CONSULTING ENGINEERS

Master Drainage Report

FOR

Salisbury Regional Park

AT

11700 MOTSENBOCKER RD

PARKER CO 80134

FOR

Town of Parker

PARKER
COLORADO

June 05, 2025

JVA, Incorporated
1319 Spruce Street
Boulder, CO 80302
303.444.1951
info@jvajva.com

www.jvajva.com

June 05, 2025

Mr. Michael Walton, PE, CFM, Senior Development Review Engineer
Town of Parker
Engineering and Development
20120 E. Main Street
Parker, CO 80138

RE: Drainage Report for Salisbury Regional Park
JVA, Inc. Project No. 3752c

Dear Michael:

The following Master Drainage Report has been prepared for Salisbury Regional Park. The stormwater report and drainage maps have been produced in accordance with the Storm Drainage and Environmental Policies for Parker, Colorado and the latest Mile High Flood Control District recommendations.

It is our understanding that the information provided herein meets the requirements specified in the Storm Drainage and Environmental Criterial Manual.

Please contact us if you have any questions regarding this submission.

Sincerely,

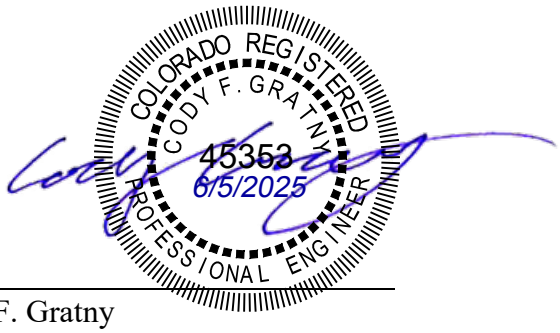
JVA, Inc.

Kelley A. McKinney
Design Engineer

CONSULTING ENGINEERS

Engineer's Statement:

This report for Salisbury Regional Park was prepared by me (or under my direct supervision) in accordance with the provisions of the Storm Drainage and Environmental Criterial Manual for the owners thereof. I understand that the Town of Parker does not and will not assume liability for drainage facilities designed by others.



Cody F. Gratny
Registered Professional Engineer
State of Colorado No. 45353

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Drainage Report – Salisbury Regional Park

MASTER DRAINAGE REPORT

Salisbury Regional Park

I. General Location and Description

A. Site Location

Salisbury Regional Park is a proposed outdoor sports complex located in the Town of Parker. The site will be positioned on a north-facing slope overlooking Cherry Creek. The site is currently an undeveloped property located at 11700 Motsenbocker Rd in the Town of Parker, Douglas County, Colorado. The intent of this Master Drainage Report is to describe the overall project, drainage criteria, site hydrology, planned stormwater management, and phased construction approach for the full park build-out. A detailed Drainage Report will be prepared and submitted for each phase of design including hydraulic analysis and stormwater quality and detention calculations.

The legal description describes the site as Lot 1 Salisbury North Minor Development 2nd Amendment location in the Northwest Quarter of Section 27 and Northwest Quarter of Section 28, Township 6 South, Range 66 West of the 6th P.M. The site is generally bounded by the Salisbury Equestrian Park to the south, Cherry Creek to the north and east, and Motsenbocker Rd to the west. A vicinity map is provided in Appendix A.

B. Description of Property

The site primarily consists of natural vegetation. Runoff generated within the site flows into two existing drainage culverts at the north end of the site. From these culverts runoff continues to travel north along existing drainage channels into Cherry Creek. For this study, it is assumed that the entirety of the site is tributary to the system. Existing runoff sheet flows across the site with slopes ranging from 0.5% to 6.0%.

Salisbury Park will be constructed in 4 phases. Phase 1 will include the construction of four baseball fields with supporting dugouts, bull pens, and batting cages. A centralized plaza will be constructed within the center of the four baseball fields that will contain bleachers and facilities buildings. Parking and access drives will be provided on the east and west side of the baseball fields. Additionally, two turf fields located west of the baseball fields are proposed as a Phase 1 bid alternate. Phase 2 will include a complex of tennis courts in the southeast corner of the site, with some additional parking area in the northeast portion of the site. Phase 3 will include the construction of a community hub, an outdoor fitness area, an inclusive playground and some additional parking, all located north of Phase 1. In Phase 4, a bike park, overlook pavilion, and bike trails will be constructed connecting to the existing Cherry Creek trail system.

According to the US Fish and Wildlife National Wetlands Inventory, Cherry Creek is classified as a Riverine area. However, there appear to be no wetland areas on-site. There are no known regional drainage plans affected by this development. The property is located adjacent to a floodway zoned AE flood hazard, with flood elevations between 5926' and 5920' per FEMA FIRM panel

08035C0069F. The property does fall within the Zone X designation which corresponds with a 0.2% annual chance flood hazard. Grading and ground disturbances will be kept outside of the floodway areas but will fall within the floodplain. This is discussed further in Section III.A of this report.

Per the National Resource Conservation Service (NRCS), the site soils are generally classified as Buick-Satanta Loams at 3 to 9 percent slopes (approximately 3.7% of the site), Loamy Alluvial Land (approximately 24.9% of the site), Sampson Loam (approximately 22.2% of the site), Sandy Wet Alluvial Land (approximately 13.1%), and Satanta Loam (approximately 36.1% of the site). Buick-Satanta Loam is classified as hydrologic soil group (HSG) C, Loamy Alluvial Land is classified as HSG C, Sampson Loam is classified as HSG B, Sandy Wet Alluvial Land is classified as HSG D, and Satanta Loam is classified as HSG B. Group A soils have a high infiltration rate when thoroughly wet with a high rate of water transmission. Group B soils have moderate infiltration rates when thoroughly wet and a moderate infiltration potential. Groups C and D have slow to very slow infiltration rates, with slow to very slow rates of water transmission. The NRCS classification maps for HSG are included in Appendix A.

Grades will be designed to match existing drainage patterns. Detention and water quality for the site will be met utilizing multiple water quality ponds located along the northern extents of site improvements and will drain to the north along historic drainage paths. The ponds will collect drainage from proposed impervious surfaces on-site, including roof areas, and parking lots.

In general, the proposed development will result in a 30.2% overall increase in site imperviousness. A summary of the historic and developed impervious values is shown in Table 1 below:

Table 1 - Impervious Surface Summary

	Site Area (acres)	**Imperviousness**
Historic	75.57	5.8%
Developed	74.62	36.0%

II. Drainage Basins and Sub-basins

A. Major Basin Description

The project site is located within the Cherry Creek Watershed. In general, the proposed development will match historic drainage patterns. Stormwater generally flows from the south to the north across the site. A network of proposed water quality basins will be constructed along the northern extents of the proposed site. Stormwater will be treated for water quality in these basins before it is discharged along historic drainage paths into Cherry Creek via storm sewer and overland flow.

B. Site Sub-Basin Description

To better evaluate the impacts of the proposed development on existing site hydrology, the site was separated into existing and developed minor basins.

The existing site has been divided into drainage basins which are described in the report below. The basin delineations are shown within the Existing Drainage Map with corresponding design points for each basin. The Historic Drainage Map is included in Appendix D.

Basin H1 (17.57 acres) is located along the east side of the site and is tributary to Cherry Creek. This basin is primarily covered in undisturbed native grasses, except for a small walk located on the northern edge of the site. Runoff sheet flows across this basin with slopes between 0.5% to 5.0%. All runoff ultimately flows to an existing culvert that conveys flows north to Basin H4.

Basin H2 (44.80 acres) contains the central and western portion of the site and is tributary to Cherry Creek. This basin is entirely covered by undisturbed native grasses. Runoff sheet flows north across this basin with slopes between 0.5% and 8.0%. An existing culvert in the northwest corner of the site collects all the runoff from this basin and conveys flows north to Basin H4.

Basin H3 (0.84 acres) is located in the northwest corner of the site, on the south side of Dransfeldt Rd. This basin contains an existing stormwater pond that treats runoff from Dransfeldt Rd. Runoff from this basin will be collected in this stormwater pond and redirected northwest across Dransfeldt Rd by an existing culvert. This basin will not be disturbed by the construction of the Salisbury Regional Park project.

Basin H4 (12.37 acres) is located in the northernmost corner of the project site. This basin is covered with undisturbed native grasses and a few existing concrete walks, and is bisected by Cherry Creek. Runoff flows directly into Cherry Creek. This basin will not be disturbed by the construction of the Salisbury Regional Park project.

The proposed site has been divided into major basins with minor sub basins. The basin delineations are shown within the Developed Drainage Map with corresponding design points for each basin. The Developed Drainage Map is included in Appendix D.

Basins A1-A12 (23.66 acres) comprise the majority of the eastern half of the proposed site. These basins contain proposed baseball fields, batting cages, the HQ building, pickleball courts, and associated parking. Runoff generated within these basins is tributary to proposed WQCV Pond A. Runoff will be conveyed to Pond A through overland flow channels, storm lines, and culverts. Pond A will release flows north to a proposed swale into an existing drainage culvert, and ultimately into Cherry Creek.

Basins B1-B7 (11.67 acres) are located in the western portion of the site. Basin B includes two multipurpose fields, a basketball court, a workout area, and associated walks and open spaces. The two multipurpose fields are an alternate. Runoff will be conveyed through a storm lines to proposed WQCV Pond B. Outfall from the pond will be directed north through a proposed swale to an existing drainage culvert, where it will ultimately be collected in Cherry Creek.

Basins C1-C4 (11.44 acres) include the two western baseball fields and a parking area located in the southwestern corner of the site. Runoff in these basins will flow to the proposed WQCV Pond C. A network of storm sewer and overland drainage channels will convey runoff to the Pond. Outfall from Pond C is directed to a proposed swale, where it will travel to an existing drainage culvert, and ultimately into Cherry Creek.

III. Drainage Design Criteria

A. Regulations

It is JVA's understanding that the work presented within this drainage report complies with all applicable Town of Parker and Mile High Flood District design standards, unless otherwise noted as a variance. Point rainfall data that was used for design was taken from the Storm Drainage and Environmental Criteria Manual from the Town of Parker and the calculation methods specified are used. This site is located within a floodplain, and the floodplain development application has been included in Appendix B. Per State and Town regulations, any development within the Special Flood Hazard Area (SFHA), otherwise known as the 100-year regulatory floodplain, which increases the base flood elevations more than 0.50-feet shall require a CLOMR be submitted on the community's behalf. Any development which increases or decreases the base flood elevations more than 0.30-feet shall require a LOMR be submitted on the community's behalf. The proposed development will not raise the base flood elevations by more than 0.30', therefore neither a CLOMR nor a LOMR has been provided.

B. Hydrology

The Rational Method (Q=CIA) was used to determine the storm runoff (Q) from the areas tributary to the new storm system, with composite runoff coefficients (C) and contributing areas (A) given for design points in sub-basins.

The runoff coefficients for various land usages were obtained from Urban Drainage and Flood Control District (UDFCD) Urban Storm Drainage Criteria Manual (USDCM) Volume 1 – Table 6-4 updated March 2024. Intensities (I) were determined using the Time-Intensity-Frequency Values and a calculated Time of Concentration (t_c) using equations 5-1, 6-2, 6-3, 6-4, and 6-5 respectively from USDCM Volume 1 dated March 2024. Post-development Time of Concentration calculations for each sub-basin, corresponding rainfall intensities, composite runoff coefficients, and storm flows for the 100-year storms for each design point are provided in Appendix C. Specific equations and references to the USDCM are provided within the calculation spreadsheets.

