Site Plan from November 2017 Planning Commission hearing

DSP - PRELIMINARY SITE PLAN
KARIG ESTATES
CITY OF ALEXANDRIA
JULY, 2017

APPLICANT / DEVELOPER
3834 SEMINARY, LLC
20072 BLACKWOLF RUN PLACE
ASHBURN, VA 20147
CONTACT: MIKE IBRAHIM
PHONE: 703-395-0101

ARCHITECT:
ORLING ARCHITECTURE
1215 CAMERON ST
ALEXANDRIA, VA 22314
CONTACT: SCOTT FLEMING
PHONE: 703-836-3205

SITE INFO
3834 SEMINARY ROAD
TAX MAP # 040.02-04-03
PARCEL # 040.02-04-03
93,423 SF. OR 2.1447 AC

3832 SEMINARY ROAD
TAX MAP # 040.02-04-04
PARCEL # 040.02-04-04
42,776 SF. OR 0.9820 AC

CIVIL ENGINEER
URBAN, LTD.
4200 D TECHNOLOGY CT.
CHANTILLY, VA. 20151
CONTACT: CLAYTON TOCK
PHONE: 703-692-2306

OWNER:
CARRIER KEATING F TR
SCHREINER DEVON A TR
9126 TAYLOR ST.
MANASSAS, VA 20110

ATTORNEY:
HART, GIBBS, PIERCE & KARP
700 N. FAIRFAX STREET SUITE 600
ALEXANDRIA, VA 22314
CONTACT: MARY CATHERINE GIBBS
PHONE: 703-836-5757

ZONING REQUIREMENTS

1) ZONING	R-20		
2) EXISTING USE	RESIDENTIAL (SINGLE FAMILY)		
3) PROPOSED USE	RESIDENTIAL (SINGLE FAMILY)		
4) TOTAL SITE AREA	136,198 (SQ. FT.) OR 3.13 ACRES		
5) TOTAL DISTURBED AREA	98,652 (SQ. FT.) OR 2.26 ACRES		
6) REQUIRED LOT AREA	20,000 (MIN)		(SQ. FT.)
7) PROVIDED LOT AREA	VARIES (SEE TABS ON THIS SHEET)		(SQ. FT.)
8) AVERAGE LOT AREA	27,814		(SQ. FT.)
9) MIN. LOT AREA	20,000		(SQ. FT.)
10) ALLOWABLE DENSITY	N/A		(D.U./AC.)
11) PROVIDED DENSITY	1.3		(D.U./AC.)
12) GROSS FLOOR AREA	24,904		(SQ. FT.)
13) NET FLOOR AREA	23,660		(SQ. FT.)
14) MAXIMUM FAR	0.25		
15) PROPOSED FAR	SEE TABLE, THIS SHEET		
16) MINIMUM FRONT YARD SETBACK	40.00 (FT.) PROVIDED	SEE TABLE, THIS SHEET	(FT.)
17) MINIMUM REAR YARD SETBACK	35.00 (FT.) PROVIDED	SEE TABLE, THIS SHEET	(FT.)
18) MINIMUM SIDE YARD SETBACK	17.50 (FT.) PROVIDED	SEE TABLE, THIS SHEET	(FT.)
19) MAX. BUILDING HEIGHT	35	(FT.)	(FT.)
20) PROP. BUILDING HEIGHT	33.4	(FT.)	
21) NUMBER OF FLOORS	2 + BASEMENT	(Commercial/Industrial ONLY)	
22) NUMBER OF UNITS	4		
UNIT TYPES	SINGLE FAMILY		
23) LOT FRONTAGE REQUIRED	75' MIN (55' MIN FOR CURVILINEAR STREETS)		
24) LOT FRONTAGE PROVIDED			
LOT 1	SEE TABLE, THIS SHEET		
	SEE TABLE, THIS SHEET		
LOT 2	SEE TABLE, THIS SHEET		
LOT 3	SEE TABLE, THIS SHEET		
LOT 4	SEE TABLE, THIS SHEET		
25) OPEN SPACE REQUIRED	N/A	% N/A	
26) OPEN SPACE PROVIDED	SEE SHEET #10	% SEE SHEET #10	(SQ. FT.)
27) GROUND LEVEL OPEN SPACE REQ'D	N/A	% N/A	(SQ. FT.)
28) GROUND LEVEL OPEN SPACE PROV.	SEE SHEET #10	% SEE SHEET #10	(SQ. FT.)
29) ROOF-TOP OPEN SPACE REQ'D	N/A	% N/A	(SQ. FT.)
30) ROOF-TOP OPEN SPACE PROV.	0	% 0	(SQ. FT.)
31) AVG. BLDG. FINISHED GRADE	SEE SHEET #29 FOR DETAIL		(FT.) (SQ. FT.)
LOT 1	262.66		
LOT 2	260.93		
LOT 3	257.24		
LOT 4	251.57		
32) REQUIRED PARKING	8		
33) PROPOSED PARKING	12 GARAGE		
34) REQUIRED STANDARD PARKING	8		
35) PROPOSED STANDARD PARKING	12		
36) PROPOSED SURFACE PARKING (ADD'L)	7		
37) REQUIRED COMPACT PARKING	0		
38) PROPOSED COMPACT PARKING	0		
39) REQUIRED HANDICAPPED PARKING	0		
40) PROPOSED HANDICAPPED PARKING	0		
41) REQUIRED LOADING SPACES	0		
42) PROPOSED LOADING SPACES	0		
43) EXISTING TRIP GENERATION	10 PER DAY		
44) PROPOSED TRIP GENERATION	54 PER DAY		
45) EXISTING IMPERVIOUS AREA	6.39	% 8,712 (SQ. FT.) OR 0.20 ACRES	
46) PROPOSED IMPERVIOUS AREA	27.80	% 37,897(SQ. FT.) OR 0.87 ACRES	

BUILDING CODE ANALYSIS*	
USE GROUP:	R-5
NUMBER OF STORIES:	2 + BASEMENT
TYPE OF CONSTRUCTION:	IRC WITH VAUSBC AMENDMENT
FIRE PROTECTION PLAN:	N/A

*SEE SHEET 06 FOR ADDITIONAL BUILDING DATA

VICINITY MAP
SCALE: 1"=500'

Sheet List Table			
Sheet Number	Sheet Title	21F	POST-DEVELOPMENT SWM
01	COVER SHEET	22	SWM NARRATIVE
02	GENERAL NOTES	23	OUTFALL ANALYSIS
03	GENERAL NOTES	24	PEDESTRIAN CIRCULATION
04	CONTEXTUAL PLAN	25	AUTOTURN EXHIBIT
05	EXISTING CONDITIONS	26	AUTOTURN EXHIBIT
06	GEOMETRY PLAN	27	SIGHT DISTANCE
06A	GIS DIMENSION PLAN	28	FIRE SERVICE PLAN
06B	UTILITY PLAN	29	AVERAGE GRADE EXHIBIT
07	GRADING PLAN	30	AVERAGE SETBACK EXHIBIT
08	OVERLAND RELIEF	31	TREE INVENTORY PLAN
09	EXISTING OPEN SPACE PLAN	32	TREE CONDITION ANALYSIS
10	PROPOSED OPEN SPACE PLAN	33	TREE SAVE PLAN
11	BMP PLAN & NARRATIVE	34	LANDSCAPE PLAN
12	BMP COMPUTATIONS	35	LANDSCAPE PLAN
13	BMP COMPUTATIONS	36	LANDSCAPE PLAN
14	BMP COMPUTATIONS	37	PLAT
14A	BMP COMPUTATIONS	38	PLAT
15	BMP DETAILS	39	CORRESPONDENCE
16	BMP DETAILS	40	GEOTECHNICAL RECOMMENDATIONS
17	BMP DETAILS	41	GEOTECHNICAL RECOMMENDATIONS
17A	BMP DETAILS	42	GEOTECHNICAL RECOMMENDATIONS
18	BMP CONSTRUCTION & MAINTENANCE	43	GEOTECHNICAL RECOMMENDATIONS
18A	BMP DETAILS	44	GEOTECHNICAL RECOMMENDATIONS
19	PRE-DEVELOPMENT DIVIDES	A1.1	FLOOR PLANS - ROOF PLANS
20	POST-DEVELOPMENT DIVIDES	A1.2	FLOOR PLANS - ROOF PLANS
21	POST-DEVELOPMENT SWM	A2.1	EXTERIOR ELEVATIONS
21A	POST-DEVELOPMENT SWM	A2.2	EXTERIOR ELEVATIONS
21B	POST-DEVELOPMENT SWM	A2.3	EXTERIOR ELEVATIONS
21C	POST-DEVELOPMENT SWM	A2.4	EXTERIOR ELEVATIONS
21D	POST-DEVELOPMENT SWM	A3.1	BUILDING SECTIONS
21E	POST-DEVELOPMENT SWM	A3.2	BUILDING SECTIONS

PROJECT NARRATIVE:
THE EXISTING SITE CONSISTS OF TWO PARCELS WHICH A TOTAL AREA OF 3.13 ACRES AND IS ZONED FOR R-20 USE. THE APPLICANT PROPOSES TO SUBDIVIDE THE SITE INTO FOUR LOTS, EACH WITH ONE SINGLE-FAMILY HOME.

APPLICATIONS REQUESTED WITH THIS SUBMISSION
- APPLICATION FOR SUBDIVISION.
- APPLICATION FOR A SITE PLAN.
- APPLICATION FOR NAMING A PUBLIC STREET.

MODIFICATIONS REQUESTED WITH THIS SUBMISSION:
-MODIFICATION FOR THE FRONT YARD SETBACK OF LOTS 2 & 3 BASED ON EDGE OF ROW FOR TRUCK TURNAROUND AND FOR LOT 4 TO MOVE HOUSE 15 FEET TOWARDS SEMINARY.

EXISTING SPECIAL USE PERMITS THAT APPLY TO THE SUBJECT SITE:
-NONE

PROPOSED SETBACK NARRATIVE
THE APPLICANT PROPOSES TO PROVIDE A 104' SETBACK FROM SEMINARY ROAD, 40' SETBACKS FROM THE NEW PUBLIC ROAD, A 40' SETBACK FROM THE END OF THE NEW PUBLIC ROAD AND 17.5' SETBACKS ON THE SIDE YARDS.

	Lot Area		Proposed Houses					Permitted			
Lot	SF	AC	# of Floors (w/o basement)	Gross Floor Area	Net Floor Area *	FAR	Bldg Ht	Gross Floor Area	Net Floor Area	FAR	Bldg Ht
1	29,797	0.68	2	6,508	6,197	0.21	35'	N/A	7,487	0.25	35.0'
2	22,840	0.52	2	5,944	5,633	0.25	35'	N/A	5,710	0.25	35.0'
3	22,558	0.52	2	5,944	5,633	0.25	35'	N/A	5,640	0.25	35.0'
4	36,059	0.83	2	9,326	9,015	0.25	35'	N/A	9,015	0.25	35.0'
Total	111,254	2.55	N/A	27,722	26,478	0.25	N/A	N/A	27,852	0.25	35.0'

* SEE ARCHITECTURAL DRAWING FOR ADDITIONAL INFORMATION REGARDING NET FLOOR AREA

SHEET 01

LOT INFORMATION

LOT	LOT SI□E :RE□UIRED□	LOT SI□E □RO□OSED□	□RONT SET□AC□ :RE□UIRED□	□RONT SET□AC□ □RO□OSED□	SIDE SET□AC□ :RE□UIRED□	SIDE SET□AC□ □RO□OSED□	REAR SET□AC□ :RE□UIRED□	REAR SET□AC□ □RO□OSED□	LOT WIDTH :RE□UIRED□	LOT WIDTH □RO□OSED□	LOT WIDTH MODI□ICATION	LOT □RONTA□E :RE□UIRED□	LOT □RONTA□E □RO□OSED□
□	□,000 S□	□,9□9□ S□	□□ 40.0□ □□ □□04.09□	□□ 40.0□ □□ □04.09□	S□ □□.□□ S□ □□.□□	S□ □□.□□ S□ □0.□□ S□ 3□.□□ S□ □□.□□	N/A	N/A	□□.0□	W□ □0.□.□□□ W□ □□□.09□	N/A	□□.0□	□□ □09.□9□ □□ □□3.9□□
□	□,000 S□	□□□40 S□	40.0□	□□.□□	□□.□□		3□.0□	□9.0□	□00□	□□□.9□□	N/A	□□.0□	□□□.□□□
3	□,000 S□	□,□□□□ S□	40.0□	□□.9□	□□.□□	S□ 3□.0□ S□ □□.□□	3□.0□	□□.□□	□00□	□□□.30□	N/A	□□.0□	□00.□□□
4	□,000 S□	3□.□9 S□	40.0□	□□.□□	□□.□□	S□ 30.0□ S□ □□.□□	3□.0□	R□ □0.□.0□ R□ □0.□.□□	□00□	□34.□0□	N/A	□□.0□	□□.□.0□

□□UILD TO LINE. SEE SHEET 30 □OR DETAILS.

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www.urban-ltd.com

COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 036790
PROFESSIONAL ENGINEER

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-17-17
08-01-17
10-19-17
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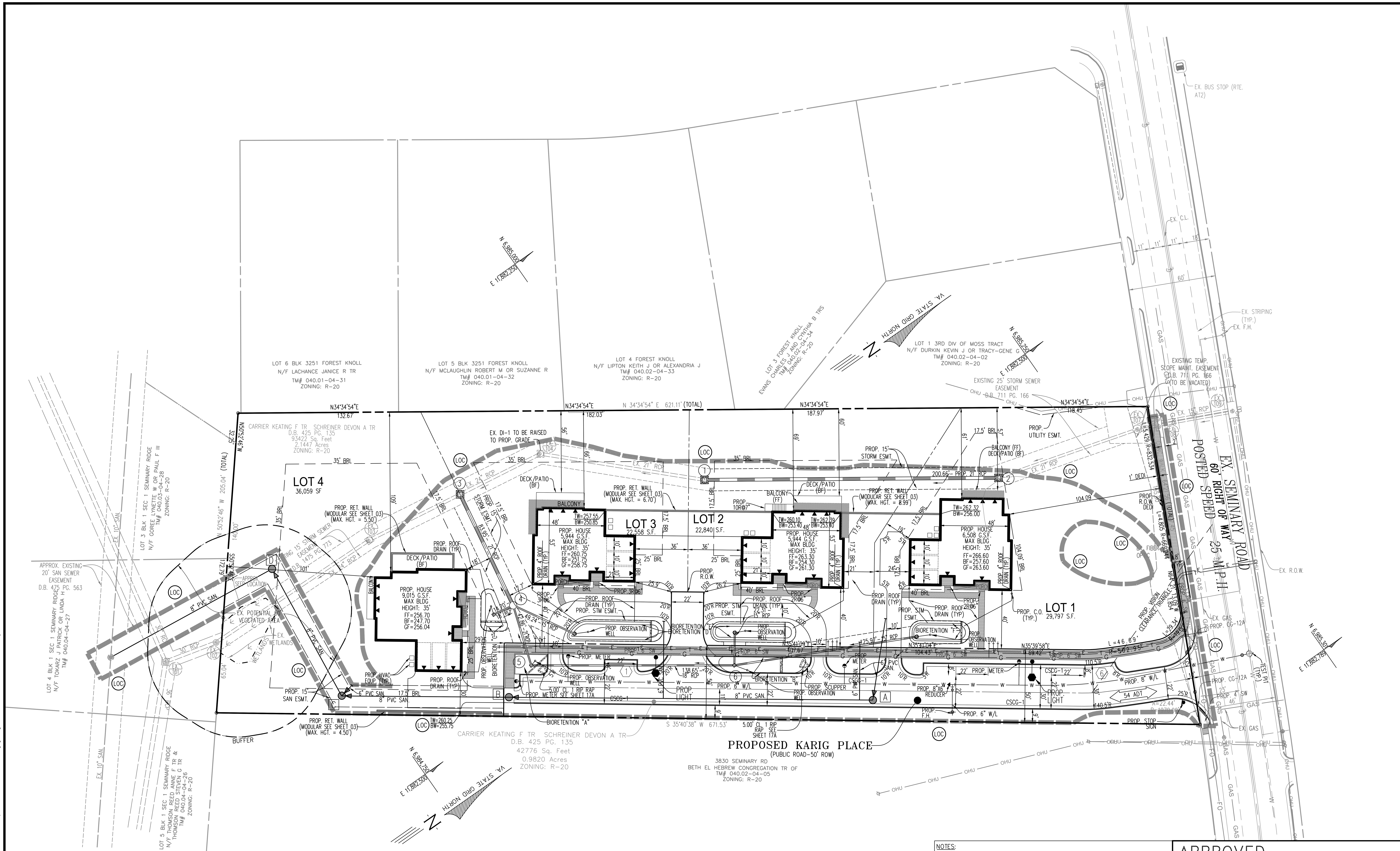
APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

Urban, Ltd. - k:\JOBS\Seminary Road\Preliminary Site Plan - Revised\2811-01-COVER.dwg [COVER (1)] October 19, 2017 - 11:10am mjstori



NOTES:

1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAELOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 in. = 30 ft.

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. ____

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

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06-06-16
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06-09-17
07-17-17
08-01-17
10-19-17

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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 036790
10-19-17
PROFESSIONAL ENGINEER

GEOMETRY PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

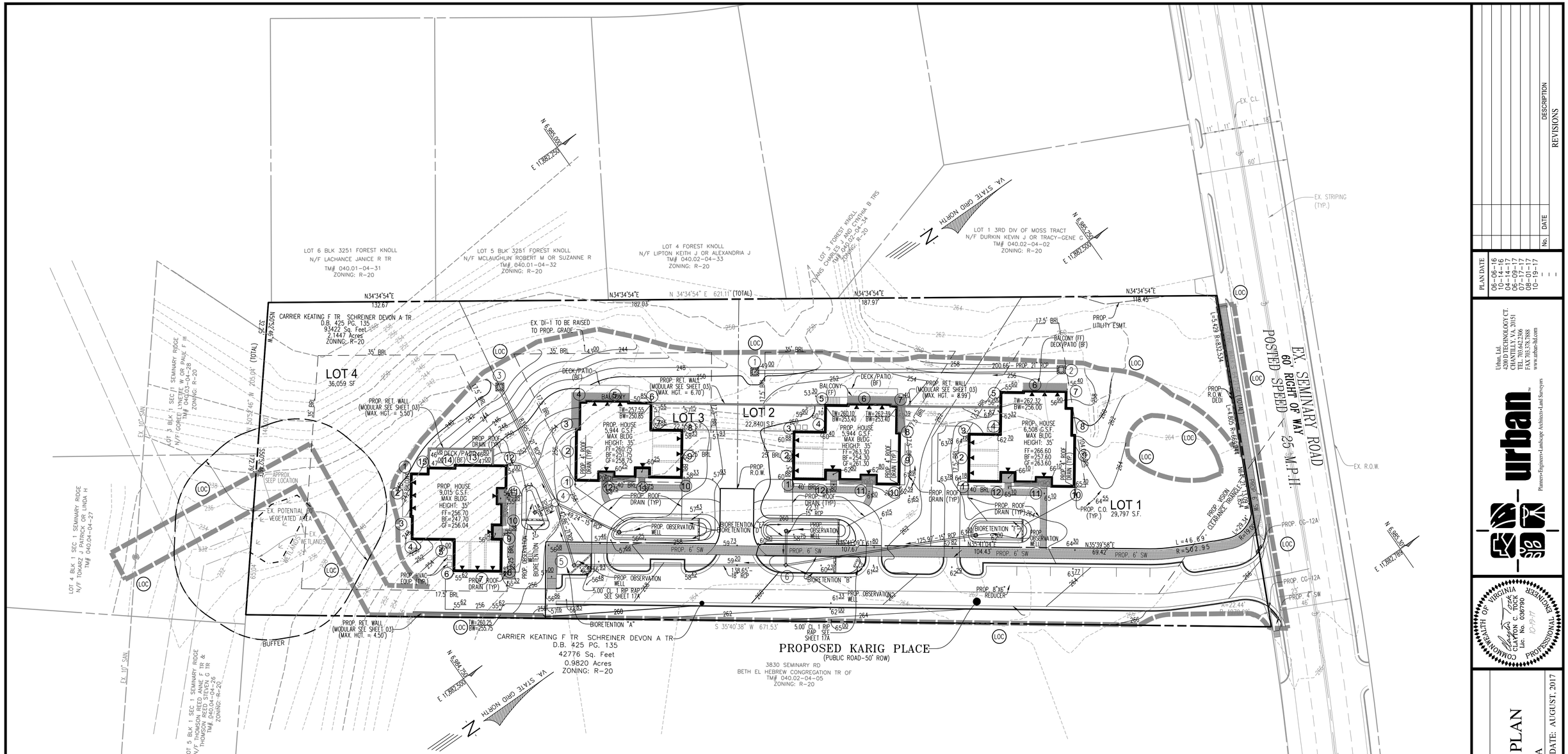
CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= N/A DATE: AUGUST, 2017

SHEET
06

FILE No.
12811

Urban, Ltd. – J:\JOBS\Seminary Road\Preliminary Site Plan – Revised\12811-08-GEOMETRY.dwg [GEO] October 19, 2017 – 11:10am mjafari



LOT 1		
SPOT NO.	EX GRADING	PROP. GRADING
1	262.83	264.18
2	262.57	264.18
3	261.11	264.18
4	262.02	262.7
5	256	255.6
6	258	256.9
7	258	256.9
8	258	265.7
9	262	265.7
10	264	265.7
11	264	265.1
12	263.32	265.1
TOTAL=	3131.85	3151.94
AVERAGE=	260.99	262.66

□IRST □LOOR □ □□□.□0
□LOOR S□STEM □ □□
□ASEMENT CEILIN□ □ □□□.□0
□RO□OSED A□□ □ □□□.□□
□ASEMENT HEI□HT A□O□E A□□ □ □.94

LOT 2		
SPOT NO.	EX GRADING	PROP. GRADING
1	261.1	260.88
2	260.27	260.88
3	254.42	260.88
4	254.3	260.4
5	252.35	260.1
6	256.65	253.4
7	257.21	262.39
8	260.73	262.39
9	261.18	261.89
10	261.73	262.39
11	260.75	262.8
12	260.75	262.8
TOTAL=	3101.44	3131.2
AVERAGE=	258.45	260.93

□IRST □LOOR □ □□3.30
□LOOR S□STEM □ □□
□ASEMENT CEILIN□ □ □□□.30
□RO□OSED A□□ □ □□0.93
□ASEMENT HEI□HT A□O□E A□□ □ □.3□

LOT 3		
SPOT NO.	EX GRADING	PROP. GRADING
1	256.77	258.25
2	252.7	258.25
3	249.79	256
4	246.9	251.75
5	250	251.75
6	249.68	257.55
7	255.91	257.85
8	256.95	258.33
9	260.02	258.33
10	260.51	258.33
11	259.53	260.25
12	262.49	260.25
TOTAL=	3061.25	3086.89
AVERAGE=	255.10	257.24

□IRST □LOOR □ □□0.□□
□LOOR S□STEM □ □□
□ASEMENT CEILIN□ □ □□9.□□
□RO□OSED A□□ □ □□□.□4
□ASEMENT HEI□HT A□O□E A□□ □ □.□□

LOT 4		
SPOT NO.	EX GRADING	PROP. GRADING
1	239.7	240
2	240.26	241
3	244.49	244.3
4	248.89	252.2
5	253	255.2
6	257.41	255.8
7	258.74	255.62
8	259.46	255.8
9	258.45	255.8
10	258.08	255.38
11	258.9	255
12	248.85	254
13	244.66	247
14	241.97	247
15	240.41	243
TOTAL=	3753.27	3757.1
AVERAGE=	250.22	250.47

□IRST □LOOR □ □□□.□0
□LOOR S□STEM □ □□
□ASEMENT CEILIN□ □ □□□.04
□RO□OSED A□□ □ □□0.4□
□ASEMENT HEI□HT A□O□E A□□ □ □.□□

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DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
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CHAIRMAN, PLANNING COMMISSION — DATE
DATE RECORDED _____
INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS
1	05-16-17	CITY COMMENTS
2	06-01-17	
3	08-01-17	
4	10-19-17	

PLAN DATE
06-06-16
10-14-16
04-14-17
05-09-17

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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 039780
PROFESSIONAL ENGINEER
10/19/17

AVERAGE GRADE EXHIBIT

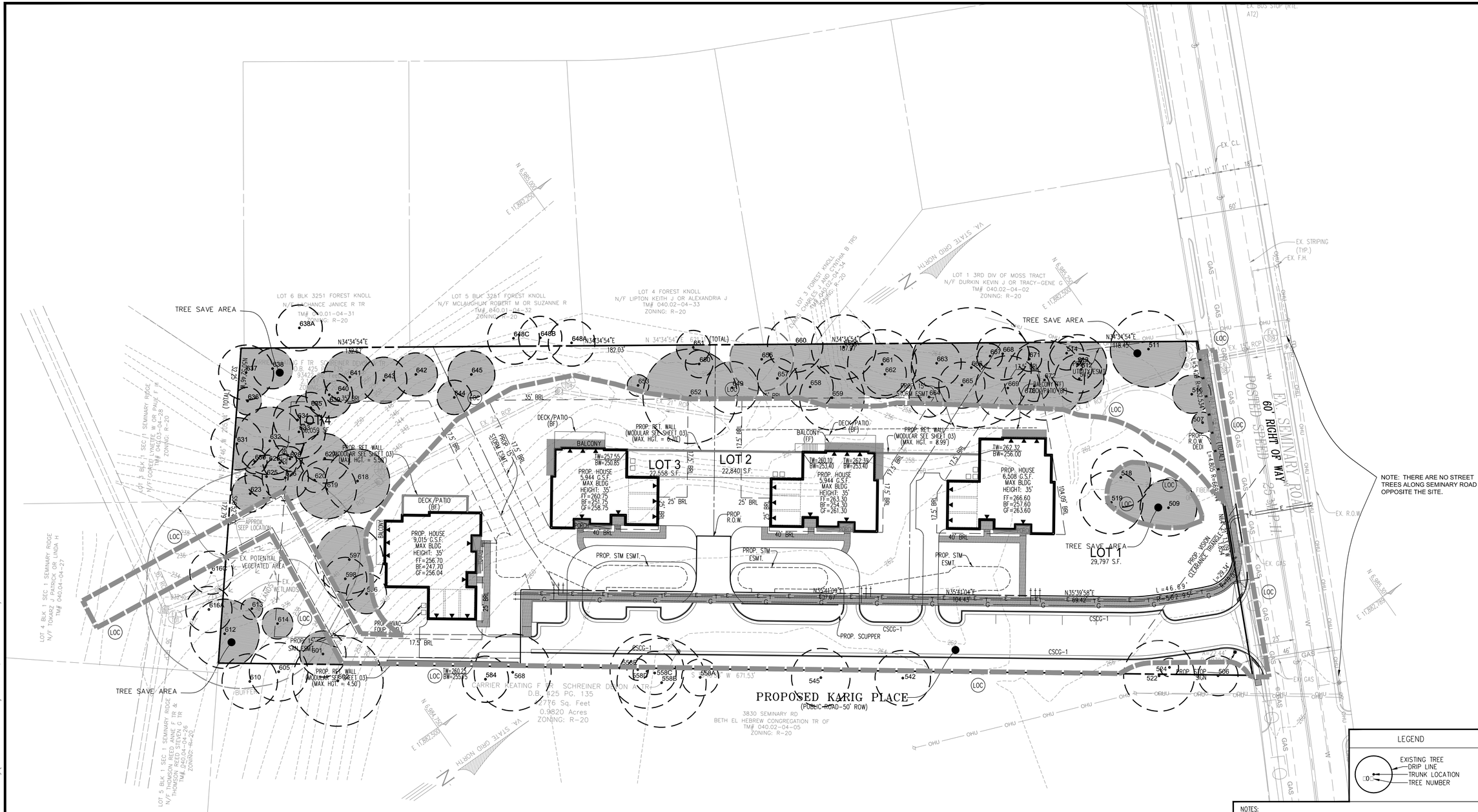
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= 2' DATE: AUGUST, 2017

SHEET 29

FILE No. 12811



No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
06-06-16
10-14-17
04-14-17
05-09-17
06-01-17
08-01-17
10-19-17
- -
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COMMONWEALTH OF VIRGINIA
Kevin J. Tankersley
Lic. No. 983
10-19-17
LANDSCAPE ARCHITECT

TREE SAVE PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"= 30' C.I.= 2' DATE: AUGUST, 2017

NOTES:
1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

SHEET 33

FILE No. 12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan - Revised\TREE INVENTORY EXHIBIT.dwg [TREE INVENTORY PLAN] October 19, 2017 - 11:11am mylori

NOTES

1. THE PROPERTIES DELINEATED ON THIS PLAT ARE LOCATED ON CITY OF ALEXANDRIA TAX ASSESSMENT MAPS 040.02-04-03 AND 040.02-04-04 AND ARE CURRENTLY ZONED R-20.

2. APPLICANT:
   3834 SEMINARY, LLC
   20072 BLACKWOLF RUN PLACE
   ASHBURN, VA 20147

   OWNERS:
   KEATING F. CARRIER, TRUSTEE
   DEVON A. SCHREINER, TRUSTEE
   9126 TAYLOR ST.
   MANASSAS, VA 20110

3. BOUNDARY INFORMATION SHOWN HEREON WAS DERIVED FROM AN ALTA/ACSM LAND TITLE SURVEY, PREPARED BY URBAN, LTD., AND DATED DECEMBER 8, 2012.

Subdivision Plat from
November 2017
Planning Commission
hearing

SURVEYOR'S CERTIFICATE

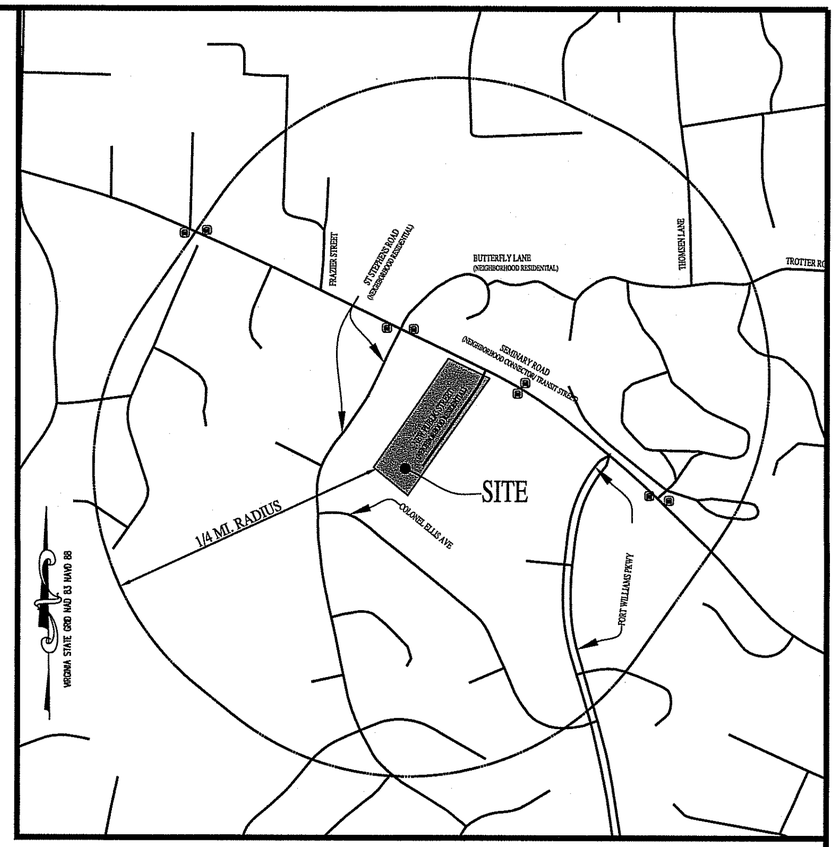
I HEREBY CERTIFY THAT I HAVE CAREFULLY SURVEYED THE PROPERTY DELINEATED BY THIS PLAT, AND THAT IT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF; THAT THIS IS A SUBDIVISION OF ALL OF THE LAND CONVEYED BY _____ TO _____ BY DEED DATED _____ AND RECORDED AMONG THE LAND RECORDS OF THE CITY OF ALEXANDRIA IN DEED BOOK _____ AT PAGE _____ AND IS WITHIN THOSE BOUNDARIES; AND THAT ALL REQUIRED MONUMENTS HAVE BEEN INSTALLED WHERE INDICATED; EXCEPT THOSE THAT WILL BE INSTALLED AT A LATER DATE BUT BEFORE COMPLETION OF THE PROJECT.

KEVIN P. O'CONNOR CLS #1967 — 10/5/2017 DATE

COMMONWEALTH OF VIRGINIA
KEVIN P. O'CONNOR
Lic. No 1967
LAND SURVEYOR

AREA TABULATION

AREA LOTS 1-4	111,254 SF OR 2.5540 ACRES
AREA STREET DEDICATION	24,944 SF OR 0.5727 ACRES
TOTAL AREA SUBDIVISION	136,198 SF OR 3.1267 ACRES
BEGINNING AREA TAX MAP 040.02-04-03	93,422 SF OR 2.1447 ACRES
-SUBDIVISION	93,422 SF OR 2.1447 ACRES
ENDING AREA TAX MAP 040.02-04-03	0 SF OR 0.0000 ACRES
BEGINNING AREA TAX MAP 040.02-04-04	42,776 SF OR 0.9820 ACRES
-SUBDIVISION	42,776 SF OR 0.9820 ACRES
ENDING AREA TAX MAP 040.02-04-04	0 SF OR 0.0000 ACRES



VICINITY MAP
SCALE: 1" = 500'

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

_____ DIRECTOR _____ DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____

_____ DIRECTOR _____ DATE

_____ CHAIRMAN, PLANNING COMMISSION _____ DATE

DATE RECORDED _____

_____ INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO.

PRELIMINARY SUBDIVISION PLAT
KARIG ESTATES
CITY OF ALEXANDRIA, VIRGINIA
SCALE: N/A DATE: FEBRUARY, 2017

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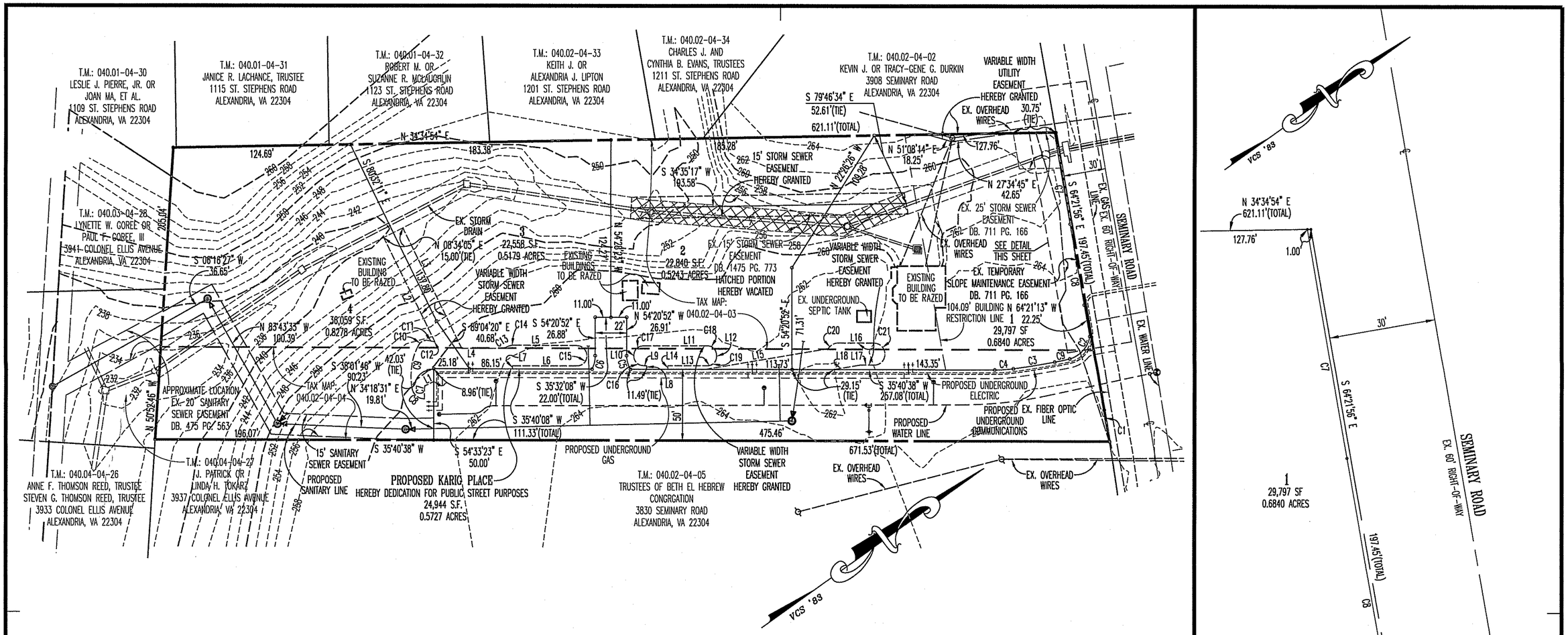

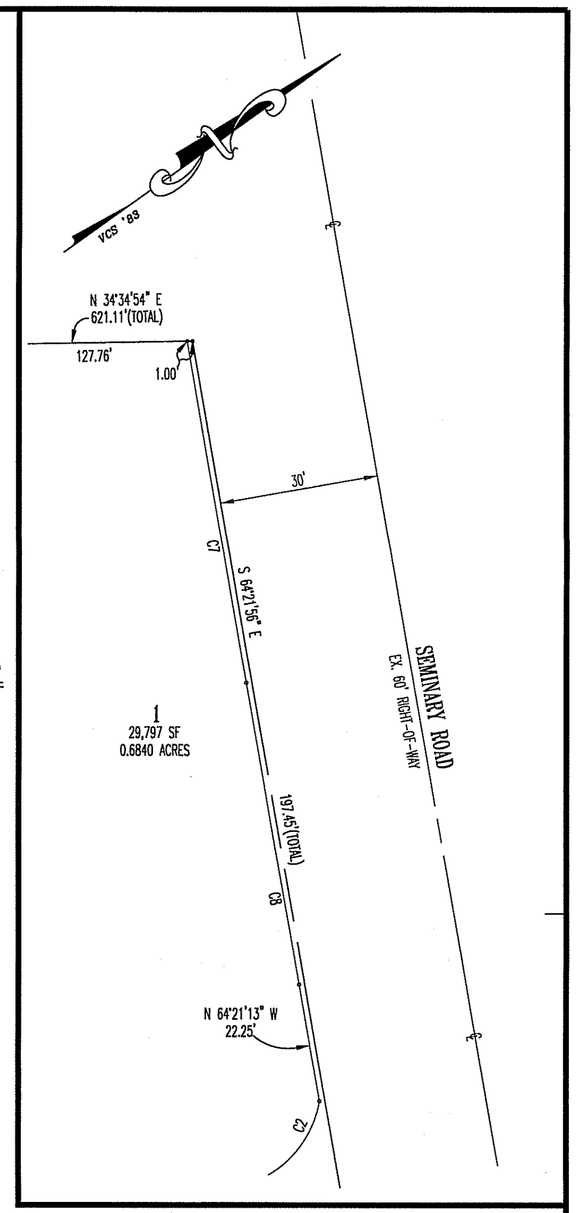

DETAIL

SCALE: 1" = 20'

CURVE TABLE FOR PROPERTY LINES

CURVE	RADIUS	DELTA	ARC LEN.	CHORD BEARING	CHORD LENGTH	TANGENT
C1	1970.00'	0°39'10"	22.44'	N 64°02'21" W	22.44'	11.22'
C2	19.01'	89°07'07"	29.57'	N 20°08'14" W	26.68'	18.72'
C3	502.95'	4°26'09"	38.94'	N 25°54'50" E	38.93'	19.48'
C4	100.00'	7°07'26"	12.43'	N 31°41'37" E	12.43'	6.22'
C5	19.00'	29°40'40"	9.84'	S 69°11'10" E	9.73'	5.03'
C6	19.00'	29°36'34"	9.82'	N 39°32'37" W	9.82'	5.02'
C7	9990.41'	00°22'25"	65.15'	N 64°20'16" W	65.15'	32.58'
C8	8030.92'	00°24'41"	57.66'	N 64°21'13" W	57.66'	28.83'
C9	151.64'	04°05'36"	10.83'	N 23°55'11" E	10.83'	5.42'

CURVE TABLE FOR STORM SEWER EASEMENTS

CURVE	ARC LENGTH	RADIUS	DELTA ANGLE	CHORD BEARING	CHORD LENGTH	TANGENT
C7	8.98'	173.00'	2°58'30"	S 53°15'39" E	8.98'	4.49'
C8	12.13'	8.81'	78°54'01"	N 75°05'25" E	11.20'	7.25'
C9	31.59'	45.52'	39°45'29"	S 45°34'50" E	30.96'	16.46'
C10	8.05'	6.35'	72°36'36"	S 10°42'33" W	7.52'	4.67'
C11	3.96'	347.06'	0°39'13"	N 46°41'14" E	3.96'	1.98'
C12	0.62'	4.35'	8°08'13"	S 50°25'44" W	0.62'	0.31'
C13	1.90'	17.80'	6°07'06"	S 05°11'48" W	1.90'	0.95'
C14	5.34'	11.06'	27°38'49"	S 22°04'46" W	5.29'	2.72'
C15	22.24'	7.10'	179°35'14"	N 54°16'50" W	14.19'	1970.74'
C16	10.37'	6.48'	91°43'57"	N 80°40'06" E	9.30'	6.68'
C17	10.34'	6.48'	91°27'57"	S 09°27'54" E	9.28'	6.65'
C18	10.40'	6.48'	91°59'58"	S 80°32'06" W	9.32'	6.71'
C19	10.37'	6.48'	91°43'57"	N 09°19'54" W	9.30'	6.68'
C20	8.14'	7.63'	61°09'27"	S 05°23'48" W	7.76'	4.51'
C21	24.13'	7.68'	180°00'55"	N 54°30'29" W	15.36'	57919.95'

LINE TABLE FOR STORM SEWER EASEMENTS

LINE	BEARING	DISTANCE
L1	S 09°26'50" W	7.14'
L2	S 80°33'10" E	81.36'
L3	N 80°33'10" W	94.04'
L4	S 35°39'08" W	30.12'
L5	S 35°54'11" W	44.22'
L6	N 35°38'10" E	45.39'
L7	S 54°20'52" E	2.15'
L8	S 54°22'20" E	2.51'
L9	N 35°40'06" E	2.32'
L10	N 54°19'54" W	0.62'
L11	S 35°24'06" W	44.98'
L12	N 54°19'54" W	0.83'
L13	N 35°40'06" E	27.66'
L14	S 54°22'20" E	2.51'
L15	S 26°02'44" W	87.45'
L16	N 35°39'08" E	25.51'
L17	S 35°39'08" W	10.01'
L18	S 26°02'54" W	19.06'

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CHAIRMAN, PLANNING COMMISSION _____ DATE _____

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INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO. _____

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COMMONWEALTH OF VIRGINIA
KEVIN P. O'CONNOR
Lic. No. 19677
10/5/2017
LAND SURVEYOR

PRELIMINARY SUBDIVISION PLAT

KARIG ESTATES

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1" = 50' DATE: FEBRUARY, 2017

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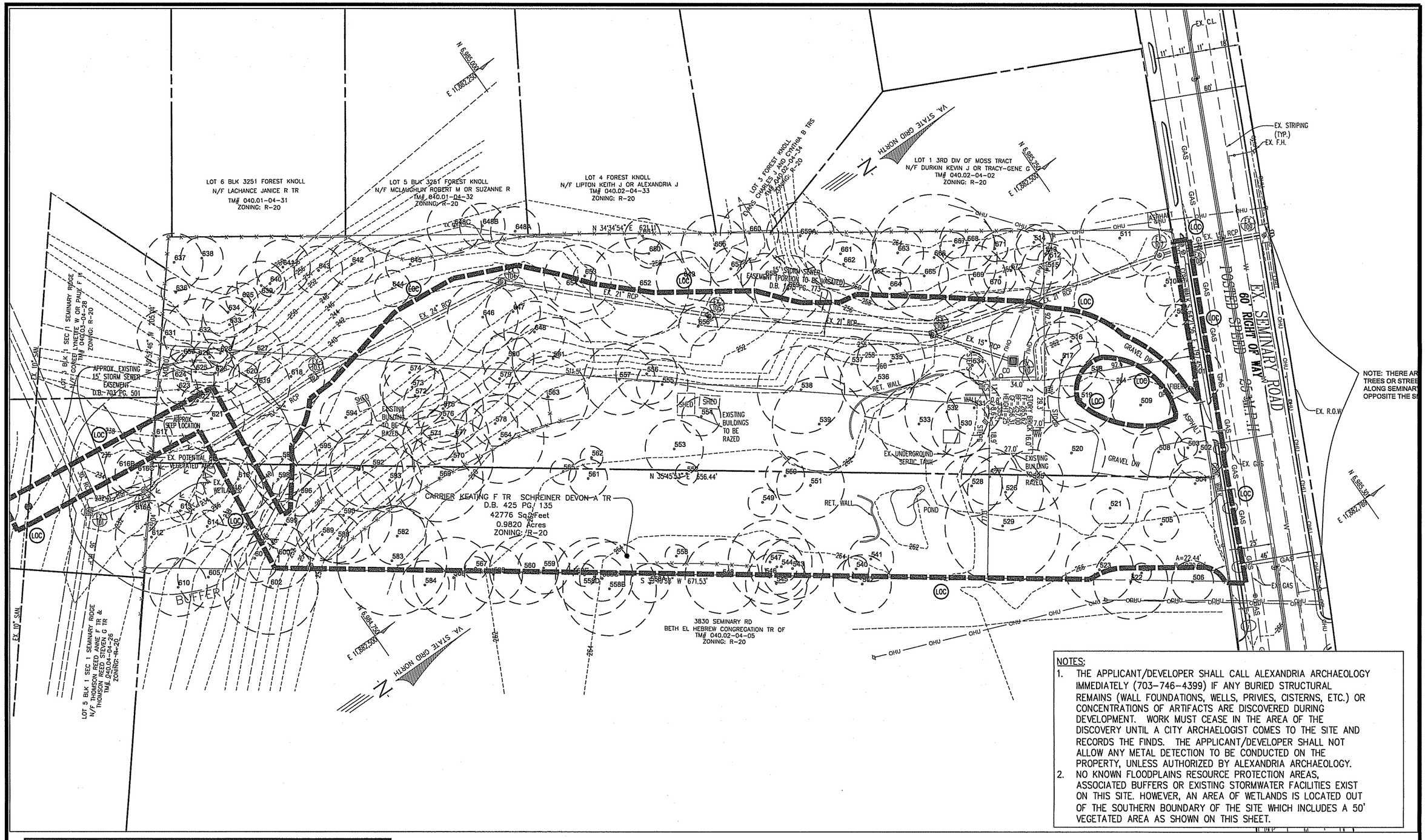

NOTES:

1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAELOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

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PRELIMINARY SUBDIVISION PLAT

KARIG ESTATES

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1" = 50' DATE: FEBRUARY, 2017

COMMONWEALTH OF VIRGINIA
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0 50 100 150

THIS PLAN PREPARED AND APPROVED BY
DOUGLAS BOWE, ISA CERTIFIED
ARBORIST # MA-5848A

LEGEND

EXISTING TREE
DRIP LINE
TRUNK LOCATION
505 TREE NUMBER

TREE INVENTORY & CONDITION ANALYSIS

TREE #	BOTANICAL NAME	COMMON NAME	SIZE	CRZ	POOR CONDITION?	STATUS	COMMENTS	CONDITION RATING
			DBH (in)	R (ft.)		(Remove or Preserve)		%
501	*Quercus phellos*	Willow Oak	27"	27'		Remove		75.00
502	*Acer rubrum*	Red Maple	16"	16'	Yes	Remove	Multi-stem; poor structure	31.25
503	*Quercus phellos*	Willow Oak	6"	6'		Remove		90.63
504	*Ilex opaca*	American Holly	16"	16'	Yes	Remove	Multi-stem; leaning	34.38
505	*Juniperus virginiana*	Eastern Red Cedar	11"	11'	Yes	Remove	English Ivy	37.50
506	*Pinus virginiana*	Virginia Pine	13"	13'		Preserve		46.88
507	*Ulmus americana*	American Elm	9"	9'		Preserve	Virginia Creeper, Wild Grape	53.13
508	*Cary glabra*	Pignut Hickory	16"	16'		Remove	Canopy dieback; codominant leaders	62.50
509	*Quercus alba*	White Oak	27"	27'		Preserve	Cable brace to tree 517	75.00
510	*Ulmus americana*	American Elm	17"	17'		Preserve	Codominant Leaders; Virginia Creeper	56.25
511	*Quercus rubra*	Northern Red Oak	30"	30'		Preserve	Codominant; English Ivy	62.50
512	*Quercus rubra*	Northern Red Oak	7"	7'		Preserve	Poison Ivy, English Ivy	56.25
513	*Cary glabra*	Pignut Hickory	19"	19'		Preserve	Hollow trunk; English Ivy, Virginia Creeper	65.63
514	*Quercus prinus*	Chestnut Oak	11"	11'		Preserve	Canopy dieback; English Ivy	59.38
515	*Ulmus americana*	American Elm	16"	16'		Preserve	Bent leader; English Ivy	56.25
516	*Quercus alba*	White Oak	18"	18'		Remove		78.13
517	*Quercus alba*	White Oak	29"	29'		Remove	Large limb removed; codominant leaders	56.25
518	*Quercus alba*	White Oak	24"	24'		Preserve	Canopy headed back	59.38
519	*Quercus alba*	White Oak	25"	25'		Preserve	Cable brace to tree 509; codominant leaders	59.38
520	*Quercus alba*	White Oak	21"	21'		Remove	Thin canopy	56.25
521	*Cary glabra*	Pignut Hickory	12"	12'		Remove		62.50
522	*Quercus alba*	White Oak	23"	23'		Preserve	Minor dieback	75.00
523	*Quercus alba*	White Oak	21"	21'		Remove		78.13
524	*Quercus alba*	White Oak	6"	6'		Preserve		62.50
525	*Quercus alba*	White Oak	19"	19'		Remove	Thin crown	59.38
526	*Quercus alba*	White Oak	27"	27'		Remove		84.38
527	*Quercus alba*	White Oak	20"	20'		Remove	Curved leaders	71.88
528	*Quercus alba*	White Oak	26"	26'		Remove	Codominant leaders	62.50
529	*Quercus alba*	White Oak	32"	32'		Remove	Codominant leaders; slight lean	78.13
530	*Quercus alba*	White Oak	18"	18'		Remove	Minor dieback	62.50
531	*Quercus alba*	White Oak	17"	17'		Remove	Codominant leaders	62.50
532	*Quercus alba*	White Oak	26"	26'		Remove		78.13
533	*Quercus alba*	White Oak	25"	25'	Yes	Remove	Cable brace; codominant; hazard	31.25
534	*Quercus alba*	White Oak	8"	8'		Remove	On hillside	75.00
535	*Quercus prinus*	Chestnut Oak	21"	21'		Remove	On hillside	71.88
536	*Quercus alba*	White Oak	23"	23'		Remove	English Ivy, Poison Ivy	59.38
537	*Quercus prinus*	Chestnut Oak	17"	17'		Remove	Curved leader; English Ivy	53.13
538	*Quercus rubra*	Northern Red Oak	27"	27'		Remove	Moderate dieback	62.50
539	*Quercus phellos*	Willow Oak	29"	29'		Remove	English Ivy, Poison Ivy	62.50
540	*Pinus virginiana*	Virginia Pine	8"	8'	Yes	Remove	English Ivy	37.50
541	*Magnolia grandiflora*	Southern Magnolia	14"	14'		Remove	Sapsucker damage	59.38
542	*Quercus alba*	White Oak	18"	18'		Preserve	English Ivy, Poison Ivy	65.63
543	*Quercus phellos*	Willow Oak	19"	19'		Remove		68.75
544	*Quercus phellos*	Willow Oak	10"	10'		Remove		68.75
545	*Quercus phellos*	Willow Oak	19"	19'		Preserve		71.88
546	*Quercus phellos*	Willow Oak	17"	17'		Remove		75.00
547	*Quercus palustris*	Pin Oak	26"	26'		Remove		78.13
548	*Prunus serotina*	Black Cherry	23"	23'		Remove	Moderate dieback, On property line needs neighbor's permission to remove	59.38
549	*Quercus shumardii*	Shumard Oak	9"	9'		Remove	Codominant leaders; 1 dying	56.25
550	*Quercus shumardii*	Shumard Oak	12"	12'		Remove	Codominant leader; leaning	59.38
551	*Quercus shumardii*	Shumard Oak	18"	18'		Remove	Leaning; Poison Ivy	62.50
552	*Liquidambar styraciflua*	Sweetgum	7"	7'		Remove	Trumpet Vine, Virginia Creeper, Wild Grape	59.38
553	*Morus rubra*	Red Mulberry	18"	18'		Remove	Multi-stem; English Ivy, Poison Ivy	40.63
554	*Ulmus americana*	American Elm	12"	12'		Remove	Codominant; Trumpet Vine	50.00
555	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Trumpet Vine	59.38
556	*Quercus prinus*	Chestnut Oak	19"	19'	Yes	Remove	Dead; English Ivy, Wild Grape	0.00
557	*Quercus alba*	White Oak	22"	22'	Yes	Remove	Dying; English Ivy, Wild Grape	21.88
558	*Liquidambar styraciflua*	Sweetgum	7"	7'	Yes	Remove	Dieback; Trumpet Vine, Wild Grape	15.63
558A	*Liquidambar styraciflua*	Sweetgum	12"	12'		Preserve		62.50
558B	*Quercus phellos*	Willow Oak	26"	26'		Preserve		81.25
558C	*Liquidambar styraciflua*	Sweetgum	14"	14'		Preserve	Grown into 558D	59.38
558D	*Quercus palustris*	Pin Oak	24"	24'		Preserve	Grown into 558C	62.50
558E	*Quercus marilandica*	Blackjack Oak	7"	7'		Preserve		75.00
559	*Quercus palustris*	Pin Oak	16"	16'	Yes	Remove	Major dieback	28.13
560	*Quercus palustris*	Pin Oak	29"	29'		Remove	Codominant leaders	75.00
561	*Ulmus americana*	American Elm	12"	12'		Remove	Minor dieback; Poison Ivy, Virginia Creeper	46.88
562	*Liquidambar styraciflua*	Sweetgum	7"	7'		Remove	Poison Ivy	50.00
563	*Quercus prinus*	Chestnut Oak	25"	25'		Remove	Hole in trunk; fence embedded	56.25
564	*Quercus prinus*	Chestnut Oak	40"	40'		Remove	Codominant; leaning; English Ivy	59.38
565	*Quercus phellos*	Willow Oak	8"	8'		Remove	English Ivy	68.75
566	*Liquidambar styraciflua*	Sweetgum	18"	18'		Preserve		62.50
567	*Quercus falcata*	Southern Red Oak	7"	7'	Yes	Remove	Dying	25.00
568	*Quercus marilandica*	Shumard Oak	25"	25'		Preserve		90.63
569	*Quercus prinus*	Chestnut Oak	35"	35'		Remove	Codominant; leaning	62.50
570	*Quercus prinus*	Chestnut Oak	25"	25'		Remove	Codominant; 1 much smaller than other	65.63
571	*Quercus prinus*	Chestnut Oak	17"	17'		Remove		71.88
572	*Quercus prinus*	Chestnut Oak	20"	20'	Yes	Remove	Dying; leaning	15.63
573	*Quercus prinus*	Chestnut Oak	20"	20'		Remove	Dieback; English Ivy, Wild Grape	59.38
574	*Quercus prinus*	Chestnut Oak	14"	14'		Remove	Dieback; English Ivy, Virginia Creeper	53.13
575	*Quercus prinus*	Chestnut Oak	25"	25'		Remove		65.63
576	*Quercus prinus*	Chestnut Oak	15"	15'		Remove		62.50
577	*Quercus prinus*	Chestnut Oak	21"	21'		Remove	Large open trunk wound	56.25
578	*Quercus prinus*	Chestnut Oak	14"	14'		Remove	Reaction wood growth in root flare	53.13
579	*Quercus prinus*	Chestnut Oak	10"	10'		Remove	Leaning; English Ivy	53.13
580	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Dieback; English Ivy	56.25
581	*Quercus prinus*	Chestnut Oak	34"	34'		Remove	Codominant; English Ivy	59.38
582	*Pinus virginiana*	Virginia Pine	18"	18'		Remove		53.13
583	*Quercus phellos*	Willow Oak	24"	24'		Remove	Minor Dieback	62.50
584	*Quercus rubra*	Northern Red Oak	15"	15'		Preserve	Lower branch dieback; English Ivy	59.38
585	*Quercus alba*	White Oak	15"	15'		Preserve	Minor dieback; English Ivy	56.25
588	*Quercus prinus*	Chestnut Oak	15"	15'		Remove	Reaction wood growth in root flare	53.13
589	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Curved trunk; split bark	56.25
590	*Quercus prinus*	Chestnut Oak	30"	30'	Yes	Remove	Codominant; 1 dead; open trunk wound	34.38
591	*Quercus prinus*	Chestnut Oak	24"	24'		Remove		68.75
592	*Quercus shumardii*	Shumard Oak	26"	26'		Remove		71.88
593	*Quercus prinus*	Chestnut Oak	20"	20'		Remove	Codominant leaders	62.50
594	*Quercus prinus*	Chestnut Oak	16"	16'	Yes	Remove	Major dieback; Poison Ivy	37.50
595	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Curved trunk	62.50
596	*Quercus prinus*	Chestnut Oak	13"	13'		Remove		68.75
597	*Quercus prinus*	Chestnut Oak	22"	22'		Preserve	Curved trunk	62.50
598	*Quercus shumardii*	Shumard Oak	14"	14'		Preserve	Open wound from dead stem	59.38
599	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Minor canopy dieback	62.50
600	*Quercus prinus*	Chestnut Oak	20"	20'		Remove	Moderate dieback	56.25
601	*Quercus prinus*	Chestnut Oak	15"	15'		Preserve	Minor dieback	65.63
602	*Quercus prinus*	Chestnut Oak	51"	51'		Preserve	Codominant	68.75
603	*Quercus prinus*	Chestnut Oak	12"	12'		Preserve	English Ivy, Wild Grape	59.38
604	*Quercus prinus*	Chestnut Oak	21"	21'		Preserve	Leaning; canopy dieback	50.00
605	*Quercus alba*	White Oak	19"	19'		Preserve		78.13
606	*Cary glabra*	Pignut Hickory	10"	10'		Preserve	Borer damage; leaf spot	46.88
607	*Quercus prinus*	Chestnut Oak	13"	13'		Preserve	Thin canopy	46.88
608	*Cary glabra*	Pignut Hickory	12"	12'		Preserve		59.38
609	*Quercus alba*	White Oak	26"	26'		Preserve	English Ivy, Poison Ivy	62.50
610	*Quercus alba*	White Oak	18"	18'		Preserve		65.63
612	*Quercus alba*	White Oak	36"	36'		Preserve	Codominant	75.00
613	*Quercus shumardii*	Shumard Oak	7"	7'		Preserve	On hillside	68.75
614	*Quercus prinus*	Chestnut Oak	10"	10'		Preserve	Bend in trunk	65.63
615	*Quercus alba*	White Oak	21"	21'		Remove	Wild Grape	71.88
616	*Quercus prinus*	Chestnut Oak	26"	26'		Remove		78.13
616A	*Acer rubrum*	Red Maple	15"	15'		Preserve	Leaning; codominant leaders	56.25
616B	*Liriodendron tulipifera*	Tulip Poplar	17"	17'		Remove		81.25
616C	*Liriodendron tulipifera*	Tulip Poplar	14"	14'		Preserve	Bend in leader	68.75
617	*Quercus alba*	White Oak	10"	10'		Remove		78.13
618	*Quercus prinus*	Chestnut Oak	25"	25'	Yes	Preserve	Dying; English Ivy, Poison Ivy	28.13
619	*Quercus prinus*	Chestnut Oak	25"	25'		Preserve	Moderate dieback	59.38
620	*Nyssa sylvatica*	Black Gum	8"	8'		Preserve		71.88

TREE INVENTORY & CONDITION ANALYSIS

TREE #	BOTANICAL NAME	COMMON NAME	SIZE	CRZ	POOR CONDITION?	STATUS	COMMENTS	CONDITION RATING
			DBH (in)	R (ft.)		(Remove or Preserve)		%
621	*Liriodendron tulipifera*	Tulip Poplar	33"	33'		Remove	Codominant; included bark	59.38
622	*Acer rubrum*	Red Maple	10"	10'		Remove	One-sided	56.25
623	*Acer rubrum*	Red Maple	12"	12'		Preserve	One-sided	53.13
624	*Quercus prinus*	Chestnut Oak	17"	17'	Yes	Remove	Leaning over; fall risk	34.38
625	*Quercus prinus*	Chestnut Oak	14"	14'		Preserve		62.50
626	*Quercus prinus*	Chestnut Oak	15"	15'		Preserve		59.38
627	*Acer rubrum*	Red Maple	13"	13'	Yes	Preserve	Codominant; opening through trunk	37.50
628	*Nyssa sylvatica*	Black Gum	8"	8'		Preserve	English Ivy	75.00
629	*Nyssa sylvatica*	Black Gum	11"	11'		Preserve	Codominant leaders	68.75
630	*Nyssa sylvatica*	Black Gum	8"	8'		Preserve	English Ivy	59.38
631	*Quercus prinus*	Chestnut Oak	17"	17'		Preserve	Bent leader	56.25
632	*Quercus alba*	White Oak	22"	22'		Preserve	English Ivy	53.13
633	*Quercus prinus*	Chestnut Oak	29"	29'	Yes	Preserve	Codominant; 1 dead; dying	15.63
634	*Quercus prinus*	Chestnut Oak	20"	20'	Yes	Preserve	Dying; English Ivy	18.75
635	*Quercus prinus*	Chestnut Oak	10"	10'	Yes	Preserve	Dying; English Ivy	12.50
636	*Quercus prinus*	Chestnut Oak	9"	9'		Preserve	English Ivy	46.88
637	*Quercus prinus*	Chestnut Oak	19"	19'	Yes	Preserve	Moderate dieback; English Ivy	34.38
638	*Quercus prinus*	Chestnut Oak	16"	16'		Preserve	English Ivy, Poison Ivy	50.00
638B	*Quercus prinus*	Chestnut Oak	25"	25'		Preserve	English Ivy	78.13
639	*Quercus prinus*	Chestnut Oak	25"	25'		Preserve	English Ivy, Wild Grape	62.50
640	*Quercus prinus*	Chestnut Oak	8"	8'		Preserve	English Ivy, Wild Grape	53.13
641	*Quercus prinus*	Chestnut Oak	17"	17'		Preserve	English Ivy, Wild Grape	59.38
642	*Quercus prinus*	Chestnut Oak	14"	14'		Preserve	Moderate dieback	59.38
643	*Quercus prinus*	Chestnut Oak	15"	15'		Preserve	Minor Dieback	62.50
644	*Cary glabra*	Pignut Hickory	10"	10'		Preserve	English Ivy	59.38
645	*Quercus falcata*	Southern Red Oak	17"	17'	Yes	Preserve	Dead	0.00
646	*Quercus prinus*	Chestnut Oak	22"	22'		Remove	English Ivy	71.88
647	*Quercus prinus*	Chestnut Oak	17"	17'		Remove	Leaning; English Ivy	59.38
648	*Quercus prinus*	Chestnut Oak	19"	19'		Remove	English Ivy, Wild Grape	65.63
648A	*Quercus alba*	White Oak	22"	22'		Preserve	Slight lean	75.00
648B	*Quercus prinus*	Chestnut Oak	14"	14'		Preserve		84.38
648C	*Quercus prinus*	Chestnut Oak	25"	25'		Preserve		81.25
649	*Acer rubrum*	Red Maple	17"	17'	Yes	Preserve	Codominant; English Ivy, Trumpet Vine	21.88
650	*Acer rubrum*	Red Maple	9"	9'		Preserve	English Ivy	62.50
651	*Nyssa sylvatica*	Black Gum	11"	11'		Preserve	English Ivy	53.13
652	*Quercus alba*	White Oak	35"	35'		Preserve	Moderate Dieback, English Ivy, Trumpet Vine	65.63
653	*Fagus grandifolia*	American Beech	7"	7'		Remove	English Ivy	65.63
654	*Quercus prinus*	Chestnut Oak	28"	28'	Yes	Preserve	Dying; codominant; Poison Ivy, English Ivy	18.75
655	*Quercus prinus*	Chestnut Oak	26"	26'	Yes	Preserve	Minor dieback, codominant leaders; English Ivy, Trumpet Vine	34.38
656	*Robinia pseudoacacia*	Black Locust	12"	12'	Yes	Remove	English Ivy	31.25
657	*Acer rubrum*	Red Maple	13"	13'	Yes	Preserve	Wound from previous existing stem; Trumpet Vine	28.13
658	*Liquidambar styraciflua*	Sweetgum	15"	15'		Preserve	Trumpet Vine	59.38
659	*Quercus prinus*	Chestnut Oak	21"	21'	Yes	Preserve	Dead	0.00
659A	*Acer rubrum*	Red Maple	21"	21'		Preserve	Codominant	62.50
660	*Quercus alba*	White Oak	18"	18'		Preserve	English Ivy, Virginia Creeper, Trumpet Vine	56.25
661	*Quercus alba*	White Oak	27"	27'		Preserve		87.50
662	*Quercus prinus*	Chestnut Oak	16"	16'		Preserve	English Ivy, Virginia Creeper	59.38
663	*Quercus prinus*	Chestnut Oak	16"	16'	Yes	Preserve	Dead; English Ivy, Wild Grape	0.00
664	*Quercus prinus*	Chestnut Oak	13"	13'	Yes	Preserve	Leaning due to Trumpet Vine	31.25
665	*Quercus prinus*	Chestnut Oak	15"	15'		Preserve		65.63
666	*Quercus prinus*	Chestnut Oak	39"	39'		Preserve	Multi-stem; English Ivy, Poison Ivy	56.25
667	*Quercus prinus*	Chestnut Oak	8"	8'		Preserve	English Ivy, Poison Ivy	59.38
668	*Quercus alba*	White Oak	17"	17'	Yes	Preserve	Dead	0.00
669	*Quercus alba*	White Oak	21"	21'		Preserve	Virginia Creeper	75.00
670	*Quercus prinus*	Chestnut Oak	10"	10'		Preserve	Poison Ivy	74.88
671	*Quercus alba*	White Oak	8"	8'	Yes	Preserve	Leader missing; English Ivy, Poison Ivy	28.13
672	*Quercus alba*	White Oak	26"	26'		Preserve	Trunk wound; English Ivy, Poison Ivy	56.25

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR _____ DATE _____

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. _____

DIRECTOR _____ DATE _____

CHAIRMAN, PLANNING COMMISSION _____ DATE _____

DATE RECORDED _____

INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO. _____

COMMONWEALTH OF VIRGINIA
KEVIN P. O'CONNOR
Lic. No. 19677
10/5/2017
LAND SURVEYOR

PRELIMINARY SUBDIVISION PLAT

KARIG ESTATES

CITY OF ALEXANDRIA, VIRGINIA

SCALE: N/A DATE: FEBRUARY, 2017

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Tel. 703.642.2306
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R.P.# 2017-07

Site Plan from October 2017
Planning Commission
hearing

DSP - PRELIMINARY SITE PLAN
KARIG ESTATES
CITY OF ALEXANDRIA

JULY, 2017

APPLICANT / DEVELOPER

3834 SEMINARY, LLC
20072 BLACKWOLF RUN PLACE
ASHBURN, VA 20147
CONTACT: MIKE IBRAHIM
PHONE: 703-395-0101

ARCHITECT:

ORLING ARCHITECTURE
1215 CAMERON ST
ALEXANDRIA, VA 22314
CONTACT: SCOTT FLEMING
PHONE: 703-836-3205

SITE INFO

3834 SEMINARY ROAD
TAX MAP # 040.02-04-03
PARCEL # 040.02-04-03
93,423 SF. OR 2.1447 AC

3832 SEMINARY ROAD
TAX MAP # 040.02-04-04
PARCEL # 040.02-04-04
42,776 SF. OR 0.9820 AC

CIVIL ENGINEER

URBAN, LTD.
4200 D TECHNOLOGY CT.
CHANTILLY, VA. 20151
CONTACT: CLAYTON TOCK
PHONE: 703-692-2306

OWNER:

CARRIER KEATING F TR
SCHREINER DEVON A TR
9126 TAYLOR ST.
MANASSAS, VA 20110

ATTORNEY:

HART, GIBBS, PIERCE & KARP
700 N. FAIRFAX STREET SUITE 600
ALEXANDRIA, VA 22314
CONTACT: MARY CATHERINE GIBBS
PHONE: 703-836-5757

ZONING REQUIREMENTS

1) ZONING	R-20		
2) EXISTING USE	RESIDENTIAL (SINGLE FAMILY)		
3) PROPOSED USE	RESIDENTIAL (SINGLE FAMILY)		
4) TOTAL SITE AREA	136,198 (SQ. FT.) OR 3.13 ACRES		
5) TOTAL DISTURBED AREA	98,652 (SQ. FT.) OR 2.26 ACRES		
6) REQUIRED LOT AREA	20,000 (MIN)		(SQ. FT.)
7) PROVIDED LOT AREA	VARIES (SEE TABS ON THIS SHEET)		(SQ. FT.)
8) AVERAGE LOT AREA	27,814		(SQ. FT.)
9) MIN. LOT AREA	20,000		(SQ. FT.)
10) ALLOWABLE DENSITY	N/A		(D.U./AC.)
11) PROVIDED DENSITY	1.3		(D.U./AC.)
12) GROSS FLOOR AREA	24,904		(SQ. FT.)
13) NET FLOOR AREA	23,660		(SQ. FT.)
14) MAXIMUM FAR	0.25		
15) PROPOSED FAR	SEE TABLE, THIS SHEET		
16) MINIMUM FRONT YARD SETBACK	40.00 (FT.)	PROVIDED SEE TABLE, THIS SHEET	(FT.)
17) MINIMUM REAR YARD SETBACK	35.00 (FT.)	PROVIDED SEE TABLE, THIS SHEET	(FT.)
18) MINIMUM SIDE YARD SETBACK	17.50 (FT.)	PROVIDED SEE TABLE, THIS SHEET	(FT.)
19) MAX. BUILDING HEIGHT	35		(FT.)
20) PROP. BUILDING HEIGHT	33.4		(FT.)
21) NUMBER OF FLOORS	2 + BASEMENT		(Commercial/Industrial ONLY)
22) NUMBER OF UNITS	4		
UNIT TYPES	SINGLE FAMILY		
23) LOT FRONTAGE REQUIRED	75' MIN (55' MIN FOR CURVILINEAR STREETS)		
24) LOT FRONTAGE PROVIDED			
LOT 1	SEE TABLE, THIS SHEET		
	SEE TABLE, THIS SHEET		
LOT 2	SEE TABLE, THIS SHEET		
LOT 3	SEE TABLE, THIS SHEET		
LOT 4	SEE TABLE, THIS SHEET		
25) OPEN SPACE REQUIRED	N/A	% N/A	
26) OPEN SPACE PROVIDED	SEE SHEET #10	% SEE SHEET #10	(SQ. FT.)
27) GROUND LEVEL OPEN SPACE REQ'D	N/A	% N/A	(SQ. FT.)
28) GROUND LEVEL OPEN SPACE PROV.	SEE SHEET #10	% SEE SHEET #10	(SQ. FT.)
29) ROOF-TOP OPEN SPACE REQ'D	N/A	% N/A	(SQ. FT.)
30) ROOF-TOP OPEN SPACE PROV.	0	% 0	(SQ. FT.)
31) AVG. BLDG. FINISHED GRADE	SEE SHEET #29 FOR DETAIL		(FT.) (SQ. FT.)
LOT 1	262.66		
LOT 2	260.93		
LOT 3	257.24		
LOT 4	251.57		
32) REQUIRED PARKING	8		
33) PROPOSED PARKING	12 GARAGE		
34) REQUIRED STANDARD PARKING	8		
35) PROPOSED STANDARD PARKING	12		
36) PROPOSED SURFACE PARKING (ADD'L)	8		
37) REQUIRED COMPACT PARKING	0		
38) PROPOSED COMPACT PARKING	0		
39) REQUIRED HANDICAPPED PARKING	0		
40) PROPOSED HANDICAPPED PARKING	0		
41) REQUIRED LOADING SPACES	0		
42) PROPOSED LOADING SPACES	0		
43) EXISTING TRIP GENERATION	10 PER DAY		
44) PROPOSED TRIP GENERATION	54 PER DAY		
45) EXISTING IMPERVIOUS AREA	6.39	% 8,712 (SQ. FT.) OR 0.20 ACRES	
46) PROPOSED IMPERVIOUS AREA	27.80	% 37,897(SQ. FT.) OR 0.87 ACRES	

BUILDING CODE ANALYSIS*	
USE GROUP:	R-5
NUMBER OF STORIES:	2 + BASEMENT
TYPE OF CONSTRUCTION:	IRC WITH VAUSBC AMENDMENT
FIRE PROTECTION PLAN:	N/A

*SEE SHEET 06 FOR ADDITIONAL BUILDING DATA

VICINITY MAP
SCALE: 1"=500'

Sheet List Table			
Sheet Number	Sheet Title	21F	POST-DEVELOPMENT SWM
01	COVER SHEET	22	SWM NARRATIVE
02	GENERAL NOTES	23	OUTFALL ANALYSIS
03	GENERAL NOTES	24	PEDESTRIAN CIRCULATION
04	CONTEXTUAL PLAN	25	AUTOTURN EXHIBIT
05	EXISTING CONDITIONS	26	AUTOTURN EXHIBIT
06	GEOMETRY PLAN	27	SIGHT DISTANCE
06A	GIS DIMENSION PLAN	28	FIRE SERVICE PLAN
06B	UTILITY PLAN	29	AVERAGE GRADE EXHIBIT
07	GRADING PLAN	30	AVERAGE SETBACK EXHIBIT
08	OVERLAND RELIEF	31	TREE INVENTORY PLAN
09	EXISTING OPEN SPACE PLAN	32	TREE CONDITION ANALYSIS
10	PROPOSED OPEN SPACE PLAN	33	TREE SAVE PLAN
11	BMP PLAN & NARRATIVE	34	LANDSCAPE PLAN
12	BMP COMPUTATIONS	35	LANDSCAPE PLAN
13	BMP COMPUTATIONS	36	LANDSCAPE PLAN
14	BMP COMPUTATIONS	37	PLAT
14A	BMP COMPUTATIONS	38	PLAT
15	BMP DETAILS	39	CORRESPONDENCE
16	BMP DETAILS	40	GEOTECHNICAL RECOMMENDATIONS
17	BMP DETAILS	41	GEOTECHNICAL RECOMMENDATIONS
17A	BMP DETAILS	42	GEOTECHNICAL RECOMMENDATIONS
18	BMP CONSTRUCTION & MAINTENANCE	43	GEOTECHNICAL RECOMMENDATIONS
18A	BMP DETAILS	44	GEOTECHNICAL RECOMMENDATIONS
19	PRE-DEVELOPMENT DIVIDES	A1.1	FLOOR PLANS - ROOF PLANS
20	POST-DEVELOPMENT DIVIDES	A1.2	FLOOR PLANS - ROOF PLANS
21	POST-DEVELOPMENT SWM	A2.1	EXTERIOR ELEVATIONS
21A	POST-DEVELOPMENT SWM	A2.2	EXTERIOR ELEVATIONS
21B	POST-DEVELOPMENT SWM	A2.3	EXTERIOR ELEVATIONS
21C	POST-DEVELOPMENT SWM	A2.4	EXTERIOR ELEVATIONS
21D	POST-DEVELOPMENT SWM	A3.1	BUILDING SECTIONS
21E	POST-DEVELOPMENT SWM	A3.2	BUILDING SECTIONS

PROJECT NARRATIVE:

THE EXISTING SITE CONSISTS OF TWO PARCELS WHICH A TOTAL AREA OF 3.13 ACRES AND IS ZONED FOR R-20 USE. THE APPLICANT PROPOSES TO SUBDIVIDE THE SITE INTO FOUR LOTS, EACH WITH ONE SINGLE-FAMILY HOME.

APPLICATIONS REQUESTED WITH THIS SUBMISSION

- APPLICATION FOR SUBDIVISION.
- APPLICATION FOR A SITE PLAN.
- APPLICATION FOR NAMING A PUBLIC STREET.

MODIFICATIONS REQUESTED WITH THIS SUBMISSION:

-NONE

EXISTING SPECIAL USE PERMITS THAT APPLY TO THE SUBJECT SITE:

-NONE

PROPOSED SETBACK NARRATIVE

THE APPLICANT PROPOSES TO PROVIDE A 104' SETBACK FROM SEMINARY ROAD, 40' SETBACKS FROM THE NEW PUBLIC ROAD, A 40' SETBACK FROM THE END OF THE NEW PUBLIC ROAD AND 17.5' SETBACKS ON THE SIDE YARDS.

	Lot Area		Proposed Houses					Permitted			
Lot	SF	AC	# of Floors (w/o basement)	Gross Floor Area	Net Floor Area *	FAR	Bldg Ht	Gross Floor Area	Net Floor Area	FAR	Bldg Ht
1	29,797	0.68	2	6,508	6,197	0.21	35'	N/A	7,487	0.25	35.0'
2	22,840	0.52	2	5,944	5,633	0.25	35'	N/A	5,710	0.25	35.0'
3	22,558	0.52	2	5,944	5,633	0.25	35'	N/A	5,640	0.25	35.0'
4	36,059	0.83	2	6,508	6,197	0.17	35'	N/A	9,015	0.25	35.0'
Total	111,254	2.55	N/A	24,904	23,660	0.25	N/A	N/A	27,852	0.25	35.0'

* SEE ARCHITECTURAL DRAWING FOR ADDITIONAL INFORMATION REGARDING NET FLOOR AREA

SHEET
01

LOT INFORMATION

LOT	LOT SIZE REQUIRED	LOT SIZE PROPOSED	FRONT SETBACK REQUIRED	FRONT SETBACK PROPOSED	SIDE SETBACK REQUIRED	SIDE SETBACK PROPOSED	REAR SETBACK REQUIRED	REAR SETBACK PROPOSED	LOT WIDTH REQUIRED	LOT WIDTH PROPOSED	LOT WIDTH MODIFICATION	LOT FRONTAGE REQUIRED	LOT FRONTAGE PROPOSED
1	20,000 SF	29,797 SF	40.0'	40.0'	S: 17.5'	S: 17.5'	N/A	N/A	80'	W: 104.0' E: 109.9'	N/A	80'	109.9'
2	20,000 SF	22,840 SF	40.0'	40.0'	S: 17.5'	S: 17.5'	35.0'	59.0'	80'	109.9'	N/A	80'	113.9'
3	20,000 SF	22,558 SF	40.0'	40.0'	S: 17.5' S: 17.5'	S: 17.5' S: 17.5'	35.0'	59.0'	80'	130.0'	N/A	80'	130.0'
4	20,000 SF	36,059 SF	40.0'	40.0'	S: 17.5' S: 17.5'	S: 17.5' S: 17.5'	35.0'	R: 59.0' R: 104.0'	80'	134.0'	N/A	80'	134.0'

BUILD TO LINE. SEE SHEET 30 FOR DETAILS.

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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 036790
PROFESSIONAL ENGINEER

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-17-17
08-01-17
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APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

Urban, Ltd. - k:\JOBS\Seminary Road\Preliminary Site Plan\12811-01-COVER.dwg [COVER (1)] August 01, 2017 - 10:54am intern002

GENERAL NOTES

1. THE SUBJECT SITE IS LOCATED ON CITY OF ALEXANDRIA ASSESSMENT MAP NO. 040.02-04-03 AND 040.02-04-04, AND IS ZONED R-20.
2. OWNER: CARRIER KEATING F TR & SCHREINER DEVON A TR
3. ADDRESS: 9126 TAYLOR ST. MANASSAS, VA 20110.
4. AREA TABULATION: REFER TO SHEET 01.
5. THE NATURAL SOILS AT THE SITE CONSIST OF KINGSTOWNE-SASSAFRAS MARUMSCO COMPLEX, KINGSTOWNE-SASSAFRAS NEABSCO COMPLEX AND URBAN LAND
6. THE SITE IS LOCATED IN THE STRAWBERRY RUN WATERSHED.
7. CONSTRUCTION PERMITS ARE REQUIRED FOR THIS PROJECT. THE APPROVED SITE PLAN MUST BE ATTACHED TO THE PERMIT APPLICATION THAT FULLY DETAILS THE CONSTRUCTION AS WELL AS LAYOUTS AND SCHEMATICS OF THE MECHANICAL, ELECTRICAL, AND PLUMBING SYSTEMS.
8. ALL PUBLIC AND PRIVATE EASEMENTS OR ALL KNOWN PUBLIC AND PRIVATE EASEMENTS, INCLUDING ALL UTILITY, EGRESS, AND CONSERVATION RESTRICTIONS ARE SHOWN. THE APPLICANT SHALL NOT CONSTRUCT ANY PERMANENT STRUCTURES OVER ANY EXISTING OR PROPOSED PUBLIC AND/OR PRIVATE EASEMENTS UNLESS OTHERWISE APPROVED BY THE PLANNING COMMISSION AND CITY OF ALEXANDRIA COUNCIL.
9. PLAT SUBJECT TO RESTRICTIONS OF RECORD.
10. BUILDING HEIGHT SHALL NOT EXCEED THE ALLOWABLE LIMIT BY CITY OF ALEXANDRIA ZONING ORDINANCE OR AS APPROVED BY THE PLANNING COMMISSION AND CITY OF ALEXANDRIA COUNCIL.
11. ALL NEW CONSTRUCTION SHALL CONFORM TO THE CURRENT STANDARDS AND SPECIFICATIONS OF THE CITY OF ALEXANDRIA AND TO THE VIRGINIA UNIFORM STATEWIDE BUILDING CODE (USBC).
12. FLOOR AREA CALCULATIONS WITH ALLOWABLE LIMITS, AS APPROVED BY PLANNING COMMISSION AND CITY COUNCIL, ARE DEMONSTRATED HEREIN.
13. PRIOR TO COMMENCING NEW WORK, THE CONTRACTOR SHALL PROTECT FROM DAMAGE ALL EXISTING ADJACENT AREAS. IF CITY'S EXISTING PUBLIC INFRASTRUCTURE, INCLUDING BUT NOT LIMITED TO, STREETS, ALLEYWAYS, DRIVEWAY APRONS, SANITARY AND STORM SEWERS, STREET LIGHTING, TRAFFIC AND PEDESTRIAN SIGNALS, SIDEWALKS, CURB AND GUTTER, AND STORM WATER DROP INLET STRUCTURES ARE DAMAGED BY THE CONTRACTOR OR BY ACTIVITIES RELATING TO THE SITE CONSTRUCTION THEN THE APPLICANT SHALL REPAIR THE SAME TO THE SATISFACTION OF DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES (T&ES). A PRE-CONSTRUCTION WALK/SURVEY OF THE SITE SHALL OCCUR WITH CONSTRUCTION AND INSPECTION STAFF TO DOCUMENT EXISTING CONDITIONS PRIOR TO ANY LAND DISTURBING ACTIVITY.
14. ALL IMPROVEMENTS TO THE CITY'S RIGHT-OF-WAY SUCH AS CURB, GUTTER, SIDEWALK, AND DRIVEWAY APRONS, ETC., ARE DESIGNED PER THE CITY OF ALEXANDRIA STANDARDS AND SPECIFICATIONS.
15. ALL STREET CUT AND PATCH WORK LOCATED IN PUBLIC RIGHT-OF-WAYS, REQUIRED FOR ANY UTILITY INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH THE CITY OF ALEXANDRIA STANDARDS AND SPECIFICATIONS AND TO THE SATISFACTION OF THE DIRECTOR OF TRANSPORTATION AND ENVIRONMENTAL SERVICES (T&ES).
16. CONTRACTOR MUST ENSURE THAT THERE IS NO DISTURBANCE ON ADJACENT PROPERTIES WITHOUT RECORDED EASEMENT OR NOTARIZED LETTER OF PERMISSION FROM THE ADJACENT PROPERTY OWNERS.
17. ALL REQUIRED STATE AND FEDERAL PERMITS, WHICH COULD INCLUDE PERMITS FROM THE VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION (VDCRI, VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY (VDEQ), VIRGINIA DEPARTMENT OF HISTORIC RESOURCES (VDHR), UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA), ARMY CORPS OF ENGINEERS AND VIRGINIA MARINE RESOURCES, MUST BE IN PLACE FOR ALL PROJECT CONSTRUCTION AND MITIGATION WORK PRIOR TO RELEASE OF THE FINAL SITE PLAN. THIS INCLUDES THE STATE REQUIREMENT FOR A VIRGINIA STORMWATER MANAGEMENT PROGRAM (VSMP) GENERAL PERMIT FOR DISCHARGES OF STORMWATER FROM CONSTRUCTION ACTIVITIES FOR LAND DISTURBING ACTIVITIES GREATER THAN 2,500. INFORMATION REGARDING THE VSMP GENERAL PERMIT CAN BE FOUND ONLINE AT: http://www.dcr.virginia.gov/soil_and_water/vsmp.shtml.
18. THIS SITE CONTAINS NO BUILDINGS LISTED ON THE ALEXANDRIA LIST OF 100-YR-OLD BUILDINGS.
19. PERMITS FROM THE CITY OF ALEXANDRIA OFFICE OF ENVIRONMENTAL QUALITY (OEQ), TRANSPORTATION AND ENVIRONMENTAL SERVICES (T&ES), AND BUILDING AND FIRE CODE ADMINISTRATION SHALL BE OBTAINED BY THE APPLICANT, AS REQUIRED AND DOCUMENTED HEREIN. THE CONTRACTOR CAN CONTACT ALEXANDRIA FIRE AND CODE ADMINISTRATION DEPARTMENT AT (703) 838-4644 OR (703) 746-4200 FOR ANY QUESTIONS OR ADDITIONAL INFORMATION.
20. ANY WORK IN THE PUBLIC RIGHT OF WAY SHALL REQUIRE A SEPARATE PERMIT FROM THE DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES. THE CONTRACTOR CAN CONTACT THE DEPARTMENT OF TRANSPORTATION AND ENVIRONMENTAL SERVICES AT (703) 746-4035 FOR ANY QUESTIONS OR ADDITIONAL INFORMATION.
21. THE PROPERTY ADDRESS MUST BE CLEARLY MARKED IN THE FRONT AND BACK OF THE PROPOSED DEVELOPMENT SITE DURING CONSTRUCTION FOR EMERGENCY RESPONSE PURPOSES IN CONTRASTING COLORS FOR EASY IDENTIFICATION.
22. THE APPLICANT SHALL CONTACT THE CRIME PREVENTION UNIT OF THE ALEXANDRIA POLICE DEPARTMENT AT 703-746-1920 REGARDING SECURITY HARDWARE FOR NEW CONSTRUCTION. THIS SHALL BE COMPLETED PRIOR TO ISSUANCE OF BUILDING PERMIT.
23. ROOF DRAINAGE SYSTEM, SUMP PUMP DISCHARGE, AND FOUNDATION DRAIN SYSTEM MUST BE INSTALLED SO AS NEITHER TO ADVERSELY IMPACT UPON, NOR CAUSE EROSION DAMAGE TO ADJACENT PROPERTIES OR THE PUBLIC RIGHT-OF-WAY.
24. THE CONTRACTOR MUST ENSURE THAT POSITIVE DRAINAGE OCCURS ON SITE TO PREVENT PONDING OR DRAINAGE PROBLEMS ON ADJACENT PROPERTIES.
25. IN THE EVENT, THE PROPOSED ROOF DRAINAGE AND/OR SUMP PUMP DISCHARGE, AND FOUNDATION DRAIN SYSTEMS AND/OR GRADING ADVERSELY IMPACTS AND/OR CREATES A NUISANCE ON PUBLIC RIGHT-OF-WAY OR PRIVATE PROPERTIES THEN THE APPLICANT SHALL BE RESPONSIBLE TO PROVIDE ADDITIONAL IMPROVEMENTS TO THE ROOF DRAINAGE AND/OR SUMP PUMP DISCHARGE AND FOUNDATION DRAIN SYSTEMS AND/OR GRADING TO THE SATISFACTION OF DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES.
26. PER THE REQUIREMENTS OF SECTION 8-1-12 OF THE CITY CHARTER AND CODE; WHEN THE BUILDING FOOTING HAS BEEN PLACED AND THE WALLS HAVE BEEN RAISED TO THE FIRST JOIST BEARING OR STORY HEIGHT ABOVE GRADE, A PLOT PLAN SHOWING THE EXACT LOCATION OF THE WALLS SHALL BE PREPARED BY A LICENSED, CERTIFIED PUBLIC LAND SURVEYOR OR PROFESSIONAL ENGINEER AND FILED WITH THE BUILDING OFFICIAL FOR APPROVAL BEFORE PROCEEDING FURTHER WITH THE CONSTRUCTION.
27. A SEPARATE DESIGN IS REQUIRED FOR ALL WALLS 24" AND OVER IN HEIGHT FROM THE GRADE AND SUBJECT TO SEPARATE PERMITS TO BE OBTAINED BY THE OWNERS. GEOTECHNICAL AND STRUCTURAL DESIGN IS TO BE COMPLETED BY OTHERS. THIS FINAL SITE PLAN SHOWS LOCATION, PROPOSED GRADING, AND DESIGN OF ALL THE WALLS.
28. SUBMIT A SURVEY, CONSISTENT WITH THE REQUIREMENTS FOR CERTIFICATE OF OCCUPANCY CHECKLIST, TO THE DEPARTMENT OF TRANSPORTATION AND ENVIRONMENTAL SERVICES PRIOR TO REQUESTING AN INSPECTION FOR A CERTIFICATE OF OCCUPANCY.
29. ALL SANITARY LATERALS AND/OR SEWERS NOT SHOWN IN THE EASEMENTS SHALL BE OWNED AND MAINTAINED PRIVATELY.
30. ALL STORM DRAINS NOT SHOWN WITHIN AN EASEMENT OR IN A PUBLIC RIGHT-OF-WAY SHALL BE OWNED AND MAINTAINED PRIVATELY.
31. ALL WATER FACILITY CONSTRUCTIONS SHALL CONFORM TO VIRGINIA AMERICAN WATER (VAW) STANDARDS AND SPECIFICATIONS. NO WORK CAN BE COMPLETED ON EXISTING AND PROPOSED WATER FACILITIES UNTIL ALL EASEMENTS AND AGREEMENTS WITH VAW ARE FINALIZED, EXECUTED AND RECORDED. DEVELOPER OR CONTRACTOR SHALL CONTACT VAW AT 703-706-3889 TO OBTAIN AN APPROVED PROPOSAL AND PAY ALL REQUIRED FEES, PRIOR TO THE START OF CONSTRUCTION, DEMOLITION AND INSPECTION OF WATER FACILITIES, INCLUDING, BUT NOT LIMITED TO, WATER MAINS, FIRE HYDRANTS, DOMESTIC AND FIRE SERVICE LINES. ALL THE PROPOSED WET TAPS ON AN EXISTING WATER MAIN SHALL BE CONSTRUCTED BY VAW.
32. THE SIDEWALKS SHALL REMAIN OPENED DURING CONSTRUCTION OR PEDESTRIAN ACCESS SHALL BE MAINTAINED TO THE SATISFACTION OF THE DIRECTOR OF TRANSPORTATION AND ENVIRONMENTAL SERVICES THROUGHOUT THE CONSTRUCTION OF THE PROJECT.
33. PRIOR TO THE RELEASE OF THE FINAL SITE PLAN, A TRAFFIC CONTROL PLAN FOR CONSTRUCTION DETAILING PROPOSED CONTROLS TO TRAFFIC MOVEMENT, LANE CLOSURES, CONSTRUCTION ENTRANCES, HAUL ROUTES, AND STORAGE AND STAGING SHALL BE PROVIDED FOR INFORMATION PURPOSES; HOWEVER, AN AMENDED TRAFFIC CONTROL PLAN, IF REQUIRED BY THE DIRECTOR OF TRANSPORTATION AND ENVIRONMENTAL SERVICES SHALL BE SUBMITTED TO THE DIRECTOR OF TRANSPORTATION AND ENVIRONMENTAL SERVICES ALONG WITH THE BUILDING PERMIT APPLICATION. THE FINAL SITE PLAN SHALL INCLUDE A STATEMENT "FOR INFORMATION ONLY" ON THE TRAFFIC CONTROL PLAN SHEETS.
34. A CERTIFICATE OF OCCUPANCY SHALL BE OBTAINED PRIOR TO ANY OCCUPANCY OF THE BUILDING OR PORTION THEREOF, IN ACCORDANCE WITH VIRGINIA USBC 115.0.
35. THIS SITE IS NOT LOCATED WITHIN A COMBINED SEWER AREA.
36. THIS SITE IS NOT LOCATED WITHIN 1000 FEET OF A FORMAL LANDFILL, DUMP, OR WASTE DISPOSAL AREA NOR ONE WITH THE POTENTIAL OF GENERATING COMBUSTIBLE GASES.
37. THE APPLICANT SHALL BE RESPONSIBLE TO DELIVER THE SOLID WASTE, AS DEFINED BY THE CITY CHARTER AND CODE OF THE CITY OF ALEXANDRIA TO THE CONVANTA ENERGY WASTE FACILITY LOCATED AT 5301 EISENHOWER AVENUE. THE DEVELOPER FURTHER AGREES TO STIPULATE IN ANY FUTURE LEASE OR PROPERTY SALES AGREEMENT THAT ALL TENANTS AND/OR PROPERTY OWNERS SHALL ALSO COMPLY WITH THIS REQUIREMENT.
38. THE SITE CONTAINS EXISTING STORM SEWER, SANITARY SEWER, WATERLINES, AND GAS. THE SUBJECT PLAN PROPOSES ADDITION OF STORM SEWER, SANITARY SEWER AND WATERLINES CONNECTIONS. FIRE HYDRANTS SHALL REMAIN IN-SERVICE AND UNOBSTRUCTED DURING CONSTRUCTION.
39. PROPOSED LIGHTS SHALL BE PROVIDED AS APPROVED BY DOMINION POWER TO ACCOMMODATE THE CITY OF ALEXANDRIA'S REQUIRED MINIMUM LIGHTING LEVELS. THERE ARE NO EXISTING LIGHTS ON SEMINARY ROAD DIRECTLY ADJACENT TO THE SITE.
40. THERE ARE NO GAS LINES PROPOSED AT THIS TIME.
41. THERE ARE NO TRANSFORMERS OR ABOVE GROUND UTILITY PEDESTALS PROPOSED AT THIS TIME.
42. ANY FUTURE UTILITIES WILL BE COORDINATED BY INDIVIDUAL SERVICE PROVIDERS APPROVED BY THE CITY OF ALEXANDRIA TO ENSURE NO CONFLICTS WITH EXISTING AND PROPOSED UTILITIES.
43. SHOWN LINES FOR PARKING SPACES ARE FOR INFORMATIONAL PURPOSES ONLY.

