

# SPECIAL EXCEPTION PLAT GENERALIZED DEVELOPMENT PLAN AEROSPACE CORPORATION

## WESTFIELDS, PARCEL 35

### SULLY DISTRICT

### FAIRFAX COUNTY, VIRGINIA

MAY, 2008

REVISED JULY 1, 2008

REVISED SEPTEMBER 4, 2008

REVISED OCTOBER 9, 2008

REVISED NOVEMBER 4, 2008

REVISED DECEMBER 1, 2008

REVISED DECEMBER 17, 2008

#### ZONING REQUIREMENTS - I-3 DISTRICT

**MINIMUM LOT AREA:** REQUIRED: 40,000 SQ. FT.  
ACTUAL: 1,760,386 SQ. FT.

**MINIMUM LOT WIDTH:** REQUIRED: 100 FEET  
ACTUAL: 1230+ FEET (LEE ROAD)  
1460+ FEET (STONECROFT BLVD.)

**MAXIMUM BUILDING HEIGHT:** REQUIRED: 75 FEET, SUBJECT TO INCREASE AS MAY BE PERMITTED BY THE BOARD OF SUPERVISORS PURSUANT TO A SPECIAL EXCEPTION IN ACCORDANCE WITH SECTION 9-807 OF THE ZONING ORDINANCE.  
PROPOSED: 136 FEET (BUILDING 1 TOWER 1A)  
165 FEET (BUILDING 1 TOWER 1B)  
160 FEET (BUILDING 2 TOWER 2A)  
160 FEET (BUILDING 2 TOWER 2B)  
(PENTHOUSE ± 22 FEET ABOVE EACH TOWER)

**MINIMUM YARD REQUIREMENTS:** REQUIRED FOR FRONT: CONTROLLED BY A 45 DEGREE ANGLE OF BULK PLANE, BUT NOT LESS THAN 40 FEET.  
PROPOSED: 50 FEET (MIN. GARAGE #1)  
80 FEET (GARAGE #2)  
REQUIRED FOR SIDE AND REAR: CONTROLLED BY A 45 DEGREE ANGLE OF BULK PLANE.  
PROPOSED: SIDE: 90 FEET (MIN. - BUILDING ONE)  
REAR: 200 +/- FEET (GENERATOR BUILDING)

**MAXIMUM FLOOR AREA RATIO:** ALLOWED: 0.50 (GRANDFATHERED)  
PROPOSED: SEE SITE TABULATION

**MINIMUM OPEN SPACE:** REQUIRED: 15%, OR 6.08 ACRES  
PROPOSED: 24.8 ACRES (61% OF SITE AREA)  
(INCLUDES PLAZA AREAS ASSOCIATED WITH BUILDINGS)

**SITE DISTURBANCE:** ASSOCIATED WITH SITE IMPROVEMENTS = APPROXIMATELY 24 ACRES  
ASSOCIATED WITH STREAM RESTORATION = APPROXIMATELY 2 ACRES

#### SITE TABULATION:

**SITE AREA:** 40.41 ACRES, OR 1,760,386 SQ. FT.

**PROPOSED R. O. W. DEDICATION:** 0.32 ACRES

FAR COMPUTATIONS	
<b>PHASE 1</b>	<b>GFA (SF)</b>
Building (Tower 1A and 1B)	452,440
Library	1,500
Visitor Center (Upper Level)	1,625
Signals Lab	27,000
Security Kiosk (2)	400
Switch Gear Building	1,200
Generator Building	11,000
<b>TOTAL PHASE 1</b>	<b>495,565</b>
<b>PHASE 2</b>	<b>GFA (SF)</b>
Building (Tower 2A and 2B)	477,400
Security Kiosk	200
Switch Gear Building	1,200
<b>TOTAL PHASE 2</b>	<b>478,800</b>
<b>TOTAL BUILDING AREA</b>	<b>974,365</b>
<b>SITE AREA</b>	<b>1,760,386</b>
<b>HALF OF RIGHT-OF-WAY</b>	<b>190,352</b>
<b>TOTAL PROPERTY AREA FOR FAR</b>	<b>1,950,738</b>
<b>FAR</b>	<b>0.50</b>

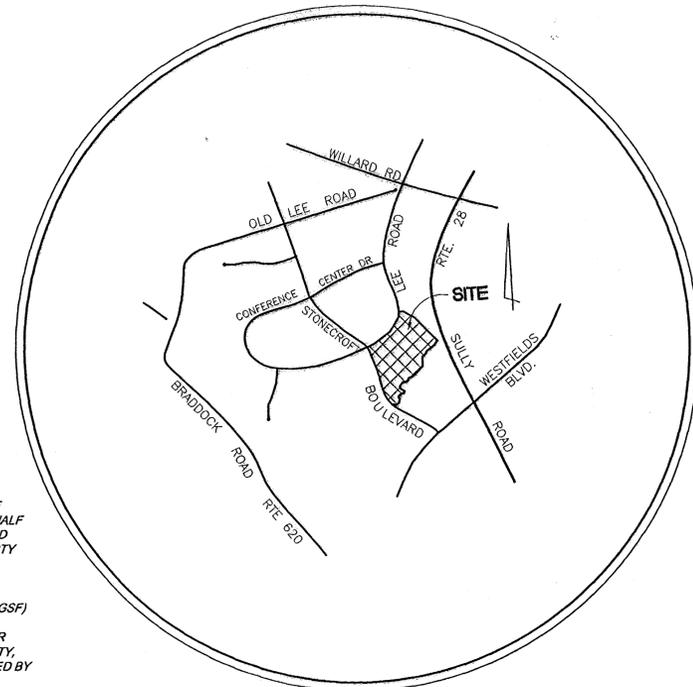
**NOTE:** THE TOTAL GROSS FLOOR AREA OF EACH BUILDING MAY VARY WITH FINAL DESIGN, PROVIDED THAT THE OVERALL TOTAL GROSS FLOOR AREA AND THE MAXIMUM BUILDING HEIGHTS DO NOT EXCEED, AND THE DIMENSIONS TO PERIPHERAL PROPERTY LINES ARE NOT LESS THAN, THE VALUES SHOWN ON THIS PLAT.

PARKING TABULATIONS			
<b>PHASE 1</b>	<b>GFA</b>	<b>ZONING</b>	<b>PARKING</b>
Building (Tower 1A and 1B)	452,440	2.6 Spaces / 1000 SF	1177
Library	1,500	1 Space / 1.5 Employees	2
Visitor Center (Upper Level)	1,625	2.6 Spaces / 1000 SF	5
Signals Lab	27,000	1 Space / 1.5 Employees	36
Security Kiosk (2)	400	2 Guards Max	4
Switch Gear Building	1,200	N/A	0
Generator Building	11,000	N/A	0
<b>TOTAL BUILDING</b>	<b>495,565</b>		
Cellar			
Labs	27,740	1 Space / 1.5 Employees	37
Conference (800 Seats)	57,382	0.3 Space / Seat	240
Cafeteria with Kitchen	16,000	1 Space / 3000 SF	6
Fitness Center	5,870	N/A	0
Data/Loading/Mechanical	48,450	1 Space / 5000 SF	10
Security Offices	6,355	2.6 Spaces / 1000 SF	17
Visitor Center (Lower Level)	1,625	2.6 Spaces / 1000 SF	5
<b>TOTAL CELLAR</b>	<b>163,422</b>		
<b>PHASE 1 - REQUIRED PARKING</b>			<b>1539</b>
<b>PARKING PROVIDED</b>			
Surface Parking			151
Garage 1			1,350
<b>PHASE 1 - TOTAL PARKING PROVIDED</b>			<b>1,541</b>
<b>PHASE 2</b>	<b>GFA</b>	<b>ZONING</b>	<b>PARKING</b>
Building (Tower 2A and 2B)	477,400	2.6 Spaces / 1000 SF	1242
Security Kiosk	200	2 Guards Max	2
Switch Gear Building	1,200	N/A	0
Cellar	175,000	2.6 Spaces / 1000 SF	455
<b>PHASE 2 - REQUIRED PARKING</b>			<b>1699</b>
<b>PHASE 2 - TOTAL PARKING PROVIDED (GARAGE 2)</b>			<b>1700</b>

LOADING TABULATION		
Phase 1 Building (Tower 1A and 1B)	452,440	5
Phase 2 Building (Tower 2A and 2B)	477,400	5

#### TABULATION NOTES:

- THE TOTAL GROSS FLOOR AREA DOES NOT INCLUDE FLOOR AREA THAT IS CLASSIFIED AS CELLAR SPACE IN ACCORDANCE WITH THE ZONING ORDINANCE.
- THE FLOOR AREA RATIO IS BASED ON THE TOTAL AREA OF THE SITE (1,760,386 SQ. FT.) PLUS THE AREA WITHIN ONE-HALF OF THE RIGHTS-OF-WAY OF STONECROFT BOULEVARD AND LEE ROAD EXTENDED ON THE FRONTAGE OF THE PROPERTY (190,352 SQ. FT.), COMPRISING A TOTAL LAND AREA OF 1,950,738 SQUARE FEET USED TO CALCULATE THE DEVELOPMENT INTENSITY. (MAXIMUM FLOOR AREA: 1,950,738 SQ.FT. X 0.50 = 975,369 GSF)
- CAPACITY OF THE AUDITORIUM SPACES IS 800 SEATS. FOR PURPOSES OF PARKING REQUIREMENTS, AT FULL CAPACITY, 50 PERCENT OF THE SEATS ARE ASSUMED TO BE OCCUPIED BY ON-SITE EMPLOYEES.
- THE TOTAL NUMBER OF PARKING SPACES REQUIRED AND/OR PROVIDED MAY VARY WITH FINAL SITE DESIGN AND MIX OF USES, PROVIDED THAT THE NUMBER OF SPACES PROVIDED SHALL NOT BE LESS THAN THE NUMBER REQUIRED BY THE ZONING ORDINANCE BASED ON THE ACTUAL RESULTING USE AREAS. REGARDLESS, IN NO INSTANCE SHALL THE PERCENTAGE OF OPEN SPACE, NOR THE DISTANCES SHOWN TO PERIPHERAL LOT LINES, BE REDUCED BELOW THOSE VALUES SHOWN ON THIS PLAT.



VICINITY MAP

SCALE: 1" = 2000'



#### NOTES:

- THE PROPERTY DELINEATED ON THIS PLAT IS LOCATED ON FAIRFAX COUNTY ASSESSMENT MAP NO. 44-1 ((4)) 35, AND IS ZONED I-3; WATER SUPPLY PROTECTION OVERLAY DISTRICT.
- EXISTING USE: VACANT
- PROPOSED USE: OFFICE/RESEARCH AND DEVELOPMENT
- OWNER/APPLICANT: THE AEROSPACE CORPORATION  
2350 EAST EL SEGUNDO BOULEVARD  
EL SEGUNDO, CA 90245
- EXISTING FEATURES SHOWN HEREIN PER SURVEY PREPARED BY BURGESS & NIPLE IN JULY, 1997. THE BOUNDARY IS FROM INFORMATION OF RECORD AND TOPOGRAPHY IS AERIAL PHOTOGRAMMETRY DATED MAY, 1997 USING NGVD 1929 DATUM. CONTOUR INTERVAL IS 2 FEET.
- THERE ARE NO BURIAL OR GRAVE SITES KNOWN TO CURRENTLY EXIST ON THIS PROPERTY.
- A 100-YEAR FLOOD PLAIN, RESOURCE PROTECTION AREAS AND ENVIRONMENTAL QUALITY CORRIDOR AREAS EXIST ON THIS PROPERTY, AS SHOWN ON SHEETS 2-6 AND 8-9.
- THE PROPERTY IS SERVED BY PUBLIC WATER AND SANITARY SEWER FACILITIES.
- THERE ARE NO KNOWN UTILITY EASEMENTS WITH A WIDTH OF 25 FEET OR MORE ON THE PROPERTY.
- THERE ARE NO KNOWN HAZARDOUS OR TOXIC SUBSTANCES OR HAZARDOUS WASTES EXISTING, GENERATED, UTILIZED, STORED, TREATED, AND/OR DISPOSED OF ON THIS SITE.
- THE TRAILS PROPOSED ON THE COMPREHENSIVE PLAN/COUNTYWIDE TRAILS PLAN THE LEE ROAD AND STONECROFT BOULEVARD FRONTAGES OF THIS PROPERTY ARE CURRENTLY EXISTING, AS SHOWN ON SHEETS 8 AND 9 THE COMPREHENSIVE PLAN/COUNTYWIDE TRAIL PLAN DOES NOT PROPOSE ANY OTHER TRAILS ON THE PROPERTY. SUBJECT TO COUNTY APPROVAL, APPLICANT RESERVES THE RIGHT TO CONSTRUCT A PRIVATE PEDESTRIAN TRAIL SYSTEM ON THE PROPERTY, INCLUDING POTENTIAL LOCATIONS WITHIN THE FLOOD PLAIN ALONG THE EXISTING SANITARY SEWER EASEMENTS.
- THIS PROPERTY IS SUBJECT TO PROFFERS ACCEPTED PURSUANT TO THE APPROVAL OF RZ 78-S-063 AND PCA 78-S-063-3.
- THE USES PROPOSED ON THIS PLAT WILL CONFORM TO ALL APPLICABLE ORDINANCES, REGULATIONS, ADOPTED STANDARDS AND ANY APPLICABLE CONDITIONS IMPOSED IN CONJUNCTION WITH THE GRANTING OF A SPECIAL EXCEPTION.
- THE APPLICANT RESERVES THE RIGHT TO APPLY THE LAND AREA(S) WITHIN ANY APPLICABLE DEDICATION(S) FOR PUBLIC RIGHT-OF-WAY PURPOSES FOR USE IN DETERMINING THE FLOOR AREA RATIO FOR THE SITE.
- ALL SIGNAGE SHALL BE IN CONFORMANCE WITH ARTICLE 12 OF THE ZONING ORDINANCE.
- MOBILE AND LAND BASED TELECOMMUNICATION FACILITIES SHALL BE PERMITTED AS PROVIDED FOR IN SECTION 2-514 OF THE ZONING ORDINANCE.
- THIS PROJECT WILL BE DESIGNED TO MEET LEED CERTIFICATION.
- MECHANICAL, ELECTRICAL, AND TELECOMMUNICATION EQUIPMENT LOCATED ON TOP OF THE BUILDINGS SHALL NOT BE HIGHER THAN THE PENTHOUSE ROOF ELEVATION AND SHALL BLEND IN ARCHITECTURALLY WITH THE PRIMARY STRUCTURE.
- RPA APPROVED JULY 29, 2008 - PLAN No. 6178-RPA-004-01.

#### SHEET INDEX

- COVER SHEET
- SPECIAL EXCEPTION / GENERALIZED DEVELOPMENT PLAN OVERVIEW
- SPECIAL EXCEPTION PLAT / GENERALIZED DEVELOPMENT PLAN
- GEOMETRIC PLAN
- EXISTING VEGETATION MAP (EVM)
- STREAM RESTORATION CONCEPT PLAN
- EXISTING CONDITIONS
- LANDSCAPING
- BUILDING #1 PLAZA ENLARGEMENT
- TREE PRESERVATION PLAN
- GARAGE ELEVATIONS AND SECTIONS
- PLANT IMAGE BOARD - DECIDUOUS
- PLANT IMAGE BOARD - EVERGREEN TREES
- PLANT IMAGE BOARD - UNDERSTORY TREES
- STORM WATER INFORMATION AND ADDITIONAL ZONING TABULATIONS
- BMP MAP
- ANGLE OF BULK PLANE DIAGRAMS
- CONCEPT PERSPECTIVES

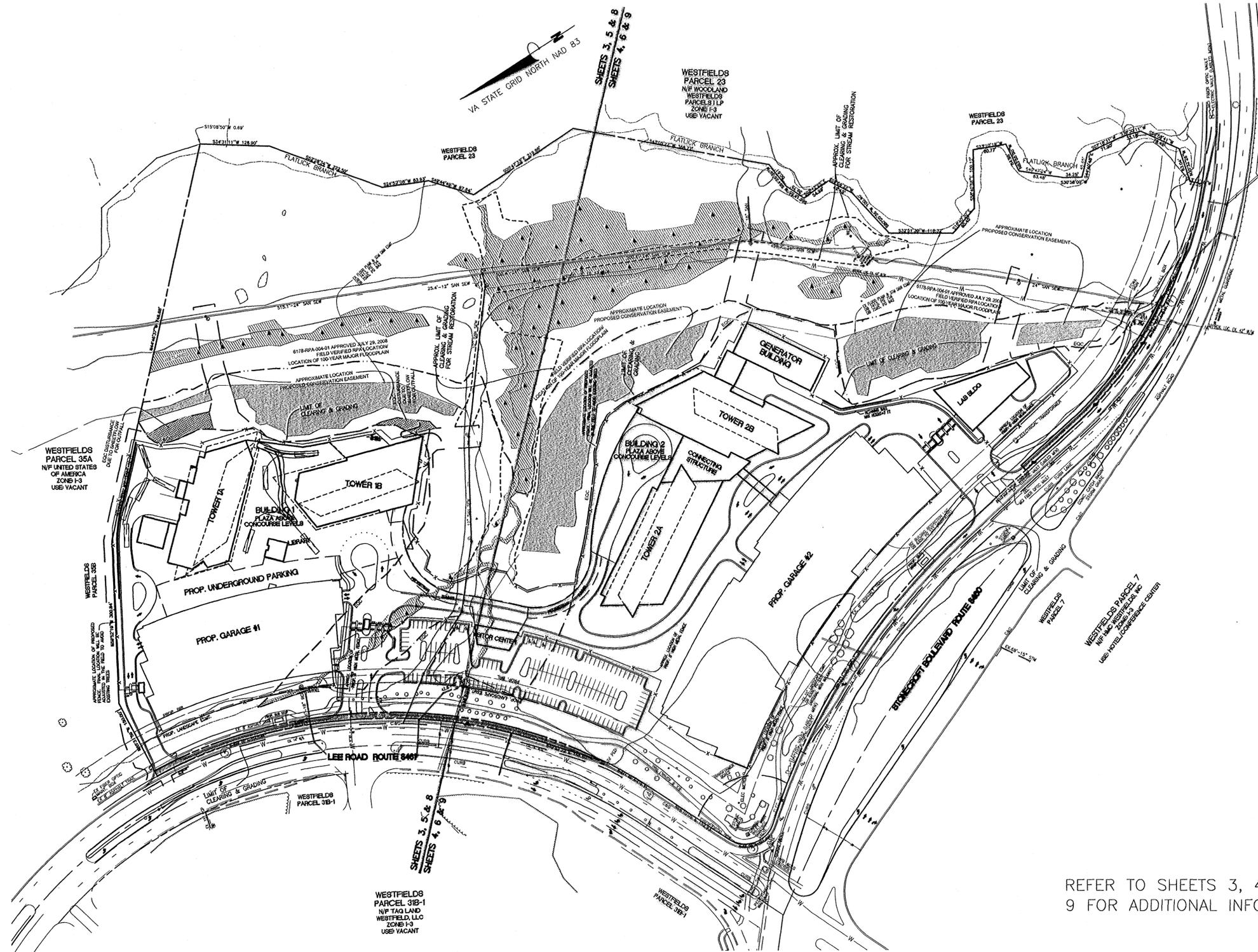
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Department of Planning  
FEB 27 2009  
Zoning



**BURGESS**

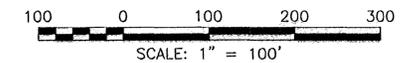
4160 PLEASANT VALLEY ROAD, CHANTILLY  
PH. (703) 631-9630

Application No PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
APPROVED DEVELOPMENT PLAN  
(DP) (GDP) (CDP) (FDP) (SE PLA)  
See Proffers dated 3/9/09  
SE conditions dated 12/31/2009 - 2/23/09  
Date of (BOS) (PC) approval 2/23/09  
Sheet 1 of 31



REFER TO SHEETS 3, 4, 5, 6, 8 AND 9 FOR ADDITIONAL INFORMATION/DETAILS

Application No PCA-78-S-063-06\_Staff WOD  
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**APPROVED DEVELOPMENT PLAN**  
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 See Proffers dated 3/9/09  
 SE conditions dated 12/31/2009 2/23/09 wcd  
 Date of (BOS) (PC) approval 2/23/09  
 Sheet 2 of 31



**SPECIAL EXCEPTION AND  
 GENERALIZED DEVELOPMENT PLAN OVERVIEW  
 AEROSPACE CORPORATION  
 WESTFIELDS, PARCEL 35**

SULLY DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



DATE: MAY, 2008  
 SCALE: 1" = 100'  
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 JOB NO.: PR45447  
 P.R. NO.: 45447  
 SHEET 2 OF  
 FILE NO.: C-4702

ADDRESS COMMENTS	DATE
DEC. 17, 2008	
ADDRESS COMMENTS	DEC. 1, 2008
ADDRESS COMMENTS	NOV. 4, 2008
ADDRESS COMMENTS	OCT. 28, 2008
ADD TRANSPORTATION ITEMS	OCT. 9, 2008
ADDRESS PRE-STAFFING COMMENTS	SEPT. 4, 2008
REVISED PER COUNTY COMMENTS	JULY 01, 2008
REVISIONS	

**BURGESS & NIPLE**  
 4160 PLEASANT VALLEY ROAD, CHANTILLY, VA 20151-1226  
 PH. (703) 631-8650 FAX (703) 631-6041



**LEGEND**

- POTENTIAL GREEN ROOF
- POTENTIAL POROUS PAVEMENT/PAVING BLOCKS
- WETLAND AREA
- FIELD VERIFIED RPA LOCATION/LOCATION OF 100-YEAR MAJOR FLOODPLAIN 6178-RPA-004-01 APPROVED JULY 29, 2008
- EQC LIMIT
- LIMITS OF CLEARING AND GRADING
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- APPROX. AREA FOR CONSERVATION EASEMENT. FINAL AREA TO BE COORDINATED WITH SITE PLAN AND STREAM RESTORATION PLAN.

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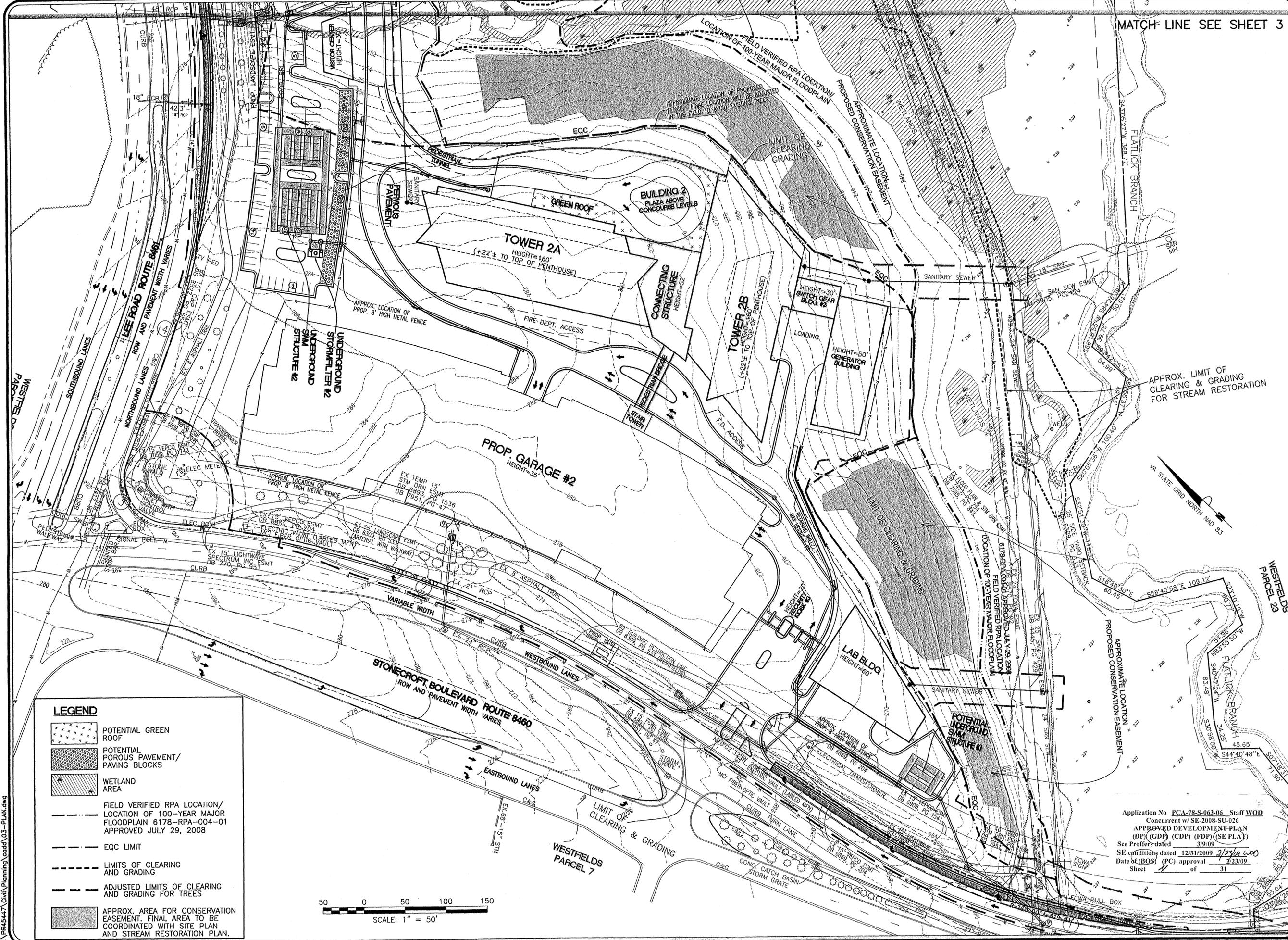
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DEC. 1, 2008	
NOV. 4, 2008	
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SEPT. 4, 2008	
JULY 01, 2008	

**SPECIAL EXCEPTION PLAT  
 GENERALIZED DEVELOPMENT PLAN  
 AEROSPACE CORPORATION  
 WESTFIELDS, PARCEL 35**



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SHEET 3 OF
FILE NO.: C-4702

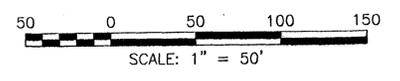
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 Concurrent w/ SE-2008-SU-026  
 APPROVED DEVELOPMENT PLAN  
 (DP) (GDP) (CDP) (FDP) (SE PLAN)  
 SE Proffers dated 3/9/09  
 SE conditions dated 12/31/2009 2/23/09 WOD  
 Date of (BOS) (PC) approval 2/23/09  
 Sheet 3 of 31



MATCH LINE SEE SHEET 3

**LEGEND**

- POTENTIAL GREEN ROOF
- POTENTIAL POROUS PAVEMENT/PAVING BLOCKS
- WETLAND AREA
- FIELD VERIFIED RPA LOCATION/LOCATION OF 100-YEAR MAJOR FLOODPLAIN 6178-RPA-004-01 APPROVED JULY 29, 2008
- EQC LIMIT
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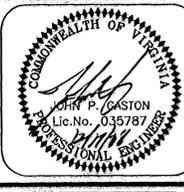


**BURGESS & NIPLÉ**  
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 PH. (703) 631-9630 FAX (703) 631-6041

ADDRESS COMMENTS	DATE
DEC. 17, 2008	
DEC. 1, 2008	
NOV. 4, 2008	
OCT. 23, 2008	
OCT. 9, 2008	
REVISIONS	
ADDRESS COMMENTS	DATE
ADD. TRANSPORTATION ITEMS	
ADDRESS COMMENTS	
REVISED PER COUNTY COMMENTS	

