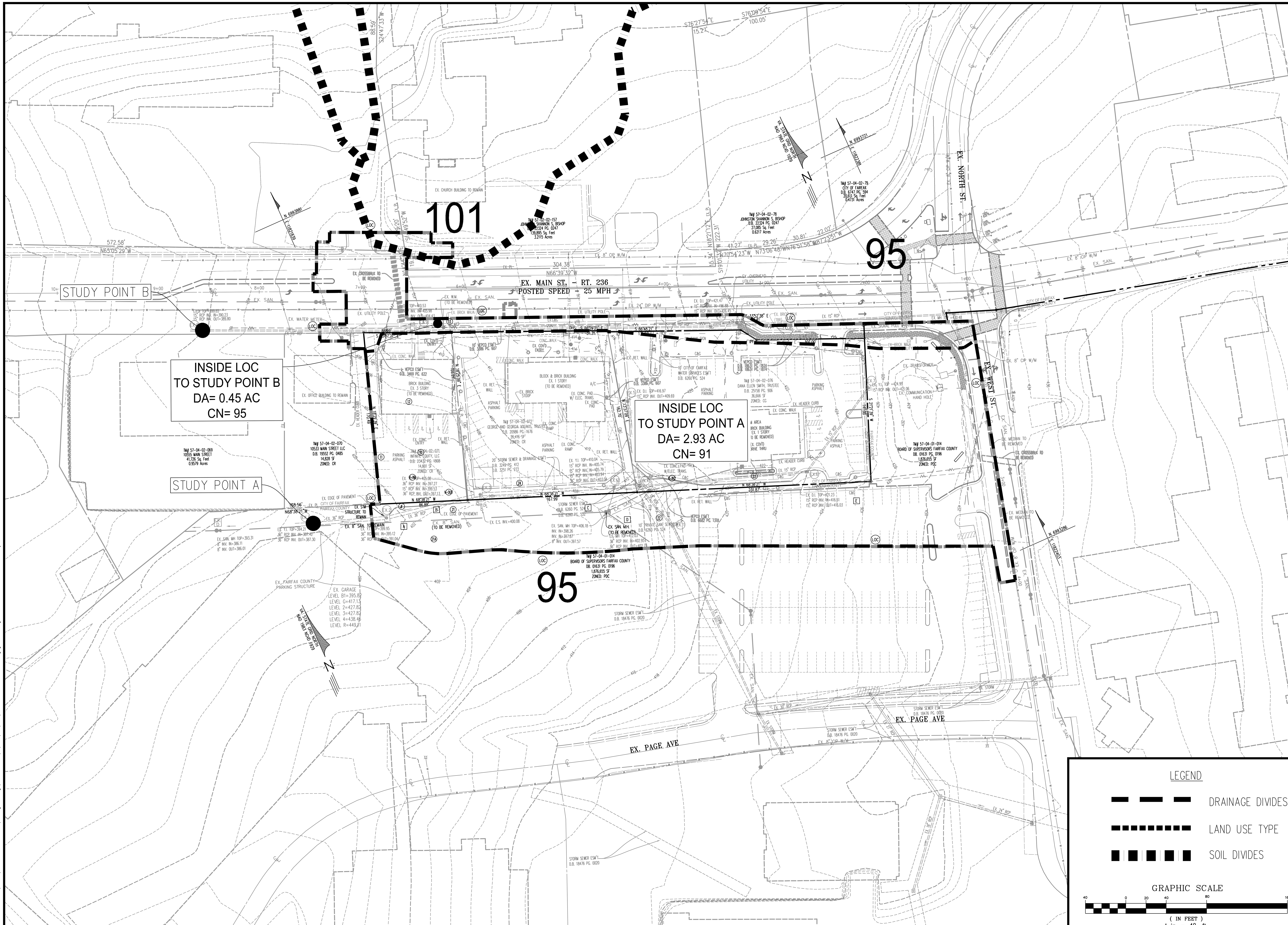

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
01-18-22
08-30-22
04-20-23
06-02-23

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COMMONWEALTH OF VIRGINIA
Lic. No. 036790
06/02/2023
PROFESSIONAL ENGINEER

SWM PRE-DEVELOPMENT
CITY CENTRE WEST
GENERAL DEVELOPMENT PLAN
SPECIAL USE PERMIT PLAT
CITY OF FAIRFAX, VIRGINIA

SCALE: 1"=40' C.I.=2' DATE: JAN., 2022

SHEET 14 OF 51

FILE No. RZ-13007

Urban, Ltd. - J:\JOBS\10523 main street\b-engineering\entitlement\cdp-fdp-spex\13007-04-SWM-PRE.dwg [SWM PRE] June 02, 2023 - 10:49am yelasri

STUDY POINT A

STUDY POINT A PRE DEVELOPMENT (LOC ONLY)

Curve Number Calculations

Area (ac)	CN	Description
1.850	98	Paved parking, HSG D
0.740	80	>75% Grass cover, Good, HSG D
0.340	77	Woods, Good, HSG D
2.930	91	Weighted Average
1.080		36.86% Pervious Area
1.850		63.14% Impervious Area

Time of Concentration Calculations

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

1 Year Flow Calculations

Runoff = 6.21 cfs@ 12.13 hrs, Volume= 18,001 cf, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 1-Year Rainfall=2.59"

2 Year Flow Calculations

Runoff = 7.94 cfs@ 12.13 hrs, Volume= 23,321 cf, Depth= 2.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.13"

10 Year Flow Calculations

Runoff = 13.32 cfs@ 12.13 hrs, Volume= 40,393 cf, Depth= 3.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=4.81"

PRE DEVELOPMENT PEAK FLOW SUMMARIES TO STUDY POINT A LOC ONLY

1-YEAR FLOW SUMMARY

Inflow Area = 127,631 sf, 63.14% Impervious, Inflow Depth = 1.69" for 1-Year event
Inflow = 6.21 cfs@ 12.13 hrs, Volume= 18,001 cf
Primary = 6.21 cfs@ 12.13 hrs, Volume= 18,001 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

2-YEAR FLOW SUMMARY

Inflow Area = 127,631 sf, 63.14% Impervious, Inflow Depth = 2.19" for 2-Year event
Inflow = 7.94 cfs@ 12.13 hrs, Volume= 23,321 cf
Primary = 7.94 cfs@ 12.13 hrs, Volume= 23,321 cf, Atten= 0%, Lag= 0.0 min

