

Final Drainage Report

***Compark Village South Filing No. 2
Parker, Colorado***

Code: CLCPKC3

Prepared For:

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ENGINEERS CERTIFICATION

This Final Drainage Report for Compark Village South Filing No. 2 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.

Rick J. Moore, P.E.

Registered Professional Engineer

State of Colorado No. 30877

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I. Introduction

A. Location

Compark Village South Filing 2 is located within the south half of section 6, township 6 south, range 66 west of the 6th principal meridian, Town of Parker, Douglas County, Colorado. The site is bound by existing residential neighborhoods to the South, future Belford Ave to the North, and future developed parcels to the East and West.

The Compark Village South Filing 2 developed area is approximately 32.9 acres. Upon final build out, the site will contain 120 residential duplex lots and 72 residential single family home lots.

B. Description of Property

The topography for the site generally slopes from South to North. The highest elevation on the site is located at the southwest quadrant of the site and the lowest elevation is located directly north of Belford Avenue.

Existing vegetation on the site is comprised of native grasses, shrubs and weedy species indigenous to the area.

C. Existing Soils

Existing soils for the site were researched on the NRCS web soil survey, see Appendix A. Three principal soil groups exist onsite:

- Newlin Gravelly Sandy Loam (NeE 8 to 30% slopes) This rolling to steep sloping soil is located on uplands and terrace side slopes. Runoff is medium and erosion hazard is slight to moderate. This soil is classified as a Type B Hydrologic Soil Group.
- Fondis Clay Loam (FoD 3 to 9% slopes) This sloping soil is located on uplands. Runoff is high and the erosion hazard is moderate. The soil is classified as a Type C Hydrologic Soil Group.
- Fondis Clay Loam (FoB 1 to 3% slopes) This gently sloping soil is located on tablelands and uplands. Runoff is medium and erosion hazard is slight to moderate. The soil is classified as a Type C Hydrologic Soil Group.

II. Drainage Basins and Sub-Basins

A. Existing Basin Description

The proposed site is tributary to Green Acres Tributary which runs through the property adjacent to the North of the site. The Green Acres Tributary confluences w/ Happy Canyon Creek upstream of Jordan Road and ultimately joins Cherry Creek, further downstream of Jordan Road. There is an existing 10' x 12' box culvert located to the north of the site that conveys flows from an existing depressed area to the north of the site through and under E-470.

The site is located within Zone X as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) numbers 08035C0062F and 08035C0066F, dated September 30, 2005 for Happy Canyon Creek. The FIRM maps can be found in Appendix A. A portion of the Green Acres Tributary is located in the Zone A 100-year Floodplain, also shown on the FIRM maps in Appendix A.

B. Proposed Basin Development

The proposed site will be divided into several drainage sub-basins. These sub-basins have been determined based on land use, area, roadway slopes, storm sewer locations and inlet capacities. The developed site will generally follow the existing drainage patterns and runoff will be conveyed via storm sewer, overland flow, and channel flow through a proposed channel to a proposed regional detention and water quality pond located directly north of the site. This regional detention pond will release restricted flows into an existing box culvert under E-470 and into the Green Acres Tributary in compliance with the Master Drainage Report for Compark Village South and Town of Parker requirements. The Preliminary Drainage Exhibit located in Appendix D shows the location and size of each proposed drainage sub-basin.

C. Sub Basin Descriptions

BEL-1

Drainage basin BEL-1 is composed of landscaped area, sidewalk, and the north half of a portion of Belford Avenue. Storm water will flow east toward Design Point B1 where it will be collected by Inlet 2-1. This is an on grade 10' Type R inlet with the capacity to handle the runoff from a 5 year storm event. From there, storm water will be conveyed to the West Water Quality Pond just southeast of Belford Avenue via storm sewer. This pond discharges directly to Green Acres Tributary. In the 100 year storm event, excess runoff will bypass Inlet 2-1 and flow into sub basin BEL-3 where it will be intercepted by Inlet 2-2.

BEL-2

Drainage basin BEL-2 is composed of landscaped area, sidewalk, and the south half of a portion of Belford Avenue. Storm water will flow east toward Design Point B2 where it will be collected by Inlet 1-1. This is an on grade 10' Type R inlet with the capacity to handle the runoff from a 5 year storm event. From there, storm water will be conveyed to the West Water Quality Pond just southeast of Belford Avenue via storm sewer. This pond discharges directly to Green Acres Tributary. In the 100 year storm event, excess runoff will bypass Inlet 1-1 and flow into sub basin BEL-4 where it will be intercepted by Inlet 1-2.

BEL-3

Drainage basin BEL-3 is composed of landscaped area, sidewalk, and the north half of a portion of Belford Avenue. Storm water will flow toward a low point in the middle of the basin at Design Point B3 where it will be collected by Inlet 2-2. This is a 15' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event for basin BEL-3 as well as the bypass runoff from basin BEL-1. From there, storm water will be conveyed to the East Water Quality Pond just east of Belford Avenue via storm sewer. This pond discharges directly to Green Acres Tributary.

BEL-4

Drainage basin BEL-4 is composed of landscaped area, sidewalk, and the south half of a portion of Belford Avenue. Storm water will flow toward a low point in the middle of the basin at Design Point B4 where it will be collected by Inlet 1-2. This is a 10' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event for basin BEL-4 as well as the bypass runoff from basin BEL-2. From there, storm water will be conveyed to the East Water Quality Pond just east of Belford Avenue via storm sewer. This pond discharges directly to Green Acres Tributary.

BEL-5

Drainage basin BEL-5 is composed of landscaped area, sidewalk, and the north half of a portion of Belford Avenue. It also includes half of the bridge over Happy Canyon Creek. Storm water will generally flow southeast toward Design Point B5 at South Chambers Road. A storm sewer network has not yet been designed to accommodate this basin. This will be completed in Phase 2.

BEL-6

Drainage basin BEL-6 is composed of landscaped area, sidewalk, and the south half of a portion of Belford Avenue. It also includes half of the bridge over Happy Canyon Creek. Storm water will generally flow southeast toward Design Point B6 at South

Chambers Road. A storm sewer network has not yet been designed to accommodate this basin. This will be completed in Phase 2.

CVS-1

Drainage basin CVS-1 is composed of landscaped area, sidewalk, and the north half of a portion of Belford Avenue. Storm water will flow northeast toward Design Point 1 where it will be intercepted by Inlet 1-3. This is an on grade 15' Type R inlet with the capacity to handle the runoff from a 5 year storm event. From there, storm water will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 1-3 and flow into sub basin CVS-3.

CVS-2

Drainage basin CVS-2 is composed of landscaped area, sidewalk, and the south half of a portion of Belford Avenue. Storm water will flow northeast toward Design Point 2 where it will be intercepted by Inlet 2-3. This is an on grade 15' Type R inlet with the capacity to handle the runoff from a 5 year storm event. From there, storm water will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 2-3 and flow into sub basin CVS-4 where it will be intercepted by Inlet 2-4.

CVS-3

Drainage basin CVS-3 is composed of landscaped area, sidewalk, and the north half of a portion of Belford Avenue. Storm water will flow northeast toward Design Point 3 where it will be collected by Inlet 1-4. This is an on grade 10' Type R inlet with the capacity to handle the runoff from a 5 year storm event. From there, storm water will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 2-3 and flow into sub basin CVS-7 where it will be intercepted by Inlet 1-6.

CVS-4

Drainage basin CVS-4 is composed of landscaped area, sidewalk, and the south half of a portion of Belford Avenue. Storm water will flow northeast toward Design Point 4 where it will be collected by Inlet 2-4. This is an on grade 15' Type R inlet with the capacity to handle the runoff from a 5 year storm event. From there, storm water will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 2-4 and flow into sub basin CVS-8 where it will be intercepted by Inlet 2-6.

CVS-4A

Drainage basin CVS-4 is composed of landscaped area, sidewalk, residential homes, and residential local streets. Storm water will flow northeast toward Design Point 4A

where it will be collected by Inlet 3-4. This is a 10' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event for basin CVS-4A as well as the bypass runoff from basin CVS-5. From there, it will be conveyed directly to Green Acres Tributary via storm sewer.

CVS-5

Drainage basin CVS-5 is composed of landscaped area, sidewalk, residential homes and residential local streets. Storm water will flow northeast toward Design Point 5 where it will be collected by Inlet 5-4. This is an on grade 15' Type R inlet with the capacity to handle the runoff from a 2 year storm event. From there, it will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 5-4 and flow into sub basin CVS-4A where it will be intercepted by Inlet 3-4.

CVS-6

Drainage basin CVS-6 is composed of landscaped area, a berm, sidewalk, and residential local streets. Storm water will flow north toward Design Point 6 where it will be collected by Inlet 6-4. This is an on grade 10' Type R inlet with the capacity to handle the runoff from a 100 year storm event. From there, it will be conveyed directly to Green Acres Tributary via storm sewer.

CVS-7

Drainage basin CVS-7 is composed of landscaped area, sidewalk, and the north half of a portion of Belford Avenue. Storm water will flow east toward Design Point 7 where it will be collected by Inlet 1-6. This is an on grade 10' Type R inlet with the capacity to handle the runoff from a 5 year storm event. From there, storm water will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 5-4 and flow into sub basin CVS-11 where it will be intercepted by Inlet 1-5.

CVS-8

Drainage basin CVS-8 is composed of landscaped area, sidewalk, and the south half of a portion of Belford Avenue. Storm water will flow east toward Design Point 8 where it will be intercepted by Inlet 2-6. This is an on grade 15' Type R inlet with the capacity to handle the runoff from a 5 year storm event. From there, storm water will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 2-6 and flow into sub basin CVS-12 where it will be intercepted by Inlet 2-5.

CVS-9

Drainage basin CVS-9 is composed of landscaped area, sidewalk, residential homes and residential local streets. Storm water will flow northeast toward Design Point 9 where it will be collected by Inlet 4-5A. This is an on grade 15' Type R inlet with the capacity to handle the runoff from a 2 year storm event. From there, it will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 4-5A and flow into sub basin CVS-12 where it will be intercepted by Inlet 2-5.

CVS-9A

Drainage basin CVS-9A is composed of landscaped area, sidewalk, residential homes and residential local streets. Storm water will generally flow northwest toward Design Point 9A where it will be collected by Inlet 4-4. This is a 5' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event. From there, it will be conveyed directly to Green Acres Tributary via storm sewer.

CVS-10

Drainage basin CVS-10 is composed of landscaped area, sidewalk, residential homes and residential local streets. Storm water will flow northeast toward Design Point 10 where it will be collected by Inlet 5-5A. This is an on grade 15' Type R inlet with the capacity to handle the runoff from a 2 year storm event. From there, storm water will be conveyed directly to Green Acres Tributary via storm sewer. In the 100 year storm event, excess runoff will bypass Inlet 5-5A and flow into sub basin CVS-13 where it will be intercepted by Inlet 4-5.

CVS-11

Drainage basin CVS-11 is composed of landscaped area, sidewalk, and the north half of a portion of Belford Avenue. Storm water will flow toward a low point in the middle of the basin at Design Point 11 where it will be collected by Inlet 1-5. This is a 10' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event for basin CVS-11 as well as the bypass runoff from basin CVS-7. From there, storm water will be conveyed to the regional detention pond at E-470 via storm sewer. This pond discharges directly to Green Acres Tributary.

CVS-12

Drainage basin CVS-12 is composed of landscaped area, sidewalk, residential homes, residential local streets, and the south half of a portion of Belford Avenue. Storm water will flow toward a low point in the middle of the north side of the basin at Design Point 12 where it will be collected by Inlet 2-5. This is a 15' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event for basin CVS-12 as well as the bypass runoff from basins CVS-8 and CVS-9. From there,

storm water will be conveyed to the regional detention pond at E-470 via storm sewer. This pond discharges directly to Green Acres Tributary.

CVS-12A

Drainage basin CVS-12A is composed of landscaped area, sidewalk, residential homes and residential local streets. Storm water will generally flow south toward Design Point 12A where it will be collected by Inlet 3-5. This is a 10' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event. From there, storm water will be conveyed to the regional detention pond at E-470 via storm sewer. This pond discharges directly to Green Acres Tributary.

CVS-13

Drainage basin CVS-13 is composed of landscaped area, sidewalk, residential homes and residential local streets. Storm water will flow northeast toward Design Point 13 where it will be collected by Inlet 4-5. This is a 15' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event. From there, storm water will be conveyed to the regional detention pond at E-470 via storm sewer. This pond discharges directly to Green Acres Tributary.

CVS-14

Drainage basin CVS-14 is composed of landscaped area, berms, sidewalk, residential homes and residential local streets. Storm water will flow toward a low point in the middle of the north side of the basin at Design Point 14 where it will be collected by Inlet 6-5. This is a 15' Type R inlet in sump with the capacity to handle the runoff from a 2 year storm event. From there, storm water will be conveyed to the regional detention pond at E-470 via storm sewer. This pond discharges directly to Green Acres Tributary. In the 100 year storm event, excess runoff will pond at Inlet 6-5 and eventually flow into sub basins CVS-13 and CVS-15 where it will be intercepted by Inlets 4-5 and 5-5.

CVS-14A

Drainage basin CVS-14A is composed of landscaped area and berms. Runoff will flow toward a swale along the north side of the basin. The swale will send the storm water east toward Design Point 14A where it will be collected by Inlet 7-5. This is a CDOT Type C inlet with the capacity to handle the runoff from a 100 year storm event. From there, storm water will be conveyed to the regional detention pond at E-470 via storm sewer. This pond discharges directly to Green Acres Tributary.

CVS-15

Drainage basin CVS-15 is to be developed in a later phase and will be composed of landscaped area, sidewalk, residential homes and residential local streets. Storm

water will flow northwest toward Design Point 15 where it will be collected by Inlet 5-5. This is a 10' Type R inlet in sump with the capacity to handle the runoff from a 100 year storm event. From there, storm water will be conveyed to the regional detention pond at E-470 via storm sewer. This pond discharges directly to Green Acres Tributary.

CVS-16

Drainage basin CVS-16 is composed of landscaped area, sidewalk, residential homes and residential local streets. Storm water will flow northeast toward Design Point 16. A storm sewer network has not yet been designed to accommodate this basin. This will be completed in a later phase of the project. In the interim condition, runoff will be collected by a temporary swale directly east of the basin. This swale is sized with the capacity to handle the runoff from the 100 year storm event. It is designed to convey water directly to the regional detention pond at E-470.

CVS-17

Drainage basin CVS-17 is to be developed in a later phase and will be composed of landscaped area, sidewalk, residential homes and residential local streets. Storm water will flow northeast toward Design Point 17. A storm sewer network has not yet been designed to accommodate this basin. This will be completed as part of a later phase.

CVS-18

Drainage basin CVS-18 is to be developed in a later phase and will be composed of landscaped area, sidewalk, and residential local streets. Storm water will flow northeast toward Design Point 18. A storm sewer network has not yet been designed to accommodate this basin. This will be completed as part of a later phase.

CVS-19

Drainage basin CVS-19 is to be developed in a later phase and will be composed of landscaped area, sidewalk, residential homes, residential local streets, and the south half of a portion of Belford Avenue. Storm water will flow northeast toward Design Point 19. A storm sewer network has not yet been designed to accommodate this basin. This will be completed as part of a later phase.

CVS-20

Drainage basin CVS-20 is to be developed in a later phase and will be composed of landscaped area, sidewalk, residential homes, and residential local streets. Storm water will flow southwest and then northwest toward Design Point 20. A storm sewer network has not yet been designed to accommodate this basin. This will be completed as part of a later phase.

CVS-21

Drainage basin CVS-21 is to be developed in a later phase and will be composed of landscaped area, sidewalk, residential homes, and residential local streets. Storm water will flow north east toward Design Point 21. A storm sewer network has not yet been designed to accommodate this basin. This will be completed as part of a later phase.

III. Drainage Design Criteria

A. Hydrology Criteria

The Town of Parker *Storm Drainage and Environmental Criteria Manual* and the Urban Drainage and Flood Control District (UDFCD) *Urban Storm Drainage Criteria Manual* were used for the storm drainage system design.

The following criteria was utilized in developing the proposed drainage system:

- The proposed drainage system is designed to match, as best as possible, the historic drainage patterns occurring at the site.
- The proposed drainage system attempts to limit the diversion of storm runoff from one basin to another (basin transfer).
- Runoff generated from drainage sub-basins is conveyed via the proposed storm sewer system, overland flow or via the Green Acres Tributary into the proposed regional detention and water quality pond.

Design Rainfall: UDFCD rainfall data is used to determine peak runoff values. The 2-year and 100-year frequency storms are used as the minor and major design storms respectively.

Runoff Calculation: Peak storm runoff is determined using the rational formula,

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

C = Runoff coefficient based on surface impermeability

I = Rainfall intensity in inches per hour

A = Drainage basin area in acres

UDFCD Imperviousness Values (Table 6-3) and Runoff Coefficients (Table 6-5) were used to develop basin runoff coefficients. These tables can be found in Appendix B. The runoff coefficients are weighted for each applicable sub-basin to more accurately reflect the runoff characteristics of the site.

Time of Concentration is determined using the criteria in Sections 3.4.1 and 3.4.2 of the UDFCD Criteria Manual. These calculations are included in Appendix B.

Rainfall intensities are determined using the Town of Parker's *Storm Drainage and Environmental Criteria Manual* Point Rainfall data and Intensity-Duration curves.

The recurrence intervals used for this study were based on a residential land use. The minor drainage system is designed for a 2-year recurrence interval and the major drainage system is designed for a 100-year recurrence interval.

B. Hydraulic Criteria

The following criteria were utilized in determining allowable street flow.

Minor Storm (2-yr)

- Local Street – No curb overtopping and flow may spread to crown of street.

Minor Storm (5-yr)

- Collector Street – No curb overtopping. Flow Spread must leave at least a 10 foot width free of water. (5-feet on each side of crown for roads without median. 10-feet on each side of median for roads with a median.)

Major Storm (100-yr)

- Local and Collector Streets – The depth of water at the gutter flowline shall not exceed 12 inches. A minimum of 18-inches must be provided from the water surface elevation to the lowest floor elevation or window well opening elevation for structures that are adjacent to the roadway (this includes residential dwellings, public, commercial and industrial buildings).

For the major and minor storm events, allowable capacity was determined using Street and Inlet Hydraulics version 3.14 by UDFCD.

IV. **Drainage Facility Design**

A. General Concept

Stormwater runoff from the proposed subdivision will generally follow existing drainage patterns from southwest to northeast on the site. Overland flow and a proposed storm sewer system will route the runoff to the Green Acres Tributary or directly to the proposed regional detention and water quality pond located on the Green Acres Tributary at E-470. This pond will release restricted flows directly into the Green Acres Tributary through the existing 10' x 12' box culvert under E-470.

B. Specific Details

As mentioned previously in this report, the site will be divided into several drainage sub-basins. The onsite runoff will be routed through the site via the proposed roadways and gutters where it will be intercepted by a number of on-grade inlets and inlets located in roadway sumps. This runoff will be routed, via storm sewer, to either the Green Acres Tributary which leads to the proposed regional detention pond or directly to the proposed regional detention pond. Existing water quality structures from the Compark Village South, Filing 1 project will ensure that any water directly entering the Green Acres Tributary is treated.

In addition to the onsite sub-basins, the runoff from some offsite areas will be routed through the proposed site. These offsite areas are two basins (H170 & H180) directly south of the site that include part of the Grand View Estates development. In each basin, flows are intercepted via proposed flared end sections and carried through the site via proposed storm sewer into either the Green Acres Tributary or directly into the proposed regional detention pond at E-470.

The proposed regional detention pond for this development was designed based on a study of major basins that all discharge to the Green Acres Tributary. As has been stated, smaller sub basins were created for this report to more accurately design the storm sewer network that serves the KB Homes residential development. To verify coordination between these two sets of data, a table has been provided below.

Basin ID	Impervious % used in GAT Hydrology Study	Composite Impervious % of Corresponding Sub Basins
H161	50%	41%
H171	50%	44%
H181	50%	38%

The corresponding composite impervious percentages from the sub basin analysis are all below the percentages used to design the regional detention pond. Therefore, the pond has been sufficiently designed to exceed the storage requirements for the KB Homes residential site.

More details for the proposed detention and water quality pond are included in the Conceptual Drainage Report for Compark South prepared by Manhard Consulting, Ltd.^[5] and approved by the Town of Parker.

V. Environmental Protection Criteria

A. Erosion and Sediment Control Measures

During construction, silt fence, inlet protection, and vehicle tracking pads will be used to prevent sediment from entering the storm sewer system or sediment leaving the site. Temporary sediment basins will also be used during construction to trap sediment from stormwater before it leaves the site. All erosion and sediment control measures will be maintained, inspected, and repaired by the Contractor throughout the construction project in compliance with Town of Parker requirements. The proposed Construction Best Management Practices (CBMPs) for this development will follow the requirements for the Town of Parker and UDFCD.

B. Water Quality

Water quality control for this development will be constructed as part of the Compark Village South Filing 1 project. This will consist of CDS manhole structures from Contech Engineered Solutions LLC at the end of each storm line that discharges to Green Acres Tributary.

VI. Conclusion

A. Compliance with Standards

The drainage system for Compark Village South Filing No. 2 was designed to meet the Town of Parker's *Storm Drainage and Environmental Criteria Manual* and the Urban Drainage and Flood Control District's *Urban Storm Drainage Criteria Manual*. The existing Flood Insurance Rate Map (FIRM) in Appendix A shows no portion of the developed site area to be within a flood hazard area. Therefore, no map revisions through FEMA are required as part of this development.

B. Drainage Concept

The drainage system was designed to allow storm water to be safely conveyed through and away from the site without negatively impacting downstream properties. The drainage concepts proposed for this site are in accordance with the Conceptual Drainage Report for Compark South prepared by Manhard Consulting, Ltd. and approved by the Town of Parker.

All storm sewer facilities are intended to be included within the Town of Parker's public improvements maintenance program. The Compark South Drainage Channel Tract will be owned and maintained by the Belford South Metropolitan District. The Town of Parker will retain oversight maintenance rights as needed during emergency conditions.

C. Erosion and Sediment Control Concept

The Construction Best Management Practices (CBMPs) proposed for this site follow the requirements of the Town of Parker and the recommendations by UDFCD. Attention to proper installation and maintenance are essential for the sediment and erosion control practices to function properly.

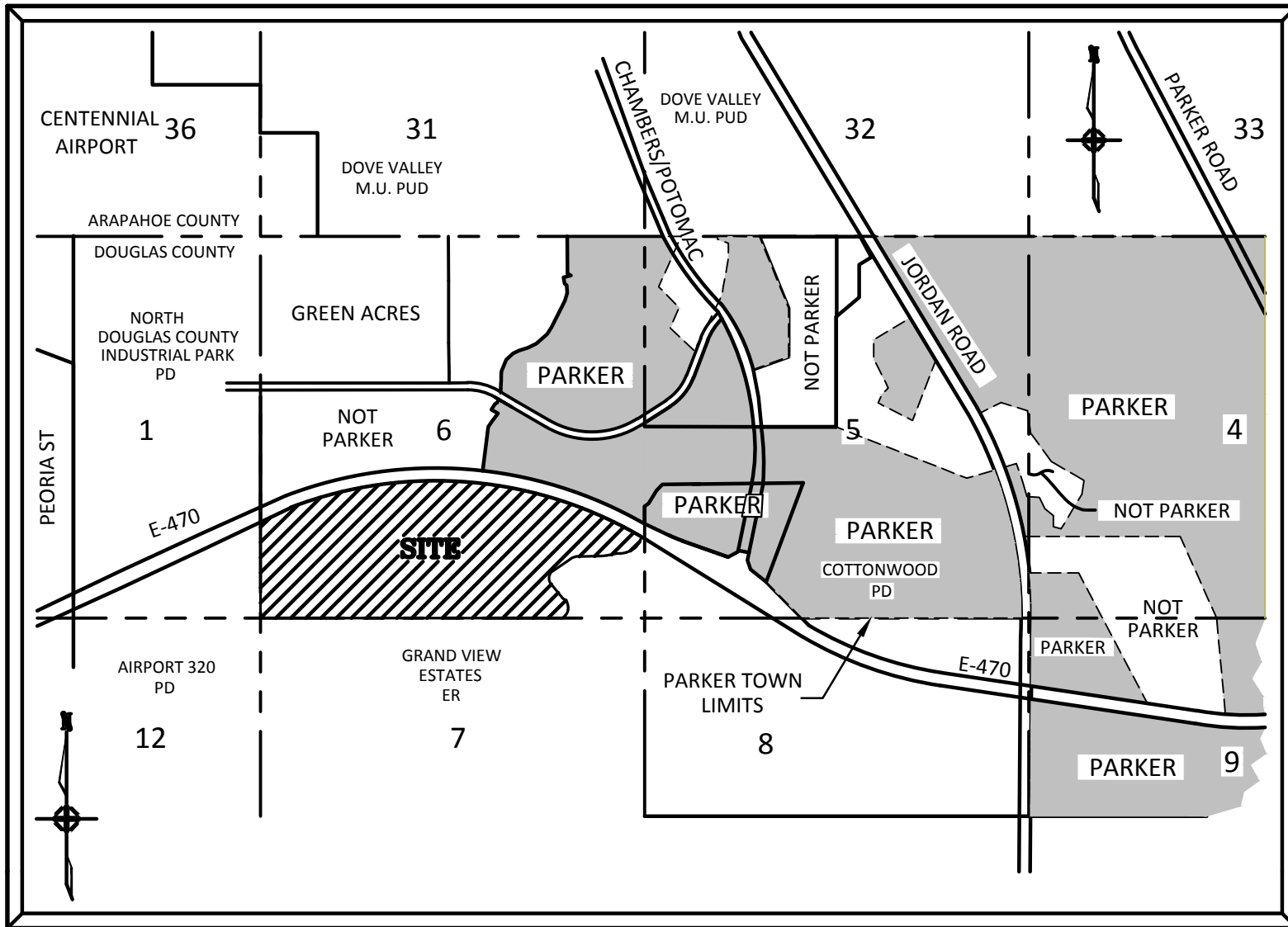
VII. References

1. Town of Parker's *Storm Drainage and Environmental Criteria Manual*, February 2014.
2. Urban Drainage and Flood Control District's *Urban Storm Drainage Criteria Manual* Vol. 1–2, dated April, 2008.
3. Urban Drainage and Flood Control District's *Urban Storm Drainage Criteria Manual* Vol. 3, dated November, 2010.
4. StormCAD, V8i (SELECT series 2), Bentley Systems, Inc., c. 2011 Bentley Systems, Inc.
5. Conceptual Drainage Report for Compark South, prepared by Manhard Consulting, Ltd., dated November 20, 2015.
6. Happy Canyon Creek Major Drainageway Plan, prepared by Muller Engineering Company, Inc., dated March 2014

APPENDIX A

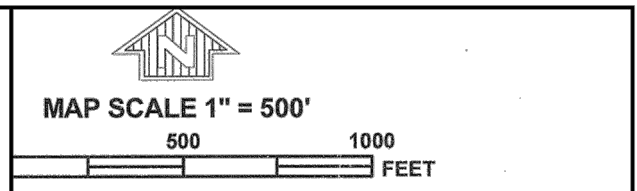
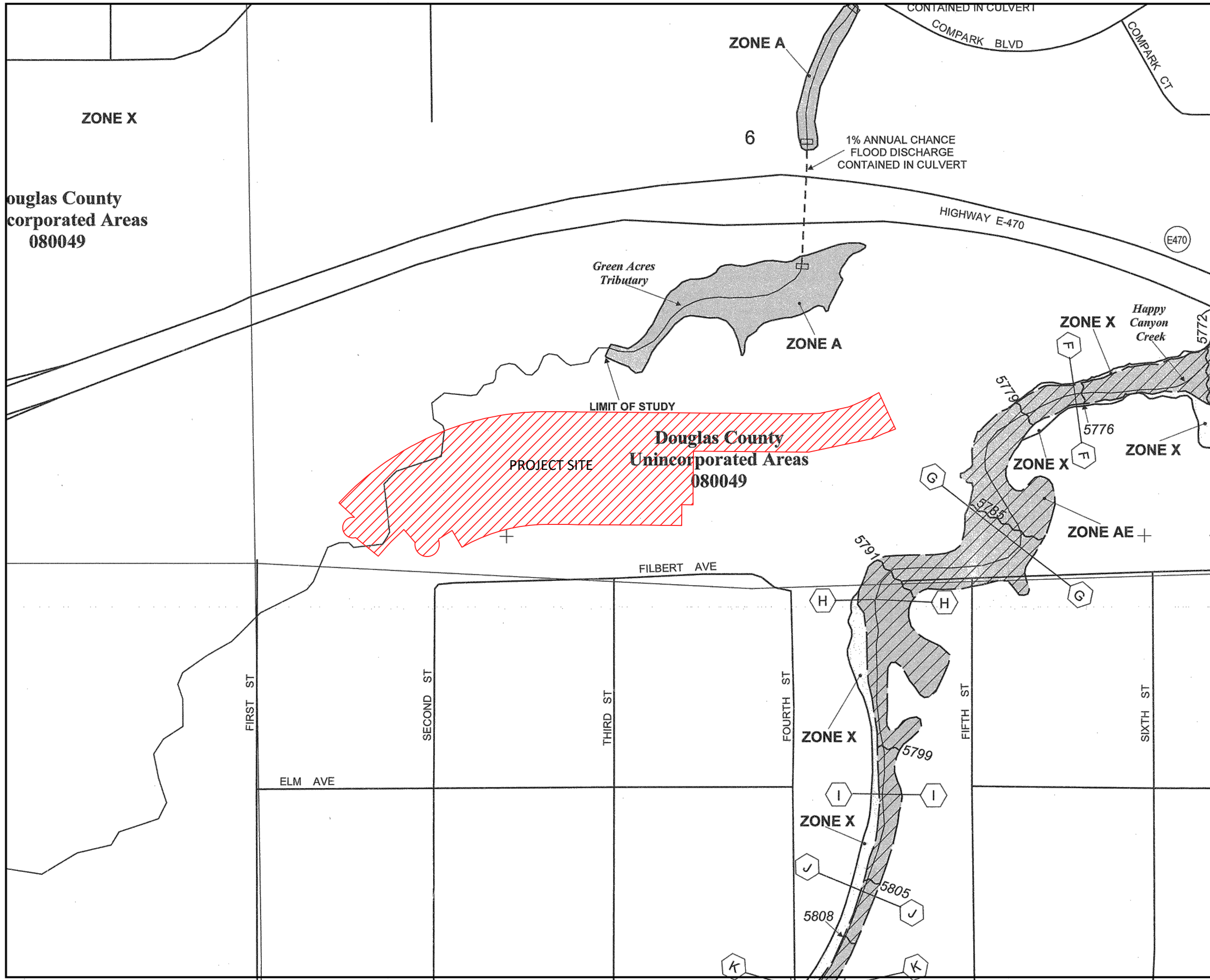
Maps

- Vicinity Map
- FEMA Flood Information Rate Map
- Soils Map



VICINITY MAP

N.T.S.



PANEL 0062F

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

PANEL 62 OF 495
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
DOUGLAS COUNTY	080049	0062	F
LONE TREE, CITY OF	080319	0062	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
08035C0062F

EFFECTIVE DATE:
SEPTEMBER 30, 2005

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

JOINS PANEL 0068

North American Vertical Datum must be compared to the vertical datum. An orthometric Vertical Datum of Douglas County flooding source. Elevations that were not used. The offsets for each Douglas County Vertical Datum conversion between the North American Vertical Datum can be found at <http://www.ngs.noaa.gov> or contact the following:

For information for bench marks, please visit the Services Branch of the National Geodetic Survey at www.ngs.noaa.gov. Additional control points are available, please visit www.ngs.noaa.gov.

by the Douglas County Planning Department. Additional input may be required. These data are for informational purposes only.

Panel configurations for this map may differ from what is shown in the previous FIRM for this area. Data tables in the Flood Insurance Rate Map (FIRM) may reflect changes in hydraulic data) may reflect changes on this map. Also, the panel configurations may differ from what is shown in the previous FIRM for this area.

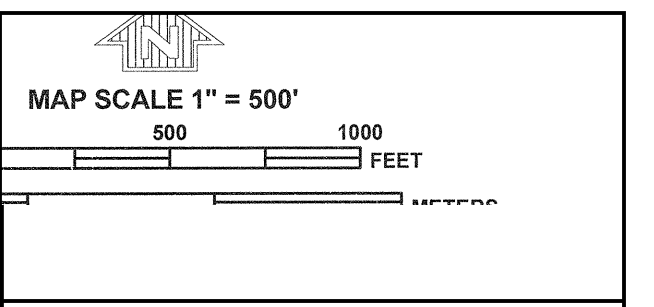
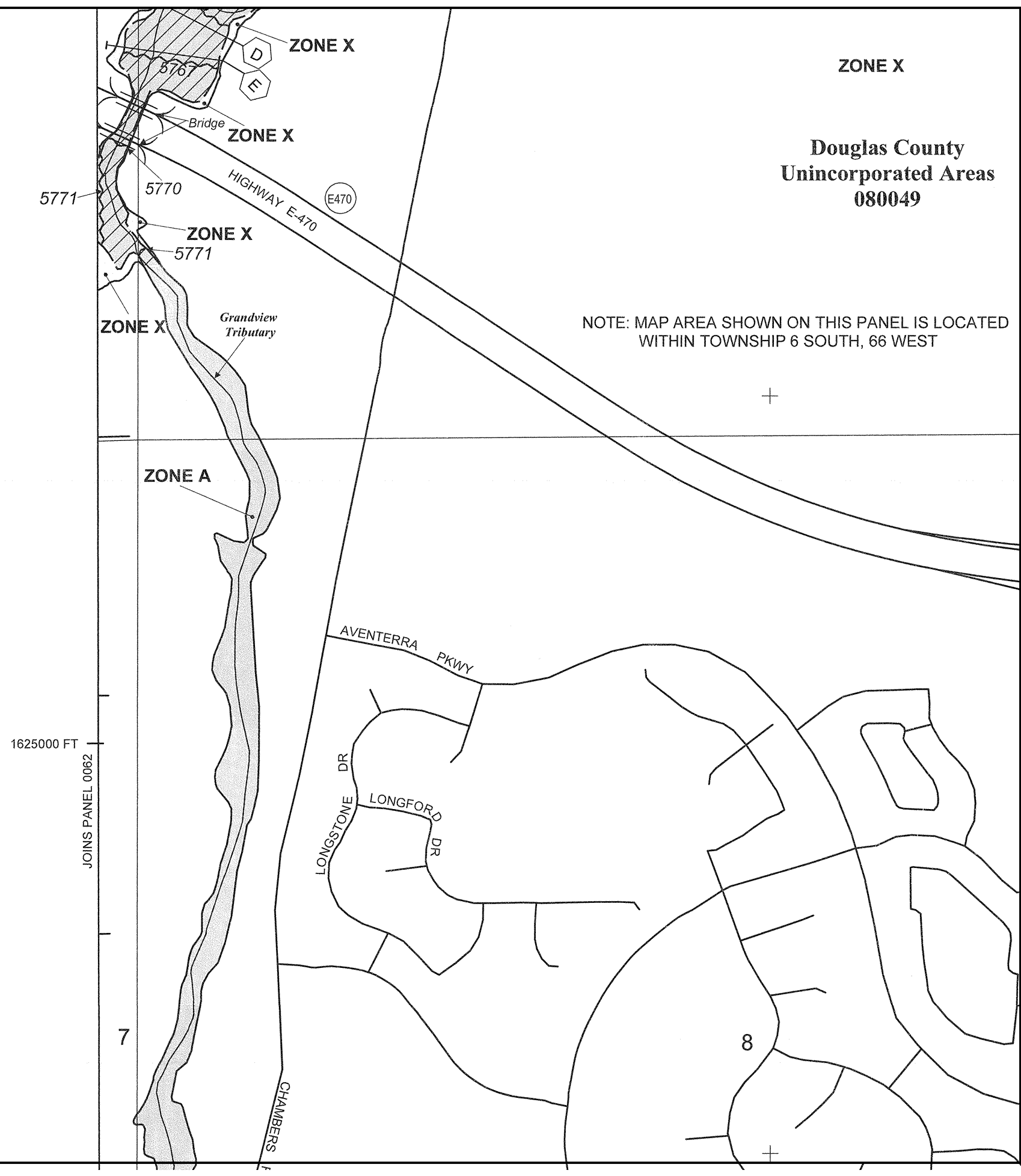
For the most current data available at the time of printing, users should contact the Douglas County Planning Department for limit locations.

An overview map of the Douglas County Flood Insurance Program panels on which each panel is located.

For more information on products, please contact the Douglas County Planning Department. A Flood Insurance Study report, and/or other information may also be reached by contacting the Douglas County Planning Department at www.douglascountyco.com.

For more information concerning the National Flood Insurance Program, please contact FEMA at 1-877-336-2662.