EXISTING CONDITIONS SURVEY NOTES

1. HORIZONTAL DATUM* NORTH AMERICAN DATUM OF 1983, NAD83
VERTICAL DATUM* NORTH AMERICAN VERTICAL DATUM OF 1988, NAVD88*
2. UTILITY INFORMATION, AS SHOWN ON THIS PLAN, IS TAKEN FROM THE RECORDS AND/OR FIELD SURVEY COMPLETED BY URBAN LTD., DATED 05/10/2012; AND CANNOT BE GUARANTEED. FOR EXACT LOCATIONS OF EXISTING UNDERGROUND UTILITIES, NOTIFY "MISS UTILITY" AT 1-800-257-7777 AND 811 72 HOURS BEFORE THE START OF ANY EXCAVATION OR CONSTRUCTION. THE CONSTRUCTION WORKERS AND CONTRACTOR(S) ARE ENCOURAGED TO VISIT DOMINION VIRGINIA POWER WEB SITE AT WWW.DOM.COM (KEYWORD SAFETY) FOR ADDITIONAL SAFETY INSTRUCTIONS.
3. LOCATION AND DEPTH OF ALL EXISTING UNDERGROUND UTILITIES TO BE VERIFIED BY CONTRACTOR PRIOR TO CONSTRUCTION. CONTRACTOR/ENGINEER SHOULD DIG TEST PITS BY HAND AT ALL UTILITY CROSSINGS TO VERIFY EXACT LOCATION.
4. THE BOUNDARY INFORMATION FOR THE SUBJECT SITE IS BASED ON A CURRENT FIELD SURVEY PREPARED BY URBAN LTD., DATED 02/01/2012 IN ACCORDANCE WITH THE REQUIREMENTS OF VIRGINIA ASSOCIATION OF LAND SURVEYORS.

* PER MEMORANDUM TO INDUSTRY, JULY 20, 2005; THE PLAN SHALL BE PREPARED USING VIRGINIA STATE PLANE (NORTHZONE) COORDINATES BASED ON NAD83 AND NAVD88; HOWEVER, IF THE CURRENT DRAWINGS ARE PREPARED USING NORTH AMERICAN DATUM OF 1927 (NAD27) AND NORTHGEODETIC VERTICAL DATUM OF 1929 (NGVD29) THEN THE AS-BUILT DRAWINGS SHALL PROVIDE A CONVERSION TABLE OF SANITARY AND STORM SEWER DATA IN THE NAD83 AND NAVD88 DATUMS.

ENVIRONMENTAL SITE ASSESSMENT

1. THERE ARE NO KNOWN TIDAL SHORES, TRIBUTARY STREAMS, FLOODPLAINS, HIGHLY ERODABLE/PERMEABLE SOILS OR BUFFER AREAS ASSOCIATED WITH SHORES OR STREAMS. HOWEVER, THERE ARE KNOWN WETLANDS PRESENT ON SITE, BUT NO WETLAND PERMITS WILL BE REQUIRED FOR THIS DEVELOPMENT PROJECT AS NO DISTURBANCES WILL BE MADE TO THE WETLAND AREAS. ADDITIONALLY, THERE IS A KNOWN UNDERGROUND STORAGE TANK ASSOCIATED WITH AN EXISTING SEPTIC SYSTEM ONSITE WHICH WILL BE REMOVED IN ACCORDANCE WITH ALL CITY, STATE, & FEDERAL REQUIREMENTS.
2. THERE ARE NO KNOWN AREAS OF SOIL OR GROUNDWATER CONTAMINATION.
3. THE CITY OF ALEXANDRIA DEPARTMENT OF TRANSPORTATION AND ENVIRONMENTAL SERVICES, OFFICE OF ENVIRONMENTAL QUALITY MUST BE NOTIFIED IF UNUSUAL OR UNANTICIPATED CONTAMINATION OR UNDERGROUND STORAGE TANKS, DRUMS, AND CONTAINERS ARE ENCOUNTERED AT THE SITE. IF THERE IS ANY DOUBT ABOUT PUBLIC SAFETY OR A RELEASE TO THE ENVIRONMENT, THE ALEXANDRIA FIRE DEPARTMENT MUST BE CONTACTED IMMEDIATELY BY CALLING 911. THE TANK OR CONTAINER'S REMOVAL, ITS CONTENTS, ANY SOIL CONTAMINATION AND RELEASES TO THE ENVIRONMENT WILL BE HANDLED IN ACCORDANCE WITH FEDERAL, STATE, AND CITY REGULATIONS.
4. ALL WELLS TO BE DEMOLISHED IN THIS PROJECT, INCLUDING MONITORING WELLS MUST BE CLOSED IN ACCORDANCE WITH VIRGINIA STATE WATER CONTROL BOARD (VSWCB) REQUIREMENTS. CONTACT ENVIRONMENTAL HEALTH SPECIALIST AND COORDINATE WITH THE ALEXANDRIA HEALTH DEPARTMENT AT 703-746-4996.
5. ALL CONSTRUCTION ACTIVITIES MUST COMPLY WITH THE ALEXANDRIA NOISE CONTROL CODE TITLE 11, CHAPTER 5, WHICH PERMITS CONSTRUCTION ACTIVITIES TO OCCUR
BETWEEN THE FOLLOWING HOURS:
MONDAY THROUGH FRIDAY FROM 7 AM TO 6 PM AND
SATURDAYS FROM 9 AM TO 6 PM.
NO CONSTRUCTION ACTIVITIES ARE PERMITTED ON SUNDAYS.
PILE DRIVING IS FURTHER RESTRICTED TO THE FOLLOWING HOURS:
MONDAY THROUGH FRIDAY FROM 9 AM TO 6 PM AND
SATURDAYS FROM 10 AM TO 4 PM.

SANITARY FLOW COMPUTATIONS

TOTAL FLOW FROM SITE = 300 GPD/UNIT * 4 UNITS = 1,200 GPD

THE TOTAL ESTIMATED FLOW DOES NOT EXCEED 10,000 GPD AND IS THEREFORE NOT SUBJECT MEMORANDUM TO INDUSTRY NO. 02-07.

DEMOLITION

1. A SEPARATE PERMIT IS REQUIRED FOR DEMOLITION; HOWEVER, NO DEMOLITION SHALL BEGIN UNTIL ALL EROSION AND SEDIMENT AND TREE PROTECTION CONTROLS ARE IN PLACE AND ARE APPROVED BY AN EROSION AND SEDIMENT CONTROL INSPECTOR OF THE DEPARTMENT OF TRANSPORTATION AND ENVIRONMENTAL SERVICES.
2. ALL WORK SHALL BE PERFORMED IN STRICT COMPLIANCE WITH THE MOST CURRENT APPLICABLE FEDERAL, STATE , AND LOCAL LAWS AND REGULATIONS, INCLUDING BUT NOT LIMITED, TO ENVIRONMENTAL PROTECTION AGENCY (EPA), OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA), VIRGINIA OCCUPATIONAL AND SAFETY HEALTH COMPLIANCE PROGRAM (VOSH ENFORCEMENT), VIRGINIA OVERHEAD HIGH VOLTAGE LINE SAFETY ACT, NATIONAL EMISSIONS STANDARDS FOR HAZARDOUS AIR POLLUTANTS (NESHAPS), AND NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH).
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF WORK WITH REPRESENTATIVE UTILITY COMPANIES AND FOR THE IMPLEMENTATION OF REQUIRED UTILITY-RELATED WORK.
4. THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE UPON ENCOUNTERING ANY HAZARDOUS MATERIALS DURING DEMOLITION AND/OR CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL DOCUMENT SAME TO THE OWNER'S REPRESENTATIVE AND OBTAIN DIRECTION AS TO THE APPROPRIATE ACTION(S) TO BE TAKEN.
5. DISCONNECTION OF SERVICES AND SYSTEMS SUPPLYING UTILITIES TO BE ABANDONED OR DEMOLISHED SHALL BE COMPLETED PRIOR TO OTHER SITE DEMOLITION IN FULL COMPLIANCE WITH APPLICABLE CODES, REGULATIONS, AND THE REQUIREMENTS OF UTILITY PURVEYORS HAVING JURISDICTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH THE UTILITY PURVEYORS, PAYMENT OF ASSOCIATED FEES AND PROCUREMENT OF ALL NECESSARY PERMITS.
6. PRIOR TO REMOVAL OF MATERIALS OVER EXISTING UTILITY SYSTEMS, THE CONTRACTOR SHALL DOCUMENT EXISTING CONDITIONS AND, IF AT VARIANCE WITH CONDITIONS AS REPRESENTED ON THE PLANS, NOTIFY THE OWNER'S REPRESENTATIVE AND OBTAIN DIRECTIONS AS TO THE APPROPRIATE ACTION(S) TO BE TAKEN.
7. THE CONTRACTOR SHALL BACKFILL EXCAVATED AREAS WITH APPROVED MATERIALS/CLEAN FILL AS PER THE REQUIREMENTS OF VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT).
8. THE CONTRACTOR SHALL PROTECT AND PREVENT DAMAGE TO EXISTING ON-SITE UTILITY DISTRIBUTION FACILITIES THAT ARE TO REMAIN. ACTIVE UTILITY DISTRIBUTION FACILITIES ENCOUNTERED DURING DEMOLITION AND/OR CONSTRUCTION ACTIVITIES SHALL BE SHUT OFF AT THE SERVICE MAIN WITH THE APPROVAL OF THE OWNER'S REPRESENTATIVE.
9. DURING DEMOLITION AND/OR CONSTRUCTION ACTIVITIES, THE CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER'S REPRESENTATIVE UPON ENCOUNTERING ANY EXISTING UTILITIES AND/OR UTILITY SYSTEM STRUCTURES NOT SHOWN ON THESE PLANS. THE CONTRACTOR SHALL DOCUMENT THE SAME AND FORWARD THE INFORMATION TO THE RESIDENT ENGINEER/OWNER'S REPRESENTATIVE, AND OBTAIN DIRECTION AS TO THE APPROPRIATE ACTION(S) TO BE TAKEN.
10. THE CONTRACTOR OR APPLICANT SHALL WORK WITH THE CITY STAFF TO REUSE THE EXISTING, LEFTOVER, UNUSED, AND/OR DISCARDED BUILDING MATERIALS AS PART OF THE DEMOLITION PROCESS OR THE CONSTRUCTION DEBRIS MUST BE REMOVED TO AN APPROVED LANDFILL WITH ADEQUATE FREQUENCY IN ACCORDANCE WITH THE VIRGINIA STATE LINER CONTROL ACT.

SIGN CONSTRUCTION

A SEPARATE PERMIT IS REQUIRED FOR SIGN CONSTRUCTION.

CEMETERY AND/OR BURIAL GROUNDS

THERE IS NO OBSERVABLE, HISTORICAL, OR ARCHAEOLOGICAL EVIDENCE OF CEMETERIES OR BURIAL GROUNDS ON THIS PROPERTY. FURTHERMORE, IT IS ILLEGAL TO DISTURB HUMAN REMAINS WITHOUT OBTAINING APPROPRIATE LEGAL AUTHORIZATION. IF BURIALS ARE FOUND DURING THE ARCHAELOGICAL INVESTIGATION AND NEED TO BE MOVED PRIOR TO DEVELOPMENT, THE APPLICANT SHALL BE RESPONSIBLE FOR THE ARCHAEOLOGICAL REMOVAL AND FOR OBTAINING THE NECESSARY LEGAL DOCUMENTS, INCLUDING A PERMIT FROM THE VIRGINIA DEPARTMENT OF HISTORIC RESOURCES FOR THE ARCHAELOGICAL REMOVAL OF BURIALS.

RODENT ABATEMENT NOTE

PRIOR TO THE ISSUANCE OF A DEMOLITION PERMIT OR LAND DISTURBANCE PERMIT, A RODENT ABATEMENT PLAN SHALL BE SUBMITTED TO THE CITY OF ALEXANDRIA BUILDING AND FIRE CODE ADMINISTRATION THAT WILL OUTLINE STEPS THAT WILL BE TAKEN TO PREVENT THE SPREAD OF RODENTS FROM THE CONSTRUCTION SITE TO THE SURROUNDING COMMUNITY AND SEWERS. THE CONTRACTOR CAN CONTACT ALEXANDRIA BUILDING AND FIRE CODE ADMINISTRATION DEPARTMENT AT (703) 746-4200 FOR ANY QUESTIONS OR ADDITIONAL INFORMATION.

MARINE CLAY STATEMENT

THE PROPOSED SITE CONTAINS AREAS WITH MARINE CLAYS.

ARCHAEOLOGY NOTES

1. ALL REQUIRED ARCHAEOLOGICAL PRESERVATION MEASURES SHALL BE COMPLETED PRIOR TO GROUND-DISTURBING ACTIVITIES (SUCH AS CORING, GRADING, FILLING, VEGETATION REMOVAL, UNDERGROUNDING UTILITIES , PILE DRIVING, LANDSCAPING AND OTHER EXCAVATIONS AS DEFINED IN SECTION 2-151 OF THE ZONING ORDINANCE) OR A RESOURCE MANAGEMENT PLAN MUST BE IN PLACE TO PRESERVE AND/OR RECOVER SIGNIFICANT RESOURCES IN CONCERT WITH CONSTRUCTION ACTIVITIES. TO CONFIRM, CALL ALEXANDRIA ARCHAEOLOGY AT (703) 838-4399.
2. CALL ALEXANDRIA ARCHAEOLOGY (703/838-4399) TWO WEEKS BEFORE THE STARTING DATE OF ANY GROUND DISTURBANCE SO THAT AN INSPECTION OR MONITORING SCHEDULE FOR CITY ARCHAEOLOGISTS CAN BE ARRANGED.
3. THE APPLICANT SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-838-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ECT.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS.
4. THE APPLICANT SHALL NOT ALLOW ANY METAL DETECTION AND/OR ARTIFACT COLLECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY. FAILURE TO COMPLY SHALL RESULT IN PROJECT DELAYS.

SOLID WASTE MANAGEMENT

1. IN COMPLIANCE WITH TITLE 5: TRANSPORTATION AND ENVIRONMENTAL SERVICES SECTION 5-1-31 OF THE CITY CHARTER AND CODE, THE CITY OF ALEXANDRIA WILL PROVIDE SOLID WASTE COLLECTION SERVICES TO EVERY USER PROPERTY, DEFINED IN SECTION 5-1-2 (12B) AS CONTAINING FOUR OR FEWER DWELLING UNITS EXCLUDING CONDOMINIUM DWELLINGS.

   SINCE THE CITY OF ALEXANDRIA IS PROVIDING SOLID WASTE COLLECTION AND DISPOSAL SERVICES, THE PLAN DEMONSTRATES THAT THE DEVELOPMENT MEETS ALL THE MINIMUM STREET STANDARDS, INCLUDING ALL STANDARD CUL-DE-SAC TURNAROUNDS, IF APPLICABLE. THE TRASH TRUCK TURNING MOVEMENTS DEMONSTRATE THAT THE TRASH TRUCK IS ABLE TO PICK UP SOLID WASTE FROM PRIVATE STREETS WITHOUT BACKING UP

   SINCE THE CITY OF ALEXANDRIA WILL PROVIDE THE SOLID WASTE COLLECTION AND DISPOSAL SERVICES; ALL TRASH AND RECYCLING RECEPTACLES ARE SHOWN LOCATED AT THE CITY'S RIGHT -OF-WAY.

2. IN THE EVENT SECTION 5-1-2(12B) OF THE CITY CHARTER AND CODE TITLE 5: TRANSPORTATION AND ENVIRONMENTAL SERVICES IS AMENDED TO DESIGNATE MULTIFAMILY DWELLINGS IN GENERAL, OR MULTI-FAMILY DWELLINGS WHEN SO PROVIDED BY SPECIAL USE PERMIT (SUP), AS REQUIRED USER PROPERTY [AS DEFINED IN 5-1-2(12B) OF THE CITY CHARTER AND CODE], THEN REFUSE COLLECTION SHALL BE PROVIDED BY THE CITY.

CONSTRUCTION NOTES

1. THE EXISTING UNDERGROUND UTILITIES SHOWN HEREIN ARE BASED UPON AVAILABLE INFORMATION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL UTILITIES BEFORE COMMENCING WORK AND FOR ANY DAMAGES WHICH MAY OCCUR BY HIS FAILURE TO LOCATE OR PRESERVE THESE UNDERGROUND UTILITIES. IF DURING CONSTRUCTION OPERATIONS, THE CONTRACTOR SHOULD ENCOUNTER UTILITIES OTHER THAN THOSE SHOWN ON THE PLANS, HE SHALL IMMEDIATELY NOTIFY THE ENGINEER AND TAKE NECESSARY ACTION AND PROPER STEPS TO PROTECT THE FACILITY AND ASSURE THE CONTINUATION OF SERVICE.
2. THE CONTRACTOR SHALL DIG TEST PITS AS REQUIRED FOLLOWING NOTIFICATION AND MARKING OF ALL EXISTING UTILITIES TO VERIFY THE LOCATION AND DEPTH OF EXISTING UTILITIES TEST HOLES TO BE PERFORMED AT LEAST 30 DAYS PRIOR TO START OF CONSTRUCTION. ANY DISCREPANCIES ARE TO BE REPORTED IMMEDIATELY TO THE OWNER AND ENGINEER. REDESIGN AND APPROVAL BY REVIEWING AGENCIES SHALL BE OBTAINED, IF REQUIRED.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE OWNER AND THE ENGINEER OF ANY CHANGES OR CONDITIONS ATTACHED TO PERMITS OBTAINED FROM ANY AUTHORITY ISSUING PERMITS.
4. THE CONTRACTOR SHALL VISIT THE SITE AND SHALL VERIFY EXISTING CONDITIONS PRIOR TO STARTING CONSTRUCTION.
5. THE CONTRACTOR SHALL CLEAR THE SITE OF ALL TREES, BUILDINGS, FOUNDATIONS, ETC., WITHIN THE LIMITS OF CONSTRUCTION UNLESS OTHERWISE SPECIFIED, AND SHALL BE RESPONSIBLE FOR ENSURING THAT EXISTING UTILITIES ARE DISCONNECTED.
6. THE DEVELOPER SHALL PROVIDE OVER-LOT GRADING TO PROVIDE POSITIVE DRAINAGE AND PRECLUDE PONDING OF WATER.
7. ALL AREAS, ON OR OFFSITE, WHICH ARE DISTURBED BY THIS CONSTRUCTION AND WHICH ARE NOT PAVED OR BUILT UPON, SHALL BE ADEQUATELY STABILIZED TO CONTROL EROSION AND SEDIMENTATION. THE MINIMUM ACCEPTABLE STABILIZATION SHALL CONSIST OF PERMANENT GRASS, SEED MIXTURE TO BE AS RECOMMENDED BY THE CITY AGENT. ALL SLOPES 3:1 AND GREATER SHALL BE SODDED AND PEGGED OR OTHERWISE STABILIZED IN A MANNER APPROVED BY THE CITY OF ALEXANDRIA.
8. EXISTING SEPTIC FIELDS, IF APPLICABLE, SHALL BE ABANDONED IN ACCORDANCE WITH VIRGINIA HEALTH DEPARTMENT STANDARDS AND SPECIFICATIONS.
9. ALL ABOVE GROUND UTILITIES SERVING THE SITE SHALL BE RELOCATED AS REQUIRED BY THE OWNING UTILITY COMPANIES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING ALL ARRANGEMENTS AND COORDINATING ALL WORK REQUIRED FOR THE NECESSARY RELOCATIONS.
10. PRIOR TO BEGINNING OF CONSTRUCTION, CONTRACTOR SHALL VERIFY FROM THE ARCHITECTURAL DRAWINGS ALL DIMENSIONS, DETAILS, AND TREATMENTS FOR THE PROPOSED BUILDINGS, WALKWAYS, AND OTHER PROPOSED CONSTRUCTION WHERE INDICATED ON THE PLANS.
11. THE CONTRACTOR IS TO VERIFY INVERT, SIZE, AND LOCATION OF BUILDING UTILITY CONNECTIONS WITH THE MECHANICAL PLANS PRIOR TO PLACEMENT OF UNDERGROUND UTILITIES.
12. EXISTING BUILDINGS, FENCES AND OTHER EXISTING PHYSICAL FEATURES ARE TO BE REMOVED AS REQUIRED BY THE CONSTRUCTION.
13. EXISTING CONSTRUCTION SHALL BE REMOVED TO NEAREST JOINT. NEW CONSTRUCTION SHALL BE PROVIDED AS SHOWN AND ANY DAMAGED AREA SHALL BE REPAIRED TO MATCH CONDITIONS EXISTING PRIOR TO CONSTRUCTION OR TO THE SATISFACTION OF DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES.
14. ALL PRIVATE BUILDING CONNECTIONS ARE TO BE INSTALLED IN ACCORDANCE WITH THE CURRENT PLUMBING CODE.
15. TOPS OF EXISTING STRUCTURES WHICH REMAIN IN USE ARE TO BE ADJUSTED IN ACCORDANCE WITH THE GRADING PLAN. ALL PROPOSED STRUCTURE TOP ELEVATIONS ARE TO BE VERIFIED BY THE CONTRACTOR WITH THE SITE GRADING PLANS. IN CASE OF CONFLICT, THE GRADING PLAN SHALL SUPERSEDE PROFILE ELEVATIONS. MINOR ADJUSTMENTS TO MEET FINISHED GRADE ELEVATIONS, IF REQUIRED, SHALL BE MADE IN THE FIELD WITH THE APPROVAL OF SITE INSPECTOR OF THE DEPARTMENT OF TRANSPORTATION AND ENVIRONMENTAL SERVICES.
16. THE DESIGN, CONSTRUCTION, FIELD PRACTICES, AND METHODS SHALL CONFORM TO THE REQUIREMENTS SET FORTH BY THE CITY OF ALEXANDRIA ZONING ORDINANCE AND DESIGN AND CONSTRUCTION STANDARDS MANUAL. FAILURE TO COMPLY WITH THE CODE, APPLICABLE MANUALS, AND PROVISIONS OF THE CONSTRUCTION AND ESCROW AGREEMENTS OR THE PERMITS SHALL BE DEEMED A VIOLATION.
17. THE APPROVAL OF THESE PLANS SHALL IN NO WAY RELIEVE THE OWNER/DEVELOPER OR HIS AGENT OF ANY LEGAL RESPONSIBILITIES WHICH MAY BE REQUIRED BY THE CODE OF VIRGINIA OR ANY ORDINANCE ENACTED BY THE CITY OF ALEXANDRIA.
18. CONSTRUCTION STAKEOUT SHALL BE UNDER THE DIRECT SUPERVISION OF A LICENSED LAND SURVEYOR IN THE COMMONWEALTH OF VIRGINIA.
19. THE CONTRACTOR IS REFERRED TO STRUCTURAL, GEOTECHNICAL, MECHANICAL, AND ARCHITECTURAL PLANS FOR FOUNDATION TREATMENT INCLUDING, BUT NOT LIMITED TO, SHEETING AND SHORING FOR BUILDING EXCAVATION, WATERPROOFING FOR FILL AGAINST BUILDINGS, LOCATION OF MECHANICAL EQUIPMENT, AND CONNECTIONS AT THE FACES OF BUILDINGS.
20. SMOOTH GRADE SHALL BE MAINTAINED FROM THE CENTERLINE OF THE EXISTING ROAD TO THE PROPOSED ENTRANCE AND/OR CURB & GUTTER TO PRECLUDE THE FORMING OF FALSE GUTIER AND/OR PONDING OF WATER ON THE ROADWAY.
21. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING A SMOOTH TRANSITION TO EXISTING CURB AND SIDEWALKS, IF APPLICABLE.
22. THE CALIFORNIA BEARING RATIO (CBR) VALUES OF IN-SITU MATERIALS SHALL BE DETERMINED BY FIELD AND/OR LABORATORY TESTS FOR ACTUAL DETERMINATION OF REQUIRED THICKNESSES OF SURFACE, BASE, SUB-BASE, AND SUB GRADE MATERIALS. THE PAVEMENT SECTION SHALL BE DESIGNED BY A GEOTECHNICAL/LICENSED PROFESSIONAL ENGINEER TO THE SATISFACTION OF DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES FOR ALL PAVEMENTS INCLUDING EMERGENCY VEHICLE EASEMENT (EVE) TO SUPPORT H-20 LOADING. IN THE CASE OF PAVEMENT PATCHES, PAVEMENT SECTION MUST MEET OR EXCEED EXISTING SECTION.
23. THE THICKNESSES OF SUB-BASE, BASE, AND WEARING COURSE SHALL BE DESIGNED USING "CALIFORNIA METHOD" AS SET FORTH ON PAGE 3-76 OF THE SECOND EDITION OF A BOOK ENTITLED, "DATABOOK FOR CIVIL ENGINEERS, VOLUME ONE, DESIGN" WRITTEN BY ELWYN E. SEELYE. AN ALTERNATE PAVEMENT SECTION DESIGNED TO THE SATISFACTION OF DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES FOR ALL PAVEMENTS INCLUDING EMERGENCY VEHICLE EASEMENT (EVE) TO SUPPORT H-20 LOADING BASED ON CBR AND VIRGINIA DEPARTMENT OF TRANSPORTATION (VDOT) METHOD (VASWANI METHOD) AND STANDARD MATERIAL SPECIFICATIONS SHALL BE ACCEPTABLE.
24. EMERGENCY VEHICLE EASEMENT (EVE) AND AMERICAN WITH DISABILITY (ADA) ACCESSIBLE PARKING SPACES MUST BE DELINEATED WITH PAVEMENT MARKINGS PER THE CITY OF ALEXANDRIA STANDARD SIGNAGE AND AMERICAN WITH DISABILITIES (ADA) REQUIREMENTS.
25. ALL STRIPING SHALL MEET THE REQUIREMENTS OF MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) STANDARDS (LATEST EDITION) AND SHALL BE THERMOPLASTIC UNLESS OTHERWISE SPECIFIED.
26. ALL EARTHWORK OPERATIONS ARE TO BE PERFORMED UNDER THE FULL TIME, ON-SITE SUPERVISION OF A REGISTERED GEOTECHNICAL ENGINEER WITH GEOTECHNICAL TESTING IN ACCORDANCE WITH CONSTRUCTION SPECIFICATIONS AND GEOTECHNICAL REPORT REQUIREMENTS.
27. THE CONTRACTORS SHALL NOT CAUSE OR PERMIT VEHICLES TO IDLE FOR MORE THAN 10 MINUTES WHEN PARKED.
28. UNLESS OTHERWISE APPROVED THE CONTRACTOR SHALL PROVIDE THERMOPLASTIC LADDER STYLE / STANDARD PEDESTRIAN CROSS WALKS AT ALL CROSSINGS AT THE PROPOSED DEVELOPMENT, WHICH MUST BE DESIGNED TO THE SATISFACTION OF THE DIRECTOR, TRANSPORTATION AND ENVIRONMENTAL SERVICES. THE DESIGN OF LADDER STYLE OR STANDARD PEDESTRIAN CROSS WALK SHALL BE EVALUATED ON A CASE BY CASE BASIS AND SHALL COMPLY WITH THE REQUIREMENTS OF POLICY MANUAL SECTION 30.18, PEDESTRIAN CROSSWALKS, JULY 13,2006. A COPY OF THE POLICY MANUAL CAN BE OBTAINED FROM YON LAMBERT, BICYCLE AND PEDESTRIAN COORDINATOR / TRANSPORTATION PLANNER, TELEPHONE (703) 746-4081.

UTILITY WORKS

UNDERGROUND UTILITY LINES SHALL BE INSTALLED IN ACCORDANCE WITH THE FOLLOWING MINIMUM STANDARDS DESCRIBED IN SECTION 4VAC50-30-40 OF THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH) AND ADDITIONAL APPLICABLE PRACTICES FOLLOWED BY THE CITY OF ALEXANDRIA:

A. ALL PRIVATE UTILITIES SHALL BE LOCATED OUTSIDE OF THE PUBLIC RIGHT-OF-WAY AND PUBLIC UTILITY EASEMENTS UNLESS THE UTILITY OWNERS HAVE FRANCHISE AGREEMENT WITH THE CITY OF ALEXANDRIA; HOWEVER, NO ELECTRIC TRANSFORMERS AND SWITCH GEARS / CONTROL BOXES SHALL BE PLACED IN THE PUBLIC RIGHT OF WAY.
B. ALL THE EXISTING AND PROPOSED PUBLIC AND PRIVATE UTILITIES AND EASEMENTS SHALL BE SHOWN AND A DESCRIPTIVE NARRATION OF VARIOUS UTILITIES SHALL BE PROVIDED ON THE PLAN.
C. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN UTILITY SERVICES AT ALL TIMES DURING CONNECTION AND/OR CONSTRUCTION.
D. NO MORE THAN 500 LINEAR FEET OF TRENCH MAY BE OPENED AT ONE TIME.
E. EXCAVATED MATERIAL SHALL BE PLACED ON THE UPHILL SIDE OF TRENCHES.
F. EFFLUENT FROM DEWATERING OPERATIONS SHALL BE FILTERED OR PASSED THROUGH AN APPROVED SEDIMENT TRAPPING DEVICE, OR BOTH, AND DISCHARGED IN A MANNER THAT DOES NOT ADVERSELY AFFECT FLOWING STREAMS OR OFF-SITE PROPERTY.
G. MATERIAL USED FOR BACKFILLING TRENCHES SHALL BE PROPERLY COMPACTED IN ACCORDANCE WITH THE CITY OF ALEXANDRIA STANDARDS AND SPECIFICATIONS TO MINIMIZE EROSION AND PROMOTE STABILIZATION.
H. SHOULD UTILITY CONSTRUCTION BE PERFORMED AFTER COMPLETING EARTHWORK, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ACHIEVING 98 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D-1551) COMPACTION IN ALL TRENCH BACKFILL.
I. RESTABILIZATION SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE VIRGINIA REGULATIONS §4VAC50-30 EROSION AND SEDIMENT CONTROL REGULATIONS, VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (VESCH).
J. APPLICABLE SAFETY REGULATIONS SHALL BE COMPLIED WITH.
K. THE CONTRACTOR IS RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL CONTROL MEASURES AS NECESSARY TO PREVENT EROSION AND SEDIMENTATION, AS DETERMINED BY THE DIRECTOR OF TRANSPORTATION AND ENVIRONMENTAL SERVICES, CITY OF ALEXANDRIA.
L. NO CONTAIMINATION HAS BEEN FOUND ONSITE.
M. UTILITY CORRIDORS IN CONTAMINATED SOIL SHALL BE OVER EXCAVATED BY 2 FEET AND BACKFILLED WITH "CLEAN" SOIL.
N. GRADING CAN BE PERFORMED ON INSTALLATION OF UTILITIES.
O. ALL NEW INSTALLATIONS AND/OR REINSTALLATIONS OF UTILITIES SUCH AS ELECTRICAL LINES, GAS PIPES, COMMUNICATION CABLES INCLUDING WATER AND SEWER LATERAL BOTH ON PRIVATE PROPERTY AND IN THE PUBLIC RIGHT OF WAY IN THE CITY OF ALEXANDRIA SHALL BE PROVIDED WITH 3" AND 6" WIDE 5 MIL OVERALL THICKNESS DETECTABLE UNDERGROUND WARNING TAPES (DUWT). THE 3" DUWT SHALL BE INSTALLED AT DEPTHS OF 12" TO 18" AND 6" WIDE AT A DEPTH OF 24" SO AS TO MAKE UNDERGROUND INSTALLATIONS EASY TO FIND USING A NON-FERROUS LOCATOR. THE DUWT SHALL BE WITH ALUMINUM BACKING OR SOLID ALUMINUM CORE LAMINATED WITH A PROTECTIVE CLEAR FILM ON BOTH SIDES, SEALING AND PROTECTING THE GRAPHICS FROM UNDERGROUND MOISTURE, ACIDS, ALKALIS, AND OTHER SOIL SUBSTANCES. ALL DUWT TAPES SHALL BE PRINTED IN BLACK INK ON AMERICAN PUBLIC WORKS ASSOCIATION (APWA) APPROVED COLORS TO MEET OR EXCEED INDUSTRY STANDARDS. THE FOLLOWING ARE THE APWA COLOR CODES:
P. DISCHARGE FROM SWIMMING POOLS SHALL BE CONNECTED TO THE SANITARY SEWER.

UTILITY COLOR CODES

COLOR	CODES
RED	CAUTION BURIED ELECTRIC POWER LINES, CABLES, CONDUITS, AND LIGHTING CABLES
YELLOW	CAUTION GAS, OIL, STEAM, PETROLEUM, OR GASEOUS MATERIALS
ORANGE	CAUTION COMMUNICATIONS, ALARM OR SIGNAL LINES, CABLES, OR CONDUITS
BLUE	CAUTION POTABLE WATER
PURPLE	CAUTION RECLAIMED WATER, IRRIGATION AMD SLURRY LINES
GREEN	CAUTION SEWER, DRAIN LINES, AND FORCE MAIN

EMERGENCY VEHICLE EASEMENTS NOTE

ALL EMERGENCY VEHICLE EASEMENTS ARE SHOWN ON THE PLAN AND SHALL BE RECORDED WITH ALEXANDRIA LAND RECORDS.

MOSQUITO CONTROL NOTES

1. SINCE STORM WATER MANAGEMENT (SWM) AND BEST MANAGEMENT PRACTICE (BMP) SYSTEMS THAT HOLD WATER FOR MORE THAN 5 DAYS BETWEEN THE MONTHS OF MAY - OCTOBER HAVE THE POTENTIAL TO CAUSE MOSQUITO BREEDING HABITATS SUCH BMPs SHALL BE TREATED WITH A REGISTERED MOSQUITO LARVAL CONTROL PRODUCT. ALL LABELS SHOULD BE FOLLOWED FOR APPLICATION RATES AND AMOUNTS.
2. SINCE EXCESSIVE VEGETATION IN EXISTING BMPs ALSO INCREASES THE POTENTIAL FOR MOSQUITO PROBLEMS; THEREFORE, VEGETATION SHALL BE CONTROLLED AND CUT TO REDUCE MOSQUITO BREEDING.
3. CONTACT THE CITY OF ALEXANDRIA ENVIRONMENTAL HEALTH VECTOR BORNE ILLNESS PROGRAM (703-746-4910) FOR QUESTIONS OR TREATMENT ASSISTANCE.

RESOURCE PROTECTION AREA NOTES

1. THE SUBJECT PROPERTY DOES NOT LIE WITHIN THE CITY OF ALEXANDRIA RESOURCE PROTECTION AREA (RPA) AND THERE AREA NO MAPPED RPA'S ON THIS PROPERTY.

FLOOD PLAIN NOTES

1. THE SITE DOES NOT LIE WITHIN 100-YEAR FLOOD PLAIN WATER SURFACE ELEVATION (WSE) PER THE DEMARCATION OF THE CURRENT FLOOD INSURANCE RATE MAP (FIRM) PUBLISHED BY FEDERAL EMERGENCY AMANGEMENT AGENCY (FEMA).

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR ____ DATE ____
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. ____
DIRECTOR ____ DATE ____
CHAIRMAN, PLANNING COMMISSION ____ DATE ____
DATE RECORDED ____
INSTRUMENT NO. ____ DEED BOOK NO. ____ PAGE NO. ____

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08-01-17
PROFESSIONAL ENGINEER

GENERAL NOTES
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA
SCALE: N/A C.I.= N/A DATE: AUGUST, 2017

SHEET
02

FILE No.
12811

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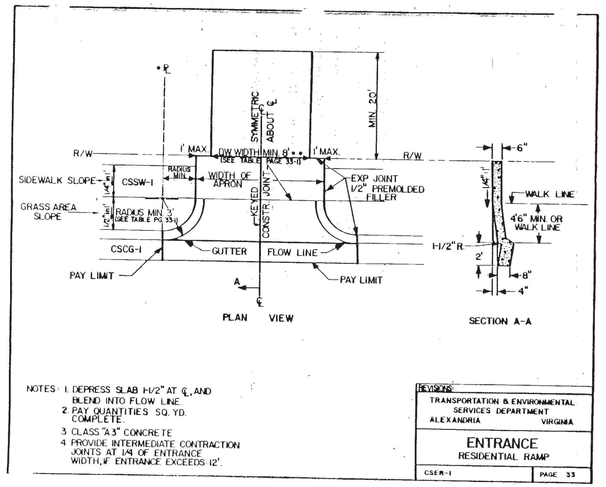
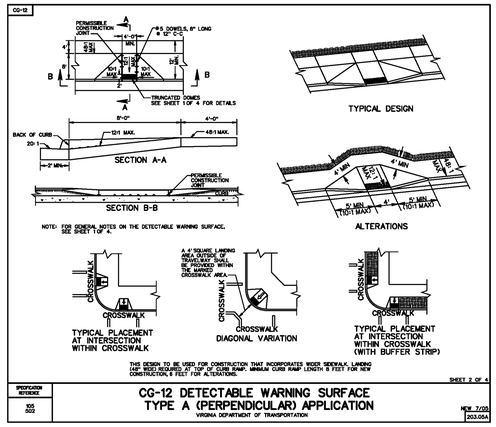


NOTES:
1. DEPRESS SLAB 1-1/2" AT ℄, AND BLEND INTO FLOW LINE.
2. PAY QUANTITIES SQ. YD. COMPLETE.
3. CLASS "A3" CONCRETE
4. PROVIDE INTERMEDIATE CONTRACTION JOINTS AT 1/4 OF ENTRANCE WIDTH, IF ENTRANCE EXCEEDS 12'.

REVISIONS
TRANSPORTATION & ENVIRONMENTAL SERVICES DEPARTMENT
ALEXANDRIA VIRGINIA
ENTRANCE RESIDENTIAL RAMP
CSER-1 PAGE 33



LEGEND:

- EXISTING OVERHEAD WIRE
- EXISTING GAS LINE
- PROPOSED GAS LINE
- EXISTING GAS VALVE
- PROPOSED GAS VALVE
- EXISTING WATER METER
- PROPOSED WATER METER
- EXISTING WATER VALVE
- PROPOSED WATER VALVE
- EXISTING FIBER OBTICS
- T.B.R. — TO BE REMOVED
- S, C, HC — STANDARD, COMPACT, AND HANDICAP PARKING SPACE DESIGNATOR
- V — VISITOR PARKING SPACE
- C.O. — CLEAN OUT
- FF — FINISHED FLOOR
- PROP. — PROPOSED
- EX. — EXISTING
- SF — SQUARE FEET
- GSF — GROSS SQUARE FEET
- NSF — NET SQUARE FEET
- (L) — LOADING AREA
- WATER METER
- TW(N) — TOP OF WALL NORTH
- TW(S) — TOP OF WALL SOUTH
- EXISTING STORM DRAIN STRUCTURE
- PROPOSED STORM DRAIN STRUCTURE
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- EXISTING WATER LINE
- PROPOSED WATER LINE
- EXISTING TREE LINE
- EXISTING PROPERTY LINE
- PROPOSED PROPERTY LINE
- EXISTING PROPERTY LINE PIPES
- PROPOSED PROPERTY LINE PIPES
- EX. FIRE HYDRANT
- PROP. FIRE HYDRANT
- PROPOSED LIMITS OF CLEARING & GRADING
- EXISTING CURB & GUTTER
- PROPOSED CURB & GUTTER
- REVERSE FLOW CURB & GUTTER
- EXISTING POWER POLE
- PROPOSED ENTRANCE/EXIT TO BUILDING
- E — PROPOSED ELECTRICAL LINE
- T — PROPOSED TELECOM LINE
- EXISTING TRAFFIC POLE
- TRAFFIC SIGN
- STREET SIGN
- EXISTING SPOT ELEVATION
- PROP. SPOT ELEVATION
- EXISTING FENCE
- EXISTING LIGHTING
- PROPOSED LIGHTING
- STREET LIGHTS (DETAIL AND SPEC. BY ARCHITECT)
- TEST PIT REQUIRED
- PROPOSED CSRP-1
- BENCHMARK
- EXISTING WETLANDS
- STREAM EDGE (WATER CONVEYANCE)
- EXISTING TREE
- PROPOSED TREE
- VPD — PROJECTED TRAFFIC COUNT (BASED ON 6TH ED. OF ITE TRIP GENERATION BOOK)

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		REVISIONS

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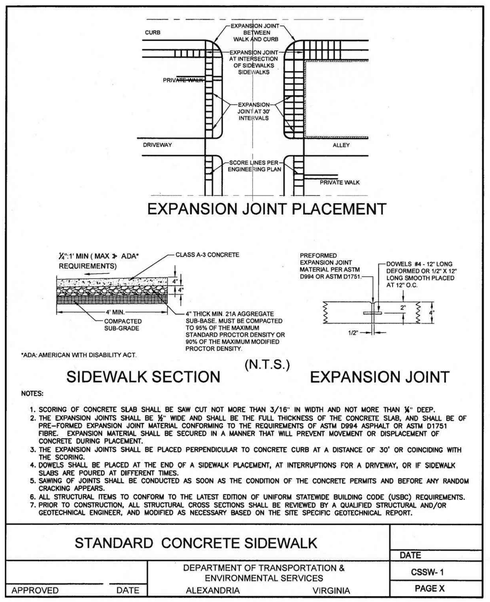
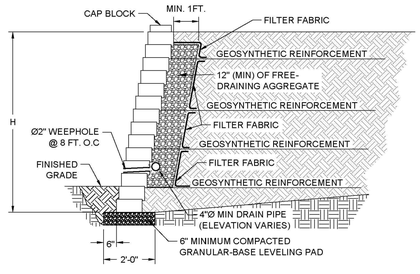


NOTES:
1. SCORING OF CONCRETE SLAB SHALL BE SAW CUT NOT MORE THAN 3/16" IN WIDTH AND NOT MORE THAN ¼" DEEP.
2. THE EXPANSION JOINTS SHALL BE ½" WIDE AND SHALL BE THE FULL THICKNESS OF THE CONCRETE SLAB, AND SHALL BE OF PRE-FORMED EXPANSION JOINT MATERIAL CONFORMING TO THE REQUIREMENTS OF ASTM D994 ASPHALT OR ASTM D1751 FIBRE. EXPANSION MATERIAL SHALL BE SECURED IN A MANNER THAT WILL PREVENT MOVEMENT OR DISPLACEMENT OF CONCRETE DURING PLACEMENT.
3. THE EXPANSION JOINTS SHALL BE PLACED PERPENDICULAR TO CONCRETE CURB AT A DISTANCE OF 30' OR COINCIDING WITH THE SCORING.
4. DOWELS SHALL BE PLACED AT THE END OF A SIDEWALK PLACEMENT, AT INTERRUPTIONS FOR A DRIVEWAY, OR IF SIDEWALK SLABS ARE POURED AT DIFFERENT TIMES.
5. SAWING OF JOINTS SHALL BE CONDUCTED AS SOON AS THE CONDITION OF THE CONCRETE PERMITS AND BEFORE ANY RANDOM CRACKING APPEARS.
6. ALL STRUCTURAL ITEMS TO CONFORM TO THE LATEST EDITION OF UNIFORM STATEWIDE BUILDING CODE (USBC) REQUIREMENTS.
7. PRIOR TO CONSTRUCTION, ALL STRUCTURAL CROSS SECTIONS SHALL BE REVIEWED BY A QUALIFIED STRUCTURAL AND/OR GEOTECHNICAL ENGINEER, AND MODIFIED AS NECESSARY BASED ON THE SITE SPECIFIC GEOTECHNICAL REPORT.

STANDARD CONCRETE SIDEWALK		
		DATE
	DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES	CSSW-1
APPROVED DATE	ALEXANDRIA VIRGINIA	PAGE X

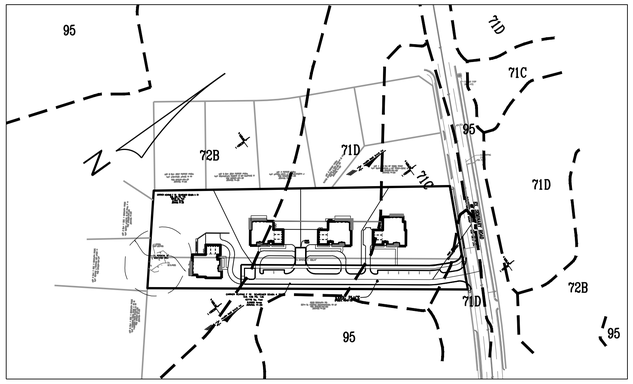
GDE



TYPICAL MECHANICALLY-STABILIZED MODULAR RETAINING WALL WITH TYPICAL DRAINAGE MEASURES

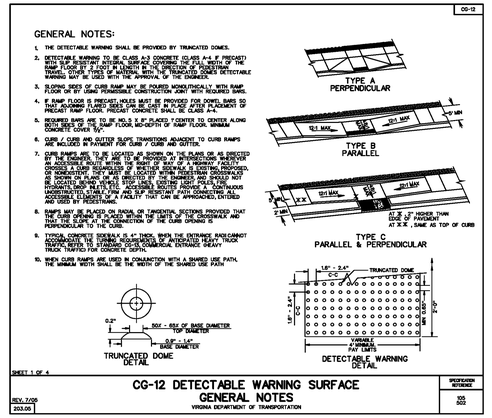
GEODESIGN AND ENGINEERING, INC. KNOWLEDGE IS OUR FOUNDATION	SEMINARY ROAD PROPERTY				
14150 Lee Road Suite C Chantilly, Virginia 20151 Phone: 703-378-8486 Fax: 703-378-8584 Cell: 703-606-8351 Email: mail@geodesigneng.com	DATE	REV. DATE	SCALE	SHEET	GDE Project number
	05-24-2017		NTS		E16011

SOILS MAP
SCALE: 1"=150'

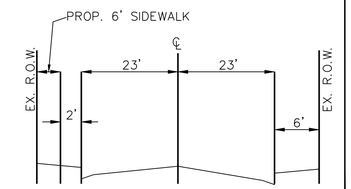


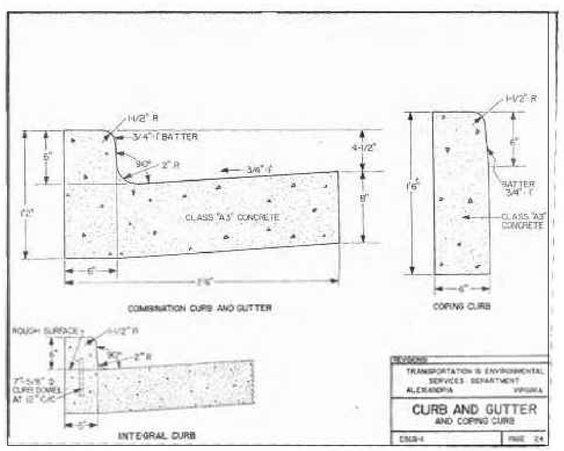
SOILS LEGEND

SOIL ID NUMBERS	SOIL SERIES NAME	FOUNDATION SUPPORT	SOIL DRAINAGE	EROSION POTENTIAL	PROBLEM CLASS	SOILS GROUP
72B	KINGSTOWNE – SASSAFRAS – NEABSCO COMPLEX	FAIR – P	MARGINAL – P,S	LOW	IVB	D
71D	KINGSTOWNE – SASSAFRAS – MARUMSCO COMPLEX	POOR – U,P,C,B	POOR – P,C,S	HIGH	IVA	D
71C	KINGSTOWNE – SASSAFRAS – MARUMSCO COMPLEX	POOR – U,P,C,B	POOR – P,C,S	HIGH	IVA	D
95	URBAN LAND	N/A	N/A	N/A	IVB	N/A



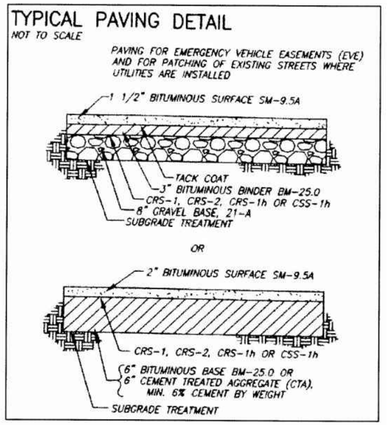
TYPICAL PROPOSED CONDITIONS SECTION
SEMINARY RD
NOT TO SCALE



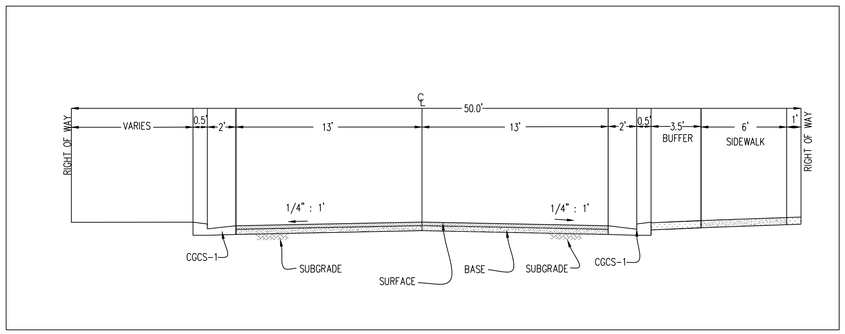


TYPICAL PAVING DETAIL
NOT TO SCALE

PAVING FOR EMERGENCY VEHICLE EASEMENTS (EVE) AND FOR PATCHING OF EXISTING STREETS WHERE UTILITIES ARE INSTALLED



PUBLIC STREET TYPICAL SECTION (N.T.S.)



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DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

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DIRECTOR — DATE

CHAIRMAN, PLANNING COMMISSION — DATE

DATE RECORDED _____

INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

GENERAL NOTES

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: N/A C.I.= N/A DATE: AUGUST, 2017

SHEET 03

FILE No. 12811

COMMONWEALTH OF VIRGINIA CLAYTON C. TOCK LIC. NO. 036180 ENGINEER PROFESSIONAL 08-01-17

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RTES. 8W, 25B, 28A, AT2, AT5

FRAZIER STREET

ST STEPHENS ROAD
(NEIGHBORHOOD RESIDENTIAL)

BUTTERFLY LANE
(NEIGHBORHOOD RESIDENTIAL)

THOMSEN LANE

TROTTER ROAD

VA. STATE GRID NORTH

N

SEMINARY ROAD
(NEIGHBORHOOD CONNECTOR/ TRANSIT STREET)

RTE. AT2

NEW PUBLIC STREET
(NEIGHBORHOOD RESIDENTIAL)

SITE

1/4 MI. RADIUS

COLONEL ELLIS AVE

FORT WILLIAMS PKWY

N QUAKER LANE

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08/01/17

CONTEXTUAL PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"= 150' C.I.= N/A DATE: AUGUST, 2017

SHEET
04

FILE No.
12811

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DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED _____

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

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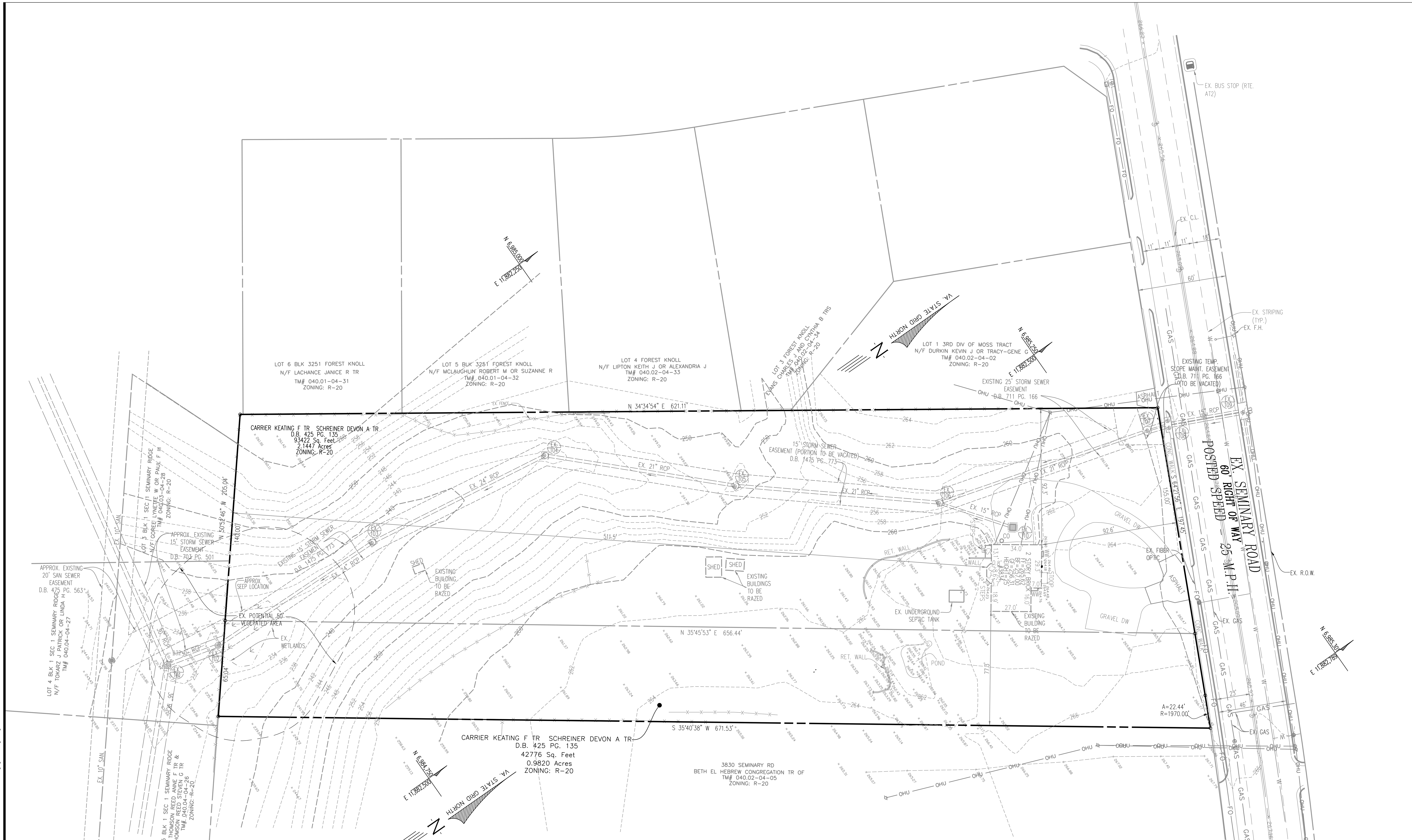

NOTES:

1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAELOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 in. = 30 ft.

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SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

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CHAIRMAN, PLANNING COMMISSION DATE

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CLAYTON C. TOCK
Lic. No. 036790
08-01-17
PROFESSIONAL ENGINEER

EXISTING CONDITIONS
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= 2' DATE: AUGUST, 2017

SHEET
05

FILE No.
12811

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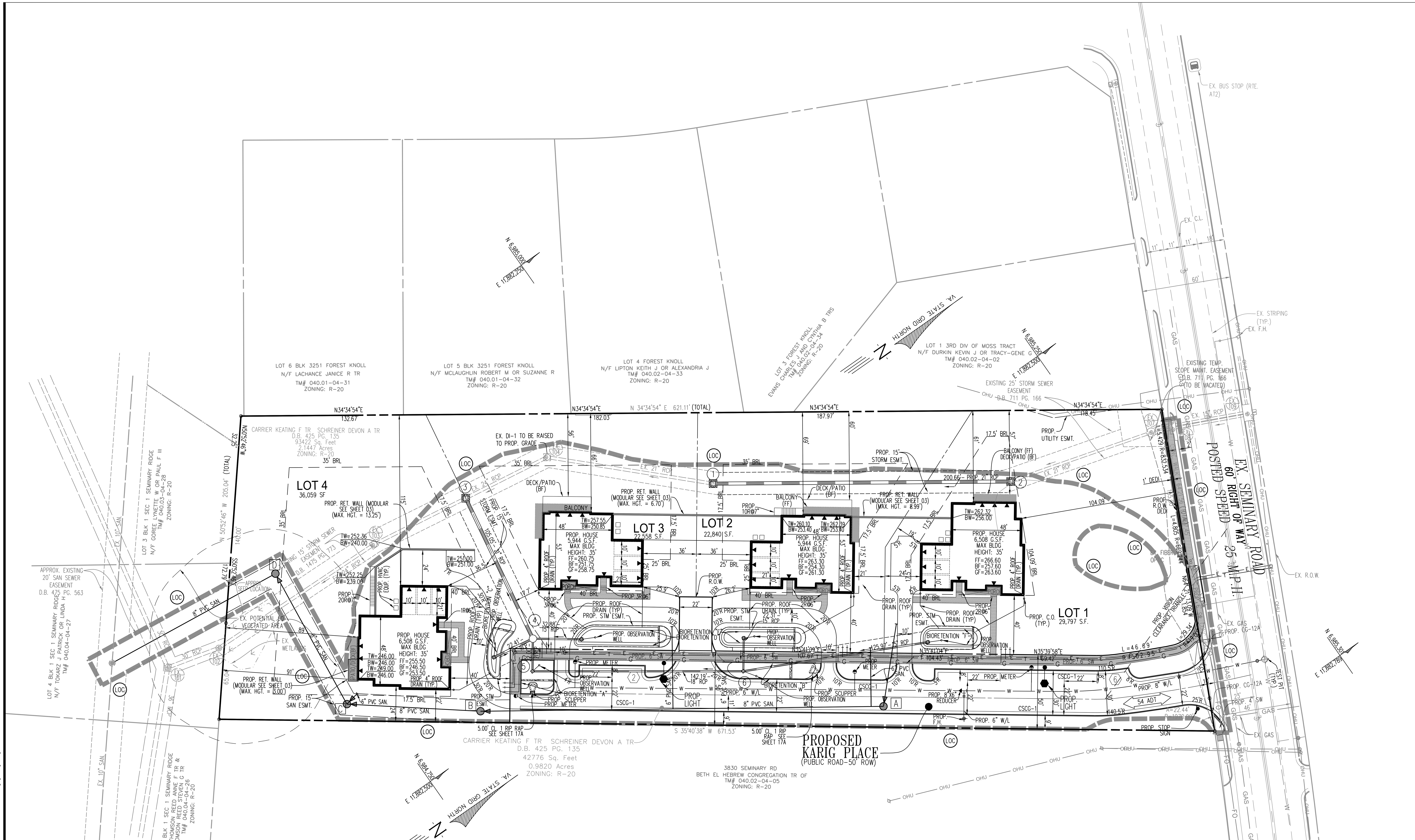

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(IN FEET)
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APPROVED

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GEOMETRY PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= N/A DATE: AUGUST, 2017

SHEET
06

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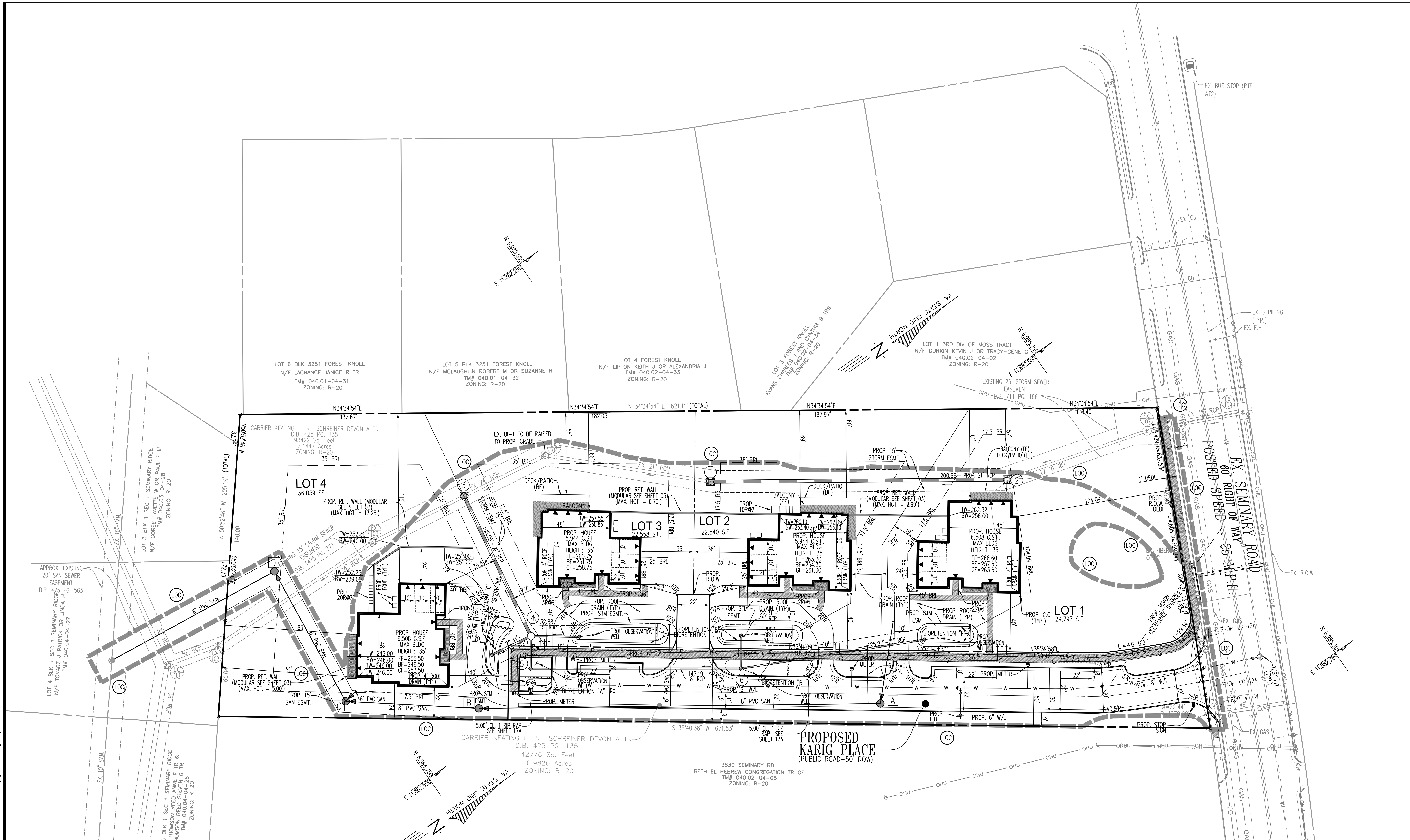

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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 036790
08-01-17
PROFESSIONAL ENGINEER

GIS DIMENSION PLAN
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

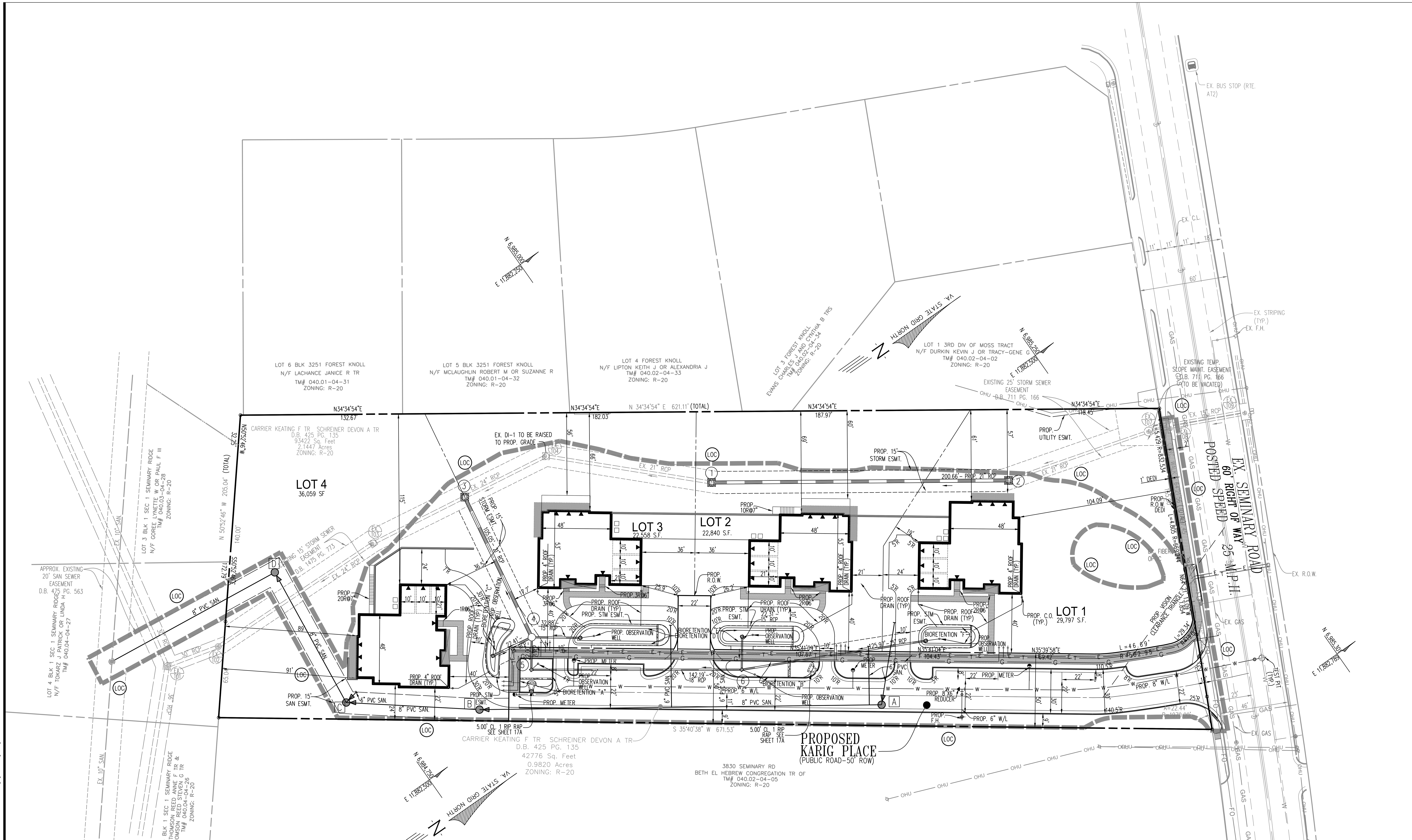
CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= N/A DATE: AUGUST, 2017

SHEET
06A

FILE No.
12811

Urban, Ltd. – J:\JOBS\Seminary Road\Preliminary Site Plan\12811-08-GEOMETRY.dwg [DIMENSION] August 01, 2017 – 10:54am intern002



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1-800-257-7777
FOR THESE UTILITIES

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TRANSCO GAS PIPELINE CO.
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CONTINENTAL TELEPHONE OF VIRGINIA
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CONTACT THESE UTILITIES

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VIRGINIA AMERICAN WATER [illegible]
ALEXANDRIA RENEW ENTERPRISES [illegible]

EMERGENCY DIAL 911
POLICE - FIRE - RESCUE

CITY OF ALEXANDRIA SHERIFF [illegible]
CITY OF ALEXANDRIA EMERGENCY [illegible]

NOTES:

1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAELOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 in. = 30 ft.

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. ____________

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED ____________

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	DATE	DESCRIPTION

REVISIONS

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-17-17
08-01-17
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CLAYTON C. TOCK
Lic. No. 036790
08-01-17
PROFESSIONAL ENGINEER

UTILITY PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= N/A DATE: AUGUST, 2017

SHEET
06B

FILE No.
12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-08-GEOMETRY.dwg [UTILITY] August 01, 2017 - 10:54am intern002

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-11-17
08-01-17
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GRADING PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= 2' DATE: AUGUST, 2017

SHEET 07

FILE No. 12811

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
OWNS CORNER OF J AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
93422 Sq. Feet
2.1447 Acres
ZONING: R-20

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F GOREE LYNETTE W OR PAUL F III
TM# 040.03-04-28
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOKARZ J PATRICK & LINDA H
TM# 040.04-04-27

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED STEVEN C TR &
THOMSON REED ANNE C TR
TM# 040.04-04-26
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres
ZONING: R-20

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

EX. BUS STOP (RTE. A72)

EX. SEMINARY ROAD
60' RIGHT OF WAY
POSTED SPEED < 25 M.P.H.

PROPOSED
KARIG PLACE
(PUBLIC ROAD-50' ROW)

LOT 1
29,797 S.F.

LOT 2
22,840 S.F.

LOT 3
9,556 S.F.

LOT 4
36,059 SF

NOTES:
1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAELOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
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GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

Urban, Ltd. - k:\JOBS\Seminary Road\Preliminary Site Plan\12811-09-GRADING.dwg [03-SITE PLAN] August 01, 2017 - 10:54am intern002

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
EVANS CHARLES J AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
93422 Sq. Feet
2.1447 Acres
ZONING: R-20

LOT 4
36,059 SF

LOT 3
22,558 S.F.

LOT 2
22,840 S.F.

LOT 1
29,797 S.F.

PROPOSED
KARIG PLACE
(PUBLIC ROAD-50' ROW)

EX. SEMINARY ROAD
60' RIGHT OF WAY
POSTED SPEED 25 M.P.H.

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOMASELLI PATRICK OR LINDA H
TM# 040.04-04-27

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED ANNE F TR &
THOMSON REED SUSAN G
TM# 040.04-04-28
ZONING: R-20

LOT 3 BLK 1 SEC 1 SEMINARY RIDGE
N/F GORECKI CHESTER W OR PAUL F III
TM# 040.04-04-29
ZONING: R-20

PROP. HOUSE
5,944 G.S.F.
MAX BLDG HEIGHT: 35'
FF=260.75
BF=251.75
GF=258.75

PROP. HOUSE
6,508 G.S.F.
MAX BLDG HEIGHT: 35'
FF=255.50
BF=246.50
GF=253.50

PROP. HOUSE
5,944 G.S.F.
MAX BLDG HEIGHT: 35'
FF=263.30
BF=254.30
GF=261.30

PROP. HOUSE
6,508 G.S.F.
MAX BLDG HEIGHT: 35'
FF=266.60
BF=257.60
GF=263.60

PROP. RET. WALL (MODULAR SEE SHEET 03) (MAX. HGT. = 13.25')

PROP. RET. WALL (MODULAR SEE SHEET 03) (MAX. HGT. = 6.70')

PROP. RET. WALL (MODULAR SEE SHEET 03) (MAX. HGT. = 8.99')

PROP. RET. WALL (MODULAR SEE SHEET 03) (MAX. HGT. = 0.00')

BIORETENTION "A"

BIORETENTION "B"

BIORETENTION "F"

PROP. OBSERVATION WELL

PROP. SCUPPER

PROP. ROOF DRAIN (TYP)

PROP. 4" ROOF DRAIN (TYP.)

PROP. 4" SW

PROP. CG-12A

PROP. C.O. (TYP.)

PROP. STOP SIGN

PROP. LIGHT

PROP. R.O.W. DEDI

PROP. R.O.W.

EX. 21" RCP

EX. 15" RCP

EX. 10" SAN

EX. C.L.

EX. STRIPING (TYP.)

EX. F.H.

EX. BUS STOP (RTE. AT2)

EX. R.O.W.

EX. WETLANDS

EX. POTENTIAL 50' VEGETATED AREA

APPROX SEEP LOCATION

OVERLAND RELIEF

BALCONY (FF)

DECK/PATIO (BF)

BALCONY

DECK/PATIO (BF)

17.5' BRL

25' BRL

35' BRL

40' BRL

200.66' PROP. 21" RCP

125.9' 15" RCP

142.18' 18" RCP

5.00' CL 1 RIP RAP SEE SHEET 17A

54 ADT

N34°34'54"E 132.67

N34°34'54"E 182.03'

N 34°34'54" E 621.11' (TOTAL)

N34°34'54"E 187.97'

N34°34'54"E 118.45

N 35°39'58"E 58.42'

L=54.43' R=825.54'

L=46.69'

L=22.44'

N 35°41'04" E 194.43'

S 35°40'38" W 671.53'

N 6,885,000 E 17,882,225

N 6,885,200 E 17,882,500

N 6,884,750 E 17,882,300

N 6,885,301 E 17,882,769

VA STATE GRID NORTH

NOTES:
1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAELOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
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GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED _____

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PROFESSIONAL ENGINEER
08/01/17

OVERLAND RELIEF

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= 2' DATE: AUGUST, 2017

SHEET 08

FILE No. 12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-20-OVERLAND RELIEF.dwg [03-SITE PLAN] August 01, 2017 - 10:55am intern002

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
EVANS CHARLES L AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

N 6,885,000
E 17,882,250

N 6,885,250
E 17,882,500

VA. STATE GRID NORTH

EX. BUS STOP (RTE. AT2)

EX. C.L.

11' 11' 11' 18'

60'

EX. STRIPING (TYP.)

EX. SEMINARY ROAD
60' RIGHT OF WAY
POSTED SPEED = 25 M.P.H.

EX. R.O.W.

ASPHALT

CONC. WALK

S 64°55'E 192.85'

155.00'

N 34°34'54" E 621.11'

EX. FENCE

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
9.3422 Sq. Feet
2.1447 Acres
ZONING: R-20

LOT 3 BLK 1 SEC 1 SEMINARY RIDGE
N/F GOREE LYNETTE W OR PAUL F III
TM# 040.03-04-28
ZONING: R-20

EX. 10" SAN.

N 50°52'46" W 205.04'

140.00'

511.5'

SHED

EXISTING BUILDING TO BE RAZED

SHED SHED

EXISTING BUILDINGS TO BE RAZED

RET. WALL

STEPS

WALL

CO

34.0'

2 STORY BRICK

16.0'

STOOP

29.3'

GF=256.01

UF=255.02

BW=247.51

18.9'

STEPS

WW

WW

29.3'

92.6'

GRAVEL DW

ASPHALT

EX. UNDERGROUND SEPTIC TANK

27.0'

EXISTING BUILDING TO BE RAZED

GRAVEL DW

N 35°45'53" E 656.44'

RET. WALL

POND

77.3'

65.04'

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOKARZ J PATRICK JR OR LINDA H
TM# 040.04-04-27

EX. 10" SAN.

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED ANNE E TR &
THOMSON REED STEVEN E TR
TM# 040.04-04-26
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres
ZONING: R-20

S 35°40'38" W 671.53'

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

N 6,884,750
E 17,882,500

VA. STATE GRID NORTH

A=22.44'
R=1970.00'

28'

46'

N 6,885,500
E 17,882,768

LEGEND

EX. OPENSPACE
(129,033 SF OR 94.7%)

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 in. = 30 ft.

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
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DIRECTOR DATE

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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 038798
PROFESSIONAL ENGINEER
06/07/17

EXISTING OPEN SPACE PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= N/A DATE: AUGUST, 2017

SHEET 09

FILE No. 12811

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LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
EVANS CHARLES L AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

N 6,985,000
E 17,882,250

N 6,985,250
E 17,882,500

VA. STATE GRID NORTH

EX. BUS STOP (RTE. AT2)

EX. C.L.

EX. STRIPING (TYP.)

EX. SEMINARY ROAD
60' RIGHT OF WAY
POSTED SPEED <= 25 M.P.H.

N34°34'54"E 132.67'
N34°34'54"E 182.03'
(TOTAL)
N34°34'54"E 187.97'
N34°34'54"E 118.45'

CARRIER KEATING F TR, SCHREINER DEVON A TR
D.B. 425 PG. 135
9,3422 Sq. Feet
2.1447 Acres
ZONING: R-20

(TOTAL) S55°57'46"W 327.5'

S55°57'46"E 172.79'

LOT 3 BLK 1 SEC 1 SEMINARY RIDGE
N/F CORREE LYNETTE W OR PAUL F III
TM# 040.03-04-28
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOKARZ J PATRICK OR LINDA H
TM# 040.04-04-27

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED ANNE L TR &
THOMSON REED STEVEN C TR
TM# 040.04-04-26
ZONING: R-20

LOT 4
36,059 SF

LOT 3
22,558 S.F.

LOT 2
22,840 S.F.

LOT 1
29,797 S.F.

PROP. R.O.W.

DECK/PATIO (BF)
BALCONY
PROP. HOUSE
5,944 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=260.75
BF=251.75
GF=258.75
PORCH

BALCONY (FF)
DECK/PATIO (BF)
PROP. HOUSE
5,944 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=263.30
BF=254.30
GF=261.30
PORCH

BALCONY (FF)
DECK/PATIO (BF)
PROP. HOUSE
6,508 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=266.60
BF=257.60
GF=263.60
PORCH

PROP. HVAC EQUIP. (TYP.)
PROP. HOUSE
6,508 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=255.50
BF=246.50
GF=253.50
PORCH
PATIO/DECK (BF)

PROP. 6' SW

PROP. VISION CLEARANCE TRIANGLE (TYP.)

L=29.34'
R=19.00'

PROP. CG-12A

PROP. 4' SW

54 ADT

L=5.429 R=832.534

L=4.805 R=669.244

(TOTAL)

N85°31'13"E 5.00'

CARRIER KEATING F TR, SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres
ZONING: R-20

N 6,984,750
E 17,882,330

VA. STATE GRID NORTH

PROPOSED
KARIG PLACE
(PUBLIC ROAD-50' ROW)

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

LEGEND

GROUND LEVEL OPENSPACE
(87,916 SF OR 79.02%)

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

		OPEN SPACE	
LOT □	LOT AREA □S.□.□	O□EN S□ACE □RO□IDED □S.□.□	□ O□ENS□ACE
□	□9□□9□	□4□□□9	□□.□□□
□	□□□40	□□□43	□□.□□□
3	□□□□□	□□4□□	□□.99□
4	3□□0□9	30□4□	□3.□□□
TOTAL	□□□□□4	□□9□□	□9.0□□

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR — DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. ____
DIRECTOR — DATE
CHAIRMAN, PLANNING COMMISSION — DATE
DATE RECORDED ____
INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-07-17
08-01-17

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COMMONWEALTH OF VIRGINIA
CLAYTON C. POCK
Lic. No. 036180
PROFESSIONAL ENGINEER
08-01-17

PROPOSED OPEN SPACE PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

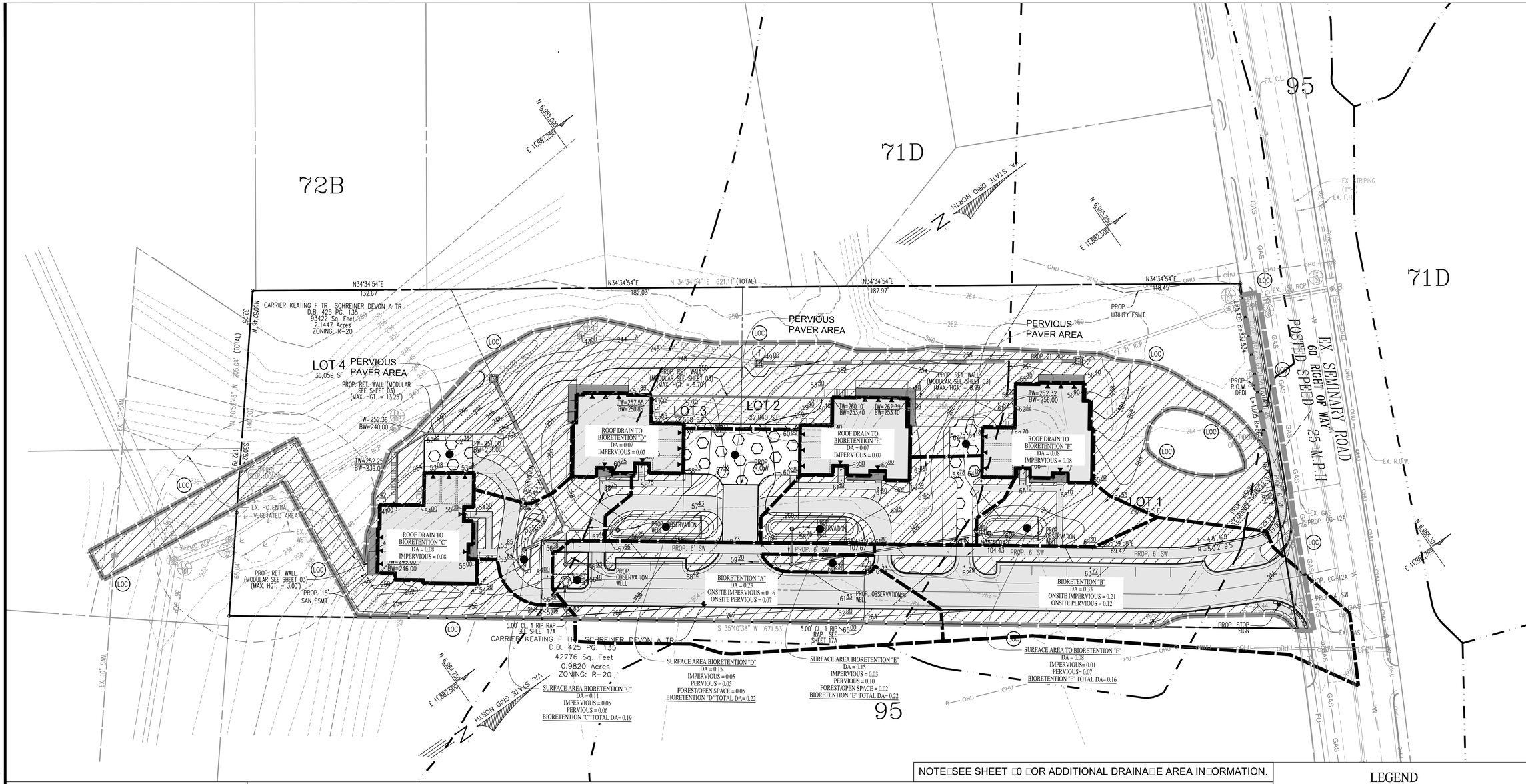
CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= N/A DATE: AUGUST, 2017

SHEET 10

FILE No. 12811

Urban, Ltd. - z:_JOBS\Seminary Road\Preliminary Site Plan\12811-16-OPEN SPACE.dwg [03-SITE PLAN] August 01, 2017 - 10:55am intern002



NOTE□SEE SHEET □0 □OR ADDITIONAL DRAINA□E AREA IN□ORMATION.

□ERCENTA□E O□ SITE AREA TREATED□ □3□□.□□ □ □9.□3□
□ERCENTA□E O□ SITE IM□ER□IOUS AREA TREATED□ 0.□□0.□□ □93.□0□

WATERSHED□STRAW□ERR□ RUN

STANDARD NOTES:

1. THE BEST MANAGEMENT PRACTICES (BMP) REQUIRED FOR THIS PROJECT SHALL BE CONSTRUCTED AND INSTALLED UNDER THE DIRECT SUPERVISION OF THE DESIGN ENGINEER OR HIS DESIGNATED REPRESENTATIVE. THE DESIGN ENGINEER SHALL MAKE A WRITTEN CERTIFICATION TO THE CITY THAT THE BMPs ARE CONSTRUCTED AND INSTALLED AS DESIGNED AND IN ACCORDANCE WITH THE APPROVED SITE PLAN. IN ADDITION, AGGREGATE LAYERS AND COLLECTOR PIPES MAY NOT BE INSTALLED UNLESS THE DESIGN ENGINEER OR HIS REPRESENTATIVE IS PRESENT.

