

Discussion

Storm Water and Erosion Study Implementation



christopher
consultants

Parkfairfax 547

Drainage Analysis

Project No. 21261.001.00
September 21, 2021

Prepared for:

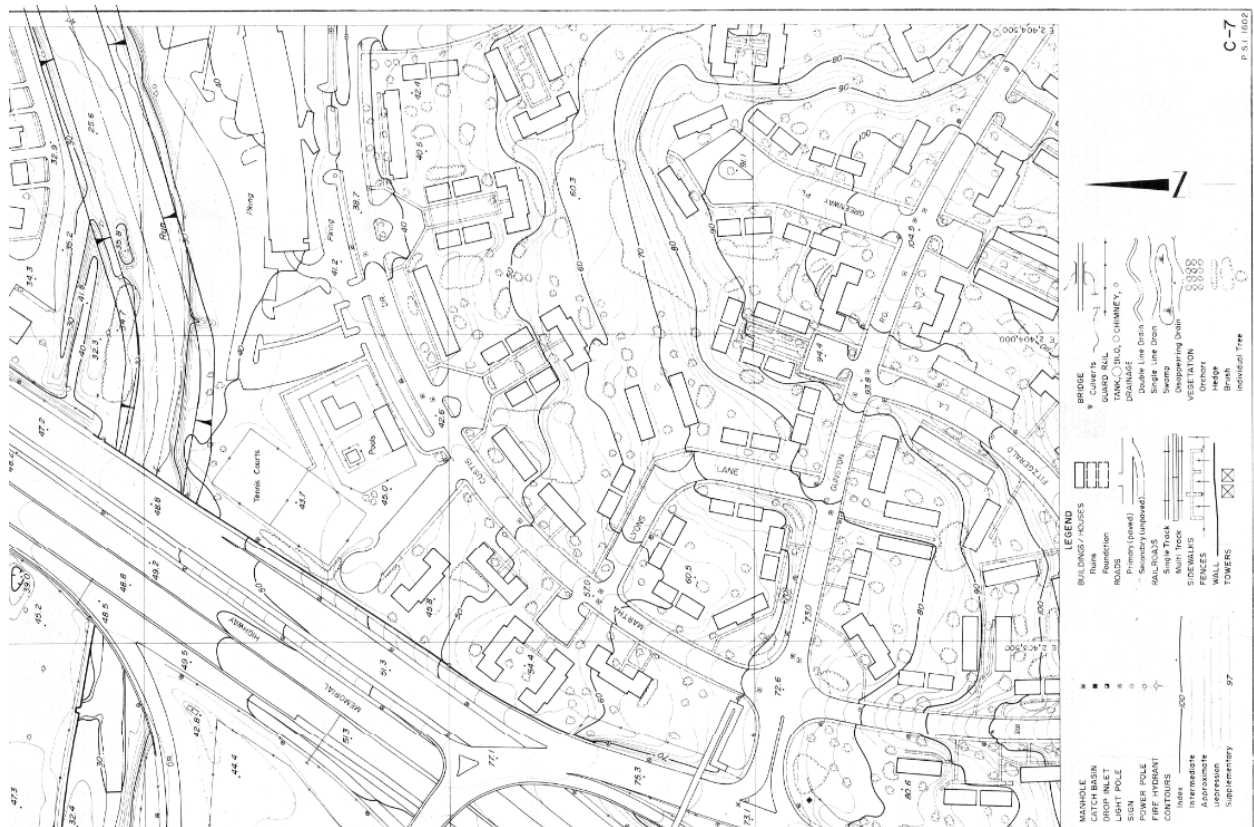
Parkfairfax Condominium
3360 Gunston Road
Alexandria, VA 22302

Scope

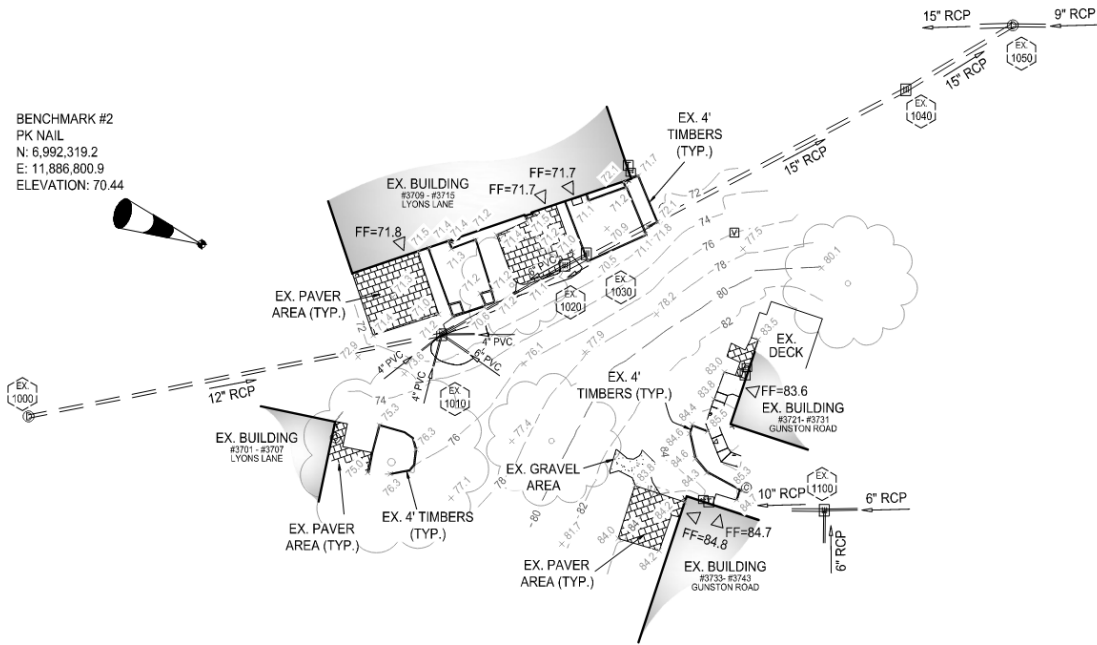
Parkfairfax is a historic community with significant landscape and wooded areas. The buildings were originally built in the early 1940's as rental units to meet wartime civilian housing needs and was converted to condominiums in 1978. The original storm system was built with terracotta using old standards. The scope of this task is to review the drainage area to the existing inlet and storm sewer system using available data. Current standards require storm inlet to be designed to handle the 2-year 24-hour storm events and the storm pipes are designed to handle the 10-year 24 hour storm events. For the purposes of this analysis, we used current City of Alexandria standards.

Existing Topography

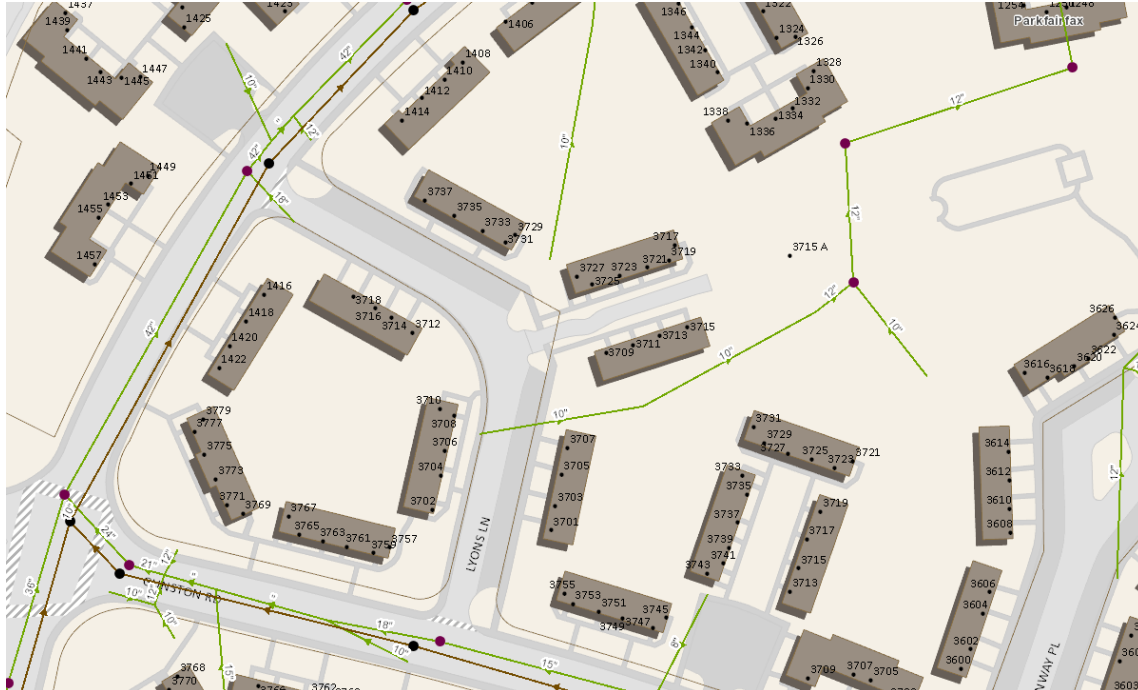
The topography in the 547 area slopes from the Southeast to the Northwest. Below is an overall topography survey used for the drainage divides that was provided by the client. See Exhibit 1.



We also utilized our topographic survey (Exhibit 2) and the City of Alexandria GIS maps to analyze the storm sewer system.



