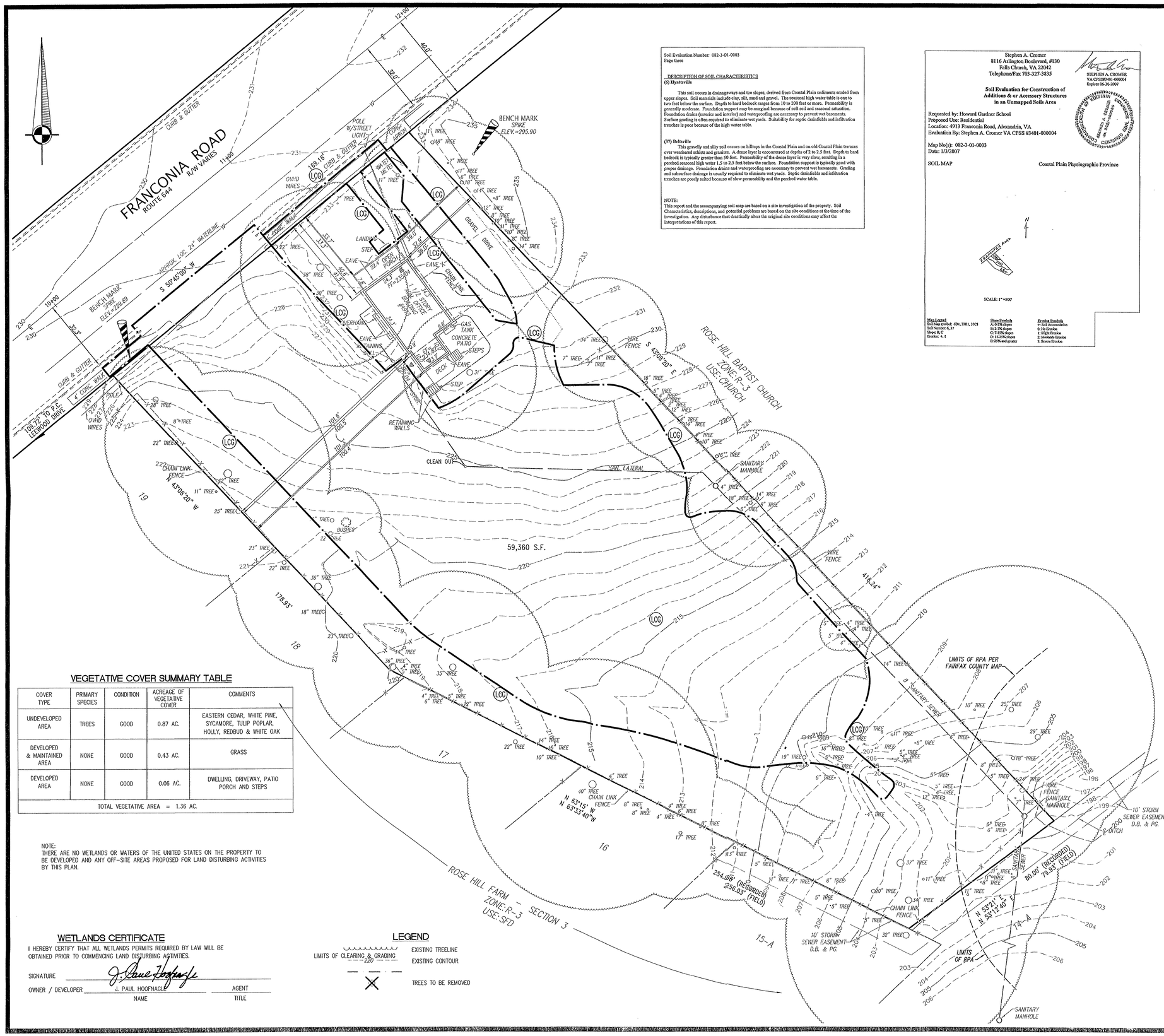

Soil Evaluation Number: 082-3-01-0003
Page three

DESCRIPTION OF SOIL CHARACTERISTICS

(6) Hyattsville

This soil occurs in drainageways and toe slopes, derived from Coastal Plain sediments eroded from upper slopes. Soil materials include clay, silt, sand and gravel. The seasonal high water table is one to two feet below the surface. Depth to hard bedrock ranges from 10 to 200 feet or more. Permeability is generally moderate. Foundation support may be marginal because of soft soil and seasonal saturation. Foundation drains (exterior and interior) and waterproofing are necessary to prevent wet basements. Surface grading is often required to eliminate wet yards. Suitability for septic drainfields and infiltration trenches is poor because of the high water table.

(37) Beltsville

This gravelly and silty soil occurs on hilltops in the Coastal Plain and on old Coastal Plain terraces over weathered schists and granites. A dense layer is encountered at depths of 2 to 2.5 feet. Depth to hard bedrock is typically greater than 50 feet. Permeability of the dense layer is very slow, resulting in a perched seasonal high water 1.5 to 2.5 feet below the surface. Foundation support is typically good with proper drainage. Foundation drains and waterproofing are necessary to prevent wet basements. Grading and subsurface drainage is usually required to eliminate wet yards. Septic drainfields and infiltration trenches are poorly suited because of slow permeability and the perched water table.

NOTE:
This report and the accompanying soil map are based on a site investigation of the property. Soil Characteristics, descriptions, and potential problems are based on the site conditions at the time of the investigation. Any disturbance that drastically alters the original site conditions may affect the interpretations of this report.

Stephen A. Cromer
8116 Arlington Boulevard, #130
Falls Church, VA 22042
Telephone/Fax 703-327-3835

STEPHEN A. CROMER
VA CPSS#3401-000004
Expires 06-30-2007

Soil Evaluation for Construction of Additions & or Accessory Structures in an Unmapped Soils Area

Requested by: Howard Gardner School
Proposed Use: Residential
Location: 4913 Franconia Road, Alexandria, VA
Evaluation By: Stephen A. Cromer VA CPSS #3401-000004

Map No(s): 082-3-01-0003
Date: 1/3/2007

SOIL MAP

Coastal Plain Physiographic Province

Map Legend
Soil Map symbol: 6B+, 37B1, 37C1
Soil Number: 6, 37
Slope: B, C
Erosion: +, 1

Slope Symbols
A: 0-2% slopes
B: 2-7% slopes
C: 7-15% slopes
D: 15-25% slopes
E: 25% and greater

Erosion Symbols
+: Soil Accumulation
0: No Erosion
1: Slight Erosion
2: Moderate Erosion
3: Severe Erosion

VICINITY MAP
SCALE: 1" = 500'

Soil Evaluation Number: 082-3-01-0003
Page two

SOIL MAP SYMBOL	SOIL SERIES NAME	SLOPE RANGE %	PROBLEM CLASS	ESTIMATED % OF SITE
Soil Map Number	Soil Series Name	Slope range in Percent	A, B, or C	Estimated percent Of Each Soil Type
6B+	Hyattsville	2-7%	B	45%
37B1	Beltsville	2-7%	B	15%
37C1	Beltsville	7-15%	B	40%
				TOTAL: 100%

POTENTIAL SOIL PROBLEMS	YES/NO	SOIL NO(S)
Slope instability	NO	
Marginal to Low Bearing Capacity	YES	6
High Seasonal Water Table	YES	6, 37
High Shrink-Swell Clays	NO	
Poor Surface Drainage	NO	
Shallow Depth to Bedrock	NO	
High Erodibility	YES	37
Flood Plain (Alluvial)	NO	
Poor Septic Field Potential	YES	6, 37
Hydric Soils Potential Wetlands	NO	

GEOTECHNICAL REQUIREMENTS

A geotechnical report may not be required for construction in **(6) Hyattsville** soil for this site provided that adequate design is incorporated into the construction plans by the architect or site engineer to address the observed seasonal groundwater conditions, and as long as construction is in natural soils and not in disturbed soil or fill. The site grading plan should indicate suitable positive surface grading away from structures, and construction plans should indicate suitable subsurface waterproofing and drainage for basements.

A geotechnical report may not be required for construction in **(37) Beltsville** soil for this site provided that adequate design is incorporated into the construction plans by the architect or site engineer to address the observed seasonal groundwater conditions, and as long as construction is in natural soils and not in disturbed soil or fill. The site grading plan should indicate suitable positive surface grading away from structures, and construction plans should indicate suitable subsurface waterproofing and drainage for basements.

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VEGETATIVE COVER SUMMARY TABLE

COVER TYPE	PRIMARY SPECIES	CONDITION	ACREAGE OF VEGETATIVE COVER	COMMENTS
UNDEVELOPED AREA	TREES	GOOD	0.87 AC.	EASTERN CEDAR, WHITE PINE, SYCAMORE, TULIP POPLAR, HOLLY, REDBUD & WHITE OAK
DEVELOPED & MAINTAINED AREA	NONE	GOOD	0.43 AC.	GRASS
DEVELOPED AREA	NONE	GOOD	0.06 AC.	DWELLING, DRIVEWAY, PATIO PORCH AND STEPS
TOTAL VEGETATIVE AREA = 1.36 AC.				

NOTE:
THERE ARE NO WETLANDS OR WATERS OF THE UNITED STATES ON THE PROPERTY TO BE DEVELOPED AND ANY OFF-SITE AREAS PROPOSED FOR LAND DISTURBING ACTIVITIES BY THIS PLAN.

WETLANDS CERTIFICATE

I HEREBY CERTIFY THAT ALL WETLANDS PERMITS REQUIRED BY LAW WILL BE OBTAINED PRIOR TO COMMENCING LAND DISTURBING ACTIVITIES.

SIGNATURE _____

OWNER / DEVELOPER J. PAUL HOOFNAGLE — NAME
AGENT — TITLE

LEGEND

LIMITS OF CLEARING & GRADING
EXISTING TREELINE
EXISTING CONTOUR
TREES TO BE REMOVED

SHEET INDEX

SHEET NUMBER	TITLE
1	VEGETATIVE PLAT AND DEMOLITION PLAN
2	SPECIAL PERMITT PLAT
3	BMP PLAN AND COMPUTATIONS
4	PLAN AND PROFILE – FRANCONIA ROAD
5 & 6	TR 55-FLOW PATH STUDY & STORAGE VOL. FOR DETENTION BASINS
7	DRAINAGE AREA MAP
8	DRAINAGE OUTFALL CROSS SECTIONS AND OUTFALL PICTURES
9	SITE PHOTOS

Application No. SE 2006-LE-026 Staff S.C.
APPROVED SE/ SP PLAN
SEE DEV CONDS DATED August 13, 2007
Date of (BOS) (BZA) approval Sept. 10, 2007
Sheet 1 of 9

RECEIVED
Department of Planning & Zoning
JUN 19 2007
Zoning Evaluation Division

No.	DESCRIPTION	DATE
1	REVISED LAYOUT AND ADDED STORM SEWER AND BMP	8/24/06
2	REVISED PARKING LAYOUT & ADDED THE FUTURE BLDG.	9/18/06
3	REVISED BMP AND ADDED STORMWATER WETLAND POND, GRADING AND LANDSCAPING.	5/7/07
4	REVISED LIMITS OF CLEARING & GRADING	6/18/07

REVISION APPROVED BY DIVISION OF DESIGN REVIEW
REVIEW BY: APPROVED DATE

VEGETATIVE PLAT AND DEMOLITION PLAN
THE HOWARD GARDNER SCHOOL

(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
D. ANTHONY BEALE
No. 4154
PROFESSIONAL ENGINEER
6/18/07
D. ANTHONY BEALE, P.E.