2. THE CONTRACTOR SHALL FURNISH THE CITY WITH AN OPERATION AND MAINTENANCE MANUAL FOR ALL BMPs ON THE PROJECT. THE MANUAL SHALL INCLUDE AN EXPLANATION OF THE FUNCTIONS AND OPERATIONS OF EACH BMP AND ANY SUPPORTING UTILITIES, CATALOG CUTS ON ANY MECHANICAL OR ELECTRICAL EQUIPMENT AND A SCHEDULE OF ROUTINE MAINTENANCE FOR THE BMPS AND SUPPORTING EQUIPMENT.

BMP/SMW FACILITIES

ONSITE AREA SUMMARY TO BMP/SWM FACILITIES						
	BIORETENTION A	BIORETENTION B	BIORETENTION C	BIORETENTION D	BIORETENTION E	BIORETENTION F
FOREST/OPENSPACE				0.05	0.02	
MANAGED TURF	0.07	0.12	0.06	0.05	0.1	0.07
IMPERVIOUS COVER	0.16	0.21	0.13	0.12	0.1	0.09
RV	0.74	0.70	0.73	0.59	0.55	0.64

BMP/SWM FACILITIES GEOGRAPHIC COORDINATES						
	BIORETENTION A	BIORETENTION B	BIORETENTION C	BIORETENTION D	BIORETENTION E	BIORETENTION F
DECIMAL DEGREES LATITUDE	38.820414N	38.820629N	38.820408N	38.820568N	38.820781N	38.821083N
DECIMAL DEGREES LONGITUDE	-77.097198W	-77.097002W	-77.097443W	-77.097247W	-77.097158W	-77.096819W

BEST MANAGEMENT PRACTICES NARRATIVE

THE SUBJECT SITE IS LOCATED ON PARCELS 040.02-04-03 AND 040.02-04-04. THE ENTIRE SITE IS LOCATED WITHIN THE STRAWBERRY RUN WATERSHED. THE SUBJECT SITE WAS ZONED R-20 PER CITY OF ALEXANDRIA ZONING ORDINANCE. WORK PROPOSED WITH THIS DEVELOPMENT PLAN PERTAINS TO THE DEMOLITION OF AN EXISTING HOUSE AND GRAVEL DRIVEWAY AND CONSTRUCT 4 SINGLE FAMILY DWELLINGS, ASSOCIATED INFRASTRUCTURE, AND A PUBLIC ROAD.

DUE TO INCREASE IN IMPERVIOUS AREA, BMP'S ARE REQUIRED FOR THIS SITE TO MEET TOTAL PHOSPHORUS REMOVAL RATE PER THE VIRGINIA RUNOFF REDUCTION METHOD REDEVELOPMENT WORKSHEET. COMPLIANCE SHALL BE MET WITH THE USE OF LEVEL 2 BIORETENTIONS AND PERMEABLE PAVEMENT.

THE TARGET REDUCTION WAS MET WITH A 0.11 LB/YR EXCEEDANCE. SEE SHEET 12-14 FOR COMPUTATIONS.

REQUIRED REDUCTION IN PHOSPHORUS LOADS: PER VRRM REDEVELOPMENT COMPLIANCE SPREADSHEET

PRE REDEVELOPMENT IMPERVIOUS AREA = 0.20 AC.
PRE REDEVELOPMENT LOAD (TP) = 0.87 LB/YR

POST REDEVELOPMENT IMPERVIOUS AREA = 0.87 AC.
POST REDEVELOPMENT LOAD (TP) = 0.81 LB/YR

ANY WATER QUALITY VOLUME ONSITE WHICH IS NOT DETAINED SHALL BE PAID WITH REQUIRED FEES IN LIEU OF, IN ACCORDANCE WITH MEMORANDUM NO.04-08 AND SECTION 13-110 OF ARTICLE XIII OF THE CITY'S ZONING ORDINANCE.

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

LEGEND

SOILS
ONSITE IMPERVIOUS AREA
ONSITE MANAGED TURF AREA

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

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DIRECTOR DATE

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CLAYTON C. TUCK
Lic. No. 056796
PROFESSIONAL ENGINEER
06-01-17

BMP PLAN & NARRATIVE

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017
SCALE: 1"=30'
C.I.= N/A

SHEET 11

FILE No. 12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-22-BMP.dwg [03-SITE PLAN] August 01, 2017 - 10:55am intern002

DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - Version 3.0

Project Name: Semminary Road
Date: 5/22/2017
Linear Development Project? No

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area (acres) → 2.26

Maximum reduction required: 20%
The site's net increase in impervious cover (acres) is: 0.67
Post-Development TP Load Reduction for Site (lb/yr): 1.71

BMP Design Specifications List: 2011 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, protected forest/open space or reforested land				1.62	1.62
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed				0.44	0.44
Impervious Cover (acres)				0.20	0.20
					2.26

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 land				0.10	0.10	*
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed				1.29	1.29	
Impervious Cover (acres)				0.87	0.87	
Area Check	OK.	OK.	OK.	OK.	2.26	

* Forest/Open Space areas must be protected in accordance with the Virginia Runoff Reduction Method

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)	1.62	0.95
Weighted Rv(forest)	0.05	0.05
% Forest	72%	60%
Managed Turf Cover (acres)	0.44	0.44
Weighted Rv(turf)	0.25	0.25
% Managed Turf	19%	28%
Impervious Cover (acres)	0.20	0.20
Rv(impervious)	0.95	0.95
% Impervious	9%	13%
Total Site Area (acres)	2.26	1.59
Site Rv	0.17	0.22
Treatment Volume and Nutrient Load		
Pre-ReDevelopment Treatment Volume (acre-ft)	0.0318	0.0290
Pre-ReDevelopment Treatment Volume (cubic feet)	1,383	1,261
Pre-ReDevelopment TP Load (lb/yr)	0.87	0.79 *
Pre-ReDevelopment TP Load per acre (lb/acre/yr)	0.38	0.50 *
Baseline TP Load (lb/yr) (0.41 lbs/acre/yr applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)		0.65

LAND COVER SUMMARY -- POST DEVELOPMENT

Land Cover Summary-Post (Final)	
Post ReDev. & New Impervious	
Forest/Open Space Cover (acres)	0.10
Weighted Rv(forest)	0.05
% Forest	4%
Managed Turf Cover (acres)	1.29
Weighted Rv (turf)	0.25
% Managed Turf	57%
Impervious Cover (acres)	0.87
Rv(impervious)	0.95
% Impervious	38%
Final Site Area (acres)	2.26
Final Post Dev Site Rv	0.51
Treatment Volume and Nutrient Load	
Final Post-Development Treatment Volume (acre-ft)	0.0962
Final Post-Development Treatment Volume (cubic feet)	4,189
Final Post-Development TP Load (lb/yr)	2.63
Final Post-Development TP Load per acre (lb/acre/yr)	1.16

Land Cover Summary-Post	
Post-ReDevelopment	
Forest/Open Space Cover (acres)	0.10
Weighted Rv(forest)	0.05
% Forest	6%
Managed Turf Cover (acres)	1.29
Weighted Rv (turf)	0.25
% Managed Turf	81%
ReDev. Impervious Cover (acres)	0.20
Rv(impervious)	0.95
% Impervious	13%
Total ReDev. Site Area (acres)	1.59
ReDev Site Rv	0.33
Post-ReDevelopment Treatment Volume (acre-ft)	0.0431
Post-ReDevelopment Treatment Volume (cubic feet)	1,879
Post-ReDevelopment Load (TP) (lb/yr)*	1.18 *
Post-ReDevelopment TP Load per acre (lb/acre/yr)	0.74
Max. Reduction Required (Below Pre-ReDevelopment Load)	20%
TP Load Reduction Required for Redeveloped Area (lb/yr)	0.53 *

Land Cover Summary-Post	
Post-Development New Impervious	
New Impervious Cover (acres)	0.67
Rv(impervious)	0.95
Post-Development Treatment Volume (acre-ft)	0.0530
Post-Development Treatment Volume (cubic feet)	2,310
Post-Development TP Load (lb/yr)	1.45
TP Load Reduction Required for New Impervious Area (lb/yr)	1.18

[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).

* Reduction below new development load limitation not required

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	1.71
Linear Project TP Load Reduction Required (lb/yr):	N/A

Nitrogen Loads (Informational Purposes Only)

Pre-ReDevelopment TN Load (lb/yr)	6.22	Final Post-Development TN Load (Post-ReDevelopment & New Impervious) (lb/yr)	18.83

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	0.07	0.00	0.00	0.00	OK.
IMPERVIOUS COVER (ac)	0.37	0.44	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED (ac)	0.37	0.44	0.00	0.00	0.00	OK.
MANAGED TURF AREA (ac)	0.19	0.28	0.00	0.00	0.00	OK.
MANAGED TURF AREA TREATED (ac)	0.19	0.28	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	

Site Treatment Volume (ft^3) 4,189

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)	1,159	1,417	0	0	0	2,576
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	0.91	1.11	0.00	0.00	0.00	2.02
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.82	1.00	0.00	0.00	0.00	1.82
TP LOAD REMAINING (lb/yr)	0.09	0.11	0.00	0.00	0.00	0.20
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	5.98	7.28	0.00	0.00	0.00	13.30

Total Phosphorus

FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	2.63
TP LOAD REDUCTION REQUIRED (lb/yr)	1.71
TP LOAD REDUCTION ACHIEVED (lb/yr)	1.82
TP LOAD REMAINING (lb/yr):	0.81
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.00 **

** TARGET TP REDUCTION EXCEEDED BY 0.11 LB/YEAR **

LINEAR PROJECT:

Total Nitrogen (For Information Purposes)

POST-DEVELOPMENT LOAD (lb/yr)	18.83
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	13.30
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	5.53

BEST MANAGEMENT PRACTICES COMPUTATIONS

WORKSHEET B: REDEVELOPMENT

1. Compile site-specific data and determine site imperviousness (Isite).

		PRE-DEVELOPMENT			POST-DEVELOPMENT		
A	Site	= 2.26	acres	Site	= 2.26	acres	
Ia	STRUCTURES	= 0.04	acres	STRUCTURES	= 0.34	acres	
	ASPHALT	= 0.14	acres	ASPHALT	= 0.41	acres	
	SIDEWALK	= 0.02	acres	SIDEWALK	= 0.12	acres	
	Total Ia	= 0.20	acres	Total Ia	= 0.87	acres	

Isite = (Total Ia/A) x 100 = 8.84 (percent expressed in whole numbers) 38.50 (percent expressed in whole numbers)

Rv = 0.05+(0.009 x I)
Rv-pre = 0.12956 unitless Rv-post = 0.3965 unitless

C = 0.26 mg/l when Isite < 20
C = 1.08 mg/l when Isite ≥ 20

*A is the total area of the site
**Ia is the total impervious cover on the site

2. Calculate the pre-development load (Lpre).

Lpre = 8.16 x Rv-pre x C x A
= 0.62 pounds per year

WORKSHEET B: REDEVELOPMENT

3. Calculate the post-development load (Lpost).

Lpost = 8.16 x Rv-post x C x A
= 7.896 pounds per year

4. Calculate the pollutant removal requirement (RR).

RR = Lpost - (0.9 x Lpre)
= 7.338 pounds per year

To determine the overall BMP efficiency required (%RR) when selecting BMP options:

%RR = RR/Lpost x 100
= 92.93 %

Revised: July 8, 2002

In addition to BMP worksheets found in the BMP handbook that required to be included for the project, the following tables must also be included and submitted in the final plans.

Project Description

Development or **(Redevelopment)**

Drainage Area	Impervious	Pervious	Total
Site Area	0.□□	□39	□.□□
On-Site Treated	0.□□	0.□4	□.3□
Off-Site Treated	0	0	0
Total Treated	0	0	□.3□
On-Site Impervious Areas Disconnected by a Vegetated Buffer			
Total Treated or Disconnected			□.3□

Water Treatment on site

BMP Type	*Area treated by BMP (acres)*	*Impervious area treated by BMP (acres)*	*BMP efficiency (%)*
BIORETENTION	□.3□	0.□□	□0□

Miscellaneous

Total WQV treated: *yes* (*no*)
Detention on site: (*yes*) *no*

Project is within which watershed? STRAWBERRY RUN
Project discharges to which body of water? CAMERON RUN

* A REQUEST SHALL BE MADE TO ADDRESS THE UNTREATED VOLUME THROUGH A CONTRIBUTION TO THE WATER QUALITY IMPROVMENT FUND PER SECTION 13-110 OF THE ZONING ORDINANCE..

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

WATERSHED: STRAWBERRY RUN

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BMP COMPUTATIONS
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
DATE: AUGUST, 2017
SCALE: N/A C.I.= N/A

SHEET 12
FILE No. 12811

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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
Managed Turf (acres)				0.19	0.19	0.25
Impervious Cover (acres)				0.37	0.37	0.95
				Total	0.56	

Total Phosphorus Available for Removal in D.A. A (lb/yr)	0.91
Post Development Treatment Volume in D.A. A (ft^3)	1,448

Stormwater Best Management Practices (RR = Runoff Reduction)

--Select from dropdown lists--

6. Bioretention (RR)	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	Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40			0	0	0	0	25	0.00	0.00	0.00	0.00		40	0.00	0.00	0.00	0.00
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80	0.19	0.37	0	1,159	290	1,448	50	0.00	0.91	0.82	0.09		60	0.00	6.50	5.98	0.52

TOTAL IMPERVIOUS COVER TREATED (ac) 0.37 AREA CHECKOK.
TOTAL MANAGED TURF AREA TREATED (ac) 0.19 AREA CHECKOK.

TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	1.71
TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr)	0.91
TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.00
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.82
TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr)	0.82
TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr)	0.09

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	5.98
NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr)	0.00
TOTAL NITROGEN REMOVED IN D.A. A (lb/yr)	5.98

☐IORETENTION "A" RCN CALCULATION

Drainage Area A		A Soils	B Soils	C Soils	D Soils
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.00	0.00	0.00
	CN	30	55	70	77
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.00	0.00	0.19
	CN	39	61	74	80
Impervious Cover	Area (acres)	0.00	0.00	0.00	0.37
	CN	98	98	98	98

$CN_{D.A.\ A}$ = 92

	1-year storm	2-year storm	10-year storm
$RV_{Developed}$ *(watershed-inch)* with no Runoff Reduction*	1.88	2.35	4.28
$RV_{Developed}$ *(watershed-inch)* with Runoff Reduction*	1.31	1.78	3.71
Adjusted CN*	**84**	**85**	**86**

Total Area (acres):	0.56
Runoff Reduction Volume (ft^3):	1,159

Drainage Area B

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)				0.07	0.07	0.05
Managed Turf (acres)				0.28	0.28	0.25
Impervious Cover (acres)				0.44	0.44	0.95
				Total	0.79	

Total Phosphorus Available for Removal in D.A. B (lb/yr)	1.11
Post Development Treatment Volume in D.A. B (ft^3)	1,771

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	Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40			0	0	0	0	0	0	0	0	0		40	0	0	0	0
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80	0.28	0.44	0	1,417	354	1,771	50	0	1.11	1.0	0.11		60	0	7.95	7.32	0.64

TOTAL IMPERVIOUS COVER TREATED (ac) 0.44 AREA CHECKOK.
TOTAL MANAGED TURF AREA TREATED (ac) 0.28 AREA CHECKOK.

TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr)	1.71
TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. B (lb/yr)	1.11
TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr)	0.00
TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr)	1.00
TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. B (lb/yr)	1.00
TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. B (lb/yr)	0.11

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr)	7.32
NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr)	0.00
TOTAL NITROGEN REMOVED IN D.A. B (lb/yr)	7.32

☐IORETENTION "☐" RCN CALCULATION

Drainage Area B		A Soils	B Soils	C Soils	D Soils
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.00	0.00	0.07
	CN	30	55	70	77
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.00	0.00	0.28
	CN	39	61	74	80
Impervious Cover	Area (acres)	0.00	0.00	0.00	0.44
	CN	98	98	98	98

$CN_{D.A.\ B}$ = 90

	1-year storm	2-year storm	10-year storm
$RV_{Developed}$ *(watershed-inch)* with no Runoff Reduction*	1.71	2.17	4.07
$RV_{Developed}$ *(watershed-inch)* with Runoff Reduction*	1.22	1.67	3.58
Adjusted CN*	**83**	**84**	**85**

Total Area (acres):	0.79
Runoff Reduction Volume (ft^3):	1,417

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

WATERSHED: STRAWBERRY RUN

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

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CHAIRMAN, PLANNING COMMISSION _____ DATE _____
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08-01-17

BMP COMPUTATIONS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017
C.I.= N/A
SCALE: N/A

SHEET 13

FILE No. 12811

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DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - Version 3.0

Project Name: Semminary Road
Date: 5/23/2017
Linear Development Project? No

Site Information

Post-Development Project (Treatment Volume and Loads)

Enter Total Disturbed Area (acres) → 3.13

Check: ####
BMP Design Specifications List: 2011 Stds & Specs
Linear project? No

Maximum reduction required: 20%
The site's net increase in impervious cover (acres) is: 0.67
Post-Development TP Load Reduction for Site (lb/yr): 1.45

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, protected forest/open space or reforested land				2.49	2.49
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed				0.44	0.44
Impervious Cover (acres)				0.20	0.20
					3.13

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 land				0.97	0.97	*
Managed Turf (acres) -- disturbed, graded for yards or other turf to be mowed/managed				1.29	1.29	
Impervious Cover (acres)				0.87	0.87	
Area Check	OK.	OK.	OK.	OK.	3.13	

* Forest/Open Space areas must be protected in accordance with the Virginia Runoff Reduction Method

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)	2.49	1.82
Weighted Rv(forest)	0.05	0.05
% Forest	80%	74%
Managed Turf Cover (acres)	0.44	0.44
Weighted Rv(turf)	0.25	0.25
% Managed Turf	14%	18%
Impervious Cover (acres)	0.20	0.20
Rv(impervious)	0.95	0.95
% Impervious	6%	8%
Total Site Area (acres)	3.13	2.46
Site Rv	0.14	0.16

Treatment Volume and Nutrient Load

Pre-ReDevelopment Treatment Volume (acre-ft)	0.0354	0.0326
Pre-ReDevelopment Treatment Volume (cubic feet)	1,541	1,419
Pre-ReDevelopment TP Load (lb/yr)	0.97	0.89 *
Pre-ReDevelopment TP Load per acre (lb/acre/yr)	0.31	0.36 *
Baseline TP Load (lb/yr) (0.41 lbs/acre/yr applied to pre-redevelopment area excluding pervious land proposed for new impervious cover)		1.01

[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)	0.97
Weighted Rv(forest)	0.05
% Forest	31%
Managed Turf Cover (acres)	1.29
Weighted Rv (turf)	0.25
% Managed Turf	41%
Impervious Cover (acres)	0.87
Rv(impervious)	0.95
% Impervious	28%
Final Site Area (acres)	3.13
Final Post Dev Site Rv	0.38

Land Cover Summary-Post	
Post-ReDevelopment	
Forest/Open Space Cover (acres)	0.97
Weighted Rv(forest)	0.05
% Forest	39%
Managed Turf Cover (acres)	1.29
Weighted Rv (turf)	0.25
% Managed Turf	52%
ReDev. Impervious Cover (acres)	0.20
Rv(impervious)	0.95
% Impervious	8%
Total ReDev. Site Area (acres)	2.46
ReDev Site Rv	0.23

Land Cover Summary-Post	
Post-Development New Impervious	
New Impervious Cover (acres)	0.67
Rv(impervious)	0.95

Treatment Volume and Nutrient Load

Final Post-Development Treatment Volume (acre-ft)	0.0998	Post-ReDevelopment Treatment Volume (acre-ft)	0.0468	Post-Development Treatment Volume (acre-ft)	0.0530
Final Post-Development Treatment Volume (cubic feet)	4,347	Post-ReDevelopment Treatment Volume (cubic feet)	2,036	Post-Development Treatment Volume (cubic feet)	2,310
Final Post-Development TP Load (lb/yr)	2.73 *	Post-ReDevelopment Load (TP) (lb/yr)*	1.28	Post-Development TP Load (lb/yr)	1.45
Final Post-Development TP Load per acre (lb/acre/yr)	0.87	Post-ReDevelopment TP Load per acre (lb/acre/yr)	0.52		
		Max. Reduction Required (Below Pre-ReDevelopment Load)	20%		
		TP Load Reduction Required for Redeveloped Area (lb/yr)	* 0.27	TP Load Reduction Required for New Impervious Area (lb/yr)	1.18

* Reduction below new development load limitation not required

Post-Development Requirement for Site Area

TP Load Reduction Required (lb/yr)	1.45
Linear Project TP Load Reduction Required (lb/yr):	N/A

Nitrogen Loads (Informational Purposes Only)

Pre-ReDevelopment TN Load (lb/yr)	6.93	Final Post-Development TN Load (Post-ReDevelopment & New Impervious) (lb/yr)	19.54

ENVIRONMENTAL MANAGEMENT ORDINANCE COMPLIANCE NARRATIVE

THE SUBJECT SITE LOCATED ON PARCELS 040.02-04-03 AND 040.02-04-04 TOTALS 3.13 ACRES. THE ENTIRE SITE SHALL BE IN COMPLIANCE WITH SECTION 13-109(E)(6) OF THE ENVIRONMENTAL MANAGEMENT ORDINANCE. COMPLIANCE SHALL BE MET WITH THE USE OF LEVEL 2 BIORETENTIONS AND PERMEABLE PAVERS.

THE TARGET REDUCTION OF 0.41(LB/(YR*AC)) IS MET WITH A 0.37 LB/YR EXCEEDANCE. SEE CALCULATIONS BELLOW.

REQUIRED REDUCTION IN PHOSPHORUS LOADS: PER SECTION 13-109 OF THE ENVIRONMENTAL MANAGEMENT ORDINANCE

TARGET REDUCTION = 3.13 AC. * 0.41(LB/(YR*AC)) = 1.28 LB/YR
POST REDEVELOPMENT LOAD (LB/YR) = 0.91 LB/YR

1.28 LB/YR ≥ 0.91 LB/YR THEREFORE ORDINANCE 13-109(E)(6) IS SATISFIED

ADDITIONAL, AS A CONSERVATIVE MEASURE, THE ENTIRE 3.13 AC. SITE HAS BEEN CALCULATED WITH THE 0.41(LB/(YR*AC)) REQUIREMENT OF NEW DEVELOPMENT.

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	0.07	0.00	0.00	0.00	OK.
IMPERVIOUS COVER (ac)	0.37	0.44	0.00	0.00	0.00	OK.
IMPERVIOUS COVER TREATED (ac)	0.37	0.44	0.00	0.00	0.00	OK.
MANAGED TURF AREA (ac)	0.19	0.28	0.00	0.00	0.00	OK.
MANAGED TURF AREA TREATED (ac)	0.19	0.28	0.00	0.00	0.00	OK.
AREA CHECK	OK.	OK.	OK.	OK.	OK.	

Site Treatment Volume (ft^3) 4,347

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)	1,159	1,417	0	0	0	2,576
TP LOAD AVAILABLE FOR REMOVAL (lb/yr)	0.91	1.11	0.00	0.00	0.00	2.02
TP LOAD REDUCTION ACHIEVED (lb/yr)	0.82	1.00	0.00	0.00	0.00	1.82
TP LOAD REMAINING (lb/yr)	0.09	0.11	0.00	0.00	0.00	0.20
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	5.98	7.32	0.00	0.00	0.00	13.30

Total Phosphorus

FINAL POST-DEVELOPMENT TP LOAD (lb/yr)	2.73
TP LOAD REDUCTION REQUIRED (lb/yr)	1.45
TP LOAD REDUCTION ACHIEVED (lb/yr)	1.82
TP LOAD REMAINING (lb/yr):	0.91
REMAINING TP LOAD REDUCTION REQUIRED (lb/yr):	0.00 **

** TARGET TP REDUCTION EXCEEDED BY 0.37 LB/YEAR **

LINEAR PROJECT:
☐OST DE☐ELO☐MENT
☐HOS☐HORUS LOAD

Total Nitrogen (For Information Purposes)

POST-DEVELOPMENT LOAD (lb/yr)	19.54
NITROGEN LOAD REDUCTION ACHIEVED (lb/yr)	13.30
REMAINING POST-DEVELOPMENT NITROGEN LOAD (lb/yr)	6.24

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

WATERSHED: STRAWBERRY RUN

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I HEREBY CERTIFY THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE COMMONWEALTH OF VIRGINIA
CLAYTON C. TUCK
Lic. No. 036790
06-01-17
PROFESSIONAL ENGINEER

BMP COMPUTATIONS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017
C.I.= N/A
SCALE: N/A

SHEET 14

FILE No. 12811

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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
Managed Turf (acres)				0.19	0.19	0.25
Impervious Cover (acres)				0.37	0.37	0.95
				Total	0.56	

Total Phosphorus Available for Removal in D.A. A (lb/yr): 0.91

Post Development Treatment Volume in D.A. A (ft^3): 1,448

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
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40			0	0	0	0	25	0.00	0.00	0.00	0.00	
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80	0.19	0.37	0	1,159	290	1,448	50	0.00	0.91	0.82	0.09	

Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
40	0.00	0.00	0.00	0.00
60	0.00	6.50	5.98	0.52

Drainage Area A		A Soils	B Soils	C Soils	D Soils
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.00	0.00	0.00
	CN	30	55	70	77
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.00	0.00	0.19
	CN	39	61	74	80
Impervious Cover	Area (acres)	0.00	0.00	0.00	0.37
	CN	98	98	98	98

$CN_{D.A. A}$: 92

	1-year storm	2-year storm	10-year storm
$RV_{Developed}$ *(watershed-inch)* with no Runoff Reduction*	1.88	2.35	4.28
$RV_{Developed}$ *(watershed-inch)* with Runoff Reduction*	1.31	1.78	3.71
Adjusted CN*	**84**	**85**	**86**

Total Area (acres): 0.56

Runoff Reduction Volume (ft^3): 1,159

TOTAL IMPERVIOUS COVER TREATED (ac): 0.37 AREA CHECK: OK.

TOTAL MANAGED TURF AREA TREATED (ac): 0.19 AREA CHECK: OK.

TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr): 1.45

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. A (lb/yr): 0.91

TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr): 0.00

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr): 0.82

TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. A (lb/yr): 0.82

TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. A (lb/yr): 0.09

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. A (lb/yr): 5.98

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

TOTAL NITROGEN REMOVED IN D.A. A (lb/yr): 5.98

Drainage Area B

Drainage Area A Land Cover (acres)

	A Soils	B Soils	C Soils	D Soils	Totals	Land Cover Rv
Forest/Open Space (acres)				0.07	0.07	0.05
Managed Turf (acres)				0.28	0.28	0.25
Impervious Cover (acres)				0.44	0.44	0.95
				Total	0.79	

Total Phosphorus Available for Removal in D.A. B (lb/yr): 1.11

Post Development Treatment Volume in D.A. B (ft^3): 1,771

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
6.a. Bioretention #1 or Micro-Bioretention #1 or Urban Bioretention (Spec #9)	40			0	0	0	0	25	0.00	0.00	0.00	0.00	
6.b. Bioretention #2 or Micro-Bioretention #2 (Spec #9)	80	0.28	0.44	0	1,417	354	1,771	50	0.00	1.11	1.00	0.11	

Nitrogen Removal Efficiency (%)	Nitrogen Load from Upstream Practices (lbs)	Untreated Nitrogen Load to Practice (lbs)	Nitrogen Removed By Practice (lbs)	Remaining Nitrogen Load (lbs)
40	0.00	0.00	0.00	0.00
60	0.00	7.95	7.32	0.64

Drainage Area B		A Soils	B Soils	C Soils	D Soils
Forest/Open Space -- undisturbed, protected forest/open space or reforested land	Area (acres)	0.00	0.00	0.00	0.07
	CN	30	55	70	77
Managed Turf -- disturbed, graded for yards or other turf to be mowed/managed	Area (acres)	0.00	0.00	0.00	0.28
	CN	39	61	74	80
Impervious Cover	Area (acres)	0.00	0.00	0.00	0.44
	CN	98	98	98	98

$CN_{D.A. B}$: 90

	1-year storm	2-year storm	10-year storm
$RV_{Developed}$ *(watershed-inch)* with no Runoff Reduction*	1.71	2.17	4.07
$RV_{Developed}$ *(watershed-inch)* with Runoff Reduction*	1.22	1.67	3.58
Adjusted CN*	**83**	**84**	**85**

Total Area (acres): 0.79

Runoff Reduction Volume (ft^3): 1,417

TOTAL IMPERVIOUS COVER TREATED (ac): 0.44 AREA CHECK: OK.

TOTAL MANAGED TURF AREA TREATED (ac): 0.28 AREA CHECK: OK.

TOTAL PHOSPHORUS REMOVAL REQUIRED ON SITE (lb/yr): 1.45

TOTAL PHOSPHORUS AVAILABLE FOR REMOVAL IN D.A. B (lb/yr): 1.11

TOTAL PHOSPHORUS REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr): 0.00

TOTAL PHOSPHORUS REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr): 1.00

TOTAL PHOSPHORUS LOAD REDUCTION ACHIEVED IN D.A. B (lb/yr): 1.00

TOTAL PHOSPHORUS REMAINING AFTER APPLYING BMP LOAD REDUCTIONS IN D.A. B (lb/yr): 0.11

SEE WATER QUALITY COMPLIANCE TAB FOR SITE COMPLIANCE CALCULATIONS

NITROGEN REMOVED WITH RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr): 7.32

NITROGEN REMOVED WITHOUT RUNOFF REDUCTION PRACTICES IN D.A. B (lb/yr): 0.00

TOTAL NITROGEN REMOVED IN D.A. B (lb/yr): 7.32

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

WATERSHED: STRAWBERRY RUN

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

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SITE PLAN NO.

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

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PROFESSIONAL ENGINEER
08/2017

BMP COMPUTATIONS

KARIG ESTATES

DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017

SCALE: 1"=30' C.I.= 2'

SHEET 14A

FILE No. 12811

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Per Table 9.4 Bioretention "A" Filter and Basin Design Criteria

Standards: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	[(1.25)(Rv)(A) / 12] + any remaining volume from upstream BMP
Surface Area (sq. ft.) =	Tv_{BMP} /Storage Depth[1]
Recommended max. contributing drainage area =	2.5 acres
Max. Ponding Depth =	6 to 12 inches[2]
Filter Media Depth min. =	36 inches
recommended max. =	48 inches
Media & Surface Cover (Section 6.6) =	supplied by vendor; tested for acceptable phosphorous index (P-index) of between 10 and 30; OR between 7 and 21 mg/kg of P in the soil media
Sub-soil Testing (Section 6.2) =	One per 1,000 sq. ft. of filter surface; Min infiltration rate > 1/2 inch/hour in order to remove the underdrain requirement.
Underdrain (Section 6.7) =	Schedule 40 PVC with clean-outs, and minimum 12-inch stone sump below the invert; OR, none, if soil infiltration requirements are met
Inflow =	sheetflow, curb cuts, trench drains, concentrated flow, or the equivalent
Geometry (Section 6.3)=	Length of shortest flow/Overall length=0.8 or greater; OR, other design methods used to prevent short-circuiting; a one-cell design (not including the pretreatment cell)
Pre-treatment (Section 6.4) =	a pretreatment cell plus one of the following: a grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment structure
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	a planting template to include turf, herbaceous vegetation, shrubs, and/or trees to achieve surface area coverage of at least 90% within 2 years. If using turf, must combine with other types of vegetation.
Building Setbacks[3] (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

Provided: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	See this sheet for $Tv_{BMP-req}$ computations
Surface Area (sq. ft.) =	301 sq.ft. > 257 sq. ft. (See this sheet for computations on required SA)
Contributing drainage area =	0.23 acres
Ponding Depth =	12 inches
Filter Media Depth =	36 inches
Media & Surface Cover (Section 6.6) =	Supplied by vendor
Sub-soil Testing (Section 6.2) =	See the geotechnical report in this plan for the results of the infiltration tests.
Underdrain (Section 6.7) =	Not needed, infiltration = 0.6 in/hr. >= 0.5 in/hr.
Inflow =	Concentrated flow
Geometry (Section 6.3)=	N/A, Outlet structure is raised above the filter surface to the ponding depth elevation.
Pre-treatment (Section 6.4) =	Gravel Flow Spreader
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	
Building Setbacks3 (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

[1] Storage Depth is the sum of the porosity (η) of the soil media and gravel layers multiplied by their respective depths, plus the surface ponding depth. Refer to Section 6.1.

[2] A ponding depth of 6 inches is preferred. Ponding depths greater than 6 inches will require a specific planting plan to ensure appropriate plant selection (Section 6.8).

[3] There are the recommendations for simple building foundations. If an in-ground basement or other special conditions exist, the design should be reviewed by a licensed engineer. Also, a Special footing or drainage design may be used to justify a reduction of the setbacks noted above.

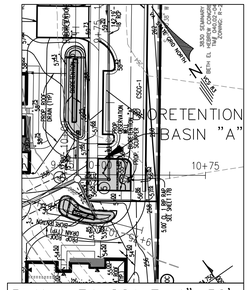
BIORETENTION "A" COMPUTATIONS

EQUATION 9.1. BIORETENTION LEVEL 2 DESIGN STORAGE DEPTH				
FILTER MEDIA DEPTH =	3	FT	η=	0.25
GRAVEL DEPTH =	2	FT	η=	0.4
MAX PONDING DEPTH =	1	FT	η=	1
DESIGN STORAGE DEPTH =	2.55	FT		
EQUATION 9.4 BIORETENTION LEVEL 2 DESIGN SURFACE AREA				
DRAINAGE AREA =	10019	SF		
Rv (COMPOSITE RUNOFF COEFFICIENT) =	0.74			
VOLUME REDUCED BY UPSTREAM BMP =	0	CF		
T_V BMP REQ. =	772	CF		
MIN SURFACE AREA =	257	SF		
PROPOSED SURFACE AREA =	301	SF		
TOTAL TREATMENT VOLUME PROVIDED =	897	CF		
PRETREATMENT CELL SIZING				
MIN RE□D □RETREATMENT CELL □OLUME	□□□	C□	□□□ O□RE□UIRED T□	
□RO□D □RETREATMENT CELL □OLUME	□9	C□		

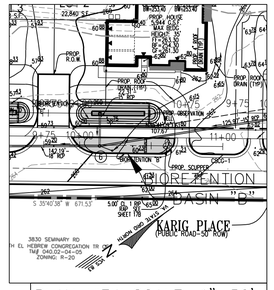
BIORETENTION "A" DESIGN ELEVATIONS

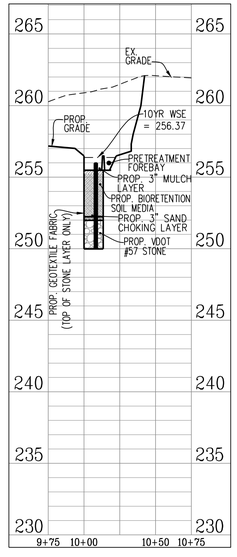
BIORETENTION DESIGN ELEVATIONS		
TOP OF MULCH	255.48	FT
TOP OF BIORETENTION SOIL MEDIA	255.23	FT
TOP OF CHOKING LAYER	252.23	FT
TOP OF GRAVEL	251.98	FT
BOTTOM OF GRAVEL	249.98	FT
STR 5 THROAT ELEVATION	255.98	FT
STR 5 INVERT ELEVATION	249.98	FT
TOP OF EMBANKMENT	256.48	FT
1-YEAR WSE	256.00	FT
2-YEAR WSE	256.11	FT
10-YEAR WSE	256.24	FT
100-YEAR WSE	*256.37*	*FT*

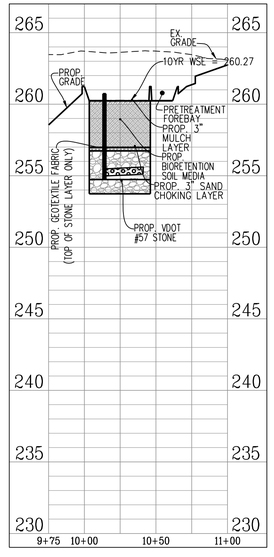
BIORETENTION "A" PLAN VIEW



BIORETENTION "B" PLAN VIEW







BIORETENTION "A" RUNOFF COMPUTATIONS

RUNOFF COMPUTATIONS			
C=	0.72	C=	0.72
I1=	2.7	I2=	3.2
A=	0.230 AC	A=	0.230 AC
Q1=CIA=	**0.447 CFS**	**Q2=CIA=**	**0.530 CFS**
C=	0.72	C=	0.72
I10=	5.2	I100=	8.2
A=	0.230 AC	A=	0.230 AC
Q10=CIA=	**0.861 CFS**	**Q100=CIA=**	**1.358 CFS**

BIORETENTION "A" FOREBAY VOLUME

BIORETENTION "A" - forebay STORAGE-ELEVATION CHART							
ELE□ATION (□□□)	AREA (□□□)	A□ERA□E AREA (□□□)	INT (□□□)	□OL (□□□)	ACCUM. □OL. (□□□)	ACCUM. □OL. (□c.□□□)	ACCUM. □OL. (□d□)
□□□.4□	□□						
□□□.4□	□□□	□□9	□.00	□□9	□□9	0.0030	4.□□

BIORETENTION BMP NARRATIVE

WATER QUALITY CONTROL REQUIREMENTS ARE PROVIDED FOR THE PUBLIC ROADWAY PORTION OF THE SITE WITH TWO BIORETENTIONS. THE BIORETENTIONS HAVE BEEN SIZED AND DESIGNED IN ACCORDANCE WITH THE SOILS C AND D DESIGN REQUIREMENTS OUTLINED IN VIRGINIA DCR STORMWATER DESIGN SPECIFICATION NO.9 AS SHOWN IN THE COMPUTATIONS BELOW.

THE BIORETENTIONS WILL BE 5 FEET DEEP WITH UP TO 1 FOOT OF WET STORAGE AREA. A FULL ROUTING OF THE 10-YEAR STORM ALONG WITH ADDITIONAL NOTES AND COMPUTATIONS CAN BE FOUND ON SHEET 21.

MAINTENANCE STATEMENT

THE PROPOSED BEST MANAGEMENT FACILITIES (BIORETENTION) WILL BE PRIVATELY OWNED AND MAINTAINED. VIRGINIA'S STORMWATER MANAGEMENT REGULATIONS REQUIRE INSPECTIONS TWICE A YEAR, AND AFTER ANY STORM THAT EXCEEDS THE CAPACITY OF THE FACILITY TO ENSURE THAT THE FACILITY REMAINS OPERATIONAL. A DETAILED INSPECTION SHALL BE PERFORMED ANNUALLY BY A QUALIFIED PROFESSIONAL TO ENSURE THAT THE FACILITY IS OPERATING AS DESIGNED, AND TO PROVIDE AN OPPORTUNITY TO SCHEDULE ANY MAINTENANCE THAT THE FACILITY MAY REQUIRE. SEE SHEET 18 FOR MAINTENANCE PROGRAM AND INSPECTION REQUIREMENTS. ADDITIONAL MAINTENANCE REQUIREMENTS CAN BE FOUND IN THE MOST RECENT VERSIONS OF THE VIRGINIA DCR STORMWATER DESIGN SPECIFICATION NO. 9.

Per Table 9.4 Bioretention "B" Filter and Basin Design Criteria

Standards: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	[(1.25)(Rv)(A) / 12] + any remaining volume from upstream BMP
Surface Area (sq. ft.) =	Tv_{BMP} /Storage Depth[1]
Recommended max. contributing drainage area =	2.5 acres
Max. Ponding Depth =	6 to 12 inches[2]
Filter Media Depth min. =	36 inches
recommended max. =	48 inches
Media & Surface Cover (Section 6.6) =	supplied by vendor; tested for acceptable phosphorous index (P-index) of between 10 and 30; OR between 7 and 21 mg/kg of P in the soil media
Sub-soil Testing (Section 6.2) =	One per 1,000 sq. ft. of filter surface; Min infiltration rate > 1/2 inch/hour in order to remove the underdrain requirement.
Underdrain (Section 6.7) =	Schedule 40 PVC with clean-outs, and minimum 12-inch stone sump below the invert; OR, none, if soil infiltration requirements are met
Inflow =	sheetflow, curb cuts, trench drains, concentrated flow, or the equivalent
Geometry (Section 6.3)=	Length of shortest flow/Overall length=0.8 or greater; OR, other design methods used to prevent short-circuiting; a one-cell design (not including the pretreatment cell)
Pre-treatment (Section 6.4) =	a pretreatment cell plus one of the following: a grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment structure
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	a planting template to include turf, herbaceous vegetation, shrubs, and/or trees to achieve surface area coverage of at least 90% within 2 years. If using turf, must combine with other types of vegetation.
Building Setbacks[3] (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

Provided: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	See this sheet for $Tv_{BMP-req}$ computations
Surface Area (sq. ft.) =	439 sq.ft. > 349 sq. ft. (See this sheet for computations on required SA)
Contributing drainage area =	0.33acres
Ponding Depth =	12 inches
Filter Media Depth =	36 inches
Media & Surface Cover (Section 6.6) =	Supplied by vendor
Sub-soil Testing (Section 6.2) =	See the geotechnical report in this plan for the results of the infiltration tests.
Underdrain (Section 6.7) =	Needed, infiltration = 0.1in/hr. < 0.5 in/hr.
Inflow =	Concentrated flow
Geometry (Section 6.3)=	N/A, Outlet structure is raised above the filter surface to the ponding depth elevation.
Pre-treatment (Section 6.4) =	Gravel Flow Spreader
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	
Building Setbacks3 (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

[1] Storage Depth is the sum of the porosity (η) of the soil media and gravel layers multiplied by their respective depths, plus the surface ponding depth. Refer to Section 6.1.

[2] A ponding depth of 6 inches is preferred. Ponding depths greater than 6 inches will require a specific planting plan to ensure appropriate plant selection (Section 6.8).

[3] There are the recommendations for simple building foundations. If an in-ground basement or other special conditions exist, the design should be reviewed by a licensed engineer. Also, a Special footing or drainage design may be used to justify a reduction of the setbacks noted above.

BIORETENTION "B" COMPUTATIONS

EQUATION 9.1. BIORETENTION LEVEL 2 DESIGN STORAGE DEPTH				
FILTER MEDIA DEPTH =	3	FT	η=	0.25
GRAVEL DEPTH =	2	FT	η=	0.4
MAX PONDING DEPTH =	1	FT	η=	1
DESIGN STORAGE DEPTH =	2.55	FT		
EQUATION 9.4 BIORETENTION LEVEL 2 DESIGN SURFACE AREA				
DRAINAGE AREA =	14375	SF		
Rv (COMPOSITE RUNOFF COEFFICIENT) =	0.7			
VOLUME REDUCED BY UPSTREAM BMP =	0	CF		
T_V BMP REQ. =	1048	CF		
MIN SURFACE AREA =	349	SF		
PROPOSED SURFACE AREA =	439	SF		
TOTAL TREATMENT VOLUME PROVIDED =	1284	CF		
PRETREATMENT CELL SIZING				
MIN RE□D □RETREATMENT CELL □OLUME	□□□	C□	□□□ O□RE□UIRED T□	
□RO□D □RETREATMENT CELL □OLUME	□□□	C□		

BIORETENTION "B" RUNOFF COMPUTATIONS

RUNOFF COMPUTATIONS			
C=	0.69	C=	0.69
I1=	2.7	I2=	3.2
A=	0.330 AC	A=	0.330 AC
Q1=CIA=	**0.615 CFS**	**Q2=CIA=**	**0.729 CFS**
C=	0.69	C=	0.69
I10=	5.2	I100=	8.2
A=	0.330 AC	A=	0.330 AC
Q10=CIA=	**1.184 CFS**	**Q100=CIA=**	**1.867 CFS**

BIORETENTION "B" DESIGN ELEVATIONS

BIORETENTION DESIGN ELEVATIONS		
TOP OF MULCH	260.23	FT
TOP OF BIORETENTION SOIL MEDIA	259.98	FT
TOP OF CHOKING LAYER	256.98	FT
TOP OF GRAVEL	256.73	FT
BOTTOM OF GRAVEL	254.73	FT
STR 6 THROAT ELEVATION	260.73	FT
STR 6 INVERT ELEVATION	254.73	FT
TOP OF EMBANKMENT	261.23	FT
1-YEAR WSE	256.35	FT
2-YEAR WSE	256.88	FT
10-YEAR WSE	260.27	FT
100-YEAR WSE	*261.01*	*FT*

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

BIORETENTION "B" FOREBAY VOLUME

BIORETENTION "B" - forebay STORAGE-ELEVATION CHART							
ELE□ATION (□□□)	AREA (□□□)	A□ERA□E AREA (□□□)	INT (□□□)	□OL (□□□)	ACCUM. □OL. (□□□)	ACCUM. □OL. (□c.□□□)	ACCUM. □OL. (□d□)
□□0.□3	□4□						
□□□.□3	□□□	□□□	□.00	□□□	□□□	0.003□	□.□□

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR — DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. _____

DIRECTOR — DATE

CHAIRMAN, PLANNING COMMISSION — DATE

DATE RECORDED _____

INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-11-17
08-01-17

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Planners • Engineers • Landscape Architects • Land Surveyors

COMMONWEALTH OF VIRGINIA — CLAYTON C. STOCK — Lic. No. 030760 — PROFESSIONAL ENGINEER — 08-01-17

BMP DETAILS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: AS SHOWN — C.I.= N/A — DATE: AUGUST, 2017

SHEET 15

FILE No. 12811

Urban, Ltd. – z:\JOBS\Seminary Road\Preliminary Site Plan\12811-22a-BMP Details.dwg [BIORETENTIONS A & B] August 01, 2017 – 10:57am intern002

Per Table 9.4 Bioretention "C" Filter and Basin Design Criteria

Standards: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	[(1.25)(Rv)(A) / 12] + any remaining volume from upstream BMP
Surface Area (sq. ft.) =	Tv_{BMP} /Storage Depth[1]
Recommended max. contributing drainage area =	2.5 acres
Max. Ponding Depth =	6 to 12 inches[2]
Filter Media Depth min. =	36 inches
recommended max. =	48 inches
Media & Surface Cover (Section 6.6) =	supplied by vendor; tested for acceptable phosphorous index (P-index) of between 10 and 30; OR between 7 and 21 mg/kg of P in the soil media
Sub-soil Testing (Section 6.2) =	One per 1,000 sq. ft. of filter surface; Min infiltration rate > 1/2 inch/hour in order to remove the underdrain requirement.
Underdrain (Section 6.7) =	Schedule 40 PVC with clean-outs, and minimum 12-inch stone sump below the invert; OR, none, if soil infiltration requirements are met
Inflow =	sheetflow, curb cuts, trench drains, concentrated flow, or the equivalent
Geometry (Section 6.3)=	Length of shortest flow/Overall length=0.8 or greater; OR, other design methods used to prevent short-circuiting; a one-cell design (not including the pretreatment cell)
Pre-treatment (Section 6.4) =	a pretreatment cell plus one of the following: a grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment structure
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	a planting template to include turf, herbaceous vegetation, shrubs, and/or trees to achieve surface area coverage of at least 90% within 2 years. If using turf, must combine with other types of vegetation.
Building Setbacks[3] (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

[1] Storage Depth is the sum of the porosity (η) of the soil media and gravel layers multiplied by their respective depths, plus the surface ponding depth. Refer to Section 6.1.

[2] A ponding depth of 6 inches is preferred. Ponding depths greater than 6 inches will require a specific planting plan to ensure appropriate plant selection (Section 6.8).

[3] There are the recommendations for simple building foundations. If an in-ground basement or other special conditions exist, the design should be reviewed by a licensed engineer. Also, a Special footing or drainage design may be used to justify a reduction of the setbacks noted above.

Provided: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	See this sheet for $Tv_{BMP, req}$ computations
Surface Area (sq. ft.) =	126 sq.ft. (See this sheet for computations on required SA)
Contributing drainage area =	0.19 acres
Ponding Depth =	12 inches
Filter Media Depth =	36 inches
Media & Surface Cover (Section 6.6) =	Supplied by vendor
Sub-soil Testing (Section 6.2) =	See the geotechnical report in this plan for the results of the infiltration tests.
Underdrain (Section 6.7) =	Not needed, infiltration = 0.86 in/hr. >= 0.5 in/hr.
Inflow =	Sheet Flow
Geometry (Section 6.3)=	N/A, Outlet structure is raised above the filter surface to the ponding depth elevation.
Pre-treatment (Section 6.4) =	Gravel Diaphram/Grass Filter Strips
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	
Building Setbacks3 (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

BIORETENTION "C" RUNOFF COMPUTATIONS

RUNOFF COMPUTATIONS	
C= 0.69	C= 0.69
I1= 2.7	I2= 3.2
A= 0.190 AC	A= 0.190 AC
Q1=CIA= 0.354 CFS	**Q2=CIA= 0.420 CFS**
C= 0.69	C= 0.69
I10= 5.2	I100= 8.2
A= 0.190 AC	A= 0.190 AC
Q10=CIA= 0.682 CFS	**Q100=CIA= 1.075 CFS**

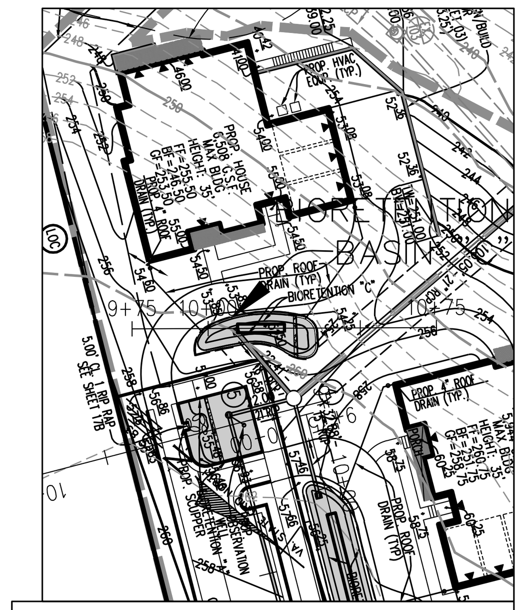
BIORETENTION "C" COMPUTATIONS

EQUATION 9.1. BIORETENTION LEVEL 2 DESIGN STORAGE DEPTH				
FILTER MEDIA DEPTH =	3	FT	η=	0.25
GRAVEL DEPTH =	2.3	FT	η=	0.4
MAX PONDING DEPTH =	1	FT	η=	1
DESIGN STORAGE DEPTH =	2.67	FT		
EQUATION 9.4 BIORETENTION LEVEL 2 DESIGN SURFACE AREA				
DRAINAGE AREA =	8276	SF		
Rv (COMPOSITE RUNOFF COEFFICIENT) =	0.73			
VOLUME REDUCED BY UPSTREAM BMP =	0	CF		
T_V BMP REQ. =	629	CF		
MIN SURFACE AREA =	NA	SF		
PROPOSED SURFACE AREA =	126	SF		
TOTAL TREATMENT VOLUME PROVIDED =	775	CF		
PRETREATMENT CELL SIZING				
MIN RE□D □RETREATMENT CELL □OLUME	43	C□	□□□ O□ RE□UIRED SUR□ACE T□	
□RO□D □RETREATMENT CELL □OLUME	□□	C□		

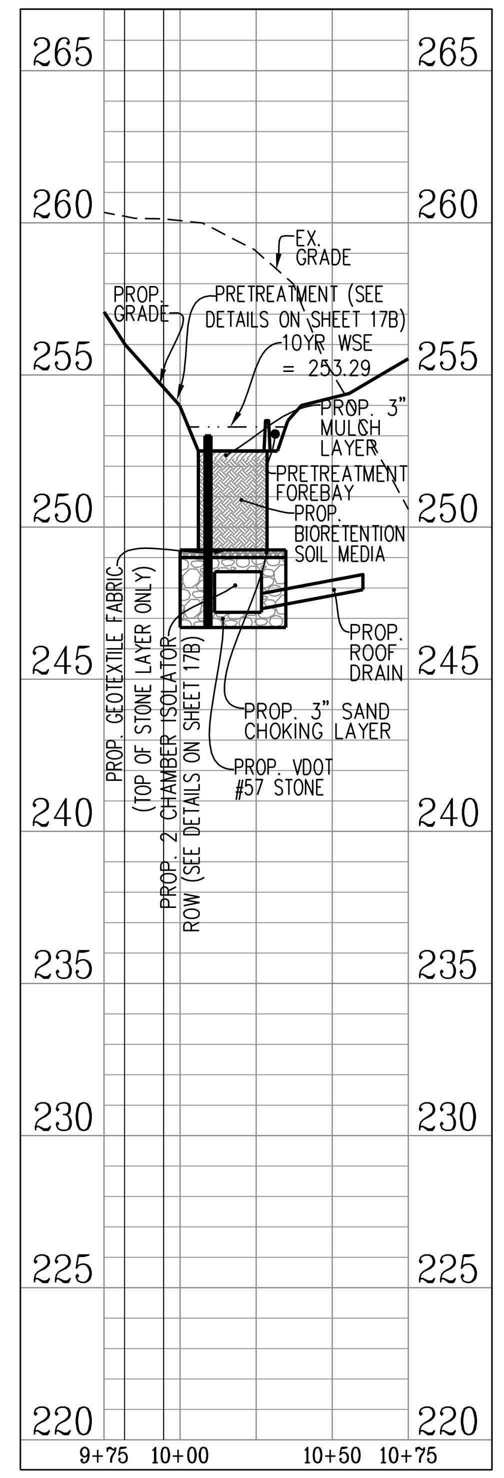
BIORETENTION "C" DESIGN ELEVATIONS

BIORETENTION DESIGN ELEVATIONS		
TOP OF MULCH	252.50	FT
TOP OF BIORETENTION SOIL MEDIA	252.25	FT
TOP OF CHOKING LAYER	249.25	FT
TOP OF GRAVEL	249.00	FT
BOTTOM OF GRAVEL	246.70	FT
STR 6 THROAT ELEVATION	253.00	FT
STR 6 INVERT ELEVATION	246.70	FT
TOP OF EMBANKMENT	253.50	FT
1-YEAR WSE	252.79	FT
2-YEAR WSE	253.03	FT
10-YEAR WSE	253.29	FT
100-YEAR WSE	*253.94*	*FT*

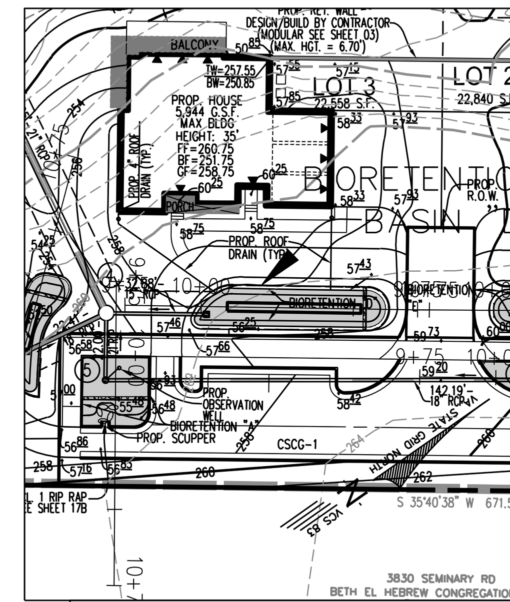
BIORETENTION "C" PLAN VIEW



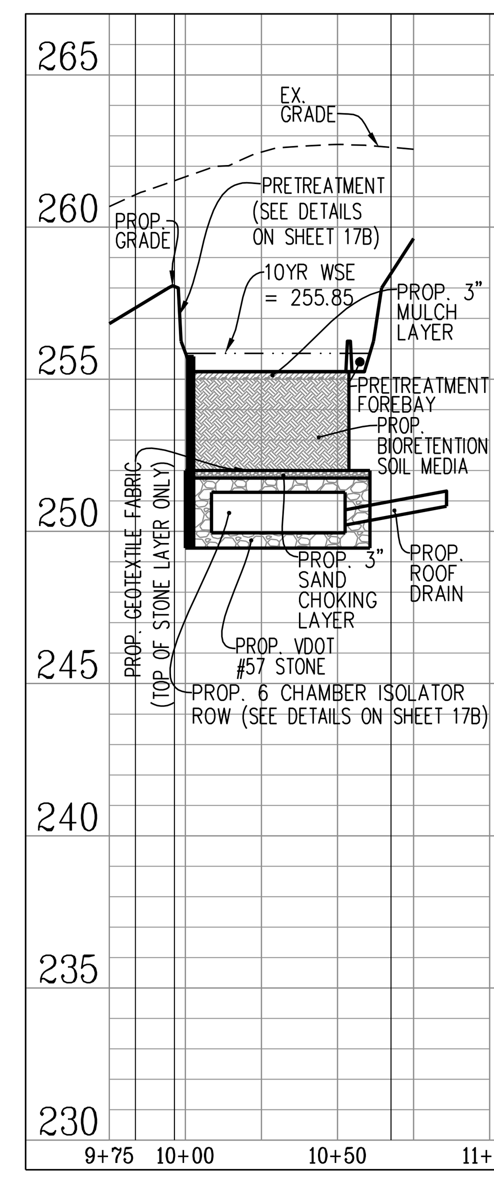
PLAN VIEW SCALE: 1"=50'



BIORETENTION "D" PLAN VIEW



PLAN VIEW SCALE: 1"=50'



BIORETENTION BMP NARRATIVE

WATER QUALITY CONTROL REQUIREMENTS ARE PROVIDED FOR LOTS 1, 2, 3 AND 4 OF THE SITE WITH FOUR BIORETENTIONS. THE BIORETENTIONS HAVE BEEN SIZED AND DESIGNED IN ACCORDANCE WITH THE SOILS C AND D DESIGN REQUIREMENTS OUTLINED IN VIRGINIA DCR STORMWATER DESIGN SPECIFICATION NO.9 AS SHOWN IN THE COMPUTATIONS BELOW.

THE BIORETENTIONS WILL BE 5.30 FEET DEEP WITH UP TO 1 FOOT OF WET STORAGE AREA. A FULL ROUTING OF THE 10-YEAR STORM ALONG WITH ADDITIONAL NOTES AND COMPUTATIONS CAN BE FOUND ON SHEET 21.

MAINTENANCE STATEMENT

THE PROPOSED BEST MANAGEMENT FACILITIES (BIORETENTION) WILL BE PRIVATELY OWNED AND MAINTAINED. VIRGINIA'S STORMWATER MANAGEMENT REGULATIONS REQUIRE INSPECTIONS TWICE A YEAR, AND AFTER ANY STORM THAT EXCEEDS THE CAPACITY OF THE FACILITY TO ENSURE THAT THE FACILITY REMAINS OPERATIONAL. A DETAILED INSPECTION SHALL BE PERFORMED ANNUALLY BY A QUALIFIED PROFESSIONAL TO ENSURE THAT THE FACILITY IS OPERATING AS DESIGNED, AND TO PROVIDE AN OPPORTUNITY TO SCHEDULE ANY MAINTENANCE THAT THE FACILITY MAY REQUIRE. SEE SHEET 18 FOR MAINTENANCE PROGRAM AND INSPECTION REQUIREMENTS. ADDITIONAL MAINTENANCE REQUIREMENTS CAN BE FOUND IN THE MOST RECENT VERSIONS OF THE VIRGINIA DCR STORMWATER DESIGN SPECIFICATION NO. 9.

BIORETENTION "C" FOREBAY VOLUME

BIORETENTION "C" - forebay STORAGE-ELEVATION CHART							
ELE□ATION	AREA	A□ERA□E	INT	□OL	ACCUM. □OL.	ACCUM. □OL.	ACCUM. □OL.
□□□	□□□	AREA □□□	□□□	□□³□	□□³□	□□c.□□□	□□d³□
□□□.□0	□□						
□□3.□0	□□	□□	□.00	□□	□□	0.00□3	□.0□

BIORETENTION "D" FOREBAY VOLUME

BIORETENTION "D" - forebay STORAGE-ELEVATION CHART							
ELE□ATION	AREA	A□ERA□E	INT	□OL	ACCUM. □OL.	ACCUM. □OL.	ACCUM. □OL.
□□□	□□□	AREA □□□	□□□	□□³□	□□³□	□□c.□□□	□□d³□
□□□.□□	3□						
□□□.□□	□□	□0	□.00	□0	□0	0.00□4	□.□0

Per Table 9.4 Bioretention "D" Filter and Basin Design Criteria

Standards: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	[(1.25)(Rv)(A) / 12] + any remaining volume from upstream BMP
Surface Area (sq. ft.) =	Tv_{BMP} /Storage Depth[1]
Recommended max. contributing drainage area =	2.5 acres
Max. Ponding Depth =	6 to 12 inches[2]
Filter Media Depth min. =	36 inches
recommended max. =	48 inches
Media & Surface Cover (Section 6.6) =	supplied by vendor; tested for acceptable phosphorous index (P-index) of between 10 and 30; OR between 7 and 21 mg/kg of P in the soil media
Sub-soil Testing (Section 6.2) =	One per 1,000 sq. ft. of filter surface; Min infiltration rate > 1/2 inch/hour in order to remove the underdrain requirement.
Underdrain (Section 6.7) =	Schedule 40 PVC with clean-outs, and minimum 12-inch stone sump below the invert; OR, none, if soil infiltration requirements are met
Inflow =	sheetflow, curb cuts, trench drains, concentrated flow, or the equivalent
Geometry (Section 6.3)=	Length of shortest flow/Overall length=0.8 or greater; OR, other design methods used to prevent short-circuiting; a one-cell design (not including the pretreatment cell)
Pre-treatment (Section 6.4) =	a pretreatment cell plus one of the following: a grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment structure
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	a planting template to include turf, herbaceous vegetation, shrubs, and/or trees to achieve surface area coverage of at least 90% within 2 years. If using turf, must combine with other types of vegetation.
Building Setbacks[3] (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

[1] Storage Depth is the sum of the porosity (η) of the soil media and gravel layers multiplied by their respective depths, plus the surface ponding depth. Refer to Section 6.1.

[2] A ponding depth of 6 inches is preferred. Ponding depths greater than 6 inches will require a specific planting plan to ensure appropriate plant selection (Section 6.8).

[3] There are the recommendations for simple building foundations. If an in-ground basement or other special conditions exist, the design should be reviewed by a licensed engineer. Also, a Special footing or drainage design may be used to justify a reduction of the setbacks noted above.

Provided: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	See this sheet for $Tv_{BMP, req}$ computations
Surface Area (sq. ft.) =	439 sq.ft. (See this sheet for computations on required SA)
Contributing drainage area =	0.22 acres
Ponding Depth =	12 inches
Filter Media Depth =	36 inches
Media & Surface Cover (Section 6.6) =	Supplied by vendor
Sub-soil Testing (Section 6.2) =	See the geotechnical report in this plan for the results of the infiltration tests.
Underdrain (Section 6.7) =	Not needed, infiltration = 1.6 in/hr. >= 0.5 in/hr.
Inflow =	Sheet Flow
Geometry (Section 6.3)=	N/A, Outlet structure is raised above the filter surface to the ponding depth elevation.
Pre-treatment (Section 6.4) =	Gravel Diaphram/ Grass Filter Strips
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	
Building Setbacks3 (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

BIORETENTION "D" RUNOFF COMPUTATIONS

RUNOFF COMPUTATIONS	
C= 0.69	C= 0.69
I1= 2.7	I2= 3.2
A= 0.220 AC	A= 0.220 AC
Q1=CIA= 0.410 CFS	**Q2=CIA= 0.486 CFS**
C= 0.69	C= 0.69
I10= 5.2	I100= 8.2
A= 0.220 AC	A= 0.220 AC
Q10=CIA= 0.789 CFS	**Q100=CIA= 1.245 CFS**

BIORETENTION "D" COMPUTATIONS

EQUATION 9.1. BIORETENTION LEVEL 2 DESIGN STORAGE DEPTH				
FILTER MEDIA DEPTH =	3	FT	η=	0.25
GRAVEL DEPTH =	2.3	FT	η=	0.4
MAX PONDING DEPTH =	1	FT	η=	1
DESIGN STORAGE DEPTH =	2.67	FT		
EQUATION 9.4 BIORETENTION LEVEL 2 DESIGN SURFACE AREA				
DRAINAGE AREA =	9583	SF		
Rv (COMPOSITE RUNOFF COEFFICIENT) =	0.59			
VOLUME REDUCED BY UPSTREAM BMP =	0	CF		
T_V BMP REQ. =	589	CF		
MIN SURFACE AREA =	NA	SF		
PROPOSED SURFACE AREA =	439	SF		
TOTAL TREATMENT VOLUME PROVIDED =	1815	CF		
PRETREATMENT CELL SIZING				
MIN RE□D □RETREATMENT CELL □OLUME	43	C□	□□□ O□ RE□UIRED SUR□ACE T□	
□RO□D □RETREATMENT CELL □OLUME	□0	C□		

BIORETENTION "D" DESIGN ELEVATIONS

BIORETENTION DESIGN ELEVATIONS		
TOP OF MULCH	255.25	FT
TOP OF BIORETENTION SOIL MEDIA	255.00	FT
TOP OF CHOKING LAYER	252.00	FT
TOP OF GRAVEL	251.75	FT
BOTTOM OF GRAVEL	249.45	FT
STR 6 THROAT ELEVATION	255.75	FT
STR 6 INVERT ELEVATION	249.45	FT
TOP OF EMBANKMENT	261.23	FT
1-YEAR WSE	251.63	FT
2-YEAR WSE	252.95	FT
10-YEAR WSE	255.85	FT
100-YEAR WSE	*258.91*	*FT*

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR ______ DATE ______
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. ______
DIRECTOR ______ DATE ______
CHAIRMAN, PLANNING COMMISSION ______ DATE ______
DATE RECORDED ______
INSTRUMENT NO. ______ DEED BOOK NO. ______ PAGE NO. ______

REVISIONS
No. | DATE | DESCRIPTION

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-17-17
08-01-17

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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 036790
08-01-17
PROFESSIONAL ENGINEER

BMP DETAILS
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
DATE: AUGUST, 2017
SCALE: AS SHOWN
C.I.= N/A

SHEET
16

FILE No.
12811

Urban, Ltd. – J:\JOBS\Seminary Road\Preliminary Site Plan\12811-22a-BMP Details.dwg [BIORETENTIONS C & D] August 01, 2017 – 10:57am intern002

Per Table 9.4 Bioretention "E" Filter and Basin Design Criteria

Standards: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	[(1.25)(Rv)(A) / 12] + any remaining volume from upstream BMP
Surface Area (sq. ft.) =	Tv_{BMP} /Storage Depth[1]
Recommended max. contributing drainage area =	2.5 acres
Max. Ponding Depth =	6 to 12 inches[2]
Filter Media Depth min. =	36 inches
recommended max. =	48 inches
Media & Surface Cover (Section 6.6) =	supplied by vendor; tested for acceptable phosphorous index (P-index) of between 10 and 30; OR between 7 and 21 mg/kg of P in the soil media
Sub-soil Testing (Section 6.2) =	One per 1,000 sq. ft. of filter surface; Min infiltration rate > 1/2 inch/hour in order to remove the underdrain requirement.
Underdrain (Section 6.7) =	Schedule 40 PVC with clean-outs, and minimum 12-inch stone sump below the invert; OR, none, if soil infiltration requirements are met
Inflow =	sheetflow, curb cuts, trench drains, concentrated flow, or the equivalent
Geometry (Section 6.3)=	Length of shortest flow/Overall length=0.8 or greater; OR, other design methods used to prevent short-circuiting; a one-cell design (not including the pretreatment cell)
Pre-treatment (Section 6.4) =	a pretreatment cell plus one of the following: a grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment structure
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	a planting template to include turf, herbaceous vegetation, shrubs, and/or trees to achieve surface area coverage of at least 90% within 2 years. If using turf, must combine with other types of vegetation.
Building Setbacks[3] (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

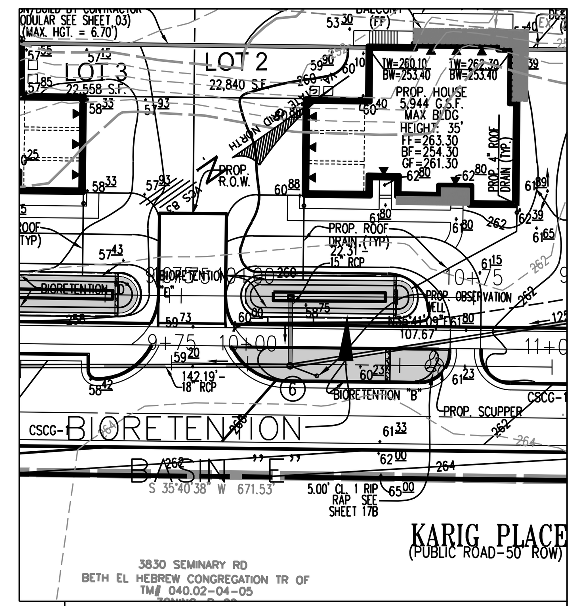
Provided: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	See this sheet for $Tv_{BMP, req}$ computations
Surface Area (sq. ft.) =	360 sq.ft. (See this sheet for computations on required SA)
Contributing drainage area =	0.22 acres
Ponding Depth =	12 inches
Filter Media Depth =	36 inches
Media & Surface Cover (Section 6.6) =	Supplied by vendor
Sub-soil Testing (Section 6.2) =	See the geotechnical report in this plan for the results of the infiltration tests.
Underdrain (Section 6.7) =	Not needed, infiltration = 3.40 in/hr. >= 0.5 in/hr.
Inflow =	Sheet Flow
Geometry (Section 6.3)=	N/A, Outlet structure is raised above the filter surface to the ponding depth elevation.
Pre-treatment (Section 6.4) =	Gravel Diaphragms/ Grass Filter Strips
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	
Building Setbacks3 (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

[1] Storage Depth is the sum of the porosity (η) of the soil media and gravel layers multiplied by their respective depths, plus the surface ponding depth. Refer to Section 6.1.

[2] A ponding depth of 6 inches is preferred. Ponding depths greater than 6 inches will require a specific planting plan to ensure appropriate plant selection (Section 6.8).

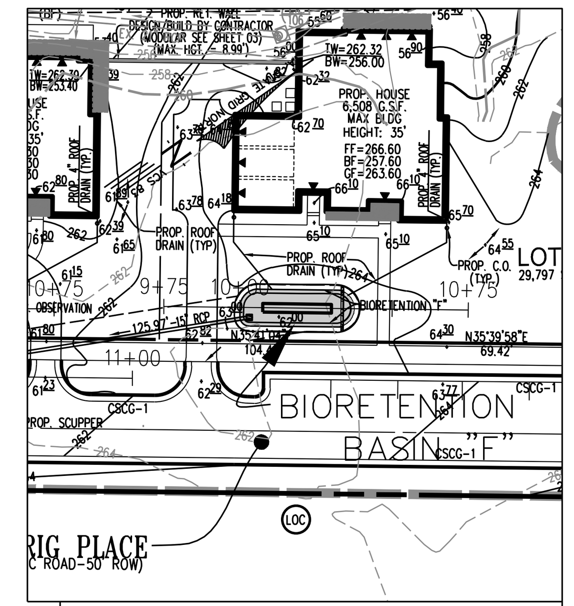
[3] There are the recommendations for simple building foundations. If an in-ground basement or other special conditions exist, the design should be reviewed by a licensed engineer. Also, a Special footing or drainage design may be used to justify a reduction of the setbacks noted above.

BIORETENTION "E" PLAN VIEW

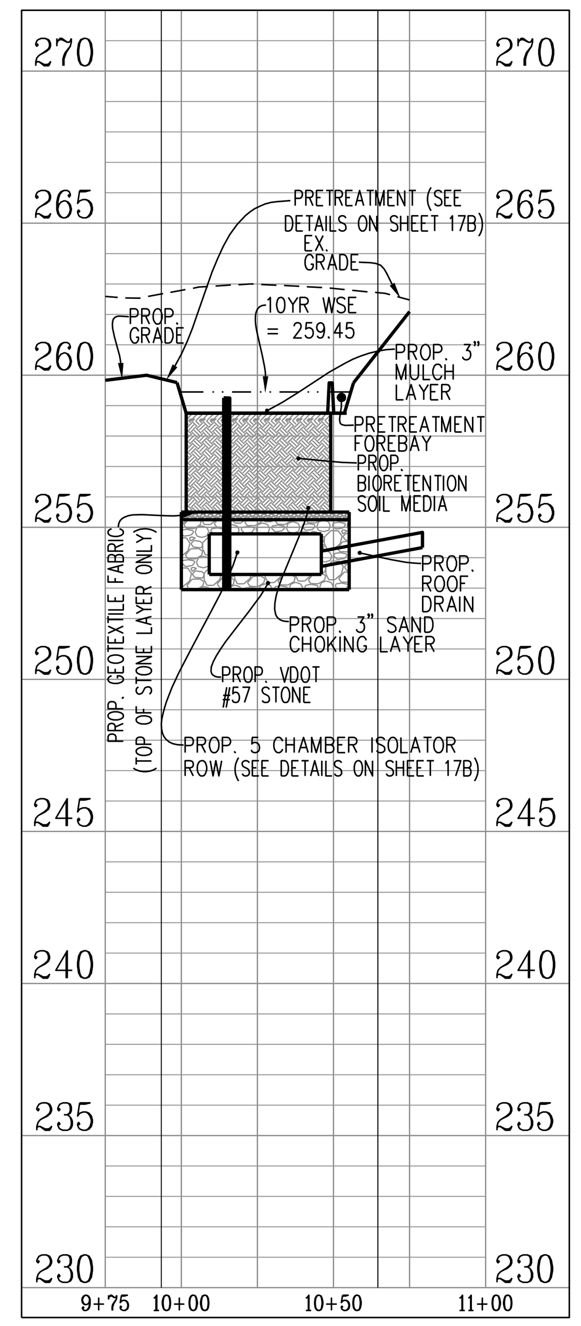


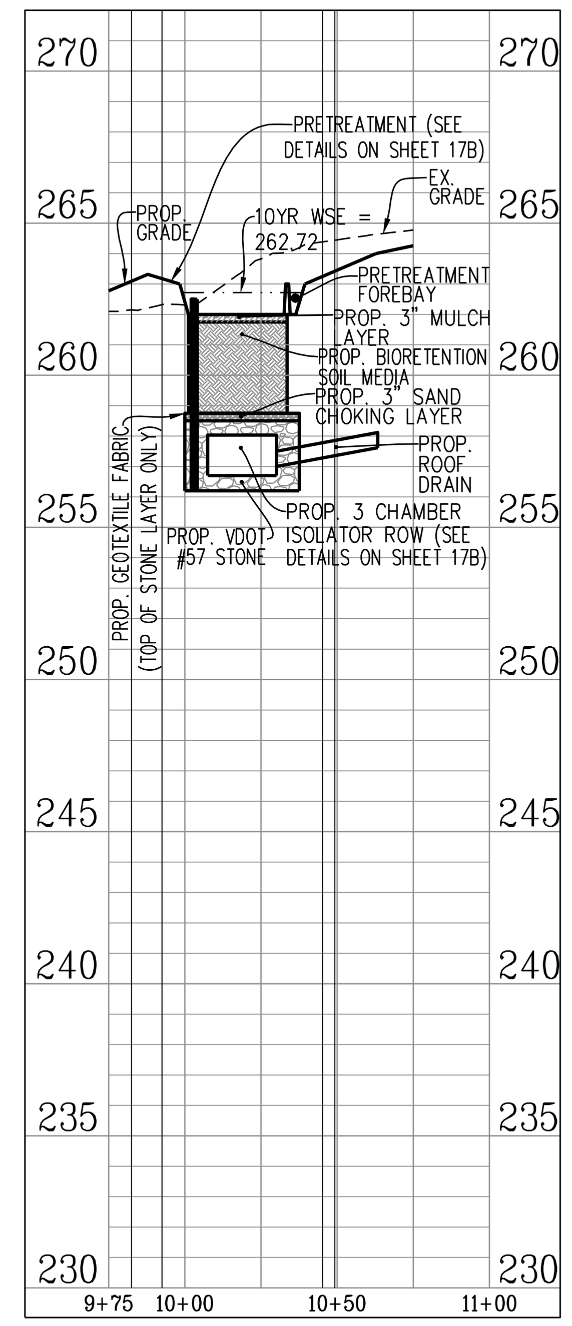
PLAN VIEW SCALE: 1"=50'

BIORETENTION "F" PLAN VIEW



PLAN VIEW SCALE: 1"=50'





BIORETENTION "E" RUNOFF COMPUTATIONS

RUNOFF COMPUTATIONS	
C= 0.69	C= 0.69
I1= 2.7	I2= 3.2
A= 0.220 AC	A= 0.220 AC
Q1=CIA= 0.410 CFS	**Q2=CIA= 0.486 CFS**
C= 0.69	C= 0.69
I10= 5.2	I100= 8.2
A= 0.220 AC	A= 0.220 AC
Q10=CIA= 0.789 CFS	**Q100=CIA= 1.245 CFS**

BIORETENTION "E" COMPUTATIONS

EQUATION 9.1. BIORETENTION LEVEL 2 DESIGN STORAGE DEPTH				
FILTER MEDIA DEPTH =	3	FT	η=	0.25
GRAVEL DEPTH =	2.3	FT	η=	0.4
MAX PONDING DEPTH =	1	FT	η=	1
DESIGN STORAGE DEPTH =	2.67	FT		
EQUATION 9.4 BIORETENTION LEVEL 2 DESIGN SURFACE AREA				
DRAINAGE AREA =	9583	SF		
Rv (COMPOSITE RUNOFF COEFFICIENT) =	0.55			
VOLUME REDUCED BY UPSTREAM BMP =	0	CF		
T_V BMP REQ. =	549	CF		
MIN SURFACE AREA =	NA	SF		
PROPOSED SURFACE AREA =	360	SF		
TOTAL TREATMENT VOLUME PROVIDED =	1499	CF		
PRETREATMENT CELL SIZING				
MIN RE□□D □RETREATMENT CELL □OLUME	3□	C□	□□□ O□ RE□UIRED T□	
□RO□D □RETREATMENT CELL □OLUME	□4	C□		

BIORETENTION "E" DESIGN ELEVATIONS

BIORETENTION DESIGN ELEVATIONS		
TOP OF MULCH	258.75	FT
TOP OF BIORETENTION SOIL MEDIA	258.50	FT
TOP OF CHOKING LAYER	255.50	FT
TOP OF GRAVEL	255.25	FT
BOTTOM OF GRAVEL	252.95	FT
STR 6 THROAT ELEVATION	259.25	FT
STR 6 INVERT ELEVATION	252.95	FT
TOP OF EMBANKMENT	259.75	FT
1-YEAR WSE	255.17	FT
2-YEAR WSE	256.61	FT
10-YEAR WSE	259.45	FT
100-YEAR WSE	*261.20*	*FT*

BIORETENTION "E" FOREBAY VOLUME

BIORETENTION "E" - forebay STORAGE-ELEVATION CHART							
ELE□ATION □□□	AREA □□□	A□ERA□E AREA □□□	INT □□□	□OL □□3□	ACCUM. □OL. □□3□	ACCUM. □OL. □□c.□□□	ACCUM. □OL. □□d3□
□□□.□□	□□						
□□9.□□	□0	□4	□.00	□4	□4	0.00□□	□.9□

Per Table 9.4 Bioretention "F" Filter and Basin Design Criteria

Standards: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	[(1.25)(Rv)(A) / 12] + any remaining volume from upstream BMP
Surface Area (sq. ft.) =	Tv_{BMP} /Storage Depth[1]
Recommended max. contributing drainage area =	2.5 acres
Max. Ponding Depth =	6 to 12 inches[2]
Filter Media Depth min. =	36 inches
recommended max. =	48 inches
Media & Surface Cover (Section 6.6) =	supplied by vendor; tested for acceptable phosphorous index (P-index) of between 10 and 30; OR between 7 and 21 mg/kg of P in the soil media
Sub-soil Testing (Section 6.2) =	One per 1,000 sq. ft. of filter surface; Min infiltration rate > 1/2 inch/hour in order to remove the underdrain requirement.
Underdrain (Section 6.7) =	Schedule 40 PVC with clean-outs, and minimum 12-inch stone sump below the invert; OR, none, if soil infiltration requirements are met
Inflow =	sheetflow, curb cuts, trench drains, concentrated flow, or the equivalent
Geometry (Section 6.3)=	Length of shortest flow/Overall length=0.8 or greater; OR, other design methods used to prevent short-circuiting; a one-cell design (not including the pretreatment cell)
Pre-treatment (Section 6.4) =	a pretreatment cell plus one of the following: a grass filter strip, gravel diaphragm, gravel flow spreader, or another approved (manufactured) pre-treatment structure
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	a planting template to include turf, herbaceous vegetation, shrubs, and/or trees to achieve surface area coverage of at least 90% within 2 years. If using turf, must combine with other types of vegetation.
Building Setbacks[3] (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

Provided: Level 2 Design	
RR: 80 TP:50	
Sizing (Section 6.1)	
Tv_{BMP}=	See this sheet for $Tv_{BMP, req}$ computations
Surface Area (sq. ft.) =	310 sq.ft. (See this sheet for computations on required SA)
Contributing drainage area =	0.16 acres
Ponding Depth =	12 inches
Filter Media Depth =	36 inches
Media & Surface Cover (Section 6.6) =	Supplied by vendor
Sub-soil Testing (Section 6.2) =	See the geotechnical report in this plan for the results of the infiltration tests.
Underdrain (Section 6.7) =	Not needed, infiltration = 2.80 in/hr. >= 0.5 in/hr.
Inflow =	Sheet Flow
Geometry (Section 6.3)=	N/A, Outlet structure is raised above the filter surface to the ponding depth elevation.
Pre-treatment (Section 6.4) =	Gravel Diaphragm/ Grass Filter Strips
Conveyance & Overflow (Section 6.5)	
Planting Plan (Section 6.8) =	
Building Setbacks3 (Section 5) =	10 feet if down-gradient from building or level (coastal plain); 50 feet if up-gradient.
Deeded Maintenance O & M Plan (Section 8)	

[1] Storage Depth is the sum of the porosity (η) of the soil media and gravel layers multiplied by their respective depths, plus the surface ponding depth. Refer to Section 6.1.

[2] A ponding depth of 6 inches is preferred. Ponding depths greater than 6 inches will require a specific planting plan to ensure appropriate plant selection (Section 6.8).

[3] There are the recommendations for simple building foundations. If an in-ground basement or other special conditions exist, the design should be reviewed by a licensed engineer. Also, a Special footing or drainage design may be used to justify a reduction of the setbacks noted above.

BIORETENTION "F" COMPUTATIONS

EQUATION 9.1. BIORETENTION LEVEL 2 DESIGN STORAGE DEPTH				
FILTER MEDIA DEPTH =	3	FT	η=	0.25
GRAVEL DEPTH =	2.3	FT	η=	0.4
MAX PONDING DEPTH =	1	FT	η=	1
DESIGN STORAGE DEPTH =	2.67	FT		
EQUATION 9.4 BIORETENTION LEVEL 2 DESIGN SURFACE AREA				
DRAINAGE AREA =	6970	SF		
Rv (COMPOSITE RUNOFF COEFFICIENT) =	0.64			
VOLUME REDUCED BY UPSTREAM BMP =	0	CF		
T_V BMP REQ. =	465	CF		
MIN SURFACE AREA =	NA	SF		
PROPOSED SURFACE AREA =	310	SF		
TOTAL TREATMENT VOLUME PROVIDED =	1160	CF		
PRETREATMENT CELL SIZING				
MIN RE□□D □RETREATMENT CELL □OLUME	□9	C□	□□□ O□ RE□UIRED T□	
□RO□D □RETREATMENT CELL □OLUME	3□	C□		

BIORETENTION "F" RUNOFF COMPUTATIONS

RUNOFF COMPUTATIONS	
C= 0.69	C= 0.69
I1= 2.7	I2= 3.2
A= 0.160 AC	A= 0.160 AC
Q1=CIA= 0.298 CFS	**Q2=CIA= 0.353 CFS**
C= 0.69	C= 0.69
I10= 5.2	I100= 8.2
A= 0.160 AC	A= 0.160 AC
Q10=CIA= 0.574 CFS	**Q100=CIA= 0.905 CFS**

BIORETENTION "F" DESIGN ELEVATIONS

BIORETENTION DESIGN ELEVATIONS		
TOP OF MULCH	262.00	FT
TOP OF BIORETENTION SOIL MEDIA	261.75	FT
TOP OF CHOKING LAYER	258.75	FT
TOP OF GRAVEL	258.50	FT
BOTTOM OF GRAVEL	256.20	FT
STR 6 THROAT ELEVATION	262.50	FT
STR 6 INVERT ELEVATION	256.20	FT
TOP OF EMBANKMENT	263.00	FT
1-YEAR WSE	258.91	FT
2-YEAR WSE	261.13	FT
10-YEAR WSE	262.72	FT
100-YEAR WSE	*263.82*	*FT*

BIORETENTION "F" FOREBAY VOLUME

BIORETENTION "F" - forebay STORAGE-ELEVATION CHART							
ELE□ATION □□□	AREA □□□	A□ERA□E AREA □□□	INT □□□	□OL □□3□	ACCUM. □OL. □□3□	ACCUM. □OL. □□c.□□□	ACCUM. □OL. □□d3□
□□□.00	□4						
□□3.00	□9	3□	□.00	3□	3□	0.000□	□.3□

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. ____
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED ____
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No. DATE DESCRIPTION REVISIONS

PLAN DATE 06-06-16 10-14-16 04-14-17 06-09-17 07-17-17 08-01-17

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Lic. No. 036790
08-01-17
PROFESSIONAL ENGINEER

BMP DETAILS
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
SCALE: AS SHOWN C.I.= N/A DATE: AUGUST, 2017

SHEET 17

FILE No. 12811

Urban, Ltd. – J:\JOBS\Seminary Road\Preliminary Site Plan\12811-22a-BMP Details.dwg [BIORETENTIONS E & F] August 01, 2017 – 10:57am intern002

FIGURE 9.8 - PRETREATMENT - GRASS FILTER FOR SHEET FLOW

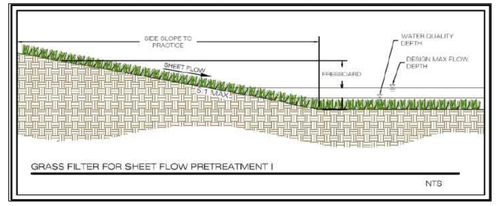


FIGURE 9.8 - PRETREATMENT - GRAVEL DIAPHRAGM FOR SHEET FLOW FROM IMPERVIOUS OR PERVIOUS

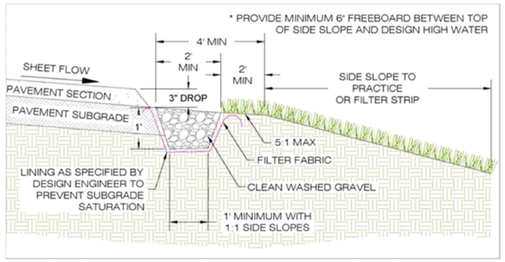


FIGURE 9-B.1: 4" P.V.C. CLEANOUT DETAIL

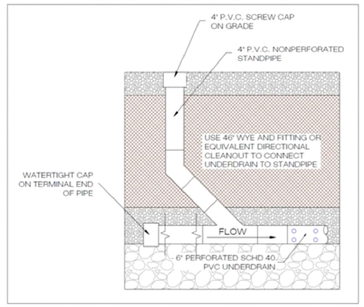
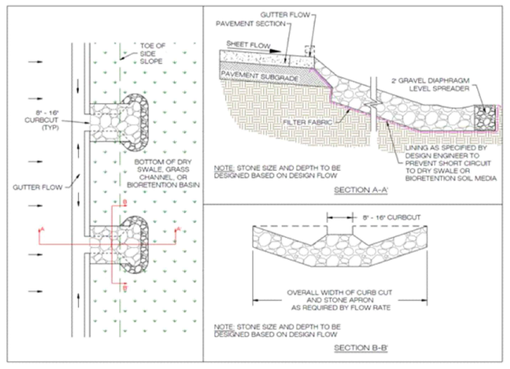


TABLE 9.7 -BIORETENTION MATERIAL SPECIFICATIONS

Table 9.7. Bioretention Material Specifications

Material	Specification	Notes
Filter Media Composition	Filter Media to contain: • 80% - 90% sand • 10%-20% soil fines • 3%-5% organic matter	The volume of filter media based on 110% of the plan volume, to account for settling or compaction.
Filter Media Testing	Available P between L+ and M per DCR 2005 Nutrient Management Criteria.	The media should be certified by the supplier.
Mulch Layer	Use aged, shredded hardwood bark mulch or stable coarse compost.	Lay a 2 to 3 inch layer on the surface of the filter bed.
Alternative Surface Cover	Use river stone or pea gravel, coir and jute matting, or turf cover.	Lay a 2 to 3 inch layer of to suppress weed growth.
Top Soil For Turf Cover	Loamy sand or sandy loam texture, with less than 5% clay content, pH corrected to between 6 and 7, and an organic matter content of at least 2%.	3 inch surface depth.
Geotextile/Liner	Use a non-woven geotextile fabric with a flow rate of > 110 gal./min./sq. ft. (e.g., Geotex 351 or equivalent)	Apply only to the sides and directly above the underdrain. For hotspots and certain karst sites only, use an appropriate liner on bottom.
Choking Layer	Lay a 2 to 4 inch layer of sand over a 2 inch layer of choker stone (typically #8 or #89 washed gravel), which is laid over the underdrain stone.	
Stone Jacket for Underdrain and/or Storage Layer	1 inch stone should be double-washed and clean and free of all fines (e.g., VDOT #57 stone).	12 inches for the underdrain; 12 to 18 inches for the stone storage layer, if needed
Underdrains, Cleanouts, and Observation Wells	Use 6 inch rigid schedule 40 PVC pipe (or equivalent corrugated HDPE for micro-bioretention), with 3/8-inch perforations at 6 inches on center; position each underdrain on a 1% or 2% slope located nor more than 20 feet from the next pipe.	Lay the perforated pipe under the length of the bioretention cell, and install non-perforated pipe as needed to connect with the storm drain system. Install T's and Y's as needed, depending on the underdrain configuration. Extend cleanout pipes to the surface with vented caps at the Ts and Ys.
Plant Materials	Plant one tree per 250 square feet (15 feet on-center, minimum 1 inch caliper). Shrubs a minimum of 30 inches high planted a minimum of 10 feet on-center. Plant ground cover plugs at 12 to 18 inches on-center; Plant container-grown plants at 18 to 24 inches on-center, depending on the initial plant size and how large it will grow.	Establish plant materials as specified in the landscaping plan and the recommended plant list. In general, plant spacing must be sufficient to ensure the plant material achieves 80% cover in the proposed planting areas within a 3-year period. If seed mixes are used, they should be from a qualified supplier, should be appropriate for stormwater basin applications, and should consist of native species (unless the seeding is to establish maintained turf).

