Master Development Drainage Plan
And
Final Drainage Report

For:

Atlas Preparatory Charter School Filing No 1B

A replat of Lot 2, Atlas Preparatory Charter School Filing No, 1A

December 10, 2019

ATLAS
PREPARATORY SCHOOL

Prepared for

Atlas Preparatory Charter School
1602 S. Murray Boulevard
Colorado Springs, CO 80906
719-579-2000

Prepared By:

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December 10, 2019

Water Resources Engineering (Stormwater)
City of Colorado Springs
30 S. Nevada Ave, Suite 401
Colorado Springs, CO 80903

RE: Atlas Preparatory Charter School Filing 1B
Master Development Drainage Plan and Final Drainage Report

The Atlas Preparatory Academy site is located at 1515 Pulsar Dr. on a 25.4 acre lot. The proposed building footprint is approximately 39,000 square feet. The Master Development Drainage Plan and Final Drainage Report was prepared in conformance with the City of Colorado Springs Drainage Criteria Manual, Volumes 1 & 2 (2014).

Should you have any additional questions or need additional information please let me know.

Sincerely,

WALLACE ENGINEERING • STRUCTURAL CONSULTANTS, INC.

Civil Engineering Services

Danny Baldwin, P.E.
Associate

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Signature Page

Atlas Preparatory Charter School, Filing No. 1B

Engineer's Statement
This report and plan for the drainage design of Atlas Preparatory Charter School, Filing No. 1B was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the City of Colorado Springs Drainage Criteria Manual and is in conformity with the master plan for the drainage basin. I understand that the City of Colorado Springs does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

SIGNATURE (Affix Seal): 0049845 2019.12.10
Colorado P.E. No. Date

Scott M. Rodehaver
0049845
12/10/2019

Developer's Statement
Atlas Preparatory Charter School hereby certifies that the drainage facilities for Atlas Preparatory Charter School, Filing No. 1B shall be constructed according to the design presented in this report. I understand that the City of Colorado Springs does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that are submitted to the City of Colorado Springs pursuant to section 7.7.906 of the City Code; and cannot, on behalf of Atlas Preparatory Charter School, Filing No. 1B, guarantee that final drainage design review will absolve Atlas Preparatory Charter School and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the final plat does not imply approval of my engineer's drainage design.

Atlas Preparatory Charter School
Name of Developer

2019.12.10
Authorized Signature Date

Brittney Stroh
Printed Name

Executive Director
Title

1602 S. Murray Boulevard, Colorado Springs, CO 80916
Address

City of Colorado Springs Statement:
Filed in accordance with Section 7.7.906 of the Code of the City of Colorado Springs, 2001, as amended.

Jonathan B. Scherer 01/07/2020
For City Engineer Date

Conditions:

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I. Purpose

The purpose of this MDDP/ FDR report is to identify the existing and proposed onsite runoff patterns and facilities associated with the development of Atlas Preparatory Charter School Filing No. 1B in Colorado Springs, Colorado, and to safely route developed storm water to adequate outfalls. The Proposed school site is approximately 25.4 acres. The proposed School is located at the corner of Academy Park Loop and Pulsar Drive and to the southwest of the existing middle school and south of the existing high school. The site is located within the Sand Creek Drainage Basin.

II. General Location and Description

The Atlas Preparatory Elementary School is part of subdivision Atlas Preparatory Charter School Filing No 1B and is located in the south east portion of the City of Colorado Springs, El Paso County, Colorado (see Vicinity Map- Appendix A). The overall property is 25.4 acres, and in the north west section of 26 in the 14S 66W township. The property will be replatted into two separate properties with the Atlas Elementary School development being constructed on the western property, and the eastern portion, adjacent to S. Murray Blvd will remain undeveloped at this time. See Appendix H for the site drainage maps that display how the overall property will be divided. The Atlas Elementary School will contain a new school building, track, and associated parking lot, and sidewalks. There will be a full spectrum extended detention basin on the south side of the site. The site is bordered on the northwest and southwest by Academy Park Loop and Pulsar Drive. There is an existing Colorado Springs Police Station, Lot 1 Blk 1 Gateway Sub Fil No 25, and Atlas Middle School, Lot 1 Atlas Preparatory Charter School Fil No 1B, to the northeast and north of the site. An existing 30' gas easement runs through the center of the proposed site. Most of the site is covered with bare soil and some scattered trees. The project includes the addition of a gym, elementary school and playground, along with a parking lot and associated sidewalks to the north end of the site. There will be two lots platted on the existing property. There are Public lines for gas, water, sanitary and electric utilities in the right of way surrounding the site. The site is not located in the Streamside Zone.

III. Soils

According to the El Paso County area soil survey, prepared by the US Department of Agriculture and Soil Conservation Service, the soil on the west side of the site is Bresser sandy loam (soil 13) with 5-9% slopes, well drained, and Hydrologic Soil Group B. The East side of the site is Ellicott loamy coarse sand (soil 28), with 0-5% slopes, excessive drainage, and Hydrologic Soil Group A. Hydrologic Soil Group A&B was used for drainage calculations in this report which are the soils found on the site by NCRS soils report found in Appendix B.

IV. Floodplain statement

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) #08041C0734G, dated December 7, 2018, no portion of the Atlas Preparatory Charter

School Filing No. 1B lies within a designated 100-yr floodplain. A copy of the FEMA Floodplain map is included in Appendix C.

V. Drainage Criteria

The current City of Colorado Springs Drainage Criteria Manual (DCM 1) Volume 1 and 2 were utilized in this report for hydrologic and hydraulic criteria. Peak runoff quantities were determined using the rational method for the 2, 5, 10, and 100-year storms, as required for drainage basins less than 100 acres. The Urban Drainage & Flood Control District (UDFCD) spreadsheets were used to determine the size of the proposed private full spectrum extended detention basin. CivilStorm software was used to calculate the hydraulic grade line for the site. CivilStorm uses the 100-year runoff rates found using the UDFCD Spreadsheets to calculates the required pipe, inlet, and other storm drain facilities required to property treat this site. Appendix E shows the similar results produced by both CivilStorm and UD-Sewer for flows from structure 4 to structure 3. CDOT standard details were used on this site for sidewalks, and end sections along the right of way. The standard method was used to calculate the hydraulic grade line in CivilStorm.

VI. Existing Drainage Basin Descriptions

The existing site is located in the Sand Creek drainage basin. Existing drainage flows generally from the north of the site towards the south. A large portion of the Police Station to the north drains onto the site, approximately 2.4 acres, where it flows through the site. The site contains natural soil and scattered natural trees and bushes. The existing site flows from north to south at 1.3%. Peak- existing runoff for the basins is depicted on the Existing Drainage Plan provided in appendix H, and the calculations for the peak existing runoff are reported in appendix D. The site is located in the Sand Creek Drainage Basin, and part of the Sand Creek Drainage Basin Planning Study Preliminary Design Report.

Subbasin XB1 consists of 18.96 acres. The south end of the existing site has natural grasses, and some trees scattered throughout. The north end contains a developed Police Station and associated parking lots that drain to the site. Runoff rate for this subbasin is 11.26 cfs for the 5-year storm and 30.95 cfs for the 100-year storm. The flow is initial overland flow for the first 100 ft, then channelizes for the rest of the site. This flows towards and existing 10-ft public concrete type-R curb inlet storm inlet XDP-1 south of the site along Pulsar Dr to a 48” public RCP storm drain.

Subbasin XB2 is 2.26 acres, and is located west of the existing school parking lot. It currently contains turf for the football field, and sheet flows south to the private area inlet with 18” RCP pipe at XDP-2, with a flow rate of 0.17 cfs for the 5- year storm and 4.44 cfs for the 100- year storm which drain into a private 18” RCP pipe to the existing Elementary School.

Subbasin XB3 is 8.86 acres and located to the east of the proposed developed portion of the site. It will be subdivided into a separate parcel, and will not have any drainage improvements during this phase of this project. There is currently natural grasses and trees on this portion of the site, and drains from the northwest to the southeast and into the public right of way. It has a mix of overland and sheet flows towards a 10' public concrete curb inlet with 48" RCP pipe draining to the east, (XDP-3) at the southwest corner of the subbasin. It flows into the right of way. The flow area has a 5 yr flow of 1.78 cfs, and a 100-year flow of 13.10 cfs.

VII. Proposed Drainage Basin

The developed site will include curb inlets, area inlets and storm sewer. The site will still generally run from north to south. The entire site will be collected at the private proposed full spectrum extended detention basin on the south end of the site. The full spectrum extended detention basin will then discharge to the 48" public RCP pipe along Pulsar Dr. at existing inlet XDP-1 which is also proposed outfall point XDP-19. A brief description of each drainage subbasin on the site is included in this section, a plan sheet depicting each proposed basin and the proposed conditions is included in Appendix H, and the calculation for the runoff for each basin is included in Appendix D. The hydraulic grade lines, and the capacity for each proposed structure, in each basin were calculated with the software CivilStorm, and are included in Appendix E.

The proposed outfall points for this site drain to public inlets in the right of way. All of these inlets have acceptable capacity for the proposed site development.

Subbasin PB1 is a 0.32-acre basin to the west of the proposed building with a runoff rate of 0.13 cfs for the 5-year storm and 0.74 cfs for the 100-year storm. These flow to a 24" diameter private HDPE area sump inlet, with 15" HDPE private storm line at XDP-1 in the center of the basin, that drains to the proposed detention basin. It has a mix of concentrated and sheet flow. The subbasin contains landscaping area, and some sidewalks in the northwest of the property. Emergency overflow routing will flow to the right of way in case of blockage at the inlet. Flow from Subbasin PB 7, 6 and 2 are also flowing though the proposed storm system to this inlet, which has a capacity of 5.35 cfs. The hydraulic grade line at this inlet is 5980.6 ft with a top of grate elevation of 5983.10 ft. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB2 is 0.55 acres and located to the north of the proposed building. This basin has an intercepted flow rate of 0.62 cfs for the 5- year storm and 1.97 for the 100 year storm and flows to a 18" diameter private HDPE sump area inlet, and 15" private HDPE storm line in the center of the basin at design point XDP-2. There is no bypass flow for this basin. The area has a combination of sheet flow and concentrated flow. There is a mix of playground area, sidewalk and grass in this basin. Emergency overflow routing will flow to PB1. Flow from Subbasin PB 7 and 6 are also flowing through the proposed storm system to this inlet which has a capacity of 5.35 cfs. The 100-year hydraulic grade line for this basin is 5982.08 ft with top of grate elevation of 5983.3 ft. After flowing to the inlet, flow is routed through the proposed storm system to the proposed full spectrum extended detention basin.

Subbasin PB3 is located to the north of the proposed building and contains portions of the bus lane, and sidewalks. The basin flows towards a 8’ sump private curb inlet type R, and 12” private HDPE storm line in the center of the basin at design point XDP-3 where it is routed through the proposed storm system to the proposed full spectrum extended detention basin after entering the inlet. There is a combination of overland and concentrated flow in this basin. This basin is 0.24 acres with an intercepted flow rate of 0.82 cfs for the 5- year storm and 2.29 cfs for the 100-year storm. Emergency overflow routing will flow to PB2. There will be a capacity of 4.03 cfs. The 100-yr hydraulic grade line for this basin is 5982.42 ft, minimum 1-ft below the final grade along the system, with a top of grate elevation of 5984.75 ft. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB4 contains 2.43 acres and an intercepted flow rate of 6.42 cfs for the 5- year storm and 13.56 cfs for the 100-year storm, with no by-pass flow. This basin is located to the north of the proposed building and contains the existing Police Station, and some of the proposed bus lane. There is a mix of overland and concentrated flow toward a proposed 18” round private CDOT concrete end section culvert at design point XDP-4 which allows water to drain under the proposed bus lane through an 18” HDPE private storm line with a flowline of 5987.00. Emergency overflow routing will flow to PB3 by flowing along the proposed bus lane in case of a blocked inlet. There is a capacity of 14.06 cfs and 100-yr hydraulic grade line of 5986.43 ft with a flowline elevation of 5985.62 ft. at structure #2 (18” round CDOT private concrete end section). After flowing through the culvert, the flow is routed to the curb inlet at XDP-19.

Subbasin PB5 is located to the west of the proposed building, contains grass area and a sidewalk. The area is 0.26 acres and has an intercepted flow rate of 0.15 cfs for the 5-year storm and 0.70 cfs for the 100-year storm. It flows toward a sump 24” diameter private HDPE area inlet, and 18” private HDPE storm line in the basin at design point XDP-5. It has a combination of overland and concentrated flow. Emergency overflow routing will flow to PB12 to the south. There is flow in this inlet from Subbasin PB 7, 2, 6, and 1 through the storm pipes. The pipe in this basin has a capacity of 5.76 cfs. The 100-yr hydraulic grade line is 5979.75 ft, and more than a foot below the final grade, with a top of grate elevation of 5983.50 ft. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB6 contains a portion of the roof on the north side of the building. The subbasin area is 0.12 acres and has an intercepted flow rate of 0.44 cfs for the 5- year storm and 0.82 cfs for the 100-year storm. The area flows off the roof via roof drains and to the an on grade 18” diameter private HDPE area inlet, and 15” HDPE private storm line at design point XDP-6. There is a mix of overland and concentrated flow with the flow coming off the roof to the storm system. Emergency overflow routing will flow to PB2. Flow from PB 7 will also flow to this design point through the storm pipes. The pipes at this inlet have a capacity of 5.76 cfs. The 100-year hydraulic grade line is 5981.73 ft with a top of grate elevation of 5985.20 ft. After entering the inlet, flow from this subbasin will flow though the proposed storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB7 contains some playground area, sidewalk and a portion of the roof. It is located to the north of the school. The area flows to an on grade 18” diameter private HDPE area inlet, and 12” HDPE storm line in the center of the site at design point XDP-7. There is a mix of sheet flow and concentrated flow. The subbasin is 0.26 acres and has an intercepted flowrate of 0.43 cfs for the 5- year storm and 1.18 cfs for the 100-year storm. The basin has a combination of sheet and concentrated flow. Emergency overflow routing will flow to PB2. The pipes have a capacity of 3.56 cfs. The 100-year hydraulic grade line is 5981.80 ft with a top of grate elevation of 5984.30. After entering the inlet, the flow will flow through the proposed storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB8 contains a portion of the roof on the north side of the building. The subbasin area is 0.04 acres and has an intercepted flow rate of 0.15 cfs for the 5- year storm and 0.27 cfs for the 100-year storm. The area flows off the roof via roof drains and to the an on grade 12” diameter private HDPE area inlet, and 15” HDPE private storm line at design point XDP-8. There is a mix of overland and concentrated flow with the flow coming off the roof to the storm system, as well as flow from PB 3 through the inlet. Emergency overflow routing will flow to PB3 in case of blockage to the inlet. The pipe has a capacity of 1.68 cfs. The 100-yr hydraulic grade line is 5982.99 ft with a top of grate elevation of 5985.60 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB9 contains a portion of the roof on the west side of the building. The subbasin area is 0.20 acres and has an intercepted flow rate of 0.76 cfs for the 5- year storm and 1.14 cfs for the 100-year storm. The area flows off the roof via roof drains and to the an on grade 24” diameter private HDPE area inlet, and 18” private HDPE storm line at design point XDP-9 with a capacity of 9.11 cfs. There is a mix of overland and concentrated flow with the flow coming off the roof to the storm system. Emergency overflow routing will flow to PB12 in case of blockage at the inlet. Flow through the storm pipes from Subbasin PB 7 2, 6, 1, and 5 will also flow through this inlet. The 100-year hydraulic grade line is 5978.86 ft at this basin design point with a top of grate elevation of 5984.95 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB10 contains a portion of the roof on the east side of the building. The subbasin area is 0.20 acres and has an intercepted flow rate of 0.77 cfs for the 5- year storm and 1.44 cfs for the 100-year storm. The area flows off the roof via roof drains and to the an on grade 24” diameter private HDPE area inlet, and 18” HDPE private storm line at design point XDP-10. There is a mix of overland and concentrated flow with the flow coming off the roof to the storm system. Emergency overflow routing will flow to PB11 in case of blockage at the inlet. Flow from Subbasin 3 and 8 will flow through the storm system to this inlet. The pipes have a capacity of 5.59 cfs. The 100- year hydraulic grade line is 5982.10 ft with a top of grate elevation of 5985.78 ft. After entering the inlet, the flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB11 is located to the east of the site. It contains a gravel fire lane, and grass area. It is 2.09 acres, with an intercepted flowrate of 2.14 cfs for the 5-year flow, and 6.19 cfs for the 100-year storm. There is a mix of sheet flow and channelized flow. It flows to a sump 30” diameter private HDPE area inlet, and 18” HDPE private storm line in the south of the basin at design point XDP-11. Emergency overflow routing will flow PB22. The capacity of this basin is 6.58 cfs. The 100-year hydraulic grade line at this basin is 5972.12 ft with a top of grate elevation of 5973.13 ft. After entering the inlet, the flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB12 is located on the west of the site and contains parking area, sidewalk, a large amount of natural grass area west of the track and the proposed private full spectrum extended detention basin. The basin flows south to the proposed full spectrum extended detention basin at design point XDP-12 a 15” CDOT private concrete end section. There is a mix of sheet flow, concentrated flow and channelized flow through the basin. It is 4.60 acres and has an intercepted flow rate of 4.17 cfs for the 5- year storm and 12.93 cfs for the 100- year storm. Emergency overflow routing will flow to the right of way to the south of the site. The 15” HDPE storm pipe exiting the full spectrum extended detention basin has a capacity of 15.28 cfs. The hydraulic grade line at this basin design point is 5969.30 ft with a top of grate elevation of 5969.30 ft. Flow from the full spectrum extended detention basin will flow to the existing public curb inlet. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB13 contains a portion of the roof on the east side of the building. The subbasin area is 0.11 acres and has an intercepted flow rate of 0.42 cfs for the 5- year storm and 0.79 cfs for the 100-year storm, and the pipe has a capacity of 6.77 cfs. There is no bypass flow. The area flows off the roof via roof drains and to the an on grade 18” diameter private HDPE area inlet at design point XDP-13. There is a mix of overland and concentrated flow with the flow coming off the roof to the storm system. Flow from Subbasin PB 3, 8, and 10 flow from the storm pipes through this inlet. Emergency overflow routing will flow to PB17 in case of blockage at the inlet. The 100-year hydraulic grade line is 5979.49 ft with a top of grate elevation of 5983.90 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB14 is located at the far east side of the site, along the south side of the bus route, and contains some sidewalk and grass area. This basin drains through design point XPD-14 to the existing turf south of the basin. The subbasin is 0.16 acres and has an intercepted flow rate 0.06 cfs for the 5-year storm and 0.43 cfs for the 100-year storm, with a pipe capacity of 4.33 cfs. The flow is a mix of sheet flow and concentrated flow. Emergency overflow routing will flow to the existing turf field and the existing middle school site on case of blockage at the proposed inlet. The 100-year hydraulic grade line is 5987.30 ft with a top of grate elevation of 5987.30. After entering the inlet, flow will be routed through the existing elementary school storm system. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB15 is located to the north of subbasin PB14 along the bus lane and contains existing turf field. It has a combination of sheet flow and concentrated flow, and is 1.63 acres. The intercepted flow for the 5-year storm is 0.58 cfs and for the 100-year storm is 3.42 cfs. This basin flows to design point XDP-15 at a proposed 18” diameter private HDPE area inlet on the southeast end of the subbasin with a capacity of 5.6 cfs. Emergency overflow routing will flow to the existing middle school site to the east. The 100-year hydraulic grade line is 5987.26 ft with a top of grate elevation of 5990.60 ft. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB16 is located south of subbasin PB15 along the bus route and contains some driveway and landscape area south of the drive. It is 0.18 acres and has anintercepted flow rate of 0.07 cfs and 0.55 cfs for the 5- and 100-year storm. There is a combination of sheet and overland flow. This basin flows to design point XDP-16 at an existing concrete area with a capacity of 6.45 cfs inlet on Atlas Middle School Property. Emergency overflow routing will flow to the existing school parking lot to the east. The 100-year hydraulic grade line is 5985.31 ft with a top of grate elevation of 5968.80 ft. After entering the inlet, the flow will be routed to the existing school storm system. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB17 is located south of the proposed building and contains grass area, north of the track. It is 0.25 acres and has an intercepted flow rate of 0.20 cfs for the 5-year storm and 0.73 cfs for the 100-year storm. There is a combination of sheet flow and concentrated flow, and flow from Subbasin PB 7, 2, 6, 1, 5, 9, 3, 8, 10, 13, 18 and 11 flow from the upstream storm pipes through the inlet. The flow drains to design point XDP-17, a sump 30” diameter private HDPE area inlet, and to a 30” storm line in the center of the basin with a capacity of 26.11 cfs. Emergency overflow routing will flow to PB21. The 100-year hydraulic grade line is 5971.96 ft with a top of grate elevation of 5973.65. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB18 is located north of the track and contains grass area, east of subbasin PB17. There is a combination of sheet flow and concentrated flow with flow from Subbasin PB3, 8, 10, 13, 18 and 11 flows through the storm system to the inlet. The basin is 0.35 acres and has a 5-year intercepted flow rate of 0.34 cfs and a 100-year flow rate of 1.11 cfs, with no bypass flow. The flow drains to design point XDP-18, sump 30” diameter private HDPE area inlet and 24” HDPE private storm line with a capacity of 14.27 cfs. Emergency overflow routing will flow to PB21 in case of blockage at the inlet. The 100-yr hydraulic grade line is 5971.84 ft at this basin design point with a top of grate elevation of 5973.65 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB19 is located along the east property line, and includes a portion of flow from the future eastern property. There is no proposed development in this subbaisn, and a future Final Drainage report must be submitted for review/ approval prior to any future development in this subbasin. It is 2.74 acres and has a flow rate of 0.62 cfs for the 5-year storm and 4.53 cfs for the 100-year storm. There is a combination of sheet flow, concentrated flow, and channelized flow in this basin, and collects flow from Subbasin PB4. It flows south along the property line to design point XDP-19 where is flows to a 10’ public concrete curb inlet then to a 48” public concrete storm line. Emergency overflow routing will flow to the downstream 10’ public inlet in the right of way to the east. This curb inlet at XDP-19 will also collect water draining to the inlet from the street to the west. The 100-year hydraulic grade line at this curb inlet is 5984.00 ft with a top of grate elevation of 5985.00. After entering the inlet, the flow will be routed through the existing public storm system. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB20 is located west of the track, and contains mostly grass with a sidewalk through the center. The basin has a combination of concentrated and sheet flow and flow from Subbasin PB 7, 6, 2, 1, 5, 9, 17, 25, 3, 8, 10, 13, 18 and 11 flows through the proposed storm system to the inlet. The subbasin is 0.24 acres and has an intercepted flow rates of 0.17 cfs and 0.66 cfs for the 5 year and 100-year storm, and no bypass flow. The basin drains to a sump 30” diameter private HDPE area inlet, and a 30” private HDPE storm line in the center of the basin at design point XDP-20, with a capacity of 5.59 cfs. Emergency overflow routing will flow to PB21 in case of blockage at the proposed inlet. The hydraulic grade line in this basin is 5971.00ft with a top of grate elevation of 5973.60 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB21 contains the turf field on the west side of the track. It is 1.79 acres and has intercepted flow rates of 0.47 acres and 4.00 cfs for the 5 year and 100-year storm, and no bypass flow. It drains to a turf underdrain system, and has a combination of sheet flow and concentrated flow. It flows to design point XDP-21, an on-grade 30” diameter private HDPE area inlet, and 36” HDPE storm line with a capacity of 3.13 cfs. Emergency overflow routing will flow south to the proposed extended detention basin. The 100-year hydraulic grade line in this basin is 5970.11ft with a top of grate elevation of 5976.75 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB22 is located on the east side of the field and contains turf and track area. It is 1.75 acres and has intercepted flow rates of 0.46 cfs for the 5-year storm and 3.36 cfs for the 100-year storm, and no bypass flow. There is a combination of sheet and overland flow. It flows to design point XDP-22 to a sump 18” diameter private HDPE area inlet, and 12” private HDPE perforated pipe storm line in the middle of the basin with a capacity of 3.13 cfs. Emergency overflow routing will flow to PB24 in case of blockage at the inlet. The 100-year hydraulic grade line in this basin is 5971.76 ft with a top of grate elevation of 5974.00 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB23 is located west of the track and south of subbasin 20. It contains grass landscape area. There is a combination of sheet and concentrated flow to design point XDP-23 at a sump 30” diameter private HDPE area inlet, and a sump 30” private HDPE storm line with a capacity of 42.18 cfs. The intercepted flow rate in this basin for the 5-year storm is 0.02 cfs and for the 100-year storm is 0.47 cfs. The basin is 0.26 acres. Emergency overflow routing will flow south to the proposed extended detention basin. There is also flow from Subbasin PB 7, 6, 2, 1, 5, 9, 17, 25, 20, 3, 8, 10, 13, 18, and 11 flowing through this inlet from the proposed storm lines. The 100-year hydraulic grade line in this basin is 5970.20 ft with a top of grate elevation of 5972.90 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin. All flow to in this inlet will be intercepted by the inlet and none of the flow will bypass the inlet under standard conditions.

Subbasin PB24 is located to the northwest of the track and contains grass and sidewalk area. It is 0.05 acres and has an intercepted flow rate of 0.02 cfs and 0.15 cfs for the 5 year and 100-year storm. There is no bypass flow. There is a combination of sheet and overland flow to design point XDP-24 at a sump 30” diameter private HDPE area inlet with a capacity of 42.18 cfs. Emergency overflow routing will flow to PB17 in case of a blocked inlet. Flow from Subbasin 7, 6, 2, 1, 5, 9, 17, 3, 8, 10, 13, 18 and 11 also flow through the pipes in the storm system and to this inlet. The 100-year hydraulic grade line in this basin is 5971.45 ft with a top of grate elevation of 5974.40 ft. After entering the inlet, flow will be routed through the storm system to the full spectrum extended detention basin.

PB-28 is 8.86 acres and located to the east of the proposed developed site. It will be part of a future development, and will not have any drainage improvements during this phase of this project. A final drainage report must be submitted and approved, and include water quality and detention, prior to any development of this eastern site. There is currently natural grasses and trees on this portion of the site, and drains from the northwest to the southeast and into the public right of way. It has a mix of overland and sheet flow towards XDP-3, a existing offsite 10’ public curb inlet at the southwest corner of the subbasin. It flows into the right of way. The flow area had a 5 yr flow of 1.78 cfs, and a 100-year flow of 13.10 cfs.

On-site detention will be controlled with a proposed private full spectrum extended detention basin. The volume of the proposed private full spectrum extended detention basin was found using UD- Detention v. 3.07 spreadsheet to determine the size of the proposed private full spectrum extended detention basin. The calculated basin volume is 0.830 acre-ft, and the private full spectrum extended detention basin has a volume of 0.832 acre-ft. The proposed private full spectrum extended detention basin size calculations are included in Appendix G. This drainage plan including the impervious area and the water quality detention requirements complies with other existing drainage studies and design such as the Sand Creek DBPS for the drainage basin (https://coloradosprings.gov/sites/default/files/9_-_sand_creek.pdf). The onsite drainage facilities will be maintained privately by the owner.

Four Step Process

The City of Colorado Springs Drainage Manual Criteria 4- step process was utilized in this drainage design. Pervious areas such as grass buffers and swales in the parking lot were included in the site to reduce the runoff as part of step 1 of the process. Step two of the process is to include a water quality capture volume with slow release, and a proposed full spectrum extended detention basin is included to maintain the water quality slow release. The site will ultimately discharge to an existing underground storm sewer system. The drainage fees paid at platting will be used to fund channel improvements per the DBPS in coordination with step 3 to stabilize drainageways. There will not be any storage or containment of materials on the site that would need to be contained as a part of step 4 of the process.

VIII. Erosion Control

Erosion control will be installed per the approved grading and erosion control plan permitted through the City of Colorado Springs.

IX. Water Quality

The proposed private full spectrum extended detention basin will be sized to accommodate water quality measures for 18.9 acres of the site. The Drainage Criteria Manual volume 2 was used to size the proposed full spectrum extended detention basin. The area contributing to the proposed full spectrum extended detention basin will be 14.26 acres, with 18.40% imperviousness per Hydrology spreadsheet in Appendix D. The proposed full spectrum extended detention basin will discharge through a UDCFD T-12 outlet structure to a 18” HDPE pipe which then will flow to a 48” RCP along Pulsar Drive south of the site. The design calculations and proposed size for the proposed full spectrum extended detention basin and outlet structure are included in Appendix G. Basins PB7, 2, 6, 1, 5, 9, 17, 20, 23, 21, 3, 8, 10, 13, 18, 12, 24, 22, and 11 will contribute to the full spectrum extended detention basin. The “Type L” soil rip rap emergency spillway will have an invert stage of 5.20 ft, and a crest length of 10.0 ft with a D_{50}=9” per appendix G. Emergency flow will flow into the right of way along Pulsar Drive to the south.

X. Drainage, Bridge Fees

Atlas Preparatory Charter School Filing No. 1B is within the Sand Creek Drainage basin. All fees were previously paid at the time of the original plat. No drainage fees are due at this time.

Construction Cost Opinion

The proposed stormwater structures will be private. The owner, Atlas Preparatory School, will continue maintain the proposed storm sewer full spectrum extended detention basin and the water quality structures. Once the runoff leaves the private BMP structures, it will be conveyed downstream by the existing public storm sewer on Pulsar Drive. Below is provided an engineer's probable construction cost opinion.

Probable Cost Opinion for Permanent BMP (All items are private and Non-Reimbursable)

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
Full Spectrum Extended Detention Basin	1	EA	$30,000	**$30,000**
Outlet Structure	1	EA	$4,000	**$4,000**
Concrete Forebays	3	EA	$2,000	**$6,000**
Trickle Channel	317	LF	$25	**$7,925**
Soil Rip-Rap Spillway	2600	SF	$5	**$13,000**
TOTAL				**$60,925**
Engineering Contingency				**10%**
TOTAL				**$67,018**

Probable Cost Opinion for Permanent Storm Drainage Improvements (All items are private and non- reimbursable)

ITEM	QUANTITY	UNIT	UNIT COST	TOTAL
CDOT End Sections	4	EA	$750	**$3,000**
8" HDPE	130	LF	$30	**$3,900**
10" HDPE	23	LF	$40	**$920**
12" HDPE	817	LF	$45	**$36,765**
15" HDPE	1100	LF	$50	**$55,000**
18" HDPE	686	LF	$60	**$41,160**
18" RCP	200	LF	$70	**$14,000**
24" HDPE	789	LF	$70	**$55,230**
Type R Inlet	1	EA	$3,000	**$3,000**
Nyloplast Area Inlets	26	EA	$600	**$15,600**
Turf Underdrain System	1	EA	$60,000	**$60,000**
TOTAL				**$288,575**
Engineering Contingency				**10%**
TOTAL				**$317,433**

This cost opinion is based on expertise and the best judgment of the engineer and does not reflect the actual market or construction costs. This shall not be construed for the basis of bidding or other means, but a reference.

XI. Summary

Site runoff and storm drain and appurtenances associated with Atlas Preparatory Charter School Filing No. 1B will not adversely affect the downstream and surrounding developments. This report is in general conformance with the MDDP drainage basin studies for the Sand Creek drainage basins, revised March 1996.

Variances

Variance requested to use existing public inlet as a junction for outlet control pipe of new full spectrum extended detention basin. Refer to Appendix I for variance request letter.

Appendix A
Vicinity Map

Existing High School
Existing Middle School
HIGHWAY 24
ACADEMY PARK LOOP
SITE AREA
S. ACADEMY BLVD
S. MURRAY BLVD
S CHELTON RD

N

NTS

Appendix B
Soils Map

United States
Department of
Agriculture

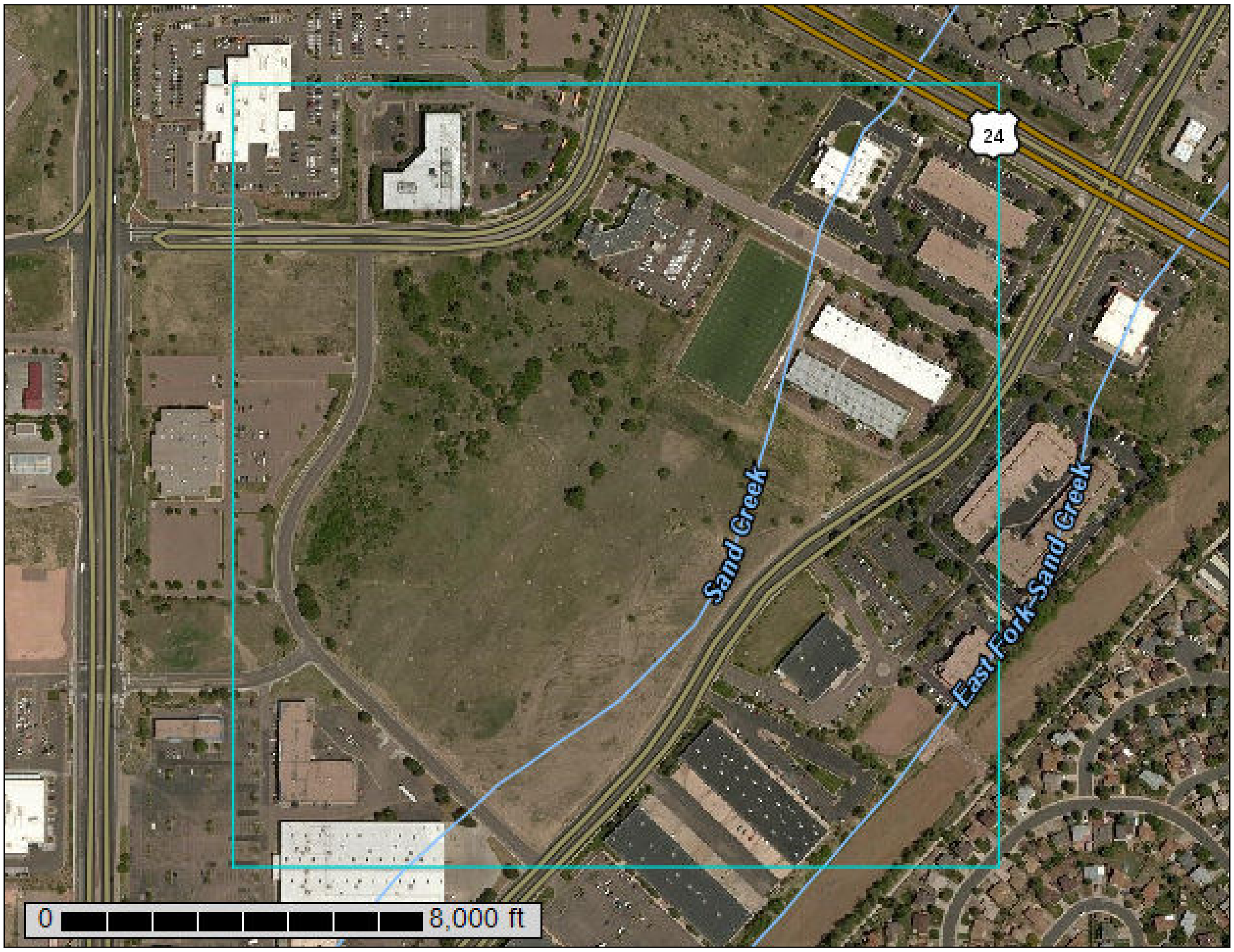
NRCS

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



March 19, 2019

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

Contents

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.

