

GIS IN LOCAL GOVERNMENT AND INDUSTRY: SYMBIOTIC EVOLUTION TOWARD AN ULTIMATE GOAL

GeoBuiz

August 11, 2015

Tom Conry



LOCAL GOVERNMENT BUSINESS LINES/SERVICES

- Utilities
 - Sanitary Sewer
 - Stormwater
 - (Drinking Water)
 - Refuse & Recycling
- Built Environment
 - Planning & Construction Control
- Human Environment
 - Human Services
 - Schools
 - Public Safety
 - Transit
- Natural Environment
 - Forestry
 - Parks
- Data Sharing – Open Data

All Use/Involve GIS

OPERATIONAL DATA (SELECTED)

- Surface Models
- Elevation Models
- Vegetation
- Tree Canopy
- Building Models
- Site Models
- Roads
- Address Points
- Cadastral Data
- Planimetric Data
- Remotely Sensed Data
 - Aerial Imagery
 - Oblique Imagery
 - Lidar
 - Multispectral satellite imagery

OPERATIONAL DATA – SOURCES

- Surface Models
- Elevation Data ✓
- Vegetation
- Tree Canopy
- Building Models
- Site Models
- Roads ✓
- Address Points ✓
- Cadastral Data ✓
- Planimetric Data ✓
- Remotely Sensed Data
 - Aerial Imagery
 - Current
 - Historic ✓
 - Oblique Imagery
 - Lidar
 - Multispectral satellite imagery
- County Created/Derived; Vendor Submitted; Purchased/Licensed; Partnered

✓ Available from County for viewing and/or download

FAIRFAX DATA AVAILABLE ON OPENDATA

2012 Election Results - Fairfax Library Bond	2013 Election Results - Virginia Governor	Current Housing Units	Non-Marine Clay Shrink-Swell Soils	Subdivisions
2012 Election Results - Fairfax Parks Bond	2013 Election Results - Virginia Lt. Governor	Current Population	Nonresidential Gross Floor Area	Supervisor Districts
2012 Election Results - Fairfax Public Safety Bond	2013 Election Results - Virginia Sheriff	Driveways & Parking Lots	Parcels	Supervisor Offices
2012 Election Results - Fairfax Storm Drainage Bond	2013 Election Results - Voter Turnout	Easements	Planning Areas	Tax Administration's Real Estate - Parcels Data
2012 Election Results - US Congress 10th District	2014 Election Results - Fairfax Transportation Bond	Elementary School Attendance Areas	Planning Districts	Tax Administration's Real Estate - Assessed Values
2012 Election Results - US Congress 11th District	2014 Election Results - US Congress 10th District	Existing Land Use - Generalized	Police Stations	Tax Administration's Real Estate - Commercial Data
2012 Election Results - US Congress 8th District	2014 Election Results - US Congress 11th District	Fairfax County Border	Political Jurisdictions	Tax Administration's Real Estate - Dwelling Addition Data
2012 Election Results - US President/Vice President	2014 Election Results - US Congress 8th District	Fire Stations	Polling Places	Tax Administration's Real Estate - Dwelling Data
2012 Election Results - US Senate	2014 Election Results - US Senate	Forecast Households	Post Offices	Tax Administration's Real Estate - Land Data
2012 Election Results - Virginia Constitution Amendment 1	2014 Election Results - Virginia Constitution Amendment	Forecast Housing Units	Potential Asbestos Containing Soils	Tax Administration's Real Estate - Legal Data
2012 Election Results - Virginia Constitution Amendment 2	2014 Election Results - Voter Turnout	Forecast Population	Previously Mapped Marine Clay	Tax Administration's Real Estate - Owner Data
2012 Election Results - Voter Turnout	2015 Special Election Results - Virginia Delegate 34th District	Future Metrorail	Quarries	Tax Administration's Real Estate - Sales Data
2013 Election Results - Fairfax School Bond	2015 Special Election Results - Voter Turnout	Future Metrorail Stations	Questionable Split Parcels	Tax Map Grid
2013 Election Results - Virginia Attorney General	Address Points	Government Centers	Radon Potential Areas	Tree Cover - 1990
2013 Election Results - Virginia Delegate 36th District	Airports	High School Attendance Areas	Railroads	Tree Cover - 2002
2013 Election Results - Virginia Delegate 37th District	Bicycle Routes	Historic Sites	Recorded Flood Plains	Tree Cover - 2011
2013 Election Results - Virginia Delegate 38th District	Building Additions	Historic Zoning Overlay Districts	Recreational Impervious Surfaces	US Congressional Districts
2013 Election Results - Virginia Delegate 39th District	Buildings	Hospitals and Urgent Care Facilities	Rights of Way	Virginia House of Delegate Districts
2013 Election Results - Virginia Delegate 40th District	Census 2010 Block	Human Services Offices	Roadway Centerlines	Virginia Senate Districts
2013 Election Results - Virginia Delegate 41st District	Census 2010 Blockgroup	Human Services Regions	Roadways & Bridges	Volunteer Group Areas
2013 Election Results - Virginia Delegate 42nd District	Census 2010 Designated Places	Landfills	School Facilities	Voting Precincts
2013 Election Results - Virginia Delegate 43rd District	Census 2010 Tract	Libraries	School Regions	Water Features - lines
2013 Election Results - Virginia Delegate 44th District	Chesapeake Bay Preservation Areas	Major Utility Lines	Shopping Centers	Water Features - polys
2013 Election Results - Virginia Delegate 45th District	Colleges & Universities	Market Sale Ratio	Sidewalks	Watersheds
2013 Election Results - Virginia Delegate 48th District	Common Areas (associated w/condo parcels)	Marumscso Soils	Soils - 1990	Wetland-zoned Property - lines
2013 Election Results - Virginia Delegate 48th District	Community Centers	Metrorail	Soils - 2011	Wetland-zoned Property - polys
2013 Election Results - Virginia Delegate 49th District	Community Pools	Metrorail Stations	Special Tax Areas	ZIP Codes
2013 Election Results - Virginia Delegate 53rd District	County Parks	Middle School Attendance Areas	Storage Tanks	Zoning
2013 Election Results - Virginia Delegate 67th District	County Trails	Non-County Parks	Stormwater Easements	Zoning Cases (post-2000)
2013 Election Results - Virginia Delegate 86th District	Current Households	Non-County Trails	Subdivision Blocks	Zoning Cases (pre-2000)
				Zoning Overlay Districts

PUBLIC WEB APPS TO USE SOME OF DATA

Public Services



Recreation



Environmental



Public Safety



Utilities



Demographics



Land Records and Development



Transportation



Arts and Culture

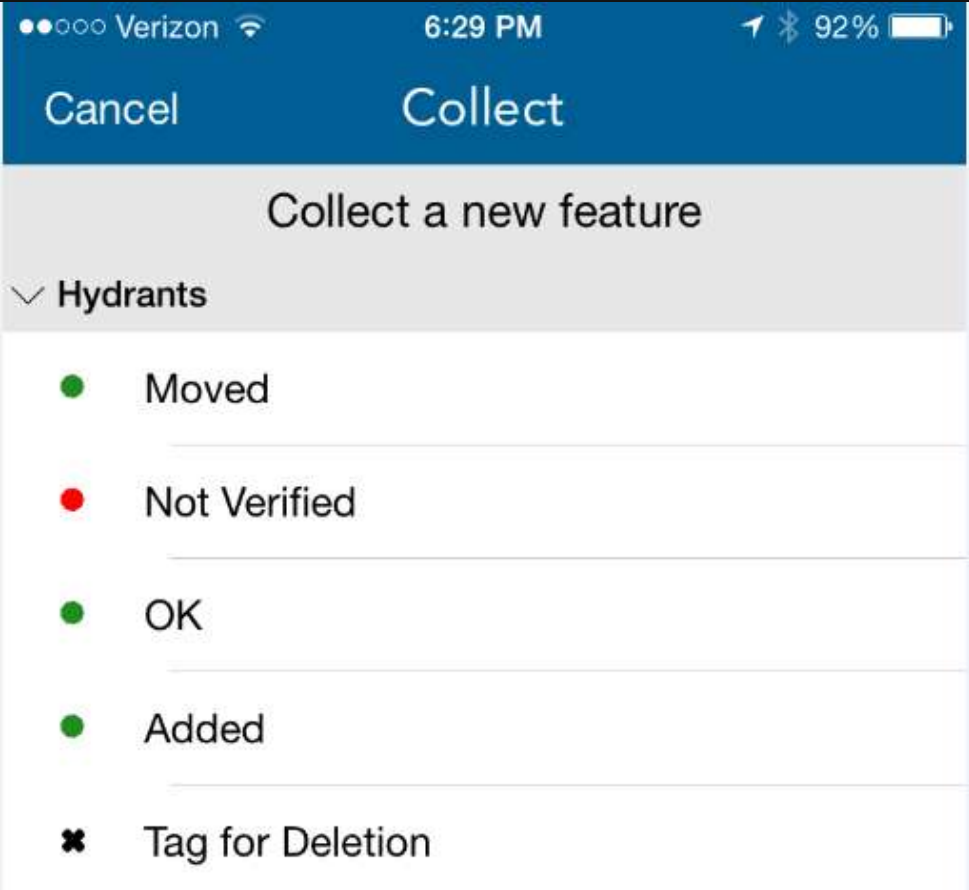


TECHNOLOGIES

- Web
 - Cloud
 - Mobile (IOS)
 - LIDAR
 - SQL & Non-SQL databases
 - Imagery
 - Multi-spectral fixed wing & satellite
 - Ortho
 - Oblique
 - (Drone)
 - (Micro-sat)
 - 3-D
 - Routing
-