FIGURE 9.9: PRE-TREATMENT - GRAVEL FLOW SPREADER FOR CONCENTRATED FLOW



GRAVEL FLOW SPREADER COMPUTAIONS

GRAVEL FLOW SPREADER	DA	C	I	Q	DEPTH OF FLOW*	CHANNEL SLOPE	d50 OF STONE**	SIDE SLOPE	BASE WIDTH
A	0.23	0.72	5.2	0.86	0.09	0.3333	0.25	H:V1	2
B	0.33	0.69	5.2	1.18	0.11	0.3333	0.25	H:V1	2

SC-310 Cumulative Storage Volumes Per Chamber

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (152 mm) Stone Base Under the Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft³ (m³)	Total System Cumulative Storage ft³ (m³)
28 (711)	14.70 (0.416)	31.00 (0.878)
27 (686)	14.70 (0.416)	30.21 (0.855)
26 (680)	Stone 14.70 (0.416)	29.42 (0.833)
25 (610)	Cover 14.70 (0.416)	28.63 (0.811)
24 (609)	14.70 (0.416)	27.84 (0.788)
23 (584)	14.70 (0.416)	27.05 (0.766)
22 (559)	14.70 (0.416)	26.26 (0.748)
21 (533)	14.64 (0.415)	25.49 (0.720)
20 (508)	14.49 (0.410)	24.54 (0.695)
19 (483)	14.22 (0.403)	23.58 (0.668)
18 (457)	13.68 (0.387)	22.47 (0.636)
17 (432)	12.99 (0.368)	21.25 (0.602)
16 (406)	12.17 (0.345)	19.97 (0.566)
15 (381)	11.25 (0.319)	18.62 (0.526)
14 (356)	10.25 (0.290)	17.22 (0.488)
13 (330)	9.15 (0.260)	15.78 (0.447)
12 (305)	7.99 (0.227)	14.29 (0.425)
11 (279)	6.78 (0.192)	12.77 (0.362)
10 (254)	5.51 (0.156)	11.22 (0.318)
9 (229)	4.19 (0.119)	9.64 (0.278)
8 (203)	2.83 (0.081)	8.03 (0.227)
7 (178)	1.43 (0.041)	6.40 (0.181)
6 (152)	0	4.74 (0.134)
5 (127)	0	3.95 (0.112)
4 (102)	Stone Foundation 0	3.16 (0.090)
3 (76)	0	2.37 (0.067)
2 (51)	0	1.58 (0.045)
1 (25)	0	0.79 (0.022)

Note: Add 0.79 cu. ft. (0.022 m³) of storage for each additional inch (25 mm) of stone foundation.

Storage Volume Per Chamber

	Bare Chamber Storage	Chamber and Stone Foundation Depth in. (mm)		
	ft³ (m³)	6 (150)	12 (305)	18 (460)
StormTech SC-310	14.7 (0.4)	31.0 (0.9)	35.7 (1.0)	40.4 (1.1)

Note: Storage volumes are in cubic feet per chamber. Assumes 40% porosity for the stone plus the chamber volume.

Amount of Stone Per Chamber

	Stone Foundation Depth		
ENGLISH TONS (LBS/C YARDS)	6"	12"	18"
StormTech SC-310	2.1 (1.5 yd³)	2.7 (1.9 yd³)	3.4 (2.4 yd³)
METRIC KILOGRAMS (METER)	150 mm	305 mm	460 mm
StormTech SC-310	1830 (1.1 m³)	2490 (1.5 m³)	2990 (1.8 m³)

Note: Assumes 6" (150 mm) of stone above, and between chambers.

Volume of Excavation Per Chamber

	Stone Foundation Depth		
	6" (150 mm)	12" (305 mm)	18" (460 mm)
StormTech SC-310	2.9 (2.2)	3.4 (2.6)	3.8 (2.9)

Note: Volumes are in cubic yards (cubic meters) per chamber. Assumes 9" (150 mm) of separation between chamber rows and 18" (460 mm) of cover. The volume of excavation will vary as the depth of the cover increases.

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S15-090508

ISOLATOR ROW

StormTech SC-310 Chamber

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots thus maximizing land usage for commercial and municipal applications.

StormTech
Detention • Retention • Recharge
Subsurface Stormwater Management™

StormTech SC-310 Chamber
(not to scale)

Nominal Chamber Specifications

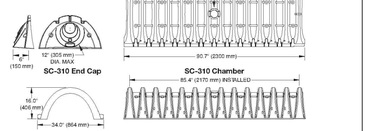
Size (L x W x H)
85.4" x 34.0" x 16.0"
(2170 x 864 x 406 mm)

Chamber Storage
14.7 ft³ (0.42 m³)

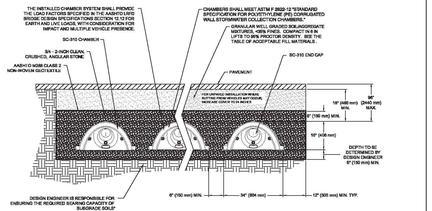
Minimum Installed Storage*
31.0 ft³ (0.88 m³)

Weight
37.0 lbs (16.8 kg)

Shipping
41 chambers/pallet
108 end caps/pallet
18 pallets/truck



Typical Cross Section Detail
(not to scale)



MADE IN THE U.S.A.

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR — DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. _____

DIRECTOR — DATE

CHAIRMAN, PLANNING COMMISSION — DATE

DATE RECORDED _____

INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-17-17
08-01-17
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05/2017

BMP DETAILS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017

SCALE: N/A — C.I.= N/A

SHEET 17A

FILE No. 12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-22e-BMP Details.dwg [BIORETENTIONS DETAILS] August 01, 2017 - 10:57am interO02

BIORETENTION - DEQ CONSTRUCTION SPECIFICATIONS PER SPECIFICATION #9, SECTION 8

8.1. CONSTRUCTION SEQUENCE

CONSTRUCTION STAGE E&S CONTROLS. MICRO-BIORETENTION AND SMALL-SCALE BIORETENTION AREAS SHOULD BE FULLY PROTECTED BY SILT FENCE OR CONSTRUCTION FENCING, PARTICULARLY IF THEY WILL RELY ON INFILTRATION (I.E., HAVE NO UNDERDRAINS). IDEALLY, BIORETENTION SHOULD REMAIN OUTSIDE THE LIMIT OF DISTURBANCE DURING CONSTRUCTION TO PREVENT SOIL COMPACTION BY HEAVY EQUIPMENT. BIORETENTION BASIN LOCATIONS MAY BE USED AS SMALL SEDIMENT TRAPS OR BASINS DURING CONSTRUCTION. HOWEVER, THESE MUST BE ACCOMPANIED BY NOTES AND GRAPHIC DETAILS ON THE ESC PLAN SPECIFYING THAT (1) THE MAXIMUM EXCAVATION DEPTH AT THE CONSTRUCTION STAGE MUST BE AT LEAST 1 FOOT ABOVE THE POST-CONSTRUCTION MAXIMUM EXCAVATION, (2) THE FACILITY MUST CONTAIN AN UNDERDRAIN, AND (3) THE PLAN MUST ALSO SHOW THE PROPER PROCEDURES FOR CONVERTING THE TEMPORARY SEDIMENT CONTROL PRACTICE TO A PERMANENT BIORETENTION FACILITY, INCLUDING DEWATERING, CLEANOUT AND STABILIZATION.

8.2 BIORETENTION INSTALLATION

THE FOLLOWING IS A TYPICAL CONSTRUCTION SEQUENCE TO PROPERLY INSTALL A BIORETENTION BASIN. THE INSTALLATION OF A BIORETENTION BASIN WILL INCLUDE INTERMEDIATE INSPECTIONS AT CRITICAL STAGES OF CONSTRUCTION WITH INSPECTOR SIGN-OFF THAT THE PARTICULAR ELEMENTS OF THE BIORETENTION ARE CONSTRUCTED ACCORDING THE APPROVED PLANS AND SPECIFICATIONS. AS AN ALTERNATIVE, IF ALLOWED BY THE VSMP AUTHORITY, THE CONTRACTOR MAY RELY ON THE ENGINEER OF RECORD OR OTHER QUALIFIED INDIVIDUAL TO CONDUCT THE INTERMEDIATE INSPECTIONS AND CERTIFICATIONS OF COMPLIANCE. THE CONSTRUCTION SEQUENCE FOR MICRO-BIORETENTION IS MORE SIMPLIFIED. THESE STEPS MAY BE MODIFIED TO REFLECT DIFFERENT BIORETENTION APPLICATIONS OR EXPECTED SITE CONDITIONS:

STEP 1. CONSTRUCTION OF THE BIORETENTION AREA MAY ONLY BEGIN AFTER THE ENTIRE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED WITH VEGETATION. IT MAY BE NECESSARY TO BLOCK CERTAIN CURB OR OTHER INLETS WHILE THE BIORETENTION AREA IS BEING CONSTRUCTED. THE PROPOSED SITE SHOULD BE CHECKED FOR EXISTING UTILITIES PRIOR TO ANY EXCAVATION.

STEP 2. THE DESIGNER AND THE INSTALLER SHOULD HAVE A PRECONSTRUCTION MEETING, CHECKING THE BOUNDARIES OF THE CONTRIBUTING DRAINAGE AREA AND THE ACTUAL INLET ELEVATIONS TO ENSURE THEY CONFORM TO ORIGINAL DESIGN. SINCE OTHER CONTRACTORS MAY BE RESPONSIBLE FOR CONSTRUCTING PORTIONS OF THE SITE, IT IS QUITE COMMON TO FIND SUBTLE DIFFERENCES IN SITE GRADING, DRAINAGE AND PAVING ELEVATIONS THAT CAN PRODUCE HYDRAULICALLY IMPORTANT DIFFERENCES FOR THE PROPOSED BIORETENTION AREA. THE DESIGNER SHOULD CLEARLY COMMUNICATE, IN WRITING, ANY PROJECT CHANGES DETERMINED DURING THE PRECONSTRUCTION MEETING TO THE INSTALLER AND THE PLAN REVIEW/INSPECTION AUTHORITY.

STEP 3. TEMPORARY E&S CONTROLS ARE NEEDED DURING CONSTRUCTION OF THE BIORETENTION AREA TO DIVERT STORMWATER AWAY FROM THE BIORETENTION AREA UNTIL IT IS COMPLETED. SPECIAL PROTECTION MEASURES SUCH AS EROSION CONTROL FABRICS MAY BE NEEDED TO PROTECT VULNERABLE SIDE SLOPES FROM EROSION DURING THE CONSTRUCTION PROCESS.

STEP 4. ANY PRE-TREATMENT CELLS SHOULD BE EXCAVATED FIRST AND THEN SEALED TO TRAP SEDIMENTS.

STEP 5. EXCAVATORS OR BACKHOES SHOULD WORK FROM THE SIDES TO EXCAVATE THE BIORETENTION AREA TO ITS APPROPRIATE DESIGN DEPTH AND DIMENSIONS. EXCAVATING EQUIPMENT SHOULD HAVE SCOOPS WITH ADEQUATE REACH SO THEY DO NOT HAVE TO SIT INSIDE THE FOOTPRINT OF THE BIORETENTION AREA. CONTRACTORS SHOULD USE A CELL CONSTRUCTION APPROACH IN LARGER BIORETENTION BASINS, WHEREBY THE BASIN IS SPLIT INTO 500 TO 1,000 SQ. FT. TEMPORARY CELLS WITH A 10-15 FOOT EARTH BRIDGE IN BETWEEN, SO THAT CELLS CAN BE EXCAVATED FROM THE SIDE.

STEP 6. IT MAY BE NECESSARY TO RIP THE BOTTOM SOILS TO A DEPTH OF 6 TO 12 INCHES TO PROMOTE GREATER INFILTRATION.

STEP 7. PLACE GEOTEXTILE FABRIC ON THE SIDES OF THE BIORETENTION AREA WITH A 6-INCH OVERLAP ON THE SIDES. IF A STONE STORAGE LAYER WILL BE USED, PLACE THE APPROPRIATE DEPTH OF #57 STONE ON THE BOTTOM, INSTALL THE PERFORATED UNDERDRAIN PIPE, PACK #57 STONE TO 3 INCHES ABOVE THE UNDERDRAIN PIPE, AND ADD APPROXIMATELY 3 INCHES OF CHOKER STONE/PEA GRAVEL AS A FILTER BETWEEN THE UNDERDRAIN AND THE SOIL MEDIA LAYER. IF NO STONE STORAGE LAYER IS USED, START WITH 6 INCHES OF #57 STONE ON THE BOTTOM, AND PROCEED WITH THE LAYERING AS DESCRIBED ABOVE.

STEP 8. OBTAIN SOIL THE MEDIA FROM A QUALIFIED VENDOR, AND STORE IT ON AN ADJACENT IMPERVIOUS AREA OR PLASTIC SHEETING. AFTER VERIFYING THAT THE MEDIA MEETS THE SPECIFICATIONS, APPLY THE MEDIA IN 12-INCH LIFTS UNTIL THE DESIRED TOP ELEVATION OF THE BIORETENTION AREA IS ACHIEVED. WAIT A FEW DAYS TO CHECK FOR SETTLEMENT, AND ADD ADDITIONAL MEDIA, AS NEEDED, TO ACHIEVE THE DESIGN ELEVATION.

STEP 9. PREPARE PLANTING HOLES FOR ANY TREES AND SHRUBS, INSTALL THE VEGETATION, AND WATER ACCORDINGLY. INSTALL ANY TEMPORARY IRRIGATION.

STEP 10. PLACE THE SURFACE COVER IN BOTH CELLS (MULCH, RIVER STONE OR TURF), DEPENDING ON THE DESIGN. IF COIR OR JUTE MATTING WILL BE USED IN LIEU OF MULCH, THE MATTING WILL NEED TO BE INSTALLED PRIOR TO PLANTING (STEP 9), AND HOLES OR SLITS WILL HAVE TO BE CUT IN THE MATTING TO INSTALL THE PLANTS.

STEP 11. INSTALL THE PLANT MATERIALS AS SHOWN IN THE LANDSCAPING PLAN, AND WATER THEM DURING WEEKS OF NO RAIN FOR THE FIRST TWO MONTHS.

8.3 CONSTRUCTION INSPECTION

INSPECTIONS DURING AND IMMEDIATELY AFTER CONSTRUCTION ARE NEEDED TO ENSURE THAT ALL THE ELEMENTS OF BIORETENTION BASINS ARE BUILT IN ACCORDANCE WITH THESE SPECIFICATIONS. USE A DETAILED INSPECTION CHECKLIST THAT REQUIRES SIGN-OFFS BY QUALIFIED INDIVIDUALS AT CRITICAL STAGES OF CONSTRUCTION AND TO ENSURE THAT THE CONTRACTOR'S INTERPRETATION OF THE PLAN IS CONSISTENT WITH THE DESIGNER'S INTENT. THE FOLLOWING IDENTIFIES THE CRITICAL STAGES OF CONSTRUCTION WHERE AN INTERMEDIATE INSPECTION AND SIGN-OFF BY A QUALIFIED INDIVIDUAL IS RECOMMENDED SINCE THE ITEMS CAN'T BE VERIFIED AFTER CONSTRUCTION IS COMPLETED. A CONSTRUCTION INSPECTION CHECKLIST THAT INCLUDES CERTIFICATIONS OF INSPECTION AT CRITICAL STAGES IS PROVIDED AT THE END OF THIS SPECIFICATION.

THE FOLLOWING REPRESENTS ITEMS THAT ARE FREQUENTLY OVERLOOKED DURING CONSTRUCTION INSPECTION BUT REPRESENT IMPORTANT ELEMENTS FOR ENSURING THE SUCCESS OF THE BIORETENTION FACILITY DURING THE INITIAL BREAK-IN PERIOD.

- VERIFY THE PROPER COVERAGE AND DEPTH OF MULCH, VEGETATION, OR SOIL MATTING HAS BEEN ACHIEVED FOLLOWING CONSTRUCTION, BOTH ON THE FILTER BED AND THE SIDE-SLOPES.
- INSPECT THE PRE-TREATMENT FORBAYS AND FILTER STRIPS TO VERIFY THAT THEY ARE PROPERLY INSTALLED, STABILIZED, AND WORKING EFFECTIVELY BEFORE OPENING THE FACILITY TO RUNOFF.
- CHECK THAT OUTFALL PROTECTION/ENERGY DISSIPATION MEASURES AT CONCENTRATED INFLOW AND OUTFLOW POINTS ARE STABLE.

UPON FINAL ACCEPTANCE OF THE FACILITY, LOG THE PRACTICE'S GPS COORDINATES AND SUBMIT THEM FOR ENTRY INTO THE VSMP AUTHORITY'S BMP MAINTENANCE TRACKING DATABASE.

Table 14.4. Clay Liner Specifications

Property	Test Method	Unit	Specification
Permeability	ASTM D-2434	Cm/sec	1 x 10^{-6}
Plasticity Index of Clay	ASTM D-423/424	%	Not less than 15
Liquid Limit of Clay	ASTM D-2216	%	Not less than 30
Clay Particles Passing	ASTM D-422	%	Not less than 30
Clay Compaction	ASTM D-2216	%	95% of standard proctor density

Source: DCR (1999)

SAMPLE CONSTRUCTION INSPECTION CHECKLIST FOR BIORETENTION PRACTICES

THE FOLLOWING CHECKLIST PROVIDES A BASIC OUTLINE OF THE ANTICIPATED ITEMS FOR THE CONSTRUCTION INSPECTION OF BIORETENTION PRACTICES. THIS CHECKLIST DOES NOT NECESSARILY DISTINGUISH BETWEEN ALL THE DESIGN VARIATIONS AND DIFFERENCES IN CONSTRUCTION BETWEEN THE FAMILY OF PRACTICES: BIORETENTION BASINS, MICRO-BIORETENTION (OR RAINGARDENS), AND URBAN BIORETENTION. SIMILARLY, THE USE OF AN INFILTRATION SUMP BELOW AN UNDERDRAIN, OR AN INFILTRATION SUMP WITH AN "UPTURNED ELBOW", AND OTHER VARIATIONS BETWEEN LEVEL 1 AND LEVEL 2 BIORETENTION MAY NOT BE CLEARLY IDENTIFIED IN THIS CHECKLIST. INSPECTORS SHOULD REVIEW THE PLANS CAREFULLY, AND ADJUST THESE ITEMS AND THE TIMING OF INSPECTION VERIFICATION AS NEEDED TO ENSURE THE INTENT OF THE DESIGN IS MET. FINALLY, USERS OF THIS INFORMATION MAY WISH TO INCORPORATE THESE ITEMS INTO A VSMP AUTHORITY CONSTRUCTION CHECKLIST FORMAT CONSISTENT WITH THE FORMAT USED FOR EROSION AND SEDIMENT CONTROL AND BMP CONSTRUCTION INSPECTIONS.

PRE-CONSTRUCTION MEETING

- ☐ PRE-CONSTRUCTION MEETING WITH THE CONTRACTOR DESIGNATED TO INSTALL THE BIORETENTION PRACTICE HAS BEEN CONDUCTED.
- ☐ IDENTIFY THE TENTATIVE SCHEDULE FOR CONSTRUCTION AND VERIFY THE REQUIREMENTS AND SCHEDULE FOR INTERIM INSPECTIONS AND SIGN-OFF.
- ☐ SUBSURFACE INVESTIGATION AND SOILS REPORT SUPPORTS THE PLACEMENT OF AN BIORETENTION PRACTICE IN THE PROPOSED LOCATION.
- ☐ IMPERVIOUS COVER HAS BEEN CONSTRUCTED/INSTALLED AND AREA IS FREE OF CONSTRUCTION EQUIPMENT, VEHICLES, MATERIAL STORAGE, ETC.
- ☐ ALL PERVIOUS AREAS OF THE CONTRIBUTING DRAINAGE AREAS HAVE BEEN ADEQUATELY STABILIZED WITH A THICK LAYER OF VEGETATION AND EROSION CONTROL MEASURES HAVE BEEN REMOVED.
- ☐ AREA OF BIORETENTION PRACTICE HAS NOT BEEN IMPACTED DURING CONSTRUCTION.
- ☐ STORMWATER HAS BEEN DIVERTED AROUND THE AREA OF THE BIORETENTION PRACTICE AND PERIMETER EROSION CONTROL MEASURES TO PROTECT THE FACILITY DURING CONSTRUCTION HAVE BEEN INSTALLED. .

EXCAVATION

- ☐ COMPARE THE BIORETENTION SURFACE AND INVERT DESIGN ELEVATIONS WITH THE ACTUAL CONSTRUCTED ELEVATIONS OF THE INFLOW AND OUTLET INVERTS AND ADJUST DESIGN ELEVATIONS AS NEEDED.
- ☐ AREA OF BIORETENTION EXCAVATION IS MARKED AND THE SIZE AND LOCATION CONFORMS TO PLAN.
- ☐ IF THE EXCAVATION AREA HAS BEEN USED AS A SEDIMENT TRAP: VERIFY THAT THE BOTTOM ELEVATION OF THE PROPOSED STONE RESERVOIR IS LOWER THAN THE BOTTOM ELEVATION OF THE EXISTING TRAP.
- ☐ FOR LEVEL 2 BIORETENTION, ENSURE THE BOTTOM OF THE EXCAVATION IS SCARIFIED PRIOR TO PLACEMENT OF STONE.
- ☐ SUBGRADE SURFACE IS FREE OF ROCKS AND ROOTS, AND LARGE VOIDS. ANY VOIDS SHOULD BE REFILLED WITH THE BASE AGGREGATE TO CREATE A LEVEL SURFACE FOR THE PLACEMENT OF AGGREGATES AND UNDERDRAIN (IF REQUIRED).
- ☐ NO GROUNDWATER SEEPAGE OR STANDING WATER IS PRESENT. ANY STANDING WATER IS DEWATERED TO AN ACCEPTABLE DEWATERING DEVICE.
- ☐ EXCAVATION OF THE BIORETENTION PRACTICE HAS ACHIEVED PROPER GRADES AND THE REQUIRED GEOMETRY AND ELEVATIONS WITHOUT COMPACTING THE BOTTOM OF THE EXCAVATION.
- ☐ CERTIFICATION OF EXCAVATION INSPECTION: INSPECTOR CERTIFIES THE SUCCESSFUL COMPLETION OF THE EXCAVATION STEPS LISTED ABOVE.

FILTER LAYER, UNDERDRAIN, AND STONE RESERVOIR PLACEMENT

- ☐ ALL AGGREGATES, INCLUDING, AS REQUIRED, THE FILTER LAYER (CHOKER STONE & SAND), THE STONE RESERVOIR LAYER OR INFILTRATION SUMP CONFORM TO SPECIFICATIONS AS CERTIFIED BY QUARRY.
- ☐ UNDERDRAIN SIZE AND PERFORATIONS MEET THE SPECIFICATIONS.
- ☐ FOR LEVEL 2 INSTALLATIONS: PLACEMENT OF FILTER LAYER AND INITIAL LIFT OF STONE RESERVOIR LAYER AGGREGATES WITH UNDERDRAIN OR INFILTRATION SUMP, SPREAD (NOT DUMPED) TO AVOID AGGREGATE SEGREGATION; OR
- ☐ IMPERMEABLE LINER, WHEN REQUIRED, MEETS PROJECT SPECIFICATIONS AND IS PLACED IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
- ☐ SIDES OF EXCAVATION COVERED WITH GEOTEXTILE, WHEN REQUIRED, PRIOR TO PLACING STONE RESERVOIR AGGREGATE; NO TEARS OR HOLES, OR EXCESSIVE WRINKLES ARE PRESENT.
- ☐ PLACEMENT OF UNDERDRAIN, OBSERVATION WELLS, AND UNDERDRAIN FITTINGS (45 DEGREE WYES, CAP AT THE UPSTREAM END, ETC.) ARE IN ACCORDANCE WITH THE APPROVED PLANS.
- ☐ ELEVATIONS OF UNDERDRAIN AND OUTLET STRUCTURE ARE IN ACCORDANCE WITH APPROVED PLANS, OR AS ADJUSTED TO MEET FIELD CONDITIONS.
- ☐ PLACEMENT OF REMAINING LIFT OF STONE RESERVOIR LAYER AS NEEDED TO ACHIEVE THE REQUIRED RESERVOIR DEPTH.
- ☐ CERTIFICATION OF FILTER LAYER AND UNDERDRAIN PLACEMENT INSPECTION: INSPECTOR CERTIFIES THE SUCCESSFUL COMPLETION OF THE FILTER LAYER AND UNDERDRAIN PLACEMENT STEPS LISTED ABOVE.

BIORETENTION SOIL MEDIA PLACEMENT

- ☐ SOIL MEDIA IS CERTIFIED BY SUPPLIER OR CONTRACTOR AS MEETING THE PROJECT SPECIFICATIONS.
- ☐ SOIL MEDIA IS PLACED IN 12-INCH LIFTS TO THE DESIGN TOP ELEVATION OF THE BIORETENTION AREA. ELEVATION HAS BEEN VERIFIED AFTER SETTLEMENT (2 TO 4 DAYS AFTER INITIAL PLACEMENT).
- ☐ SIDE SLOPES OF PONDING AREA ARE FEATHERED BACK AT THE REQUIRED SLOPE (NO STEEPER THAN 3H:1V).
- ☐ CERTIFICATION OF SOIL MEDIA PLACEMENT INSPECTION: INSPECTOR CERTIFIES THE SUCCESSFUL COMPLETION OF THE SOIL MEDIA STEPS LISTED ABOVE.

PRETREATMENT AND PLANT INSTALLATION

- ☐ PLACEMENT OF ENERGY DISSIPATORS AND PRETREATMENT PRACTICES (FOREBAYS, GRAVEL DIAPHRAGMS, ETC.) ARE INSTALLED IN ACCORDANCE WITH THE APPROVED PLANS.
- ☐ RISER, OVERFLOW WEIR, OR OTHER OUTFLOW STRUCTURE IS SET TO THE PROPER ELEVATION AND FUNCTIONAL; OR.
- ☐ EXTERNAL BYPASS STRUCTURE IS BUILT IN ACCORDANCE WITH THE APPROVED PLANS.
- ☐ APPROPRIATE NUMBER AND SPACING OF PLANTS ARE INSTALLED IN ACCORDANCE WITH THE APPROVED PLANS.
- ☐ ALL EROSION AND SEDIMENT CONTROL PRACTICES HAVE BEEN REMOVED.
- ☐ FOLLOW-UP INSPECTION AND AS-BUILT SURVEY/CERTIFICATION HAS BEEN SCHEDULED.
- ☐ GPS COORDINATES HAVE BEEN DOCUMENTED FOR ALL BIORETENTION PRACTICE INSTALLATIONS ON THE PARCEL.

CONSTRUCTION INSPECTION

INSPECTIONS ARE NEEDED DURING CONSTRUCTION TO ENSURE THAT FACILITIES ARE BUILT IN ACCORDANCE WITH THE APPROVED PLANS AND DESIGN SPECIFICATIONS. THE DEVELOPER/OWNER SHALL PROVIDE FOR PERIODIC INSPECTIONS OF THE FACILITY DURING CONSTRUCTION. DETAILED INSPECTION CHECKLISTS SHALL BE USED THAT INCLUDE SIGN-OFFS BY A LICENSED LAND SURVEYOR OR PROFESSIONAL ENGINEER REGISTERED IN VIRGINIA AT CRITICAL STAGES OF CONSTRUCTION, TO ENSURE THAT THE CONTRACTOR'S INTERPRETATION OF THE PLAN IS CONSISTENT WITH THE DESIGNER'S INTENT. THE ACTUAL INSPECTIONS MAY BE PERFORMED BY AN INDIVIDUAL UNDER THE DIRECT SUPERVISION OF THE LICENSED PROFESSIONAL.

AS-BUILT CERTIFICATION

AFTER THE FACILITY HAS BEEN CONSTRUCTED, THE DEVELOPER SHALL HAVE AN AS-BUILT CERTIFICATION CONDUCTED BY A LICENSED LAND SURVEYOR OR PROFESSIONAL ENGINEER REGISTERED IN VIRGINIA AND SUBMITTED TO THE COUNTY ALONG WITH THE AS-BUILT CHECKLIST AND AS-BUILT PLAN. THE AS-BUILT CERTIFICATION VERIFIES THAT THE FACILITY WAS INSTALLED AS DESIGNED AND APPROVED.
THE FOLLOWING COMPONENTS SHALL BE ADDRESSED IN THE AS-BUILT CERTIFICATION:

a. THE FILTER IS IN CONFORMANCE WITH THE SPECIFICATION AND IS INSTALLED TO THE CORRECT DEPTH (IF APPLICABLE).
b. ELEVATIONS (e.g., THE INVERT OF THE UNDERDRAIN, INVERTS FOR THE INFLOW AND OUTFLOW POINTS, etc.) AND THE SURFACE SLOPE ARE PER THE PLAN (IF APPLICABLE).
c. PRETREATMENT STRUCTURES (IF APPLICABLE) ARE PROPERLY INSTALLED AND WORKING EFFECTIVELY.
d. OBSERVATION WELLS ARE INSTALLED AND WORKING EFFECTIVELY (IF APPLICABLE).
e. ANY MATERIAL DELIVERY TICKETS AND CERTIFICATIONS FROM THE MATERIAL SUPPLIERS AND RESULTS OF THE TESTS AND INSPECTIONS (IF APPLICABLE).
f. INFILTRATION BASED FACILITIES SHALL BE INSPECTED AT THE OBSERVATION WELL 24 HOURS FOLLOWING A STORM EVENT IN EXCESS OF 0.5 INCHES OF RAINFALL OR ARTIFICIAL FLOODING TO DETERMINE THAT THE FACILITY IS DRAINING PROPERLY. REPORT OF FIELD PERFORMANCE TEST RESULTS AHLL BE INCLUDED ALONG WITH THE AS-BUILT SUBMISSION PACKAGE.
g. PLANTING IS INSTALLED PER PLAN (IF APPLICABLE).
h. BASED ON THE TYPE OF THE FACILITY, DIGITAL PHOTOGRAPHS DOCUMENTING CONSTRUCTION AND SHOWING THE SITE BEFORE BEGINNING CONSTRUCTION, THE EXCAVATION'S WALLS AND BOTTOM BEFORE ANY BACKFILL, PLACEMENT OF EACH MATERIAL LAYER SHOWING THE FINAL TOP SURFACE OF EACH LAYER, PLACEMENT OF THE UNDERDRAIN SYSTEM, OBSERVATION WELLS, AND, OUTLET WORKS (IF APPLICABALE).
i. GPS COORDINATES FOR EACH FACILITY.

BIORETENTION MAINTENANCE

9.1. MAINTENANCE AGREEMENTS

THE VIRGINIA STORMWATER MANAGEMENT REGULATIONS (4 VAC 50-60) SPECIFY THE CIRCUMSTANCES UNDER WHICH A MAINTENANCE AGREEMENT MUST BE EXECUTED BETWEEN THE OWNER AND THE VSMP AUTHORITY, AND SETS FORTH INSPECTION REQUIREMENTS, COMPLIANCE PROCEDURES IF MAINTENANCE IS NEGLECTED, NOTIFICATION OF THE LOCAL PROGRAM UPON TRANSFER OF OWNERSHIP, AND RIGHT-OF-ENTRY FOR LOCAL PROGRAM PERSONNEL.

- ALL BIORETENTION PRACTICES MUST INCLUDE A LONG TERM MAINTENANCE AGREEMENTS CONSISTENT WITH THE PROVISIONS OF THE VSMP REGULATIONS, AND MUST INCLUDE THE RECOMMENDED MAINTENANCE TASKS AND A COPY OF AN ANNUAL INSPECTION CHECKLIST.
- WHEN MICRO-SCALE BIORETENTION PRACTICES ARE APPLIED ON PRIVATE RESIDENTIAL LOTS, HOMEOWNERS SHOULD BE EDUCATED REGARDING THEIR ROUTINE MAINTENANCE NEEDS BY BEING PROVIDED A SIMPLE DOCUMENT THAT EXPLAINS THEIR PURPOSE AND ROUTINE MAINTENANCE NEEDS. .
- A DEED RESTRICTION, DRAINAGE EASEMENT OR OTHER MECHANISM ENFORCEABLE BY THE VSMP AUTHORITY MUST BE IN PLACE TO HELP ENSURE THAT RAIN GARDENS AND BIORETENTION FILTERS ARE MAINTAINED AND NOT CONVERTED OR DISTURBED, AS WELL AS TO PASS THE KNOWLEDGE ALONG TO ANY SUBSEQUENT OWNERS.
- THE MECHANISM SHOULD, IF POSSIBLE, GRANT AUTHORITY FOR THE VSMP AUTHORITY TO ACCESS THE PROPERTY FOR INSPECTION OR CORRECTIVE ACTION.

9.1. FIRST YEAR MAINTENANCE OPERATIONS

SUCCESSFUL ESTABLISHMENT OF BIORETENTION AREAS REQUIRES THAT THE FOLLOWING TASKS BE UNDERTAKEN IN THE FIRST YEAR FOLLOWING INSTALLATION:

- INITIAL INSPECTIONS. FOR THE FIRST 6 MONTHS FOLLOWING CONSTRUCTION, THE SITE SHOULD BE INSPECTED AT LEAST TWICE AFTER STORM EVENTS THAT EXCEED 1/2 INCH OF RAINFALL.
- SPOT RESEEDING. INSPECTORS SHOULD LOOK FOR BARE OR ERODING AREAS IN THE CONTRIBUTING DRAINAGE AREA OR AROUND THE BIORETENTION AREA, AND MAKE SURE THEY ARE IMMEDIATELY STABILIZED WITH GRASS COVER.
- FERTILIZATION. ONE-TIME, SPOT FERTILIZATION MAY BE NEEDED FOR INITIAL PLANTINGS.
- WATERING. WATERING IS NEEDED ONCE A WEEK DURING THE FIRST 2 MONTHS, AND THEN AS NEEDED DURING FIRST GROWING SEASON (APRIL-OCTOBER), DEPENDING ON RAINFALL.
- REMOVE AND REPLACE DEAD PLANTS. SINCE UP TO 10% OF THE PLANT STOCK MAY DIE OFF IN THE FIRST YEAR, CONSTRUCTION CONTRACTS SHOULD INCLUDE A CARE AND REPLACEMENT WARRANTY TO ENSURE THAT VEGETATION IS PROPERLY ESTABLISHED AND SURVIVES DURING THE FIRST GROWING SEASON FOLLOWING CONSTRUCTION. THE TYPICAL THRESHOLDS BELOW WHICH REPLACEMENT IS REQUIRED ARE 85% SURVIVAL OF PLANT MATERIAL AND 100% SURVIVAL OF TREES.

9.1. MAINTENANCE INSPECTIONS

IT IS HIGHLY RECOMMENDED THAT A SPRING MAINTENANCE INSPECTION AND CLEANUP BE CONDUCTED AT EACH BIORETENTION AREA. THE FOLLOWING IS A LIST OF SOME OF THE KEY MAINTENANCE PROBLEMS TO LOOK FOR:

- CHECK TO SEE IF 75% TO 90% COVER (MULCH PLUS VEGETATIVE COVER) HAS BEEN ACHIEVED IN THE BED, AND MEASURE THE DEPTH OF THE REMAINING MULCH.
- CHECK FOR SEDIMENT BUILDUP AT CURB CUTS, GRAVEL DIAPHRAGMS OR PAVEMENT EDGES THAT PREVENTS FLOW FROM GETTING INTO THE BED, AND CHECK FOR OTHER SIGNS OF BYPASSING.
- CHECK FOR ANY WINTER- OR SALT-KILLED VEGETATION, AND REPLACE IT WITH HARDIER SPECIES.
- NOTE PRESENCE OF ACCUMULATED SAND, SEDIMENT AND TRASH IN THE PRE-TREATMENT CELL OR FILTER BEDS, AND REMOVE IT.
- INSPECT BIORETENTION SIDE SLOPES AND GRASS FILTER STRIPS FOR EVIDENCE OF ANY RILL OR GULLY EROSION, AND REPAIR IT.
- CHECK THE BIORETENTION BED FOR EVIDENCE OF MULCH FLOTATION, EXCESSIVE PONDING, DEAD PLANTS OR CONCENTRATED FLOWS, AND TAKE APPROPRIATE REMEDIAL ACTION.
- CHECK INFLOW POINTS FOR CLOGGING, AND REMOVE ANY SEDIMENT.
- LOOK FOR ANY BARE SOIL OR SEDIMENT SOURCES IN THE CONTRIBUTING DRAINAGE AREA, AND STABILIZE THEM IMMEDIATELY.
- CHECK FOR CLOGGED OR SLOW-DRAINING SOIL MEDIA, A CRUST FORMED ON THE TOP LAYER, INAPPROPRIATE SOIL MEDIA, OR OTHER CAUSES OF INSUFFICIENT FILTERING TIME, AND RESTORE PROPER FILTRATION CHARACTERISTICS.

EXAMPLE MAINTENANCE INSPECTION CHECKLISTS FOR BIORETENTION AREAS CAN BE ACCESSED IN APPENDIX C OF CHAPTER 9 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (2010).

9.1. ROUTINE AND NON-ROUTINE MAINTENANCE TASKS

MAINTENANCE OF BIORETENTION AREAS SHOULD BE INTEGRATED INTO ROUTINE LANDSCAPE MAINTENANCE TASKS. IF LANDSCAPING CONTRACTORS WILL BE EXPECTED TO PERFORM MAINTENANCE, THEIR CONTRACTS SHOULD CONTAIN SPECIFICS ON UNIQUE BIORETENTION LANDSCAPING NEEDS, SUCH AS MAINTAINING ELEVATION DIFFERENCES NEEDED FOR PONDING, PROPER MULCHING, SEDIMENT AND TRASH REMOVAL, AND LIMITED USE OF FERTILIZERS AND PESTICIDES. A CUSTOMIZED MAINTENANCE SCHEDULE MUST BE PREPARED FOR EACH BIORETENTION FACILITY, SINCE THE MAINTENANCE TASKS WILL DIFFER DEPENDING ON THE SCALE OF BIORETENTION, THE LANDSCAPING TEMPLATE CHOSEN, AND THE TYPE OF SURFACE COVER. A GENERALIZED SUMMARY OF COMMON MAINTENANCE TASKS AND THEIR FREQUENCY IS PROVIDED IN TABLE 9.8.

THE MOST COMMON NON-ROUTINE MAINTENANCE PROBLEM INVOLVES STANDING WATER. IF WATER REMAINS ON THE SURFACE FOR MORE THAN 48 HOURS AFTER A STORM, ADJUSTMENTS TO THE GRADING MAY BE NEEDED OR UNDERDRAIN REPAIRS MAY BE NEEDED. THE SURFACE OF THE FILTER BED SHOULD ALSO BE CHECKED FOR ACCUMULATED SEDIMENT OR A FINE CRUST THAT BUILDS UP AFTER THE FIRST SEVERAL STORM EVENTS. THERE ARE SEVERAL METHODS THAT CAN BE USED TO REHABILITATE THE FILTER (TRY THE EASIEST THINGS FIRST, AS LISTED BELOW):

- OPEN THE UNDERDRAIN OBSERVATION WELL OR CLEANOUT AND POUR IN WATER TO VERIFY THAT THE UNDERDRAINS ARE FUNCTIONING AND NOT CLOGGED OR OTHERWISE IN NEED OF REPAIR. THE PURPOSE OF THIS CHECK IS TO SEE IF THERE IS STANDING WATER ALL THE WAY DOWN THROUGH THE SOIL. IF THERE IS STANDING WATER ON TOP, BUT NOT IN THE UNDERDRAIN, THEN THERE IS A CLOGGED SOIL LAYER. IF THE UNDERDRAIN AND STAND PIPE INDICATES STANDING WATER, THEN THE UNDERDRAIN MUST BE CLOGGED AND WILL NEED TO BE SNAKED.
- REMOVE ACCUMULATED SEDIMENT AND TILL 2 TO 3 INCHES OF SAND INTO THE UPPER 8 TO 12 INCHES OF SOIL.
- INSTALL SAND WICKS FROM 3 INCHES BELOW THE SURFACE TO THE UNDERDRAIN LAYER. SAND WICKS CAN BE INSTALLED BY EXCAVATING OR AUGERING (USING A TREE AUGER OR SIMILAR TOOL) DOWN TO THE GRAVEL STORAGE ZONE TO CREATE VERTICAL COLUMNS WHICH ARE THEN FILLED WITH A CLEAN OPEN-GRADED COARSE SAND MATERIAL (COARSE SAND MIX SIMILAR TO THE GRADATION USED FOR THE SOIL MEDIA). A SUFFICIENT NUMBER OF WICK DRAINS OF SUFFICIENT DIMENSION SHOULD BE INSTALLED TO MEET THE DESIGN DEWATERING TIME FOR THE FACILITY.
- LAST RESORT - REMOVE AND REPLACE SOME OR ALL OF THE SOIL MEDIA.

TABLE 9.8. SUGGESTED ANNUAL MAINTENANCE ACTIVITIES FOR BIORETENTION

MAINTENANCE TASKS	FRENQUENCY
• MOWING OF GRASS FILTER STRIPS AND BIORETENTION TURF COVER	AT LEAST 4 TIMES A YEAR
• SPOT WEEDING, EROSION REPAIR, TRASH REMOVAL, AND MULCH RAKING	TWICE DURING GROWING SEASON
• ADD REINFORCEMENT PLANTING TO MAINTAIN DESIRED THE VEGETATION DENSITY • REMOVE INVASIVE PLANTS USING RECOMMENDED CONTROL METHODS • STABILIZE THE CONTRIBUTING DRAINAGE AREA TO PREVENT EROSION	AS NEEDED
• SPRING INSPECTION AND CLEANUP • SUPPLEMENT MULCH TO MAINTAIN A 3 INCH LAYER • PRUNE TREES AND SHRUBS	ANNUALLY
• REMOVE SEDIMENT IN PRE-TREATMENT CELLS AND INFLOW POINTS	ONCE EVERY 2 TO 3 YEARS
• REPLACE THE MULCH LAYER	EVERY 3 YEARS

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

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CHAIRMAN, PLANNING COMMISSION ____ DATE ____
DATE RECORDED ____
INSTRUMENT NO. ____ DEED BOOK NO. ____ PAGE NO. ____

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PROFESSIONAL ENGINEER

BMP CONSTRUCTION & MAINTENANCE
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA
SCALE: N/A C.I.= N/A DATE: AUGUST, 2017

SHEET
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PERMEABLE PAVER CONSTRUCTION SEQUENCE

THE FOLLOWING IS A TYPICAL CONSTRUCTION SEQUENCE TO PROPERLY INSTALL PERMEABLE PAVEMENT, WHICH MAY NEED TO BE MODIFIED TO DEPENDING ON WHETHER POROUS ASPHALT (PA), PERVIOUS CONCRETE (PC) OR INTERLOCKING PAVER (IP) DESIGNS ARE EMPLOYED.

STEP 1. CONSTRUCTION OF THE PERMEABLE PAVEMENT SHALL ONLY BEGIN AFTER THE ENTIRE CONTRIBUTING DRAINAGE AREA HAS BEEN STABILIZED. THE PROPOSED SITE SHOULD BE CHECKED FOR EXISTING UTILITIES PRIOR TO ANY EXCAVATION. DO NOT INSTALL THE SYSTEM IN RAIN OR SNOW, AND DO NOT INSTALL FROZEN AGGREGATE MATERIALS.

STEP 2. AS NOTED ABOVE, TEMPORARY EROSION AND SEDIMENT (E&S) CONTROLS ARE NEEDED DURING INSTALLATION TO DIVERT STORMWATER AWAY FROM THE PERMEABLE PAVEMENT AREA UNTIL IT IS COMPLETED. SPECIAL PROTECTION MEASURES SUCH AS EROSION CONTROL FABRICS MAY BE NEEDED TO PROTECT VULNERABLE SIDE SLOPES FROM EROSION DURING THE EXCAVATION PROCESS. THE PROPOSED PERMEABLE PAVEMENT AREA MUST BE KEPT FREE FROM SEDIMENT DURING THE ENTIRE CONSTRUCTION PROCESS. CONSTRUCTION MATERIALS THAT ARE CONTAMINATED BY SEDIMENTS MUST BE REMOVED AND REPLACED WITH CLEAN MATERIALS.

STEP 3. WHERE POSSIBLE, EXCAVATORS OR BACKHOES SHOULD WORK FROM THE SIDES TO EXCAVATE THE RESERVOIR LAYER TO ITS APPROPRIATE DESIGN DEPTH AND DIMENSIONS. FOR MICRO-SCALE AND SMALL-SCALE PAVEMENT APPLICATIONS, EXCAVATING EQUIPMENT SHOULD HAVE ARMS WITH ADEQUATE EXTENSION SO THEY DO NOT HAVE TO WORK INSIDE THE FOOTPRINT OF THE PERMEABLE PAVEMENT AREA (TO AVOID COMPACTION). CONTRACTORS CAN UTILIZE A CELL CONSTRUCTION APPROACH, WHEREBY THE PROPOSED PERMEABLE PAVEMENT AREA IS SPLIT INTO 500 TO 1000 SQ. FT. TEMPORARY CELLS WITH A 10 TO 15 FOOT EARTH BRIDGE IN BETWEEN, SO THAT CELLS CAN BE EXCAVATED FROM THE SIDE. EXCAVATED MATERIAL SHOULD BE PLACED AWAY FROM THE OPEN EXCAVATION SO AS TO NOT JEOPARDIZE THE STABILITY OF THE SIDE WALLS.

STEP 4. THE NATIVE SOILS ALONG THE BOTTOM AND SIDES OF THE PERMEABLE PAVEMENT SYSTEM SHOULD BE SCARIFIED OR TILLED TO A DEPTH OF 3 TO 4 INCHES PRIOR TO THE PLACEMENT OF THE FILTER LAYER OR FILTER FABRIC. IN LARGE SCALE PAVING APPLICATIONS WITH WEAK SOILS, THE SOIL SUBGRADE MAY NEED TO BE COMPACTED TO 95% OF THE STANDARD PROCTOR DENSITY TO ACHIEVE THE DESIRED LOAD-BEARING CAPACITY. (NOTE: THIS EFFECTIVELY ELIMINATES THE INFILTRATION FUNCTION OF THE INSTALLATION, AND IT MUST BE ADDRESSED DURING HYDROLOGIC DESIGN.)

STEP 5. THE FILTER LAYER SHOULD BE INSTALLED ON THE BOTTOM OF THE RESERVOIR LAYER, AND WHERE WARRANTED, FILTER FABRIC CAN BE PLACED ON THE SIDES.

STEP 6. PROVIDE A MINIMUM OF 2 INCHES OF AGGREGATE ABOVE AND BELOW THE UNDERDRAINS. THE UNDERDRAINS SHOULD SLOPE DOWN TOWARDS THE OUTLET AT A GRADE OF 0.5% OR STEEPER. THE UP-GRADIENT END OF UNDERDRAINS IN THE RESERVOIR LAYER SHOULD BE CAPPED. WHERE AN UNDERDRAIN PIPE IS CONNECTED TO A STRUCTURE, THERE SHALL BE NO PERFORATIONS WITHIN 1 FOOT OF THE STRUCTURE. ENSURE THAT THERE ARE NO PERFORATIONS IN CLEAN-OUTS AND OBSERVATION WELLS WITHIN 1 FOOT OF THE SURFACE.

STEP 7. SPREAD 6-INCH LIFTS OF THE APPROPRIATE CLEAN, WASHED STONE AGGREGATE. PLACE AT LEAST 4 INCHES OF ADDITIONAL AGGREGATE ABOVE THE UNDERDRAIN, AND THEN COMPACT IT USING A VIBRATORY ROLLER IN STATIC MODE UNTIL THERE IS NO VISIBLE MOVEMENT OF THE AGGREGATE. DO NOT CRUSH THE AGGREGATE WITH THE ROLLER.

STEP 8. INSTALL OVERDRAIN IF REQUIRED AND CONNECT INTO OUTLET CONVEYANCE SYSTEM.

STEP 9. INSTALL THE DESIRED DEPTH OF THE BEDDING LAYER, DEPENDING ON THE TYPE OF PAVEMENT, AS FOLLOWS:
PERVIOUS CONCRETE: NO BEDDING LAYER IS USED.
POROUS ASPHALT: THE BEDDING LAYER FOR POROUS ASPHALT PAVEMENT CONSISTS OF 1 TO 2 INCHES OF CLEAN, WASHED ASTM D 448 NO.57 STONE. THE FILTER COURSE MUST BE LEVELED AND PRESSED (CHOKED) INTO THE RESERVOIR BASE WITH AT LEAST FOUR (4) PASSES OF A 10-TON STEEL DRUM STATIC ROLLER.
INTERLOCKING PAVERS: THE BEDDING LAYER FOR OPEN-JOINTED PAVEMENT BLOCKS SHOULD CONSIST OF 2 INCHES OF WASHED ASTM D 448 NO.8 STONE.

STEP 10. PAVING MATERIALS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER OR INDUSTRY SPECIFICATIONS FOR THE PARTICULAR TYPE OF PAVEMENT.

INSTALLATION OF POROUS ASPHALT. THE FOLLOWING HAS BEEN EXCERPTED FROM VARIOUS DOCUMENTS, MOST NOTABLY JACKSON (2007).

1. INSTALL POROUS ASPHALT PAVEMENT SIMILARLY TO REGULAR ASPHALT PAVEMENT. THE PAVEMENT SHOULD BE LAID IN A SINGLE LIFT OVER THE FILTER COURSE. THE LAYING TEMPERATURE SHOULD BE BETWEEN 230OF AND 260OF, WITH A MINIMUM AIR TEMPERATURE OF 50OF, TO ENSURE THAT THE SURFACE DOES NOT STIFFEN BEFORE COMPACTION.
2. COMPLETE COMPACTION OF THE SURFACE COURSE WHEN THE SURFACE IS COOL ENOUGH TO RESIST A 10-TON ROLLER. ONE OR TWO PASSES OF THE ROLLER ARE REQUIRED FOR PROPER COMPACTION. MORE ROLLING COULD CAUSE A REDUCTION IN THE POROSITY OF THE PAVEMENT.
3. THE MIXING PLANT MUST PROVIDE CERTIFICATION OF THE AGGREGATE MIX, ABRASION LOSS FACTOR, AND ASPHALT CONTENT IN THE MIX. TEST THE ASPHALT MIX FOR ITS RESISTANCE TO STRIPPING BY WATER USING ASTM 1664. IF THE ESTIMATED COATING AREA IS NOT ABOVE 95%, ADDITIONAL ANTI-STRIPPING AGENTS MUST BE ADDED TO THE MIX.
4. TRANSPORT THE MIX TO THE SITE IN A CLEAN VEHICLE WITH SMOOTH DUMP BEDS SPRAYED WITH A NON-PETROLEUM RELEASE AGENT. THE MIX SHALL BE COVERED DURING TRANSPORTATION TO CONTROL COOLING.
5. TEST THE FULL PERMEABILITY OF THE PAVEMENT SURFACE BY APPLICATION OF CLEAN WATER AT A RATE OF AT LEAST FIVE GALLONS PER MINUTE OVER THE ENTIRE SURFACE. ALL WATER MUST INFILTRATE DIRECTLY, WITHOUT PUDDLE FORMATION OR SURFACE RUNOFF.
6. INSPECT THE FACILITY 18 TO 30 HOURS AFTER A SIGNIFICANT RAINFALL (GREATER THAN 1/2 INCH) OR ARTIFICIAL FLOODING, TO DETERMINE THAT THE FACILITY IS DRAINING PROPERLY.

CONSTRUCTION INSPECTION

INSPECTIONS BEFORE, DURING AND AFTER CONSTRUCTION ARE NEEDED TO ENSURE THAT PERMEABLE PAVEMENT IS BUILT IN ACCORDANCE WITH THESE SPECIFICATIONS. USE A DETAILED INSPECTION CHECKLIST THAT REQUIRES SIGN-OFFS BY QUALIFIED INDIVIDUALS AT CRITICAL STAGES OF CONSTRUCTION AND TO ENSURE THAT THE CONTRACTOR'S INTERPRETATION OF THE PLAN IS CONSISTENT WITH THE DESIGNER'S INTENT. THE BASIC ELEMENTS OF A PERMEABLE PAVEMENT CONSTRUCTION CHECKLIST ARE PROVIDED AT THE END OF THIS SPECIFICATION.

ONCE THE FINAL CONSTRUCTION INSPECTION HAS BEEN COMPLETED, LOG THE GPS COORDINATES FOR EACH FACILITY AND SUBMIT THEM FOR ENTRY INTO THE LOCAL BMP MAINTENANCE TRACKING DATABASE.

IT MAY BE ADVISABLE TO DIVERT THE RUNOFF FROM THE FIRST FEW RUNOFF-PRODUCING STORMS AWAY FROM LARGER PERMEABLE PAVEMENT APPLICATIONS, PARTICULARLY WHEN UP-GRADIENT CONVENTIONAL ASPHALT AREAS DRAIN TO THE PERMEABLE PAVEMENT. THIS CAN HELP REDUCE THE INPUT OF FINE PARTICLES THAT ARE OFTEN PRODUCED SHORTLY AFTER CONVENTIONAL ASPHALT IS LAID DOWN.

MAINTENANCE AGREEMENTS

THE VIRGINIA STORMWATER MANAGEMENT REGULATIONS (4 VAC 50-60) SPECIFY THE CIRCUMSTANCES UNDER WHICH A MAINTENANCE AGREEMENT MUST BE EXECUTED BETWEEN THE OWNER AND THE VSMP AUTHORITY, AND SETS FORTH INSPECTION REQUIREMENTS, COMPLIANCE PROCEDURES IF MAINTENANCE IS NEGLECTED, NOTIFICATION OF THE LOCAL PROGRAM UPON TRANSFER OF OWNERSHIP, AND RIGHT-OF-ENTRY FOR LOCAL PROGRAM PERSONNEL.

1. ALL PERMEABLE PAVEMENT INSTALLATIONS MUST BE COVERED BY A LONG TERM MAINTENANCE AGREEMENT AND DRAINAGE EASEMENT CONSISTENT WITH THE PROVISIONS OF THE VSMP REGULATIONS TO ALLOW INSPECTION AND MAINTENANCE.
2. THE MAINTENANCE AGREEMENTS SHOULD NOTE WHICH CONVENTIONAL PARKING LOT MAINTENANCE TASKS MUST BE AVOIDED (E.G., SANDING, RE-SEALING, RE-SURFACING, POWER-WASHING). SIGNS SHOULD BE POSTED ON LARGER PARKING LOTS TO INDICATE THEIR STORMWATER FUNCTION AND SPECIAL MAINTENANCE REQUIREMENTS. WHEN MICRO-SCALE OR SMALL-SCALE PERMEABLE PAVEMENT ARE INSTALLED ON PRIVATE RESIDENTIAL LOTS, HOMEOWNERS SHOULD BE PROVIDED A SIMPLE DOCUMENT THAT EXPLAINS THE PURPOSE OF THE PERMEABLE PAVEMENT AND OUTLINES (1) THE ROUTINE MAINTENANCE NEEDS, (2) THE LONG-TERM MAINTENANCE PLAN, AND (3) THE BASIC PARAMETERS OF THE DEED RESTRICTION, DRAINAGE EASEMENT OR OTHER MECHANISM ENFORCEABLE BY THE VSMP AUTHORITY TO HELP ENSURE THAT THE PERMEABLE PAVEMENT SYSTEM IS MAINTAINED AND FUNCTIONING.
3. THE MECHANISM SHOULD, IF POSSIBLE, GRANT AUTHORITY FOR THE VSMP AUTHORITY TO ACCESS THE PROPERTY FOR INSPECTION OR CORRECTIVE ACTION.

MAINTENANCE TASKS

IT IS DIFFICULT TO PRESCRIBE THE SPECIFIC TYPES OR FREQUENCY OF MAINTENANCE TASKS THAT ARE NEEDED TO MAINTAIN THE HYDROLOGIC FUNCTION OF PERMEABLE PAVEMENT SYSTEMS OVER TIME. MOST INSTALLATIONS WORK REASONABLY WELL YEAR AFTER YEAR WITH LITTLE OR NO MAINTENANCE, WHEREAS SOME HAVE PROBLEMS RIGHT FROM THE START.

THE FOLLOWING TASKS MUST BE AVOIDED ON ALL PERMEABLE PAVEMENTS:

1. SANDING
2. RE-SEALING
3. RE-SURFACING
4. POWER WASHING
5. STORAGE OF SNOW PILES CONTAINING SAND
6. STORAGE OF MULCH OR SOIL MATERIALS
7. CONSTRUCTION STAGING ON UNPROTECTED PAVEMENT

A PREVENTATIVE MAINTENANCE TASK FOR LARGE-SCALE APPLICATIONS INVOLVES REGENERATIVE AIR VACUUM SWEEPING ON A FREQUENCY CONSISTENT WITH THE USE AND LOADINGS ENCOUNTERED IN THE PARKING LOT. MANY CONSIDER AN ANNUAL, DRY-WEATHER SWEEPING IN THE SPRING MONTHS TO BE IMPORTANT. THE CONTRACT FOR SWEEPING SHOULD SPECIFY THAT A VACUUM SWEEPER BE USED THAT DOES NOT USE WATER SPRAY, SINCE SPRAYING MAY LEAD TO SUBSURFACE CLOGGING. VACUUM SETTINGS FOR LARGE-SCALE INTERLOCKING PAVER APPLICATIONS SHOULD BE CALIBRATED SO THEY DO NOT PICK UP THE STONES BETWEEN PAVEMENT BLOCKS.

MAINTENANCE INSPECTIONS

IT IS HIGHLY RECOMMENDED THAT A SPRING MAINTENANCE INSPECTION AND CLEANUP BE CONDUCTED AT EACH PERMEABLE PAVEMENT SITE, PARTICULARLY AT LARGE-SCALE APPLICATIONS.

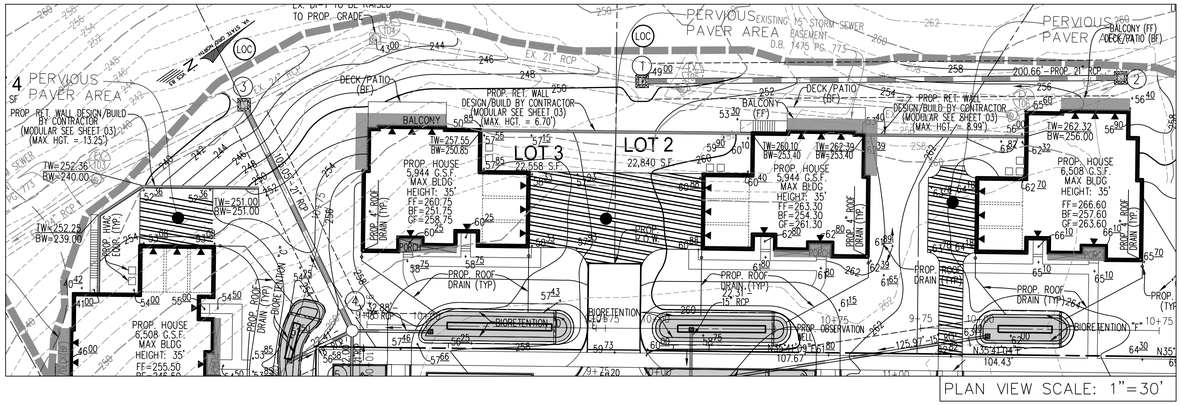
MAINTENANCE OF PERMEABLE PAVEMENT IS DRIVEN BY ANNUAL INSPECTIONS THAT EVALUATE THE CONDITION AND PERFORMANCE OF THE PRACTICE. ANY PERMEABLE PAVEMENT INSTALLATION WITH EXTERNAL DRAINAGE AREA (RUN-ON) SHOULD BE INSPECTED MORE FREQUENTLY DURING THE FIRST YEAR (FOUR SEASONS) TO ENSURE THAT THERE ARE NO UNEXPECTED CONTRIBUTING LOADS OF SEDIMENT OR PAVEMENT PARTICULATES FROM THE CONTRIBUTING AREA. IF SO, EXTENSIVE INVESTIGATION SHOULD ASSESS WAYS TO LIMIT THE CONTRIBUTIONS, OR THE MAINTENANCE SCHEDULE SHOULD BE ADJUSTED TO ENSURE THE PAVEMENT DOES NOT BECOME CLOGGED.

THE FOLLOWING ARE SUGGESTED ROUTINE ANNUAL MAINTENANCE INSPECTION POINTS FOR PERMEABLE PAVEMENTS:

1. THE DRAWDOWN RATE SHOULD BE MEASURED AT THE OBSERVATION WELL FOR THREE (3) DAYS FOLLOWING A STORM EVENT IN EXCESS OF 1/2 INCH IN DEPTH. IF STANDING WATER IS STILL OBSERVED IN THE WELL AFTER THREE DAYS, THIS IS A CLEAR SIGN THAT CLOGGING IS A PROBLEM.
2. INSPECT THE SURFACE OF THE PERMEABLE PAVEMENT FOR EVIDENCE OF SEDIMENT DEPOSITION, ORGANIC DEBRIS, STAINING OR PONDING THAT MAY INDICATE SURFACE CLOGGING. IF ANY SIGNS OF CLOGGING ARE NOTED, SCHEDULE A VACUUM SWEEPER (NO BROOMS OR WATER SPRAY) TO REMOVE DEPOSITED MATERIAL. THEN, TEST SECTIONS BY POURING WATER FROM A FIVE GALLON BUCKET TO ENSURE THEY WORK.
3. INSPECT THE STRUCTURAL INTEGRITY OF THE PAVEMENT SURFACE, LOOKING FOR SIGNS OF SURFACE DETERIORATION, SUCH AS SLUMPING, CRACKING, SPALLING OR BROKEN PAVERS. REPLACE OR REPAIR AFFECTED AREAS, AS NECESSARY.
4. CHECK INLETS, PRETREATMENT CELLS AND ANY FLOW DIVERSION STRUCTURES FOR SEDIMENT BUILDUP AND STRUCTURAL DAMAGE. NOTE IF ANY SEDIMENT NEEDS TO BE REMOVED.
5. INSPECT THE CONDITION OF THE OBSERVATION WELL AND MAKE SURE IT IS STILL CAPPED.
6. GENERALLY INSPECT ANY CONTRIBUTING DRAINAGE AREA FOR ANY CONTROLLABLE SOURCES OF SEDIMENT OR EROSION.

AN EXAMPLE MAINTENANCE INSPECTION CHECKLIST FOR PERMEABLE PAVEMENT CAN BE ACCESSED IN APPENDIX C OF CHAPTER 9 OF THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK (2010). BASED ON INSPECTION RESULTS, SPECIFIC MAINTENANCE TASKS WILL BE TRIGGERED AND SCHEDULED TO KEEP THE FACILITY IN OPERATING CONDITION.

PERMEABLE PAVER AREA PLAN VIEW



PERMEABLE PAVER NARRATIVE

PERMEABLE PAVERS ARE PROVIDED ON DRIVEWAYS OF LOTS 1-4. THE PERMEABLE PAVERS HAVE BEEN UTILIZED TO ADJUST LAND COVER FROM IMPERVIOUS TO WOODED/FORESTED. NO STORAGE OR PHOSPHORUS REDUCTION HAS BEEN ASSOCIATED WITH THE PAVERS. THE PERMEABLE PAVERS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE SOILS C AND D DESIGN REQUIREMENTS OUTLINED IN VIRGINIA DCR STORMWATER DESIGN SPECIFICATION NO.7.

VA DEQ STORMWATER DESIGN SPECIFICATION NO. 7 PERMEABLE PAVEMENT

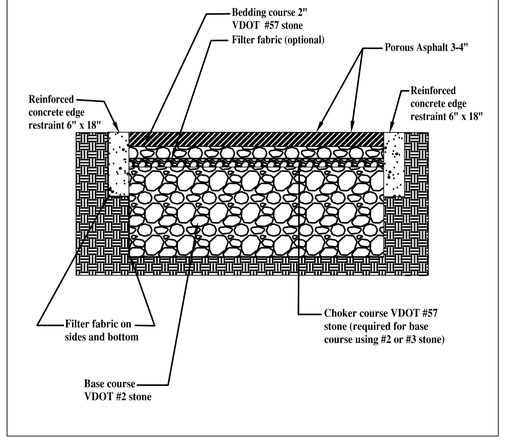
Table 7.5. Material Specifications for Underneath the Pavement Surface

Material	Specification	Notes
Bedding Layer	PC: None PA: 2 in. depth of No. 8 stone IP: 2 in. depth of No. 8 stone over 3 to 4 inches of No. 57	ASTM D448 size No. 8 stone (e.g. 3/8 to 3/16 inch in size). Should be double-washed and clean and free of all fines.
Reservoir Layer	PC: No. 57 stone PA: No. 2 stone IP: No. 57 stone	ASTM D448 size No. 57 stone (e.g. 1 1/2 to 1/2 inch in size); No. 2 Stone (e.g. 3 inch to 3/4 inch in size). Depth is based on the pavement structural and hydraulic requirements. Should be double-washed and clean and free of all fines.
Underdrain	Use 4 to 6 inch diameter perforated PVC (AASHTO M 252) pipe, with 3/8-inch perforations at 6 inches on center; each underdrain installed at a minimum 0.5% slope located 20 feet or less from the next pipe (or equivalent corrugated HDPE may be used for smaller load-bearing applications). Perforated pipe installed for the full length of the permeable pavement cell, and non-perforated pipe, as needed, is used to connect with the storm drain system. T's and Y's installed as needed, depending on the underdrain configuration. Extend cleanout pipes to the surface with vented caps at the Ts and Ys.	
Filter Layer	The underlying native soils should be separated from the stone reservoir by a thin, 2 to 4 inch layer of choker stone (e.g. No. 8) covered by a 6 to 8 inch layer of coarse sand (e.g. ASTM C 33, 0.02-0.04 inch).	The sand should be placed between the stone reservoir and the choker stone, which should be placed on top of the underlying native soils.
Filter Fabric (optional)	Use a needled, non-woven, polypropylene geotextile with Grab Tensile Strength equal to or greater than 120 lbs (ASTM D4632), with a Mullen Burst Strength equal to or greater than 225 lbs./sq. in (ASTM D3786), with a Flow Rate greater than 125 gpm/sq. ft. (ASTM D4491), and an Apparent Opening Size (AOS) equivalent to a US # 70 or # 80 sieve (ASTM D4751). The geotextile AOS selection is based on the percent passing the No. 200 sieve in "A" Soil subgrade, using FHWA or AASHTO selection criteria.	
Impermeable Liner	Use a thirty mil (minimum) PVC Geomembrane liner covered by 8 to 12 oz./sq. yd. non-woven geotextile. NOTE: THIS IS USED ONLY FOR KARST REGIONS.	
Observation Well	Use a perforated 4 to 6 inch vertical PVC pipe (AASHTO M 252) with a lockable cap, installed flush with the surface.	

Table 7.6. Different Permeable Pavement Specifications

Material	Specification	Notes
Permeable Interlocking Concrete Pavers	Surface open area: 5% to 15%. Thickness: 3.125 inches for vehicles. Compressive strength: 55 Mpa. Open void fill media: aggregate	Must conform to ASTM C936 specifications. Reservoir layer required to support the structural load.
Concrete Grid Pavers	Open void content: 20% to 50%. Thickness: 3.5 inches. Compressive strength: 35 Mpa. Open void fill media: aggregate, topsoil and grass, coarse sand	Must conform to ASTM C 1319 specifications. Reservoir layer required to support the structural load.
Plastic Reinforced Grid Pavers	Void content: depends on fill material. Compressive strength: varies, depending on fill material. Open void fill media: aggregate, topsoil and grass, coarse sand.	Reservoir layer required to support the structural load.
Pervious Concrete	Void content: 15% to 25 %. Thickness: typically 4 to 8 inches. Compressive strength: 2.8 to 28 Mpa. Open void fill media: None	May not require a reservoir layer to support the structural load, but a layer may be included to increase the storage or infiltration.
Porous Asphalt	Void content: 15% to 20 % Thickness: typically 3 to 7 in. (depending on traffic load). Open void fill media: None.	Reservoir layer required to support the structural load.

PERMEABLE PAVEMENT TYPICAL CROSS SECTION



THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL BMP'S SHALL BE PRIVATELY MAINTAINED

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	DESCRIPTION	DATE
	REVISIONS	

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-07-17
08-01-17
- - -

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COMMONWEALTH OF VIRGINIA CLAYTON C. TOCK Lic. No. 056790 PROFESSIONAL ENGINEER 05-01-17

BMP DETAILS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

C.I.= N/A

DATE: AUGUST, 2017

SCALE: N/A

SHEET 18A

FILE No. 12811

Urban, Ltd. - z:\JOBS\Seminary Road\Preliminary Site Plan\12811-22a-BMP Details.dwg [PAVER DETAILS] August 01, 2017 - 11:45am rfulling

SITE DRAINAGE SHED DESIGNATION CALCULATION SUMMARY

CURVE NUMBER CALCULATION

Area (ac)	CN	Description
0.460	80	>75% Grass cover, Good, HSG D
0.200	98	Paved parking, HSG D
1.600	77	Woods, Good, HSG D
2.260	79	Weighted Average

TIME OF CONCENTRATION CALCULATION

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00 2014 MODEL

PRE-DEVELOPMENT CONDITIONS

Runoff = 3.95 cfs @ 11.96 hrs, Volume= 7,992 cf, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.70"

POST-DEVELOPMENT CONDITIONS

Runoff = 5.44 cfs @ 11.96 hrs, Volume= 10,966 cf, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.20"

10 YEAR POST-DEVELOPMENT CONDITIONS

Runoff = 11.98 cfs @ 11.96 hrs, Volume= 24,403 cf, Depth= 2.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.20"

PRE DEVELOPMENT
ONSITE AREA
TO STUDY POINT "A"
DA =2.26AC
RCN= 79
Tc=5 MIN

STUDY POINT "A"

LEGEND

ON SITE AREA

ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
06-06-16
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04-14-17
06-09-17
07-21-17
08-01-17

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Clayton Tock Clifton
Lic. No. 038790
PROFESSIONAL ENGINEER
08/01/17

PRE-DEVELOPMENT DIVIDES

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017
SCALE: 1"=30' C.I.= 2'

SHEET 19

FILE No. 12811

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Onsite Area Tab	Acre
Bioretention "A"	
Surface Area	0.23
Total	0.23
Bioretention "B"	
Surface Area	0.33
Total	0.33
Bioretention "C"	
Surface Area	0.11
Rooftop Area	0.08
Total	0.19
Bioretention "D"	
Surface Area	0.15
Rooftop Area	0.07
Total	0.22
Bioretention "E"	
Surface Area	0.15
Rooftop Area	0.07
Total	0.22
Bioretention "F"	
Surface Area	0.08
Rooftop Area	0.08
Total	0.16

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
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POST-DEVELOPMENT DIVIDES

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' | C.I.= 2' | DATE: AUGUST, 2017

SHEET 20

FILE No. 12811

71C | 71D | 72B | 95

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
TOMS CHARLES A
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
9.3422 Sq. Feet
2.1447 Acres
ZONING: R-20

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED STEVEN E TR &
THOMSON REED ANNE F TR
TM# 040.03-04-26
ZONING: R-20

EX. 10" SAN.

EX. 21" RCP

EX. 15" RCP

EX. 18" RCP

EX. 24" RCP

EX. BUS STOP (RTE. ATE)

EX. C.L.

EX. STRIPING (TYP.)

EX. R.O.W.

EX. SEMINARY ROAD
60' R/CRP
POSTED SPEED = 25 M.P.H.

PROP. R.O.W. DEDI

PROP. UTILITY ESMT.

N 6,885,000
E 17,882,250

N 6,885,250
E 17,882,500

N 6,884,750
E 17,882,500

VA. STATE GRID NORTH

N 34°34'54" E 621.11'

S 35°40'38" W 671.53'

L=46.69'
R=502.95
S 39°58'56" E
69.42

A=22.44'
TANG.=12.00'

PROP. RET. WALL (MODULAR SEE SHEET 03)
(MAX. HGT. = 13.25')

PROP. RET. WALL (MODULAR SEE SHEET 03)
(MAX. HGT. = 6.70')

PROP. RET. WALL (MODULAR SEE SHEET 03)
(MAX. HGT. = 8.99')

DECK/PATIO (BF)

BALCONY (FF)

BALCONY (FF)
DECK/PATIO (BF)

PROP. HOUSE
5,944 G.S.F.
MAX BLDG.

PROP. HOUSE
6,508 G.S.F.
MAX BLDG.

TW=257.55
BW=250.85

TW=260.10
BW=253.40

TW=262.39
BW=253.40

TW=262.32
BW=256.00

TW=252.36
BW=240.00

TW=251.00
BW=251.00

TW=252.25
BW=239.00

TW=247.00
BW=246.00

GF=253.50

ROOF DRAIN TO BIORETENTION "D"
DA = 0.07
IMPERVIOUS = 0.07

ROOF DRAIN TO BIORETENTION "E"
DA = 0.07
IMPERVIOUS = 0.07

ROOF DRAIN TO BIORETENTION "F"
DA = 0.08
IMPERVIOUS = 0.08

ROOF DRAIN TO BIORETENTION "C"
DA = 0.08
IMPERVIOUS = 0.08

SURFACE AREA BIORETENTION "D"
DA = 0.15
IMPERVIOUS = 0.05
PERVIOUS = 0.05
FOREST/OPEN SPACE = 0.05

SURFACE AREA BIORETENTION "E"
DA = 0.15
IMPERVIOUS = 0.03
PERVIOUS = 0.10
FOREST/OPEN SPACE = 0.02

SURFACE AREA BIORETENTION "F"
DA = 0.08
IMPERVIOUS= 0.01
PERVIOUS= 0.07

SURFACE AREA BIORETENTION "C"
DA = 0.11
IMPERVIOUS = 0.05
PERVIOUS = 0.06

SURFACE AREA TO BIORETENTION "A"
DA = 0.23
ONSITE IMPERVIOUS = 0.16
ONSITE PERVIOUS = 0.07
OFFSITE PERVIOUS = 0.08

SURFACE AREA TO BIORETENTION "B"
DA = 0.33
ONSITE IMPERVIOUS = 0.21
ONSITE PERVIOUS = 0.12
OFFSITE IMPERVIOUS = 0.07
OFFSITE PERVIOUS = 0.03

BIO "A"
BIO "B"
BIO "C"
BIO "D"
BIO "E"
BIO "F"

PROP. OBSERVATION WELL

PROP. ROOF DRAIN (TYP)

PROP. 4" ROOF DRAIN (TYP.)

PROP. HVAC LOC. (TYP)

PROP. R.O.W.