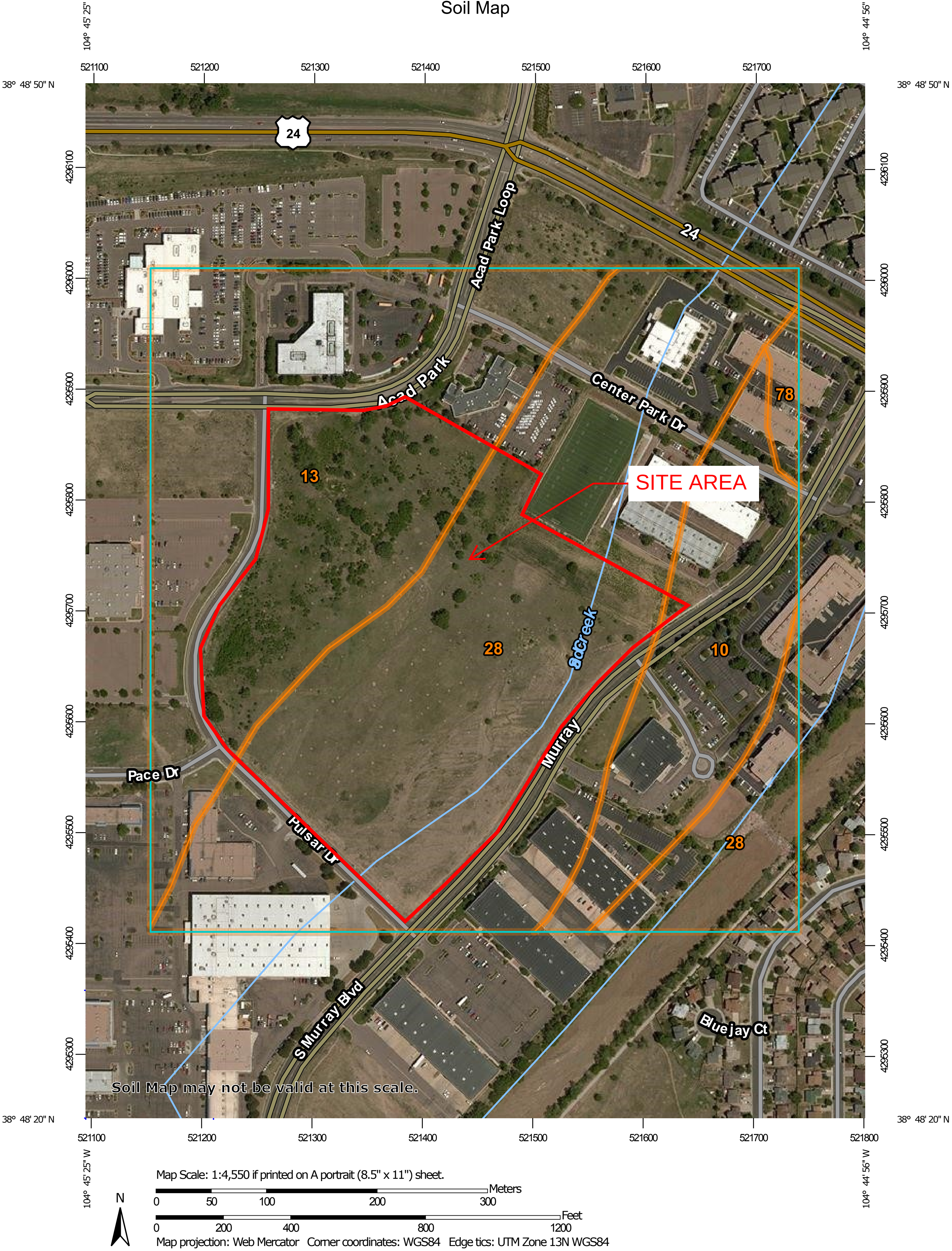
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree 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.

Soil Map



Map Scale: 1:4,550 if printed on A portrait (8.5" x 11") sheet.

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 16, Sep 10, 2018

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

Date(s) aerial images were photographed: Apr 15, 2011—Jun 17, 2014

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
10	Blendon sandy loam, 0 to 3 percent slopes	11.6	13.3%
13	Bresser sandy loam, cool, 5 to 9 percent slopes	30.1	34.5%
28	Ellicott loamy coarse sand, 0 to 5 percent slopes	44.6	51.1%
78	Sampson loam, 0 to 3 percent slopes	0.9	1.0%
Totals for Area of Interest		**87.2**	**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

10—Blendon sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 3671
Elevation: 6,000 to 6,800 feet
Mean annual precipitation: 14 to 16 inches
Mean annual air temperature: 46 to 48 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Blendon and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blendon

Setting

Landform: Terraces, alluvial fans
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy alluvium derived from arkose

Typical profile

A - 0 to 10 inches: sandy loam
Bw - 10 to 36 inches: sandy loam
C - 36 to 60 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Available water storage in profile: Moderate (about 6.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

13—Bresser sandy loam, cool, 5 to 9 percent slopes

Map Unit Setting

National map unit symbol: 2tlpk
Elevation: 5,500 to 6,960 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 48 to 52 degrees F
Frost-free period: 100 to 130 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Bresser, Cool

Setting

Landform: Interfluves
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Tertiary aged alluvium derived from arkose

Typical profile

Ap - 0 to 5 inches: sandy loam
Bt1 - 5 to 8 inches: sandy loam
Bt2 - 8 to 27 inches: sandy clay loam
Bt3 - 27 to 36 inches: sandy loam
C - 36 to 80 inches: loamy coarse sand

Properties and qualities

Slope: 5 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.1 to 2.0 mmhos/cm)

Available water storage in profile: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Minor Components

Ascalon

Percent of map unit: 10 percent
Landform: Interfluves
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

Truckton

Percent of map unit: 5 percent
Landform: Interfluves
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: Sandy Foothill (R049BY210CO)
Hydric soil rating: No

28—Ellicott loamy coarse sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 3680
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 125 to 145 days
Farmland classification: Not prime farmland

Map Unit Composition

Ellicott and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ellicott

Setting

Landform: Flood plains, stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Sandy alluvium

Typical profile

A - 0 to 4 inches: loamy coarse sand
C - 4 to 60 inches: stratified coarse sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: Sandy Bottomland LRU's A & B (R069XY031CO)
Other vegetative classification: SANDY BOTTOMLAND (069AY031CO)
Hydric soil rating: No

Minor Components

Fluvaquentic haplaquoll

Percent of map unit:
Landform: Swales
Hydric soil rating: Yes

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

78—Sampson loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 369s
Elevation: 5,500 to 6,500 feet
Mean annual precipitation: 13 to 15 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 135 to 155 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Sampson and similar soils: 90 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sampson

Setting

Landform: Depressions, alluvial fans, terraces
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 15 inches: loam
Bt - 15 to 34 inches: clay loam
Bk - 34 to 60 inches: sandy clay loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 9.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3c
Hydrologic Soil Group: B
Ecological site: Loamy Foothill (R049BY202CO)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit:
Hydric soil rating: No

Pleasant

Percent of map unit:
Landform: Depressions
Hydric soil rating: Yes

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Appendix C
FEMA Floodplain Map

National Flood Hazard Layer FIRMette

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 17.5	Cross Sections with 1% Annual Chance Water Surface Elevation
	⑧ — —	Coastal Transect
	~~ 513 ~~~	Base Flood Elevation Line (BFE)
	═	Limit of Study
	—	Jurisdiction Boundary
	— - —	Coastal Transect Baseline
	—	Profile Baseline
	—	Hydrographic Feature
MAP PANELS	☐	Digital Data Available
	☐	No Digital Data Available
	☒	Unmapped

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/3/2019 at 4:35:23 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.

Appendix D
Hydrologic Calculations

EXISTING CONDITIONS

Date 06.14.2019 **Sheet No.** 1 of 3
Job# 1975009 Atlas Preparatory Elementary School
Subject Existing Drainage Calculations

Composite Runoff Coefficients

		Runoff Coefficients (HSG A&B)**			
Land Use Or Surface Characteristics	**% Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{100}**
Hardscape (Asph & Conc)	100.0%	0.89	0.90	0.92	0.96
Roofs	90.0%	0.71	0.73	0.75	0.81
Gravel	80.0%	0.57	0.59	0.63	0.70
Lawns (A & B Soils, 2-7%)	0.0%	0.02	0.08	0.15	0.35
Lawns (C & D Soils, 2-7%)	0.0%	0.04	0.15	0.25	0.50

Design Layout

Subbasin	Total Area (acres)	Total Area (sf)	Land Use Area per Subbasin											Weighted Imperviousness	Total Weighted Runoff Coefficients			
			Hardscaping		Roofs		Gravel		Lawns (A&B Soils)		Lawns (C&D Soils)		% Check					
			Area (sf)	%	Area (sf)	%	Area (sf)	%	Area (sf)	%	Area (sf)	%			2-year	5-year	10-year	100-year
XB1	18.96	826,011	46,773	5.7%	17,720	2.1%	0	0.0%	761518	92.2%	0	0.0%	100.0%	7.59%	0.08	0.14	0.21	0.39
XB2	2.26	98,321	1,061	1.1%	0	0.0%	0	0.0%	97260	98.9%	0	0.0%	100.0%	1.08%	0.03	0.09	0.16	0.36
XB3	8.86	386,017	0	0.0%	0	0.0%	0	0.0%	386017	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
Total	**30.08**	**1,310,349**	**47,834**	**3.7%**	**17,720**	**1.4%**	**0**	**0.0%**	**1244795**	**95.0%**	**0**	**0.0%**	**100.0%**	**4.9%**	**0.06**	**0.12**	**0.19**	**0.38**

** Colorado Springs Drainage Manual, Chapter 6, Table 6-6.

XB = Existing Basin

XOS = Existing Off-Site Basin

EXISTING CONDITIONS

Date	06.14.2019	**Sheet No.** 2	of	3
Job#	1975009 Atlas Preparatory Elementary School			
Subject	Existing Drainage Calculations			

Time of Concentration

Rational Method

Subbasin Data			Initial / Overland, t_i				Travel Time, t_t						Urban Basins			Final	Remarks
			Time (Ti) = $0.395(1.1\text{-}C_5)L^{1'2})/(S^{1'3})$*				(Tt) = (L)/(V*60) where (V = $C_v Sw^{1'2}$) **						Tc Check				Contributing Basins
Design Point	Coeff. C_5	Area (Ac)	Length (ft)	Δ Elev. (ft)	Slope (ft/ft)	Ti (min.)	Length (ft)	Δ Elev. (ft)	Slope (ft/ft)	Conveyance Coefficient (C_v)***	Velocity (fps)	Tt (min.)	Computed Tc (min.)	Total Length (ft)	Tc=(L/180)+10 (min.)	Tc (min.)	
XDP-1	0.14	18.96	100.00	3	0.030	12.20	1472	27	0.018	10	1.35	18.11	30.31	1,572.00	18.73	30.31	XB1
XDP-2	0.09	2.26	100.00	3	0.030	12.85	360	6	0.017	10	1.29	4.65	17.50	460.00	12.56	17.50	XB2
XDP-3	0.08	8.86	100.00	1	0.010	18.70	857	17	0.020	20	2.82	5.07	23.77	957.00	15.32	23.77	XB3
-																	-
-																	-

* Colorado Springs Drainage Manual, Chapter 6, Eq. 6-8

** Colorado Springs Drainage Manual, Chapter 6, Eq. 6-9
and table 6-7 for Cv Coefficients

*** Colorado Springs Drainage Manual, Chapter 6, Table 6-7

EXISTING CONDITIONS

Date 06.14.2019 **Sheet No.** 3 of 3

Job# 1975009 Atlas Preparatory Elementary School

Subject Existing Drainage Calculations

Hydrologic Analysis

				Runoff Coefficients				Rainfall Intensity*				Peak Discharge			
Basin	**Design Point**	**Area (ac)**	**Time of Concentration Tc (min)**	C_2	C_5	C_{10}	C_{100}	I 2-yr (in/hr)	I 5-yr (in/hr)	I 10-yr (in/hr)	I 100-yr (in/hr)	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 10-yr (cfs)	Q 100-yr (cfs)
XB1	XDP-1	18.96	30.31	0.08	0.14	0.21	0.39	1.98	2.47	2.88	4.14	3.15	6.56	11.26	30.95
XB2	XDP-2	2.26	17.50	0.03	0.09	0.16	0.36	2.63	3.29	3.84	5.52	0.17	0.66	1.37	4.44
XB3	XDP-3	8.86	23.77	0.02	0.08	0.15	0.35	2.26	2.83	3.30	4.75	0.40	2.01	4.39	14.73

* IDF Equations From Colorado Springs Drainage Manual, Chapter 6, Figure 6-5

I100 = -2.52 ln(tc) + 12.735

I50 = -2.25 ln(tc) + 11.375

I25 = -2.00 ln(tc) + 10.111

I10 = -1.75 ln(tc) + 8.847

I5 = -1.50 ln(tc) + 7.583

I2 = -1.19 ln(tc) + 6.035

PROPOSED CONDITIONS

Date	09.09.2019	**Sheet No.**	1	of	3
Job#	1975009 Atlas Preparatory Elementary School				
Subject	Proposed Drainage Calculations				

Composite Runoff Coefficients

		Runoff Coefficients (HSG A&B)**			
Land Use Or Surface Characteristics	**% Imp.**	**C_2**	**C_5**	**C_{10}**	**C_{100}**
Hardscape (Asph & Conc)	100.0%	0.89	0.90	0.92	0.96
Roofs	90.0%	0.71	0.73	0.75	0.81
Gravel	80.0%	0.57	0.59	0.63	0.70
Lawns (A & B Soils, 2-7%)	0.0%	0.02	0.08	0.15	0.35
Lawns (C & D Soils, 2-7%)	0.0%	0.04	0.15	0.25	0.50

Design Layout

Subbasin	Total Area (acres)	Total Area (sf)	Land Use Area per Subbasin										% Check	Weighted Imperviousness	Total Weighted Runoff Coefficients			
			Hardscaping		Roofs		Gravel		Lawns (A&B Soils)		Lawns (C&D Soils)							
			Area (sf)	%	Area (sf)	%	Area (sf)	%	Area (sf)	%	Area (sf)	%			2-year	5-year	10-year	100-year
PB1	0.32	13,914	490	3.5%	0	0.0%	0	0.0%	13424	96.5%	0	0.0%	100.0%	3.52%	0.05	0.11	0.18	0.37
PB2	0.55	24,133	4,420	18.3%	0	0.0%	1,014	4.2%	18699	77.5%	0	0.0%	100.0%	21.68%	0.20	0.25	0.31	0.48
PB3	0.62	26,913	7,771	28.9%	0	0.0%	0	0.0%	19142	71.1%	0	0.0%	100.0%	28.87%	0.27	0.32	0.37	0.53
PB4	2.43	105,916	47,780	45.1%	17,720	16.7%	0	0.0%	40416	38.2%	0	0.0%	100.0%	60.17%	0.53	0.56	0.60	0.70
PB5	0.26	11,380	914	8.0%	0	0.0%	0	0.0%	10466	92.0%	0	0.0%	100.0%	8.03%	0.09	0.15	0.21	0.40
PB6	0.12	5,223	0	0.0%	5,027	96.2%	0	0.0%	196	3.8%	0	0.0%	100.0%	86.62%	0.68	0.71	0.73	0.79
PB7	0.26	11,380	1,443	12.7%	2,324	20.4%	0	0.0%	7613	66.9%	0	0.0%	100.0%	31.06%	0.27	0.32	0.37	0.52
PB8	0.04	1,690	0	0.0%	1,690	100.0%	0	0.0%	0	0.0%	0	0.0%	100.0%	90.00%	0.71	0.73	0.75	0.81
PB9	0.20	8,756	0	0.0%	8,756	100.0%	0	0.0%	0	0.0%	0	0.0%	100.0%	90.00%	0.71	0.73	0.75	0.81
PB10	0.20	8,911	0	0.0%	8,911	100.0%	0	0.0%	0	0.0%	0	0.0%	100.0%	90.00%	0.71	0.73	0.75	0.81
PB11	2.09	90,846	22,040	24.3%	0	0.0%	3,013	3.3%	65793	72.4%	0	0.0%	100.0%	26.91%	0.25	0.30	0.35	0.51
PB12	4.60	200,564	44,480	22.2%	0	0.0%	482	0.2%	155602	77.6%	0	0.0%	100.0%	22.37%	0.21	0.26	0.32	0.49
PB13	0.11	4,885	0	0.0%	4,885	100.0%	0	0.0%	0	0.0%	0	0.0%	100.0%	90.00%	0.71	0.73	0.75	0.81
PB14	0.16	7,000	0	0.0%	0	0.0%	0	0.0%	7000	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
PB15	1.66	72,271	2,251	3.1%	0	0.0%	0	0.0%	70020	96.9%	0	0.0%	100.0%	3.11%	0.05	0.11	0.17	0.37
PB16	0.18	7,881	0	0.0%	0	0.0%	0	0.0%	7881	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
PB17	0.25	10,683	0	0.0%	0	0.0%	2,454	23.0%	8229	77.0%	0	0.0%	100.0%	18.38%	0.15	0.20	0.26	0.43
PB18	0.35	15,034	0	0.0%	0	0.0%	4,422	29.4%	10612	70.6%	0	0.0%	100.0%	23.53%	0.18	0.23	0.29	0.45
PB19	2.74	119,264	0	0.0%	0	0.0%	0	0.0%	119264	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
PB20	0.24	10,256	1,360	13.3%	0	0.0%	0	0.0%	8896	86.7%	0	0.0%	100.0%	13.26%	0.14	0.19	0.25	0.43
PB21	1.79	77,839	0	0.0%	0	0.0%	0	0.0%	77839	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
PB22	1.75	76,149	0	0.0%	0	0.0%	0	0.0%	76149	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
PB23	0.26	11,182	0	0.0%	0	0.0%	0	0.0%	11182	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
PB24	0.05	2,264	0	0.0%	0	0.0%	0	0.0%	2264	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
PB25	8.86	386,015	0	0.0%	0	0.0%	0	0.0%	386015	100.0%	0	0.0%	100.0%	0.00%	0.02	0.08	0.15	0.35
Total	**30.08**	**1,310,349**	**132,949**	**11.0%**	**49,313**	**4.6%**	**11,385**	**1.7%**	**1116702**	**85.2%**	**0**	**0.0%**	**100.0%**	**15.08**	**0.15**	**0.20**	**0.26**	**0.44**

** Colorado Springs Drainage Manual, Chapter 6, Table 6-6.

XB = Existing Basin

XOS = Existing Off-Site Basin

Impervious area to EDB	143616.0	SF
	3.30	ACRES

AREAS CONTRIBUTING TO EDB

- PB1
- PB2
- PB3
- PB5
- PB6
- PB7
- PB8
- PB9
- PB10
- PB11
- PB12
- PB13
- PB17
- PB18
- PB20
- PB21
- PB22
- PB23
- PB24

PROPOSED CONDITIONS

Date 09.09.2019 **Sheet No.** 2 of 3
Job# 1975009 Atlas Preparatory Elementary School
Subject Proposed Drainage Calculations

Time of Concentration

Rational Method

Subbasin Data			Initial / Overland, t_i Time (Ti) = 0.395(1.1-C_5)$L^{1/2}$)/($S^{1/3}$)*				Travel Time, t_t (Tt) = (L)/(V*60) where (V = $C_v Sw^{1/2}$) **						Urban Basins Tc Check			Final	Remarks
Design Point	Coeff. C_5	Area (Ac)	Length (ft)	Δ Elev. (ft)	Slope (ft/ft)	Ti (min.)	Length (ft)	Δ Elev. (ft)	Slope (ft/ft)	Conveyance Coefficient (C_v)***	Velocity (fps)	Tt (min.)	Computed Tc (min.)	Total Length (ft)	Tc=(L/180)+10 (min.)	Tc (min.)	Contributing Basins
XDP-1	0.11	0.32	57.00	0.65	0.011	13.13	26	0.5	0.019	20	2.77	0.16	13.29	83.00	10.46	13.29	PB1
XDP-2	0.25	0.55	43.00	1.11	0.026	7.44	97	1.7	0.018	20	2.65	0.61	8.05	140.00	10.78	8.05	PB2
XDP-3	0.32	0.62	13.00	0.9	0.069	2.72	635	6.83	0.011	15	1.56	6.80	9.52	648.00	13.60	9.52	PB3
XDP-4	0.56	2.43	52.00	1.2	0.023	5.42	294	10.7	0.036	20	3.82	1.28	6.70	346.00	11.92	6.70	PB4
XDP-5	0.15	0.26	42.00	0.64	0.015	9.85	105	1.16	0.011	15	1.58	1.11	10.96	147.00	10.82	10.96	PB5
XDP-6	0.71	0.12	38.00	12.6	0.332	1.39	17	3	0.176	20	8.40	0.03	1.42	55.00	10.31	5.00	PB6
XDP-7	0.32	0.26	23.00	1.3	0.057	3.87	58	1.1	0.019	15	2.07	0.47	4.33	81.00	10.45	5.00	PB7
XDP-8	0.73	0.04	27.00	9	0.333	1.10	17	3	0.176	15	6.30	0.04	1.14	44.00	10.24	5.00	PB8
XDP-9	0.73	0.20	40.00	13.3	0.333	1.33	17	3	0.176	15	6.30	0.04	1.38	57.00	10.32	5.00	PB9
XDP-10	0.73	0.20	34.00	8.5	0.250	1.35	17	3	0.176	15	6.30	0.04	1.40	51.00	10.28	5.00	PB10
XDP-11	0.30	2.09	100.00	1.4	0.014	13.18	373	11.8	0.032	15	2.67	2.33	15.51	473.00	12.63	15.51	PB11
XDP-12	0.26	4.60	78.00	2	0.026	9.90	727	13.5	0.019	15	2.04	5.93	15.83	805.00	14.47	15.83	PB12
XDP-13	0.73	0.11	34.00	8.5	0.250	1.35	17	3	0.176	15	6.30	0.04	1.40	51.00	10.28	5.00	PB13
XDP-14	0.08	0.16	23.00	1	0.043	5.50	231	3.7	0.016	15	1.90	2.03	7.52	254.00	11.41	7.52	PB14
XDP-15	0.11	1.66	100.00	2.5	0.025	13.43	360	6	0.017	15	1.94	3.10	16.53	460.00	12.56	16.53	PB15
XDP-16	0.08	0.18	13.00	1.5	0.115	2.98	140	3.3	0.024	15	2.30	1.01	4.00	153.00	10.85	5.00	PB16
XDP-17	0.20	0.25	100.00	4.8	0.048	9.81	36	4.75	0.132	15	5.45	0.11	9.92	136.00	10.76	9.92	PB17
XDP-18	0.23	0.35	100.00	5.94	0.059	8.81	93	3.56	0.038	15	2.93	0.53	9.34	193.00	11.07	9.34	PB18
XDP-19	0.08	2.74	100.00	4.98	0.050	10.95	1300	15.96	0.012	15	1.66	13.04	23.99	1,400.00	17.78	23.99	PB19
XDP-20	0.19	0.24	92.00	2.61	0.028	11.32	46	0.46	0.010	15	1.50	0.51	11.83	138.00	10.77	11.83	PB20
XDP-21	0.08	1.79	100.00	1.18	0.012	17.70	1	0.1	0.100	15	4.74	0.00	17.70	101.00	10.56	17.70	PB21
XDP-22	0.08	1.75	100.00	1.18	0.012	17.70	1	0.1	0.100	15	4.74	0.00	17.70	101.00	10.56	17.70	PB22
XDP-23	0.08	0.26	96.00	0.9	0.009	18.72	170	4.49	0.026	15	2.44	1.16	19.88	266.00	11.48	19.88	PB23
XDP-24	0.08	0.05	50.00	4.48	0.090	6.37	33	0.82	0.025	15	2.36	0.23	6.60	83.00	10.46	6.60	PB24
XDP-25	0.08	8.86	100.00	1	0.010	18.70	857	17	0.020	20	2.82	5.07	23.77	957.00	15.32	23.77	PB25

* Colorado Springs Drainage Manual, Chapter 6, Eq. 6-8
** Colorado Springs Drainage Manual, Chapter 6, Eq. 6-9
and table 6-7 for Cv Coefficients
*** Colorado Springs Drainage Manual, Chapter 6, Table 6-7

PROPOSED CONDITIONS

Date 09.09.2019 **Sheet No.** 3 of 3

Job# 1975009 Atlas Preparatory Elementary School

Subject Proposed Drainage Calculations

Hydrologic Analysis

				Runoff Coefficients				Rainfall Intensity*				Peak Discharge			
Basin	**Design Point**	**Area (ac)**	**Time of Concentration Tc (min)**	C_2	C_5	C_{10}	C_{100}	I 2-yr (in/hr)	I 5-yr (in/hr)	I 10-yr (in/hr)	I 100-yr (in/hr)	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 10-yr (cfs)	Q 100-yr (cfs)
PB1	XDP-1	0.32	13.29	0.05	0.11	0.18	0.37	2.96	3.70	4.32	6.22	0.05	0.13	0.24	0.74
PB2	XDP-2	0.55	8.05	0.20	0.25	0.31	0.48	3.55	4.46	5.20	7.48	0.40	0.62	0.90	1.97
PB3	XDP-3	0.62	9.52	0.27	0.32	0.37	0.53	3.35	4.20	4.90	7.06	0.56	0.82	1.13	2.29
PB4	XDP-4	2.43	6.70	0.53	0.56	0.60	0.70	3.77	4.73	5.52	7.94	4.84	6.42	8.02	13.56
PB5	XDP-5	0.26	10.96	0.09	0.15	0.21	0.40	3.19	3.99	4.66	6.70	0.07	0.15	0.26	0.70
PB6	XDP-6	0.12	5.00	0.68	0.71	0.73	0.79	4.12	5.17	6.03	8.68	0.34	0.44	0.53	0.82
PB7	XDP-7	0.26	5.00	0.27	0.32	0.37	0.52	4.12	5.17	6.03	8.68	0.29	0.43	0.58	1.18
PB8	XDP-8	0.04	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.11	0.15	0.18	0.27
PB9	XDP-9	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.59	0.76	0.91	1.41
PB10	XDP-10	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.60	0.77	0.93	1.44
PB11	XDP-11	2.09	15.51	0.25	0.30	0.35	0.51	2.77	3.47	4.05	5.83	1.44	2.14	2.98	6.19
PB12	XDP-12	4.60	15.83	0.21	0.26	0.32	0.49	2.75	3.44	4.01	5.78	2.71	4.17	5.95	12.93
PB13	XDP-13	0.11	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.33	0.42	0.51	0.79
PB14	XDP-14	0.16	7.52	0.02	0.08	0.15	0.35	3.63	4.56	5.32	7.65	0.01	0.06	0.13	0.43
PB15	XDP-15	1.66	16.53	0.05	0.11	0.17	0.37	2.70	3.38	3.94	5.67	0.21	0.59	1.14	3.47
PB16	XDP-16	0.18	5.00	0.02	0.08	0.15	0.35	4.12	5.17	6.03	8.68	0.01	0.07	0.16	0.55
PB17	XDP-17	0.25	9.92	0.15	0.20	0.26	0.43	3.30	4.14	4.83	6.95	0.12	0.20	0.31	0.73
PB18	XDP-18	0.35	9.34	0.18	0.23	0.29	0.45	3.38	4.23	4.94	7.11	0.21	0.34	0.50	1.11
PB19	XDP-19	2.74	23.99	0.02	0.08	0.15	0.35	2.25	2.82	3.29	4.73	0.12	0.62	1.35	4.53
PB20	XDP-20	0.24	11.83	0.14	0.19	0.25	0.43	3.09	3.88	4.52	6.51	0.10	0.17	0.27	0.66
PB21	XDP-21	1.79	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.47	1.02	3.44
PB22	XDP-22	1.75	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.46	1.00	3.36
PB23	XDP-23	0.26	19.88	0.02	0.08	0.15	0.35	2.48	3.10	3.61	5.20	0.01	0.06	0.14	0.47
PB24	XDP-24	0.05	6.60	0.02	0.08	0.15	0.35	3.79	4.75	5.54	7.98	0.00	0.02	0.04	0.15
PB25	XDP-25	8.86	23.77	0.02	0.08	0.15	0.35	2.26	2.83	3.30	4.75	0.40	2.01	4.39	14.73

* IDF Equations From Colorado Springs Drainage Manual, Chapter 6, Figure 6-5

I100 = -2.52 ln(tc) + 12.735

I50 = -2.25 ln(tc) + 11.375

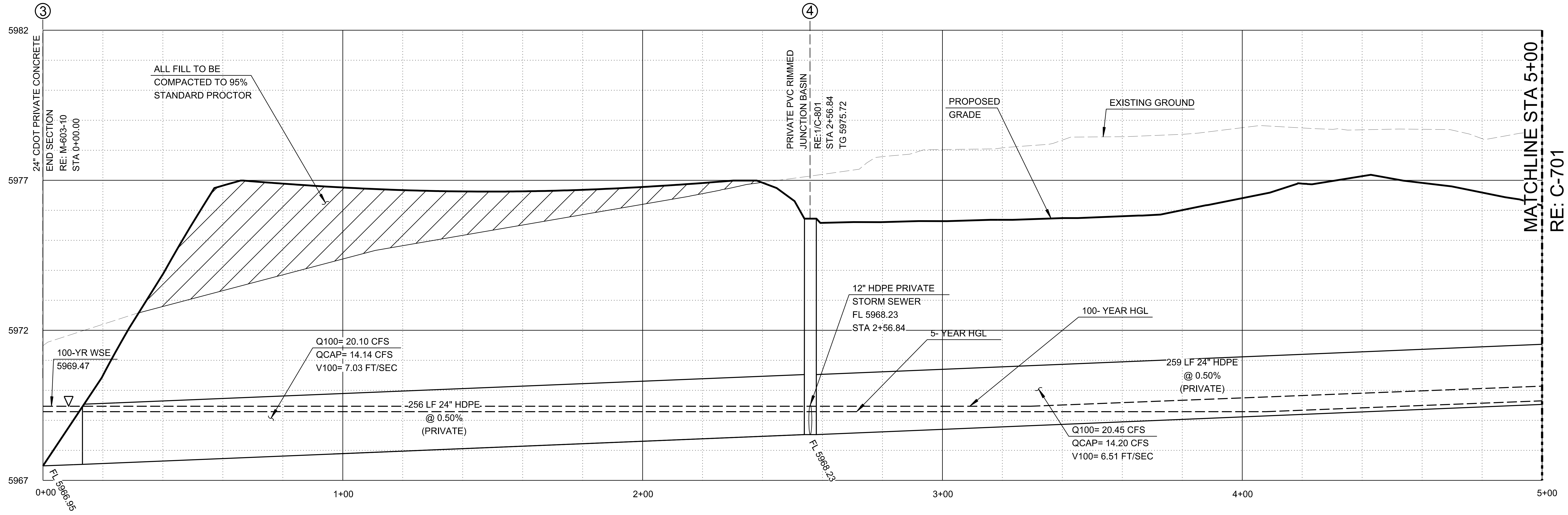
I25 = -2.00 ln(tc) + 10.111

I10 = -1.75 ln(tc) + 8.847

I5 = -1.50 ln(tc) + 7.583

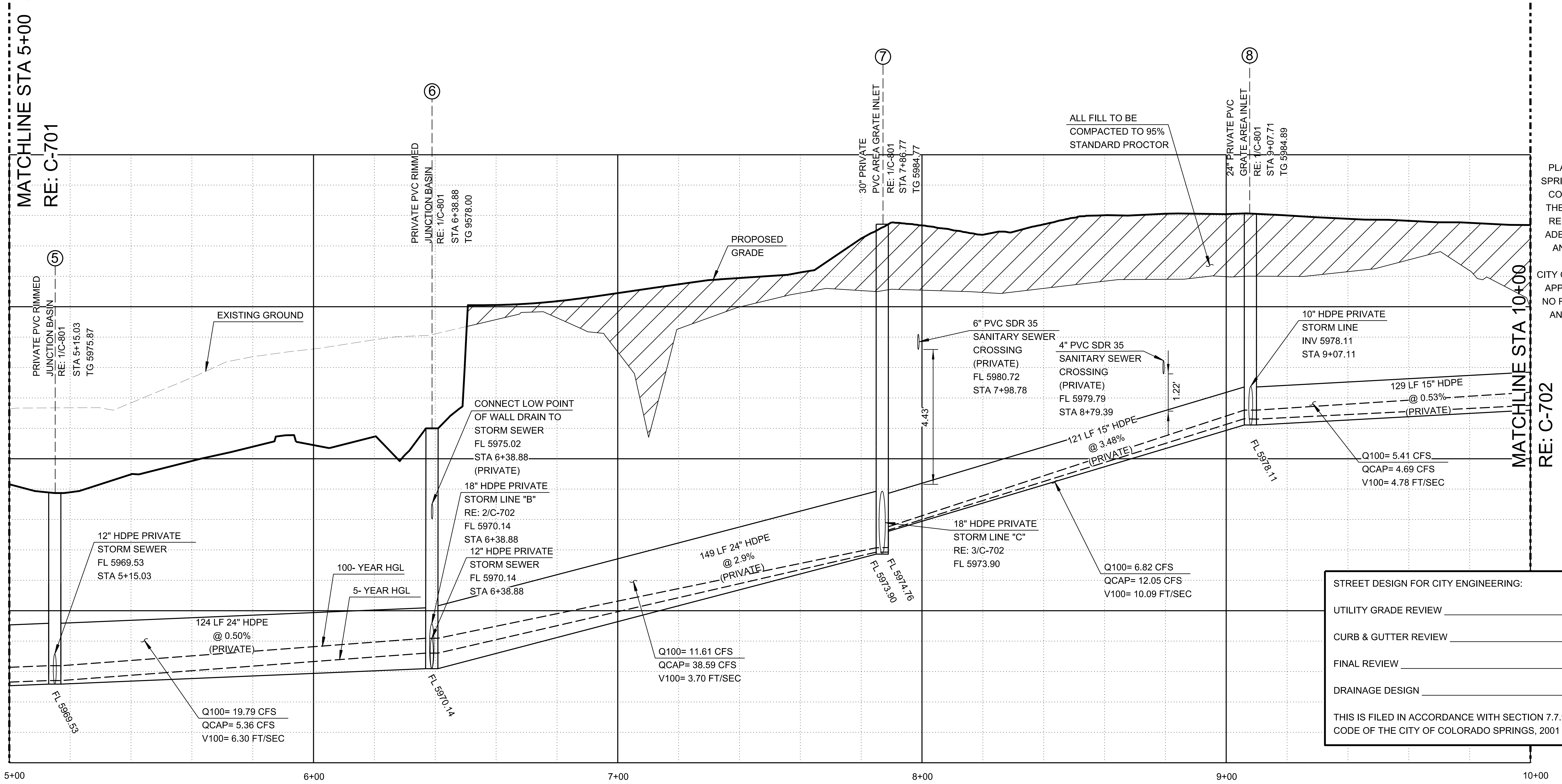
I2 = -1.19 ln(tc) + 6.035

Appendix E
Hydraulic Calculations



1 STORM LINE "A"

HORIZ: 1"=20' VERT: 1"=2'