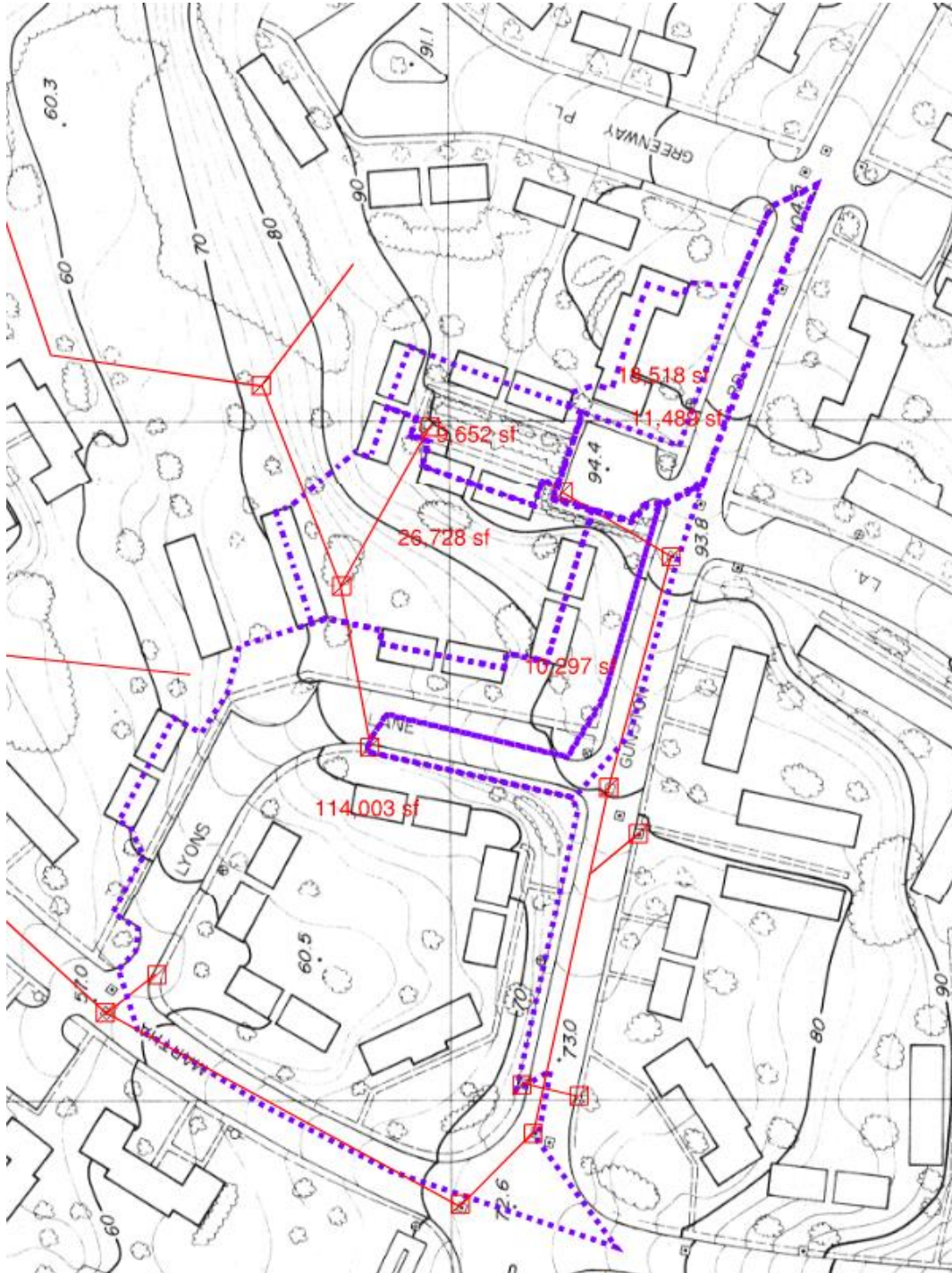
SITE 547



The City of Alexandria GIS maps are located here:
<https://geo.alexandriava.gov/Html5Viewer/Index.html?viewer=sewerviewer>

Drainage Divides

Below are this the drainage divides for the storm sewer system in the area. This information was used to analyze the inlets and storm sewer system in this area.



Analysis

To complete our analysis, we made the following assumptions:

- Storm structure #1100 connects to #1010.
- The roof drains from the building all connect to the storm sewer system but are clogged.
- Every unit has an impervious area of 20' x 20'.
- The owner at Unit number #3711 has a rear amenity area larger than 20' from the building and will be revised to be only 20' from the building to allow for better drainage to storm structure #1010
- Storm structures #1020 and #1030 are clogged.

The drainage area to storm structure #1010 is 0.62 Ac with a weighted c value of 0.61. The drainage area to storm structure #1100 is 0.22 Ac with a weighted c value of 0.62. The drainage area to storm structure #21 is 2.62 Ac with a weighted c value of 0.66. Below are the inlet and storm sewer calculations. The storm sewer and inlet at structure #21 are inadequate.

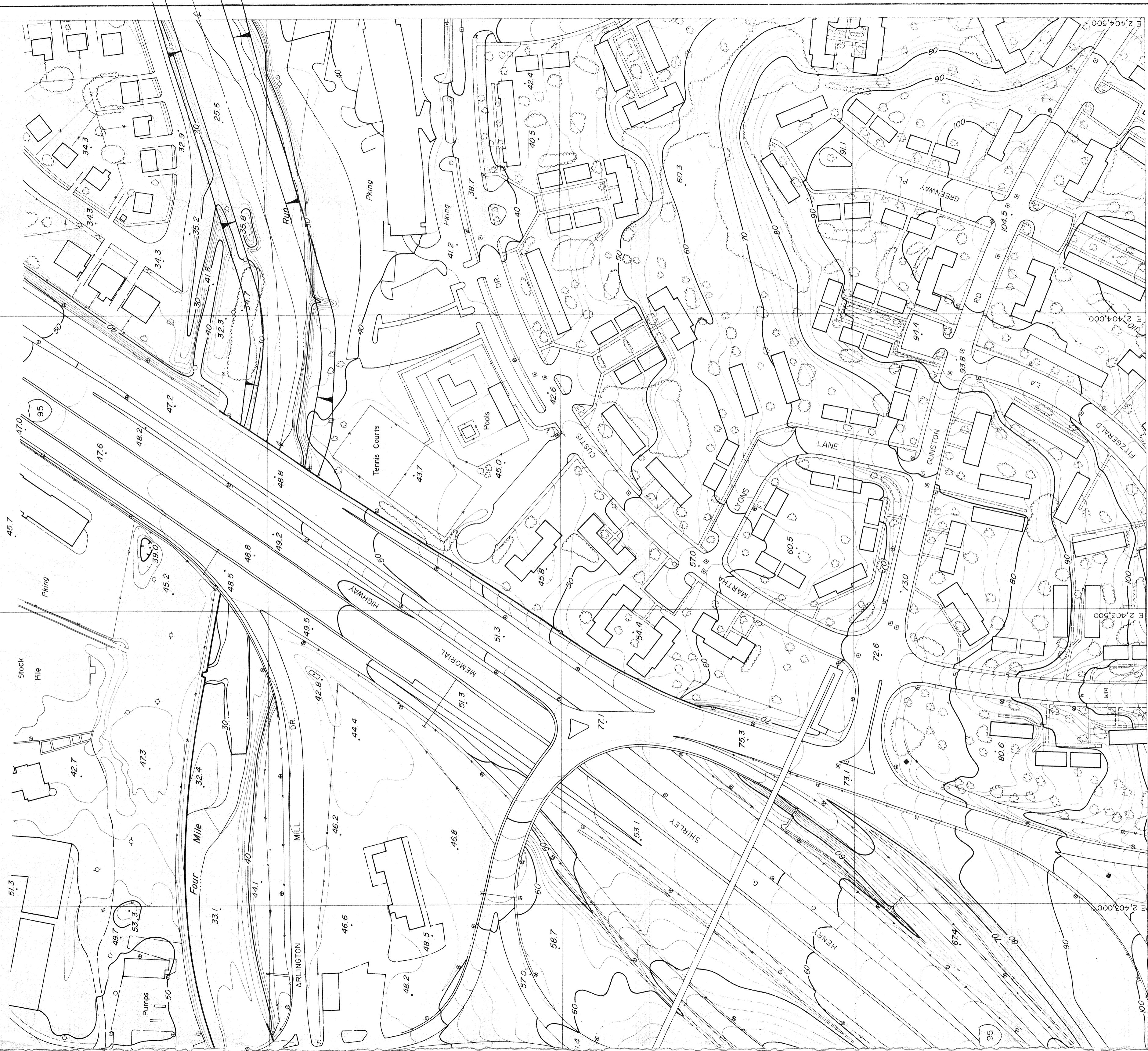
STORM WATER INLET COMPUTATIONS																				
NUMBER	INLET TYPE	LENGTH ft	DRAINAGE AREA, Ac	C	CA	INTENSITY In./Hr.	Q INCRE C.F.S.	Q RRYOV C.F.S.	Qt GUTTERFLOW C.F.S.	S GUTTERSLOPE ft/ft	Sx CROSS SLOPE ft/ft	T SPREAD	d ft	E (Chart 16)	h ft	Q Intercepted C.F.S.	Qb Carry Over C.F.S.	T Spread @ Sag ft	REMARKS	
(left)			1.31	0.66	0.87	6.2	5.37		5.37	0.0200	0.0200	11.61	-	-	-	-	-	-	Left	
21	SAG	4			1.73	6.2	10.74		10.74				1.26	-	0.46	-	2.75	-	56.63	
(right)			1.31	0.66	0.87	6.2	5.37		5.37	0.0200	0.0200	11.61	-	-	-	-	-	-	Right	

YARD INLET COMPUTATIONS												
NUMBER	INLET	TYPE	A, Ac	C	CA	I, in	Q, cfs	HW, ft	Top Elev, ft	10 Yr. W.S.E. (ft)	REMARKS	COMMENTS
1010	Grate	12" RD	0.62	0.61	0.38	6.2	2.33	0.63	69.73	70.36	50% clogged*	FIRST FLOOR ELEV=71.7
1100	Grate	12"x12"	0.22	0.62	0.14	6.2	0.85	0.40	86.32	86.72	50% clogged*	

STORM SEWER DESIGN COMPUTATIONS														
STRUCTURE		DRAINAGE AREA (ACRES) "A"	RUN-OFF COEF. "C"	RAIN FALL In./Hr.	RUNOFF "Q" C.F.S.	INVERT ELEVATIONS		LENGTH (ft)	SLOPE (ft/ft)	DIAMETER IN	CAPACITY C.F.S.	VELOCITY F.P.S.	FLOW TIME Seconds	REMARKS
From	To					Upper End	Lower End							
1000	1010	0.24	0.90	9.00	1.92	67.69	64.83	127.70	0.0224	12	5.32	6.11	20.89	
1010	1040	0.62	0.61	9.00	6.54	64.73	61.92	159.10	0.0177	15	8.57	7.65	20.81	
1100	1010	0.22	0.62	9.00	1.24	83.47	unknown	unknown	0.0100	10	2.19	4.07		Assumed Length & Slope
21	20	2.62	0.66	9.00	15.60	unknown	unknown	unknown	0.0100	18	10.50	5.94		Assumed Length & Slope

Summary

The storm sewer structure #1010 by building 547 appears to be inadequate to handle significant storm events. Diverting drainage away from this area would improve this condition. While diverting water from storm structure #1010 improves this area, the drainage area to storm structure #21 is significant and the 10-year storm event generates a ponding depth of approximately 1.3'. The conceptual design diverts additional drainage to this area and christopher recommends meeting with City of Alexandria to discuss prior to moving forward with final design.