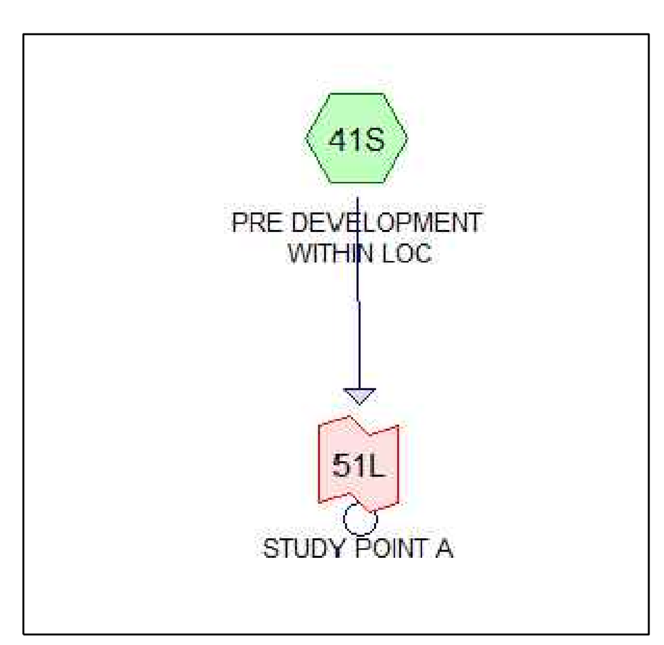
Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

10-YEAR FLOW SUMMARY

Inflow Area = 127,631 sf, 63.14% Impervious, Inflow Depth = 3.80" for 10-Year event
Inflow = 13.32 cfs@ 12.13 hrs, Volume= 40,393 cf
Primary = 13.32 cfs@ 12.13 hrs, Volume= 40,393 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

PRE DEVELOPMENT HYDROCAD NODES



STUDY POINT B

STUDY POINT B PRE DEVELOPMENT (LOC ONLY)

Curve Number Calculations

Area (ac)	CN	Description
0.380	98	Paved parking, HSG D
0.070	80	>75% Grass cover, Good, HSG D
0.450	95	Weighted Average
0.070		15.56% Pervious Area
0.380		84.44% Impervious Area

Time of Concentration Calculations

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

1 Year Flow Calculations

Runoff = 1.10 cfs@ 12.13 hrs, Volume= 3,349 cf, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 1-Year Rainfall=2.59"

2 Year Flow Calculations

Runoff = 1.37 cfs@ 12.13 hrs, Volume= 4,209 cf, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.13"

10 Year Flow Calculations

Runoff = 2.17 cfs@ 12.13 hrs, Volume= 6,912 cf, Depth= 4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=4.81"

PRE DEVELOPMENT PEAK FLOW SUMMARIES TO STUDY POINT B LOC ONLY

1-YEAR FLOW SUMMARY

Inflow Area = 19,602 sf, 84.44% Impervious, Inflow Depth = 2.05" for 1-Year event
Inflow = 1.10 cfs@ 12.13 hrs, Volume= 3,349 cf
Primary = 1.10 cfs@ 12.13 hrs, Volume= 3,349 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

2-YEAR FLOW SUMMARY

Inflow Area = 19,602 sf, 84.44% Impervious, Inflow Depth = 2.58" for 2-Year event
Inflow = 1.37 cfs@ 12.13 hrs, Volume= 4,209 cf
Primary = 1.37 cfs@ 12.13 hrs, Volume= 4,209 cf, Atten= 0%, Lag= 0.0 min

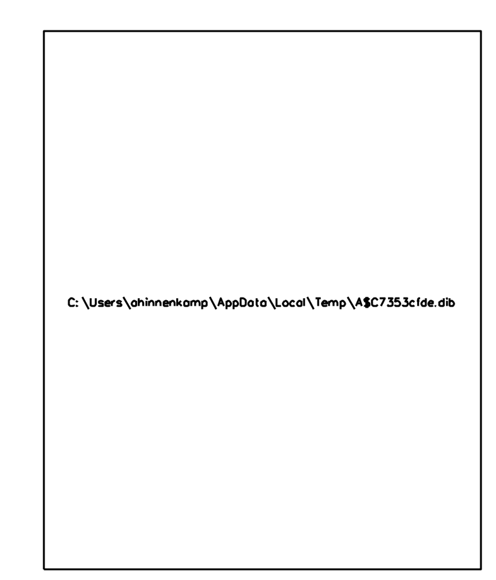
Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

10-YEAR FLOW SUMMARY

Inflow Area = 19,602 sf, 84.44% Impervious, Inflow Depth = 4.23" for 10-Year event
Inflow = 2.17 cfs@ 12.13 hrs, Volume= 6,912 cf
Primary = 2.17 cfs@ 12.13 hrs, Volume= 6,912 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

PRE DEVELOPMENT HYDROCAD NODES



REVISIONS

No.	DATE	DESCRIPTION

PLAN DATE
01-18-22
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04-20-23
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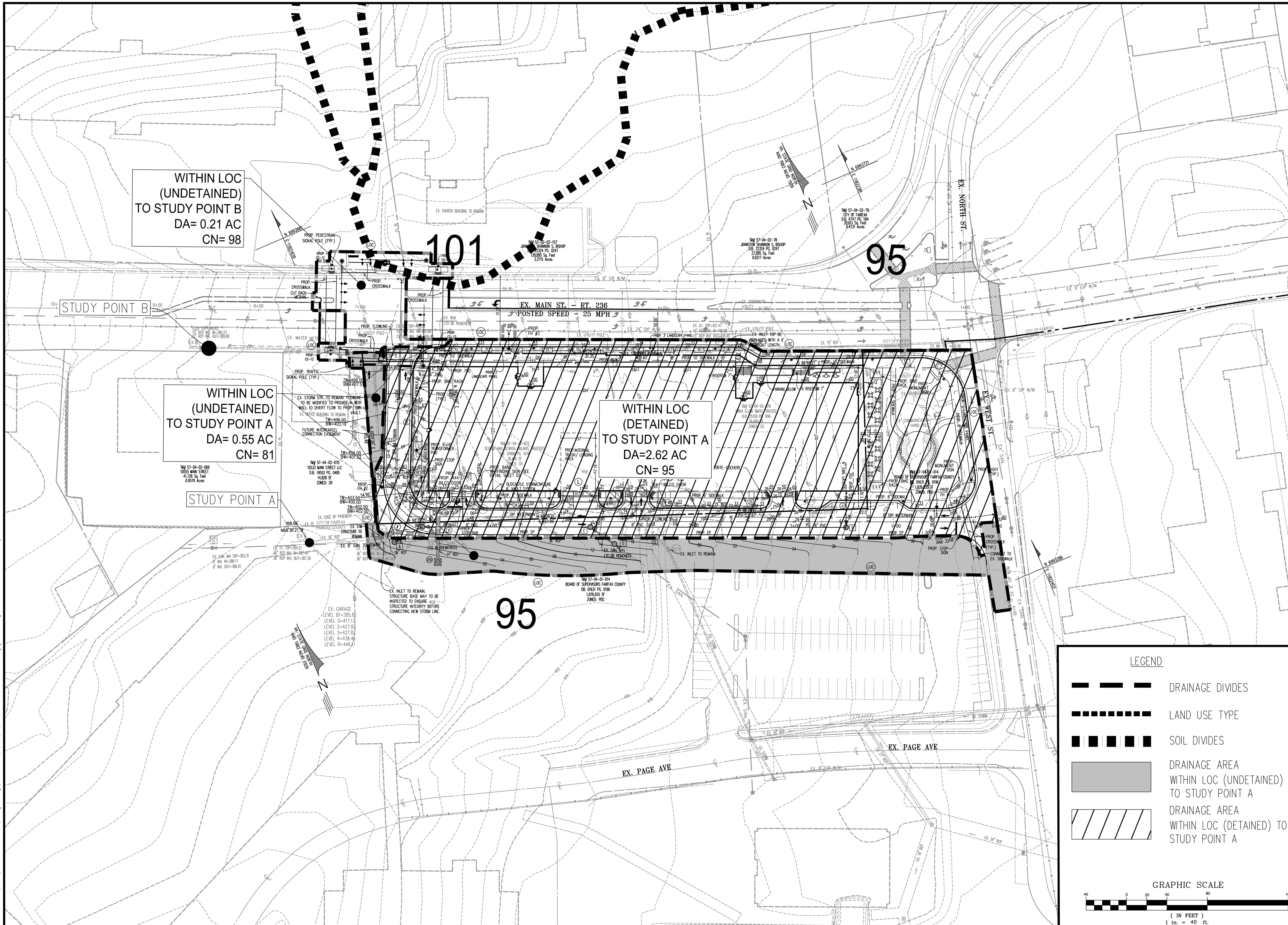
COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 036790
06/02/2023
PROFESSIONAL ENGINEER

