V1_Drainage Report - Final_COMMENTS.pdf Markup Summary

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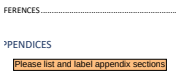

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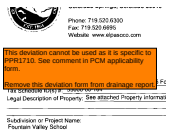

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This deviation cannot be used as it is specific to PPR1710. See comment in PCM applicability form.

Remove this deviation form from drainage report.

eschoenheit (10)

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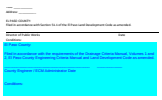

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El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____
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County Engineer / ECM Administrator Date

Conditions:

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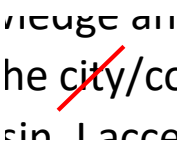

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Add Four Step Process

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Please quantify this in term of what the downstream drainage and infiltration area can accommodate based on analysis. See page 6 of the previous FDR PPR1917 for example. Discuss at what point the downstream capacity will be exceeded since there has been numerous redevelopments over the years and increase in runoff and impervious area.

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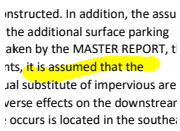
provide analysis summation to substantiate. In term of imperviousness and cfs runoff increase etc.



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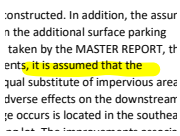

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FOUNTAIN VALLEY SCHOOL ACADEMIC BUILDING

FINAL DRAINAGE REPORT
6155 Fountain Valley School Road, Colorado Springs, CO

Martin/Martin, Inc. Project No.: 23.0895

March 13, 2026

PCD File #
PPR2610

Prepared For: Fountain Valley School of Colorado
6155 Fountain Valley School Road
Colorado Springs, CO, 80911
719-391-5231
Attn: Dave Mesko, John Litchenberg

Prepared By: MARTIN/MARTIN, INC.
12499 WEST COLFAX AVENUE
LAKEWOOD, COLORADO 80215
303.431.6100

Principal-in-Charge: Peter S. Buckley, PE
Project Manager: Nicole Kontour, PE
Project Engineer: Alecsander Guevara-Petrone, PE

Statements and Acknowledgements

ENGINEERS STATEMENT:

The attached drainage plan and report were prepared under my direct supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the city/county for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Peter S. Buckley, PE
PE. No: 40671
Martin/Martin Consulting Engineers

DEVELOPERS STATEMENT:
I, Fountain Valley School of Colorado, the developer have read and will comply with all of the requirements specified in this drainage report and plan.

Fountain Valley School of Colorado
By: _____
Title: _____
Address: _____

EL PASO COUNTY:
Filed in accordance with Section 51.1 of the El Paso Land Development Code as amended.

Director of Public Works Date
Conditions:

El Paso County:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

_____ _____
County Engineer / ECM Administrator Date

Conditions:

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Please list and label appendix sections

Add Four Step Process

I. GENERAL LOCATION AND DESCRIPTION

A. Location

The Fountain Valley School of Colorado Academic Center project (hereafter referred to as the "PROJECT") is located within the Northeast Quarter of the Southwest Corner of Section 18 and in the Northwest Quarter of the Southeast Corner of Section 18, Township 15 South, Range 65 West of the 6th Principal Meridian, City of Colorado Springs, County of El Paso, State of Colorado. The Fountain Valley School of Colorado is a privately owned preparatory school, with a campus encompassing approximately 937 acres, and is located east of Security, Colorado and within the south-central portion of El Paso County, Colorado. The PROJECT is an approximate 10.43 acre redevelopment of the heart of campus. The existing campus is bound by Fontaine Boulevard to the South, Grinnell Boulevard to the West, and Goldfield Drive to the North and East. The proposed site is nested between the Big Johnson Reservoir and the McCrae Reservoir. The Fountain Valley School of Colorado property is surrounded by residential developments to the south, west, and north. The remaining area adjacent to the property is undeveloped land.

Figure 1: Vicinity Map

B. Description of Property

The existing site consists of a hacienda, library, dormitories, classroom building, chapel, student center, administrative building, health center, science building, and gymnasium/performing arts center. The existing site has various asphalt drive lanes and roads, parking lots, asphalt, concrete, and brick paver pathways, and a roundabout. Existing ground coverage throughout

the site is limited to native grass, trees, shrubs, and bushes. A portion of the existing irrigation ditch that services the approximate 937 acre campus passes through the proposed site and is to undergo realignment and restoration with the PROJECT.

A geotechnical investigation and study was carried out for this project completed by Terracon. The report titled "Fountain Valley School Academic Center Improvements" and dated May 31, 2024 provided recommendations for foundations, grading and drainage, pavements, and findings from the subsurface explorations such as soil types, groundwater depths, and soil infiltration rates. The report was further supplemented by an NRCS Web Soils Survey. Per the NRCS Soils Survey, the majority of the proposed site is underlain by Truckton Sandy Loam, 0 to 3 percent slopes (96) and Truckton Sandy Loam, 3 to 9 percent slopes(97). The soils are considered to have high infiltration potential with well drained class and low to very low runoff potential and characterized as Hydrologic Soil Group A. Hydrologic and Runoff Calculations have been completed utilizing Type A soils. The NRCS Soils Survey shall be included in Appendix A for reference. It should be noted that the previous drainage study, to be referenced in this report, titled "Master Development Drainage Plan Fountain Valley School," prepared by Kiowa Engineering Corporation, and dated received April 28, 2011 utilized Hydrologic Soil Group B for Hydrologic and Rational calculations. Based on the NRCS soils report, geotechnical investigation, Hydrologic Soils Group characteristics, and the engineer's judgement, it is believed that the onsite soils more closely align with Hydrologic Soil Group A.

During the onsite geotechnical investigation, it was documented that groundwater levels are relatively shallow, ranging in depth from 2 to 15 feet below the existing surface. Recommendations for site grading and design, construction activities, and dewatering operations have been provided by the geotechnical engineer and are documented within the referenced report. It should be noted that the groundwater levels observed during the site investigation may be subject to change resulting in groundwater elevations higher or lower than originally documented. A perimeter drain has not been recommended for the proposed structures associated with the PROJECT, however sump pumps are required at the elevator pits.

The existing site generally slopes west to east with existing slopes ranging from 4%-20% and an approximate elevation difference of 40 feet. In general, stormwater conveyance consists of overland flow from the chapel and sage residence hall to the existing private irrigation ditch west of the existing surface parking lot. In addition, storm sewer infrastructure such as area inlets, roadway inlets, and storm sewer pipe support drainage operations. Further discussion of existing drainage patterns and reference to the master drainage report, titled "Master Development Drainage Plan Fountain Valley School," prepared by Kiowa Engineering Corporation, and dated received April 28, 2011 (hereafter referred to as the "MASTER REPORT") will occur in the following sections of this report.

Various existing dry and wet utilities exist beneath the existing site and have been mapped to the best of the engineer's ability. Where conflicts occur, coordination to relocate or adjust utilities has occurred and is accounted for in the construction documents.

The proposed development for the Fountain Valley School of Colorado Academic Center Project consists of a major demolition phase consisting of the removal of the existing administration building and classroom/motel building, the existing asphalt parking lot southeast of the irrigation ditch, the existing asphalt drive lane and asphalt parking lot west of the Chapel and Hacienda, the roundabout, all pathways within the heart of campus, various landscaping elements. In addition a portion of the private irrigation ditch set to the relocated with the PROJECT. Construction for the proposed development consists of one 2-story, 33,339 SF, Humanities Building, one 2-story, 22,408 SF, STEM Building, a bioswale, wet meadow, realignment of pedestrian pathways and circulation, realignment of the west drive lane and associated parking, realignment of the north drive lane, new surface parking southeast of the wet meadow, fire rescue accessibility improvements, and various landscaping improvements throughout the site. This development is anticipated to have a total area of 10.43 acres. Due to the existing campus foliage, grading operations and tiebacks have been strategic to protect various existing trees on site while adhering to existing drainage patterns.

II. DRAINAGE BASINS AND SUB-BASINS

A. Major Basin Descriptions

Per the MASTER REPORT, the proposed development is within the Big Johnson Reservoir/Crews Gulch Basin. A Drainage Basin Planning Study (DBPS) was referenced in the MASTER REPORT and states that detention will not be required with any development in this area since detention is accomplished with Carp Lake, otherwise known as McRae Reservoir, downstream of the school and north of Fontaine Boulevard. According to the MASTER REPORT and provided topographic survey, the existing campus generally drains north to south through a combination of sheet flow, gutter flow, storm sewer and associated infrastructure, and swales. As observed on site and described in the MASTER REPORT, a system of irrigation ditches runs through the campus and has portions that function as the main conveyance path of all stormwater runoff associated with the western half of the Fountain Valley School of Colorado campus. While that general drainage pattern remains consistent with the PROJECT, due to existing buildings within the location of the proposed site within the larger Fountain Valley Campus, runoff generally overland flows west to east before flowing south. Ultimately, runoff generated from the campus discharges into Crews Gulch and Carp Lake south of the school property. It was stated in the MASTER REPORT that water quality is indirectly provided by segments of the irrigation ditch due to their flat nature, slowing water down and allowing for sediment to deposit along the channel. In addition to indirect water quality, the length and roughness of the irrigation ditch increases time of concentration and lowers peak flows reaching Carp Lake. Excerpts from the MASTER REPORT will be provided within Appendix D for reference.

It should be noted that analysis discussed within MASTER REPORT elected to assume the irrigation ditch is flowing full. However, the irrigation ditch and laterals are used infrequently during the irrigation season. In addition, the MASTER REPORT utilized the 5-YR and 100-YR storm events for runoff calculations. Per the El Paso County Drainage Criteria, minor and major storm event reoccurrence intervals to be analyzed are the 10-YR and 100-YR events, respectively. When validating runoff quantities, only the Q_{100} values provided in the MASTER

REPORT have been considered. Variability in runoff results is expected as the proposed study will be utilizing Hydrologic Soil Group A whereas the MASTER REPORT utilized Hydrologic Soil Group B for runoff calculations.

Floodplain Statement: According to the Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map (FIRM), Panel No. 08041C0952G, dated December 7, 2018, the existing site is within unshaded Zone X, Area of Minimal Flood Hazard. A portion of the existing campus, approximately 0.21 miles to the southeast of the proposed site, is within Zone AE, Regulatory Floodway. No development or construction associated with the PROJECT is planned within Zone AE. If future development is planned within a Regulatory Floodway at the Fountain Valley School of Colorado, a Floodplain Development Permit may be required. A copy of the FEMA FIRMette has been included in Appendix A for reference.

B. Sub-Basin Descriptions

Existing Drainage

In the existing condition, stormwater runoff within the proposed site is typically conveyed via overland flow west to east, with additional collection and conveyance support via storm sewer infrastructure, before ultimately flowing south once runoff enters in the irrigation ditch. The drainage plan associated with the MASTER REPORT has divided the campus into three basin groupings: 'A' sub-basins, 'B' sub-basins, and 'C' sub-basin. Each set of sub-basins have specific design points associated with multiple individual basins to identify a final outfall location and quantify runoff. Sub-basins have individual collection elements, where applicable, such as roadway or area inlets, however for the purposes of understanding total runoff associated with a larger area having similar drainage patterns, sub-basins B-1 through B-3 and Design Point 3a for example, a singular design point has been assigned. For the purposes of this study, existing sub-basins A-1, A-2, B-1, B-2, B-3, C-1, C-2, C-3, D-1, and D-2 and design points 1, 3a, 5, and 6 will be further discussed and analyzed. While the MASTER REPORT is intended to be referenced when discussing developed runoff and existing drainage patterns, it should be noted that the study described within then MASTER REPORT considered future development and master planning provided by the Fountain Valley School of Colorado. The existing conditions associated with the proposed drainage study outlined in this report do not reflect all of the assumptions made in the MASTER REPORT. Where applicable, additional analysis will be provided on existing sub-basins to create a more cohesive picture of the existing campus to date, proposed improvements, imperviousness, and runoff. An exhibit of the existing drainage plan and proposed drainage basins associated with the PROJECT has been developed and included in Appendix E for reference.

Existing Sub-Basin A-2: Approximately 3.94 ac, comprised of asphalt road, a portion of the existing chapel, a portion of the existing dining hall/hacienda, a future performing arts center, and associated landscaping and hardscaping. This existing sub-basin is located on the western frontage of the existing campus and proposed site and is tributary to design point 1. Improvements within this sub-basin are limited and consist mostly of removal and replacement of surface features, such as the existing asphalt road and surface parking. The runoff associated

with existing sub-basin A-2 is not tributary to the proposed outfalls designed and installed with this project. It is assumed that the minimal increase in imperviousness to this basin, if any, is negligible and will have no adverse impacts on downstream existing infrastructure. Future key elements assumed during the study of this existing sub-basin that do not exist onsite at the time of this drainage analysis are the future performing arts building and future garden amphitheater. Existing sub-basin A-2 is considered an off-site basin for the purposes of this drainage study.

Existing Sub-Basins D-1 and D-2: The total area of these sub-basins is approximately 24.96 ac, comprised of existing buildings, faculty residences, asphalt drive lanes, and associated landscaping and hardscaping. These sub-basins are undisturbed and will have no improvements occur as part of the PROJECT but should be considered as they are tributary to design point 6 being the furthest upstream end of the irrigation ditch the PROJECT will be outfalling to. It is important to understand assumed flows to design point 6 to verify capacity of the newly aligned portion of the existing irrigation ditch, now being described as the wet meadow with the PROJECT. In general, future key elements associated with these sub-basins have been installed in some capacity based on the existing drainage plan and onsite observations.

Existing Sub-Basins C-1 and C-2: The total area of these sub-basins is approximately 51.16 ac, comprised of existing buildings, faculty residences, gravel drive lanes, and associated landscaping and hardscaping. Sub-basin C-1 is undisturbed and will have no improvements occur as part of the PROJECT but should be considered as sub-basin C-1 is tributary to design point 5 being an upstream portion of the irrigation ditch the PROJECT will be outfalling to. Sub-Basin C-2 will be subject to minor improvements as part of the PROJECT such as realignment of the existing asphalt road and demolition of the existing classroom building. Due to the proposed drainage strategy and layout of the existing and proposed site, a small area, no more than 0.5ac will no longer be tributary to design point 5 as the remainder of existing sub-basin C-2 still is. Further discussion will be provided in the proposed drainage section. It is important to understand assumed flows to design point 5 to verify capacity of the newly aligned portion of the existing irrigation ditch, now being described as the wet meadow with the PROJECT. Future key elements assumed during the MASTER REPORT analysis that are no longer considered for construction or to be demolished with this project are the existing and future classroom buildings.

Existing Sub-Basins, B-1, B-2, B-3, and C-3: The total area of these sub-basins is approximately 24.8 ac, comprised of existing buildings, faculty residences, asphalt and gravel drive lanes, and associated hardscaping and landscaping. Sub-basin B-1 is generally undisturbed and will have no major improvements occur as part of the PROJECT but should be considered as sub-basin B-1 introduces approximately 35.5cfs during the 100-YR event to the proposed storm sewer system and is tributary to design point 3a also being downstream most outfall of the irrigation ditch and the final design point of the proposed PROJECT stormwater infrastructure. Improvements to sub-basin B-1 generally include realignment of the existing asphalt drive lane, relocation of existing storm sewer curb inlets, and minor hardscaping and landscaping improvements. Sub-basins B-2, B-3, and C-3 in the MASTER REPORT encompass the PROJECT and proposed

development and shall be further sub-divided and analyzed as part of this drainage study. Further discussion will occur within the proposed drainage section of this report.

In general, runoff generated within western portion the existing Fountain Valley School of Colorado campus is intended to be collected and conveyed via overland flow and storm sewer infrastructure to the existing irrigation ditch starting north of the existing tennis courts, also being design point 5, and ending at design point 3a also being the final campus outfall. From this point, runoff is conveyed via irrigation ditch east of Fountain Valley School Road before being discharged to flood irrigate the existing heavily vegetated hay fields south of the track and field and east of Fountain Valley School Road. These hay fields also function as the water quality facility servicing the existing campus per the approved drainage criteria deviation. DEV17015, submitted and approved with a 2007 development, requests deviation from ECM Section I.7.1.B. The proposed deviation was for a 'non-standard' BPM, in lieu of a 'standard' BMP, being the private irrigation system and hay fields to provide water quality to an extent equal to or greater than a constructed BMP. In the deviation review and decision form, the following was stated: "Theoretical analysis of the water quality control is difficult to impossible to determine for BMPs. However, empirically the required water quality control is provided as the required water quality capture volume is met not only for the proposed development, but for the entire developed core area of the school." A copy of the deviation request form has been included in Appendix D for reference.

Proposed Drainage

Runoff generated within the proposed development is intended to be collected and conveyed via overland flow, storm sewer infrastructure, and surface features such as a BioSwale and Wet Meadow to the existing design point 3a at the southeast corner of the proposed site. Due to the nature of improvements associated with the PROJECT various existing elements for drainage conveyance have been removed and replaced. Most notably the existing culvert at design point 3a and the grass lined portion of the irrigation ditch southeast of the existing administrative building. These improvements do not fundamentally change the conveyance of runoff but provide a more functional use of the space to better fit the campus programmatic updates associated with the PROJECT. As stated previously, the proposed development is approximately 10.43 acres of disturbed area. The rational calculations prepared for this report pertain to the area, approximately 9.39 acres, tributary to design point 3a, also being the existing culvert at the southeast corner of the site north of existing site access road east of the campus main entry roundabout. The remaining 1.04 acres is limited to offsite bases that are not tributary to design point 3a. These areas being the redeveloped MASTER REPORT sub-basin A-2 and the proposed southeast surface parking lot. These areas are tributary to MASTER REPORT design points 1 and 8, respectively.

The PROJECT proposes a heart of campus redevelopment that is approximately 9.39acres and 36.8% impervious with approximate 10-YR and 100-YR runoff quantities of 21.37cfs and 43.67cfs, respectively. In comparison to the MASTER REPORT existing sub-basins to be redeveloped, the acreage and 100-YR runoff quantities are as follows, 10.01 acres and 37.8cfs, respectively. It is important to note that the 5.87cfs delta in runoff quantities between the

proposed and existing site may be largely attributed to the assumptions taken with respect to the MASTER REPORT and the proposed development. The PROJECT is redeveloping existing sub-basins B-2, B-3, and C-3 which assumed minimal building additions whereas larger building additions were slated for construction in adjacent existing sub-basins. In the existing condition at the time of this report, various future buildings and/or additions assumed by the MASTER REPORT did not materialize and the PROJECT has proposed two larger structures amounting to approximately 30,754SF. Demolition of two structures is set to occur with the PROJECT amounting to approximately 9,729SF, resulting in a net addition of 21,025SF of roof area not originally assumed or accounted for in runoff calculations for the existing sub-basins in question which amounts to approximately 3.92cfs.

Based on the various assumptions within the MASTER REPORT in comparison to existing development on the campus, it is assumed that any delta in runoff quantities is negligible to the entire campus drainage system, water quality provided by the hay fields, and capacity of the downstream detention provided by Carp Lake. This report and the accompanying appendices and documentation will demonstrate that the proposed storm sewer infrastructure, BioSwale, and Wet Meadow, have been adequately sized to convey the minor and major events, in addition to ensuring that the final outfall for the proposed site, design point 3a, has been adequately sized for all runoff tributary.

Please quantify this in term of what the downstream drainage and infiltration area can accommodate based on analysis. See page 6 of the previous FDR PPR1917 for example. Discuss at what point the downstream capacity will be exceeded since there has been numerous redevelopments over the years and increase in runoff and impervious area.

Proposed Site Drainage Specific Details

The proposed site and associated drainage strateg four primary catchment areas. Three of the four areas are tribu mary collection or conveyance elements. The fourth area is limited t ot enter any of the proposed collection or conveyance elements but s campus wide site drainage strategy and patterns. Further discussion en below in this report. The remaining onsite areas tributary to ex timate site outfall, also being proposed design point C20, can be furt

- ‘A’ Sub-Basins
    - ‘A’ sub-basins are limited to A1-A stics limited to landscaping, concrete, roof, grave e general drainage strategy is limited to overland flo cifics areas where storm infrastructure is required t rious site/building elements. Runoff within ‘A’ sub-b t to east, curb chases have been strategically pla off to traverse beneath walks and avoid overtop ‘A’ sub-basins are tributary to the BioSwale located west of the proposed buildings. Developed runoff associated with the ‘A’ sub-basins has been calculated at 8.5cfs for the minor storm and 17.69cfs for the major storm event. The bioswale has been designed to convey both the minor and major events while indirectly providing additional water quality, that has not been accounted for, via sediment deposits along the bottom channel of the BioSwale. Sections along the BioSwale have been analyzed to determine water surface elevation and ensure adequate

clearance beneath pedestrian bridge and walkway crossings. Once runoff associated with the 'A' sub-basins is discharged from the BioSwale flared end section, it will enter a gravel swale and sediment basin to dissipate energy and trap sediment prior to entering the Wet Meadow. Once runoff enters the Wet Meadow, all flows from 'A' and 'C' sub-basins will be conveyed to design point C20 which is the ultimate outfall point for all runoff associated with the PROJECT. Design point C20 is a proposed 45"x29" HERCP culvert that has replaced the existing 30"x19" existing HERCP culvert. From here, runoff will enter the existing irrigation ditch south of Fountain Valley School Road before adhering to existing drainage patterns and flood irrigating the existing hay fields.

- 'B' Sub-Basins
    - 'B' sub-basins are limited to B1-B24, have surface characteristics limited to landscaping, asphalt, concrete, grasspave and gravelpave systems, roof, and gravel. The general drainage strategy is limited to minor overland flows directed towards concentrated conveyance paths via grass swales, gravel swales, and curb and gutter, to be collected by area inlets and roadway inlets. All developed runoff within the proposed 'B' sub-basins shall be collected and conveyed via storm sewer infrastructure. The main site trunk line responsible for the conveyance of proposed 'B' sub-basin runoff, and the MASTER REPORT existing sub-basin B-1, is Stormline A, which has a secondary outfall that has been divorced from the BioSwale and Wet Meadow. To reduce the size of energy dissipation structures, sediment forebays, and proposed culverts, runoff within the proposed 'B' sub-basins and the existing 35.5cfs per the MASTER REPORT has been elected to be divorced from the overland site runoff. The secondary outfall is intended to maintain existing drainage patterns by discharging on the south side of Fountain Valley School Road and reintroducing runoff to the existing irrigation ditch before entering existing conveyance paths and flood irrigating the existing hay fields to provide water quality as mentioned above. All runoff associated with the 'B' sub-basins tributary to Stormline A, located west of the proposed buildings, has been calculated at 4.79cfs for the minor storm and 9.51cfs for the major storm event in the proposed condition. Hydraulic modeling has been completed and includes the additional 35.5cfs in the major storm event associated with the MASTER REPORT B-1 sub-basin to ensure all storm infrastructure has been adequately sized.
- 'C' Sub-Basins
    - 'C' sub-basins are limited to C1-C21, have surface characteristics limited to landscaping, grasspave and gravel pave systems, gravel, concrete, asphalt, and roof. The general drainage strategy is limited to minor overland flows directed towards concentrated conveyance paths via grass swales, gravel swales, and curb and gutter, to be collected by area inlets and roadway inlets. All developed runoff within the proposed 'C' sub-basins shall be collected and conveyed via storm sewer infrastructure before ultimately outfalling to the Wet Meadow in the southeast portion of the site. Stormlines B and C are the main trunk line associated with the conveyance of this portion of the site. 'C' sub-basins cover

the remaining site area being the eastern portion of the buildings and PROJECT site in addition to the proposed asphalt drive lane along the northern portion of the PROJECT site and a portion of site northeast of the existing student center. Runoff will generally flow overland or be discharged via flared end section into the proposed Wet Meadow before ultimately being conveyed via culvert to the existing irrigation ditch southeast of fountain valley school road. From here, runoff will enter the existing irrigation ditch south of Fountain Valley School Road before adhering to existing drainage patterns and flood irrigating the existing hay fields.

Proposed Site Drainage – Off-site Drainage

Off-site drainage is limited to two areas within the PROJECT site. The first area where off-site drainage is to occur is within MASTER REPORT sub-basin A-1 and A-2, the existing asphalt road, west of the existing chapel, and the associated landscaping and hardscaping. In the existing condition, drainage within MASTER REPORT sub-basin A-1 overland flows to existing design point 1, west of the main entry roundabout, before entering a 24" CMP culvert. Runoff within MASTER REPORT sub-basin A-2 is conveyed via roadside ditch to a 24" CMP culvert northwest of the main entry roundabout before being conveyed to design po e basins are limited to a realignment of the existing asphalt road, concrete sidewalk, and grasspave system. It should be noted th REPORT drainage plan various future improvements such as fut preforming arts building, future amphitheater, and a future clas accounted for when designing this basin. In the existing conditi none of the abovementioned improvements have been constructed. In addition, the assumed for future parking encompasses a much greater area than the additional surface parking provided with the PROJECT. Based on these assumptions taken by the MASTER REPORT, the current existing conditions, and the proposed improvements, it is assumed that the development associated with the project is as most an equal substitute of impervious area and therefore will have no increase in developed runoff, or adverse effects on the downstream infrastructure. The additional area where off-site drainage occurs is located in the southeast portion of the site, also being the proposed surface parking lot. The improvements associated with the PROJECT are limited to the asphalt surface parking lot which is a revitalization of the existing surface parking lot. During the drainage and grading analysis of the proposed project, it was intended to maintain existing drainage patterns. Existing topography suggests that runoff within this portion of the existing campus generally slopes west to east. In order to maintain historic drainage patterns, the proposed surface parking lot was designed to best match the existing condition resulting in off-site flows adhering to historic drainage patterns. In total, offsite drainage accounts for 1.04 acres of disturbed area resulting in a total disrobed PROJECT area of 10.43 acres. Refer to the Existing Drainage Plan Exhibit included in Appendix D.

provide analysis summation to substantiate. In term of imperviousness and cfs runoff increase etc.

III. DRAINAGE DESIGN CRITERIA

A. Regulations

The proposed drainage design is in compliance with the following criteria:

- The City of Colorado Springs/El Paso County Drainage Criterial Manual Volume 1 and 2, October 2018 (CRITERIA)
- Mile High Flood District (MHFD) Drainage Criteria Manual Volumes 1, 2, and 3, latest revision (MANUAL)
- The City of Colorado Springs Drainage Criteria Manual Volume 1, January 2021 (CS CRITERIA)

B. Development Criteria Reference and Constraints

Development constraints the PROJECT and existing campus must adhere to are the requirements laid out in the MASTER REPORT for future development and the approved drainage criteria deviation, DEV17015.

C. Hydrologic Criteria

The proposed design is in accordance with the CRITERIA and the MANUAL. The major and minor design storms utilized for the hydrologic and hydraulic calculations are the 100-year and 10-year events, respectively, per the criteria. The rational method was utilized to determine unrouted, 100-year and 5-year, stormwater runoff associated with the proposed development. Soils were classified as NRCS Hydrologic Soil Group A for rational calculations. Per the CRITERIA, NOAA Atlas 14 one-hour point rainfall data was utilized to ensure the most accurate values were taken into consideration. The 100-year, one-hour precipitation depth utilized for calculations was X.XX inches, while the 10-year, one-hour precipitation depth utilized was X.XX inches. Runoff coefficients and surface characteristic impervious values were based on the CRITERIA. In general, one-hour point rainfall depths for the sub-basins tributary to the existing drainage conveyance system are summarized in the table below:

One (1) Hour Point Rainfall (inches)					
2-Year	5-Year	10-Year	25-Year	50-Year	100-Year
1.00	1.28	1.55	1.97	2.33	2.73

Table 1: One-Hour Point Rainfall Data for Fountain Valley School of Colorado, Colorado Springs, CO

All hydrologic calculations are available for reference within Appendix B.

D. Hydraulic Criteria

Hydraulic analysis for the proposed drainage infrastructure has been designed in accordance with the CRITERIA and CS CRITERIA using Bentley StormCAD hydraulic modeling software. Per the CRITERIA the minor and major storm intervals were considered to have 10-Year and 100-Year return periods, respectively. Supporting calculations and profiles have been provided in Appendix C. The table below provided in Chapter 9 of the CS CRITERIA defines the bend and lateral loss coefficients utilized with the standard headloss method in StormCAD:

Table 9-4. STORMCAD Standard Method Coefficients

Bend Loss		
Bend Angle	**K Coefficient**	
0°	0.05	
22.5°	0.10	
45°	0.40	
60°	0.64	
90°	1.32	
LATERAL LOSS		
One Lateral K Coefficient		
Bend Angle	Non-surcharged	Surcharged
45°	0.27	0.47
60°	0.52	0.90
90°	1.02	1.77
Two Laterals K Coefficient		
45°	0.96	
60°	1.16	
90°	1.52	

Table 2: StormCAD Standard Headloss Coefficients, CS CRITERIA

IV. DRAINAGE FACILITY DESIGN

A. General Concept

The PROJECT anticipates a total of 10.43 acres to be disturbed with 9.39 acres tributary to MASTER REPORT design point 3a. Per the MASTER REPORT, no maximum developed imperviousness was provided however the proposed development has remained within the constraints provided by the MASTER REPORT.

The proposed site has been sub-divided into 59 individual basins and then further categorized into three separate tributary quadrants, namely the BioSwale Flows, Wet Meadow Flows, and Piped Flows. The areas tributary to the BioSwale account for approximately 4.19acres and produces runoff quantities of 8.5cfs and 17.69cfs for the minor and major events, respectively. Cross sections of the bioswale have been analyzed with the use of Bentley FlowMaster. The geometry of the bioswale consists of a 5’-wide flat bottom, with side slopes ranging from 2%-

25% and variable distances. The bioswale has been designed such that during the 100-Year event the normal depth will not exceed 15", while maintaining a minimum 12 inches of freeboard between the 100-YR water surface elevation and the bottom of the pedestrian bridge. The area tributary to the Wet Meadow is approximately 3.64 acres and produces runoff quantities of 8.08cfs and 16.47cfs for the minor and major events, respectively. The wet meadow has been designed as a trapezoidal channel with bottom side slopes of 2% for the first 1.5' offset on either side of the centerline with the remaining channel having side slopes ranging from 2%-25%. Bentely FlowMaster was utilized for cross section analysis. The Piped Flows are limited to the remainder of the PROJECT site and account for approximately 1.56acres and produces runoff quantities of 4.79cfs and 9.51cfs for the minor and major events, respectively. StormCAD was utilized to evaluate the hydraulics of the system for the proposed and existing developments.

V. CONCLUSIONS

A. Compliance with Standards

This drainage study conforms to The City of Colorado Springs/El Paso County Drainage Criterial Manual Volume 1 and 2, October 2018, the latest revision of the Mile High Flood District Manual Volumes 1-3, and the City of Colorado Springs Drainage Criteria Manual Volume 1, January 2021.

B. Drainage Concept

The proposed storm drainage system outline in this report is designed to fully accommodate the 100-Year storm event in the developed condition. As the entirety of the PROJECT site is not capturable, off-site flows will adhere to existing drainage patterns before ultimately being conveyed to the existing heavily vegetated hay fields where water quality is provided. The development of this site will not adversely impact any downstream existing waterways, infrastructure, or Carp Lake.

REFERENCES

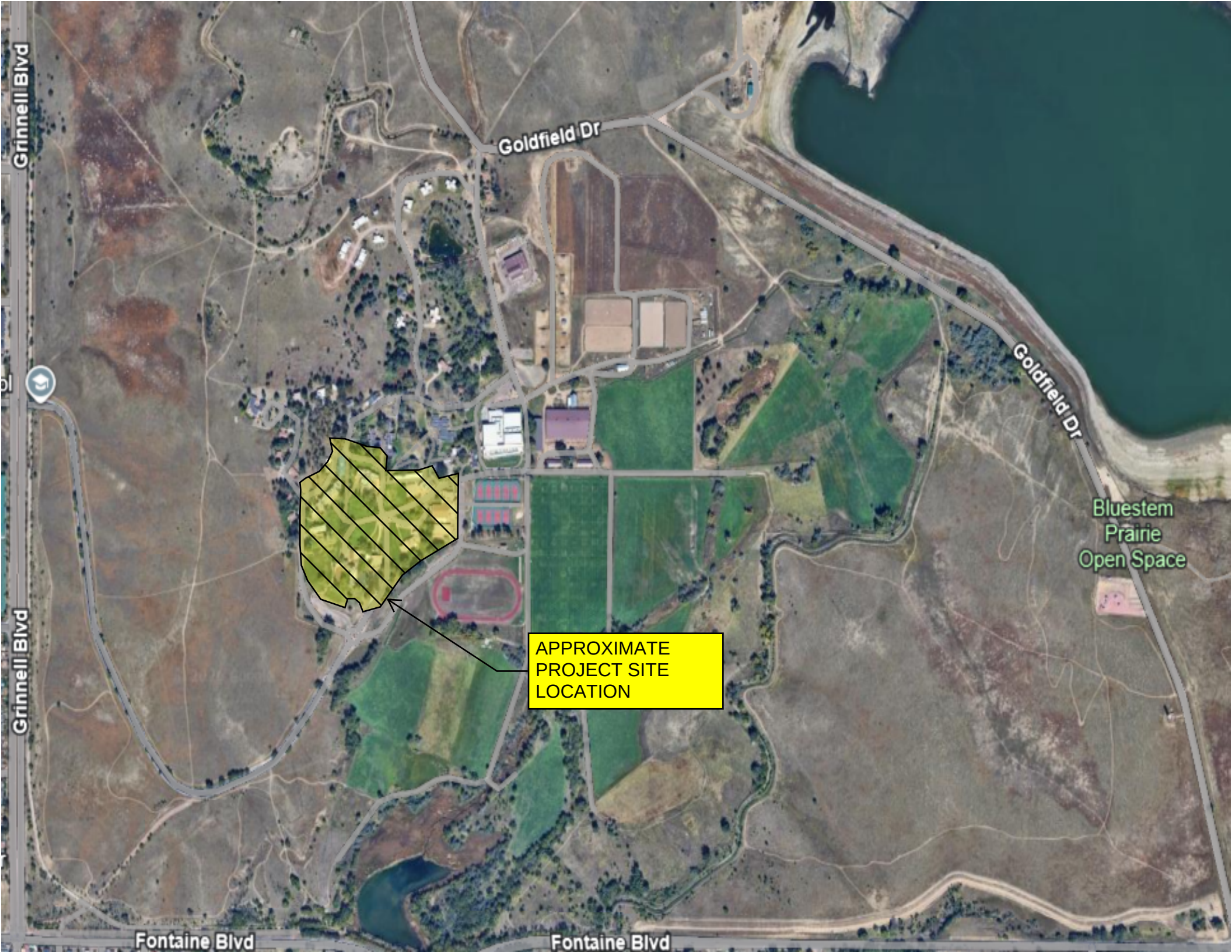
The City of Colorado Springs/El Paso County Drainage Criterial Manual Volume 1 and 2, October 2018 (CRITERIA)

Mile High Flood District (MHFD) Drainage Criteria Manual Volumes 1, 2, and 3, latest revision (MANUAL)

The City of Colorado Springs Drainage Criteria Manual Volume 1, January 2021 (CS CRITERIA)

“Master Development Drainage Plan Fountain Valley School” prepared by Kiowa Engineering Corporation, and dated received April 28, 2011

APPENDIX A


Grinnell Blvd
Goldfield Dr
Goldfield Dr
Bluestem
Prairie
Open Space
APPROXIMATE
PROJECT SITE
LOCATION
Grinnell Blvd
Fontaine Blvd
Fontaine Blvd

National Flood Hazard Layer FIRMette

FEMA

104°42'56"W 38°44'51"N

104°42'19"W 38°44'23"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 11/14/2023 at 5:54 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

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

Custom Soil Resource Report for El Paso County Area, Colorado

August 28, 2025

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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97—Truckton sandy loam, 3 to 9 percent slopes.....14
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,780 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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

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

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

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

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

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

Soil Survey Area: El Paso County Area, Colorado
Survey Area Data: Version 22, Sep 3, 2024

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

Date(s) aerial images were photographed: Jul 23, 2024—Aug 4, 2024

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
96	Truckton sandy loam, 0 to 3 percent slopes	4.0	22.7%
97	Truckton sandy loam, 3 to 9 percent slopes	13.7	77.3%
Totals for Area of Interest		**17.7**	**100.0%**

Map Unit Descriptions

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

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

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

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

onsite investigation is needed to define and locate the soils and miscellaneous areas.

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

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

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

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

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

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

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

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

El Paso County Area, Colorado

96—Truckton sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2yvrd
Elevation: 5,400 to 7,000 feet
Mean annual precipitation: 14 to 23 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 90 to 155 days
Farmland classification: Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60

Map Unit Composition

Truckton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Fan remnants, interfluves
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Wind re-worked alluvium derived from arkose

Typical profile

A - 0 to 4 inches: sandy loam
Bt1 - 4 to 12 inches: sandy loam
Bt2 - 12 to 19 inches: sandy loam
C - 19 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Blakeland

Percent of map unit: 5 percent
Landform: Hills, interfluves
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Bresser

Percent of map unit: 5 percent
Landform: Terraces, interfluves
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Pleasant, frequently ponded

Percent of map unit: 2 percent
Landform: Closed depressions
Down-slope shape: Concave, linear
Across-slope shape: Concave
Ecological site: R067BY010CO - Closed Depression
Hydric soil rating: Yes

Urban land

Percent of map unit: 2 percent
Hydric soil rating: No

Ellicott, occasionally flooded

Percent of map unit: 1 percent
Landform: Drainageways, flood plains
Down-slope shape: Linear
Across-slope shape: Concave, linear
Ecological site: R067BY031CO - Sandy Bottomland
Hydric soil rating: No

97—Truckton sandy loam, 3 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2x0j2
Elevation: 5,300 to 6,850 feet
Mean annual precipitation: 14 to 19 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 85 to 155 days
Farmland classification: Not prime farmland

Map Unit Composition

Truckton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Truckton

Setting

Landform: Hillslopes, interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Re-worked alluvium derived from arkose

Typical profile

A - 0 to 4 inches: sandy loam
Bt1 - 4 to 12 inches: sandy loam
Bt2 - 12 to 19 inches: sandy loam
C - 19 to 80 inches: sandy loam

Properties and qualities

Slope: 3 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 1 percent
Maximum salinity: Nonsaline (0.1 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: A
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Minor Components

Blakeland

Percent of map unit: 8 percent
Landform: Hillslopes, interfluves
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

Bresser

Percent of map unit: 7 percent

Landform: Low hills, interfluves
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Ecological site: R049XB210CO - Sandy Foothill
Hydric soil rating: No

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APPENDIX B

PROJECT INFORMATION

PROJECT NAME:	FVS - Academic Center
PROJECT NO:	23.0895
DESIGN BY:	AG
REVIEWED BY:	NK
JURISDICTION:	El Paso County
REPORT TYPE:	Drainage - Final
DATE:	03/16/26

MARTIN/MARTIN CONSULTING ENGINEERS

JURISDICTIONAL STANDARD	C2	C5	C10	C100	% IMPERV
LANDSCAPE	0.02	0.08	0.25	0.35	0%
GRAVEL	0.57	0.59	0.80	0.85	80%
ROOF	0.71	0.73	0.90	0.95	90%
PAVED	0.88	0.89	0.90	0.95	100%

TOTAL SITE COMPOSITE	9.39	0.23	0.24	0.25	0.40	36.8%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA (ACRES)	COMPOSITE RUNOFF COEFFICIENTS C2	C5	C10	C100	PERCENT IMPERVIOUSNESS
A1	LANDSCAPE	0.98	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.01	0.57	0.59	0.80	0.85	80%
	PAVED	0.11	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**1.10**	0.11	0.16	0.32	0.41	**10.3%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA (ACRES)	COMPOSITE RUNOFF COEFFICIENTS C2	C5	C10	C100	PERCENT IMPERVIOUSNESS
A2	LANDSCAPE	0.15	0.02	0.08	0.25	0.35	0%
	PAVED	0.01	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**0.16**	0.05	0.11	0.27	0.37	**3.4%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA (ACRES)	COMPOSITE RUNOFF COEFFICIENTS C2	C5	C10	C100	PERCENT IMPERVIOUSNESS
A3	LANDSCAPE	0.24	0.02	0.08	0.25	0.35	0%
	PAVED	0.07	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**0.31**	0.21	0.25	0.39	0.48	**21.5%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA (ACRES)	COMPOSITE RUNOFF COEFFICIENTS C2	C5	C10	C100	PERCENT IMPERVIOUSNESS
A4	LANDSCAPE	0.72	0.02	0.08	0.25	0.35	0%
	PAVED	0.05	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**0.77**	0.07	0.13	0.29	0.39	**6.1%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA (ACRES)	COMPOSITE RUNOFF COEFFICIENTS C2	C5	C10	C100	PERCENT IMPERVIOUSNESS
A5	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
	PAVED	0.02	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.01	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.05**	0.36	0.39	0.46	0.56	**43.4%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA (ACRES)	COMPOSITE RUNOFF COEFFICIENTS C2	C5	C10	C100	PERCENT IMPERVIOUSNESS
A6	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	PAVED	0.05	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.02	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.08**	0.62	0.64	0.67	0.75	**73.2%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
A7	LANDSCAPE	0.11	0.02	0.08	0.25	0.35	0%
	PAVED	0.01	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.08	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.20**	0.14	0.18	0.28	0.39	**19.2%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
A8	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
	ROOF	0.04	0.71	0.73	0.90	0.95	90%
	GRAVEL	0.003	0.57	0.59	0.80	0.85	80%
SUB-BASIN COMPOSITE		**0.06**	0.52	0.55	0.73	0.79	**66.1%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
A9	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	ROOF	0.05	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		**0.06**	0.62	0.64	0.81	0.87	**78.2%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
A10	LANDSCAPE	0.004	0.02	0.08	0.25	0.35	0%
	ROOF	0.06	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		**0.07**	0.67	0.69	0.86	0.91	**84.3%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
A11	ROOF	0.09	0.71	0.73	0.90	0.95	90%
	GRAVEL	0.03	0.57	0.59	0.80	0.85	80%
	PAVED	0.003	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**0.12**	0.68	0.70	0.88	0.93	**87.9%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
A12	LANDSCAPE	0.08	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.03	0.57	0.59	0.80	0.85	80%
	PAVED	0.06	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**0.17**	0.44	0.47	0.59	0.66	**51.8%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
A13	LANDSCAPE	0.48	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.10	0.57	0.59	0.80	0.85	80%
	PAVED	0.28	0.88	0.89	0.90	0.95	100%
	ROOF	0.20	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		**1.06**	0.43	0.46	0.60	0.67	**50.8%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B1	LANDSCAPE	0.11	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.01	0.57	0.59	0.80	0.85	80%
	PAVED	0.02	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.04	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.18**	0.18	0.22	0.34	0.44	**22.2%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B2	ROOF	0.14	0.71	0.73	0.90	0.95	90%
	SUB-BASIN COMPOSITE	0.14	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B3	LANDSCAPE	0.13	0.02	0.08	0.25	0.35	0%
	PAVED	0.18	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.002	0.21	0.23	0.24	0.38	35%
	SUB-BASIN COMPOSITE	0.31	0.51	0.54	0.62	0.69	57.5%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B4	LANDSCAPE	0.03	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.003	0.57	0.59	0.80	0.85	80%
	SUB-BASIN COMPOSITE	0.03	0.08	0.13	0.31	0.40	8.3%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B5	ROOF	0.03	0.71	0.73	0.90	0.95	90%
	SUB-BASIN COMPOSITE	0.03	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B6	ROOF	0.04	0.71	0.73	0.90	0.95	90%
	SUB-BASIN COMPOSITE	0.04	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B7	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.01	0.57	0.59	0.80	0.85	80%
	SUB-BASIN COMPOSITE	0.02	0.15	0.21	0.38	0.47	19.6%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B8	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.004	0.57	0.59	0.80	0.85	80%
	PAVED	0.01	0.88	0.89	0.90	0.95	100%
	SUB-BASIN COMPOSITE	0.03	0.39	0.43	0.55	0.63	45.8%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B9	LANDSCAPE	0.09	0.02	0.08	0.25	0.35	0%
	PAVED	0.01	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.02	0.21	0.23	0.24	0.38	35%
	SUB-BASIN COMPOSITE	0.12	0.16	0.20	0.33	0.43	17.7%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT
		(ACRES)	C2	C5	C10	C100	IMPERVIOUSNESS
B10	ROOF	0.02	0.71	0.73	0.90	0.95	90%
	SUB-BASIN COMPOSITE	0.02	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B11	ROOF	0.05	0.71	0.73	0.90	0.95	90%
	SUB-BASIN COMPOSITE	0.05	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B12	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.002	0.57	0.59	0.80	0.85	80%
	PAVED	0.003	0.88	0.89	0.90	0.95	100%
	SUB-BASIN COMPOSITE	0.02	0.23	0.28	0.43	0.51	26.9%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B13	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
	PAVED	0.01	0.88	0.89	0.90	0.95	100%
	SUB-BASIN COMPOSITE	0.03	0.41	0.45	0.54	0.62	45.2%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B14	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.001	0.57	0.59	0.80	0.85	80%
	SUB-BASIN COMPOSITE	0.01	0.05	0.11	0.28	0.38	5.1%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B15	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	PAVED	0.05	0.88	0.89	0.90	0.95	100%
	SUB-BASIN COMPOSITE	0.06	0.78	0.79	0.82	0.88	88.2%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B16	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
	SUB-BASIN COMPOSITE	0.02	0.02	0.08	0.25	0.35	0.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B17	ROOF	0.05	0.71	0.73	0.90	0.95	90%
	SUB-BASIN COMPOSITE	0.05	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B18	LANDSCAPE	0.03	0.02	0.08	0.25	0.35	0%
	PAVED	0.02	0.88	0.89	0.90	0.95	100%
	SUB-BASIN COMPOSITE	0.05	0.41	0.45	0.55	0.62	45.8%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B19	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
SUB-BASIN COMPOSITE		0.02	0.02	0.08	0.25	0.35	0.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B20	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.003	0.57	0.59	0.80	0.85	80%
	INVISIBLE STRUCTURES	0.01	0.21	0.23	0.24	0.38	35%
	PAVED	0.001	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		0.03	0.17	0.21	0.34	0.45	22.3%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B21	LANDSCAPE	0.07	0.02	0.08	0.25	0.35	0%
	PAVED	0.03	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.02	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		0.12	0.24	0.28	0.38	0.48	27.5%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B22	ROOF	0.02	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		0.02	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B23	ROOF	0.04	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		0.04	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B24	ROOF	0.04	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		0.04	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B25	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.004	0.57	0.59	0.80	0.85	80%
	PAVED	0.003	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		0.02	0.28	0.32	0.47	0.55	33.1%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
B26	LANDSCAPE	0.03	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.01	0.57	0.59	0.80	0.85	80%
	PAVED	0.02	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.01	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.06**	0.32	0.36	0.47	0.56	**38.6%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C1	LANDSCAPE	0.32	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.02	0.57	0.59	0.80	0.85	80%
	PAVED	0.09	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.06	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.49**	0.22	0.27	0.39	0.49	**25.8%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C2	LANDSCAPE	0.27	0.02	0.08	0.25	0.35	0%
	PAVED	0.02	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**0.28**	0.07	0.12	0.28	0.38	**5.3%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C3	LANDSCAPE	0.03	0.02	0.08	0.25	0.35	0%
	PAVED	0.24	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**0.27**	0.77	0.79	0.82	0.88	**87.7%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C4	ROOF	0.06	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		**0.06**	0.71	0.73	0.90	0.95	**90.0%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C5	ROOF	0.08	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		**0.08**	0.71	0.73	0.90	0.95	**90.0%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C6	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.001	0.57	0.59	0.80	0.85	80%
SUB-BASIN COMPOSITE		**0.01**	0.05	0.11	0.28	0.38	**4.8%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C7	LANDSCAPE	0.03	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.01	0.57	0.59	0.80	0.85	80%
	PAVED	0.01	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		**0.05**	0.32	0.36	0.50	0.58	**38.3%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C8	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
SUB-BASIN COMPOSITE		**0.02**	0.02	0.08	0.25	0.35	**0.0%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C9	LANDSCAPE	0.01	0.02	0.08	0.25	0.35	0%
	PAVED	0.003	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.01	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.01**	0.30	0.33	0.40	0.50	**36.8%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C10	LANDSCAPE	0.14	0.02	0.08	0.25	0.35	0%
	PAVED	0.04	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.06	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.25**	0.22	0.25	0.36	0.46	**25.9%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C11	LANDSCAPE	0.03	0.02	0.08	0.25	0.35	0%
	PAVED	0.01	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.01	0.21	0.23	0.24	0.38	35%
SUB-BASIN COMPOSITE		**0.05**	0.17	0.21	0.33	0.43	**20.3%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C12	ROOF	0.01	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		**0.01**	0.71	0.73	0.90	0.95	**90.0%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C13	ROOF	0.07	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		**0.07**	0.71	0.73	0.90	0.95	**90.0%**

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C14	ROOF	0.03	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		0.03	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C15	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.001	0.57	0.59	0.80	0.85	80%
SUB-BASIN COMPOSITE		0.02	0.04	0.10	0.27	0.37	2.5%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C16	LANDSCAPE	0.02	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.01	0.57	0.59	0.80	0.85	80%
SUB-BASIN COMPOSITE		0.02	0.16	0.21	0.39	0.47	19.7%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C17	ROOF	0.04	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		0.04	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C18	ROOF	0.05	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		0.05	0.71	0.73	0.90	0.95	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C19	ROOF	0.06	0.02	0.08	0.25	0.35	90%
SUB-BASIN COMPOSITE		0.06	0.02	0.08	0.25	0.35	90.0%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C20	LANDSCAPE	1.09	0.02	0.08	0.25	0.35	0%
	GRAVEL	0.05	0.57	0.59	0.80	0.85	80%
	PAVED	0.13	0.88	0.89	0.90	0.95	100%
	INVISIBLE STRUCTURES	0.08	0.21	0.23	0.24	0.38	35%
	ROOF	0.24	0.71	0.73	0.90	0.95	90%
SUB-BASIN COMPOSITE		1.59	0.22	0.27	0.42	0.51	25.9%

SUB-BASIN	SURFACE CHARACTERISTICS	AREA	COMPOSITE RUNOFF COEFFICIENTS				PERCENT IMPERVIOUSNESS
		(ACRES)	C2	C5	C10	C100	
C21	ROOF	0.12	0.71	0.73	0.90	0.95	90%
	PAVED	0.04	0.88	0.89	0.90	0.95	100%
SUB-BASIN COMPOSITE		0.16	0.75	0.77	0.90	0.95	92.3%

TOTAL SITE COMPOSITE	9.39	0.31	0.35	0.49	0.57	36.8%

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SUB-BASIN DATA				INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS) Is Project Urban? Yes						REMARKS
BASIN	DESIGN POINT	C_5	AREA ac	LENGTH ft	SLOPE ft/ft	t_i min	LENGTH ft	SLOPE ft/ft	C_v	VEL. fps	t_t min	COMP. t_c	TOT. LENGTH ft	SLOPE ft/ft	IMP %	tc First DP	tc min	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
A1	A1	0.16	1.10	270	0.1000	13.0	92	0.0080	20	1.79	0.9	13.9	361.6	0.08	10.3%	25.9	13.9	
A2	A2	0.11	0.16	106	0.1940	6.9	60	0.0200	2.5	0.35	2.8	9.8	166.4	0.13	3.4%	26.2	9.8	
A3	A3	0.25	0.31	116	0.1090	7.5	10	0.1090	2.5	0.83	0.2	7.7	125.5	0.11	21.5%	22.4	7.7	
A4	A4	0.13	0.77	204	0.0970	11.8	165	0.0610	2.5	0.62	4.4	16.3	368.6	0.08	6.1%	26.1	16.3	
A5	A5	0.39	0.05	9	0.1050	1.8	22	0.0200	2.5	0.35	1.0	2.8	30.8	0.04	43.4%	18.8	5.0	
A6	A6	0.64	0.08	54	0.0180	5.0	27	0.0200	10	1.41	0.3	5.4	80.6	0.02	73.2%	13.7	5.4	
A7	A7	0.18	0.20	28	0.0200	7.0	48	0.0200	7	0.99	0.8	7.8	76.0	0.02	19.2%	23.2	7.8	
A8	A8	0.55	0.06	13	0.1040	1.6	45	0.0250	15	2.37	0.3	2.0	58.3	0.04	66.1%	15.0	5.0	
A9	A9	0.64	0.06	10	0.1430	1.1	22	0.0200	7	0.99	0.4	1.4	31.5	0.06	78.2%	12.8	5.0	
A10	A10	0.69	0.07	12	0.1040	1.2	8	0.1000	7	2.21	0.1	1.3	19.9	0.10	84.3%	11.7	5.0	
A11	A11	0.70	0.12	50	0.1860	1.9	50	0.0500	10	2.24	0.4	2.3	100.0	0.12	87.9%	11.2	5.0	
A12	A12	0.47	0.17	69	0.0900	4.5	43	0.0200	2.5	0.35	2.0	6.6	111.5	0.06	51.8%	17.5	6.6	
A13	A13	0.46	1.06	35	0.2500	2.4	460	0.0310	15	2.64	2.9	5.3	495.0	0.05	50.8%	20.1	5.3	
B1	B1	0.22	0.18	99	0.1000	7.4	63	0.0567	20	4.76	0.2	7.6	161.3	0.08	22.2%	22.6	7.6	
B2	B2	0.73	0.14			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
B3	B3	0.54	0.31	20	0.0200	3.6	235	0.0504	20	4.49	0.9	4.4	255.0	0.05	57.5%	17.2	5.0	
B4	B4	0.13	0.03	20	0.0850	3.8	35	0.0200	15	2.12	0.3	4.1	54.2	0.04	8.3%	25.0	5.0	
B5	B5	0.73	0.03			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
B6	B6	0.73	0.04			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
B7	B7	0.21	0.02	22	0.0900	3.7	53	0.0200	15	2.12	0.4	4.1	75.1	0.04	19.6%	23.2	5.0	
B8	B8	0.43	0.03	25	0.1200	2.7	23	0.0200	15	2.12	0.2	2.8	47.7	0.07	45.8%	18.4	5.0	
B9	B9	0.20	0.12	20	0.2270	2.6	56	0.0507	2.5	0.56	1.6	4.2	75.5	0.10	17.7%	23.4	5.0	
B10	B10	0.73	0.02			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
B11	B11	0.73	0.05			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
B12	B12	0.28	0.02	21	0.0550	3.9	24	0.0200	15	2.12	0.2	4.1	45.6	0.04	26.9%	21.7	5.0	
B13	B13	0.45	0.03	34	0.0470	4.1	23	0.0870	7	2.06	0.2	4.3	57.1	0.06	45.2%	18.4	5.0	
B14	B14	0.11	0.01	7	0.0820	2.3	19	0.0526	7	1.61	0.2	2.5	25.6	0.06	5.1%	25.3	5.0	
B15	B15	0.79	0.06	78	0.0490	2.9	5	0.0180	20	2.68	0.0	2.9	83.0	0.05	88.2%	11.0	5.0	
B16	B16	0.08	0.02	12	0.1000	3.0	22	0.0396	7	1.39	0.3	3.3	34.4	0.06	0.0%	26.2	5.0	
B17	B17	0.73	0.05			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
B18	B18	0.45	0.05	33	0.0900	3.3	34	0.0150	20	2.45	0.2	3.5	67.0	0.05	45.8%	18.5	5.0	
B19	B19	0.08	0.02	17	0.0500	4.4	17	0.0200	7	0.99	0.3	4.7	33.8	0.03	0.0%	26.2	5.0	
B20	B20	0.21	0.03	20	0.0600	4.0	20	0.0200	2.5	0.35	1.0	4.9	40.2	0.04	22.3%	22.4	5.0	
B21	B21	0.28	0.12	36	0.0815	4.5	49	0.0321	2.5	0.45	1.8	6.3	85.2	0.05	27.5%	21.7	6.3	
B22	B22	0.73	0.02			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
B23	B23	0.73	0.04			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
B24	B24	0.73	0.04			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin

