

# **DRAINAGE REPORT**

**FOR**

## **CENTURA PARKER NHC**

June 20, 2023

Prepared For:

**CENTURA HEALTH**  
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**ENGINEER'S STATEMENT**

This report for the final design of Centura Parker NHC was prepared by me or under my direct supervision in accordance with the provisions of the Town of Parker Storm Drainage and Environmental Criteria Manual. I understand that the Town of Parker and its designated town authority do not and will not assume liability for drainage facilities designed by others.

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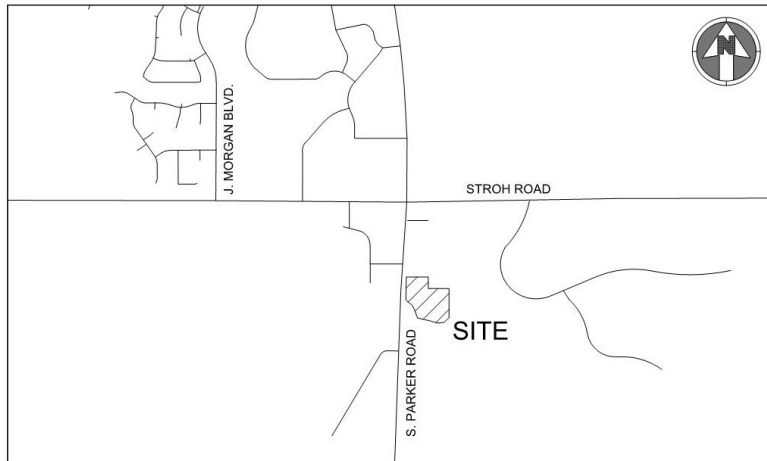
Jason D. Carr, P.E.  
State of Colorado  
No. 33854

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

### **A. Location**



Vicinity Map

The proposed Centura Parker NHC (Project) is located southeast of the intersection of Stroh Road and S. Parker Road. More specifically, the Project is located on Filing No. 1, Lots 6-14 Parker Pointe Subdivision. The parcel is in the northeast 1/4 of Section 3, Township 3 South, Range 66 West of the Sixth Principal Meridian in the Town of Parker, Douglas County, and State of Colorado.

Locally, the project is located in a moderately developed area. Parker Road and retail development is located to the west while open space and large lot single family development is located to the east. Kinney Creek and open space/undeveloped areas. Located to the south of the Site.

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

The subject property is regionally located southeast of the intersection of Parker Road and Stroh Road in Parker, Colorado and has a total area of 4.08 acres. The property is currently undeveloped, covered with natural grasses and weeds.

Based on recent site survey and site observations, the general topography of the Property and immediate surrounding area ranges from gently sloping to moderately hilly terrain. Outlying areas exist in a similar state with localized areas very hilly. Elevations on the property range from approximately 5977 to 5965 feet. The property naturally slopes to the south and southwest towards Kinney Creek.

According to the Natural Resource Conservation Service (NRCS) Mapping on site soils are predominantly Bresser-Trucon Sandy Loam (BtE) and Loamy Alluvial Land (Lu). These soils are categorized as Hydrologic Soil Group B.

### **C. PROPOSED DEVELOPMENT**

The Project includes the construction of 2 story neighborhood health center, surface parking lot, walking trails, utilities, drainage infrastructure, and associated landscaping and hardscape improvements. The facility will provide primary care, radiology, laboratory space, pharmacy, and general support spaces.

## D. FLOODPLAIN

The Flood Insurance Rate Map Number 08035C0182G, dated October 2020, the project site is located within FEMA Unshaded Zone X except the south portion of the property which is within Zone A. Zone A is defined as no base flood elevations determined. The base flood is defined as the flood that has a 1% chance of being equaled or exceeded in any given year (100-year), while unshaded Zone X is defined as areas determined to be outside of the 0.2% annual chance (500-year) floodplain.

A LOMR is currently being processed by others to adjust the current mapping and bring the property completely out of the 100-year floodplain.

## II. DRAINAGE BASINS AND SUB-BASINS

### A. Major Basin Description

According to the "Final Drainage Report prepared by Perception design Group, inc. dated November 28, 2018, (Master Report), The site falls within two major drainage basins. The southerly portion of the site is tributary to Kinney Creek while areas north of the site's existing high point ridge are tributary to Stroh Gulch. The southerly line of basin H1 defines the historic break between the two basins. Per the Town of Parker, most of this historic runoff to Stroh Gulch is captured and conveyed via storm sewer to the new regional detention pond located immediately east of the property and ultimately released to Kinney Creek. A final drainage report was prepared for Stroh Crossing Filing No. 1 by Calibre Engineering. This is the development on the north side of Stroh Road. This report anticipated runoff from the Parker Pointe property and made allowance to handle the flow. Basin ST-2b from the Calibre report quantifies 18.9 cfs for the basin. Basin SR2 in this report indicates 4.1 cfs tributary to Stroh Road downstream of the newly placed inlet on Stroh Road for Basin SR1plus carryover from Inlet SR1 of 3.2 cfs for a total tributary to Stroh Gulch of 7.3 cfs.

Kinney Creek was studied by WRC Engineering Inc. in a report entitled "Flood Hazard Area Delineation for Kinney Creek Fonder Draw and Tributaries" dated April 2004. A floodplain was delineated along the southwest corner of the site. Minor grading is proposed in the floodplain along Parker Road. Roadway widening encroaches upon and places fill in the floodplain. To mitigate this the shoulder, borrow ditch is shifted east in similar size to replace filled floodplain with like volume and shape.

### B. Sub-Basin Description

To facilitate design, the site is divided into multiple sub-basins described as follows and are delineated on the final drainage map.

Basins A1, A2 and A3 are used to represent developed on-site basins that will drain to the regional pond. Basins O1 and O2 are on-site basins comprised mostly of landscape and open space that drain directly off site, bypassing the regional detention pond, flowing south directly to Kinney Creek. runoff from O2 goes west initially, then south to the Creek in the swale adjacent to Parker Road. Stormwater runoff from the proposed development will generally be captured by roof drains or overland flow to curb inlets and area inlets. Captured flows will be conveyed east to an existing storm sewer network which drains runoff to the regional pond.

### **III. DRAINAGE DESIGN CRITERIA**

#### **A. REGULATIONS**

1. Town of Parker Storm Drainage and Environmental Drainage Criteria Manual (CRITERIA).
2. Urban Drainage and Flood Control District Drainage Criteria Manual, latest revision (MANUAL)

#### **B. Development Criteria Reference and Constrains**

The MASTER drainage report has been defined as the development criteria for the proposed site improvements.

#### **C. Hydrologic Criteria**

The proposed drainage system is designed in accordance with the CRITERIA and the MANUAL. Per the CRITERIA, the minor and major storms were considered to have a 5-year and 100-year recurrence interval, respectively. The Rational Method was used to quantify rainfall and peak runoff values for the project site. The one-hour point rainfall depths were determined from the CRITERIA and are summarized in the table below:

**Table 1 - One-Hour Point Rainfall Depths**

Return Period	One-Hour Point Rainfall (inches)
Minor (5-Year)	1.39
Major (100-Year)	2.60

Developed flow rates were calculated using composite imperviousness coefficients from the MANUAL. Refer to Appendix B for detailed calculations and design aids.

#### **D. Hydraulic Criteria**

Final storm sewer sizes and water surface profiles were analyzed using the Bentley Storm CAD hydraulic modeling software. Per the CRITERIA, the minor and major storms were considered to have a 5-year and 100-year return period, respectively.

All proposed inlets are designed in accordance with the CRITERIA and the MANUAL. Proposed sump inlets will accommodate flows analyzed under the 100-year storm event. Supporting hydraulic calculations are provided in Appendix C.

#### **E. WAIVER/VARIANCE FROM CRITERIA**

There are no variances requested for this site.

### **IV. DRAINAGE FACILITY DESIGN**

#### **A. General Concept**

Proposed drainage patterns across the project site generally remain consistent with conveyance patterns described in the MASTER report. Typically, developed on-site runoff will sheet flow to the east and will be captured by sump inlets. The landscape areas to the east of the proposed building will overland flow and captured by sump area inlets. Roof drains will collect rainwater and internally route flows to a roof drain connection. Captured flows will be conveyed via storm sewer to the east of

the project site to the regional facility. A proposed drainage plan is provided in Appendix D. The proposed storm sewer system will adequately convey fully developed runoff for the 5-year and 100-year design storms. Basins along the perimeter of the project site are landscape and open space and runoff will drain directly into Kinney Creek and then to the west crossing parker road via existing box culvert.

**B. Specific Details**

The project site is comprised of three on-site sub-basins, and two off-site sub-basins consisting of approximately 4.08 acres with a composite impervious value of approximately 45%. A proposed drainage plan is provided in Appendix D for reference. The sub-basins associated with the proposed development are described as follows.

**Basin A:**

Basin A is approximately a total of 2.10 acres and consists of the proposed NHC building, the majority of the parking lot, drives, and associated landscaping. The areas within Basin A typically slope from west to east and are routed via overland flow, swales, curb and gutter, and proposed drainage infrastructure to area inlets, grated manholes, and curb inlets. The developed runoff for the basin produces undetained flows of Q5=6.12 cfs and Q100=12.68 cfs. Stormwater within this basin will be routed to the proposed inlet within Sub-basin A3 before connecting to existing City stormwater infrastructure east of the site that ultimately outfalls to stormwater detention and water quality pond.

RUNOFF SUMMARY									
BASIN	DESIGN POINT	AREA (ACRES)	% IMP.	C <sub>5</sub>	C <sub>100</sub>	DIRECT RUNOFF 5YR (CFS)	TOTAL RUNOFF 5YR (CFS)	DIRECT RUNOFF 100YR (CFS)	TOTAL RUNOFF 100YR (CFS)
A1	A1	0.37	90%	0.77	0.84	1.34	1.34	2.73	2.73
A2	A2	0.24	94%	0.80	0.86	0.84	0.84	1.68	1.68
A3	A3	1.49	85%	0.73	0.82	3.94	4.78	8.27	9.95

**Off-site Sub-Basins:**

Basins O1 and O2 are approximately a total of 1.98 acres that lie along the south and west perimeter of the site and consist almost entirely of landscaping. The areas within the O Basins are constrained by existing site grades that require the flows to drain off-site without being captured by proposed stormwater infrastructure. The proposed drainage patterns mimic existing site conditions in that the area is entirely landscaped cover, is conveyed via overland flow, and discharges west of the site where existing stormwater infrastructure ultimately routes flows to South Parker Road. The developed runoff for the basin produces undetained flows of Q5=0.38 cfs and Q100=6.08 cfs.