The composite runoff coefficients (C) were calculated using site imperviousness and hydrologic soil type to define an area-weighted coefficient per basin. The rainfall intensity (I) in inches per hour was defined using the intensity-duration curves included in Table 5.1 of the Parker Storm Drainage and Environmental Criteria Manual and shown below in Table 2. The Time of concentration values were a minimum five (5) minutes per MHFD standard. Each basin was evaluated based on area (A) in acres. Final peak discharge (Q) is defined in cubic feet per second (cfs). Post-development time of concentration calculations for each sub-basin, corresponding rainfall intensities, and composite runoff coefficients for each sub-basin are provided in the Appendix. Table 2 below presents the design rainfall used for runoff calculations.

Table 2 - Design Rainfall Totals

Frequency of Design Event	One Hour Point Rainfall P1 (in)
2 yr	0.99
5 yr	1.39
10 yr	1.64
25 yr	1.98
50 yr	2.31
100 yr	2.60

C. Hydraulics

Design storm recurrence intervals are consistent with the Town of Parker requirements: the minor storm analysis is the 5-year event, and the major storm is the 100-year event. Water surface profiles and pipe hydraulic grade line computations will be provided in the Drainage Report submitted for each phase.

D. Water Quality Enhancement

Detention and water quality for the site's developed basins is provided through a network of proposed extended detention basins located generally along the north extents of the site improvements. These facilities will slow down runoff and encourage infiltration, sedimentation, and filtration, thus aiding in the removal of excess sediment, solids, nutrients, metals and grit, and other typical pollutants from stormwater.

IV. Drainage Facility Design

A network of new storm sewers and drainage swales will convey captured runoff northward towards a series of proposed extended detention basins and water quality treatment facilities. These basins will discharge stormwater to the north along historic drainage paths. All proposed storm sewers and drainage swales will be owned and maintained by the Town of Parker.

A series of swales and culverts will bypass offsite flows from two upstream detention ponds along the west side of the site. The Horseshoe Ridge Detention Ponds 1 and 2 have a peak outflow of 137.7 cfs and Salisbury Heights Pond C has a peak outflow of 7.2 cfs. Detailed calculations are provided within the Phase 1 Drainage Report.

The Town of Parker's Storm Drainage and Environmental Criteria Manual requires the implementation of full-spectrum detention. This approach is designed to control peak discharge across all runoff events, from frequent storms to the 100-year event, effectively replicating pre-development conditions. Due to elevation constraints and proximity within the 100-year floodplain, onsite ponds are designed to address the Water Quality Capture Volume only. A variance request is included in Section V of this report.

The Water Quality Basin designs include one of two outlet structure designs. The first design is an outlet structure with a water quality orifice plate and overflow pipe. The second design is a weir wall with a water quality orifice plate and an overflow weir. This approach meets the Town's stormwater management requirements for water quality and keeps fill within the adjacent floodplain minimal.

In the final drainage condition, three ponds will provide WQCV for the entire site. Pond A and Pond C will be constructed in Phase 1. Interim ponds will provide WQCV for the remainder of the site until Pond B is constructed in Phase 3.

Table 3 – Detention basin volumes

Basin ID	Watershed Area (ac.)	Provided Volume (ac-ft)	Required Volume (ac-ft)	Peak Outflow Q (cfs)
Pond A	23.66	0.746	0.448	1.05
Pond B	11.67	0.402	0.205	0.12
Pond C	11.44	0.920	0.170	0.12

V. Conclusions

A. Compliance with Standards

The stormwater facilities and design proposed for the Salisbury Regional Park have been designed and analyzed in accordance with the Town of Parker Storm Drainage and Environmental Criteria Manual, the Mile High Flood District recommendations set forth in the Urban Storm Drainage Criteria Manuals and engineering best practices within the State of Colorado. The proposed drainage design will maintain existing runoff conditions by attenuating and treating developed flows and reduce the potential for adverse effects downstream.

B. Variances

For this project, we are seeking variances from the Town of Parker's standard requirements for stormwater facilities and infrastructure. The need for variances on this project stems from the site's proximity to and within the Cherry Creek 100-year floodplain. Per State and Town regulations, and development within the special Flood Hazard Area (SFHA), otherwise known as the 100-year regulatory floodplain, which increased flood elevations more than 0.5 feet shall require a CLOMR be submitted on the community's behalf. Any development which increases or decreases the base flood elevations more than 0.30-feet shall require a LOMR be submitted on the community's behalf. The following variances are requested due elevation constraints resulting from the floodplain:

- On-site extended detention basins as they pertain to Section 7.2 of the Storm Drainage and Environmental Criteria Manual regarding the need for full spectrum detention ponds. The grading constraint limits the amount of detention that can be provided within each pond, and therefore full-spectrum detention cannot be provided. Water Quality has been prioritized and provided for all modified drainage basins within the site.

- A variance is requested from Section 6.4.1.1 of the SDECM for storm pipes less than the required 18" diameter. The proposed minimum culvert pipe size is 12" RCP. This variance is requested due to constraints related to shallow storm system outfall elevation, which would require substantially raising the site to achieve minimum cover on an 18" pipe.
- A variance is requested from reviewer requests for storm conveyance pipes less than 0.5% slope. The minimum proposed pipe slope is 0.25%. This variance is requested due to constraints related to shallow storm system outfall elevation, which would require substantially raising the site to achieve greater pipe slopes, or utilize larger pipes, which would require substantially raising the site above existing elevations.
- A variance is requested from Section 6.3.3.4 of the SDECM for major storm hydraulic grade lines within 12-inches of the surface. The minimum proposed hydraulic grade line depth is zero inches (surface). This variance is requested due to constraints related to shallow storm system outfall elevation, which would require substantially raising the site to achieve greater pipe slopes, or utilize larger pipes to lower the HGL, which would require substantially raising the site above existing elevations.

C. Drainage Concept

The proposed stormwater management infrastructure and techniques are in substantial compliance with all applicable regulations and will improve existing site drainage conditions. The design incorporates strategic grading, Best Management Practices, and control measures to provide stormwater quality treatment and attenuate developed flows to mimic historic flows for a variety of return events. The improvements presented in this report are intended to improve existing conditions and minimize flood risk. It is believed that the proposed improvements will not adversely impact properties upstream or downstream, and do not adversely impact drainageways downstream.

VI. References

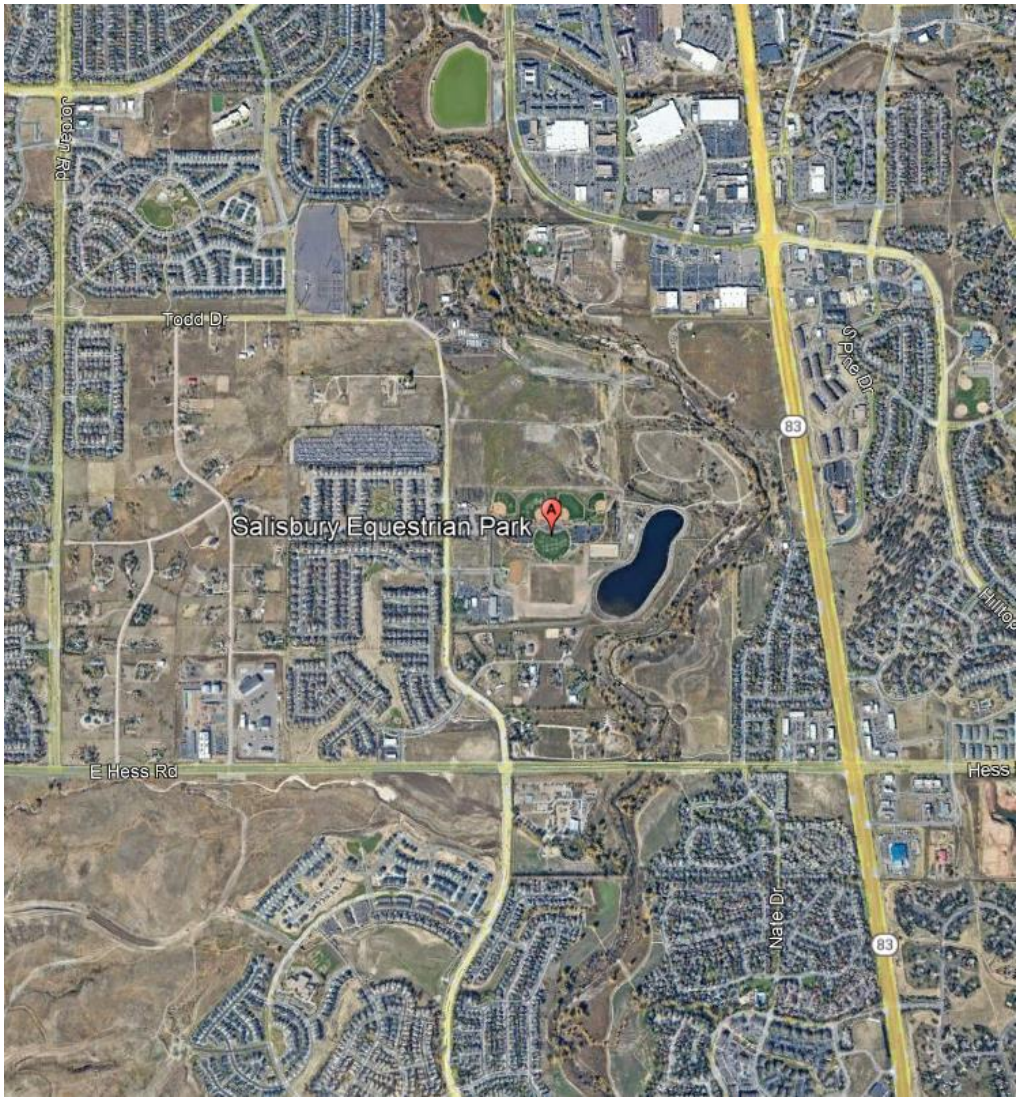
1. "Final Roadway Drainage Report for Dransfeldt Road Extension" Douglas County, Colorado, August, 2023
2. "Salisbury Regional Park Phase 1 Floodplain Development Permit Application" Town of Parker, Colorado, November 2023
3. "Storm Drainage and Environmental Criteria Manual", Town of Parker, Colorado, February, 2014.
4. "Urban Storm Drainage Criteria Manual", Mile High Flood District, Latest Edition.
5. https://www.fema.gov/flood-maps. Accessed 14 May 2024.
6. https://websoilsurvey.nrcs.usda.gov/app/. Accessed 14 May 2024
7. https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/. Accessed 14 May 2024

