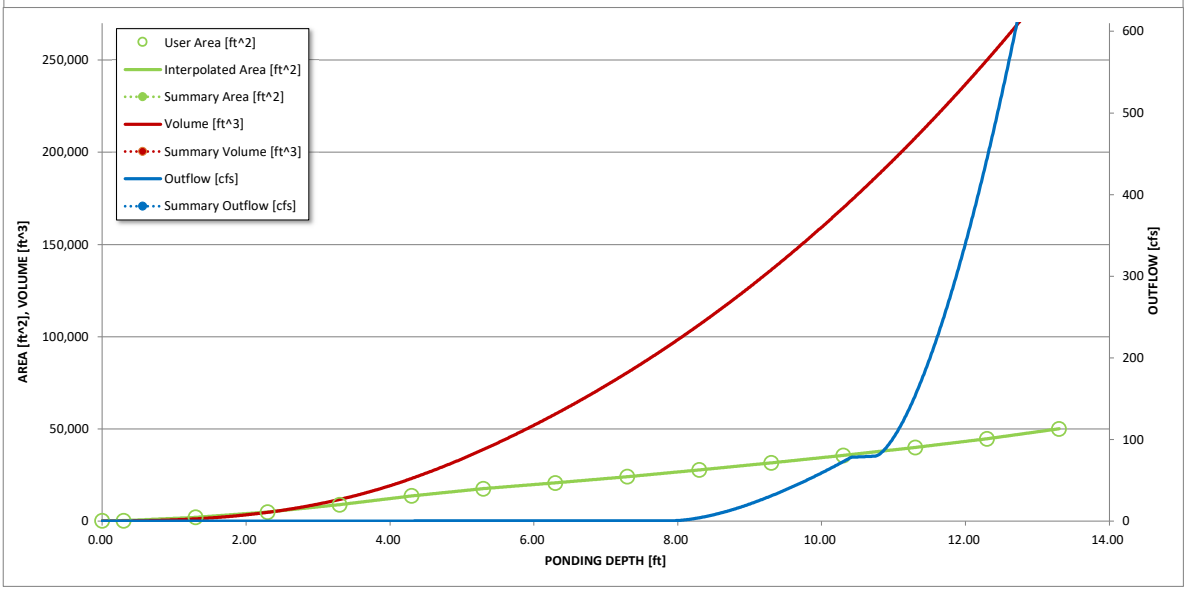
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	N/A	N/A	1.06	1.43	1.66	1.72	2.26	2.60	3.11
CUHP Runoff Volume (acre-ft) =	0.787	2.201	2.051	3.280	4.102	4.448	6.468	7.882	9.835
Inflow Hydrograph Volume (acre-ft) =	N/A	N/A	2.051	3.280	4.102	4.448	6.468	7.882	9.835
CUHP Predevelopment Peak Q (cfs) =	N/A	N/A	8.0	25.8	35.1	45.2	73.8	94.0	121.1
OPTIONAL Override Predevelopment Peak Q (cfs) =	N/A	N/A						87.9	
Predevelopment Unit Peak Flow, q (cfs/acre) =	N/A	N/A	0.18	0.58	0.79	1.01	1.65	1.97	2.71
Peak Inflow Q (cfs) =	N/A	N/A	44.4	72.9	86.9	95.5	139.3	170.1	209.5
Peak Outflow Q (cfs) =	0.4	0.6	0.6	8.6	16.8	27.5	59.6	79.0	122.4
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.5	0.6	0.8	0.9	1.0
Structure Controlling Flow =	Plate	Plate	Plate	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Overflow Weir 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	0.2	0.4	0.7	1.5	2.0	2.0
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	38	67	65	68	66	65	61	59	56
Time to Drain 99% of Inflow Volume (hours) =	**40**	71	69	74	74	73	71	70	68
Maximum Ponding Depth (ft) =	5.04	7.91	7.49	8.53	8.86	9.20	10.01	10.56	11.13
Area at Maximum Ponding Depth (acres) =	0.38	0.61	0.57	0.66	0.69	0.72	0.79	0.84	0.90
Maximum Volume Stored (acre-ft) =	0.790	2.203	1.956	2.595	2.810	3.049	3.667	4.117	4.615

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			

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Sep 25 2026

Pond L - Emergency Overflow Pipe Capacity

Circular

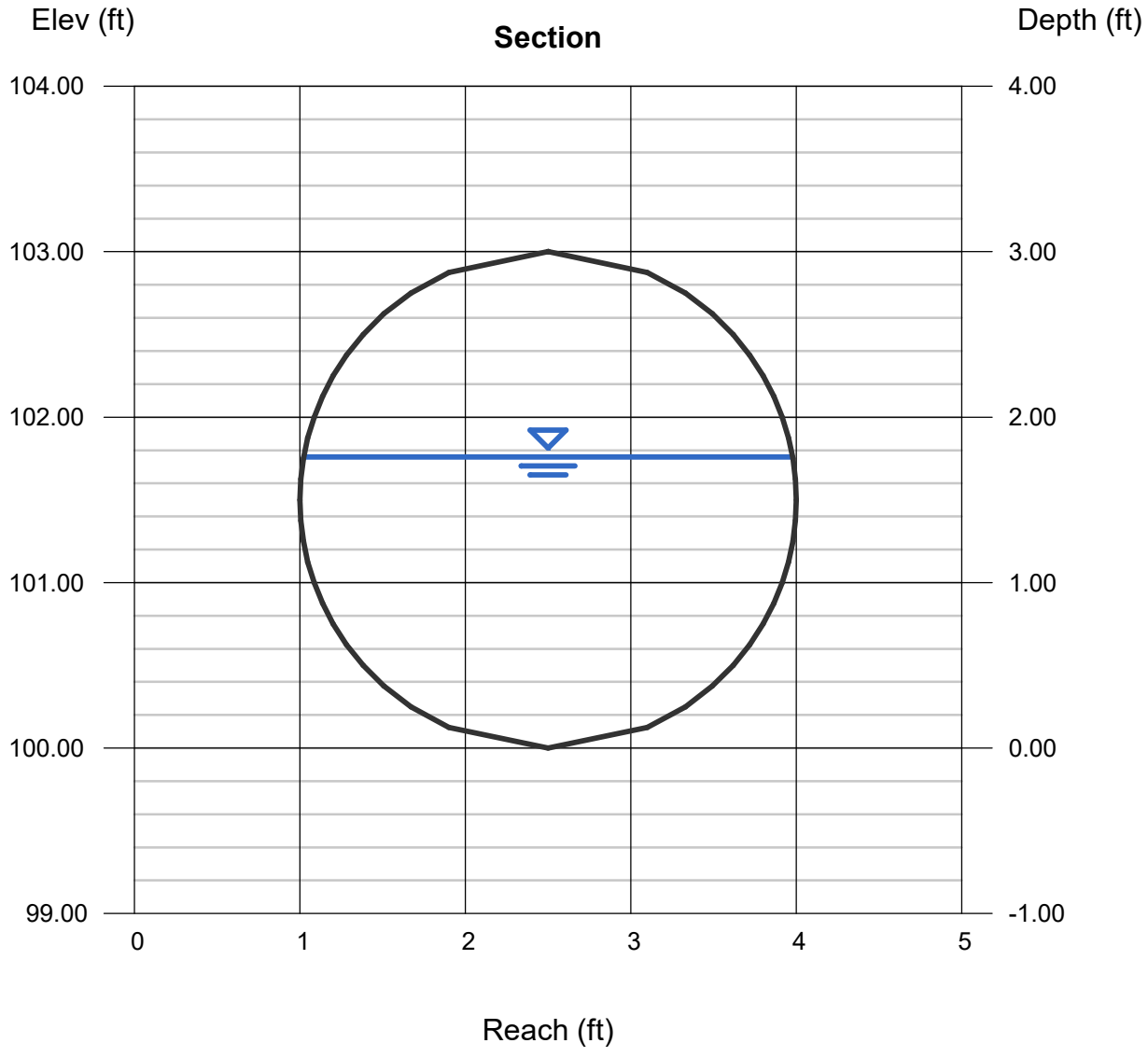
Diameter (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 1.00
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 47.10

Highlighted

Depth (ft)	= 1.76
Q (cfs)	= 47.10
Area (sqft)	= 4.33
Velocity (ft/s)	= 10.87
Wetted Perim (ft)	= 5.25
Crit Depth, Yc (ft)	= 2.24
Top Width (ft)	= 2.95
EGL (ft)	= 3.60



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Sep 25 2026

Pond M1 - Emergency Overflow Pipe Capacity

Circular

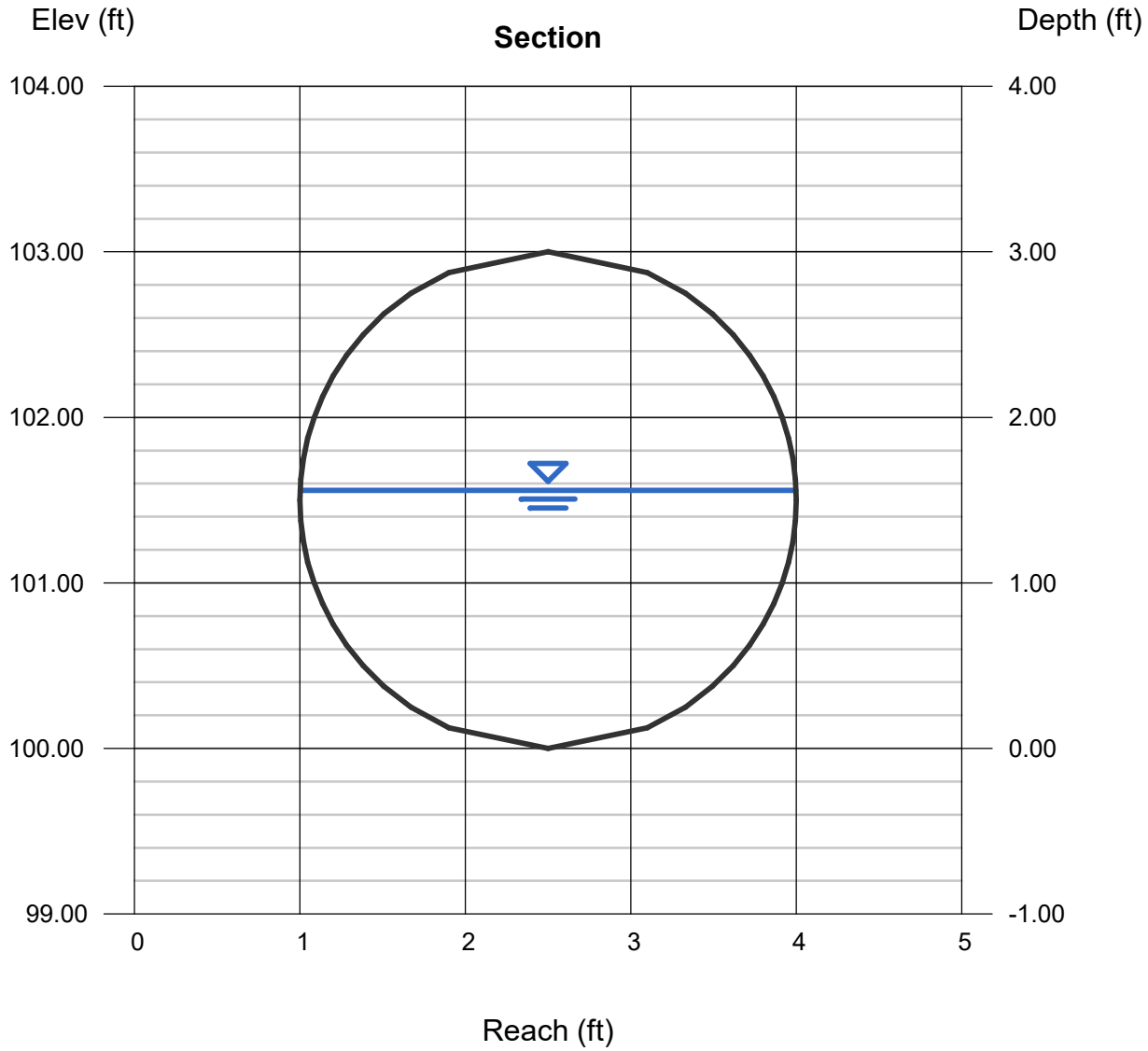
Diameter (ft)	= 3.00
Invert Elev (ft)	= 100.00
Slope (%)	= 0.50
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 27.10

Highlighted

Depth (ft)	= 1.56
Q (cfs)	= 27.10
Area (sqft)	= 3.73
Velocity (ft/s)	= 7.26
Wetted Perim (ft)	= 4.84
Crit Depth, Yc (ft)	= 1.68
Top Width (ft)	= 3.00
EGL (ft)	= 2.38



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Sep 25 2026

Pond M2 - Emergency Overflow Pipe Capacity

Circular

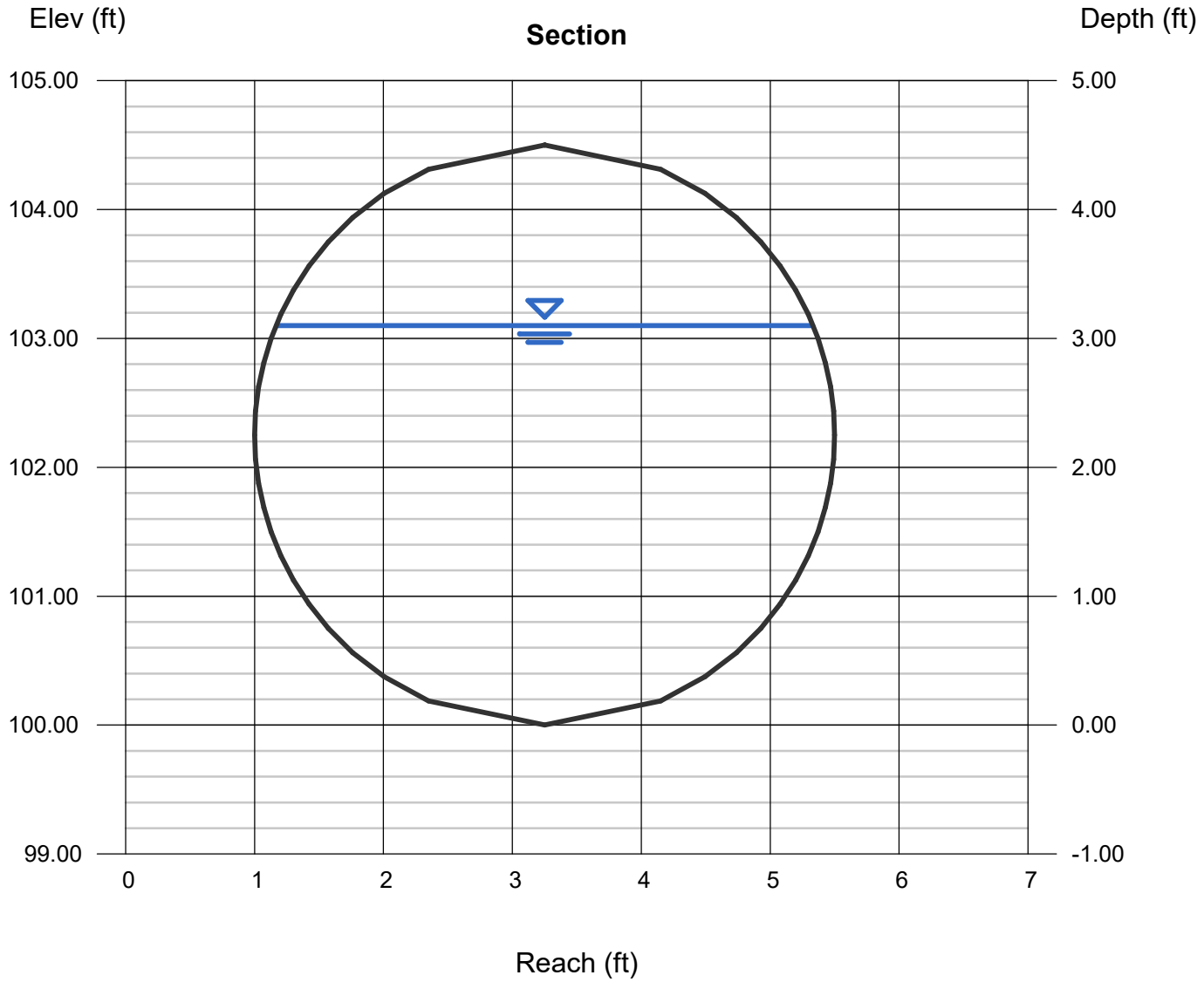
Diameter (ft)	= 4.50
Invert Elev (ft)	= 100.00
Slope (%)	= 0.95
N-Value	= 0.012

Calculations

Compute by:	Known Q
Known Q (cfs)	= 170.00

Highlighted

Depth (ft)	= 3.10
Q (cfs)	= 170.00
Area (sqft)	= 11.70
Velocity (ft/s)	= 14.53
Wetted Perim (ft)	= 8.82
Crit Depth, Yc (ft)	= 3.80
Top Width (ft)	= 4.16
EGL (ft)	= 6.38



Appendix D - Reference Documents

PHASE I DRAINAGE REPORT

FOR

PINE CANYON

CASTLE ROCK, COLORADO

Located in parts of Section 34, 35 & 36, Township 7 South, Range 67 West of the 6th Principal Meridian, and part of Section 1, Township 8 South, Range 67 West of the 6th Principal Meridian

Prepared for:

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CORE Project Number: 25-004

April 2025

TABLE OF CONTENTS

I. GENERAL LOCATION AND DESCRIPTION 1
A. Site Location 1
B. Description of Property 1
II. DRAINAGE BASINS AND SUB-BASINS 2
A. Major Drainage Basins 2
B. Minor Drainage Basins 3
III. EXISTING STORMWATER conveyance AND STORAGE FACILiTIES 8
A. Existing Stormwater Conveyance Facilities 8
B. Existing Stormwater Storage Facilities 9
IV. PROPOSED STORMWATER CONVEYANCE and STorage FACILITIES 9
A. Proposed Stormwater Conveyance Facilities 9
B. Proposed Stormwater Storage Facilities 10
V. WATER QUALITY AND BEST MANAGEMENT PRACTICES 11
A. Non-Structural Best Management Practices 11
B. Structural Best Management Practices 11
VI. FLOODPLAIN MODIFICATIONS 13
A. Major Drainageway – Undesignated Floodplain 13
B. Major Drainageway – Designated Floodplain 13
VII. POTENTIAL PERMITTING REQUIREMENTS 13
VIII. CONCLUSIONS 14
IX. REFERENCES 15

APPENDICES

Appendix A

- Vicinity Map
- FIRM Maps
- NRCS Soil Classification Map & Hydrologic Soil Group Map

Appendix B Hydrologic Calculations

Appendix C Detention Pond Calculations

Appendix D Reference Excerpts

Appendix E Drainage Maps

I. GENERAL LOCATION AND DESCRIPTION

A. Site Location

This Phase I Drainage Report provides a preliminary design for the Pine Canyon development located in parts of Section 34, 35 & 36, Township 7 South, Range 67 west of the 6th Principal Meridian, and part of Section 1, Township 8 South, Range 67 west of the 6th Principal Meridian and will be referred herein as the "site". The site is located on both the east and west side of I-25 between the Wilcox Street/Wolfensberger and Founders Parkway exit. The eastern portion of the site, referred to as the eastern parcels, is bounded by Founders Parkway to the east, the Scott property, undeveloped to the north, Front Street/I-25 to the west, and The Woodlands Filing 9 and 10 and Scott II – Filing 2 subdivisions to the south. The western portion of the site, referred to as the western parcels, is bounded by I-25 to the east, undeveloped land to the south, Metzler Ranch Filing No. 2 to the north, and East Plum Creek to the west. See the Vicinity Map located within Appendix A.