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CHECKED BY:	DWB

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STORM SEWER PROFILES

C-701

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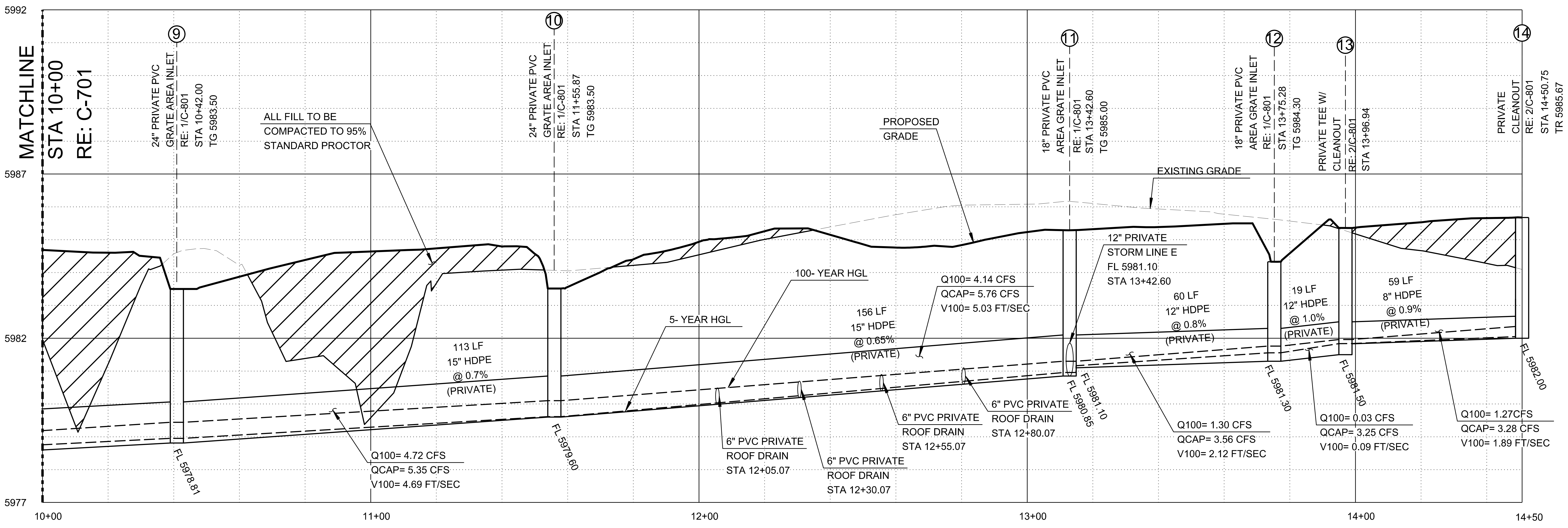

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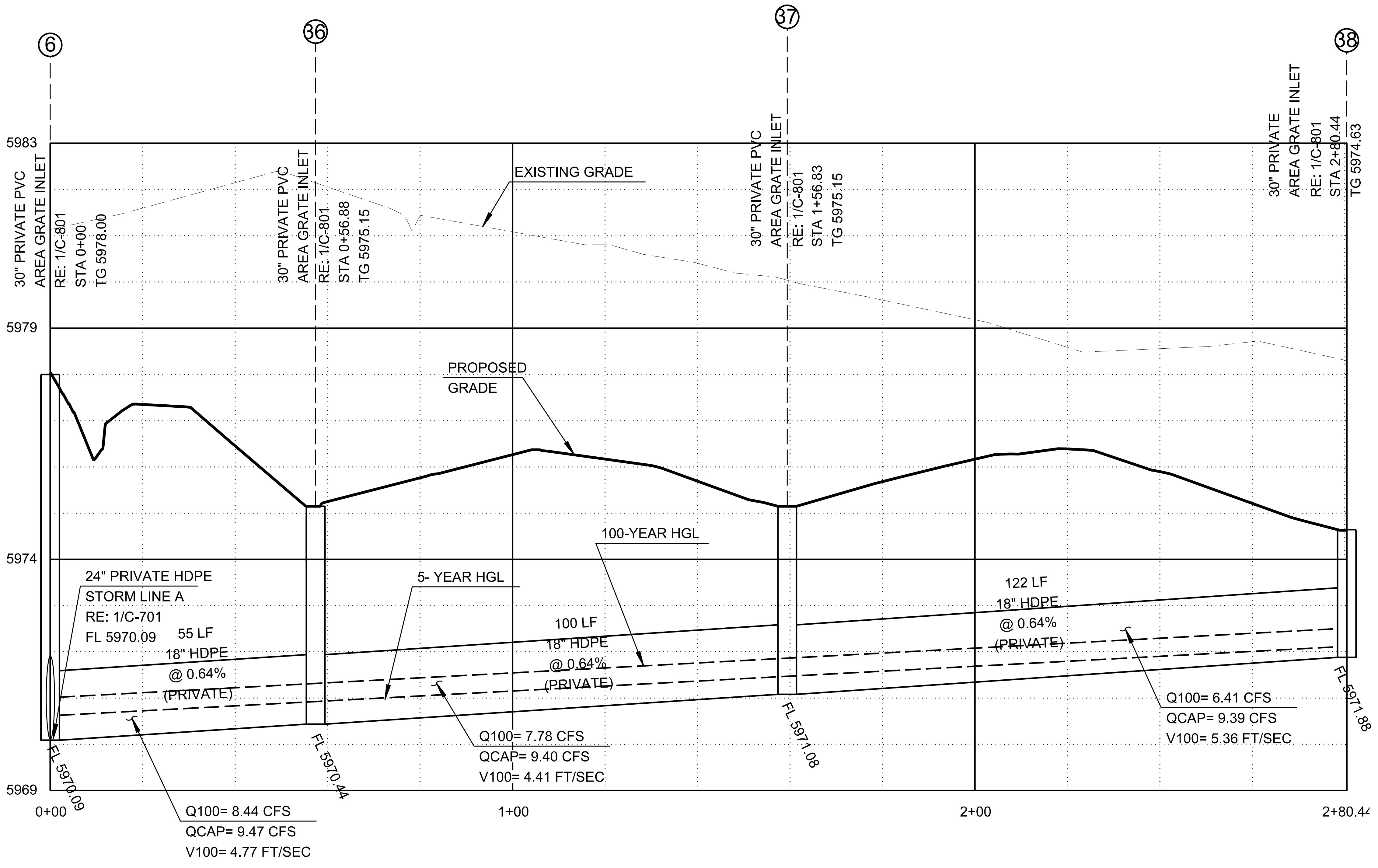

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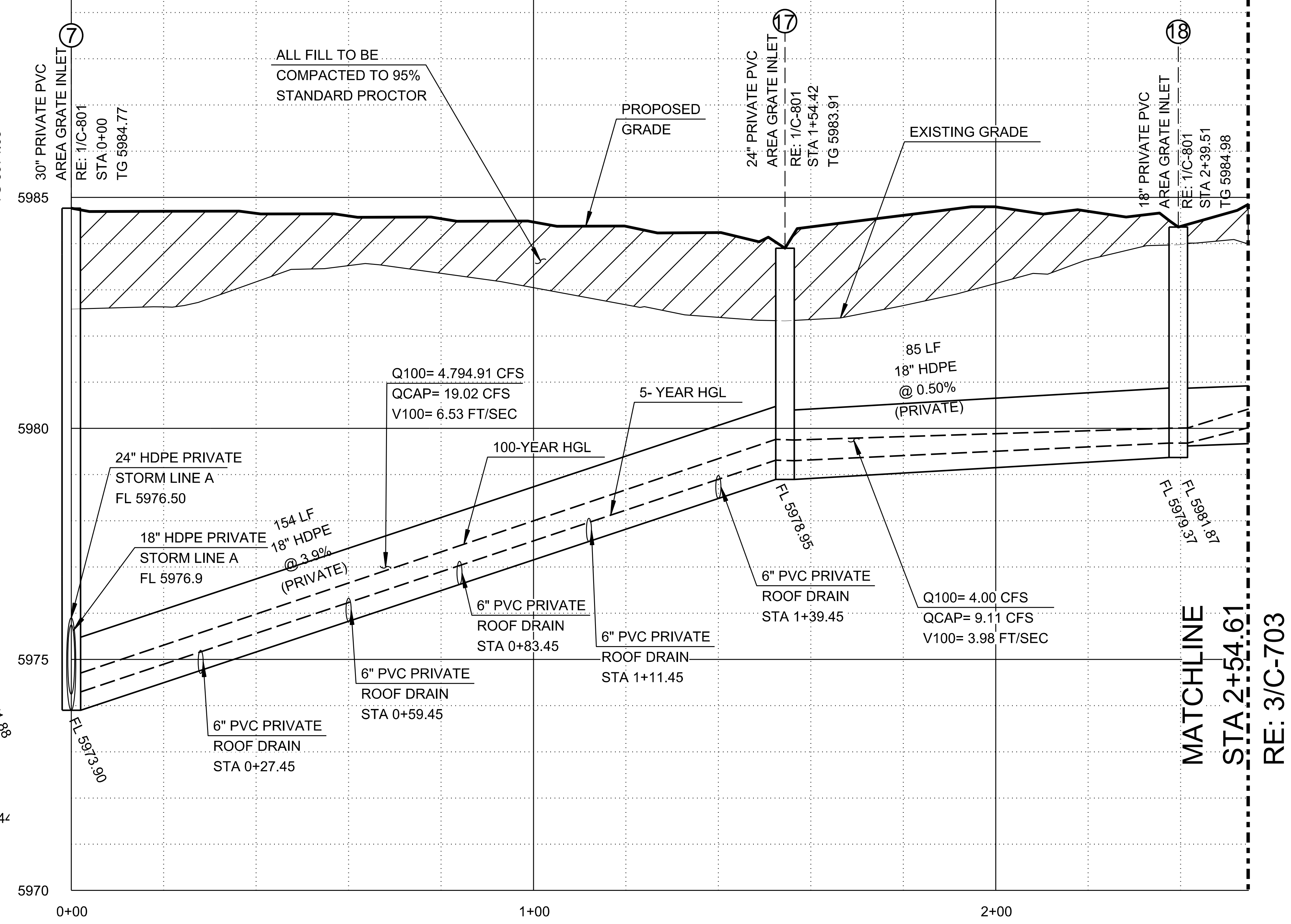

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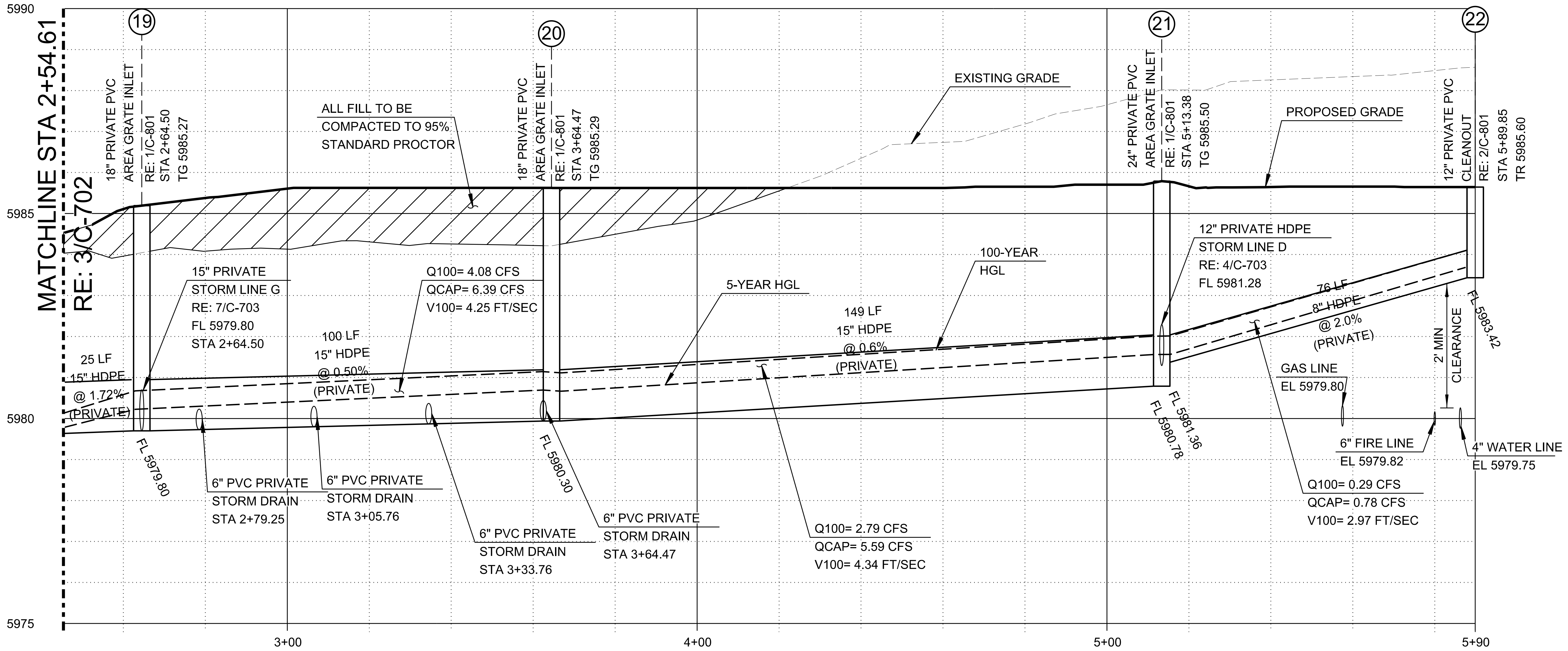

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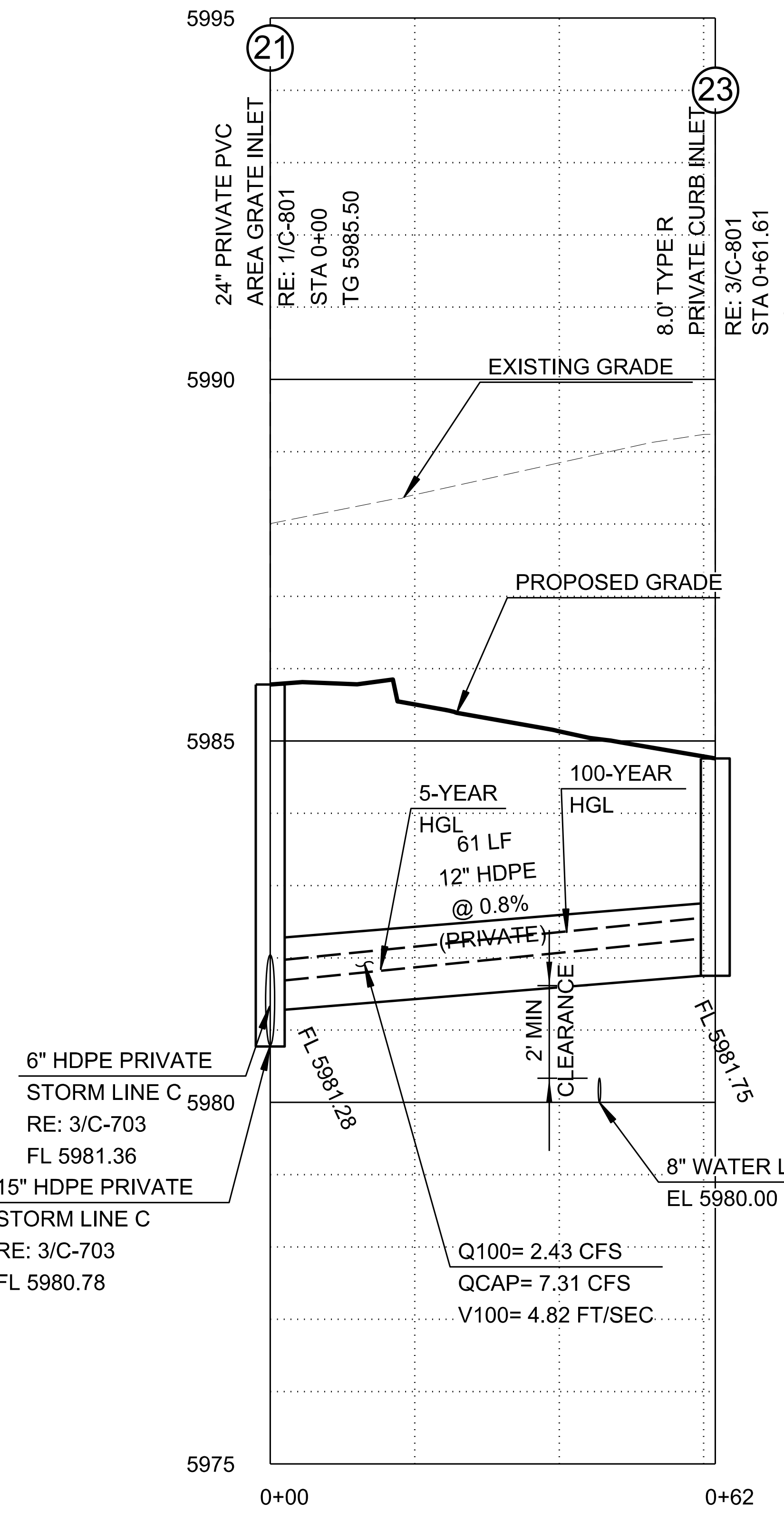

4 STORM LINE "D"

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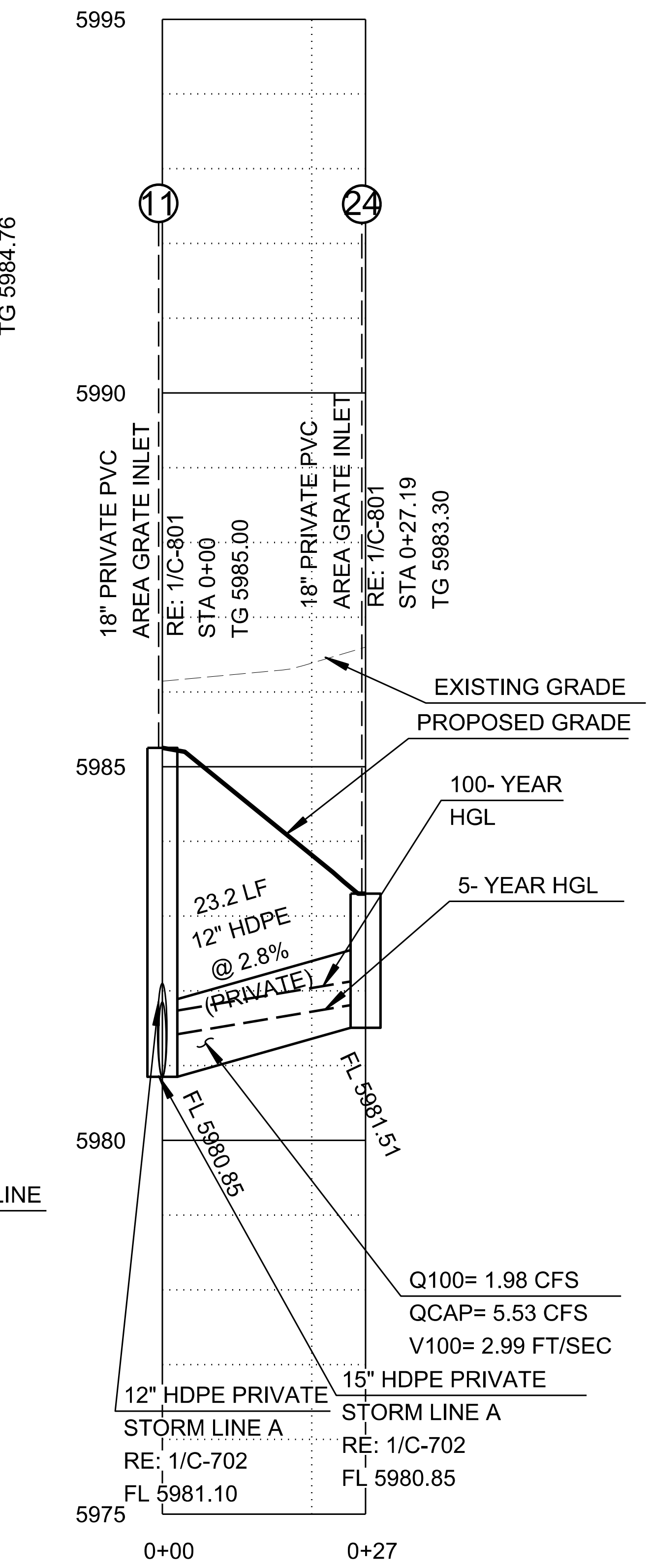
VERT: 1"=2'



5 STORM LINE "E"

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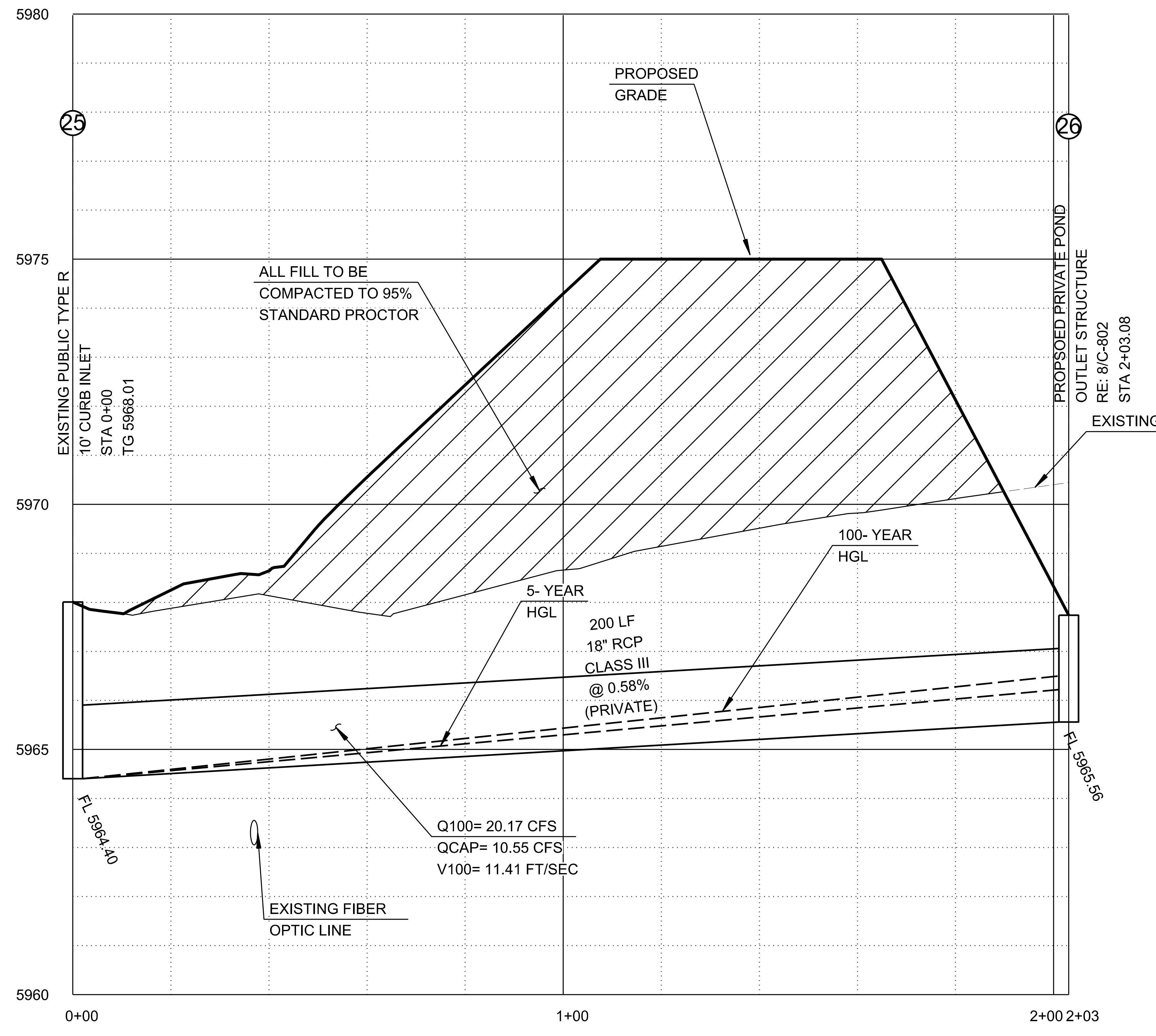
VERT: 1"=2'



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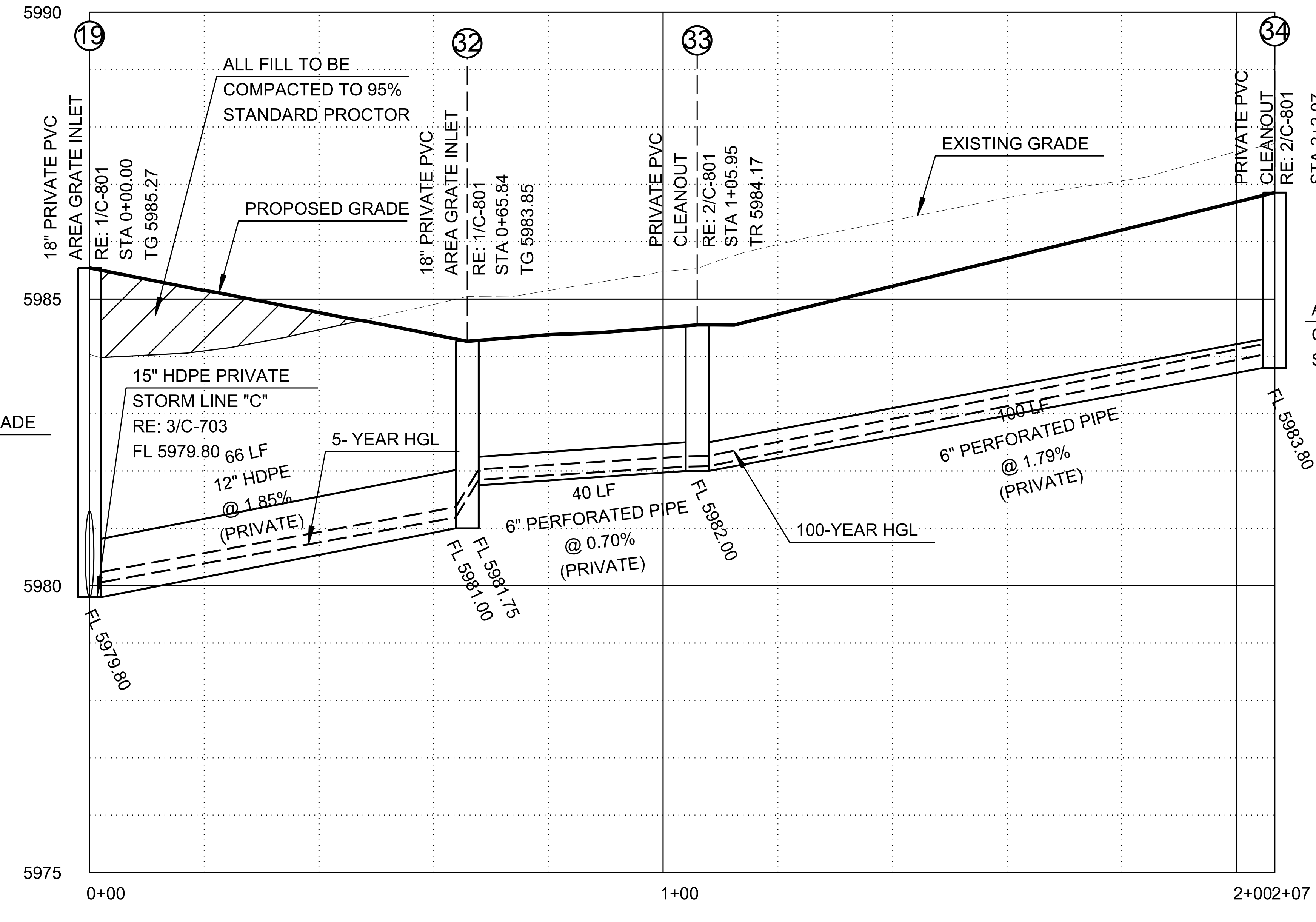

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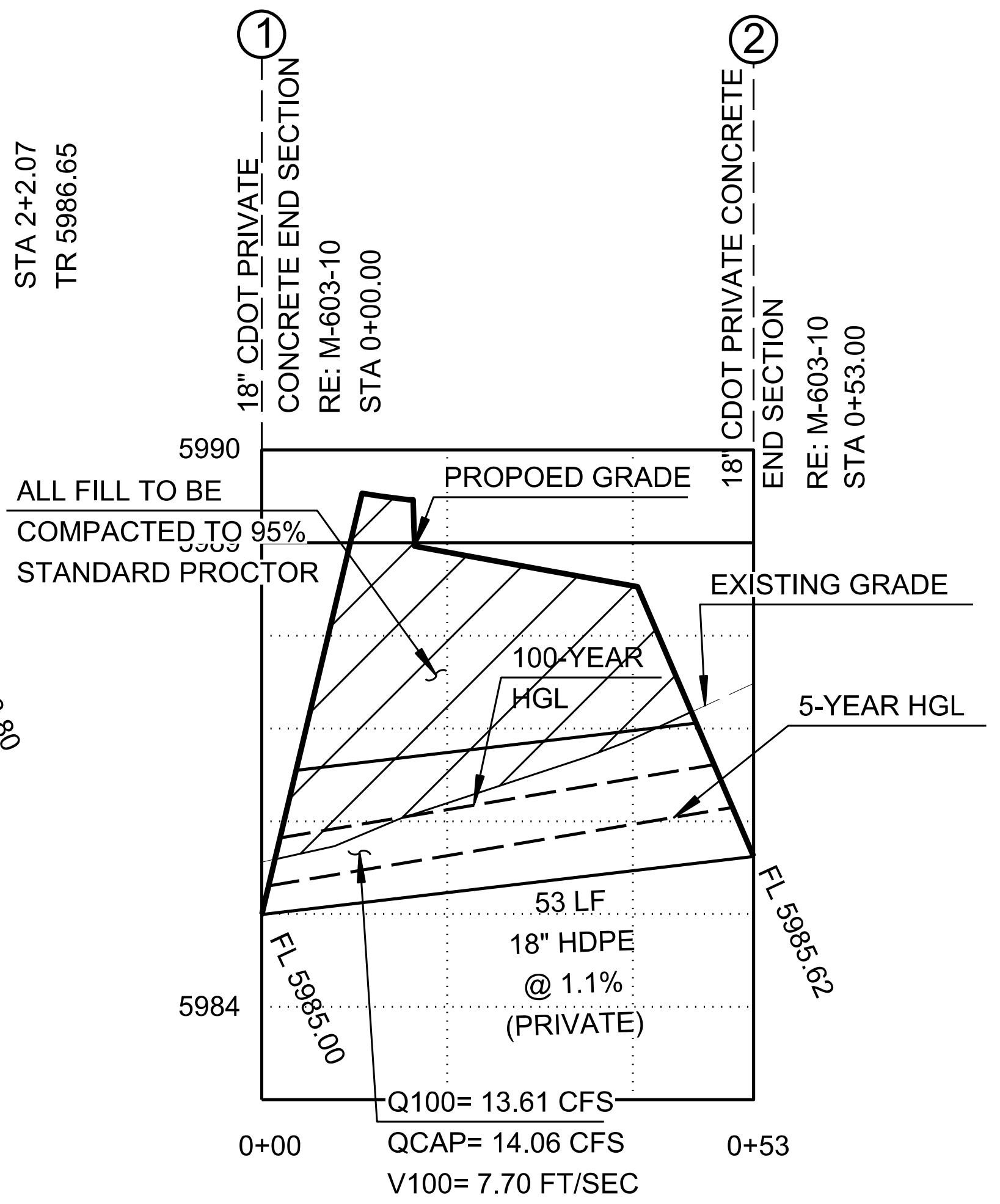

8 STORM LINE "H"

HORIZ: 1"=20' VERT: 1"=2'

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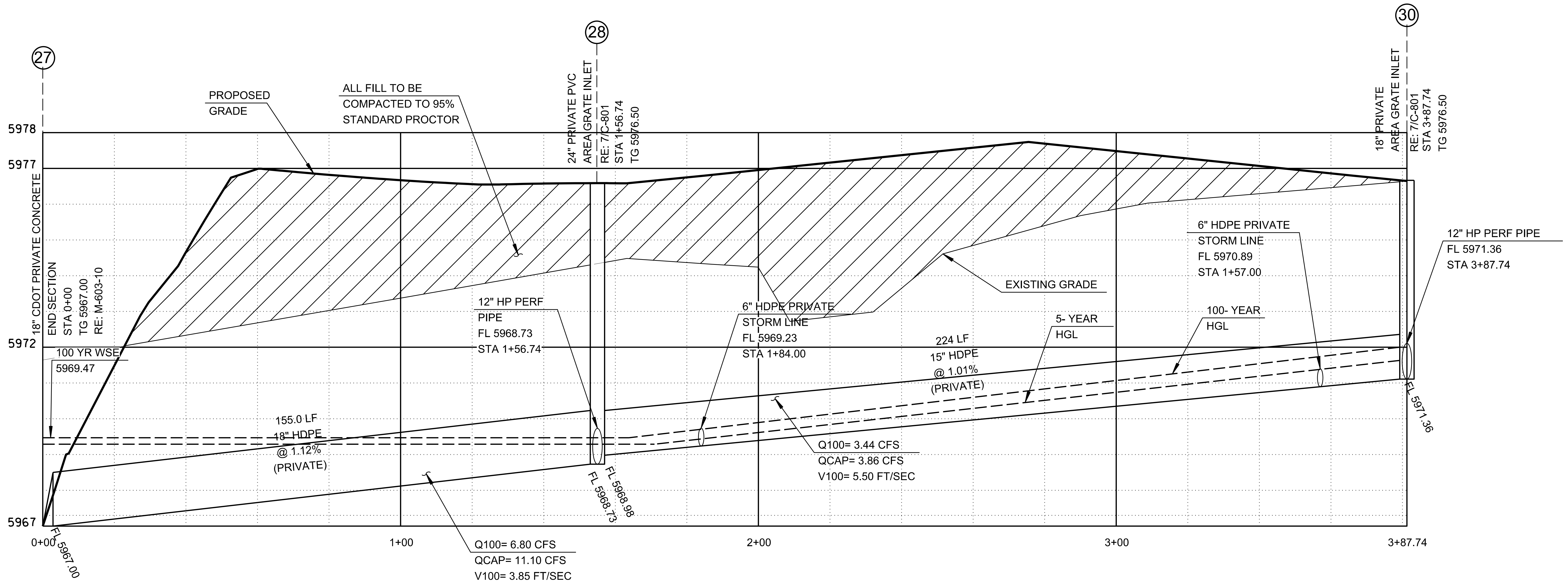

9 STORM LINE "I"

HORIZ: 1"=20'
VERT: 1"=2'

