DRAINAGE REPORT

FOR

Parker Town Hall Expansion

February 5, 2024

Prepared For:

Town of Parker
20120 E Mainstreet
Parker, CO 80138
(303) 841-0353

Prepared By:

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Consulting Engineers
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Denver, Colorado 80237
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S. A. Miro Job No. 22139

ENGINEER'S STATEMENT

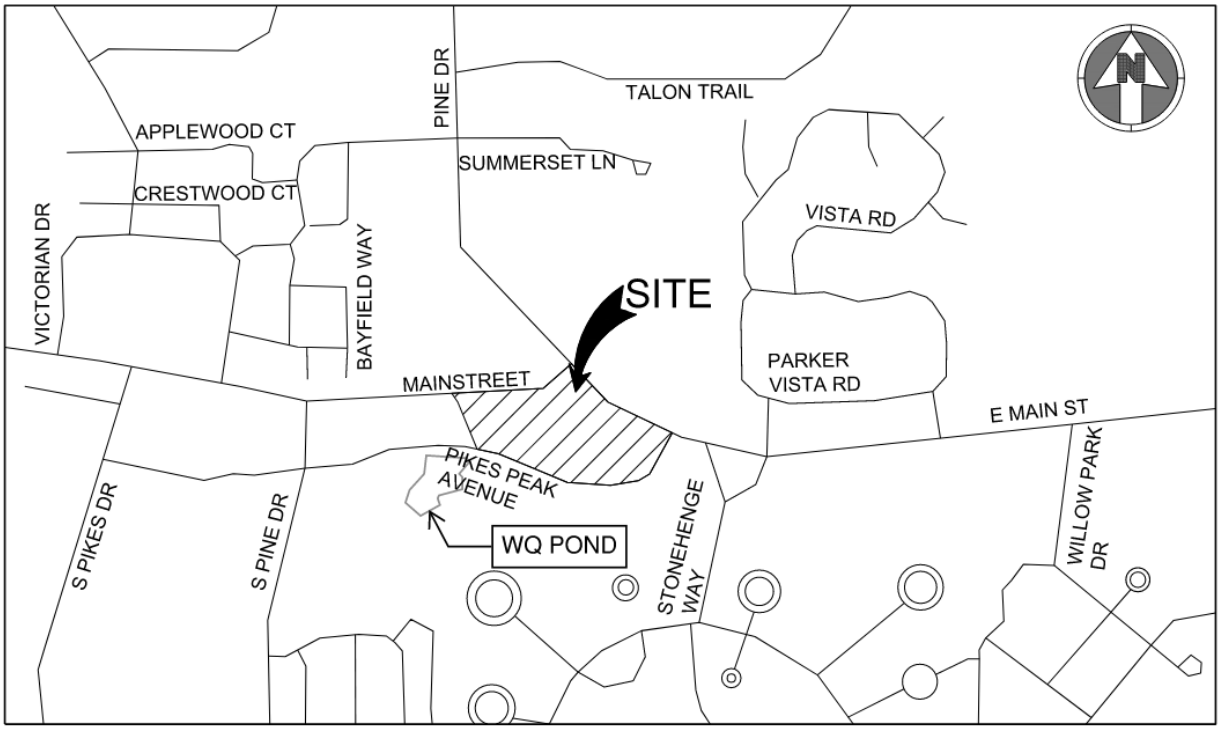
This report for the final design of Parker Town Hall Expansion was prepared by me or under my direct supervision in accordance with the provisions of the Town of Parker Storm Drainage and Environmental Criteria Manual. I understand that the Town of Parker and its designated town authority do not and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

Megan H. Vogt, P.E.
Registered Professional Engineer
State of Colorado No. 47666

Table of Contents

I. General Location And Description

A. Location



VICINITY MAP
NTS

The site is located at 20120 Mainstreet in Parker, Colorado, and contains the existing Parker Town Hall facility. The site includes the existing building with a footprint of roughly ½ acre, and about 1½ acres of pavement including parking lot and sidewalks. The total property area is 6.67 acres (290,350 sq. ft.) including Lots 1 and 2.

The exact location is Lots 1 and 2, Parker Town Hall, 3rd Amendment, Subdivision Exemption Plat located in the Northwest ¼ of Section 23, Township 6 South, Range 66 West of the 6th P.M.

The site is bound by Main Street on the north, East Main Street to the east, Pikes Peak Avenue on the south and “Old Town Hall” to the west. The site is adjacent to Sulphur Gulch, which lies south of the site. The site is tributary to an existing regional water quality pond (“Town Hall Pond”), which is located southwest of the site and serves the site as well as other surrounding developments. The Town Hall Pond discharges into Sulphur Gulch.

Surrounding subdivisions include Rowley Down to the south, Mainstreet and Pine Marketplace to the north, Civic Center to the west, and Parker Vista to the east.

B. Description of Property

The existing site is developed with parking areas, landscape islands, sidewalks, and utilities serving the existing Town Hall. Old Town Hall is located west of the site at 20118 Mainstreet. Pikes Peak Ave. bounds the site on the south and east, and provides vehicular access from E Main Street and from Mainstreet via PACE Center Drive.

The existing facility sits below E Main Street by several feet, with a large hillside separating the

facility from the street. General speaking, the site slopes from north to south, and gently from east to west. Developed runoff from the site is conveyed via the existing underground storm network to the existing Town Hall Pond located east of the PACE Center.

The existing soils are primarily in Hydrological Group B with a small portion in Group A. The NRCS Web Soil Survey is included in Appendix A for reference.

C. Proposed Development

The existing Town Hall facility will be expanded to include a two-story addition to the east. The expansion will have a footprint of about 18,900 square feet. No below-grade interior space is proposed, though there will be portions of the building which fall below the exterior grade.

The proposed design includes revisions to the existing parking lot to accommodate the addition. The existing round-about will be reconfigured, and the existing curb cut serving the round-about will be closed in lieu of a new entrance which will better support the new primary entrance to the facility. The proposed land use matches the existing land use, continuing to provide public Town Hall facilities as well as office space for Town of Parker staff.

D. Floodplain

Per the Flood Insurance Rate Map Number 08035C0069F, dated September 30, 2005, the project site is located within FEMA Unshaded Zone which is defined as: “areas determined to be outside of the 0.2% annual chance (500-year) floodplain”.

Sulphur Gulch lies south of the property and is noted as Zone AE. This area is not anticipated to impact the site which is outside of limits of construction and disturbance. The nearest floodplain contour to the Town Hall’s site is 5886, which is 1.7’ lower than the existing local low point (design point 3 on the proposed drainage plan). We understand that the Town Hall site has not experienced any flood conditions in recent years.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Basin Description

Based on the “Town of Parker, Town Hall Water Quality Basin, Design Report”, by Moser & Associates Engineering, hereby referred to as the Moser Report, the site falls within the 7.5 acre Town Hall Watershed, which includes Parker Town Hall and Old Town Hall. The existing regional water quality pond (“Town Hall Pond”) was sized to provide water quality treatment for the Town Hall site, along with a portion of the larger Pine Gulch Watershed. Relevant references from this existing report are included in Appendix D.

The Moser Report assumes a total imperviousness of the Town Hall basin of 85%, and designed the Town Hall Pond to provide full water quality treatment for this level of development. This proposed expansion will impact the imperviousness slightly, but will remain well below the ultimate planned imperviousness. As such, this project does not propose any additional water quality or detention measures.

Our design includes an analysis of the capacity of the existing and proposed storm sewer system, utilizing the Town Hall’s as-built records to confirm basins and offsite drainage patterns. The as-built Drainage Plan is included in Appendix D for reference.

The Flood Hazard Area Delineation for the Sulphur Gulch major basin was prepared by Merrick & Company in February 2021.

B. Sub-Basin Description

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 west through the existing storm sewer network and to the Town Hall Pond. There are no known offsite flows onto the site. The adjacent roadways Main Street and Pikes Peak are developed with inlets at local low points which are captured separately.

There are no known major drainageways on the site with a total tributary area greater than 130 acres.

The site is divided into multiple sub-basins, which are detailed in the following paragraphs and depicted within the Drainage Plan, Fig. 1, located within Appendix E.

Basins A1 and A2 (A basins) will drain via surface flow into inlets and connect to the existing public main in Pikes Peak Ave at the existing storm manhole STM MH 3.

Basin B1 will drain via surface flow to a new Type 16 inlet located near the new vehicular entrance. This inlet will connect to the existing private 8" PVC roof drain line via wye connection. The flows will outfall to the existing public main in Pikes Peak Ave at the existing storm manhole STM MH 2.

Basins C1, C2, C3, C4 & C5 (C basins) will drain via surface flow into proposed and existing inlets via swales, curb and gutters, and curb chases, combining with A & B basin runoff at the existing public main in Pikes Peak Ave at the existing storm existing manhole STM MH 1.

The proposed and existing roof areas are divided into various R basins, each representing an internal drain which will be conveyed below-grade by the existing and proposed storm network. Only overflow from the roof areas will discharge directly to grade.

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 Moser Report and Town Hall Final Drainage Report are being utilized as the primary references for the development, and dictate the limits for development within the project's basin. Excerpts from these documents are included for reference within Appendix D.

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. Please 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 StormCAD hydraulic modeling software. Per the CRITERIA, the minor and major storms were considered to have a 5-year and 100-year return period, respectively. The Hydraulic Grade Lines (HGLs) for the minor 5-year event remain within the pipes and the HGLs for the major 100-year event remain one foot below grade as required by the CRITERIA.

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 storm-related variances requested for this site.

IV. DRAINAGE FACILITY DESIGN

A. General Concept

Proposed drainage patterns across the project site generally remain consistent with existing conveyance patterns. Typically, developed on-site runoff will sheet flow to the southwest and will be captured by a network of underground pipes. Captured flows will be conveyed via storm sewer to the southwest of the project site across Pike Peak Ave to the water quality pond. Per the Moser Report, the pond provides water quality treatment, but not detention. The proposed storm sewer system will adequately convey fully developed runoff for the 5-year and 100-year design storms. Refer to the Drainage Plan within Appendix E for additional information on the proposed drainage patterns.

B. Specific Details

The existing double Type 16 inlet located at Design Point 3 does not have a clear surface overflow path in the event this inlet becomes clogged in the existing condition. This sump inlet is approximately 3’ lower than the adjacent portion of Pikes Peak Ave. The proposed curb cut and additional single Type 16 inlet at Design Point 6 provides a lower overflow location than the existing condition, and ensures that the overflow path is below the existing and proposed finished floor elevations (FFEs).

C. Detention and Water Quality

The Moser Report notes water quality for the project site is provided in the Town Hall Pond located southwest of the project site. This water quality basin has been sized to accommodate tributary flows from the fully developed condition. The Town Hall Basin (7.5 acres) was designed with an 85% imperviousness assumed for the fully developed condition. Appendix D contains relevant pages from the Moser Report for reference.

The design of the proposed expansion accounts for 5.2 acres of both disturbed and undisturbed areas which impact the existing storm infrastructure, and total an imperviousness of 56%. The imperviousness of the entire 7.5 acre Town Hall Basin has not been re-evaluated, however the nominal impact to the imperviousness is clearly consistent with those uses anticipated in the Moser Report, and is will not bring the basin’s imperviousness to above 85%. Therefore, no additional on-site water quality treatment or detention storage is proposed.

V. ENVIRONMENTAL PROTECTION CRITERIA

The project will include disturbance of approximately 1.65 acres (72,000 square feet). The soils on site belong primarily to NRCS Hydrologic Group B and generally exhibit a moderate hazard of erosion by water. A small portion is classified as Group A to remain conservative type B will used as the controlling Hydrologic Soil Group. 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 will be 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. Silt fences will be used around the perimeter of the site. Inlet protection per the Town of Parker standard details will be placed 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 parameters outlined within the associated master drainage reports and plans. The proposed drainage system will provide adequate conveyance of developed stormwater runoff to the existing stormwater infrastructure downstream of the site and ultimately to the Town Hall Pond and Sulphur Gulch without adverse impact.

B. Summary of Drainage Concept

The Parker Town Hall Expansion drainage and stormwater infrastructure improvements will provide stormwater conveyance for the minor and major storm events and will route runoff to the downstream receiving drainageways. Fully developed flows will be conveyed via overland flow, curb and gutter, and below-grade infrastructure to proposed inlets. The proposed storm sewer system will discharge into the existing storm sewer infrastructure west of the project site which remains in conformance with the Moser 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. Maintenance of the proposed facilities shall be the responsibility of the Town of Parker.

As previously stated, the proposed project remains in conformance with the master planning for the area and is not anticipated to have a major impact on the Major Drainageway Planning Studies. The increased impervious area has been accounted for in the master planned infrastructure and downstream facilities.

C. Summary of Sediment and Erosion Control Concept

The sediment and erosion control plans are included in the construction documents. The temporary measures are per Parker standards and have been designed to protect downstream infrastructure during the construction phase. Permanent sediment and erosion control will be done through a combination of strategically placed landscaped drainage swales, existing and proposed storm inlets, and deliberate grading matching the existing patterns.

VII. REFERENCES

1. “Geotechnical Engineering Study Parker Town Hall Expansion”, Kumar & Associates, Inc., dated January 17, 2023.
2. “Town of Parker, Town Hall Water Quality Basin, Design Report”, Moser & Associates Engineering, No date provided.
3. “Final Drainage Report for Parker Town Hall”, S.A. Miro, Inc., dated January 11, 2001, revised March 12, 2001.
4. “Storm Drainage and Environmental Criteria Manual”, Town of Parker, Revised and Adopted February 2014.
5. “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

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 contained within the Flood Insurance Study (FIS) report that accompanies 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 FIS report 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 Flood Insurance Study report for this jurisdiction.

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 **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 13. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane 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 (NAVD 88). These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. An average offset between NAVD 88 and the National Geodetic Vertical Datum of 1929 (NGVD 29) has been computed for each Douglas County flooding source. This offset was then applied to the NGVD 29 flood elevations that were not revised during the creation of this countywide format FIRM. The offsets for each flooding source shown on this FIRM are shown in the Douglas County Vertical Datum Offset Table below. 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:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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. For information about additional control points maintained by Douglas County, please visit http://www.publicstaging.douglas.co.us/website/control/viewer.htm.

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 2003.

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 in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this 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.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov.

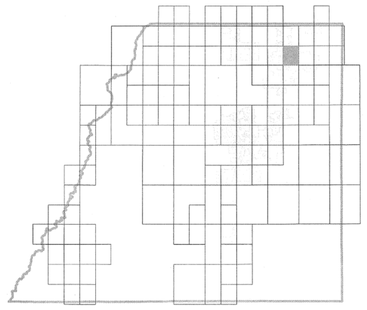
If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

Douglas County Vertical Datum Offset Table

Flooding Source	Vertical Datum Offset (ft)	Flooding Source	Vertical Datum Offset (ft)
Baldwin Gulch	3.10	Newlin Gulch	3.14
Bayou Gulch	3.22	Plum Creek, Cross Section A to D	3.12
Big Dry Creek Tributary C	3.15	Section 34 Tributary	3.62
Carpenter Creek	3.93	Sellers Gulch	3.43
Cherry Creek, Cross Section BZ to CU	3.23	Sellers Gulch, Unnamed Tributary	3.39
East Plum Creek, Cross Section W to AY	3.28	Sulphur Gulch	3.13
East Plum Creek, Cross Section AZ to CZ	3.49	Tallman Gulch	3.16
East Plum Creek, Cross Section DA to EM	3.71	West Plum Creek, Cross Section W to AM	3.68
Glade Gulch	3.65		
Happy Canyon Creek	3.12		

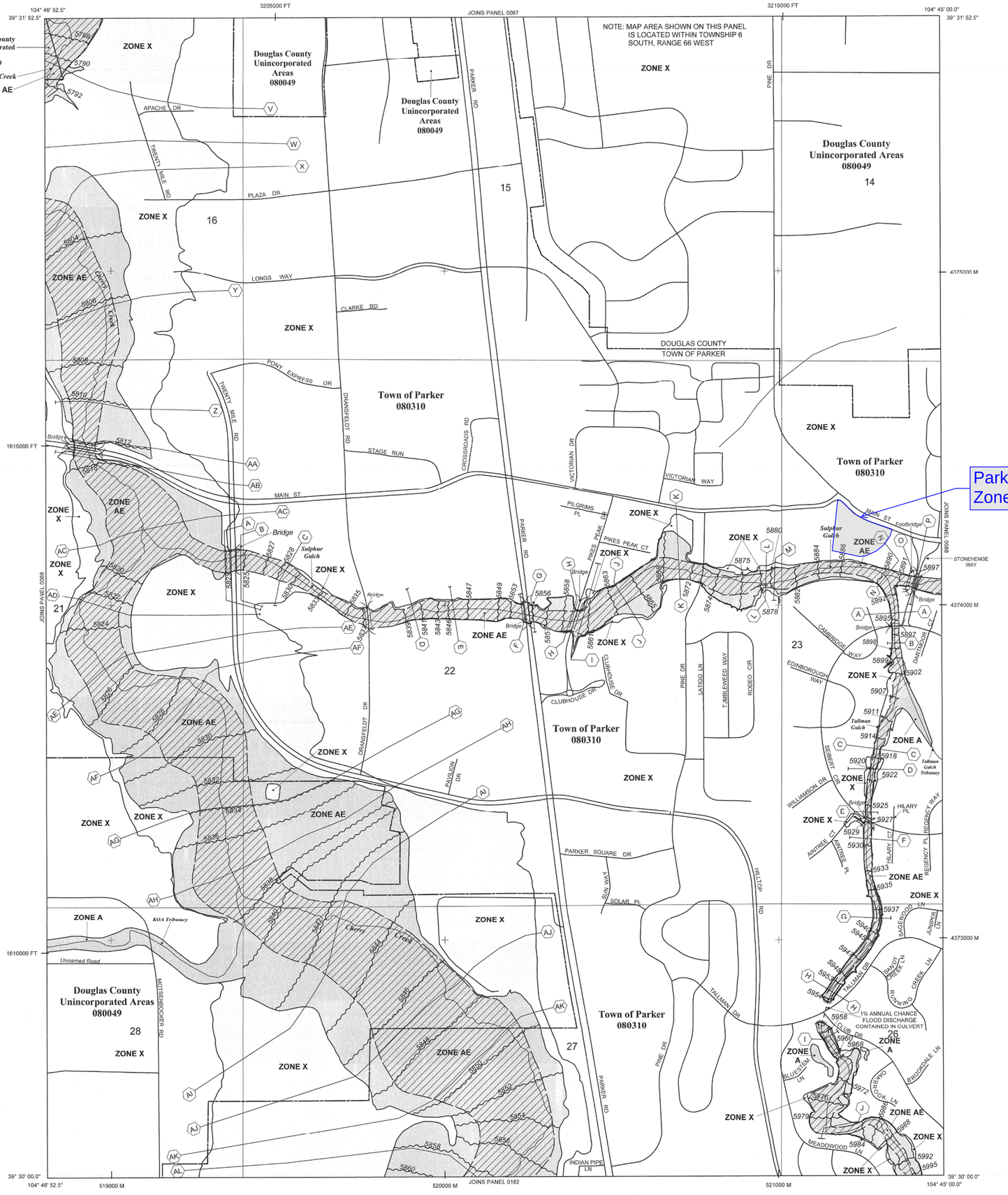
Example: To convert Baldwin Gulch elevations to NAVD 88, 3.10 feet were added to the NGVD 29 elevations.

Panel Location Map



This digital Flood Insurance Rate Map (FIRM) was produced through a cooperative partnership between the State of Colorado Water Conservation Board, the Urban Drainage and Flood Control District, and the Federal Emergency Management Agency (FEMA). The State of Colorado Water Conservation Board and the Urban Drainage and Flood Control District have implemented a long-term approach of floodplain management to reduce the costs associated with flooding. As part of this effort, both the State of Colorado and the Urban Drainage and Flood Control District have joined in Cooperating Technical Partner agreements with FEMA to produce this digital FIRM.

Additional flood hazard information and resources are available from local communities, the Colorado Water Conservation Board, and the Urban Drainage and Flood Control District.



Parker Town Hall
Zone X

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. 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.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

Floodplain boundary
Floodway boundary
Zone D 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.
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
*Referenced to the North American Vertical Datum of 1988
A — A — Cross section line
104° 50' 37.5" , 39° 30' 00" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4276000 M — 1000-meter Universal Transverse Mercator grid ticks, zone 13
3180000 FT — 5000-foot ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 502), Lambert Conformal Conic projection
KK6400 — National Geodetic Survey bench mark (see explanation in Notes to Users section of this FIRM panel

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
SEPTEMBER 30, 2005

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

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.

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

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0069F

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

PANEL 69 OF 495
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
DOUGLAS COUNTY	080049	0069	F
PARKER, TOWN OF	080310	0069	F

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
08035C0069F

EFFECTIVE DATE:
SEPTEMBER 30, 2005

Federal Emergency Management Agency

5. HYDROLOGIC CRITERIA

5.1 INTRODUCTION

This section presents the criteria and methodology for determining storm runoff design peaks and volumes to be used in the Town of Parker for preparation of storm drainage plans and facility design. In general, hydrologic analysis of the initial and major storm events for both the historic and fully developed site conditions is required. In addition to the hydrologic analysis for a site, a hydrologic analysis should be performed for all off site basins that impact the proposed site. The Town of Parker adopts procedures prescribed by the Urban Drainage and Flood Control District (UDFCD) for performing hydrologic analysis. These procedures may be found in the Rainfall and Runoff sections of the MANUAL. Standards and technical criteria found in the MANUAL should be followed except where superseded by specific requirements of this manual.

5.2 DESIGN RAINFALL

For any storm runoff technique, design rainfall must first be established. The design rainfall data to be used for the Town of Parker were obtained from NOAA Atlas 2, Precipitation– Frequency Atlas of the Western United States, Volume III– Colorado. The design storm events developed and utilized are the same as those used by UDFCD.

The one-hour point rainfall depths for different frequency events are shown in Table 5.1 herein. Rainfall intensity as a function of the one-hour point rainfall and the time of concentration can be approximated by the following equation which appears in the MANUAL as Equation RA-5.

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

Where, I = rainfall intensity (in/hr)
P_1 = one-hour point rainfall depth (in)
t_c = time of concentration (min)

Graphical presentation of the equation is shown as the Time-Intensity-Frequency curves in Figure 5.1 herein. Rainfall intensity for use in the Rational Method may be taken from Figure 5.1 or calculated using the equation.

TABLE 5.1
ONE-HOUR POINT RAINFALL

Frequency of Design Event (yr)	One-hour Point Rainfall, P_1 (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.