B. Description of Property

The overall property consists of approximately 540 acres of currently undeveloped land with slopes ranging from 2% to 45% covered in native vegetation, various species of trees, and the Castle Rock Ridgeline contributing to various rock outcroppings across the site.

The National Resource Conservation Service (NRCS) Web Soil Surveys were relied upon to determine the soil types and characteristics located on-site. Soil maps are provided in Appendix A. The soils vary throughout the site and include Bresser Sandy Loam (BrB), Bresser Sandy Loam (BrD), Fondis Clay Loam (FoD), Fondis-Kutch (Fu), Kutch Sandy Loam (KtE), Stapelton Loamy Sand (SsE). The soil types located on-site are a part of Type A, B, C, and D hydrologic soil groups. The Castle Rock Ridgeline extends through the eastern portion of the site, defining the soil characteristics of the eastern parcels. Hydrologic Soil Group D is predominantly located west of the ridgeline, while Hydrologic Soil Group C is predominantly located east of the ridgeline. The western parcels hydrologic soil group is predominantly Hydrologic Soul Group B with Hydrologic Soil Group D encompassing East Plum Creek that traverses the western parcels. Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups (A, B, C, and D) according to the rate of water infiltration. Soil group A has the most infiltration and produces the least runoff and group D has the least infiltration and produces the most runoff. See the NRCS Soil Survey Maps located within Appendix A.

East Plum Creek, a major drainageway, traverses the western border of the site. There are three (3) tributaries to East Plum Creek that convey stormwater flows through the site. Walker Tributary #1 conveys stormwater flows from the eastern parcels underneath I-25, Liggett Road, and the Union Pacific Railroad and discharges into East Plum Creek. Walker Tributary #2 conveys stormwater flows from the eastern parcels to the southern edge of the site where they are conveyed through The Woodlands Filing No. 9 and Scott II Filing No. 3 existing developments. Scott Tributary conveys stormwater flows from the eastern parcels to the north edge of the site where they are conveyed through vacant land then to Metzler Ranch Filing 1 existing development. There are no other major drainageways, existing irrigation ditches, or canals located on the site. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

FEMA Firm Panel Map No. 08035C0189G, Revised March 16th, 2016 and Map No. 08035C0188G, Revised March 16, 2016, were used to determine the floodplain areas located on-site. For the eastern parcels, the Walker Tributary #2 is located within a shaded region of Zone X, which are areas of moderate flood hazard having either a 0.2 percent annual chance flood risk or areas of 1% annual chance flood risk with average depths of less than 1 foot or with drainage areas less than 1 square mile. The western boundary of the project is located within the East Plum Creek floodplain, Floodway zone AE, which are areas subject to a one percent or greater annual chance of flooding (100-Year storm event) in any given year with Base Flood Elevations determined. The lower reach of Walker Tributary #2 is classified as a Major Drainageway in accordance with TOCR Floodplain Regulations. Floodplain delineations will be established at the time of site development in accordance with local Floodplain Regulations. The floodplain has been depicted on the attached drainage maps located in Appendix A.

Significant geologic features located on-site include the Castle Rock Ridgeline that contributes to various rock outcroppings located east of I-25, bisecting the eastern parcels and East Plum Creek drainageway located west of I-25, traversing across the western parcels.

The western parcels will consist of mixed-use development including, but not limited to, residential lots, multi-family areas, commercial areas that include office space and` business district, open spaces, parks, trails, roadways, utility infrastructure, a water treatment facility, and wells. The eastern parcels will consist of multi-family, school, residential, a designated commercial area, open space, parks, trails, roadways, and utility infrastructure.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

The Castle Rock Ridgeline bisects the eastern portion of the site, dividing the existing historic drainage pattern between two major drainage basins. Portions of the site situated west of the ridgeline are located within the East Plum Creek Basin and portions of the site situated east of the ridgeline are located with the Cherry Creek Basin. No major basin transfers are proposed. There may be transfers between minor basins, but flows will not exceed historic rates. See the Drainage Maps located within Appendix E for additional detail.

Cherry Creek Basin

Portions of the site situated east of the ridgeline are located within the Cherry Creek Basin. These portions of the project within Cherry Creek Basin are subject to Department of Public Health and Environment Water Quality Control Commission Cherry Creek Reservoir Control Regulation 5 CCR 1002-72. This portion of the site is currently undeveloped and will consist of multi-family and single-family residential developments. Flows from this portion of the site flow from the ridgeline to the east and are conveyed through the Castle Oaks Estates (Terrain) Planned Development, into McMurdo Gulch, and ultimately into Cherry Creek. There are no other major drainageways, existing irrigation ditches, or canals located on this portion of the project. No major basin transfers are proposed. There may be transfers between minor basins, but flows will not

exceed historic rates. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

East Plum Creek Basin

Portions of the site situated west of the ridgeline are located within the East Plum Creek Basin. This portion of the site is currently undeveloped and will consist of multi-family, single-family residential, school, commercial mixed-use, and business district. Flows from this portion of the site flow from ridgeline to the west where they are then conveyed under I-25, Front Street, Liggett Road, and the Union Pacific Railroad via existing culvert crossings and are channelized in three tributary drainageways, Walker Tributary #1, Walker Tributary #2, and Scott Tributary. These flows are then conveyed into East Plum Creek which traverses the western border of the site. East Plum Creek flows from south to north, conveying all flows from this portion of the site ultimately to the South Platte River. Walker Tributary #1, Walker Tributary #2, and Scott Tributary are located onsite. There are no other major drainageways, existing irrigation ditches, or canals located on the site. No major basin transfers are proposed. There may be transfers between minor basins, but flows will not exceed historic rates. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested. A summary of the various outfalls and their tributary areas is provided below:

Summary of Tributary Areas					
Overall Watershed	Tributary	Existing Tributary Area	Proposed Tributary Area	Δ	Δ
		(Ac)	(Ac)	(Ac)	%
East Plum Creek	Drains Directly to Plum Creek	41.3	40.7	-0.6	-1.5%
	Walker Tributary #1	346.2	384.0	37.8	10.9%
	Walker Tributary #2	114.6	101.8	-12.8	-11.2%
	Walker Tributary #2 via The Woodlands	12.4	26.1	13.8	111.4%
	Hangman's Gulch via Front St	90.5	56.0	-34.5	-38.2%
	Hangman's Gulch via The Woodlands	32.9	25.3	-7.6	-23.2%
	Scott Tributary	106.0	111.9	5.9	5.6%
Cherry Creek	McMurdo Gulch	63.1	63.1	0.0	-0.1%

The site is currently undeveloped and will be developed to have various commercial, mixed-use, municipal, and residential land uses. Offsite flows will be routed through the site and will maintain their historic drainage patterns. No improvements or development is anticipated within East Plum Creek.

B. Minor Drainage Basins

The proposed drainage basins delineated within this report generally reflect historical drainage patterns of the site. Proposed detention ponds will control discharge into existing drainageways or existing drainage infrastructure at historic, or below historic,

flow rates to comply with stormwater requirements of Castle Rock, Douglas County, and Cherry Creek Basin Water Quality Authority. Offsite flows will be conveyed through the site to maintain their historic drainage patterns. Fully developed conditions are assumed for offsite flows if this information is available, otherwise offsite flows are based on existing conditions.

Several minor basins discharge detained flows into off-site drainageways or existing drainage infrastructure of previously developed areas. Basins G, I, and K discharge directly to the Woodlands development, Basins L and M discharge directly to the Castle Oaks Estates development, Basins J and H discharge indirectly to the Metzler Ranch development via Scott's Tributary drainageway, and Basin E discharges directly to Hangman's Gulch drainageway. Further details relative to these discharges will be provided in future Phase II and Phase III reports.

The Drainage Maps included in the Appendix show sub-basin boundaries and acreages. The proposed basins are described as below:

East Plum Creek Basin

Basin A (15.77 Ac)

Basin A is currently undeveloped and drains directly to East Plum Creek, which traverses the basin. This basin appears to convey offsite flows to East Plum Creek from an existing industrial area to the east (Hier Drilling), although this drainage design cannot be confirmed through existing construction documents or reports. This basin is anticipated to be open space and includes portions of the existing Union Pacific Railroad. This basin is comprised of a portion of existing Basin EX1.

Basin B (16.99 Ac)

Basin B is currently undeveloped and conceptually consists of open channel, undeveloped open space, and portions of the existing Union Pacific Railroad. Walker Tributary #1 is located in the northern portion of Basin B and discharges directly into East Plum Creek. This basin is comprised of a portion of existing Basin EX1.

Basin C (18.10 Ac)

Basin C is currently undeveloped and is tributary to the Walker Tributary #1, which bisects the center of the site and flows west underneath the railroad in an existing culvert. This basin is comprised of existing Basin EX5. Basin C will consist of a commercial/business park and a small portion of dedicated open space. Stormflows from the eastern parcels as well as from Basin D will be routed through the Basin. Runoff from Basin C will be detained in Pond C and released into the Walker Tributary #1 drainageway at historic rates. Walker Tributary #1 will likely be relocated or piped along the western edge (railroad) to accommodate the proposed land plan. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

Basin D (51.63 Ac)

Basin D is currently undeveloped and is tributary to the Walker Tributary #1, which traverses the southern edge of the basin and flows west underneath Liggett Road in existing culverts. Basin D will consist of a commercial/business park and a small portion of dedicated open space. Storm flows from the eastern parcels will be routed through the

Basin. Runoff from Basin D will be detained in Pond D and released into the existing culverts below Liggett Road and ultimately to the Walker Tributary #1 drainageway at historic rates. The tributary will be piped or will remain in its existing state along the southern edge of the basin and discharge into an existing culvert located underneath Liggett Road, to be determined with future phases. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested. Offsite flows from northeast of Basin D will be piped through the northern portion of the basin consistent with the existing drainage pattern. This basin is comprised of portions of existing basins EX6 and EX8.

Basin E (25.27 Ac)

Basin E is currently undeveloped. In the existing condition, the majority of the basin is tributary to Walker Tributary #1 and a minor portion is tributary to Hangman's Gulch via the Scott II Filing No. 3 and Castle Terrace developments. In the proposed condition, this basin will be tributary to Hangman's Gulch. This basin is comprised of existing basins EX9, EX10, and EX28. Basin E will consist of multi-family units and parks. Stormflows from Basin O and F will be routed through the eastern portion of the Basin. The majority of the runoff from Basin E will be detained in Pond E and released into the existing Front Street storm sewer system to Hangman's Gulch at historic rates.

Basin F (38.19 Ac)

Basin F is currently undeveloped. In its existing condition, this basin is tributary to both Walker Tributary #1 and Hangman's Gulch via the Scott II Filing No. 3 and Castle Terrace developments. In the proposed condition this basin is tributary to Walker Tributary #1. This basin is comprised of existing basins EX9 and EX28. Basin F will consist of open-space and single-family residential units. Runoff from Basin F will be detained in Pond F and released into a proposed stormwater system that will discharge to Walker Tributary #1 at historic rates.

Basin G (101.79 Ac)

Basin G is currently undeveloped and located in the south central portion of the site. This basin is comprised of existing basin EX15, as well as portions of EX11 and EX18. The basin historically drains to the Walker Tributary #2 which is tributary to Hangman's Gulch. Basin G will consist of dedicated open-space and single-family development. Runoff from Basin G will be conveyed to Walker Tributary #2 which will generally remain a natural drainageway that drains into Pond G. Flows from Pond G will then be released at historic rates into Hangman's Gulch.

Basin H (67.28 Ac)

Basin H is currently undeveloped and drains to Scott's Tributary. The basin consists of runoff from the north-central portion of the site that historically drains to Scott's Tributary and is conveyed to a storm sewer within Metzler Ranch Filing No. 1. This basin is comprised of portions of existing basins EX11, EX12, and EX13. Basin H will consist of single-family units and a park area. Runoff from Basin J will be routed through the basin. Runoff from Basin H will be conveyed to Pond H where flows will be released at historic rates into the existing Scott's Tributary drainageway.

Basin I (26.11 Ac)

Basin I is currently undeveloped and is tributary to Hangman's Gulch. This basin is comprised of existing basin EX18, as well as portions of EX15 and EX20. The basin consists of runoff from the southeastern portion of the site that historically drains to the Woodlands Filing No. 9 drainageway where it is conveyed to Hangman's Gulch. Basin I will consist of single-family units and open space. Runoff from Basin I will be conveyed to Pond I where flows will be released at historic rates into the Woodlands Filing No. 9 development.

Basin J (44.57 Ac)

Basin J is currently undeveloped and drains to Scott's Tributary. This basin is comprised of portions of existing basins EX11, EX12, EX13, and EX15. Basin J will consist of single-family units, open space, and a resort. Runoff from Basin J will be conveyed to Pond J where flows will be released at the historic rate and conveyed through Basin H to the existing Scott's Tributary drainageway. From there, runoff is conveyed to a storm sewer within Metzler Ranch Filing No. 1, consistent with historic drainage patterns.

Basin K (25.30 Ac)

Basin K is currently undeveloped and is tributary to Hangman's Gulch. This basin consists of existing basin EX19. This basin is located in the southeastern portion of the site that historically drains to the Woodlands Filing No. 10 & 12 storm sewer, and eventually Hangman's Gulch. Basin K will consist of single-family units and open space. Runoff from Basin K will be conveyed to Pond K where flows will be released at historic rates into the Woodlands development.

Basin N (18.78 Ac)

Basin N is currently undeveloped and drains directly to East Plum Creek, which traverses the basin. This basin consists of portions of existing basin EX1. This basin appears to convey offsite flows to East Plum Creek from an existing industrial area to the east (Hier Drilling), although this drainage design cannot be confirmed through existing construction documents or reports. This basin is anticipated to be open space - development is not anticipated within the basin.

Basin O (43.86 Ac)

Basin O is currently undeveloped. In its existing condition it is tributary to both Walker Tributary #1 and Hangman's Gulch via Scott II Filing No. 3. When developed, this basin will be tributary to Walker Tributary #1. This basin consists of portions of existing basins EX9 and EX28. Basin O will consist of a school, open space, and single-family units. Stormflows from Basin F will be routed through the northern portion of the basin. Runoff from Basin O will be detained in Pond O and released into Walker Tributary #1 at historic rates.

Cherry Creek Basin

Basin L (28.76 Ac)

Basin L is currently undeveloped and is tributary to McMurdo Gulch which eventually discharges to Cherry Creek. This basin consists of existing basins EX14, EX16 and EX25. The basin consists of runoff from the northeast portion of the site which historically drains

to the existing culvert underneath Founders Parkway. Basin L will consist of open space and residential units. Runoff from Basin L will be conveyed to Pond L where flows will be released at historic rates into the Founders Parkway roadside ditch and the culvert that crosses into the Castle Oaks Estates development. No major basin transfers are proposed.

Basin M (34.31 Ac)

Basin M is currently undeveloped and is tributary to McMurdo Gulch which eventually discharges to Cherry Creek. This basin consists of portions of existing basins EX14, EX16, and EX25. The basin consists of runoff from the southeast portion of the site which historically drains to existing culverts underneath Founders Parkway. Basin M will consist of residential units. Runoff from Basin M will be conveyed to Pond M where flows will be released at historic rates into the Founders Parkway culverts that cross into the Castle Oaks Estates development.

Off-Site Basins

Basin OS1 (10.71 Ac)

Basin OS1 is currently undeveloped and drains to Walker Tributary #1 through Basin B. This basin consists of a portion of existing basin EX4. Runoff from this Basin will be conveyed through Basin B to Walker Tributary #1 consistent with the historic flow pattern. The zoning for this basin is public land.

Basin OS2 (29.10 Ac)

Basin OS2 is an existing agricultural property with associated buildings and a residence. It drains to Walker Tributary #1 through Basin D. This basin consists of a portion of existing basin EX8. Runoff from this Basin will be conveyed within Walker Tributary #1 to the existing culverts under Liggett Road consistent with the historic flow pattern. The zoning for this basin is general industrial.

Basin OS3 (23.57 Ac)

Basin OS3 is currently undeveloped and is tributary to Walker Tributary #1. This basin consists of existing basin EX9. The basin consists of off-site runoff from the unplatted Scott parcel to the north of Basin E. Runoff from this Basin will be conveyed within Walker Tributary #1 and the existing culverts under Front Street and I-25. The future land use for this basin is unknown.

Basin EX2 (18.16 Ac)

Basin EX2 is currently developed and consists of I-25, Front St, and a portion of Hazen Moore Filing No. 1. This basin drains to an existing culvert under I-25 and eventually to Walker Tributary #1. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX3 (26.84 Ac)

Basin EX3 is currently developed and consists of Metzler Ranch Filing No. 2 and a detention pond to serve the development. The pond discharges to Walker Tributary #1. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX7 (19.90 Ac)

Basin EX7 is currently developed and consists of Castle Lock Self Storage and a detention pond to serve the development. The pond appears to discharge to Walker Tributary #1. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX21 (6.53 Ac)

Basin EX21 is currently developed and consists of commercial development. This basin appears to discharge via sheet flow to open space onsite and then East Plum Creek. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX22 (6.73 Ac)

Basin EX22 is currently developed and consists of Storquest Self Storage and a detention pond to serve the development. The pond discharges to open space onsite and then East Plum Creek. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX23 (35.20 Ac)

Basin EX23 is currently developed and consists of Metzler Ranch Filing No. 8, Hazen Moore Filing No. 1, and a detention pond to serve both developments. The pond discharges to an existing storm sewer crossing underneath Front Street and I-25. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX24 (51.70 Ac)

Basin EX24 is currently developed and consists of Hazen Moore Filing No. 2, open space, and a detention pond to serve the development. The pond discharges to a storm sewer that travels through Hazen Moore Filing No. 1 to Walker Tributary #1. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX26 (12.30 Ac)

Basin EX26 is currently developed and consists of Scott II Castle Terrace and a detention pond to serve the development. The pond discharges to Hangman's Gulch via existing storm sewer in Front Street. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

Basin EX27 (18.41 Ac)

Basin EX27 is currently developed and consists of Scott II Filing No. 3 and a detention pond to serve the development. The pond discharges onsite and is routed to Hangman's Gulch via existing storm sewer in Front Street. Historic flow patterns will be maintained for this parcel as Pine Canyon is developed.

