2026 SURVEYORS' Conference

Survey, Tax Parcel Maps and GIS

Kevin Zelinsky

JANUARY 11-14,2026 | HERSHEY, PA

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Kevin Zelinsky, GISP, CMS

Kevin Zelinsky is the **Tax Map/GIS/CADD Department Manager and Senior Associate** with Remington & Vernick Engineers. He oversees the entire mapping operation for the firm's eleven regional offices located throughout Pennsylvania, New Jersey, Delaware, Maryland, and North Carolina. Kevin received his GISP certification from URISA in 2004, earned his Certified Mapping Scientist, GIS/LIS certification from ASPRS in 2006, and received his Professional Certificate in Geomatics from Rutgers University in 2008. He has over forty years of experience in the civil engineering and cartographic industry, and his municipal maps have been honored with a variety of awards for excellence. Kevin is an adjunct professor, Instructor of Intro to GIS, Rowan College of South Jersey and is also a member of the GIS Certification Institute (GISCI) Outreach Committee.

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OUTLINE

2026 SURVEYORS' Conference

- What Is A Property Survey and Why Is It Important?
- Why GIS Doesn't Replace the Need for Surveyors
- Define features and technical aspects of GIS
- Demonstrate implementations of GIS utilizing available GIS Resources
- Demonstrate implementations of GIS in tax parcel maps and land surveying projects
- Demonstrate interoperability between GIS and CAD systems
- Metadata

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What is a Property Survey & Why is it Important

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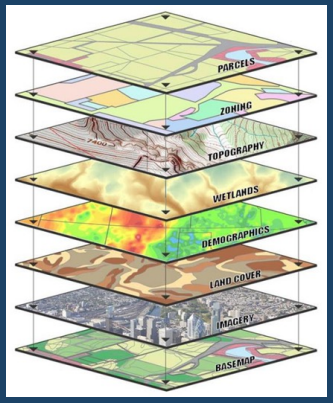
What is a Property Survey?

- You can have your property surveyed at any time, but you will most likely hire a surveyor when you're buying a home or constructing something.
- Most mortgage companies require a property survey to make sure the property is worth the amount of money they're providing in the loan.
- However, the property survey is not always legally required. Some mortgage companies will be satisfied with title insurance.
- A property surveyor will research into the property before they even look at the land.
- They'll research the history of the deed and may include a title search.
- This title search makes sure there are no discrepancies when it comes to who owns the land.



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What is a Property Survey & Why is it Important

Then, the surveyor will actually go out to the property and sketch out the land, its boundaries, and different elements that make up your property.

This is called the fieldwork.

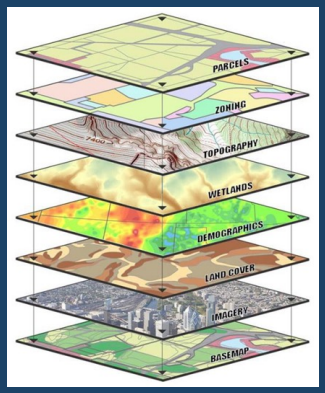
After surveying, they will provide a type of map detailing the property's legal boundaries.

The survey will also include a written description of the property, the street address, the location of buildings and adjacent properties, and any improvements a homeowner can make to the land.

A property survey also includes things like right-of-ways and easements.

These are elements that detail what to do with shared yards or driveways, or if your neighbor has a right of way to the street or alleyway between your homes.

All property surveys begin with research into legal descriptions about the land they'll be surveying and its history.



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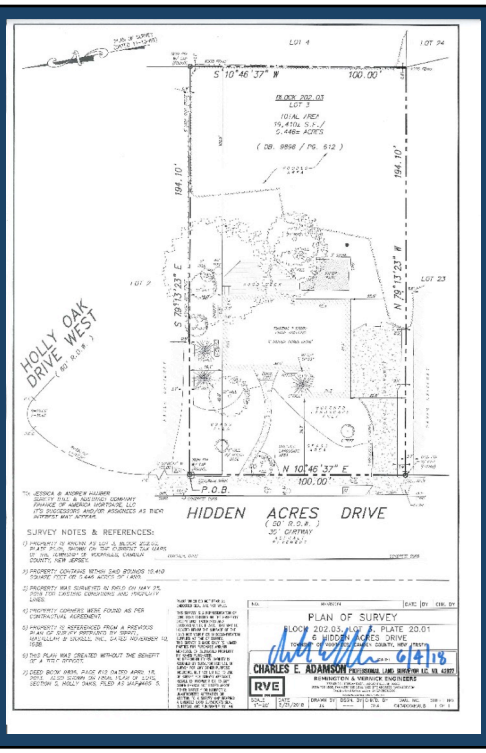

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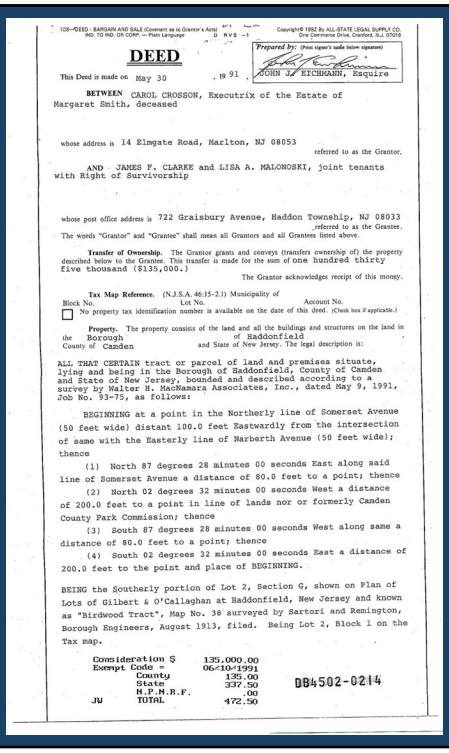

109—DEED - BARGAIN AND SALE (Covenant as to Grantor's Acts) INDIVIDUAL OR CORP. — Plain Language

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Prepared by: (Print signer's name below signature)
JOHN J. EICHMANN, Esquire

DEED

This Deed is made on May 30, 19 91

BETWEEN CAROL CROSSON, Executrix of the Estate of Margaret Smith, deceased

whose address is 14 Elmgate Road, Marlton, NJ 08053 referred to as the Grantor.

AND JAMES F. CLARKE and LISA A. MALONOSKI, joint tenants with Right of Survivorship

whose post office address is 722 Graisbury Avenue, Haddon Township, NJ 08033 referred to as the Grantee.

The words "Grantor" and "Grantee" shall mean all Grantors and all Grantees listed above.

Transfer of Ownership. The Grantor grants and conveys (transfers ownership of) the property described below to the Grantee. This transfer is made for the sum of one hundred thirty five thousand ($135,000.)

The Grantor acknowledges receipt of this money.

Tax Map Reference. (N.J.S.A. 46:15-2.1) Municipality of
Block No. Lot No. Account No.
☐ No property tax identification number is available on the date of this deed. (Check box if applicable.)

Property. The property consists of the land and all the buildings and structures on the land in the Borough of Haddonfield
County of Camden and State of New Jersey. The legal description is:

ALL THAT CERTAIN tract or parcel of land and premises situate, lying and being in the Borough of Haddonfield, County of Camden and State of New Jersey, bounded and described according to a survey by Walter H. MacNamara Associates, Inc., dated May 9, 1991, Job No. 93-75, as follows:

BEGINNING at a point in the Northerly line of Somerset Avenue (50 feet wide) distant 100.0 feet Eastwardly from the intersection of same with the Easterly line of Narberth Avenue (50 feet wide); thence

(1) North 87 degrees 28 minutes 00 seconds East along said line of Somerset Avenue a distance of 80.0 feet to a point; thence

(2) North 02 degrees 32 minutes 00 seconds West a distance of 200.0 feet to a point in line of lands nor or formerly Camden County Park Commission; thence

(3) South 87 degrees 28 minutes 00 seconds West along same a distance of 80.0 feet to a point; thence

(4) South 02 degrees 32 minutes 00 seconds East a distance of 200.0 feet to the point and place of BEGINNING.

BEING the Southerly portion of Lot 2, Section G, shown on Plan of Lots of Gilbert & O'Callaghan at Haddonfield, New Jersey and known as "Birdwood Tract", Map No. 38 surveyed by Sartori and Remington, Borough Engineers, August 1913, filed. Being Lot 2, Block 1 on the Tax map.

Consideration $	135,000.00	
Exempt Code =	06-10-1991	
County	135.00	
State	337.50	DB4502-0214
N.P.M.R.F.	.00	
JU TOTAL	472.50	

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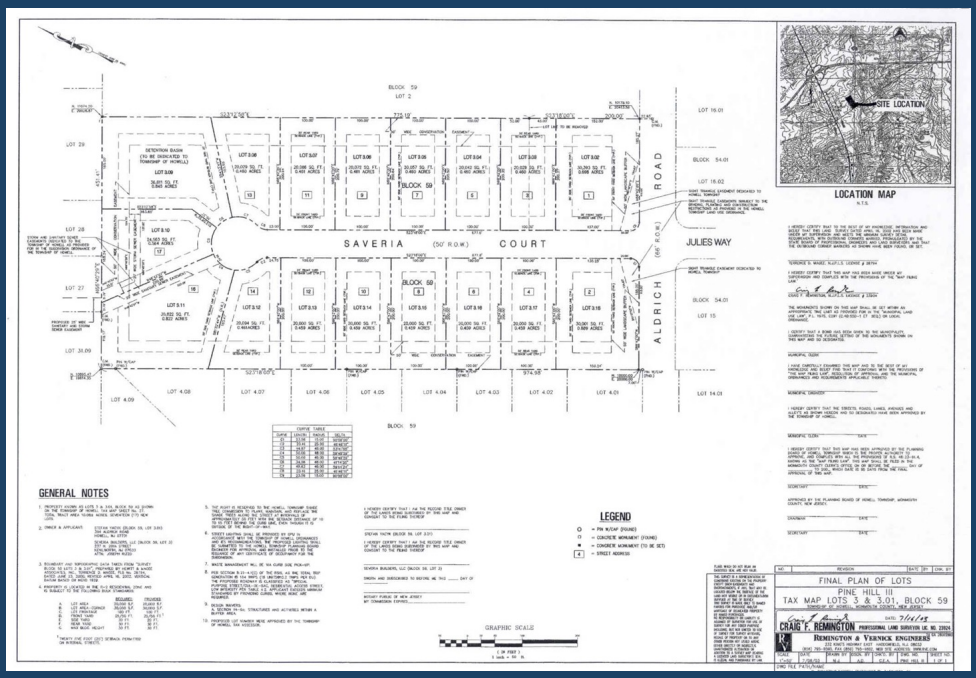