ENABLING TECHNOLOGY – EXAMPLES

FIRE AND RESCUE – HYDRANT VALIDATION



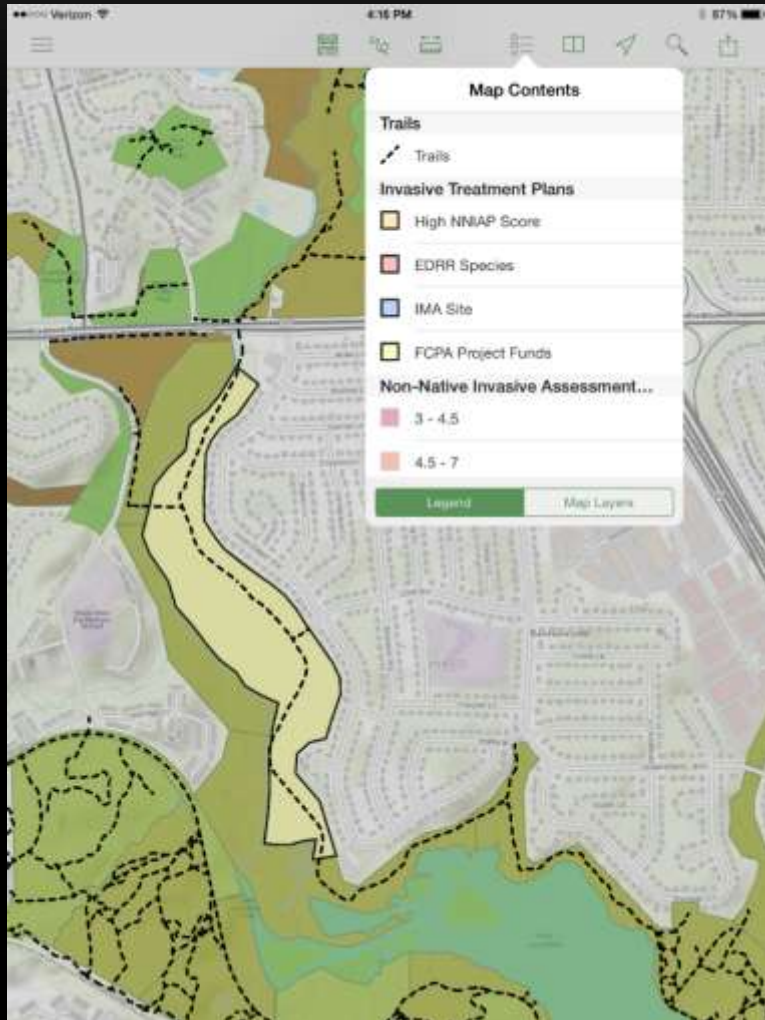
ENABLING TECHNOLOGY – HYDRANT RESULTS

The screenshot displays the 'Hydrants Collector' web application interface. The main map area shows a geographic distribution of hydrants, color-coded by status: green for 'OK', 'Moved', and 'Added', and red for 'Not Verified'. Black 'X' marks indicate hydrants 'Tag for Deletion'. The map includes a legend on the left, navigation controls, and a search bar. Below the map, a data table provides details for selected hydrant features.

Hydrants (56,723 features, 0 selected)

last_edited_date	Status	CommentField
7/21/2014, 11:34 AM	Added	Verified by M433
7/21/2014, 11:53 AM	Added	
7/24/2014, 8:04 PM	Added	
7/28/2014, 11:54 AM	Added	
7/28/2014, 12:08 PM	Added	

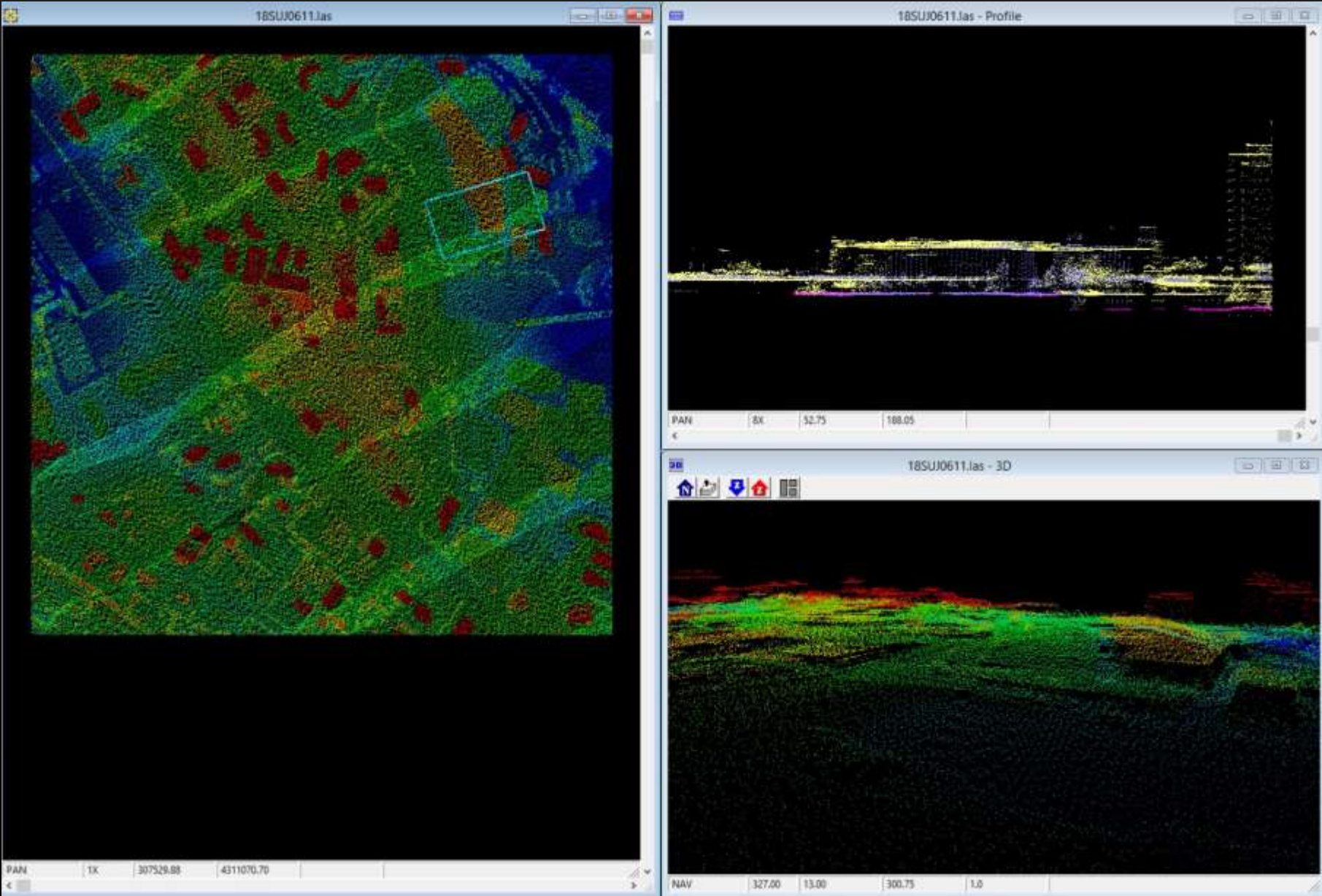
ENABLING TECHNOLOGY – PARKS AND RECREATION – INVASIVE SPECIES



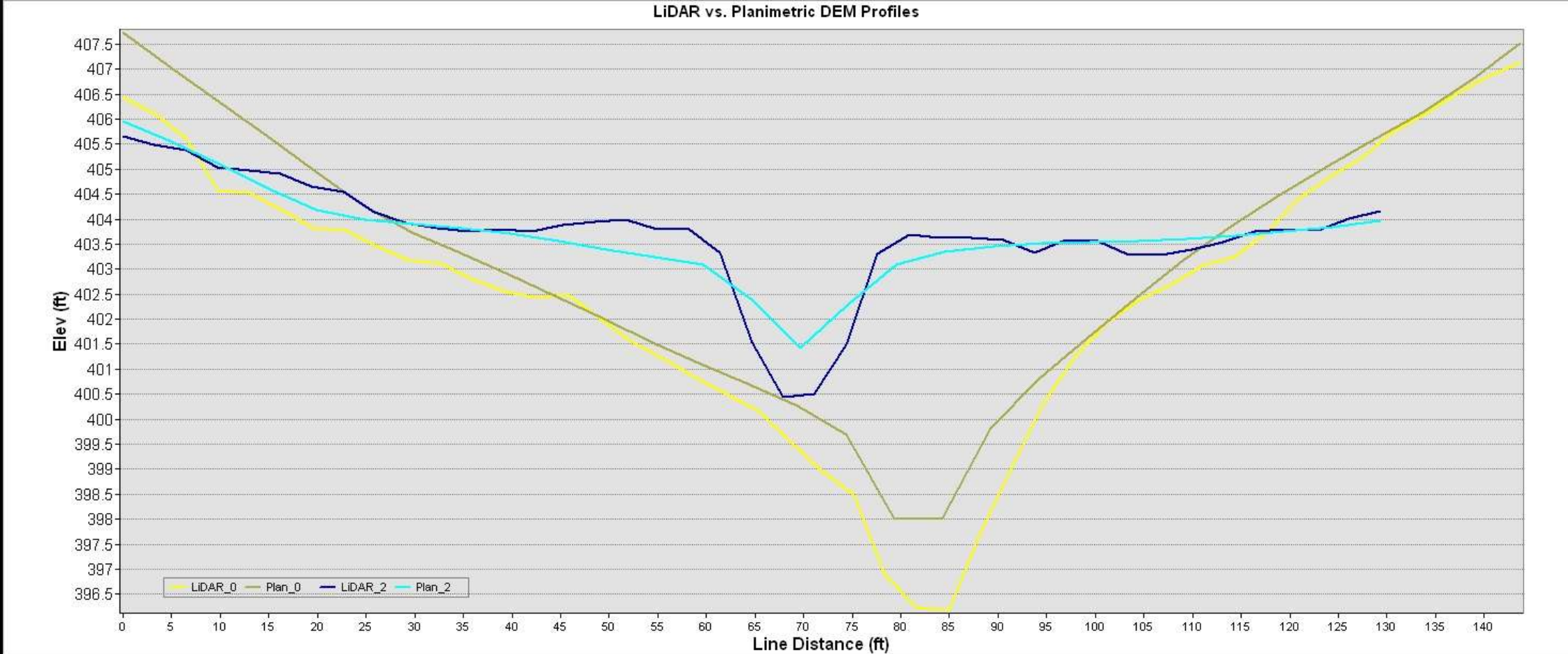
ENABLING TECHNOLOGY PUBLIC WORKS – REFUSE COLLECTION ROUTING



ENABLING TECHNOLOGY PUBLIC WORKS – STORM WATER: LIDAR



MUCH MORE DETAILED SURFACE MODELING LIDAR & PLANIMETRIC PROFILES COMPARED



LIDAR



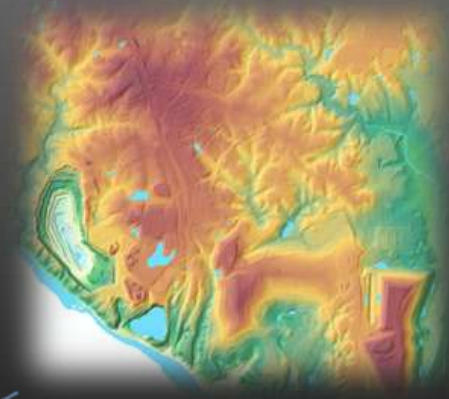
Aerial Imagery from VA



Multi-spectral Imagery



Planimetric Data



OBJECTID	SHAPE	AREA	PERCENTAGE
1	POLYGON	2178168.410001	58.140013

CoverType	AREA	PERCENTAGE
Barren Earth	272737.164488	4.260418
Barren	480756.107763	7.362071
Grass, Short	774176.861164	11.868107
Other Impervious	1431407.381776	21.740740
Water	705103.907108	10.911411
Tree Canopy	1481107.871222	22.769164
Water	148769.872518	2.269114