SWM PRE-DEVELOPMENT COMPUTATIONS
CITY CENTRE WEST
GENERAL DEVELOPMENT PLAN
SPECIAL USE PERMIT PLAT
CITY OF FAIRFAX, VIRGINIA

SCALE: N/A C.I.= N/A DATE: JAN., 2022

SHEET 15 OF 51

FILE No. RZ-13007



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SWM POST-DEVELOPMENT
CITY CENTRE WEST
GENERAL DEVELOPMENT PLAN
SPECIAL USE PERMIT PLAT
CITY OF FAIRFAX, VIRGINIA

SCALE: 1"=40'
C.I.= 2'
DATE: JAN., 2022

SHEET 16 OF 51

FILE No. RZ-13007

Urban, Ltd. - J:\JOBS\10523 main street\b-engineering\entitlement\cdp-fdp-spex\13007-04-SWM-POST.dwg [SWM POST] June 02, 2023 - 10:49am yelosri

STUDY POINT A POST DEVELOPMENT (LOC ONLY) DETAINED

Curve Number Calculations

	Area (ac)	CN	Description
*	2.230	98	Paved parking, HSG D
	0.390	80	>75% Grass cover, Good, HSG D
	2.620	95	Weighted Average
	0.390		14.89% Pervious Area
	2.230		85.11% Impervious Area

Time of Concentration Calculations

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

1 Year Flow Calculations

Runoff = 6.42 cfs@ 12.13 hrs Volume= 19,501 cf Depth=2.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 1-Year Rainfall=2.59"

2 Year Flow Calculations

Runoff = 7.95 cfs@ 12.13 hrs Volume= 24,503 cf Depth=2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.13"

10 Year Flow Calculations

Runoff = 12.66 cfs@ 12.13 hrs Volume= 40,243 cf Depth=4.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=4.81"

STUDY POINT A POST DEVELOPMENT (LOC ONLY) UNDETAINED

Curve Number Calculations

Area (ac)	CN	Description
0.530	80	>75% Grass cover, Good, HSG D
0.030	98	Paved parking, HSG D
0.560	81	Weighted Average
0.530		94.64% Pervious Area
0.030		5.36% Impervious Area

Time of Concentration Calculations

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, Direct Entry**

1 Year Flow Calculations

Runoff = 0.72 cfs@ 12.14 hrs Volume= 2,047 cf Depth=1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 1-Year Rainfall=2.59"

2 Year Flow Calculations

Runoff = 1.01 cfs@ 12.13 hrs Volume= 2,875 cf Depth=1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.13"

10 Year Flow Calculations

Runoff = 2.00 cfs@ 12.13 hrs Volume= 5,729 cf Depth=2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=4.81"

STUDY POINT A

VAULT COMPUTATIONS

Volume	Invert	Avail.Storage	Storage Description
#1A	393.00'	0 cf	**8.00'W x 240.00'L x 8.17'H Field A** 15,680 cf Overall - 15,680 cf Embedded = 0 cf x 40.0% Voids
#2A	393.00'	11,333 cf	**Oldcastle StormCapture SC2 x 715** Inside #1 Inside= 84.0"W x 84.0"H => 49.56 sf x 16.00'L = 793.0 cf Outside= 96.0"W x 98.0"H => 65.33 sf x 16.00'L = 1,045.3 cf 1 Rows adjusted for 562.5 cf perimeter wall
		11,333 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	393.00'	**36.0" Round Culvert** L= 20.0' Ke= 0.700 Inlet/ Outlet Invert= 393.00'/ 392.00' S= 0.0500'/' Cc= 0.900 n= 0.013 Concrete pipe, straight & clean, Flow Area= 7.07 sf
#2	Device 1	393.50'	**8.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	397.00'	**12.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=2.43 cfs @ 12.27 hrs HW=395.92' (Free Discharge)
└1=**Culvert** (Passes 2.43 cfs of 36.05 cfs potential flow)
  ├2=**Orifice/Grate** (Orifice Controls 2.43 cfs @ 6.96 fps)
  └3=**Orifice/Grate** (Controls 0.00 cfs)

POST DEVELOPMENT HYDROCAD NODES

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FLOW SUMMARY AND ENERGY BALANCE

FLOW SUMMARY			
	1 YR	2 YR	10 YR
Pre Development Flows at Study Point 'A' (cfs)	6.21	7.94	13.32
Allowable Flow At Study Point 'A' (cfs)	4.15*	7.94	13.32
Post-Development Flows at Study Point 'A' (cfs)	3.05	3.68	8.84

*** Per the Energy Balance Equation**

ENERGY BALANCE METHOD TO STUDY POINT A

$Q_{(Developed)}$=	3.05	cfs
$Q_{(Pre\text{-}Developed)}$=	6.21	cfs
$RV_{(Pre\text{-}Developed)}$=	18001.00	cf
$RV_{(Developed)}$=	21549.00	cf
I.F. =	0.8	(0.8 for sites greater than one acre) (0.9 for sites less than or equal to one acre)

Q Developed		I.F x ($Q_{Pre\text{-}Developed}$ x $RV_{Pre\text{-}Developed}$)/$RV_{Developed}$
3.05	≤	4.15

STORM SEWER DESIGN COMPUTATIONS

Project: 10523 MAIN STREET ☐ Lag time

From Point	To Point	Drainage Area	C Factor	C x A Increment	C x A Cumm.	Inlet Time Min.	Rain Fall In/Hr	Runoff Q C.F.S.	Invert Elevation Upper End	Invert Elevation Lower End	Length FT.	Slope %	Dia. IN.	Capacity Q C.F.S.	VEL. F.P.S.	Flow Time MIN.	Remarks
EX. 11	EX. 10	0.48	0.75	0.36	0.36	5.00	6.77	2.44	425.39	416.88	240.85	3.53%	15	12.18	7.74	0.52	
EX. 10	EX. 9	0.45	0.82	0.37	0.73	5.00	6.77	4.94	416.45	405.98	296.04	3.54%	15	12.18	9.40	0.53	
EX. 9	EX. 8	0.42	0.79	0.33	1.06	5.00	6.77	7.18	404.43	390.23	207.34	6.85%	15	16.95	13.24	0.26	
*																	
PROP. MH	EX. 1	5.18	0.82	4.25	4.25	5.00	6.77	28.76	390.50	387.40	62.26	4.98%	36	149.24	16.31	0.06	
*																	