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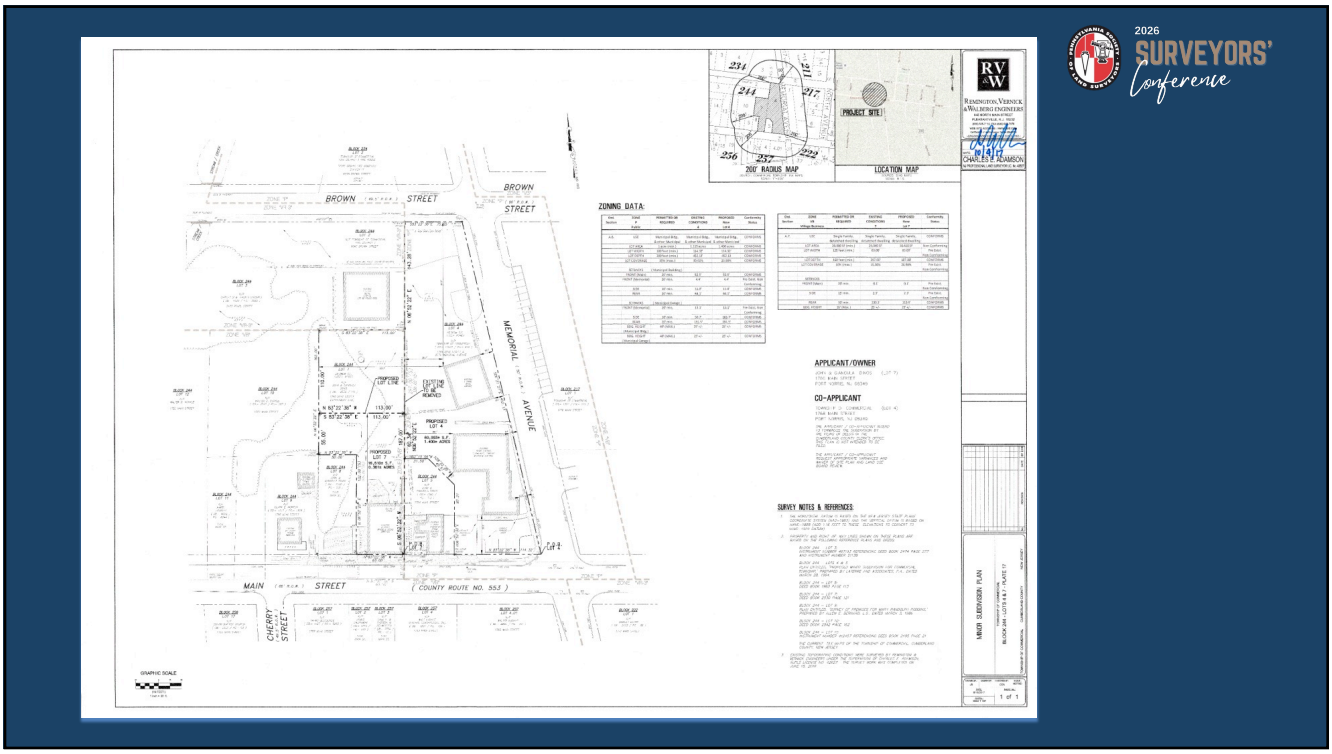

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Did you know that 3 of the presidents on Mount Rushmore were surveyors?

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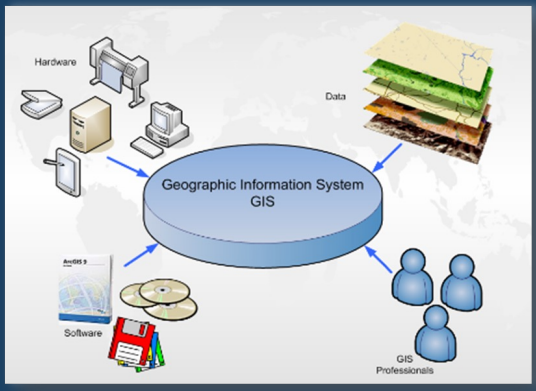
Elements of GIS: Definition

G - spatial (geographic) data we use everyday
I - database aspect - incorporating databases documenting spatial data
S - synthesis of spatial data with attribute information from data base

A **Geographic Information System (GIS)** integrates hardware, software, and data for capturing, managing, analyzing, and displaying all forms of geographically-referenced information.



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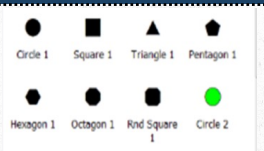
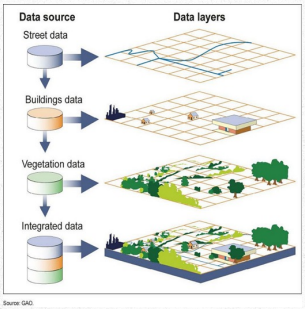
GIS Fundamentals

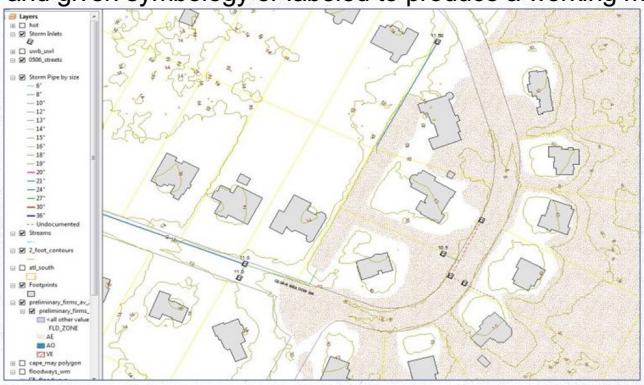
Data exists as Points, Lines or Polygon

- Point data example: Fire Hydrant, Utility Pole
- Line data example: Sewer Main, Interceptor, Streams
- Polygon data example: Tax Parcel, Lake, Service Area



Features are overlaid together and given symbology or labeled to produce a working map





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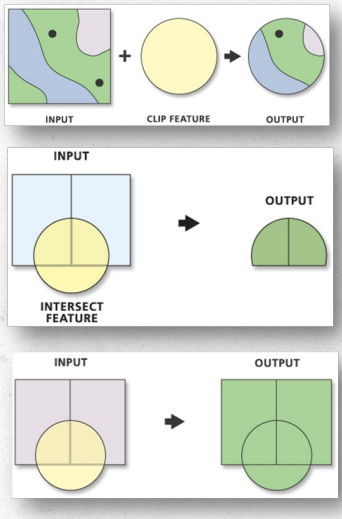
GIS Analysis: Clip; Intersect; Union



- **Clip** - Extracts input features that overlay the clip features; use this tool to cut out a piece of one feature class using one or more of the features in another feature class as a "cookie cutter"
- **Intersect** - Computes a geometric intersection of the input features; features or portions of features, which overlap in all layers and/or feature classes, will be written to the output feature class
- **Union** - Computes a geometric union of the Input Features; all features will be written to the Output Feature Class with the attributes from the Input Features, which it overlaps

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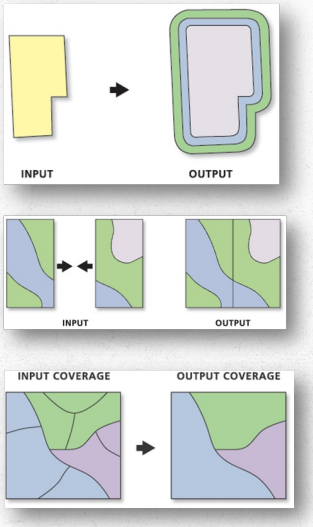
Buffers; Merge; Dissolve



Buffers - Creates buffer polygons around input features to a specified distance

Merge - Combines multiple input datasets of the same data type into a single, new output dataset

Dissolve - Aggregates features based on specified attributes

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Why GIS doesn't replace the need for Surveyors

- With all the readily available aerial and satellite imagery, it is a legitimate questions to ask if GIS can be used to replace surveyors to understand property issues and to resolve legal disputes involving parcel lines.
- The ability to access Google Maps or a local agency's online mapping application to look up parcel lines and overlay them with aerial photography provides a good overview and can provide some answers to property questions.
- However, all of this geographic data can't replace legal boundary data.
- Property lines are not physical entities that are visible on aerial imagery or on base map data such as street networks.
- Those lines are created through a network of reference points (usually markers or "monuments" buried underground) and surface measurements between those points.
- This is what surveyors call "ground evidence," or legal boundary data.
- GIS data is pulled together from a variety of sources with varying degrees of accuracy and precision.
- Overlaid together, the error found within each dataset is amplified.
- Therefore, overlaying a parcel database that may have an accuracy of +/- 10 feet onto aerial imagery with an accuracy of +/- 30 feet can lead to features ending up over 80 feet away from their true point.

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Why GIS doesn't replace the need for Surveyors

- In addition, sometimes the source data is unknown, and the accompanying metadata is missing that would provide the user with an understanding of the currency and accuracy of the data.
- Legal disputes that arise over the precise location of property boundary lines need to be resolved based on the origination and use of legal boundary data documented over time by licensed surveyors.
- Surveying is highly regulated and comes with legal requirements for the methods used to record property information.
- Surveyors are required by law to meet standards for experience and to pass examinations in order to be licensed.
- These laws are, in effect, consumer protection laws that ensure property rights and public safety.
- Therefore, locating your property lines on the ground will still require the preparation of a current survey from a reputable, professional land surveyor.
- If you want to avoid potential conflicts with your adjacent property owners that might lead to litigation, a proper land survey provided under the duties and obligations of professional licensure is still your best insurance.
- If you are ever sued for encroachment of another's property, which can be a financial burden for most individuals or businesses, a professionally prepared and sealed land survey, based on the highly relevant legal boundary data, is still an excellent defense.

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GIS Data Types

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Three main categories of data for GIS maps

Feature data, including GIS shapefiles

- Feature data, image data and grid data are the three main categories of data for incorporation into GIS maps.
- Feature data includes the standard GIS file format for geographic features and attribute data, known as the shapefile.