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STORM SEWER PROFILES

C-704

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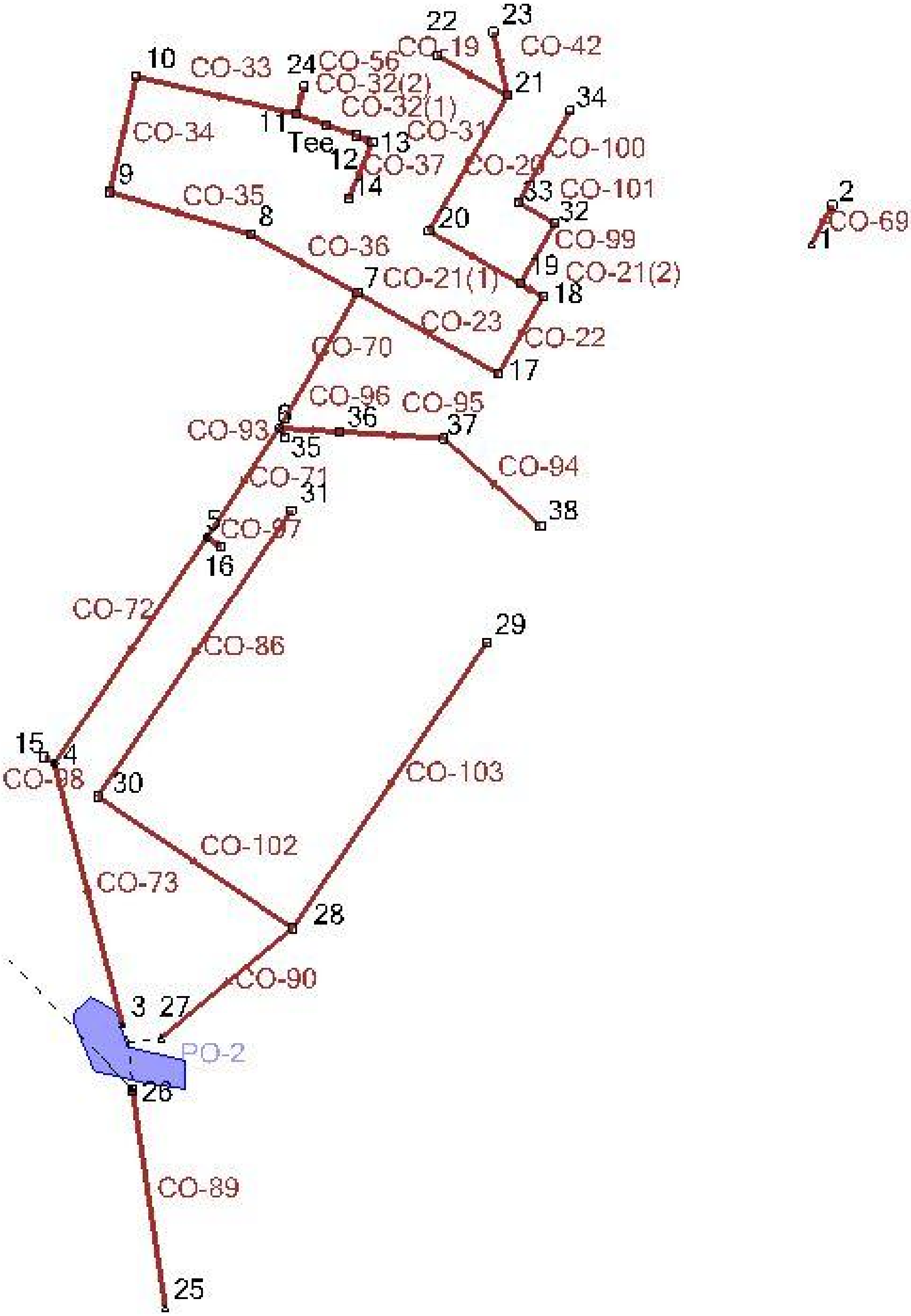
Scenario: Base

5-year



FlexTable: Manhole Table

Current Time: 0.00 hours 5-YEAR

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total In) (cfs)	Flow (Total Out) (cfs)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Diameter (in)	Is Ever Overflowing?
194	6	5,978.09	5,978.09	5,969.57	0.32	0.15	5,970.08	5,970.08	30.0	False
196	5	5,975.87	5,975.87	5,969.50	0.32	0.15	5,969.89	5,969.89	30.0	False
198	4	5,975.79	5,975.79	5,968.48	0.21	0.15	5,968.86	5,968.86	30.0	False

FlexTable: Outfall Table

Current Time: 0.00 hours 5-YEAR

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Flow (Total In Maximum) (cfs)	Flow (Total Out) (cfs)
1	5,988.71	5,983.99	Free Outfall	6.43	0.15
3	5,967.48	5,967.48	Boundary Element	(N/A)	0.15
27	5,971.37	5,967.00	Boundary Element	(N/A)	0.15
25	5,967.98	5,964.41	Free Outfall	13.88	0.00

FlexTable: Catch Basin Table

Current Time: 0.00 hours 5-YEAR

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Diameter (in)	Is Ever Overflowing?
2	5,987.00	5,984.12	5,984.62	5,984.62	36.0	False
7	5,984.75	5,973.90	5,974.20	5,974.20	30.0	False
8	5,984.95	5,978.11	5,978.17	5,978.17	24.0	False
9	5,983.50	5,978.81	5,979.19	5,979.19	24.0	False
10	5,983.50	5,979.60	5,979.96	5,979.96	24.0	False
11	5,985.20	5,980.85	5,981.22	5,981.22	18.0	False
12	5,984.30	5,981.30	5,981.62	5,981.62	18.0	False
13	5,985.50	5,981.50	5,981.80	5,981.80	12.0	False
14	5,985.40	5,982.00	5,982.28	5,982.28	12.0	False
15	5,974.47	5,969.00	5,969.08	5,969.08	18.0	False
16	5,976.30	5,969.70	5,969.89	5,969.89	18.0	False
17	5,983.90	5,978.95	5,979.03	5,979.03	24.0	False
18	5,984.40	5,979.23	5,979.56	5,979.56	18.0	False
19	5,985.18	5,979.80	5,980.01	5,980.01	18.0	False
20	5,985.60	5,980.17	5,980.63	5,980.63	18.0	False
21	5,985.78	5,981.28	5,981.57	5,981.57	18.0	False
22	5,985.60	5,982.75	5,982.86	5,982.86	12.0	False
23	5,984.75	5,981.75	5,981.94	5,981.94	36.0	False
24	5,983.30	5,981.50	5,981.59	5,981.59	18.0	False
28	5,976.58	5,968.73	5,968.82	5,968.82	24.0	False
29	5,976.56	5,973.00	5,973.12	5,973.12	18.0	False
30	5,976.59	5,971.36	5,971.52	5,971.52	18.0	False
31	5,976.57	5,974.50	5,974.62	5,974.62	18.0	False
32	5,984.27	5,981.00	5,981.00	5,981.00	18.0	False
33	5,984.54	5,981.50	5,981.50	5,981.50	12.0	False
34	5,986.88	5,983.80	5,983.80	5,983.80	12.0	False
35	5,978.50	5,969.80	5,970.08	5,970.08	18.0	False
36	5,975.15	5,970.02	5,970.32	5,970.32	30.0	False
37	5,975.15	5,970.82	5,971.14	5,971.14	30.0	False
38	5,974.63	5,971.88	5,972.17	5,972.17	30.0	False
Tee	5,985.20	5,981.00	5,981.40	5,981.40	18.0	False

FlexTable: Conduit Table

Current Time: 0.00 hours 5-YEAR

Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Slope (Calculated) (%)	Diameter (in)	Velocity (Maximum Calculated) (ft/s)	Flow (Maximum) (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)
22	5,982.75	21	5,981.28	1.93	8.0	1.99	0.15	1.68	5,982.86
21	5,981.28	20	5,980.17	0.75	15.0	3.33	0.97	5.59	5,981.57
20	5,980.17	19	5,979.80	0.37	15.0	3.17	1.74	3.93	5,980.63
18	5,979.23	17	5,978.95	0.33	18.0	3.04	1.74	6.03	5,979.56
17	5,978.95	7	5,973.90	3.28	18.0	5.56	2.16	19.02	5,979.03
7	5,973.90	6	5,969.57	2.91	24.0	6.96	5.87	38.59	5,974.20
13	5,981.50	12	5,981.30	0.83	12.0	3.74	1.18	3.25	5,981.80
12	5,981.30	Tee	5,981.00	1.00	12.0	4.36	1.61	3.56	5,981.62
11	5,980.85	10	5,979.60	0.80	15.0	4.56	2.67	5.76	5,981.22
10	5,979.60	9	5,978.81	0.69	15.0	4.37	2.80	5.35	5,979.96
9	5,978.81	8	5,978.11	0.53	15.0	4.04	2.95	4.69	5,979.19
8	5,978.11	7	5,973.90	3.48	15.0	8.61	3.71	12.05	5,978.17
14	5,982.00	13	5,981.50	0.85	12.0	3.76	1.18	3.28	5,982.28
Tee	5,981.00	11	5,980.85	0.50	12.0	3.56	1.61	2.52	5,981.40
23	5,981.75	21	5,981.28	0.76	15.0	3.82	0.82	7.31	5,981.94
19	5,979.80	18	5,979.23	2.28	15.0	5.85	1.74	9.75	5,980.01
2	5,984.12	1	5,983.99	0.38	18.0	4.84	6.44	6.44	5,984.62
24	5,981.50	11	5,980.85	2.41	12.0	3.03	0.62	5.53	5,981.59
6	5,969.57	5	5,969.50	0.06	24.0	4.17	8.57	5.36	5,970.08
5	5,969.50	4	5,968.48	0.39	24.0	4.75	8.74	14.20	5,969.89
4	5,968.48	3	5,967.48	0.39	24.0	3.64	8.80	14.14	5,968.86
30	5,971.36	28	5,968.73	1.17	12.0	3.19	0.48	3.86	5,971.52
36	5,970.02	6	5,969.57	0.81	18.0	1.80	2.68	9.47	5,970.32
37	5,970.82	36	5,970.02	0.80	18.0	4.07	2.48	9.40	5,971.14
38	5,971.88	37	5,970.82	0.80	18.0	4.26	2.14	9.39	5,972.17
32	5,981.00	19	5,979.80	1.85	12.0	0.00	0.00	4.85	5,981.00
33	5,981.50	32	5,981.00	1.25	6.0	0.00	0.00	0.63	5,981.50
34	5,983.80	33	5,981.50	2.28	6.0	0.00	0.00	0.85	5,983.80
35	5,969.80	6	5,969.57	2.89	8.0	0.06	0.02	2.06	5,970.08
16	5,969.70	5	5,969.50	7.58	8.0	1.18	0.17	3.33	5,969.89
15	5,969.00	4	5,968.48	6.72	8.0	1.38	0.06	3.13	5,969.08
31	5,974.50	30	5,971.36	0.96	12.0	2.28	0.24	3.49	5,974.62
29	5,973.00	28	5,968.73	1.30	12.0	2.45	0.23	4.06	5,973.12
26	5,966.50	25	5,964.41	1.01	18.0	7.85	13.88	10.55	5,966.50
28	5,968.73	27	5,967.00	1.12	18.0	0.56	0.94	11.10	5,968.82

Hydraulic Grade Line (Out) (ft)	Length (User Defined) (ft)	Manning's n	Headloss (ft)
5,981.57	76.0	0.013	1.29
5,980.63	148.0	0.013	0.94
5,980.01	100.0	0.013	0.62
5,979.03	85.0	0.013	0.53
5,974.20	154.0	0.013	4.83
5,970.08	148.8	0.013	4.12

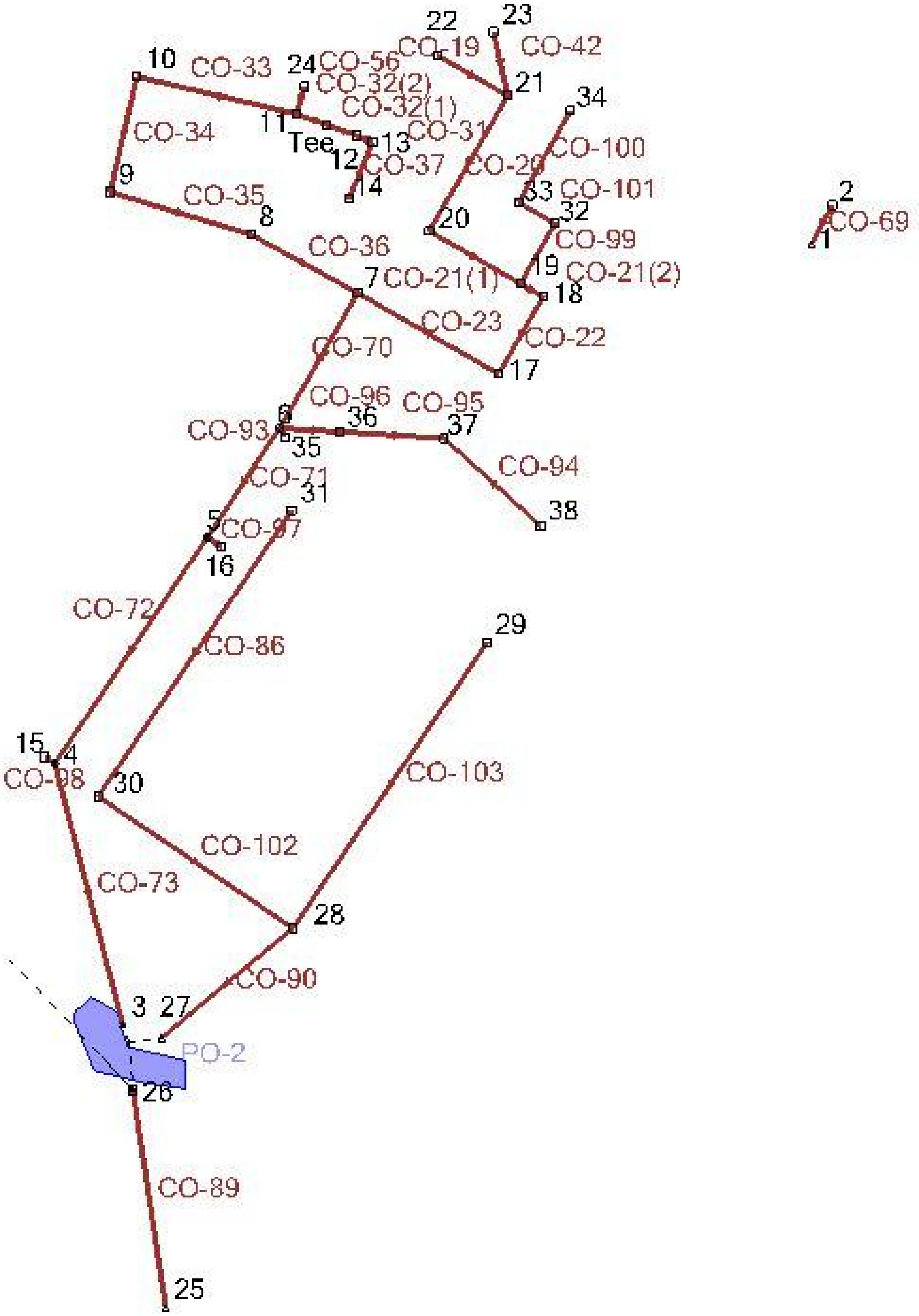
FlexTable: Conduit Table

Current Time: 0.00 hours

Hydraulic Grade Line (Out) (ft)	Length (User Defined) (ft)	Manning's n	Headloss (ft)
5,981.62	24.0	0.013	0.18
5,981.40	30.0	0.013	0.22
5,979.96	157.0	0.013	1.26
5,979.19	115.0	0.013	0.77
5,978.17	133.0	0.013	1.02
5,974.20	121.0	0.013	3.97
5,981.80	59.0	0.013	0.48
5,981.22	30.0	0.013	0.18
5,981.57	62.0	0.010	0.37
5,979.56	25.0	0.013	0.45
5,983.99	34.6	0.013	0.63
5,981.22	27.0	0.013	0.37
5,969.89	124.6	0.013	0.20
5,968.86	259.0	0.013	1.03
5,967.73	256.0	0.013	1.12
5,968.82	224.5	0.013	2.70
5,970.08	55.4	0.013	0.23
5,970.32	100.0	0.013	0.82
5,971.14	132.6	0.013	1.03
5,980.01	64.8	0.013	0.99
5,981.00	40.1	0.013	0.50
5,981.50	100.7	0.013	2.30
5,970.08	8.0	0.013	0.00
5,969.89	2.6	0.013	0.00
5,968.86	7.7	0.013	0.22
5,971.52	328.0	0.013	3.10
5,968.82	328.8	0.013	4.30
5,964.41	207.0	0.013	2.09
5,967.02	155.0	0.013	1.80

Scenario: Base

100-year



FlexTable: Conduit Table

Current Time: 0.00 hours 100-YEAR

Start Node	Invert (Start) (ft)	Stop Node	Invert (Stop) (ft)	Slope (Calculated) (%)	Diameter (in)	Velocity (Maximum Calculated) (ft/s)	Flow (Maximum) (cfs)	Capacity (Full Flow) (cfs)	Hydraulic Grade Line (In) (ft)
22	5,982.75	21	5,981.28	1.93	8.0	2.81	0.27	1.68	5,982.86
21	5,981.28	20	5,980.30	0.66	15.0	4.09	2.56	5.26	5,981.68
20	5,980.30	19	5,979.80	0.50	15.0	4.39	4.00	4.57	5,980.82
18	5,979.37	17	5,978.95	0.49	18.0	4.29	4.00	7.38	5,979.73
17	5,978.95	7	5,973.90	3.28	18.0	6.46	4.79	19.02	5,979.01
7	5,973.90	6	5,970.14	2.53	24.0	4.07	12.79	35.96	5,974.07
13	5,981.50	12	5,981.30	0.83	12.0	1.51	1.18	3.25	5,981.85
12	5,981.30	Tee	5,981.00	1.00	12.0	3.00	2.36	3.56	5,981.77
11	5,980.85	10	5,979.60	0.80	15.0	4.20	5.15	5.76	5,981.29
10	5,979.60	9	5,978.81	0.69	15.0	4.80	5.89	5.35	5,980.07
9	5,978.81	8	5,978.11	0.53	15.0	5.37	6.59	4.69	5,979.29
8	5,978.11	7	5,973.90	3.48	15.0	10.48	8.00	12.05	5,978.18
14	5,982.00	13	5,981.50	0.85	12.0	3.75	1.18	3.28	5,982.28
Tee	5,981.00	11	5,980.85	0.50	12.0	3.12	2.36	2.52	5,981.50
23	5,981.75	21	5,981.28	0.76	15.0	5.09	2.29	7.31	5,982.01
19	5,979.80	18	5,979.37	1.72	15.0	6.55	4.00	8.47	5,980.09
2	5,985.62	1	5,985.00	1.79	18.0	8.59	13.60	14.06	5,986.11
24	5,981.50	11	5,980.85	2.41	12.0	3.50	2.01	5.53	5,981.68
6	5,970.14	5	5,969.53	0.49	24.0	6.45	20.26	15.89	5,970.46
5	5,969.53	4	5,968.23	0.50	24.0	6.66	20.92	16.00	5,969.84
4	5,968.23	3	5,966.95	0.50	24.0	6.81	21.39	16.00	5,968.55
30	5,971.36	28	5,968.73	1.17	12.0	5.50	3.44	3.86	5,971.70
36	5,970.44	6	5,970.14	0.54	18.0	4.46	7.88	7.73	5,970.89
37	5,971.08	36	5,970.44	0.64	18.0	4.06	7.17	8.41	5,971.57
38	5,971.88	37	5,971.08	0.60	18.0	4.63	6.18	8.16	5,972.42
32	5,981.00	19	5,979.80	1.85	12.0	0.00	0.00	4.85	5,981.00
33	5,981.50	32	5,981.00	1.25	6.0	0.00	0.00	0.63	5,981.50
34	5,983.80	33	5,981.50	2.28	6.0	0.00	0.00	0.85	5,983.80
35	5,970.30	6	5,970.14	2.01	8.0	0.43	0.15	1.71	5,970.46
16	5,969.70	5	5,969.53	6.63	8.0	4.99	0.66	3.11	5,969.94
15	5,969.00	4	5,968.23	9.95	8.0	3.67	0.47	3.81	5,969.16
31	5,974.50	30	5,971.36	0.96	12.0	4.38	1.72	3.49	5,974.81
29	5,973.00	28	5,968.73	1.30	12.0	5.06	1.68	4.06	5,973.29
26	5,966.50	25	5,964.41	1.01	18.0	9.37	16.56	10.55	5,966.50
28	5,968.73	27	5,967.00	1.12	18.0	3.85	6.80	11.10	5,969.04

Start Node	Hydraulic Grade Line (Out) (ft)	Length (User Defined) (ft)	Manning's n	Head loss (ft)
22	5,981.68	76.0	0.013	1.18
21	5,980.82	148.0	0.013	0.86
20	5,980.09	100.0	0.013	0.73
18	5,979.01	85.0	0.013	0.73
17	5,974.07	154.0	0.013	4.94
7	5,970.46	148.8	0.013	3.61

* These values are inputted from Proposed Hydrology Table in Appendix D.

This table is calculated using the Implicit Method

FlexTable: Conduit Table

Current Time: 0.00 hours

Start Node	Hydraulic Grade Line (Out) (ft)	Length (User Defined) (ft)	Manning's n	Head loss (ft)
13	5,981.77	24.0	0.013	0.08
12	5,981.50	30.0	0.013	0.26
11	5,980.07	157.0	0.013	1.23
10	5,979.29	115.0	0.013	0.78
9	5,978.18	133.0	0.013	1.11
8	5,974.07	121.0	0.013	4.11
14	5,981.85	59.0	0.013	0.43
Tee	5,981.29	30.0	0.013	0.21
23	5,981.68	62.0	0.010	0.33
19	5,979.73	25.0	0.013	0.36
2	5,985.01	34.6	0.013	1.11
24	5,981.29	27.0	0.013	0.39
6	5,969.84	124.6	0.013	0.61
5	5,968.55	259.0	0.013	1.29
4	5,967.23	256.0	0.013	1.32
30	5,969.04	224.5	0.013	2.65
36	5,970.46	55.4	0.013	0.43
37	5,970.89	100.0	0.013	0.68
38	5,971.57	132.6	0.013	0.85
32	5,980.09	64.8	0.013	0.91
33	5,981.00	40.1	0.013	0.50
34	5,981.50	100.7	0.013	2.30
35	5,970.46	8.0	0.013	0.00
16	5,969.84	2.6	0.013	0.10
15	5,968.55	7.7	0.013	0.62
31	5,971.70	328.0	0.013	3.11
29	5,969.04	328.8	0.013	4.24
26	5,964.41	207.0	0.013	2.09
28	5,967.02	155.0	0.013	2.02

FlexTable: Manhole Table

Current Time: 0.00 hours 100-YEAR

ID	Label	Elevation (Ground) (ft)	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Flow (Total In) (cfs)	Flow (Total Out) (cfs)	Hydraulic Grade Line (Out) (ft)	Hydraulic Grade Line (In) (ft)	Diameter (in)	Is Ever Overflowing?
194	6	5,978.09	5,978.09	5,970.14	0.37	0.15	5,970.46	5,970.46	30.0	False
196	5	5,975.87	5,975.87	5,969.53	0.81	0.15	5,969.84	5,969.84	30.0	False
198	4	5,975.79	5,975.79	5,968.23	0.62	0.15	5,968.55	5,968.55	30.0	False

FlexTable: Outfall Table

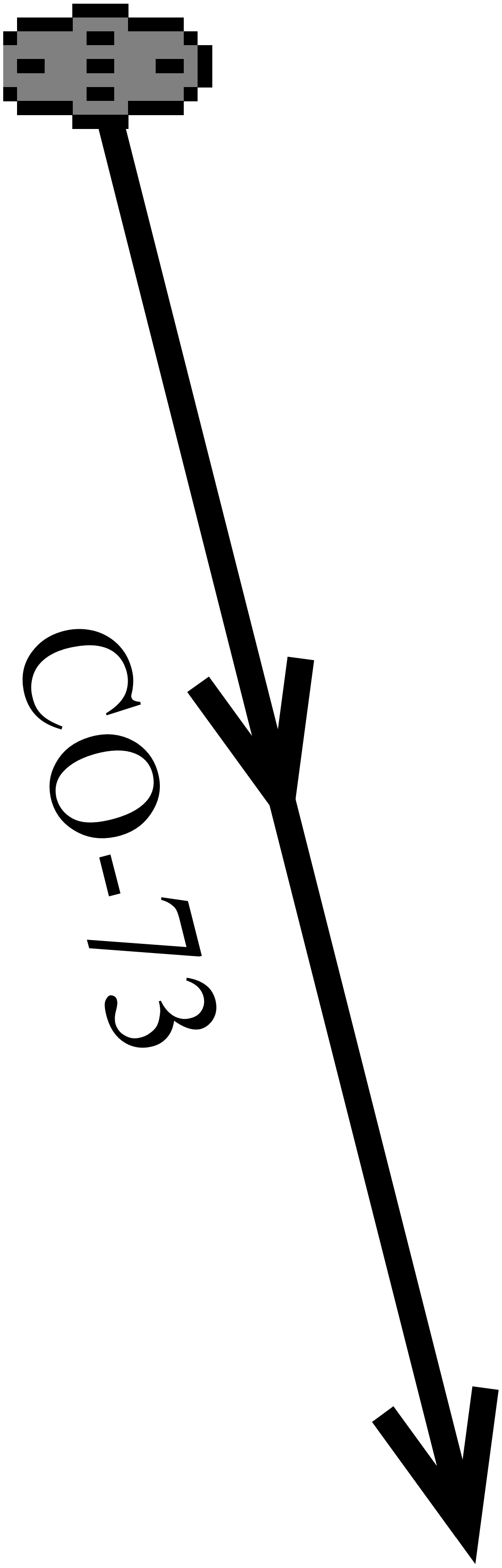
Current Time: 0.00 hours 100-YEAR

Label	Elevation (Rim) (ft)	Elevation (Invert) (ft)	Boundary Condition Type	Flow (Total In Maximum) (cfs)	Flow (Total Out) (cfs)
1	5,988.71	5,985.00	Free Outfall	13.60	0.15
3	5,967.48	5,966.95	Boundary Element	(N/A)	0.15
27	5,971.37	5,967.00	Boundary Element	(N/A)	0.15
25	5,967.98	5,964.41	Free Outfall	16.56	0.00

FlexTable: Catch Basin Table

Current Time: 0.00 hours 100-YEAR

Label	Elevation (Ground) (ft)	Elevation (Invert) (ft)	Hydraulic Grade Line (In) (ft)	Hydraulic Grade Line (Out) (ft)	Diameter (in)	Is Ever Overflowing?
2	5,987.00	5,985.62	5,986.11	5,986.11	36.0	True
7	5,984.75	5,973.90	5,974.07	5,974.07	30.0	False
8	5,984.95	5,978.11	5,978.18	5,978.18	24.0	False
9	5,983.50	5,978.81	5,979.29	5,979.29	24.0	False
10	5,983.50	5,979.60	5,980.07	5,980.07	24.0	False
11	5,985.20	5,980.85	5,981.29	5,981.29	18.0	False
12	5,984.30	5,981.30	5,981.77	5,981.77	18.0	False
13	5,985.50	5,981.50	5,981.85	5,981.85	12.0	False
14	5,985.40	5,982.00	5,982.28	5,982.28	12.0	False
15	5,974.47	5,969.00	5,969.16	5,969.16	18.0	False
16	5,976.30	5,969.70	5,969.94	5,969.94	18.0	False
17	5,983.90	5,978.95	5,979.01	5,979.01	24.0	False
18	5,984.40	5,979.37	5,979.73	5,979.73	18.0	False
19	5,985.18	5,979.80	5,980.09	5,980.09	18.0	False
20	5,985.60	5,980.30	5,980.82	5,980.82	18.0	False
21	5,985.78	5,981.28	5,981.68	5,981.68	18.0	False
22	5,985.60	5,982.75	5,982.86	5,982.86	12.0	False
23	5,984.75	5,981.75	5,982.01	5,982.01	36.0	False
24	5,983.30	5,981.50	5,981.68	5,981.68	18.0	False
28	5,976.58	5,968.73	5,969.04	5,969.04	24.0	False
29	5,976.56	5,973.00	5,973.29	5,973.29	18.0	False
30	5,976.59	5,971.36	5,971.70	5,971.70	18.0	False
31	5,976.57	5,974.50	5,974.81	5,974.81	18.0	False
32	5,984.27	5,981.00	5,981.00	5,981.00	18.0	False
33	5,984.54	5,981.50	5,981.50	5,981.50	12.0	False
34	5,986.88	5,983.80	5,983.80	5,983.80	12.0	False
35	5,978.50	5,970.30	5,970.46	5,970.46	18.0	False
36	5,975.15	5,970.44	5,970.89	5,970.89	30.0	False
37	5,975.15	5,971.08	5,971.57	5,971.57	30.0	False
38	5,974.63	5,971.88	5,972.42	5,972.42	30.0	True
Tee	5,985.20	5,981.00	5,981.50	5,981.50	18.0	False


CO-73

Program: UDSEWER Math Model Interface 2.1.1.4 **Run Date:** 11/14/2019 11:12:18 AM	**UDSewer Results Summary** **Project Title:** Atlas Preparatory Charter School **Project Description:** Addition of New Building, Parking lot and Track Area

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System Input Summary

Rainfall Parameters

Rainfall Return Period: 5
Rainfall Calculation Method: Formula

One Hour Depth (in):
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 500
Maximum Urban Overland Len. (ft): 300
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 24.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
OUTFALL 1	5967.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO-73	5975.70	8.80	0.00	2.02	0.35	0.08	57.00	0.40	256.00	4.14

Manhole Output Summary:

	Local Contribution					**Total Design Flow**				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CO-73	18.81	1.03	19.84	NaN	NaN	0.71	12.45	NaN	8.80	Surface Water Present (Downstream)

Sewer Input Summary:

		Elevation			**Loss Coefficients**			**Given Dimensions**		
Element Name	**Sewer Length (ft)**	**Downstream Invert (ft)**	**Slope (%)**	**Upstream Invert (ft)**	**Mannings n**	**Bend Loss**	**Lateral Loss**	**Cross Section**	**Rise (ft or in)**	**Span (ft or in)**
CO-73	256.00	5967.46	0.4	5968.48	0.013	0.03	0.00	CIRCULAR	24.00 in	24.00 in

---

Sewer Flow Summary:

	Full Flow Capacity		**Critical Flow**		**Normal Flow**						
Element Name	**Flow (cfs)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Froude Number**	**Flow Condition**	**Flow (cfs)**	**Surcharged Length (ft)**	**Comment**
CO-73	14.35	4.57	12.70	5.22	13.59	4.80	0.88	Subcritical	8.80	0.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		**Calculated**		**Used**			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
CO-73	8.80	CIRCULAR	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	24.00 in	3.14	

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 0.00

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
CO-73	5967.46	5968.48	0.00	0.00	5968.51	5969.69	5968.94	1.06	5969.99

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

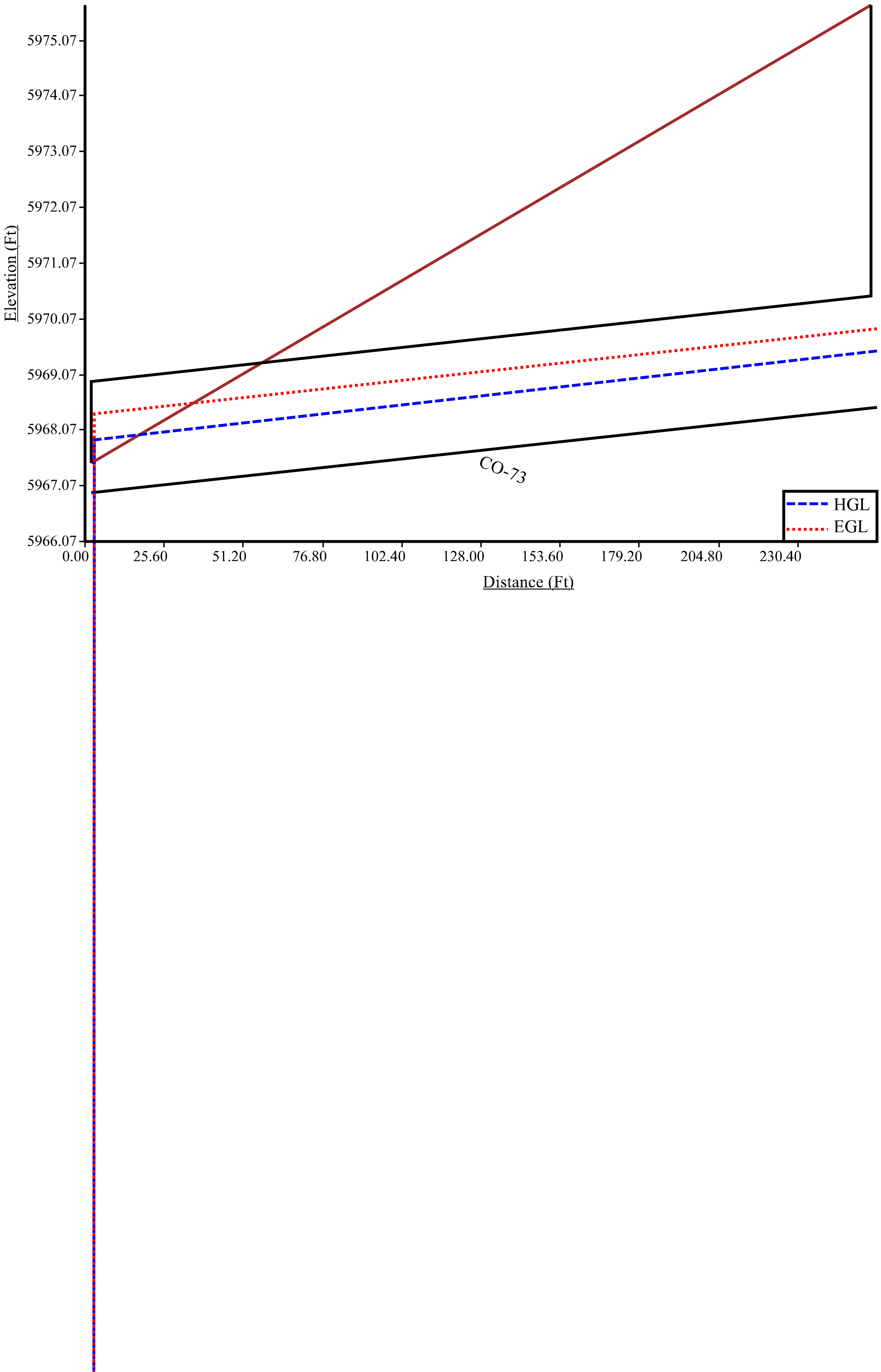
The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

					Downstream			Upstream				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
CO-73	256.00	3.00	4.00	5.50	0.00	0.61	0.00	13.44	7.80	4.97	294.02	

Total earth volume for sewer trenches = 294 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.