APPENDIX A – LOCATION INFORMATION

Salisbury Park North

Development

AT
11700 Motsenbocker Road
Parker, CO

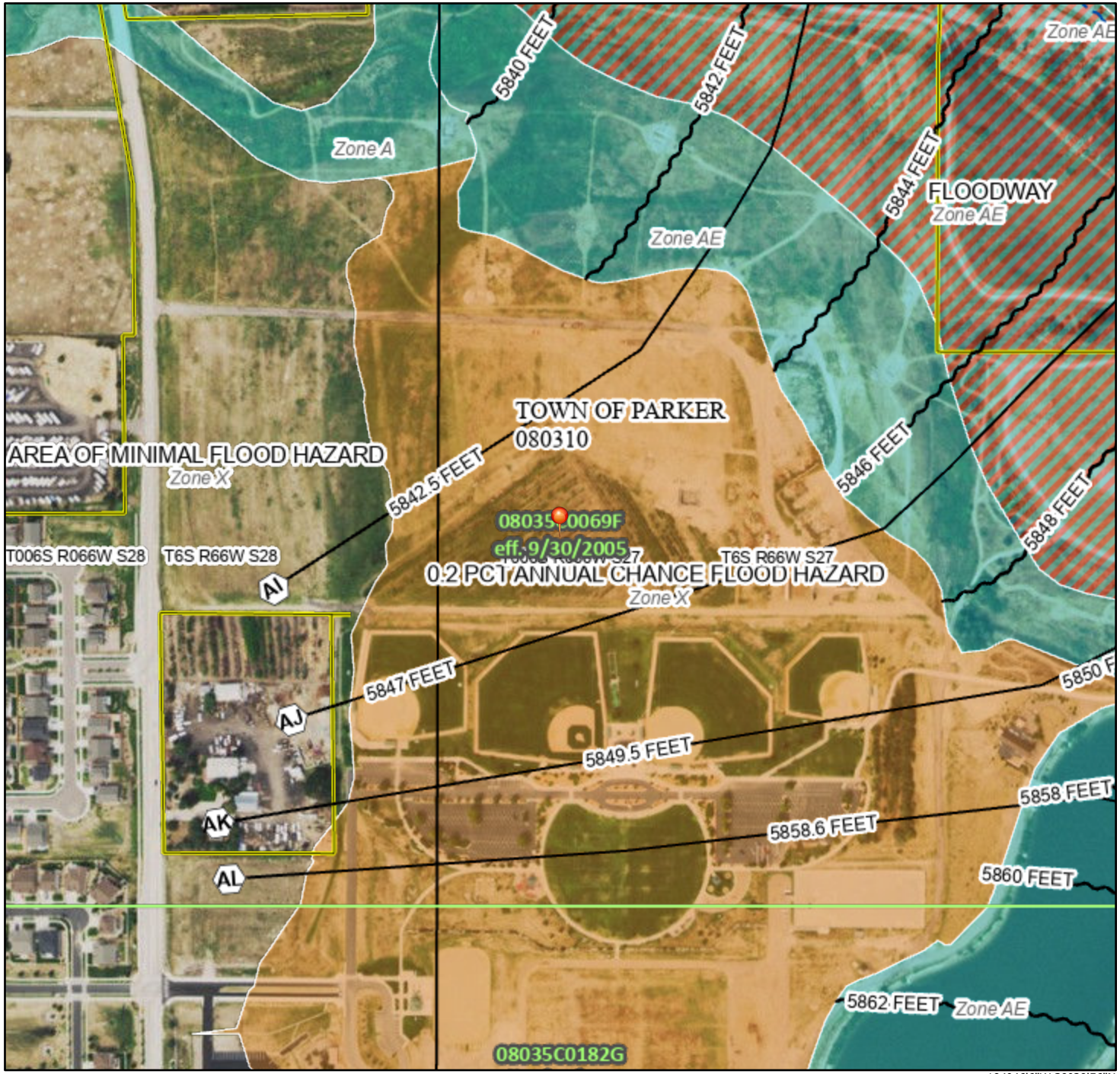


VICINITY MAP NOT TO SCALE

National Flood Hazard Layer FIRMette

FEMA

104°46'43"W 39°30'24"N



104°46'6"W 39°29'56"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
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

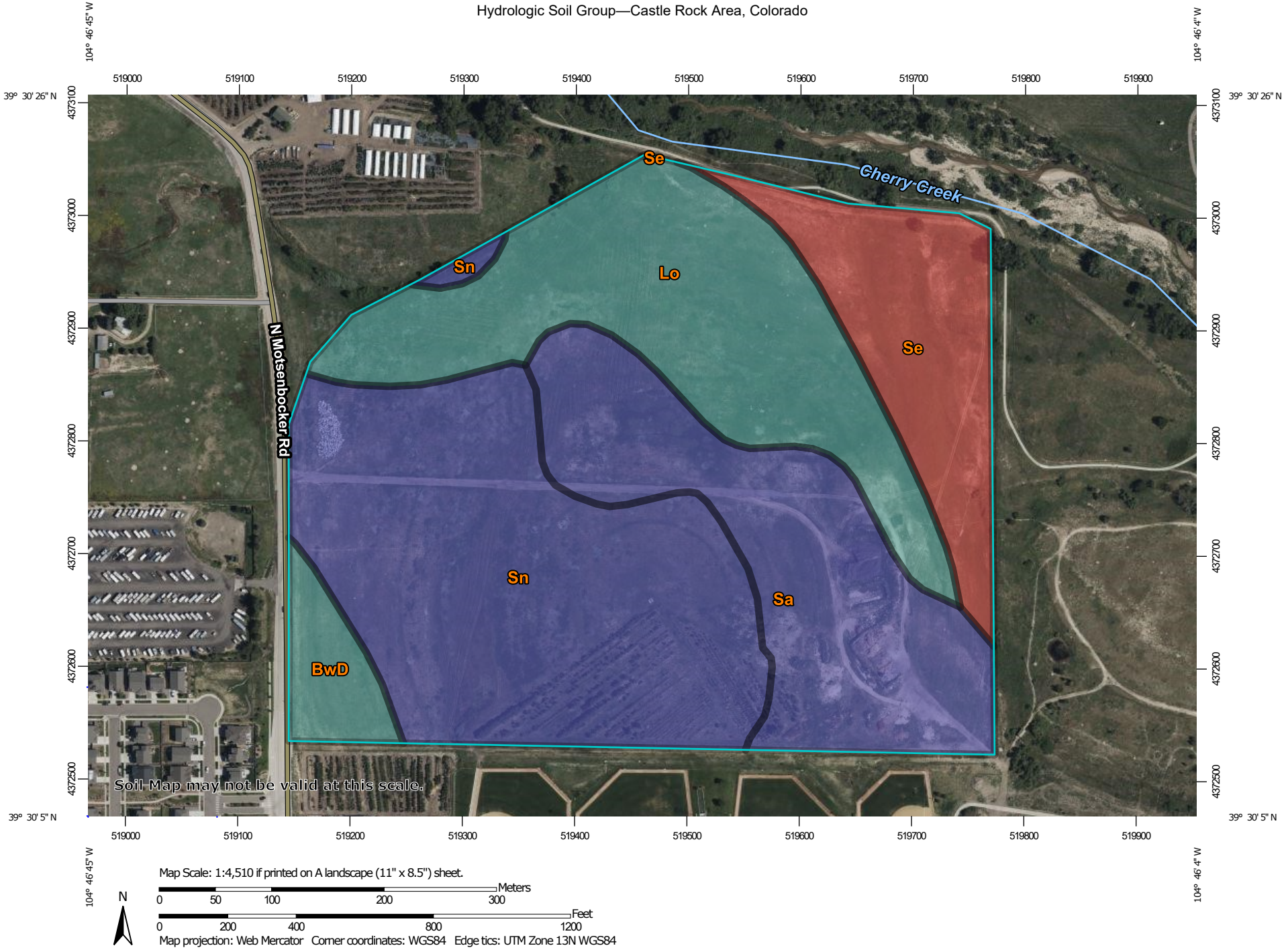
N

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 6/16/2023 at 4:40 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.



Map Scale: 1:4,510 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 17, Aug 29, 2024

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

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

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BwD	Buick-Satanta loams, 3 to 9 percent slopes	C	2.6	3.7%
Lo	Loamy alluvial land	C	18.0	24.9%
Sa	Sampson loam	B	16.0	22.2%
Se	Sandy wet alluvial land	D	9.4	13.1%
Sn	Satanta loam	B	26.0	36.1%
Totals for Area of Interest			**72.1**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