Image data

- Image data includes aerial photography, satellite photos and scanned maps.
- Image data is also referred to as raster data.

Grid data

- Grid data is composed of numerous grid cells, similar to a sheet of graph paper.
- Each cell contains a very small portion of the overall map or aerial photograph.
- Grid data is also referred to as raster data.

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Elements of GIS: Data Types

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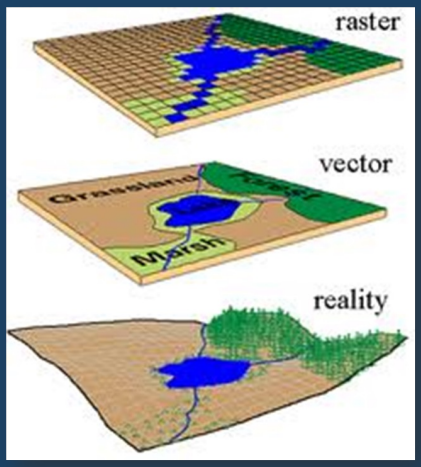
- **Vector Data (Points, Lines, Polygons)**
  - Esri shapefile
  - AutoCAD .dwg files
  - Microstation .dgn files
  - TIN (Triangular Irregular Network)
  - Geodatabase
- **Raster Data**
  - TIFF
  - JPEG
  - MrSID
  - DEM (Digital Elevation Model)
  - Lidar – "Light Detection And Ranging"



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Elements of GIS: Software

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Selected Commercial GIS Software Packages

- Environmental Systems Research Institute (Esri®) (ArcGIS)
- Autodesk (AutoCAD® Map 3D)
- Bentley Systems (MicroStation and Bentley Map)

Selected Free GIS Software Packages

- Google Earth
- Esri ArcGIS Online
- Quantum GIS

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Vector & Imagery Data

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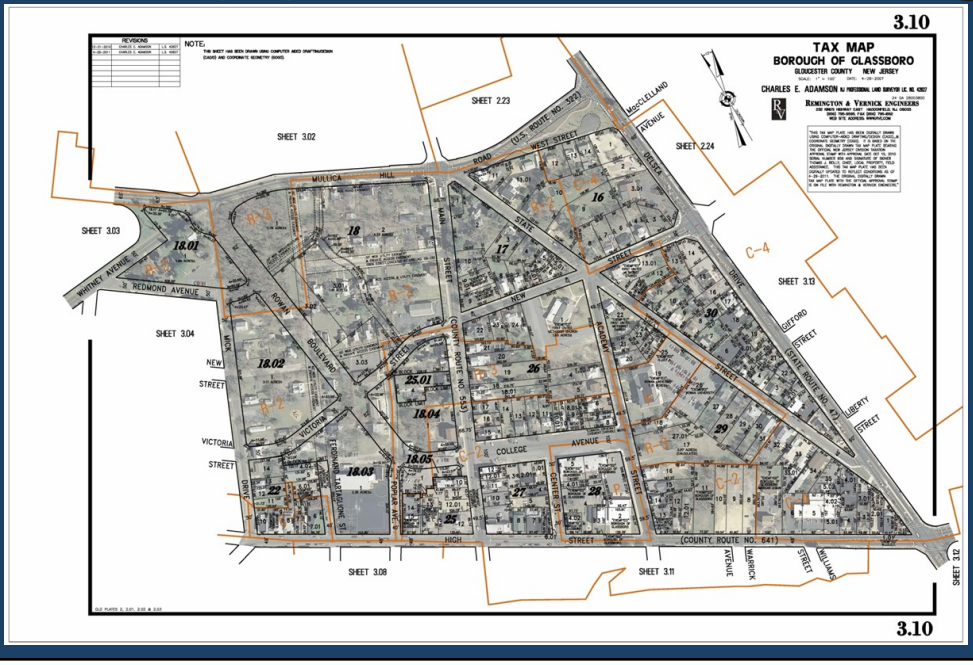

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Elements of GIS: Data Sources

- **NJGIN -** (New Jersey Geographic Network)
- **NJDEP -** (iMap)- (GIS Resource Data)
- **NWI -** (National Wetland Inventory)
- **NAIP -** (National Agriculture Imagery Program) Imagery
- **FEMA -** (Federal Emergency Management Agency/FIRMettes)
- **NGS -** (National Geodetic Survey)
- **NRCS -** (National Resource Conservation Service)
- **NJACTB -** (New Jersey Association of County Tax Boards)
- **PASDA -** (Pennsylvania Spatial Data Access)
- **ESRI –** (Environmental Systems Research Institute)
  - ArcGIS On Line-(Esri's free on line mapping tool and resources)

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Map Projections

- All GIS data layers must be in the same map projection in order to combine data accurately
- New Jersey State Plane Coordinate System and North American Datum of 1983 (NAD 83) (soon to be 2022 Datum in 2025/2026)
- Common denominator for sharing GIS data
- Used by the NJDEP and other local agencies

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Elements of GIS: GIS Professionals

- GIS Professionals come from many different backgrounds, just like surveyors
- Many educational opportunities for learning GIS are available
- GIS Professionals have voluntary certification programs

- GIS Professionals are licensed as “GIS Surveyors” in South Carolina
- Companies can apply for and be elected by the GIS Certification
- Institute (GISCI) as a GISCI Endorsing Employer

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Field Survey of Data Collected Features

Survey Teams can field collect and/or locate asset data using GPS survey methods, including ESRI Field Map application.

Such as:
- Location/elevation of utility structures
- Location of existing facilities
- Location of existing Roadways
- Property boundaries/corners
- Wetland boundaries
- Flood elevations

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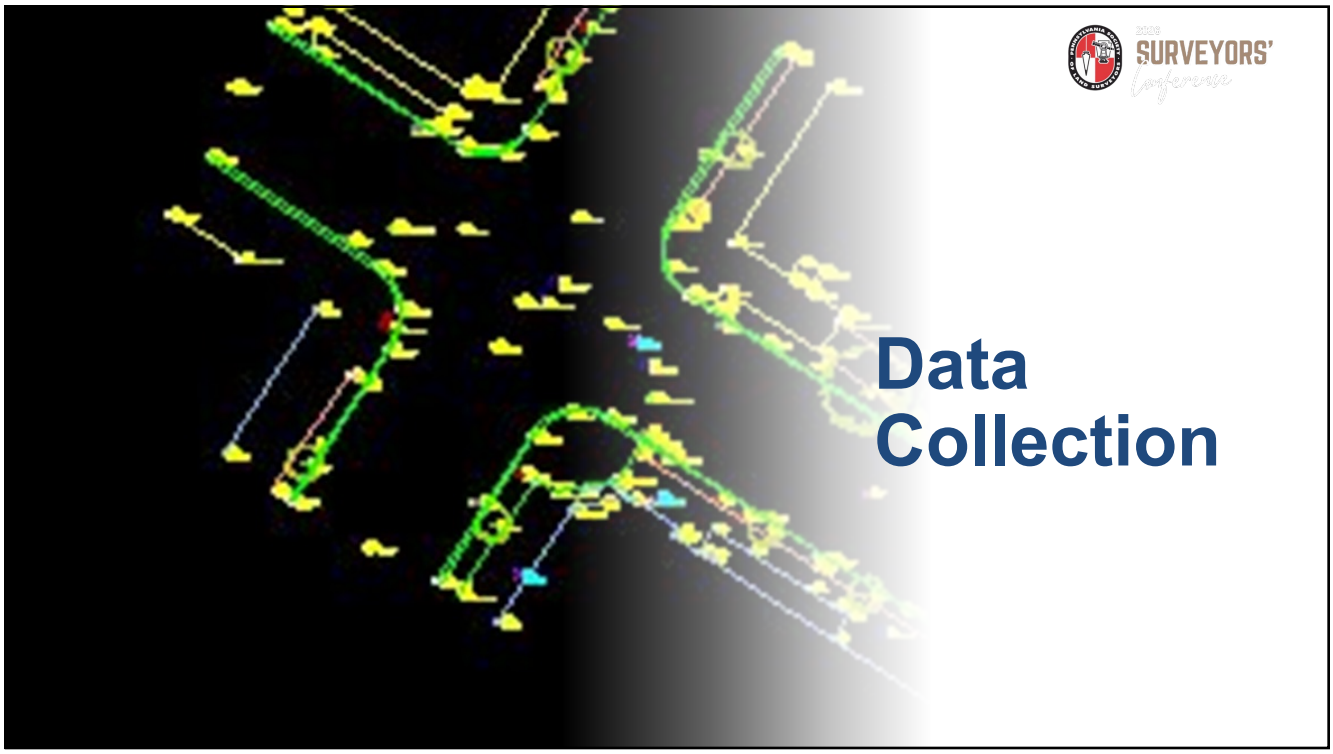
2026
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Conference
Data
Collection