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www.AlexandriaSurveys.com

DRAFTED: REM	CHECKED: PAE
DESIGNED: CBF	CHECKED: WGF
DATE: AUGUST, 2006	SCALE : N/A

SHEET 1 OF 9

57-06

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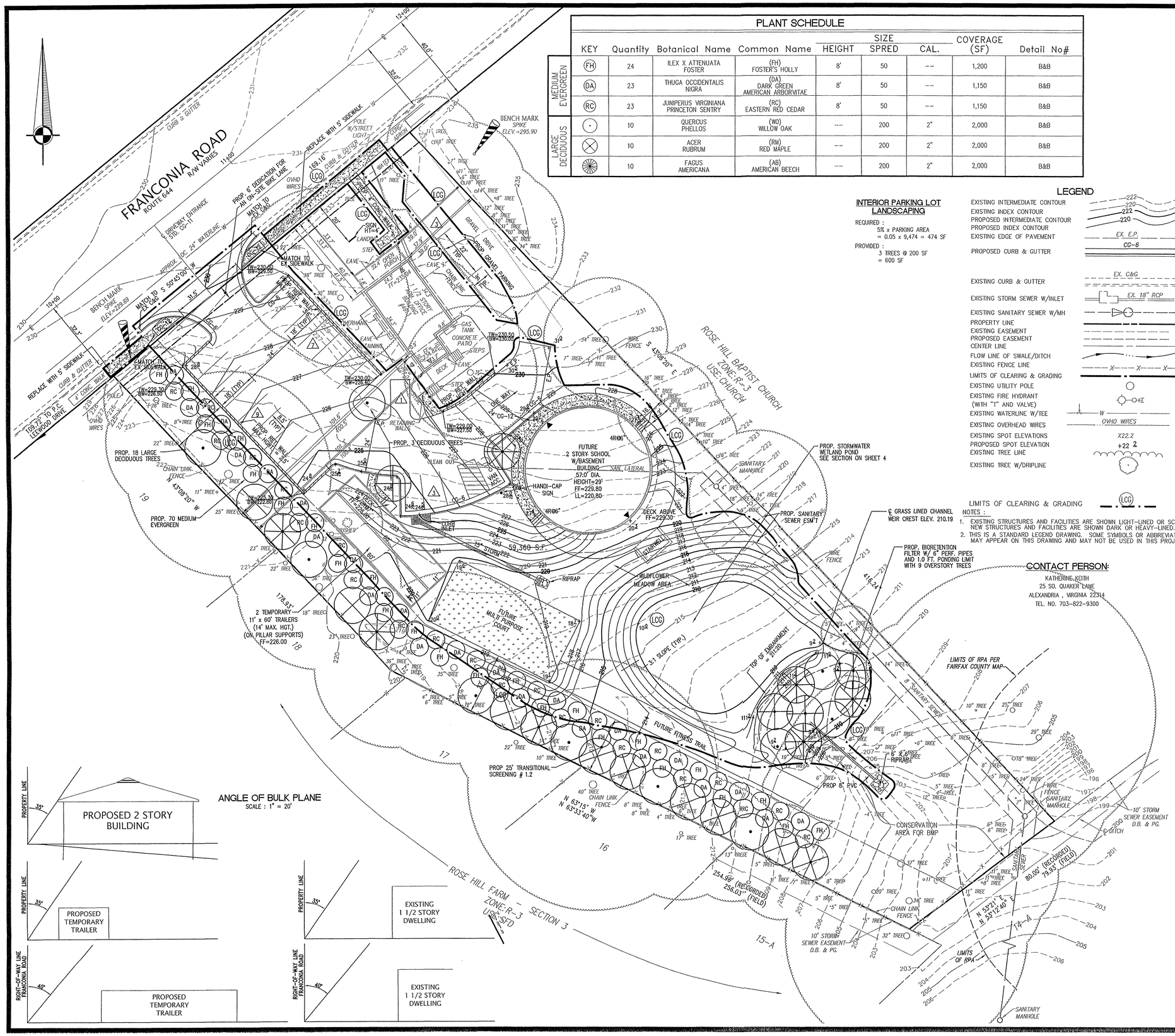

PLANT SCHEDULE

	KEY	Quantity	Botanical Name	Common Name	SIZE HEIGHT	SIZE SPRED	SIZE CAL.	COVERAGE (SF)	Detail No#
MEDIUM EVERGREEN	FH	24	ILEX X ATTENUATA FOSTER	(FH) FOSTER'S HOLLY	8'	50	--	1,200	B&B
	DA	23	THUGA OCCIDENTALIS NIGRA	(DA) DARK GREEN AMERICAN ARBORVITAE	8'	50	--	1,150	B&B
	RC	23	JUNIPERUS VIRGINIANA PRINCETON SENTRY	(RC) EASTERN RED CEDAR	8'	50	--	1,150	B&B
LARGE DECIDUOUS	•	10	QUERCUS PHELLOS	(WO) WILLOW OAK	--	200	2"	2,000	B&B
	⊗	10	ACER RUBRUM	(RM) RED MAPLE	--	200	2"	2,000	B&B
	✺	10	FAGUS AMERICANA	(AB) AMERICAN BEECH	--	200	2"	2,000	B&B

INTERIOR PARKING LOT LANDSCAPING

REQUIRED :
5% x PARKING AREA
= 0.05 x 9,474 = 474 SF

PROVIDED :
3 TREES @ 200 SF
= 600 SF

LEGEND

EXISTING INTERMEDIATE CONTOUR	222
EXISTING INDEX CONTOUR	220
PROPOSED INTERMEDIATE CONTOUR	222
PROPOSED INDEX CONTOUR	220
EXISTING EDGE OF PAVEMENT	EX. E.P.
PROPOSED CURB & GUTTER	CG-6
EXISTING CURB & GUTTER	EX. C&G
EXISTING STORM SEWER W/INLET	EX. 18" RCP
EXISTING SANITARY SEWER W/MH	
PROPERTY LINE	
EXISTING EASEMENT	
PROPOSED EASEMENT	
CENTER LINE	
FLOW LINE OF SWALE/DITCH	
EXISTING FENCE LINE	X X X
LIMITS OF CLEARING & GRADING	
EXISTING UTILITY POLE	
EXISTING FIRE HYDRANT (WITH "1" AND VALVE)	H
EXISTING WATERLINE W/TEE	W
EXISTING OVERHEAD WIRES	OVHD WIRES
EXISTING SPOT ELEVATIONS	X22.2
PROPOSED SPOT ELEVATION	+22 2
EXISTING TREE LINE	
EXISTING TREE W/DRIPLINE	

LIMITS OF CLEARING & GRADING — LCG —

NOTES :
1. EXISTING STRUCTURES AND FACILITIES ARE SHOWN LIGHT-LINED OR SCREENED. NEW STRUCTURES AND FACILITIES ARE SHOWN DARK OR HEAVY-LINED.
2. THIS IS A STANDARD LEGEND DRAWING. SOME SYMBOLS OR ABBREVIATIONS MAY APPEAR ON THIS DRAWING AND MAY NOT BE USED IN THIS PROJECT.

NOTES:

1. THE PROPERTY IS DELINEATED HEREON IS LOCATED ON TAX MAP 82-3-001-3 AND IS ZONED R-3.
2. SITE AREA = 59,360 SQUARE FEET OR 1.3627 ACRES.
3. AS PER REAL ESTATE ASSESSMENT RECORDS, THIS DWELLING WAS CONSTRUCTED IN 1920.
4. REQUIRED YARDS:
   A. SINGLE FAMILY DWELLINGS:
      FRONT: = 30 FEET
      SIDE: = 12 FEET
      REAR: = 25 FEET
   B. ALL OTHER STRUCTURES:
      FRONT: CONTROLLED BY A 40° ANGLE OF BULK PLANE, BUT NOT LESS THAN 30 FEET.
      SIDE: CONTROLLED BY A 35° ANGLE OF BULK PLANE, BUT NOT LESS THAN 10 FEET.
      REAR: CONTROLLED BY 35° ANGLE OF BULK PLANE, BUT NOT LESS THAN 25 FEET.
5. HEIGHTS:
   EXISTING DWELLING = 23.0 FEET
   EXISTING OPEN PORCH = 10.9 FEET
   EXISTING DECK = 11.2 FEET
   EXISTING STORAGE = 6.6 FEET
   EXISTING SHED = 11.1 FEET
   EXISTING FENCES = AS NOTED
   EXISTING WALLS = AS NOTED
   PROPOSED TEMPORARY TRAILER = 14.0 FEET
   FUTURE 2 STORY BUILDING W/BASEMENT = 29.0 FEET
6. PARKING TABULATION:
   REQUIRED: 0.3 SPACE PER STUDENT
   48 STUDENTS = 14 SPACES REQUIRED
   8 OFFICE STAFF = 8 SPACES REQUIRED
   HANDICAP SPACE = 1 SPACE REQUIRED
   TOTAL PARKING = 23 SPACES REQUIRED
   TOTAL PARKING = 24 SPACES PROVIDED
   PARKING FOR USE DURING SPECIAL EVENTS WILL BE IN THE PARKING LOT ON THE ADJACENT CHURCH PROPERTY BY SHARED PARKING AGREEMENT.
7. THIS PROPERTY IS SERVED BY PUBLIC WATER AND SEWER.
8. GROSS FLOOR AREA:
   EXISTING BUILDING = 970 S.F.
   FUTURE BUILDING = 7,656 S.F.
   TOTAL GROSS FLOOR AREA = 8,626 S.F.
9. FLOOR AREA RATIO:
   EXISTING & PROPOSED = 0.15 ALLOWED = 0.25
10. SEE VEGETATIVE PLAT FOR TREE PRESERVATION.
11. THERE IS NO LAND DISTURBANCE WITHIN THE RESOURCE PROTECTION AREA.
12. THERE ARE NO GRAVE SITES OR BURIAL GROUNDS VISIBLE ON THIS PROPERTY UNLESS NOTED OTHERWISE.
13. THIS APPLICATION PROPOSES FOR TEMPORARY TRAILERS ON SITE.
14. TOTAL OPEN SPACE ON THIS PROPERTY IS 44,064 S.F. OR 74% OF THE SITE.
15. THIS APPLICATION PROPOSES TO CONSTRUCT A NEW BUILDING AND PARKING LOT.
16. THE WESTERN BOUNDARY THAT ABUTTS THE DETACHED DWELLINGS WILL BE PROVIDED WITH TRANSITIONAL SCREENING ONE. THIS WILL CONSIST OF ONE LARGE DECIDUOUS TREE WITH AN ULTIMATE HEIGHT OF 50 FEET OR GREATER FOR EVERY 15 LINEAR FEET, PLUS ONE MEDIUM EVERGREEN TREE WITH AN ULTIMATE HEIGHT OF 20 TO 40 FEET FOR EVERY 5 LINEAR FEET. THE EXISTING CHAIN LINK FENCE WILL REMAIN.
    THE PROPERTY BOUNDARY THAT ABUTTS THE CHURCH WHICH DOES NOT REQUIRE TRANSITIONAL PLANTINGS ACCORDING TO ARTICLE 13 WILL NEVER THE LESS BE PLANTED IN SHRUBS AND SMALL TREES, FORMING A HEDGEROW WHICH WILL BENEFIT BIRDS AND OTHER WILDLIFE.
17. NO TRAILS OR ROAD WIDENING SHOWN PER COMPREHENSIVE PLAN.
18. BIORETENTION FILTER AND CONSERVATION AREA PROVIDED FOR WATER QUALITY.
19. TO THE BEST OF MY KNOWLEDGE NO EASEMENTS EXIST ON THIS SITE WITH WIDTH OF 25 FEET OR GREATER.
20. NO HAZARDOUS OR TOXIC SUBSTANCES WILL BE GENERATED, UTILIZED, STORED, TREATED OR DISPOSED OF AT THIS SITE.
21. THE TOPOGRAPHY SHOWN ON PLAT WAS DONE BY ASI, LLC AND IS BASED ON USGS DATUM.
22. DUSTLESS SURFACE WAIVER SHALL BE REQUESTED FOR THE USE OF PARTIAL GRAVEL PARKING.
23. SEPERATE BUILDING PERMIT IS REQUIRED FOR RETAINING WALL 2.0 FEET AND GREATER IN HEIGHT.