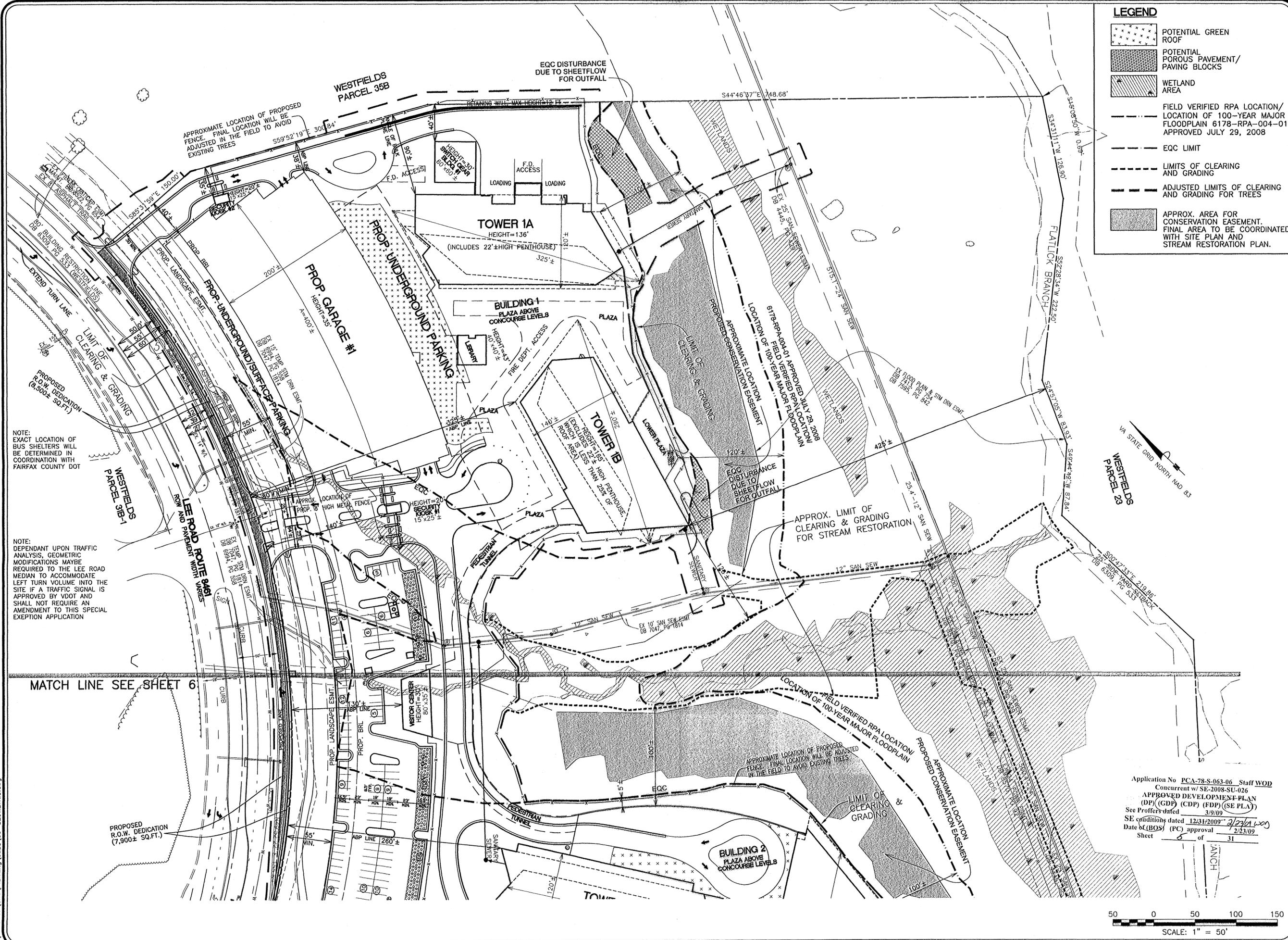
**SPECIAL EXCEPTION PLAT  
 GENERALIZED DEVELOPMENT PLAN  
 AEROSPACE CORPORATION  
 WESTFIELDS, PARCEL 35**

WESTFIELD 23  
 WESTFIELD 29  
 WESTFIELD 35  
 WESTFIELD 36



Application No. PCA-78-S-063-06 Staff WOD  
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 See Proffers dated 3/9/09  
 SE conditions dated 12/31/2009 2/23/09  
 Date of (BOS) (PC) approval 2/23/09  
 Sheet 31 of 31

DATE: MAY, 2008
SCALE: 1" = 50'
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P.R. NO.: 45447
SHEET 4 OF
FILE NO.: C-4702



**LEGEND**

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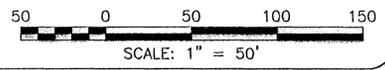
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OCT. 26, 2008	
OCT. 9, 2008	
SEPT. 4, 2008	
JULY 01, 2008	

**GEOMETRIC PLAN**  
**AEROSPACE CORPORATION**  
**WESTFIELDS, PARCEL 35**



DATE: MAY, 2008  
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 SHEET 5 OF  
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 SE conditions dated 12/31/2009 2/23/10  
 Date of (HOS) (PC) approval 2/23/09  
 Sheet 5 of 31



NOTE:  
 EXACT LOCATION OF  
 BUS SHELTERS WILL  
 BE DETERMINED IN  
 COORDINATION WITH  
 FAIRFAX COUNTY DOT

NOTE:  
 DEPENDANT UPON TRAFFIC  
 ANALYSIS, GEOMETRIC  
 MODIFICATIONS MAYBE  
 REQUIRED TO THE LEE ROAD  
 MEDIAN TO ACCOMMODATE  
 LEFT TURN VOLUME INTO THE  
 SITE IF A TRAFFIC SIGNAL IS  
 APPROVED BY VDOT AND  
 SHALL NOT REQUIRE AN  
 AMENDMENT TO THIS SPECIAL  
 EXCEPTION APPLICATION

MATCH LINE SEE SHEET 6

PROPOSED  
 R.O.W. DEDICATION  
 (7,900± SQ.FT.)

**BURGESS & NIPLE**  
 4160 PLEASANT VALLEY ROAD, CHANTILLY, VA 20151-1226  
 PH. (703) 631-9650 FAX (703) 631-6041

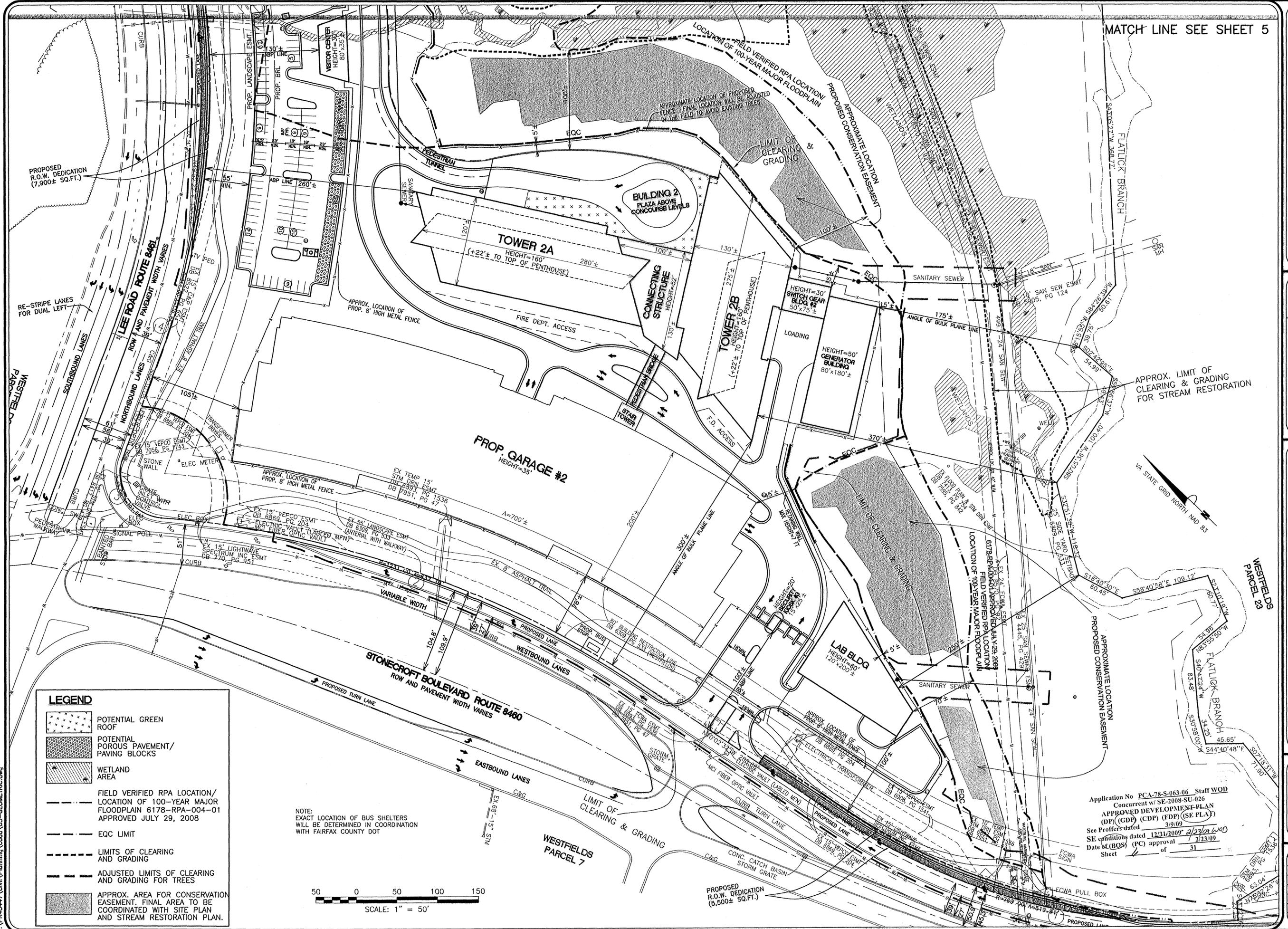
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SEPT. 4, 2008	
JULY 01, 2008	

**GEOMETRIC PLAN**  
**AEROSPACE CORPORATION**  
**WESTFIELDS, PARCEL 35**  
 SUDDY DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



DATE: MAY, 2008
SCALE: 1" = 50'
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SHEET 6 OF
FILE NO.: C-4702

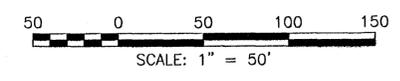
MATCH LINE SEE SHEET 5



**LEGEND**

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NOTE:  
 EXACT LOCATION OF BUS SHELTERS  
 WILL BE DETERMINED IN COORDINATION  
 WITH FAIRFAX COUNTY DOT



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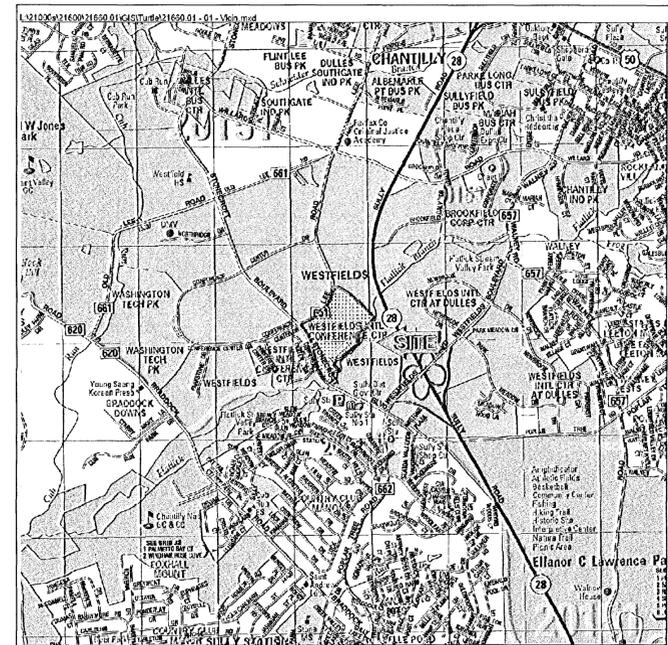


NOTES:

1. This Existing Vegetation Map is based upon examination of background materials, such as the USGS Manassas, VA, 1994 & Herndon, VA 1994 topographic quadrangle, existing topography, the Fairfax County Soils Map, the National Wetlands Inventory Map, and aerial photography, as well as a field verification performed by Jean M. Tufts, WPIT, and Jeffrey A. Browning, WPIT, of Wetland Studies and Solutions, Inc. (WSSI) on January 25, 2008.
2. Topography and boundary information provided by Burgess & Niple, Inc., and a Spring 2004 WSSI Color Infrared Aerial Photograph, were used as the base for this exhibit.
3. Waters of the U.S. delineation information shown hereon, was performed by WSSI as described in a report dated February 13, 2008. A jurisdictional determination from the U.S. Army Corps of Engineers verifying these boundaries is pending.

**LEGEND**

	SITE BOUNDARY
	VEGETATION COMMUNITY BOUNDARY
	PERENNIAL STREAM (PER WSSI FIELD INVESTIGATION AND FAIRFAX COUNTY CHESAPEAKE BAY MAPPING, SEE NOTE 3)
	INTERMITTENT STREAM (PER WSSI FIELD INVESTIGATION AND FAIRFAX COUNTY CHESAPEAKE BAY MAPPING, SEE NOTE 3)
	WETLAND BOUNDARY (SEE NOTE 3)



**EXISTING VEGETATION MAP SUMMARY TABLE**

VEGETATION COMMUNITY	COVER TYPE	PRIMARY SPECIES	SUCCESSIONAL STAGE	CONDITION*	ACREAGE (ac)	COMMENTS
A	Upland Forest	Oak/Hickory	Sub-Climax	Good	21.44	See Condition Description
B	Bottomland Forest	American Sycamore	Long Term Sub-Climax	Good	9.59	See Condition Description
C	Bottomland Forest	Red Maple/Black Gum	Early Successional	Fair-Good	3.66	See Condition Description
D	Upland Forest	Virginia Pine	Early Successional	Fair	0.35	See Condition Description
E	Maintained Grassland	Red Oak/White Oak	N/A	Fair-Good	3.95	See Condition Description
F	Open Field	Eastern Red Cedar	Early Successional	Fair-Good	1.05	See Condition Description
G	Developed	White Pine	N/A	Good	0.37	See Condition Description
Total Approximate Acreage*					40.41	

CONDITION DESCRIPTION:

- Area A is a mature upland forest in good overall condition and comprises the majority of the site. The canopy is dominated by white oak (*Quercus alba*). Sub-dominants include mockernut hickory (*Carya alba*), pignut hickory (*Carya glabra*), American beech (*Fagus grandifolia*), and red oak (*Quercus rubra*). The understory includes the species found in the canopy. The herbaceous layer is virtually absent due to the time of year the field verification was conducted, and there are only a few sparse colonies of blueberry (*Vaccinium* sp.) in some areas. Few mature dead trees were noted within the stand.
- Area B is a mature bottomland forest in good overall condition in the southeastern portion of the site and is associated with the floodplain of Flatlick Branch. The canopy is dominated by mature American sycamore (*Platanus occidentalis*), pin oak (*Quercus palustris*), and tulip poplar (*Liriodendron tulipifera*). Other tree species include green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), and red maple (*Acer rubrum*). The understory includes pawpaw (*Asimina triloba*) and coralberry (*Symphoricarpos orbiculatus*). Few mature dead standing trees are present within the stand. Younger pioneer species occur along the edge of the utility right-of-way, primarily river birch (*Betula nigra*).
- Area C consists of a young bottomland forest in the central portion of the site and is associated with unnamed tributaries to Flatlick Branch. A non-maintained sewerline easement is also located in this area. Dominant species include sweet gum (*Liquidambar styraciflua*) and red maple. Other tree species include black gum (*Nyssa sylvatica*) and river birch. Herbaceous dominants include stout wood reedgrass (*Cinna arundinacea*), greenbriar (*Smilax rotundifolia*), and blunt broom sedge (*Carex tribuloides*.)
- Area D consists solely of a group of young Virginia pines (*Pinus virginiana*) in the northwestern portion of the site. No other species are present within the stand.
- Area E consists of maintained grassland (that includes a bike path) along the northern and western boundaries of the site. Scattered mature trees include some native and some non-native tree species including white oak, red oak, bird cherry (*Prunus avium*), eastern red cedar (*Juniperus virginiana*), Bradford pear (*Pyrus calleryana*), Virginia pine and red maple. Area E also includes a utility right-of-way in the central portion of the site.
- Area F consists of an open field dominated by eastern red cedar. Bradford pear is also naturalizing in the field. The trees are young, but well established.
- Area G consists of a developed area including several volley ball courts. Several mature white pine (*Pinus strobus*) are planted between Stonecroft Boulevard and the courts.

**Wetland**  
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**3 VEGETATION MAP**

Aerospace Corporation - Westfields Parcel 35  
Fairfax County, Virginia

Mike Construction Limited Partnership

Application No. PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
APPROVED DEVELOPMENT PLAN  
(DP) (GDP) (CDP) (FDP) (SE PLA)  
See Proffers dated 3/9/09  
SE conditions dated 12/31/2009 2/23/09  
Date of (BOS) (PC) approval 2/23/09  
Sheet 7 of 31

**COMMONWEALTH OF VIRGINIA**  
MICHAEL F. ADAMS JR.  
Lic. No. 045587  
12/17/08  
PROFESSIONAL ENGINEER

**REVISIONS**

No.	Date	Description	App. By
1	7/1/08	Revised acreage numbers	BNR/MH
1	12/17/08	Revision date added (no changes)	BNR/MH

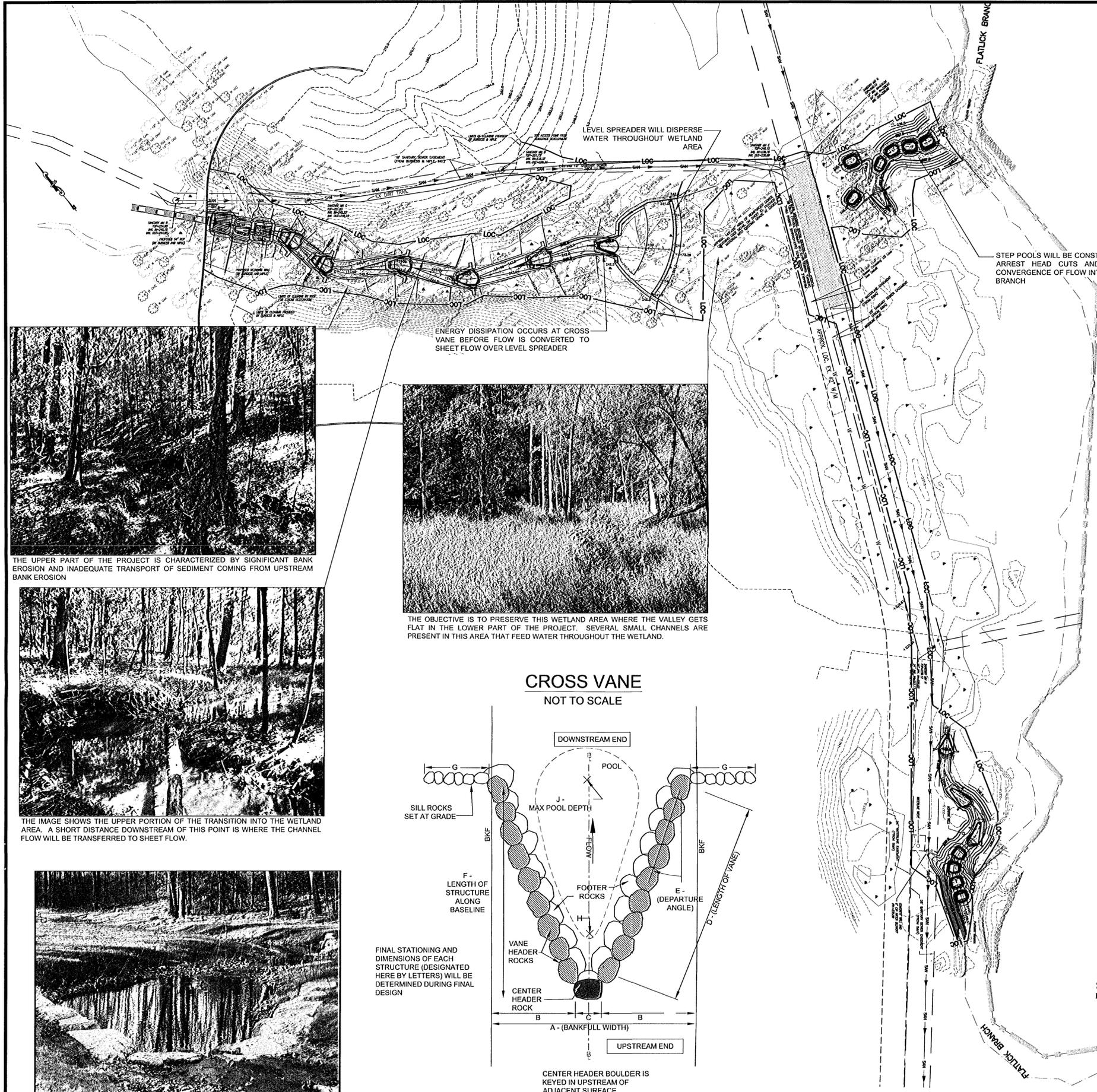
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Vertical Datum: NGVD 29  
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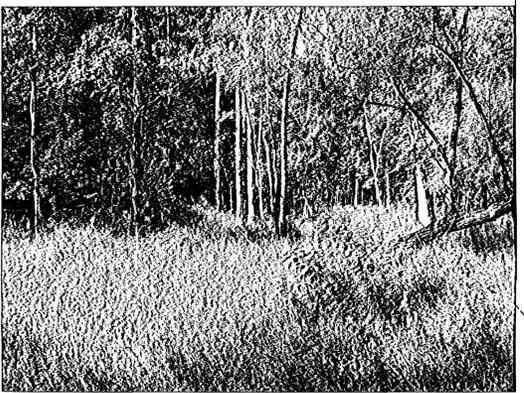
Design	Draft	Approved
JMT	JMT	LABG/MH

Sheet #  
7 of

Computer File Name:  
L2100982160021660.01 CADD/05 ENR EVM.dwg



THE UPPER PART OF THE PROJECT IS CHARACTERIZED BY SIGNIFICANT BANK EROSION AND INADEQUATE TRANSPORT OF SEDIMENT COMING FROM UPSTREAM BANK EROSION



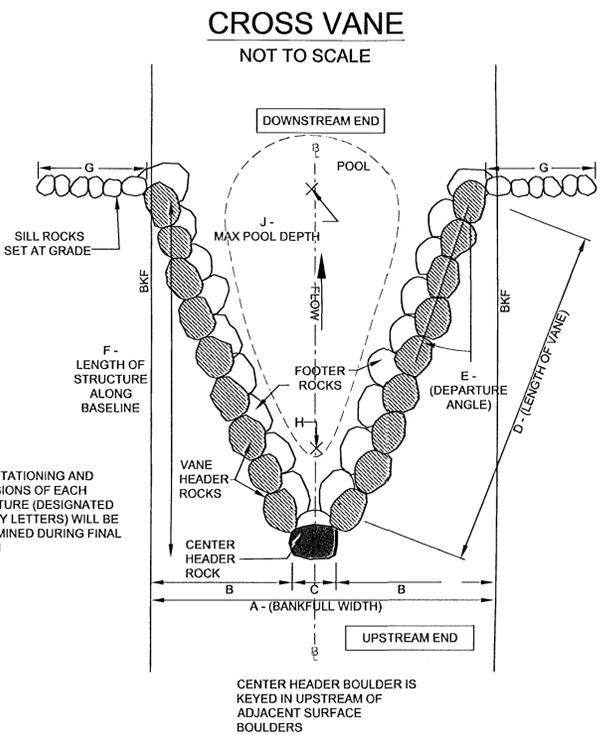
THE OBJECTIVE IS TO PRESERVE THIS WETLAND AREA WHERE THE VALLEY GETS FLAT IN THE LOWER PART OF THE PROJECT. SEVERAL SMALL CHANNELS ARE PRESENT IN THIS AREA THAT FEED WATER THROUGHOUT THE WETLAND.



THE IMAGE SHOWS THE UPPER PORTION OF THE TRANSITION INTO THE WETLAND AREA. A SHORT DISTANCE DOWNSTREAM OF THIS POINT IS WHERE THE CHANNEL FLOW WILL BE TRANSFERRED TO SHEET FLOW.



THIS VIEW SHOWS CROSS VANES CONSTRUCTED AT THE NORTHERN VIRGINIA STREAM RESTORATION BANK, SNAKEDEN REACH 3. SIMILAR STRUCTURES WILL BE UTILIZED ON THIS PROJECT TO CONTROL GRADE AND PROVIDE IN-STREAM HABITAT AND BANK PROTECTION.



THIS VIEW SHOWS THE NORTHERN VIRGINIA STREAM RESTORATION BANK, SNAKEDEN REACH 1 LOOKING DOWNSTREAM TO ILLUSTRATE THE CONNECTION OF THE CHANNEL WITH A PLANTED RIPARIAN AREA. FOR THIS PROJECT, THE SLOPE OF THE FLOODPLAIN WILL BE VIRTUALLY FLAT TO PROMOTE FREQUENT ACCESS OF HIGH FLOWS TO THE ADJACENT WETLAND AREAS.

**DESIGN SUMMARY:**

STREAM RESTORATION IS PROPOSED FOR THE UNNAMED TRIBUTARY TO FLATLICK BRANCH AS PART OF THE AEROSPACE CORP WESTFIELDS PARCEL 35 DEVELOPMENT. BASED ON SITE PLANS AND HYDROLOGIC DATA PROVIDED BY BURGESS AND NIPLE, GRADING CHANGES ON THE SITE REDIRECT THE MAJORITY OF STORMWATER THROUGH A PROPOSED 54" RCP INTO THE UNNAMED TRIBUTARY. THIS DISCHARGE IS CONVEYED THROUGH A SECTION OF THE UNNAMED TRIBUTARY THAT WILL BE RESTORED TO A STABLE PATTERN AND PROFILE USING NATURAL CHANNEL DESIGN CONCEPTS. A LEVEL SPREADER IS INCORPORATED IN ORDER TO PRESERVE THE STABLE FORESTED WETLAND LOCATED DOWNSTREAM OF THE PROPOSED 54" RCP. THE LEVEL SPREADER IS DESIGNED TO EVENLY DISTRIBUTE THE FLOW INTO THE EXISTING WETLAND AT NON-EROSIVE VELOCITIES. CHANNEL STABILIZATION IS PROPOSED WHERE THE FLOW CONVERGES AND RETURNS TO FLATLICK BRANCH. CROSS VANES AND STEP POOLS ARE ADDED TO PREVENT CHANNEL EROSION FROM ADVANCING UPSTREAM, WHICH COULD PUT UTILITIES AND WETLAND AREAS AT RISK.