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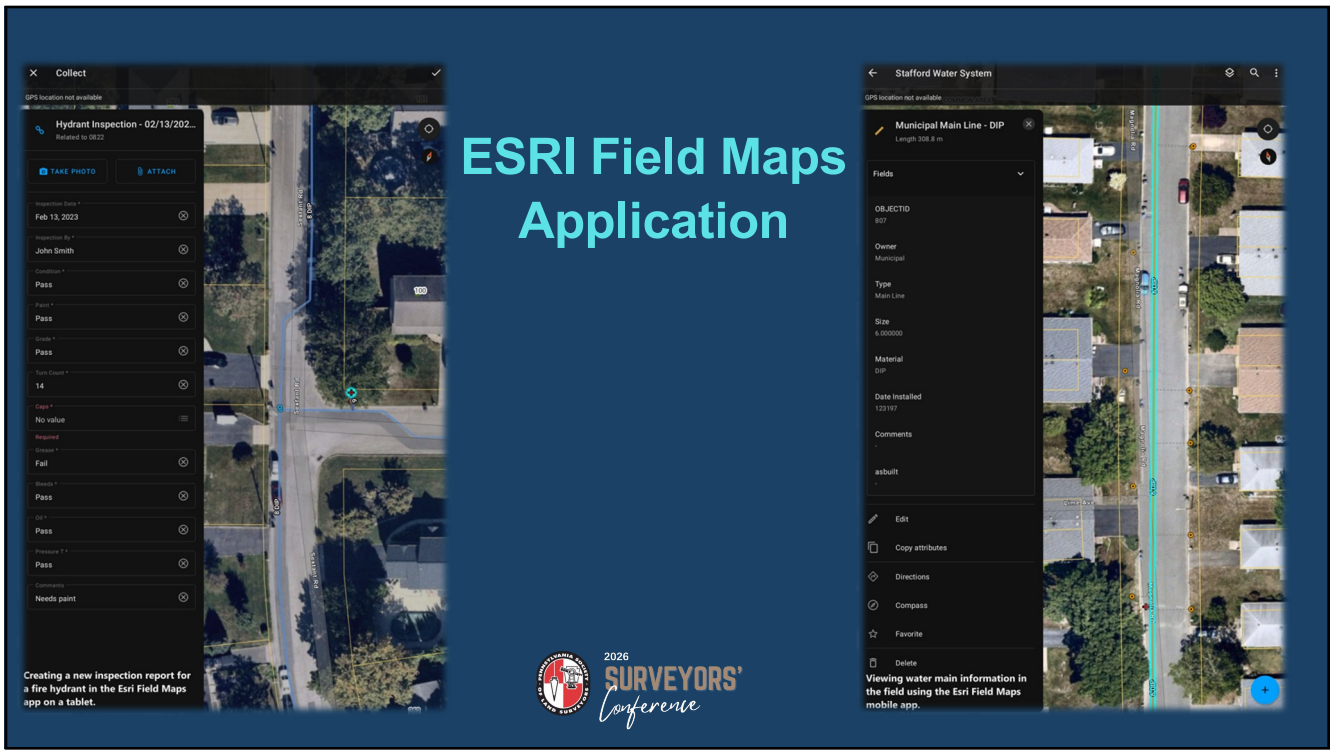
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Hydrant Inspection - 02/13/202...
Related to 0822
TAKE PHOTO
ATTACH
Feb 13, 2023
John Smith
Pass
Pass
Pass
14
No value
Fail
Pass
Pass
Pass
Needs paint
Creating a new inspection report for a fire hydrant in the Esri Field Maps app on a tablet.
ESRI Field Maps
Application
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Stafford Water System
GPS location not available
Municipal Main Line - DIP
Length 308.8 m
Fields
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Main Line
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Material
DIP
Date Installed
123197
Comments
asbuilt
Edit
Copy attributes
Directions
Compass
Favorite
Delete
Viewing water main information in the field using the Esri Field Maps mobile app.

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New Datums: Replacing NAVD 88 and NAD 83

- To improve the National Spatial Reference System (NSRS), NGS will replace the North American Horizontal Datum of 1983 (NAD 83) and the North American Vertical Datum of 1988 (NAVD 88) with a new geometric reference frame and geopotential horizontal and vertical datum in 2022. NGS plans to roll out components or the modernization in 2025 (most likely in BETA). Will probably not be finalized until 2026.
- The new reference frames will rely primarily on Global Navigation Satellite Systems (GNSS), such as the Global Positioning System (GPS), as well as on a gravimetric geoid model resulting from our Gravity for the Redefinition of the American Vertical Datum (GRAV-D) Project.
- These new reference frames will be easier to access and to maintain than NAD 83 and NAVD 88, which rely on physical survey marks that deteriorate over time.
- In 2025/2026 the U.S. American survey foot is going to change to the International survey foot. The U.S. survey foot will only exist when you transform NATRF2022 to NAD83. (In stated where NAD83 was defined in U.S. survey foot)

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4 New Modernizations (Horizontal) Replacing NAD 83

- North American Terrestrial Reference Frame of 2022 (NATRF2022).
  - This is the one we and most of the continental United States will use.
- Pacific Terrestrial Reference Frame of 2022 (PATRF2022)
- Caribbean Terrestrial Reference Frame of 2022 (CATRF2022)
- Mariana Terrestrial Reference Frame of 2022 (MATRF2022)

Current epoch for NATRF2022 is epoch 2020.0
Datum should be written as NATRF2022 (EPOCH 2020.0)
Epoch is going to be updates every 5 to 10 year (still not determined)
Showing the proper reference epoch will be critical

NAVD 88 will be replaced with:

North American-Pacific Geopotential Datum of 2022 (NAPGD2022)

- Based of strength of gravity
- This is why we did GPS on Benchmarks
- No leveling was used to determine heights

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Important Guidelines

- Geography is intrinsic to the work we do, which demonstrates the value of GIS.
- “GIS/LIS developers should keep in mind that it is easy to build a less accurate map on a more accurate base, but virtually impossible to build a more accurate map on a less accurate base.”
- Multipurpose Land Information Systems: The Guidebook
- Federal Geodetic Control Committee

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GIS and CADD Software Products

Esri ArcGIS
- Highly recommended by industry analysts
- Used by the NJDEP
- The world’s most popular GIS software
- Links traditional database sources, graphics and maps
- Completely integrated analysis system
- www.esri.com

Autodesk, Inc., is an American multinational software corporation that makes software for the architecture, engineering, construction, manufacturing, media, and entertainment industries. AutoCAD was designed as drafting tool.

Bentley Systems, Incorporated, is a software company that produces solutions for the design, construction and operation of infrastructure, used to design, engineer, build, and operate large constructed assets such as roadways, railways, bridges, buildings, industrial and power plants and utility networks. MicroStation was designed as platform.

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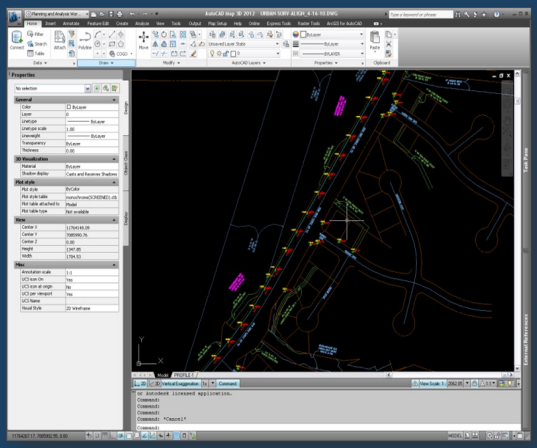
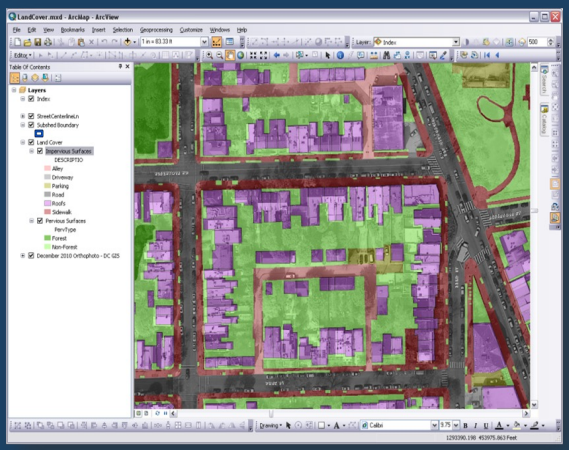
GIS Concepts: Differences Between CAD & GIS



Autodesk AutoCAD Map



Esri ArcGIS for Desktop

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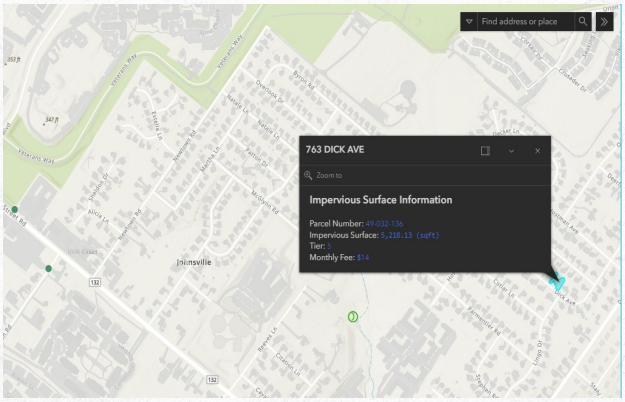
Esri Arc Enterprise



- Esri ArcGIS Enterprise is a complete, out-of-the-box Web based GIS where Esri has template applications that can be customized for your use as well as story maps that can incorporate pictures and drawings to your town map.

- Almost any GIS operation that you can do locally can also be run using a service. It enables sharing of GIS resources across the Web.

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Tax Parcel Base Maps

What are the benefits?

- Inventory/Reuse existing data to save costs
- Computer-generated Parcel Base Maps pave the way for future mapping options
- Accurate, georeferenced parcel data for incorporation in other municipal/county mapping
- A strong foundation for GIS implementation

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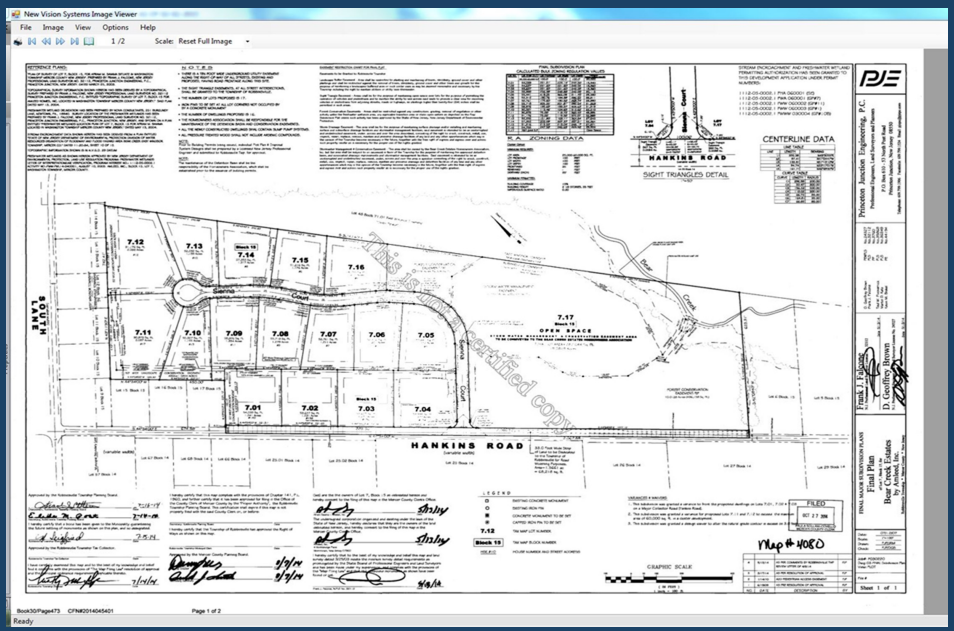