ENABLING TECHNOLOGY: 3-D VIRTUAL FAIRFAX



STAFF

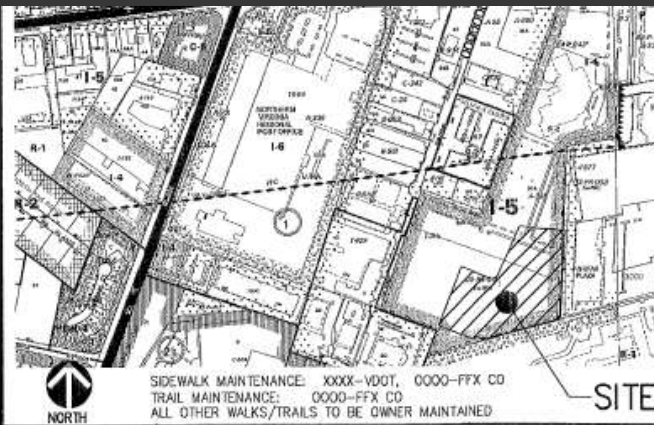
- Management
 - Increasing expectation for GIS Utilization and Integration
- Staff
 - Increasing capabilities

HG Wells

“...THE PAST IS BUT THE BEGINNING OF A BEGINNING...”

NEXT FRONTIER: BUILT ENVIRONMENT & 3-D

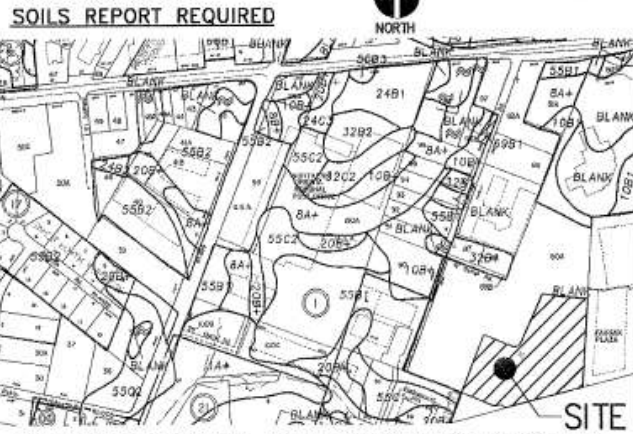
SITE PLANS



TAX MAP REFERENCE NUMBER(S)

MAP PAGE #	DOUBLE CIRCLE #	BLOCK (SINGLE CIRCLE #)	LOT/PARCEL(S) #
49-3	1		80E, 80F, 81A, 82A, 82B

SOILS MAP DATA



SOIL ID NUMBERS	SOIL SERIES NAME	FOUNDATION SUPPORT	SUBSURFACE DRAINAGE	SLOPE STABILITY	ERODABILITY	PROBLEM CLASS
SOILS PROPERTIES TO BE IDENTIFIED ON A SOILS REPORT THAT WILL BE SUBMITTED SEPARATELY.						

OWNER/DEVELOPER: Jonathan B. Cox
 NAME: Jonathan B. Cox
 TITLE: Fairfax County, Fire Marshal

DATE: 6-18-11 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): F. Belmont
 STREETLIGHT SECTION, PLANNING & DESIGN DIVISION-DPWES

DATE: 6-15-11 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): R. Collins
 PUBLIC WATER AGENCY

DATE: 6-23-11 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): F. Chilton
 SANITARY SEWER REVIEW, ESRO, LDS, DPWES

DATE: 12/30/2011 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): Nathan Soria
 GEOTECHNICAL REVIEW, ESRO, LDS - DPWES

DATE: 10-3-11 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): B. Salvo
 STORMWATER REVIEW, ESRO, LDS, DPWES

DATE: 9-27-11 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): G. T. Nelson
 URBAN FORESTRY MANAGEMENT DIVISION, LDS, DPWES

DATE: 6-16-11 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): G. Buckler
 FAIRFAX COUNTY FIRE MARSHAL

DATE: 7-1-2011 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): K. Nelson
 VIRGINIA DEPARTMENT OF TRANSPORTATION

DATE: 10-14-11 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): J. Shabazz
 PLAN REVIEW, ENVIRONMENTAL & SITE REVIEW DIVISION, LDS - DPWES

DATE: 10-21-11 RECOMMEND APPROVAL (SIGNATURE & PRINTED NAME): J. Shabazz
 PLAN REVIEW, ENVIRONMENTAL & SITE REVIEW DIVISION, LDS - DPWES

APPROVED BY: J. Shabazz
 DIRECTOR, ENVIRONMENTAL & SITE REVIEW DIVISION, LDS - DPWES

DATE: 1-9-12 BY: J. Shabazz
 DIRECTOR, DEPT. OF PUBLIC WORKS AND ENVIRONMENTAL SERVICES

THIS PLAN SHALL EXPIRE WITHOUT NOTICE IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE COUNTY CODE. REVISIONS DO NOT EXTEND THE APPROVAL PERIOD. THE APPROVAL PERIOD IS INDEPENDENT OF THE AGREEMENT EXPIRATION DATE.

THIS APPROVAL IS NOT A COMMITMENT TO PROVIDE PUBLIC SANITARY SEWER

CERTIFICATE OF NO CHANGE

(FOR SUBMISSION OTHER THAN THE FIRST)
 I HEREBY CERTIFY THAT NO CHANGES HAVE BEEN MADE THAT WOULD AFFECT THE PRIOR APPROVAL BY THE:

FIRE MARSHAL DATED: 06/16/2011
 WATER AUTHORITY DATED: 06/15/2011 (FALLS CHURCH)
 HEALTH DEPARTMENT DATED: N/A
 VDOT DATED: 07/01/2011 (APPROVAL LETTER ATTACHED)
 DPWES-WPMD (SAN. SEW.) DATED: 06/23/2011
 DPWES-STREETLIGHTS DATED: 06/08/2011

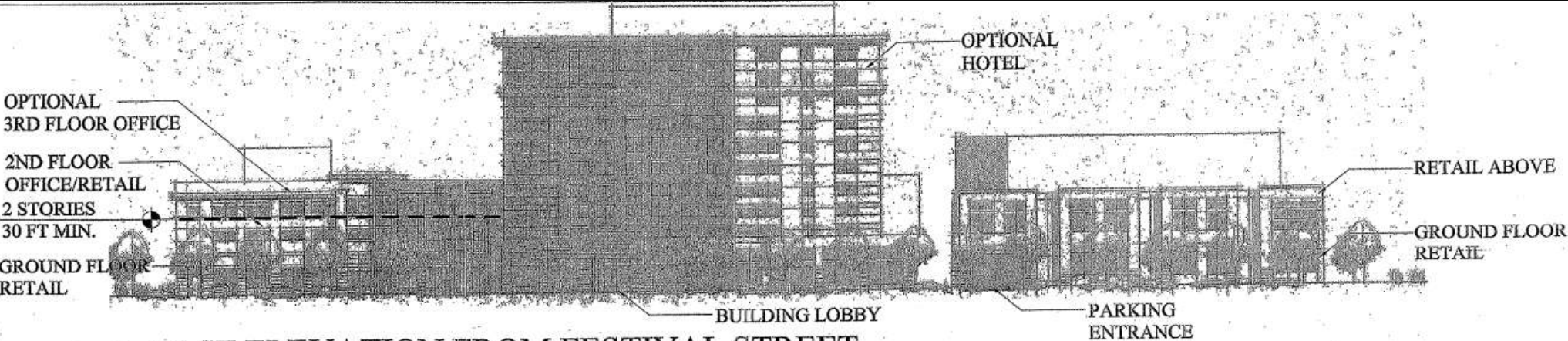
SHEET INDEX

1.	COVER SHEET	
2.	NOTES AND LEGEND	
3.	NOTES AND TABULATIONS	
4-5.	SITE DETAILS	
6.	EXISTING CONDITIONS & DEMOLITION PLAN	
7.	RESERVED	
8.	OVERALL SITE PLAN (FOR INFORMATION ONLY)	
9.	SITE PLAN	
10.	OVERLAND RELIEF PLAN	
11.	SITE WALKWAY PLAN	
12.	SITE LIGHTING PLAN	
13.	RESERVED	
14.	AVERAGE GRADE COMPUTATIONS	
15.	FIRE LANE MARKING PLAN	
16.	BUILDING PLAN & ARCHITECTURAL DATA	
17.	LANDSCAPE PLAN	
18.	RESERVED	
19.	EROSION AND SEDIMENT CONTROL PLAN - PHASE I	
20.	EROSION AND SEDIMENT CONTROL PLAN - PHASE II	
21.	EROSION AND SEDIMENT CONTROL COMPUTATIONS	
22.	EROSION AND SEDIMENT CONTROL NOTES AND DETAILS	
23-24.	RESERVED	
25.	STORM DRAIN PROFILES	
26.	RESERVED	
27.	UTILITY PROFILES	
28-29.	RESERVED	
29.	LANDSCAPE NOTES	
30.	LANDSCAPE NOTES AND DETAILS	
31-32.	LANDSCAPE NOTES, DETAILS AND COMPUTATIONS	
33.	CORRESPONDENCE	