NOAA Atlas 14, Volume 8, Version 2
Location name: Parker, Colorado, USA*
Latitude: 39.5054°, Longitude: -104.7733°
Elevation: 5837 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffery Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**0.224** (0.183-0.276)	**0.281** (0.229-0.347)	**0.379** (0.308-0.470)	**0.463** (0.374-0.577)	**0.585** (0.458-0.760)	**0.684** (0.520-0.898)	**0.785** (0.577-1.06)	**0.893** (0.627-1.23)	**1.04** (0.701-1.48)	**1.16** (0.757-1.66)
10-min	**0.327** (0.267-0.404)	**0.411** (0.336-0.509)	**0.555** (0.451-0.688)	**0.679** (0.548-0.845)	**0.857** (0.670-1.11)	**1.00** (0.762-1.31)	**1.15** (0.844-1.55)	**1.31** (0.918-1.81)	**1.52** (1.03-2.16)	**1.69** (1.11-2.43)
15-min	**0.399** (0.326-0.493)	**0.502** (0.409-0.620)	**0.676** (0.550-0.838)	**0.827** (0.669-1.03)	**1.04** (0.817-1.36)	**1.22** (0.929-1.60)	**1.40** (1.03-1.89)	**1.59** (1.12-2.20)	**1.86** (1.25-2.64)	**2.06** (1.35-2.96)
30-min	**0.527** (0.431-0.652)	**0.664** (0.542-0.821)	**0.895** (0.728-1.11)	**1.10** (0.885-1.36)	**1.38** (1.08-1.80)	**1.62** (1.23-2.12)	**1.86** (1.36-2.50)	**2.11** (1.48-2.91)	**2.45** (1.65-3.48)	**2.72** (1.78-3.91)
60-min	**0.667** (0.545-0.824)	**0.823** (0.672-1.02)	**1.10** (0.891-1.36)	**1.34** (1.08-1.66)	**1.69** (1.32-2.20)	**1.98** (1.51-2.61)	**2.29** (1.68-3.08)	**2.61** (1.84-3.62)	**3.07** (2.07-4.36)	**3.43** (2.25-4.93)
2-hr	**0.806** (0.662-0.988)	**0.983** (0.807-1.21)	**1.30** (1.06-1.59)	**1.58** (1.28-1.95)	**2.00** (1.58-2.59)	**2.35** (1.80-3.07)	**2.72** (2.02-3.64)	**3.12** (2.21-4.29)	**3.68** (2.51-5.20)	**4.14** (2.73-5.89)
3-hr	**0.906** (0.747-1.11)	**1.09** (0.897-1.33)	**1.42** (1.16-1.74)	**1.72** (1.40-2.12)	**2.18** (1.73-2.82)	**2.56** (1.98-3.35)	**2.98** (2.22-3.98)	**3.43** (2.45-4.70)	**4.07** (2.79-5.73)	**4.59** (3.04-6.50)
6-hr	**1.11** (0.917-1.34)	**1.32** (1.09-1.60)	**1.69** (1.40-2.06)	**2.04** (1.67-2.49)	**2.57** (2.06-3.30)	**3.02** (2.35-3.90)	**3.50** (2.62-4.63)	**4.02** (2.89-5.46)	**4.77** (3.28-6.64)	**5.37** (3.59-7.54)
12-hr	**1.35** (1.12-1.62)	**1.61** (1.34-1.94)	**2.07** (1.72-2.50)	**2.48** (2.05-3.00)	**3.08** (2.48-3.90)	**3.58** (2.80-4.58)	**4.12** (3.10-5.39)	**4.68** (3.38-6.29)	**5.48** (3.80-7.55)	**6.12** (4.12-8.50)
24-hr	**1.64** (1.38-1.96)	**1.94** (1.63-2.32)	**2.47** (2.06-2.96)	**2.93** (2.43-3.52)	**3.59** (2.89-4.49)	**4.13** (3.24-5.22)	**4.69** (3.56-6.07)	**5.29** (3.84-7.01)	**6.11** (4.26-8.32)	**6.76** (4.58-9.31)
2-day	**1.95** (1.65-2.31)	**2.28** (1.92-2.70)	**2.83** (2.38-3.37)	**3.32** (2.77-3.96)	**4.01** (3.25-4.97)	**4.58** (3.62-5.73)	**5.16** (3.94-6.62)	**5.78** (4.23-7.60)	**6.64** (4.67-8.95)	**7.31** (5.00-9.97)
3-day	**2.11** (1.79-2.49)	**2.47** (2.09-2.91)	**3.07** (2.59-3.63)	**3.59** (3.01-4.26)	**4.33** (3.52-5.32)	**4.92** (3.90-6.12)	**5.53** (4.24-7.04)	**6.17** (4.53-8.06)	**7.05** (4.97-9.44)	**7.73** (5.31-10.5)
4-day	**2.23** (1.90-2.62)	**2.61** (2.22-3.07)	**3.26** (2.76-3.84)	**3.80** (3.20-4.50)	**4.58** (3.73-5.61)	**5.20** (4.14-6.44)	**5.84** (4.48-7.39)	**6.50** (4.78-8.44)	**7.39** (5.23-9.86)	**8.09** (5.57-10.9)
7-day	**2.55** (2.18-2.98)	**2.97** (2.53-3.47)	**3.67** (3.12-4.30)	**4.27** (3.61-5.02)	**5.12** (4.19-6.22)	**5.79** (4.63-7.12)	**6.48** (5.01-8.15)	**7.20** (5.33-9.28)	**8.17** (5.82-10.8)	**8.93** (6.19-12.0)
10-day	**2.85** (2.44-3.31)	**3.28** (2.81-3.82)	**4.02** (3.42-4.68)	**4.64** (3.94-5.43)	**5.53** (4.54-6.68)	**6.23** (5.00-7.63)	**6.96** (5.39-8.71)	**7.71** (5.73-9.90)	**8.74** (6.25-11.5)	**9.54** (6.64-12.7)
20-day	**3.74** (3.23-4.32)	**4.22** (3.64-4.88)	**5.03** (4.32-5.82)	**5.72** (4.88-6.64)	**6.69** (5.53-8.01)	**7.46** (6.03-9.04)	**8.25** (6.44-10.2)	**9.07** (6.80-11.5)	**10.2** (7.34-13.3)	**11.1** (7.75-14.6)
30-day	**4.49** (3.88-5.15)	**5.05** (4.36-5.80)	**5.98** (5.15-6.88)	**6.76** (5.79-7.81)	**7.84** (6.50-9.31)	**8.68** (7.03-10.4)	**9.53** (7.47-11.7)	**10.4** (7.82-13.1)	**11.6** (8.37-15.0)	**12.5** (8.78-16.3)
45-day	**5.41** (4.70-6.19)	**6.14** (5.32-7.02)	**7.30** (6.31-8.37)	**8.25** (7.09-9.49)	**9.53** (7.91-11.2)	**10.5** (8.52-12.5)	**11.4** (8.98-14.0)	**12.4** (9.34-15.5)	**13.6** (9.87-17.4)	**14.5** (10.3-18.9)
60-day	**6.19** (5.39-7.05)	**7.09** (6.17-8.09)	**8.52** (7.38-9.73)	**9.65** (8.32-11.1)	**11.1** (9.25-13.0)	**12.2** (9.95-14.5)	**13.3** (10.5-16.1)	**14.3** (10.8-17.8)	**15.6** (11.3-19.8)	**16.5** (11.7-21.4)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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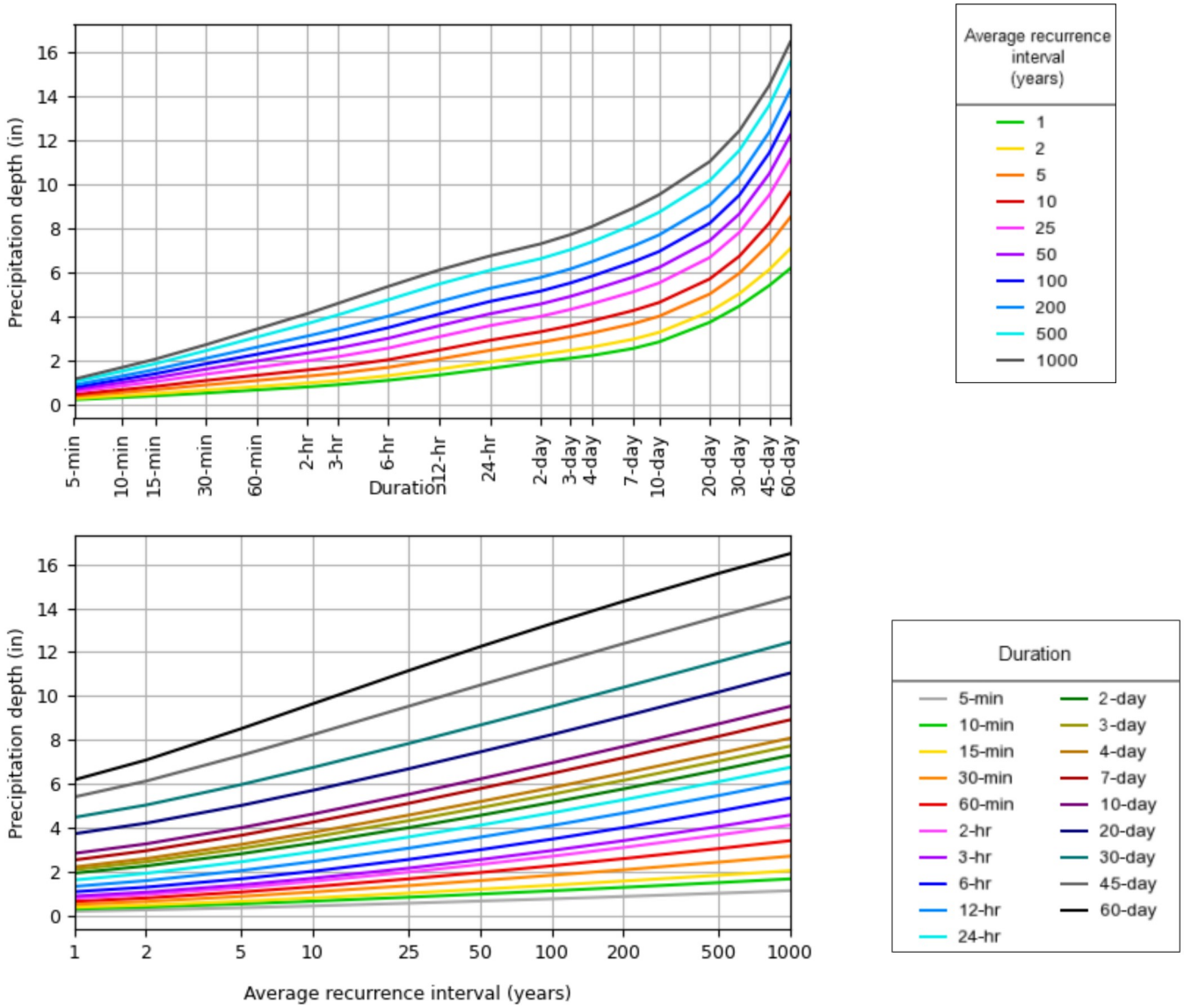
PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 39.5054°, Longitude: -104.7733°



NOAA Atlas 14, Volume 8, Version 2 Created (GMT): Thu Jan 30 16:53:30 2025

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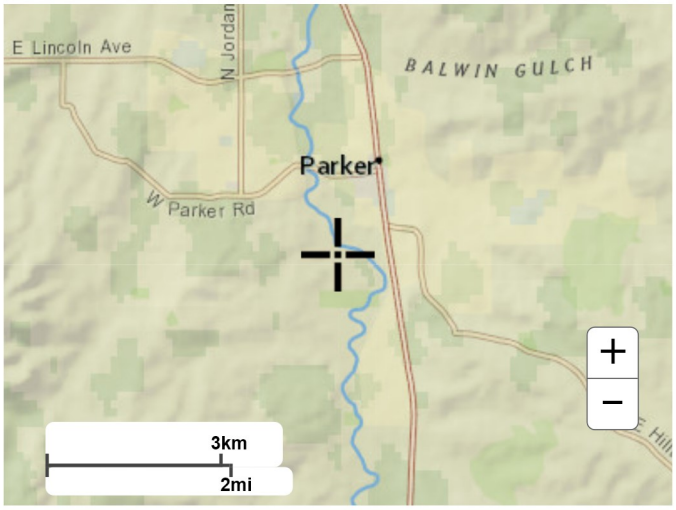
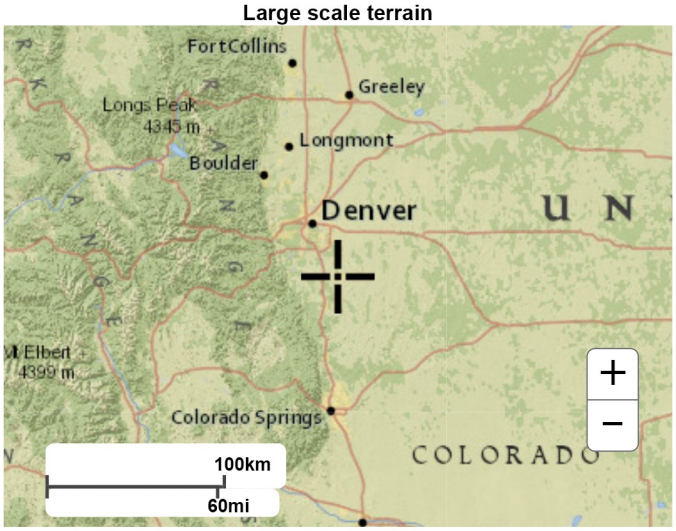
Maps & aerials