III. EXISTING STORMWATER CONVEYANCE AND STORAGE FACILITIES

A. Existing Stormwater Conveyance Facilities

Numerous existing stormwater conveyance facilities will be maintained or modified within the overall site stormwater design. All improvements to existing drainageways and tributaries will be discussed in further detail within subsequent drainage reports.

The general alignment of Walker Tributary #1 drainage will be maintained, and it is anticipated that it will be replaced with proposed storm sewer infrastructure or open channel within each planning area based on land uses and site layouts. Smaller drainageways that contribute to the Walker Tributary #1 on-site will be rerouted due to the proposed development and conveyed to proposed stormwater storage facilities. Natural drainageways may require additional stabilization and will be determined in subsequent detailed drainage reports. No major basin transfers are proposed. There may be transfers between minor basins, but flows will not exceed historic rates. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

The general alignment of Walker Tributary #2 drainage will be maintained. It is anticipated that it will be replaced with proposed storm sewer infrastructure or open channel within the planning area based on land use and site layout. Smaller drainageways that contribute to the Walker Tributary #2 on-site will be rerouted due to the proposed development and conveyed to a proposed stormwater storage facility. Walker Tributary #2 is included in the Hangman's Gulch and Parkview Tributary Drainageway Master Plan, prepared for the Town of Castle Rock, that requires stability improvements within the drainageway. The final configuration of the drainage infrastructure associated with the development of the property, and any stability improvements within the project boundary, will be determined in subsequent detailed drainage reports. A map excerpt from the master plan is included in Appendix D.

The existing culverts located underneath Founders Parkway, I-25, Front Street, Liggett Road, and the Union Pacific Railroad will be utilized in the final design for the proposed pond release and rerouting of off-site flows. Ponds will release flows at the historic flow rates.

The off-site existing drainageways to the north and south of the development will remain and convey stormwater runoff from the development.

East Plum Creek will remain undisturbed to reduce development impacts to the floodplain and no improvements are anticipated at this time.

B. Existing Stormwater Storage Facilities

There are minimal existing stormwater storage facilities located on the site. A small agricultural pond is located on the northeast corner of Basin D and it is believed this pond currently detains stormwater runoff from I-25 and the adjacent roadside ditch. This pond is situated in the upper reach of Basin D and due to elevation constraints will not be utilized to detain developed flows from Basin D and may be removed during the development of this Planning Area.

IV. PROPOSED STORMWATER CONVEYANCE AND STORAGE FACILITIES

A. Proposed Stormwater Conveyance Facilities

The site will generally follow the historic drainage pattern with some minor rerouting due to the proposed development in each planning area respectively. Proposed detention ponds will be utilized and are generally located on the Drainage Map. The detention pond

locations are conceptual and are subject to adjustments through the design of each Planning Area. It is noted, that utilizing grading and stormwater conveyance measures that there may be the opportunity during final design to consolidate detention facilities. This will create an opportunity for an urban environment that will preserve natural drainage patterns. Off-site runoff entering the site will be routed through the site to generally maintain the historical drainage pattern, except for Walker Tributary #1 will be piped and routed through the western parcels to accommodate final land plan, and a portion of Basin E will be routed to the culverts crossing under Front Street and I-25 rather than flowing through the Scott II Filing No. 3 development. Piping of major drainageways is typically not permissible in the Town of Castle Rock, thus if piping is required a variance will be requested.

No drainage conveyance problems are anticipated with this project, as stormwater flows will generally be conveyed within each Planning Area to localized detention facilities where flows will be discharged to the existing adjacent drainageways. All drainage conveyance facilities will be designed with suitable access and maintenance that will meet the requirements of the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual.

The proposed site will utilize a combination of curb/gutter, inlets, swales/channels, and storm pipe to convey stormwater to the proposed staging facilities. Any additional information regarding the specific conveyance elements or designs will be discussed in subsequent detailed studies. All public conveyance elements will be owned and maintained by the Town. All private conveyance elements will be owned and maintained by a metropolitan district, HOA, or private entity. The Site will be graded to minimize drainage through lots. A subsurface storm sewer will be provided to collect runoff.

A grass swale or constructed wetland channel are included in additional water quality treatment measures under consideration for the Walker Tributary #1 reach from the Union Pacific Railroad to the confluence with East Plum Creek. These measures also provide conveyance and are discussed further in Section V. B. of this report.

B. Proposed Stormwater Storage Facilities

The site will utilize extended detention ponds for water quality and storage. The proposed development will either have a new detention pond or will be able to utilize and reconfigure the existing agricultural ponds. The ponds and outlet structures will be designed as Extended Detention Basins (EDB) that provide storage for the Water Quality Capture Volume (WQCV), Excess Urban Runoff Volume (EURV), and the 100-year storm event that will release at the historic rates. The EDBs provide full spectrum detention meaning they utilize capture and slow release of the EURV. The WQCV represents runoff from frequent storm events such as the 80th percentile runoff-producing event. The EURV represents the difference between the developed and pre-developed runoff volume for the range of storms that produce runoff (generally greater than the 2-year event). Detention pond volumes for each basin will be calculated using the Mile High Flood District (MHFD) spreadsheet for full-spectrum detention. A maintenance access road, per Town of Castle Rock design criteria, shall be provided for access to each outlet structure. Maintenance of the ponds will be provided by the Metropolitan District or HOA. The final layout and location of the proposed ponds are subject to change and will be detailed in subsequent reports as the ponds have been preliminarily located based on the historic

flow paths. The ponds may also be split into multiple smaller ponds to accommodate final land plans.

Efforts during final design of the detention facilities will be made to locate the ponds in areas that will allow the preservation of existing slopes, trees, vegetation, and other natural features. In addition, the detention facilities shall be designed within the existing natural drainage corridors to promote natural design and aesthetics of the drainage facilities.

V. WATER QUALITY AND BEST MANAGEMENT PRACTICES

A. Non-Structural Best Management Practices

The drainage design for the Pine Canyon development will incorporate the non-structural Best Management Practices (BMP's) as outlined in Volume 3 of the MHFD Drainage Criteria Manual. A BMP is a method used to prevent or control stormwater runoff and the discharge of pollutants, including sediment, into local waterbodies. Silt fences, inlet protection, and site-stabilization techniques are typical BMPs on a construction site. Individual BMP's will be determined for each site within the development during final design. The major runoff pollutant generated from lawns will be phosphorus contained in fertilizers. Paved areas will generate pollutants such as oil, gasoline, etc. The concept of pollutant removal as recommended in Volume 3 of the MHFD Drainage Criteria Manual will be implemented in this development.

B. Structural Best Management Practices

The developer is considering Low Impact Design (LID) for stormwater discharge principles in the drainage design of the Pine Canyon development. The drainage design for Pine Canyon will incorporate several different types of structural Best Management Practices (BMP's) as outlined in Volume 3 of the MHFD Drainage Criteria Manual. Such structural BMP's may include Extended Detention Basins (EDB), Grass Swales (GS), Grass Buffers (GB), and Porous Landscape Detention (PLD). The design and location of these BMP's will be determined in subsequent reports. For this report, detention ponds have been conceptually located as shown on the drainage plan. Ponds are designed to collect, and detain, runoff and discharge at historic rates. Regular maintenance will occur to ensure that the BMP's function properly. Maintenance access will also be designed for each BMP in subsequent reports. Water quality measures have been included in the design of the proposed extended detention basins. The basins are designed to incorporate structures that release flows for the Water Quality Capture Volume (WQCV), Excess Urban Runoff Volume (EURV), and the 100-year storm event. Engineered Grass Swale, Constructed Wetland Pond, or Constructed Wetland Channel, as outlined in Volume 3 of the MHFD Drainage Criteria Manual, may be included to reduce the sediment and pollutants in the discharged stormwater.

MHFD describes the above-mentioned Treatment BMPs as follows:

Grass Swale

Grass swales are densely vegetated trapezoidal or triangular channels with low-pitched side slopes designed to convey runoff slowly. Grass swales have low longitudinal slopes and broad cross-sections that convey flow in a slow and shallow manner, thereby

facilitating sedimentation and filtering (straining) while limiting erosion. Berms or check dams may be incorporated into grass swales to reduce velocities and encourage settling and infiltration.

Grass swales are well suited for sites with low to moderate slopes. Drop structures or other features designed to provide the same function as a drop structures (e.g., a driveway with a stabilized grade differential at the downstream end) can be integrated into the design to enable use of this BMP at a broader range of site conditions.

Constructed Wetland Pond

A constructed wetlands pond is a shallow retention pond designed to permit the growth of wetland plants such as rushes, willows, and cattails. Constructed wetlands slow runoff and allow time for sedimentation, filtering, and biological uptake.

Constructed wetlands ponds differ from "natural" wetlands, as they are artificial and are built to enhance stormwater quality. Do not use existing or natural wetlands to treat stormwater runoff. Stormwater should be treated prior to entering natural or existing wetlands and other environmentally sensitive areas. Allowing untreated stormwater to flow into existing wetlands will overload and degrade the quality of the wetland. Sometimes, small wetlands that exist along ephemeral streams on Colorado's high plains can be enlarged and incorporated into the constructed wetland system. Such actions, however, require the approval of federal and state regulators.

Regulations intended to protect natural wetlands recognize a separate classification of wetlands, constructed for water quality treatment. Such wetlands generally are not allowed to be used to mitigate the loss of natural wetlands but are allowed to be disturbed by maintenance activities. Therefore, the legal and regulatory status of maintaining a wetland constructed for the primary purpose of water quality enhancement is separate from the disturbance of a natural wetland. Nevertheless, any activity that disturbs a constructed wetland should be cleared through the U.S. Army Corps of Engineers to ensure it is covered by some form of an individual, general, or nationwide 404 permit.

A constructed wetland pond requires a positive net influx of water to maintain vegetation and microorganisms. This can be supplied by groundwater or a perennial stream. An ephemeral stream will not provide adequate water to support this BMP. A constructed wetland pond is best used as a follow-up BMP in a watershed, although it can serve as a stand-alone facility.

Constructed Wetland Channel

A constructed wetland channel is a conveyance BMP that is built, in part, to enhance stormwater quality. Constructed wetland channels use dense vegetation to slow down runoff and allow time for both biological uptake and settling of sediment.

Constructed wetlands differ from natural wetlands, as they are artificial and are built to enhance stormwater quality. Do not use existing or natural wetlands to treat stormwater runoff. Stormwater should be treated prior to entering natural or existing wetlands and other environmentally sensitive areas. Allowing untreated stormwater to flow into existing wetlands will overload and degrade the quality of the wetland.

The relationship with existing wetlands, regulations, and permitting for constructed wetland ponds also apply to constructed wetland channels.

Constructed wetland channels provide conveyance of stormwater similar to a grass swale; however, this BMP is appropriate when a baseflow can be anticipated. A constructed wetland channel requires a net influx of water to maintain vegetation and microorganisms. This can be supplied by groundwater or a perennial stream. An ephemeral stream may not provide adequate water. In addition to water supply, loamy soils are needed in the wetland bottom to permit plants to take root. Wetland channels also require a near-zero longitudinal slope; drop structures can be used to create and maintain a flat grade.

VI. FLOODPLAIN MODIFICATIONS

A. Major Drainageway – Undesignated Floodplain

During preliminary and final design, the un-delineated major drainageway floodplains will be identified and delineated. Efforts will be made to protect and preserve the natural drainageways that traverse the site. Impacts will be limited to improvements in the areas of discharges from the proposed detention facilities and will conform to the TOCR drainage criteria. These improvements will be designed to mitigate erosion and preserve the natural character and historical drainage patterns to the greatest extent feasible.

B. Major Drainageway – Designated Floodplain

Potential modifications to both Walker Tributary #1 and Walker Tributary #2, shaded zone X as defined by the FEMA Flood Insurance Rate Maps (FIRM), may include realignment, piping, and channel stabilization. No floodplain modifications for East Plum Creek are anticipated, and the area adjacent to the floodplain is anticipated to mainly remain open space.

Design measures will help minimize the adverse effects due to the increase in runoff within the drainageways. The impact of proposed development on the area will be well mitigated and the steps taken for water quality control will exceed the usually required measures by Town of Castle Rock and MHFD. Impacts and stability analysis to the Major Drainageways will be further studied and analyzed during the subsequent detailed drainage studies.

If modifications to the existing floodplains are required, then they will result in a revision to the FIRM map. This is done by submitting a Conditional Letter of Map Revision (CLOMR). A CLOMR outlines the reasoning for the change and defines the new floodplain. After improvements to the drainageways are complete, a Letter of Map Revision (LOMR) is submitted to show that the channel improvements were constructed to the specifications outlined in the CLOMR and that the floodplain is accurately mapped.

VII. POTENTIAL PERMITTING REQUIREMENTS

Additional permitting through the State of Colorado and/or Army Corps of Engineers may be required if wetlands are disturbed or created. No significant impacts to wetlands are expected. Additional permitting through FEMA may be required if floodplain modifications are made. As discussed in the previous section, no floodplain modifications are needed for East Plum Creek, although Walter Tributary may be modified.

VIII. CONCLUSIONS

In conclusion, the drainage for Pine Canyon will be designed such that existing drainage patterns are improved or maintained. Drainage infrastructure across the Site will provide water quality and flood control for runoff produced by the development as well as offsite flows. There will be no negative drainage impacts to adjacent infrastructure including CDOT highways, roads, and neighborhoods due to the Pine Canyon development.

IX. REFERENCES

1. Town of Castle Rock, Colorado. February 2025. Storm Drainage Design And Technical Criteria Manual.
2. MHFD (Mile High Flood District). Revised March 2024. Urban Storm Drainage Criteria Manual. Volume 1.
3. MHFD (Mile High Flood District). Revised September 2017. Urban Storm Drainage Criteria Manual. Volume II.
4. MHFD (Mile High Flood District). Revised March 2024. Urban Storm Drainage Criteria Manual. Volume III.
5. FEMA (Federal Emergency Management Agency). Revised March 16, 2016. Flood Insurance Rate Map (FIRM) No. 08035C0189G and No. 08035C0188G.
6. Final Drainage Report for Metzler Ranch Filing No. 1; Rocky Mountain Consultants, Inc.; February 1998.
7. Final Drainage Report for Scott II Filing No. 3; Rocky Mountain Consultants, Inc.; May 1994.
8. Final Drainage Report for Castle Terrace; Rocky Mountain Consultants, Inc.; September 1996.
9. The Woodlands Filing No. 9 Phase III Drainage Report; Merrick & Company; November 20, 1998.
10. Phase III Drainage Report for The Woodlands Filing No. 10; Peak Civil Consultants, Inc.; August 2000.
11. Phase III Drainage Report for The Woodlands Filing No. 12; Peak Civil Consultants, Inc.; June 2000.
12. Castle Oaks Estates Filing No. 1 Phase III Drainage Report; Nolte & Associates; September 25, 2003.
13. Castle Oaks Estates Filing No. 1 – Amendment No. 2 Phase III Drainage Report; Nolte & Associates; June 2006.
14. Hangman's Gulch and Parkview Tributary Drainageway Master Plan; Hartwig & Associates and Stephen W. Rogers Consulting; Adopted February 23, 2013.

APPENDIX B

HYDROLOGIC CALCULATIONS

Pine Canyon - Existing

CORE Project #: 25-004

Prepared By: RAS

IMPERVIOUS CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-2 and 6-3

		Residential & Commercial							Lawns					Soil Type		
		Single Family			Multi-Unit				Clay/Sandy Soil							
		N/A	N/A	N/A	Commercial	Roof/ Concrete Walks & Drives	Streets: Paved	Gravel	2-7% Slope	>7% Slope	Historic			Soil Type A Area	Soil Type B Area	Soil Type C Area
% Imperv.		65.00%	65.00%	45.00%	85.00%	90.00%	100.00%	40.00%	5.00%	5.00%	2.00%					
	Design											Total	Percent			
BASIN	Point	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Impervious	Area	Area	
EX1	1	-	-	-	-	-	-	2.30	22.58	9.68	-	34.55	7.3%	-	-	34.55
EX2	2	-	-	-	-	-	9.18	-	3.06	5.92	-	18.16	53.0%	-	-	18.16
EX3	3	-	-	-	26.84	-	-	-	-	-	-	26.84	85.0%	-	26.84	-
EX4	4	-	-	-	-	-	-	2.91	17.50	2.30	-	22.70	9.5%	-	22.70	-
EX5	5	-	-	-	-	-	1.22	1.59	9.98	4.70	-	17.49	14.8%	-	17.49	-
EX6	6	-	-	-	-	-	3.44	-	22.96	15.42	-	41.82	12.8%	-	41.82	-
EX7	7	-	-	-	5.74	-	0.70	-	11.48	1.98	-	19.90	31.4%	-	19.90	-
EX8	8	-	-	2.30	-	-	3.44	-	25.95	7.22	-	38.91	15.8%	-	38.91	-
EX9	9	-	-	0.69	-	-	-	-	36.75	36.06	-	73.50	5.4%	-	-	73.50
EX10	10	-	-	-	-	-	-	-	9.28	9.28	-	18.57	5.0%	-	-	18.57
EX11	11	-	-	-	-	-	-	-	18.06	18.06	-	36.11	5.0%	-	-	36.11
EX12	12	-	-	-	-	-	-	-	22.28	22.28	-	44.57	5.0%	-	-	44.57
EX13	13	-	-	-	-	-	-	-	12.64	12.64	-	25.28	5.0%	-	-	25.28
EX14	14	-	-	-	-	-	-	-	9.70	9.70	-	19.39	5.0%	-	-	19.39
EX15	15	-	-	-	-	-	-	-	57.31	57.31	-	114.62	5.0%	-	-	114.62
EX16	16	-	-	-	-	-	-	-	3.11	3.11	-	6.22	5.0%	-	-	6.22
EX17	17	-	-	-	-	-	-	-	12.72	12.72	-	25.44	5.0%	-	-	25.44
EX18	18	-	-	-	-	-	-	-	6.18	6.18	-	12.35	5.0%	-	-	12.35
EX19	19	-	-	-	-	-	-	-	12.35	12.35	-	24.71	5.0%	-	-	24.71
EX20	20	-	-	-	-	-	-	-	4.12	4.12	-	8.24	5.0%	-	-	8.24
EX21	21	-	-	-	-	1.96	-	4.57	-	0.00	-	6.53	55.0%	-	6.53	-
EX22	22	-	-	-	6.73	-	-	-	-	-	-	6.73	85.0%	-	6.73	-
EX23	23	-	-	24.64	-	-	9.87	-	0.69	-	-	35.20	59.6%	-	-	35.20
EX24	24	-	-	36.19	-	-	13.22	-	2.30	-	-	51.70	57.3%	-	-	51.70
EX25	25	-	-	-	-	-	-	-	6.03	6.03	-	12.06	5.0%	-	-	12.06
EX26	26	-	12.30	-	-	-	-	-	-	-	-	12.30	65.0%	-	-	12.30
EX27	27	-	-	18.41	-	-	-	-	-	-	-	18.41	45.0%	-	-	18.41
EX28	28	-	-	-	-	-	-	-	8.37	8.37	-	16.73	5.0%	-	-	16.73
EX29	29	-	-	-	-	-	-	-	12.26	12.26	-	24.52	5.0%	-	-	24.52
TOTAL		**0.00**	**12.30**	**82.22**	**39.31**	**1.96**	**41.08**	**11.37**	**347.62**	**277.67**	**0.00**	**813.54**	**19.3%**			