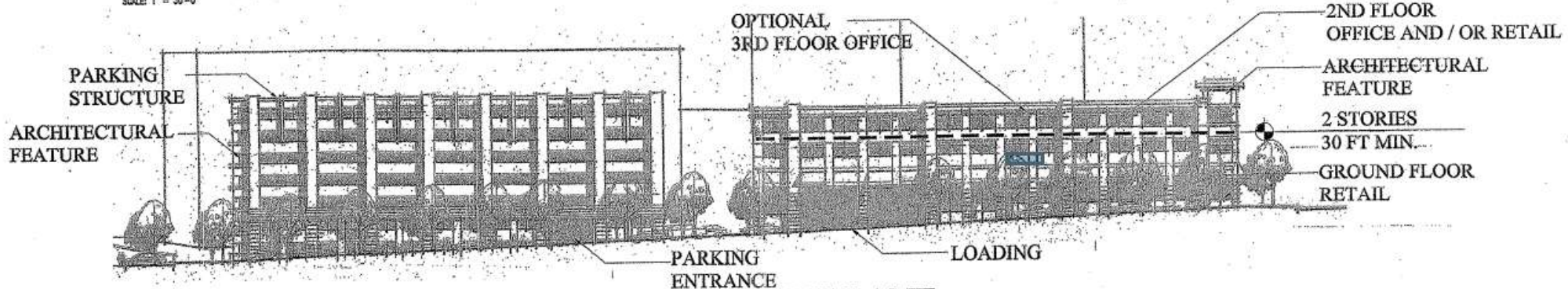
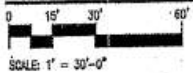
Handwritten notes: (5) height of pole, (11) handicap, (3) Residential & public bike rack tabulation (46 provided for 46), 1/2" scale.

MERRIFIELD TOWN CENTER
 PARCEL 'H'
 COUNTY NUMBER 0561-SP-008-2

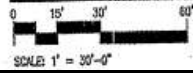
SITE PLANS (CONTINUED)



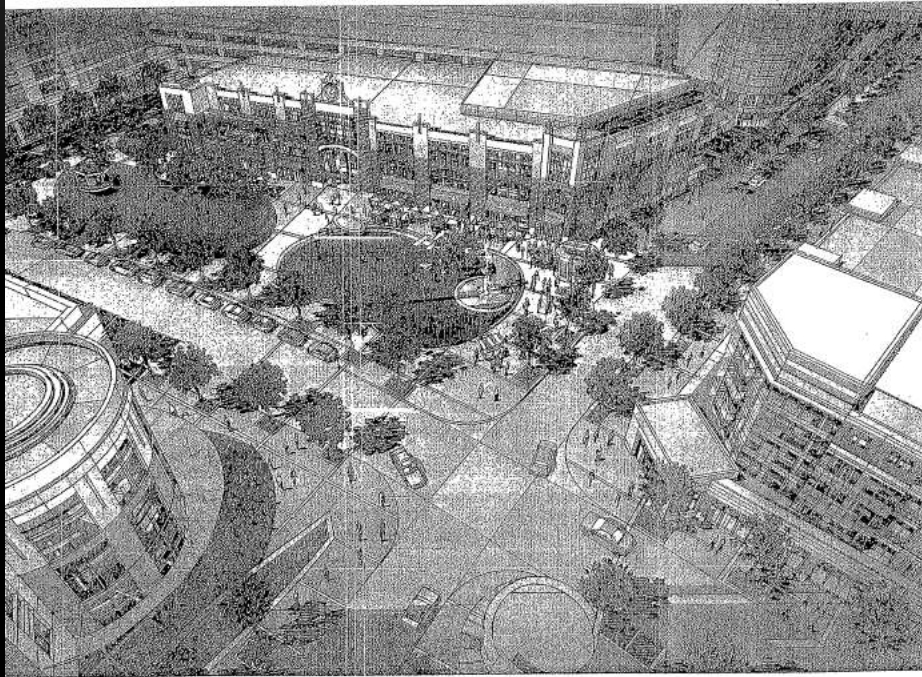
1. EAST ELEVATION FROM FESTIVAL STREET



2. SOUTH ELEVATION FROM STRAWBERRY LANE



SITE PLANS (CONTINUED)



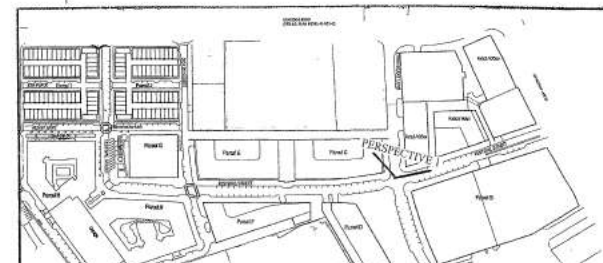
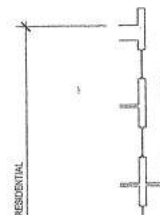
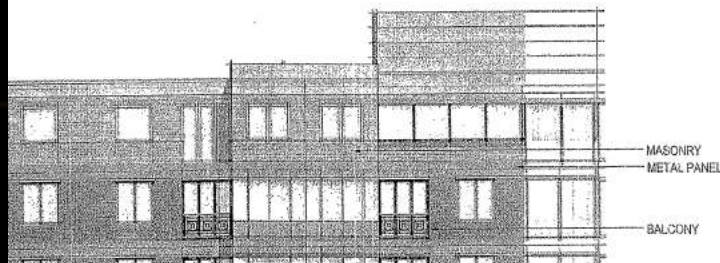
NORTH PARK - AERIAL
PERSPECTIVE (ILLUSTRATIVE)

(NTS)