Vertical Datum



PANEL 0066F

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

PANEL 66 OF 495
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
DOUGLAS COUNTY	080049	0066	F
PARKER, TOWN OF	080310	0066	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
08035C0066F

EFFECTIVE DATE:
SEPTEMBER 30, 2005

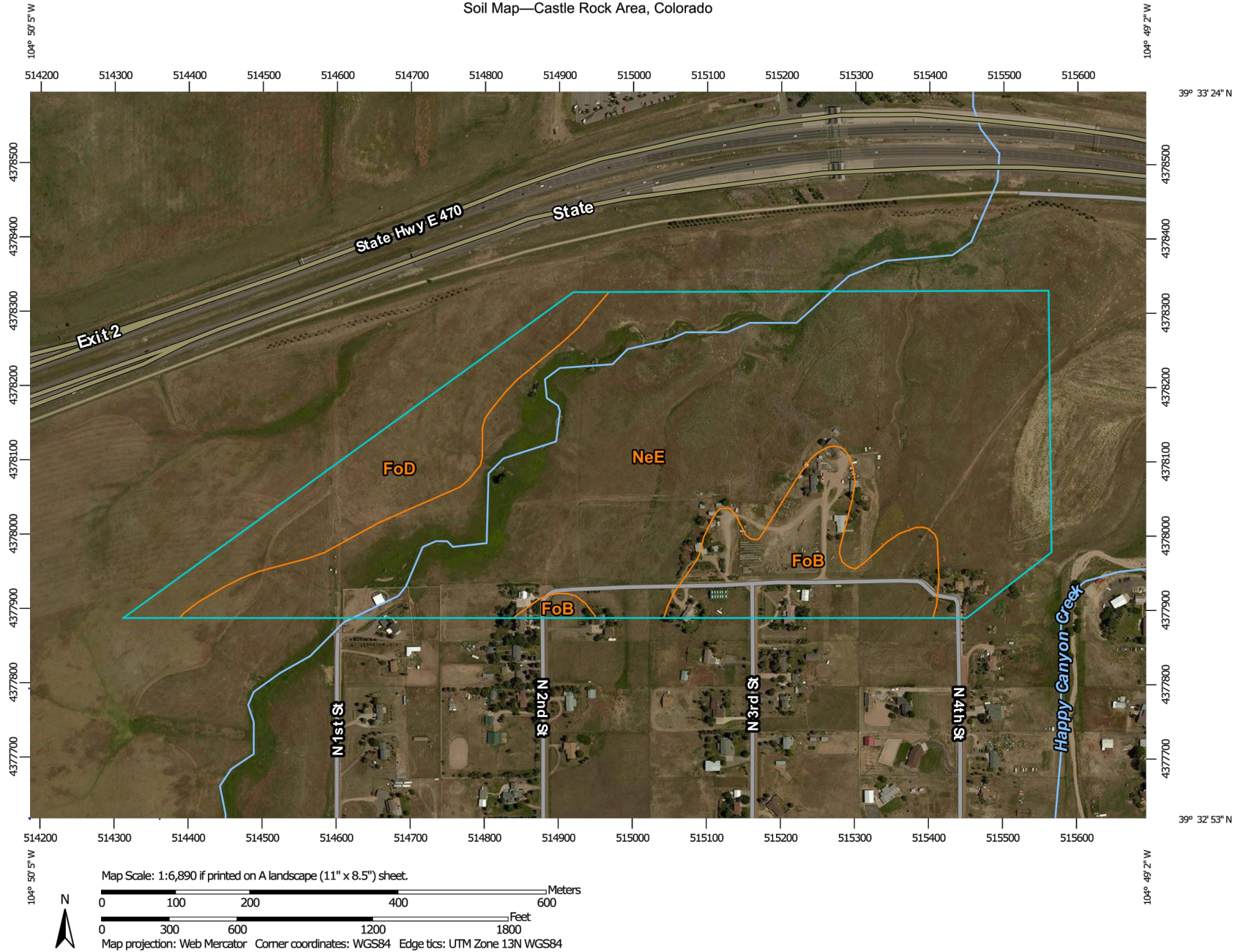


Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

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Soil Map—Castle Rock Area, Colorado



Web Soil Survey
National Cooperative Soil Survey

1/14/2016
Page 1 of 3







































COMPARK VILLAGE SOUTH FILING NO. 1
TOWN OF PARKER, CO
SOIL MAP EXHIBIT

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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: <http://websoilsurvey.nrcs.usda.gov>
 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 8, Sep 23, 2014

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

Date(s) aerial images were photographed: Jun 10, 2014—Aug 21, 2014

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.



COMPARK VILLAGE SOUTH FILING NO. 1
 TOWN OF PARKER, CO
 SOIL MAP EXHIBIT

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Soil Map—Castle Rock Area, Colorado

Map Unit Legend

Castle Rock Area, Colorado (CO622)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FoB	Fondis clay loam, 1 to 3 percent slopes	12.3	12.1%
FoD	Fondis clay loam, 3 to 9 percent slopes	13.2	12.9%
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	76.6	75.0%
Totals for Area of Interest		102.1	100.0%



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/14/2016
Page 3 of 3

3

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COMPARK VILLAGE SOUTH FILING NO. 1
TOWN OF PARKER, CO
SOIL MAP EXHIBIT



APPENDIX B

Hydrologic Analysis

- UDFCD Table 6-3
- UDFCD Table 6-4
- UDFCD Table 6-5
- UDFCD Figures 6-1, 6-2 & 6-3
- Impervious Percentage Calculations
- Time of Concentration Calculations
- 2-Year Storm Runoff Calculations
- 5-Year Storm Runoff Calculations
- 100-Year Storm Runoff Calculations

Table 6-3. Recommended percentage imperviousness values

Land Use or Surface Characteristics	Percentage Imperviousness (%)
Business:	
Downtown Areas	95
Suburban Areas	75
Residential:	
Single-family	
2.5 acres or larger	12
0.75 – 2.5 acres	20
0.25 – 0.75 acres	30
0.25 acres or less	45
Apartments	75
Industrial:	
Light areas	80
Heavy areas	90
Parks, cemeteries	10
Playgrounds	25
Schools	55
Railroad yard areas	50
Undeveloped Areas:	
Historic flow analysis	2
Greenbelts, agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and walks	90
Roofs	90
Lawns, sandy soil	2
Lawns, clayey soil	2

Table 6-4. Runoff coefficient equations based on NRCS soil group and storm return period

NRCS Soil Group	Storm Return Period					
	2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
A	$C_A = 0.89i$	$C_A = 0.93i$	$C_A = 0.94i$	$C_A = 0.944i$	$C_A = 0.95i$	$C_A = 0.81i + 0.154$
B	$C_B = 0.89i$	$C_B = 0.93i$	$C_B = 0.81i + 0.125$	$C_B = 0.70i + 0.23$	$C_B = 0.59i + 0.364$	$C_B = 0.49i + 0.454$
C/D	$C_{C/D} = 0.89i$	$C_{C/D} = 0.87i + 0.052$	$C_{C/D} = 0.74i + 0.2$	$C_{C/D} = 0.64i + 0.31$	$C_{C/D} = 0.54i + 0.418$	$C_{C/D} = 0.45i + 0.508$

Where:

i = % imperviousness (expressed as a decimal)

C_A = Runoff coefficient for Natural Resources Conservation Service (NRCS) HSG A soils

C_B = Runoff coefficient for NRCS HSG B soils

$C_{C/D}$ = Runoff coefficient for NRCS HSG C and D soils.

The values for various catchment imperviousness and storm return periods are presented graphically in Figures 6-1 through 6-3, and are tabulated in Table 6-5. These coefficients were developed for the Denver region to work in conjunction with the time of concentration recommendations in Section 2.4. Use of these coefficients and this procedure outside of the semi-arid climate found in the Denver region may not be valid. The UD-Rational Excel workbook performs all the needed calculations to find the runoff coefficient given the soil type and imperviousness and the reader may want to take advantage of this macro-enabled Excel workbook that is available for download from the UDFCD's website www.udfcd.org.

See Examples 7.1 and 7.2 that illustrate the Rational Method.

Table 6-5. Runoff coefficients, *c*

Total or Effective % Imperviousness	NRCS Hydrologic Soil Group A					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
2%	0.02	0.02	0.02	0.02	0.02	0.17
5%	0.04	0.05	0.05	0.05	0.05	0.19
10%	0.09	0.09	0.09	0.09	0.1	0.23
15%	0.13	0.14	0.14	0.14	0.14	0.28
20%	0.18	0.19	0.19	0.19	0.19	0.32
25%	0.22	0.23	0.24	0.24	0.24	0.36
30%	0.27	0.28	0.28	0.28	0.29	0.4
35%	0.31	0.33	0.33	0.33	0.33	0.44
40%	0.36	0.37	0.38	0.38	0.38	0.48
45%	0.4	0.42	0.42	0.42	0.43	0.52
50%	0.45	0.47	0.47	0.47	0.48	0.56
55%	0.49	0.51	0.52	0.52	0.52	0.6
60%	0.53	0.56	0.56	0.57	0.57	0.64
65%	0.58	0.6	0.61	0.61	0.62	0.68
70%	0.62	0.65	0.66	0.66	0.67	0.72
75%	0.67	0.7	0.71	0.71	0.71	0.76
80%	0.71	0.74	0.75	0.76	0.76	0.8
85%	0.76	0.79	0.8	0.8	0.81	0.84
90%	0.8	0.84	0.85	0.85	0.86	0.88
95%	0.85	0.88	0.89	0.9	0.9	0.92
100%	0.89	0.93	0.94	0.94	0.95	0.96
Total or Effective % Imperviousness	NRCS Hydrologic Soil Group B					
2%	0.02	0.02	0.14	0.24	0.38	0.46
5%	0.04	0.05	0.17	0.27	0.39	0.48
10%	0.09	0.09	0.21	0.3	0.42	0.5
15%	0.13	0.14	0.25	0.34	0.45	0.53
20%	0.18	0.19	0.29	0.37	0.48	0.55
25%	0.22	0.23	0.33	0.41	0.51	0.58
30%	0.27	0.28	0.37	0.44	0.54	0.6
35%	0.31	0.33	0.41	0.48	0.57	0.63
40%	0.36	0.37	0.45	0.51	0.6	0.65
45%	0.4	0.42	0.49	0.55	0.63	0.67
50%	0.45	0.47	0.53	0.58	0.66	0.7
55%	0.49	0.51	0.57	0.62	0.69	0.72
60%	0.53	0.56	0.61	0.65	0.72	0.75
65%	0.58	0.6	0.65	0.69	0.75	0.77
70%	0.62	0.65	0.69	0.72	0.78	0.8
75%	0.67	0.7	0.73	0.76	0.81	0.82
80%	0.71	0.74	0.77	0.79	0.84	0.85
85%	0.76	0.79	0.81	0.83	0.87	0.87
90%	0.8	0.84	0.85	0.86	0.89	0.9
95%	0.85	0.88	0.89	0.9	0.92	0.92
100%	0.89	0.93	0.94	0.94	0.95	0.94

Table 6-5. Runoff coefficients, *c* (continued)

Total or Effective % Imperviousness	NRCS Hydrologic Soil Groups C and D					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
2%	0.02	0.07	0.22	0.32	0.43	0.52
5%	0.04	0.1	0.24	0.34	0.45	0.53
10%	0.09	0.14	0.27	0.37	0.47	0.55
15%	0.13	0.18	0.31	0.41	0.5	0.58
20%	0.18	0.23	0.35	0.44	0.53	0.6
25%	0.22	0.27	0.39	0.47	0.55	0.62
30%	0.27	0.31	0.42	0.5	0.58	0.64
35%	0.31	0.36	0.46	0.53	0.61	0.67
40%	0.36	0.4	0.5	0.57	0.63	0.69
45%	0.4	0.44	0.53	0.6	0.66	0.71
50%	0.45	0.49	0.57	0.63	0.69	0.73
55%	0.49	0.53	0.61	0.66	0.72	0.76
60%	0.53	0.57	0.64	0.69	0.74	0.78
65%	0.58	0.62	0.68	0.73	0.77	0.8
70%	0.62	0.66	0.72	0.76	0.8	0.82
75%	0.67	0.7	0.76	0.79	0.82	0.85
80%	0.71	0.75	0.79	0.82	0.85	0.87
85%	0.76	0.79	0.83	0.85	0.88	0.89
90%	0.8	0.83	0.87	0.89	0.9	0.91
95%	0.85	0.88	0.9	0.92	0.93	0.94
100%	0.89	0.92	0.94	0.95	0.96	0.96

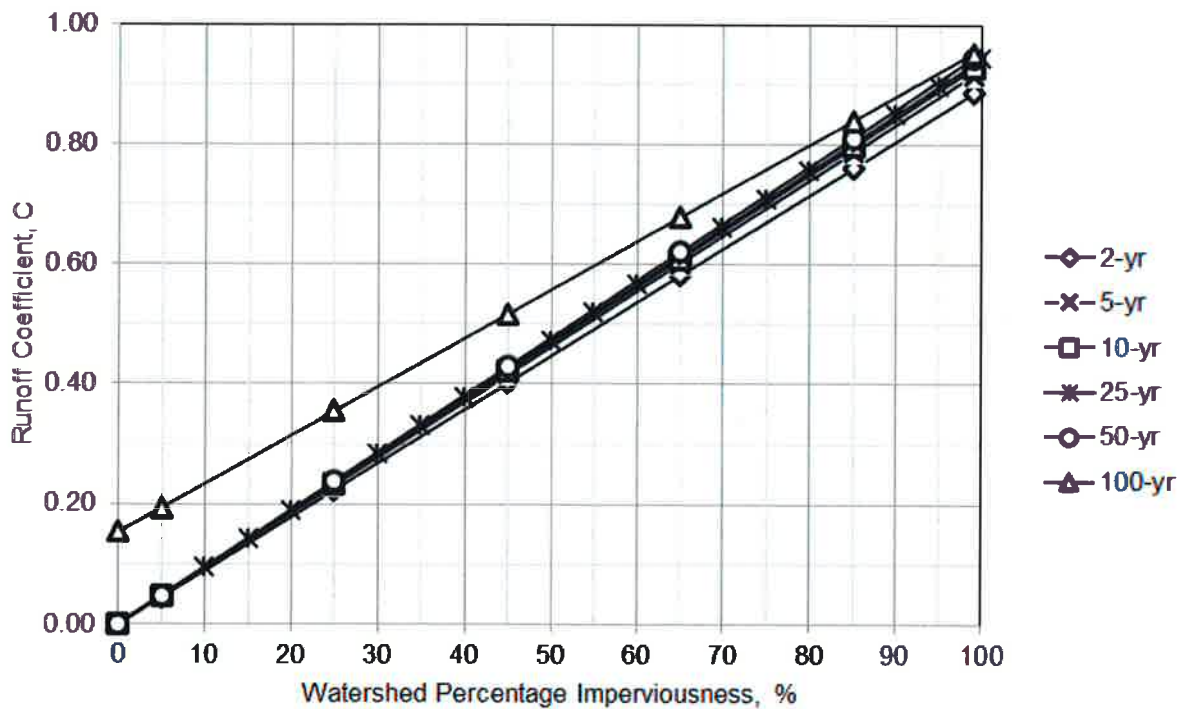


Figure 6-1. Runoff coefficient vs. watershed imperviousness NRCS HSG A

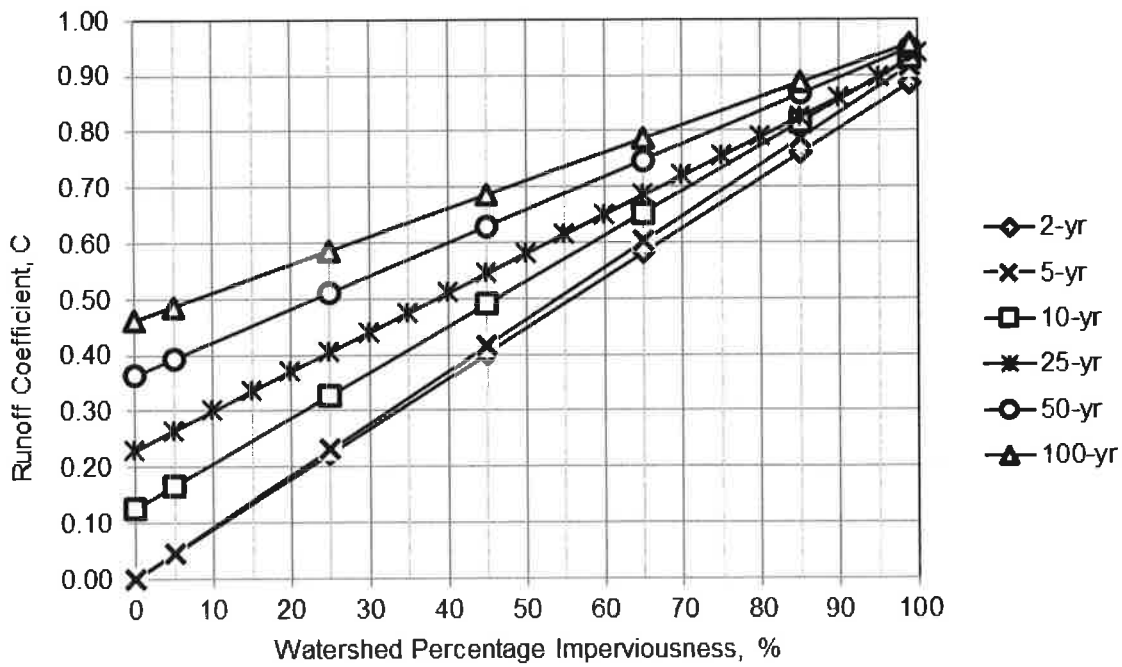


Figure 6-2. Runoff coefficient vs. watershed imperviousness NRCS HSG B

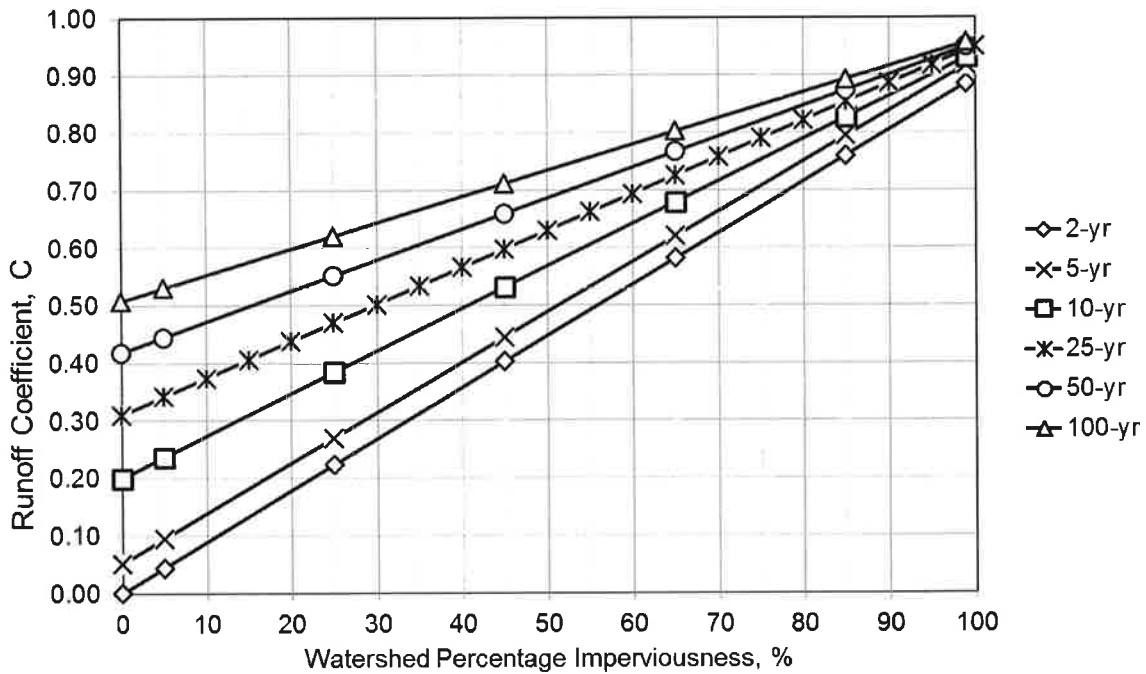


Figure 6-3. Runoff coefficient vs. watershed imperviousness NRCS HSG C and D

Compark South

TOWN OF PARKER, COLORADO PROPOSED IMPERVIOUSNESS CALCULATIONS 6/9/2016

CVS-1

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	1.18	1.18
Landscape	2%	2.67	0.05

Total Area: 3.85

Percentage Imperviousness: 32.0%
C₂ (Table 6-4, Type C Soil): 0.28
C₅ (Table 6-4, Type C Soil): 0.33
C₁₀₀ (Table 6-4, Type C Soil): 0.65

CVS-2

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	1.09	1.09
Landscape	2%	0.33	0.01

Total Area: 1.42

Percentage Imperviousness: 77.0%
C₂ (Table 6-4, Type C Soil): 0.69
C₅ (Table 6-4, Type C Soil): 0.72
C₁₀₀ (Table 6-4, Type C Soil): 0.85

CVS-3

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	0.57	0.57
Landscape	2%	0.37	0.01

Total Area: 0.94

Percentage Imperviousness: 62.0%
C₂ (Table 6-4, Type B Soil): 0.55
C₅ (Table 6-4, Type B Soil): 0.58
C₁₀₀ (Table 6-4, Type B Soil): 0.76

*Note: Impervious percentages were determined using Figures 3-3, 3-4, 3-5 from Volume 3 of the Urban Storm Drainage Criteria Manual.

CVS-4

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	0.56	0.56
Landscape	2%	0.61	0.01

Total Area: 1.17

Percentage Imperviousness:	49.0%
C₂ (Table 6-4, Type B Soil):	0.44
C₅ (Table 6-4, Type B Soil):	0.46
C₁₀₀ (Table 6-4, Type B Soil):	0.69

CVS-4A

Percentage Imperviousness*:	50.0%
C₂ (Table 6-4, Type B Soil):	0.45
C₅ (Table 6-4, Type B Soil):	0.47
C₁₀₀ (Table 6-4, Type B Soil):	0.70

CVS-5

Percentage Imperviousness*:	45.0%
C₂ (Table 6-4, Type B Soil):	0.40
C₅ (Table 6-4, Type B Soil):	0.42
C₁₀₀ (Table 6-4, Type B Soil):	0.67

CVS-6

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	0.28	0.28
Landscape	2%	0.37	0.01

Total Area: 0.65

Percentage Imperviousness:	45.0%
C₂ (Table 6-4, Type B Soil):	0.40
C₅ (Table 6-4, Type B Soil):	0.42
C₁₀₀ (Table 6-4, Type B Soil):	0.67

*Note: Impervious percentages were determined using Figures 3-3, 3-4, 3-5 from Volume 3 of the Urban Storm Drainage Criteria Manual.

CVS-6A

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	0.00	0.00
Landscape	2%	0.78	0.02

Total Area: 0.78

Percentage Imperviousness: 2.0%
C₂ (Table 6-4, Type B Soil): 0.02
C₅ (Table 6-4, Type B Soil): 0.02
C₁₀₀ (Table 6-4, Type B Soil): 0.46

CVS-7

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	0.86	0.86
Landscape	2%	0.25	0.01

Total Area: 1.11

Percentage Imperviousness: 78.0%
C₂ (Table 6-4, Type B Soil): 0.69
C₅ (Table 6-4, Type B Soil): 0.73
C₁₀₀ (Table 6-4, Type B Soil): 0.84

CVS-8

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	0.86	0.86
Landscape	2%	0.73	0.01

Total Area: 1.59

Percentage Imperviousness: 55.0%
C₂ (Table 6-4, Type B Soil): 0.49
C₅ (Table 6-4, Type B Soil): 0.51
C₁₀₀ (Table 6-4, Type B Soil): 0.72

CVS-9

Percentage Imperviousness*: 55.0%
C₂ (Table 6-4, Type B Soil): 0.49
C₅ (Table 6-4, Type B Soil): 0.51
C₁₀₀ (Table 6-4, Type B Soil): 0.72

*Note: Impervious percentages were determined using Figures 3-3, 3-4, 3-5 from Volume 3 of the Urban Storm Drainage Criteria Manual.

CVS-9A

Percentage Imperviousness*:	55.0%
C₂ (Table 6-4, Type B Soil):	0.49
C₅ (Table 6-4, Type B Soil):	0.51
C₁₀₀ (Table 6-4, Type B Soil):	0.72

CVS-10

Percentage Imperviousness*:	51.0%
C₂ (Table 6-4, Type B Soil):	0.45
C₅ (Table 6-4, Type B Soil):	0.47
C₁₀₀ (Table 6-4, Type B Soil):	0.70

CVS-11

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	1.57	1.57
Landscape	2%	0.46	0.01

Total Area: 2.03

Percentage Imperviousness:	78.0%
C₂ (Table 6-4, Type B Soil):	0.69
C₅ (Table 6-4, Type B Soil):	0.73
C₁₀₀ (Table 6-4, Type B Soil):	0.84

CVS-12

Percentage Imperviousness*:	55.0%
C₂ (Table 6-4, Type B Soil):	0.49
C₅ (Table 6-4, Type B Soil):	0.51
C₁₀₀ (Table 6-4, Type B Soil):	0.72

CVS-12A

Percentage Imperviousness*:	55.0%
C₂ (Table 6-4, Type B Soil):	0.49
C₅ (Table 6-4, Type B Soil):	0.51
C₁₀₀ (Table 6-4, Type B Soil):	0.72

*Note: Impervious percentages were determined using Figures 3-3, 3-4, 3-5 from Volume 3 of the Urban Storm Drainage Criteria Manual.

CVS-13

Percentage Imperviousness*:	55.0%
C₂ (Table 6-4, Type B Soil):	0.49
C₅ (Table 6-4, Type B Soil):	0.51
C₁₀₀ (Table 6-4, Type B Soil):	0.72

CVS-14

Percentage Imperviousness:	43.0%
C₂ (Table 6-4, Type B Soil):	0.38
C₅ (Table 6-4, Type B Soil):	0.40
C₁₀₀ (Table 6-4, Type B Soil):	0.66

CVS-14A

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	0.00	0.00
Landscape	2%	4.12	0.08

Total Area: 4.12

Percentage Imperviousness:	2.0%
C₂ (Table 6-4, Type B Soil):	0.02
C₅ (Table 6-4, Type B Soil):	0.02
C₁₀₀ (Table 6-4, Type B Soil):	0.46

CVS-15

Percentage Imperviousness*:	55.0%
C₂ (Table 6-4, Type B Soil):	0.49
C₅ (Table 6-4, Type B Soil):	0.51
C₁₀₀ (Table 6-4, Type B Soil):	0.72

CVS-16

Percentage Imperviousness*:	50.0%
C₂ (Table 6-4, Type B Soil):	0.45
C₅ (Table 6-4, Type B Soil):	0.47
C₁₀₀ (Table 6-4, Type B Soil):	0.70

*Note: Impervious percentages were determined using Figures 3-3, 3-4, 3-5 from Volume 3 of the Urban Storm Drainage Criteria Manual.

CVS-17

Percentage Imperviousness*:	51.0%
C ₂ (Table 6-4, Type B Soil):	0.45
C ₅ (Table 6-4, Type B Soil):	0.47
C ₁₀₀ (Table 6-4, Type B Soil):	0.70

CVS-18

Percentage Imperviousness*:	50.0%
C ₂ (Table 6-4, Type B Soil):	0.45
C ₅ (Table 6-4, Type B Soil):	0.47
C ₁₀₀ (Table 6-4, Type B Soil):	0.70

CVS-19

Percentage Imperviousness*:	73.0%
C ₂ (Table 6-4, Type B Soil):	0.65
C ₅ (Table 6-4, Type B Soil):	0.68
C ₁₀₀ (Table 6-4, Type B Soil):	0.81

CVS-20

Percentage Imperviousness*:	50.0%
C ₂ (Table 6-4, Type B Soil):	0.45
C ₅ (Table 6-4, Type B Soil):	0.47
C ₁₀₀ (Table 6-4, Type B Soil):	0.70

CVS-21

Percentage Imperviousness*:	50.0%
C ₂ (Table 6-4, Type B Soil):	0.45
C ₅ (Table 6-4, Type B Soil):	0.47
C ₁₀₀ (Table 6-4, Type B Soil):	0.70

*Note: Impervious percentages were determined using Figures 3-3, 3-4, 3-5 from Volume 3 of the Urban Storm Drainage Criteria Manual.

BEL-1

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	1.23	1.23
Landscape	2%	2.50	0.05

Total Area: 3.73

Percentage Imperviousness: 34.0%
C₂ (Table 6-4, Type B Soil): 0.30
C₅ (Table 6-4, Type B Soil): 0.32
C₁₀₀ (Table 6-4, Type B Soil): 0.62

BEL-2

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	0.68	0.68
Landscape	2%	0.70	0.01

Total Area: 1.38

Percentage Imperviousness: 77.0%
C₂ (Table 6-4, Type B Soil): 0.69
C₅ (Table 6-4, Type B Soil): 0.72
C₁₀₀ (Table 6-4, Type B Soil): 0.83

BEL-3

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	1.34	1.34
Landscape	2%	5.42	0.11

Total Area: 6.76

Percentage Imperviousness: 21.0%
C₂ (Table 6-4, Type B Soil): 0.19
C₅ (Table 6-4, Type B Soil): 0.20
C₁₀₀ (Table 6-4, Type B Soil): 0.56

*Note: Impervious percentages were determined using Figures 3-3, 3-4, 3-5 from Volume 3 of the Urban Storm Drainage Criteria Manual.

BEL-4

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	1.36	1.36
Landscape	2%	0.39	0.01

Total Area: 1.75

Percentage Imperviousness: 78.0%
C₂ (Table 6-4, Type B Soil): 0.69
C₅ (Table 6-4, Type B Soil): 0.73
C₁₀₀ (Table 6-4, Type B Soil): 0.84

BEL-5

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	3.43	3.43
Landscape	2%	1.12	0.02

Total Area: 4.55

Percentage Imperviousness: 76.0%
C₂ (Table 6-4, Type B Soil): 0.68
C₅ (Table 6-4, Type B Soil): 0.71
C₁₀₀ (Table 6-4, Type B Soil): 0.83

BEL-6

Land Use	Imperviousness (UDFCD Table 6-3)	Total Area (Acres)	Impervious Area (Acres)
Pavement/Hardscape	100%	2.77	2.77
Landscape	2%	1.18	0.02

Total Area: 3.95

Percentage Imperviousness: 71.0%
C₂ (Table 6-4, Type B Soil): 0.63
C₅ (Table 6-4, Type B Soil): 0.66
C₁₀₀ (Table 6-4, Type B Soil): 0.80

*Note: Impervious percentages were determined using Figures 3-3, 3-4, 3-5 from Volume 3 of the Urban Storm Drainage Criteria Manual.

**PROPOSED DRAINAGE BASINS
STANDARD FORM SF-2
TIME OF CONCENTRATION**

PROJECT: **Compark Village South, Filing 1**
 CALCULATED BY: **RAK** DATE: **June 30, 2016**
 REVISED BY: DATE:

NOTES:
 $T_i = [0.395 \times (1.1 - C_g) \times L^{0.5}] / (S^{0.33})$
 $T_i = L / (60 \times V)$ (Velocity from UDFCD Fig. RO-1)
 $T_c \text{ Check} = 10 + L/180$ (Urbanized Basins Only)

JOB NO: CLCPKC3

SUB-BASIN DATA			INITIAL/OVERLAND TIME (T _i)			TRAVEL TIME (T _t) - (GRASS SWALE)				TRAVEL TIME (T _t) - (PAVEMENT/CURB & GUTTER)				T _c CHECK (urbanized basins)		FINAL T _c (min)	REMARKS
AREA DESIGNATION	RUNOFF COEFFICIENT, C ₁₀₀	AREA, A (acres)	FLOW LENGTH, (ft)	SLOPE (%)	INITIAL TIME T _i (min)	FLOW LENGTH, (ft)	SLOPE (%)	VELOCITY (fps)	TRAVEL TIME T _t (min)	FLOW LENGTH, (ft)	SLOPE (%)	VELOCITY (fps)	TRAVEL TIME T _t (min)	TOTAL LENGTH (ft)	MAXIMUM T _c = (L/180 + 10)		
CVS-1 (Inlet 1-3)	0.65	3.85	0	0.0%	0.0	0	0.0%	0.0	0.0	1172	2.0%	2.8	6.9	1172	16.5	6.9	
CVS-2 (Inlet 2-3)	0.85	1.42	0	0.0%	0.0	0	0.0%	0.0	0.0	1125	2.0%	2.8	6.6	1125	16.3	6.6	
CVS-3 (Inlet 1-4)	0.76	0.94	0	0.0%	0.0	0	0.0%	0.0	0.0	1055	2.0%	2.8	6.2	1055	15.9	6.2	
CVS-4 (Inlet 2-4)	0.69	1.17	0	0.0%	0.0	0	0.0%	0.0	0.0	600	1.5%	2.4	4.1	600	13.3	4.1	
CVS-4A (Inlet 3-4)	0.70	1.76	100	1.5%	6.3	49	1.5%	0.9	1.0	405	1.5%	2.4	2.8	554	13.1	10.0	
CVS-5 (Inlet 5-4)	0.67	2.63	100	4.0%	4.9	130	5.5%	1.6	1.3	380	1.3%	2.3	2.8	610	13.4	9.0	
CVS-6 (Inlet 6-4)	0.67	0.58	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	Minimum
CVS-6A (Inlet 7-4)	0.46	0.78	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	Minimum
CVS-7 (Inlet 1-6)	0.84	1.11	0	0.0%	0.0	0	0.0%	0.0	0.0	904	0.6%	1.5	10.2	904	15.0	10.2	
CVS-8 (Inlet 2-6)	0.72	1.59	0	0.0%	0.0	0	0.0%	0.0	0.0	897	0.6%	1.5	10.1	897	15.0	10.1	
CVS-9 (Inlet 4-5A)	0.72	2.50	60	1.5%	4.6	115	1.5%	0.9	2.2	624	1.1%	2.1	5.0	799	14.4	11.8	
CVS-9A (Inlet 3-4)	0.72	0.37	-	-	-	-	-	-	-	-	-	-	-	-	-	5.0	Minimum
CVS-10 (Inlet 5-5A)	0.70	3.47	100	4.0%	4.5	113	4.0%	1.4	1.3	682	1.0%	2.0	5.7	895	15.0	11.6	
CVS-11 (Inlet 1-5)	0.84	2.03	0	0.0%	0.0	0	0.0%	0.0	0.0	1046	0.5%	1.4	12.3	1046	15.8	12.3	
CVS-12 (Inlet 2-5)	0.72	4.48	100	1.5%	5.9	48	1.5%	0.9	0.9	599	1.0%	2.0	5.0	747	14.2	11.9	
CVS-12A (Inlet 3-5)	0.72	2.63	100	1.7%	5.7	51	1.7%	0.9	0.9	467	1.8%	2.7	2.9	618	13.4	9.5	
CVS-13 (Inlet 4-5)	0.72	4.89	30	4.7%	2.2	0	0.0%	0.0	0.0	739	1.0%	2.0	6.2	769	14.3	8.4	
CVS-14 (Inlet 6-5)	0.66	6.55	100	1.5%	6.9	20	1.5%	0.9	0.4	1229	1.0%	2.0	10.2	1349	17.5	17.5	
CVS-14A (Inlet 7-5)	0.46	4.12	100	5.0%	6.8	1258	2.0%	1.0	21.2	0	0.0%	0.0	0.0	1358	17.5	17.5	
CVS-15 (Inlet 5-5)	0.72	3.00	100	5.7%	3.8	127	5.7%	1.7	1.3	723	1.4%	2.4	5.1	950	15.3	10.2	
CVS-16	0.70	2.07	100	1.6%	6.2	44	1.6%	0.9	0.8	772	1.0%	2.0	6.4	916	15.1	13.5	
CVS-17	0.70	4.10	100	5.3%	4.1	129	5.3%	1.6	1.3	564	1.0%	2.0	4.7	793	14.4	10.2	
CVS-18	0.70	3.06	100	15.5%	2.9	115	3.0%	1.2	1.6	990	1.0%	2.0	8.3	1205	16.7	12.8	
CVS-19	0.81	1.61	100	3.5%	3.4	200	3.5%	1.3	2.5	0	0.0%	0.0	0.0	300	11.7	6.0	
CVS-20	0.70	1.80	100	2.0%	5.8	17	2.0%	1.0	0.3	570	1.0%	2.0	4.8	687	13.8	10.8	
CVS-21	0.70	3.88	100	0.0%	22.3	164	3.3%	1.3	2.1	833	1.1%	2.1	6.6	1097	16.1	16.1	
BEL-1 (Inlet 2-1)	0.62	3.73	100	1.5%	7.6	466	1.5%	0.9	9.1	462	0.8%	1.8	4.4	508	12.8	12.8	
BEL-2 (Inlet 1-1)	0.83	1.38	0	0.0%	0.0	0	0.0%	0.0	0.0	1123	1.5%	2.4	7.6	1123	16.2	7.6	
BEL-3 (Inlet 2-2)	0.56	6.76	100	1.5%	8.6	232	1.5%	0.9	4.5	462	0.8%	1.8	4.3	794	14.4	14.4	
BEL-4 (Inlet 1-2)	0.84	1.75	0	0.0%	0.0	0	0.0%	0.0	0.0	825	0.8%	1.7	7.9	825	14.6	7.9	
BEL-5	0.83	4.55	100	3.1%	3.4	0	0.0%	0.0	0.0	1602	3.1%	3.5	7.6	1702	19.5	11.0	
BEL-6	0.80	3.95	100	9.8%	2.5	0	0.0%	0.0	0.0	1009	3.0%	3.5	4.9	1109	16.2	7.4	

**PROPOSED DRAINAGE BASINS
STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)**

PROJECT: COMPARK VILLAGE SOUTH, FILINGS 1 & 2 CLCPKC3
 CALCULATED BY: RAK DATE: June 30, 2016 Manning's n-value = 0.013
 REVISED BY: _____ DATE: _____ 2-YEAR