TREE COVER CALCULATION

1. TOTAL SITE AREA	59,360 SF
2. - BUILDING FOOTPRINT	(-) 3,485 SF
3. ADJUSTED SITE AREA	55,875 SF
4. X REQUIRED PERCENTAGE	X .020
5.= TREE COVER REQUIRED	11,175 SF
6. EXISTING TREE COVER AREA (1.25 X 21,425)	26,781 SF
7. PROPOSED TREES (OUTSIDE EXISTING TREE CANOPY)	
20 X 50	1,000 SF
15 X 200	3,000 SF
8. TOTAL PROVIDED	30,781 SF

No.	REVISION DESCRIPTION	DATE
1	REVISED LAYOUT AND ADDED STORM SEWER AND BMP	8/24/06
2	REVISED LAYOUT, GRADING AND LANDSCAPING	9/18/06
3	REVISED BMP AND ADDED STORMWATER WETLAND POND, GRADING AND LANDSCAPING.	2/16/07
4	REVISED BMP AND STORMWATER WETLAND POND LAYOUT & GRADING	6/18/07

No.	REVIEW DESCRIPTION	APPROVED DATE
	REVISION APPROVED BY DIVISION OF DESIGN REVIEW	

SPECIAL EXCEPTION PLAT
THE HOWARD GARDNER SCHOOL
(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
D. ANTHONY BEALE
No. 4154
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6/15/07

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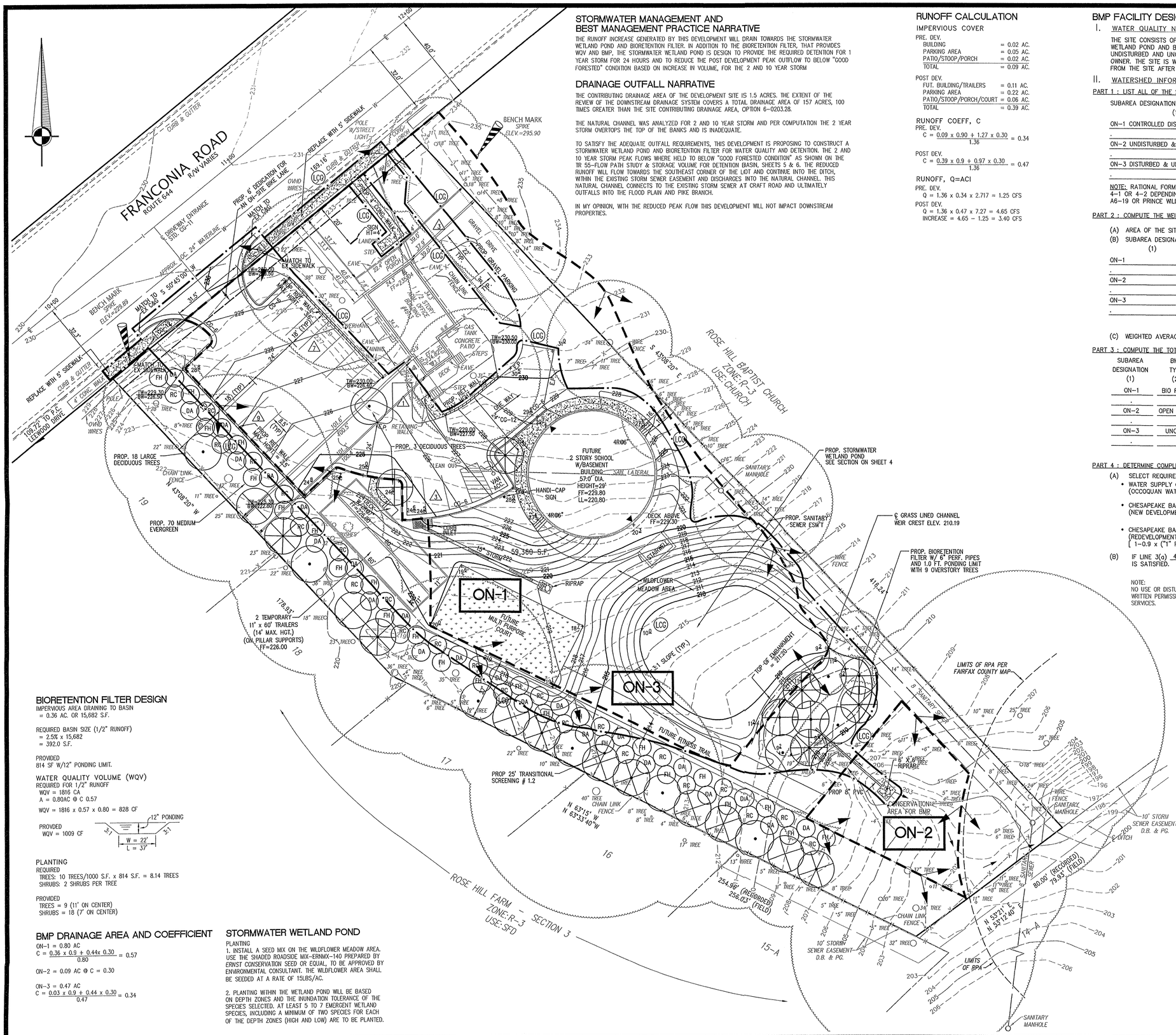
DRAFTED: REM	CHECKED: PAE
DESIGNED: CBF	CHECKED: WGF
DATE: AUGUST, 2006	SCALE : N/A

SHEET 2 OF 9

Application No. SE2006-LE-026 Staff S.U.
APPROVED (BS) / SP PLAN
SEE DEV CONDS DATED August 13, 2007
Date of (BOS) (BZA) approval Sept. 10, 2007
Sheet 2 of 9

57-06



STORMWATER MANAGEMENT AND BEST MANAGEMENT PRACTICE NARRATIVE

THE RUNOFF INCREASE GENERATED BY THIS DEVELOPMENT WILL DRAIN TOWARDS THE STORMWATER WETLAND POND AND BIORETENTION FILTER. IN ADDITION TO THE BIORETENTION FILTER, THAT PROVIDES WQV AND BMP, THE STORMWATER WETLAND POND IS DESIGN TO PROVIDE THE REQUIRED DETENTION FOR 1 YEAR STORM FOR 24 HOURS AND TO REDUCE THE POST DEVELOPMENT PEAK OUTFLOW TO BELOW "GOOD FORESTED" CONDITION BASED ON INCREASE IN VOLUME, FOR THE 2 AND 10 YEAR STORM

DRAINAGE OUTFALL NARRATIVE

THE CONTRIBUTING DRAINAGE AREA OF THE DEVELOPMENT SITE IS 1.5 ACRES. THE EXTENT OF THE REVIEW OF THE DOWNSTREAM DRAINAGE SYSTEM COVERS A TOTAL DRAINAGE AREA OF 157 ACRES, 100 TIMES GREATER THAN THE SITE CONTRIBUTING DRAINAGE AREA, OPTION 6-0203.28.

THE NATURAL CHANNEL WAS ANALYZED FOR 2 AND 10 YEAR STORM AND PER COMPUTATION THE 2 YEAR STORM OVERTOPS THE TOP OF THE BANKS AND IS INADEQUATE.

TO SATISFY THE ADEQUATE OUTFALL REQUIREMENTS, THIS DEVELOPMENT IS PROPOSING TO CONSTRUCT A STORMWATER WETLAND POND AND BIORETENTION FILTER FOR WATER QUALITY AND DETENTION. THE 2 AND 10 YEAR STORM PEAK FLOWS WHERE HELD TO BELOW "GOOD FORESTED CONDITION" AS SHOWN ON THE TR 55-FLOW PATH STUDY & STORAGE VOLUME FOR DETENTION BASIN, SHEETS 5 & 6. THE REDUCED RUNOFF WILL FLOW TOWARDS THE SOUTHEAST CORNER OF THE LOT AND CONTINUE INTO THE DITCH, WITHIN THE EXISTING STORM SEWER EASEMENT AND DISCHARGES INTO THE NATURAL CHANNEL. THIS NATURAL CHANNEL CONNECTS TO THE EXISTING STORM SEWER AT CRAFT ROAD AND ULTIMATELY OUTFALLS INTO THE FLOOD PLAIN AND PIKE BRANCH.

IN MY OPINION, WITH THE REDUCED PEAK FLOW THIS DEVELOPMENT WILL NOT IMPACT DOWNSTREAM PROPERTIES.

RUNOFF CALCULATION

IMPERVIOUS COVER

PRE. DEV.

BUILDING	= 0.02 AC.
PARKING AREA	= 0.05 AC.
PATIO/STOOP/PORCH	= 0.02 AC.
TOTAL	= 0.09 AC.

POST DEV.

FUT. BUILDING/TRAILERS	= 0.11 AC.
PARKING AREA	= 0.22 AC.
PATIO/STOOP/PORCH/COURT	= 0.06 AC.
TOTAL	= 0.39 AC.

RUNOFF COEFF, C

PRE. DEV.

$$C = \frac{0.09 \times 0.90 + 1.27 \times 0.30}{1.36} = 0.34$$

POST DEV.

$$C = \frac{0.39 \times 0.9 + 0.97 \times 0.30}{1.36} = 0.47$$

RUNOFF, Q=ACI

PRE. DEV.

Q = 1.36 x 0.34 x 2.717 = 1.25 CFS

POST DEV.

Q = 1.36 x 0.47 x 7.27 = 4.65 CFS

INCREASE = 4.65 - 1.25 = 3.40 CFS

BMP FACILITY DESIGN CALCULATIONS

I. WATER QUALITY NARRATIVE

THE SITE CONSISTS OF 1.36 COMMERCIAL DEVELOPMENT, COMPOSED OF 0.80 ACRE DRAINING TO THE WETLAND POND AND BIO FILTER, 0.07 ACRE OF UNDISTURBED QUALIFYING OPEN SPACE AND 0.49 ACRE UNDISTURBED AND UNCONTROLLED. THE WETLAND POND AND BIO FILTER WILL BE PRIVATELY MAINTAINED BY THE OWNER. THE SITE IS WITHIN THE CHESAPEAKE BAY PRESERVATION AREA AND IT REQUIRES THAT THE P LOAD FROM THE SITE AFTER DEVELOPMENT BE REDUCED BY 40%. 40.0% PHOSPHORUS REMOVAL IS PROVIDED.