RUNOFF SUMMARY							
BASIN	DESIGN POINT	AREA (ACRES)	% IMP.	C <sub>5</sub>	C <sub>100</sub>	Q <sub>5</sub> (CFS)	Q <sub>100</sub> (CFS)
O1	O1	1.31	2%	0.05	0.49	0.19	3.45
O2	O2	0.67	4%	0.07	0.50	0.19	2.63

### **C. DETENTION AND WATER QUALITY**

According to the MASTER report, water quality and detention for the project site is provided in the regional detention pond located east project site. This extended detention basin has been sized to accommodate tributary flows from the fully developed condition. The proposed use for the property is consistent with those uses anticipated in the master report, therefore, no additional on-site water quality treatment or detention storage is required. According to the MASTER report, this regional drainage facility has been adequately sized to treat and detain all developed flows prior to discharging into Kinney Creek.

### **V. ENVIRONMENTAL PROTECTION CRITERIA**

The project will include disturbance of approximately 3.14 acres. The soils on site belong primarily to NRCS Hydrologic Group B and generally exhibit a moderate hazard of erosion by water. The site consists of native vegetation including native grasses and weeds. The construction plans include detailed Construction BMP Plans to mitigate and prevent erosion and sediment transportation. Final locations of erosion control measures are to be determined by the Contractor and Erosion Control Inspector and updated as necessary during construction. Further, the project will require an application to the State of Colorado, Colorado Dept. of Health for a Construction Activities Stormwater permit, prior to land disturbance.

The erosion control measures are placed on the site to reduce the on-site erosion, prevent sediment from entering the storm sewer system, and to eliminate sediment deposit off-site. Vehicle tracking control pads will be placed at all access locations for the site. Diversion ditches connecting to temporary sediment basins, silt fences will be used around the perimeter of the site. Inlet protection per the Town of Parker standard details will be constructed around all inlets shown on plans. Erosion control matting will be used on all slopes steeper than 4:1. All disturbed areas not being covered by asphalt, concrete, or landscaping will be seeded with an approved seeding mixture as soon as practical after final grading occurs or for any areas of disturbed land that will be exposed for longer than 30 days. All erosion control measures shall be inspected weekly at a minimum and maintained and repaired by the Contractor during construction as needed. The Contractor shall also inspect and repair all erosion control measures as needed following each heavy precipitation or snowmelt.

### **VI. SUMMARY**

#### **A. COMPLIANCE WITH STANDARDS**

This report conforms to the Town of Parker Storm Drainage and Environmental Criteria Manual, the Urban Drainage and Flood Control District Manual, and the associated master drainage report. The proposed drainage system will provide adequate conveyance of developed stormwater runoff to downstream, existing stormwater infrastructure and ultimately the water quality and detention facility without adversely affecting downstream facilities.

#### **B. SUMMARY OF CONCEPT**

The Centura Parker Neighborhood Health Center drainage and stormwater infrastructure improvements will provide stormwater conveyance for the minor and major storm events and will safely and efficiently route flows to the downstream receiving drainageways. Fully developed flows will be conveyed via overland flow and curb and gutter to proposed inlets. The proposed storm sewer system will discharge into the existing storm sewer infrastructure to the east of the project site which remains in conformance with the approved MASTER drainage report.

The hydraulic grade line for the minor year storm will remain within the proposed storm sewer while the hydraulic grade line for the major year storm will remain one foot below finished grade. These measures will effectively control runoff from proposed development and minimize adverse impacts to downstream facilities.

## **VII. REFERENCES**

1. "Geotechnical Engineering Report for Proposed Centura Parker NHC", Ground Engineering, Inc., Dated November 14, 2022.
2. "Final Drainage Report Parker Pointe", Perception design group, inc., Dated November 28, 2018.
3. "Storm Drainage and Environmental Criteria Manual", Town of Parker, Revised and Adopted February 2014.
4. "Urban Storm Drainage Criteria Manual". Latest revision.

**VIII.APPENDIX**

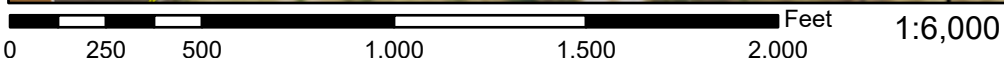
**Appendix A: MAPS & DESIGN AIDS**

**FEMA Firm Maps  
Town of Parker Rainfall Values  
Web Soil Survey**

# National Flood Hazard Layer FIRMMette



104°45'46"W 39°28'42"N



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

## Legend

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

SPECIAL FLOOD HAZARD AREAS		Without Base Flood Elevation (BFE) Zone A, V, A99
		With BFE or Depth Zone AE, AO, AH, VE, AR
		Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD		0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
		Future Conditions 1% Annual Chance Flood Hazard Zone X
		Area with Reduced Flood Risk due to Levee. See Notes. Zone X
		Area with Flood Risk due to Levee Zone D
OTHER AREAS		NO SCREEN Area of Minimal Flood Hazard Zone X
		Effective LOMRs
GENERAL STRUCTURES		Area of Undetermined Flood Hazard Zone D
		Channel, Culvert, or Storm Sewer
		Levee, Dike, or Floodwall
OTHER FEATURES		20.2 Cross Sections with 1% Annual Chance
		17.5 Water Surface Elevation
		Coastal Transect
		Base Flood Elevation Line (BFE)
		Limit of Study
MAP PANELS		Jurisdiction Boundary
		Coastal Transect Baseline
		Profile Baseline
		Hydrographic Feature
		Digital Data Available
		No Digital Data Available
		Unmapped
		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.



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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/8/2023 at 3:10 AM 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.

**NOTES TO USERS**

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

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

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

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

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

NGS Information Services  
NOAA, NIMS 12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, Maryland 20910-3282  
(301) 713-3242

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

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

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

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

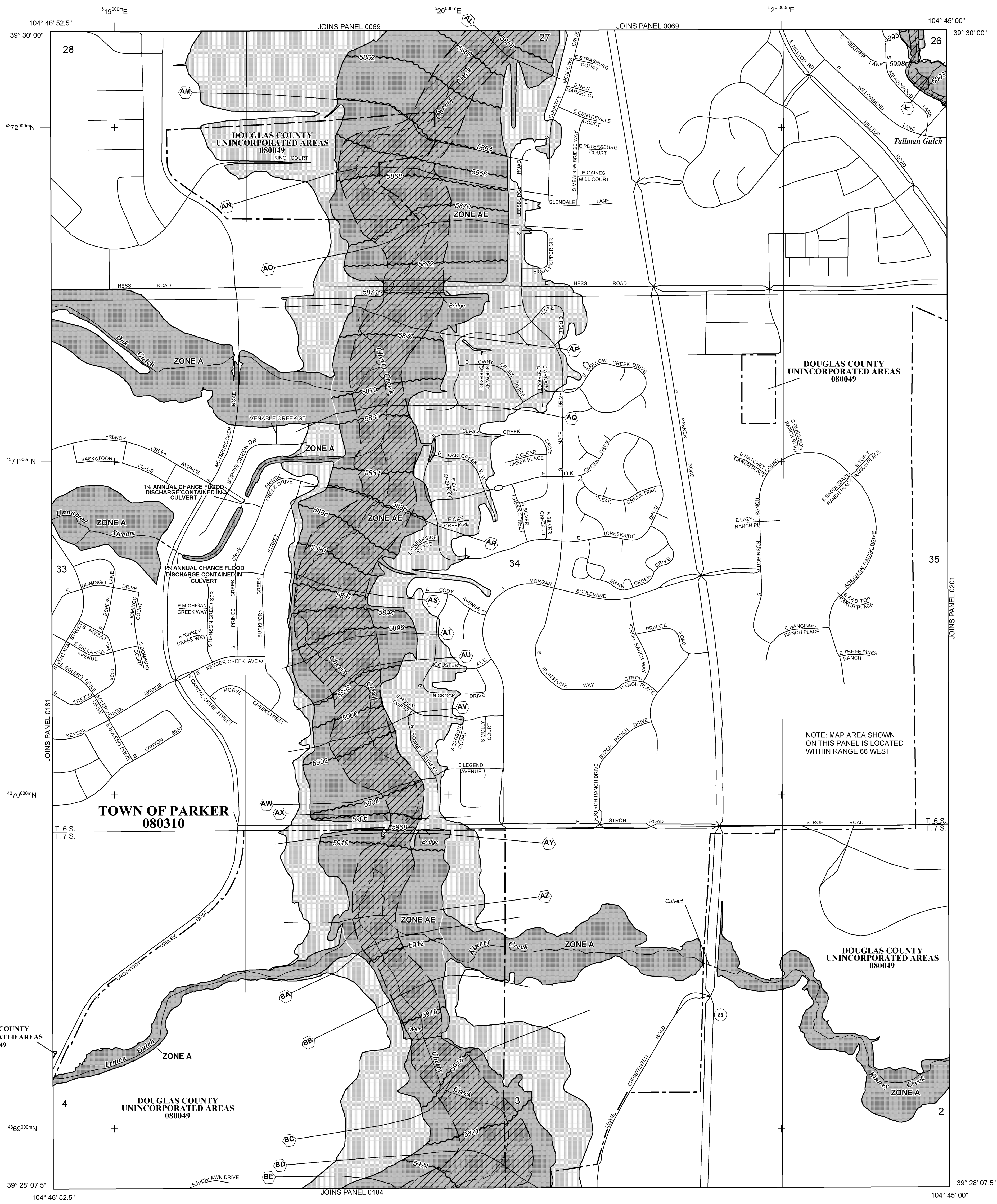
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations** and **floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the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

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

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

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

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



**LEGEND**

**SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**  
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

**ZONE A** No Base Flood Elevations determined.  
**ZONE AE** Base Flood Elevations determined.  
**ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.  
**ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.  
**ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently defeated. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.  
**ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.  
**ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.  
**ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

**FLOODWAY AREAS IN ZONE AE**  
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**  
**ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.  
**OTHER AREAS**  
**ZONE D** Areas determined to be outside the 0.2% annual chance floodplain.  
**ZONE X** Areas in which flood hazards are undetermined, but possible.