PEAK FLOW SUMMARY

1-YEAR STORM EVENT

Inflow Area = 138,521 sf 71.07% Impervious, Inflow Depth = 1.87" for 1-Year event
Inflow = 3.05 cfs@ 12.17 hrs Volume= 21,549 cf
Primary = 3.05 cfs@ 12.17 hrs Volume= 21,549 cf Atten= 0% Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

2-YEAR STORM EVENT

Inflow Area = 138,521 sf 71.07% Impervious, Inflow Depth = 2.37" for 2-Year event
Inflow = 3.68 cfs@ 12.17 hrs Volume= 27,380 cf
Primary = 3.68 cfs@ 12.17 hrs Volume= 27,380 cf Atten= 0% Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

10-YEAR STORM EVENT

Inflow Area = 138,521 sf 71.07% Impervious, Inflow Depth = 3.98" for 10-Year event
Inflow = 8.84 cfs@ 12.19 hrs Volume= 45,973 cf
Primary = 8.84 cfs@ 12.19 hrs Volume= 45,973 cf Atten= 0% Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

No. DATE DESCRIPTION REVISIONS

PLAN DATE
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COMMONWEALTH OF VIRGINIA PROFESSIONAL ENGINEER 06/02/2023

SWM POST-DEVELOPMENT COMPUTATIONS
CITY CENTRE WEST
GENERAL DEVELOPMENT PLAN
SPECIAL USE PERMIT PLAT
CITY OF FAIRFAX, VIRGINIA

SCALE: 1"=40' C.I.= N/A DATE: JAN., 2022

SHEET 17 OF 51

FILE No. RZ-13007

STUDY POINT B

STUDY POINT B POST DEVELOPMENT (LOC ONLY) UNDETAINED

Curve Number Calculations

	Area (ac)	CN	Description
*	0.210	98	Paved parking, HSG D
	0.210		100.00% Impervious Area

Time of Concentration Calculations

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry, Direct Entry

1 Year Flow Calculations

Runoff = 0.55 cfs@ 12.13 hrs Volume= 1,799 cf Depth=2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 1-Year Rainfall=2.59"

2 Year Flow Calculations

Runoff = 0.67 cfs@ 12.13 hrs Volume= 2,209 cf Depth=2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.13"

10 Year Flow Calculations

Runoff = 1.04 cfs@ 12.13 hrs Volume= 3,486 cf Depth=4.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 10-Year Rainfall=4.81"

POST DEVELOPMENT HYDROCAD NODES

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FLOW SUMMARY AND ENERGY BALANCE

FLOW SUMMARY	1 YR	2 YR	10 YR
Pre Development Flows at Study Point 'B' (cfs)	1.10	1.37	2.17
Allowable Flow At Study Point 'B' (cfs)	1.36*	1.37	2.17
Post-Development Flows at Study Point 'B' (cfs)	0.55	0.67	1.04

* Per the Energy Balance Equation

ENERGY BALANCE METHOD TO STUDY POINT B

Q(Developed)=	0.55	cfs
Q(Pre-Developed)=	1.10	cfs
RV(Pre-Developed)=	3349.00	cf
RV(Developed)=	1799.00	cf
I.F. =	0.8	(0.8 for sites greater than one acre) (0.9 for sites less than or equal to one

Q Developed		I.F x (QPre-Developed x RV Pre-Developed)/RV Developed
0.55	≤	1.64

STORM SEWER DESIGN COMPUTATIONS

☐ Lag time

Project: 10523 MAIN STREET

From Point	To Point	Drainage Area	C Factor	C x A Increment	C x A Cumm.	Inlet Time Min.	Rain Fall In/Hr	Runoff Q C.F.S.	Invert Elevation Upper End	Invert Elevation Lower End	Length FT.	Slope %	Dia. IN.	Capacity Q C.F.S.	VEL. F.P.S.	Flow Time MIN.	Remarks
EX. 11	EX. 10	0.48	0.75	0.36	0.36	5.00	6.77	2.44	425.39	416.88	240.85	3.53%	15	12.18	7.74	0.52	
EX. 10	EX. 9	0.45	0.82	0.37	0.73	5.00	6.77	4.94	416.45	405.98	296.04	3.54%	15	12.18	9.40	0.53	
EX. 9	EX. 8	0.42	0.79	0.33	1.06	5.00	6.77	7.18	404.43	390.23	207.34	6.85%	15	16.95	13.24	0.26	
*																	
PROP. MH	EX. 1	5.18	0.82	4.25	4.25	5.00	6.77	28.76	390.50	387.40	62.26	4.98%	36	149.24	16.31	0.06	
*																	

SWM NARRATIVE

THIS APPLICATION PROPOSES TO REZONE THE EXISTING COMMERCIAL RETAIL (CR) AND COMMERCIAL GENERAL (CG) PARCELS TO CONSOLIDATED COMMERCIAL URBAN (CU) PARCEL TO ALLOW FOR A MIXED USE BUILDING WITH RESIDENTIAL AND COMMERCIAL USES.

THE EXISTING SITE CURRENTLY DRAINS IN TWO DIRECTIONS. MAJORITY OF EXISTING SITE DRAINS SOUTHWEST THROUGH AN EXISTING STORM SYSTEM WHICH LEAVES THE SITE AT EXISTING STR. 1 AND CONTINUES DOWNSTREAM THROUGH A CLOSED CONDUIT SYSTEM. REST OF THE SITE DRAINS NORTH THROUGH AN EXISTING STORM SYSTEM WHICH LEAVES THE SITE AT EXISTING STR. 8. EXISTING STRUCTURES 1 AND 8 ARE ESTABLISHED AS STUDY POINT "A" AND "B", RESPECTIVELY FOR THE SWM ANALYSIS.

STUDY POINT A:
MAJORITY OF THE SITE WILL BE SERVED BY ONE DETENTION FACILITY IN THE FORM OF AN UNDERGROUND STORMCAPTURE SC2 VAULT SYSTEM BY OLDCASTLE. THE FACILITY WILL PROVIDE DETENTION FOR MAJORITY OF THE SITE WHILE MAINTAINING PEAK FLOWS, NOT TO EXCEED PRE-DEVELOPMENT CONDITIONS FOR THE 1, 2, AND 10 YEAR STORM EVENTS AS COMPUTED ON SHEET 15, 17, AND 18. IN ADDITION, THE 1-YEAR DESIGN PEAK FLOW WILL NOT EXCEED THE ALLOWABLE RATE COMPUTED BY THE 1-YEAR ENERGY BALANCE EQUATION AS COMPUTED ON SHEET 17 FOR STUDY POINT "A". THE FACILITY WILL OUTFALL INTO THE PROPOSED ONSITE STORM SYSTEM AND CONTINUE DOWNSTREAM WHERE THE RUNOFF LEAVES THE SITE AT EXISTING STRUCTURE 1. THE EXISTING STORM SYSTEM CAPACITY WAS VERIFIED FOR THE PROPOSED IMPROVEMENTS DRAINING TO STUDY POINT "A" AT EXISTING STRUCTURE 1. THE EXISTING SYSTEM REMAINS ADEQUATE AS SHOWN ON STORM COMPUTATIONS ON THIS SHEET.