II. WATERSHED INFORMATION

PART 1 : LIST ALL OF THE SUBAREAS AND "C" FACTORS USED IN THE BMP COMPUTATIONS

SUBAREA DESIGNATION AND DESCRIPTION (1)	"C" (2)	ACRES (3)
ON-1 CONTROLLED DISTURBED AREEA DRAINING TO BIO FILTER	0.57	0.80
.	.	.
ON-2 UNDISTURBED & UNCONTROLLED CONSERVATION AREA	0.30	0.09
.	.	.
ON-3 DISTURBED & UNCONTROLLED AREA	0.34	0.47
.	.	.

NOTE: RATIONAL FORMULA "C" FACTORS ARE TAKEN FROM THE GENERAL ZONING VALUES LISTED IN APPENDIX 4-1 OR 4-2 DEPENDING ON THE LOCATION OF THE BMP FACILITY (FAIRFAX COUNTY FACILITIES MANUAL CHART A6-19 OR PRINCE WILLIAM COUNTY DESIGN AND CONSTRUCTION STANDARDS MANUAL, EXHIBIT 1).

PART 2 : COMPUTE THE WEIGHTED AVERAGE "C" FACTOR FOR THE SITE

(A) AREA OF THE SITE (a) 1.36 ACRES

(B) SUBAREA DESIGNATION (1)	"C" (2)		ACRES (3)		PRODUCT (4)
ON-1	0.57	x	0.80	=	0.46
.	.	x	.	=	.
ON-2	0.30	x	0.07	=	0.02
.	.	x	.	=	.
ON-3	0.34	x	0.49	=	0.17
.	.	x	.	=	.

(b) TOTAL = 0.65

(C) WEIGHTED AVERAGE "C" FACTOR (b) / (a) = (c) 0.48

PART 3 : COMPUTE THE TOTAL PHOSHORUS REMOVEL FOR THE SITE

SUBAREA DESIGNATION (1)	BMP TYPE (2)	REMOVAL EFF. (%) (3)		AREA RATIO (4)		"C" FACTOR RATIO (5)		PRODUCT (6)
ON-1	BIO FILTER	50	x	0.80/1.36	x	0.57/0.48	=	34.9
.	.	.	x	.	x	.	=	.
ON-2	OPEN SPACE	100	x	0.07/1.36	x	1	=	5.1
.	.	.	x	.	x	.	=	.
ON-3	UNCONT	--	x	--	x	--	=	--
.	.	.	x	.	x	.	=	.

(a) TOTAL = 40.0

PART 4 : DETERMINE COMPLIANCE WITH PHOSPHORUS REMOVAL REQUIREMENT

(A) SELECT REQUIREMENT (a) 40%

- WATER SUPPLY OVERLAY DISTRICT (OCCOQUAN WATERSHED) = 50% (FAIRFAX COUNTY AND PRINCE WILLIAM COUNTY)
- CHESAPEAKE BAY PRESERVATION AREA (NEW DEVELOPMENT) = 40% (FAIRFAX COUNTY) 50% (PRINCE WILLIAM COUNTY)
- CHESAPEAKE BAY PRESERVATION AREA (REDEVELOPMENT) = [1-0.9 x ("1" PRE / "1" POST)] x 100 = . %

(B) IF LINE 3(a) 40.00 < LINE 4(a) 40 THEN PHOSPHORUS REMOVAL IS SATISFIED.

NOTE:
NO USE OR DISTURBANCE OF THIS AREA IS PERMITTED WITHOUT THE EXPRESS WRITTEN PERMISSION OF THE DIRECTOR OF THE OFFICE OF SITE AND ENVIRONMENTAL SERVICES.

BIORETENTION FILTER DESIGN

IMPERVIOUS AREA DRAINING TO BASIN
= 0.36 AC. OR 15,682 S.F.

REQUIRED BASIN SIZE (1/2" RUNOFF)
= 2.5% x 15,682
= 392.0 S.F.

PROVIDED
814 SF W/12" PONDING LIMIT.

WATER QUALITY VOLUME (WQV)
REQUIRED FOR 1/2" RUNOFF
WQV = 1816 CA
A = 0.80AC @ C 0.57
WQV = 1816 x 0.57 x 0.80 = 828 CF

PROVDED
WQV = 1009 CF

PLANTING
REQUIRED
TREES: 10 TREES/1000 S.F. x 814 S.F. = 8.14 TREES
SHRUBS: 2 SHRUBS PER TREE

PROVIDED
TREES = 9 (11' ON CENTER)
SHRUBS = 18 (7' ON CENTER)

BMP DRAINAGE AREA AND COEFFICIENT

ON-1 = 0.80 AC

$$C = \frac{0.36 \times 0.9 + 0.44 \times 0.30}{0.80} = 0.57$$

ON-2 = 0.09 AC @ C = 0.30

ON-3 = 0.47 AC

$$C = \frac{0.03 \times 0.9 + 0.44 \times 0.30}{0.47} = 0.34$$

STORMWATER WETLAND POND

PLANTING
1. INSTALL A SEED MIX ON THE WILDFLOWER MEADOW AREA. USE THE SHADED ROADSIDE MIX-ERNMX-140 PREPARED BY ERNST CONSERVATION SEED OR EQUAL, TO BE APPROVED BY ENVIRONMENTAL CONSULTANT. THE WILDFLOWER AREA SHALL BE SEEDED AT A RATE OF 15LBS/AC.

2. PLANTING WITHIN THE WETLAND POND WILL BE BASED ON DEPTH ZONES AND THE INUNDATION TOLERANCE OF THE SPECIES SELECTED. AT LEAST 5 TO 7 EMERGENT WETLAND SPECIES, INCLUDING A MINIMUM OF TWO SPECIES FOR EACH OF THE DEPTH ZONES (HIGH AND LOW) ARE TO BE PLANTED.

No.	REVISION	DATE
1	ADDED SHEET	8/24/06
2	REVISED BMP CALCULATIONS	9/13/06
3	REVISED BMP CALCULATIONS AND NARRATIVES	5/17/07
4	REVISED BMP & STORMWATER WETLAND POND LAYOUT, BMP/SWM NARRATIVE AND OUTFALL NARRATIVE	6/19/07

No.	DESCRIPTION	REVIEW BY:	APPROVED	DATE
	REVISION APPROVED BY DIVISION OF DESIGN REVIEW			

BMP PLAN AND COMPUTATIONS
THE HOWARD GARDNER SCHOOL
(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

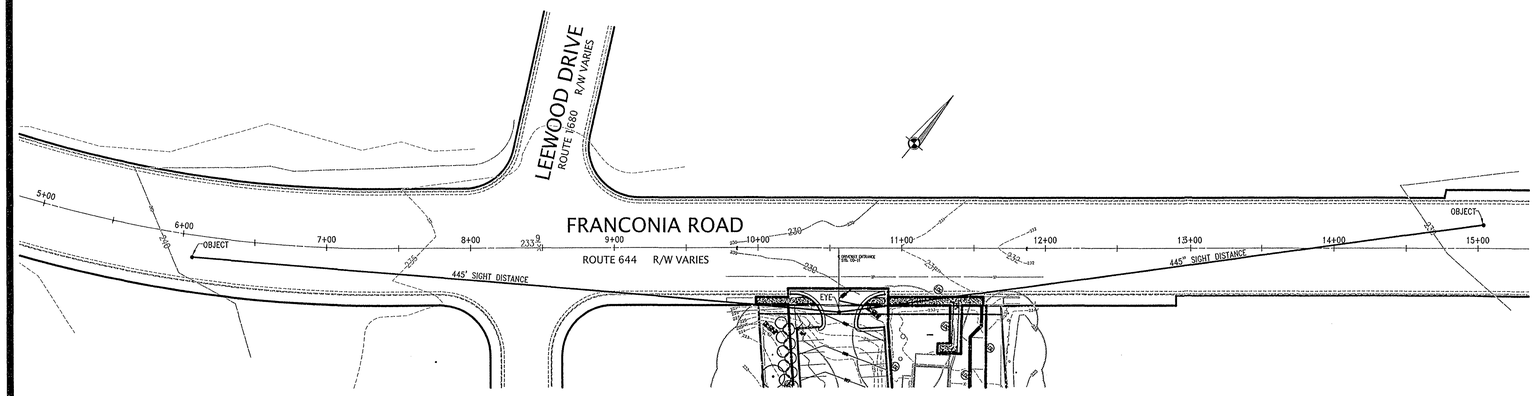
COMMONWEALTH OF VIRGINIA
D. ANTHONY BEALE
No. 4154
PROFESSIONAL ENGINEER
6/18/07
D. ANTHONY BEALE, P.E.

Application No. SE 2006-LE-026 Staff S. W.
APPROVED SE/SP PLAN
SEE DEV CONDS DATED August 13, 2007
Date of BOS (BZA) approval Sept. 10, 2007
Sheet 3 of 9

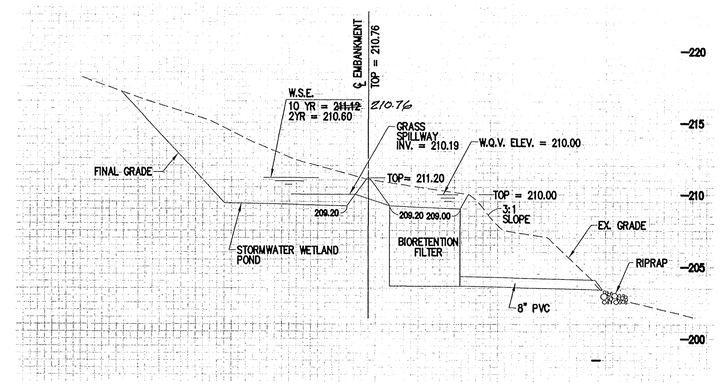
Alexandria Surveys International, LLC
6363 South Kings Highway
Alexandria, Virginia 22306
703.660.6615 Phone
703.768.7764 Fax
www.AlexandriaSurveys.com

DRAFTED: REM	CHECKED: PAE
DESIGNED: CBF	CHECKED: WGF
DATE: AUGUST, 2006	SCALE : N/A
SHEET 3 OF 9	

57-06

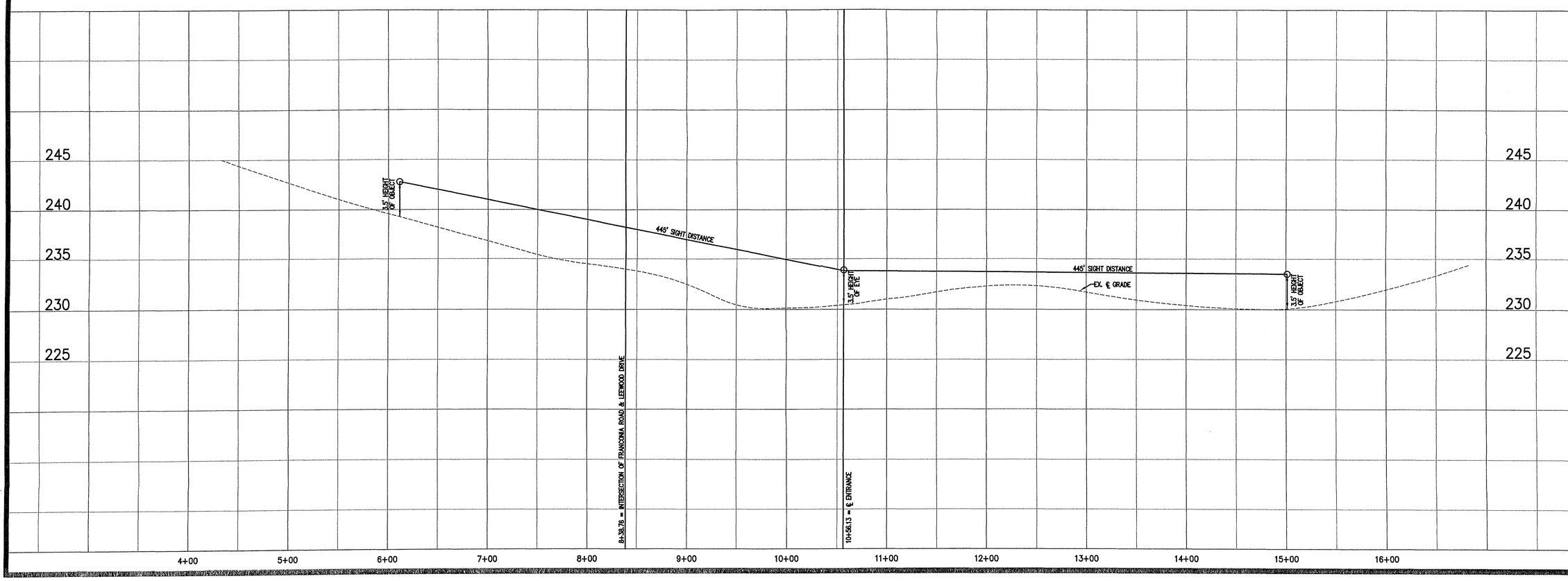


PLAN VIEW
FRANCONIA ROAD
ROUTE 644 R/W VARIES
POSTED SPEED LIMIT = 35 MPH



STORMWATER WETLAND POND SECTION
SCALE: HOR. 1"=20'
VER. 1"=5'