**SURVEY OF
ALEXANDRIA
A, VIRGINIA**

CONTOUR INTERVAL 2



- MANHOLE
- CATCH BASIN
- DROP INLET
- LIGHT POLE
- SIGN
- POWER POLE
- FIRE HYDRANT
- CONTOURS
- Index
- Intermediate
- Approximate
- Depression
- Supplementary

- BUILDINGS / HOUSES
- Ruins
- Foundation
- ROADS
- Primary (paved)
- Secondary (unpaved)
- RAILROADS
- Single Track
- Multi Track
- SIDEWALKS
- FENCES
- WALL
- TOWERS

- BRIDGE
- Culverts
- GUARD RAIL
- TANK, ○ SILO, ○ CHIMNEY, ○
- DRAINAGE
- Double Line Drain
- Single Line Drain
- Swamp
- Disappearing Drain
- VEGETATION
- Orchard
- Hedge
- Brush
- Individual Tree



E 2,404,500
E 2,404,000
E 2,403,500
E 2,403,000

GENERAL NOTES

1. THE PROPERTY SHOWN HEREON IS IDENTIFIED ON THE CITY OF ALEXANDRIA, VIRGINIA GEOGRAPHIC INFORMATION SYSTEM AS MAP NUMBER 013.02-0A-00 AND IS ZONED RB.
2. THE PROPERTY SHOWN HEREON IS NOW IN THE NAME OF PARKFAIRFAX CONDOMINIUM, AS SHOWN ON A PLAT ATTACHED TO THE DEED RECORDED IN DEED BOOK 847 AT PAGE 508, AMONG THE LAND RECORDS OF THE CITY OF ALEXANDRIA, VIRGINIA.
3. A.) HORIZONTAL DATUM SHOWN HEREON IS REFERENCED TO THE VIRGINIA COORDINATE SYSTEM (VCS) 1983 - NORTH AS ESTABLISHED FROM A CURRENT GPS SURVEY.
B.) THE VERTICAL DATUM SHOWN HEREON IS REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88) GEIOD-12B (GEIOD-18) AS ESTABLISHED FROM A CURRENT GPS SURVEY.
4. NO TITLE REPORT FURNISHED. ALL UNDERLYING TITLE LINES, EASEMENTS, SERVITUDES AND OTHER MATTERS OF TITLE MAY NOT BE SHOWN HEREON. THIS DOCUMENT DOES NOT REPRESENT A CURRENT BOUNDARY SURVEY.
5. THE PHYSICAL IMPROVEMENTS AND TOPOGRAPHY SHOWN HEREON ARE BASED UPON A FIELD SURVEY CONDUCTED BY THIS FIRM ON BETWEEN THE DATES OF AUGUST 2 AND AUGUST 4, 2021.
6. NO GEOTECHNICAL, SUBSURFACE, FIELD REVIEWS, RESEARCH, AGENCY OR GOVERNMENTAL RECORD REVIEWS, OR OTHER INVESTIGATIONS HAVE BEEN MADE FOR THE PURPOSE OF LOCATING, OR DETERMINING THE EXISTENCE OF HAZARDOUS MATERIALS, OR OTHER ENVIRONMENTAL CONCERNS ON SITE IN THE PERFORMANCE OF CHRISTOPHER CONSULTANTS, LTD SERVICES FOR THE PROJECT AS SHOWN HEREON.
7. NO CERTIFICATION HAS BEEN MADE AS TO THE LOCATIONS OF UNDERGROUND UTILITIES SUCH AS, BUT NOT LIMITED TO ELECTRIC, GAS, TELEPHONE, CATV, WATER, SANITARY AND STORM SEWERS.
8. DURING THE PROCESS OF OUR PHYSICAL SURVEY NO INDICATIONS OF A CEMETERY WERE FOUND. NO FURTHER INSPECTION OF THIS PROPERTY HAS BEEN MADE FOR POSSIBLE CEMETERIES.
9. STORM AND SANITARY INVERTS, PIPE SIZES AND MATERIALS HAVE BEEN DETERMINED THROUGH THE USE OF A SEWER VIDEO CAMERA OPERATED BY THIS FIRM ON AUGUST 3, 2021.

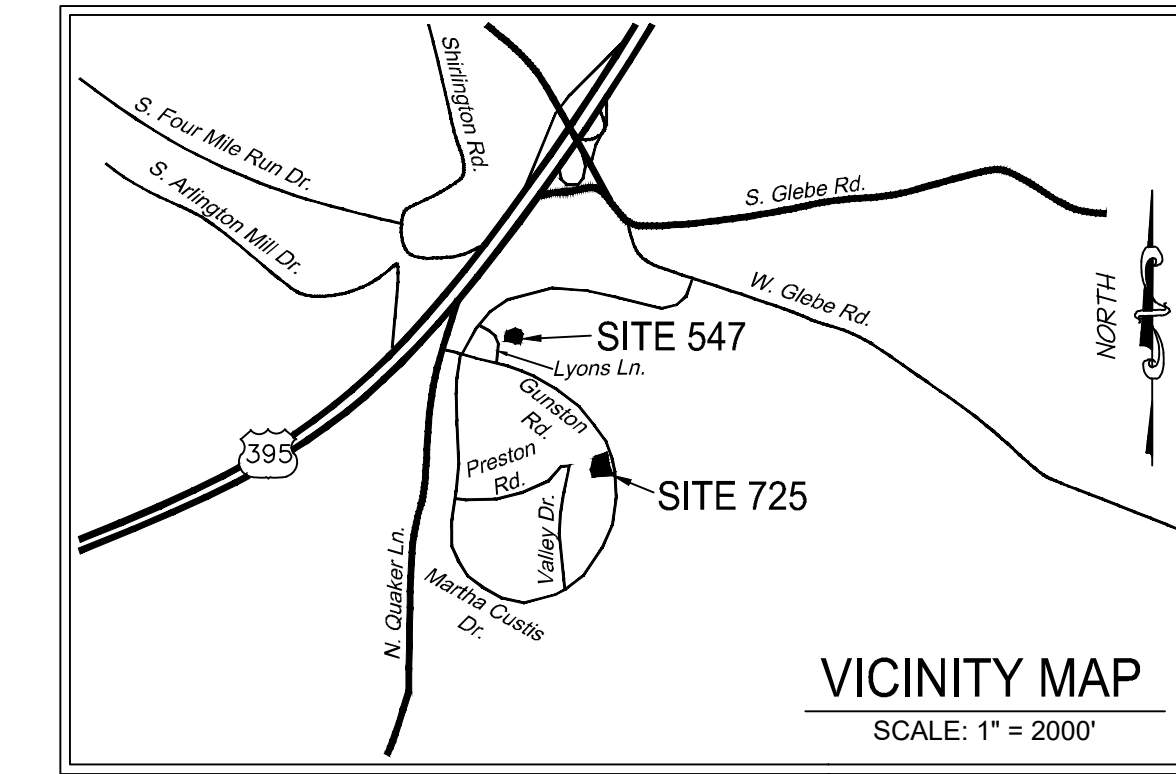
UTILITY MARKING NOTES:

1. THE LOCATION OF UTILITIES SHOWN HEREON ARE FROM OBSERVED EVIDENCE OF ABOVE GROUND APPURTENANCES AND SURFACE GROUND MARKINGS.
2. BEFORE DIGGING IN THIS AREA, CALL "MISS UTILITY" 1-800-552-7001 FOR FIELD LOCATIONS (REQUEST FOR GROUND MARKINGS) OF UNDERGROUND UTILITY LINES.
3. MISS UTILITY WAS NOTIFIED TO MARK FOR UNDERGROUND UTILITIES ON JULY 30, 2021 (TICKET #B121109603-00B AND TICKET #B121100616-00B), NO UNDERGROUND UTILITIES WERE FOUND OR LOCATED BY THIS FIRM.
4. NO PLANS OR MAPS WERE PROVIDED BY THE UTILITY COMPANIES LISTED BELOW TO THE SURVEYOR AT THE TIME OF THE SURVEY.



UTILIZING THE FREE MISS UTILITY SERVICE, AS RENDERED FOR THE PREPARATION OF THIS BASE MAP IS UNDERSTOOD TO NOT REFLECT IN FULL ALL UNDERGROUND UTILITIES AND THAT THOSE LINES MARKED, SURVEYED AND SHOWN HEREON ARE AN APPROXIMATION OF THE ACTUAL UTILITY LOCATION. UTILITIES SHOWN ON THE SURVEY ARE FOR DOCUMENTING AS MANY UTILITY SERVICES ON THE PROPERTY ONLY. THE UNDERGROUND UTILITIES MAPPED ARE NOT INTENDED TO FACILITATE CIVIL ENGINEERING DESIGN.

UTILITY DESCRIPTION	RESPONSE (MISS UTILITY)	RESPONSE (CHRISTOPHER)
ALEXANDRIA-TRAFFIC	HAS NOT RESPONDED.	UTILITY MARKS WERE NOT FOUND AND ARE NOT SHOWN HEREON.
ALEXANDRIA CITY-SEWER	MARKED UP TO PRIVATELY OWNED UTILITY.	UTILITY MARKS WERE NOT FOUND AND ARE NOT SHOWN HEREON.
COMCAST	NO CONFLICT.	UTILITY MARKS WERE NOT FOUND AND ARE NOT SHOWN HEREON.
DOMINION ENERGY ELEC. DIST.	HAS NOT RESPONDED FOR SITE 547. MARKED FOR SITE 725.	UTILITY MARKS WERE NOT FOUND AND ARE NOT SHOWN HEREON.
PARKFAIRFAX-UTILITIES	MARKED.	UTILITY MARKS WERE NOT FOUND AND ARE NOT SHOWN HEREON.
VIRGINIA AMERICAN WATER	NO CONFLICT.	UTILITY MARKS WERE NOT FOUND AND ARE NOT SHOWN HEREON.
VERIZON	MARKED.	UTILITY MARKS WERE NOT FOUND AND ARE NOT SHOWN HEREON.
WASHINGTON GAS	NO CONFLICT	UTILITY MARKS WERE NOT FOUND AND ARE NOT SHOWN HEREON.



FLOOD ZONE NOTE

THE AREA SHOWN HEREON IS LOCATED ON THE FLOOD INSURANCE RATE MAP (FIRM), NO. 5155190029E, WITH AN EFFECTIVE DATE OF JUNE 16, 2011.

BY GRAPHICAL DEPICTION ONLY, THE PROPERTY SHOWN HEREON IS SHOWN IN:

- FLOOD ZONE "X" (OTHER AREAS), AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN.

A FIELD SURVEY WAS NOT PERFORMED TO DETERMINE THE FLOOD ZONES LISTED HEREON. AN ELEVATION CERTIFICATE MAY BE NEEDED TO VERIFY THIS DETERMINATION OR APPLY FOR A VARIANCE FROM THE FEDERAL EMERGENCY MANAGEMENT AGENCY.

