



PHASE III DRAINAGE REPORT

FOR

AdventHealth Castle Pines MOB

SE Corner of Castle Pines Pkwy.
and Canyon Forge Dr.
City of Castle Pines
Douglas County, CO

Prepared for:

Portercare Adventist Health System
9395 Crown Crest Blvd.
Parker, CO 80138

Prepared by:

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S. A. Miro Job No. 25-060

**MARCH 2026
REVISED JUNE 2026**

Certification Statements:

"This report and plan for the Phase III drainage design of AdventHealth Castle Pines MOB was prepared by me (or under my direct supervision) in accordance with the provisions of Douglas County Storm Drainage Design and Technical Criteria Manual for the owners thereof. I understand that the City of Castle Pines and Douglas County does not, and will not, assume liability for drainage facilities designed by others."

Ryan J. Humphrey P.E.
State of Colorado
No. 64927

"Portercare Adventist Health System hereby certifies that the drainage facilities for AdventHealth Castle Pines MOB shall be constructed according to the design presented in this report. I understand that Douglas County does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that Douglas County reviews drainage plans pursuant to Colorado Revised Statutes, Title 30, Article 28; but cannot, on behalf of AdventHealth Castle Pines MOB, guarantee that final drainage design review will absolve Portercare Adventist Health System and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design."

Portercare Adventist Health System

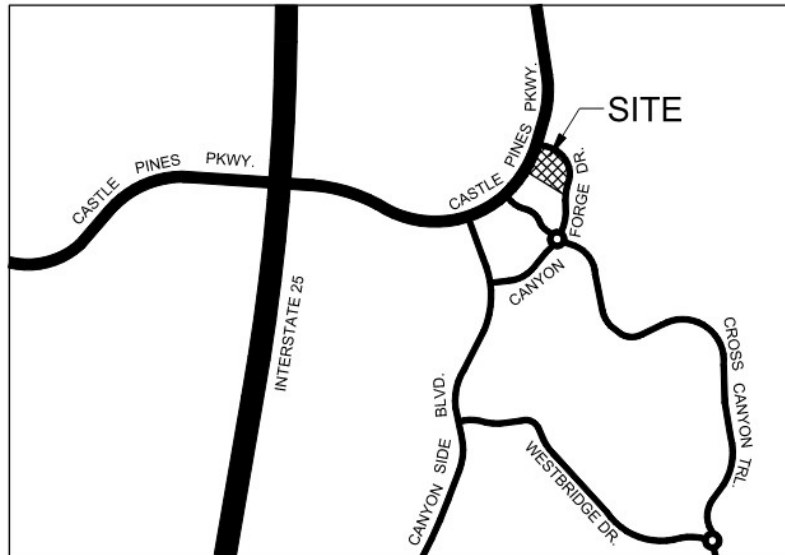
Authorized Signature

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I. GENERAL LOCATION AND DESCRIPTION

A. Site Location



VICINITY MAP

This Phase III Drainage Report is being prepared for the proposed “AdventHealth Castle Pines MOB”. This project site is in Canyonside Subdivision Filing number 2, lot 3. More specifically, in a parcel located in the northwest quarter & southwest quarter of section 2, township 7 south, range 67 west of the sixth principal meridian, in the City of Castle Pines, Douglas County, Colorado.

The site is on the southeast corner of Castle Pines Parkway and Canyon Forge Drive. It is approximately 3,000 feet east of I-25 at the Castle Pines Parkway exit. Bound to the north and east by Canyon Forge Drive, to the west by Castle Pines Parkway and to the south by Lots 1 & 2 of Filing 2.

The surrounding and adjacent developments are currently vacant. However, individual lots are under contract or sold. Lot 1A, Canyonside Filing No. 2, 2nd Amendment are under contract for an active adult multi-family. Open space is planned to the east on the other side of Canyon Forge Dr. Tract C to the north is being used for water quality and detention. Canyonside Filing No. 2, 3rd Amendment are under contract for residential use. To the west on the other side of Castle Pines Parkway is Filing 4 with some residential and commercial uses planned. See the appendix for a surrounding uses breakdown which was included in the concept design package submitted to the DRC on December 5th, 2025.

B. Description

The site is 5.78 acres (251,841 square feet).

Ground cover consists of sparsely vegetated undeveloped soil. The site generally slopes from southeast to northwest. Existing swales on west side of the lot and the adjacent Castle Pines Parkway ROW have rip rap check dams installed. The swales outfall to existing inlets. The site has been over lot graded in preparation for development with flatter grades on the north and west sides of the property and steeper grades (varying from 4:1 and 5:1, horizontal to vertical) on the south and east sides of the lot.

The hydrologic soil group is C/D. The Fondis-Kutch association is classified as sandy-clay with the approximately top 6 inches loam and sandy loam. As such, the infiltration of surface runoff is expected to be lower than hydrologic soils grouped A or B. Additionally the soils are noted as expansive and compressible on top of expansive bedrock per the Draft Geotechnical Investigation by CTL Thompson dated January 14, 2026. These soils are typical of the available developable land east of the Front Range. See the appendix for the relevant pages from the NRCS web soil survey

Major and minor drainageways adjacent to the site include Newlin Gulch approximately 1,300 feet east of the southeast corner of the property. The Parkway Tributary Major Drainageway exists north of the property. The existing Pond F2 outfalls to this Parkway Drainage way per the Phase III Drainage Report for Canyonside Subdivision Filing No. 2 prepared by Core Consultants, Inc. dated June 15, 2022, hereby referred to as the Master Report.

Floodplains delineated on the FEMA FIRM maps are shown in the appendix and the project site is Zone X. Map number 08035C0180G, revised September 4th, 2020. The previously mentioned Newline Gulch is the only nearby floodplain noted as Zone A. See the master drainage plan in the appendix of this report.

No known existing irrigation canals or ditches.

No known significant geologic features.

The proposed land use is healthcare for a Medical Office Building.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

The site is in the Newlin Gulch Major Drainage Basin, according to the Master Report. See the following excerpt from page 5 of the Master Report for a description of the on-site and off-site major drainage basin characteristics and flow patterns and paths. "The watershed starts west I-25 and ends at Mainstreet in the Town of Parker. The basin drains northeast via Newlin Gulch and its tributaries through areas of Castle Pines, unincorporated Douglas County, Rueter-Hess Reservoir, and the Town of Parker. The gulch joins with Cherry Creek near Challenger Park in the Town of Parker."

The basin is in mostly undeveloped areas with plans for future development with some scattered developed areas.

The Master Report discusses the previous studies and plans for this major drainage basin. There are no known updates from the time of this Master Report.

The proposed site discussed in this report for Lot 3 in Canyonside Subdivision Filing number 2 was planned for development and accounted for in the Master Report. As such, no plans for improvements are proposed to the existing channels adjacent to the site.

As this site's development was accounted for in the Master Report, there are no known off-site flow patterns anticipated to impact downstream properties.

B. Minor Drainage Basins

The proposed site conforms to the master drainage report. Therefore, the proposed development is anticipated to conform to the historic drainage patterns. The developed runoff will outfall to proposed and existing inlets which will be routed via proposed and existing pipes to the existing detention and water quality pond F2.

A small portion of the on-site flow will sheet flow into the existing swale on the west side of the property and outfall into the existing CDOT type D inlet A5. This area and subsequent flow which was planned in the existing A-4 basin will now be tributary to the A-5 basin. The revision from the

Master Plan basin's are shown in Figure 2 proposed vs. Master Plan Calculations verifying the capacity of the existing inlet and swale are included in the appendix of this report.

Minor drainage basin descriptions are as follows:

After entering the inlets or proposed swale (described more specifically per each basin below), stormwater will connect to the existing storm infrastructure via proposed pipes and manholes. This is ultimately routed north to the existing pond F2 where it will be treated and detained.

All proposed basins are within vacant, undeveloped land. The proposed land use is a parking lot, Medical Office Building, sidewalks and landscape islands.

All A4 basins & the R1 basin are within the Master Plan basin A4 which was designed with 85% imperviousness. As the proposed site falls under this 85% imperviousness (46.4% total) the developed condition proposed with this project is not anticipated to impact the off-site flow patterns. The existing storm infrastructure and downstream water quality and detention pond was designed with the fully developed condition considered. The design intent is to match the historic drainage patterns and follow the Master Plan drainage basins.

BASIN A4.1

Basin A4.1 is 0.23 acres and accounts for the northwestern edge of the parking lot. This basin has an impervious value of 89% and generates 5-yr and 100-yr design flows of 0.66 and 1.51 cfs, respectively. Runoff is conveyed via sheet flow and then into the curb and gutter as channelized flow. This outfalls to the *proposed 5' type R inlet A-20 in sump*. In the event the inlet is clogged, stormwater will overtop the curb behind the street inlet and sheet flow to the existing swale and outfall to *existing inlet A5*.

There are 0.02 acres of landscaped area within the basin which are assumed to be irrigated. Any over watering of this area will match the stormwater drainage pattern and is not anticipated to impact the site drainage.

BASIN A4.2

Basin A4.2 is 0.46 acres and accounts for the northeastern edge of the parking lot. This basin has an impervious value of 89% and generates 5-yr and 100-yr design flows of 1.32 and 3.04 cfs, respectively. Runoff is conveyed via sheet flow and then into the curb and gutter as channelized flow. This outfalls to the *proposed 5' type R inlet A-41 in sump*. In the event the inlet is clogged, stormwater will overtop the curb behind the street inlet and sheet flow to the Canyon Forge Drive and outfall to *existing inlet A6*.

There are 0.04 acres of landscaped area within the basin which are assumed to be irrigated. Any over watering of this area will match the stormwater drainage pattern and is not anticipated to impact the site drainage.

BASIN A4.3

Basin A4.3 is 0.79 acres and accounts for the eastern edge of the parking lot and the existing previous land west of the detached sidewalk on Canyon Forge Drive. This basin has an impervious value of 64% and generates 5-yr and 100-yr design flows of 1.66 and 4.61 cfs, respectively. Runoff is conveyed via sheet flow and then into the curb and gutter as channelized flow. This outfalls to the *proposed 10' type R inlet A-50 on grade*. In the event the inlet is clogged, stormwater will bypass and continue channelized flow into the curb on Canyon Forge Drive and outfall to *existing inlet A6*.

There are 0.06 acres (*0.27 of the pervious acres are not expected to be irrigated*) of landscaped area within the basin which are assumed to be irrigated. Any over watering of this area will match the stormwater drainage pattern and is not anticipated to impact the site drainage.

BASIN A4.4

Basin A4.4 is 0.03 acres and accounts a landscaped area on the southeastern corner of the building. This basin has an impervious value of 36% and generates 5-yr and 100-yr design flows of 0.04 and 0.16 cfs, respectively. Runoff is conveyed via sheet flow in the landscape area and outfalls to the *proposed 12" area inlet A-20 in sump*. In the event the inlet is clogged, stormwater will overtop the curb to the north and to the flush curb transition to the west follow the drainage patterns of proposed basins A4.3 and A4.4, respectively to the *proposed inlets A-50 and A-30*.

There are 0.03 acres of landscaped area within the basin which are assumed to be irrigated. Any over watering of this area will match the stormwater drainage pattern and is not anticipated to impact the site drainage.

BASIN A4.5

Basin A4.5 is 1.38 acres and accounts for the southern portion of the parking lot and the existing previous land west of the detached sidewalk on Canyon Forge Drive. This basin has an impervious value of 37% and generates 5-yr and 100-yr design flows of 1.77 and 6.87 cfs, respectively. Runoff is conveyed via sheet flow and then into the curb and gutter as channelized flow. This outfalls to the *proposed 5' type R inlet A-30 in sump*. In the event the inlet is clogged, stormwater will overtop the curb behind the street inlet and channelized flow to the proposed swale in proposed basin A4.6. Which will ultimately outfall to the existing swale and into *existing inlet A5*.

There are 0.03 acres (*1.03 of the pervious acres are not expected to be irrigated*) of landscaped area within the basin which are assumed to be irrigated. Any over watering of this area will match the stormwater drainage pattern and is not anticipated to impact the site drainage.

BASIN A4.6

Basin A4.6 is 1.72 acres and accounts for the mostly undisturbed previous land south and west of the proposed building. This basin has an impervious value of 20% and generates 5-yr and 100-yr design flows of 1.29 and 7.62 cfs, respectively. Runoff is conveyed via sheet flow and then into the proposed swale as channelized flow. This outfalls to the existing swale west of the project's disturbed area and outfalls to *the existing inlet A5 in sump*. In the event the inlet is clogged, stormwater will pond and sheet flow to the *existing inlet A6 in sump*.

There are 0 acres (*all 1.72 of the pervious acres are not expected to be irrigated*) of landscaped area within the basin which are assumed to be irrigated. Any over watering of this area will match the stormwater drainage pattern and is not anticipated to impact the site drainage.

BASIN R1

Basin R1 is 0.32 acres and accounts for the proposed building's roof area. This basin has an impervious value of 95% and generates 5-yr and 100-yr design flows of 0.99 and 2.20 cfs, respectively. These flows have been split by 50% with one half of the flow routed north and the other half routed south of the building. Runoff is conveyed via gutters into the planned roof drain connection. These flows captured in the curbs and gutters outfall underground to the proposed storm infrastructure. In the event the roof drains are clogged, it is assumed stormwater will be collected via roof drain overflows and discharged at grade via lambstongue(s).

There are no known irrigated areas planned on the roof as such it is not anticipated to impact the site drainage.

III. DRAINAGE DESIGN CRITERIA

A. Regulations

This Drainage Report is based upon the criteria specified in the Storm Drainage Design and Technical Criteria Manual (Manual) from Douglas County. Where the Manual references the Urban Storm Drainage Criteria Manual (Urban Drainage), the report complies with both documents.

B. Drainage Studies, Outfall Systems Plans, Site Constraints

This Drainage Report is also based upon the previously mentioned Master Report. The undeveloped Lot 3 which this project is located on was planned for future development and the existing storm infrastructure and pond were designed with an 85% imperviousness which is greater than the 46.4% imperviousness calculated with this MOB. As such, the proposed development complies with the Master Plan for Filing 2. The existing pond F2 has capacity for this proposed development based on this lower imperviousness and thus lower runoff.

Additionally, this Drainage Report has reviewed the *“Drainage Report for Life Time Castle Pines, Lot 1, Canyonside Subdivision No. 3, in City of Castle Pines, Colorado”*, amended April 8, 2025 by Collins Engineers, Inc. Hereby referred to as the LT Report. This LT Report does not appear to have totaled the flows for; the existing upstream conditions, the offsite basins which will outfall into the existing infrastructure upstream of the proposed MOB, and the calculated proposed flows directly upstream of the Master Report’s design point A9. As such, the master planned flows will need to govern the analysis of the expected flows when checking the capacity of the existing infrastructure for this MOB’s change in flows. This is expected to result in a more conservative check of the existing infrastructure’s capacity as the **LT report calculated a 62.75% imperviousness for Parcel 3 vs. the Master Report’s assumed 85%** for high density mixed-use combined land use imperviousness. See Appendix C for additional markups and clarifications.

This drainage report has reviewed the *“Phase III Drainage Report for Canyonside Subdivision Filing No. 2, Lot 1 and Lot 2, Douglas County Castle Pines, Colorado”* amended June 9, 2025, by Kimley-Horn and Associates, Inc. Similar to the LT report the total flows at the connection to existing do not appear to have been included. As such, the master planned flows will continue to govern the analysis of the existing infrastructure’s capacity. Again, this is expected to result in a more conservative check as **this report calculated a weighted imperviousness of 64.5% which is less than Master Report’s 85%**. See Appendix C for additional markups and clarifications.

Lot 2 in Filing 2 south of this project, is upstream of this project. Development of this lot has also been accounted for within the Master Plan and those developed design flows have been included in Lot 3’s StormCAD model to check capacity of the existing stormwater infrastructure. Additionally Filing 3, Lot 1 is upstream of this project southwest of Cross Canyon Trail has also accounted for in the Master Report with those developed design flows are also included in the StormCAD model. See the mark ups on the master drainage plan for further clarification.

There are no planned changes to UDFCD Outfall Systems Plans (OSP) with this development. Per the Master Report this site is in the Newlin Gulch watershed which was previously studied by Kiowa Engineering Corp. in 1993. A Major Drainageway Plan (MDP) for Newlin Gulch watershed is currently underway that will supersede the 1993 OSP, a draft was prepared by Muller in 2015. MHFD website states “A key goal of the study is to update hydrology based on the most current land use information for existing and future conditions and to assess impacts associated with Rueter-Hess Reservoir”.

Due to Lot 3 being vacant and the site development being master planned, site constraints did not impact the stormwater management facility design.

C. Hydrology

The design rainfall and runoff calculation method used is the Rational Method, for the 5-year and 100-year storm events. The hydrologic soil group in this area is Type C/D.

Table 1 - One-Hour Point Rainfall Depths (Castle Pines – City Office)	
Return Period	One-Hour Point Rainfall (inches)
2-Year	0.84
5-Year	1.12
10-Year	1.36
50-Year	2.01
100-Year	2.31

As the development has a lower calculated impervious percentage and lower runoff than the Master Plan designed for, no changes to the detention storage calculations or release rates are included.

D. Hydraulics

StormCAD was used to determine the conveyance facility capacities.

The hydraulic grade line calculation method was the node analysis type based on StormCAD results and profiles. The loss coefficients are shown in the manhole tables in the appendix of this report. The standard head loss method was used and the resulting head loss in feet is shown in the appendix of this report on the manhole tables for the StormCAD output

StormCAD uses the step backwater calculation for the HGL profiles which provides the resulting water surface elevations at each of the nodes and inside the pipes. These are shown on the storm plan and profiles included in the appendix of this report.

No changes in the detention pond routing are proposed with this development.

E. Water Quality Enhancement

No changes to the Best Management Practices (BMPs) or the design procedures used in the Master Report for water quality are proposed with this development.

IV. STORMWATER MANAGEMENT FACILITY DESIGN

A. Stormwater Conveyance Facilities

The proposed site drains to five (5) strategically placed inlets. The general intent is diverting water from the proposed building and connecting to the existing stormwater infrastructure to outfall to the existing water quality and detention pond. Emergency surface overflow paths in the events inlets are clogged are provided in the individual sub-basin descriptions.

The proposed drainage paths match the historic drainage pattern which generally slopes from southeast to northwest. Intentional high points and ridge lines have been provided to minimize tributary areas to each inlet.

Inlets have been provided on the south side of the building with an emergency surface overflow swale and a flush curb provided to route water west of the building for overflow. Most of the low points at inlets have been placed in sump with surface overflow paths planned to continue downstream. The pipes have been located to avoid the domestic water, fire service, and sanitary sewer service lines and crossings have been checked to provide vertical clearance from utility crossings. The peak flow rates at design points have been calculated conservatively to provide an

additional factor of safety. These conservative calculations use the minimum time of concentration of 5 minutes and to not account for routing through the pipes. Additionally, an impervious value of 20% for disturbed soils has been applied to all pervious surfaces even those that are not being disturbed by the proposed grading and earthwork efforts on the project. This factor of safety provides slightly higher flow rates to ensure pipe and inlet capacities are adequate. The HGLs have been checked and correspondingly pipe sizes and/or slopes have been upsized to provide the needed capacity or downsized to reduce material and costs.

The storm sewer will be outfalling to the existing pond and the previously approved and designed energy dissipation is anticipated to be adequate.

After water quality and detention are provided within the existing pond F2, the outfall is to the Parkway Tributary Major Drainageway just north of the pond below the 100-year predeveloped rate of 43.7 cfs, conforming to the historic drainage pattern, according to the Master Report.

The proposed emergency surface overflow swale also serves as the drainage path for the largely undisturbed and completely pervious area in the proposed basin A4.6. This swale has been modeled and has capacity for tributary flow. See the appendix for the swale calculation. from MHFD which

Allowable street capacities are shown in the inlet calculations. See the appendix for the standard MHFD inlet calculations.

Maintenance for stormwater easements and facilities will be in accordance with Douglas County, the City of Castle Pines, and MHFD.

No off-site facilities are proposed.

B. Stormwater Storage Facilities

No changes are proposed to the existing pond.

C. Water Quality Enhancement Best Management Practices

No changes are proposed to the existing pond.

D. Floodplain Modification

No floodplain modifications are proposed.

E. Additional Permitting Requirements

There are no known additional permits required because of this proposed development.

F. General

The relevant tables, calculations, software outputs, and figures used for this Phase III drainage design are shown in the appendices of this report.

V. CONCLUSIONS

This drainage design for the AdventHealth Castle Pines Medical Office Building in the Canyonside Subdivision Filing No. 2, Lot 3 complies with the Douglas County Storm Drainage Design and Technical Criteria Manual (the adopted criteria for the City of Castle Pines) and Urban Drainage.

This drainage report conforms to the Master Plan and Report prepared by Core Consultants, Inc. dated June 15, 2022.

There are no variances proposed with this drainage design.

The drainage concept prepared in this report effectively conveys the additional runoff generated by the proposed development to proposed and existing stormwater infrastructure. Where it will discharge to the existing pond F2 which was designed to treat and detain developed runoff of this and other adjacent properties.

VI. REFERENCES

1. Douglas County, Colorado, "*Storm Drainage Design and Technical Criteria Manual*", Amended July 8, 2008
2. Mile High Flood District, "*Urban Storm Drainage Criteria Manual*," revised 2016, partially updated March 2024.
3. Core Consulting, Inc., "*Phase III Drainage Report for Canyonside Subdivision Filing No. 2, Castle Pines, Colorado*", amended June 15, 2022.
4. Collins Engineers, Inc., "*Drainage Report for Life Time Castle Pines, Lot 1, Canyonside Subdivision No. 3, in City of Castle Pines, Colorado*", amended April 8, 2025.
5. Kimley-Horn and Associates, Inc., "*Phase III Drainage Report for Canyonside Subdivision Filing No. 2, Lot 1 and Lot 2, Douglas County Castle Pines, Colorado*" amended June 9, 2025.
6. Draft of Geotechnical Investigation, AdventHealth, Canyonside, Filing No. 2, Northeast of Cross Canyon Trail and Hess Road, Castle Pines, Colorado by CTL Thompson, dated January 14, 2026.
7. NRCS Soil Survey Staff, (Natural Resources Conservation Service). United States Department of Agriculture. Web Soil Survey. Available online at the following link:
<https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>. Accessed February 26, 2026.
8. FEMA (Federal Emergency Management Agency) FIRM (Flood Insurance Rate Map)"No. 08035C0180G". Revised September 4, 2020. Available online at the following link:
<https://www.fema.gov/flood-maps/national-flood-hazard-layer>. Accessed February 26, 2026.

VII. APPENDIX

Appendix A

Hydrologic Computations

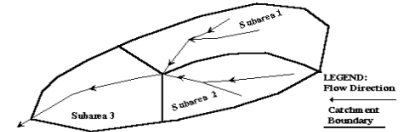
Determination of Runoff Coefficients for Rational Method

MHFD-Rational, Version 3.00 (August 2025)

Designer: MAB
Company: S. A. MIRO
Date: 2/26/2026
Project: AH CASTLE PINES MOB
Location: CASTLE PINES

Cells of this color are for required user-input

Cells of this color are for optional override values



Provide subcatchment names on the Rational Calcs worksheet to open up the table below.