Application No. SE 2006-LE-026 Staff S.W.
APPROVED (SE) SP PLAN
SEE DEV CONDS DATED August 13, 2007
Date of (BOS) (BZA) approval Sept. 11, 2007
Sheet 4 of 9



No.	REVISION	DATE
1	ADDED STORMWATER WETLAND POND SECTIONS	5/7/07
2	REVISED STORMWATER WETLAND POND SECTION	6/18/07

No.	DESCRIPTION	REVIEW BY:	APPROVED	DATE
	REVISION APPROVED BY DIVISION OF DESIGN REVIEW			

PLAN AND PROFILE - FRANCONIA ROAD
THE HOWARD GARDNER SCHOOL
(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
D. ANTHONY BEALE
No. 4154
PROFESSIONAL ENGINEER
6/18/07
D. ANTHONY BEALE, P.E.

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DRAFTED: REM	CHECKED: PAE
DESIGNED: CBF	CHECKED: WGF
DATE: AUGUST, 2006	SCALE: HORZ. 1"=50' VERT. 1"=5'

SHEET 4 OF 9

57-06

Worksheet 2: Runoff curve number and runoff

Project THE HOWARD GARDNER SCHOOL By ____ Date ____

Location TOTAL SITE AREA Checked ____ Date ____

Circle one: (Present) Developed

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	Fig. 2-3	Fig. 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
C	WOODS (GOOD)	70			1.36	95
				Totals =	1.36	95

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{95}{1.36}$ = ____ ; Use CN = 70

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	1	2	10
Rainfall, P (24-hour)	in	2.7	3.2	5.2
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	0.6	0.8	2.2

Worksheet 2: Runoff curve number and runoff

Project ____ By ____ Date ____

Location ____ Checked ____ Date ____

Circle one: Present (Developed)

1. Runoff curve number (CN)

Soil name and hydrologic group (appendix A)	Cover description (cover type, treatment, and hydrologic condition; percent impervious; unconnected/connected impervious area ratio)	CN 1/ Table 2-2	Fig. 2-3	Fig. 2-4	Area ☒ acres ☐ mi² ☐ %	Product of CN x area
C	COMMERCIAL	84			0.76	71.44
C	WETLAND POND/BMP	74			0.21	15.54
C	WOODS (GOOD)	70			0.39	27.30
				Totals =	1.36	114.28

1/ Use only one CN source per line.

CN (weighted) = $\frac{\text{total product}}{\text{total area}} = \frac{114.28}{1.36}$ = ____ ; Use CN = 84

2. Runoff

		Storm #1	Storm #2	Storm #3
Frequency	yr	1	2	10
Rainfall, P (24-hour)	in	2.7	3.2	5.2
Runoff, Q (Use P and CN with table 2-1, fig. 2-1, or eqs. 2-3 and 2-4.)	in	1.90	2.70	3.5

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project ____ By ____ Date ____

Location TOTAL SITE AREA Checked ____ Date ____

Circle one: (Present) Developed

Circle one: (Tc) T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID	AB 1		
1. Surface description (table 3-1)		WOODS		
2. Manning's roughness coeff., n (table 3-1)		0.4		
3. Flow length, L (total L ≤ 300 ft)	ft	180		
4. Two-yr 24-hr rainfall, P_2	in	3.2		
5. Land slope, s	ft/ft	0.08		
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t	hr	0.32	+	= 0.32
Shallow concentrated flow	Segment ID	BE		
7. Surface description (paved or unpaved)		UNPAVED		
8. Flow length, L	ft	350		
9. Watercourse slope, s	ft/ft	0.06		
10. Average velocity, V (figure 3-1)	ft/s	4.0		
11. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.02	+	= 0.02
Channel flow	Segment ID			
12. Cross sectional flow area, a	ft²			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			0.34

(20 MIN)

Worksheet 3: Time of concentration (T_c) or travel time (T_t)

Project ____ By ____ Date ____

Location ____ Checked ____ Date ____

Circle one: Present (Developed)

Circle one: T_c T_t through subarea

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	Segment ID			
1. Surface description (table 3-1)		SMOOTH SURFACE	GRASS	
2. Manning's roughness coeff., n (table 3-1)		0.011	0.15	
3. Flow length, L (total L ≤ 300 ft)	ft	150	200	
4. Two-yr 24-hr rainfall, P_2	in	3.5	3.5	
5. Land slope, s	ft/ft	0.05	0.09	
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t	hr	0.02	+ 0.76	= 0.77
Shallow concentrated flow	Segment ID			
7. Surface description (paved or unpaved)		UNPAVED		
8. Flow length, L	ft	350		
9. Watercourse slope, s	ft/ft	0.06		
10. Average velocity, V (figure 3-1)	ft/s	4.0		
11. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr	0.02	+	= 0.02
Channel flow	Segment ID			
12. Cross sectional flow area, a	ft²			
13. Wetted perimeter, p_w	ft			
14. Hydraulic radius, $r = \frac{a}{p_w}$ Compute r	ft			
15. Channel slope, s	ft/ft			
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\,r^{2/3}\,s^{1/2}}{n}$ Compute V	ft/s			
18. Flow length, L	ft			
19. $T_t = \frac{L}{3600\,V}$ Compute T_t	hr		+	=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19)	hr			0.19

11.0 MIN

Worksheet 5a: Basic watershed data

Project ____ Location ____ By ____ Date ____

Circle one: (Present) Developed ____ Frequency (yr) 1 Checked ____ Date ____

Subarea name	Drainage area A_m (mi²)	Time of concentration T_c (hr)	Travel time through subarea T_t (hr)	Downstream subarea names	Travel time summation to outlet ΣT_t (hr)	24-hr Rainfall P (in)	Runoff curve number CN	Runoff Q (in)	$A_m Q$ (mi²-in)	Initial abstraction I_a (in)	I_a/P
1	0.0007	0.32	0.02	2	0.02	2.7	70	0.6	0.001	0.857	0.32
2	0.0014	0.02	—	—		2.7	70	0.6	0.001	0.857	0.32

From worksheet 3 — From worksheet 2 — From table 5-1

Worksheet 5b: Tabular hydrograph discharge summary

Project ____ Location ____ By ____ Date ____

Circle one: (Present) Developed ____ Frequency (yr) 1 Checked ____ Date ____

Subarea name	Basic watershed data used 1/: Sub-area T_c (hr)	ΣT_c to outlet (hr)	I_a/P	$A_m Q$ (mi²-in)	Select and enter hydrograph times in hours from exhibit 5- 2/: 11.8	11.9	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7
					Discharges at selected hydrograph times 3/ (cfs)											
1	0.30	0	0.30	0.001	0	0	0	0.01	0.06	0.25	0.53	0.39	0.45	0.30	0.22	0.17
2	0.10	—	0.30	0.001	0	0	0	0.15	0.57	0.94	0.51	0.22	0.17	0.15	0.13	0.11
Composite hydrograph at outlet					0	0	0	0.16	0.63	1.19	1.05	0.79	0.62	0.45	0.35	0.28

1/ * Worksheet 5a. Rounded as needed for use with exhibit 5.
2/ Enter rainfall distribution type used.
3/ Hydrograph discharge for selected times is $A_m Q$ multiplied by tabular discharge from appropriate exhibit 5.

Worksheet 5a: Basic watershed data

Project ____ Location ____ By ____ Date ____

Circle one: Present (Developed) ____ Frequency (yr) 1 Checked ____ Date ____

Subarea name	Drainage area A_m (mi²)	Time of concentration T_c (hr)	Travel time through subarea T_t (hr)	Downstream subarea names	Travel time summation to outlet ΣT_t (hr)	24-hr Rainfall P (in)	Runoff curve number CN	Runoff Q (in)	$A_m Q$ (mi²-in)	Initial abstraction I_a (in)	I_a/P
1	0.0007	0.17	0.02	2	0.02	2.7	84	1.20	0.001	0.381	0.14
2	0.0014	0.02	—	—	—	2.7	84	1.20	0.002	0.381	0.14

From worksheet 3 — From worksheet 2 — From table 5-1

Application No. SE 2006-LE-026 Staff S. W.

APPROVED SE SP PLAN

SEE DEV CONDS DATED August 13, 2007

Date of BOS (BZA) approval Sept. 10, 2007

Sheet 5 of 9

Worksheet 5b: Tabular hydrograph discharge summary

Project ____ Location ____ By ____ Date ____

Circle one: Present (Developed) ____ Frequency (yr) 1 Checked ____ Date ____

Subarea name	Basic watershed data used 1/: Sub-area T_c (hr)	ΣT_c to outlet (hr)	I_a/P	$A_m Q$ (mi²-in)	Select and enter hydrograph times in hours from exhibit 5- 2/: 11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7
					Discharges at selected hydrograph times 3/ (cfs)											
1	0.20	0.0	0.10	0.001	0.02	0.09	0.05	0.21	0.40	0.74	0.80	0.48	0.25	0.17	0.13	0.10
2	0.10	—	0.10	0.002	0.05	0.06	0.09	0.42	0.81	1.48	1.60	0.96	0.50	0.33	0.26	0.21
Composite hydrograph at outlet					0.07	0.09	0.14	0.60	1.21	2.22	2.40	1.44	0.75	0.50	0.39	0.31

1/ * Worksheet 5a. Rounded as needed for use with exhibit 5.
2/ Enter rainfall distribution type used.
3/ Hydrograph discharge for selected times is $A_m Q$ multiplied by tabular discharge from appropriate exhibit 5.