LEGEND

<p>Utilities - Storm</p> <ul style="list-style-type: none"> ⊙ STORM MANHOLE ⊞ STORM DRAIN INLET < ROOF DRAIN OUTLET <p>Utilities - Sanitary</p> <ul style="list-style-type: none"> ⊙ SANITARY CLEAN-OUT <p>Utilities - Water</p> <ul style="list-style-type: none"> ⊙ WATER METER ⊞ FIRE HYDRANT <p>Utilities - Gas</p> <ul style="list-style-type: none"> ⊙ GAS VALVE <p>Utilities - Electric</p> <ul style="list-style-type: none"> ⊞ VAULT ⊞ ELECTRIC BOX <p>Utilities - Communication</p> <ul style="list-style-type: none"> ⊞ COMMUNICATION PEDESTAL 	<p>Misc. Structures</p> <ul style="list-style-type: none"> +150.0 SPOT ELEVATION ○ DECIDUOUS TREE ▽ DOOR LOCATION <p>Abbreviations</p> <ul style="list-style-type: none"> EX. EXISTING CONC. CONCRETE CSW CONCRETE SIDEWALK TRANS. TRANSFORMER RCP REINFORCED CONCRETE PIPE PVC POLYVINYL CHLORIDE PIPE TYP. TYPICAL FF FINISHED FLOOR 	<p>Surfaces</p> <ul style="list-style-type: none"> CONCRETE AREA PAVER AREA GRAVEL AREA <p>Linetypes</p> <ul style="list-style-type: none"> INDEX CONTOUR (10') INT. CONTOUR (2') STORM PIPE
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STORM STRUCTURE DATA

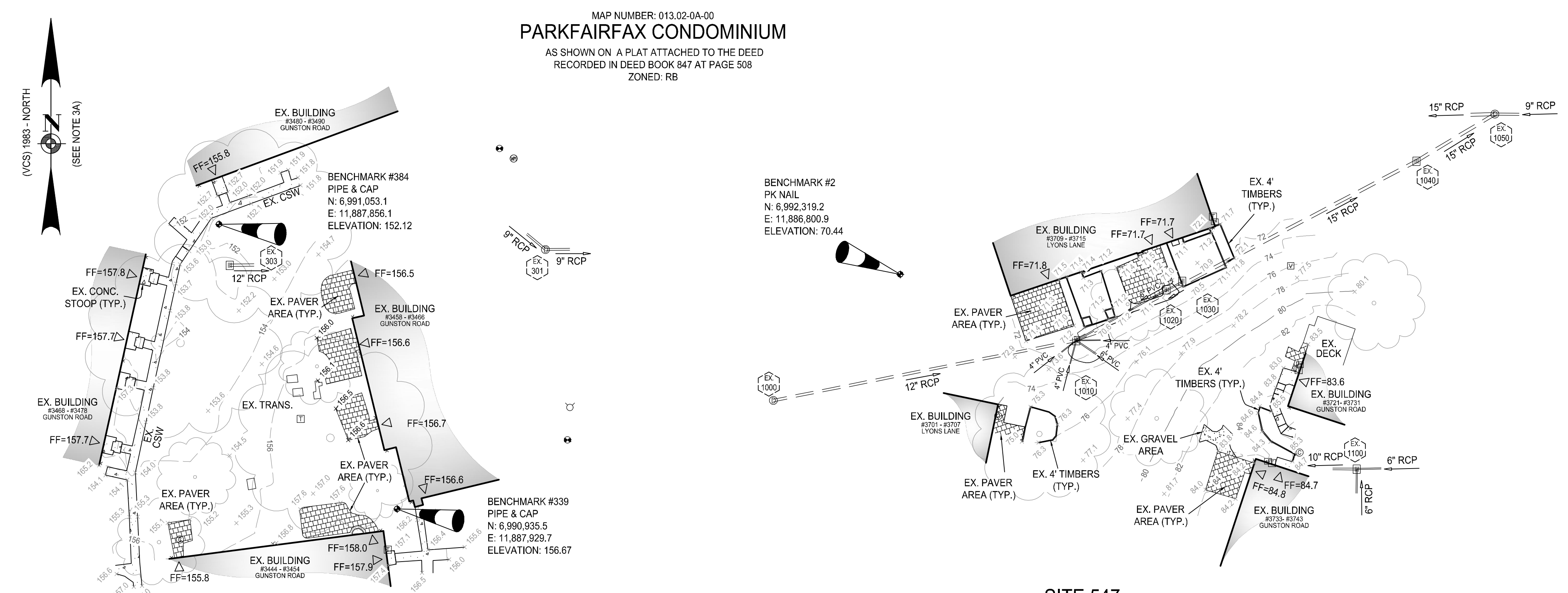
- EX-1000 RIM EL. = 72.49
INV OUT (12" RCP TO 1010) = 67.69
- EX-1030 RIM EL. = 70.52
INV OUT (TO 1020) = 69.92
- EX-1020 RIM EL. = 70.34
INV OUT = 68.84
STRUCTURE FILLED WITH MUD AND DEBRIS.
INACCESSIBLE AT TIME OF SURVEY.
- EX-1010 RIM EL. = 69.73
INV IN (12" RCP FROM 1000) = 64.83
INV IN (6" PVC FROM 1020) = 68.18
INV IN (6" PVC FROM SE) = 67.43
INV IN (4" PVC FROM EAST) = 68.33
INV IN (4" PVC FROM SSW) = 68.63
INV IN (4" PVC FROM SW) = 68.90
INV OUT (15" RCP TO 1040) = 64.73
- EX-1040 RIM EL. = 65.72
INV IN (15" RCP FROM 1010) = 61.92
INV OUT (15" RCP TO 1050) = 61.82
- EX-1050 RIM EL. = 67.74
INV IN (15" RCP FROM 1040) = 61.24
INV IN (9" RCP FROM EAST) = 61.34
INV OUT (15" RCP TO WEST) = 61.14
- EX-1100 RIM EL. = 86.32
INV IN (6" RCP FROM EAST) = 83.52
INV IN (6" RCP FROM SOUTH) = 83.52
INV OUT (10" RCP TO WEST) = 83.47
- EX-301 RIM EL. = 139.93
INV IN (9" RCP FROM NW) = 133.43
INV OUT (9" RCP TO EAST) = 132.63
- EX-303 RIM EL. = 150.92
INV OUT (12" RCP FROM EAST) = 146.32
STRUCTURE FILLED WITH MUD AND DEBRIS
AT TIME OF SURVEY.

BENCHMARK #1
PK NAIL
N: 6,992,535.2
E: 11,866,493.1
ELEVATION: 54.54

MAP NUMBER: 013.02-0A-00
PARKFAIRFAX CONDOMINIUM
AS SHOWN ON A PLAT ATTACHED TO THE DEED
RECORDED IN DEED BOOK 847 AT PAGE 508
ZONED: RB

BENCHMARK #2
PK NAIL
N: 6,992,319.2
E: 11,886,800.9
ELEVATION: 70.44

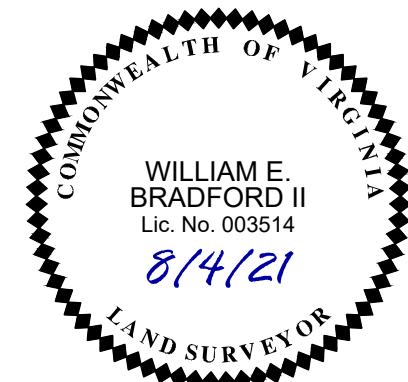
BENCHMARK #339
PIPE & CAP
N: 6,990,935.5
E: 11,887,929.7
ELEVATION: 156.67



SURVEYOR'S CERTIFICATION

THIS TOPOGRAPHIC SURVEY ON A PORTION OF THE LAND OF PARKFAIRFAX CONDOMINIUM WAS COMPLETED UNDER THE DIRECT AND RESPONSIBLE CHARGE OF WILLIAM E. BRADFORD II, L.S., FROM AN ACTUAL GROUND SURVEY MADE UNDER MY SUPERVISION BETWEEN THE DATES OF AUGUST 2 AND AUGUST 4, 2021 AND THAT THIS PLAT MEETS MINIMUM ACCURACY STANDARDS OF THE COMMONWEALTH OF VIRGINIA UNLESS OTHERWISE NOTED.

GIVEN UNDER THIS 4th DAY OF AUGUST, 2021.