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SUB-BASIN DATA				INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS) Is Project Urban? Yes						REMARKS
BASIN	DESIGN POINT	C_5	AREA ac	LENGTH ft	SLOPE ft/ft	t_i min	LENGTH ft	SLOPE ft/ft	C_v	VEL. fps	t_t min	COMP. t_c	TOT. LENGTH ft	SLOPE ft/ft	IMP %	tc First DP	tc min	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	
B25	B25	0.32	0.02	23	0.0200	5.4	20	0.0200	20	2.83	0.1	5.5	43.1	0.02	33.1%	20.5	5.5	
B26	B26	0.36	0.06	50	0.0250	7.0	27	0.0250	20	3.16	0.1	7.1	77.0	0.03	38.6%	19.6	7.1	
C1	C1	0.27	0.49	54	0.1700	4.3	200	0.0106	20	2.06	1.6	6.0	254.4	0.04	25.8%	24.2	6.0	
C2	C2	0.12	0.28	64	0.0700	7.4	72	0.0200	2.5	0.35	3.4	10.8	135.7	0.04	5.3%	26.0	10.8	
C3	C3	0.79	0.27	20	0.0200	2.0	351	0.0291	20	3.41	1.7	3.7	370.6	0.03	87.7%	12.7	5.0	
C4	C4	0.73	0.06			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
C5	C5	0.73	0.08			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
C6	C6	0.11	0.01	21	0.0750	4.2	10	0.1000	2.5	0.79	0.2	4.4	30.5	0.08	4.8%	25.2	5.0	
C7	C7	0.36	0.05	13	0.2050	1.8	76	0.0377	15	2.91	0.4	2.2	89.1	0.06	38.3%	20.0	5.0	
C8	C8	0.08	0.02	6	0.2500	1.6	33	0.0200	2.5	0.35	1.6	3.1	39.0	0.06	0.0%	26.4	5.0	
C9	C9	0.33	0.01	25	0.0130	6.4	14	0.0200	7	0.99	0.2	6.7	39.3	0.02	36.8%	19.9	6.7	
C10	C10	0.25	0.25	31	0.0720	4.4	113	0.0381	2.5	0.49	3.9	8.3	144.0	0.05	25.9%	22.4	8.3	
C11	C11	0.21	0.05	20	0.0200	5.7	30	0.0200	15	2.12	0.2	5.9	50.0	0.02	20.3%	22.8	5.9	
C12	C12	0.73	0.01			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
C13	C13	0.73	0.07			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
C14	C14	0.73	0.03			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
C15	C15	0.10	0.02	18	0.0700	4.0	21	0.0200	7	0.99	0.4	4.4	38.9	0.04	2.5%	25.8	5.0	
C16	C16	0.21	0.02	13	0.1180	2.6	22	0.0600	15	3.67	0.1	2.7	34.3	0.08	19.7%	22.8	5.0	
C17	C17	0.73	0.04			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
C18	C18	0.73	0.05			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
C19	C19	0.08	0.06			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	90.0%		5.0	Roof Basin
C20	C20	0.27	1.59	120	0.0710	8.6	431	0.0060	15	1.16	6.2	14.8	551.0	0.02	25.9%	28.9	14.8	
C21	C21	0.77	0.16			0.0			20	0.00	0.0	0.0	0.0	#DIV/0!	92.3%		5.0	Roof Basin

*Velocity (V) = $C_v S_w 0.5$

TABLE 6-2

Type of Land Surface	Conveyance Coefficient, Cv
Heavy Meadow	2.5
Tillage / Field	5
Short Pasture and Lawns	7
Nearly Bare Ground	10
Grassed Waterway	15
Paved Areas and Shallow Paved Swales	20

**Table 6-2, UDFCD (V.1), Chapter 6, Page 6-5*

in which: Cv = Conveyance Coefficient (See Table Above)
Sw = Watercourse Slope (ft/ft)

MARTIN/MARTIN CONSULTING ENGINEERS

CALCULATED BY: AG
CHECKED BY: NK
DATE: 03/16/26

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

JOB NO: 23.0895
PROJECT: FVS - Academic Center
DESIGN STORM: 10-YEAR
ONE-HR PRECIP: 1.55

BASIN	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
		AREA (AC)	RUNOFF COEFF	t_c (MIN)	CxA (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S(CxA) (AC)	I (IN/HR)	Q (CFS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A1	A1	1.10	0.32	13.9	0.35	3.65	1.27					
A2	A2	0.16	0.27	9.8	0.04	4.23	0.18					
A3	A3	0.31	0.39	7.7	0.12	4.62	0.56					
A4	A4	0.77	0.29	16.3	0.22	3.38	0.75					
A5	A5	0.05	0.46	5.0	0.02	5.26	0.11					
A6	A6	0.08	0.67	5.4	0.05	5.16	0.27					
A7	A7	0.20	0.28	7.8	0.05	4.60	0.25					
A8	A8	0.06	0.73	5.0	0.04	5.26	0.23					
A9	A9	0.06	0.81	5.0	0.05	5.26	0.24					
A10	A10	0.07	0.86	5.0	0.06	5.26	0.30					
A11	A11	0.12	0.88	5.0	0.11	5.26	0.57					
A12	A12	0.17	0.59	6.6	0.10	4.86	0.49					
A13	A13	1.06	0.60	5.3	0.63	5.19	3.28					
B1	B1	0.18	0.34	7.6	0.06	4.63	0.28					
B2	B2	0.14	0.90	5.0	0.13	5.26	0.68					
B3	B3	0.31	0.62	5.0	0.19	5.26	1.00					
B4	B4	0.03	0.31	5.0	0.01	5.26	0.05					
B5	B5	0.03	0.90	5.0	0.03	5.26	0.13					
B6	B6	0.04	0.90	5.0	0.04	5.26	0.21					
B7	B7	0.02	0.38	5.0	0.01	5.26	0.05					
B8	B8	0.03	0.55	5.0	0.02	5.26	0.08					
B9	B9	0.12	0.33	5.0	0.04	5.26	0.21					
B10	B10	0.02	0.90	5.0	0.02	5.26	0.10					
B11	B11	0.05	0.90	5.0	0.04	5.26	0.23					
B12	B12	0.02	0.43	5.0	0.01	5.26	0.04					
B13	B13	0.03	0.54	5.0	0.02	5.26	0.09					
B14	B14	0.01	0.28	5.0	0.00	5.26	0.01					
B15	B15	0.06	0.82	5.0	0.05	5.26	0.27					
B16	B16	0.02	0.25	5.0	0.00	5.26	0.02					
B17	B17	0.05	0.90	5.0	0.05	5.26	0.26					
B18	B18	0.05	0.55	5.0	0.03	5.26	0.15					
B19	B19	0.02	0.25	5.0	0.00	5.26	0.02					
B20	B20	0.03	0.34	5.0	0.01	5.26	0.05					
B21	B21	0.12	0.38	6.3	0.05	4.92	0.23					
B22	B22	0.02	0.90	5.0	0.02	5.26	0.11					

CALCULATED BY: AG
CHECKED BY: NK
DATE: 03/16/26

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

JOB NO: 23.0895
PROJECT: FVS - Academic Center
DESIGN STORM: 10-YEAR
ONE-HR PRECIP: 1.55

BASIN	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
		AREA (AC)	RUNOFF COEFF	t_c (MIN)	CxA (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S(CxA) (AC)	I (IN/HR)	Q (CFS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
B23	B23	0.04	0.90	5.0	0.03	5.26	0.17					
B24	B24	0.04	0.90	5.0	0.03	5.26	0.17					
B25	B25	0.02	0.47	5.5	0.01	5.11	0.05					
B26	B26	0.06	0.47	7.1	0.03	4.74	0.13					
C1	C1	0.49	0.39	6.0	0.19	5.01	0.96					
C2	C2	0.28	0.28	10.8	0.08	4.07	0.33					
C3	C3	0.27	0.82	5.0	0.22	5.26	1.17					
C4	C4	0.06	0.90	5.0	0.06	5.26	0.29					
C5	C5	0.08	0.90	5.0	0.07	5.26	0.36					
C6	C6	0.01	0.28	5.0	0.00	5.26	0.01					
C7	C7	0.05	0.50	5.0	0.03	5.26	0.14					
C8	C8	0.02	0.25	5.0	0.01	5.26	0.03					
C9	C9	0.01	0.40	6.7	0.01	4.84	0.03					
C10	C10	0.25	0.36	8.3	0.09	4.50	0.40					
C11	C11	0.05	0.33	5.9	0.02	5.01	0.08					
C12	C12	0.01	0.90	5.0	0.01	5.26	0.06					
C13	C13	0.07	0.90	5.0	0.06	5.26	0.33					
C14	C14	0.03	0.90	5.0	0.03	5.26	0.17					
C15	C15	0.02	0.27	5.0	0.00	5.26	0.03					
C16	C16	0.02	0.39	5.0	0.01	5.26	0.05					
C17	C17	0.04	0.90	5.0	0.04	5.26	0.21					
C18	C18	0.05	0.90	5.0	0.05	5.26	0.25					
C19	C19	0.06	0.25	5.0	0.02	5.26	0.08					
C20	C20	1.59	0.42	14.8	0.66	3.54	2.35					
C21	C21	0.16	0.90	5.0	0.14	5.26	0.75					

I. One-Hr Precipitation Values from NOAA Atlas 14 PFDS

Return Period:	2-YEAR	5-YEAR	10-YEAR	100-YEAR
Depth In Inches:	1.00	1.28	1.55	2.73

**Equation 5-1, UDFCD (V.1), Chapter 5, Page 5-9*

*Rainfall Intensity: $I = \frac{(28.5 \times P1)}{(10 + t_c)^{0.786}}$

In Which:
I = Rainfall Intensity (Inches Per Hour)
P1 = 1-Hour Point Rainfall Depth (Inches)
tc = Time Of Concentration (Minutes)

MARTIN/MARTIN CONSULTING ENGINEERS

CALCULATED BY: AG
CHECKED BY: NK
DATE: 03/16/26

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

JOB NO: 23.0895
PROJECT: FVS - Academic Center
DESIGN STORM: 100-YEAR
ONE-HR PRECIP: 2.73

BASIN	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
		AREA (AC)	RUNOFF COEFF	t_c (MIN)	CxA (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S(CxA) (AC)	I (IN/HR)	Q (CFS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A1	A1	1.10	0.41	13.9	0.45	6.43	2.90					
A2	A2	0.16	0.37	9.8	0.06	7.45	0.43					
A3	A3	0.31	0.48	7.7	0.15	8.14	1.22					
A4	A4	0.77	0.39	16.3	0.30	5.96	1.76					
A5	A5	0.05	0.56	5.0	0.03	9.26	0.24					
A6	A6	0.08	0.75	5.4	0.06	9.09	0.53					
A7	A7	0.20	0.39	7.8	0.08	8.10	0.63					
A8	A8	0.06	0.79	5.0	0.05	9.26	0.44					
A9	A9	0.06	0.87	5.0	0.05	9.26	0.45					
A10	A10	0.07	0.91	5.0	0.06	9.26	0.57					
A11	A11	0.12	0.93	5.0	0.12	9.26	1.07					
A12	A12	0.17	0.66	6.6	0.11	8.56	0.97					
A13	A13	1.06	0.67	5.3	0.71	9.14	6.48					
B1	B1	0.18	0.44	7.6	0.08	8.16	0.65					
B2	B2	0.14	0.95	5.0	0.14	9.26	1.27					
B3	B3	0.31	0.69	5.0	0.21	9.26	1.96					
B4	B4	0.03	0.40	5.0	0.01	9.26	0.11					
B5	B5	0.03	0.95	5.0	0.03	9.26	0.25					
B6	B6	0.04	0.95	5.0	0.04	9.26	0.39					
B7	B7	0.02	0.47	5.0	0.01	9.26	0.11					
B8	B8	0.03	0.63	5.0	0.02	9.26	0.16					
B9	B9	0.12	0.43	5.0	0.05	9.26	0.48					
B10	B10	0.02	0.95	5.0	0.02	9.26	0.19					
B11	B11	0.05	0.95	5.0	0.05	9.26	0.44					
B12	B12	0.02	0.51	5.0	0.01	9.26	0.07					
B13	B13	0.03	0.62	5.0	0.02	9.26	0.18					
B14	B14	0.01	0.38	5.0	0.00	9.26	0.03					
B15	B15	0.06	0.88	5.0	0.05	9.26	0.50					
B16	B16	0.02	0.35	5.0	0.01	9.26	0.06					
B17	B17	0.05	0.95	5.0	0.05	9.26	0.48					

CALCULATED BY: AG
CHECKED BY: NK
DATE: 03/16/26

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

JOB NO: 23.0895
PROJECT: FVS - Academic Center
DESIGN STORM: 100-YEAR
ONE-HR PRECIP: 2.73

BASIN	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
		AREA (AC)	RUNOFF COEFF	t_c (MIN)	CxA (AC)	I (IN/HR)	Q (CFS)	t_c (MIN)	S(CxA) (AC)	I (IN/HR)	Q (CFS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
B18	B18	0.05	0.62	5.0	0.03	9.26	0.31					
B19	B19	0.02	0.35	5.0	0.01	9.26	0.05					
B20	B20	0.03	0.45	5.0	0.01	9.26	0.11					
B21	B21	0.12	0.48	6.3	0.06	8.67	0.52					
B22	B22	0.02	0.95	5.0	0.02	9.26	0.20					
B23	B23	0.04	0.95	5.0	0.03	9.26	0.31					
B24	B24	0.04	0.95	5.0	0.03	9.26	0.31					
B25	B25	0.02	0.55	5.5	0.01	9.01	0.10					
B26	B26	0.06	0.56	7.1	0.03	8.35	0.27					
C1	C1	0.49	0.49	6.0	0.24	8.82	2.10					
C2	C2	0.28	0.38	10.8	0.11	7.16	0.77					
C3	C3	0.27	0.88	5.0	0.24	9.26	2.21					
C4	C4	0.06	0.95	5.0	0.06	9.26	0.54					
C5	C5	0.08	0.95	5.0	0.07	9.26	0.67					
C6	C6	0.01	0.38	5.0	0.00	9.26	0.03					
C7	C7	0.05	0.58	5.0	0.03	9.26	0.29					
C8	C8	0.02	0.35	5.0	0.01	9.26	0.07					
C9	C9	0.01	0.50	6.7	0.01	8.52	0.06					
C10	C10	0.25	0.46	8.3	0.11	7.92	0.90					
C11	C11	0.05	0.43	5.9	0.02	8.83	0.18					
C12	C12	0.01	0.95	5.0	0.01	9.26	0.11					
C13	C13	0.07	0.95	5.0	0.07	9.26	0.61					
C14	C14	0.03	0.95	5.0	0.03	9.26	0.31					
C15	C15	0.02	0.37	5.0	0.01	9.26	0.06					
C16	C16	0.02	0.47	5.0	0.01	9.26	0.10					
C17	C17	0.04	0.95	5.0	0.04	9.26	0.38					
C18	C18	0.05	0.95	5.0	0.05	9.26	0.47					
C19	C19	0.06	0.35	5.0	0.02	9.26	0.20					
C20	C20	1.59	0.51	14.8	0.80	6.23	5.01					
C21	C21	0.16	0.95	5.0	0.15	9.26	1.40					

I. One-Hr Precipitation Values from NOAA Atlas 14 PFDS

Return Period:	2-YEAR	5-YEAR	10-YEAR	100-YEAR
Depth In Inches:	1.00	1.28	1.55	2.73

**Equation 5-1, UDFCD (V.1), Chapter 5, Page 5-9*

*Rainfall Intensity: $I = \frac{(28.5 \times P1)}{(10 + t_c)^{0.786}}$

In Which:
I = Rainfall Intensity (Inches Per Hour)
P1 = 1-Hour Point Rainfall Depth (Inches)
tc = Time Of Concentration (Minutes)

MARTIN/MARTIN CONSULTING ENGINEERS

PROJECT: FVS - Academic Center
JOB NO: 23.090
DATE: 03/16/26

MARTIN/MARTIN CONSULTING ENGINEERS

RUNOFF SUMMARY							
BASIN	DESIGN POINT	AREA (ACRES)	% IMP.	C_{10}	C_{100}	Q_{10} (CFS)	Q_{100} (CFS)
A1	A1	1.10	10.3%	0.32	0.41	1.27	2.90
A2	A2	0.16	3.4%	0.27	0.37	0.18	0.43
A3	A3	0.31	21.5%	0.39	0.48	0.56	1.22
A4	A4	0.77	6.1%	0.29	0.39	0.75	1.76
A5	A5	0.05	43.4%	0.46	0.56	0.11	0.24
A6	A6	0.08	73.2%	0.67	0.75	0.27	0.53
A7	A7	0.20	19.2%	0.28	0.39	0.25	0.63
A8	A8	0.06	66.1%	0.73	0.79	0.23	0.44
A9	A9	0.06	78.2%	0.81	0.87	0.24	0.45
A10	A10	0.07	84.3%	0.86	0.91	0.30	0.57
A11	A11	0.12	87.9%	0.88	0.93	0.57	1.07
A12	A12	0.17	51.8%	0.59	0.66	0.49	0.97
A13	A13	1.06	50.8%	0.60	0.67	3.28	6.48
B1	B1	0.18	22.2%	0.34	0.44	0.28	0.65
B2	B2	0.14	90.0%	0.90	0.95	0.68	1.27
B3	B3	0.31	57.5%	0.62	0.69	1.00	1.96
B4	B4	0.03	8.3%	0.31	0.40	0.05	0.11
B5	B5	0.03	90.0%	0.90	0.95	0.13	0.25
B6	B6	0.04	90.0%	0.90	0.95	0.21	0.39
B7	B7	0.02	19.6%	0.38	0.47	0.05	0.11
B8	B8	0.03	45.8%	0.55	0.63	0.08	0.16
B9	B9	0.12	17.7%	0.33	0.43	0.21	0.48
B10	B10	0.02	90.0%	0.90	0.95	0.10	0.19
B11	B11	0.05	90.0%	0.90	0.95	0.23	0.44
B12	B12	0.02	26.9%	0.43	0.51	0.04	0.07
B13	B13	0.03	45.2%	0.54	0.62	0.09	0.18
B14	B14	0.01	5.1%	0.28	0.38	0.01	0.03
B15	B15	0.06	88.2%	0.82	0.88	0.27	0.50
B16	B16	0.02	0.0%	0.25	0.35	0.02	0.06
B17	B17	0.05	90.0%	0.90	0.95	0.26	0.48
B18	B18	0.05	45.8%	0.55	0.62	0.15	0.31
B19	B19	0.02	0.0%	0.25	0.35	0.02	0.05
B20	B20	0.03	22.3%	0.34	0.45	0.05	0.11
B21	B21	0.12	27.5%	0.38	0.48	0.23	0.52
B22	B22	0.02	90.0%	0.90	0.95	0.11	0.20
B23	B23	0.04	90.0%	0.90	0.95	0.17	0.31
B24	B24	0.04	90.0%	0.90	0.95	0.17	0.31

PROJECT: FVS - Academic Center
JOB NO: 23.090
DATE: 03/16/26

MARTIN/MARTIN CONSULTING ENGINEERS

RUNOFF SUMMARY							
BASIN	DESIGN POINT	AREA (ACRES)	% IMP.	C_{10}	C_{100}	Q_{10} (CFS)	Q_{100} (CFS)
B25	B25	0.02	33.1%	0.47	0.55	0.05	0.10
B26	B26	0.06	38.6%	0.47	0.56	0.13	0.27
C1	C1	0.49	25.8%	0.39	0.49	0.96	2.10
C2	C2	0.28	5.3%	0.28	0.38	0.33	0.77
C3	C3	0.27	87.7%	0.82	0.88	1.17	2.21
C4	C4	0.06	90.0%	0.90	0.95	0.29	0.54
C5	C5	0.08	90.0%	0.90	0.95	0.36	0.67
C6	C6	0.01	4.8%	0.28	0.38	0.01	0.03
C7	C7	0.05	38.3%	0.50	0.58	0.14	0.29
C8	C8	0.02	0.0%	0.25	0.35	0.03	0.07
C9	C9	0.01	36.8%	0.40	0.50	0.03	0.06
C10	C10	0.25	25.9%	0.36	0.46	0.40	0.90
C11	C11	0.05	20.3%	0.33	0.43	0.08	0.18
C12	C12	0.01	90.0%	0.90	0.95	0.06	0.11
C13	C13	0.07	90.0%	0.90	0.95	0.33	0.61
C14	C14	0.03	90.0%	0.90	0.95	0.17	0.31
C15	C15	0.02	2.5%	0.27	0.37	0.03	0.06
C16	C16	0.02	19.7%	0.39	0.47	0.05	0.10
C17	C17	0.04	90.0%	0.90	0.95	0.21	0.38
C18	C18	0.05	90.0%	0.90	0.95	0.25	0.47
C19	C19	0.06	90.0%	0.25	0.35	0.08	0.20
C20	C20	1.59	25.9%	0.42	0.51	2.35	5.01
C21	C21	0.16	92.3%	0.90	0.95	0.75	1.40
SITE COMPOSITE		**9.39**	**36.8%**	**0.24**	**0.40**	**21.37**	**43.67**

FVSD Site Flow Summary

Bioswale	Flowrates		Piped East	Flowrates		Piped West	Flowrates	
Basins	**Q10**	**Q100**	Basins	Q10	Q100	Basins	Q10	Q100
A1	1.27	2.9	C1	0.96	2.1	B1	0.28	0.65
A2	0.18	0.43	C2	0.33	0.77	B2	0.68	1.27
A3	0.56	1.22	C3	1.17	2.21	B3	1	1.96
A4	0.75	1.76	C4	0.29	0.54	B4	0.05	0.11
A5	0.11	0.24	C5	0.36	0.67	B5	0.13	0.25
A6	0.27	0.53	C6	0.01	0.03	B6	0.21	0.39
A7	0.25	0.63	C7	0.14	0.29	B7	0.05	0.11
A8	0.23	0.44	C8	0.03	0.07	B8	0.08	0.16
A9	0.24	0.45	C9	0.03	0.06	B9	0.21	0.48
A10	0.3	0.57	C10	0.4	0.9	B10	0.1	0.19
A11	0.57	1.07	C11	0.08	0.18	B11	0.23	0.44
A12	0.49	0.97	C12	0.06	0.11	B12	0.04	0.07
A13	3.28	6.48	C13	0.33	0.61	B13	0.09	0.18
TOTAL	**8.5**	**17.69**	C14	0.17	0.31	B14	0.01	0.03
			C15	0.03	0.06	B15	0.27	0.5
			C16	0.05	0.1	B16	0.02	0.06
			C17	0.21	0.38	B17	0.26	0.48
			C18	0.25	0.47	B18	0.15	0.31
			C19	0.08	0.2	B19	0.02	0.05
			C20	2.35	5.01	B20	0.05	0.11
			C21	0.75	1.4	B21	0.23	0.52
			TOTAL	**8.08**	**16.47**	B22	0.11	0.2
						B23	0.17	0.31
						B24	0.17	0.31
						B25	0.05	0.1
						B26	0.13	0.27
						TOTAL	**4.79**	**9.51**

APPENDIX C

10-YEAR EVENT

Conduit Table - Time: 0.00 hours

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Velocity (ft/s)	Diameter (in)	Material	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-1	ST INLET #I-3	5,768.17	ST MH #I-2	5,767.11	30.3	0.035	3.55	24.0	Concrete	0.013	0.22	42.34	5,768.33	5,767.21
CO-2	ST MH #I-2	5,766.61	ST MH #I-1	5,762.78	109.5	0.035	4.97	24.0	Concrete	0.013	0.67	42.30	5,766.89	5,764.79
CO-3	ST MH #I-1	5,762.58	ST MH #A-7	5,761.47	31.7	0.035	12.63	24.0	Concrete	0.013	16.49	42.33	5,764.04	5,762.46
CO-5	ST MH #A-6	5,755.13	KOR-N-TEE #A-7	5,754.06	53.8	0.020	10.20	30.0	Concrete	0.013	16.72	57.84	5,756.51	5,756.06
CO-6	KOR-N-TEE #A-7	5,754.06	ST MH #A-5	5,752.78	63.7	0.020	10.28	30.0	Concrete	0.013	16.98	58.14	5,755.45	5,753.75
CO-7	ST MH #A-5	5,751.78	KOR-N-TEE #A-6	5,750.92	28.5	0.030	11.77	36.0	Concrete	0.013	17.31	115.82	5,753.11	5,752.95
CO-8	KOR-N-TEE #A-6	5,750.92	ST MH #A-4	5,748.94	66.2	0.030	11.95	30.0	Concrete	0.013	17.40	70.93	5,752.33	5,749.83
CO-10	KOR-N-TEE #A-2	5,747.10	KOR-N-TEE #A-1	5,746.69	32.6	0.013	8.70	36.0	Concrete	0.013	17.96	74.81	5,748.46	5,748.60
CO-11	KOR-N-TEE #A-1	5,746.69	ST MH #A-3	5,746.08	49.0	0.012	8.67	36.0	Concrete	0.013	17.98	74.41	5,748.05	5,747.13
CO-13	ST INLET #A-1.1	5,753.71	ST FES #A-1.1	5,752.85	41.5	0.021	8.37	24.0	Concrete	0.013	7.33	32.56	5,754.67	5,753.52
CO-14	ST AREA INLET #A1.1	5,748.73	KOR-N-TEE #A-1	5,747.77	24.0	0.040	3.17	10.0	PVC	0.010	0.05	5.70	5,748.82	5,748.60
CO-15	ST AREA INLET #A1.2	5,748.72	KOR-N-TEE #A-2	5,748.18	6.8	0.079	5.53	10.0	PVC	0.010	0.13	8.03	5,749.00	5,749.01
CO-16	ST AREA INLET #J-2	5,753.40	ST AREA INLET #J-1	5,751.64	44.1	0.040	4.48	10.0	PVC	0.010	0.15	5.69	5,753.57	5,751.73
CO-17	ST AREA INLET #J-1	5,751.44	ST MH #A-4	5,751.17	27.3	0.010	3.65	10.0	PVC	0.010	0.39	2.83	5,751.71	5,751.38
CO-18	TRENCH DRAIN CONNECTION	5,752.71	KOR-N-TEE #A-6	5,751.84	43.8	0.020	3.59	8.0	PVC	0.010	0.15	2.21	5,752.92	5,752.95
CO-19	TRENCH DRAIN CONNECTION	5,756.29	ST CO #E-1	5,756.07	10.8	0.020	4.28	8.0	PVC	0.010	0.26	2.24	5,756.53	5,756.42
CO-20	ST CO #E-1	5,756.07	ST MH #E-1	5,755.44	31.9	0.020	4.25	8.0	PVC	0.010	0.26	2.21	5,756.31	5,755.59
CO-21	ST MH #E-1	5,755.10	ST MH #A-5	5,754.36	74.0	0.010	3.93	12.0	PVC	0.010	0.54	4.63	5,755.40	5,754.59
CO-22	SCUPPER DRAIN #E-1	5,756.62	ST AREA INLET #E-2	5,756.47	7.7	0.020	4.25	6.0	PVC	0.010	0.24	1.02	5,756.87	5,756.65
CO-23	ST AREA INLET #E-2	5,756.27	ST MH #E-1	5,755.98	14.6	0.020	4.34	6.0	PVC	0.010	0.25	1.03	5,756.52	5,756.15
CO-25	ST AREA INLT #E-1	5,756.27	ST MH #E-1	5,755.98	14.7	0.020	2.23	6.0	PVC	0.010	0.03	1.03	5,756.35	5,756.04
CO-26	ST AREA INLET #C-5	5,754.44	ST AREA INLET #C-4	5,753.06	46.0	0.030	2.19	10.0	PVC	0.010	0.02	4.93	5,754.50	5,753.10
CO-27	ST AREA INLET #C-4	5,752.86	ST AREA INLET #C-3	5,751.91	31.7	0.030	3.05	10.0	PVC	0.010	0.06	4.93	5,752.96	5,752.02
CO-29	ST AREA INLET #C-1	5,753.26	ST AREA INLET #C-2	5,752.86	20.1	0.020	2.55	6.0	PVC	0.010	0.04	1.03	5,753.36	5,752.93
CO-31	ST AREA INLET #K-1	5,753.55	ST INLET #K-1	5,753.27	27.3	0.010	3.50	8.0	PVC	0.010	0.30	1.59	5,753.80	5,753.47
CO-37	ST MH #B-3	5,748.16	ST MH #B-2	5,747.35	65.5	0.012	5.37	18.0	Concrete	0.013	2.68	11.68	5,748.78	5,747.84
CO-47	ST AREA INLET #H-2	5,758.20	STRM TEE	5,758.05	19.0	0.008	1.10	6.0	PVC	0.010	0.22	0.65	5,759.50	5,759.48
CO-50	ST AREA INLET #H-1	5,758.66	STRM TEE	5,758.05	30.5	0.020	0.75	6.0	PVC	0.010	0.15	1.03	5,759.49	5,759.48
CO-51	ST MH #A-8	5,761.40	ST MH #A-7	5,760.15	35.8	0.035	0.00	24.0	Concrete	0.013	0.00	42.28	5,761.51	5,761.51
CO-52	ST INLET #I-2	5,767.61	ST MH #I-2	5,767.11	10.0	0.050	5.18	24.0	Concrete	0.013	0.51	50.58	5,767.85	5,767.26
CO-53	ST INLET #I-1	5,762.98	ST MH #I-1	5,762.78	10.6	0.019	9.98	24.0	Concrete	0.013	16.02	31.13	5,764.80	5,764.79
CO-57	ST AREA INLET #F-1	5,755.13	KOR-N-TEE #A-7	5,754.89	23.2	0.010	1.19	8.0	PVC	0.010	0.42	1.60	5,756.08	5,756.06
CO-60	EX. MANHOLE	5,778.02	ST MH #I-2	5,769.77	110.4	0.075	0.00	24.0	Concrete	0.013	0.00	61.85	5,778.02	5,769.77

10-YEAR EVENT

Conduit Table - Time: 0.00 hours

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Velocity (ft/s)	Diameter (in)	Material	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-64	ST MH #B-2	5,746.85	ST FES #B-1	5,746.06	62.9	0.013	5.49	24.0	Concrete	0.013	3.15	25.35	5,747.47	5,746.54
CO-65	ST CO #D-1	5,753.58	ST AREA INLET #D-1	5,752.70	43.9	0.020	0.00	6.0	PVC	0.010	0.00	1.03	5,753.58	5,752.70
CO-66	ST AREA INLET #D-1	5,751.70	ST MH #B-3	5,749.24	82.8	0.030	5.95	8.0	PVC	0.010	0.51	2.71	5,752.04	5,749.44
CO-67	ST INLET #B-1	5,750.60	ST MH #B-5	5,750.31	23.5	0.012	4.23	18.0	Concrete	0.013	1.17	11.67	5,751.00	5,750.63
CO-68	ST MH #B-5	5,750.11	ST MH #B-4	5,749.66	35.7	0.013	4.26	18.0	Concrete	0.013	1.17	11.80	5,750.51	5,750.17
CO-69	ST INLET #K-1	5,752.17	ST MH #B-4	5,749.66	100.5	0.025	5.77	18.0	Concrete	0.013	1.45	16.60	5,752.62	5,750.17
CO-70	O-6	5,784.89	CB-40	5,784.62	34.9	0.008	2.30	10.0	PVC	0.010	1.26	2.51	5,785.59	5,785.39
CO-71	CB-40	5,785.24	CB-42	5,784.89	35.0	0.010	0.48	10.0	PVC	0.010	0.26	2.85	5,785.62	5,785.59
CO-72	CB-40	5,785.13	CB-41	5,784.89	21.8	0.011	1.82	10.0	PVC	0.010	0.99	2.99	5,785.73	5,785.59
CO-73	CB-41	5,785.53	CB-43	5,785.13	35.3	0.011	1.61	10.0	PVC	0.010	0.88	3.03	5,786.11	5,785.95
CO-74	CB-43	5,785.77	CB-45	5,785.53	23.8	0.010	0.85	10.0	PVC	0.010	0.46	2.86	5,786.20	5,786.13
CO-75	CB-45	5,786.04	CB-46	5,785.77	27.6	0.010	0.43	10.0	PVC	0.010	0.23	2.82	5,786.33	5,786.25
CO-76	CB-43	5,785.99	CB-44	5,785.53	40.9	0.011	0.58	10.0	PVC	0.010	0.32	3.02	5,786.34	5,786.24
CO-77	ST AREA INLET #H-3	5,758.69	STRM BEND	5,758.58	15.7	0.007	0.96	6.0	PVC	0.010	0.19	0.61	5,759.55	5,759.54
CO-78	STRM BEND	5,758.58	ST AREA INLET #H-2	5,758.20	50.7	0.007	0.95	6.0	PVC	0.010	0.19	0.63	5,759.53	5,759.50
CO-79	ST MH #B-4	5,749.46	ST MH #B-3	5,748.36	88.6	0.012	5.16	18.0	Concrete	0.013	2.32	11.71	5,750.04	5,748.81
CO-4(1)	ST MH #A-7	5,759.65	KOR-N-TEE #A-8	5,757.15	125.3	0.020	10.25	24.0	Concrete	0.013	16.49	31.95	5,761.11	5,759.38
CO-4(2)	KOR-N-TEE #A-8	5,757.15	ST MH #A-6	5,755.63	75.8	0.020	10.31	24.0	Concrete	0.013	16.72	32.04	5,758.62	5,757.14
CO-81	STRM TEE	5,758.05	KOR-N-TEE #A-8	5,757.90	20.6	0.007	1.80	6.0	PVC	0.010	0.35	0.62	5,759.43	5,759.38
CO-82	SCUPPER DRAIN #H-1	5,759.00	ST AREA INLET #H-1	5,758.66	17.1	0.020	0.33	6.0	PVC	0.010	0.07	1.03	5,759.50	5,759.50
CO-83	SCUPPER DRAIN #H-2	5,758.82	ST AREA INLET #H-3	5,758.69	16.3	0.008	0.73	6.0	PVC	0.010	0.14	0.65	5,759.57	5,759.57
CO-84	SCUPPER DRAIN #K-1	5,753.75	ST AREA INLET #K-1	5,753.55	9.9	0.020	4.53	6.0	PVC	0.010	0.29	1.04	5,754.02	5,753.74
CO-85	SCUPPER DRAIN #D-1	5,753.28	ST AREA INLET #D-1	5,752.70	29.2	0.020	4.84	6.0	PVC	0.010	0.38	1.03	5,753.59	5,752.91
CO-86	ST RD #C-1	5,756.00	ST AREA INLET #C-5	5,755.82	9.1	0.020	0.00	6.0	PVC	0.010	0.00	1.03	5,756.00	5,755.82
CO-87	SCUPPER DRAIN #C-2	5,752.61	ST AREA INLET #C-3	5,752.64	18.4	-0.002	1.70	6.0	PVC	0.010	0.33	0.29	5,753.05	5,752.93
CO-88	SCUPPER DRAIN #C-1	5,753.33	ST AREA INLET #C-2	5,752.86	23.6	0.020	3.69	6.0	PVC	0.010	0.14	1.03	5,753.52	5,752.99
CO-89	ST AREA INLET #C-2	5,752.66	STORM TEE	5,750.91	53.6	0.033	4.76	8.0	PVC	0.010	0.21	2.84	5,752.87	5,751.29
CO-90	STORM TEE	5,750.82	ST MH #B-2	5,750.00	27.4	0.030	6.09	10.0	PVC	0.010	0.59	4.93	5,751.16	5,750.20
CO-91	ST AREA INLET #C-3	5,751.71	STORM TEE	5,750.82	29.8	0.030	5.41	10.0	PVC	0.010	0.40	4.92	5,751.98	5,751.29
CO-94	SCUPPER DRAIN #J-1	5,754.15	ST AREA INLET #J-2	5,753.73	10.6	0.040	4.19	6.0	PVC	0.010	0.10	1.45	5,754.30	5,753.82
CO-95	ST RD #A-2	5,753.50	DROP STRUCTURE #A-2	5,752.24	28.0	0.045	5.37	6.0	PVC	0.010	0.19	1.55	5,753.72	5,752.36
CO-9(1)	ST MH #A-4	5,748.42	KOR-N-TEE #A-5	5,747.89	41.8	0.013	8.68	36.0	Concrete	0.013	17.65	75.06	5,749.76	5,749.79
CO-96	DROP STRUCTURE #A-2	5,750.24	KOR-N-TEE #A-5	5,749.14	36.6	0.030	4.63	6.0	PVC	0.010	0.19	1.26	5,750.46	5,749.79
CO-97	ST RD #A-1	5,752.50	DROP STRUCTURE #A-1	5,751.74	13.8	0.055	0.00	6.0	PVC	0.010	0.00	1.71	5,752.50	5,751.74
CO-9(2)(1)	KOR-N-TEE #A-5	5,747.89	KOR-N-TEE #A-4	5,747.44	36.0	0.013	8.66	36.0	Concrete	0.013	17.76	74.62	5,749.24	5,749.48

10-YEAR EVENT

Conduit Table - Time: 0.00 hours

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Velocity (ft/s)	Diameter (in)	Material	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-98	DROP STRUCTURE #A-1	5,749.74	KOR-N-TEE #A-4	5,748.67	35.5	0.030	0.00	6.0	PVC	0.010	0.00	1.27	5,749.74	5,749.48
CO-9(2)(2)(1)	KOR-N-TEE #A-4	5,747.44	KOR-N-TEE #A-3	5,747.17	21.7	0.012	8.63	36.0	Concrete	0.013	17.75	74.33	5,749.20	5,749.26
CO-9(2)(2)(2)	KOR-N-TEE #A-3	5,747.17	KOR-N-TEE #A-2	5,747.10	5.8	0.012	8.54	36.0	Concrete	0.013	17.87	73.08	5,749.00	5,749.01
CO-99	SCUPPER DRAIN #A-1	5,749.43	ST CO #A-1	5,749.31	6.0	0.020	4.02	6.0	PVC	0.010	0.19	1.03	5,749.65	5,749.47
CO-100	ST CO #A-1	5,749.11	KOR-N-TEE #A-3	5,748.42	15.3	0.045	5.36	6.0	PVC	0.010	0.19	1.55	5,749.33	5,749.26
CO-101	H-1	5,743.89	O-4	5,743.52	63.0	0.006	5.89	45.0	Concrete	0.013	13.98	50.62	5,744.90	5,744.41
CO-102	ST MH #A-3	5,745.08	ST MH #A-2	5,742.65	161.9	0.015	9.27	36.0	Concrete	0.013	17.98	81.72	5,746.44	5,744.38
CO-103	ST MH #A-2	5,742.34	ST MH #A-1	5,739.60	68.5	0.040	13.15	36.0	Concrete	0.013	17.96	133.35	5,743.70	5,740.38
CO-104	ST MH #A-1	5,738.60	ST FES #A-1	5,737.91	137.8	0.005	6.22	36.0	Concrete	0.013	17.95	47.19	5,739.96	5,739.19
CO-59(1)	ST AREA INLET #G-1	5,757.72	ST TEE	5,757.35	8.2	0.045	4.24	6.0	PVC	0.010	0.09	1.55	5,757.86	5,757.55
CO-59(2)	ST TEE	5,757.35	ST AREA INLET #F-1	5,756.18	25.9	0.045	4.24	6.0	PVC	0.010	0.09	1.55	5,757.49	5,756.26
CO-105	ST RD #F-1	5,758.00	ST TEE	5,757.35	32.5	0.020	0.00	6.0	PVC	0.010	0.00	1.03	5,758.00	5,757.55
CO-61(1)	SCUPPER DRAIN #F-1	5,755.67	ST AREA INLET #F-2	5,755.51	15.7	0.010	2.58	6.0	PVC	0.010	0.10	0.74	5,756.10	5,756.10
CO-61(2)	ST AREA INLET #F-2	5,755.34	ST AREA INLET #F-1	5,755.13	21.6	0.010	0.40	8.0	PVC	0.010	0.14	1.55	5,756.10	5,756.10
CO-107	ST CO #AC-1	5,755.45	ST MH #A-6	5,755.33	12.1	0.010	0.00	6.0	PVC	0.010	0.00	0.73	5,757.14	5,757.14
CO-108	TYPE C INLET	5,754.78	ST INLET #K-1	5,753.00	87.0	0.020	4.81	12.0	PVC	0.010	0.45	6.62	5,755.06	5,753.18
CO-93(1)	ST AREA INLET #J1.1	5,752.14	ST WYE CONNECTION	5,752.11	3.2	0.009	1.73	6.0	PVC	0.010	0.03	0.71	5,752.22	5,752.19
CO-93(2)	ST WYE CONNECTION	5,752.11	ST AREA INLET #J-1	5,751.64	47.0	0.010	1.76	6.0	PVC	0.010	0.03	0.73	5,752.19	5,751.74
CO-109	ST RD #A-3	5,752.25	ST WYE CONNECTION	5,752.11	9.2	0.015	0.00	6.0	PVC	0.010	0.00	0.90	5,752.25	5,752.19

10-YEAR EVENT

Catch Basin Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Flow (Total Out) (cfs)	Flow (Additional Subsurface) (cfs)	Capacity (Inlet) (cfs)
ST INLET #I-2	5,776.82	5,767.61	0.050	5,767.86	5,767.85	0.51	0.00	(N/A)
ST INLET #I-1	5,772.38	5,762.98	0.050	5,764.82	5,764.80	16.02	0.00	(N/A)
ST INLET #I-3	5,774.64	5,768.17	0.050	5,768.33	5,768.33	0.22	0.00	(N/A)
ST AREA INLET #H-3	5,761.12	5,758.69	1.320	5,759.57	5,759.55	0.19	0.00	(N/A)
ST AREA INLET #H-2	5,761.13	5,758.20	0.050	5,759.50	5,759.50	0.22	0.00	(N/A)
ST AREA INLET #H-1	5,761.28	5,758.66	1.120	5,759.50	5,759.49	0.15	0.00	(N/A)
ST AREA INLET #G-1	5,761.27	5,757.72	0.050	5,757.87	5,757.86	0.09	0.00	(N/A)
SCUPPER DRAIN #E-1	5,760.72	5,756.62	0.050	5,756.87	5,756.87	0.24	0.00	(N/A)
ST AREA INLET #K-1	5,761.90	5,753.55	0.050	5,753.81	5,753.80	0.30	0.00	(N/A)
ST INLET #K-1	5,760.96	5,752.17	1.560	5,752.88	5,752.62	1.45	0.00	(N/A)
ST INLET #B-1	5,760.12	5,750.60	0.050	5,751.01	5,751.00	1.17	0.00	(N/A)
ST AREA INLET #D-1	5,759.17	5,751.70	0.570	5,752.11	5,752.04	0.51	0.00	(N/A)
ST AREA INLET #C-5	5,758.88	5,754.44	0.400	5,754.51	5,754.50	0.02	0.00	(N/A)
ST AREA INLET #C-4	5,758.42	5,752.86	0.640	5,752.99	5,752.96	0.06	0.00	(N/A)
ST AREA INLET #C-3	5,758.81	5,751.71	0.320	5,752.02	5,751.98	0.40	0.00	(N/A)
ST AREA INLET #C-2	5,758.56	5,752.66	0.620	5,752.92	5,752.87	0.21	0.00	(N/A)
ST AREA INLET #C-1	5,757.50	5,753.26	0.050	5,753.36	5,753.36	0.04	0.00	(N/A)
ST AREA INLET #J-2	5,758.60	5,753.40	0.100	5,753.57	5,753.57	0.15	0.00	(N/A)
ST AREA INLET #J-1	5,758.33	5,751.44	0.320	5,751.74	5,751.71	0.39	0.00	(N/A)
ST AREA INLET #A1.2	5,758.59	5,748.72	0.050	5,749.00	5,749.00	0.13	0.00	(N/A)
ST AREA INLET #A1.1	5,758.87	5,748.73	0.050	5,748.83	5,748.82	0.05	0.00	(N/A)
ST INLET #A-1.1	5,757.46	5,753.71	0.050	5,754.69	5,754.67	7.33	0.00	(N/A)
ST AREA INLT #E-1	5,758.75	5,756.27	0.050	5,756.35	5,756.35	0.03	0.00	(N/A)
TRENCH DRAIN CONNECTION	5,759.72	5,752.71	0.050	5,752.93	5,752.92	0.15	0.00	(N/A)
TRENCH DRAIN CONNECTION	5,759.95	5,756.29	0.050	5,756.53	5,756.53	0.26	0.00	(N/A)
SCUPPER DRAIN #H-1	5,762.00	5,759.00	0.050	5,759.50	5,759.50	0.07	0.00	(N/A)
SCUPPER DRAIN #F-1	5,762.01	5,755.67	0.050	5,756.10	5,756.10	0.10	0.00	(N/A)
CB-40	5,785.77	5,784.89	0.050	5,785.59	5,785.59	1.26	0.00	(N/A)
CB-41	5,786.94	5,785.13	0.050	5,785.73	5,785.73	0.99	0.00	(N/A)
CB-42	5,786.70	5,785.24	0.050	5,785.62	5,785.62	0.26	0.00	(N/A)
CB-43	5,787.54	5,785.53	0.600	5,786.13	5,786.11	0.88	0.00	(N/A)
CB-44	5,786.88	5,785.99	0.050	5,786.34	5,786.34	0.32	0.00	(N/A)
CB-45	5,786.89	5,785.77	0.050	5,786.20	5,786.20	0.46	0.00	(N/A)
CB-46	5,787.74	5,786.04	0.050	5,786.33	5,786.33	0.23	0.00	(N/A)
ST AREA INLET #F-1	5,761.47	5,755.13	1.120	5,756.10	5,756.08	0.42	0.00	(N/A)
SCUPPER DRAIN #H-2	5,762.02	5,758.82	0.050	5,759.57	5,759.57	0.14	0.00	(N/A)
SCUPPER DRAIN #K-1	5,762.02	5,753.75	0.050	5,754.03	5,754.02	0.29	0.00	(N/A)
SCUPPER DRAIN #D-1	5,761.82	5,753.28	0.050	5,753.60	5,753.59	0.38	0.00	(N/A)
SCUPPER DRAIN #C-2	5,759.79	5,752.61	0.050	5,753.05	5,753.05	0.33	0.00	(N/A)
SCUPPER DRAIN #C-1	5,758.93	5,753.33	0.050	5,753.52	5,753.52	0.14	0.00	(N/A)
ST AREA INLET #E-2	5,760.18	5,756.27	0.100	5,756.53	5,756.52	0.25	0.00	(N/A)
ST AREA INLET #J1.1	5,758.49	5,752.14	0.720	5,752.24	5,752.22	0.03	0.00	(N/A)
SCUPPER DRAIN #J-1	5,759.43	5,754.15	0.050	5,754.31	5,754.30	0.10	0.00	(N/A)
SCUPPER DRAIN #A-1	5,759.46	5,749.43	0.050	5,749.65	5,749.65	0.19	0.00	(N/A)

10-YEAR EVENT

Catch Basin Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Flow (Total Out) (cfs)	Flow (Additional Subsurface) (cfs)	Capacity (Inlet) (cfs)
ST AREA INLET #F-2	5,761.78	5,755.34	0.050	5,756.10	5,756.10	0.14	0.00	(N/A)
TYPE C INLET	5,761.95	5,754.78	0.050	5,755.06	5,755.06	0.45	0.00	(N/A)

10-YEAR EVENT

Manhole Table - Time: 0.00 hours

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Flow (Total Out) (cfs)	System Flow Time (min)
ST MH #I-2	5,776.98	5,766.61	1.570	5,767.04	5,766.89	0.67	7.752
ST MH #I-1	5,772.69	5,762.58	1.070	5,764.79	5,764.04	16.49	17.518
ST MH #A-7	5,772.87	5,759.65	0.570	5,761.51	5,761.11	16.49	17.559
ST MH #A-8	5,773.06	5,761.40	0.100	5,761.51	5,761.51	0.00	0.000
ST MH #A-6	5,763.82	5,755.13	1.120	5,757.14	5,756.51	16.72	17.886
ST MH #A-5	5,763.00	5,751.78	1.070	5,753.65	5,753.11	17.31	18.077
ST MH #E-1	5,760.85	5,755.10	1.570	5,755.58	5,755.40	0.54	5.167
ST MH #A-4	5,760.33	5,748.42	1.070	5,750.31	5,749.76	17.65	18.210
ST MH #A-3	5,759.01	5,745.08	0.100	5,746.49	5,746.44	17.98	18.569
ST MH #B-2	5,754.32	5,746.85	0.370	5,747.55	5,747.47	3.15	11.881
ST MH #B-3	5,754.60	5,748.16	0.370	5,748.87	5,748.78	2.68	11.678
EX. MANHOLE	5,784.16	5,778.02	0.370	5,778.02	5,778.02	0.00	0.000
ST MH #B-5	5,760.11	5,750.11	0.520	5,750.59	5,750.51	1.17	5.092
ST MH #B-4	5,756.73	5,749.46	0.620	5,750.17	5,750.04	2.32	11.392
ST RD #C-1	5,759.92	5,756.00	0.050	5,756.00	5,756.00	0.00	0.000
ST RD #A-3	5,759.40	5,752.25	0.050	5,752.25	5,752.25	0.00	0.000
ST RD #A-2	5,759.99	5,753.50	0.050	5,753.72	5,753.72	0.19	5.000
DROP STRUCTURE #A-2	5,759.62	5,750.24	0.370	5,750.49	5,750.46	0.19	5.087
ST RD #A-1	5,759.98	5,752.50	0.050	5,752.50	5,752.50	0.00	0.000
DROP STRUCTURE #A-1	5,759.81	5,749.74	0.100	5,749.74	5,749.74	0.00	0.000
ST CO #A-1	5,759.35	5,749.11	0.620	5,749.38	5,749.33	0.19	5.025
ST MH #A-1	5,750.76	5,738.60	0.050	5,739.98	5,739.96	17.95	18.947
ST MH #A-2	5,764.24	5,742.34	1.320	5,744.38	5,743.70	17.96	18.860
ST RD #F-1	5,762.92	5,758.00	0.050	5,758.00	5,758.00	0.00	0.000
ST CO #AC-1	5,762.81	5,755.45	2.370	5,757.14	5,757.14	0.00	0.000
ST CO #D-1	5,760.75	5,753.58	0.400	5,753.58	5,753.58	0.00	0.000

Transition Table - Time: 0.00 hours

ID	Label	Elevation (Ground) (ft)	Elevation (Top) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (Out) (ft)
84	STRM TEE	5,765.23	5,758.55	5,758.05	0.35	5,759.43
87	ST CO #E-1	5,760.10	5,760.10	5,756.07	0.26	5,756.31
90	KOR-N-TEE #A-2	5,758.89	5,750.10	5,747.10	17.96	5,748.46
160	STRM BEND	5,763.05	5,759.08	5,758.58	0.19	5,759.53
201	KOR-N-TEE #A-8	5,765.76	5,759.15	5,757.15	16.72	5,758.62
218	STORM TEE	5,758.98	5,751.65	5,750.82	0.59	5,751.16
223	KOR-N-TEE #A-6	5,762.43	5,762.43	5,750.92	17.40	5,752.33
233	KOR-N-TEE #A-5	5,759.50	5,750.89	5,747.89	17.76	5,749.24
240	KOR-N-TEE #A-4	5,759.47	5,750.44	5,747.44	17.75	5,749.20
245	KOR-N-TEE #A-3	5,759.07	5,750.17	5,747.17	17.87	5,749.00
251	KOR-N-TEE #A-1	5,759.29	5,749.69	5,746.69	17.98	5,748.05
261	ST TEE	5,762.24	5,757.85	5,757.35	0.09	5,757.49
272	KOR-N-TEE #A-7	5,765.29	5,756.56	5,754.06	16.98	5,755.45
275	ST WYE CONNECTION	5,758.80	5,752.61	5,752.11	0.03	5,752.19

10-YEAR EVENT

Outfall Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	System Flow Time (min)
ST FES #A-1.1	5,755.10	5,752.85	Free Outfall	0.00	5,753.52	7.31	5.333
O-4	5,745.94	5,743.52	Free Outfall	0.00	5,744.41	13.95	7.633
ST FES #B-1	5,748.08	5,746.05	Free Outfall	0.00	5,746.54	3.13	12.072
O-6	5,785.50	5,784.62	Free Outfall	0.00	5,785.39	1.24	9.246
ST FES #A-1	5,740.91	5,737.91	Free Outfall	0.00	5,739.19	17.93	19.316

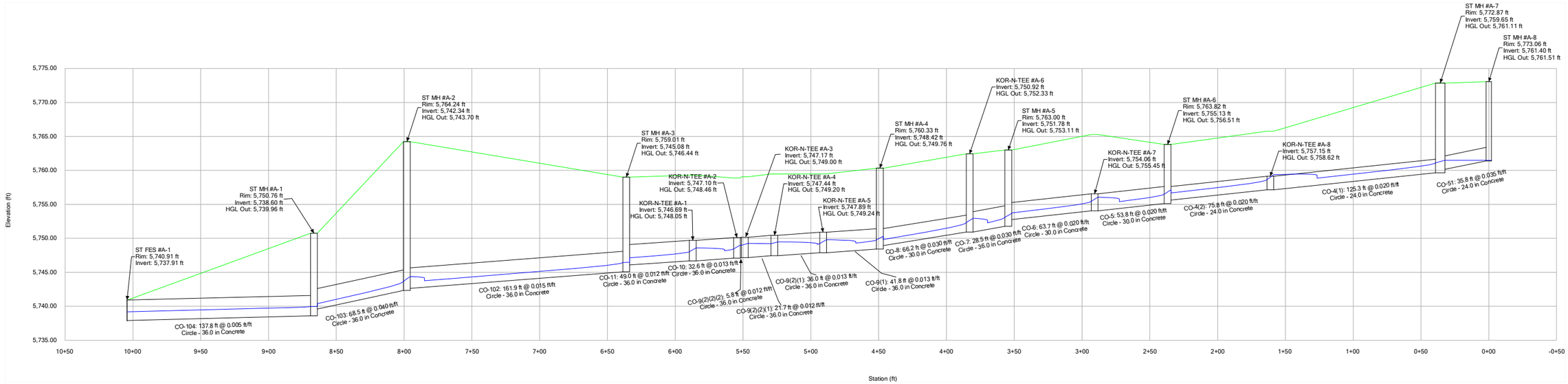
Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
B3/2	ST INLET #I-2	0.155	0.620	5.000	0.51
B1	ST INLET #I-3	0.140	0.340	7.610	0.22
B3/2	ST INLET #I-1	0.155	0.620	5.000	0.51
A-8	CB-46	0.060	0.730	5.000	0.23
A-7	CB-42	0.200	0.280	7.770	0.26
A-9	CB-45	0.060	0.810	5.000	0.26
A-10	CB-44	0.070	0.860	5.000	0.32
A6/2	CB-43	0.040	0.670	5.350	0.14
A6/2	CB-41	0.040	0.670	5.350	0.14
A-5	CB-40	0.050	0.460	5.000	0.12
A-13	ST INLET #A-1.1	1.060	0.600	5.250	3.33
B-25	ST AREA INLET #A1.1	0.020	0.470	5.540	0.05
C-17.18.19.20	H-1	1.750	0.430	7.455	3.54
B-24	SCUPPER DRAIN #A-1	0.040	0.900	5.000	0.19
B-26	ST AREA INLET #A1.2	0.060	0.470	7.120	0.13
B21	ST AREA INLET #J-1	0.120	0.380	6.300	0.23
B22	SCUPPER DRAIN #J-1	0.020	0.900	5.000	0.10
C15	ST AREA INLET #C-2	0.020	0.270	5.000	0.03
B20	ST AREA INLET #J-2	0.030	0.340	5.000	0.05
C16	ST AREA INLET #C-1	0.020	0.390	5.000	0.04
C14	SCUPPER DRAIN #C-1	0.030	0.900	5.000	0.14
C13	SCUPPER DRAIN #C-2	0.070	0.900	5.000	0.33
B19	ST AREA INLET #J1.1	0.020	0.250	5.000	0.03
C9	ST AREA INLET #C-5	0.010	0.400	6.670	0.02
C11/2	ST AREA INLET #C-4	0.025	0.330	5.940	0.04
C11/2	ST AREA INLET #C-3	0.025	0.330	5.940	0.04
B18	TRENCH DRAIN CONNECTION	0.050	0.550	5.000	0.15
B16	ST AREA INLT #E-1	0.020	0.250	5.000	0.03
B15	TRENCH DRAIN CONNECTION	0.060	0.820	5.000	0.26

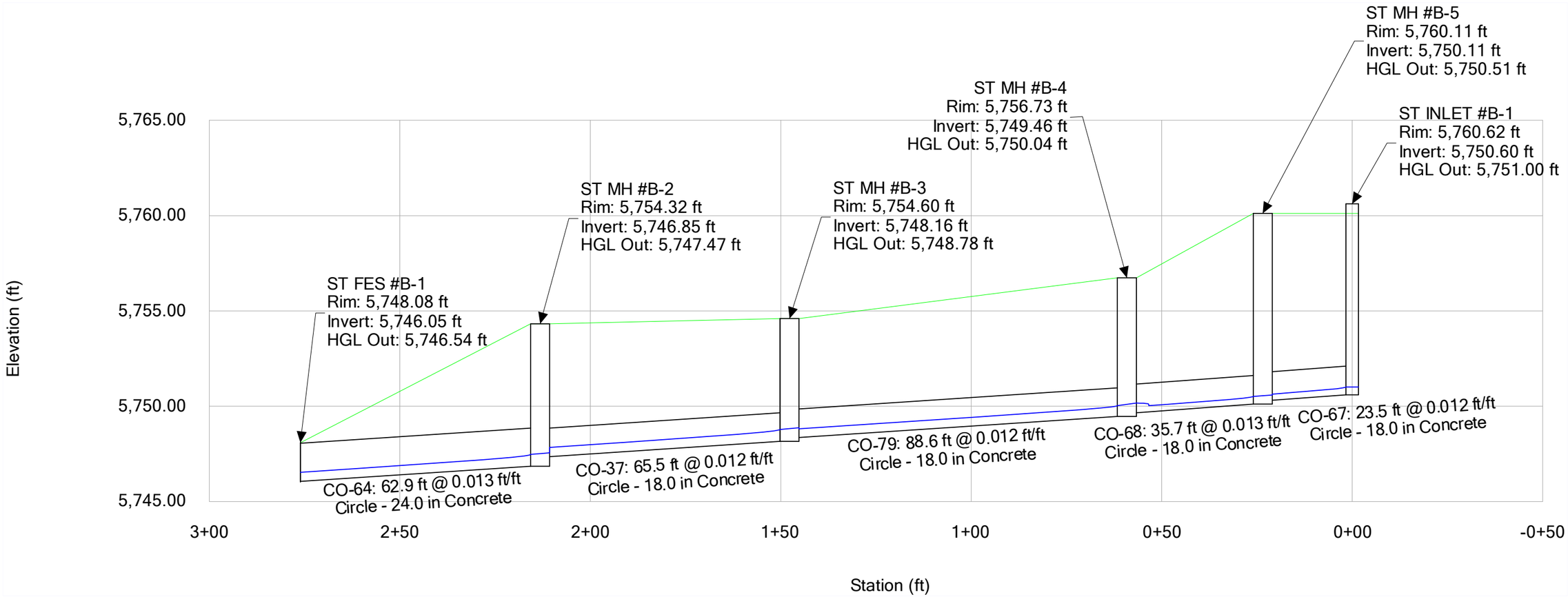
Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
B13	ST AREA INLET #G-1	0.030	0.540	5.000	0.09
B9	ST AREA INLET #F-1	0.120	0.330	5.000	0.21
B12	ST AREA INLET #F-2	0.020	0.430	5.000	0.05
B11	SCUPPER DRAIN #E-1	0.050	0.900	5.000	0.24
B14	ST AREA INLET #E-2	0.010	0.280	5.000	0.01
C5	SCUPPER DRAIN #D-1	0.080	0.900	5.000	0.38
C7	ST AREA INLET #D-1	0.050	0.500	5.000	0.13
B10	SCUPPER DRAIN #F-1	0.020	0.900	5.000	0.10
C4	SCUPPER DRAIN #K-1	0.060	0.900	5.000	0.29
C6	ST AREA INLET #K-1	0.010	0.280	5.000	0.01
C1	ST INLET #K-1	0.490	0.390	5.970	0.96
C-3	ST INLET #B-1	0.270	0.820	5.000	1.17
B5	SCUPPER DRAIN #H-2	0.030	0.900	5.000	0.14
B4	ST AREA INLET #H-3	0.030	0.310	5.000	0.05
C-2	TYPE C INLET	0.280	0.390	10.800	0.45
B7	ST AREA INLET #H-2	0.020	0.380	5.000	0.04
B6	SCUPPER DRAIN #H-1	0.040	0.310	5.000	0.07
B8	ST AREA INLET #H-1	0.030	0.550	5.000	0.09
B23	ST RD #A-2	0.040	0.900	5.000	0.19