Subcatchment Name	# of Subareas	Area (ac)	NRCS Hydrologic Soil Group	Percent Imperviousness				Runoff Coefficient, C							(Optional) Override Runoff Coefficient, C							
				Imperviousness Source	Imperviousness Category	Calculated Imperviousness	(Optional) Override Imperviousness	WQE & 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	WQE & 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	
R1	1	0.32	C/D			95.0%	95.0%	0.79	0.81	0.83	0.85	0.86	0.87	0.89	0.79	0.81	0.83	0.85	0.86	0.87	0.89	
		0.32	C/D	Surface Type	Roofs	95%		0.79	0.81	0.83	0.85	0.86	0.87	0.89								
A-4.1	2	0.23	C/D			88.8%	88.8%	0.73	0.76	0.78	0.82	0.83	0.85	0.87	0.73	0.76	0.78	0.82	0.83	0.85	0.87	
		0.02	C/D	Surface Type	Disturbed Soil	20%		0.14	0.20	0.28	0.43	0.49	0.57	0.65								
		0.21	C/D	Surface Type	Roadways and Paved Streets	95%		0.79	0.81	0.83	0.85	0.86	0.87	0.89								
A-4.2	2	0.46	C/D			89.2%	89.2%	0.74	0.76	0.79	0.82	0.83	0.85	0.87	0.74	0.76	0.79	0.82	0.83	0.85	0.87	
		0.04	C/D	Surface Type	Disturbed Soil	20%		0.14	0.20	0.28	0.43	0.49	0.57	0.65								
		0.42	C/D	Surface Type	Roadways and Paved Streets	95%		0.79	0.81	0.83	0.85	0.86	0.87	0.89								
A-4.3	2	0.79	C/D			63.6%	63.6%	0.52	0.55	0.60	0.68	0.71	0.74	0.79	0.52	0.55	0.60	0.68	0.71	0.74	0.79	
		0.33	C/D	Surface Type	Disturbed Soil	20%		0.14	0.20	0.28	0.43	0.49	0.57	0.65								
		0.46	C/D	Surface Type	Roadways and Paved Streets	95%		0.79	0.81	0.83	0.85	0.86	0.87	0.89								
A-4.4	2	0.03	C/D			35.9%	35.9%	0.27	0.33	0.40	0.52	0.57	0.63	0.70	0.27	0.33	0.40	0.52	0.57	0.63	0.70	
		0.03	C/D	Surface Type	Disturbed Soil	20%		0.14	0.20	0.28	0.43	0.49	0.57	0.65								
		0.01	C/D	Surface Type	Concrete Driveways and Walks	95%		0.79	0.81	0.83	0.85	0.86	0.87	0.89								
A-4.5	2	1.38	C/D			37.3%	37.3%	0.29	0.34	0.41	0.53	0.58	0.64	0.71	0.29	0.34	0.41	0.53	0.58	0.64	0.71	
		1.06	C/D	Surface Type	Disturbed Soil	20%		0.14	0.20	0.28	0.43	0.49	0.57	0.65								
		0.32	C/D	Surface Type	Roadways and Paved Streets	95%		0.79	0.81	0.83	0.85	0.86	0.87	0.89								
A-4.6	1	1.72	C/D			20.0%	20.0%	0.14	0.20	0.28	0.43	0.49	0.57	0.65	0.14	0.20	0.28	0.43	0.49	0.57	0.65	
		1.72	C/D	Surface Type	Disturbed Soil	20%		0.14	0.20	0.28	0.43	0.49	0.57	0.65								
TOTAL	3	4.94	C/D			46.4%	46.4%	0.37	0.41	0.47	0.58	0.62	0.67	0.73	0.37	0.41	0.47	0.58	0.62	0.67	0.73	
		0.32	C/D	Surface Type	Roofs	95%		0.79	0.81	0.83	0.85	0.86	0.87	0.89								
		1.42	C/D	Surface Type	Roadways and Paved Streets	95%		0.79	0.81	0.83	0.85	0.86	0.87	0.89								
		3.20	C/D	Surface Type	Disturbed Soil	20%		0.14	0.20	0.28	0.43	0.49	0.57	0.65								



Composite C Calculations

Project Information

Project Name: AH Castle Pines MOB
Miro Project No: 25-060
Revised Date: 3/2/2026
Calculated By: RJH

Coefficient Equations

$$C_{CD(2)} = 0.834I^{1.122} \quad C_{CD(10)} = 0.735i + 0.132$$

$$C_{CD(5)} = 0.815i + 0.035 \quad C_{CD(100)} = 0.409i + 0.484$$

*NOTE: C_{CD} Equations from USDCM updated March 2024

Basin Designation	A Paved (ft ²)	A Roof (ft ²)	A Disturbed Soil (ft ²)	A total	Impervious- ness	C _{CD}	C _{CD}	C _{CD}	C _{CD}
	95%	95%	20%	(acres)		02 yr	05 yr	10 yr	100 yr
Prev. A4 now A6			2,547	0.06	20%	0.14	0.20	0.28	0.57
Prev. A4 now A5			1,937	0.04	20%	0.14	0.20	0.28	0.57

**AH CASTLE PINES
CANYONSIDE
MOB**

**CONCEPT DESIGN
PACKAGE**

DATE 12/5/2025

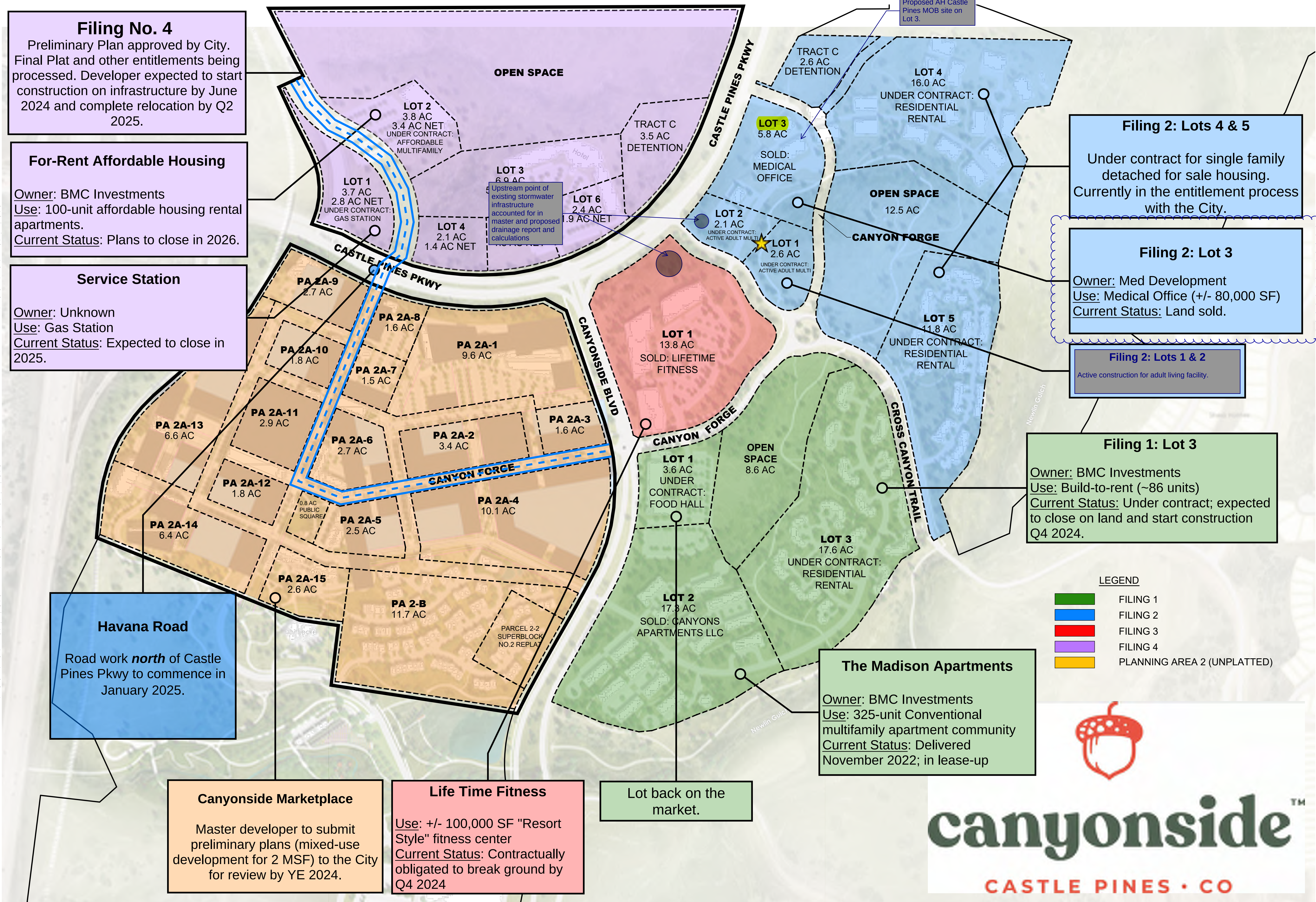
REVISIONS		
#	DESCRIPTION	DATE

SHEET TITLE

**SURROUNDING
USES**

SHEET NUMBER

S100



canyonsideTM
CASTLE PINES • CO

Calculation of Peak Runoff using Rational Method

Designer: MAB
Company: S. A. MIRO
Date: 2/26/2026
Project: AH CASTLE PINES MOB
Location: CASTLE PINES

MHFD-Rational, Version 3.00 (August 2025)

Cells of this color are for required user-input

Cells of this color are for optional override values

Provide input for area, soil type, and imperviousness on the Runoff Coeffs worksheet.

Subcatchment Name	Area (ac)	NRCS Hydrologic Soil Group(s)	Imperviousness	Runoff Coefficient, C						
				WQE & 2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
R1	0.32	C/D	95.0%	0.79	0.81	0.83	0.85	0.86	0.87	0.89
A-4.1	0.23	C/D	88.8%	0.73	0.76	0.78	0.82	0.83	0.85	0.87
A-4.2	0.46	C/D	89.2%	0.74	0.76	0.79	0.82	0.83	0.85	0.87
A-4.3	0.79	C/D	63.6%	0.52	0.55	0.60	0.68	0.71	0.74	0.79
A-4.4	0.03	C/D	35.9%	0.27	0.33	0.40	0.52	0.57	0.63	0.70
A-4.5	1.38	C/D	37.3%	0.29	0.34	0.41	0.53	0.58	0.64	0.71
A-4.6	1.72	C/D	20.0%	0.14	0.20	0.28	0.43	0.49	0.57	0.65

Calculation of Peak Runoff using Rational Method

Select MHFD location for NOAA Atlas 14 Rainfall Depths from the pulldown list OR enter your own depths obtained from the NOAA website (click this link)

1-hour rainfall depth, P1 (in) =	WQE	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
	0.60	0.84	1.12	1.36	1.72	2.01	2.31	3.07

Rainfall Intensity Equation Coefficients =

a	b	c
28.50	10.00	0.786

$$I(\text{in/hr}) = \frac{a * P_1}{(b + t_c)^c}$$

$$Q(\text{cfs}) = CIA$$

Subcatchment Name	Time of Concentration				Rainfall Intensity, I (in/hr)								Peak Flow, Q (cfs)							
	Computed t _c (min)	Regional t _c (min)	Selected t _c (min)	(Optional) Override t _c (min)	WQE	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr	WQE	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr	500-yr
R1	1.15	9.87	5.00	5.00	2.04	2.86	3.80	4.61	5.83	6.82	7.84	10.41	0.52	0.73	0.99	1.23	1.60	1.89	2.20	2.97
A-4.1	1.35	10.94	5.00	5.00	2.04	2.86	3.80	4.61	5.83	6.82	7.84	10.41	0.34	0.48	0.66	0.82	1.09	1.29	1.51	2.06
A-4.2	1.33	10.87	5.00	5.00	2.04	2.86	3.80	4.61	5.83	6.82	7.84	10.41	0.68	0.96	1.32	1.66	2.18	2.59	3.04	4.13
A-4.3	2.14	15.21	5.00	5.00	2.04	2.86	3.80	4.61	5.83	6.82	7.84	10.41	0.83	1.17	1.66	2.19	3.12	3.81	4.61	6.49
A-4.4	3.01	19.94	5.00	5.00	2.04	2.86	3.80	4.61	5.83	6.82	7.84	10.41	0.02	0.02	0.04	0.06	0.10	0.12	0.16	0.23
A-4.5	2.96	19.69	5.00	5.00	2.04	2.86	3.80	4.61	5.83	6.82	7.84	10.41	0.80	1.13	1.77	2.58	4.24	5.42	6.87	10.11
A-4.6	3.51	22.64	10.00	5.00	2.04	2.86	3.80	4.61	5.83	6.82	7.84	10.41	0.48	0.67	1.29	2.21	4.32	5.76	7.62	11.65

MINIMUM 5 MINUTE TIME OF CONCENTRATION APPLIED TO ALL BASINS FOR CONSERVATIVE DESIGN RATES.



Runoff Calculations (Rational Method)

Project Information

Project Name: AH Castle Pines MOB
S.A. Project No: 25-060
Revised Date: 3/2/2026
Calculated By: RJH

Intensity Equation

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

*NOTE: P & Intensity Equation from UDFCD Criteria Manual

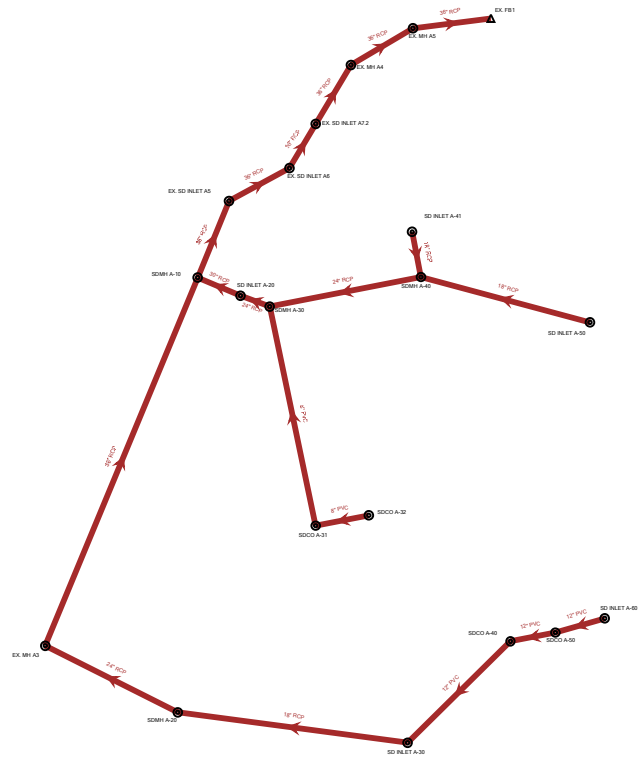
Basin Designation	Area (ac.)	'c'	cA	t _c (min)	P ₁	intensity (in/hr)	Q (cfs)	
Prev. A4 now A6	0.06	0.14	0.01	5.00	0.84	2.85	0.02	02 YR
		0.20	0.01		1.12	3.80	0.04	05 YR
		0.28	0.02		1.36	4.61	0.08	10 YR
		0.57	0.03		2.31	7.84	0.26	100 YR
Prev. A4 now A5	0.04	0.14	0.01	5.00	0.84	2.85	0.02	02 YR
		0.20	0.01		1.12	3.80	0.03	05 YR
		0.28	0.01		1.36	4.61	0.06	10 YR
		0.57	0.03		2.31	7.84	0.20	100 YR

RUNOFF SUMMARY						
Design Point	Tributary Basin(s)	Tributary Area (ac.)	Direct Runoff (CFS/5-yr)	Total Runoff (CFS/5-yr)	Direct Runoff (CFS/100-yr)	Total Runoff (CFS/100-yr)
-	A-4.4	0.03	0.04	-	0.16	-
-	1/2 of R1	0.16	0.49	-	1.10	-
1	A-4.4 & 1/2 of R1	0.19	-	0.53	-	1.26
-	A-4.5	1.38	1.77	-	6.87	-
2	DP1 & A-4.5	1.57	-	2.31	-	8.12
-	Master Rpt Q (Ex DP's A9+A10+A11+A3)	30.12	33.06	-	98.42	-
3	DP2 & Master Rpt Q	31.69	-	35.37	-	106.54
-	A-4.3	0.79	1.66	-	4.61	-
-	A-4.2	0.46	1.32	-	3.04	-
4	A-4.3 & A-4.2	1.25	-	2.98	-	7.65
-	1/2 of R1	0.19	0.49	-	1.10	-
5	DP 4 & 1/2 of R1	1.44	-	3.48	-	8.75
-	A-4.1	0.23	0.66	-	1.51	-
6	DP 5 & A-4.1	1.67	-	4.14	-	10.26
7	DP 3 & DP 6	33.36	-	39.50	-	116.81
-	A-4.6	1.72	1.29	-	7.62	-
-	Added Flows to Ex A5	0.04	0.03	-	0.20	-
-	Ex Flows to Ex A5	1.38	0.18	-	3.65	-
8	DP 7 & A-4.6 & Total Flows to Ex A5	34.78	-	41.01	-	128.27
-	Added Flows to Ex A6	0.06	0.04	-	0.26	-
-	Ex Flows to Ex A6	0.89	1.68	-	4.67	-
9	DP8 & Total Flows to Ex A6	35.73	-	42.73	-	133.20
-	Ex A7.1	3.64	2.91	-	13.00	-
-	Ex A7.2	0.09	0.24	-	0.57	-
10	DP9 & Ex A7.1 & Ex A7.2	39.46	-	45.88	-	146.77

Appendix B

Hydraulic Computations

STORMCAD PLAN VIEW





MANHOLE TABLE 5-YEARS

Project Information

Project Name: AdventHealth Castle Pines MOB

Miro Project No: 25060

Revised Date: 3/4/2026

Calculated By: ATE

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Notes	Headloss Method	Headloss Coefficient (Standard)	Headloss (ft)
SDCO A-50	6,293.56	6,293.56	6,289.66	0.53	6,289.96	6,289.96	ROOF DRAIN	Standard	0	0
SDMH A-20	6,293.38	6,293.38	6,283.38	2.31	6,283.91	6,283.91	5' DIA.	Standard	0	0
SDCO A-40	6,293.28	6,293.28	6,289.34	0.53	6,289.71	6,289.64	ROOF DRAIN	Standard	0.6	0.07
SDCO A-31	6,293.20	6,293.20	6,288.94	0.49	6,289.37	6,289.27	ROOF DRAIN	Standard	0.8	0.1
SDCO A-32	6,293.19	6,293.19	6,289.70	0.49	6,290.03	6,290.03	ROOF DRAIN	Standard	0	0
SD INLET A-60	6,293.08	6,293.08	6,290.02	0.04	6,290.10	6,290.10	12" NYLOPLAST DRAIN	Standard	0	0
SD INLET A-30	6,291.47	6,291.47	6,287.12	2.31	6,287.81	6,287.70	5' TYPE R	Standard	0.5	0.11
SD INLET A-50	6,287.67	6,287.67	6,282.15	1.66	6,282.64	6,282.64	10' TYPE R	Standard	0	0
SDMH A-30	6,287.42	6,287.42	6,276.85	3.48	6,277.72	6,277.50	5' DIA.	Standard	0.9	0.21
SD INLET A-20	6,286.98	6,286.98	6,275.70	4.14	6,276.48	6,276.36	5' TYPE R	Standard	0.5	0.12
SDMH A-40	6,285.96	6,285.96	6,279.20	2.98	6,280.00	6,279.81	5' DIA.	Standard	0.9	0.2
SDMH A-10	6,284.87	6,284.87	6,274.22	39.5	6,276.27	6,276.27	5' DIA.	Standard	0	0
SD INLET A-41	6,284.78	6,284.78	6,280.03	1.32	6,280.46	6,280.46	5' TYPE R	Standard	0	0
EX. MH A3	6,293.95	6,293.95	6,281.85	35.37	6,283.78	6,283.78	5' DIA.	Absolute		0
EX. SD INLET A5	6,278.14	6,278.14	6,269.24	41.01	6,271.33	6,271.33	CDOT TYPE D	Absolute		0
EX. SD INLET A6	6,275.69	6,275.69	6,266.81	42.73	6,268.94	6,268.94	10' TYPE R	Absolute		0
EX. SD INLET A7.2	6,276.45	6,276.45	6,260.88	45.88	6,263.09	6,263.09	10' TYPE R	Absolute		0
EX. MH A4	6,269.12	6,269.12	6,251.10	45.88	6,253.31	6,253.31	5' DIA.	Absolute		0
EX. MH A5	6,256.04	6,256.04	6,245.19	45.88	6,251.87	6,251.87	5' DIA.	Absolute		0



MANHOLE TABLE 100-YEARS

Project Information

Project Name: AdventHealth Castle Pines MOB

Miro Project No: 25060

Revised Date: 3/4/2026

Calculated By: ATE

Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Notes	Headloss Method	Headloss Coefficient (Standard)	Headloss (ft)
SDCO A-50	6,293.56	6,293.56	6,289.66	1.26	6,290.13	6,290.13	ROOF DRAIN	Standard	0	0
SDMH A-20	6,293.38	6,293.38	6,283.38	8.12	6,284.84	6,284.84	5' DIA.	Standard	0	0
SDCO A-40	6,293.28	6,293.28	6,289.34	1.26	6,289.92	6,289.81	ROOF DRAIN	Standard	0.6	0.11
SDCO A-31	6,293.20	6,293.20	6,288.94	1.1	6,289.63	6,289.44	ROOF DRAIN	Standard	0.8	0.19
SDCO A-32	6,293.19	6,293.19	6,289.70	1.1	6,290.20	6,290.20	ROOF DRAIN	Standard	0	0
SD INLET A-60	6,293.08	6,293.08	6,290.02	0.16	6,290.18	6,290.18	12" NYLOPLAST DRAIN	Standard	0	0
SD INLET A-30	6,291.47	6,291.47	6,287.12	8.12	6,288.49	6,288.23	5' TYPE R	Standard	0.5	0.26
SD INLET A-50	6,287.67	6,287.67	6,282.15	4.61	6,282.98	6,282.98	10' TYPE R	Standard	0	0
SDMH A-30	6,287.42	6,287.42	6,276.85	8.75	6,278.28	6,277.90	5' DIA.	Standard	0.9	0.38
SD INLET A-20	6,286.98	6,286.98	6,275.70	10.26	6,277.15	6,277.03	5' TYPE R	Standard	0.5	0.11
SDMH A-40	6,285.96	6,285.96	6,279.20	7.65	6,280.53	6,280.19	5' DIA.	Standard	0.9	0.35
SDMH A-10	6,284.87	6,284.87	6,274.22	116.81	6,277.16	6,277.16	5' DIA.	Standard	0	0
SD INLET A-41	6,284.78	6,284.78	6,280.03	3.04	6,280.69	6,280.69	5' TYPE R	Standard	0	0
EX. MH A3	6,293.95	6,293.95	6,281.85	106.54	6,284.77	6,284.77	5' DIA.	Absolute		0
EX. SD INLET A5	6,278.14	6,278.14	6,269.24	128.27	6,272.20	6,272.20	CDOT TYPE D	Absolute		0
EX. SD INLET A6	6,275.69	6,275.69	6,266.81	133.2	6,269.78	6,269.78	10' TYPE R	Absolute		0
EX. SD INLET A7.2	6,276.45	6,276.45	6,260.88	146.77	6,263.86	6,263.86	10' TYPE R	Absolute		0
EX. MH A4	6,269.12	6,269.12	6,251.10	146.77	6,257.41	6,257.41	5' DIA.	Absolute		0
EX. MH A5	6,256.04	6,256.04	6,245.19	146.77	6,254.50	6,254.50	5' DIA.	Absolute		0



CONDUIT TABLE

Scenario 5 - Years

Project Name	AdventHealth Castle Pines MOB
S.A. Project No	25060
Revised Date	3/4/2026
Calculated By	ATE

Start Node	Invert (start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Notes
SD INLET A-60	6,290.02	SDCO A-50	6,289.66	36	0.01	12	0.01	0.04	1.82	4.63	12" PVC
SDCO A-50	6,289.66	SDCO A-40	6,289.34	32	0.01	12	0.01	0.53	3.92	4.63	12" PVC
SDCO A-40	6,289.34	SD INLET A-30	6,287.62	101	0.017	12	0.01	0.53	4.73	6.03	12" PVC
SD INLET A-30	6,287.12	SDMH A-20	6,283.88	162.3	0.02	18	0.013	2.31	6.11	14.85	18" RCP
SD INLET A-50	6,282.15	SDMH A-40	6,279.70	122.5	0.02	18	0.013	1.66	5.55	14.85	18" RCP
SD INLET A-41	6,280.03	SDMH A-40	6,279.70	32.2	0.01	18	0.013	1.32	4.06	10.5	18" RCP
SDMH A-20	6,283.38	EX. MH A3	6,282.86	103.7	0.005	24	0.013	2.31	3.62	16	24" RCP
SDMH A-40	6,279.20	SDMH A-30	6,277.05	107.9	0.02	24	0.013	2.98	6.38	31.99	24" RCP
SDMH A-30	6,276.85	SD INLET A-20	6,276.20	21.8	0.03	24	0.013	3.48	7.7	39.17	24" RCP
SD INLET A-20	6,275.70	SDMH A-10	6,274.72	32.5	0.03	30	0.013	4.14	7.89	71.02	30" RCP
EX. MH A3	6,281.85	SDMH A-10	6,274.22		0.027	36	0.013	35.37	13.9	110.37	36" RCP
SDMH A-10	6,274.22	EX. SD INLET A5	6,269.24	70.7	0.07	36	0.013	39.5	20.17	177.05	36" RCP
EX. SD INLET A5	6,269.24	EX. SD INLET A6	6,266.81	65.4	0.037	36	0.013	41.01	16.16	128.53	36" RCP
EX. SD INLET A6	6,266.81	EX. SD INLET A7.2	6,260.88	40.1	0.148	36	0.013	42.73	26.89	256.35	36" RCP
EX. SD INLET A7.2	6,260.88	EX. MH A4	6,251.10	39.9	0.245	36	0.013	45.88	32.86	330.16	36" RCP
EX. MH A4	6,251.10	EX. MH A5	6,245.19	60.2	0.098	36	0.013	45.88	23.7	208.95	36" RCP
EX. MH A5	6,245.19	EX. FB1	6,243.54	60	0.027	36	0.013	45.88	6.49	110.6	36" RCP
SDCO A-32	6,289.70	SDCO A-31	6,288.94	37.9	0.02	8	0.01	0.49	5.1	2.22	8" PVC
SDCO A-31	6,288.94	SDMH A-30	6,281.12	156.8	0.05	8	0.01	0.49	7.08	3.51	8" PVC