STUDY POINT B:
FOR STUDY POINT B, EXISTING STORM SYSTEM CAPACITY WAS VERIFIED FOR THE PROPOSED IMPROVEMENTS. THE PROPOSED DRAINAGE AREA TO STUDY POINT B IS BEING REDUCED AND DIVERTED TO STUDY POINT A THROUGH A WEIR SYSTEM. THE WEIR SYSTEM WILL MAINTAINING PEAK FLOWS, NOT TO EXCEED PRE-DEVELOPMENT CONDITIONS FOR THE 1, 2, AND 10 YEAR STORM EVENTS AS COMPUTED ON SHEET 15 AND 18. IN ADDITION, THE 1-YEAR DESIGN PEAK FLOW WILL NOT EXCEED THE ALLOWABLE RATE COMPUTED BY THE 1-YEAR ENERGY BALANCE EQUATION AS COMPUTED ON SHEET 18 FOR STUDY POINT B".

ALL BMP/SWM COMPUTATIONS SHOWN ON THIS APPLICATION ARE PRELIMINARY AND ARE SUBJECT TO CHANGE UPON RETRIEVAL OF NEW INFORMATION AND/OR IDENTIFICATION OF ADDITIONAL SITE CONSTRAINTS. THEREFORE, THE APPLICANT RESERVES THE RIGHT TO CHANGE AND/OR MODIFY THE PROPOSED BMP/SWM DEVICES AT THE TIME OF FINAL SITE PLAN TO MEET REQUIREMENTS.

PEAK FLOW SUMMARY

1-YEAR STORM EVENT

Inflow Area = 9,148 sf 100.00% Impervious, Inflow Depth =2.36" for 1-Year event
Inflow = 0.55 cfs@ 12.13 hrs Volume= 1,799 cf
Primary = 0.55 cfs@ 12.13 hrs Volume= 1,799 cf Atten= 0% Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

2-YEAR STORM EVENT

Inflow Area = 9,148 sf 100.00% Impervious, Inflow Depth =2.90" for 2-Year event
Inflow = 0.67 cfs@ 12.13 hrs Volume= 2,209 cf
Primary = 0.67 cfs@ 12.13 hrs Volume= 2,209 cf Atten= 0% Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

10-YEAR STORM EVENT

Inflow Area = 9,148 sf 100.00% Impervious, Inflow Depth =4.57" for 10-Year event
Inflow = 1.04 cfs@ 12.13 hrs Volume= 3,486 cf
Primary = 1.04 cfs@ 12.13 hrs Volume= 3,486 cf Atten= 0% Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs

REVISIONS
No. | DATE | DESCRIPTION

PLAN DATE
01-18-22
08-30-22
04-20-23
06-02-23

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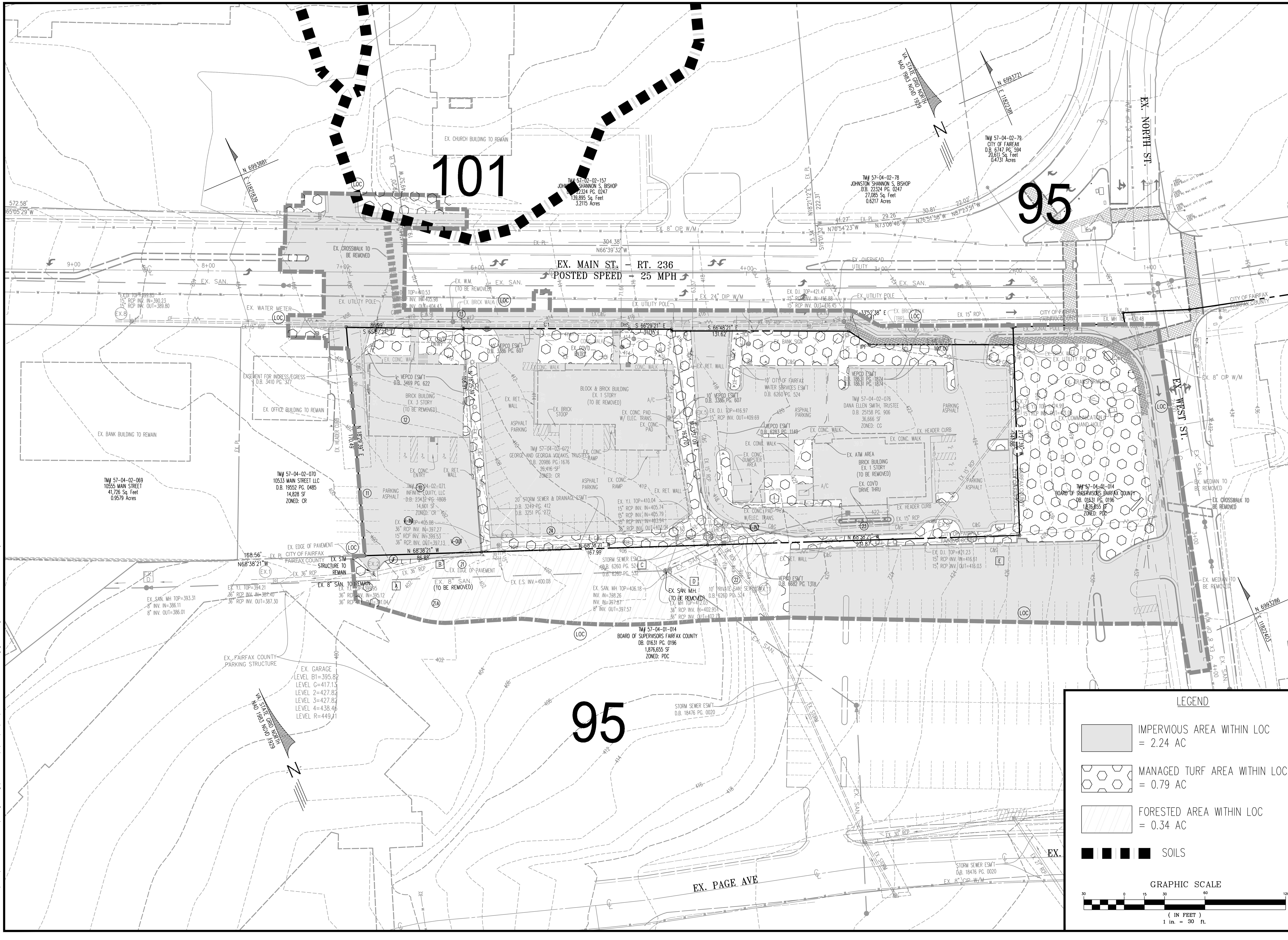
COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 036790
06/02/2023
PROFESSIONAL ENGINEER

SWM POST DEVELOPMENT COMPUTATIONS
CITY CENTRE WEST
GENERAL DEVELOPMENT PLAN
SPECIAL USE PERMIT PLAT
CITY OF FAIRFAX, VIRGINIA

SCALE: 1"=40'
C.I.= N/A
DATE: JAN., 2022

SHEET
18
OF
51

FILE No.
RZ-13007



LEGEND

IMPERVIOUS AREA WITHIN LOC = 2.24 AC

MANAGED TURF AREA WITHIN LOC = 0.79 AC

FORESTED AREA WITHIN LOC = 0.34 AC

SOILS

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 in. = 30 ft.