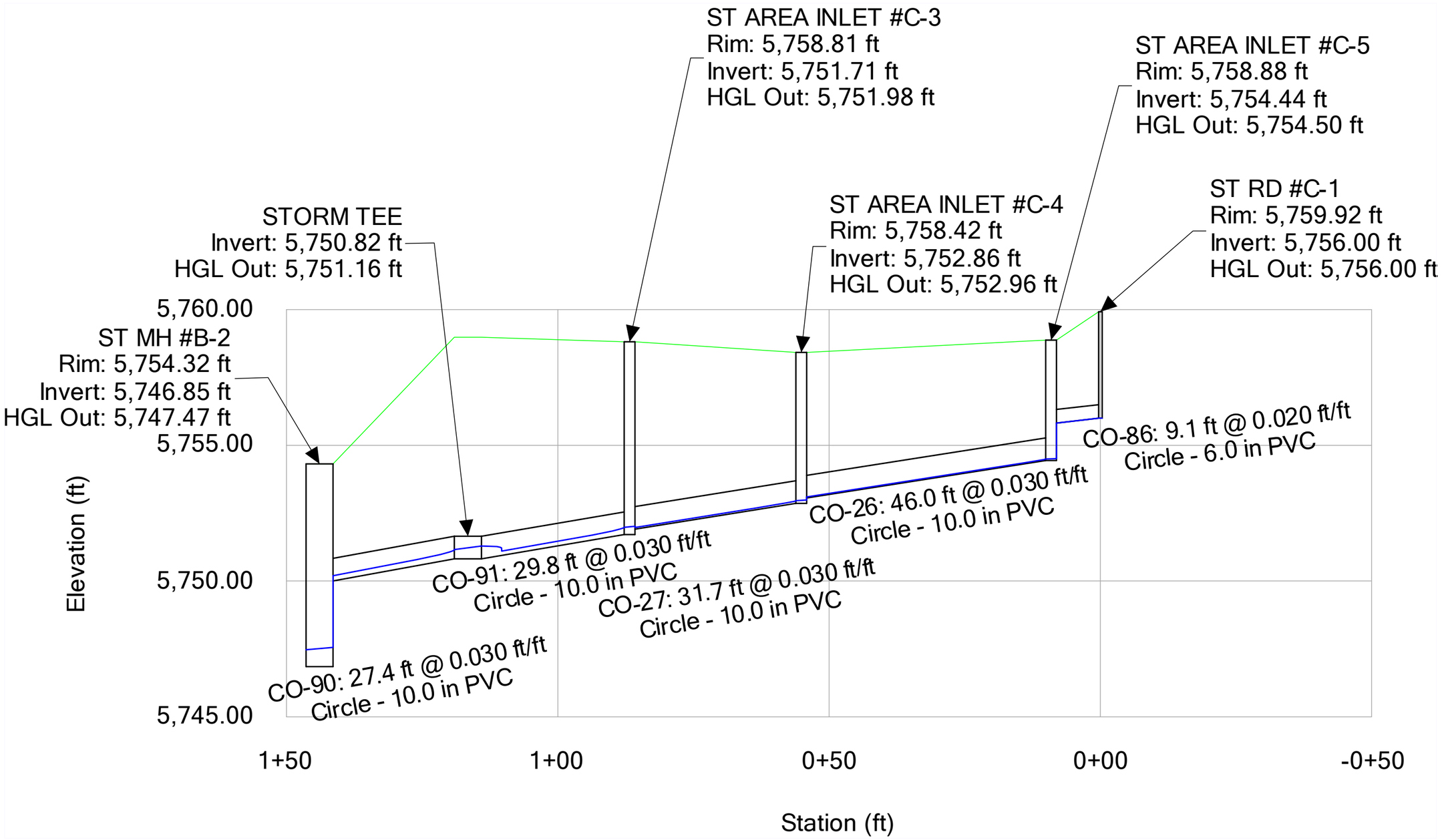
STORMLINE A


ST MH #A-7
Rim: 5,772.87 ft
Invert: 5,759.65 ft
HGL Out: 5,761.11 ft
ST MH #A-8
Rim: 5,773.06 ft
Invert: 5,761.40 ft
HGL Out: 5,761.51 ft
KOR-N-TEE #A-6
Invert: 5,750.92 ft
HGL Out: 5,752.33 ft
ST MH #A-5
Rim: 5,763.00 ft
Invert: 5,751.78 ft
HGL Out: 5,753.11 ft
ST MH #A-6
Rim: 5,763.82 ft
Invert: 5,755.13 ft
HGL Out: 5,756.51 ft
KOR-N-TEE #A-7
Invert: 5,754.06 ft
HGL Out: 5,755.45 ft
KOR-N-TEE #A-8
Invert: 5,757.15 ft
HGL Out: 5,758.62 ft
ST MH #A-4
Rim: 5,760.33 ft
Invert: 5,748.42 ft
HGL Out: 5,749.76 ft
KOR-N-TEE #A-3
Invert: 5,747.17 ft
HGL Out: 5,749.00 ft
ST MH #A-3
Rim: 5,759.01 ft
Invert: 5,745.08 ft
HGL Out: 5,746.44 ft
ST MH #A-2
Rim: 5,764.24 ft
Invert: 5,742.34 ft
HGL Out: 5,743.70 ft
ST MH #A-1
Rim: 5,750.76 ft
Invert: 5,738.60 ft
HGL Out: 5,739.96 ft
ST FES #A-1
Rim: 5,740.91 ft
Invert: 5,737.91 ft
KOR-N-TEE #A-4
Invert: 5,747.44 ft
HGL Out: 5,749.20 ft
KOR-N-TEE #A-2
Invert: 5,747.10 ft
HGL Out: 5,748.46 ft
KOR-N-TEE #A-1
Invert: 5,746.69 ft
HGL Out: 5,748.05 ft
KOR-N-TEE #A-5
Invert: 5,747.89 ft
HGL Out: 5,749.24 ft
CO-104: 137.8 ft @ 0.005 ft/ft
Circle - 36.0 in Concrete
CO-103: 68.5 ft @ 0.040 ft/ft
Circle - 36.0 in Concrete
CO-102: 161.9 ft @ 0.015 ft/ft
Circle - 36.0 in Concrete
CO-11: 49.0 ft @ 0.012 ft/ft
Circle - 36.0 in Concrete
CO-10: 32.6 ft @ 0.013 ft/ft
Circle - 36.0 in Concrete
CO-9(2)(2): 5.8 ft @ 0.012 ft/ft
Circle - 36.0 in Concrete
CO-9(2)(2)(1): 21.7 ft @ 0.012 ft/ft
Circle - 36.0 in Concrete
CO-9(2)(1): 36.0 ft @ 0.013 ft/ft
Circle - 36.0 in Concrete
CO-9(1): 41.8 ft @ 0.013 ft/ft
Circle - 36.0 in Concrete
CO-8: 66.2 ft @ 0.030 ft/ft
Circle - 30.0 in Concrete
CO-7: 28.5 ft @ 0.030 ft/ft
Circle - 36.0 in Concrete
CO-6: 63.7 ft @ 0.020 ft/ft
Circle - 30.0 in Concrete
CO-5: 53.8 ft @ 0.020 ft/ft
Circle - 30.0 in Concrete
CO-4(2): 75.8 ft @ 0.020 ft/ft
Circle - 24.0 in Concrete
CO-4(1): 125.3 ft @ 0.020 ft/ft
Circle - 24.0 in Concrete
CO-51: 35.8 ft @ 0.035 ft/ft
Circle - 24.0 in Concrete
Elevation (ft)
5,775.00
5,770.00
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
5,740.00
5,735.00
10+50
10+00
9+50
9+00
8+50
8+00
7+50
7+00
6+50
6+00
5+50
5+00
4+50
4+00
3+50
3+00
2+50
2+00
1+50
1+00
0+50
0+00
-0+50
Station (ft)

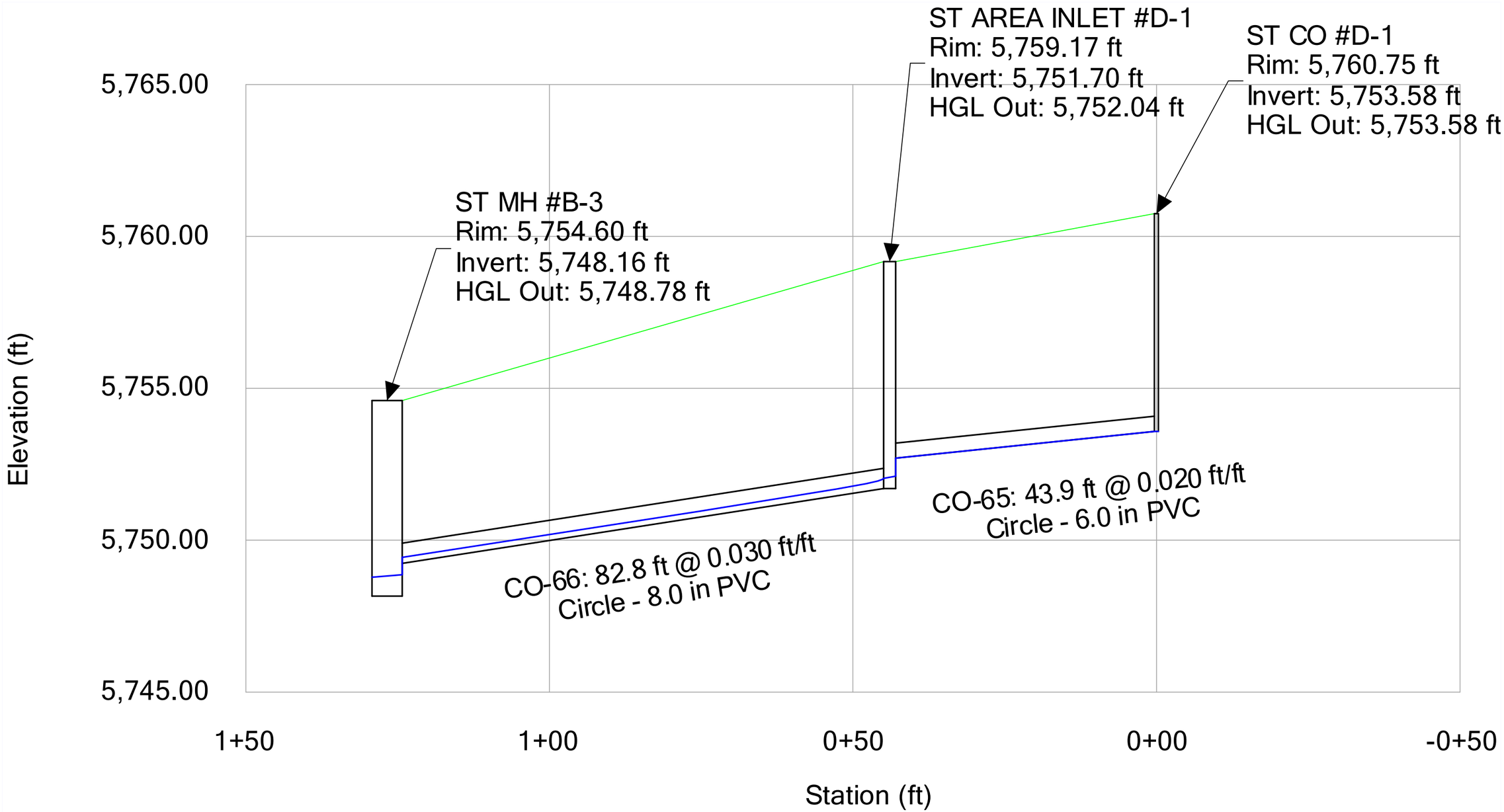
STORMLINE B


ST MH #B-5
Rim: 5,760.11 ft
Invert: 5,750.11 ft
HGL Out: 5,750.51 ft
ST MH #B-4
Rim: 5,756.73 ft
Invert: 5,749.46 ft
HGL Out: 5,750.04 ft
ST INLET #B-1
Rim: 5,760.62 ft
Invert: 5,750.60 ft
HGL Out: 5,751.00 ft
ST MH #B-2
Rim: 5,754.32 ft
Invert: 5,746.85 ft
HGL Out: 5,747.47 ft
ST MH #B-3
Rim: 5,754.60 ft
Invert: 5,748.16 ft
HGL Out: 5,748.78 ft
ST FES #B-1
Rim: 5,748.08 ft
Invert: 5,746.05 ft
HGL Out: 5,746.54 ft
CO-64: 62.9 ft @ 0.013 ft/ft
Circle - 24.0 in Concrete
CO-37: 65.5 ft @ 0.012 ft/ft
Circle - 18.0 in Concrete
CO-79: 88.6 ft @ 0.012 ft/ft
Circle - 18.0 in Concrete
CO-68: 35.7 ft @ 0.013 ft/ft
Circle - 18.0 in Concrete
CO-67: 23.5 ft @ 0.012 ft/ft
Circle - 18.0 in Concrete
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
3+00
2+50
2+00
1+50
1+00
0+50
0+00
-0+50
Station (ft)

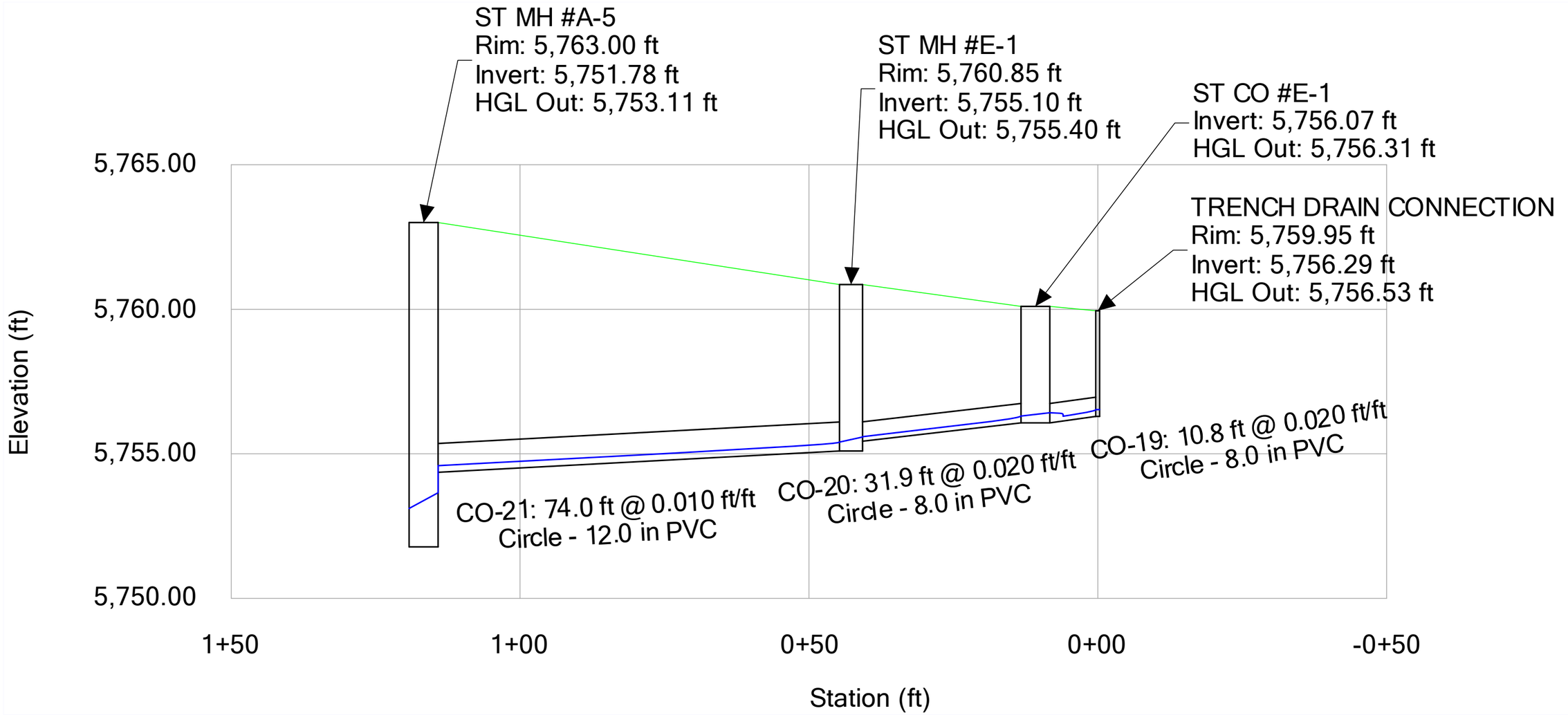
STORMLINE C


ST AREA INLET #C-3
Rim: 5,758.81 ft
Invert: 5,751.71 ft
HGL Out: 5,751.98 ft
ST AREA INLET #C-5
Rim: 5,758.88 ft
Invert: 5,754.44 ft
HGL Out: 5,754.50 ft
ST RD #C-1
Rim: 5,759.92 ft
Invert: 5,756.00 ft
HGL Out: 5,756.00 ft
ST AREA INLET #C-4
Rim: 5,758.42 ft
Invert: 5,752.86 ft
HGL Out: 5,752.96 ft
STORM TEE
Invert: 5,750.82 ft
HGL Out: 5,751.16 ft
ST MH #B-2
Rim: 5,754.32 ft
Invert: 5,746.85 ft
HGL Out: 5,747.47 ft
CO-86: 9.1 ft @ 0.020 ft/ft
Circle - 6.0 in PVC
CO-26: 46.0 ft @ 0.030 ft/ft
Circle - 10.0 in PVC
CO-91: 29.8 ft @ 0.030 ft/ft
Circle - 10.0 in PVC
CO-27: 31.7 ft @ 0.030 ft/ft
Circle - 10.0 in PVC
CO-90: 27.4 ft @ 0.030 ft/ft
Circle - 10.0 in PVC
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
1+50
1+00
0+50
0+00
-0+50
Station (ft)

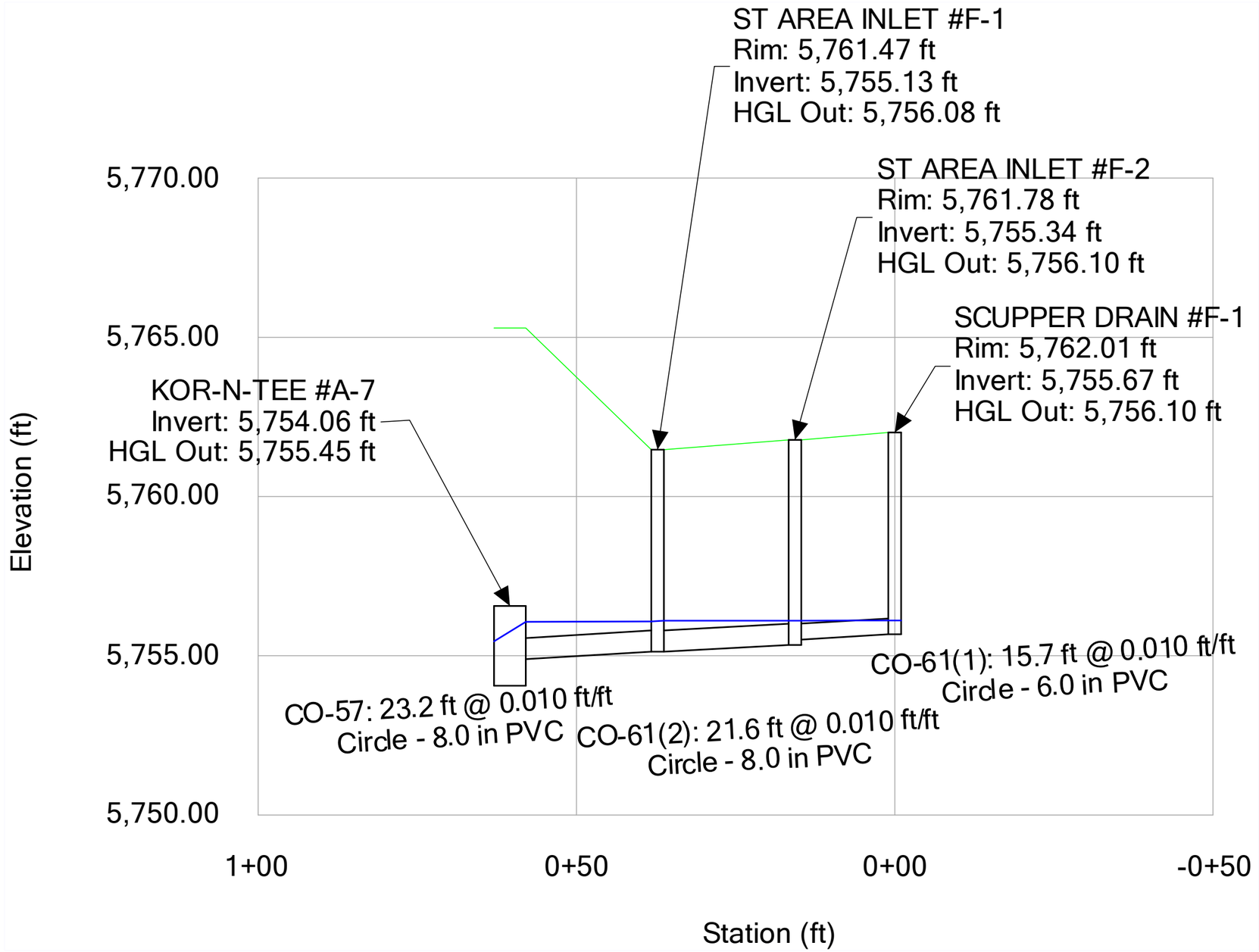
STORMLINE D


ST AREA INLET #D-1
Rim: 5,759.17 ft
Invert: 5,751.70 ft
HGL Out: 5,752.04 ft
ST CO #D-1
Rim: 5,760.75 ft
Invert: 5,753.58 ft
HGL Out: 5,753.58 ft
ST MH #B-3
Rim: 5,754.60 ft
Invert: 5,748.16 ft
HGL Out: 5,748.78 ft
CO-65: 43.9 ft @ 0.020 ft/ft
Circle - 6.0 in PVC
CO-66: 82.8 ft @ 0.030 ft/ft
Circle - 8.0 in PVC
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
1+50
1+00
0+50
0+00
-0+50
Station (ft)

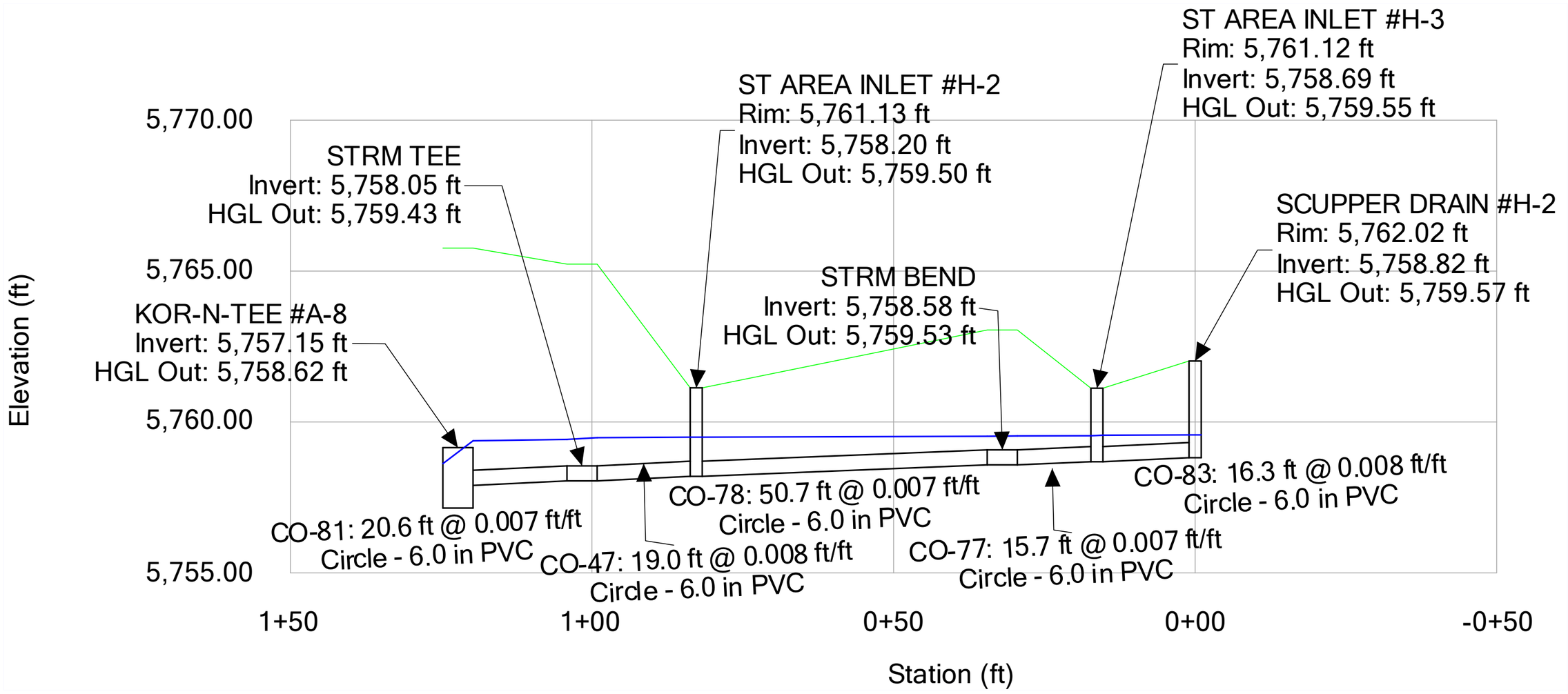
STORMLINE E


ST MH #A-5
Rim: 5,763.00 ft
Invert: 5,751.78 ft
HGL Out: 5,753.11 ft
ST MH #E-1
Rim: 5,760.85 ft
Invert: 5,755.10 ft
HGL Out: 5,755.40 ft
ST CO #E-1
Invert: 5,756.07 ft
HGL Out: 5,756.31 ft
TRENCH DRAIN CONNECTION
Rim: 5,759.95 ft
Invert: 5,756.29 ft
HGL Out: 5,756.53 ft
5,765.00
5,760.00
5,755.00
5,750.00
Elevation (ft)
CO-21: 74.0 ft @ 0.010 ft/ft
Circle - 12.0 in PVC
CO-20: 31.9 ft @ 0.020 ft/ft
Circle - 8.0 in PVC
CO-19: 10.8 ft @ 0.020 ft/ft
Circle - 8.0 in PVC
1+50
1+00
0+50
0+00
-0+50
Station (ft)

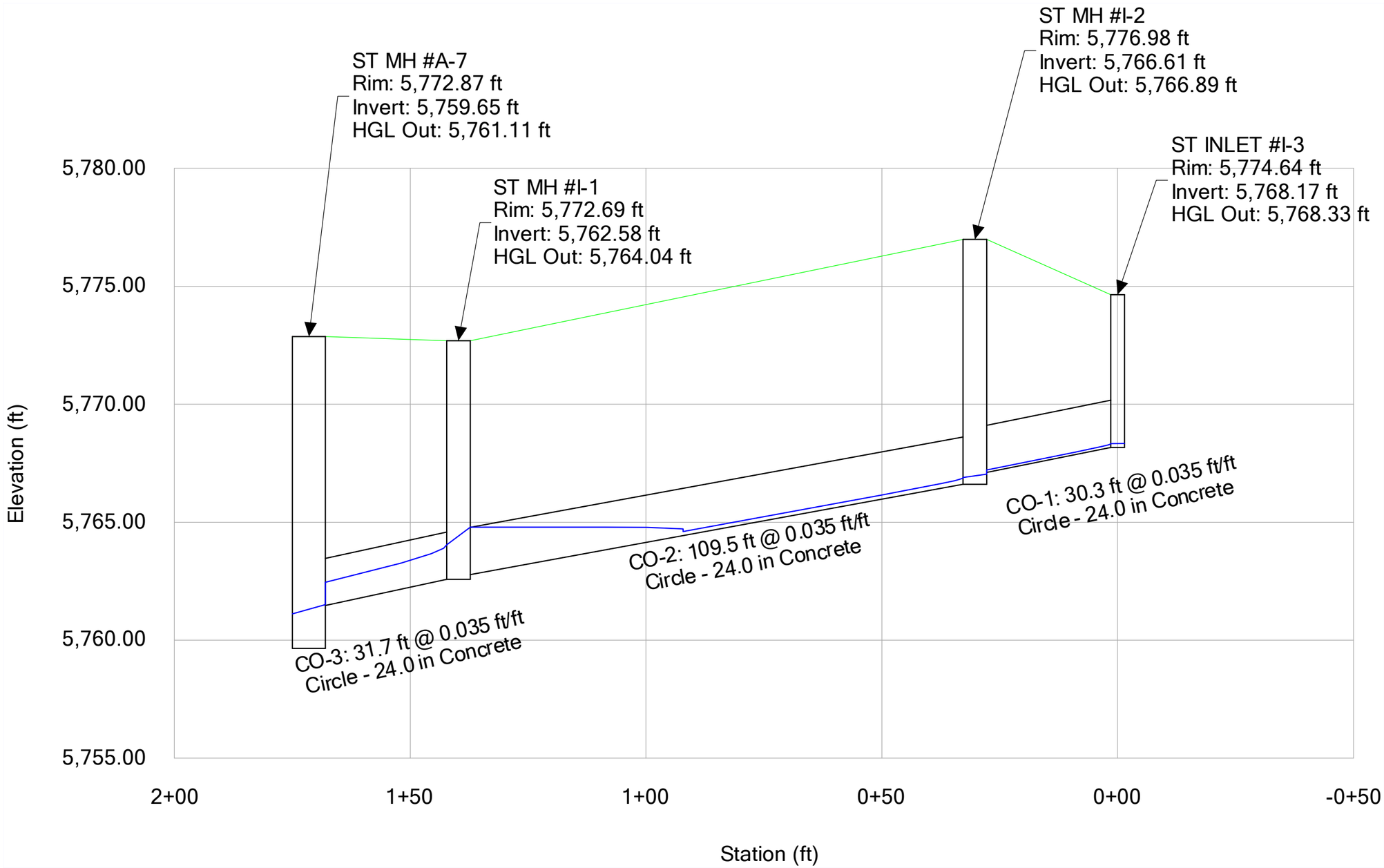
STORMLINE F


ST AREA INLET #F-1
Rim: 5,761.47 ft
Invert: 5,755.13 ft
HGL Out: 5,756.08 ft
ST AREA INLET #F-2
Rim: 5,761.78 ft
Invert: 5,755.34 ft
HGL Out: 5,756.10 ft
SCUPPER DRAIN #F-1
Rim: 5,762.01 ft
Invert: 5,755.67 ft
HGL Out: 5,756.10 ft
KOR-N-TEE #A-7
Invert: 5,754.06 ft
HGL Out: 5,755.45 ft
5,770.00
5,765.00
5,760.00
5,755.00
5,750.00
Elevation (ft)
CO-57: 23.2 ft @ 0.010 ft/ft
Circle - 8.0 in PVC
CO-61(2): 21.6 ft @ 0.010 ft/ft
Circle - 8.0 in PVC
CO-61(1): 15.7 ft @ 0.010 ft/ft
Circle - 6.0 in PVC
1+00
0+50
0+00
-0+50
Station (ft)

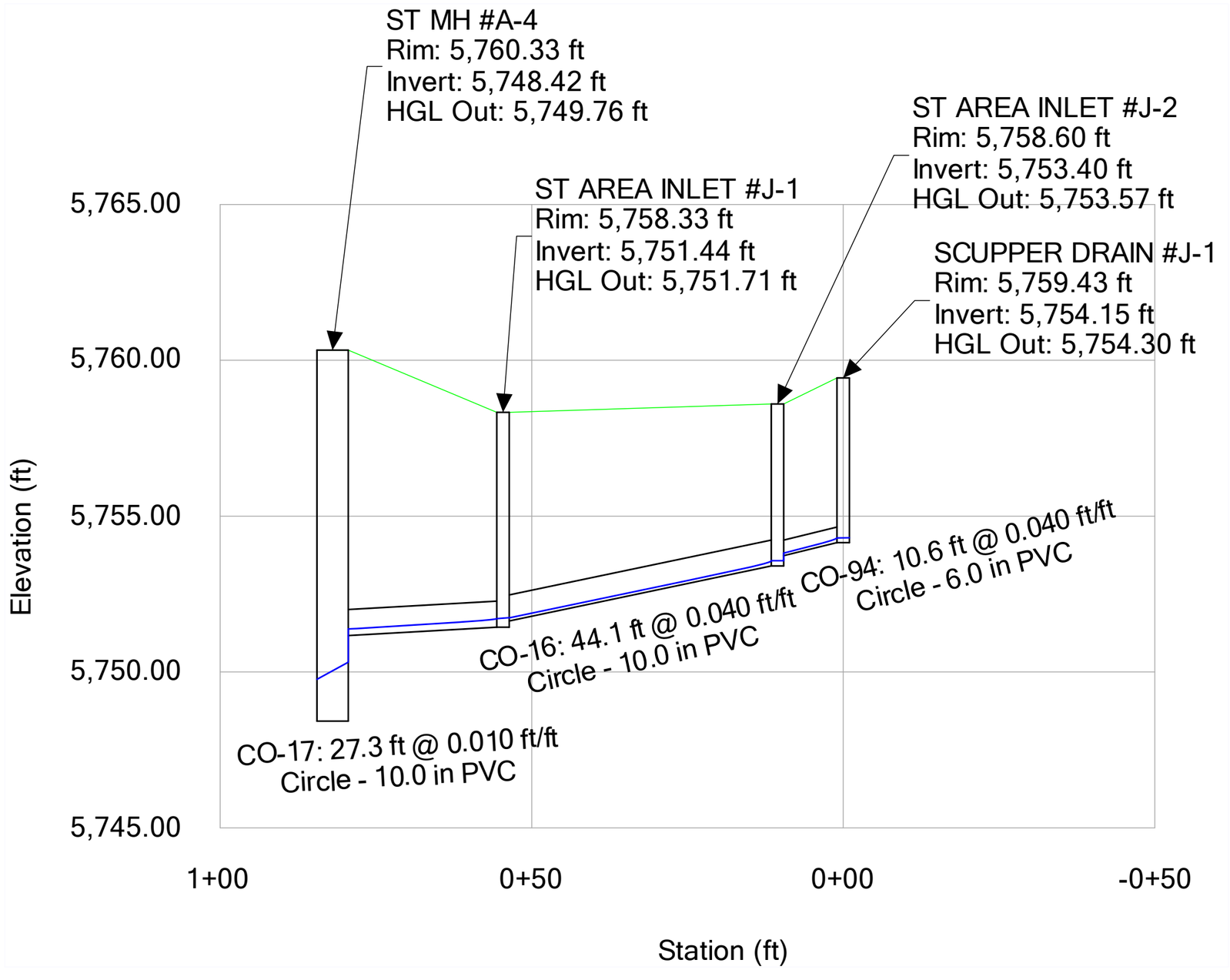
STORMLINE H


ST AREA INLET #H-3
Rim: 5,761.12 ft
Invert: 5,758.69 ft
HGL Out: 5,759.55 ft
ST AREA INLET #H-2
Rim: 5,761.13 ft
Invert: 5,758.20 ft
HGL Out: 5,759.50 ft
SCUPPER DRAIN #H-2
Rim: 5,762.02 ft
Invert: 5,758.82 ft
HGL Out: 5,759.57 ft
STRM TEE
Invert: 5,758.05 ft
HGL Out: 5,759.43 ft
STRM BEND
Invert: 5,758.58 ft
HGL Out: 5,759.53 ft
KOR-N-TEE #A-8
Invert: 5,757.15 ft
HGL Out: 5,758.62 ft
CO-81: 20.6 ft @ 0.007 ft/ft
Circle - 6.0 in PVC
CO-47: 19.0 ft @ 0.008 ft/ft
Circle - 6.0 in PVC
CO-78: 50.7 ft @ 0.007 ft/ft
Circle - 6.0 in PVC
CO-77: 15.7 ft @ 0.007 ft/ft
Circle - 6.0 in PVC
CO-83: 16.3 ft @ 0.008 ft/ft
Circle - 6.0 in PVC
5,770.00
5,765.00
5,760.00
5,755.00
Elevation (ft)
1+50
1+00
0+50
0+00
-0+50
Station (ft)

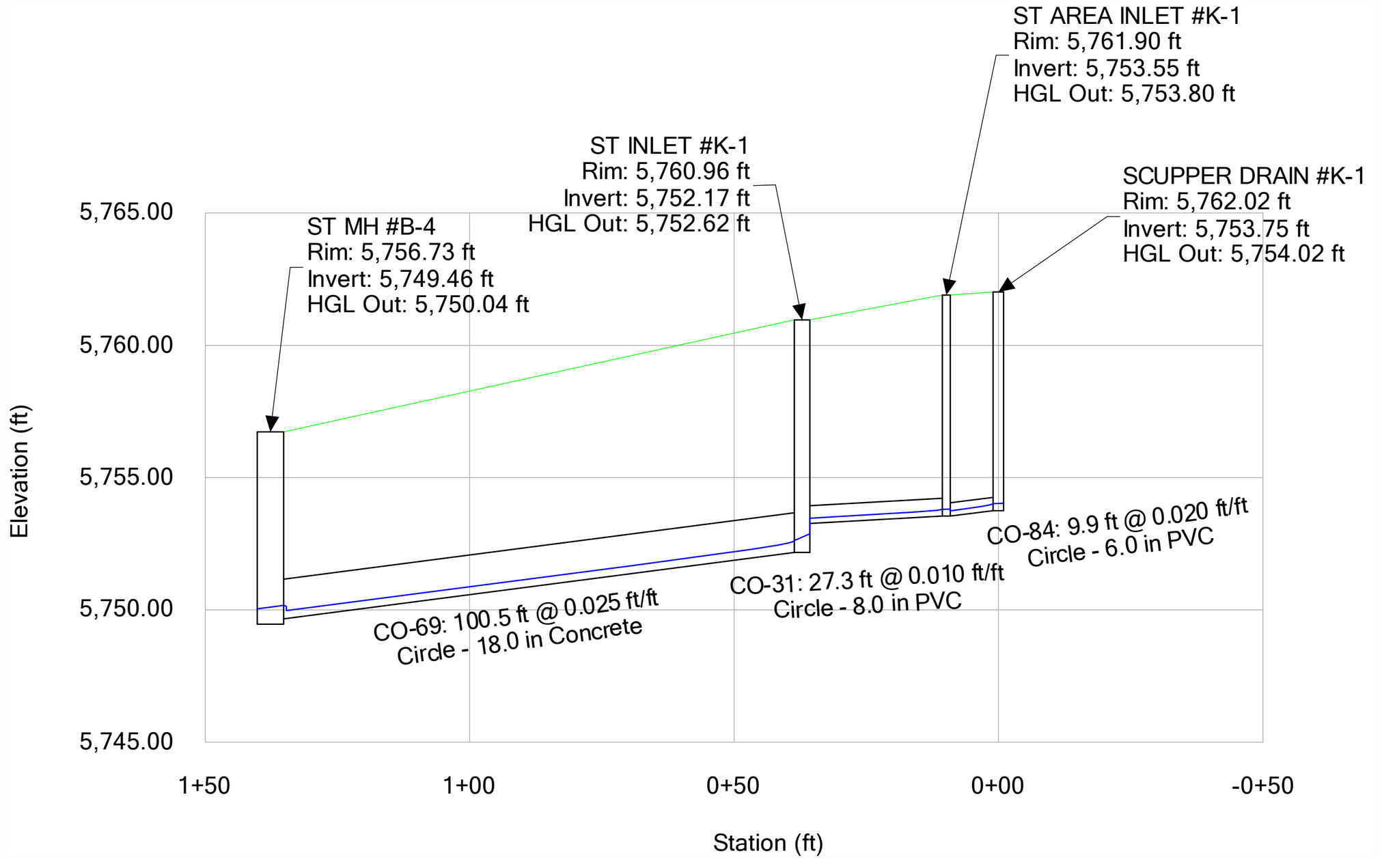
STORMLINE I


ST MH #A-7
Rim: 5,772.87 ft
Invert: 5,759.65 ft
HGL Out: 5,761.11 ft
ST MH #I-1
Rim: 5,772.69 ft
Invert: 5,762.58 ft
HGL Out: 5,764.04 ft
ST MH #I-2
Rim: 5,776.98 ft
Invert: 5,766.61 ft
HGL Out: 5,766.89 ft
ST INLET #I-3
Rim: 5,774.64 ft
Invert: 5,768.17 ft
HGL Out: 5,768.33 ft
CO-3: 31.7 ft @ 0.035 ft/ft
Circle - 24.0 in Concrete
CO-2: 109.5 ft @ 0.035 ft/ft
Circle - 24.0 in Concrete
CO-1: 30.3 ft @ 0.035 ft/ft
Circle - 24.0 in Concrete
5,780.00
5,775.00
5,770.00
5,765.00
5,760.00
5,755.00
Elevation (ft)
2+00
1+50
1+00
0+50
0+00
-0+50
Station (ft)

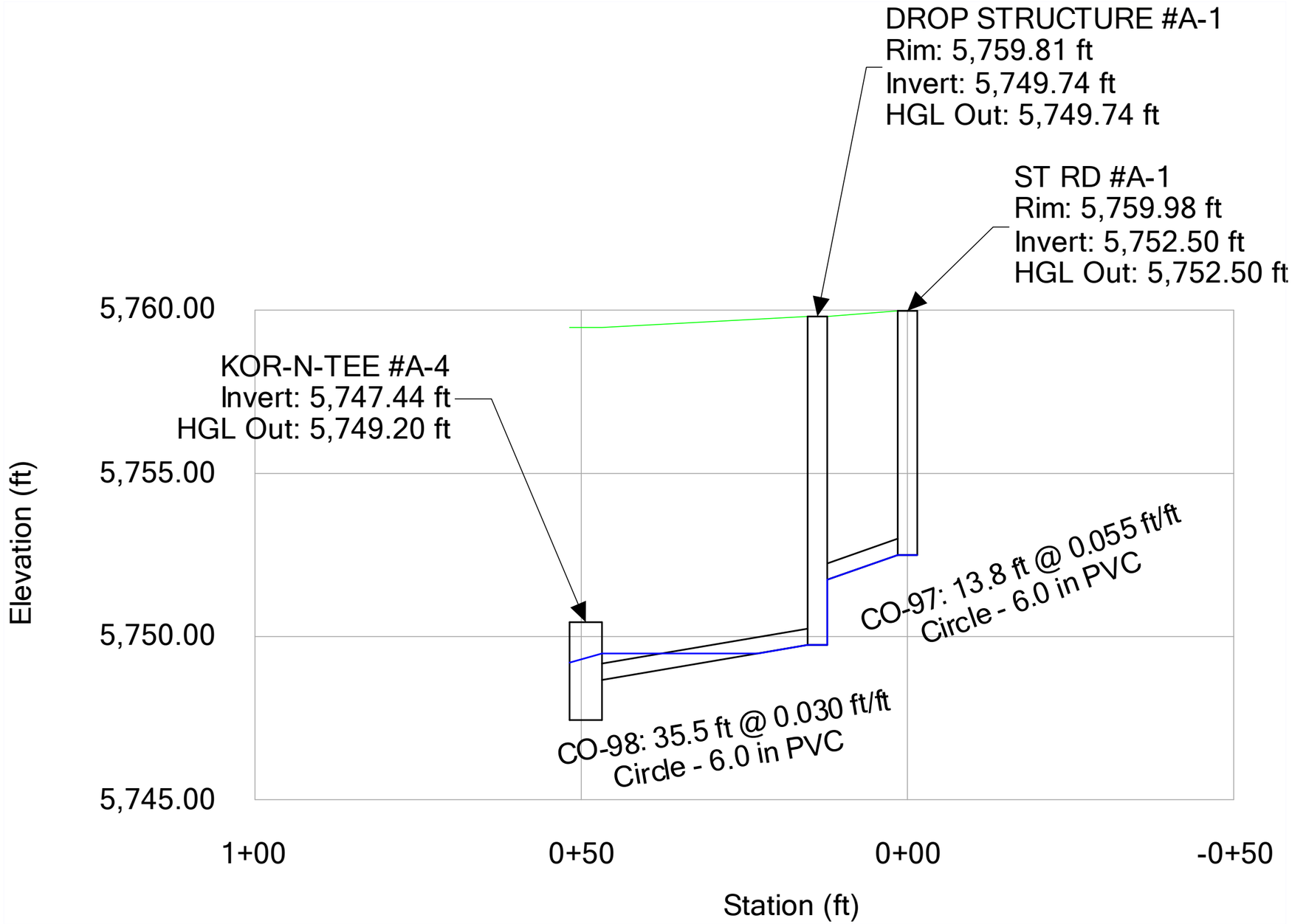
STORMLINE J


ST MH #A-4
Rim: 5,760.33 ft
Invert: 5,748.42 ft
HGL Out: 5,749.76 ft
ST AREA INLET #J-1
Rim: 5,758.33 ft
Invert: 5,751.44 ft
HGL Out: 5,751.71 ft
ST AREA INLET #J-2
Rim: 5,758.60 ft
Invert: 5,753.40 ft
HGL Out: 5,753.57 ft
SCUPPER DRAIN #J-1
Rim: 5,759.43 ft
Invert: 5,754.15 ft
HGL Out: 5,754.30 ft
CO-17: 27.3 ft @ 0.010 ft/ft
Circle - 10.0 in PVC
CO-16: 44.1 ft @ 0.040 ft/ft
Circle - 10.0 in PVC
CO-94: 10.6 ft @ 0.040 ft/ft
Circle - 6.0 in PVC
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
1+00
0+50
0+00
-0+50
Station (ft)

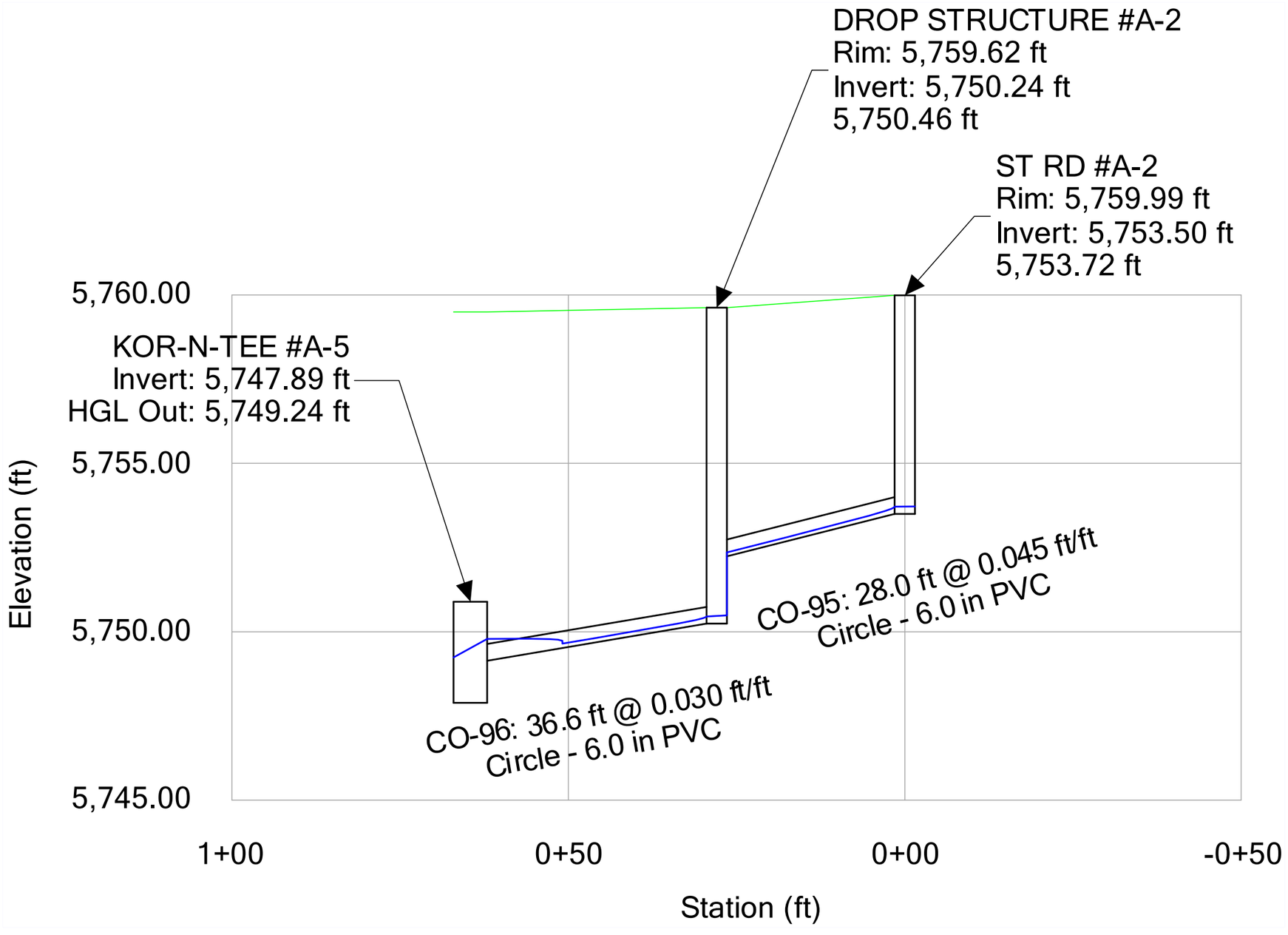
STORMLINE K

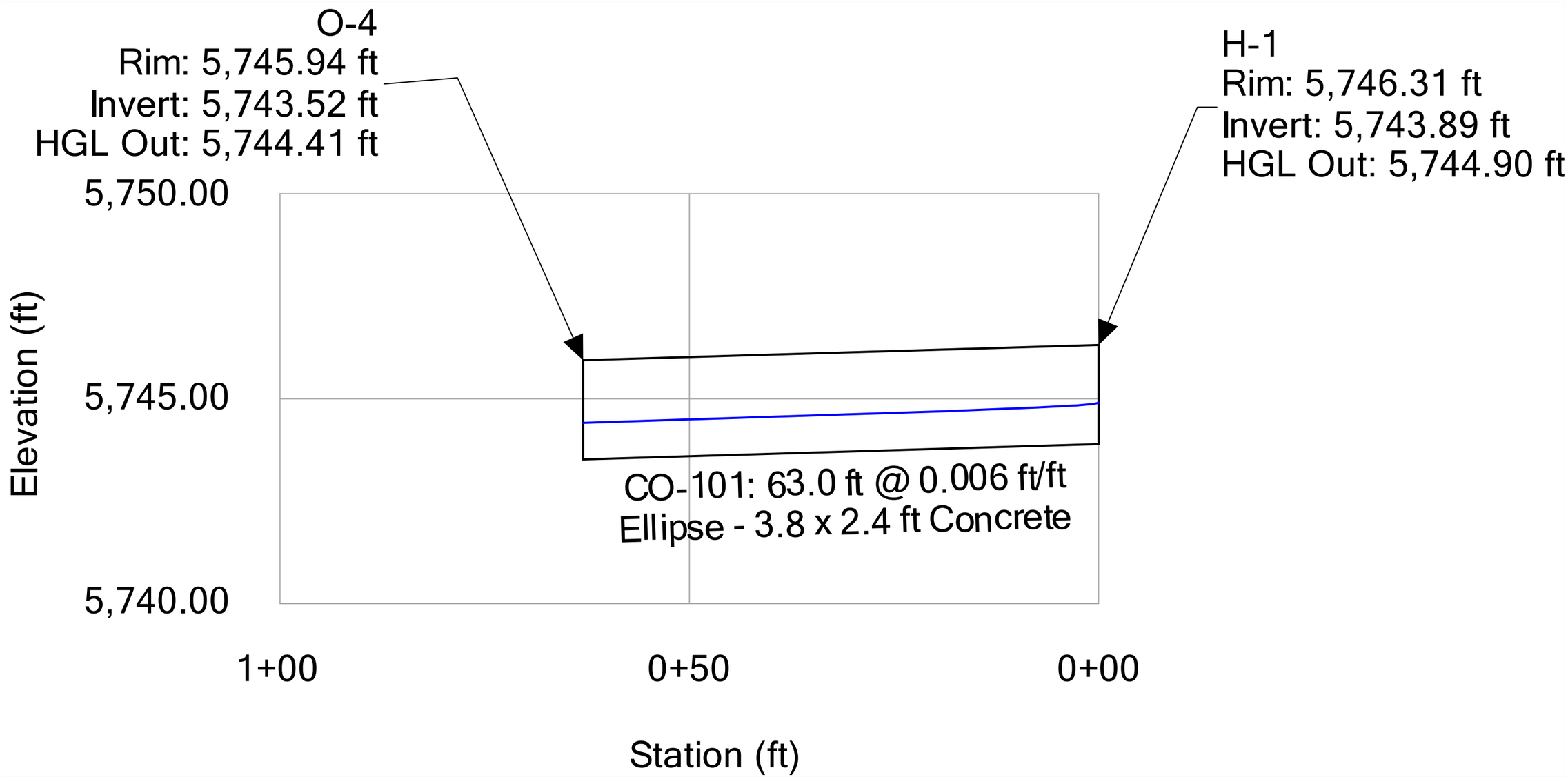

ST AREA INLET #K-1
Rim: 5,761.90 ft
Invert: 5,753.55 ft
HGL Out: 5,753.80 ft
ST INLET #K-1
Rim: 5,760.96 ft
Invert: 5,752.17 ft
HGL Out: 5,752.62 ft
SCUPPER DRAIN #K-1
Rim: 5,762.02 ft
Invert: 5,753.75 ft
HGL Out: 5,754.02 ft
ST MH #B-4
Rim: 5,756.73 ft
Invert: 5,749.46 ft
HGL Out: 5,750.04 ft
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
CO-69: 100.5 ft @ 0.025 ft/ft
Circle - 18.0 in Concrete
CO-31: 27.3 ft @ 0.010 ft/ft
Circle - 8.0 in PVC
CO-84: 9.9 ft @ 0.020 ft/ft
Circle - 6.0 in PVC
1+50
1+00
0+50
0+00
-0+50
Station (ft)

STORMLINE A-A



STORMLINE A-B




O-4
Rim: 5,745.94 ft
Invert: 5,743.52 ft
HGL Out: 5,744.41 ft
H-1
Rim: 5,746.31 ft
Invert: 5,743.89 ft
HGL Out: 5,744.90 ft
5,750.00
5,745.00
5,740.00
Elevation (ft)
CO-101: 63.0 ft @ 0.006 ft/ft
Ellipse - 3.8 x 2.4 ft Concrete
1+00
0+50
0+00
Station (ft)