Basin ID	Design Point	DIRECT RUNOFF						Direct Runoff, Q (cfs)	Total Runoff, Q (cfs)	STORM SEWER					REMARKS
		Area (ac)	Tc (min.)	Runoff Coefficient, C	Intensity, I (in/hr)	C*A (Acres)	Intercepted (cfs)			Bypass (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)		
CVS-1 (Inlet 1-3)	1	3.85	6.9	0.28	4.3	1.10	4.7	4.7	4.7	0.0	8.9	3.8%	24		
CVS-2 (Inlet 2-3)	2	1.42	6.6	0.69	4.3	0.97	4.2	4.2	4.2	0.0	4.2	10.0%	24		
CVS-3 (Inlet 1-4)	3	0.94	6.2	0.55	4.4	0.52	2.3	2.3	2.3	0.0	2.3	1.7%	18		
CVS-4 (Inlet 2-4)	4	1.17	4.1	0.44	5.0	0.51	2.5	2.5	2.5	0.0	2.5	0.9%	18		
CVS-4A (Inlet 3-4)	4A	1.76	10.0	0.45	3.8	0.78	2.9	2.9	2.9	0.0	2.9	1.0%	18		
CVS-5 (Inlet 5-4)	5	2.63	9.0	0.40	3.9	1.05	4.1	4.1	4.1	0.0	4.1	1.0%	18		
CVS-6 (Inlet 6-4)	6	0.58	5.0	0.40	4.7	0.23	1.1	1.1	1.1	0.0	9.7	1.7%	36		
CVS-6A (Inlet 7-4)	6A	0.78	5.0	0.02	4.7	0.01	0.1	0.1	0.1	0.0	8.6	0.4%	36		
CVS-7 (Inlet 1-6)	7	1.11	10.2	0.69	3.7	0.77	2.9	2.9	2.9	0.0	5.8	3.0%	24		
CVS-8 (Inlet 2-6)	8	1.59	10.1	0.49	3.7	0.78	2.9	2.9	2.9	0.0	2.9	1.4%	24		
CVS-9 (Inlet 4-5A)	9	2.50	11.8	0.49	3.5	1.22	4.3	4.3	4.3	0.0	4.3	1.0%	18		
CVS-9A (Inlet 4-4)	9A	0.37	5.0	0.49	4.7	0.18	0.9	0.9	0.9	0.0	0.9	1.0%	18		
CVS-10 (Inlet 5-5A)	10	3.47	11.6	0.45	3.5	1.58	5.6	5.6	5.6	0.0	5.6	1.0%	18		
CVS-11 (Inlet 1-5)	11	2.03	12.3	0.69	3.4	1.41	4.9	4.9	4.9	0.0	4.9	0.8%	36		
CVS-12 (Inlet 2-5)	12	4.48	11.9	0.49	3.5	2.19	7.7	7.7	7.7	0.0	7.7	0.7%	36		
CVS-12A (Inlet 3-5)	12A	2.63	9.5	0.49	3.8	1.29	4.9	4.9	4.9	0.0	41.5	1.9%	36		
CVS-13 (Inlet 4-5)	13	4.89	8.4	0.49	4.0	2.39	9.6	9.6	9.6	0.0	9.6	1.9%	18		
CVS-14 (Inlet 6-5)	14	6.55	17.5	0.38	2.9	2.51	7.3	7.3	7.3	0.0	11.6	3.2%	30		
CVS-14A (Inlet 7-5)	14A	4.01	17.5	0.02	2.9	0.07	0.2	0.2	0.2	0.0	4.3	4.7%	24		
CVS-15 (Inlet 5-5)	15	3.00	10.2	0.49	3.7	1.47	5.5	5.5	5.5	0.0	5.5	1.9%	18		
CVS-16	16	2.07	13.5	0.45	3.3	0.92	3.1	3.1	3.1	0.0	-	-	-		
CVS-17	17	4.10	10.2	0.45	3.7	1.86	7.0	7.0	7.0	0.0	-	-	-		
CVS-18	18	3.06	12.8	0.45	3.4	1.36	4.6	4.6	4.6	0.0	-	-	-		
CVS-19	19	1.61	6.0	0.65	4.5	1.05	4.7	4.7	4.7	0.0	-	-	-		
CVS-20	20	1.80	10.8	0.45	3.6	0.80	2.9	2.9	2.9	0.0	-	-	-		
CVS-21	21	3.88	16.1	0.45	3.1	1.73	5.3	5.3	5.3	0.0	-	-	-		
BEL-1 (Inlet 2-1)	B1	3.73	12.8	0.30	3.4	1.13	3.8	3.8	3.8	0.0	5.9	3.3%	36		
BEL-2 (Inlet 1-1)	B2	1.38	7.6	0.69	4.2	0.95	3.9	3.9	3.9	0.0	8.4	0.9%	36		
BEL-3 (Inlet 2-2)	B3	6.76	14.4	0.19	3.2	1.26	4.1	4.1	4.1	0.0	6.6	3.2%	36		
BEL-4 (Inlet 1-2)	B4	1.75	7.9	0.69	4.1	1.21	5.0	5.0	5.0	0.0	11.6	2.9%	36		
BEL-5	B5	4.55	11.0	0.68	3.6	3.08	11.1	11.1	-	-	-	-	-		
BEL-6	B6	3.95	7.4	0.63	4.2	2.50	10.5	10.5	-	-	-	-	-		

**PROPOSED DRAINAGE BASINS
STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)**

PROJECT: COMPARK VILLAGE SOUTH, FILINGS 1 & 2

CLCPKC3

CALCULATED BY: RAK
REVISED BY:

DATE: June 30, 2016
DATE:

Manning's n-value =0.013

5-YEAR

Basin ID	Design Point	DIRECT RUNOFF							INLET		STORM SEWER			REMARKS
		Area (ac)	Tc (min.)	Runoff Coefficient, C	Intensity, I (in/hr)	C*A (Acres)	Direct Runoff, Q (cfs)	Total Runoff, Q (cfs)	Intercepted (cfs)	Bypass (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	
CVS-1 (Inlet 1-3)	1	3.85	6.9	0.33	4.3	1.27	5.5	5.5	5.5	0.0	10.0	3.8%	24	
CVS-2 (Inlet 2-3)	2	1.42	6.6	0.72	4.3	1.03	4.5	4.5	4.5	0.0	4.5	10.0%	24	
CVS-3 (Inlet 1-4)	3	0.94	6.2	0.58	4.4	0.54	2.4	2.4	2.4	0.0	2.4	1.7%	18	
CVS-4 (Inlet 2-4)	4	1.17	4.1	0.46	5.0	0.53	2.6	2.6	2.6	0.0	2.6	0.9%	18	
CVS-4A (Inlet 3-4)	4A	1.76	10.0	0.47	3.8	0.82	3.1	3.1	3.1	0.0	3.1	1.0%	18	
CVS-5 (Inlet 5-4)	5	2.63	9.0	0.42	3.9	1.10	4.3	4.3	4.3	0.0	4.3	1.0%	18	
CVS-6 (Inlet 6-4)	6	0.58	5.0	0.42	4.7	0.24	1.1	1.1	1.1	0.0	9.7	1.7%	36	
CVS-6A (Inlet 7-4)	6A	0.78	5.0	0.02	4.7	0.01	0.1	0.1	0.1	0.0	8.6	0.4%	36	
CVS-7 (Inlet 1-6)	7	1.11	10.2	0.73	3.7	0.81	3.0	3.0	3.0	0.0	6.0	3.0%	24	
CVS-8 (Inlet 2-6)	8	1.59	10.1	0.51	3.7	0.81	3.0	3.0	3.0	0.0	3.0	1.4%	24	
CVS-9 (Inlet 4-5A)	9	2.50	11.8	0.51	3.5	1.28	4.5	4.5	4.5	0.0	4.5	1.0%	18	
CVS-9A (Inlet 4-4)	9A	0.37	5.0	0.51	4.7	0.19	0.9	0.9	0.9	0.0	0.9	1.0%	18	
CVS-10 (Inlet 5-5A)	10	3.47	11.6	0.47	3.5	1.65	5.8	5.8	5.8	0.0	5.8	1.0%	18	
CVS-11 (Inlet 1-5)	11	2.03	12.3	0.73	3.4	1.47	5.1	5.1	5.1	0.0	5.1	0.8%	36	
CVS-12 (Inlet 2-5)	12	4.48	11.9	0.51	3.5	2.29	8.0	8.0	8.0	0.0	8.0	0.7%	36	
CVS-12A (Inlet 3-5)	12A	2.63	9.5	0.51	3.8	1.35	5.2	5.2	5.2	0.0	43.2	1.9%	36	
CVS-13 (Inlet 4-5)	13	4.89	8.4	0.51	4.0	2.50	10.0	10.0	10.0	0.0	10.0	1.9%	18	
CVS-14 (Inlet 6-5)	14	6.55	17.5	0.40	2.9	2.62	7.7	7.7	7.7	0.0	12.0	3.2%	30	
CVS-14A (Inlet 7-5)	14A	4.01	17.5	0.02	2.9	0.07	0.2	0.2	0.2	0.0	4.3	4.7%	24	
CVS-15 (Inlet 5-5)	15	3.00	10.2	0.51	3.7	1.53	5.7	5.7	5.7	0.0	5.7	1.9%	18	
CVS-16	16	2.07	13.5	0.47	3.3	0.96	3.2	3.2	-	-	-	-	-	
CVS-17	17	4.10	10.2	0.47	3.7	1.94	7.3	7.3	-	-	-	-	-	
CVS-18	18	3.06	12.8	0.47	3.4	1.42	4.8	4.8	-	-	-	-	-	
CVS-19	19	1.61	6.0	0.68	4.5	1.09	4.9	4.9	-	-	-	-	-	
CVS-20	20	1.80	10.8	0.47	3.6	0.84	3.1	3.1	-	-	-	-	-	
CVS-21	21	3.88	16.1	0.47	3.1	1.80	5.5	5.5	-	-	-	-	-	
BEL-1 (Inlet 2-1)	B1	3.73	12.8	0.32	3.4	1.18	4.0	4.0	4.0	0.0	6.1	3.3%	36	
BEL-2 (Inlet 1-1)	B2	1.38	7.6	0.72	4.2	0.99	4.1	4.1	4.1	0.0	8.8	0.9%	36	
BEL-3 (Inlet 2-2)	B3	6.76	14.4	0.20	3.2	1.32	4.2	4.2	4.2	0.0	6.9	3.2%	36	
BEL-4 (Inlet 1-2)	B4	1.75	7.9	0.73	4.1	1.27	5.2	5.2	5.2	0.0	12.1	2.9%	36	
BEL-5	B5	4.55	11.0	0.71	3.6	3.22	11.6	11.6	-	-	-	-	-	
BEL-6	B6	3.95	7.4	0.66	4.2	2.61	10.9	10.9	-	-	-	-	-	

**PROPOSED DRAINAGE BASINS
STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)**

PROJECT: COMPARK VILLAGE SOUTH, FILINGS 1 & 2

CLCPKC3

CALCULATED BY: RAK
REVISED BY:

DATE: June 30, 2016
DATE:

Manning's n-value =0.013

100-YEAR

Basin ID	Design Point	DIRECT RUNOFF							INLET		STORM SEWER			REMARKS
		Area (ac)	Tc (min.)	Runoff Coefficient, C	Intensity, I (in/hr)	C*A (Acres)	Direct Runoff, Q (cfs)	Total Runoff with Bypass, Q (cfs)	Intercepted (cfs)	Bypass (cfs)	Design Flow (cfs)	Slope (%)	Pipe Size (inches)	
CVS-1 (Inlet 1-3)	1	3.85	6.9	0.65	8.0	2.51	20.2	20.2	13.5	6.7	22.5	3.8%	24	Bypass flow goes to CVS-3.
CVS-2 (Inlet 2-3)	2	1.42	6.6	0.85	8.1	1.21	9.9	9.9	9.0	1.0	9.0	10.0%	24	Bypass flow goes to CVS-4.
CVS-3 (Inlet 1-4)	3	0.94	6.2	0.76	8.3	0.71	5.9	12.6	7.7	4.9	7.7	1.7%	18	Takes bypass flow from CVS-1. Bypass goes to CVS-7.
CVS-4 (Inlet 2-4)	4	1.17	4.1	0.69	9.3	0.81	7.5	8.5	8.0	0.5	8.0	0.9%	18	Takes bypass flow from CVS-2. Bypass goes to CVS-8.
CVS-4A (Inlet 3-4)	4A	1.76	10.0	0.70	7.0	1.23	8.6	11.0	11.0	0.0	11.0	1.0%	18	Takes bypass flow from CVS-5.
CVS-5 (Inlet 5-4)	5	2.63	9.0	0.67	7.3	1.77	13.0	13.0	10.6	2.4	10.6	1.0%	18	Bypass flow goes to CVS-4A.
CVS-6 (Inlet 6-4)	6	0.58	5.0	0.67	8.8	0.39	3.5	3.5	3.5	0.0	54.5	1.7%	36	
CVS-6A (Inlet 7-4)	6A	0.78	5.0	0.46	8.8	0.36	3.2	3.2	3.2	0.0	51.0	0.4%	36	
CVS-7 (Inlet 1-6)	7	1.11	10.2	0.84	7.0	0.93	6.5	11.4	7.3	4.1	15.4	3.0%	24	Takes bypass flow from CVS-3. Bypass goes to CVS-11.
CVS-8 (Inlet 2-6)	8	1.59	10.1	0.72	7.0	1.15	8.1	8.6	8.1	0.5	8.1	1.4%	24	Takes bypass flow from CVS-4. Bypass goes to CVS-12.
CVS-9 (Inlet 4-5A)	9	2.50	11.8	0.72	6.6	1.81	11.9	11.9	10.1	1.8	10.1	1.0%	18	Bypass flow goes to CVS-12.
CVS-9A (Inlet 4-4)	9A	0.37	5.0	0.72	8.8	0.27	2.4	2.4	2.4	0.0	2.4	1.0%	18	
CVS-10 (Inlet 5-5A)	10	3.47	11.6	0.70	6.6	2.44	16.2	16.2	12.0	4.2	12.0	1.0%	18	Bypass flow goes to CVS-13.
CVS-11 (Inlet 1-5)	11	2.03	12.3	0.84	6.5	1.70	11.0	15.1	15.1	0.0	15.1	0.8%	36	Takes bypass flow from CVS-7.
CVS-12 (Inlet 2-5)	12	4.48	11.9	0.72	6.6	3.24	21.3	23.6	23.6	0.0	23.6	0.7%	36	Takes bypass flow from CVS-8 and CVS-9.
CVS-12A (Inlet 3-5)	12A	2.63	9.5	0.72	7.2	1.90	13.6	13.6	13.6	0.0	140.4	1.9%	36	Takes bypass flow from CVS-13 and CVS-15.
CVS-13 (Inlet 4-5)	13	4.89	8.4	0.72	7.5	3.54	26.6	37.2	37.2	0.0	37.2	1.9%	18	Takes bypass flow from CVS-10 and CVS 14.
CVS-14 (Inlet 6-5)	14	6.55	17.5	0.66	5.5	4.35	23.8	23.8	11.1	12.7	45.9	3.2%	30	Bypass flow goes to CVS-13 and CVS-15
CVS-14A (Inlet 7-5)	14A	4.01	17.5	0.46	5.5	1.86	10.2	10.2	10.2	0.0	34.8	4.7%	24	
CVS-15 (Inlet 5-5)	15	3.00	10.2	0.72	7.0	2.17	15.2	21.6	21.6	0.0	21.6	1.9%	18	Takes bypass from CVS-14.
CVS-16	16	2.07	13.5	0.70	6.2	1.45	9.0	-	-	-	-	-	-	
CVS-17	17	4.10	10.2	0.70	7.0	2.89	20.2	-	-	-	-	-	-	
CVS-18	18	3.06	12.8	0.70	6.4	2.14	13.6	-	-	-	-	-	-	
CVS-19	19	1.61	6.0	0.81	8.4	1.31	11.0	-	-	-	-	-	-	
CVS-20	20	1.80	10.8	0.70	6.8	1.26	8.6	-	-	-	-	-	-	
CVS-21	21	3.88	16.1	0.70	5.7	2.71	15.5	-	-	-	-	-	-	
BEL-1 (Inlet 2-1)	B1	3.73	12.8	0.62	6.3	2.31	14.7	14.7	8.3	6.4	63.6	3.3%	36	Bypass flow goes to BEL-3.
BEL-2 (Inlet 1-1)	B2	1.38	7.6	0.83	7.8	1.15	8.9	8.9	6.5	2.4	69.5	0.9%	36	Bypass flow goes to BEL-4.
BEL-3 (Inlet 2-2)	B3	6.76	14.4	0.56	6.0	3.76	22.6	29.0	29.0	0.0	95.6	3.2%	36	Takes bypass from BEL-1.
BEL-4 (Inlet 1-2)	B4	1.75	7.9	0.84	7.7	1.46	11.2	13.6	13.6	0.0	110.8	2.9%	36	Takes bypass from BEL-2.
BEL-5	B5	4.55	11.0	0.83	6.8	3.76	25.5	-	-	-	-	-	-	
BEL-6	B6	3.95	7.4	0.80	7.9	3.17	24.9	-	-	-	-	-	-	

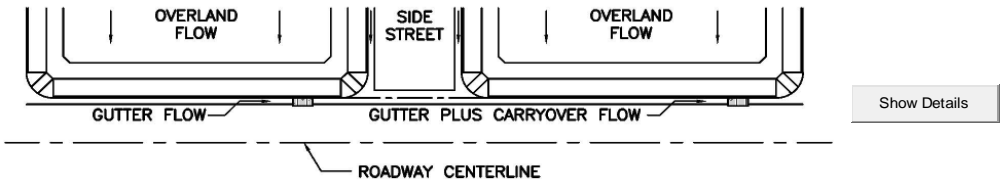
APPENDIX C

Hydraulic Analysis

- Inlet Capacity Calculations
- StormCAD Storm Sewer Design
 - 2-Year Storm Table and Profiles
 - 5-Year Storm Table and Profiles
 - 100-Year Storm Table and Profiles
- Swale Calculations
- Water Quality Structure Cut Sheets & Calculations

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

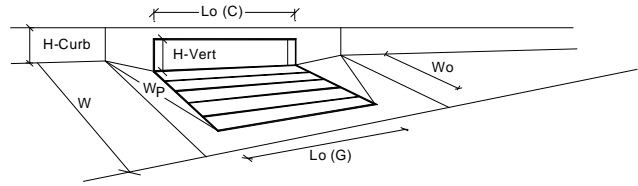
Project: COMPARK SOUTH
 Inlet ID: INLET 3-4



Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Minor Storm</td> <td style="padding: 2px;">Major Storm</td> </tr> <tr> <td style="text-align: center;">2.9</td> <td style="text-align: center;">8.6</td> </tr> </table> cfs	Minor Storm	Major Storm	2.9	8.6	<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---												
Minor Storm	Major Storm																		
2.9	8.6																		
* If you enter values in Row 14, skip the rest of this sheet and proceed to sheet Q-Allow or Area Inlet.																			
Geographic Information: (Enter data in the blue cells):																			
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D																	
		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Slope (ft/ft)</td> <td style="padding: 2px;">Length (ft)</td> </tr> <tr> <td style="padding: 2px;">Overland Flow =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Channel Flow =</td> <td style="padding: 2px;"></td> </tr> </table>	Slope (ft/ft)	Length (ft)	Overland Flow =		Channel Flow =												
Slope (ft/ft)	Length (ft)																		
Overland Flow =																			
Channel Flow =																			
Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Minor Storm</td> <td style="padding: 2px;">Major Storm</td> </tr> <tr> <td style="padding: 2px;">Design Storm Return Period, T_r =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Return Period One-Hour Precipitation, P_1 =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">C_1 =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">C_2 =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">C_3 =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =</td> <td style="padding: 2px;"></td> </tr> </table>	Minor Storm	Major Storm	Design Storm Return Period, T_r =		Return Period One-Hour Precipitation, P_1 =		C_1 =		C_2 =		C_3 =		User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =		User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =		
Minor Storm	Major Storm																		
Design Storm Return Period, T_r =																			
Return Period One-Hour Precipitation, P_1 =																			
C_1 =																			
C_2 =																			
C_3 =																			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =																			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =																			
		Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="padding: 2px;">0.0</td><td style="padding: 2px;">2.4</td></tr></table> cfs	0.0	2.4															
0.0	2.4																		
		Total Design Peak Flow, Q = <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="padding: 2px;">2.9</td><td style="padding: 2px;">11.0</td></tr></table> cfs	2.9	11.0															
2.9	11.0																		

INLET IN A SUMP OR SAG LOCATION

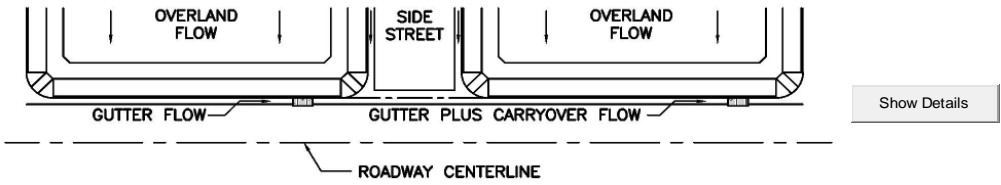
Project = **COMPARK SOUTH**
 Inlet ID = **INLET 3-4**



Design Information (Input)	MINOR		MAJOR	
	Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	$a_{local} =$	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	$N_o =$	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	12.0	inches
Grate Information	<input checked="" type="checkbox"/> Override Depths			
Length of a Unit Grate	$L_o (G) =$	N/A	N/A	feet
Width of a Unit Grate	$W_o =$	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	$A_{ratio} =$	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_r (G) =$	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	$C_w (G) =$	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_o (G) =$	N/A	N/A	
Curb Opening Information	<input checked="" type="checkbox"/> Override Depths			
Length of a Unit Curb Opening	$L_o (C) =$	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	$H_{vert} =$	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	$H_{throat} =$	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	$W_p =$	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	$C_r (C) =$	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w (C) =$	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_o (C) =$	0.67	0.67	
Total Inlet Interception Capacity (assumes clogged condition)				
Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)	$Q_a =$	8.7	25.5	cfs
	$Q_{PEAK REQUIRED} =$	2.9	11.0	cfs

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

Project: COMPARK SOUTH
 Inlet ID: INLET 4-4



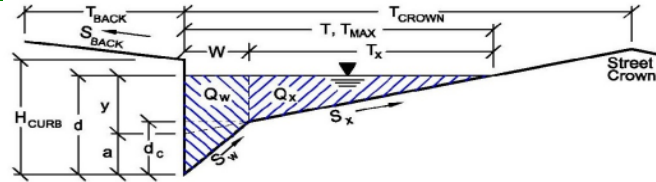
<p>Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):</p>		<table border="1" style="display: inline-table;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> </tr> <tr> <td style="text-align: center;">0.9</td> <td style="text-align: center;">2.4</td> </tr> </table> cfs	Minor Storm	Major Storm	0.9	2.4	<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---
Minor Storm	Major Storm						
0.9	2.4						
<p>* If you enter values in Row 14, skip the rest of this sheet and proceed to sheet Q-Allow or Area Inlet.</p>							
<p>Geographic Information: (Enter data in the blue cells):</p>							
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D					
		Slope (ft/ft) Length (ft)					
		Overland Flow = <input type="text"/>					
		Channel Flow = <input type="text"/>					
<p>Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + I_c)^{C_3}$</p>							
		Design Storm Return Period, T_r = <input type="text"/> years					
		Return Period One-Hour Precipitation, P_1 = <input type="text"/> inches					
		C_1 = <input type="text"/>					
		C_2 = <input type="text"/>					
		C_3 = <input type="text"/>					
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/>							
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 = <input type="text"/>							
		Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <input type="text"/> 0.0 <input type="text"/> 0.0 cfs					
		Total Design Peak Flow, Q = <input type="text"/> 0.9 <input type="text"/> 2.4 cfs					

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

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

Project: **COMPARK SOUTH**

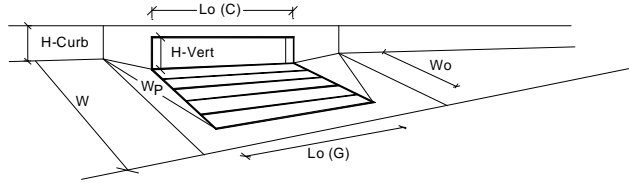
Inlet ID: **INLET 4-4**



Gutter Geometry (Enter data in the blue cells)	
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 0.0$ ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.020$
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft
Gutter Width	$W = 2.00$ ft
Street Transverse Slope	$S_x = 0.020$ ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	$S_0 = 0.000$ ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.012$
Max. Allowable Spread for Minor & Major Storm	$T_{MAX} = \begin{matrix} \text{Minor Storm} & \text{Major Storm} \\ 17.0 & 17.0 \end{matrix}$ ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	$d_{MAX} = \begin{matrix} \text{Minor Storm} & \text{Major Storm} \\ 6.0 & 12.0 \end{matrix}$ inches
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes
MINOR STORM Allowable Capacity is based on Depth Criterion	
MAJOR STORM Allowable Capacity is based on Depth Criterion	
Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	$Q_{allow} = \begin{matrix} \text{Minor Storm} & \text{Major Storm} \\ \text{SUMP} & \text{SUMP} \end{matrix}$ cfs
Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	

INLET IN A SUMP OR SAG LOCATION

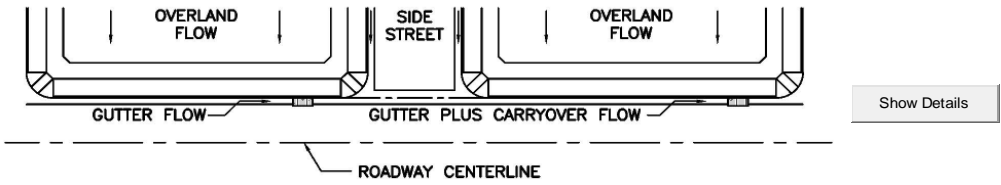
Project = **COMPARK SOUTH**
 Inlet ID = **INLET 4-4**



Design Information (Input)	MINOR		MAJOR	
	Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} = 3.00	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	N_o = 1	1	1	
Water Depth at Flowline (outside of local depression)	Ponding Depth = 3.4	5.6	inches	<input type="checkbox"/> Override Depths
Grate Information	MINOR		MAJOR	
Length of a Unit Grate	$L_o (G)$ = N/A	N/A	N/A	feet
Width of a Unit Grate	W_o = N/A	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} = N/A	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_r (G)$ = N/A	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	$C_w (G)$ = N/A	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_o (G)$ = N/A	N/A	N/A	
Curb Opening Information	MINOR		MAJOR	
Length of a Unit Curb Opening	$L_o (C)$ = 5.00	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H_{vert} = 6.00	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H_{throat} = 6.00	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	θ = 63.40	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p = 2.00	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	$C_r (C)$ = 0.10	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w (C)$ = 3.60	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_o (C)$ = 0.67	0.67	0.67	
Total Inlet Interception Capacity (assumes clogged condition)	MINOR		MAJOR	
	Q_a = 1.1	4.6	cfs	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)	$Q_{PEAK REQUIRED}$ = 0.9	2.4	cfs	

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

Project: COMPARK SOUTH
 Inlet ID: INLET 5-4



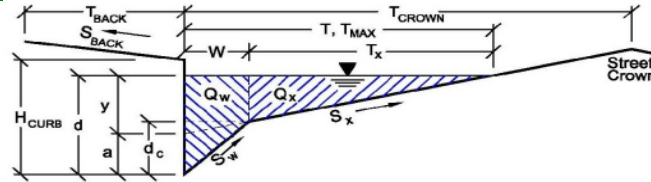
Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):		*Q _{known} = <input type="text" value="4.1"/> <input type="text" value="13.0"/> cfs	<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---
Geographic Information: (Enter data in the blue cells):		Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D	
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Slope (ft/ft) Length (ft) Overland Flow = <input type="text"/> <input type="text"/> Channel Flow = <input type="text"/> <input type="text"/>	
Rainfall Information: Intensity I (inch/hr) = C ₁ * P ₁ / (C ₂ + I _c) ^{C₃}		Design Storm Return Period, T _r = <input type="text"/> <input type="text"/> years Return Period One-Hour Precipitation, P ₁ = <input type="text"/> <input type="text"/> inches C ₁ = <input type="text"/> <input type="text"/> C ₂ = <input type="text"/> <input type="text"/> C ₃ = <input type="text"/> <input type="text"/> User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/> <input type="text"/> User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C ₅ = <input type="text"/> <input type="text"/>	Minor Storm Major Storm Bypass (Carry-Over) Flow from upstream Subcatchments, Q _b = <input type="text" value="0.0"/> <input type="text" value="0.0"/> cfs Total Design Peak Flow, Q = <input type="text" value="4.1"/> <input type="text" value="13.0"/> cfs

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

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

Project:
Inlet ID:

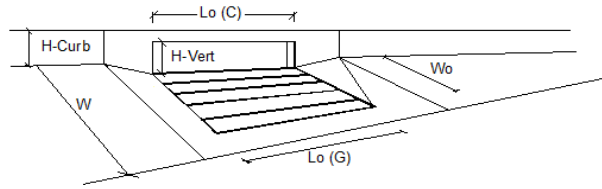
COMPARK SOUTH
INLET 5-4



Gutter Geometry (Enter data in the blue cells)									
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="0.0"/> ft								
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/>								
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches								
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft								
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft								
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft								
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.015"/> ft/ft								
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.013"/>								
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">$T_{MAX} =$</td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td style="text-align: right;">ft</td> </tr> <tr> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: right;"></td> </tr> </table>	$T_{MAX} = $	Minor Storm	Major Storm	ft	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	
$T_{MAX} = $	Minor Storm	Major Storm	ft						
<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>							
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">$d_{MAX} =$</td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td style="text-align: right;">inches</td> </tr> <tr> <td style="text-align: center;"><input style="width: 50px;" type="text" value="6.0"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="6.0"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="12.0"/></td> <td style="text-align: right;"></td> </tr> </table>	$d_{MAX} = $	Minor Storm	Major Storm	inches	<input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="12.0"/>	
$d_{MAX} = $	Minor Storm	Major Storm	inches						
<input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="12.0"/>							
Allow Flow Depth at Street Crown (leave blank for no)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: right;">check = yes</td> </tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes					
<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes							
MINOR STORM Allowable Capacity is based on Spread Criterion									
MAJOR STORM Allowable Capacity is based on Depth Criterion									
Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	$Q_{allow} = $ <input style="width: 50px;" type="text" value="16.4"/> cfs								
Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	<input style="width: 50px;" type="text" value="137.5"/> cfs								

INLET ON A CONTINUOUS GRADE

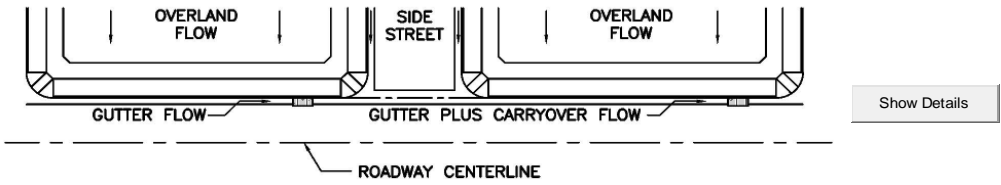
Project: COMPARK SOUTH
 Inlet ID: INLET 5-4



Design Information (Input)	MINOR		MAJOR		
	Type = CDOT Type R Curb Opening				
Type of Inlet	CDOT Type R Curb Opening				
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	$a_{LOCAL} =$	3.0	3.0		inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o =$	3	3		
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o =$	5.00	5.00		ft
Width of a Unit Grate (cannot be greater than W from Q-Allow)	$W_o =$	N/A	N/A		ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_r-G =$	N/A	N/A		
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_r-C =$	0.10	0.10		
Street Hydraulics: OK - $Q <$ maximum allowable from sheet 'Q-Allow'					
Total Inlet Interception Capacity	$Q =$	4.10	10.59		cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b =$	0.0	2.4		cfs
Capture Percentage = $Q_i/Q_o =$	$C\% =$	100	81		%

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

Project: COMPARK SOUTH
 Inlet ID: INLET 6-4



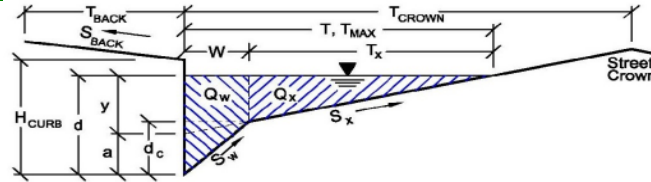
<p>Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):</p> <p>*Q_{known} = <input type="text" value="1.1"/> <input type="text" value="3.5"/> cfs</p> <p>* If you enter values in Row 14, skip the rest of this sheet and proceed to sheet Q-Allow or Area Inlet.</p>		<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---
<p>Geographic Information: (Enter data in the blue cells):</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 30%;"> <p>Site Type:</p> <p><input type="radio"/> Site is Urban</p> <p><input type="radio"/> Site is Non-Urban</p> </div> <div style="width: 30%;"> <p>Flows Developed For:</p> <p><input type="radio"/> Street Inlets</p> <p><input type="radio"/> Area Inlets in a Median</p> </div> <div style="width: 30%;"> <p>Subcatchment Area = <input type="text"/> Acres</p> <p>Percent Imperviousness = <input type="text"/> %</p> <p>NRCS Soil Type = <input type="text"/> A, B, C, or D</p> </div> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 45%;"> <p>Slope (ft/ft) Length (ft)</p> <p>Overland Flow = <input type="text"/> <input type="text"/></p> <p>Channel Flow = <input type="text"/> <input type="text"/></p> </div> </div>		
<p>Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + I_c)^{C_3}$</p> <p>Design Storm Return Period, T_r = <input type="text"/> years</p> <p>Return Period One-Hour Precipitation, P₁ = <input type="text"/> inches</p> <p>C₁ = <input type="text"/></p> <p>C₂ = <input type="text"/></p> <p>C₃ = <input type="text"/></p> <p>User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/></p> <p>User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C₅ = <input type="text"/></p> <p>Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <input type="text" value="0.0"/> <input type="text" value="0.0"/> cfs</p> <p>Total Design Peak Flow, Q = <input type="text" value="1.1"/> <input type="text" value="3.5"/> cfs</p>		

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

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

Project:
Inlet ID:

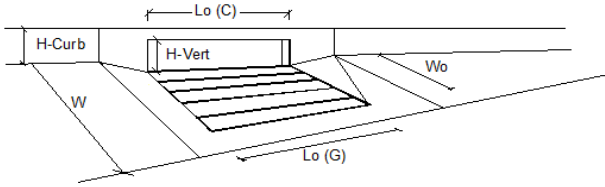
COMPARK SOUTH
INLET 6-4



Gutter Geometry (Enter data in the blue cells)	
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 0.0$ ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.020$
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft
Gutter Width	$W = 2.00$ ft
Street Transverse Slope	$S_x = 0.020$ ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.006$ ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.013$
Max. Allowable Spread for Minor & Major Storm	$T_{MAX} = 17.0$ ft (Minor Storm) / 17.0 ft (Major Storm)
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	$d_{MAX} = 6.0$ inches (Minor Storm) / 12.0 inches (Major Storm)
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> Minor Storm / <input checked="" type="checkbox"/> Major Storm check = yes
MINOR STORM Allowable Capacity is based on Spread Criterion	
MAJOR STORM Allowable Capacity is based on Depth Criterion	
Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	$Q_{allow} = 10.4$ cfs (Minor Storm) / 86.9 cfs (Major Storm)
Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	

INLET ON A CONTINUOUS GRADE

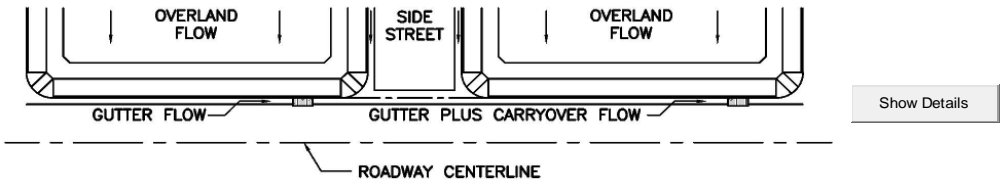
Project: COMPARK SOUTH
 Inlet ID: INLET 6-4



Design Information (Input)	MINOR		MAJOR		
	MINOR	MAJOR	MINOR	MAJOR	
Type of Inlet	Type = CDOT Type R Curb Opening				
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	$a_{LOCAL} = 3.0$	3.0			inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o = 2$	2			
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o = 5.00$	5.00			ft
Width of a Unit Grate (cannot be greater than W from Q-Allow)	$W_o = N/A$	N/A			ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_r-G = N/A$	N/A			
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_r-C = 0.10$	0.10			
Street Hydraulics: OK - $Q < Q_{max}$ allowable from sheet 'Q-Allow'					
Total Inlet Interception Capacity	$Q = 1.10$	3.47			cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b = 0.0$	0.0			cfs
Capture Percentage = $Q_i/Q_o =$	$C\% = 100$	99			%

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

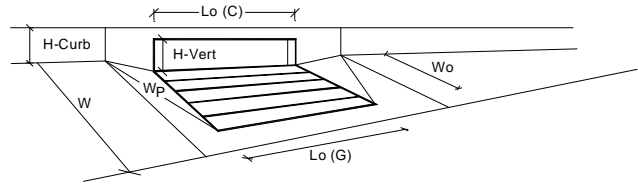
Project: COMPARK SOUTH
 Inlet ID: INLET 3-5



Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):		* Q_{known} = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">Minor Storm</td> <td style="width: 50px; text-align: center;">Major Storm</td> </tr> <tr> <td style="text-align: center;">4.9</td> <td style="text-align: center;">13.6</td> </tr> </table> cfs	Minor Storm	Major Storm	4.9	13.6	<--- FILL IN THIS SECTION OR...									
Minor Storm	Major Storm															
4.9	13.6															
Geographic Information: (Enter data in the blue cells):		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Subcatchment Area =</td> <td style="width: 20%;"><input style="width: 100%;" type="text"/></td> <td style="width: 10%;">Acres</td> <td style="width: 30%;"></td> </tr> <tr> <td>Percent Imperviousness =</td> <td><input style="width: 100%;" type="text"/></td> <td>%</td> <td></td> </tr> <tr> <td>NRCS Soil Type =</td> <td><input style="width: 100%;" type="text"/></td> <td>A, B, C, or D</td> <td></td> </tr> </table>		Subcatchment Area =	<input style="width: 100%;" type="text"/>	Acres		Percent Imperviousness =	<input style="width: 100%;" type="text"/>	%		NRCS Soil Type =	<input style="width: 100%;" type="text"/>	A, B, C, or D		FILL IN THE SECTIONS BELOW. <---
Subcatchment Area =	<input style="width: 100%;" type="text"/>	Acres														
Percent Imperviousness =	<input style="width: 100%;" type="text"/>	%														
NRCS Soil Type =	<input style="width: 100%;" type="text"/>	A, B, C, or D														
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Slope (ft/ft) Length (ft) Overland Flow = <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="width: 50px;"><input style="width: 100%;" type="text"/></td><td style="width: 50px;"><input style="width: 100%;" type="text"/></td></tr></table> Channel Flow = <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="width: 50px;"><input style="width: 100%;" type="text"/></td><td style="width: 50px;"><input style="width: 100%;" type="text"/></td></tr></table>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>										
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>															
<input style="width: 100%;" type="text"/>	<input style="width: 100%;" type="text"/>															
Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">Minor Storm</td> <td style="width: 50px; text-align: center;">Major Storm</td> </tr> </table>	Minor Storm	Major Storm												
Minor Storm	Major Storm															
Design Storm Return Period, T_r = <input style="width: 100%;" type="text"/> years																
Return Period One-Hour Precipitation, P_1 = <input style="width: 100%;" type="text"/> inches																
C_1 = <input style="width: 100%;" type="text"/>																
C_2 = <input style="width: 100%;" type="text"/>																
C_3 = <input style="width: 100%;" type="text"/>																
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input style="width: 100%;" type="text"/>																
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 = <input style="width: 100%;" type="text"/>																
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0.0</td> <td style="width: 50px; text-align: center;">0.0</td> </tr> </table> cfs		0.0	0.0													
0.0	0.0															
Total Design Peak Flow, Q = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">4.9</td> <td style="width: 50px; text-align: center;">13.6</td> </tr> </table> cfs		4.9	13.6													
4.9	13.6															