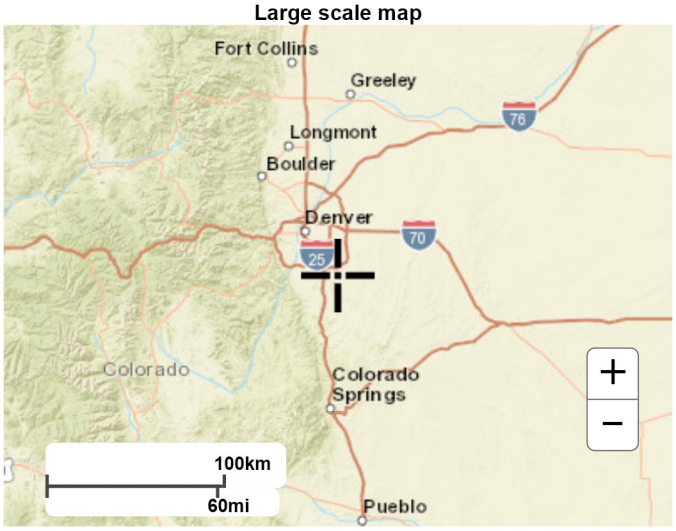
Small scale terrain



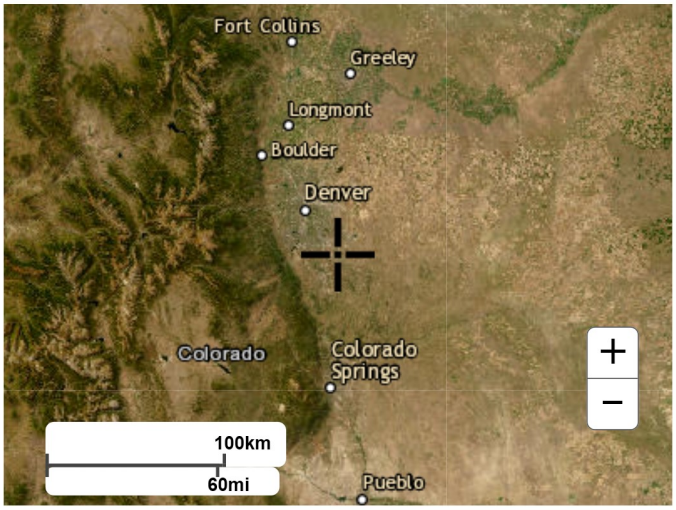
Large scale terrain



Large scale map



Large scale aerial



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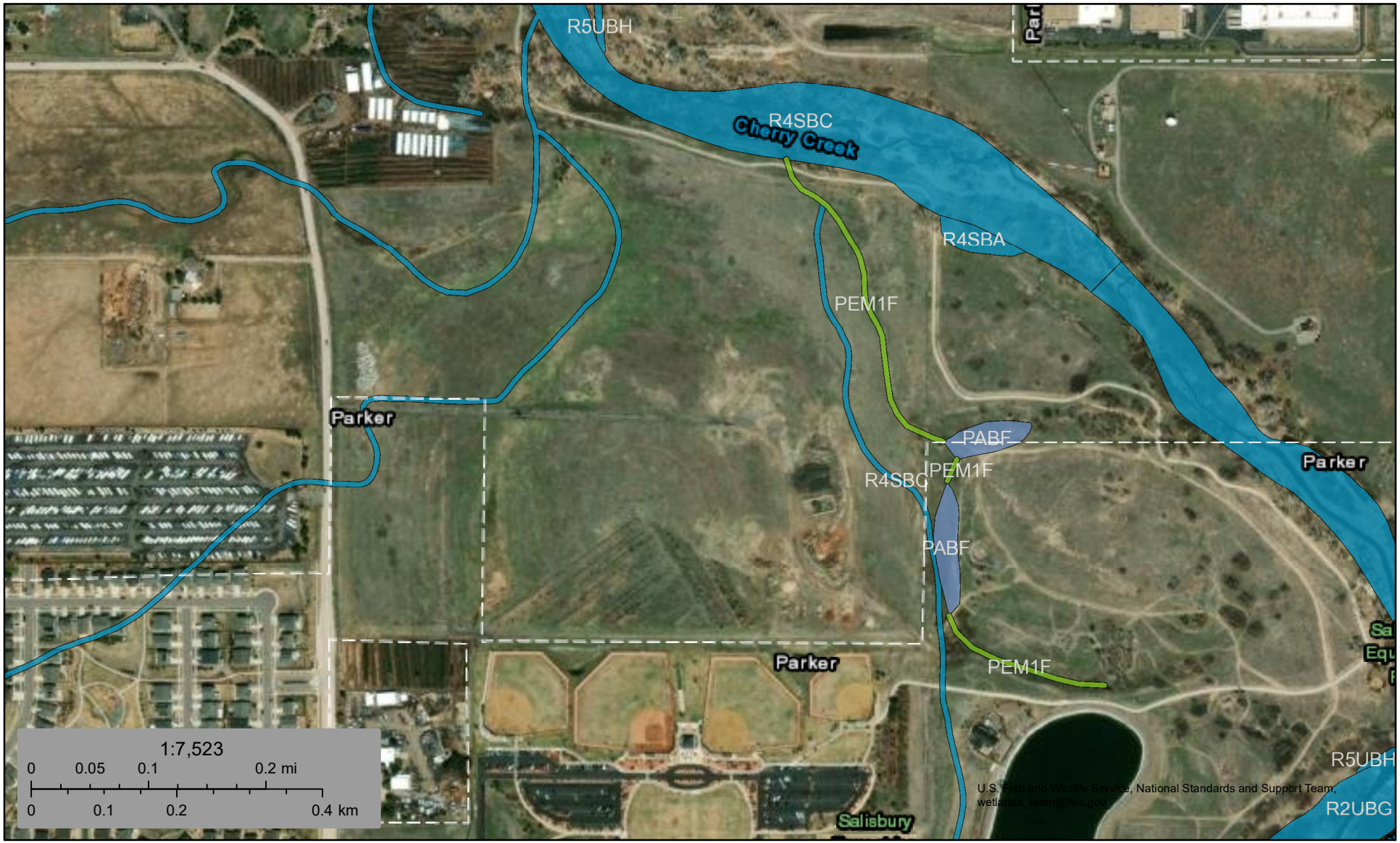
US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

U.S. Fish and Wildlife Service
National Wetlands Inventory

Salisbury Park North Wetlands Inventory



November 14, 2024

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

APPENDIX C – COMPUTATIONS

JVA Incorporated
1319 Spruce Street
Boulder, CO 80302
Ph: (303) 444 1951

JVA Office:
Boulder

Version 2024.03: 10/3/2024

Project Information:

Job Name:	Salisbury Park North		
Job Number:	3752c		
Date:	4/25/2025		
Designed by:	KAM		
Municipality :	Parker	Soil Type:	C/D

Runoff Calculations:

Minor Design Storm:	5	year
Major Design Storm:	100	year

Detention Calculations:

Minor Storm Detention:	EURV	year	plus	0	% EURV
Major Storm Detention:	100	year	plus	100	% EURV
Detention Volume by:	EURV (MHFD)		Enter WQCV :	0	cf
				(GB, PP, PLD, SFB, EDB,etc.)	

Allowable Release Rates (if applicable):

Max release rate 1 cfs / acre? Yes Site Area: 0.00 acres

Enter Offsite flows to bypass site (these will be added to the allowable release rates)

Qminor =	0.00	cfs (bypass flows)	**Qminor allow =**	**ENTER VALUE**	**cfs**
Q100 =	0.00	cfs (bypass flows)	**Q100allow =**	**0.00**	**cfs**

Rainfall Data Information:

Enter City, Town, or County: Parker

Frequency of Design Event	One Hour Point Rainfall P1	
2 yr	0.82	in
5 yr	1.10	in
10 yr	1.34	in
100 yr	2.29	in

Runoff Coefficient Calculations:

Use MHFD Equations? Yes

Intensity Duration Values:

I-D-F Calculate

JVA Incorpo
1319 Spruce b
Boulder, CO
Ph: (303) 444

Job Name: Salisbury Park North
Number: 3752c
Date: 4/25/25
By: KAM

Municipality: Parker

Salisbury Park North

Historic Runoff Coefficient & Time of Concentration Calculations

Municipality: Parker
Impervious Values: MHFD
Runoff Coefficients: MHFD Formulae
Major Design Storm: 100
Minor Design Storm: 5

Basin Design Data

		I (%) =	5%	95%			I (%)	Runoff Coefficients (MHFD Forumulae Table 6-5)				Initial Overland Time (t_i) MHFD Eq 6-3			Channelized Travel Time (t_t) MHFD Eq 6-4						t_c Comp	Regional Check ($t_{regional}$) MHFD Eq 6-5			t_c Final
Basin Name	Soil Type	Design Point	Area (sf) Undisturbed Native	Area (sf) Concrete Drives/Walks	A_{Total} (sf)	A_{Total} (ac)	Imp (%)	C2	C5	C10	C100	Length (ft)	Slope (%)	t_i (min)	Length (ft)	Slope (%)	Type of Land Surface	K	Velocity (fps)	t_t (min)	Time of Conc $t_i + t_t = t_c$	Channelized Length (ft)	Channelized Slope (ft/ft)	$t_{regional}$	t_c or $t_{regional}$
H1	C/D	1	759,288	5,897	765,185	17.57	5.7%	0.03	0.08	0.17	0.51	500	1.4%	37.8			Paved areas & shallow paved swales	20	0.0	0.0	37.8	0	0.000	N/A	37.8
H2	C/D	2	1,951,339		1,951,339	44.80	5.0%	0.03	0.08	0.17	0.50	500	1.0%	42.6			Paved areas & shallow paved swales	20	0.0	0.0	42.6	0	0.000	N/A	42.6
H3	C/D	3	35,811	970	36,780	0.84	7.4%	0.04	0.10	0.19	0.51	19	25.0%	2.7	163	1.8%	Paved areas & shallow paved swales	20	2.7	1.0	3.8	163	0.018	26.8	5.0
H4	C/D	4	516304.11	22422.37	538,726	12.37	8.7%	0.05	0.11	0.20	0.52	438	1.4%	34.1	570	0.5%	Grassed waterway	15	1.1	9.0	43.0	570	0.005	37.7	37.7
	TOTAL SITE		3,262,742	29,289	3,292,031	75.57	5.8%	0.03	0.08	0.17	0.51														

$I = (28.5\ P1) / ((10 + TC)\ 0.786)$

			Runoff Coeff's				Rainfall Intensities (in/hr)				Area		Flow Rates (cfs)			
Basin Name	Design Point	Time of Conc (tc)	C2	C5	C10	C100	2	5	10	100	A_{Total} (sf)	A_{Total} (ac)	Q2	Q5	Q10	Q100
H1	1	37.8	0.03	0.08	0.17	0.51	1.12	1.50	1.83	3.12	765,185	17.57	0.66	2.15	5.58	27.84
H2	2	42.6	0.03	0.08	0.17	0.50	1.04	1.39	1.70	2.90	1,951,339	44.80	1.35	4.72	12.82	65.50
H3	3	5.0	0.04	0.10	0.19	0.51	2.79	3.73	4.55	7.77	36,780	0.84	0.11	0.30	0.71	3.37
H4	4	37.7	0.05	0.11	0.20	0.52	1.13	1.50	1.83	3.13	538,726	12.37	0.75	1.98	4.45	20.13
										TOTAL SITE	3,292,031	75.57	2.87	9.15	23.57	116.85

JVA Incorporated
1319 Spruce Street
Boulder, CO 80302
Ph: (303) 444 1951

Job Name: Salisbury Park North
Job Number: 3752c
Date: 4/25/25
By: KAM

Salisbury Park North

Composite Runoff Coefficient Calculations

Municipality: Parker
Impervious Values: MHFD
Runoff Coefficients: MHFD Formulae

Basin Design Data

		I (%) =	95%	95%	95%	20%	60%	5%			I (%)	Runoff Coefficients (MHFD Forumulae Table 6-5)			
Basin Name	Soil Type	Design Point	Area (sf) Streets Paved	Area (sf) Concrete Drives/Walks	Area (sf) Roof	Area (sf) Landscaping	Area (sf) Artificial Turf (Sports Fields)	Area (sf) Undisturbed Native	A_{Total} (sf)	A_{Total} (ac)	Imp (%)	C2	C5	C10	C100
A1	C/D	1		25,874	3,584	10,157			39,615	0.91	75.8%	0.61	0.65	0.69	0.79
A2	C/D	2		28,471	3,467	11,513			43,451	1.00	75.1%	0.61	0.65	0.68	0.79
A3	C/D	3		27,319		97,375			124,694	2.86	36.4%	0.27	0.33	0.40	0.63
A4	C/D	4		39,552		185,057			224,609	5.16	33.2%	0.24	0.31	0.38	0.62
A5	C/D	5	26,659	3,814		13,178			43,651	1.00	72.4%	0.58	0.62	0.66	0.78
A6	C/D	6	22,604	5,199		11,625			39,428	0.91	72.9%	0.58	0.63	0.67	0.78
A7	C/D	7	89,321	90,683		83,566			263,570	6.05	71.2%	0.57	0.62	0.66	0.78
A8	C/D	9		22,157		18,976			41,133	0.94	60.4%	0.47	0.53	0.58	0.73
A9	C/D	10	32,684	44,241		44,933			121,858	2.80	67.3%	0.54	0.58	0.63	0.76
A10	C/D	11	28,658						28,658	0.66	95.0%	0.79	0.81	0.83	0.87
A11	C/D	12	16,081	2,450		586			19,117	0.44	92.7%	0.77	0.79	0.81	0.86
A12	C/D	13				40,845			40,845	0.94	20.0%	0.14	0.20	0.28	0.57
B1	C/D	14		291		19,932			20,223	0.46	21.1%	0.15	0.21	0.29	0.57
B2	C/D	15		15,076		2,449	106,872		124,397	2.86	63.5%	0.50	0.55	0.60	0.74
B3	C/D	16		12,608		7,725	110,436		130,768	3.00	61.0%	0.48	0.53	0.58	0.73
B4	C/D	18		23,222		42,563			65,784	1.51	46.5%	0.35	0.41	0.47	0.67
B5	C/D	19		1,578		26,032			27,610	0.63	24.3%	0.17	0.23	0.31	0.58
B6	C/D	20		19,637	6,765	22,563			48,965	1.12	60.4%	0.47	0.53	0.58	0.73
B7	C/D	22		16,717		74,094			90,810	2.08	33.8%	0.25	0.31	0.38	0.62
C1	C/D	23	31,860	7,024		64,739			103,623	2.38	48.1%	0.37	0.43	0.49	0.68
C2	C/D	24	30,714	5,552		6,425			42,691	0.98	83.7%	0.68	0.72	0.75	0.83
C3	C/D	25		22,578		152,490			175,068	4.02	29.7%	0.21	0.28	0.35	0.61
C4	C/D	26		28,633	1,734	146,505			176,871	4.06	32.9%	0.24	0.30	0.37	0.62
BP1	C/D	28				44,401			44,401	1.02	20.0%	0.14	0.20	0.28	0.57
BP2	C/D	29				205,092		183,887	388,979	8.93	12.9%	0.08	0.14	0.23	0.54
EX1	C/D	30				40,191		200,876	241,066	5.53	7.5%	0.05	0.10	0.19	0.51
EX2	C/D	31		22,422				516,304	538,726	12.37	8.7%	0.05	0.11	0.20	0.52
		TOTAL PROPERTY	278,581	465,095	15,549	1,373,010	217,308	901,067	3,250,611	74.62	36.0%	0.27	0.33	0.40	0.63

