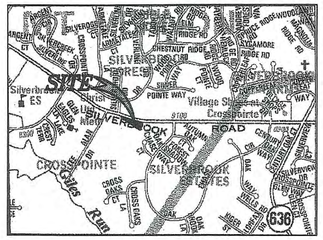
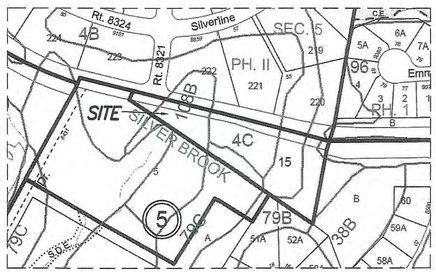


VICINITY MAP
(N.T.S)



SOIL MAP
SCALE: N.T.S.

SITE DESCRIPTION

SITE ADDRESS: 9121 SILVERBROOK ROAD, FAIRFAX COUNTY, VA.
TOTAL SITE AREA: 1.792 ACRE OR 78,076 SF (CALCULATED)
PROPOSED DEDICATION: 0.418 ACRE OR 18,194 SF
LAND AFTER DEDICATION: 1.374 ACRE OR 59,882 SF
ZONE: R-1

TAX MAP #: 97-4-01-0015
PROPOSED BUILDING AREA: 6200 SF

PLAYGROUND AREA
PROPOSED NUMBER OF CHILDERN=55 AT ONE TIME
REQUIRED AREA = 55x100 SF/CHILDERN = 5,500 SF
PROVIDED = 5,525 SF > 5,500 SF [OK]

OCCUPANCY
PROPOSED NUMBER OF CHILDERN: 99
PROPOSED NUMBER OF EMPLOYEE: 9-10

BUILDING HEIGHT
REQUIRED BUILDING HEIGHT: 35'
PROPOSED BUILDING HEIGHT: 20' (MAXIMUM)

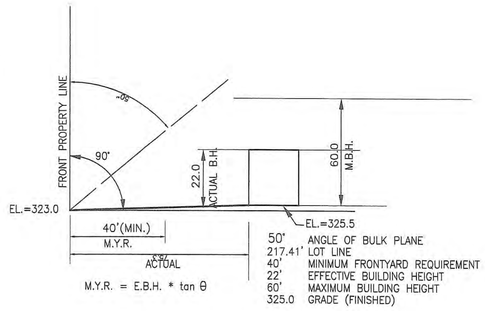
YARD SETBACK
REQUIRED MINIMUM: FRONT 40'
REAR 25'
SIDE 20'

LANDSCAPING BUFFER
REQUIRED MINIMUM: FRONT 10'
REAR 25'
SIDE 25'

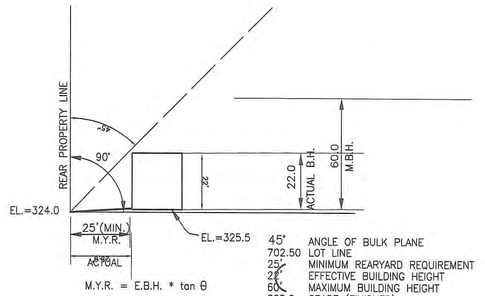
FLOOR AREA CALCULATION (FAR)
OPEN SPACE REQUIRED: MIN. 15% OF THE SITE AREA
OPEN SPACE PROPOSED: 18,707 SF /62,415 SF=30.0%

PARKING SPACE CACULATION
MAXIMUM ENROLLMENT: 99
PARKING SPACE REQUIRED: 0.19 SPACE PER PERSON
PARKING SPACE NEEDED: 99*0.19=19
PARKING SPACE PROVIDED: 24>19 SPACES, [OK]

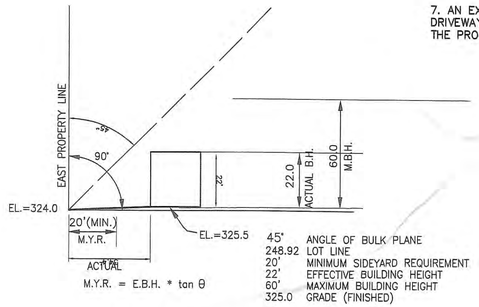
LOADING SPACE
NO LOADING SPACE REQUIRED



PROPOSED 1-STORY BUILDING
DETAIL ANGLE OF BULK PLANE
(FRONT YARD)
(SCALE 1"=30')



PROPOSED 1-STORY BUILDING
DETAIL ANGLE OF BULK PLANE
(REAR YARD)
(SCALE 1"=30')



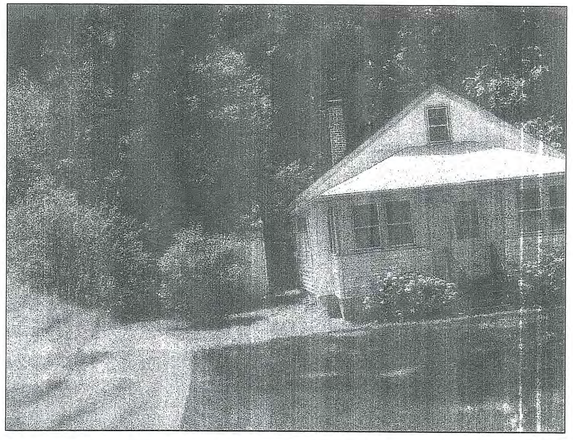
PROPOSED 1-STORY BUILDING
DETAIL ANGLE OF BULK PLANE
(SIDE YARD)
(SCALE 1"=30')

Soil No.	Soil Name	Problem Class OLD	Problem Class NEW	Foundation Support	Drainage	Septic Drainfields	Infiltration Trenches	Erosion Potential	Site %
4	Barker Crossroads-Nathalie	C	IVB	Fair	Good	Fair	Good	High	53
79	Nathalie Gravelly Loam	C	I	Fair	Good	Fair	Good	High	20
108	Wheaton-Sumerduck	B	IVB	Marginal	Poor	Poor	Poor	Medium	18

(3) Barkers Crossroads-Nathalie Complex
This complex is a mixture of the development-disturbed Barkers Crossroads soil and the natural Nathalie soil. The complex occurs in areas of the piedmont with granite bedrock that have been developed but retain a good portion of undisturbed soil. Barkers Crossroads soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Nathalie soil will be found under older vegetation in ungraded back and front yards and common areas. For a description of the two soils that make up this map unit, please see (3) Barkers Crossroads and (79) Nathalie.

(79) Nathalie
This soil, derived from granite, occurs on hilltops and sideslopes of the Piedmont. Loams and clays overlie sandy and clayey decomposed rock. Sticky clays may occur within the subsoil. Quartz gravels are common throughout. The soil is well drained. Depth to hard bedrock ranges from 10 to 75 feet. The soil typically provides favorable support for small buildings (3 stories or less)< but it is bast to sink the footer below the clay layer. The clay subsoil is difficult to compact and move when wet. Nathalie is generally well suited for septic drainfields and infiltration trenches, but deep installation (>6 feet) may be required because of sticky clays in the subsoil. Nathalie is highly susceptible to erosion.

(108) Wheaton-Sumerduck
This complex is a mixture of the development-disturbed Wheaton soil and the natural Sumerduck soil. The complex occurs near floodplains in the areas of the Piedmont with micoceous schist and phyllite bedrock that have been developed but retain a good portion of undisturbed soil. Wheaton soil will be clustered around foundations, streets, sidewalks, playing fields and other graded areas. Sumerduck soild will be found along undisturbed areas within the border of the floodplain. For a description of the two soils that make up this map unit, please see (102) Wheaton and (93) Sumerduck.



EXISTING SITE PHOTOGRAPH
(FROM STREET FACING TO THE HOUSE)

PROJECT NARRTIVE:

THIS SITE CONSISTS OF 1.792 AC OF TOTAL LAND (COMPUTED AS 1.8135 ACRE RECORDED) AND IS ZONED R-1. THE SITE IS LOCATED AT 9121 SILVERBROOK ROAD, SPRINGFIELD IN FAIRFAX COUNTY, VIRGINIA.

THE SITE IS CURRENTLY DEVELOPED WITH A ONE-STORY SINGLE FAMILY DWELLING. THE REAR SIDE OF THE LOT AND ITS VICINITY IS MOSTLY WOODED WITH HARDWOOD WITH MOST OF THE TREES AS OAKS, MAPLES, POPLARS (YOUNG TO MATURED), AND THE REMAINDER OF THE LOT IS OPEN SPACE COVERED WITH GRASSES.