Courthouse Research

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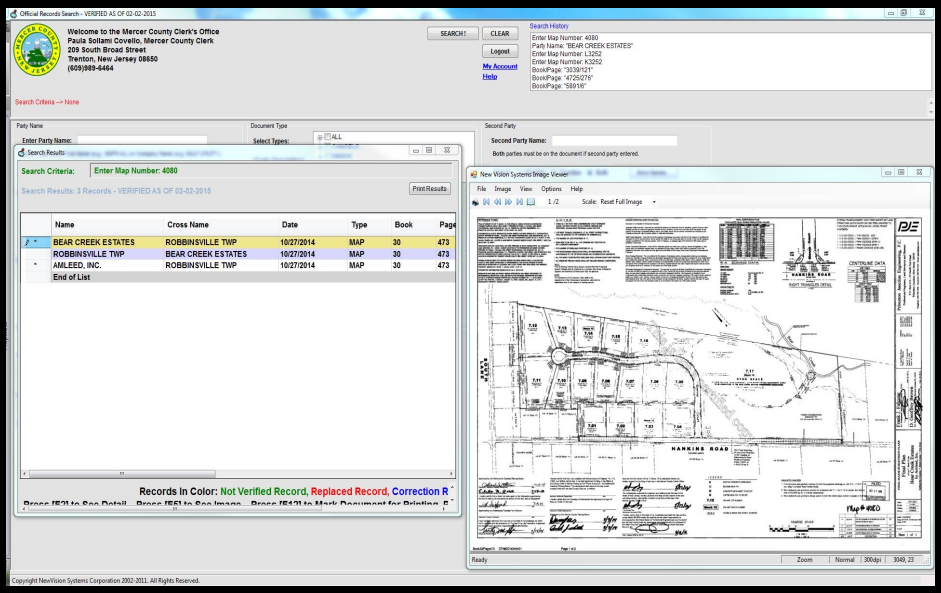
Courthouse Research



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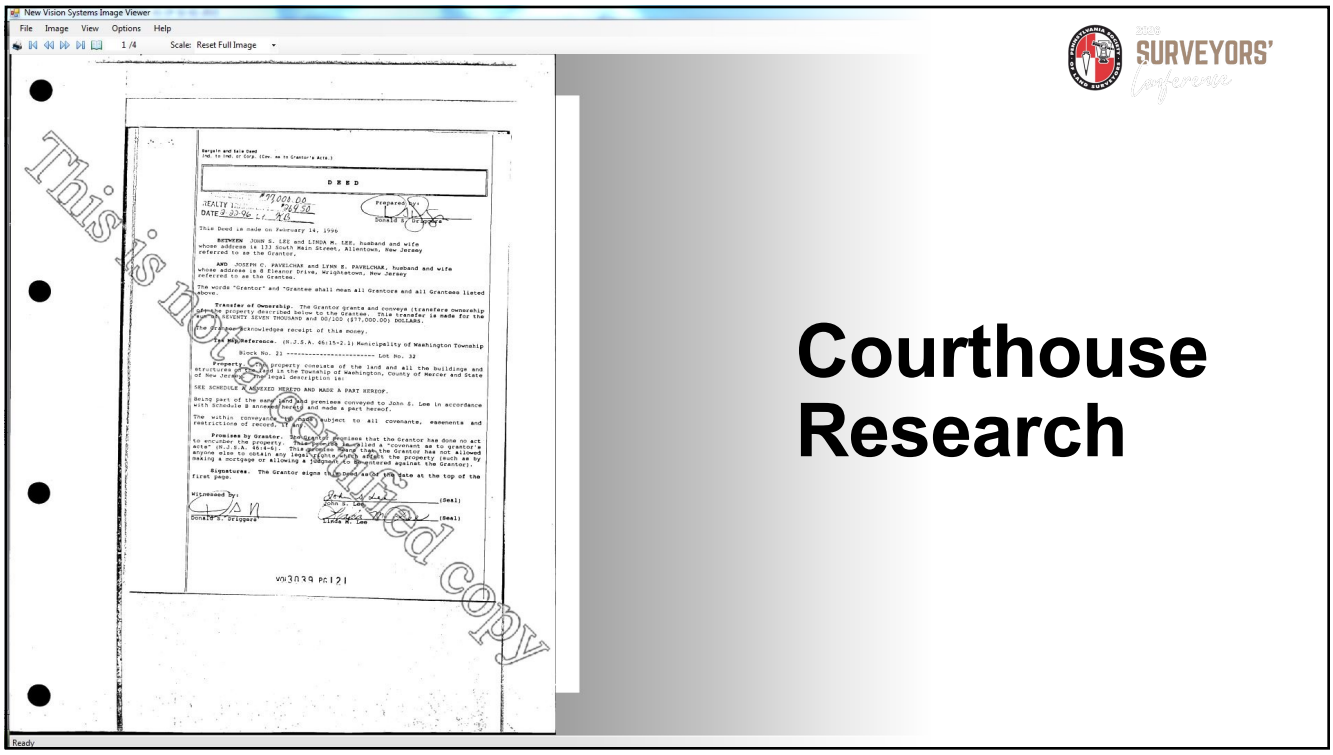

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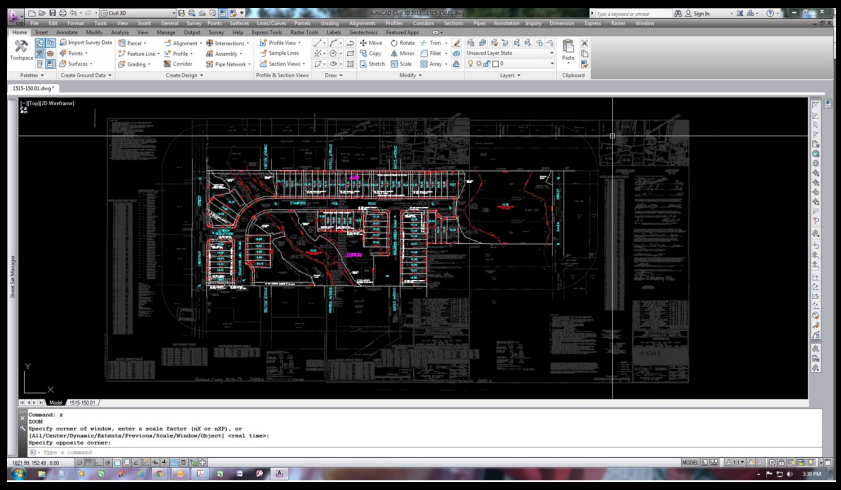

This graphic shows an example of a tax map drawing file displayed with a raster image overlaid for reference in model space preparing to “vectorize” line work along with coordinate geometry using AutoCAD

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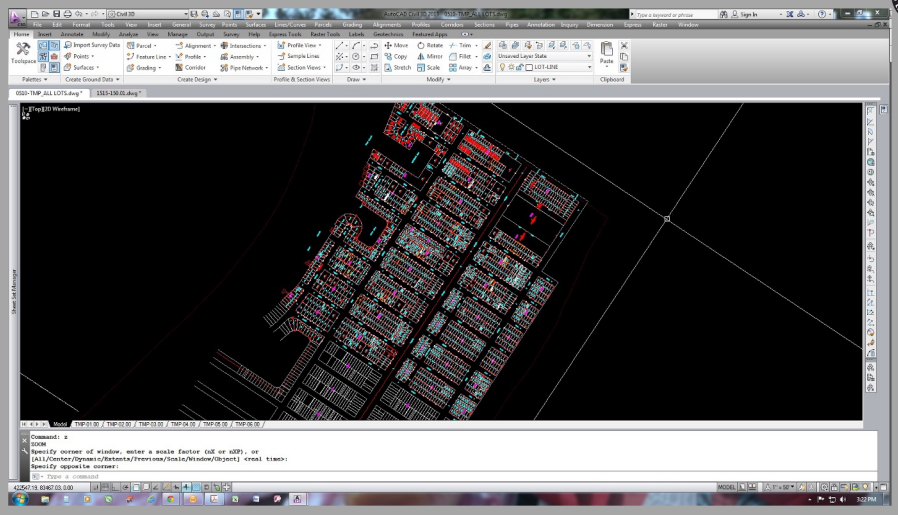

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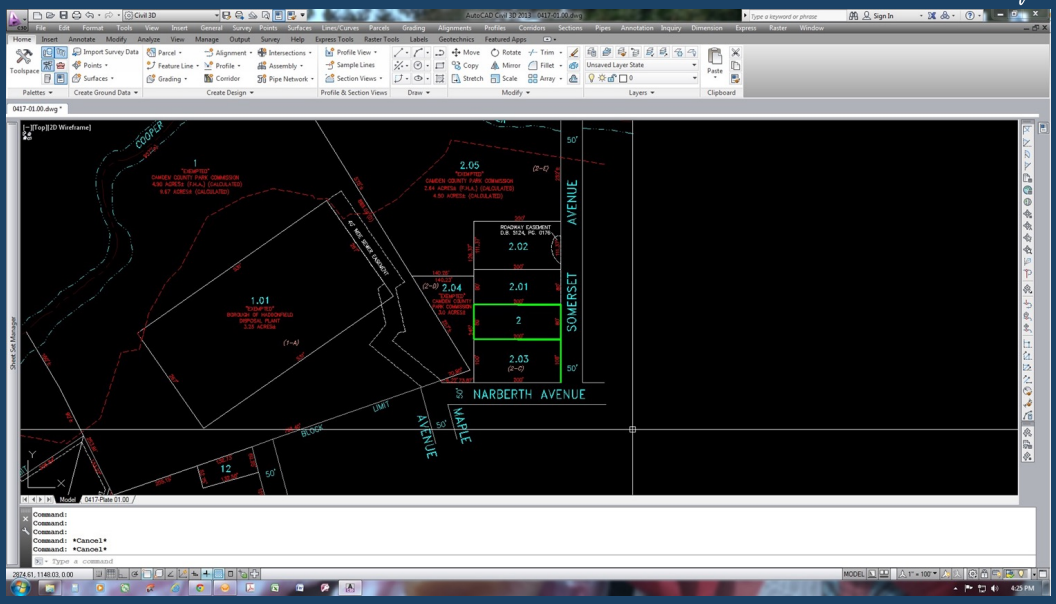