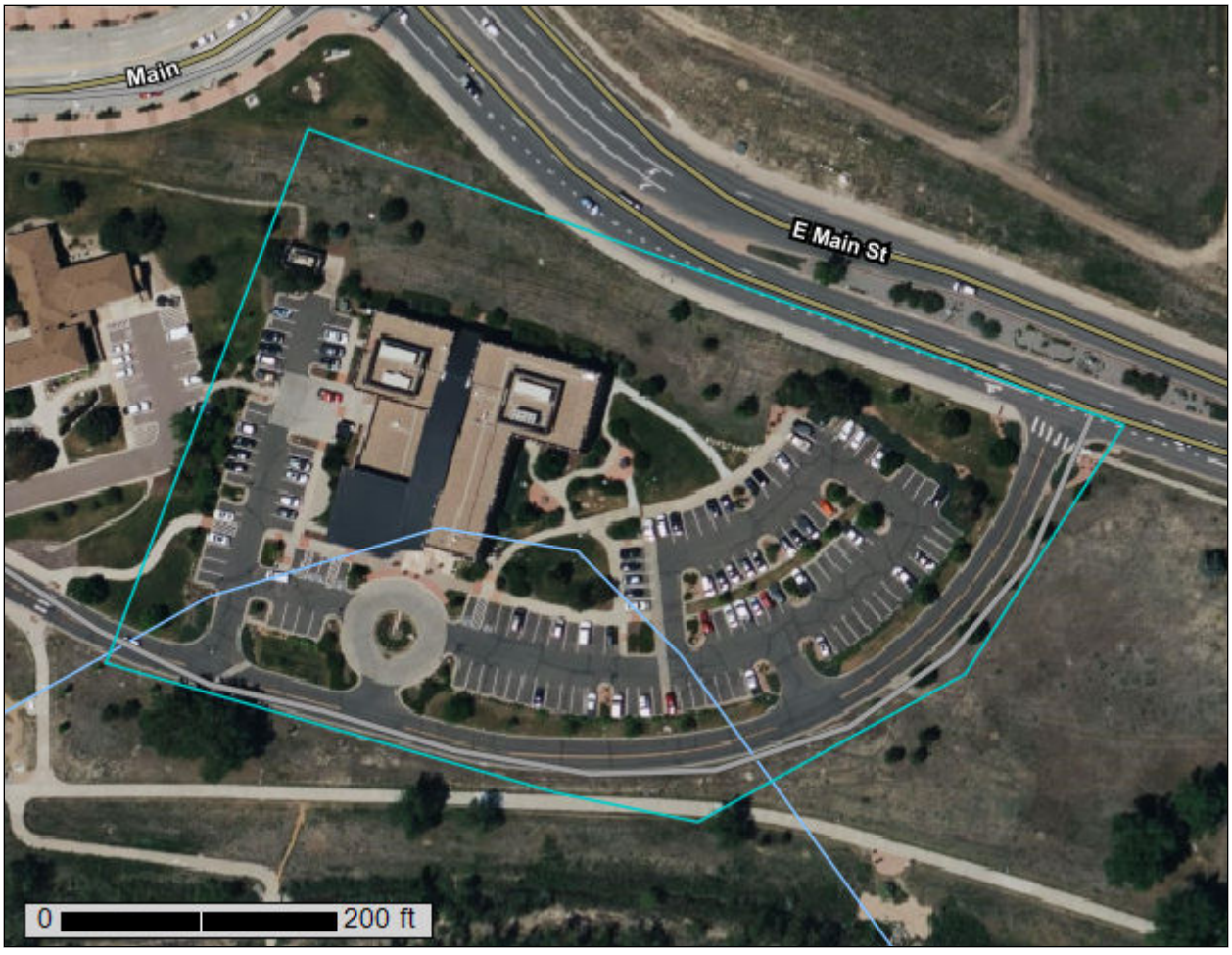
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for Castle Rock Area, Colorado



May 2, 2023

Custom Soil Resource Report
Soil Map

Map Scale: 1:1,290 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 15 30 60 90

Feet
0 50 100 200 300

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 Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 15, Sep 1, 2022

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

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BtE	Bresser-Truckton sandy loams, 5 to 25 percent slopes	1.3	25.2%
Sa	Sampson loam	2.7	53.4%
Sd	Sandy alluvial land	1.1	21.4%
Totals for Area of Interest		**5.1**	**100.0%**

Map Unit Descriptions

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

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

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

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

Castle Rock Area, Colorado

BtE—Bresser-Truckton sandy loams, 5 to 25 percent slopes

Map Unit Setting

National map unit symbol: jqy9
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 47 to 52 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Bresser

Setting

Landform: Terraces
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy eolian deposits

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 30 inches: sandy clay loam
H3 - 30 to 60 inches: loamy sand

Properties and qualities

Slope: 5 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Description of Truckton

Setting

Landform: Terraces
Landform position (three-dimensional): Tread, riser

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from arkosic sedimentary rock

Typical profile
H1 - 0 to 4 inches: sandy loam
H2 - 4 to 19 inches: sandy loam
H3 - 19 to 60 inches: sandy loam

Properties and qualities
Slope: 10 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Newlin
Percent of map unit: 5 percent
Hydric soil rating: No

Blakeland
Percent of map unit: 5 percent
Hydric soil rating: No

Stapleton
Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Sa—Sampson loam

Map Unit Setting
National map unit symbol: jr02

Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Sampson and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sampson

Setting

Landform: Stream terraces on drainageways
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered alluvium derived from arkose

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 28 inches: clay loam
H3 - 28 to 38 inches: loam
H4 - 38 to 60 inches: silt loam

Properties and qualities

Slope: 1 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B
Ecological site: R049XC202CO - Loamy Foothill 14-19 PZ
Hydric soil rating: No

Minor Components

Englewood

Percent of map unit: 8 percent
Hydric soil rating: No

Bresser

Percent of map unit: 7 percent
Hydric soil rating: No

Loamy alluvial land
Percent of map unit: 4 percent
Hydric soil rating: No

Aquic haplustolls
Percent of map unit: 1 percent
Landform: Swales
Hydric soil rating: Yes

Sd—Sandy alluvial land

Map Unit Setting
National map unit symbol: jr03
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition
Sandy alluvial land: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sandy Alluvial Land

Setting
Landform: Swales, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered alluvium derived from arkose

Typical profile
H1 - 0 to 20 inches: loamy sand
H2 - 20 to 60 inches: stratified sand to sandy loam

Properties and qualities
Slope: 1 to 5 percent
Drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (2.00 to 20.00 in/hr)
Depth to water table: About 60 inches
Frequency of flooding: FrequentNone
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w

Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Loamy alluvial land
Percent of map unit: 8 percent
Hydric soil rating: No

Loamy alluvial land, dark surface
Percent of map unit: 8 percent
Hydric soil rating: No

Bresser
Percent of map unit: 4 percent
Hydric soil rating: No

Truckton
Percent of map unit: 4 percent
Hydric soil rating: No

Fluvaquentic haplustolls
Percent of map unit: 1 percent
Landform: Terraces
Hydric soil rating: Yes

Appendix B: Hydrologic Calculations

Composite C Calculations
Time of Concentration Calculations
Runoff Calculations

Composite C Calculations

Project Information

Project Name:	**Parker Town Hall**
Miro Project No:	**22139**
Revised Date:	**10/30/2023**
Calculated By:	**RJH**

Jurisdiction Impervious Value

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

Coefficient Equations

$C_{CD\ (2)}$ =0.83I^1.122

$C_{CD\ (5)}$ = 0.82i+0.035

$C_{CD\ (10)}$ = 0.74i+0.132

$C_{CD\ (100)}$ = 0.4i+0.484

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

Basin Designation	A_{pond} (ft^2)	$A_{landscape}$ (ft^2)	A_{paved} (ft^2)	A_{roof} (ft^2)	A_{total} (acres)	Impervious-ness	C_{CD} 02 yr	C_{CD} 05 yr	C_{CD} 10 yr	C_{CD} 100 yr
R1	0	0	0	6,156	0.14	90%	0.74	0.77	0.80	0.84
A1	0	11,693	0	0	0.27	2%	0.01	0.05	0.15	0.49
R2	0	0	0	9,660	0.22	90%	0.74	0.77	0.80	0.84
A2	0	10,938	40,037	0	1.17	79%	0.64	0.68	0.72	0.80
EX. R1	0	0	0	10,605	0.24	90%	0.74	0.77	0.80	0.84
R3	0	0	0	3,083	0.07	90%	0.74	0.77	0.80	0.84
B1	0	241	7,617	0	0.18	97%	0.80	0.83	0.85	0.87
C1	0	2,147	0	0	0.05	2%	0.01	0.05	0.15	0.49
C2	0	12,612	904	0	0.31	9%	0.05	0.11	0.20	0.52
C3	0	42,366	442	0	0.98	3%	0.02	0.06	0.15	0.50
C4	0	452	8,506	0	0.21	95%	0.78	0.81	0.84	0.86
EX. R2	0	0	0	10,264	0.24	90%	0.74	0.77	0.80	0.84
C5	0	16,923	33,148	0	1.15	67%	0.53	0.58	0.63	0.75
Total	0	97,372	90,653	39,768	5.23	56%	0.44	0.50	0.55	0.71

TIME OF CONCENTRATION

Project Information

Project Name: Parker Town Hall
S.A. Project No: 22139
Revised Date: 10/30/2023
Calculated By: RJH

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

$t_i = 0.395(1.1 - C_5)L^{1/2} / S^{1/3}$ $t_t = (L/v)/60$
t_c check: $t_c = (26-17i) +(L/(60(14i+19)S^{\wedge}1/2)$

*NOTE: Cv Values, T_i, T_t, & T_c Equations from UDFCD Criteria Manual updated March 2017

SUB-BASIN DATA			INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)						$t_i + t_t$	t_c CHECK (urbanized basins)	FINAL t_c USED
Basin Designation	Area (acres)	C_{CD} 05 yr	length (ft)	slope %	t_i (min)	length (ft)	slope %	Type of Land Surface	Conveyance Coefficient Cv	velocity (ft/sec)	t_t (min)	t_c (min)	Total Length (ft)	t_c (min)
R1	0.14	0.77	187	2.00%	6.51	0	0.00%	Paved areas and shallow paved swales	20	0.00	0.00	6.51	187	**6.51**
A1	0.27	0.05	206	1.90%	22.28	0	0.00%	Grassed waterway	15	0.00	0.00	22.28	206	**22.28**
R2	0.22	0.77	93	2.0%	4.59	0	0.00%	Paved areas and shallow paved swales	20	0.00	0.00	4.59	93	**5.00**
A2	1.17	0.68	263	4.18%	7.71	78	1.88%	Paved areas and shallow paved swales	20	2.75	0.47	8.18	341	**8.18**
EX. R1	0.24	0.77	134	2.00%	5.51	0	0.00%	Paved areas and shallow paved swales	20	0.00	0	5.51	134	**5.00**
R3	0.07	0.77	63	2.00%	3.78	0	0.00%	Paved areas and shallow paved swales	20	0.00	0.00	3.78	63	**5.00**
B1	0.18	0.83	101	1.73%	4.14	33	0.94%	Paved areas and shallow paved swales	20	1.94	0.28	4.42	134	**5.00**
C1	0.05	0.05	59	1.90%	11.92	0	0.00%	Grassed waterway	15	0.00	0.00	11.92	59	**11.92**
C2	0.31	0.11	71	7.52%	7.84	206	0.46%	Grassed waterway	15	1.01	3.39	11.23	277	**11.23**
C3	0.98	0.06	18	5.72%	4.52	271	0.85%	Grassed waterway	15	1.38	3.26	7.79	289	**7.79**
C4	0.21	0.81	120	2.96%	4.00	17	2.41%	Paved areas and shallow paved swales	20	3.11	0.09	4.09	137	**5.00**
EX. R2	0.24	0.77	156	2.00%	5.94	0	6.00%	Paved areas and shallow paved swales	20	4.90	0	5.94	156	**5.94**
C5	1.15	0.58	49	4.04%	4.16	296	1.64%	Paved areas and shallow paved swales	20	2.56	1.93	6.09	345	**6.09**
Total		0.50			0			Paved areas and shallow paved swales	20		0	0.00	0	**5.00**

Runoff Calculations (Rational Method)

Project Information

Project Name: Paker Town Hall
S.A. Project No: 22139
Revised Date: 10/30/2023
Calculated By: RJH

Intensity Equation

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

*NOTE: P & Intensity Equation from UDFCD Criteria Manual

Basin Designation	Area (ac.)	'c'	cA	t_c (min)	P_1	intensity (in/hr)	Q (cfs)	
R1	0.14	0.74	0.10	6.51	0.99	3.11	0.32	02 YR
		0.77	0.11		1.39	4.37	0.48	05 YR
		0.80	0.11		1.64	5.16	0.58	10 YR
		0.84	0.12		2.60	8.18	0.98	100 YR
A1	0.27	0.01	0.00	22.28	0.99	1.84	0.01	02 YR
		0.05	0.01		1.39	2.58	0.04	05 YR
		0.15	0.04		1.64	3.05	0.12	10 YR
		0.49	0.13		2.60	4.83	0.64	100 YR
R2	0.22	0.74	0.16	5.00	0.99	3.36	0.55	02 YR
		0.77	0.17		1.39	4.71	0.81	05 YR
		0.80	0.18		1.64	5.56	0.98	10 YR
		0.84	0.19		2.60	8.82	1.65	100 YR
A2	1.17	0.64	0.75	8.18	0.99	2.89	2.15	02 YR
		0.68	0.80		1.39	4.05	3.24	05 YR
		0.72	0.84		1.64	4.78	4.01	10 YR
		0.80	0.94		2.60	7.58	7.10	100 YR
EX. R1	0.24	0.74	0.18	5.00	0.99	3.36	0.60	02 YR
		0.77	0.19		1.39	4.71	0.89	05 YR
		0.80	0.19		1.64	5.56	1.08	10 YR
		0.84	0.21		2.60	8.82	1.81	100 YR
R3	0.07	0.74	0.05	5.00	0.99	3.36	0.18	02 YR
		0.77	0.05		1.39	4.71	0.26	05 YR
		0.80	0.06		1.64	5.56	0.31	10 YR
		0.84	0.06		2.60	8.82	0.53	100 YR
B1	0.18	0.80	0.14	5.00	0.99	3.36	0.49	02 YR
		0.83	0.15		1.39	4.71	0.71	05 YR
		0.85	0.15		1.64	5.56	0.85	10 YR
		0.87	0.16		2.60	8.82	1.39	100 YR
C1	0.05	0.01	0.00	11.92	0.99	2.49	0.00	02 YR
		0.05	0.00		1.39	3.50	0.01	05 YR
		0.15	0.01		1.64	4.13	0.03	10 YR
		0.49	0.02		2.60	6.54	0.16	100 YR
C2	0.31	0.05	0.02	11.23	0.99	2.56	0.04	02 YR
		0.11	0.03		1.39	3.59	0.12	05 YR
		0.20	0.06		1.64	4.23	0.26	10 YR
		0.52	0.16		2.60	6.71	1.08	100 YR

Runoff Calculations (Rational Method)

Project Information

Project Name: **Paker Town Hall**
S.A. Project No: **22139**
Revised Date: **10/30/2023**
Calculated By: **RJH**

Intensity Equation

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

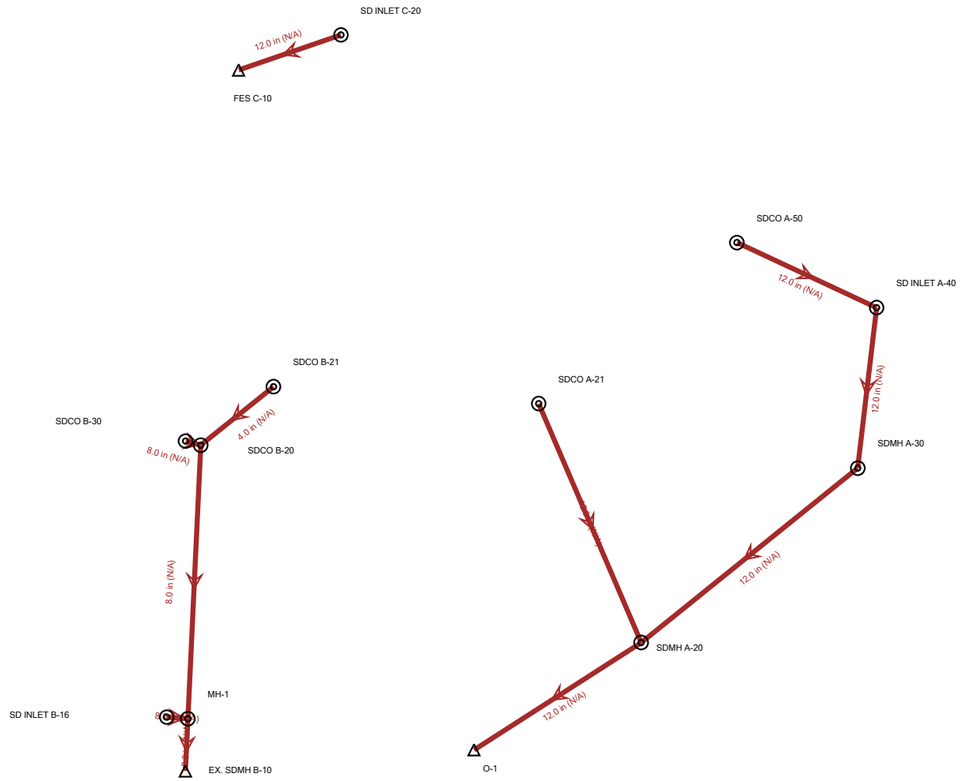
*NOTE: P & Intensity Equation from UDFCD Criteria Manual

Basin Designation	Area (ac.)	'c'	cA	t_c (min)	P_1	intensity (in/hr)	Q (cfs)	
C3	0.98	0.02	0.02	7.79	0.99	2.94	0.05	02 YR
		0.06	0.06		1.39	4.12	0.24	05 YR
		0.15	0.15		1.64	4.87	0.74	10 YR
		0.50	0.49		2.60	7.71	3.76	100 YR
C4	0.21	0.78	0.16	5.00	0.99	2.94	0.47	02 YR
		0.81	0.17		1.39	4.12	0.69	05 YR
		0.84	0.17		1.64	4.87	0.84	10 YR
		0.86	0.18		2.60	7.71	1.37	100 YR
EX. R2	0.24	0.74	0.17	5.94	0.99	3.20	0.56	02 YR
		0.77	0.18		1.39	4.49	0.82	05 YR
		0.80	0.19		1.64	5.30	1.00	10 YR
		0.84	0.20		2.60	8.41	1.67	100 YR
C5	1.15	0.53	0.61	6.09	0.99	3.18	1.93	02 YR
		0.58	0.67		1.39	4.46	2.99	05 YR
		0.63	0.72		1.64	5.26	3.79	10 YR
		0.75	0.86		2.60	8.35	7.21	100 YR
Total	5.23	0.44	2.28	5.00	0.99	3.36	7.66	02 YR
		0.50	2.60		1.39	4.71	12.26	05 YR
		0.55	2.87		1.64	5.56	15.97	10 YR
		0.71	3.71		2.60	8.82	32.72	100 YR

Appendix C: Hydraulic Calculations

StormCAD Results
Inlet Capacity

STORMCAD PLAN VIEW



Parker Town Hall
5-YR Conduit Table

ID	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (Out) (ft)	Capacity (Full Flow) (cfs)
58	SDMH A-20	5,886.59	O-1	5,885.95	85.5	0.01	12.00	0.013	1.32	3.78	5,886.41	3.09
60	SDCO A-50	5,888.44	SD INLET A-40	5,888.11	67	0.01	12.00	0.01	0.48	2.98	5,888.37	3.27
61	SD INLET C-20	5,891.88	FES C-10	5,890.96	47.1	0.02	12.00	0.013	0.01	1.24	5,890.99	4.99
62	SD INLET A-40	5,887.94	SDMH A-30	5,887.57	73.7	0.01	12.00	0.013	0.51	2.51	5,887.87	2.52
63	SDMH A-30	5,887.37	SDMH A-20	5,886.76	123	0.01	12.00	0.013	0.51	2.51	5,887.08	2.52
64	SDCO B-21	5,886.63	SDCO B-20	5,885.82	40.6	0.02	4.00	0.01	0.26	4.39	5,886.04	0.35
65	SDCO B-20	5,885.29	Wye Connection	5,883.05	119.2	0.02	8.00	0.01	1.15	6.27	5,883.66	2.15
66	SDCO B-30	5,885.63	SDCO B-20	5,885.49	6.8	0.02	8.00	0.01	0.89	6.02	5,885.83	2.22
67	SDCO A-21	5,887.50	SDMH A-20	5,886.76	115.4	0.01	12.00	0.013	0.81	3.13	5,887.12	2.86
68	Wye	5,883.05	EX. SDMH B-10	5,882.62	22.8	0.02	8.00	0.01	1.85	6.94	5,883.12	2.15
70	SD INLET B-16	5,883.92	Wye Connection	5,883.74	9.2	0.02	8.00	0.01	0.71	5.67	5,884.03	2.22

Parker Town Hall
100-YR Conduit Table

ID	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (User Defined) (ft)	Slope (Calculated) (ft/ft)	Diameter (in)	Manning's n	Flow (cfs)	Velocity (ft/s)	Hydraulic Grade Line (Out) (ft)	Capacity (Full Flow) (cfs)
58	SDMH A-20	5,886.59	O-1	5,885.95	85.5	0.01	12.00	0.013	3.26	4.44	5,886.72	3.09
60	SDCO A-50	5,888.44	SD INLET A-40	5,888.11	67	0.01	12.00	0.01	0.98	3.64	5,888.48	3.27
61	SD INLET C-20	5,891.88	FES C-10	5,890.96	47.1	0.02	12.00	0.013	0.18	3	5,891.09	4.99
62	SD INLET A-40	5,887.94	SDMH A-30	5,887.57	73.7	0.01	12.00	0.013	1.61	3.4	5,888.11	2.52
63	SDMH A-30	5,887.37	SDMH A-20	5,886.76	123	0.01	12.00	0.013	1.61	3.4	5,887.47	2.52
64	SDCO B-21	5,886.63	SDCO B-20	5,885.82	40.6	0.02	4.00	0.01	0.53	6.07	5,887.21	0.35
65	SDCO B-20	5,885.29	Wye Connection	5,883.05	119.2	0.02	8.00	0.01	2.34	6.7	5,884.57	2.15
66	SDCO B-30	5,885.63	SDCO B-20	5,885.49	6.8	0.02	8.00	0.01	1.81	5.19	5,887.21	2.22
67	SDCO A-21	5,887.50	SDMH A-20	5,886.76	115.4	0.01	12.00	0.013	1.65	3.77	5,887.47	2.86
68	Wye Connection	5,883.05	EX. SDMH B-10	5,882.62	22.8	0.02	8.00	0.01	3.73	10.69	5,883.28	2.15
70	SD INLET B-16	5,883.92	Wye Connection	5,883.74	9.2	0.02	8.00	0.01	1.39	3.98	5,884.57	2.22

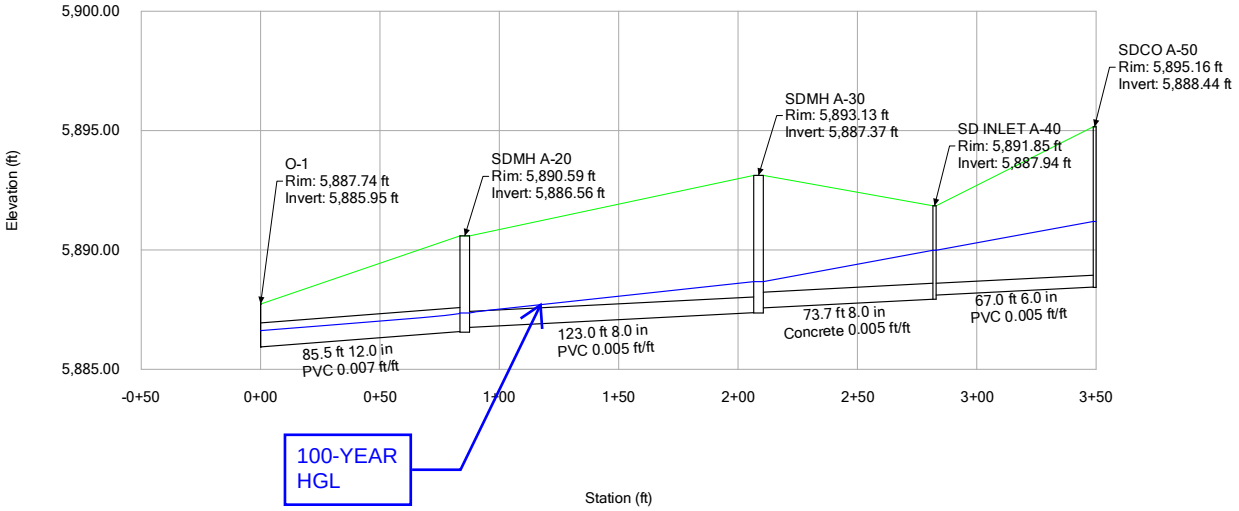
Parker Town Hall
5-YR Manhole Table

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Flow (Local In) (cfs)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
33	SDCO A-50	5,895.16	5,895.16	(N/A)	0.48	0.48	0.29	5,888.73	5,888.73
34	SD INLET C-20	5,894.86	5,894.86	(N/A)	0.01	0.01	0.04	5,891.92	5,891.92
37	SD INLET A-40	5,891.85	5,891.85	5,888.11	0.51	0.51	0.31	5,888.25	5,888.25
38	SDCO B-21	5,891.49	5,891.49	(N/A)	0.26	0.26	0.28	5,886.92	5,886.92
39	SDCO B-20	5,891.29	5,891.29	5,885.82	1.15	1.15	0.51	5,885.80	5,885.80
40	SDCO B-30	5,891.28	5,891.28	(N/A)	0.89	0.89	0.45	5,886.07	5,886.07
41	SDCO A-21	5,890.82	5,890.82	(N/A)	0.81	0.81	0.38	5,887.88	5,887.88
44	SD INLET B-16	5,889.33	5,889.33	(N/A)	0.71	0.71	0.40	5,884.32	5,884.32
79	Wye Connection	5,889.65	5,889.65	5,883.05	1.85	1.85	0.61	5,883.66	5,883.66
82	SDMH A-30	5,893.13	5,893.13	5,887.57	0	0.51	0.31	5,887.68	5,887.68
83	SDMH A-20	5,890.59	5,890.59	5,886.76	1.32	1.32	0.51	5,887.08	5,887.08

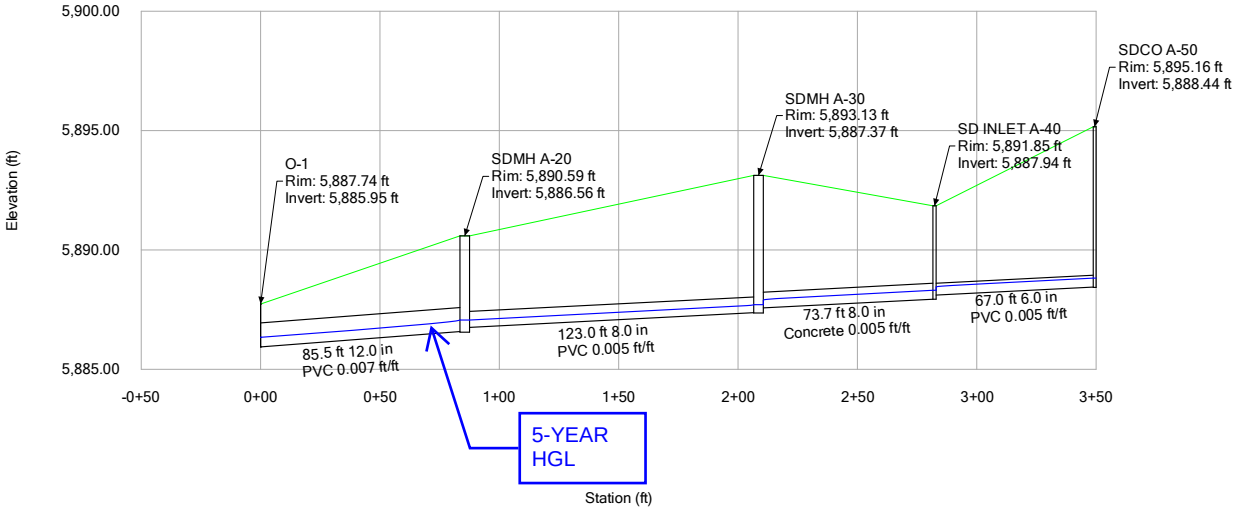
Parker Town Hall
100-YR Manhole Table

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert in 1) (ft)	Flow (Local In) (cfs)	Flow (Total Out) (cfs)	Depth (Out) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
33	SDCO A-50	5,895.16	5,895.16	(N/A)	0.98	0.98	0.42	5,888.86	5,888.86
34	SD INLET C-20	5,894.86	5,894.86	(N/A)	0.16	0.16	0.16	5,892.05	5,892.05
37	SD INLET A-40	5,891.85	5,891.85	5,888.11	1.61	1.61	0.58	5,888.52	5,888.52
38	SDCO B-21	5,891.49	5,891.49	(N/A)	0.53	0.53	2.44	5,889.08	5,889.08
39	SDCO B-20	5,891.29	5,891.29	5,885.82	2.34	2.34	1.92	5,887.21	5,887.21
40	SDCO B-30	5,891.28	5,891.28	(N/A)	1.81	1.81	1.68	5,887.30	5,887.30
41	SDCO A-21	5,890.82	5,890.82	(N/A)	1.65	1.65	0.55	5,888.05	5,888.05
44	SD INLET B-16	5,889.33	5,889.33	(N/A)	1.39	1.39	0.72	5,884.64	5,884.64
79	Wye Connection	5,889.65	5,889.65	5,883.05	3.73	3.73	1.52	5,884.57	5,884.57
82	SDMH A-30	5,893.13	5,893.13	5,887.57	0	1.61	0.58	5,887.95	5,887.95
83	SDMH A-20	5,890.59	5,890.59	5,886.76	3.26	3.26	0.91	5,887.47	5,887.47