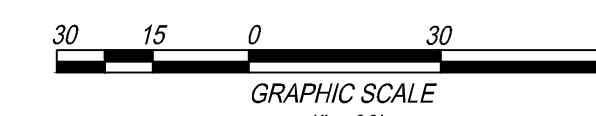


William E. Bradford II

WILLIAM E. BRADFORD II
COMMONWEALTH OF VIRGINIA
LICENSED LAND SURVEYOR NO.: 003514

SITE 725

SITE 547



REV#	DATE	REVISION

TOPOGRAPHIC SURVEY ON A PORTION OF THE LAND OF

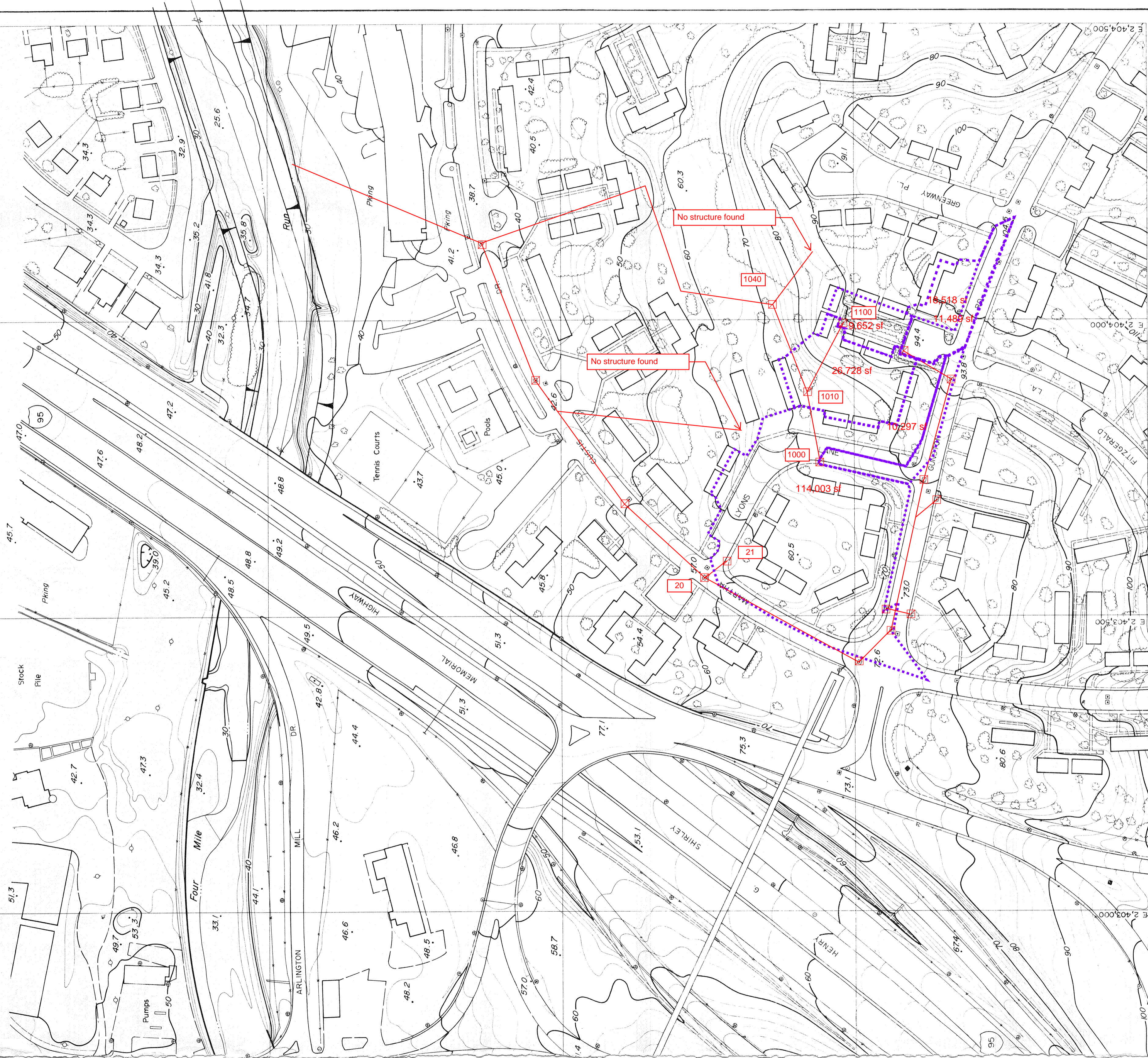
PARK FAIRFAX CONDOMINIUM

AS SHOWN ON A PLAT RECORDED WITH AND ATTACHED TO THE DEED
RECORDED IN DEED BOOK 847 AT PAGE 508

CITY OF ALEXANDRIA, VIRGINIA

PROJECT: 21261.001.00
DRAWING NO.: 1109999
SCALE: 1" = 30'
DATE: 8/18/21
DRAWN: ERR / RTC
CHECKED: CGH
SHEET No.

christopher consultants
9301 innovation dr
suite 150
manassas, va 20110
p 703.393.9887
engineering • surveying • land planning



SURVEY OF ALEXANDRIA A, VIRGINIA

CONTOUR INTERVAL 2



- MANHOLE
- CATCH BASIN
- DROP INLET
- LIGHT POLE
- SIGN
- POWER POLE
- FIRE HYDRANT
- CONTOURS
 - Index
 - Intermediate
 - Approximate
 - Depression
 - Supplementary

- BUILDINGS / HOUSES
 - Ruins
 - Foundation
- ROADS
 - Primary (paved)
 - Secondary (unpaved)
- RAILROADS
 - Single Track
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- SIDEWALKS
- FENCES
- WALL
- TOWERS

- BRIDGE
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- GUARD RAIL
- TANK, ○ SILO, ○ CHIMNEY, ○
- DRAINAGE
 - Double Line Drain
 - Single Line Drain
 - Swamp
 - Disappearing Drain
- VEGETATION
 - Orchard
 - Hedge
 - Brush
 - Individual Tree



STORM WATER INLET COMPUTATIONS

NUMBER	INLET TYPE	LENGTH ft.	DRAINAGE AREA, Ac	C	CA	INTENSITY In./Hr.	Q INCRE. C.F.S.	Q RRYOV C.F.S.	Qt GUTTERFLOW C.F.S.	S GUTTERSLOPE ft./ft	Sx CROSS SLOPE ft./ft	T SPREAD	W ft.	W/T	Sw ft./ft	Sw/Sx	Eo (Chart 10)	a	Sw' a/(12W)	Se (Sx+SwEo) ft./ft	Lt Length ft.	P Effec. Lt. ft.	L/Lt	d ft.	E (Chart 16)	h ft.	Q Intercepted C.F.S.	d/h	Qb Carry Over C.F.S.	T Spread @ Sag ft.	REMARKS
(left)			1.31	0.66	0.87	6.2	5.37		5.37	0.0200	0.0200	11.61	2	0.17	0.0833	4.17		3.52	0.1466	0.0200	-	-	-	-	-	-	-	-	-	-	Left
21	SAG	4			1.73	6.2	10.74		10.74				2								-	14.4	-	1.26	-	0.46	-	2.75	-	56.63	
(right)			1.31	0.66	0.87	6.2	5.37		5.37	0.0200	0.0200	11.61	2	0.17	0.0833	4.17		3.52	0.1466	0.0200	-	-	-	-	-	-	-	-	-	Right	

YARD INLET COMPUTATIONS

NUMBER	INLET	TYPE	A, Ac	C	CA	I, in	Q, cfs	HW, ft	Top Elev, ft	10 Yr. W.S.E. (ft)	REMARKS	COMMENTS
1010	Grate	12" RD	0.62	0.61	0.38	6.2	2.33	0.63	69.73	70.36	50% clogged*	FIRST FLOOR ELEV=71.7
1100	Grate	12"x12"	0.22	0.62	0.14	6.2	0.85	0.40	86.32	86.72	50% clogged*	

STORM SEWER DESIGN COMPUTATIONS

STRUCTURE		DRAINAGE AREA (ACRES) "A"	RUN-OFF COEF.		"CA"	"CA"	INLET TIME Min.	RAIN FALL In./Hr.	RUNOFF		INVERT ELEVATIONS		LENGTH (ft)	SLOPE (ft/ft)	MANNING'S "n" VALUE	DIAMETER IN	CAPACITY	VELOCITY F.P.S.	FLOW TIME Seconds	REMARKS
From	To		"C"	Increment	Accumulated	"Q"			Upper End	Lower End	C.F.S.									
1000	1010	0.24	0.90	0.213	0.213	5	9.00	1.92	67.69	64.83	127.70	0.0224	0.013	12	5.32	6.11	20.89			
1010	1040	0.62	0.61	0.376	0.727	5	9.00	6.54	64.73	61.92	159.10	0.0177	0.013	15	8.57	7.65	20.81			
1100	1010	0.22	0.62	0.138	0.138	5	9.00	1.24	83.47	unknown	unknown	0.0100	0.013	10	2.19	4.07		Assumed Length & Slope		
21	20	2.62	0.66	1.733	1.733	5	9.00	15.60	unknown	unknown	unknown	0.0100	0.013	18	10.50	5.94		Assumed Length & Slope		

Draft Plan

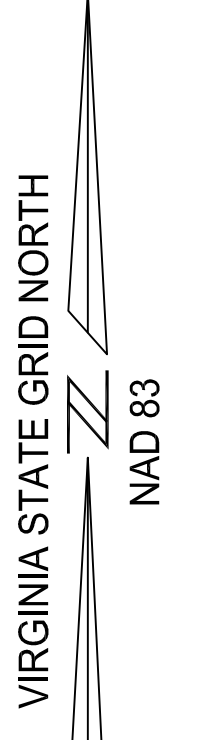
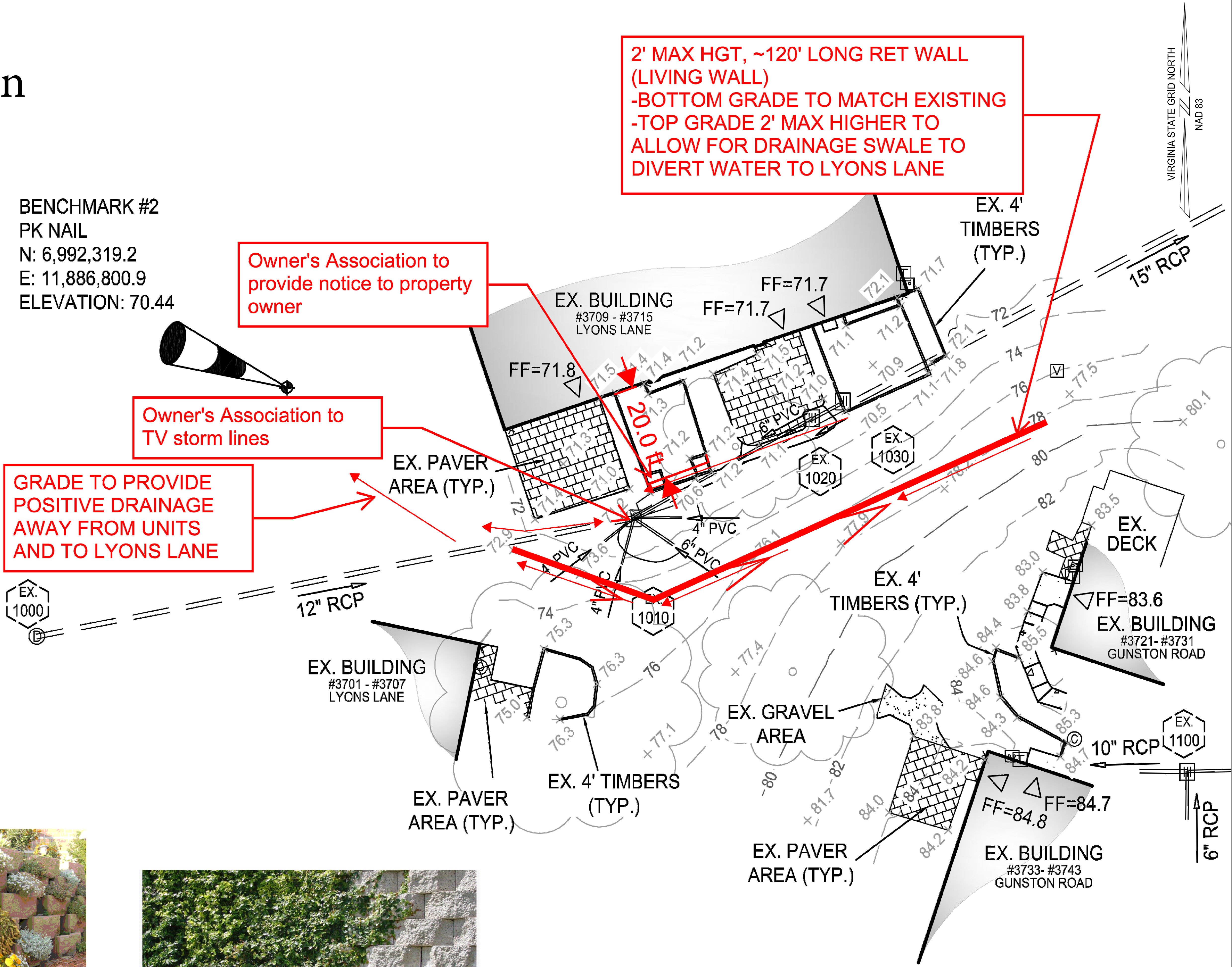
BENCHMARK #2
PK NAIL
N: 6,992,319.2
E: 11,886,800.9
ELEVATION: 70.44