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State, County and Regional Data

- GIS resource data can often be obtained at little or no cost for municipal GIS projects
- Many municipalities are aware of what data is available
- Municipalities do not always understand the additional work needed to customize the data to their needs
- It's not as ready-made as it seems

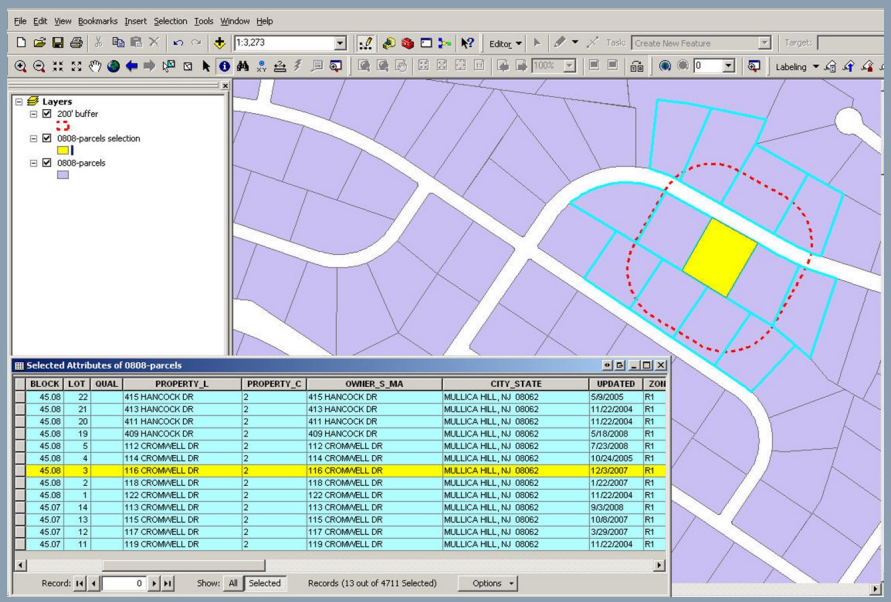
40

GIS Implementation

What is GIS?

- Geographic Information System (GIS) is a digital mapping database
- Combines geographic data with corresponding tabular data (attributes)
- Layers of data can be viewed individually or collectively
- Isolate/highlight specific map features by attributes, such as all school properties
- Create buffers of selected features
- Query attribute data

41



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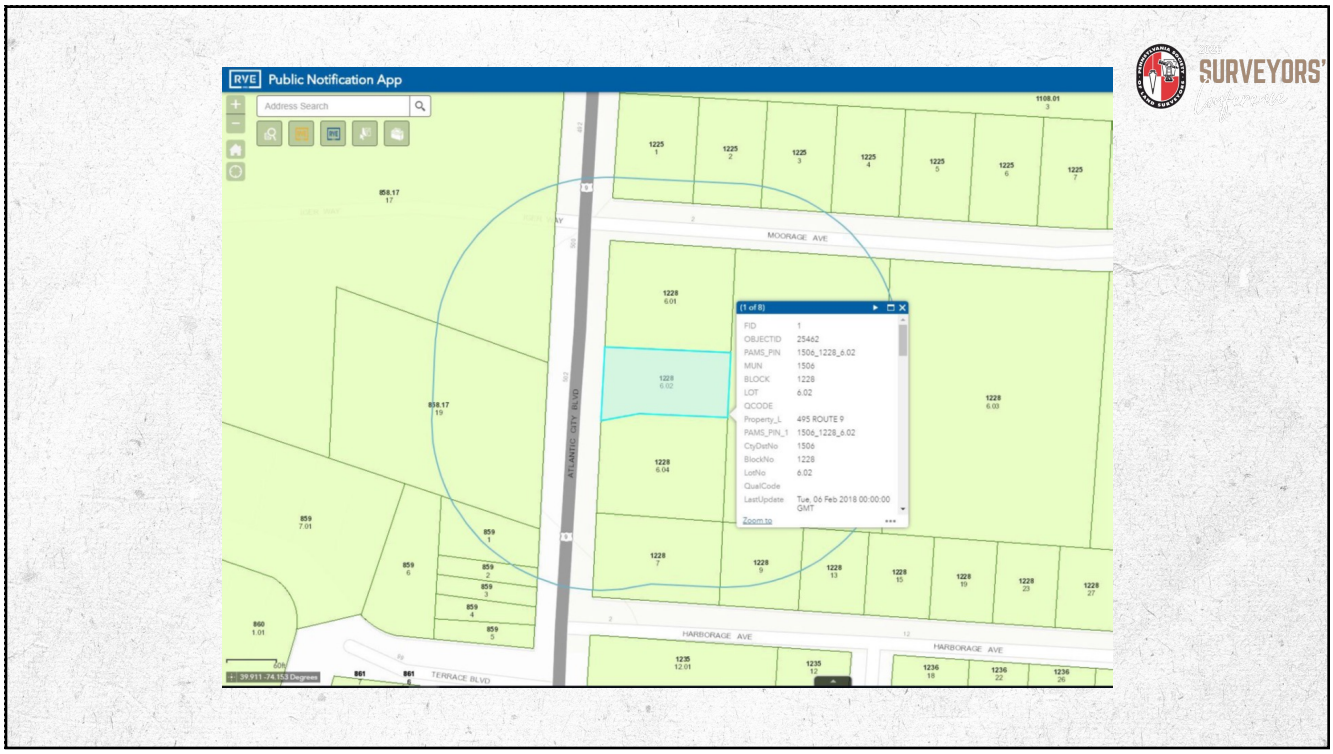
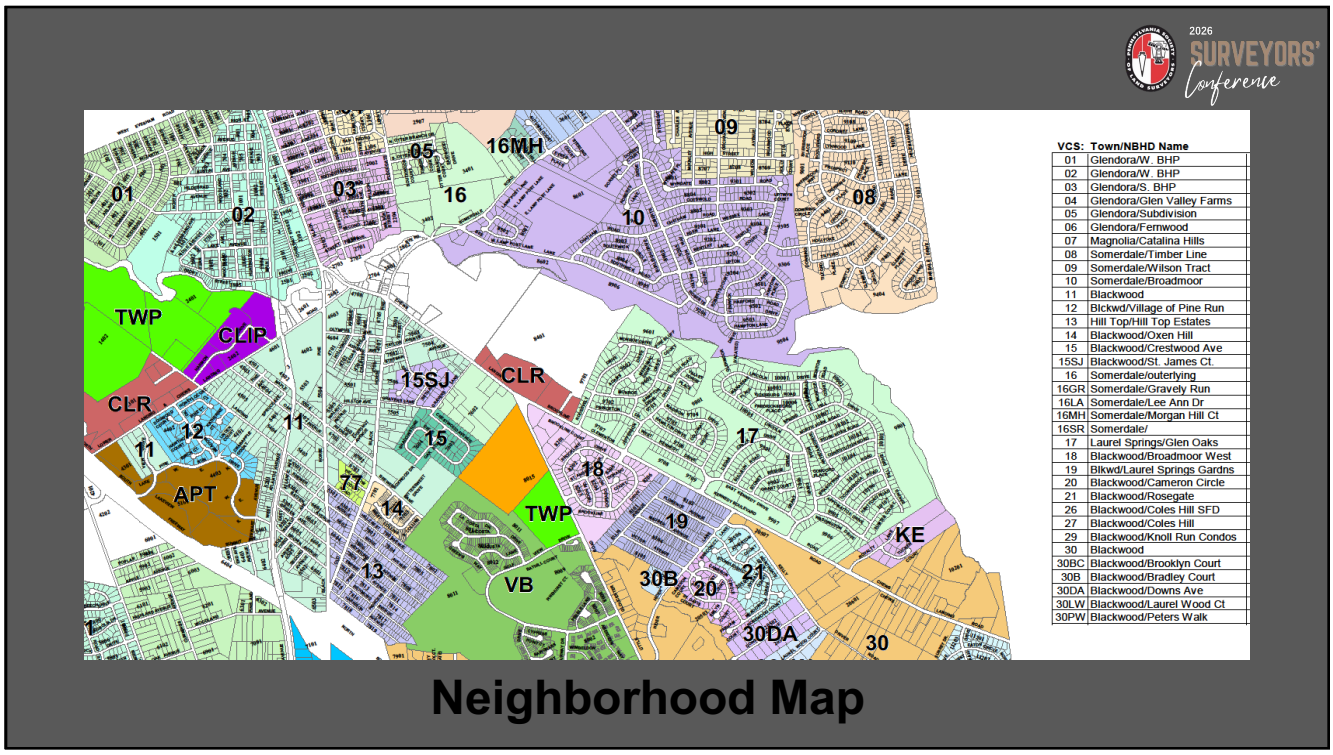

RVE Public Notification App
Address Search
MOORAGE AVE
ATLANTIC CITY BLVD
HARBORAGE AVE
TERRACE BLVD

43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KE
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30B
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30DA
30
VCS: Town/NBHD Name
01 Glendora/W. BHP
02 Glendora/W. BHP
03 Glendora/S. BHP
04 Glendora/Glen Valley Farms
05 Glendora/Subdivision
06 Glendora/Fernwood
07 Magnolia/Catalina Hills
08 Somerdale/Timber Line
09 Somerdale/Wilson Tract
10 Somerdale/Broadmoor
11 Blackwood
12 Blckwd/Village of Pine Run
13 Hill Top/Hill Top Estates
14 Blackwood/Oxen Hill
15 Blackwood/Crestwood Ave
15SJ Blackwood/St. James Ct.
16 Somerdale/outerlying
16GR Somerdale/Gravely Run
16LA Somerdale/Lee Ann Dr
16MH Somerdale/Morgan Hill Ct
16SR Somerdale/
17 Laurel Springs/Glen Oaks
18 Blackwood/Broadmoor West
19 Blkwd/Laurel Springs Gardns
20 Blackwood/Cameron Circle
21 Blackwood/Rosegate
26 Blackwood/Coles Hill SFD
27 Blackwood/Coles Hill
29 Blackwood/Knoll Run Condos
30 Blackwood
30BC Blackwood/Brooklyn Court
30B Blackwood/Bradley Court
30DA Blackwood/Downs Ave
30LW Blackwood/Laurel Wood Ct
30PW Blackwood/Peters Walk
Neighborhood Map