5-Year Profile



Program: UDSEWER Math Model Interface 2.1.1.4 **Run Date:** 11/14/2019 11:14:29 AM	**UDSewer Results Summary** **Project Title:** Atlas Preparatory Charter School **Project Description:** Addition of New Building, Parking lot and Track Area

System Input Summary

Rainfall Parameters

Rainfall Return Period: 100
Rainfall Calculation Method: Formula

One Hour Depth (in):
Rainfall Constant "A": 28.5
Rainfall Constant "B": 10
Rainfall Constant "C": 0.786

Rational Method Constraints

Minimum Urban Runoff Coeff.: 0.20
Maximum Rural Overland Len. (ft): 500
Maximum Urban Overland Len. (ft): 300
Used UDFCD Tc. Maximum: Yes

Sizer Constraints

Minimum Sewer Size (in): 18.00
Maximum Depth to Rise Ratio: 0.90
Maximum Flow Velocity (fps): 18.0
Minimum Flow Velocity (fps): 2.0

Backwater Calculations:

Tailwater Elevation (ft): 0.00

Manhole Input Summary:

		Given Flow		Sub Basin Information						
Element Name	Ground Elevation (ft)	Total Known Flow (cfs)	Local Contribution (cfs)	Drainage Area (Ac.)	Runoff Coefficient	5yr Coefficient	Overland Length (ft)	Overland Slope (%)	Gutter Length (ft)	Gutter Velocity (fps)
OUTFALL 1	5966.95	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
CO-73	5975.70	22.10	0.00	2.02	0.35	0.08	57.00	0.40	256.00	4.14

Manhole Output Summary:

	Local Contribution					Total Design Flow				
Element Name	**Overland Time (min)**	**Gutter Time (min)**	**Basin Tc (min)**	**Intensity (in/hr)**	**Local Contrib (cfs)**	**Coeff. Area**	**Intensity (in/hr)**	**Manhole Tc (min)**	**Peak Flow (cfs)**	**Comment**
OUTFALL 1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
CO-73	18.81	1.03	19.84	NaN	NaN	0.71	31.26	NaN	22.10	Surface Water Present (Downstream)

Sewer Input Summary:

		Elevation			Loss Coefficients			Given Dimensions		
Element Name	**Sewer Length (ft)**	**Downstream Invert (ft)**	**Slope (%)**	**Upstream Invert (ft)**	**Mannings n**	**Bend Loss**	**Lateral Loss**	**Cross Section**	**Rise (ft or in)**	**Span (ft or in)**
CO-73	256.00	5966.94	0.6	5968.48	0.013	0.03	0.00	CIRCULAR	24.00 in	24.00 in

Sewer Flow Summary:

	Full Flow Capacity		Critical Flow		Normal Flow						
Element Name	**Flow (cfs)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Depth (in)**	**Velocity (fps)**	**Froude Number**	**Flow Condition**	**Flow (cfs)**	**Surcharged Length (ft)**	**Comment**
CO-73	17.57	5.59	24.00	7.03	24.00	7.03	0.00	Pressurized	22.10	256.00	

- A Froude number of 0 indicates that pressured flow occurs (adverse slope or undersized pipe).
- If the sewer is not pressurized, full flow represents the maximum gravity flow in the sewer.
- If the sewer is pressurized, full flow represents the pressurized flow conditions.

Sewer Sizing Summary:

			Existing		Calculated		Used			
Element Name	**Peak Flow (cfs)**	**Cross Section**	**Rise**	**Span**	**Rise**	**Span**	**Rise**	**Span**	**Area (ft^2)**	**Comment**
CO-73	22.10	CIRCULAR	24.00 in	24.00 in	27.00 in	27.00 in	24.00 in	24.00 in	3.14	Existing height is smaller than the suggested height. Existing width is smaller than the suggested width. Exceeds max. Depth/Rise

- Calculated diameter was determined by sewer hydraulic capacity rounded up to the nearest commercially available size.
- Sewer sizes should not decrease downstream.
- All hydraulics where calculated using the 'Used' parameters.

Grade Line Summary:

Tailwater Elevation (ft): 0.00

	Invert Elev.		Downstream Manhole Losses		HGL		EGL		
Element Name	**Downstream (ft)**	**Upstream (ft)**	**Bend Loss (ft)**	**Lateral Loss (ft)**	**Downstream (ft)**	**Upstream (ft)**	**Downstream (ft)**	**Friction Loss (ft)**	**Upstream (ft)**
CO-73	5966.94	5968.48	0.00	0.00	5968.94	5971.37	5969.71	2.43	5972.14

- Bend and Lateral losses only apply when there is an outgoing sewer. The system outfall, sewer #0, is not considered a sewer.
- Bend loss = Bend K * V_fi ^ 2/(2*g)
- Lateral loss = V_fo ^ 2/(2*g)- Junction Loss K * V_fi ^ 2/(2*g).
- Friction loss is always Upstream EGL - Downstream EGL.

Excavation Estimate:

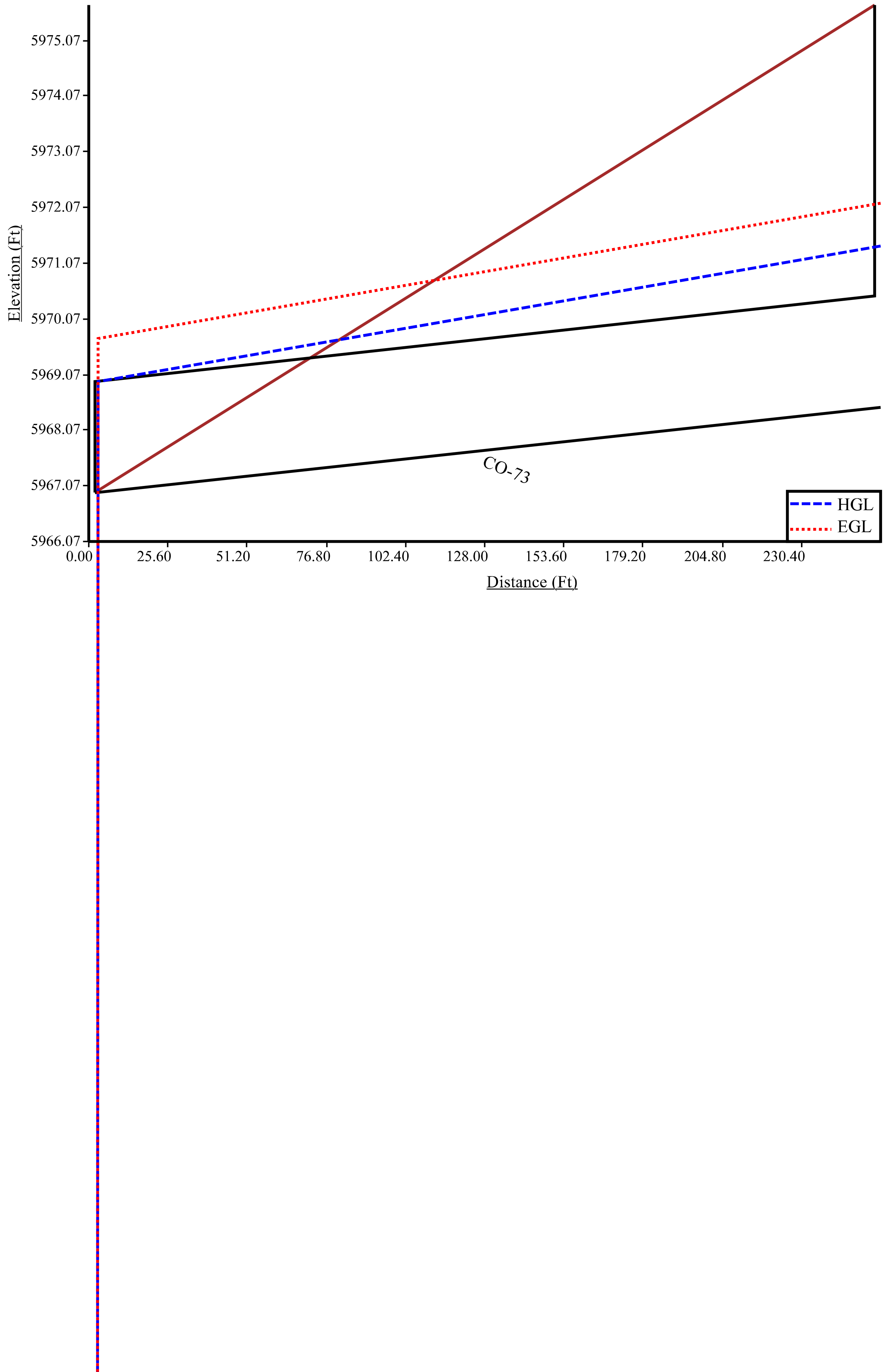
The trench side slope is 1.0 ft/ft
The minimum trench width is 2.00 ft

					Downstream			Upstream				
Element Name	**Length (ft)**	**Wall (in)**	**Bedding (in)**	**Bottom Width (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Top Width (ft)**	**Trench Depth (ft)**	**Cover (ft)**	**Volume (cu. yd)**	**Comment**
CO-73	256.00	3.00	4.00	5.50	0.00	0.59	0.00	13.44	7.80	4.97	293.55	

Total earth volume for sewer trenches = 294 cubic yards.

- The trench was estimated to have a bottom width equal to the outer pipe diameter plus 36 inches.
- If the calculated width of the trench bottom is less than the minimum acceptable width, the minimum acceptable width was used.
- The sewer wall thickness is equal to: (equivalent diameter in inches/12)+1 inches
- The sewer bedding thickness is equal to:
  - Four inches for pipes less than 33 inches.
  - Six inches for pipes less than 60 inches.
  - Eight inches for all larger sizes.

100-Year Profile

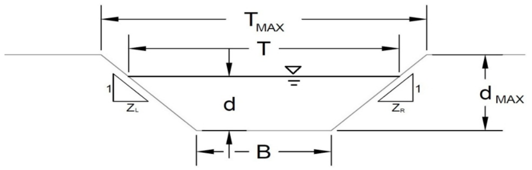


Version 4.05 Released March 2017

AREA INLET IN A SWALE

Atlas Preparatory School

XDP-1



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0190	ft/ft
Bottom Width	B =	1.00	ft
Left Side Slope	Z1 =	6.25	ft/ft
Right Side Slope	Z2 =	6.25	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**7.00**	**7.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.00**	**1.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**1.1**	**1.1**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.48**	**0.48**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.1**	**0.6**	**cfs**
Water Depth	d =	**0.19**	**0.42**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

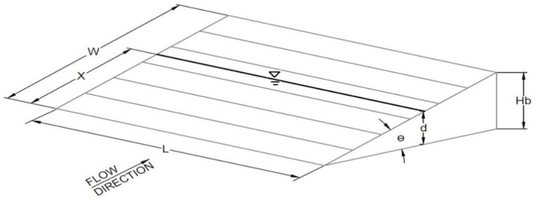
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-1

Inlet Design Information (Input)

Type of Inlet	User-Defined ▾	Inlet Type =	User-Defined	
Angle of Inclined Grate (must be <= 30 degrees)		θ =	0.00	degrees
Width of Grate		W =	2.00	feet
Length of Grate		L =	2.00	feet
Open Area Ratio		A_{RATIO} =	0.70	
Height of Inclined Grate		H_B =	0.00	feet
Clogging Factor		C_f =	0.50	
Grate Discharge Coefficient		C_d =	N/A	
Orifice Coefficient		C_o =	0.64	
Weir Coefficient		C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.19	0.42	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.1**	**3.4**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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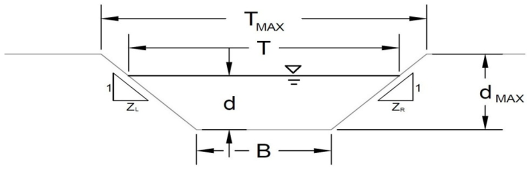
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-2



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0180	ft/ft
Bottom Width	B =	1.00	ft
Left Side Slope	Z1 =	14.00	ft/ft
Right Side Slope	Z2 =	14.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:

○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**20.00**	**30.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.00**	**1.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**8.1**	**35.4**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.68**	**1.00**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**1.0**	**2.9**	**cfs**
Water Depth	d =	**0.41**	**0.54**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

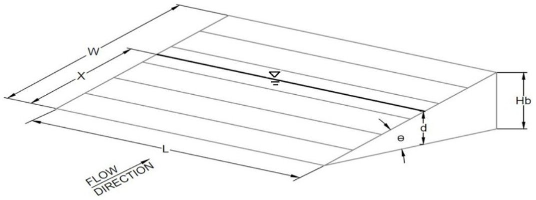
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-2

Inlet Design Information (Input)

Type of Inlet: User-Defined ▾ Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	2.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.41	0.54	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**3.3**	**4.9**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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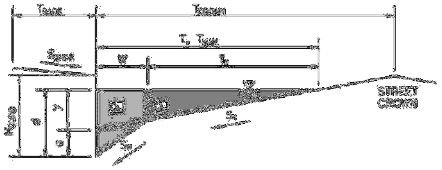
ALLOWABLE CAPACITY FOR ONE-HALF OF STREET (Minor & Major Storm)

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

Project: Atlas Preparatory School
Inlet ID: XDP-3



Gutter Geometry (Enter data in the blue cells)

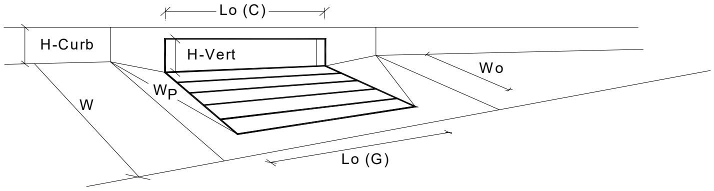
Maximum Allowable Width for Spread Behind Curb	T_{BACK} =	35.0	ft
Side Slope Behind Curb (leave blank for no conveyance credit behind curb)	S_{BACK} =	0.011	ft/ft
Manning's Roughness Behind Curb (typically between 0.012 and 0.020)	n_{BACK} =	0.012	
Height of Curb at Gutter Flow Line	H_{CURB} =	6.00	inches
Distance from Curb Face to Street Crown	T_{CROWN} =	35.0	ft
Gutter Width	W =	1.00	ft
Street Transverse Slope	S_X =	0.550	ft/ft
Gutter Cross Slope (typically 2 inches over 24 inches or 0.083 ft/ft)	S_W =	0.083	ft/ft
Street Longitudinal Slope - Enter 0 for sump condition	S_O =	0.000	ft/ft
Manning's Roughness for Street Section (typically between 0.012 and 0.020)	n_{STREET} =	0.012	

		Minor Storm	Major Storm	
Max. Allowable Spread for Minor & Major Storm	T_{MAX} =	35.0	35.0	ft
Max. Allowable Depth at Gutter Flowline for Minor & Major Storm	d_{MAX} =	6.0	6.0	inches
Check boxes are not applicable in SUMP conditions		☐	☐	

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion				
MAJOR STORM Allowable Capacity is based on Depth Criterion	Q_{allow} =	**SUMP**	**SUMP**	**cfs**

INLET IN A SUMP OR SAG LOCATION

Version 4.05 Released March 2017



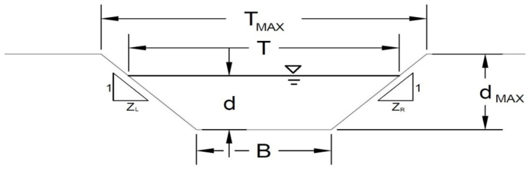
Design Information (Input)			MINOR	MAJOR	
Type of Inlet	CDOT Type R Curb Opening ▾	Type =	CDOT Type R Curb Opening		
Local Depression (additional to continuous gutter depression 'a' from above)		a_{local} =	3.00	3.00	inches
Number of Unit Inlets (Grate or Curb Opening)		No =	1	1	
Water Depth at Flowline (outside of local depression)		Ponding Depth =	6.0	6.0	inches
Grate Information			MINOR	MAJOR	☐ Override Depths
Length of a Unit Grate		L_o (G) =	N/A	N/A	feet
Width of a Unit Grate		W_o =	N/A	N/A	feet
Area Opening Ratio for a Grate (typical values 0.15-0.90)		A_{ratio} =	N/A	N/A	
Clogging Factor for a Single Grate (typical value 0.50 - 0.70)		C_f (G) =	N/A	N/A	
Grate Weir Coefficient (typical value 2.15 - 3.60)		C_w (G) =	N/A	N/A	
Grate Orifice Coefficient (typical value 0.60 - 0.80)		C_o (G) =	N/A	N/A	
Curb Opening Information			MINOR	MAJOR	
Length of a Unit Curb Opening		L_o (C) =	10.00	10.00	feet
Height of Vertical Curb Opening in Inches		H_{vert} =	6.00	6.00	inches
Height of Curb Orifice Throat in Inches		H_{throat} =	6.00	6.00	inches
Angle of Throat (see USDCM Figure ST-5)		Theta =	63.40	63.40	degrees
Side Width for Depression Pan (typically the gutter width of 2 feet)		W_p =	1.00	1.00	feet
Clogging Factor for a Single Curb Opening (typical value 0.10)		C_f (C) =	0.10	0.10	
Curb Opening Weir Coefficient (typical value 2.3-3.7)		C_w (C) =	3.60	3.60	
Curb Opening Orifice Coefficient (typical value 0.60 - 0.70)		C_o (C) =	0.67	0.67	
Low Head Performance Reduction (Calculated)			MINOR	MAJOR	
Depth for Grate Midwidth		d_{Grate} =	N/A	N/A	ft
Depth for Curb Opening Weir Equation		d_{Curb} =	0.42	0.42	ft
Combination Inlet Performance Reduction Factor for Long Inlets		$RF_{Combination}$ =	0.57	0.57	
Curb Opening Performance Reduction Factor for Long Inlets		RF_{Curb} =	0.93	0.93	
Grated Inlet Performance Reduction Factor for Long Inlets		RF_{Grate} =	N/A	N/A	
			MINOR	MAJOR	
Total Inlet Interception Capacity (assumes clogged condition)		Q_a =	**10.0**	**10.0**	**cfs**
Inlet Capacity IS GOOD for Minor and Major Storms(>Q PEAK)		$Q_{PEAK\ REQUIRED}$ =	0.8	2.4	cfs

Version 4.05 Released March 2017

AREA INLET IN A SWALE

Atlas Preparatory School

XDP-4



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	1.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ○ **Cohesive**
- ○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**137.00**	**137.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.70**	**1.70**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**374.0**	**374.0**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**1.36**	**1.36**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**6.4**	**13.5**	**cfs**
Water Depth	d =	**0.51**	**0.58**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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AREA INLET IN A SWALE

Atlas Preparatory School

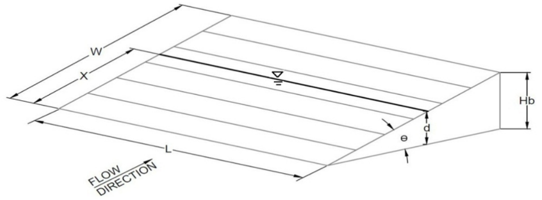
XDP-4

Inlet Design Information (Input)

Type of Inlet: CDOT Type C

Inlet Type = CDOT Type C

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	0.96	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.51	0.58	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.7**	**8.3**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**5.2**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**61**	**%**

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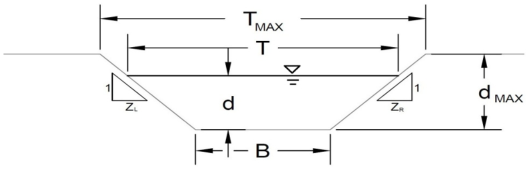
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-5



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	1.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:

○ **Non-Cohesive**

○ **Cohesive**

○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**25.00**	**25.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.50**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**0.8**	**0.8**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.24**	**0.24**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.1**	**0.7**	**cfs**
Water Depth	d =	**0.12**	**0.22**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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AREA INLET IN A SWALE

Atlas Preparatory School

XDP-5

Inlet Design Information (Input)

Type of Inlet ▾ User-Defined

Inlet Type = User-Defined

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	8.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.12	0.22	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.4**	**3.5**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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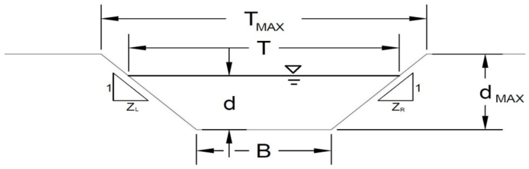
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-6



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0800	ft/ft
Bottom Width	B =	1.00	ft
Left Side Slope	Z1 =	10.00	ft/ft
Right Side Slope	Z2 =	10.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ☐ **Non-Cohesive**
- ☐ **Cohesive**
- ☐ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**5.00**	**5.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.00**	**1.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**4.7**	**4.7**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.20**	**0.20**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.6**	**1.4**	**cfs**
Water Depth	d =	**0.08**	**0.12**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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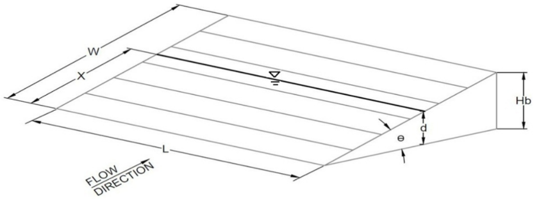
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-6

Inlet Design Information (Input)

Type of Inlet	User-Defined	Inlet Type =	User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	1.50	feet
Length of Grate	L =	1.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.08	0.12	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.2**	**0.4**	**cfs**
	Bypassed Flow, Q_b =	**0.4**	**1.1**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**31**	**25**	**%**

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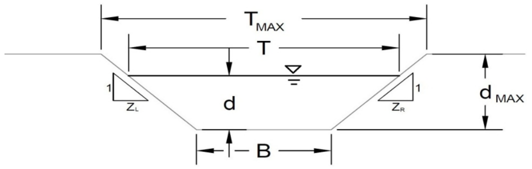
AREA INLET IN A SWALE

Atlas Preparatory School
XDP-7



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0190	ft/ft
Bottom Width	B =	23.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ☐ **Non-Cohesive**
- ☐ **Cohesive**
- ☐ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**56.00**	**56.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**1.43**	**1.43**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**5.1**	**5.1**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.33**	**0.33**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.4**	**1.2**	**cfs**
Water Depth	d =	**0.09**	**0.15**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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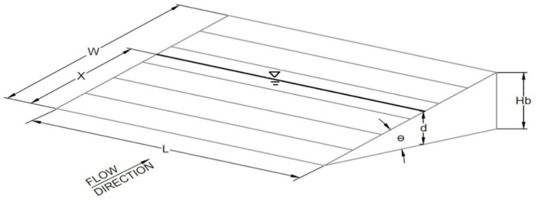
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-7

Inlet Design Information (Input)

Type of Inlet User-Defined ▾ Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	1.50	feet
Length of Grate	L =	1.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.09	0.15	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.2**	**0.5**	**cfs**
	Bypassed Flow, Q_b =	**0.2**	**0.6**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**55**	**47**	**%**

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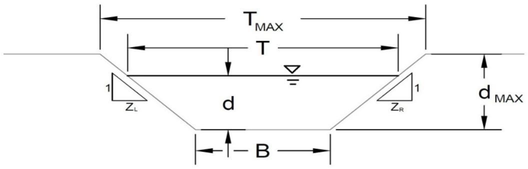
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-8



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.2200	ft/ft
Bottom Width	B =	4.00	ft
Left Side Slope	Z1 =	54.00	ft/ft
Right Side Slope	Z2 =	54.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
☐ **Non-Cohesive**
☐ **Cohesive**
☐ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**10.00**	**10.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**1.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**2.4**	**2.4**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.06**	**0.06**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.2**	**0.3**	**cfs**
Water Depth	**d =**	**0.01**	**0.02**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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AREA INLET IN A SWALE

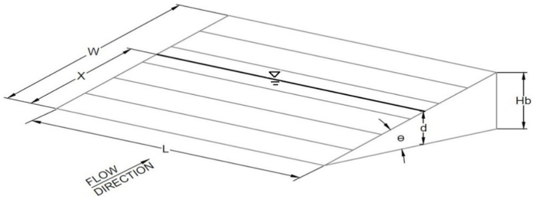
Atlas Preparatory School

XDP-8

Inlet Design Information (Input)

Type of Inlet: User-Defined ▾

Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	3.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.01	0.02	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.0**	**0.0**	**cfs**
	Bypassed Flow, Q_b =	**0.1**	**0.2**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**17**	**15**	**%**

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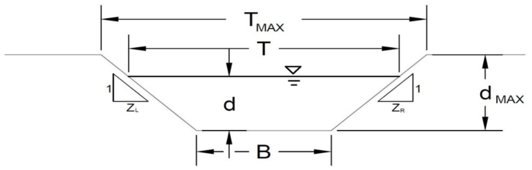
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-9



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0100	ft/ft
Bottom Width	B =	1.00	ft
Left Side Slope	Z1 =	5.00	ft/ft
Right Side Slope	Z2 =	5.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**15.00**	**15.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**1.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Depth Criterion	**Q_{allow} =**	**9.2**	**9.2**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	**d_{allow} =**	**1.00**	**1.00**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.8**	**1.4**	**cfs**
Water Depth	**d =**	**0.55**	**0.62**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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AREA INLET IN A SWALE

Atlas Preparatory School

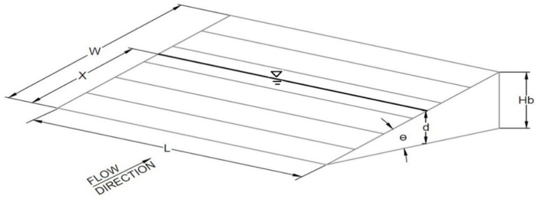
XDP-9

Inlet Design Information (Input)

Type of Inlet User-Defined ▾

Inlet Type = User-Defined

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.50	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.55	0.62	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**6.3**	**7.6**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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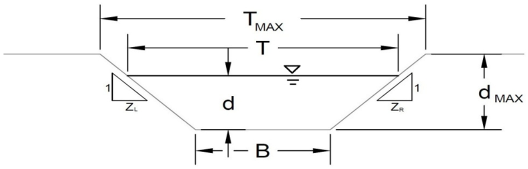
AREA INLET IN A SWALE

Atlas Preparatory School
XDP-10



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0100	ft/ft
Bottom Width	B =	1.00	ft
Left Side Slope	Z1 =	10.00	ft/ft
Right Side Slope	Z2 =	10.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ○ **Cohesive**
- ○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**15.00**	**15.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**5.00**	**5.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**3.6**	**3.6**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.70**	**0.70**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.9**	**1.7**	**cfs**
Water Depth	d =	**0.49**	**0.60**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

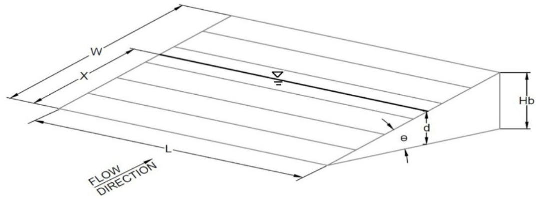
Atlas Preparatory School

XDP-10

Inlet Design Information (Input)

Type of Inlet: User-Defined

Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	2.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.49	0.60	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**4.2**	**5.6**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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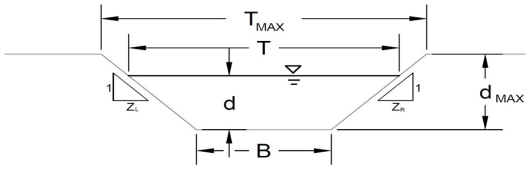
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-11



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.1100	ft/ft
Bottom Width	B =	5.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:

○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**27.00**	**35.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**5.00**	**5.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**2.2**	**7.1**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.22**	**0.30**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**2.2**	**6.6**	**cfs**
Water Depth	d =	**0.22**	**0.30**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

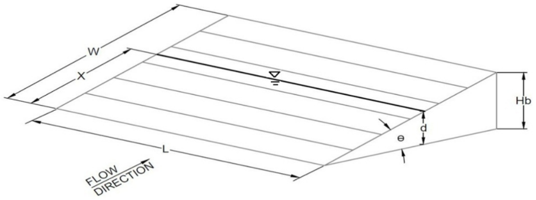
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-11

Inlet Design Information (Input)

Type of Inlet: User-Defined ▾ | Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.50	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

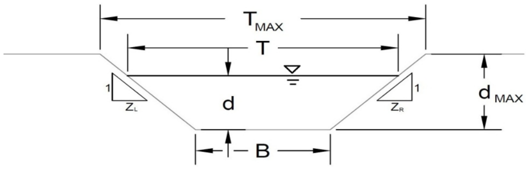
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.22	0.30	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**1.6**	**2.5**	**cfs**
	Bypassed Flow, Q_b =	**0.6**	**4.1**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**72**	**38**	**%**

Version 4.05 Released March 2017

AREA INLET IN A SWALE

Atlas Preparatory School

XDP-13



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	0.013	
Channel Invert Slope	S_O =	0.0570	ft/ft
Bottom Width	B =	4.00	ft
Left Side Slope	Z1 =	3.00	ft/ft
Right Side Slope	Z2 =	3.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ○ **Cohesive**
- ○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**5.00**	**5.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**0.50**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**5.8**	**5.8**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.17**	**0.17**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.4**	**0.8**	**cfs**
Water Depth	**d =**	**0.04**	**0.05**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

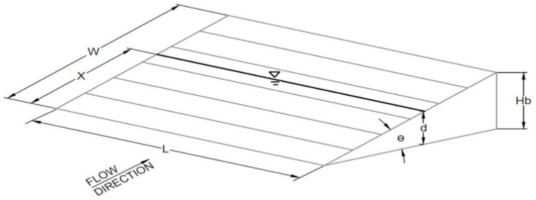
Atlas Preparatory School

XDP-13

Inlet Design Information (Input)

Type of Inlet: User-Defined

Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	2.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.04	0.05	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.1**	**0.1**	**cfs**
	Bypassed Flow, Q_b =	**0.3**	**0.6**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**19**	**18**	**%**

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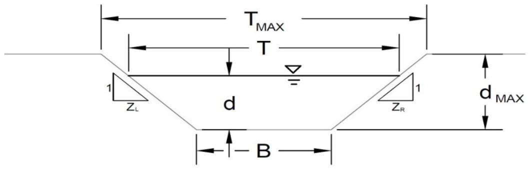
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-15



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D		
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below		
Channel Invert Slope	S_O =	0.0080		ft/ft
Bottom Width	B =	15.00		ft
Left Side Slope	Z1 =	3.00		ft/ft
Right Side Slope	Z2 =	3.00		ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**17.00**	**18.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**0.50**	**0.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**1.6**	**7.4**	**cfs**
MAJOR STORM Allowable Capacity is based on Depth Criterion	d_{allow} =	**0.33**	**0.50**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.6**	**3.4**	**cfs**
Water Depth	d =	**0.18**	**0.40**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

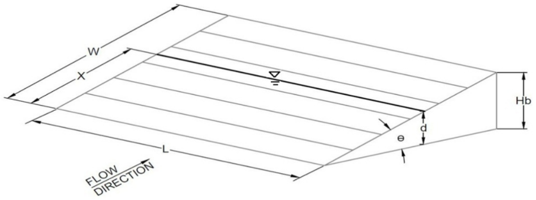
Atlas Preparatory School

XDP-15

Inlet Design Information (Input)

Type of Inlet ▾ User-Defined

Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	1.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.18	0.40	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.8**	**2.7**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.7**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**79**	**%**

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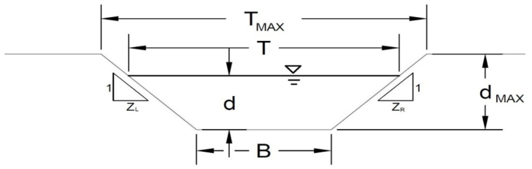
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-17



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0200	ft/ft
Bottom Width	B =	25.00	ft
Left Side Slope	Z1 =	8.00	ft/ft
Right Side Slope	Z2 =	8.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ○ **Cohesive**
- ○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**30.00**	**30.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.00**	**2.00**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**6.1**	**6.1**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.31**	**0.31**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.2**	**1.1**	**cfs**
Water Depth	**d =**	**0.06**	**0.15**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

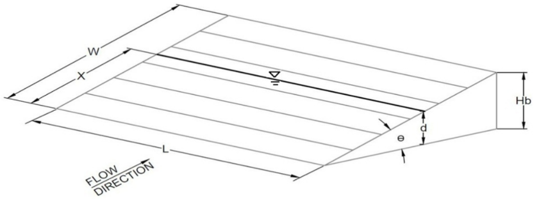
Atlas Preparatory School

XDP-17

Inlet Design Information (Input)

Type of Inlet	User-Defined	Inlet Type =	User-Defined

Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	



		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.06	0.15	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.2**	**0.9**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.2**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**96**	**82**	**%**

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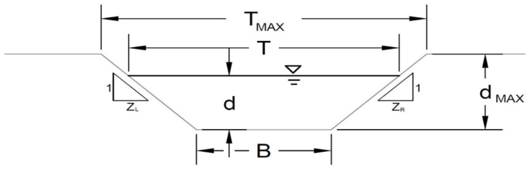
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-18



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0300	ft/ft
Bottom Width	B =	29.00	ft
Left Side Slope	Z1 =	31.00	ft/ft
Right Side Slope	Z2 =	31.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**35.00**	**40.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**0.94**	**0.94**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**0.8**	**2.3**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.10**	**0.18**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.6**	**2.1**	**cfs**
Water Depth	**d =**	**0.08**	**0.17**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

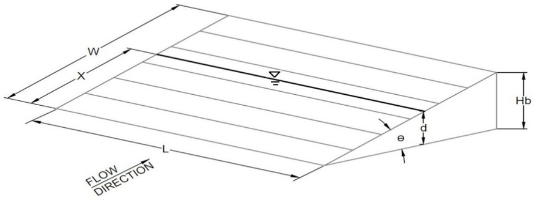
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-18

Inlet Design Information (Input)

Type of Inlet: User-Defined ▾ Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	2.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.08	0.17	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.3**	**1.0**	**cfs**
	Bypassed Flow, Q_b =	**0.3**	**1.1**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**55**	**47**	**%**

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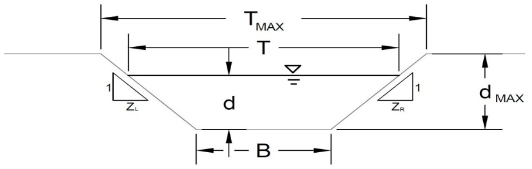
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-20



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0300	ft/ft
Bottom Width	B =	10.00	ft
Left Side Slope	Z1 =	50.00	ft/ft
Right Side Slope	Z2 =	50.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ● **Cohesive**
- ○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**93.00**	**93.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**3.10**	**3.10**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**125.2**	**125.2**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.83**	**0.83**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.3**	**1.3**	**cfs**
Water Depth	d =	**0.09**	**0.19**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

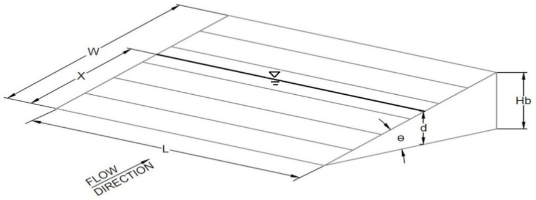
Atlas Preparatory School

XDP-20

Inlet Design Information (Input)

Type of Inlet ☐ User-Defined ▾

Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.50	feet
Length of Grate	L =	2.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

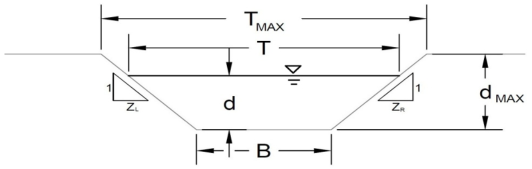
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.09	0.19	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.4**	**1.2**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.1**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**92**	**%**

Version 4.05 Released March 2017

AREA INLET IN A SWALE

Atlas Preparatory School

XDP-22



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0130	ft/ft
Bottom Width	B =	0.50	ft
Left Side Slope	Z1 =	7.30	ft/ft
Right Side Slope	Z2 =	7.30	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ○ **Cohesive**
- ○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**5.00**	**7.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**1.50**	**1.50**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**0.2**	**0.5**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.31**	**0.45**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.1**	**0.4**	**cfs**
Water Depth	**d =**	**0.18**	**0.40**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

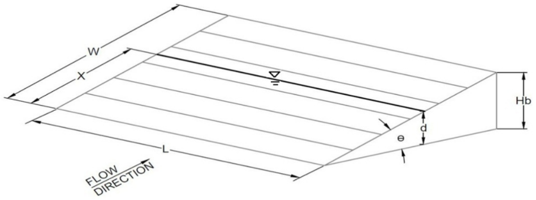
Atlas Preparatory School

XDP-22

Inlet Design Information (Input)

Type of Inlet ▾ User-Defined

Inlet Type = User-Defined



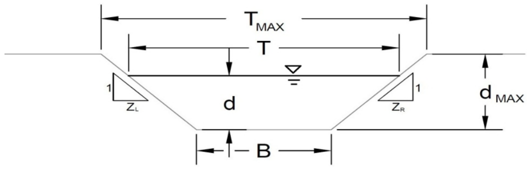
Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	1.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.18	0.40	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.8**	**2.6**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

Version 4.05 Released March 2017

AREA INLET IN A SWALE

Atlas Preparatory School
XDP-23



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0110	ft/ft
Bottom Width	B =	28.00	ft
Left Side Slope	Z1 =	15.00	ft/ft
Right Side Slope	Z2 =	15.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ☐ **Non-Cohesive**
- ☐ **Cohesive**
- ☐ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	T_{MAX} =	**30.00**	**32.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	d_{MAX} =	**2.70**	**2.70**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	Q_{allow} =	**0.2**	**0.8**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	d_{allow} =	**0.07**	**0.13**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	Q_o =	**0.1**	**0.7**	**cfs**
Water Depth	d =	**0.04**	**0.13**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

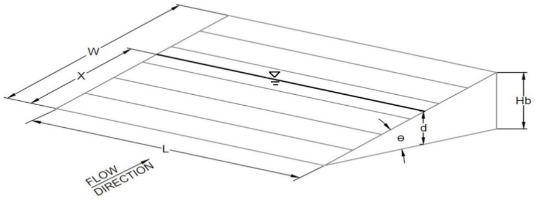
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-23

Inlet Design Information (Input)

Type of Inlet	User-Defined	Inlet Type =	User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.04	0.13	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.1**	**0.7**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

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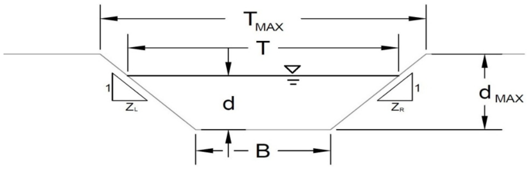
AREA INLET IN A SWALE

Atlas Preparatory School

XDP-24



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0060	ft/ft
Bottom Width	B =	7.00	ft
Left Side Slope	Z1 =	18.00	ft/ft
Right Side Slope	Z2 =	18.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
○ **Non-Cohesive**
○ **Cohesive**
○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**12.00**	**15.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**0.66**	**0.66**	**feet**

Allowable Channel Capacity Based On Channel Geometry

		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**0.2**	**0.4**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.14**	**0.22**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.0**	**0.4**	**cfs**
Water Depth	**d =**	**0.07**	**0.21**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

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AREA INLET IN A SWALE

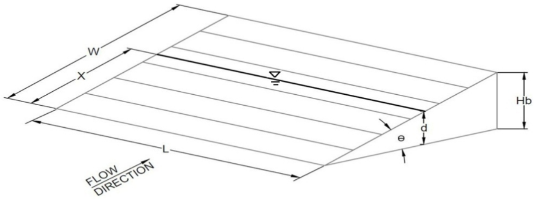
Atlas Preparatory School

XDP-24

Inlet Design Information (Input)

Type of Inlet: User-Defined

Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	1.50	feet
Length of Grate	L =	1.50	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

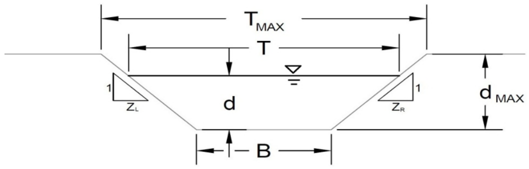
		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.07	0.21	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.2**	**0.9**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

Version 4.05 Released March 2017

AREA INLET IN A SWALE

Atlas Preparatory School

XDP-25



This worksheet uses the NRCS vegetal retardance method to determine Manning's n.