THE INTENT OF THE PROJECT IS TO DEVELOP THE LOT FOR THE DAY CARE CENTER BY THE SPECIAL USE PERMIT PROCESS UNDER ZONE R-1. THE DEVELOPMENT PROPOSES TO BUILD AN APPROXIMATELY 6.200 SF GROSS FLOOR AREA BUILDING WITH 25 PARKING SPACES AS SHOWN ON THE SITE PLAN. THE EXISTING VEGETATION WILL BE PRESERVED AND WILL SERVE AS A SCREENING BUFFER ON THE REAR SIDE OF THE LOT. ADDITIONAL LANDSCAPING AND SCREENING WILL BE PROVIDED AS NEEDED ON THE REST OF THE AREA. THE REMAINING AREA WILL BE USED AS A PLAYGROUND FOR THE DAY CARE CENTER, AND WILL BE MERELY A GREEN LAWN.

A PRIVATELY MAINTAINED SUBSURFACE STORAGE SYSTEM (MINIMUM STANDARD 3.10 E) WILL BE PROPOSED UNDER THE PARKING LOT FOR BOTH QUALITY AND QUANTITY CONTROL MEASURES. THIS APPROACH OF STORMWATER MANAGEMENT IS SELECTED AS AN APPROPRIATE TECHNOLOGY AS COMPARED TO THE DRY POND OR DITCHES FROM THE PROSPECTIVE USE OF THE DEVELOPMENT. THE FRONT STRIP OF THE STUDY LOT 15 WILL BE DEDICATED TO THE PUBLIC USE PURPOSES FOR FUTURE POTENTIAL EXTENSION OF THE STREET AND UTILITIES. THE DEDICATION WILL COMPRISE OF APPROXIMATELY 15,661 SF WHICH WILL RESULT THE LOT AREA BEING REDUCED TO 1.432 ACRES AFTER THE RIGHT-OF-WAY DEDICATION.

THE EXISTING DWELLING IS SERVED BY THE PUBIC WATER AND A ON-SITE SEPTIC SYSTEM. THE PROPOSED DAY CARE CENTER INCLUDES THE EXTENSION THE EXISTING SEWER LINE LOCATED WITHIN THE RIGHT OF WAY OF OAK CHASE CIRCLE. THIS EXTENSION CONSISTS OF THE EXTENSION OF ABOUT 616 LINEAR FEET OF SEWER MAIN AND TWO MANHOLES AND WILL FLOW BY GRAVITY.

SITE ANALYSIS:

GENERAL NOTES

1. EXISTING BOUNDARY AND TOPOGRAPHY IS BASED ON FIELD RUN TOPOGRAPHY SURVEY AND IS PREPARED BY SDE ON MARCH 2007.

2. PUBLIC WATER AND SEWER AVAILABLE TO THE SITE.

3. THERE ARE NO EXISTING GRAVE YARDS ON THIS PROPERTY.

4. SIGNAGE WILL BE IN CONFORMANCE WITH ARTICLE 12 OF THE FAIRFAX COUNTY ZONING ORDINANCE.

5. EXISTING STRUCTURES COMPRISE OF APPROXIMATELY 1940 SF TO BE DEMOLISHED.

VDOT NOTE

1. METHODS AND MATERIALS USED SHALL CONFORM TO CURRENT COUNTY/TOWN AND VDOT STANDARDS AND SPECIFICATIONS.

2. THE DEVELOPER IS RESPONSIBLE FOR ANY DAMAGE TO EXISTING ROADS AND UTILITIES WHICH OCCUR AS A RESULT OF PROJECT CONSTRUCTION WITHIN OR CONTIGUOUS TO THE EXISTING RIGHT-OF-WAY.

3. THE DEVELOPER IS RESPONSIBLE FOR ALL TRAFFIC CONTROL. THE DEVELOPER SHALL SUBMIT A SIGNING, STRIPPING AND /OR SIGNALIZATION PLAN TO THE VDOT LAND DEVELOPMENT SECTION A MINIMUM OF 30 DAYS PRIOR TO PERMIT APPLICATION. THE DEVELOPER SHALL NOT COMMENCE CONSTRUCTION OF ANY PAVEMENT COURSE WITHOUT AN APPROVED STRIPING PLAN.

4. ADDITIONAL DITCH LININGS OR SILTATION AND EROSION CONTROL MEASURES SHALL BE PROVIDED, AT THE DEVELOPER'S EXPENSE, AS DETERMINED NECESSARY BY VDOT AND/OR THE COUNTY/TWON DURING FIELD REVIEW. ALL COSTS SHALL BE ASSUMED BY THE DEVELOPER.

5. OVERLAY OF EXISTING PAVEMENT SHALL BE MINIMUM OF 1.25" DEPTH; ANY COSTS ASSOCIATED WITH PAVEMENT OVERLAY, OR THE MILLING OF EXISTING PAVEMENT TO OBTAIN REQUIRED DEPTH, SHALL BE ASSUMED BY THE DEVELOPER.

6. ALL DAMAGES TO EXISTING ROAD AS A RESULT OF CONSTRUCTION ACTIVITIES SHALL BE THE RESPONSIBILITY OF THE DEVELOPER/CONTRACTOR AND WILL BE RESTORED TO THE SATISFACTION OF VIRGINIA DEPARTMENT OF TRANSPORTATION. PAVEMENT PATCH FOR UTILITY SERVICE SHALL BE IN ACCORDANCE WITH VDOT STANDARDS.

7. AN EXISTING CURB-CUT WILL BE USED FOR THE ENTRANCE DRIVEWAY. NO VDOT PERMIT WILL BE REQUIRED AS A PART OF THE PROJECT.

SEDIMENT AND EROSION CONTROL NARRTIVE

ALL THE EROSION AND SEDIMENT CONROTL MEASURED WILL BE IMPLETMENTED PER VIRGINIA EROSION AND SEDIMENT CONTROL MEASURES AND FAIRFAX COUNTY REQUIREMENTS, AND THE DETAIL PLAN AND DESCRIPTION WILL BE GIVEN ON THE FINAL PLANS.

STORMWATER MAINTENANCE

THE STORMWATER FACILITY WILL BE PRIVATELY MAINTAINED.

ON-SITE STORMWATER NARRATIVE

THE SITE CONSISTS OF APPROXIMATELY 1.1055 AC. OF TOTAL AREA AND IS DIVIDED INTO TWO DRAINAGE AREAS ON ITS PRE-DEVELOPMENT CONDITIONS HAVING AREAS OF 0.13 AC AND 0.976 AC.-REFER TO THE PRE-DEVELOPMENT DRAINAGE MAP. THE DRAINAGE AREA 0.13 AC. OUTFALLS TO THE STUDY POINT "A", AN EXISTING DITCH WITHIN THE VDOT RIGHT-OF-WAY.THE ON-SITE CONTRIBUTION AT THE POINT IS 0.23 CFS AND 0.18 CFS FROM 10-YEAR AND 2-YEAR STORM RESPECTIVELY, WHICH ARE THE ALLOWABLE RUNOFF RATES FOR 10-YR AND 2-YR STORM FOR THE POST-DEVELOPMENT CONDITION AT THE STUDY POINT A. THE TOTAL ONSITE/OFFSITE AREA THAT OUTFALLS AT THIS POINT IS 0.31 AC. AND TOTAL RUNOFF CONTRIBUTION AT THIS POINT IS 0.55 CFS AND 0.43 CFS FROM 10-YR AND 2-YR STORM RESPECTIVELY.
THE REMAINING ON-SITE DRAINAGE AREA OF 0.976 AC. OUTFALLS AS A SHEET FLOW TO THE ADJACENT LOTS. THE TOTAL RUNOFF FROM THIS AREA IS 1.73 CFS.

AS A RESULT OF THE DEVELOPMENT, THE SITE IS DIVIDED INTO THREE DRAINAGE AREAS, WITH AREAS 0.55 AC., 0.14 AC, AND 0.42 AC AS SHOWN ON THE POST-DEVELOPMENT DRAINAGE MAPS. THE DRAINAGE AREA 0.14 AC. OUTFALLS AS SHEET FLOW TO THE CURB-GUTTER OF SILVERBROOK ROAD, WHICH ULTIMATELY OUTFALLS TO THE STREET INLET LOCATED TO THE EAST FROM THE STUDY SITE. THE DRAINAGE AREA THAT OUTFALLS TO THE ADJACENT LOT DECREASES SIGNIFICANLTY TO 0.42 AC. AND ITS 10-YEAR SURFACE RUNOFF WILL BE 0.91 CFS AS COMPARED TO PRE-DEVELOPMENT RUNOFF RATE OF 1.73 CFS. THIS RUNOFF DISPERSE AS A SHEET FLOW. THE DRAINAGE AREA THAT OUTFALLS AT THE STUDY POINT "A" WILL INCREASE FROM 0.13 AC. TO 0.61 AC. AND THE RUNOFF RATE WILL INCREASE TO 3.55 CFS FROM THE 10-YEAR STORM. UNDERGROUND STORAGE SYSTEM (POROUS PAVEMENT) WILL BE PROVIDED TO OFFSET THE INCREASED RUNOFF RATE AT THE STUDY POINT "A",. THE POST-DEVELOPMENT RUNOFF RATE FOR THE 2-YEAR AND 10-YEAR STORM WILL BE KEPT LESS THAN 0.13 CFS AND 0.61 CFS RESPECTIVELY, REFER TO THE STORMWATER COMPUTATIONS.