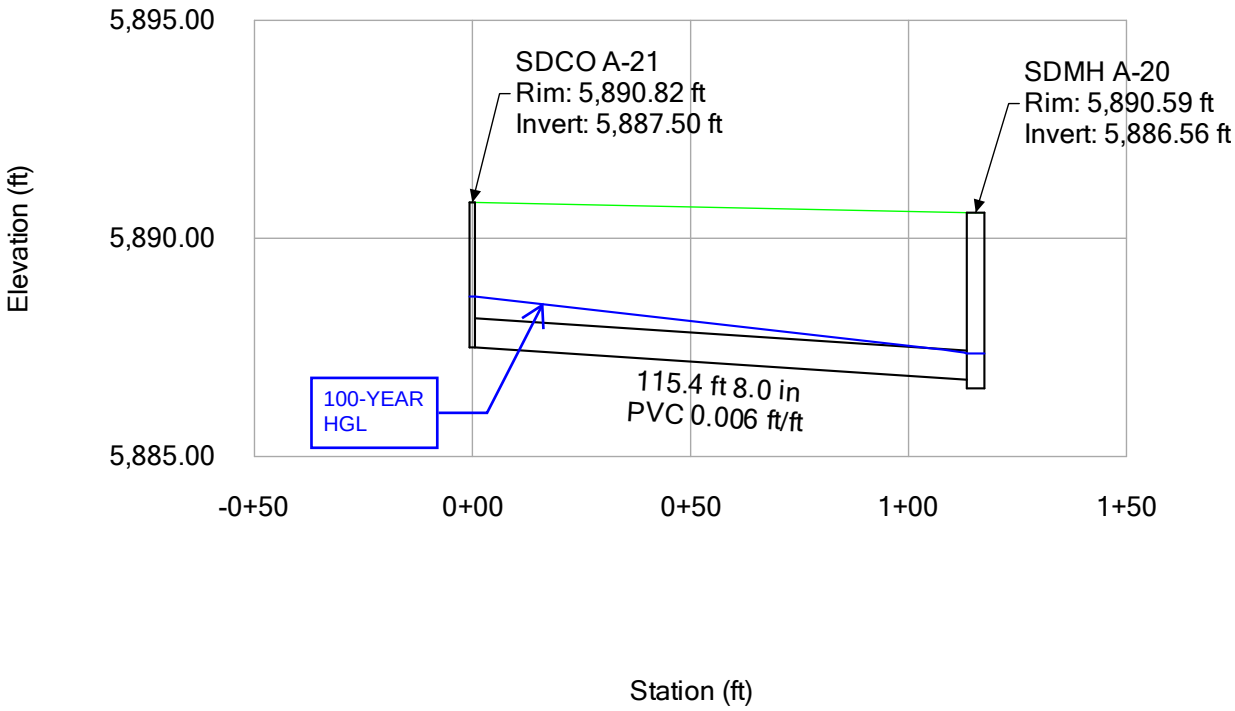
Profile Report
Engineering Profile - STORM LINE A (100-YEAR)



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



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



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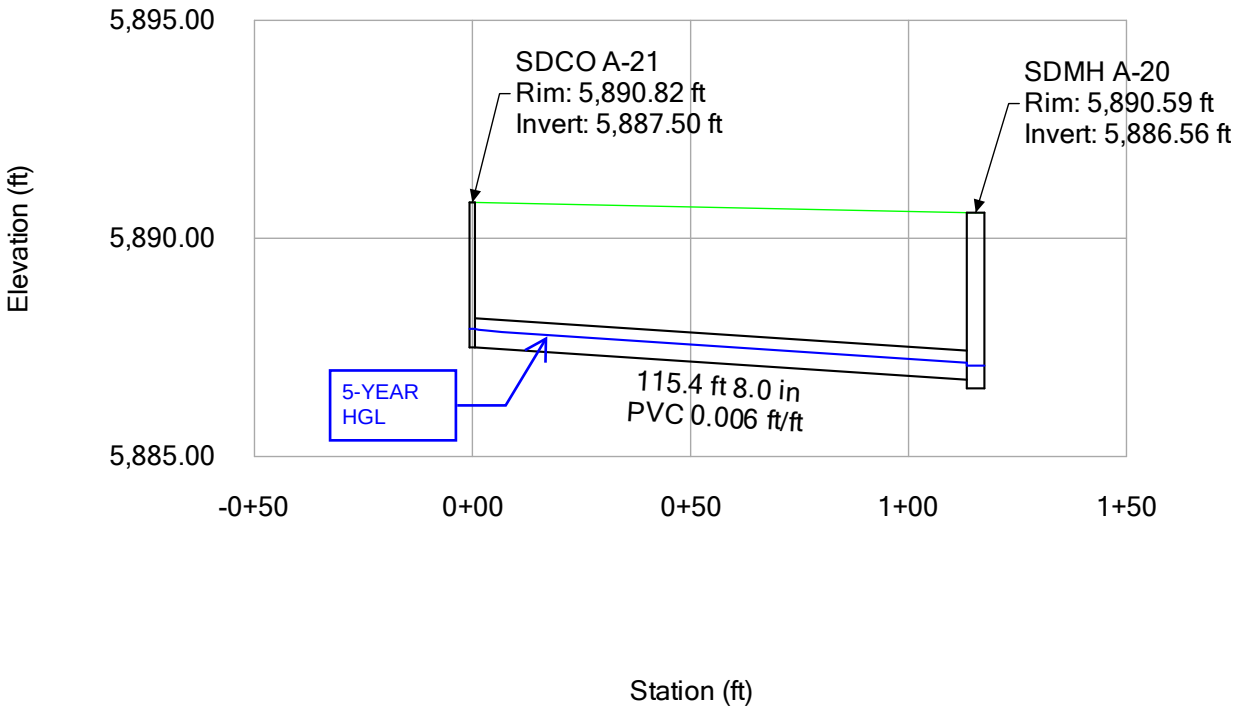

Profile Report
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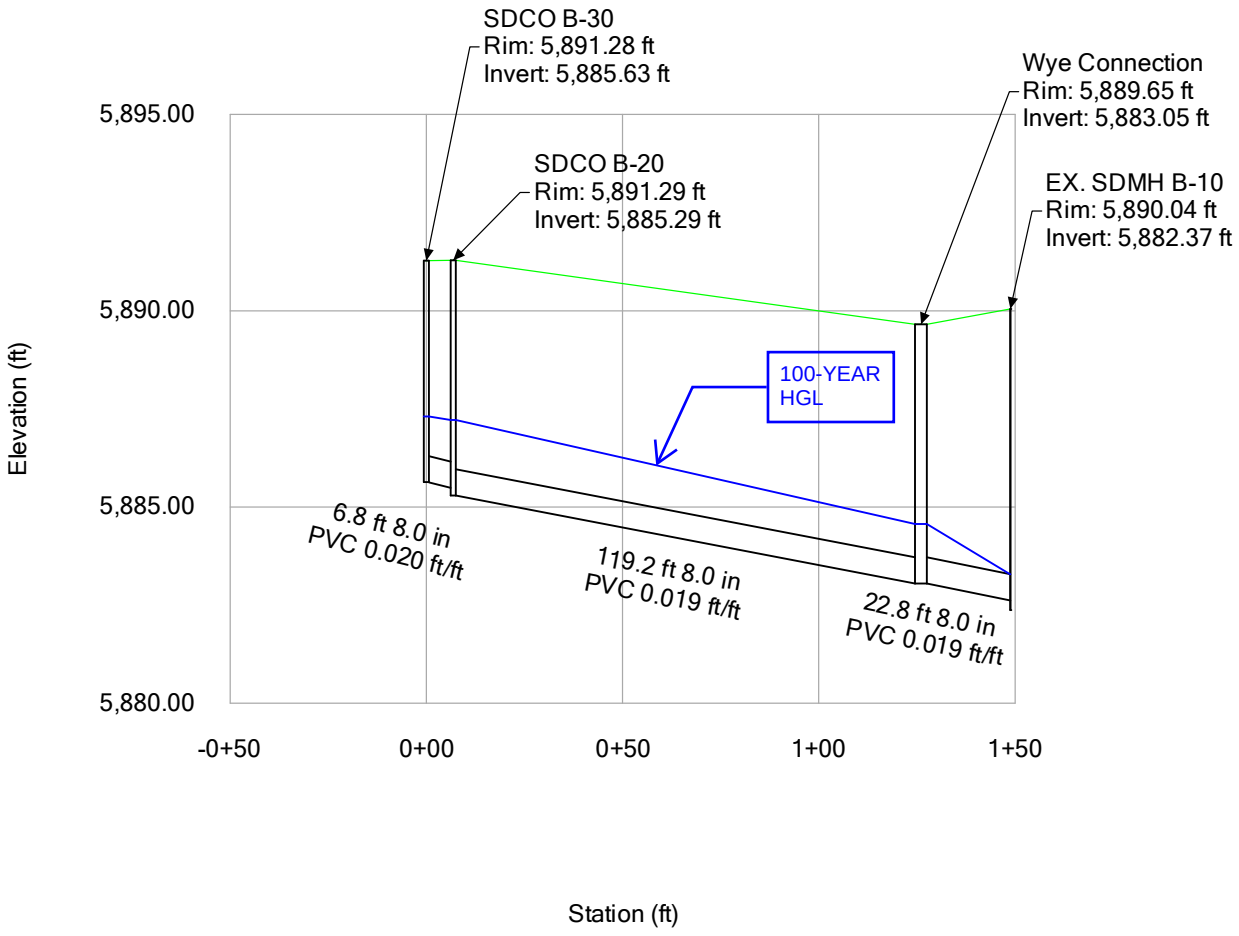
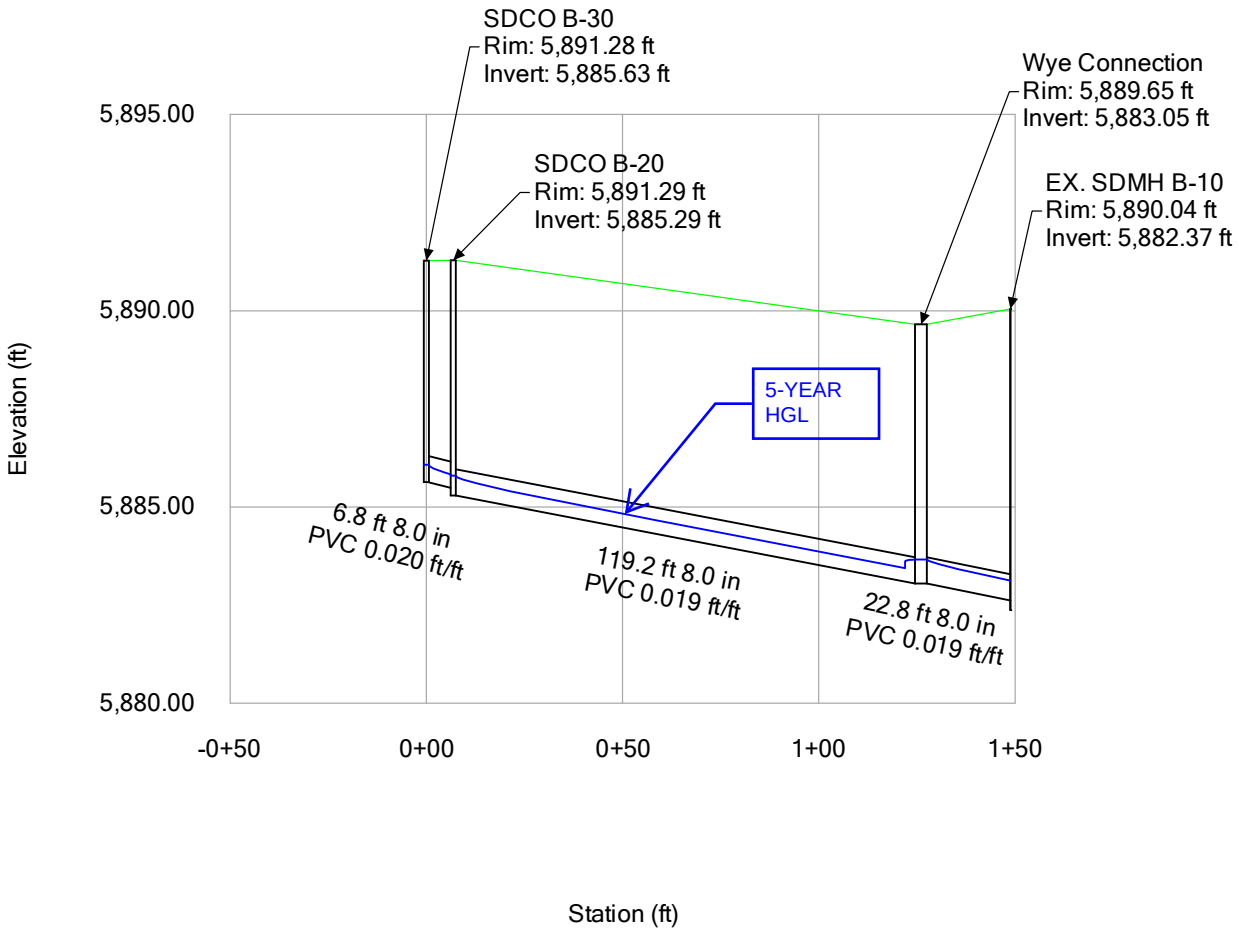
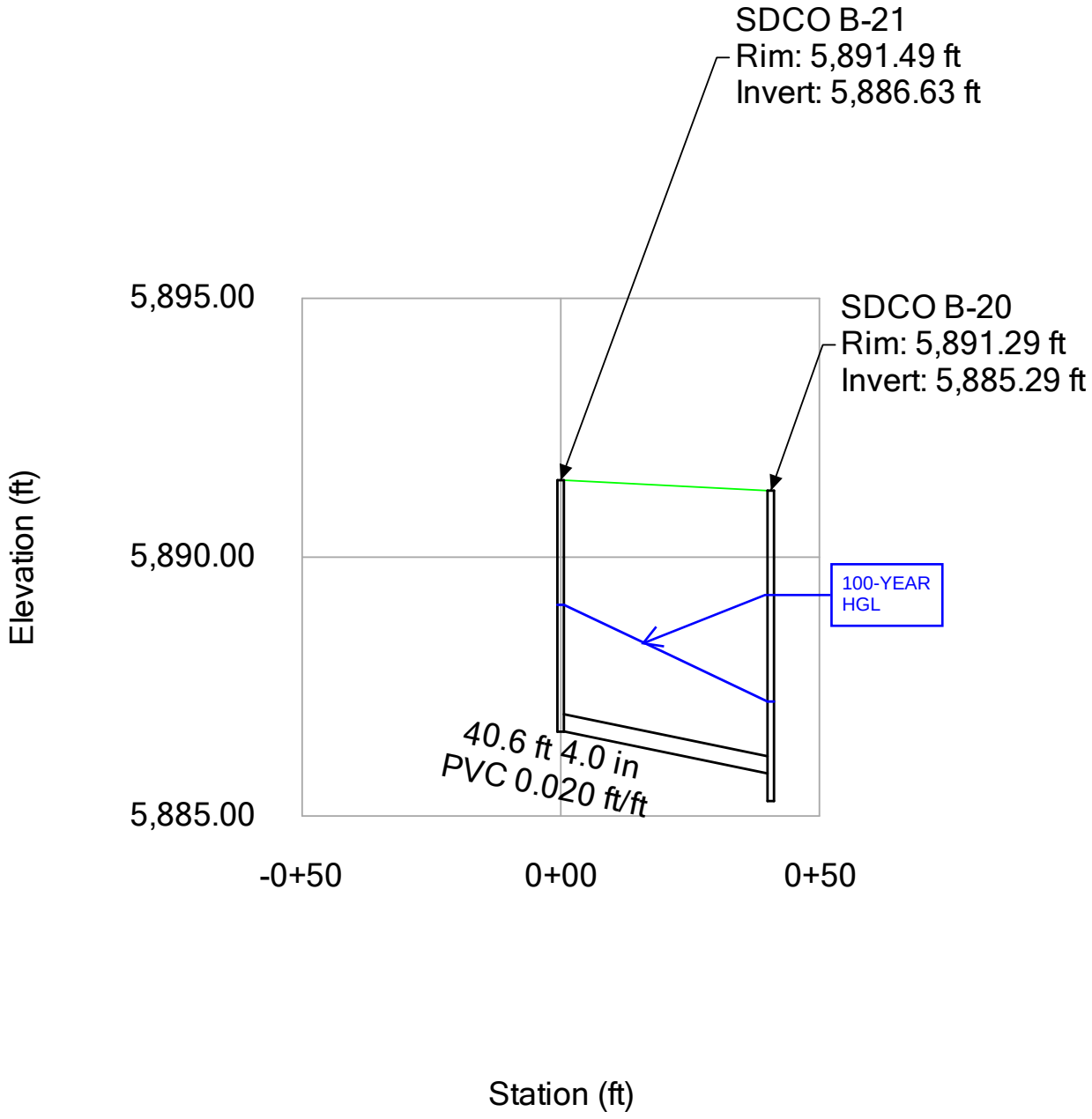


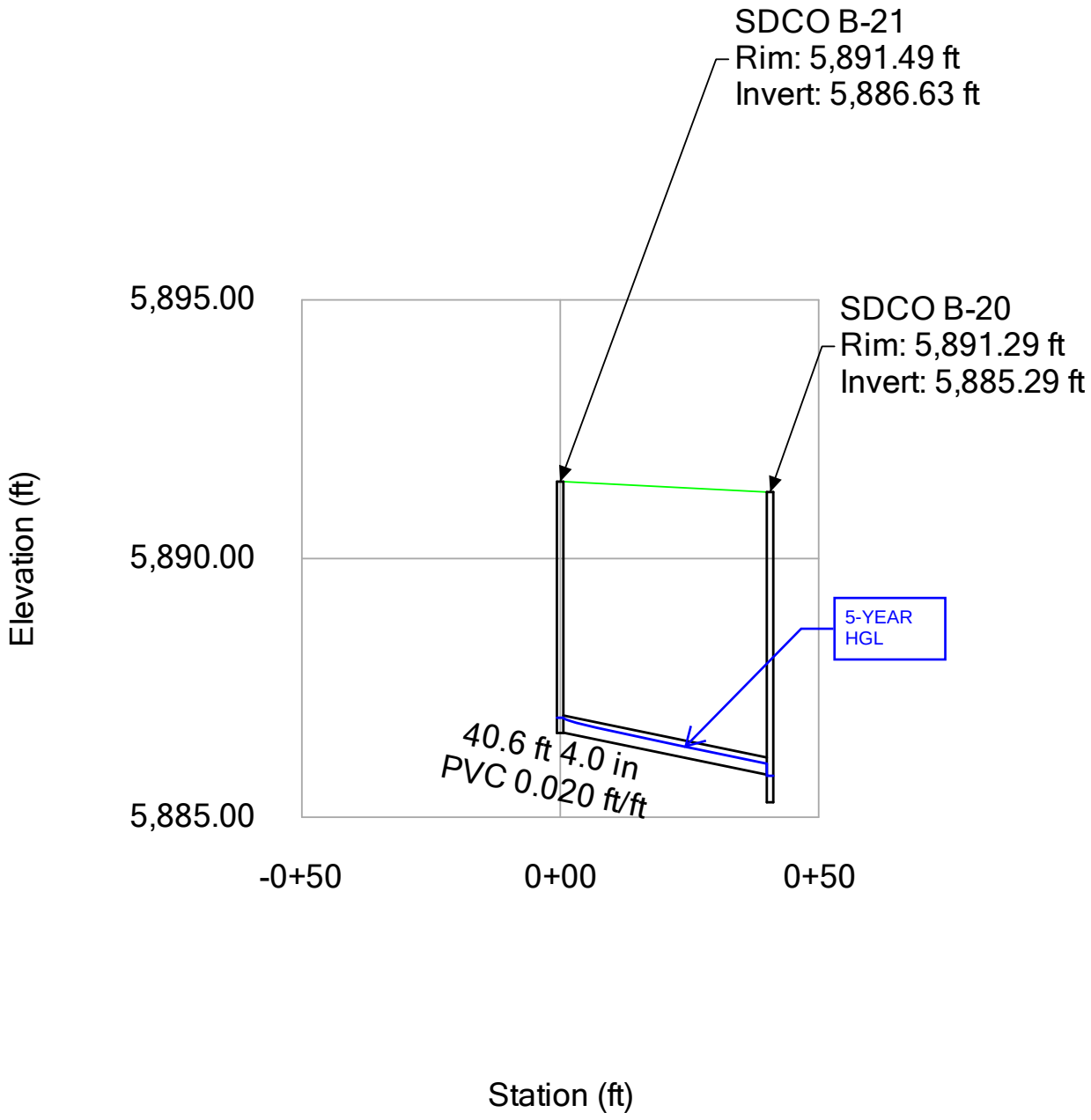
Profile Report
Engineering Profile - STORM LINE B (5-YEAR)



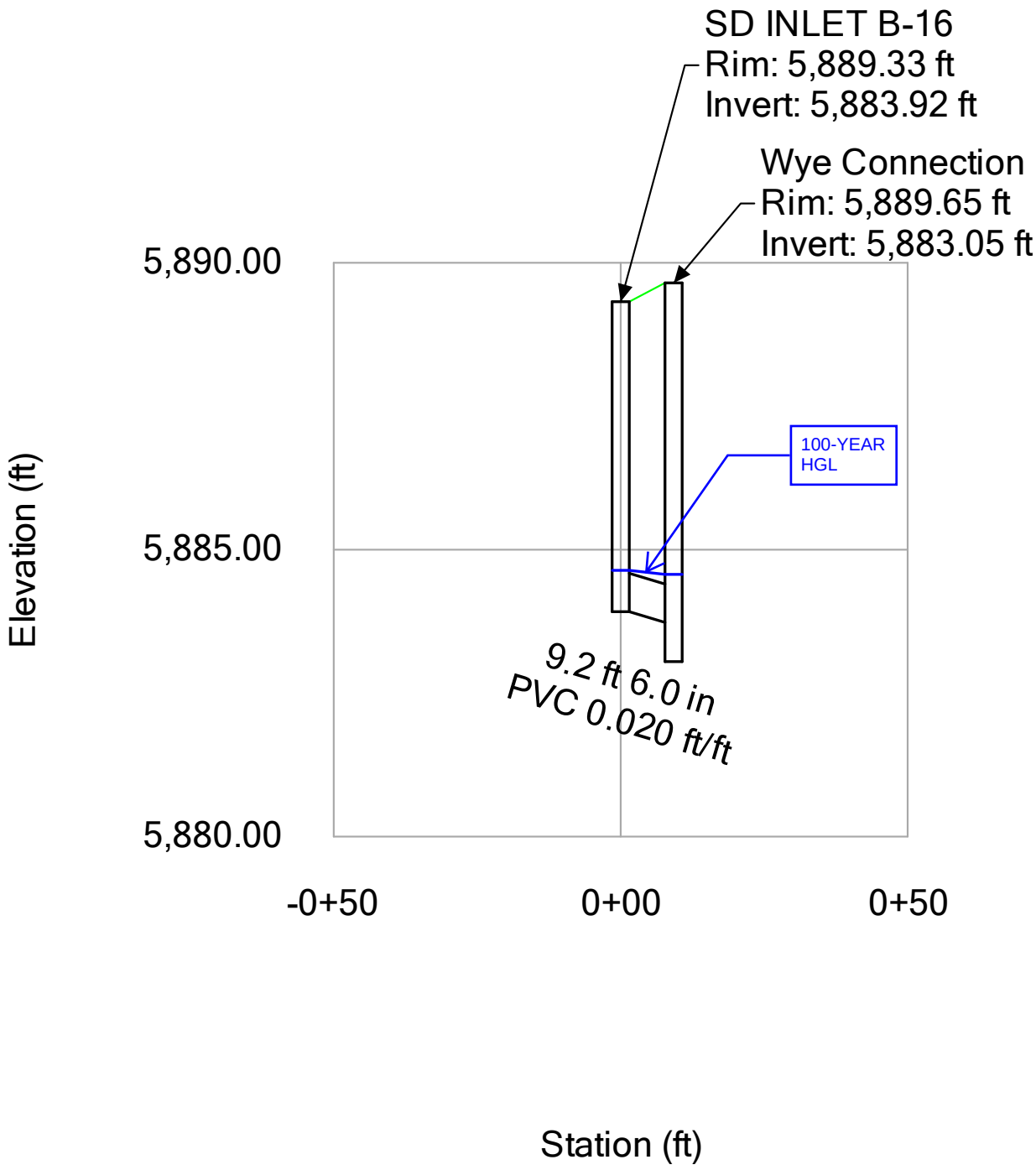
Profile Report
Engineering Profile - STORM LINE B-20 (100-YEAR)