Pine Canyon - Proposed

CORE Project #: 25-004

Prepared By: RAS

IMPERVIOUS CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-2 and 6-3

		Residential							Landscape Area					Soil Type		
		Single Family			Multi-Family											
		Rural/Low Density	Medium Density (&Schools)	High Density	High Denisty	ROW/ Concrete	Asphalt/ Ponded Water	Packed Gravel	Open Space	Parks/ED Bs	Commercial /Industrial			Soil Type A Area	Soil Type B Area	Soil Type C/D Area
% Imperv.		45.00%	55.00%	65.00%	75.00%	95.00%	100.00%	40.00%	10.00%	25.00%	90.00%					
BASIN	Design Point	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Area (ac)	Total Area (ac)	Percent Impervious	Area (ac)	Area (ac)	Area (ac)
A	A	-	-	-	-	-	-	-	15.77	-	-	15.77	10.0%	-	-	15.77
B	B	-	-	-	-	-	-	-	16.99	-	-	16.99	10.0%	-	16.99	-
C	C	-	-	-	-	2.82	-	1.88	1.23	0.69	11.48	18.10	77.7%	-	18.10	-
D	D	-	-	-	-	4.59	-	-	10.42	1.56	35.05	51.63	72.3%	-	51.63	-
E	E	-	-	-	15.80	4.59	-	0.24	5.71	3.52	-	25.27	70.3%	-	5.74	19.53
F	F	-	20.66	-	-	3.55	-	0.35	12.82	0.80	-	38.19	42.9%	-	-	38.19
G	G	30.48	34.70	-	-	7.35	-	2.05	16.80	10.42	-	101.79	44.1%	-	29.27	72.53
H	H	-	41.32	-	-	3.90	-	1.39	10.68	9.99	-	67.28	45.4%	-	-	67.28
I	I	17.60	-	-	-	3.21	-	0.66	4.63	0.71	-	26.11	45.5%	-	4.66	21.45
J	J	-	13.22	-	-	2.18	-	0.14	5.91	1.72	21.40	44.57	66.6%	-	-	44.57
K	K	16.44	-	-	-	2.64	-	0.60	4.52	1.10	-	25.30	43.0%	-	-	25.30
L	L	-	16.07	-	-	6.20	-	0.91	5.59	-	-	28.76	54.4%	-	-	28.76
M	M	-	20.66	-	-	5.05	-	0.78	7.82	-	-	34.31	50.3%	-	-	34.31
N	N	2.20	-	-	-	1.84	-	-	14.74	-	-	18.78	22.4%	-	18.78	-
O	O	-	34.30	-	-	5.05	-	0.55	3.96	-	-	43.86	55.4%	-	-	43.86
OS1	36	-	-	-	-	-	-	1.17	9.54	-	-	10.71	13.3%	-	10.71	-
OS2	37	2.30	-	-	-	3.44	-	-	23.36	-	-	29.10	22.8%	-	29.10	-
OS3	38	0.80	-	-	-	-	-	-	22.77	-	-	23.57	11.2%	-	-	23.57
TOTAL		**69.82**	**180.94**	**0.00**	**15.80**	**56.42**	**0.00**	**10.71**	**193.25**	**30.52**	**67.93**	**620.09**	**46.6%**			

APPENDIX C

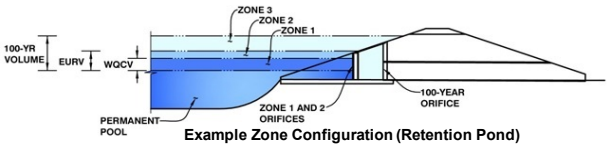
DETENTION POND CALCULATIONS

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin L**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**		**Note: L / W Ratio < 1**
Watershed Area =	28.76	acres	**L / W Ratio = 0.34**
Watershed Length =	650	ft	
Watershed Length to Centroid =	300	ft	
Watershed Slope =	0.050	ft/ft	
Watershed Imperviousness =	54.40%	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.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.524	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.490	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.226	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	1.934	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	2.405	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	2.538	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	3.754	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	4.558	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	5.737	acre-feet		inches
Approximate 2-yr Detention Volume =	1.177	acre-feet		
Approximate 5-yr Detention Volume =	1.845	acre-feet		
Approximate 10-yr Detention Volume =	2.093	acre-feet		
Approximate 25-yr Detention Volume =	2.007	acre-feet		
Approximate 50-yr Detention Volume =	2.467	acre-feet		
Approximate 100-yr Detention Volume =	2.846	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.524	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.966	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.618	acre-feet
Total Detention Basin Volume =	3.108	acre-feet
Initial Surcharge Volume (ISV) =	68	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	

Initial Surcharge Area (A_{ISV}) =	208	ft^2
Surcharge Volume Length (L_{ISV}) =	14.4	ft
Surcharge Volume Width (W_{ISV}) =	14.4	ft
Depth of Basin Floor (H_{FLOOR}) =	0.99	ft
Length of Basin Floor (L_{FLOOR}) =	216.4	ft
Width of Basin Floor (W_{FLOOR}) =	113.4	ft
Area of Basin Floor (A_{FLOOR}) =	24,537	ft^2
Volume of Basin Floor (V_{FLOOR}) =	8,910	ft^3
Depth of Main Basin (H_{MAIN}) =	4.18	ft
Length of Main Basin (L_{MAIN}) =	249.8	ft
Width of Main Basin (W_{MAIN}) =	146.8	ft
Area of Main Basin (A_{MAIN}) =	36,683	ft^2
Volume of Main Basin (V_{MAIN}) =	127,102	ft^3
Calculated Total Basin Volume (V_{total}) =	**3.126**	acre-feet

Depth Increment = 0.50 ft

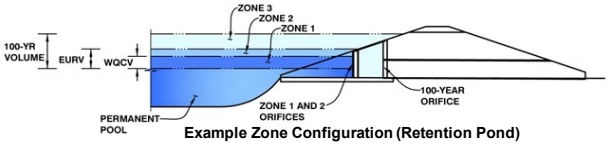
Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		14.4	14.4	208		0.005		
ISV	0.33		14.4	14.4	208		0.005	68	0.002
	0.50		14.4	14.4	208		0.005	104	0.002
	1.00		49.1	31.4	1,542		0.035	304	0.007
	1.50		151.1	81.4	12,299		0.282	3,339	0.077
Floor	1.82		216.4	113.4	24,537		0.563	9,122	0.209
	2.00		217.8	114.8	25,014		0.574	13,581	0.312
Zone 1 (WQCV)	2.37		220.8	117.8	26,007		0.597	23,020	0.528
	2.50		221.8	118.8	26,361		0.605	26,424	0.607
	3.00		225.8	122.8	27,739		0.637	39,947	0.917
	3.50		229.8	126.8	29,150		0.669	54,168	1.244
Zone 2 (EURV)	3.87		232.8	129.8	30,214		0.694	65,150	1.496
	4.00		233.8	130.8	30,592		0.702	69,102	1.586
	4.50		237.8	134.8	32,067		0.736	84,766	1.946
	5.00		241.8	138.8	33,574		0.771	101,175	2.323
	5.50		245.8	142.8	35,112		0.806	118,345	2.717
Z3 (100+1/2WQCV)	5.98		249.6	146.7	36,619		0.841	135,559	3.112
	6.00		249.8	146.8	36,683		0.842	136,292	3.129
	6.50		253.8	150.8	38,285		0.879	155,033	3.559
	7.00		257.8	154.8	39,920		0.916	174,583	4.008
	7.50		261.8	158.8	41,587		0.955	194,959	4.476
	8.00		265.8	162.8	43,285		0.994	216,175	4.963
	8.50		269.8	166.8	45,016		1.033	238,249	5.469
	9.00		273.8	170.8	46,778		1.074	261,197	5.996
	9.50		277.8	174.8	48,573		1.115	285,033	6.543
	10.00		281.8	178.8	50,400		1.157	309,775	7.111
	10.50		285.8	182.8	52,258		1.200	335,438	7.701
	11.00		289.8	186.8	54,149		1.243	362,039	8.311
	11.50		293.8	190.8	56,072		1.287	389,592	8.944
	12.00		297.8	194.8	58,026		1.332	418,115	9.599
	12.50		301.8	198.8	60,013		1.378	447,624	10.276
	13.00		305.8	202.8	62,031		1.424	478,134	10.976
	13.50		309.8	206.8	64,082		1.471	509,661	11.700
	14.00		313.8	210.8	66,165		1.519	542,221	12.448
	14.50		317.8	214.8	68,279		1.567	575,830	13.219
	15.00		321.8	218.8	70,426		1.617	610,505	14.015
	15.50		325.8	222.8	72,604		1.667	646,261	14.836
	16.00		329.8	226.8	74,815		1.718	683,115	15.682
	16.50		333.8	230.8	77,058		1.769	721,082	16.554
	17.00		337.8	234.8	79,332		1.821	760,178	17.451
	17.50		341.8	238.8	81,639		1.874	800,419	18.375
	18.00		345.8	242.8	83,977		1.928	841,822	19.326
	18.50		349.8	246.8	86,348		1.982	884,402	20.303
	19.00		353.8	250.8	88,751		2.037	928,175	21.308
	19.50		357.8	254.8	91,185		2.093	973,158	22.341
	20.00		361.8	258.8	93,652		2.150	1,019,366	23.401
	20.50		365.8	262.8	96,150		2.207	1,066,815	24.491
	21.00		369.8	266.8	98,681		2.265	1,115,522	25.609
	21.50		373.8	270.8	101,244		2.324	1,165,501	26.756
	22.00		377.8	274.8	103,838		2.384	1,216,771	27.933
	22.50		381.8	278.8	106,465		2.444	1,269,345	29.140
	23.00		385.8	282.8	109,123		2.505	1,323,241	30.377
	23.50		389.8	286.8	111,814		2.567	1,378,474	31.645
	24.00		393.8	290.8	114,537		2.629	1,435,060	32.944
	24.50		397.8	294.8	117,291		2.693	1,493,016	34.275
	25.00		401.8	298.8	120,078		2.757	1,552,357	35.637
	25.50		405.8	302.8	122,896		2.821	1,613,099	37.032
	26.00		409.8	306.8	125,747		2.887	1,675,259	38.459

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.02 (February 2020)

Project: **Pine Canyon - Phase 1 Drainage Report**

Basin ID: **Basin M**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	34.31	acres
Watershed Length =	1,800	ft
Watershed Length to Centroid =	900	ft
Watershed Slope =	0.050	ft/ft
Watershed Imperviousness =	50.30%	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.

			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	0.592	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	1.633	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.06 in.) =	1.554	acre-feet	1.06	inches
5-yr Runoff Volume (P1 = 1.43 in.) =	2.508	acre-feet	1.43	inches
10-yr Runoff Volume (P1 = 1.66 in.) =	3.148	acre-feet	1.66	inches
25-yr Runoff Volume (P1 = 1.69 in.) =	3.338	acre-feet		inches
50-yr Runoff Volume (P1 = 2.26 in.) =	4.997	acre-feet	2.26	inches
100-yr Runoff Volume (P1 = 2.6 in.) =	6.104	acre-feet	2.60	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	7.716	acre-feet		inches
Approximate 2-yr Detention Volume =	1.285	acre-feet		
Approximate 5-yr Detention Volume =	2.046	acre-feet		
Approximate 10-yr Detention Volume =	2.321	acre-feet		
Approximate 25-yr Detention Volume =	2.236	acre-feet		
Approximate 50-yr Detention Volume =	2.753	acre-feet		
Approximate 100-yr Detention Volume =	3.215	acre-feet		

Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	0.592	acre-feet
Zone 2 Volume (EURV - Zone 1) =	1.041	acre-feet
Zone 3 (100yr + 1 / 2 WQCV - Zones 1 & 2) =	1.878	acre-feet
Total Detention Basin Volume =	3.511	acre-feet
Initial Surcharge Volume (ISV) =	77	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	234	ft^2
Surcharge Volume Length (L_{ISV}) =	15.3	ft
Surcharge Volume Width (W_{ISV}) =	15.3	ft
Depth of Basin Floor (H_{FLOOR}) =	1.07	ft
Length of Basin Floor (L_{FLOOR}) =	233.6	ft
Width of Basin Floor (W_{FLOOR}) =	122.3	ft
Area of Basin Floor (A_{FLOOR}) =	28,571	ft^2
Volume of Basin Floor (V_{FLOOR}) =	11,197	ft^3
Depth of Main Basin (H_{MAIN}) =	4.10	ft
Length of Main Basin (L_{MAIN}) =	266.4	ft
Width of Main Basin (W_{MAIN}) =	155.1	ft
Area of Main Basin (A_{MAIN}) =	41,320	ft^2
Volume of Main Basin (V_{MAIN}) =	142,476	ft^3
Calculated Total Basin Volume (V_{total}) =	**3.532**	acre-feet

Depth Increment = 0.50 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		15.3	15.3	234		0.005		
ISV	0.33		15.3	15.3	234		0.005	77	0.002
	0.50		15.3	15.3	234		0.005	117	0.003
	1.00		50.0	32.3	1,615		0.037	335	0.008
	1.50		152.0	82.3	12,511		0.287	3,442	0.079
Floor	1.90		233.6	122.3	28,571		0.656	11,440	0.263
	2.00		234.4	123.1	28,856		0.662	14,312	0.329
Zone 1 (WQCV)	2.40		237.6	126.3	30,011		0.689	26,084	0.599
	2.50		238.4	127.1	30,302		0.696	29,100	0.668
	3.00		242.4	131.1	31,780		0.730	44,619	1.024
	3.50		246.4	135.1	33,290		0.764	60,886	1.398
Zone 2 (EURV)	3.81		248.9	137.6	34,243		0.786	71,353	1.638
	4.00		250.4	139.1	34,832		0.800	77,915	1.789
	4.50		254.4	143.1	36,406		0.836	95,724	2.198
	5.00		258.4	147.1	38,012		0.873	114,327	2.625
	5.50		262.4	151.1	39,650		0.910	133,741	3.070
Z3 (100+1/2WQCV)	5.98		266.2	155.0	41,253		0.947	153,157	3.516
	6.00		266.4	155.1	41,320		0.949	153,983	3.535
	6.50		270.4	159.1	43,023		0.988	175,067	4.019
	7.00		274.4	163.1	44,757		1.027	197,011	4.523
	7.50		278.4	167.1	46,523		1.068	219,829	5.047
	8.00		282.4	171.1	48,321		1.109	243,539	5.591
	8.50		286.4	175.1	50,151		1.151	268,155	6.156
	9.00		290.4	179.1	52,013		1.194	293,694	6.742
	9.50		294.4	183.1	53,907		1.238	320,173	7.350
	10.00		298.4	187.1	55,833		1.282	347,606	7.980
	10.50		302.4	191.1	57,791		1.327	376,011	8.632
	11.00		306.4	195.1	59,781		1.372	405,402	9.307
	11.50		310.4	199.1	61,803		1.419	435,797	10.005
	12.00		314.4	203.1	63,857		1.466	467,210	10.726
	12.50		318.4	207.1	65,943		1.514	499,659	11.471
	13.00		322.4	211.1	68,061		1.562	533,158	12.240
	13.50		326.4	215.1	70,211		1.612	567,725	13.033
	14.00		330.4	219.1	72,393		1.662	603,374	13.852
	14.50		334.4	223.1	74,607		1.713	640,123	14.695
	15.00		338.4	227.1	76,853		1.764	677,986	15.564
	15.50		342.4	231.1	79,131		1.817	716,981	16.460
	16.00		346.4	235.1	81,441		1.870	757,122	17.381
	16.50		350.4	239.1	83,783		1.923	798,427	18.329
	17.00		354.4	243.1	86,157		1.978	840,911	19.305
	17.50		358.4	247.1	88,563		2.033	884,589	20.307
	18.00		362.4	251.1	91,001		2.089	929,479	21.338
	18.50		366.4	255.1	93,471		2.146	975,595	22.397
	19.00		370.4	259.1	95,973		2.203	1,022,955	23.484
	19.50		374.4	263.1	98,507		2.261	1,071,574	24.600
	20.00		378.4	267.1	101,073		2.320	1,121,467	25.745
	20.50		382.4	271.1	103,671		2.380	1,172,652	26.920
	21.00		386.4	275.1	106,301		2.440	1,225,143	28.125
	21.50		390.4	279.1	108,963		2.501	1,278,958	29.361
	22.00		394.4	283.1	111,657		2.563	1,334,112	30.627
	22.50		398.4	287.1	114,383		2.626	1,390,620	31.924
	23.00		402.4	291.1	117,141		2.689	1,448,500	33.253
	23.50		406.4	295.1	119,931		2.753	1,507,767	34.614
	24.00		410.4	299.1	122,753		2.818	1,568,436	36.006
	24.50		414.4	303.1	125,607		2.884	1,630,525	37.432
	25.00		418.4	307.1	128,493		2.950	1,694,049	38.890
	25.50		422.4	311.1	131,411		3.017	1,759,023	40.382
	26.00		426.4	315.1	134,361		3.085	1,825,465	41.907

Pine Canyon - Phase 1

POND SUMMARY TABLE							
BASIN	DESIGN POINT	AREA (AC)	IMPERVIOUS (%)	WQCV (AC-FT)	EURV (AC-FT)	100YR + 1/2 WQCV VOL (AC-FT)	100YR EMERGENCY OVERFLOW (CFS)
A	A	15.77	10.0%	-	-	-	-
B	B	16.99	10.0%	-	-	-	-
C	C	18.10	77.7%	0.477	1.558	2.701	70.8
D	D	51.63	72.3%	1.233	4.110	7.244	212.0
E	E	25.27	70.3%	0.582	1.779	3.352	101.8
F	F	38.19	42.9%	0.599	1.538	3.518	118.0
G	G	101.79	44.1%	1.617	4.363	9.627	312.9
H	H	67.28	45.4%	1.095	2.877	6.430	207.3
I	I	26.11	45.5%	0.423	1.115	2.499	95.3
J	J	44.57	66.6%	0.968	2.878	5.595	187.4
K	K	25.30	43.0%	0.396	1.017	2.335	86.7
L	L	28.76	54.4%	0.528	1.496	3.112	136.6
M	M	34.31	50.3%	0.592	1.633	3.516	110.3
N	N	18.78	22.4%	-	-	-	-
O	O	43.86	55.4%	0.815	2.326	4.806	155.9