JVA Incorporated
1319 Spruce Street
Boulder, CO 80302
Ph: (303) 444 1951

Municipality: Parker

Job Name: Salisbury Park North
Job Number: 3752c
Date: 4/25/25
By: KAM

Salisbury Park North

Time of Concentration Calculations

Municipality: Parker
Impervious Values: MHFD
Runoff Coefficients: MHFD Formulae

Sub-Basin Data				Initial Overland Time (t_i) MHFD Eq 6-3			Channelized Travel Time (t_t) MHFD Eq 6-4						t_c Comp	Regional Check ($t_{regional}$) MHFD Eq 6-5			t_c Final
Basin Name	Design Point	A_{Total} (ac)	C5	Length (ft)	Slope (%)	t_i (min)	Length (ft)	Slope (%)	Type of Land Surface	C_v	Velocity (fps)	t_t (min)	Time of Conc $t_i + t_t = t_c$	Channelized Length (ft)	Channelized Slope (ft/ft)	$t_{regional}$	t_c or $t_{regional}$
A1	1	0.91	0.65	190	1.00%	11.3			Paved areas & shallow paved swales	20	0.0	0.0	11.3	0	0.000	N/A	11.3
A2	2	1.00	0.65	21	2.00%	3.0			Grassed waterway	15	0.0	0.0	3.0	0	0.000	N/A	5.0
A3	3	2.86	0.33	110	1.00%	14.8	583	0.50%	Grassed waterway	15	1.1	9.2	23.9	583	0.005	29.6	23.9
A4	4	5.16	0.31	300	1.20%	23.7	442	0.60%	Grassed waterway	15	1.2	6.3	30.1	442	0.006	27.3	27.3
A5	5	1.00	0.62	121	2.65%	6.9	237	0.60%	Grassed waterway	15	1.2	3.4	10.3	237	0.006	16.4	10.3
A6	6	0.91	0.63	154	2.65%	7.7	204	0.60%	Grassed waterway	15	1.2	2.9	10.7	204	0.006	15.9	10.7
A7	7	6.05	0.62	41	4.10%	3.6	1491	1.00%	Paved areas & shallow paved swales	20	2.0	12.4	16.0	1491	0.010	27.0	16.0
A8	9	0.94	0.53	190	1.00%	14.5			Paved areas & shallow paved swales	20	0.0	0.0	14.5	0	0.000	N/A	14.5
A9	10	2.80	0.58	392	3.10%	12.8	304	1.10%	Grassed waterway	15	1.6	3.2	16.1	304	0.011	17.2	16.1
A10	11	0.66	0.81	12	2.00%	1.5	1152	1.40%	Paved areas & shallow paved swales	20	2.4	8.1	9.6	1152	0.014	17.1	9.6
A11	12	0.44	0.79	12	2.00%	1.6	271	1.00%	Paved areas & shallow paved swales	20	2.0	2.3	3.8	271	0.010	12.3	5.0
A12	13	0.94	0.20	21	24.60%	2.6	346	0.50%	Grassed waterway	15	1.1	5.4	8.0	346	0.005	29.5	8.0
B1	14	0.46	0.21	22	8.10%	3.8	151	0.60%	Grassed waterway	15	1.2	2.2	6.0	151	0.006	25.1	6.0
B2	15	2.86	0.55	276	0.50%	21.0			Short Pasture and lawns	7	0.0	0.0	21.0	0	0.000	N/A	21.0
B3	16	3.00	0.53	276	0.50%	21.8			Short Pasture and lawns	7	0.0	0.0	21.8	0	0.000	N/A	21.8
B4	18	1.51	0.41	304	2.30%	16.6			Short Pasture and lawns	7	0.0	0.0	16.6	0	0.000	N/A	16.6
B5	19	0.63	0.23	215	1.90%	18.8			Short Pasture and lawns	7	0.0	0.0	18.8	0	0.000	N/A	18.8
B6	20	1.12	0.53	88	1.90%	7.9			Short Pasture and lawns	7	0.0	0.0	7.9	0	0.000	N/A	7.9
B7	22	2.08	0.31	200	2.00%	16.2	218	1.00%	Grassed waterway	15	1.5	2.4	18.7	218	0.010	22.9	18.7
C1	23	2.38	0.43	118	2.10%	10.5	554	0.70%	Paved areas & shallow paved swales	20	1.7	5.5	16.0	554	0.007	24.8	16.0
C2	24	0.98	0.72	76	1.60%	5.2	201	0.50%	Paved areas & shallow paved swales	20	1.4	2.4	7.6	201	0.005	14.1	7.6
C3	25	4.02	0.28	120	1.00%	16.5	795	0.40%	Grassed waterway	15	0.9	14.0	30.5	795	0.004	36.9	30.5
C4	26	4.06	0.30	143	1.00%	17.5	685	0.50%	Grassed waterway	15	1.1	10.8	28.2	685	0.005	32.3	28.2
BP1	28	1.02	0.20	173	8.00%	10.9	290	0.50%	Grassed waterway	15	1.1	4.6	15.4	290	0.005	28.4	15.4
BP2	29	8.93	0.14	125	6.80%	10.4	947	0.90%	Grassed waterway	15	1.4	11.1	21.5	947	0.009	39.2	21.5
EX1	30	5.53	0.10	125	6.80%	10.9	947	0.90%	Grassed waterway	15	1.4	11.1	22.0	947	0.009	41.3	22.0
EX2	31	12.37	0.11	438	1.40%	34.1	570	0.50%	Grassed waterway	15	1.1	9.0	43.0	570	0.005	37.7	37.7

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Job Name: Salisbury Park North
Job Number: 3752c
Date: 4/25/25
By: KAM