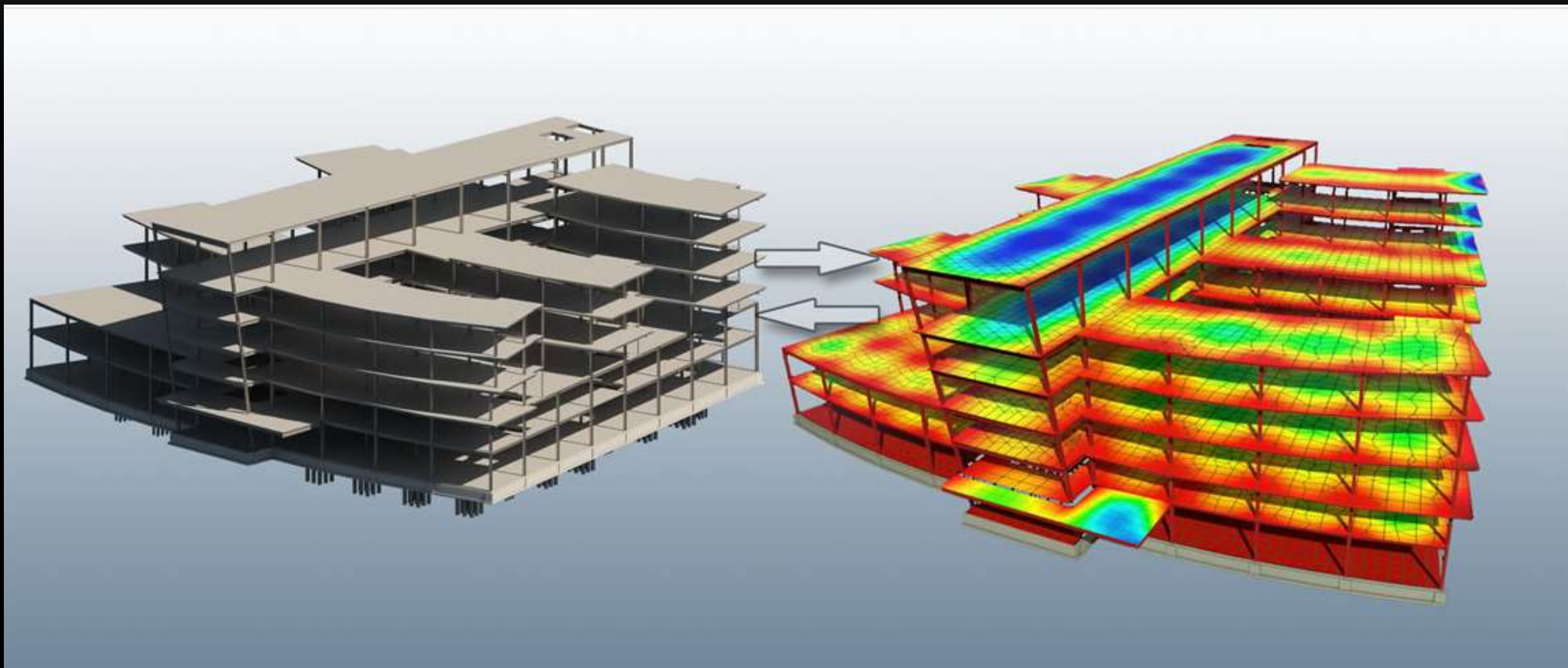


TOWNHOUSE CORNER UNIT

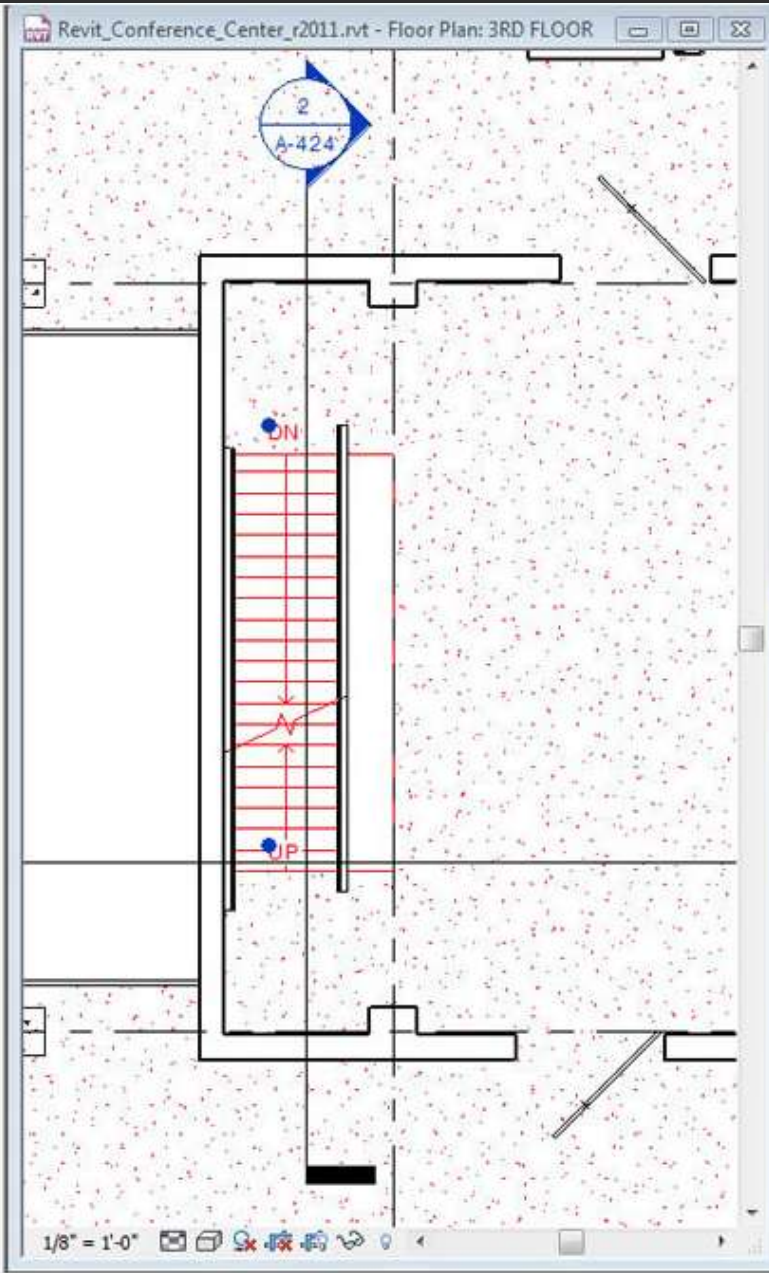
(NTS)



WHAT SHOULD FUTURE SUBMISSIONS LOOK LIKE?



- Revit_Conference_Center_r20...
- Views (all)
- Floor Plans
 - 1ST FLOOR
 - 1ST FLOOR - WOF
 - 1ST FLOOR ANNC
 - 1ST LS LOBBY
 - 1ST LS NW SERVI
 - 1ST LS STAIR 1
 - 1ST LS STAIR 2
 - 1ST LS STAIR 3
 - 1ST LS STAIR 5
 - 2ND FLOOR
 - 2ND FLOOR - OFFI
 - 2ND FLOOR ANNC
 - 2ND LS NW SERV
 - 2ND LS STAIR 1
 - 2ND LS STAIR 3
 - 2ND LS STAIR #2
 - 3RD FLOOR
 - 3RD FLOOR ANNC
 - 3RD FLOOR NE RE
 - 3RD LS NW SERV
 - 3RD LS STAIR1
 - 3RD LS STAIR 2
 - 3RD LS STAIR 3
 - 4TH FLOOR
 - 4TH FLOOR ANNO
 - 4TH LS NW SERVI
 - 5TH FLOOR
 - 5TH FLOOR EXHIE
 - 6TH FLOOR
 - 7TH FLOOR
 - 8 ROOF
 - B1 BASEMENT
 - B1 BASEMENT - C
 - B1 BASEMENT - S
 - B1 BASEMENT - S
 - B1 BASEMENT - W
 - B1 BASEMENT AN
 - B1 BASEMENT FIN
 - B1 BASEMENT ST.
 - B1 BASEMENT ST.
 - B1 BASEMENT ST.
 - B1 BASEMENT ST.



Interference Report

Group by: Category 1, Category :

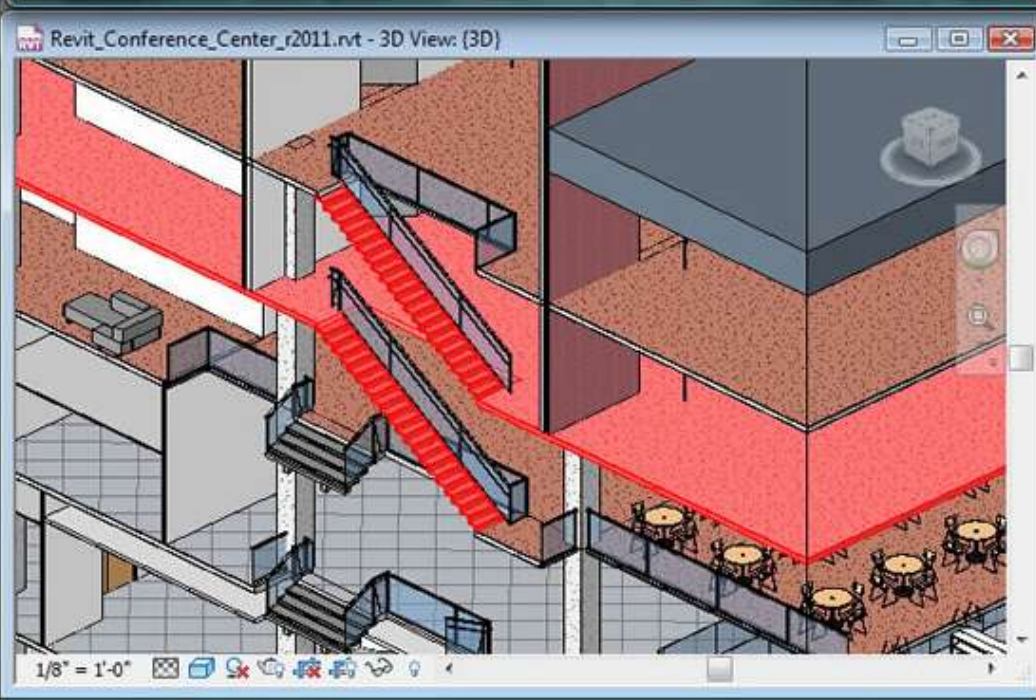
Message	
+	Stairs
+	Stairs
+	Stairs
+	Stairs
	Floors : Floor : Upper Floors - Carpet on Concrete : id 285499
	Stairs : Stair : 7" max riser 11" tread grand : id 316245
+	Stairs
+	Stairs

Created: Wednesday, January 28, 2010 12:14:21

Last Update:

Note: Refresh updates interferences listed above.

Show Export... Refresh Close



NSDI THOUGHTS

- Existing Framework data sets are important
- Need to re-evaluate the requirements for them
 - E.g., LIDAR in the elevation data set
 - Topology and address points in transportation due to Next Gen 9-1-1

END RESULT: INCREASINGLY DETAILED MODEL OF FAIRFAX –
WIDELY AVAILABLE



TOM CONRY

GIS Manager

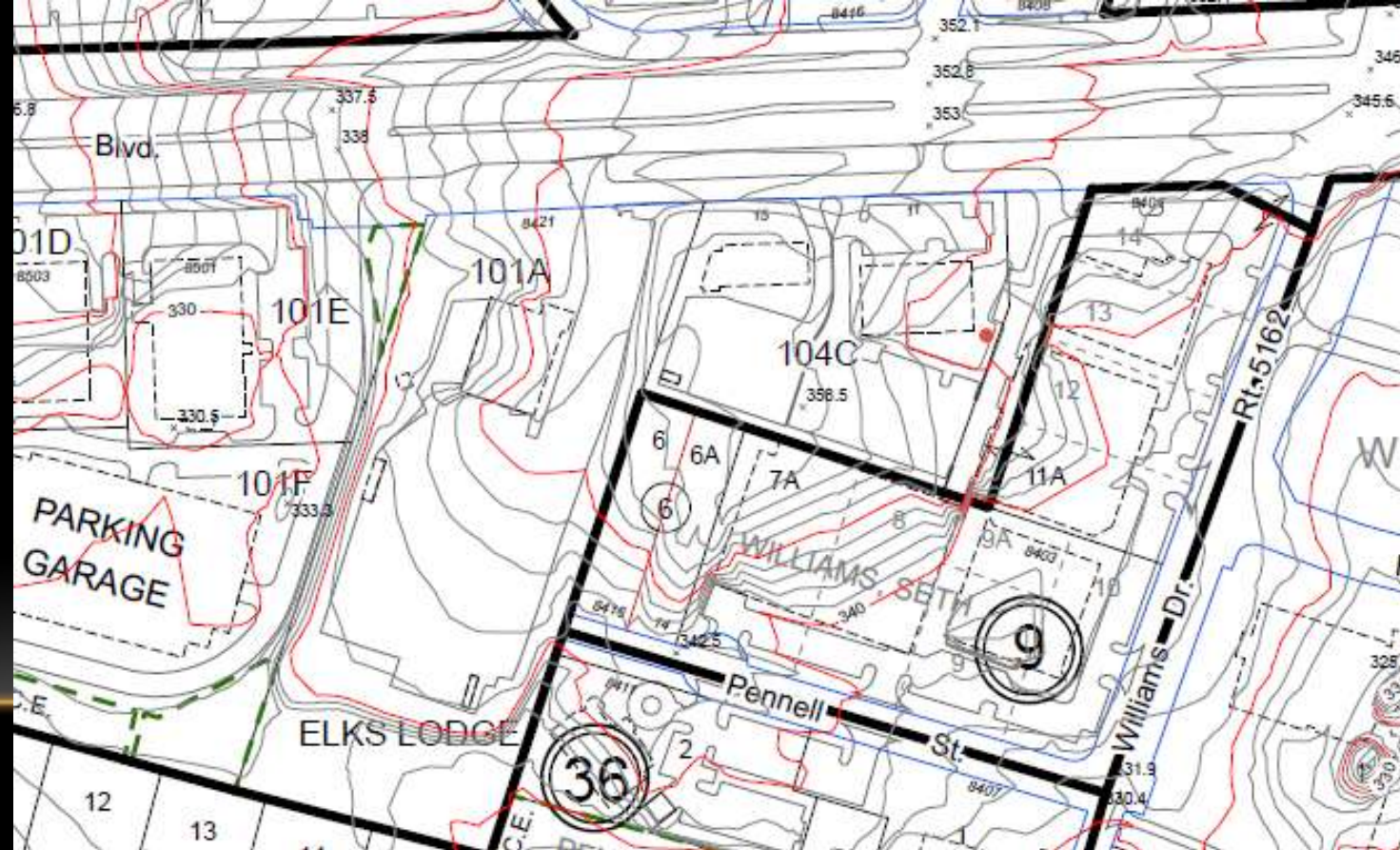
Fairfax County

Thomas.conry@fairfaxcounty.gov

703-324-3909

THEN

- GIS data was predominantly 2-D:
 - Planimetric data
 - Orthophotos
 - Topographic (3-D) data