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**  
**OTHERWISE PROTECTED AREAS (OPAs)**  
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.  
1% Annual Chance Floodplain Boundary  
0.2% Annual Chance Floodplain Boundary  
Floodway boundary  
Zone D boundary  
CBRS and OPA boundary  
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.  
Base Flood Elevation line and value; elevation in feet\* (EL 987)  
\*Referenced to the North American Vertical Datum of 1988

**MAP REPOSITORIES**  
Refer to Map Repositories list on Map Index  
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP  
SEPTEMBER 30, 2005  
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL  
MARCH 16, 2016: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to update map format, to add roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision.  
For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.  
To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

**Cross section line**  
**Transect line**  
45° 02' 08", 93° 02' 12"  
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere  
1000-meter Universal Transverse Mercator grid values, zone 13  
DX5510 X Bench mark (see explanation in Notes to Users section of this FIRM panel)  
M1.5 River Mile

**MAP SCALE 1" = 500'**  
250 0 500 1000 FEET  
150 0 150 300 METERS

**NATIONAL FLOOD INSURANCE PROGRAM**

**PANEL 0182G**

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

**PANEL 182 OF 495**  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
DOUGLAS COUNTY	080049	0182	G
PARKER, TOWN OF	080310	0182	G

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

**MAP NUMBER**  
**08035C0182G**  
**MAP REVISED**  
**MARCH 16, 2016**

**Federal Emergency Management Agency**

**TABLE 5.1**  
**ONE-HOUR POINT RAINFALL**

Frequency of Design Event (yr)	One-hour Point Rainfall, P <sub>1</sub> (in)
2	0.99
5	1.39
10	1.64
25	1.98
50	2.31
100	2.60

### 5.3 FLOOD HYDROLOGY OVERVIEW

Various methods exist to determine appropriate flood peaks or hydrographs for storm drainage planning and design. Methods for determining flood peaks or hydrographs are the Rational Method, the Colorado Urban Hydrograph Procedure (CUHP), and Urban Drainage Stormwater Management (UDSWM) model. The Town of Parker discourages the use of computer models other than CUHP and UDSWM since these programs are preferred, if not required, by UDFCD for studies involving major drainageways where UDFCD approval is sought or where maintenance eligibility is requested.

The three methods are briefly described in this section, and a discussion of their applicability to the Town of Parker is discussed. UDSWM is mostly used to combine and route the hydrographs generated using CUHP.

In general, the Rational Method is the most widely used and accepted technique for determining peak flows in urban areas for small basins. Within the constraints outlined in the MANUAL, use of the Rational Method provides a relatively simple but effective way to analyze storm runoff.

CUHP is somewhat more complicated than the Rational Method. It allows a manual computation of a runoff hydrograph which may be used for further hydraulic routing through channels and/or detention ponds. Historically, CUHP is best used in urban areas for which runoff coefficients have been derived. However, recent improvements by UDFCD include consideration for different soil types, thus CUHP is now more applicable to rural areas. The reader is referred to UDFCD for the latest version of CUHP.

UDSWM is a computer model that generates runoff hydrographs and routes and combines these hydrographs. UDSWM is a modified version of the Runoff Block of the Environmental Protection Agency's Storm Water Management Model (SWMM). It has been modified to be used in conjunction with CUHP. Table 5.2 herein provides guidance on selecting the appropriate method for a given project.

Soil Map—Castle Rock Area, Colorado



Map Scale: 1:3,840 if printed on A portrait (8.5" x 11") sheet.



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



Natural Resources  
Conservation Service

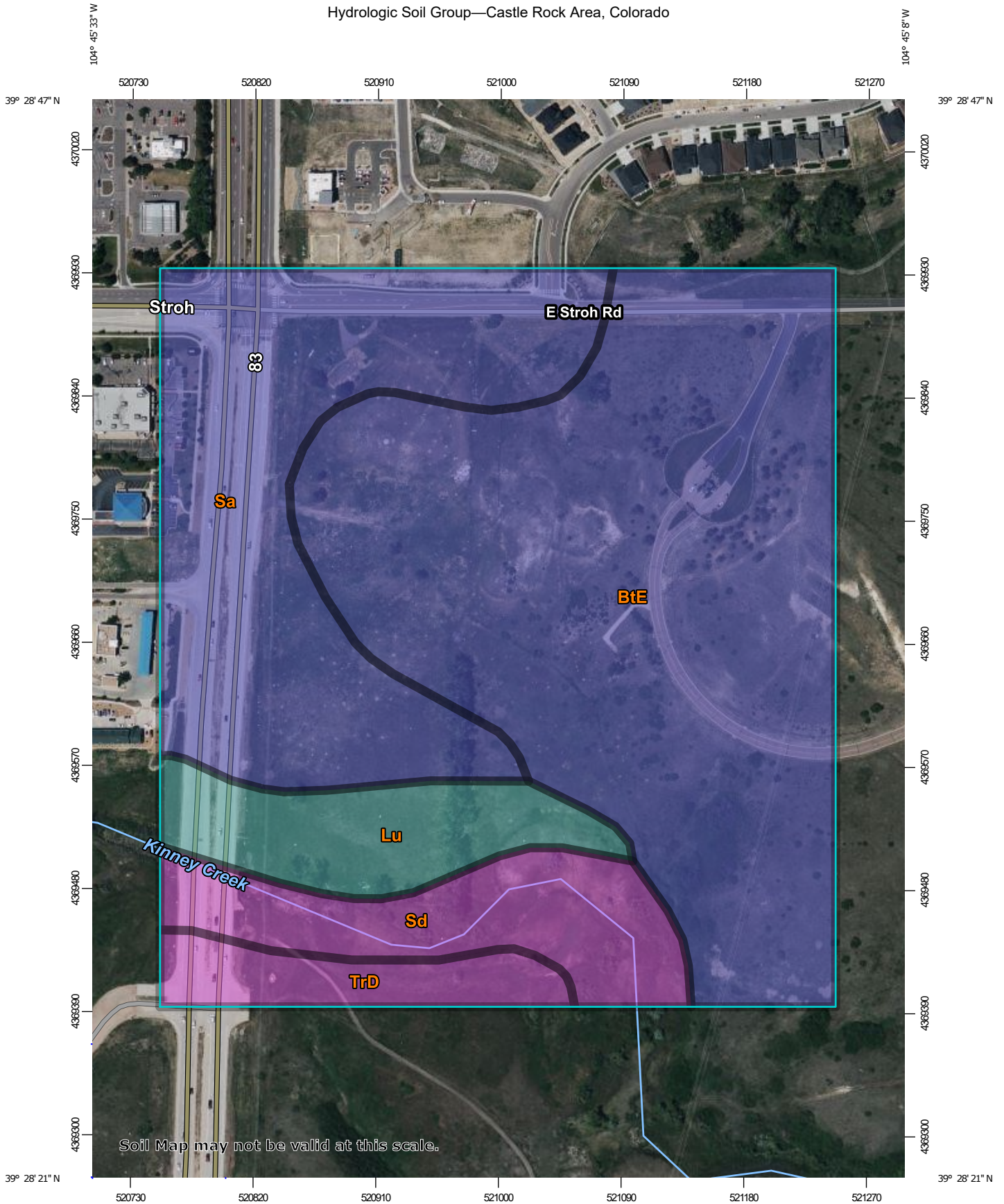
Web Soil Survey  
National Cooperative Soil Survey

5/11/2023  
Page 1 of 3

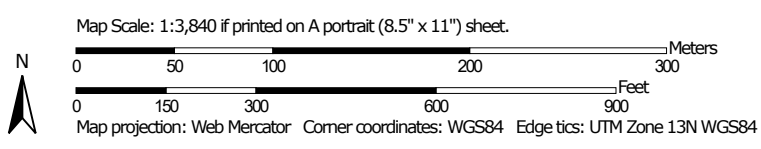
## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BtE	Bresser-Truckton sandy loams, 5 to 25 percent slopes	33.8	50.9%
Lu	Loamy alluvial land, dark surface	5.3	8.0%
Sa	Sampson loam	18.0	27.1%
Sd	Sandy alluvial land	6.3	9.5%
TrD	Truckton sandy loam, 3 to 9 percent slopes	3.0	4.5%
<b>Totals for Area of Interest</b>		<b>66.4</b>	<b>100.0%</b>

Hydrologic Soil Group—Castle Rock Area, Colorado



Soil Map may not be valid at this scale.



## Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BtE	Bresser-Truckton sandy loams, 5 to 25 percent slopes	B	33.8	50.9%
Lu	Loamy alluvial land, dark surface	C	5.3	8.0%
Sa	Sampson loam	B	18.0	27.1%
Sd	Sandy alluvial land	A	6.3	9.5%
TrD	Truckton sandy loam, 3 to 9 percent slopes	A	3.0	4.5%
<b>Totals for Area of Interest</b>			<b>66.4</b>	<b>100.0%</b>

## Description

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

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

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

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

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

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

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

**Appendix B**  
**Hydrologic Calculations**



## Composite C Calculations

### Project Information

**Project Name:** Parker NHC  
**Miro Project No:** 220057  
**Revised Date:** 6/20/2023  
**Calculated By:** ESI

### Jurisdiction Impervious Value

**Pond Area** 100%  
**Landscape Area** 2%  
**Paved Area** 100%  
**Roof Area** 90%

### Coefficient Equations

$C_{CD(2)} = 0.83i^{1.122}$        $C_{CD(10)} = 0.74i + 0.132$   
 $C_{CD(5)} = 0.82i + 0.035$        $C_{CD(100)} = 0.4i + 0.484$

\*NOTE:  $C_{CD}$  Equations from UDFCD Criteria Manual updated March 2017

Basin Designation	$A_{pond}$ (ft <sup>2</sup> )	$A_{landscape}$ (ft <sup>2</sup> )	$A_{paved}$ (ft <sup>2</sup> )	$A_{roof}$ (ft <sup>2</sup> )	$A_{total}$ (acres)	Impervious-ness	$C_{CD}$ 02 yr	$C_{CD}$ 05 yr	$C_{CD}$ 10 yr	$C_{CD}$ 100 yr
A1				15,986	0.37	90%	0.74	0.77	0.80	0.84
A2		654	9,616		0.24	94%	0.77	0.80	0.83	0.86
A3		9,817	55,261		1.49	85%	0.69	0.73	0.76	0.82
O1		57,103			1.31	2%	0.01	0.05	0.15	0.49
O2		28,652	571		0.67	4%	0.02	0.07	0.16	0.50
TOTAL		96,225	65,449	15,986	4.08	46%	0.35	0.41	0.47	0.67



**TIME OF CONCENTRATION**

**Project Information**  
 Project Name: Parker NHC  
 S.A. Project No: 220057  
 Revised Date: 6/20/2023  
 Calculated By: ESI