INLET IN A SUMP OR SAG LOCATION

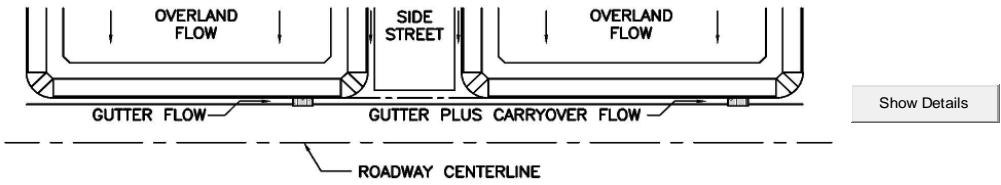
Project = **COMPARK SOUTH**
 Inlet ID = **INLET 3-5**



Design Information (Input)	MINOR		MAJOR	
	Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a _{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	No =	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	12.0	inches
Grate Information	<input checked="" type="checkbox"/> Override Depths			
Length of a Unit Grate	L _o (G) =	N/A	N/A	feet
Width of a Unit Grate	W _o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A _{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	C _r (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	C _w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	C _o (G) =	N/A	N/A	
Curb Opening Information				
Length of a Unit Curb Opening	L _o (C) =	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	H _{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	H _{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	W _p =	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	C _r (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	C _w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	C _o (C) =	0.67	0.67	
Total Inlet Interception Capacity (assumes clogged condition)				
Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)	Q _a =	8.7	25.5	cfs
	Q _{PEAK REQUIRED} =	4.9	13.6	cfs

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

Project: COMPARK SOUTH
 Inlet ID: INLET 4-5

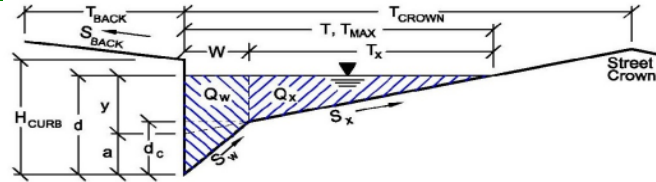


Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Minor Storm</td> <td style="padding: 2px;">Major Storm</td> </tr> <tr> <td align="center" style="padding: 2px;">9.6</td> <td align="center" style="padding: 2px;">26.6</td> </tr> <tr> <td align="center" colspan="2" style="padding: 2px;">cfs</td> </tr> </table>	Minor Storm	Major Storm	9.6	26.6	cfs		<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---																														
Minor Storm	Major Storm																																						
9.6	26.6																																						
cfs																																							
* If you enter values in Row 14, skip the rest of this sheet and proceed to sheet Q-Allow or Area Inlet.																																							
Geographic Information: (Enter data in the blue cells):																																							
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D																																					
		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Slope (ft/ft)</td> <td style="padding: 2px;">Length (ft)</td> </tr> <tr> <td style="padding: 2px;">Overland Flow = <input type="text"/></td> <td style="padding: 2px;"><input type="text"/></td> </tr> <tr> <td style="padding: 2px;">Channel Flow = <input type="text"/></td> <td style="padding: 2px;"><input type="text"/></td> </tr> </table>	Slope (ft/ft)	Length (ft)	Overland Flow = <input type="text"/>	<input type="text"/>	Channel Flow = <input type="text"/>	<input type="text"/>																															
Slope (ft/ft)	Length (ft)																																						
Overland Flow = <input type="text"/>	<input type="text"/>																																						
Channel Flow = <input type="text"/>	<input type="text"/>																																						
Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$																																							
		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Design Storm Return Period, T_r = <input type="text"/></td> <td style="padding: 2px;">Minor Storm</td> <td style="padding: 2px;">Major Storm</td> <td style="padding: 2px;">years</td> </tr> <tr> <td style="padding: 2px;">Return Period One-Hour Precipitation, P_1 = <input type="text"/></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;">inches</td> </tr> <tr> <td style="padding: 2px;">C_1 = <input type="text"/></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">C_2 = <input type="text"/></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">C_3 = <input type="text"/></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 = <input type="text"/></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <input type="text"/></td> <td align="center" style="padding: 2px;">0.0</td> <td align="center" style="padding: 2px;">10.6</td> <td style="padding: 2px;">cfs</td> </tr> <tr> <td style="padding: 2px;">Total Design Peak Flow, Q = <input type="text"/></td> <td align="center" style="padding: 2px;">9.6</td> <td align="center" style="padding: 2px;">37.2</td> <td style="padding: 2px;">cfs</td> </tr> </table>	Design Storm Return Period, T_r = <input type="text"/>	Minor Storm	Major Storm	years	Return Period One-Hour Precipitation, P_1 = <input type="text"/>			inches	C_1 = <input type="text"/>				C_2 = <input type="text"/>				C_3 = <input type="text"/>				User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/>				User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 = <input type="text"/>				Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <input type="text"/>	0.0	10.6	cfs	Total Design Peak Flow, Q = <input type="text"/>	9.6	37.2	cfs	
Design Storm Return Period, T_r = <input type="text"/>	Minor Storm	Major Storm	years																																				
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Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <input type="text"/>	0.0	10.6	cfs																																				
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ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

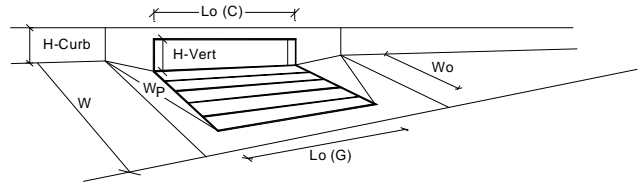
Project: COMPARK SOUTH
 Inlet ID: INLET 4-5



Gutter Geometry (Enter data in the blue cells)									
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="0.0"/> ft								
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/>								
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches								
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft								
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft								
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft								
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft								
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.000"/> ft/ft								
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.013"/>								
Max. Allowable Spread for Minor & Major Storm	<table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td></td> </tr> <tr> <td>$T_{MAX} =$</td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: right;">ft</td> </tr> </table>		Minor Storm	Major Storm		$T_{MAX} = $	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	ft
	Minor Storm	Major Storm							
$T_{MAX} = $	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	ft						
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td></td> </tr> <tr> <td>$d_{MAX} =$</td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="6.0"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="12.0"/></td> <td style="text-align: right;">inches</td> </tr> </table>		Minor Storm	Major Storm		$d_{MAX} = $	<input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="12.0"/>	inches
	Minor Storm	Major Storm							
$d_{MAX} = $	<input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="12.0"/>	inches						
Allow Flow Depth at Street Crown (leave blank for no)	<table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><input type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: right;">check = yes</td> </tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes					
<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes							
MINOR STORM Allowable Capacity is based on Depth Criterion									
MAJOR STORM Allowable Capacity is based on Depth Criterion									
Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'									
Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'									
$Q_{allow} = $	<table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td style="text-align: center;">Minor Storm</td> <td style="text-align: center;">Major Storm</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="SUMP"/></td> <td style="text-align: center;"><input style="width: 50px;" type="text" value="SUMP"/></td> <td style="text-align: right;">cfs</td> </tr> </table>		Minor Storm	Major Storm			<input style="width: 50px;" type="text" value="SUMP"/>	<input style="width: 50px;" type="text" value="SUMP"/>	cfs
	Minor Storm	Major Storm							
	<input style="width: 50px;" type="text" value="SUMP"/>	<input style="width: 50px;" type="text" value="SUMP"/>	cfs						

INLET IN A SUMP OR SAG LOCATION

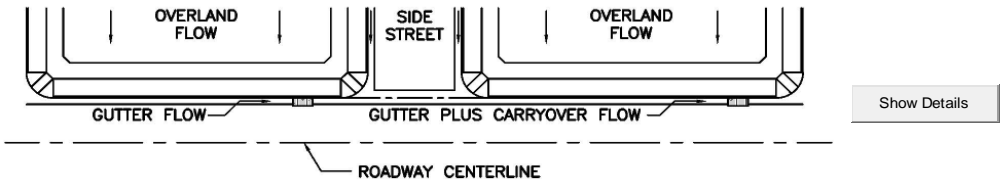
Project = **COMPARK SOUTH**
 Inlet ID = **INLET 4-5**



Design Information (Input)	MINOR		MAJOR	
	Type of Inlet	Inlet Type = CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} = 3.00	3.00	inches	
Number of Unit Inlets (Grate or Curb Opening)	No = 3	3		
Water Depth at Flowline (outside of local depression)	Ponding Depth = 5.6	12.0	inches	
Grate Information	MINOR		MAJOR	
Length of a Unit Grate	$L_o (G)$ = N/A	N/A	feet	
Width of a Unit Grate	W_o = N/A	N/A	feet	
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} = N/A	N/A		
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_r (G)$ = N/A	N/A		
Grate Weir Coefficient (typical value 2.15 - 3.60)	$C_w (G)$ = N/A	N/A		
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_o (G)$ = N/A	N/A		
Curb Opening Information	MINOR		MAJOR	
Length of a Unit Curb Opening	$L_o (C)$ = 5.00	5.00	feet	
Height of Vertical Curb Opening in Inches	H_{vert} = 6.00	6.00	inches	
Height of Curb Orifice Throat in Inches	H_{throat} = 6.00	6.00	inches	
Angle of Throat (see USDCM Figure ST-5)	Theta = 63.40	63.40	degrees	
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p = 2.00	2.00	feet	
Clogging Factor for a Single Curb Opening (typical value 0.10)	$C_r (C)$ = 0.10	0.10		
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w (C)$ = 3.60	3.60		
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_o (C)$ = 0.67	0.67		
Total Inlet Interception Capacity (assumes clogged condition)	MINOR		MAJOR	
	Q_a = 11.2	39.1	cfs	
Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)	$Q_{PEAK REQUIRED}$ = 9.6	37.2	cfs	

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

Project: COMPARK SOUTH
 Inlet ID: INLET 5-5

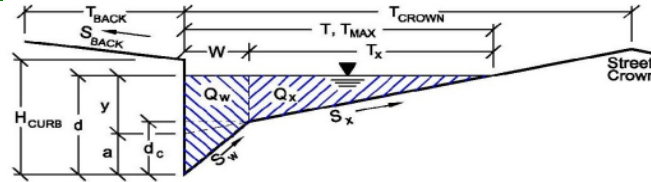


<p>Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):</p> <p>*Q_{known} = <table border="1" style="display: inline-table;"><tr><td style="width: 50px;">Minor Storm</td><td style="width: 50px;">Major Storm</td></tr><tr><td style="text-align: center;">5.5</td><td style="text-align: center;">15.2</td></tr></table> cfs</p> <p>* If you enter values in Row 14, skip the rest of this sheet and proceed to sheet Q-Allow or Area Inlet.</p>		Minor Storm	Major Storm	5.5	15.2	<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---																						
Minor Storm	Major Storm																											
5.5	15.2																											
<p>Geographic Information: (Enter data in the blue cells):</p> <table style="width: 100%;"> <tr> <td style="width: 30%;"> Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban </td> <td style="width: 30%;"> Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median </td> <td style="width: 40%;"> Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D <table style="width: 100%;"> <tr> <td style="width: 50%;">Slope (ft/ft)</td> <td style="width: 50%;">Length (ft)</td> </tr> <tr> <td>Overland Flow = <input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>Channel Flow = <input type="text"/></td> <td><input type="text"/></td> </tr> </table> </td> </tr> </table>		Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D <table style="width: 100%;"> <tr> <td style="width: 50%;">Slope (ft/ft)</td> <td style="width: 50%;">Length (ft)</td> </tr> <tr> <td>Overland Flow = <input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>Channel Flow = <input type="text"/></td> <td><input type="text"/></td> </tr> </table>	Slope (ft/ft)	Length (ft)	Overland Flow = <input type="text"/>	<input type="text"/>	Channel Flow = <input type="text"/>	<input type="text"/>																		
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D <table style="width: 100%;"> <tr> <td style="width: 50%;">Slope (ft/ft)</td> <td style="width: 50%;">Length (ft)</td> </tr> <tr> <td>Overland Flow = <input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>Channel Flow = <input type="text"/></td> <td><input type="text"/></td> </tr> </table>	Slope (ft/ft)	Length (ft)	Overland Flow = <input type="text"/>	<input type="text"/>	Channel Flow = <input type="text"/>	<input type="text"/>																				
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<p>Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$</p> <table style="width: 100%;"> <tr> <td style="width: 50%;">Design Storm Return Period, T_r = <input type="text"/> years</td> <td style="width: 50%;">Minor Storm</td> <td style="width: 50%;">Major Storm</td> </tr> <tr> <td>Return Period One-Hour Precipitation, P₁ = <input type="text"/> inches</td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>C₁ = <input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>C₂ = <input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>C₃ = <input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C₅ = <input type="text"/></td> <td><input type="text"/></td> <td><input type="text"/></td> </tr> <tr> <td>Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <input type="text"/></td> <td style="text-align: center;">0.0</td> <td style="text-align: center;">6.4</td> </tr> <tr> <td>Total Design Peak Flow, Q = <input type="text"/></td> <td style="text-align: center;">5.5</td> <td style="text-align: center;">21.6</td> </tr> </table>		Design Storm Return Period, T _r = <input type="text"/> years	Minor Storm	Major Storm	Return Period One-Hour Precipitation, P ₁ = <input type="text"/> inches	<input type="text"/>	<input type="text"/>	C ₁ = <input type="text"/>	<input type="text"/>	<input type="text"/>	C ₂ = <input type="text"/>	<input type="text"/>	<input type="text"/>	C ₃ = <input type="text"/>	<input type="text"/>	<input type="text"/>	User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/>	<input type="text"/>	<input type="text"/>	User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C ₅ = <input type="text"/>	<input type="text"/>	<input type="text"/>	Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <input type="text"/>	0.0	6.4	Total Design Peak Flow, Q = <input type="text"/>	5.5	21.6
Design Storm Return Period, T _r = <input type="text"/> years	Minor Storm	Major Storm																										
Return Period One-Hour Precipitation, P ₁ = <input type="text"/> inches	<input type="text"/>	<input type="text"/>																										
C ₁ = <input type="text"/>	<input type="text"/>	<input type="text"/>																										
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Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <input type="text"/>	0.0	6.4																										
Total Design Peak Flow, Q = <input type="text"/>	5.5	21.6																										

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

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

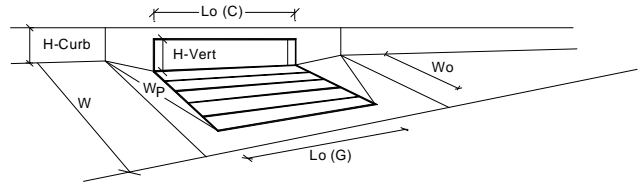
Project: **COMPARK SOUTH**
 Inlet ID: **INLET 5-5**



Gutter Geometry (Enter data in the blue cells)						
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} =$	0.0 ft				
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} =$	0.020 ft/ft				
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} =$	0.020				
Height of Curb at Gutter Flow Line	$H_{CURB} =$	6.00 inches				
Distance from Curb Face to Street Crown	$T_{CROWN} =$	17.0 ft				
Gutter Width	$W =$	2.00 ft				
Street Transverse Slope	$S_x =$	0.020 ft/ft				
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w =$	0.083 ft/ft				
Street Longitudinal Slope - Enter 0 for sump condition	$S_o =$	0.000 ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} =$	0.013				
Max. Allowable Spread for Minor & Major Storm	$T_{MAX} =$	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> </tr> <tr> <td>17.0</td> <td>17.0</td> </tr> </table> ft	Minor Storm	Major Storm	17.0	17.0
Minor Storm	Major Storm					
17.0	17.0					
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	$d_{MAX} =$	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> </tr> <tr> <td>6.0</td> <td>12.0</td> </tr> </table> inches	Minor Storm	Major Storm	6.0	12.0
Minor Storm	Major Storm					
6.0	12.0					
Allow Flow Depth at Street Crown (leave blank for no)		<table border="1"> <tr> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td>check = yes</td> </tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes				
MINOR STORM Allowable Capacity is based on Depth Criterion						
MAJOR STORM Allowable Capacity is based on Depth Criterion						
	$Q_{allow} =$	<table border="1"> <tr> <th>Minor Storm</th> <th>Major Storm</th> </tr> <tr> <td>SUMP</td> <td>SUMP</td> </tr> </table> cfs	Minor Storm	Major Storm	SUMP	SUMP
Minor Storm	Major Storm					
SUMP	SUMP					
Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak' Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'						

INLET IN A SUMP OR SAG LOCATION

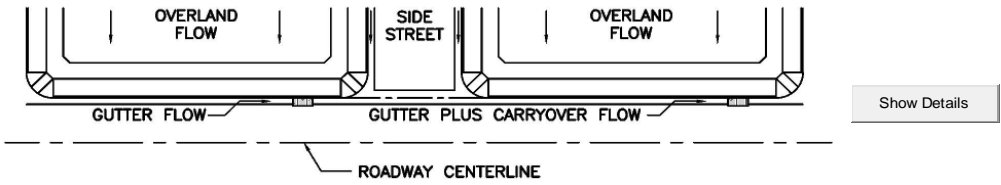
Project = **COMPARK SOUTH**
 Inlet ID = **INLET 5-5**



Design Information (Input)	MINOR		MAJOR	
	Type of Inlet	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	$a_{local} =$	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)	$N_o =$	2	2	
Water Depth at Flowline (outside of local depression)	Ponding Depth =	5.6	12.0	inches
Grate Information	<input checked="" type="checkbox"/> Override Depths			
Length of a Unit Grate	$L_o (G) =$	N/A	N/A	feet
Width of a Unit Grate	$W_o =$	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)	$A_{ratio} =$	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_r (G) =$	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)	$C_w (G) =$	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_o (G) =$	N/A	N/A	
Curb Opening Information				
Length of a Unit Curb Opening	$L_o (C) =$	5.00	5.00	feet
Height of Vertical Curb Opening in Inches	$H_{vert} =$	6.00	6.00	inches
Height of Curb Orifice Throat in Inches	$H_{throat} =$	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)	Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)	$W_p =$	2.00	2.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)	$C_r (C) =$	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w (C) =$	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_o (C) =$	0.67	0.67	
Total Inlet Interception Capacity (assumes clogged condition)				
Inlet Capacity IS GOOD for Minor and Major Storms (>Q PEAK)	$Q_a =$	8.7	25.5	cfs
	$Q_{PEAK REQUIRED} =$	5.5	21.6	cfs

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

Project: COMPARK SOUTH
 Inlet ID: INLET 4-5A



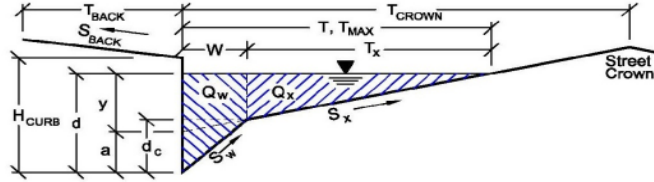
Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Minor Storm</td> <td style="padding: 2px;">Major Storm</td> </tr> <tr> <td style="text-align: center;">4.3</td> <td style="text-align: center;">11.9</td> </tr> </table> cfs	Minor Storm	Major Storm	4.3	11.9	<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---												
Minor Storm	Major Storm																		
4.3	11.9																		
* If you enter values in Row 14, skip the rest of this sheet and proceed to sheet Q-Allow or Area Inlet.																			
Geographic Information: (Enter data in the blue cells):																			
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D																	
		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Slope (ft/ft)</td> <td style="padding: 2px;">Length (ft)</td> </tr> <tr> <td style="padding: 2px;">Overland Flow =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Channel Flow =</td> <td style="padding: 2px;"></td> </tr> </table>	Slope (ft/ft)	Length (ft)	Overland Flow =		Channel Flow =												
Slope (ft/ft)	Length (ft)																		
Overland Flow =																			
Channel Flow =																			
Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + I_c)^{C_3}$		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Minor Storm</td> <td style="padding: 2px;">Major Storm</td> </tr> <tr> <td style="padding: 2px;">Design Storm Return Period, T_r =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">Return Period One-Hour Precipitation, P_1 =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">C_1 =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">C_2 =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">C_3 =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =</td> <td style="padding: 2px;"></td> </tr> </table>	Minor Storm	Major Storm	Design Storm Return Period, T_r =		Return Period One-Hour Precipitation, P_1 =		C_1 =		C_2 =		C_3 =		User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =		User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =		
Minor Storm	Major Storm																		
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User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C =																			
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 =																			
		Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="padding: 2px;">0.0</td><td style="padding: 2px;">0.0</td></tr></table> cfs	0.0	0.0															
0.0	0.0																		
		Total Design Peak Flow, Q = <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="padding: 2px;">4.3</td><td style="padding: 2px;">11.9</td></tr></table> cfs	4.3	11.9															
4.3	11.9																		

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

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

Project: **COMPARK SOUTH**

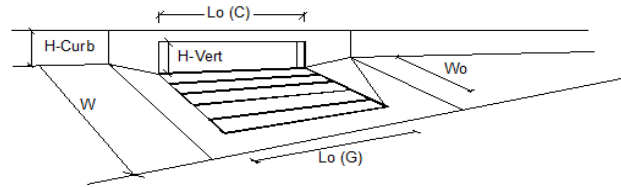
Inlet ID: **INLET 4-5A**



Gutter Geometry (Enter data in the blue cells)	
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = 0.0$ ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = 0.020$ ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = 0.020$
Height of Curb at Gutter Flow Line	$H_{CURB} = 6.00$ inches
Distance from Curb Face to Street Crown	$T_{CROWN} = 17.0$ ft
Gutter Width	$W = 2.00$ ft
Street Transverse Slope	$S_x = 0.020$ ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = 0.083$ ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = 0.015$ ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = 0.013$
Max. Allowable Spread for Minor & Major Storm	$T_{MAX} = \begin{matrix} \text{Minor Storm} & \text{Major Storm} \\ 17.0 & 17.0 \end{matrix}$ ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	$d_{MAX} = \begin{matrix} \text{Minor Storm} & \text{Major Storm} \\ 6.0 & 12.0 \end{matrix}$ inches
Allow Flow Depth at Street Crown (leave blank for no)	<input type="checkbox"/> <input checked="" type="checkbox"/> check = yes
MINOR STORM Allowable Capacity is based on Spread Criterion	
MAJOR STORM Allowable Capacity is based on Depth Criterion	
Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	$Q_{allow} = \begin{matrix} \text{Minor Storm} & \text{Major Storm} \\ 16.4 & 137.5 \end{matrix}$ cfs
Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	

INLET ON A CONTINUOUS GRADE

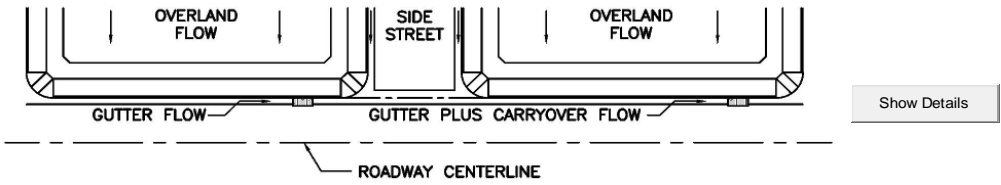
Project: COMPARK SOUTH
 Inlet ID: INLET 4-5A



Design Information (Input)	MINOR		MAJOR	
	Type of Inlet	Type = CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a _{LOCAL} = 3.0	3.0	inches	
Total Number of Units in the Inlet (Grate or Curb Opening)	No = 3	3		
Length of a Single Unit Inlet (Grate or Curb Opening)	L _o = 5.00	5.00	ft	
Width of a Unit Grate (cannot be greater than W from Q-Allow)	W _o = N/A	N/A	ft	
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	C _{r-G} = N/A	N/A		
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	C _{r-C} = 0.10	0.10		
Street Hydraulics: OK - Q < maximum allowable from sheet 'Q-Allow'				
Total Inlet Interception Capacity	Q = 4.30	10.05	cfs	
Total Inlet Carry-Over Flow (flow bypassing inlet)	Q _b = 0.0	1.8	cfs	
Capture Percentage = Q _i /Q _a =	C% = 100	84	%	

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

Project: COMPARK SOUTH
 Inlet ID: INLET 5-5A

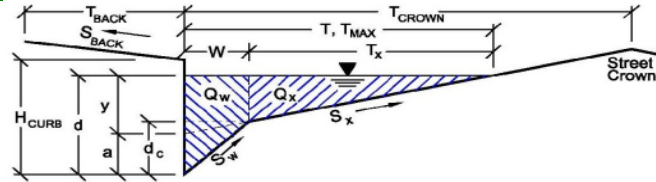


Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):		* Q_{known} = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">Minor Storm</td> <td style="width: 50px; text-align: center;">Major Storm</td> </tr> <tr> <td style="text-align: center;">5.6</td> <td style="text-align: center;">16.2</td> </tr> </table> cfs	Minor Storm	Major Storm	5.6	16.2	<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---
Minor Storm	Major Storm						
5.6	16.2						
Geographic Information: (Enter data in the blue cells):		Subcatchment Area = <input style="width: 50px;" type="text"/> Acres Percent Imperviousness = <input style="width: 50px;" type="text"/> % NRCS Soil Type = <input style="width: 50px;" type="text"/> A, B, C, or D					
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban	Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median	Slope (ft/ft) Length (ft) Overland Flow = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; height: 20px;"></td> <td style="width: 50px; height: 20px;"></td> </tr> </table> Channel Flow = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; height: 20px;"></td> <td style="width: 50px; height: 20px;"></td> </tr> </table>					
Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + I_c)^{C_3}$		Design Storm Return Period, T_r = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">Minor Storm</td> <td style="width: 50px; text-align: center;">Major Storm</td> </tr> <tr> <td style="text-align: center;"> </td> <td style="text-align: center;"> </td> </tr> </table> years		Minor Storm	Major Storm		
Minor Storm	Major Storm						
Return Period One-Hour Precipitation, P_1 = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; height: 20px;"></td> <td style="width: 50px; height: 20px;"></td> </tr> </table> inches				C_1 = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; height: 20px;"></td> <td style="width: 50px; height: 20px;"></td> </tr> </table>			
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; height: 20px;"></td> <td style="width: 50px; height: 20px;"></td> </tr> </table>				User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; height: 20px;"></td> <td style="width: 50px; height: 20px;"></td> </tr> </table>			
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">0.0</td> <td style="width: 50px; text-align: center;">0.0</td> </tr> </table> cfs		0.0	0.0				
0.0	0.0						
Total Design Peak Flow, Q = <table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="width: 50px; text-align: center;">5.6</td> <td style="width: 50px; text-align: center;">16.2</td> </tr> </table> cfs		5.6	16.2				
5.6	16.2						

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

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

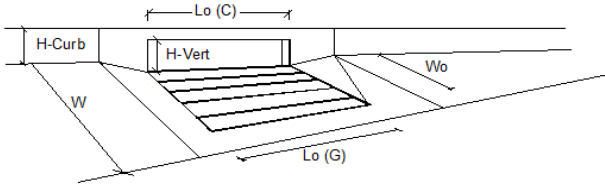
Project: COMPARK SOUTH
 Inlet ID: INLET 5-5A



Gutter Geometry (Enter data in the blue cells)							
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} = $ <input style="width: 50px;" type="text" value="0.0"/> ft						
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} = $ <input style="width: 50px;" type="text" value="0.020"/>						
Height of Curb at Gutter Flow Line	$H_{CURB} = $ <input style="width: 50px;" type="text" value="6.00"/> inches						
Distance from Curb Face to Street Crown	$T_{CROWN} = $ <input style="width: 50px;" type="text" value="17.0"/> ft						
Gutter Width	$W = $ <input style="width: 50px;" type="text" value="2.00"/> ft						
Street Transverse Slope	$S_x = $ <input style="width: 50px;" type="text" value="0.020"/> ft/ft						
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w = $ <input style="width: 50px;" type="text" value="0.083"/> ft/ft						
Street Longitudinal Slope - Enter 0 for sump condition	$S_o = $ <input style="width: 50px;" type="text" value="0.015"/> ft/ft						
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} = $ <input style="width: 50px;" type="text" value="0.013"/>						
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; padding: 0 10px;">Minor Storm</td> <td style="text-align: center; padding: 0 10px;">Major Storm</td> <td style="padding: 0 10px;"></td> </tr> <tr> <td style="border: 1px solid black; text-align: center;">$T_{MAX} =$ <input style="width: 50px;" type="text" value="17.0"/></td> <td style="border: 1px solid black; text-align: center;">$T_{MAX} =$ <input style="width: 50px;" type="text" value="17.0"/></td> <td style="padding: 0 10px;">ft</td> </tr> </table>	Minor Storm	Major Storm		$T_{MAX} = $ <input style="width: 50px;" type="text" value="17.0"/>	$T_{MAX} = $ <input style="width: 50px;" type="text" value="17.0"/>	ft
Minor Storm	Major Storm						
$T_{MAX} = $ <input style="width: 50px;" type="text" value="17.0"/>	$T_{MAX} = $ <input style="width: 50px;" type="text" value="17.0"/>	ft					
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; text-align: center;">$d_{MAX} =$ <input style="width: 50px;" type="text" value="6.0"/></td> <td style="border: 1px solid black; text-align: center;">$d_{MAX} =$ <input style="width: 50px;" type="text" value="12.0"/></td> <td style="padding: 0 10px;">inches</td> </tr> </table>	$d_{MAX} = $ <input style="width: 50px;" type="text" value="6.0"/>	$d_{MAX} = $ <input style="width: 50px;" type="text" value="12.0"/>	inches			
$d_{MAX} = $ <input style="width: 50px;" type="text" value="6.0"/>	$d_{MAX} = $ <input style="width: 50px;" type="text" value="12.0"/>	inches					
Allow Flow Depth at Street Crown (leave blank for no)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; padding: 0 10px;"><input type="checkbox"/></td> <td style="text-align: center; padding: 0 10px;"><input checked="" type="checkbox"/></td> <td style="padding: 0 10px;">check = yes</td> </tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes			
<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes					
MINOR STORM Allowable Capacity is based on Spread Criterion							
MAJOR STORM Allowable Capacity is based on Depth Criterion							
Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'	$Q_{allow} = $ <table style="border: 1px solid black; display: inline-table; vertical-align: middle;"> <tr> <td style="padding: 2px 10px;">16.4</td> <td style="padding: 2px 10px;">137.5</td> </tr> </table> cfs	16.4	137.5				
16.4	137.5						
Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'							

INLET ON A CONTINUOUS GRADE

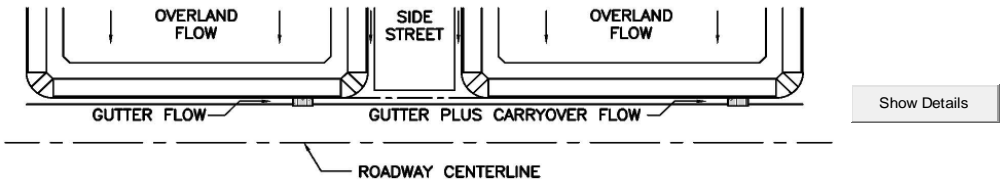
Project: COMPARK SOUTH
 Inlet ID: INLET 5-5A



Design Information (Input)	MINOR		MAJOR	
	Type of Inlet	Type = CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	$a_{LOCAL} =$	3.0	3.0	inches
Total Number of Units in the Inlet (Grate or Curb Opening)	$N_o =$	3	3	
Length of a Single Unit Inlet (Grate or Curb Opening)	$L_o =$	5.00	5.00	ft
Width of a Unit Grate (cannot be greater than W from Q-Allow)	$W_o =$	N/A	N/A	ft
Clogging Factor for a Single Unit Grate (typical min. value = 0.5)	$C_r-G =$	N/A	N/A	
Clogging Factor for a Single Unit Curb Opening (typical min. value = 0.1)	$C_r-C =$	0.10	0.10	
Street Hydraulics: OK - $Q <$ maximum allowable from sheet 'Q-Allow'				
Total Inlet Interception Capacity	$Q =$	5.60	11.98	cfs
Total Inlet Carry-Over Flow (flow bypassing inlet)	$Q_b =$	0.0	4.2	cfs
Capture Percentage = $Q_i/Q_o =$	$C\% =$	100	74	%

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

Project: COMPARK SOUTH
Inlet ID: INLET 6-5



Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):		Minor Storm	Major Storm	
		*Q _{known} =	7.6	23.5
				cfs
* If you enter values in Row 14, skip the rest of this sheet and proceed to sheet Q-Allow or Area Inlet.				
Geographic Information: (Enter data in the blue cells):				
Site Type: <input type="radio"/> Site is Urban <input type="radio"/> Site is Non-Urban		Flows Developed For: <input type="radio"/> Street Inlets <input type="radio"/> Area Inlets in a Median		Subcatchment Area = <input type="text"/> Acres Percent Imperviousness = <input type="text"/> % NRCS Soil Type = <input type="text"/> A, B, C, or D
		Slope (ft/ft)	Length (ft)	
		Overland Flow = <input type="text"/>	<input type="text"/>	
		Channel Flow = <input type="text"/>	<input type="text"/>	
Rainfall Information: Intensity I (inch/hr) = C ₁ * P ₁ / (C ₂ + I _c) ^{C₃}		Minor Storm	Major Storm	
Design Storm Return Period, T _r = <input type="text"/> years				
Return Period One-Hour Precipitation, P ₁ = <input type="text"/> inches				
C ₁ = <input type="text"/>				
C ₂ = <input type="text"/>				
C ₃ = <input type="text"/>				
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/>				
User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C ₅ = <input type="text"/>				
Bypass (Carry-Over) Flow from upstream Subcatchments, Q _b = <input type="text"/>		0.0	0.0	cfs
Total Design Peak Flow, Q = <input type="text"/>		7.6	23.5	cfs

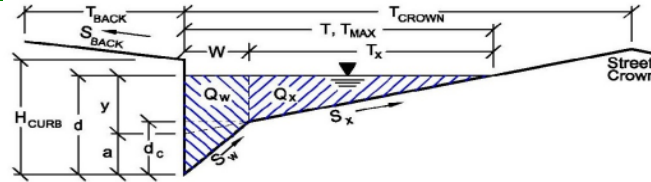
<---
FILL IN THIS SECTION
OR...
FILL IN THE
SECTIONS BELOW.
<---

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

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

Project:
Inlet ID:

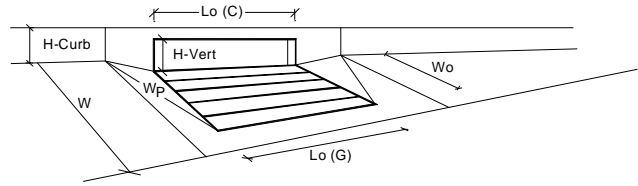
COMPARK SOUTH
INLET 6-5



Gutter Geometry (Enter data in the blue cells)					
Maximum Allowable Width for Spread Behind Curb	$T_{BACK} =$ <input style="width: 50px;" type="text" value="0.0"/> ft				
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	$S_{BACK} =$ <input style="width: 50px;" type="text" value="0.020"/> ft/ft				
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	$n_{BACK} =$ <input style="width: 50px;" type="text" value="0.020"/>				
Height of Curb at Gutter Flow Line	$H_{CURB} =$ <input style="width: 50px;" type="text" value="6.00"/> inches				
Distance from Curb Face to Street Crown	$T_{CROWN} =$ <input style="width: 50px;" type="text" value="17.0"/> ft				
Gutter Width	$W =$ <input style="width: 50px;" type="text" value="2.00"/> ft				
Street Transverse Slope	$S_x =$ <input style="width: 50px;" type="text" value="0.020"/> ft/ft				
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	$S_w =$ <input style="width: 50px;" type="text" value="0.083"/> ft/ft				
Street Longitudinal Slope - Enter 0 for sump condition	$S_o =$ <input style="width: 50px;" type="text" value="0.000"/> ft/ft				
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	$n_{STREET} =$ <input style="width: 50px;" type="text" value="0.013"/>				
Max. Allowable Spread for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border: none;">$T_{MAX} =$</td> <td style="text-align: center; border: none;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: center; border: none;"><input style="width: 50px;" type="text" value="17.0"/></td> <td style="text-align: center; border: none;">ft</td> </tr> </table>	$T_{MAX} =$	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	ft
$T_{MAX} =$	<input style="width: 50px;" type="text" value="17.0"/>	<input style="width: 50px;" type="text" value="17.0"/>	ft		
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border: none;">$d_{MAX} =$</td> <td style="text-align: center; border: none;"><input style="width: 50px;" type="text" value="6.0"/></td> <td style="text-align: center; border: none;"><input style="width: 50px;" type="text" value="12.0"/></td> <td style="text-align: center; border: none;">inches</td> </tr> </table>	$d_{MAX} =$	<input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="12.0"/>	inches
$d_{MAX} =$	<input style="width: 50px;" type="text" value="6.0"/>	<input style="width: 50px;" type="text" value="12.0"/>	inches		
Allow Flow Depth at Street Crown (leave blank for no)	<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border: none;"><input type="checkbox"/></td> <td style="text-align: center; border: none;"><input checked="" type="checkbox"/></td> <td style="text-align: center; border: none;">check = yes</td> </tr> </table>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	check = yes			
MINOR STORM Allowable Capacity is based on Depth Criterion					
MAJOR STORM Allowable Capacity is based on Depth Criterion					
<table style="width: 100%; border: none;"> <tr> <td style="text-align: center; border: none;">$Q_{allow} =$</td> <td style="text-align: center; border: none;"><input style="width: 50px;" type="text" value="SUMP"/></td> <td style="text-align: center; border: none;"><input style="width: 50px;" type="text" value="SUMP"/></td> <td style="text-align: center; border: none;">cfs</td> </tr> </table>		$Q_{allow} =$	<input style="width: 50px;" type="text" value="SUMP"/>	<input style="width: 50px;" type="text" value="SUMP"/>	cfs
$Q_{allow} =$	<input style="width: 50px;" type="text" value="SUMP"/>	<input style="width: 50px;" type="text" value="SUMP"/>	cfs		
Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak' Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'					

INLET IN A SUMP OR SAG LOCATION

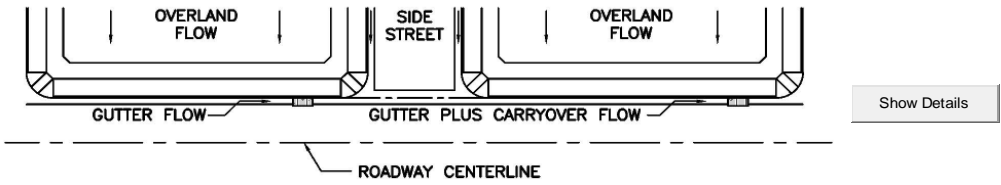
Project = **COMPARK SOUTH**
 Inlet ID = **INLET 6-5**