Profile Report
Engineering Profile - STORM LINE B-20 (5-YEAR)

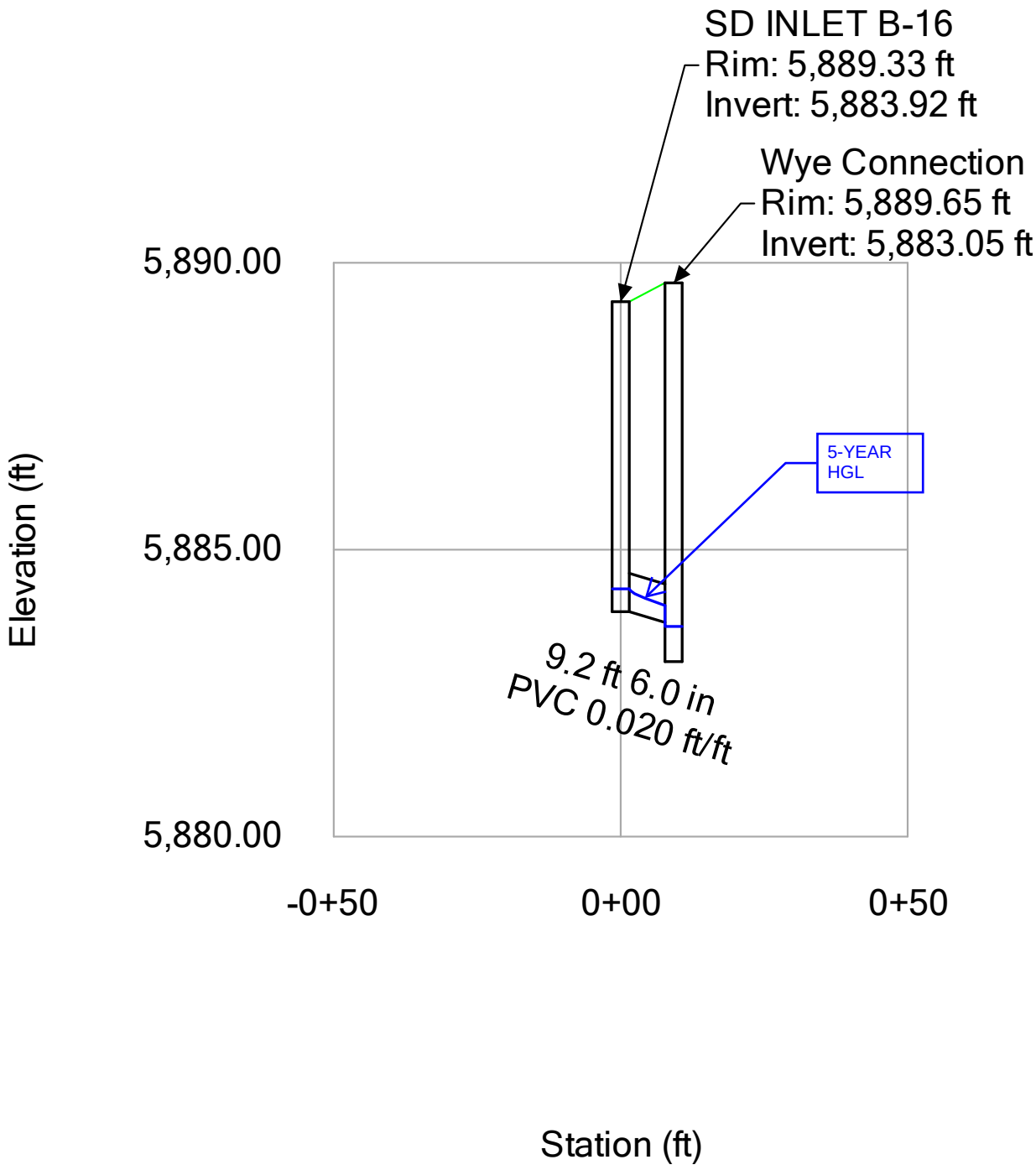


Profile Report
Engineering Profile - STORM LINE B-15 (100-YEAR)

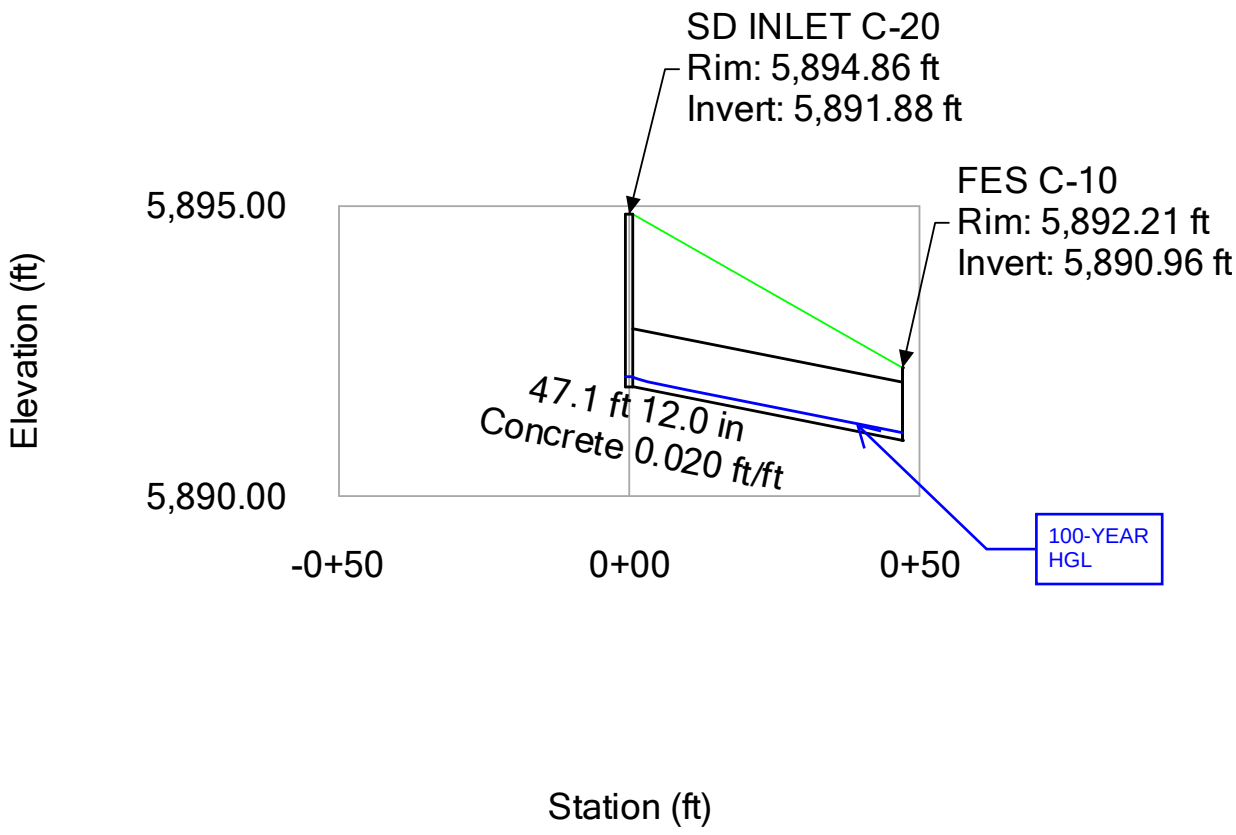


Profile Report

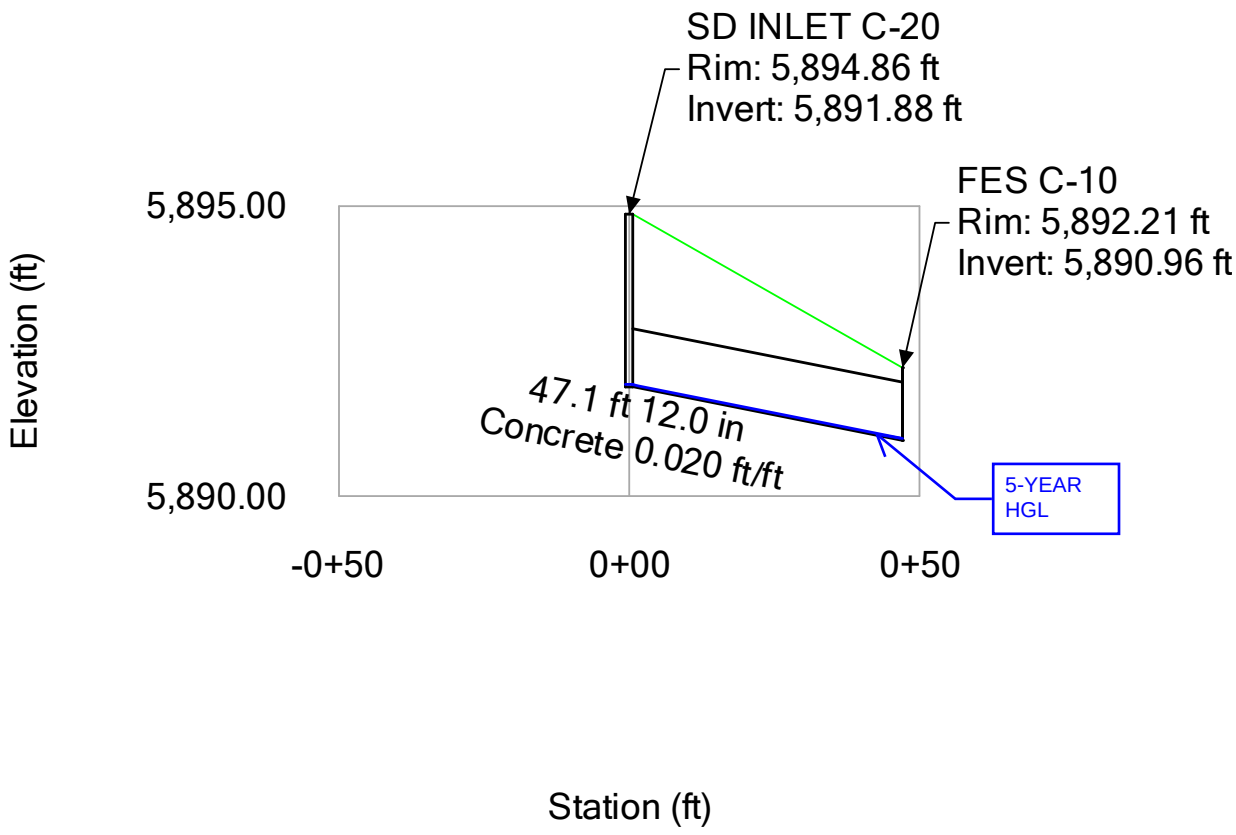
Engineering Profile - STORM LINE B-15 (5-YEAR)



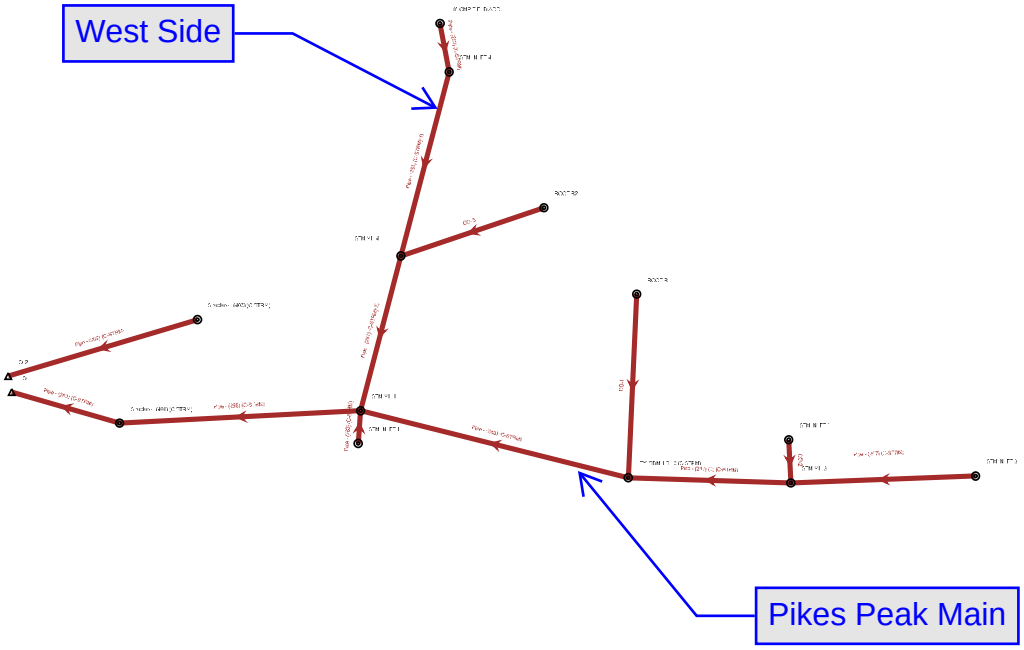
Profile Report
Engineering Profile - STORM LINE C (100-YEAR)



Profile Report
Engineering Profile - STORM LINE C (5-YEAR)

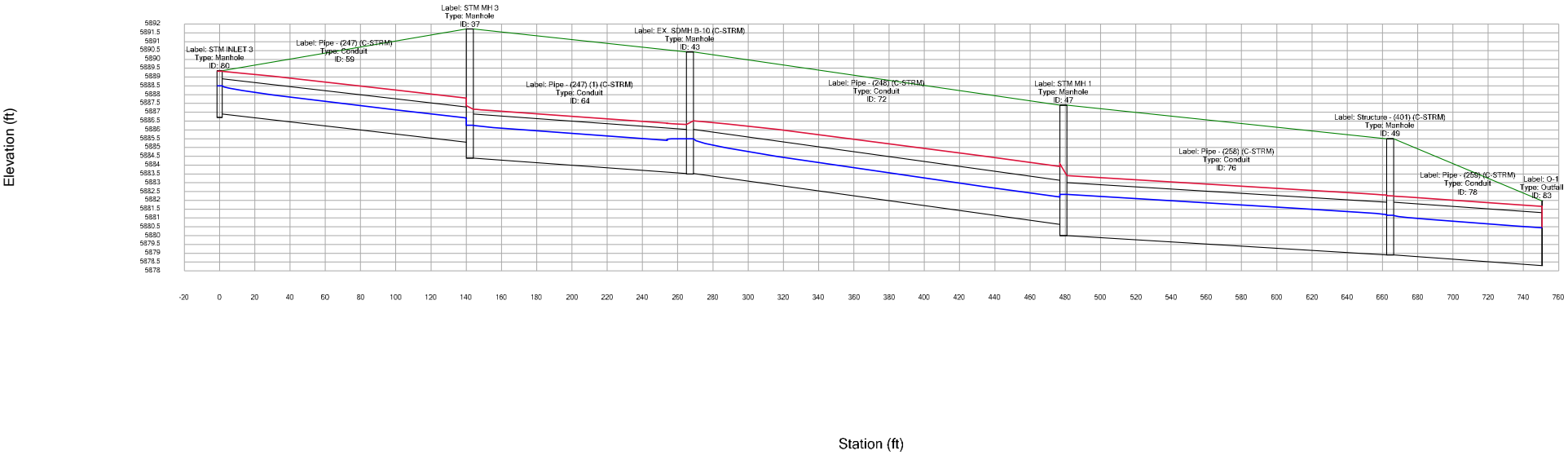


Scenario: 100 Year



Profile Report
Profile: Pikes Peak Main

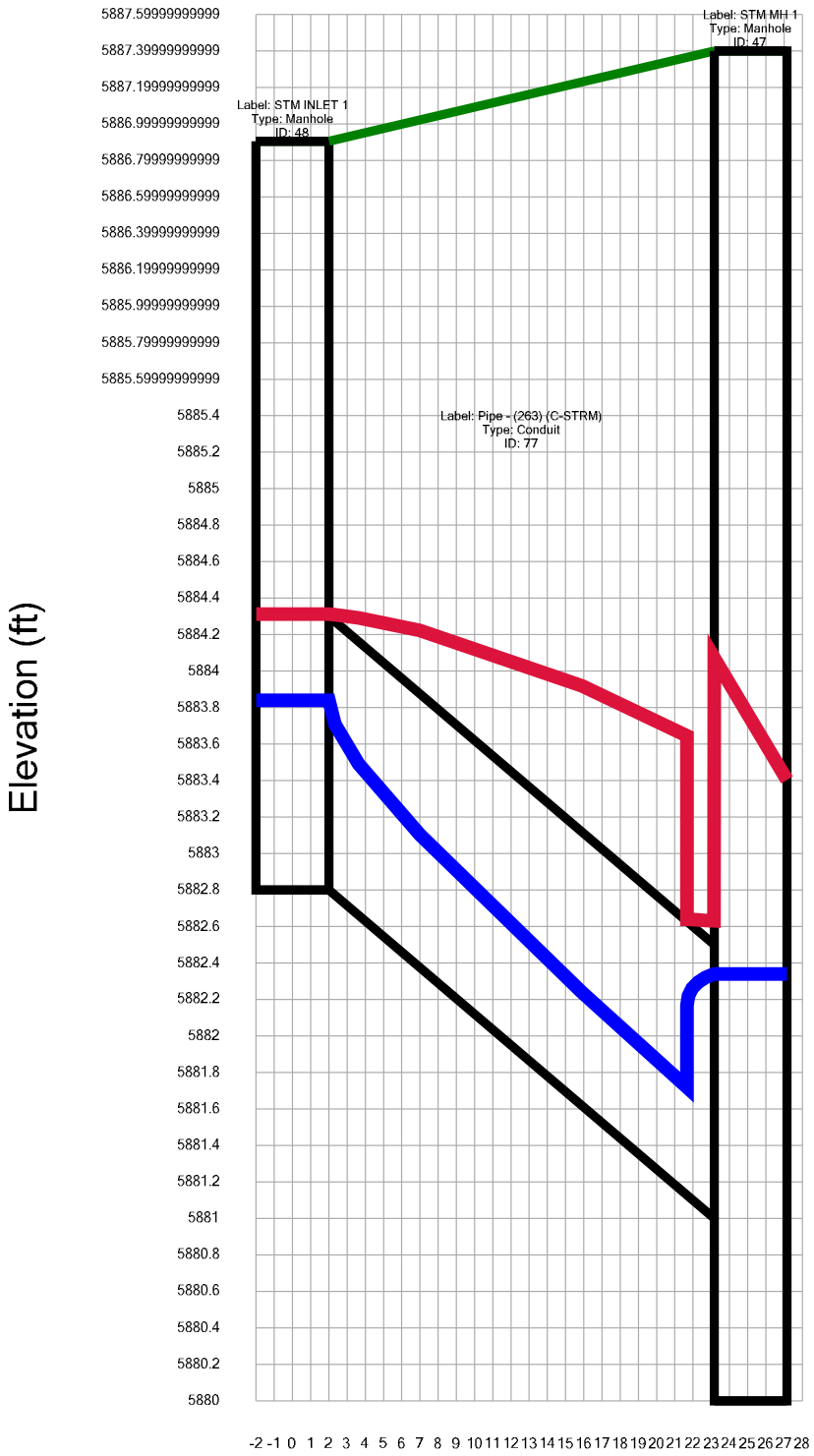
Pikes Peak Main - 100 Year



Profile Report

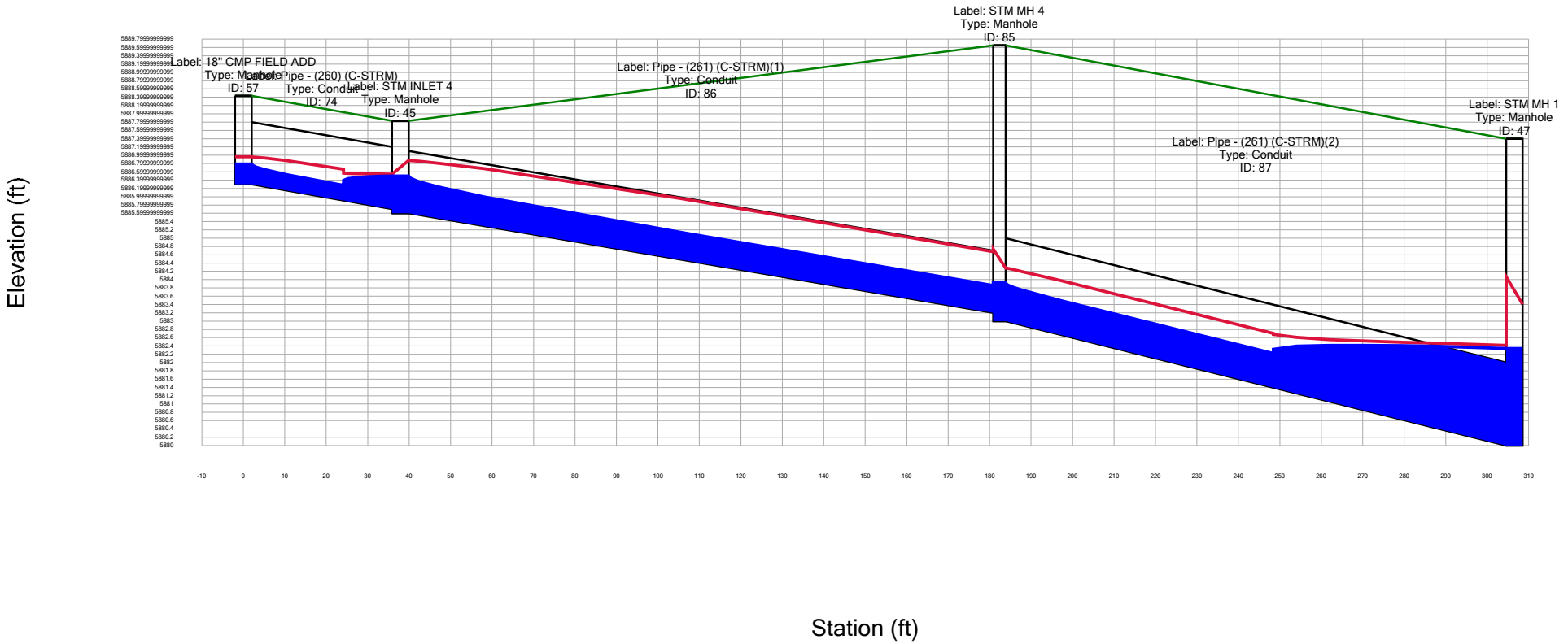
Profile: Prop Basin C5 Ex DP4 to Ex DP 6