**Conveyance Coefficient Value**  
 Grassed Waterway 15  
 Heavy Meadow 2.5  
 Nearly Bare Ground 10  
 Paved Areas and Shallow Paved Swales 20  
 Short Pasture and Lawns 7  
 Tillage / Field 5

**Time of Concentration Equations**

$$t_i = 0.395(1.1 - C_c)L^{1/2} / S^{1/3} \quad t_t = (L/v)/60$$

$$t_c \text{ check: } t_c = (26-17i) + (L/(60(14i+19)S^{1/2}))$$

\*NOTE: Cv Values, T<sub>i</sub>, T<sub>t</sub>, & T<sub>c</sub> Equations from UDFCD Criteria Manual updated March 2017

SUB-BASIN DATA			INITIAL/OVERLAND TIME (t <sub>i</sub> )			TRAVEL TIME (t <sub>t</sub> )						t <sub>i</sub> + t <sub>t</sub>	t <sub>c</sub> CHECK (urbanized basins)	FINAL t <sub>c</sub> USED
Basin Designation	Area (acres)	C <sub>CD</sub> 05 yr	length (ft)	slope %	t <sub>i</sub> (min)	length (ft)	slope %	Type of Land Surface	Conveyance Coefficient Cv	velocity (ft/sec)	t <sub>t</sub> (min)	t <sub>c</sub> (min)	Total Length (ft)	t <sub>c</sub> (min)
A1	0.37	0.77	64	0.88%	5.00	0	0.00%	Paved areas and shallow paved swales	20	0.00	0.00	5.00	64	5.00
A2	0.24	0.80	90	1.50%	4.50	231	1.30%	Paved areas and shallow paved swales	20	2.28	1.69	6.19	321	6.19
A3	1.49	0.73	270	1.50%	9.64	208	1.20%	Paved areas and shallow paved swales	20	2.19	1.58	11.22	478	11.22
O1	1.31	0.05	65	0.70%	17.48	99	1.00%	Paved areas and shallow paved swales	20	2.00	0.83	18.31	165	18.31
O2	0.67	0.07	60	7.9%	7.37	0	0.00%	Paved areas and shallow paved swales	20	0.00	0.00	7.37	60	7.37



## Runoff Calculations (Rational Method)

### Project Information

**Project Name:** Parker NHC  
**S.A. Project No:** 220057  
**Revised Date:** 6/20/2023  
**Calculated By:** ESI

### Intensity Equation

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

\*NOTE: P & Intensity Equation from UDFCD Criteria Manual

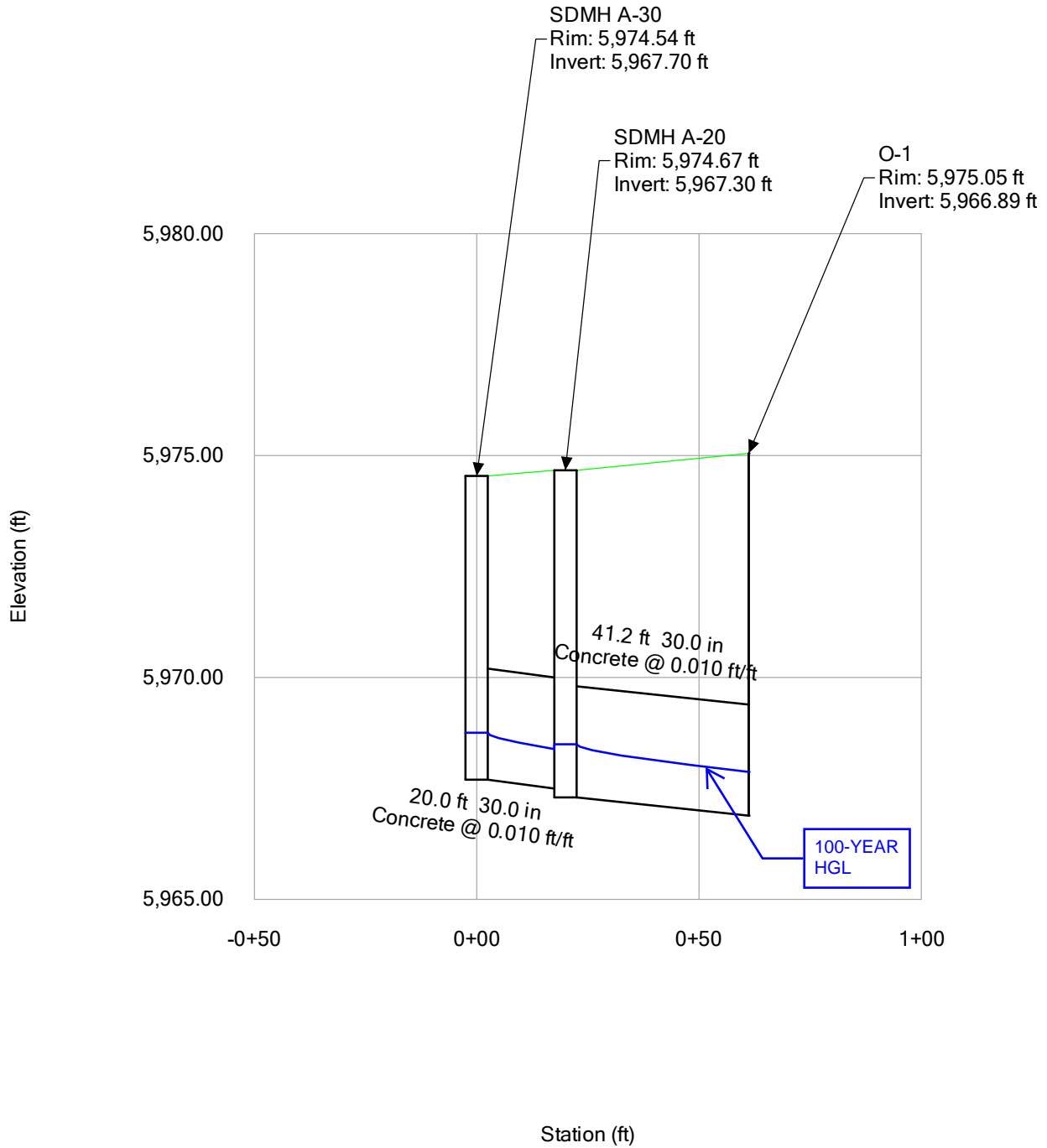
Basin Designation	Area (ac.)	'c'	cA	t <sub>c</sub> (min)	P <sub>1</sub>	intensity (in/hr)	Q (cfs)
A1	0.37	0.74	0.27	5.00	0.99	3.36	0.91 02 YR
		0.77	0.28		1.39	4.71	1.34 05 YR
		0.80	0.29		1.64	5.56	1.63 10 YR
		0.84	0.31		2.60	8.82	2.73 100 YR
A2	0.24	0.77	0.18	6.19	0.99	3.16	0.58 02 YR
		0.80	0.19		1.39	4.44	0.84 05 YR
		0.83	0.19		1.64	5.24	1.02 10 YR
		0.86	0.20		2.60	8.31	1.68 100 YR
A3	1.49	0.69	1.04	11.22	0.99	2.56	2.65 02 YR
		0.73	1.10		1.39	3.59	3.94 05 YR
		0.76	1.14		1.64	4.24	4.83 10 YR
		0.82	1.23		2.60	6.71	8.27 100 YR
O1	1.31	0.01	0.01	18.31	0.99	2.04	0.03 02 YR
		0.05	0.07		1.39	2.86	0.19 05 YR
		0.15	0.19		1.64	3.38	0.65 10 YR
		0.49	0.64		2.60	5.35	3.45 100 YR
O2	0.67	0.02	0.01	7.37	0.99	2.99	0.04 02 YR
		0.07	0.05		1.39	4.20	0.19 05 YR
		0.16	0.11		1.64	4.96	0.54 10 YR
		0.50	0.34		2.60	7.86	2.63 100 YR