For more information see Section 7.2.3 of the USDCM.

Analysis of Trapezoidal Grass-Lined Channel Using SCS Method

NRCS Vegetal Retardance (A, B, C, D, or E)	A, B, C, D or E	D	
Manning's n (Leave cell D16 blank to manually enter an n value)	n =	see details below	
Channel Invert Slope	S_O =	0.0180	ft/ft
Bottom Width	B =	15.00	ft
Left Side Slope	Z1 =	62.00	ft/ft
Right Side Slope	Z2 =	62.00	ft/ft

Check one of the following soil types:

Soil Type:	Max. Velocity (V_{MAX})	Max Froude No. (F_{MAX})
Non-Cohesive	5.0 fps	0.60
Cohesive	7.0 fps	0.80
Paved	N/A	N/A

Choose One:
- ○ **Non-Cohesive**
- ○ **Cohesive**
- ○ **Paved**

		Minor Storm	Major Storm	
Max. Allowable Top Width of Channel for Minor & Major Storm	**T_{MAX} =**	**25.00**	**25.00**	**feet**
Max. Allowable Water Depth in Channel for Minor & Major Storm	**d_{MAX} =**	**0.40**	**0.40**	**feet**

Allowable Channel Capacity Based On Channel Geometry		Minor Storm	Major Storm	
MINOR STORM Allowable Capacity is based on Top Width Criterion	**Q_{allow} =**	**0.3**	**0.3**	**cfs**
MAJOR STORM Allowable Capacity is based on Top Width Criterion	**d_{allow} =**	**0.08**	**0.08**	**ft**

Water Depth in Channel Based On Design Peak Flow

Design Peak Flow	**Q_o =**	**0.0**	**0.2**	**cfs**
Water Depth	**d =**	**0.02**	**0.08**	**feet**

Minor storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'
Major storm max. allowable capacity GOOD - greater than the design flow given on sheet 'Inlet Management'

Version 4.05 Released March 2017

AREA INLET IN A SWALE

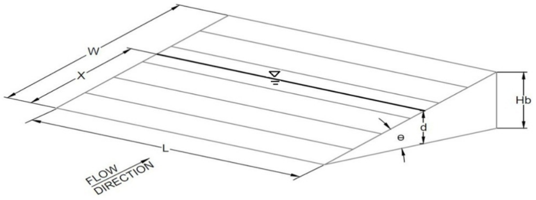
Atlas Preparatory School

XDP-25

Inlet Design Information (Input)

Type of Inlet ▾ User-Defined

Inlet Type = User-Defined



Angle of Inclined Grate (must be <= 30 degrees)	θ =	0.00	degrees
Width of Grate	W =	2.00	feet
Length of Grate	L =	3.00	feet
Open Area Ratio	A_{RATIO} =	0.70	
Height of Inclined Grate	H_B =	0.00	feet
Clogging Factor	C_f =	0.50	
Grate Discharge Coefficient	C_d =	N/A	
Orifice Coefficient	C_o =	0.64	
Weir Coefficient	C_w =	2.05	

		MINOR	MAJOR	
Water Depth at Inlet (for depressed inlets, 1 foot is added for depression)	d =	0.02	0.08	
Total Inlet Interception Capacity (assumes clogged condition)	**Q_a =**	**0.0**	**0.3**	**cfs**
	Bypassed Flow, Q_b =	**0.0**	**0.0**	**cfs**
	Capture Percentage = Q_a/Q_o = C%	**100**	**100**	**%**

Appendix F
Water Quality Calculations

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer: McKinley
Company: Wallace Engineering
Date: November 14, 2019
Project: 1975009- Atlas Preparatory Charter School
Location: 1515 Pulsar Dr, Colorado Springs, CO

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.47	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.56	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event	2.56	
Max Intensity for Optional User Defined Storm	2.55488		

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	PB-1	PB-2	PB-3	PB-5	PB-6	PB-7	PB-8	PB-9	PB-10	PB-11	PB-12	PB-13	PB-17	PB-18
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	0.320	0.550	0.620	0.260	0.120	0.260	0.040	0.200	0.200	2.090	4.600	0.110	0.250	0.350
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000	0.000	0.000	0.115	0.000	0.040	0.200	0.200	0.000	0.000	0.110	0.000	0.000
Unconnected Impervious Area (UIA, acres)	0.011	0.101	0.178	0.021	0.000	0.086	0.000	0.000	0.000	0.510	1.021	0.000	0.000	0.000
Receiving Pervious Area (RPA, acres)	0.309	0.449	0.442	0.239	0.005	0.174	0.000	0.000	0.000	0.128	0.330	0.000	0.000	0.000
Separate Pervious Area (SPA, acres)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.452	3.249	0.000	0.250	0.350
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C	C	C	C	C	C	C	C	C	C	C	C

CALCULATED RESULTS (OUTPUT)

	PB-1	PB-2	PB-3	PB-5	PB-6	PB-7	PB-8	PB-9	PB-10	PB-11	PB-12	PB-13	PB-17	PB-18
Total Calculated Area (ac, check against input)	0.320	0.550	0.620	0.260	0.120	0.260	0.040	0.200	0.200	2.090	4.600	0.110	0.250	0.350
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%	0.0%	0.0%	95.8%	0.0%	100.0%	100.0%	100.0%	0.0%	0.0%	100.0%	0.0%	0.0%
Unconnected Impervious Area (UIA, %)	3.4%	18.4%	28.7%	8.1%	0.0%	33.1%	0.0%	0.0%	0.0%	24.4%	22.2%	0.0%	0.0%	0.0%
Receiving Pervious Area (RPA, %)	96.6%	81.6%	71.3%	91.9%	4.2%	66.9%	0.0%	0.0%	0.0%	6.1%	7.2%	0.0%	0.0%	0.0%
Separate Pervious Area (SPA, %)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	69.5%	70.6%	0.0%	100.0%	100.0%
A_R (RPA / UIA)	28.091	4.446	2.483	11.381	0.000	2.023	0.000	0.000	0.000	0.251	0.323	0.000	0.000	0.000
I_a Check	0.030	0.180	0.290	0.080	1.000	0.330	1.000	1.000	1.000	0.800	0.760	1.000	1.000	1.000
f / I for WQCV Event:	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
f / I for 10-Year Event:	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
f / I for 100-Year Event:	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
f / I for Optional User Defined Storm CUHP:	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31
IRF for WQCV Event:	0.08	0.47	0.56	0.21	1.00	0.58	1.00	1.00	1.00	0.80	0.78	1.00	1.00	1.00
IRF for 10-Year Event:	0.13	0.76	0.86	0.34	1.00	0.87	1.00	1.00	1.00	0.95	0.94	1.00	1.00	1.00
IRF for 100-Year Event:	0.13	0.80	0.90	0.36	1.00	0.91	1.00	1.00	1.00	0.97	0.97	1.00	1.00	1.00
IRF for Optional User Defined Storm CUHP:	0.13	0.80	0.90	0.36	1.00	0.91	1.00	1.00	1.00	0.97	0.97	1.00	1.00	1.00
Total Site Imperviousness: I_{total}	3.4%	18.4%	28.7%	8.1%	95.8%	33.1%	100.0%	100.0%	100.0%	24.4%	22.2%	100.0%	0.0%	0.0%
Effective Imperviousness for WQCV Event:	0.3%	8.6%	16.2%	1.7%	95.8%	19.2%	100.0%	100.0%	100.0%	19.4%	17.3%	100.0%	0.0%	0.0%
Effective Imperviousness for 10-Year Event:	0.4%	14.0%	24.7%	2.7%	95.8%	28.7%	100.0%	100.0%	100.0%	23.1%	20.8%	100.0%	0.0%	0.0%
Effective Imperviousness for 100-Year Event:	0.5%	14.7%	25.9%	2.9%	95.8%	30.1%	100.0%	100.0%	100.0%	23.8%	21.5%	100.0%	0.0%	0.0%
Effective Imperviousness for Optional User Defined Storm CUHP:	0.5%	14.7%	25.9%	2.9%	95.8%	30.1%	100.0%	100.0%	100.0%	23.8%	21.5%	100.0%	0.0%	0.0%

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

	PB-1	PB-2	PB-3	PB-5	PB-6	PB-7	PB-8	PB-9	PB-10	PB-11	PB-12	PB-13	PB-17	PB-18
WQCV Event CREDIT: Reduce Detention By:	91.8%	45.8%	33.0%	77.0%	0.0%	30.1%	0.0%	0.0%	0.0%	14.7%	16.6%	0.0%	N/A	N/A
10-Year Event CREDIT**: Reduce Detention By:	208.8%	27.2%	15.2%	89.9%	0.3%	14.5%	0.8%	0.2%	0.2%	6.0%	6.7%	0.3%	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	208.3%	22.4%	10.2%	86.8%	0.2%	9.6%	0.5%	0.1%	0.1%	2.7%	3.4%	0.2%	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:	33.8%	13.4%	6.9%	37.1%	0.0%	6.7%	0.0%	0.0%	0.0%	1.7%	2.1%	0.0%	0.0%	0.0%

Total Site Imperviousness:	**26.0%**
Total Site Effective Imperviousness for WQCV Event:	**20.7%**
Total Site Effective Imperviousness for 10-Year Event:	**24.3%**
Total Site Effective Imperviousness for 100-Year Event:	**24.9%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	**24.9%**

Notes:

* Use Green-Ampt average infiltration rate values from Table 3-3.

** Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed

Site-Level Low Impact Development (LID) Design Effective Impervious Calculator

LID Credit by Impervious Reduction Factor (IRF) Method

UD-BMP (Version 3.06, November 2016)

User Input

Calculated cells

Designer: McKinley
Company: Wallace Engineering
Date: November 14, 2019
Project: 1975009- Atlas Preparatory Charter School
Location: 1515 Pulsar Dr, Colorado Springs, CO

***Design Storm: 1-Hour Rain Depth	WQCV Event	0.60	inches
***Minor Storm: 1-Hour Rain Depth	10-Year Event	1.47	inches
***Major Storm: 1-Hour Rain Depth	100-Year Event	2.56	inches
Optional User Defined Storm	CUHP		
(CUHP) NOAA 1 Hour Rainfall Depth and Frequency for User Defined Storm	100-Year Event	2.56	
Max Intensity for Optional User Defined Storm	2.55488		

SITE INFORMATION (USER-INPUT)

Sub-basin Identifier	PB-20	PB-21	PB-22	PB-23	PB-24									
Receiving Pervious Area Soil Type	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam	Sandy Loam									
Total Area (ac., Sum of DCIA, UIA, RPA, & SPA)	0.240	1.790	1.790	0.260	0.050									
Directly Connected Impervious Area (DCIA, acres)	0.000	0.000	0.000	0.000	0.000									
Unconnected Impervious Area (UIA, acres)	0.031	0.000	0.000	0.000	0.000									
Receiving Pervious Area (RPA, acres)	0.209	1.790	1.790	0.000	0.000									
Separate Pervious Area (SPA, acres)	0.000	0.000	0.000	0.260	0.050									
RPA Treatment Type: Conveyance (C), Volume (V), or Permeable Pavement (PP)	C	C	C	C	C	C	C	C	C	C	C			
						MISSING INPUT	MISSING INPUT	MISSING INPUT	MISSING INPUT	MISSING INPUT	MISSING INPUT			

CALCULATED RESULTS (OUTPUT)

Total Calculated Area (ac, check against input)	0.240	1.790	1.790	0.260	0.050									
Directly Connected Impervious Area (DCIA, %)	0.0%	0.0%	0.0%	0.0%	0.0%									
Unconnected Impervious Area (UIA, %)	12.9%	0.0%	0.0%	0.0%	0.0%									
Receiving Pervious Area (RPA, %)	87.1%	100.0%	100.0%	0.0%	0.0%									
Separate Pervious Area (SPA, %)	0.0%	0.0%	0.0%	100.0%	100.0%									
A_R (RPA / UIA)	6.742	0.000	0.000	0.000	0.000									
I_a Check	0.130	1.000	1.000	1.000	1.000									
f / I for WQCV Event:	1.7	1.7	1.7	1.7	1.7									
f / I for 10-Year Event:	0.5	0.5	0.5	0.5	0.5									
f / I for 100-Year Event:	0.3	0.3	0.3	0.3	0.3									
f / I for Optional User Defined Storm CUHP:	0.31	0.31	0.31	0.31	0.31									
IRF for WQCV Event:	0.34	1.00	1.00	1.00	1.00									
IRF for 10-Year Event:	0.55	1.00	1.00	1.00	1.00									
IRF for 100-Year Event:	0.58	1.00	1.00	1.00	1.00									
IRF for Optional User Defined Storm CUHP:	0.58	1.00	1.00	1.00	1.00									
Total Site Imperviousness: I_{total}	12.9%	0.0%	0.0%	0.0%	0.0%									
Effective Imperviousness for WQCV Event:	4.4%	0.0%	0.0%	0.0%	0.0%									
Effective Imperviousness for 10-Year Event:	7.1%	0.0%	0.0%	0.0%	0.0%									
Effective Imperviousness for 100-Year Event:	7.5%	0.0%	0.0%	0.0%	0.0%									
Effective Imperviousness for Optional User Defined Storm CUHP:	7.5%	0.0%	0.0%	0.0%	0.0%									

LID / EFFECTIVE IMPERVIOUSNESS CREDITS

WQCV Event CREDIT: Reduce Detention By:	61.5%	N/A	N/A	N/A	N/A							N/A	N/A	N/A
10-Year Event CREDIT**: Reduce Detention By:	53.3%	N/A	N/A	N/A	N/A							N/A	N/A	N/A
100-Year Event CREDIT**: Reduce Detention By:	49.7%	N/A	N/A	N/A	N/A							N/A	N/A	N/A
User Defined CUHP CREDIT: Reduce Detention By:	27.2%	0.0%	0.0%	0.0%	0.0%									

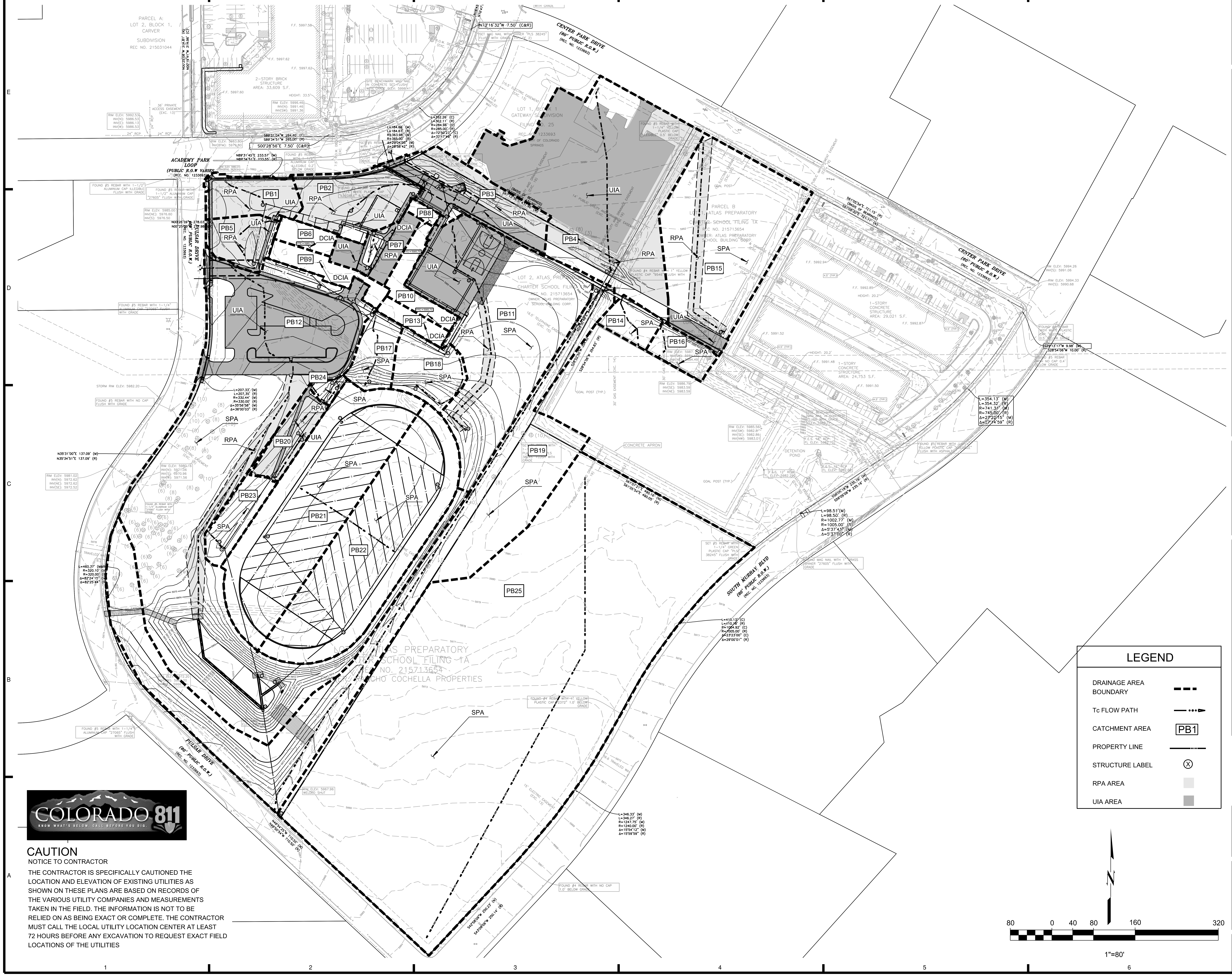
Total Site Imperviousness:	**0.8%**
Total Site Effective Imperviousness for WQCV Event:	**0.3%**
Total Site Effective Imperviousness for 10-Year Event:	**0.4%**
Total Site Effective Imperviousness for 100-Year Event:	**0.4%**
Total Site Effective Imperviousness for Optional User Defined Storm CUHP:	**0.4%**

Notes:

[*] Use Green-Ampt average infiltration rate values from Table 3-3.

[**] Flood control detention volume credits based on empirical equations from Storage Chapter of USDCM.

*** Method assumes that 1-hour rainfall depth is equivalent to 1-hour intensity for calculation purposed



LEGEND

DRAINAGE AREA BOUNDARY	— — —
Tc FLOW PATH	—•••➤
CATCHMENT AREA	PB1
PROPERTY LINE	——···——
STRUCTURE LABEL	Ⓧ
RPA AREA	▨
UIA AREA	▨

80 0 40 80 160 320

1"=80'

COLORADO 811
KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.

CAUTION

NOTICE TO CONTRACTOR

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THE LOCATION AND ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES

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WALLA ENGINEERING
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M/E/P/FP
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Colorado Springs, CO 80907
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wallace

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Structural Consultants, Inc.

Structural and Civil Consultants
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303.350.1690, 800.364.5858

THIS DOCUMENT IS PRELIMINARY IN NATURE ANDIS NOT A FINAL, SIGNED AND SEALED DOCUMENT.

ATLAS
PREPARATORY SCHOOL

ATLAS PREPARATORY SCHOOL

1515 Pulsar Dr
Colorado Springs, CO 80916

DRAINAGE DESIGN

SEPTEMBER 2019

MARK	DATE	DESCRIPTION

ISSUE:	
DATE:	05.02.2019
PROJECT NO:	1975009
CAD DWG FILE:	
DRAWN BY:	MML
CHECKED BY:	DWB

SHEET TITLE

PRELIMINARY PROPOSED OVERALL DRAINAGE MAP

C-505

11/14/2019 10:41:07 AM \\civil-server\projects\1975009 Atlas Preparatory Elem School\Dgn\Drainage\Proposed Areas Sheet.dgn

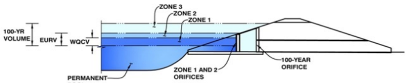
Appendix G
Detention Pond Calculations

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)

Project: Atlas Preparatory School

Basin ID: Sand Creek



Example Zone Configuration (Retention Pond)

Required Volume Calculation

Selected BMP Type =	**EDB**			
Watershed Area =	18.90	acres		
Watershed Length =	1,500	ft		
Watershed Slope =	0.024	ft/ft		
Watershed Imperviousness =	17.50%	percent		
Percentage Hydrologic Soil Group A =	36.0%	percent		
Percentage Hydrologic Soil Group B =	64.0%	percent		
Percentage Hydrologic Soil Groups C/D =	0.0%	percent		
Desired WQCV Drain Time =	40.0	hours		
Location for 1-hr Rainfall Depths =	Denver - Capitol Building			
Water Quality Capture Volume (WQCV) =	0.165	acre-feet	Optional User Override 1-hr Precipitation	
Excess Urban Runoff Volume (EURV) =	0.310	acre-feet		
2-yr Runoff Volume (P1 = 1.19 in.) =	0.219	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	0.316	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	0.524	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	1.012	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	1.384	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	1.898	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	2.966	acre-feet		inches
Approximate 2-yr Detention Volume =	0.204	acre-feet		
Approximate 5-yr Detention Volume =	0.296	acre-feet		
Approximate 10-yr Detention Volume =	0.464	acre-feet		
Approximate 25-yr Detention Volume =	0.592	acre-feet		
Approximate 50-yr Detention Volume =	0.649	acre-feet		
Approximate 100-yr Detention Volume =	0.830	acre-feet		

Stage-Storage Calculation

Zone 1 Volume (WQCV) =	0.165	acre-feet
Zone 2 Volume (EURV - Zone 1) =	0.145	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	0.520	acre-feet
Total Detention Basin Volume =	0.830	acre-feet
Initial Surcharge Volume (ISV) =	22	ft^3
Initial Surcharge Depth (ISD) =	0.33	ft
Total Available Detention Depth (H_{total}) =	5.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.005	ft/ft
Slopes of Main Basin Sides (S_{main}) =	3	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	3	
Initial Surcharge Area (A_{ISV}) =	68	ft^2
Surcharge Volume Length (L_{ISV}) =	8.3	ft
Surcharge Volume Width (W_{ISV}) =	8.3	ft
Depth of Basin Floor (H_{FLOOR}) =	0.67	ft
Length of Basin Floor (L_{FLOOR}) =	143.7	ft
Width of Basin Floor (W_{FLOOR}) =	52.7	ft
Area of Basin Floor (A_{FLOOR}) =	7,580	ft^2
Volume of Basin Floor (V_{FLOOR}) =	1,861	ft^3
Depth of Main Basin (H_{MAIN}) =	3.50	ft
Length of Main Basin (L_{MAIN}) =	164.7	ft
Width of Main Basin (W_{MAIN}) =	73.8	ft
Area of Main Basin (A_{MAIN}) =	12,150	ft^2
Volume of Main Basin (V_{MAIN}) =	34,240	ft^3
Calculated Total Basin Volume (V_{total}) =	**0.830**	acre-feet

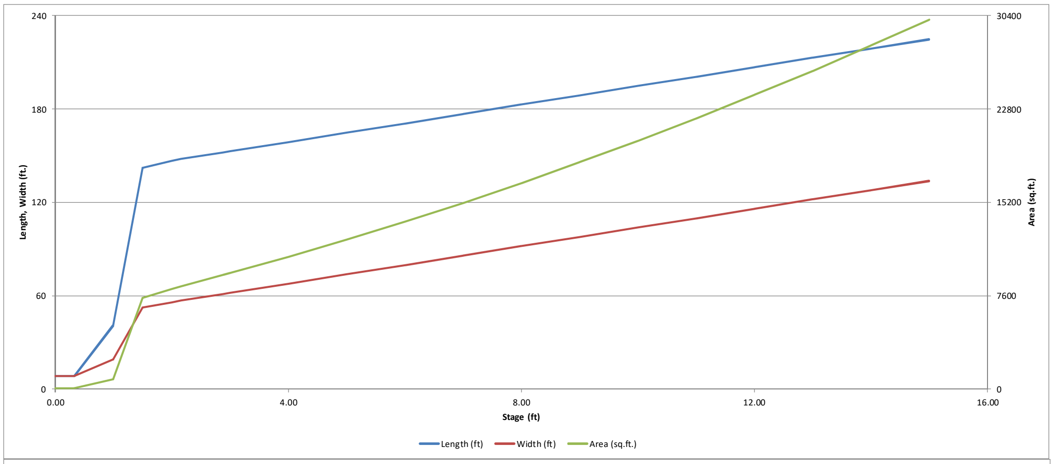
Total Watershed imperviousness area: 3.30 acres. Sample Calcs in appendix D.

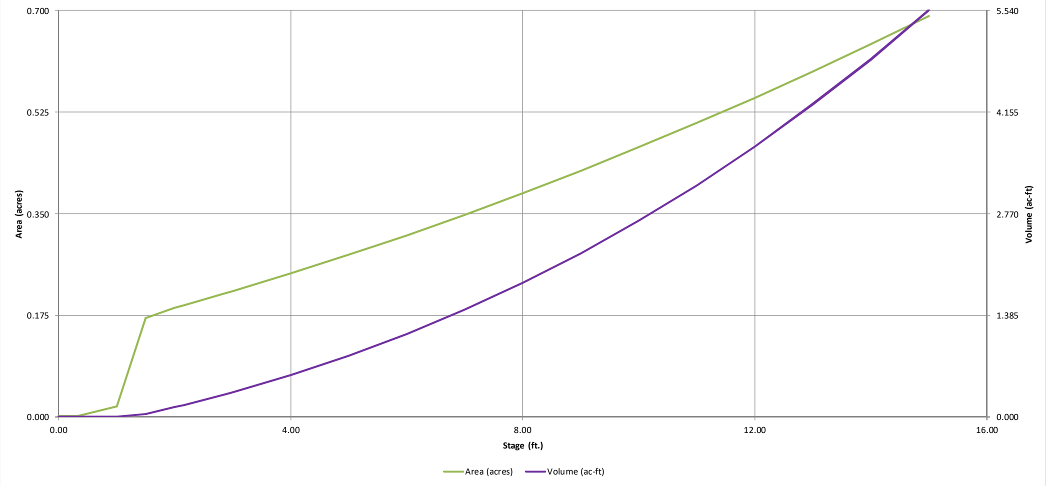
Depth Increment = 1 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		8.3	8.3	68		0.002		
ISV	0.33		8.3	8.3	68		0.002	22	0.001
	1.00		40.7	18.9	771		0.018	114	0.003
Floor	1.50		142.2	52.3	7,432		0.171	1,883	0.043
	2.00		146.7	55.7	8,169		0.188	5,817	0.134
Zone 1 (WQCV)	2.16		147.7	56.7	8,377		0.192	7,223	0.166
Zone 2 (EURV)	2.88		152.0	61.0	9,278		0.213	13,577	0.312
	3.00		152.7	61.8	9,432		0.217	14,699	0.337
	4.00		158.7	67.8	10,755		0.247	24,787	0.569
Zone 3 (100-year)	5.00		164.7	73.8	12,150		0.279	36,233	0.832
	6.00		170.7	79.8	13,617		0.313	49,111	1.127
	7.00		176.7	85.8	15,156		0.348	63,491	1.458
	8.00		182.7	91.8	16,767		0.385	79,447	1.824
	9.00		188.7	97.8	18,450		0.424	97,049	2.228
	10.00		194.7	103.8	20,205		0.464	116,370	2.671
	11.00		200.7	109.8	22,032		0.506	137,482	3.156
	12.00		206.7	115.8	23,931		0.549	160,457	3.684
	13.00		212.7	121.8	25,901		0.595	185,367	4.255
	14.00		218.7	127.8	27,944		0.642	212,284	4.873
	15.00		224.7	133.8	30,059		0.690	241,280	5.539

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

UD-Detention, Version 3.07 (February 2017)



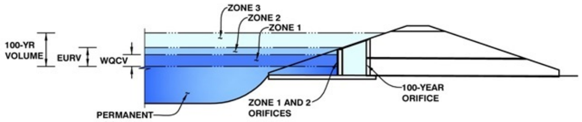


Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Project:

Basin ID:



Example Zone Configuration (Retention Pond)

	Stage (ft)	Zone Volume (ac-ft)	Outlet Type
Zone 1 (WQCV)	2.16	0.165	Orifice Plate
Zone 2 (EURV)	2.88	0.145	Orifice Plate
Zone 3 (100-year)	5.00	0.520	Weir&Pipe (Restrict)
		0.830	Total

User Input: Orifice at Underdrain Outlet (typically used to drain WQCV in a Filtration BMP)

Underdrain Orifice Invert Depth =	N/A	ft (distance below the filtration media surface)
Underdrain Orifice Diameter =	N/A	inches

Calculated Parameters for Underdrain

Underdrain Orifice Area =	N/A	ft^2
Underdrain Orifice Centroid =	N/A	feet

User Input: Orifice Plate with one or more orifices or Elliptical Slot Weir (typically used to drain WQCV and/or EURV in a sedimentation BMP)

Invert of Lowest Orifice =	0.00	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Orifice Plate =	3.01	ft (relative to basin bottom at Stage = 0 ft)
Orifice Plate: Orifice Vertical Spacing =	12.00	inches
Orifice Plate: Orifice Area per Row =	0.60	sq. inches (diameter = 7/8 inch)

Calculated Parameters for Plate

WQ Orifice Area per Row =	4.167E-03	ft^2
Elliptical Half-Width =	N/A	feet
Elliptical Slot Centroid =	N/A	feet
Elliptical Slot Area =	N/A	ft^2

User Input: Stage and Total Area of Each Orifice Row (numbered from lowest to highest)

	Row 1 (required)	Row 2 (optional)	Row 3 (optional)	Row 4 (optional)	Row 5 (optional)	Row 6 (optional)	Row 7 (optional)	Row 8 (optional)
Stage of Orifice Centroid (ft)	0.00	1.00	2.01					
Orifice Area (sq. inches)	0.60	0.60	0.60					

	Row 9 (optional)	Row 10 (optional)	Row 11 (optional)	Row 12 (optional)	Row 13 (optional)	Row 14 (optional)	Row 15 (optional)	Row 16 (optional)
Stage of Orifice Centroid (ft)								
Orifice Area (sq. inches)								

User Input: Vertical Orifice (Circular or Rectangular)

	Not Selected	Not Selected	
Invert of Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Depth at top of Zone using Vertical Orifice =	N/A	N/A	ft (relative to basin bottom at Stage = 0 ft)
Vertical Orifice Diameter =	N/A	N/A	inches

Calculated Parameters for Vertical Orifice

	Not Selected	Not Selected	
Vertical Orifice Area =	N/A	N/A	ft^2
Vertical Orifice Centroid =	N/A	N/A	feet

User Input: Overflow Weir (Dropbox) and Grate (Flat or Sloped)

	Zone 3 Weir	Not Selected	
Overflow Weir Front Edge Height, Ho =	4.00	N/A	ft (relative to basin bottom at Stage = 0 ft)
Overflow Weir Front Edge Length =	4.00	N/A	feet
Overflow Weir Slope =	0.00	N/A	H:V (enter zero for flat grate)
Horiz. Length of Weir Sides =	4.00	N/A	feet
Overflow Grate Open Area % =	70%	N/A	%, grate open area/total area
Debris Clogging % =	50%	N/A	%

Calculated Parameters for Overflow Weir

	Zone 3 Weir	Not Selected	
Height of Grate Upper Edge, H_t =	4.00	N/A	feet
Over Flow Weir Slope Length =	4.00	N/A	feet
Grate Open Area / 100-yr Orifice Area =	8.40	N/A	should be $\geq$ 4
Overflow Grate Open Area w/o Debris =	11.20	N/A	ft^2
Overflow Grate Open Area w/ Debris =	5.60	N/A	ft^2