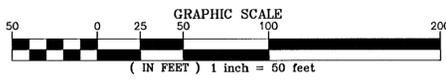
**CONCEPTUAL LAYOUT NOTES:**

1. THIS PLAN IS FOR CONCEPTUAL PURPOSES ONLY AND SHALL NOT BE USED FOR CONSTRUCTION.
2. PRIOR TO THE DEVELOPMENT OF A FINAL DESIGN PLAN, FURTHER HYDROLOGIC/HYDRAULIC STUDY SHALL BE CONDUCTED TO REFINE THE DIMENSIONS OF THE PROPOSED CHANNEL. THE CURRENT DIMENSIONS ARE BASED ON THE 2-YR OUTFALL DISCHARGE PROVIDED BY BURGESS AND NIPLE AND MAY CHANGE.
3. THE DIMENSIONS OF THE FLOW DISSIPATION STRUCTURE MAY BE ALTERED AFTER H&H MODELING OF THE STRUCTURE.
4. LOCATION AND DETAILS OF STRUCTURES MAY CHANGE DURING FINAL DESIGN.
5. THE DETAIL SHOWN IS FOR ILLUSTRATIVE PURPOSES AND MAY NOT DEPICT FINAL DESIGN DIMENSIONS OR SPECIFICATIONS. OTHER DETAILS WILL ALSO BE DEVELOPED FOR FINAL DESIGN
6. REVEGETATION PLAN WILL CONSIST OF RIPARIAN AND FORESTED WETLAND PLANTINGS AS APPROPRIATE.

Application No. PCA-78-S-063-06 Staff WOD  
 Concurrent w/ SE-2008-SU-026  
 APPROVED DEVELOPMENT PLAN  
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 SE conditions dated 12/31/2009  
 Date of (BOS) (PC) approval 2/23/09  
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THIS VIEW SHOWS STEP POOLS CONSTRUCTED AT THE NORTHERN VIRGINIA STREAM RESTORATION BANK, SNAKEDEN REACH 4. THESE ARE SIMILAR TO WHAT WILL BE CONSTRUCTED AT THE DOWNSTREAM COLLECTION POINTS AND AT THE UPSTREAM END OF THE PROJECT AT THE OUTFALL



**CONCEPTUAL PLAN. NOT FOR CONSTRUCTION**



REVISIONS		Appr. By	By
No.	Date	Description	

Horizontal Datum: VCS NAD 83  
 Vertical Datum: NGVD 29  
 Boundary and Topo Source: WSSI

Design	Draft	Approved
MFA	RDD	MFA

Sheet #  
**7A**

Stream Restoration Success Criteria: The initial success criteria shall be:

- (1) With respect to reforested riparian buffer areas:
  - (a) Plant density of at least 400 living wood stems (including volunteers) per acre of trees and shrubs must be achieved by the end of the first growing season following planting and maintained through the end of the monitoring period or until canopy coverage is greater than 30%, and
  - (b) Herbaceous plant coverage of at least 60% must be achieved by the end of the first growing season, and at least 80% each monitoring year thereafter.
  - (c) Woody plant coverage (from live-stakes, tublings, container grown material, and volunteers) along stream banks shall achieve a density of at least 5 l.f./stem by the end of the first growing season and for each monitoring year thereafter.
- (2) With respect to the stream and riparian system, the following elements of the restored stream reach shall be assessed using the stated criteria:
  - (a) Dimension - The analysis of each permanent cross-section specified on the Stream Restoration Site Plan shall indicate that:
    - (i) The bankfull Cross-Sectional Area did not increase or decrease by an amount greater than 20% of the as-built cross-section.
  - (b) Pattern - The analysis of the plan-view survey of field measurements shall indicate that:
    - (i) The Sinuosity of the stream (defined as the stream length along the thalweg divided by the valley length) did not increase or decrease by an amount greater than 0.2 of the as-built pattern.
  - (c) Profile- The analysis of the longitudinal profile shall indicate that the slope of the longitudinal profile did not increase or decrease by an amount greater than 0.3% of the as-built slope.
  - (d) Structures - The analysis of each instream structure shall indicate that:
    - (i) The angle of any rock vane, j-hook, or cross vane did not increase or decrease by an amount greater than 3 degrees from the as-built angle, and remains between 20 and 30 degrees from the tangent to the bankfull at the end of the outside vane arm.
    - (ii) The slope of any rock vane, j-hook, or cross vane did not increase or decrease by an amount greater than 2% from the as-built slope (i.e. if the design slope was 5%, then any slope from 3% to 7% would be acceptable) and remains between 2% and 7%.

Stream Restoration Monitoring: The monitoring period shall be no more than ten (10) years, unless deficiencies exist at the end of the 10th year, in which case the monitoring period shall be extended (see Section 3c). The Applicant shall perform all necessary work to monitor the restoration in order to demonstrate compliance with the Success Criteria. The Monitoring Program shall follow the guidelines established below:

- (1) With respect to reforested riparian buffer areas:
  - (a) Visual Description. Visual descriptions shall be provided with each monitoring report to Fairfax County. Visual descriptions shall be accomplished by the provision of ground level photographs, taken facing north, south, east, and west, from stations located adjacent to each vegetation plot and hydrology monitoring station [permanent markers shall be established to ensure that the same locations (and view directions) are monitored in each monitoring period].
  - (b) Vegetation. Sample plots shall be located on a stratified random basis over areas of the site that are reforested riparian buffer areas in order to sample all habitat areas of buffer area at locations adjacent to each photo location marker. A minimum of 3 plots/acre shall be sampled.
 

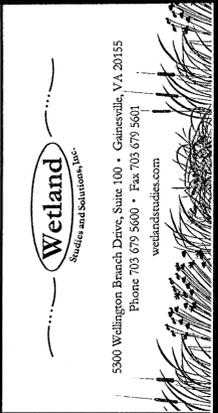
Each plot shall be of a size no less than a 30 foot radius for woody plants and a 3 foot diameter for herbaceous plants. Alternative sampling methods may be submitted for DEQ review and approval. The vegetation data shall be collected in the July - November time period and shall include:

    - (i) Dominant vegetation species identification;
    - (ii) Coverage assessment;
    - (iii) Number of woody plant stems (total and #/acre);
    - (iv) Indicator Status.
- (2) With respect to the stream and riparian system:
  - (a) Woody plant coverage (from live stakes, tublings, container grown material, and volunteers) along stream banks shall be quantified by species and density (5 l.f./stem along the stream bank edge).
  - (b) Exposure of bank pins (with locations specified on the Stream Restoration Site Plan) shall be measured to provide an assessment of bank erosion in the restored reach.
  - (c) Scour chains (with locations specified on the Stream Restoration Site Plans) shall be assessed to provide data on sediment movement in the stream bed.
  - (d) Each Stream Stabilization Structure shall be surveyed, photographed from a permanent monitoring post, or otherwise designated location, established in the first report, visually evaluated for stability, and

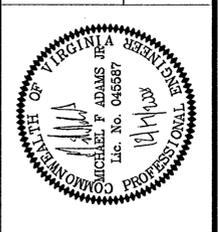
- a narrative statement provided as to whether or not specific Success Criteria have been violated.
- (e) To assess channel stability Success Criteria related to cross-sections, four cross sections shall be provided (with permanent markers established the first time in locations specified in the Stream Restoration Site Plan) on a representative mix of riffles and pools at these same time periods.
  - (f) A surveyed profile of the stream along its thalweg provided as soon as practicable after completion, and in years 1, 3, 5 and 10 and compared to the original design to assess compliance with Success Criteria.
  - (g) Location of any riparian areas with excessive erosion that needs replanting or protection with rock or coir logs shall be identified.
  - (h) Within one week after any storm event that exceeds 3.2 inches in 24 hours or 2.0 inches in 2 hours (Fairfax County 2 year storms), the subject stream reach shall be visually inspected for damages. Any damage noted shall be immediately reported to Fairfax County in writing, with supporting photographs, and accompanied by a remediation plan. Photographs and narrative shall be utilized to summarize performance and remediation efforts in the next monitoring report, and shall also be submitted to Fairfax County immediately upon completion of restoration efforts.
- (3) Timing of Monitoring Activities: Monitoring activities shall occur during the growing season, and at least:
    - (a) Prior to restoration activities, as soon as practicable after completion of restoration, and once during the 1st, 2nd, 3rd, 5th, 7th and 10th growing seasons following completion of grading (note that field surveys will be conducted in years 1, 3, 5 and 10);
    - (b) Monitoring of woody vegetation for the first year or any year following planting shall take place between August and November;
    - (c) If all Success Criteria have not been met in the 10th year, then a monitoring report (and any necessary corrective actions as noted in the Stream Restoration section's preamble) shall be required for each consecutive year until two annual sequential reports indicate that all criteria have been successfully satisfied (which is an indication that corrective actions were successful).
    - (d) A final monitoring report (typically prepared the 10th growing season following completion of grading).

Stream Restoration Reports: The Applicant shall submit reports to Fairfax County DPWES describing the conditions of the restoration and relating those conditions to the Success Criteria. Reports shall be submitted by November 30th of each monitoring year and shall contain all data and photos collected in the Monitoring Program, comparison of the data relevant to the Success Criteria with respect to the design plans and previous monitoring reports and as-builts. In the event that the stream restoration fails to meet the success criteria specified herein, the Applicant shall develop the necessary contingency plans and implement appropriate remedial actions until the success criteria are met.

Stream Restoration Maintenance: The stream restoration project shall be placed in a private drainage easement and shall be maintained by the Applicant in perpetuity. The Applicant shall perform all necessary work to maintain the Stream Restoration consistent with the Success Criteria. Corrective actions shall be undertaken to bring deficiencies up to the performance standards described herein, if necessary.



AEROSPACE CORP WESTFIELDS PARCEL 35  
 STREAM RESTORATION CONCEPT PLAN  
 Fairfax County, Virginia  
 Stream Restoration Success Criteria  
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REVISIONS		App. By	Rev. By
No.	Description		

DATE: DECEMBER 17, 2008 SCALE: N/A

Application No. PCA-78-S-063-06 Staff WOD  
 Concurrent w/ SE-2008-SU-026  
 APPROVED DEVELOPMENT PLAN  
 (DP) (GDP) (CDP) (FDP) (SE PLA)  
 See Proffer's dated 3/9/09  
 SE conditions dated 12/31/2009 7/23/09  
 Date of (BOS) (PC) approval 7/23/09  
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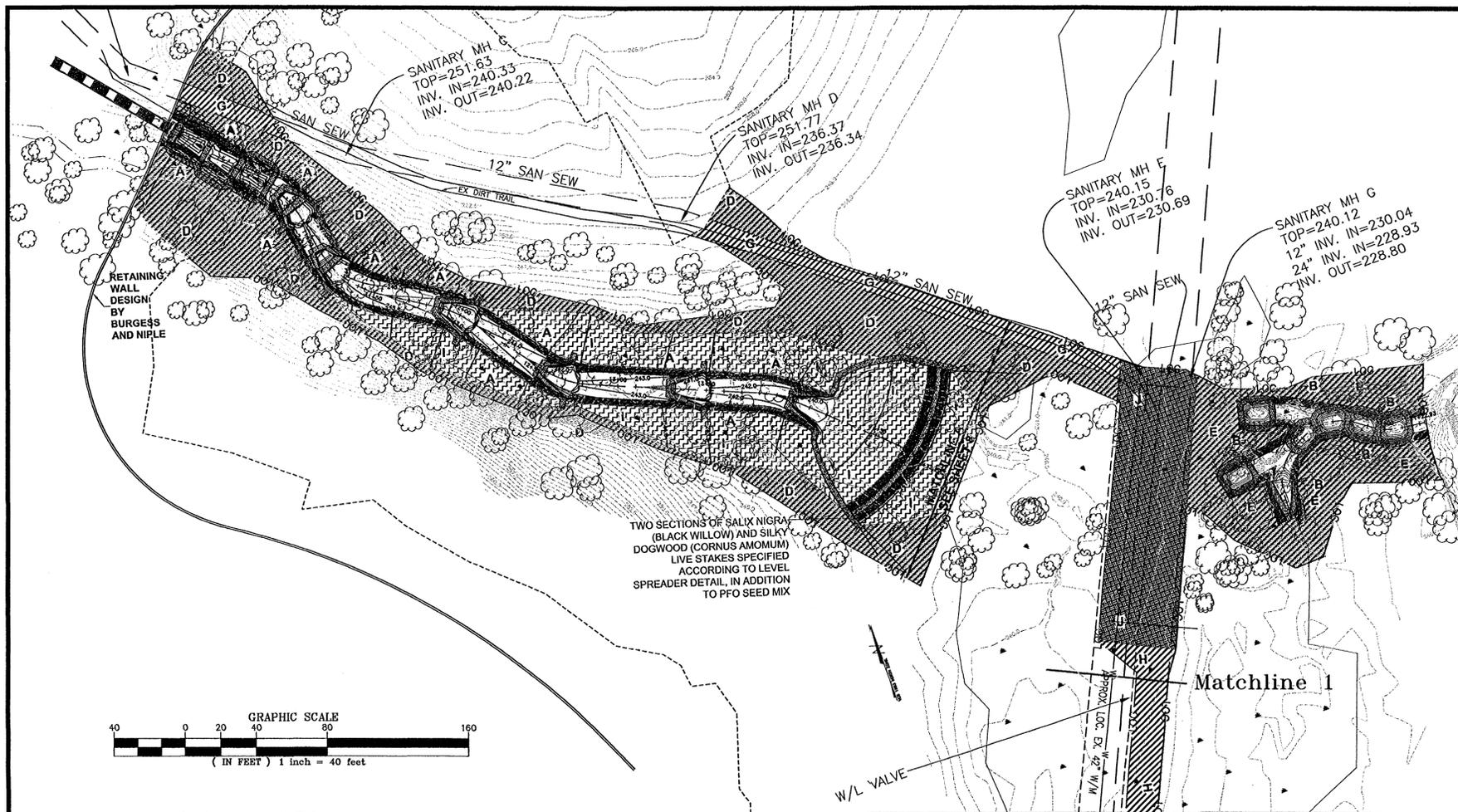
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 MFA RDD MFA  
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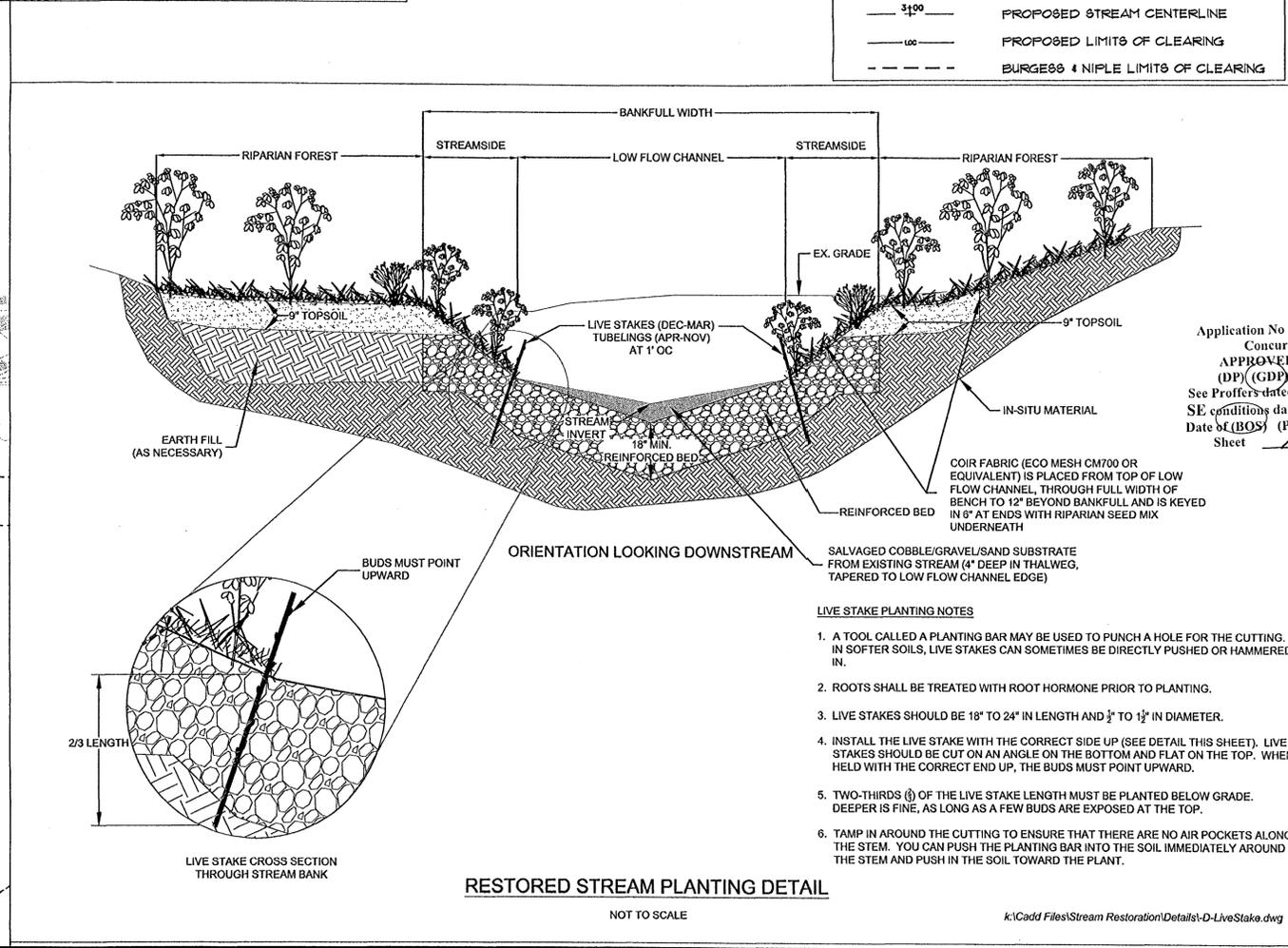
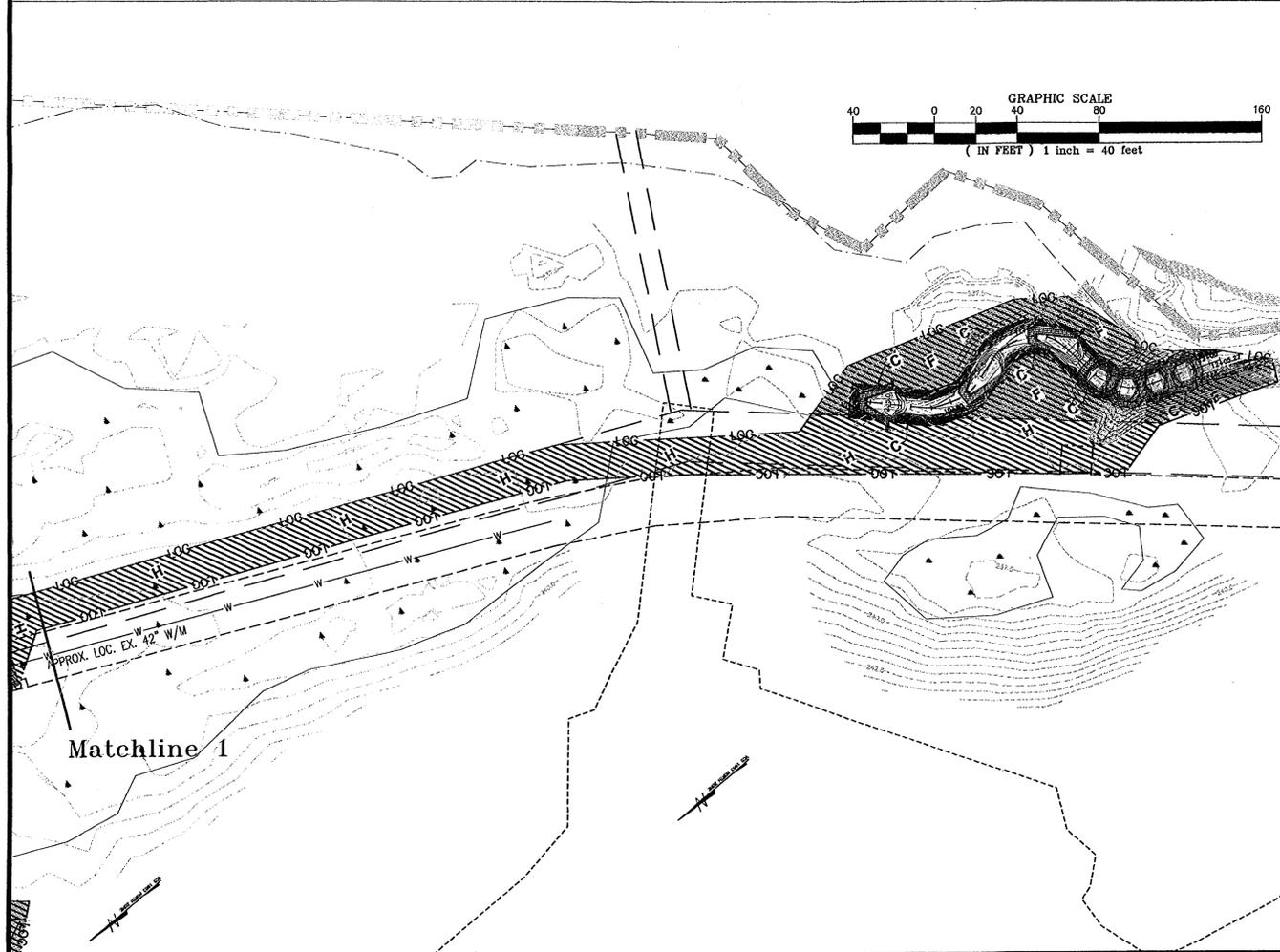




PLANTING AREAS	SYMBOL
STREAMSIDE* 6,251 SF = 0.14 AC 1,691 LF (Alder, Elderberry, Silky Dogwood, Southern Arrowwood, typ.)	A, B & C
RIPARIAN FOREST* 32,846 SF = 0.75 AC (Variety of Oak, Hickory, Maple, Birch, Dogwood, Gum, Hornbeam, Elder, etc. species)	D, E & F
RIPARIAN SEED MIX ONLY 14,983 SF = 0.34 AC (Seed mix contains grasses, forbs, shrubs and trees)	G & H
FORESTED WETLAND 16,118 SF = 0.37 AC (Wetland Oaks, Green Ash, Birch, Sweet Gum, Sycamore, Willow, Box Elder, Maple, Alder, Arrowwood, Buttonbush, Inkberry, Winterberry, typ.)	I
WETLAND SEED MIX ONLY 6,186 SF = 0.16 AC (Seed mix contains grasses, sedges, forbs, rushes, shrubs and trees)	J

\* RIPARIAN SEED MIX SHALL BE DISTRIBUTED EVENLY THROUGHOUT ALL DISTURBED AREAS IN THE AMOUNT SPECIFIED ON THE VEGETATION SCHEDULE.

LEGEND	
	EXISTING CONTOURS (0.5')
	PROPOSED CONTOURS (0.5')
	EXISTING SANITARY EASEMENT
	EXISTING WATER LINE EASEMENT
	PROPOSED STREAM CENTERLINE
	PROPOSED LIMITS OF CLEARING
	BURGESS & NIPLE LIMITS OF CLEARING



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AEROSPACE CORP WESTFIELDS PARCEL 35  
STREAM RESTORATION CONCEPT PLAN

Fairfax County, Virginia

Planting Plan

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Professional Engineer  
COMMONWEALTH OF VIRGINIA  
JAMES F. ADAMS, JR.  
Lic. No. 045687

Application No PCA-78-S-063-06 Staff WOD  
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REVISION	No.	Date	Description

Horizontal Datum: VCS NAD 83  
Vertical Datum: NGVD 29  
Boundary and Topo Source: WSSI

Design	Draft	Approved
RDD	RDD	MSR

Sheet #  
7G of

Computer File Name:  
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DATE: December 17, 2008  
SCALE: 1" = 40'

**Design Narrative**

**I. Background**

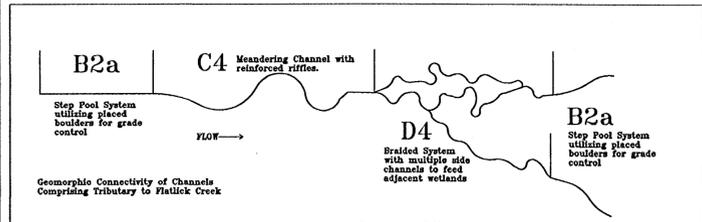
The stream restoration design philosophy for the unnamed tributary of Flatlick Branch is that of Natural Channel Design (NCD). As the name implies, the goal of NCD is to restore a degraded stream by mimicking, as much as possible, the characteristics of a stable, "natural" system. Through the use of geomorphic principles, NCD seeks to achieve long-term stability given current as well as future flow rates.

Prior to developing restoration design protocols applicable to this urban stream, development of a hydrologic/geomorphic basis for these designs was necessary. Though regional curves that predict bankfull discharge as a function of drainage area have been published, the data utilized to produce curves for the Eastern United States do not account for altered hydrology in urban systems. Given the lack of available hydrologic data for small urban systems, there was considerable uncertainty as to the applicability of published regional curve data to the unnamed tributary to Flatlick Branch.

To develop a design on similar stream restoration projects in Fairfax County that will result in environmentally sound, aesthetically pleasing streams with long-term stability, WSSI undertook an analysis that included a review of prior studies and implementation of hydrologic model data (developed by Burgess and Niple) from the proposed development. Information from both of these sources was then considered in order to develop a design that incorporates certain, practicable elements of the NCD philosophy, while also taking into account the significant constraints imposed by the complex urban nature of the project watershed. These constraints include limitations on the location and size of the restored channels which, in turn, determines the type and size of the channel substrate materials that must be used. Details of the development of the design are discussed below, prefaced by a discussion of how restorations employing elements of NCD are in compliance with state law.

**II. Regulatory Compliance**

NCD is the preferred design methodology for the Virginia Department of Environmental Quality (DEQ) and the U.S. Army Corps of Engineers (COE). The 2005 state legislature revised state law to stipulate that any stream restoration project that is designed in accordance with NCD principles is exempt from the requirements of MS 19 (Code of Virginia, § 10.1-560 and 10.1-561) as well as any related local requirements. Additionally, on March 16, 2007, DEQ published its proposed Section 401 Water Quality Certification Conditions for Nationwide Permit (NWP) #27 (Stream and Wetland Restoration Activities) requiring that natural stream design be used for stream restoration. Therefore, the flow rates used for this project were developed using NCD methodologies and compared to flow rates derived from the traditional modeling techniques.



One of the principal tenets of NCD is the concept of multiple stream types and the unique properties associated with various types of streams. The unnamed tributary to Flatlick Branch is comprised of three different stream types, each with a specific function related to hydraulics and/or ecological function. At the upstream end of the project, a Ba stream (Step Pools with a small floodplain) is used to decrease the channel bed elevation over a relatively short distance. This is accomplished by using boulders placed individually at specific elevations to provide grade control. The step pools transition into a C stream type, which provides a variety of habitat as well as connectivity to the floodplain and wetland areas adjacent to the channel. At the end of the C stream is a cross vane that transitions into a level spreader. The level spreader then diffuses flow into a braided D stream that runs through a wetland area. D stream types are unique braided systems that are flat, wide and often rough; these properties slow down the flow of water through the system and, in this case, feed wetland areas that not only diversify habitat, but provide abundant vegetation to slow down flow. If the D stream type was to be converted into a single-thread channel by ditching, which would have the effect of not only concentrating flow but also steepening the channel, the wetland would likely be drained. Lastly, at the downstream end of the project, a Ba stream type is once again used to drop the grade of the stream bed over a relatively short distance.