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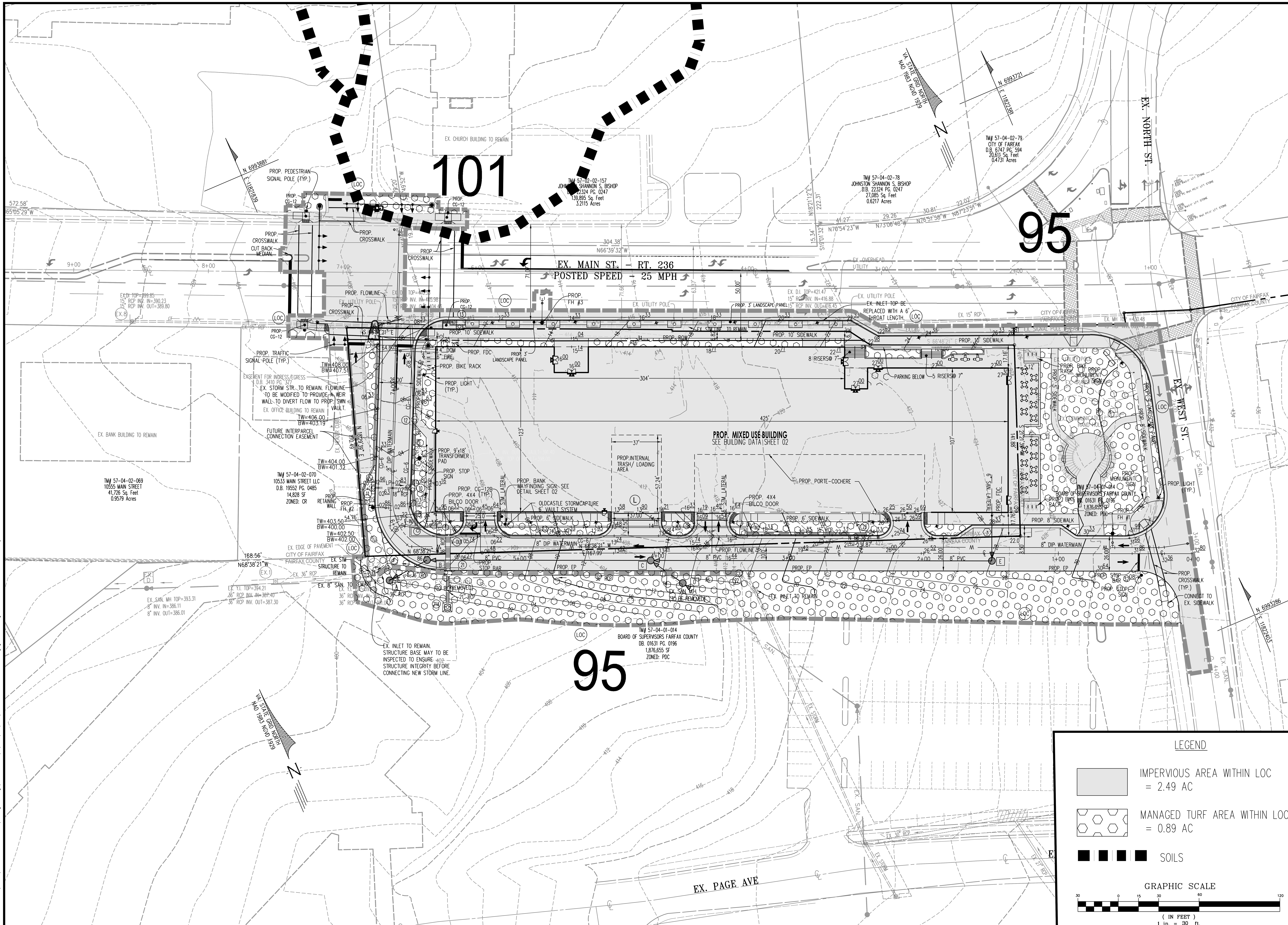
BMP PRE-DEVELOPMENT
CITY CENTRE WEST
GENERAL DEVELOPMENT PLAN
SPECIAL USE PERMIT PLAT
CITY OF FAIRFAX, VIRGINIA

SCALE: 1" = 30' C.I.= 2' DATE: JAN., 2022

SHEET 19 OF 51

FILE No. RZ-13007



LEGEND

IMPERVIOUS AREA WITHIN LOC = 2.49 AC

MANAGED TURF AREA WITHIN LOC = 0.89 AC

SOILS

GRAPHIC SCALE

(IN FEET)
1 in. = 30 ft.