RECEIVED
Department of Planning & Zoning
DEC 04 2009
Zoning Evaluation Division

~~Withdrawn / Dismissed~~
NOT APPROVED

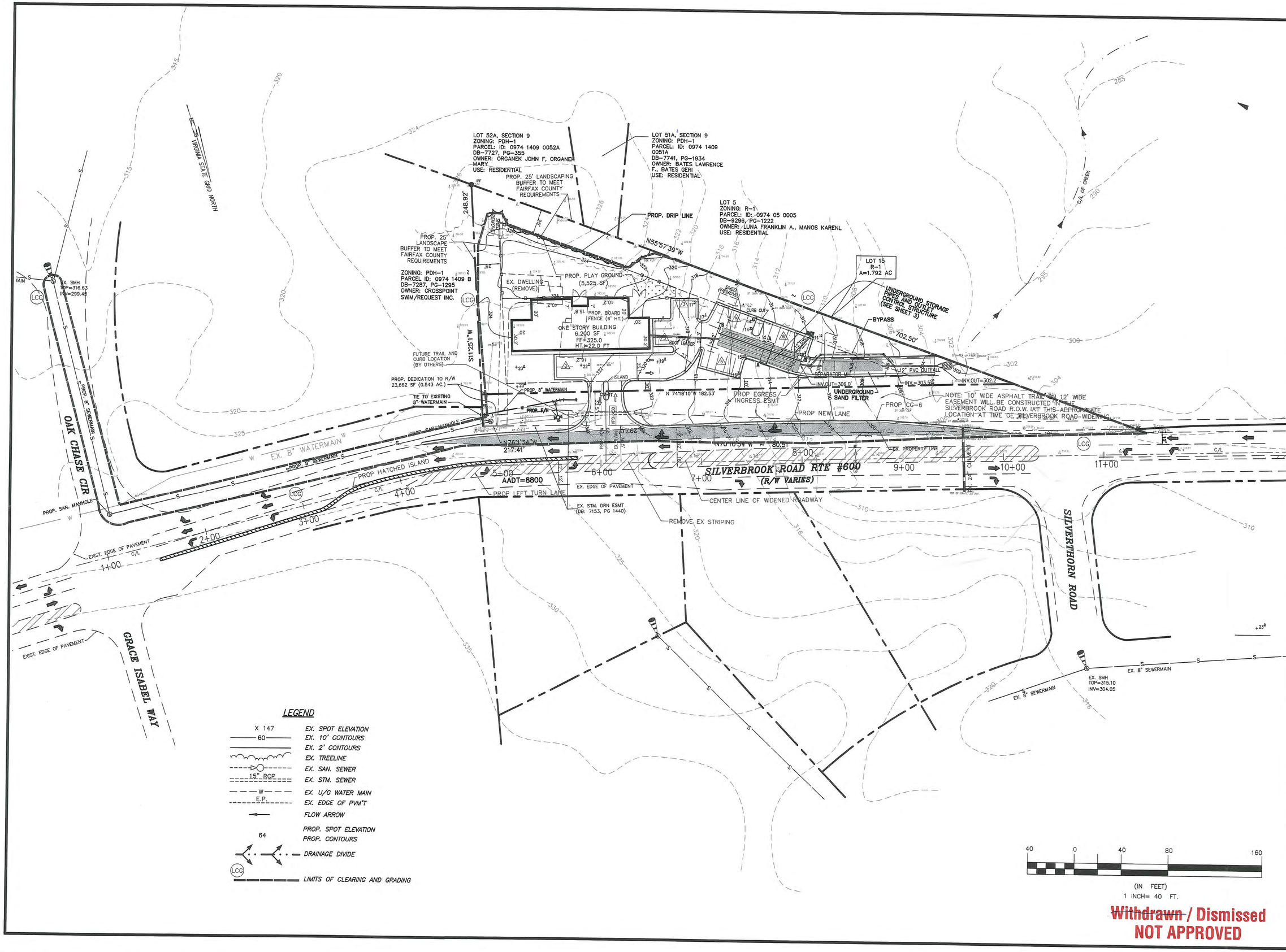
SDE, INC.
ENGINEERS . PLANNERS . ARCHITECTS . LANDSCAPE ARCHITECTS . SURVEYORS
LEESBURG PIKE, SUITE 305N
FALLS CHURCH, VA 22043 PH: (703) 556-0800

9121 SILVERBROOK ROAD
MAGISTERIAL DISTRICT: SPRINGFIELD FAIRFAX COUNTY

SPECIAL EXCEPTION PLAT

COMMONWEALTH OF VIRGINIA
HAMID MOGHADAM-YEGANEH
Lic. No. 22137
PROFESSIONAL ENGINEER
12/3/09

DESIGNED BY: SDE, INC.
DRAWN BY: S.L.
CHECKED BY: HAMID T., PE
SCALE: 1"=40'
DATE: 12/02/2009
PROJECT/FILE #
SHEET NUMBER 1 OF 5



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SHEET NUMBER
2 OF 5

IMPERVIOUS AREA COMPUTATIONS

TOTAL LOT AREA = 62415 SF OR 1.433 ACRE
IMPERVIOUS C– FACTOR = 0.90
PERVIOUS C–FACTOR = 0.25
TIME OF CONCENTRATION = 5 MIN
RAINFALL INTENSITY, I2 = 5.75 IN/HR
RAINFALL INTENSITY, I10 = 7.27 IN/HR

DESCRIPTIONS	PRE–DEVELOPMENT	POST–DEVELOPMENT
BUILDINGS	1,620	6,200
DRIVEWAYS	2,318	8,470
OTHERS (SHED, WALL ETC.)	200	2,000
TOTAL	4,138	16,670

INCREASE IN IMPERVIOUSNESS = 12,532 SF

(UNDERGROUND STORAGE PIPES AND SANFILTER STRUCTURE, WILL BE PROVIDED FOR BOTH BMP AND STORMWATER COMPUTATIONS, AS SHOWN ON SHEETS 2 AND 3.)

"C" FACTOR COMPUTATIONS

A. PRE–DEVELOPMENT

$= \frac{(4138 \times 0.9 + 58277 \times 0.25)}{62415} = 0.29$

B. POST–DEVELOPMENT

$= \frac{(16670 \times 0.9 + 45745 \times 0.25)}{62415} = 0.42$

PRE–DEVELOPMENT (OVERALL)

(5 MIN Tc) Q2=(0.29 x 5.45 x 1.433) = 2.26 CFS
Q10 = (0.29 x 7.27 x 1.433) = 3.02 CFS

POST–DEVELOPMENT (OVERALL)

(5 MIN Tc) Q2 = (0.42 x 5.45 x 1.433) = 3.28 CFS
Q10 = (0.42 x 7.27 x 1.433) = 4.38 CFS

POST DEVELOPMENT CHANGE IN RUNOFF (PRIOR TO STM MANAGEMENT)

= 4.38 – 3.02 = 1.36 CFS

POST DEVELOPMENT CHANGE IN RUNOFF (AFTER TO STM MANAGEMENT)

= 4.38 – 3.02–(12532 x 0.9/43,560 x 7.27)
= –0.53 CFS DECREASE

Sand filter design			Remarks
C Factor of Sand Filter Area			
I(in/hr)	1.5		
Kp (in/hr)	3		
C =(I-Kp)/I	-1		
Sand Filter Detention Design Computation			
a) Water Quality Volume			
Inches of runoff to be treated:	1	ins	
Area of Pervious Concrete Blocks	3200	sf	
Maximuml impervious area to be treated (5X pervious concrete block area) :			
Total impervious area to be treated:	10880		
Total area to be treated (including pervious pavement area)	14080	sf	
Required WQV per imperv.acre to porous pavement:	3630	sf	
WQV	1173	cf	
Water Quality Depth	0.37	ft	
Water Quality Depth	4.4	ins	
ts (time base of the design storm)	2	hrs	
Minimum area of pervious pavement (Ap = WQV/[(kp/12)*(ts)])	2347	sf	
Detention Volume			
Site Area	1.79	Acres	
Volume of precipitation 2-yr, 2-hr storm (2" depth)	12995	cf	
Volume of precipitation 10-yr, 2-hr storm (3" depth)	19493	cf	
Pre- development site C factor 2-yr storm	0.20		
Pre- development site C factor 10-yr storm	0.29		
Pre- development 2-yr runoff volume	2599	cf	
Pre- development 10-yr runoff volume	5653	cf	
Post-development C factor	0.42		
Post-development 2-yr runoff volume	5458	cf	
Post-development 10-yr runoff volume	8187	cf	
Delta 2-yr runoff volume	2859	cf	
Delta 10-yr runoff volume	2534	cf	
Storage volume to be provided	3000	cf	
2 feet cover			
Diameter of pipes (309.7' - 306.2')	3.5	ft	
Cross-sectional area of pipes	9.62	ft	
Total length of pipes (4 x 79.0')	316	ft	
Total volume provided	3040.3		> 3000 cf