**III. Published Data**

In the process of determining a design protocol, a review of work performed by others was conducted. This included review and consideration of published regional curves as well as reports on urbanization and how it can result in downstream channel enlargement. Specific information reviewed as part of this analysis included the following:

North Carolina Piedmont Regional Curve Data<sup>1</sup>

This data includes bankfull hydraulic geometry relationships for both "urban" and "rural" streams. The streams defined as "urban" averaged 43% impervious area and those classified as "rural" contained "no more than 20%". Impervious cover of up to 20% represents a wide range of land use conditions. For instance, The Chesapeake Bay Local Assistance Manual (CBLAM)<sup>2</sup> assigns a 20% impervious cover to 0.5 acre residential lots (2 houses per acre), which would be considered a rural condition for the North Carolina Piedmont Regional Curve. Land use in the project watershed above the pipe outfall consists of an average impervious cover of 68%. This is much higher than the 43% impervious area that comprises the "urban" condition of the North Carolina Piedmont Regional Curve Data. The effect of this range of imperviousness is detailed in the Discussion section below.

Maryland Piedmont Regional Curve Data<sup>3</sup>

The U.S. Fish and Wildlife Service published a report on Maryland piedmont streams that presents regional curve information. Given that the project watershed is located in close proximity to the study area and in the same physiographic province (piedmont), the MD data is considered to be the most applicable to the unnamed tributary to Flatlick Branch. Note the average impervious area of the contributing watersheds in this study is approximately 8% (and thus is classified as "rural"). This is much lower than the value of imperviousness located within the project watershed.

Eastern United States Regional Curve Data

Regional curve information developed from streams in the eastern portion of the United States is presented in Water in Environmental Planning<sup>4</sup> by Dunne and Leopold (1978).

Dynamics of Urban Stream Channel Enlargement

The Center for Watershed Protection published a report<sup>5</sup> on the impact of watershed development on channel enlargement. From this study, it is estimated that ultimate channel enlargement can take 50-75 yrs from the time the watershed is fully developed. The project watershed is still under development, suggesting the channels have not yet reached their ultimate size (this is supported by the current condition of the channels). Based on an average impervious area in the project watershed up to the pipe outfall of about 68% and assuming no retention of stormwater in the watershed, the resulting enlargement factor would be approximately 8.2.

**IV. Hydrologic/Hydraulic Modeling**

A hydrologic model of the project watershed was developed by Burgess and Niple to assess stormwater outflows from the project watershed based on the proposed development. The post-development watershed conditions used by Burgess and Niple (including off-site flows from other site plans) were used for the analysis. Flow rates developed from both the NRCS 2- and 10-yr, Type II storm events were compared to results obtained from application of the enlargement factor to the MD regional curve data.

**V. Discussion**

From the analysis described above, it is clear that there are two distinct methodologies (regional curves and hydrologic modeling) available to size the channel. When considered in relation to one another along with good engineering judgment, a reasonable design methodology has been developed for use in this project. A discussion on each contributing component is provided below, along with the resulting design protocol employed for the unnamed tributary to Flatlick Branch.

Regional Curves

It is evident that use of the regional curves developed for rural MD streams would result in channels that are significantly undersized. The urban nature of the project watershed (for which contributing impervious area averages 68%) results in significantly higher flow rates than the comparably sized watersheds represented by the curves.

In regards to the effects of urbanization, the published regional curves tell a consistent story. Rural curves (MD and NC only - no data representing the character of the "Eastern" curve is available) fall well below the urban NC curve. Since the NC rural curve represents a wide range of development conditions with up to 20% imperviousness in watersheds, it is not surprising that it plots above the MD rural curve with an impervious area of 8%. Because of the uncertainty in the conditions of the watersheds used to develop the NC rural curve along with the significant difference between the average impervious area of the regional curve data and the project watershed, the NC regional curves are not an appropriate method to size the restored channel. The rural MD data has been determined, however, to be representative of VA piedmont streams through comparison with reference stream data collected by WSSI. Thus, the published rural MD data is applicable, yet requires adjustment to account for the effects of urbanization (i.e. increased flow rates).

Through application of the enlargement factors to the cross-sectional areas represented by the MD rural curve for each design reach in the project watershed, a modified regional curve was developed that is specific to the percentage of imperviousness within the project watershed. The cross-sectional area calculated using the enlargement factor was converted to a flowrate using the bankfull discharge relationships developed as part of the published MD data. This data was compared to the hydrologic modeling data to develop a set of design flowrates for the unnamed tributary to Flatlick Branch.

Hydrologic Modeling

The 2-yr modeled flow data plots below the modified MD curve data. As impervious area increases, stormflow hydrographs have larger peaks for shorter durations. To account for the increase in peak flows that occurs with the increase in impervious area due to the proposed development, Stormwater Management (SWM) facilities have been included on the site and are also present upstream of the site. These SWMs include underground storage, rain gardens, green roofs and others which are designed to reduce peak flows leaving the site. These SWM facilities are included in the hydrologic modeling analysis but are unable to be included in the regional curve analysis.

Enlargement Factor

Studies have shown and experience confirms that channels enlarge in response to increased runoff volumes, peak rates, and increased frequencies resulting from development of the watershed. Enlargement curves provide a measure of the potential enlargement factor based on impervious area. The enlargement factor was applied to the MD rural curve in order to replicate the NC urban curve. The NC urban curve was developed from watersheds with 43% impervious area, which results in an enlargement factor of 4.25. This factor of 4.25 was applied to the MD rural curve, which compares well with the NC urban curve and establishes the validity of using the enlargement factor to account for differences in impervious area between the MD rural curve and the project watershed.

**VI. Design Protocol**

Ultimate Channel Size

The ultimate size of the restored channel in the project watershed is determined by use of the hydrologic model data for the 2-yr storm provided by Burgess and Niple. Although the MD regional curve with enlargement factor is used in other urbanized restorations completed by WSSI, none of those projects included as much impervious area or as many SWM facilities as are included in this project watershed. There is also a large difference between the impervious area in the upper, urbanized portion of the watershed and the lower, forested portion of the watershed. This dichotomy of land use causes flowrates to decrease moving downstream in the project watershed, according to the regional curve analysis.

In addition, the regional curve analysis does not give any consideration to stormwater management facilities, it represents a worst-case scenario for the determination of flows in a developing watershed. This type of conservative approach is often desired in order to ensure stability of the restored reach under changing flow conditions. However, oversizing the unnamed tributary to Flatlick Branch could result in loss of wetland function at the downstream portion of the watershed.

Because of the uncertainty in the application of the regional curve analysis to this project along with the desire to keep the unnamed tributary hydrologically connected to the surrounding wetland area, the 2-yr hydrologic model value of 113 cfs will be used as the target flowrate used to begin the iterative channel design process - a process that must consider all relevant constraints (tree impacts, overbank flooding, sewer laterals, access, etc.) to arrive at the optimum channel design.

Velocity over Level Spreader

To maintain stability of the untouched wetland area, a level spreader was designed to keep velocities below the maximum allowable velocity to prevent soil erosion for the Rowland Series silt loam soils found in the stream valley during the 2-year design discharge of 113 cfs. Although the permissible velocity for silt loam soils is 3.0 fps (obtained from Table 5-22 in the Virginia Erosion and Sediment Control Handbook, as referenced in Section 6-1009 of the Fairfax County Public

Facilities Manual), a permissible velocity of 2.5 fps (for sandy loam soils) was used for this analysis. According to the Fairfax County Soil Survey, sandy loam textures are common near creek banks and sandbars with Rowland Series soils. Because sandy loam textures could be present on site, 2.5 fps is used as the maximum permissible velocity. Velocity over the level spreader was calculated using continuity with Manning's equation. It is assumed that the full length of the level spreader is utilized for the cross-sectional area. Due to the large length of the level spreader relative to the depth, the cross-section is approximated as rectangular. Although it is expected that the wetland area will be heavily vegetated, which will slow down flow, a Manning's n of 0.035 (a typical value for unvegetated channels) is used as a conservative velocity approach. Sample calculations are shown below.

$$Q = VA \quad V = \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$$

$$Q = \left( \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}} \right) (A)$$

$$n = 0.035 \quad L = 94 \text{ [ft]} \quad S = 0.005 \text{ [ft/ft]}$$

$$A = Lh \text{ [ft}^2\text{]} \quad R = \frac{A}{P} = \frac{Lh}{L+2h} \text{ [ft]}$$

where L = length of level spreader

n = Manning's number

S = channel slope

h = height of water above level spreader

A = flow area

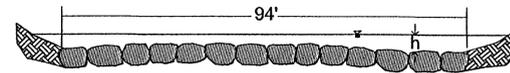
P = wetted perimeter

Q = design flow

V = velocity over the level spreader

$$113 = \frac{1.49}{0.035} \left( \frac{94h}{94+2h} \right)^{\frac{2}{3}} (0.005)^{\frac{1}{2}} (94h)$$

$$h = 0.57 \text{ [ft]} \quad V = 2.09 \text{ [ft/s]}$$



The depth of flow, h, is calculated from continuity and Manning's to be 0.57 ft. This depth results in a velocity of 2.09 ft/s, which is below the design permissible velocity of 2.5 ft/s. In addition, the permissible velocity is for unlined earthen channels. In this case, flow from over the level spreader enters a densely vegetated wetland area, which provides flow resistance (reducing the velocity) and reinforcement of the soils, so the actual velocity is expected to be lower than the 2.09 ft/s computed here.

Wingwalls, which have a top elevation of 1.5 ft above the level spreader, will be constructed to confine the flow to the level spreader area. The velocity analysis above provides a conservative value of velocity but most likely underestimates flow depth. To ensure the wingwalls will not be overtopped, a second continuity analysis was performed that uses a Manning's number of 0.1, which is a typical value for flow through vegetation. Sample calculations for this analysis are shown below.

$$Q = VA \quad V = \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}}$$

$$Q = \left( \frac{1.49}{n} R^{\frac{2}{3}} S^{\frac{1}{2}} \right) (A)$$

$$n = 0.1 \quad L = 94 \text{ [ft]} \quad S = 0.005 \text{ [ft/ft]}$$

$$A = Lh \text{ [ft}^2\text{]} \quad R = \frac{A}{P} = \frac{Lh}{L+2h} \text{ [ft]}$$

$$113 = \frac{1.49}{0.1} \left( \frac{94h}{94+2h} \right)^{\frac{2}{3}} (0.005)^{\frac{1}{2}} (94h)$$

$$h = 1.09 \text{ [ft]} \quad V = 1.10 \text{ [ft/s]}$$

The higher Manning's n value results in a water depth of 1.09 ft which is less than the 1.5 ft difference between the top elevation of the wingwalls and the elevation of the level spreader.

Based on this analysis, velocities are below the permissible velocity for the given soil type and the design flows do not top the wing wall. The densely vegetated wetland area along the profile of the level spreader and the low velocity combine to create a stable system to meet the objective of preserving the wetland in the lower portion of the project while still conveying the design discharge.

Channel Substrate and Sediment Transport

In a stream system where there is an ample supply of sediment, the restored reach must be designed to provide adequate sediment transport. If this is not considered, sediment will aggrade in the channel and can result in redirection and erosion of a new channel. In the project watershed, however, the vast majority of channel sediments are supplied through incision of the channel bed and subsequent erosion of the channel banks. The urban nature of the contributing watersheds is such that very little sediment is contributed through overland runoff. The sediments that are supplied are also very small - thus providing adequate sediment transport is not a concern in the project watershed. In fact, since stabilization of the bed and banks will drastically reduce the available in-stream sediment supply, preventing mobilization of the substrate material is necessary because little replenishment is available.

Therefore, it will be necessary to provide a reinforced bed throughout the upper portion of the unnamed tributary to Flatlick Branch to prevent the entrainment of sediment that will eventually be deposited in the wetland area located in the lower portion of the project watershed.

Sizing of the bed material is determined through analysis of the shear stresses the channel lining will experience, based on the flow depth and channel slope in each reach:

$$\tau = \gamma^* D^* S$$

Where:

- t = maximum shear stress, lb/ft<sup>2</sup>
- Y = specific weight of water, 62.4 lb/ft<sup>3</sup>
- D = maximum depth, ft
- S = channel slope, ft/ft

The minimum required diameter of the mean size of the substrate material (D<sub>50</sub>) is then computed by the equation relating shear stress to particle size<sup>6</sup>:

$$D_{50} = 3.070^* \tau$$

Where:

1.042

D<sub>50</sub> = min. diameter of the mean substrate particle size, in.

Note that the substrate material is sized for the maximum shear stress experienced in the deepest portion of the channel (in the riffle) at the bankfull elevation in order to provide a larger factor of safety (shear stress is typically computed using the mean riffle depth). This computed substrate size is then used to armor the entire channel bottom, representing a significant factor of safety. In addition, shear stress computations generally represent the required force to initiate movement of loose, non-implicated particles. The substrate in the unnamed tributary to Flatlick Branch will be constructed using crushed stone (cap-rock and or class A1 riprap) with the voids filled with a sand, gravel and topsoil mixture. The angularity of the crushed rock, along with the filling of the voids, will result in a very resistant, armored substrate that will be capable of withstanding much greater shear stress than the computation of the required D<sub>50</sub> would suggest. Specific computations to determine the substrate size for this reach are presented in this plan set.

Overbank flooding is also considered, especially in relation to flow through the wetland areas in the lower portion of the watershed. Overbank design velocities are limited to the specified allowable velocity contained in the Virginia Erosion and Sediment Control Handbook for "sandy loam (noncolloidal)". This allowable velocity, 2.5 fps, is used as a basis for sizing the step pool leading into the wetland system in the lower portion of the watershed. Coupled with the fact that the significant benefit provided by the wetland vegetation was not considered, the wetland areas will remain stable.

Reference Data

Layout of the channel pattern is governed by several factors, including the pattern of the existing stream channel, site constraints (trees, utilities, paths, etc.), and reference reach information. Wherever site constraints do not pose a limitation, parameters of the stream pattern suggested by WSSI-compiled reference data will be utilized.

Future Watershed Conditions

Hydrologic modeling in the project watershed considered post-development conditions, which is considered a fully developed condition. Although post-development conditions include an increase in impervious area, Best Management Practices are also included which reduce peak flow rates to a degree, particularly in smaller storms. In the event a redevelopment project does propose to increase the amount of impervious area in the watershed, state and county regulations are in-place to require that stormwater management be provided to offset any increases in stormwater runoff. In addition, adequate outfall regulations require that the downstream receiving water be able to withstand any increase in runoff rate or volume. Thus, any redevelopment that proposes to increase stormwater runoff from the site will be required to abide by these regulations, although it is unlikely that any redevelopment within the watershed will increase the amount of impervious area.

**VII. Conclusion**

Natural Channel Design theories, techniques, and practices are employed as described in this plan set, and are modified as necessary to ensure long term stability will be achieved in these urbanized hydrologic conditions. Through careful review and study of previous analyses and modeling of the watershed, a design protocol has been developed that considers all sources without undue reliance on any one. The design protocol employed for the unnamed tributary to Flatlick Branch will provide an environmentally sound, aesthetically pleasing, and structurally stable stream restoration project.

- <sup>1</sup>Harman, W.H. et al. 1999. Bankfull Hydraulic Geometry Relationships for North Carolina Streams. AWRA Wildland Hydrology Symposium Proceedings. Edited By: D.S. Olsen and J.P. Potonydy. AWRA Summer Symposium. Bozeman, MT.
- <sup>2</sup>Chesapeake Bay Local Assistance Department. 1989. Chesapeake Bay Local Assistance Manual.
- <sup>3</sup>McCandless, T.L. and Everett, R.A. 2002. Bankfull Discharge and Channel Characteristics of Streams in the Piedmont Hydrologic Region. U.S. Fish and Wildlife Service, Report CBF0-SO2-01.
- <sup>4</sup>Dunne, T., and L.B. Leopold, 1978. Water in Environmental Planning. W.H. Freeman Co. San Francisco, CA.
- <sup>5</sup>Caraco, D. 2000. The Dynamics of Urban Stream Channel Enlargement. Watershed Protection Techniques 3(3):729-734. The Center for Watershed Protection. Elliot City, MD.

**AEROSPACE CORP WESTFIELDS PARCEL 35  
STREAM RESTORATION CONCEPT PLAN**



REVISIONS		App. By	Rev. By
No.	Date		
	Description		

Horizontal Datum: N/A  
Vertical Datum: N/A  
Boundary and Topo Source: N/A

Design	Draft	Approved
RDD	RDD	MSR

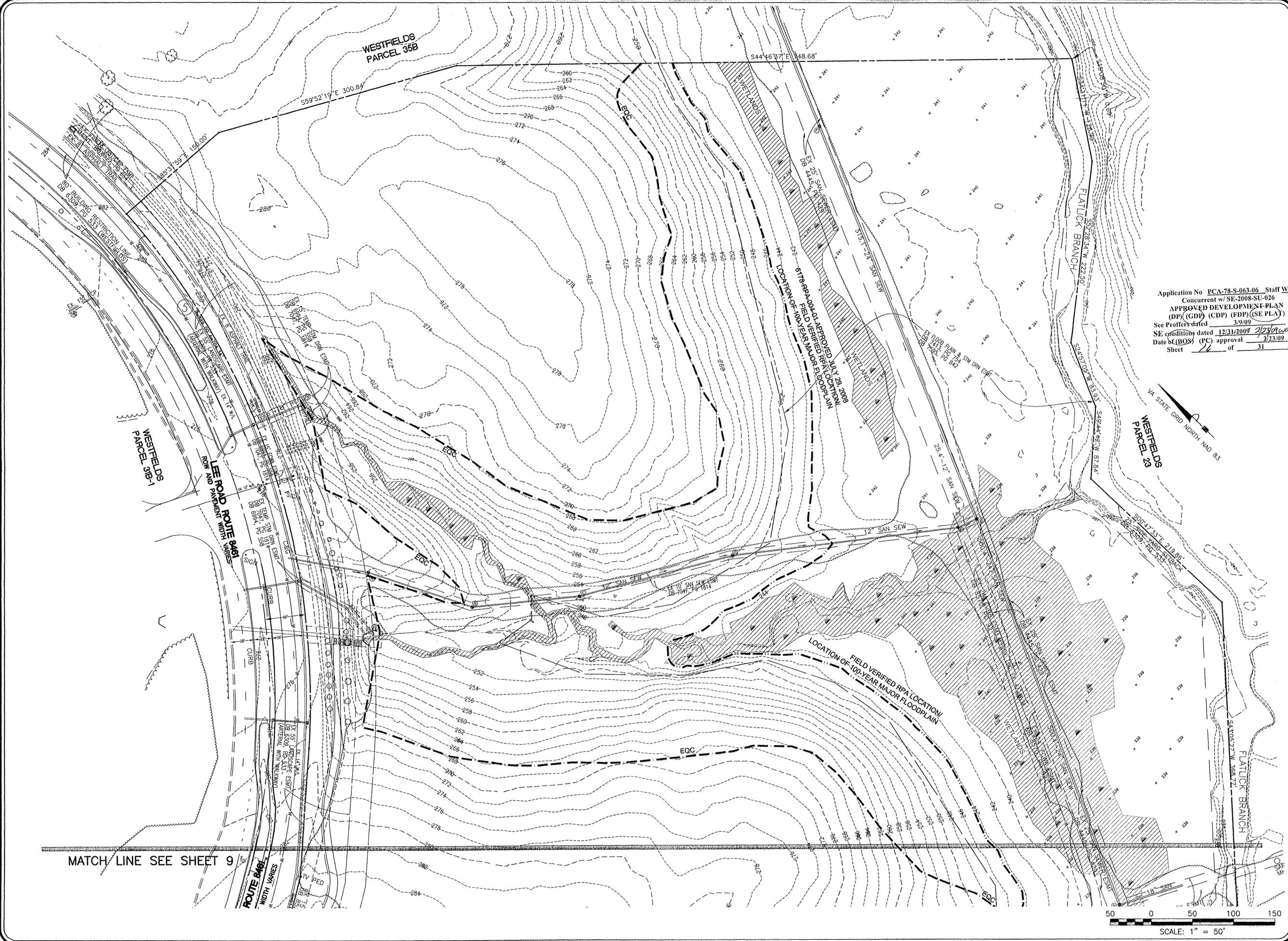
Sheet #  
**7H** of

**Wetland**  
Studies and Solutions, Inc.

5300 Wellington Branch Drive, Suite 100 • Gainesville, VA 20155  
Phone 703 679 5600 • Fax 703 679 5601  
wetlandstudies.com

Fairfax County, Virginia  
Design Narrative  
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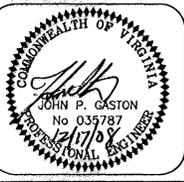
Application No PCA-78-S-063-06 Staff **WOD**  
Concurrent w/ SE-2008-SU-026  
**APPROVED DEVELOPMENT PLAN**  
(DP) (GDP) (CDP) (FDP) (SE PLAN)  
See Proffer's dated 3/9/09  
SE conditions dated 12/31/2009 2/23/09 WOD  
Date of (BOS) (PC) approval 2/23/09  
Sheet 15 of 31



Application No PCA-78-S-063-06 Staff WOD  
 Concurrent w/ SE-2008-SU-026  
**APPROVED DEVELOPMENT PLAN**  
 (DP) (GDP) (CDP) (FDP) (SE PLN)  
 See Proffers dated 3/9/09  
 SE conditions dated 12/31/2009 *[Signature]*  
 Date of (BOS) (PC) approval 2/23/09  
 Sheet 26 of 31

ADDRESS COMMENTS	DATE
DEC. 17, 2008	
ADDRESS COMMENTS	DEC. 1, 2008
ADDRESS COMMENTS	NOV. 4, 2008
ADDRESS COMMENTS	OCT. 28, 2008
ADD TRANSPORTATION ITEMS	OCT. 9, 2008
ADDRESS PRE-STAFFING COMMENTS	SEPT. 4, 2008
REVISED PER COUNTY COMMENTS	JULY 01, 2008

**EXISTING CONDITIONS**  
**AEROSPACE CORPORATION**  
**WESTFIELDS, PARCEL 35**  
 SULLY DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



DATE: MAY, 2008  
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 CHECK: DMT CHECK: JPG  
 JOB NO.: PR45447  
 P.R. NO.: 45447  
 SHEET 8 OF  
 FILE NO.: C-4702

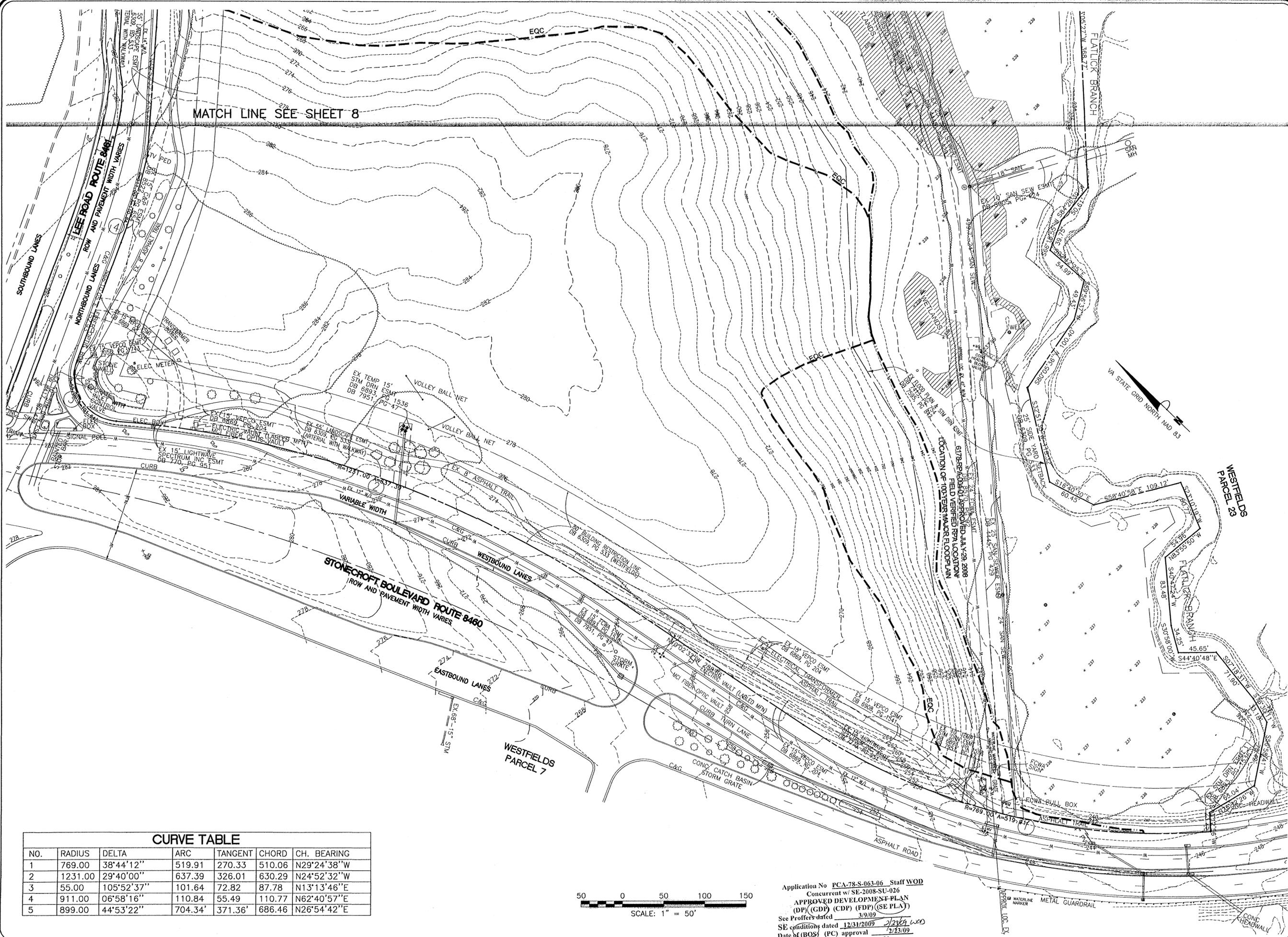
**BURGESS & NIPLE**  
 4160 PLEASANT VALLEY ROAD, CHANTILLY, VA 20151-0226  
 PH: (703) 631-9630 FAX (703) 631-6041

ADDRESS COMMENTS	DATE
REVISIONS	
REVISED PER COUNTY COMMENTS	JULY 01, 2008
ADD TRANSPORTATION ITEMS	SEPT. 4, 2008
ADDRESS COMMENTS	OCT. 28, 2008
ADDRESS COMMENTS	OCT. 4, 2008
ADDRESS COMMENTS	NOV. 4, 2008
ADDRESS COMMENTS	DEC. 1, 2008
ADDRESS COMMENTS	DEC. 17, 2008

**EXISTING CONDITIONS**  
**AEROSPACE CORPORATION**  
**WESTFIELDS, PARCEL 35**  
 SULLY DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



DATE:	MAY, 2008
SCALE:	1" = 50'
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DRAWN:	MPC
CHECK:	DMT
CHECK:	JPG
JOB NO.:	PR45447
P.R. NO.:	45447
SHEET:	9 OF
FILE NO.:	C-4702



MATCH LINE SEE SHEET 8

**CURVE TABLE**

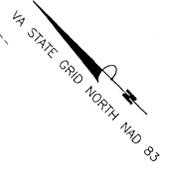
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2	1231.00	29°40'00"	637.39	326.01	630.29	N24°52'32"W
3	55.00	105°52'37"	101.64	72.82	87.78	N13°13'46"E
4	911.00	06°58'16"	110.84	55.49	110.77	N62°40'57"E
5	899.00	44°53'22"	704.34	371.36	686.46	N26°54'42"E



Application No PCA-78-S-063-06 Staff WOD  
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 SE conditions dated 12/31/2009 2/23/09 WOD  
 Date of (BOS) (PC) approval 2/23/09  
 Sheet 17 of 31