100-YEAR EVENT

Conduit Table - Time: 0.00 hours

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Velocity (ft/s)	Diameter (in)	Material	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-1	ST INLET #I-3	5,768.17	ST MH #I-2	5,767.11	30.3	0.035	0.21	24.0	Concrete	0.013	0.65	42.34	5,771.26	5,771.26
CO-2	ST MH #I-2	5,766.61	ST MH #I-1	5,762.78	109.5	0.035	0.44	24.0	Concrete	0.013	1.38	42.30	5,771.26	5,771.25
CO-3	ST MH #I-1	5,762.58	ST MH #A-7	5,761.47	31.7	0.035	11.84	24.0	Concrete	0.013	37.20	42.33	5,768.92	5,768.07
CO-5	ST MH #A-6	5,755.13	KOR-N-TEE #A-7	5,754.06	53.8	0.020	7.70	30.0	Concrete	0.013	37.80	57.84	5,757.88	5,757.42
CO-6	KOR-N-TEE #A-7	5,754.06	ST MH #A-5	5,752.78	63.7	0.020	12.65	30.0	Concrete	0.013	38.36	58.14	5,756.15	5,755.17
CO-7	ST MH #A-5	5,751.78	KOR-N-TEE #A-6	5,750.92	28.5	0.030	14.78	36.0	Concrete	0.013	38.98	115.82	5,754.65	5,754.57
CO-8	KOR-N-TEE #A-6	5,750.92	ST MH #A-4	5,748.94	66.2	0.030	7.98	30.0	Concrete	0.013	39.16	70.93	5,753.51	5,752.91
CO-10	KOR-N-TEE #A-2	5,747.10	KOR-N-TEE #A-1	5,746.69	32.6	0.013	10.78	36.0	Concrete	0.013	40.28	74.81	5,749.82	5,749.76
CO-11	KOR-N-TEE #A-1	5,746.69	ST MH #A-3	5,746.08	49.0	0.012	10.74	36.0	Concrete	0.013	40.33	74.41	5,748.76	5,747.76
CO-13	ST INLET #A-1.1	5,753.71	ST FES #A-1.1	5,752.85	41.5	0.021	10.23	24.0	Concrete	0.013	15.47	32.56	5,755.13	5,753.89
CO-14	ST AREA INLET #A1.1	5,748.73	KOR-N-TEE #A-1	5,747.77	24.0	0.040	0.18	10.0	PVC	0.010	0.10	5.70	5,749.76	5,749.76
CO-15	ST AREA INLET #A1.2	5,748.72	KOR-N-TEE #A-2	5,748.18	6.8	0.079	0.52	10.0	PVC	0.010	0.28	8.03	5,750.41	5,750.41
CO-16	ST AREA INLET #J-2	5,753.40	ST AREA INLET #J-1	5,751.64	44.1	0.040	5.54	10.0	PVC	0.010	0.30	5.69	5,753.64	5,752.94
CO-17	ST AREA INLET #J-1	5,751.44	ST MH #A-4	5,751.17	27.3	0.010	1.47	10.0	PVC	0.010	0.80	2.83	5,752.93	5,752.91
CO-18	TRENCH DRAIN CONNECTION	5,752.71	KOR-N-TEE #A-6	5,751.84	43.8	0.020	0.83	8.0	PVC	0.010	0.29	2.21	5,754.58	5,754.57
CO-19	TRENCH DRAIN CONNECTION	5,756.29	ST CO #E-1	5,756.07	10.8	0.020	5.14	8.0	PVC	0.010	0.49	2.24	5,756.62	5,756.57
CO-20	ST CO #E-1	5,756.07	ST MH #E-1	5,755.44	31.9	0.020	5.10	8.0	PVC	0.010	0.49	2.21	5,756.40	5,755.78
CO-21	ST MH #E-1	5,755.10	ST MH #A-5	5,754.36	74.0	0.010	4.74	12.0	PVC	0.010	1.03	4.63	5,755.53	5,755.17
CO-22	SCUPPER DRAIN #E-1	5,756.62	ST AREA INLET #E-2	5,756.47	7.7	0.020	5.02	6.0	PVC	0.010	0.44	1.02	5,756.96	5,756.72
CO-23	ST AREA INLET #E-2	5,756.27	ST MH #E-1	5,755.98	14.6	0.020	5.14	6.0	PVC	0.010	0.48	1.03	5,756.62	5,756.23
CO-25	ST AREA INLT #E-1	5,756.27	ST MH #E-1	5,755.98	14.7	0.020	2.93	6.0	PVC	0.010	0.07	1.03	5,756.40	5,756.07
CO-26	ST AREA INLET #C-5	5,754.44	ST AREA INLET #C-4	5,753.06	46.0	0.030	2.77	10.0	PVC	0.010	0.04	4.93	5,754.53	5,753.12
CO-27	ST AREA INLET #C-4	5,752.86	ST AREA INLET #C-3	5,751.91	31.7	0.030	3.92	10.0	PVC	0.010	0.13	4.93	5,753.02	5,752.15
CO-29	ST AREA INLET #C-1	5,753.26	ST AREA INLET #C-2	5,752.86	20.1	0.020	3.19	6.0	PVC	0.010	0.09	1.03	5,753.41	5,753.03
CO-31	ST AREA INLET #K-1	5,753.55	ST INLET #K-1	5,753.27	27.3	0.010	4.18	8.0	PVC	0.010	0.57	1.59	5,753.90	5,753.55
CO-37	ST MH #B-3	5,748.16	ST MH #B-2	5,747.35	65.5	0.012	6.44	18.0	Concrete	0.013	5.27	11.68	5,749.04	5,748.06
CO-47	ST AREA INLET #H-2	5,758.20	STRM TEE	5,758.05	19.0	0.008	2.28	6.0	PVC	0.010	0.45	0.65	5,764.25	5,764.18
CO-50	ST AREA INLET #H-1	5,758.66	STRM TEE	5,758.05	30.5	0.020	2.68	6.0	PVC	0.010	0.53	1.03	5,764.33	5,764.18
CO-51	ST MH #A-8	5,761.40	ST MH #A-7	5,760.15	35.8	0.035	0.00	24.0	Concrete	0.013	0.00	42.28	5,768.07	5,768.07
CO-52	ST INLET #I-2	5,767.61	ST MH #I-2	5,767.11	10.0	0.050	0.32	24.0	Concrete	0.013	1.00	50.58	5,771.26	5,771.26
CO-53	ST INLET #I-1	5,762.98	ST MH #I-1	5,762.78	10.6	0.019	11.50	24.0	Concrete	0.013	36.12	31.13	5,771.52	5,771.25
CO-57	ST AREA INLET #F-1	5,755.13	KOR-N-TEE #A-7	5,754.89	23.2	0.010	2.56	8.0	PVC	0.010	0.89	1.60	5,757.50	5,757.42
CO-60	EX. MANHOLE	5,778.02	ST MH #I-2	5,769.77	110.4	0.075	0.00	24.0	Concrete	0.013	0.00	61.85	5,778.02	5,771.26

100-YEAR EVENT

Conduit Table - Time: 0.00 hours

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Velocity (ft/s)	Diameter (in)	Material	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-64	ST MH #B-2	5,746.85	ST FES #B-1	5,746.06	62.9	0.013	6.67	24.0	Concrete	0.013	6.20	25.35	5,747.73	5,746.74
CO-65	ST CO #D-1	5,753.58	ST AREA INLET #D-1	5,752.70	43.9	0.020	0.00	6.0	PVC	0.010	0.00	1.03	5,753.58	5,752.70
CO-66	ST AREA INLET #D-1	5,751.70	ST MH #B-3	5,749.24	82.8	0.030	7.13	8.0	PVC	0.010	0.98	2.71	5,752.17	5,749.52
CO-67	ST INLET #B-1	5,750.60	ST MH #B-5	5,750.31	23.5	0.012	5.08	18.0	Concrete	0.013	2.22	11.67	5,751.16	5,750.76
CO-68	ST MH #B-5	5,750.11	ST MH #B-4	5,749.66	35.7	0.013	5.12	18.0	Concrete	0.013	2.21	11.80	5,750.67	5,750.49
CO-69	ST INLET #K-1	5,752.17	ST MH #B-4	5,749.66	100.5	0.025	7.07	18.0	Concrete	0.013	2.91	16.60	5,752.82	5,750.49
CO-70	O-6	5,784.89	CB-40	5,784.62	34.9	0.008	4.83	10.0	PVC	0.010	2.63	2.51	5,785.97	5,785.61
CO-71	CB-40	5,785.24	CB-42	5,784.89	35.0	0.010	1.17	10.0	PVC	0.010	0.64	2.85	5,785.81	5,785.77
CO-72	CB-40	5,785.13	CB-41	5,784.89	21.8	0.011	3.63	10.0	PVC	0.010	1.98	2.99	5,785.97	5,785.77
CO-73	CB-41	5,785.53	CB-43	5,785.13	35.3	0.011	3.17	10.0	PVC	0.010	1.73	3.03	5,786.37	5,786.12
CO-74	CB-43	5,785.77	CB-45	5,785.53	23.8	0.010	1.66	10.0	PVC	0.010	0.90	2.86	5,786.50	5,786.46
CO-75	CB-45	5,786.04	CB-46	5,785.77	27.6	0.010	0.81	10.0	PVC	0.010	0.44	2.82	5,786.53	5,786.50
CO-76	CB-43	5,785.99	CB-44	5,785.53	40.9	0.011	1.09	10.0	PVC	0.010	0.59	3.02	5,786.52	5,786.46
CO-77	ST AREA INLET #H-3	5,758.69	STRM BEND	5,758.58	15.7	0.007	1.91	6.0	PVC	0.010	0.37	0.61	5,761.33	5,761.28
CO-78	STRM BEND	5,758.58	ST AREA INLET #H-2	5,758.20	50.7	0.007	1.89	6.0	PVC	0.010	0.37	0.63	5,761.26	5,761.13
CO-79	ST MH #B-4	5,749.46	ST MH #B-3	5,748.36	88.6	0.012	6.21	18.0	Concrete	0.013	4.57	11.71	5,750.28	5,749.01
CO-4(1)	ST MH #A-7	5,759.65	KOR-N-TEE #A-8	5,757.15	125.3	0.020	11.84	24.0	Concrete	0.013	37.20	31.95	5,766.82	5,763.44
CO-4(2)	KOR-N-TEE #A-8	5,757.15	ST MH #A-6	5,755.63	75.8	0.020	12.03	24.0	Concrete	0.013	37.80	32.04	5,761.03	5,758.91
CO-81	STRM TEE	5,758.05	KOR-N-TEE #A-8	5,757.90	20.6	0.007	4.84	6.0	PVC	0.010	0.95	0.62	5,763.79	5,763.44
CO-82	SCUPPER DRAIN #H-1	5,759.00	ST AREA INLET #H-1	5,758.66	17.1	0.020	1.81	6.0	PVC	0.010	0.35	1.03	5,761.32	5,761.28
CO-83	SCUPPER DRAIN #H-2	5,758.82	ST AREA INLET #H-3	5,758.69	16.3	0.008	1.35	6.0	PVC	0.010	0.27	0.65	5,761.14	5,761.12
CO-84	SCUPPER DRAIN #K-1	5,753.75	ST AREA INLET #K-1	5,753.55	9.9	0.020	5.32	6.0	PVC	0.010	0.53	1.04	5,754.12	5,753.83
CO-85	SCUPPER DRAIN #D-1	5,753.28	ST AREA INLET #D-1	5,752.70	29.2	0.020	5.65	6.0	PVC	0.010	0.71	1.03	5,753.70	5,753.01
CO-86	ST RD #C-1	5,756.00	ST AREA INLET #C-5	5,755.82	9.1	0.020	0.00	6.0	PVC	0.010	0.00	1.03	5,756.00	5,755.82
CO-87	SCUPPER DRAIN #C-2	5,752.61	ST AREA INLET #C-3	5,752.64	18.4	-0.002	3.16	6.0	PVC	0.010	0.62	0.29	5,753.22	5,753.04
CO-88	SCUPPER DRAIN #C-1	5,753.33	ST AREA INLET #C-2	5,752.86	23.6	0.020	4.39	6.0	PVC	0.010	0.27	1.03	5,753.59	5,753.03
CO-89	ST AREA INLET #C-2	5,752.66	STORM TEE	5,750.91	53.6	0.033	5.83	8.0	PVC	0.010	0.42	2.84	5,752.96	5,751.51
CO-90	STORM TEE	5,750.82	ST MH #B-2	5,750.00	27.4	0.030	7.39	10.0	PVC	0.010	1.16	4.93	5,751.30	5,750.29
CO-91	ST AREA INLET #C-3	5,751.71	STORM TEE	5,750.82	29.8	0.030	6.60	10.0	PVC	0.010	0.78	4.92	5,752.10	5,751.51
CO-94	SCUPPER DRAIN #J-1	5,754.15	ST AREA INLET #J-2	5,753.73	10.6	0.040	5.02	6.0	PVC	0.010	0.18	1.45	5,754.36	5,753.85
CO-95	ST RD #A-2	5,753.50	DROP STRUCTURE #A-2	5,752.24	28.0	0.045	6.40	6.0	PVC	0.010	0.35	1.55	5,753.80	5,752.40
CO-9(1)	ST MH #A-4	5,748.42	KOR-N-TEE #A-5	5,747.89	41.8	0.013	5.62	36.0	Concrete	0.013	39.70	75.06	5,752.38	5,752.24
CO-96	DROP STRUCTURE #A-2	5,750.24	KOR-N-TEE #A-5	5,749.14	36.6	0.030	1.80	6.0	PVC	0.010	0.35	1.26	5,752.32	5,752.24
CO-97	ST RD #A-1	5,752.50	DROP STRUCTURE #A-1	5,751.74	13.8	0.055	0.00	6.0	PVC	0.010	0.00	1.71	5,752.50	5,751.74
CO-9(2)(1)	KOR-N-TEE #A-5	5,747.89	KOR-N-TEE #A-4	5,747.44	36.0	0.013	5.64	36.0	Concrete	0.013	39.90	74.62	5,751.71	5,751.58

100-YEAR EVENT

Conduit Table - Time: 0.00 hours

Label	Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Length (Unified) (ft)	Slope (Calculated) (ft/ft)	Velocity (ft/s)	Diameter (in)	Material	Manning's n	Flow (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)
CO-98	DROP STRUCTURE #A-1	5,749.74	KOR-N-TEE #A-4	5,748.67	35.5	0.030	0.00	6.0	PVC	0.010	0.00	1.27	5,751.58	5,751.58
CO-9(2)(2)(1)	KOR-N-TEE #A-4	5,747.44	KOR-N-TEE #A-3	5,747.17	21.7	0.012	5.64	36.0	Concrete	0.013	39.88	74.33	5,751.05	5,750.97
CO-9(2)(2)(2)	KOR-N-TEE #A-3	5,747.17	KOR-N-TEE #A-2	5,747.10	5.8	0.012	5.67	36.0	Concrete	0.013	40.09	73.08	5,750.44	5,750.41
CO-99	SCUPPER DRAIN #A-1	5,749.43	ST CO #A-1	5,749.31	6.0	0.020	1.81	6.0	PVC	0.010	0.35	1.03	5,751.05	5,751.04
CO-100	ST CO #A-1	5,749.11	KOR-N-TEE #A-3	5,748.42	15.3	0.045	1.80	6.0	PVC	0.010	0.35	1.55	5,751.01	5,750.97
CO-101	H-1	5,743.89	O-4	5,743.52	63.0	0.006	7.40	45.0	Concrete	0.013	29.16	50.62	5,745.38	5,744.84
CO-102	ST MH #A-3	5,745.08	ST MH #A-2	5,742.65	161.9	0.015	11.52	36.0	Concrete	0.013	40.32	81.72	5,747.15	5,745.64
CO-103	ST MH #A-2	5,742.34	ST MH #A-1	5,739.60	68.5	0.040	16.53	36.0	Concrete	0.013	40.29	133.35	5,744.41	5,740.86
CO-104	ST MH #A-1	5,738.60	ST FES #A-1	5,737.91	137.8	0.005	7.50	36.0	Concrete	0.013	40.28	47.19	5,740.73	5,739.98
CO-59(1)	ST AREA INLET #G-1	5,757.72	ST TEE	5,757.35	8.2	0.045	5.20	6.0	PVC	0.010	0.17	1.55	5,757.93	5,757.64
CO-59(2)	ST TEE	5,757.35	ST AREA INLET #F-1	5,756.18	25.9	0.045	5.21	6.0	PVC	0.010	0.17	1.55	5,757.58	5,757.61
CO-105	ST RD #F-1	5,758.00	ST TEE	5,757.35	32.5	0.020	0.00	6.0	PVC	0.010	0.00	1.03	5,758.00	5,757.64
CO-61(1)	SCUPPER DRAIN #F-1	5,755.67	ST AREA INLET #F-2	5,755.51	15.7	0.010	0.90	6.0	PVC	0.010	0.18	0.74	5,757.63	5,757.62
CO-61(2)	ST AREA INLET #F-2	5,755.34	ST AREA INLET #F-1	5,755.13	21.6	0.010	0.77	8.0	PVC	0.010	0.27	1.55	5,757.62	5,757.61
CO-107	ST CO #AC-1	5,755.45	ST MH #A-6	5,755.33	12.1	0.010	0.00	6.0	PVC	0.010	0.00	0.73	5,758.91	5,758.91
CO-108	TYPE C INLET	5,754.78	ST INLET #K-1	5,753.00	87.0	0.020	5.63	12.0	PVC	0.010	0.77	6.62	5,755.15	5,753.23
CO-93(1)	ST AREA INLET #J1.1	5,752.14	ST WYE CONNECTION	5,752.11	3.2	0.009	0.33	6.0	PVC	0.010	0.07	0.71	5,752.94	5,752.94
CO-93(2)	ST WYE CONNECTION	5,752.11	ST AREA INLET #J-1	5,751.64	47.0	0.010	0.33	6.0	PVC	0.010	0.06	0.73	5,752.94	5,752.94
CO-109	ST RD #A-3	5,752.25	ST WYE CONNECTION	5,752.11	9.2	0.015	0.00	6.0	PVC	0.010	0.00	0.90	5,752.94	5,752.94

Catch Basin Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Flow (Total Out) (cfs)	Flow (Additional Subsurface) (cfs)	Capacity (Inlet) (cfs)
ST INLET #I-2	5,776.82	5,767.61	0.050	5,771.26	5,771.26	1.00	0.00	(N/A)
ST INLET #I-1	5,772.38	5,762.98	0.050	5,771.63	5,771.52	36.12	0.00	(N/A)
ST INLET #I-3	5,774.64	5,768.17	0.050	5,771.26	5,771.26	0.65	0.00	(N/A)
ST AREA INLET #H-3	5,761.12	5,758.69	1.320	5,761.19	5,761.12	0.37	0.00	(N/A)
ST AREA INLET #H-2	5,761.13	5,758.20	0.050	5,761.13	5,761.13	0.45	0.00	(N/A)
ST AREA INLET #H-1	5,761.28	5,758.66	1.120	5,761.41	5,761.28	0.53	0.00	(N/A)
ST AREA INLET #G-1	5,761.27	5,757.72	0.050	5,757.93	5,757.93	0.17	0.00	(N/A)
SCUPPER DRAIN #E-1	5,760.72	5,756.62	0.050	5,756.97	5,756.96	0.44	0.00	(N/A)
ST AREA INLET #K-1	5,761.90	5,753.55	0.050	5,753.91	5,753.90	0.57	0.00	(N/A)
ST INLET #K-1	5,760.96	5,752.17	1.560	5,753.20	5,752.82	2.91	0.00	(N/A)
ST INLET #B-1	5,760.12	5,750.60	0.050	5,751.17	5,751.16	2.22	0.00	(N/A)
ST AREA INLET #D-1	5,759.17	5,751.70	0.570	5,752.29	5,752.17	0.98	0.00	(N/A)
ST AREA INLET #C-5	5,758.88	5,754.44	0.400	5,754.54	5,754.53	0.04	0.00	(N/A)
ST AREA INLET #C-4	5,758.42	5,752.86	0.640	5,753.05	5,753.02	0.13	0.00	(N/A)
ST AREA INLET #C-3	5,758.81	5,751.71	0.320	5,752.15	5,752.10	0.78	0.00	(N/A)
ST AREA INLET #C-2	5,758.56	5,752.66	0.620	5,753.03	5,752.96	0.42	0.00	(N/A)
ST AREA INLET #C-1	5,757.50	5,753.26	0.050	5,753.41	5,753.41	0.09	0.00	(N/A)
ST AREA INLET #J-2	5,758.60	5,753.40	0.100	5,753.65	5,753.64	0.30	0.00	(N/A)
ST AREA INLET #J-1	5,758.33	5,751.44	0.320	5,752.94	5,752.93	0.80	0.00	(N/A)
ST AREA INLET #A1.2	5,758.59	5,748.72	0.050	5,750.42	5,750.41	0.28	0.00	(N/A)
ST AREA INLET #A1.1	5,758.87	5,748.73	0.050	5,749.76	5,749.76	0.10	0.00	(N/A)
ST INLET #A-1.1	5,757.46	5,753.71	0.050	5,755.16	5,755.13	15.47	0.00	(N/A)
ST AREA INLT #E-1	5,758.75	5,756.27	0.050	5,756.40	5,756.40	0.07	0.00	(N/A)
TRENCH DRAIN CONNECTION	5,759.72	5,752.71	0.050	5,754.58	5,754.58	0.29	0.00	(N/A)
TRENCH DRAIN CONNECTION	5,759.95	5,756.29	0.050	5,756.63	5,756.62	0.49	0.00	(N/A)
SCUPPER DRAIN #H-1	5,762.00	5,759.00	0.050	5,761.32	5,761.32	0.35	0.00	(N/A)
SCUPPER DRAIN #F-1	5,762.01	5,755.67	0.050	5,757.63	5,757.63	0.18	0.00	(N/A)
CB-40	5,785.77	5,784.89	0.050	5,785.79	5,785.77	2.63	0.00	(N/A)
CB-41	5,786.94	5,785.13	0.050	5,785.98	5,785.97	1.98	0.00	(N/A)
CB-42	5,786.70	5,785.24	0.050	5,785.82	5,785.81	0.64	0.00	(N/A)
CB-43	5,787.54	5,785.53	0.600	5,786.46	5,786.37	1.73	0.00	(N/A)
CB-44	5,786.88	5,785.99	0.050	5,786.52	5,786.52	0.59	0.00	(N/A)
CB-45	5,786.89	5,785.77	0.050	5,786.50	5,786.50	0.90	0.00	(N/A)
CB-46	5,787.74	5,786.04	0.050	5,786.53	5,786.53	0.44	0.00	(N/A)
ST AREA INLET #F-1	5,761.47	5,755.13	1.120	5,757.61	5,757.50	0.89	0.00	(N/A)
SCUPPER DRAIN #H-2	5,762.02	5,758.82	0.050	5,761.14	5,761.14	0.27	0.00	(N/A)
SCUPPER DRAIN #K-1	5,762.02	5,753.75	0.050	5,754.13	5,754.12	0.53	0.00	(N/A)
SCUPPER DRAIN #D-1	5,761.82	5,753.28	0.050	5,753.72	5,753.70	0.71	0.00	(N/A)
SCUPPER DRAIN #C-2	5,759.79	5,752.61	0.050	5,753.23	5,753.22	0.62	0.00	(N/A)
SCUPPER DRAIN #C-1	5,758.93	5,753.33	0.050	5,753.60	5,753.59	0.27	0.00	(N/A)
ST AREA INLET #E-2	5,760.18	5,756.27	0.100	5,756.64	5,756.62	0.48	0.00	(N/A)
ST AREA INLET #J1.1	5,758.49	5,752.14	0.720	5,752.95	5,752.94	0.07	0.00	(N/A)
SCUPPER DRAIN #J-1	5,759.43	5,754.15	0.050	5,754.36	5,754.36	0.18	0.00	(N/A)
SCUPPER DRAIN #A-1	5,759.46	5,749.43	0.050	5,751.05	5,751.05	0.35	0.00	(N/A)

Catch Basin Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Flow (Total Out) (cfs)	Flow (Additional Subsurface) (cfs)	Capacity (Inlet) (cfs)
ST AREA INLET #F-2	5,761.78	5,755.34	0.050	5,757.62	5,757.62	0.27	0.00	(N/A)
TYPE C INLET	5,761.95	5,754.78	0.050	5,755.15	5,755.15	0.77	0.00	(N/A)

Manhole Table - Time: 0.00 hours

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Headloss Coefficient (Standard)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Flow (Total Out) (cfs)	System Flow Time (min)
ST MH #I-2	5,776.98	5,766.61	1.570	5,771.26	5,771.26	1.38	10.041
ST MH #I-1	5,772.69	5,762.58	1.070	5,771.25	5,768.92	37.20	17.515
ST MH #A-7	5,772.87	5,759.65	0.570	5,768.07	5,766.82	37.20	17.560
ST MH #A-8	5,773.06	5,761.40	0.100	5,768.07	5,768.07	0.00	0.000
ST MH #A-6	5,763.82	5,755.13	1.120	5,758.91	5,757.88	37.80	17.841
ST MH #A-5	5,763.00	5,751.78	1.070	5,755.17	5,754.65	38.98	18.042
ST MH #E-1	5,760.85	5,755.10	1.570	5,755.78	5,755.53	1.03	5.139
ST MH #A-4	5,760.33	5,748.42	1.070	5,752.91	5,752.38	39.70	18.212
ST MH #A-3	5,759.01	5,745.08	0.100	5,747.24	5,747.15	40.32	18.650
ST MH #B-2	5,754.32	5,746.85	0.370	5,747.86	5,747.73	6.20	11.702
ST MH #B-3	5,754.60	5,748.16	0.370	5,749.18	5,749.04	5.27	11.532
EX. MANHOLE	5,784.16	5,778.02	0.370	5,778.02	5,778.02	0.00	0.000
ST MH #B-5	5,760.11	5,750.11	0.520	5,750.78	5,750.67	2.21	5.077
ST MH #B-4	5,756.73	5,749.46	0.620	5,750.49	5,750.28	4.57	11.295
ST RD #C-1	5,759.92	5,756.00	0.050	5,756.00	5,756.00	0.00	0.000
ST RD #A-3	5,759.40	5,752.25	0.050	5,752.94	5,752.94	0.00	0.000
ST RD #A-2	5,759.99	5,753.50	0.050	5,753.81	5,753.80	0.35	5.000
DROP STRUCTURE #A-2	5,759.62	5,750.24	0.370	5,752.34	5,752.32	0.35	5.073
ST RD #A-1	5,759.98	5,752.50	0.050	5,752.50	5,752.50	0.00	0.000
DROP STRUCTURE #A-1	5,759.81	5,749.74	0.100	5,751.58	5,751.58	0.00	0.000
ST CO #A-1	5,759.35	5,749.11	0.620	5,751.04	5,751.01	0.35	5.055
ST MH #A-1	5,750.76	5,738.60	0.050	5,740.78	5,740.73	40.28	18.954
ST MH #A-2	5,764.24	5,742.34	1.320	5,745.64	5,744.41	40.29	18.884
ST RD #F-1	5,762.92	5,758.00	0.050	5,758.00	5,758.00	0.00	0.000
ST CO #AC-1	5,762.81	5,755.45	2.370	5,758.91	5,758.91	0.00	0.000
ST CO #D-1	5,760.75	5,753.58	0.400	5,753.58	5,753.58	0.00	0.000

Transition Table - Time: 0.00 hours

ID	Label	Elevation (Ground) (ft)	Elevation (Top) (ft)	Elevation (Invert) (ft)	Flow (Total Out) (cfs)	Hydraulic Grade Line (Out) (ft)
84	STRM TEE	5,765.23	5,758.55	5,758.05	0.95	5,763.79
87	ST CO #E-1	5,760.10	5,760.10	5,756.07	0.49	5,756.40
90	KOR-N-TEE #A-2	5,758.89	5,750.10	5,747.10	40.28	5,749.82
160	STRM BEND	5,763.05	5,759.08	5,758.58	0.37	5,761.26
201	KOR-N-TEE #A-8	5,765.76	5,759.15	5,757.15	37.80	5,761.03
218	STORM TEE	5,758.98	5,751.65	5,750.82	1.16	5,751.30
223	KOR-N-TEE #A-6	5,762.43	5,762.43	5,750.92	39.16	5,753.51
233	KOR-N-TEE #A-5	5,759.50	5,750.89	5,747.89	39.90	5,751.71
240	KOR-N-TEE #A-4	5,759.47	5,750.44	5,747.44	39.88	5,751.05
245	KOR-N-TEE #A-3	5,759.07	5,750.17	5,747.17	40.09	5,750.44
251	KOR-N-TEE #A-1	5,759.29	5,749.69	5,746.69	40.33	5,748.76
261	ST TEE	5,762.24	5,757.85	5,757.35	0.17	5,757.58
272	KOR-N-TEE #A-7	5,765.29	5,756.56	5,754.06	38.36	5,756.15
275	ST WYE CONNECTION	5,758.80	5,752.61	5,752.11	0.06	5,752.94

Outfall Table - Time: 0.00 hours

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Elevation (User Defined Tailwater) (ft)	Hydraulic Grade (ft)	Flow (Total Out) (cfs)	System Flow Time (min)
ST FES #A-1.1	5,755.10	5,752.85	Free Outfall	0.00	5,753.89	15.45	5.318
O-4	5,745.94	5,743.52	Free Outfall	0.00	5,744.84	29.11	7.597
ST FES #B-1	5,748.08	5,746.05	Free Outfall	0.00	5,746.74	6.17	11.859
O-6	5,785.50	5,784.62	Free Outfall	0.00	5,785.61	2.62	8.389
ST FES #A-1	5,740.91	5,737.91	Free Outfall	0.00	5,739.98	40.24	19.260

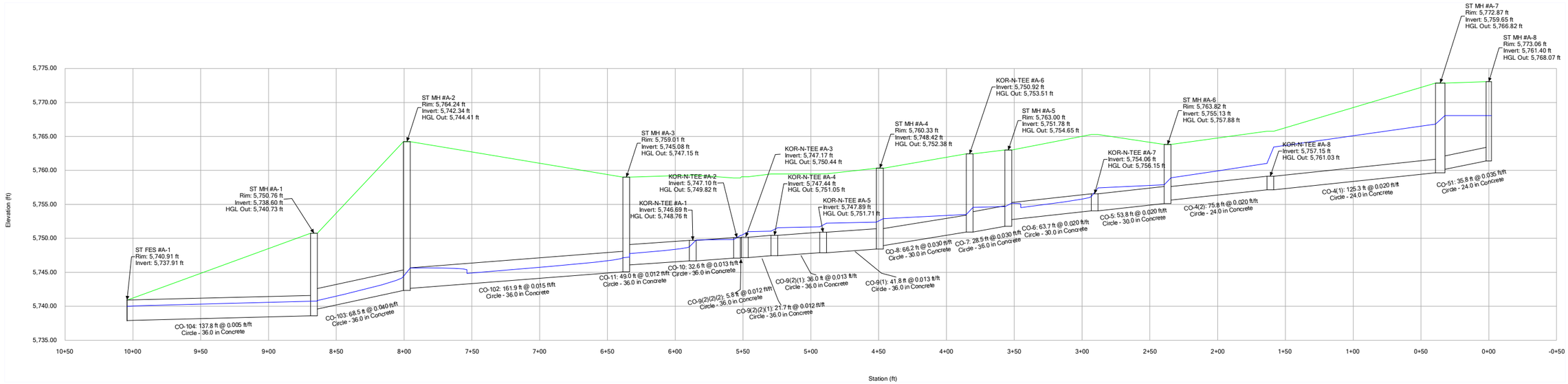
Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
B3/2	ST INLET #I-2	0.155	0.690	5.000	1.00
B1	ST INLET #I-3	0.180	0.440	7.610	0.65
B3/2	ST INLET #I-1	0.155	0.690	5.000	1.00
A-8	CB-46	0.060	0.790	5.000	0.44
A-7	CB-42	0.200	0.390	7.770	0.64
A-9	CB-45	0.060	0.870	5.000	0.49
A-10	CB-44	0.070	0.910	5.000	0.59
A6/2	CB-43	0.040	0.750	5.350	0.27
A6/2	CB-41	0.040	0.750	5.350	0.27
A-5	CB-40	0.050	0.560	5.000	0.26
A-13	ST INLET #A-1.1	1.060	0.670	5.250	6.54
B-25	ST AREA INLET #A1.1	0.020	0.550	5.540	0.10
C-17.18.19.20	H-1	1.750	0.520	7.455	7.54
B-24	SCUPPER DRAIN #A-1	0.040	0.950	5.000	0.35
B-26	ST AREA INLET #A1.2	0.060	0.560	7.120	0.28
B21	ST AREA INLET #J-1	0.120	0.480	6.300	0.50
B22	SCUPPER DRAIN #J-1	0.020	0.950	5.000	0.18
C15	ST AREA INLET #C-2	0.020	0.370	5.000	0.07
B20	ST AREA INLET #J-2	0.030	0.450	5.000	0.13
C16	ST AREA INLET #C-1	0.020	0.470	5.000	0.09
C14	SCUPPER DRAIN #C-1	0.030	0.950	5.000	0.27
C13	SCUPPER DRAIN #C-2	0.070	0.950	5.000	0.62
B19	ST AREA INLET #J1.1	0.020	0.350	5.000	0.07
C9	ST AREA INLET #C-5	0.010	0.500	6.670	0.04
C11/2	ST AREA INLET #C-4	0.025	0.430	5.940	0.10
C11/2	ST AREA INLET #C-3	0.025	0.430	5.940	0.10
B18	TRENCH DRAIN CONNECTION	0.050	0.620	5.000	0.29
B16	ST AREA INLT #E-1	0.020	0.350	5.000	0.07
B15	TRENCH DRAIN CONNECTION	0.060	0.880	5.000	0.49

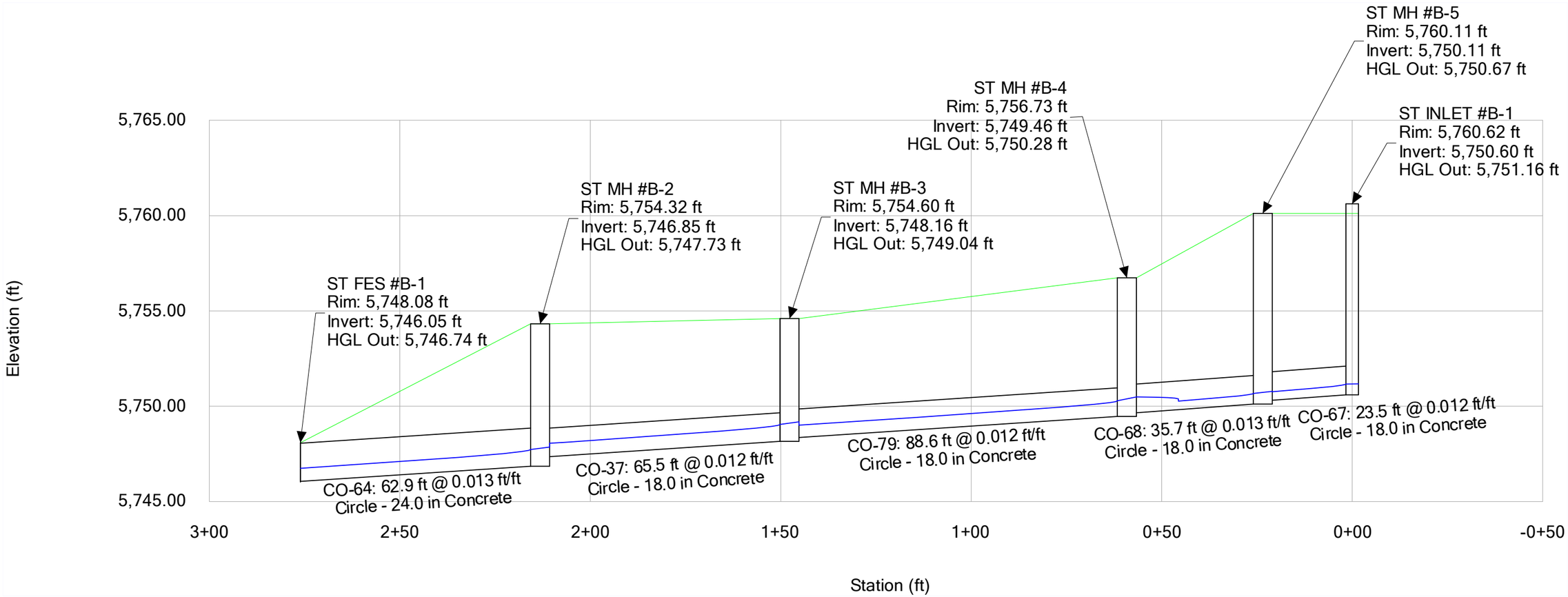
Catchment Table - Time: 0.00 hours

Label	Outflow Element	Area (User Defined) (acres)	Runoff Coefficient (Rational)	Time of Concentration (min)	Flow (Total Out) (cfs)
B13	ST AREA INLET #G-1	0.030	0.620	5.000	0.17
B9	ST AREA INLET #F-1	0.120	0.430	5.000	0.48
B12	ST AREA INLET #F-2	0.020	0.510	5.000	0.10
B11	SCUPPER DRAIN #E-1	0.050	0.950	5.000	0.44
B14	ST AREA INLET #E-2	0.010	0.380	5.000	0.04
C5	SCUPPER DRAIN #D-1	0.080	0.950	5.000	0.71
C7	ST AREA INLET #D-1	0.050	0.580	5.000	0.27
B10	SCUPPER DRAIN #F-1	0.020	0.950	5.000	0.18
C4	SCUPPER DRAIN #K-1	0.060	0.950	5.000	0.53
C6	ST AREA INLET #K-1	0.010	0.380	5.000	0.04
C1	ST INLET #K-1	0.490	0.490	5.970	2.13
C-3	ST INLET #B-1	0.270	0.880	5.000	2.22
B5	SCUPPER DRAIN #H-2	0.030	0.950	5.000	0.27
B4	ST AREA INLET #H-3	0.030	0.400	5.000	0.11
C-2	TYPE C INLET	0.280	0.380	10.800	0.77
B7	ST AREA INLET #H-2	0.020	0.470	5.000	0.09
B6	SCUPPER DRAIN #H-1	0.040	0.950	5.000	0.35
B8	ST AREA INLET #H-1	0.030	0.630	5.000	0.18
B23	ST RD #A-2	0.040	0.950	5.000	0.35

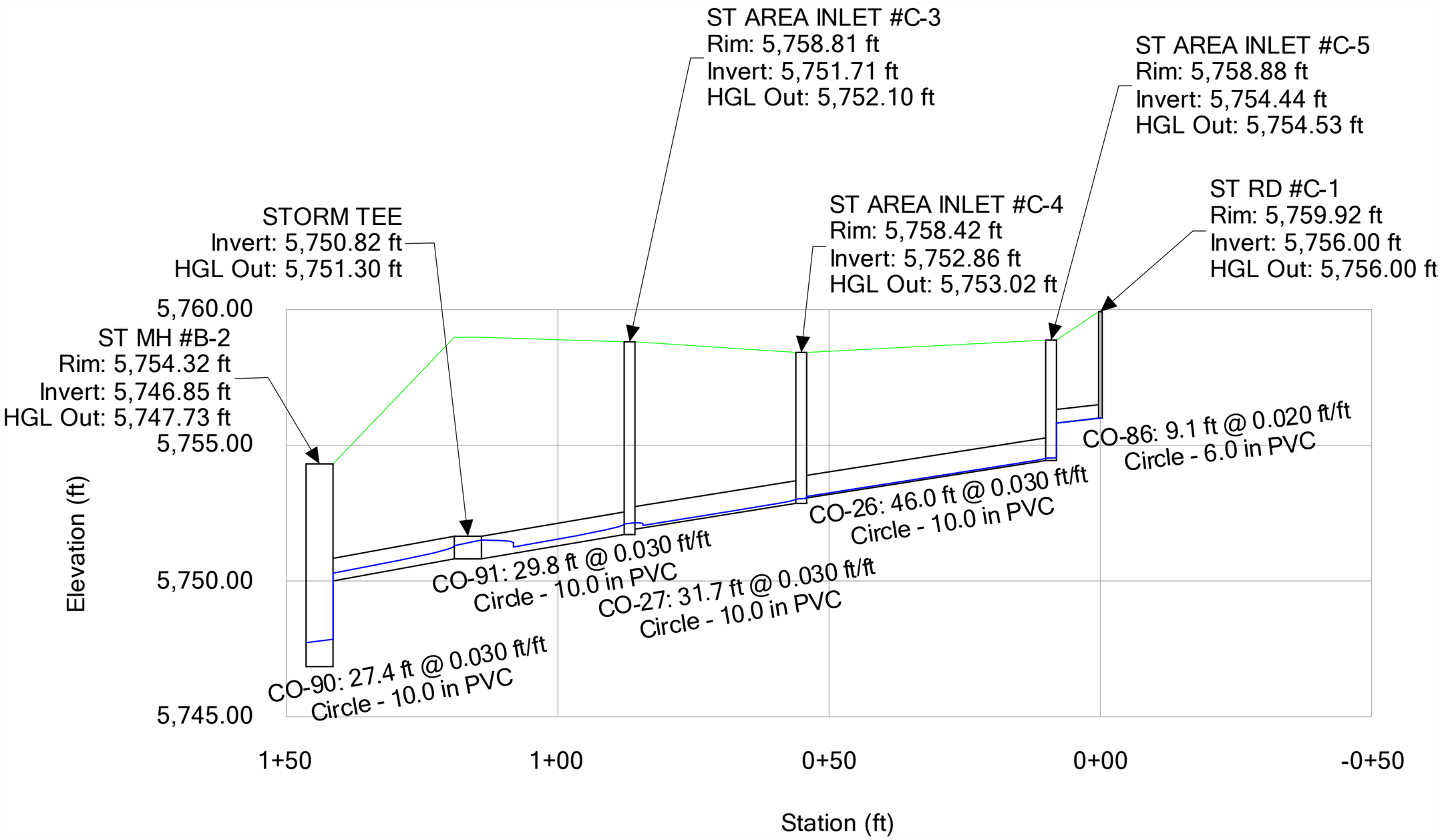
STORMLINE A


ST MH #A-7
Rim: 5,772.87 ft
Invert: 5,759.65 ft
HGL Out: 5,766.82 ft
ST MH #A-8
Rim: 5,773.06 ft
Invert: 5,761.40 ft
HGL Out: 5,768.07 ft
ST MH #A-2
Rim: 5,764.24 ft
Invert: 5,742.34 ft
HGL Out: 5,744.41 ft
ST MH #A-1
Rim: 5,750.76 ft
Invert: 5,738.60 ft
HGL Out: 5,740.73 ft
ST MH #A-3
Rim: 5,759.01 ft
Invert: 5,745.08 ft
HGL Out: 5,747.15 ft
ST MH #A-4
Rim: 5,760.33 ft
Invert: 5,748.42 ft
HGL Out: 5,752.38 ft
ST MH #A-5
Rim: 5,763.00 ft
Invert: 5,751.78 ft
HGL Out: 5,754.65 ft
ST MH #A-6
Rim: 5,763.82 ft
Invert: 5,755.13 ft
HGL Out: 5,757.88 ft
ST FES #A-1
Rim: 5,740.91 ft
Invert: 5,737.91 ft
KOR-N-TEE #A-1
Invert: 5,746.69 ft
HGL Out: 5,748.76 ft
KOR-N-TEE #A-2
Invert: 5,747.10 ft
HGL Out: 5,749.82 ft
KOR-N-TEE #A-3
Invert: 5,747.17 ft
HGL Out: 5,750.44 ft
KOR-N-TEE #A-4
Invert: 5,747.44 ft
HGL Out: 5,751.05 ft
KOR-N-TEE #A-5
Invert: 5,747.89 ft
HGL Out: 5,751.71 ft
KOR-N-TEE #A-6
Invert: 5,750.92 ft
HGL Out: 5,753.51 ft
KOR-N-TEE #A-7
Invert: 5,754.06 ft
HGL Out: 5,756.15 ft
KOR-N-TEE #A-8
Invert: 5,757.15 ft
HGL Out: 5,761.03 ft
CO-104: 137.8 ft @ 0.005 ft/ft
Circle - 36.0 in Concrete
CO-103: 68.5 ft @ 0.040 ft/ft
Circle - 36.0 in Concrete
CO-102: 161.9 ft @ 0.015 ft/ft
Circle - 36.0 in Concrete
CO-11: 49.0 ft @ 0.012 ft/ft
Circle - 36.0 in Concrete
CO-10: 32.6 ft @ 0.013 ft/ft
Circle - 36.0 in Concrete
CO-9(2)(2): 5.8 ft @ 0.012 ft/ft
Circle - 36.0 in Concrete
CO-9(2)(2)(1): 21.7 ft @ 0.012 ft/ft
Circle - 36.0 in Concrete
CO-9(2)(1): 36.0 ft @ 0.013 ft/ft
Circle - 36.0 in Concrete
CO-9(1): 41.8 ft @ 0.013 ft/ft
Circle - 36.0 in Concrete
CO-8: 66.2 ft @ 0.030 ft/ft
Circle - 30.0 in Concrete
CO-7: 28.5 ft @ 0.030 ft/ft
Circle - 36.0 in Concrete
CO-6: 63.7 ft @ 0.020 ft/ft
Circle - 30.0 in Concrete
CO-5: 53.8 ft @ 0.020 ft/ft
Circle - 30.0 in Concrete
CO-4(2): 75.8 ft @ 0.020 ft/ft
Circle - 24.0 in Concrete
CO-4(1): 125.3 ft @ 0.020 ft/ft
Circle - 24.0 in Concrete
CO-51: 35.8 ft @ 0.035 ft/ft
Circle - 24.0 in Concrete
Elevation (ft)
5,775.00
5,770.00
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
5,740.00
5,735.00
10+50
10+00
9+50
9+00
8+50
8+00
7+50
7+00
6+50
6+00
5+50
5+00
4+50
4+00
3+50
3+00
2+50
2+00
1+50
1+00
0+50
0+00
-0+50
Station (ft)

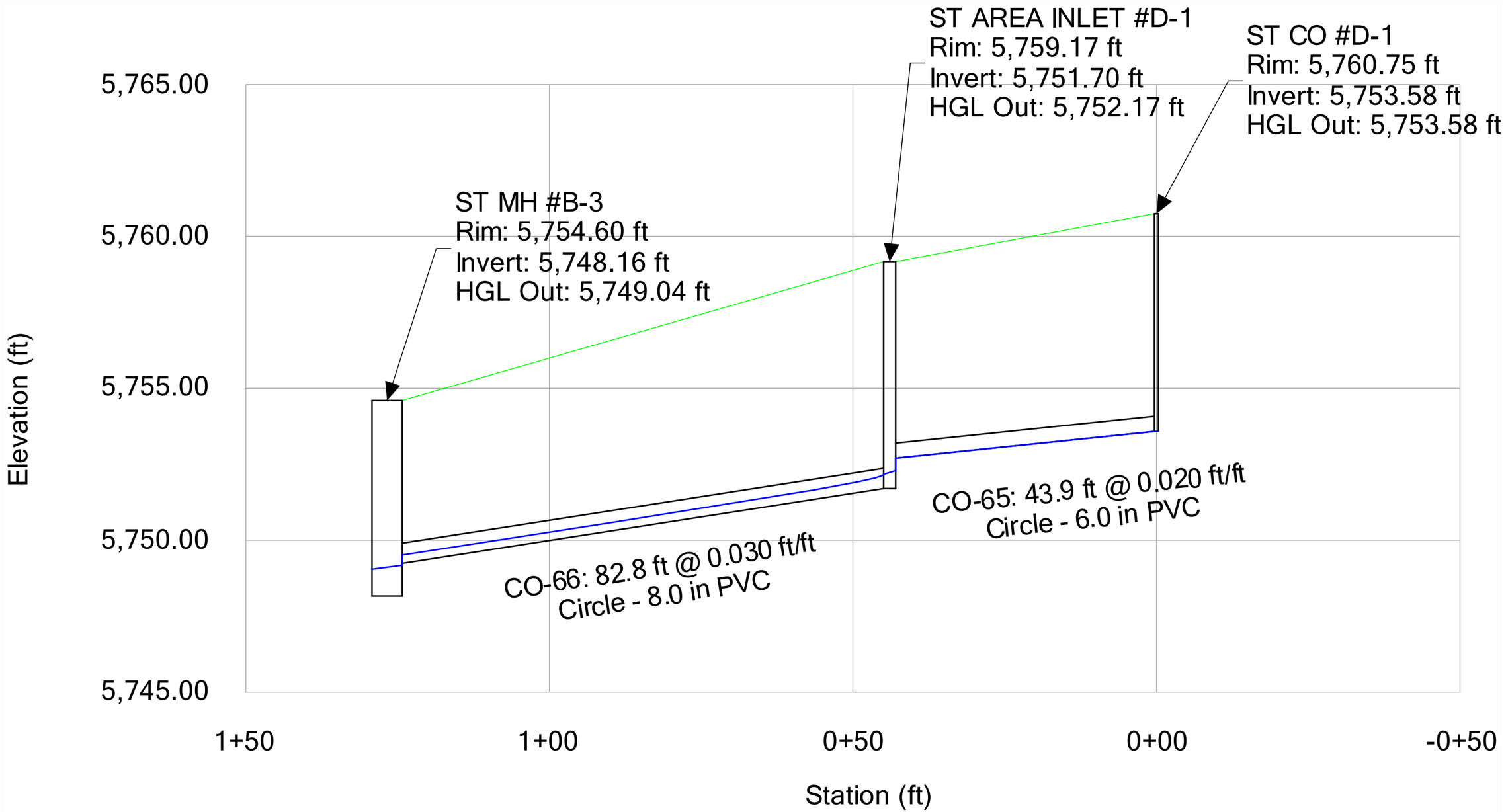
STORMLINE B


ST MH #B-5
Rim: 5,760.11 ft
Invert: 5,750.11 ft
HGL Out: 5,750.67 ft
ST MH #B-4
Rim: 5,756.73 ft
Invert: 5,749.46 ft
HGL Out: 5,750.28 ft
ST INLET #B-1
Rim: 5,760.62 ft
Invert: 5,750.60 ft
HGL Out: 5,751.16 ft
ST MH #B-2
Rim: 5,754.32 ft
Invert: 5,746.85 ft
HGL Out: 5,747.73 ft
ST MH #B-3
Rim: 5,754.60 ft
Invert: 5,748.16 ft
HGL Out: 5,749.04 ft
ST FES #B-1
Rim: 5,748.08 ft
Invert: 5,746.05 ft
HGL Out: 5,746.74 ft
CO-64: 62.9 ft @ 0.013 ft/ft
Circle - 24.0 in Concrete
CO-37: 65.5 ft @ 0.012 ft/ft
Circle - 18.0 in Concrete
CO-79: 88.6 ft @ 0.012 ft/ft
Circle - 18.0 in Concrete
CO-68: 35.7 ft @ 0.013 ft/ft
Circle - 18.0 in Concrete
CO-67: 23.5 ft @ 0.012 ft/ft
Circle - 18.0 in Concrete
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
3+00
2+50
2+00
1+50
1+00
0+50
0+00
-0+50
Station (ft)

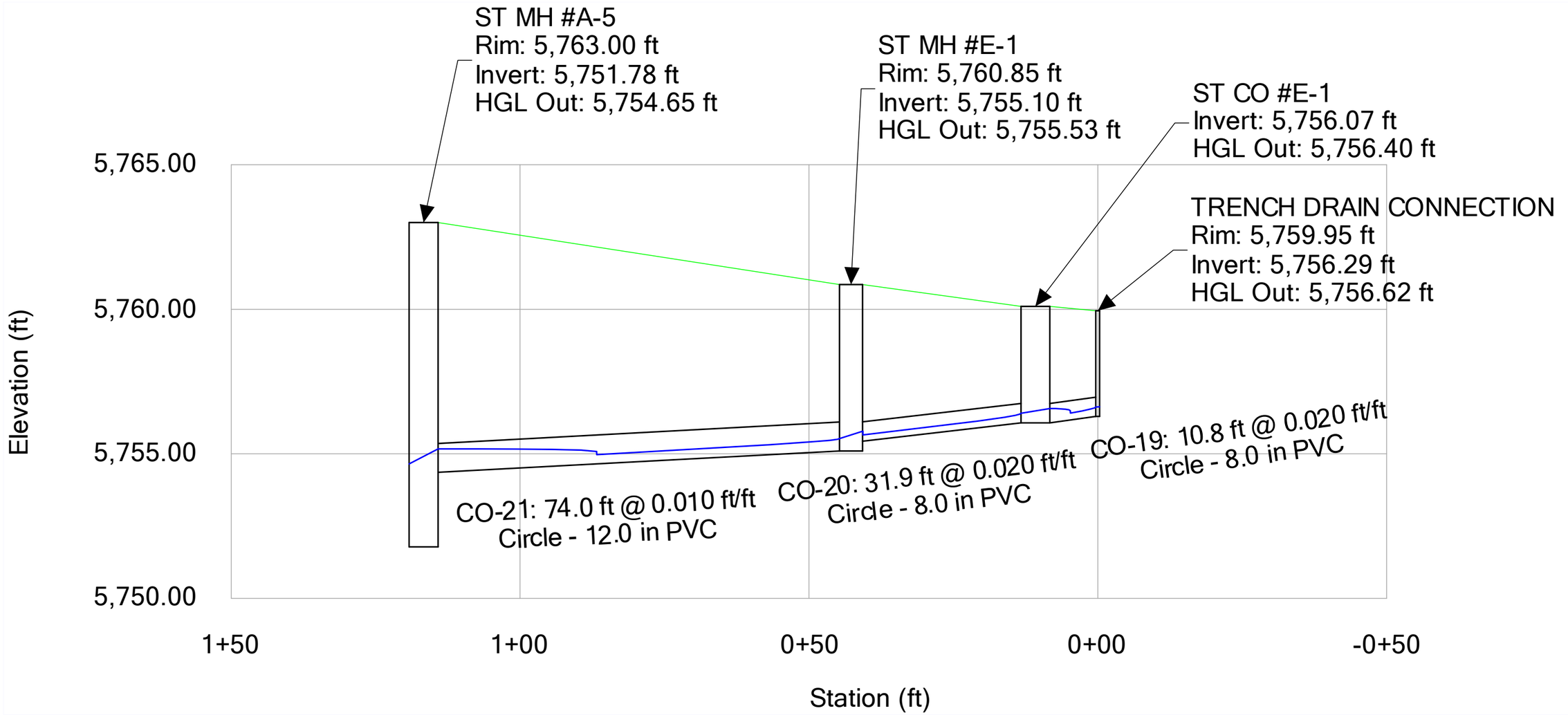
STORMLINE C


ST AREA INLET #C-3
Rim: 5,758.81 ft
Invert: 5,751.71 ft
HGL Out: 5,752.10 ft
ST AREA INLET #C-5
Rim: 5,758.88 ft
Invert: 5,754.44 ft
HGL Out: 5,754.53 ft
ST RD #C-1
Rim: 5,759.92 ft
Invert: 5,756.00 ft
HGL Out: 5,756.00 ft
ST AREA INLET #C-4
Rim: 5,758.42 ft
Invert: 5,752.86 ft
HGL Out: 5,753.02 ft
STORM TEE
Invert: 5,750.82 ft
HGL Out: 5,751.30 ft
ST MH #B-2
Rim: 5,754.32 ft
Invert: 5,746.85 ft
HGL Out: 5,747.73 ft
CO-86: 9.1 ft @ 0.020 ft/ft
Circle - 6.0 in PVC
CO-26: 46.0 ft @ 0.030 ft/ft
Circle - 10.0 in PVC
CO-91: 29.8 ft @ 0.030 ft/ft
Circle - 10.0 in PVC
CO-27: 31.7 ft @ 0.030 ft/ft
Circle - 10.0 in PVC
CO-90: 27.4 ft @ 0.030 ft/ft
Circle - 10.0 in PVC
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
1+50
1+00
0+50
0+00
-0+50
Station (ft)

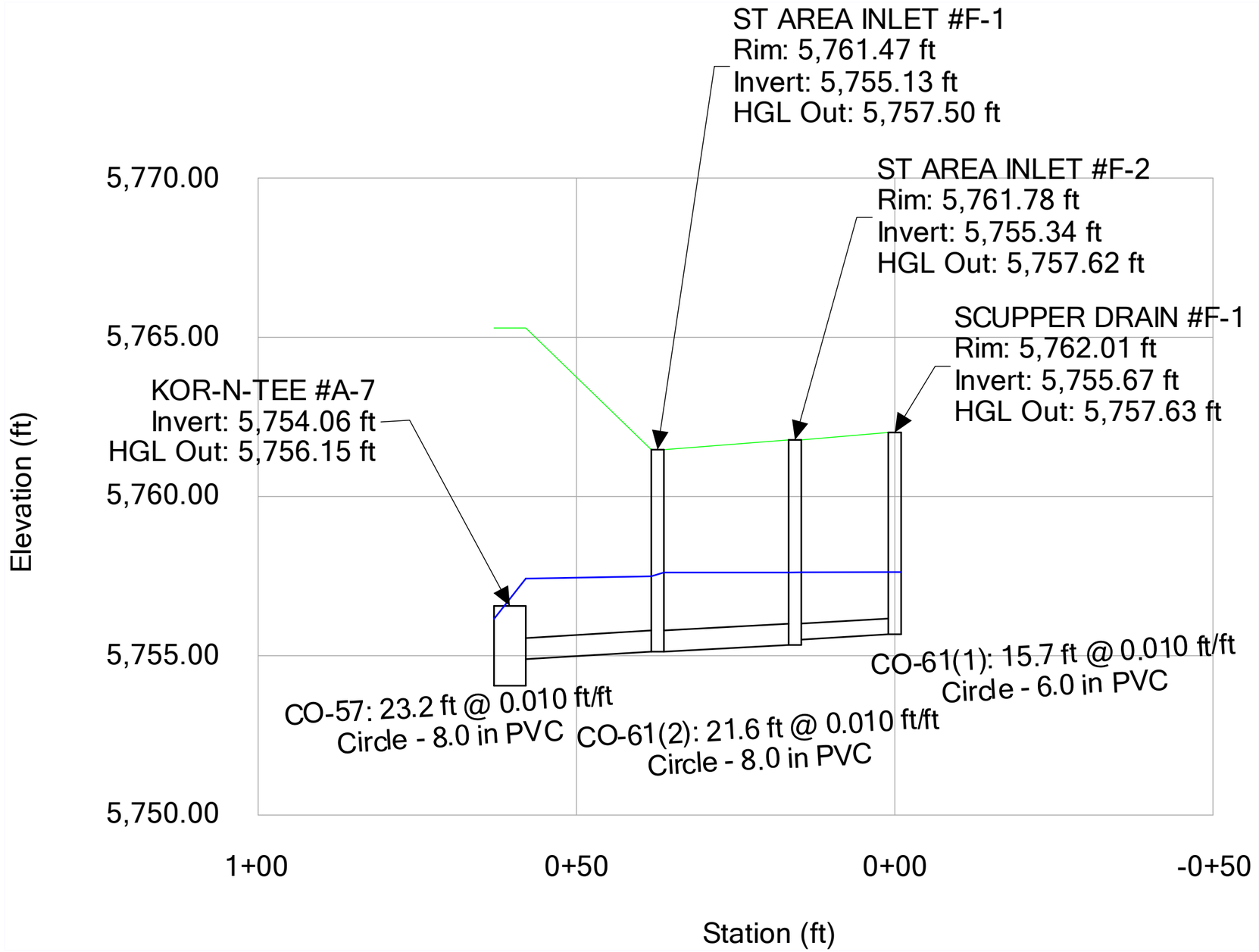
STORMLINE D


ST AREA INLET #D-1
Rim: 5,759.17 ft
Invert: 5,751.70 ft
HGL Out: 5,752.17 ft
ST CO #D-1
Rim: 5,760.75 ft
Invert: 5,753.58 ft
HGL Out: 5,753.58 ft
ST MH #B-3
Rim: 5,754.60 ft
Invert: 5,748.16 ft
HGL Out: 5,749.04 ft
CO-65: 43.9 ft @ 0.020 ft/ft
Circle - 6.0 in PVC
CO-66: 82.8 ft @ 0.030 ft/ft
Circle - 8.0 in PVC
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
1+50
1+00
0+50
0+00
-0+50
Station (ft)