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BMP POST-DEVELOPMENT
CITY CENTRE WEST
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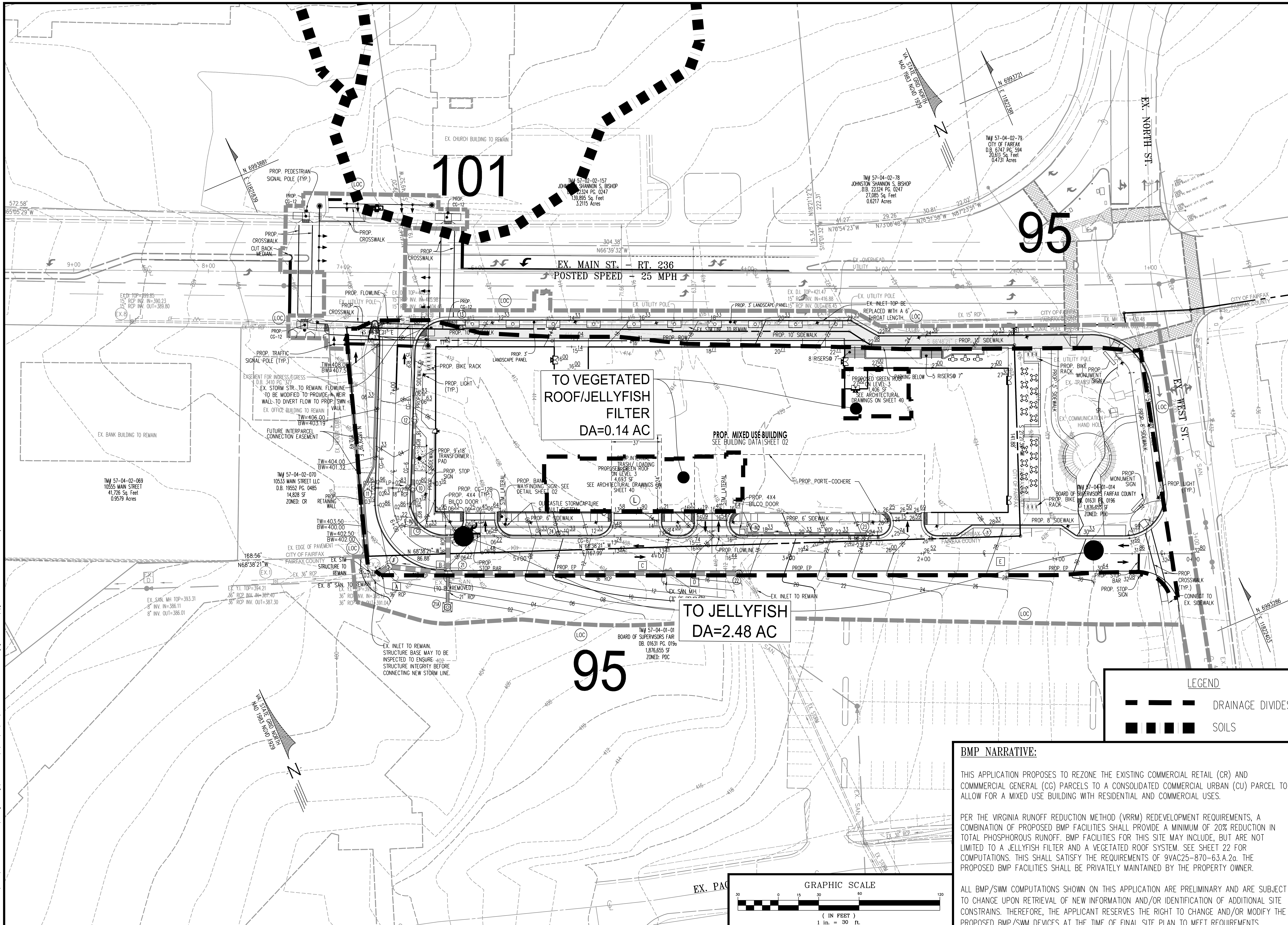
CITY OF FAIRFAX, VIRGINIA

SCALE: 1"=30' C.I.=2' DATE: JAN., 2022

SHEET 20 OF 51

FILE No. RZ-13007



LEGEND

DRAINAGE DIVIDES

SOILS

BMP NARRATIVE:

THIS APPLICATION PROPOSES TO REZONE THE EXISTING COMMERCIAL RETAIL (CR) AND COMMMERCIAL GENERAL (CG) PARCELS TO A CONSOLIDATED COMMERCIAL URBAN (CU) PARCEL TO ALLOW FOR A MIXED USE BUILDING WITH RESIDENTIAL AND COMMERCIAL USES.

PER THE VIRGINIA RUNOFF REDUCTION METHOD (VRRM) REDEVELOPMENT REQUIREMENTS, A COMBINATION OF PROPOSED BMP FACILITIES SHALL PROVIDE A MINIMUM OF 20% REDUCTION IN TOTAL PHOSPHOROUS RUNOFF. BMP FACILITIES FOR THIS SITE MAY INCLUDE, BUT ARE NOT LIMITED TO A JELLYFISH FILTER AND A VEGETATED ROOF SYSTEM. SEE SHEET 22 FOR COMPUTATIONS. THIS SHALL SATISFY THE REQUIREMENTS OF 9VAC25-870-63.A.2a. THE PROPOSED BMP FACILITIES SHALL BE PRIVATELY MAINTAINED BY THE PROPERTY OWNER.

ALL BMP/SWM COMPUTATIONS SHOWN ON THIS APPLICATION ARE PRELIMINARY AND ARE SUBJECT TO CHANGE UPON RETRIEVAL OF NEW INFORMATION AND/OR IDENTIFICATION OF ADDITIONAL SITE CONSTRAINS. THEREFORE, THE APPLICANT RESERVES THE RIGHT TO CHANGE AND/OR MODIFY THE PROPOSED BMP/SWM DEVICES AT THE TIME OF FINAL SITE PLAN TO MEET REQUIREMENTS.

No.	DATE	DESCRIPTION
		REVISIONS

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COMMONWEALTH OF VIRGINIA — PROFESSIONAL ENGINEER — 06/02/2023

BMP POST-DEVELOPMENT
CITY CENTRE WEST GENERAL DEVELOPMENT PLAN
SPECIAL USE PERMIT PLAT
CITY OF FAIRFAX, VIRGINIA

DATE: JAN., 2022
SCALE: 1"=30'
C.I.= 2'

SHEET 21 OF 51

FILE No. RZ-13007

Project Name:	FAIRFAX CITY CENTER WEST	
Date:	6/2/2023	
Linear Development Project?	No	

CLEAR ALL (Ctrl+Shift+R)

data input cells / constant values / calculation cells / final results

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area *(acres)* → 3.38

Maximum reduction required:	*20%*
The site's net increase in impervious cover (acres) is:	*0.24*
Post-Development TP Load Reduction for Site (lb/yr):	*1.53*

Check:	
BMP Design Specifications List:	2013 Draft Stds & Specs
Linear project?	No
Land cover areas entered correctly?	✓
Total disturbed area entered?	✓

Pre-ReDevelopment Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed forest/open space	0.00	0.00	0.00	0.34	0.34
Managed Turf (acres) -- disturbed, graded for yards or other turf to be	0.00	0.00	0.00	0.81	0.81
Impervious Cover (acres)	0.00	0.00	0.00	2.23	2.23
					3.38

Post-Development Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals
Forest/Open Space (acres) -- undisturbed, protected forest/open space or reforested	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres) -- disturbed, graded for yards or other turf to be	0.00	0.00	0.00	0.91	0.91
Impervious Cover (acres)	0.00	0.00	0.00	2.47	2.47
Area Check	OK.	OK.	OK.	OK.	3.38

Constants

Annual Rainfall (inches)	43
Target Rainfall Event (inches)	1.00
Total Phosphorus (TP) EMC (mg/L)	0.26
Total Nitrogen (TN) EMC (mg/L)	1.86
Target TP Load (lb/acre/yr)	0.41
Pj (unitless correction factor)	0.90

Runoff Coefficients (Rv)

	A Soils	B Soils	C Soils	D Soils
Forest/Open Space	0.02	0.03	0.04	0.05
Managed Turf	0.15	0.20	0.22	0.25
Impervious Cover	0.95	0.95	0.95	0.95

LAND COVER SUMMARY -- PRE-REDEVELOPMENT

Land Cover Summary-Pre

Pre-ReDevelopment	Listed	Adjusted[1]
Forest/Open Space Cover (acres)	0.34	0.10
Weighted Rv(forest)	0.05	0.05
% Forest	10%	3%
Managed Turf Cover (acres)	0.81	0.81
Weighted Rv(turf)	0.25	0.25
% Managed Turf	24%	26%
Impervious Cover (acres)	2.23	2.23
Rv(impervious)	0.95	0.95
% Impervious	66%	71%
Total Site Area (acres)	**3.38**	**3.14**
Site Rv	**0.69**	**0.74**

Treatment Volume and Nutrient Load

Pre-ReDevelopment Treatment Volume (acre-ft)	0.1948	0.1938
Pre-ReDevelopment Treatment Volume (cubic feet)	8,487	8,443
Pre-ReDevelopment TP Load (lb/yr)	**5.33**	**5.30**
Pre-ReDevelopment TP Load per acre (lb/acre/yr)	1.58	1.69
Baseline TP Load (lb/yr) (**0.41 lbs/acre/yr** applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)		*1.29*

[1] Adjusted Land Cover Summary:
Pre ReDevelopment land cover minus pervious land cover (forest/open space or managed turf) acreage proposed for new impervious cover.