Design Information (Input)	MINOR		MAJOR	
	Type of Inlet	Inlet Type = CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from 'Q-Allow')	a_{local} = 3.00	3.00	inches	
Number of Unit Inlets (Grate or Curb Opening)	No = 3	3		
Water Depth at Flowline (outside of local depression)	Ponding Depth = 5.6	5.6	inches <input type="checkbox"/> Override Depths	
Grate Information	MINOR		MAJOR	
Length of a Unit Grate	$L_o (G)$ = N/A	N/A	feet	
Width of a Unit Grate	W_o = N/A	N/A	feet	
Area Opening Ratio for a Grate (typical values 0.15-0.90)	A_{ratio} = N/A	N/A		
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)	$C_l (G)$ = N/A	N/A		
Grate Weir Coefficient (typical value 2.15 - 3.60)	$C_w (G)$ = N/A	N/A		
Grate Orifice Coefficient (typical value 0.60 - 0.80)	$C_o (G)$ = N/A	N/A		
Curb Opening Information	MINOR		MAJOR	
Length of a Unit Curb Opening	$L_o (C)$ = 5.00	5.00	feet	
Height of Vertical Curb Opening in Inches	H_{vert} = 6.00	6.00	inches	
Height of Curb Orifice Throat in Inches	H_{throat} = 6.00	6.00	inches	
Angle of Throat (see USDCM Figure ST-5)	Theta = 63.40	63.40	degrees	
Side Width for Depression Pan (typically the gutter width of 2 feet)	W_p = 2.00	2.00	feet	
Clogging Factor for a Single Curb Opening (typical value 0.10)	$C_l (C)$ = 0.10	0.10		
Curb Opening Weir Coefficient (typical value 2.3-3.7)	$C_w (C)$ = 3.60	3.60		
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)	$C_o (C)$ = 0.67	0.67		
Total Inlet Interception Capacity (assumes clogged condition)	MINOR		MAJOR	
	Q_a = 11.1	11.1	cfs	
WARNING: Inlet Capacity less than Q Peak for MAJOR Storm	$Q_{PEAK REQUIRED}$ = 7.6	23.5	cfs	

**DESIGN PEAK FLOW FOR ONE-HALF OF STREET
OR GRASS-LINED CHANNEL BY THE RATIONAL METHOD**

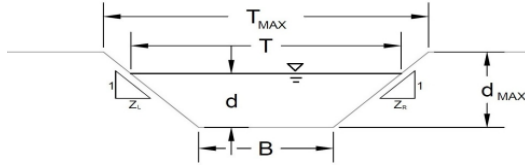
Project: COMPARK SOUTH
 Inlet ID: INLET 7-5



<p>Design Flow: ONLY if already determined through other methods: (local peak flow for 1/2 of street OR grass-lined channel):</p>		<table border="1" style="display: inline-table;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> </tr> <tr> <td style="text-align: center;">0.2</td> <td style="text-align: center;">9.8</td> </tr> <tr> <td colspan="2" style="text-align: right;">cfs</td> </tr> </table>	Minor Storm	Major Storm	0.2	9.8	cfs		<--- FILL IN THIS SECTION OR... FILL IN THE SECTIONS BELOW. <---				
Minor Storm	Major Storm												
0.2	9.8												
cfs													
<p>* If you enter values in Row 14, skip the rest of this sheet and proceed to sheet Q-Allow or Area Inlet.</p>													
<p>Geographic Information: (Enter data in the blue cells):</p>													
<p>Site Type:</p> <p><input type="radio"/> Site is Urban</p> <p><input type="radio"/> Site is Non-Urban</p>	<p>Flows Developed For:</p> <p><input type="radio"/> Street Inlets</p> <p><input type="radio"/> Area Inlets in a Median</p>	<p>Subcatchment Area = <input type="text"/> Acres</p> <p>Percent Imperviousness = <input type="text"/> %</p> <p>NRCS Soil Type = <input type="text"/> A, B, C, or D</p>											
		<table border="1" style="display: inline-table;"> <tr> <td style="width: 50px;">Slope (ft/ft)</td> <td style="width: 50px;">Length (ft)</td> </tr> <tr> <td style="text-align: center;">Overland Flow = <input type="text"/></td> <td style="text-align: center;">Channel Flow = <input type="text"/></td> </tr> </table>	Slope (ft/ft)	Length (ft)	Overland Flow = <input type="text"/>	Channel Flow = <input type="text"/>							
Slope (ft/ft)	Length (ft)												
Overland Flow = <input type="text"/>	Channel Flow = <input type="text"/>												
<p>Rainfall Information: Intensity I (inch/hr) = $C_1 * P_1 / (C_2 + T_c)^{C_3}$</p>													
		<table border="1" style="display: inline-table;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> </tr> <tr> <td style="text-align: center;">Design Storm Return Period, T_r = <input type="text"/> years</td> <td style="text-align: center;">Return Period One-Hour Precipitation, P_1 = <input type="text"/> inches</td> </tr> <tr> <td style="text-align: center;">C_1 = <input type="text"/></td> <td style="text-align: center;">C_2 = <input type="text"/></td> </tr> <tr> <td style="text-align: center;">C_3 = <input type="text"/></td> <td style="text-align: center;">C_4 = <input type="text"/></td> </tr> <tr> <td style="text-align: center;">User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/></td> <td style="text-align: center;">User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 = <input type="text"/></td> </tr> </table>	Minor Storm	Major Storm	Design Storm Return Period, T_r = <input type="text"/> years	Return Period One-Hour Precipitation, P_1 = <input type="text"/> inches	C_1 = <input type="text"/>	C_2 = <input type="text"/>	C_3 = <input type="text"/>	C_4 = <input type="text"/>	User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/>	User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 = <input type="text"/>	
Minor Storm	Major Storm												
Design Storm Return Period, T_r = <input type="text"/> years	Return Period One-Hour Precipitation, P_1 = <input type="text"/> inches												
C_1 = <input type="text"/>	C_2 = <input type="text"/>												
C_3 = <input type="text"/>	C_4 = <input type="text"/>												
User-Defined Storm Runoff Coefficient (leave this blank to accept a calculated value), C = <input type="text"/>	User-Defined 5-yr. Runoff Coefficient (leave this blank to accept a calculated value), C_5 = <input type="text"/>												
		<table border="1" style="display: inline-table;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> </tr> <tr> <td style="text-align: center;">Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = 0.0</td> <td style="text-align: center;">0.0</td> </tr> <tr> <td colspan="2" style="text-align: right;">cfs</td> </tr> </table>	Minor Storm	Major Storm	Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = 0.0	0.0	cfs						
Minor Storm	Major Storm												
Bypass (Carry-Over) Flow from upstream Subcatchments, Q_b = 0.0	0.0												
cfs													
		<table border="1" style="display: inline-table;"> <tr> <td style="width: 50px;">Minor Storm</td> <td style="width: 50px;">Major Storm</td> </tr> <tr> <td style="text-align: center;">Total Design Peak Flow, Q = 0.2</td> <td style="text-align: center;">9.8</td> </tr> <tr> <td colspan="2" style="text-align: right;">cfs</td> </tr> </table>	Minor Storm	Major Storm	Total Design Peak Flow, Q = 0.2	9.8	cfs						
Minor Storm	Major Storm												
Total Design Peak Flow, Q = 0.2	9.8												
cfs													

AREA INLET IN A TRAPEZOIDAL GRASS-LINED CHANNEL

COMPARK SOUTH
INLET 7-5



Grass Type	Limiting Manning's n
A	0.06
B	0.04
C	0.033
D	0.03
E	0.024

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)
Manning's n (Leave cell D16 blank to manually enter an n value)
Channel Invert Slope
Bottom Width
Left Side Slope
Right Side Slope

Warning 01
Warning 01

Check one of the following soil types:

Soil Type:	Max. Velocity (V _{MAX})	Max Froude No. (F _{MAX})
Sandy	5.0 fps	0.50
Non-Sandy	7.0 fps	0.80

A, B, C, D or E: **C**
n = see details below
S₀ = 0.0100 ft/ft
B = 2.00 ft
Z1 = 0.20 ft/ft
Z2 = 0.20 ft/ft

Choose One:

Sandy

Non-Sandy

Max. Allowable Top Width of Channel for Minor & Major Storm
Max. Allowable Water Depth in Channel for Minor & Major Storm

	Minor Storm	Major Storm	
T _{MAX} =	12.00	12.00	feet
d _{MAX} =	1.00	2.10	feet

Allowable Channel Capacity Based On Channel Geometry

MINOR STORM Allowable Capacity is based on Depth Criterion
MAJOR STORM Allowable Capacity is based on Depth Criterion

	Minor Storm	Major Storm	
Q _{allow} =	1.02	10.51	cfs
d _{allow} =	1.00	2.10	ft

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow
Water Depth

Q _o =	0.20	9.80	cfs
d =	0.54	2.04	feet

Minor storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'
Major storm max. allowable capacity GOOD - greater than flow given on sheet 'Q-Peak'

AREA INLET IN A TRAPEZOIDAL GRASS-LINED CHANNEL

COMPARK SOUTH

INLET 7-5

Inlet Design Information (Input)

Type of Inlet

Inlet Type = CDOT Type C

Angle of Inclined Grate (must be ≤ 30 degrees)

$\theta =$ 0.00 degrees

Width of Grate

$W =$ 3.00 feet

Length of Grate

$L =$ 3.00 feet

Open Area Ratio

$A_{RATIO} =$ 0.70

Height of Inclined Grate

$H_B =$ 0.00 feet

Clogging Factor

$C_1 =$ 0.50

Grate Discharge Coefficient

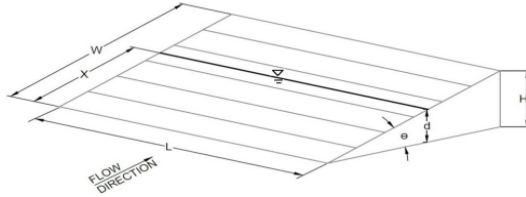
$C_d =$ 0.96

Orifice Coefficient

$C_o =$ 0.64

Weir Coefficient

$C_w =$ 2.05



Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)

	MINOR	MAJOR
$d =$	0.54	2.04

Total Inlet Interception Capacity (assumes clogged condition)

	MINOR	MAJOR	
$Q_a =$	7.23	23.09	cfs

Inlet Capacity IS GOOD for Minor and Major Storms ($> Q_{PEAK}$)

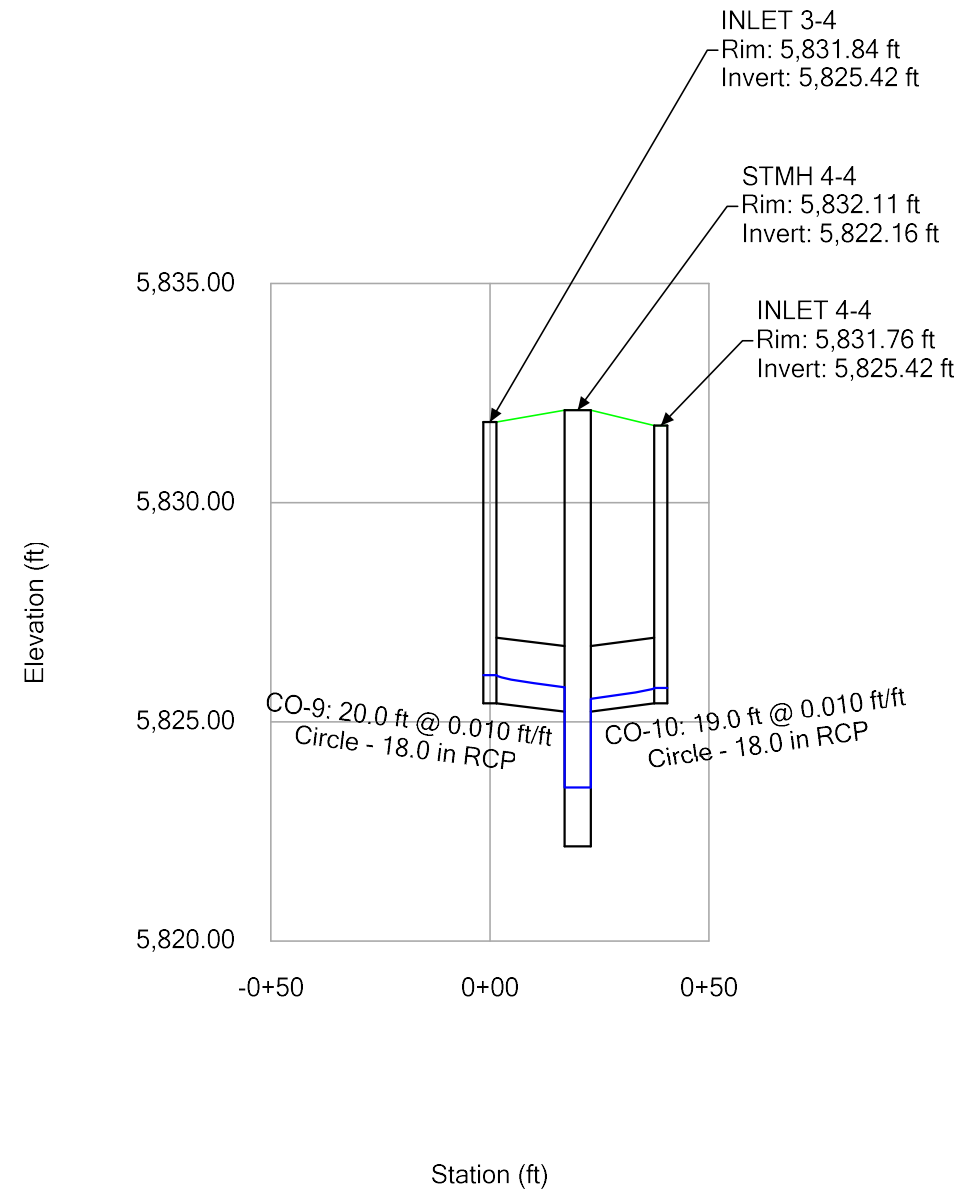
Bypassed Flow, $Q_b =$	0.00	0.00	cfs
------------------------	------	------	-----

Capture Percentage = $Q_a/Q_o = C\%$	100	100	%
--------------------------------------	-----	-----	---

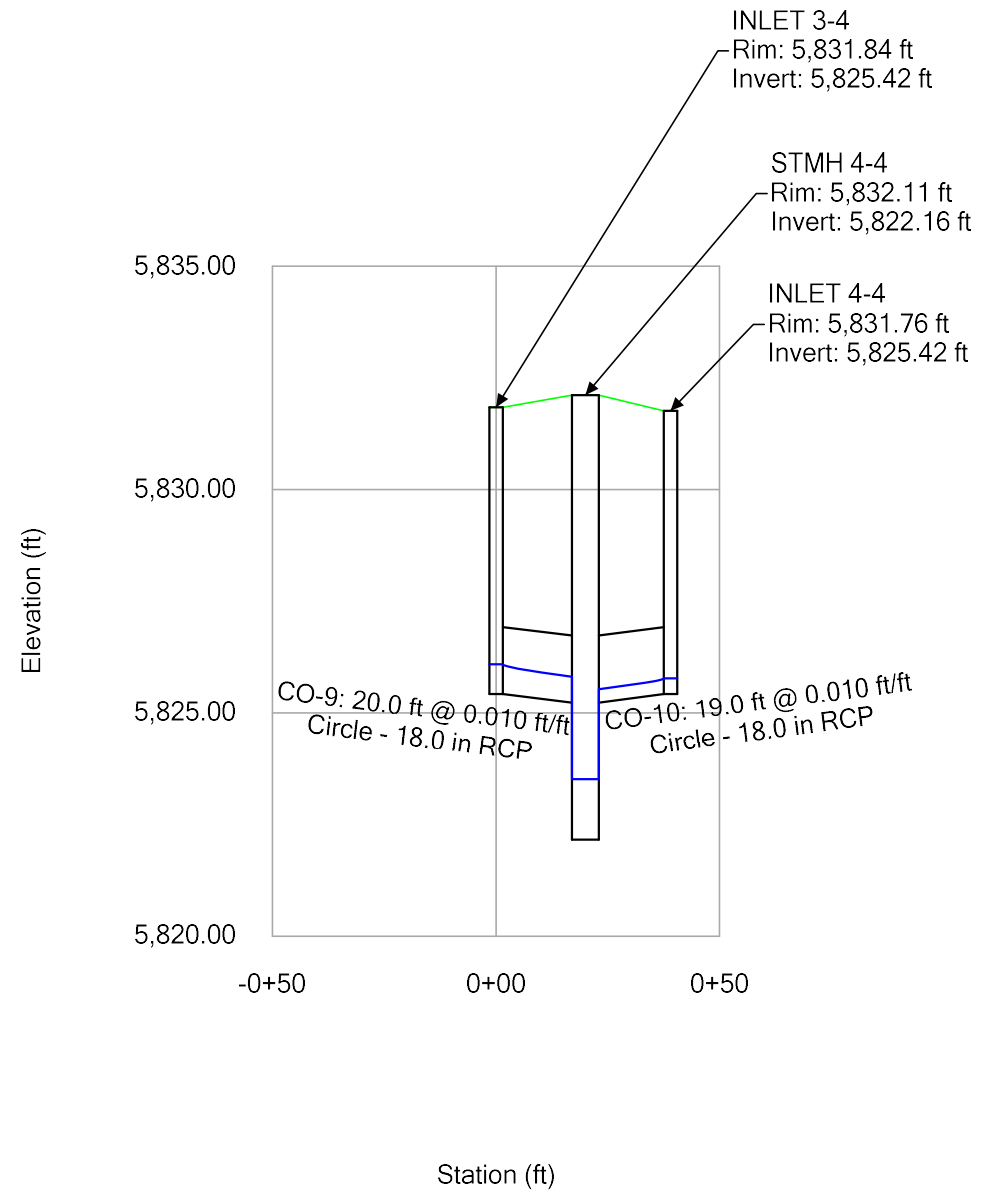
Warning 01: Sideslope steepness exceeds USDCM Volume I recommendation.

Warning 02: Depth (d) exceeds USDCM Volume I recommendation.

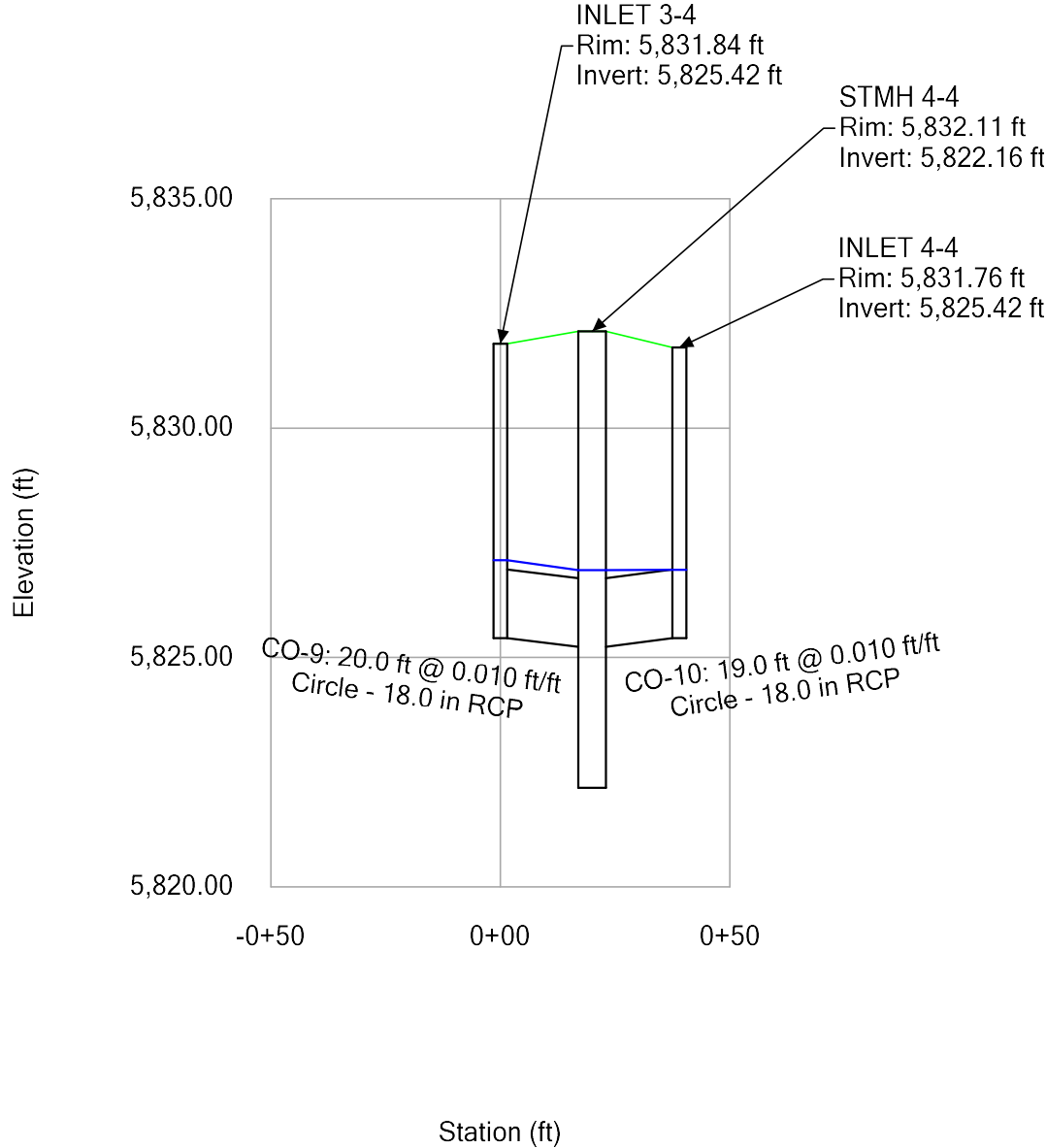
Profile Report
Engineering Profile - Profile - Storm Line 4A (Compark Village South StormCAD [2 year].stsw)



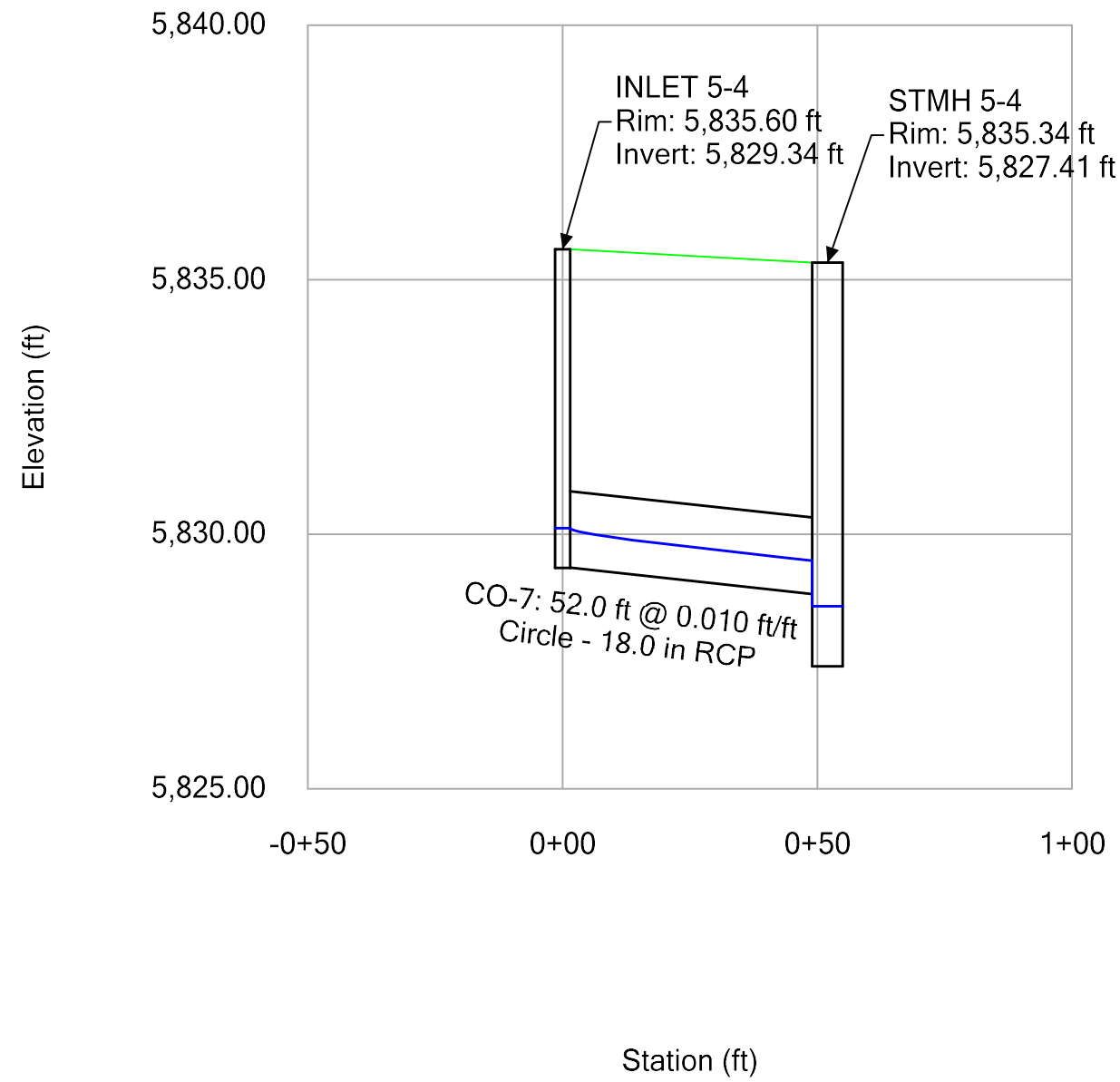
Profile Report
Engineering Profile - Profile - Storm Line 4A (Compark Village South StormCAD [5 year].stsw)



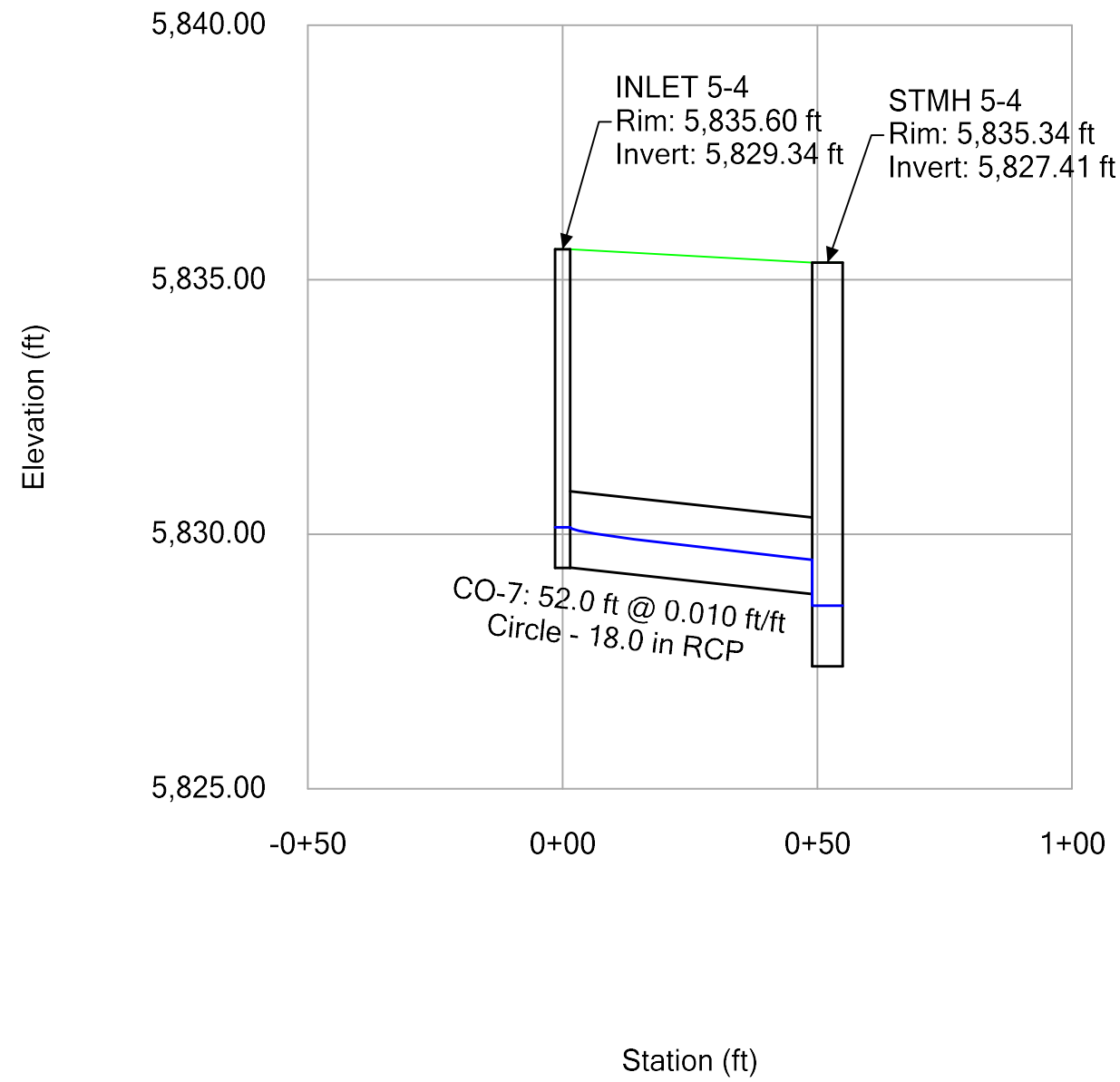
Profile Report
Engineering Profile - Profile - Storm Line 4A (Compark Village South StormCAD [100 year].stsw)



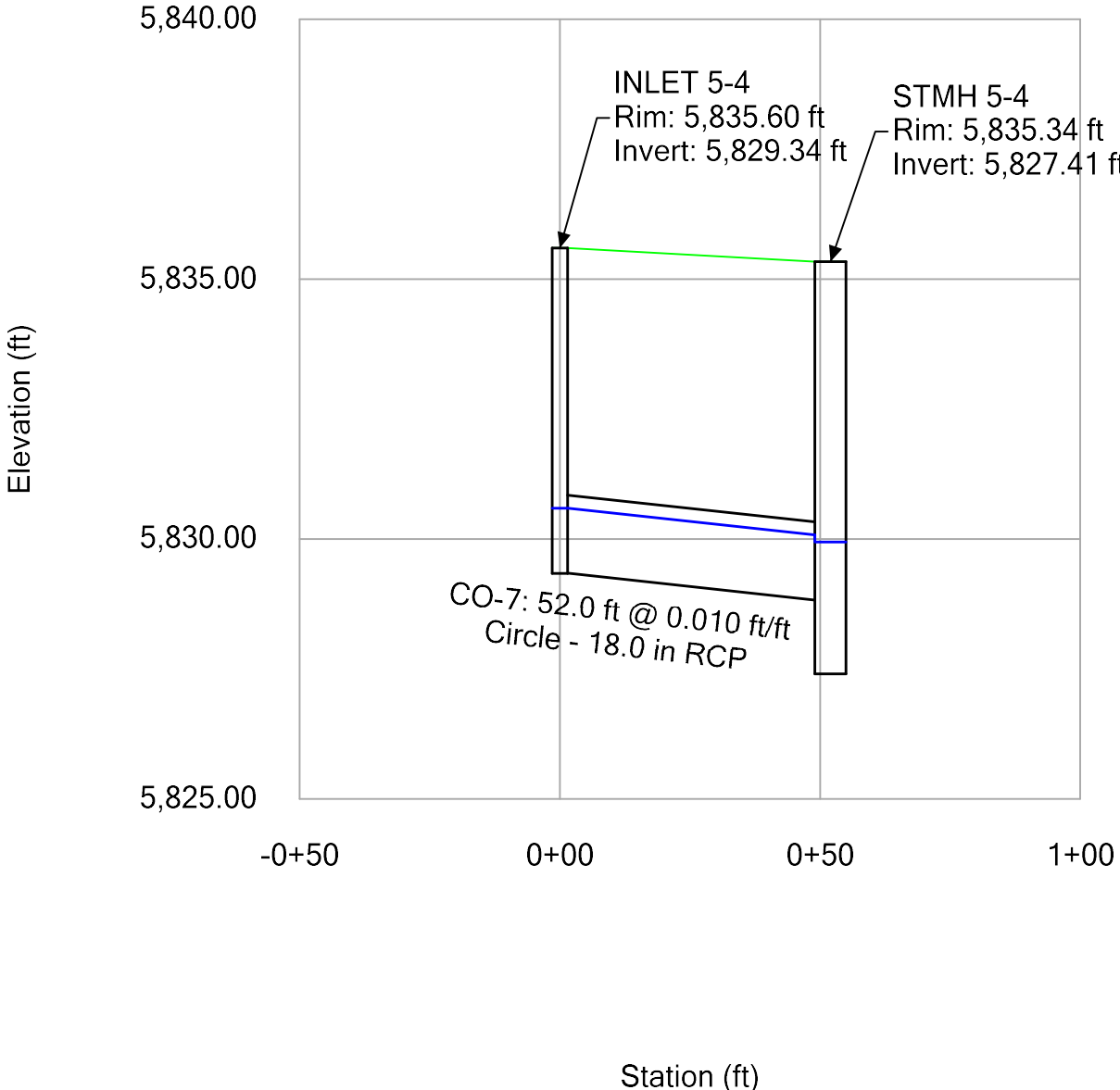
Profile Report
Engineering Profile - Profile - Storm Line 4B (Compark Village South StormCAD [2 year].stsw)



Profile Report
Engineering Profile - Profile - Storm Line 4B (Compark Village South StormCAD [5 year].stsw)

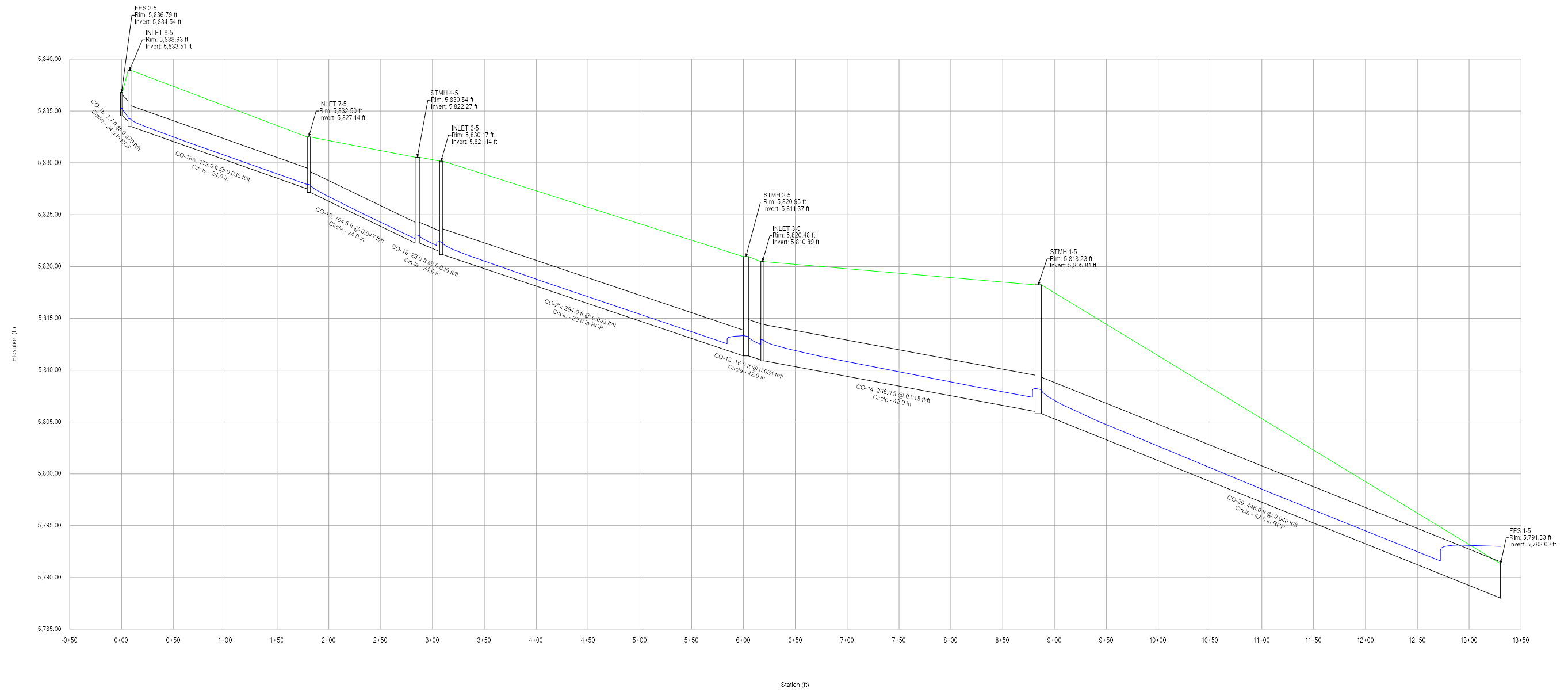


Profile Report
Engineering Profile - Profile - Storm Line 4B (Compark Village South StormCAD [100 year].stsw)