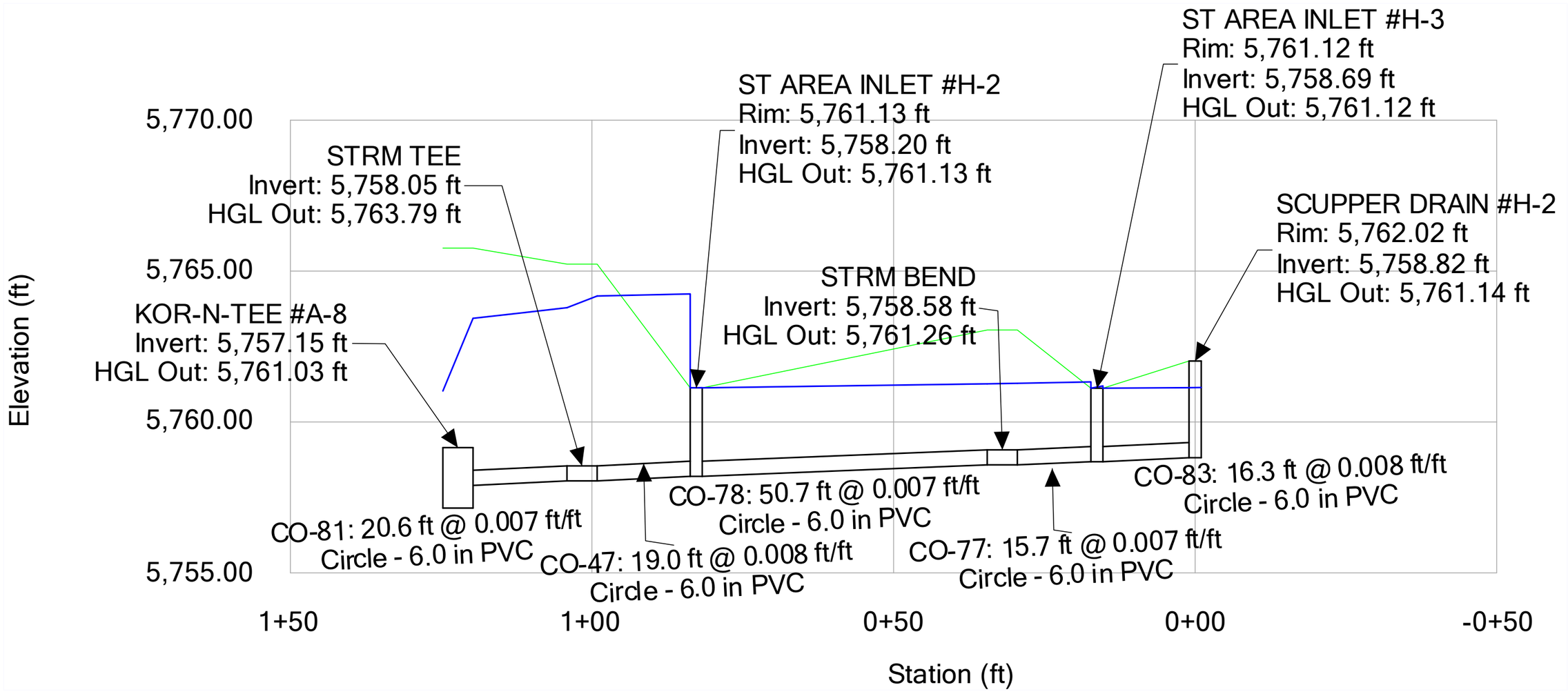
STORMLINE E


ST MH #A-5
Rim: 5,763.00 ft
Invert: 5,751.78 ft
HGL Out: 5,754.65 ft
ST MH #E-1
Rim: 5,760.85 ft
Invert: 5,755.10 ft
HGL Out: 5,755.53 ft
ST CO #E-1
Invert: 5,756.07 ft
HGL Out: 5,756.40 ft
TRENCH DRAIN CONNECTION
Rim: 5,759.95 ft
Invert: 5,756.29 ft
HGL Out: 5,756.62 ft
5,765.00
5,760.00
5,755.00
5,750.00
Elevation (ft)
CO-21: 74.0 ft @ 0.010 ft/ft
Circle - 12.0 in PVC
CO-20: 31.9 ft @ 0.020 ft/ft
Circle - 8.0 in PVC
CO-19: 10.8 ft @ 0.020 ft/ft
Circle - 8.0 in PVC
1+50
1+00
0+50
0+00
-0+50
Station (ft)

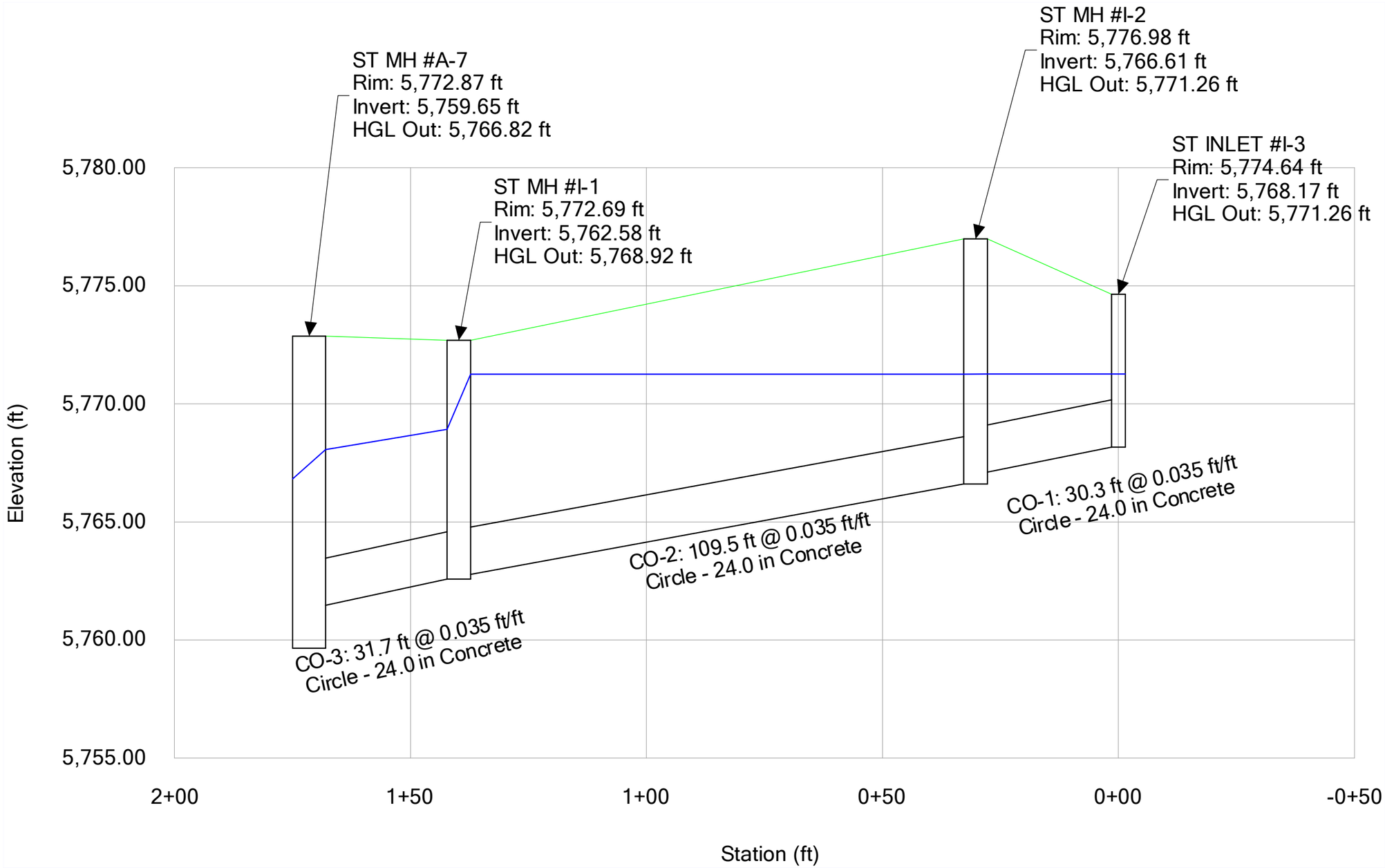
STORMLINE F


ST AREA INLET #F-1
Rim: 5,761.47 ft
Invert: 5,755.13 ft
HGL Out: 5,757.50 ft
ST AREA INLET #F-2
Rim: 5,761.78 ft
Invert: 5,755.34 ft
HGL Out: 5,757.62 ft
SCUPPER DRAIN #F-1
Rim: 5,762.01 ft
Invert: 5,755.67 ft
HGL Out: 5,757.63 ft
KOR-N-TEE #A-7
Invert: 5,754.06 ft
HGL Out: 5,756.15 ft
5,770.00
5,765.00
5,760.00
5,755.00
5,750.00
Elevation (ft)
CO-57: 23.2 ft @ 0.010 ft/ft
Circle - 8.0 in PVC
CO-61(2): 21.6 ft @ 0.010 ft/ft
Circle - 8.0 in PVC
CO-61(1): 15.7 ft @ 0.010 ft/ft
Circle - 6.0 in PVC
1+00
0+50
0+00
-0+50
Station (ft)

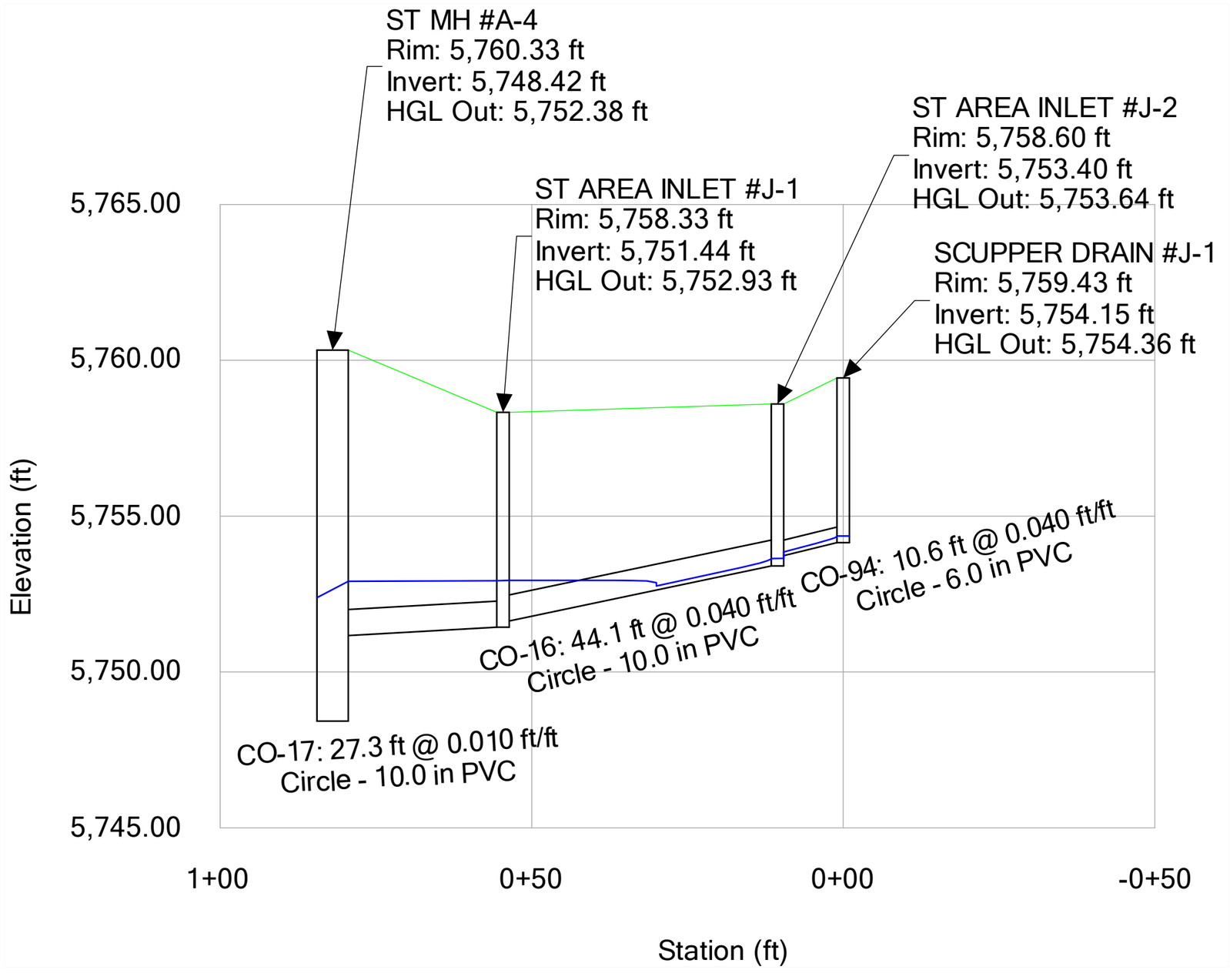
STORMLINE H


ST AREA INLET #H-3
Rim: 5,761.12 ft
Invert: 5,758.69 ft
HGL Out: 5,761.12 ft
ST AREA INLET #H-2
Rim: 5,761.13 ft
Invert: 5,758.20 ft
HGL Out: 5,761.13 ft
SCUPPER DRAIN #H-2
Rim: 5,762.02 ft
Invert: 5,758.82 ft
HGL Out: 5,761.14 ft
STRM TEE
Invert: 5,758.05 ft
HGL Out: 5,763.79 ft
STRM BEND
Invert: 5,758.58 ft
HGL Out: 5,761.26 ft
KOR-N-TEE #A-8
Invert: 5,757.15 ft
HGL Out: 5,761.03 ft
CO-83: 16.3 ft @ 0.008 ft/ft
Circle - 6.0 in PVC
CO-78: 50.7 ft @ 0.007 ft/ft
Circle - 6.0 in PVC
CO-81: 20.6 ft @ 0.007 ft/ft
Circle - 6.0 in PVC
CO-47: 19.0 ft @ 0.008 ft/ft
Circle - 6.0 in PVC
CO-77: 15.7 ft @ 0.007 ft/ft
Circle - 6.0 in PVC
5,770.00
5,765.00
5,760.00
5,755.00
Elevation (ft)
1+50
1+00
0+50
0+00
-0+50
Station (ft)

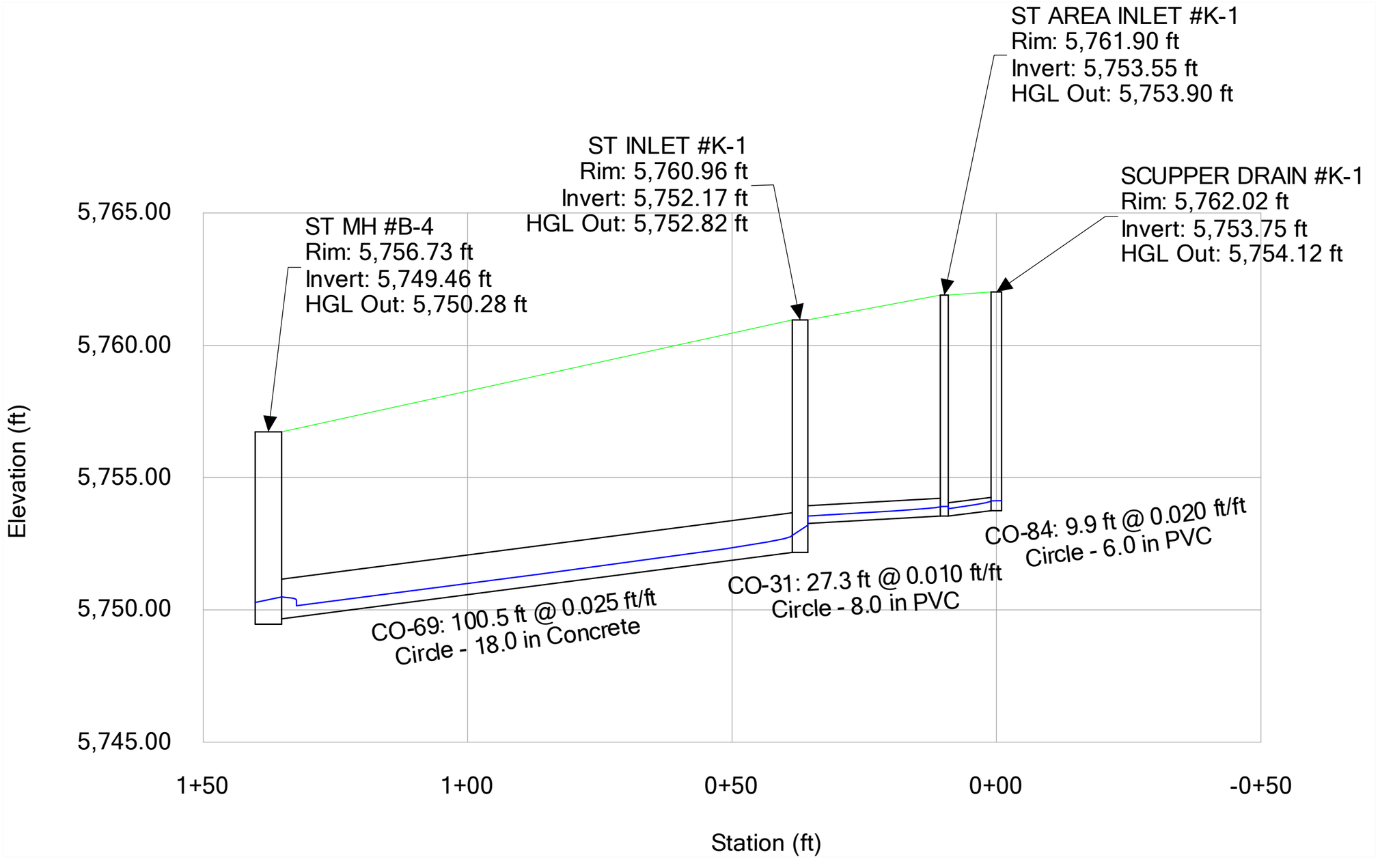
STORMLINE I


ST MH #A-7
Rim: 5,772.87 ft
Invert: 5,759.65 ft
HGL Out: 5,766.82 ft
ST MH #I-1
Rim: 5,772.69 ft
Invert: 5,762.58 ft
HGL Out: 5,768.92 ft
ST MH #I-2
Rim: 5,776.98 ft
Invert: 5,766.61 ft
HGL Out: 5,771.26 ft
ST INLET #I-3
Rim: 5,774.64 ft
Invert: 5,768.17 ft
HGL Out: 5,771.26 ft
CO-3: 31.7 ft @ 0.035 ft/ft
Circle - 24.0 in Concrete
CO-2: 109.5 ft @ 0.035 ft/ft
Circle - 24.0 in Concrete
CO-1: 30.3 ft @ 0.035 ft/ft
Circle - 24.0 in Concrete
5,780.00
5,775.00
5,770.00
5,765.00
5,760.00
5,755.00
Elevation (ft)
2+00
1+50
1+00
0+50
0+00
-0+50
Station (ft)

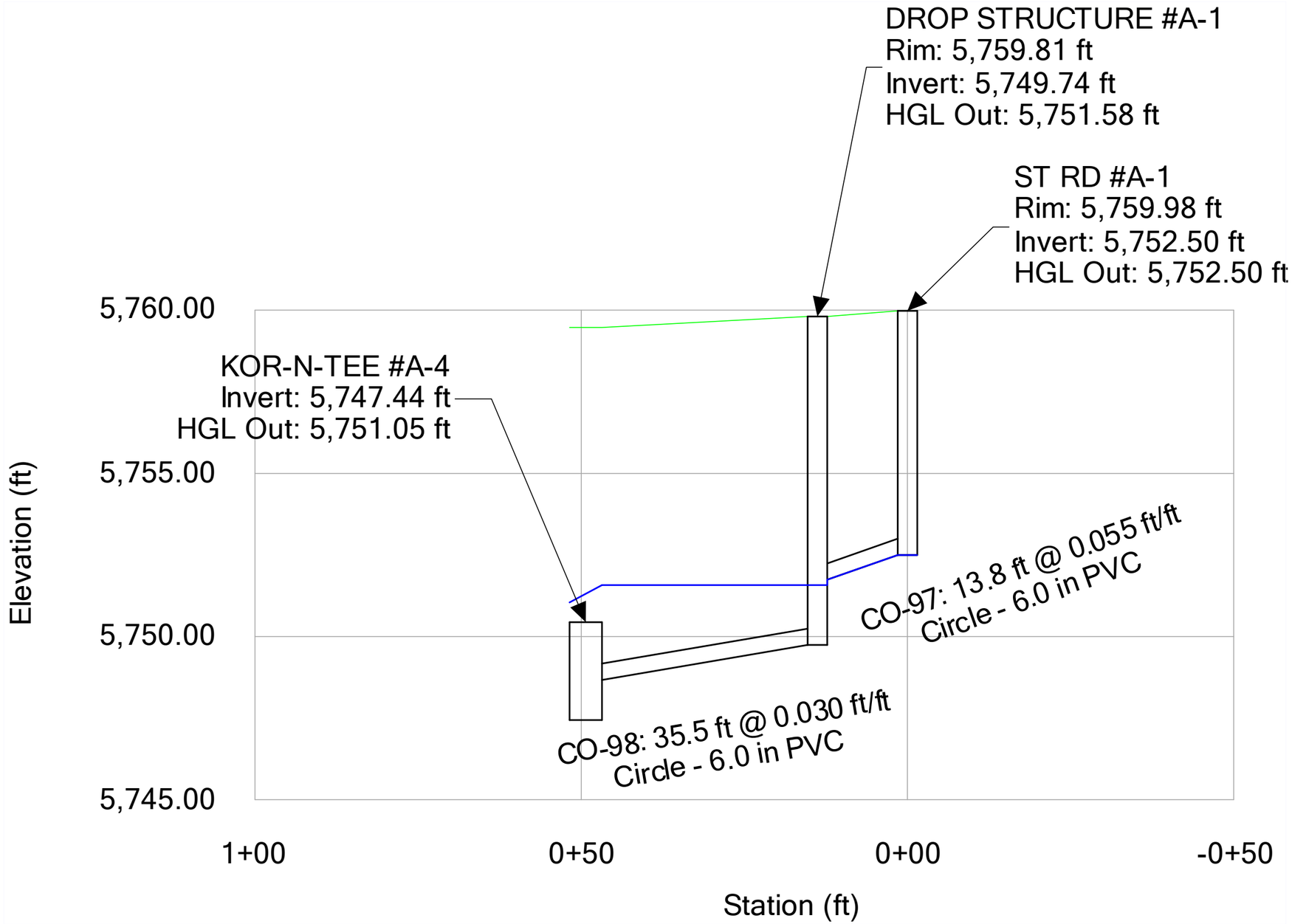
STORMLINE J


ST MH #A-4
Rim: 5,760.33 ft
Invert: 5,748.42 ft
HGL Out: 5,752.38 ft
ST AREA INLET #J-1
Rim: 5,758.33 ft
Invert: 5,751.44 ft
HGL Out: 5,752.93 ft
ST AREA INLET #J-2
Rim: 5,758.60 ft
Invert: 5,753.40 ft
HGL Out: 5,753.64 ft
SCUPPER DRAIN #J-1
Rim: 5,759.43 ft
Invert: 5,754.15 ft
HGL Out: 5,754.36 ft
CO-17: 27.3 ft @ 0.010 ft/ft
Circle - 10.0 in PVC
CO-16: 44.1 ft @ 0.040 ft/ft
Circle - 10.0 in PVC
CO-94: 10.6 ft @ 0.040 ft/ft
Circle - 6.0 in PVC
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
1+00
0+50
0+00
-0+50
Station (ft)

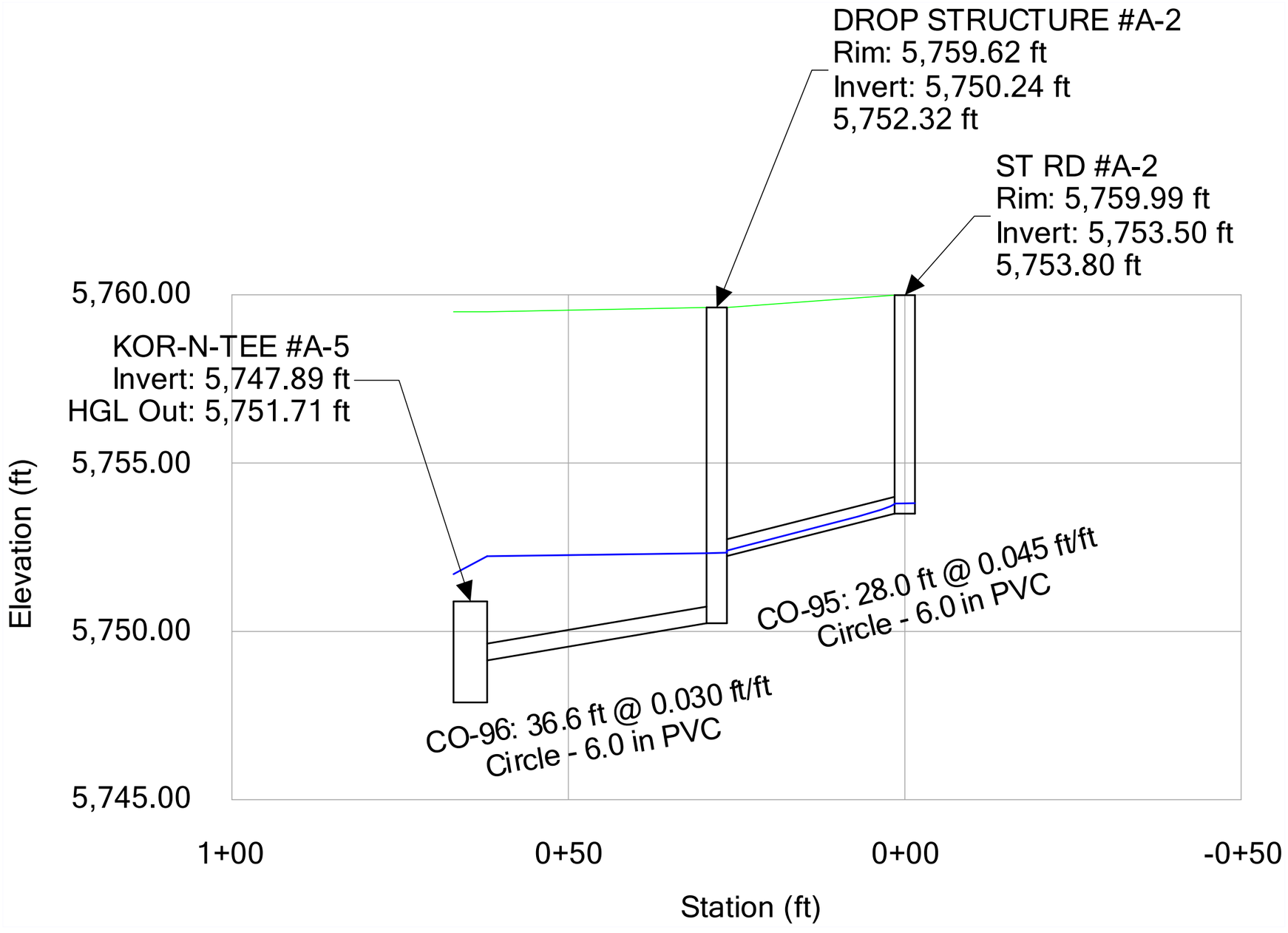
STORMLINE K

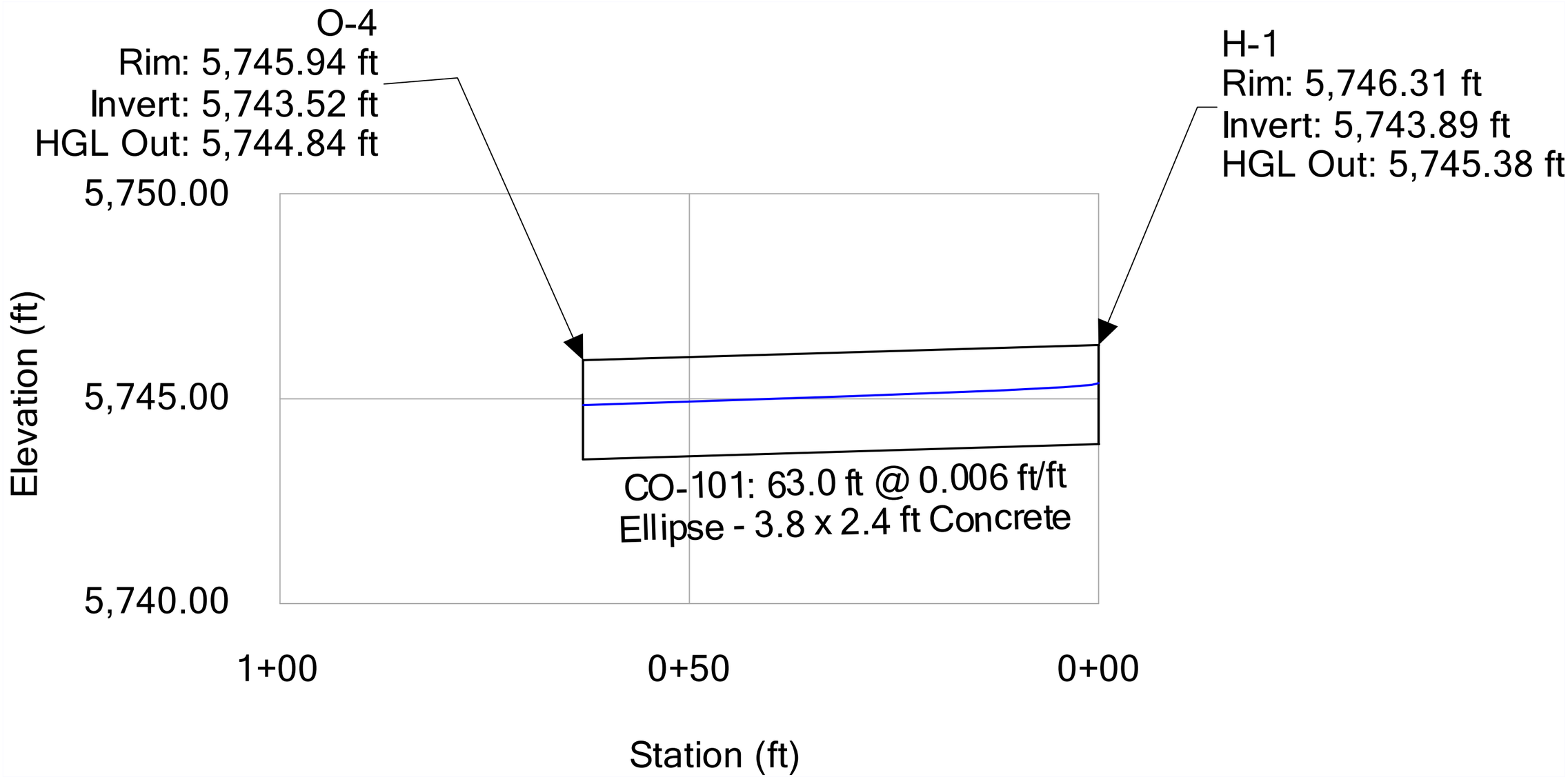

ST AREA INLET #K-1
Rim: 5,761.90 ft
Invert: 5,753.55 ft
HGL Out: 5,753.90 ft
ST INLET #K-1
Rim: 5,760.96 ft
Invert: 5,752.17 ft
HGL Out: 5,752.82 ft
SCUPPER DRAIN #K-1
Rim: 5,762.02 ft
Invert: 5,753.75 ft
HGL Out: 5,754.12 ft
ST MH #B-4
Rim: 5,756.73 ft
Invert: 5,749.46 ft
HGL Out: 5,750.28 ft
5,765.00
5,760.00
5,755.00
5,750.00
5,745.00
Elevation (ft)
CO-69: 100.5 ft @ 0.025 ft/ft
Circle - 18.0 in Concrete
CO-31: 27.3 ft @ 0.010 ft/ft
Circle - 8.0 in PVC
CO-84: 9.9 ft @ 0.020 ft/ft
Circle - 6.0 in PVC
1+50
1+00
0+50
0+00
-0+50
Station (ft)

STORMLINE A-A



STORMLINE A-B

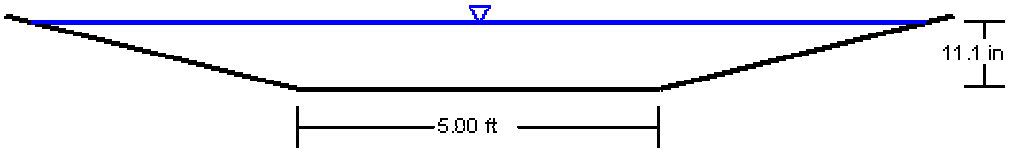


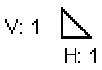

O-4
Rim: 5,745.94 ft
Invert: 5,743.52 ft
HGL Out: 5,744.84 ft
H-1
Rim: 5,746.31 ft
Invert: 5,743.89 ft
HGL Out: 5,745.38 ft
5,750.00
5,745.00
5,740.00
Elevation (ft)
CO-101: 63.0 ft @ 0.006 ft/ft
Ellipse - 3.8 x 2.4 ft Concrete
1+00
0+50
0+00
Station (ft)

Normal Depth at Bioswale

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	0.020	ft/ft
Normal Depth	11.1	in
Left Side Slope	25.000	%
Right Side Slope	25.000	%
Bottom Width	5.00	ft
Discharge	25.00	cfs





Normal Depth at Bioswale

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.050	
Channel Slope	0.020	ft/ft
Left Side Slope	25.000	%
Right Side Slope	25.000	%
Bottom Width	5.00	ft
Discharge	25.00	cfs

Results		
Normal Depth	11.1	in
Flow Area	8.0	ft²
Wetted Perimeter	12.6	ft
Hydraulic Radius	7.6	in
Top Width	12.39	ft
Critical Depth	9.0	in
Critical Slope	0.046	ft/ft
Velocity	3.11	ft/s
Velocity Head	0.15	ft
Specific Energy	1.07	ft
Froude Number	0.681	
Flow Type	Subcritical	

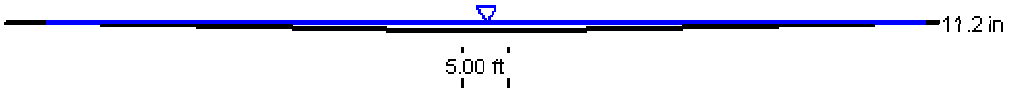
GVF Input Data		
Downstream Depth	0.0	in
Length	0.0	ft
Number Of Steps	0	

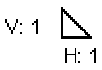
GVF Output Data		
Upstream Depth	0.0	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	11.1	in
Critical Depth	9.0	in
Channel Slope	0.020	ft/ft
Critical Slope	0.046	ft/ft

Normal Depth at Wet Meadow, Minor Event

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.050
Channel Slope	0.005 ft/ft
Normal Depth	11.2 in
Left Side Slope	2.000 %
Right Side Slope	2.000 %
Bottom Width	5.00 ft
Discharge	63.46 cfs





Normal Depth at Wet Meadow, Minor Event

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.050
Channel Slope	0.005 ft/ft
Left Side Slope	2.000 %
Right Side Slope	2.000 %
Bottom Width	5.00 ft
Discharge	63.46 cfs

Results	
Normal Depth	11.2 in
Flow Area	48.5 ft²
Wetted Perimeter	98.6 ft
Hydraulic Radius	5.9 in
Top Width	98.60 ft
Critical Depth	7.0 in
Critical Slope	0.054 ft/ft
Velocity	1.31 ft/s
Velocity Head	0.03 ft
Specific Energy	0.96 ft
Froude Number	0.329
Flow Type	Subcritical

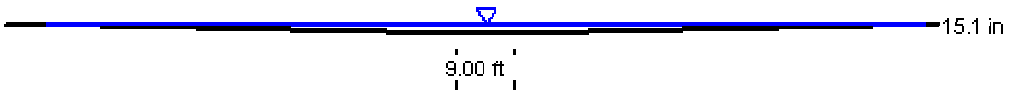
GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

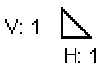
GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	11.2 in
Critical Depth	7.0 in
Channel Slope	0.005 ft/ft
Critical Slope	0.054 ft/ft

Normal Depth at Wet Meadow, Major Event

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.050
Channel Slope	0.005 ft/ft
Normal Depth	15.1 in
Left Side Slope	2.000 %
Right Side Slope	2.000 %
Bottom Width	9.00 ft
Discharge	145.00 cfs





Normal Depth at Wet Meadow, Major Event

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.050
Channel Slope	0.005 ft/ft
Left Side Slope	2.000 %
Right Side Slope	2.000 %
Bottom Width	9.00 ft
Discharge	145.00 cfs

Results	
Normal Depth	15.1 in
Flow Area	90.1 ft²
Wetted Perimeter	134.6 ft
Hydraulic Radius	8.0 in
Top Width	134.57 ft
Critical Depth	9.5 in
Critical Slope	0.048 ft/ft
Velocity	1.61 ft/s
Velocity Head	0.04 ft
Specific Energy	1.30 ft
Froude Number	0.346
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	0.00 ft/s
Upstream Velocity	0.00 ft/s
Normal Depth	15.1 in
Critical Depth	9.5 in
Channel Slope	0.005 ft/ft
Critical Slope	0.048 ft/ft

Project	Fountain Valley School - Acadmiec Center
Project #	23.0895
Date	3/16/2026
Title	12" Square Flat Grate Inlet

MARTIN/MARTIN
CONSULTING ENGINEERS

INLET CAPACITY BASED ON CAPTURE CHART FROM INLET MANUFACTURER

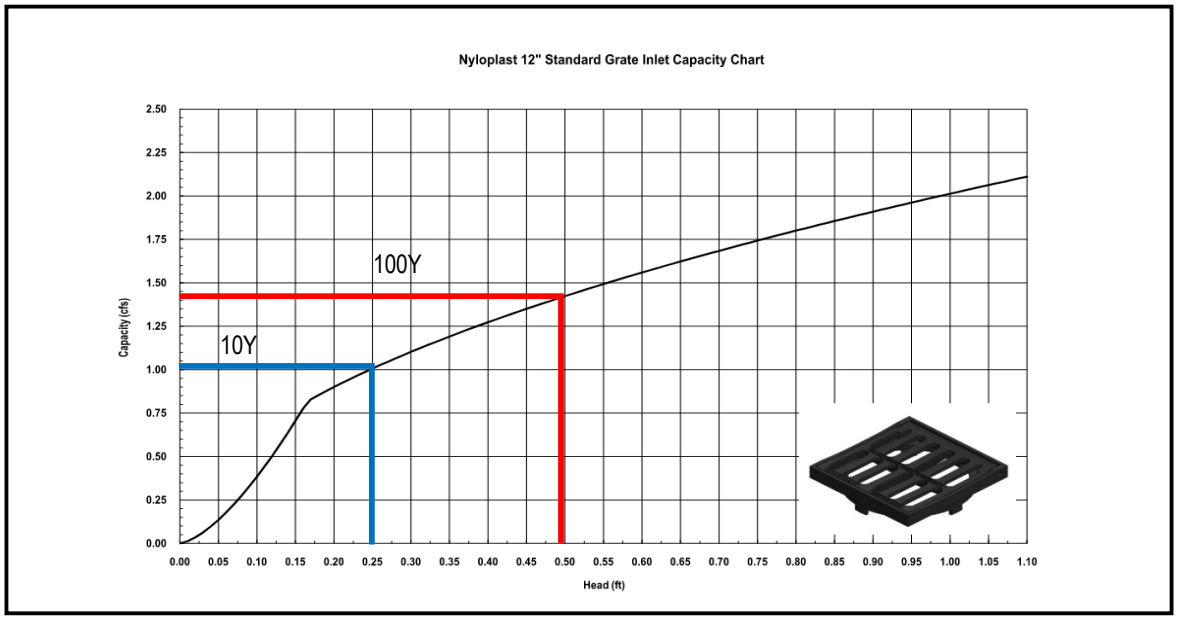
References *ADS*

GENERAL

Inlet type/name: 12" Nyloplast Inlet - Standard Grate

X: 50% Effective inlet capture (50%-70%)

	10-Year	100-year		
Q	0.01	0.03	cfs	Required flow for inlet
d	0.25	0.50	ft	Maximum Ponding depth



	10-Year	100-year		
Q_{inlet}	1.00	1.40	cfs	Inlet capture
$Q_{inlet\text{-}reduced}$	0.50	0.70	cfs	Inlet effective capture capacity
	Good	**Good**		

Notes

Project	Fountain Valley School - Acadmiec Center
Project #	23.0895
Date	3/16/2026
Title	15" Round Flat Grate Inlet

MARTIN/MARTIN CONSULTING ENGINEERS

INLET CAPACITY BASED ON CAPTURE CHART FROM INLET MANUFACTURER

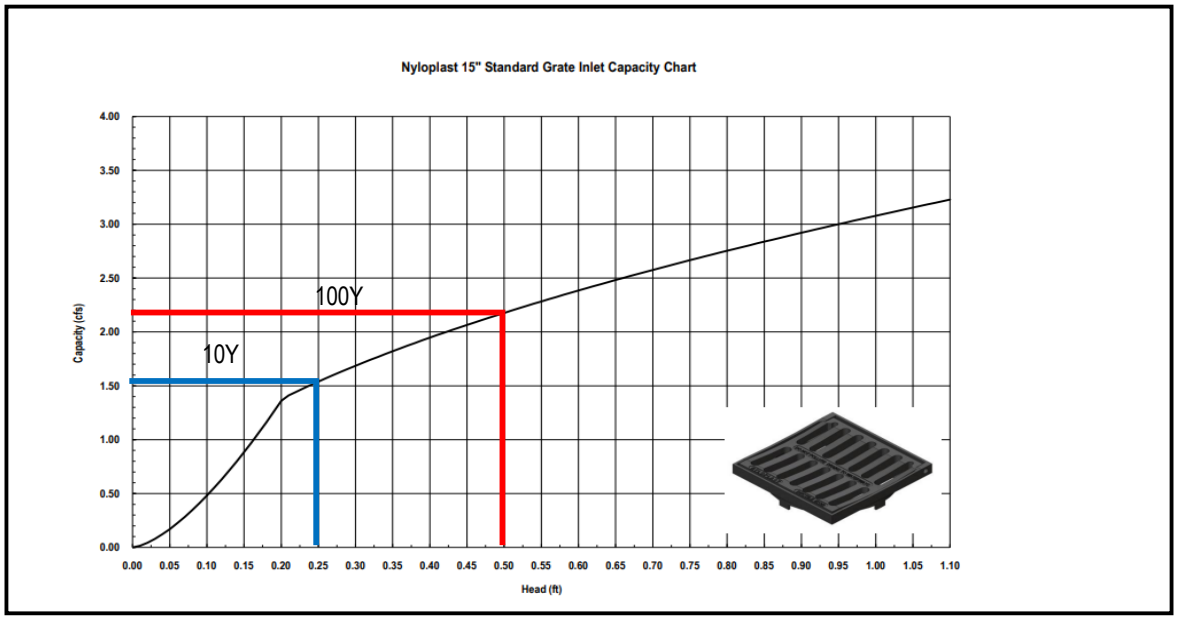
References *ADS*

GENERAL

Inlet type/name: 15" Nyloplast Inlet - Standard Grate

X: 50% Effective inlet capture (50%-70%)

	10-Year	100-year		
Q	0.8	0.16	cfs	Required flow for inlet
d	0.25	0.50	ft	Maximum Ponding depth



	10-Year	100-year		
Q_{inlet}	1.50	2.20	cfs	Inlet capture
$Q_{inlet\text{-}reduced}$	0.75	1.10	cfs	Inlet effective capture capacity
	No Good	**Good**		

Notes

Project	Fountain Valley School - Acadmiec Center
Project #	23.0895
Date	3/16/2026
Title	18" Round Flat Grate Inlet

MARTIN/MARTIN CONSULTING ENGINEERS

INLET CAPACITY BASED ON CAPTURE CHART FROM INLET MANUFACTURER

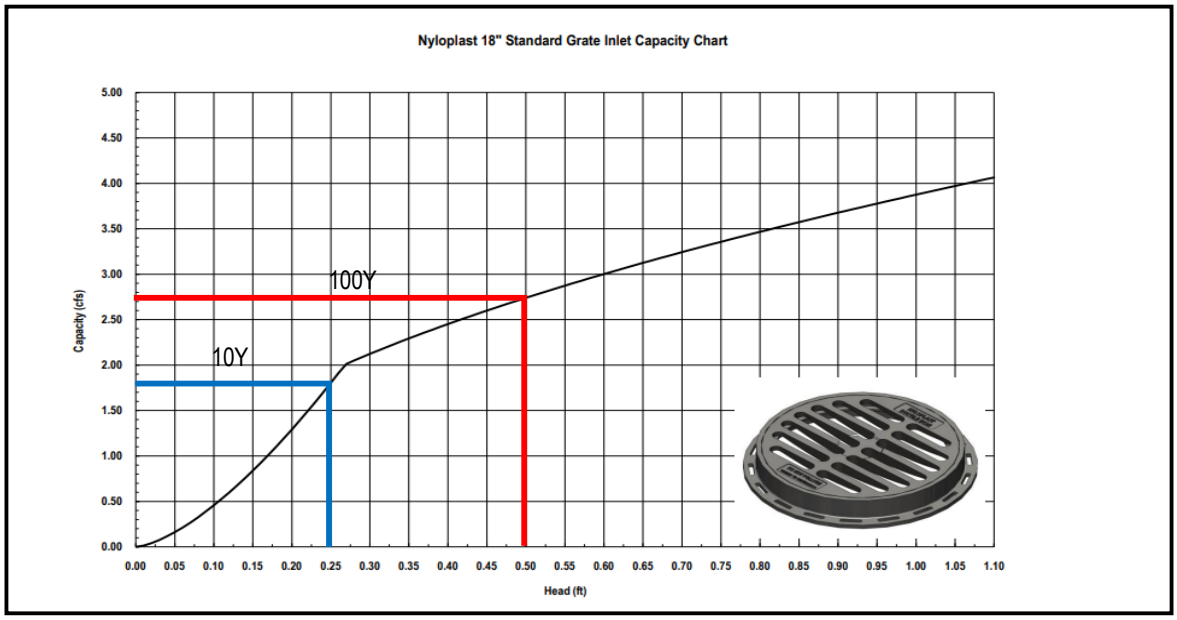
References *ADS*

GENERAL

Inlet type/name: 18" Nyloplast Inlet - Standard Grate

X: 50% Effective inlet capture (50%-70%)

	10-Year	100-year		
Q	0.23	0.52	cfs	Required flow for inlet
d	0.25	0.50	ft	Maximum Ponding depth



	10-Year	100-year		
Q_{inlet}	1.80	2.70	cfs	Inlet capture
$Q_{inlet\text{-}reduced}$	0.90	1.35	cfs	Inlet effective capture capacity
	Good	**Good**		

Notes

Project	Fountain Valley School - Acadmiec Center
Project #	23.0895
Date	3/16/2026
Title	24" Round Flat Grate Inlet

MARTIN/MARTIN CONSULTING ENGINEERS

INLET CAPACITY BASED ON CAPTURE CHART FROM INLET MANUFACTURER

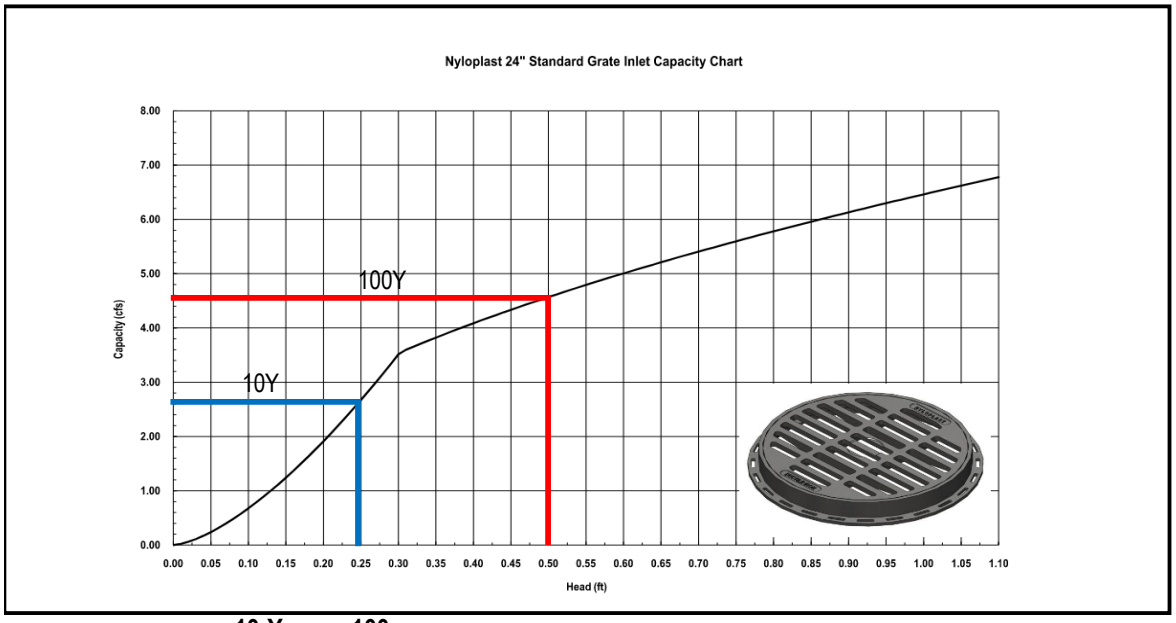
References *ADS*

GENERAL

Inlet type/name: 24" Nyloplast Inlet - Standard Grate

X: 50% Effective inlet capture (50%-70%)

	10-Year	100-year		
Q	0.23	0.52	cfs	Required flow for inlet
d	0.25	0.6	ft	Maximum Ponding depth



	10-Year	100-year		
Q_{inlet}	2.60	4.60	cfs	Inlet capture
$Q_{inlet\text{-}reduced}$	1.30	2.30	cfs	Inlet effective capture capacity
	Good	**Good**		

Notes

Project	Fountain Valley School - Acadmiec Center
Project #	23.0895
Date	3/16/2026
Title	18" Beehive Inlet

MARTIN/MARTIN CONSULTING ENGINEERS

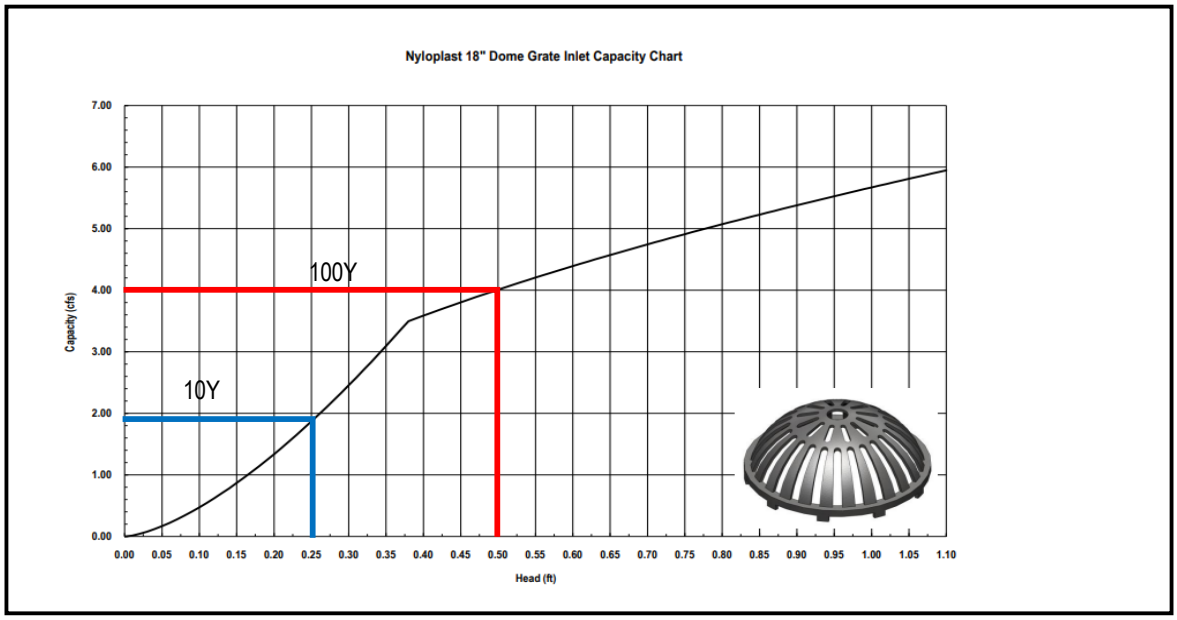
INLET CAPACITY BASED ON CAPTURE CHART FROM INLET MANUFACTURER

References *ADS*

GENERAL

Inlet type/name	18" Nyloplast Inlet - Dome Grate	
X	50%	Effective inlet capture (50%-70%)

	10-Year	100-year		
Q	0.23	0.52	cfs	Required flow for inlet
d	0.25	0.5	ft	Maximum Ponding depth



	10-Year	100-year		
Q_{inlet}	1.90	4.00	cfs	Inlet capture
$Q_{inlet\text{-}reduced}$	0.95	2.00	cfs	Inlet effective capture capacity
	Good	**Good**		

Notes

Project	Fountain Valley School - Acadmiec Center
Project #	23.0895
Date	3/16/2026
Title	24" Beehive Grate

MARTIN/MARTIN CONSULTING ENGINEERS

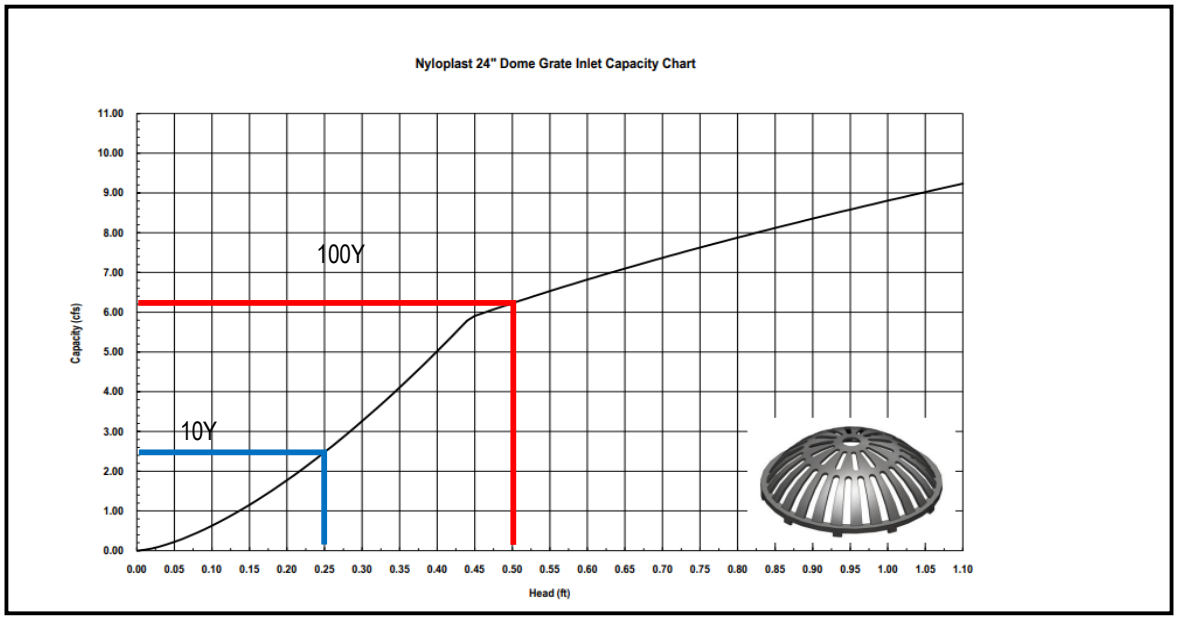
INLET CAPACITY BASED ON CAPTURE CHART FROM INLET MANUFACTURER

References *ADS*

GENERAL

Inlet type/name	24" Nyloplast Inlet - Dome Grate	
X	50%	Effective inlet capture (50%-70%)

	10-Year	100-year		
Q	0.23	0.52	cfs	Required flow for inlet
d	0.25	0.50	ft	Maximum Ponding depth



	10-Year	100-year		
Q_{inlet}	2.40	6.20	cfs	Inlet capture
$Q_{inlet\text{-}reduced}$	1.20	3.10	cfs	Inlet effective capture capacity
	Good	**Good**		

Notes

APPENDIX D

Planning & Community Development Department
2880 International Circle
Colorado Springs, Colorado 80910

Phone: 719.520.6300
Fax: 719.520.6695
Website www.elpasoco.com

DEVIATION REVIEW AND DECISION FORM

NEW DOC

Procedure # R-FM-051-07
Issue Date: 12/31/07
Revision Issued: 00/00/00

DSD FILE NO.: DEV 1701 5

This deviation cannot be used as it is specific to PPR1710. See comment in PCM applicability form.