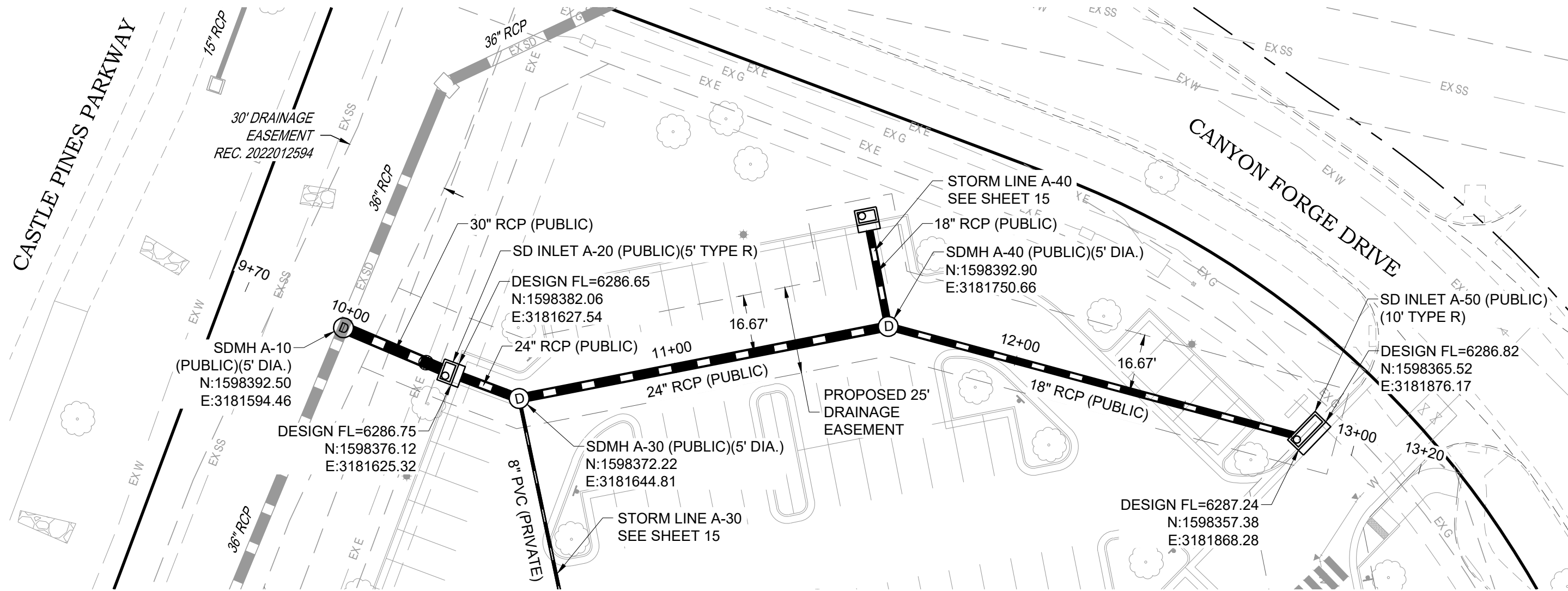


CONDUIT TABLE

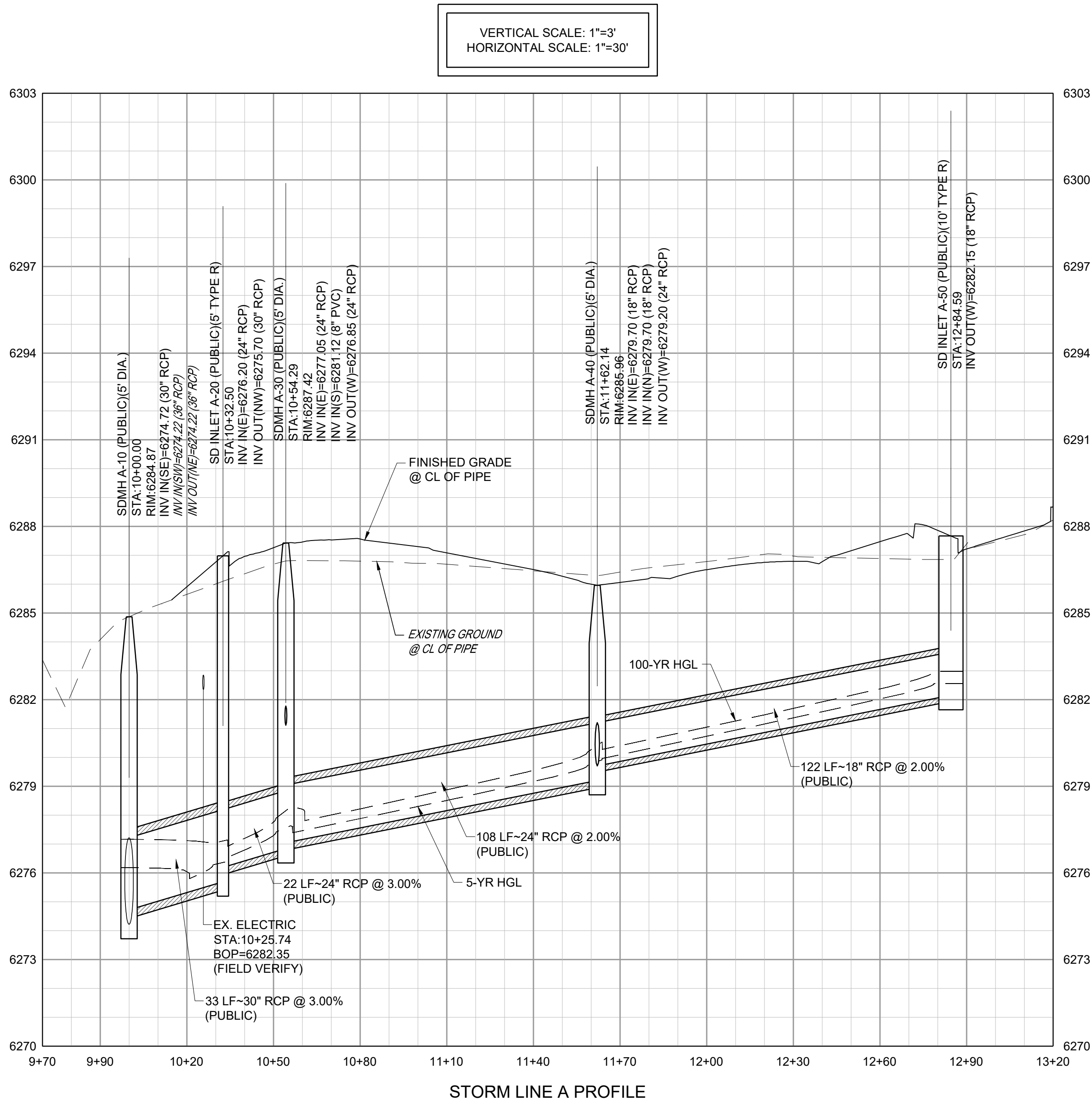
Scenario 100 - Years

Project Name	AdventHealth Castle Pines MOB
S.A. Project No	25060
Revised Date	3/4/2026
Calculated By	ATE

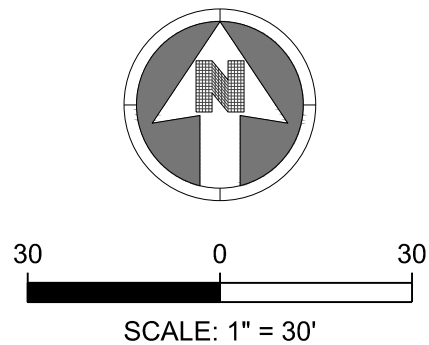
Start Node	Invert (start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Notes
SD INLET A-60	6,290.02	SDCO A-50	6,289.66	36	0.01	12	0.01	0.16	2.76	4.63	12" PVC
SDCO A-50	6,289.66	SDCO A-40	6,289.34	32	0.01	12	0.01	1.26	5.02	4.63	12" PVC
SDCO A-40	6,289.34	SD INLET A-30	6,287.62	101	0.017	12	0.01	1.26	6.07	6.03	12" PVC
SD INLET A-30	6,287.12	SDMH A-20	6,283.88	162.3	0.02	18	0.013	8.12	8.59	14.85	18" RCP
SD INLET A-50	6,282.15	SDMH A-40	6,279.70	122.5	0.02	18	0.013	4.61	7.41	14.85	18" RCP
SD INLET A-41	6,280.03	SDMH A-40	6,279.70	32.2	0.01	18	0.013	3.04	5.14	10.5	18" RCP
SDMH A-20	6,283.38	EX. MH A3	6,282.86	103.7	0.005	24	0.013	8.12	5.11	16	24" RCP
SDMH A-40	6,279.20	SDMH A-30	6,277.05	107.9	0.02	24	0.013	7.65	8.36	31.99	24" RCP
SDMH A-30	6,276.85	SD INLET A-20	6,276.20	21.8	0.03	24	0.013	8.75	10.04	39.17	24" RCP
SD INLET A-20	6,275.70	SDMH A-10	6,274.72	32.5	0.03	30	0.013	10.26	10.29	71.02	30" RCP
EX. MH A3	6,281.85	SDMH A-10	6,274.22		0.027	36	0.013	106.54	17.79	110.37	36"RCP
SDMH A-10	6,274.22	EX. SD INLET A5	6,269.24	70.7	0.07	36	0.013	116.81	26.75	177.05	36"RCP
EX. SD INLET A5	6,269.24	EX. SD INLET A6	6,266.81	65.4	0.037	36	0.013	128.27	20.73	128.53	36"RCP
EX. SD INLET A6	6,266.81	EX. SD INLET A7.2	6,260.88	40.1	0.148	36	0.013	133.2	36.62	256.35	36"RCP
EX. SD INLET A7.2	6,260.88	EX. MH A4	6,251.10	39.9	0.245	36	0.013	146.77	45.34	330.16	36"RCP
EX. MH A4	6,251.10	EX. MH A5	6,245.19	60.2	0.098	36	0.013	146.77	20.76	208.95	36"RCP
EX. MH A5	6,245.19	EX. FB1	6,243.54	60	0.027	36	0.013	146.77	20.76	110.6	36"RCP
SDCO A-32	6,289.70	SDCO A-31	6,288.94	37.9	0.02	8	0.01	1.1	6.35	2.22	8" PVC
SDCO A-31	6,288.94	SDMH A-30	6,281.12	156.8	0.05	8	0.01	1.1	8.9	3.51	8" PVC



STORM LINE A PLAN



STORM LINE A PROFILE



- NOTES:
- SEE SHEET 02 FOR CIVIL NOTES AND LEGEND.
 - ALL EXISTING DRY UTILITIES ARE ASSUMED TO BE 3' DEEP TO TOP OF PIPE.
 - ALL EXISTING WATER LINES ARE ASSUMED TO BE 4.5' DEEP TO TOP OF PIPE.
 - THE CONTRACTOR SHALL POTHOLE ALL EXISTING UTILITY CROSSINGS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY POTENTIAL CONFLICTS IMMEDIATELY.



S. A. MIRO, INC.
CIVIL + STRUCTURAL
CONSULTING ENGINEERS
4582 S. Ulster St., Suite 750
Denver, CO 80237
303-741-3737
www.samiro.com