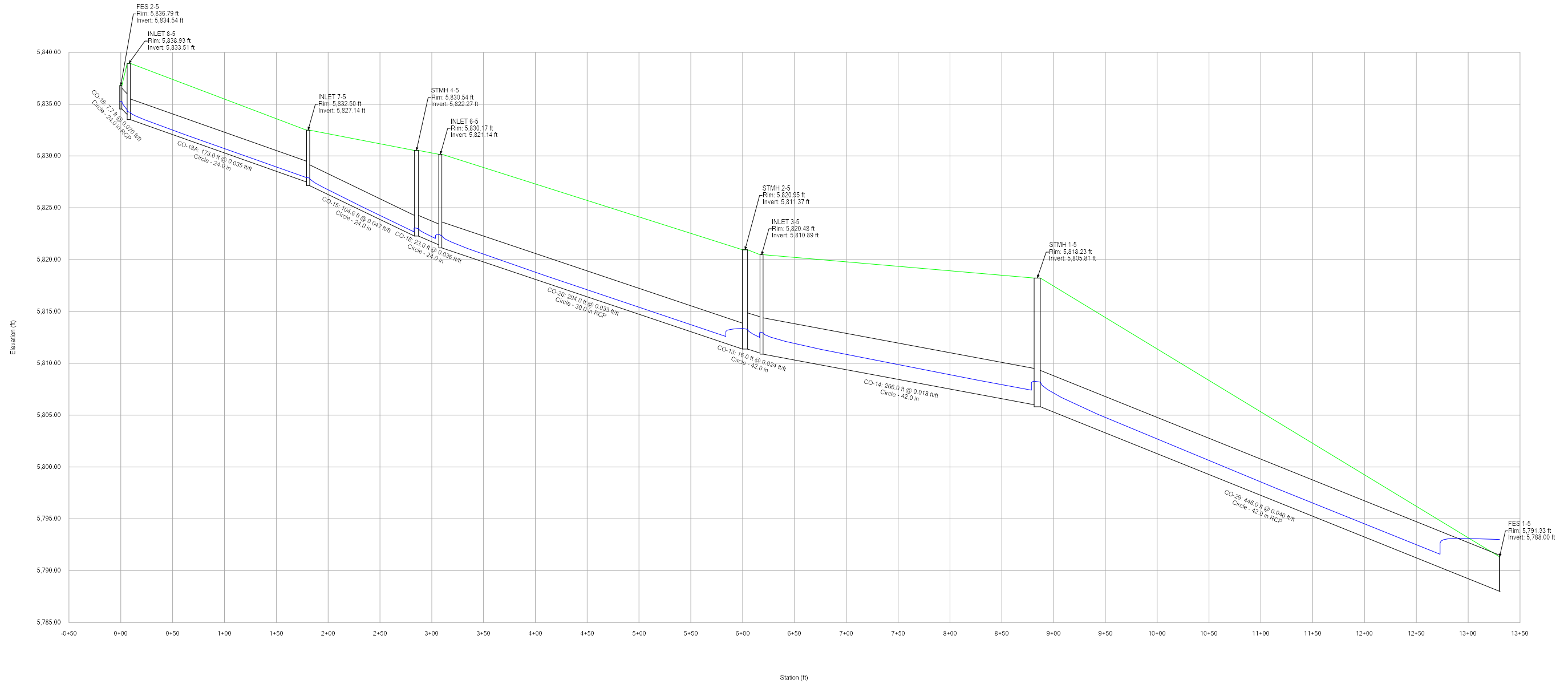
Profile Report

Engineering Profile - Profile - Storm Line 5 (Compark Village South StormCAD [2 year].stsw)



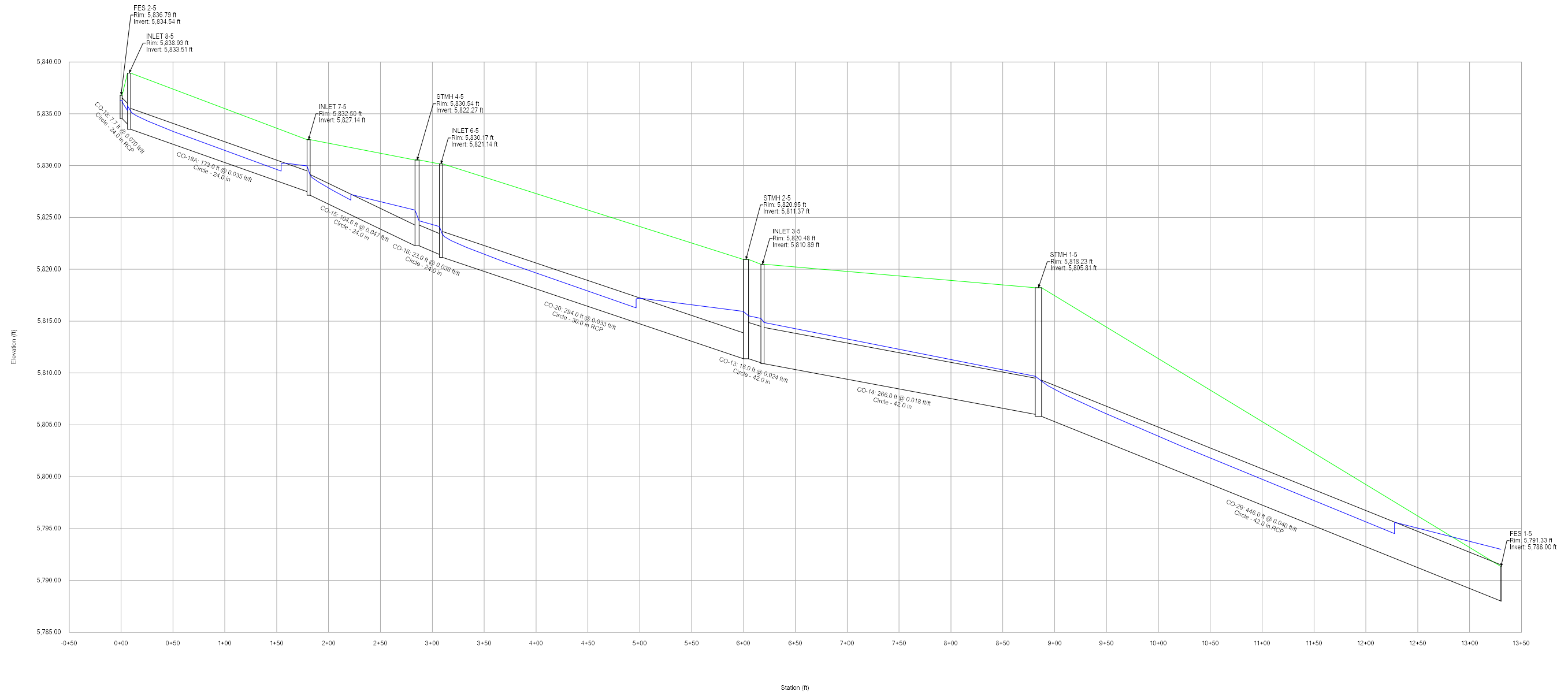
Profile Report

Engineering Profile - Profile - Storm Line 5 (Compark Village South StormCAD [5 year].stsw)

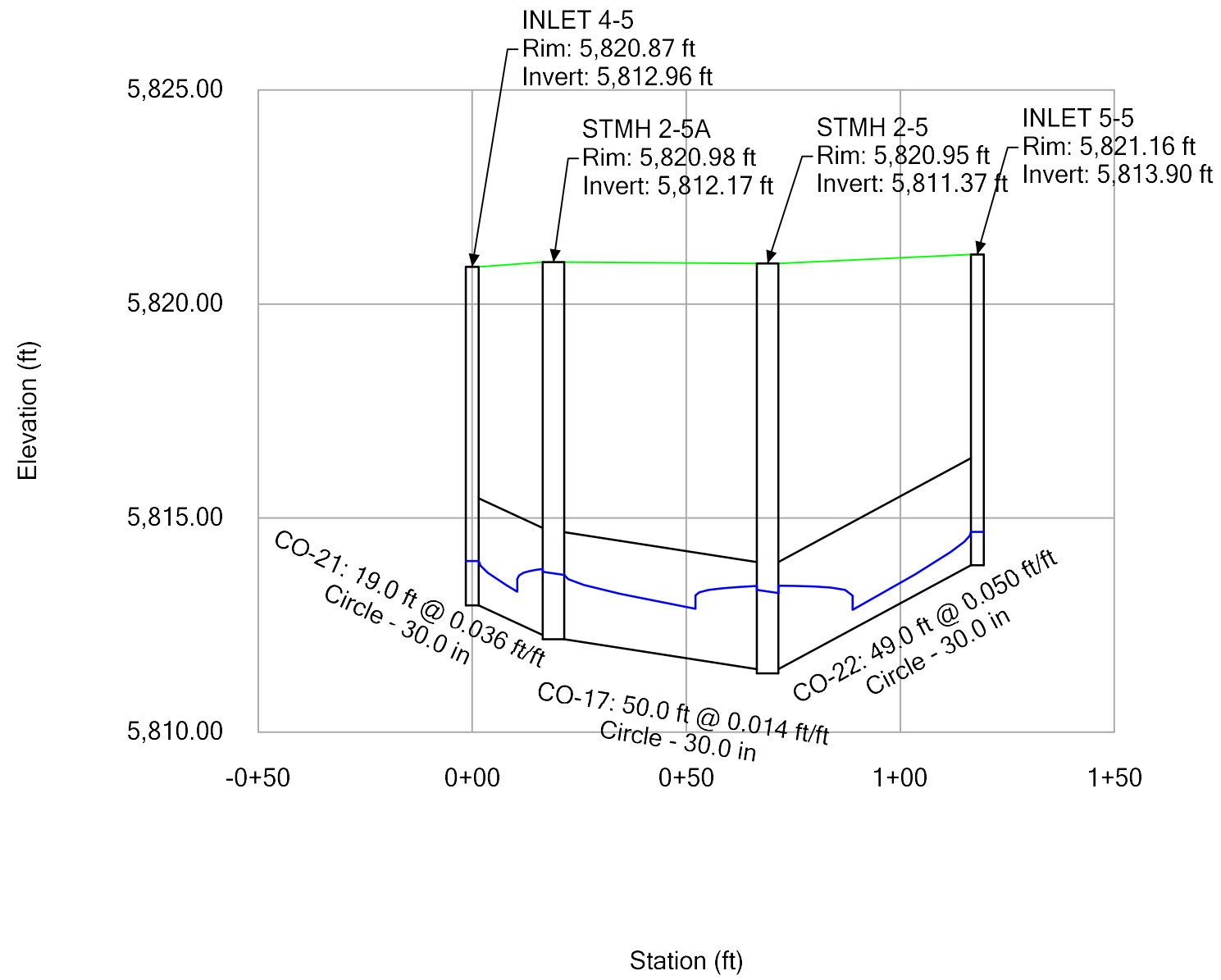


Profile Report

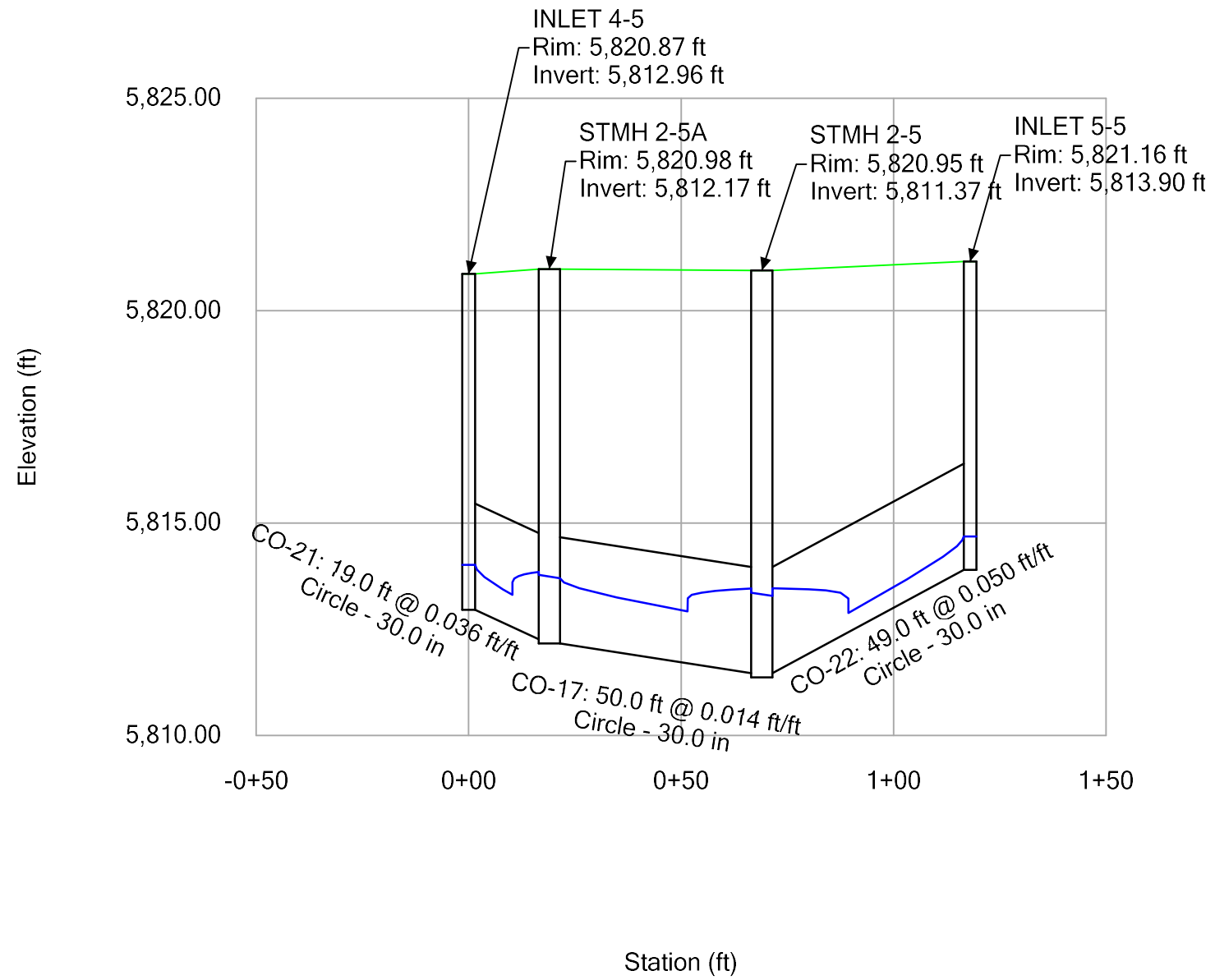
Engineering Profile - Profile - Storm Line 5 (Compark Village South StormCAD [100 year].stsw)



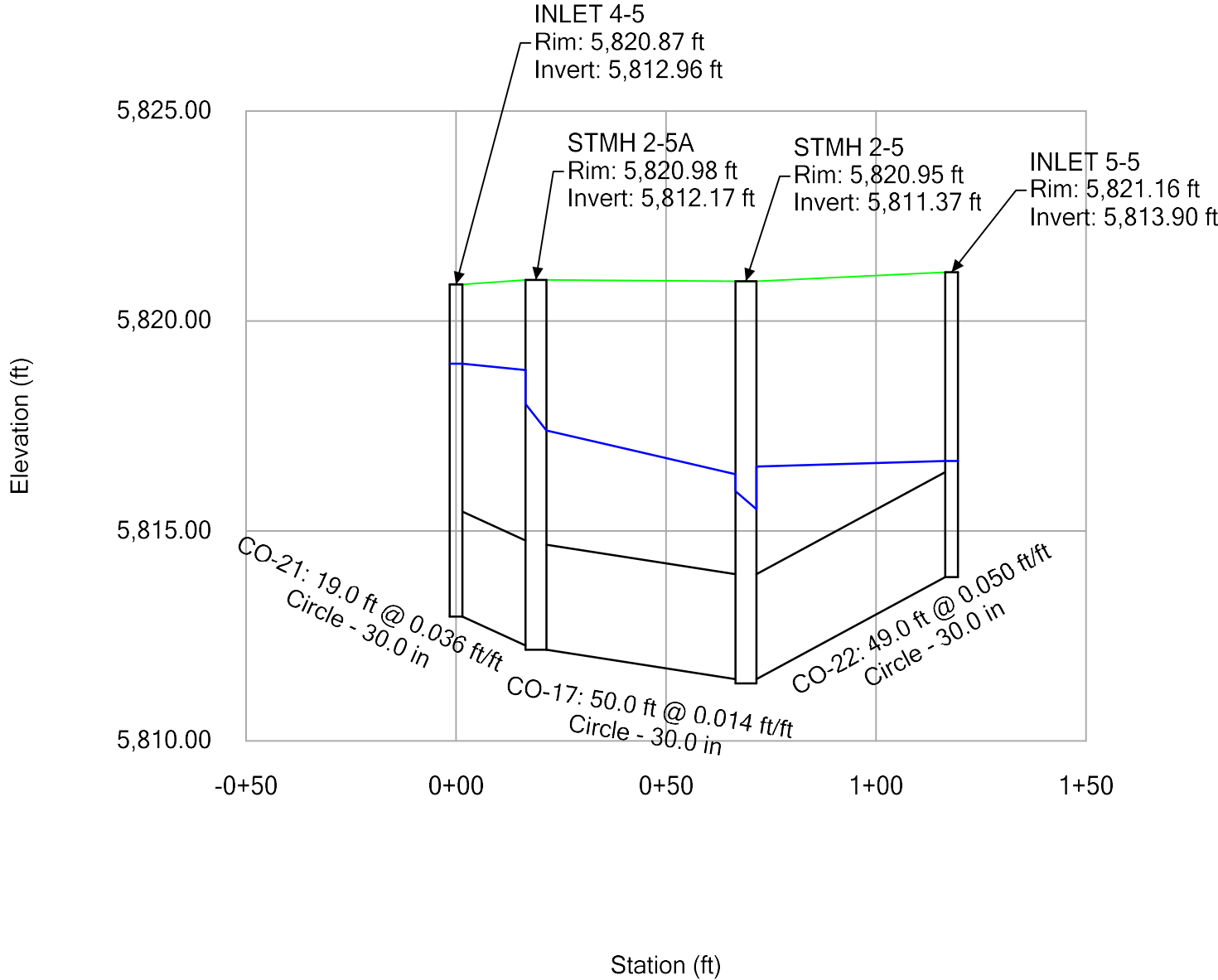
Profile Report
Engineering Profile - Profile - Storm Line 5B (Compark Village South StormCAD [2 year].stsw)



Profile Report
Engineering Profile - Profile - Storm Line 5B (Compark Village South StormCAD [5 year].stsw)

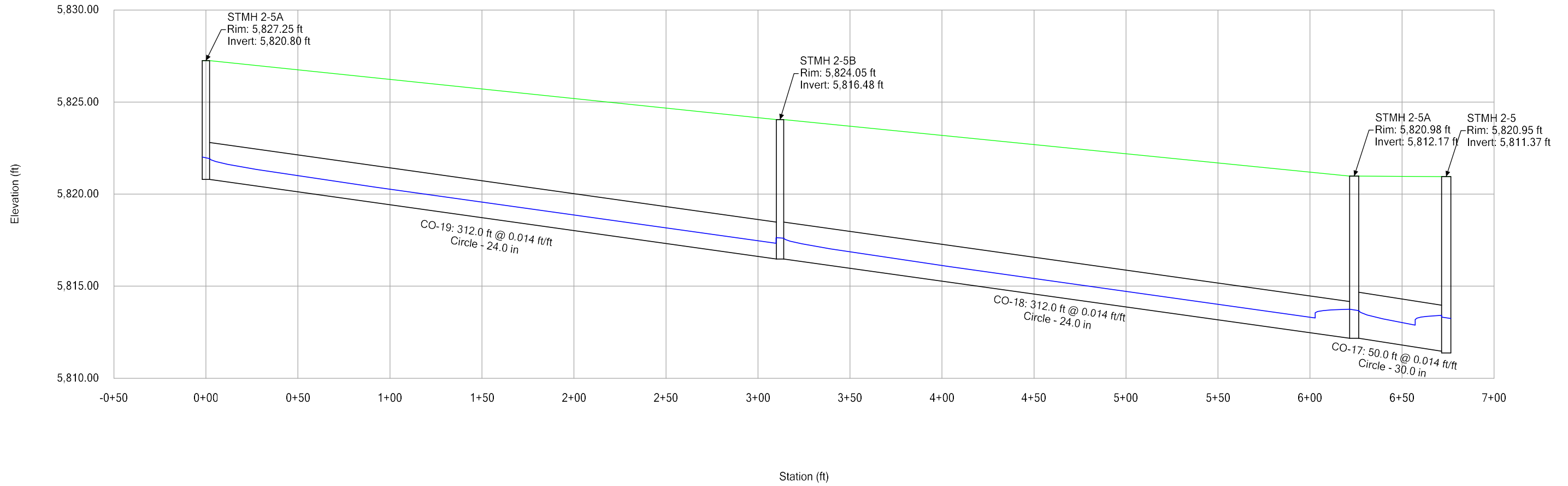


Profile Report
Engineering Profile - Profile - Storm Line 5B (Compark Village South StormCAD [100 year].stsw)



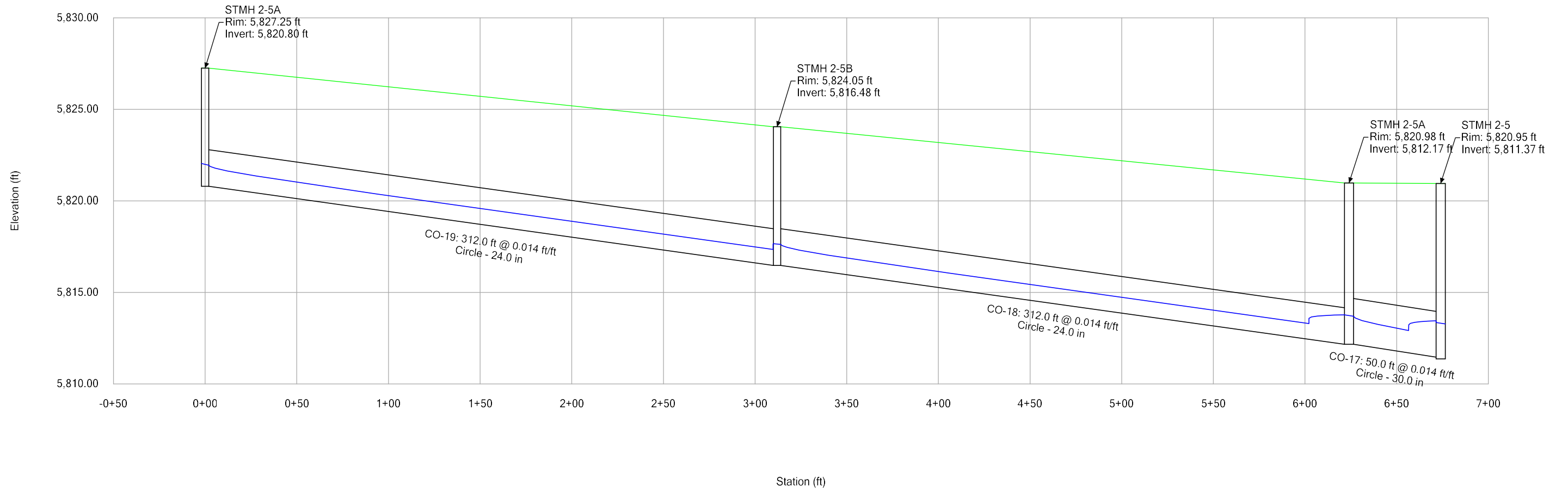
Profile Report

Engineering Profile - Profile - Storm Line 5C (Compark Village South StormCAD [2 year].stsw)



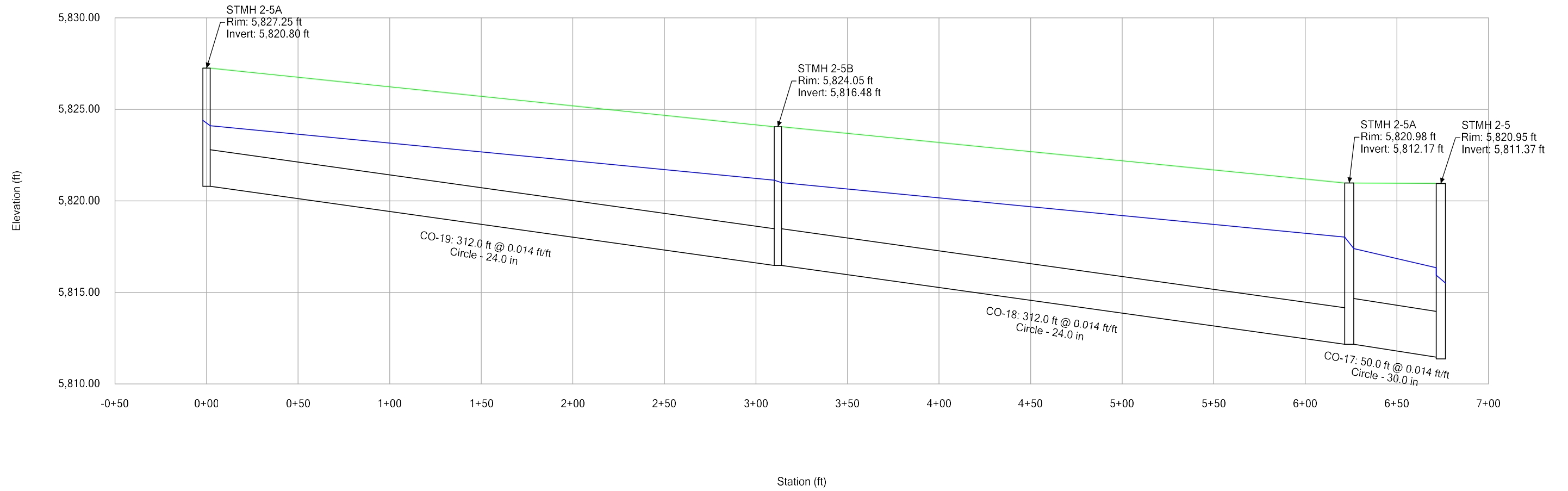
Profile Report

Engineering Profile - Profile - Storm Line 5C (Compark Village South StormCAD [5 year].stsw)

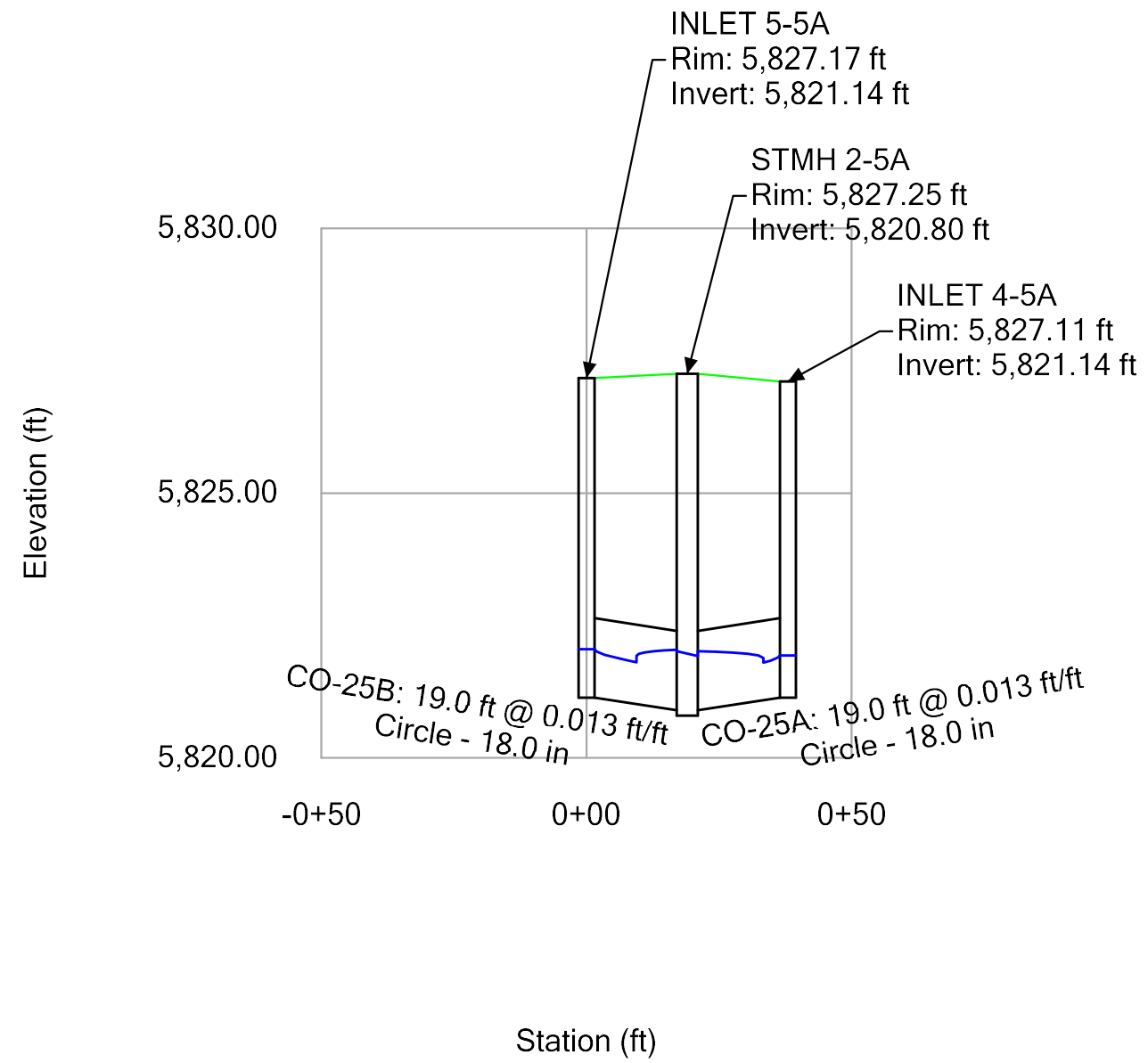


Profile Report

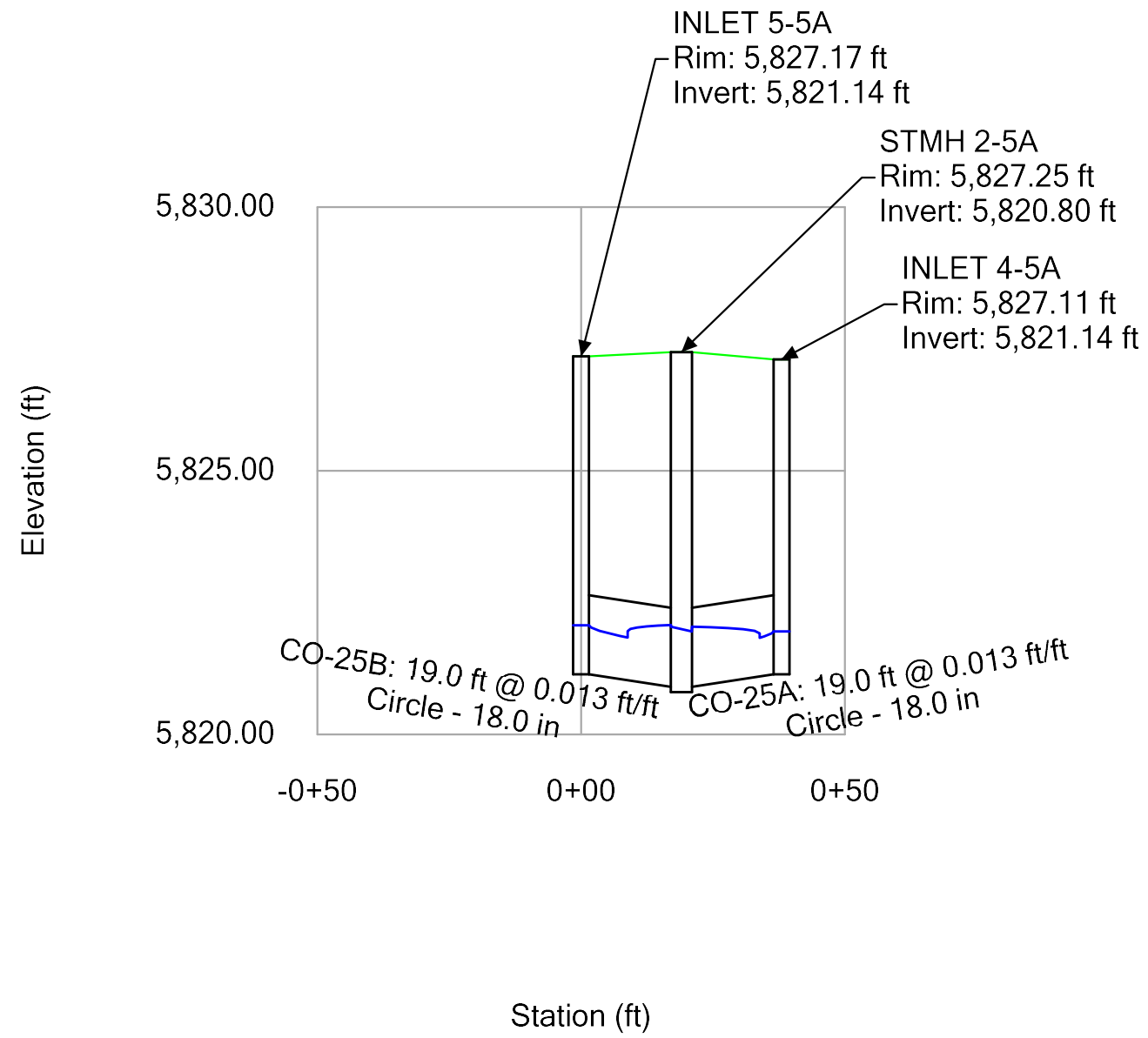
Engineering Profile - Profile - Storm Line 5C (Compark Village South StormCAD [100 year].stsw)



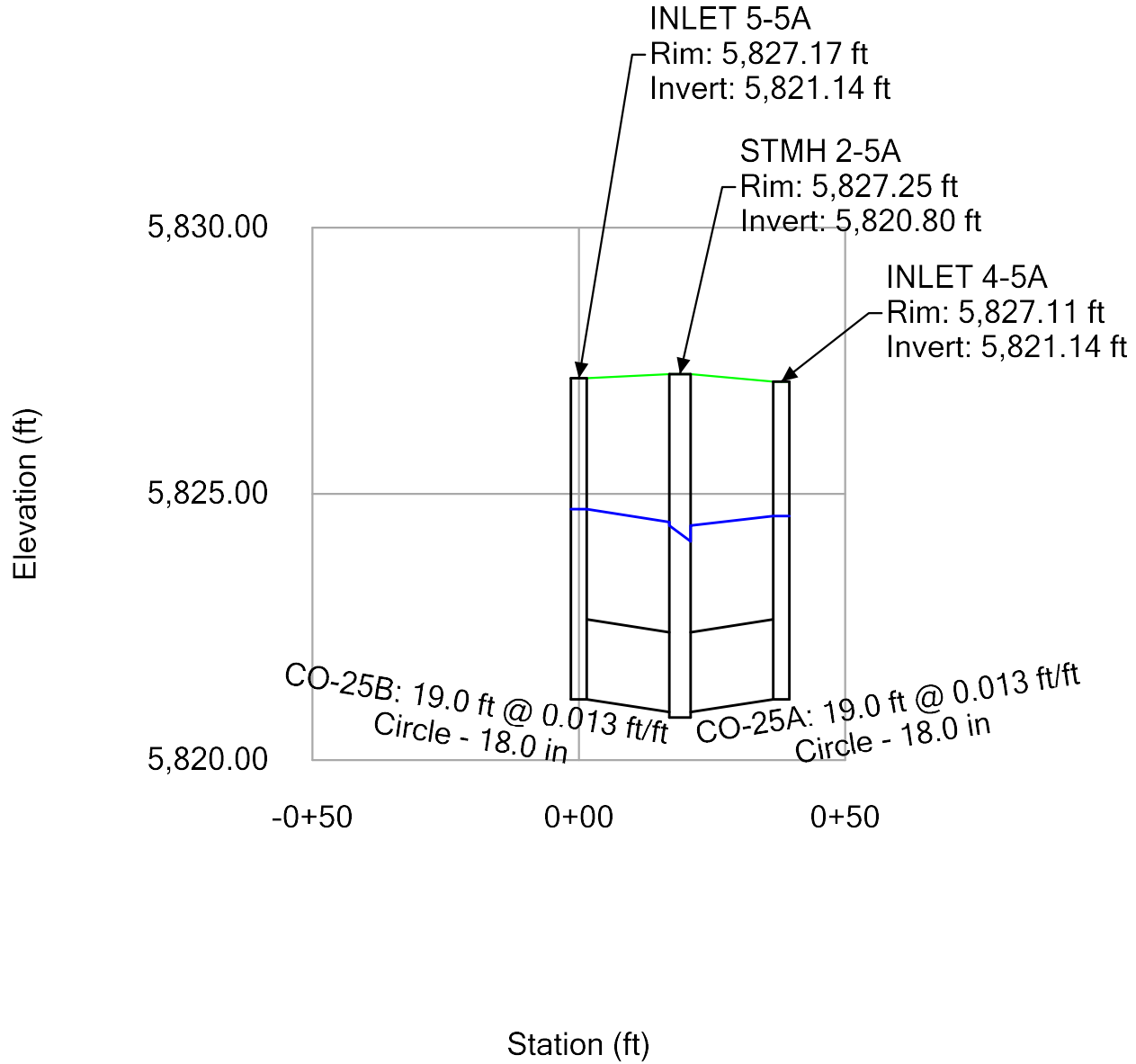
Profile Report
Engineering Profile - Profile - Storm Line 5D (Compark Village South StormCAD [2 year].stsw)



Profile Report
Engineering Profile - Profile - Storm Line 5D (Compark Village South StormCAD [5 year].stsw)