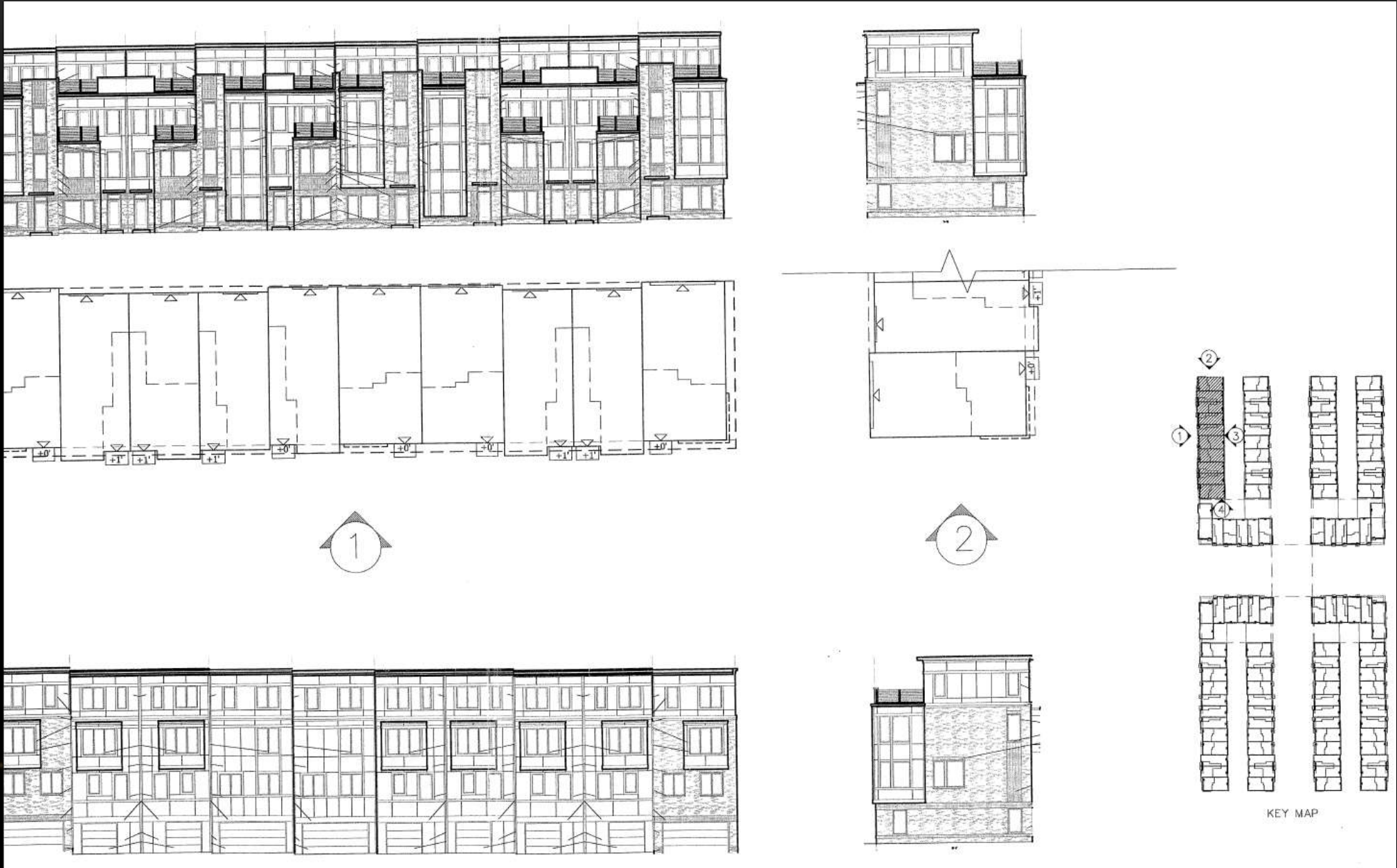
RESTON TOWN CENTER NOON YESTERDAY



RESTON TOWN CENTER 5PM YESTERDAY



SITE PLANS CONTINUED



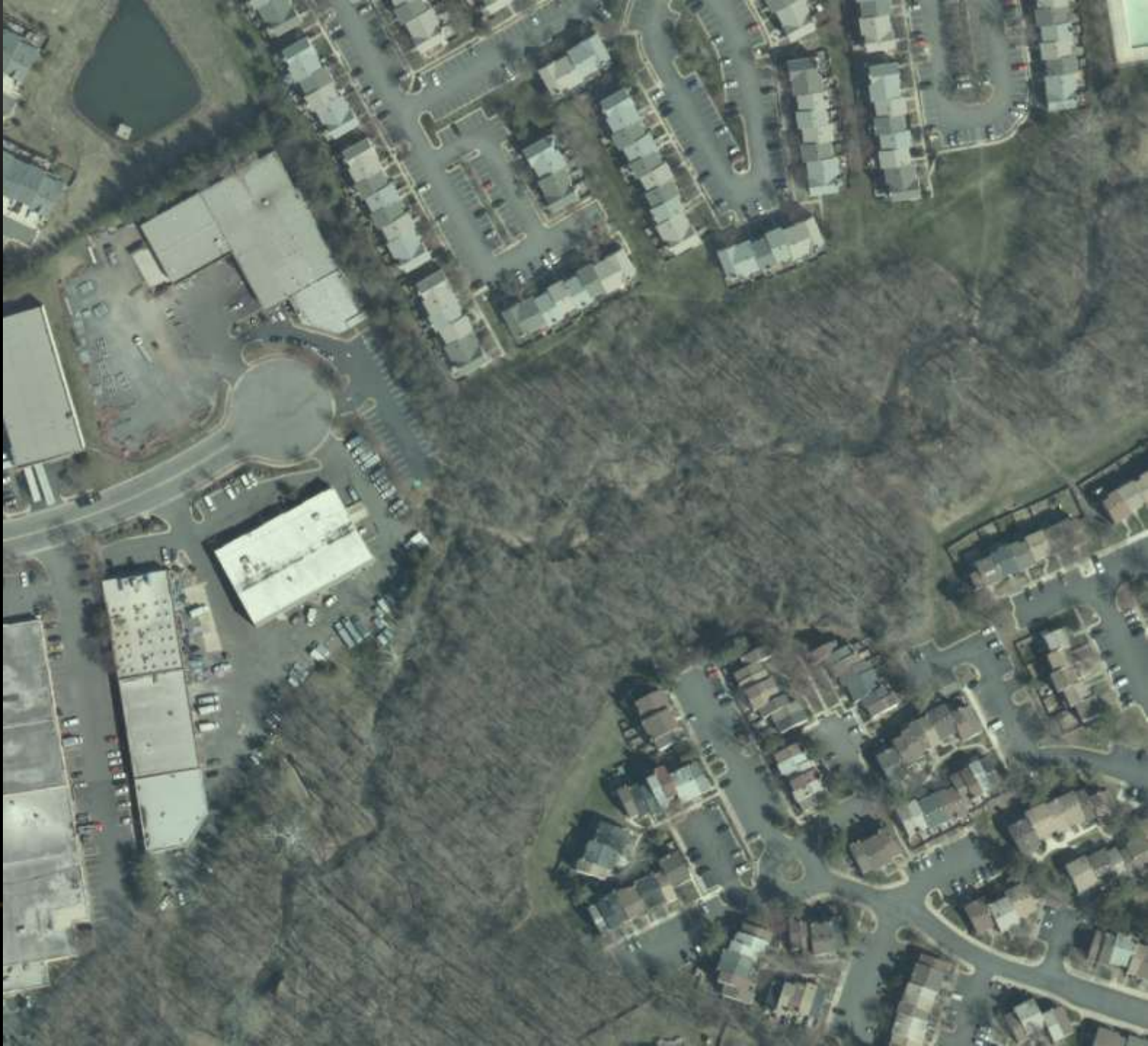
QUESTIONS ON NEXT STEPS

- Digital Submissions?
 - Beyond PDF?
 - BIM?
 - Who should engage?
-

COUNTY'S LAND INFORMATION SYSTEMS

- Existing systems are approaching the end of their lifecycle (legacy, technology changes)
 - LDS
 - PAWS
 - ZAPS
 - FIDO
 - Active discussions on their replacement are underway
-