44

Incorporating GIS data to CAD – Raw GIS data

45

Important Utility Legislation

- Water and Stormwater changes
- The New Jersey Department of Environmental Protection, as part of a nationwide update mandated by the EPA, has developed new stormwater regulations to address groundwater pollution issues, (MS4)
- The Water Quality Accountability Act requires both private and public water purveyors to conduct certain testing, reporting, management and infrastructure investment/planning services to be in compliance with the new State regulations. has created new construction standards for community water systems.
- GIS can assist with compliance and is required

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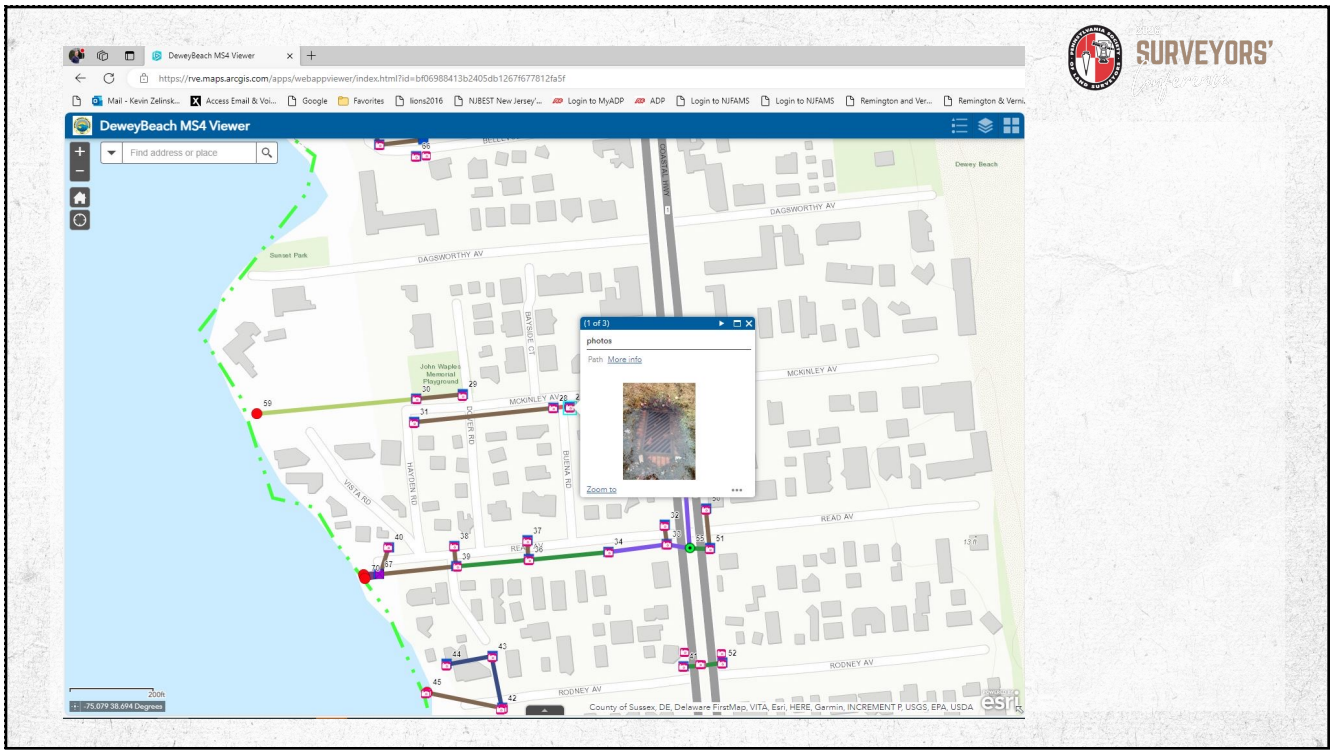
SURVEYORS'
Layers
3-14-08 061.jpg - Windows Picture and Fax Viewer
Parcels
New Group Layer

47


SURVEYORS'
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Find address or place
photos
DAGSWORTHY AV
MCKINLEY AV
READ AV
RODNEY AV
County of Sussex, DE, Delaware FirstMap, VITA, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA

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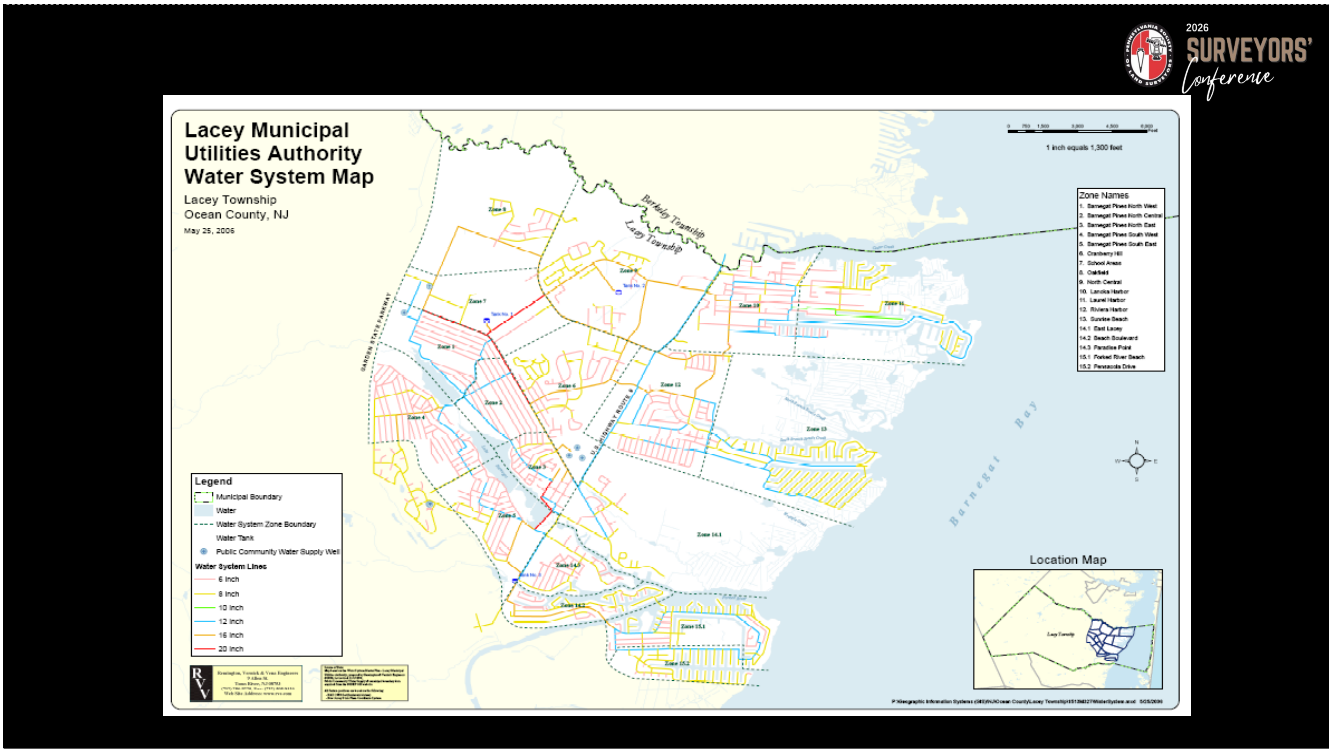
Water Quality Accountability Act (WQAA)

- GIS data is required for (WQAA)
- In accordance with the New Jersey Water Quality Accountability Act, the following mapping must identify the geographical location of all water main valves, fire hydrants and other water asset infrastructure utilizing GPS technology

- Create digitally mapped geographic information systems (GIS) data for submission in a GIS-compatible format to the New Jersey Department of Environmental Protection (NJDEP).

- Another requirement of the WQAA is to complete an Asset Management Plan (Plan) that is certified by a licensed Professional Engineer and/or Licensed Operator. This plan is being required by the WQAA so that the Municipality may plan for and allocate funds on an annual basis to remediate and address the highest priority project identified in the Plan.

49



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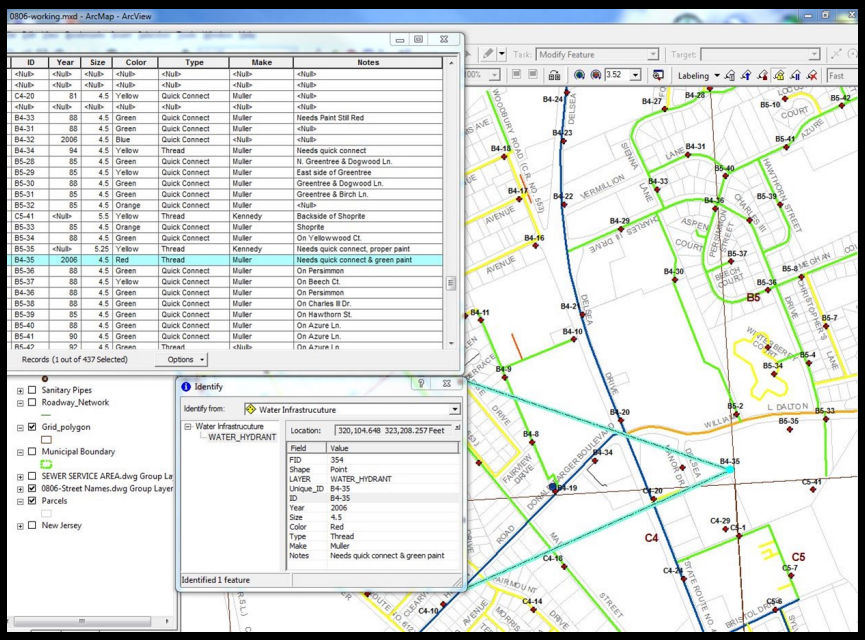

51

GIS Mapping Required

- Any qualifying permit must include GIS mapping

  The recommended mapping to accompany the Asset Management Plan meeting the criteria outlined above is as follows:

- "A map identifying the existing water system including sources, treatment, distribution and storage facilities, and the water service area.

- For the purposes of this section, 'water service area' means the geographic area within which a water system operates for the provision of water. The mapped water service area shall clearly delineate the boundary of the geographical area currently served by the existing water system, in addition to the valves, fire hydrants, water mains and other water asset infrastructure assets.