No.	REVISION	DATE
1	ADDED SHEET	8/24/06
2	REPLACED CALCULATIONS	5/18/07

No.	DESCRIPTION	REVIEW BY:	APPROVED	DATE
	REVISION APPROVED BY DIVISION OF DESIGN REVIEW			

TR 55-FLOW PATH STUDY + STORAGE VOL. FOR DETENTION BASINS THE HOWARD GARDNER SCHOOL

(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA — D. ANTHONY BEALE — No. 4154 — PROFESSIONAL ENGINEER — 6/18/07

D. ANTHONY BEALE, P.E.

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DRAFTED: REM	CHECKED: PAE
DESIGNED: CBF	CHECKED: WGF
DATE: AUGUST, 2006	SCALE : N/A

SHEET 5 OF 9

57-06

Worksheet 5a: Basic watershed data

Project ______ Location ______ By ______ Date ______

Circle one: (Present) Developed ______ Frequency (yr) 2 Checked ______ Date ______

Subarea name	Drainage area A_m (mi^2)	Time of concentration T_c (hr)	Travel time through subarea T_t (hr)	Downstream subarea names	Travel time summation to outlet ΣT_t (hr)	24-hr Rainfall P (in)	Runoff curve number CN	Runoff Q (in)	A_mQ (mi^2-in)	Initial abstraction I_a (in)	I_a/P
1	0.0007	0.32	0.02	2	0.02	3.2	70	0.80	0.001	0.857	0.27
2	0.0014	0.02	–	–	–	3.2	70	0.80	0.001	0.857	0.27

From worksheet 3 — From worksheet 2 — From table 5-1

Worksheet 5b: Tabular hydrograph discharge summary

Project ______ Location ______ By ______ Date ______

Circle one: (Present) Developed ______ Frequency (yr) 2 Checked ______ Date ______

Subarea name	Subarea T_c (hr)	ΣT_t to outlet (hr)	I_a/P	A_mQ (mi^2-in)	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7
1	0.30	0.0	0.30	0.001	0	0	0	0.01	0.06	0.25	0.53	0.57	0.45	0.30	0.22	0.17
2	0.10	–	0.30	0.001	0	0	0	0.15	0.57	0.94	0.52	0.22	0.17	0.15	0.13	0.11
Composite hydrograph at outlet					0	0	0	0.16	0.63	1.19	1.05	0.79	0.62	0.45	0.35	0.28

Basic watershed data used 1/ — Select and enter hydrograph times in hours from exhibit 5- 2/ — Discharges at selected hydrograph times 3/ (cfs)

1/ Worksheet 5a. Rounded as needed for use with exhibit 5.
2/ Enter rainfall distribution type used.
3/ Hydrograph discharge for selected times is A_mQ multiplied by tabular discharge from appropriate exhibit 5.

Worksheet 5a: Basic watershed data

Project ______ Location ______ By ______ Date ______

Circle one: (Present) Developed ______ Frequency (yr) 10 Checked ______ Date ______

Subarea name	Drainage area A_m (mi^2)	Time of concentration T_c (hr)	Travel time through subarea T_t (hr)	Downstream subarea names	Travel time summation to outlet ΣT_t (hr)	24-hr Rainfall P (in)	Runoff curve number CN	Runoff Q (in)	A_mQ (mi^2-in)	Initial abstraction I_a (in)	I_a/P
1	0.0007	0.32	0.02	2	0.02	5.2	70	2.2	0.002	0.857	0.16
2	0.0014	0.02	–	–	–	5.2	70	2.2	0.003	0.857	0.16

From worksheet 3 — From worksheet 2 — From table 5-1

Worksheet 5b: Tabular hydrograph discharge summary

Project ______ Location ______ By ______ Date ______

Circle one: (Present) Developed ______ Frequency (yr) 10 Checked ______ Date ______

Subarea name	Subarea T_c (hr)	ΣT_t to outlet (hr)	I_a/P	A_mQ (mi^2-in)	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7
1	0.30	0	0.30	0.002	0	0	0	0.02	0.13	0.50	1.05	1.15	0.91	0.61	0.44	0.35
2	0.1	–	0.30	0.003	0	0	0	0.03	0.19	0.75	1.58	1.72	1.36	0.91	0.66	0.52
Composite hydrograph at outlet					0	0	0	0.05	0.32	1.25	2.63	2.87	2.27	1.52	1.10	0.87

Basic watershed data used 1/ — Select and enter hydrograph times in hours from exhibit 5- 2/ — Discharges at selected hydrograph times 3/ (cfs)

1/ Worksheet 5a. Rounded as needed for use with exhibit 5.
2/ Enter rainfall distribution type used.
3/ Hydrograph discharge for selected times is A_mQ multiplied by tabular discharge from appropriate exhibit 5.

Worksheet 5a: Basic watershed data

Project ______ Location ______ By ______ Date ______

Circle one: Present (Developed) ______ Frequency (yr) 2 Checked ______ Date ______

Subarea name	Drainage area A_m (mi^2)	Time of concentration T_c (hr)	Travel time through subarea T_t (hr)	Downstream subarea names	Travel time summation to outlet ΣT_t (hr)	24-hr Rainfall P (in)	Runoff curve number CN	Runoff Q (in)	A_mQ (mi^2-in)	Initial abstraction I_a (in)	I_a/P
1	0.0007	0.17	0.02	2	0.02	3.2	84	1.7	0.001	0.381	0.12
2	0.0014	0.02	–	–	–	3.2	84	1.7	0.002	0.381	0.12

From worksheet 3 — From worksheet 2 — From table 5-1

Worksheet 5b: Tabular hydrograph discharge summary

Project ______ Location ______ By ______ Date ______

Circle one: Present (Developed) ______ Frequency (yr) 2 Checked ______ Date ______

Subarea name	Subarea T_c (hr)	ΣT_t to outlet (hr)	I_a/P	A_mQ (mi^2-in)	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7
1	0.20	0	0.10	0.001	0.02	0.03	0.05	0.21	0.40	0.74	0.80	0.48	0.25	0.17	0.13	0.10
2	0.10	–	0.10	0.002	0.05	0.06	0.09	0.42	0.81	1.48	1.60	0.96	0.50	0.33	0.26	0.21
Composite hydrograph at outlet					0.07	0.09	0.14	0.63	1.21	2.22	2.40	1.44	0.75	0.50	0.39	0.31

Basic watershed data used 1/ — Select and enter hydrograph times in hours from exhibit 5- 2/ — Discharges at selected hydrograph times 3/ (cfs)

1/ Worksheet 5a. Rounded as needed for use with exhibit 5.
2/ Enter rainfall distribution type used.
3/ Hydrograph discharge for selected times is A_mQ multiplied by tabular discharge from appropriate exhibit 5.

Worksheet 5a: Basic watershed data

Project ______ Location ______ By ______ Date ______

Circle one: Present (Developed) ______ Frequency (yr) 10 Checked ______ Date ______

Subarea name	Drainage area A_m (mi^2)	Time of concentration T_c (hr)	Travel time through subarea T_t (hr)	Downstream subarea names	Travel time summation to outlet ΣT_t (hr)	24-hr Rainfall P (in)	Runoff curve number CN	Runoff Q (in)	A_mQ (mi^2-in)	Initial abstraction I_a (in)	I_a/P
1	0.0007	0.17	0.02	2	0.02	5.2	84	3.5	0.003	0.381	0.07
2	0.0014	0.02	–	–	–	5.2	84	3.5	0.005	0.381	0.07

From worksheet 3 — From worksheet 2 — From table 5-1

Worksheet 5b: Tabular hydrograph discharge summary

Project ______ Location ______ By ______ Date ______

Circle one: Present (Developed) ______ Frequency (yr) 10 Checked ______ Date ______

Subarea name	Subarea T_c (hr)	ΣT_t to outlet (hr)	I_a/P	A_mQ (mi^2-in)	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7
1	0.20	0	0.10	0.003	0.07	0.09	0.14	0.63	1.21	2.22	2.40	1.44	0.75	0.50	0.38	0.31
2	0.10	–	0.10	0.005	0.12	0.17	0.27	1.67	3.23	5.05	3.12	1.09	0.74	0.62	0.52	0.43
Composite hydrograph at outlet					0.19	0.26	0.41	2.30	4.44	7.27	5.52	2.53	1.49	1.12	0.90	0.74

Basic watershed data used 1/ — Select and enter hydrograph times in hours from exhibit 5- 2/ — Discharges at selected hydrograph times 3/ (cfs)

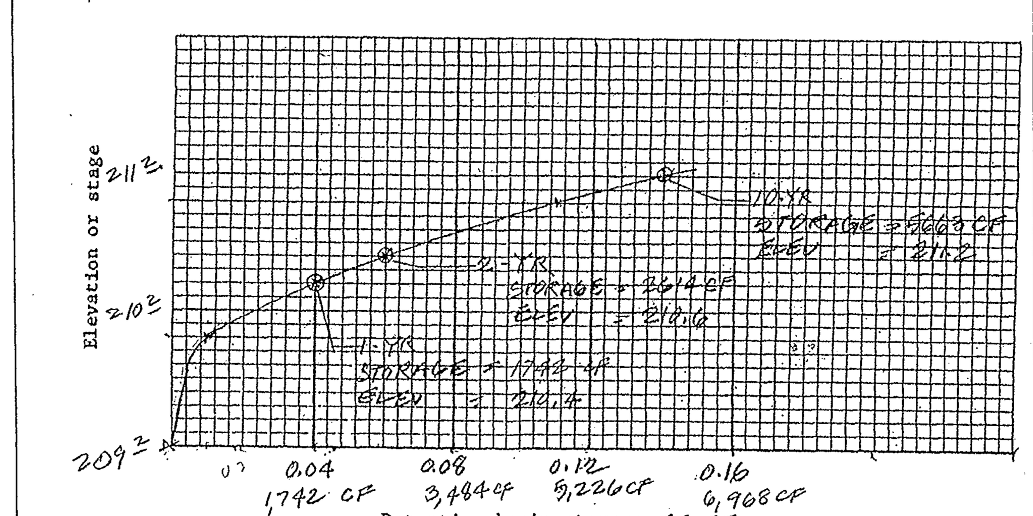
1/ Worksheet 5a. Rounded as needed for use with exhibit 5.
2/ Enter rainfall distribution type used.
3/ Hydrograph discharge for selected times is A_mQ multiplied by tabular discharge from appropriate exhibit 5.