EVOLUTION



Aerial Photography

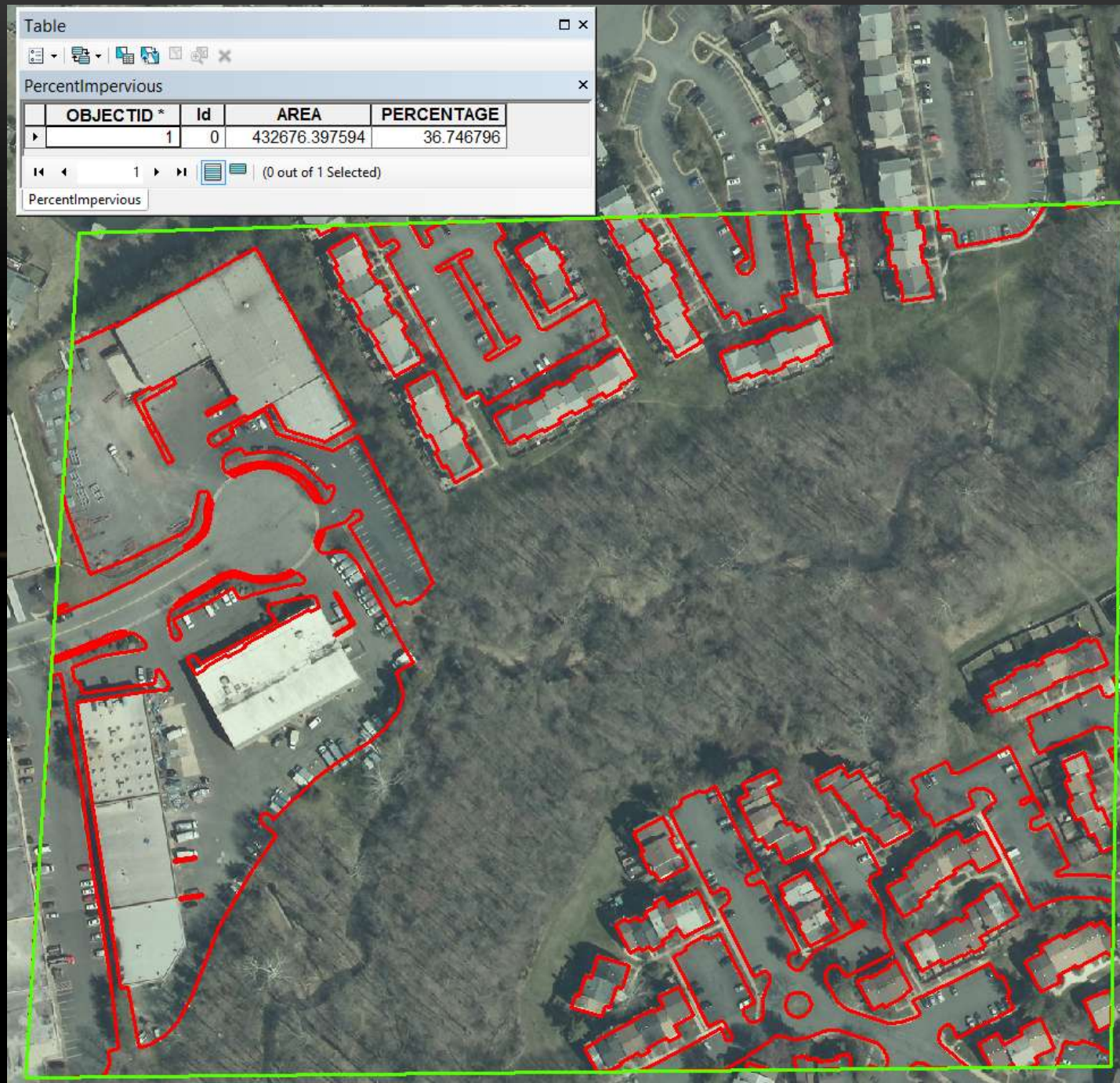


Planimetric Impervious



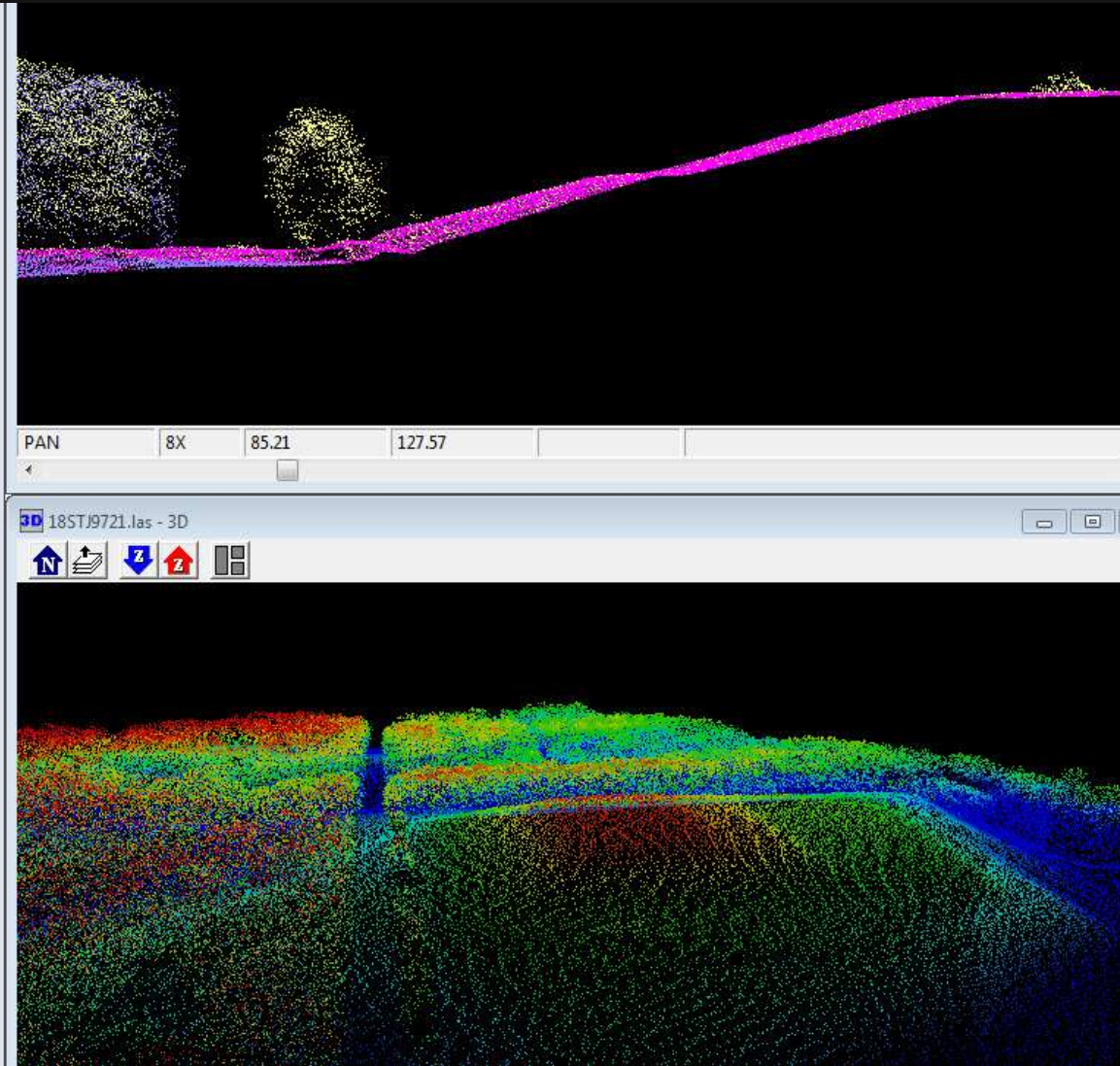
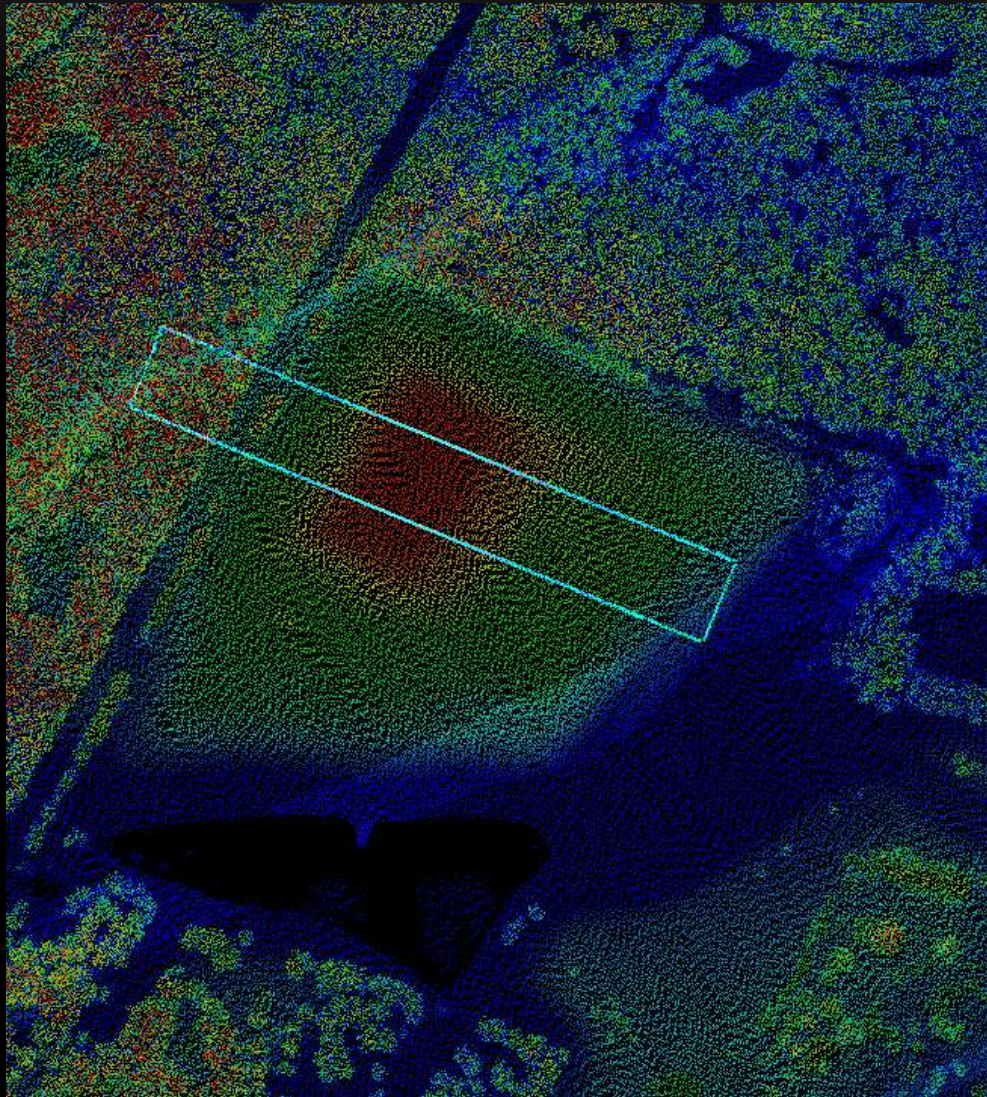
Planimetric Impervious