Remove this deviation form from drainage report.

Fountain Valley School Road

Tax Schedule ID(s) #: 55000-00-164

Legal Description of Property: See attached Property Information

Subdivision or Project Name:
Fountain Valley School

Section of ECM from Which Deviation is Sought: ECM Section I.7.1.B

Specific Criteria from Which a Deviation is Sought:: We are requesting that the County either accept a 'non-standard' BMP in lieu of a 'standard' BMP or recognize that the existing site provides water quality such that there are no "significant water quality impacts" from the site.

Proposed Nature and Extent of Deviation: The existing site facilities including the private irrigation system and hay fields provide water quality to an extent equal to or greater than a construct BMP.

Applicant Information:

Applicant: Fountain Valley School of Colorado Email Address: jrefior@fvs.edu

Applicant is: X Owner ____ Consultant ____ Contractor

Mailing Address: 6155 Fountain Valley School Road, C/S State: CO Postal Code: 80911

Telephone Number: (719) 391-5231 Fax Number: (719) 391-5415

Engineer Information:

Engineer: Andrew W. McCord Email Address: amccord@kiowaengineering.com

Company Name: Kiowa Engineering Corporation

Mailing Address: 1604 South 21st Street, Colorado Springs State: CO Postal Code: 80904

Registration Number: 25057 State of Registration: Colorado

Telephone Number: (719) 630-7342 Fax Number:

Explanation of Request (Attached diagrams, figures and other documentation to clarify request):

Section of ECM from Which Deviation is Sought: ECM Section I.7.1.B

Specific Criteria from Which a Deviation is Sought:: We are requesting that the County either accept a 'non-standard' BMP in lieu of a 'standard' BMP or recognize that the existing site provides water quality such that there is no "significant water quality impacts" from the site. ←

Proposed Nature and Extent of Deviation: The existing site facilities including the private irrigation system and hay fields provide water quality to an extent equal to or greater than a constructed BMP.

Reason for the Requested Deviation: The existing site conditions provide water quality to an extent equal to or greater than a 'standard' constructed BMP.

Comparison of Proposed Deviation to ECM Standard: Theoretical analysis of the water quality control is difficult to impossible to determine for BMPs. However, empirically the required water quality control is provided as the required water quality capture volume is met not only for the proposed disturbance, but for the entire developed core area of the school. ←

PPR-17-010

Applicable Regional or National Standards used as Basis: *El Paso County Engineering Criteria Manual Appendix I; Colorado Springs Drainage Criteria Manual, Volume 2: Stormwater Quality Policies, Procedures and Best Management Practices: Urban Drainage and Flood Control District Volume 3*

Application Consideration:

CHECK IF APPLICATION MEETS CRITERIA FOR CONSIDERATION	JUSTIFICATION
■ The ECM standard is inapplicable to a particular situation.	This site is unique in that the existing conditions on the site provide water quality control.
■ Topography, right-of-way, or other geographical conditions or impediments impose an undue hardship on the applicant, and an equivalent alternative that can accomplish the same design objective is available and does not compromise public safety or accessibility.	The site is relatively isolated on a approximately 1,000 acre site with the closest developed area over a quarter of a mile from the site's boundary. The site provides water quality control using its private irrigation system and hay fields. Installing constructed BMPs is not necessary and will not compromise public safety.
■ A change to a standard is required to address a specific design or construction problem, and if not modified, the standard will impose an undue hardship on the applicant with little or no material benefit to the public.	The change to the standard is not specific, rather it is to allow the existing site conditions to provide water quality control or accept that there are no significant water quality impacts from the site based upon its existing condition.

If at least one of the criteria listed above is not met, this application for deviation cannot be considered.

Criteria for Approval:

PLEASE EXPLAIN HOW EACH OF THE FOLLOWING CRITERIA HAVE BEEN SATISFIED BY THIS REQUEST	
The request for a deviation is not based exclusively on financial considerations.	While not constructing 'standard' BMPs is a cost savings, this request is being made because the need for other BMPs on this unique site are unnecessary.
The deviation will achieve the intended result with a comparable or superior design and quality of improvement.	While theoretical analysis of the water quality control is difficult to impossible to determine for BMPs by calculation, empirically the required water quality capture volume is met not only for the proposed disturbance, but for the entire developed core area of the school.
The deviation will not adversely affect safety or operations.	Due to the location of the site along with the existing site conditions providing water quality control, this request does not adversely affect public safety or operations.
The deviation will not adversely affect maintenance and its associated cost.	This deviation does not affect maintenance costs for the County. The School has a full-time employee who manages the irrigation system and grounds.
The deviation will not adversely affect aesthetic appearance.	The deviation will not adversely affect the aesthetic appearance as the site will remain effectively the same. This site is very well shielded from view from most public property.

Owner, Applicant and Engineer Declaration:
To the best of my knowledge, the information on this application and all additional or supplemental documentation is true, factual and complete. I am fully aware that any misrepresentation of any information on this application may be grounds for denial. I have familiarized myself with the rules, regulations and procedures with respect to preparing and filing this application. I also understand that an incorrect submittal will be cause to have the project removed from the agenda of the Planning Commission, Board of County Commissioners and/or Board of Adjustment or delay review, and that any approval of this application is based on the representations made in the application and may be revoked on any breach of representation or condition(s) of approval.

Janet M Rejon — July 13, 2017
Signature of owner (or authorized representative) — Date

Signature of applicant (if different from owner) — Date

July 13, 2017
Signature of Engineer — Date

Engineer's Seal

COLORADO LICENSED AND REGISTERED PROFESSIONAL ENGINEER 25057

Review and Recommendation:
APPROVED by the ECM Administrator

Date 18 July 2017

This request has been determined to have met the criteria for approval. A deviation from Section I.7.1.B of ECM is hereby granted based on the justification provided. Comments:

SEE ATTACHED CONDITIONS OF APPROVAL

____ Additional comments or information are attached.

DENIED by the ECM Administrator

Date

This request has been determined not to have met criteria for approval. A deviation from Section _____ of ECM is hereby denied. Comments:

____ Additional comments or information are attached.

Property Information

Project Location

Fountain Valley School
6155 Fountain Valley School Road
Colorado Springs, Colorado

Legal Description:

The Southwest Quarter of Section 7 Except that portion described in Book 5052 at Page 256 of the El Paso County Records, Township 15 South, Range 65 West of the 6TH P.M.; that portion of the Southeast Quarter of Section 7 and that portion of the Southwest Quarter of Section 8, Township and Range aforesaid, described as follows: Commencing at the South Quarter Corner of said Section 7; Thence easterly on the south line of Section 7, 30 feet to the point of beginning; Thence northerly on a line 30.00 feet easterly of the North-South Centerline of said Section, 1658.72 feet; Thence easterly 2825.0 feet; Thence northerly 447.28 feet; Thence easterly 300.00 feet; Thence southerly to intersect the northwesterly line of Big Johnson Reservoir; Thence southwesterly on the westerly line of said reservoir to intersect the south line of the Southeast Quarter of said Section 7; Thence westerly on said south line to the point of beginning; Section 18, Township and Range aforesaid, except tracts to Fountain Mutual Irrigation Company, also except the tract conveyed as described in Book 5052 at Page 256, of the El Paso County records; that portion of Section 17, Township and Range aforesaid lying southwesterly of Bradley Road, said tract contains approximately 937 acres.

Zone: A-5
Tax Schedule No.: 55000-00-164

Conditions of approval for DEV-17-015

In the event that the hay fields, natural depression areas and/or irrigation ditches referenced in the Fountain Valley School Athletic Center and Roads Drainage Letter dated June 29, 2017 are developed or otherwise modified in function to not provide the runoff capture volume described in said report, this deviation approval will be invalidated at that time and some other form of WQCV meeting County criteria will be required to be provided by Fountain Valley School for the areas developed per said report and any other additional development.

NEW DOC

RECEIVED
APR 2 8 2011
EPC DEVELOPMENT SERVICES

Master Development Drainage Plan
Fountain Valley School
El Paso County, Colorado

Prepared for:
Fountain Valley School
c/o Next Level Development
118 N. Tejon Street, Suite 205
Colorado Springs, Colorado 80903

Prepared by:

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Kiowa Project No. 10034

January 17, 2011
Revised April 18, 2011

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IV. Hydraulic Calculations 5
V. Existing Drainage Patterns 6
VI. Site Drainage Plan 7
VII. Water Quality Facilities 9
VIII. Irrigation Ditches / Drainage Channels 9
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X. Floodplain Statement 10
XI. Drainage and Bridge Fees 11

LIST OF TABLES

Table 5-1 Recommended Average Runoff Coefficients ..... Appendix A

LIST OF FIGURES

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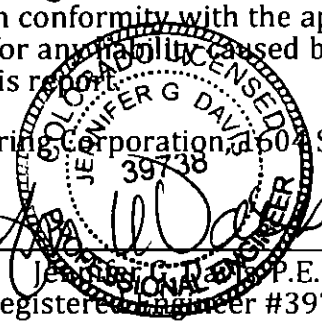
Figure 4 Drainage Basin Boundary Map 13
Figure 5 Overall Drainage Basin Map ..... Map Pocket
Figure 6 Master Development Drainage Plan – Existing Condition ..... Map Pocket
Figure 7 Master Development Drainage Plan - Proposed Condition ..... Map Pocket

Appendix A – Hydrologic Calculations
Appendix B – Hydraulic Calculations

ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City/County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Kiowa Engineering Corporation, 1604 South 21st Street, Colorado Springs, Colorado 80904



Jennifer G. Davis, P.E.
Registered Engineer #39738
For and on Behalf of Kiowa Engineering Corporation

4/19/2011
Date

DEVELOPER'S STATEMENT:

I, the Developer, have read and will comply with all of the requirements specified in this drainage report and plan.

BY: Wayne M. Timura

4/28/11
Date

PRINT NAME: WAYNE M. TIMURA

ADDRESS: Next Level Development
118 N. Tejon Street, Suite 205
Colorado Springs, Colorado 80903

EL PASO COUNTY:

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 & 2, El Paso County Engineering Criteria Manual and Land Development code, as amended.

5-11-11
Date

Andre P. Brackin, P.E.
El Paso County Engineer/ECM Administrator

Conditions: _____

I. General Location and Description

Fountain Valley School is an existing preparatory school located east of Security in the south central portion of El Paso County, Colorado. The developed portion of the school property is located in the central portion of the property. The campus is currently developed with administrative buildings, a dining hall, a library, a student center, classrooms, dormitories, faculty residences, a health center, a gymnasium, an athletic field and track, tennis courts, maintenance buildings, barns, stables, equestrian arenas, and storage sheds. Numerous driveways and parking areas provide access to the main campus area. Hay fields comprise the area to the east and south of the campus. The remainder of the property to the west and north is undeveloped.

The Fountain Valley School property encompasses approximately 937 acres and is roughly bounded by Grinnell Street to the west, Bradley Road to the north, Goldfield Drive to the east, and Fontaine Boulevard to the south. The campus area of the site is located in Section 18, Township 15 South, Range 66 West of the 6th P.M. A vicinity map showing the location of the site is presented on Figure 1 on the following page.

The Fountain Valley School property is being masterplanned and the 2000 AL-00-024 Special Use Permit is being updated. This Master Development Drainage Plan (MDDP) is being submitted as a part of the Special Use and Site Development Plan. Future plans for the school are anticipated to be constructed in phases. Improvements will expand the campus slightly to the north, east, and south and include construction of new buildings, additions to buildings, roadway improvements, new roadways and parking areas, and new athletic and maintenance areas. Proposed buildings include faculty residences, classroom facilities, a performing arts facility, dormitories, Athletic Complex, a multi-purpose arena, and maintenance/storage buildings. Plans also include expanding the existing gymnasium and administration building. Additional athletic fields and riding arenas are proposed along the east side of the campus. Roadway and parking improvements are located on the southern side of the campus. A roundabout is proposed just inside the main gate to the campus. New parking is planned west of the roundabout, south of the existing track, east of the proposed Athletic Complex, and adjacent to the proposed multi-purpose arena.

The main campus area generally slopes from the north to the south at slopes of approximately 2%-10%. According to the *Soil Survey for El Paso County, Colorado*, the site's soil, as shown on Figure 2, consists of several different soil types, most of which fall into the Hydrologic Soil Group B category. Some Hydrologic Soil Group C and D soils lie east of the main campus area and include the existing athletic field.

II. Previous Reports

1) *Drainage Letter and Erosion Control Plan for Fountain Valley School Strategic Development Plan*, prepared by URS, dated July 31, 2000.

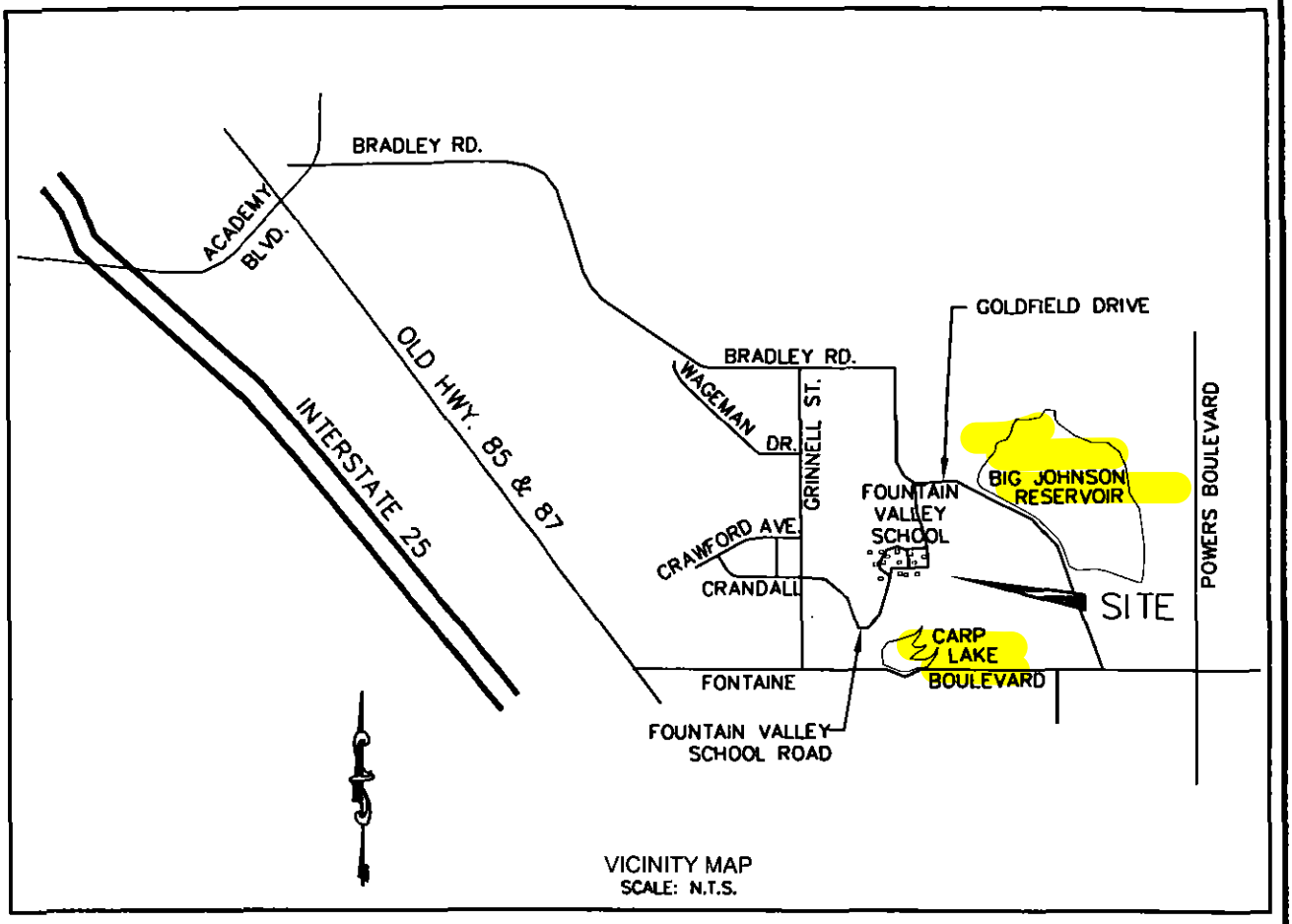


FIGURE 1
VICINITY MAP
FOUNTAIN VALLEY SCHOOL

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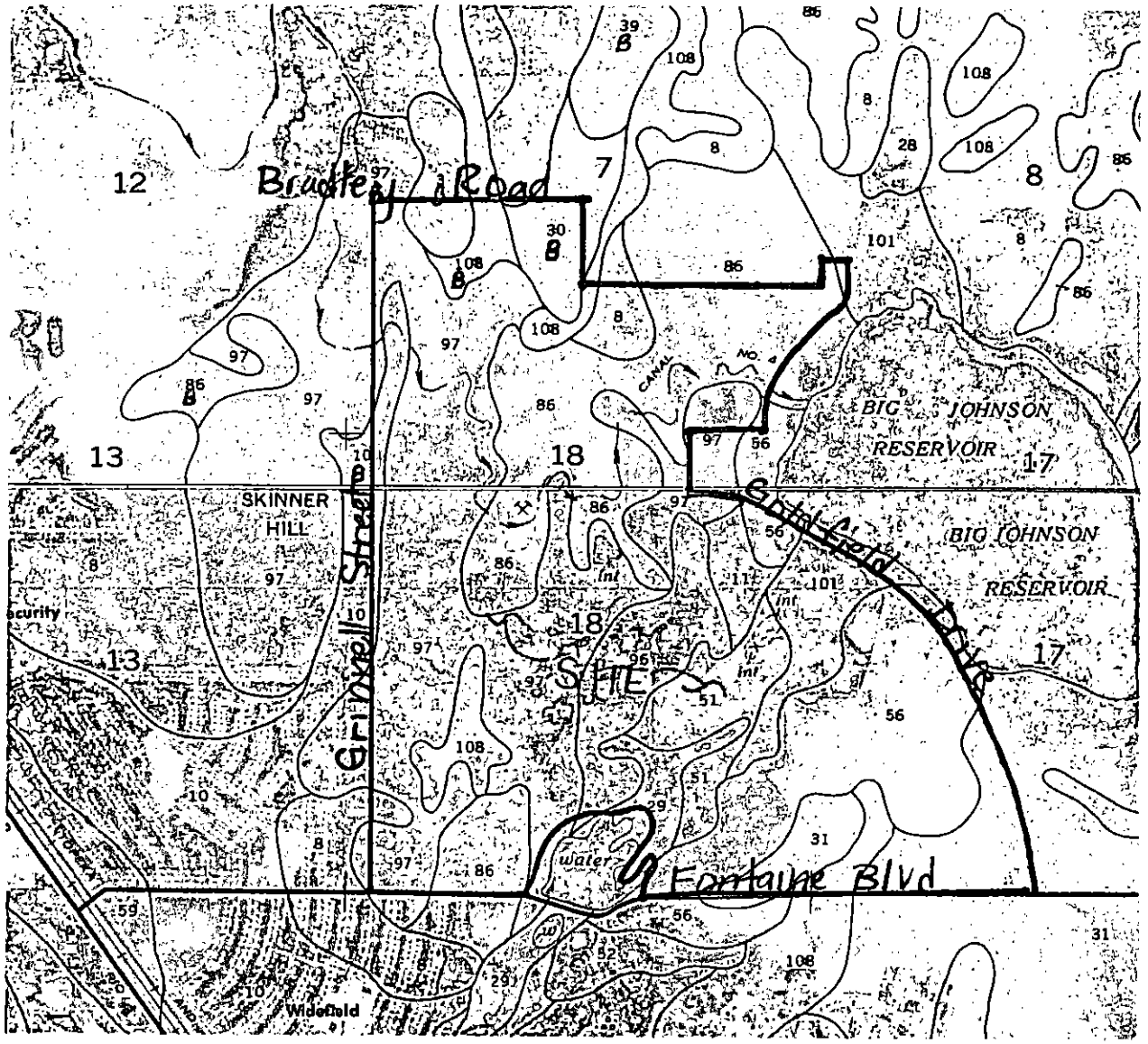


SHEET NO. 24
EL PASO COUNTY AREA, COLORADO
(FOUNTAIN QUADRANGLE)

SOIL SERIES
11 BRESSER SANDY LOAM (B)
29 FLUVAQUENTIC HAPLAQUOLLS (B/D)
30 FORT COLLINS LOAM (B)
31 FORT COLLINS LOAM (B)
39 KEITH SILT LOAM (B)
51 MANZANOLA CLAY LOAM (C)
56 NELSON–TASSEL FINE SANDY LOAMS (B/D)
86 STONEHAM SANDY LOAM (B)
96 TRUCKTON SANDY LOAM (B)
97 TRUCKTON SANDY LOAM (B)
108 WILEY SILT LOAM (B)

SCALE: N.T.S.

FIGURE 2
SOIL SURVEY OF EL PASO COUNTY FOUNTAIN VALLEY SCHOOL

2) *Drainage Letter and Erosion Control Plan for Fountain Valley School Dormitory Expansion*, prepared by Kiowa Engineering Corp., filed October 29, 1998.

3) *Big Johnson Reservoir/Crews Gulch Drainage Basin Planning Study*, prepared by Kiowa Engineering Corporation, dated June, 1991.

4) *City of Colorado Springs and El Paso County Drainage Criteria Manual*, dated October 1997.

5) *City of Colorado Springs Drainage Criteria Manual Volume 2*, dated November 2002.

6) *El Paso County, Engineering Criteria Manual*, dated January 9, 2006 and revised January 1, 2008.

7) *Soil Survey of El Paso County Area, Colorado*, prepared by United States Department of Agriculture Soil Conservation Service, dated June 1981.

The Drainage Basin Planning Study (DBPS) (Reference 3) was prepared to identify feasible stormwater management plans to satisfy the existing and future needs within the Big Johnson Reservoir / Crews Gulch Basin. Drainage and bridge fees were also established in the DBPS. Fountain Valley School is located within Reach 4 per the DBPS. Generally speaking, detention will not be required with any development in this area since detention will be accomplished with Carp Lake, aka McRae Reservoir, downstream of the school. The DBPS assumed no new development would occur at Fountain Valley School. According to the DBPS, if new development occurs at the school, peak discharge rates were to be limited to historic rates. Therefore, detention may be required with the proposed new development at Fountain Valley School.

Improvements were recommended near Fountain Valley School in the DBPS. A new outlet structure with an energy dissipater was planned for in the DBPS at the outlet of Carp Lake at Fontaine Boulevard, which is located south of the school. This outlet structure drains into Widefield Park along the south side of Fontaine Boulevard and has been installed.

Assuming the area draining to Big Johnson Reservoir from the north, east and south, was to be developed as part of the Waterview Property development, construction of a new outlet structure was proposed to increase the reservoir's discharge capacity to pass developed runoff through the reservoir. Improvements were planned in the DBPS to convey the increased flows from Big Johnson Reservoir to Carp Lake. A 36-inch RCP was planned to carry runoff from the outlet structure under Goldfield Drive to the west through the Fountain Valley School property. Improvements to the existing drainage channel were planned to route runoff from this storm pipe to the southwest to an existing drainage channel that outfalls directly into Carp Lake. Bank lining was proposed for both the existing and proposed channels. The existing drainage channel currently travels across the Fountain Valley School property south and east of the existing athletic field.

Neither the channel improvements nor the improvements to the outlet structure have been constructed. Subsequent to the DBPS, the property surrounding Big Johnson Reservoir to the north, east, and south was purchased by the City of Colorado Springs

Trails and Open Space Program and established as Open Space. Since the vast majority of the area draining to Big Johnson Reservoir is now dedicated Open Space and will no longer be developed, an increase in runoff draining to or discharging from Big Johnson Reservoir is no longer anticipated. As such, the planned outlet and drainage channel improvements are no longer necessary.

III. Drainage Design Criteria

Per our pre-application meeting with the County, the focus of this MDDP is on the developed area of the Fountain Valley School campus and not the entire property owned by Fountain Valley School.

The hydrology for this site was estimated using the methods outlined in the *City of Colorado Springs and El Paso County, Drainage Criteria Manual.* The topography for the site was compiled using FIMS mapping with a two-foot contour interval and is presented at a horizontal scale of 1-inch to 200-feet on Figure 5 and 1-inch to 100-feet on Figures 6 and 7. Figure 4 presents the full extent of the drainage basin boundaries using USGS mapping with a 20-foot contour interval at a scale of 1-inch to 2000-feet. Figures 5 and 6 present the existing drainage patterns and Figure 7 presents the proposed drainage patterns for the site, including the sub-basins and the corresponding flow rates. The flow rates for the sub-basins were estimated using the Rational Method. The 5-year and 100-year recurrence intervals were determined. The hydrologic calculations can be found in Appendix A of this report.

The runoff coefficients for the site were determined using Table 5-1 of the *City of Colorado Springs and El Paso County, Drainage Criteria Manual.* Pasture/Meadow and Lawns were assumed for the pervious areas of the site and Paved Streets, Drive and Walks, and Roofs were assumed for impervious areas for both the existing and proposed conditions. A copy of Table 5-1 is located in Appendix A of this report. The hydrologic calculations were performed assuming Hydrologic Soil Group B for the majority of the site with Hydrologic Soil Group C being used for Basins E-4 and E-5 only. The hydrologic calculations can be found in Appendix A of this report.

IV. Hydraulic Calculations

The sizing of the proposed onsite drainage structures were made using the methods outlined in the *City of Colorado Springs and El Paso County, Drainage Criteria Manual.* The hydraulic capacities of curb and grated inlets were determined using the UDINLET computer model developed by the University of Colorado at Denver. Colorado Department of Transportation (CDoT) Type R curb inlets and Type C and Type D grated inlets are planned to be used within the site. The culverts were sized assuming inlet control, a 100-year storm and a maximum headwater to depth ratio of 1.2. The hydraulic capacities of the culverts were determined using the UD-Culvert analysis and design program developed by the University of Colorado at Denver. All road culverts are to be

reinforced concrete or HDPE with flared end sections. The outlets of all culverts will be protected with riprap and sized to meet the outlet velocity condition at each culvert.

V. Existing Drainage Patterns

Presented on Figures 5 and 6 are the existing sub-basin boundaries, data relevant to these basins, and the existing drainage facilities adjacent to and within the Fountain Valley School campus. Figure 4 shows the full extent of the sub-basins.

The site generally drains from the north to the south through a combination of sheet flow, gutter flow, storm sewer, culverts and drainage swales/channels. A system of irrigation ditches runs through the site but is assumed to be running full for purposes of this report. Runoff generated from the Fountain Valley School campus ultimately discharges into Crews Gulch and Carp Lake south of the school property. From Carp Lake, runoff drains to the south under Fontaine Boulevard to Widefield Park, to the southwest in Crews Gulch, and ultimately to Fountain Creek.

Even though the onsite irrigation laterals are assumed to be flowing full, they are only used infrequently during the irrigation season. Some of the site's storm runoff drains to and is conveyed by the ditches. This routing, through relatively flat ditches, slows the runoff and allows sediment to drop out of the storm runoff. Thus, water quality is indirectly provided by the irrigation ditches. This longer and slower route also increases the time of concentration which results in lower peak flows reaching Carp Lake.

The 'A' sub-basins are located at the southwest portion of the campus area. These sub-basins are primarily undeveloped. Runoff generated from these basins drain to an existing 24-inch CMP culvert located near the gated entrance to the school. Runoff draining to this culvert discharges under the Fountain Valley School Road to the southeast. Runoff then sheet flows and is directed to channels that convey runoff to the south and east to Carp Lake.

The 'B' sub-basins are located in the western portion of the campus. These sub-basins are currently developed with faculty residences, dormitories, a student center, a dining hall, a library, an administration building, roadways, and parking areas. Several existing curb inlets intercept runoff in the upper (northern) portion of these sub-basins. An existing 24-inch HDPE storm sewer conveys the collected runoff to the south between the administration building and the library. Several other grated inlets collect runoff near the administration building. A storm pipe directs this runoff, and connects, to the 24-inch system. A grated inlet and culvert along the west side of Fountain Valley Ranch Road discharges runoff to the east near the end of the 24-inch system. This culvert frequently conveys collected ground water. Runoff from these storm pipes drain to an existing earthen irrigation ditch to the south. Assuming the ditch is flowing full, runoff from these sub-basins continues to sheet flow and channel flow to the south to Carp Lake.

The 'C' sub-basins are located in the northern and western portion of the campus. These sub-basins are currently developed with faculty residences, a health center, classrooms, dormitories, a gymnasium, a student center, roadways, and parking areas. The upper

(northern) portion of these sub-basins drains to an existing 30-inch RCP storm sewer system. This system discharges to the existing concrete irrigation ditch located along the west side of the tennis courts. Another storm sewer system collects runoff near the gymnasium and conveys it to the south under the earthen irrigation ditch. A system of roof drains from the administration building and from the building to the north combines and is conveyed to the earthen irrigation ditch to the south via a 12-inch PVC. Assuming the irrigation ditches are full, runoff generated from these sub-basins drain to the south/southeast across the tennis courts and around the track via an existing grass swale. Runoff discharges into an existing drainage channel which directs runoff to the south to Carp Lake.

The 'D' sub-basins are located in the east central portion of the campus. These sub-basins include faculty residences, dormitories, tennis courts, and the track. An existing concrete irrigation ditch runs along a portion of the eastern side of these sub-basins. The ditch also runs in a westerly/easterly direction, cutting the 'D' sub-basins in half. Assuming the ditch is full, runoff generated from these sub-basins sheet flow to the south. Grass swales direct runoff to the south to an existing drainage channel that conveys runoff to Carp Lake south of the site.

The 'E' sub-basins are located along the eastern side of the campus area. These sub-basins include an athletic field, equestrian arenas, barns, and stables. Two different earthen irrigation ditches run in a westerly/easterly direction, dividing the 'E' sub-basins into different sections. Assuming the ditches are full, runoff generated from these sub-basins sheet flow to the south to an existing drainage channel south of the athletic field. The channel conveys runoff to the southwest to Carp Lake.

VI. Site Drainage Plan

The proposed drainage patterns and drainage facilities for the site are conceptual in nature and are shown on Figure 7 located in the pocket at the rear of this report. Runoff can be routed numerous ways through the site. A general description of the drainage patterns and the hydraulic structures within the school site follows.

Detention: Per the DBPS, drainage facilities are required onsite with new development to restrict peak discharges from the school site to historic levels. The hydrologic calculations indicate that proposed runoff slightly increases from existing conditions by only 5.4% for the areas draining to Carp Lake (DP 12) on Figure 5 for the 100-year storm event. Approximately 142.1 cfs and 343.0 cfs currently drain to Carp Lake (DP-12) for the 5-year and 100-year events, respectively. With the proposed development at Fountain Valley School, approximately 152.7 cfs and 361.4 cfs will drain to Carp Lake (DP-12) for the 5-year and 100-year storm events, respectively.

Compared to the 2000 Drainage Letter prepared by URS and listed as Reference 1 under Section II of this report, calculated runoff figures draining to Carp Lake are similar. The previous report calculated flows draining to Carp Lake using the Rational Method and only one basin. This basin contained 204 acres compared to multiple smaller basins

totaling approximately 263 acres in this report. Typically, basins are no larger than 100 acres when using the Rational Method. Existing runoff per the previous report was estimated at Q_5=110 cfs and Q_{100}=256 cfs with proposed runoff draining to Carp Lake estimated at Q_5=113 cfs and Q_{100}=260 cfs. On a per acre basis, these existing flows equate to Q_5=0.54 cfs/acre and Q_{100}=1.25 cfs/acres and these proposed flows equate to Q_5=0.55 cfs/acre and Q_{100}=1.27 cfs/acre. Compared to flows on a per acre basis calculated in this report, flows are similar and fall within 7% of each other. Since hydrologic calculations are subjective, these slight differences are reasonable. Flows draining to Carp Lake at DP-12 in this report equate to Q_5=0.54 cfs/acre and Q_{100}=1.30 cfs/acres for the existing condition and Q_5=0.58 cfs/acre and Q_{100}=1.37 cfs/acres for the proposed condition.

Although the hydrologic calculations in this report show a slight increase in runoff, the physical features of the Fountain Valley School site actually provide incidental detention prior to reaching Carp Lake. However, modeling this is difficult and not feasible. Since incidental detention is provided on the site, formal detention facilities are not necessary with the proposed development at Fountain Valley School to maintain runoff at historic peak rates. The majority of the runoff draining to design point 12 will drain to the existing earthen irrigation ditch east of the proposed roundabout. The ditch will slow down the runoff and increase the conveyance time to reach Carp Lake. If the irrigation ditch overflows, runoff from the ditch will be widely spread and sheet flow slowly from the ditch to the southeast to Carp Lake. This increase in time will decrease the peak rate. In addition to an increase in the travel time, the hay fields and wetland areas south of the school site act as a natural detention area. The small increase in impervious area and increase in runoff can be handled within this relatively flat and highly vegetated area. This area also acts as a natural water quality facility whereby sediment drops out as runoff meanders slowly prior to reaching Carp Lake.

Channels: Several proposed roadside ditches are proposed to route runoff alongside the uphill side of several of the new roadways. These ditches will help prevent runoff from travelling across those roadways. Another proposed channel includes a riprap-lined channel that runs along the southern side of the tennis courts and western side of the existing athletic field. This channel will provide an overflow for the existing concrete channel that will reroute runoff to the east around the new gymnasium.

Road Crossings: With the improvements to Fountain Valley School, several culverts are proposed to convey stormwater under roadways. A 24-inch culvert is proposed to convey runoff from Sub-basin A-2 under the proposed roundabout to the existing 24-inch culvert near the gated entrance. A 42-inch culvert is proposed to convey runoff in the existing earthen irrigation ditch under the new roadway east of the roundabout. A 15-inch culvert is proposed west of the new parking lot south of the track. A 36-inch culvert is proposed under the new parking lot access driveway east of the future gymnasium. A 24-inch culvert is proposed under the driveway providing access to the new parking lot south of the track. This culvert will convey runoff collected in the existing drainage channel to the southeast.

Storm Sewer Facilities: With the proposed improvements at Fountain Valley School, the existing 24-inch storm sewer system will need to be extended to route runoff past the new buildings and parking areas. The existing 24-inch storm sewer system will be extended to the southwest as a 30-inch and 36-inch storm sewer through the new parking lot adjacent to the new multi-purpose arena. The existing 12-inch PVC system along the east side of the administration building will connect to this storm sewer system. This system will also be extended to the northeast as a 24-inch storm pipe to collect runoff in the new cul-de-sac between the administration building and gymnasium. This 24-inch pipe will also convey runoff from the existing earthen irrigation ditch. Once the new gym is constructed, the 24-inch storm will be extended to the northeast connect to the existing concrete irrigation ditch. Irrigation water will continue to drain through this storm sewer system. Any overflow will be split and directed to the east from the end of the concrete ditch along the south side of the tennis courts.

The existing 30-inch RCP storm system will continue to drain to the existing concrete irrigation ditch. With the development of the new gymnasium, runoff in the concrete ditch will be rerouted to the east in a riprap-lined channel with an option to alternatively direct runoff in a 42-inch storm sewer. The storm system would run in an easterly direction alongside the tennis courts and then in a southerly direction alongside the athletic field prior to discharging into an existing drainage channel. The outlet would be protected with riprap. Inlets could be installed in the proposed parking lots east of the tennis courts and Athletic Complex and connect to the 42-inch storm system.

VII. Water Quality Facilities

As required by El Paso County in Volume 2 of the *City/County Drainage Criteria Manual*, water quality measures need to be introduced in new developments in order to reduce the detrimental effects of urbanized impervious areas upon stormwater runoff. Water quality best management practices (BMPs) will need to be implemented within the areas of new development in order to mitigate erosion. Water quality facilities will not be required for existing development.

Future projects at the school should be evaluated on a case-by-case basis to determine if water quality is necessary for that project. If it is established that an assessment is needed for a certain project, runoff discharging at the southern property boundary will be examined to determine the need for water quality facilities.

Due to the fact that runoff from the Fountain Valley School site drains to the heavily vegetated hay fields and wetland areas to the south, specific water quality features should not be required with future development. These areas to the south provide natural water quality features for the site prior to runoff reaching Carp Lake.

The low impact development techniques listed below could be considered for minimizing or eliminating the need for specific water quality features in conjunction with future development at Fountain Valley School.

1. Roof leaders from proposed buildings and expansions of buildings will be directed to the landscaped areas adjacent to the buildings and away from driveways, streets and sidewalks. This will allow for percolation of most storm events that normally would be discharged into the private street section and eventually into downstream storm water systems. This effectively reduces the percent impervious value for the site and lowers the total volume of runoff.
2. In the landscaped areas between the buildings and parking areas, grass-lined swales can be constructed to carry runoff to a storm sewer system, culvert, or drainage channel. The swales will be designed with a pervious invert.
3. Depending upon the layout and frequency of use of the proposed parking areas, pervious pavement systems may be feasible.
4. The practice of minimizing directly connected impervious areas (MDCIA) can be implemented to reduce the amount of impervious areas, slow down runoff, and promote filtration. MDCIA reduces peaks flows and reduces the need for specific water quality features. Reduction in paved areas and the use of porous pavement, grass buffers, and grass swales can be employed with this approach.

VIII. Irrigation Ditches / Drainage Channels

With the proposed future development at Fountain Valley School, some of the existing irrigation ditches and drainage channels will be affected to the south and east.

The irrigation ditch that runs along the south side of the gymnasium and administration building is presently used for irrigation purposes and will need to be rerouted with the current layout of the proposed facilities. The expansion of the gymnasium, the new parking lot for the multi-purpose arena, and the new roadway providing access to these buildings will be constructed where the irrigation ditch is now situated. With the construction of the multi-purpose arena and the adjacent parking area, runoff from the existing earthen irrigation ditch can be collected in an inlet and piped through this area. Downstream of this area, the pipe can discharge back into the earthen ditch. With the construction of the new gymnasium, the pipe can be extended to the north and connected to the existing concrete irrigation ditch.

A portion of the existing drainage channel that runs in a southwesterly direction east of the existing athletic field may need to be relocated or piped, depending on the location of the future athletic field. With the present plan, a portion of the channel runs through the southeastern portion of the field. This existing channel is the main channel draining from Big Johnson Reservoir.

IX. Wetland Areas

The majority of wetland areas on the Fountain Valley School property reside in the vicinity of Carp Lake and the drainage channel (Crews Gulch) conveying runoff from Big Johnson Reservoir to Carp Lake. Per the *Drainage Letter and Erosion Control Plan for*

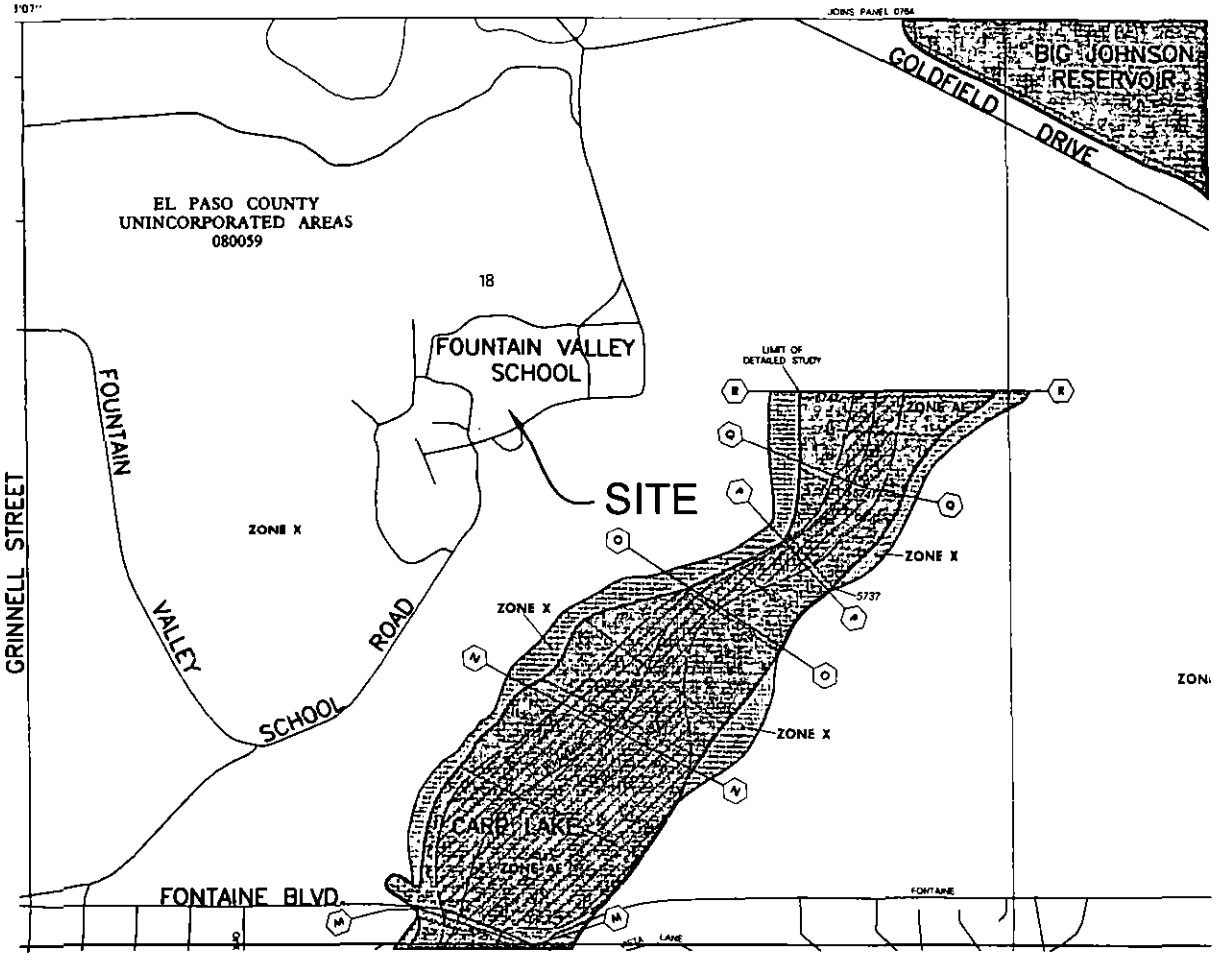
Fountain Valley School Dormitory Expansion, the U.S. Corps of Engineers determined that no waters of the U.S. were affected by the proposed development and a 404 permit was not required. No wetland areas are anticipated to be affected by the proposed future development of the school. However, the property owner should be aware of possible impacts with future development. Because wetland areas can change over time, it is possible that portions of future development may lie within jurisdictional wetland or jurisdictional waters of the U.S. Any required environmental studies and permits related to the impact upon any potential wetland areas around these future facilities will be prepared and submitted to the U.S. Army Corps of Engineers as part of obtaining a 404 permit.

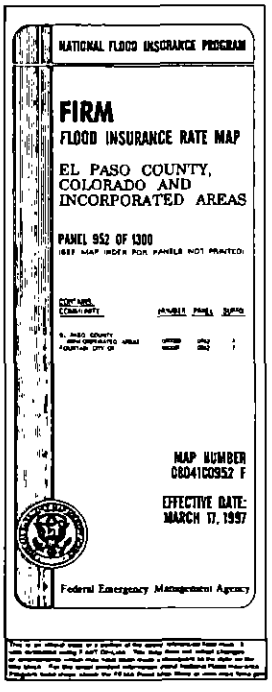
X. Flood Plain Statement

According to the Federal Emergency Management Agency (FEMA), the Fountain Valley School property does lie within a designated floodplain. The Floodplain Insurance Rate Map (FIRM) for El Paso County panel 08041C0952 F, dated March 17, 1997 was reviewed to determine any potential floodplain delineation. The southeastern corner of the existing athletic field and a majority of the proposed athletic field to the east both lay within a Zone AE 100-year floodplain as delineated in the Flood Insurance Study. Zone AE indicates that base flood elevations have been determined as shown on the floodplain map. Along the western edge of the Zone AE area, a small sliver of these fields lay within a Zone X 500-year floodplain. If development is planned within a designated floodplain at Fountain Valley School, a Floodplain Development Permit may be required through the Pikes Peak Regional Floodplain Management Office prior to any construction or modification within that floodplain. A copy of the relevant portion of the FIRM panel is shown on Figure 3.

XI. Drainage and Bridge Fees

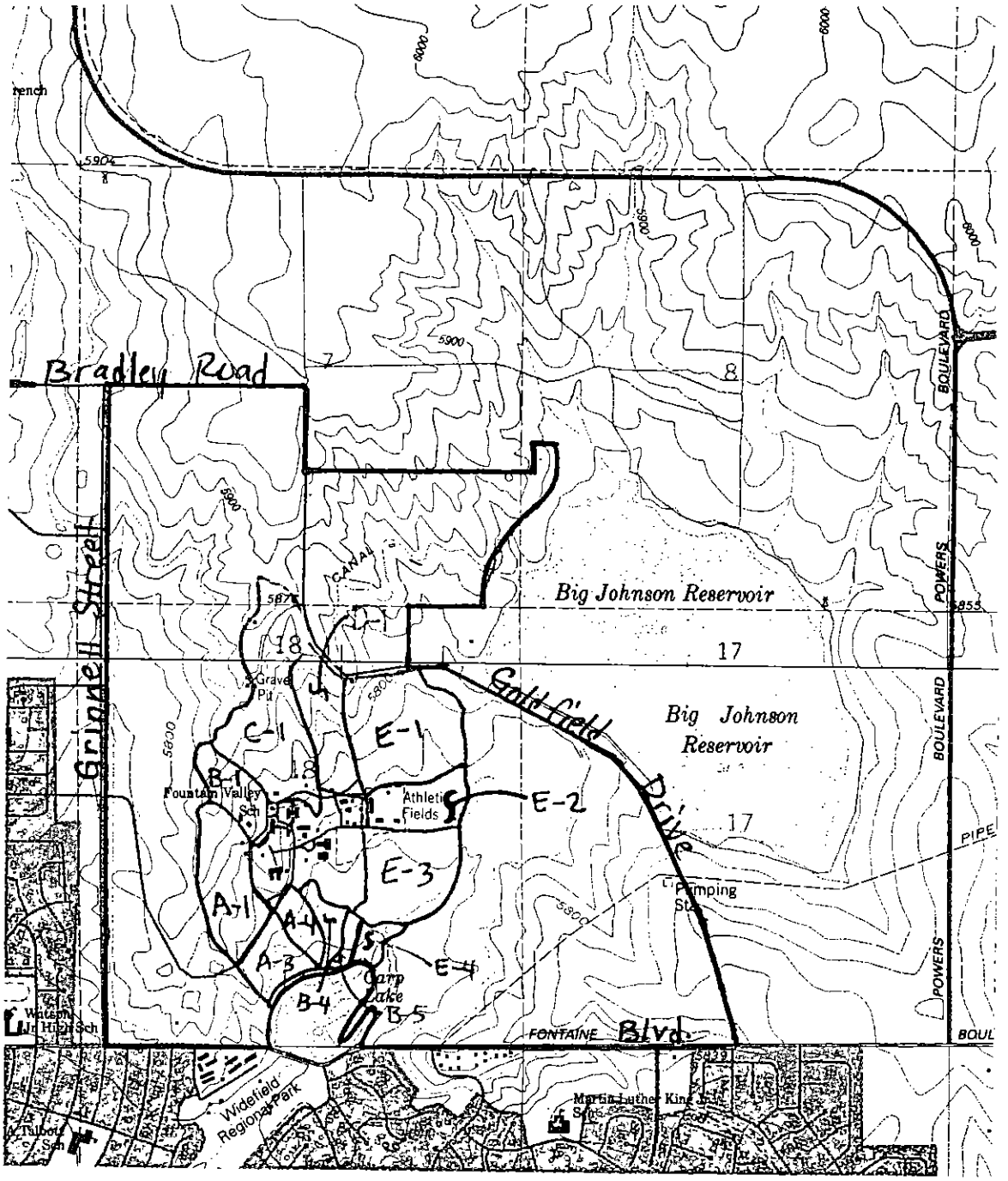
Fountain Valley School lies within the Big Johnson / Crews Gulch Drainage Basin. The DBPS assumed that no new development would occur within the school property. See the discussion on Page 73 of the DBPS. As such, the school area was removed from the area subject to fee assessment. The drainage and bridge fees for the Big Johnson / Crews Gulch Drainage Basin were established based upon the exclusion of the Fountain Valley School property. Therefore, no drainage or bridge fees are due with the proposed development at Fountain Valley School. See page 82 in the DBPS for the basin fee determination.





SCALE: N.T.S.