EX. POTENTIAL VEGETATED AREA

EX. WETLANDS

APPROX. SEEP LOCATION

STUDY POINT "A"

5.00' CL I RIP RAP
SEE SHEET 17A

PROPOSED
KARIG PLACE
(PUBLIC ROAD-50' R/W)

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres
ZONING: R-20

SEE SHEET 11 FOR LAND COVER MAP AND SHEETS 12-14 AND 21 FOR CN COMPUTATIONS.
ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

LEGEND

ON SITE AREA

SOIL BOUNDARY

GRAPHIC SCALE

30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

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CHAIRMAN, PLANNING COMMISSION — DATE
DATE RECORDED _____
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DATE RECORDED _____

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POST-DEVELOPMENT SWM

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: N/A — C.I.= N/A — DATE: AUGUST, 2017

SHEET 21

FILE No. 12811

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ONSITE DETAINED-DEVELOPMENT HYDROGRAPH TABLES - TO BIORETNETION "A"

1-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.09	0.00	0.00
4.00	0.13	0.00	0.00
5.00	0.17	0.00	0.00
6.00	0.22	0.00	0.00
7.00	0.27	0.00	0.00
8.00	0.32	0.00	0.00
9.00	0.40	0.00	0.00
10.00	0.49	0.00	0.00
11.00	0.63	0.01	0.00
12.00	1.79	0.44	0.13
13.00	2.08	0.61	0.01
14.00	2.21	0.70	0.01
15.00	2.30	0.76	0.00
16.00	2.38	0.80	0.00
17.00	2.43	0.84	0.00
18.00	2.49	0.88	0.00
19.00	2.53	0.91	0.00
20.00	2.57	0.94	0.00
21.00	2.60	0.96	0.00
22.00	2.64	0.99	0.00
23.00	2.67	1.01	0.00
24.00	2.70	1.03	0.00
25.00	2.70	1.03	0.00
26.00	2.70	1.03	0.00
27.00	2.70	1.03	0.00
28.00	2.70	1.03	0.00
29.00	2.70	1.03	0.00
30.00	2.70	1.03	0.00
31.00	2.70	1.03	0.00
32.00	2.70	1.03	0.00
33.00	2.70	1.03	0.00
34.00	2.70	1.03	0.00
35.00	2.70	1.03	0.00
36.00	2.70	1.03	0.00
37.00	2.70	1.03	0.00
38.00	2.70	1.03	0.00
39.00	2.70	1.03	0.00
40.00	2.70	1.03	0.00

2-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.15	0.00	0.00
5.00	0.20	0.00	0.00
6.00	0.26	0.00	0.00
7.00	0.32	0.00	0.00
8.00	0.38	0.00	0.00
9.00	0.47	0.01	0.00
10.00	0.58	0.03	0.01
11.00	0.75	0.07	0.02
12.00	2.12	0.89	0.63
13.00	2.47	1.15	0.04
14.00	2.62	1.28	0.02
15.00	2.73	1.37	0.02
16.00	2.82	1.43	0.01
17.00	2.89	1.49	0.01
18.00	2.95	1.54	0.01
19.00	3.00	1.59	0.01
20.00	3.05	1.63	0.01
21.00	3.09	1.66	0.01
22.00	3.13	1.69	0.01
23.00	3.16	1.73	0.01
24.00	3.20	1.76	0.01
25.00	3.20	1.76	0.00
26.00	3.20	1.76	0.00
27.00	3.20	1.76	0.00
28.00	3.20	1.76	0.00
29.00	3.20	1.76	0.00
30.00	3.20	1.76	0.00
31.00	3.20	1.76	0.00
32.00	3.20	1.76	0.00
33.00	3.20	1.76	0.00
34.00	3.20	1.76	0.00
35.00	3.20	1.76	0.00
36.00	3.20	1.76	0.00
37.00	3.20	1.76	0.00
38.00	3.20	1.76	0.00
39.00	3.20	1.76	0.00
40.00	3.20	1.76	0.00

10-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.18	0.00	0.00
4.00	0.25	0.00	0.00
5.00	0.33	0.00	0.00
6.00	0.42	0.00	0.00
7.00	0.51	0.01	0.00
8.00	0.62	0.04	0.01
9.00	0.76	0.08	0.01
10.00	0.94	0.15	0.02
11.00	1.22	0.29	0.04
12.00	3.45	1.97	1.21
13.00	4.01	2.47	0.07
14.00	4.26	2.70	0.04
15.00	4.44	2.85	0.03
16.00	4.58	2.98	0.03
17.00	4.69	3.08	0.02
18.00	4.79	3.17	0.02
19.00	4.88	3.25	0.02
20.00	4.95	3.32	0.01
21.00	5.02	3.38	0.01
22.00	5.08	3.44	0.01
23.00	5.14	3.50	0.01
24.00	5.20	3.55	0.01
25.00	5.20	3.55	0.00
26.00	5.20	3.55	0.00
27.00	5.20	3.55	0.00
28.00	5.20	3.55	0.00
29.00	5.20	3.55	0.00
30.00	5.20	3.55	0.00
31.00	5.20	3.55	0.00
32.00	5.20	3.55	0.00
33.00	5.20	3.55	0.00
34.00	5.20	3.55	0.00
35.00	5.20	3.55	0.00
36.00	5.20	3.55	0.00
37.00	5.20	3.55	0.00
38.00	5.20	3.55	0.00
39.00	5.20	3.55	0.00
40.00	5.20	3.55	0.00

POST-DEVELOPMENT BIORETENTION "A" OUTFLOW SUMMARIES

Summary for 1-Year Pond Outflow

Summary for Pond 7P: BIORETENTION "A"

Inflow Area = 13,504 sf , 0.00% Impervious , Inflow Depth = 1.21" for 1-year event
Inflow = 0.68 cfs @ 11.96 hrs , Volume= 1,362 cf
Outflow = 0.06 cfs @ 12.48 hrs , Volume= 826 cf , Atten= 91% , Lag= 31.0 min
Discarded = 0.00 cfs @ 12.48 hrs , Volume= 307 cf
Primary = 0.06 cfs @ 12.48 hrs , Volume= 519 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 256.00' @ 12.48 hrs Surf.Area= 430 sf Storage= 710 cf

Plug-Flow detention time= 437.5 min calculated for 826 cf (61% of inflow)
Center-of-Mass det. time= 318.9 min (1,155.4 - 836.6)

Volume	Invert	Avail.Storage	Storage Description		
#1	250.47'	929 cf	Custom Stage Data (Conic)	Listed below	(Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
250.47	301	0.0	0	0	301
252.47	301	40.0	241	241	424
255.47	382	25.0	256	496	636
255.48	382	100.0	4	500	637
256.48	478	100.0	429	929	758

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.47'	0.300 in/hr Exfiltration over Surface area
#2	Primary	250.47'	18.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 250.47' / 249.47' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	255.97'	15.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.48 hrs HW=256.00' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.06 cfs @ 12.48 hrs HW=256.00' (Free Discharge)
└2=Culvert (Passes 0.06 cfs of 23.25 cfs potential flow)
└3=Orifice/Grate (Weir Controls 0.06 cfs @ 0.54 fps)

Summary for 2-Year Pond Outflow

Summary for Pond 7P: BIORETENTION "A"

Inflow Area = 13,504 sf , 0.00% Impervious , Inflow Depth = 1.67" for 2-year event
Inflow = 0.93 cfs @ 11.96 hrs , Volume= 1,875 cf
Outflow = 0.67 cfs @ 12.05 hrs , Volume= 1,338 cf , Atten= 28% , Lag= 5.8 min
Discarded = 0.00 cfs @ 12.06 hrs , Volume= 316 cf
Primary = 0.66 cfs @ 12.05 hrs , Volume= 1,022 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 256.11' @ 12.06 hrs Surf.Area= 441 sf Storage= 758 cf

Plug-Flow detention time= 298.8 min calculated for 1,337 cf (71% of inflow)
Center-of-Mass det. time= 198.8 min (1,024.4 - 825.6)

Volume	Invert	Avail.Storage	Storage Description		
#1	250.47'	929 cf	Custom Stage Data (Conic)	Listed below	(Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
250.47	301	0.0	0	0	301
252.47	301	40.0	241	241	424
255.47	382	25.0	256	496	636
255.48	382	100.0	4	500	637
256.48	478	100.0	429	929	758

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.47'	0.300 in/hr Exfiltration over Surface area
#2	Primary	250.47'	18.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 250.47' / 249.47' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	255.97'	15.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 12.06 hrs HW=256.10' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.62 cfs @ 12.05 hrs HW=256.10' (Free Discharge)
└2=Culvert (Passes 0.62 cfs of 23.50 cfs potential flow)
└3=Orifice/Grate (Weir Controls 0.62 cfs @ 1.19 fps)

Summary for 10-Year Pond Outflow

Summary for Pond 7P: BIORETENTION "A"

Inflow Area = 13,504 sf , 0.00% Impervious , Inflow Depth = 3.50" for 10-year event
Inflow = 1.89 cfs @ 11.95 hrs , Volume= 3,942 cf
Outflow = 1.83 cfs @ 11.97 hrs , Volume= 3,405 cf , Atten= 3% , Lag= 0.9 min
Discarded = 0.00 cfs @ 11.97 hrs , Volume= 338 cf
Primary = 1.83 cfs @ 11.97 hrs , Volume= 3,067 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 256.24' @ 11.97 hrs Surf.Area= 454 sf Storage= 819 cf

Plug-Flow detention time= 149.9 min calculated for 3,405 cf (86% of inflow)
Center-of-Mass det. time= 85.9 min (888.7 - 802.8)

Volume	Invert	Avail.Storage	Storage Description		
#1	250.47'	929 cf	Custom Stage Data (Conic)	Listed below	(Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
250.47	301	0.0	0	0	301
252.47	301	40.0	241	241	424
255.47	382	25.0	256	496	636
255.48	382	100.0	4	500	637
256.48	478	100.0	429	929	758

Device	Routing	Invert	Outlet Devices
#1	Discarded	250.47'	0.300 in/hr Exfiltration over Surface area
#2	Primary	250.47'	18.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 250.47' / 249.47' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#3	Device 2	255.97'	15.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.00 cfs @ 11.97 hrs HW=256.24' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.77 cfs @ 11.97 hrs HW=256.24' (Free Discharge)
└2=Culvert (Passes 1.77 cfs of 23.82 cfs potential flow)
└3=Orifice/Grate (Weir Controls 1.77 cfs @ 1.69 fps)

OFFSITE DETAINED-DEVELOPMENT HYDROGRAPH TABLES - TO BIORETNETION "A"

1-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.09	0.00	0.00
4.00	0.13	0.00	0.00
5.00	0.17	0.00	0.00
6.00	0.22	0.00	0.00
7.00	0.27	0.00	0.00
8.00	0.32	0.00	0.00
9.00	0.40	0.00	0.00
10.00	0.49	0.00	0.00
11.00	0.63	0.01	0.00
12.00	1.79	0.44	0.13
13.00	2.08	0.61	0.01
14.00	2.21	0.70	0.01
15.00	2.30	0.76	0.00
16.00	2.38	0.80	0.00
17.00	2.43	0.84	0.00
18.00	2.49	0.88	0.00
19.00	2.53	0.91	0.00
20.00	2.57	0.94	0.00
21.00	2.60	0.96	0.00
22.00	2.64	0.99	0.00
23.00	2.67	1.01	0.00
24.00	2.70	1.03	0.00
25.00	2.70	1.03	0.00
26.00	2.70	1.03	0.00
27.00	2.70	1.03	0.00
28.00	2.70	1.03	0.00
29.00	2.70	1.03	0.00
30.00	2.70	1.03	0.00
31.00	2.70	1.03	0.00
32.00	2.70	1.03	0.00
33.00	2.70	1.03	0.00
34.00	2.70	1.03	0.00
35.00	2.70	1.03	0.00
36.00	2.70	1.03	0.00
37.00	2.70	1.03	0.00
38.00	2.70	1.03	0.00
39.00	2.70	1.03	0.00
40.00	2.70	1.03	0.00

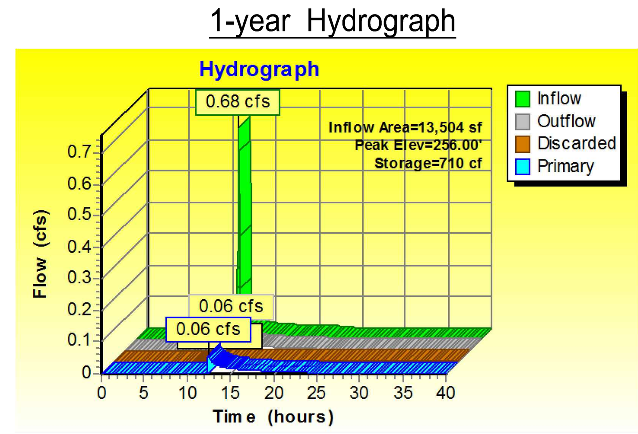
2-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.15	0.00	0.00
5.00	0.20	0.00	0.00
6.00	0.26	0.00	0.00
7.00	0.32	0.00	0.00
8.00	0.38	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.58	0.00	0.00
11.00	0.75	0.02	0.00
12.00	2.12	0.64	0.18
13.00	2.47	0.87	0.01
14.00	2.62	0.98	0.01
15.00	2.73	1.05	0.01
16.00	2.82	1.11	0.00
17.00	2.89	1.16	0.00
18.00	2.95	1.21	0.00
19.00	3.00	1.25	0.00
20.00	3.05	1.28	0.00
21.00	3.09	1.32	0.00
22.00	3.13	1.35	0.00
23.00	3.16	1.37	0.00
24.00	3.20	1.40	0.00
25.00	3.20	1.40	0.00
26.00	3.20	1.40	0.00
27.00	3.20	1.40	0.00
28.00	3.20	1.40	0.00
29.00	3.20	1.40	0.00
30.00	3.20	1.40	0.00
31.00	3.20	1.40	0.00
32.00	3.20	1.40	0.00
33.00	3.20	1.40	0.00
34.00	3.20	1.40	0.00
35.00	3.20	1.40	0.00
36.00	3.20	1.40	0.00
37.00	3.20	1.40	0.00
38.00	3.20	1.40	0.00
39.00	3.20	1.40	0.00
40.00	3.20	1.40	0.00

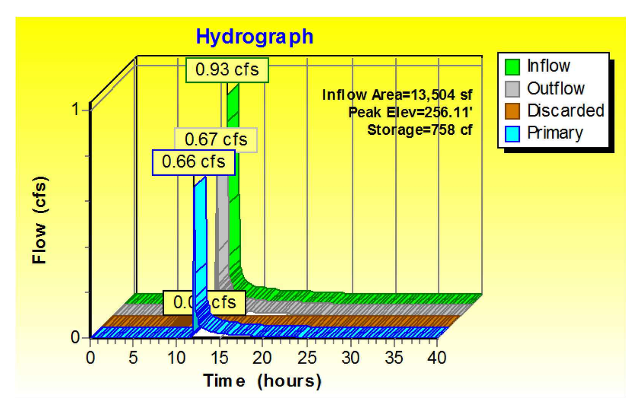
10-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.18	0.00	0.00
4.00	0.25	0.00	0.00
5.00	0.33	0.00	0.00
6.00	0.42	0.00	0.00
7.00	0.51	0.00	0.00
8.00	0.62	0.01	0.00
9.00	0.76	0.03	0.00
10.00	0.94	0.07	0.00
11.00	1.22	0.16	0.01
12.00	3.45	1.59	0.38
13.00	4.01	2.05	0.02
14.00	4.26	2.26	0.01
15.00	4.44	2.41	0.01
16.00	4.58	2.53	0.01
17.00	4.69	2.62	0.01
18.00	4.79	2.71	0.01
19.00	4.88	2.79	0.01
20.00	4.95	2.85	0.00
21.00	5.02	2.91	0.00
22.00	5.08	2.96	0.00
23.00	5.14	3.02	0.00
24.00	5.20	3.07	0.00
25.00	5.20	3.07	0.00
26.00	5.20	3.07	0.00
27.00	5.20	3.07	0.00
28.00	5.20	3.07	0.00
29.00	5.20	3.07	0.00
30.00	5.20	3.07	0.00
31.00	5.20	3.07	0.00
32.00	5.20	3.07	0.00
33.00	5.20	3.07	0.00
34.00	5.20	3.07	0.00
35.00	5.20	3.07	0.00
36.00	5.20	3.07	0.00
37.00	5.20	3.07	0.00
38.00	5.20	3.07	0.00
39.00	5.20	3.07	0.00
40.00	5.20	3.07	0.00

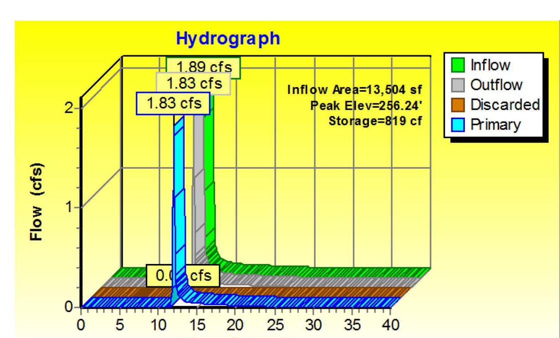
1-year Hydrograph



2-year Hydrograph



10-year Hydrograph



POST-DEVELOPMENT BIORETENTION "A" HYDROGRAPH TABLES

1-year Hydrograph Table

Hydrograph for Pond 7P: BIORETENTION "A"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	250.47	0.00	0.00	0.00
1.00	0.00	0	250.47	0.00	0.00	0.00
2.00	0.00	0	250.47	0.00	0.00	0.00
3.00	0.00	0	250.47	0.00	0.00	0.00
4.00	0.00	0	250.47	0.00	0.00	0.00
5.00	0.00	0	250.47	0.00	0.00	0.00
6.00	0.00	0	250.47	0.00	0.00	0.00
7.00	0.00	0	250.47	0.00	0.00	0.00
8.00	0.00	0	250.47	0.00	0.00	0.00
9.00	0.00	0	250.47	0.00	0.00	0.00
10.00	0.00	3	250.49	0.00	0.00	0.00
11.00	0.01	16	250.61	0.00	0.00	0.00
12.00	0.60	486	255.36	0.00	0.00	0.00
13.00	0.04	706	255.99	0.04	0.00	0.04
14.00	0.02	703	255.98	0.02	0.00	0.02
15.00	0.02	702	255.98	0.02	0.00	0.02
16.00	0.01	701	255.98	0.01	0.00	0.01
17.00	0.01	700	255.97	0.01	0.00	0.01
18.00	0.01	700	255.97	0.01	0.00	0.01
19.00	0.01	700	255.97	0.01	0.00	0.01
20.00	0.01	700	255.97	0.01	0.00	0.01
21.00	0.01	699	255.97	0.01	0.00	0.01
22.00	0.01	699	255.97	0.01	0.00	0.00
23.00	0.01	699	255.97	0.01	0.00	0.00
24.00	0.01	699	255.97	0.01	0.00	0.00
25.00	0.00	689	255.95	0.00	0.00	0.00
26.00	0.00	679	255.92	0.00	0.00	0.00
27.00	0.00	668	255.90	0.00	0.00	0.00
28.00	0.00	658	255.87	0.00	0.00	0.00
29.00	0.00	647	255.85	0.00	0.00	0.00
30.00	0.00	637	255.82	0.00	0.00	0.00
31.00	0.00	626	255.80	0.00	0.00	0.00
32.00	0.00	616	255.77	0.00	0.00	0.00
33.00	0.00	606	255.75	0.00	0.00	0.00
34.00	0.00	596	255.72	0.00	0.00	0.00
35.00	0.00	586	255.70	0.00	0.00	0.00
36.00	0.00	576	255.67	0.00	0.00	0.00
37.00	0.00	566	255.65	0.00	0.00	0.00
38.00	0.00	556	255.62	0.00	0.00	0.00
39.00	0.00	546	255.60	0.00	0.00	0.00
40.00	0.00	536	255.57	0.00	0.00	0.00

2-year Hydrograph Table

Hydrograph for Pond 7P: BIORETENTION "A"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	250.47	0.00	0.00	0.00
1.00	0.00	0	250.47	0.00	0.00	0.00
2.00	0.00	0	250.47	0.00	0.00	0.00
3.00	0.00	0	250.47	0.00	0.00	0.00
4.00	0.00	0	250.47	0.00	0.00	0.00
5.00	0.00	0	250.47	0.00	0.00	0.00
6.00	0.00	0	250.47	0.00	0.00	0.00
7.00	0.00	0	250.47	0.00	0.00	0.00
8.00	0.00	0	250.47	0.00	0.00	0.00
9.00	0.00	4	250.50	0.00	0.00	0.00
10.00	0.01	12	250.57	0.00	0.00	0.00
11.00	0.02	47	250.86	0.00	0.00	0.00
12.00	0.81	718	256.01	0.14	0.00	0.14
13.00	0.05	708	255.99	0.05	0.00	0.05
14.00	0.03	704	255.98	0.03	0.00	0.03
15.00	0.02	703	255.98	0.02	0.00	0.02
16.00	0.02	702	255.98	0.02	0.00	0.02
17.00	0.02	701	255.98	0.02	0.00	0.01
18.00	0.01	701	255.98	0.01	0.00	0.01
19.00	0.01	700	255.97	0.01	0.00	0.01
20.00	0.01	700	255.97	0.01	0.00	0.01
21.00	0.01	700	255.97	0.01	0.00	0.01
22.00	0.01	700	255.97	0.01	0.00	0.01
23.00	0.01	700	255.97	0.01	0.00	0.01
24.00	0.01	700	255.97	0.01	0.00	0.01
25.00	0.00	689	255.95	0.00	0.00	0.00
26.00	0.00	679	255.92	0.00	0.00	0.00
27.00	0.00	668	255.90	0.00	0.00	0.00
28.00	0.00	658	255.87	0.00	0.00	0.00
29.00	0.00	647	255.85	0.00	0.00	0.00
30.00	0.00	637	255.82	0.00	0.00	0.00
31.00	0.00	627	255.80	0.00	0.00	0.00
32.00	0.00	616	255.77	0.00	0.00	0.00
33.00	0.00	606	255.75	0.00	0.00	0.00
34.00	0.00	596	255.72	0.00	0.00	0.00
35.00	0.00	586	255.70	0.00	0.00	0.00
36.00	0.00	576	255.67	0.00	0.00	0.00
37.00	0.00	566	255.65	0.00	0.00	0.00
38.00	0.00	556	255.62	0.00	0.00	0.00
39.00	0.00	546	255.60	0.00	0.00	0.00
40.00	0.00	536	255.57	0.00	0.00	0.00

10-year Hydrograph Table

Hydrograph for Pond 7P: BIORETENTION "A"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	250.47	0.00	0.00	0.00
1.00	0.00	0	250.47	0.00	0.00	0.00
2.00	0.00	0	250.47	0.00	0.00	0.00
3.00	0.00	0	250.47	0.00	0.00	0.00
4.00	0.00	0	250.47	0.00	0.00	0.00
5.00	0.00	0	250.47	0.00	0.00	0.00
6.00	0.00	3	250.49	0.00	0.00	0.00
7.00	0.00	9	250.54	0.00	0.00	0.00
8.00	0.01	24	250.67	0.00	0.00	0.00
9.00	0.02	59	250.96	0.00	0.00	0.00
10.00	0.03	124	251.50	0.00	0.00	0.00
11.00	0.06	260	252.72	0.00	0.00	0.00
12.00	1.61	814	256.23	1.73	0.00	1.73
13.00	0.09	714	256.01	0.10	0.00	0.09
14.00	0.06	709	255.99	0.06	0.00	0.05
15.00	0.04	707	255.99	0.05	0.00	0.04
16.00	0.03	705	255.98	0.04	0.00	0.03
17.00	0.03	704	255.98	0.03	0.00	0.03
18.00	0.03	703	255.98	0.03	0.00	0.02
19.00	0.02	702	255.98	0.02	0.00	0.02
20.00	0.02	702	255.98	0.02	0.00	0.02
21.00	0.02	701	255.98	0.02	0.00	0.02
22.00	0.02	701	255.98	0.02	0.00	0.02
23.00	0.02	701	255.98	0.02	0.00	0.01
24.00	0.02	701	255.98	0.02	0.00	0.01
25.00	0.00	690	255.95	0.00	0.00	0.00
26.00	0.00	679	255.92	0.00	0.00	0.00
27.00	0.00	669	255.90	0.00	0.00	0.00
28.00	0.00	658	255.87	0.00	0.00	0.00
29.00	0.00	648	255.85	0.00	0.00	0.00
30.00	0.00	637	255.82	0.00	0.00	0.00
31.00	0.00	627	255.80	0.00	0.00	0.00
32.00	0.00	617	255.77	0.00	0.00	0.00
33.00	0.00	606	255.75	0.00	0.00	0.00
34.00	0.00	596	255.72	0.00	0.00	0.00
35.00	0.00	586	255.70	0.00	0.00	0.00
36.00	0.00	576	255.67	0.00	0.00	0.00
37.00	0.00	566	255.65	0.00	0.00	0.00
38.00	0.00	556	255.62	0.00	0.00	0.00
39.00	0.00	546	255.60	0.00	0.00	0.00
40.00	0.00	537	255.57	0.00	0.00	0.00

□IORETENTION "A" ONSITE DETAINED DRAINA□E SHED □OSTDE□ELO□MENT CALCULATION SUMMAR□

C□r□□ N□□ □□r C□c□□□io□□

Area (ac)	CN	Description
* 0.230	84-86	*SEE VRRM FOR CN
0.230		

Ti□ □o□Co□c□□r□io□ C□c□□□io□□

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

□ □□□r □o□ C□c□□□io□□

Runoff = 0.53 cfs @ 11.96 hrs , Volume= 1,063 cf, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.70"

□ □□□r □o□ C□c□□□io□□

Runoff = 0.72 cfs @ 11.96 hrs , Volume= 1,467 cf, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.20"

□0 □□□r □o□ C□c□□□io□□

Runoff = 1.45 cfs @ 11.95 hrs , Volume= 3,051 cf, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.20"

□IORETENTION "A" O□□SITE DETAINED DRAINA□E SHED □OSTDE□ELO□MENT CALCULATION SUMMAR□

C□r□□ N□□ □□r C□c□□□io□□

Area (ac)	CN	Description
0.080	80	>75% Grass cover, Good, HSG D
0.080		100.00% Pervious Area

Ti□ □o□Co□c□□r□io□ C□c□□□io□□

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

□ □□□r □o□ C□c□□□io□□

Runoff = 0.15 cfs @ 11.96 hrs , Volume= 299 cf, Depth= 1.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.70"

□ □□□r □o□ C□c□□□io□□

Runoff = 0.20 cfs @ 11.96 hrs , Volume= 407 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.20"

□0 □□□r □o□ C□c□□□io□□

Runoff = 0.44 cfs @ 11.96 hrs , Volume= 891 cf, Depth= 3.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.20"

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

REVISIONS

No.	DATE	DESCRIPTION

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-17-17
08-01-17
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CLAYTON C. TOCK
Lic. No. 036790
08-01-17
PROFESSIONAL ENGINEER

POST-DEVELOPMENT SWM
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA
DATE: AUGUST, 2017
C.I.= N/A
SCALE: N/A

SHEET
21A

FILE No.
12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-21-SWM POST.dwg [03-SITE PLAN (3)] August 01, 2017 - 10:55am intern002

ONSITE DETAINED-DEVELOPMENT HYDROGRAPH TABLES - TO BIORETNETION "B"

1-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.09	0.00	0.00
4.00	0.13	0.00	0.00
5.00	0.17	0.00	0.00
6.00	0.22	0.00	0.00
7.00	0.27	0.00	0.00
8.00	0.32	0.00	0.00
9.00	0.40	0.00	0.00
10.00	0.49	0.01	0.00
11.00	0.63	0.04	0.02
12.00	1.79	0.65	0.70
13.00	2.08	0.86	0.04
14.00	2.21	0.96	0.03
15.00	2.30	1.02	0.02
16.00	2.38	1.08	0.02
17.00	2.43	1.13	0.01
18.00	2.49	1.17	0.01
19.00	2.53	1.20	0.01
20.00	2.57	1.23	0.01
21.00	2.60	1.26	0.01
22.00	2.64	1.29	0.01
23.00	2.67	1.31	0.01
24.00	2.70	1.34	0.01
25.00	2.70	1.34	0.00
26.00	2.70	1.34	0.00
27.00	2.70	1.34	0.00
28.00	2.70	1.34	0.00
29.00	2.70	1.34	0.00
30.00	2.70	1.34	0.00
31.00	2.70	1.34	0.00
32.00	2.70	1.34	0.00
33.00	2.70	1.34	0.00
34.00	2.70	1.34	0.00
35.00	2.70	1.34	0.00
36.00	2.70	1.34	0.00
37.00	2.70	1.34	0.00
38.00	2.70	1.34	0.00
39.00	2.70	1.34	0.00
40.00	2.70	1.34	0.00

2-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.15	0.00	0.00
5.00	0.20	0.00	0.00
6.00	0.26	0.00	0.00
7.00	0.32	0.00	0.00
8.00	0.38	0.00	0.00
9.00	0.47	0.01	0.00
10.00	0.58	0.03	0.01
11.00	0.75	0.07	0.02
12.00	2.12	0.89	0.90
13.00	2.47	1.15	0.05
14.00	2.62	1.28	0.03
15.00	2.73	1.37	0.03
16.00	2.82	1.43	0.02
17.00	2.89	1.49	0.02
18.00	2.95	1.54	0.02
19.00	3.00	1.59	0.01
20.00	3.05	1.63	0.01
21.00	3.09	1.66	0.01
22.00	3.13	1.69	0.01
23.00	3.16	1.73	0.01
24.00	3.20	1.76	0.01
25.00	3.20	1.76	0.00
26.00	3.20	1.76	0.00
27.00	3.20	1.76	0.00
28.00	3.20	1.76	0.00
29.00	3.20	1.76	0.00
30.00	3.20	1.76	0.00
31.00	3.20	1.76	0.00
32.00	3.20	1.76	0.00
33.00	3.20	1.76	0.00
34.00	3.20	1.76	0.00
35.00	3.20	1.76	0.00
36.00	3.20	1.76	0.00
37.00	3.20	1.76	0.00
38.00	3.20	1.76	0.00
39.00	3.20	1.76	0.00
40.00	3.20	1.76	0.00

10-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.18	0.00	0.00
4.00	0.25	0.00	0.00
5.00	0.33	0.00	0.00
6.00	0.42	0.00	0.00
7.00	0.51	0.02	0.01
8.00	0.62	0.05	0.01
9.00	0.76	0.09	0.02
10.00	0.94	0.17	0.03
11.00	1.22	0.32	0.07
12.00	3.45	2.05	1.77
13.00	4.01	2.56	0.10
14.00	4.26	2.79	0.06
15.00	4.44	2.95	0.05
16.00	4.58	3.07	0.04
17.00	4.69	3.18	0.03
18.00	4.79	3.27	0.03
19.00	4.88	3.35	0.03
20.00	4.95	3.42	0.02
21.00	5.02	3.48	0.02
22.00	5.08	3.54	0.02
23.00	5.14	3.60	0.02
24.00	5.20	3.65	0.02
25.00	5.20	3.65	0.00
26.00	5.20	3.65	0.00
27.00	5.20	3.65	0.00
28.00	5.20	3.65	0.00
29.00	5.20	3.65	0.00
30.00	5.20	3.65	0.00
31.00	5.20	3.65	0.00
32.00	5.20	3.65	0.00
33.00	5.20	3.65	0.00
34.00	5.20	3.65	0.00
35.00	5.20	3.65	0.00
36.00	5.20	3.65	0.00
37.00	5.20	3.65	0.00
38.00	5.20	3.65	0.00
39.00	5.20	3.65	0.00
40.00	5.20	3.65	0.00

POST-DEVELOPMENT BIORETENTION "B" OUTFLOW SUMMARIES

Summary for 1-Year Pond Outflow

Summary for Pond 8P: BIORETENTION "B"

Inflow Area = 18,731 sf , 16.28% Impervious , Inflow Depth = 1.43" for 1-year event
Inflow = 1.09 cfs @ 11.96 hrs , Volume= 2,240 cf
Outflow = 0.89 cfs @ 12.01 hrs , Volume= 2,240 cf , Atten= 19% , Lag= 2.9 min
Discarded = 0.00 cfs @ 10.55 hrs , Volume= 27 cf
Primary = 0.89 cfs @ 12.01 hrs , Volume= 2,212 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 256.35' @ 12.01 hrs Surf.Area= 438 sf Storage= 198 cf

Plug-Flow detention time= 7.0 min calculated for 2,237 cf (100% of inflow)
Center-of-Mass det. time= 7.0 min (828.1 - 821.1)

Volume	Invert	Avail.Storage	Storage Description
#1	255.22'	1,313 cf	Custom Stage Data (Conic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
255.22	438	0.0	0	0	438
257.22	438	40.0	350	350	586
260.22	438	25.0	329	679	809
260.23	587	100.0	5	684	958
261.23	671	100.0	629	1,313	1,080

Device	Routing	Invert	Outlet Devices
#1	Discarded	255.22'	0.050 in/hr Exfiltration over Surface area
#2	Primary	255.22'	15.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 255.22' / 254.22' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 2	260.72'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	255.22'	6.0" Vert. Underdrain C= 0.600

Discarded OutFlow Max=0.00 cfs @ 10.55 hrs HW=255.28' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=0.88 cfs @ 12.01 hrs HW=256.34' (Free Discharge)
└2=Culvert (Passes 0.88 cfs of 5.21 cfs potential flow)
 ├3=Orifice/Grate (Controls 0.00 cfs)
 └4=Underdrain (Orifice Controls 0.88 cfs @ 4.48 fps)

Summary for 2-Year Pond Outflow

Summary for Pond 8P: BIORETENTION "B"

Inflow Area = 18,731 sf , 16.28% Impervious , Inflow Depth = 1.92" for 2-year event
Inflow = 1.45 cfs @ 11.96 hrs , Volume= 2,993 cf
Outflow = 1.12 cfs @ 12.01 hrs , Volume= 2,993 cf , Atten= 22% , Lag= 3.3 min
Discarded = 0.00 cfs @ 9.80 hrs , Volume= 29 cf
Primary = 1.12 cfs @ 12.01 hrs , Volume= 2,964 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 256.88' @ 12.01 hrs Surf.Area= 438 sf Storage= 291 cf

Plug-Flow detention time= 6.5 min calculated for 2,990 cf (100% of inflow)
Center-of-Mass det. time= 6.5 min (818.7 - 812.1)

Volume	Invert	Avail.Storage	Storage Description
#1	255.22'	1,313 cf	Custom Stage Data (Conic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
255.22	438	0.0	0	0	438
257.22	438	40.0	350	350	586
260.22	438	25.0	329	679	809
260.23	587	100.0	5	684	958
261.23	671	100.0	629	1,313	1,080

Device	Routing	Invert	Outlet Devices
#1	Discarded	255.22'	0.050 in/hr Exfiltration over Surface area
#2	Primary	255.22'	15.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 255.22' / 254.22' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 2	260.72'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	255.22'	6.0" Vert. Underdrain C= 0.600

Discarded OutFlow Max=0.00 cfs @ 9.80 hrs HW=255.28' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=1.11 cfs @ 12.01 hrs HW=256.85' (Free Discharge)
└2=Culvert (Passes 1.11 cfs of 7.39 cfs potential flow)
 ├3=Orifice/Grate (Controls 0.00 cfs)
 └4=Underdrain (Orifice Controls 1.11 cfs @ 5.65 fps)

Summary for 10-Year Pond Outflow

Summary for Pond 8P: BIORETENTION "B"

Inflow Area = 18,731 sf , 16.28% Impervious , Inflow Depth = 3.83" for 10-year event
Inflow = 2.80 cfs @ 11.95 hrs , Volume= 5,972 cf
Outflow = 2.07 cfs @ 12.01 hrs , Volume= 5,972 cf , Atten= 26% , Lag= 3.6 min
Discarded = 0.00 cfs @ 7.20 hrs , Volume= 34 cf
Primary = 2.07 cfs @ 12.01 hrs , Volume= 5,938 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 260.27' @ 12.01 hrs Surf.Area= 590 sf Storage= 705 cf

Plug-Flow detention time= 5.8 min calculated for 5,965 cf (100% of inflow)
Center-of-Mass det. time= 5.8 min (797.8 - 791.9)

Volume	Invert	Avail.Storage	Storage Description
#1	255.22'	1,313 cf	Custom Stage Data (Conic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
255.22	438	0.0	0	0	438
257.22	438	40.0	350	350	586
260.22	438	25.0	329	679	809
260.23	587	100.0	5	684	958
261.23	671	100.0	629	1,313	1,080

Device	Routing	Invert	Outlet Devices
#1	Discarded	255.22'	0.050 in/hr Exfiltration over Surface area
#2	Primary	255.22'	15.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 255.22' / 254.22' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#3	Device 2	260.72'	18.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#4	Device 2	255.22'	6.0" Vert. Underdrain C= 0.600

Discarded OutFlow Max=0.00 cfs @ 7.20 hrs HW=255.28' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.00 cfs)

Primary OutFlow Max=2.04 cfs @ 12.01 hrs HW=260.13' (Free Discharge)
└2=Culvert (Passes 2.04 cfs of 15.29 cfs potential flow)
 ├3=Orifice/Grate (Controls 0.00 cfs)
 └4=Underdrain (Orifice Controls 2.04 cfs @ 10.39 fps)

OFFSITE DETAINED-DEVELOPMENT HYDROGRAPH TABLES - TO BIORETNETION "B"

1-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.09	0.00	0.00
4.00	0.13	0.00	0.00
5.00	0.17	0.00	0.00
6.00	0.22	0.00	0.00
7.00	0.27	0.00	0.00
8.00	0.32	0.00	0.00
9.00	0.40	0.00	0.00
10.00	0.49	0.00	0.00
11.00	0.63	0.01	0.00
12.00	1.79	0.44	0.13
13.00	2.08	0.61	0.01
14.00	2.21	0.70	0.01
15.00	2.30	0.76	0.00
16.00	2.38	0.80	0.00
17.00	2.43	0.84	0.00
18.00	2.49	0.88	0.00
19.00	2.53	0.91	0.00
20.00	2.57	0.94	0.00
21.00	2.60	0.96	0.00
22.00	2.64	0.99	0.00
23.00	2.67	1.01	0.00
24.00	2.70	1.03	0.00
25.00	2.70	1.03	0.00
26.00	2.70	1.03	0.00
27.00	2.70	1.03	0.00
28.00	2.70	1.03	0.00
29.00	2.70	1.03	0.00
30.00	2.70	1.03	0.00
31.00	2.70	1.03	0.00
32.00	2.70	1.03	0.00
33.00	2.70	1.03	0.00
34.00	2.70	1.03	0.00
35.00	2.70	1.03	0.00
36.00	2.70	1.03	0.00
37.00	2.70	1.03	0.00
38.00	2.70	1.03	0.00
39.00	2.70	1.03	0.00
40.00	2.70	1.03	0.00

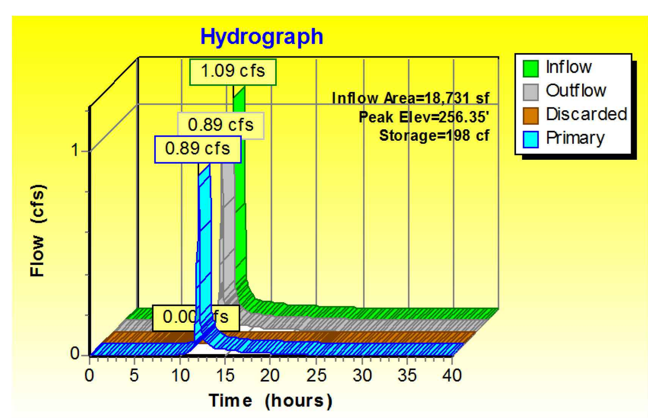
2-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.15	0.00	0.00
5.00	0.20	0.00	0.00
6.00	0.26	0.01	0.00
7.00	0.32	0.03	0.00
8.00	0.38	0.06	0.00
9.00	0.47	0.10	0.01
10.00	0.58	0.16	0.01
11.00	0.75	0.27	0.02
12.00	2.12	1.43	0.35
13.00	2.47	1.75	0.02
14.00	2.62	1.90	0.01
15.00	2.73	2.00	0.01
16.00	2.82	2.08	0.01
17.00	2.89	2.14	0.01
18.00	2.95	2.20	0.01
19.00	3.00	2.25	0.00
20.00	3.05	2.30	0.00
21.00	3.09	2.34	0.00
22.00	3.13	2.38	0.00
23.00	3.16	2.41	0.00
24.00	3.20	2.45	0.00
25.00	3.20	2.45	0.00
26.00	3.20	2.45	0.00
27.00	3.20	2.45	0.00
28.00	3.20	2.45	0.00
29.00	3.20	2.45	0.00
30.00	3.20	2.45	0.00
31.00	3.20	2.45	0.00
32.00	3.20	2.45	0.00
33.00	3.20	2.45	0.00
34.00	3.20	2.45	0.00
35.00	3.20	2.45	0.00
36.00	3.20	2.45	0.00
37.00	3.20	2.45	0.00
38.00	3.20	2.45	0.00
39.00	3.20	2.45	0.00
40.00	3.20	2.45	0.00

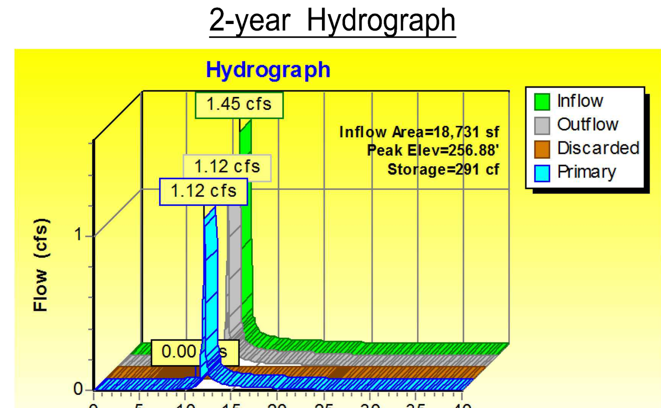
10-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.18	0.00	0.00
4.00	0.25	0.01	0.00
5.00	0.33	0.03	0.00
6.00	0.42	0.07	0.00
7.00	0.51	0.12	0.01
8.00	0.62	0.18	0.01
9.00	0.76	0.28	0.01
10.00	0.94	0.41	0.02
11.00	1.22	0.63	0.03
12.00	3.45	2.68	0.60
13.00	4.01	3.23	0.03
14.00	4.26	3.48	0.02
15.00	4.44	3.65	0.02
16.00	4.58	3.78	0.01
17.00	4.69	3.89	0.01
18.00	4.79	3.99	0.01
19.00	4.88	4.08	0.01
20.00	4.95	4.15	0.01
21.00	5.02	4.21	0.01
22.00	5.08	4.28	0.01
23.00	5.14	4.34	0.01
24.00	5.20	4.39	0.01
25.00	5.20	4.39	0.00
26.00	5.20	4.39	0.00
27.00	5.20	4.39	0.00
28.00	5.20	4.39	0.00
29.00	5.20	4.39	0.00
30.00	5.20	4.39	0.00
31.00	5.20	4.39	0.00
32.00	5.20	4.39	0.00
33.00	5.20	4.39	0.00
34.00	5.20	4.39	0.00
35.00	5.20	4.39	0.00
36.00	5.20	4.39	0.00
37.00	5.20	4.39	0.00
38.00	5.20	4.39	0.00
39.00	5.20	4.39	0.00
40.00	5.20	4.39	0.00

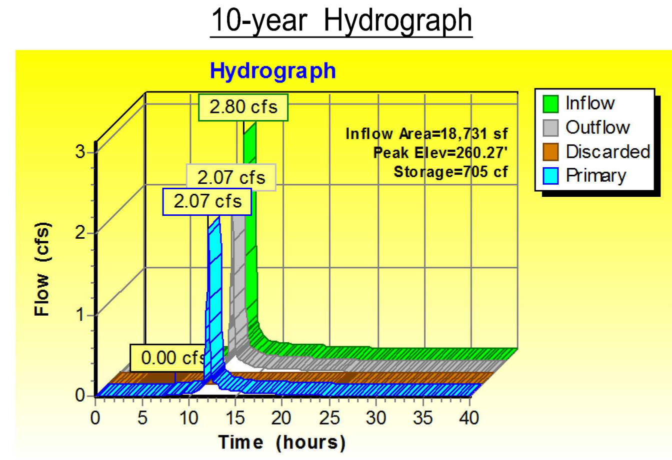
1-year Hydrograph



2-year Hydrograph



10-year Hydrograph



POST-DEVELOPMENT BIORETENTION "B" HYDROGRAPH TABLES

1-year Hydrograph Table

Hydrograph for Pond 8P: BIORETENTION "B"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	255.22	0.00	0.00	0.00
1.00	0.00	0	255.22	0.00	0.00	0.00
2.00	0.00	0	255.22	0.00	0.00	0.00
3.00	0.00	0	255.22	0.00	0.00	0.00
4.00	0.00	0	255.22	0.00	0.00	0.00
5.00	0.00	0	255.22	0.00	0.00	0.00
6.00	0.00	1	255.22	0.00	0.00	0.00
7.00	0.00	1	255.23	0.00	0.00	0.00
8.00	0.00	2	255.23	0.00	0.00	0.00
9.00	0.00	3	255.24	0.00	0.00	0.00
10.00	0.01	6	255.26	0.01	0.00	0.01
11.00	0.02	14	255.30	0.02	0.00	0.02
12.00	0.95	198	256.35	0.89	0.00	0.89
13.00	0.06	25	255.36	0.06	0.00	0.06
14.00	0.04	19	255.33	0.04	0.00	0.04
15.00	0.03	16	255.31	0.03	0.00	0.03
16.00	0.02	14	255.30	0.02	0.00	0.02
17.00	0.02	13	255.30	0.02	0.00	0.02
18.00	0.02	12	255.29	0.02	0.00	0.02
19.00	0.02	12	255.29	0.02	0.00	0.02
20.00	0.01	11	255.28	0.01	0.00	0.01
21.00	0.01	11	255.28	0.01	0.00	0.01
22.00	0.01	11	255.28	0.01	0.00	0.01
23.00	0.01	10	255.28	0.01	0.00	0.01
24.00	0.01	10	255.28	0.01	0.00	0.01
25.00	0.00	0	255.22	0.00	0.00	0.00
26.00	0.00	0	255.22	0.00	0.00	0.00
27.00	0.00	0	255.22	0.00	0.00	0.00
28.00	0.00	0	255.22	0.00	0.00	0.00
29.00	0.00	0	255.22	0.00	0.00	0.00
30.00	0.00	0	255.22	0.00	0.00	0.00
31.00	0.00	0	255.22	0.00	0.00	0.00
32.00	0.00	0	255.22	0.00	0.00	0.00
33.00	0.00	0	255.22	0.00	0.00	0.00
34.00	0.00	0	255.22	0.00	0.00	0.00
35.00	0.00	0	255.22	0.00	0.00	0.00
36.00	0.00	0	255.22	0.00	0.00	0.00
37.00	0.00	0	255.22	0.00	0.00	0.00
38.00	0.00	0	255.22	0.00	0.00	0.00
39.00	0.00	0	255.22	0.00	0.00	0.00
40.00	0.00	0	255.22	0.00	0.00	0.00

2-year Hydrograph Table

Hydrograph for Pond 8P: BIORETENTION "B"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	255.22	0.00	0.00	0.00
1.00	0.00	0	255.22	0.00	0.00	0.00
2.00	0.00	0	255.22	0.00	0.00	0.00
3.00	0.00	0	255.22	0.00	0.00	0.00
4.00	0.00	0	255.22	0.00	0.00	0.00
5.00	0.00	0	255.22	0.00	0.00	0.00
6.00	0.00	1	255.23	0.00	0.00	0.00
7.00	0.00	2	255.23	0.00	0.00	0.00
8.00	0.00	3	255.24	0.00	0.00	0.00
9.00	0.01	7	255.26	0.01	0.00	0.01
10.00	0.02	12	255.29	0.01	0.00	0.01
11.00	0.04	19	255.33	0.04	0.00	0.04
12.00	1.25	289	256.87	1.12	0.00	1.12
13.00	0.07	28	255.38	0.08	0.00	0.08
14.00	0.04	22	255.34	0.05	0.00	0.05
15.00	0.04	19	255.33	0.04	0.00	0.04
16.00	0.03	16	255.31	0.03	0.00	0.03
17.00	0.02	15	255.31	0.02	0.00	0.02
18.00	0.02	14	255.30	0.02	0.00	0.02
19.00	0.02	13	255.29	0.02	0.00	0.02
20.00	0.02	12	255.29	0.02	0.00	0.02
21.00	0.02	12	255.29	0.02	0.00	0.01
22.00	0.01	12	255.29	0.01	0.00	0.01
23.00	0.01	11	255.28	0.01	0.00	0.01
24.00	0.01	11	255.28	0.01	0.00	0.01
25.00	0.00	0	255.22	0.00	0.00	0.00
26.00	0.00	0	255.22	0.00	0.00	0.00
27.00	0.00	0	255.22	0.00	0.00	0.00
28.00	0.00	0	255.22	0.00	0.00	0.00
29.00	0.00	0	255.22	0.00	0.00	0.00
30.00	0.00	0	255.22	0.00	0.00	0.00
31.00	0.00	0	255.22	0.00	0.00	0.00
32.00	0.00	0	255.22	0.00	0.00	0.00
33.00	0.00	0	255.22	0.00	0.00	0.00
34.00	0.00	0	255.22	0.00	0.00	0.00
35.00	0.00	0	255.22	0.00	0.00	0.00
36.00	0.00	0	255.22	0.00	0.00	0.00
37.00	0.00	0	255.22	0.00	0.00	0.00
38.00	0.00	0	255.22	0.00	0.00	0.00
39.00	0.00	0	255.22	0.00	0.00	0.00
40.00	0.00	0	255.22	0.00	0.00	0.00

10-year Hydrograph Table

Hydrograph for Pond 8P: BIORETENTION "B"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	255.22	0.00	0.00	0.00
1.00	0.00	0	255.22	0.00	0.00	0.00
2.00	0.00	0	255.22	0.00	0.00	0.00
3.00	0.00	0	255.22	0.00	0.00	0.00
4.00	0.00	1	255.23	0.00	0.00	0.00
5.00	0.00	2	255.23	0.00	0.00	0.00
6.00	0.01	5	255.25	0.01	0.00	0.01
7.00	0.01	10	255.28	0.01	0.00	0.01
8.00	0.02	12	255.29	0.02	0.00	0.02
9.00	0.03	17	255.31	0.03	0.00	0.03
10.00	0.05	21	255.34	0.04	0.00	0.04
11.00	0.10	32	255.40	0.09	0.00	0.09
12.00	2.37	679	260.22	2.06	0.00	2.06
13.00	0.14	39	255.44	0.14	0.00	0.14
14.00	0.08	30	255.39	0.08	0.00	0.08
15.00	0.06	26	255.37	0.07	0.00	0.06
16.00	0.05	23	255.35	0.05	0.00	0.05
17.00	0.04	21	255.34	0.04	0.00	0.04
18.00	0.04	20	255.33	0.04	0.00	0.04
19.00	0.03	18	255.32	0.03	0.00	0.03
20.00	0.03	16	255.31	0.03	0.00	0.03
21.00	0.03	16	255.31	0.03	0.00	0.03
22.00	0.03	15	255.31	0.03	0.00	0.03
23.00	0.02	15	255.30	0.02	0.00	0.02
24.00	0.02	15	255.30	0.02	0.00	0.02
25.00	0.00	0	255.22	0.00	0.00	0.00
26.00	0.00	0	255.22	0.00	0.00	0.00
27.00	0.00	0	255.22	0.00	0.00	0.00
28.00	0.00	0	255.22	0.00	0.00	0.00
29.00	0.00	0	255.22	0.00	0.00	0.00
30.00	0.00	0	255.22	0.00	0.00	0.00
31.00	0.00	0	255.22	0.00	0.00	0.00
32.00	0.00	0	255.22	0.00	0.00	0.00
33.00	0.00	0	255.22	0.00	0.00	0.00
34.00	0.00	0	255.22	0.00	0.00	0.00
35.00	0.00	0	255.22	0.00	0.00	0.00
36.00	0.00	0	255.22	0.00	0.00	0.00
37.00	0.00	0	255.22	0.00	0.00	0.00
38.00	0.00	0	255.22	0.00	0.00	0.00
39.00	0.00	0	255.22	0.00	0.00	0.00
40.00	0.00	0	255.22	0.00	0.00	0.00

BIORETENTION "B" ONSITE DETAINED DRAINAGE SHED POSTDEVELOPMENT CALCULATION SUMMARY

Curve Number Calculations

Area (ac)	CN	Description
0.330	84-86	*SEE VRRM FOR CN
0.330		

Time of Concentration Calculations

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

1-Year Flow Calculations

Runoff = 0.76 cfs @ 11.96 hrs, Volume= 1,525 cf, Depth= 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.70"

2-Year Flow Calculations

Runoff = 1.04 cfs @ 11.96 hrs, Volume= 2,105 cf, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.20"

10-Year Flow Calculations

Runoff = 2.08 cfs @ 11.95 hrs, Volume= 4,377 cf, Depth= 3.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.20"

BIORETENTION "B" OFFSITE DETAINED DRAINAGE SHED POSTDEVELOPMENT CALCULATION SUMMARY

Curve Number Calculations

Area (ac)	CN	Description
0.030	□0	□□□□ □r□□□co□□r□□ood□HS□ D
0.0□0	9□	U□co□□□c□□d □□□□□ □□□□HS□ D
0.□00	93	W□i□□□□d A□□r□□□

Time of Concentration Calculations

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

1-Year Flow Calculations

Runoff = 0.34 c□□ □□.9□ □r□ □o□□□ □□ □□□c□D□□□□.9□"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr □-year Rainfall=□.□0"

2-Year Flow Calculations

Runoff = 0.4□ c□□ □□.9□ □r□ □o□□□ □□ □□□c□D□□□□.4□"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr □-year Rainfall=3.□0"

10-Year Flow Calculations

Runoff = 0.□□ c□□ □□.9□ □r□ □o□□□ □□ □□9□c□D□□□□4.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=□.□0"

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR ______ DATE ______
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. ______
DIRECTOR ______ DATE ______
CHAIRMAN, PLANNING COMMISSION ______ DATE ______
DATE RECORDED ______
INSTRUMENT NO. ______ DEED BOOK NO. ______ PAGE NO. ______

No.	DATE	DESCRIPTION

REVISIONS

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-17-17
08-01-17
-
-
-

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CLAYTON C. TOCK
Lic. No. 036790
08-01-17
PROFESSIONAL ENGINEER

POST-DEVELOPMENT SWM
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA
DATE: AUGUST, 2017
C.I.= N/A
SCALE: N/A

SHEET
21B

FILE No.
12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-21-SWM POST.dwg [03-SITE PLAN (4)] August 01, 2017 - 10:56am intern002

ONSITE DETAINED-DEVELOPMENT HYDROGRAPH TABLES - TO BIORETNETION "C"

1-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.09	0.00	0.00
4.00	0.13	0.00	0.00
5.00	0.17	0.00	0.00
6.00	0.22	0.00	0.00
7.00	0.27	0.00	0.00
8.00	0.32	0.00	0.00
9.00	0.40	0.00	0.00
10.00	0.49	0.00	0.00
11.00	0.63	0.02	0.01
12.00	1.79	0.56	0.31
13.00	2.08	0.75	0.02
14.00	2.21	0.85	0.01
15.00	2.30	0.91	0.01
16.00	2.38	0.96	0.01
17.00	2.43	1.01	0.01
18.00	2.49	1.05	0.01
19.00	2.53	1.08	0.01
20.00	2.57	1.11	0.00
21.00	2.60	1.14	0.00
22.00	2.64	1.16	0.00
23.00	2.67	1.19	0.00
24.00	2.70	1.21	0.00
25.00	2.70	1.21	0.00
26.00	2.70	1.21	0.00
27.00	2.70	1.21	0.00
28.00	2.70	1.21	0.00
29.00	2.70	1.21	0.00
30.00	2.70	1.21	0.00
31.00	2.70	1.21	0.00
32.00	2.70	1.21	0.00
33.00	2.70	1.21	0.00
34.00	2.70	1.21	0.00
35.00	2.70	1.21	0.00
36.00	2.70	1.21	0.00
37.00	2.70	1.21	0.00
38.00	2.70	1.21	0.00
39.00	2.70	1.21	0.00
40.00	2.70	1.21	0.00

2-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.15	0.00	0.00
5.00	0.20	0.00	0.00
6.00	0.26	0.00	0.00
7.00	0.32	0.00	0.00
8.00	0.38	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.58	0.02	0.00
11.00	0.75	0.06	0.01
12.00	2.12	0.83	0.42
13.00	2.47	1.09	0.03
14.00	2.62	1.21	0.02
15.00	2.73	1.30	0.01
16.00	2.82	1.37	0.01
17.00	2.89	1.42	0.01
18.00	2.95	1.47	0.01
19.00	3.00	1.52	0.01
20.00	3.05	1.55	0.01
21.00	3.09	1.59	0.01
22.00	3.13	1.62	0.01
23.00	3.16	1.65	0.00
24.00	3.20	1.68	0.00
25.00	3.20	1.68	0.00
26.00	3.20	1.68	0.00
27.00	3.20	1.68	0.00
28.00	3.20	1.68	0.00
29.00	3.20	1.68	0.00
30.00	3.20	1.68	0.00
31.00	3.20	1.68	0.00
32.00	3.20	1.68	0.00
33.00	3.20	1.68	0.00
34.00	3.20	1.68	0.00
35.00	3.20	1.68	0.00
36.00	3.20	1.68	0.00
37.00	3.20	1.68	0.00
38.00	3.20	1.68	0.00
39.00	3.20	1.68	0.00
40.00	3.20	1.68	0.00

10-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.18	0.00	0.00
4.00	0.25	0.00	0.00
5.00	0.33	0.00	0.00
6.00	0.42	0.00	0.00
7.00	0.51	0.01	0.00
8.00	0.62	0.04	0.00
9.00	0.76	0.08	0.01
10.00	0.94	0.15	0.01
11.00	1.22	0.29	0.03
12.00	3.45	1.97	0.84
13.00	4.01	2.47	0.05
14.00	4.26	2.70	0.03
15.00	4.44	2.85	0.02
16.00	4.58	2.98	0.02
17.00	4.69	3.08	0.02
18.00	4.79	3.17	0.01
19.00	4.88	3.25	0.01
20.00	4.95	3.32	0.01
21.00	5.02	3.38	0.01
22.00	5.08	3.44	0.01
23.00	5.14	3.50	0.01
24.00	5.20	3.55	0.01
25.00	5.20	3.55	0.00
26.00	5.20	3.55	0.00
27.00	5.20	3.55	0.00
28.00	5.20	3.55	0.00
29.00	5.20	3.55	0.00
30.00	5.20	3.55	0.00
31.00	5.20	3.55	0.00
32.00	5.20	3.55	0.00
33.00	5.20	3.55	0.00
34.00	5.20	3.55	0.00
35.00	5.20	3.55	0.00
36.00	5.20	3.55	0.00
37.00	5.20	3.55	0.00
38.00	5.20	3.55	0.00
39.00	5.20	3.55	0.00
40.00	5.20	3.55	0.00

POST-DEVELOPMENT BIORETENTION "C" OUTFLOW SUMMARIES

Summary for 1-Year Pond Outflow

Summary for Pond 3P: BIORETENTION "C"

Inflow Area = 6,970 sf , 0.00% Impervious , Inflow Depth = 1.21" for 1-year event
Inflow = 0.35 cfs @ 11.96 hrs , Volume= 702 cf
Outflow = 0.01 cfs @ 15.88 hrs , Volume= 612 cf , Atten= 98% , Lag= 235.1 min
Discarded = 0.01 cfs @ 15.88 hrs , Volume= 612 cf
Primary = 0.00 cfs @ 0.00 hrs , Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 252.79' @ 15.88 hrs Surf.Area= 319 sf Storage= 434 cf

Plug-Flow detention time= 646.7 min calculated for 612 cf (87% of inflow)
Center-of-Mass det. time= 584.2 min (1,421.2 - 837.1)

Volume	Invert	Avail.Storage	Storage Description
#1	247.16'	540 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	247.16'	85 cf	4.83'W x 21.44'L x 2.33'H Field A 242 cf Overall - 29 cf Embedded = 212 cf x 40.0% Voids
#3A	247.66'	29 cf	ADS_StormTech SC-310 +Cap x 2 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		654 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
247.16	183	0.0	0	0	183
249.48	183	40.0	170	170	294
249.49	126	25.0	0	170	351
252.49	126	25.0	95	265	471
252.50	152	100.0	1	266	497
253.50	417	100.0	274	540	768

Device	Routing	Invert	Outlet Devices
#1	Primary	247.16'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 247.16' / 246.16' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	253.00'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	247.16'	0.430 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.01 cfs @ 15.88 hrs HW=252.79' (Free Discharge)
└3=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=247.16' (Free Discharge)
└1=Culvert (Controls 0.00 cfs)
└2=Orifice/Grate (Controls 0.00 cfs)

Summary for 2-Year Pond Outflow

Summary for Pond 3P: BIORETENTION "C"

Inflow Area = 6,970 sf , 0.00% Impervious , Inflow Depth = 1.68" for 2-year event
Inflow = 0.48 cfs @ 11.96 hrs , Volume= 977 cf
Outflow = 0.05 cfs @ 12.35 hrs , Volume= 852 cf , Atten= 89% , Lag= 23.8 min
Discarded = 0.01 cfs @ 12.35 hrs , Volume= 691 cf
Primary = 0.05 cfs @ 12.35 hrs , Volume= 162 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 253.03' @ 12.35 hrs Surf.Area= 379 sf Storage= 492 cf

Plug-Flow detention time= 527.4 min calculated for 851 cf (87% of inflow)
Center-of-Mass det. time= 466.6 min (1,292.1 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	247.16'	540 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	247.16'	85 cf	4.83'W x 21.44'L x 2.33'H Field A 242 cf Overall - 29 cf Embedded = 212 cf x 40.0% Voids
#3A	247.66'	29 cf	ADS_StormTech SC-310 +Cap x 2 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		654 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
247.16	183	0.0	0	0	183
249.48	183	40.0	170	170	294
249.49	126	25.0	0	170	351
252.49	126	25.0	95	265	471
252.50	152	100.0	1	266	497
253.50	417	100.0	274	540	768

Device	Routing	Invert	Outlet Devices
#1	Primary	247.16'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 247.16' / 246.16' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	253.00'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	247.16'	0.430 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.01 cfs @ 12.35 hrs HW=253.03' (Free Discharge)
└3=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.03 cfs @ 12.35 hrs HW=253.03' (Free Discharge)
└1=Culvert (Passes 0.03 cfs of 10.95 cfs potential flow)
└2=Orifice/Grate (Weir Controls 0.03 cfs @ 0.55 fps)

Summary for 10-Year Pond Outflow

Summary for Pond 3P: BIORETENTION "C"

Inflow Area = 6,970 sf , 0.00% Impervious , Inflow Depth = 3.55" for 10-year event
Inflow = 0.99 cfs @ 11.95 hrs , Volume= 2,064 cf
Outflow = 0.93 cfs @ 11.98 hrs , Volume= 1,912 cf , Atten= 6% , Lag= 1.4 min
Discarded = 0.01 cfs @ 11.98 hrs , Volume= 763 cf
Primary = 0.92 cfs @ 11.98 hrs , Volume= 1,149 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 253.29' @ 11.98 hrs Surf.Area= 455 sf Storage= 574 cf

Plug-Flow detention time= 257.5 min calculated for 1,912 cf (93% of inflow)
Center-of-Mass det. time= 217.5 min (1,019.5 - 802.0)

Volume	Invert	Avail.Storage	Storage Description
#1	247.16'	540 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	247.16'	85 cf	4.83'W x 21.44'L x 2.33'H Field A 242 cf Overall - 29 cf Embedded = 212 cf x 40.0% Voids
#3A	247.66'	29 cf	ADS_StormTech SC-310 +Cap x 2 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		654 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
247.16	183	0.0	0	0	183
249.48	183	40.0	170	170	294
249.49	126	25.0	0	170	351
252.49	126	25.0	95	265	471
252.50	152	100.0	1	266	497
253.50	417	100.0	274	540	768

Device	Routing	Invert	Outlet Devices
#1	Primary	247.16'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 247.16' / 246.16' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#2	Device 1	253.00'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads
#3	Discarded	247.16'	0.430 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=0.01 cfs @ 11.98 hrs HW=253.28' (Free Discharge)
└3=Exfiltration (Exfiltration Controls 0.01 cfs)

Primary OutFlow Max=0.89 cfs @ 11.98 hrs HW=253.28' (Free Discharge)
└1=Culvert (Passes 0.89 cfs of 11.21 cfs potential flow)
└2=Orifice/Grate (Orifice Controls 0.89 cfs @ 2.55 fps)

□IORETENTION "C" ONSITE DETAINED DRAINA□E SHED □OSTDE□ELO□MENT CALCULATION SUMMAR□

C□r□□ N□□ □□r C□c□□□io□□

Area (ac)	CN	Description
0.160	83-85	*SEE VRRM FOR CN
0.160		

Ti□ □o□Co□c□□r□io□ C□c□□□io□□

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

□ □□□r □o□ C□c□□□io□□

Runoff = 0.35 cfs @ 11.96 hrs , Volume= 702 cf, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.70"

□ □□□r □o□ C□c□□□io□□

Runoff = 0.48 cfs @ 11.96 hrs , Volume= 977 cf, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.20"

□0 □□r □o□ C□c□□□io□□

Runoff = 0.99 cfs @ 11.95 hrs , Volume= 2,064 cf, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.20"

POST-DEVELOPMENT BIORETENTION "C" HYDROGRAPH TABLES

1-year Hydrograph Table

Hydrograph for Pond 3P: BIORETENTION "C"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	247.16	0.00	0.00	0.00
1.00	0.00	0	247.16	0.00	0.00	0.00
2.00	0.00	0	247.16	0.00	0.00	0.00
3.00	0.00	0	247.16	0.00	0.00	0.00
4.00	0.00	0	247.16	0.00	0.00	0.00
5.00	0.00	0	247.16	0.00	0.00	0.00
6.00	0.00	0	247.16	0.00	0.00	0.00
7.00	0.00	0	247.16	0.00	0.00	0.00
8.00	0.00	0	247.16	0.00	0.00	0.00
9.00	0.00	0	247.16	0.00	0.00	0.00
10.00	0.00	1	247.17	0.00	0.00	0.00
11.00	0.01	6	247.22	0.00	0.00	0.00
12.00	0.31	241	249.11	0.00	0.00	0.00
13.00	0.02	392	252.57	0.01	0.01	0.00
14.00	0.01	420	252.73	0.01	0.01	0.00
15.00	0.01	431	252.78	0.01	0.01	0.00
16.00	0.01	434	252.79	0.01	0.01	0.00
17.00	0.01	431	252.78	0.01	0.01	0.00
18.00	0.01	426	252.75	0.01	0.01	0.00
19.00	0.01	418	252.72	0.01	0.01	0.00
20.00	0.00	408	252.66	0.01	0.01	0.00
21.00	0.00	397	252.60	0.01	0.01	0.00
22.00	0.00	385	252.53	0.01	0.01	0.00
23.00	0.00	374	252.32	0.01	0.01	0.00
24.00	0.00	363	251.98	0.01	0.01	0.00
25.00	0.00	340	251.26	0.01	0.01	0.00
26.00	0.00	318	250.54	0.01	0.01	0.00
27.00	0.00	296	249.85	0.01	0.01	0.00
28.00	0.00	276	249.41	0.01	0.01	0.00
29.00	0.00	258	249.26	0.00	0.00	0.00
30.00	0.00	240	249.10	0.00	0.00	0.00
31.00	0.00	223	248.96	0.00	0.00	0.00
32.00	0.00	207	248.81	0.00	0.00	0.00
33.00	0.00	191	248.68	0.00	0.00	0.00
34.00	0.00	175	248.56	0.00	0.00	0.00
35.00	0.00	160	248.44	0.00	0.00	0.00
36.00	0.00	146	248.32	0.00	0.00	0.00
37.00	0.00	131	248.21	0.00	0.00	0.00
38.00	0.00	118	248.11	0.00	0.00	0.00
39.00	0.00	104	248.01	0.00	0.00	0.00
40.00	0.00	91	247.91	0.00	0.00	0.00

2-year Hydrograph Table

Hydrograph for Pond 3P: BIORETENTION "C"

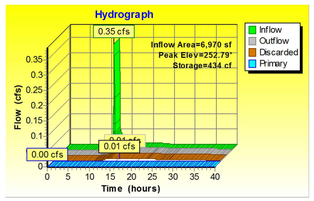
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	247.16	0.00	0.00	0.00
1.00	0.00	0	247.16	0.00	0.00	0.00
2.00	0.00	0	247.16	0.00	0.00	0.00
3.00	0.00	0	247.16	0.00	0.00	0.00
4.00	0.00	0	247.16	0.00	0.00	0.00
5.00	0.00	0	247.16	0.00	0.00	0.00
6.00	0.00	0	247.16	0.00	0.00	0.00
7.00	0.00	0	247.16	0.00	0.00	0.00
8.00	0.00	0	247.16	0.00	0.00	0.00
9.00	0.00	0	247.16	0.00	0.00	0.00
10.00	0.00	0	247.16	0.00	0.00	0.00
11.00	0.01	17	247.31	0.00	0.00	0.00
12.00	0.42	366	252.07	0.01	0.01	0.00
13.00	0.03	487	253.01	0.03	0.01	0.02
14.00	0.02	485	253.00	0.02	0.01	0.01
15.00	0.01	485	253.00	0.01	0.01	0.00
16.00	0.01	484	253.00	0.01	0.01	0.00
17.00	0.01	484	253.00	0.01	0.01	0.00
18.00	0.01	483	253.00	0.01	0.01	0.00
19.00	0.01	479	252.98	0.01	0.01	0.00
20.00	0.01	471	252.95	0.01	0.01	0.00
21.00	0.01	462	252.91	0.01	0.01	0.00
22.00	0.01	451	252.87	0.01	0.01	0.00
23.00	0.00	441	252.82	0.01	0.01	0.00
24.00	0.00	430	252.77	0.01	0.01	0.00
25.00	0.00	404	252.64	0.01	0.01	0.00
26.00	0.00	378	252.44	0.01	0.01	0.00
27.00	0.00	353	251.67	0.01	0.01	0.00
28.00	0.00	330	250.93	0.01	0.01	0.00
29.00	0.00	308	250.22	0.01	0.01	0.00
30.00	0.00	286	249.55	0.01	0.01	0.00
31.00	0.00	268	249.34	0.01	0.01	0.00
32.00	0.00	250	249.19	0.00	0.00	0.00
33.00	0.00	233	249.04	0.00	0.00	0.00
34.00	0.00	216	248.89	0.00	0.00	0.00
35.00	0.00	200	248.75	0.00	0.00	0.00
36.00	0.00	184	248.62	0.00	0.00	0.00
37.00	0.00	169	248.50	0.00	0.00	0.00
38.00	0.00	154	248.39	0.00	0.00	0.00
39.00	0.00	139	248.27	0.00	0.00	0.00
40.00	0.00	125	248.17	0.00	0.00	0.00

10-year Hydrograph Table

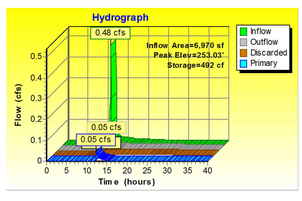
Hydrograph for Pond 3P: BIORETENTION "C"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	247.16	0.00	0.00	0.00
1.00	0.00	0	247.16	0.00	0.00	0.00
2.00	0.00	0	247.16	0.00	0.00	0.00
3.00	0.00	0	247.16	0.00	0.00	0.00
4.00	0.00	0	247.16	0.00	0.00	0.00
5.00	0.00	0	247.16	0.00	0.00	0.00
6.00	0.00	1	247.17	0.00	0.00	0.00
7.00	0.00	4	247.19	0.00	0.00	0.00
8.00	0.00	8	247.23	0.00	0.00	0.00
9.00	0.01	20	247.34	0.00	0.00	0.00
10.00	0.01	48	247.58	0.00	0.00	0.00
11.00	0.03	111	248.06	0.00	0.00	0.00
12.00	0.84	572	253.29	0.91	0.01	0.90
13.00	0.05	491	253.03	0.05	0.01	0.04
14.00	0.03	488	253.01	0.03	0.01	0.02
15.00	0.02	487	253.01	0.02	0.01	0.02
16.00	0.02	486	253.01	0.02	0.01	0.01
17.00	0.02	485	253.00	0.02	0.01	0.01
18.00	0.01	485	253.00	0.01	0.01	0.01
19.00	0.01	485	253.00	0.01	0.01	0.00
20.00	0.01	484	253.00	0.01	0.01	0.00
21.00	0.01	484	253.00	0.01	0.01	0.00
22.00	0.01	484	253.00	0.01	0.01	0.00
23.00	0.01	484	253.00	0.01	0.01	0.00
24.00	0.01	484	253.00	0.01	0.01	0.00
25.00	0.00	457	252.89	0.01	0.01	0.00
26.00	0.00	428	252.76	0.01	0.01	0.00
27.00	0.00	401	252.62	0.01	0.01	0.00
28.00	0.00	375	252.35	0.01	0.01	0.00
29.00	0.00	351	251.58	0.01	0.01	0.00
30.00	0.00	327	250.85	0.01	0.01	0.00
31.00	0.00	305	250.15	0.01	0.01	0.00
32.00	0.00	284	249.49	0.01	0.01	0.00
33.00	0.00	266	249.32	0.01	0.01	0.00
34.00	0.00	248	249.17	0.00	0.00	0.00
35.00	0.00	231	249.02	0.00	0.00	0.00
36.00	0.00	214	248.87	0.00	0.00	0.00
37.00	0.00	198	248.74	0.00	0.00	0.00
38.00	0.00	182	248.61	0.00	0.00	0.00
39.00	0.00	167	248.49	0.00	0.00	0.00
40.00	0.00	152	248.37	0.00	0.00	0.00

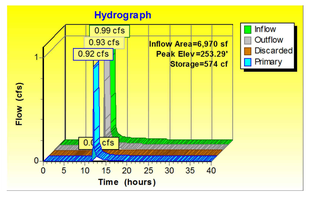
1-year Hydrograph



2-year Hydrograph



10-year Hydrograph



THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR ____ DATE ____

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. ____

DIRECTOR ____ DATE ____

CHAIRMAN, PLANNING COMMISSION ____ DATE ____

DATE RECORDED ____

INSTRUMENT NO. ____ DEED BOOK NO. ____ PAGE NO. ____

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-17
04-14-17
06-09-17
07-21-17
08-01-17

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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
LIC. NO. 036160
ENGINEER
PROFESSIONAL
08-01-17

POST-DEVELOPMENT SWM

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: N/A C.I.= N/A DATE: AUGUST, 2017

SHEET 21C

FILE No. 12811

Urban, Ltd. - z:\JOBS\Seminary Road\Preliminary Site Plan\12811-21-SWM POST.dwg [03-SITE PLAN (5)] August 01, 2017 - 10:56am intern002

"D"

ONSITE DETAINED-DEVELOPMENT HYDROGRAPH TABLES - TO BIORETNETION "D"

1-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.09	0.00	0.00
4.00	0.13	0.00	0.00
5.00	0.17	0.00	0.00
6.00	0.22	0.00	0.00
7.00	0.27	0.00	0.00
8.00	0.32	0.00	0.00
9.00	0.40	0.00	0.00
10.00	0.49	0.00	0.00
11.00	0.63	0.02	0.01
12.00	1.79	0.56	0.42
13.00	2.08	0.75	0.03
14.00	2.21	0.85	0.02
15.00	2.30	0.91	0.01
16.00	2.38	0.96	0.01
17.00	2.43	1.01	0.01
18.00	2.49	1.05	0.01
19.00	2.53	1.08	0.01
20.00	2.57	1.11	0.01
21.00	2.60	1.14	0.01
22.00	2.64	1.16	0.01
23.00	2.67	1.19	0.01
24.00	2.70	1.21	0.01
25.00	2.70	1.21	0.00
26.00	2.70	1.21	0.00
27.00	2.70	1.21	0.00
28.00	2.70	1.21	0.00
29.00	2.70	1.21	0.00
30.00	2.70	1.21	0.00
31.00	2.70	1.21	0.00
32.00	2.70	1.21	0.00
33.00	2.70	1.21	0.00
34.00	2.70	1.21	0.00
35.00	2.70	1.21	0.00
36.00	2.70	1.21	0.00
37.00	2.70	1.21	0.00
38.00	2.70	1.21	0.00
39.00	2.70	1.21	0.00
40.00	2.70	1.21	0.00

2-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.15	0.00	0.00
5.00	0.20	0.00	0.00
6.00	0.26	0.00	0.00
7.00	0.32	0.00	0.00
8.00	0.38	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.58	0.02	0.00
11.00	0.75	0.06	0.01
12.00	2.12	0.83	0.58
13.00	2.47	1.09	0.04
14.00	2.62	1.21	0.02
15.00	2.73	1.30	0.02
16.00	2.82	1.37	0.01
17.00	2.89	1.42	0.01
18.00	2.95	1.47	0.01
19.00	3.00	1.52	0.01
20.00	3.05	1.55	0.01
21.00	3.09	1.59	0.01
22.00	3.13	1.62	0.01
23.00	3.16	1.65	0.01
24.00	3.20	1.68	0.01
25.00	3.20	1.68	0.00
26.00	3.20	1.68	0.00
27.00	3.20	1.68	0.00
28.00	3.20	1.68	0.00
29.00	3.20	1.68	0.00
30.00	3.20	1.68	0.00
31.00	3.20	1.68	0.00
32.00	3.20	1.68	0.00
33.00	3.20	1.68	0.00
34.00	3.20	1.68	0.00
35.00	3.20	1.68	0.00
36.00	3.20	1.68	0.00
37.00	3.20	1.68	0.00
38.00	3.20	1.68	0.00
39.00	3.20	1.68	0.00
40.00	3.20	1.68	0.00

10-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.18	0.00	0.00
4.00	0.25	0.00	0.00
5.00	0.33	0.00	0.00
6.00	0.42	0.00	0.00
7.00	0.51	0.01	0.00
8.00	0.62	0.04	0.01
9.00	0.76	0.08	0.01
10.00	0.94	0.15	0.02
11.00	1.22	0.29	0.04
12.00	3.45	1.97	1.16
13.00	4.01	2.47	0.07
14.00	4.26	2.70	0.04
15.00	4.44	2.85	0.03
16.00	4.58	2.98	0.02
17.00	4.69	3.08	0.02
18.00	4.79	3.17	0.02
19.00	4.88	3.25	0.02
20.00	4.95	3.32	0.01
21.00	5.02	3.38	0.01
22.00	5.08	3.44	0.01
23.00	5.14	3.50	0.01
24.00	5.20	3.55	0.01
25.00	5.20	3.55	0.00
26.00	5.20	3.55	0.00
27.00	5.20	3.55	0.00
28.00	5.20	3.55	0.00
29.00	5.20	3.55	0.00
30.00	5.20	3.55	0.00
31.00	5.20	3.55	0.00
32.00	5.20	3.55	0.00
33.00	5.20	3.55	0.00
34.00	5.20	3.55	0.00
35.00	5.20	3.55	0.00
36.00	5.20	3.55	0.00
37.00	5.20	3.55	0.00
38.00	5.20	3.55	0.00
39.00	5.20	3.55	0.00
40.00	5.20	3.55	0.00

POST-DEVELOPMENT BIORETENTION "D" OUTFLOW SUMMARIES

Summary for 1-Year Pond Outflow

Summary for Pond 4P: BIORETENTION "D"

Inflow Area = 9,583 sf , 0.00% Impervious , Inflow Depth = 1.21" for 1-year event
Inflow = 0.48 cfs @ 11.96 hrs , Volume= 966 cf
Outflow = 0.02 cfs @ 13.84 hrs , Volume= 966 cf , Atten= 96% , Lag= 113.1 min
Discarded = 0.02 cfs @ 13.84 hrs , Volume= 966 cf
Primary = 0.00 cfs @ 0.00 hrs , Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 251.63' @ 13.84 hrs Surf.Area= 650 sf Storage= 499 cf

Plug-Flow detention time= 319.2 min calculated for 964 cf (100% of inflow)
Center-of-Mass det. time= 319.2 min (1,156.3 - 837.1)

Volume	Invert	Avail.Storage	Storage Description
#1	249.91'	1,379 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	249.91'	190 cf	4.83'W x 49.92'L x 2.33'H Field A 563 cf Overall - 88 cf Embedded = 475 cf x 40.0% Voids
#3A	250.41'	88 cf	ADS_StormTech SC-310 +Cap x 6 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,657 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
249.91	409	0.0	0	0	409
252.23	409	40.0	380	380	575
252.24	439	25.0	1	381	605
255.24	439	25.0	329	710	828
255.25	471	100.0	5	714	860
256.25	879	100.0	664	1,379	1,278

Device	Routing	Invert	Outlet Devices
#1	Discarded	249.91'	0.800 in/hr Exfiltration over Wetted area
#2	Primary	249.91'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 249.91' / 248.91' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	255.75'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 13.84 hrs HW=251.63' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=249.91' (Free Discharge)
└2=Culvert (Controls 0.00 cfs)
└3=Orifice/Grate (Controls 0.00 cfs)

Summary for 2-Year Pond Outflow

Summary for Pond 4P: BIORETENTION "D"

Inflow Area = 9,583 sf , 0.00% Impervious , Inflow Depth = 1.68" for 2-year event
Inflow = 0.66 cfs @ 11.96 hrs , Volume= 1,344 cf
Outflow = 0.02 cfs @ 14.02 hrs , Volume= 1,344 cf , Atten= 97% , Lag= 123.6 min
Discarded = 0.02 cfs @ 14.02 hrs , Volume= 1,344 cf
Primary = 0.00 cfs @ 0.00 hrs , Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 252.95' @ 14.02 hrs Surf.Area= 680 sf Storage= 737 cf

Plug-Flow detention time= 407.4 min calculated for 1,344 cf (100% of inflow)
Center-of-Mass det. time= 407.2 min (1,232.7 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	249.91'	1,379 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	249.91'	190 cf	4.83'W x 49.92'L x 2.33'H Field A 563 cf Overall - 88 cf Embedded = 475 cf x 40.0% Voids
#3A	250.41'	88 cf	ADS_StormTech SC-310 +Cap x 6 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,657 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
249.91	409	0.0	0	0	409
252.23	409	40.0	380	380	575
252.24	439	25.0	1	381	605
255.24	439	25.0	329	710	828
255.25	471	100.0	5	714	860
256.25	879	100.0	664	1,379	1,278

Device	Routing	Invert	Outlet Devices
#1	Discarded	249.91'	0.800 in/hr Exfiltration over Wetted area
#2	Primary	249.91'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 249.91' / 248.91' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	255.75'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 14.02 hrs HW=252.95' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=249.91' (Free Discharge)
└2=Culvert (Controls 0.00 cfs)
└3=Orifice/Grate (Controls 0.00 cfs)

Summary for 10-Year Pond Outflow

Summary for Pond 4P: BIORETENTION "D"

Inflow Area = 9,583 sf , 0.00% Impervious , Inflow Depth = 3.55" for 10-year event
Inflow = 1.36 cfs @ 11.95 hrs , Volume= 2,838 cf
Outflow = 0.29 cfs @ 12.12 hrs , Volume= 2,836 cf , Atten= 79% , Lag= 10.2 min
Discarded = 0.03 cfs @ 12.10 hrs , Volume= 2,339 cf
Primary = 0.26 cfs @ 12.12 hrs , Volume= 497 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 255.85' @ 12.10 hrs Surf.Area= 944 sf Storage= 1,345 cf

Plug-Flow detention time= 446.8 min calculated for 2,833 cf (100% of inflow)
Center-of-Mass det. time= 447.1 min (1,249.1 - 802.0)

Volume	Invert	Avail.Storage	Storage Description
#1	249.91'	1,379 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	249.91'	190 cf	4.83'W x 49.92'L x 2.33'H Field A 563 cf Overall - 88 cf Embedded = 475 cf x 40.0% Voids
#3A	250.41'	88 cf	ADS_StormTech SC-310 +Cap x 6 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,657 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
249.91	409	0.0	0	0	409
252.23	409	40.0	380	380	575
252.24	439	25.0	1	381	605
255.24	439	25.0	329	710	828
255.25	471	100.0	5	714	860
256.25	879	100.0	664	1,379	1,278

Device	Routing	Invert	Outlet Devices
#1	Discarded	249.91'	0.800 in/hr Exfiltration over Wetted area
#2	Primary	249.91'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 249.91' / 248.91' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	255.75'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.10 hrs HW=255.85' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.23 cfs @ 12.12 hrs HW=255.85' (Free Discharge)
└2=Culvert (Passes 0.23 cfs of 11.03 cfs potential flow)
└3=Orifice/Grate (Weir Controls 0.23 cfs @ 1.05 fps)

□IORETENTION "D" ONSITE DETAINED DRAINA□E SHED □OSTDE□ELO□MENT CALCULATION SUMMAR□

C□r□□ N□□ □□r C□c□□□io□□

Area (ac)	CN	Description
0.220	83-85	*SEE VRRM FOR CN
0.220		100.00% Pervious Area

Ti□ □ o□Co□c□□r□io□ C□c□□□io□□

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

□ □□□r □o□ C□c□□□io□□

Runoff = 0.48 cfs @ 11.96 hrs, Volume= 966 cf, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.70"

□ □□□r □o□ C□c□□□io□□

Runoff 0.66 cfs @ 11.96 hrs, Volume= 1,344 cf, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.20"

□0 □□□r □o□ C□c□□□io□□

Runoff = 1.36 cfs @ 11.95 hrs, Volume= 2,838 cf, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.20"

POST-DEVELOPMENT BIORETENTION "D" HYDROGRAPH TABLES

1-year Hydrograph Table

Hydrograph for Pond 4P: BIORETENTION "D"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	249.91	0.00	0.00	0.00
1.00	0.00	0	249.91	0.00	0.00	0.00
2.00	0.00	0	249.91	0.00	0.00	0.00
3.00	0.00	0	249.91	0.00	0.00	0.00
4.00	0.00	0	249.91	0.00	0.00	0.00
5.00	0.00	0	249.91	0.00	0.00	0.00
6.00	0.00	0	249.91	0.00	0.00	0.00
7.00	0.00	0	249.91	0.00	0.00	0.00
8.00	0.00	0	249.91	0.00	0.00	0.00
9.00	0.00	0	249.91	0.00	0.00	0.00
10.00	0.00	1	249.91	0.00	0.00	0.00
11.00	0.01	6	249.93	0.00	0.00	0.00
12.00	0.42	308	250.97	0.02	0.02	0.00
13.00	0.03	487	251.58	0.02	0.02	0.00
14.00	0.02	499	251.63	0.02	0.02	0.00
15.00	0.01	488	251.59	0.02	0.02	0.00
16.00	0.01	468	251.51	0.02	0.02	0.00
17.00	0.01	441	251.41	0.02	0.02	0.00
18.00	0.01	411	251.31	0.02	0.02	0.00
19.00	0.01	379	251.21	0.02	0.02	0.00
20.00	0.01	345	251.09	0.02	0.02	0.00
21.00	0.01	309	250.97	0.02	0.02	0.00
22.00	0.01	274	250.86	0.02	0.02	0.00
23.00	0.01	239	250.75	0.01	0.01	0.00
24.00	0.01	205	250.64	0.01	0.01	0.00
25.00	0.00	155	250.49	0.01	0.01	0.00
26.00	0.00	106	250.32	0.01	0.01	0.00
27.00	0.00	59	250.14	0.01	0.01	0.00
28.00	0.00	14	249.96	0.01	0.01	0.00
29.00	0.00	1	249.91	0.00	0.00	0.00
30.00	0.00	0	249.91	0.00	0.00	0.00
31.00	0.00	0	249.91	0.00	0.00	0.00
32.00	0.00	0	249.91	0.00	0.00	0.00
33.00	0.00	0	249.91	0.00	0.00	0.00
34.00	0.00	0	249.91	0.00	0.00	0.00
35.00	0.00	0	249.91	0.00	0.00	0.00
36.00	0.00	0	249.91	0.00	0.00	0.00
37.00	0.00	0	249.91	0.00	0.00	0.00
38.00	0.00	0	249.91	0.00	0.00	0.00
39.00	0.00	0	249.91	0.00	0.00	0.00
40.00	0.00	0	249.91	0.00	0.00	0.00

2-year Hydrograph Table

Hydrograph for Pond 4P: BIORETENTION "D"

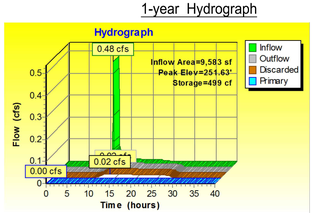
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	249.91	0.00	0.00	0.00
1.00	0.00	0	249.91	0.00	0.00	0.00
2.00	0.00	0	249.91	0.00	0.00	0.00
3.00	0.00	0	249.91	0.00	0.00	0.00
4.00	0.00	0	249.91	0.00	0.00	0.00
5.00	0.00	0	249.91	0.00	0.00	0.00
6.00	0.00	0	249.91	0.00	0.00	0.00
7.00	0.00	0	249.91	0.00	0.00	0.00
8.00	0.00	0	249.91	0.00	0.00	0.00
9.00	0.00	1	249.92	0.00	0.00	0.00
10.00	0.00	5	249.93	0.00	0.00	0.00
11.00	0.01	13	249.96	0.01	0.01	0.00
12.00	0.58	464	251.50	0.02	0.02	0.00
13.00	0.04	714	252.74	0.02	0.02	0.00
14.00	0.02	737	252.95	0.02	0.02	0.00
15.00	0.02	729	252.88	0.02	0.02	0.00
16.00	0.01	708	252.69	0.02	0.02	0.00
17.00	0.01	679	252.42	0.02	0.02	0.00
18.00	0.01	646	252.19	0.02	0.02	0.00
19.00	0.01	612	252.06	0.02	0.02	0.00
20.00	0.01	574	251.91	0.02	0.02	0.00
21.00	0.01	534	251.76	0.02	0.02	0.00
22.00	0.01	495	251.61	0.02	0.02	0.00
23.00	0.01	457	251.47	0.02	0.02	0.00
24.00	0.01	420	251.34	0.02	0.02	0.00
25.00	0.00	362	251.15	0.02	0.02	0.00
26.00	0.00	305	250.96	0.02	0.02	0.00
27.00	0.00	250	250.79	0.01	0.01	0.00
28.00	0.00	197	250.62	0.01	0.01	0.00
29.00	0.00	146	250.46	0.01	0.01	0.00
30.00	0.00	97	250.28	0.01	0.01	0.00
31.00	0.00	51	250.10	0.01	0.01	0.00
32.00	0.00	9	249.94	0.01	0.01	0.00
33.00	0.00	1	249.91	0.00	0.00	0.00
34.00	0.00	0	249.91	0.00	0.00	0.00
35.00	0.00	0	249.91	0.00	0.00	0.00
36.00	0.00	0	249.91	0.00	0.00	0.00
37.00	0.00	0	249.91	0.00	0.00	0.00
38.00	0.00	0	249.91	0.00	0.00	0.00
39.00	0.00	0	249.91	0.00	0.00	0.00
40.00	0.00	0	249.91	0.00	0.00	0.00

10-year Hydrograph Table

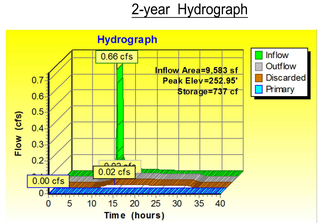
Hydrograph for Pond 4P: BIORETENTION "D"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	249.91	0.00	0.00	0.00
1.00	0.00	0	249.91	0.00	0.00	0.00
2.00	0.00	0	249.91	0.00	0.00	0.00
3.00	0.00	0	249.91	0.00	0.00	0.00
4.00	0.00	0	249.91	0.00	0.00	0.00
5.00	0.00	0	249.91	0.00	0.00	0.00
6.00	0.00	1	249.91	0.00	0.00	0.00
7.00	0.00	4	249.92	0.00	0.00	0.00
8.00	0.01	7	249.94	0.01	0.01	0.00
9.00	0.01	13	249.96	0.01	0.01	0.00
10.00	0.02	24	250.00	0.01	0.01	0.00
11.00	0.04	83	250.23	0.01	0.01	0.00
12.00	1.16	1,141	255.53	0.03	0.03	0.00
13.00	0.07	1,292	255.78	0.07	0.03	0.04
14.00	0.04	1,280	255.76	0.04	0.03	0.01
15.00	0.03	1,276	255.75	0.03	0.03	0.00
16.00	0.02	1,270	255.74	0.03	0.03	0.00
17.00	0.02	1,251	255.71	0.03	0.03	0.00
18.00	0.02	1,223	255.67	0.03	0.03	0.00
19.00	0.02	1,188	255.61	0.03	0.03	0.00
20.00	0.01	1,144	255.54	0.03	0.03	0.00
21.00	0.01	1,097	255.45	0.03	0.03	0.00
22.00	0.01	1,050	255.37	0.03	0.03	0.00
23.00	0.01	1,003	255.27	0.03	0.03	0.00
24.00	0.01	958	254.96	0.02	0.02	0.00
25.00	0.00	876	254.22	0.02	0.02	0.00
26.00	0.00	795	253.48	0.02	0.02	0.00
27.00	0.00	717	252.77	0.02	0.02	0.00
28.00	0.00	643	252.18	0.02	0.02	0.00
29.00	0.00	574	251.91	0.02	0.02	0.00
30.00	0.00	508	251.66	0.02	0.02	0.00
31.00	0.00	445	251.43	0.02	0.02	0.00
32.00	0.00	384	251.22	0.02	0.02	0.00
33.00	0.00	326	251.03	0.02	0.02	0.00
34.00	0.00	270	250.85	0.02	0.02	0.00
35.00	0.00	217	250.68	0.01	0.01	0.00
36.00	0.00	165	250.52	0.01	0.01	0.00
37.00	0.00	115	250.35	0.01	0.01	0.00
38.00	0.00	68	250.17	0.01	0.01	0.00
39.00	0.00	22	250.00	0.01	0.01	0.00
40.00	0.00	2	249.92	0.00	0.00	0.00

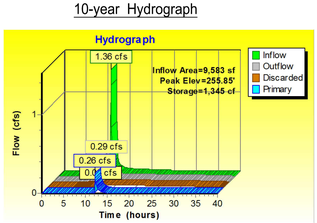
1-year Hydrograph



2-year Hydrograph



10-year Hydrograph



THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-21-17
08-01-17

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CLAYTON c. POCK
Lic. No. 0508190
PROFESSIONAL ENGINEER
08-01-17

POST-DEVELOPMENT SWM
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
DATE: AUGUST, 2017
C.I.= N/A
SCALE: N/A

SHEET 21D

FILE No. 12811

Urban, Ltd. - k:\JOBS\Seminary Road\Preliminary Site Plan\12811-21-SWM POST.dwg [03-SITE PLAN (6)] August 01, 2017 - 10:56am intern002

ONSITE DETAINED-DEVELOPMENT HYDROGRAPH TABLES - TO BIORETNETION "E"

1-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.09	0.00	0.00
4.00	0.13	0.00	0.00
5.00	0.17	0.00	0.00
6.00	0.22	0.00	0.00
7.00	0.27	0.00	0.00
8.00	0.32	0.00	0.00
9.00	0.40	0.00	0.00
10.00	0.49	0.00	0.00
11.00	0.63	0.02	0.01
12.00	1.79	0.56	0.42
13.00	2.08	0.75	0.03
14.00	2.21	0.85	0.02
15.00	2.30	0.91	0.01
16.00	2.38	0.96	0.01
17.00	2.43	1.01	0.01
18.00	2.49	1.05	0.01
19.00	2.53	1.08	0.01
20.00	2.57	1.11	0.01
21.00	2.60	1.14	0.01
22.00	2.64	1.16	0.01
23.00	2.67	1.19	0.01
24.00	2.70	1.21	0.01
25.00	2.70	1.21	0.00
26.00	2.70	1.21	0.00
27.00	2.70	1.21	0.00
28.00	2.70	1.21	0.00
29.00	2.70	1.21	0.00
30.00	2.70	1.21	0.00
31.00	2.70	1.21	0.00
32.00	2.70	1.21	0.00
33.00	2.70	1.21	0.00
34.00	2.70	1.21	0.00
35.00	2.70	1.21	0.00
36.00	2.70	1.21	0.00
37.00	2.70	1.21	0.00
38.00	2.70	1.21	0.00
39.00	2.70	1.21	0.00
40.00	2.70	1.21	0.00

2-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.15	0.00	0.00
5.00	0.20	0.00	0.00
6.00	0.26	0.00	0.00
7.00	0.32	0.00	0.00
8.00	0.38	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.58	0.02	0.00
11.00	0.75	0.06	0.01
12.00	2.12	0.83	0.58
13.00	2.47	1.09	0.04
14.00	2.62	1.21	0.02
15.00	2.73	1.30	0.02
16.00	2.82	1.37	0.01
17.00	2.89	1.42	0.01
18.00	2.95	1.47	0.01
19.00	3.00	1.52	0.01
20.00	3.05	1.55	0.01
21.00	3.09	1.59	0.01
22.00	3.13	1.62	0.01
23.00	3.16	1.65	0.01
24.00	3.20	1.68	0.01
25.00	3.20	1.68	0.00
26.00	3.20	1.68	0.00
27.00	3.20	1.68	0.00
28.00	3.20	1.68	0.00
29.00	3.20	1.68	0.00
30.00	3.20	1.68	0.00
31.00	3.20	1.68	0.00
32.00	3.20	1.68	0.00
33.00	3.20	1.68	0.00
34.00	3.20	1.68	0.00
35.00	3.20	1.68	0.00
36.00	3.20	1.68	0.00
37.00	3.20	1.68	0.00
38.00	3.20	1.68	0.00
39.00	3.20	1.68	0.00
40.00	3.20	1.68	0.00

10-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.18	0.00	0.00
4.00	0.25	0.00	0.00
5.00	0.33	0.00	0.00
6.00	0.42	0.00	0.00
7.00	0.51	0.01	0.00
8.00	0.62	0.04	0.01
9.00	0.76	0.08	0.01
10.00	0.94	0.15	0.02
11.00	1.22	0.29	0.04
12.00	3.45	1.97	1.16
13.00	4.01	2.47	0.07
14.00	4.26	2.70	0.04
15.00	4.44	2.85	0.03
16.00	4.58	2.98	0.02
17.00	4.69	3.08	0.02
18.00	4.79	3.17	0.02
19.00	4.88	3.25	0.02
20.00	4.95	3.32	0.01
21.00	5.02	3.38	0.01
22.00	5.08	3.44	0.01
23.00	5.14	3.50	0.01
24.00	5.20	3.55	0.01
25.00	5.20	3.55	0.00
26.00	5.20	3.55	0.00
27.00	5.20	3.55	0.00
28.00	5.20	3.55	0.00
29.00	5.20	3.55	0.00
30.00	5.20	3.55	0.00
31.00	5.20	3.55	0.00
32.00	5.20	3.55	0.00
33.00	5.20	3.55	0.00
34.00	5.20	3.55	0.00
35.00	5.20	3.55	0.00
36.00	5.20	3.55	0.00
37.00	5.20	3.55	0.00
38.00	5.20	3.55	0.00
39.00	5.20	3.55	0.00
40.00	5.20	3.55	0.00

POST-DEVELOPMENT BIORETENTION "E" OUTFLOW SUMMARIES

Summary for 1-Year Pond Outflow

Summary for Pond 5P: BIORETENTION "E"

Inflow Area = 9,583 sf , 0.00% Impervious , Inflow Depth = 1.21" for 1-year event
Inflow = 0.48 cfs @ 11.96 hrs , Volume= 966 cf
Outflow = 0.03 cfs @ 12.76 hrs , Volume= 966 cf , Atten= 93% , Lag= 48.2 min
Discarded = 0.03 cfs @ 12.76 hrs , Volume= 966 cf
Primary = 0.00 cfs @ 0.00 hrs , Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 255.17' @ 12.76 hrs Surf.Area= 530 sf Storage= 416 cf

Plug-Flow detention time= 128.7 min calculated for 964 cf (100% of inflow)
Center-of-Mass det. time= 128.6 min (965.6 - 837.1)

Volume	Invert	Avail.Storage	Storage Description
#1	253.41'	1,135 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	253.41'	164 cf	4.83'W x 42.80'L x 2.33'H Field A 483 cf Overall - 74 cf Embedded = 409 cf x 40.0% Voids
#3A	253.91'	74 cf	ADS_StormTech SC-310 +Cap x 5 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,372 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
253.41	323	0.0	0	0	323
255.73	323	40.0	300	300	471
255.74	360	25.0	1	301	508
258.74	360	25.0	270	571	710
258.75	387	100.0	4	574	737
259.75	755	100.0	561	1,135	1,114

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.41'	1.700 in/hr Exfiltration over Wetted area
#2	Primary	253.41'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 253.41' / 252.41' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	259.25'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 12.76 hrs HW=255.17' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.41' (Free Discharge)
└2=Culvert (Controls 0.00 cfs)
└3=Orifice/Grate (Controls 0.00 cfs)

Summary for 2-Year Pond Outflow

Summary for Pond 5P: BIORETENTION "E"

Inflow Area = 9,583 sf , 0.00% Impervious , Inflow Depth = 1.68" for 2-year event
Inflow = 0.66 cfs @ 11.96 hrs , Volume= 1,344 cf
Outflow = 0.04 cfs @ 12.87 hrs , Volume= 1,344 cf , Atten= 94% , Lag= 54.6 min
Discarded = 0.04 cfs @ 12.87 hrs , Volume= 1,344 cf
Primary = 0.00 cfs @ 0.00 hrs , Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 256.61' @ 12.87 hrs Surf.Area= 567 sf Storage= 616 cf