PROJECT 257483

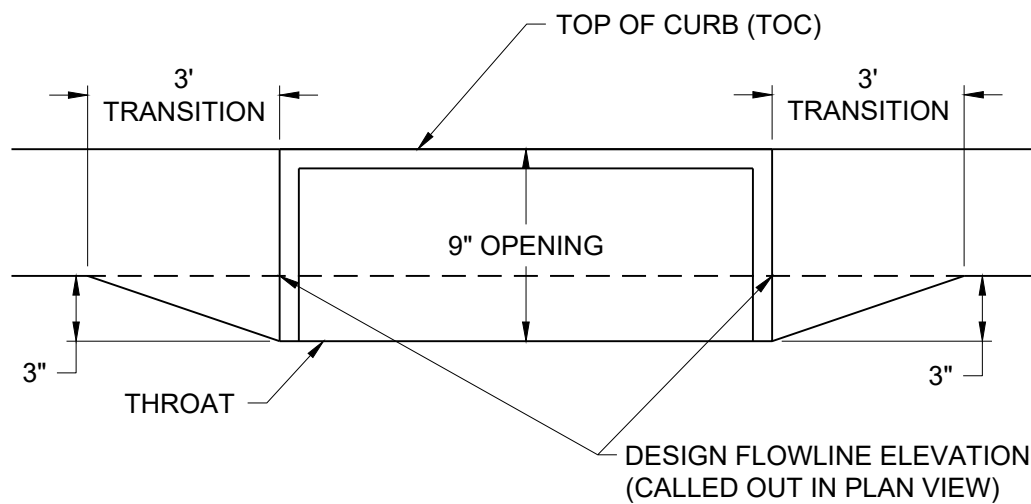
ADVENTHEALTH CASTLE PINES

CONSTRUCTION DOCUMENTS

DATE 06/05/2026

REVISIONS

#	DESCRIPTION	DATE
---	-------------	------



TYPE R INLET ANNOTATION DETAIL

CITY DEVELOPMENT REVIEW ENGINEER

DATE

THESE CONSTRUCTION DRAWINGS HAVE
BEEN REVIEWED BY THE CITY OF CASTLE
PINES FOR *IMPROVEMENTS ONLY

* STREET AND DRAINAGE

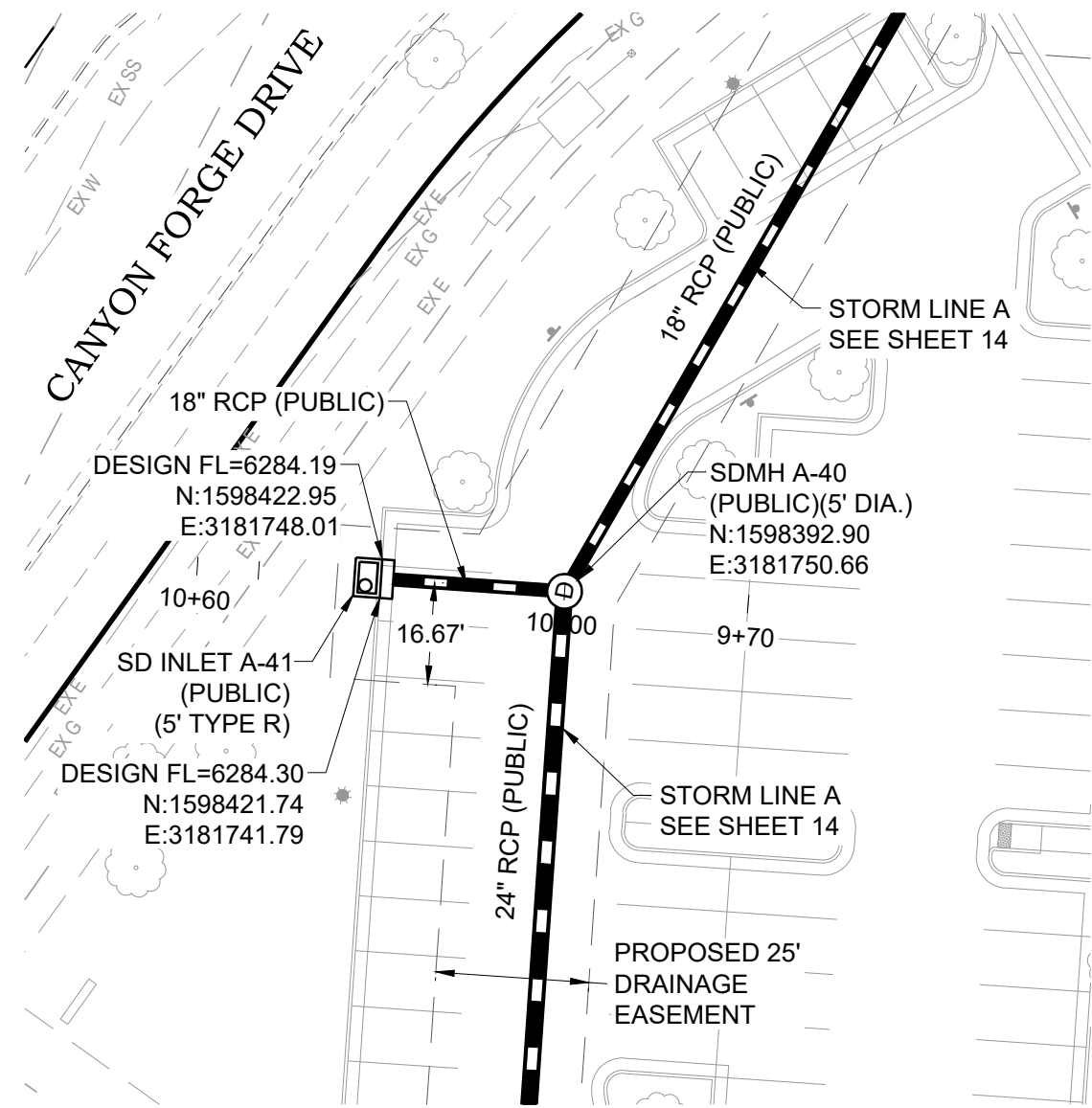
PUBLIC WORKS ACCEPTANCE BLOCK

SHEET TITLE

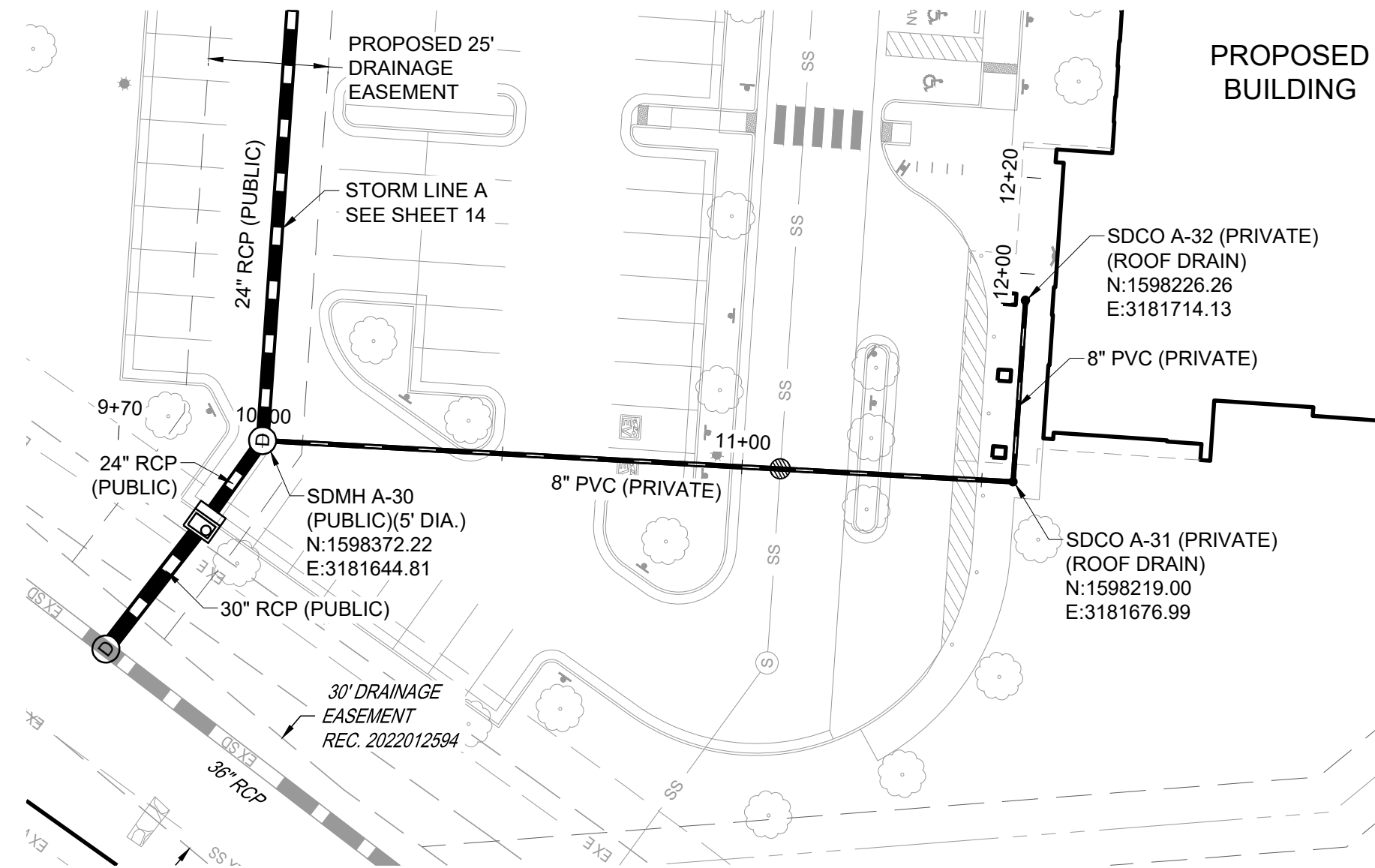
STORM PLAN AND PROFILES

SHEET NUMBER

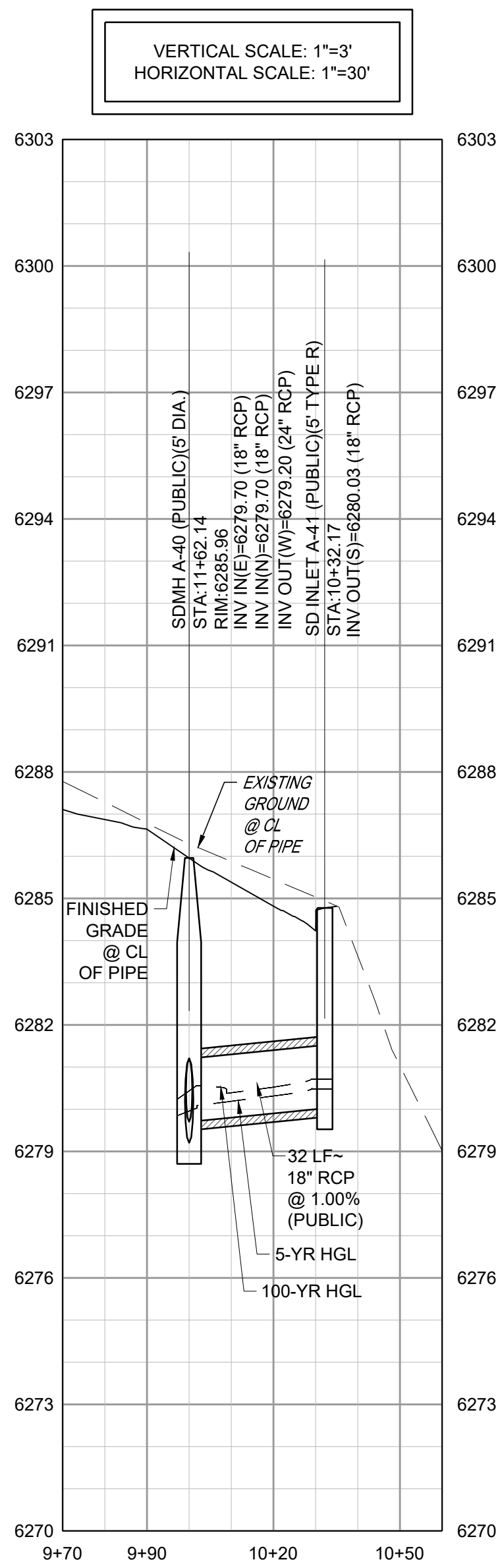
14



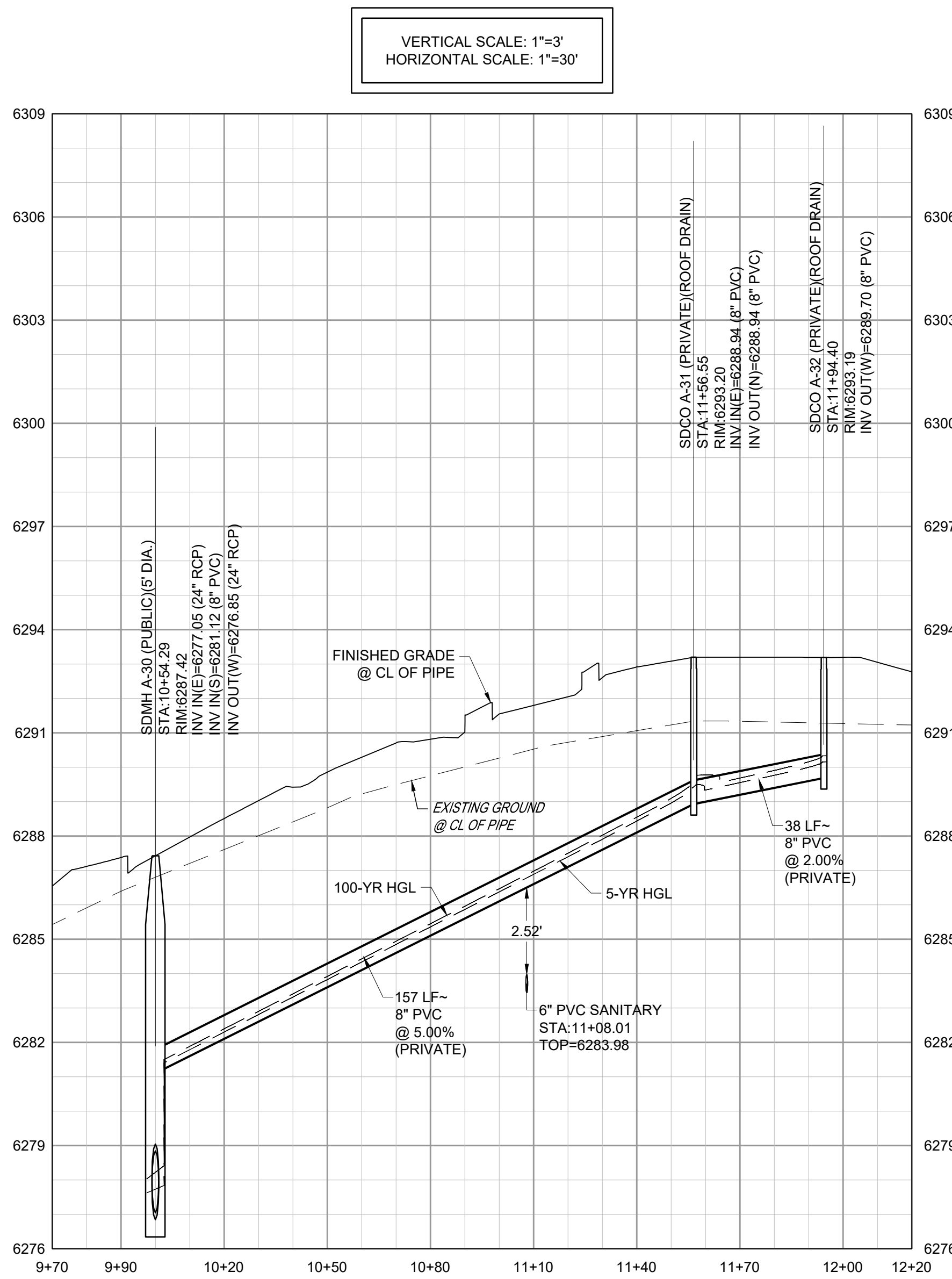
STORM LINE A-40 PLAN



STORM LINE A-30 PLAN



STORM LINE A-40 PROFILE



STORM LINE A-30 PROFILE

- SCALE: 1" = 30'
- NOTES:
 - SEE SHEET 02 FOR CIVIL NOTES AND LEGEND.
 - ALL EXISTING DRY UTILITIES ARE ASSUMED TO BE 3' DEEP TO TOP OF PIPE
 - ALL EXISTING WATER LINES ARE ASSUMED TO BE 4.5' DEEP TO TOP OF PIPE.
 - THE CONTRACTOR SHALL POTHOLE ALL EXISTING UTILITY CROSSINGS PRIOR TO CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY POTENTIAL CONFLICTS IMMEDIATELY.

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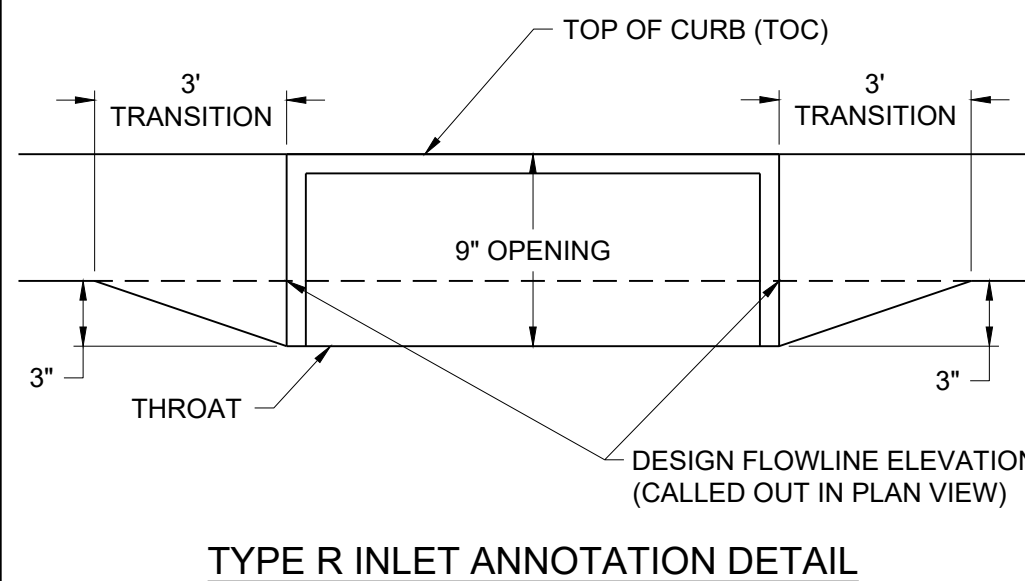
PROJECT 257483

ADVENTHEALTH CASTLE PINES

CONSTRUCTION DOCUMENTS

DATE 06/05/2026

REVISIONS		
	DESCRIPTION	DATE



TYPE R INLET ANNOTATION DETAIL

CITY DEVELOPMENT REVIEW ENGINEER

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN REVIEWED BY THE CITY OF CASTLE PINES FOR * IMPROVEMENTS ONLY

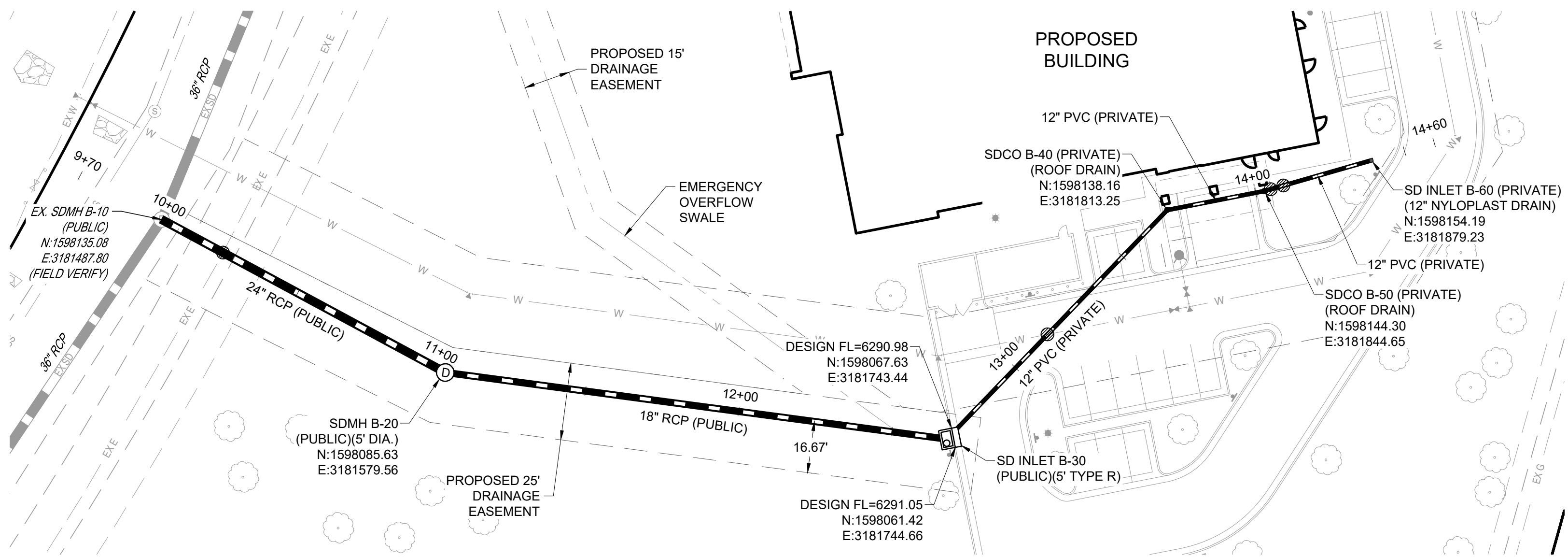
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PUBLIC WORKS ACCEPTANCE BLOCK

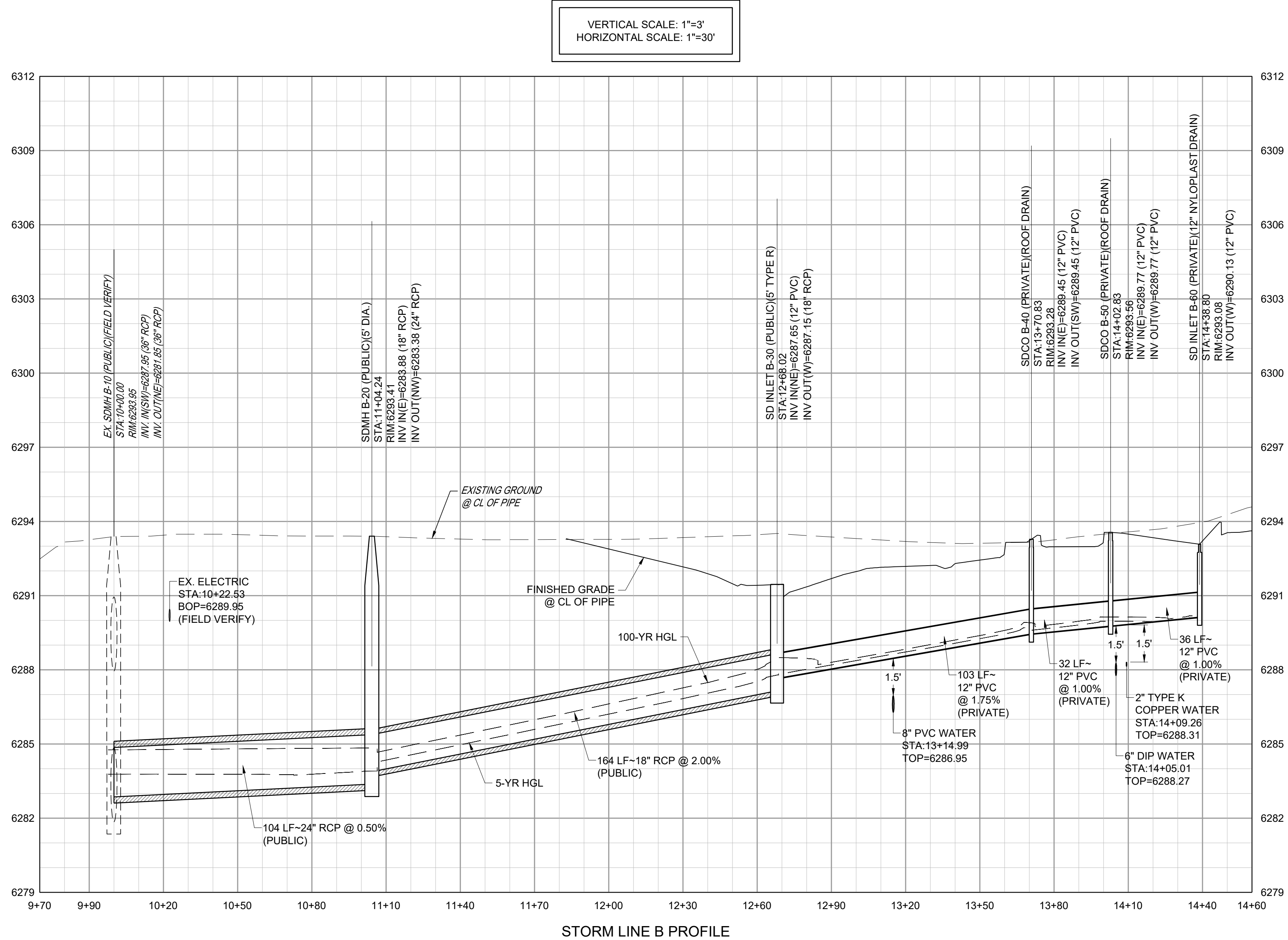
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SHEET NUMBER

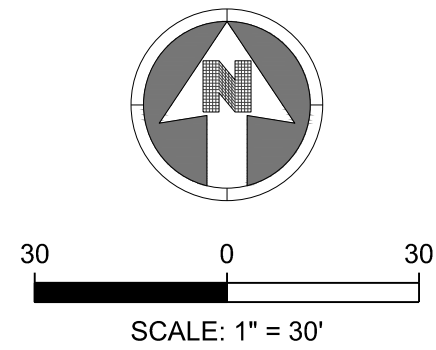
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STORM LINE B PLAN



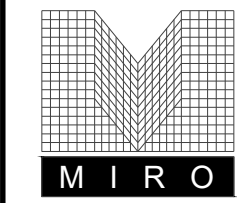
STORM LINE B PROFILE



- NOTES:
- SEE SHEET 02 FOR CIVIL NOTES AND LEGEND.
 - ALL EXISTING DRY UTILITIES ARE ASSUMED TO BE 3' DEEP TO TOP OF PIPE.
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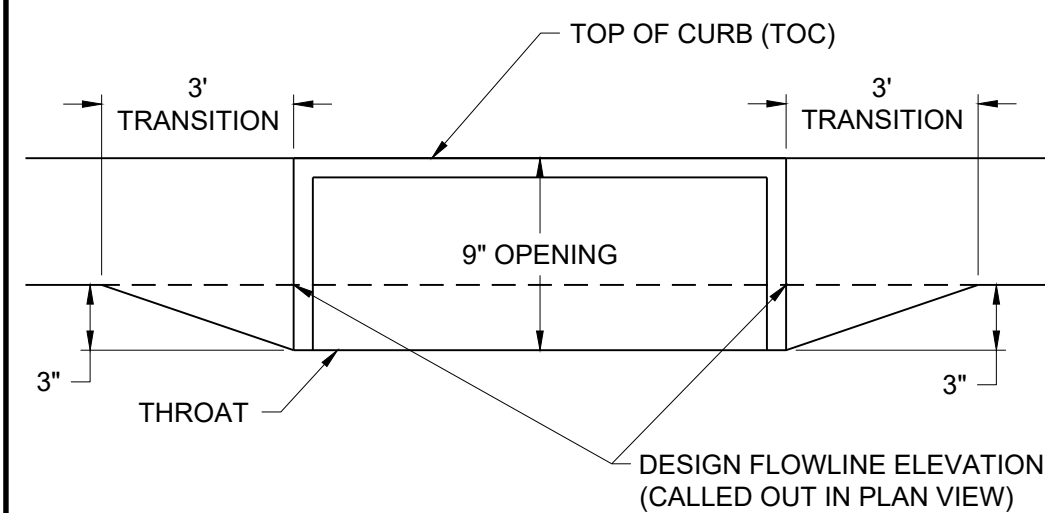
PROJECT 257483

ADVENTHEALTH CASTLE PINES

CONSTRUCTION DOCUMENTS

DATE 06/05/2026

REVISIONS	DESCRIPTION	DATE
1		



TYPE R INLET ANNOTATION DETAIL

CITY DEVELOPMENT REVIEW ENGINEER

DATE

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* STREET AND DRAINAGE

PUBLIC WORKS ACCEPTANCE BLOCK

SHEET TITLE

STORM PLAN AND PROFILES

SHEET NUMBER

16

INLET MANAGEMENT

Project: AdventHealth Castle Pines MOB

Minor: 5-year

Major: 100-year

Worksheet Protected

INLET NAME	SD INLET A-20	SD INLET A-41
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	In Sump	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening
Number of Inlet Units	1	1

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	0.66	1.32
Major Peak Flow, Q (cfs)	1.51	3.04

Bypass (Carry-Over) Flow from Upstream

Inlets must be organized from upstream (left) to downstream (right) in order for b

Receive Bypass Flow from:		
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)		
Major Bypass Flow Received, Q_b (cfs)		

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	0.66	1.32
Major Total Design Peak Flow, Q (cfs)	1.51	3.04
Minor Inlet Interception Capacity, Q_a (cfs)	5.08	4.18
Major Inlet Interception Capacity, Q_a (cfs)	12.22	11.57
Minor Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	N/A	N/A
Minor Flow Capture Percentage, C%	100%	100%
Major Flow Capture Percentage, C%	100%	100%

INLET MANAGEMENT

Project: AdventHealth Castle Pines MOB

Minor: 5-year

Major: 100-year

Worksheet Protected

INLET NAME	SD INLET A-50	SD INLET A-30
Inlet Application (Street or Area)	STREET	STREET
Hydraulic Condition	On Grade	In Sump
Inlet Type	CDOT Type R Curb Opening	CDOT Type R Curb Opening
Number of Inlet Units	1	1

USER-DEFINED INPUT

User-Defined Peak Flows

Minor Peak Flow, Q (cfs)	1.66	1.77
Major Peak Flow, Q (cfs)	4.61	6.87

Bypass (Carry-Over) Flow from Upstream

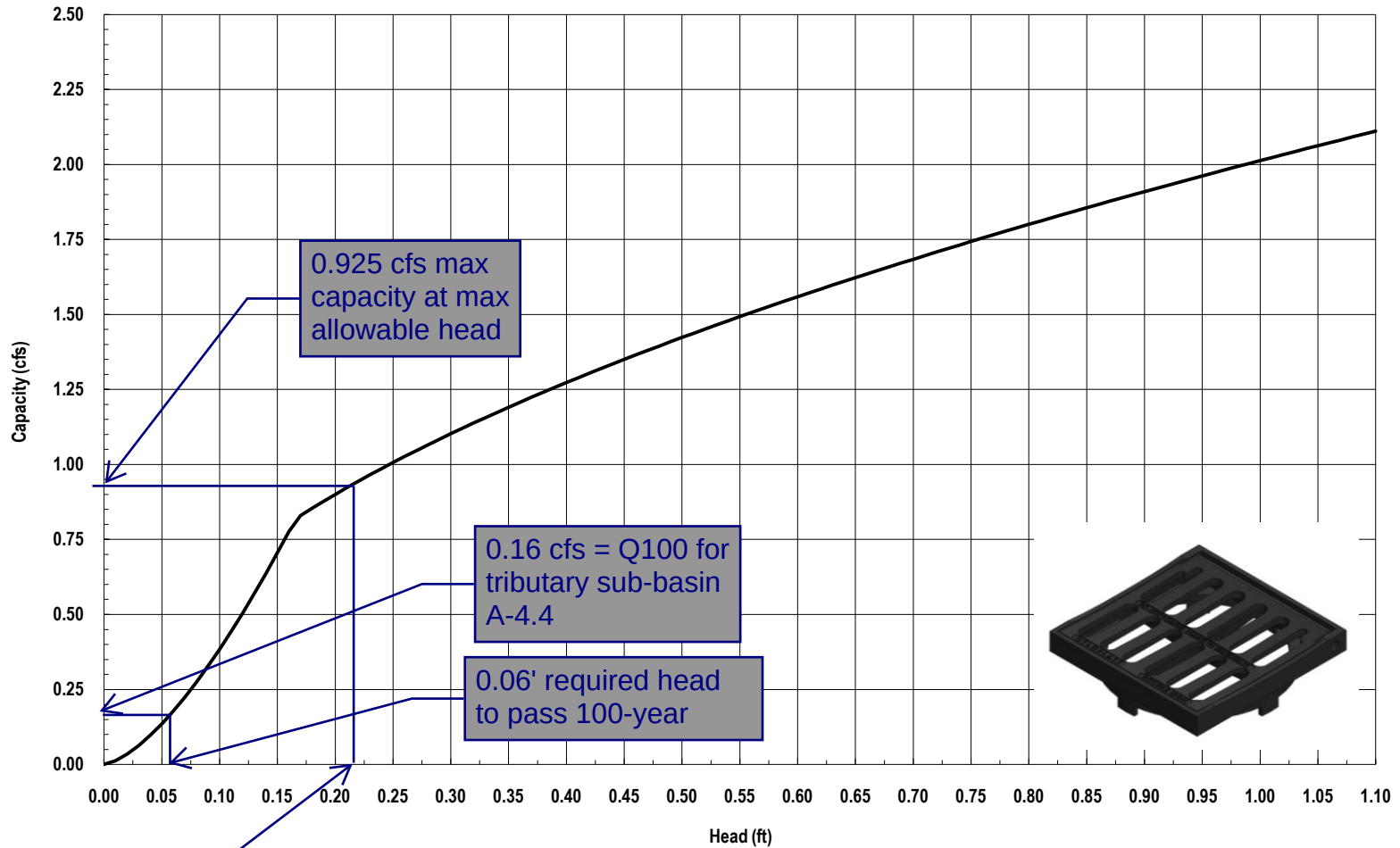
[Bypass flows to be linked.](#)

Receive Bypass Flow from:		
Bypass Flow Description (Optional):		
Minor Bypass Flow Received, Q_b (cfs)		
Major Bypass Flow Received, Q_b (cfs)		

CALCULATED OUTPUT

Minor Total Design Peak Flow, Q (cfs)	1.66	1.77
Major Total Design Peak Flow, Q (cfs)	4.61	6.87
Minor Inlet Interception Capacity, Q_a (cfs)	1.66	5.38
Major Inlet Interception Capacity, Q_a (cfs)	4.56	11.52
Minor Flow Bypassed Downstream, Q_b (cfs)	0.00	N/A
Major Flow Bypassed Downstream, Q_b (cfs)	0.05	N/A
Minor Flow Capture Percentage, C%	100%	100%
Major Flow Capture Percentage, C%	99%	100%

Nyloplast 12" Standard Grate Inlet Capacity Chart



0.22' maximum WSE
from inlet grate
elevation to building
FFE

Worksheet for Emergency Overflow Swale

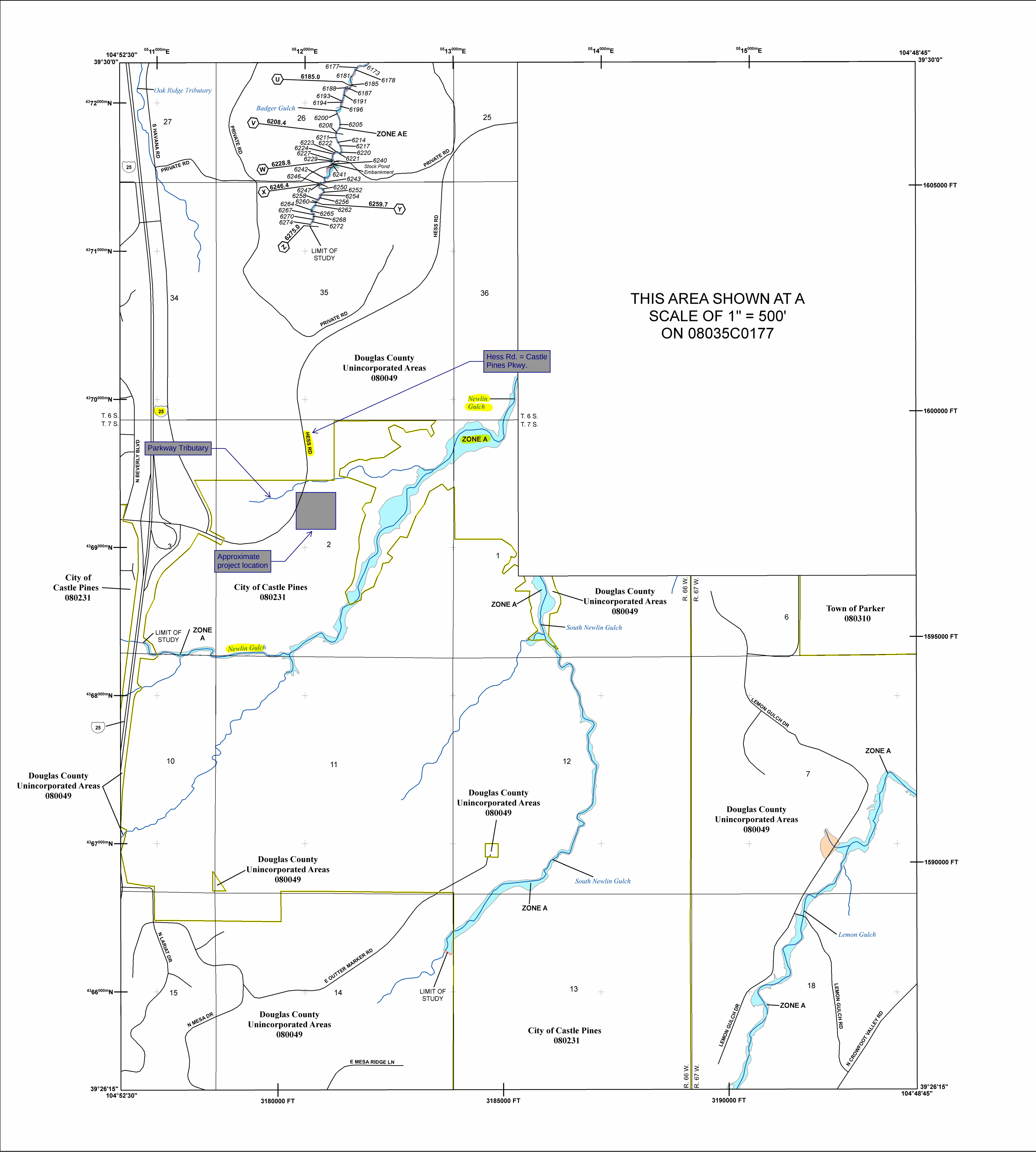
Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth
Input Data	
Roughness Coefficient	0.020
Channel Slope	0.52 %
Left Side Slope	10.000 H:V
Right Side Slope	10.000 H:V
Discharge	7.62 cfs
Results	
Normal Depth	6.9 in
Flow Area	3.3 ft ²
Wetted Perimeter	11.5 ft
Hydraulic Radius	3.4 in
Top Width	11.46 ft
Critical Depth	6.2 in
Critical Slope	0.92 %
Velocity	2.32 ft/s
Velocity Head	0.08 ft
Specific Energy	0.66 ft
Froude Number	0.764
Flow Type	Subcritical
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	6.9 in
Critical Depth	6.2 in
Channel Slope	0.52 %
Critical Slope	0.92 %

Q100 for sub-basin A-4.6

12' wide swale > wetted perimeter
provides capacity greater than depth of flow

Appendix C

Referenced Information



FLOOD HAZARD INFORMATION

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

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT [HTTPS://MSC.FEMA.GOV](https://msc.fema.gov)

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) Zone A, V, A99	With BFE or Depth Zone AE, AO, AH, VE, AR	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
OTHER AREAS	NO SCREEN	Areas of Minimal Flood Hazard Zone X	Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer	Accredited or Provisionally Accredited Levee, Dike, or Floodwall	Non-accredited Levee, Dike, or Floodwall
OTHER FEATURES	Cross Sections with 1% Annual Chance Water Surface Elevation (BFE)	Coastal Transect	Coastal Transect Baseline
	Profile Baseline	Hydrographic Feature	Base Flood Elevation Line (BFE)
	Limit of Study	Jurisdiction Boundary	

NOTES TO USERS

For information and questions about this 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.