Prop Basin C5 Ex DP4 to Ex DP 6 - 100 Year

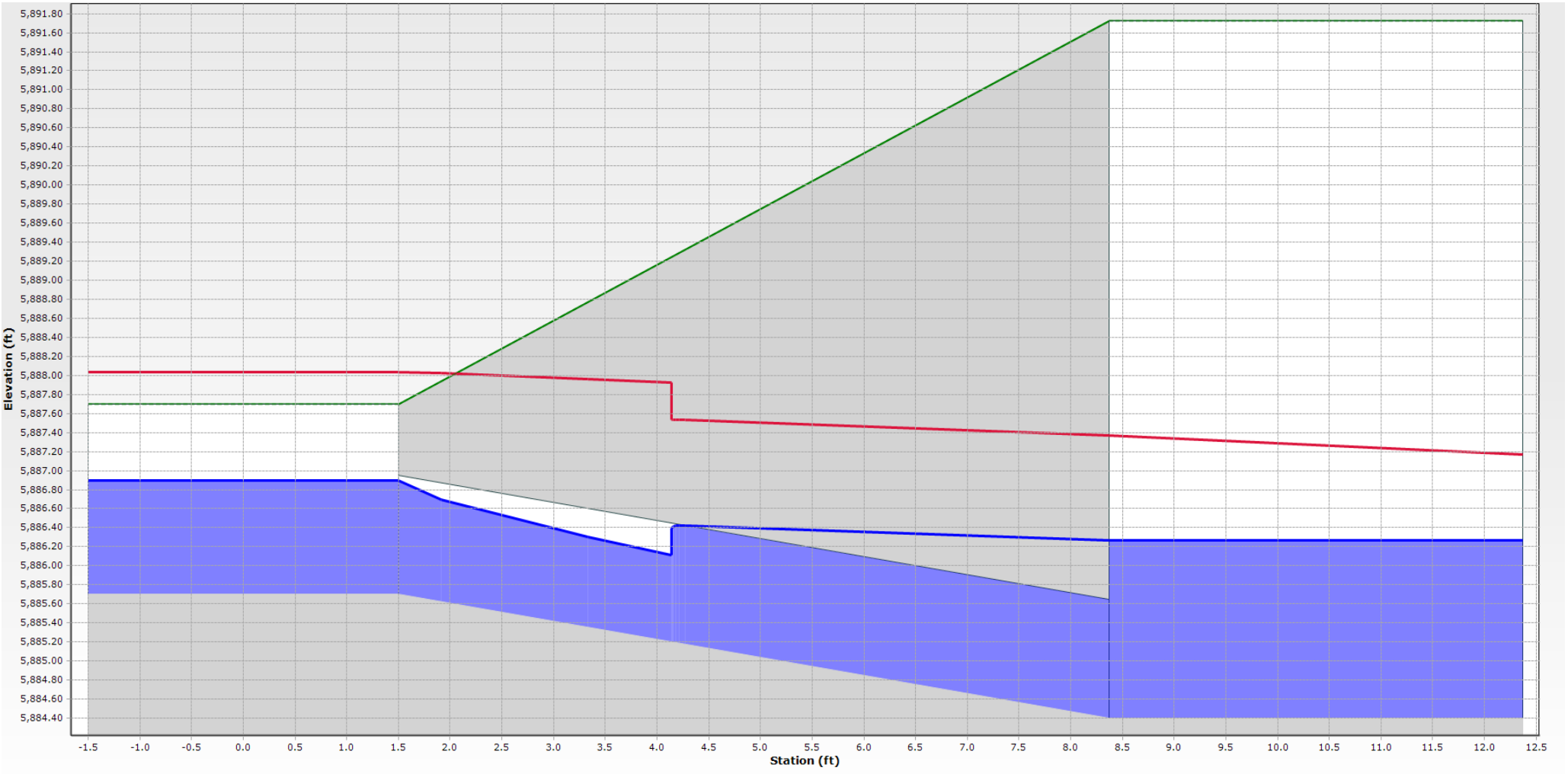


Profile Report
Profile: West Side

West Side - 100 Year - Time: 0.00

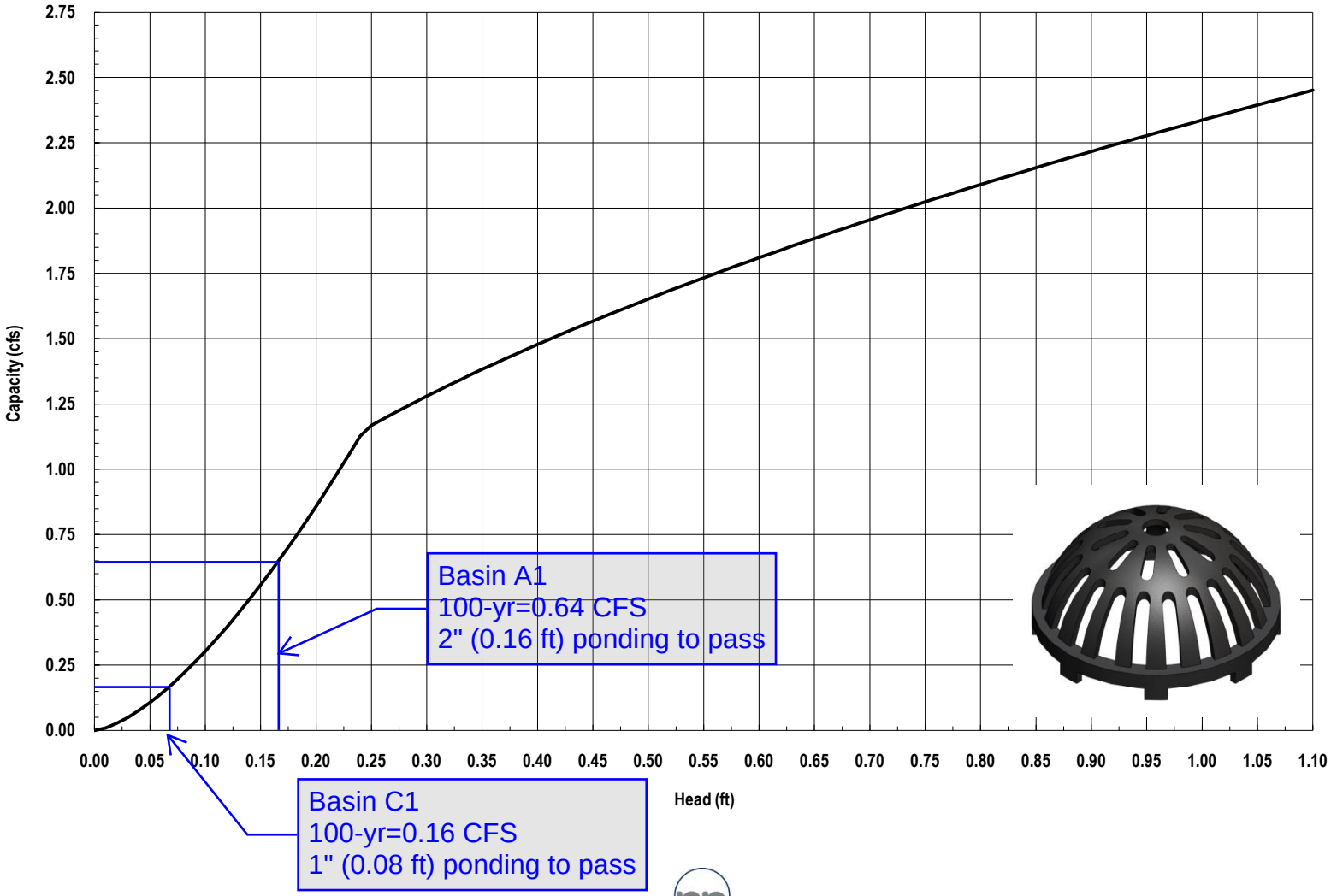


Profile Report
Profile: Prop Basin A2 DP3 to DP4



Station (ft)

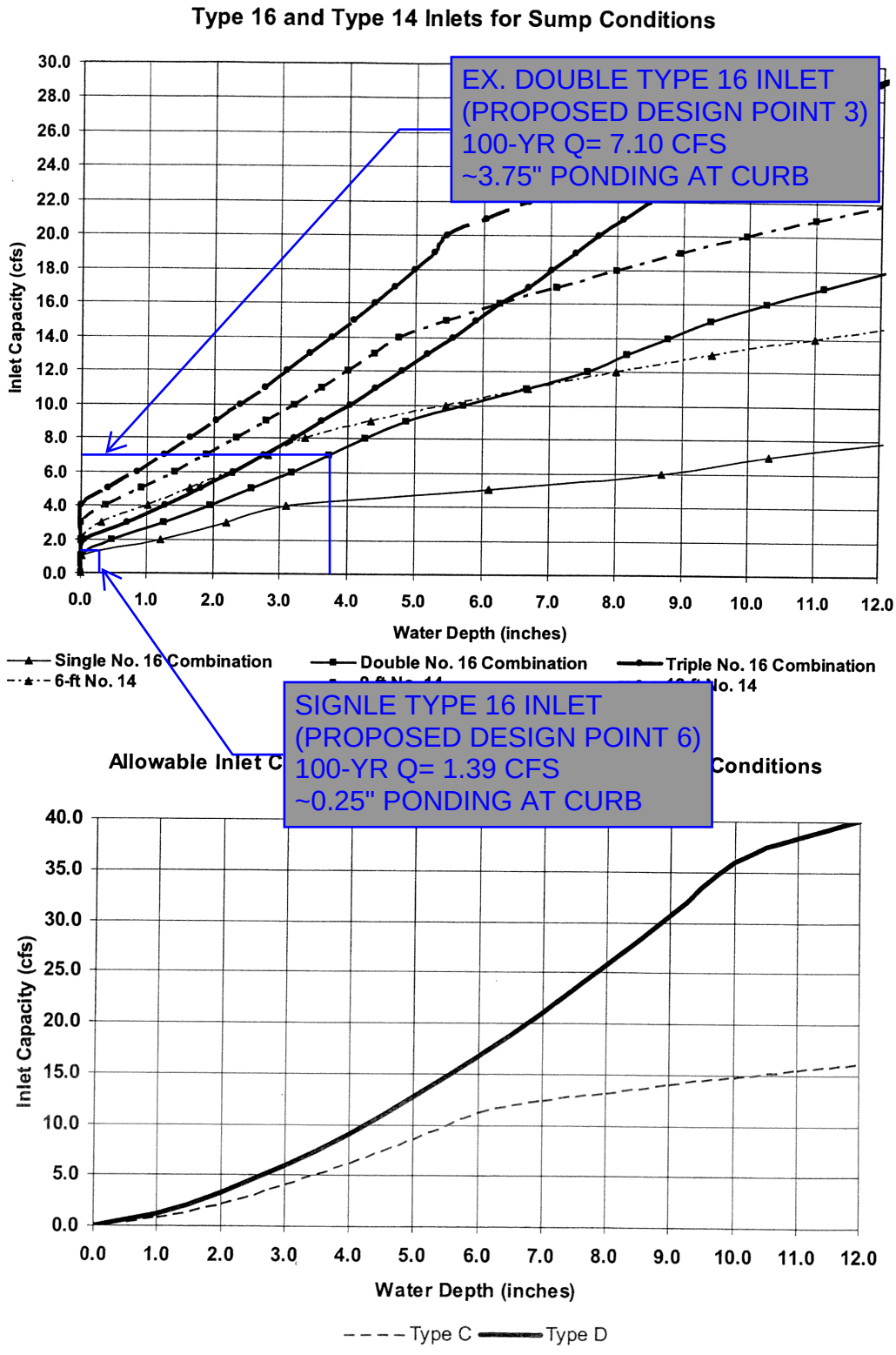
Nyloplast 12" Dome Grate Inlet Capacity Chart



Nyloplast®
3130 Verona Avenue • Buford, GA 30518
(866) 888-8479 / (770) 932-2443 • Fax: (770) 932-2490

Figure 8.1. Allowable Inlet Capacity— Sump Conditions

Note: See Section 8.3.2 for assumptions.



Appendix D: Existing Drainage Reports and Plans

Moser Report with Relevant Pages, Calculations, Plans
As-built Drainage and Grading Plans from Original Town Hall

MOSER & associates ENGINEERING

720 S. Colorado Boulevard, Suite 410 S
Denver, Colorado 80246
phone (303) 757-3655
fax (303) 300-1635

Town of Parker
Town Hall Water Quality Basin
Design Report

General Location and Description

The Town Hall Water Quality Basin improvement project is located adjacent to the Parker Town Hall at East Mainstreet and Pine Drive. The project area is approximately 3 acres. There is an existing water quality basin in place in the project area. Sulphur Gulch is located at the southern limit of the project, and the existing basin discharges / overflows into it.

The purpose of this project is to provide additional water quality volume for future development as well as to bring the outlet structure, forebay, and other basin features up to Urban Drainage and Flood Control District (UDFCD) and Town of Parker criteria.

Major Watersheds

The tributary area to the Town Hall Water Quality Basin is comprised of two watersheds, the Pine Gulch Watershed, and the Town Hall Watershed. See the appendix for a watershed map.

The Pine Gulch Watershed consists of approximately 524 acres. Flows from this watershed are collected in a ditch on the north side of East Mainstreet and conveyed underneath Pine Drive in a 48" reinforced concrete pipe (RCP). A double 4' x 2' concrete box culvert (CBC) conveys flows under the Town Hall access road into the existing water quality basin.

There is a large earthen dam in this watershed that was built by the Soil Conservation Service. Approximately 446 acres are tributary to the dam. This dam greatly reduces peak flow rates within the Pine Gulch Watershed. The lower 87 acres of the Pine Gulch Watershed are directly tributary to the Town Hall Water Quality Basin. For the purposes of this design, only the lower 87 acres are considered due to the diminished peak flow rates and water quality benefits of the dam. For the purposes of determining peak flow rates, outflows from the dam are taken into account at maximum discharge based on the outlet pipe size.

Future planned development in the lower Pine Gulch Watershed consists of the Mainstreet and Pine Drive commercial development. This is a 33 acre area adjacent

to the Town Hall area. The remaining is not currently planned for development and a portion of the area consists of existing low density residential development. The Town of Parker has indicated that any additional future development in the lower Pine Gulch Watershed will be required to provide detention to release at historic rates.

The Town Hall Watershed consists of approximately 7.5 acres which includes the Town Hall Building, the Old Town Hall, a well pump station, and all associated roads and parking lots. The majority of the runoff from the Town Hall building is collected in a storm sewer system and conveyed to the existing water quality basin in a 36" corrugated metal pipe (CMP). The runoff from the old town hall building is routed to a 12" CMP that discharges directly into the existing water quality basin. Runoff from the well pump station is collected in an 18" RCP that discharges into the existing water quality basin.

Combining the Town Hall Watershed and the lower Pine Gulch Watershed, the total area tributary to the water quality pond is 95 acres.

Existing Water Quality Basin Characteristics

The existing water quality basin contains approximately 1.2 acre-feet of runoff at the crest spillway elevation. The outlet structure consists of a water quality orifice riser plate. The existing outlet structure discharges to Sulphur Gulch using an 18" RCP. Stormwater runoff volumes in excess of the pond capacity spill out of the pond via a broad spillway on the southeast side of the pond. Stormwater which overtop the spill way flows in an uncontrolled fashion over the bike path and overland into Sulphur Gulch.

Hydrologic Design

A detailed hydrologic analysis was not performed for this project. Instead, the following reports were used to determine peak flows into the basin:

- Sulphur Gulch Outfall Systems Planning Study, Kiowa Engineering, January 2001.
- East Mainstreet Road Widening Drainage Report, CH2M Hill, 2003
- Mainstreet and Pine Drive Conceptual Drainage Analysis, Peak Civil Engineering, 2005.

As discussed above, the Soil Conservation Service (SCS) dam greatly reduces the peak flows in the Pine Gulch watershed. The Outfall Systems Plan (OSP) does not account for the effect of the SCS dam, resulting in peak flows within the Pine Gulch Watershed much larger then the anticipated peak flows with the dam in place. Therefore, the OSP report was not used in determining flow rates into the Town Hall Water Quality Basin.

The East Mainstreet Road Widening Drainage Report considers the effect ofSCS dam. The 100-year peak flow calculated in this report is 96 cfs at East Mainstreet.

This flow rate does not include the effect of the proposed Mainstreet and Pine Drive commercial development.

The Mainstreet and Pine Drive Conceptual Drainage Analysis did not directly consider the effect of the SCS dam, however, Peak Civil calculated a maximum 100-year direct discharge of approximately 58 cfs in email correspondence. Adding this flow to the East Mainstreet Road Widening Drainage Report design flow of 96 cfs yeilds a flow of 154 cfs.. This is the 100-year design flow used for the Pine Gulch Watershed. This flow is conservative because the numbers that Peak Civil used to calculate the discharge from the commercial property were conservative and they were directly added to the previous report without accounting for hydrograph routing or subtracting contributions from the commercial area in the first report

A drainage report for the Town Hall watershed was not available for this project. A very conservative rational method calculation was performed for the town hall watershed, resulting in a 100-year peak runoff of 52 cfs (see the appendix). Adding this value to the Pine Gulch design discharge of 154 cfs, results in a total design inflow to the basin of 206 cfs. We believe this to be a conservative number as it is based on the direct addition of several rational method calculations to the flow calculated in the East Mainstreet Widening Drainage report

Hydraulic Design

The water quality basin was sized by criteria found in the UDFCD Urban Storm Drainage Criteria Manual (USDCM), Volume 3. Based on existing land uses and the future land use for the Mainstreet and Pine Drive commercial property, a composite impervious value of 59% was calculated for the watershed. Based on the size of the watershed, the required water quality control volume (WQCV) was calculated to be 2.22 acre-feet. Detailed calculations may be found in the appendix.

The proposed water quality basin includes a concrete lined forebay to trap sediment at the pipe outfalls. This forebay was designed to contain approximately 5% of the WQCV, per UDSCM criteria. All existing pipes into the water quality basin were routed to the forebay. An 18" high concrete wall contains the water in the forebay and releases it through a 2-foot wide notch into a 4-foot wide concrete trickle channel.

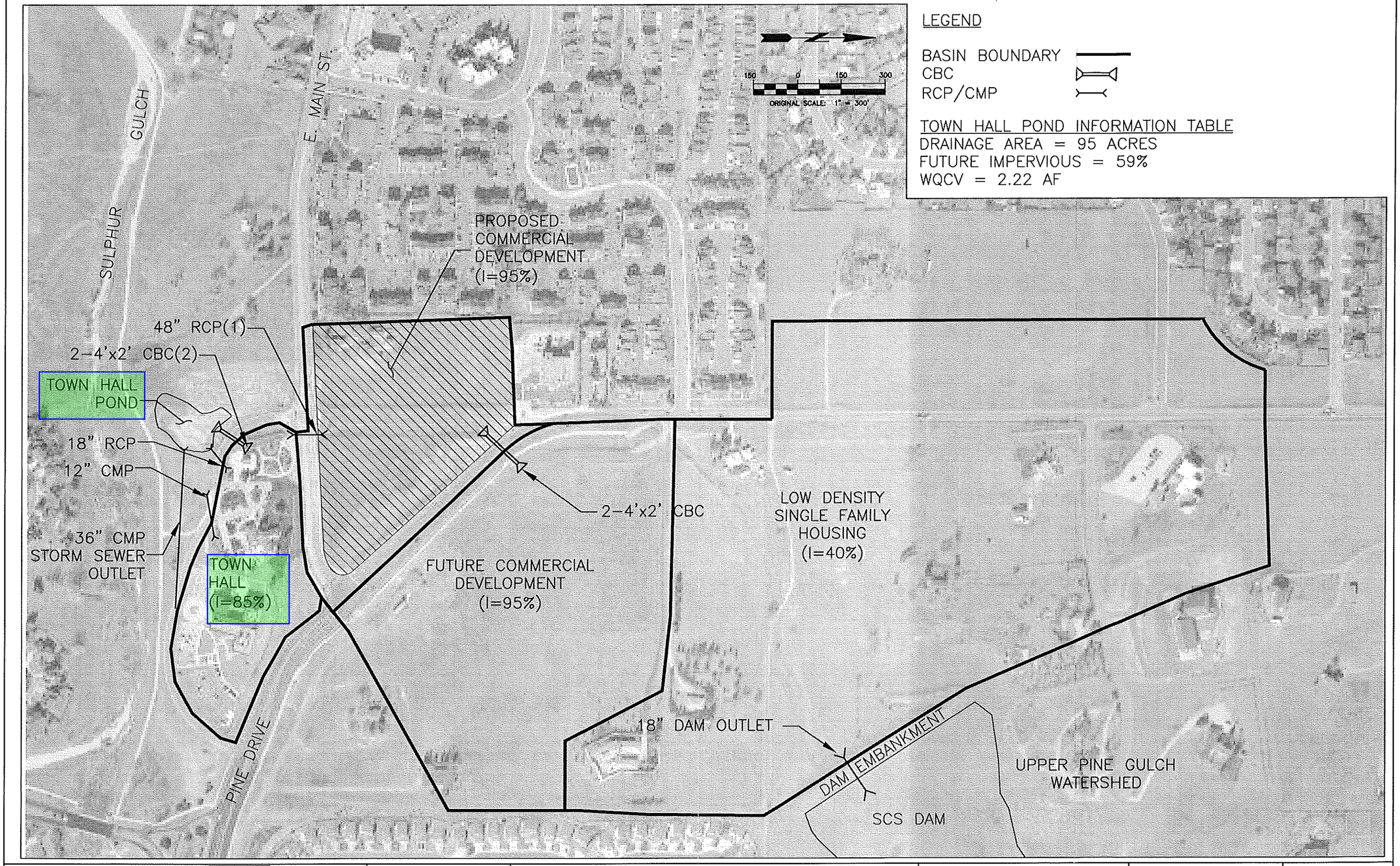
The trickle channel conveys flows to a concrete lined micropool. The micropool is 3-feet deep and flows directly into the outlet structure.

The water quality outlet structure was designed by USDCM Volume 3 criteria to contain the 85th percentile event for 40-hours. A stage-storage-outflow simulation was run to confirm a 40 hour drain time for the pond geometry and outlet structure design. The structure is a CDOT Type D inlet modified with a water quality orifice plate and wingwalls. The structure ties into the existing 18" RCP pond outlet pipe, as well as a new 36" RCP.

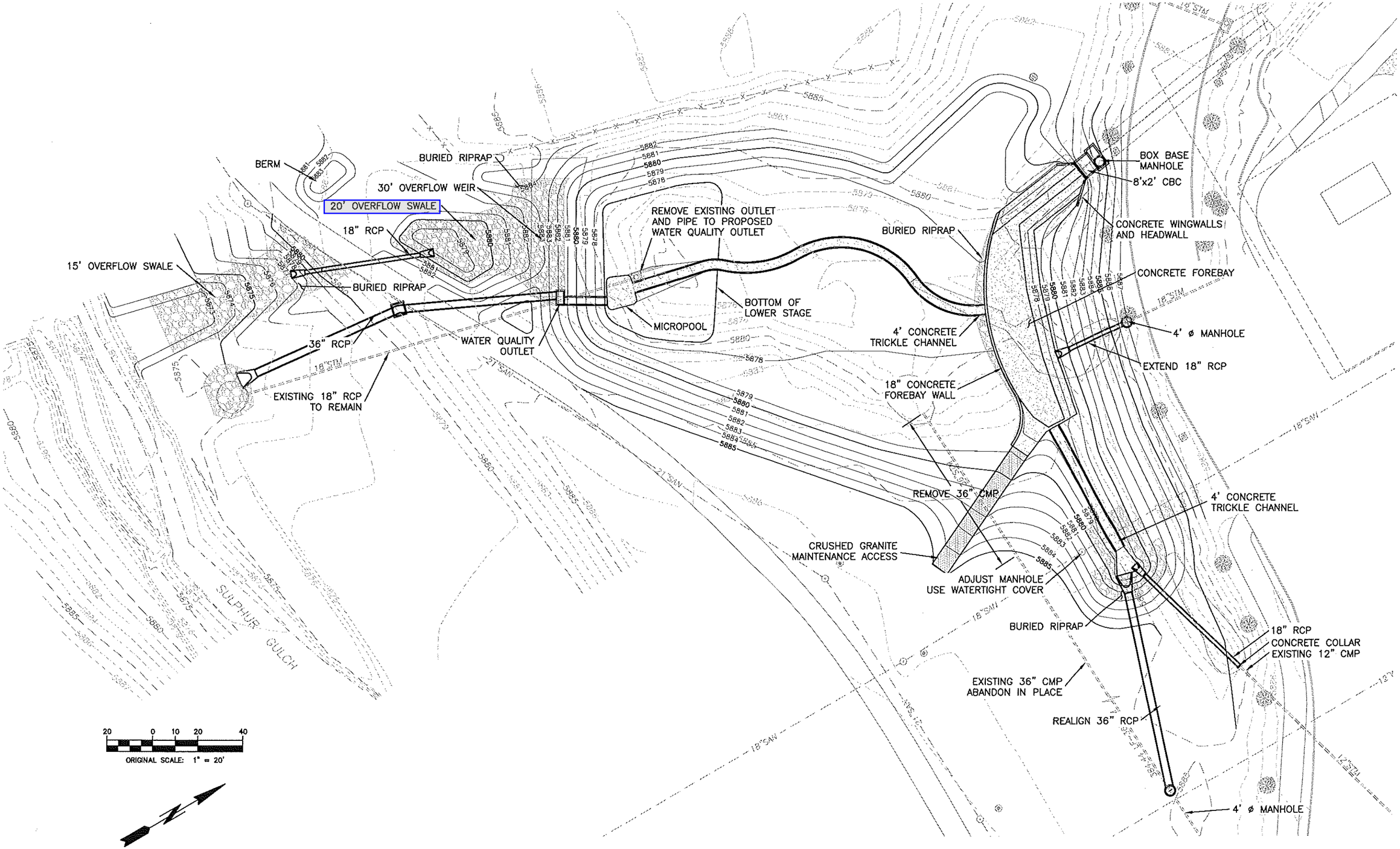
The peak flow through the water quality orifice plate is approximately 2.5 at the design water quality capture volume. When pond storage exceeds the WQCV, water flows into the top of the inlet box through a standard inlet grate. The overflow spillway elevation was set 1.5 feet higher than the inlet grate. This allows 1.5 feet headwater to build up over the inlet grate before the pond overtops the spillway. The maximum flow into the box from the inlet grate is approximately 77 cfs, controlled by the inlet hydraulics.

Flows in excess of 79 cfs (the inlet grate flow plus the orifice plate flow) cause the pond to overtop the overflow spillway. The overflow spillway is 40 feet wide and 2.5 feet deep and was designed to carry the entire 100-year design flow of 206 cfs in the event the outlet structure is completely clogged.

A buried riprap rundown channel carries flows from the spillway into Sulphur Gulch. An 18" RCP carries flows under the existing bike path. The 18" RCP will not handle the entire 100-year flow. In very large storm events, excess flows will overtop the bike path.