APPENDIX E

DRAINAGE MAPS

EX1 34.55
EX2 18.16
EX3 26.84
EX4 22.70
EX5 17.49
EX6 41.82
EX7 19.90
EX8 38.91
EX9 73.50
EX10 18.57
EX11 36.11
EX12 44.57
EX13 25.28
EX14 19.39
EX15 114.62
EX16 6.22
EX17 25.44
EX18 12.35
EX19 24.71
EX20 8.24
EX21 6.53
EX22 6.73
EX23 35.20
EX24 51.70
EX25 12.06
EX26 12.30
EX27 18.41
EX28 16.73
EX29 24.52

EXISTING CULVERT
EXISTING SWALE
UNION PACIFIC RAILROAD
EXISTING DETENTION POND STORQUEST
EXISTING 18" RCP
N. LUGGETT RD
EXISTING 8'X7' BOX CULVERT
EAST PLUM CREEK
WALKER TRIBUTARY #1
MEADOWS FOURTH AMENDMENT PD DENSITY: 1-8 DU/AC (SFD), 8-12 DU/AC (MF)
REGULATORY FLOODPLAIN
PARKS & OPEN SPACE
EXISTING DETENTION POND CASTLE LOCK SELF STORAGE
EXISTING DETENTION POND CASTLE TERRACE SCOTT II, FILING 3
METZLER RANCH PD FILING NO.2 (GI)
EXISTING DETENTION POND METZLER RANCH FILING NO. 2
EXISTING 24" RCP
EXISTING 54" RCP
EXISTING SWALE
EXISTING 4'X6' BOX CULVERT
EXISTING 48" CMP
UNPLATTED SCOTT PARCEL
INTERSTATE 25
FRONT STREET
CASTLE TERRACE SCOTT II RESIDENTIAL (MF)
HANGMAN'S GULCH
SCOTT II FILING NO. 3 RESIDENTIAL (SFD)
EXISTING RCP
EXISTING 60" RCP
METZLER RANCH FILING NO. 8
EXISTING DETENTION POND METZLER RANCH FILING NO. 8
METZLER RANCH FILING NO. 1
EXISTING 36" RCP
EXISTING24" RCP
HAZEN MOORE FILING NO. 1
WOODLANDS BLVD
HAZEN MOORE FILING NO. 2
EXISTING DETENTION POND HAZEN MOORE FILING NO. 2
EXISTING 30" HDPE
EXISTING 42" STORM
EXISTING 7'X10' BOX CULVERT
EXISTING POND
WALKER TRIBUTARY #1
UNPLATTED SCOTT PARCEL
EXISTING 27" HDPE
EXISTING FRONT STREET STORM SEWER SYSEM
PLATEAU NATURAL GAS COMPANY EASEMENT (BK 146, PG 66)
EXISTING 24" RCP
EXISTING 18" RCP
EXISTING DETENTION POND SCOTT II, FILING 3
EXISTING AREA INLET
SCOTT'S TRIBUTARY
EXISTING 60" RCP
EXISTING 36" RCP CULVERT
EXISTING STOCK POND
EXISTING 75' PUBLIC SERVICE EASEMENT (BK 121 PG 480)
EXISTING 10' EASEMENT (BK 569 PG 262)
FOUNDERS PARKWAY
EXISTING 36" CULVERT
CASTLE ROCK RIDGELINE (MAJOR BASIN DIVIDE)
WALKER TRIBUTARY #2
EAST PLUM CREEK BASIN
CHERRY CREEK BASIN
EXISTING 42" RCP CULVERT
EXISTING 60" RCP CULVERT
EXISTING 60.0' COLORADO GAS COMPANY EASEMENT (BK 505, PG 256) (BK 653, PG 756)
CASTLE OAKS FILING NO.1 RESIDENTIAL(SFD)
WOODLANDS 9 TRIBUTARY
THE WOODLANDS FILING NO.9 RESIDENTIAL (SFD)
EXISTING 36" RCP
EXISTING 30" RCP
EXISTING 27" RCP
THE WOODLANDS FILING NO. 10 RESIDENTIAL (SFD)
THE WOODLANDS FILING NO. 12 RESIDENTIAL (SFD)

0 400' 800'
1 inch = 400 ft.

LEGEND
XX — BASIN DESIGNATION
XX.XX — BASIN AREA
DIRECTIONAL FLOW AROW
DESIGN/COLLECTION POINT
PROPOSED POND DESIGNATION (APPROXIMATE LOCATION)
OVERALL PROPERTY BOUNDARY
MAJOR DRAINAGE BASIN BOUNDARY (CASTLE ROCK RIDGELINE)
MINOR DRAINAGE BASIN BOUNDARY
CHANNEL FLOWLINE & FLOW DIRECTION
PLANNING AREA (PA) BOUNDARY

KEY MAP
SCALE: 1" = 2000'

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PINE CANYON
CASTLE ROCK, COLORADO

PHASE I DRAINAGE MAPS
EXISTING DRAINAGE MAP

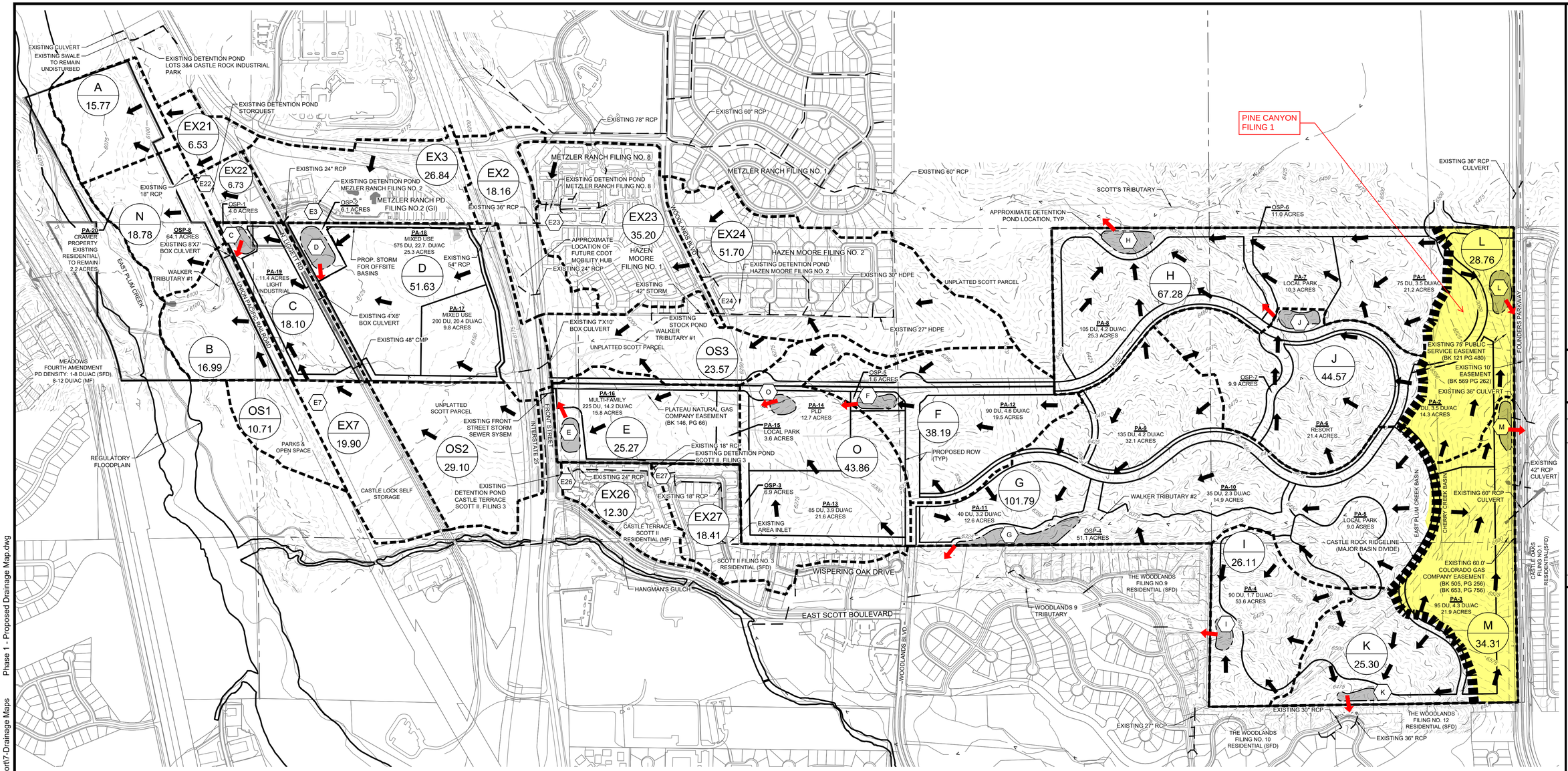
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0 400' 800'

1 inch = 400 ft.

POND SUMMARY TABLE

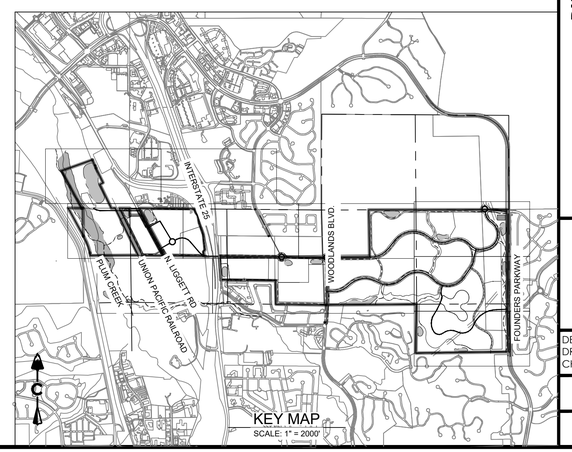
BASIN	DESIGN POINT	AREA (AC)	IMPERVIOUS (%)	WQCV (AC-FT)	EURV (AC-FT)	100YR + 1/2 WQC V VOL (AC-FT)	100YR EMERGENCY OVERFLOW (CFS)
A	A	15.77	10.0%	-	-	-	-
B	B	16.99	10.0%	-	-	-	-
C	C	18.10	77.7%	0.477	1.558	2.701	70.8
D	D	51.63	72.3%	1.233	4.110	7.244	212.0
E	E	25.27	70.3%	0.582	1.779	3.352	101.8
F	F	38.19	42.9%	0.599	1.538	3.518	118.0
G	G	101.79	44.1%	1.617	4.363	9.627	312.9
H	H	67.28	45.4%	1.095	2.877	6.430	207.3
I	I	26.11	45.5%	0.423	1.115	2.499	95.3
J	J	44.57	66.6%	0.968	2.878	5.595	187.4
K	K	25.30	43.0%	0.396	1.017	2.335	86.7
L	L	28.76	54.4%	0.528	1.496	3.112	136.6
M	M	34.31	50.3%	0.592	1.633	3.516	110.3
N	N	18.78	22.4%	-	-	-	-
O	O	43.86	55.4%	0.815	2.326	4.806	155.9

NOTES
1. VALUES IN THIS TABLE ARE ESTIMATES, AND WILL BE EVALUATED FURTHER IN FUTURE PHASES.

NOTES:
1. SLOPE EASEMENTS ARE REQUIRED ANYWHERE LAND IS DISTURBED WITHIN THE TOWN OPEN SPACE. REQUIRED PRIVATE MAINTENANCE WILL INCLUDE EROSION CONTROL AND NATIVE GROUND COVER UPKEEP. THE EXACT LOCATIONS OF THESE EASEMENTS WILL BE ESTABLISHED AFTER PHASE I.
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LEGEND

- XX / XX.XX — BASIN DESIGNATION (BASIN AREA)
- PROPOSED FLOW ARROW (CONTOURS NOT SHOWN, TBD)
- EMERGENCY OVERFLOW ARROW
- X — DESIGN/COLLECTION POINT
- X — PROPOSED POND DESIGNATION (APPROXIMATE LOCATION)
- OVERALL PROPERTY BOUNDARY
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PHASE I DRAINAGE MAPS
PROPOSED DRAINAGE MAP

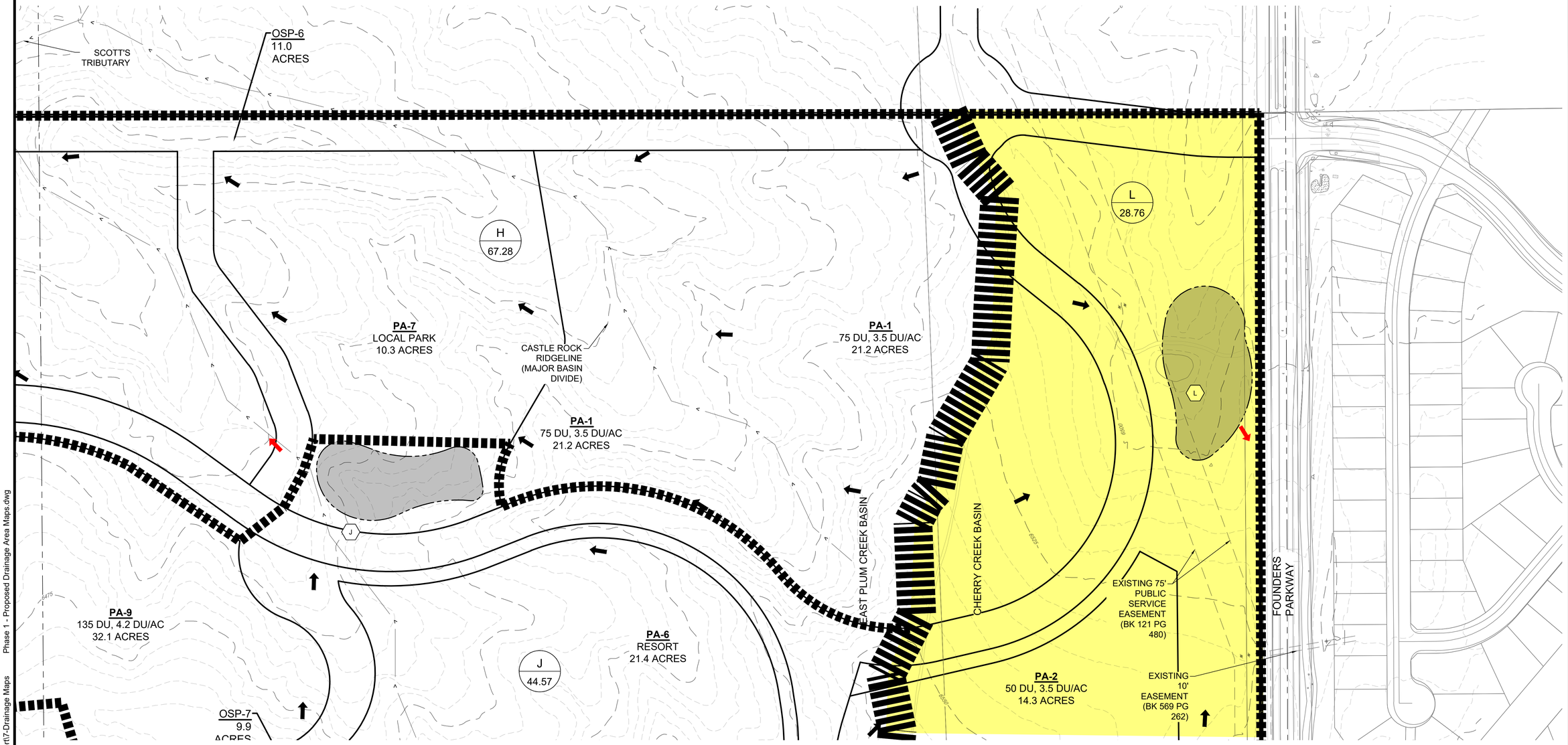
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0 100' 200'

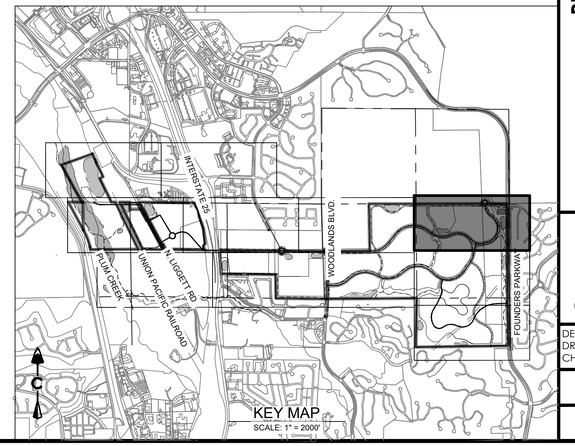
1 inch = 100 ft.