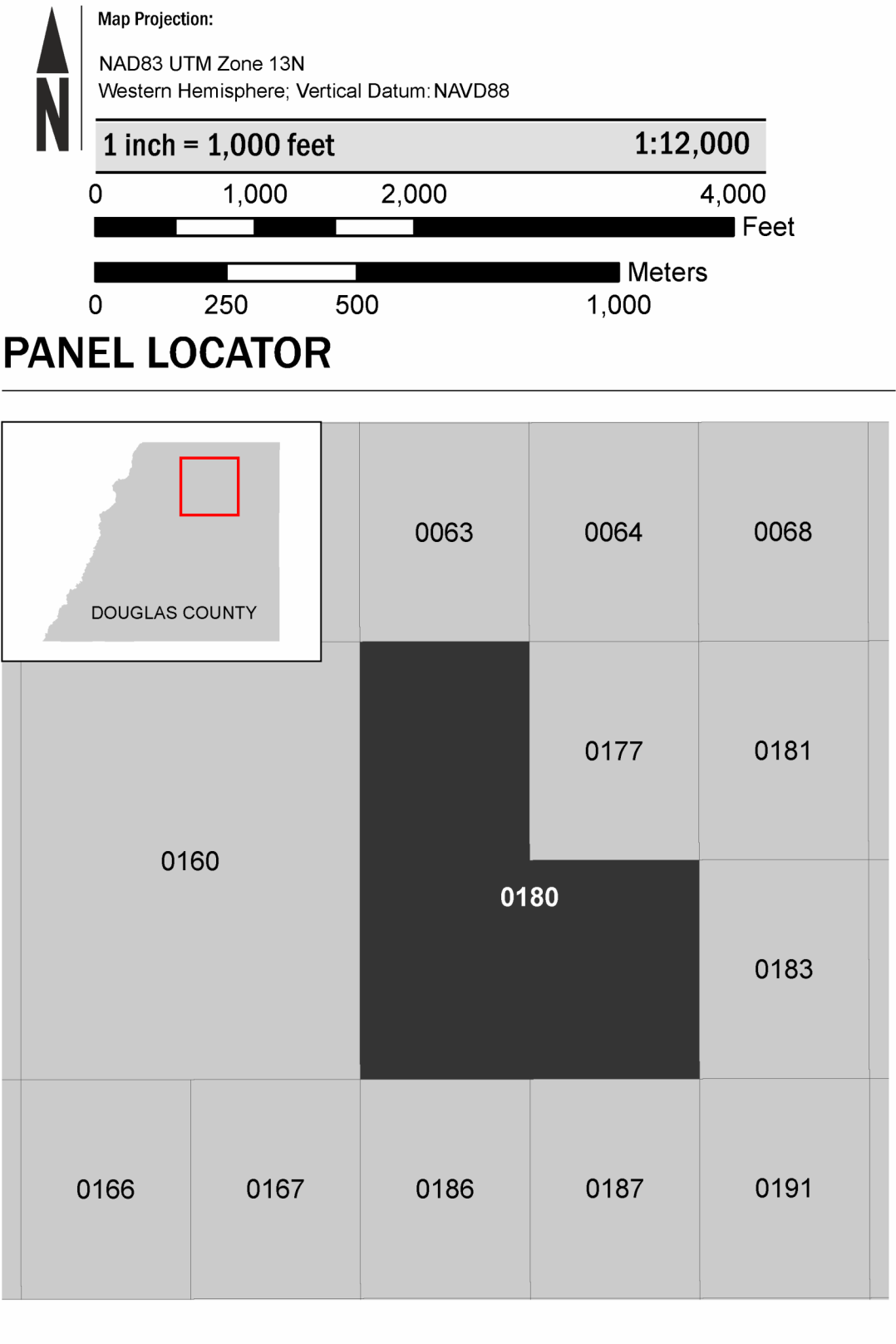
Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM index. These may be ordered directly from the Flood Map Service Center at the number listed above.

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

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

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

SCALE



FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO

And Incorporated Areas

PANEL 180 OF 495

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE PINES, CITY OF	080231	0180	G
DOUGLAS COUNTY	080049	0180	G
PARKER, TOWN OF	080310	0180	G

VERSION NUMBER 2.3.3.2

MAP NUMBER 08035C0180G

MAP REVISED SEPTEMBER 4, 2020

National Flood Hazard Layer FIRMMette



104°51'56"W 39°28'38"N



0 250 500 1,000 1,500 2,000 Feet 1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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



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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/27/2026 at 9:14 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Castle Rock Area, Colorado**



February 26, 2026

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: 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.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Fu	Fondis-Kutch association	5.5	100.0%
Totals for Area of Interest		5.5	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Castle Rock Area, Colorado

Fu—Fondis-Kutch association

Map Unit Setting

National map unit symbol: jqyq
Landscape: Uplands
Elevation: 5,500 to 6,800 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Fondis and similar soils: 50 percent
Kutch and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fondis

Setting

Landscape: Uplands
Landform: Valley sides, Draws
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over coarse-silty outwash derived from arkose

Typical profile

H1 - 0 to 7 inches: loam
H2 - 7 to 24 inches: clay
H3 - 24 to 60 inches: sandy clay loam

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
***Hydrologic Soil Group:* C**
Ecological site: R049XB208CO - Clayey Foothill
Hydric soil rating: No

Description of Kutch

Setting

Landscape: Uplands

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Fine-textured residuum weathered from calcareous shale

Typical profile

H1 - 0 to 6 inches: sandy loam

H2 - 6 to 32 inches: clay

H3 - 32 to 36 inches: weathered bedrock

Properties and qualities

Slope: 5 to 40 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Drainage class: Well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 15 percent

Gypsum, maximum content: 2 percent

Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: D

Ecological site: R049XB208CO - Clayey Foothill

Hydric soil rating: No

Minor Components

Bresser

Percent of map unit: 5 percent

Hydric soil rating: No

Newlin

Percent of map unit: 5 percent

Hydric soil rating: No

Hilly gravelly land

Percent of map unit: 4 percent

Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent

Landform: Swales

Hydric soil rating: Yes

References

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- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelpdb1043084>

Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Chapter 4. Drainage Report and Construction Drawing Submittal Requirements

4.4 Phase II Drainage Report and Plan

4.4.1 Requirement for Phase II Drainage Report and Plan Submittal. Submittal of a Phase II drainage report and plan is required with specific development or land use proposals, as generally outlined in Table 4-1. The purpose of the Phase II drainage report is to identify and refine conceptual stormwater management solutions to the challenges that may be present or occur on-site and off-site. All reports shall be prepared on 8-1/2"x11" paper and shall be bound. The drawings, figures, and tables shall be bound with the report or included in a pocket attached to the report. The report shall include a cover letter presenting the preliminary design for review and shall be certified by a Professional Engineer licensed in Colorado.

4.4.2 Report Contents. The Phase II drainage report generally consists of a narrative portion and appendices with supporting calculations and other pertinent information. The narrative shall lead the reader logically through the entire analysis and design process and provide a clear picture of all stormwater management issues. The narrative portion shall provide detailed discussion regarding the general location and description of the site, off-site and on-site drainage basins and sub-basins, drainage design criteria, stormwater management facility design, and conclusions, as provided in Sections II through V of the outline presented in this section. Discussion of methodology, assumptions, input, and a summary of results shall be provided in the narrative for all hydrologic or hydraulic modeling efforts. Peak flow rates, storage volumes, critical water surface elevations, and stormwater management facility sizes shall also be summarized or discussed in the report narrative. The appendices must provide the appropriate backup information and calculations, but the reader should not have to review information contained in the appendices to have a clear and thorough understanding of the project and the stormwater management analysis and facility designs.

The following is an outline of the **minimum** Phase II drainage report requirements:

I. COVER SHEET

- A. Name of Project
- B. Address
- C. Owner
- D. Developer
- E. Engineer
- F. Submittal date and revision dates as applicable

Owner is the developer

II. GENERAL LOCATION AND DESCRIPTION

- A. Site Location
 - 1. Site Vicinity Map
 - 2. Township, Range, Section, and ¼ Section

Chapter 4. Drainage Report and Construction Drawing Submittal Requirements

- 3. Existing and proposed streets, roadways, and highways adjacent to and within the proposed development, or within the area served by the proposed drainage improvements ✓
- 4. Names of surrounding or adjacent developments, including land use or zoning information ✓
- B. Description of Property ✓
 - 1. Area in Acres ✓
 - 2. Ground cover, vegetation, site topography and slopes ✓
 - 3. NRCS Soils Classification Map and discussion ✓
 - 4. Major and minor drainageways ✓
 - 5. Floodplains delineated by UDFCD FHAD studies or on FEMA FIRM Maps ✓
 - 6. Existing irrigation canals or ditches ✓
 - 7. Significant geologic features ✓
 - 8. Proposed land use ✓

III. DRAINAGE BASINS AND SUB-BASINS

- A. Major Drainage Basins
 - 1. On-site and off-site major drainage basin characteristics and flow patterns and paths ✓
 - 2. Existing and proposed land uses within the basins if known ✓
 - 3. Discussion of all drainageway planning or floodplain delineation studies that affect the major drainageways, such as UDFCD FHAD Studies and Outfall System Planning studies ✓
 - 4. Discussion of the condition of any channel within or adjacent to the development, including existing conditions, need for improvements, and impact on the proposed development ✓
 - 5. Discussion of the impacts of the off-site flow patterns and paths, under fully developed conditions ✓
- B. Minor Drainage Basins
 - 1. On-site and off-site minor drainage basin characteristics and flow patterns and paths under historic and developed conditions ✓
 - 2. Existing and proposed land uses within the basins ✓
 - 3. Discussion of irrigation facilities that will influence or be impacted by the site drainage ✓
 - 4. Discussion of the impacts of the off-site flow patterns and paths, under fully developed conditions ✓

IV. DRAINAGE DESIGN CRITERIA

- A. Regulations
 - 1. County criteria and optional provisions selected, when applicable ✓
 - 2. *UDFCD Manual* criteria and optional provisions selected, when applicable ✓

Chapter 4. Drainage Report and Construction Drawing Submittal Requirements

- B. Drainage Studies, Outfall Systems Plans, Site Constraints
 - 1. Discuss previous drainage studies or master plans for the site or project that influence the stormwater facility design
 - 2. Discuss drainage studies for adjacent developments and how those developments affect the stormwater facility design
 - 3. Discuss UDFCD Outfall Systems Plans and how recommendations in those studies affect the design
 - 4. Discuss impacts to stormwater management facility design caused by site constraints, such as streets, utilities, light rail, rapid transit, existing structures, etc
- C. Hydrology
 - 1. Runoff calculations method(s)
 - 2. Design storm recurrence intervals
 - 3. Design rainfall
 - 4. Detention storage calculation method(s)
 - 5. Detention storage release rate calculation method
- D. Hydraulics
 - 1. Methods used to determine conveyance facility capacities
 - 2. Hydraulic grade line calculation method and discussion of loss coefficients
 - 3. Methods used to calculate water surface profile
 - 4. Detention pond routing
- E. Water Quality Enhancement
 - 1. Discuss proposed Best Management Practices
 - 2. Identify design procedures
- V. STORMWATER MANAGEMENT FACILITY DESIGN
 - A. Stormwater Conveyance Facilities
 - 1. Discuss general conveyance concepts
 - 2. Discuss proposed drainage paths and patterns
 - 3. Discuss storm sewer design, including inlet and pipe locations and sizes, tributary basins and areas, peak flow rates at design points, hydraulic grade lines, etc.
 - 4. Discuss storm sewer outfall locations and design, including method of energy dissipation
 - 5. Discuss how runoff is conveyed from all outfalls to the nearest major drainageway, including a discussion of the flow path and capacity downstream of the outfall to the nearest major drainageway
 - 6. Discuss open channel and swale designs, including dimensions, alignments, tributary basins and areas, peak flow rates at design points, stabilization and grade control improvements, low flow or trickle channel capacities, water surface elevations, etc
 - 7. Discuss allowable street capacities

Chapter 4. Drainage Report and Construction Drawing Submittal Requirements

8. Discuss maintenance aspects of the design and easements and tracts that are required for stormwater conveyance purposes ✓
9. Discussion of the facilities needed off site for the conveyance of minor and major flows to the major drainageway ✓
- B. Stormwater Storage Facilities ✓
 1. Discuss detention pond designs, including release rates, storage volumes and water surface elevations for the 2-year, 100-year and emergency overflow conditions, outlet structure design, emergency spillway design, etc
 2. Discuss pond outfall locations and design, including method of energy dissipation
 3. Discuss how runoff is conveyed from all pond outfalls and emergency spillways to the nearest major drainageway, including a discussion of the flow path and capacity downstream of the outfall to the nearest major drainageway
 4. Discuss maintenance aspects of the design and easements and tracts that are required for stormwater storage purposes
- C. Water Quality Enhancement Best Management Practices ✓
 1. Discuss the design of all structural water quality Best Management Practices, including tributary areas, sizing, treatment volumes, design features, etc
 2. Discuss how runoff is conveyed from all pond outfalls to the nearest major drainageway, including a discussion of the flow path and capacity downstream of the outfall to the nearest major drainageway
 3. Discuss the operation and maintenance aspects of the design and easements and tracts that are required for stormwater quality enhancement purposes
- D. Floodplain Modification ✓
 1. Discuss why the floodplain modifications are proposed
 2. Discuss the source of the floodplain information and level of detail (UDFCD Flood Hazard Area Delineation or FEMA Flood Insurance Rate Maps)
 3. Discuss details of floodplain modifications, including level of encroachment, velocities, depths, stabilization measures, water surface elevations, etc
 4. Discuss Conditional Letter or Map Revision (CLOMR) and Letter or Map Revision (LOMR) requirements
 5. Discuss County floodplain development regulations and Floodplain Development Permit
- E. Additional Permitting Requirements ✓
 1. Section 404 of the Clean Water Act
 2. The Endangered Species Act
 3. Other local, state, or federal requirements

Chapter 4. Drainage Report and Construction Drawing Submittal Requirements

- F. General ✓
1. Discuss all tables, figures, charts, drawings, etc. that were used in design of stormwater management facilities and describe materials that are included in the appendix of the report ✓
- VI. CONCLUSIONS ✓
- A. Compliance with Standards ✓
1. Douglas County Criteria ✓
 2. UDFCD Criteria ✓
 3. Master Plans and UDFCD Outfall Systems Plans ✓
 4. ~~Cherry Creek Reservoir Control Regulation No. 72~~ N/A
 5. ~~Chatfield Reservoir Control Regulation No. 73~~ N/A
- B. Variances ✓
1. Identify provisions by section number for which a variance will be requested, or has been approved by the County (final version of Drainage Report). Additional information on variances is available in Chapter 1 General Provisions
 2. Provide justification for each variance request
- C. Drainage Concept ✓
1. Discuss overall effectiveness of stormwater management design to properly convey, store and treat stormwater. ✓
- VII. REFERENCES ✓
- Reference all criteria, master plans, reports or other technical information used in development of the concepts discussed in the drainage report ✓
- VIII. APPENDICES ✓
- A. Hydrologic Computations ✓
1. Determination of runoff coefficients and times of concentration ✓
 2. Land use assumptions for off-site areas ✓
 3. ~~Colorado Urban Hydrograph Procedure input parameter determination~~ N/A
 4. ~~UDSWM input parameter determination~~ N/A
 5. Peak flow rate calculations for the minor and major storms ✓
 6. Rainfall information ✓
 7. ~~CUHP/UDSWMM input and output~~ N/A
 8. Hydrograph data (if applicable) N/A
 9. Connectivity diagram showing relationship/connectivity of basins, conveyance facilities, detention ponds, and design points ✓
- ~~B. Hydraulic Computations~~
1. ~~Culvert capacities~~ N/A

Chapter 4. Drainage Report and Construction Drawing Submittal Requirements

2. Storm sewer capacities and hydraulic grade lines, including the loss coefficients ✓
 3. Street capacities ✓
 4. Inlet capacities ✓
 5. Open channel or swale capacities ✓
 6. ~~Low flow and trickle channels~~ N/A
 7. ~~Stabilization and grade control improvements~~ N/A
 8. Water surface profiles ✓
 9. ~~Stage storage discharge determination for detention ponds~~ N/A
 10. ~~Detention pond routing calculations~~ N/A
 11. ~~Emergency spillway sizing calculations~~ N/A
 12. ~~Downstream/outfall capacity to the nearest major drainageway~~ N/A
 13. ~~Energy dissipation at pipe outfalls~~ N/A
- ~~C. Water Quality Enhancement Best Management Practices~~ N/A
1. ~~Design and sizing~~ N/A
- D. Referenced Information ✓
1. Copies of pertinent portions of all referenced materials or drainage reports ✓

Note: Hydraulic computations will be required with the Phase II drainage report if the information necessary to perform the calculations is available. Availability of information will be determined by the Public Works Engineering staff, based on the level of detail contained in the application submitted to the Planning Division. Regardless of present availability, all hydraulic computations will be required in the Phase III drainage report.

- 4.4.3 Certification Statement.** The report shall contain a certification page with the following statement: ✓

"This report and plan for the Phase II drainage design of (Name of Development) was prepared by me (or under my direct supervision) in accordance with the provisions of Douglas County Drainage Design and Technical Criteria for the owners thereof. I understand that Douglas County does not and will not assume liability for drainage facilities designed by others."

SIGNATURE: _____
Registered Professional Engineer State
Of Colorado No. _____
(Affix Seal)

- 4.4.4 Standard Forms.** Use appropriate copies of the County's standard forms and UDFCD design spreadsheets applicable to the design. When using County and UDFCD standard forms, charts, nomographs, etc., the form must be annotated as necessary to depict the specific information pertinent to the site. The engineer is required to show the appropriate information relative to the design and provide the lines, notes, etc. to depict how the design information was ✓

Chapter 4. Drainage Report and Construction Drawing Submittal Requirements

arrived at. For example, when using street gutter capacity charts, a separate chart for each street section shall be submitted, with the specific street criteria highlighted and the final result circled. Forms that are copied out of the book without the appropriate annotations are not adequate.

4.4.5 Checklists. Design or report checklists as referenced in the individual sections of this **Criteria**, and as available on the Douglas County website, must be completed and submitted with the drainage report. Appropriate notations shall be provided with the checklist to assist the reviewer in determining whether the design is complete (i.e., if a specific item is not addressed, an explanation should be provided). All design or report checklists that have been developed will be available on the Douglas County website. New and/or revised checklists will be added as they are developed. ✓

4.4.6 Phase II Drainage Plan Requirements. The following is an outline of the **minimum** Phase II drainage plan requirements. All plans must be bound:

I. OVERALL DRAINAGE PLAN

- A. 24" x 36" or 22" x 34" are acceptable size ✓
- B. Title block and legend ✓
- C. Show boundaries of entire development or project ✓
- D. Existing or proposed streets, roadways, or highways ✓
- E. Show limits of all major basins, including off-site basins where feasible ✓
- F. General drainage patterns and flow paths, including those entering and leaving the site ✓
- G. Topographic information with a 5-foot maximum contour interval ✓
- H. Identify existing and proposed stormwater management facilities, upstream, downstream, or within the site, which will provide a stormwater management function for the site ✓
- I. Overlay or figure showing layout of Detailed Drainage Plan sheets ✓

II. DETAILED DRAINAGE PLANS

- A. 24" x 36" or 22" x 34" are acceptable sizes ✓
- B. Title block and legend ✓
- C. Basin designations, design points, flow rates, volumes and release rates ✓
- D. Scale 1"=20' to 1"=100', as required to show sufficient detail ✓
- E. Existing (dashed or screened) and proposed (solid) contours with a 2-foot maximum contour interval. In terrain where the slope exceeds 15%, the maximum interval is 5-feet. Contours must extend a minimum of 100 feet beyond property lines and contour elevation labels must be included ✓
- F. Existing utilities and structures ✓
- G. All property lines and easements with type of easements noted ✓
- H. Adjacent developments or ownerships ✓

Chapter 4. Drainage Report and Construction Drawing Submittal Requirements

- I. Streets and roadways with Right-of-Way and flow line widths, type of curb and gutter or roadside swale, slopes flow directions, and crosspans ✓
- J. Drainage basin and sub-basin limits ✓
- K. Existing and proposed stormwater management facilities, including irrigation ditches, roadside swales, open channels and drainageways, storm sewer, culverts, detention ponds, water quality enhancement structures or features, etc. Information must be included regarding materials, sizes, shapes, and slopes ✓
- L. Proposed outfall points and existing or proposed facilities to convey runoff to the nearest major drainageway, without damage to downstream properties ✓
- M. Location and elevation of all existing and proposed 100-year floodplain boundaries, including the source of designation. All floodplain designations that exist for the site should be included (i.e. FEMA Flood Insurance Rate Maps, UDFCD Flood Hazard Area Delineation, and others) N/A
- N. Summary runoff table ✓

NOTE: The items listed above will be required with the Phase II drainage report or a written explanation as to why information cannot be provided.

4.4.7 Master Plan of Drainage. The Douglas County Subdivision Resolution makes reference to a Master Plan of Drainage in the Sketch Plan and Preliminary Plan discussion regarding procedures and submittal requirements, and that is reflected in Table 4-1. The Master Plan of Drainage shall be considered equivalent to a Phase I or Phase II drainage report for the Sketch Plan and Preliminary Plan submittals, respectively, and must meet those minimum requirements.