Salisbury Park North

Developed Storm Runoff Calculations

Design Storm : **100 Year**

Point Hour Rainfall (P_1) : **2.29**

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

	Direct Runoff							Total Runoff				Inlets				Pipe						Pipe/Swale Travel Time				
Basin Name	Design Point	Area (ac)	C100	tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Total tc (min)	ΣC*A (ac)	I (in/hr)	Q (cfs)	Inlet Type	Q intercepted	Q carryover	Q bypass	Pipe Size (in) or equivalent	Pipe Material	Slope (%)	Pipe Flow (cfs)	Max Pipe Capacity (cfs)	Length (ft)	Velocity (fps)	tt (min)	Total Time (min)	Notes
A1	1	0.91	0.79	11.3	0.72	5.89	4.25	11.31	0.72	5.89	4.26	Trench Drain	4.26	0.00	0.00	12 in	RCP	0.5%	**4.3**	2.7	30	3.2	0.16	11.46	Basin A1
A2	2	1.00	0.79	5.0	0.79	7.76	6.12	5.00	0.79	7.77	6.13	Perforated Drains	6.13	0.00	0.00	12 in	PVC	0.5%	**6.1**	3.5	487	4.2	1.95	6.95	Basin A2
A3	3	2.86	0.63	23.9	1.81	4.08	7.39	23.93	1.81	4.09	7.41		7.41	0.00	0.00										Basin A3
	TOTAL TO DP3							23.93	3.32	4.09	13.59	Flared End Section	13.59	0.00	0.00	18 in	RCP	0.4%	**13.6**	7.1	180	3.8	0.80	24.73	Basin A1 + A2 + A3
A4	4	5.16	0.62	27.3	3.20	3.79	12.11	27.32	3.20	3.79	12.13		12.13	0.00	0.00										Basin A4
	TOTAL TO DP4							27.32	6.52	3.79	24.73	Flared End Section	24.73	0.00	0.00	24 in	RCP	1.9%	24.7	33.6	220	10.9	0.34	27.66	DP3 + Basin A4
A5	5	1.00	0.78	10.3	0.78	6.11	4.78	10.33	0.78	6.12	4.78		4.78	0.00	0.00										Basin A5
	TOTAL TO DP5							27.66	7.30	3.77	27.51	Area Inlet	27.51	0.00	0.00	18 in	RCP	0.4%	**27.5**	7.1	108	3.8	0.48	28.14	DP4 + Basin A5
A6	6	0.91	0.78	10.7	0.71	6.03	4.27	10.67	0.71	6.04	4.27	Area Inlet	4.27	0.00	0.00	18 in	RCP	0.5%	4.3	8.0	51	4.3	0.20	10.87	Basin A6
A7	7	6.05	0.78	16.0	4.69	5.04	23.64	15.98	4.69	5.04	23.66	Combination Inlet	23.66	0.00	0.00	24 in	RCP	0.5%	**23.7**	17.2	335	5.1	1.10	17.08	Basin A7
	TOTAL TO DP8							17.08	5.40	4.88	26.36	N/A	26.36	0.00	0.00	36 in	RCP	0.5%	26.4	50.7	163	6.8	0.40	17.48	DP6 + DP7
A8	9	0.94	0.73	14.5	0.69	5.28	3.64	14.47	0.69	5.29	3.65	Trench Drain	3.65	0.00	0.00	12 in	RCP	0.5%	**3.6**	2.7	267	3.2	1.39	15.86	Basin A8
A9	10	2.80	0.76	16.1	2.12	5.03	10.69	16.07	2.12	5.03	10.69		10.69	0.00	0.00										Basin A9
	TOTAL TO DP10							16.07	2.81	5.03	14.16	Area Inlet	14.16	0.00	0.00	18 in	RCP	0.5%	**14.2**	8.0	14	4.2	0.06	16.13	Basin A8 + A9
A10	11	0.66	0.87	9.6	0.57	6.29	3.61	9.58	0.57	6.30	3.62		3.62	0.00	0.00										Basin A10
	TOTAL TO DP11							16.13	3.39	5.02	17.02	Combination Inlet	17.02	0.00	0.00	18 in	RCP	0.5%	**17.0**	8.1	35	4.2	0.14	16.26	DP10 + Basin A10
A11	12	0.44	0.86	5.0	0.38	7.76	2.94	5.00	0.38	7.77	2.94	Sheet Flow to Pond	2.94	0.00	0.00										Basin A11
A12	13	0.94	0.57	8.0	0.53	6.71	3.56	8.04	0.53	6.72	3.56	Sheet Flow to Pond	3.56	0.00	0.00										Basin A12
B1	14	0.46	0.57	6.0	0.26	7.38	1.95	5.99	0.26	7.39	1.96	Area Inlet	1.96	0.00	0.00	12 in	PVC	0.5%	2.0	3.5	714	4.3	2.78	8.77	Basin B1
B2	15	2.86	0.74	21.0	2.12	4.38	9.30	21.02	2.12	4.39	9.32	Underdrain	9.32	0.00	0.00	15 in	PVC	2.6%	9.3	14.5	16	11.7	0.02	21.05	Basin B2
B3	16	3.00	0.73	21.8	2.20	4.30	9.47	21.79	2.20	4.30	9.48	Underdrain	9.48	0.00	0.00	18 in	PVC	0.3%	**9.5**	7.3	283	3.9	1.22	23.01	Basin B3
	TOTAL TO DP17							23.01	4.59	4.18	19.18		19.18	0.00	0.00	24 in	RCP	1.0%	19.2	24.3	125	8.0	0.26	23.27	Basin B1 + B2 + B3
B4	18	1.51	0.67	16.6	1.02	4.94	5.03	16.62	1.02	4.95	5.04		5.04	0.00	0.00										Basin B4
	TOTAL TO DP18							23.27	5.61	4.15	23.29	Area Inlet	23.29	0.00	0.00	24 in	RCP	1.0%	23.3	24.3	109	7.2	0.25	23.52	DP15 + B4
B5	19	0.63	0.58	18.8	0.37	4.64	1.72	18.82	0.37	4.65	1.72		1.72	0.00	0.00										Basin B5
	TOTAL TO DP19							23.52	5.98	4.13	24.68	Area Inlet	24.68	0.00	0.00	24 in	RCP	1.0%	**24.7**	24.3	106	7.2	0.25	23.77	DP18 + Basin B5
B6	20	1.12	0.73	7.9	0.82	6.74	5.54	7.95	0.82	6.75	5.54	Area Inlet	5.54	0.00	0.00	24 in	RCP	1.0%	5.5	24.3	91	5.9	0.26	8.21	Basin B6
	TOTAL TO DP21							23.77	6.80	4.10	27.91	N/A	27.91	0.00	0.00	24 in	RCP	1.0%	**27.9**	24.3	134	7.2	0.31	24.08	DP18 + DP20
B7	22	2.08	0.62	18.7	1.30	4.66	6.05	18.67	1.30	4.67	6.06		6.06	0.00	0.00										Basin B7
	TOTAL TO DP22							24.08	8.10	4.08	33.00		33.00	0.00	0.00	24 in	RCP	1.0%	**33.0**	24.3	63	7.2	0.15	24.22	DP21 + Basin B7
C1	23	2.38	0.68	16.0	1.62	5.04	8.16	15.98	1.62	5.04	8.17	Combination Inlet	8.17	0.00	0.00	18 in	PVC	1.0%	8.2	14.7	274	7.9	0.57	16.55	Basin C1
C2	24	0.98	0.83	7.6	0.81	6.85	5.55	7.60	0.81	6.85	5.55		5.55	0.00	0.00										Basin C2
	TOTAL TO DP24							16.55	2.43	4.96	12.05	Combination Inlet	12.05	0.00	0.00	24 in	PVC	1.0%	12.0	31.6	138	8.7	0.26	16.82	Basin C1 + C2
C3	25	4.02	0.61	30.5	2.43	3.55	8.64	30.50	2.43	3.56	8.66		8.66	0.00	0.00										Basin C3
	TOTAL TO DP25							30.50	4.86	3.56	17.30	Flared End Section	17.30	0.00	0.00	24 in	RCP	1.0%	17.3	24.3	123	7.8	0.26	30.76	DP24 + Basin C3
C4	26	4.06	0.62	28.2	2.51	3.72	9.34	28.24	2.51	3.72	9.35		9.35	0.00	0.00										Basin C4
	TOTAL TO DP26							30.76	7.37	3.54	26.10	Flared End Section	26.10	0.00	0.00	24 in	RCP	1.0%	**26.1**	24.3	312	7.2	0.72	31.48	DP25 + Basin C4
	TOTAL TO DP27							31.48	15.47	3.49	54.02	N/A	54.02	0.00	0.00	24 in	RCP	1.0%	**54.0**	24.3	222	7.2	0.51	32.00	DP22 + DP26
BP1	28	1.02	0.57	15.4	0.58	5.12	2.95	15.43	0.58	5.13	2.96	Ex. Flared End Section	2.96	0.00	0.00										Basin BP1
BP2	29	8.93	0.54	21.5	4.79	4.33	20.76	21.48	4.79	4.34	20.79	Ex. Flared End Section	20.79	0.00	0.00										Basin BP2
EX1	30	5.53	0.51	22.0	2.85	4.28	12.19	21.95	2.85	4.29	12.21	Ex. Flared End Section	12.21	0.00	0.00										Basin EX1
EX2	31	12.37	0.52	37.7	6.43	3.13	20.12	37.65	6.43	3.13	20.13	Cherry Creek Drainageway	20.13	0.00	0.00										Basin EX2

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Job Name: Salisbury Park North
Job Number: 3752c
Date: 4/25/25
By: KAM

Salisbury Park North

Developed Storm Runoff Calculations

Design Storm : **5 Year**

Point Hour Rainfall (P_1) : **1.10**

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

	Direct Runoff							Total Runoff				Inlets				Pipe					Pipe/Swale Travel Time				
Basin Name	Design Point	Area (ac)	C5	tc (min)	C*A (ac)	I (in/hr)	Q (cfs)	Total tc (min)	ΣC*A (ac)	I (in/hr)	Q (cfs)	Inlet Type	Q intercepted	Q carryover	Q bypass	Pipe Size (in) or equivalent	Pipe Material	Slope (%)	Pipe Flow (cfs)	Max Pipe Capacity (cfs)	Length (ft)	Velocity (fps)	tt (min)	Total Time (min)	Notes
A1	1	0.91	0.65	11.3	0.59	2.83	1.68	11.31	0.59	2.83	1.68	Trench Drain	1.68	0.00	0.00	12 in	RCP	0.5%	1.7	2.7	30	3.4	0.15	11.46	Basin A1
A2	2	1.00	0.65	5.0	0.65	3.73	2.41	5.00	0.65	3.73	2.41	Perforated Drains	2.41	0.00	0.00	12 in	PVC	0.5%	2.4	3.5	487	4.5	1.81	6.81	Basin A2
A3	3	2.86	0.33	23.9	0.95	1.96	1.86	23.93	0.95	1.96	1.87		1.87	0.00	0.00										Basin A3
	TOTAL TO DP3							23.93	2.19	1.96	4.30	Flared End Section	4.30	0.00	0.00	18 in	RCP	0.4%	4.3	7.1	180	3.9	0.76	24.69	Basin A1 + A2 + A3
A4	4	5.16	0.31	27.3	1.58	1.82	2.87	27.32	1.58	1.82	2.87		2.87	0.00	0.00										Basin A4
	TOTAL TO DP4							27.32	3.77	1.82	6.86	Flared End Section	6.86	0.00	0.00	24 in	RCP	1.9%	6.9	33.6	220	7.9	0.47	27.79	DP3 + Basin A4
A5	5	1.00	0.62	10.3	0.63	2.93	1.83	10.33	0.63	2.94	1.84		1.84	0.00	0.00										Basin A5
	TOTAL TO DP5							27.79	4.39	1.80	7.93	Area Inlet	7.93	0.00	0.00	18 in	RCP	0.4%	**7.9**	7.1	108	3.8	0.48	28.27	DP4 + Basin A5
A6	6	0.91	0.63	10.7	0.57	2.89	1.65	10.67	0.57	2.90	1.65	Area Inlet	1.65	0.00	0.00	18 in	RCP	0.5%	1.7	8.0	51	3.3	0.26	10.92	Basin A6
A7	7	6.05	0.62	16.0	3.72	2.42	9.01	15.98	3.72	2.42	9.02	Combination Inlet	9.02	0.00	0.00	24 in	RCP	0.5%	9.0	17.2	335	5.2	1.08	17.06	Basin A7
	TOTAL TO DP8							17.06	4.29	2.35	10.07	N/A	10.07	0.00	0.00	36 in	RCP	0.5%	10.1	50.7	163	5.2	0.52	17.58	DP6 + DP7
A8	9	0.94	0.53	14.5	0.50	2.53	1.26	14.47	0.50	2.54	1.26	Trench Drain	1.26	0.00	0.00	12 in	RCP	0.5%	1.3	2.7	267	3.1	1.42	15.89	Basin A8
A9	10	2.80	0.58	16.1	1.63	2.41	3.94	16.07	1.63	2.42	3.95		3.95	0.00	0.00										Basin A9
	TOTAL TO DP10							16.07	2.13	2.42	5.15	Area Inlet	5.15	0.00	0.00	18 in	RCP	0.5%	5.1	8.0	14	4.5	0.05	16.12	Basin A8 + A9
A10	11	0.66	0.81	9.6	0.53	3.02	1.61	9.58	0.53	3.03	1.61		1.61	0.00	0.00										Basin A10
	TOTAL TO DP11							16.12	2.66	2.41	6.43	Combination Inlet	6.43	0.00	0.00	18 in	RCP	0.5%	6.4	8.1	35	4.7	0.12	16.25	DP10 + Basin A10
A11	12	0.44	0.79	5.0	0.35	3.73	1.29	5.00	0.35	3.73	1.29	Sheet Flow to Pond	1.29	0.00	0.00										Basin A11
A12	13	0.94	0.20	8.0	0.19	3.22	0.60	8.04	0.19	3.23	0.60	Sheet Flow to Pond	0.60	0.00	0.00										Basin A12
B1	14	0.46	0.21	6.0	0.10	3.54	0.34	5.99	0.10	3.55	0.34	Area Inlet	0.34	0.00	0.00	12 in	PVC	0.5%	0.3	3.5	714	2.6	4.54	10.53	Basin B1
B2	15	2.86	0.55	21.0	1.58	2.10	3.31	21.02	1.58	2.11	3.32	Underdrain	3.32	0.00	0.00	15 in	PVC	2.6%	3.3	14.5	16	9.0	0.03	21.05	Basin B2
B3	16	3.00	0.53	21.8	1.60	2.06	3.29	21.79	1.60	2.07	3.30	Underdrain	3.30	0.00	0.00	18 in	PVC	0.3%	3.3	7.3	283	3.8	1.26	23.05	Basin B3
	TOTAL TO DP17							23.05	3.27	2.01	6.56		6.56	0.00	0.00	24 in	RCP	1.0%	6.6	24.3	125	6.1	0.34	23.39	Basin B1 + B2 + B3
B4	18	1.51	0.41	16.6	0.62	2.37	1.48	16.62	0.62	2.38	1.49		1.49	0.00	0.00										Basin B4
	TOTAL TO DP18							23.39	3.90	1.99	7.75	Area Inlet	7.75	0.00	0.00	24 in	RCP	1.0%	7.7	24.3	109	6.4	0.28	23.67	DP15 + B4
B5	19	0.63	0.23	18.8	0.15	2.23	0.33	18.82	0.15	2.23	0.33		0.33	0.00	0.00										Basin B5
	TOTAL TO DP19							23.67	4.04	1.98	7.99	Area Inlet	7.99	0.00	0.00	24 in	RCP	1.0%	8.0	24.3	106	6.4	0.27	23.95	DP18 + Basin B5
B6	20	1.12	0.53	7.9	0.59	3.24	1.92	7.95	0.59	3.24	1.92	Area Inlet	1.92	0.00	0.00	24 in	RCP	1.0%	1.9	24.3	91	4.2	0.36	8.31	Basin B6
	TOTAL TO DP21							23.95	4.64	1.96	9.10	N/A	9.10	0.00	0.00	24 in	RCP	1.0%	9.1	24.3	134	6.7	0.34	24.28	DP18 + DP20
B7	22	2.08	0.31	18.7	0.65	2.24	1.45	18.67	0.65	2.24	1.45		1.45	0.00	0.00										Basin B7
	TOTAL TO DP22							24.28	5.28	1.95	10.29		10.29	0.00	0.00	24 in	RCP	1.0%	10.3	24.3	63	6.9	0.15	24.43	DP21 + Basin B7
C1	23	2.38	0.43	16.0	1.02	2.42	2.46	15.98	1.02	2.42	2.46	Combination Inlet	2.46	0.00	0.00	18 in	PVC	1.0%	2.5	14.7	274	5.8	0.79	16.77	Basin C1
C2	24	0.98	0.72	7.6	0.70	3.29	2.31	7.60	0.70	3.29	2.31		2.31	0.00	0.00										Basin C2
	TOTAL TO DP24							16.77	1.72	2.37	4.07	Combination Inlet	4.07	0.00	0.00	24 in	PVC	1.0%	4.1	31.6	138	6.5	0.36	17.12	Basin C1 + C2
C3	25	4.02	0.28	30.5	1.11	1.70	1.89	30.50	1.11	1.71	1.90		1.90	0.00	0.00										Basin C3
	TOTAL TO DP25							30.50	2.83	1.71	4.84	Flared End Section	4.84	0.00	0.00	24 in	RCP	1.0%	4.8	24.3	123	5.7	0.36	30.86	DP24 + Basin C3
C4	26	4.06	0.30	28.2	1.23	1.78	2.19	28.24	1.23	1.79	2.20		2.20	0.00	0.00										Basin C4
	TOTAL TO DP26							30.86	4.06	1.70	6.89	Flared End Section	6.89	0.00	0.00	24 in	RCP	1.0%	6.9	24.3	312	6.2	0.84	31.70	DP25 + Basin C4
	TOTAL TO DP27							31.70	9.35	1.67	15.61	N/A	15.61	0.00	0.00	24 in	RCP	1.0%	15.6	24.3	222	7.7	0.48	32.18	DP22 + DP26
BP1	28	1.02	0.20	15.4	0.20	2.46	0.50	15.43	0.20	2.46	0.50	Ex. Flared End Section	0.50	0.00	0.00										Basin BP1
BP2	29	8.93	0.14	21.5	1.25	2.08	2.60	21.48	1.25	2.08	2.61	Ex. Flared End Section	2.61	0.00	0.00										Basin BP2
EX1	30	5.53	0.10	22.0	0.53	2.05	1.09	21.95	0.53	2.06	1.10	Ex. Flared End Section	1.10	0.00	0.00										Basin EX1
EX2	31	12.37	0.11	37.7	1.31	1.50	1.97	37.65	1.31	1.50	1.98	Cherry Creek Drainageway	1.98	0.00	0.00										Basin EX2