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PHASE I DRAINAGE MAPS
PROPOSED AREA DRAINAGE MAPS

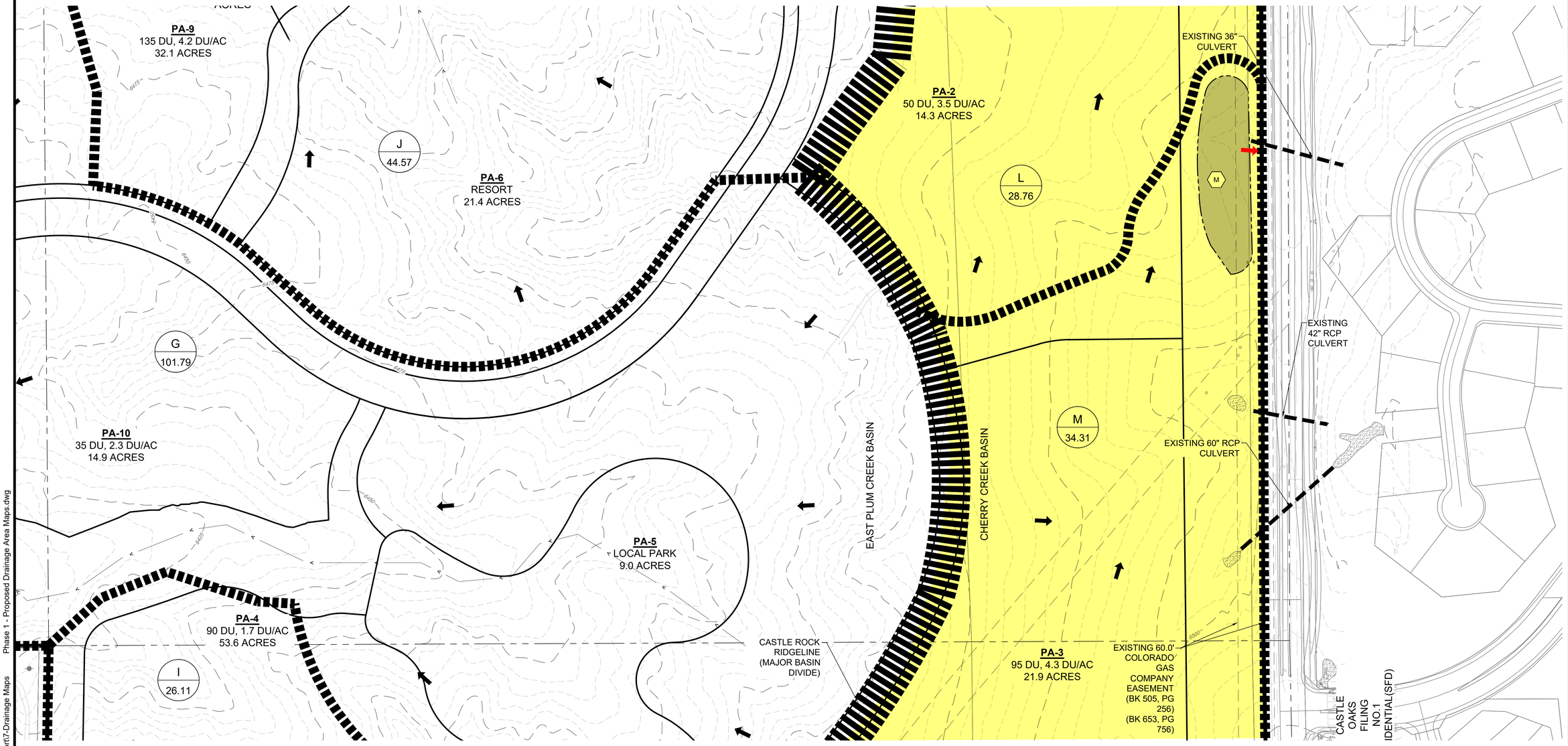
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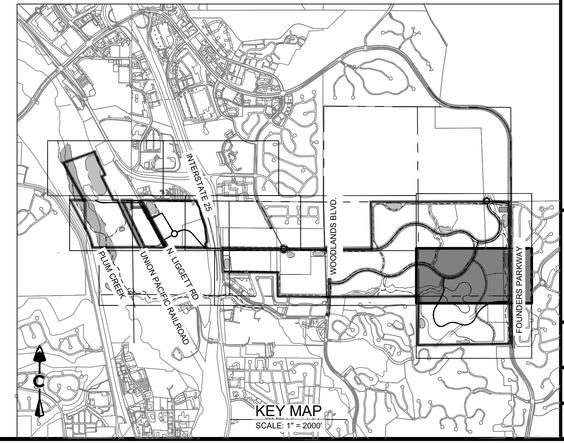
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PHASE I DRAINAGE MAPS
PROPOSED AREA DRAINAGE MAPS

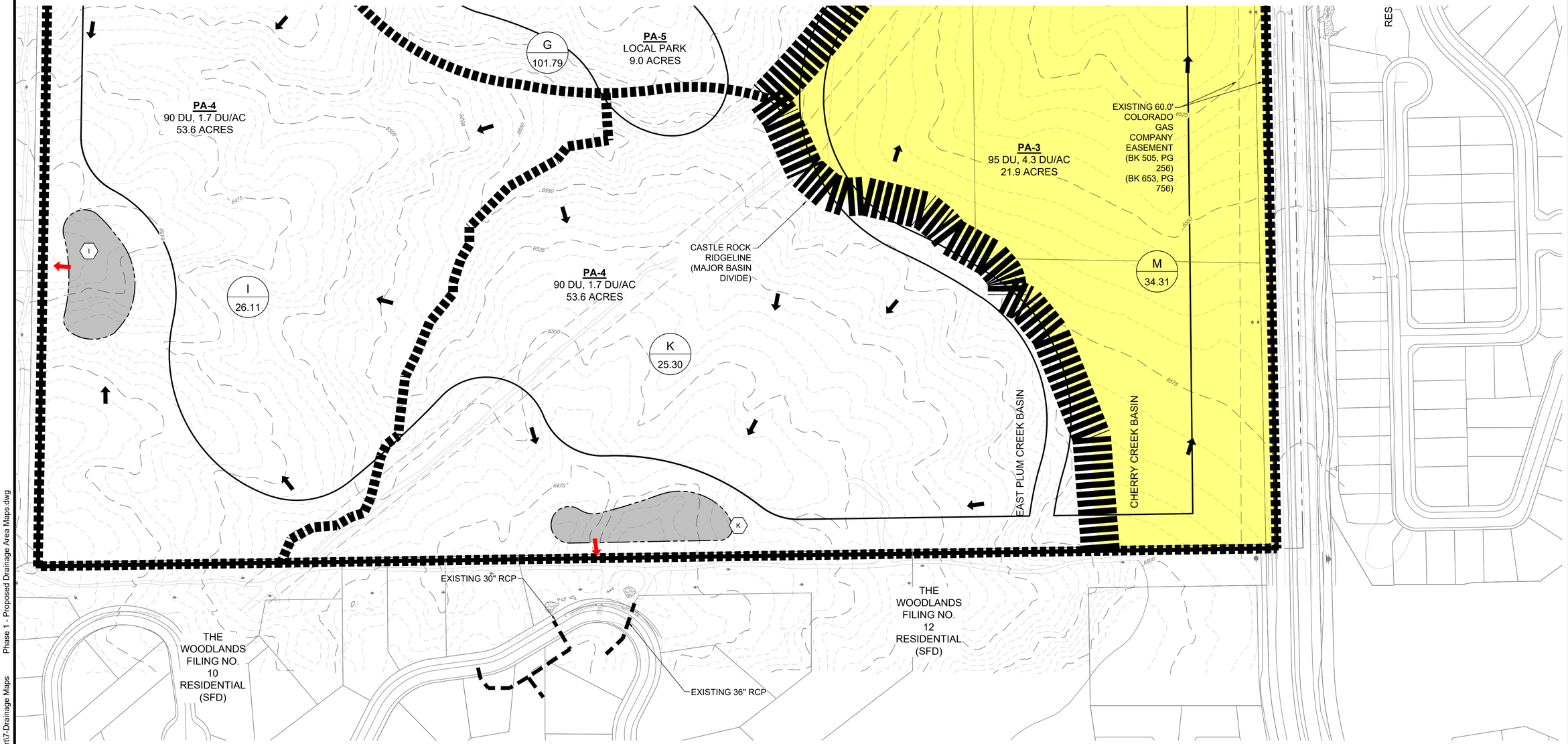
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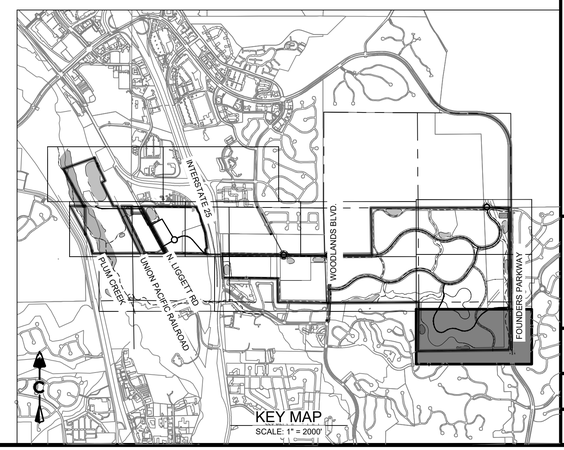
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PHASE I DRAINAGE MAPS
PROPOSED AREA DRAINAGE MAPS

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CASTLE OAKS ESTATES FILING NO. 1
PHASE III DRAINAGE REPORT

For

Castle Oaks Estates, LLC

2 North Cascade Ave.
Colorado Springs, CO 80903

By

Nolte Associates, Inc.
7000 S. Yosemite Street, Suite 200
Englewood, Colorado 80112
(303) 220-1001

September 25, 2003

RECEIVED
OCT 30 2003
TOWN OF CASTLE ROCK
DEVELOPMENT SERVICES

DATE: 09/11/03 TIME: 11:25 a.m. DRAWING NAME: ETDR-05.DWG
SERVER: NONE SERVICE: NONE PLOTTING VIEW: NONE
N:\Adwl 383\Cadd\Exhibits\Phase III Drainage\ KLD PROJ. MGR: RJM

LEGEND

- XX — BASIN DESIGNATION
- BASIN AREA: XX.X
- X.XX / X.XX — 5 YEAR COEFFICIENTS / 100 YEAR COEFFICIENTS
- BASIN BOUNDARY
- DIRECTIONAL FLOW ARROW
- (HP) HIGH POINT
- (LP) LOW POINT

NOTE: 100-YR FLOODPLAIN SHOWN IS TAKEN FROM FIRM, TOWN OF CASTLE ROCK, COLORADO, COMMUNITY PANEL NUMBER, 080050 0189 C, SEPTEMBER 30, 1987.

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF (cfs)	100 YEAR RUNOFF (cfs)
G-1	3.50	4.4	12.7
G-2	3.44	5.7	12.9
G-3A	4.64	7.6	18.9
G-3B	4.01	6.3	15.6
G-4	4.42	6.0	14.9
G-5	4.04	4.7	13.9
G-6	1.09	1.9	4.7
OS-210	37.25	52.0	52.0
OS-240	17.05	9.0	32.0
G-7	15.91	10.7	45.4
G-8	1.00	4.4	8.7
G-9	0.68	3.0	5.9
G-10	3.56	8.1	18.2
G-11	3.83	8.7	19.4
G-12	21.40	18.4	67.8
OS-360	9.63	12.0	24.0
OS-270	8.36	16.0	30.0
H-1	7.30	9.0	28.7
H-2	2.45	2.5	8.3
H-3	1.51	1.5	5.1
H-4	3.04	3.7	11.7
H-5	3.09	3.7	11.1

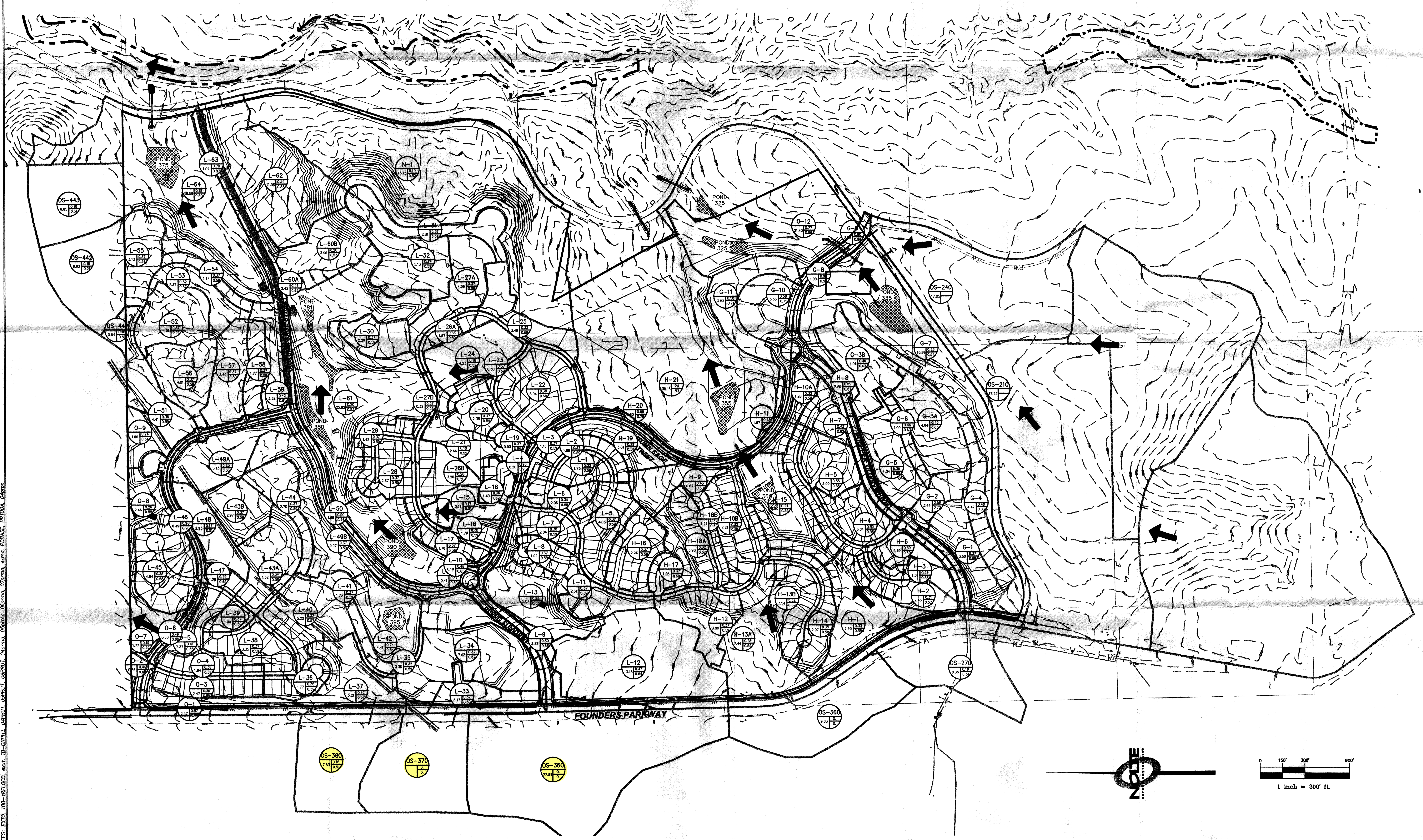
BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF (cfs)	100 YEAR RUNOFF (cfs)
H-6	4.39	6.5	18.2
H-7	3.34	6.5	17.2
H-8	2.26	5.4	12.8
H-9	0.67	0.7	2.8
H-10A	1.28	1.8	5.9
H-10B	7.81	7.8	24.7
H-11	1.67	3.4	8.9
H-12	3.90	4.6	13.3
H-13A	7.44	5.9	23.5
H-13B	3.54	3.7	11.9
H-14	2.97	3.4	10.1
H-15	5.80	5.1	21.4
H-16	3.52	4.3	12.5
H-17	1.06	1.5	4.3
H-18A	3.98	4.1	13.2
H-18B	1.21	1.6	4.8
H-19	3.01	3.2	11.7
H-20	0.60	1.0	4.1
L-1	1.73	2.0	6.3
L-2	1.89	2.4	6.9
L-3	1.16	1.9	5.5
L-4	0.20	0.9	1.7

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF (cfs)	100 YEAR RUNOFF (cfs)
L-5	4.03	5.1	14.7
L-6	2.06	2.5	7.8
L-7	2.04	2.9	8.1
L-8	1.92	2.4	7.0
L-9	3.88	7.1	17.1
L-10	0.19	0.4	1.1
L-11	2.31	2.9	8.4
L-12	13.18	19.7	48.5
L-13	5.07	4.7	20.6
L-14	0.41	0.6	1.7
L-15	2.11	1.4	7.8
L-16	1.79	2.2	6.3
L-17	1.78	2.3	6.6
L-18	1.40	1.8	5.2
L-19	0.93	1.2	3.6
L-20	2.38	3.1	8.8
L-21	2.66	2.0	9.8
L-22	6.04	7.3	21.0
L-23	0.30	0.5	1.6
L-24	4.23	2.8	14.5
L-25	3.49	3.6	11.5
L-26A	1.57	1.8	5.4

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF (cfs)	100 YEAR RUNOFF (cfs)
L-26B	3.20	2.9	10.5
L-27A	4.09	4.7	13.6
L-27B	0.32	0.5	1.5
L-28	2.67	3.4	9.8
L-29	1.42	1.8	5.4
L-30	2.29	2.9	8.5
L-31	2.81	3.5	10.0
L-32	5.13	5.8	16.7
OS-360	22.89	30.0	57.0
OS-370	7.83	17.0	32.0
L-33	3.17	4.5	13.1
L-34	7.63	8.3	26.9
L-35	0.36	0.5	1.5
OS-380	7.83	13.0	25.0
L-36	1.77	2.2	6.7
L-37	5.21	5.7	18.3
L-38	3.35	4.2	12.2
L-39	1.04	1.4	4.2
L-40	5.20	5.8	17.8
L-41	1.73	2.3	6.5
L-42	4.41	3.8	15.7
L-43A	4.32	4.7	14.4

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF (cfs)	100 YEAR RUNOFF (cfs)
L-43B	2.97	3.9	11.3
L-44	2.70	3.5	10.2
L-45	4.94	5.9	17.8
L-46	0.49	2.2	4.3
L-47	1.28	2.1	4.9
L-48	2.93	2.2	12.0
L-49A	5.13	4.5	17.9
L-49B	9.97	11.1	32.0
L-50	1.86	6.5	12.6
OS-441	0.64	1.0	0.8
L-51	4.41	4.9	14.7
L-52	4.01	6.5	18.9
L-53	2.37	3.5	11.6
L-54	1.17	1.6	4.5
OS-442	6.63	8.8	6.9
L-55	3.13	4.2	12.2
L-56	4.01	5.0	14.4
L-57	3.69	4.4	12.7
L-58	1.77	2.3	6.8
L-59	3.28	5.9	15.8
L-60a	2.42	4.8	11.9
L-60b	3.96	3.0	14.6

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF (cfs)	100 YEAR RUNOFF (cfs)
L-61	25.82	14.2	68.0
L-62	11.58	14.4	44.7
L-63	1.02	3.9	8.0
OS-443	6.85	8.5	6.7
L-64	18.56	10.2	51.1
O-1	3.47	8.0	18.2
O-2	0.56	1.1	2.9
O-3	2.47	2.9	8.7
O-4	1.84	2.4	7.1
O-5	2.37	2.7	8.3
O-6	0.68	1.6	4.0
O-7	1.77	1.4	7.1
O-8	2.46	2.8	11.0
O-9	1.66	1.6	6.5



NO.	BY	DATE	REVISIONS:
1	RAES	7/24/03	TOWN COMMENTS DATED 7/7/03

CAUTION: The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT V

DEVELOPED DRAINAGE - OVERALL RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.9001 FAX WWW.NOLTE.COM

SHEET NUMBER V OF 10 SHEETS

SCALE
VERTICAL: 1"= N/A
HORIZONTAL: 1"= 300'

JOB NUMBER DV1383

XREFS: EXTO, 100-YRFLOOD, exut, TB-DRPH3, 04PRUT, 05PRUT, 06PRUT, 04prma, 05prma, 06prma, 07prma, exma, PDBASE, PRTOOA, 04prpn

SEE SHEET DR8

SEE SHEET DR7

FOUNDERS PARKWAY

EXISTING 72" CULVERT

AUTUMN SAGE STREET

COPPER CLOUD DRIVE

AMBER SUN COURT

AMBER SUN CIRCLE

CHAPARRAL POINT

BOWIE POINT

BLANKET PONY CIRCLE

LONG RIFLE TRAIL

GHOST DANCE TRAIL

GHOST DANCE LANE

H-1 7.30 0.33 0.58

H-2 2.45 0.31 0.57

H-3 1.51 0.29 0.56

H-4 3.04 0.33 0.58

H-5 3.09 0.35 0.58

H-6 4.39 0.39 0.60

H-7 3.34 0.43 0.62

H-8 2.26 0.52 0.67

H-10A 1.28 0.33 0.58

H-10B 7.81 0.33 0.58

H-11 1.67 0.43 0.62

H-13A 7.44 0.25 0.55

H-13B 3.94 0.32 0.57

H-14 2.97 0.35 0.59

H-15 5.80 0.24 0.55

G-1 3.50 0.37 0.59

G-2 3.44 0.56 0.70

G-3A 4.64 0.46 0.63

G-3B 4.01 0.46 0.63

G-4 4.42 0.46 0.63

G-5 4.04 0.36 0.59

G-6 1.09 0.46 0.63

OS-270 8.36 0.16 0.57

OS-360 9.63 0. 0.