**Appendix C**  
**Hydraulic Calculations**

**StormCAD Results**  
**Inlet Capacity**

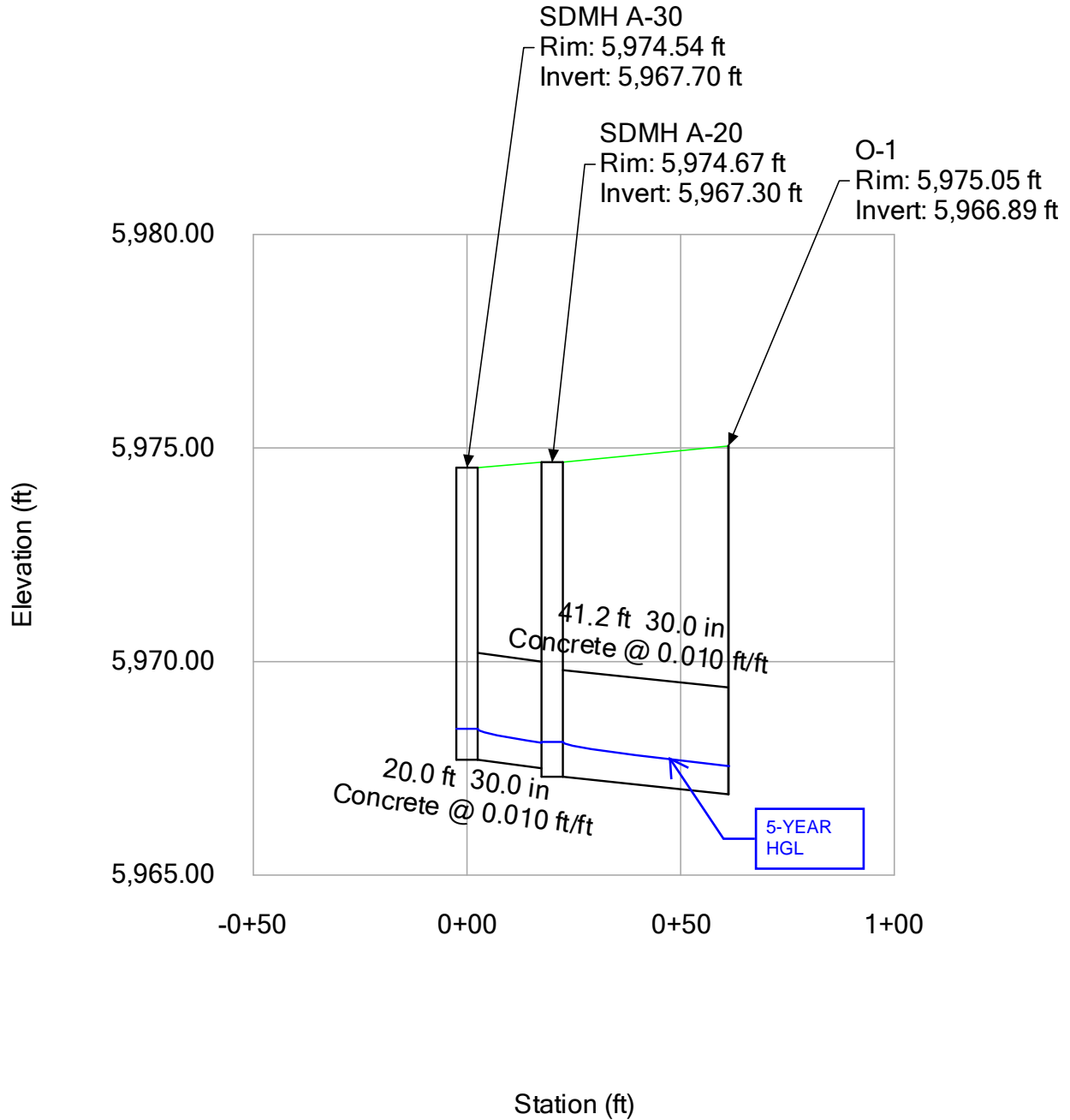
# Profile Report

## Engineering Profile - **STORM LINE A (100-YEAR)**



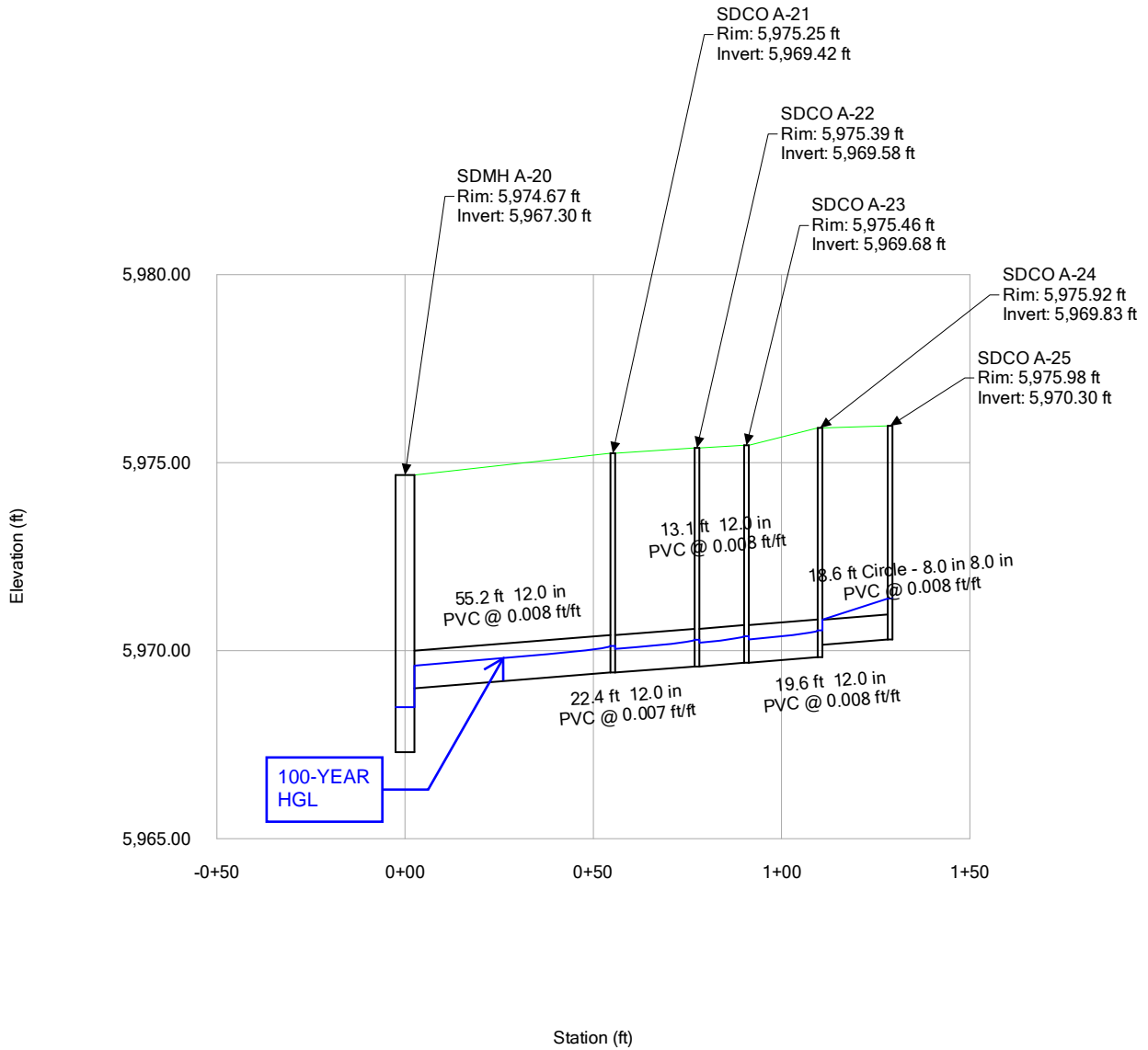
# Profile Report

## Engineering Profile - STORM LINE A (5-YEAR)



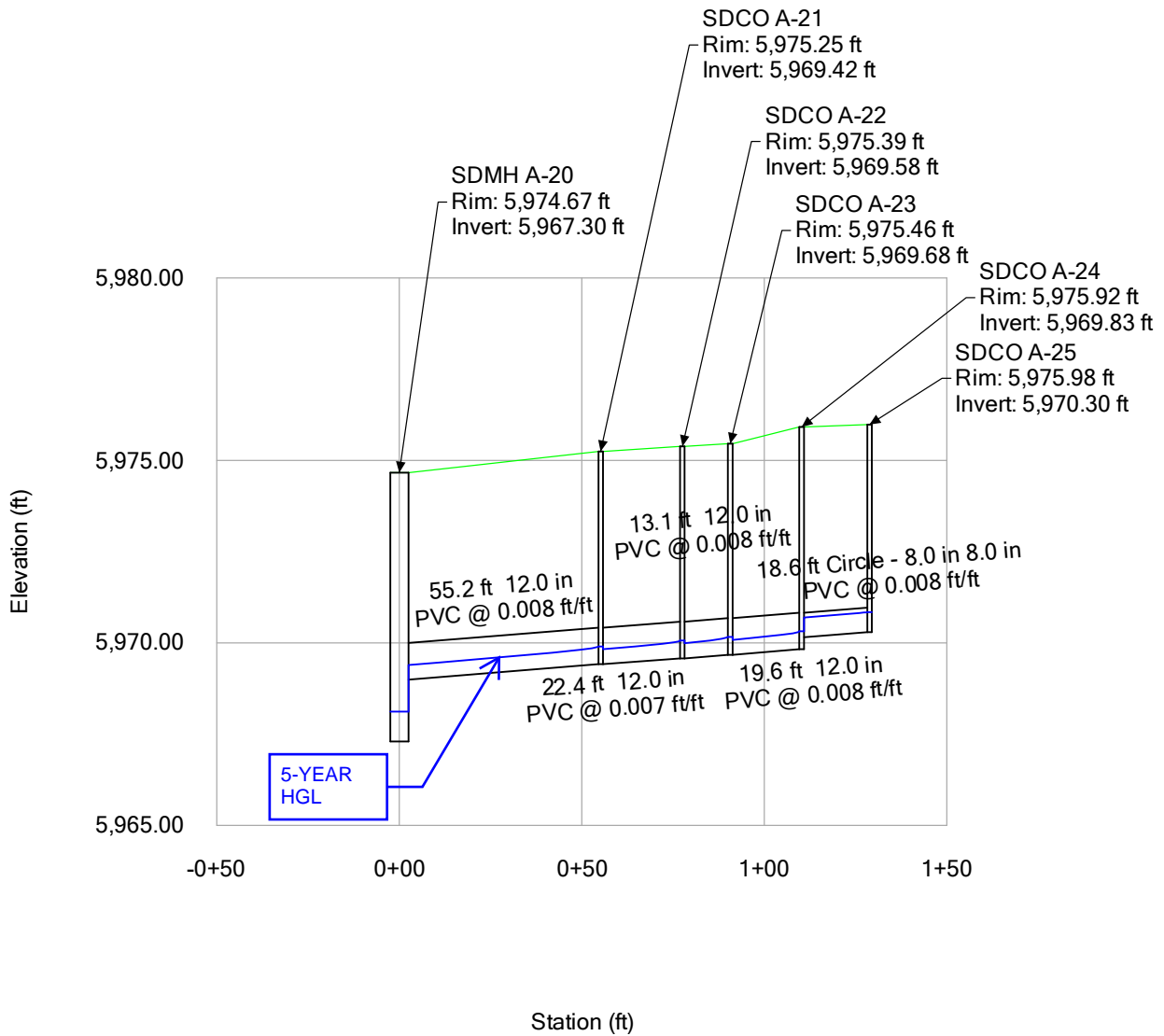
# Profile Report

## Engineering Profile - STORM LINE A-20 (100-YEAR)

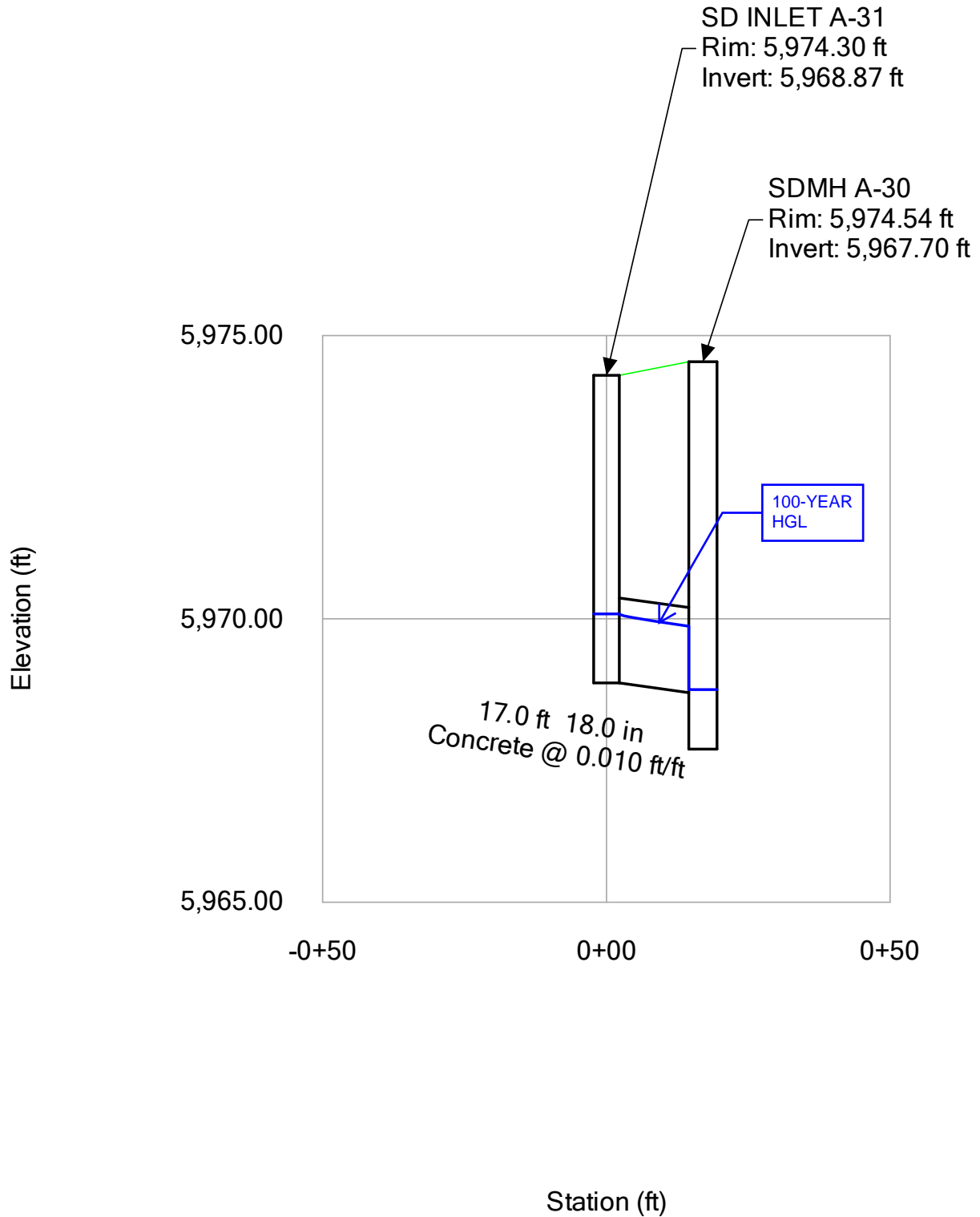


# Profile Report

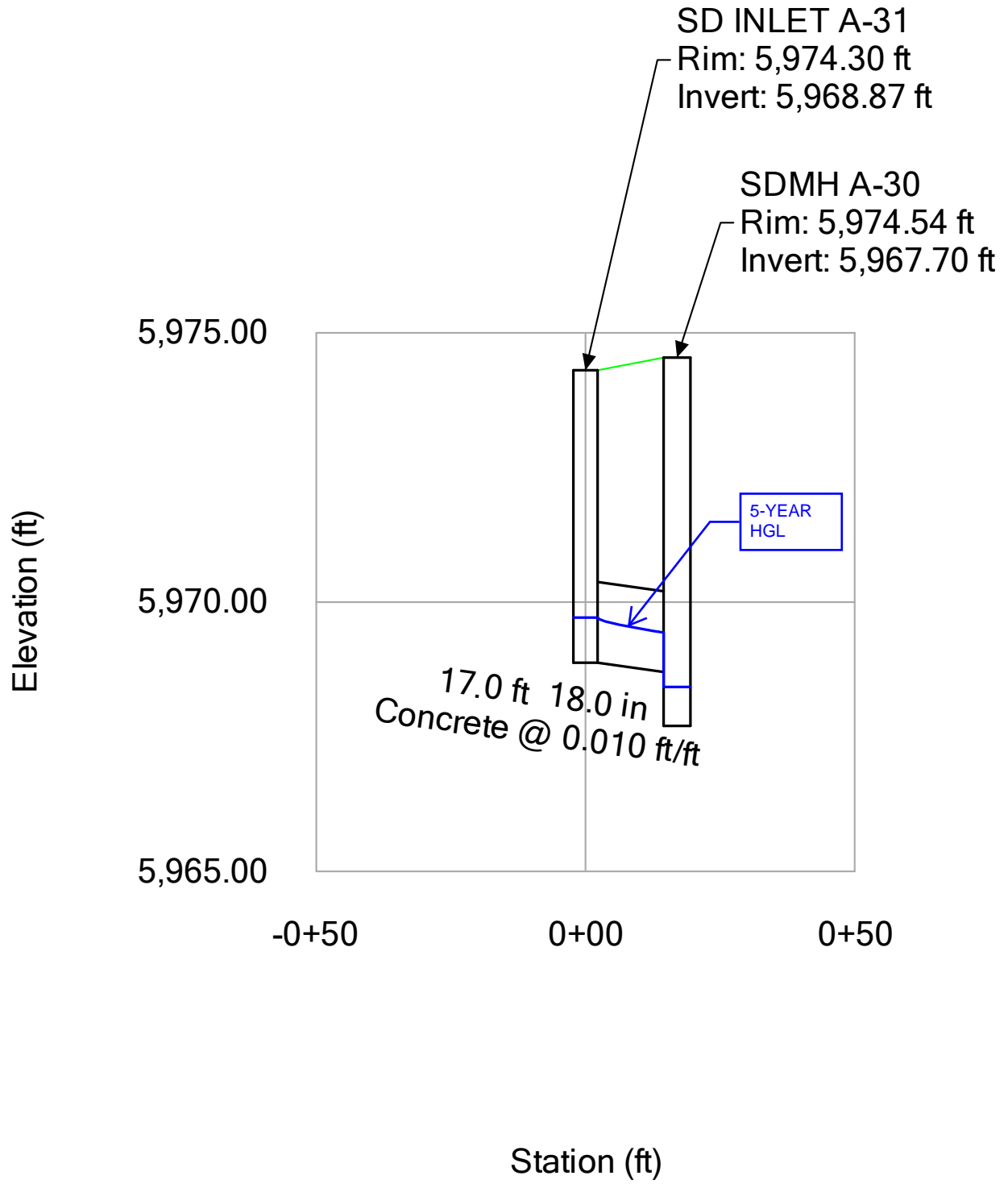
## Engineering Profile - STORM LINE A-20 (5-YEAR)



**Profile Report**  
**Engineering Profile - STORM LINE A-30 (100-YEAR)**



**Profile Report**  
**Engineering Profile - STORM LINE A-30 (5-YEAR)**



Scenario 100-Year  
 FlexTable Conduit

Start Node	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Material
SDMH A-20	O-1	5966.89	41.2	0.01	30	12.68	7.35	40.9	Concrete
SDCO A-25	SDCO A-24	5970.16	18.6	0.008	8	2.73	7.82	1.36	PVC
SDCO A-24	SDCO A-23	5969.68	19.6	0.008	12	2.73	5.54	4.05	PVC
SDCO A-22A	SDCO A-22	5970.25	23.1	0.01	4	0	0	0.25	PVC
SDCO A-23	SDCO A-22	5969.58	13.1	0.008	12	2.73	5.53	4.04	PVC
SDCO A-22	SDCO A-21	5969.42	22.4	0.007	12	2.73	5.39	3.92	PVC
SDCO A-21	SDMH A-20	5969	55.2	0.008	12	2.73	5.52	4.04	PVC
SD INLET A-31	SDMH A-30	5968.7	17	0.01	18	9.95	6.76	10.5	Concrete
SDMH A-30	SDMH A-20	5967.5	20	0.01	30	9.95	6.89	41.07	Concrete

Scenario 5-Year  