2' MAX HGT, ~120' LONG RET WALL (LIVING WALL)
-BOTTOM GRADE TO MATCH EXISTING
-TOP GRADE 2' MAX HIGHER TO ALLOW FOR DRAINAGE SWALE TO DIVERT WATER TO LYONS LANE

Owner's Association to provide notice to property owner

Owner's Association to TV storm lines

GRADE TO PROVIDE POSITIVE DRAINAGE AWAY FROM UNITS AND TO LYONS LANE



christopher consultants
9900 main st
suite 400
fairfax, va 22031
p 703.273.6820
engineering • surveying • land planning

PARK FAIRFAX
BUILDING 547
ALEXANDRIA, VA

MARK	DATE	DESCRIPTION

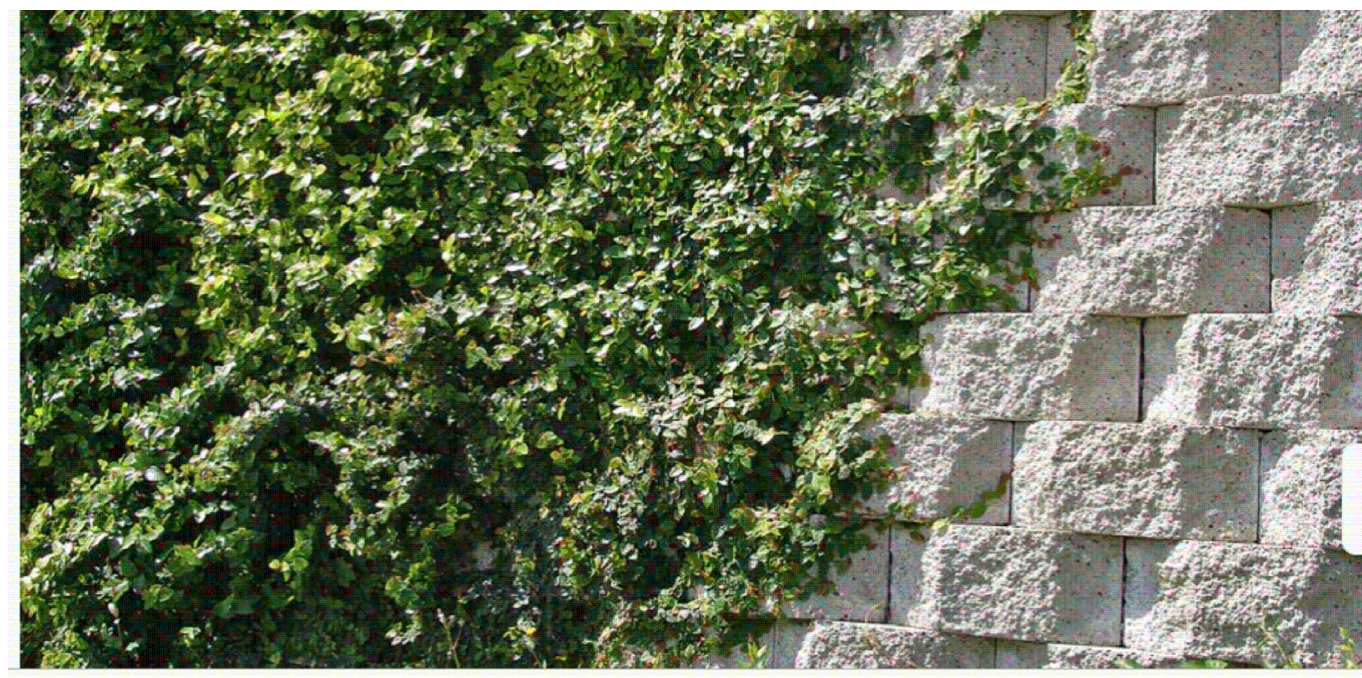
PROJECT No.: 21261.001.00
DRAWING No.: 111026
DATE: 9/17/2021
SCALE: 1" = 10'
DESIGN: AJG
DRAWN: AJG
CHECKED:
SHEET TITLE:

CONCEPTUAL GRADING EXHIBIT

SHEET No. **C-100**

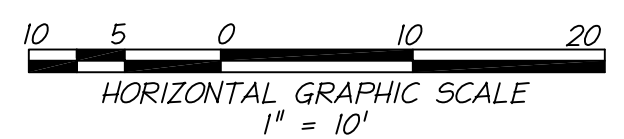


VERSA-GREEN PLANTABLE RETAINING WALL



KEYSTONE STANDARD BLOCK PLANTABLE WALL

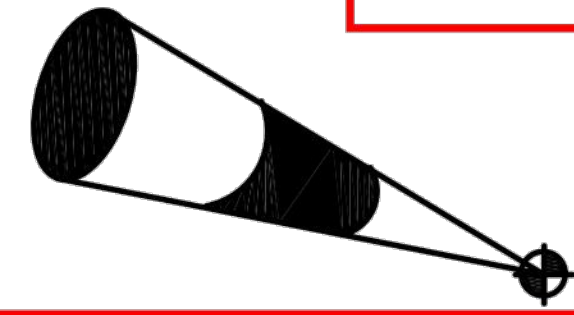
SITE 547



Example of grate inlet to install in between structures 1000 and 1010



MARK #2
 19.2
 300.9
 N: 70.44



VIRGINIA STATE GRID NORTH
 NAD 83

2' MAX HGT, ~120' LONG RET WALL (LIVING WALL)
 -BOTTOM GRADE TO MATCH EXISTING
 -TOP GRADE 2' MAX HIGHER TO ALLOW FOR DRAINAGE SWALE TO DIVERT WATER TO LYONS LANE

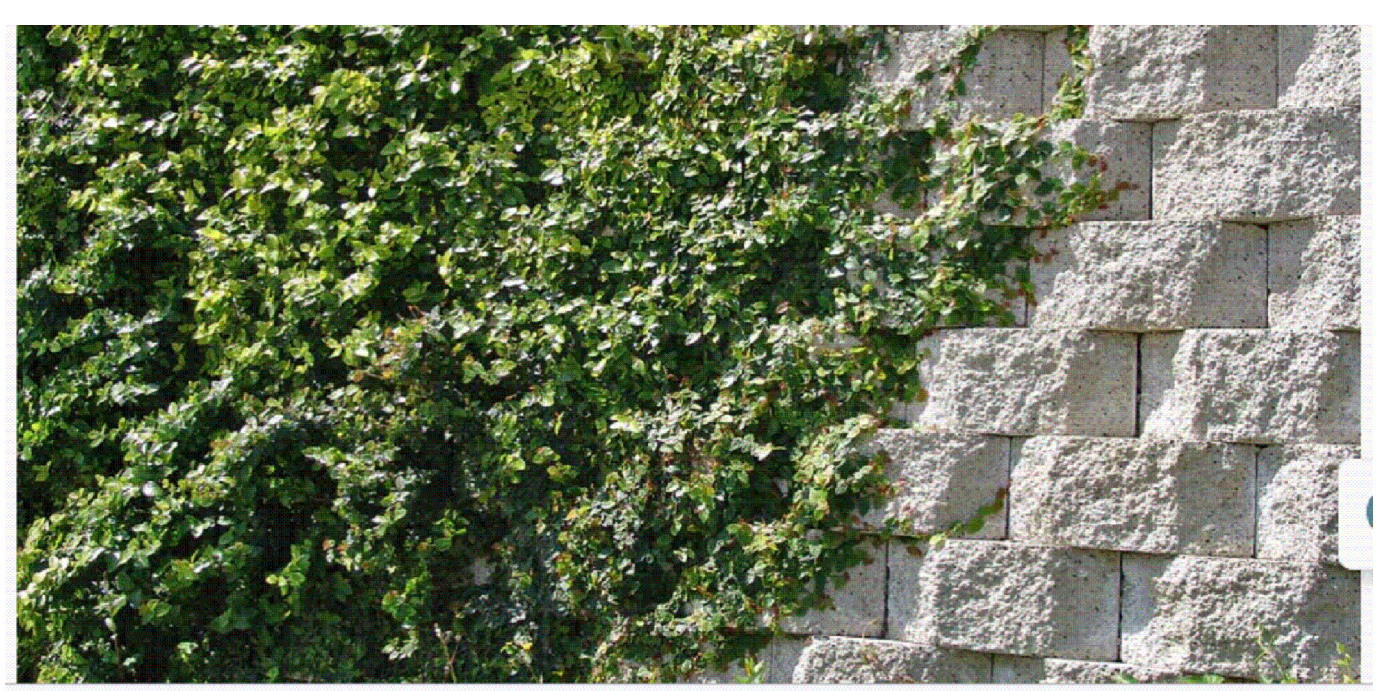
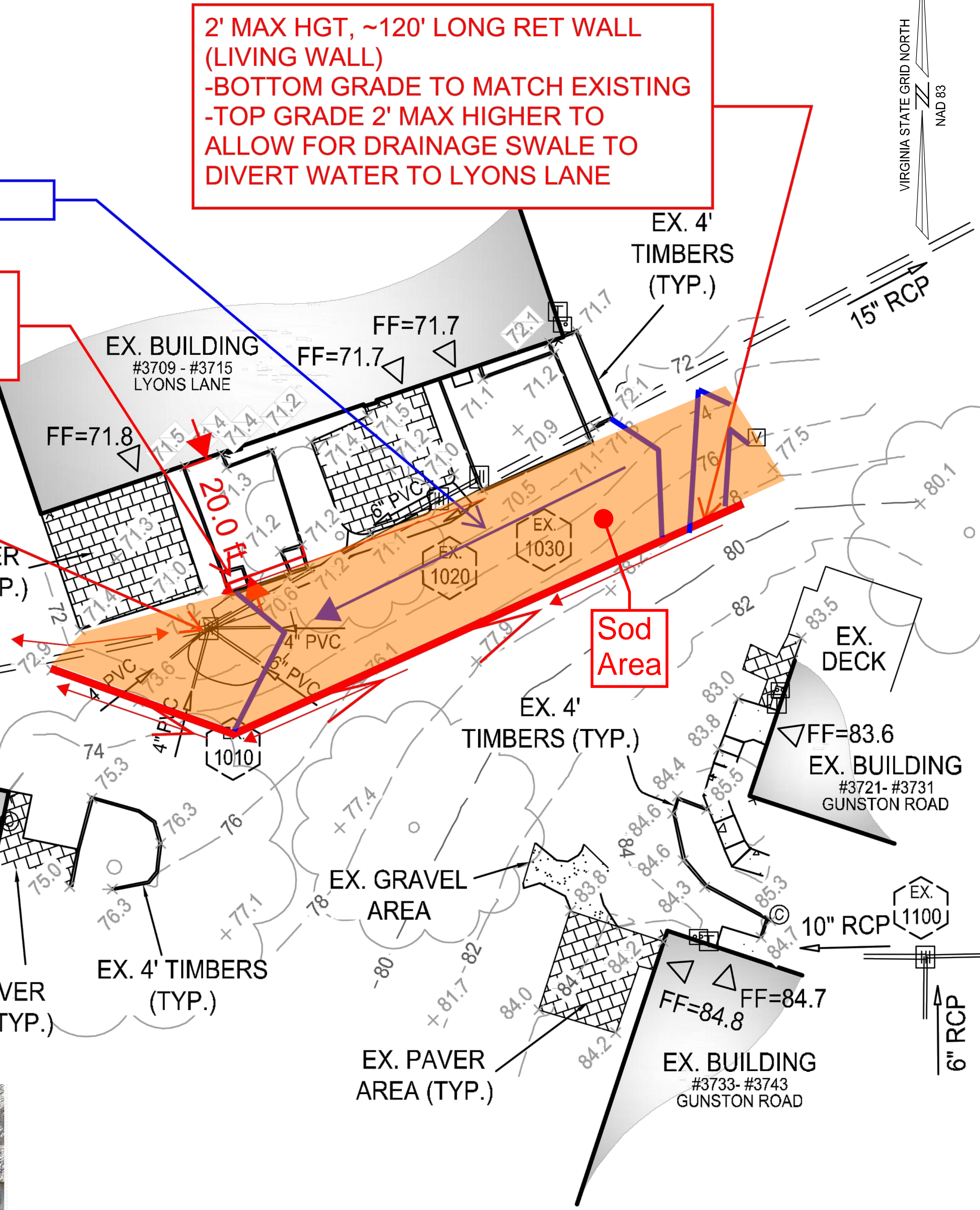
Dry swale at 3%