		INFLOW HYDROGRAPHS				
TIME	I2	I10	I100	Q2	Q10	Q100
0	0.00	0.00	0.00	0.0	0.0	0.0
5	5.45	7.25	9.84	2.6	3.5	4.7
10	3.51	4.68	6.37	1.7	2.2	3.1
15	2.60	3.46	4.73	1.2	1.7	2.3
20	2.08	2.77	3.74	1.0	1.3	1.8
25	1.72	2.29	3.13	0.8	1.1	1.5
30	1.46	1.94	2.65	0.7	0.9	1.3
35	1.28	1.68	2.33	0.6	0.8	1.1
40	1.10	1.47	2.07	0.5	0.7	1.0
45	1.00	1.31	1.88	0.5	0.6	0.9
50	0.89	1.18	1.69	0.4	0.6	0.8
55	0.82	1.08	1.55	0.4	0.5	0.7
60	0.74	0.99	1.42	0.4	0.5	0.7
65	0.68	0.91	1.30	0.3	0.4	0.6
70	0.62	0.83	1.18	0.3	0.4	0.6
75	0.56	0.74	1.07	0.3	0.4	0.5
80	0.49	0.66	0.95	0.2	0.3	0.5
85	0.43	0.58	0.83	0.2	0.3	0.4
90	0.37	0.50	0.71	0.2	0.2	0.3

PHOSPHOROUS REMOVAL CALCULATIONS – "OCCOQUAN METHOD"

(A) Area of the site 1.250 AC

(B) Surface area designation	(1)	"c" (2)		Acres (3)		Product (4)	
Roof Area (Controlled)	A1	0.9	x	0.136	=	0.122	
Parking area (Controlled)	A2	0.9	x	0.196	=	0.176	
Patio and Walk (Controlled)	A3	0.9	x	0.017	=	0.015	
Unpaved (Controlled)	A4	0.25	x	0.361	=	0.090	
Unpaved (Uncontrolled)	A5	0.25	x	0.418	=	0.105	
Parking area (Uncontrolled)	A6	0.9	x	0.122	=	0.110	

(C) Weighted average "c" factor — Total (b) = 0.617

Part 3: Compute the Total Phosphorus Removal for the Site — (b) / (a) = (c) 0.49

Subarea Designation	BMP Type	Removal Eff. (%)	Area Ratio		"C" Factor Ratio	Product
A1	Sandfilter	65	x 0.109	x	1.836	= 13.0
A2	Sandfilter	65	x 0.157	x	1.836	= 18.7
A3	Sandfilter	65	x 0.014	x	1.836	= 1.7
A4	Sandfilter	65	x 0.289	x	0.510	= 9.6

Fairfax county phosphorous removal requirement = 40% Total 43.0

The phosphorous removal is in compliance with Phosphorus Removal Requirement. Therefore, the design is acceptable.

THE SYSTEM IS DESIGNED FOR 1" DEPTH OF FIRST FLUSH.
THE REMOVAL EFFICIENCY OF 65% IS EQUIVILENT TO THE REMOVAL RATE OF A SAND FILTER DESIGNED FOR A 2–YEAR 2–HOUR STORM.

STORMWATER DETENTION WORKSHEET

RATIONAL FORMULA FOR DRAINAGE AREAS < 20 ACRES: Q=CIA

PROJECT NAME:
PROJECT NUMBER:

		PRE DEVEL.	POST DEVEL.
SITE AREA IN ACRES:	ACRES	1.79	1.79
RATIONAL C FACTOR 2YR		0.29	0.42
RATIONAL C FACTOR 10 YR		0.29	0.42
TIME OF CONCENTRATION	MIN	5.00	5.00
2 YR PEAK RAINFALL INTENSITY IN/HR		5.45	5.45
10 YR PEAK RAINFALL INTENSITY IN/HR		7.27	7.27
Q2 PEAK	Q=CIA CFS	1.95	4.10
Q10 PEAK	Q=CIA CFS	3.77	5.47
DELTA Q2	Q2 PEAK POST - Q2 PEAK PRE CFS		2.1
DELTA Q10	Q10 PEAK POST - Q10 PEAK PRE CFS		1.7

DRAINAGE DIVIDE TO DETENTION FACILITY	
DRAINAGE AREA TO DETENTION FACILITY ACRES	0.6
RATIONAL C FACTOR	0.8
TIME OF CONCENTRATION MINS	5
2 YR RAINFALL INTENSITY IN/HR	5.45
10 YR RAINFALL INTENSITY IN/HR	7.27
Q2 PEAK TO POND CFS	2.6
Q10 PEAK TO POND CFS	3.5

ALLOWABLE RELEASE= PEAK Q TO POND - DELTA Q	
Q2 ALLOWABLE CFS	0.5
Q10 ALLOWABLE CFS	1.8

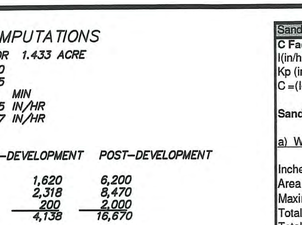
VOLUME REQUIREMENTS	PRE DEVEL.	POST DEVEL.
SITE AREA IN ACRES:	1.79	1.79
RATIONAL C FACTOR 2YR	0.29	0.42
RATIONAL C FACTOR 10 YR	0.29	0.42
2-YR 2-HR TOTAL RAINFALL INS	2.00	2.00
10-YR 2-HR TOTAL RAINFALL INS	3.00	3.00
2-YR 2-HR RUNOFF VOLUME CF	2593	5446
10-YR 2-HR RUNOFF VOLUME CF	5640	8168
2-YR STORAGE REQUIRED CF		2852
10-YR STORAGE REQUIRED CF		2528
DETENTION STORAGE REQUIRED IS THE GRATER OF THE TWO CF		2852
48 HR DRAWDOWN TO BE PROVIDED FOR THE 2-YR 2-HR STORM FOR BMP		

WORKSHEET 3.12A
SIZING COMPUTATIONS FOR D.C. UNDERGROUND VAULT SAND FILTER
Page 1 of 4

Part 1: Select maximum ponding depth over filter:

2h = 2.0 ft;

h = 1.0 ft



From Pollutant Load Sheets:

I_a = 0.65 acres

WQV = 1173 ft^3

Outflow by gravity possible X

Effluent pump required __

Part 2: Compute Minimum Area of Filter (A_{ft}):

$A_{ft} = \frac{545 L_a d_f}{(d_f + h)}$

= [545 x 0.65 x 0.5] / [0.5 + 1.0]

= 118.1 ft^2

Part3: Considering Site Constraints, Select Filter Width (W_f) and Compute Filter Length (L_f) and Adjusted Filter Area (A_f):

W_f = 120 ft;

WORKSHEET 3.12A
SIZING COMPUTATIONS FOR D.C. UNDERGROUND VAULT SAND FILTER
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Part 11: Set Length of Clearwell (L_{cw}) for Adequate Maintenance Access (Minimum = 3 ft) and Compute Final Inside Length (L_{ti}):

L_{cw} = 3.5 ft:

Sum of interior partition thicknesses (t_{pi}) = 0.85 ft

$L_{ti} = L_f + L_p + L_{cw} + t_{pi}$

= 12 + 42.8 + 3.5 + 0.85

= 59.2 ft

WORKSHEET 3.12A
SIZING COMPUTATIONS FOR D.C. UNDERGROUND VAULT SAND FILTER
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$L_f = A_{ft} / W_f$

= 120 / 10

= 12 , say 12 ft

$A_f = W_f \times L_f$ = 10 x 12

= 120 ft^2

Part 4: Compute the Storage Volume on Top of the Filter(V_{TF})

$V_{TF} = A_f \times 2h$ = 120 x 2.0

= 240 ft^3

Part 5: Compute Storage in Filter Voids (V_v):
(Assume 40% voids in filter media)

$V_v = 0.4 \times A_f \times (d_f + d_g)$

= 0.4 x 120 x (0.5 + 0.5)

= 48 ft^3

Part 6: Compute Flow Through Filter During Filling Period (V_Q):
(Assume 1-hour to fill per D.C. practice)

$V_Q = \frac{kA_f(d_f + h)}{d_f}$; use k = 2 ft/day = 0.0833 ft/hr

= [0.0833 x 120 x (0.5 + 1.0)]/ 0.5

= 30.0 ft^3

Part 12: Design Effluent Pump if Required

Since pump must be capable of handling flow when filter is new, use k = 12 feet/day = 0.5 ft/hr