 FlexTable Conduit

Start Node	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Flow (cfs)	Velocity (ft/s)	Capacity (Full Flow) (cfs)	Material
SDMH A-20	O-1	5966.89	41.2	0.01	30	6.12	5.99	40.9	Concrete
SDCO A-25	SDCO A-24	5970.16	18.6	0.008	8	1.34	4.45	1.36	PVC
SDCO A-24	SDCO A-23	5969.68	19.6	0.008	12	1.34	4.63	4.05	PVC
SDCO A-22A	SDCO A-22	5970.25	23.1	0.01	4	0	0	0.25	PVC
SDCO A-23	SDCO A-22	5969.58	13.1	0.008	12	1.34	4.62	4.04	PVC
SDCO A-22	SDCO A-21	5969.42	22.4	0.007	12	1.34	4.52	3.92	PVC
SDCO A-21	SDMH A-20	5969	55.2	0.008	12	1.34	4.62	4.04	PVC
SD INLET A-31	SDMH A-30	5968.7	17	0.01	18	4.78	5.8	10.5	Concrete
SDMH A-30	SDMH A-20	5967.5	20	0.01	30	4.78	5.59	41.07	Concrete

Scenario 100-Year  
 FlexTable Manhole

Label	Elevation (Rim) (ft)	Elevation (Invert Out) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (Out) (ft)	System Flow Time (min)	Notes
SDCO A-25	5975.98	5970.3	2.73	5971.38	5972.33	0	CLEANOUT
SDCO A-24	5975.92	5969.83	2.73	5970.54	5970.87	0.04	CLEANOUT
SDCO A-22A	5975.95	5970.48	0	5970.48	5970.48	0	CLEANOUT
SDCO A-23	5975.46	5969.68	2.73	5970.39	5970.72	0.099	CLEANOUT
SDCO A-22	5975.39	5969.58	2.73	5970.29	5970.62	0.138	CLEANOUT
SDCO A-21	5975.25	5969.42	2.73	5970.13	5970.46	0.207	CLEANOUT
SD INLET A-31	5974.3	5968.87	9.95	5970.09	5970.74	0	DOUBLE TYPE 16 COMBO
SDMH A-30	5974.54	5967.7	9.95	5968.75	5969.15	0.042	5' DIA.
SDMH A-20	5974.67	5967.3	12.68	5968.5	5968.96	0.374	5' DIA.