APPENDIX D – MAPPING

DRAINAGE MAP LEGEND

- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- EXISTING SPOT ELEVATION
- HISTORIC DRAINAGE BASIN BOUNDARY (MAJOR BASIN)
- HISTORIC DRAINAGE BASIN BOUNDARY (SUB BASIN)
- DIRECTION OF FLOW (HISTORIC)
- BASIN DESIGN POINT
- DRAINAGE BASIN IDENTIFICATION BUBBLE

A = HISTORIC BASIN DESIGNATION
.50 = 100-YR RUNOFF COEFFICIENT
1.0 = AREA ACRES

HISTORIC RUNOFF SUMMARY TABLE

BASIN	DESIGN POINT	AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (Cfs)
H1	1	17.57	2.71	31.61
H2	2	44.80	5.97	74.37
H3	3	0.84	0.38	3.83
H4	4	12.37	2.50	22.85

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Town of Parker SALISBURY REGIONAL PARK - PHASE 1

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ARCHITECTURE
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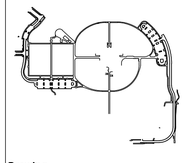
Checked By:	WTP/CWK/CFG

Key Map



Drawing

HISTORIC DRAINAGE MAP

FIG. 1

SITE PLAN SUBMITTAL

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THE LINE SHOWN ABOVE IS 1" WHEN PLOTTED ON ARCH D SHEETS ORIGINAL PAGE SIZE

THE SQUARES ABOVE ARE COLOR, WITH BLACK AND WHITE TESTS, & PRINTED CORRECTLY

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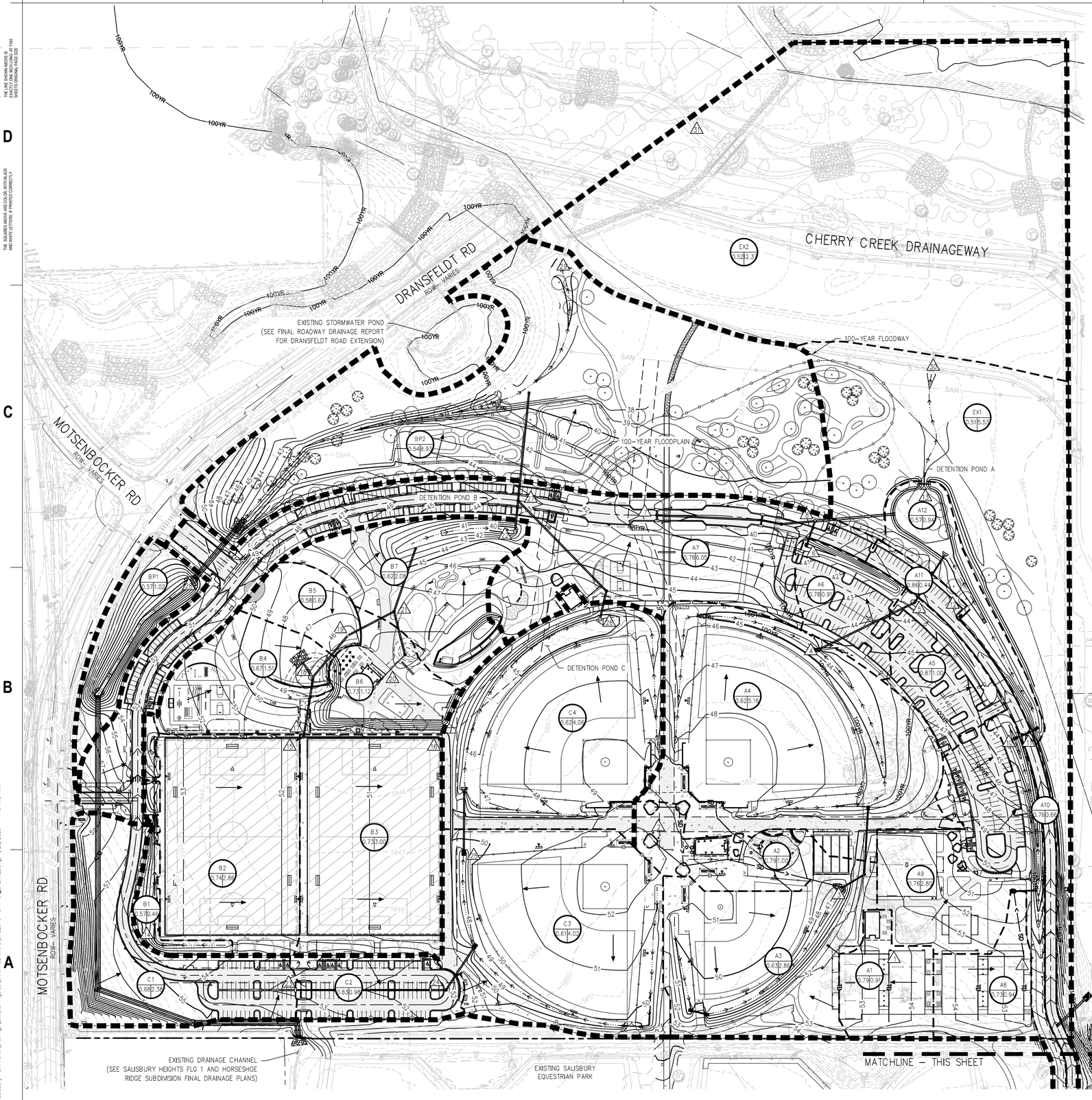

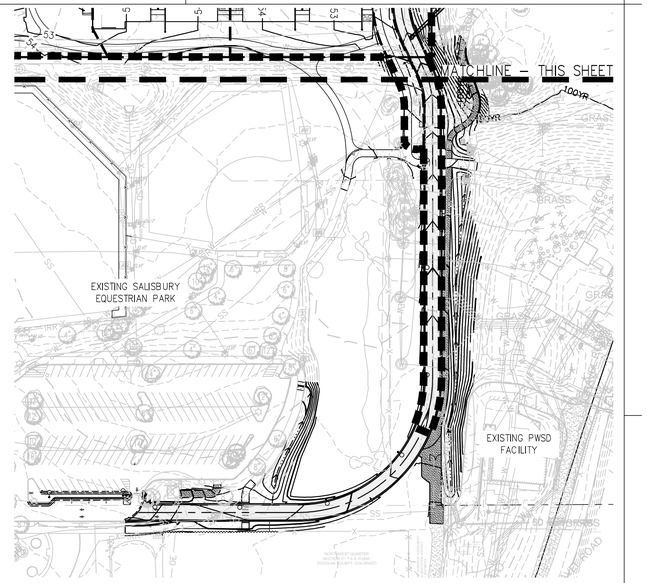

DRAINAGE MAP LEGEND

- EXISTING INDEX CONTOUR
- EXISTING INTERMEDIATE CONTOUR
- PROPOSED INDEX CONTOUR
- PROPOSED INTERMEDIATE CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- HISTORIC DRAINAGE BASIN BOUNDARY (MAJOR BASIN)
- HISTORIC DRAINAGE BASIN BOUNDARY (SUB BASIN)
- DEVELOPED DRAINAGE BASIN BOUNDARY (MAJOR BASIN)
- DEVELOPED DRAINAGE BASIN BOUNDARY (SUB BASIN)
- DIRECTION OF FLOW (HISTORIC)
- DIRECTION OF FLOW (DEVELOPED)
- OVERFLOW PATH
- BASIN DESIGN POINT
- DRAINAGE BASIN IDENTIFICATION BUBBLE

A = DEVELOPED BASIN DESIGNATION
.50 = 100-YR RUNOFF COEFFICIENT
1.0 = AREA ACRES

DEVELOPED RUNOFF SUMMARY TABLE

BASIN	DESIGN POINT	AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (Cfs)
A1	1	0.91	1.68	4.26
A2	2	1.00	2.41	6.13
A3	3	2.86	1.87	7.41
A4	4	5.16	2.87	12.13
A5	5	1.00	1.84	4.78
A6	6	0.91	1.65	4.27
A7	7	6.05	9.02	23.66
A8	9	0.94	1.26	3.65
A9	10	2.80	3.95	10.69
A10	11	0.66	1.61	3.62
A11	12	0.44	1.29	2.94
A12	13	0.94	0.60	3.56
B1	14	0.46	0.34	1.96
B2	15	2.86	3.32	9.32
B3	16	3.00	3.30	9.48
B4	18	1.51	1.49	5.04
B5	19	0.63	0.33	1.72
B6	20	1.12	1.92	5.54
B7	22	2.08	1.45	6.06
C1	23	2.38	2.46	8.17
C2	24	0.98	2.31	5.55
C3	25	4.02	1.90	8.66
C4	26	4.06	2.20	9.35
BP1	28	1.02	0.50	2.96
BP2	29	8.93	2.61	20.79
EX1	30	5.53	1.10	12.21
EX2	31	12.37	1.98	20.13

100 0 100 200
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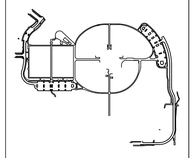

Drawing

DEVELOPED MASTER DRAINAGE MAP

FIG. 2

SITE PLAN SUBMITTAL

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