Owner's Association to provide notice to property owner

Owner's Association to TV storm lines

GRADE TO PROVIDE POSITIVE DRAINAGE AWAY FROM UNITS AND TO LYONS LANE

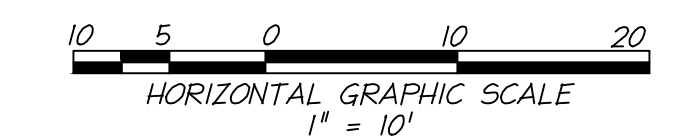
Potential location for doghouse grate inlet to collect stormwater from above the retaining wall



VERSA-GREEN PLANTABLE RETAINING WALL

KEYSTONE STANDARD BLOCK PLANTABLE WALL

SITE 547



christopher consultants
 9900 main st
 suite 400
 fairfax, va 22031
 engineering • surveying • land planning

PARK FAIRFAX
 BUILDING 547
 ALEXANDRIA, VA

MARK	DATE	DESCRIPTION

PROJECT No.: 21261.001.00
 DRAWING No.: 111026
 DATE: 9/17/2021
 SCALE: 1" = 10'
 DESIGN: AJG
 DRAWN: AJG
 CHECKED: []

SHEET TITLE:
CONCEPTUAL GRADING EXHIBIT

SHEET No.
C-100



9900 MAIN ST STE 400, FAIRFAX, VA 22031
 (703)-273-6820

1/14/2022

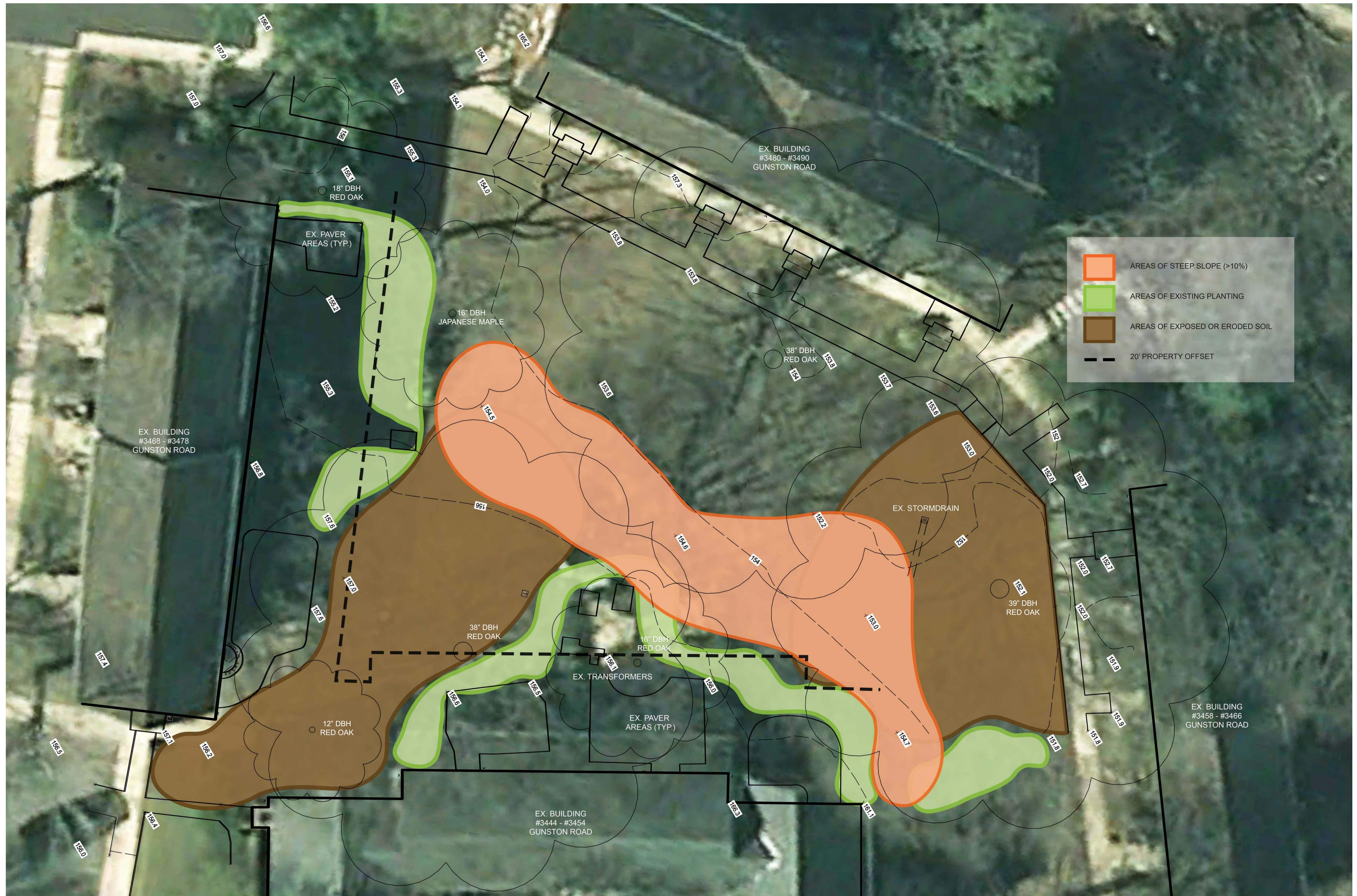
PARKFAIRFAX 547 SITE PRELIMINARY BUDGET
(FIGURES BASED ON CONCEPTUAL GRADING EXHIBIT SENT TO H.O.A. AROUND 12/13/21)

SITE										
DOGHOUSE GRATE INLET										
	1 EA	@	\$ 1400	-	\$ 2500 /SF	=	\$1,400.00	-	\$2,500.00	
RETAINING WALL (LIVING WALL)										
	240 SF	@	\$ 40	-	\$ 50 /SF	=	\$9,600.00	-	\$12,000.00	
SOD										
	2,500 SF	@	\$ 1.5	-	\$ 2.5 /SF	=	\$3,750.00	-	\$6,250.00	
EARTHWORK/GRADING										
	1 EA	@	\$ 8,000	-	\$ 10,000 /EA	=	\$8,000.00	-	\$10,000.00	
							TOTAL COST = \$	\$22,750.00	-	\$30,750.00
							TOTAL COST WITH 5% CONTINGENCY = \$	\$23,887.50	-	\$32,287.50

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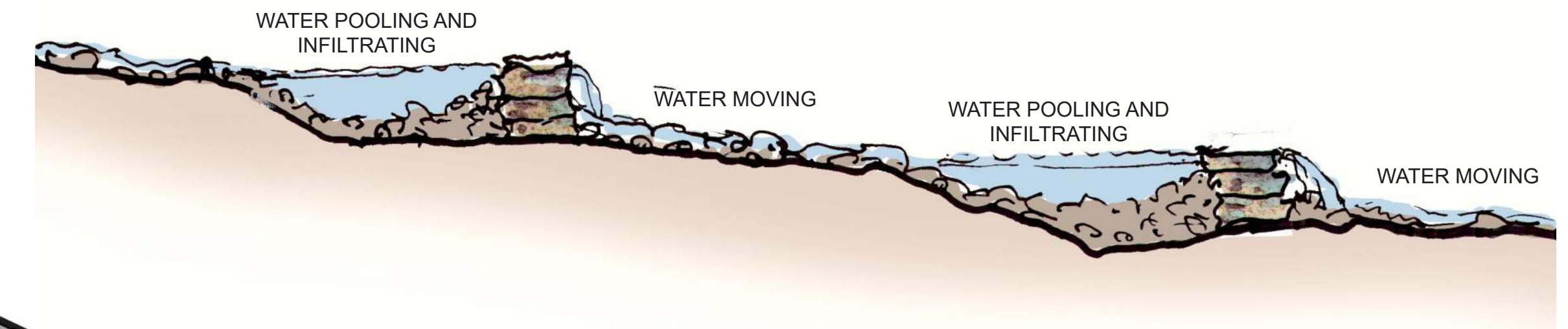
NOTES:

1. THE ABOVE ESTIMATE WAS PREPARED BY A REGISTERED PROFESSIONAL ENGINEER LICENSED TO PRACTICE IN THE STATE OF VIRGINIA AND IS A PROFESSIONAL OPINION OF CONSTRUCTION COSTS.
2. THE OPINION OF PROBABLE CONSTRUCTION COSTS PROVIDED HEREIN ARE MADE ON THE BASIS OF EXPERIENCE AND REPRESENT OUR BEST JUDGEMENT AS CIVIL ENGINEERS FAMILIAR WITH THE CONSTRUCTION INDUSTRY. THE FIRM CANNOT AND DOES NOT GUARANTEE THAT PROPOSALS, BIDS, OR THE CONSTRUCTION COST WILL NOT VARY FROM OUR OPINIONS OF PROBABLE COSTS. IF THE OWNER WISHES GREATER ASSURANCES AS TO THE CONSTRUCTION COST, WE RECOMMEND THE EMPLOYMENT OF AN INDEPENDENT COST ESTIMATOR.
3. CONCEPTUAL DESIGN WAS NOT FINALIZED OR APPROVED AT THE TIME THIS ESTIMATE WAS PREPARED, ACTUAL ITEMS AND QUANTITIES WILL VARY BASED ON FINAL DESIGN



	AREAS OF STEEP SLOPE (>10%)
	AREAS OF EXISTING PLANTING
	AREAS OF EXPOSED OR ERODED SOIL
	20' PROPERTY OFFSET





Check Dam
 Check dams are a way of slowing down water and giving it a chance to infiltrate as it goes along a dry stream or swale. Stacked stones or a concrete weir is placed at a point to allow water to pool and infiltrate into the soil before it overflows into the next section of the dry stream. This finely grained system of infiltration areas greatly reduces the amount of runoff and eventual impact on the end drain.