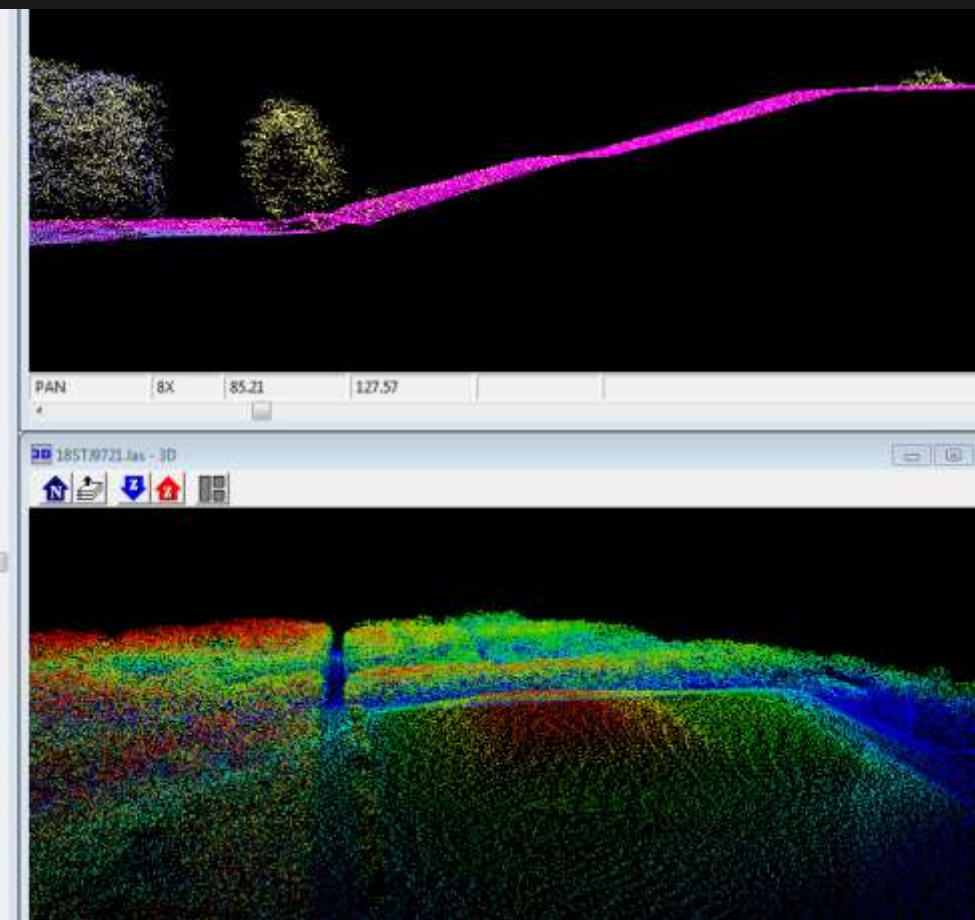
Impervious Percentage



AND NOW

- 3-D Data vastly more useable
 - Cost & Quality





LiDAR

+



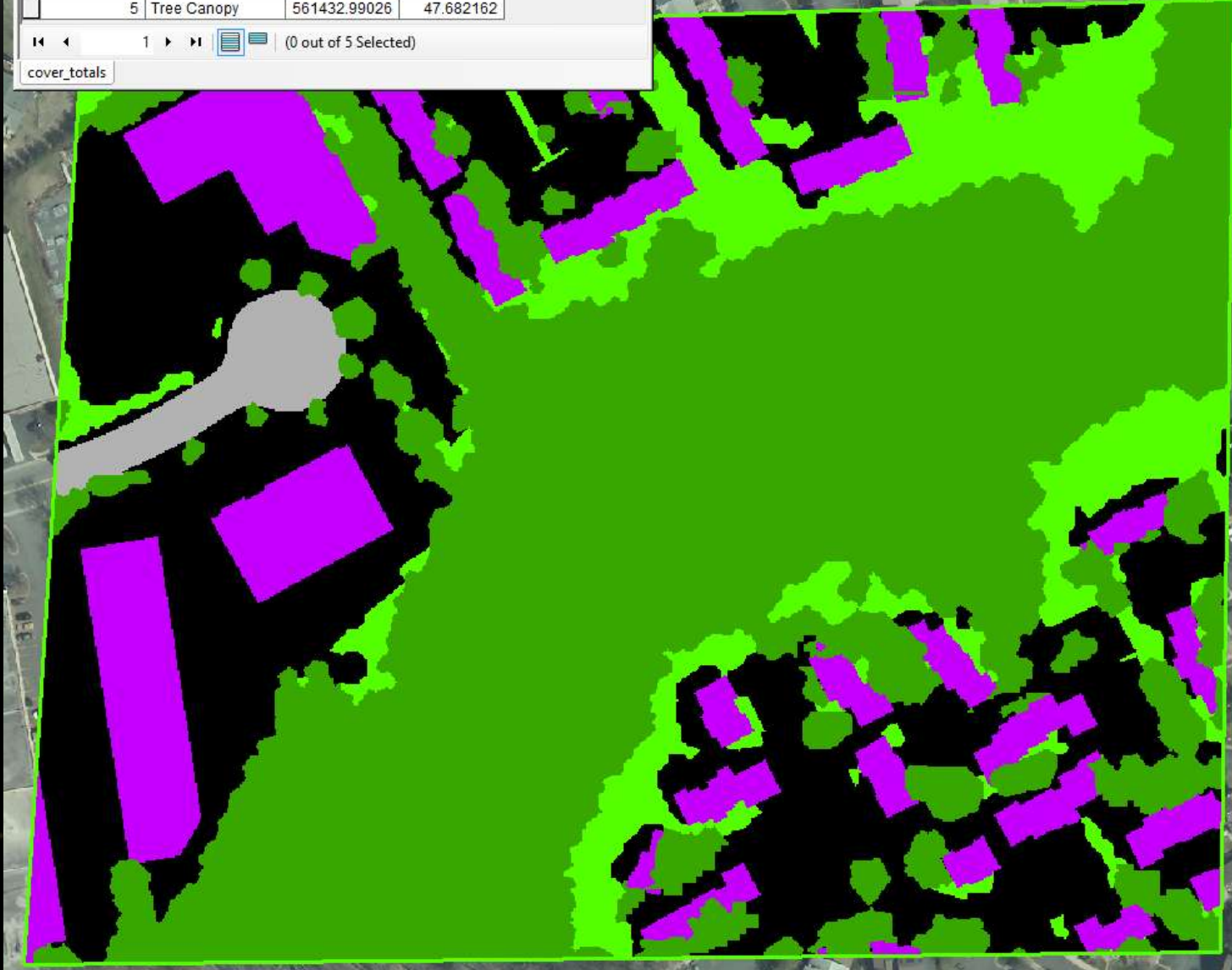
Multispectral Satellite Imagery

Table

cover_totals

OBJECTID*	CoverType	AREA	PERCENTAGE
1	Buildings	151429.61890	12.860825
2	Grass_Shrub	127808.75704	10.85472
3	Other Impervious	314882.29077	26.742761
4	Roads	21002.437721	1.783724
5	Tree Canopy	561432.99026	47.682162

(0 out of 5 Selected)



LAND COVER

LIDAR & PLANIMETRIC SURFACES COMPARED

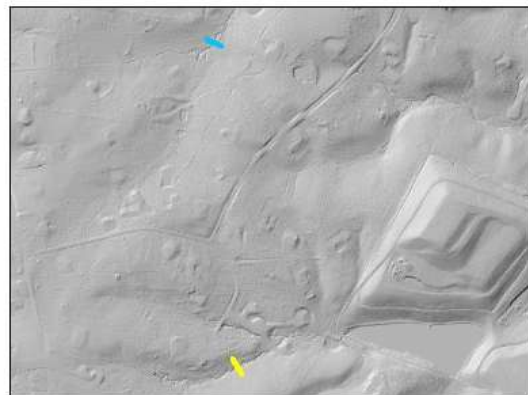


Figure 1. 2012 LiDAR DEM

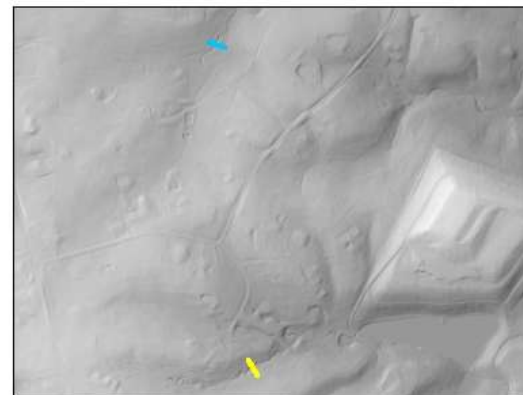


Figure 2. 2009 Planimetric DEM

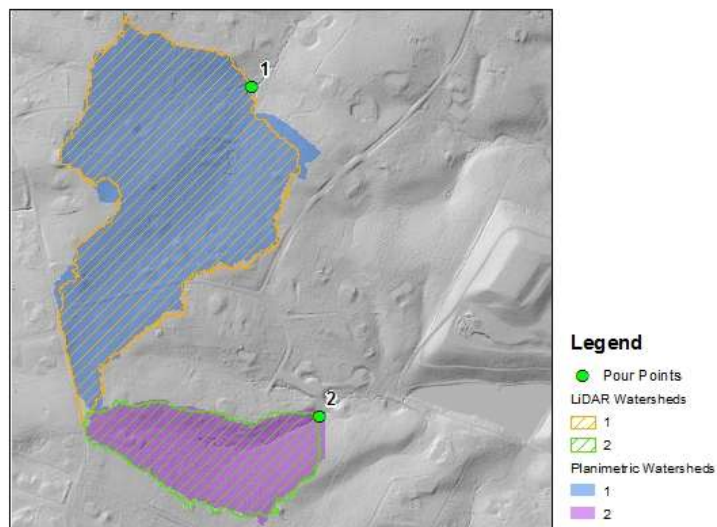


Figure 3. Watershed Comparison

VIRTUAL FAIRFAX

THIS IS NOT NEW – RICHLAND COUNTY SC

In addition to standard paper documents, each engineering document/plan delivered to Richland County will be accompanied by several digital files relating to that submission. Digital files to be submitted include:

- A completed original CAD drawing in .dxf format named using the development name (ie. Earlewood_phases56.dxf). This file shall include all layers and graphic elements included in the submitted paper document (geography, text, legend, scale, labels, etc.). This file will include features classified in the standard layers defined in Appendix A. If the drawing contains layers that are not included in Appendix A, then a list of these layers shall also be submitted (ASCII text file labeled: 'subdivisionname_phasesXX_xlyrspec.txt'). The completed CAD drawing file shall contain text in standard fonts that can be read without third-party software.