**AEROSPACE CORPORATION**  
**WESTFIELDS PARCEL 35**  
 SULLY DISTRICT  
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Application No PCA-78-S-063-06 Staff WOD  
 Concurrent w/ SE-2008-SU-026  
**APPROVED DEVELOPMENT PLAN**  
 (DP) (GDP) (CDP) (FDP) (SE PLAT)  
 See Proffers dated 3/9/09  
 SE conditions dated 12/31/2009 2/23/09 WOD  
 Date of (BOS) (PC) approval 2/23/09  
 Sheet 18 of 31



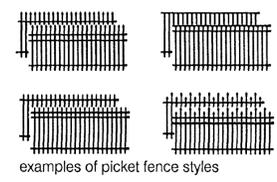
SUBMISSIONS/REVISIONS	
7-1-08	REVISED PER COUNTY COMMENTS
9-10-08	REVISED PER COUNTY COMMENTS
10-9-08	REVISED PER COUNTY COMMENTS
11-4-08	REVISED PER COUNTY COMMENTS
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

KEY MAP	
DATE:	MAY, 2008
PROJECT NUMBER:	W801
SCALE:	1" = 50'
DRAWING TITLE:	<b>LANDSCAPE PLAN</b>
SHEET NUMBER:	<b>10</b>

**LEGEND**

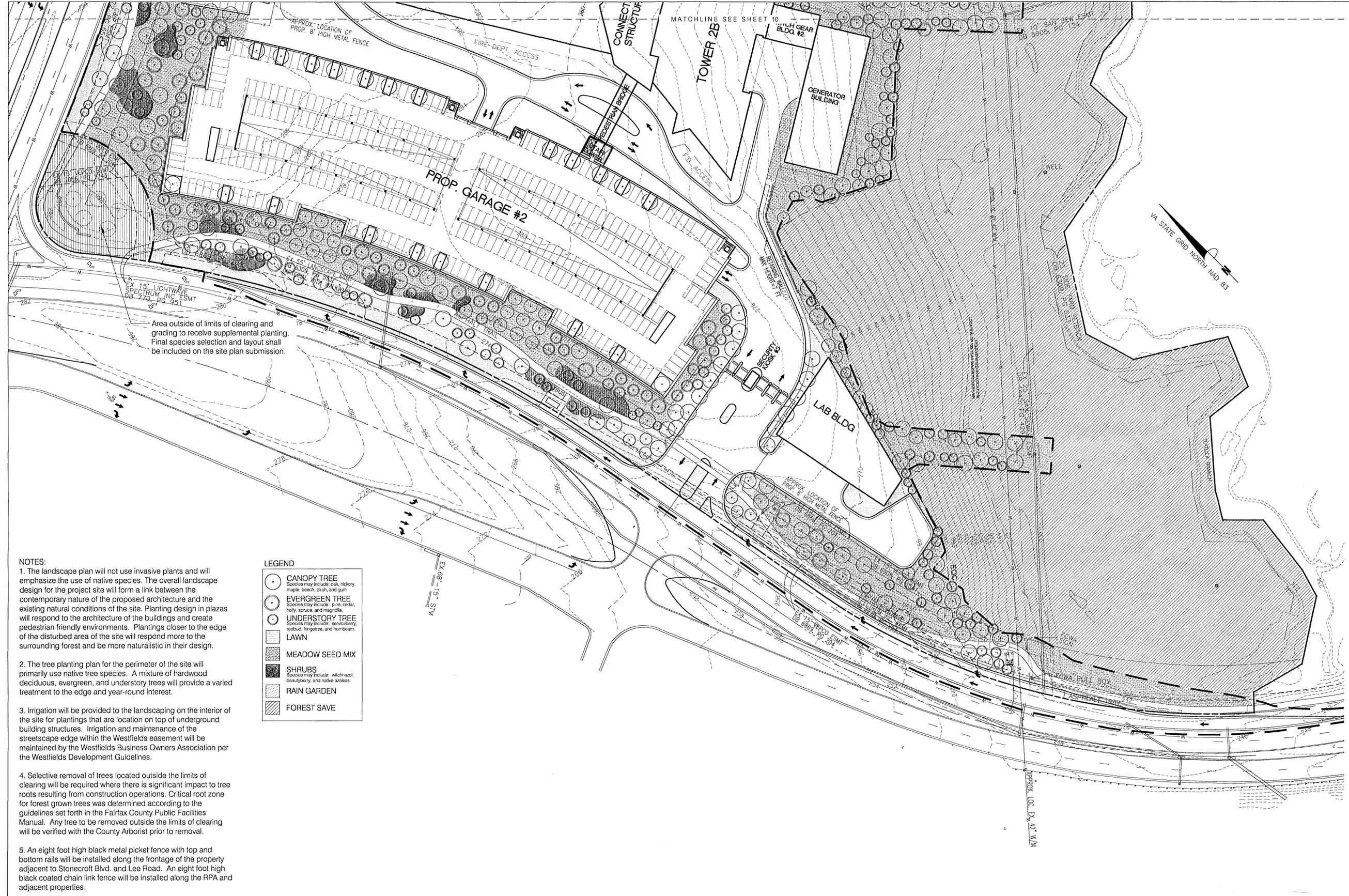
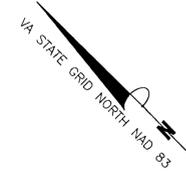
- CANOPY TREE**  
Species may include: oak, hickory, maple, beech, birch, and gum.
- EVERGREEN TREE**  
Species may include: pine, cedar, holly, spruce, and magnolia.
- UNDERSTORY TREE**  
Species may include: serviceberry, redbud, fringetree, and hornbeam.
- LAWN**
- MEADOW SEED MIX**
- SHRUBS**  
Species may include: witchhazel, beautyberry, and native azaleas.
- RAIN GARDEN**
- FOREST SAVE**

- NOTES:**
- The landscape plan will not use invasive plants and will emphasize the use of native species. The overall landscape design for the project site will form a link between the contemporary nature of the proposed architecture and the existing natural conditions of the site. Planting design in plazas will respond to the architecture of the buildings and create pedestrian friendly environments. Plantings closer to the edge of the disturbed area of the site will respond more to the surrounding forest and be more naturalistic in their design.
  - The tree planting plan for the perimeter of the site will primarily use native tree species. A mixture of hardwood deciduous, evergreen, and understory trees will provide a varied treatment to the edge and year-round interest.
  - Irrigation will be provided to the landscaping on the interior of the site for plantings that are located on top of underground building structures. Irrigation and maintenance of the streetscape edge within the Westfields easement will be maintained by the Westfields Business Owners Association per the Westfields Development Guidelines.
  - Selective removal of trees located outside the limits of clearing will be required where there is significant impact to tree roots resulting from construction operations. Critical root zone for forest grown trees was determined according to the guidelines set forth in the Fairfax County Public Facilities Manual. Any tree to be removed outside the limits of clearing will be verified with the County Arborist prior to removal.
  - An eight foot high black metal picket fence with top and bottom rails will be installed along the frontage of the property adjacent to Stonecroft Blvd. and Lee Road. An eight foot high black coated chain link fence will be installed along the RPA and adjacent properties.



MATCHLINE SEE SHEET 10A

AEROSPACE CORPORATION  
WESTFIELDS PARCEL 35  
SULLY DISTRICT  
FAIRFAX COUNTY, VIRGINIA



NOTES:

1. The landscape plan will not use invasive plants and will emphasize the use of native species. The overall landscape design for the project site will form a link between the contemporary nature of the proposed architecture and the existing natural conditions of the site. Planting design in plazas will respond to the architecture of the buildings and create pedestrian friendly environments. Plantings closer to the edge of the disturbed area of the site will respond more to the surrounding forest and be more naturalistic in their design.

2. The tree planting plan for the perimeter of the site will primarily use native tree species. A mixture of hardwood deciduous, evergreen, and understory trees will provide a varied treatment to the edge and year-round interest.

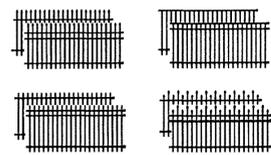
3. Irrigation will be provided to the landscaping on the interior of the site for plantings that are location on top of underground building structures. Irrigation and maintenance of the streetscape edge within the Westfields easement will be maintained by the Westfields Business Owners Association per the Westfields Development Guidelines.

4. Selective removal of trees located outside the limits of clearing will be required where there is significant impact to tree roots resulting from construction operations. Critical root zone for forest grown trees was determined according to the guidelines set forth in the Fairfax County Public Facilities Manual. Any tree to be removed outside the limits of clearing will be verified with the County Arborist prior to removal.

5. An eight foot high black metal picket fence with top and bottom rails will be installed along the frontage of the property adjacent to Stonecroft Blvd. and Lee Road. An eight foot high black coated chain link fence will be installed along the RPA and adjacent properties.

LEGEND

- CANOPY TREE  
Species may include: oak, hickory, maple, beech, birch, and gum.
- EVERGREEN TREE  
Species may include: pine, cedar, holly, spruce, and magnolia.
- UNDERSTORY TREE  
Species may include: serviceberry, redbud, fringetree, and hornbeam.
- LAWN
- MEADOW SEED MIX
- SHRUBS  
Species may include: witchhazel, beautyberry, and native azaleas.
- RAIN GARDEN
- FOREST SAVE



examples of picket fence styles



SUBMISSIONS/ REVISIONS	
7-1-08	REVISED PER COUNTY COMMENTS
9-10-08	REVISED PER COUNTY COMMENTS
10-9-08	REVISED PER COUNTY COMMENTS
11-4-08	REVISED PER COUNTY COMMENTS
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

KEY MAP	
DATE:	MAY, 2008
PROJECT NUMBER:	W801

1" = 50'

Application No PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
APPROVED DEVELOPMENT PLAN  
(DP) (GDP) (CDP) (FDP) (SE PLA)  
See Proffer's dated 3/9/09  
SE conditions dated 12/31/2009 2/23/09 200  
Date of (BOS) (PC) approval 1/2/09  
Sheet 19 of 31

LANDSCAPE PLAN

10A

NOTE: PLAZA DRAWING IS FOR CONCEPT DESIGN ONLY AND IS SUBJECT TO CHANGE.



O C U L U S

2410 17th STREET NW SUITE 201 WASHINGTON DC 20009  
 P 202 588 5454 F 202 588 5449 E OCLUS@OCULUS-DC.COM

AEROSPACE  
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 FAIRFAX COUNTY, VIRGINIA



SUBMISSIONS/REVISIONS	
11-4-08	REVISED PER COUNTY COMMENTS
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

KEY MAP  
 DATE: MAY, 2008  
 PROJECT NUMBER: W801  
 SCALE: 1" = 16'  
 DRAWING TITLE: BUILDING 1 PLAZA ENLARGEMENT

Application No PCA-78-S-063-06 Staff WOD  
 Concurrent w/ SE-2008-SU-026  
 APPROVED DEVELOPMENT PLAN  
 (DP) (GDP) (CDP) (FDP) (SE PLA)  
 See Proffers dated 3/9/09  
 SE conditions dated 12/31/2009 2/23/09 LRD  
 Date of (BOS) (PC) approval 7/23/09  
 Sheet 20 of 31

10B

SHEET NUMBER

**AEROSPACE CORPORATION  
WESTFIELDS PARCEL 35**  
SULLY DISTRICT  
FAIRFAX COUNTY, VIRGINIA

Application No PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
**APPROVED DEVELOPMENT PLAN**  
(DP)(GDP)(CDP)(FDP)(SE PLAN)  
See Proffers dated 3/9/09  
SE conditions dated 12/31/2009 2/23/2010  
Date of (BOS) (PC) approval 2/23/09  
Sheet 11 of 31



SUBMISSIONS/ REVISIONS	
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

KEY MAP	
DATE	MAY, 2008
PROJECT NUMBER	W801
SCALE	1" = 50'

**TREE PRESERVATION PLAN**

DRAWING TITLE:  
**10C**  
SHEET NUMBER:

Tree Number	Diameter (in.)	Action	Notes
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101	12	remove	will sustain significant root damage
102	14	remove	will sustain significant root damage
103	14	remove	will sustain significant root damage
105	18	remove	will sustain significant root damage
106	16	remove	will sustain significant root damage
107	16	save	
109	28 twin	remove	will sustain significant root damage
112	10	save	
114	12	save	
115	12	remove	will sustain significant root damage
120	18	remove	dead
121	16	remove	will sustain significant root damage
123	12	remove	will sustain significant root damage
125	174	remove	will sustain significant root damage
127	10	save	
133	22	remove	will sustain significant root damage
145	12	remove	will sustain significant root damage
148	14	remove	will sustain significant root damage
150	10	save	
152	18	remove	will sustain significant root damage
153	18	remove	will sustain significant root damage
155	10	remove	dead
156	18	remove	will sustain significant root damage
157	12	remove	will sustain significant root damage
158	12	remove	will sustain significant root damage
159	10	remove	will sustain significant root damage
163	10	save	
169	10	save	
171	10	save	
176	16	remove	will sustain significant root damage
179	10	remove	will sustain significant root damage
188	22	save	
189	12	save	
190	14	remove	will sustain significant root damage
198	18	remove	will sustain significant root damage
202	18	remove	dead
204	10	save	
208	12	remove	will sustain significant root damage
209	10	remove	will sustain significant root damage
210	24 twin	remove	will sustain significant root damage
218	14	remove	will sustain significant root damage
222	12	remove	will sustain significant root damage
223	12	remove	will sustain significant root damage
224	12	remove	will sustain significant root damage
227	14	save	
229	14	remove	will sustain significant root damage
230	14	remove	will sustain significant root damage
232	12	remove	will sustain significant root damage
235	18	remove	will sustain significant root damage
238	10	save	
240	10	save	
241	16	remove	will sustain significant root damage
255	14	remove	will sustain significant root damage
257	12	remove	will sustain significant root damage
261	12	remove	will sustain significant root damage
268	16	remove	will sustain significant root damage
272	16	remove	will sustain significant root damage
273	10	remove	will sustain significant root damage
276	22	save	
280	14	save	
281	14	remove	will sustain significant root damage

**LEGEND**

TREE OUTSIDE THE LIMITS OF CLEARING TO BE REMOVED



MATCHLINE SEE SHEET 10D

AEROSPACE CORPORATION  
WESTFIELDS PARCEL 35  
SULLY DISTRICT  
FAIRFAX COUNTY, VIRGINIA



SUBMISSIONS/REVISIONS	
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

KEY MAP

DATE: MAY, 2008

PROJECT NUMBER: W801

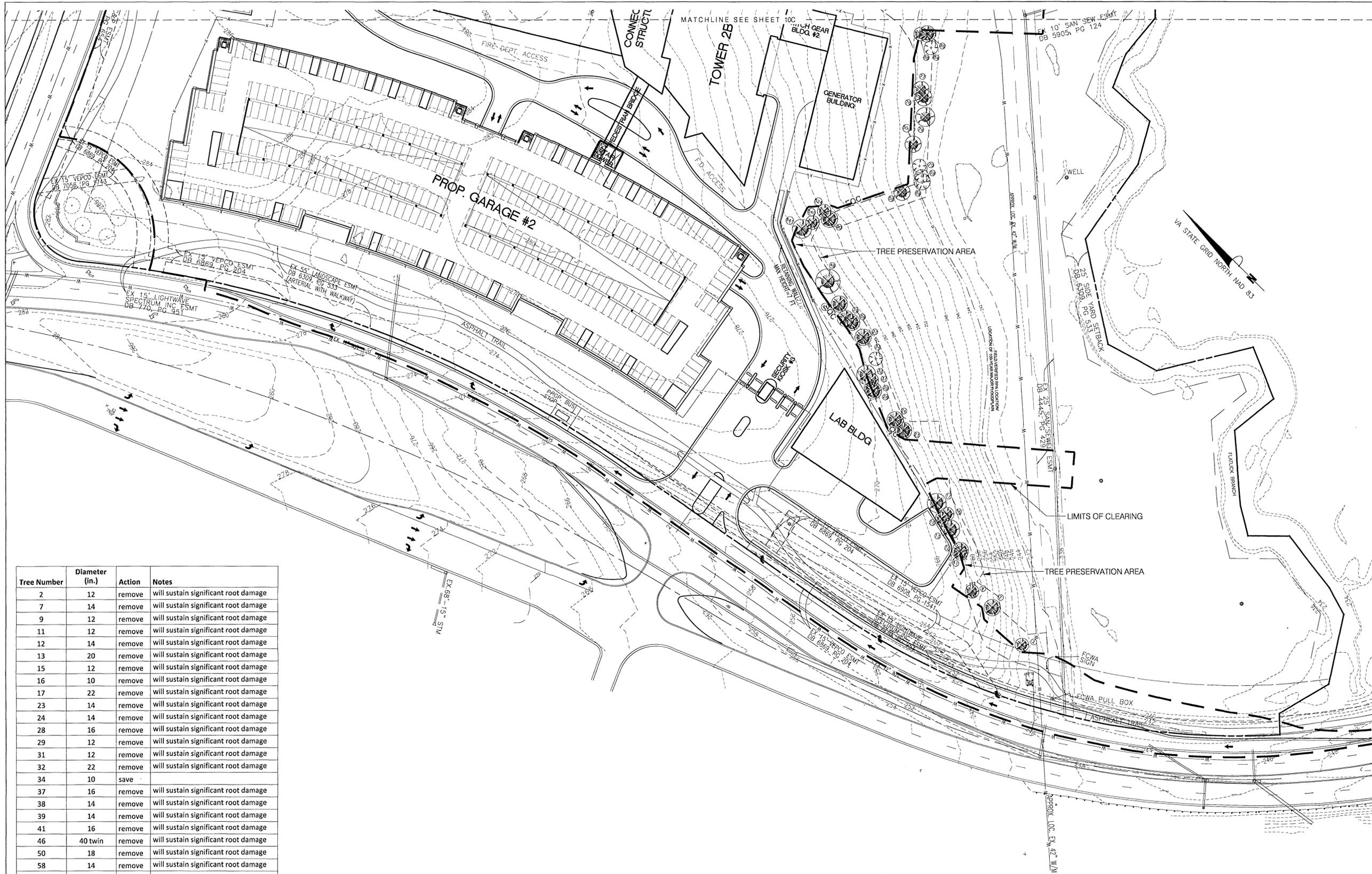
SCALE: 1" = 50'

TREE PRESERVATION PLAN

DRAWING TITLE:

10D

SHEET NUMBER



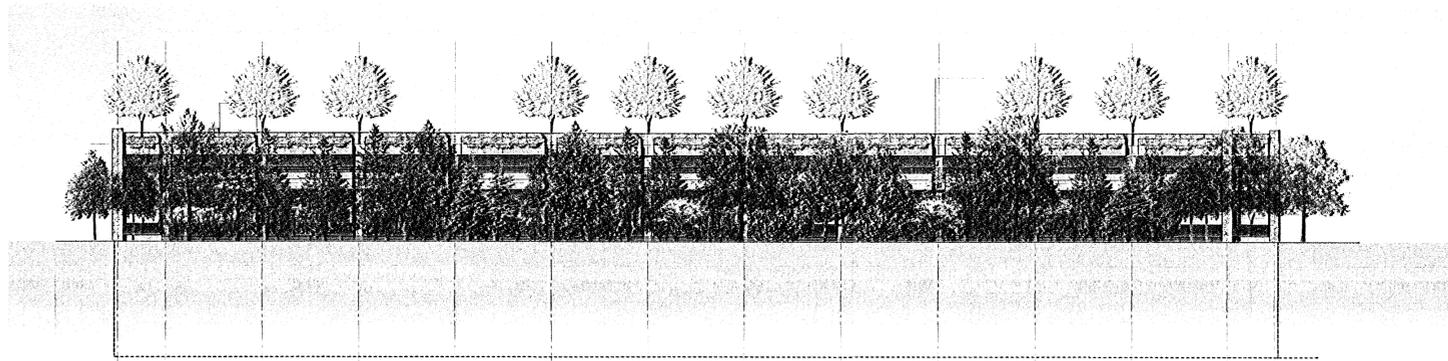
Tree Number	Diameter (in.)	Action	Notes
2	12	remove	will sustain significant root damage
7	14	remove	will sustain significant root damage
9	12	remove	will sustain significant root damage
11	12	remove	will sustain significant root damage
12	14	remove	will sustain significant root damage
13	20	remove	will sustain significant root damage
15	12	remove	will sustain significant root damage
16	10	remove	will sustain significant root damage
17	22	remove	will sustain significant root damage
23	14	remove	will sustain significant root damage
24	14	remove	will sustain significant root damage
28	16	remove	will sustain significant root damage
29	12	remove	will sustain significant root damage
31	12	remove	will sustain significant root damage
32	22	remove	will sustain significant root damage
34	10	save	
37	16	remove	will sustain significant root damage
38	14	remove	will sustain significant root damage
39	14	remove	will sustain significant root damage
41	16	remove	will sustain significant root damage
46	40 twin	remove	will sustain significant root damage
50	18	remove	will sustain significant root damage
58	14	remove	will sustain significant root damage
64	14	save	
69	12	save	
70	10	save	
74	20	remove	will sustain significant root damage
76	14	remove	will sustain significant root damage
77	14	remove	will sustain significant root damage
500	18	remove	will sustain significant root damage
524	10	remove	will sustain significant root damage
540	12	remove	will sustain significant root damage
541	24	remove	will sustain significant root damage
84	12	save	
86	14	remove	will sustain significant root damage
88	10	remove	will sustain significant root damage

LEGEND

TREE OUTSIDE THE LIMITS OF CLEARING TO BE REMOVED

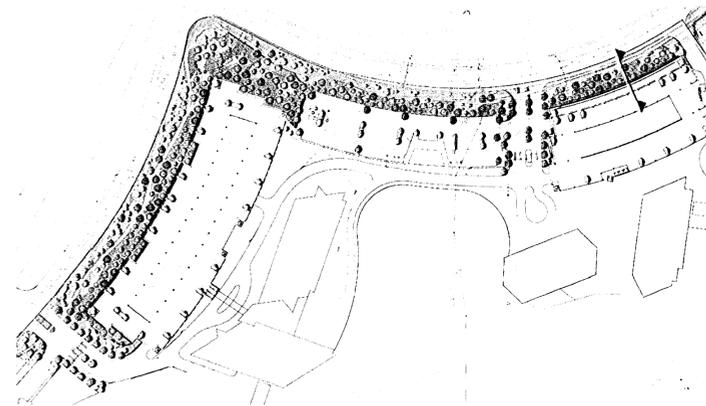
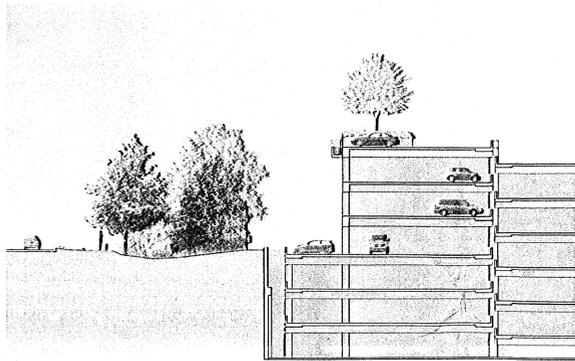
Application No PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
APPROVED DEVELOPMENT PLAN  
(DP) (GDP) (CDP) (FDP) (SE PLAN)  
See Proffers dated 3/9/09  
SE conditions dated 12/31/2009 7/23/09  
Date of (BOS) (PC) approval 2/23/09  
Sheet 22 of 31

AEROSPACE  
 CORPORATION  
 WESTFIELDS PARCEL 35  
 SULLY DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



1 GARAGE 1 ELEVATION - (note garage facade is diagrammatic and subject to change)

1"=25'



2 GARAGE 1 SECTION

1"=25'

3 SECTION KEY PLAN

NTS

SUBMISSIONS/ REVISIONS	
7-1-08	REVISED PER COUNTY COMMENTS
9-10-08	REVISED PER COUNTY COMMENTS
10-9-08	REVISED PER COUNTY COMMENTS
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

KEY MAP

DATE: MAY, 2008

PROJECT NUMBER: W801

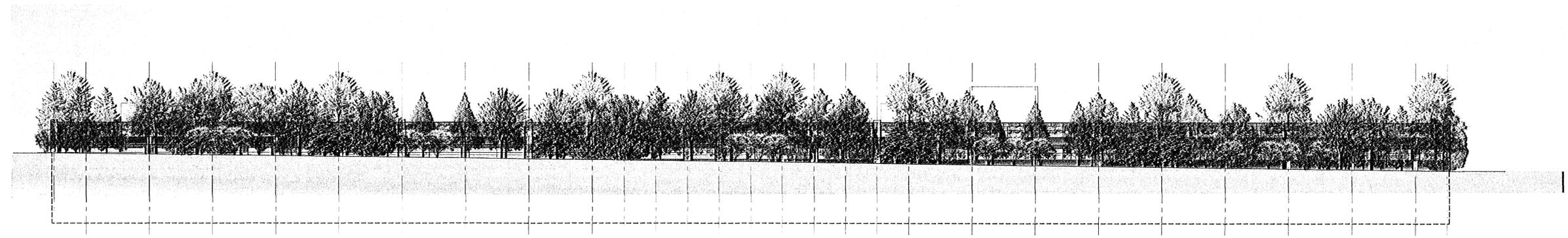
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DRAWING TITLE: GARAGE 1 ELEVATION & SECTION

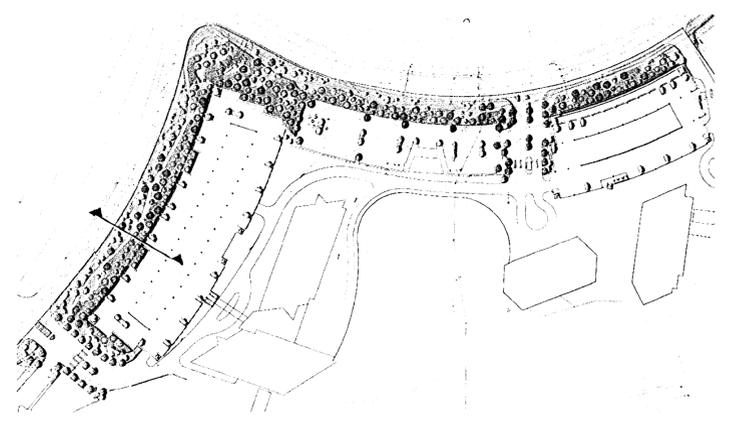
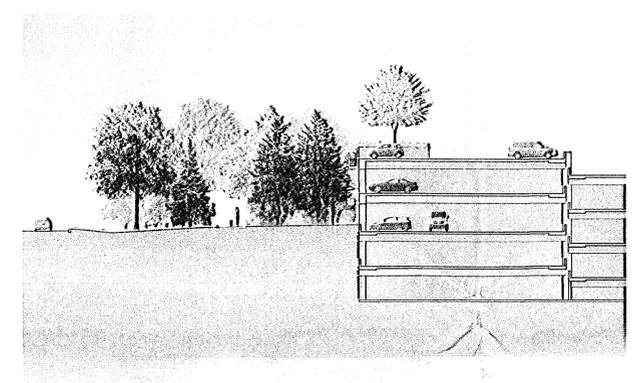
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Application No PCA-78-S-063-06 Staff WOD  
 Concurrent w/ SE-2008-SU-026  
 APPROVED DEVELOPMENT PLAN  
 (DP) (GDP) (CDP) (FDP) (SE PLA)  
 See Proffers dated 3/9/09  
 SE conditions dated 12/3/2009 2/27/09 WOD  
 Date of (BOS) (PC) approval 2/23/09  
 Sheet 23 of 31