4.4.8 “Transitional” Phase II Drainage Report. The Phase II drainage report requirements may be reduced at the request of the applicant if there is uncertainty regarding the final developed characteristics of individual parcels, lots, or sites within the proposed development. There is frequently uncertainty with commercial and business park developments at the preliminary or final plat stage regarding the size and placement of buildings, the detailed lot or parcel grading, the extent of paved areas, and the location of local stormwater management facilities and detention facilities. As the individual lots or parcels develop, separate Phase III drainage reports are typically prepared as the site characteristics and layout, are determined. If a transitional Phase II drainage report is prepared for a development, the Phase II drainage report requirements shall be adhered to with the following exceptions or modifications:

1. Conservative assumptions may be made for areas where there is uncertainty regarding drainage factors related to the development of the site.
2. The level of detail may be reduced in the hydraulic and hydrologic analysis in areas where uncertainty exists.



PHASE III DRAINAGE REPORT FOR CANYONSIDE SUBDIVISION FILING NO. 2 CASTLE PINES, COLORADO

PARCEL 4, THE CANYONS SUPERBLOCK PLAT NO. 2, A SUBDIVISION PLAT RECORDED AT
RECEPTION NO. 2018040799, IN THE RECORDS OF THE DOUGLAS COUNTY CLERK AND
RECORDER'S OFFICE, LYING WITHIN THE SOUTH HALF OF SECTION 2, TOWNSHIP 7 SOUTH,
RANGE 67 WEST, OF THE SIXTH PRINCIPAL MERIDIAN,
CITY OF CASTLE PINES, COUNTY OF DOUGLAS, STATE OF COLORADO.

CASE NO. FLP-2021-002

Prepared for:

North Canyons Development Company
3033 East First Avenue, Suite 725
Denver, CO 80206
Contact: Mary Hart
Phone: (720) 624-1699
Email: mhart@alpertcorp.com

Prepared by:

CORE Consultants, Inc.
3473 S. Broadway
Englewood, CO 80113
Contact: Kevin Rohrbough, P.E.
Phone: 303-703-4444
Email: krohrbough@liveyourcore.com

CORE Project Number: 14-002-020

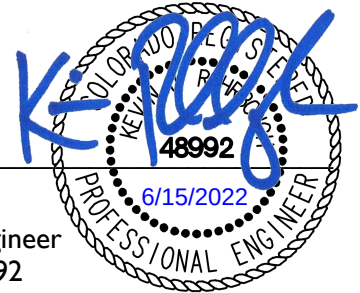
June 15, 2022

APPROVAL BLOCKS**ENGINEER'S STATEMENT:**

This report and plan for the Phase III Drainage design of Canyonside Subdivision Filing No. 2 was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Castle Pines Drainage Design and Technical Criteria for the owners thereof. I understand that the City of Castle Pines does not and will not assume liability for drainage facilities designed by others.

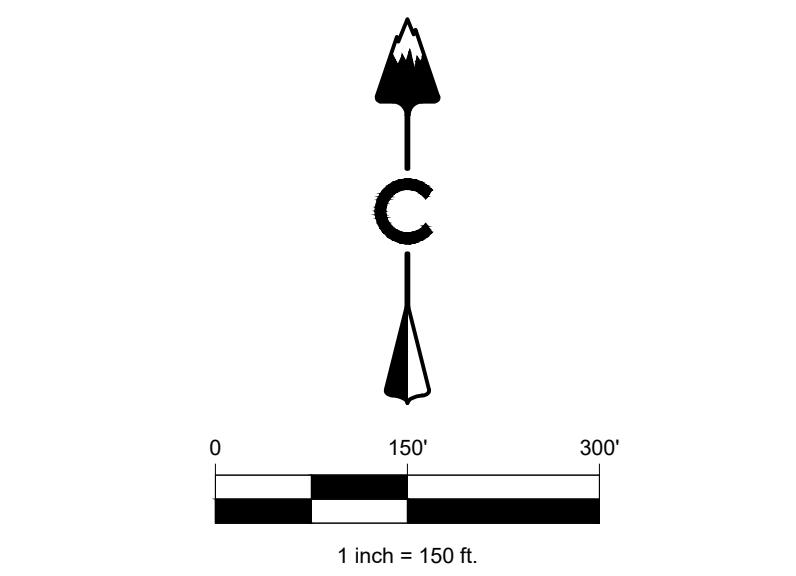
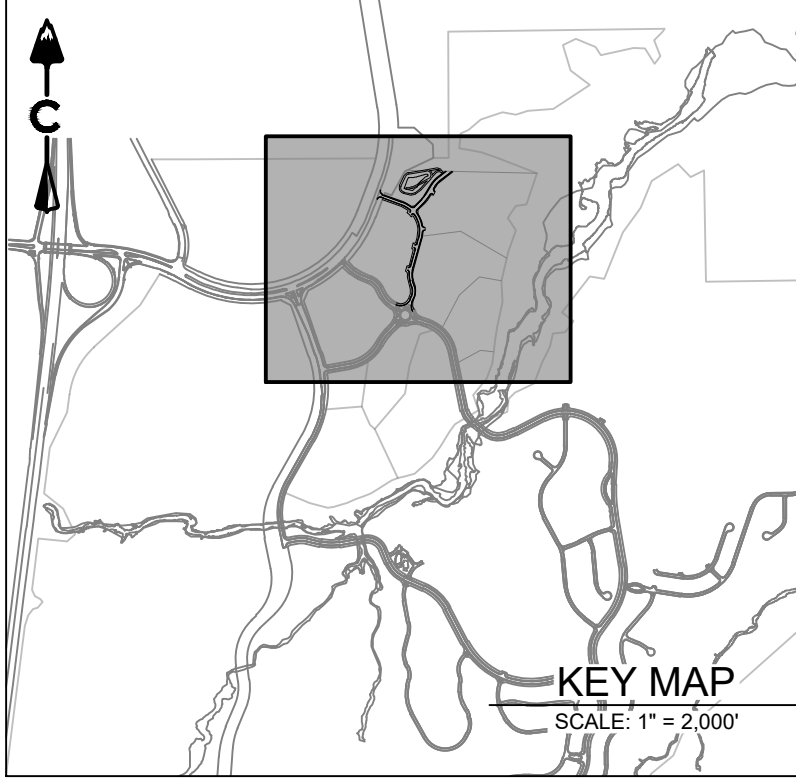
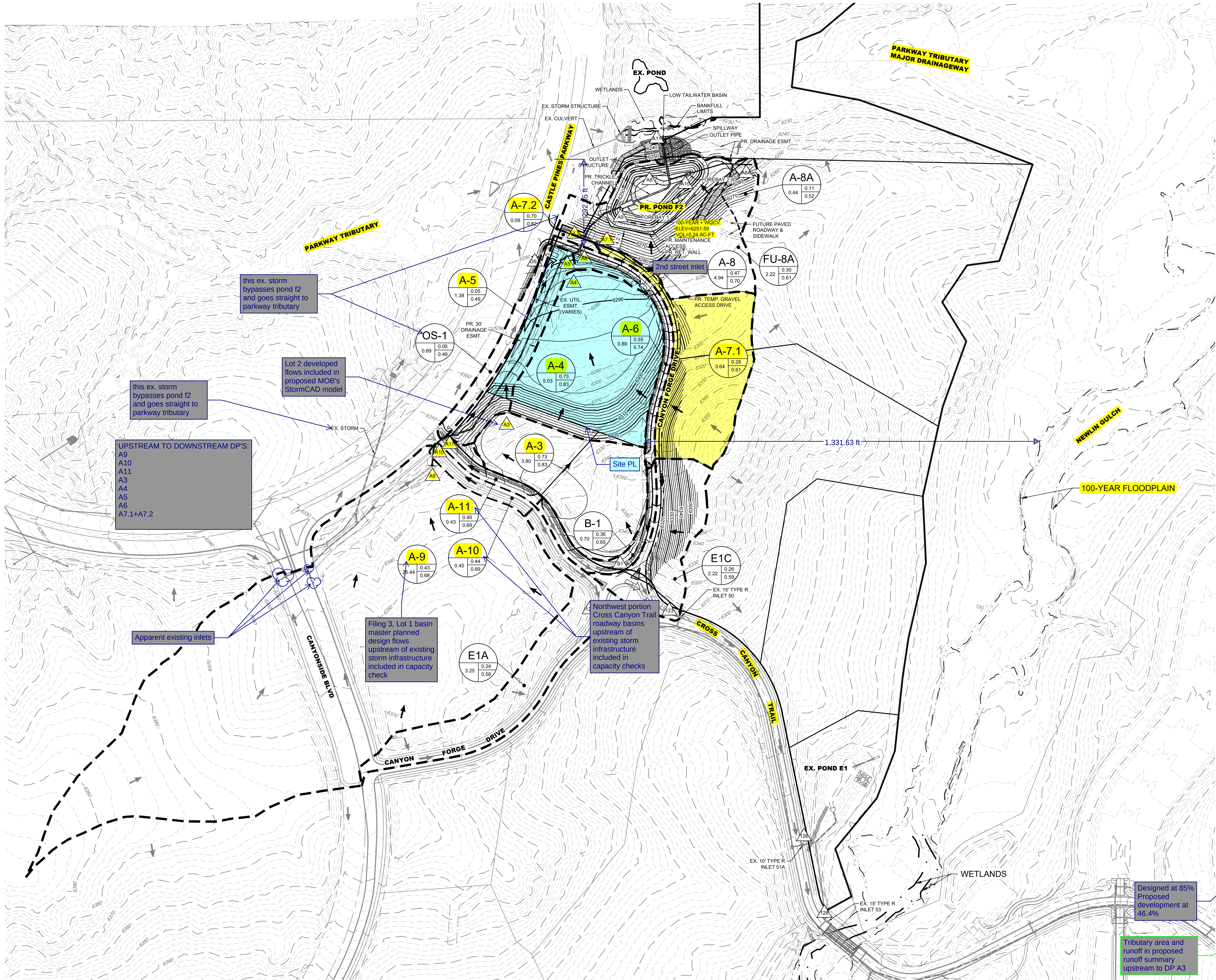
SIGNATURE: _____

Kevin Rohrbough, P.E.
Registered Professional Engineer
State of Colorado No. 48992

**OWNER/DEVELOPER'S STATEMENT:**

North Canyons Development Company hereby certifies that the drainage facilities for Canyonside Subdivision Filing No. 2 shall be constructed according to the design presented in this report. I understand that the City of Castle Pines does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that The City of Castle Pines reviews drainage plans pursuant to Colorado Revised Statutes, Title 30, Article 28; but cannot, on behalf of Canyonside Subdivision Filing No. 2, guarantee that final drainage design review will absolve North Canyons Development Company and/or their successors and/or assigns of future liability for improper design. I further understand that approval for the final plat does not imply approval of my engineer's drainage design.

Lee Alpert
North Canyons Development Company, a Delaware limited
liability company
By: Alpert Development Manager, LLC, its Manager
Authorized Signature



LEGEND	
EXISTING	PROPOSED
AREA XX.X	AREA XXX
0.45	0.45
0.60	0.60
BASIN DESIGNATION	
5 YEAR COEFFICIENTS	
100 YEAR COEFFICIENTS	
DESIGN POINT	
DIRECTIONAL FLOW ARROW	
EMERGENCY OVERFLOW ROUTE	
PROPOSED DRAINAGE BASIN	
EXISTING DRAINAGE BASIN	
PROPOSED MAJOR CONTOUR	
PROPOSED MINOR CONTOUR	
EXISTING MAJOR CONTOUR	
EXISTING MINOR CONTOUR	
EASEMENT	
RIGHT OF WAY (R.O.W.)	
CENTERLINE	
PROJECT BOUNDARY	
PROPOSED STORM & STUB OUT	
EXISTING STORM & STUB OUT	
STORM MANHOLES	
STORM INLETS	
FES, FOREBAY, & TRICKLE CHANNEL	
OUTLET STRUCTURE	
CRUSHER FINES	
MAINTENANCE ACCESS	
RIPRAP	
100 YEAR FLOODPLAIN	
WETLAND	
LIMITS OF CONSTRUCTION	
RETAINING WALL	
DRAINAGE SWALE	

- NOTES:
- THE SITE DOES NOT CONTAIN THE 100-YEAR FLOODPLAIN.
 - ALL PROPOSED STORM IMPROVEMENTS ARE PRIVATE UNLESS OTHERWISE NOTED.
 - ALL PROPOSED STORM IMPROVEMENTS ARE DESIGNED FOR THE 5-YEAR (MINOR) AND 100-YEAR (MAJOR) STORM EVENTS UNLESS OTHERWISE NOTED.
 - STORM INFRASTRUCTURE IS SIZED TO ACCOUNT FOR THE FUTURE PAVED ROAD AND SIDEWALKS WITHIN BASIN A-8. THE FUTURE BASIN IS DESIGNATED FU-8A.
 - BASIN A-8A IS A SUB-BASIN WITHIN BASIN A-8 BROKEN OUT TO SIZE THE TYP C INLET IN SUMP AT DP A8A.

POND F2 SUMMARY TABLE				
EVENT	WSE (FTMSL)	VOL (AC-FT)	MAX RELEASE (CFS)	
WQCV	6245.34	0.833	0.4	
CUV	6247.97	2.352	0.7	
100-YR	6250.66	4.404	38.8	
*AN EXTENDED DETENTION BASIN				
DESIGNED FOR FULL SPECTRUM DETENTION				
RUNOFF SUMMARY TABLE				
DIRECT RUNOFF				
DESIGN POINT	BASIN	AREA (AC)	5-Year RUNOFF (CFS)	100-Year RUNOFF (CFS)
A-3	A-3	5.03	12.41	29.10
A-4	A-4	5.03	12.41	29.10
A-5	A-5	1.38	0.18	3.65
A-6	A-6	0.88	1.88	4.67
A-7.1	A-7.1	3.64	2.91	13.00
A-7.2	A-7.2	0.09	0.24	0.57
A-8	A-8	4.94	6.93	21.34
A-9	A-9	25.44	31.75	70.72
A-10	A-10	0.43	0.74	2.33
A-11	A-11	0.43	0.74	2.33
B-1	B-1	0.70	0.95	3.53
E1A	E1A	3.25	2.26	11.58
E1C	E1C	2.22	1.80	8.66
A-8A	A-8A	0.44	0.14	1.41
FU-8A	FU-8A	2.22	1.72	7.35
O1	OS-1	0.69	0.10	1.91

UPSTREAM TO DOWNSTREAM DP'S:
A9
A10
A11
A3
A4
A5
A6
A7.1+A7.2

this ex. storm bypasses pond f2 and goes straight to parkway tributary

this ex. storm bypasses pond f2 and goes straight to parkway tributary

Lot 2 developed flows included in proposed MOB's StormCAD model

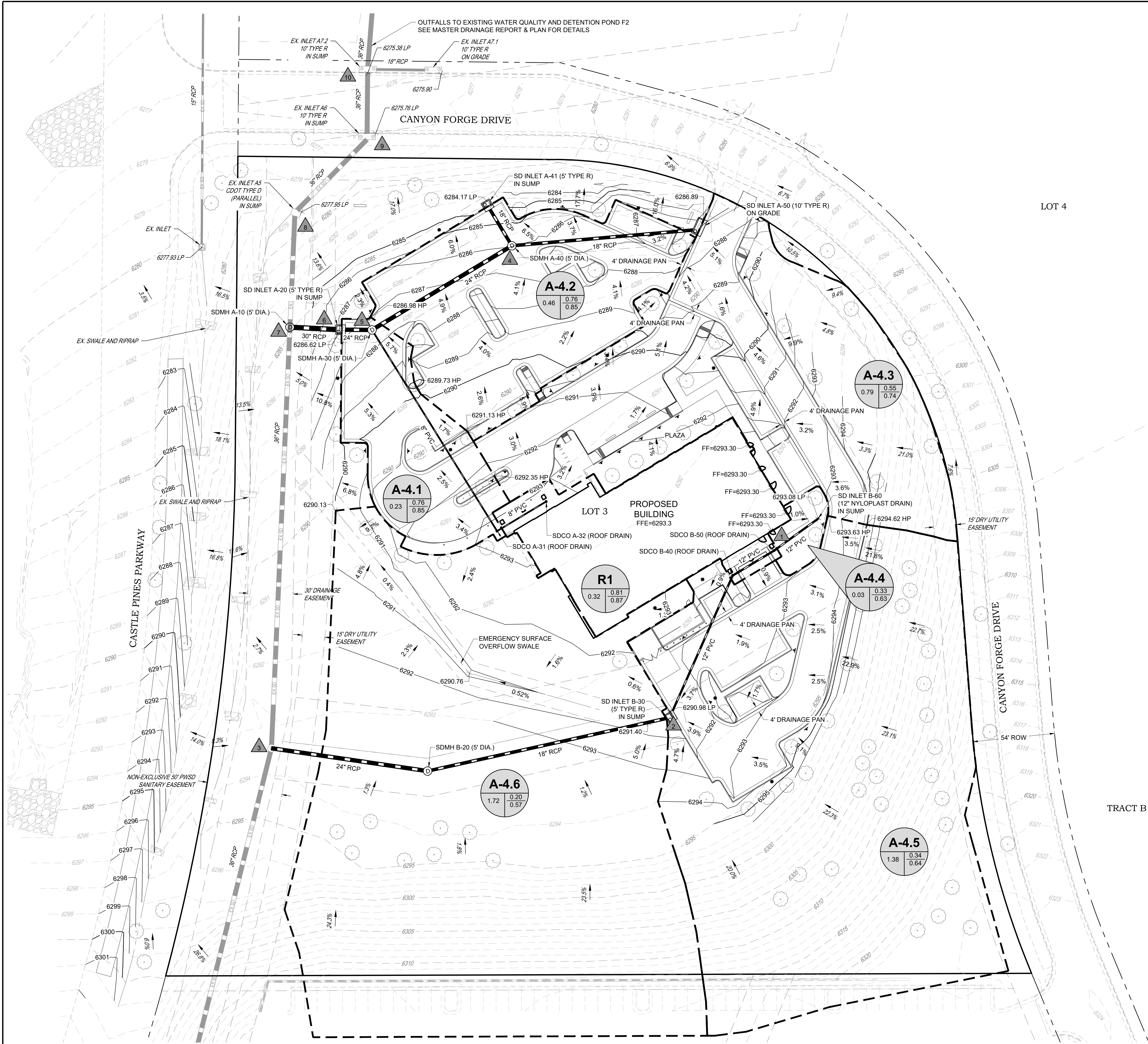
Filing 3, Lot 1 basin master planned design flows upstream of existing storm infrastructure included in capacity check

Northwest portion Cross Canyon Trail roadway basins upstream of existing storm infrastructure included in capacity checks

Designed at 85% Proposed development at 46.4%

Tributary area and runoff in proposed runoff summary upstream to DP A3

Appendix D
Proposed Drainage Plan



NOTES:

1. THE ROOF BASIN'S CALCULATED RUNOFF HAS BEEN DIVIDED BY 2 TO ACCOUNT FOR THE ROOF DRAIN CONNECTIONS ON BOTH THE NORTH AND SOUTH SIDES OF THE BUILDING.

LEGEND:

- 43 EXISTING MINOR CONTOURS
- 45 EXISTING MAJOR CONTOUR
- 43 PROPOSED MINOR CONTOURS
- 45 PROPOSED MAJOR CONTOURS
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- BASIN BOUNDARY
- PROPOSED MANHOLE
- PROPOSED INLETS
- FLOW DIRECTION ARROW
- DESIGN POINT DESIGNATION
- BASIN DESIGNATION
- INTERMEDIATE YEAR COMPOSITE C
- 100 YEAR COMPOSITE C
- BASIN AREA (ACRES)

Design Point	Tributary Basin(s)	RUNOFF SUMMARY				
		Tributary Area (ac.)	Direct Runoff (CFS/yr)	Total Runoff (CFS/yr)	Direct Runoff (CFS/100-yr)	Total Runoff (CFS/100-yr)
-	A-4.4	0.03	0.04	-	0.16	-
-	1/2 of R1	0.16	0.49	-	1.10	-
1	A-4.4 & 1/2 of R1	0.19	-	0.53	-	1.26
-	A-4.5	1.38	1.77	-	6.87	-
2	DP1 & A-4.5	1.57	-	2.31	-	8.12
-	Master Rpt Q (Ex DP's A9+A10+A11+A3)	30.12	33.06	-	98.42	-
3	DP2 & Master Rpt Q	31.69	-	35.37	-	106.54
-	A-4.3	0.79	1.68	-	4.61	-
-	A-4.2	0.46	1.32	-	3.04	-
4	A-4.3 & A-4.2	1.25	-	2.98	-	7.65
-	1/2 of R1	0.19	0.49	-	1.10	-
5	DP 4 & 1/2 of R1	1.44	-	3.48	-	8.75
-	A-4.1	0.23	0.66	-	1.51	-
6	DP 5 & A-4.1	1.67	-	4.14	-	10.26
7	DP 3 & DP 6	33.36	-	39.50	-	116.81
-	A-4.6	1.72	1.29	-	7.62	-
-	Added Flows to Ex A5	0.04	0.03	-	0.20	-
-	Ex Flows to Ex A5	1.38	0.18	-	3.65	-
8	DP 7 & A-4.6 & Total Flows to Ex A5	34.78	-	41.01	-	128.27
-	Added Flows to Ex A6	0.06	0.04	-	0.26	-
-	Ex Flows to Ex A6	0.89	1.68	-	4.67	-
9	DP8 & Total Flows to Ex A6	35.73	-	42.73	-	133.20

CITY DEVELOPMENT REVIEW ENGINEER

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN REVIEWED BY THE CITY OF CASTLE PINES FOR * IMPROVEMENTS ONLY

* STREET AND DRAINAGE

PUBLIC WORKS ACCEPTANCE BLOCK



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PROJECT 257483

ADVENTHEALTH
CASTLE PINES

CONSTRUCTION
DOCUMENTS

DATE 06/05/2026

REVISIONS

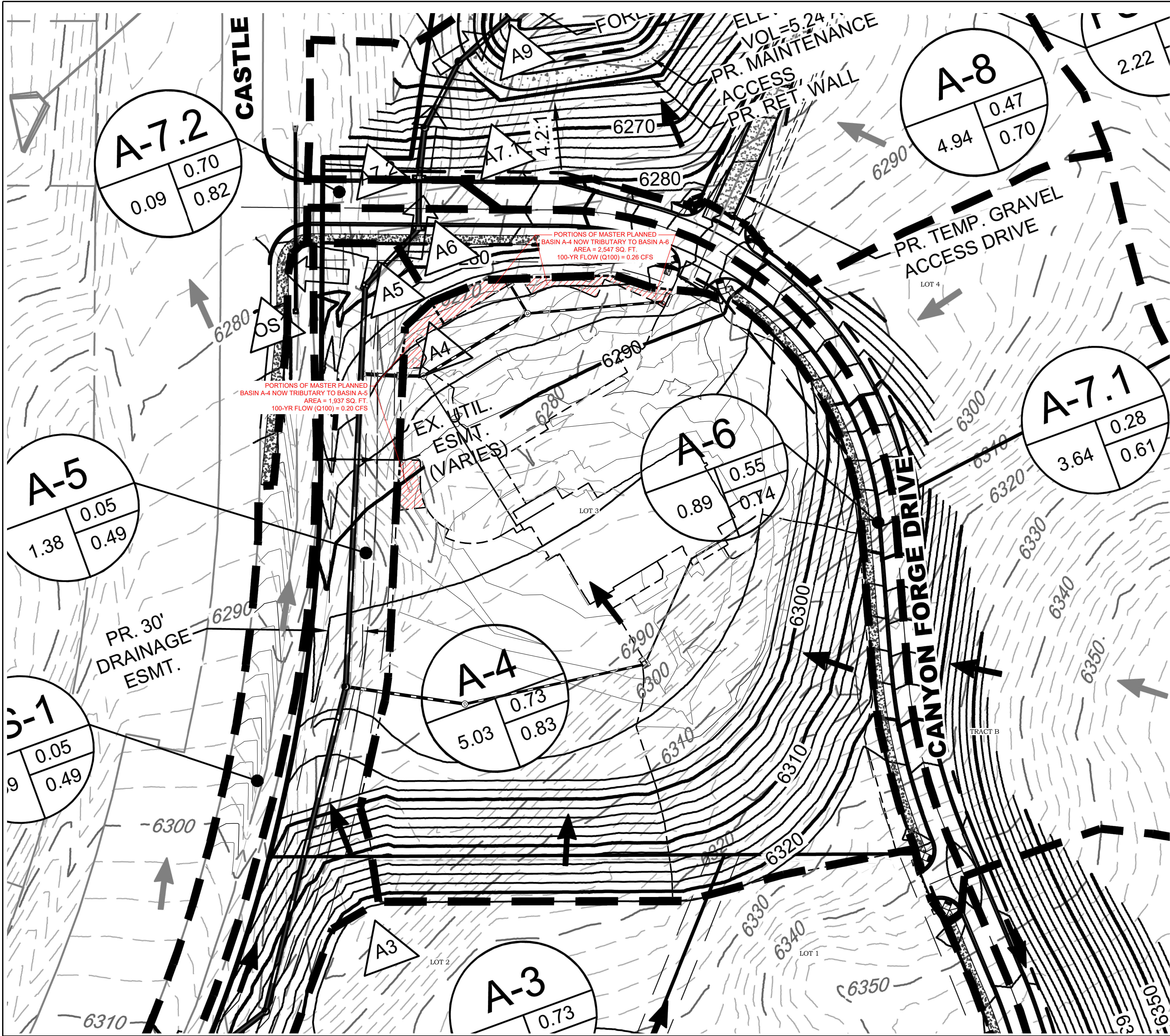
DESCRIPTION	DATE
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SHEET TITLE

PROPOSED
DRAINAGE PLAN

SHEET NUMBER

FIG. 1

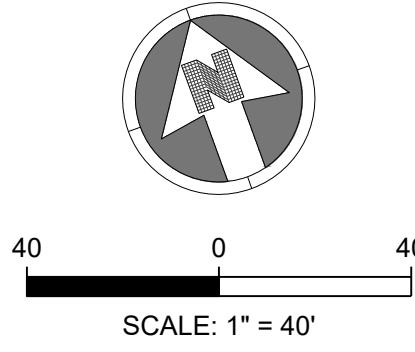


NOTES:

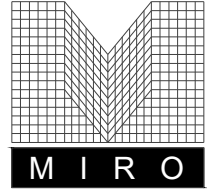
1. THE MASTER DRAINAGE PLAN IS OVERLAID ON THE PROPOSED PROJECT FOR REFERENCE. THIS FIGURE 2 PLAN COMPARES THE MASTER PLANNED BASINS TO THE PROPOSED BASINS TO SHOW WHERE THE PROPOSED MOB BASINS VARY FROM THE MASTER PLAN.