MOSER & associates ENGINEERING 720 S. COLORADO BLVD. SUITE 410 S DENVER, CO 80246 PHONE: 303-757-3655 FAX: 303-300-1635	DESIGNED DD DATE 10/31/05 DRAWN DD DATE 10/31/05 CHECKED DATE REVISED DATE	TRIBUTARY DRAINAGE AREA	PARKER TOWN HALL DETENTION BASIN	TOWN OF PARKER	FIGURE 1



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PLOT DATE: Jun 12, 2007 6:04pm

NO.	DATE	DESCRIPTION	BY

DESIGNED DPD DATE 02/03/06
DRAWN DPD DATE 02/03/06
CHECKED RRM DATE 02/03/06

MOSER & associates ENGINEERING
720 S. COLORADO BLVD.,
SUITE 410S
DENVER, CO 80246
PH: (303) 757-3655

PROJECT NO. _____

Town of Parker COLORADO
Town of Parker
Public Works Department
20120 East Mainstreet
Parker, CO 80138
(303) 840-9546

PARKER TOWN HALL
WATER QUALITY BASIN

SITE PLAN

SHEET 7 OF 25

Town Hall Watershed Flow Approximation

Area = 7.5 acres

i = 85%

T_L = (Assumes 5 minutes)

I = 8.7 in/hr (Town of Parker IDF curve)

C_{100} = 0.79 CUDSLM Vol1-2, Table RO-5)

Q_{100} = C_{100} *I*A = 51.5

Use: 52 cfs

TABLE RO-5

Runoff Coefficients, C

Percentage Imperviousness	Type C and D NRCS Hydrologic Soil Groups					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
0%	0.04	0.15	0.25	0.37	0.44	0.50
5%	0.08	0.18	0.28	0.39	0.46	0.52
10%	0.11	0.21	0.30	0.41	0.47	0.53
15%	0.14	0.24	0.32	0.43	0.49	0.54
20%	0.17	0.26	0.34	0.44	0.50	0.55
25%	0.20	0.28	0.36	0.46	0.51	0.56
30%	0.22	0.30	0.38	0.47	0.52	0.57
35%	0.25	0.33	0.40	0.48	0.53	0.57
40%	0.28	0.35	0.42	0.50	0.54	0.58
45%	0.31	0.37	0.44	0.51	0.55	0.59
50%	0.34	0.40	0.46	0.53	0.57	0.60
55%	0.37	0.43	0.48	0.55	0.58	0.62
60%	0.41	0.46	0.51	0.57	0.60	0.63
65%	0.45	0.49	0.54	0.59	0.62	0.65
70%	0.49	0.53	0.57	0.62	0.65	0.68
75%	0.54	0.58	0.62	0.66	0.68	0.71
80%	0.60	0.63	0.66	0.70	0.72	0.74
85%	0.66	0.68	0.71	0.75	0.77	0.79
90%	0.73	0.75	0.77	0.80	0.82	0.83
95%	0.80	0.82	0.84	0.87	0.88	0.89
100%	0.89	0.90	0.92	0.94	0.95	0.96
	Type B NRCS Hydrologic Soils Group					
0%	0.02	0.08	0.15	0.25	0.30	0.35
5%	0.04	0.10	0.19	0.28	0.33	0.38
10%	0.06	0.14	0.22	0.31	0.36	0.40
15%	0.08	0.17	0.25	0.33	0.38	0.42
20%	0.12	0.20	0.27	0.35	0.40	0.44
25%	0.15	0.22	0.30	0.37	0.41	0.46
30%	0.18	0.25	0.32	0.39	0.43	0.47
35%	0.20	0.27	0.34	0.41	0.44	0.48
40%	0.23	0.30	0.36	0.42	0.46	0.50
45%	0.26	0.32	0.38	0.44	0.48	0.51
50%	0.29	0.35	0.40	0.46	0.49	0.52
55%	0.33	0.38	0.43	0.48	0.51	0.54
60%	0.37	0.41	0.46	0.51	0.54	0.56
65%	0.41	0.45	0.49	0.54	0.57	0.59
70%	0.45	0.49	0.53	0.58	0.60	0.62
75%	0.51	0.54	0.58	0.62	0.64	0.66
80%	0.57	0.59	0.63	0.66	0.68	0.70
85%	0.63	0.66	0.69	0.72	0.73	0.75
90%	0.71	0.73	0.75	0.78	0.80	0.81
95%	0.79	0.81	0.83	0.85	0.87	0.88
100%	0.89	0.90	0.92	0.94	0.95	0.96

WQCV Calculations

Total Area = 9.5 Acres

- Town Hall Area = 7.5 Acres
- Commercial Development = 33.3 Acres
- Low Density Residential = 54.2 Acres

Impervious Values

- Town Hall = 85%
- Commercial Development = 95%
- Low Density Residential = 35%

Composite Impervious Value

i = .85(7.5/95)+.95(33.3/95)+.35(54.2/95)

i = 0.59

WQCV = 0.23 Watershed inches (USDCM Figure EDB-2)

WQCV = (0.24/12)*95*1.2 = 2.21 acre-feet

Bottom Stage:

Required Volume = 3% of WQCV

= 0.068 acre-feet

= 2890 ft^3

* 1-2 deep

Micropool

- 2.5' Deep, or 1/2 Top Stage Depth

Top Stage

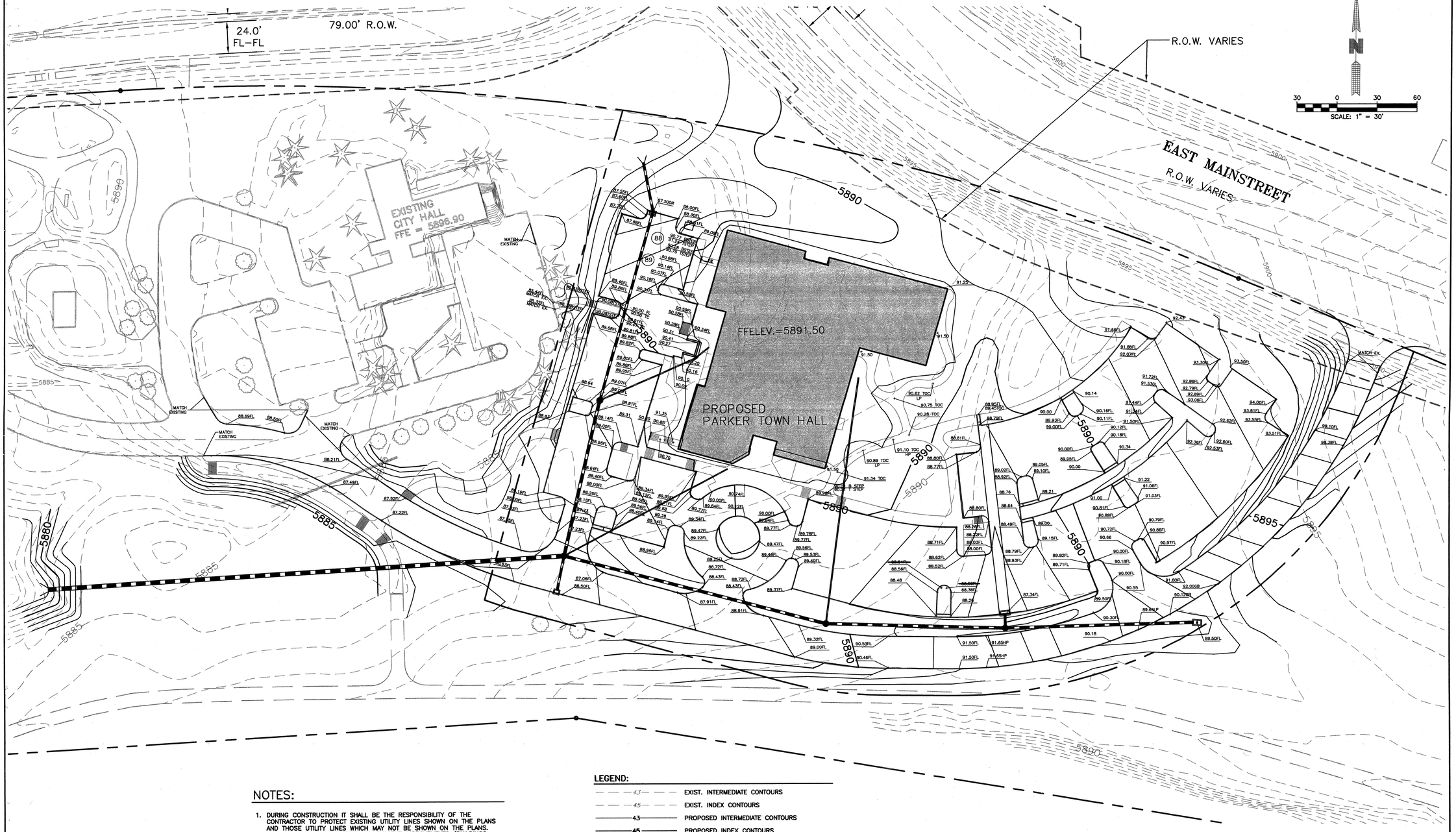
- < 2.0' Deep

Forebay

Volume = 5% of WQCV

= 0.011 acre-feet

= 4818 ft^3



NOTES:

1. DURING CONSTRUCTION IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT EXISTING UTILITY LINES SHOWN ON THE PLANS AND THOSE UTILITY LINES WHICH MAY NOT BE SHOWN ON THE PLANS.
2. CONTRACTOR SHALL PROTECT ALL ADJACENT IMPROVEMENTS (BUILDINGS, ROADWAYS, FENCES, PARKING LOTS, UTILITIES, ETC.) FROM DAMAGE AND EROSION. ALL DISTURBED AREAS OFF–SITE SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
3. THE CONTRACTOR SHALL NOTIFY APPROPRIATE PERSONNEL FOR UTILITY LOCATIONS AND NOTICE OF CONSTRUCTION COMMENCEMENT 48 HOURS PRIOR TO START OF CONSTRUCTION.
4. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBILE FOR CONDITIONS AT AND ADJACENT TO THE JOB SITE, INCLUDING SAFETY OF ALL PERSONS AND PROPERTY DURING PERFORMANCE OF THE WORK. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS.
5. THE CONTRACTOR SHALL NOTIFY THE CONTRUCTION MANAGER IMMEDIATELY SHOULD ANY CONFLICTS EXIST BETWEEN THE PLANS AND WHAT IS FOUND IN THE FIELD.
6. PROPERTY LINE BEARING, DISTANCE, AND EXISTING SITE PLANIMETRIC INFORMATION IS BASED ON SURVEY DATED 01/19/01 BY ROCKY MOUNTAIN CONSULTANTS, INC. S.A. MIRO, INC. MAKES NO WARRANTY TO THE ACCURACY OF THIS INFORMATION. CONTRACTOR'S SURVEYOR SHALL VERIFY ALL PERTINENT PROPERTY BOUNDARY INFORMATION PRIOR TO CONSTRUCTION.
7. ALL STORM PIPE WILL BE SPIRALLED ALUMINIZED STEEL EXCEPT FOR ROOF DRAIN STORM PIPE WHICH WILL BE PVC.
8. MAXIMUM SLOPES OF ALL CUTS AND FILLS SHALL BE 4:1 UNLESS NOTED OTHERWISE.
9. THE CONTRACTOR SHALL OBTAIN, AT HIS EXPENSE, ALL PERMITS THAT ARE NECESSARY TO COMPLETE THE CONSTRUCTION GRADING AND SHALL COMPLY WITH ALL LOCAL, STATE AND FEDERAL REGULATIONS.
10. SPOT ELEVATIONS ARE TO FLOWLINE UNLESS NOTED OTHERWISE.
11. NEW GRADING CONTOURS SHALL MEET AND MATCH EXISTING LANDSCAPING AND CONTOURS AT PROPERTY LINE.
12. ALL PROPOSED GRADING IS TO FINISHED GRADE UNLESS NOTED OTHERWISE.

LEGEND:

43	EXIST. INTERMEDIATE CONTOURS
45	EXIST. INDEX CONTOURS
43	PROPOSED INTERMEDIATE CONTOURS
45	PROPOSED INDEX CONTOURS
+45.44E	EXISTING SPOT ELEVATION
+45.45	PROPOSED FLOWLINE SPOT ELEVATION
+46.44GB	PROPOSED GRADE BREAK SPOT ELEVATION
+44.56HP	PROPOSED HIGH POINT SPOT ELEVATION
+43.33GD	PROPOSED GROUND SPOT ELEVATION
+45.67TC	PROPOSED TOP OF CONCRETE SPOT ELEVATION
+45.76TA	PROPOSED TOP OF ASPHALT SPOT ELEVATION
+44.33TBC	PROPOSED TOP BACK OF CURB SPOT ELEVATION
+42.22LP	PROPOSED LOW POINT SPOT ELEVATION
+42.22TW	PROPOSED TOP OF WALL SPOT ELEVATION
	PROPOSED STORM SEWER INLET
	PROPOSED STORM SEWER
	PROPOSED MANHOLE
	PROPOSED CLEANOUT
	EXISTING STORM INLET
18"ST	EXISTING STORM SEWER
GR	GRATE
TSTEP	TOP OF STEP
BSTEP	BOTTOM OF STEP

CALL UTILITY NOTIFICATION
CENTER OF COLORADO
1-800-922-1987
CALL 2–BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

CONSTRUCTION RECORD DOCUMENTS

S. A. MIRO, INC. HAS RELIED ON THE INFORMATION PROVIDED BY HYDER CONSTRUCTION INC. (UNDATED) AND SURVEY BY AZTEC CONSULTANTS DATED 05/29/02 AS "AS BUILT" RECORD OF CONSTRUCTION IN THE PREPARATION OF THESE CONSTRUCTION RECORD DOCUMENTS, AND HAS NOT PERFORMED INDEPENDENT FIELD VERIFICATION OF THE INFORMATION

Davis Partnership Architects

2301 BLAKE ST., STE. #100
DENVER, COLORADO 80205
303.861.8555 F.303.861.3027

0137 MAIN STREET, UNIT C106
POST OFFICE BOX 2711
EDWARDS, COLORADO 81632
970.926.8960 F.970.926.8961

CIVIL ENGINEERS
S. A. MIRO, INC.
Consulting Engineers
4582 S. Ulster Street Parkway
Ste 1501 Denver, Colorado 80237
303 741 3737

ISSUE/REVISION	DATE	NO.
DESIGN DEVELOPMENT SET	01/11/01	
DESIGN DEVELOPMENT SET	01/24/01	1
DESIGN DEVELOPMENT SET	03/09/01	2
CD PRICING SET	03/28/01	3
CD SET	04/23/01	4
AS–BUILTS	08/14/02	5

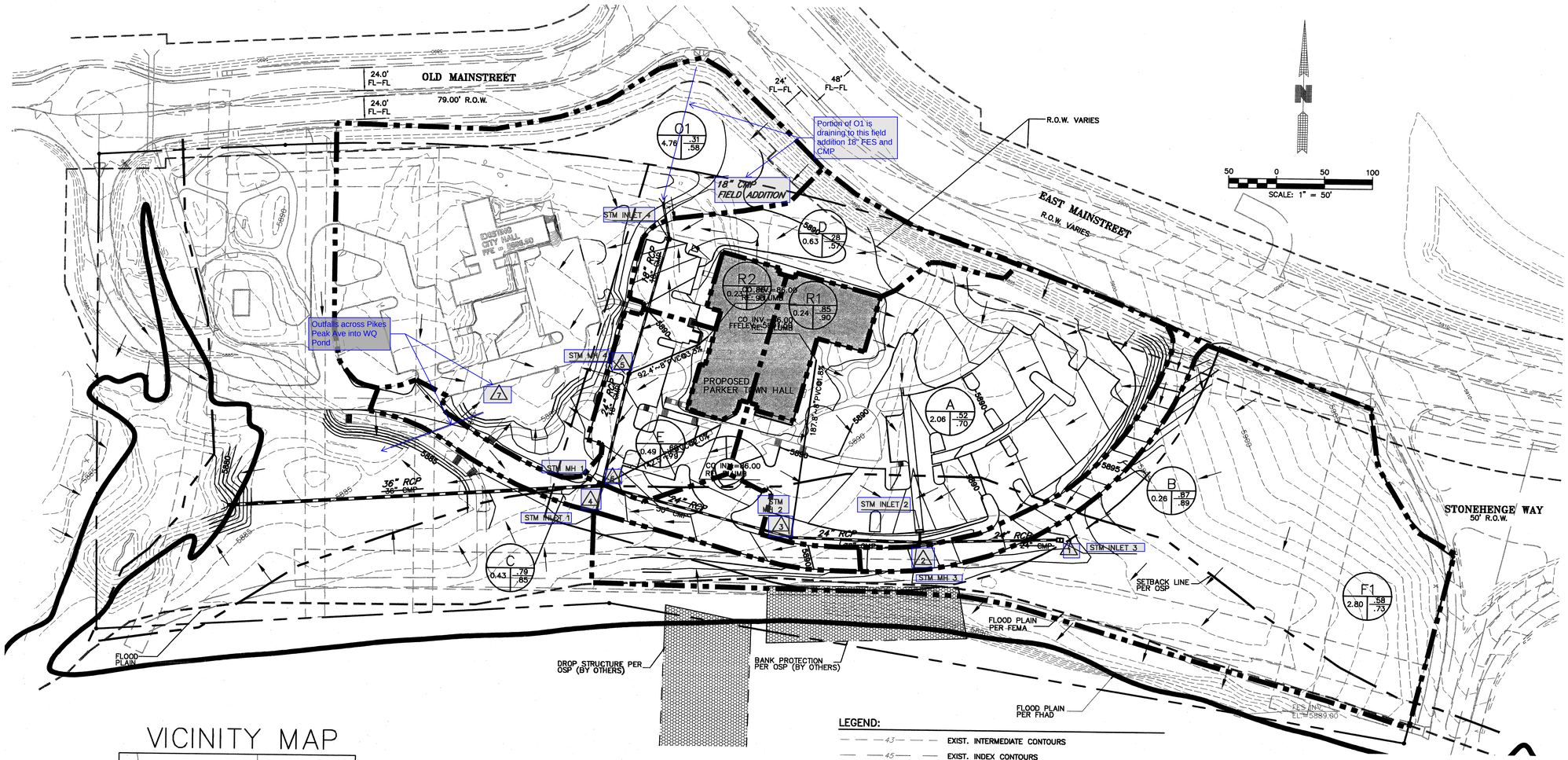
PARKER
TOWN HALL

20120 E. MAIN ST.
PARKER, CO

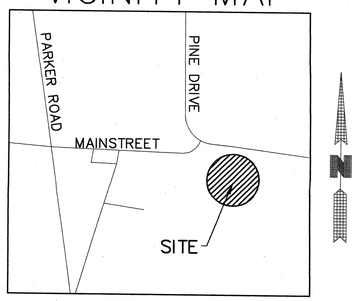
OVERALL GRADING PLAN

DRAWN BY	TRR
CHK'D BY	KDB
SHEET FILE	

SHEET NUMBER:
C2.00
D.P.A. PROJECT #



VICINITY MAP



NOT TO SCALE

RUNOFF SUMMARY

DESIGN POINT	TRIBUTARY AREA (ac.)	DIRECT RUNOFF Q–5 (cfs)	DIRECT RUNOFF Q–100 (cfs)
1	3.06	8.70	19.6
2	5.12	13.6	31.6
3	5.36	14.4	33.0
4	0.92	3.32	6.77
5	0.86	1.56	4.42
6	7.14	17.3	39.4
7	4.76	6.49	20.4

LEGEND:

- EXIST. INTERMEDIATE CONTOURS
- EXIST. INDEX CONTOURS
- PROPOSED INTERMEDIATE CONTOURS
- PROPOSED INDEX CONTOURS
- BASIN BOUNDARY
- FLOW ARROW
- Q_5 =XX.XX CFS; Q_{100}=XX.XX CFS — DESIGN POINT DESIGNATION
- BASIN DESIGNATION
- BASIN AREA (ACRES) — 5 YEAR COMPOSITE C / 100 YEAR COMPOSITE C
- PROPOSED STORM SEWER INLET
- PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED CLEANOUT
- EXISTING STORM INLET
- 18"ST — EXISTING STORM SEWER
- FEMA — FEDERAL EMERGENCY MANAGEMENT AGENCY
- FHAD — FLOOD HAZARD AREA DELINEATION
- OSP — SULPHUR AND TALLMAN GULCH WATERSHED OUTFALL SYSTEMS PLANNING STUDY

CONSTRUCTION RECORD DOCUMENTS

S. A. MIRO, INC. HAS RELIED ON THE INFORMATION PROVIDED BY HYDER CONSTRUCTION INC. (UNDATED) AND SURVEY BY AZTEC CONSULTANTS DATED 05/29/02 AS "AS BUILT" RECORD OF CONSTRUCTION IN THE PREPARATION OF THESE CONSTRUCTION RECORD DOCUMENTS, AND HAS NOT PERFORMED INDEPENDENT FIELD VERIFICATION OF THE INFORMATION

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303 741 3737

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DESIGN DEVELOPMENT SET	03/09/01	2
CD PRICING SET	03/28/01	3
CD SET	04/23/01	4
AS–BUILTS	08/14/02	5

PARKER TOWN HALL

20120 E. MAIN ST.
PARKER, CO

DRAINAGE PLAN

DRAWN BY	TRR
CHK'D BY	KDB
SHEET FILE	

SHEET NUMBER:

C2.20

D.P.A. PROJECT #

Appendix E: Proposed Plans

Drainage Plan - Figure 1
Site Plan
Erosion Control Plans

Basin Designation	A total (acres)	Impervious-ness	CCD 05 yr	CCD 100 yr
R1	0.14	90%	0.77	0.84
A1	0.27	2%	0.05	0.49
R2	0.22	90%	0.77	0.84
A2	1.17	79%	0.68	0.80
EX. R1	0.24	90%	0.77	0.84
R3	0.07	90%	0.77	0.84
B1	0.18	97%	0.83	0.87
C1	0.05	2%	0.05	0.49
C2	0.31	9%	0.11	0.52
C3	0.98	3%	0.06	0.50
C4	0.21	95%	0.81	0.86
EX. R2	0.24	90%	0.77	0.84
C5	1.15	67%	0.58	0.75
Total	5.23	56%	0.50	0.71

PROPOSED RUNOFF SUMMARY

Design Point	Tributary Basin(s)	Tributary Area (ac.)	Direct Runoff (CFS/5-yr)	Total Runoff (CFS/5-yr)	Direct Runoff (CFS/100-yr)	Total Runoff (CFS/100-yr)
	A1	0.27	0.04		0.64	
	R1	0.14	0.48		0.98	
DP1	A1,R1	0.41		0.51		1.61
	R2	0.22	0.81		1.65	
DP2	DP1,R2	0.63		1.32		3.26
	A2	1.17	3.24		7.10	
DP3	DP2,A2	1.80		4.56		10.36
DP4	DP3, EX. DP 1	4.86		13.26		29.96
	EX.R1	0.24	0.89		1.81	
DP5	EX.R1	0.24		0.89		1.81
	R3	0.07	0.26		0.53	
DP6	R3	0.07		0.26		0.53
	B1	0.18	0.71		1.39	
DP7	B1	0.18		0.71		1.39
DP8	DP4,DP5,DP6,DP7	5.36		15.11		33.69
	C1	0.05	0.01		0.16	
	C2	0.31	0.12		1.08	
DP9	C1,C2	0.36		0.13		1.24
	C3	0.98	0.24		3.76	
DP10	DP8,C3	1.34		0.36		5.00
	C4	0.21	0.69		1.37	
DP11	DP9,C4	1.55		1.05		6.37
	EX. R2	0.24	0.82		1.67	
DP12	DP10,EX. R2	1.78		1.87		8.04
	C5	1.15	2.99		7.21	
DP13	DP11,C5,DP7	8.29		19.97		48.94

30 0 30
SCALE: 1" = 30'

LEGEND:

- EXISTING MINOR CONTOURS
- EXISTING MAJOR CONTOUR
- EXISTING STORM SEWER
- EXISTING STORM INLET
- PROPOSED MINOR CONTOURS
- PROPOSED MAJOR CONTOURS
- PROPOSED STORM SEWER
- PROPOSED MANHOLE
- PROPOSED INLETS
- BASIN BOUNDARY
- PROPOSED DOWNSPOUT
- FLOW DIRECTION ARROW
- EXISTING DESIGN POINT DESIGNATION SEE NOTE 2
- PROPOSED DESIGN POINT DESIGNATION
- B (0.52 | 0.73 / 0.82) — BASIN DESIGNATION; INTERMEDIATE YEAR COMPOSITE C; 100 YEAR COMPOSITE C; BASIN AREA (ACRES)

NOTES:

1. RELOCATED EXISTING ROOF DRAIN SERVING 10,605 SQ. FT. OF THE EXISTING BUILDING'S ROOF AREA PER COORDINATION WITH THE PLUMBING CONSULTANT.
2. THE EXISTING DRAINAGE PLAN FROM THE ORIGINAL TOWN HALL BUILDING FROM 2002 CAN BE USED FOR COMPARING THE EXISTING TO PROPOSED DESIGN POINTS. INCLUDED IN THE APPENDIX OF THE DRAINAGE REPORT.

THE TOWN OF PARKER REVIEW CONSTITUTES GENERAL COMPLIANCE WITH 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.