Worksheet 6a: Detention basin storage, peak outflow discharge (q_o) known

Project ______ By ______ Date ______

Location ______ Checked ______ Date ______

Circle one: Present (Developed) ______



1. Data: Drainage area .... A_m = 0.0021 mi^2; Rainfall distribution type (I, IA, II, III) = II
2. Frequency ...... yr: 1 (1st stage)
3. Peak inflow discharge, q_i .... cfs: 2.22 (From worksheet 4 or 5b)
4. Peak outflow discharge, q_o .... cfs: 1.19 1/
5. Compute $\frac{q_o}{q_i}$ ....: 0.54
6. $\frac{V_s}{V_r}$ ....: 0.26 (Use $\frac{q_o}{q_i}$ with figure 6-1)
7. Runoff, Q ...... in: 1.3 (From worksheet 2)
8. Runoff volume, V_r .... ac-ft: 0.15 ($V_r = QA_m53.33$)
9. Storage volume, V_s .... ac-ft: 0.04 — 1,742 CF ($V_s = V_r(\frac{V_s}{V_r})$)
10. Maximum stage, E_{max} (From plot): 210.4

---

1. Data: Drainage area .... A_m = 0.002 mi^2; Rainfall distribution type (I, IA, II, III) = II
2. Frequency ...... yr: 2 (1st stage)
3. Peak inflow discharge, q_i .... cfs: 2.40 (From worksheet 4 or 5b)
4. Peak outflow discharge, q_o .... cfs: 1.10 1/ — q_o PRE DEV. = 1.19 CFS
5. Compute $\frac{q_o}{q_i}$ ....: 0.46
6. $\frac{V_s}{V_r}$ ....: 0.29 (Use $\frac{q_o}{q_i}$ with figure 6-1)
7. Runoff, Q ...... in: 1.70 (From worksheet 2)
8. Runoff volume, V_r .... ac-ft: 0.19 ($V_r = QA_m53.33$)
9. Storage volume, V_s .... ac-ft: 0.06 — 2614 CF ($V_s = V_r(\frac{V_s}{V_r})$)
10. Maximum stage, E_{max} (From plot): 210.6

---

1. Data: Drainage area .... A_m = 0.002 mi^2; Rainfall distribution type (I, IA, II, III) = II
2. Frequency ...... yr: 10 (1st stage)
3. Peak inflow discharge, q_i .... cfs: 7.27 (From worksheet 4 or 5b)
4. Peak outflow discharge, q_o .... cfs: 2.80 1/ — q_o PRE DEV. = 2.87 CFS
5. Compute $\frac{q_o}{q_i}$ ....: 0.39
6. $\frac{V_s}{V_r}$ ....: 0.33 (Use $\frac{q_o}{q_i}$ with figure 6-1)
7. Runoff, Q ...... in: 3.50 (From worksheet 2)
8. Runoff volume, V_r .... ac-ft: 0.39 ($V_r = QA_m53.33$)
9. Storage volume, V_s .... ac-ft: 0.13 — 5663 CF ($V_s = V_r(\frac{V_s}{V_r})$)
10. Maximum stage, E_{max} (From plot): 211.2

1/ 2nd stage q_o includes 1st stage q_o.

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WEIR DESIGN (2 YR STORM)

$Q_o = 3.2 \times LW \times HW^{3/2}$

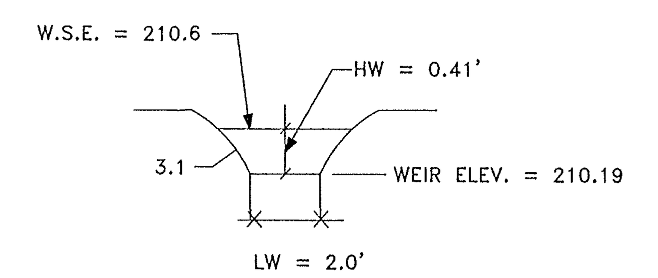
WHERE:

HW = 210.6 − 210.19 = 0.41'

Q_o = 1.10 CFS

$LW = \frac{1.10}{3.2 \times 0.31^{3/2}} = 2.0'$

W.S.E. 2 YR = 210.60



10 YEAR STORM HW

$2.80 = 3.2 \times 0.74 \times HW^{3/2}$

$HW = \frac{2.8}{3.2 \times 2.0} = 0.57'$

W.S.E. = 210.76

No.	REVISION	DATE
1	ADDED SHEET	6/18/07

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TR 55-FLOW PATH STUDY AND STORAGE VOL. FOR DETENTION BASINS THE HOWARD GARDNER SCHOOL

(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA — D. ANTHONY BEALE No. 4154 — PROFESSIONAL ENGINEER — 6/18/07

D. ANTHONY BEALE, P.E.

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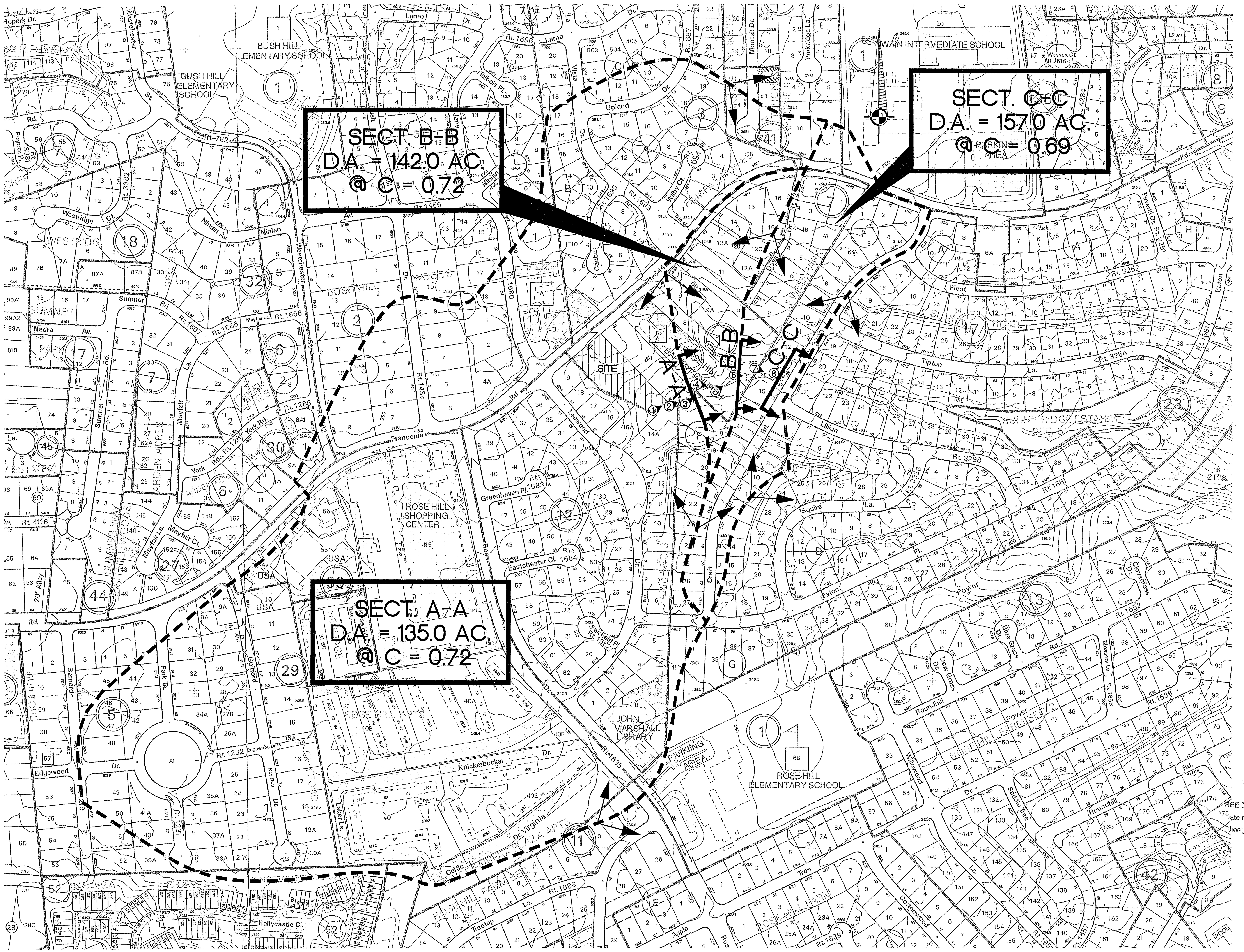
DRAINAGE AREA MAP

SCALE: 1" = 200'



SEE SHEET 5 FOR CROSS SECTIONS AND PICTURES

No.	REVISION	DATE
1	ADDED SHEET	8/24/06
2	REVISED SHEET NUMBER	6/18/07

No.	DESCRIPTION	REVIEW BY :	APPROVED	DATE
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DRAINAGE AREA MAP
THE HOWARD GARDNER SCHOOL
(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
D. ANTHONY BEALE
No. 4154
6/18/9
PROFESSIONAL ENGINEER

D. ANTHONY BEALE, P.E.

...ation No. SE 2006-LE-026 Staff S. C.
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SEE DEV CONDS DATED August 13, 2007
...ate of (BOS) (BZA) approval Sept. 10, 2007
...heet 7 of 9

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SHEET 7 OF 9	

57-06

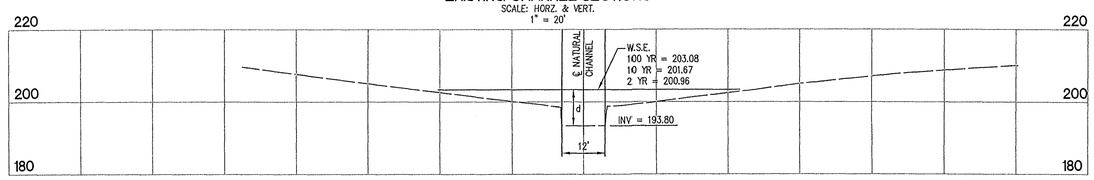
Q:\2006\57-06\dwg\SPECIAL EXCEPTION\NEW\06-DRAIN AREA MAP.dwg

EXISTING CHANNEL SECTIONS

SCALE: HORZ. & VERT.
1" = 20'

SECTION A-A

DA = 135.0 AC
@ C = 0.72
SLOPE = 1.03%, $S^{1/2}$ = 0.10
Tc = 20 MIN.
I_2 = 3.0
I_{10} = 4.5
I_{100} = 6.2
Q = ACI
Q_{2YR} = 135 x 0.72 x 3.0 = 291.6 CFS
Q_{10YR} = 135 x 0.72 x 4.5 = 437.4 CFS
Q_{100YR} = 135 x 0.72 x 6.2 x 1.25 = 753.3 CFS



$Q = \frac{1.486 \times R^{2/3} \times S^{1/2} \times A}{n}$

n = 0.10

RETURN PERIOD (YR)	d (ft)	AREA (S.F.)	wp	$R^{2/3}$	Q (CFS)	V (fps)
2	7.16	122.60	60.32	1.61	293.30	2.39
10	7.87	157.60	61.74	1.87	437.90	2.78
100	9.28	270.00	104.60	1.89	758.30	2.81

RUNOFF COEFF., C

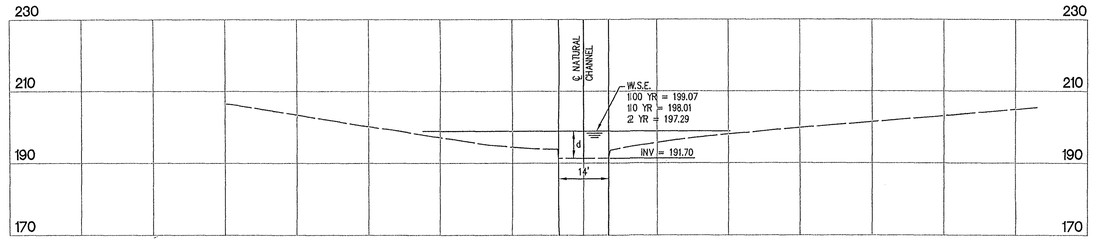
SECT. A-A
D.A. = 135 AC
$C = \frac{94 \times 0.84 + 41 \times 0.45}{135} = 0.72$

SECT. B-B
D.A. = 142 AC
$C = \frac{135 \times 0.72 + 7.0 \times 0.50}{142} = 0.71$

SECT. C-C
D.A. = 157 AC
$C = \frac{142 \times 0.71 + 15 \times 0.50}{157} = 0.69$