AEROSPACE CORPORATION  
 WESTFIELDS PARCEL 35  
 SULLY DISTRICT  
 FAIRFAX COUNTY, VIRGINIA



1 GARAGE 2 ELEVATION - (note garage facade is diagrammatic and subject to change) 1"=25'



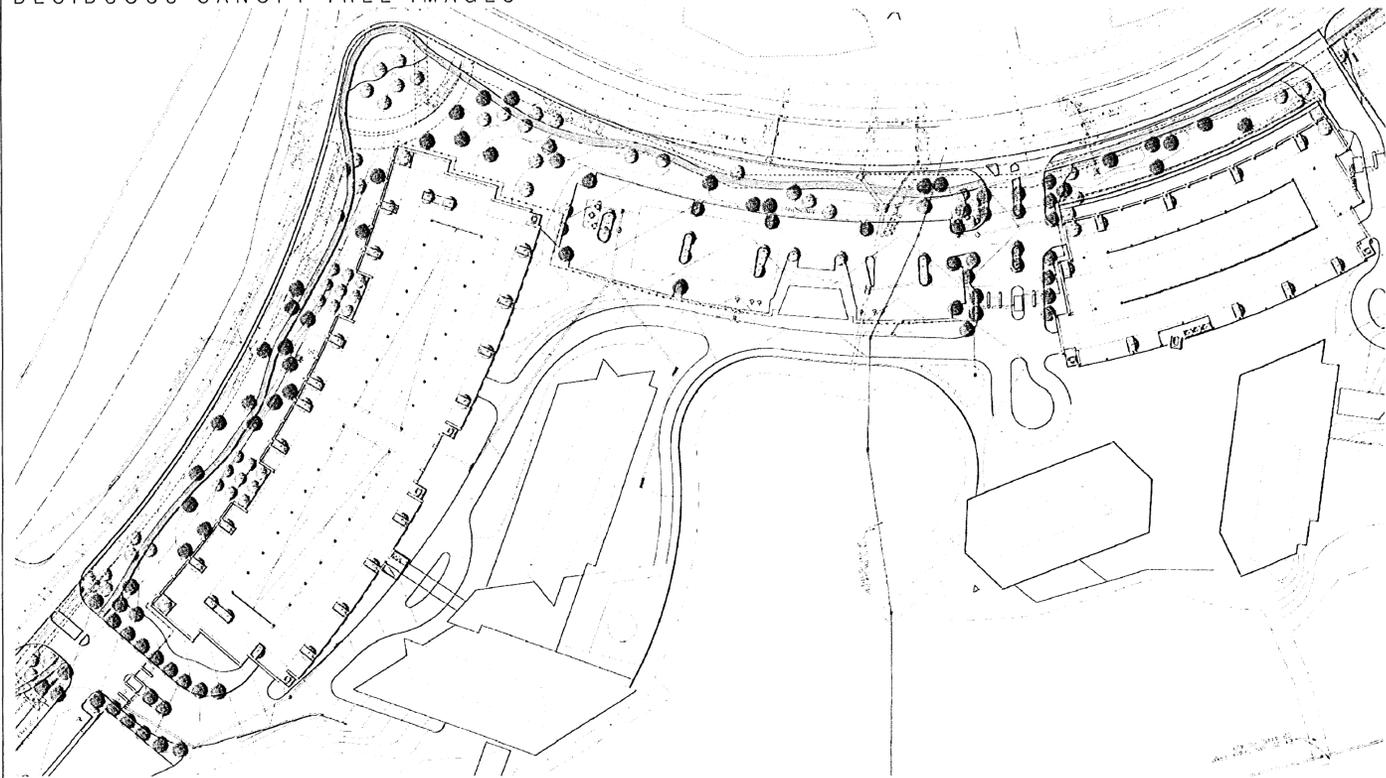
2 GARAGE 2 SECTION 1"=25' 3 SECTION KEY PLAN NTS

SUBMISSIONS/ REVISIONS	
7-1-08	REVISED PER COUNTY COMMENTS
9-10-08	REVISED PER COUNTY COMMENTS
10-9-08	REVISED PER COUNTY COMMENTS
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

KEY MAP	
DATE:	MAY, 2008
PROJECT NUMBER:	W801
SCALE:	1" = 25'

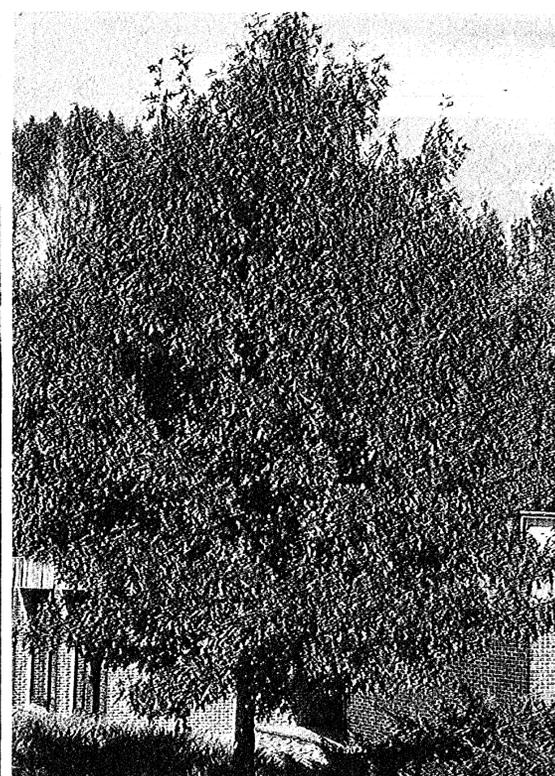
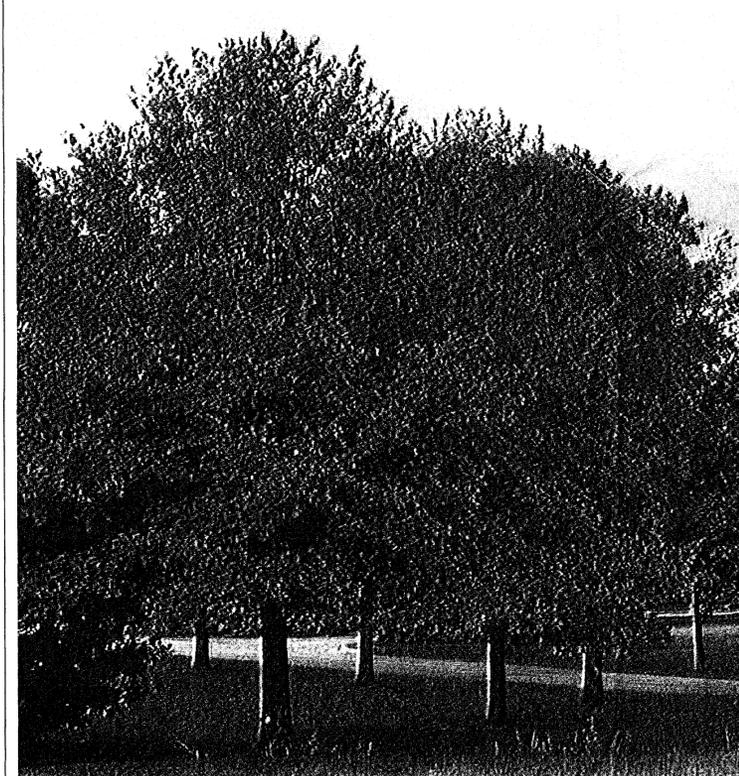
Application No PCA-78-S-063-06 Staff WOD  
 Concurrent w/ SE-2008-SU-026  
**APPROVED DEVELOPMENT PLAN**  
 (DP) (GDP) (CDP) (FDP) (SE PLAN)  
 See Proffers dated 3/9/09  
 SE conditions dated 12/31/2009 2/23/09 w/o  
 Date of (BOS) (PC) approval 2/23/09  
 Sheet 24 of 31

GARAGE 2 ELEVATION & SECTION  
 DRAWING TITLE:  
 SHEET NUMBER:  
**11A**



2410 17th STREET NW SUITE 201 WASHINGTON DC 20009  
P 202 588 5454 F 202 588 5449 E OCULUS@OCULUS-DC.COM

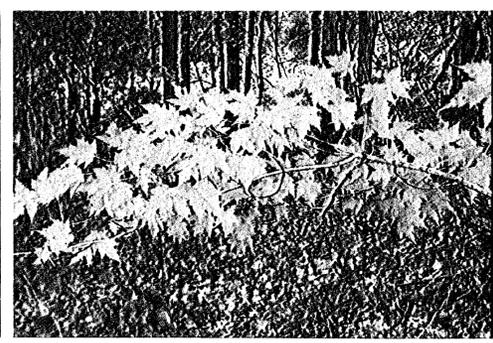
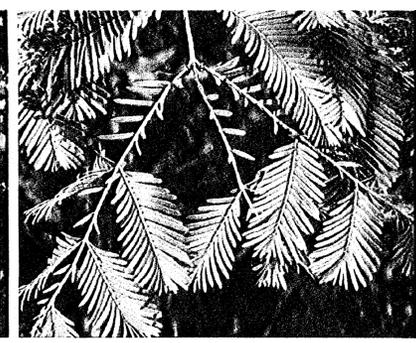
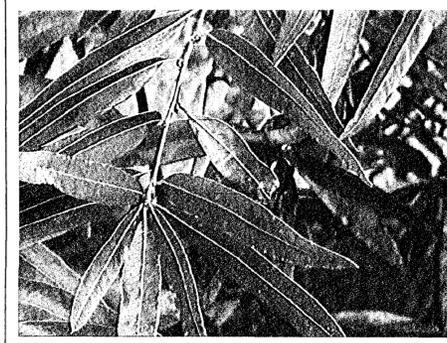
AEROSPACE CORPORATION  
WESTFIELDS PARCEL 35  
SULLY DISTRICT  
FAIRFAX COUNTY, VIRGINIA



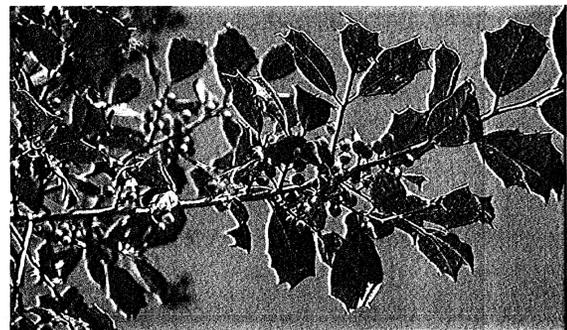
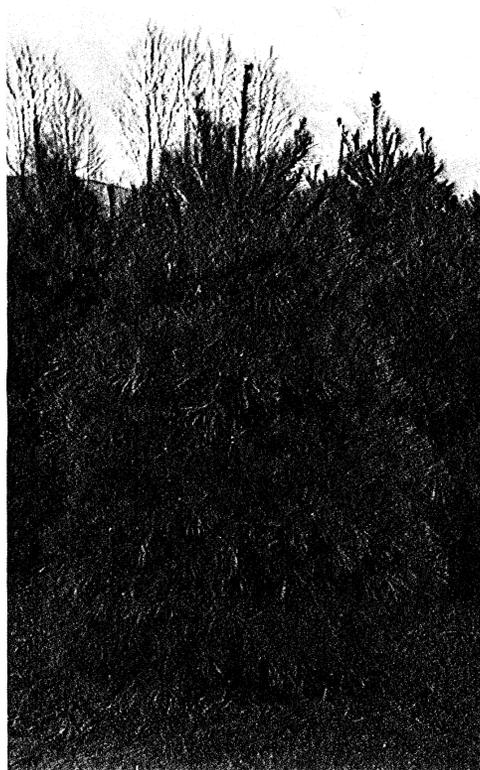
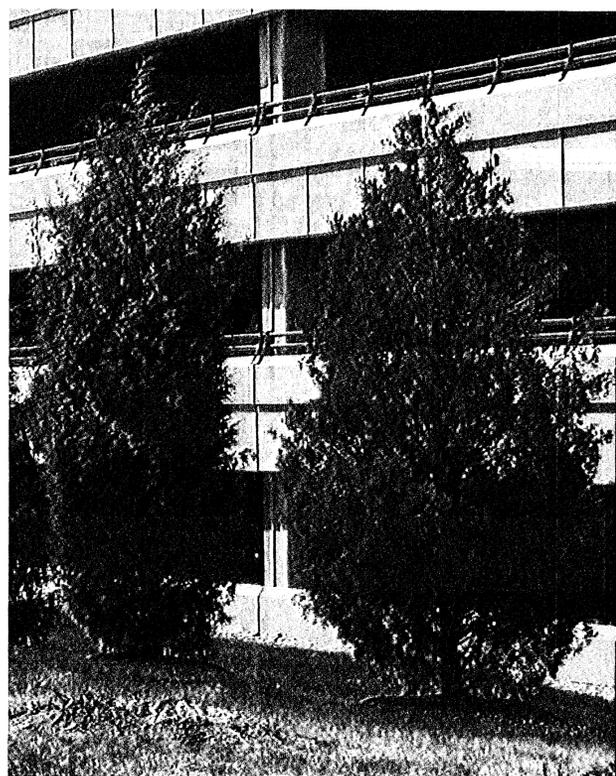
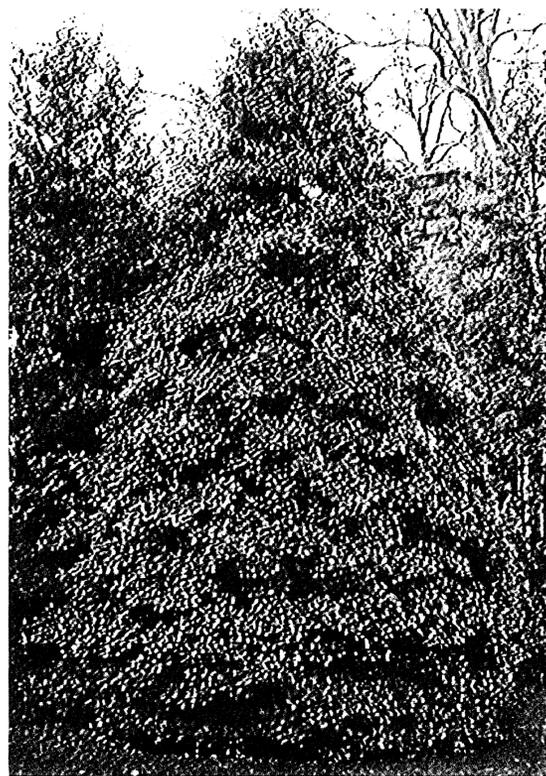
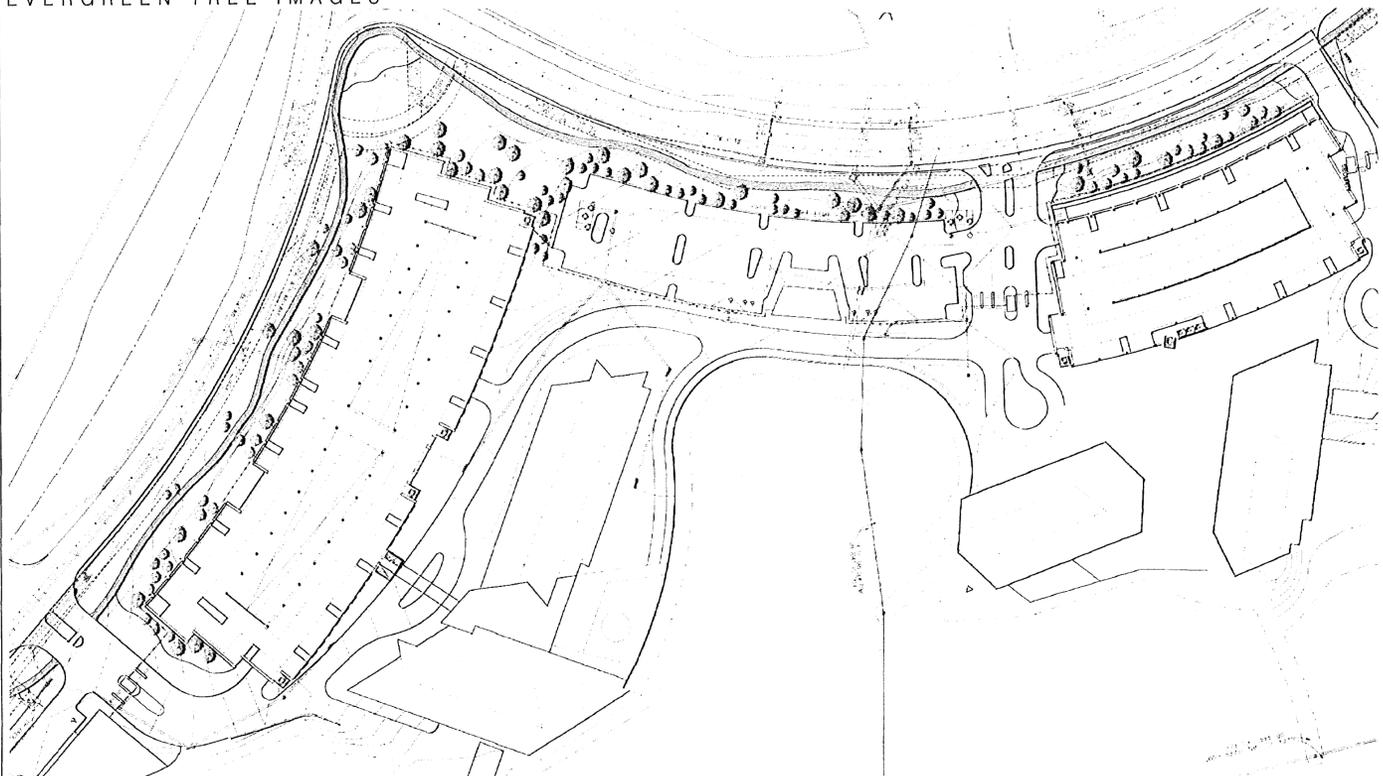
Application No PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
APPROVED DEVELOPMENT PLAN  
(DP) (GDP) (CDP) (FDP) (SE PLAN)  
See Proffers dated 3/9/09  
SE conditions dated 12/31/2009 2/23/09 WOD  
Date of (BOS) (PC) approval 2/13/09  
Sheet 27 of 31



SUBMISSIONS/ REVISIONS	
7-1-08	REVISED PER COUNTY COMMENTS
9-10-08	REVISED PER COUNTY COMMENTS
10-9-08	REVISED PER COUNTY COMMENTS
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS



KEY MAP:  
DATE: MAY, 2008  
PROJECT NUMBER: W801  
SCALE:  
PLANT IMAGE BOARD -  
DECIDUOUS CANOPY TREES  
ALONG STREETSCAPE SIDE



OCULUS

2410 17th STREET NW SUITE 201 WASHINGTON DC 20009  
P 202 588 5454 F 202 588 5449 E OCULUS@OCULUS-DC.COM

AEROSPACE CORPORATION  
WESTFIELDS PARCEL 35  
SULLY DISTRICT  
FAIRFAX COUNTY, VIRGINIA

Application No. PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
APPROVED DEVELOPMENT PLAN  
(DP) (GDP) (CDP) (FDP) (SE PLA)  
See Proffers dated 3/9/09  
SE conditions dated 12/31/2009 2/23/09 bel  
Date of (BOS) (PC) approval 2/23/09  
Sheet 26 of 31

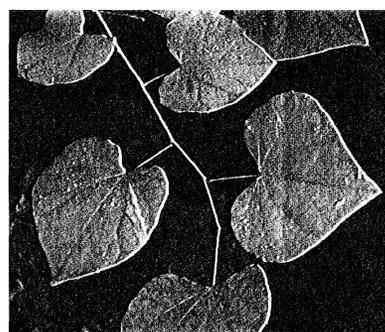
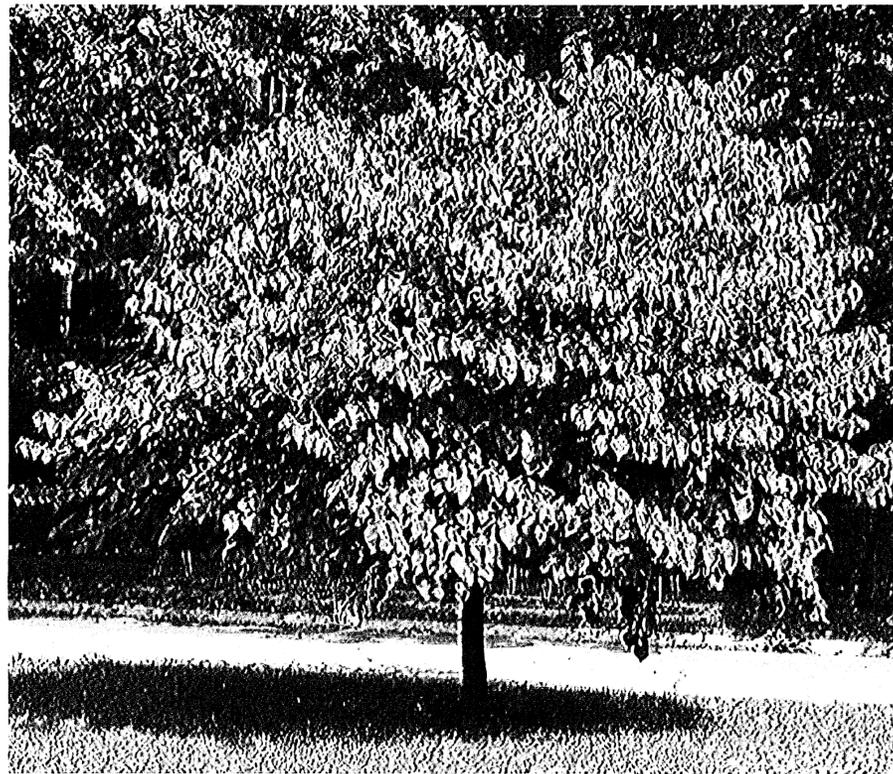
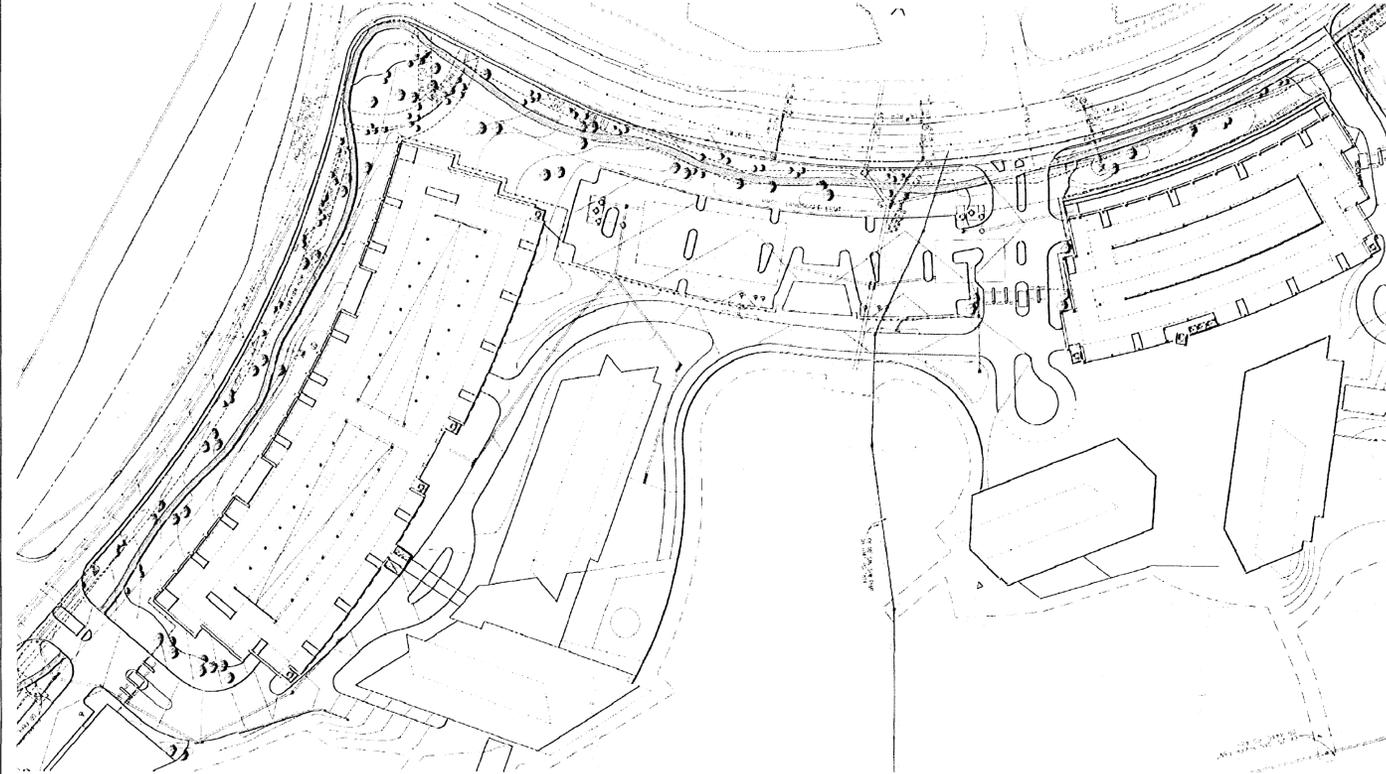


SUBMISSIONS/REVISIONS	
7-1-08	REVISED PER COUNTY COMMENTS
9-10-08	REVISED PER COUNTY COMMENTS
10-9-08	REVISED PER COUNTY COMMENTS
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

KEY MAP  
DATE: MAY, 2008  
PROJECT NUMBER: W801  
SCALE:  
PLANT IMAGE BOARD -  
EVERGREEN TREES  
ALONG STREETSCAPE SIDE

12A

SHEET NUMBER



AEROSPACE CORPORATION  
WESTFIELDS PARCEL 35  
SULLY DISTRICT  
FAIRFAX COUNTY, VIRGINIA



SUBMISSIONS/ REVISIONS	
7-1-08	REVISED PER COUNTY COMMENTS
9-10-08	REVISED PER COUNTY COMMENTS
10-9-08	REVISED PER COUNTY COMMENTS
12-1-08	REVISED PER COUNTY COMMENTS
12-17-08	REVISED PER COUNTY COMMENTS

Application No. PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
APPROVED DEVELOPMENT PLAN  
(DP) (GDP) (CDP) (FDP) (SE PLAN)  
See Proffers dated 3/9/09  
SE conditions dated 12/31/2009 7/23/09  
Date of (BOS) (PC) approval 2/23/09  
Sheet 27 of 31

KEY MAP	
DATE:	MAY, 2008
PROJECT NUMBER:	W801
SCALE:	
DRAWING TITLE:	PLANT IMAGE BOARD - UNDERSTORY TREES ALONG STREETSCAPE SIDE

FLOOR AREA TABULATIONS FOR LAND AREAS WITHIN ZONING PARCELS A AND A-2 JUNE 30, 2008

THE LAND AREAS THAT ARE WITHIN THE TWO ZONING PARCELS THAT WERE DESIGNATED AS ZONING PARCELS A AND A-2 WITH THE REZONING OF THE WESTFIELDS SITE (CASE NUMBER RZ 78-S-063) ARE SUBJECT TO A ZONING PROFFER THAT LIMITS THE TOTAL ALLOWABLE BUILDING FLOOR AREA THAT MAY BE DEVELOPED ON THESE PARCELS. THE FOLLOWING TABULATIONS ARE PROVIDED IN COMPLIANCE WITH PROFFER #2 TO PROVIDE AN ACCOUNTING OF THE BUILDING FLOOR AREA ALLOCATIONS APPLICABLE TO ZONING PARCELS A AND A-2. IT SHOULD BE NOTED THAT THE PERMITTED DEVELOPMENT ON A NUMBER OF THESE PARCELS HAS BEEN ESTABLISHED THROUGH RECORDED DEEDS AND AGREEMENTS THAT LIMIT OR ALLOCATE DEVELOPMENT RIGHTS.