LEGEND:

	43	EXISTING MINOR CONTOURS
	45	EXISTING MAJOR CONTOUR
	43	PROPOSED MINOR CONTOURS
	45	PROPOSED MAJOR CONTOURS
		PROPOSED STORM SEWER
		EXISTING STORM SEWER
		BASIN BOUNDARY
		PROPOSED MANHOLE
		PROPOSED INLETS



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ADVENTHEALTH CASTLE PINES

CONSTRUCTION DOCUMENTS

DATE 06/05/2026

REVISIONS

DESCRIPTION	DATE
-------------	------

CITY DEVELOPMENT REVIEW ENGINEER

DATE

THESE CONSTRUCTION DRAWINGS HAVE BEEN REVIEWED BY THE CITY OF CASTLE PINES FOR * IMPROVEMENTS ONLY

* STREET AND DRAINAGE

PUBLIC WORKS ACCEPTANCE BLOCK

SHEET TITLE
**PROPOSED VS.
MASTER DRAINAGE
PLAN**

SHEET NUMBER

FIG. 2

DRAINAGE REPORT

FOR THE

**LIFE TIME - CASTLE PINES
LOT 1
CANYONSIDE SUBDIVISION NO. 3**

**IN
CITY OF CASTLE PINES, COLORADO**

Prepared For:

**LTF REAL ESTATE COMPANY, INC.
2902 CORPORATE PLACE
CHANHASSEN, MN 55317**

Prepared By:

COLLINS ENGINEERS, INC.

**455 SHERMAN STREET, SUITE 160
DENVER, CO 80203
(303) 447-0090
ALEX SALTZGAVER
COLLINS JOB NO. 14504.04-25**

**January 10, 2025
Revised: February 12, 2025
April 8, 2025**

LTF Real Estate Company, Inc. hereby certifies that the drainage facilities for the Life Time – Castle Pines site will be constructed according to the design presented in this report. I understand that the City of Castle Pines does not and shall not assume liability for the drainage facilities designed and/or certified by my engineer. I understand that the City of Castle Pines reviews drainage plans but cannot, on behalf of LTF Real Estate Company, Inc, guarantee that final drainage design review will absolve LTF Real Estate Company, Inc and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the Plat and/or Development Permit does not imply approval of my engineer's drainage design.

Attest:



BROOKE L. BALLMAN
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2029

Brooke L. Ballman
Notary Public

*Christopher Ryan - Senior Associate
General Counsel*
Name of Responsible Party

[Signature]
Authorized Signature

ENGINEER'S CERTIFICATION

I hereby certify that this report (plan) for the final drainage design of Life Time – Castle Pines was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Castle Pines Standards and Specifications for the Design and Construction of Public and Private Improvements for the Responsible Parties thereof. I understand that the City of Castle Pines does not and shall not assume liability for drainage facilities designed by others.

Alex Saltzgaver, P.E.
Registered Professional Engineer
State of Colorado No. 48923



2. Existing soils were determined by the U.S. Department of Agriculture - Natural Resources Conservation Service. The soils have a rating of C and D, with 2.0% of the existing soil of the site being composed of Type D. Existing grades of the site are mainly moderately steep slopes ranging from 3 to 25%. Ground cover consists mostly of native grasses.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Drainage Basins

1. The project site is located in Flood Zone X: "Area of Minimal Flood Hazard" per FEMA Flood Map 08035C0180G.
2. On-Site Major Basins: The project site is part of two existing basins, F-2 and E-1, according to the Drainage Map from the Canyonside Preliminary Plan No. 1, Master Drainage Report (in Appendix E). Basin F-2 has been reassessed per the Canyonside Subdivision Filing No. 2, Phase III Drainage Report proposed drainage map and broken down into separate basins. The project site is now part of the proposed Basins A-9 and E1A per the Canyonside Subdivision Filing No. 2. A portion of the parcel to the west of the project site (Parcel 2) is also included in Basin A-9. This undeveloped portion of Basin A-9 currently flows to curb inlets in Canyonside Blvd, into the existing storm sewer under the road which outlets to the swale along the north portion of the Life Time site and ultimately to pond F-2. Capacity improvements for the storm sewer crossing Canyonside Blvd. have been completed by The Canyons. With future development this offsite area will likely continue to drain to the north under Castle Pines Parkway.

Basin E1A includes the southern portion of the project site, according to the Drainage Map from the Canyonside Preliminary Plan No. 1, Master Drainage Report (in Appendix E). Runoff from this basin is collected in Pond E1.

Parking and Access Drives, Landscaped Medians- Basin (A): Basin A consists of the paved parking lot, landscaped areas, and the access drives from Canyonside Boulevard, Canyon Forge Drive, and Cross Canyon Trail.

Building and Pool Deck - Basin (B): Basin B consists of the proposed Life Time building, as well as the pool deck.

Basins Flowing Off-site (O-1, O-2, O-3, O-4): The off-site basins consist of landscape and will not be picked up by the proposed on-site storm sewer conveyance system. Basins O-1 thru O-3 ultimately drain to pond F-2, while basin O-4 drains to pond E-1.

Generally, the proposed stormwater drains from south to north across the site. Stormwater will be piped from the center of the proposed parking lot along the east access drive to the existing drainage swale located at the north of the site. From this drainage swale, stormwater will leave the project site through a modified impact stilling basin and into an existing area drain. This area drain connects to an existing 36" pipe that leads to Pond F2, located approximately 1300 feet northeast of the project site. This detention pond is designed as an

APPENDIX B

Hydrologic Computations

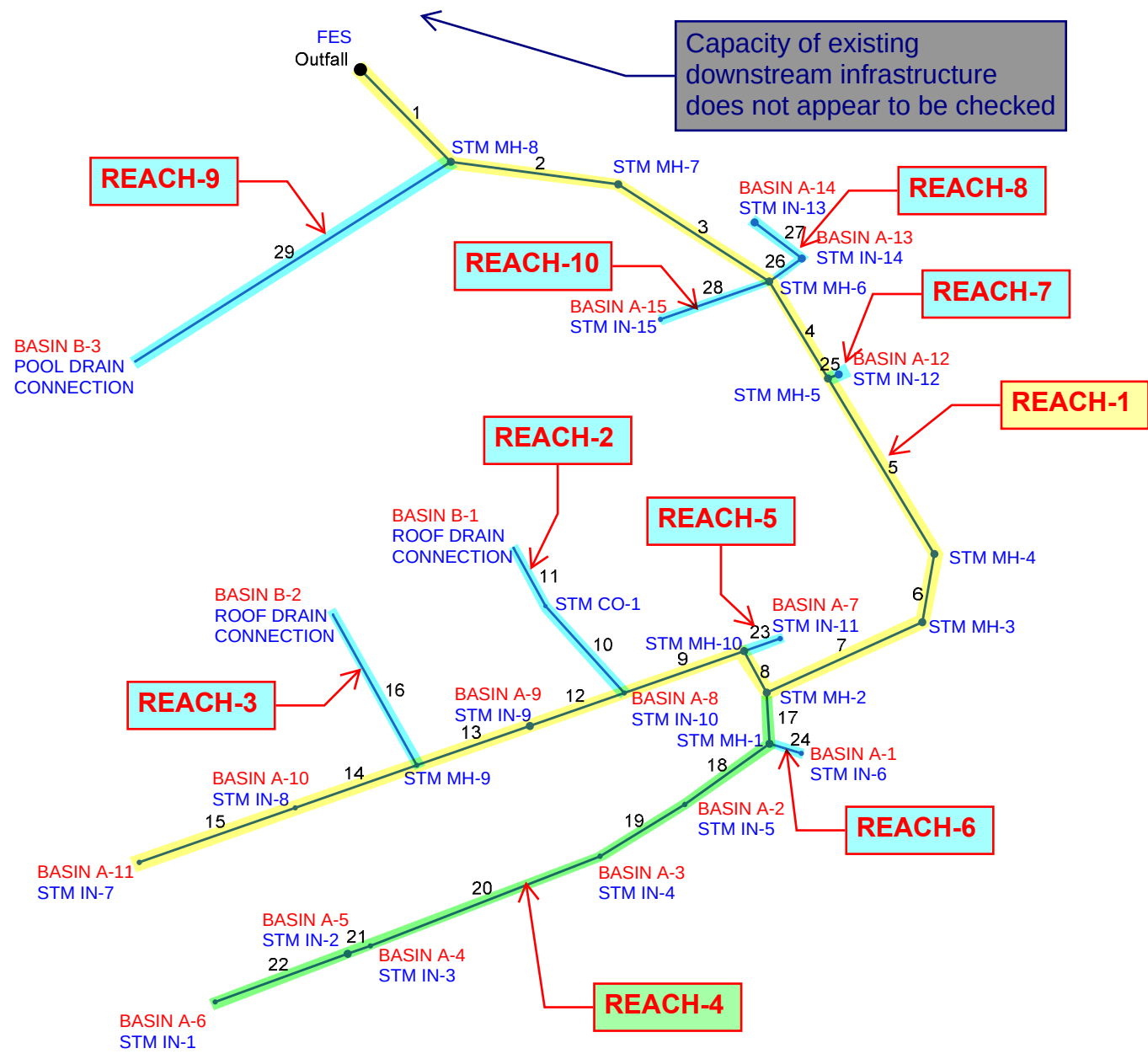
Proposed Conditions

COMPOSITE 'C' FACTORS																											
LOCATION: Castle Pines, Douglas County						Phase III Drainage Report								BY: MAS				Soil Type: C/D				DATE: 1/10/2025					
BASIN DESIGNATION						Asphalt				Concrete				Roof				Lawn				COMPOSITE C FACTOR				% IMPERVIOUS	
	Asphalt	Concrete	Roof	Lawn	TOTAL	2YR	5 YR	10 YR	100 YR	2YR	5 YR	10 YR	100 YR	2YR	5 YR	10 YR	100 YR	2YR	5 YR	10 YR	100 YR	2YR	5 YR	10 YR	100 YR		
Imperviousness =						95				95				95				20									
A-1	0.491	0.055	0.000	0.070	0.62	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.72	0.74	0.77	0.84	86.44	
A-2	0.171	0.014	0.000	0.067	0.25	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.62	0.65	0.68	0.79	75.11	
A-3	0.367	0.022	0.000	0.025	0.41	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.75	0.77	0.80	0.85	90.49	
A-4	0.405	0.029	0.000	0.074	0.51	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.70	0.72	0.75	0.83	84.13	
A-5	0.131	0.037	0.000	0.000	0.17	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.79	0.81	0.83	0.87	95.00	
A-6	0.544	0.057	0.000	0.368	0.97	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.54	0.58	0.62	0.76	66.52	
A-7	0.614	0.042	0.000	0.019	0.68	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.77	0.79	0.81	0.86	92.84	
A-8	0.199	0.046	0.000	0.031	0.28	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.72	0.74	0.77	0.84	86.52	
A-9	0.296	0.039	0.000	0.054	0.39	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.70	0.72	0.75	0.83	84.51	
A-10	0.443	0.037	0.000	0.043	0.52	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.74	0.76	0.78	0.85	88.84	
A-11	0.485	0.037	0.000	0.094	0.62	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.69	0.72	0.75	0.82	83.54	
A-12	0.147	0.035	0.000	0.284	0.47	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.39	0.44	0.49	0.69	49.28	
A-13	0.067	0.013	0.000	0.160	0.24	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.36	0.40	0.46	0.67	45.17	
A-14	0.020	0.004	0.000	0.258	0.28	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.20	0.25	0.33	0.60	26.48	
A-15	0.245	0.145	0.000	0.085	0.48	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.67	0.70	0.73	0.82	81.55	
B-1	0.000	0.000	0.423	0.000	0.42	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.79	0.81	0.83	0.87	95.00	
B-2	0.000	0.000	0.739	0.000	0.74	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.79	0.81	0.83	0.87	95.00	
B-3	0.000	1.198	0.000	0.000	1.20	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.79	0.81	0.83	0.87	95.00	
O-1	0.000	0.000	0.000	0.450	0.45	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.14	0.20	0.28	0.57	20.00	
O-2	0.081	0.142	0.000	2.245	2.47	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.20	0.26	0.33	0.60	26.77	
O-3	0.000	0.000	0.000	0.090	0.09	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.14	0.20	0.28	0.57	20.00	
O-4	0.013	0.004	0.000	1.495	1.51	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.79	0.81	0.83	0.87	0.14	0.20	0.28	0.57	0.15	0.21	0.29	0.57	20.86	
Total	4.719	1.957	1.161	5.913	13.75																		TOTAL IMPERVIOUS %				62.75
																							TOTAL AREA (AC)				13.75

Less than the 85%
master planned
impervious % .

APPENDIX C

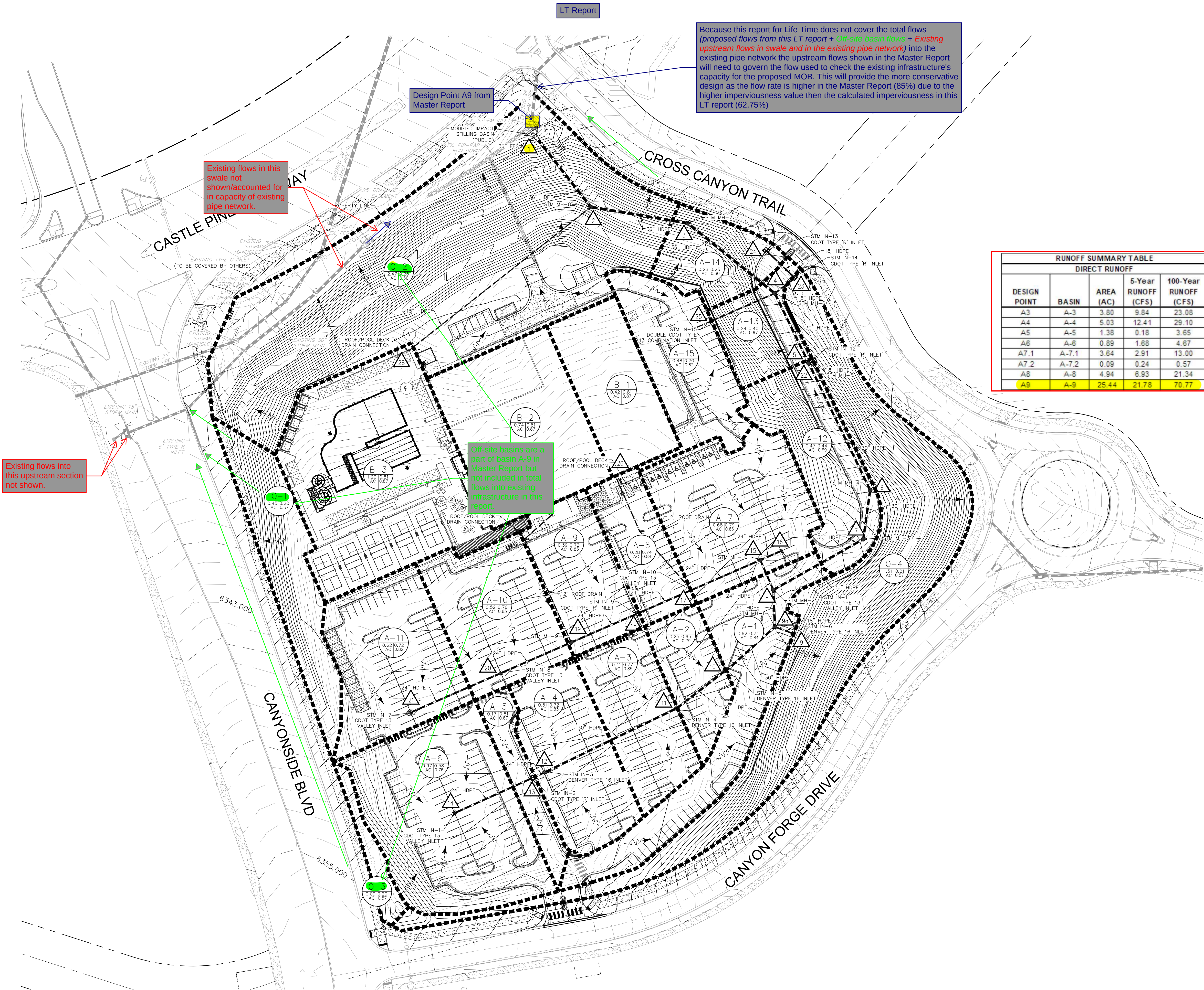
Hydraulic Computations



APPENDIX D

Final Drainage Map

P:\25-CD\14504-Life Time\Work\14-Castle Pines (2024)\DWG\Plans\14504.04 - Drainage Plan.dwg, 2/12/2025 3:38:56 PM, kelly.adams



Because this report for Life Time does not cover the total flows (proposed flows from this LT report + Off-site basin flows + Existing upstream flows in swale and in the existing pipe network) into the existing pipe network the upstream flows shown in the Master Report will need to govern the flow used to check the existing infrastructure's capacity for the proposed MOB. This will provide the more conservative design as the flow rate is higher in the Master Report (85%) due to the higher imperviousness value then the calculated imperviousness in this LT report (62.75%)

Existing flows in this swale not shown/accounted for in capacity of existing pipe network.

Existing flows into this upstream section not shown.

Off-site basins are a part of basin A-9 in Master Report but not included in total flows into existing infrastructure in this report.

RUNOFF SUMMARY TABLE				
DIRECT RUNOFF				
DESIGN POINT	BASIN	AREA (AC)	5-Year RUNOFF (CFS)	100-Year RUNOFF (CFS)
A3	A-3	3.80	9.84	23.08
A4	A-4	5.03	12.41	29.10
A5	A-5	1.38	0.18	3.65
A6	A-6	0.89	1.68	4.67
A7.1	A-7.1	3.64	2.91	13.00
A7.2	A-7.2	0.09	0.24	0.57
A8	A-8	4.94	6.93	21.34
A9	A-9	25.44	21.78	70.77

LEGEND

A = BASIN DESIGNATION
B = AREA IN ACRES
C = 5-YR "C"
100-YR "C"

A

B

C

1

DESIGN POINT DESIGNATION

PROPOSED BASIN BOUNDARY

EXISTING BASIN DELINEATION

PROPERTY LINE

EXISTING CONTOURS

PROPOSED CONTOURS

FLOW ARROW

5660

5659

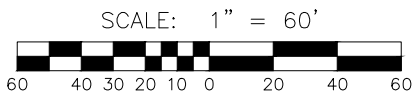
5305

5304

←

→

SUMMARY RUNOFF TABLE			
DESIGN POINT	AREA (AC)	TOTAL Q-5YR	TOTAL Q-100YR
1	—	29.36	62.11
2	—	29.36	62.11
3	—	24.96	53.53
4	—	24.96	53.53
5	—	24.96	53.53
6	—	24.96	53.53
7	—	24.96	53.53
8	—	24.96	53.53
9	0.62	9.32	20.01
9a	—	9.32	20.01
10	0.25	7.50	16.32
11	0.41	6.71	14.56
12	0.51	5.15	11.45
13	0.17	3.38	7.75
14	0.97	2.72	6.46
15	—	13.59	27.29
16	0.68	13.59	27.29
17	0.28	10.99	22.16
18	0.39	8.34	16.88
19	—	6.97	14.04
20	0.52	4.07	8.37
21	0.62	2.14	4.48
22	0.47	0.93	2.64
23	0.24	0.82	2.91
24	0.28	0.35	1.48
25	0.48	1.62	3.43
26	0.42	1.66	3.24
27	0.74	2.90	5.67
28	1.20	4.71	9.19



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LIFE TIME CASTLE PINES - DRAINAGE MAP

LIFE TIME - CASTLE PINES

CASTLE PINES, COLORADO

REV. NO.

DATE

REVISIONS DESCRIPTION

2024

REVISIONS

drawn by: MAS
checked by: KNA
QA/QC by:
project no.: 14504.04-25
drawing no.: 11/14/2024

APPENDIX E

Previous Drainage Reports

LT Report

CANYONSIDE SUBDIVISION FILING NO. 2

CORE Project #: 14-002-020

Prepared By: DJB

PERCENT IMPERVIOUS CALCULATIONS

-REFERENCE UDFCD Vol.1 RUNOFF Table 6-3

Assumed 85% for parcel 3 per LT report markups on next sheet on the Master Drainage Plan.

Markups from LT report.

This is for undeveloped flows to the west.