User Input: Outlet Pipe w/ Flow Restriction Plate (Circular Orifice, Restrictor Plate, or Rectangular Orifice)

	Zone 3 Restrictor	Not Selected	
Depth to Invert of Outlet Pipe =	1.00	N/A	ft (distance below basin bottom at Stage = 0 ft)
Outlet Pipe Diameter =	18.00	N/A	inches
Restrictor Plate Height Above Pipe Invert =	12.70		inches

Calculated Parameters for Outlet Pipe w/ Flow Restriction Plate

	Zone 3 Restrictor	Not Selected	
Outlet Orifice Area =	1.33	N/A	ft^2
Outlet Orifice Centroid =	0.59	N/A	feet
Half-Central Angle of Restrictor Plate on Pipe =	1.99	N/A	radians

User Input: Emergency Spillway (Rectangular or Trapezoidal)

Spillway Invert Stage=	5.20	ft (relative to basin bottom at Stage = 0 ft)
Spillway Crest Length =	10.00	feet
Spillway End Slopes =	4.00	H:V
Freeboard above Max Water Surface =	1.00	feet

Calculated Parameters for Spillway

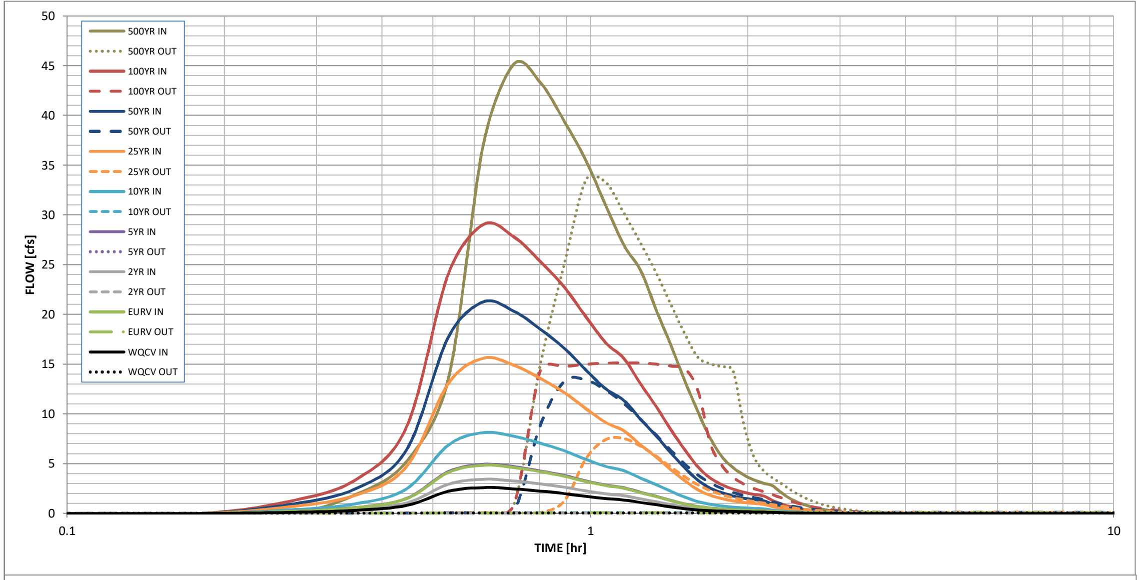
Spillway Design Flow Depth=	0.83	feet
Stage at Top of Freeboard =	7.03	feet
Basin Area at Top of Freeboard =	0.35	acres

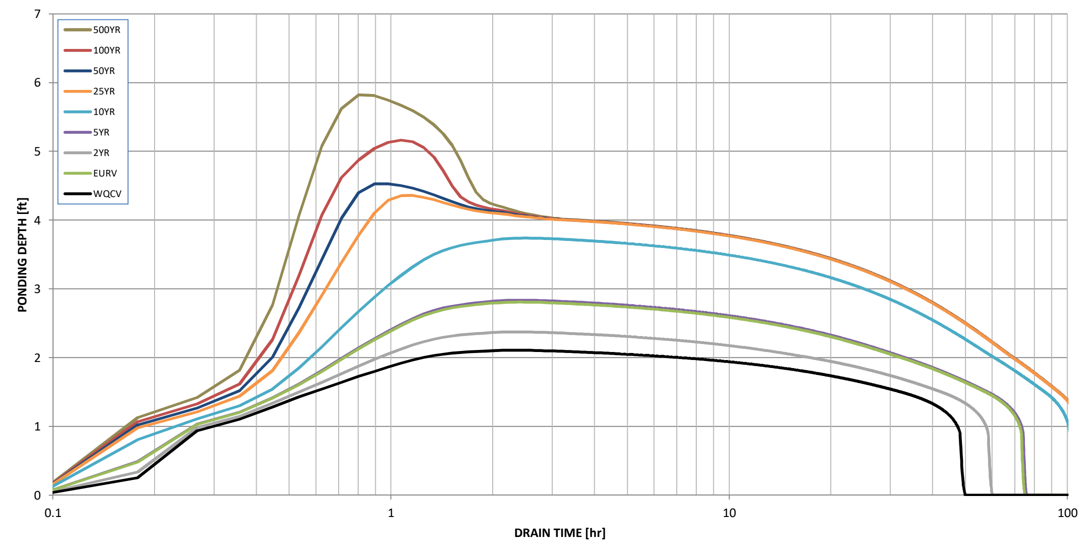
Routed Hydrograph Results

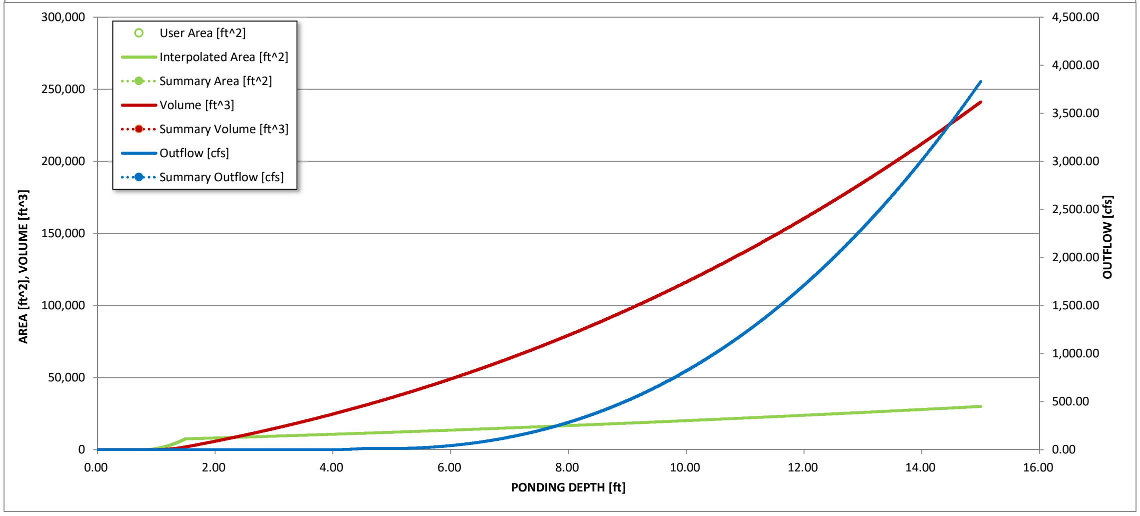
Design Storm Return Period =	WQCV	EURV	2 Year	5 Year	10 Year	25 Year	50 Year	100 Year	500 Year
One-Hour Rainfall Depth (in) =	0.53	1.07	1.19	1.50	1.75	2.00	2.25	2.52	3.14
Calculated Runoff Volume (acre-ft) =	0.165	0.310	0.219	0.316	0.524	1.012	1.384	1.898	2.966
OPTIONAL Override Runoff Volume (acre-ft) =									
Inflow Hydrograph Volume (acre-ft) =	0.165	0.310	0.219	0.316	0.523	1.010	1.383	1.896	2.965
Predevelopment Unit Peak Flow, q (cfs/acre) =	0.00	0.00	0.01	0.01	0.12	0.40	0.61	0.89	1.44
Predevelopment Peak Q (cfs) =	0.0	0.0	0.1	0.3	2.3	7.6	11.4	16.8	27.2
Peak Inflow Q (cfs) =	2.6	4.9	3.4	4.9	8.1	15.6	21.3	29.1	45.2
Peak Outflow Q (cfs) =	0.1	0.1	0.1	0.1	0.1	7.5	13.4	15.2	33.6
Ratio Peak Outflow to Predevelopment Q =	N/A	N/A	N/A	0.3	0.0	1.0	1.2	0.9	1.2
Structure Controlling Flow =	Plate	Plate	Plate	Plate	Plate	Overflow Grate 1	Overflow Grate 1	Outlet Plate 1	Spillway
Max Velocity through Grate 1 (fps) =	N/A	N/A	N/A	N/A	N/A	0.7	1.2	1.3	1.4
Max Velocity through Grate 2 (fps) =	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Time to Drain 97% of Inflow Volume (hours) =	46	70	56	70	96	99	95	91	82
Time to Drain 99% of Inflow Volume (hours) =	**48**	72	58	73	100	106	105	103	99
Maximum Ponding Depth (ft) =	2.11	2.81	2.37	2.83	3.74	4.36	4.53	5.17	5.82
Area at Maximum Ponding Depth (acres) =	0.19	0.21	0.20	0.21	0.24	0.26	0.26	0.28	0.31
Maximum Volume Stored (acre-ft) =	0.154	0.295	0.207	0.301	0.503	0.657	0.702	0.877	1.069

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)







S-A-V-D Chart Axis Override	X-axis	Left Y-Axis	Right Y-Axis
minimum bound			
maximum bound			

Detention Basin Outlet Structure Design

Outflow Hydrograph Workbook Filename:

Storm Inflow Hydrographs **UD-Detention, Version 3.07 (February 2017)**

The user can override the calculated inflow hydrographs from this workbook with inflow hydrographs developed in a separate program.

	SOURCE	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK	WORKBOOK
Time Interval	TIME	WQCV [cfs]	EURV [cfs]	2 Year [cfs]	5 Year [cfs]	10 Year [cfs]	25 Year [cfs]	50 Year [cfs]	100 Year [cfs]	500 Year [cfs]
5.35 min	0:00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:05:21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hydrograph Constant	0:10:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	0:16:03	0.12	0.22	0.16	0.22	0.36	0.68	0.92	1.25	1.91
0.934	0:21:24	0.32	0.58	0.42	0.59	0.97	1.85	2.51	3.42	5.26
	0:26:45	0.81	1.50	1.07	1.53	2.50	4.75	6.45	8.77	13.52
	0:32:06	2.23	4.12	2.94	4.20	6.87	13.06	17.72	24.08	37.08
	0:37:27	2.61	4.85	3.44	4.94	8.13	15.60	21.27	29.06	45.15
	0:42:48	2.48	4.62	3.27	4.70	7.76	14.91	20.34	27.82	43.31
	0:48:09	2.25	4.20	2.98	4.28	7.06	13.57	18.52	25.32	39.41
	0:53:30	2.00	3.74	2.64	3.81	6.30	12.15	16.60	22.73	35.46
	0:58:51	1.71	3.21	2.26	3.27	5.43	10.52	14.40	19.75	30.93
	1:04:12	1.49	2.80	1.98	2.86	4.74	9.15	12.52	17.16	26.95
	1:09:33	1.35	2.54	1.79	2.59	4.29	8.30	11.35	15.56	24.38
	1:14:54	1.10	2.08	1.46	2.12	3.53	6.88	9.44	12.97	20.38
	1:20:15	0.89	1.69	1.18	1.72	2.88	5.64	7.76	10.69	16.85
	1:25:36	0.67	1.28	0.89	1.31	2.21	4.37	6.05	8.38	13.29
	1:30:57	0.48	0.94	0.65	0.96	1.64	3.28	4.57	6.38	10.20
	1:36:18	0.36	0.69	0.48	0.70	1.19	2.38	3.34	4.69	7.57
	1:41:39	0.28	0.54	0.37	0.55	0.92	1.83	2.55	3.56	5.71
	1:47:00	0.23	0.44	0.31	0.45	0.76	1.50	2.09	2.90	4.61
	1:52:21	0.20	0.38	0.26	0.38	0.65	1.27	1.76	2.45	3.89
	1:57:42	0.17	0.33	0.23	0.34	0.57	1.12	1.54	2.14	3.39
	2:03:03	0.16	0.30	0.21	0.31	0.51	1.00	1.39	1.92	3.04
	2:08:24	0.15	0.28	0.19	0.28	0.47	0.92	1.28	1.76	2.78
	2:13:45	0.11	0.20	0.14	0.21	0.35	0.68	0.94	1.30	2.06
	2:19:06	0.08	0.15	0.10	0.15	0.25	0.50	0.69	0.95	1.50
	2:24:27	0.06	0.11	0.08	0.11	0.19	0.36	0.50	0.70	1.11
	2:29:48	0.04	0.08	0.06	0.08	0.14	0.27	0.37	0.52	0.82
	2:35:09	0.03	0.06	0.04	0.06	0.10	0.19	0.27	0.37	0.60
	2:40:30	0.02	0.04	0.03	0.04	0.07	0.14	0.19	0.27	0.43
	2:45:51	0.01	0.03	0.02	0.03	0.05	0.10	0.14	0.19	0.31
	2:51:12	0.01	0.02	0.01	0.02	0.03	0.07	0.09	0.13	0.22
	2:56:33	0.00	0.01	0.01	0.01	0.02	0.04	0.06	0.08	0.14
	3:01:54	0.00	0.00	0.00	0.00	0.01	0.02	0.03	0.04	0.08
	3:07:15	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.03
	3:12:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
	3:17:57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:23:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:28:39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:34:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:39:21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:44:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:50:03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3:55:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:00:45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:06:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:11:27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:16:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:22:09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:27:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:32:51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:38:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:43:33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:48:54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:54:15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4:59:36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:04:57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:10:18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:15:39	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:21:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:26:21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:31:42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:37:03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:42:24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:47:45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:53:06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5:58:27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:03:48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:09:09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:14:30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:19:51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6:25:12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Detention Basin Outlet Structure Design

UD-Detention, Version 3.07 (February 2017)

Summary Stage-Area-Volume-Discharge Relationships

The user can create a summary S-A-V-D by entering the desired stage increments and the remainder of the table will populate automatically.

The user should graphically compare the summary S-A-V-D table to the full S-A-V-D table in the chart to confirm it captures all key transition points.

Stage - Storage Description	Stage [ft]	Area [ft^2]	Area [acres]	Volume [ft^3]	Volume [ac-ft]	Total Outflow [cfs]

For best results, include the stages of all grade slope changes (e.g. ISV and Floor) from the S-A-V table on Sheet 'Basin'.

Also include the inverts of all outlets (e.g. vertical orifice, overflow grate, and spillway, where applicable).

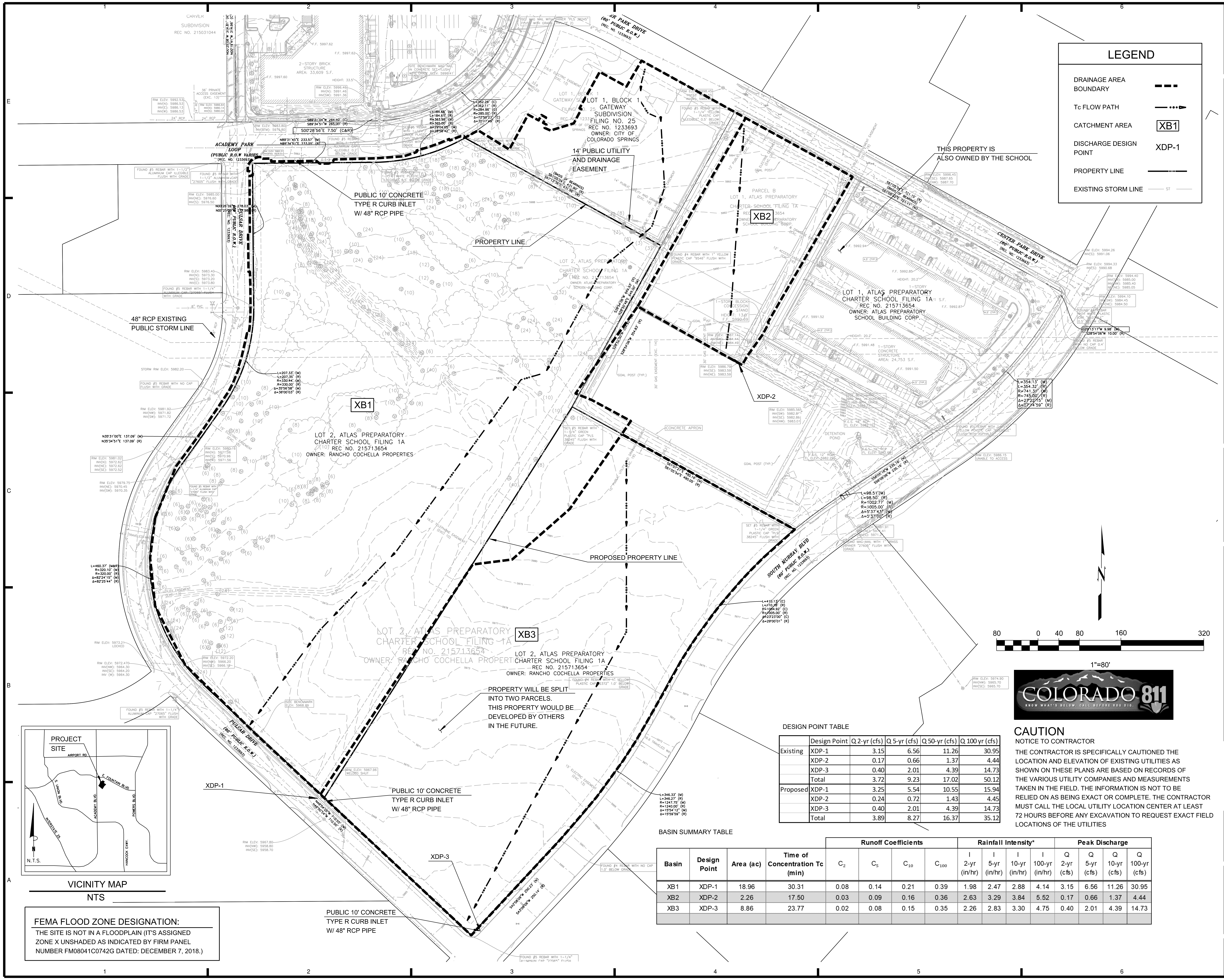
Emergency Spillway Calculation

D50=5.23S^(0.43)(1.35Cf*q)^(0.56)

S=	0.333	ft/ft
Cf=	2	
q=	1.65	cfs/ft
D50=	7.1	*

Re: UDFCD Volume 1 Sec. 5.12
*calculated 7.1, Use "Type L"
with D50=9"

Appendix H
Drainage Maps



LEGEND

DRAINAGE AREA BOUNDARY	▬ ▬ ▬
Tc FLOW PATH	—·—·→
CATCHMENT AREA	XB1
DISCHARGE DESIGN POINT	XDP-1
PROPERTY LINE	——
EXISTING STORM LINE	— ST —

VICINITY MAP

NTS

FEMA FLOOD ZONE DESIGNATION:

THE SITE IS NOT IN A FLOODPLAIN (IT'S ASSIGNED ZONE X UNSHADED AS INDICATED BY FIRM PANEL NUMBER FM08041C0742G DATED: DECEMBER 7, 2018.)

DESIGN POINT TABLE

	Design Point	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 50-yr (cfs)	Q 100 yr (cfs)
Existing	XDP-1	3.15	6.56	11.26	30.95
	XDP-2	0.17	0.66	1.37	4.44
	XDP-3	0.40	2.01	4.39	14.73
	Total	3.72	9.23	17.02	50.12
Proposed	XDP-1	3.25	5.54	10.55	15.94
	XDP-2	0.24	0.72	1.43	4.45
	XDP-3	0.40	2.01	4.39	14.73
	Total	3.89	8.27	16.37	35.12

BASIN SUMMARY TABLE

				Runoff Coefficients				Rainfall Intensity*				Peak Discharge			
Basin	Design Point	Area (ac)	Time of Concentration Tc (min)	C_2	C_5	C_{10}	C_{100}	I 2-yr (in/hr)	I 5-yr (in/hr)	I 10-yr (in/hr)	I 100-yr (in/hr)	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 10-yr (cfs)	Q 100-yr (cfs)
XB1	XDP-1	18.96	30.31	0.08	0.14	0.21	0.39	1.98	2.47	2.88	4.14	3.15	6.56	11.26	30.95
XB2	XDP-2	2.26	17.50	0.03	0.09	0.16	0.36	2.63	3.29	3.84	5.52	0.17	0.66	1.37	4.44
XB3	XDP-3	8.86	23.77	0.02	0.08	0.15	0.35	2.26	2.83	3.30	4.75	0.40	2.01	4.39	14.73

COLORADO 811
KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.

CAUTION

NOTICE TO CONTRACTOR

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THE LOCATION AND ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES

\\civil-server\projects\1975009 Atlas Preparatory Elem School\Dgn\Drainage\Existing Drainage Sheet.dgn

8:57:06 AM

9/27/2019

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ATLAS
PREPARATORY SCHOOL

ATLAS PREPARATORY SCHOOL

1515 Pulsar Dr
Colorado Springs, CO 80916

DRAINAGE DESIGN

SEPTEMBER 2019

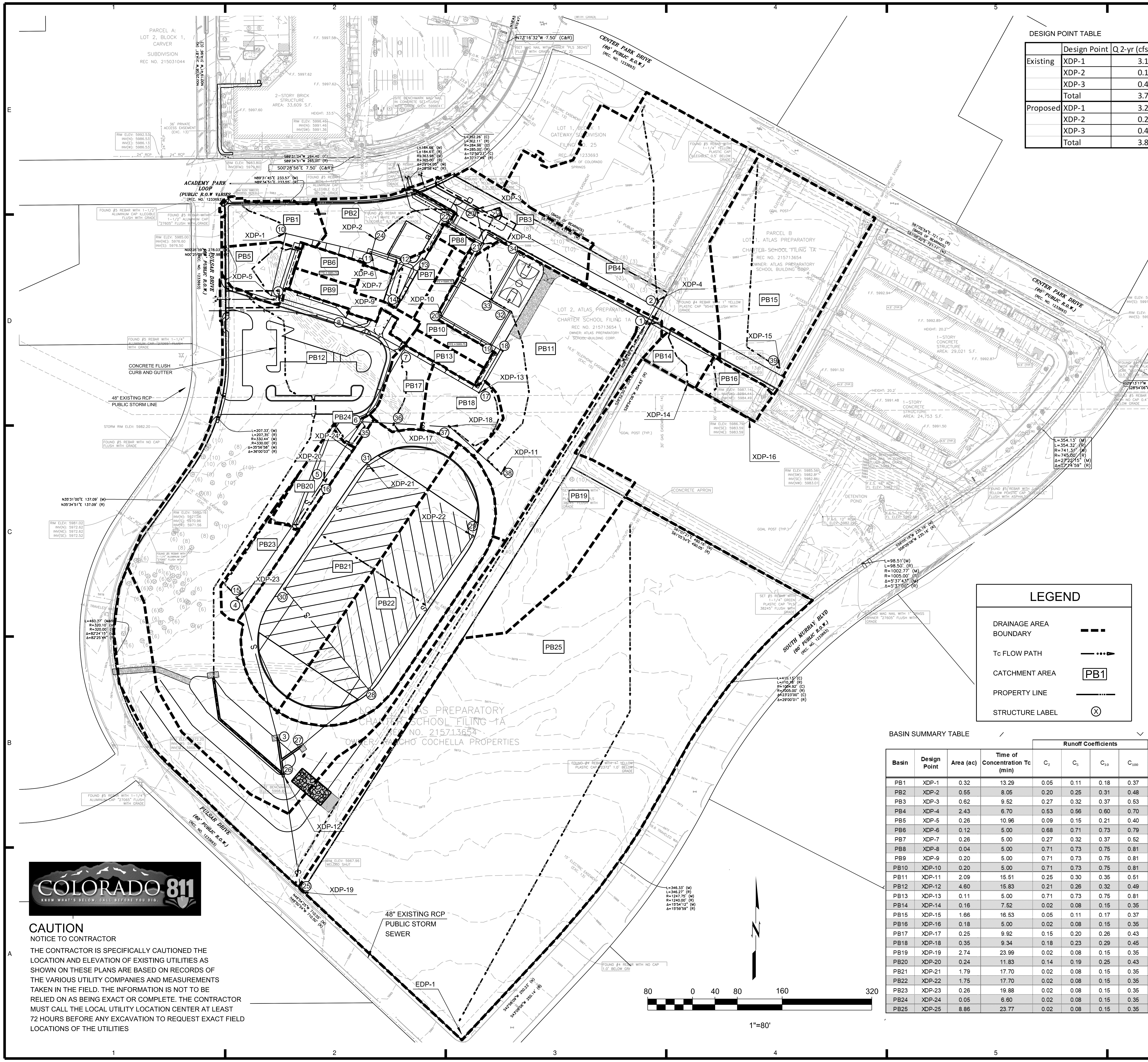
MARK	DATE	DESCRIPTION

ISSUE:	
DATE:	05.02.2019
PROJECT NO:	1975009
CAD DWG FILE:	
DRAWN BY:	MML
CHECKED BY:	DWB

SHEET TITLE

PRELIMINARY EXISTING
DRAINAGE PLAN

C-504



LEGEND

DRAINAGE AREA BOUNDARY	▬ ▬ ▬
Tc FLOW PATH	-·-·-·→
CATCHMENT AREA	PB1
PROPERTY LINE	——·——
STRUCTURE LABEL	ⓧ

CAUTION

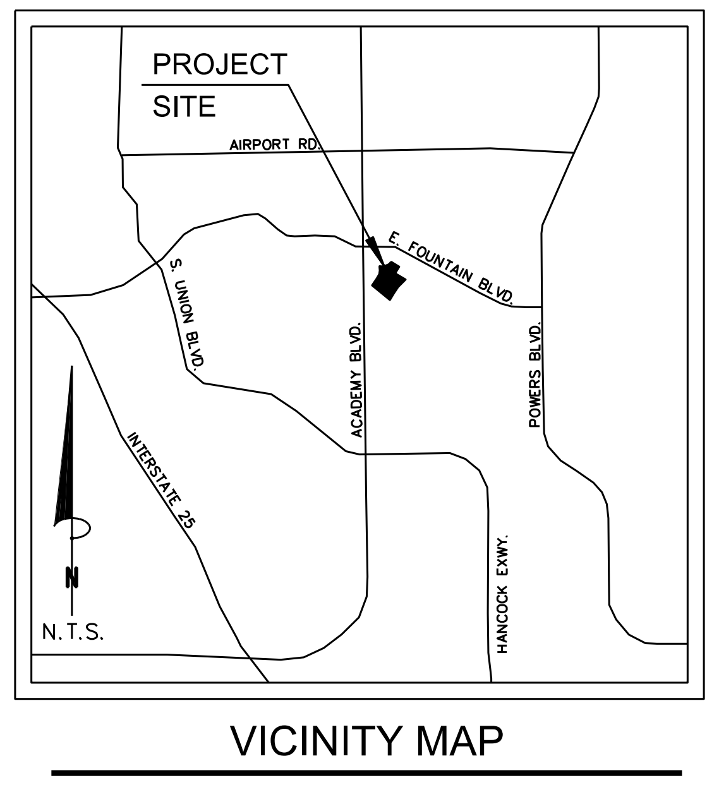
NOTICE TO CONTRACTOR

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THE LOCATION AND ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES

COLORADO 811
KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.

DESIGN POINT TABLE

	Design Point	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 50-yr (cfs)	Q 100 yr (cfs)
Existing	XDP-1	3.15	6.56	11.26	30.95
	XDP-2	0.17	0.66	1.37	4.44
	XDP-3	0.40	2.01	4.39	14.73
	Total	3.72	9.23	17.02	50.12
Proposed	XDP-1	3.25	5.54	10.55	15.94
	XDP-2	0.24	0.72	1.43	4.45
	XDP-3	0.40	2.01	4.39	14.73
	Total	3.89	8.27	16.37	35.12



VICINITY MAP

NTS

BASIN SUMMARY TABLE

				Runoff Coefficients				Rainfall Intensity*				Peak Discharge			
Basin	Design Point	Area (ac)	Time of Concentration Tc (min)	C_2	C_5	C_{10}	C_{100}	I 2-yr (in/hr)	I 5-yr (in/hr)	I 10-yr (in/hr)	I 100-yr (in/hr)	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 10-yr (cfs)	Q 100-yr (cfs)
PB1	XDP-1	0.32	13.29	0.05	0.11	0.18	0.37	2.96	3.70	4.32	6.22	0.05	0.13	0.24	0.74
PB2	XDP-2	0.55	8.05	0.20	0.25	0.31	0.48	3.55	4.46	5.20	7.48	0.40	0.62	0.90	1.97
PB3	XDP-3	0.62	9.52	0.27	0.32	0.37	0.53	3.35	4.20	4.90	7.06	0.56	0.82	1.13	2.29
PB4	XDP-4	2.43	6.70	0.53	0.56	0.60	0.70	3.77	4.73	5.52	7.94	4.84	6.42	8.02	13.56
PB5	XDP-5	0.26	10.96	0.09	0.15	0.21	0.40	3.19	3.99	4.66	6.70	0.07	0.15	0.26	0.70
PB6	XDP-6	0.12	5.00	0.68	0.71	0.73	0.79	4.12	5.17	6.03	8.68	0.34	0.44	0.53	0.82
PB7	XDP-7	0.26	5.00	0.27	0.32	0.37	0.52	4.12	5.17	6.03	8.68	0.29	0.43	0.58	1.18
PB8	XDP-8	0.04	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.11	0.15	0.18	0.27
PB9	XDP-9	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.59	0.76	0.91	1.41
PB10	XDP-10	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.60	0.77	0.93	1.44
PB11	XDP-11	2.09	15.51	0.25	0.30	0.35	0.51	2.77	3.47	4.05	5.83	1.44	2.14	2.98	6.19
PB12	XDP-12	4.60	15.83	0.21	0.26	0.32	0.49	2.75	3.44	4.01	5.78	2.71	4.17	5.95	12.93
PB13	XDP-13	0.11	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.33	0.42	0.51	0.79
PB14	XDP-14	0.16	7.52	0.02	0.08	0.15	0.35	3.63	4.56	5.32	7.65	0.01	0.06	0.13	0.43
PB15	XDP-15	1.66	16.53	0.05	0.11	0.17	0.37	2.70	3.38	3.94	5.67	0.21	0.59	1.14	3.47
PB16	XDP-16	0.18	5.00	0.02	0.08	0.15	0.35	4.12	5.17	6.03	8.68	0.01	0.07	0.16	0.55
PB17	XDP-17	0.25	9.92	0.15	0.20	0.26	0.43	3.30	4.14	4.83	6.95	0.12	0.20	0.31	0.73
PB18	XDP-18	0.35	9.34	0.18	0.23	0.29	0.45	3.38	4.23	4.94	7.11	0.21	0.34	0.50	1.11
PB19	XDP-19	2.74	23.99	0.02	0.08	0.15	0.35	2.25	2.82	3.29	4.73	0.12	0.62	1.35	4.53
PB20	XDP-20	0.24	11.83	0.14	0.19	0.25	0.43	3.09	3.88	4.52	6.51	0.10	0.17	0.27	0.66
PB21	XDP-21	1.79	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.47	1.02	3.44
PB22	XDP-22	1.75	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.46	1.00	3.36
PB23	XDP-23	0.26	19.88	0.02	0.08	0.15	0.35	2.48	3.10	3.61	5.20	0.01	0.06	0.14	0.47
PB24	XDP-24	0.05	6.60	0.02	0.08	0.15	0.35	3.79	4.75	5.54	7.98	0.00	0.02	0.04	0.15
PB25	XDP-25	8.86	23.77	0.02	0.08	0.15	0.35	2.26	2.83	3.30	4.75	0.40	2.01	4.39	14.73

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PREPARATORY SCHOOL

ATLAS PREPARATORY SCHOOL

1515 Pulsar Dr
Colorado Springs, CO 80916

DRAINAGE DESIGN

SEPTEMBER 2019

MARK	DATE	DESCRIPTION

ISSUE:
DATE: 05.02.2019
PROJECT NO: 1975009
CAD DWG FILE:
DRAWN BY: MML
CHECKED BY: DWB

SHEET TITLE

PRELIMINARY PROPOSED OVERALL DRAINAGE MAP

C-505

\\civil-server\projects\1975009 Atlas Preparatory Elem School\Dgn\Drainage\Proposed Drainage Sheet.dgn
11:52:48 AM
11/14/2019

BASIN SUMMARY TABLE

Basin	Design Point	Area (ac)	Time of Concentration Tc (min)	Runoff Coefficients				Rainfall Intensity*				Peak Discharge			
				C_2	C_5	C_{10}	C_{100}	I 2-yr (in/hr)	I 5-yr (in/hr)	I 10-yr (in/hr)	I 100-yr (in/hr)	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 10-yr (cfs)	Q 100-yr (cfs)
PB1	XDP-1	0.32	13.29	0.05	0.11	0.18	0.37	2.96	3.70	4.32	6.22	0.05	0.13	0.24	0.74
PB2	XDP-2	0.55	8.05	0.20	0.25	0.31	0.48	3.55	4.46	5.20	7.48	0.40	0.62	0.90	1.97
PB3	XDP-3	0.62	9.52	0.27	0.32	0.37	0.53	3.35	4.20	4.90	7.06	0.56	0.82	1.13	2.29
PB4	XDP-4	2.43	6.70	0.53	0.56	0.60	0.70	3.77	4.73	5.52	7.94	4.84	6.42	8.02	13.56
PB5	XDP-5	0.26	10.96	0.09	0.15	0.21	0.40	3.19	3.99	4.66	6.70	0.07	0.15	0.26	0.70
PB6	XDP-6	0.12	5.00	0.68	0.71	0.73	0.79	4.12	5.17	6.03	8.68	0.34	0.44	0.53	0.82
PB7	XDP-7	0.26	5.00	0.27	0.32	0.37	0.52	4.12	5.17	6.03	8.68	0.29	0.43	0.58	1.18
PB8	XDP-8	0.04	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.11	0.15	0.18	0.27
PB9	XDP-9	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.59	0.76	0.91	1.41
PB10	XDP-10	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.60	0.77	0.93	1.44
PB11	XDP-11	2.09	15.51	0.25	0.30	0.35	0.51	2.77	3.47	4.05	5.83	1.44	2.14	2.98	6.19
PB12	XDP-12	4.60	15.83	0.21	0.26	0.32	0.49	2.75	3.44	4.01	5.78	2.71	4.17	5.95	12.93
PB13	XDP-13	0.11	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.33	0.42	0.51	0.79
PB14	XDP-14	0.16	7.52	0.02	0.08	0.15	0.35	3.63	4.56	5.32	7.65	0.01	0.06	0.13	0.43
PB15	XDP-15	1.66	16.53	0.05	0.11	0.17	0.37	2.70	3.38	3.94	5.67	0.21	0.59	1.14	3.47
PB16	XDP-16	0.18	5.00	0.02	0.08	0.15	0.35	4.12	5.17	6.03	8.68	0.01	0.07	0.16	0.55
PB17	XDP-17	0.25	9.92	0.15	0.20	0.26	0.43	3.30	4.14	4.83	6.95	0.12	0.20	0.31	0.73
PB18	XDP-18	0.35	9.34	0.18	0.23	0.29	0.45	3.38	4.23	4.94	7.11	0.21	0.34	0.50	1.11
PB19	XDP-19	2.74	23.99	0.02	0.08	0.15	0.35	2.25	2.82	3.29	4.73	0.12	0.62	1.35	4.53
PB20	XDP-20	0.24	11.83	0.14	0.19	0.25	0.43	3.09	3.88	4.52	6.51	0.10	0.17	0.27	0.66
PB21	XDP-21	1.79	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.47	1.02	3.44
PB22	XDP-22	1.75	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.46	1.00	3.36
PB23	XDP-23	0.26	19.88	0.02	0.08	0.15	0.35	2.48	3.10	3.61	5.20	0.01	0.06	0.14	0.47
PB24	XDP-24	0.05	6.60	0.02	0.08	0.15	0.35	3.79	4.75	5.54	7.98	0.00	0.02	0.04	0.15
PB25	XDP-25	8.86	23.77	0.02	0.08	0.15	0.35	2.26	2.83	3.30	4.75	0.40	2.01	4.39	14.73