FIGURE 3
FLOOD INSURANCE RATE MAP
FOUNTAIN VALLEY SCHOOL



SCALE: 1"=2000'

FIGURE 4

DRAINAGE BASIN BOUNDARY MAP
USGS 7.5' MAP (ELSEMERE & FOUNTAIN)
FOUNTAIN VALLEY SCHOOL

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Appendix A
Hydrologic Calculations
Runoff Coefficient Calculations
Time of Concentration
Runoff Calculations

TABLE 5-1

RECOMMENDED AVERAGE RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY 10 A&B*	10 C&D*	100 A&B*	100 C&D*
Business					
Commercial Areas	95	0.90	0.90	0.90	0.90
Neighborhood Areas	70	0.75	0.75	0.80	0.80
Residential					
1/8 Acre or less	65	0.60	0.70	0.70	0.80
1/4 Acre	40	0.50	0.60	0.60	0.70
1/3 Acre	30	0.40	0.50	0.55	0.60
1/2 Acre	25	0.35	0.45	0.45	0.55
1 Acre	20	0.30	0.40	0.40	0.50
Industrial					
Light Areas	80	0.70	0.70	0.80	0.80
Heavy Areas	90	0.80	0.80	0.90	0.90
Parks and Cemeteries	7	0.30	0.35	0.55	0.60
Playgrounds	13	0.30	0.35	0.60	0.65
Railroad Yard Areas	40	0.50	0.55	0.60	0.65
Undeveloped Areas					
Historic Flow Analysis- Greenbelts, Agricultural	2	0.15	0.25	0.20	0.30
Pasture/Meadow	0	0.25	0.30	0.35	0.45
Forest	0	0.10	0.15	0.15	0.20
Exposed Rock	100	0.90	0.90	0.95	0.95
Offsite Flow Analysis (when land use not defined)	45	0.55	0.60	0.65	0.70
Streets					
Paved	100	0.90	0.90	0.95	0.95
Gravel	80	0.80	0.80	0.85	0.85
Drive and Walks	100	0.90	0.90	0.95	0.95
Roofs	90	0.90	0.90	0.95	0.95
Lawns	0	0.25	0.30	0.35	0.45

* Hydrologic Soil Group

9/30/90

Fountain Valley School
Existing Condition
Runoff Coefficient Calculation

Basin	Area 1			Area 2			Basin C_5	Basin C_{100}	Basin
	% Area	C_5	C_{100}	% Area	C_5	C_{100}			
A-1	3 %	0.90	0.95	97 %	0.25	0.35	**0.27**	**0.37**	A-1
A-2	8 %	0.90	0.95	92 %	0.25	0.35	**0.30**	**0.40**	A-2
A-3	1 %	0.90	0.95	99 %	0.25	0.35	**0.26**	**0.36**	A-3
A-4	1 %	0.90	0.95	99 %	0.25	0.35	**0.26**	**0.36**	A-4
B-1	12 %	0.90	0.95	88 %	0.25	0.35	**0.33**	**0.42**	B-1
B-2	36 %	0.90	0.95	64 %	0.25	0.35	**0.49**	**0.57**	B-2
B-3	5 %	0.90	0.95	95 %	0.25	0.35	**0.29**	**0.38**	B-3
B-4	0 %	0.90	0.95	100 %	0.25	0.35	**0.25**	**0.35**	B-4
B-5	0 %	0.90	0.95	100 %	0.25	0.35	**0.25**	**0.35**	B-5
C-1	2 %	0.90	0.95	98 %	0.25	0.35	**0.26**	**0.36**	C-1
C-2	39 %	0.90	0.95	61 %	0.25	0.35	**0.51**	**0.59**	C-2
C-3	21 %	0.90	0.95	79 %	0.25	0.35	**0.39**	**0.47**	C-3
D-1	6 %	0.90	0.95	94 %	0.25	0.35	**0.29**	**0.39**	D-1
D-2	34 %	0.90	0.95	66 %	0.25	0.35	**0.47**	**0.55**	D-2
D-3	30 %	0.90	0.95	70 %	0.25	0.35	**0.45**	**0.53**	D-3
D-4	14 %	0.90	0.95	86 %	0.25	0.35	**0.34**	**0.43**	D-4
E-1	1 %	0.90	0.95	99 %	0.25	0.35	**0.26**	**0.36**	E-1
E-2	4 %	0.90	0.95	96 %	0.25	0.35	**0.28**	**0.37**	E-2
E-3	0 %	0.90	0.95	100 %	0.30	0.45	**0.30**	**0.45**	E-3
E-4	0 %	0.90	0.95	100 %	0.30	0.45	**0.30**	**0.45**	E-4

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 1	A-1	25.48 ac	86.68 %	0.27	0.37	0.23	0.32
	A-2	3.91 ac	13.32 %	0.30	0.40	0.04	0.05
		29.40 ac	100.0 %			**0.27**	**0.37**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 2	DP 1	29.40 ac	56.32 %	0.27	0.37	0.15	0.21
	A-3	15.15 ac	29.03 %	0.26	0.36	0.08	0.10
	A-4	7.65 ac	14.66 %	0.26	0.36	0.04	0.05
		52.20 ac	100.0 %			**0.27**	**0.36**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 3	B-1	14.79 ac	75.57 %	0.33	0.42	0.25	0.32
	B-2	2.67 ac	13.66 %	0.49	0.57	0.07	0.08
	B-3	2.11 ac	10.77 %	0.29	0.38	0.03	0.04
		19.57 ac	100.0 %			**0.35**	**0.44**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 4	DP 3	19.57 ac	66.32 %	0.35	0.44	0.23	0.29
	B-4	6.07 ac	20.57 %	0.25	0.35	0.05	0.07
	B-5	3.87 ac	13.10 %	0.25	0.35	0.03	0.05
		29.50 ac	100.0 %			**0.31**	**0.41**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 5	C-1	45.99 ac	90.02 %	0.26	0.36	0.24	0.33
	C-2	5.10 ac	9.98 %	0.51	0.59	0.05	0.06
		51.09 ac	100.0 %			**0.29**	**0.38**

Fountain Valley School
Existing Condition
Runoff Coefficient Calculation

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 6	D-1	20.59 ac	82.50 %	0.29	0.39	0.24	0.32
	D-2	4.37 ac	17.50 %	0.47	0.55	0.08	0.10
		24.96 ac	100.0 %			**0.32**	**0.42**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 7	DP-5	51.09 ac	58.24 %	0.29	0.38	0.17	0.22
	DP-6	24.96 ac	28.45 %	0.32	0.42	0.09	0.12
	C-3	4.75 ac	5.42 %	0.39	0.47	0.02	0.03
	D-3	6.92 ac	7.89 %	0.45	0.53	0.04	0.04
		87.71 ac	100.0 %			**0.31**	**0.41**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 8	DP 7	87.71 ac	96.33 %	0.31	0.41	0.30	0.39
	D-4	3.34 ac	3.67 %	0.34	0.43	0.01	0.02
		91.05 ac	100.0 %			**0.32**	**0.41**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 9	E-1	40.80 ac	71.81 %	0.26	0.36	0.18	0.26
	E-2	16.02 ac	28.19 %	0.28	0.37	0.08	0.11
		56.81 ac	100.0 %			**0.26**	**0.36**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 10	E-1	40.80 ac	48.20 %	0.26	0.36	0.12	0.17
	E-2	16.02 ac	18.92 %	0.28	0.37	0.05	0.07
	E-3	27.82 ac	32.87 %	0.30	0.45	0.10	0.15
		84.63 ac	100.0 %			**0.27**	**0.39**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 11	DP 8	91.05 ac	51.83 %	0.32	0.41	0.16	0.21
	DP 10	84.63 ac	48.17 %	0.27	0.39	0.13	0.19
		175.68 ac	100.0 %			**0.30**	**0.40**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 12	DP 11	175.68 ac	66.83 %	0.30	0.40	0.20	0.27
	DP 2	52.20 ac	19.86 %	0.27	0.36	0.05	0.07
	DP 4	29.50 ac	11.22 %	0.31	0.41	0.04	0.05
	E-4	5.48 ac	2.08 %	0.30	0.45	0.01	0.01
		262.86 ac	100.0 %			**0.29**	**0.40**

Existing condition

Basin A-1

overland 585' from elev 5842 to 5803 ⇒ 6.7%

channel 1020' from 5803 to 5750 ⇒ 5.2%
assume grass v-ditch w/ 15:1 side slopes
⇒ v = 4.5 fps

Basin A-3

overland 350' from 5752' to 5732' ⇒ 5.7%

channel 630' from 5732' to 5714' ⇒ 2.9%
assume grass v-ditch w/ 40:1 side slopes
⇒ v = 3.3 fps

Basin A-2

overland 140' from 5801' to 5794' ⇒ 5%

channel 770' from 5794' to 5752' ⇒ 5.5%
assume grass v-ditch w/ 15:1 side slopes
⇒ v = 3.2 fps

Basin A-4 overland 400' from 5760' to 5730' ⇒ 7.5%

Channel 800' from 5730' to 5716' ⇒ 1.8%
assume grass v-ditch w/ 40:1 side slopes
⇒ v = 3.1 fps

Basin B-1 overland 325' from 5848' to 5822 ⇒ 8%

Channel 510' from 5822 to 5793 ⇒ 5.7%
grass v-ditch w/ 30:1 side slopes
⇒ v = 4.0 fps

o&g flow 335' from 5793 to 5786 ⇒ 2%
⇒ v = 2.7 fps

storm 385' @ 5% ⇒ v = 15 fps
↳ 24" HDPE

Basin B-2 Overland 240' from 5796' to 5776 ⇒ 7.9%
channel 285' from 5776 to 5757' ⇒ 6.7%
grass v-ditch 15:1 side slopes
⇒ v = 3.0 fps

Basin B-3 overland 200' from 5764' to 5751' ⇒ 6.5%
pipe flow 280' @ 1.0% ⇒ v = 8 fps
channel 80' from 5748 to 5742 ⇒ 7.5% ⇒ v = 4.3fps

Basin B-4 overland 240' from 5741 to 5732 ⇒ 3.8%
Channel 1000' from 5732 to 5714 ⇒ 1.8%
grass v = 2.0 fps

Basin B-5 overland 260' from 5728 to 5724' ⇒ 1.5%
channel 770' from 5724 to 5714 ⇒ 1.3%
grass ⇒ V = 1.7 fps

Basin C-1 overland 560' from 5890 to 5860 ⇒ 5.4%
channel 2680' from 5860 to 5763 ⇒ 3.6%
grass v-ditch w/ 20:1 sideslopes
⇒ v = 4.1 fps

Basin C-2 overland 110' from 5778 to 5772 ⇒ 5.5%
grass channel 700' from 5772 to 5748 ⇒ 3.4%
⇒ v = 3.3 fps

Basin C-3 overland 240' from 5798 to 5780 ⇒ 7.5%
grass channel 700' from 5780 to 5744 ⇒ 5.1%
⇒ v = 3.3 fps

Basin D-1 overland 700' from 5862 to 5820 ⇒ 6%
grass channel 1380' from 5820 to 5758 ⇒ 4.5%
v-ditch w/ 20:1 side slopes
⇒ v = 3.8 fps

Basin D-2 Overland 225' from 5784 to 5766 ⇒ 8%

grass channel 375' from 5766 to 5750 ⇒ 4.3%
⇒ v = 3.2 fps

Basin D-3 overland 300' from 5748 to 5742 ⇒ 2%

grass channel 420' from 5742 to 5732 ⇒ 2.4%
⇒ v = 2.3 fps

~~Basin D-4~~ overland 175' from 5742 to 5736 ⇒ 3.4%

grass channel 625' from 5763 to 5724 ⇒ 6.2%
V-ditch w/ 15:1 side slopes ⇒ v = 6 fps

Basin E-1 overland 635' from 5840 to 5788 ⇒ 8.2%

grass channel 990' from 5788 to 5698 ⇒ 9%
⇒ v = 4.5 fps

Basin E-2 overland 265' from 5758 to 5752 ⇒ 2.3%

grass channel 325' from 5752 to 5746 ⇒ 1.8%
⇒ v = 2 fps

Basin E-3 Overland 1000' from 5748 to 5728 ⇒ 2%

grass channel 250' from 5728 to 5718 ⇒ 4%
V-ditch w/ 15:1 side slopes ⇒ v = 5.5 fps

Basin E-4 overland 300' from 5736 to 5718 ⇒ 4%

grass channel 800' from 5718 to 5714 ⇒ 0.5%
20' bottom 3:1 side slopes ⇒ v = 4 fps

Basin F-1 overland 1000' from 5966 to 5954 ⇒ 1.2%

grass channel 4030' from 5954 to 5794 ⇒ 4.0%
V-ditch w/ 10:1 side slopes
⇒ v = 6 fps

Basin F-2 overland 850' from 5860 to 5800 ⇒ 7%
grass channel 2515' from 5800 to 5750 ⇒ 2%
v-ditch w/ 15:1 side slopes ⇒ v = 4 fps

Basin F-3 overland 1000' from 5880 to 5800 ⇒ 8%
grass channel 2520' from 5800 to 5750 ⇒ 2%
v-ditch w/ 15:1 side slopes ⇒ v = 4 fps

Basin F-4 overland 620' from 5802 to 5758 ⇒ 7%
grass channel 730' from 5758 to 5746 ⇒ 1.6%
v-ditch w/ 15:1 side slopes ⇒ v = 2 fps

Basin F-5 overland 700' from 5840 to 5800 ⇒ 5.7%
grass channel 1260' from 5800 to 5737 ⇒ 5%
v-ditch w/ 20:1 side slopes ⇒ v = 4.4 fps

DP-1 T_c = T_c for Basin A-1 = 23.8 min

DP-2 T_c = T_c for DP-1 plus 1025' grass channel flow ⇒ v = 3.3 fps (per Basin A-3)

$$T_c = 23.8 + \frac{1025}{3.3(60)} = 29.0 \text{ min}$$

DP-3 T_c = T_c fo Basin B-1 plus 600' pipe flow @ 2.5% ⇒ v = 12 fps plus channel flow for Basin B-3

$$T_c = 17.6 \text{ min} + \frac{600}{12(60)} = 18.4 \text{ min}$$

DP-4 T_c = T_c for DP-3 plus 1310' grass channel ⇒ v = 2 fps (per Basin B-4)

$$T_c = 18.4 + \frac{1310}{60(2)} = 29.3 \text{ min}$$

DP-5 T_c = T_c for Basin C-1 plus 300' pipe flow 30" RCP @ 5.0% ⇒ v = 17 fps

$$T_c = 32.0 \text{ cfs} + \frac{300}{60(17)} = 32.3 \text{ min}.$$

DP-6 T_c = T_c for Basin D-1 plus 370' channel flow @ 2.2% ⇒ v = 2.3 fps

$$T_c = 28.1 + \frac{370}{60(2.3)} = 30.8 \text{ min}.$$

DP-7 T_c = T_c for DP 5 plus grass channel 580' @ 2% ⇒ v = 2.1 fps

$$T_c = 32.3 + \frac{580}{60(2.1)} = 36.9 \text{ min}$$

DP-8 T_c = T_c for DP 7 plus grass swale 310' @ 1.9% ⇒ V = 2.1 fps

$$T_c = 36.9 + \frac{310}{60(2.1)} = 39.4 \text{ min.}$$

DP-9 T_c = T_c for Basin E-1 plus 530' grass Channel @ 1.9% ⇒ V = 2.1 fps

$$T_c = 23.4 + \frac{530}{60(2.1)} = 27.6 \text{ min}$$

DP-10 T_c = T_c for DP 9 plus:

1) grass swale 950' @ 1.7% ⇒ V = 2 fps
2) grass channel 480', V = same as Basin E-4

$$T_c = 27.6 + \frac{950}{60(2)} + \frac{480}{60(4)} = 37.5 \text{ min}$$

DP-11 T_c = DP 8 plus 930' channel ⇒ V = 4 fps (per Basin E-4)

$$T_c = 39.4 + \frac{930}{60(4)} = 43.3 \text{ min.}$$

DP-12 T_c = T_c for DP 11

T_c = 43.3 min.

Fountain Valley School
Existing Time of Concentration Calculation

Basin	Slope				Length				Run Coef.	Velocity				T_c				T_c	Basin
	O'land 1	Chan. 1	C&G	Pipe	O'land 1	Chan. 1	C&G	Pipe	(5-year)	O'land 1	Chan. 1	C&G	Pipe	O'land 1	Chan. 1	C&G	Pipe		
A-1	6.7 %	5.2 %			585 lf	1,020 lf			0.27	0.5 ft/sec	4.5 ft/sec			20.0 min.	3.8 min.			**23.8 min.**	A-1
A-2	5.0 %	5.5 %			140 lf	770 lf			0.30	0.2 ft/sec	3.2 ft/sec			10.3 min.	4.0 min.			**14.3 min.**	A-2
A-3	5.7 %	2.9 %			350 lf	630 lf			0.26	0.4 ft/sec	3.3 ft/sec			16.5 min.	3.2 min.			**19.7 min.**	A-3
A-4	7.5 %	1.8 %			400 lf	800 lf			0.26	0.4 ft/sec	3.1 ft/sec			16.1 min.	4.3 min.			**20.4 min.**	A-4
B-1	8.0 %	5.7 %	2.0 %	5.0 %	325 lf	510 lf	335 lf	385 lf	0.33	0.4 ft/sec	4.0 ft/sec	2.7 ft/sec	15.0 ft/sec	13.0 min.	2.1 min.	2.1 min.	0.4 min.	**17.6 min.**	B-1
B-2	7.9 %	6.7 %			240 lf	285 lf			0.49	0.4 ft/sec	3.6 ft/sec			8.9 min.	1.3 min.			**10.2 min.**	B-2
B-3	6.5 %	7.5 %		1.0 %	200 lf	80 lf		280 lf	0.29	0.3 ft/sec	4.3 ft/sec		8.0 ft/sec	11.6 min.	0.3 min.		0.6 min.	**12.4 min.**	B-3
B-4	3.8 %	1.8 %			240 lf	1,000 lf			0.25	0.3 ft/sec	2.0 ft/sec			15.8 min.	8.3 min.			**24.1 min.**	B-4
B-5	1.5 %	1.3 %			260 lf	770 lf			0.25	0.2 ft/sec	1.7 ft/sec			22.4 min.	7.5 min.			**29.9 min.**	B-5
C-1	5.4 %	3.6 %			560 lf	2,680 lf			0.26	0.4 ft/sec	4.1 ft/sec			21.1 min.	10.9 min.			**32.0 min.**	C-1
C-2	5.5 %	3.4 %			110 lf	700 lf			0.51	0.3 ft/sec	3.3 ft/sec			6.6 min.	3.5 min.			**10.1 min.**	C-2
C-3	7.5 %	5.1 %			240 lf	700 lf			0.39	0.4 ft/sec	3.3 ft/sec			10.6 min.	3.5 min.			**14.1 min.**	C-3
D-1	6.0 %	4.5 %			700 lf	1,380 lf			0.29	0.5 ft/sec	3.8 ft/sec			22.0 min.	6.1 min.			**28.1 min.**	D-1
D-2	8.0 %	4.3 %			225 lf	375 lf			0.47	0.4 ft/sec	3.2 ft/sec			8.9 min.	2.0 min.			**10.8 min.**	D-2
D-3	2.0 %	2.4 %			300 lf	420 lf			0.45	0.3 ft/sec	2.3 ft/sec			16.8 min.	3.0 min.			**19.8 min.**	D-3
D-4	3.4 %	6.2 %			175 lf	625 lf			0.34	0.2 ft/sec	6.0 ft/sec			12.5 min.	1.7 min.			**14.3 min.**	D-4
E-1	8.2 %	9.0 %			635 lf	990 lf			0.26	0.5 ft/sec	4.5 ft/sec			19.7 min.	3.7 min.			**23.4 min.**	E-1
E-2	2.3 %	1.8 %			265 lf	325 lf			0.28	0.2 ft/sec	2.0 ft/sec			19.0 min.	2.7 min.			**21.7 min.**	E-2
E-3	2.0 %	4.0 %			1,000 lf	250 lf			0.30	0.4 ft/sec	5.5 ft/sec			37.6 min.	0.8 min.			**38.3 min.**	E-3
E-4	4.0 %	0.5 %			300 lf	800 lf			0.30	0.3 ft/sec	4.0 ft/sec			16.3 min.	3.3 min.			**19.7 min.**	E-4
DP-1									0.27									**23.8 min.**	DP-1
DP-2									0.27									**29.0 min.**	DP-2
DP-3									0.35									**18.4 min.**	DP-3
DP-4									0.31									**29.3 min.**	DP-4
DP-5									0.29									**32.3 min.**	DP-5
DP-6									0.32									**30.8 min.**	DP-6
DP-7									0.31									**36.9 min.**	DP-7
DP-8									0.32									**39.4 min.**	DP-8
DP-9									0.26									**27.6 min.**	DP-9
DP-10									0.27									**37.5 min.**	DP-10
DP-11									0.30									**43.3 min.**	DP-11
DP-12									0.29									**43.3 min.**	DP-12

Equations:

Time of Concentration (Overland) = $1.87(1.1-C_5)L^{0.5}S^{-0.333}$

C_5 = Runoff coefficient for five-year flow

L = Length of overland flow in feet

S = Slope of flow path in percent

Velocity (Road) = $10(10^{[0.5\log S+0.3]})$

S = Slope of flow path in percent

Velocity (Channel) = $(1.49/n)R_n^{2/3}S^{1/2}$

Slope (S) = Slope of the channel

n = Manning's number

R_n = Hydraulic Radius (Reynold's Number)

*Without Detention

Fountain Valley School
Existing Runoff Calculation

Basin / Design Point	Contributing Basins	Area	Area	C_5	C_{100}	Time of Concentration	Rainfall Intensity i_5	Rainfall Intensity i_{100}	Runoff Q_5	Runoff Q_{100}	Basin / Design Point
A-1		1,110,000 sf	25.48 ac	0.27	0.37	23.8 min.	2.7 in/hr	4.7 in/hr	18.0 cfs	43.9 cfs	A-1
A-2		170,507 sf	3.91 ac	0.30	0.40	14.3 min.	3.4 in/hr	6.1 in/hr	4.1 cfs	9.5 cfs	A-2
A-3		659,993 sf	15.15 ac	0.26	0.36	19.7 min.	2.9 in/hr	5.2 in/hr	11.5 cfs	28.3 cfs	A-3
A-4		333,283 sf	7.65 ac	0.26	0.36	20.4 min.	2.9 in/hr	5.1 in/hr	5.6 cfs	13.9 cfs	A-4
B-1		644,098 sf	14.79 ac	0.33	0.42	17.6 min.	3.1 in/hr	5.5 in/hr	15.2 cfs	34.7 cfs	B-1
B-2		116,420 sf	2.67 ac	0.49	0.57	10.2 min.	4.0 in/hr	7.1 in/hr	5.2 cfs	10.7 cfs	B-2
B-3		91,831 sf	2.11 ac	0.29	0.38	12.4 min.	3.7 in/hr	6.5 in/hr	2.2 cfs	5.2 cfs	B-3
B-4		264,371 sf	6.07 ac	0.25	0.35	24.1 min.	2.6 in/hr	4.7 in/hr	4.0 cfs	10.0 cfs	B-4
B-5		168,408 sf	3.87 ac	0.25	0.35	29.9 min.	2.3 in/hr	4.1 in/hr	2.2 cfs	5.6 cfs	B-5
C-1		2,003,235 sf	45.99 ac	0.26	0.36	32.0 min.	2.2 in/hr	4.0 in/hr	26.9 cfs	66.0 cfs	C-1
C-2		222,034 sf	5.10 ac	0.51	0.59	10.1 min.	4.0 in/hr	7.1 in/hr	10.4 cfs	21.2 cfs	C-2
C-3		207,012 sf	4.75 ac	0.39	0.47	14.1 min.	3.5 in/hr	6.1 in/hr	6.4 cfs	13.9 cfs	C-3
D-1		896,901 sf	20.59 ac	0.29	0.39	28.1 min.	2.4 in/hr	4.3 in/hr	14.5 cfs	34.3 cfs	D-1
D-2		190,207 sf	4.37 ac	0.47	0.55	10.8 min.	3.9 in/hr	6.9 in/hr	8.0 cfs	16.6 cfs	D-2
D-3		301,276 sf	6.92 ac	0.45	0.53	19.8 min.	2.9 in/hr	5.2 in/hr	9.0 cfs	19.1 cfs	D-3
D-4		145,512 sf	3.34 ac	0.34	0.43	14.3 min.	3.5 in/hr	6.1 in/hr	3.9 cfs	8.8 cfs	D-4
E-1		1,777,100 sf	40.80 ac	0.26	0.36	23.4 min.	2.7 in/hr	4.8 in/hr	28.1 cfs	69.2 cfs	E-1
E-2		697,645 sf	16.02 ac	0.28	0.37	21.7 min.	2.8 in/hr	5.0 in/hr	12.4 cfs	29.7 cfs	E-2
E-3		1,211,867 sf	27.82 ac	0.30	0.45	38.3 min.	2.0 in/hr	3.6 in/hr	16.7 cfs	44.6 cfs	E-3
E-4		238,609 sf	5.48 ac	0.30	0.45	19.7 min.	2.9 in/hr	5.2 in/hr	4.8 cfs	12.9 cfs	E-4
DP-1	A-1, A-2	1,280,507 sf	29.40 ac	0.27	0.37	23.8 min.	2.7 in/hr	4.7 in/hr	21.2 cfs	51.3 cfs	DP-1
DP-2	All 'A' Basins	2,273,783 sf	52.20 ac	0.27	0.36	29.0 min.	2.4 in/hr	4.2 in/hr	32.8 cfs	80.2 cfs	DP-2
DP-3	B-1, B-2, B-3	852,349 sf	19.57 ac	0.35	0.44	18.4 min.	3.0 in/hr	5.4 in/hr	20.7 cfs	46.5 cfs	DP-3
DP-4	All 'B' Basins	1,285,128 sf	29.50 ac	0.31	0.41	29.3 min.	2.3 in/hr	4.2 in/hr	21.8 cfs	50.6 cfs	DP-4
DP-5	C-1, C-2	2,225,269 sf	51.09 ac	0.29	0.38	32.3 min.	2.2 in/hr	3.9 in/hr	32.5 cfs	77.5 cfs	DP-5
DP-6	D-1, D-2	1,087,108 sf	24.96 ac	0.32	0.42	30.8 min.	2.3 in/hr	4.1 in/hr	18.4 cfs	42.3 cfs	DP-6
DP-7	C-1, C-2, C-3, D-1, D-2, D-3	3,820,665 sf	87.71 ac	0.31	0.41	36.9 min.	2.0 in/hr	3.6 in/hr	56.5 cfs	130.9 cfs	DP-7
DP-8	All 'C' and 'D' Basins	3,966,177 sf	91.05 ac	0.32	0.41	39.4 min.	2.0 in/hr	3.5 in/hr	56.5 cfs	130.8 cfs	DP-8
DP-9	E-1, E-2	2,474,745 sf	56.81 ac	0.26	0.36	27.6 min.	2.4 in/hr	4.3 in/hr	36.3 cfs	89.1 cfs	DP-9
DP-10	E-1, E-2, E3	3,686,612 sf	84.63 ac	0.27	0.39	37.5 min.	2.0 in/hr	3.6 in/hr	47.1 cfs	119.3 cfs	DP-10
DP-11	DP 8, DP10	7,652,789 sf	175.68 ac	0.30	0.40	43.3 min.	1.8 in/hr	3.3 in/hr	96.2 cfs	232.3 cfs	DP-11
DP-12	DP 2, DP 4, DP12, Basin E-4	11,450,309 sf	262.86 ac	0.29	0.40	43.3 min.	1.8 in/hr	3.3 in/hr	142.1 cfs	343.0 cfs	DP-12

Equations:

$i_5 = 54.6/(T_c^{0.69}+6.72)$

$i_{100} = 75/((10+T_c)^{0.786})$

i_5=Average 5-year Rainafall Intensity in inches per hour

i_{100}=Average 100-year Rainfall Intensity in inches per hour

T_c=Time of Concentration

$Q = CiA$

Q = Peak Runoff Rate, in cubic feet per second (cfs)

C = Runoff coefficient representing a ration of peak runoff rate to average rainfall intensity for a duration equal to the runoff time of concentration.

i = average rainfall intensity in inches per hour

A = Drainage area in acres

Fountain Valley School
Future Condition
Runoff Coefficient Calculation

Basin	Area 1			Area 2			Basin C_5	Basin C_{100}	Basin
	% Area	C_5	C_{100}	% Area	C_5	C_{100}			
A-1	4 %	0.90	0.95	96 %	0.25	0.35	**0.28**	**0.37**	A-1
A-2	19 %	0.90	0.95	81 %	0.25	0.35	**0.38**	**0.47**	A-2
A-3	1 %	0.90	0.95	99 %	0.25	0.35	**0.26**	**0.36**	A-3
A-4	3 %	0.90	0.95	97 %	0.25	0.35	**0.27**	**0.37**	A-4
A-5	23 %	0.90	0.95	77 %	0.25	0.35	**0.40**	**0.49**	A-5
A-6	19 %	0.90	0.95	81 %	0.25	0.35	**0.37**	**0.46**	A-6
B-1	14 %	0.90	0.95	86 %	0.25	0.35	**0.34**	**0.43**	B-1
B-2	40 %	0.90	0.95	60 %	0.25	0.35	**0.51**	**0.59**	B-2
B-3	40 %	0.90	0.95	60 %	0.25	0.35	**0.51**	**0.59**	B-3
B-4a	39 %	0.90	0.95	61 %	0.25	0.35	**0.51**	**0.59**	B-4a
B-4b	0 %	0.90	0.95	100 %	0.25	0.35	**0.25**	**0.35**	B-4b
B-5	0 %	0.90	0.95	100 %	0.25	0.35	**0.25**	**0.35**	B-5
C-1	5 %	0.90	0.95	95 %	0.25	0.35	**0.28**	**0.38**	C-1
C-2	47 %	0.90	0.95	53 %	0.25	0.35	**0.55**	**0.63**	C-2
C-3	29 %	0.90	0.95	71 %	0.25	0.35	**0.44**	**0.53**	C-3
D-1	7 %	0.90	0.95	93 %	0.25	0.35	**0.29**	**0.39**	D-1
D-2	34 %	0.90	0.95	66 %	0.25	0.35	**0.47**	**0.55**	D-2
D-3	53 %	0.90	0.95	47 %	0.25	0.35	**0.60**	**0.67**	D-3
D-4	16 %	0.90	0.95	84 %	0.25	0.35	**0.35**	**0.45**	D-4
E-1	2 %	0.90	0.95	98 %	0.25	0.35	**0.26**	**0.36**	E-1
E-2	4 %	0.90	0.95	96 %	0.25	0.35	**0.28**	**0.38**	E-2
E-3	1 %	0.90	0.95	99 %	0.30	0.45	**0.30**	**0.45**	E-3
E-4	0 %	0.90	0.95	100 %	0.30	0.45	**0.30**	**0.45**	E-4

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 1	A-1	25.46 ac	86.61 %	0.28	0.37	0.24	0.32
	A-2	3.94 ac	13.39 %	0.38	0.47	0.05	0.06
		29.40 ac	100.0 %			**0.29**	**0.39**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 2	DP 1	29.40 ac	38.65 %	0.29	0.39	0.11	0.15
	A-3	15.03 ac	19.76 %	0.26	0.36	0.05	0.07
	A-4	5.07 ac	6.67 %	0.27	0.37	0.02	0.02
	DP-3b	26.57 ac	34.92 %	0.39	0.48	0.14	0.17
		76.07 ac	100.0 %			**0.32**	**0.41**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 3a	B-1	14.79 ac	59.62 %	0.34	0.43	0.20	0.26
	B-2	2.67 ac	10.78 %	0.51	0.59	0.05	0.06
	B-3	2.30 ac	9.28 %	0.51	0.59	0.05	0.05
	C-3	5.04 ac	20.32 %	0.44	0.53	0.09	0.11
		24.80 ac	100.0 %			**0.39**	**0.48**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 3b	DP 3a	24.80 ac	93.36 %	0.39	0.48	0.37	0.45
	A-5	1.76 ac	6.64 %	0.40	0.49	0.03	0.03
		26.57 ac	100.0 %			**0.39**	**0.48**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 4a	A-6	1.20 ac	39.78 %	0.37	0.46	0.15	0.18
	B-4a	1.81 ac	60.22 %	0.51	0.59	0.30	0.35
		3.01 ac	100.0 %			**0.45**	**0.54**

Fountain Valley School
Future Condition
Runoff Coefficient Calculation

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 4b	DP 4a	3.01 ac	47.24 %	0.45	0.54	0.21	0.25
	B-4b	3.36 ac	52.76 %	0.25	0.35	0.13	0.18
		6.37 ac	100.0 %			**0.35**	**0.44**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 5	C-1	45.99 ac	89.89 %	0.28	0.38	0.25	0.34
	C-2	5.17 ac	10.11 %	0.55	0.63	0.06	0.06
		51.16 ac	100.0 %			**0.31**	**0.40**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 6	D-1	20.59 ac	82.50 %	0.29	0.39	0.24	0.32
	D-2	4.37 ac	17.50 %	0.47	0.55	0.08	0.10
		24.96 ac	100.0 %			**0.32**	**0.42**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 7	DP-5	51.16 ac	61.53 %	0.31	0.40	0.19	0.25
	DP-6	24.96 ac	30.02 %	0.32	0.42	0.10	0.13
	D-3	7.03 ac	8.46 %	0.60	0.67	0.05	0.06
		83.15 ac	100.0 %			**0.34**	**0.43**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 8	DP 7	83.15 ac	95.87 %	0.34	0.43	0.32	0.41
	D-4	3.58 ac	4.13 %	0.35	0.45	0.01	0.02
		86.73 ac	100.0 %			**0.34**	**0.43**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 9	E-1	40.80 ac	71.81 %	0.26	0.36	0.19	0.26
	E-2	16.02 ac	28.19 %	0.28	0.38	0.08	0.11
		56.81 ac	100.0 %			**0.27**	**0.37**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 10	E-1	40.80 ac	48.09 %	0.26	0.36	0.13	0.17
	E-2	16.02 ac	18.88 %	0.28	0.38	0.05	0.07
	E-3	28.02 ac	33.03 %	0.30	0.45	0.10	0.15
		84.83 ac	100.0 %			**0.28**	**0.39**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 11	DP 8	86.73 ac	50.55 %	0.34	0.43	0.17	0.22
	DP 10	84.83 ac	49.45 %	0.28	0.39	0.14	0.19
		171.56 ac	100.0 %			**0.31**	**0.41**

Design Point	Basin	Area	% Area	C_5	C_{100}	C_5	C_{100}
DP 12	DP 11	171.56 ac	65.13 %	0.31	0.41	0.20	0.27
	DP 2	76.07 ac	28.88 %	0.32	0.41	0.09	0.12
	DP 4b	6.37 ac	2.42 %	0.35	0.44	0.01	0.01
	B-5	3.93 ac	1.49 %	0.25	0.35	0.00	0.01
	E-4	5.48 ac	2.08 %	0.30	0.45	0.01	0.01
		263.41 ac	100.0 %			**0.31**	**0.41**

Basin A-1 Overland - same as Existing
channel 1030' - assume V = same as Existing condition

Basin A-2 overland 100' from 5801 to 5797 ⇒ 4%
grass channel 750' - assume V = same as existing

Basin A-3 Overland, Channel } Same as existing

Basin A-4 overland 300' from 5746 to 5732 ⇒ 4.7%
grass channel 415' from 5732 to 5716 ⇒ 2.6%
⇒ V = 2.4 fps

Basin A-5 overland 215' from 5754 to 5739 ⇒ 7%
grasschannel 50' @ 2% ⇒ V = 2.2 fps

Basin A-6 overland 300' from 5742 to 5728 ⇒ 4.7%
grass channel 40' @ 2.5% ⇒ V = 2.4 fps

Basin B-1 Overland, Channel, C&G Pipe } Same as existing

Basin B-2 Overland, channel } same as existing

Basin B-3 Overland - same as existing
pipe 280' @ 1% ⇒ V = 8 fps - same as Exist.
pipe 240' @ 1.7% ⇒ V = 10 fps
combine 2 pipes for avg of V = 8.9 fps

Basin B-4a Overland 190' from 5738 to 5732 ⇒ 3.2%
grass channel 190' from 5732 to 5727 ⇒ 2.6% ⇒ v = 2.4 fps
C&G/sheet flow 100' @ 1% ⇒ v = 2 fps

Basin B-4b overland 265' from 5727 to 5723 ⇒ 1.5%
grass channel 550' from 5723 to 5714 ⇒ 1.6%
⇒ v = 1.8 fps

Basin B-5 overland, channel } same as existing

Basin C-1 overland, channel } same as existing

Basin C-2 overland – same as existing
grass channel 750' from 5772 to 5748 ⇒ 3.2%
⇒ v = 2.8 fps

Basin C-3 overland – same as existing
grass channel 660' ⇒ v = same as existing
pipe flow 80' @ 1% ⇒ v = 6.5 fps

Basin D-1 overland, channel } same as existing

Basin D-2 overland, channel } same as existing

Basin D-3 overland, channel } same as existing

Basin D-4 overland 70' from 5740 to 5738 ⇒ 2.9%
grass channel 700' ⇒ V= same as existing

Basin E-1 overland, channel } same as existing

Basin E-2 overland, channel } same as existing

Basin E-3 overland 880' @ 2%
grass channel 950' from 5726 to 5714 ⇒ 0.8%
V-ditch w/ 3:1 side slopes ⇒ V= 5 fps

Basin E-4 overland, channel } same as existing

Basin F-1 overland, channel
Basin F-2 overland, channel
Basin F-3 overland, channel
Basin F-4 overland, channel
Basin F-5 overland, channel
} same as existing

DP-1 T_c = T_c for Basin A-1 = 23.6 min

DP-2 T_c = T_c for DP-3b plus channel 780' @ 2.9% ~~as shown for existing DP~~
⇒ V = ~~3~~ fps

T_c = ~~21.9~~ + ~~900~~ / ~~3~~(60) = ~~25.9~~ min

DP-3a T_c = T_c for Basin B-1 PLUS 600' pipe flow @ V = 12 fps AND 240' pipe flow @ V = 10 fps

$T_c = 17.5 + \frac{600}{60(12)} + \frac{240}{60(10)} = 18.7$ min

DP-~~3c~~ 3b T_c = T_c for ~~A-5 plus~~ DP-3a plus:
60' pipe @ ~~2.6~~ 1.9 ⇒ V = ~~5~~ 10 fps
225' grass channel @ 0.5% ⇒ V = ~~2.4~~ 1.2 fps

$T_c = \frac{18.7}{10.3} + \frac{60}{60(10)} + \frac{225}{60(1.2)} = \frac{21.9}{12.6}$ min.

DP-~~4~~3a T_c = T_c for ~~DP-3 plus~~: Basin A-6
1) ~~285' channel @ 1.4% ⇒ V = 3.7 fps (4' ditch 6:1 side~~
2) ~~pipe flow~~ } per DP-4a
3) ~~channel~~ }

14.4 min = $T_c = 18.1 + \frac{285}{60(3.7)} + \frac{110}{60(5)} + \frac{375}{60(2.4)} = 22.3$ min

DP-4b T_c = T_c for DP-4a plus channel flow
745' @ 1.4% ⇒ V = same as Basin B-4b (proposed)

$T_c = \frac{14.4}{22.3} + \frac{745}{60(1.8)} = \frac{24.3}{29.2}$ min

DP-5 T_c = T_c for Basin C-1 plus:

pipe flow - 300' of 30" RCP @ 5% $\Rightarrow$ v = 17 fps

$T_c = 31.6 + \frac{300}{60(17)} = 31.9$ min.

DP-6 T_c = T_c for Basin D-1 plus 370' channel flow @ 2.2% $\Rightarrow$ v = 2.3 fps

$T_c = 28.0 + \frac{370}{60(2.3)} = 30.7$ min.

DP-7 T_c = T_c for DP 5 plus grass channel 580' @ 2% $\Rightarrow$ v = 2.1 fps

$T_c = 31.9 + \frac{580}{60(2.1)} = 36.5$ min

DP-8 T_c = T_c for DP 7 plus grass swale 310' @ 1.9% $\Rightarrow$ v = 2.1 fps

$T_c = 36.5 + \frac{310}{60(2.1)} = 39.0$ min

DP-9 T_c = T_c for Basin E-1 plus 530' grass channel @ 1.9% $\Rightarrow$ v = 2.1 fps

$T_c = 23.3 + \frac{530}{60(2.1)} = 27.5$ min

DP-10 T_c = T_c for DP 9 plus:

1) grass swale 950' $\Rightarrow$ v = 2 fps (same as Ex. DP 6)
2) grass channel 480', v = same as Basin E-4

$T_c = 27.5 + \frac{950}{60(2)} + \frac{480}{60(4)} = 37.4$ min

DP 11 T_c = DP 8 plus 930' grass channel

$\Rightarrow v = 4$ fps (per Basin E-4)

$$T_c = 39.0 + \frac{930}{60(4)} = 42.9 \text{ min}$$

DP 12 T_c = T_c for DP 11

$T_c = 42.9$ min

Fountain Valley School
Future Time of Concentration Calculation

Basin	Slope				Length				Run Coef.	Velocity				T_c				T_c	Basin
	O'land 1	Chan. 1	C&G	Pipe	O'land 1	Chan. 1	C&G	Pipe	(5-year)	O'land 1	Chan. 1	C&G	Pipe	O'land 1	Chan. 1	C&G	Pipe		
A-1	6.7 %	5.2 %			585 lf	1,030 lf			0.28	0.5 ft/sec	4.5 ft/sec			19.8 min.	3.8 min.			**23.6 min.**	A-1
A-2	4.0 %	5.5 %			100 lf	750 lf			0.38	0.2 ft/sec	3.2 ft/sec			8.5 min.	3.9 min.			**12.4 min.**	A-2
A-3	5.7 %	2.9 %			350 lf	630 lf			0.26	0.4 ft/sec	3.3 ft/sec			16.5 min.	3.2 min.			**19.7 min.**	A-3
A-4	4.7 %	2.6 %			300 lf	615 lf			0.27	0.3 ft/sec	2.4 ft/sec			16.1 min.	4.3 min.			**20.3 min.**	A-4
A-5	7.0 %	2.0 %			215 lf	50 lf			0.40	0.4 ft/sec	2.2 ft/sec			10.1 min.	0.4 min.			**10.5 min.**	A-5
A-6	4.7 %	2.5 %			300 lf	40 lf			0.37	0.4 ft/sec	2.4 ft/sec			14.1 min.	0.3 min.			**14.4 min.**	A-6
B-1	8.0 %	5.7 %	2.0 %	5.0 %	325 lf	510 lf	335 lf	385 lf	0.34	0.4 ft/sec	4.0 ft/sec	2.7 ft/sec	15.0 ft/sec	12.8 min.	2.1 min.	2.1 min.	0.4 min.	**17.5 min.**	B-1
B-2	7.9 %	6.7 %			240 lf	285 lf			0.51	0.5 ft/sec	3.6 ft/sec			8.6 min.	1.3 min.			**9.9 min.**	B-2
B-3	6.5 %			1.3 %	200 lf			520 lf	0.51	0.4 ft/sec			8.9 ft/sec	8.4 min.			1.0 min.	**9.4 min.**	B-3
B-4a	3.2 %	2.6 %	1.0 %		190 lf	190 lf	100 lf		0.51	0.3 ft/sec	2.4 ft/sec	2.0 ft/sec		10.4 min.	1.3 min.	0.8 min.		**12.6 min.**	B-4a
B-4b	1.5 %	1.6 %			265 lf	550 lf			0.25	0.2 ft/sec	1.8 ft/sec			22.6 min.	5.1 min.			**27.7 min.**	B-4b
B-5	1.5 %	1.3 %			260 lf	770 lf			0.25	0.2 ft/sec	1.7 ft/sec			22.3 min.	7.5 min.			**29.9 min.**	B-5
C-1	5.4 %	3.6 %			560 lf	2,680 lf			0.28	0.5 ft/sec	4.1 ft/sec			20.7 min.	10.9 min.			**31.6 min.**	C-1
C-2	5.5 %	3.2 %			110 lf	750 lf			0.55	0.3 ft/sec	2.8 ft/sec			6.1 min.	4.5 min.			**10.5 min.**	C-2
C-3	7.5 %	5.1 %		1.0 %	240 lf	660 lf		80 lf	0.44	0.4 ft/sec	3.3 ft/sec		6.5 ft/sec	9.8 min.	3.3 min.		0.2 min.	**13.3 min.**	C-3
D-1	6.0 %	4.5 %			700 lf	1,380 lf			0.29	0.5 ft/sec	3.8 ft/sec			21.9 min.	6.1 min.			**28.0 min.**	D-1
D-2	8.0 %	4.3 %			225 lf	375 lf			0.47	0.4 ft/sec	3.2 ft/sec			6.9 min.	2.0 min.			**10.8 min.**	D-2
D-3	2.0 %	2.4 %			300 lf	420 lf			0.60	0.4 ft/sec	2.3 ft/sec			13.0 min.	3.0 min.			**16.0 min.**	D-3
D-4	2.9 %	6.2 %			70 lf	700 lf			0.35	0.1 ft/sec	6.0 ft/sec			8.2 min.	1.9 min.			**10.1 min.**	D-4
E-1	8.2 %	9.0 %			635 lf	990 lf			0.26	0.5 ft/sec	4.5 ft/sec			19.6 min.	3.7 min.			**23.3 min.**	E-1
E-2	2.3 %	1.8 %			265 lf	325 lf			0.28	0.2 ft/sec	2.0 ft/sec			18.9 min.	2.7 min.			**21.6 min.**	E-2
E-3	2.0 %	0.8 %			880 lf	950 lf			0.30	0.4 ft/sec	5.0 ft/sec			35.1 min.	3.2 min.			**38.3 min.**	E-3
E-4	4.0 %	0.5 %			300 lf	800 lf			0.30	0.3 ft/sec	4.0 ft/sec			16.3 min.	3.3 min.			**19.7 min.**	E-4
DP-1									0.29									**23.6 min.**	DP-1
DP-2									0.32									**26.9 min.**	DP-2
DP-3a									0.39									**18.7 min.**	DP-3a
DP-3b									0.39									**21.9 min.**	DP-3b
DP-4a									0.45									**14.4 min.**	DP-4a
DP-4b									0.35									**21.3 min.**	DP-4b
DP-5									0.31									**31.9 min.**	DP-5
DP-6									0.32									**30.7 min.**	DP-6
DP-7									0.34									**36.5 min.**	DP-7
DP-8									0.34									**38.9 min.**	DP-8
DP-9									0.27									**27.5 min.**	DP-9
DP-10									0.28									**37.4 min.**	DP-10
DP-11									0.31									**42.8 min.**	DP-11
DP-12									0.31									**42.8 min.**	DP-12

Equations:

Time of Concentration (Overland) = $1.87(1.1-C_5)L^{0.5}S^{-0.333}$

C_5 = Runoff coefficient for five-year flow

L = Length of overland flow in feet

S = Slope of flow path in percent

Velocity (Road) = $10(10^{(0.5\log S - 0.3)})$

S = Slope of flow path in percent

Velocity (Channel) = $(1.49/n)R_n^{2/3}S^{1/2}$

Slope (S) = Slope of the channel

n = Manning's number

R_n = Hydraulic Radius (Reynold's Number)

*Without Detention

Fountain Valley School
Future Runoff Calculation

Basin / Design Point	Contributing Basins	Area	Area	C_5	C_{100}	Time of Concentration	Rainfall Intensity i_5	Rainfall Intensity i_{100}	Runoff Q_5	Runoff Q_{100}	Basin / Design Point
A-1		1,109,126 sf	25.46 ac	0.28	0.37	23.6 min.	2.7 in/hr	4.7 in/hr	**18.7 cfs**	**45.0 cfs**	A-1
A-2		171,463 sf	3.94 ac	0.38	0.47	12.4 min.	3.7 in/hr	6.5 in/hr	**5.4 cfs**	**11.9 cfs**	A-2
A-3		654,584 sf	15.03 ac	0.26	0.36	19.7 min.	2.9 in/hr	5.2 in/hr	**11.4 cfs**	**28.1 cfs**	A-3
A-4		221,064 sf	5.07 ac	0.27	0.37	20.3 min.	2.9 in/hr	5.1 in/hr	**3.9 cfs**	**9.6 cfs**	A-4
A-5		76,883 sf	1.76 ac	0.40	0.49	10.5 min.	4.0 in/hr	7.0 in/hr	**2.8 cfs**	**6.0 cfs**	A-5
A-6		52,142 sf	1.20 ac	0.37	0.46	14.4 min.	3.4 in/hr	6.1 in/hr	**1.5 cfs**	**3.4 cfs**	A-6
B-1		644,098 sf	14.79 ac	0.34	0.43	17.5 min.	3.1 in/hr	5.5 in/hr	**15.7 cfs**	**35.5 cfs**	B-1
B-2		116,420 sf	2.67 ac	0.51	0.59	9.9 min.	4.1 in/hr	7.1 in/hr	**5.5 cfs**	**11.2 cfs**	B-2
B-3		100,277 sf	2.30 ac	0.51	0.59	9.4 min.	4.2 in/hr	7.3 in/hr	**4.9 cfs**	**9.9 cfs**	B-3
B-4a		78,922 sf	1.81 ac	0.51	0.59	12.6 min.	3.7 in/hr	6.5 in/hr	**3.4 cfs**	**6.9 cfs**	B-4a
B-4b		146,375 sf	3.36 ac	0.25	0.35	27.7 min.	2.4 in/hr	4.3 in/hr	**2.0 cfs**	**5.1 cfs**	B-4b
B-5		171,338 sf	3.93 ac	0.25	0.35	29.9 min.	2.3 in/hr	4.1 in/hr	**2.3 cfs**	**5.7 cfs**	B-5
C-1		2,003,235 sf	45.99 ac	0.28	0.38	31.6 min.	2.2 in/hr	4.0 in/hr	**29.0 cfs**	**69.6 cfs**	C-1
C-2		225,232 sf	5.17 ac	0.55	0.63	10.5 min.	4.0 in/hr	7.0 in/hr	**11.4 cfs**	**22.8 cfs**	C-2
C-3		219,537 sf	5.04 ac	0.44	0.53	13.3 min.	3.6 in/hr	6.3 in/hr	**7.9 cfs**	**16.7 cfs**	C-3
D-1		896,901 sf	20.59 ac	0.29	0.39	28.0 min.	2.4 in/hr	4.3 in/hr	**14.6 cfs**	**34.6 cfs**	D-1
D-2		190,207 sf	4.37 ac	0.47	0.55	10.8 min.	3.9 in/hr	6.9 in/hr	**8.0 cfs**	**16.6 cfs**	D-2
D-3		306,287 sf	7.03 ac	0.60	0.67	16.0 min.	3.3 in/hr	5.8 in/hr	**13.7 cfs**	**27.2 cfs**	D-3
D-4		156,154 sf	3.58 ac	0.35	0.45	10.1 min.	4.0 in/hr	7.1 in/hr	**5.1 cfs**	**11.3 cfs**	D-4
E-1		1,777,100 sf	40.80 ac	0.26	0.36	23.3 min.	2.7 in/hr	4.8 in/hr	**28.7 cfs**	**70.3 cfs**	E-1
E-2		697,645 sf	16.02 ac	0.28	0.38	21.6 min.	2.8 in/hr	5.0 in/hr	**12.5 cfs**	**29.9 cfs**	E-2
E-3		1,220,449 sf	28.02 ac	0.30	0.45	38.3 min.	2.0 in/hr	3.6 in/hr	**17.0 cfs**	**45.2 cfs**	E-3
E-4		238,609 sf	5.48 ac	0.30	0.45	19.7 min.	2.9 in/hr	5.2 in/hr	**4.8 cfs**	**12.9 cfs**	E-4
DP-1	A-1, A-2	1,280,589 sf	29.40 ac	0.29	0.39	23.6 min.	2.7 in/hr	4.7 in/hr	**22.6 cfs**	**53.7 cfs**	DP-1
DP-2	A-1, A-2, A-3, A-4, A-5, B-1, B-2, B-3, C-3	3,313,452 sf	76.07 ac	0.32	0.41	26.9 min.	2.5 in/hr	4.4 in/hr	**59.8 cfs**	**138.2 cfs**	DP-2
DP-3a	B-1, B-2, B-3, C-3	1,080,332 sf	24.80 ac	0.39	0.48	18.7 min.	3.0 in/hr	5.4 in/hr	**29.5 cfs**	**64.2 cfs**	DP-3a
DP-3b	A-5, B-1, B-2, B-3, C-3	1,157,215 sf	26.57 ac	0.39	0.48	21.9 min.	2.8 in/hr	4.9 in/hr	**29.0 cfs**	**63.2 cfs**	DP-3b
DP-4a	A-6, B-4A	131,064 sf	3.01 ac	0.45	0.54	14.4 min.	3.4 in/hr	6.1 in/hr	**4.7 cfs**	**9.8 cfs**	DP-4a
DP-4b	A-6, B-4A, B-4b	277,439 sf	6.37 ac	0.35	0.44	21.3 min.	2.8 in/hr	5.0 in/hr	**6.2 cfs**	**14.0 cfs**	DP-4b
DP-5	C-1, C-2	2,228,467 sf	51.16 ac	0.31	0.40	31.9 min.	2.2 in/hr	4.0 in/hr	**35.2 cfs**	**82.2 cfs**	DP-5
DP-6	D-1, D-2	1,087,108 sf	24.96 ac	0.32	0.42	30.7 min.	2.3 in/hr	4.1 in/hr	**18.6 cfs**	**42.6 cfs**	DP-6
DP-7	C-1, C-2, D-1, D-2, D-3	3,621,862 sf	83.15 ac	0.34	0.43	36.5 min.	2.1 in/hr	3.7 in/hr	**57.8 cfs**	**131.4 cfs**	DP-7
DP-8	All 'C' and 'D' Basins except C-3	3,778,016 sf	86.73 ac	0.34	0.43	38.9 min.	2.0 in/hr	3.5 in/hr	**58.0 cfs**	**131.8 cfs**	DP-8
DP-9	E-1, E-2	2,474,745 sf	56.81 ac	0.27	0.37	27.5 min.	2.4 in/hr	4.3 in/hr	**37.0 cfs**	**90.3 cfs**	DP-9
DP-10	E-1, E-2, E-3	3,695,194 sf	84.83 ac	0.28	0.39	37.4 min.	2.0 in/hr	3.6 in/hr	**48.0 cfs**	**120.9 cfs**	DP-10
DP-11	DP 8, DP10	7,473,210 sf	171.56 ac	0.31	0.41	42.8 min.	1.9 in/hr	3.3 in/hr	**98.6 cfs**	**235.1 cfs**	DP-11
DP-12	DP 2, DP 4b, DP 11, Basin B-5, Basin E-4	11,474,048 sf	263.41 ac	0.31	0.41	42.8 min.	1.9 in/hr	3.3 in/hr	**152.7 cfs**	**361.4 cfs**	DP-12

Equations:

$I_c = 54.6/(T_c^{0.83}+6.72)$

$i_{100} = 75/((10+T_c)^{0.786})$

i_5=Average 5-year Rainfall Intensity in inches per hour

i_{100}=Average 100-year Rainfall Intensity in inches per hour

T_c=Time of Concentration

$Q = CiA$

Q = Peak Runoff Rate, in cubic feet per second (cfs)

C = Runoff coefficient representing a ration of peak runoff rate to average rainfall intensity for a duration equal to the runoff time of concentration.

i = average rainfall intensity in inches per hour

A = Drainage area in acres

Appendix B
Hydraulic Calculations

Fountain Valley School
CDot Type C Grated Inlet Sizing

Proposed CDOT Type C Grated Inlet - Basin B-3

Proposed CDOT Type C Grated Inlet - Orifice Equation

Orifice Coefficient, c		0.6
Opening Size	Length	2.92 ft
	Depth	2.9 ft
Opening Area		8.52 sf
Opening Area w/50% Blockage*		4.26 sf
Opening Elevation		5743.00

Water Elevation	Head / Flow Depth, h	Orifice Flow, Q
5743.25	0.25 ft	10.3 cfs
5743.50	0.50 ft	14.5 cfs
5743.75	0.75 ft	17.8 cfs
5744.00	1.00 ft	20.5 cfs

*Clogging Factor = 2.0 for Grated Inlet in Sump Condition

Orifice Equation
Q=cA(2gh)^0.5
g=gravity=32.2 fps

Proposed CDOT Type C Grated Inlet - Weir Equation

Opening Size	Length	2.92 ft
	Depth	2.9 ft
Perimeter		11.68 ft
Clogging Factor, F		2.0
Grate Elevation		5743.00

Water Elevation	Head / Flow Depth, d	Weir Flow, Q
5743.25	0.25 ft	2.2 cfs
5743.50	0.50 ft	6.2 cfs
5743.75	0.75 ft	11.4 cfs
5744.00	1.00 ft	17.5 cfs

*Clogging Factor = 2.0 for Grated Inlet in Sump Condition
Weir Equation
Q=(3.0*P*d^1.5)/F
P=perimeter of grate opening, in feet
d=depth fo water at grate, in feet
F=Clogging Factor

Fountain Valley School
CDot Type C Grated Inlet Sizing

Proposed CDOT Type C Grated Inlet - Basin D-4

Proposed CDOT Type C Grated Inlet - Orifice Equation

Orifice Coefficient, c		0.6
Opening Size	Length	2.92 ft
	Depth	2.9 ft
Opening Area		8.52 sf
Opening Area w/50% Blockage*		4.26 sf
Opening Elevation		5726.00

Water Elevation	Head / Flow Depth, h	Orifice Flow, Q
5726.25	0.25 ft	10.3 cfs
5726.50	0.50 ft	14.5 cfs
5726.75	0.75 ft	17.8 cfs
5727.00	1.00 ft	20.5 cfs

*Clogging Factor = 2.0 for Grated Inlet in Sump Condition

Orifice Equation
Q=cA(2gh)^0.5
g=gravity=32.2 fps

Proposed CDOT Type C Grated Inlet - Weir Equation

Opening Size	Length	2.92 ft
	Depth	2.9 ft
Perimeter		11.68 ft
Clogging Factor, F		2.0
Grate Elevation		5726.00

Water Elevation	Head / Flow Depth, d	Weir Flow, Q
5726.25	0.25 ft	2.2 cfs
5726.50	0.50 ft	6.2 cfs
5726.75	0.75 ft	11.4 cfs
5727.00	1.00 ft	17.5 cfs

*Clogging Factor = 2.0 for Grated Inlet in Sump Condition
Weir Equation
Q=(3.0*P*d^1.5)/F
P=perimeter of grate opening, in feet
d=depth fo water at grate, in feet
F=Clogging Factor

Fountain Valley School
CDot Type D Grated Inlet Sizing

Proposed CDOT Type D Grated Inlet - Basin D-6 (5-year = DP 5, DP 6, Basin D-3 = 35.2+18.6+13.7 = 67.5 cfs

Proposed CDOT Type D Grated Inlet - Orifice Equation

Orifice Coefficient, c		0.6
Opening Size	Length	2.92 ft
	Depth	5.7 ft
Opening Area		16.53 sf
Opening Area w/50% Blockage*		8.26 sf
Opening Elevation		5737.00

Water Elevation	Head / Flow Depth, h	Orifice Flow, Q
5738.50	1.50 ft	48.7 cfs
5739.00	2.00 ft	56.3 cfs
5739.50	2.50 ft	62.9 cfs
5740.00	3.00 ft	68.9 cfs

*Clogging Factor = 2.0 for Grated Inlet in Sump Condition

Orifice Equation
Q=cA(2gh)^0.5
g=gravity=32.2 fps

Proposed CDOT Type D Grated Inlet - Weir Equation

Opening Size	Length	2.92 ft
	Depth	5.7 ft
Perimeter		17.17 ft
Clogging Factor, F		2.0
Grate Elevation		5737.00

Water Elevation	Head / Flow Depth, d	Weir Flow, Q
5738.50	1.50 ft	47.3 cfs
5739.00	2.00 ft	72.9 cfs
5739.50	2.50 ft	101.8 cfs
5740.00	3.00 ft	133.9 cfs

*Clogging Factor = 2.0 for Grated Inlet in Sump Condition
Weir Equation
Q=(3.0*P*d^1.5)/F
P=perimeter of grate opening, in feet
d=depth fo water at grate, in feet
F=Clogging Factor

Fountain Valley School
Storm Sewer Capacity Calculations

Pipe #	Q_{100}	Contributing Flows	Mannings 'n'	Pipe Slope	Calculated Pipe Diameter	**Proposed Pipe Diameter**	Min. Slope of Pipe	Flow Velocity	Pipe Capacity
1	16.7 cfs	Basin C-3	0.013	**1.00 %**	21-inch	**24-inch**	0.545 %	7.2 ft/sec	**23 cfs**
2	64.2 cfs	DP 3a	0.013	**1.00 %**	35-inch	**36-inch**	0.927 %	9.5 ft/sec	**67 cfs**
3	46.7 cfs	Basins B-1, B-2	0.013	**1.50 %**	29-inch	**30-inch**	1.297 %	10.3 ft/sec	**50 cfs**
4*	67.5 cfs	DP 5 & DP 6, Basin D-3	0.013	**2.00 %**	32-inch	**36-inch**	1.025 %	13.4 ft/sec	**95 cfs**
5	124.8 cfs	DP 5 & DP 6	0.013	**1.50 %**	42-inch	**42-inch**	1.540 %	12.8 ft/sec	**124 cfs**

Equations:

Pipe Diameter = $((2.16Qn)/(S^{0.5}))^{0.375}$

Q = Discharge in cubic feet per second

n = Manning's roughness coefficient

S = Slope of the pipe

Flow Velocity = $(1.49/n)R_h^{2/3} S^{1/2}$

n = Manning's roughness coefficient

R_h = Hydraulic Radius

S = Slope of the pipe

Pipe Capacity = $(1.49/n)AR_h^{2/3} S^{1/2}$

A = Cross-sectional area of pipe

$A=p(D^2/4)$

D = Inside Diameter of Pipe

$R_h = A_w/W_p$

$A_w = p(d^2/4)$

A_w = Water Cross Sectional Area

d = Water (Flow) Depth Within Pipe

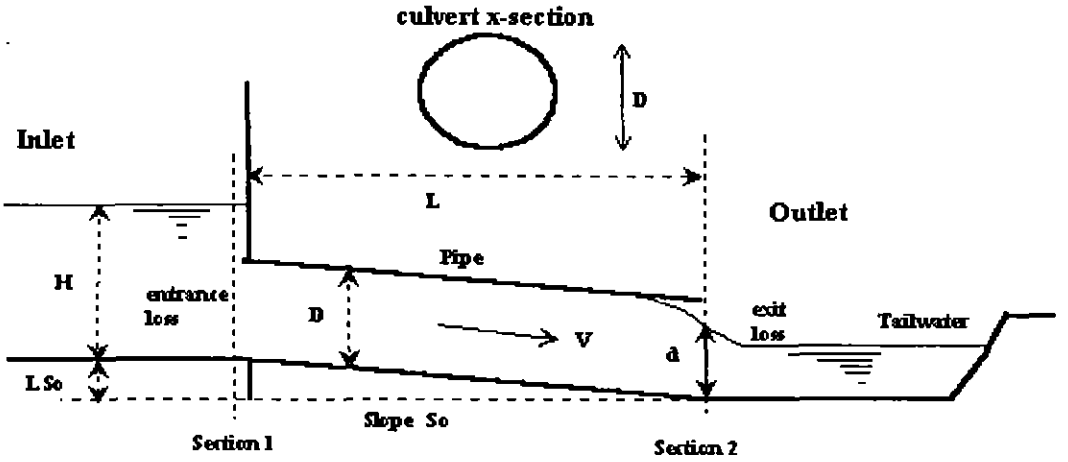
W_p = pd (For Capacity Calculation)

W_p=Wetted Perimeter of Pipe

* 5-year storm event

Headwater Depth For Circular Culvert

Project: 10034 Fountain Valley School
Pipe ID: Culvert in Basin A-5 (DP 3b - 100-year)

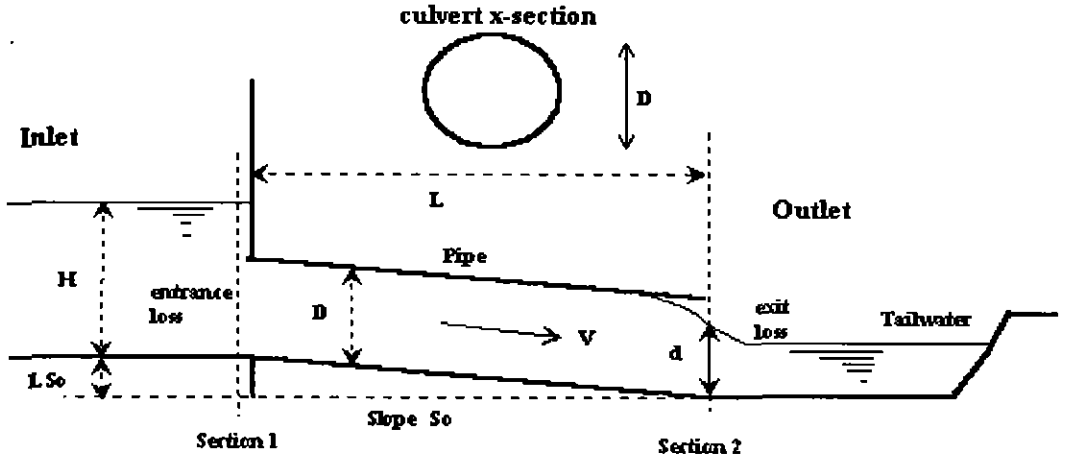


Design Information (input)			
Design Discharge		**Q =**	**63.2 cfs**
Pipe Diameter		D =	42.00 inches
Inlet Edge Type (choose from pull-down list)	Inlet Type =	Square End Projection	
Inlet Invert Elevation		I_e =	5740.00 ft
Outlet Invert Elevation		O_e =	5739.50 ft
Pipe Length		L =	50.0 ft
Manning's Roughness n-value		n =	0.013
Bend Loss Coefficient		K_b =	0.00
Exit Loss Coefficient		K_x =	1.00
Tailwater Water Surface Elevation		El. Y_t =	0.00 ft

Calculations (output)			
Pipe Cross Sectional Area		A_o =	9.62 sq ft
Culvert Slope		S_o =	0.0100 ft/ft
Normal Flow Depth		Y_n =	2.01 ft
Critical Flow Depth		Y_c =	2.49 ft
Headwater Depth by Inlet Control			
Headwater Depth by Inlet Control		**HW-inlet=**	**4.11 ft**
Headwater Depth by Outlet Control			
Tailwater Depth for Design		d =	3.00 ft
Friction Loss Coefficient over Culvert Length		K_f =	0.29
Sum of All Loss Coefficients		K_s =	1.49
Headwater Depth by Outlet Control		**HW-outlet=**	**4.17 ft**
Design Headwater Depth		**HW=**	**4.17 ft**
HW/D Ratio =		**HW/D=**	**1.19**

Headwater Depth For Circular Culvert

Project: 10034 Fountain Valley School
Pipe ID: Culvert under roundabout in Basin A-6 (100-year)



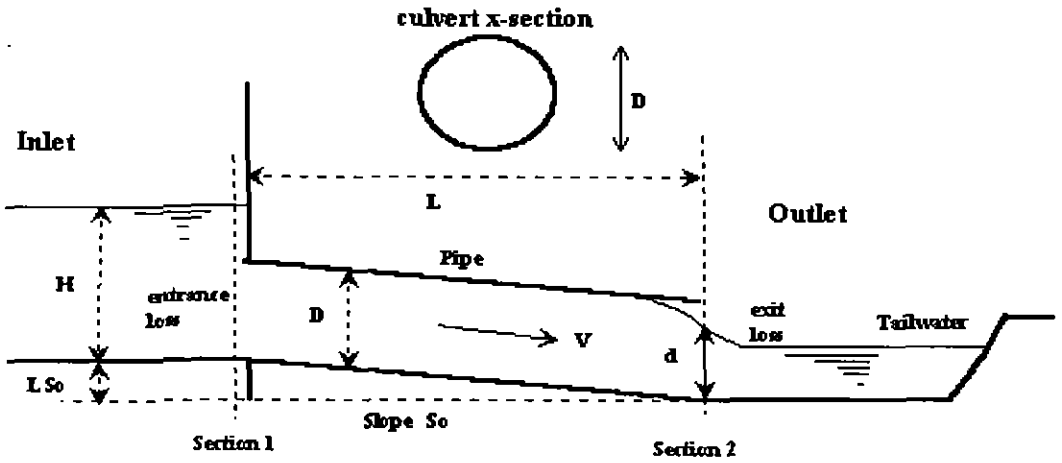
Design Information (input)				
Design Discharge		**Q =**	**3.4**	**cfs**
Pipe Diameter		D =	15.00	inches
Inlet Edge Type (choose from pull-down list)	Inlet Type =	Square End Projection		
Inlet Invert Elevation		I_e =	5726.00	ft
Outlet Invert Elevation		O_e =	5725.40	ft
Pipe Length		L =	60.0	ft
Manning's Roughness n-value		n =	0.013	
Bend Loss Coefficient		K_b =	0.00	
Exit Loss Coefficient		K_x =	1.00	
Tailwater Water Surface Elevation		El. Y_t =	0.00	ft

Calculations (output)				
Pipe Cross Sectional Area		A_o =	1.23	sq ft
Culvert Slope		S_o =	0.0100	ft/ft
Normal Flow Depth		Y_n =	0.64	ft
Critical Flow Depth		Y_c =	0.74	ft
Headwater Depth by Inlet Control				
Headwater Depth by Inlet Control		**HW-inlet=**	**1.13**	**ft**
Headwater Depth by Outlet Control				
Tailwater Depth for Design		d =	1.00	ft
Friction Loss Coefficient over Culvert Length		K_f =	1.39	
Sum of All Loss Coefficients		K_s =	2.59	
Headwater Depth by Outlet Control		**HW-outlet=**	**0.82**	**ft**
Design Headwater Depth		**HW=**	**1.13**	**ft**
Note 01 HW/D Ratio =		**HW/D=**	**0.90**	

Note 01: A Hw / D ratio of less than 1.0 may indicate an oversized culvert.