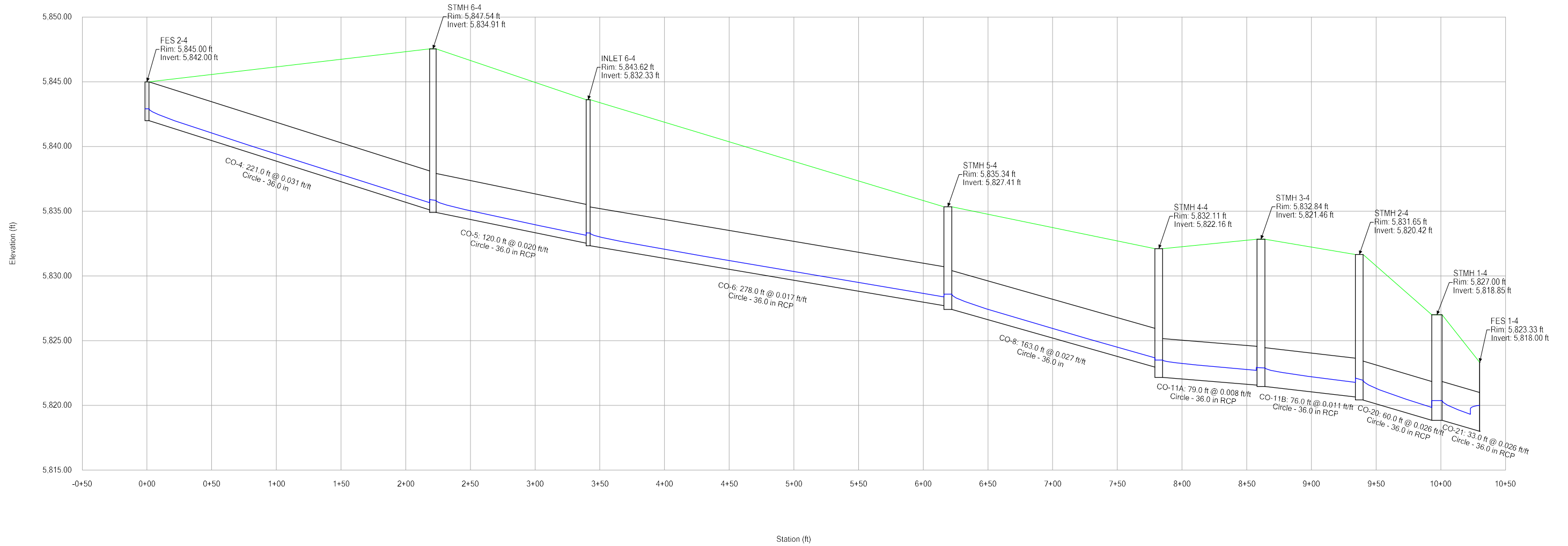


Profile Report
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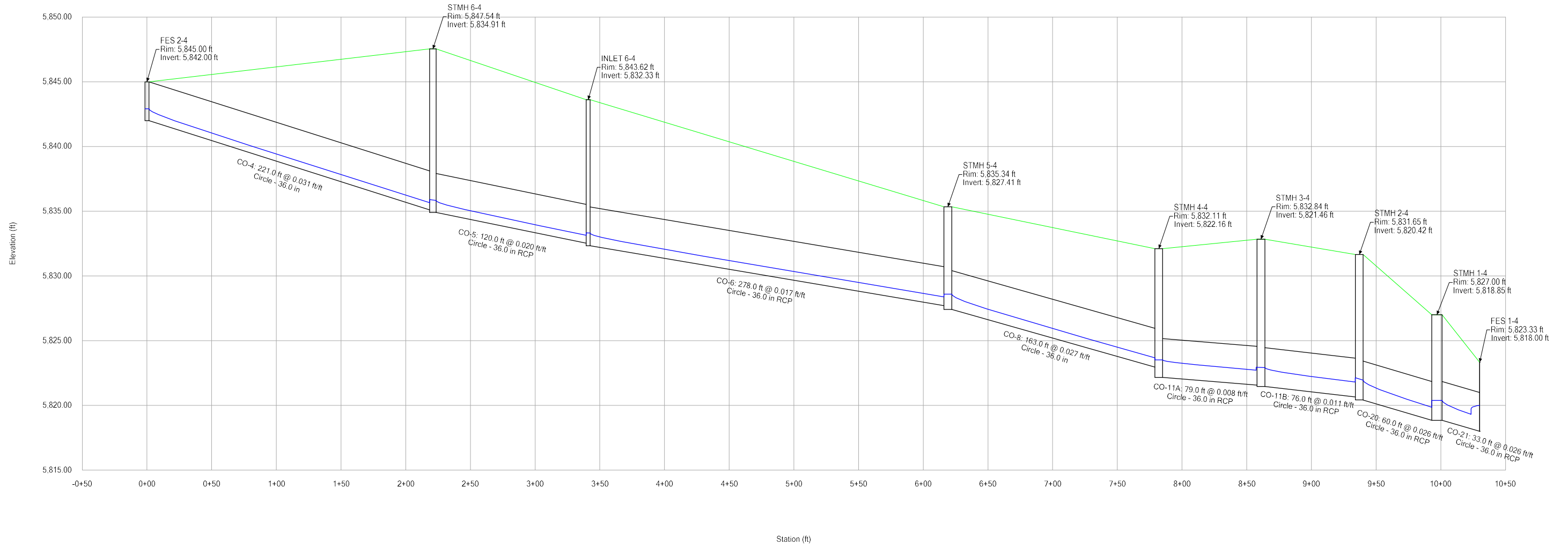
Profile Report

Engineering Profile - Profile - Storm Line 4 (Compark Village South StormCAD [2 year].stsw)



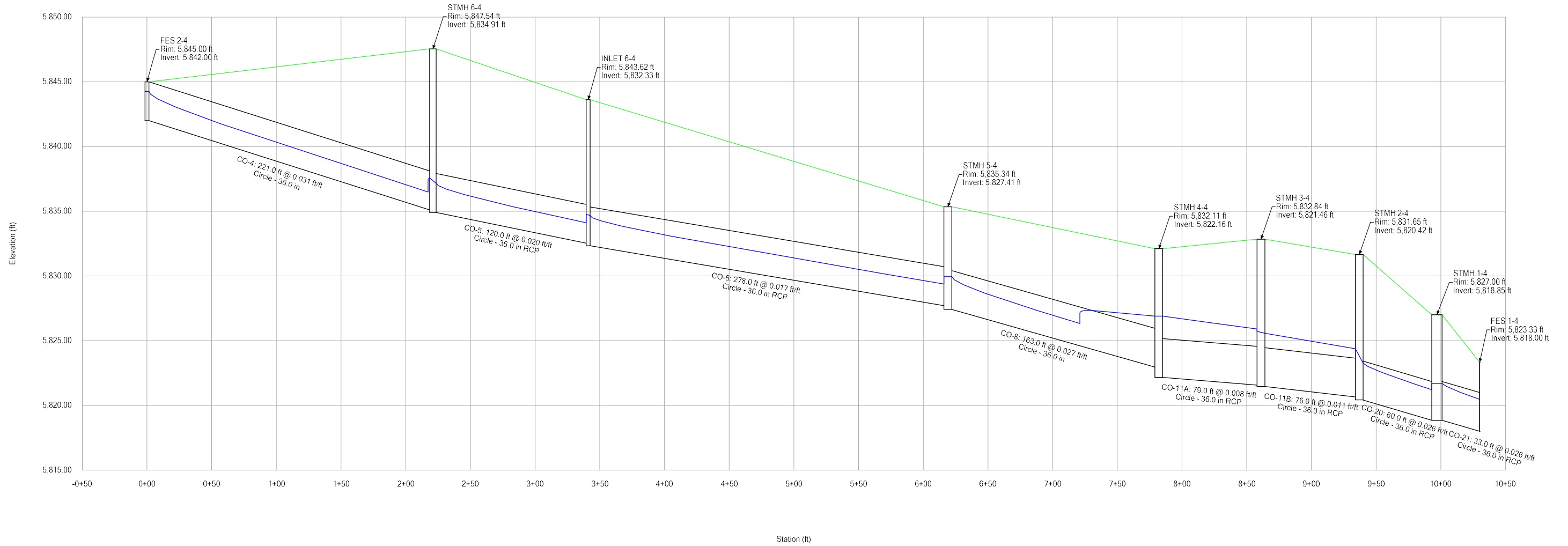
Profile Report

Engineering Profile - Profile - Storm Line 4 (Compark Village South StormCAD [5 year].stsw)

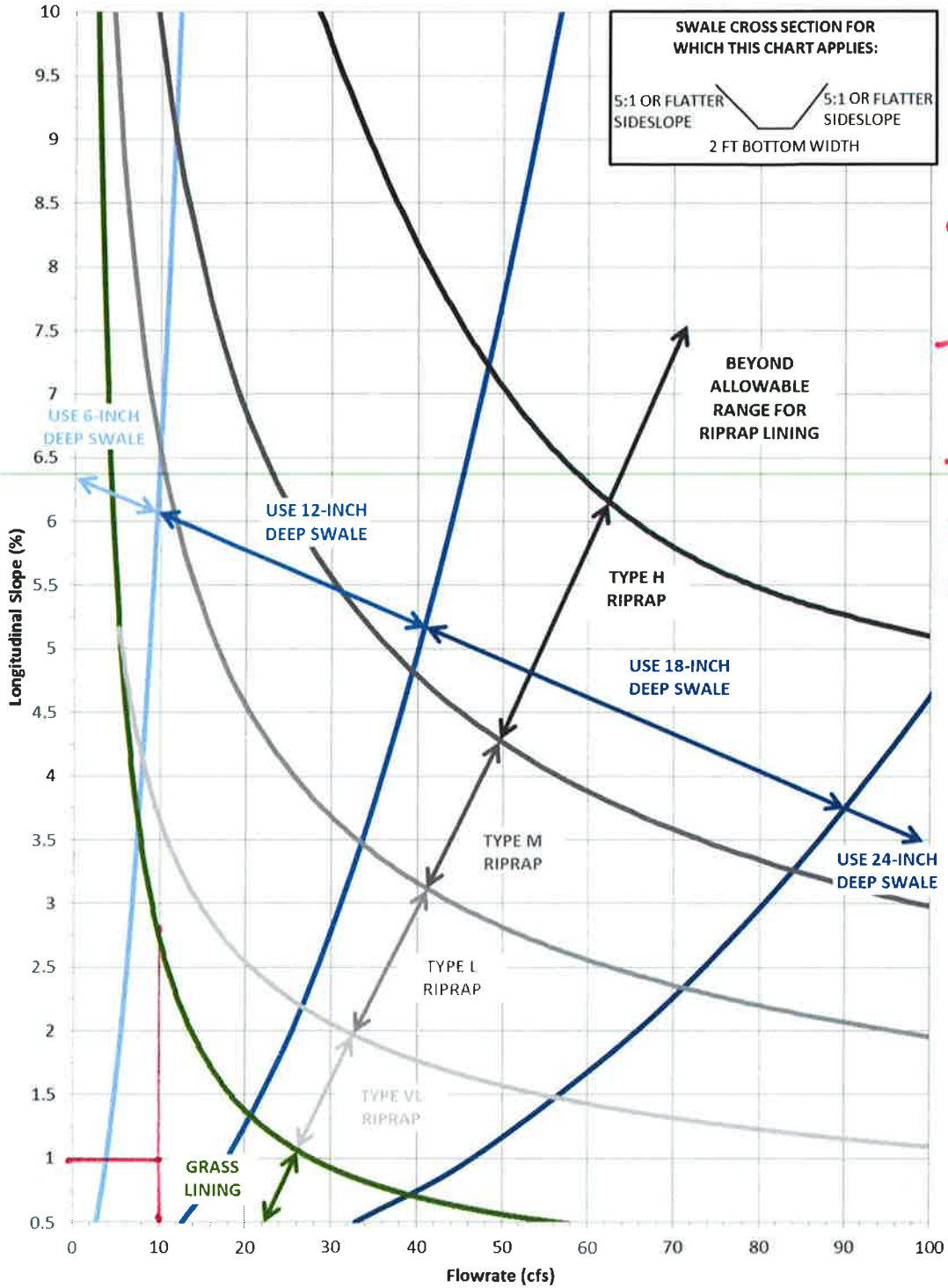


Profile Report

Engineering Profile - Profile - Storm Line 4 (Compark Village South StormCAD [100 year].stsw)



TEMPORARY SWALE (EAST OF RESIDENTIAL SITE)



Upper
 $Q = 9.8 \text{ cfs}$
 $s = 1\%$
 -1' Deep to Match Lower
 -Grass lined
 -2' Bottom
 -5:1 Sides

Figure 8-22. Swale stability chart; 2- to 4-foot bottom width and side slopes between 5:1 and 10:1
 (Note: Riprap classifications refer to gradation for riprap used in soil riprap or void-filled riprap. See Figure 8-34 for gradations.) (Source: Muller Engineering Company)

TEMPORARY SWALE (EAST OF RESIDENTIAL SITE)

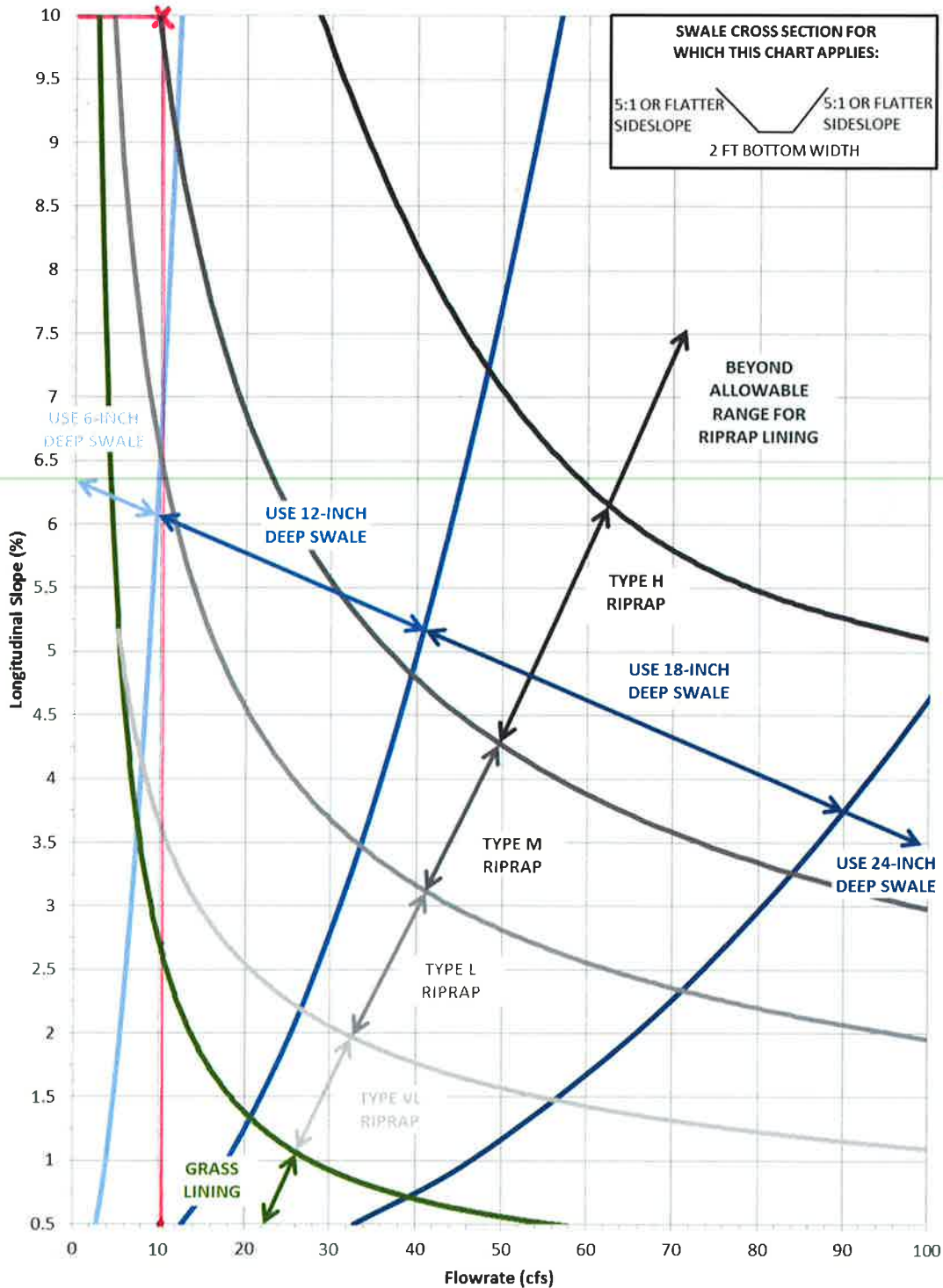


Figure 8-22. Swale stability chart; 2- to 4-foot bottom width and side slopes between 5:1 and 10:1
 (Note: Riprap classifications refer to gradation for riprap used in soil riprap or void-filled riprap. See Figure 8-34 for gradations.) (Source: Muller Engineering Company)

Temporary Swale East of Residential Site - Upper

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.035	
Channel Slope	0.01000	ft/ft
Left Side Slope	0.20	ft/ft (H:V)
Right Side Slope	0.20	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	9.80	ft ³ /s

Results

Normal Depth	0.79	ft
Flow Area	3.29	ft ²
Wetted Perimeter	5.62	ft
Hydraulic Radius	0.59	ft
Top Width	4.32	ft
Critical Depth	0.57	ft
Critical Slope	0.02837	ft/ft
Velocity	2.98	ft/s
Velocity Head	0.14	ft
Specific Energy	0.93	ft
Froude Number	0.60	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.79	ft
Critical Depth	0.57	ft
Channel Slope	0.01000	ft/ft

Temp Swale East of Street E - Top

GVF Output Data

Critical Slope 0.02837 ft/ft

Temporary Swale East of Residential Site - Lower

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.050	
Channel Slope	0.10000	ft/ft
Left Side Slope	0.20	ft/ft (H:V)
Right Side Slope	0.20	ft/ft (H:V)
Bottom Width	4.00	ft
Discharge	9.80	ft ³ /s

Results

Normal Depth	0.48	ft
Flow Area	1.95	ft ²
Wetted Perimeter	4.97	ft
Hydraulic Radius	0.39	ft
Top Width	4.19	ft
Critical Depth	0.57	ft
Critical Slope	0.05791	ft/ft
Velocity	5.03	ft/s
Velocity Head	0.39	ft
Specific Energy	0.87	ft
Froude Number	1.30	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

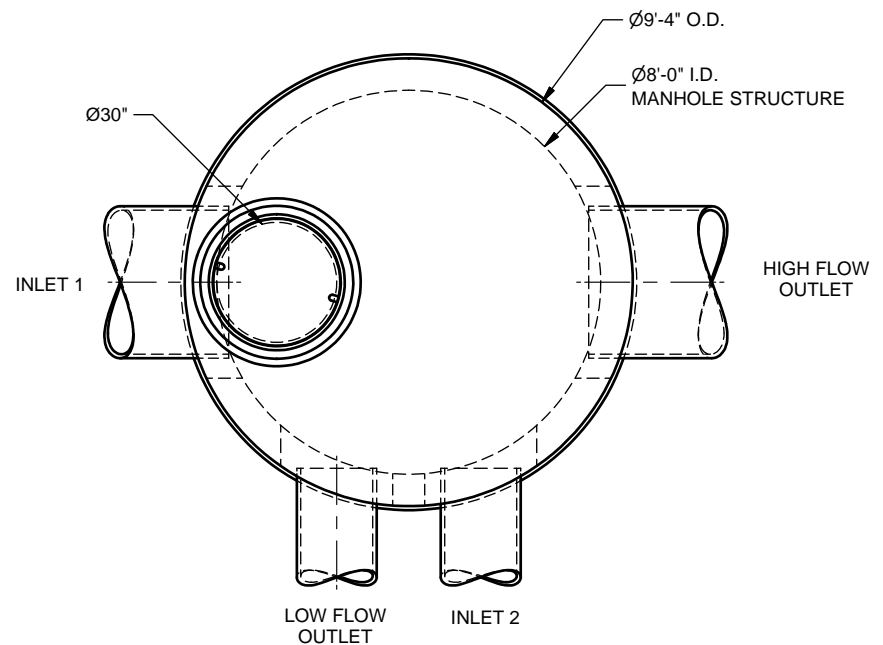
Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.48	ft
Critical Depth	0.57	ft
Channel Slope	0.10000	ft/ft

Temp Swale East of Street E - Bottom

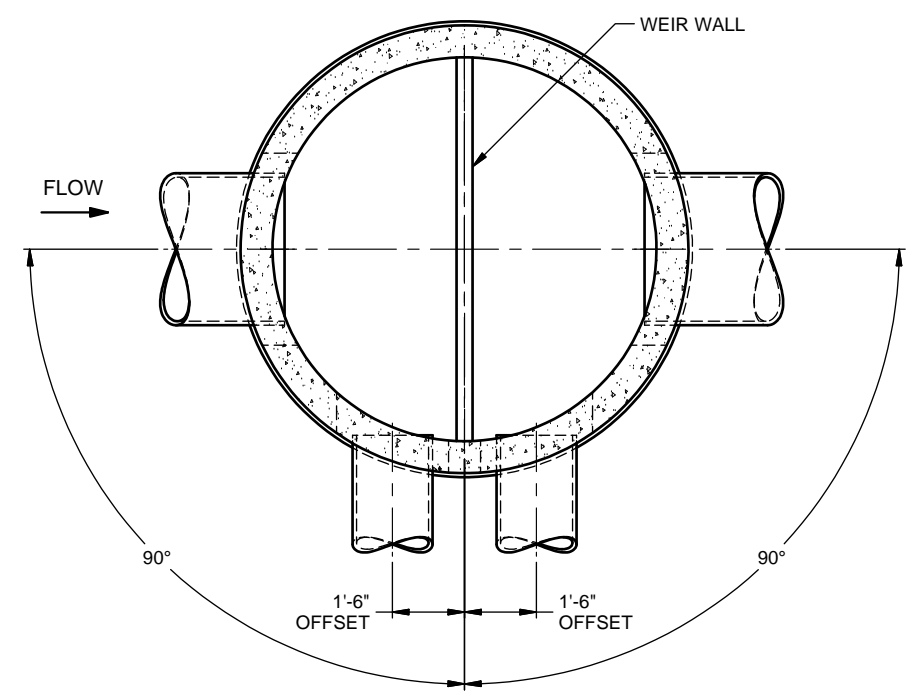
GVF Output Data

Critical Slope 0.05791 ft/ft

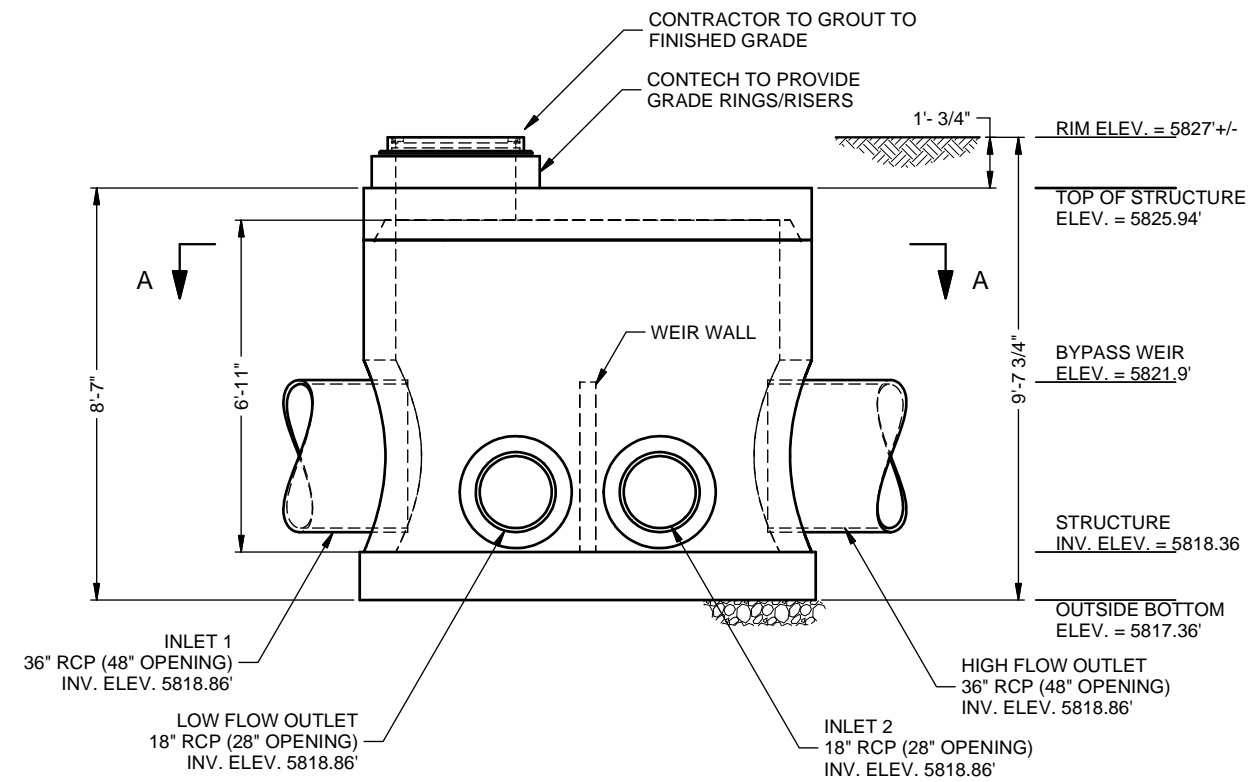
FOR REFERENCE ONLY. TO BE CONSTRUCTED AS PART OF FILING 1.



PLAN VIEW



SECTION A-A



ELEVATION VIEW

MATERIAL LIST - PROVIDED BY CONTECH

COUNT	DESCRIPTION	INSTALLED BY
1	JOINT SEALANT (BY PRECASTER)	CONTRACTOR
1 PLACE	GRADE RINGS/RISERS	CONTRACTOR
1	Ø30" x 4" EJ #41600484, OR EQUIVALENT	CONTRACTOR

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH REPRESENTATIVE. www.ContechES.com.
- BYPASS STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
- STRUCTURE SHALL MEET AASHTO HS-20 ASSUMING EARTH COVER OF 0' - 5', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 LOAD RATING AND BE CAST WITH THE CONTECH LOGO.
- BYPASS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE MANHOLE STRUCTURE (LIFTING CLUTCHES PROVIDED).
- CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S).
- CONTRACTOR TO INSTALL GRADE RINGS/RISERS OR BLOCK REQUIRED BETWEEN THE TOP OF THE STRUCTURE AND THE BASE OF THE MANHOLE FRAMES.

STRUCTURE WEIGHT
APPROXIMATE HEAVIEST PICK = 27000 LBS.
OF 2 PIECES

MAX FOOTPRINT = 9.5'

CONTECH
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DRAWING

LPICO
LAYOUT 1C

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NO.	DATE	REVISION DESCRIPTION	BY

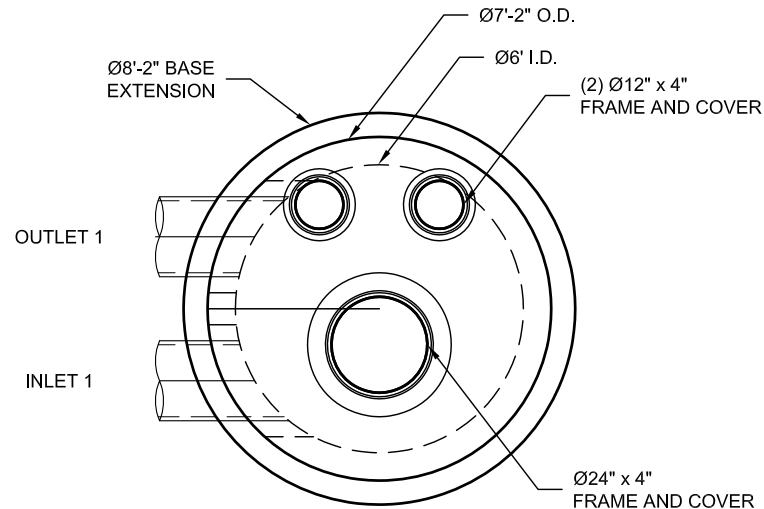
DIVERSION BYPASS BPMH96 -
542946-40
COMPARK SOUTH
PARKER, CO

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www.ContechES.com
9025 Centre Pointe Drive, Suite 400, West Chester, OH 41069
800-338-1122 513-645-7000 513-645-7846 FAX

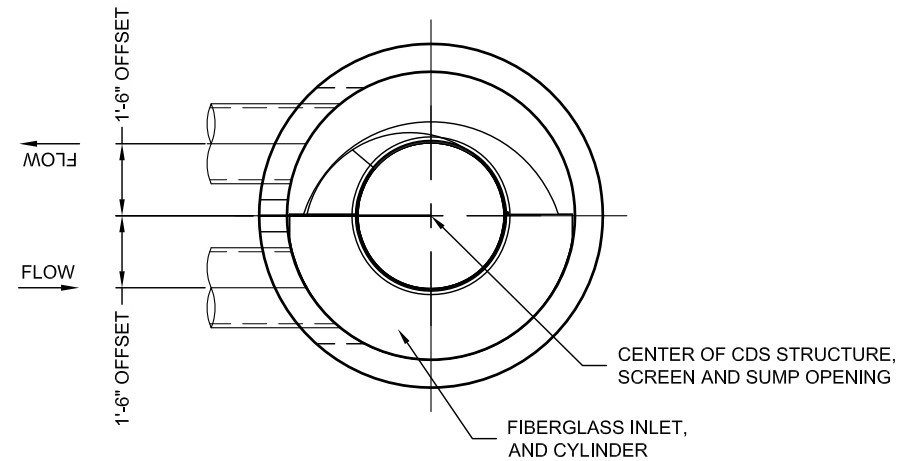
DATE: 7/15/16	SCALE: NONE
DESIGNED: JHR	DRAWN: MLC
CHECKED:	APPROVED:
PROJECT NUMBER: 542946	SHEET: 1 OF 1

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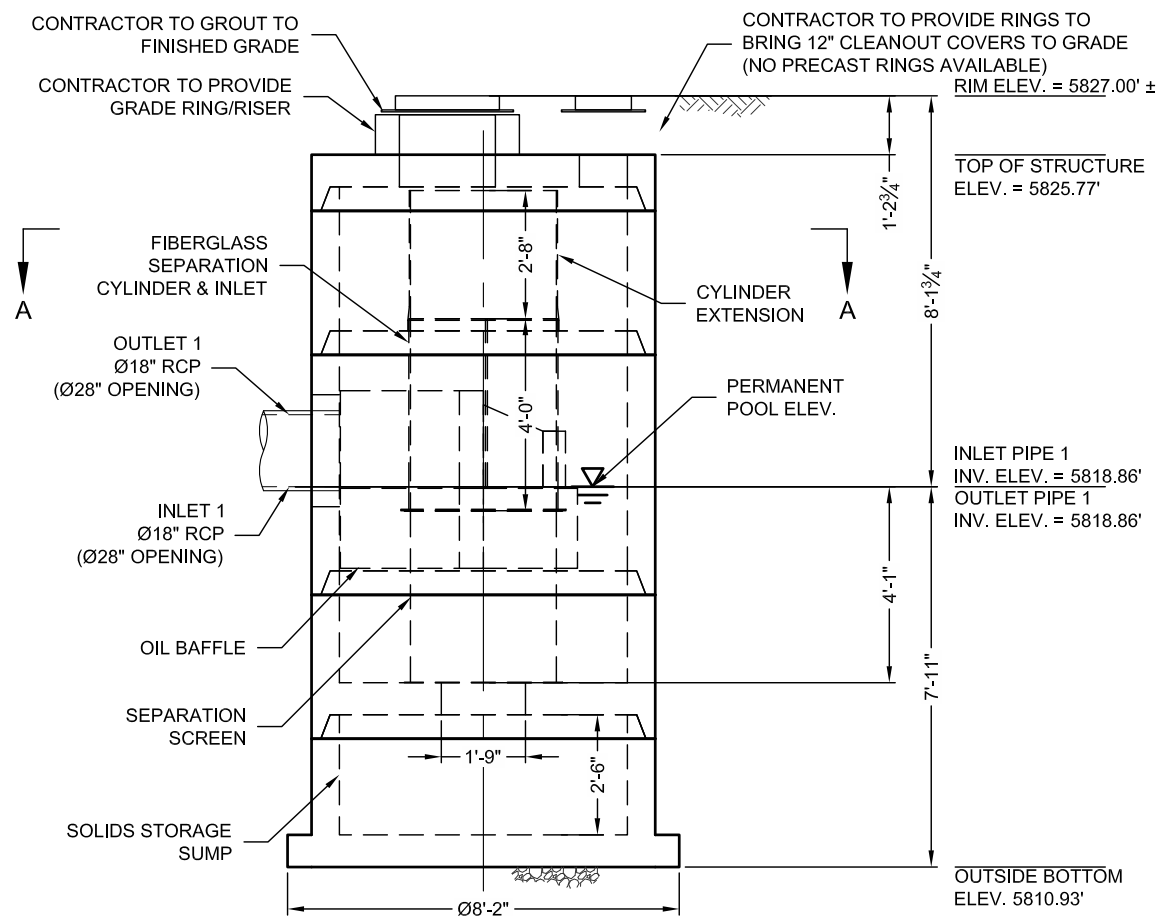


PLAN VIEW



SECTION A-A

● INTERNAL COMPONENTS TO BE INSTALLED BY CONTECH ON SITE



ELEVATION VIEW

MATERIAL LIST (PROVIDED BY CONTECH)

COUNT	DESCRIPTION	INSTALLED BY
1	FIBERGLASS INLET AND CYLINDER	CONTECH
1	2400 micron, 3' O.D. x 3.58' SEP. SCREEN	CONTECH
1	CYLINDER EXTENSION	CONTRACTOR
1	SEALANT FOR JOINTS (BY PRECASTER)	CONTRACTOR
1	Ø24" x 4" FRAME & COVER, E.J.#41600389, OR EQUIV.	CONTRACTOR
2	Ø12" x 4" FRAME & COVER, E.J.#41610201, OR EQUIV.	CONTRACTOR

SITE DESIGN DATA

WATER QUALITY FLOW RATE	0 CF
PEAK FLOW RATE	88 CF
RETURN PERIOD OF PEAK FLOW	100 YRS

GENERAL NOTES

- CONTECH TO PROVIDE ALL MATERIALS UNLESS NOTED OTHERWISE.
- FOR FABRICATION DRAWINGS WITH DETAILED STRUCTURE DIMENSIONS AND WEIGHT, PLEASE CONTACT YOUR CONTECH ENGINEERED SOLUTIONS LLC REPRESENTATIVE. www.ContechES.com
- CDS WATER QUALITY STRUCTURE SHALL BE IN ACCORDANCE WITH ALL DESIGN DATA AND INFORMATION CONTAINED IN THIS DRAWING. CONTRACTOR TO CONFIRM STRUCTURE MEETS REQUIREMENTS OF PROJECT.
- STRUCTURE SHALL MEET AASHTO HS-20 LOAD RATING, ASSUMING EARTH COVER OF 0' - 2', AND GROUNDWATER ELEVATION AT, OR BELOW, THE OUTLET PIPE INVERT ELEVATION. ENGINEER OF RECORD TO CONFIRM ACTUAL GROUNDWATER ELEVATION. CASTINGS SHALL MEET AASHTO M306 AND BE CAST WITH THE CONTECH LOGO.
- IF REQUIRED, PVC HYDRAULIC SHEAR PLATE IS PLACED ON SHELF AT BOTTOM OF SCREEN CYLINDER. REMOVE AND REPLACE AS NECESSARY DURING MAINTENANCE CLEANING.
- CDS STRUCTURE SHALL BE PRECAST CONCRETE CONFORMING TO ASTM C-478 AND AASHTO LOAD FACTOR DESIGN METHOD.

INSTALLATION NOTES

- ANY SUB-BASE, BACKFILL DEPTH, AND/OR ANTI-FLOTATION PROVISIONS ARE SITE-SPECIFIC DESIGN CONSIDERATIONS AND SHALL BE SPECIFIED BY ENGINEER OF RECORD.
- CONTRACTOR TO PROVIDE EQUIPMENT WITH SUFFICIENT LIFTING AND REACH CAPACITY TO LIFT AND SET THE CDS MANHOLE STRUCTURE.
- CONTRACTOR TO INSTALL JOINT SEALANT BETWEEN ALL STRUCTURE SECTIONS AND ASSEMBLE STRUCTURE.
- CONTRACTOR TO PROVIDE, INSTALL, AND GROUT INLET AND OUTLET PIPE(S). MATCH PIPE INVERTS WITH ELEVATIONS SHOWN. ALL PIPE CENTERLINES TO MATCH PIPE OPENING CENTERLINES.
- CONTRACTOR TO TAKE APPROPRIATE MEASURES TO ASSURE UNIT IS WATER TIGHT, HOLDING WATER TO FLOWLINE INVERT MINIMUM. IT IS SUGGESTED THAT ALL JOINTS BELOW PIPE INVERTS ARE GROUTED.

STRUCTURE WEIGHT

APPROXIMATE HEAVIEST PICK = 10000 LBS.
STRUCTURE IS DELIVERED IN 5 PIECES

MAX FOOTPRINT = Ø8'-2"

CONTECH
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MARK	DATE	REVISION DESCRIPTION	BY

CDS3035-6-C - 542946-20
COMPARK SOUTH
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for SYSTEM: STMH 1-4A

CONTECH
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CDS
THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING PATENTS OR OTHER PATENTS PENDING.