Adjusted total acreage is consistent with Post-ReDevelopment acreage (minus acreage of new impervious cover).

Column I shows load reduction requriement for new impervious cover (based on new development load limit, 0.41 lbs/acre/year).

LAND COVER SUMMARY -- POST DEVELOPMENT

Land Cover Summary-Post (Final)

Post ReDev. & New Impervious	
Forest/Open Space Cover (acres)	0.00
Weighted Rv(forest)	0.00
% Forest	0%
Managed Turf Cover (acres)	0.91
Weighted Rv (turf)	0.25
% Managed Turf	27%
Impervious Cover (acres)	2.47
Rv(impervious)	0.95
% Impervious	73%
Final Site Area (acres)	**3.38**
Final Post Dev Site Rv	**0.76**

Land Cover Summary-Post

Post-ReDevelopment	
Forest/Open Space Cover (acres)	0.00
Weighted Rv(forest)	0.00
% Forest	0%
Managed Turf Cover (acres)	0.91
Weighted Rv (turf)	0.25
% Managed Turf	29%
ReDev. Impervious Cover (acres)	2.23
Rv(impervious)	0.95
% Impervious	71%
Total ReDev. Site Area (acres)	**3.14**
ReDev Site Rv	**0.75**

Land Cover Summary-Post

Post-Development New Impervious	
New Impervious Cover (acres)	0.24
Rv(impervious)	0.95

Treatment Volume and Nutrient Load

Final Post-Development Treatment Volume (acre-ft)	0.2145
Final Post-Development Treatment Volume (cubic feet)	9,344
Final Post-Development TP Load (lb/yr)	**5.87**
Final Post-Development TP Load per acre **(lb/acre/yr)**	1.74

Post-ReDevelopment Treatment Volume (acre-ft)	0.1955
Post-ReDevelopment Treatment Volume (cubic feet)	8,516
Post-ReDevelopment Load (TP) (lb/yr)*	5.35
Post-ReDevelopment TP Load per acre **(lb/acre/yr)**	1.70
Max. Reduction Required (Below Pre-ReDevelopment Load)	20%
TP Load Reduction Required for Redeveloped Area (lb/yr)	**1.11**

Post-Development Treatment Volume (acre-ft)	0.0190
Post-Development Treatment Volume (cubic feet)	828
Post-Development TP Load (lb/yr)	0.52
TP Load Reduction Required for New Impervious Area (lb/yr)	**0.42**

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	**1.53**

Nitrogen Loads (Informational Purposes Only)

Pre-ReDevelopment TN Load (lb/yr)	38.15
Final Post-Development TN Load (Post-ReDevelopment & New Impervious) (lb/yr)	42.00

Drainage Area A

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres)	0.00	0.00	0.00	0.39	0.39	0.25
Impervious Cover (acres)	0.00	0.00	0.00	2.23	2.23	0.95
				Total	2.62	

Stormwater Best Management Practices (RR = Runoff Reduction)

--Select from dropdown lists-

Practice	Runoff Reduction Credit (%)	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	Volume from Upstream Practice (ft^3)	Runoff Reduction (ft^3)	Remaining Runoff Volume (ft^3)	Total BMP Treatment Volume (ft^3)	Phosphorus Removal Efficiency (%)	Phosphorus Load from Upstream Practices (lb)	Untreated Phosphorus Load to Practice (lb)	Phosphorus Removed By Practice (lb)	Remaining Phosphorus Load (lb)	Downstream Practice to be Employed
1. Vegetated Roof (RR)													
1.a. Vegetated Roof #1 (Spec #5)	45		0.14		217	266	483	0		0.30	0.14	0.17	14.b. MTD - Filtering
14. Manufactured Treatment Devices (no RR)													
14.a. Manufactured Treatment Device-Hydrodynamic	0			0	0	0	0	0	0.00	0.00	0.00	0.00	
14.b. Manufactured Treatment Device-Filtering	0	0.39	2.09	266	0	7,827	7,827	65	0.17	4.75	3.19	1.72	
14.c. Manufactured Treatment Device-Generic	0			0	0	0	0	0	0.00	0.00	0.00	0.00	

TOTAL IMPERVIOUS COVER TREATED (ac)	2.23	AREA CHECK: OK.
TOTAL MANAGED TURF AREA TREATED (ac)	0.39	AREA CHECK: OK.

TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	1.53
TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)	5.05
TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	3.19
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.14
TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr)	3.33
TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr)	1.72

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.98
NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.00
TOTAL NITROGEN REMOVED IN D.A. A (lb/yr)	0.98

Site Results (Water Quality Compliance)

Area Checks	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	AREA CHECK
FOREST/OPEN SPACE (ac)	0.00	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER (ac)	2.23	0.00	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED (ac)	2.23	0.00	0.00	0.00	0.00	OK.
MANAGED TURF AREA (ac)	0.39	0.00	0.00	0.00	0.00	OK.
MANAGED TURF AREA TREATED (ac)	0.39	0.00	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	

Site Treatment Volume (ft^3) 9,344

Runoff Reduction Volume and TP By Drainage Area

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	TOTAL
RUNOFF REDUCTION VOLUME ACHIEVED (ft^3)	217	0	0	0	0	217
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	5.05	0.00	0.00	0.00	0.00	5.05
TP LOAD REDUCTION ACHIEVED (lb/yr)	3.33	0.00	0.00	0.00	0.00	3.33
TP LOAD REMAINING (lb/yr)	1.72	0.00	0.00	0.00	0.00	1.72
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	0.98	0.00	0.00	0.00	0.00	0.98

Total Phosphorus

FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	5.87
TP LOAD REDUCTION REQUIRED (lb/yr)	1.53
TP LOAD REDUCTION ACHIEVED (lb/yr)	3.33
TP LOAD REMAINING (lb/yr):	2.54
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.00 **

** TARGET TP REDUCTION EXCEEDED BY 1.8 LB/YEAR **

Total Nitrogen (For Information Purposes)

POST-DEVELOPMENT LOAD (lb/yr)	42.00
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	0.98
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	41.02

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FILE No. RZ-13007