Headwater Depth For Circular Culvert

Project: 10034 Fountain Valley School
Pipe ID: Culvert in Basin D-4 (100-year)



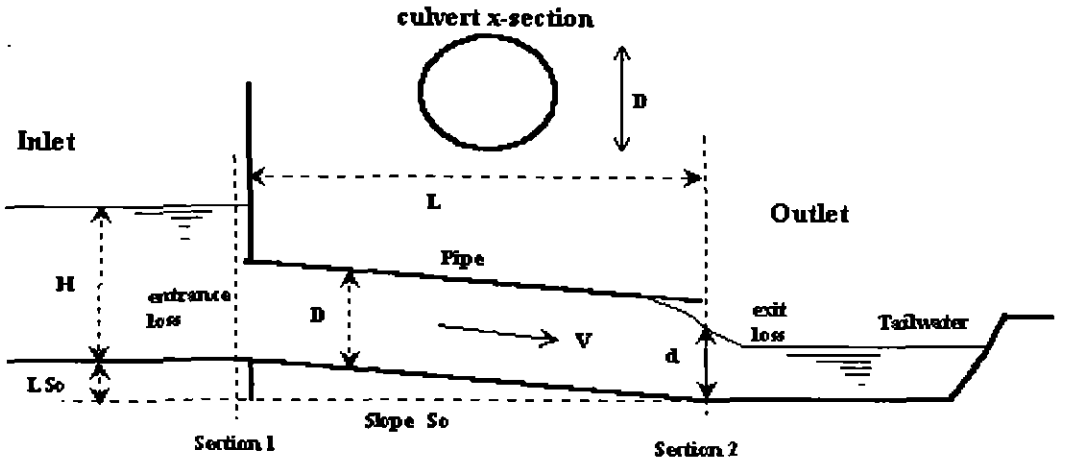
Design Information (input)			
Design Discharge		**Q =**	**11.3 cfs**
Pipe Diameter		D =	24.00 inches
Inlet Edge Type (choose from pull-down list)	Inlet Type =	Square End Projection	
Inlet Invert Elevation		I_e =	5722.00 ft
Outlet Invert Elevation		O_e =	5721.00 ft
Pipe Length		L =	60.0 ft
Manning's Roughness n-value		n =	0.013
Bend Loss Coefficient		K_b =	0.00
Exit Loss Coefficient		K_x =	1.00
Tailwater Water Surface Elevation		El. Y_t =	0.00 ft

Calculations (output)			
Pipe Cross Sectional Area		A_o =	3.14 sq ft
Culvert Slope		S_o =	0.0167 ft/ft
Normal Flow Depth		Y_n =	0.86 ft
Critical Flow Depth		Y_c =	1.21 ft
Headwater Depth by Inlet Control			
Headwater Depth by Inlet Control		**HW-Inlet=**	**1.83 ft**
Headwater Depth by Outlet Control			
Tailwater Depth for Design		d =	1.60 ft
Friction Loss Coefficient over Culvert Length		K_f =	0.74
Sum of All Loss Coefficients		K_s =	1.94
Headwater Depth by Outlet Control		**HW-outlet=**	**1.19 ft**
Design Headwater Depth		**HW=**	**1.83 ft**
Note 01 HW/D Ratio =		**HW/D=**	**0.92**

Note 01: A Hw / D ratio of less than 1.0 may indicate an oversized culvert.

Headwater Depth For Circular Culvert

Project: 10034 Fountain Valley School
Pipe ID: Culvert under roundabout in Basin A-2 (100-year)



Design Information (input)

Design Discharge		**Q =**	**11.9** **cfs**
Pipe Diameter		D =	24.00 inches
Inlet Edge Type (choose from pull-down list)	Inlet Type =	Square End Projection	
Inlet Invert Elevation		I_e =	5751.50 ft
Outlet Invert Elevation		O_e =	5750.00 ft
Pipe Length		L =	150.0 ft
Manning's Roughness n-value		n =	0.013
Bend Loss Coefficient		K_b =	0.00
Exit Loss Coefficient		K_x =	1.00
Tailwater Water Surface Elevation		El. Y_t =	0.00 ft

Calculations (output)

Pipe Cross Sectional Area	A_o =	3.14 sq ft
Culvert Slope	S_o =	0.0100 ft/ft
Normal Flow Depth	Y_n =	1.03 ft
Critical Flow Depth	Y_c =	1.24 ft
Headwater Depth by Inlet Control		
Headwater Depth by Inlet Control	**HW-inlet=**	**1.91** **ft**
Headwater Depth by Outlet Control		
Tailwater Depth for Design	d =	1.62 ft
Friction Loss Coefficient over Culvert Length	K_f =	1.85
Sum of All Loss Coefficients	K_s =	3.05
Headwater Depth by Outlet Control	**HW-outlet=**	**1.02** **ft**
Design Headwater Depth	**HW=**	**1.91** **ft**
Note 01 HW/D Ratio =	**HW/D=**	**0.95**

Note 01: A Hw / D ratio of less than 1.0 may indicate an oversized culvert.

Fountain Valley School
Road Side Ditch Capacity Calculation

Channel Section Structure 1

Trapezoidal Channel Capacity Calculation (Values to be Input)			
Design Flow*	11.9 cfs	Left Channel Side Slope	6:1
Bottom Width	2.0 ft	Right Channel Side Slope	6:1
Depth of Flow	0.49 ft	Channel Longitudinal Slope	5.0 %
Freeboard	0.51 ft	Manning's Roughness Coef.	0.030

Channel Flow Velocity	**5.0 ft/sec**
Channel Flow Capacity	**12.2 cfs**
Swale Depth	1.0 ft
Top Width	14.0 ft
Capacity Check	Okay

Channel Area (not include Freeb)	2.4 sf
Channel Wetted Perimeter	8.0 ft
Hydraulic Radius	0.30 ft

*Q100 = Basin A-2 = 11.9 cfs

Equations:

Area (A) = $b(d)+zd^2$

b = width

d = depth

Perimeter (P) = $b+2d*(1+z^2)^{0.5}$

z = side slope

Hydraulic Radius = A/P

Velocity = $(1.49/n)R_n^{2/3} S^{1/2}$

Slope (S) = Slope of the channel

n = Manning's number

R_n = Hydraulic Radius (Reynold's Number)

Flow = $(1.49/n)AR_n^{2/3} S^{1/2}$

Fountain Valley School
Road Side Ditch Capacity Calculation

Channel Section Structure 2

Trapezoidal Channel Capacity Calculation (Values to be Input)			
Design Flow*	3.4 cfs	Left Channel Side Slope	6:1
Bottom Width	2.0 ft	Right Channel Side Slope	6:1
Depth of Flow	0.32 ft	Channel Longitudinal Slope	2.5 %
Freeboard	0.68 ft	Manning's Roughness Coef.	0.030

Channel Flow Velocity	**2.8 ft/sec**
Channel Flow Capacity	**3.5 cfs**
Swale Depth	1.0 ft
Top Width	14.0 ft
Capacity Check	Okay

Channel Area (not include Freeb)	1.3 sf
Channel Wetted Perimeter	5.9 ft
Hydraulic Radius	0.21 ft

*Q100 = Basin A-6= 3.4 cfs

Equations:

Area (A) = $b(d)+zd^2$
- b = width
- d = depth

Perimeter (P) = $b+2d*(1+z^2)^{0.5}$
- z = side slope

Hydraulic Radius = A/P

Velocity = $(1.49/n)R_n^{2/3} S^{1/2}$
- Slope (S) = Slope of the channel
- n = Manning's number
- R_n = Hydraulic Radius (Reynold's Number)

Flow = $(1.49/n)AR_n^{2/3} S^{1/2}$

Fountain Valley School
Road Side Ditch Capacity Calculation

Channel Section Structure 3

Trapezoidal Channel Capacity Calculation (Values to be Input)			
Design Flow*	152.0 cfs	Left Channel Side Slope	3:1
Bottom Width	4.0 ft	Right Channel Side Slope	3:1
Depth of Flow	1.97 ft	Channel Longitudinal Slope	2.0 %
Freeboard	1.03 ft	Manning's Roughness Coef.	0.030

Channel Flow Velocity	**7.9 ft/sec**
Channel Flow Capacity	**153.7 cfs**
Swale Depth	3.0 ft
Top Width	22.0 ft
Capacity Check	Okay

Channel Area (not include Freeb)	19.5 sf
Channel Wetted Perimeter	16.5 ft
Hydraulic Radius	1.19 ft

*Q100 = DP 5, DP 6 and Basin D-3 = 82.2+42.6+27.2=152.0 cfs

Equations:

Area (A) = $b(d)+zd^2$

b = width

d = depth

Perimeter (P) = $b+2d*(1+z^2)^{0.5}$

z = side slope

Hydraulic Radius = A/P

Velocity = $(1.49/n)R_n^{2/3} S^{1/2}$

Slope (S) = Slope of the channel

n = Manning's number

R_n = Hydraulic Radius (Reynold's Number)

Flow = $(1.49/n)AR_n^{2/3} S^{1/2}$

Fountain Valley School

Channel Lining Calculations

100-year Design Frequency

Design assumes 3:1 side slopes

Permissable Shear Stress for Grassline Netting	2.10 psf

Description	Mannings 'n'	Q	Slope	Bottom Width (B)	d/B Factor	Normal Depth (d/B Ratio)	Depth of Flow	Shear Stress	**Channel Type**
Ditch #2 in Basin A-6	0.030	3.4 cfs	2.5%	2.00 ft	0.068	0.160	0.32 ft	0.50 psf	**Grasslined**
Ditch #1 in Basin A-2	0.030	11.9 cfs	5.0%	2.00 ft	0.169	0.245	0.49 ft	1.53 psf	**Grasslined**
Ditch #3 in Basin D-3	0.030	152.0 cfs	2.0%	4.00 ft	0.537	0.493	1.97 ft	2.46 psf	**Riprap**

Calculation method taken from 'Design of Roadside Channels with Flexible Linings, Hydraulic Engineering Circular No. 15'

D/B Factor = $Qn / (1.486S^{1/2}B^{2.67})$

Q = Runoff Rate, in cubic feet per second (cfs)

n = Manning's roughness coefficient

S = Slope of the Channel

B = Channel Bottom Width (ft)

d/B Ratio = Normal Depth interpolated value from Chart 4.1 (Curves for Computing Normal Depth in Trap. Channels)

Flow Depth (d) = Normal Depth * B

Shear Stress = 62.4 S*D

Fountain Valley School
Riprap Design Calculation

Proposed Hydraulic Structure Location	Description	Design Flow	Channel Flow Velocity	Channel Slope	Riprap Value	Calculated Riprap Type	**Proposed Riprap Type**
Ditch #3	Basin D-3	152.0 cfs	7.9 ft/sec	2.0 %	2.9	VL	**L**

Equations:

Riprap Value = $VS^{0.17}/(S_s-1)^{0.66}$

V = mean channel flow velocity

S = Longitudinal channel slope (ft/ft)

S_s = Specific Gravity of stone (minimum S_s = 2.50)

S_s = 2.64 (most cases)

Riprap Value	Riprap Type	D50
1.4 to 3.2	VL	6 inches
3.3 to 3.9	L	9 inches
4.0 to 4.5	M	12 inches
4.6 to 5.5	H	18 inches
5.6 to 6.4	VH	24 inches

Equations taken from *Section 10.10.2, City of Colorado Springs & El Paso County Drainage Criteria Manual*

DESIGN POINT FLOWS		
	5-YEAR	100-YEAR
1	21.2 cfs	51.3 cfs
2	32.8 cfs	80.2 cfs
3	20.7 cfs	46.5 cfs
4	21.8 cfs	50.6 cfs
5	32.5 cfs	77.5 cfs
6	18.4 cfs	42.3 cfs
7	56.5 cfs	130.9 cfs
8	56.5 cfs	130.8 cfs
9	36.3 cfs	89.1 cfs
10	47.1 cfs	119.3 cfs
11	96.2 cfs	232.3 cfs
12	142.1 cfs	343.0 cfs

LEGEND

R 10.24 ac 7.9 cfs 28.9 cfs	DRAINAGE BASIN DESIGNATION DRAINAGE BASIN AREA 5-YEAR BASIN RUNOFF 100-YEAR BASIN RUNOFF
2.2 cfs 4.3 cfs	5-YEAR EXISTING RUNOFF 100-YEAR EXISTING RUNOFF
1	EXISTING DESIGN POINT
	EXISTING DRAINAGE BASIN BOUNDARY
	FLOW DIRECTION
	TIME OF CONCENTRATION PATH

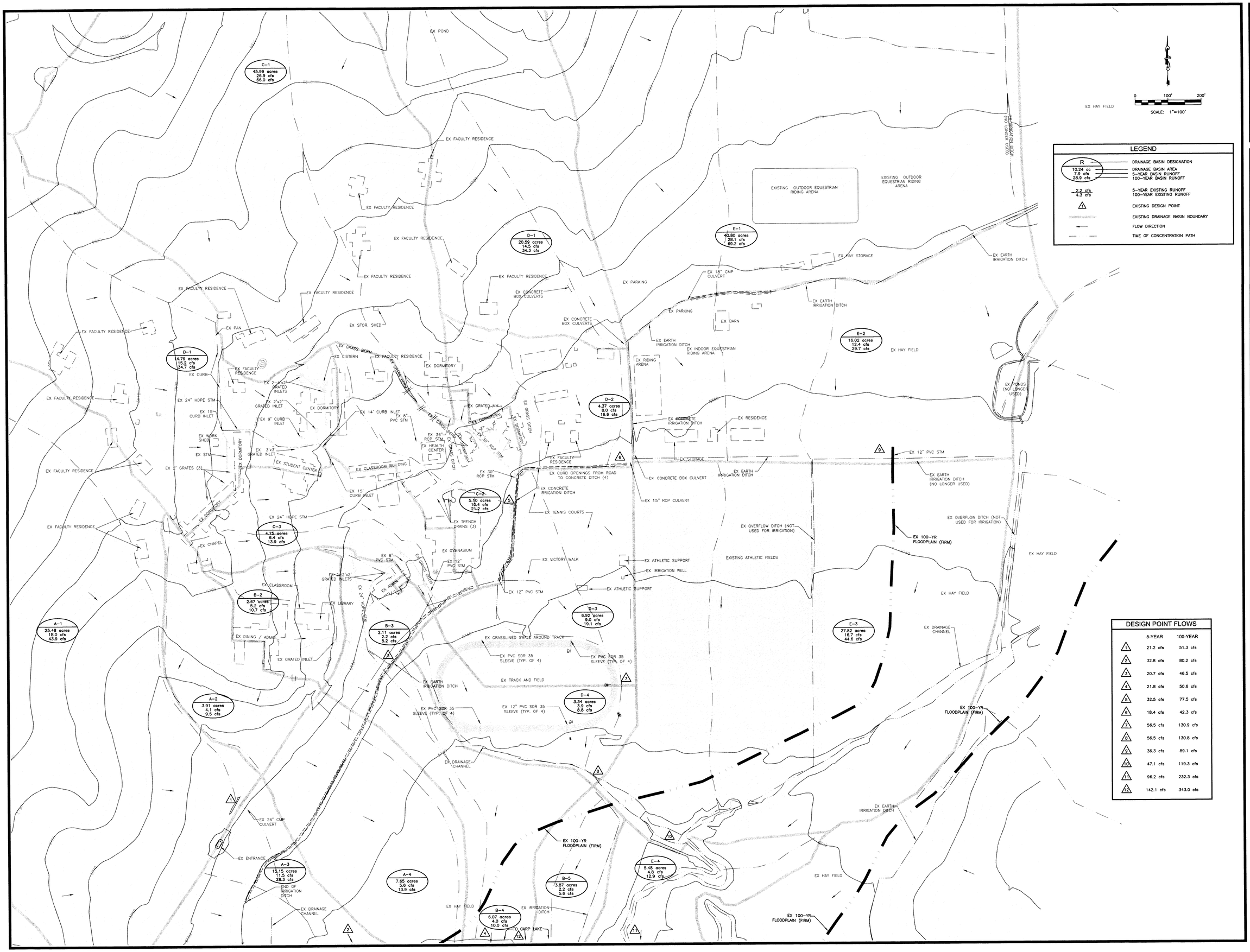
Kiowa
Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

FOUNTAIN VALLEY SCHOOL
MASTER DEVELOPMENT DRAINAGE PLAN
OVERALL DRAINAGE BASIN MAP
EL PASO COUNTY, COLORADO

Project No.:	10034
Date:	April 18, 2011
Design:	JGD
Drawn:	JGD
Check:	AWMc
Revisions:	

SHEET
5
OF 7 SHEETS

10034DP.dwg/Apr 18, 2011



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1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

FOUNTAIN VALLEY SCHOOL
MASTER DEVELOPMENT DRAINAGE PLAN
EXISTING CONDITION
EL PASO COUNTY, COLORADO

Project No.:	10034
Date:	April 18, 2011
Design:	JGD
Drawn:	JGD
Check:	AWMc
Revisions:	

SHEET

FIG 6

OF 7 SHEETS

10034DP.dwg/Apr 18, 2011

FOUNTAIN VALLEY SCHOOL
MASTER DEVELOPMENT DRAINAGE PLAN
PROPOSED CONDITION
EL PASO COUNTY, COLORADO

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Project No.:	10034
Date:	April 18, 2011
Design:	JDD
Drawn:	JDD
Check:	AWM
Revisions:	

SHEET **FIG 7**

OF 7 SHEETS

10034DP-FinalApr18, 2011

LEGEND

- DRAINAGE BASIN DESIGNATION
- DRAINAGE BASIN AREA
- 5-YEAR RUNOFF
- 100-YEAR RUNOFF
- DEVELOPED 5-YEAR RUNOFF
- DEVELOPED 100-YEAR RUNOFF
- DEVELOPED DESIGN POINT
- DEVELOPED DRAINAGE BASIN BOUNDARY
- FLOW DIRECTION
- TIME OF CONCENTRATION PATH
- HYDRAULIC STRUCTURE IDENTIFIER
- HYDRAULIC STRUCTURE IDENTIFIER

DESIGN POINT FLOWS

	5-YEAR	100-YEAR
1	22.6 cfs	53.7 cfs
2	59.8 cfs	138.2 cfs
3	29.5 cfs	64.2 cfs
4	29.0 cfs	63.2 cfs
5	4.7 cfs	9.8 cfs
6	6.2 cfs	14.0 cfs
7	35.2 cfs	82.2 cfs
8	18.6 cfs	42.6 cfs
9	57.8 cfs	131.4 cfs
10	58.0 cfs	131.8 cfs
11	37.0 cfs	90.3 cfs
12	48.0 cfs	120.9 cfs
13	98.6 cfs	235.1 cfs
14	152.7 cfs	361.4 cfs

SCALE: 1"=100'

0 100' 200'

Update to
Master Development Drainage Plan
Fountain Valley School
El Paso County, Colorado

Prepared for:
Fountain Valley School
c/o Next Level Development
118 N. Tejon Street, Suite 205
Colorado Springs, Colorado 80903

Prepared by:

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Kiowa Project No. 12018

June 6, 2012

AL-11-3
PPR-07-030

Page

Table of Contents ii

Engineer's Statement iii

I. General Location and Description 1

II. Previous Reports 1

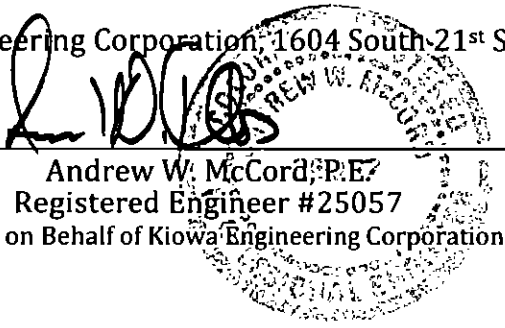
III. Site Drainage 2

IV. Conclusion 2

ENGINEER'S STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City/County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

Kiowa Engineering Corporation, 1604 South 21st Street, Colorado Springs, Colorado 80904



Andrew W. McCord, P.E.
Registered Engineer #25057
For and on Behalf of Kiowa Engineering Corporation

6/6/2012
Date

DEVELOPER'S STATEMENT:

I, the Developer, have read and will comply with all of the requirements specified in this drainage report and plan.

BY: Wayne M. Tijmura

6/6/12
Date

PRINT NAME: WAYNE M. TIJMURA

ADDRESS: Next Level Development
118 N. Tejon Street, Suite 205
Colorado Springs, Colorado 80903

REVIEWED FOR GENERAL
COMPLIANCE WITH
EL PASO COUNTY
ENGINEERING CRITERIA
BY:
DATE: 6/6/12

I. General Location and Description

Fountain Valley School is an existing preparatory school located east of Security in the south central portion of El Paso County, Colorado. The developed portion of the school property is located in the central portion of the property. The campus is currently developed with administrative buildings, a dining hall, a library, a student center, classrooms, dormitories, faculty residences, a health center, a gymnasium, an athletic field and track, tennis courts, maintenance buildings, barns, stables, equestrian arenas, and storage sheds. Numerous driveways and parking areas provide access to the main campus area. Hay fields comprise the area to the east and south of the campus. The remainder of the property to the west and north is undeveloped.

The Fountain Valley School property encompasses approximately 937 acres and is roughly bounded by Grinnell Street to the west, Bradley Road to the north, Goldfield Drive to the east, and Fontaine Boulevard to the south. The campus area of the site is located in Section 18, Township 15 South, Range 66 West of the 6th P.M. A vicinity map showing the location of the site is presented on Figure 1 on the following page.

The Fountain Valley School property has been masterplanned and the Special Use Permit has been updated. This update to the Master Development Drainage Plan (MDDP) is being submitted as a part of the Amended Site Development Plan for the proposed Athletic Facilities Building. The proposed Athletic Facilities Building is a change to previously approved Special Use and Site Development Plan. The proposed Athletic Facilities Building has been relocated within the Fountain Valley School campus. The originally proposed location of the Athletic Facilities Building, which consists on a gymnasium, bouldering area, wellness center, and pool, was located immediately south of the existing Gymnasium. The proposed location of the Athletic Facilities Building is now north of the existing tennis courts and east of the existing dormitories. A portion of the proposed Athletic Facilities Building will encroach upon the existing maintenance buildings. The maintenance facilities has been previously masterplanned to move to the northeast from their existing location.

II. Previous Reports

1) *Master Development Drainage Plan Fountain Valley School,* prepared by Kiowa Engineering Corporation, dated April 18, 2011.

2) *Drainage Letter and Erosion Control Plan for Fountain Valley School Strategic Development Plan*, prepared by URS, dated July 31, 2000.

3) *Drainage Letter and Erosion Control Plan for Fountain Valley School Dormitory Expansion*, prepared by Kiowa Engineering Corp., filed October 29, 1998.

4) *Big Johnson Reservoir/Crews Gulch Drainage Basin Planning Study*, prepared by Kiowa Engineering Corporation, dated June, 1991.

5) *City of Colorado Springs and El Paso County Drainage Criteria Manual*, dated October 1997.

6) *City of Colorado Springs Drainage Criteria Manual Volume 2*, dated November 2002.

7) *El Paso County, Engineering Criteria Manual*, dated January 9, 2006 and revised January 1, 2008.

8) *Soil Survey of El Paso County Area, Colorado*, prepared by United States Department of Agriculture Soil Conservation Service, dated June 1981.

III. Site Drainage

The proposed general drainage patterns and drainage facilities for the site will remain the same as described in the approved MDDP. The MDDP Drainage patterns and facilities are conceptual in nature, and runoff is generally routed to the south utilizing existing drainage facilities, new site-specific facilities, irrigation laterals, and existing fields. The ultimate outfall will be to Carp Lake.

The impervious area is effectively the same between the previously proposed Gymnasium location and the newly proposed Athletic Facilities Building. The new Athletic Facilities Building footprint has an approximately 2,500 square feet smaller footprint than the previously proposed gymnasium expansion. With the proposed ancillary site features, including parking, the change in imperviousness area is negligible.

With the negligible increase in site imperviousness, the volume and rate of runoff will remain essentially as defined in the previously approved MDDP with the new proposed location of the Athletic Facilities.

IV. Conclusion

The site drainage patterns immediately adjacent to the proposed Athletic Facilities Building will change to accommodate the site development, however, the overall drainage patterns, amount, and rate will remain the same as studied in the previously approved Master Development Drainage Plan. The new location of the Athletic Facilities Building, will not affect downstream drainage impact from the Fountain valley School.

FOUNTAIN VALLEY SCHOOL
UPDATED MASTER DEVELOPMENT DRAINAGE PLAN
PROPOSED CONDITION
EL PASO COUNTY, COLORADO

Kiowa Engineering Corporation
1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Project No.:	12018
Date:	June 6, 2012
Design:	AWMc
Drawn:	CAD
Check:	AWMc
Revisions:	

SHEET **MDDP** OF 1 SHEET

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LEGEND

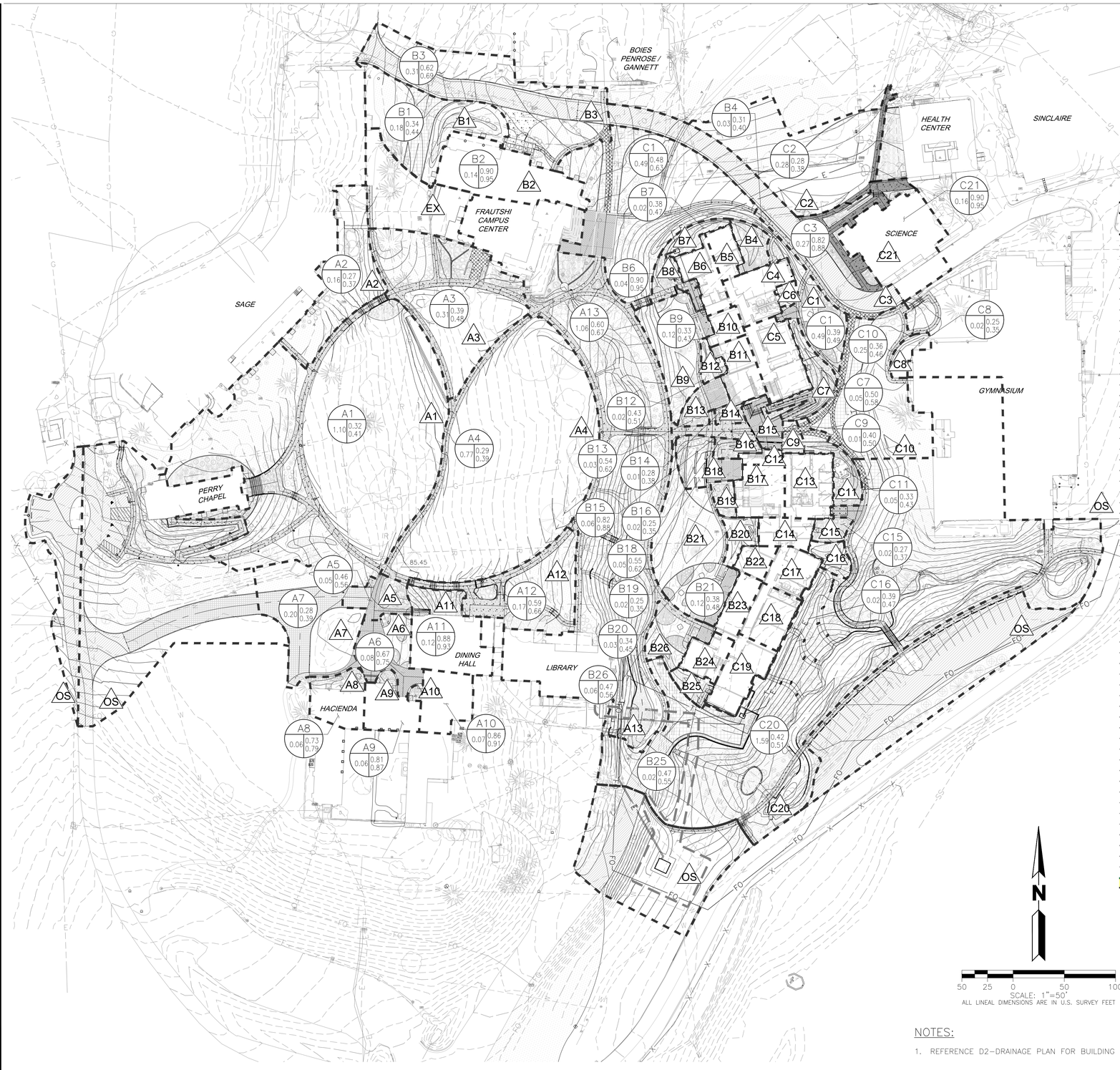
- DRAINAGE BASIN DESIGNATION
- DRAINAGE BASIN AREA
- 5-YEAR BASIN RUNOFF
- 100-YEAR BASIN RUNOFF
- DEVELOPED 5-YEAR RUNOFF
- DEVELOPED 100-YEAR RUNOFF
- DEVELOPED DESIGN POINT
- DEVELOPED DRAINAGE BASIN BOUNDARY
- FLOW DIRECTION
- TIME OF CONCENTRATION PATH
- HYDRAULIC STRUCTURE IDENTIFIER
- HYDRAULIC STRUCTURE IDENTIFIER

DESIGN POINT FLOWS

	5-YEAR	100-YEAR
1	22.6 cfs	53.7 cfs
2	59.8 cfs	138.2 cfs
3	29.5 cfs	64.2 cfs
4	29.0 cfs	63.2 cfs
4a	4.7 cfs	9.8 cfs
4b	6.2. cfs	14.0 cfs
5	35.2 cfs	82.2 cfs
6	18.6 cfs	42.6 cfs
7	57.8 cfs	131.4 cfs
8	58.0 cfs	131.8 cfs
9	37.0 cfs	90.3 cfs
10	48.0 cfs	120.9 cfs
11	98.6 cfs	235.1 cfs
12	152.7 cfs	361.4 cfs

0 100' 200'
SCALE: 1"=100'

APPENDIX E



LEGEND

BASIN BOUNDARY

SUB-BASIN BOUNDARY

DIRECTION OF FLOW

DESIGN POINT 1

BASIN: B (1.25, .88, .94) C10 C100

AREA IN ACRES

RUNOFF SUMMARY

BASIN	DESIGN POINT	AREA (ACRES)	% IMP.	C_{II}	C_{III}	Q_{II} (CFS)	Q_{III} (CFS)
A1	A1	1.10	10.3%	0.32	0.41	1.27	2.30
A2	A2	0.16	3.4%	0.27	0.37	0.18	0.43
A3	A3	0.31	21.5%	0.33	0.48	0.56	1.22
A4	A4	0.77	6.1%	0.29	0.39	0.75	1.76
A5	A5	0.05	43.4%	0.46	0.56	0.11	0.24
A6	A6	0.08	73.2%	0.67	0.75	0.27	0.53
A7	A7	0.20	19.2%	0.28	0.39	0.25	0.63
A8	A8	0.06	66.1%	0.73	0.79	0.23	0.44
A9	A9	0.06	78.2%	0.81	0.87	0.24	0.45
A10	A10	0.07	84.3%	0.86	0.91	0.30	0.57
A11	A11	0.12	87.3%	0.88	0.93	0.57	1.07
A12	A12	0.17	51.8%	0.59	0.66	0.43	0.97
A13	A13	1.06	50.8%	0.60	0.67	3.28	6.48
B1	B1	0.18	22.2%	0.34	0.44	0.28	0.65
B2	B2	0.14	90.0%	0.90	0.95	0.68	1.27
B3	B3	0.31	57.5%	0.62	0.69	1.00	1.96
B4	B4	0.03	8.3%	0.31	0.40	0.05	0.11
B5	B5	0.03	90.0%	0.90	0.95	0.13	0.25
B6	B6	0.04	90.0%	0.90	0.95	0.21	0.39
B7	B7	0.02	19.6%	0.38	0.47	0.05	0.11
B8	B8	0.03	45.8%	0.55	0.63	0.08	0.16
B9	B9	0.12	17.7%	0.33	0.43	0.21	0.48
B10	B10	0.02	90.0%	0.90	0.95	0.10	0.19
B11	B11	0.05	90.0%	0.90	0.95	0.23	0.44
B12	B12	0.02	26.3%	0.43	0.51	0.04	0.07
B13	B13	0.03	45.2%	0.54	0.62	0.09	0.18
B14	B14	0.01	5.1%	0.28	0.38	0.01	0.03
B15	B15	0.06	88.2%	0.82	0.88	0.27	0.50
B16	B16	0.02	0.0%	0.25	0.35	0.02	0.06
B17	B17	0.05	90.0%	0.90	0.95	0.25	0.48
B18	B18	0.05	45.8%	0.55	0.62	0.15	0.31
B19	B19	0.02	0.0%	0.25	0.35	0.02	0.05
B20	B20	0.03	22.3%	0.34	0.45	0.05	0.11
B21	B21	0.12	27.5%	0.38	0.48	0.23	0.52
B22	B22	0.02	90.0%	0.90	0.95	0.11	0.20
B23	B23	0.04	90.0%	0.90	0.95	0.17	0.31
B24	B24	0.04	90.0%	0.90	0.95	0.17	0.31
B25	B25	0.02	33.1%	0.47	0.55	0.05	0.10
B26	B26	0.06	38.6%	0.47	0.56	0.13	0.27
C1	C1	0.49	25.8%	0.33	0.43	0.36	2.10
C2	C2	0.28	5.3%	0.28	0.38	0.33	0.77
C3	C3	0.27	87.7%	0.82	0.88	1.17	2.21
C4	C4	0.06	90.0%	0.90	0.95	0.23	0.54
C5	C5	0.08	90.0%	0.90	0.95	0.36	0.67
C6	C6	0.01	4.8%	0.28	0.38	0.01	0.03
C7	C7	0.05	38.3%	0.50	0.58	0.14	0.29
C8	C8	0.02	0.0%	0.25	0.35	0.03	0.07
C9	C9	0.01	36.8%	0.40	0.50	0.03	0.06
C10	C10	0.25	25.3%	0.36	0.46	0.40	0.90
C11	C11	0.05	20.3%	0.33	0.43	0.08	0.16
C12	C12	0.01	90.0%	0.90	0.95	0.06	0.11
C13	C13	0.07	90.0%	0.90	0.95	0.33	0.61
C14	C14	0.03	90.0%	0.90	0.95	0.17	0.31
C15	C15	0.02	2.5%	0.27	0.37	0.03	0.06
C16	C16	0.02	19.7%	0.33	0.47	0.05	0.10
C17	C17	0.04	90.0%	0.90	0.95	0.21	0.38
C18	C18	0.05	90.0%	0.90	0.95	0.25	0.47
C19	C19	0.06	90.0%	0.90	0.95	0.08	0.20
C20	C20	1.59	25.3%	0.42	0.51	2.35	5.01
C21	C21	0.16	32.3%	0.30	0.95	0.75	1.40
SITE COMPOSITE		**9.39**	**36.82**	**0.24**	**0.40**	**21.37**	**43.67**

N

50 25 0 50 100

SCALE: 1"=50'

ALL LINEAL DIMENSIONS ARE IN U.S. SURVEY FEET

BASIS OF BEARING:

BEARINGS ARE BASED ON THE COLORADO STATE PLANE CENTRAL ZONE NAD83 BEARING OF N89°11'31"E ALONG THE NORTHERLY LINE OF THE NORTHWEST QUARTER OF SECTION 5, T15S, R65W OF THE 6TH P.M. BEING MONUMENTED BY A FOUND 3-¼" ALUMINUM CAP AT THE NORTHWEST CORNER AND A FOUND 3-¼" ALUMINUM CAP PLS 17502 AT THE NORTH QUARTER CORNER.

BENCHMARK

ELEVATIONS ARE BASED NGS POINT HOWELLS, A NGS BRASS DISK SET IN CONCRETE ON THE SOUTH SIDE OF POWERS ROAD APPROXIMATELY 950 WEST OF THE INTERSECTION WITH PEAK INNOVATION PARKWAY

ELEVATION = 5934.60 (NAVD1988) DATUM.

NOTES:

1. REFERENCE D2-DRAINAGE PLAN FOR BUILDING BASIN BREAKDOWN

MARTIN/MARTIN CONSULTING ENGINEERS
12499 West Colfax Avenue Lakewood, Colorado 80215
303.431.6100 martinmartin.com

NOT FOR CONSTRUCTION

FOUNTAIN VALLEY SCHOOL ACADEMIC CENTER

DRAINAGE PLAN

No.	Issue / Revision	Date	Name
1	1ST ENGINEERING SUBMITTAL	03/13/26	NLK

Job Number 23.0895
Project Manager N.KONTOUR
Design By A.GUEVARA
Drawn By J.DIAZ
Principal In Charge P.BUCKLEY

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Sheet Number:

D1

1 of 2

PLOT DATE: Monday, March 16, 2026 4:44 PM LAST SAVED BY: MMOLINA
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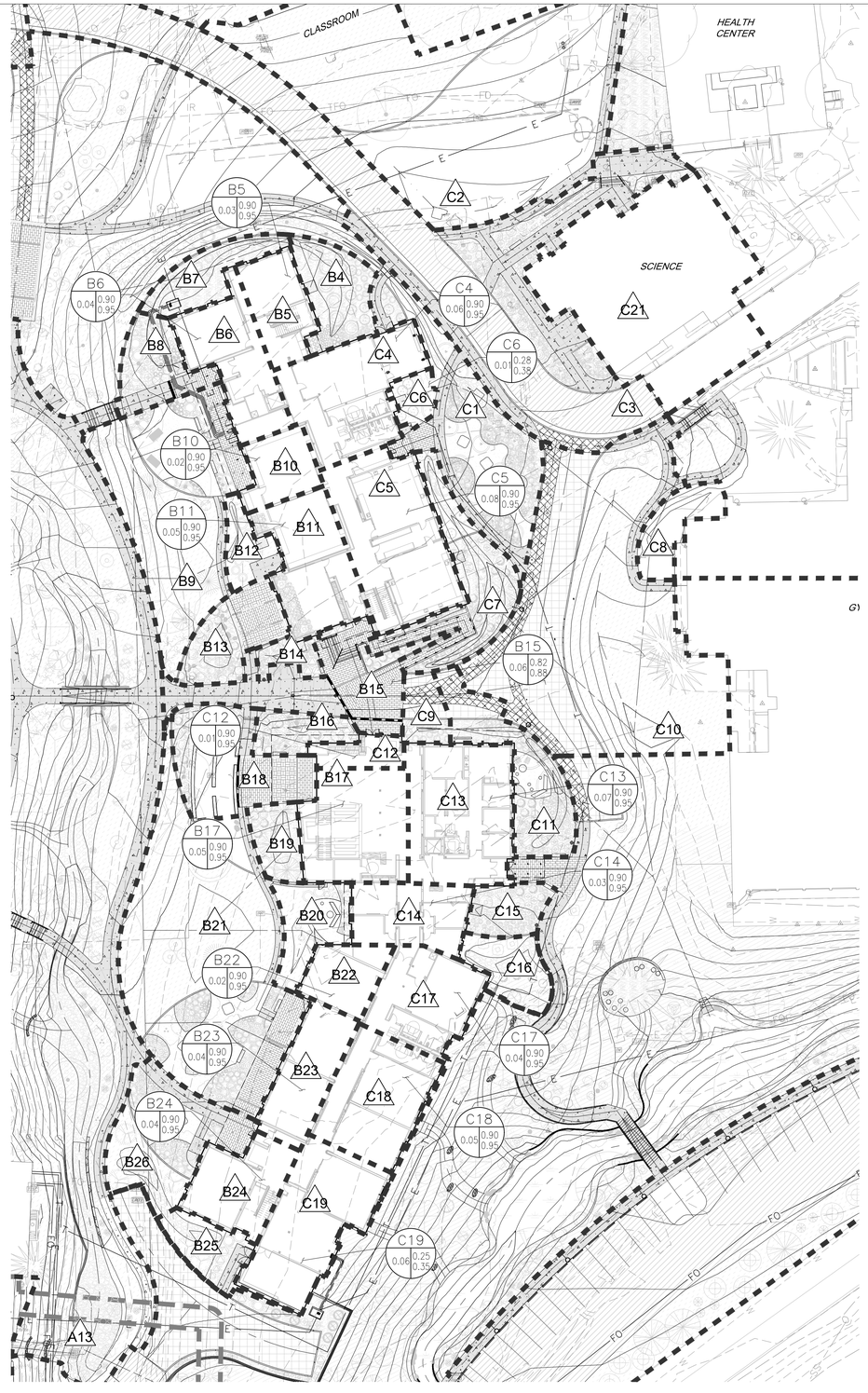

RUNOFF SUMMARY

BASIN	DESIGN POINT	AREA (ACRES)	% IMP.	C_{II}	C_{III}	Q_{II} (CFS)	Q_{III} (CFS)
A1	A1	1.10	10.3%	0.32	0.41	1.27	2.90
A2	A2	0.16	3.4%	0.27	0.37	0.18	0.43
A3	A3	0.31	21.5%	0.33	0.48	0.56	1.22
A4	A4	0.77	6.1%	0.29	0.39	0.75	1.76
A5	A5	0.05	43.4%	0.46	0.56	0.11	0.24
A6	A6	0.08	73.2%	0.67	0.75	0.27	0.53
A7	A7	0.20	19.2%	0.28	0.39	0.25	0.63
A8	A8	0.06	66.1%	0.73	0.79	0.23	0.44
A9	A9	0.06	78.2%	0.81	0.87	0.24	0.45
A10	A10	0.07	84.3%	0.86	0.91	0.30	0.57
A11	A11	0.12	87.3%	0.88	0.93	0.57	1.07
A12	A12	0.17	51.8%	0.53	0.66	0.49	0.97
A13	A13	1.06	50.8%	0.60	0.67	3.28	6.48
B1	B1	0.18	22.2%	0.34	0.44	0.28	0.65
B2	B2	0.14	90.0%	0.90	0.95	0.66	1.27
B3	B3	0.31	57.5%	0.62	0.69	1.00	1.96
B4	B4	0.03	8.3%	0.31	0.40	0.05	0.11
B5	B5	0.03	90.0%	0.90	0.95	0.13	0.25
B6	B6	0.04	90.0%	0.90	0.95	0.21	0.39
B7	B7	0.02	13.6%	0.38	0.47	0.05	0.11
B8	B8	0.03	45.8%	0.55	0.63	0.08	0.16
B9	B9	0.12	17.7%	0.33	0.43	0.21	0.46
B10	B10	0.02	90.0%	0.90	0.95	0.10	0.19
B11	B11	0.05	90.0%	0.90	0.95	0.23	0.44
B12	B12	0.02	26.9%	0.43	0.51	0.04	0.07
B13	B13	0.03	45.2%	0.54	0.62	0.03	0.16
B14	B14	0.01	5.1%	0.28	0.38	0.01	0.03
B15	B15	0.06	68.2%	0.82	0.88	0.27	0.50
B16	B16	0.02	0.0%	0.25	0.35	0.02	0.06
B17	B17	0.05	90.0%	0.90	0.95	0.26	0.48
B18	B18	0.05	45.8%	0.55	0.62	0.15	0.31
B19	B19	0.02	0.0%	0.25	0.35	0.02	0.05
B20	B20	0.03	22.3%	0.34	0.45	0.05	0.11
B21	B21	0.12	27.5%	0.38	0.48	0.23	0.52
B22	B22	0.02	90.0%	0.90	0.95	0.11	0.20
B23	B23	0.04	90.0%	0.90	0.95	0.17	0.31
B24	B24	0.04	90.0%	0.90	0.95	0.17	0.31
B25	B25	0.02	33.1%	0.47	0.55	0.05	0.10
B26	B26	0.06	38.6%	0.47	0.56	0.13	0.27
C1	C1	0.43	25.8%	0.39	0.49	0.96	2.10
C2	C2	0.28	5.3%	0.28	0.38	0.33	0.77
C3	C3	0.27	87.7%	0.82	0.88	1.17	2.21
C4	C4	0.06	90.0%	0.90	0.95	0.29	0.54
C5	C5	0.08	90.0%	0.90	0.95	0.36	0.67
C6	C6	0.01	4.8%	0.28	0.38	0.01	0.03
C7	C7	0.05	38.3%	0.50	0.58	0.14	0.23
C8	C8	0.02	0.0%	0.25	0.35	0.03	0.07
C9	C9	0.01	36.8%	0.40	0.50	0.03	0.06
C10	C10	0.25	25.3%	0.36	0.46	0.40	0.90
C11	C11	0.05	20.3%	0.33	0.43	0.08	0.18
C12	C12	0.01	90.0%	0.90	0.95	0.06	0.11
C13	C13	0.07	90.0%	0.90	0.95	0.33	0.61
C14	C14	0.03	90.0%	0.90	0.95	0.17	0.31
C15	C15	0.02	2.5%	0.27	0.37	0.03	0.06
C16	C16	0.02	19.7%	0.33	0.47	0.05	0.10
C17	C17	0.04	90.0%	0.90	0.95	0.21	0.38
C18	C18	0.05	90.0%	0.90	0.95	0.25	0.47
C19	C19	0.06	90.0%	0.25	0.35	0.08	0.20
C20	C20	1.53	25.3%	0.42	0.51	2.35	5.01
C21	C21	0.16	32.3%	0.90	0.95	0.75	1.40
SITE COMPOSITE		**9.39**	**36.8%**	**0.24**	**0.40**	**21.37**	**43.67**

NOTES:

1. REFERENCE D1–DRAINAGE PLAN FOR SITE BASIN BREAKDOWN.

LEGEND

BASIN BOUNDARY

SUB-BASIN BOUNDARY

DIRECTION OF FLOW

DESIGN POINT 1

BASIN B | C10 | C100 | AREA IN ACRES 1.25 | 68 | 93

N

30 15 0 30 60

SCALE: 1"=30'

ALL LINEAL DIMENSIONS ARE IN U.S. SURVEY FEET

BASIS OF BEARING:

BEARINGS ARE BASED ON THE COLORADO STATE PLANE CENTRAL ZONE NAD83 BEARING OF N89°11'31"E ALONG THE NORTHERLY LINE OF THE NORTHWEST QUARTER OF SECTION 5, T15S, R65W OF THE 6TH P.M. BEING MONUMENTED BY A FOUND 3-¼" ALUMINUM CAP AT THE NORTHWEST CORNER AND A FOUND 3-¼" ALUMINUM CAP PLS 17502 AT THE NORTH QUARTER CORNER.

BENCHMARK

ELEVATIONS ARE BASED NGS POINT HOWELLS, A NGS BRASS DISK SET IN CONCRETE ON THE SOUTH SIDE OF POWERS ROAD APPROXIMATELY 950 WEST OF THE INTERSECTION WITH PEAK INNOVATION PARKWAY

ELEVATION = 5934.60 (NAVD1988) DATUM.

MARTIN/MARTIN CONSULTING ENGINEERS
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303.431.6100 martinmartin.com

NOT FOR CONSTRUCTION

FOUNTAIN VALLEY SCHOOL ACADEMIC CENTER

DRAINAGE PLAN

No.	Issue / Revision	Date
1	1ST ENGINEERING SUBMITTAL	03/13/26

Job Number	23.0895
Project Manager	N.KONTOUR
Design By	A.QUEVARA
Drawn By	J.DIAZ
Principal In Charge	P.BUCKLEY
Name	NLK
Date	03/13/26

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Sheet Number:

D2

2 of 2

PLOT DATE: Monday, March 16, 2026 4:46 PM LAST SAVED BY: MMOLINA
DRAWING LOCATION: G:\BUCKLEY\23.0895-Fountain Valley School Academic Building\PLANS\EXHIBITS\Drainage Plans\D2 - DRAINAGE PLAN-ROOF PLAN.dwg

PROPOSED DRAINAGE BASIN

EXISTING DRAINAGE BASIN

FUTURE FACULTY HOUSING
EX FACULTY RESIDENCE
EX PAN
EX STOR. SHED
EX CISTERN
EX DORMITORY
EX CURB
EX 24" HDPE STM
EX 15" CURB INLET
EX 2'x2' GRATED INLETS
EX 2'x2' GRATED INLET
EX 8" CURB INLET
EX WORK SHED
EX STM
EX 2' GRATES (3)
EX 14' CURB INLET
EX 8" PVC STM
FUTURE CLASSROOM BLDG.
CLASSROOM
BANES PENROSE EXNETT
WELLNESS CENTER
SINCLAIRE
EX 36" RCP STM
EX 30" RCP STM
EX STUDENT CENTER
FRAUTSCHI CAMPUS CENTER
EX CONCRETE IRRIGATION DITCH TO REMAIN
EX TRENCH DRAINS (3)
GYMNASIUM
EX GYMNASIUM
EX 12" PVC STM
EX VICTORY WALK
RIPRAP-LINED CHANNEL
FUTURE PERFORMING ARTS FACILITIES AND ASSOCIATED PARKING
CHAPEL
DINING HALL
LIBRARY
ADMIN
EX GRATED INLET
FUTURE PARKING
ROADSIDE DITCH
FUTURE GARDEN AMPHITHEATER
FUTURE ACADEMIC / MIDDLE SCHOOL CLASSROOM EXPANSION
24" CULVERT
EX. IRRIGATION DITCH TO REMAIN
42" CULVERT
EX 24" CMP CULVERT
EX ENTRANCE
END OF IRRIGATION DITCH
EX DRAINAGE CHANNEL
FUTURE ROUND-ABOUT & ROADS TO ACCESS FUTURE ATHLETIC FACILITIES & CLASSROOMS
EX. IRRIGATION DITCH TO REMAIN
CURB OPENING
TYPE C CDoT GRATED INLET
36" STORM
GRASSLINED SWALE
EX DRAINAGE CHANNEL
ROADSIDE DITCH
FUTURE PARKING
15" CULVERT
24" CULVERT
EX 100-YR FLOODPLAIN (FIRM)
EX HAY FIELD
EX IRRIGATION DITCH
EX GRASSLINED SWALE AROUND TRACK
EX PVC SDR 35 SLEEVE (TYP. OF 4)
EX TRACK AND FIELD
EX EARTH IRRIGATION DITCH
EX 12" PVC SDR 35 SLEEVE (TYP. OF 4)
RIPRAP-LINED CHANNEL
CDoT TYPE C GRATED INLET STORM
PROVIDE STRUCTURE AT END OF CONCRETE DITCH TO DIRECT OVERFLOW TO EAST INT. PROPOSED RIPRAP CHANNEL
EX CONCRETE BOX CULVERTS
EX PARKING
EX BARN
EX EARTH IRRIGATION DITCH
EX INDOOR EQUESTRIAN RIDING ARENA
EX RIDING ARENA
EX CONCRETE IRRIGATION DITCH
EX RESIDENCE
EX STORAGE
EX CURB OPENINGS FROM ROAD TO CONCRETE DITCH (4)
EX CONCRETE BOX CULVERT
EX CONCRETE IRRIGATION DITCH
EX 15" RCP CULVERT
EX TENNIS COURTS
EX. EARTH IRRIGATION DITCH TO REMAIN PRIOR TO NEW GYM CONSTRUCTION. 24-INCH STORM TO BE EXTENDED AROUND NEW GYM AND CONNECT TO EX. CONCRETE DITCH WITH NEW GYM CONSTRUCTION.
FUTURE PARKING
ALTERNATIVE: PIPE RUNOFF WITH 42-INCH STORM
EX ATHLETIC SUPPORT
EX IRRIGATION WELL
EX OVERFLOW USED FOR
EXISTING ATHLETIC FI
EX ATHLETIC SUPPORT
CDoT TYPE D GRATED INLET
36" CULVERT
FUTURE GYM / FITNESS
EX 12" PVC STM
FUTURE PARKING
ALTERNATIVE: PIPE RUNOFF WITH 42-INCH STORM
EX TRACK AND FIELD
FUTURE DORMITORIES
EX GRATED MH
EX DORMITORY
EX GRASS DITCH
EX FACULTY RESIDENCE
FUTURE PARKING
CHANNEL
RIPRAP-LINED
EX 12" PVC SDR 35 SLEEVE (TYP. OF 4)
EX 12" PVC SDR 35 SLEEVE (TYP. OF 4)
EX FACULTY RESIDENCE
EX CONCRETE BOX CULVERTS
EX PARKING
EX CONCRETE BOX CULVERTS
EX FACULTY RESIDENCE
EX FACULTY RESIDENCE
EX FACULTY RESIDENCE