Plug-Flow detention time= 170.3 min calculated for 1,344 cf (100% of inflow)
Center-of-Mass det. time= 170.2 min (995.6 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	253.41'	1,135 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	253.41'	164 cf	4.83'W x 42.80'L x 2.33'H Field A 483 cf Overall - 74 cf Embedded = 409 cf x 40.0% Voids
#3A	253.91'	74 cf	ADS_StormTech SC-310 +Cap x 5 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,372 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
253.41	323	0.0	0	0	323
255.73	323	40.0	300	300	471
255.74	360	25.0	1	301	508
258.74	360	25.0	270	571	710
258.75	387	100.0	4	574	737
259.75	755	100.0	561	1,135	1,114

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.41'	1.700 in/hr Exfiltration over Wetted area
#2	Primary	253.41'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 253.41' / 252.41' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	259.25'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 12.87 hrs HW=256.61' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=253.41' (Free Discharge)
└2=Culvert (Controls 0.00 cfs)
└3=Orifice/Grate (Controls 0.00 cfs)

Summary for 10-Year Pond Outflow

Summary for Pond 5P: BIORETENTION "E"

Inflow Area = 9,583 sf , 0.00% Impervious , Inflow Depth = 3.55" for 10-year event
Inflow = 1.36 cfs @ 11.95 hrs , Volume= 2,838 cf
Outflow = 0.63 cfs @ 12.07 hrs , Volume= 2,838 cf , Atten= 54% , Lag= 6.8 min
Discarded = 0.06 cfs @ 12.07 hrs , Volume= 2,386 cf
Primary = 0.58 cfs @ 12.07 hrs , Volume= 451 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 259.45' @ 12.07 hrs Surf.Area= 838 sf Storage= 1,163 cf

Plug-Flow detention time= 197.9 min calculated for 2,838 cf (100% of inflow)
Center-of-Mass det. time= 197.8 min (999.8 - 802.0)

Volume	Invert	Avail.Storage	Storage Description
#1	253.41'	1,135 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	253.41'	164 cf	4.83'W x 42.80'L x 2.33'H Field A 483 cf Overall - 74 cf Embedded = 409 cf x 40.0% Voids
#3A	253.91'	74 cf	ADS_StormTech SC-310 +Cap x 5 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,372 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
253.41	323	0.0	0	0	323
255.73	323	40.0	300	300	471
255.74	360	25.0	1	301	508
258.74	360	25.0	270	571	710
258.75	387	100.0	4	574	737
259.75	755	100.0	561	1,135	1,114

Device	Routing	Invert	Outlet Devices
#1	Discarded	253.41'	1.700 in/hr Exfiltration over Wetted area
#2	Primary	253.41'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 253.41' / 252.41' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	259.25'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 12.07 hrs HW=259.42' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.50 cfs @ 12.07 hrs HW=259.43' (Free Discharge)
└2=Culvert (Passes 0.50 cfs of 11.10 cfs potential flow)
└3=Orifice/Grate (Weir Controls 0.50 cfs @ 1.37 fps)

□IORETENTION "E" ONSITE DETAINED DRAINA□E SHED □OSTDE□ELO□MENT CALCULATION SUMMAR□

C□r□□ N□□ □□r C□c□□□io□□

Area (ac)	CN	Description
0.220	83-85	*SEE VRRM FOR CN
0.220		100.00% Pervious Area

Ti□ □ o□Co□c□□r□io□ C□c□□□io□□

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

□ □□□r □o□ C□c□□□io□□

Runoff = 0.48 cfs @ 11.96 hrs, Volume= 966 cf, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.70"

□ □□□r □o□ C□c□□□io□□

Runoff = 0.66 cfs @ 11.96 hrs, Volume= 1,344 cf, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.20"

□0 □□□r □o□ C□c□□□io□□

Runoff = 1.36 cfs @ 11.95 hrs, Volume= 2,838 cf, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.20"

POST-DEVELOPMENT BIORETENTION "E" HYDROGRAPH TABLES

1-year Hydrograph Table

Hydrograph for Pond 5P: BIORETENTION "E"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	253.41	0.00	0.00	0.00
1.00	0.00	0	253.41	0.00	0.00	0.00
2.00	0.00	0	253.41	0.00	0.00	0.00
3.00	0.00	0	253.41	0.00	0.00	0.00
4.00	0.00	0	253.41	0.00	0.00	0.00
5.00	0.00	0	253.41	0.00	0.00	0.00
6.00	0.00	0	253.41	0.00	0.00	0.00
7.00	0.00	0	253.41	0.00	0.00	0.00
8.00	0.00	0	253.41	0.00	0.00	0.00
9.00	0.00	0	253.41	0.00	0.00	0.00
10.00	0.00	1	253.41	0.00	0.00	0.00
11.00	0.01	4	253.43	0.01	0.01	0.00
12.00	0.42	287	254.61	0.03	0.03	0.00
13.00	0.03	414	255.16	0.03	0.03	0.00
14.00	0.02	378	254.99	0.03	0.03	0.00
15.00	0.01	323	254.76	0.03	0.03	0.00
16.00	0.01	263	254.52	0.03	0.03	0.00
17.00	0.01	201	254.27	0.03	0.03	0.00
18.00	0.01	140	254.04	0.02	0.02	0.00
19.00	0.01	81	253.79	0.02	0.02	0.00
20.00	0.01	24	253.52	0.02	0.02	0.00
21.00	0.01	4	253.43	0.01	0.01	0.00
22.00	0.01	4	253.43	0.01	0.01	0.00
23.00	0.01	3	253.43	0.01	0.01	0.00
24.00	0.01	3	253.43	0.01	0.01	0.00
25.00	0.00	0	253.41	0.00	0.00	0.00
26.00	0.00	0	253.41	0.00	0.00	0.00
27.00	0.00	0	253.41	0.00	0.00	0.00
28.00	0.00	0	253.41	0.00	0.00	0.00
29.00	0.00	0	253.41	0.00	0.00	0.00
30.00	0.00	0	253.41	0.00	0.00	0.00
31.00	0.00	0	253.41	0.00	0.00	0.00
32.00	0.00	0	253.41	0.00	0.00	0.00
33.00	0.00	0	253.41	0.00	0.00	0.00
34.00	0.00	0	253.41	0.00	0.00	0.00
35.00	0.00	0	253.41	0.00	0.00	0.00
36.00	0.00	0	253.41	0.00	0.00	0.00
37.00	0.00	0	253.41	0.00	0.00	0.00
38.00	0.00	0	253.41	0.00	0.00	0.00
39.00	0.00	0	253.41	0.00	0.00	0.00
40.00	0.00	0	253.41	0.00	0.00	0.00

2-year Hydrograph Table

Hydrograph for Pond 5P: BIORETENTION "E"

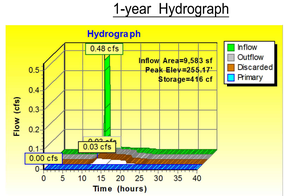
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	253.41	0.00	0.00	0.00
1.00	0.00	0	253.41	0.00	0.00	0.00
2.00	0.00	0	253.41	0.00	0.00	0.00
3.00	0.00	0	253.41	0.00	0.00	0.00
4.00	0.00	0	253.41	0.00	0.00	0.00
5.00	0.00	0	253.41	0.00	0.00	0.00
6.00	0.00	0	253.41	0.00	0.00	0.00
7.00	0.00	0	253.41	0.00	0.00	0.00
8.00	0.00	0	253.41	0.00	0.00	0.00
9.00	0.00	1	253.41	0.00	0.00	0.00
10.00	0.00	3	253.42	0.00	0.00	0.00
11.00	0.01	7	253.45	0.01	0.01	0.00
12.00	0.58	431	255.23	0.03	0.03	0.00
13.00	0.04	615	256.60	0.04	0.04	0.00
14.00	0.02	576	256.16	0.04	0.04	0.00
15.00	0.02	513	255.62	0.03	0.03	0.00
16.00	0.01	447	255.31	0.03	0.03	0.00
17.00	0.01	378	254.99	0.03	0.03	0.00
18.00	0.01	311	254.71	0.03	0.03	0.00
19.00	0.01	246	254.45	0.03	0.03	0.00
20.00	0.01	180	254.19	0.03	0.03	0.00
21.00	0.01	118	253.95	0.02	0.02	0.00
22.00	0.01	59	253.69	0.02	0.02	0.00
23.00	0.01	8	253.45	0.01	0.01	0.00
24.00	0.01	4	253.43	0.01	0.01	0.00
25.00	0.00	0	253.41	0.00	0.00	0.00
26.00	0.00	0	253.41	0.00	0.00	0.00
27.00	0.00	0	253.41	0.00	0.00	0.00
28.00	0.00	0	253.41	0.00	0.00	0.00
29.00	0.00	0	253.41	0.00	0.00	0.00
30.00	0.00	0	253.41	0.00	0.00	0.00
31.00	0.00	0	253.41	0.00	0.00	0.00
32.00	0.00	0	253.41	0.00	0.00	0.00
33.00	0.00	0	253.41	0.00	0.00	0.00
34.00	0.00	0	253.41	0.00	0.00	0.00
35.00	0.00	0	253.41	0.00	0.00	0.00
36.00	0.00	0	253.41	0.00	0.00	0.00
37.00	0.00	0	253.41	0.00	0.00	0.00
38.00	0.00	0	253.41	0.00	0.00	0.00
39.00	0.00	0	253.41	0.00	0.00	0.00
40.00	0.00	0	253.41	0.00	0.00	0.00

10-year Hydrograph Table

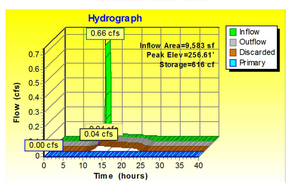
Hydrograph for Pond 5P: BIORETENTION "E"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	253.41	0.00	0.00	0.00
1.00	0.00	0	253.41	0.00	0.00	0.00
2.00	0.00	0	253.41	0.00	0.00	0.00
3.00	0.00	0	253.41	0.00	0.00	0.00
4.00	0.00	0	253.41	0.00	0.00	0.00
5.00	0.00	0	253.41	0.00	0.00	0.00
6.00	0.00	1	253.41	0.00	0.00	0.00
7.00	0.00	2	253.42	0.00	0.00	0.00
8.00	0.01	4	253.43	0.01	0.01	0.00
9.00	0.01	7	253.44	0.01	0.01	0.00
10.00	0.02	11	253.46	0.02	0.02	0.00
11.00	0.04	41	253.60	0.02	0.02	0.00
12.00	1.16	1,054	259.26	0.08	0.05	0.02
13.00	0.07	1,053	259.26	0.07	0.05	0.02
14.00	0.04	1,033	259.23	0.05	0.05	0.00
15.00	0.03	976	259.12	0.05	0.05	0.00
16.00	0.02	899	258.96	0.05	0.05	0.00
17.00	0.02	812	258.75	0.05	0.05	0.00
18.00	0.02	729	257.86	0.04	0.04	0.00
19.00	0.02	645	256.93	0.04	0.04	0.00
20.00	0.01	561	255.99	0.04	0.04	0.00
21.00	0.01	483	255.48	0.03	0.03	0.00
22.00	0.01	412	255.15	0.03	0.03	0.00
23.00	0.01	347	254.86	0.03	0.03	0.00
24.00	0.01	285	254.61	0.03	0.03	0.00
25.00	0.00	191	254.23	0.03	0.03	0.00
26.00	0.00	101	253.89	0.02	0.02	0.00
27.00	0.00	20	253.50	0.02	0.02	0.00
28.00	0.00	0	253.41	0.00	0.00	0.00
29.00	0.00	0	253.41	0.00	0.00	0.00
30.00	0.00	0	253.41	0.00	0.00	0.00
31.00	0.00	0	253.41	0.00	0.00	0.00
32.00	0.00	0	253.41	0.00	0.00	0.00
33.00	0.00	0	253.41	0.00	0.00	0.00
34.00	0.00	0	253.41	0.00	0.00	0.00
35.00	0.00	0	253.41	0.00	0.00	0.00
36.00	0.00	0	253.41	0.00	0.00	0.00
37.00	0.00	0	253.41	0.00	0.00	0.00
38.00	0.00	0	253.41	0.00	0.00	0.00
39.00	0.00	0	253.41	0.00	0.00	0.00
40.00	0.00	0	253.41	0.00	0.00	0.00

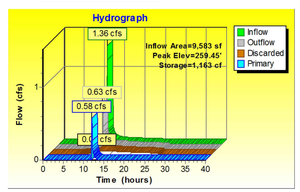
1-year Hydrograph



2-year Hydrograph



10-year Hydrograph



THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-11-17
08-01-17

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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 0508780
PROFESSIONAL ENGINEER
05-01-17

POST-DEVELOPMENT SWM
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
SCALE: N/A
DATE: AUGUST, 2017
C.I.= N/A

SHEET 21E

FILE No. 12811

Urban, Ltd. - k:\JOBS\Seminary Road\Preliminary Site Plan\12811-21-SWM POST.dwg [3-03-SITE PLAN (7)] August 01, 2017 - 10:56am intern002

ONSITE DETAINED-DEVELOPMENT HYDROGRAPH TABLES - TO BIORETNETION "F"

1-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.06	0.00	0.00
3.00	0.09	0.00	0.00
4.00	0.13	0.00	0.00
5.00	0.17	0.00	0.00
6.00	0.22	0.00	0.00
7.00	0.27	0.00	0.00
8.00	0.32	0.00	0.00
9.00	0.40	0.00	0.00
10.00	0.49	0.00	0.00
11.00	0.63	0.02	0.01
12.00	1.79	0.56	0.37
13.00	2.08	0.75	0.02
14.00	2.21	0.85	0.01
15.00	2.30	0.91	0.01
16.00	2.38	0.96	0.01
17.00	2.43	1.01	0.01
18.00	2.49	1.05	0.01
19.00	2.53	1.08	0.01
20.00	2.57	1.11	0.01
21.00	2.60	1.14	0.00
22.00	2.64	1.16	0.00
23.00	2.67	1.19	0.00
24.00	2.70	1.21	0.00
25.00	2.70	1.21	0.00
26.00	2.70	1.21	0.00
27.00	2.70	1.21	0.00
28.00	2.70	1.21	0.00
29.00	2.70	1.21	0.00
30.00	2.70	1.21	0.00
31.00	2.70	1.21	0.00
32.00	2.70	1.21	0.00
33.00	2.70	1.21	0.00
34.00	2.70	1.21	0.00
35.00	2.70	1.21	0.00
36.00	2.70	1.21	0.00
37.00	2.70	1.21	0.00
38.00	2.70	1.21	0.00
39.00	2.70	1.21	0.00
40.00	2.70	1.21	0.00

2-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.03	0.00	0.00
2.00	0.07	0.00	0.00
3.00	0.11	0.00	0.00
4.00	0.15	0.00	0.00
5.00	0.20	0.00	0.00
6.00	0.26	0.00	0.00
7.00	0.32	0.00	0.00
8.00	0.38	0.00	0.00
9.00	0.47	0.00	0.00
10.00	0.58	0.02	0.00
11.00	0.75	0.06	0.01
12.00	2.12	0.83	0.50
13.00	2.47	1.09	0.03
14.00	2.62	1.21	0.02
15.00	2.73	1.30	0.01
16.00	2.82	1.37	0.01
17.00	2.89	1.42	0.01
18.00	2.95	1.47	0.01
19.00	3.00	1.52	0.01
20.00	3.05	1.55	0.01
21.00	3.09	1.59	0.01
22.00	3.13	1.62	0.01
23.00	3.16	1.65	0.01
24.00	3.20	1.68	0.01
25.00	3.20	1.68	0.00
26.00	3.20	1.68	0.00
27.00	3.20	1.68	0.00
28.00	3.20	1.68	0.00
29.00	3.20	1.68	0.00
30.00	3.20	1.68	0.00
31.00	3.20	1.68	0.00
32.00	3.20	1.68	0.00
33.00	3.20	1.68	0.00
34.00	3.20	1.68	0.00
35.00	3.20	1.68	0.00
36.00	3.20	1.68	0.00
37.00	3.20	1.68	0.00
38.00	3.20	1.68	0.00
39.00	3.20	1.68	0.00
40.00	3.20	1.68	0.00

10-YEAR

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00
1.00	0.05	0.00	0.00
2.00	0.11	0.00	0.00
3.00	0.18	0.00	0.00
4.00	0.25	0.00	0.00
5.00	0.33	0.00	0.00
6.00	0.42	0.00	0.00
7.00	0.51	0.01	0.00
8.00	0.62	0.04	0.01
9.00	0.76	0.08	0.01
10.00	0.94	0.15	0.02
11.00	1.22	0.29	0.04
12.00	3.45	1.97	1.00
13.00	4.01	2.47	0.06
14.00	4.26	2.70	0.03
15.00	4.44	2.85	0.03
16.00	4.58	2.98	0.02
17.00	4.69	3.08	0.02
18.00	4.79	3.17	0.02
19.00	4.88	3.25	0.01
20.00	4.95	3.32	0.01
21.00	5.02	3.38	0.01
22.00	5.08	3.44	0.01
23.00	5.14	3.50	0.01
24.00	5.20	3.55	0.01
25.00	5.20	3.55	0.00
26.00	5.20	3.55	0.00
27.00	5.20	3.55	0.00
28.00	5.20	3.55	0.00
29.00	5.20	3.55	0.00
30.00	5.20	3.55	0.00
31.00	5.20	3.55	0.00
32.00	5.20	3.55	0.00
33.00	5.20	3.55	0.00
34.00	5.20	3.55	0.00
35.00	5.20	3.55	0.00
36.00	5.20	3.55	0.00
37.00	5.20	3.55	0.00
38.00	5.20	3.55	0.00
39.00	5.20	3.55	0.00
40.00	5.20	3.55	0.00

POST-DEVELOPMENT BIORETENTION "F" OUTFLOW SUMMARIES

Summary for 1-Year Pond Outflow

Summary for Pond 6P: BIORETENTION "F"

Inflow Area = 8,276 sf , 0.00% Impervious , Inflow Depth = 1.21" for 1-year event
Inflow = 0.41 cfs @ 11.96 hrs , Volume= 834 cf
Outflow = 0.02 cfs @ 13.09 hrs , Volume= 834 cf , Atten= 95% , Lag= 67.7 min
Discarded = 0.02 cfs @ 13.09 hrs , Volume= 834 cf
Primary = 0.00 cfs @ 0.00 hrs , Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 258.91' @ 13.09 hrs Surf.Area= 401 sf Storage= 387 cf

Plug-Flow detention time= 191.6 min calculated for 833 cf (100% of inflow)
Center-of-Mass det. time= 191.4 min (1,028.5 - 837.1)

Volume	Invert	Avail.Storage	Storage Description
#1	256.66'	937 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	256.66'	111 cf	4.83'W x 28.56'L x 2.33'H Field A 322 cf Overall - 44 cf Embedded = 278 cf x 40.0% Voids
#3A	257.16'	44 cf	ADS_StormTech SC-310 +Cap x 3 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,092 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
256.66	263	0.0	0	0	263
258.98	263	40.0	244	244	396
258.99	310	25.0	1	245	443
261.99	310	25.0	233	477	631
262.00	325	100.0	3	480	646
263.00	602	100.0	456	937	933

Device	Routing	Invert	Outlet Devices
#1	Discarded	256.66'	1.400 in/hr Exfiltration over Wetted area
#2	Primary	256.66'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 256.66' / 255.66' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	262.50'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 13.09 hrs HW=258.91' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=256.66' (Free Discharge)
└2=Culvert (Controls 0.00 cfs)
└3=Orifice/Grate (Controls 0.00 cfs)

Summary for 2-Year Pond Outflow

Summary for Pond 6P: BIORETENTION "F"

Inflow Area = 8,276 sf , 0.00% Impervious , Inflow Depth = 1.68" for 2-year event
Inflow = 0.57 cfs @ 11.96 hrs , Volume= 1,160 cf
Outflow = 0.03 cfs @ 13.13 hrs , Volume= 1,160 cf , Atten= 95% , Lag= 70.6 min
Discarded = 0.03 cfs @ 13.13 hrs , Volume= 1,160 cf
Primary = 0.00 cfs @ 0.00 hrs , Volume= 0 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 261.13' @ 13.13 hrs Surf.Area= 448 sf Storage= 566 cf

Plug-Flow detention time= 236.2 min calculated for 1,159 cf (100% of inflow)
Center-of-Mass det. time= 236.2 min (1,061.6 - 825.5)

Volume	Invert	Avail.Storage	Storage Description
#1	256.66'	937 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	256.66'	111 cf	4.83'W x 28.56'L x 2.33'H Field A 322 cf Overall - 44 cf Embedded = 278 cf x 40.0% Voids
#3A	257.16'	44 cf	ADS_StormTech SC-310 +Cap x 3 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,092 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
256.66	263	0.0	0	0	263
258.98	263	40.0	244	244	396
258.99	310	25.0	1	245	443
261.99	310	25.0	233	477	631
262.00	325	100.0	3	480	646
263.00	602	100.0	456	937	933

Device	Routing	Invert	Outlet Devices
#1	Discarded	256.66'	1.400 in/hr Exfiltration over Wetted area
#2	Primary	256.66'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 256.66' / 255.66' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	262.50'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.03 cfs @ 13.13 hrs HW=261.13' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=256.66' (Free Discharge)
└2=Culvert (Controls 0.00 cfs)
└3=Orifice/Grate (Controls 0.00 cfs)

Summary for 10-Year Pond Outflow

Summary for Pond 6P: BIORETENTION "F"

Inflow Area = 8,276 sf , 0.00% Impervious , Inflow Depth = 3.55" for 10-year event
Inflow = 1.17 cfs @ 11.95 hrs , Volume= 2,451 cf
Outflow = 0.74 cfs @ 12.05 hrs , Volume= 2,451 cf , Atten= 37% , Lag= 5.6 min
Discarded = 0.04 cfs @ 12.05 hrs , Volume= 1,884 cf
Primary = 0.70 cfs @ 12.05 hrs , Volume= 566 cf

Routing by Stor-Ind method, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Peak Elev= 262.72' @ 12.05 hrs Surf.Area= 653 sf Storage= 935 cf

Plug-Flow detention time= 224.7 min calculated for 2,451 cf (100% of inflow)
Center-of-Mass det. time= 224.6 min (1,026.6 - 802.0)

Volume	Invert	Avail.Storage	Storage Description
#1	256.66'	937 cf	Custom Stage Data (Conic) Listed below (Recalc)
#2A	256.66'	111 cf	4.83'W x 28.56'L x 2.33'H Field A 322 cf Overall - 44 cf Embedded = 278 cf x 40.0% Voids
#3A	257.16'	44 cf	ADS_StormTech SC-310 +Cap x 3 Inside #2 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		1,092 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
256.66	263	0.0	0	0	263
258.98	263	40.0	244	244	396
258.99	310	25.0	1	245	443
261.99	310	25.0	233	477	631
262.00	325	100.0	3	480	646
263.00	602	100.0	456	937	933

Device	Routing	Invert	Outlet Devices
#1	Discarded	256.66'	1.400 in/hr Exfiltration over Wetted area
#2	Primary	256.66'	12.0" Round Culvert L= 20.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 256.66' / 255.66' S= 0.0500 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf
#3	Device 2	262.50'	8.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 12.05 hrs HW=262.72' (Free Discharge)
└1=Exfiltration (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.69 cfs @ 12.05 hrs HW=262.72' (Free Discharge)
└2=Culvert (Passes 0.69 cfs of 11.14 cfs potential flow)
└3=Orifice/Grate (Weir Controls 0.69 cfs @ 1.52 fps)

□IORETENTION "□" ONSITE DETAINED DRAINA□E SHED □OSTDE□ELO□MENT CALCULATION SUMMAR□

C□r□□N□□ □□r C□c□□□io□□

Area (ac)	CN	Description
0.190	83-85	*SEE VRRM FOR CN
0.190		100.00% Pervious Area

Ti□ □o□Co□c□□r□□io□ C□c□□□io□□

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

□ □□□r □o□ C□c□□□io□□

Runoff = 0.41 cfs @ 11.96 hrs, Volume= 834 cf, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-year Rainfall=2.70"

□ □□□r □o□ C□c□□□io□□

Runoff = 0.57 cfs @ 11.96 hrs, Volume= 1,160 cf, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-year Rainfall=3.20"

□0 □□□r □o□ C□c□□□io□□

Runoff = 1.17 cfs @ 11.95 hrs, Volume= 2,451 cf, Depth= 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-year Rainfall=5.20"

POST-DEVELOPMENT BIORETENTION "F" HYDROGRAPH TABLES

1-year Hydrograph Table

Hydrograph for Pond 6P: BIORETENTION "F"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	256.66	0.00	0.00	0.00
1.00	0.00	0	256.66	0.00	0.00	0.00
2.00	0.00	0	256.66	0.00	0.00	0.00
3.00	0.00	0	256.66	0.00	0.00	0.00
4.00	0.00	0	256.66	0.00	0.00	0.00
5.00	0.00	0	256.66	0.00	0.00	0.00
6.00	0.00	0	256.66	0.00	0.00	0.00
7.00	0.00	0	256.66	0.00	0.00	0.00
8.00	0.00	0	256.66	0.00	0.00	0.00
9.00	0.00	0	256.66	0.00	0.00	0.00
10.00	0.00	1	256.66	0.00	0.00	0.00
11.00	0.01	4	256.68	0.00	0.00	0.00
12.00	0.37	256	258.11	0.02	0.02	0.00
13.00	0.02	387	258.91	0.02	0.02	0.00
14.00	0.01	374	258.82	0.02	0.02	0.00
15.00	0.01	343	258.63	0.02	0.02	0.00
16.00	0.01	306	258.40	0.02	0.02	0.00
17.00	0.01	266	258.16	0.02	0.02	0.00
18.00	0.01	226	257.94	0.02	0.02	0.00
19.00	0.01	186	257.72	0.02	0.02	0.00
20.00	0.01	146	257.51	0.02	0.02	0.00
21.00	0.00	107	257.30	0.02	0.02	0.00
22.00	0.00	70	257.09	0.01	0.01	0.00
23.00	0.00	35	256.88	0.01	0.01	0.00
24.00	0.00	6	256.70	0.01	0.01	0.00
25.00	0.00	0	256.66	0.00	0.00	0.00
26.00	0.00	0	256.66	0.00	0.00	0.00
27.00	0.00	0	256.66	0.00	0.00	0.00
28.00	0.00	0	256.66	0.00	0.00	0.00
29.00	0.00	0	256.66	0.00	0.00	0.00
30.00	0.00	0	256.66	0.00	0.00	0.00
31.00	0.00	0	256.66	0.00	0.00	0.00
32.00	0.00	0	256.66	0.00	0.00	0.00
33.00	0.00	0	256.66	0.00	0.00	0.00
34.00	0.00	0	256.66	0.00	0.00	0.00
35.00	0.00	0	256.66	0.00	0.00	0.00
36.00	0.00	0	256.66	0.00	0.00	0.00
37.00	0.00	0	256.66	0.00	0.00	0.00
38.00	0.00	0	256.66	0.00	0.00	0.00
39.00	0.00	0	256.66	0.00	0.00	0.00
40.00	0.00	0	256.66	0.00	0.00	0.00

2-year Hydrograph Table

Hydrograph for Pond 6P: BIORETENTION "F"

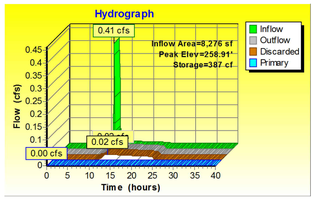
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	256.66	0.00	0.00	0.00
1.00	0.00	0	256.66	0.00	0.00	0.00
2.00	0.00	0	256.66	0.00	0.00	0.00
3.00	0.00	0	256.66	0.00	0.00	0.00
4.00	0.00	0	256.66	0.00	0.00	0.00
5.00	0.00	0	256.66	0.00	0.00	0.00
6.00	0.00	0	256.66	0.00	0.00	0.00
7.00	0.00	0	256.66	0.00	0.00	0.00
8.00	0.00	0	256.66	0.00	0.00	0.00
9.00	0.00	1	256.67	0.00	0.00	0.00
10.00	0.00	3	256.68	0.00	0.00	0.00
11.00	0.01	8	256.71	0.01	0.01	0.00
12.00	0.50	386	258.90	0.02	0.02	0.00
13.00	0.03	566	261.13	0.03	0.03	0.00
14.00	0.02	551	260.93	0.03	0.03	0.00
15.00	0.01	512	260.43	0.03	0.03	0.00
16.00	0.01	465	259.83	0.03	0.03	0.00
17.00	0.01	415	259.18	0.02	0.02	0.00
18.00	0.01	368	258.79	0.02	0.02	0.00
19.00	0.01	323	258.51	0.02	0.02	0.00
20.00	0.01	278	258.23	0.02	0.02	0.00
21.00	0.01	234	257.98	0.02	0.02	0.00
22.00	0.01	192	257.75	0.02	0.02	0.00
23.00	0.01	153	257.54	0.02	0.02	0.00
24.00	0.01	115	257.34	0.02	0.02	0.00
25.00	0.00	62	257.05	0.01	0.01	0.00
26.00	0.00	12	256.74	0.01	0.01	0.00
27.00	0.00	0	256.66	0.00	0.00	0.00
28.00	0.00	0	256.66	0.00	0.00	0.00
29.00	0.00	0	256.66	0.00	0.00	0.00
30.00	0.00	0	256.66	0.00	0.00	0.00
31.00	0.00	0	256.66	0.00	0.00	0.00
32.00	0.00	0	256.66	0.00	0.00	0.00
33.00	0.00	0	256.66	0.00	0.00	0.00
34.00	0.00	0	256.66	0.00	0.00	0.00
35.00	0.00	0	256.66	0.00	0.00	0.00
36.00	0.00	0	256.66	0.00	0.00	0.00
37.00	0.00	0	256.66	0.00	0.00	0.00
38.00	0.00	0	256.66	0.00	0.00	0.00
39.00	0.00	0	256.66	0.00	0.00	0.00
40.00	0.00	0	256.66	0.00	0.00	0.00

10-year Hydrograph Table

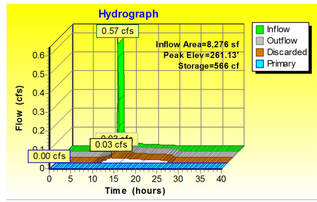
Hydrograph for Pond 6P: BIORETENTION "F"

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Outflow (cfs)	Discarded (cfs)	Primary (cfs)
0.00	0.00	0	256.66	0.00	0.00	0.00
1.00	0.00	0	256.66	0.00	0.00	0.00
2.00	0.00	0	256.66	0.00	0.00	0.00
3.00	0.00	0	256.66	0.00	0.00	0.00
4.00	0.00	0	256.66	0.00	0.00	0.00
5.00	0.00	0	256.66	0.00	0.00	0.00
6.00	0.00	1	256.66	0.00	0.00	0.00
7.00	0.00	2	256.67	0.00	0.00	0.00
8.00	0.01	4	256.68	0.00	0.00	0.00
9.00	0.01	7	256.70	0.01	0.01	0.00
10.00	0.02	12	256.73	0.01	0.01	0.00
11.00	0.04	53	256.99	0.01	0.01	0.00
12.00	1.00	907	262.66	0.49	0.04	0.46
13.00	0.06	837	262.52	0.06	0.03	0.03
14.00	0.03	830	262.50	0.04	0.03	0.00
15.00	0.03	816	262.47	0.03	0.03	0.00
16.00	0.02	781	262.39	0.03	0.03	0.00
17.00	0.02	733	262.27	0.03	0.03	0.00
18.00	0.02	682	262.13	0.03	0.03	0.00
19.00	0.01	627	261.91	0.03	0.03	0.00
20.00	0.01	570	261.18	0.03	0.03	0.00
21.00	0.01	513	260.45	0.03	0.03	0.00
22.00	0.01	460	259.76	0.03	0.03	0.00
23.00	0.01	410	259.11	0.02	0.02	0.00
24.00	0.01	367	258.78	0.02	0.02	0.00
25.00	0.00	295	258.34	0.02	0.02	0.00
26.00	0.00	227	257.94	0.02	0.02	0.00
27.00	0.00	164	257.60	0.02	0.02	0.00
28.00	0.00	106	257.29	0.02	0.02	0.00
29.00	0.00	52	256.98	0.01	0.01	0.00
30.00	0.00	5	256.69	0.01	0.01	0.00
31.00	0.00	0	256.66	0.00	0.00	0.00
32.00	0.00	0	256.66	0.00	0.00	0.00
33.00	0.00	0	256.66	0.00	0.00	0.00
34.00	0.00	0	256.66	0.00	0.00	0.00
35.00	0.00	0	256.66	0.00	0.00	0.00
36.00	0.00	0	256.66	0.00	0.00	0.00
37.00	0.00	0	256.66	0.00	0.00	0.00
38.00	0.00	0	256.66	0.00	0.00	0.00
39.00	0.00	0	256.66	0.00	0.00	0.00
40.00	0.00	0	256.66	0.00	0.00	0.00

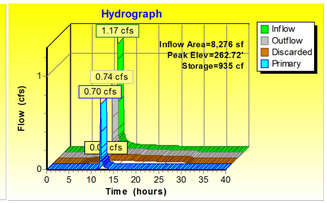
1-year Hydrograph



2-year Hydrograph



10-year Hydrograph



THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-12-17
08-01-17

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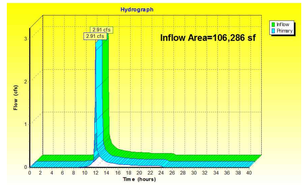
CITY OF ALEXANDRIA, VIRGINIA
SCALE: N/A C.I.= N/A DATE: AUGUST, 2017

SHEET 21F

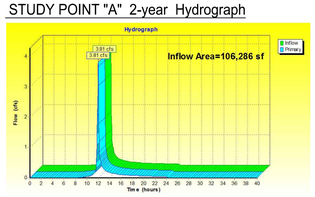
FILE No. 12811

Urban, Ltd. — J:\JOBS\Seminary Road\Preliminary Site Plan\12811-21-SWM POST.dwg [03-SITE PLAN (B)] August 01, 2017 - 10:56am intern002

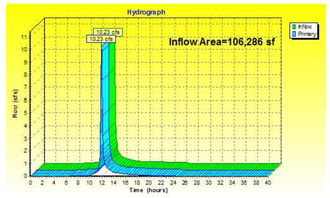
STUDY POINT "A" 1-year Hydrograph



STUDY POINT "A" 2-year Hydrograph



STUDY POINT "A" 10-year Hydrograph



1-year		Primary Outflow			
Areas	Inflow(cfs.)	Time of Peak Flow	Peak Flow (cfs.)	Time of Study Point A Peak Flow	Peak Flow at Time of Study Point A Peak Flow (cfs.)
Bioretention "A"	0.68	12.48 hrs.	0.06	11.97 hrs.	0
Bioretention "B"	1.09	12.01 hrs.	0.89	11.97 hrs.	0.8639
Bioretention "C"	0.35	0 hrs.	0	11.97 hrs.	0
Bioretention "D"	0.48	0 hrs.	0	11.97 hrs.	0
Bioretention "E"	0.48	0 hrs.	0	11.97 hrs.	0
Bioretention "F"	0.41	0 hrs.	0	11.97 hrs.	0
Onsite Undetained	2.09	11.96 hrs.	2.09	11.97 hrs.	1.786

2-year		Primary Outflow			
Areas	Inflow(cfs.)	Time of Peak Flow	Peak Flow (cfs.)	Time of Study Point A Peak Flow	Peak Flow at Time of Study Point A Peak Flow (cfs.)
Bioretention "A"	0.93	12.05 hrs.	0.66	11.97 hrs.	0.1358
Bioretention "B"	1.45	12.01 hrs.	1.12	11.97 hrs.	1.0984
Bioretention "C"	0.48	12.35 hrs.	0.05	11.97 hrs.	0.0097
Bioretention "D"	0.66	0 hrs.	0	11.97 hrs.	0
Bioretention "E"	0.66	0 hrs.	0	11.97 hrs.	0
Bioretention "F"	0.57	0 hrs.	0	11.97 hrs.	0
Onsite Undetained	2.57	11.96 hrs.	2.57	11.97 hrs.	2.3298

10-year		Primary Outflow			
Areas	Inflow(cfs.)	Time of Peak Flow	Peak Flow (cfs.)	Time of Study Point A Peak Flow	Peak Flow at Time of Study Point A Peak Flow (cfs.)
Bioretention "A"	1.89	11.97 hrs.	1.83	11.97 hrs.	1.6781
Bioretention "B"	2.8	12.01 hrs.	2.07	11.97 hrs.	2.0009
Bioretention "C"	0.99	11.98 hrs.	0.92	11.97 hrs.	0.873
Bioretention "D"	1.36	12.12 hrs.	0.26	11.97 hrs.	0
Bioretention "E"	1.36	12.07 hrs.	0.58	11.97 hrs.	0.0194
Bioretention "F"	1.17	12.05 hrs.	0.7	11.97 hrs.	0.4462
Onsite Undetained	5.49	11.95 hrs.	5.49	11.97 hrs.	4.5641

STUDY POINT "A" STORMWATER MANAGEMENT & OUTFALL ANALYSIS

THE EXISTING TOPOGRAPHY OF THE SITE IS SUCH THAT THE SHED DRAINS FROM THE NORTH TO THE SOUTH. THE ENTIRE SITE WAS ANALYZED AS ONE DRAINAGE SHED IN ORDER TO CALCULATE THE POST DEVELOPMENT RUNOFF TO ENSURE OUTFALL ADEQUACY.

SIX BIORETENTION BASINS HAVE BEEN PROPOSED WITH THIS SITE TO CAPTURE RUNOFF FROM THE FRONT YARDS AND THE NEW PUBLIC ROAD. GEOTECHNICAL TESTS HAVE BEEN PERFORMED AT THE PROPOSED BMP LOCATIONS TO DETERMINE THE INFILTRATION RATES.

THE PLAN DEMONSTRATES THAT THE SITE HAS BEEN DEVELOPED TO DECREASE THE POST DEVELOPMENT PEAK RUNOFF RATE FROM THE PRE-DEVELOPMENT PEAK RUNOFF RATE FOR A TWO-YEAR AND TEN YEAR CONSIDERED INDIVIDUALLY.

FOR THE PROPOSED OUTFALL ANALYSIS FOR THE SITE IT HAS BEEN ASSUMED THAT THE PROPOSED DEVELOPMENT SHALL DRAIN TO A NATURAL CHANNEL BEFORE MEETING THE END OF ANALYSIS AT STRAWBERRY RUN. PER THE CURRENT VIRGINIA STORMWATER MANAGEMENT HANDBOOK:

$$Q_{DEVELOPED} \leq I.F * (Q_{PRE\text{-}DEVELOPED} * RV_{PRE\text{-}DEVELOPED}) / RV_{DEVELOPED}$$

AS SHOWN IN THE CALCULATIONS ON THE SHEET, THE ALLOWABLE RUNOFF WILL BE 3.25 CFS, 6.04 CFS, AND 13.12 CFS FOR THE 1, 2, AND 10-YEAR RUNOFFS PROSPECTIVELY WHILE THE PROPOSED RUNOFF IS CALCULATED AS BEING 2.91 CFS, 3.81 CFS, AND 10.23 CFS, WELL BELOW THE REQUIRED RUNOFF.

PER CODE 4VAC50-60-66 IN THE VIRGINIA STORMWATER MANAGEMENT HANDBOOK AND ARTICLE XIII OF THE CITY OF ALEXANDRIA ZONING ORDINANCE, WHEN DISCHARGING INTO A MANMADE CHANNEL, CHANNEL PROTECTION SHALL BE ANALYZED TO CONVEY THE POST DEVELOPMENT PEAK DISCHARGE FROM THE 2-YEAR, 24-HOUR STORM EVENT WITHOUT CAUSING EROSION OF THE SYSTEM. ADDITIONALLY, AREAS WHICH CURRENTLY DO NOT EXPERIENCE LOCALIZED FLOODING, THE 10-YEAR, 24-HOUR STORM SHALL CONFINE THE POST DEVELOPMENT FLOW WITH THE SYSTEM.

DUE TO THE RUNOFF REDUCTION AND STORAGE OF THE BIORETENTION BASINS, BOTH REQUIREMENTS ARE MET.

THE PLAN DEMONSTRATES THE AVAILABILITY OF A STORM SEWER ADEQUATE OUTFALL IN COMPLIANCE WITH THE REQUIREMENTS OF VIRGINIA DEPARTMENT OF CONSERVATION AND RECREATION (DCR), EROSION AND SEDIMENT CONTROL (ESC) REGULATIONS (4VAC50-30-40.19) MINIMUM STANDARD 19 (MS-19), ARTICLE XI SECTION 11-410 (N) OF THE ALEXANDRIA ZONING ORDINANCE (AZO), AND THE APPROVED CONDITION OF DEVELOPMENT.

Clayton Tock — 08-01-17

URBAN LTD. — DATE

CLAYTON C. TOCK, P.E., PRINCIPLE

STORMWATER BMP AND DETENTION FACILITIES MAINTENANCE AGREEMENT

THE APPLICANT SHALL SUBMIT TO THE CITY OF ALEXANDRIA A STORMWATER BMP AND DETENTION FACILITIES MAINTENANCE AGREEMENT WITH FINAL #2 SUBMISSION. THE AGREEMENT SHALL INCLUDE MAINTENANCE OF LEVEL 2 BIORETENTIONS, ALL PROPOSED WITH THE SITE PLAN. THE MAINTENANCE AGREEMENT SHALL BE REGISTERED WITH ALEXANDRIA LAND RECORDS.

STUDY POINT A

FLOW SUMMARY		PRE-DEVELOPMENT			POST-DEVELOPMENT SUMMARY			Q ALLOW*
NODE ID	RETURN EVENT	Q PEAK hrs	Q PEAK cfs	Rv cu.ft.	Q PEAK hrs	Q PEAK cfs	Rv cu.ft.	PRE-DEV CFS
ONSITE UNDETAINED	1	11.96	3.95	7,992	11.96	2.09	4,206	
	2	11.96	5.44	10,966	11.96	2.75	5,557	
	10	11.96	11.98	24,403	11.95	5.49	11,409	
ONSITE DETAINED	1				11.96	3.01	6,056	
	2				11.96	4.14	8,397	
	10				11.95	8.41	17,618	
OFFSITE DETAINED	1	11.96	0.48	1014	11.96	0.48	1,014	
	2	11.95	0.61	1295	11.95	0.61	1,295	
	10	11.95	1.15	2486	11.95	1.15	2,486	
STUDY POINT A	1	11.96	4.43	9,006	11.96	2.91	4,855	3.25
STUDY POINT A	2	11.96	6.05	12,261	12.00	3.81	7,310	6.04
STUDY POINT A	10	11.96	13.13	26,889	11.97	10.23	20,179	13.12

= 2.77 + OFFSITE DETAINED (0.48)

ALL PROPOSED SWM FACILITIES SHALL BE PRIVATELY MAINTAINED.

WATERSHED: STRAWBERRY RUN

ONSITE UNDETAINED DRAINAGE SHED COMPOSITE CALCULATION SUMMARY

Curve Number Calculation

Area (ac)	CN	Adj	Description
0.060	98		Unconnected pavement, HSG D
0.820	84		50-75% Grass cover, Fair, HSG D
0.030	77		Woods, Good, HSG D
0.910	85	84	Weighted Average, UI Adjusted

Time of Concentration Calculation

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

*A TIME OF CONCENTRATION OF 5 MINUTES HAS BEEN ASSUMED AS A CONSERVATIVE ESTIMATE

ALL CALCULATIONS SHOWN AS TAKEN FROM HYDROCAD VERSION 10.00

1 Year Storm Calculation

Inflow Area = 41,382 sf, 10.53% Impervious, Inflow Depth = 1.27" for 1-year event
Inflow = 2.09 cfs @ 11.96 hrs, Volume= 4,206 cf
Primary = 2.09 cfs @ 11.96 hrs, Volume= 4,206 cf, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs Type II 24-hr 1-year Rainfall=2.70"

2 Year Storm Calculation

Inflow Area = 41,382 sf, 10.53% Impervious, Inflow Depth = 1.68" for 2-year event
Inflow = 2.75 cfs @ 11.96 hrs, Volume= 5,557 cf
Primary = 2.75 cfs @ 11.96 hrs, Volume= 5,557 cf, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs Type II 24-hr 2-year Rainfall=3.20"

10 Year Storm Calculation

Inflow Area = 41,382 sf, 10.53% Impervious, Inflow Depth = 3.45" for 10-year event
Inflow = 5.49 cfs @ 11.95 hrs, Volume= 11,409 cf
Primary = 5.49 cfs @ 11.95 hrs, Volume= 11,409 cf, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-40.00 hrs, dt= 0.05 hrs Type II 24-hr 10-year Rainfall=5.20"

STUDY POINT A ENERGY BALANCE COMPUTATIONS

*THE POST DEVELOPMENT RUNOFF FOR THE 1 YEAR FROM THE ON-SITE AREA SHALL BE LESS THAN THE PRE-DEVELOPED PER THE STATE ENERGY BALANCE EQUATION STATED BELOW:

Qdev ≤ I.F. * (Qpre * RVpre)/RVdev
WHERE I.F.(IMPROVEMENT FACTOR) IS 0.9 FOR SITES GREATER THAN 1.0 ACRE

THE COMPUTATIONS FOR THE 1 YEAR ALLOWABLE RATE IS PROVIDED AT RIGHT:

1 YEAR SWM RUNOFF COMPUTATIONS
Rv pre = 7,992 CU.FT.
Q pre = 3.95 CFS
Rv dev = 10,262 CU.FT.

Qdev on-site ≤ I.F. * (Qpre * RVpre)/RVdev
Qdev on-site ≤ 0.9 * (3.95* 7,992)/10,262
Qdev on-site ≤ 2.77 CFS

SEE SHEETS 20-21 FOR SWM POST-DEVELOPMENTS COMPUTATIONS TO SHOW FLOOD AND CHANNEL PROTECTION REQUIREMENTS HAVE BEEN MET.

THE DESIGN SHOWN IS PRELIMINARY AND IS SUBJECT TO CHANGE WITH FINAL ENGINEERING DURING THE FINAL SITE PROCESS.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR — DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
DIRECTOR — DATE
CHAIRMAN, PLANNING COMMISSION — DATE
DATE RECORDED _____
INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

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COMMONWEALTH OF VIRGINIA — CLAYTON C. TOCK — Lic. No. 036790 — PROFESSIONAL ENGINEER — 08-01-17

SWM NARRATIVE

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

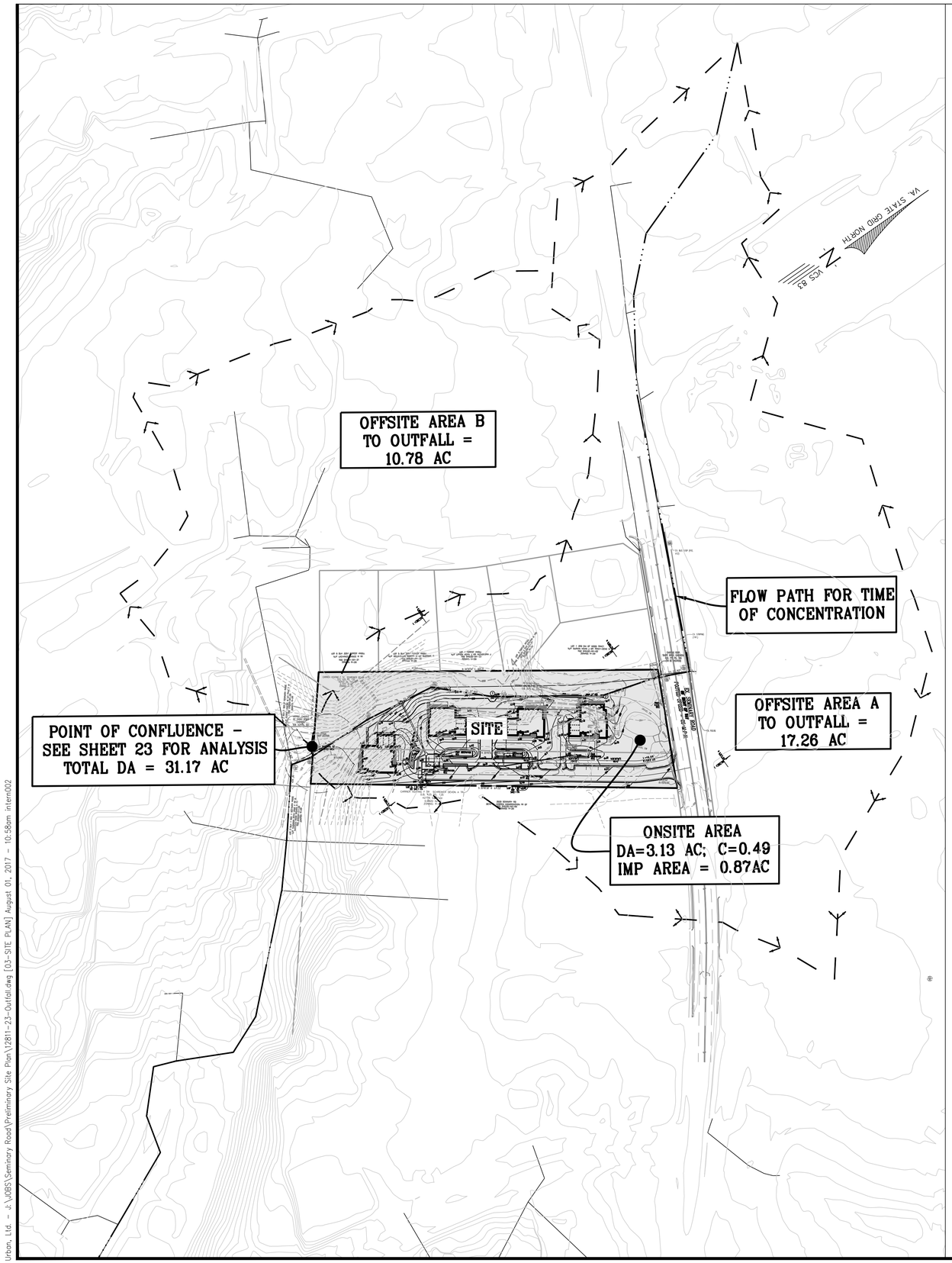
CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017
C.I.= N/A
SCALE: N/A

SHEET 22

FILE No. 12811

Urban, Ltd. - z:\JOBS\Seminary Road\Preliminary Site Plan\12811-21-SWM.dwg [03-SITE PLAN] August 01, 2017 - 1:50pm rfulling



LEGEND

DRAINAGE DIVIDE

WATERSHED: STRAWBERRY RUN

OUTFALL NARRATIVE:

THE SU□JECT SITE IS LOCATED WITHIN THE STRAW□ERR□ RUN WATERSHED AND HAS A TOTAL SITE AREA O□ 3.□3 AC. THE SITE IS NOT WITHIN AN□ R□A'S AND DOES CONTAIN WETLANDS. THIS □LAN DEMONSTRATES THE DRAINA□E DI□IDE AREAS□□ RADIN□ IN□ORMATION□AND THE STRUCTURES WHERE EACH SU□AREA DRAINS.

THE □RO□OSED CONDITION WILL IM□RO□E THE E□ISTIN□ CONDITION DUE TO THE DECREASE IN □LOW □ROM THE SU□JECT SITE. AS SHOWN ON SHEET □□ THE □RO□OSED □LAN WILL RESULT IN A □.□□C□S REDUCTION □OR THE □ □EAR E□ENT□IN A □.□4 C□S REDUCTION □OR THE □ □EAR E□ENT AND A □.90 C□S REDUCTION □OR THE □0 □EAR E□ENT □ELOW THE E□ISTIN□ CONDITIONS.

ADEQUATE OUTFALL ANALYSIS:

THE □LAN DEMONSTRATES THE A□AILA□ILIT□ O□ A STORM SEWER ADE□UATE OUT□ALL IN COM□LIANCE WITH THE RE□UIREMENTS O□ □IR□INIA DE□ARTMENT O□ CONSER□ATION AND RECREATION □DCR□EROSION AND SEDIMENT CONTROL □ESC□RE□ULATIONS □4□AC□0□30□40.□9□MINIMUM STANDARD □9 □MS□9□ARTICLE □I SECTION □□4□0□N□O□ THE ALE□ANDRIA □ONIN□ ORDINACE□A□O□AND THE A□□RO□ED CONDITION O□ DE□ELO□MENT.

NOTES:
1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR _____ DATE _____

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____

DIRECTOR _____ DATE _____

CHAIRMAN, PLANNING COMMISSION _____ DATE _____

DATE RECORDED _____

INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO. _____

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- - - -

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CLAYTON C. TOCK
Lic. No. 0507B0
PROFESSIONAL ENGINEER
06-01-17

OUTFALL ANALYSIS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=100' C.I.= 2' DATE: AUGUST, 2017

SHEET
23

FILE No.
12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-23-Outfall.dwg [03-SITE PLAN] August 01, 2017 - 10:58am intern002

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
EVANS CHARLES D AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

N 6,885,000
E 17,882,225

N 6,885,200
E 17,882,500

VA. STATE GRID NORTH

EX. BUS STOP (RTE. AT2)

EX. C.L.

11' 11' 11' 18'

60'

EX. STRIPING (TYP.)

EX. SEMINARY ROAD
60' RIGHT OF WAY
POSTED SPEED = 25 M.P.H.

N34°34'54"E 132.67'

N34°34'54"E 182.03'

(TOTAL)

N34°34'54"E 187.97'

N34°34'54"E 118.45'

(TOTAL) 32.26' N59°53'46"W

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
93422 Sq. Feet
2.1447 Acres
ZONING: R-20

LOT 4
36,059 SF

LOT 3
22,558 S.F.

LOT 2
22,840 S.F.

LOT 1
29,797 S.F.

PROP. RET. WALL (MODULAR SEE SHEET 03)
(MAX. HGT. = 13.25')

PROP. RET. WALL (MODULAR SEE SHEET 03)
(MAX. HGT. = 6.70')

PROP. RET. WALL (MODULAR SEE SHEET 03)
(MAX. HGT. = 8.99')

PROP. RET. WALL (MODULAR SEE SHEET 03)
(MAX. HGT. = 3.00')

DECK/PATIO (BF)

BALCONY

BALCONY (FF)
DECK/PATIO (BF)

TW=257.55
BW=250.85

PROP. HOUSE
5,944 G.S.F.
MAX BLDG. HEIGHT: 35'
FF=260.75
BF=251.75
GF=258.75

TW=260.10
BW=253.40

TW=262.39
BW=253.40

PROP. HOUSE
5,944 G.S.F.
MAX BLDG. HEIGHT: 35'
FF=263.30
BF=254.30
GF=261.30

TW=262.32
BW=256.00

PROP. HOUSE
6,508 G.S.F.
MAX BLDG. HEIGHT: 35'
FF=266.60
BF=257.60
GF=263.60

TW=252.36
BW=240.00

TW=251.00
BW=251.00

TW=252.25
BW=239.00

PROP. HVAC (TYP.)

PROP. HOUSE
6,508 G.S.F.
MAX BLDG. HEIGHT: 35'
FF=255.50
BF=246.50
GF=253.50

TW=246.00
BW=246.00
TW=249.00
BW=246.00

PROP. R.O.W.

PROP. R.O.W. DEDI

L=543.63' R=668.24'

N34°34'54"E 172.79'

APPROX. SEEP LOCATION

EX. POTENTIAL S VEGETATED AREA

EX. WETLANDS

N35°41'09"E 40.00'

N35°41'04"E 40.00'

N35°39'58"E 59.23'

L = 46.69'

L = 29.34'

PROP. VISION CLEARANCE TRIANGLE

PROP. CG-12A

PROP. 4' SW

PROP. STOP SIGN

54 ADT

PROP. LIGHT

PROP. LIGHT

PROPOSED
KARIG PLACE
(PUBLIC ROAD-50' ROW)

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres
ZONING: R-20

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

N 6,884,750
E 17,882,300

VA. STATE GRID NORTH

N 6,885,301
E 17,882,769

LOT 3 BLK 1 SEC 1 SEMINARY RIDGE
N/F GORECT JEFFREY W OR PAUL F III
TM# 040.04-04-28
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TONARY PATRICK OR LINDA H
TM# 040.04-04-27

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED ANNE F TR &
THOMSON REED SCOTT G TR
TM# 040.04-04-26
ZONING: R-20

LEGEND

PEDESTRIAN PATH

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 in. = 30 ft.

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO.

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

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08-01-17

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CLAYTON C. STOCK
Lic. No. 036786
ENGINEER
PROFESSIONAL
08/01/17

PEDESTRIAN CIRCULATION

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

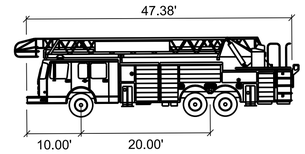
DATE: AUGUST, 2017

SCALE: 1"=30' C.I.= N/A

SHEET 24

FILE No. 12811

Urban, Ltd. – J:\JOBS\Seminary Road\Preliminary Site Plan\12811-14-PED CIRC.dwg [03-SITE PLAN] August 01, 2017 - 10:58am intern002



Fire Truck 203 feet

Width	: 8.00
Track	: 8.00
Lock to Lock Time	: 6.0
Steering Angle	: 24.8

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-27-17
08-01-17

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CLAYTON C. TOCK
Lic. No. 056786
ENGINEER
PROFESSIONAL
06/01/17

AUTOTURN EXHIBIT

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017
SCALE: 1"=30' C.I.= N/A

SHEET 25

FILE No. 12811

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
EVANS CHARLES D AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

N 6,885,000
E 17,882,225

N 6,885,250
E 17,882,500

VA STATE GRID NORTH

N34°34'54"E 132.67' (TOTAL)
N34°34'54"E 182.03'
N34°34'54"E 187.97' (TOTAL)
N34°34'54"E 118.45'

N59°53'46"W 32.25' (TOTAL)

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
93422 Sq. Feet
2.1447 Acres
ZONING: R-20

LOT 4
36,059 SF

LOT 3
22,558 S.F.

LOT 2
22,840 S.F.

LOT 1
29,797 S.F.

PROP. HOUSE
6,508 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=255.50
BF=246.50
GF=253.50

PROP. HOUSE
5,944 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=260.75
BF=251.75
GF=258.75

PROP. HOUSE
5,944 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=263.30
BF=254.30
GF=261.30

PROP. HOUSE
6,508 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=266.60
BF=257.60
GF=263.60

DECK/PATIO (BF)
BALCONY
BALCONY (FF)
DECK/PATIO (BF)
BALCONY (FF)
DECK/PATIO (BF)
PROP. WHF. (1W)
PROP. R.O.W.

N 6,884,750
E 17,882,300

N 6,885,301
E 17,882,769

N 6,884,753 E 656.44'

EX. C.L.
11' 11' 11' 11'
60'
EX. STRIPING (TYP.)

EX. SEMINARY ROAD
60' RIGHT OF WAY
POSTED SPEED 25 M.P.H.

L=5.429 R=832.534
L=4.805 R=669.244
L=29.14' R=19.00'
PROP. VISION CLEARANCE TRIANGLES
54' ADT
PROP. STOP SIGN

KARIG PLACE
(PUBLIC ROAD-50' ROW)

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

LOT 3 BLK 1 SEC 1 SEMINARY RIDGE
N/F GORECT, KRISTEN W OR PAUL F III
TM# 040.04-04-28
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOMASKO, PATRICK OR LINDA H
TM# 040.04-04-27

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON, REED ANNE F TR &
THOMSON, REED STEVEN G TR
TM# 040.04-04-26
ZONING: R-20

S 77°25'55" W 4,597.25'

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. _____

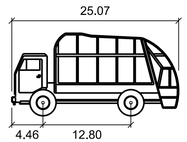
DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED _____

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-12 AUTOTURN EXHIBIT.dwg, [AUTOTURN EXHIBIT] August 01, 2017 - 10:59pm intern002



2MU	feet
Width	: 8.20
Track	: 8.20
Lock to Lock Time	: 6.0
Steering Angle	: 40.8

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-21-17
08-01-17

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Lic. No. 056788
ENGINEER
PROFESSIONAL
06/01/17

AUTOTURN EXHIBIT

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017

SCALE: 1"=30' C.I.= N/A

SHEET 26

FILE No. 12811

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
EVANS CHARLES D AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

N 6,885,000
E 17,882,250

N 6,885,250
E 17,882,500

VA STATE GRID NORTH

EX. C.L.
11' 11' 11' 11'
60'
EX. STRIPING (TYP.)

EX. SEMINARY ROAD
60' RIGHT OF WAY
POSTED SPEED 25 M.P.H.

N34°34'54"E 132.67'
N34°34'54"E 182.03'
(TOTAL)
N34°34'54"E 187.97'
N34°34'54"E 118.45'
32.26'
N50°53'46"W
(TOTAL)
L=5.429 R=832.534

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
93422 Sq. Feet
2.1447 Acres
ZONING: R-20

LOT 4
36,059 SF

LOT 3
22,558 S.F.

LOT 2
22,840 S.F.

LOT 1
29,797 S.F.

DECK/PATIO (BF)
BALCONY
PROP. HOUSE
5,944 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=260.75
BF=251.75
GF=258.75

DECK/PATIO (BF)
BALCONY (FF)
PROP. HOUSE
5,944 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=263.30
BF=254.30
GF=261.30

BALCONY (FF)
DECK/PATIO (BF)
PROP. HOUSE
6,508 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=266.60
BF=257.60
GF=263.60

PROP. HOUSE
6,508 G.S.F.
MAX BLDG.
HEIGHT: 35'
FF=255.50
BF=246.50
GF=253.50

PROP. WWF (DUP)
PROP. WWF (TYP)

PROP. R.O.W.

N 87°46'53" E 656.44'

PROP. VISION CLEARANCE TRIANGLE
L=29.14'
R=19.00'
N64°13'07"W 26.23'

54 ADT

PROP. STOP SIGN

N 6,885,301
E 17,882,769

KARIG PLACE
(PUBLIC ROAD-50' ROW)

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres
ZONING: R-20

N 6,884,750
E 17,882,500

VA STATE GRID NORTH

LOT 3 BLK 1 SEC 1 SEMINARY RIDGE
N/F GORET THEODORE W OR PAUL F III
TM# 040.04-04-28
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TONARY PATRICK OR LINDA H
TM# 040.04-04-27

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED ANNE F TR &
THOMSON REED SCOTT G TR
TM# 040.04-04-26
ZONING: R-20

L=77.79'
S 49°25'05" E

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO. _____

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED _____

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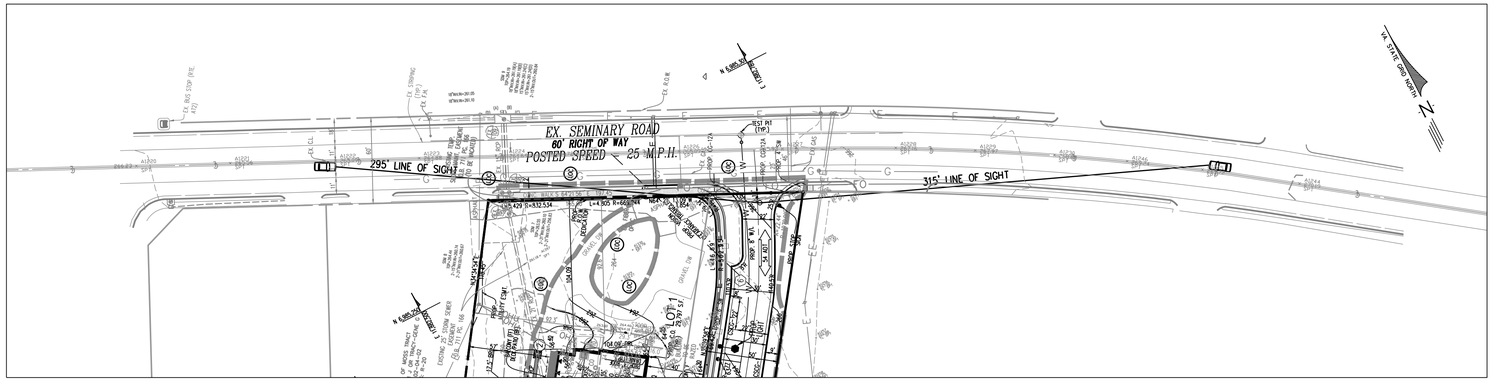
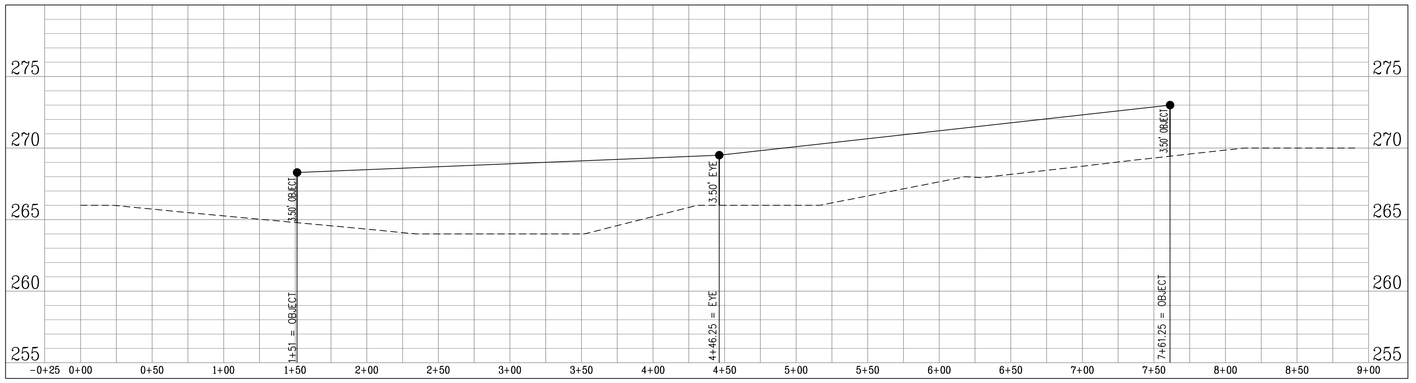
Urban, Ltd. - J:\JOBS\Seminary Road\Preliminery Site Plan\12811-12 AUTOTURN EXHIBIT(2).dwg [AUTOTURN EXHIBIT] August 01, 2017 - 10:59am intern002



EX. SEMINARY RD.

POSTED SPEED = 25 MPH



APPROVED

SPECIAL USE PERMIT NO. 2016-0025

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DIRECTOR DATE

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SITE PLAN NO. _____

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED _____

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

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06-09-17
07-21-17
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PROFESSIONAL ENGINEER
08-01-17

SIGHT DISTANCE

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

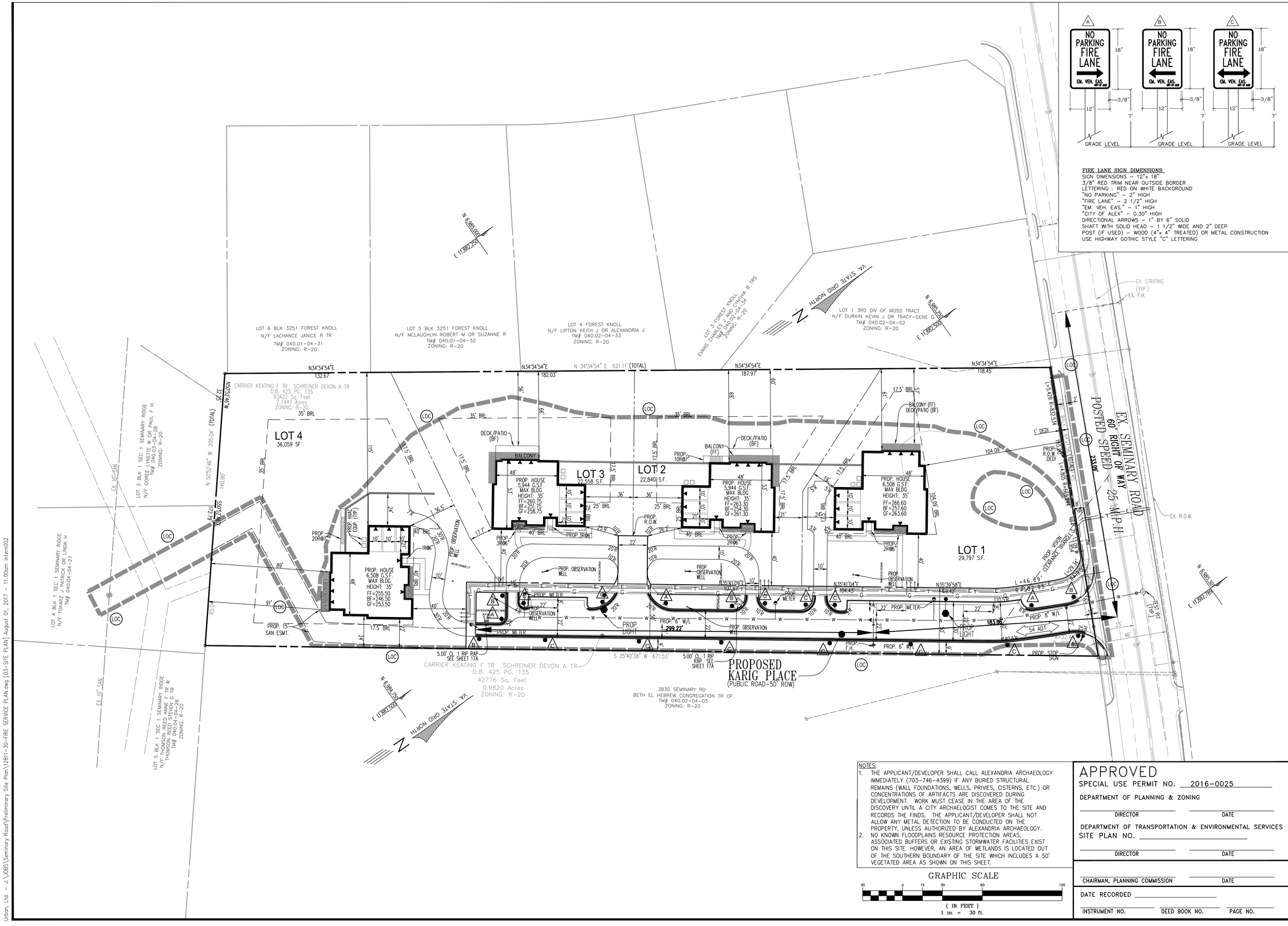
CITY OF ALEXANDRIA, VIRGINIA

SCALE: H:1"=50' V:1"=5' C.I.= 2' DATE: AUGUST, 2017

SHEET
27

FILE No.
12811

Urban, Ltd. - z:\JOBS\Seminary Road\Preliminary Site Plan\12811-31-SIGHT DISTANCE.dwg [Layout1] August 01, 2017 - 10:59am intern002



FIRE LANE SIGN DIMENSIONS:
SIGN DIMENSIONS – 12"x 18"
3/8" RED TRIM NEAR OUTSIDE BORDER
LETTERING : RED ON WHITE BACKGROUND
"NO PARKING" – 2" HIGH
"FIRE LANE" – 2 1/2" HIGH
"EM. VEH. EAS." – 1" HIGH
"CITY OF ALEX" – 0.30" HIGH
DIRECTIONAL ARROWS – 1" BY 6" SOLID
SHAFT WITH SOLID HEAD – 1 1/2" WIDE AND 2" DEEP
POST (IF USED) – WOOD (4"x 4" TREATED) OR METAL CONSTRUCTION
USE HIGHWAY GOTHIC STYLE "C" LETTERING

NOTES:
1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE

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SITE PLAN NO. _____
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COMMONWEALTH OF VIRGINIA
CLAYTON C. TOCK
Lic. No. 036784
PROFESSIONAL ENGINEER
08/01/17

FIRE SERVICE PLAN
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
DATE: AUGUST, 2017
SCALE: 1"=30' C.I.= N/A

SHEET 28

FILE No. 12811

Urban, Ltd. – J:\JOBS\Seminary Road\Preliminery Site Plan\12811-30-FIRE SERVICE PLAN.dwg [03-SITE PLAN] August 01, 2017 - 11:00am intern002

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
EVANS CHARLES L AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOKARZ J PATRICK OR LINDA H
TM# 040.04-04-27

LOT 3 BLK 1 SEC 1 SEMINARY RIDGE
N/F GORECKI LYNETTE W OR PAUL F III
TM# 040.04-04-28
ZONING: R-20

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED ANNE F TR &
THOMSON REED STEVEN G TR
TM# 040.04-04-26
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
93422 Sq. Feet
2.1447 Acres
ZONING: R-20

LOT 4
36,059 SF

LOT 3
22,840 S.F.

LOT 2
22,840 S.F.

LOT 1
29,797 S.F.

EX. SEMINARY ROAD
60' RIGHT OF WAY
POSTED SPEED < 25 M.P.H.

EX. R.O.W.

EX. STRIPING (TYP.)

EX. C.L.

PROPOSED
KARIG PLACE
(PUBLIC ROAD-50' ROW)

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres
ZONING: R-20

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

EX. DI-1 TO BE RAISED TO PROP. GRADE

PROP. RET. WALL (MODULAR SEE SHEET 03) (MAX. HGT. = 6.70')

PROP. RET. WALL (MODULAR SEE SHEET 03) (MAX. HGT. = 8.99')

PROP. RET. WALL (MODULAR SEE SHEET 03) (MAX. HGT. = 13.25')

PROP. RET. WALL (MODULAR SEE SHEET 03) (MAX. HGT. = 11.00')

PROP. HOUSE 5,944 G.S.F. MAX BLDG HEIGHT: 35'
TW=257.55 BW=250.85
FF=260.75 BF=251.75 GF=258.75

PROP. HOUSE 5,944 G.S.F. MAX BLDG HEIGHT: 35'
TW=260.10 BW=253.40
FF=263.30 BF=254.30 GF=261.30

PROP. HOUSE 6,508 G.S.F. MAX BLDG HEIGHT: 35'
TW=262.32 BW=256.00
FF=266.60 BF=257.60 GF=263.60

PROP. HOUSE 6,508 G.S.F. MAX BLDG HEIGHT: 35'
TW=252.36 BW=240.00
TW=252.25 BW=239.00
TW=251.00 BW=251.00
FF=255.50 BF=246.50 GF=253.50
TW=246.00 BW=246.00
TW=249.00 BW=246.00

PROP. 4" ROOF DRAIN (TYP.)

PROP. ROOF DRAIN (TYP)

PROP. OBSERVATION WELL

BIORETENTION "A"

BIORETENTION "B"

BIORETENTION "C"

BIORETENTION "D"

PROP. 6' SW

PROP. 4' SW

PROP. 15" RCP

PROP. 18" RCP

PROP. 8"x6" REDUCER

PROP. C.O. (TYP.)

PROP. CG-12A

PROP. UTILITY ESMT.

PROP. R.O.W. DEDI

PROP. VISION CLEARANCE TRIANGLE

BALCONY (FF) DECK/PATIO (BF)

DECK/PATIO (BF)

BALCONY (FF)

APPROX. SEEP LOCATION

EX. POTENTIAL RPA VEGETATED AREA

EX. WETLANDS

EX. 10" SAN.

5.00' CL 1 RIP RAP SEE SHEET 17A

N 6,885,000
E 17,882,250

N 6,885,250
E 17,882,500

N 6,884,750
E 17,882,500

VA. STATE GRID NORTH

N34°34'54"E 132.67

N34°34'54"E 182.03

N 34°34'54" E 621.11' (TOTAL)

N34°34'54"E 187.97'

N34°34'54"E 118.45

N 30°54'46" W 205.04' (TOTAL)

S 35°40'38" W 671.53'

N35°41'04"E 104.43'

N35°39'58"E 69.42'

L=529.82' R=610.53'

L=46.69' R=50.00'

L=29.34' R=19.00'

L=4.80' R=50.00'

L=22.44' R=1030.00'

LOT 1		
SPOT NO.	EX GRADING	PROP. GRADING
1	262.83	264.18
2	262.57	264.18
3	261.11	264.18
4	262.02	262.7
5	256	255.6
6	258	256.9
7	258	256.9
8	258	265.7
9	262	265.7
10	264	265.7
11	264	265.1
12	263.32	265.1
TOTAL=	3131.85	3151.94
AVERAGE=	260.99	262.66

□IRST □LOOR □ □□□.□0
□LOOR S□STEM □ □□
□ASEMENT CEILIN□ □ □□□.□0
□RO□OSED A□□ □ □□□.□□
□ASEMENT HEI□HT A□O□E A□□ □ □.94

LOT 2		
SPOT NO.	EX GRADING	PROP. GRADING
1	261.1	260.88
2	260.27	260.88
3	254.42	260.88
4	254.3	260.4
5	252.35	260.1
6	256.65	253.4
7	257.21	262.39
8	260.73	262.39
9	261.18	261.89
10	261.73	262.39
11	260.75	262.8
12	260.75	262.8
TOTAL=	3101.44	3131.2
AVERAGE=	258.45	260.93

□IRST □LOOR □ □□3.30
□LOOR S□STEM □ □□
□ASEMENT CEILIN□ □ □□□.30
□RO□OSED A□□ □ □□0.93
□ASEMENT HEI□HT A□O□E A□□ □ □.3□

LOT 3		
SPOT NO.	EX GRADING	PROP. GRADING
1	256.77	258.25
2	252.7	258.25
3	249.79	256
4	246.9	251.75
5	250	251.75
6	249.68	257.55
7	255.91	257.85
8	256.95	258.33
9	260.02	258.33
10	260.51	258.33
11	259.53	260.25
12	262.49	260.25
TOTAL=	3061.25	3086.89
AVERAGE=	255.10	257.24

□IRST □LOOR □ □□0.□□
□LOOR S□STEM □ □□
□ASEMENT CEILIN□ □ □□9.□□
□RO□OSED A□□ □ □□□.□4
□ASEMENT HEI□HT A□O□E A□□ □ □.□□

LOT 4		
SPOT NO.	EX GRADING	PROP. GRADING
1	250.74	249
2	246.02	246
3	241.01	240.42
4	246.04	254
5	241.56	253.08
6	244.94	253.08
7	247.01	253.08
8	252.45	254.5
9	258.14	254.5
10	259.23	254.6
11	258.56	254.6
12	255.26	252
TOTAL=	3000.96	3018.86
AVERAGE=	250.08	251.57

□IRST □LOOR □ □□□.□0
□LOOR S□STEM □ □□
□ASEMENT CEILIN□ □ □□4.□0
□RO□OSED A□□ □ □□□.□□
□ASEMENT HEI□HT A□O□E A□□ □ □.93

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
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CLAYTON C. TOCK
Lic. No. 038798
PROFESSIONAL ENGINEER
06/07/17

AVERAGE GRADE EXHIBIT

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=30' C.I.= 2' DATE: AUGUST, 2017

SHEET 29

FILE No. 12811

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOKARZ J PATRICK OR LINDA H
TM# 040.04-04-27

LOT 3 BLK 1 SEC 1 SEMINARY RIDGE
N/F GOREE LYNETTE W OR PAUL F III
TM# 040.03-04-28
ZONING: R-20

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.02-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.02-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LAPSLEY PAUL A JR TRUSTEE ET AL
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
EVANS CHARLES GRAD SYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

CARRER KEATING F TR, SCHREINER DEVON A TR
D.B. 425 PG. 135
93422 Sq. Feet
2.1447 Acres

TM# 040.02-04-03

CARRER KEATING F TR, SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres

3830 SEMINARY RD
SOUTH EL CAMINO DEVELOPMENT TR OF
TM# 040.02-04-05

TM# 040.02-04-04

SUBJECT PARCEL

LOT 1, 3RD DIV OF MOSS TRACT
N/F DUNN JOHN J OR TRACY-DUNN G
TM# 040.02-04-02

ST. STEPHENS RD

APPROXIMATE HEIGHT 25'

APPROXIMATE HEIGHT 22'

APPROXIMATE HEIGHT 17'

APPROXIMATE HEIGHT 22'

APPROXIMATE HEIGHT 24'

289.06'

88.09'

37.69'

64.74'

40.87'

FORT WILLIAMS PKWY

SEMINARY ROAD
60' RIGHT OF WAY

VA STATE GRID NORTH

NOTE:
AVERAGE SETBACK IS = 104.09'

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
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CHRISTOPHER C. TOCK
Lic. No. 036790
PROFESSIONAL ENGINEER
08-01-17

AVERAGE SETBACK EXHIBIT

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"=40' C.I.= N/A DATE: AUGUST, 2017

SHEET 30

FILE No. 12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-40-SETBACK EXHIBIT.dwg [EXHIBIT 1] August 01, 2017 - 11:00am intern002

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
CLARK CHARLES L AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F GORECKI JANICE W OR PAUL F JR
TM# 040.01-04-28
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOKASZ PATRICK OR LINDA H
TM# 040.04-04-27

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED ANNE F TR &
THOMSON REED ELIZABETH G TR
TM# 040.04-04-26
ZONING: R-20

CARRIER KEATING F TR SCHREINER DEVON A TR
D.B. 425 PG. 135
42776 Sq. Feet
0.9820 Acres
ZONING: R-20

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

EX. SEMINARY ROAD
POSTED SPEED 25 M.P.H.
60' RIGHT OF WAY

EX. BUS STOP (RTE. AT2)

EX. C.L.

EX. STRIPING (TYP.)

EX. F.H.

EX. R.O.W.

EX. 24" RCP

EX. 21" RCP

EX. 15" RCP

EX. 10" SAN

APPROX. EXISTING 15" STORM SEWER EASEMENT D.B.: 703 PG. 501

APPROX. STEP LOCATION

EX. POTENTIAL VEGETATED AREA

EX. WETLAND

EXISTING BUILDINGS TO BE RAZED

EXISTING BUILDINGS TO BE RAZED

EX. UNDERGROUND SEPTIC TANK

EXISTING BUILDING TO BE RAZED

EX. STORM EASEMENT TO BE VACATED D.B. 775 PG. 771

RET. WALL

POND

GRAVEL DW.

ASPHALT DW.

EX. GAS

EX. OHU

N 6,885,000
E 11,882,250

N 6,885,250
E 11,882,750

N 6,884,750
E 11,882,500

VA STATE GRID NORTH

N 35°45'53" E 656.44'

S 35°45'53" W 671.53'

A=22.44'

NOTE: THERE ARE NO STREET TREES OR STREET LIGHTS ALONG SEMINARY ROAD OPPOSITE THE SITE.