CAUTION

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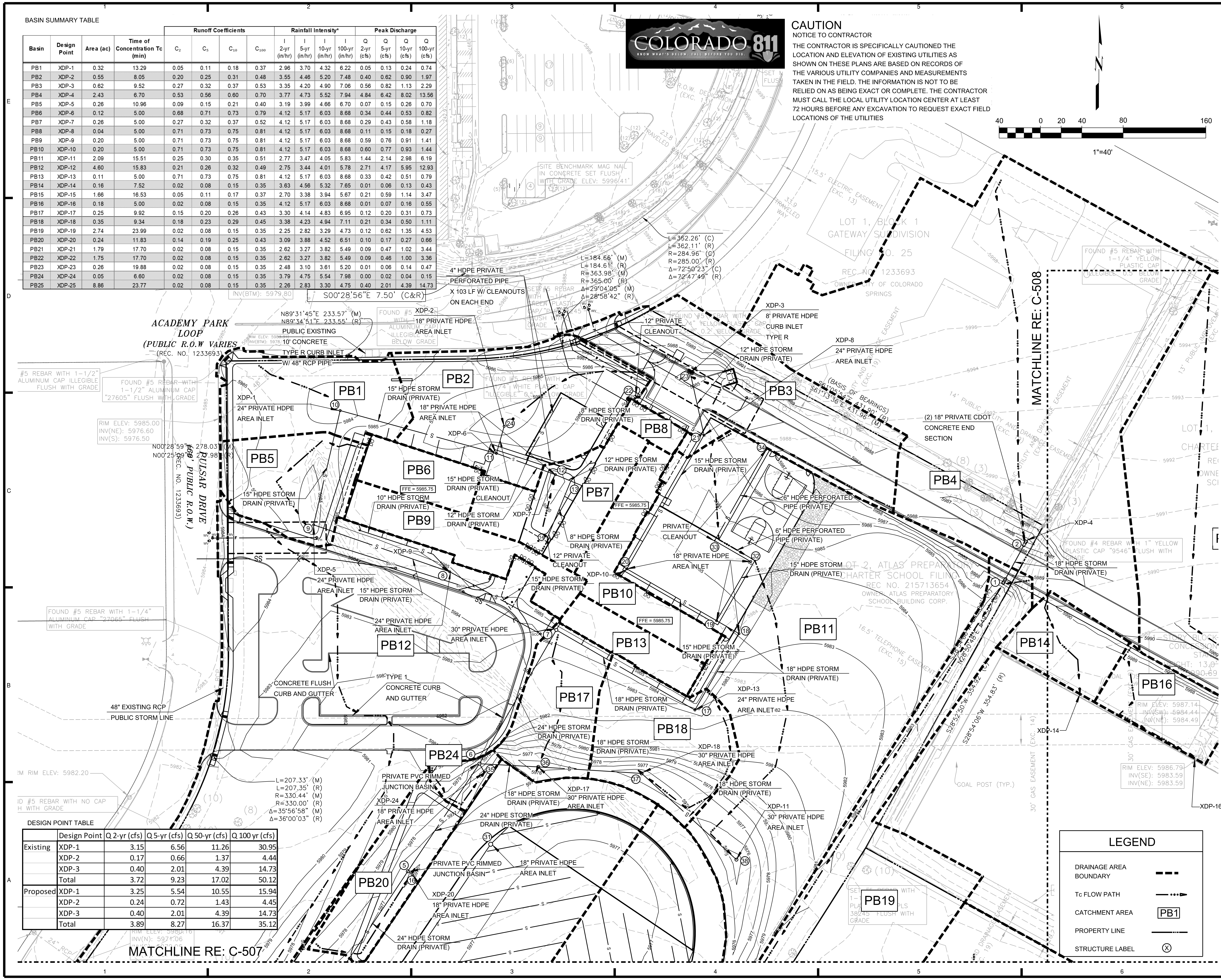

DESIGN POINT TABLE

	Design Point	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 50-yr (cfs)	Q 100 yr (cfs)
Existing	XDP-1	3.15	6.56	11.26	30.95
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	XDP-3	0.40	2.01	4.39	14.73
	Total	3.72	9.23	17.02	50.12
Proposed	XDP-1	3.25	5.54	10.55	15.94
	XDP-2	0.24	0.72	1.43	4.45
	XDP-3	0.40	2.01	4.39	14.73
	Total	3.89	8.27	16.37	35.12

LEGEND

DRAINAGE AREA BOUNDARY	▬ ▬ ▬
Tc FLOW PATH	-·-·-►
CATCHMENT AREA	PB1
PROPERTY LINE	———
STRUCTURE LABEL	ⓧ

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ATLAS PREPARATORY SCHOOL

ATLAS PREPARATORY SCHOOL

1515 Pulsar Dr
Colorado Springs, CO 80916

DRAINAGE DESIGN

SEPTEMBER 2019

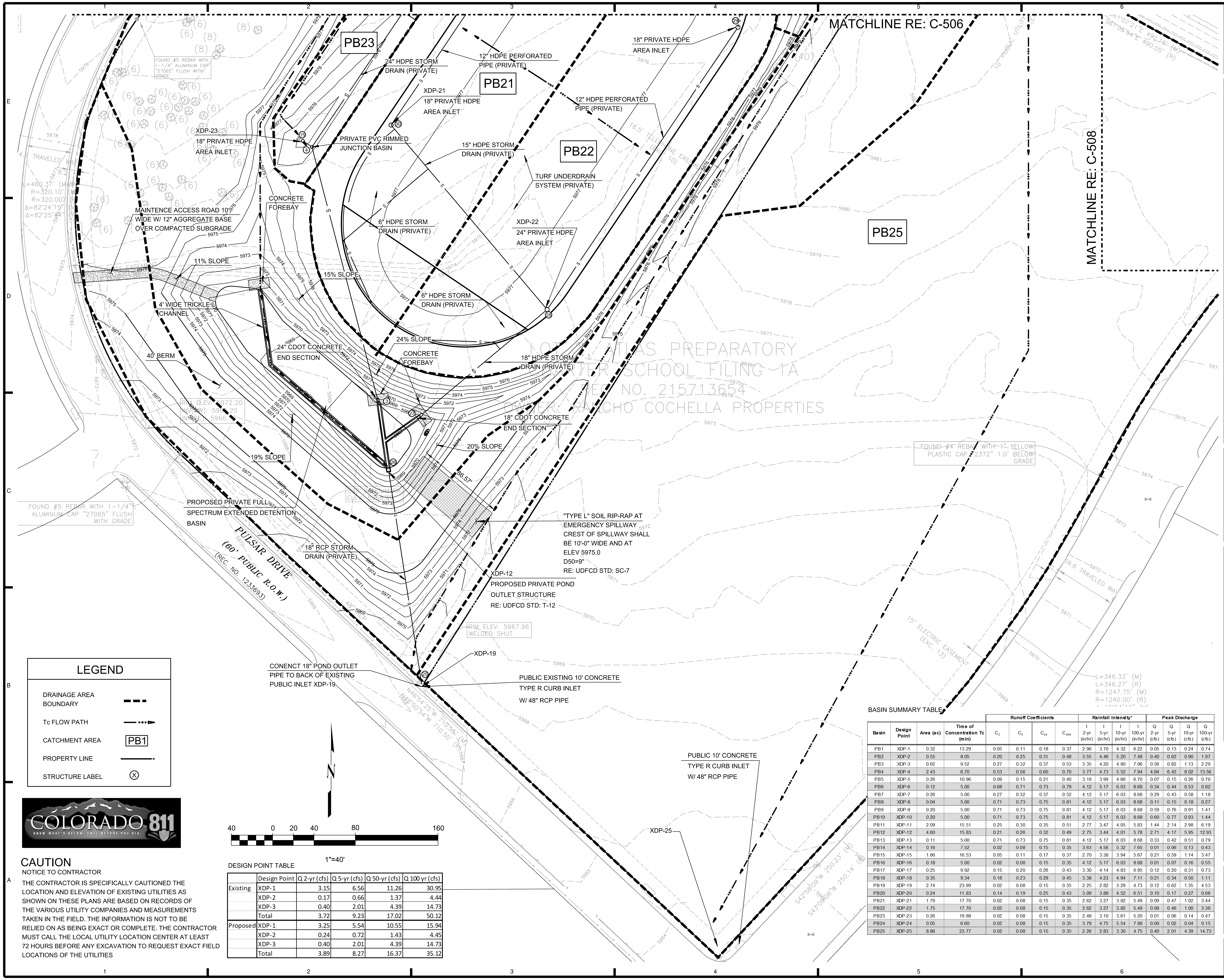
MARK	DATE	DESCRIPTION

ISSUE:
DATE: 05.02.2019
PROJECT NO: 1975009
CAD DWG FILE:
DRAWN BY: MML
CHECKED BY: DWB

SHEET TITLE
PRELIMINARY PROPOSED
DRAINAGE MAP (NORTH)

C-506

11/15/2019 9:33:48 AM \\civil-server\projects\1975009 Atlas Preparatory Elem School\Dgn\Drainage\Proposed Drainage Sheet 2.dgn



LEGEND

DRAINAGE AREA BOUNDARY	▬ ▬ ▬
Tc FLOW PATH	—••➤
CATCHMENT AREA	PB1
PROPERTY LINE	—— - ——
STRUCTURE LABEL	⊗

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CAUTION

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PB1	XDP-1	0.32	13.29	0.05	0.11	0.18	0.37	2.96	3.70	4.32	6.22	0.05	0.13	0.24	0.74
PB2	XDP-2	0.55	8.05	0.20	0.25	0.31	0.48	3.55	4.46	5.20	7.48	0.40	0.62	0.90	1.97
PB3	XDP-3	0.62	9.52	0.27	0.32	0.37	0.53	3.35	4.20	4.90	7.06	0.56	0.82	1.13	2.29
PB4	XDP-4	2.43	6.70	0.53	0.56	0.60	0.70	3.77	4.73	5.52	7.94	4.84	6.42	8.02	13.56
PB5	XDP-5	0.26	10.96	0.09	0.15	0.21	0.40	3.19	3.99	4.66	6.70	0.07	0.15	0.26	0.70
PB6	XDP-6	0.12	5.00	0.68	0.71	0.73	0.79	4.12	5.17	6.03	8.68	0.34	0.44	0.53	0.82
PB7	XDP-7	0.26	5.00	0.27	0.32	0.37	0.52	4.12	5.17	6.03	8.68	0.29	0.43	0.58	1.18
PB8	XDP-8	0.04	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.11	0.15	0.18	0.27
PB9	XDP-9	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.59	0.76	0.91	1.41
PB10	XDP-10	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.60	0.77	0.93	1.44
PB11	XDP-11	2.09	15.51	0.25	0.30	0.35	0.51	2.77	3.47	4.05	5.83	1.44	2.14	2.98	6.19
PB12	XDP-12	4.60	15.83	0.21	0.26	0.32	0.49	2.75	3.44	4.01	5.78	2.71	4.17	5.95	12.93
PB13	XDP-13	0.11	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.33	0.42	0.51	0.79
PB14	XDP-14	0.16	7.52	0.02	0.08	0.15	0.35	3.63	4.56	5.32	7.65	0.01	0.06	0.13	0.43
PB15	XDP-15	1.66	16.53	0.05	0.11	0.17	0.37	2.70	3.38	3.94	5.67	0.21	0.59	1.14	3.47
PB16	XDP-16	0.18	5.00	0.02	0.08	0.15	0.35	4.12	5.17	6.03	8.68	0.01	0.07	0.16	0.55
PB17	XDP-17	0.25	9.92	0.15	0.20	0.26	0.43	3.30	4.14	4.83	6.95	0.12	0.20	0.31	0.73
PB18	XDP-18	0.35	9.34	0.18	0.23	0.29	0.45	3.38	4.23	4.94	7.11	0.21	0.34	0.50	1.11
PB19	XDP-19	2.74	23.99	0.02	0.08	0.15	0.35	2.25	2.82	3.29	4.73	0.12	0.62	1.35	4.53
PB20	XDP-20	0.24	11.83	0.14	0.19	0.25	0.43	3.09	3.88	4.52	6.51	0.10	0.17	0.27	0.66
PB21	XDP-21	1.79	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.47	1.02	3.44
PB22	XDP-22	1.75	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.46	1.00	3.36
PB23	XDP-23	0.26	19.88	0.02	0.08	0.15	0.35	2.48	3.10	3.61	5.20	0.01	0.06	0.14	0.47
PB24	XDP-24	0.05	6.60	0.02	0.08	0.15	0.35	3.79	4.75	5.54	7.98	0.00	0.02	0.04	0.15
PB25	XDP-25	8.86	23.77	0.02	0.08	0.15	0.35	2.26	2.83	3.30	4.75	0.40	2.01	4.39	14.73

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ATLAS PREPARATORY SCHOOL

ATLAS PREPARATORY SCHOOL

1515 Pulsar Dr
Colorado Springs, CO 80916

DRAINAGE DESIGN

SEPTEMBER 2019

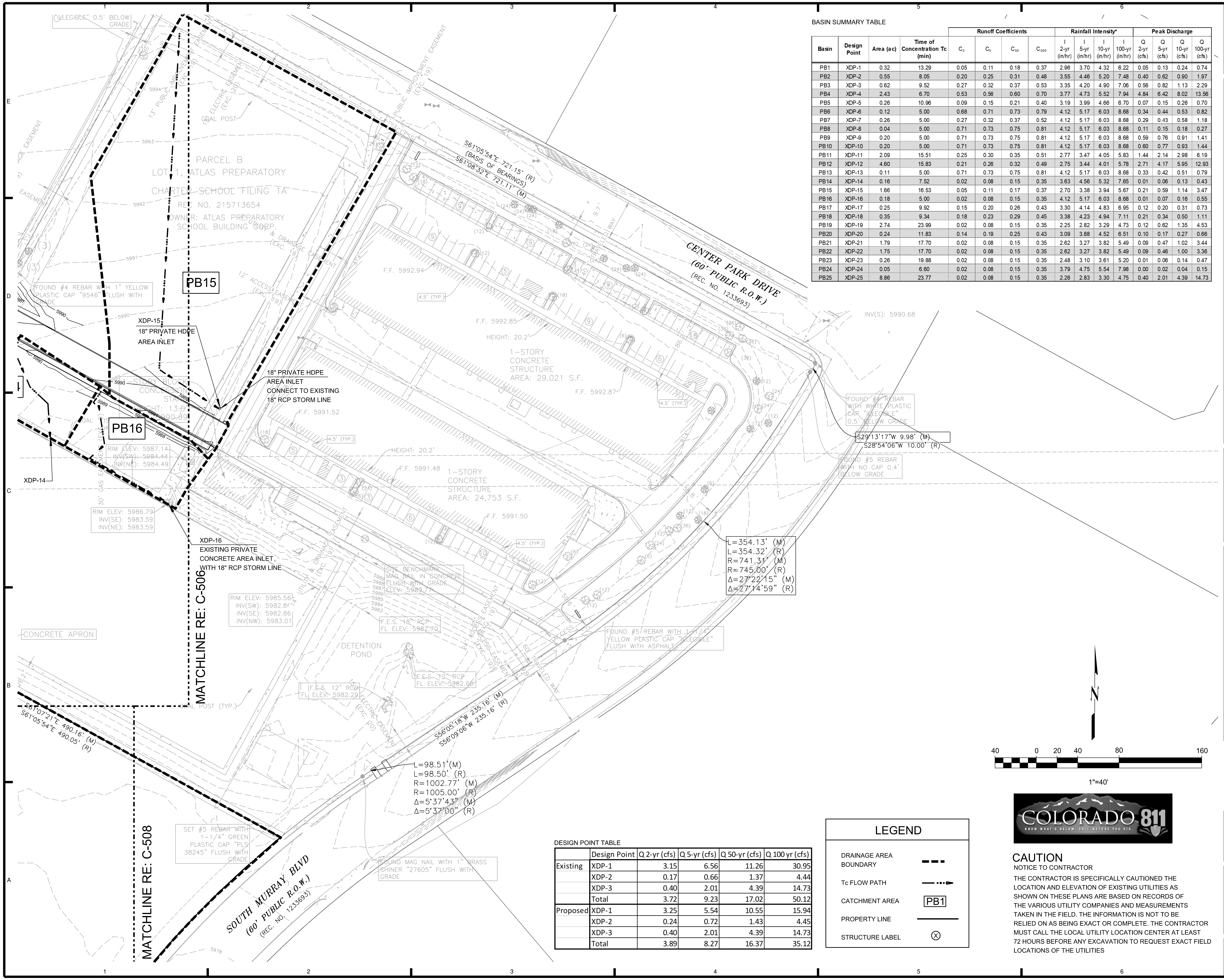
MARK	DATE	DESCRIPTION

ISSUE:
DATE: 05.02.2019
PROJECT NO: 1975009
CAD DWG FILE:
DRAWN BY: MML
CHECKED BY: DWB

SHEET TITLE

PRELIMINARY PROPOSED
DRAINAGE MAP (SOUTH)

C-507



BASIN SUMMARY TABLE

				Runoff Coefficients				Rainfall Intensity*				Peak Discharge			
Basin	Design Point	Area (ac)	Time of Concentration Tc (min)	C_2	C_5	C_{10}	C_{100}	I 2-yr (in/hr)	I 5-yr (in/hr)	I 10-yr (in/hr)	I 100-yr (in/hr)	Q 2-yr (cfs)	Q 5-yr (cfs)	Q 10-yr (cfs)	Q 100-yr (cfs)
PB1	XDP-1	0.32	13.29	0.05	0.11	0.18	0.37	2.96	3.70	4.32	6.22	0.05	0.13	0.24	0.74
PB2	XDP-2	0.55	8.05	0.20	0.25	0.31	0.48	3.55	4.46	5.20	7.48	0.40	0.62	0.90	1.97
PB3	XDP-3	0.62	9.52	0.27	0.32	0.37	0.53	3.35	4.20	4.90	7.06	0.56	0.82	1.13	2.29
PB4	XDP-4	2.43	6.70	0.53	0.56	0.60	0.70	3.77	4.73	5.52	7.94	4.84	6.42	8.02	13.56
PB5	XDP-5	0.26	10.96	0.09	0.15	0.21	0.40	3.19	3.99	4.66	6.70	0.07	0.15	0.26	0.70
PB6	XDP-6	0.12	5.00	0.68	0.71	0.73	0.79	4.12	5.17	6.03	8.68	0.34	0.44	0.53	0.82
PB7	XDP-7	0.26	5.00	0.27	0.32	0.37	0.52	4.12	5.17	6.03	8.68	0.29	0.43	0.58	1.18
PB8	XDP-8	0.04	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.11	0.15	0.18	0.27
PB9	XDP-9	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.59	0.76	0.91	1.41
PB10	XDP-10	0.20	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.60	0.77	0.93	1.44
PB11	XDP-11	2.09	15.51	0.25	0.30	0.35	0.51	2.77	3.47	4.05	5.83	1.44	2.14	2.98	6.19
PB12	XDP-12	4.60	15.83	0.21	0.26	0.32	0.49	2.75	3.44	4.01	5.78	2.71	4.17	5.95	12.93
PB13	XDP-13	0.11	5.00	0.71	0.73	0.75	0.81	4.12	5.17	6.03	8.68	0.33	0.42	0.51	0.79
PB14	XDP-14	0.16	7.52	0.02	0.08	0.15	0.35	3.63	4.56	5.32	7.65	0.01	0.06	0.13	0.43
PB15	XDP-15	1.66	16.53	0.05	0.11	0.17	0.37	2.70	3.38	3.94	5.67	0.21	0.59	1.14	3.47
PB16	XDP-16	0.18	5.00	0.02	0.08	0.15	0.35	4.12	5.17	6.03	8.68	0.01	0.07	0.16	0.55
PB17	XDP-17	0.25	9.92	0.15	0.20	0.26	0.43	3.30	4.14	4.83	6.95	0.12	0.20	0.31	0.73
PB18	XDP-18	0.35	9.34	0.18	0.23	0.29	0.45	3.38	4.23	4.94	7.11	0.21	0.34	0.50	1.11
PB19	XDP-19	2.74	23.99	0.02	0.08	0.15	0.35	2.25	2.82	3.29	4.73	0.12	0.62	1.35	4.53
PB20	XDP-20	0.24	11.83	0.14	0.19	0.25	0.43	3.09	3.88	4.52	6.51	0.10	0.17	0.27	0.66
PB21	XDP-21	1.79	17.70	0.02	0.08	0.15	0.35	2.62	3.27	3.82	5.49	0.09	0.47	1.02	3.44
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PB24	XDP-24	0.05	6.60	0.02	0.08	0.15	0.35	3.79	4.75	5.54	7.98	0.00	0.02	0.04	0.15
PB25	XDP-25	8.86	23.77	0.02	0.08	0.15	0.35	2.26	2.83	3.30	4.75	0.40	2.01	4.39	14.73

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LEGEND

DRAINAGE AREA BOUNDARY	▬ ▬ ▬
Tc FLOW PATH	—··—>
CATCHMENT AREA	PB1
PROPERTY LINE	——
STRUCTURE LABEL	ⓧ

COLORADO 811
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ATLAS
PREPARATORY SCHOOL

ATLAS PREPARATORY SCHOOL
1515 Pulsar Dr
Colorado Springs, CO 80916

DRAINAGE DESIGN

SEPTEMBER 2019

MARK	DATE	DESCRIPTION

ISSUE:
DATE: 05.02.2019
PROJECT NO: 1975009
CAD DWG FILE:
DRAWN BY: MML
CHECKED BY: DWB

SHEET TITLE
PRELIMINARY PROPOSED
DRAINAGE MAP (EAST)

C-508

\\civil-server\projects\1975009 Atlas Preparatory Elem School\Dgn\Drainage\Proposed Drainage Sheet 4.dgn
7:55:44 AM
11/14/2019

Appendix I
Variance Request Letter

wallace

December 4, 2019

Water Resources Engineering Division (WRED)
City of Colorado Springs
30 S. Nevada Ave, Suite 401
Colorado Springs, CO 80903

RE: Atlas Preparatory Charter School
Storm Sewer Variance Request

Dear Sir or Madam:

The proposed Atlas Preparatory Charter School Fil. No. 1B is located at 1515 Pulsar Dr. on a 25.4-acre lot. This building will consist of approximately 38,826 square feet, one story building addition with associated parking, drives, and sidewalks. City of Colorado Springs Drainage Criteria Manual requires inlets not used as junctions. It is requested the existing public inlet along Pulsar Drive be used as a junction for our new pipe coming out of the new detention pond in lieu of placing a new manhole junction adjacent to this inlet. This variance request for this storm sewer construction will not impact any future or adjacent developments. It is kindly requested that this variance be approved to continue with the Development Plan (DP) review process.

Should you have any additional questions or need additional information please let me know.

Sincerely,

WALLACE ENGINEERING • STRUCTURAL CONSULTANTS, INC.

Civil Engineering Services

Danny Baldwin, P.E.
Associate

Wallace Engineering
Structural Consultants, Inc.
9800 Pyramid Court, Suite 350
Englewood, Colorado 80112
303.350.1690, 800.364.5858
www.wallacesc.com

Variance Request No:________________

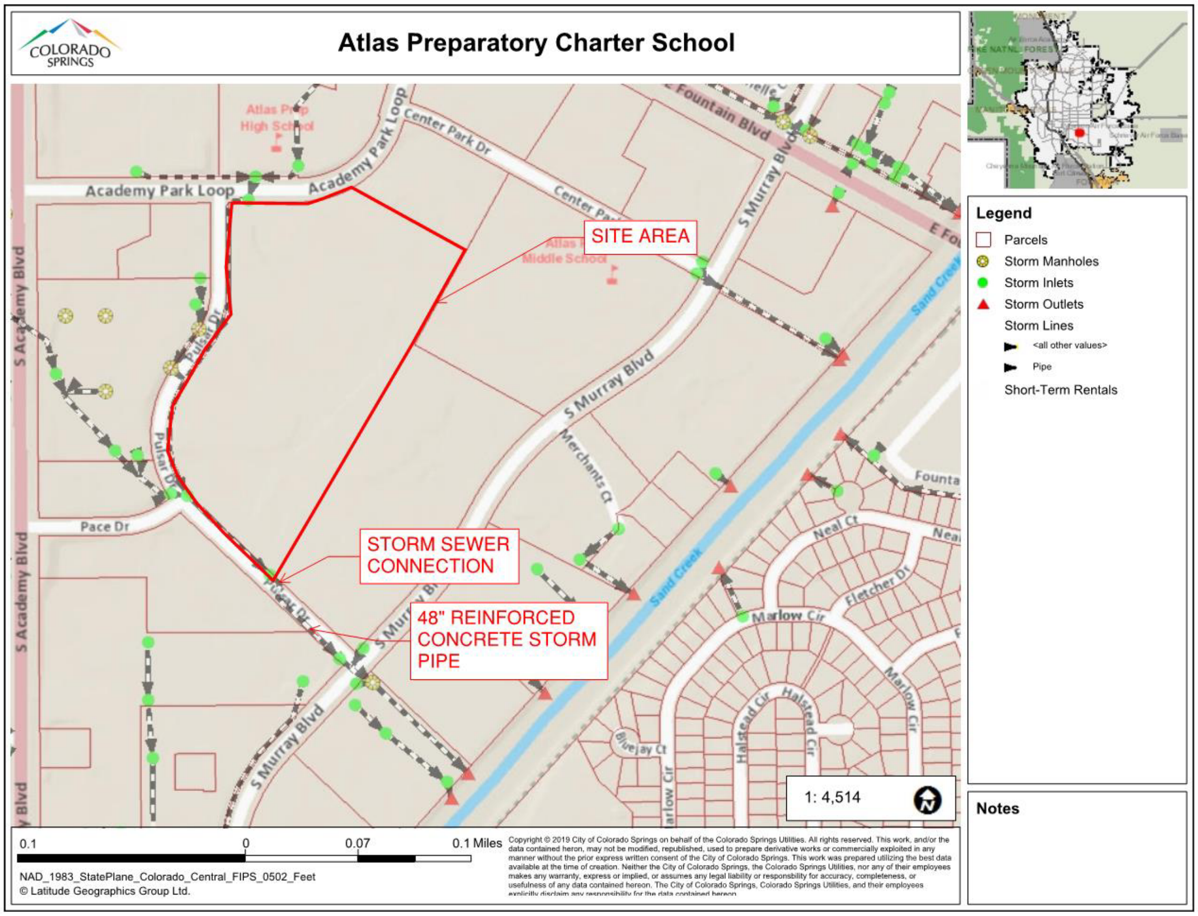
Name of Applicant: Wallace Engineering_

Owner: Atlas Preparatory Charter School

Project Address: 1515 Pulsar Dr.

Date: December, 4 2019

Vicinity Map:



Applicable Criteria:

The City of Colorado Springs Drainage Criteria Manual Volume 1, Chapter 9, Subsection 6.2 requires that inlets may not be used as junctions on trunk lines.

Justification:

The criteria manual requirement described above cannot be met because the drainage of the site requires an existing public inlet be used as a junction for the discharge pipe coming out of a new detention pond. The site drains to a full spectrum extended detention drainage basin. The basin releases the flow through an outlet structure and to the existing storm sewer system along Pulsar Drive. The proposed connection is to an existing storm sewer inlet to make the site cost effective and meet the drainage requirements. The existing storm sewer system along Pulsar Drive consists of a 48” RCP. Adding a new structure along this 48” pipe would be costly and possibly conflict with other existing utilities running along this pipe in the right of way.

Alternate Criterion:

The proposed alternative is to connect the proposed pond outlet pipe to the back of the existing public 10’ Type R curb inlet structure with an 18” RCP storm line. This would allow the inlet to be used as a junction and avoid costly options to create another junction in the existing storm sewer system. The existing inlet will not need to be modified due to the angle of the proposed storm line coming into the inlet.

Supporting Documentation:

Calculations are included, to show that the proposed drainage out of the pond is less than or equal to the flow that is running off the site and into the existing storm sewer, showing that the proposed flow will not overflow the existing inlet.

Peak flow and Water Quality Statement:

This variance request will have no effects on Fountain Creek. Post-developed peak flows will discharge at historic rates or less. This variance has no impact on water quality in Fountain Creek.

Should you have any additional questions or need additional information please let me know.

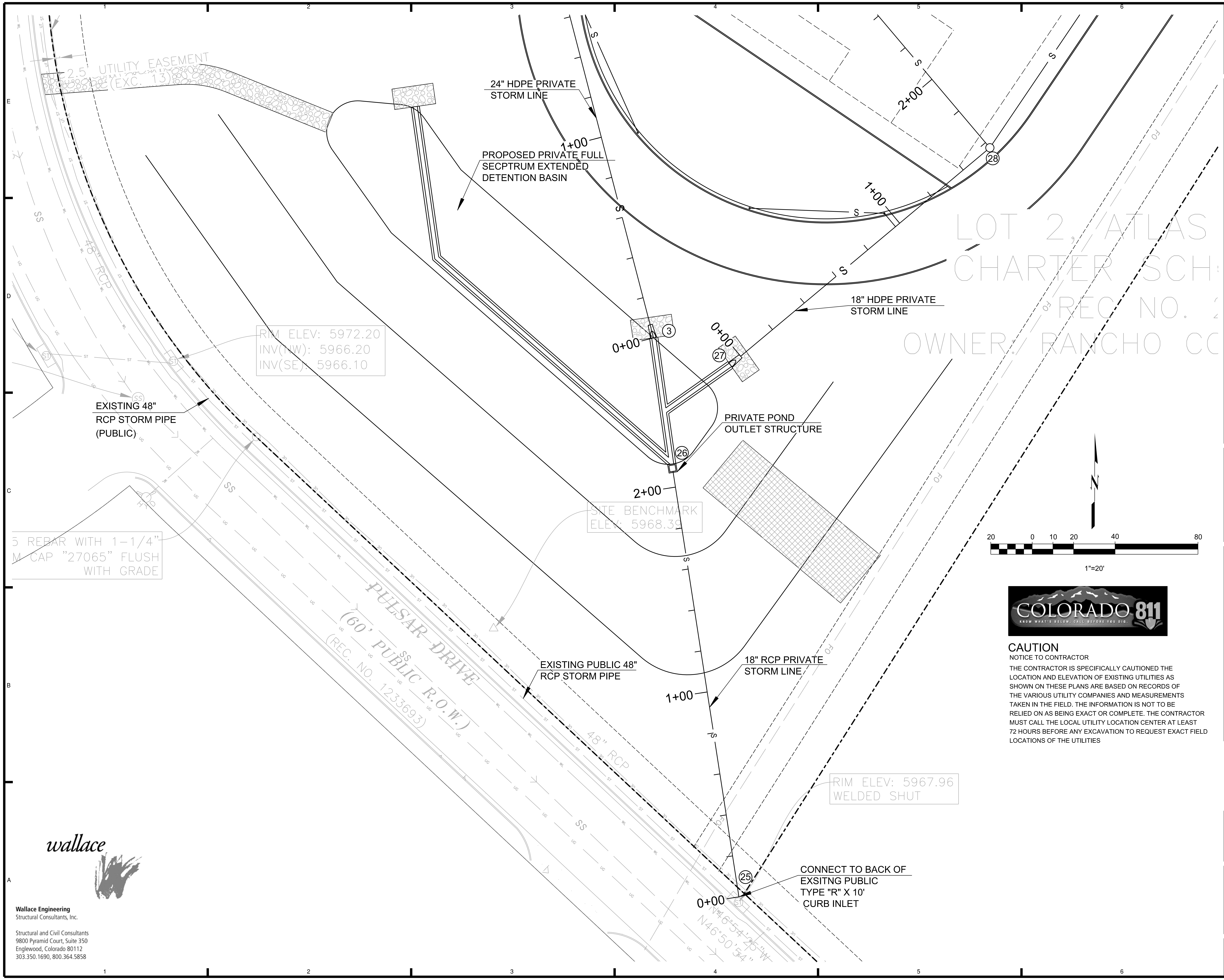
Sincerely,

WALLACE ENGINEERING • STRUCTURAL CONSULTANTS, INC.
Civil Engineering Services

SCOTT M. RODEHAVER
0049845

12/04/2019
Scott Rodehaver, P.E.
Colorado P.E. No.0049845
Principal

Date: December 4, 2019



COLORADO 811
KNOW WHAT'S BELOW. CALL BEFORE YOU DIG.

CAUTION

NOTICE TO CONTRACTOR

THE CONTRACTOR IS SPECIFICALLY CAUTIONED THE LOCATION AND ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES AND MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE LOCAL UTILITY LOCATION CENTER AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATIONS OF THE UTILITIES

wallace
Wallace Engineering
Structural Consultants, Inc.

Structural and Civil Consultants
9800 Pyramid Court, Suite 350
Englewood, Colorado 80112
303.350.1690, 800.364.5858

\\civil-server\projects\1975009 Atlas Preparatory Elem School\Dgn\Storm Sewer\Variance Exhibit Sheet.dgn
9:12:42 AM
11/22/2019

fbt | architects
MAIL: 415 N. Tejon St.
Colorado Springs, CO 80903
PHO: 719-309-9440
FAX: 505.884.5390
WEB: www.fbtarch.com

CONSULTANT

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STRUCTURAL
WALLA ENGINEERING
One Park Square
6501 Americas Pkwy #301,
Albuquerque, NM 87110
P: 505-881-3008

M/E/P/FP
BRIDGERS & PAXTON
1365 W Garden of the Gods Rd #130,
Colorado Springs, CO 80907
P: 719-630-3350

LANDSCAPE
GROUNDWORKSTUDIO
One Park Square,
6501 Americas Pkwy #300,
Albuquerque, NM 87110
P: 505-212-9126

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ATLAS
PREPARATORY SCHOOL

ATLAS PREPARATORY SCHOOL

1515 Pulsar Dr.
Colorado Springs, CO 80916

STORM SEWER PLAN

NOVEMBER 2019

MARK	DATE	DESCRIPTION

ISSUE:
DATE: 06.28.2019
PROJECT NO: 1975009
CAD DWG FILE:
DRAWN BY: MML
CHECKED BY: DWB

SHEET TITLE

VARIANCE EXHIBIT

C-401