$Q = \frac{kA_f(d_f + h)}{d_f}$

= [0.5 x 120 x (0.5 + 1.0)] / 0.5

= 180 ft^3/hr : /3600 = 0.05 cfs;

x 448 = 22.4 gpm

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SIZING COMPUTATIONS FOR D.C. UNDERGROUND VAULT SAND FILTER
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Part 7: Compute Net Volume to be Stored Awaiting Filtration (V_{st}):

$V_{st} = WQV - V_{TF} - V_v - V_Q$

= 1173 - 240 - 48 - 30

= 855 ft^3

Part 8: Compute Minimum Length of Permanent Pool (L_{pm}):

$L_{pm} = \frac{V_{st}}{(2h \times W_f)}$ = 855 / (2.0 x 10)

= 42.8 ft

Part 9: Compute Minimum Length of Sediment Chamber (L_{sm})
(to contain at least 20% of WQV per Austin practice)

$L_{sm} = \frac{0.2WQV}{(2h \times W_f)}$ = 234.6 / 20.0

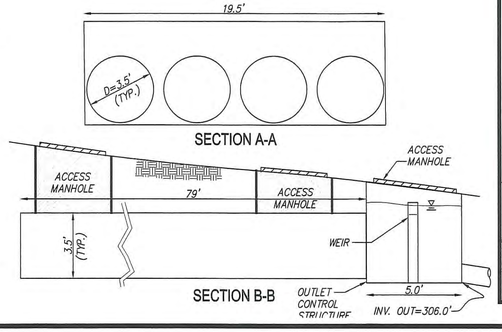
= 11.7 ft

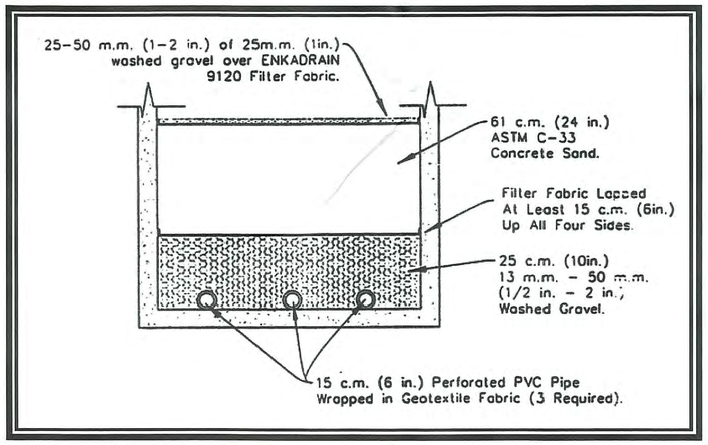
Part 10: Set Final Length of Permanent Pool (L_p)

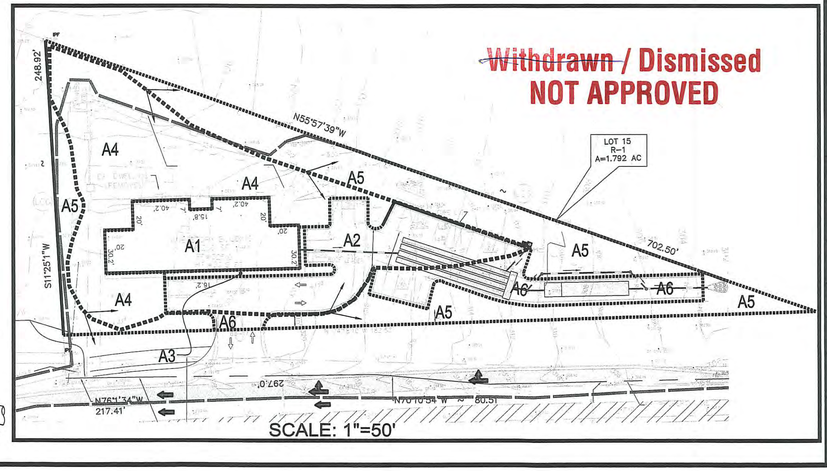
L_{sm} + 2ft = 11.7 + 2 = 13.7 ft

If $L_{pm} \geq L_{sm}$ + 2ft, Make $L_p = L_{pm}$ 42.8 = ft

If $L_{pm} < L_{sm}$ + 2ft, make $L_p = L_{sm}$ +2ft =







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ENGINEERS . PLANNERS . ARCHITECTS . LANDSCAPE ARCHITECTS . SURVEYORS
LEESBURG PIKE, SUITE 305N
FALLS CHURCH, VA 22043 PH: (703) 556–0800

9121 SILVERBROOK ROAD
MAGISTERIAL DISTRICT: SPRINGFIELD FAIRFAX COUNTY

OUTFALL ANALYSIS & SWM COMPUTATIONS

COMMONWEALTH OF VIRGINIA
HAMID MOGHAVEMI–TEHRANI
Lic. No. 23137
12/3/09
PROFESSIONAL ENGINEER

DESIGNED BY: SDE, INC.
DRAWN BY: S.L.
CHECKED BY: HAMID T., PE
SCALE: as noted
DATE: 12/02/2009
PROJECT/FILE #
SHEET NUMBER 3 OF 5

ADEQUATE OUTFALL NARRATIVE

THE SITE CONSISTS OF 1.433 ACRES OF TOTAL AREA (AFTER THE DEDICATION). CURRENTLY THE SITE IS DEVELOPED WITH A SMALL RESIDENTIAL DWELLING. THE PROPOSED OVERALL 100-YR RUNOFF FROM THE SITE IS 8.56 CFS WHICH SHEET FLOWS ACROSS THE LOT AND OUTFALLS TO THE ROAD SIDE DITCH. THE DITCH CONVEYS THE RUNOFF TO THE EAST AS A SHALLOW CONCENTRATED FLOW AND CONVERGES WITH THE OUTFALL LOCATION OF EXISTING 24" RCP CULVERT LAID UNDER SILVERBROOK ROAD. STORMWATER QUANTITY MANAGEMENT WILL BE USED TO ENSURE THAT THE PEAK RUNOFF FROM THE SITE DOES NOT EXCEED ITS CURRENT RUNOFF.

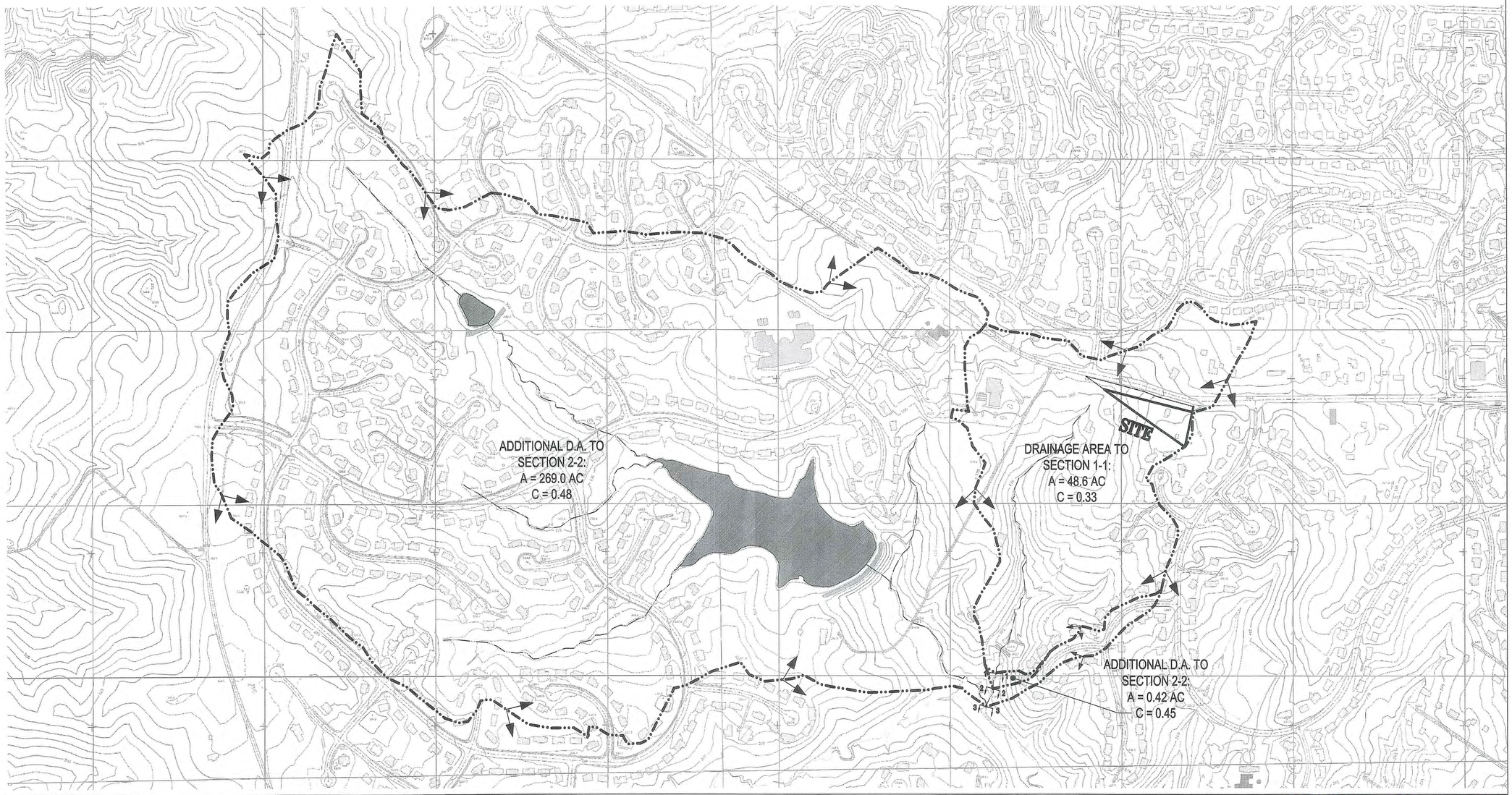
THREE STUDY SECTIONS 1-1, 2-2, AND 3-3 ARE TAKEN DOWNSTREAM OF THAT POINT OF CONFLUENCE WHERE THE DRAINAGE AREA IS GREATER THAN 100 TIMES THE SITE AREA (269.0 AC > 1.433 AC * 100). RUNOFF CALCULATIONS ALONG WITH CROSS SECTION AND VELOCITIES WILL BE INCLUDED AT THE TIME OF THE SITE PLAN SUBMISSION IN ORDER TO DEMONSTRATE THE ADEQUACY OF THE OUTFALL.