DATE:	07/18/16	SCALE:	1/4" = 1'-0"
DESIGNED:	JHR	DRAWN:	MLC
CHECKED:	XXX	APPROVED:	----
PROJECT No.:	542946	SEQUENCE No.:	20
SHEET:	1	OF	1

LPICO
LAYOUT 1A
3035-6-FGIS
1026 / FI72886



**OFFLINE CONCENTRIC CDS
HYDRAULIC CALCULATIONS**



7/26/2016

Compark South

Parker, CO

542946

STMH 1-4

DESIGN PARAMETERS

CDS Model No. = **CDS3035-6**

Design Treatment Flow = **3.8** cfs

Peak Design Flow = **88** cfs

Peak Design Return Interval = **100** year

Rim Elev. @ CDS (diversion) = **5827.00** ft

Required FB @ CDS Unit = **1.00** ft

Rim Elev. @ 1st U/S Structure = **5825.81** ft

Reqd. FB @ 1st U/S Structure = **1.00** ft

HYDRAULIC RESULTS SUMMARY

Estimated FB at CDS Unit = **1.31** ft (OK)

Est. FB at 1st U/S structure = **0.52** ft (Flood Potential)

DETAILED CALCULATIONS

7/26/2016

TREATMENT FLOW

Estimated HGL at Outfall

$$EL_{D/S \text{ Inv.}} = \underline{5817.99} \text{ ft} \quad (\text{based on CDS Invert unless provided})$$

$$HGL_{D/S} = \underline{5,818.37} \text{ ft} \quad (\text{unless provided, } D/S_{INV} + d_{n-WQ})$$

Exit Loss from DownStream Pipe, h_1

$$h_1 = k * [V^2 / (2*g)]$$

where,

$$k = \underline{0.40}$$

$$V = Q / A_F \\ = \underline{7.31} \text{ fps}$$

$$h_1 = \underline{0.33} \text{ ft}$$

$$EGL_1 = EL_0 + h_1 \\ = \underline{5818.70} \text{ ft}$$

Head Loss Through Downstream Pipe, h_2

Friction Losses, h_2

$$h_2 = S_{EGL} * L$$

where,

$$L_{D/S} = \underline{33} \text{ ft}$$

$$S_{EGL} = [(Q * n) / (1.49 * A_F * R^{2/3})]^2$$

where,

D/S Pipe Characteristics

$$\text{Dia.} = \underline{36} \text{ in}$$

$$S_{PIPE} = \underline{0.0261} \text{ ft/ft}$$

$$n = \underline{0.013}$$

Flow Characteristics

$$d_F = \underline{0.38} \text{ ft}$$

$$A_F = \underline{0.52} \text{ sf}$$

$$P_W = \underline{2.18} \text{ ft}$$

$$R = \underline{0.24} \text{ ft}$$

$$S_{EGL} = \underline{0.0275} \text{ ft / ft}$$

$$h_2 = \underline{0.91} \text{ ft}$$

$$EGL_2' = EGL_1 + h_2 \\ = \underline{5819.61} \text{ ft}$$

Check Entrance Condition for Critical Depth Control

$$EL_{CDS \text{ Inv.}} = \underline{5818.85} \text{ ft}$$

$$d_c = \underline{0.62} \text{ ft}$$

$$EGL_C = EL_{CDS \text{ Inv.}} + d_c + V_{dc}^2 / (2*g) \\ = \underline{5819.67} \text{ ft}$$

Identify Controlling EGL

Flow enters pipe at critical depth, EGLc controls.

$$EGL_2 = \underline{5819.67} \text{ ft}$$

Re-entry Loss into DownStream Pipe, h_3

$$h_3 = k * [V^2 / (2 * g)]$$

where,

$$k = \underline{0.40}$$

$$V = Q / A$$

$$= \underline{3.59} \text{ fps (flow area based on critical depth)}$$

$$h_3 = \underline{0.08} \text{ ft}$$

$$EGL_3' = EGL_2 + h_3$$

$$= \underline{5819.75} \text{ ft}$$

Check for CDS outlet control

$$EL_{\text{CDS Inv.}} = \underline{5818.85} \text{ ft}$$

$$\text{CDS I/O Diam.} = \underline{18.00} \text{ in}$$

$$L_{\text{CDS out}} = \underline{5.00} \text{ ft}$$

$$L_{\text{CDS in}} = \underline{5.00} \text{ ft}$$

$$d_{\text{c (CDS out)}} = \underline{0.74} \text{ ft}$$

$$EGL_{\text{C}} = EL_{\text{CDS Inv.}} + d_{\text{c (CDS Out)}} + V_{\text{dc}}^2 / (2 * g)$$

$$= \underline{5819.89} \text{ ft}$$

Identify Controlling EGL

The greater value controls

$$EGL_3 = \underline{5819.89} \text{ ft}$$

Determine CDS Weir Height

$$HL_{\text{CDS Op}} = \underline{2.00} \text{ ft}$$

$$V_{\text{CDS out}} = 2.91 \text{ ft} \quad (\text{partial pipe})$$

$$HL_{\text{CDS out}} = 0.012 \text{ ft}$$

$$V_{\text{CDS in}} = 2.15 \text{ ft} \quad (\text{full pipe})$$

$$HL_{\text{CDS in}} = 0.008 \text{ ft}$$

$$HL_{\text{CDS I/O}} = 2.02 \text{ ft}$$

$$EL_{\text{W}}' = EGL_3 + HL_{\text{CDS Op}} + HL_{\text{CDS I/O}}$$

$$= \underline{5821.91} \text{ ft}$$

$$H_{\text{W}}' = EL_{\text{W}}' - EL_{\text{CDS Inv.}}$$

$$= \underline{3.06} \text{ ft, or } \underline{36.7} \text{ in}$$

Adjust for constructability

$$\text{Use } H_{\text{W}} = \underline{36.5} \text{ in, or } \underline{3.04} \text{ ft}$$

$$EL_{\text{W}} = EL_{\text{CDS Inv.}} + H_{\text{W}}$$

$$= \underline{5821.89} \text{ ft}$$

PEAK CONVEYANCE FLOW

7/26/2016

Estimated HGL at Outfall

$$\text{HGL}_{D/S} = \underline{5,820.00} \text{ ft (water level at D/S outlet per engineer, 100-yr)}$$

Exit Loss from D/S Pipe, h_1

$$h_1 = k * [V^2 / (2 * g)]$$

where,

$$k = \underline{0.40}$$

$$V = Q / A_F \\ = \underline{17.10} \text{ fps}$$

$$h_1 = \underline{1.82} \text{ ft}$$

$$\text{EGL}_1 = \text{EL}_0 + h_1 \\ = \underline{5821.82} \text{ ft}$$

Head Loss Through D/S Pipe, h_2

Friction Losses, h_2

$$h_2 = S_{\text{EGL}} * L_{D/S}$$

where,

$$L_{D/S} = \underline{33} \text{ ft}$$

$$S_{\text{EGL}} = [(Q * n) / (1.49 * A_F * R^{2/3})]^2$$

where,

D/S Pipe Characteristics

$$\text{Dia.} = \underline{36} \text{ in}$$

$$S_{\text{PIPE}} = \underline{0.0261} \text{ ft/ft}$$

$$n = \underline{0.013}$$

Flow Characteristics

$$d_n = \underline{2.05} \text{ ft}$$

$$A_F = \underline{5.15} \text{ sf}$$

$$P_W = \underline{5.84} \text{ ft}$$

$$R = \underline{0.88} \text{ ft}$$

$$S_{\text{EGL}} = \underline{0.0263} \text{ ft / ft}$$

$$h_2 = \underline{0.87} \text{ ft}$$

$$\text{EGL}_2' = \text{EGL}_1 + h_2 \\ = \underline{5822.68} \text{ ft}$$

Check Entrance Condition for Critical Depth Control

$$\text{EL}_{\text{CDS Inv.}} = \underline{5818.85} \text{ ft}$$

$$d_c = \underline{2.99} \text{ ft}$$

$$\text{EGL}_C = \text{EL}_{\text{CDS Inv.}} + d_c + V_{dc}^2 / (2 * g) \\ = \underline{5824.25} \text{ ft}$$

Identify Controlling EGL

Cannot enter at less than minimum energy, EGLc controls.

$$\text{EGL}_2 = \underline{5824.25} \text{ ft}$$

Re-entry Loss into D/S Pipe, h_3

$$h_3 = k * [V^2 / (2 * g)]$$

where,

$$k = \frac{0.40}{}$$

$$V = Q / A_F$$

$$= \frac{12.45}{\text{fps (area based on critical depth)}}$$

$$h_3 = \frac{0.96}{\text{ft}}$$

$$\text{EGL}_3 = \text{EGL}_2 + h_3$$

$$= \frac{5825.21}{\text{ft}}$$

$$\text{HGL}_3 = \text{EGL}_3 - [(V_p/4)^2 / (2 * g)]$$

$$= \frac{5825.06}{\text{ft (velocity assumed 25% of pipe velocity)}}$$

Head over Diversion Weir, h_4

$$\text{EL}_{\text{weir}} = \frac{5821.89}{\text{ft (established above)}}$$

$$L_{\text{weir}} = \frac{8.00}{\text{ft}}$$

(weir is submerged)

Headloss for Free Discharge Condition

$$h_{4a} = [Q / (C * L)]^{2/3}$$

where,

$$C = \frac{3.43}{}$$

$$h_{4a} = \frac{2.18}{\text{ft}}$$

$$\text{EGL}_{4a} = \text{EL}_{\text{weir}} + h_{4a}$$

$$= \frac{5824.07}{\text{ft}}$$

Headloss for Submerged Condition

$$d_{\text{sub}} = \frac{3.17}{\text{ft (depth of submergence)}}$$

$$h_{4b} = \frac{0.48}{\text{ft (separate submerged weir calc.)}}$$

$$\text{EGL}_{4b} = \text{EGL}_3 + h_{4b}$$

$$= \frac{5825.69}{\text{ft}}$$

Identify EGL U/S of Weir

The discharge condition is Submerged, therefore

$$\text{EGL}_4 = \frac{5825.69}{\text{ft}}$$

Expansion Loss from U/S Pipe, h_5

$$h_5 = k * [V^2 / (2 * g)]$$

where,

$$k = \frac{0.40}{}$$

$$V = Q / A_F$$

$$= \frac{12.45}{\text{fps}}$$

$$h_5 = \frac{0.96}{\text{ft}}$$

$$\text{EGL}_5 = \text{EGL}_4 + h_5$$

$$= \frac{5826.65}{\text{ft}}$$

Head Loss Through U/S Pipe, h_6 Friction Losses, h_6

$$h_6 = S_{EGL} * L$$

where,

$$L_{U/S} = \frac{60}{1} \text{ ft}$$

$$S_{EGL} = \left[\frac{Q * n}{1.49 * A_F * R^{2/3}} \right]^2$$

where,

U/S Pipe Characteristics

$$\text{Dia.} = \frac{36}{1} \text{ in}$$

$$S_{PIPE} = \frac{0.0261}{1} \text{ ft/ft}$$

$$n = \frac{0.013}{1}$$

Flow Characteristics

$$d_n = \frac{3.00}{1} \text{ ft}$$

$$A_F = \frac{7.07}{1} \text{ sf}$$

$$P_W = \frac{9.42}{1} \text{ ft}$$

$$R = \frac{0.75}{1} \text{ ft}$$

$$S_{EGL} = \frac{0.0173}{1} \text{ ft / ft}$$

$$h_6 = \frac{1.04}{1} \text{ ft}$$

$$EGL_6' = EGL_5 + h_6$$

$$= \frac{5827.69}{1} \text{ ft}$$

Check Entrance Condition for Critical Depth Control

$$EL_{U/S \text{ Inv.}} = \frac{5820.42}{1} \text{ ft (based on inv \& slope unless provided)}$$

$$d_c = \frac{2.99}{1} \text{ ft}$$

$$EGL_C = EL_{CDS \text{ Inv.}} + d_c + V_{dc}^2 / (2 * g)$$

$$= \frac{5825.82}{1} \text{ ft}$$

Identify Controlling EGL

Friction based EGL controls.

$$EGL_6 = \frac{5827.69}{1} \text{ ft}$$

$$HGL_6 = EGL_6 - [V^2 / (2 * g)]$$

$$= \frac{5825.29}{1} \text{ ft}$$

Headloss Across Diversion Structure During Peak Flow

$$HL_{DW} = EGL_5 - EGL_2$$

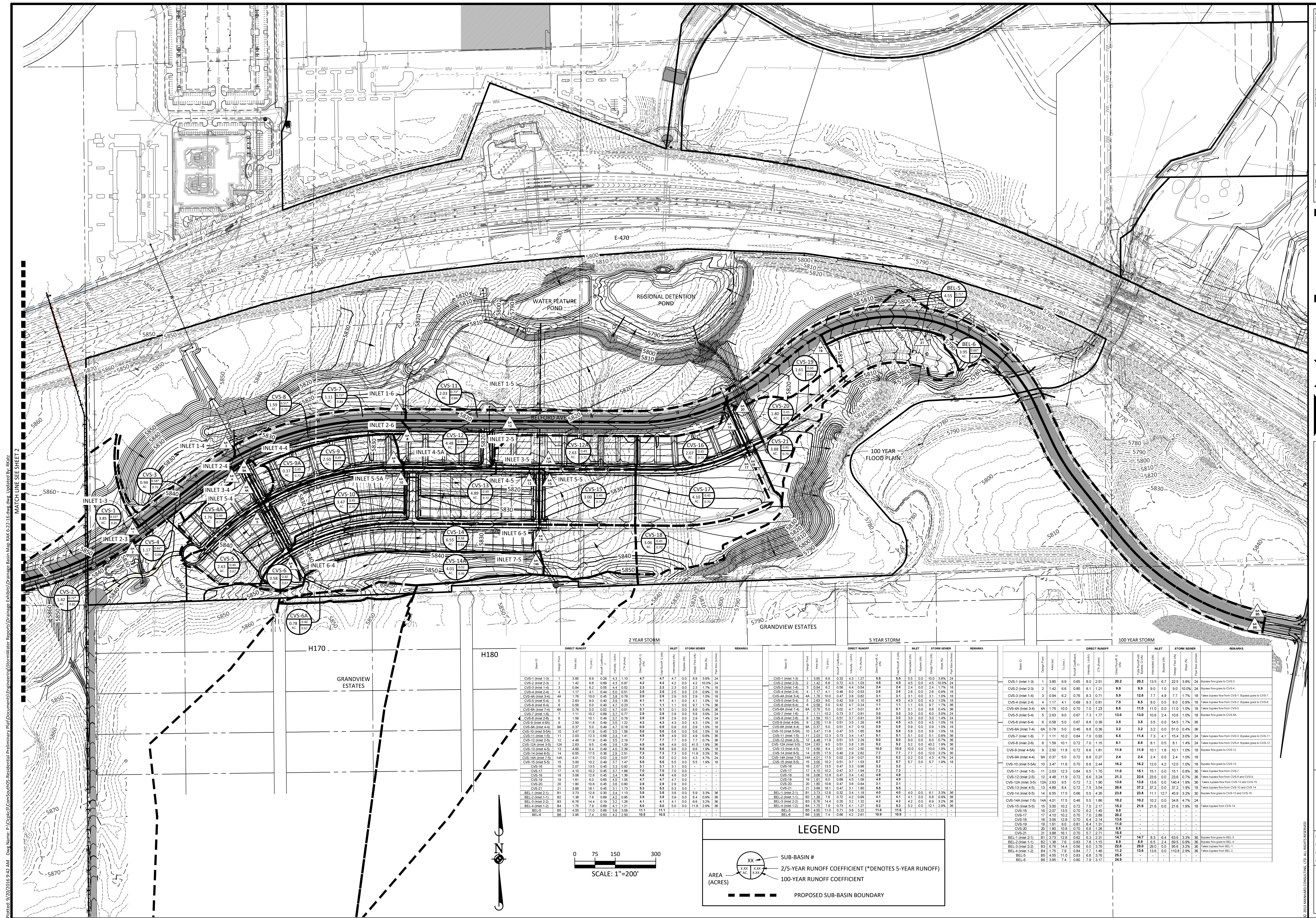
$$HL_{DW} = \frac{2.40}{1} \text{ ft}$$

$$\text{Freeboard at CDS Unit} = \frac{1.31}{1} \text{ ft}$$

$$\text{FB at first U/S structure} = \frac{0.52}{1} \text{ ft}$$

APPENDIX D

Drainage Basin Map



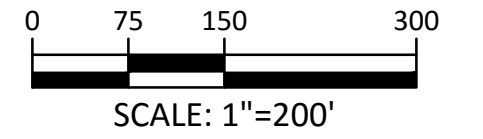
Planets: 9/20/2016 9:42 AM. Draw Name: P:\C\Clark\ComSource\Residential\Documents\Engineering\StormWater_Reports\Drainage\Exhibits\Drainage Basin Map_RAK_6-23-16.dwg. Updated By: RAK.

Basin ID	Catchment Area (Ac)	DIRECT RUNOFF				INLET	STORM SEWER				REMARKS	
		Depth (ft)	Area (Ac)	Time (min)	Volume (MG)		Flow (MGD)	Depth (ft)	Flow (MGD)	Time (min)		
CVS-1 (Inlet 1-3)	1	3.85	6.9	0.28	4.3	110	4.7	4.7	0.0	8.9	3.8%	24
CVS-2 (Inlet 2-3)	2	1.42	6.6	0.89	4.3	0.87	4.2	4.2	0.0	4.2	10.0%	24
CVS-3 (Inlet 1-4)	3	0.84	6.2	0.95	4.4	0.92	2.3	2.3	0.0	2.3	1.7%	18
CVS-4 (Inlet 2-4)	4	1.17	4.1	0.44	5.0	0.51	2.5	2.5	0.0	2.5	0.9%	19
CVS-5 (Inlet 3-4)	5	2.63	9.0	0.40	3.9	1.05	4.1	4.1	0.0	4.1	1.0%	18
CVS-6 (Inlet 4-4)	6	0.96	5.0	0.40	4.7	0.23	1.1	1.1	0.0	1.1	0.7%	17
CVS-7 (Inlet 5-4)	7	1.11	10.2	0.89	3.7	0.77	2.9	2.9	0.0	2.9	3.0%	24
CVS-8 (Inlet 1-5)	8	1.29	10.1	0.49	3.7	0.28	2.9	2.9	0.0	2.9	1.4%	24
CVS-9 (Inlet 4-5A)	9	2.50	11.8	0.49	3.5	1.22	4.3	4.3	0.0	4.3	1.0%	18
CVS-10 (Inlet 5-5A)	10	3.47	11.6	0.45	3.5	1.58	5.6	5.6	0.0	5.6	1.0%	18
CVS-11 (Inlet 1-5)	11	2.03	12.3	0.89	3.4	1.41	4.9	4.9	0.0	4.9	0.8%	36
CVS-12 (Inlet 2-5)	12	4.48	11.9	0.49	3.5	2.19	7.7	7.7	0.0	7.7	0.7%	36
CVS-13 (Inlet 3-5)	13A	2.63	9.5	0.49	3.8	1.29	4.9	4.9	0.0	4.9	1.9%	36
CVS-14 (Inlet 4-5)	13	4.89	9.4	0.49	4.2	2.36	8.8	8.8	0.0	8.8	1.9%	36
CVS-15 (Inlet 5-5)	14	6.55	17.5	0.38	2.8	2.51	7.3	7.3	0.0	7.3	3.7%	30
CVS-16 (Inlet 1-6)	14A	4.29	17.6	0.35	2.8	0.67	6.2	6.2	0.0	6.2	4.7%	24
CVS-17 (Inlet 2-6)	15	3.00	10.2	0.40	3.7	1.47	5.5	5.5	0.0	5.5	1.9%	18
CVS-18 (Inlet 3-6)	16	2.07	13.5	0.40	3.3	0.92	3.1	3.1	0.0	3.1	0.0%	-
CVS-19 (Inlet 4-6)	17	4.10	10.2	0.40	3.7	1.86	7.9	7.9	0.0	7.9	0.0%	-
CVS-20 (Inlet 5-6)	18	3.08	12.8	0.40	3.4	1.36	4.6	4.6	0.0	4.6	0.0%	-
CVS-21 (Inlet 1-7)	19	1.61	6.9	0.40	4.3	1.05	4.7	4.7	0.0	4.7	0.0%	-
CVS-22 (Inlet 2-7)	20	1.80	10.8	0.40	3.6	0.80	2.9	2.9	0.0	2.9	0.0%	-
CVS-23 (Inlet 3-7)	21	3.88	16.1	0.47	3.1	1.13	6.3	6.3	0.0	6.3	0.0%	-
BEL-1 (Inlet 2-1)	81	3.73	12.8	0.52	3.4	1.13	3.8	3.8	0.0	3.8	3.3%	36
BEL-2 (Inlet 1-1)	82	1.36	7.6	0.89	4.2	0.65	3.9	3.9	0.0	3.9	0.9%	36
BEL-3 (Inlet 2-2)	83	4.31	14.4	0.19	3.2	1.26	4.1	4.1	0.0	4.1	0.6%	36
BEL-4 (Inlet 1-2)	84	1.75	7.9	0.89	4.1	1.21	5.0	5.0	0.0	5.0	1.6%	29%
BEL-5	85	4.95	11.0	0.24	3.6	1.11	11.1	11.1	0.0	11.1	0.0%	-
BEL-6	86	3.95	7.4	0.83	4.2	2.90	10.5	10.5	0.0	10.5	0.0%	-

Basin ID	Catchment Area (Ac)	DIRECT RUNOFF				INLET	STORM SEWER				REMARKS		
		Depth (ft)	Area (Ac)	Time (min)	Volume (MG)		Flow (MGD)	Depth (ft)	Flow (MGD)	Time (min)			
CVS-1 (Inlet 1-3)	1	3.85	6.9	0.85	8.0	2.51	20.2	13.5	6.7	22.5	3.8%	24	
CVS-2 (Inlet 2-3)	2	1.42	6.6	0.85	8.1	1.21	8.9	9.0	1.0	9.0	10.0%	24	
CVS-3 (Inlet 1-4)	3	0.84	6.2	0.76	8.3	0.71	8.5	12.6	7.7	4.9	7.7	1.7%	18
CVS-4 (Inlet 2-4)	4	1.17	4.1	0.69	9.3	0.81	7.5	8.5	8.0	0.5	8.0	0.9%	18
CVS-5 (Inlet 3-4)	5	2.63	9.0	0.70	7.0	1.23	8.6	11.0	11.0	11.0	1.0%	18	
CVS-6 (Inlet 4-4)	6	0.96	5.0	0.67	7.3	1.77	13.0	13.0	10.6	2.4	10.6	1.0%	18
CVS-7 (Inlet 5-4)	7	1.11	10.2	0.84	7.0	0.93	6.5	11.4	7.3	4.1	15.4	3.0%	24
CVS-8 (Inlet 1-5)	8	1.29	10.1	0.49	3.7	0.28	8.1	8.8	8.1	0.5	8.1	1.4%	24
CVS-9 (Inlet 4-5A)	9	2.50	11.8	0.49	3.5	1.22	4.9	11.9	11.9	10.1	1.8	1.0%	18
CVS-10 (Inlet 5-5A)	10	3.47	11.6	0.45	3.5	1.58	5.6	5.6	0.0	5.6	1.0%	18	
CVS-11 (Inlet 1-5)	11	2.03	12.3	0.73	3.4	1.47	5.1	5.1	0.0	5.1	0.8%	36	
CVS-12 (Inlet 2-5)	12	4.48	11.9	0.49	3.5	2.19	8.0	8.0	0.0	8.0	0.7%	36	
CVS-13 (Inlet 3-5)	13A	2.63	9.5	0.49	3.8	1.29	4.9	4.9	0.0	4.9	1.9%	36	
CVS-14 (Inlet 4-5)	13	4.89	9.4	0.49	4.2	2.36	8.8	8.8	0.0	8.8	1.9%	36	
CVS-15 (Inlet 5-5)	14	6.55	17.5	0.38	2.8	2.51	7.3	7.3	0.0	7.3	3.7%	30	
CVS-16 (Inlet 1-6)	14A	4.29	17.6	0.35	2.8	0.67	6.2	6.2	0.0	6.2	4.7%	24	
CVS-17 (Inlet 2-6)	15	3.00	10.2	0.40	3.7	1.47	5.5	5.5	0.0	5.5	1.9%	18	
CVS-18 (Inlet 3-6)	16	2.07	13.5	0.40	3.3	0.92	3.1	3.1	0.0	3.1	0.0%	-	
CVS-19 (Inlet 4-6)	17	4.10	10.2	0.40	3.7	1.86	7.9	7.9	0.0	7.9	0.0%	-	
CVS-20 (Inlet 5-6)	18	3.08	12.8	0.40	3.4	1.36	4.6	4.6	0.0	4.6	0.0%	-	
CVS-21 (Inlet 1-7)	19	1.61	6.9	0.40	4.3	1.05	4.7	4.7	0.0	4.7	0.0%	-	
CVS-22 (Inlet 2-7)	20	1.80	10.8	0.40	3.6	0.80	3.1	3.1	0.0	3.1	0.0%	-	
CVS-23 (Inlet 3-7)	21	3.88	16.1	0.47	3.1	1.13	6.3	6.3	0.0	6.3	0.0%	-	
BEL-1 (Inlet 2-1)	81	3.73	12.8	0.52	3.4	1.13	4.0	4.0	0.0	4.0	3.3%	36	
BEL-2 (Inlet 1-1)	82	1.36	7.6	0.82	4.2	0.65	4.1	4.1	0.0	4.1	0.9%	36	
BEL-3 (Inlet 2-2)	83	4.31	14.4	0.19	3.2	1.26	4.2	4.2	0.0	4.2	0.6%	36	
BEL-4 (Inlet 1-2)	84	1.75	7.9	0.89	4.1	1.21	5.0	5.0	0.0	5.0	1.6%	29%	
BEL-5	85	4.95	11.0	0.24	3.6	1.11	11.1	11.1	0.0	11.1	0.0%	-	
BEL-6	86	3.95	7.4	0.86	4.2	2.61	10.9	10.9	0.0	10.9	0.0%	-	

LEGEND

- XX SUB-BASIN #
- XXX AC 2/5-YEAR RUNOFF COEFFICIENT (*DENOTES 5-YEAR RUNOFF)
- XXX AC 100-YEAR RUNOFF COEFFICIENT
- PROPOSED SUB-BASIN BOUNDARY



DATE

REVISIONS

PROJ. MGR.: RLB

PROJ. ASSOC.: ASD

DRAWN BY: RAK

DATE: 6-30-16

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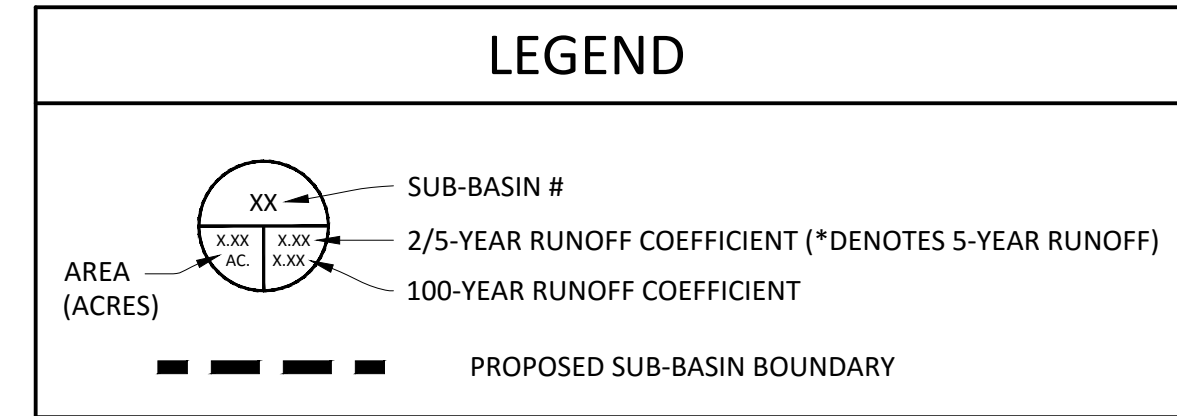
PROPOSED DRAINAGE AREA MAP

SHEET

1 OF 3

CLCPK3

Plotted: 9/20/2016 8:38 AM. Draw Name: P:\Projects\CompSouth\Documents\Engineering\StormWater\Reports\Embshid\Drainage Basin Map_RAK 6-23-16.dwg. Updated by: RAK



2 YEAR STORM

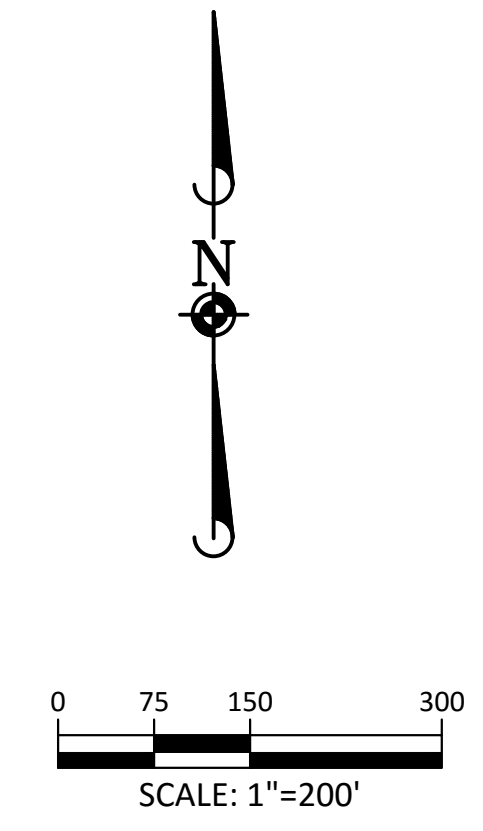
Basin ID	Drainage Point	Area (Ac)	Runoff Coefficient	Runoff (CFS)	Drainage Time (Min)	Inlet	Storm Sewer	Remarks
CVS-1 (Inlet 1-3)	1	3.85	0.69	0.28	4.3	110	4.7	4.7
CVS-2 (Inlet 2-3)	2	1.42	0.65	0.55	4.4	0.97	4.3	4.2
CVS-3 (Inlet 1-4)	3	0.94	0.82	0.55	4.4	0.52	2.3	2.3
CVS-4 (Inlet 1-4)	4	1.17	0.41	0.44	0.50	0.51	2.5	2.5
CVS-4A (Inlet 3-4)	4A	1.76	0.40	0.45	0.38	0.78	2.9	2.9
CVS-5 (Inlet 5-4)	5	2.63	0.40	0.40	0.39	1.05	4.1	4.1
CVS-6 (Inlet 5-4)	6	0.98	0.40	0.40	0.47	0.29	1.1	1.1
CVS-6A (Inlet 7-4)	6A	0.78	0.0	0.02	4.7	0.01	0.1	0.1
CVS-7 (Inlet 1-6)	7	1.11	0.52	0.59	0.37	0.29	2.9	2.9
CVS-8 (Inlet 2-6)	8	1.59	0.41	0.49	0.37	0.78	2.9	2.9
CVS-9 (Inlet 4-5A)	9	2.30	0.40	0.40	0.35	1.22	4.3	4.3
CVS-9A (Inlet 1-4)	9A	0.37	0.0	0.00	4.7	0.18	0.9	0.9
CVS-10 (Inlet 5-5A)	10	3.47	0.40	0.40	0.35	1.58	5.6	5.6
CVS-11 (Inlet 1-5)	11	2.03	0.52	0.69	0.34	1.41	4.9	4.9
CVS-12 (Inlet 2-5)	12	4.48	0.40	0.40	0.35	2.19	7.7	7.7
CVS-12A (Inlet 3-5)	12A	2.63	0.40	0.40	0.38	1.29	4.9	4.9
CVS-13 (Inlet 4-5)	13	4.89	0.40	0.40	0.35	1.98	9.8	9.8
CVS-14 (Inlet 6-5)	14	6.95	0.40	0.40	0.35	2.81	14.3	14.3
CVS-14A (Inlet 7-5)	14A	4.01	0.40	0.40	0.38	0.97	6.2	6.2
CVS-15 (Inlet 5-5)	15	3.00	0.40	0.40	0.37	1.47	5.5	5.5
CVS-16	16	2.07	0.45	0.45	0.33	0.90	3.1	3.1
CVS-17	17	4.10	0.52	0.65	0.37	1.86	7.0	7.0
CVS-18	18	3.96	0.58	0.65	0.34	1.36	4.8	4.8
CVS-19	19	1.61	0.40	0.40	0.45	1.05	4.7	4.7
CVS-20	20	1.80	0.48	0.45	0.36	0.80	2.9	2.9
CVS-21	21	3.86	0.61	0.65	0.31	1.29	5.3	5.3
BEL-1 (Inlet 2-1)	81	3.73	0.28	0.30	3.4	1.13	3.9	3.9
BEL-2 (Inlet 1-1)	82	1.36	0.40	0.40	0.42	0.99	4.1	4.1
BEL-3 (Inlet 2-2)	83	6.76	0.44	0.44	0.32	1.26	4.1	4.1
BEL-4 (Inlet 1-2)	84	1.75	0.40	0.40	0.42	1.21	5.0	5.0
BEL-5	85	4.55	0.40	0.40	0.36	1.05	11.1	11.1
BEL-6	86	3.95	0.40	0.40	0.42	2.50	10.5	10.5

5 YEAR STORM

Basin ID	Drainage Point	Area (Ac)	Runoff Coefficient	Runoff (CFS)	Drainage Time (Min)	Inlet	Storm Sewer	Remarks
CVS-1 (Inlet 1-3)	1	3.85	0.69	0.33	4.3	127	6.5	6.5
CVS-2 (Inlet 2-3)	2	1.42	0.65	0.43	1.03	4.5	4.5	4.5
CVS-3 (Inlet 1-4)	3	0.94	0.82	0.58	4.4	0.54	2.4	2.4
CVS-4 (Inlet 1-4)	4	1.17	0.46	0.46	0.53	2.6	3.4	3.4
CVS-4A (Inlet 3-4)	4A	1.76	0.40	0.47	0.38	0.92	3.1	3.1
CVS-5 (Inlet 5-4)	5	2.63	0.40	0.40	0.39	1.10	4.3	4.3
CVS-6 (Inlet 5-4)	6	0.98	0.40	0.40	0.47	0.24	1.1	1.1
CVS-6A (Inlet 7-4)	6A	0.78	0.0	0.02	4.7	0.01	0.1	0.1
CVS-7 (Inlet 1-6)	7	1.11	0.52	0.73	0.28	0.81	3.0	3.0
CVS-8 (Inlet 2-6)	8	1.59	0.41	0.51	0.37	0.81	3.0	3.0
CVS-9 (Inlet 4-5A)	9	2.30	0.40	0.40	0.35	0.98	4.2	4.2
CVS-9A (Inlet 1-4)	9A	0.37	0.0	0.01	4.7	0.18	0.9	0.9
CVS-10 (Inlet 5-5A)	10	3.47	0.40	0.40	0.35	1.05	4.8	4.8
CVS-11 (Inlet 1-5)	11	2.03	0.52	0.73	0.34	1.47	6.1	6.1
CVS-12 (Inlet 2-5)	12	4.48	0.40	0.40	0.35	2.29	8.0	8.0
CVS-12A (Inlet 3-5)	12A	2.63	0.40	0.40	0.38	1.29	5.2	5.2
CVS-13 (Inlet 4-5)	13	4.89	0.40	0.40	0.35	1.98	10.0	10.0
CVS-14 (Inlet 6-5)	14	6.95	0.40	0.40	0.35	2.81	14.3	14.3
CVS-14A (Inlet 7-5)	14A	4.01	0.40	0.40	0.38	0.97	6.2	6.2
CVS-15 (Inlet 5-5)	15	3.00	0.40	0.40	0.37	1.53	6.7	6.7
CVS-16	16	2.07	0.45	0.47	0.33	0.90	3.2	3.2
CVS-17	17	4.10	0.52	0.47	0.37	1.84	7.3	7.3
CVS-18	18	3.96	0.58	0.44	0.34	1.42	4.8	4.8
CVS-19	19	1.61	0.40	0.46	0.45	1.09	4.9	4.9
CVS-20	20	1.80	0.48	0.47	0.36	0.84	3.1	3.1
CVS-21	21	3.86	0.61	0.47	0.31	1.00	5.5	5.5
BEL-1 (Inlet 2-1)	81	3.73	0.28	0.30	3.4	1.16	4.0	4.0
BEL-2 (Inlet 1-1)	82	1.36	0.40	0.42	0.99	4.1	4.1	4.1
BEL-3 (Inlet 2-2)	83	6.76	0.44	0.40	0.32	1.30	4.2	4.2
BEL-4 (Inlet 1-2)	84	1.75	0.40	0.42	1.21	5.0	5.0	5.0
BEL-5	85	4.55	0.40	0.36	1.05	11.6	11.6	11.6
BEL-6	86	3.95	0.40	0.42	2.61	10.9	10.9	10.9

100 YEAR STORM

Basin ID	Drainage Point	Area (Ac)	Runoff Coefficient	Runoff (CFS)	Drainage Time (Min)	Inlet	Storm Sewer	Remarks
CVS-1 (Inlet 1-3)	1	3.85	0.69	0.60	2.91	20.2	20.2	20.2
CVS-2 (Inlet 2-3)	2	1.42	0.65	0.81	1.21	9.9	9.9	9.9
CVS-3 (Inlet 1-4)	3	0.94	0.82	0.76	0.3	0.71	5.9	5.9
CVS-4 (Inlet 1-4)	4	1.17	0.46	0.50	0.53	2.6	3.1	3.1
CVS-4A (Inlet 3-4)	4A	1.76	0.40	0.46	0.38	0.92	3.1	3.1
CVS-5 (Inlet 5-4)	5	2.63	0.40	0.46	0.39	1.10	4.3	4.3
CVS-6 (Inlet 5-4)	6	0.98	0.40	0.46	0.47	0.24	1.1	1.1
CVS-6A (Inlet 7-4)	6A	0.78	0.0	0.02	4.7	0.01	0.1	0.1
CVS-7 (Inlet 1-6)	7	1.11	0.52	0.74	0.28	0.81	3.0	3.0
CVS-8 (Inlet 2-6)	8	1.59	0.41	0.51	0.37	0.81	3.0	3.0
CVS-9 (Inlet 4-5A)	9	2.30	0.40	0.46	0.35	0.98	4.2	4.2
CVS-9A (Inlet 1-4)	9A	0.37	0.0	0.01	4.7	0.18	0.9	0.9
CVS-10 (Inlet 5-5A)	10	3.47	0.40	0.46	0.35	1.05	4.8	4.8
CVS-11 (Inlet 1-5)	11	2.03	0.52	0.74	0.34	1.47	6.1	6.1
CVS-12 (Inlet 2-5)	12	4.48	0.40	0.46	0.35	2.29	8.0	8.0
CVS-12A (Inlet 3-5)	12A	2.63	0.40	0.46	0.38	1.29	5.2	5.2
CVS-13 (Inlet 4-5)	13	4.89	0.40	0.46	0.35	1.98	10.0	10.0
CVS-14 (Inlet 6-5)	14	6.95	0.40	0.46	0.35	2.81	14.3	14.3
CVS-14A (Inlet 7-5)	14A	4.01	0.40	0.46	0.38	0.97	6.2	6.2
CVS-15 (Inlet 5-5)	15	3.00	0.40	0.46	0.37	1.53	6.7	6.7
CVS-16	16	2.07	0.45	0.50	0.33	0.90	3.2	3.2
CVS-17	17	4.10	0.52	0.47	0.37	1.84	7.3	7.3
CVS-18	18	3.96	0.58	0.44	0.34	1.42	4.8	4.8
CVS-19	19	1.61	0.40	0.46	0.45	1.09	4.9	4.9
CVS-20	20	1.80	0.48	0.47	0.36	0.84	3.1	3.1
CVS-21	21	3.86	0.61	0.47	0.31	1.00	5.5	5.5
BEL-1 (Inlet 2-1)	81	3.73	0.28	0.30	3.4	1.16	4.0	4.0
BEL-2 (Inlet 1-1)	82	1.36	0.40	0.42	0.99	4.1	4.1	4.1
BEL-3 (Inlet 2-2)	83	6.76	0.44	0.40	0.32	1.30	4.2	4.2
BEL-4 (Inlet 1-2)	84	1.75	0.40	0.42	1.21	5.0	5.0	5.0
BEL-5	85	4.55	0.40	0.36	1.05	11.6	11.6	11.6
BEL-6	86	3.95	0.40	0.42	2.61	10.9	10.9	10.9



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PROJ. MGR.: RLB
 PROJ. ASSOC.: ASD
 DRAWN BY: RAK
 DATE: 6-30-16

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2 OF 3
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