LEGEND

EXISTING TREE
DRIP LINE
505 TRUNK LOCATION
TREE NUMBER

THIS PLAN PREPARED AND APPROVED BY
DOUGLAS BOWE, ISA CERTIFIED
ARBORIST # MA-5848A

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

NOTES:
1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR _____ DATE _____

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____

DIRECTOR _____ DATE _____

CHAIRMAN, PLANNING COMMISSION _____ DATE _____

DATE RECORDED _____

INSTRUMENT NO. _____ DEED BOOK NO. _____ PAGE NO. _____

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-07-17
08-01-17
- - -
- - -

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COMMONWEALTH OF VIRGINIA
Kevin J. Tankersley
Lic. No. 983
08-01-17
LANDSCAPE ARCHITECT

TREE INVENTORY PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"= 30' C.I.= 2' DATE: AUGUST, 2017

SHEET 31

FILE No. 12811

Urban, Ltd. - z:\JOBS\Seminary Road\Preliminary Site Plan\TREE INVENTORY - EXISTING.dwg [TREE INVENTORY PLAN] August 01, 2017 - 11:01am intern002

TREE INVENTORY & CONDITION ANALYSIS

TREE #	BOTANICAL NAME	COMMON NAME	SIZE	CRZ	POOR CONDITION?	STATUS	COMMENTS	CONDITION RATING
			DBH (in)	R (ft.)		(Remove or Preserve)		%
501	*Quercus phellos*	Willow Oak	27"	27'		Remove		75.00
502	*Acer rubrum*	Red Maple	16"	16'	Yes	Remove	Multi-stem; poor structure	31.25
503	*Quercus phellos*	Willow Oak	6"	6'		Remove		90.63
504	*Ilex opaca*	American Holly	16"	16'	Yes	Remove	Multi-stem; leaning	34.38
505	*Juniperus virginiana*	Eastern Red Cedar	11"	11'	Yes	Remove	English Ivy	37.50
506	*Pinus virginiana*	Virginia Pine	13"	13'		Preserve		46.88
507	*Ulmus americana*	American Elm	9"	9'		Preserve	Virginia Creeper, Wild Grape	53.13
508	*Cary glabra*	Pignut Hickory	16"	16'		Remove	Canopy dieback; codominant leaders	62.50
509	*Quercus alba*	White Oak	27"	27'		Preserve	Cable brace to tree 517	75.00
510	*Ulmus americana*	American Elm	17"	17'		Preserve	Codominant Leaders; Virginia Creeper	56.25
511	*Quercus rubra*	Northern Red Oak	30"	30'		Preserve	Codominant; English Ivy	62.50
512	*Quercus rubra*	Northern Red Oak	7"	7'		Preserve	Poison Ivy, English Ivy	56.25
513	*Cary glabra*	Pignut Hickory	19"	19'		Preserve	Hollow trunk; English Ivy, Virginia Creeper	65.63
514	*Quercus prinus*	Chestnut Oak	11"	11'		Preserve	Canopy dieback; English Ivy	59.38
515	*Ulmus americana*	American Elm	16"	16'		Preserve	Bent leader; English Ivy	56.25
516	*Quercus alba*	White Oak	18"	18'		Remove		78.13
517	*Quercus alba*	White Oak	29"	29'		Remove	Large limb removed; codominant leaders	56.25
518	*Quercus alba*	White Oak	24"	24'		Preserve	Canopy headed back	59.38
519	*Quercus alba*	White Oak	25"	25'		Preserve	Cable brace to tree 509; codominant leaders	59.38
520	*Quercus alba*	White Oak	21"	21'		Remove	Thin canopy	56.25
521	*Cary glabra*	Pignut Hickory	12"	12'		Remove		62.50
522	*Quercus alba*	White Oak	23"	23'		Preserve	Minor dieback	75.00
523	*Quercus alba*	White Oak	21"	21'		Remove		78.13
524	*Quercus alba*	White Oak	6"	6'		Preserve		62.50
525	*Quercus alba*	White Oak	19"	19'		Remove	Thin crown	59.38
526	*Quercus alba*	White Oak	27"	27'		Remove		84.38
527	*Quercus alba*	White Oak	20"	20'		Remove	Curved leaders	71.88
528	*Quercus alba*	White Oak	26"	26'		Remove	Codominant leaders	62.50
529	*Quercus alba*	White Oak	32"	32'		Remove	Codominant leaders; slight lean	78.13
530	*Quercus alba*	White Oak	18"	18'		Remove	Minor dieback	62.50
531	*Quercus alba*	White Oak	17"	17'		Remove	Codominant leaders	62.50
532	*Quercus alba*	White Oak	26"	26'		Remove		78.13
533	*Quercus alba*	White Oak	25"	25'	Yes	Remove	Cable brace; codominant; hazard	31.25
534	*Quercus alba*	White Oak	8"	8'		Remove	On hillside	75.00
535	*Quercus prinus*	Chestnut Oak	21"	21'		Remove	On hillside	71.88
536	*Quercus alba*	White Oak	23"	23'		Remove	English Ivy, Poison Ivy	59.38
537	*Quercus prinus*	Chestnut Oak	17"	17'		Remove	Curved leader; English Ivy	53.13
538	*Quercus rubra*	Northern Red Oak	27"	27'		Remove	Moderate dieback	62.50
539	*Quercus phellos*	Willow Oak	29"	29'		Remove	English Ivy, Poison Ivy	62.50
540	*Pinus virginiana*	Virginia Pine	8"	8'	Yes	Remove	English Ivy	37.50
541	*Magnolia grandiflora*	Southern Magnolia	14"	14'		Remove	Sapsucker damage	59.38
542	*Quercus alba*	White Oak	18"	18'		Preserve	English Ivy, Poison Ivy	65.63
543	*Quercus phellos*	Willow Oak	19"	19'		Remove		68.75
544	*Quercus phellos*	Willow Oak	10"	10'		Remove		68.75
545	*Quercus phellos*	Willow Oak	19"	19'		Preserve		71.88
546	*Quercus phellos*	Willow Oak	17"	17'		Remove		75.00
547	*Quercus palustris*	Pin Oak	26"	26'		Remove		78.13
548	*Prunus serotina*	Black Cherry	23"	23'		Remove	Moderate dieback, On property line needs neighbor's permission to remove	59.38
549	*Quercus shumardii*	Shumard Oak	9"	9'		Remove	Codominant leaders; 1 dying	56.25
550	*Quercus shumardii*	Shumard Oak	12"	12'		Remove	Codominant leader; leaning	59.38
551	*Quercus shumardii*	Shumard Oak	18"	18'		Remove	Leaning; Poison Ivy	62.50
552	*Liquidambar styraciflua*	Sweetgum	7"	7'		Remove	Trumpet Vine, Virginia Creeper, Wild Grape	59.38
553	*Morus rubra*	Red Mulberry	18"	18'		Remove	Multi-stem; English Ivy, Poison Ivy	40.63
554	*Ulmus americana*	American Elm	12"	12'		Remove	Codominant; Trumpet Vine	50.00
555	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Trumpet Vine	59.38
556	*Quercus prinus*	Chestnut Oak	19"	19'	Yes	Remove	Dead; English Ivy, Wild Grape	0.00
557	*Quercus alba*	White Oak	22"	22'	Yes	Remove	Dying; English Ivy, Wild Grape	21.88
558	*Liquidambar styraciflua*	Sweetgum	7"	7'	Yes	Remove	Dieback; Trumpet Vine, Wild Grape	15.63
558A	*Liquidambar styraciflua*	Sweetgum	12"	12'		Preserve		62.50
558B	*Quercus phellos*	Willow Oak	26"	26'		Preserve		81.25
558C	*Liquidambar styraciflua*	Sweetgum	14"	14'		Preserve	Grown into 558D	59.38
558D	*Quercus palustris*	Pin Oak	24"	24'		Preserve	Grown into 558C	62.50
558E	*Quercus marilandica*	Blackjack Oak	7"	7'		Preserve		75.00
559	*Quercus palustris*	Pin Oak	16"	16'	Yes	Remove	Major dieback	28.13
560	*Quercus palustris*	Pin Oak	29"	29'		Remove	Codominant leaders	75.00
561	*Ulmus americana*	American Elm	12"	12'		Remove	Minor dieback; Poison Ivy, Virginia Creeper	46.88
562	*Liquidambar styraciflua*	Sweetgum	7"	7'		Remove	Poison Ivy	50.00
563	*Quercus prinus*	Chestnut Oak	25"	25'		Remove	Hole in trunk; fence embedded	56.25
564	*Quercus prinus*	Chestnut Oak	40"	40'		Remove	Codominant; leaning; English Ivy	59.38
565	*Quercus phellos*	Willow Oak	8"	8'		Remove	English Ivy	68.75
566	*Liquidambar styraciflua*	Sweetgum	18"	18'		Preserve		62.50
567	*Quercus falcata*	Southern Red Oak	7"	7'	Yes	Remove	Dying	25.00
568	*Quercus marilandica*	Shumard Oak	25"	25'		Preserve		90.63
569	*Quercus prinus*	Chestnut Oak	35"	35'		Remove	Codominant; leaning	62.50
570	*Quercus prinus*	Chestnut Oak	25"	25'		Remove	Codominant; 1 much smaller than other	65.63
571	*Quercus prinus*	Chestnut Oak	17"	17'		Remove		71.88
572	*Quercus prinus*	Chestnut Oak	20"	20'	Yes	Remove	Dying; leaning	15.63
573	*Quercus prinus*	Chestnut Oak	20"	20'		Remove	Dieback; English Ivy, Wild Grape	59.38
574	*Quercus prinus*	Chestnut Oak	14"	14'		Remove	Dieback; English Ivy, Virginia Creeper	53.13
575	*Quercus prinus*	Chestnut Oak	25"	25'		Remove		65.63
576	*Quercus prinus*	Chestnut Oak	15"	15'		Remove		62.50
577	*Quercus prinus*	Chestnut Oak	21"	21'		Remove	Large open trunk wound	56.25
578	*Quercus prinus*	Chestnut Oak	14"	14'		Remove	Reaction wood growth in root flare	53.13
579	*Quercus prinus*	Chestnut Oak	10"	10'		Remove	Leaning; English Ivy	53.13
580	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Dieback; English Ivy	56.25
581	*Quercus prinus*	Chestnut Oak	34"	34'		Remove	Codominant; English Ivy	59.38
582	*Pinus virginiana*	Virginia Pine	18"	18'		Remove		53.13
583	*Quercus phellos*	Willow Oak	24"	24'		Remove	Minor Dieback	62.50
584	*Quercus rubra*	Northern Red Oak	15"	15'		Preserve	Lower branch dieback; English Ivy	59.38
585	*Quercus alba*	White Oak	15"	15'		Preserve	Minor dieback; English Ivy	56.25
588	*Quercus prinus*	Chestnut Oak	15"	15'		Remove	Reaction wood growth in root flare	53.13
589	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Curved trunk; split bark	56.25
590	*Quercus prinus*	Chestnut Oak	30"	30'	Yes	Remove	Codominant; 1 dead; open trunk wound	34.38
591	*Quercus prinus*	Chestnut Oak	24"	24'		Remove		68.75
592	*Quercus shumardii*	Shumard Oak	26"	26'		Remove		71.88
593	*Quercus prinus*	Chestnut Oak	20"	20'		Remove	Codominant leaders	62.50
594	*Quercus prinus*	Chestnut Oak	16"	16'	Yes	Remove	Major dieback; Poison Ivy	37.50
595	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Curved trunk	62.50
596	*Quercus prinus*	Chestnut Oak	13"	13'		Remove		68.75
597	*Quercus prinus*	Chestnut Oak	22"	22'		Preserve	Curved trunk	62.50
598	*Quercus shumardii*	Shumard Oak	14"	14'		Preserve	Open wound from dead stem	59.38
599	*Quercus prinus*	Chestnut Oak	16"	16'		Remove	Minor canopy dieback	62.50
600	*Quercus prinus*	Chestnut Oak	20"	20'		Remove	Moderate dieback	56.25
601	*Quercus prinus*	Chestnut Oak	15"	15'		Preserve	Minor dieback	65.63
602	*Quercus prinus*	Chestnut Oak	51"	51'		Preserve	Codominant	68.75
603	*Quercus prinus*	Chestnut Oak	12"	12'		Preserve	English Ivy, Wild Grape	59.38
604	*Quercus prinus*	Chestnut Oak	21"	21'		Preserve	Leaning; canopy dieback	50.00
605	*Quercus alba*	White Oak	19"	19'		Preserve		78.13
606	*Cary glabra*	Pignut Hickory	10"	10'		Preserve	Borer damage; leaf spot	46.88
607	*Quercus prinus*	Chestnut Oak	13"	13'		Preserve	Thin canopy	46.88
608	*Cary glabra*	Pignut Hickory	12"	12'		Preserve		59.38
609	*Quercus alba*	White Oak	26"	26'		Preserve	English Ivy, Poison Ivy	62.50
610	*Quercus alba*	White Oak	18"	18'		Preserve		65.63
612	*Quercus alba*	White Oak	36"	36'		Preserve	Codominant	75.00
613	*Quercus shumardii*	Shumard Oak	7"	7'		Preserve	On hillside	68.75
614	*Quercus prinus*	Chestnut Oak	10"	10'		Preserve	Bend in trunk	65.63
615	*Quercus alba*	White Oak	21"	21'		Remove	Wild Grape	71.88
616	*Quercus prinus*	Chestnut Oak	26"	26'		Remove		78.13
616A	*Acer rubrum*	Red Maple	15"	15'		Preserve	Leaning; codominant leaders	56.25
616B	*Liriodendron tulipifera*	Tulip Poplar	17"	17'		Remove		81.25
616C	*Liriodendron tulipifera*	Tulip Poplar	14"	14'		Preserve	Bend in leader	68.75
617	*Quercus alba*	White Oak	10"	10'		Remove		78.13
618	*Quercus prinus*	Chestnut Oak	25"	25'	Yes	Preserve	Dying; English Ivy, Poison Ivy	28.13
619	*Quercus prinus*	Chestnut Oak	25"	25'		Preserve	Moderate dieback	59.38
620	*Nyssa sylvatica*	Black Gum	8"	8'		Preserve		71.88

TREE INVENTORY & CONDITION ANALYSIS

TREE #	BOTANICAL NAME	COMMON NAME	SIZE	CRZ	POOR CONDITION?	STATUS	COMMENTS	CONDITION RATING
			DBH (in)	R (ft.)		(Remove or Preserve)		%
621	*Liriodendron tulipifera*	Tulip Poplar	33"	33'		Remove	Codominant; included bark	59.38
622	*Acer rubrum*	Red Maple	10"	10'		Remove	One-sided	56.25
623	*Acer rubrum*	Red Maple	12"	12'		Preserve	One-sided	53.13
624	*Quercus prinus*	Chestnut Oak	17"	17'	Yes	Remove	Leaning over; fail risk	34.38
625	*Quercus prinus*	Chestnut Oak	14"	14'		Preserve		62.50
626	*Quercus prinus*	Chestnut Oak	15"	15'		Preserve		59.38
627	*Acer rubrum*	Red Maple	13"	13'	Yes	Preserve	Codominant; opening through trunk	37.50
628	*Nyssa sylvatica*	Black Gum	8"	8'		Preserve	English Ivy	75.00
629	*Nyssa sylvatica*	Black Gum	11"	11'		Preserve	Codominant leaders	68.75
630	*Nyssa sylvatica*	Black Gum	8"	8'		Preserve	English Ivy	59.38
631	*Quercus prinus*	Chestnut Oak	17"	17'		Preserve	Bent leader	56.25
632	*Quercus alba*	White Oak	22"	22'		Preserve	English Ivy	53.13
633	*Quercus prinus*	Chestnut Oak	29"	29'	Yes	Preserve	Codominant; 1 dead; dying	15.63
634	*Quercus prinus*	Chestnut Oak	20"	20'	Yes	Preserve	Dying; English Ivy	18.75
635	*Quercus prinus*	Chestnut Oak	10"	10'	Yes	Preserve	Dying; English Ivy	12.50
636	*Quercus prinus*	Chestnut Oak	9"	9'		Preserve	English Ivy	46.88
637	*Quercus prinus*	Chestnut Oak	19"	19'	Yes	Preserve	Moderate dieback; English Ivy	34.38
638	*Quercus prinus*	Chestnut Oak	16"	16'		Preserve	English Ivy, Poison Ivy	50.00
638B	*Quercus prinus*	Chestnut Oak	25"	25'		Preserve	English Ivy	78.13
639	*Quercus prinus*	Chestnut Oak	25"	25'		Preserve	English Ivy, Wild Grape	62.50
640	*Quercus prinus*	Chestnut Oak	8"	8'		Preserve	English Ivy, Wild Grape	53.13
641	*Quercus prinus*	Chestnut Oak	17"	17'		Preserve	English Ivy, Wild Grape	59.38
642	*Quercus prinus*	Chestnut Oak	14"	14'		Preserve	Moderate dieback	59.38
643	*Quercus prinus*	Chestnut Oak	15"	15'		Preserve	Minor Dieback	62.50
644	*Cary glabra*	Pignut Hickory	10"	10'		Preserve	English Ivy	59.38
645	*Quercus falcata*	Southern Red Oak	17"	17'	Yes	Preserve	Dead	0.00
646	*Quercus prinus*	Chestnut Oak	22"	22'		Remove	English Ivy	71.88
647	*Quercus prinus*	Chestnut Oak	17"	17'		Remove	Leaning; English Ivy	59.38
648	*Quercus prinus*	Chestnut Oak	19"	19'		Remove	English Ivy, Wild Grape	65.63
648A	*Quercus alba*	White Oak	22"	22'		Preserve	Slight lean	75.00
648B	*Quercus prinus*	Chestnut Oak	14"	14'		Preserve		84.38
648C	*Quercus prinus*	Chestnut Oak	25"	25'		Preserve		81.25
649	*Acer rubrum*	Red Maple	17"	17'	Yes	Preserve	Codominant; English Ivy, Trumpet Vine	21.88
650	*Acer rubrum*	Red Maple	9"	9'		Preserve	English Ivy	62.50
651	*Nyssa sylvatica*	Black Gum	11"	11'		Preserve	English Ivy	53.13
652	*Quercus alba*	White Oak	35"	35'		Preserve	Moderate Dieback, English Ivy, Trumpet Vine	65.63
653	*Fagus grandifolia*	American Beech	7"	7'		Remove	English Ivy	65.63
654	*Quercus prinus*	Chestnut Oak	28"	28'	Yes	Preserve	Dying; codominant; Poison Ivy, English Ivy	18.75
655	*Quercus prinus*	Chestnut Oak	26"	26'	Yes	Preserve	Minor dieback, codominant leaders; English Ivy, Trumpet Vine	34.38
656	*Robinia pseudoacacia*	Black Locust	12"	12'	Yes	Remove	English Ivy	31.25
657	*Acer rubrum*	Red Maple	13"	13'	Yes	Preserve	Wound from previous existing stem; Trumpet Vine	28.13
658	*Liquidambar styraciflua*	Sweetgum	15"	15'		Preserve	Trumpet Vine	59.38
659	*Quercus prinus*	Chestnut Oak	21"	21'	Yes	Preserve	Dead	0.00
659A	*Acer rubrum*	Red Maple	21"	21'		Preserve	Codominant	62.50
660	*Quercus alba*	White Oak	18"	18'		Preserve	English Ivy, Virginia Creeper, Trumpet Vine	56.25
661	*Quercus alba*	White Oak	27"	27'		Preserve		87.50
662	*Quercus prinus*	Chestnut Oak	16"	16'		Preserve	English Ivy, Virginia Creeper	59.38
663	*Quercus prinus*	Chestnut Oak	16"	16'	Yes	Preserve	Dead; English Ivy, Wild Grape	0.00
664	*Quercus prinus*	Chestnut Oak	13"	13'	Yes	Preserve	Leaning due to Trumpet Vine	31.25
665	*Quercus prinus*	Chestnut Oak	15"	15'		Preserve		65.63
666	*Quercus prinus*	Chestnut Oak	39"	39'		Preserve	Multi-stem; English Ivy, Poison Ivy	56.25
667	*Quercus prinus*	Chestnut Oak	8"	8'		Preserve	English Ivy, Poison Ivy	59.38
668	*Quercus alba*	White Oak	17"	17'	Yes	Preserve	Dead	0.00
669	*Quercus alba*	White Oak	21"	21'		Preserve	Virginia Creeper	75.00
670	*Quercus prinus*	Chestnut Oak	10"	10'		Preserve	Poison Ivy	74.88
671	*Quercus alba*	White Oak	8"	8'	Yes	Preserve	Leader missing; English Ivy, Poison Ivy	28.13
672	*Quercus alba*	White Oak	26"	26'		Preserve	Trunk wound; English Ivy, Poison Ivy	56.25

No. | DATE | DESCRIPTION
REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-07-17
08-01-17
- - -

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COMMONWEALTH OF VIRGINIA
Kevin J. Tankersley
Lic. No. 983
08-01-17
LANDSCAPE ARCHITECT

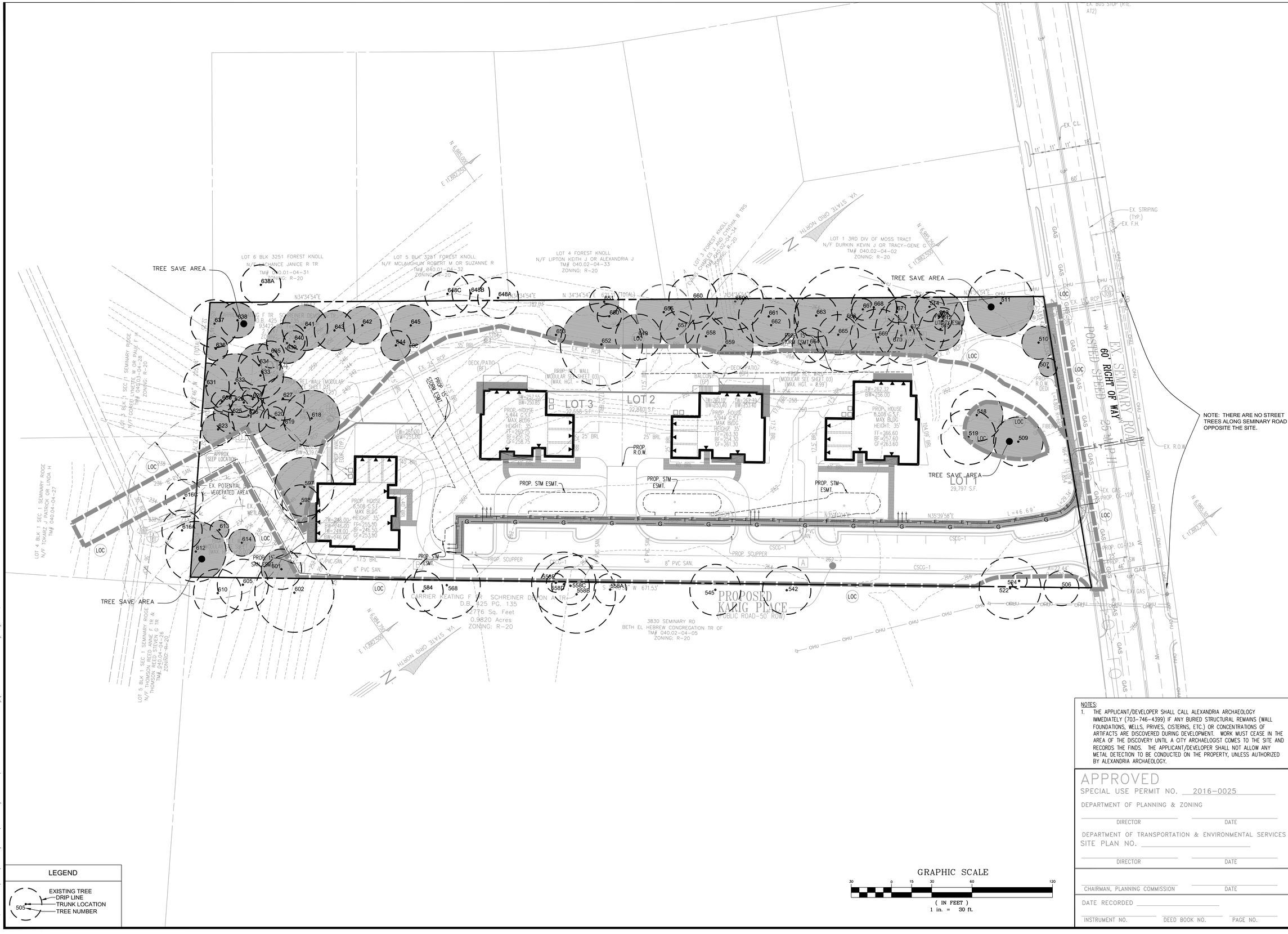
TREE CONDITION ANALYSIS
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
DATE: AUGUST, 2017
C.I.= N/A
SCALE: N/A

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR — DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
DIRECTOR — DATE
CHAIRMAN, PLANNING COMMISSION — DATE
DATE RECORDED _____
INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

SHEET 32

FILE No. 12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\TREE INVENTORY - EXISTING.dwg [CONDITION ANALYSIS] August 01, 2017 - 11:01am intern002



LEGEND

- EXISTING TREE
- DRIP LINE
- TRUNK LOCATION
- TREE NUMBER

505

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)

1 in. = 30 ft.

NOTES:

1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO.

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

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LANDSCAPE ARCHITECT

TREE SAVE PLAN

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: 1"= 30' C.I.= 2' DATE: AUGUST, 2017

SHEET 33

FILE No. 12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\TREE INVENTORY EXHIBIT.dwg [TREE INVENTORY PLAN] August 01, 2017 - 11:01am intern002

LOT 6 BLK 3251 FOREST KNOLL
N/F LACHANCE JANICE R TR
TM# 040.01-04-31
ZONING: R-20

LOT 5 BLK 3251 FOREST KNOLL
N/F MCLAUGHLIN ROBERT M OR SUZANNE R
TM# 040.01-04-32
ZONING: R-20

LOT 4 FOREST KNOLL
N/F LIPTON KEITH J OR ALEXANDRIA J
TM# 040.02-04-33
ZONING: R-20

LOT 3 FOREST KNOLL
N/F CLARK CHARLES E AND CYNTHIA B TRS
TM# 040.02-04-34
ZONING: R-20

LOT 1 3RD DIV OF MOSS TRACT
N/F DURKIN KEVIN J OR TRACY-GENE G
TM# 040.02-04-02
ZONING: R-20

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F GOREL JOHNNIE W OR PAUL F JR
TM# 040.04-04-28
ZONING: R-20

LOT 4 BLK 1 SEC 1 SEMINARY RIDGE
N/F TOKARZ PATRICK OR LINDA F
TM# 040.04-04-27

LOT 5 BLK 1 SEC 1 SEMINARY RIDGE
N/F THOMSON REED ANNE F TR &
THOMSON REED ROBERT G TR
TM# 040.04-04-26
ZONING: R-20

3830 SEMINARY RD
BETH EL HEBREW CONGREGATION TR OF
TM# 040.02-04-05
ZONING: R-20

EX. BUS STOP (RTE. AT2)

EX. C.L.

EX. STRIPING (TYP.)

EX. F.H.

EXISTING TEMP. SCORE MAINT. EASEMENT (TO BE VACATED)

EXISTING 25' STORM SEWER EASEMENT D.B. 711 PG. 166

EX. DI-1 TO BE RAISED TO PROP. GRADE

PROP. 15" STORM ESMT.

PROP. 21" RCP

EX. 21" RCP

EX. 15" RCP

EX. 10" SAN.

EX. 8" PVC SAN.

APPROX. EXISTING 20' SAN SEWER EASEMENT D.B. 475 PG. 563

EX. POTENTIAL VEGETATED AREA

EX. WETLANDS

PROP. 15" SAN. ESM.

8" PVC SAN.

PROP. 4" ROOF DRAIN (TYP.)

PROP. ROOF DRAIN (TYP.)

PROP. STM ESMT.

PROP. 18" RCP

PROP. 15" RCP

PROP. 8" PVC SAN.

PROP. 6" PVC SAN.

PROP. 8" REDUCER

PROP. LIGHT

PROP. CG-12A

PROP. 4" SW

PROP. CONCRETE SIDEWALK

PROP. CROSSWALK

PROP. C.O. (TYP.)

PROP. STOP SIGN

BIORETENTION "A"

BIORETENTION "B"

BIORETENTION "C"

100' SIGHT TRIANGLE

60' RIGHT OF WAY

EX. R.O.W.

POSTED SPEED 25 MPH

KARIG PLACE
(PUBLIC ROAD-50' ROW)

VA STATE GRID NORTH

NOTE: THERE ARE NO STREET TREES OR STREET LIGHTS ALONG SEMINARY ROAD OPPOSITE THE SITE.

LEGEND

EXISTING TREE TO BE PRESERVED
DRIP LINE
505 TRUNK LOCATION
TREE NUMBER

PROPOSED TREES

PROPOSED SHRUBS

TREE SAVE AREAS

Planting Notes

1. All protection and preservation measures for existing vegetation, including maintenance shall be approved by the City Arborist in-field prior to commencement of any site disturbing activity.
2. Specification for all plantings shall be in accordance with the current and most up to date edition of ANSI-Z60.1, The American Standard for Nursery Stock as produced by the American Association of Nurserymen; Washington, DC.
3. The applicant has made suitable arrangements for pre-selection tagging, pre-contract growing, or is undertaking specialized planting stock development with a nursery or grower that is conveniently located to the project site, other procedures that will ensure availability of specified materials. In the event that shortages and/or inability to obtain specified plantings occurs, remedial efforts including species changes, additional plantings and modification to the landscape plan shall be undertaken by the applicant. All remedial efforts shall, with prior approval by the city, be performed to the satisfaction of the Directors of Planning & Zoning, Recreation, Parks & Cultural Activities and Transportation and Environmental Services.
4. In lieu of more strenuous specifications, all landscape related work shall be installed and maintained in accordance with the current and most up to date edition (at time of construction) of Landscape Specification Guidelines, as produced by the Landscape Contractors Association of Maryland, District of Columbia and Virginia; Gaithersburg, Maryland.
5. Prior to commencement of landscape installation/planting operations, a pre-installation/construction meeting will be scheduled with the City's Arborist and Landscape Architects to review the scope of installation procedures and processes.
6. Maintenance for this project shall be performed in perpetuity, in compliance with the City of Alexandria Landscape Guidelines and/or as conditioned by project approval.
7. A certification letter for tree wells, tree trenches and plantings above structure shall be provided by the project's Landscape Architect. The letter shall certify that all below grade construction is in compliance with approved drawings and specifications. The letter shall be submitted to the City Arborist and approved prior to approval of the last and final Certificate of Occupancy for the project. The letter shall be submitted by the owner/applicant/successor and sealed and dated as approved by the project's Landscape Architect.
8. As-built drawings for this landscape and/or irrigation/water management system will be provided in compliance with the City of Alexandria Landscape Guidelines. As-built drawings shall include clear identification of all variation(s) and changes from approved drawings including location, quantity and specification of all project elements.
9. Maintenance of all trees and landscape materials shall conform to accepted industry standards set forth by the Landscape Contractors Association, American Society of Landscape Architects, the International Society of Arboriculture, and the American National Standards Institute.

MAINTENANCE NOTE:
MAINTENANCE OF ALL TREES AND LANDSCAPE MATERIALS SHALL CONFORM TO ACCEPTED INDUSTRY STANDARDS SET FORTH BY THE LANDSCAPE CONTRACTORS ASSOCIATION, AMERICAN SOCIETY OF LANDSCAPE ARCHITECTS, THE INTERNATIONAL SOCIETY OF ARBORICULTURE, AND THE AMERICAN NATIONAL STANDARDS INSTITUTE.

NOTES:
1. FOR EXISTING TREE INVENTORY, SEE TREE CONDITION ANALYSIS SHEET 32
2. FOR PLANTING SPECIFICATIONS, PLANT SCHEDULE, AND TABULATIONS SEE SHEET 35

GRAPHIC SCALE
30 0 15 30 60 120
(IN FEET)
1 in. = 30 ft.

NOTES:
1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

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COMMONWEALTH OF VIRGINIA
Kevin J. Tankersley
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LANDSCAPE ARCHITECT
06/09/17

LANDSCAPE PLAN
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
SCALE: 1"= 30' C.I.= 2' DATE: AUGUST, 2017

SHEET 34

FILE No. 12811

Urban, Ltd. - z:\JOBS\Seminary Road\Preliminary Site Plan\12811-XX-LANDSCAPE PLAN.dwg [LANDSCAPE PLAN] August 01, 2017 - 11:01pm intern002

PLANTING SPECIFICATIONS

1. QUALITY ASSURANCE:
   A. Landscape planting and related work shall be performed by a firm with a minimum of five years experience specializing in this type and scale of work.
   B. Applicable Specifications and Standards:
      City of Alexandria Zoning Ordinance,
      American Joint Committee on Horticultural Nomenclature
      American Standard for Nursery Stock, latest edition
      American Association of Nurserymen Landscape Specification Guidelines for Virginia, latest edition, Landscape Contractors Association.
      Virginia Erosion and Sediment Control Handbook (VESCH)
2. SUBMITTALS: Submit the following to the Owner's Representative prior to beginning work:
   A. Copies of manufacturer's data for all materials required.
   B. Samples of required mulch material.
   C. Chemical and mechanical analysis and samples of all existing soil, topsoil, organic matter and soil mix to be used.
   D. Planting schedule showing the dates (earliest and latest) proposed for each type of plant specified, schedule each type of planting within the normal planting seasons for such work. Include requests for any proposed changes in the approved planting season and a list of proposed sources for all plant materials.
   E. List of proposed sources for all plant material.
3. DELIVERY, HANDLING, AND STORAGE:
   A. Deliver packaged materials in manufacturer's unopened containers or bundles, fully identified with name, brand, type, weight, and analysis. Store packaged materials in such a manner as to prevent damage or intrusion of foreign matter.
   B. Dig balled and burlapped (B& B) plants with firm, natural balls of earth, of a diameter not less than that shown on the plant list nor less than recommended by the American Standard for Nursery Stock, and of sufficient depth to include the fibrous and feeding roots. B&B plants will not be accepted if the ball is cracked or broken before or during planting operation.
   C. Deliver trees and shrubs after preparations for planting have been completed. Do not bend, bind, or tie trees or shrubs in such a manner as to damage bark, break branches or destroy natural shape. If planting is delayed more than 6 hours after delivery, set trees and shrubs in shade, protect from weather and mechanical damage, and keep roots moist by heeling-in bare root stock and covering plant balls with soil, peat moss or other acceptable material for balled stock. Plants shall be kept well watered and shall not remain unplanted for longer than ten (10) days after delivery.
   D. Plants shall be lifted and handled from the bottom of the ball only.
   E. Do not remove container-grown stock from containers until planting time.
4. DRAINAGE: Before planting, determine that areas to receive plant material have adequate subdrainage.
   A. The landscape contractor is responsible for drainage tests as necessary to identify any problems prior to beginning planting operations. Upon commencement of planting operations the landscape contractor assumes responsibility for soil conditions.
   B. Dig planting pits to full depth and dimensions indicated on drawings.
   C. At bottom of planting pit, excavate rectangular pit 12 inches by 12 inches by 18 inches deep. Quickly pour water into pit to a depth of 6 inches (approximately 3-3 3/4 gallon). Note time required for water to be completely absorbed. Divide time noted by 6 to achieve average rate of absorption for 1 inch of water. Where rate of absorption exceeds 60 minutes per inch, notify owner immediately for directions on how to proceed.
5. PLANTING DATES: Planting shall be done only within the following dates except as approved by Owner.
   A. Deciduous Trees and Shrubs: March 1 to May 31 and October 15 to December 15.
   B. Evergreen Trees, Shrubs and Vines: March 1 to May 31 and September 1 to November 15.
   C. All plant material shall be guaranteed by the Contractor for a period of 1 year from the date final acceptance to be in good, healthy and flourishing condition.
6. MATERIALS FOR PLANTING:
   A. Topsoil: shall be a fertile, friable natural loam, uniform in composition, free of stones, lumps, plants and their roots, debris and other extraneous matter over 1 inch in diameter, capable of sustaining vigorous plant growth. Soil shall be harvested at a single source from the O and/or A horizons of the soil profile.
      1) Topsoil shall have a pH range of 5.5 to 7.5.
      2) Topsoil shall contain 1.5-5% organic matter by dry weight.
      3) Soil Texture: sandy loam, sandy clay loam with the following particle size distribution:
         Gravel Less than 10%
         Silt 15-30%
         Clay 20-35%
         Chemical Levels shall be:
         Magnesium Mg 100+ units
         Phosphorus P205 150+ units
         Potassium - K20 120+ units
      4) Soluble Salts/ Conductivity - Not to exceed 900 ppm/0.9 mmhos/cm (in soil); not to exceed 3000 ppm/2.5 mmhos/cm (in high organic mix)
      5) Cation exchange capacity shall be a minimum of 8 meq/100g.
   B. Clay Loam to Sandy Clay Loam Soil: shall be a fertile, friable natural loam, uniform in composition, free of stones, lumps, plants and their roots, debris and other extraneous matter over 1 inch in diameter, capable of sustaining vigorous plant growth.
      1) Soil shall have a pH range of 5.5 to 6.5.
      2) Soil shall contain 2-5% organic content by volume.
      3) Soil Texture: Clay loam to sandy clay loam with the following particle size distribution:
         Gravel Less than 10%
         Sand 20-50%
         Silt <35%%
         Clay 20-40%
      4) Chemical Levels shall be:
         Magnesium Mg 100+ units
         Phosphorus P205 150+ units
         Potassium - K20 120+ units
      5) Soluble Salts/ Conductivity - Not to exceed 900 ppm/0.9 mmhos/cm (in soil); not to exceed 3000 ppm/2.5 mmhos/cm (in high organic mix)
      6) Cation exchange capacity shall be 20-35 meq/100g.
   C. Compost: Compost shall be mature, stable, weed free, and produced by aerobic decomposition of organic matter. Compost feedstock shall be plant matter, such as high lignin forestry products or yard waste (leaves, brush and yard trimmings).
      1) The product must not contain any visible refuse or other physical contaminants, substances toxic to plants, or over 5% sand, silt, clay or rock material by dry weight.
      2) Compost shall be sampled and tested as required by the Seal of Testing Assurance Program of the United States Composting Council (USCC) and shall meet the physical requirements for compost as determined by USCC.
      3) The product shall possess no objectionable odors. The product must meet all applicable USEPA CFR, Title 40, Part 503 Standards for Class A biosolids.
      4) The moisture level shall be such that no visible water or dust is produced when handling the material.
   D. Composted Pine Bark Fines: Shall be approved composted, ground pine bark having no particle with a dimension greater than 3/4 inch. No more than 10% shall be wood.
   E. Sand: Shall be quartz based sharp concrete sand, ASTM C-33 Fine Aggregate, with a Fines Modulus Index between 2.8 and 3.2.
   F. Trace Elements: Shall be commercially available slow release materials containing zinc (Zn), Molybdenum (Mo), Copper (Cu), Boron (B), and Magnesium (Mn).
   G. Fertilizer: A commercial fertilizer for ornamental trees, shrubs and ground cover with an analysis of 10% Nitrogen, 6% Phosphorus and 4% Potassium shall be used. This fertilizer shall be granular with a minimum of 50% of the total Nitrogen in organic form. 14-14-14-Osmocote (or approved equal) shall be applied at a rate of 10 lbs. per square foot, tilled to a depth of 8 inches, shall be used for perennials.
   H. Soil Separator: Shall be rot resistant non-woven polypropylene filter fabric, water permeable, and unaffected by freezing and thawing. Acceptable products include: Mirafi 140N, Mirafi Civil Engineering Co., or Stabilenka Type T-80, American Enka Co., Enka, N.C.
   I. Planter Drainage Fabric: Shall be prefabricated planter drainage fabric Miradrain 9000, a composite system consisting of a Mirafi drainage fabric bonded to a three-dimensional highly impact-resistant plastic core. The core shall have the following attributes:
      1) Compressive Strength: (ASTM D-1621), 15,000 + PSF.
      2) Overlaps: Shall be capable of mechanically interlocking so as to prevent separation of the overlaps during backfill.
7. PLANT MATERIALS: (Refer to the PLANT LIST on the drawings for specific types and quantities of plants):
   J. Plants shall be nursery grown in accordance with good horticultural practices. Plants shall either be obtained from local nurseries and/or others, which have soil (heavy clay) and climatic conditions similar to those in the locality of the project.
   K. Plant material grown in sandy, well-drained soil will not be approved for this project. Plants shall be true to species and variety and unless specifically noted otherwise, all plants shall be of specimen quality, exceptionally heavy, symmetrical, tightly-knit plants, so trained or favored in their development and appearance as to be superior in form, number of branches, compactness and symmetry.
   C. Plants shall be sound, healthy and vigorous, well branched and densely foliated when in leaf, free of disease, insect pests, eggs or larvae and shall have healthy, well-developed root systems. They shall be free from physical damage or any conditions that would prevent thriving health and the desired appearance.
   D. Trees, which have a damaged or crooked leader, or multiple leaders, unless specified in the plant list, will be rejected. Trees with abrasion of the bark, sun scald, disfiguring knots, or pruning cuts more than 1 1/4 inch diameter which have not completely callused, will be rejected.
   E. Plants shall conform to measurements specified in the plant schedules except that plants larger than specified may be used if acceptable to the Landscape Architect or owner. Use of such plants shall not increase the contract price. If larger plants are accepted, the root ball shall be sized for the larger plant.
   F. Caliper Measurement: Shall be taken at a point on the trunk 6 inches above natural ground line for trees up to 4 inches diameter, and at a point 12 inches above the natural ground line for trees over 4 inches diameter.
   G. Plants shall be measured when branches are in the normal position. Height and spread dimensions specified refer to the main body of the plant and not from branch tip to tip.
1. SOIL MIXING PROCEDURES:
   A. Topsoil used in sand/soil mixes shall be screened or shredded prior to mixing in sands. Maximum clod inclusion for soil mixes shall not exceed:

Clod size (largest dimension)	% of the soil mix volume
Less than 1"	Unlimited
1 to 3 inches	20%
3 to 6 inches	5%
>6 inches	Less than 2%

   B. Source material and soil mix stockpiles shall be protected from rain by covering with filter cloth.
9. INSPECTION:
   A. Examine the areas and conditions where soil mix is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions are corrected to permit proper installation of the work.
   B. Cooperate with other Contractors and trades working in and adjacent to other work areas. Examine drawings which show development of entire project and become familiar with scope of other work required.
10. SOIL INSTALLATION - GENERAL PROCEDURES:
   A. If subgrade soil compaction exceeds 80%, existing soil shall be ripped to a depth of 12 inch to alleviate compaction which has taken place during construction. Prior to loosening of soil, Contractor must locate existing utilities and coordinate with Owner any underground electric lines, drainage pipes, conduits, etc.
   B. Prepare the subgrade by roughening the top 3" of the subsoil by dragging the teeth of a backhoe bucket across the surface.
   C. Begin soil installation as soon as subsoil is prepared. Use low impact equipment with track belts, large tires, or low tire pressure to lower compaction and soil damage during installation.
   D. Monitor compaction during installation and loosen soils as needed if compaction exceeds 80%.
   E. Install specified soil in 12"-18" thick lifts. Compact each lift sufficiently to reduce settling but not enough to prevent the movement of water and feeder roots through the soil. The soils in each lift should feel firm to the foot in all areas and make only slight heel prints.
11. INSTALLATION OF SOIL MIX FOR LAWN AREAS ON GRADE:
   A. Soil Mix for Lawns on Grade: shall consist of 10% compost and 90% topsoil, by volume. These materials must meet specifications described in Section 2.00.
   B. Loosen subgrade lawn areas to a minimum of 3". Remove stones more than 1-1/2" in any dimension and sticks, roots, rubbish, and other extraneous matter. Limit preparation to areas which will be planted promptly after preparation.
   C. Spread soil mix for lawn areas on grade to a minimum depth of 8" as required to meet grade and elevations shown on drawings, after lightly rolling and natural settlement. Allow for sod thickness in areas to be sodded.
12. INSTALLATION OF SOIL MIX FOR TREE PITS ON GRADE
   A. Confirm that native subsoil drains at a rate of at least ½" per hour. If drainage is less than ½" per hour, provide subsurface drainage lines.
   B. Install 30-36" of Soil Mix for Tree Pit Backfill on Grade:
      1) Shall consist of clay loam to sandy clay loam soil, sand, and composted pine bark fines at a rate of 5.5:1 to 10.5:1.5 to achieve the following:
         (a) Clay content of Soil Mix shall be 10-20% of the soil mix, by volume.
         (b) Minimum amount of coarse to medium sand in the mix shall be 55%
         (c) Minimum infiltration rate at 80-85% compaction shall be 1-3 inches per hour.
   A. Composted pine bark fines shall not exceed 10% of the total soil mix by volume.
   B. Till 4" of compost into the top 6" of the installed Soil Mix for Tree Pit Backfill on Grade.
13. INSTALLATION OF SOIL MIX FOR MULCHED SHRUB AND PERENNIAL BEDS:
   A. Confirm that native subsoil drains at a rate of at least ½" per hour. If drainage is less than ½" per hour, provide subsurface drainage lines.
   B. Install 14" of Soil Mix for Mulched Shrub and Perennial Beds on Grade:
      1) Shall consist of clay loam to sandy clay loam soil, sand, and composted pine bark fines at a rate of 5.5:1 to 10.5:1.5 to achieve the following:
         (a) Clay content of Soil Mix shall be 10-20% of the soil mix, by volume.
         (b) Minimum amount of coarse to medium sand in the mix shall be 55%
         (c) Minimum infiltration rate at 80-85% compaction shall be 1-3 inches per hour.
      2) Composted pine bark fines shall not exceed 10% of the total soil mix by volume.
   C. Till 4" of compost into the top 6" of the installed Soil Mix for Tree Pit Backfill on Grade.
14. GENERAL PLANT INSTALLATION:
   A. Excavation: Excavate all tree pits and planting areas to the width and depth shown in the planting details.
   B. Center plant in pit and orient for the best visual effect. Set plants plumb and hold rigidly in position until soil has been tamped firmly around root ball.
   C. Mulch within 48 hours after planting and after applying the pre-emergent herbicide, except ground cover areas (which shall have organic material placed before planting) with a 2" layer of mulch immediately after planting. All bed lines shall be cut with a smooth consistent edge to a minimum depth of 3 inches. Keep mulch out of the crowns of shrubs and off buildings, sidewalks, light standards, and other structures.
   D. All planting areas to conform to specified grades after full settlement has occurred and mulch has been applied. Provide saucers around tree pits as shown on planting details. Remove all tags, labels, strings, etc. from all plants.
15. PERMANENT SEEDING OR SODDING FOR GRASS AREAS :
   A. Lawn Seed or Sod varieties shall be an improved variety turf-type fescue blend. The landscape contractor shall select from varieties approved by the Alabama Cooperative Extension Service
   B. Refer to the Virginia Erosion and Sediment Control Handbook (VESCH), for guidelines, specifications and installation techniques of seed and sod.
   C. Maintenance shall begin immediately after each plant and lawn area is installed and shall continue until 90 days after final acceptance of the last section.
16. OTHER:
   A. All Contractors shall be required to completely remove all trash, debris and excess materials from the work area and the property (especially at all curb, gutters and sidewalks) daily during installation.
   B. Dead plants are to be removed from the job by the Contractor weekly. Contractor shall maintain an updated, comprehensive list of all dead materials removed, and present a copy of the list to the owner at the end of every month during the contract period.
   C. Contractor is solely responsible for plant maintenance including shrubs and groundcovers, and shall maintain area in a weed and debris free condition. Maintenance shall begin immediately after each plant and lawn area is installed and shall continue until 90 days after final acceptance of the last section.
   D. Contractor shall guarantee all landscape improvements, including sod/seeding, for one full year as required by the specifications. Contractor must contact the owner at least 10 working days in advance to schedule acceptance inspections. Contractor must replace all dead or unacceptable plants during the following recommended planting season.
17. GENERAL LANDSCAPE NOTES:
   A. All protection and preservation measures for existing vegetation, including maintenance shall be approved by the city arborist in field prior to commencement of any site disturbing activity.
   B. Specification for all plantings shall be in accordance with the current and most up-to-date edition of ANSI-Z60.1, The American Standard for Nursery Stock as produced by the American Association of Nurserymen; Washington, D.C.
   C. The applicant has made suitable arrangements for pre-selection tagging, pre-contract growing, or is undertaking specialized planting stock development with a nursery or grower that is conveniently located to the project site, other procedures that will ensure availability of specified materials. in the event that shortages and/or inability to obtain specified plantings occurs, remedial efforts including species changes, additional plantings and modification to the landscape plan shall be undertaken by the applicant. all remedial efforts shall, with prior approval by the city, be performed to the satisfaction of the Directors of Planning & Zoning, Recreation, Parks & Cultural Activities and Transportation & Environmental Services.
   D. In lieu of more strenuous specifications, all landscape related work shall be installed and maintained in accordance with the current and most up-to-date edition (at time of construction) of landscape specification guidelines as produced by the Landscape Contractors Association of Maryland, District of Columbia and Virginia; Gaithersburg, Maryland.
   E. Prior to commencement of landscape installation/planting operations, a pre-installation/construction meeting will be scheduled with the city's arborist and landscape architects to review the scope of installation procedures and processes.
   F. Maintenance for this project shall be performed in perpetuity, in compliance with City of Alexandria Landscape Guidelines and/or as conditioned by project approval.
   G. As-built drawings for this landscape and/or irrigation/water management system will be provided in compliance with City of Alexandria Landscape Guidelines. as-built drawings shall include clear identification of all variations(s) and changes from approved drawings including location, quantity and specification of all project elements.

PLANT SCHEDULE

Key	Qty.	Botanical Name	Common Name	Ht./Size	Cal./Spd.	Type	Remarks	Crown Coverage Area	Cover Total
		Large Shade Trees							
UA	4	Ulmus americana	American Elm		2.5"	B&B	Uniform branching pattern	1250	5,000
		Medium Shade Trees							
CL	2	Cladrastis lutea	Yellowood		2.5"	B&B	Uniform branching pattern	750	1,500
QA	6	Quercus accutissima	Sawtooth Oak		2.5"	B&B	Uniform branching pattern	750	4,500
TC	9	Tilia cordata	Littleleaf Linden		2.5"	B&B	Uniform branching pattern	750	6,750
ZS	9	Zelkova serrata 'Green Vase'	Green Vase Japanese Zelkova		2.5"	B&B	Uniform branching pattern	750	6,750
		Small Ornamental Trees							
LI	3	Lagerstoemia indica 'Whitt II'	Dynamite Crape Myrtle		2.5"	B&B	Uniform branching pattern	250	750
		Shrubs							
CO	28	Cephalanthus occidentalis 'Sugar Shack'	Sugar Shack Buttonbush		2.5"	B&B	Uniform branching pattern	2	56
HP	20	Hydrangea paniculata 'SMHPLQF'	Little Quick Fire Hydrangea		2.5"	B&B	Uniform branching pattern	2	40
IG	20	Ilex glabra	Inkberry Holly		2.5"	B&B	Uniform branching pattern	2	40
JN	21	Jasminum nudiflorum	Winter Jasmine		2.5"	B&B	Uniform branching pattern	2	42
VD	15	Viburnum dentatum	Arrowwood Viburnum		2.5"	B&B	Uniform branching pattern	2	30
		Perennials / Aquatics							
RH	256	Rudbeckia hirta	Black-eyed Susan	1 gallon		Cont.	24" o.c.		
SN	187	Aster novae-angeliae	New England Aster	1 gallon		Cont.	18" o.c.		
		Grass Sod							
SOD*	7,735 s.y.	Grass Sod: Tall Fescue/Kentucky Blue Grass Blend	90% (proportion by weight) Turf Type Tall Fescues: One or any combination of Turf Type Tall Fescues recommended by Virginia 10% (proportion by weight) Kentucky Blue Grass: One or any combination of Kentucky Blue Grass recommended by Virginia All sod shall be VCIA 'Certified'. Sod shall be cut with clean edges at a uniform thickness of 1/2 inch plus or minus 1/4 inch.						
								TOTAL:	**25,458**

*NOTE: SOD TO BE PLANTED IN ALL DISTURBED AREAS THAT ARE NOT PAVED.

NOTES FOR PRESERVATION AND PROTECTION OF EXISTING VEGETATION

1. VEGETATION TO BE REMOVED SHALL BE APPROVED BY THE CITY ARBORIST.
2. PROVIDE, IMPLEMENT AND FOLLOW A TREE CONSERVATION AND PROTECTION PROGRAM THAT IS DEVELOPED TO THE SATISFACTION OF THE CITY ARBORIST. THE TREE CONSERVATION AND PROTECTION PROGRAM SHALL BE AUTHORED BY AN ARBORIST CERTIFIED BY THE INTERNATIONAL SOCIETY OF ARBORICULTURE.
3. THE LOCATION AND METHOD FOR PROTECTION AND PRESERVATION OF EXISTING TREES SHALL BE SHOWN ON ALL PLAN SHEETS INCLUDING DEMOLITION, SEDIMENT AND EROSION CONTROL, SITE PLAN AND LANDSCAPE PLAN.
4. PROTECTION OF EXISTING VEGETATION SHALL BE IN COMPLIANCE WITH THE CITY OF ALEXANDRIA LANDSCAPE GUIDELINES AND THE VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK (CURRENT EDITION).
5. APPLICANT MUST PROVIDE DOCUMENTATION OF COMMUNICATION WITH THE ADJACENT PROPERTY OWNER(S) VERIFYING NOTIFICATION OF CONSTRUCTION IMPACT, POTENTIAL FOR LOSS, AND AGREED UPON REMEDIAL MEASURES PERTAINING TO THE EXISTING TREE(S) ON ADJACENT PROPERTIES THAT WILL BE EFFECTED BY PROJECT WORK.
6. PROVIDE SPECIFIC CONSTRUCTION STAGING INFORMATION THAT INDICATES METHODS, AND PROCEDURES TO BE IMPLEMENTED FOR PROTECTION OF EXISTING ON-SITE AND OFF-SITE VEGETATION TO THE CITY OF ALEXANDRIA ARBORIST. NO CONSTRUCTION DEBRIS, FILL AND/OR MATERIALS SHALL BE PLACED OR STORED BENEATH THE CANOPY COVER OF PROTECTED TREES OR OUTSIDE THE LIMITS OF DISTURBANCE.
7. TREE PROTECTION SHALL BE PROVIDED WHERE SILT FENCE IS NOT ADEQUATE. PROTECTION SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO THE DRIP LINE OF THE TREES TO BE SAVED. THE CONTRACTOR WILL CONSULT THE SITE INSPECTOR BEFORE THE CONSTRUCTION STARTS. THE LOCATION AND METHOD FOR TREE PROTECTION FENCING AND PRESERVATION OF EXISTING TREES MUST BE ESTABLISHED AND APPROVED IN-FIELD BY THE CITY ARBORIST PRIOR TO COMMENCEMENT OF CLEARING, GROUND DISTURBING ACTIVITY OR CONSTRUCTION. TO THE EXTENT POSSIBLE, ALL TREE PROTECTION SHALL BE INSTALLED AT THE DRIP LINE OF THE TREE(S).
8. VEGETATION DESIGNATED FOR PROTECTION SHALL RECEIVE ENHANCED LEVEL OF MAINTENANCE THROUGHOUT THE ENTIRE CONSTRUCTION PERIOD. MAINTENANCE SHALL INCLUDE, BUT NOT BE LIMITED TO, ITEMS SUCH AS: MONITORING HEALTH, GROWTH AND VIGOR OF VEGETATION, SELECTIVE PRUNING, WATERING, FERTILIZATION, INSTALLATION OF MULCH AND IN-KIND REPLACEMENT OF SEVERELY OR TERMINALLY DAMAGED VEGETATION. MAINTENANCE SHALL BE TO THE SATISFACTION OF THE DIRECTOR OF RECREATION, PARKS AND CULTURAL ACTIVITIES.
9. IN THE EVENT ANY TREES DESIGNATED TO BE SAVED ARE DAMAGED OR DESTROYED, THE APPLICANT SHALL REPLACE SUCH TREE WITH ADDITIONAL TREES OF SIGNIFICANT CALIPER EQUAL, CUMULATIVELY, TO THE TREE DESTROYED. THE PENALTY SHALL APPLY EXCEPT AS MAY BE NECESSARY FOR THE PREVENTION OR TREATMENT OF DISEASE, THE REMOVAL OF DEAD OR DAMAGED TREES OR OTHER GOOD HUSBANDRY PRACTICES AND AFTER CONSULTATION WITH THE CITY OF ALEXANDRIA ARBORIST AND THE DEPARTMENT OF PLANNING AND ZONING.

CANOPY COVER REQUIREMENTS: LOT 1

GROSS SITE AREA	29,949 SF or 0.6875 Acres
TREE COVER REQUIRED (25% of GSA)	7,487
NEW TREE COVER TO BE ADDED	
PROPOSED TREE COVER FROM NEW PLANTINGS:	12,292 SF
EXISTING TREE COVER TO REMAIN:	6,796 SF
TOTAL TREE COVER PROVIDED	19,088 SF

CANOPY COVER REQUIREMENTS: LOT 2

GROSS SITE AREA	22,840 SF or 0.5243 Acres
TREE COVER REQUIRED (25% of GSA)	5,710
NEW TREE COVER TO BE ADDED	
PROPOSED TREE COVER FROM NEW PLANTINGS:	3,820 SF
EXISTING TREE COVER TO REMAIN:	6,240 SF
TOTAL TREE COVER PROVIDED	10,060 SF

CANOPY COVER REQUIREMENTS: LOT 3

GROSS SITE AREA	22,558 SF or 0.5179 Acres
TREE COVER REQUIRED (25% of GSA)	5,645
NEW TREE COVER TO BE ADDED	
PROPOSED TREE COVER FROM NEW PLANTINGS:	6,802 SF
EXISTING TREE COVER TO REMAIN:	2,202 SF
TOTAL TREE COVER PROVIDED	9,004 SF

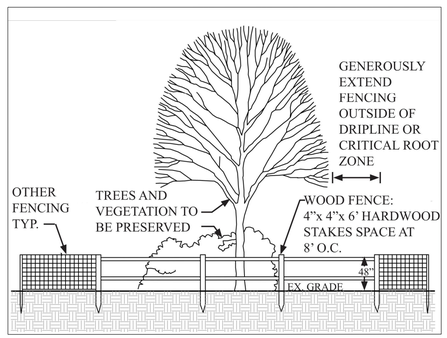
CANOPY COVER REQUIREMENTS: LOT 4

GROSS SITE AREA	36,059 SF or 0.8278 Acres
TREE COVER REQUIRED (25% of GSA)	9,015
NEW TREE COVER TO BE ADDED	
PROPOSED TREE COVER FROM NEW PLANTINGS:	2,524 SF
EXISTING TREE COVER TO REMAIN:	11,714 SF
TOTAL TREE COVER PROVIDED	14,238 SF

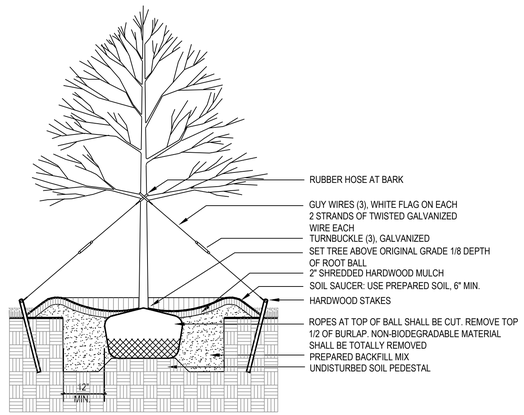
CANOPY COVER REQUIREMENTS: TOTAL ALL LOTS

GROSS SITE AREA	111,406 SF or 2.5575 Acres
TREE COVER REQUIRED (25% of GSA)	27,852
NEW TREE COVER TO BE ADDED	
PROPOSED TREE COVER FROM NEW PLANTINGS:	25,438 SF
EXISTING TREE COVER TO REMAIN:	26,952 SF
TOTAL TREE COVER PROVIDED	52,390 SF

NOTE: 10 SHRUBS (20 SF OF COVER) ARE LOCATED IN THE BIORETENTION AREAS WITHIN THE RIGHT OF WAY AND ARE EXCLUDED FROM THE CANOPY COVER REQUIREMENTS: TOTAL ALL LOTS.



1 TREE PROTECTION FENCE
NTS



4 DECIDUOUS TREE PLANTING
NTS

BIORETENTION "A" COMPUTATIONS

Total Area Bioretention:	**301 s.f. or**	**0.01 ac.**	
Proposed Plantings:	**Proposed Required:**		
40% of Area planted with Shrubs (10' O.C.)	4	1	Shrubs
60% of Area planted with Perennials	182	181	SF

BIORETENTION "B" COMPUTATIONS

Total Area Bioretention:	**439 s.f. or**	**0.01 ac.**	
Proposed Plantings:	**Proposed Required:**		
40% of Area planted with Shrubs (10' O.C.)	6	2	Shrubs
60% of Area planted with Perennials	280	264	SF

BIORETENTION "C" COMPUTATIONS

Total Area Bioretention:	**126 s.f. or**	**0.00 ac.**	
Proposed Plantings:	**Proposed Required:**		
40% of Area planted with Shrubs (10' O.C.)	2	0	Shrubs
60% of Area planted with Perennials	79	76	SF

BIORETENTION "D" COMPUTATIONS

Total Area Bioretention:	**439 s.f. or**	**0.01 ac.**	
Proposed Plantings:	**Proposed Required:**		
40% of Area planted with Shrubs (10' O.C.)	6	2	Shrubs
60% of Area planted with Perennials	280	264	SF

BIORETENTION "E" COMPUTATIONS

Total Area Bioretention:	**360 s.f. or**	**0.01 ac.**	
Proposed Plantings:	**Proposed Required:**		
40% of Area planted with Shrubs (10' O.C.)	6	1	Shrubs
60% of Area planted with Perennials	223	216	SF

BIORETENTION "F" COMPUTATIONS

Total Area Bioretention:	**310 s.f. or**	**0.01 ac.**	
Proposed Plantings:	**Proposed Required:**		
40% of Area planted with Shrubs (10' O.C.)	4	1	Shrubs
60% of Area planted with Perennials	206	186	SF

NOTE: DUE TO INSUFFICIENT SOIL DEPTH FOR TREES, THE BIORETENTION AREAS ARE BEING PLANTED WITH THE 'PERENNIAL GARDEN WITH SHRUBS' TEMPLATE.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE:
05 - 06 - 16
10 - 14 - 17
04 - 14 - 17
06 - 09 - 17
07 - 12 - 17
08 - 01 - 17
- - - - - -

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COMMONWEALTH OF VIRGINIA
Kevin J. Tankersley
Lic. No. 983
08-01-17
LANDSCAPE ARCHITECT

LANDSCAPE COMPUTATIONS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017
C.I.= N/A
SCALE: N/A

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES

SITE PLAN NO.

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

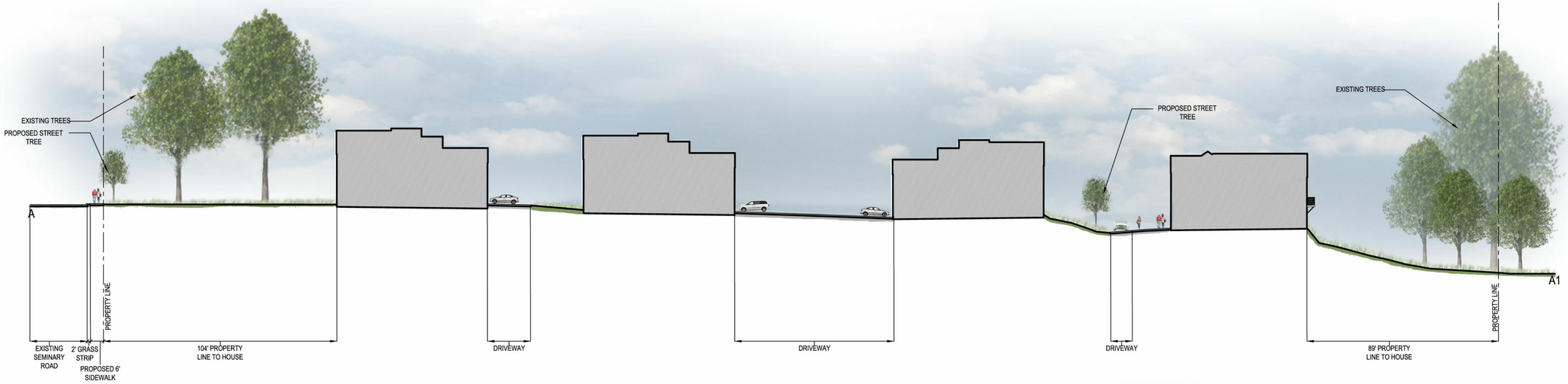
DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

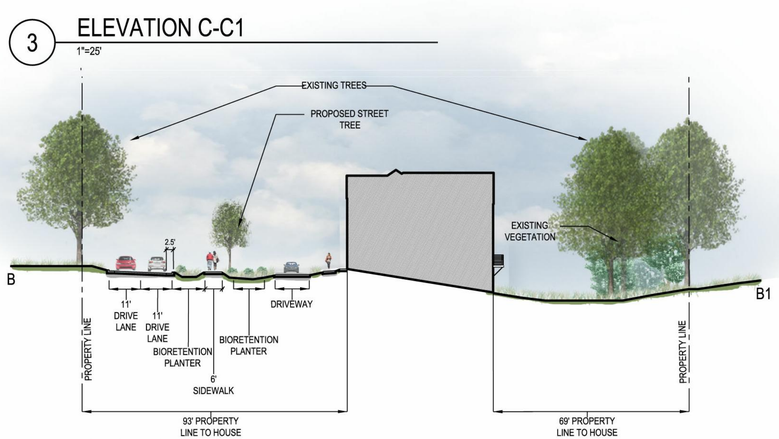
SHEET 35

FILE No. 12811

Urban, Ltd. - z:\JOBS\Seminary Road\Preliminary Site Plan\12811-XX-LANDSCAPE PLAN.dwg [Street Tree Tabulations] August 01, 2017 - 11:02am intern002

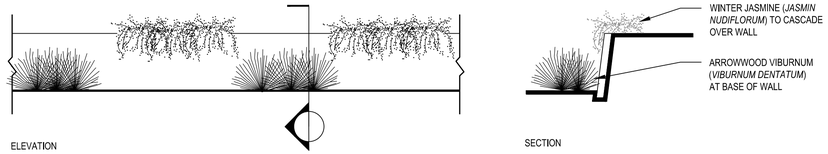


1 SECTION A-A1
1"=25'

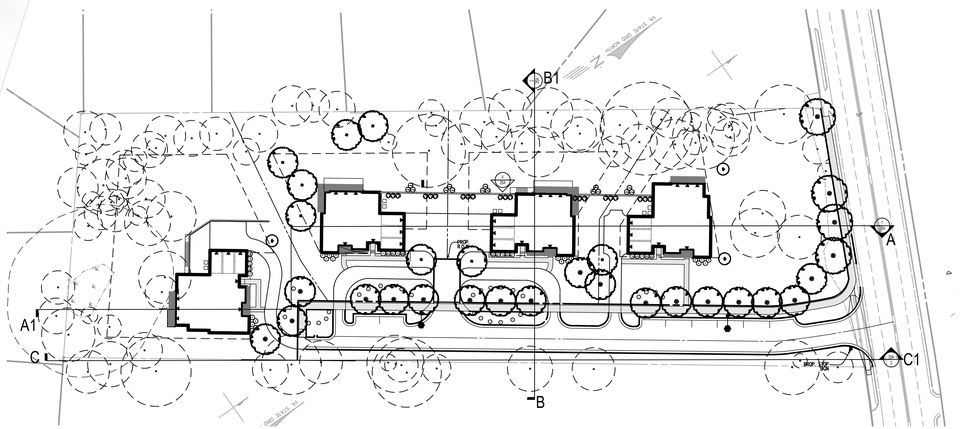


3 ELEVATION C-C1
1"=25'

2 SECTION B-B1
1"=25'



4 TYPICAL RETAINING WALL PLANTING
1"=10'



GRAPHIC SCALE
25 0 12.5 25 50 100
(IN FEET)
1 in. = 25 ft.

NOTES:
1. THE APPLICANT/DEVELOPER SHALL CALL ALEXANDRIA ARCHAEOLOGY IMMEDIATELY (703-746-4399) IF ANY BURIED STRUCTURAL REMAINS (WALL FOUNDATIONS, WELLS, PRIVIES, CISTERNS, ETC.) OR CONCENTRATIONS OF ARTIFACTS ARE DISCOVERED DURING DEVELOPMENT. WORK MUST CEASE IN THE AREA OF THE DISCOVERY UNTIL A CITY ARCHAEOLOGIST COMES TO THE SITE AND RECORDS THE FINDS. THE APPLICANT/DEVELOPER SHALL NOT ALLOW ANY METAL DETECTION TO BE CONDUCTED ON THE PROPERTY, UNLESS AUTHORIZED BY ALEXANDRIA ARCHAEOLOGY.
2. NO KNOWN FLOODPLAINS RESOURCE PROTECTION AREAS, ASSOCIATED BUFFERS OR EXISTING STORMWATER FACILITIES EXIST ON THIS SITE. HOWEVER, AN AREA OF WETLANDS IS LOCATED OUT OF THE SOUTHERN BOUNDARY OF THE SITE WHICH INCLUDES A 50' VEGETATED AREA AS SHOWN ON THIS SHEET.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-21-17
08-01-17

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COMMONWEALTH OF VIRGINIA
Kevin J. Tankersley
Lic. No. 983
06/09/17
LANDSCAPE ARCHITECT

LANDSCAPE PLAN
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
SCALE: 1"=25' C.I.= 2' DATE: AUGUST, 2017

SHEET 36

FILE No. 12811

Urban, Ltd. - z:\JOBS\Seminary Road\Preliminary Site Plan\12811-XX-LANDSCAPE PLAN.dwg [Site Sections] August 01, 2017 - 11:02am intern002

NOTES

1. THE PROPERTIES DELINEATED ON THIS PLAT ARE LOCATED ON CITY OF ALEXANDRIA TAX ASSESSMENT MAPS 040.02-04-03 AND 040.02-04-04 AND ARE CURRENTLY ZONED R-20.

2. APPLICANT:
   3834 SEMINARY, LLC
   20072 BLACKWOLF RUN PLACE
   ASHBURN, VA 20147

   OWNERS:
   KEATING F. CARRIER, TRUSTEE
   DEVON A. SCHREINER, TRUSTEE
   9126 TAYLOR ST.
   MANASSAS, VA 20110

3. BOUNDARY INFORMATION SHOWN HEREON WAS DERIVED FROM AN ALTA/ACSM LAND TITLE SURVEY, PREPARED BY URBAN, LTD., AND DATED DECEMBER 8, 2012.

SURVEYOR'S CERTIFICATE

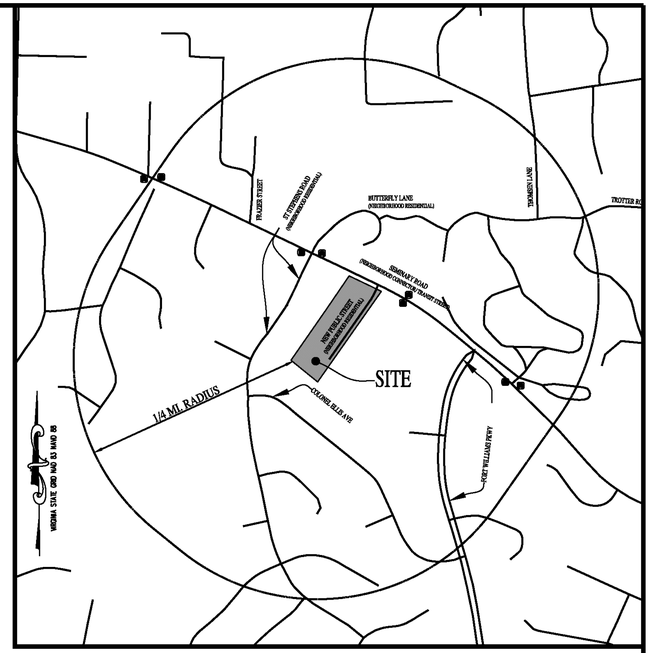
I HEREBY CERTIFY THAT I HAVE CAREFULLY SURVEYED THE PROPERTY DELINEATED BY THIS PLAT, AND THAT IT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF; THAT THIS IS A SUBDIVISION OF ALL OF THE LAND CONVEYED BY _____ TO _____ BY DEED DATED _____ AND RECORDED AMONG THE LAND RECORDS OF THE CITY OF ALEXANDRIA IN DEED BOOK _____ AT PAGE _____ AND IS WITHIN THOSE BOUNDARIES; AND THAT ALL REQUIRED MONUMENTS HAVE BEEN INSTALLED WHERE INDICATED; EXCEPT THOSE THAT WILL BE INSTALLED AT A LATER DATE BUT BEFORE COMPLETION OF THE PROJECT.

KEVIN P. O'CONNOR CLS #1967 — DATE

COMMONWEALTH OF VIRGINIA
0□0□□□□
KEVIN P. O'CONNOR
Lic. No 1967
LAND SURVEYOR

AREA TABULATION

AREA LOTS 1-4	111,254 SF OR 2.5540 ACRES
AREA STREET DEDICATION	24,944 SF OR 0.5727 ACRES
TOTAL AREA SUBDIVISION	136,198 SF OR 3.1267 ACRES
BEGINNING AREA TAX MAP 040.02-04-03	93,422 SF OR 2.1447 ACRES
-SUBDIVISION	93,422 SF OR 2.1447 ACRES
ENDING AREA TAX MAP 040.02-04-03	0 SF OR 0.0000 ACRES
BEGINNING AREA TAX MAP 040.02-04-04	42,776 SF OR 0.9820 ACRES
-SUBDIVISION	42,776 SF OR 0.9820 ACRES
ENDING AREA TAX MAP 040.02-04-04	0 SF OR 0.0000 ACRES



VICINITY MAP
SCALE: 1" = 500'

APPROVED

SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR — DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____

DIRECTOR — DATE

CHAIRMAN, PLANNING COMMISSION — DATE

DATE RECORDED _____

INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

PRELIMINARY SUBDIVISION PLAT
KARIG ESTATES
CITY OF ALEXANDRIA, VIRGINIA
SCALE: N/A DATE: FEBRUARY, 2017

Urban, Ltd.
4200 D Technology Court
Chantilly, Virginia 20151
Tel. 703.642.2306
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R.P.# 2017-07

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
05-06-16
10-14-16
04-14-17
06-09-17
07-21-17
08-01-17
- - -
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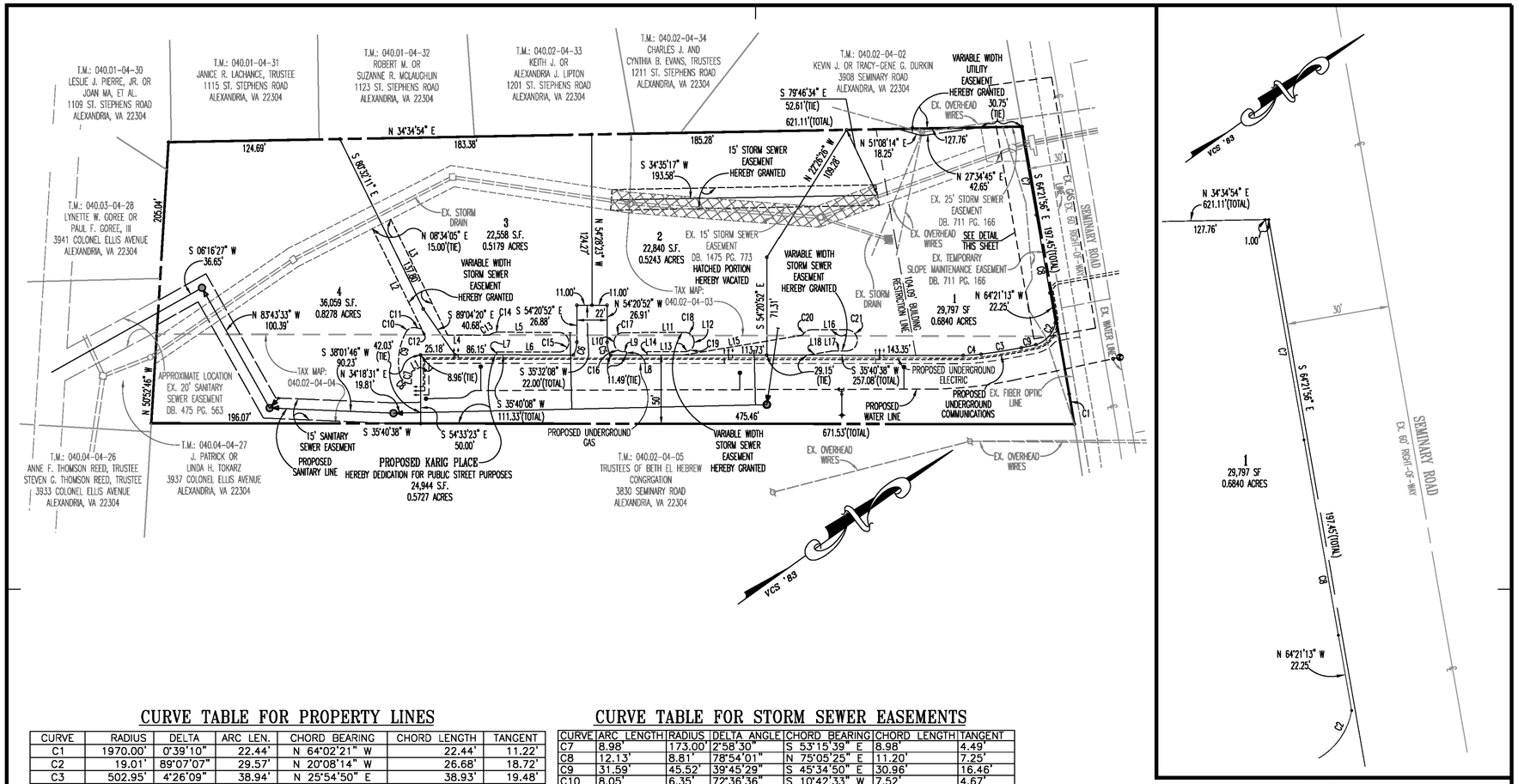
PLAT
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
SCALE: N/A C.I.= N/A DATE: AUGUST, 2017

SHEET 37

FILE No. 12811

Urban, Ltd. – J:\JOBS\Seminary Road\Preliminary Site Plan\12811-XX-PLAT.dwg [PLAT] August 01, 2017 – 11:02am intern002



DETAIL
SCALE: 1" = 20'

CURVE TABLE FOR PROPERTY LINES

CURVE	RADIUS	DELTA	ARC LEN.	CHORD BEARING	CHORD LENGTH	TANGENT
C1	1970.00'	0°39'10"	22.44'	N 64°02'21" W	22.44'	11.22'
C2	19.01'	89°07'07"	29.57'	N 20°08'14" W	26.68'	18.72'
C3	502.95'	4°26'09"	38.94'	N 25°54'50" E	38.93'	19.48'
C4	100.00'	7°07'26"	12.43'	N 31°41'37" E	12.43'	6.22'
C5	19.00'	29°40'40"	9.84'	S 69°11'10" E	9.73'	5.03'
C6	19.00'	29°36'34"	9.82'	N 39°32'37" W	9.82'	5.02'
C7	9990.41'	00°22'25"	65.15'	N 64°20'16" W	65.15'	32.58'
C8	8030.92'	00°24'41"	57.66'	N 64°21'13" W	57.66'	28.83'
C9	151.64'	04°05'36"	10.83'	N 23°55'11" E	10.83'	5.42'

CURVE TABLE FOR STORM SEWER EASEMENTS

CURVE	ARC LENGTH	RADIUS	DELTA ANGLE	CHORD BEARING	CHORD LENGTH	TANGENT
C7	8.98'	173.00'	2°58'30"	S 53°15'39" E	8.98'	4.49'
C8	12.13'	8.81'	78°54'01"	N 75°05'25" E	11.20'	7.25'
C9	31.59'	45.52'	39°45'29"	S 45°34'50" E	30.96'	16.46'
C10	8.05'	6.35'	72°36'36"	S 10°42'33" W	7.52'	4.67'
C11	3.96'	347.06'	0°39'13"	N 46°41'14" E	3.96'	1.98'
C12	0.62'	4.35'	8°08'13"	S 50°25'44" W	0.62'	0.31'
C13	1.90'	17.80'	6°07'06"	S 05°11'48" W	1.90'	0.95'
C14	5.34'	11.06'	27°38'49"	S 22°04'46" W	5.29'	2.72'
C15	22.24'	7.10'	179°35'14"	N 54°16'50" W	14.19'	1970.74'
C16	10.37'	6.48'	91°43'57"	N 80°40'06" E	9.30'	6.68'
C17	10.34'	6.48'	91°27'57"	S 09°27'54" E	9.28'	6.65'
C18	10.40'	6.48'	91°59'58"	S 80°32'06" W	9.32'	6.71'
C19	10.37'	6.48'	91°43'57"	N 09°19'54" W	9.30'	6.68'
C20	8.14'	7.63'	61°09'27"	S 05°23'48" W	7.76'	4.51'
C21	24.13'	7.68'	180°00'55"	N 54°30'29" W	15.36'	57919.95'

LINE TABLE FOR STORM SEWER EASEMENTS

LINE	BEARING	DISTANCE
L1	S 09°26'50" W	7.14'
L2	S 80°33'10" E	81.36'
L3	N 80°33'10" W	94.04'
L4	S 35°39'08" W	30.12'
L5	S 35°54'11" W	44.22'
L6	N 35°38'10" E	45.39'
L7	S 54°20'52" E	2.15'
L8	S 54°22'20" E	2.51'
L9	N 35°40'06" E	2.32'
L10	N 54°19'54" W	0.62'
L11	S 35°24'06" W	44.98'
L12	N 54°19'54" W	0.83'
L13	N 35°40'06" E	27.66'
L14	S 54°22'20" E	2.51'
L15	S 26°02'44" W	87.45'
L16	N 35°39'08" E	25.51'
L17	S 35°39'08" W	10.01'
L18	S 26°02'54" W	19.06'

0 50 100 150

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DEPARTMENT OF PLANNING & ZONING

DIRECTOR DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED _____

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

COMMONWEALTH OF VIRGINIA
0□□0□□□
KEVIN P. O'CONNOR
Lic. No 1967
LAND SURVEYOR

PRELIMINARY SUBDIVISION PLAT
KARIG ESTATES
CITY OF ALEXANDRIA, VIRGINIA
SCALE: 1" = 50' DATE: FEBRUARY, 2017

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PLAT
KARIG ESTATES
DSP-PRELIMINARY SITE PLAN
CITY OF ALEXANDRIA, VIRGINIA
SCALE: N/A C.I.= N/A DATE: AUGUST, 2017

SHEET
38

FILE No.
12811

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

February 22, 2017

PRELIMINARY JURISDICTIONAL DETERMINATION

Northern Virginia Regulatory Section
NAO-2017-00220 (3832/3834 Seminary Road)

Mr. Mike Ibrahim
3834 Seminary, LLC
20072 Blackwolf Run Place
Ashburn, VA 20147

Dear Mr. Ibrahim:

This letter is in regard to your request for a verification of a preliminary jurisdictional determination for waters of the U.S. (including wetlands) on property known as 3832 and 3834 Seminary Road, located on 3.12 acres, south of Seminary Road at 3832 and 3834 Seminary Road in City of Alexandria, Virginia.

The map entitled "3832 and 3834 Seminary Road", by TNT Environmental, LLC dated November 22, 2016 *(copy enclosed)* provides the location of waters and/or wetlands on the property listed above. The basis for this delineation includes application of the Corps' 1987 Wetland Delineation Manual and *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region*, and the positive indicators of wetland hydrology, hydric soils, and hydrophytic vegetation.

Discharges of dredged or fill material, including those associated with mechanized landclearing, into waters and/or wetlands on this site may require a Department of the Army permit and authorization by state and local authorities including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC) and/or a permit from your local wetlands board. This letter is a confirmation of the Corps preliminary jurisdiction for the waters and/or wetlands on the subject property and does not authorize any work in these areas. Please obtain all required permits before starting work in the delineated waters/wetland areas.

This is a preliminary jurisdictional determination and is therefore not a legally binding determination regarding whether Corps jurisdiction applies to the waters or wetlands in question. Accordingly, you may either consent to jurisdiction as set out in this preliminary jurisdictional determination and the attachments hereto if you agree with the determination, or you may request and obtain an approved jurisdictional determination.

"This preliminary jurisdictional determination and associated wetland delineation map may be submitted with a permit application."

Enclosed is a copy of the "Preliminary Jurisdictional Determination Form". Please review the document, sign, and return one copy to Ms. Theresita Crockett-Augustine either via email (**theresita.m.crockett-augustine@usace.army.mil**) or via standard mail to US Army Corps of Engineers, Northern Virginia Field Office at 18139 Triangle Plaza, Suite 213, Dumfries, Virginia 22026 within 30 days of receipt and keep one for your records. This delineation of waters and/or wetlands is valid for a period of five years from the date of this letter unless new information warrants revision prior to the expiration date.

If you have any questions, please contact Ms. Theresita Crockett-Augustine at (703) 221-9736 or **theresita.m.crockett-augustine@usace.army.mil**.

Sincerely,

Theresita Crockett-Augustine
Environmental Scientist
Northern Virginia Regulatory Section

Enclosures

AUGUSTINE.THERESITA.CROCKETT.1230827040
Digitally signed by AUGUSTINE.THERESITA.CROCKETT.1230827040
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USA, cn=AUGUSTINE.THERESITA.CROCKETT.1230827040
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CLAYTON C. TOCK
Lic. No. 036780
PROFESSIONAL ENGINEER
07/28/17

CORRESPONDENCE

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

DATE: AUGUST, 2017
SCALE: N/A
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It should be noted that even though man-made fills were encountered at one boring locations, man-made fills should be anticipated in other areas at the site especially near the existing house, especially in the vicinity of the existing houses and their basements.

The description of subsurface conditions presented herein is of a generalized nature, provided to highlight the major soils encountered. The test boring logs included in **Appendix C** should be reviewed for specific information regarding the conditions at individual test boring locations. The stratification lines shown on the test boring logs represent the conditions only at the actual test boring locations. Variations may occur and should be expected between test locations. The stratification lines represent the approximate boundary between subsurface materials and the actual transitions may be more gradual.

2.4 Groundwater Observations

All the borings were found dry during and at completion of the augering and sampling field operations, and 24 hours after completion of the field operations. The test borings were backfilled immediately after 24 hours for safety considerations.

Variations in groundwater conditions from those described herein should be anticipated at different locations across the site and at different times of the year. Furthermore, construction activities may impact existing groundwater conditions. We recommend that the Contractor evaluate the actual groundwater conditions at the time of construction to select appropriate construction techniques and identify dewatering requirements.

3.0 GLOBAL STABILITY EVALUATION

The slopes. Including the retaining wall on Lot 4, were analyzed based on the field and laboratory testing information and analysis, SPT "N" blow counts recorded and GDE significant experience in the area, utilizing GSTABLE software.

GDE analyzed the global stability along four profiles, representing the most critical profiles as follows:

- Section A-A, along the highest section of the retaining wall on Lot 4
- Section B-B, along another most critical section on Lot 4
- Section C-C, along the planned slope between Lots 3 & 4
- Section D-D, along the slope below Lot3

Based on the planned grading and the encountered soils in the areas of the two retaining walls between Lots 1&2, and 3&4, and the maximum planned heights of the retaining walls, there was no reason to conduct global stability analysis at these areas and the stability issues along these walls will be a matter of internal stability only and should be taken care of during the structural designs of these walls

Graphical representations of the four profiles are provided in **Appendix E**. Information obtained from the boring logs was used in developing subsurface soil profiles. The boring logs are attached in **Appendix C**.

The goal of the analysis was to evaluate the global stabilities of the retaining walls and assess the need for stabilization measures. The minimum acceptable factor of safety (FOS) against global slope failure is 1.50. The strength characteristics and other parameters of the in-situ ML soils are provided in the following Section.

SELECTION OF DESIGN PARAMETERS

The design parameters for the in-situ soils were conservatively estimated by our engineers based on the recorded SPT "N" values recorded, the laboratory test results performed, and GDE significant past experience with similar soils and geologic conditions. Since the Shelby tubes were disturbed and GDE could not evaluate the residual sheer of the highly plastic soils in the laboratory, GDE assumed a conservative value for the residual sheer based on our significant experience in this area over the years. Since the Shelby tubes were disturbed and GDE could not evaluate the residual sheer of the highly plastic soils in the laboratory, GDE assumed a conservative value for the residual sheer based on our significant experience in this area over the years.

The design parameters utilized in our slope stability analyses (unit weights, cohesion, and angle of internal friction) are summarized in the following table:

SOIL TYPE	SOIL PARAMETERS			
	MOIST WEIGHT (PCF)	SATURATED WEIGHT (PCF)	COHESION (PSF)	FRICTION ANGLE (DEGREES)
Fill – SM, SP-SC or more granular soils	125	130	0	30
Gravel, sand and clay terrace deposits-GP-GW-SP-SC	130	135	0	36
Potomac Clays (MH) – CH)- Residual Shear Strength	115	120	0	8
Potomac Sands SC	120	125	0	32
Sandy Silt (ML)	115	120	0	28

Table – Soil Parameters for Global Stability Analysis

STABILITY ANALYSIS

GDE utilized the computer program GSTABL7 to generate potential failure surfaces with randomly selected radii and centers for the profiles analyzed. The output files for selected runs of this program, including plots of the ten most critical failure circles for the profiles analyzed are presented in the Appendix. The slope stability analysis was performed based on the soil parameters summarized above.

Groundwater was not encountered in any of the test borings. However, conservatively, we assumed a relatively shallow groundwater table located on top of the fat clays/elastic silt layers and saturating one foot of the fat clay. The Potomac sands (SC) soils located within the deeper depths were assumed to be completely saturated.

The building loads were assumed to be equal to 200 psf, and the roadway loads were assumed to be 250 psf.

Below is a discussion of the results of the global stability analysis:

Section A-A – Lot 4 and Retaining Wall

Analysis of the selected profile along this section resulted in a minimum F.O.S against failure of 0.8, less than the required factor of safety of 1.25. Therefore, stabilization measures would be required.

Utilizing piers with a lateral capacity of 50K, spaced at 6-foto o.c., and extending 10 feet into the ground from existing ground surface, resulted in a minimum F.O.S of 1.3, greater than the 1.25 F.O.S. required.

Section B-B – Lot 4

Analysis of the selected profile along this section resulted in a minimum F.O.S against failure of 0.8, less than the required factor of safety of 1.25. Therefore, stabilization measures would be required.

Utilizing piers with a lateral capacity of 50K, spaced at 6-foto o.c., and extending 12 feet into the ground from existing ground surface, resulted in a minimum F.O.S of 1.3, greater than the 1.25 F.O.S. required.

Section C-C – Between Lots 3 & 4

Analysis of the selected profile along this section resulted in a minimum F.O.S against failure of 1.2, less than the required factor of safety of 1.25. Therefore, stabilization measures would be required.

Utilizing piers with a lateral capacity of 50K, spaced at 6-foto o.c., and extending 10 feet into the ground from existing ground surface along contour lines 240 & 242, resulted in a minimum F.O.S of 1.5, greater than the 1.25 F.O.S. required.

Section C-C – Between Lots 3 & 4- Upper Slope

Analysis of the upper slope of this profile above the piers as needed and stated in the previous analysis, resulted in a minimum F.O.S against failure of 1.8, greater than the required minimum factor of safety of 1.25. Therefore, no stabilization measures would be needed.

Section D-D – Lot 3

Analysis of the selected profile resulted in a minimum F.O.S against failure of 1.6, greater than the required minimum factor of safety of 1.25. Therefore, no stabilization measures would be needed.

Based on the above, GDE provided an outline of the locations of the proposed piers as shown on a copy of the site plan in **Appendix E**. No other stabilization measures would be needed.

The piers have to be structurally designed by GDE or others at a later time. GDE recommends that the piers have a minimum diameter of 3 feet to allow for proper inspection of the bottom of the piers.

4.0 RECOMMENDATIONS

4.1 Site Preparation and Earthwork

The construction areas including building pads, roadway, retaining walls, and driveways, should be stripped of trees, vegetation, topsoil organic matter, soft soils and any other unsuitable materials such as undocumented man-made fill. The removed soils should e replaced with approved controlled fill.

Additionally, fat clays (CH) and elastic silt (MH) soils, if encountered at the subgrade elevations for footings and slabs, have to be excavated depending on their depth below the planned subgrades for footings and slabs, and for roadways, as discussed in following sections in this report. The excavated soils should be replaced with approved controlled fills.

Once the unsuitable soils/materials are removed and prior to fill placement, the stripped subgrades should be observed by a GDE engineer or his qualified representative and proofrolled, if possible, by a minimum 10-ton loaded, rubber-tired truck to identify any possible loose or soft areas that may need to be removed. All soft and loose soils should be removed as directed by GDE engineer or a qualified representative to suitable-bearing subgrade. Fill placement may then proceed.

Controlled fill placement should extend laterally beyond the structure footprint a minimum distance of 5 feet at subgrade elevation or depth of fill, whichever is greater. The fill should be placed at a 3H:1V slope of shallower. Controlled fill for the building pads should be placed to an elevation 8 inches below the floor slab-on-grade. Footing trenches for the houses should be excavated after the building pads have been properly prepared.

The terrace deposit soils (GP-GW, SP-SC & SC) soils are suitable for use as controlled fill/backfill subject to moisture adjustment at the time of construction. However, soils classified as elastic silt or fat clays (MH & CH), and other soils classified as silt and clay (CL & ML) with liquid limit and plasticity index greater than 40 & 15, are not suitable for use as controlled fill. If off-site borrow soils will be needed for use as controlled fill for the building pads. GDE recommends using soils classified as gravel, silty gravel, clayey gravel, sand, clayey sand and silty sand (GW, GP, GM, GC, SW, SP, and SM). Soils classified as clays/silts (CL and ML) to be used as controlled fills/backfills are subject to the following restrictions:

Liquid Limit	$\leq$40
Plasticity Index	$\leq$15

Controlled fills along the planned slopes should be classified as silty sand and/or clayey sand (SM & SC) or more granular. All controlled fill soils should be free from topsoil, organics, and other unsuitable materials, and should not contain rock fragments greater than 4 inches in their greatest dimension.

Controlled fill should be placed in loose horizontal lifts of maximum 10 inches thick, and compacted uniformly with the proper equipment. Controlled fill should be compacted to at least ninety-five percent (95%) of the maximum dry density as established by ASTM D-698, AASHTO T-99 or VTM-1 test methods. Moisture content of the fill soils should be maintained within plus or minus two (±2) percentage points of the optimum moisture content to facilitate efficient compaction.

An engineering technician working under the supervision of the Geotechnical Engineer should observe site preparation and earthwork, and test controlled fill compaction for building pads, roadway and driveways. The earthwork should be performed under the supervision of and to the satisfaction of the Geotechnical Engineer.

4.2 Demolition of Existing Structures

All existing structures including footings, slabs, basement walls, driveways, and utilities should be removed from all proposed building pads, roadways and driveways, including 5-foot offsets. All soils undercut below the planned grades should be replaced with controlled fill.

Any water well(s) should be abandoned and sealed as per the Fairfax County and State Health Department regulations. The demolition of existing buildings and other structures should be carried out under the supervision of the Geotechnical Engineer of Record.

4.3 Groundwater

Based on our field observations, and the anticipated depth of excavations, we do not anticipate that groundwater table will be encountered during grading operations and utility excavations. However, perched water conditions should be anticipated, especially if excavation are carried out in wet seasons or following prolonged periods of precipitation.