THE REDEVELOPMENT OF THE SITE WILL PROPOSED SUBSURFACE STORAGE SYSTEM TO OFFSET THE INCREASED RUNOFF AS A RESULT OF THE INCREASED IMPERVIOUS AREA OF 12,532 SF. THE SAND FILTER SYSTEM HAS BEEN DESIGNED TO ACCOMMODATE 10 YEAR RUNOFF (3" DEPTH) FROM THE INCREASED IMPERVIOUS AREA. THE EXCESS WATER OUTFALLS TO THE DITCH VIA OVERFLOW PIPE. AS A RESULT OF THE PROPOSED SAND FILTER SYSTEM, THE OVERALL RUNOFF WILL BE DECREASED BY 0.53 CFS DURING PEAK CONDITIONS. THEREFORE, IT IS EVIDENT THAT THE EXISTING ADEQUATE OUTFALLS WILL ALSO BE ADEQUATE FOR THE PROPOSED DEVELOPMENT OF THE SITE AND NO FLOODING OR ADVERSE EFFECT WILL BE ANTICIPATED AT THE DOWNSTREAM OF THE SITE. THE EXISTING DRAINAGE PATTERN WILL BE MAINTAINED BY THE PROPOSED DEVELOPMENT.

THE EXTENT OF THE DRAINAGE STUDY HAS BEEN PERFORMED PER PFM 6-203.2 (1) AND PER THE ZONING ORDINANCE 9-011, PARAGRAPH 2.u(2)(c) AND THE CHANNEL CAPACITY METHOD HAS BEEN USED TO ADDRESS THE ADEQUACY OF THE OUTFALLS THROUGH OUT THE EXTENT OF STUDY. HEC-RAS OUTPUT HAS BEEN USED TO STUDY THE FLOW DEPTH RELATION OF THE IRREGULAR SECTIONS (SWALE).

DRAINAGE MAP

SCALE: 1"=300'



Withdrawn / Dismissed
NOT APPROVED

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LEESBURG PIKE, SUITE 305N
FALLS CHURCH, VA 22043 PH: (703) 556-0800

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OUTFALL ANALYSIS & SWM COMPUTATIONS

COMMONWEALTH OF VIRGINIA
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SHEET NUMBER	3A OF 5

SCREENING BUFFER (TYPE I)

1. REAR LOT LINE (SOUTH)

WIDTH = 25 FT
LENGTH= 702.5 LF

THE EXISTING TREES WILL BE PRESERVED AS SCREENING.
ONLY THE CLEARED AREA WILL BE REFORESTED.

LENGTH=182 LF

DESCRIPTION	TYPE	RATE	LENGTH	TOTAL
REAR LOT	LARGE TREE	1/10 LF	182	18
REAR LOT	EVERGREEN (M)	1/5 LF	182	37

1. LEFT SIDE YARD (ONE SIDE YARD)

WIDTH = 25 FT
LENGTH= 248.92 LF

DESCRIPTION	TYPE	RATE	LENGTH	TOTAL
SIDE YARD	LARGE TREE	1/10 LF	248.92	25
SIDE YARD	EVERGREEN (M)	1/5 LF	248.92	50

PARKING LOT LANDSCAPING

1. INTERIOR

PARKING LOT LANDSCAPING REQUIREMENTS
TOTAL AREA OF PARKING LOT: 11,636 SF
TOTAL AREA OF LANDSCAPING REQUIRED:
5% * 11,680 = 582 SF
TOTAL LANDSCAPED AREA PROVIDED: 730 SF
730 SF > 582 SF

2. PERIPHERIAL LANDSCAPING

a. LEFT (EAST) OF THE PARKING LOT
AS TRANSITIONAL SCREENING IS PROVIDED ON THAT SIDE, NO PERIPHERAL PAKRING IS REQUIRED.

b. PROPERTY LINE ABUTTING THE RIGHT-OF-WAY

A 10' STRIP WILL BE PROVIDE ALL ACROSS THE FRONT LINE.

DESCRIPTION	TYPE	RATE	LENGTH	TOTAL
FRONT LOT	DECIDIOUS	1/40 LF	648.8	16

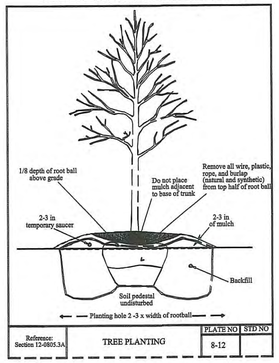
TREE COVER COMPUTATIONS

TOTAL LOT AREA = 62415 SF OR 1.433 ACRE
TREE COVER REQUIREMENTS= 30% OR 18,725 SF
TREE FROM PRESERVATIONS=13,700 SF
CREDIT FOR EXISTING TREES=13,700 SF@0.25=3,425 SF

PROPOSED TREE

PROPOSED TREE =21,525 SF
TOTAL TREE COVER ON THE LOT = 21,525+3,425+13,700 = 38,650 SF >18,725 SF OK

FAIRFAX COUNTY PUBLIC FACILITIES MANUAL



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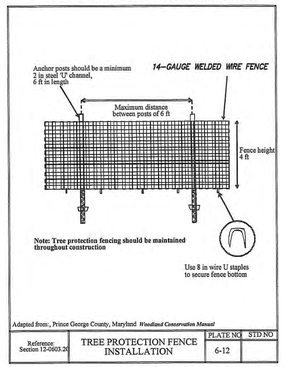

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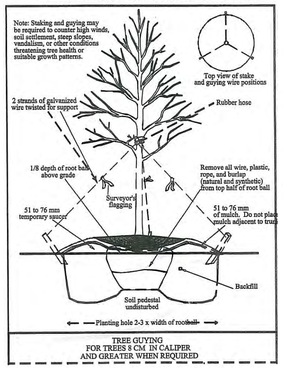