Dry Stream
 A dry stream gives stormwater an erosion-free path to move through the site. A swale is cut into the ground and lined with landscape fabric to protect the underlying soil and then stones. This serves as both an effective erosion control measure and a beautiful year round centerpiece.



Raised Stepping Stones
 Raised stepping stones create low impact paths across dry streams or planted areas. One of the main causes of empty, erodible ground on this site is the informal pedestrian pathways that crisscross the site and stamp down plant growth. By giving a bit of direction to how residents should move through the site, we can reduce the amount of eroded ground while creating a more curated and intentional experience of moving through this space.





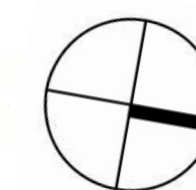
Mulching
 A simple and essential intervention to make across this site is mulching over areas where tree roots are exposed. Not only does this get rid of the existing tripping hazard, it re-stabilizes the soil, begins to add back nutrients lost through erosion, and slows erosion in a way that does no harm to the tree. If shrubs and groundcovers are planted into the mulch, that does even more to stabilize the soil and prevent erosion.



Rain Garden
 Turning the existing drain into a rain garden will solve the problem of sediment building up around and clogging the drain. Surrounding the drain, at a lower elevation, will be a rain garden basin that collects rainwater and allows it to be taken up by plants or filtered into the groundwater, allowing sediments time to settle out. In this plan, the drain turns from the main conveyance of water to simply an overflow once the rain garden is unable to hold all the water in a storm event.



Stone Feature Steps
 Adding steps at some of the areas with steeper grade changes smooths out the problematic topography by doubling as a retaining wall, creating a band of protection against erosion. In addition, it creates informal seating on the site and the feel of a natural amphitheater between the steps and the lawn below. Unlike wooden steps and retaining walls already used around the property, stone will be a more eternal solution, and they are reusable is repositioning becomes necessary





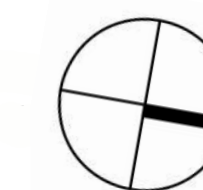
Grass Filter Strip
As stormwater moves through grass, especially long grass, it slows down and sediment is filtered out. Putting swaths of Pennsylvania Sedge, a shade tolerant ornamental grass, throughout this site would quickly stabilize the soil, absorb runoff and sediment, and create a peaceful river of flowing grass fronds.



Rain Barrels
Another solution for controlling runoff on site is using rain barrels to hold water from storm events. This could be implemented through a new HOA requirement that if homeowners increase the impervious surface in their outdoor spaces by more than 20' feet, the HOA will require the homeowner to put in a rain barrel to mitigate for the permeable surface lost.



Shade Perennials
Planting hardy shade perennials along the slopes is by far the best long term solution for preventing erosion and tree root exposure. Plants can be selected for their ability to spread quickly and have fibrous root systems that hold soil in place. Additionally, it makes for a better ecological and aesthetic habitat.





Grass Filter Strip
As stormwater moves through grass, it slows down and sediment is filtered out. Putting swaths of Pennsylvania Sedge - a shade tolerant and vigorously growing ornamental grass - throughout this site would quickly stabilize the soil, absorb runoff and sediment, and create a peaceful river of flowing grass fronds. By mowing this a few times a year, a shorter grass can be achieved that is less likely to harbor small mammals.



Shade Perennials
Planting hardy shade perennials along the slopes is by far the best long term solution for preventing erosion and tree root exposure. Plants can be selected for their ability to spread quickly and have fibrous root systems that hold soil in place. Additionally, it has good aesthetic benefits.



Rain Garden
Turning the existing drain into a rain garden will solve the problem of sediment building up around and clogging the drain. Surrounding the drain, at a lower elevation, will be a rain garden basin that collects rainwater and allows it to be taken up by plants or filtered into the groundwater, allowing sediments time to settle out. In this plan, the drain stops being the main conveyance of water and instead becomes simply an overflow once the rain garden is unable to hold all the water in a storm event.

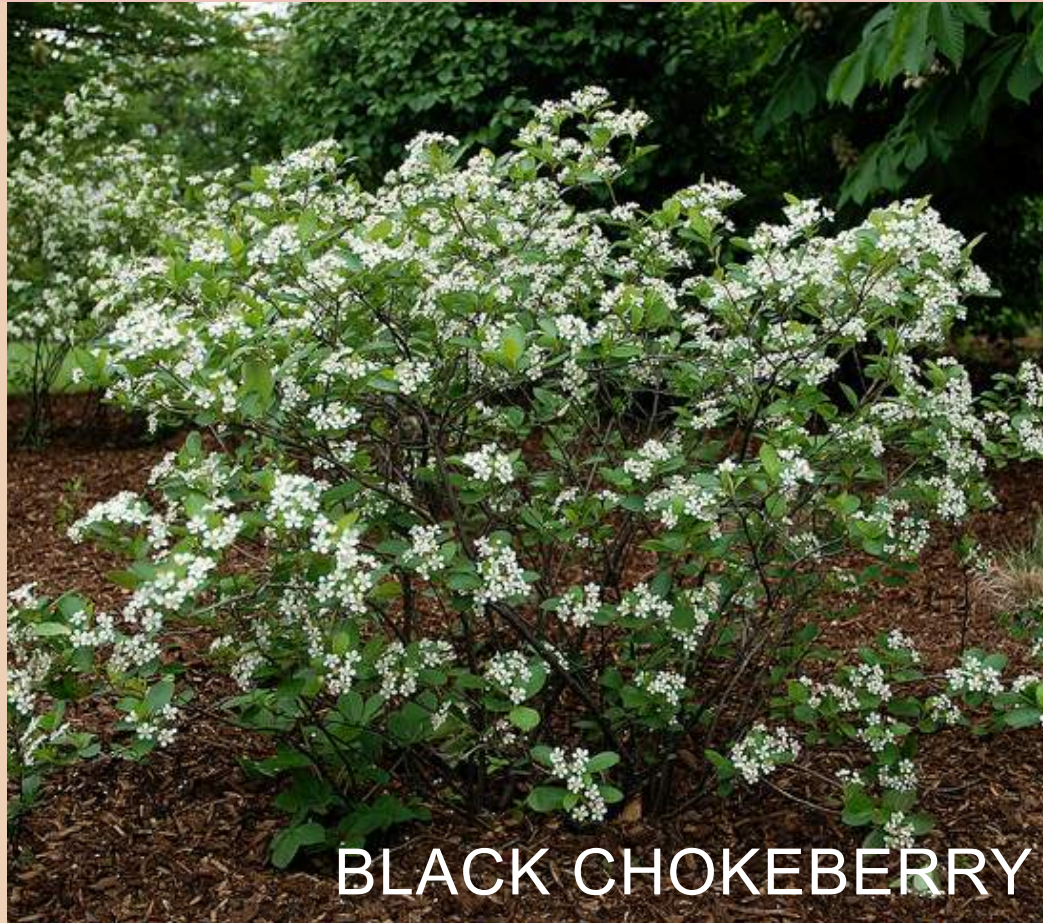
SHRUBS

GROUNDCOVERS

DRY OR
INTERMITTENT
MOISTURE



OAKLEAF HYDRANGEA



BLACK CHOKEBERRY



TIARELLA



HEUCHERA



ALLEGHANEY SPURGE



RED OSIER DOGWOOD



RED OSIER DOGWOOD



PENNSYLVANIA SEDGE



WHITE TURTLEHEAD



DWARF CRESTED IRIS

INTERMITTENT
TO HIGH
MOISTURE



SPICEBUSH



VIRGINIA SWEETPIRE



INLAND SEA OATS



CINNAMON FERN



BLUE MISTFLOWER



9900 MAIN ST STE 400, FAIRFAX, VA 22031
 (703)-273-6820

12/13/2021

**PARKFAIRFAX 725 LANDSCAPE PRELIMINARY BUDGET
 (FIGURES BASED ON CONCEPT 'C' AND ADDITIONAL REQUEST FROM H.O.A. ON 12/6/21)**

HARDSCAPE							
DECOMPOSED GRAVEL PATH							
	850 SF	@	\$ 4	-	\$ 6 /SF	=	\$ 3,400.00 - \$ 5,100.00
METAL EDGING							
	300 LF	@	\$ 2.5	-	\$ 4 /LF	=	\$ 750.00 - \$ 1,200.00
DRAIN MODIFICATION							
	1 EA	@	\$ 1,000	-	\$ 1,500 /EA	=	\$ 1,000.00 - \$ 1,500.00
OPTIONAL STONE STEPS (IF USED IN FINAL CONCEPT)							
	60 LF	@	\$ 75	-	\$ 100 /LF	=	\$ 4,500.00 - \$ 6,000.00
LANDSCAPE							
SOD							
	2,000 SF	@	\$ 1.5	-	\$ 2.5 /SF	=	\$ 3,000.00 - \$ 5,000.00
SHRUBS, GRASSES, GROUNDCOVERS							
	4,200 SF	@	\$ 6	-	\$ 9 /SF	=	\$ 25,200.00 - \$ 37,800.00
MULCH							
	45 CU YD	@	\$ 50	-	\$ 60 /CU YD	=	\$ 2,250.00 - \$ 2,700.00
EARTHWORK/GRADING							
	1 EA	@	\$ 8,000	-	\$ 10,000 /EA	=	\$ 8,000.00 - \$ 10,000.00
						TOTAL COST = \$	\$37,850.00 - \$ 56,600.00
						TOTAL COST WITH 5% CONTINGENCY = \$	\$39,742.50 - \$ 59,430.00

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NOTES:

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