It is GDE professional opinion that if perched water is encountered, typical dewatering measures such as diversion ditches, interceptor drains, sump pits and pumps will be sufficient as dewatering measures.

4.4 Excavations

Typical excavation equipment such as loaders, excavators, dozers and backhoes can be utilized to excavate soils on this site. Hoe-ramming and/or blasting is not anticipated to be needed on this site.

Temporary excavations for utilities should be made with 1H:1V or flatter side slopes in accordance with applicable local and OSHA excavation standards detailed in 29 CFR, Part 1926, and should be adequately protected against sudden cave-in or sloughing by using steel trench boxes or other measures. The project contractor is responsible for worker safety in and around excavations.

4.5 FOUNDATIONS

4.5.1 Shallow Foundations

Shallow foundations (continuous and spread footings) are adequate for the support of the proposed buildings. The footings should be supported on undisturbed, suitable-bearing naturally occurring soils or on controlled fill. The footings should not be directly supported on on-site fat clays or elastic silts (CH & MH), or on silts and clays (ML & CL) with liquid limit and plasticity index greater than 45 and 20, respectively, unless these soils are at least 4 feet below the exterior finished grade, as stated in Section 4.5.2 below.

Continuous footings that are partially located in fill and partially in undisturbed soil formation, should be designed as grade beams, 5 feet on either side of the transition. The column footings, in similar circumstances, should be extended into the underlying virgin soils.

The footings may be sized and designed on the basis of a net allowable bearing pressure of 3,000 psf, subject to the observations and approval of soil conditions at the bottom of footing excavations for suitable soil bearing by the Geotechnical Engineer. The minimum width requirements of foundations should be based on the International Residential Code (IRC) 2012. However, we recommend that the minimum footing width be 18 inches for continuous wall footing, and 30 inches for column footings.

Footing excavations should not be left open for long periods, and should be protected to prevent water and loose soil from entering the excavation. If the soil in excavations becomes softened by water, the soft soil should be removed before concrete placement. If concrete could not be placed shortly after excavating footing trenches due to inclement weather conditions or any other circumstances, the bottom of the footing excavations and trenches should be protected by undercutting 3 inches and placing a 3-inch thick lean-mix concrete work mat.

4.5.2 Depth of Footings

The embedment depth of footings should be governed by the minimum depth requirements for protection against frost heave in accordance with the International Residential Code (IRC 2012). The depth of frost in Northern Virginia is approximately 24 inches. Therefore, the footings should be embedded at least 24 inches below the lowest adjacent exterior finished grade.

The footings should not be supported on soils classified as fat clays and elastic silts (CH & MH), or on silts and clays (ML & CL) with liquid limit and plasticity index greater than 45 and 20, respectively. If these soils are encountered, the footings can bear on these soils provided they be embedded at least 4 feet below the adjacent exterior finished grades. Alternatively, these soils should be excavated in their entirety, or to a minimum depth of 4 feet below the adjacent exterior finished grades, whichever occurs first and replaced with controlled fill. Backfill around and above the footing should satisfy the controlled fill requirements described in Section 4.1 'Site Preparation and Earthwork'.

4.5.3 Anticipated Settlements

The footings, if designed on the basis of recommended allowable bearing pressures, are expected to experience a total settlement of less than 1 inch with differential settlement between adjacent walls or columns limited to ½-inch over a 30-foot span.

FULL GEOTECHNICAL ANALYSIS HAS BEEN PROVIDED UNDER SEPARATE COVER.

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COMMONWEALTH OF VIRGINIA — Clayton C. Tock — Lic. No. 036780 — PROFESSIONAL ENGINEER — 08-01-17

GEOTECHNICAL RECOMMENDATIONS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: N/A — C.I.= N/A — DATE: AUGUST, 2017

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4.6 Below-Grade Walls

4.6.1 Wall Design

Below-grade walls should be designed based on the soil type to be backfilled against the walls. In the drainage zone immediately behind the wall, the wall should be backfilled with granular soils classified as sandy silt (ML), silty sand (SM), clayey sand (SC) or more granular. The maximum wall heights is 9 feet with maximum 8 feet of backfill heights. Depending on the soil types to be used to backfill the basement walls, the walls can be designed as shown in the following table in accordance with the 2012 IRC:

BACKFILL MATERIAL	Wall Thickness (in)*	Vertical Reinforcement*
GW, GP, SW, & SP	8	#4 at 32 inches O.C.
GM, GC, SM, SM-SC, and ML	8	# 4 at 20 inches O.C.
SC, MH, ML-CL, and CL	8	# 4 at 16 inches O.C.

* Wall thickness and reinforcement are based on the assumption that proper drainage measures, as discussed in this report, are incorporated in the design and construction of below-grade walls.

Generally, considering the on-site soil classification, GDE recommends that the walls be reinforced with minimum vertical reinforcement of #4 at 20 inch O.C.

Below-grade walls should be backfilled with granular soils such as sandy silt, silty sand, clayey sand (ML, SM, & SC) or more granular that are free draining soils. The liquid limit and plasticity index of the backfill soils should not exceed 40 and 15, respectively. Equivalent steel bars can be used instead of the ones given in the above table. Please refer to the 2012 IRC.

Another way to design the walls is to use a lateral equivalent hydrostatic pressure of 45 pcf provided that the walls are backfilled with granular soils such as sandy silt (ML), silty sand (SM) or more granular, and that proper drainage measures are incorporated in the design. If drainage measures are not implemented, the wall should be designed using an equivalent hydrostatic pressure of 60 pcf.

GDE recommends that the walls be designed and constructed with adequate drainage to prevent the development of hydrostatic pressures in the backfill. Heavy compaction and other construction equipment should not operate closer than 5 feet to the walls. The backfill in this zone should be compacted with small vibratory compaction equipment such as tampers or walk-behind rollers to reduce any potential damage to the wall.

GDE also recommends that the concrete to be used in the construction of basement walls has a 28-day compressive strength of at least 3,000 pounds per square inch (psi).

4.6.2 Waterproofing/Damp-Proofing

The following recommendations are provided for waterproofing/damp proofing of below-grade walls and the installation of peripheral drainage. All drains should be daylighted at an appropriate location, or into adjacent storm manholes. The drain and outfall locations should be shown on the construction plans. If outfall pipes cross any property lines, they should be placed in recorded drainage easements. Based on the proposed basement floor elevations and planned grading, the basements are designed as both walk-out basements and in-ground basements. The peripheral basement drains can be discharged by gravity for walk-put basements and by pumping for in-ground basements to appropriate locations.

Recommendations for basement drainage by gravity and pumping are presented below. Typical construction details are provided in **Appendix F**.

4.6.2.1 Drainage by Gravity

- Install 2-inch diameter bleeder pipes in the upper half of the footings at 8-foot intervals.
- An exterior tile drain (perforated 4-inch diameter PVC pipe) should be installed in approximately 18 inches of VDOT No. 57 gravel along the footings with at least 2 inches of gravel below the pipe. The gravel filter should be completely covered with a non-woven geotextile fabric (AOS #70 Sieve, Gradient Ratio 2 or less), to minimize the potential for migration of fines into the filter.
- The floor slab subgrade should be shaped to slope uniformly towards the inner periphery of the basement. The bleeder pipes should be covered with sufficient amount of gravel and should be connected with the gravel blanket below the slab (average thickness of 4 inches) which is to be placed for lateral drainage and as a capillary barrier.
- The exterior faces of below-grade walls should be coated with bituminous material or other damp proofing/water proofing coating approved by Fairfax County. Alternatively, the walls should be treated with a penetrating concrete sealer, such as DECO-20 or an equivalent product, as a water proofing agent.
- Below-grade walls should be backfilled as recommended in Section 4.6.
- Fine-grained soils should be placed as a "cap" above the wall backfill to reduce infiltration of surface water into the backfill. The cap should be 12 to 18 inches thick and should be graded to slope away from the house.

- Surface grades within 10 feet of houses should slope away from the house a minimum of five percent (5%) to prevent ponding and to reduce seepage of water into basement wall backfill soils. Yards should be graded with slopes no flatter than three percent (3%) to reduce the potential for wet yards.
- The roof drains must discharge beyond the limits of excavations for basement walls.

4.7 Floor Slab-on-Grade

The subgrade soil for floor slabs-on-grade should be proof-rolled and prepared as described in Section 4.1. A free-draining, granular blanket of crushed stone or gravel should be placed under the slab for lateral drainage and as a capillary barrier. This blanket should be at least 4 inches thick. A 6-mil thick impermeable plastic membrane (vapor barrier) should be placed between the granular blanket and the overlying concrete slab. The entire slab should be reinforced with a welded wire fabric.

Column points and periphery walls should be isolated from the slab to minimize the possibility of the slab cracking due to relative displacement. The slab should be designed based on a modulus of subgrade reaction "k" of not more than 200 psi/inch.

Slabs-on-grade floors should not be directly supported on on-site fat clays and/or elastic silts (CH & MH)). Since these soils are anticipated to be encountered at or below the planned slab subgrades(s), they should be removed to a minimum depth of 2 feet below subgrade elevation and replaced with controlled fill as approved by the Geotechnical Engineer of Record.

4.8 Pavement

The pavements for this project, including curbs and gutters, should be constructed on subgrade soils consisting of suitable-bearing, naturally occurring soils or controlled fill. The pavement should not be directly supported on elastic silt, fat clay (MH or CH) and/or on silts and clays with LL>45 or PI>20. If these soils are encountered at or below the subgrade elevation for pavements, they should be removed to a minimum depth of 2 feet below pavement subgrade elevation and replaced with controlled fill approved by the Geotechnical Engineer.

Pavement thickness is typically designed based the results of the California Bearing Ratio (CBR) tests under soaked conditions. For preliminary design purposes, an estimated soaked CBR value of 10 can be assumed for on-site soils. Greater than typical pavement thickness should be anticipated since it is anticipated that the roads would be subjected to heavy truck loading during house construction. It should be noted that the pavement section designed for post-construction traffic may not be sufficient to support the heavy loading imposed by construction traffic, which may cause significant damage to the pavement requiring significant maintenance cost during and after completion of the project

construction. Therefore, we recommend enhancing the pavement section to account for heavy construction traffic prior to project completion.

Controlled fill placed to six (6) inches below the pavement subgrade should be compacted to at least ninety-five percent (95%) of the maximum density as determined by ASTM D-698, AASHTO T-99 or VTM-1 test methods. The top six (6) inches of the pavement subgrade, whether it consists of controlled fill or natural soil, should be compacted to one hundred percent (100%) of the maximum dry density. Moisture content of the controlled fill and/or subgrade soil should be within plus or minus two (±2) percentage points of the optimum moisture content at the time of compaction.

4.9 Retaining Walls

As stated earlier in this report, three retaining walls are planned on this site. The retaining walls have not been designed as of the date of this report. However, we understand that the walls most probably will be designed as a mechanically-stabilized segmental block walls.

The walls should be backfilled with the on-site, granular soils classified as silty sand (SP-SC-SC-GW-GP) or more granular soils. If imported soils from off-site sources would be needed, GDE recommends that imported soils be granular soils classified as SM, SW, SP, GM, GW and GP. However, the type of soil backfill should be ultimately provided by the wall designer. In general, the following soil parameters can be used to design the retaining walls:

Material	*Moist Unit Weight (pcf)*	*Saturated Unit Weight (pcf)*	*Cohesion (psf)*	*Angle of internal friction (degrees)*
On-site Granular Soils SP-SC, SC, GW- GP & GC	*125*	*130*	*0*	*32*
Foundation soil	*125*	*130*	*0*	*32*

The retaining wall designer should provide all the specifications required to construct the walls. However, in general, the following are GDE recommendations for the design and construction of the retaining walls:

- The wall footings should bear on undisturbed, suitable-bearing soils or on controlled structural fill.

- If the walls are designed as cantilever reinforced concrete walls, the walls should not be supported on silt/clay soils with liquid limit (LL) and plasticity index (PI) greater than 40 and 15, respectively.
- The wall footings may be designed based on a maximum allowable soil bearing pressure of 3,000 psf.
- Granular permeable soils should be used as backfill for the retaining wall. The backfill soils should be placed in loose, maximum 8-inch thick horizontal layers and compacted to at least ninety-five percent (95%) of the maximum density as determined by ASTM D-698, AASHTO T-99 or VTM-1 test methods.
- Appropriate drainage measures should be provided behind the walls to relieve hydrostatic pressure. These measures may include providing two-inch diameter weep holes in the wall located at 8 feet on center, and 12-inch thick gravel filter zone behind the wall along the height of the wall, except the top 12 to 18 inches. The filter zone should be wrapped around with a filter fabric with an ASO=70 or less, to allow dissipation of excess hydrostatic pressure. However, the drainage measures should ultimately be determined by the wall designer based on the wall type.
- Heavy compaction and construction equipment should not operate closer than 5 feet to the wall, so as not to impose additional pressure on the wall which may lead to damaging the wall. Small vibratory rollers, such as hand held tampers or walk-behind rollers should be used to compact the fill in the vicinity to the wall.

4.10 Drilled Piers

As stated earlier, drilled piers will be needed to stabilize the designed slopes. The piers will extend to 10 feet and 12 feet below the existing surface grades. GDE recommends that the piers be at least 3-foot in diameter. The pier excavation need to be observed by GDE engineer or his qualified representative prior to installation.

Based on the encountered subsurface soils, we do not anticipate that casing would be needed. However, we recommend that the drilled holes for the piers be inspected and constructed immediately following completion and not be left open overnight. Concrete can be poured directly into the holes since they are shallow in depth. However, GDE recommends that the concrete not fall greater than 5 feet into the bottom of the hole.

Additionally, GDE recommends that the concrete for the piers be tested during the concrete pours and concrete cylinders be fabricated and tested to determine the concrete compressive strength.

GeoDesign & Engineering, Inc.
KNOWLEDGE IS OUR FOUNDATION

May 18, 2017

3834 Seminary, LLC
20072 Blackwolf Run Place
Ashburn, Virginia 20147

Attention: Mr. Mike Ibrahim

Reference: Executive Summary
Seminary Road Property @
3832 & 3834 Seminary Road
Alexandria, Fairfax County, Virginia
GDE Project No.: E16011

Dear Mr. Ibrahim:

As requested, below is a brief summary of the geotechnical study that Geo Design & Engineering, Inc. (GDE), performed at the above-referenced project site:

- Drilled borings at the site with Standard Penetration Testing (SPT) and collected soil samples for classification and analysis
- Performed laboratory testing analysis on representative samples of the soils collected
- Performed analysis and provided recommendations for the design and construction of footings, slabs, below-grade walls, waterproofing/damp-proofing, …etc.
- Provided recommendations for the design and construction of the planned retaining walls.
- Provide preliminary recommendations for the design and construction of the planned street pavement. The final design will be based on tested on the average California Bearing Ratio (CBR) values of the pavement subgrade soils
- Performed stability analysis at several profiles of the most critical profiles of re-graded slopes and/or slopes/retaining walls/buildings
- Provide recommendations for stabilization measures of the planned slopes including drilled pier construction

Should you have any questions, please contact us at your convenience

Sincerely,
Geo Design & Engineering, Inc.

COMMONWEALTH OF VIRGINIA
MOHAMAD ABDEL-KASSEM
No. 042431
PROFESSIONAL ENGINEER

Mohamad Abdel-Kassem, P.E., Principal

5.0 CONSTRUCTION CONSIDERATIONS

5.1 Construction Quality Control

In order to evaluate in-situ soil conditions observed during this study and those developed during construction stage versus the design plans and specifications, the following construction items should be observed/tested by a certified soils technician working under the supervision of the Geotechnical Engineer:

1. Controlled fill placement and compaction;
2. Footing and floor slab excavations;
3. Below-grade walls
4. Waterproofing/damp-proofing
5. Installation and backfill of Utility Trenches
6. Construction of the pavements and C & G
7. Retaining wall construction and all its elements
8. Pier excavation and installation
9. Other inspections/observations as required

5.2 Responsibility of Developer

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P." This document was issued to better allow for the safety of workers entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavations or footing excavations, be constructed in accordance with the new OSHA guidelines. It is our understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the Contractor could be liable for substantial penalties.

The Contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The Contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the Contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in all local, state, and federal safety regulations.

We are providing this information solely as a service to our client. GDE does not assume responsibility for construction site safety or the Contractor's or other parties' compliance with local, state, and federal safety or other regulations.

FULL GEOTECHNICAL ANALYSIS HAS BEEN PROVIDED UNDER SEPARATE COVER.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO.
DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

No.	DATE	REVISIONS
		DESCRIPTION

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-17-17
08-01-17

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CLAYTON C. TOCK
Lic. No. 036780
PROFESSIONAL ENGINEER
08-01-17

GEOTECHNICAL RECOMMENDATIONS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

C.I.= N/A
SCALE: N/A
DATE: AUGUST, 2017

SHEET
41

FILE No.
12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-19-GEOTECH.dwg [CORRESPONDENCE (4)] August 01, 2017 - 11:03am intern002

5.3 City Requirements

1. All construction involving problem soils should be performed under the full-time observation of the Geotechnical Engineer of Record.

2. The Geotechnical Engineer of Record should furnish a written opinion to the City of Alexandria as to whether or not the work has been performed in accordance with the approved plans and his recommendations for the units to be occupied prior to the issuance of residential use permits.

6.0 REPORT LIMITATIONS

This report has been prepared for the exclusive use of **3834 Seminary, LLC** and its consultants for the specific application to **Seminary Road Property** project as described herein and located in Fairfax County, Virginia.

The recommendations submitted are based on the available subsurface information obtained by GDE and details concerning the proposed construction provided by the client. After the project plans and specifications are finalized, GDE should be retained and provided the opportunity to review the final design plans and specifications to evaluate that our engineering recommendations have been properly incorporated into the project documents. If there are any revisions to the proposed construction for this project or if deviations from the subsurface conditions described in this report are encountered during construction, we should be notified immediately to determine if changes in our geotechnical engineering recommendations are required. If GDE is not retained to perform these functions, GDE will not be responsible for the impact of any change of conditions on the geotechnical recommendations for the project.

GDE warrants that the findings, preliminary recommendations, specifications, or preliminary professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

GEODESIGN & ENGINEERING, INC.
KNOWLEDGE IS OUR FOUNDATION

June 7, 2017

3834 Seminary, LLC
20072 Blackwolf Run Place
Ashburn, Virginia 20147

Attention: Mr. Mike Ibrahim

Reference: Infiltration Testing
Seminary Road Property
Alexandria, Virginia
GDE Project No.: E16011

Dear Mr. Ibrahim:

Geo Design & Engineering, Inc. (GDE) appreciates your confidence in its services and is pleased to submit this report of subsurface exploration and infiltration testing for bio-retention ponds and porous pavers areas planned at the above-referenced project.

The project Civil Engineer, Urban, provided GDE with a copy of the site plan showing the locations of the bioretention ponds and the porous pavers areas. Briefly, the following is planned:

1. Six bio-retention areas labeled A, B, C, D, E & F. Bio-retentions A, B & C are designed to be 5 feet deep, and Bio-retentions D, E, & F are designed to be 5.3 feet deep.
2. Three permeable paver areas labeled A, B & C. they are all designed to be 3 feet deep

Based on our review of the site plan, and in accordance with the procedures established for testing and establishing infiltration rates, GDE engineers performed the following:

Exploratory Hole

GDE engineers performed initial exploratory test holes with a drill rig machine and hand augers in the middle of the planned bio-retention areas and permeable pavers areas. The exploratory test holes are typically augered to depths of that is a minimum of two feet (2 ft.) below the planned bio-retention ponds and permeable paver areas, respectively, as required. A total of six (6) test holes were augered for the bio-retention ponds, and a total of four (4) test holes were augered for permeable pavers areas B & C. Permeable pavers area A is located in fill behind a retaining wall and could not be constructed at the planned location and was not explored or tested. GDE has communicated as such to the project Civil Engineer.

The purpose of the exploratory test holes was to verify that neither groundwater nor bedrock exist within 2 feet below the bottom of the planned infiltration areas. GDE engineers did not encounter groundwater or bedrock within the depth explored. In addition, indications of a seasonal water table were not observed within the depth explored.

Infiltration Testing

Following completion of the exploratory test holes, GDE engineers augered two (2), 4-inch diameter holes on each side of each exploratory hole, to within 0-2 feet below the bottom of the infiltration area, in order to conduct infiltration testing. Four-inch (4-inch) diameter standpipes were installed in the test holes. The pipes were then filled with 2 feet of water and left to be soaked for 24 hours. Following the pre-soaking period of 24 hours, field infiltration tests were performed for a period of 4 hours. To conduct the infiltration tests, the pipes were re-filled with water to an initial water head of 2 feet and infiltration was measured each passing hour for the next four hours. The results of the infiltration tests and the average infiltration per hour for each location are as follows:

Table 1 - Summary of Infiltration Test Results – Bio-retention area "A"

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
1	1	0.72	0.60
	2	0.66	
	3	0.56	
	4	0.48	
2	1	0.78	0.60
	2	0.66	
	3	0.54	
	4	0.48	

Table 2 - Summary of Infiltration Test Results – Bio-retention area "B"

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
1	1	0.24	0.10
	2	0.12	
	3	0.12	
	4	0.0	
2	1	0.30	0.16
	2	0.18	
	3	0.12	
	4	0.06	

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Table 3 - Summary of Infiltration Test Results - Bio-retention area "C"

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
1	1	1.20	0.94
	2	0.96	
	3	0.86	
	4	0.72	
2	1	1.02	0.79
	2	0.84	
	3	0.74	
	4	0.57	

Table 4 - Summary of Infiltration Test Results - Bio-retention area "D"

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
1	1	2.04	1.60
	2	1.68	
	3	1.32	
	4	1.32	
2	1	1.92	1.62
	2	1.80	
	3	1.56	
	4	1.20	

Table 5 - Summary of Infiltration Test Results - Bio-retention area "E"

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
1	1	4.32	3.57
	2	3.60	
	3	3.36	
	4	3.00	
2	1	3.84	3.21
	2	3.36	
	3	2.88	
	4	2.76	

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Table 6 - Summary of Infiltration Test Results - Bio-retention area "F"

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
1	1	4.80	3.80
	2	4.08	
	3	3.36	
	4	3.00	
2	1	2.40	1.83
	2	1.92	
	3	1.56	
	4	1.44	

Table 7 - Summary of Infiltration Test Results – Permeable Pavers Area "B"

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
1-1	1	0.84	0.60
	2	0.60	
	3	0.48	
	4	0.48	
1-2	1	0.60	0.50
	2	0.54	
	3	0.48	
	4	0.36	

Table 8 - Summary of Infiltration Test Results - Permeable Pavers Area B"- Second Location

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
2-1	1	0.96	0.72
	2	0.72	
	3	0.66	
	4	0.54	
2-2	1	0.66	0.48
	2	0.54	
	3	0.36	
	4	0.36	

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Table 8 - Summary of Infiltration Test Results – Permeable Pavers Area "C"

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
1-1	1	6.00	5.20
	2	5.40	
	3	4.80	
	4	4.56	
1-2	1	4.80	3.0
	2	4.20	
	3	3.84	
	4	3.60	

Table 9 - Summary of Infiltration Test Results - Permeable Pavers Area "C"- Second Location

Location No.	Time (hr.)	Infiltration (in./hr.)	Average Infiltration for each test hole (in./hr.)
2-1	1	7.20	6.15
	2	6.60	
	3	5.40	
	4	4.80	
2-2	1	4.80	4.20
	2	4.32	
	3	4.08	
	4	3.60	

Based on the above, the following are the average infiltration rates for the bio-retention ponds and permeable paver areas:

Location	Average Infiltration (in/hr)
Bio-retention A	0.60
Bio-retention B	0.10
Bio-retention C	0.86
Bio-retention D	1.60
Bio-retention E	3.40
Bio-retention F	2.80
Permeable Paver Area B	0.54
Permeable Paver Area C	4.60

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Based on the above, Bio-retention Pond B and Permeable Paver Area A could not be constructed. The other infiltration areas can be designed based on the infiltration rates obtained.

It has been our pleasure serving you on this project. Should you have questions concerning this letter report or require additional information, please do not hesitate to contact us.

Very truly yours;

GEO DESIGN & ENGINEERING, INC.

COMMONWEALTH OF VIRGINIA
6-7-2017
MOHAMMAD J. KASSEM
PROFESSIONAL ENGINEER

Mohamad Abu-Kassem, P.E., Principal

Attachment: Exploratory Boring Location Plan & Boring Logs

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DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____
DIRECTOR — DATE
CHAIRMAN, PLANNING COMMISSION — DATE
DATE RECORDED _____
INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
06-06-16
10-14-16
04-14-17
06-09-17
07-17-17

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CLAYTON C. TOCK
Lic. No. 036780
PROFESSIONAL ENGINEER
08-04-17

GEOTECHNICAL RECOMMENDATIONS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: N/A
C.I.= N/A
DATE: AUGUST, 2017

SHEET
42

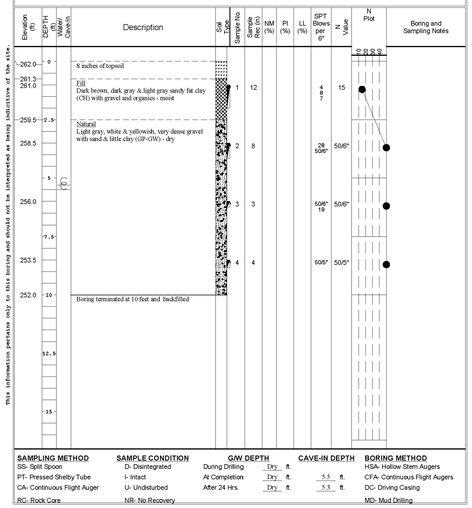
FILE No.
12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-19-GEOTECH.dwg [CORRESPONDENCE 42] August 01, 2017 - 11:03am intern002

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — **BORING NO:** EXP-1
LOCATION: Bio-Rention F — **PROJECT NO:** E16011
BORING METHOD: HSA — **HOLE DIA.(in.):** 6 — **HAMMER WT.(lbs.):** 140 — **FOREMAN:**
SURFACE ELEV (ft)+/-: 262 — **SAMPLING METHOD:** SS — **HAMMER DROP (in.):** 30 — **INSPECTOR:**
DATE STARTED: 3-7-2017 — **SAMPLER DIA (in):** 2-1/4 — **ROCK CORE DIA (in):** — **DATE COMPLETED:** 3-7-2017



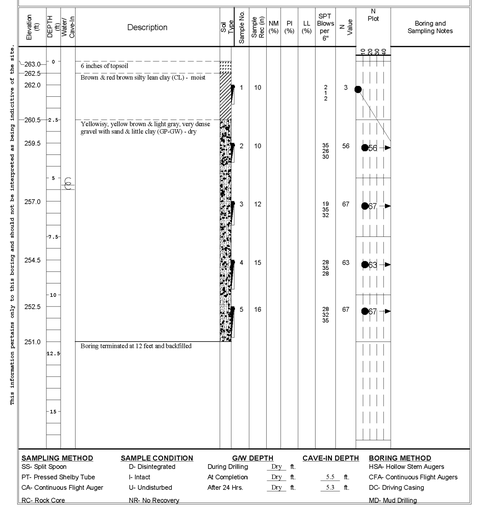
SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.	5.5	ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	Dry ft.	5.3	ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 1 **Geo Design & Engineering, Inc.**

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — **BORING NO:** EXP-2
LOCATION: Bio-Retention E — **PROJECT NO:** E16011
BORING METHOD: HSA — **HOLE DIA.(in.):** 6 — **HAMMER WT.(lbs.):** 140 — **FOREMAN:**
SURFACE ELEV (ft)+/-: 263 — **SAMPLING METHOD:** SS — **HAMMER DROP (in.):** 30 — **INSPECTOR:**
DATE STARTED: 3-7-2017 — **SAMPLER DIA (in):** 2-1/4 — **ROCK CORE DIA (in):** — **DATE COMPLETED:** 3-7-2017



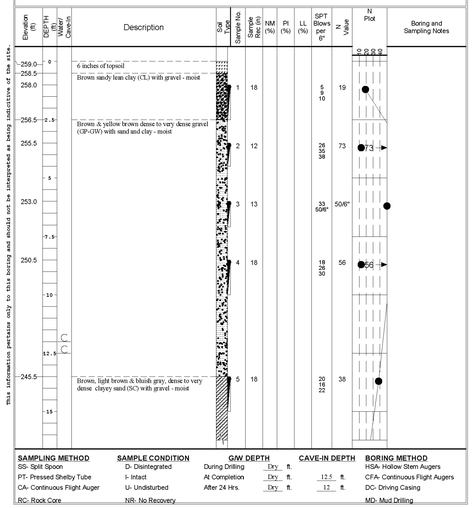
SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.	5.5	ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	Dry ft.	5.3	ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 1 **Geo Design & Engineering, Inc.**

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — **BORING NO:** EXP-4
LOCATION: Bio-Retention C — **PROJECT NO:** E16011
BORING METHOD: HSA — **HOLE DIA.(in.):** 6 — **HAMMER WT.(lbs.):** 140 — **FOREMAN:**
SURFACE ELEV (ft)+/-: 259 — **SAMPLING METHOD:** SS — **HAMMER DROP (in.):** 30 — **INSPECTOR:**
DATE STARTED: 3-8-2017 — **SAMPLER DIA (in):** 2-1/4 — **ROCK CORE DIA (in):** — **DATE COMPLETED:** 3-8-2017



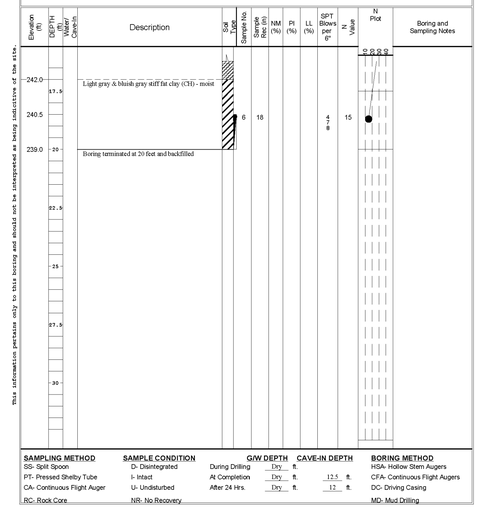
SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.	12.5	ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	Dry ft.	12	ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 2 **Geo Design & Engineering, Inc.**

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — **BORING NO:** EXP-4
LOCATION: Bio-Retention C — **PROJECT NO:** E16011
BORING METHOD: HSA — **HOLE DIA.(in.):** 6 — **HAMMER WT.(lbs.):** 140 — **FOREMAN:**
SURFACE ELEV (ft)+/-: 259 — **SAMPLING METHOD:** SS — **HAMMER DROP (in.):** 30 — **INSPECTOR:**
DATE STARTED: 3-8-2017 — **SAMPLER DIA (in):** 2-1/4 — **ROCK CORE DIA (in):** — **DATE COMPLETED:** 3-8-2017



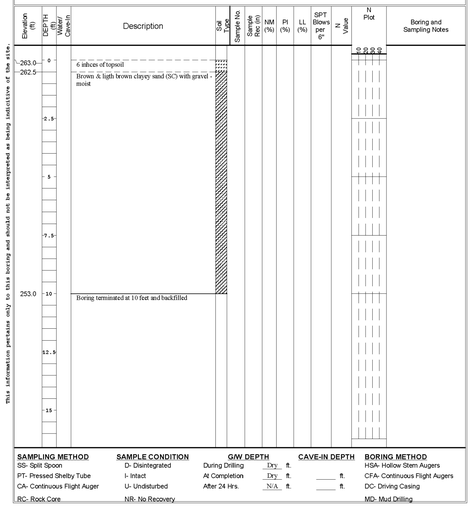
SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.	12.5	ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	Dry ft.	12	ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 2 of 2 **Geo Design & Engineering, Inc.**

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — **BORING NO:** EXP-5
LOCATION: Bio-retention B — **PROJECT NO:** E16011
BORING METHOD: Hand Augers — **HOLE DIA.(in.):** 3 — **HAMMER WT.(lbs.):** — **FOREMAN:**
SURFACE ELEV (ft)+/-: 263 — **SAMPLING METHOD:** Hand — **HAMMER DROP (in.):** — **INSPECTOR:**
DATE STARTED: 5-22-17 — **SAMPLER DIA (in):** 3 — **ROCK CORE DIA (in):** — **DATE COMPLETED:** 5-22-17



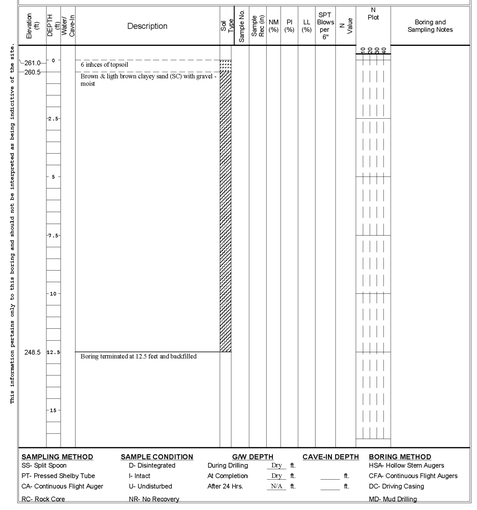
SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.		ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	N/A ft.		ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 1 **Geo Design & Engineering, Inc.**

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — **BORING NO:** EXP-6
LOCATION: Bio-retention A — **PROJECT NO:** E16011
BORING METHOD: Hand Augers — **HOLE DIA.(in.):** 3 — **HAMMER WT.(lbs.):** — **FOREMAN:**
SURFACE ELEV (ft)+/-: 261 — **SAMPLING METHOD:** Hand — **HAMMER DROP (in.):** — **INSPECTOR:**
DATE STARTED: 5-22-17 — **SAMPLER DIA (in):** 3 — **ROCK CORE DIA (in):** — **DATE COMPLETED:** 5-22-17



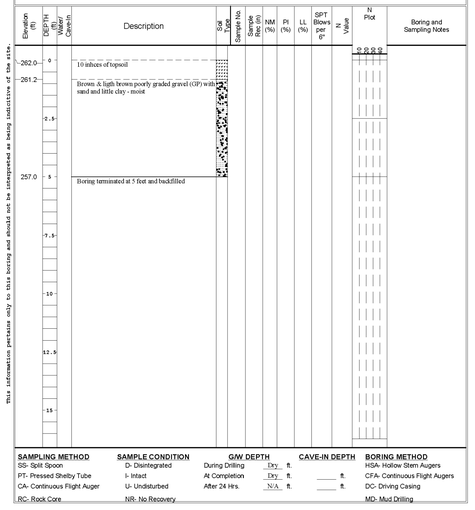
SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.		ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	N/A ft.		ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 1 **Geo Design & Engineering, Inc.**

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — **BORING NO:** EXP-7
LOCATION: See Permeable Paver Area C — **PROJECT NO:** E16011
BORING METHOD: Hand Augers — **HOLE DIA.(in.):** 3 — **HAMMER WT.(lbs.):** — **FOREMAN:**
SURFACE ELEV (ft)+/-: 262 — **SAMPLING METHOD:** Hand — **HAMMER DROP (in.):** — **INSPECTOR:**
DATE STARTED: 5-23-17 — **SAMPLER DIA (in):** 3 — **ROCK CORE DIA (in):** — **DATE COMPLETED:** 5-23-17



SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.		ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	N/A ft.		ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 1 **Geo Design & Engineering, Inc.**

FULL GEOTECHNICAL ANALYSIS HAS BEEN PROVIDED UNDER SEPARATE COVER.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025

DEPARTMENT OF PLANNING & ZONING

DIRECTOR — DATE

DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
SITE PLAN NO. _____

DIRECTOR — DATE

CHAIRMAN, PLANNING COMMISSION — DATE

DATE RECORDED _____

INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

PLAN DATE
06-06-16
10-14-16
04-14-17
05-09-17
07-17-17

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COMMONWEALTH OF VIRGINIA — CLAYTON C. TOCK — Lic. No. 038780 — PROFESSIONAL ENGINEER — 08-04-17

GEOTECHNICAL RECOMMENDATIONS

KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

CITY OF ALEXANDRIA, VIRGINIA

SCALE: N/A — C.I.= N/A — DATE: AUGUST, 2017

SHEET 43

FILE No. 12811

Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-19-GEOTECH.dwg [CORRESPONDENCE 43] August 01, 2017 - 11:03am intern002

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — BORING NO: EXP-8
LOCATION: See Permeable Paver Area C — PROJECT NO: E16011
BORING METHOD: Hand Augers — HOLE DIA.(in.): 3 — HAMMER WT.(lbs.): — FOREMAN:
SURFACE ELEV (ft)+/-: 262 — SAMPLING METHOD: Hand — HAMMER DROP (in.): — INSPECTOR:
DATE STARTED: 5-23-17 — SAMPLER DIA (in): 3 — ROCK CORE DIA (in): — DATE COMPLETED: 5-23-17

Elevation (ft)	DEPTH (ft)	Water Level (ft)	Description	Soil Type	Sample No	Sample Recovery	NM (%)	PI (%)	LL (%)	SPT Blows per 6"	N Value	N Plot	Boring and Sampling Notes
262.0	0		Fill Man-made fill, dark brown sandy lean clay- top 8 inhces classified as topsoil										
260.8	1.2		Brown & ligth brown poorly graded gravel (GP) with sand and little clay - moist										
257.0	5		Boring terminated at 5 feet and backfilled										

This information pertains only to this boring and should not be interpreted as being indicative of the site.

SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.	_____	ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	N/A ft.	_____	ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 1 **Geo Design & Engineering, Inc.**

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

PROJECT: Seminary Road Property — BORING NO: EXP-9
LOCATION: See Permeable Paver Area B — PROJECT NO: E16011
BORING METHOD: Hand Augers — HOLE DIA.(in.): 3 — HAMMER WT.(lbs.): — FOREMAN:
SURFACE ELEV (ft)+/-: 260 — SAMPLING METHOD: Hand — HAMMER DROP (in.): — INSPECTOR:
DATE STARTED: 5-24-17 — SAMPLER DIA (in): 3 — ROCK CORE DIA (in): — DATE COMPLETED: 5-24-17

Elevation (ft)	DEPTH (ft)	Water Level (ft)	Description	Soil Type	Sample No	Sample Recovery	NM (%)	PI (%)	LL (%)	SPT Blows per 6"	N Value	N Plot	Boring and Sampling Notes
260.0	0		8 inches of topsoil										
259.3	0.7		Brown & light brown clayey sand (SC) with gravel - moist										
255.0	5		Boring terminated at 5 feet and backfilled										

This information pertains only to this boring and should not be interpreted as being indicative of the site.

SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.	_____	ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	N/A ft.	_____	ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 1 **Geo Design & Engineering, Inc.**

Geo Design & Engineering, Inc.

Record of Subsurface Soil Exploration

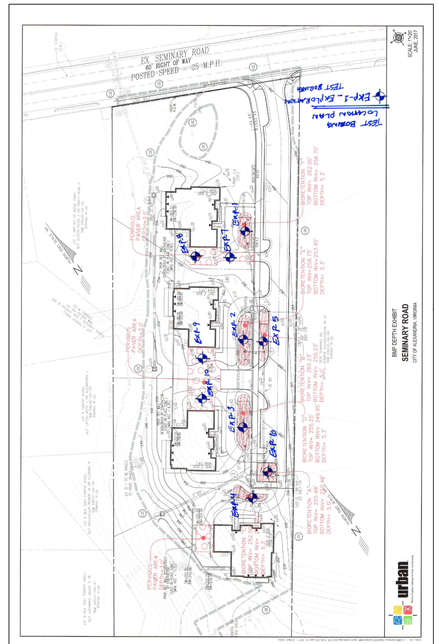
PROJECT: Seminary Road Property — BORING NO: EXP-10
LOCATION: See Permeable Paver Area B — PROJECT NO: E16011
BORING METHOD: Hand Augers — HOLE DIA.(in.): 3 — HAMMER WT.(lbs.): — FOREMAN:
SURFACE ELEV (ft)+/-: 260 — SAMPLING METHOD: Hand — HAMMER DROP (in.): — INSPECTOR:
DATE STARTED: 5-24-17 — SAMPLER DIA (in): 3 — ROCK CORE DIA (in): — DATE COMPLETED: 5-24-17

Elevation (ft)	DEPTH (ft)	Water Level (ft)	Description	Soil Type	Sample No	Sample Recovery	NM (%)	PI (%)	LL (%)	SPT Blows per 6"	N Value	N Plot	Boring and Sampling Notes
260.0	0		8 inches of topsoil										
259.3	0.7		Brown & light brown clayey sand (SC) with gravel - moist										
253.0	7		Boring terminated at 7 feet and backfilled										

This information pertains only to this boring and should not be interpreted as being indicative of the site.

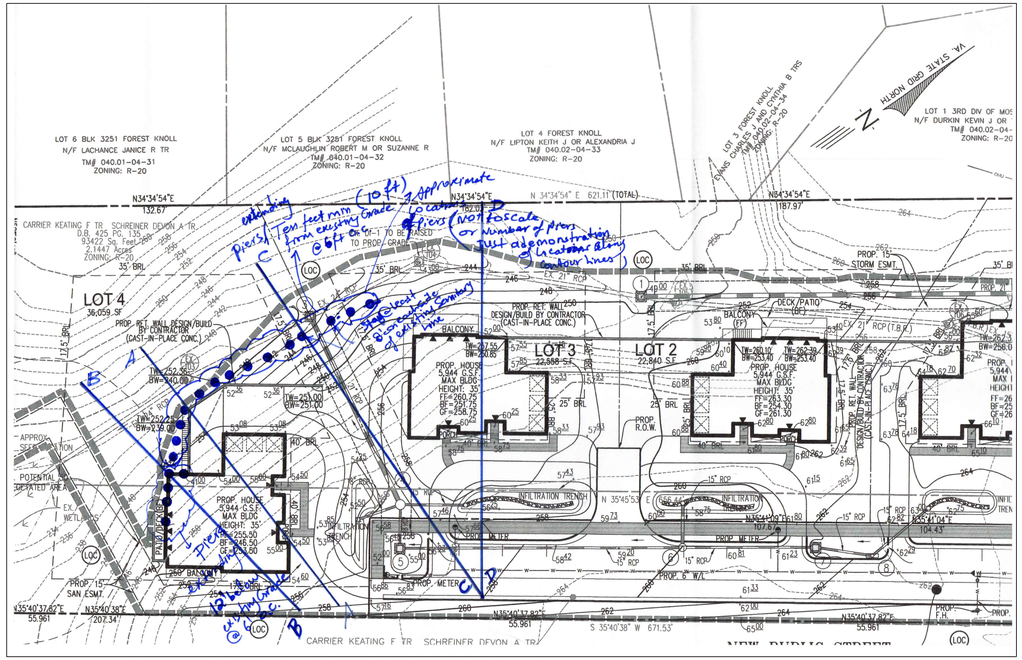
SAMPLING METHOD	SAMPLE CONDITION	G/W DEPTH		CAVE-IN DEPTH		BORING METHOD
SS- Split Spoon	D- Disintegrated	During Drilling	Dry ft.			HSA- Hollow Stem Augers
PT- Pressed Shelby Tube	I- Intact	At Completion	Dry ft.	_____	ft.	CFA- Continuous Flight Augers
CA- Continuous Flight Auger	U- Undisturbed	After 24 Hrs.	N/A ft.	_____	ft.	DC- Driving Casing
RC- Rock Core	NR- No Recovery					MD- Mud Drilling

Figure PAGE 1 of 1 **Geo Design & Engineering, Inc.**



APPENDIX E

PROFILES AND GLOBAL STABILITY ANALYSES RESULTS



FULL GEOTECHNICAL ANALYSIS HAS BEEN PROVIDED UNDER SEPARATE COVER.

APPROVED
SPECIAL USE PERMIT NO. 2016-0025
DEPARTMENT OF PLANNING & ZONING
DIRECTOR — DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
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DIRECTOR — DATE
CHAIRMAN, PLANNING COMMISSION — DATE
DATE RECORDED _____
INSTRUMENT NO. — DEED BOOK NO. — PAGE NO.

No.	DATE	DESCRIPTION
		REVISIONS

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06-09-17
07-21-17
08-01-17

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COMMONWEALTH OF VIRGINIA — CLAYTON C. TOCK — Lic. No. 038790 — PROFESSIONAL ENGINEER — 08/01/17

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KARIG ESTATES
DSP-PRELIMINARY SITE PLAN

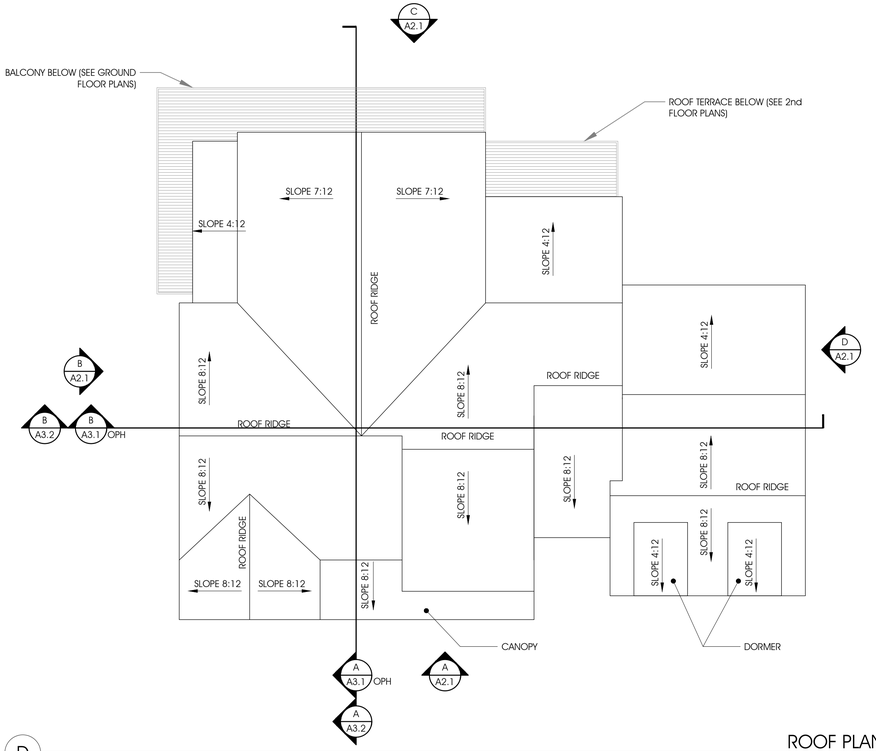
CITY OF ALEXANDRIA, VIRGINIA

SCALE: N/A — C.I.= N/A — DATE: AUGUST, 2017

SHEET 44

FILE No. 12811

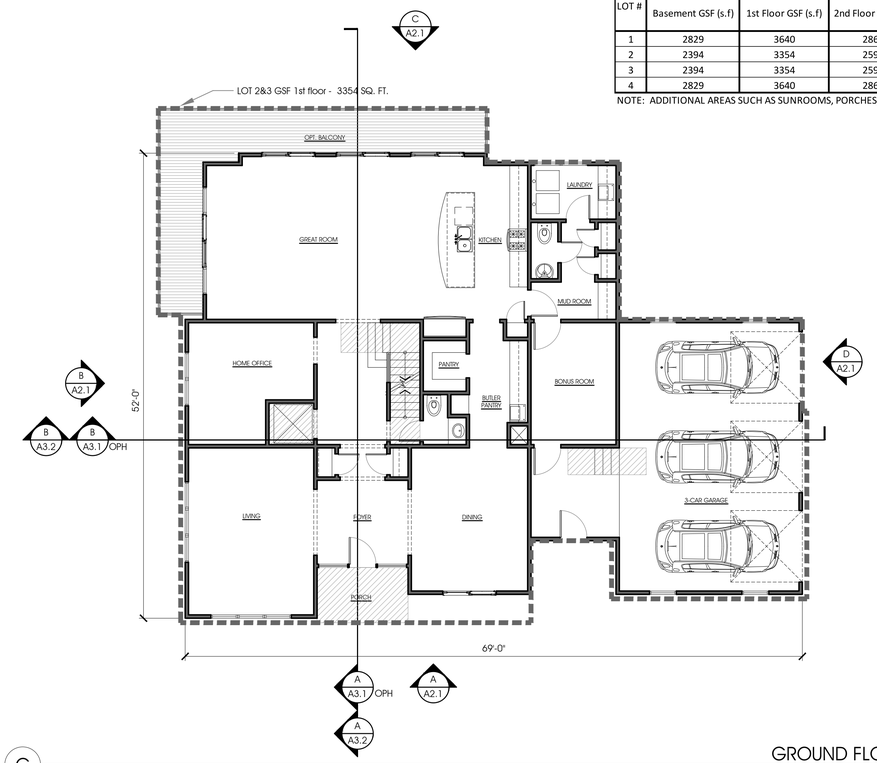
Urban, Ltd. - J:\JOBS\Seminary Road\Preliminary Site Plan\12811-19-GEOTECH.dwg [CORRESPONDENCE 44] August 01, 2017 - 11:03am intern002



D

ROOF PLAN

1/8"=1'-0"



C

GROUND FLOOR PLAN

1/8"=1'-0"

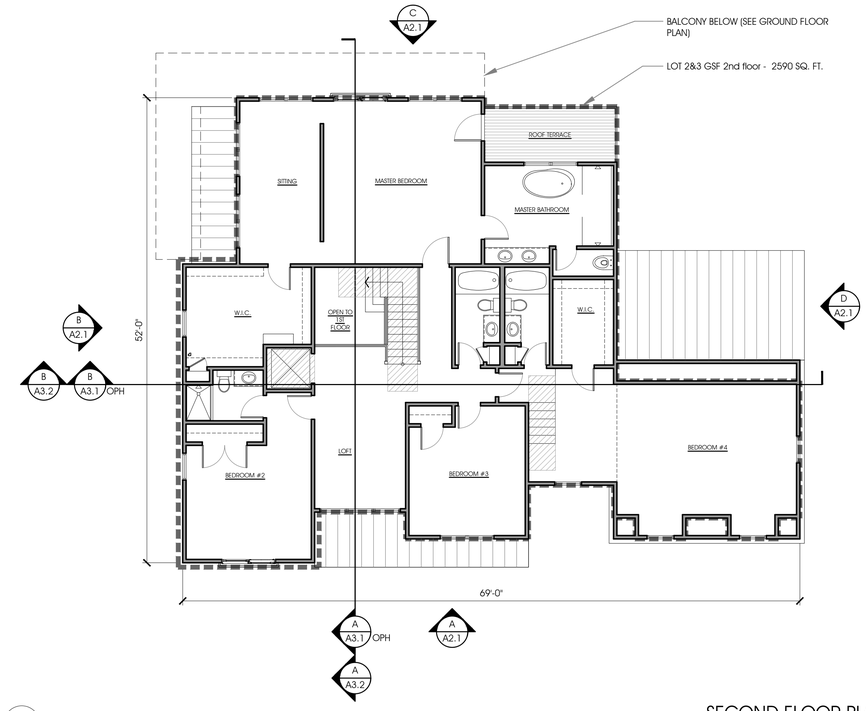
FLOOR AREA STATISTICS								
LOT #	BELOW GRADE	ABOVE GRADE						
	Basement GSF (s.f)	1st Floor GSF (s.f)	2nd Floor GSF (s.f)	Total GSF (s.f) 1st&2nd Floors	Total Deductions			Total Net Floor Area
					Stair	Elevator	Porch (240 s.f. max)	
1	2829	3640	2868	6508	186	62	63	6197
2	2394	3354	2590	5944	186	62	63	5633
3	2394	3354	2590	5944	186	62	63	5633
4	2829	3640	2868	6508	186	62	63	6197

NOTE: ADDITIONAL AREAS SUCH AS SUNROOMS, PORCHES, AND / OR DECKS MAY BE PROVIDED (UP TO MAX PERMITTED FAR)

PLAN LEGEND

GROSS FLOOR AREA

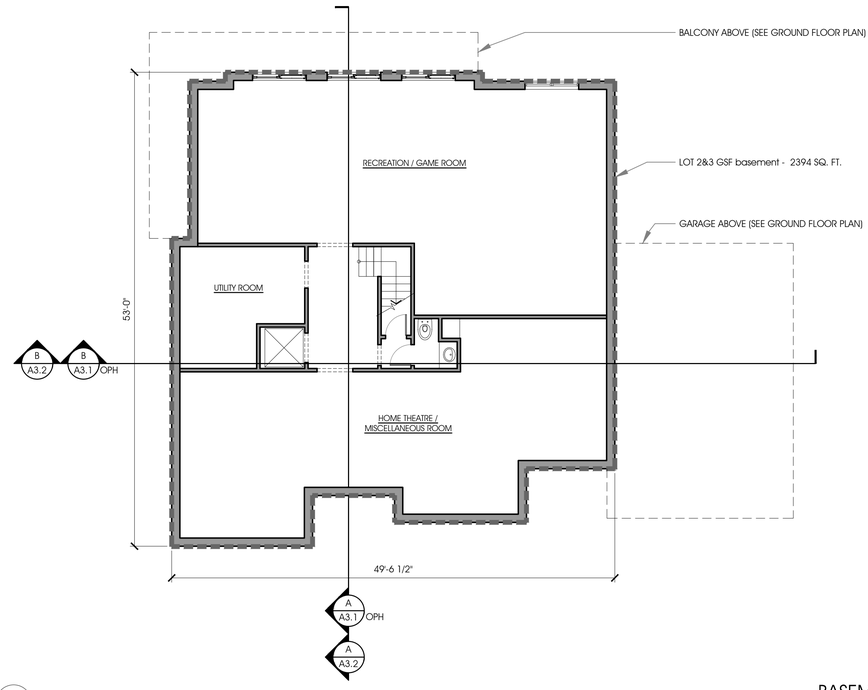
AREAS DEDUCTED FROM GROSS FLOOR AREA TO DETERMINE FAR:
- STAIRWAYS
- ELEVATOR SHAFTS / VERTICAL CHASES
- FRONT PORCHES PER ZONING SECTION 7-2504



B

SECOND FLOOR PLAN

1/8"=1'-0"



A

BASEMENT PLAN

1/8"=1'-0"

NOTE: THE PROJECT WILL EMPLOY GREEN BUILDING TECHNIQUES SUCH AS USE OF PERVIOUS PAVING IN DRIVEWAYS, USE OF ENERGY STAR APPLIANCES AND EQUIPMENT, HIGH EFFICIENCY HVAC EQUIPMENT, USE OF LED LIGHT FIXTURES, VARIOUS SUSTAINABILITY MEASURES SUCH AS USE OF EFFICIENT FRAMING SYSTEM AND ENGINEERING TRUSSES, AND IMPROVED INDOOR AIR QUALITY MEASURES SUCH AS THE USE OF DEHUMIDIFICATION SYSTEM, MAXIMIZING PERIMETER THERMAL INSULATION AND EMPLOYMENT OF ON SITE DIAGNOSTIC TESTS FOR AIR INFILTRATION AND DUCT LEAKAGE STANDARDS. FINAL GREEN BUILDING TECHNIQUES TO BE DEVELOPED DURING THE FINAL SITE PLAN PROCESS.

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SITE PLAN NO.

DIRECTOR DATE

CHAIRMAN, PLANNING COMMISSION DATE

DATE RECORDED

INSTRUMENT NO. DEED BOOK NO. PAGE NO.

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Reg. No. 003940
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KARIG ESTATES

City of Alexandria, Virginia

16003

REVISIONS

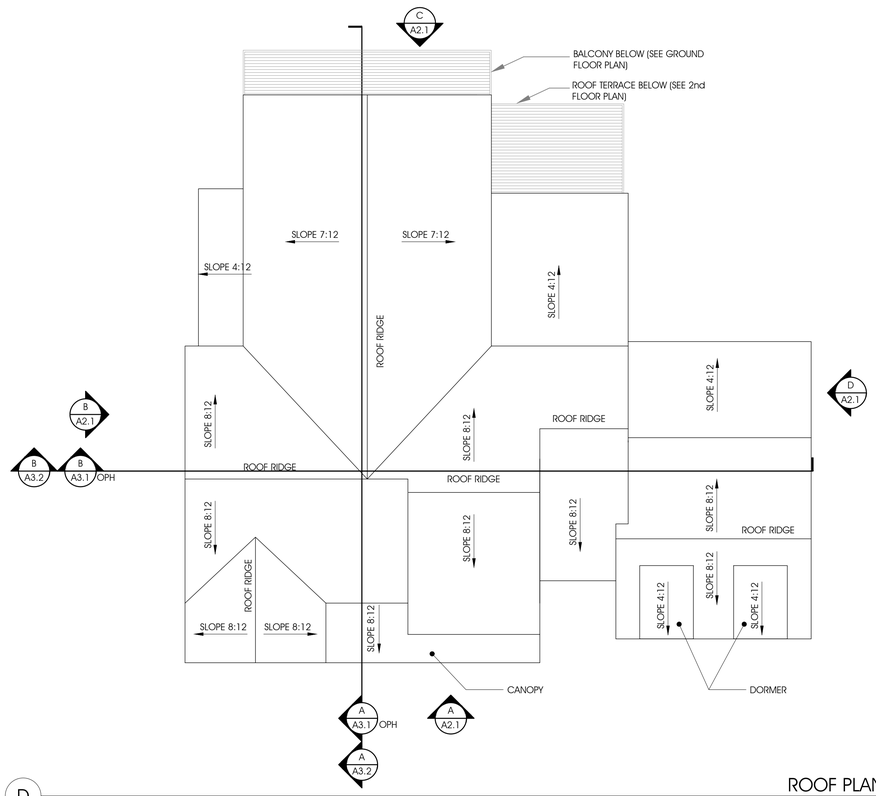
DATE	DESCRIPTION

DSP
PRELIMINARY
SITE PLAN
07.17.17

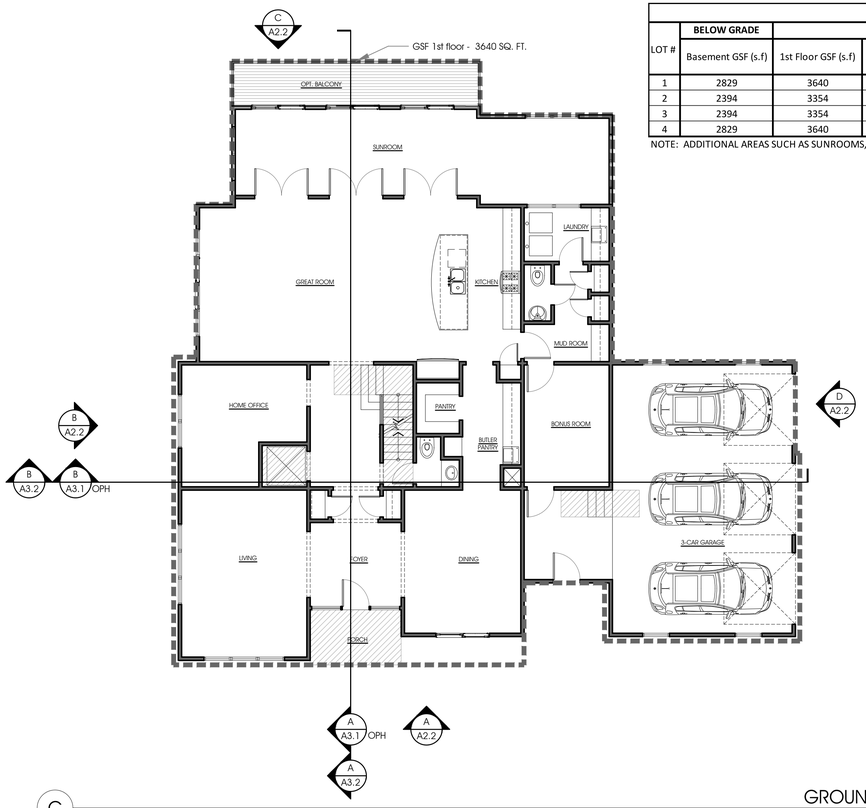
FLOOR PLANS
ROOF PLAN
(LOTS 2&3)

SHEET NO.

A1.1

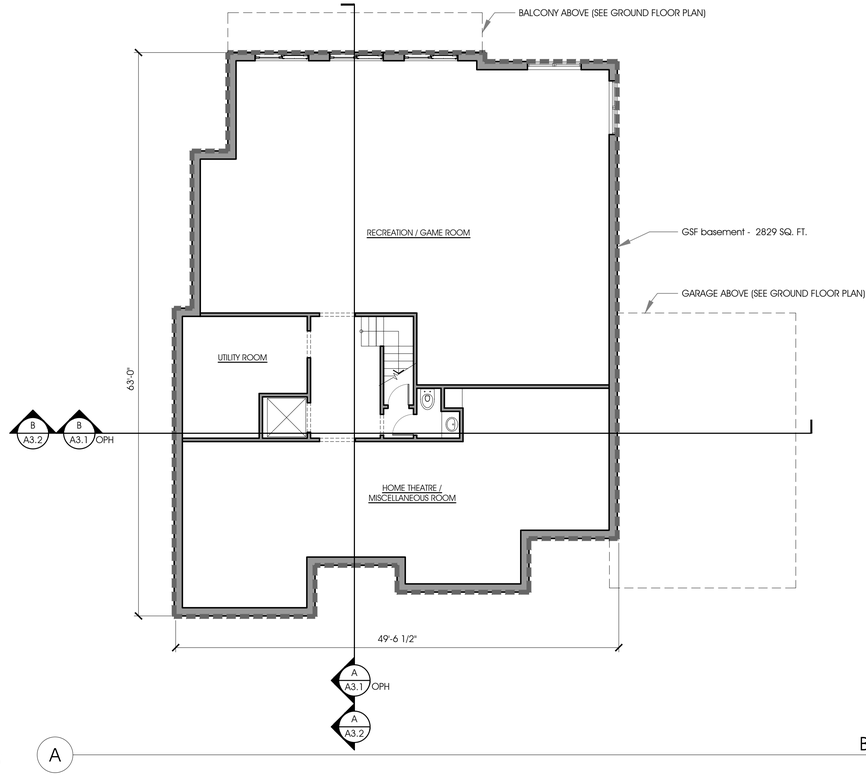


D ROOF PLAN
1/8"=1'-0"



C GROUND FLOOR PLAN
1/8"=1'-0"

B SECOND FLOOR PLAN
1/8"=1'-0"



A BASEMENT PLAN
1/8"=1'-0"

FLOOR AREA STATISTICS

LOT #	BELOW GRADE	ABOVE GRADE						
	Basement GSF (s.f)	1st Floor GSF (s.f)	2nd Floor GSF (s.f)	Total GSF (s.f) 1st&2nd Floors	Total Deductions			Total Net Floor Area
					Stair	Elevator	Porch (240 s.f. max)	
1	2829	3640	2868	6508	186	62	63	6197
2	2394	3354	2590	5944	186	62	63	5633
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4	2829	3640	2868	6508	186	62	63	6197

NOTE: ADDITIONAL AREAS SUCH AS SUNROOMS, PORCHES, AND / OR DECKS MAY BE PROVIDED (UP TO MAX PERMITTED FAR)

PLAN LEGEND

GROSS FLOOR AREA

AREAS DEDUCTED FROM GROSS FLOOR AREA TO DETERMINE FAR:
- STAIRWAYS
- ELEVATOR SHAFTS / VERTICAL CHASES
- FRONT PORCHES PER ZONING SECTION 7-2504

NOTE: THE PROJECT WILL EMPLOY GREEN BUILDING TECHNIQUES SUCH AS USE OF PERVIOUS PAVING IN DRIVEWAYS, USE OF ENERGY STAR APPLIANCES AND EQUIPMENT, HIGH EFFICIENCY HVAC EQUIPMENT, USE OF LED LIGHT FIXTURES, VARIOUS SUSTAINABILITY MEASURES SUCH AS USE OF EFFICIENT FRAMING SYSTEM AND ENGINEERING TRUSSES, AND IMPROVED INDOOR AIR QUALITY MEASURES SUCH AS THE USE OF DEHUMIDIFICAITON SYSTEM. MAXIMIZING PERIMETER THERMAL INSULATION AND EMPLOYMENT OF ON SITE DIAGNOSTIC TESTS FOR AIR INFILTRATION AND DUCT LEAKAGE STANDARDS. FINAL GREEN BUILDING TECHNIQUES TO BE DEVELOPED DURING THE FINAL SITE PLAN PROCESS.

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KARIG ESTATES
City of Alexandria, Virginia

16003

REVISIONS

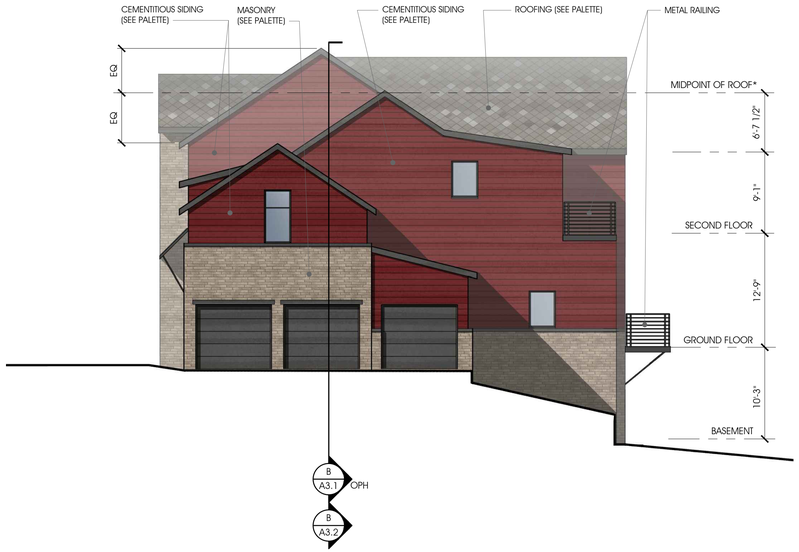
DATE	DESCRIPTION

DSP
PRELIMINARY
SITE PLAN
07.17.17

FLOOR PLANS
ROOF PLAN
(LOTS 1&4)

SHEET NO.

A1.2



D

TYPICAL RIGHT SIDE ELEVATION - BASE MODEL (LOTS 2&3)

1/8"=1'-0"

C

TYPICAL REAR ELEVATION - BASE MODEL (LOTS 2&3)

1/8"=1'-0"

B

TYPICAL LEFT SIDE ELEVATION - BASE MODEL (LOTS 2&3)

1/8"=1'-0"

A

* SEE A3.1 FOR BUILDING HEIGHT PER LOT

TYPICAL FRONT ELEVATION - BASE MODEL (LOTS 2&3)

1/8"=1'-0"

MATERIALS PALETTE

MASONRY

Brick - Blond | Brick - Grey | Brick - Cream

Architectural Masonry/Synthetic Stone Units - Beige Grey Mix | Architectural Masonry/Synthetic Stone Units - Brown Mix | Architectural Masonry/Synthetic Stone Units - Blond Mix

CEMENTITIOUS SIDING

1 | 2

3 | 4

ROOFING

Diamond Pattern Shingles 1 | Diamond Pattern Shingles 2 | Shingles 3

Shingles 4 | Standing Seam Metal 1 | Standing Seam Metal 2

NOTE: SEE SHEET A2.2, A2.3 AND A2.4 FOR POSSIBLE ALTERNATE CONFIGURATIONS, COLORS AND MATERIALS. DESIGN AND MATERIALS TO BE FINALIZED DURING THE BUILDING PERMIT PROCESS.

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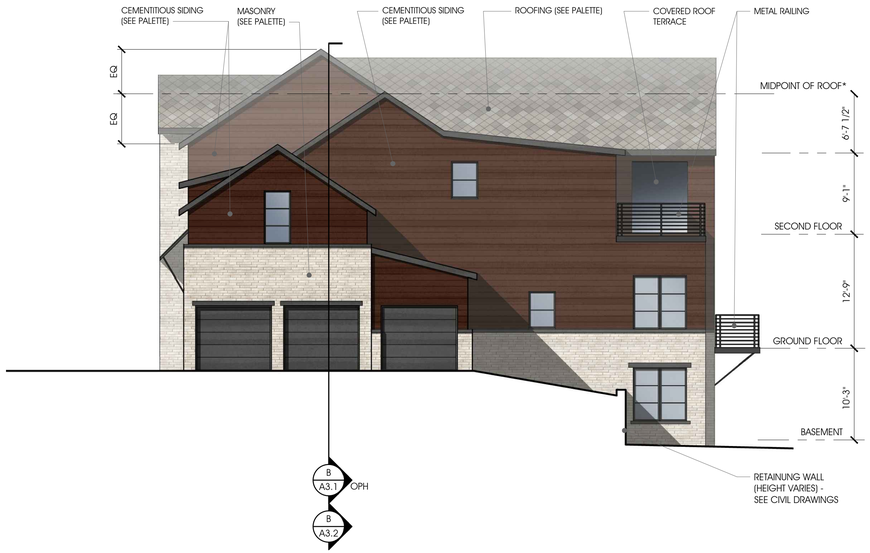
DSP
PRELIMINARY
SITE PLAN
07.17.17

EXTERIOR ELEVATIONS BASE MODEL (LOTS 2&3)

SHEET NO.

A2.1



D TYPICAL RIGHT SIDE ELEVATION - BASE MODEL (LOTS 1&4)

1/8"=1'-0"

C TYPICAL REAR ELEVATION - BASE MODEL (LOTS 1&4)

1/8"=1'-0"

B TYPICAL LEFT SIDE ELEVATION - BASE MODEL (LOTS 1&4)

1/8"=1'-0"

A * SEE A3.1 FOR BUILDING HEIGHT PER LOT

TYPICAL FRONT ELEVATION - BASE MODEL (LOTS 1&4)

1/8"=1'-0"

MATERIALS PALETTE

MASONRY

Brick - Blond | Brick - Grey | Brick - Cream

Architectural Masonry/Synthetic Stone Units - Beige Grey Mix | Architectural Masonry/Synthetic Stone Units - Brown Mix | Architectural Masonry/Synthetic Stone Units - Blond Mix

CEMENTITIOUS SIDING

1 | 2

3 | 4

ROOFING

Diamond Pattern Shingles 1 | Diamond Pattern Shingles 2 | Shingles 3

Shingles 4 | Standing Seam Metal 1 | Standing Seam Metal 2

NOTE: SEE SHEET A2.1, A2.3 AND A2.4 FOR POSSIBLE ALTERNATE CONFIGURATIONS, COLORS AND MATERIALS. DESIGN AND MATERIALS TO BE FINALIZED DURING THE BUILDING PERMIT PROCESS.

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DEPARTMENT OF PLANNING & ZONING
DIRECTOR DATE
DEPARTMENT OF TRANSPORTATION & ENVIRONMENTAL SERVICES
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DIRECTOR DATE
CHAIRMAN, PLANNING COMMISSION DATE
DATE RECORDED
INSTRUMENT NO. DEED BOOK NO. PAGE NO.

COMMONWEALTH OF VIRGINIA
JOHN W. RUST
Reg. No. 003940
07/17/17
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City of Alexandria, Virginia

16003

REVISIONS

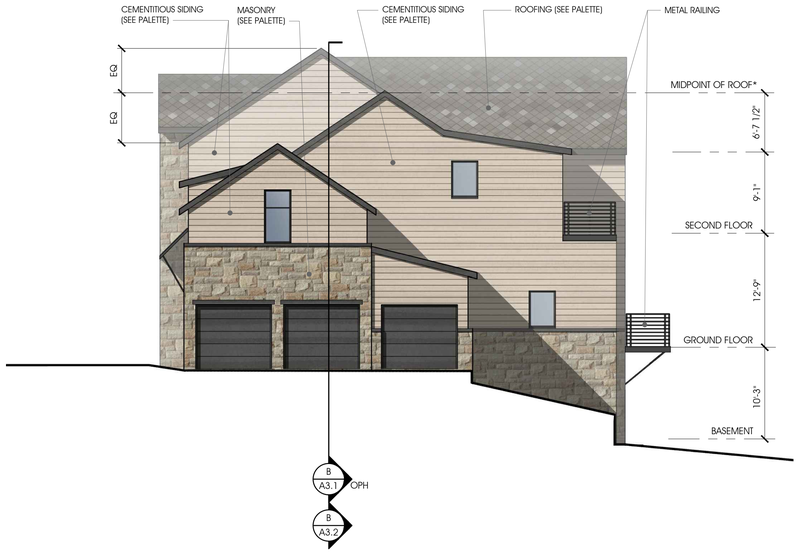
DATE	DESCRIPTION

DSP PRELIMINARY SITE PLAN 07.17.17

EXTERIOR ELEVATIONS BASE MODEL (LOTS 1&4)

SHEET NO.

A2.2



D RIGHT SIDE ELEVATION (ALTERNATE 1)

1/8"=1'-0"

C REAR ELEVATION (ALTERNATE 1)

1/8"=1'-0"

B LEFT SIDE ELEVATION (ALTERNATE 1)

1/8"=1'-0"

A * SEE A3.1 FOR BUILDING HEIGHT PER LOT

FRONT ELEVATION (ALTERNATE 1)

1/8"=1'-0"

MATERIALS PALETTE

MASONRY

Brick - Blond | **Brick - Grey** | **Brick - Cream**

Architectural Masonry/Synthetic Stone Units - Beige Grey Mix | **Architectural Masonry/Synthetic Stone Units - Brown Mix** | **Architectural Masonry/Synthetic Stone Units - Blond Mix**

CEMENTITIOUS SIDING

1 | **2**

3 | **4**

ROOFING

Diamond Pattern Shingles 1 | **Diamond Pattern Shingles 2** | **Shingles 3**

Shingles 4 | **Standing Seam Metal 1** | **Standing Seam Metal 2**

NOTE: SEE SHEET A2.1, A2.2 AND A2.4 FOR POSSIBLE ALTERNATE CONFIGURATIONS, COLORS AND MATERIALS. DESIGN AND MATERIALS TO BE FINALIZED DURING THE BUILDING PERMIT PROCESS.

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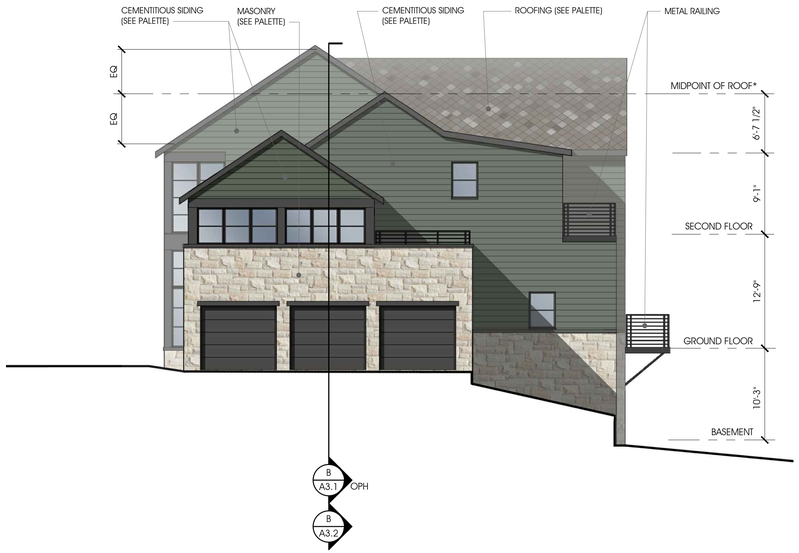
EXTERIOR ELEVATIONS (ALTERNATE 1)

SHEET NO.

A2.3



D RIGHT SIDE ELEVATION (ALTERNATE 2)

1/8"=1'-0"

C REAR ELEVATION (ALTERNATE 2)

1/8"=1'-0"

B LEFT SIDE ELEVATION (ALTERNATE 2)

1/8"=1'-0"

A * SEE A3.1 FOR BUILDING HEIGHT PER LOT

FRONT ELEVATION (ALTERNATE 2)

1/8"=1'-0"

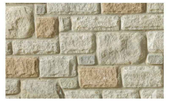
MATERIALS PALETTE

MASONRY

Brick - Blond

Brick - Grey

Brick - Cream



Architectural Masonry/Synthetic Stone Units - Beige Grey Mix

Architectural Masonry/Synthetic Stone Units - Brown Mix

Architectural Masonry/Synthetic Stone Units - Blond Mix

CEMENTITIOUS SIDING

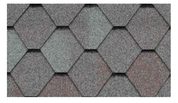
1

2

3

4

ROOFING



Diamond Pattern Shingles 1

Diamond Pattern Shingles 2

Shingles 3

Shingles 4

Standing Seam Metal 1

Standing Seam Metal 2

NOTE: SEE SHEET A2.1, A2.2 AND A2.3 FOR POSSIBLE ALTERNATE CONFIGURATIONS, COLORS AND MATERIALS. DESIGN AND MATERIALS TO BE FINALIZED DURING THE BUILDING PERMIT PROCESS.

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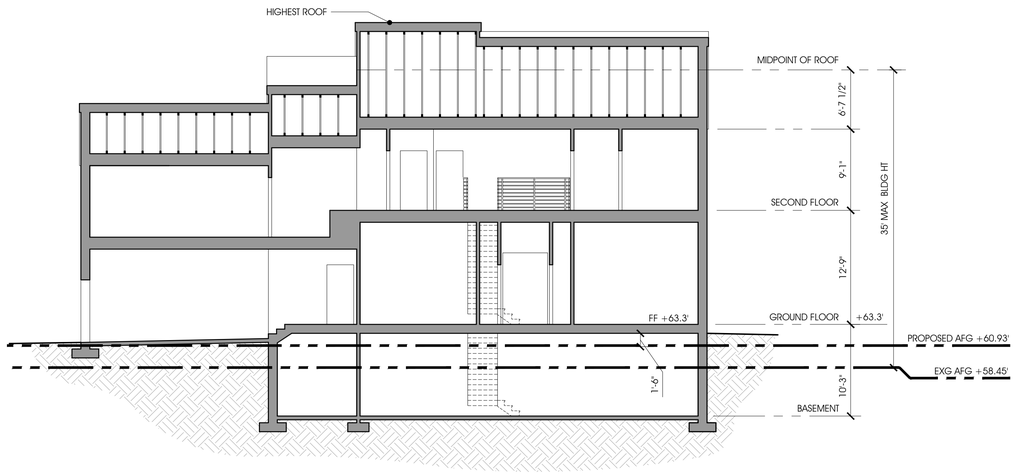
EXTERIOR ELEVATIONS (ALTERNATE 2)

SHEET NO.

A2.4

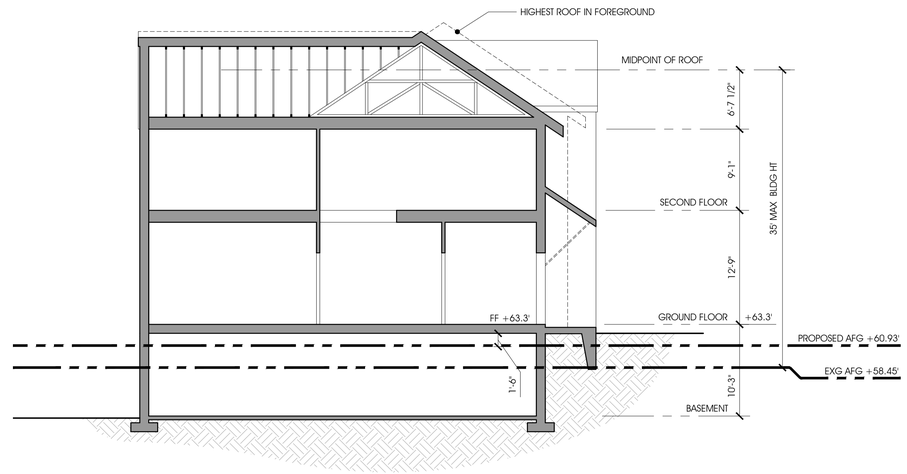
LOT 2



B

LOT 2 BUILDING SECTION

1/8"=1'-0"

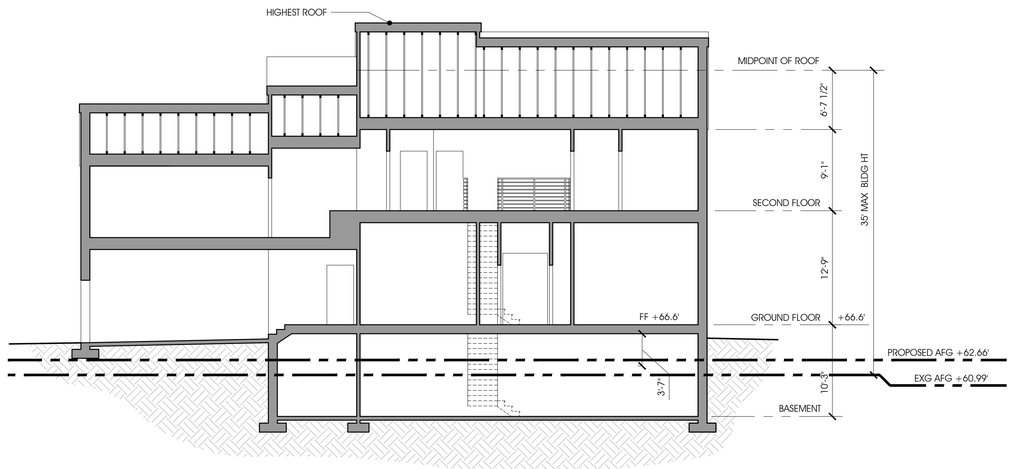


A

LOT 2 BUILDING SECTION

1/8"=1'-0"

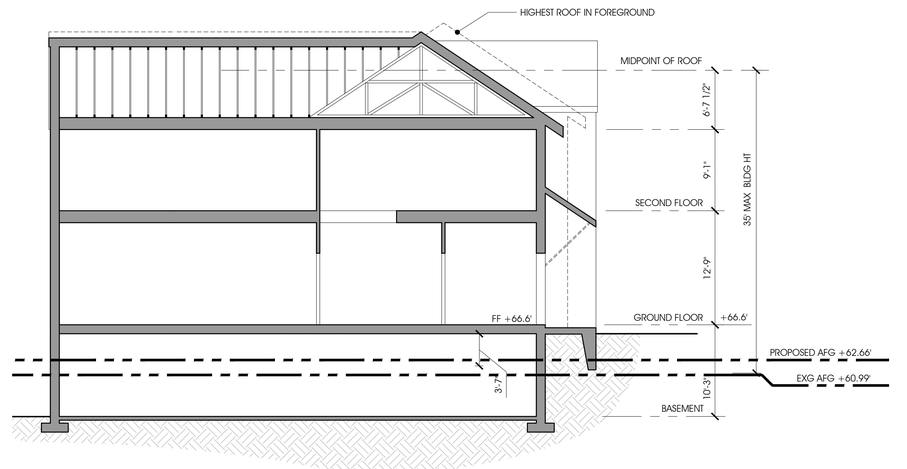
LOT 1



B

LOT 1 BUILDING SECTION

1/8"=1'-0"



A

LOT 1 BUILDING SECTION

1/8"=1'-0"

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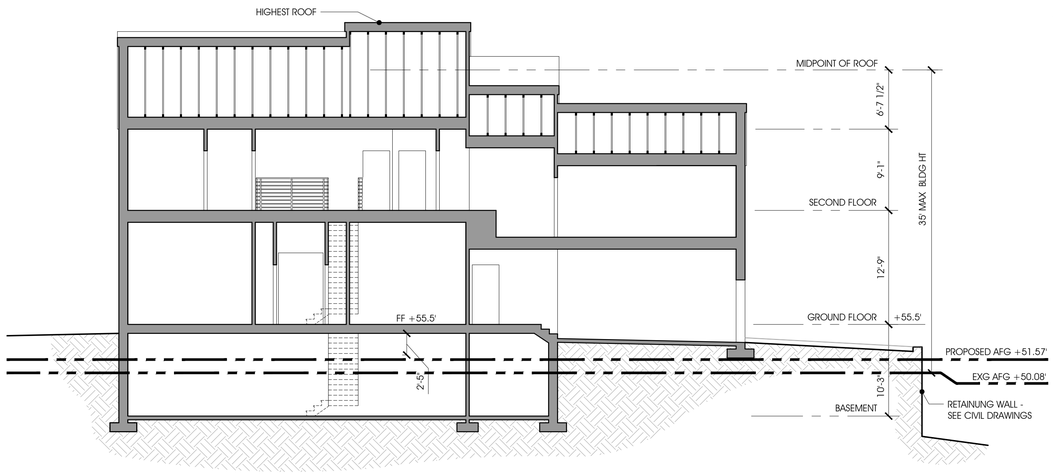
SHEET NO.

A3.1

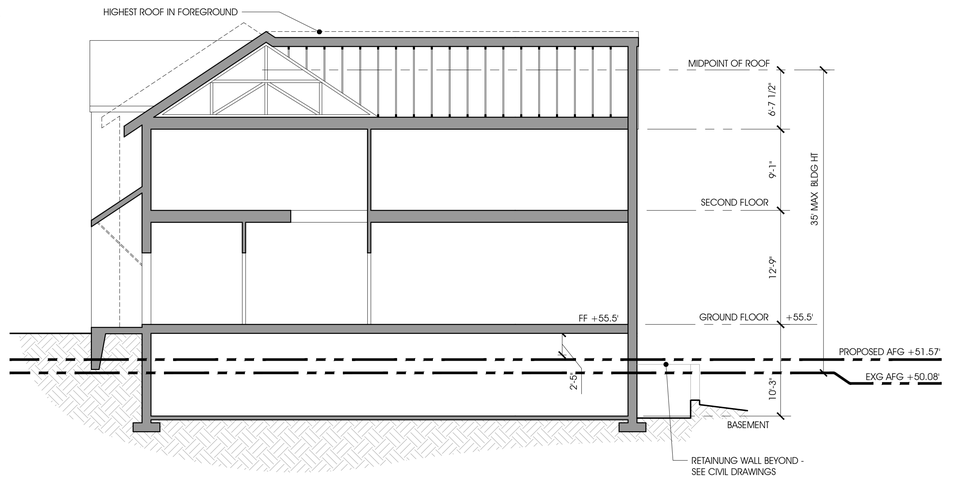
LOT 4



B

LOT 4 BUILDING SECTION

1/8"=1'-0"

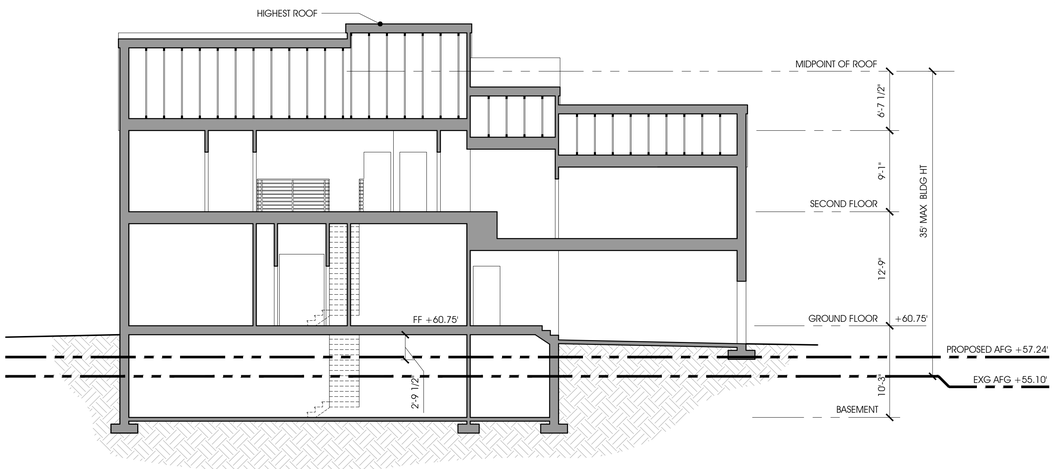


A

LOT 4 BUILDING SECTION

1/8"=1'-0"

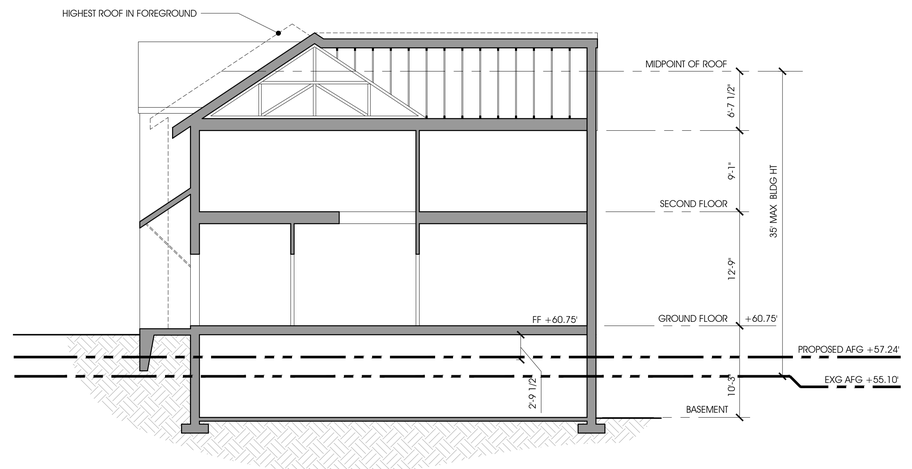
LOT 3



B

LOT 3 BUILDING SECTION

1/8"=1'-0"



A

LOT 3 BUILDING SECTION

1/8"=1'-0"

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