1. CALCULATION OF GROSS ALLOWABLE FLOOR AREA, ZONING PARCELS A AND A-2:

ZONING PARCEL	AREA	F A R CREDIT PER PROFFER	POTENTIAL FLOOR AREA
A	274.12591 AC. (11,9490,924 SQ. FT.)	0.50	5,970,462 SQ. FT.
A-2	59.66678 AC. ( 2, 599,084 SQ. FT.)	0.00	0 SQ. FT.
TOTALS	333.79269 AC. (14,540,008 SQ. FT.)	0.41 (AVERAGE)	5,970,462 SQ. FT.

2. FLOOR AREA CHARGED AGAINST THE TOTAL POTENTIAL FLOOR AREA FOR LAND AREAS WITHIN ZONING PARCELS A AND A-2 THAT HAVE BEEN PREVIOUSLY DEVELOPED OR ARE SUBJECT TO POTENTIAL FUTURE DEVELOPMENT (EXCLUDING PARCEL 35A):

PARCEL	AREA OF PARCEL WITHIN ZONING PARCEL A OR A-2 (ACRES / SQ. FT.)	FLOOR AREA CHARGED AGAINST TOTAL (GROSS SQ. FT.)
3A	32.72 / 1,425,347	709,282 (1)
7	12.62 / 545,371	223,602 (2)
9A-1	34.89 / 1,519,694	659,368 (1)
9A-2	17.02 / 741,315	321,653 (1)
9B-1	41.08 / 1,789,595	252,855 (3)
9B-2	7.57 / 329,750	135,360 (2)
11	2.08 / 90,683	400 (1)
15A	0.14 / 5,823	2,387 (2)
15B-1	4.23 / 184,250	83,940 (2)
25A	3.58 / 155,953	34,217 (1)
27C	2.01 / 87,520	33,933 (2)
29D	1.90 / 82,764	700 (1)
29E-1	0.08 / 3,600	1,476 (2)
31A-1	8.71 / 379,250	149,472 (1)
31A-2	9.88 / 430,598	150,077 (1)
31A-3	6.35 / 276,469	85,451 (1)
31-B1	18.74 / 816,489	300,000 (1)
31B-2	6.18 / 269,110	85,000 (1)
35B	9.00 / 392,050	160,737 (1)
39	31.56 / 1,374,754	563,643 (1)
41	7.41 / 322,900	0 (1)
TOTALS	259.03 / 11,282,708	4,106,356

- NOTES:  
 (1) FLOOR AREA CHARGED BASED ON A FLOOR AREA ALLOCATION ASSIGNED TO THE DEVELOPMENT PARCEL BY A RECORDED DEED/AGREEMENT  
 (2) FLOOR AREA CHARGED BASED ON THE POTENTIAL DEVELOPMENT OF THE DEVELOPMENT PARCEL TO A FLOOR AREA RATIO OF 0.41 CALCULATED ON THE AREA OF THE PARCEL WITHIN ZONING PARCELS A AND A-2  
 (3) FLOOR AREA CHARGED BASED ON THE POTENTIAL DEVELOPMENT OF REMAINDER PARCEL 9B-1A (14.81 AC.) TO A MAXIMUM F.A. R. OF 0.50.

3. REMAINING FLOOR AREA TO BE ALLOCATED:

- A. GROSS BUILDING FLOOR AREA ALLOCATED TO ZONING PARCELS A AND A-2: 5,970,462 GROSS SQ. FT.  
 B. LESS, GROSS BUILDING FLOOR AREAS PREVIOUSLY ALLOCATED AS SHOWN ABOVE: 4,106,356 GROSS SQ. FT.  
 C. FLOOR AREA REMAINING TO BE ALLOCATED: 1,864,106 GROSS SQ. FT.  
 4. FLOOR AREA ALLOCATION FOR PARCEL 35A:  
 A. FLOOR AREA REMAINING TO BE ALLOCATED: 1,864,106 GROSS SQ. FT.  
 B. LESS, GROSS BUILDING FLOOR AREA PROPOSED ON PARCEL 35A: 975,350 GROSS SQ. FT.  
 C. REMAINING FLOOR AREA: 888,756 GROSS SQ. FT.

SPECIAL EXCEPTION AEROSPACE CORPORATION WESTFIELDS, PARCEL 35

MINIMUM STORMWATER INFORMATION FOR REZONING, SPECIAL EXCEPTION, SPECIAL PERMIT AND DEVELOPMENT PLAN APPLICATIONS

The following information is required to be shown or provided in all zoning applications, or a waiver request of the submission requirement with justification shall be attached. Note: Waivers will be acted upon separately. Failure to adequately address the required submission information may result in a delay in processing this application.

This information is required under the following Zoning Ordinance paragraphs:  
 Special Permits (8-011 2J & 2L) Special Exceptions (8-011 2J & 2L)  
 Cluster Subdivision (9-615 1G & 1N) Commercial Revitalization Districts (9-622 2A (12) & (14))  
 Development Plans PRC District (18-302 3 & 4L) PRC Plan (18-303 1E & 1O)  
 FDP P Districts (except PRC) (18-502 1F & 1Q) Amendments (18-202 10F & 10I)

1. Plat is at a minimum scale of 1"=50' (unless it is depicted on one sheet with a minimum scale of 1"=100').
2. A graphic depicting the stormwater management facility(ies) and limits of clearing and grading accommodate the stormwater management facility(ies), storm drainage pipe systems and outlet protection, pond spillways, access roads, site outfalls, energy dissipation devices, and stream stabilization measures as shown on Sheet 3&4.
3. Provide:  
 Facility Name/ Type & No. On-site area served (acres) Off-site area (acres) Drainage area (acres) Footprint area (sq ft) Storage Volume (cf) If pond, dam height (ft)  
 STORM FILTER #1 4.0 AC N/A 4.0 AC ±200 SF N/A N/A  
 STORM FILTER #2 4.0 AC N/A 4.0 AC ±200 SF N/A N/A  
 SWM DETENTION SIB #1 5.49 AC N/A 5.49 AC ±2,432 SF ±12,265 CF N/A  
 SWM DETENTION SIB #2 7.8 AC N/A 7.8 AC ±3,640 SF ±18,302 CF N/A  
 SWM DETENTION SIB #3 2.29 AC N/A 2.29 AC ±1,472 SF ±7,741 CF N/A  
 RAIN GARDEN 1.78 AC N/A 1.78 AC ±15,686 SF N/A N/A  
 GREEN ROOF AREA 0.54 AC N/A 0.54 AC ±10,782 SF N/A N/A  
 PERVIOUS PAVT. AREA 0.47 AC N/A 0.47 AC ±4,802 SF N/A N/A  
 Totals 26.2 AC N/A 26.2 AC ±44,194 SF ±58,308 CF N/A
4. Onsite drainage channels, outfalls and pipe systems are shown on Sheet 3&4. Pond inlet and outlet pipe systems are shown on Sheet N/A.
5. Maintenance access (road) to stormwater management facility(ies) are shown on Sheet N/A. Type of maintenance access road surface noted on the plat is N/A (asphalt, geoblock, gravel, etc.).
6. Landscaping and tree preservation shown in and near the stormwater management facility is shown on Sheet N/A.
7. A 'stormwater management narrative' which contains a description of how detention and best management practices requirements will be met is provided on Sheet 12.
8. A description of the existing conditions of each numbered site outfall extended downstream from the site to a point which is at least 100 times the site area or which has a drainage area of at least one square mile (640 acres) is provided on Sheet 12.
9. A description of how the outfall requirements, including contributing drainage areas of the Public Facilities Manual will be satisfied is provided on Sheet 12.
10. Existing topography with maximum contour intervals of two (2) feet and a note as to whether it is an air survey or field run is provided on Sheets 8&9. NOTE ON SHEET 1
11. A submission waiver is requested for N/A
12. Stormwater management is not required because N/A

BMP FACILITY DESIGN CALCULATIONS:

Part 1: LIST OF SUBAREAS AND "C" FACTORS USED

SUBAREA DESIGNATION AND DESCR.	C	AREA ACRES
(1) QUALIFYING OPEN SPACE	0.30	12.55
(2) STORM FILTER #1	0.80	4.00
(3) STORM FILTER #2	0.80	4.00
(4) RAIN GARDEN	0.75	1.78
(5) GREEN ROOF AREA	0.45	0.54
(6) PERVIOUS PAVEMENT AREA #1	0.90	0.15
(7) PERVIOUS PAVEMENT AREA #2	0.90	0.14
(8) PERVIOUS PAVEMENT AREA #3	0.90	0.18
(9) ON-SITE UNCONTROLLED	0.55	17.07
		40.41 SITE AREA

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

(A) SITE AREA	40.41 AC			
(B) SUBAREA DESIGNATION	C	X	ACRES	= PRODUCT
(1) QUALIFYING OPEN SPACE	0.30	X	12.55	3.77
(2) STORM FILTER #1	0.80	X	4.00	3.20
(3) STORM FILTER #2	0.80	X	4.00	3.20
(4) RAIN GARDEN	0.75	X	1.78	1.34
(5) GREEN ROOF AREA	0.45	X	0.54	0.24
(6) PERVIOUS PAVEMENT AREA #1	0.90	X	0.15	0.14
(7) PERVIOUS PAVEMENT AREA #2	0.90	X	0.14	0.13
(8) PERVIOUS PAVEMENT AREA #3	0.90	X	0.18	0.16
(9) ON-SITE UNCONTROLLED	0.55	X	17.07	9.39
			TOTAL= 40.41	TOTAL= 21.55

WEIGHTED AVERAGE "C" FACTOR FOR THE SITE= 21.55 / 40.4 = 0.53

Part 3: COMPUTE THE TOTAL PHOSPHORUS REMOVAL FOR THE SITE

SUB-AREA	BMP TYPE	EFF.	OFF SITE	AREA RATIO	"C" FACTOR RATIO	PRO-DUCT
(1) QUALIFYING OPEN SPACE		100		12.55 / 40.4 = 0.31	1.00	31.08
(2) STORM FILTER #1		50		4.00 / 40.4 = 0.10	0.80 / 0.53 = 1.50	7.42
(3) STORM FILTER #2		50		4.00 / 40.4 = 0.10	0.80 / 0.53 = 1.50	7.42
(4) RAIN GARDEN		50		1.78 / 40.4 = 0.04	0.75 / 0.53 = 1.41	3.10
(5) GREEN ROOF AREA		50		0.54 / 40.4 = 0.01	0.45 / 0.53 = 0.84	0.45
(6) PERVIOUS PAVEMENT AREA #1		35		0.15 / 40.4 = 0.00	0.90 / 0.53 = 1.69	0.22
(7) PERVIOUS PAVEMENT AREA #2		35		0.14 / 40.4 = 0.00	0.90 / 0.53 = 1.69	0.20
(8) PERVIOUS PAVEMENT AREA #3		35		0.18 / 40.4 = 0.00	0.90 / 0.53 = 1.69	0.26
(9) ON-SITE UNCONTROLLED		0		17.07 / 40.4 = 0.42	0.55 / 0.53 = 1.03	0.00
				TOTAL SITE PHOSPHORUS REMOVAL =		50.14

Part 4: DETERMINE COMPLIANCE WITH PHOSPHORUS REMOVAL REQUIREMENT  
 REQUIREMENT: 50% FOR THE ENTIRE SITE  
 SITE PHOSPHORUS REMOVAL = 50.14 % > 50.00 %  
 NOTE: BMP CALCULATIONS ARE BASED ON THE NORTHERN VIRGINIA BMP HANDBOOK (OCOQUAN METHOD)

NOTES:

(1) IF AN INADEQUATE SECTION IS ENCOUNTERED DURING THE FINAL ENGINEERING DESIGN STAGE, A PROPORTIONAL IMPROVEMENT AND NO ADVERSE IMPACT TO THE DOWNSTREAM DRAINAGE SYSTEM WILL BE SHOWN BY USING ACCEPTABLE METHODS DESCRIBED IN SECTION 6-0203.4 OF THE PFM, WHICH INCLUDES THE CRITICAL SHEAR STRESS METHOD, CHANNEL CAPACITY METHOD, AND 1-YEAR DETENTION METHOD.

(2) THE STORM WATER MANAGEMENT/BMP FACILITIES SHOWN ON THIS PLAT ARE BASED ON PRELIMINARY EVALUATIONS AND DESIGNS. THE TYPE, LOCATION, SIZE AND ASSOCIATED COMPUTATIONS OF SWM/BMP FACILITIES UTILIZED ON THIS SITE MAY VARY WITH FINAL ENGINEERING DESIGN PROVIDED THAT ALL FACILITIES SHALL BE WITHIN THE LIMITS OF CLEARING PROPOSED ON THIS PLAT.

COMPUTATIONS FOR OUTFALL #1 AND #3 SHEET FLOW CONDITION

TIME OF CONCENTRATION	Tc= 5 MIN
RAINFALL INTENSITY	(2YR)= 5.45 IN/HR (10YR)= 7.27 IN/HR

OUTFALL #1  
 PRE-DEVELOPMENT RUNOFF  
 Q(2YR) = 6.18 CFS  
 Q(10YR) = 8.24 CFS  
 A= 3.78 AC, C= 0.30

POST-DEVELOPMENT RUNOFF  
 Q(2YR) = 5.86 CFS  
 Q(10YR) = 7.82 CFS  
 A= 2.50 AC, C= 0.43

OUTFALL #3  
 PRE-DEVELOPMENT RUNOFF  
 Q(2YR) = 3.30 CFS  
 Q(10YR) = 4.41 CFS  
 A= 2.02 AC, C= 0.30

POST-DEVELOPMENT RUNOFF  
 Q(2YR) = 1.94 CFS  
 Q(10YR) = 2.59 CFS  
 A= 0.66 AC, C= 0.54

STORM WATER MANAGEMENT (SWM), BEST MANAGEMENT PRACTICES (BMP)

THE PROPERTY ASSOCIATED WITH THIS SITE PLAN IS LOCATED IN THE WESTFIELDS INTERNATIONAL CORPORATE CENTER IN CHANTILLY AND IS DESIGNATED AS WESTFIELDS PARCEL 35. THE SITE IS BORDERED BY LEE ROAD ROUTE 8461 TO THE NORTH, STONECROFT BOULEVARD ROUTE 8460 TO THE WEST, WESTFIELDS PARCEL 35A TO THE EAST AND WESTFIELDS PARCEL 23 TO THE SOUTH. THE TOTAL SITE AREA FOR THE SUBJECT PROPERTY IS 40.41 ACRES, OF WHICH, ONLY ABOUT 23.2 ACRES WILL BE DISTURBED WITH THIS DEVELOPMENT. THE MAJORITY OF THE SITE CONSISTS OF MATURE UPLAND FOREST IN GOOD OVERALL CONDITION. THE REMAINDER OF THE SITE CONSISTS OF MATURE/YOUNG BOTTOMLAND FOREST, MAINTAINED GRASSLAND, AND OPEN FIELD. THE EXISTING TERRAIN GENERALLY SLOPES TOWARDS FLATLICK BRANCH.

FLATLICK BRANCH TRAVERSES THE SOUTHERN PROPERTY LINE, APPROXIMATELY 13.8 ACRES OF THE PROPERTY IS WITHIN THE 100-YEAR FLOOD PLAIN LIMIT OF FLATLICK BRANCH, WHICH IS ALSO CONSIDERED TO BE THE LIMIT OF THE RESOURCE PROTECTION AREA (RPA). UP TO 21.15 ACRES OF THE PROPERTY IS CONSIDERED TO BE AN ENVIRONMENTAL QUALITY CORRIDOR (EQC). THERE IS AN EXISTING DEFINED CHANNEL THAT BISECTS THE MIDDLE PORTION OF THE SITE (FLOWING SOUTHWARD) THAT RECEIVES STORM WATER RUNOFF FROM LEE ROAD AND UPSTREAM PROPERTIES FROM THE NORTH AND CONVEYS THE WATER TO THE MAIN STREAM BED OF FLATLICK BRANCH. STORM WATER RUNOFF FROM THE EXISTING UN-DEVELOPED SITE DRAINS TOWARDS FLATLICK BRANCH.

THE SITE IS WITHIN THE CUB RUN WATERSHED, WHICH ULTIMATELY DRAINS TO THE OCOQUAN. THEREFORE, THE PHOSPHOROUS REMOVAL REQUIREMENT FOR THIS DEVELOPMENT IS 50%. WATER QUALITY IMPROVEMENT [BEST MANAGEMENT PRACTICES (BMP)] WILL BE PRIMARILY MET THROUGH A COMBINATION OF QUALIFYING OPEN SPACE AND THE USE OF UNDERGROUND MANUFACTURED BMP DEVICES, RAIN GARDEN, GREEN ROOF, AND PERVIOUS PAVEMENT (APPROXIMATE LOCATION SHOWN ON THE PLAT). DEDICATED OPEN SPACE AREAS USED FOR BMP CREDIT WILL BE PLACED IN A CONSERVATION EASEMENT AS A WATER QUALITY MANAGEMENT AREA, WHICH PROVIDES APPROXIMATELY 34% OF THE OVERALL PHOSPHOROUS REMOVAL CREDIT FOR THIS DEVELOPMENT. BMP CREDIT ALLOCATION FOR EACH OF THE FACILITY IS SHOWN ON THE BMP COMPUTATIONS ON THIS SHEET. BMP CALCULATION IS BASED ON THE NORTHERN VIRGINIA BMP HANDBOOK (OCOQUAN METHOD). SEE BMP MAP ON SHEET 13A.

STORMWATER MANAGEMENT (SWM) WILL BE PRIMARILY ACCOMPLISHED USING THREE UNDERGROUND SWM FACILITIES WITH INDEPENDENT CONTROL STRUCTURES. THE 2-YEAR AND 10-YEAR FLOWS WILL BE ATTENUATED TO PRE-DEVELOPMENT CONDITIONS. THE PROPERTY OWNER WILL BE RESPONSIBLE FOR THE MAINTENANCE OF ALL SWM/BMP FACILITIES. WITH THE PROPOSED DEVELOPMENT, THE EXISTING DRAINAGE PATTERN WILL BE ESSENTIALLY MAINTAINED AND THE RATE OF DRAINAGE FLOW WILL NOT BE INCREASED ABOVE THE PRE-DEVELOPMENT LEVEL. THIS PLAN COMPLIES FULLY WITH THE AMENDED CHESAPEAKE BAY PRESERVATION ORDINANCE (CBPO).

ADEQUATE OUTFALL ANALYSIS

THE PRIMARY OUTFALL FOR THIS SITE IS PROVIDED BY FLATLICK BRANCH, WHICH FLOWS WESTWARD ALONG THE SOUTHERN PROPERTY LINE. A SECONDARY OUTFALL FOR THIS DEVELOPMENT IS PROVIDED BY THE EXISTING STORM SEWER SYSTEM ALONG STONECROFT BOULEVARD.

THERE ARE FOUR OUTFALLS FOR THIS DEVELOPMENT. THREE OF THE FOUR ARE DRAINING DIRECTLY TO FLATLICK BRANCH AND ONE IS DRAINING TO THE EXISTING STORM DRAIN SYSTEM IN STONECROFT BOULEVARD. AS EXPLAINED BELOW, TWO OF THE OUTFALLS (OUTFALL #1 AND OUTFALL #3) ARE SHEET FLOW CONDITION AND THE OTHER TWO OUTFALLS (OUTFALL #2 AND OUTFALL #4) ARE CONCENTRATED FLOWS:

OUTFALL #1 - LOCATED IN THE FLOOD PLAIN/RPA AREA, AT THE SOUTH EAST CORNER OF THE PROPOSED DEVELOPMENT, REAR OF TOWER 1A, RECEIVES RUNOFF VIA SHEET FLOW CONDITION FROM THE LOWER SECTION OF THE DRIVEWAY SERVING THE LOADING DOCK AREA OF TOWER 1A AND OUTFALLS DIRECTLY VIA OVERLAND TO THE FLOOD PLAIN/RPA. THE PRE-DEVELOPMENT 10-YEAR SHEET FLOW TO THIS OUTFALL IS ±8.24 CFS. THE POST-DEVELOPMENT 10-YEAR FLOW TO THIS OUTFALL IS ±7.82 CFS. BASED ON THE ADEQUATE OUTFALL REQUIREMENTS PERTAINING TO SHEET FLOW CONDITIONS, IF SHEET FLOW IS MAINTAINED IN THE POST-DEVELOPMENT CONDITION AND THE FLOW/VOLUME IS LESS THAN THE PRE-DEVELOPMENT LEVELS, ADEQUATE OUTFALL REQUIREMENT IS MET. BASED ON THE SHEET FLOW COMPUTATIONS SHOWN ON THIS SHEET, IT IS MY PROFESSIONAL OPINION THAT ADEQUATE EXIST FOR OUTFALL #1.

OUTFALL #2 - LOCATED AT THE END OF PROPOSED STORM STRUCTURE #1 IS AN EXISTING DEFINED CHANNEL THAT BISECTS THE MIDDLE PORTION OF THE SITE (FLOWING SOUTHWARD) TOWARDS FLATLICK BRANCH. CURRENTLY, THIS CHANNEL RECEIVES OFFSITE FLOW FROM LEE ROAD AND UPSTREAM PROPERTIES FROM THE NORTH VIA COMBINATION OF CLOSED SYSTEM AND OPEN CHANNEL FLOW. IT ALSO RECEIVES ONSITE FLOW FROM THE SUBJECT PROPERTY. OFFSITE FLOW WILL BE INTERCEPTED AND DIVERTED THROUGH THE DEVELOPMENT BY A PROPOSED CLOSED STORM SEWER SYSTEM AND RELEASED AT THE SAME POINT WITHIN THE EXISTING NATURAL CHANNEL AT PROPOSED STRUCTURE #1. ONSITE FLOW WILL ALSO BE COLLECTED BY A PROPOSED CLOSED STORM SEWER SYSTEM AND DETAINED IN TWO UNDERGROUND SWM STRUCTURES. OUTFALL PIPES FROM TWO OF THE UNDERGROUND SWM SYSTEMS (SWM FACILITY #1 AND #2), WHICH PROVIDES SWM FOR ±13.1 ACRES OF THE PROPOSED DEVELOPMENT, CONNECT TO THE SAME STORM SYSTEM THAT OUTFALLS TO THE EXISTING CHANNEL AT PROPOSED STR. #1. THE EXISTING STREAM CHANNEL CONVEYS RUNOFF TO FLATLICK BRANCH.

THE EXTENT OF REVIEW FOR THIS OUTFALL WILL BE BASED ON PFM 6-0203.2C, WHICH STATES THAT THE EXTENT OF REVIEW SHALL BE TO A POINT THAT IS AT LEAST 150 FT DOWNSTREAM OF A POINT WHERE THE DRAINAGE AREA IS 360 ACRES OR GREATER. STRUCTURE #1 OUTFALLS DIRECTLY INTO THE FLOOD PLAIN LIMIT OF FLATLICK BRANCH, WHICH HAS AN AREA GREATER THAN 360 ACRES. THE POST-DEVELOPMENT 2-YR FLOW TO THIS OUTFALL IS ±110 CFS AND 2-YR VELOCITY IS 14.9 FPS. THE POST-DEVELOPMENT 10-YR FLOW TO THIS OUTFALL IS ±218 CFS AND THE 10-YR VELOCITY IS 17.3 FPS. AEROSPACE CORPORATION COMMITTED TO RESTORE THE EXISTING STREAM CHANNEL. THIS WILL BE DONE AS SEPARATE PROJECT INDEPENDENT OF THE SPECIAL EXCEPTION AND SITE PLAN. AEROSPACE HIRED AND ENVIRONMENTAL CONSULTANT TO DESIGN AND CONDUCT THE STREAM RESTORATION PROJECT. THE ENVIRONMENTAL ENGINEERS WILL INCORPORATE DEVICES THAT WILL REDUCE VELOCITY AND NATURALLY RESTORE THE STREAM CHANNEL TO PRE-DEVELOPMENT FLOW FROM OUR OUTFALL AND CONVEY TO FLATLICK BRANCH IN A NON-EROSIVE LEVEL. DEVICES THAT MAY BE USED INCLUDE PLUNGE POOLS AND OTHER FEATURES THAT DISSIPATES ENERGY AND REDUCE VELOCITY. THE MODIFIED STREAM SECTION WILL BE ANALYZED BY THE USE OF A 10-YEAR FREQUENCY STORM TO VERIFY THAT STORM WATER WILL NOT OVERTOP CHANNEL BANKS NOR CAUSE EROSION OF CHANNEL BED AND BANKS FOR THE 2-YEAR VELOCITY. IT IS MY PROFESSIONAL OPINION THAT THE STREAM RESTORATION PROJECT WILL PROVIDE ADEQUATE OUTFALL FOR OUTFALL #2.

OUTFALL #3 - LOCATED ADJACENT TO THE FLOOD PLAIN/RPA AREA, REAR OF TOWER 2A, RECEIVES RUNOFF VIA SHEET FLOW CONDITION FROM THE SECTION OF THE DRIVEWAY SERVING THE LOADING DOCK AREA AND OUTFALLS DIRECTLY VIA OVERLAND TO THE FLOOD PLAIN/RPA. THE PRE-DEVELOPMENT 10-YEAR SHEET FLOW TO THIS OUTFALL IS ±4.41 CFS. THE POST-DEVELOPMENT 10-YEAR FLOW TO THIS OUTFALL IS ±2.59 CFS. BASED ON THE ADEQUATE OUTFALL REQUIREMENTS PERTAINING TO SHEET FLOW CONDITIONS, IF SHEET FLOW IS MAINTAINED IN THE POST-DEVELOPMENT CONDITION AND THE FLOW/VOLUME IS LESS THAN THE PRE-DEVELOPMENT LEVELS, ADEQUATE OUTFALL REQUIREMENT IS MET. BASED ON THE SHEET FLOW COMPUTATIONS SHOWN ON THIS SHEET, IT IS MY PROFESSIONAL OPINION THAT ADEQUATE EXIST FOR OUTFALL #3.

OUTFALL #4 - LOCATED AT THE SOUTHWEST CORNER OF THE DEVELOPMENT ADJACENT TO STONECROFT BOULEVARD. THIS OUTFALL IS TO THE EXISTING STORM DRAINAGE SYSTEM ON STONECROFT BOULEVARD. THE PROPOSED UNDERGROUND SWM FACILITY (SWM FACILITY #3) OUTFALLS TO THIS SYSTEM AT EXISTING STRUCTURE #1, WHICH IS CONSIDERED AS THE POINT OF CONFLUENCE. THE EXISTING STORM DRAINAGE SYSTEM AT STONECROFT BOULEVARD WAS DESIGNED TO RECEIVE FLOW FROM A PORTION OF THE SUBJECT PROPERTY.

THE EXTENT OF REVIEW FOR THIS OUTFALL WILL BE BASED ON PFM 6-0203.2A, WHICH STATES THAT THE EXTENT OF REVIEW SHALL BE TO A POINT THAT IS AT LEAST 150 FT DOWNSTREAM OF A POINT WHERE THE RECEIVING PIPE OR CHANNEL IS JOINED BY ANOTHER THAT HAS A DRAINAGE AREA THAT IS AT LEAST 90% OF THE SIZE OF THE FIRST DRAINAGE AREA AT THE POINT OF CONFLUENCE.