Scenario 5-Year  
 FlexTable Manhole

Label	Elevation (Rim) (ft)	Elevation (Invert Out) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (Out) (ft)	Energy Grade Line (Out) (ft)	System Flow Time (min)	Notes
SDCO A-25	5975.98	5970.3	1.34	5970.85	5971.14	0	CLEANOUT
SDCO A-24	5975.92	5969.83	1.34	5970.32	5970.51	0.07	CLEANOUT
SDCO A-22A	5975.95	5970.48	0	5970.48	5970.48	0	CLEANOUT
SDCO A-23	5975.46	5969.68	1.34	5970.17	5970.36	0.14	CLEANOUT
SDCO A-22	5975.39	5969.58	1.34	5970.07	5970.26	0.187	CLEANOUT
SDCO A-21	5975.25	5969.42	1.34	5969.91	5970.1	0.27	CLEANOUT
SD INLET A-31	5974.3	5968.87	4.78	5969.71	5970.05	0	DOUBLE TYPE 16 COMBO
SDMH A-30	5974.54	5967.7	4.78	5968.42	5968.68	0.049	5' DIA.
SDMH A-20	5974.67	5967.3	6.12	5968.12	5968.42	0.469	5' DIA.

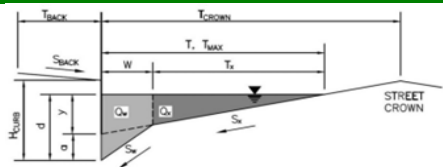
MHFD-Inlet, Version 5.02 (August 2022)

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

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

**Project:**

**Inlet ID:** SD Inlet A-31



**Gutter Geometry:**

Maximum Allowable Width for Spread Behind Curb  
 Side Slope Behind Curb (leave blank for no conveyance credit behind curb)  
 Manning's Roughness Behind Curb (typically between 0.012 and 0.020)

$T_{BACK}$  = 0.0 ft  
 $S_{BACK}$  = 0.020 ft/ft  
 $n_{BACK}$  = 0.016

Height of Curb at Gutter Flow Line  
 Distance from Curb Face to Street Crown  
 Gutter Width  
 Street Transverse Slope  
 Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)  
 Street Longitudinal Slope - Enter 0 for sump condition  
 Manning's Roughness for Street Section (typically between 0.012 and 0.020)

$H_{CURB}$  = 6.00 inches  
 $T_{CROWN}$  = 26.0 ft  
 $W$  = 2.00 ft  
 $S_X$  = 0.010 ft/ft  
 $S_W$  = 0.083 ft/ft  
 $S_0$  = 0.000 ft/ft  
 $n_{STREET}$  = 0.016

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

	Minor Storm	Major Storm	
$T_{MAX}$	26.0	26.0	ft
$d_{MAX}$	6.0	6.0	inches
	<input type="checkbox"/>	<input type="checkbox"/>	

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

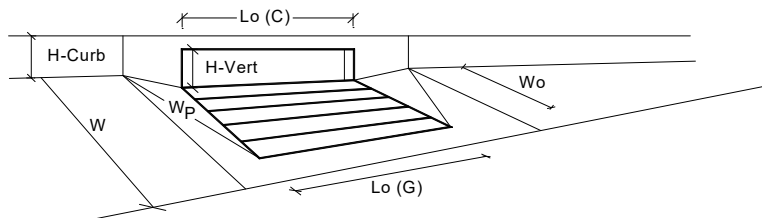
$Q_{allow}$  = 

Minor Storm	Major Storm
<b>SUMP</b>	<b>SUMP</b>

 cfs

## INLET IN A SUMP OR SAG LOCATION

*MHFD-Inlet, Version 5.02 (August 2022)*



Design Information (Input)	MINOR	MAJOR	
Type of Inlet	Denver No. 16 Combination		
Local Depression (additional to continuous gutter depression 'a' from above)	2.00	2.00	inches
Number of Unit Inlets (Grate or Curb Opening)	2	2	
Water Depth at Flowline (outside of local depression)	4.9	4.9	inches
<b>Grate Information</b>	MINOR	MAJOR	<input type="checkbox"/> Override Depths
Length of a Unit Grate	3.00	3.00	feet
Width of a Unit Grate	1.73	1.73	feet
Open Area Ratio for a Grate (typical values 0.15-0.90)	0.31	0.31	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	0.50	0.50	
Grate Weir Coefficient (typical value 2.15 - 3.60)	3.60	3.60	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	0.60	0.60	
<b>Curb Opening Information</b>	MINOR	MAJOR	
Length of a Unit Curb Opening	3.00	3.00	feet
Height of Vertical Curb Opening in Inches	6.50	6.50	inches
Height of Curb Orifice Throat in Inches	5.25	5.25	inches
Angle of Throat (see USDCM Figure ST-5)	0.00	0.00	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	3.70	3.70	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	0.66	0.66	
<b>Low Head Performance Reduction (Calculated)</b>	MINOR	MAJOR	
Depth for Grate Midwidth	0.43	0.43	ft
Depth for Curb Opening Weir Equation	0.24	0.24	ft
Grated Inlet Performance Reduction Factor for Long Inlets	0.57	0.57	
Curb Opening Performance Reduction Factor for Long Inlets	N/A	N/A	
Combination Inlet Performance Reduction Factor for Long Inlets	0.57	0.57	
Total Inlet Interception Capacity (assumes clogged condition)	4.2	4.2	cfs
<b>WARNING: Inlet Capacity &lt; Q Peak for Minor and Major Storms</b>	4.78	9.95	cfs

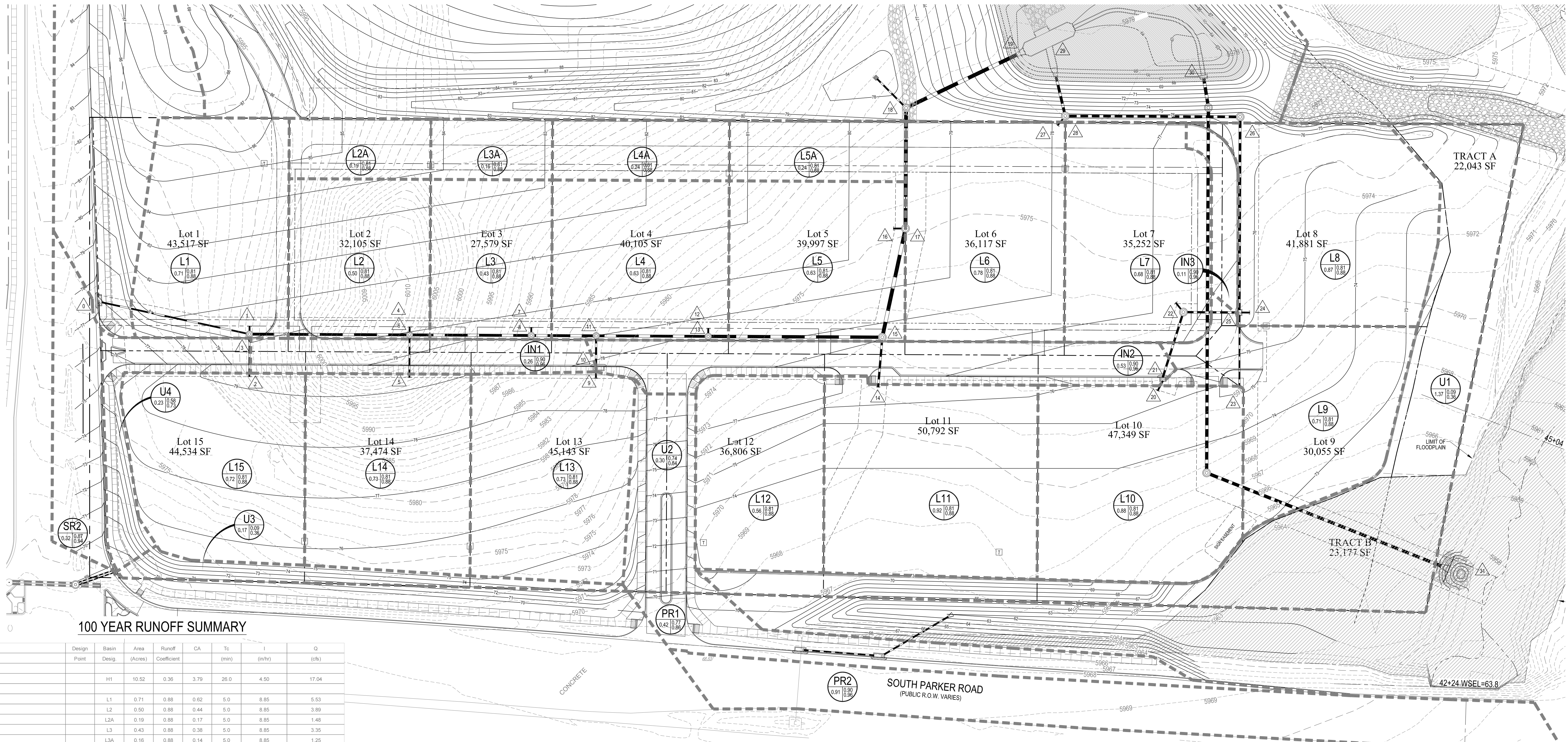
**Appendix D**  
**DRAINAGE REPORTS AND PLANS**