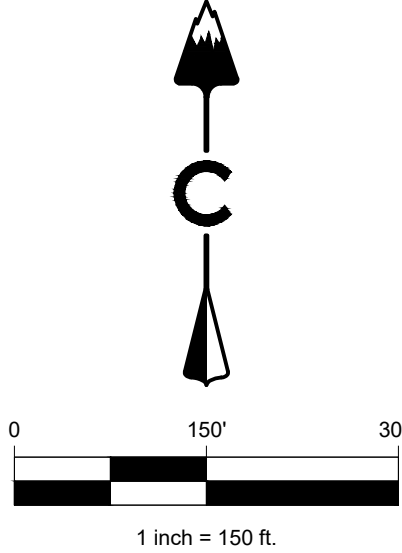
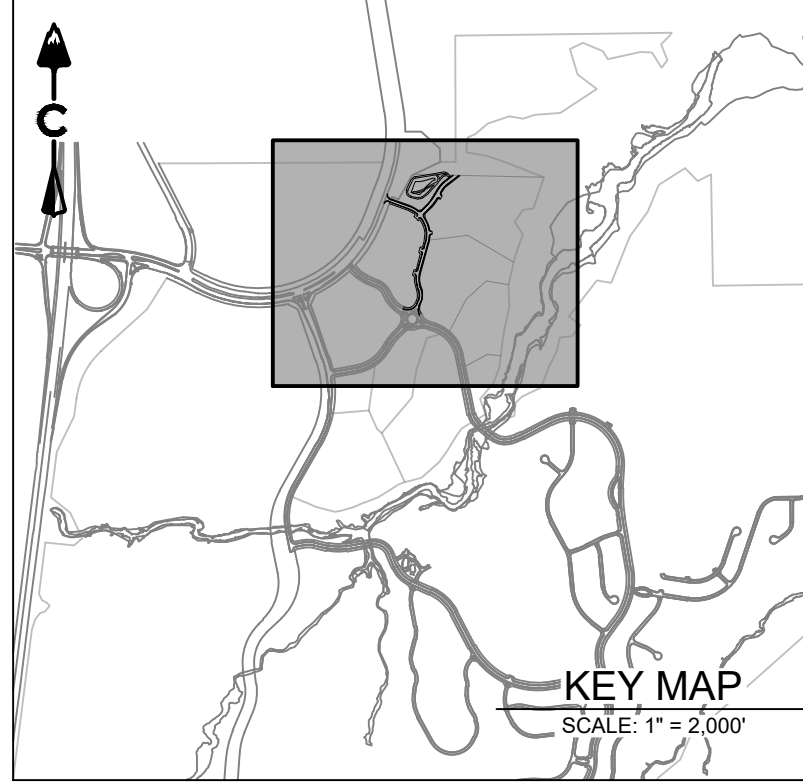
		Combined Land Use Imperviousness				Discrete Surface Material Imperviousness					Historic						Soil Type			
		Mixed-Use				Building/ Road			Landscape								Open Space	Soil Type A Area	Soil Type B Area	Soil Type C Area
		Maximum Density	High Density	Medium Density	Low Density	Roof/ Concrete Pavement	Asphalt/ Pondered Water	Gravel (Packed)	2-7% Slope	>7% Slope										
% Imperv.		95.00%	85.00%	75.00%	65.00%	90.00%	100.00%	40.00%	2.00%	2.00%	2.00%									
	Design											Total	Percent							
BASIN	Point	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Area	Impervious	Area	Area					
A-3	A3	-	3.80	-	-	-	-	-	-	-	-	3.80	85.0%	-	-	3.80				
A-4	A4	-	5.03	-	-	-	-	-	-	-	-	5.03	85.0%	-	-	5.03				
A-5	A5	-	-	-	-	-	-	-	1.38	-	-	1.38	2.0%	-	-	1.38				
A-6	A6	-	-	-	-	0.17	0.40	-	0.32	-	-	0.89	62.7%	-	-	0.89				
A-7.1	A7.1	-	0.48	-	-	0.15	0.50	-	0.21	-	2.31	3.64	29.8%	-	-	3.64				
A-7.2	A7.2	-	-	-	-	0.02	0.06	-	0.02	-	-	0.09	80.8%	-	-	0.09				
A-8	A8	-	0.73	-	-	0.48	1.53	-	2.21	-	-	4.94	53.1%	-	-	4.94				
A-9	A9	-	12.05	-	-	0.30	1.64	-	11.46	-	-	25.44	48.6%	-	-	25.44				
A-10	A10	-	-	-	-	0.07	0.15	-	0.22	-	-	0.45	49.5%	-	-	0.45				
A-11	A11	-	-	-	-	0.07	0.15	-	0.21	-	-	0.43	51.3%	-	-	0.43				
SUBTOTAL TO PROPOSED POND F2		-	22.08	-	-	1.25	4.42	-	16.02	-	2.31	46.09	53.6%	-	-	46.09				
B-1	B1	-	-	-	-	0.14	0.14	-	0.42	-	-	0.70	39.4%	-	-	0.70				
E1A	121	-	-	-	-	0.08	0.67	-	0.09	-	2.40	3.25	24.5%	-	-	3.25				
E1C	123	-	-	-	-	0.09	0.48	-	0.13	-	1.52	2.22	26.9%	-	-	2.22				
SUBTOTAL TO EXISTING POND E1		-	-	-	-	0.31	1.30	-	0.65	-	3.92	6.17	27.0%	-	-	6.17				
FOR SEPARATE SYSTEM SIZING:																				
Proposed condition:																				
A-8A	A8A	-	-	-	-	0.01	-	0.06	0.37	-	-	0.44	8.5%	-	-	0.44				
Future Condition:																				
FU-8A	FU8A	-	-	-	-	0.11	0.58	-	1.53	-	-	2.22	31.9%	-	-	2.22				
Roadside Ditch:																				
OS-1	O1	-	-	-	-	-	-	-	0.69	-	-	0.69	2.0%	-	-	0.69				

Markups from Life Time Fitness Drainage Report

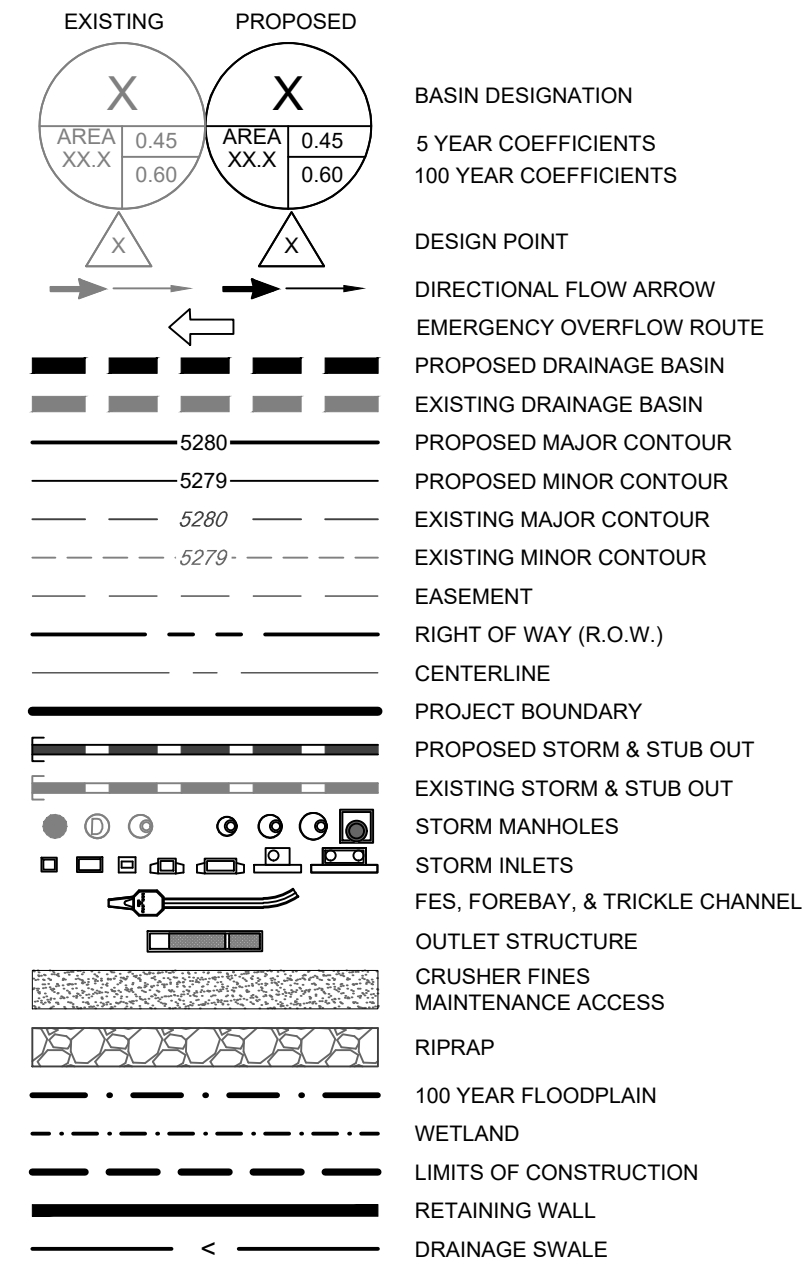
This portion of Parcel 2 will have undeveloped flows that will need to be routed through the project site. Ultimately these developed flows will be routed to the north to a future regional pond.

Assumed parcel 3 would be 85% impervious

Master Planned flow at most upstream point for underground pipe system which the proposed MOB will connect to.



LEGEND



NOTES:

1. THE SITE DOES NOT CONTAIN THE 100-YEAR FLOODPLAIN.
2. ALL PROPOSED STORM IMPROVEMENTS ARE PRIVATE UNLESS OTHERWISE NOTED.
3. ALL PROPOSED STORM IMPROVEMENTS ARE DESIGNED FOR THE 5-YEAR (MINOR) AND 100-YEAR (MAJOR) STORM EVENTS UNLESS OTHERWISE NOTED.
4. STORM INFRASTRUCTURE IS SIZED TO ACCOUNT FOR THE FUTURE PAVED ROAD AND SIDEWALKS WITHIN BASIN A-8. THE FUTURE BASIN IS DESIGNATED FU-8A.
5. BASIN A-8A IS A SUB-BASIN WITHIN BASIN A-8 BROKEN OUT TO SIZE THE TYP C INLET IN SUMP AT DP A8A.

POND F2 SUMMARY TABLE				
EVENT	WSE (FT/MSL)	VOL (AC-FT)	MAX REL. (CFS)	
WQCV	6245.34	0.833	0.4	
5YR	6247.97	2.352	0.7	
100-YR	6251.16	4.844	40.16	

*AN EXTENDED DETENTION BASIN
DESIGNED FOR FULL SPECTRUM DETENTION

RUNOFF SUMMARY TABLE				
DIRECT RUNOFF				
DESIGN POINT	BASIN	AREA (AC)	5-Year RUNOFF (CFS)	100-Year RUNOFF (CFS)
A3	A-3	5.03	9.24	23.98
A4	A-4	5.03	12.41	29.10
A5	A-5	1.38	0.18	3.65
A6	A-6	0.89	1.68	4.67
A7.1	A-7.1	3.64	2.91	13.00
A7.2	A-7.2	0.09	0.24	0.57
A8	A-8	4.94	6.93	21.34
A8A	A-8A	0.44	0.14	1.41
FU-8A	FU-8A	2.22	1.72	7.35
O1	OS-1	0.69	0.10	1.91

#	REVISION DESCRIPTION	DATE	BY
0	ISSUED FOR APPROVAL	04/06/22	RR



PHASE III DRAINAGE REPORT

FOR

Canyonside Subdivision
Filing No. 2, Lot 1 and Lot 2
Douglas County,
Castle Pines, Colorado

Prepared for:

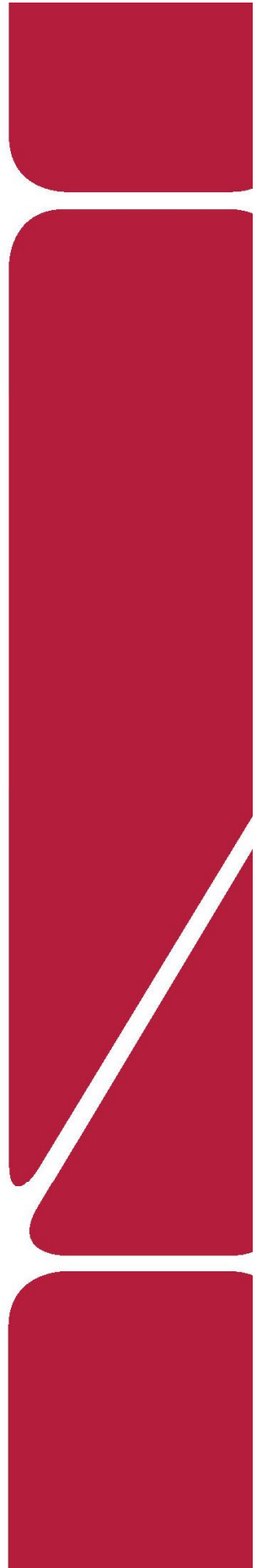
Greystar Development Central, LLC
Contact: Adam Lea

Prepared by:

Kimley-Horn and Associates, Inc.
2 North Nevada Avenue, Suite 900
Colorado Springs, Colorado 80903
Contact: Eric McDaniel, P.E.



Project #: 096433015
Prepared: March 25, 2025
Revised: June 9, 2025



CERTIFICATION

ENGINEER'S CERTIFICATION STATEMENT

I affirm that this report and plan for Canyonside Subdivision, Filing No. 2, Lot 1 and Lot 2 was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Castle Pines Drainage Design and Technical Criteria for the owner thereof. I understand that the city of Castle Pines does not and will not assume liability for drainage facilities designed by others.



SIGNATURE: _____
Eric McDaniel, CO P.E. #58358 Date

DEVELOPER'S CERTIFICATION STATEMENT

Greystar Development Central, LLC hereby certifies that the drainage facilities for Canyonside Subdivision, Filing No. 2, Lot 1 and Lot 2 shall be constructed according to the design presented in this report. I understand that Douglas County does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and Douglas County reviews drainage plans pursuant to Colorado Revised Statutes, Title 30, Article 28; but cannot, on behalf of Greystar Development Central, LLC, guarantee that final drainage design review will absolve Greystar Development Central, LLC and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

Greystar Development Central, LLC

Name of Developer

A handwritten signature in black ink, appearing to read "Chris [unclear]", written over a horizontal line.

6/10/2025

Authorized Signature

Date

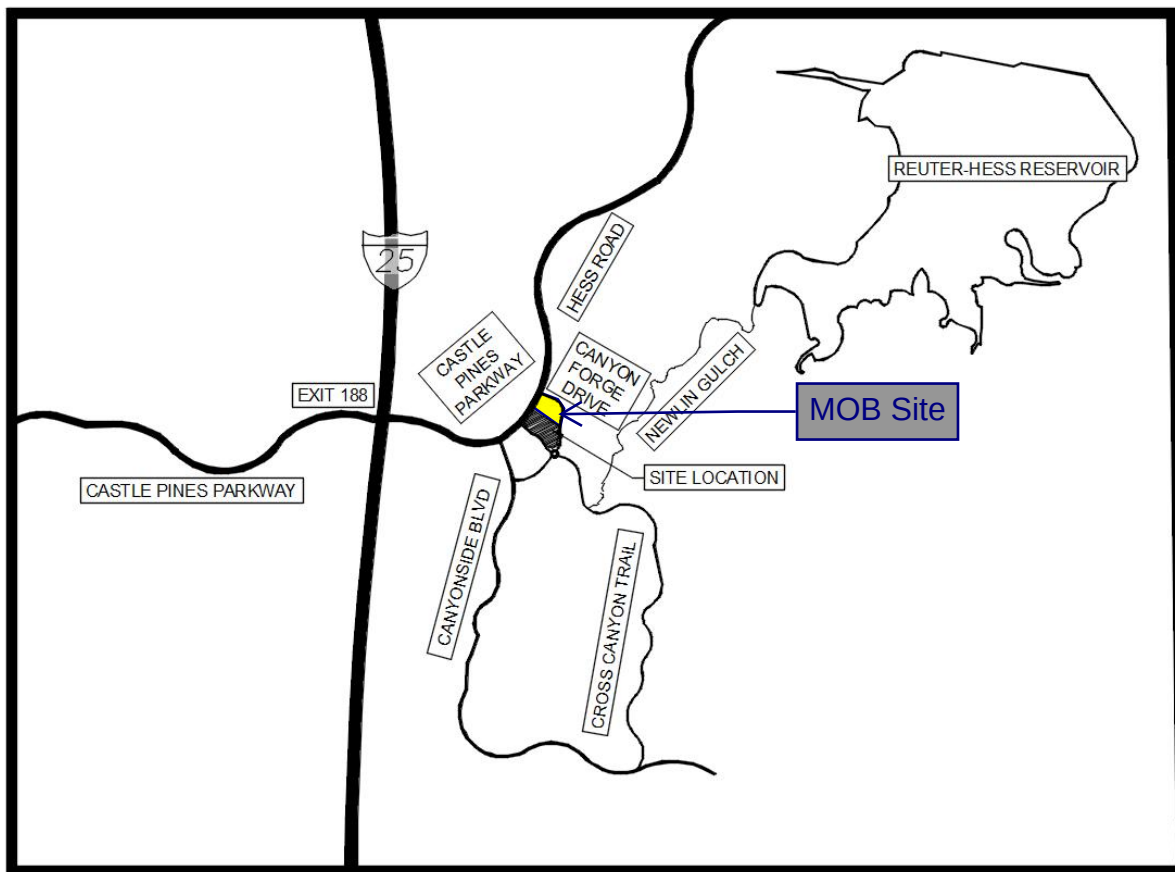
GENERAL LOCATION AND DESCRIPTION

SITE LOCATION

The purpose of this report is to outline the Phase III Drainage Report for a 164 unit multifamily apartment building for the 55+ community (the "Project") located in Lot 1 and Lot 2 of the Canyonside Subdivision, Filing No. 2 (the "Site"), City of Castle Pines (the "City"), Douglas County (the "County"), Colorado. The Project is located in the northwest 1/4 and southwest 1/4 of Section 2, Township 7 South, Range 67 West of the 6th PM.

The adjacent zoning land uses and roadways to the Project are listed below:

- North of Site: The Canyons Planned Development (PA3)
- West of Site: Castle Pines Parkway
- East of Site: Canyon Forge Drive
- South of Site: Cross Canyon Trail



VICINITY MAP

NOT TO SCALE



DRAINAGE DESIGN CRITERIA

REGULATIONS

The proposed storm facilities and drainage design follow the Douglas County Storm Drainage Design and Technical Criteria Manual (the "CRITERIA") and the Mile High Flood Control District Manual (the "MANUAL"). Site drainage is not significantly impacted by such constraints as utilities or existing development. Further detail regarding onsite drainage patterns is provided in the Stormwater Conveyance Facilities Section.

DRAINAGE STUDIES

The Master Study and Master Drainage Report provide updated calculations for the downstream detention pond F2 and E1 and the tributary areas to these pond. The proposed drainage facilities for the Site are designed to follow the historic flow patterns of the Site as well as the intent of the original storm water design for the overall development. This Phase III Drainage Report is in general compliance with the Master Study and Master Drainage Report.

The Master Study calculated weighted percent impervious for the majority of the Site based on high-density mixed-use percent impervious values to account for future development of the Site. The Master Study weighted percent impervious for the tributary area (consisting mostly of Sub-basins A-3) to the extended basin F2 was 85.0%. The proposed project has a weighted imperviousness of 64.5% which is less than the calculated weighted imperviousness of the Master Study.

The Master Study proposed runoff coefficients for the tributary area (consisting mostly of Sub-basins A-3) to the extended detention basin F2 are 0.73 and 0.83 for the 5-year and 100-year, respectively. The proposed project runoff coefficients are 0.56 and 0.74 for the 5-year and 100-year respectively. This shows compliance with the Master Study.

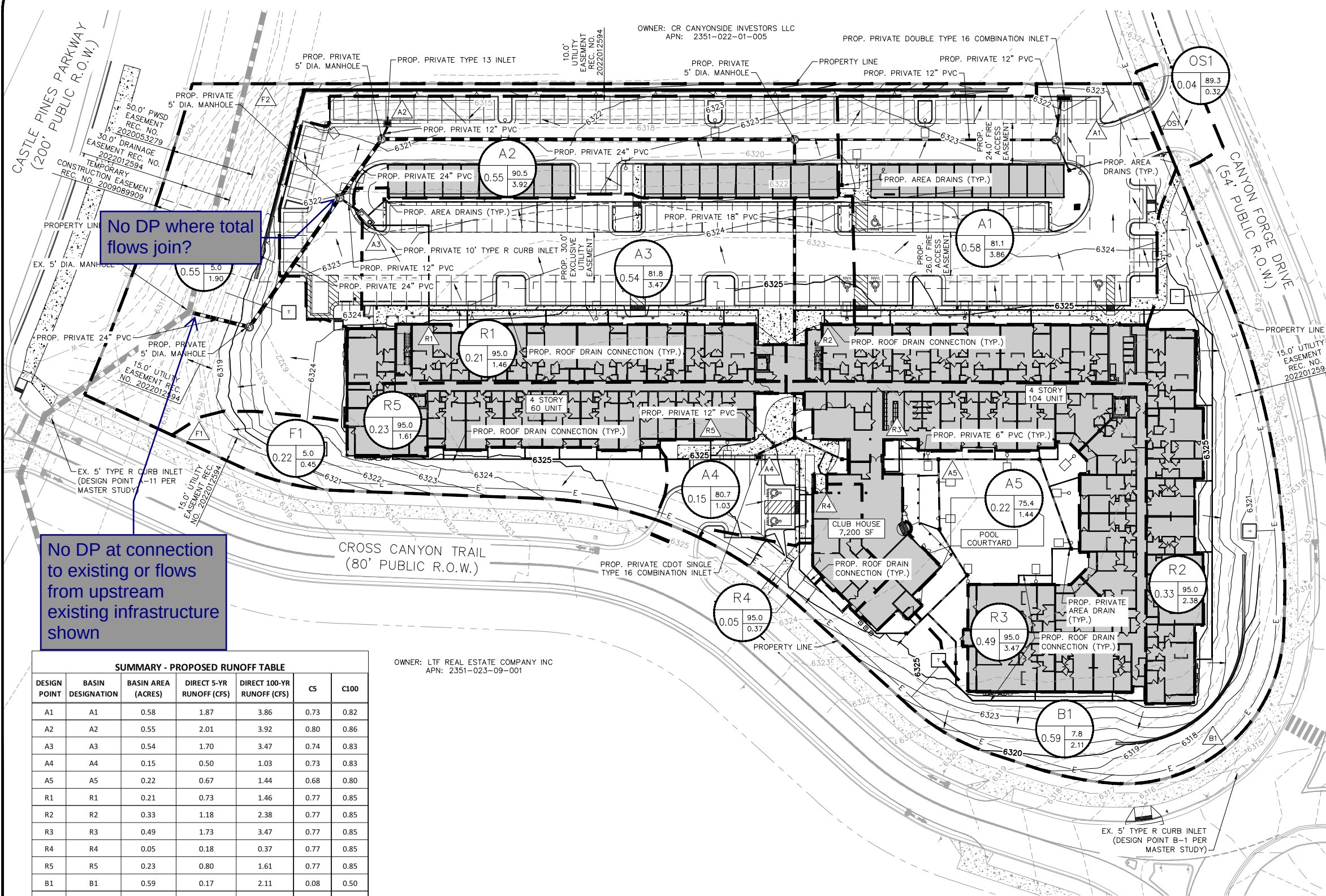
Applicable portions of the Master Study and Master Drainage Report are included in the Appendix E for reference.

HYDROLOGIC CRITERIA

The 5-year and 100-year design storm events were used in determining rainfall and runoff for the proposed drainage system per Chapter 6 of the CRITERIA. Table 6-1 of the CRITERIA is the source for rainfall data for the 5-year and 100-year design storm events. Design runoff was calculated using the Rational Method for developed conditions as established in the CRITERIA and MANUAL. Runoff coefficients for the proposed development were determined using Table 6-4 of the MANUAL by calculating weighted impervious values for each specific site basin. The 100-year detention and water quality capture volume are provided in the downstream detention basins F2 and E1. Based upon this approach, we feel that the drainage design provided for the Site is conservative and in keeping with the zoning and historic drainage concept for the area.

HYDRAULIC CRITERIA

The proposed drainage facilities will be designed in accordance with the CRITERIA and MANUAL. Hydraulic calculations were computed using StormCAD and the Standard Step method and summarized in Appendix C. On-site runoff is routed to the existing detention basins



No DP where total flows join?

No DP at connection to existing or flows from upstream existing infrastructure shown

SUMMARY - PROPOSED RUNOFF TABLE						
DESIGN POINT	BASIN DESIGNATION	BASIN AREA (ACRES)	DIRECT 5-YR RUNOFF (CFS)	DIRECT 100-YR RUNOFF (CFS)	C5	C100
A1	A1	0.58	1.87	3.86	0.73	0.82
A2	A2	0.55	2.01	3.92	0.80	0.86
A3	A3	0.54	1.70	3.47	0.74	0.83
A4	A4	0.15	0.50	1.03	0.73	0.83
A5	A5	0.22	0.67	1.44	0.68	0.80
R1	R1	0.21	0.73	1.46	0.77	0.85
R2	R2	0.33	1.18	2.38	0.77	0.85
R3	R3	0.49	1.73	3.47	0.77	0.85
R4	R4	0.05	0.18	0.37	0.77	0.85
R5	R5	0.23	0.80	1.61	0.77	0.85
B1	B1	0.59	0.17	2.11	0.08	0.50
F1	F1	0.22	0.03	0.45	0.05	0.49
F2	F2	0.55	0.11	1.90	0.05	0.49
OS1	OS1	0.04	0.17	0.32	0.81	0.86
Total		4.74	11.85	27.79	0.56	0.74

OWNER: LTF REAL ESTATE COMPANY INC
APN: 2351-023-09-001

LEGEND

A

B

C

D

#

EX4

→

FLOW DIRECTION

—

PROPERTY BOUNDARY

- - -

EASEMENT

EXISTING STORM SEWER

DRAINAGE BASIN BOUNDARY

XXXX

PROPOSED MAJOR CONTOUR

XXXX

PROPOSED MINOR CONTOUR

XXXX

EXISTING MAJOR CONTOUR

XXXX

EXISTING MINOR CONTOUR

PROPOSED STORM SEWER

PROPOSED CONCRETE PAN

□

PROPOSED STORM INLET

A = BASIN DESIGNATION

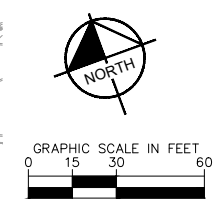
B = AREA (ACRES)

C = BASIN IMPERVIOUSNESS

D = 100YR DESIGN STORM RUNOFF (CFS)

FEMA FLOODPLAIN STATEMENT

THE SUBJECT PROPERTY IS SITUATED IN FLOOD ZONE "X" ACCORDING TO FLOOD INSURANCE RATE MAP (FIRM) COMMUNITY PANEL NO. 08035C0180G WITH AN EFFECTIVE DATE OF SEPTEMBER 4, 2020.



CANYONSIDE SUBDIVISION,
FILING NO. 2, LOT 1 AND LOT 2
PROPOSED DRAINAGE MAP

Kimley»Horn

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PHONE: 719-453-0180