OS-210 37.25

0 50' 100' 200'

1 inch = 100' ft.

KEY MAP
1" = 2000'

LEGEND

- BASIN DESIGNATION (XX)
- BASIN AREA (XX.X)
- 5 YEAR COEFFICIENTS (X.XX)
- 100 YEAR COEFFICIENTS (X.XX)
- BASIN BOUNDARY
- DESIGN POINT (XX)
- DIRECTIONAL FLOW ARROW
- HIGH POINT (HP)
- LOW POINT (LP)

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NO.	BY	DATE	REVISIONS
1	RKS	7/14/03	TOM COMMENTS DATED 7/7/03

CAUTION

The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be approved by the preparer of these plans.

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-A

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NOLTE
CONSULTING ENGINEERING
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.9001 TEL 303.220.9001 FAX WWW.NOLTE.COM

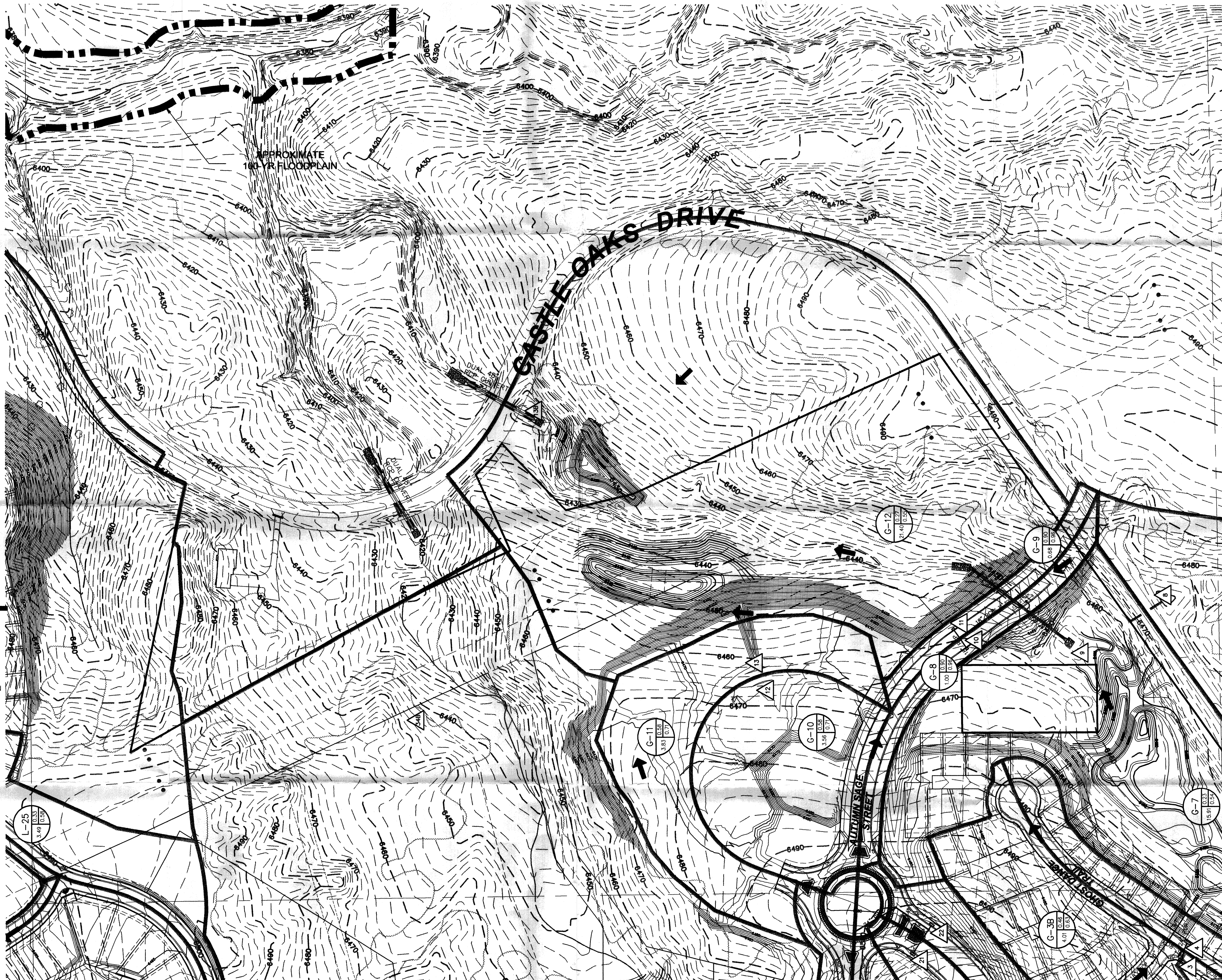
SHEET NUMBER
DR6
OF 10 SHEETS

SCALE
VERTICAL: 1"= N/A
HORIZONTAL: 1"= 100'

JOB NUMBER
DV1383

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0 50' 100' 200'

1 inch = 100' ft.

NOTE: 100-YR FLOODPLAIN SHOWN IS TAKEN FROM FIRM, TOWN OF CASTLE ROCK, COLORADO COMMUNITY PANEL NUMBER, 080050 0189 C, SEPTEMBER 30, 1987.



KEY MAP
1" = 2000'

LEGEND

- XX — BASIN DESIGNATION
- XX.X — BASIN AREA
- X.XX — 5 YEAR COEFFICIENTS
- X.XX — 100 YEAR COEFFICIENTS
- BASIN BOUNDARY
- XX — DESIGN POINT
- DIRECTIONAL FLOW ARROW
- HP — HIGH POINT
- LP — LOW POINT

SEE SHEET DR8

SEE SHEET DR6

NO.	BY	DATE	REVISIONS:
1	RAES	7/24/03	TOWN COMMENTS DATED 7/7/03

CAUTION: The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-B

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC   DATE SUBMITTED: JUNE 2003

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303.220.1001 TEL 303.220.9001 FAX WWW.NOLTE.COM

SHEET NUMBER DR7 OF 10 SHEETS

SCALE
VERTICAL: 1"= N/A
HORIZONTAL: 1"= 100'

JOB NUMBER DV1383

DATE: 09/15/03 TIME: 7:18 a.m. DRAWING NAME: ETDR-08.DWG
SERVER: NONE SERVICE: NONE PLOTTING VIEW: NONE
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LEGEND

- BASIN DESIGNATION
- 5 YEAR COEFFICIENTS
- 100 YEAR COEFFICIENTS
- BASIN BOUNDARY
- DESIGN POINT
- DIRECTIONAL FLOW ARROW
- HIGH POINT
- LOW POINT

KEY MAP

1inch = 100' ft.

SEE SHEET DR6

SEE SHEET DR10

SEE SHEET DR7

SEE SHEET DR9

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CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT IX-A

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC DATE SUBMITTED: JUNE 2003

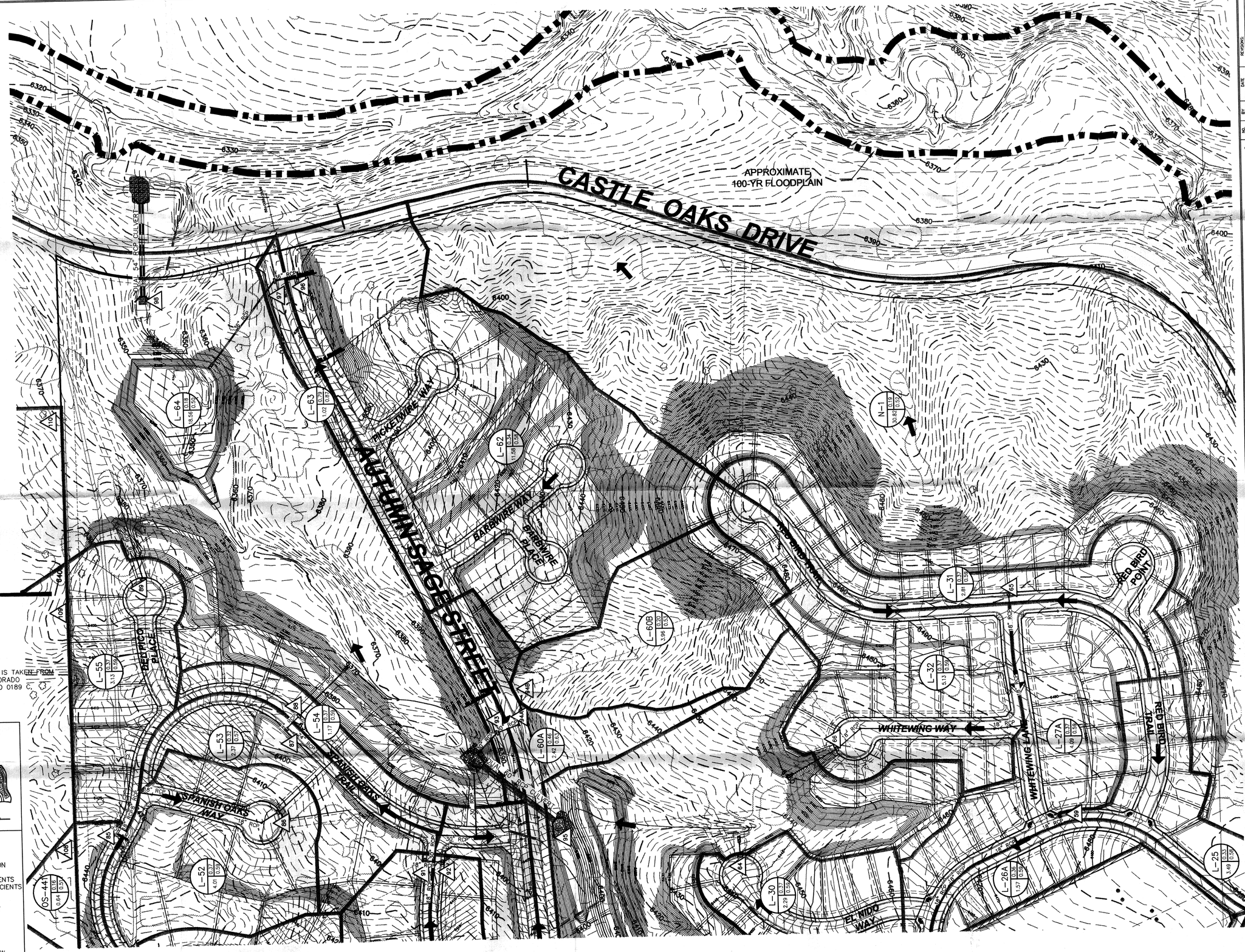
NO.	BY	DATE	REVISIONS
1	RMS	7/29/03	TOWN COMMENTS DATED 7/7/03

The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

JOB NUMBER DV1383

SHEET NUMBER DR8 OF 10 SHEETS

SCALE VERTICAL: 1"= N/A HORIZONTAL: 1"= 100'



NOTE: 100-YR FLOODPLAIN SHOWN IS TAKEN FROM FIRM, TOWN OF CASTLE ROCK, COLORADO COMMUNITY PANEL NUMBER, 080050 0189 C, SEPTEMBER 30, 1987.

KEY MAP 1"=2000'

LEGEND

- BASIN DESIGNATION (XX)
- BASIN AREA (XX.X)
- 5 YEAR COEFFICIENTS (X.XX)
- 100 YEAR COEFFICIENTS (X.XX)
- BASIN BOUNDARY
- DESIGN POINT (XX)
- DIRECTIONAL FLOW ARROW
- HIGH POINT (HP)
- LOW POINT (LP)

SEE SHEET DR10

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-D

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NO.	BY	DATE	REVISIONS
1	RKS	7/04/03	TEAM COMMENTS MAILED 7/7/03

CAUTION

The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to, or uses of, these plans. All changes, uses and additions to the original drawings must be approved in writing and shall be approved by the preparer of these plans.

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SHEET NUMBER DR9 OF 10 SHEETS

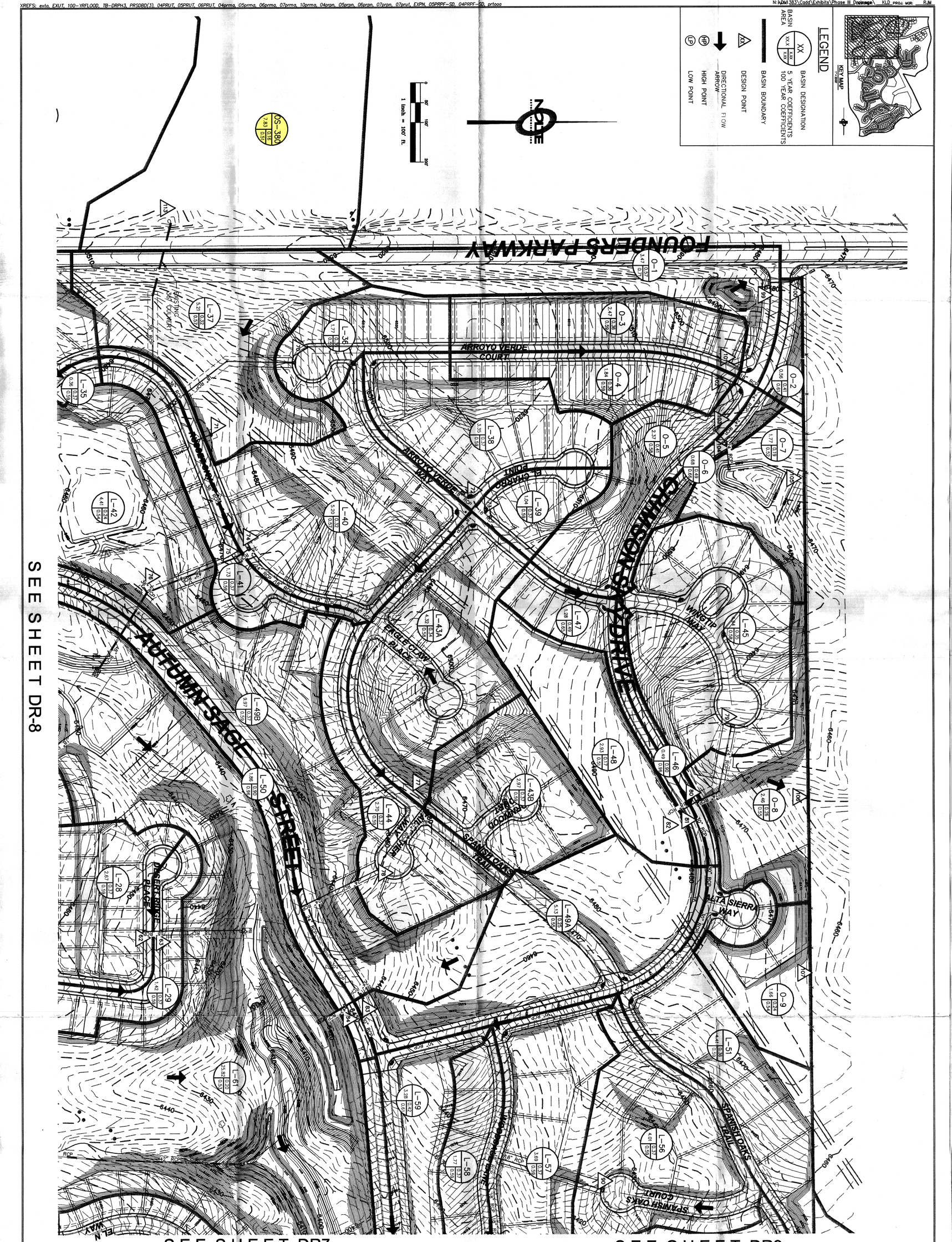
SCALE
VERTICAL: 1"= N/A
HORIZONTAL: 1"= 100'

JOB NUMBER DV1383

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N:\DM\2003\Castle Oaks\Phase II\Drawings\MJD Rational Work\

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DATE: 09/15/03 TIME: 7:31 a.m. DRAWING NAME: ETDR-10.DWG
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CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-E

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC DATE SUBMITTED: JUNE 2003

NO.	BY	DATE	REVISIONS
1	RMS	7/24/03	TOWN COMMENTS DATED 7/7/03

The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

JOB NUMBER DV1383
SHEET NUMBER DR10 OF 10 SHEETS
SCALE VERTICAL: 1"= N/A HORIZONTAL: 1"= 100'

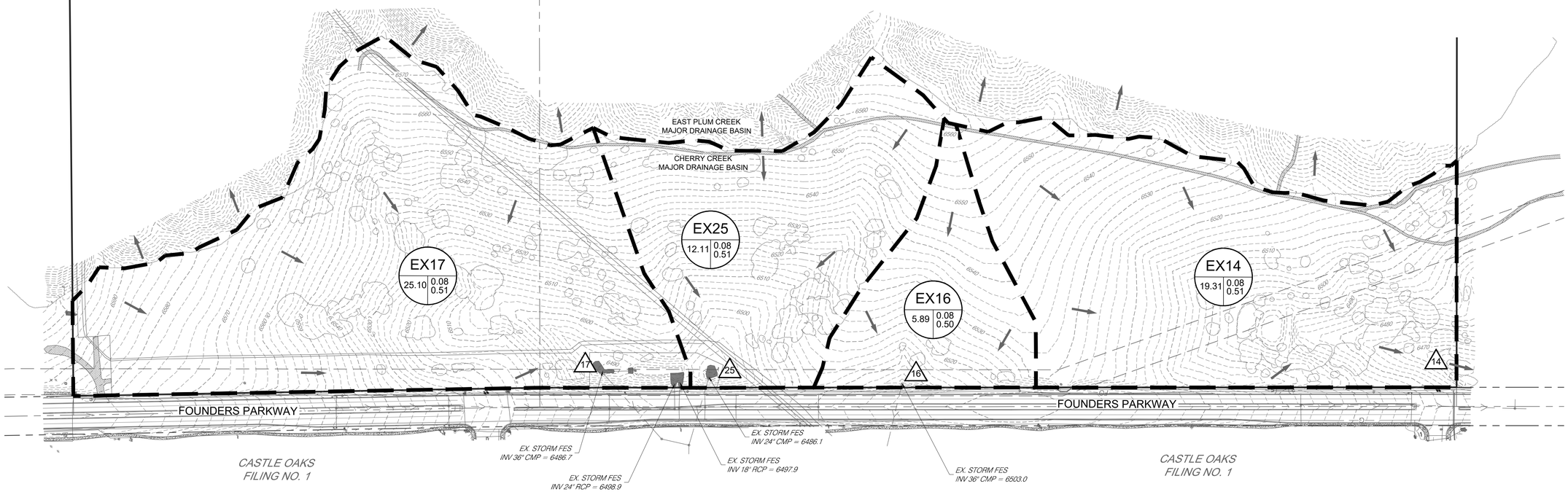
Appendix E - Drainage Maps

LEGEND:

- EXISTING MINOR CONTOUR (2FT)
- EXISTING MAJOR CONTOUR (10 FT)
- EXISTING STORM SEWER
- HISTORICAL DRAINAGE BASIN BOUNDARY
- EXISTING FLOW DIRECTION
- DESIGN POINT

HISTORICAL DRAINAGE BASIN ID: A
BASIN ACREAGE (AC): 2.30
C_5: 0.18
C_{100}: 0.52

Existing Basin Summary Table						
		Runoff Coefficients			Peak Flows (cfs)	
Basin	Area (AC)	C_5	C_{100}	I (%)	Q_5	Q_{100}
EX14	19.31	0.08	0.51	6%	4.1	46.0
EX16	5.89	0.08	0.50	5%	1.3	15.4
EX17	25.10	0.08	0.51	6%	5.3	60.4
EX25	12.11	0.08	0.51	6%	2.5	27.5



N

0 75 150 300
SCALE: 1" = 150'

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NOT FOR CONSTRUCTION

DATE	NO.	NOTES

PROJECT NO. 250100.001

PINE CANYON FILING 1
CASTLE ROCK, COLORADO
EXISTING DRAINAGE PLAN

SHEET
1 OF 1

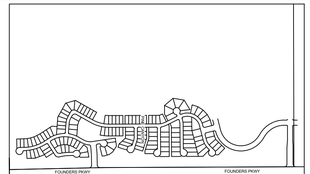
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Basin Summary Table						
		Runoff Coefficients			Peak Flows (cfs)	
Basin	Area (AC)	C_5	C_{100}	I (%)	Q_5	Q_{100}
L1	0.79	0.62	0.78	71%	2.1	4.8
L2	1.55	0.54	0.74	62%	3.3	8.2
L3	1.06	0.48	0.71	54%	2.2	5.9
L4	1.43	0.40	0.67	45%	2.3	6.8
L5	3.42	0.49	0.71	55%	6.1	16.1
L6	0.58	0.48	0.71	54%	1.2	3.2
L7	0.86	0.46	0.70	52%	1.5	4.0
L8	1.79	0.49	0.71	56%	3.2	8.4
L9	0.26	0.62	0.78	71%	0.8	1.7
L10	0.68	0.59	0.76	65%	1.8	4.2
L11	1.28	0.57	0.75	65%	3.1	7.4
L12	7.84	0.21	0.57	21%	4.7	23.7
M1.1	1.08	0.54	0.74	62%	2.8	6.9
M1.2	1.29	0.52	0.73	59%	2.4	6.0
M1.3	1.08	0.42	0.68	47%	1.5	4.5
M1.4	1.94	0.52	0.73	59%	3.6	9.2
M1.5	2.46	0.22	0.58	23%	1.8	8.5

Basin Summary Table						
		Runoff Coefficients			Peak Flows (cfs)	
Basin	Area (AC)	C_5	C_{100}	I (%)	Q_5	Q_{100}
M2.1	0.31	0.70	0.82	81%	1.0	2.1
M2.2	0.52	0.53	0.73	60%	1.1	2.7
M2.3	1.87	0.52	0.73	59%	3.7	9.5
M2.4	0.15	0.81	0.87	95%	0.6	1.2
M2.5	4.48	0.47	0.70	53%	6.8	18.5
M2.6	2.39	0.54	0.74	62%	5.0	12.4
M2.7	0.86	0.62	0.78	72%	2.1	4.8
M2.8	4.47	0.44	0.69	49%	7.2	20.5
M2.9	3.69	0.47	0.70	53%	6.0	16.5
M2.10	0.74	0.60	0.76	68%	2.0	4.5
M2.11	2.50	0.39	0.66	43%	3.3	10.2
M2.12	0.30	0.75	0.84	88%	1.1	2.2
M2.13	0.35	0.74	0.84	86%	1.3	2.6
M2.14	0.53	0.57	0.75	65%	1.5	3.5
M2.15	0.63	0.60	0.76	68%	1.5	3.6
M2.16	1.50	0.50	0.72	56%	2.9	7.7
M2.17	1.16	0.49	0.71	56%	2.7	7.2
M2.18	0.78	0.51	0.72	57%	1.8	4.6
M2.19	6.21	0.23	0.58	24%	4.0	18.3
M2.20	5.93	0.25	0.59	26%	4.4	19.0
OF-1	2.05	0.81	0.87	95%	6.4	12.4
OF-2	3.19	0.81	0.87	95%	10.0	19.4

LEGEND:

- EXISTING MINOR CONTOUR (2 FT)
- EXISTING MAJOR CONTOUR (10 FT)
- PROPOSED MINOR CONTOUR (2 FT)
- PROPOSED MAJOR CONTOUR (10 FT)
- EXISTING STORM SEWER
- MINOR DRAINAGE BASIN
- MAJOR DRAINAGE BASIN
- EXISTING DRAINAGE BASIN
- HISTORIC DRAINAGE BASIN
- PROPOSED STORM SEWER
- EMERGENCY OVERFLOW PATH
- FLOW DIRECTION
- DESIGN POINT
- DRAINAGE BASIN ID
- BASIN ACREAGE (AC)



KEY MAP
1"=1000'



SCALE: 1" = 150'

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DATE	NO.	NOTES

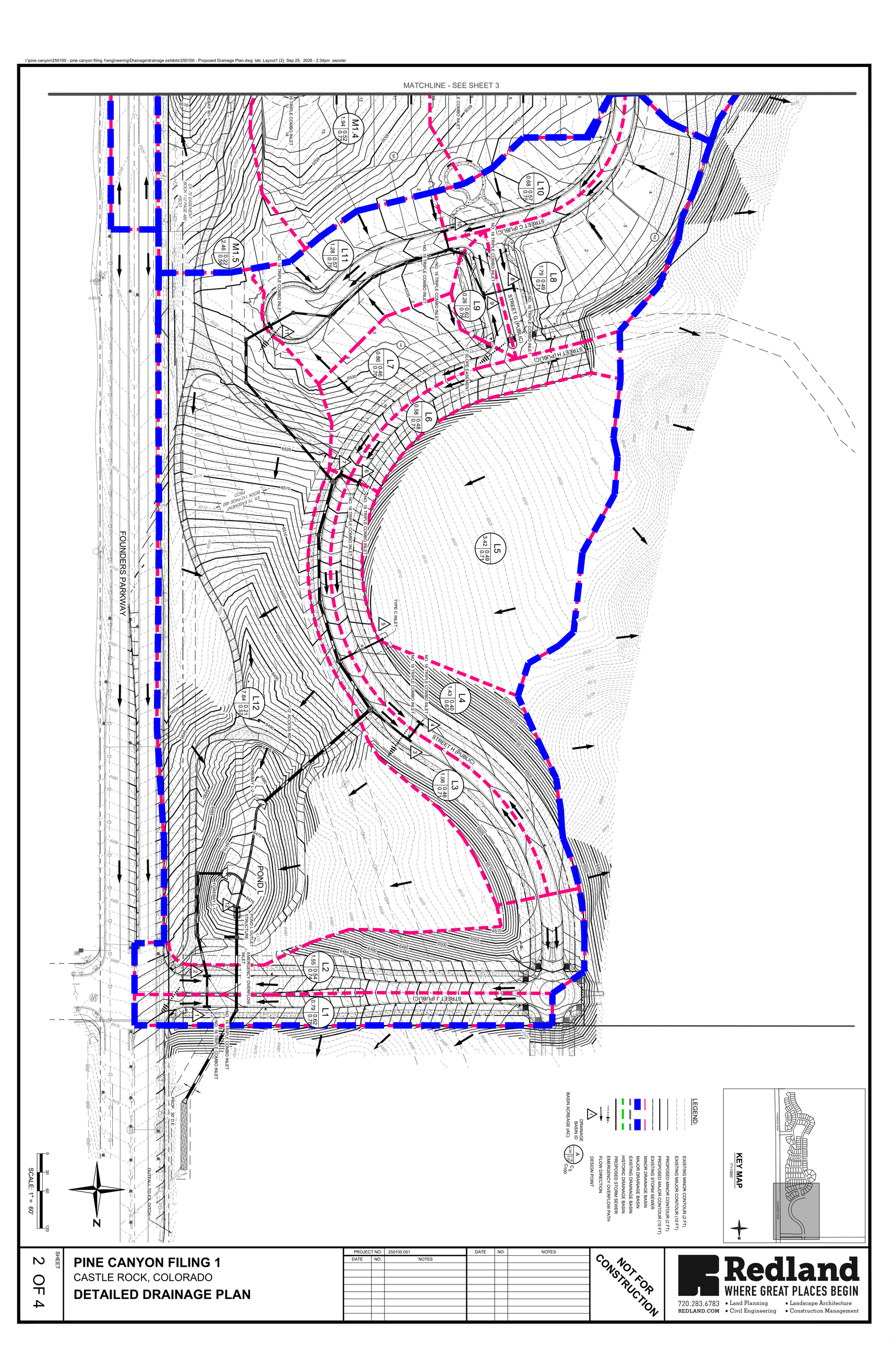
PROJECT NO. 25t100.001

DATE	NO.	NOTES

PINE CANYON FILING 1
CASTLE ROCK, COLORADO
OVERALL DRAINAGE PLAN

SHEET
1 OF 4

I:\pine canyon\25t100 - pine canyon filing 1\engineering\Drainage\drainage exhibits\25t100 - Proposed Drainage Plan.dwg tab: Layout1 Sep 25, 2025 - 2:34pm asouter



SHEET 2 OF 4

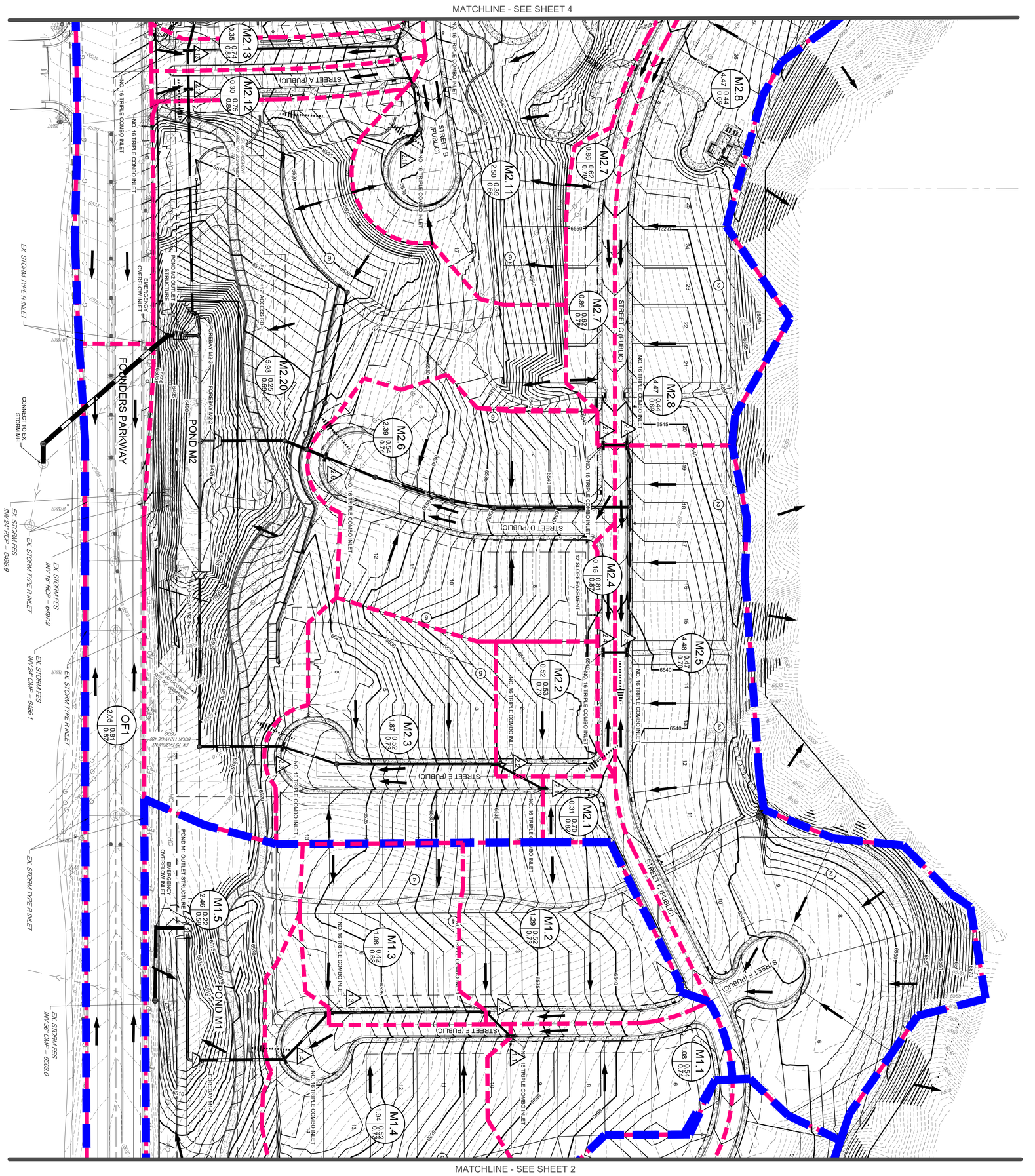
PINE CANYON FILING 1
CASTLE ROCK, COLORADO
DETAILED DRAINAGE PLAN

PROJECT NO:	250100.001
DATE	NO. / NOTES

DATE	NO.	NOTES

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SHEET 3 OF 4

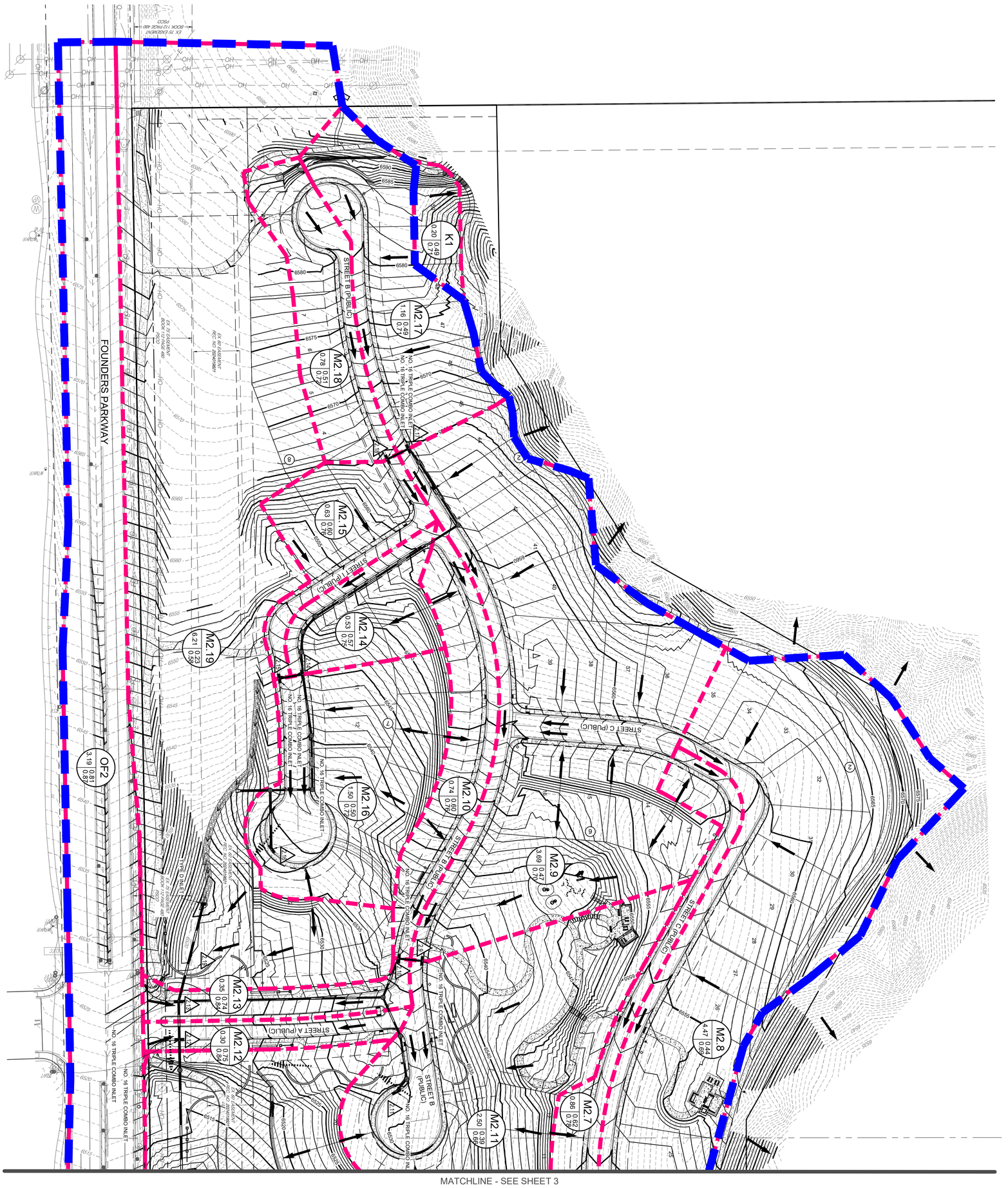
PINE CANYON FILING 1
CASTLE ROCK, COLORADO
DETAILED DRAINAGE PLAN

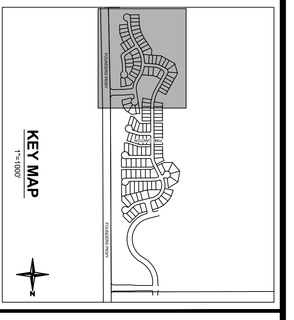
PROJECT NO:	250100.001	
DATE	NO.	NOTES

DATE	NO.	NOTES

NOT FOR CONSTRUCTION

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LEGEND:

- EXISTING MINOR CONTOUR (2 FT)
- EXISTING MAJOR CONTOUR (10 FT)
- PROPOSED MINOR CONTOUR (2 FT)
- PROPOSED MAJOR CONTOUR (10 FT)
- EXISTING STORM SEWER
- MINOR DRAINAGE BASIN
- MAJOR DRAINAGE BASIN
- EXISTING DRAINAGE BASIN
- HISTORIC DRAINAGE BASIN
- PROPOSED STORM SEWER
- EMERGENCY OVERFLOW PATH
- FLOW DIRECTION
- DESIGN POINT
- DRAINAGE BASIN ID
- BASIN ACREAGE (AC)
- A (0.00 AC) C100 C/Q

SCALE: 1" = 60'

PINE CANYON FILING 1

CASTLE ROCK, COLORADO

DETAILED DRAINAGE PLAN

SHEET 4 OF 4

PROJECT NO:	250100.001	
DATE	NO.	NOTES

DATE	NO.	NOTES

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