**Master Drainage Plan**

**Proposed Drainage Plan**

SEE SHEET DP3

STROH ROAD



100 YEAR RUNOFF SUMMARY

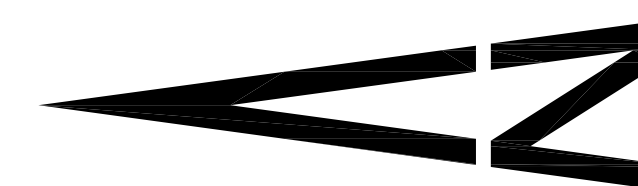
Design Point	Basin Desig.	Area (Acres)	Runoff Coefficient	CA	Tc (min)	I (in/hr)	Q (cfs)
H1		10.52	0.36	3.79	26.0	4.50	17.04
L1	L1	0.71	0.88	0.62	5.0	8.85	5.53
L2	L2	0.50	0.88	0.44	5.0	8.85	3.89
L2A	L2A	0.19	0.88	0.17	5.0	8.85	1.48
L3	L3	0.43	0.88	0.38	5.0	8.85	3.35
L3A	L3A	0.16	0.88	0.14	5.0	8.85	1.25
L4	L4	0.63	0.88	0.55	5.0	8.85	4.91
L4A	L4A	0.24	0.88	0.21	5.0	8.85	1.87
L5	L5	0.63	0.88	0.55	5.0	8.85	4.91
L5A	L5A	0.24	0.88	0.21	5.0	8.85	1.87
L6	L6	0.78	0.88	0.69	5.0	8.85	6.07
L7	L7	0.68	0.88	0.60	5.0	8.85	5.30
L8	L8	0.87	0.88	0.77	5.0	8.85	6.78
L9	L9	0.71	0.88	0.62	5.0	8.85	5.53
L10	L10	0.88	0.88	0.77	5.0	8.85	6.85
L11	L11	0.92	0.88	0.81	5.0	8.85	7.16
L12	L12	0.56	0.88	0.49	5.0	8.85	4.36
L13	L13	0.73	0.88	0.64	5.0	8.85	5.69
L14	L14	0.73	0.88	0.64	5.0	8.85	5.69
L15	L15	0.72	0.88	0.63	5.0	8.85	5.61
IN1	IN1	0.26	0.96	0.25	5.0	8.85	2.21
IN2	IN2	0.53	0.96	0.51	5.0	8.85	4.50
IN3	IN3	0.11	0.96	0.11	5.0	8.85	0.93
SR1	SR1	3.75	0.42	1.58	22.4	4.90	7.72
TOTAL FLOW TO FOREBAY							103.45
OS1	OS1	23.34	0.39	9.10	25.5	4.50	40.96
TOTAL TO POND							144.41
U1	U1	1.37	0.36	0.49	25.5	4.50	2.22
U2	U2	0.3	0.84	0.25	25.5	4.50	1.13
U3	U3	0.17	0.36	0.06	25.5	4.50	0.28
U4	U4	0.23	0.73	0.17	25.5	4.50	0.78
UN-CAPTURED SITE RUNOFF							4.38
SR2	SR2	0.32	0.94	0.30	5.0	8.85	2.66
PR1	PR1	0.42	0.86	0.36	5.0	8.85	3.20
PR2	PR2	0.91	0.96	0.87	5.0	8.85	7.73

DETENTION SUMMARY

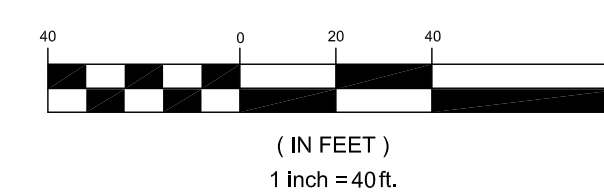
ZONE	VOLUME	ELEVATION	RELEASE RATE
WOCV	0.566 AC-FT		41 HOURS
EURV+WOCV	1.472 AC-FT	5968.03	70 HOURS
100 YEAR	2.753 AC-FT	5970.05	36.7 CFS

LEGEND

- 5340 --- EXISTING CONTOUR
- 42 --- PROPOSED CONTOUR
- R1** BASIN DESIGNATION
- 0.20 0.75 0.83 5 YR RUNOFF COEFFICIENT
- 100 YR RUNOFF COEFFICIENT
- BASIN AREA
- BASIN BOUNDARY LINE
- △ DESIGN POINT



GRAPHIC SCALE



BENCHMARK

BENCHMARK: DOUGLAS COUNTY SURVEY CONTROL MONUMENT TT15A - 3" DIAMETER DOUGLAS COUNTY GIS ALUMINUM CAP AT THE NE CORNER OF STROH ROAD AND SOUTH PARKER ROAD (US HIGHWAY 63)  
ELEVATION: 5970.79 FEET (NAVD 1988 DATUM)

DRAINAGE PLAN WEST

design by: JWD  
approved by: JWD  
project no.: 2015-015

date: 10/01/17

SHEET

DP2

PREPARED UNDER THE DIRECT SUPERVISION OF JERRY W. DAVIDSON, P.E. COLORADO REG # 30226 FOR AND ON BEHALF OF PERCEPTION DESIGN GROUP, INC.

NO.	DATE	DESCRIPTION
11/01/18		SIXTH SUBMITTAL
08/31/18		FOURTH SUBMITTAL
05/25/18		THIRD SUBMITTAL
03/19/18		PWSO SUBMITTAL
02/28/18		SECOND SUBMITTAL
10/24/17		INITIAL SUBMITTAL

REVISIONS

PARKER POINTE  
LOTS 1 THRU 15 AND TRACTS A AND B, PARKER POINTE FILING NO. 1  
SOUTHEAST CORNER PARKER ROAD AND STROH ROAD  
PARKER, COLORADO



THE TOWN OF PARKER REVIEW CONSTITUTES GENERAL COMPLIANCE WITH THE TOWN'S STANDARDS AND APPROVED VARIANCES. SUBJECT TO THESE PLANS BEING STAMPED, SIGNED, AND DATED BY THE PROFESSIONAL ENGINEER OF RECORD. REVIEW BY THE TOWN DOES NOT CONSTITUTE APPROVAL OF THE PLAN DESIGN OR ACCURACY AND CORRECTNESS OF ENGINEERING CALCULATIONS. ERRORS IN THE DESIGN OR CALCULATIONS REMAIN THE RESPONSIBILITY OF THE REGISTERED PROFESSIONAL ENGINEER WHOSE STAMP AND SIGNATURE ARE AFFIXED TO THIS DOCUMENT.

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TOWN OF PARKER, DIRECTOR OF ENGINEERING

DATE



**S.A. MIRO INC.**  
CONSULTING ENGINEERS  
4582 South Ulster Street  
Suite 750, Denver, CO 80237  
303-741-3737  
www.samiro.com



Know what's below.  
**Call before you dig.**

NO.	DESCRIPTION	DATE

**CENTURA PARKER NHC  
PARKER, CO 80134**

**DRAINAGE MAP**

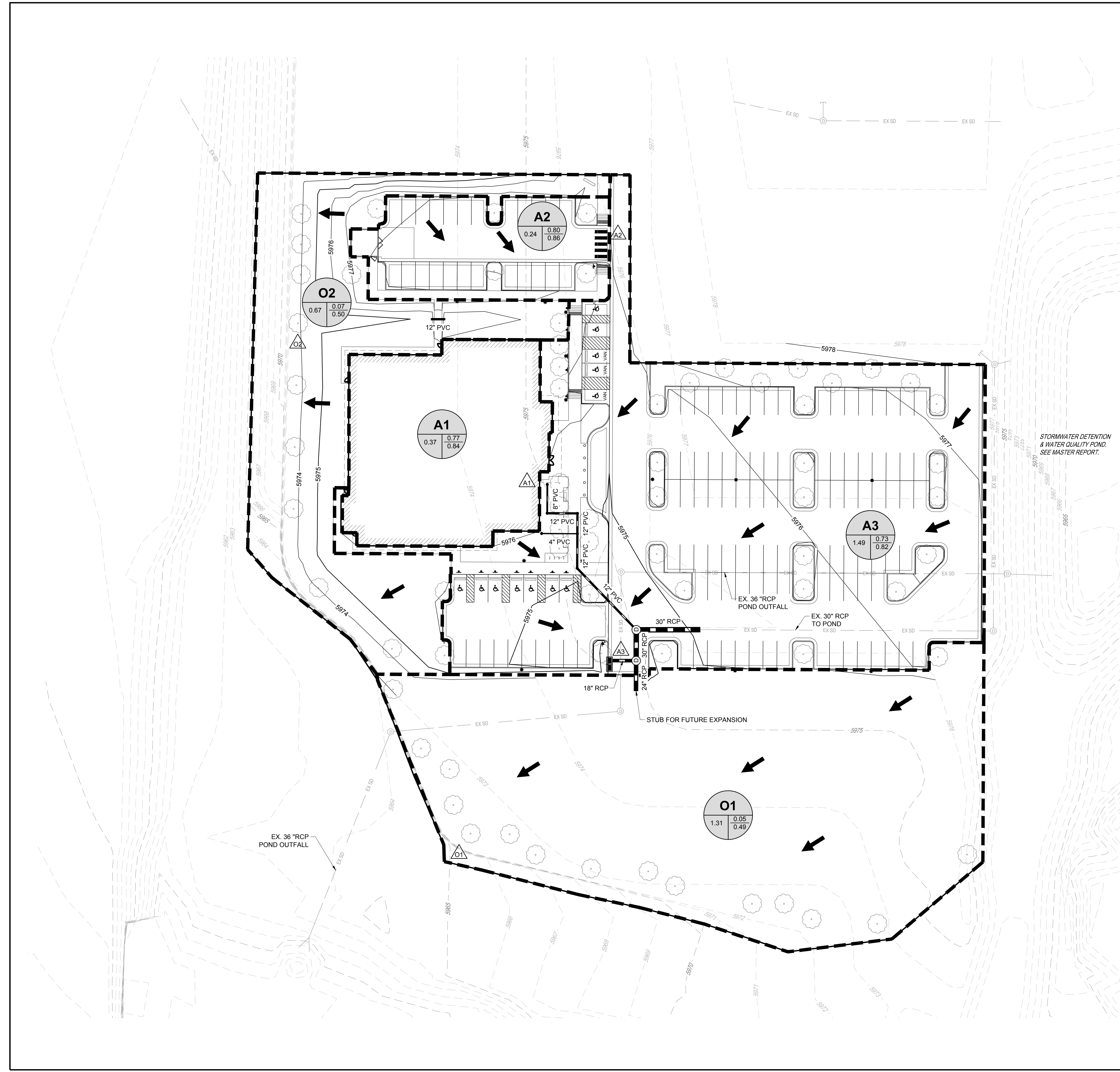
PROJECT:  
DRAWING TITLE:  
FILE PATH: C:\Users\FPC\Documents\S.A. Miro, Inc\Civil\Jobs\225287 Parker NHC\05 CAD\Exhibits\Drainage Map.dwg 01 - 02/2023

DESIGNED BY: SSM  
DRAWN BY: SSM  
CHECKED BY: JDC  
MIRO JOB NO. 22057  
DRAWING NUMBER:

**FIG. 1**

SHEET TITLE  
**DRAINAGE MAP**

SHEET NUMBER  
**FIG. 1**



**LEGEND:**

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

**RUNOFF SUMMARY**

BASINS	DESIGN POINT	TRIBUTARY AREA (ac.)	DIRECT RUNOFF		TOTAL RUNOFF	
			Q-5YR (cfs)	Q-100YR (cfs)	Q-5YR (cfs)	Q-100YR PEAK(cfs)
A1	A1	0.37	1.34	2.73	1.34	2.73
A2	A2	0.24	0.84	1.68	0.84	1.68
A3	A3	1.49	3.94	8.27	4.78	9.95
O1	O1	1.31	0.19	3.45	0.19	3.45
O2	O2	0.67	0.19	2.63	0.19	2.63

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Town of Parker, Director of Engineering/Public Works \_\_\_\_\_ Date \_\_\_\_\_