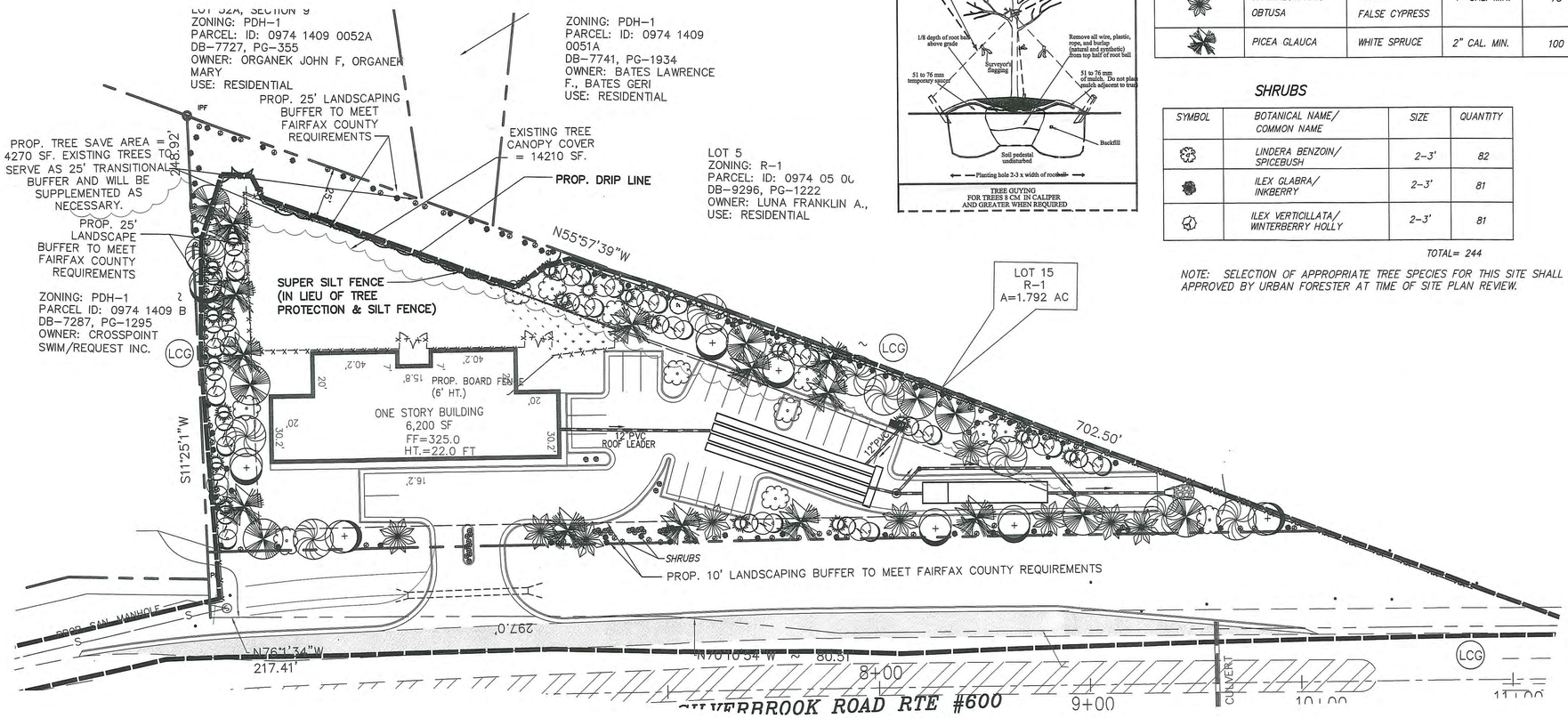

PROPOSED PLANTING SCHEDULE

OVERSTORY

SYMBOL	BOTANICAL NAME	COMMON NAME	SIZE	10-YR PROJECTED COVER AREA	TREES TO BE PLANTED				TOTAL TREES	COVER AREA (SF)
					SCREEN		PARKING LOT			
					REAR	SIDE	INTERIOR	PERIPHERY		
	ACER RUBRUM	RED MAPLE	3" CAL. MIN.	250 SF	4	6	—	—	10	2,500
	QUERCUS RUBRA	RED OAK	3" CAL. MIN.	250 SF	5	6	—	—	11	2,750
	QUERCUS PHELLOS	WILLOW OAK	3" CAL. MIN.	250 SF	5	7	—	—	12	3,000
	QUERCUS ALBA	WHITE OAK	3" CAL. MIN.	250 SF	4	6	—	—	10	2,500
								SUB-TOTAL=	10,750 SF	

EVERGREEN

	TSUGA CAROLINIANA	CAROLINA HEMLOCK	12' HT	125 SF	9	12	—	—	21	2,625
	ILEX OPACA	AMERICAN HOLLY	9' HT	125 SF	8	14	—	—	22	2,750
	CHAMAECYPARIS THYOIDES	ATLANTIC WHITECEDAR	3" CAL. MIN.	75 SF	9	12	—	—	21	1,575
	JUNIPERUS VIRGINIANA	EASTERN REDCEDAR	7 ' HT	75 SF	9	12	—	—	21	1,575
								SUB-TOTAL=	8,525	

LARGE EVERGREEN TREES

	CHAMAECYPARIS OBTUSA	HINOKI FALSE CYPRESS	1" CAL. MIN.	75 SF	—	—	2	8	10	750
	PICEA GLAUCA	WHITE SPRUCE	2" CAL. MIN.	100 SF	—	—	4	8	12	1200
								SUB-TOTAL=	1,950	
								TOTAL=	21,225 SF	

SHRUBS

SYMBOL	BOTANICAL NAME/ COMMON NAME	SIZE	QUANTITY
	LINDERA BENZOIN/ SPICEBUSH	2-3'	82
	ILEX GLABRA/ INKBERRY	2-3'	81
	ILEX VERTICILLATA/ WINTERBERRY HOLLY	2-3'	81
		TOTAL=	244

NOTE: SELECTION OF APPROPRIATE TREE SPECIES FOR THIS SITE SHALL BE APPROVED BY URBAN FORESTER AT TIME OF SITE PLAN REVIEW.

Withdrawn / Dismissed
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LANDSCAPE PLAN

COMMONWEALTH OF VIRGINIA
HAMID MOGHAYEMI-TEHRANI
Lic. No. 23137
PROFESSIONAL ENGINEER
12/3/09

DESIGNED BY: SDE, INC.
DRAWN BY: S.L.
CHECKED BY: HAMID T., PE
SCALE: 1":30'
DATE: 12/02/2009
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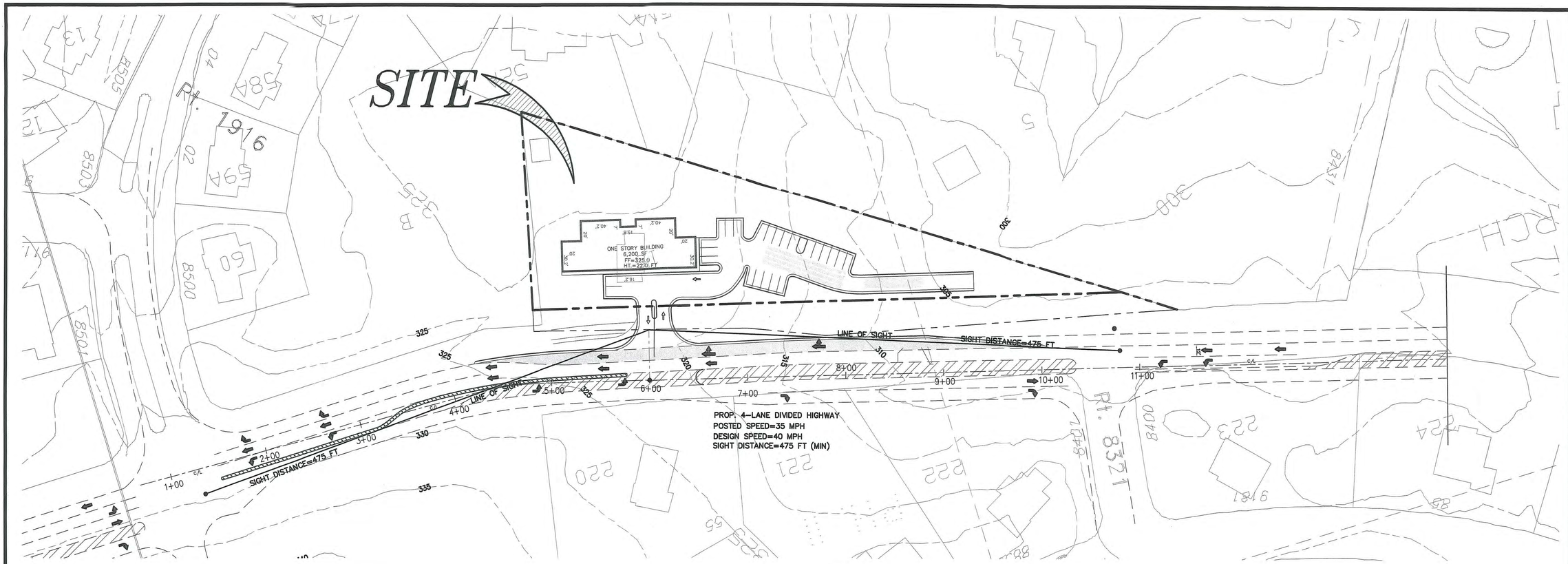