THIS REVIEW DOES NOT CONSTITUTE APPROVAL OF ANY PRIVATE ON-SITE IMPROVEMENTS WHICH MAY BE SHOWN. CONSTRUCTION CANNOT COMMENCE UNTIL ALL REQUIRED DRAINAGE/TRAFFIC REPORT(S), FINAL DEVELOPMENT PLAN(S), SPECIAL REVIEW(S), GRADING PERMIT, AND/OR OTHER PERMITS ARE COMPLETE, APPROVED AND ON FILE WITH THE TOWN OF PARKER

Town of Parker, Director of Engineering/Public Works Date

MIRO
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
1	FIRST TOWN SUBMITTAL	11/03/2023
2	SECOND TOWN SUBMITTAL	02/05/2024

PROJECT: **PARKER TOWN HALL EXPANSION**
20120 MAINSTREET
PARKER, CO 80138

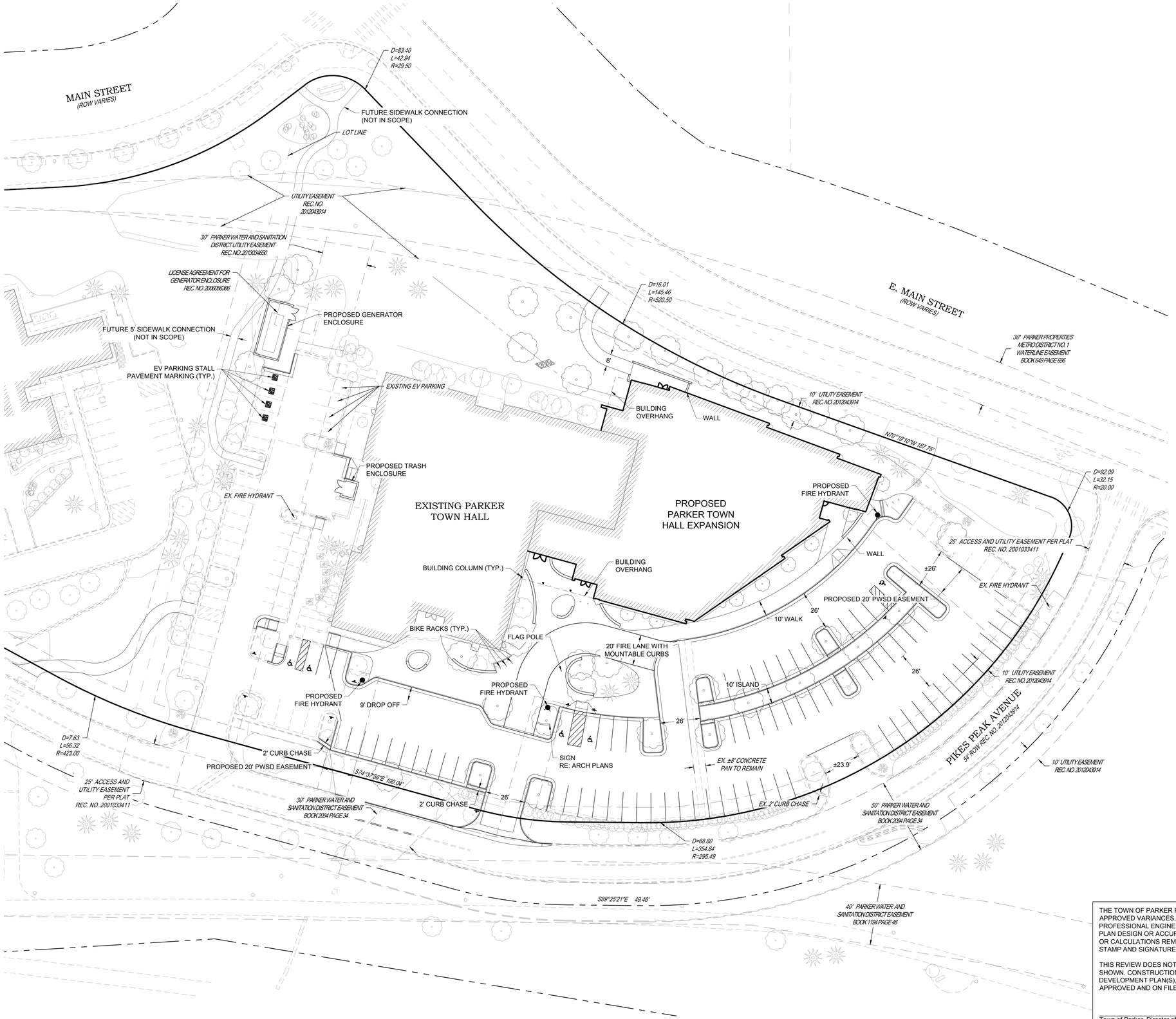
DRAWING TITLE: **DRAINAGE PLAN**

FILE PATH: C:\Users\FKF\ACCDocs\S. A. Miro, Inc\Civil\Jobs\22139 Parker Town Hall\05 CAD\Plans and Details\Drainage Plan.dwg FIG 1 - 2/5/2024

DESIGNED BY:	RJH
DRAWN BY:	DEI
CHECKED BY:	MHV
MIRO JOB NO.	22139

DRAWING NUMBER:

FIG.1



30 0 30

SCALE: 1" = 30'

NOTES:

1. SEE SHEET C-001 FOR CIVIL NOTES AND LEGEND.
2. ADD ALTERNATE 1 - SEAL COAT EXISTING ASPHALT AND RESTRIPE PARKING LOT.
3. ADD ALTERNATE 2 - ADD ADDITIONAL PEDESTRIAN CROSSING INCLUDING PUSH BUTTON SIGNAL AND RAISED CROSSWALK ON PIKES PEAK AVENUE.
4. A SITE INSPECTION IS REQUIRED PRIOR TO DEMOLITION AND CONSTRUCTION.
5. NO VERTICAL CONSTRUCTION ON THIS SITE WILL BE ALLOWED UNTIL SUCH TIME THE CURB GUTTER AND FIRST LIFT OF ASPHALT ARE INSTALLED

THE TOWN OF PARKER REVIEW CONSTITUTES GENERAL COMPLIANCE WITH 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/Public Works Date

MIRO

S.A. MIRO INC.
CONSULTING ENGINEERS

4582 South Ulster Street
Suite 750, Denver, CO 80237
303-741-3737
www.samiro.com

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

NO.	DESCRIPTION	DATE
1	FIRST TOWN SUBMITTAL	11/03/2023
2	SECOND TOWN SUBMITTAL	02/05/2024

PROJECT: **PARKER TOWN HALL EXPANSION**
20120 MAINSTREET
PARKER, CO 80138

DRAWING TITLE: **SITE PLAN**

FILE PATH: C:\Users\rhi\DC\ACCDocs\S. A. Miro, Inc-Civil\Jobs\22139 Parker Town Hall\05 CAD\Plans and Details\C021-SITE-PLAN.dwg C021 - 2/5/2024

DESIGNED BY:	RJH
DRAWN BY:	DEI
CHECKED BY:	MHV
MIRO JOB NO.	22139

DRAWING NUMBER:

C-021

EROSION CONTROL CONSTRUCTION PLANS

FOR

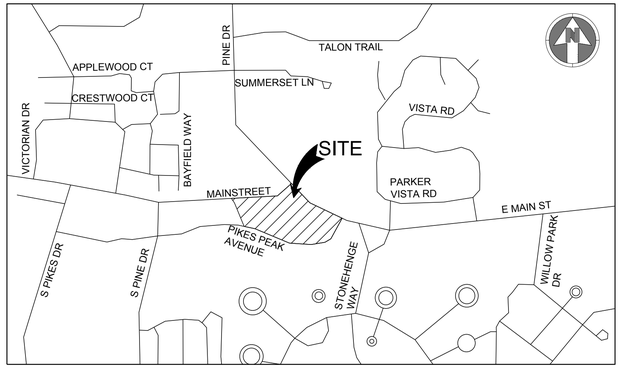
PARKER TOWN HALL

LOT 1, PARKER TOWN HALL, 3RD AMENDMENT, SUBDIVISION EXEMPTION PLAT, ACCORDING TO THE PLAT THEREOF RECORDED FEBRUARY 5, 2015 AT RECEPTION NO. 2015007140, COUNTY OF DOUGLAS, STATE OF COLORADO

ENGINEER'S STATEMENT

I HEREBY CERTIFY THAT THESE PLANS WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF COLORADO.

MEGAN HUERTER VOGT
REGISTERED PROFESSIONAL ENGINEER
COLORADO NO. 47666



VICINITY MAP
NTS

Sheet List Table	
Sheet Number	Sheet Title
C-240	EROSION CONTROL COVER SHEET
C-241	INITIAL EROSION CONTROL PLAN
C-242	INTERIM EROSION CONTROL PLAN
C-243	FINAL EROSION CONTROL PLAN
C-244	OFF-SITE EROSION CONTROL PLAN
C-251	EROSION CONTROL DETAILS
C-252	EROSION CONTROL DETAILS
C-253	EROSION CONTROL DETAILS
C-254	EROSION CONTROL DETAILS
C-255	EROSION CONTROL DETAILS
C-256	EROSION CONTROL DETAILS
C-257	EROSION CONTROL DETAILS
C-258	EROSION CONTROL DETAILS
C-259	EROSION CONTROL DETAILS

CONTACTS:

OWNER'S REPRESENTATIVE
TOWN OF PARKER
20120 E. MAIN STREET
PARKER, CO 80138
P: (303) 840-9546

ENGINEER
S.A. MIRO INC.
MEGAN H. VOGT
4582 SOUTH ULSTER STREET
SUITE 750 DENVER, CO 80237
303-741-3737

SURVEYOR
AZTEC CONSULTANTS, INC.
DANIEL E. DAVIS
300 EAST MINERAL AVE, SUITE 1
LITTLETON, CO 80122
P: (303)-713-1898

PUBLIC UTILITIES:

SOUTH METRO FIRE DISTRICT
9195 E. MINERAL AVENUE
CENTENNIAL, CO 80112
P: (720) 989-2244

PARKER WATER & SANITATION DISTRICT
18100 WOODMAN ROAD
PARKER, CO 80134
P: (303) 841-4627

TOWN OF PARKER
20120 E. MAIN STREET
PARKER, CO 80138
P: (303) 840-9546

BASIS OF BEARING:

BEARINGS SHOWN HEREON ARE GRID BEARINGS DERIVED FROM GPS OBSERVATIONS BASED UPON THE COLORADO COORDINATE SYSTEM OF 1983 CENTRAL ZONE (NAD 83, 2011), REFERENCED TO THE WEST LINE OF THE NORTHWEST QUARTER OF SECTION 23, TOWNSHIP 6 SOUTH, RANGE 66 WEST, SIXTH PRINCIPAL MERIDIAN, BEING MONUMENTED AT THE NORTHWEST CORNER OF SAID SECTION 23 BY A 3-1/4" DIAMETER ALUMINUM CAP STAMPED IN PART "AZTEC CONSULTANTS, INC. LS 17666 2003" AND AT THE WEST QUARTER CORNER OF SAID SECTION 23 BY A 2-3/4" ALUMINUM CAP STAMPED IN PART "LS 13155 1993", TAKEN TO BEAR NORTH 00°25'07" EAST, A DISTANCE OF 2,648.44 FEET.

BENCHMARK:

1-1/4" ALUMINUM ALLOY CAP SET ON NUMBER 5 REBAR STAMPED " AZTEC CP 51 "LOCATED IN THE NORTH PARKING LOT OF CORNERSTONE PARK IN LITTELTON, IN THE GRASSY ISLAND 80.3 FEET EAST OF THE EAST EDGE THE GRAVEL TRAFFIC CIRCLE, AND 8 FEET NORTH OF THE EDGE OF GRAVEL

ELEVATION=5399.27 (NAVD 88).

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Town of Parker, Director of Engineering/Public Works Date

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NO.	DESCRIPTION	DATE
1	FIRST TOWN SUBMITTAL	11/03/2023
2	SECOND TOWN SUBMITTAL	02/05/2024

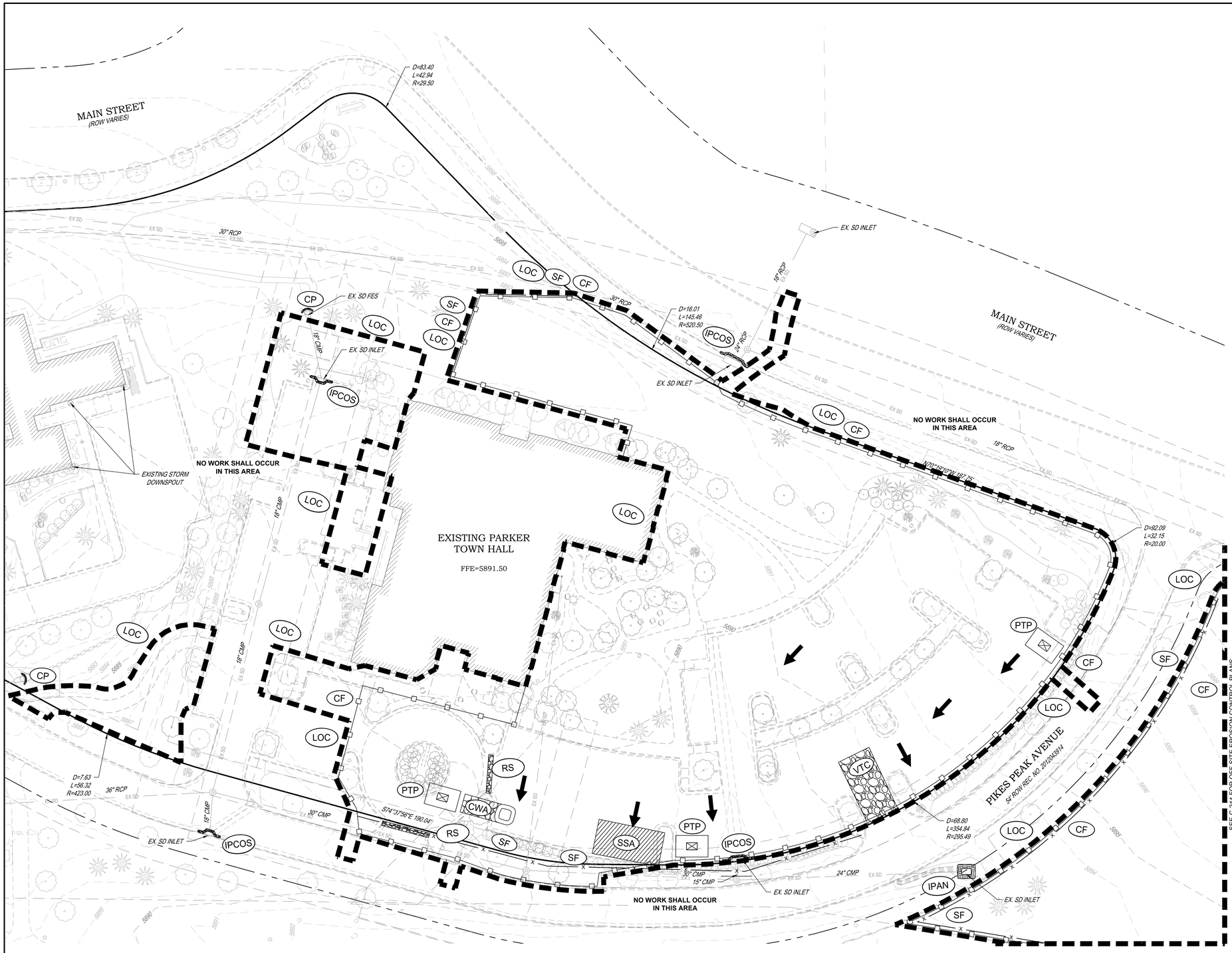
PROJECT: **PARKER TOWN HALL EXPANSION**
20120 MAINSTREET
PARKER, CO 80138

DRAWING TITLE: **EROSION CONTROL COVER SHEET**

FILE PATH:

DESIGNED BY:	RJH
DRAWN BY:	DEI
CHECKED BY:	MHV
MIRO JOB NO.	22139

DRAWING NUMBER:
C-240



TOWN OF PARKER NOTES:

1. ALL GRADES SHOWN ARE FINAL FINISHED SURFACE GRADE AFTER TOPSOIL, SOD, PAVING ETC., EXCEPT IN THE AREA OF SOIL STOCK PILE.
2. SEE TOWN OF PARKER CONSTRUCTION BEST MANAGEMENT PRACTICES.
3. THE VTC PAD FOR A CWA DOES NOT NEED TO CONFORM TO THE FORMAL VTC DETAIL, AND THE TRUE LOCATION OF THE CWA MAY BE DETERMINED BY THE TOWN AND ECS.
4. THE TRUE LOCATION OF THE PORTABLE TOILET PROTECTION (PTP) MAY BE DETERMINED.
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6. ALL DIRTY STREET, CURBS, GUTTERS, SIDEWALKS, DRIVE AISLES, ETC., MUST BE THOROUGHLY CLEANED THROUGHOUT THE DAY AND IMMEDIATELY BEFORE THE END OF THE WORK DAY.
7. LOT PROTECTION (LP) IS REQUIRED ON COMMERCIAL LOTS WHEN LANDSCAPING IS NOT POSSIBLE.
8. PROVIDE SEDIMENT CONTROL LOGS (SCL) ALONG BACK OF ALL CURBS ADJACENT TO LANDSCAPE/PERVIOUS AREAS INCLUDING LANDSCAPE ISLANDS AND ALL ATTACHED PEDESTRIAN WALKS.
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PROJECT: **PARKER TOWN HALL EXPANSION**
20120 MAINSTREET
PARKER, CO 80138

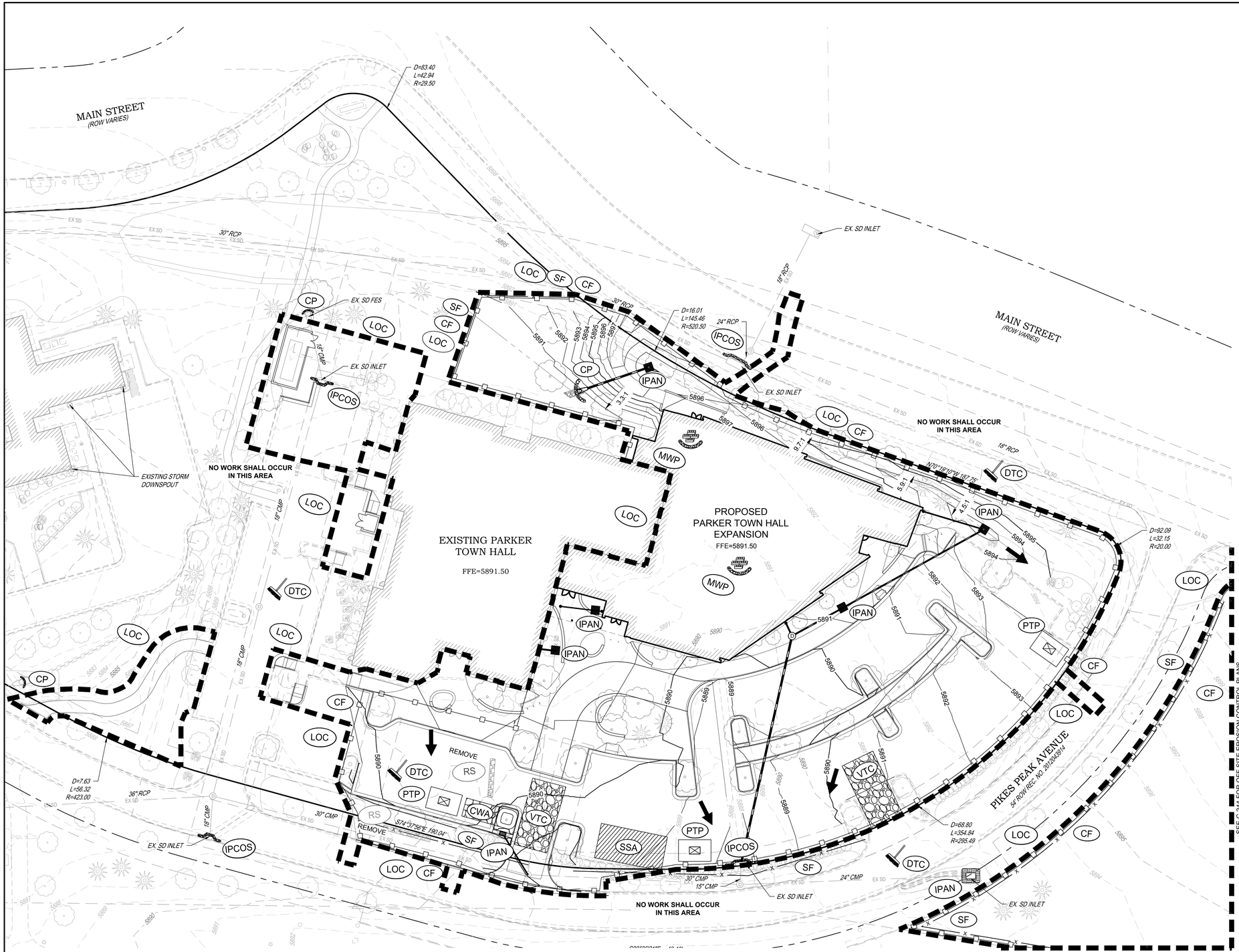
DRAWING TITLE: **INITIAL EROSION CONTROL PLAN**

FILE PATH:

DESIGNED BY:	RJH
DRAWN BY:	DEI
CHECKED BY:	MHV
MIRO JOB NO.	22139

DRAWING NUMBER:

C-241



30 0 30

SCALE: 1" = 30'

NOTES:

1. SEE SHEETS C-251-C-259 FOR EROSION CONTROL NOTES, LEGEND AND DETAILS.
2. ADDITIONAL PTP`S MAY BE NEEDED IN THE INTERIM AND FINAL PHASE.
3. EROSION CONTROL BLANKETS ARE REQUIRED FOR ALL SLOPES STEEPER THAN 4:1.

LEGEND:

	CD	CHECK DAM
	CF	CONSTRUCTION FENCE
	CP	CULVERT PROTECTION
	CWA	CONCRETE WASHOUT AREA
	D	DEWATERING
	DD	DIVERSION DITCH
	DP	DETENTION POND PROTECTION
	DTC	DEBRIS TRASH CONTROL
	ECB	EROSION CONTROL BLANKET
	IPAN	INLET PROTECTION FOR AREA INLETS NOT IN PAVEMENT
	IPAP	INLET PROTECTION FOR AREA INLETS IN PAVEMENT
	PCOG	INLET PROTECTION, CURB ON-GRADE, TYPE R INLET
	PCOS	INLET PROTECTION, CURB ON SUMP, TYPE R INLET
	LP	LOT PROTECTION
	MWP	MASONRY WORK PROTECTION
	PTP	PORTABLE TOILET PROTECTION
	RCSC	ROUGH CUT STREET CONTROL
	RS	ROCK SOCK
	RSS	ROCK SOCK IN SWALE
	SB	STRAW BALE
	SCL	SEDIMENT CONTROL LOGS
—x—x—	SF	SILT FENCE
	SMC	SEEDING, MULCHING AND CRIMPING
	SR	SURFACE ROUGHING
	SSA	STABILIZED STAGING AREA
	STP	SIDEWALK TRANSITION PROTECTION
	TI	TEMPORARY IRRIGATION
	TSB	TEMPORARY SEDIMENT BASIN
	VTC	VEHICLE TRACKING CONTROL
	LOC	LIMITS OF CONSTRUCTION
		FLOW DIRECTION ARROW

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2	SECOND TOWN SUBMITTAL	02/05/2024

PROJECT: **PARKER TOWN HALL EXPANSION**
20120 MAINSTREET
PARKER, CO 80138

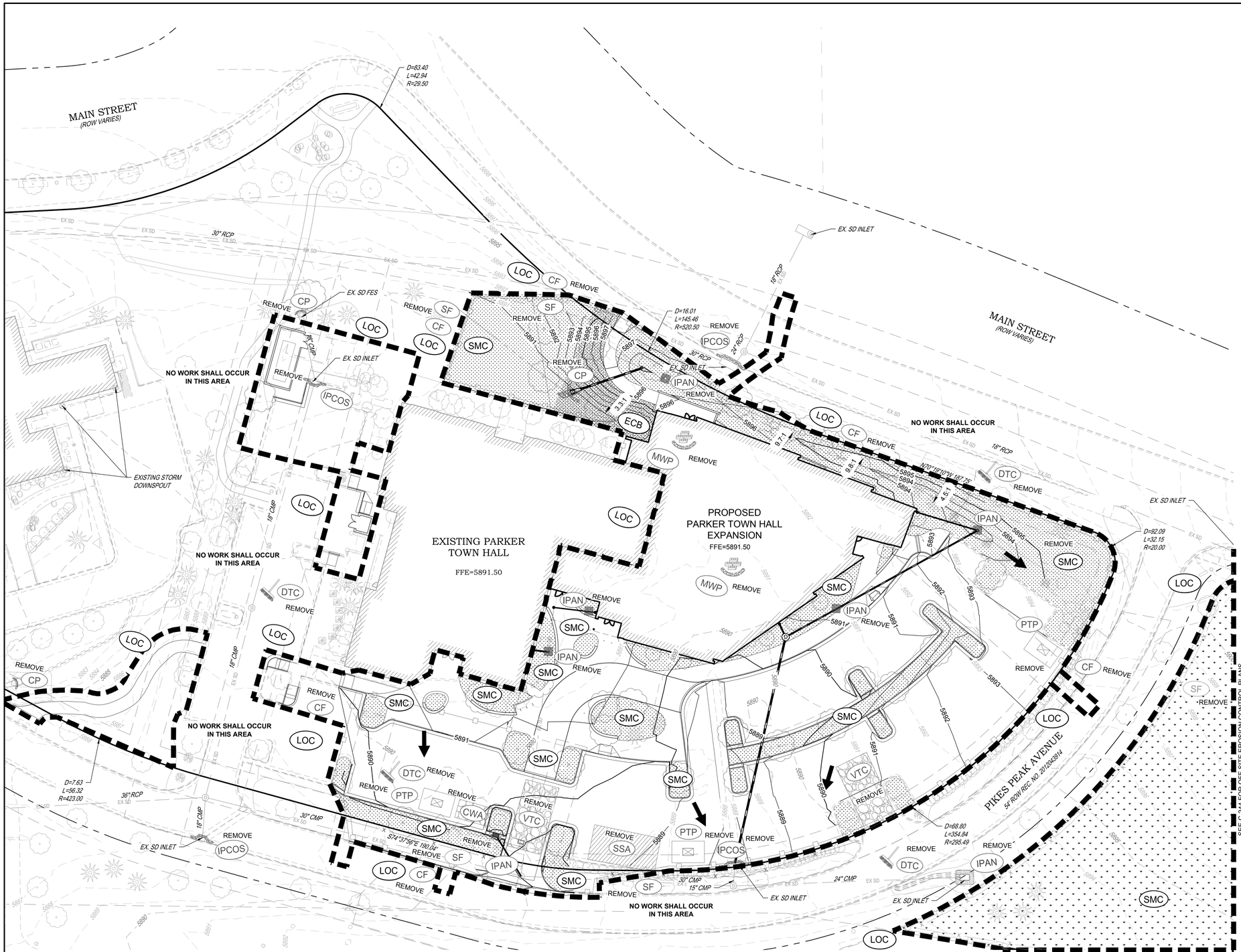
DRAWING TITLE: **INTERIM EROSION CONTROL PLAN**

FILE PATH:

DESIGNED BY:	RJH
DRAWN BY:	DEI
CHECKED BY:	MHV
MIRO JOB NO.	22139

DRAWING NUMBER:

C-242



30 0 30

SCALE: 1" = 30'

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SCL	SEDIMENT CONTROL LOGS
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SMC	SEEDING, MULCHING AND CRIMPING
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SSA	STABILIZED STAGING AREA
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	FLOW DIRECTION ARROW

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PROJECT: **PARKER TOWN HALL EXPANSION**
20120 MAINSTREET
PARKER, CO 80138

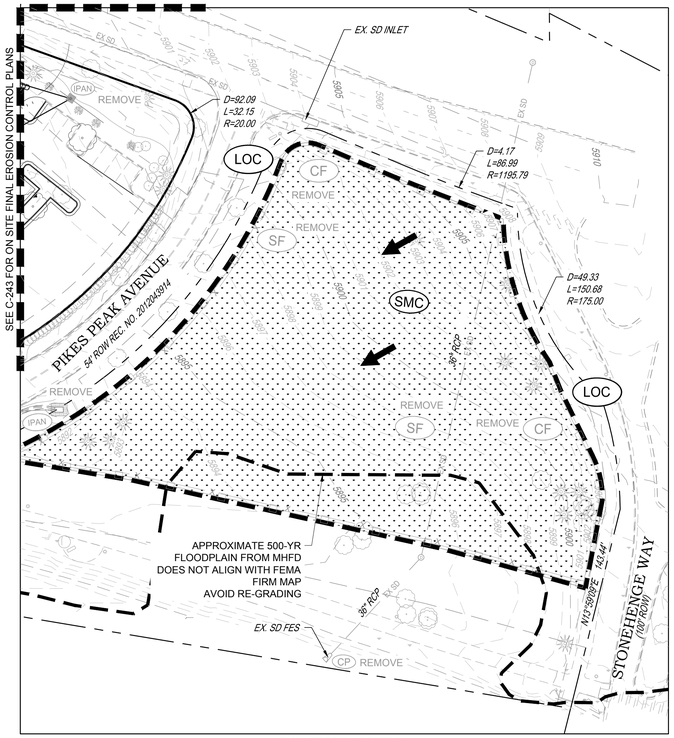
DRAWING TITLE: **FINAL EROSION CONTROL PLAN**

FILE PATH:

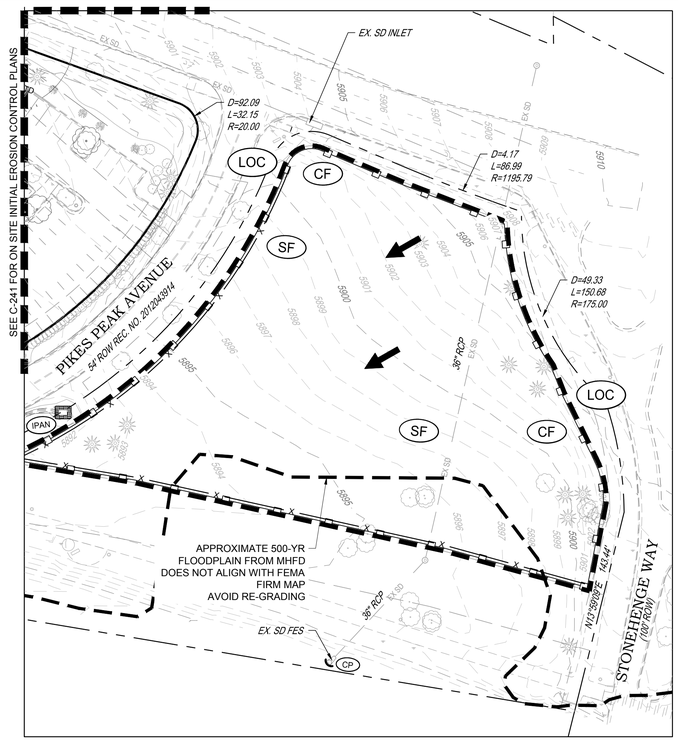
DESIGNED BY:	RJH
DRAWN BY:	DEI
CHECKED BY:	MHV
MIRO JOB NO.	22139

DRAWING NUMBER:

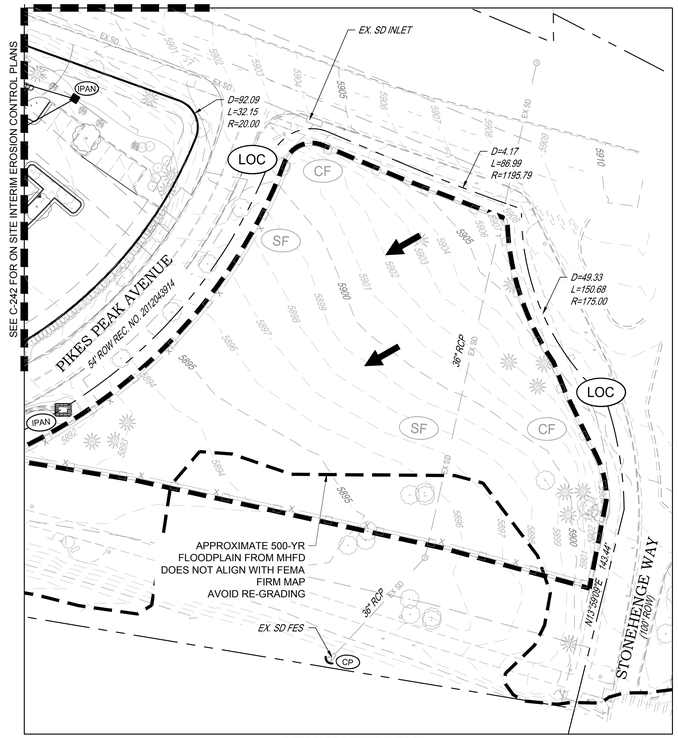
C-243



FINAL EROSION CONTROL



INITIAL EROSION CONTROL



INTERIM EROSION CONTROL

50 0 50

SCALE: 1" = 50'

NOTES:

1. SEE SHEETS C-251-C-259 FOR EROSION CONTROL NOTES, LEGEND AND DETAILS.

LEGEND:

	CD	CHECK DAM
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	LOC	LIMITS OF CONSTRUCTION
		FLOW DIRECTION ARROW

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1	FIRST TOWN SUBMITTAL	11/03/2023
2	SECOND TOWN SUBMITTAL	02/05/2024

PROJECT: **PARKER TOWN HALL EXPANSION**
20120 MAINSTREET
PARKER, CO 80138

DRAWING TITLE: **OFF-SITE EROSION CONTROL PLAN**

FILE PATH:

DESIGNED BY:	RJH
DRAWN BY:	DEI
CHECKED BY:	MHV
MIRO JOB NO.	22139

DRAWING NUMBER:

C-244

Appendix F: Checklists

Drainage Report Checklist

Checklist of Drainage Report Requirements

Project Name: Parker Town Hall Expansion

____ **Conceptual** ____ **Preliminary** ____ **Final**

Initial or N/A	Item No.	Description	Conceptual Drainage Report (CDR)	Preliminary Drainage Report (PDR)	Final Drainage Report (FDR)
[✓]		COVER SHEET with title, date, applicant, preparer	X	X	X
[✓]		TABLE OF CONTENTS	X	X	X
[✓]		PE Certification and Seal		X	X
GENERAL LOCATION & DESCRIPTION					
[✓]	1	Township, range, section, quarter section	X	X	X
[✓]	2	Local streets within and adjacent to the subdivision	X	X	X
[✓]	3	Major drainageway and facilities	X	X	X
[✓]	4	Names of surrounding subdivisions	X	X	X
[✓]	5	Area in acres (verify with plat if available)	X	X	X
[✓]	6	Existing ground cover (trees, scrubs, etc.)	X	X	X
[✓]	7	Existing soil conditions	X	X	X
[✓]	8	Proposed land use	X	X	X
DRAINAGE BASINS AND SUB-BASINS					
		Major Basin Description			
[✓]	9	Reference major drainageway planning study	X	X	X
[✓]	10	Reference flood hazard delineation report	X	X	X
[✓]	11	Reference FEMA flood insurance study	X	X	X
[✓]	12	Identify presence of regulatory floodplains/floodways at site. Discuss any proposed disturbance to floodplain.	X	X	X
[N/A]	13	Supporting and labeled FEMA flood insurance map included (if applicable)		X	X
[N/A]	14	Will a FEMA LOMR be required?		X	X
[✓]	15	Reference previous drainage studies affecting the site	X	X	X
[N/A]	16	Coordination with surrounding subdivision plans	X	X	X
[✓]	17	Basin drainage characteristics - existing and planned land uses affecting the site	X	X	X
		Site Sub-Basin Description			
[✓]	18.19	Discussion of historic drainage pattern of the property	X	X	X
[✓]	19	Discussion of off-site drainage flow patterns onto the site	X	X	X
[N/A]	20	Supporting off-site delineation map included		X	X
[✓]	21	Identify presence or absence of any major drainageways on the site with total tributary area >130 acres	X	X	X
[✓]	22	Discussion of development of off-site basins and impact on site	X	X	X
DRAINAGE DESIGN CRITERIA					
		Regulations			
[N/A]	23	Discussion of compliance with the Town's floodplain ordinance	X	X	X
		Discussion of compliance with Town's Stream Preservation Standards			
[N/A]	24	Stream Buffers in project area	X	X	X
[N/A]	25	Permitted uses planned, if any	X	X	X
[N/A]	26	Discussion of Minor or Major Modification requested	X	X	X
[✓]	27	Discussion of compliance with UD&FCD maintenance eligibility review	X	X	X
		Development Criteria Reference and Constraints			
[✓]	28	Discussion of previous drainage studies for the site	X	X	X

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[✓]	29	Complies with previous study/Does not comply (Discussion on changes from the previous study)	X	X	X
[✓]	30	Discussion of coordination with adjacent drainage studies	X	X	X
[✓]	31	Discussion of site drainage constraints (such as streets, utilities, existing structures, etc.)	X	X	X
		Hydrology Criteria			
[✓]	32	Identify design rainfall event, frequency, and duration	X	X	X
[✓]	33	Identify runoff calculation method used	X	X	X
[N/A]	34	Identify calculation method for detention storage requirement	X	X	X
[N/A]	35	Identify calculation method for detention discharge	X	X	X
[N/A]	36	Discussion and justification of criteria or methods not referenced by SDECM	X	X	X
		Hydraulic Criteria			
[N/A]	37	Identify street capacity references		X	X
[✓]	38	Identify other capacity references		X	X
[N/A]	39	Identify detention pond outlet design method		X	X
[N/A]	40	Identify check/ drop structure criteria used		X	X
[N/A]	41	Discussion of drainage facility design criteria not referenced by SDECM		X	X
		Variance from Criteria			
[✓]	42	Identify provision by section number for which a variance is requested	X	X	X
[N/A]	43	Provide justification and discussion for each variance requested	X	X	X
DRAINAGE FACILITY DESIGN					
		General Concept			
[✓]	44	Discussion of concept and proposed drainage patterns of the site	X	X	X
[✓]	45	Discussion of off-site runoff impacting the site	X	X	X
[✓]	46	Discussion of runoff impacting downstream properties		X	X
[✓]	47	Discussion of tables, charts, figures, drawing, etc. presented in the appendix	X	X	X
[✓]	48	Discussion of proposed drainage patterns	X	X	X
		Specific Details			
[✓]	49	Discussion of drainage problems of the site	X	X	X
[N/A]	50	Underdrains allowed in ROW only with Public Works Director approval		X	X
[✓]	51	Discussion of specific solutions at design points	X	X	X
		Discussion of detention storage required for full-spectrum detention			
[✓]	52	Supporting labeled calculations for adequate storage volume requirement	X	X	X
[N/A]	53	Supporting labeled calculations that detention pond will accommodate volume required	X	X	X
[N/A]	54	Supporting labeled calculations for water surface elevations		X	X
[N/A]	55	Supporting labeled calculations for minimum of one foot freeboard requirement		X	X
		Discussion of outlet requirements			
[N/A]	56	Water quality requirements are met - per SDECM Section 8.3		X	X
[N/A]	57	Supporting labeled calculations for water quality orifice plate geometry and perforation sizing.			X
[N/A]	58	Supporting labeled calculations for detention pond outlet staged release structure		X	X
[N/A]	59	Supporting labeled calculations for detention pond outlet pipe capacity		X	X
[N/A]	60	Supporting labeled calculations for sewer pipe outfall, design of riprap (match with grades, and downstream flowpath)			X
[N/A]	61	Supporting labeled calculations for emergency overflow conditions		X	X
		Discussion of storm sewer configuration			

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[✓]	62	Supporting labeled calculations for storm sewer capacity, type of flow, calculated pipe losses, and hydraulic grade line calculations		X	X
[✓]	63	Supporting labeled calculations for storm sewer inlet type and sizing calculations		X	X
[N/A]	64	Supporting labeled calculations for storm sewer outlet conditions			X
[N/A]	65	Supporting labeled calculations for conduit outlet protection design			X
		Discussion on channel design and soil erodibility within channel			
[N/A]	66	Supporting labeled calculations for type of flow and velocity of flow		X	X
[N/A]	67	Discussion on proposed channel lining/bank protection		X	X
[N/A]	68	Supporting labeled calculations for freeboard requirement		X	X
[N/A]	69	Supporting labeled calculations for water surface elevations		X	X
[N/A]	70	Supporting labeled calculations for backwater analysis		X	X
[N/A]	71	Supporting labeled calculations for sizing calculation for check structures			X
[N/A]	72	Supporting labeled calculations for sizing calculation for drop structures			X
[N/A]	73	Discussion of easements and tracts dedicated for drainage & maintenance purposes	X	X	X
[N/A]	74	Discussion of maintenance and access aspects of the design		X	X
		Stormwater Utility Eligible Facilities			
[N/A]	75	Identify stormwater facilities proposed for acceptance into the Stormwater Utility		X	X
ENVIRONMENTAL PROTECTION CRITERIA					
		General			
[N/A]	76	Identify wetland areas, jurisdictional status, and other "Waters of the U.S."	X	X	X
[N/A]	77	Identify potential impacts to T & E species and presence of Habitat Protection Areas and Stream Restoration Areas	X	X	X
[N/A]	78	Discuss compliance with State and Federal environmental permitting regulations	X	X	X
		Construction BMP Plan			
[✓]	79	Discussion of Construction BMP Requirements (per SDECM Section 8.2)	X	X	X
		Permanent BMP Plan			
[N/A]	80	Discussion of Permanent BMP requirements (per SDECM Section 8.3)	X	X	X
[N/A]	81	Supporting labeled calculations for WQCV requirements		X	X
[N/A]	82	Supporting labeled calculations for storage volume requirements		X	X
[N/A]	83	Supporting labeled calculations for outlet structure design		X	X
[N/A]	84	Discussion of landscaping considerations for PBMP		X	X
[N/A]	85	Discussion of maintenance and access aspects of the design		X	X
CONCLUSIONS					
		Compliance with Standards			
[✓]	86	Town Ordinances	X	X	X
[✓]	87	Town SDECM	X	X	X
[N/A]	88	Major drainageway plans (UDFCD Outfall Systems Plan)	X	X	X
[N/A]	89	Town floodplain regulations	X	X	X
[N/A]	90	Stream Preservation Standards	X	X	X
		Drainage Concept			
[✓]	91	Effectiveness of design to control storm runoff	X	X	X
[✓]	92	Discussion of maintenance responsibility for public and private drainage facilities		X	X
[✓]	93	Discuss impact of proposed development on the Major Drainageway Planning Studies recommendations		X	X

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		Sediment and Erosion Control Concept			
[✓]	94	Effectiveness of erosion control plan		X	X
[✓]	95	Suitability of site soils for development		X	X
[✓]	96	Certification statement and PE seal and signature		X	X
REFERENCES					
[✓]	97	List all drainage reports and technical information used	X	X	X
[✓]	98	List all computer software used in analysis	X	X	X
APPENDICES					
		Hydrologic Computations (Historic)			
[✓]	99	Historic basin delineation, onsite and offsite	X	X	X
[✓]	100	Runoff coefficient determination, including composite "C" calculation	X	X	X
[✓]	101	Rational Method analysis for each basin, initial and major storm	X	X	X
[✓]	102	Rational method analysis for each design point (i.e., routed cumulative flow), initial and major storm	X	X	X
[✓]	103	Schematic figure illustrating routing for basins and design points	X	X	X
[N/A]	104	CUHP/UDSWM input and output data	X	X	X
[N/A]	105	Schematic figure illustrating routing of CUHP basins and UDSWM elements	X	X	X
		Hydrologic Computations (Developed)			
[✓]	106	Developed basin delineation, onsite and offsite	X	X	X
[✓]	107	Runoff coefficient determination, including composite "C" calculation	X	X	X
[✓]	108	Rational Method analysis for each basin, initial and major storm	X	X	X
[✓]	109	Rational method analysis for each design point (i.e., routed cumulative flow), initial and major storm	X	X	X
[✓]	110	Schematic figure illustrating routing for basins and design points	X	X	X
[N/A]	111	CUHP/UDSWM input and output data	X	X	X
[N/A]	112	Schematic figure illustrating routing of CUHP basins and UDSWM elements	X	X	X
		Hydraulic Computations (Extended Detention Basin)			
[N/A]	113	Volume of storage required (WQCV, EURV and 100-year event)	X	X	X
[N/A]	114	Volume of designed detention pond (maximum volume)	X	X	X
[N/A]	115	Does maximum water surface elevation allow for one foot minimum freeboard requirement (may require profile of pond)		X	X
[N/A]	116	Inflow(s) energy dissipater (see hydraulic computations for storm sewer)		X	X
[N/A]	117	Forebay - volume and drain pipe/weir		X	X
		Hydraulic Computation (EDB Outlet Structure)			
[N/A]	118	Calculation of Historic release rates based on UDFCD Volume 2, Storage Chapter	X	X	X
[N/A]	119	Calculation of allowable 100-year release rate based on UDFCD Volume 2, Storage Chapter	X	X	X
[N/A]	120	Water quality orifice plate geometry		X	X
[N/A]	121	Water quality trash rack/screen geometry and open area			X
[N/A]	122	Orifice or weir sizing for 100-year release rate			X
[N/A]	123	Orifice or weir placement for 100-year water surface elevation		X	X
[N/A]	124	Trash Rack (overflow) sizing calculation			X
[N/A]	125	Calculations for emergency overflow		X	X
[N/A]	126	Capacity, velocity, and Froude number calculations for outlet structure storm sewer pipe		X	X
[N/A]	127	Calculations for outlet protection for outlet structure pipe			X

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[N/A]	128	Invert locations, slope, diameter (18-inch minimum), material (RCP only) and pipe classification for outlet structure storm sewer pipe			X
[N/A]	129	Does the invert out of the outlet structure storm sewer pipe match grade and have a logical downstream flowpath		X	X
[N/A]	130	Profile of outlet structure and outlet storm sewer pipe (may be included with profile of pond)			X
[N/A]	131	Design procedure form included			X
		Hydraulic Computation (Storm Sewer Configuration)			
[✓]	132	Minimum pipe size 18-inch (RCP only) for lateral and main line		X	X
[✓]	133	Capacity calculations		X	X
[N/A]	134	Pipe loss calculations		X	X
[✓]	135	Initial and Major Storm hydraulic grade line calculations (minor storm cannot surcharge storm sewer system)		X	X
[✓]	136	Inlet (or entrance condition) sizing and capacity calculations			X
[✓]	137	Velocity and Froude number calculation at pipe outlet		X	X
[N/A]	138	Outlet protection design calculations			X
[✓]	139	Discharge of a storm sewer onto streets is prohibited		X	X
		Hydraulic Computation (Culverts)			
[✓]	140	Calculations for flow through structure		X	X
[N/A]	141	Calculations for controlling condition (entrance or outlet)		X	X
[N/A]	142	Capacity calculations (minimum 24-inch CMP or RCP within ROW or 18-inch minimum RCP or CMP for swales at driveways, trails and sidewalks)		X	X
[N/A]	143	Velocity calculations (minimum of 3 fps during initial storm is recommended)		X	X
[N/A]	144	Water surface or overtopping elevations calculated and compared to allowable overtopping (see SDECM Table 2.7)		X	X
		Hydraulic Computation (Bridges)			
[N/A]	145	See UDFCD Volume 2, Hydraulic Structures Chapter		X	X
		Hydraulic Computation (Open Channels)			
[N/A]	146	Calculation of developed flow through the channel		X	X
[N/A]	147	Investigation of erodibility of soils in channel is required		X	X
[N/A]	148	Calculations to document 100-year discharge flow parameters		X	X
[N/A]	149	Backwater calculations		X	X
[N/A]	150	Check structure design calculations		X	X
[N/A]	151	Drop structure design calculations		X	X
[N/A]	152	Riprap design calculations		X	X
[N/A]	153	Calculations for all other proposed channel lining			
		Hydraulic Computation (Streets)			
[N/A]	154	Street classification			X
[N/A]	155	Street capacity major and initial storm (see SDECM Section 2.5)			X
		Permanent BMP Calculations			
[N/A]	156	Calculations for WQCV requirements		X	X
[N/A]	157	Calculations for storage volume requirements		X	X
[N/A]	158	Supporting labeled calculations for outlet structure design		X	X
[N/A]	159	All other design calculations necessary for design of Permanent BMP		X	X
HISTORIC CONDITIONS DRAINAGE DRAWING					
[✓]	160	24"x 36" drawing - scale of 1"=100' to 1"=400'	X	X	X

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[✓]	161	General location or vicinity map	X	X	X
[✓]	162	North arrow and scale	X	X	X
[✓]	163	Legend to define map symbols	X	X	X
[✓]	164	Title block in lower right hand corner	X	X	X
[✓]	165	Existing contours at appropriate contour interval	X	X	X
[✓]	166	Delineation of onsite basins and offsite basins impacting site	X	X	X
[✓]	167	Drainage flow paths and design points for accumulated flow	X	X	X
[✓]	168	Table showing routing and accumulation of flow at design points for initial and major event	X	X	X
[✓]	169	Existing drainage facilities	X	X	X
[✓]	170	Existing 100-year floodplains	X	X	X
[✓]	171	Stream Buffer areas	X	X	X
DRAINAGE DRAWING CONTENTS					
[✓]	172	24"x 36" drawing - scale of 1"=20' to 1"=200'	X	X	X
[✓]	173	General location or vicinity map	X	X	X
[✓]	174	North arrow and scale	X	X	X
[✓]	175	Legend to define map symbols	X	X	X
[✓]	176	Title block in lower right hand corner	X	X	X
[✓]	177	Existing contours at minimum 2 foot contour interval (dashed-shaded) extending minimum of 100' beyond property lines	X	X	X
[✓]	178	Proposed contours at minimum 2 foot contour interval (solid) extending minimum of 100' beyond property lines	X	X	X
[✓]	179	All property and lots lines shown	X	X	X
[✓]	180	All easements and tracts shown and labeled with purpose	X	X	X
[✓]	181	Streets shown (with ROW width, flowline, sidewalk, etc. for PDR and FDR)	X	X	X
[✓]	182	Existing drainage facilities shown with structures, ditches, drainageways, gutter flow, culverts, etc.	X	X	X
[✓]	183	Existing drainage facilities labeled with material, size, shape, slope, and location	X	X	X
[N/A]	184	Stream Buffer areas	X	X	X
[✓]	185	Overall drainage area boundary shown (including any off-site basins)	X	X	X
[✓]	186	Drainage area sub-boundary shown	X	X	X
[✓]	187	Basin and sub-basin descriptor (which includes identification, area, runoff coefficients or flows)	X	X	X
[✓]	188	Directional flow arrows	X	X	X
[✓]	189	Table showing routing and accumulation of flow at design points for major & initial event	X	X	X
[N/A]	190	Proposed type of street flow (detail if necessary)		X	X
[✓]	191	Drainage ditches, swales, gutter, and cross pans shown (Generally shown for CDR)	X	X	X
[✓]	192	Proposed storm sewer shown including size and type of pipe, inlets, manholes, outfall, riprap, etc. shown (Generally shown for CDR)	X	X	X
[✓]	193	Existing storm sewer shown including size and type of pipe, inlets, manholes, outfall, riprap, etc. labeled (if any)		X	X
[N/A]	194	Proposed open drainage channels shown including drop and check structures, riprap, channel lining, side slope, channel slope, etc. shown (Generally shown for CDR)	X	X	X
[N/A]	195	Existing open drainage channels shown including drop and check structures, riprap, channel lining, side slope, channel slope, etc.		X	X
[N/A]	196	Detention pond with extent of pond delineated	X	X	X
[N/A]	197	Shaded area of 100-year water surface shown for detention pond		X	X
[N/A]	198	Table of volumes and release rates for water quality/detention facilities	X	X	X

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[N/A]	199	Detail information on EDB outlet structure			X
[N/A]	200	Profile of EDB outlet structure showing water surface elevations, outlet pipe, water quality orifice plate, and discharge orifices			X
[N/A]	201	Detail of water quality orifice plate showing size of perforations, number of rows, and spacing			X
[N/A]	202	Detail information on Permanent BMPs			X
[N/A]	203	Profile of Permanent BMP outlet structure showing water surface elevations, outlet pipe, water quality orifice plate, and discharge orifices			X
[N/A]	204	Location and elevation (if known) for all existing and proposed utilities by of affecting the drainage design	X	X	X
[N/A]	205	Routing of off-site flows thru the development (around detention basins, not through)	X	X	X
[N/A]	206	Definition of flow path leaving the development through downstream properties to a major drainageway (if applicable)	X	X	X
[N/A]	207	Location of all FEMA floodplains affecting the site (both existing and proposed)	X	X	X