THE CONTRIBUTING DRAINAGE AREA ASSOCIATED WITH THE PROPOSED DEVELOPMENT TO THE EXISTING STORM SEWER SYSTEM ON STONECROFT BOULEVARD IS ±2.7 ACRES. THE POINT OF CONFLUENCE IS AT EXISTING STRUCTURE #1, WHICH IS THE POINT WHERE THE OUTFALL PIPE FROM PROPOSED SWM FACILITY 3 CONNECTS TO THE EXISTING STORM SEWER SYSTEM. THE TOTAL CONTRIBUTING OFFSITE AREA TO EXISTING STRUCTURE #2 IS ±3.3 ACRES, WHICH IS MORE THAN 90% OF THE CONTRIBUTING AREA ASSOCIATED WITH THE DEVELOPMENT. THEREFORE, PER PFM 6-0203.2A, THE EXTENT OF REVIEW ON THE EXISTING SYSTEM WILL BE 150 DOWNSTREAM OF EXISTING STRUCTURE #2. BASED ON OUR PRELIMINARY ANALYSIS OF THE EXISTING STORM SEWER SYSTEM ALONG STONECROFT BOULEVARD, IT IS MY PROFESSIONAL OPINION THAT ADEQUATE OUTFALL EXIST FOR OUTFALL #4.

**BURGESS & NIPLE**  
 4160 PLEASANT VALLEY ROAD, CHANTILLY, VA 20151-1226  
 PH. (703) 637-9630 FAX (703) 637-8041

DATE	REVISIONS
DEC. 17, 2008	ADDRESS COMMENTS
DEC. 1, 2008	ADDRESS COMMENTS
NOV. 4, 2008	ADDRESS COMMENTS
OCT. 28, 2008	ADDRESS COMMENTS
OCT. 9, 2008	ADD TRANSPORTATION ITEMS
SEPT. 4, 2008	ADDRESS PRE-STAFFING COMMENTS
JULY 01, 2008	REVISED PER COUNTY COMMENTS

STORM WATER INFORMATION SHEET AND ADDITIONAL ZONING TABULATIONS  
**AEROSPACE CORPORATION**  
**WESTFIELDS, PARCEL 35**  
 SULLY STREET  
 FAIRFAX COUNTY, VIRGINIA

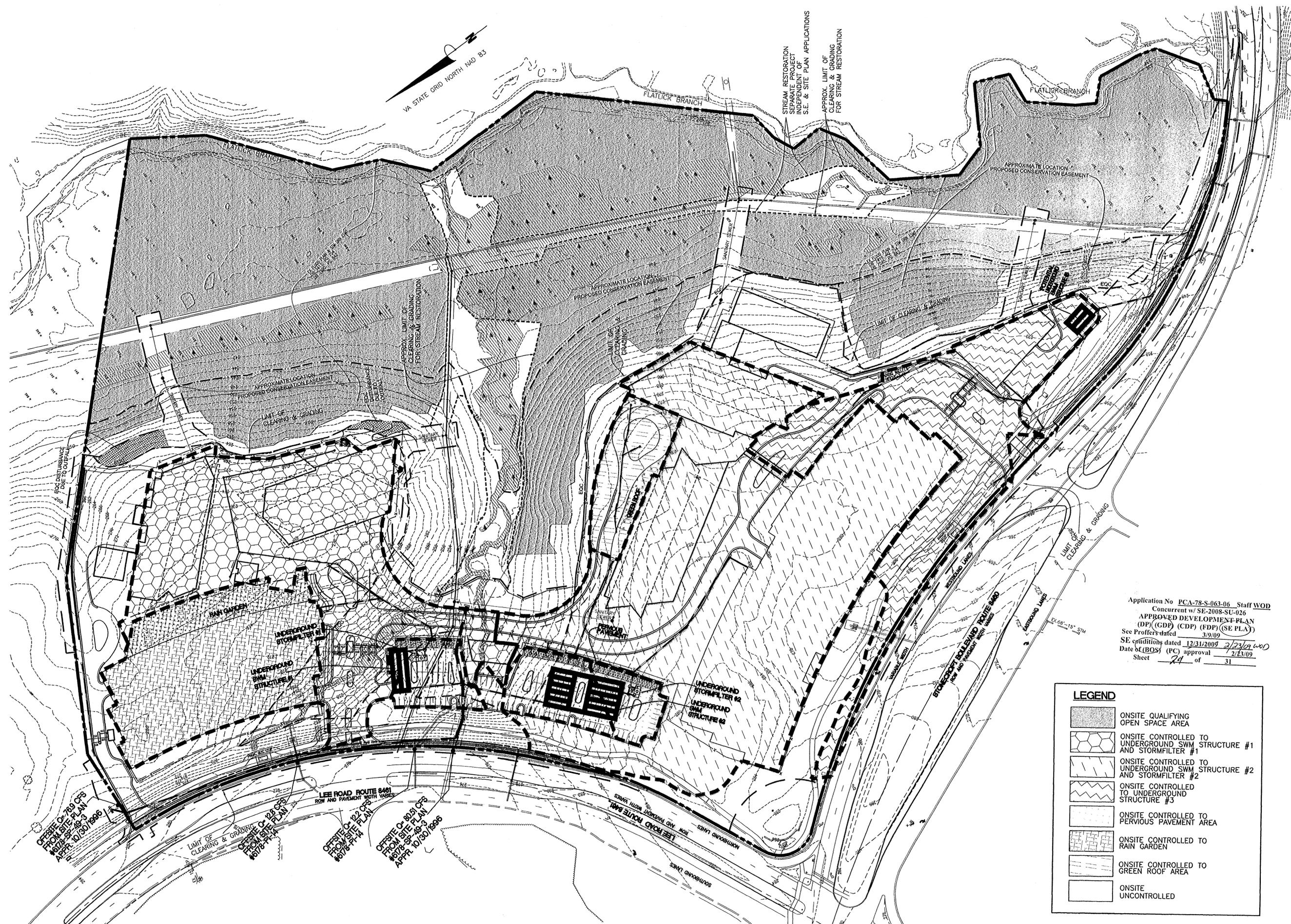
COMMONWEALTH OF VIRGINIA  
 JOHN P. GASTON  
 Lic. No. 035787  
 PROFESSIONAL ENGINEER

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JOB NO.:	PR45447
P.R. NO.:	45447
SHEET:	13 OF
FILE NO.:	C-4702



STREAM RESTORATION  
SEPARATE PROJECT  
INDEPENDENT OF  
S.E. & SITE PLAN APPLICATIONS

APPROX. LIMIT OF  
CLEARING & GRADING  
FOR STREAM RESTORATION



Application No. PCA-78-S-063-06 Staff WOD  
Concurrent w/ SE-2008-SU-026  
APPROVED DEVELOPMENT PLAN  
(DP) (GDP) (CDP) (FDP) (SE PLAN)  
See Proffers dated 3/9/09  
SE conditions dated 12/31/2009 2/23/09 w/o  
Date of (BOS) (PC) approval 2/23/09  
Sheet 24 of 31

LEGEND	
	ONSITE QUALIFYING OPEN SPACE AREA
	ONSITE CONTROLLED TO UNDERGROUND SWM STRUCTURE #1 AND STORMFILTER #1
	ONSITE CONTROLLED TO UNDERGROUND SWM STRUCTURE #2 AND STORMFILTER #2
	ONSITE CONTROLLED TO UNDERGROUND STRUCTURE #3
	ONSITE CONTROLLED TO PERVIOUS PAVEMENT AREA
	ONSITE CONTROLLED TO RAIN GARDEN
	ONSITE CONTROLLED TO GREEN ROOF AREA
	ONSITE UNCONTROLLED

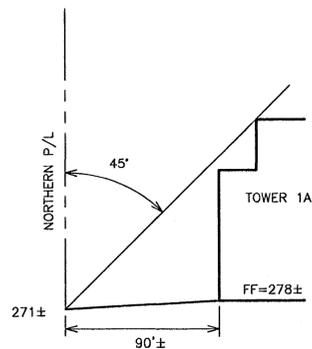
**BURGESS & NIPLE**  
4160 PLEASANT VALLEY ROAD, CHANTILLY, VA 20151-1226  
PH. (703) 637-9630 FAX (703) 631-6041

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OCT. 28, 2008	
OCT. 9, 2008	
SEPT. 4, 2008	
JULY 01, 2008	

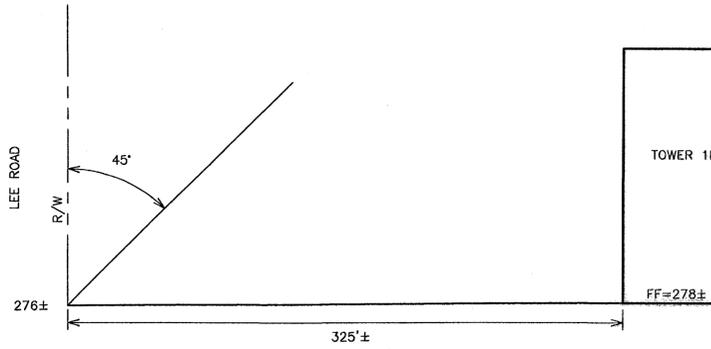
**STORM WATER AND BEST MANAGEMENT PRACTICES MAP**  
**AEROSPACE CORPORATION**  
**WESTFIELDS, PARCEL 35**

JOHN P. GASTON  
Lic. No. 035787  
Professional Engineer

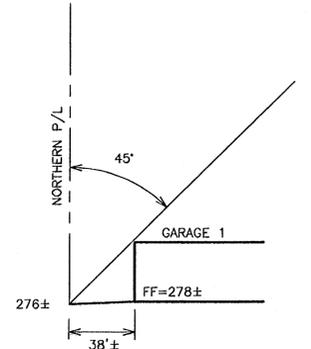
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FILE NO.: C-4702



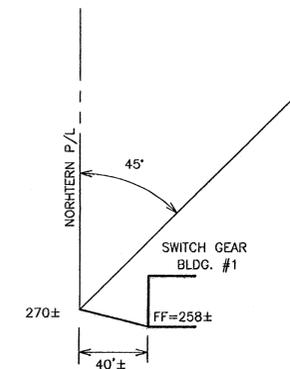
TOWER 1A  
ANGLE OF BULK PLANE



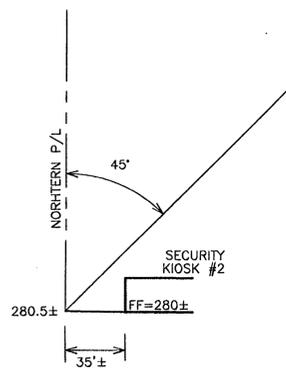
TOWER 1B  
ANGLE OF BULK PLANE



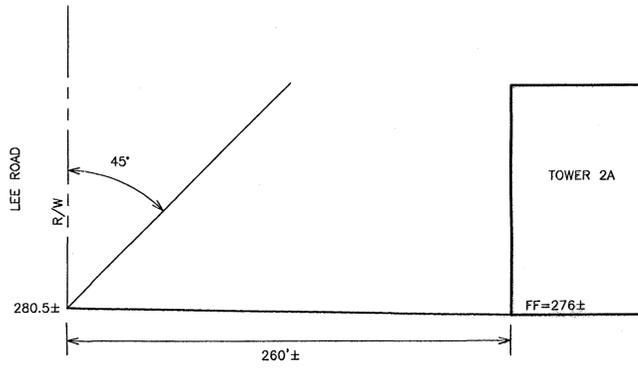
GARAGE 1  
ANGLE OF BULK PLANE



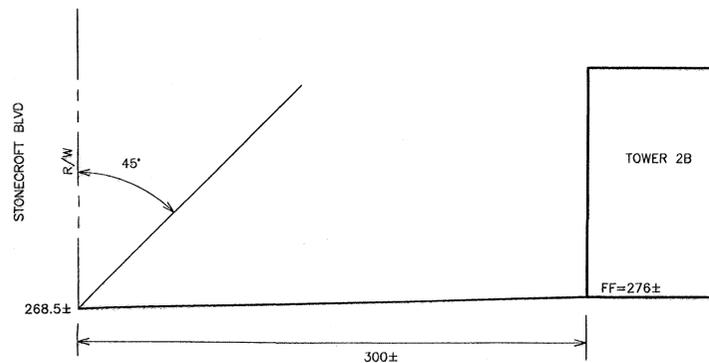
SWITCH GEAR BLDG. #1  
ANGLE OF BULK PLANE



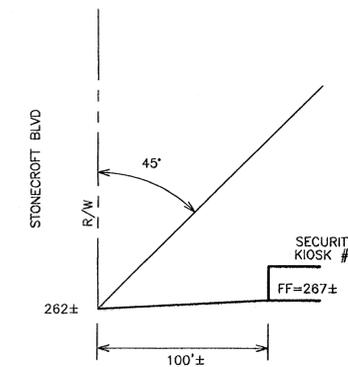
SECURITY KIOSK #2  
ANGLE OF BULK PLANE



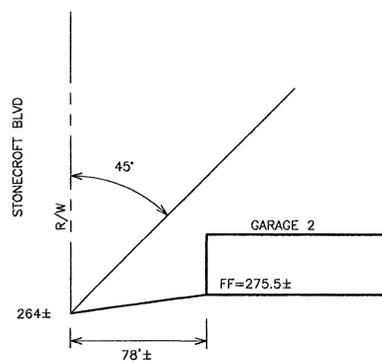
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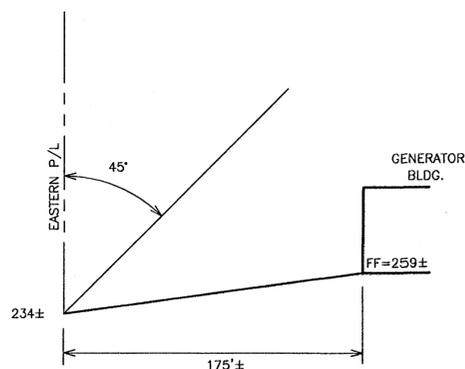
TOWER 2B  
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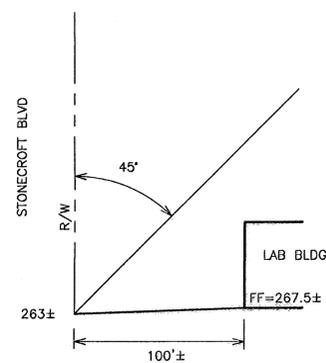
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ANGLE OF BULK PLANE



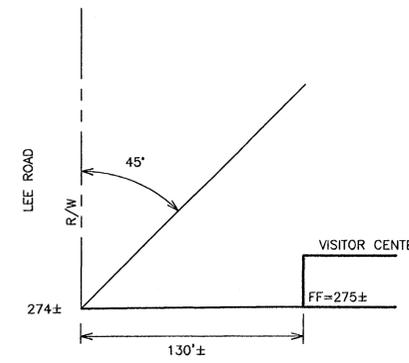
GARAGE 2  
ANGLE OF BULK PLANE



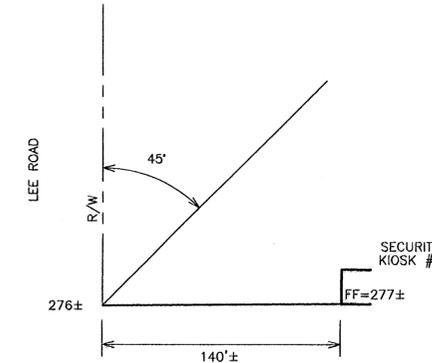
GENERATOR BUILDING  
ANGLE OF BULK PLANE



LAB BUILDING  
ANGLE OF BULK PLANE



VISITOR CENTER  
ANGLE OF BULK PLANE



SECURITY KIOSK #1  
ANGLE OF BULK PLANE

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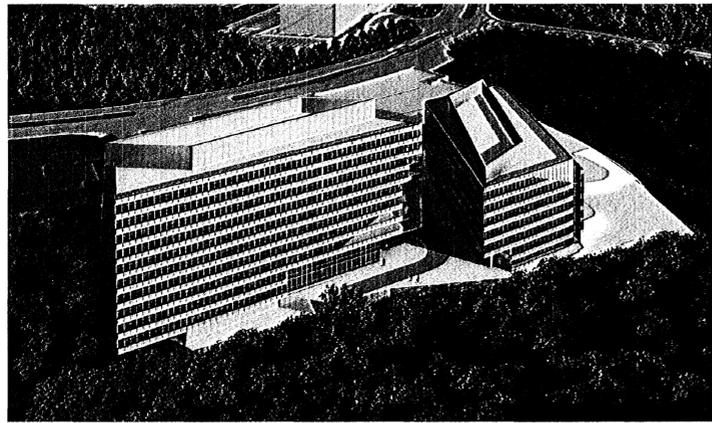
ADDRESS COMMENTS	DATE
ADDRESS COMMENTS	DEC. 17, 2008
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ANGLE OF BULK PLANE DIAGRAMS  
**AEROSPACE CORPORATION**  
**WESTFIELDS, PARCEL 35**  
 SULLY DISTRICT  
 FAIRFAX COUNTY, VIRGINIA

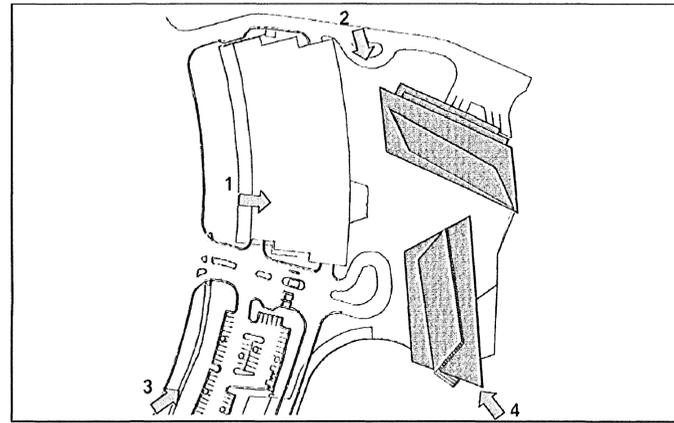


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 FILE NO.: C-4702

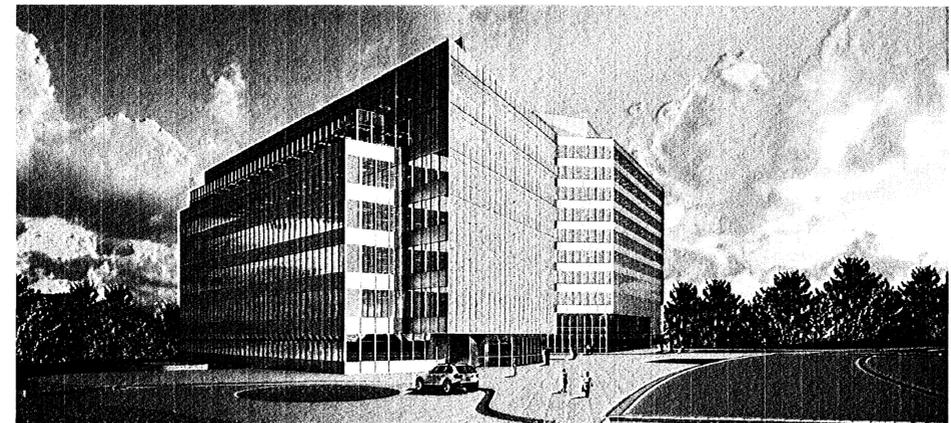
**BURGESS & NIPLE**  
 4160 PLEASANT VALLEY ROAD, CHANTILLY, VA 20151-1226  
 PH. (703) 631-8630 FAX (703) 631-6041



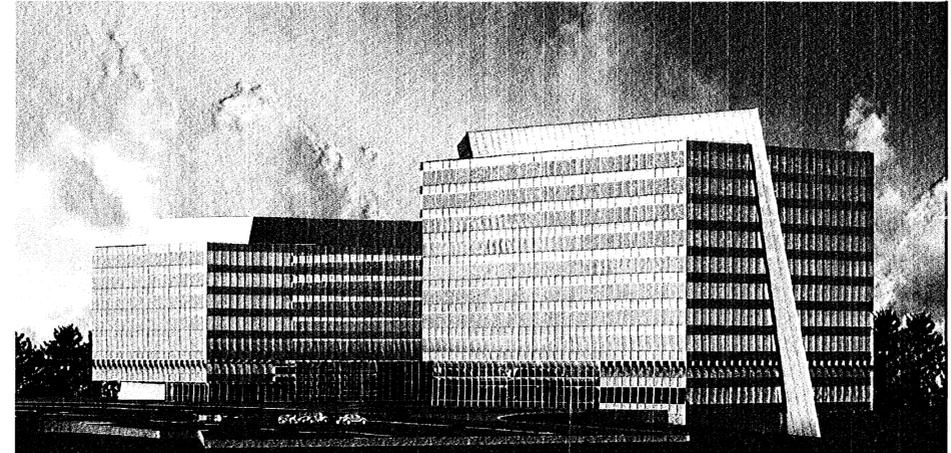
Aerial View



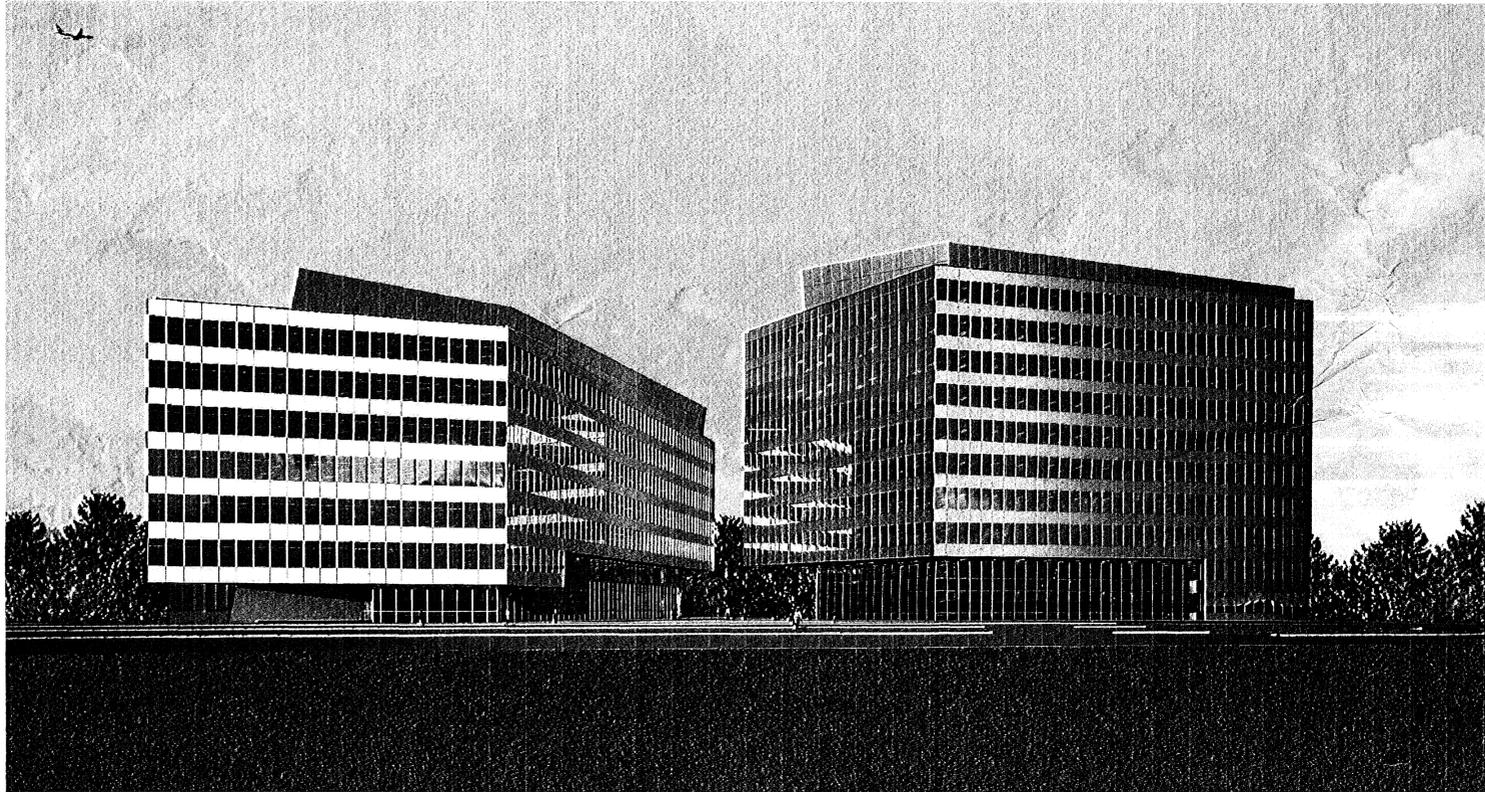
Floor Plan Diagram



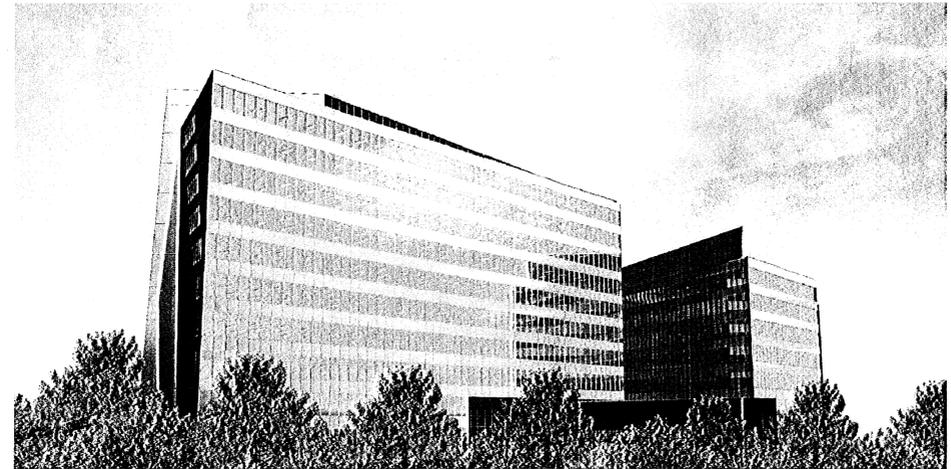
2 Perspective - From NRO - Garage Not Shown



3 Perspective - Vehicular Entrance - Garage Not Shown

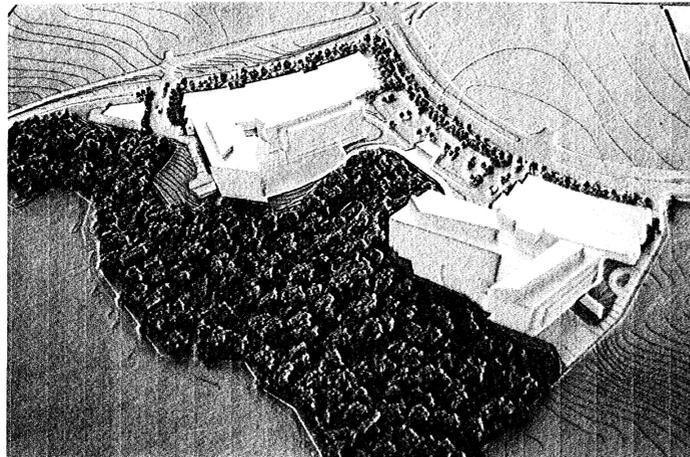


1 Perspective - Towards Plaza - Garage Not Shown



4 Perspective - From Route 28

NOTE: GARAGE AND LANDSCAPING NOT SHOWN



Massing Model



Massing Model

Application No PCA-78-S-063-06 Staff WOD  
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Sheet 31 of 31