SECTION B-B

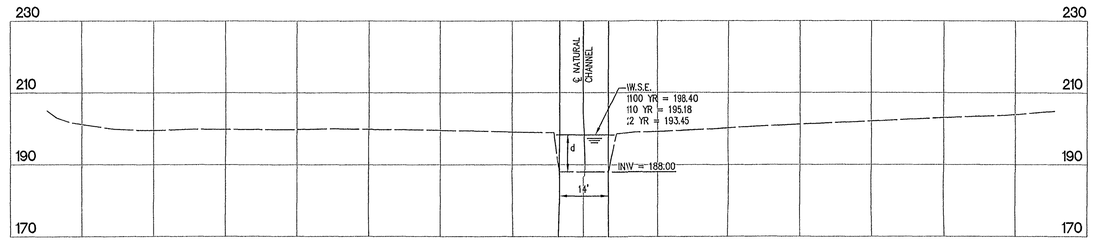
DA = 142.0 AC
@ C = 0.71
SLOPE = 1.80%, $S^{1/2}$ = 0.13
Tc = 20 MIN.
I_2 = 3.0
I_{10} = 4.5
I_{100} = 6.2
Q = ACI
Q_{2YR} = 142 x 0.71 x 3.0 = 302.5 CFS
Q_{10YR} = 142 x 0.71 x 4.5 = 453.0 CFS
Q_{100YR} = 142 x 0.71 x 6.2 x 1.25 = 781.4 CFS



RETURN PERIOD (YR)	d (ft)	AREA (S.F.)	wp	R	Q (CFS)	V (fps)
2	5.53	120.30	81.10	1.30	302.10	2.51
10	6.26	161.10	91.50	1.46	453.90	2.82
100	7.30	244.10	114.60	1.66	782.00	3.20

SECTION C-C

DA = 157.0 AC
@ C = 0.69
SLOPE = 1.80%, $S^{1/2}$ = 0.13
Tc = 20 MIN.
I_2 = 3.0
I_{10} = 4.5
I_{100} = 6.2
Q = ACI
Q_{2YR} = 157 x 0.69 x 3.0 = 325.0 CFS
Q_{10YR} = 157 x 0.69 x 4.5 = 487.5 CFS
Q_{100YR} = 157 x 0.69 x 6.2 x 1.25 = 839.6 CFS



RETURN PERIOD (YR)	d (ft)	AREA (S.F.)	wp	R	Q (CFS)	V (fps)
2	5.45	80.39	26.40	2.11	327.37	4.07
10	7.18	108.42	30.45	2.34	489.65	4.52
100	10.4	164.32	38.40	2.65	840.41	5.11

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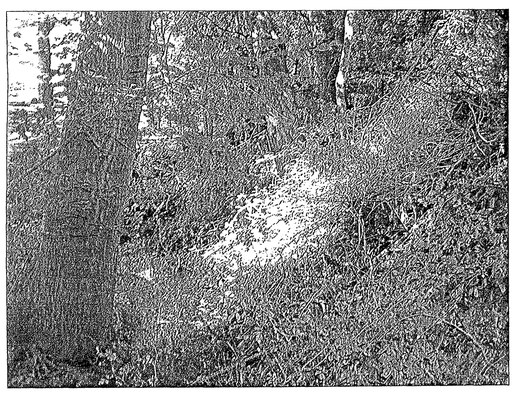
Sheet 8 of 9



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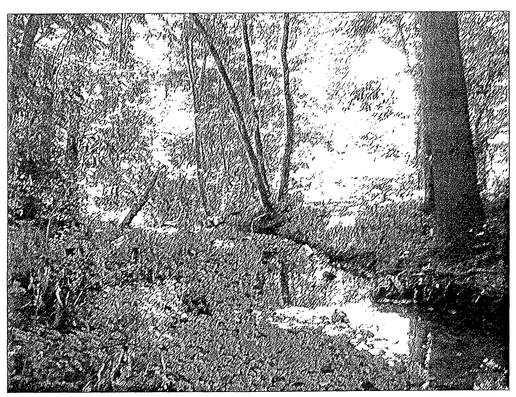

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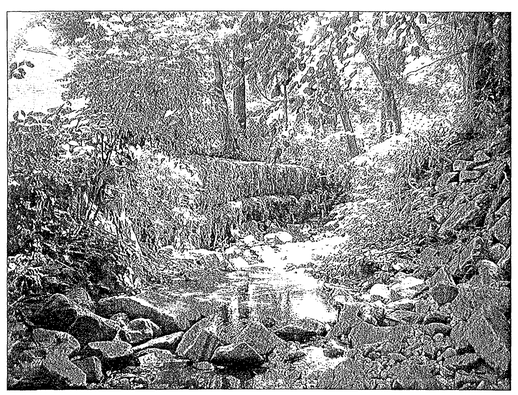

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SEE SHEET 5 FOR LOCATION OF CROSS SECTIONS AND PICTURES

No.	REVISION	DATE
1	ADDED SHEET	8/24/06
2	REVISED SHEET NUMBER	5/18/07

No.	DESCRIPTION	REVIEW BY	APPROVED	DATE
	REVISION APPROVED BY DIVISION OF DESIGN REVIEW			

DRAINAGE OUTFALL CROSS SECTIONS AND OUTFALL PICTURES
THE HOWARD GARDNER SCHOOL
(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
D. ANTHONY BEALE
No. 4154
PROFESSIONAL ENGINEER
6/18/07

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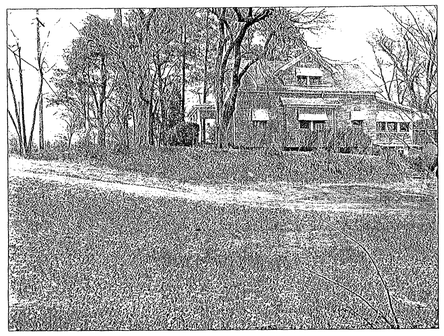
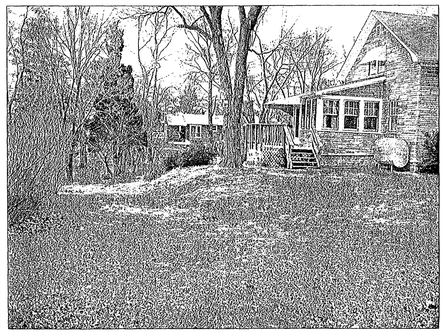
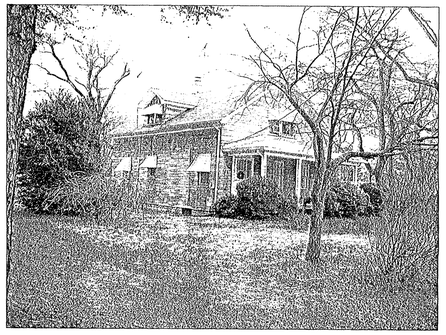
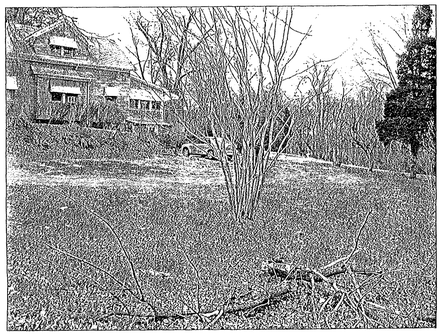
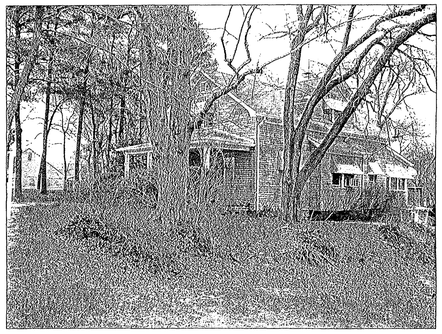
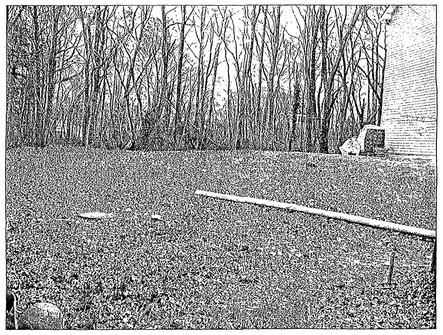
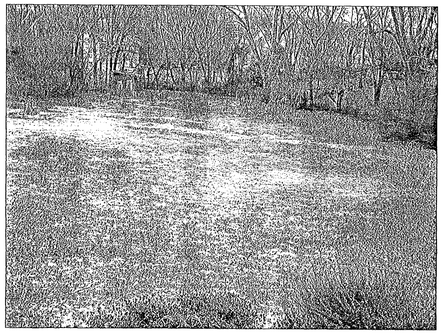
SHEET 8 OF 9	

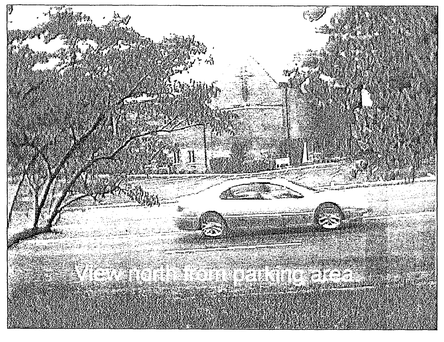
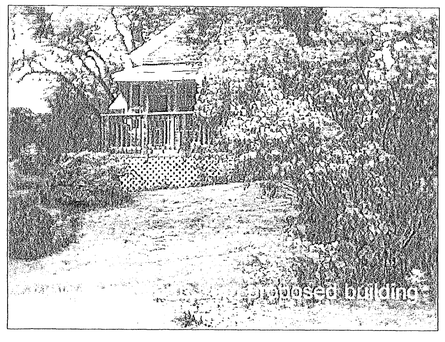
57-06

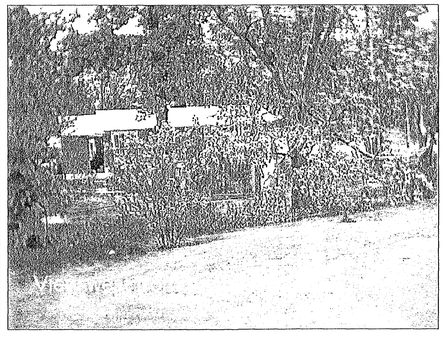
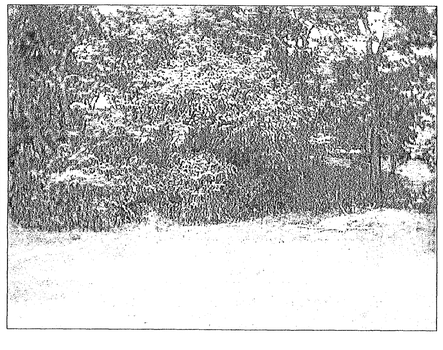







View north from parking area.

Proposed building

...tion No. SE 2006-LE-026 Staff J. U.
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Date of (BOS) (BZA) approval Sept. 10, 2007
Sheet 7 of 7

No.	REVISION	DATE
1	ADDED SHEET	8/24/06
2	REVISED SHEET NUMBER	6/19/07

No.	DESCRIPTION	REVIEW BY:	APPROVED	DATE
	REVISION APPROVED BY DIVISION OF DESIGN REVIEW			

SITE PHOTOS
THE HOWARD GARDNER SCHOOL
(4913 FRANCONIA ROAD)
LEE DISTRICT
FAIRFAX COUNTY, VIRGINIA

COMMONWEALTH OF VIRGINIA
D. ANTHONY BEALE
No. 154
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6/13/07
D. Anthony Beale
D. ANTHONY BEALE, P.E.

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DATE: AUGUST, 2006	SCALE: HORZ: 1"=50' VERT: 1"=5'

SHEET 9 OF 9

57-06