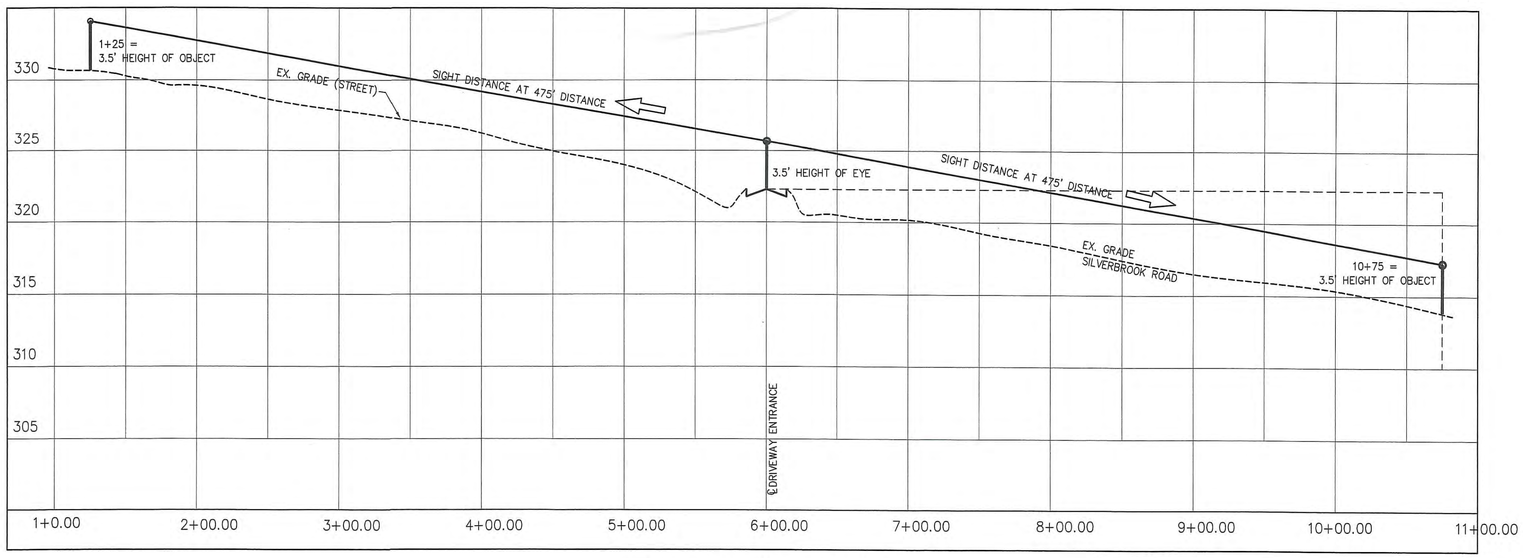

SIGHT DISTANCE PROFILE

POSTED SPEED=35 MPH
DESIGN SPEED=40 MPH
SIGHT DISTANCE=475 FT (MIN)

HORIZONTAL: 1" = 50'
VERTICAL: 1"= 5'

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FALLS CHURCH, VA 22043 PH: (703) 556-0800

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MAGISTERIAL DISTRICT: SPRINGFIELD FAIRFAX COUNTY

SIGHT DISTANCE PROFILE

COMMONWEALTH OF VIRGINIA
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12/3/09

DESIGNED BY: SDE, INC.

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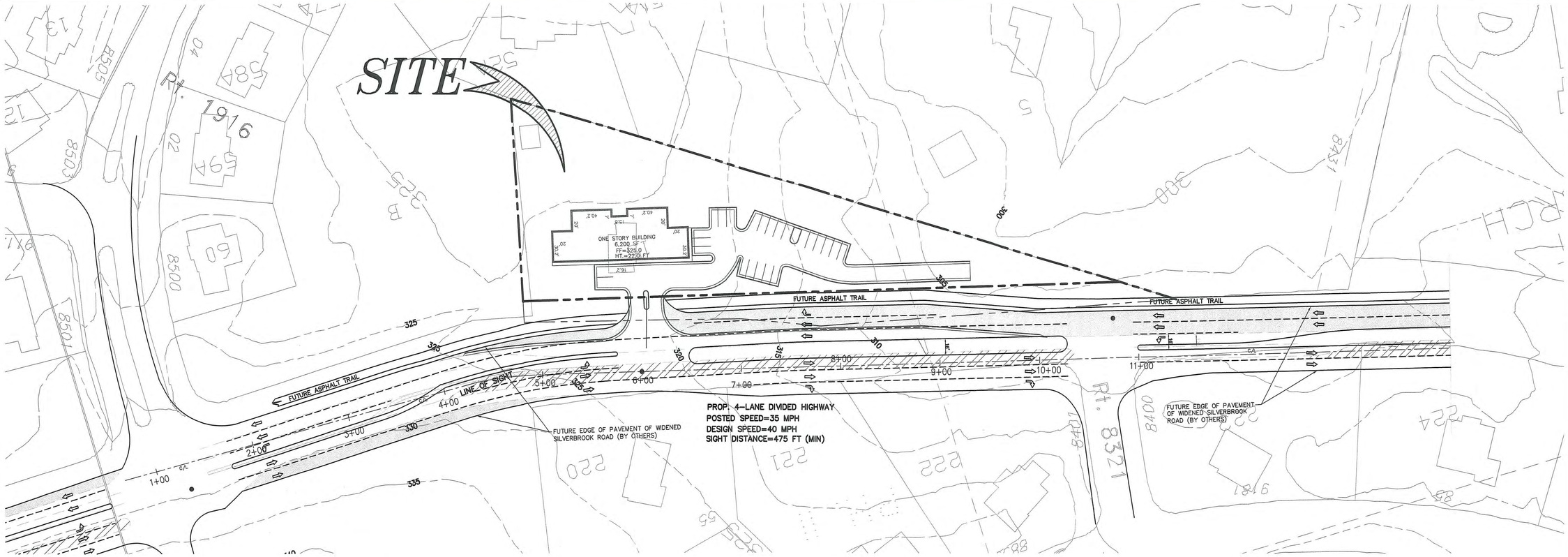
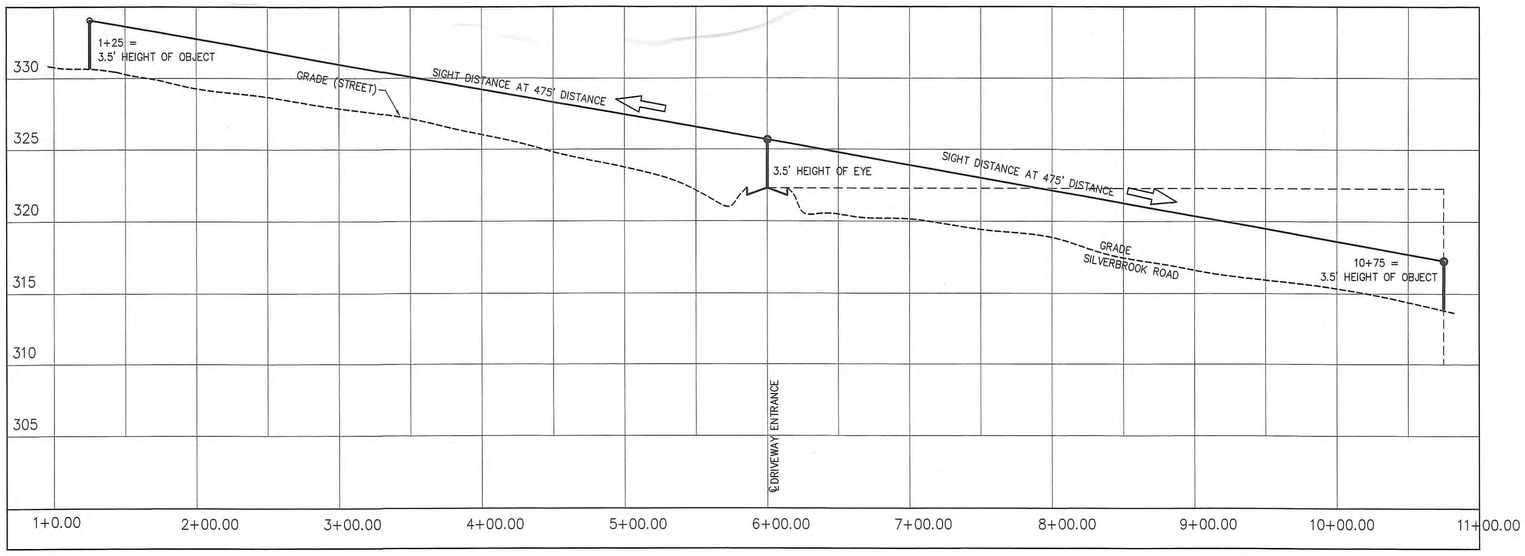
5 OF 5





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FALLS CHURCH, VA 22043 PH: (703) 556-0800

9121 SILVERBROOK ROAD

MAGISTERIAL DISTRICT: SPRINGFIELD FAIRFAX COUNTY

FUTURE ROADWAY AND SIGHT DISTANCE PROFILE

COMMONWEALTH OF VIRGINIA
HAMID MOGHAVEMI-TEHRANI
Lic. No. 23137
12/2/09
PROFESSIONAL ENGINEER

DESIGNED BY: SDE, INC.
DRAWN BY: S.L.
CHECKED BY: HAMID T., PE
SCALE: 1"=50'
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