- Mapping shall be in the form of digital Geographic Information Systems (GIS) data, at a scale of 1:12,000."

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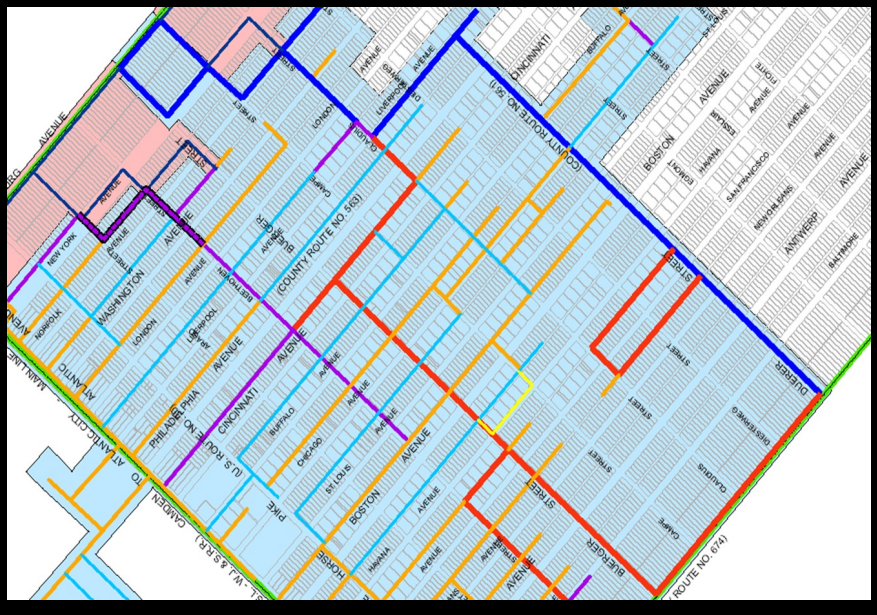
USGA Quadrangle

53

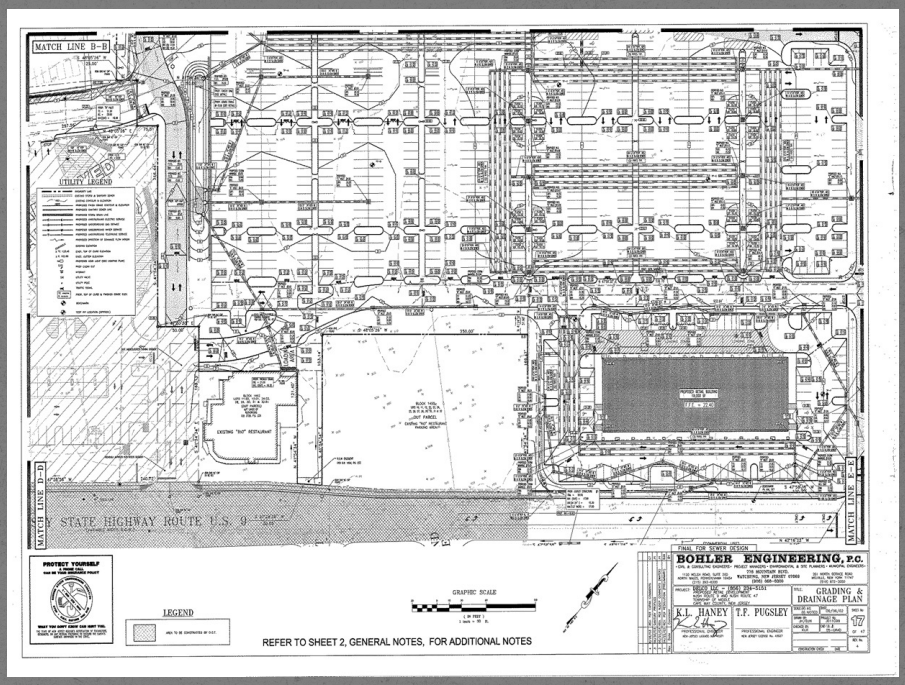


54

Sanitary Sewer Maps

- The following facilities will be included based on available data
- Manholes (rims, inverts and manhole identification numbers)
- Sanitary sewer system pipes (size/type, slope, length, flow directions)
- Laterals (station location and house number)
- Pump stations
- Force main(s) (size/type, length, flow directions)

55



56


00 Lafayette Ave
Middle Township, New Jersey
Street View - Aug 2013
SURVEYORS'

57


SURVEYORS'

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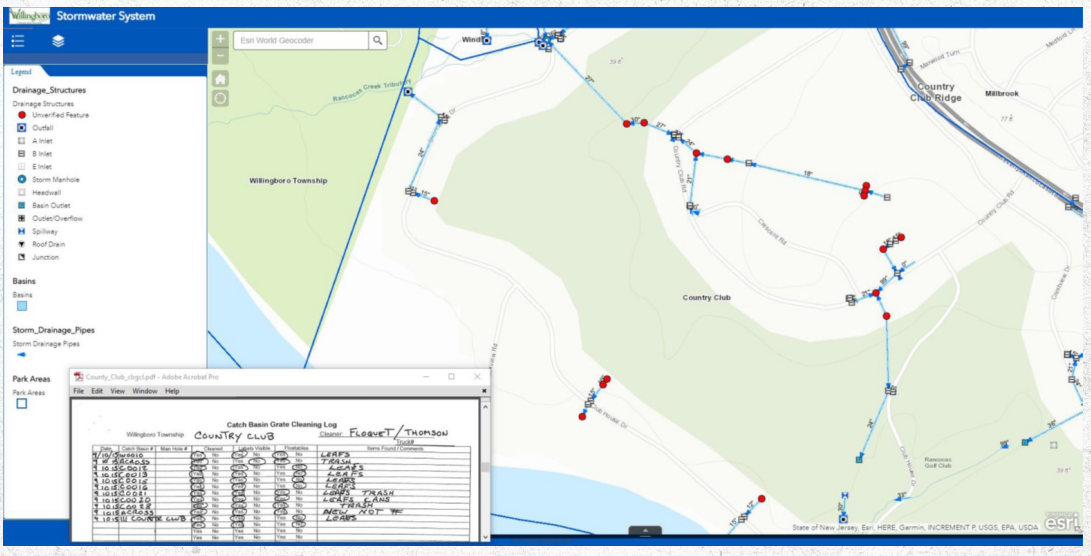
Storm Sewer System Maps

- To be based on Local & County data
- Manholes (rims, inverts and manhole identification numbers)
- Storm sewer system pipes (size/type, slope, length, flow directions)
- Catch basins (grate type, materials, size of pipes entering/existing basin)
- Outfalls (size, materials, manufacturer)

59

60

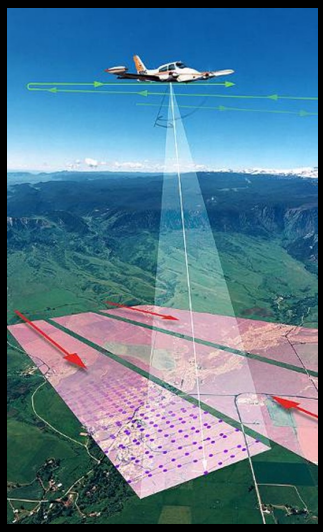
MS4 Mapping Applications



61

Airborne Laser Scanning

- ALS/LiDAR is an active remote sensing technology that measures distance with reflected laser light. LiDAR: Light Detection and Ranging or Laser Imaging Detection and Ranging)
- 1st developed in 1960 by Hughes Aircraft inc.
- Modern computers and DGPS make it practical.
- Typically used in very accurate mapping of topography.
- New technologies and applications are currently being developed.



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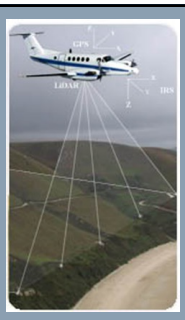
Lidar Overview

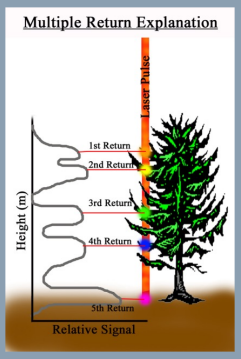
What LiDAR is . . .

- Light Detection And Ranging
- Highly accurate topographic data
- Active Sensing System
  - Uses its own energy source, not reflected natural or naturally emitted radiation
- Ranging of the reflecting object based on time difference between emission and reflection. (Multiple Returns per pulse of light)
- Direct acquisition of terrain information

What LiDAR is not . . .

- Photography
- A substitute for photography
- All weather
- Able to 'see through' trees
  - if sunlight can reach a spot on the ground so can the laser; if sunlight can't reach the ground due to various vegetation, than neither can the laser





Examples of LiDAR uses . . .

Generate digital elevation models and contours for use in:

- Engineering design and design reviews (irrigation design, pivots, pipelines, surge valves and livestock pipelines)
- Conservation planning (HEL Determinations, practice design, landscape visualization)
- Floodplain mapping
- Hydrologic modeling
- Soil Survey (slope, aspect)
- Dam safety assessments
- Surface Feature Extraction (trees, shrubs, roads, buildings)
- Vegetation Mapping (Height, Density)
- Landform Extraction (ridges, benches, valleys)

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Defining Drone Mapping

• Drone mapping uses drones to capture photographs of an area and stitch them together to create a 2D or 3D map

• The map can be used for various purposes, including surveying land, inspecting infrastructure and planning agricultural fields

• Mapping involves taking many pictures from different angles and positions and stitching them together to create a map

• The challenge is getting accurate measurements from the photographs for specific purposes such as surveying land areas or measuring distances

• With the right software and practice, highly accurate maps can be created using drones

• Drone-based maps are often as accurate as traditional ground-based surveying methods such as GPS

64

Drone Surveying & GIS Mapping

- **Benefits of drone surveying:**

- 3D mapping, land surveys, photogrammetry and topographic surveying

- **What is a drone survey?**

- Definition and application of surveying principles using a drone to gather information

- **How does a drone survey work?**

- Use of downward-facing sensors, multispectral and RGB cameras and LiDAR payloads to capture data

- **How do drones collect data?**

- Use of Geographic Information Systems (GIS) and other collection tools to visualize and map locations

- **Drones used for surveying:**

- Multirotor and fixed-wing models, autonomous flight, battery life and camera specifications

Drones are efficient and effective tools for surveying, enabling more accurate and detailed data collection

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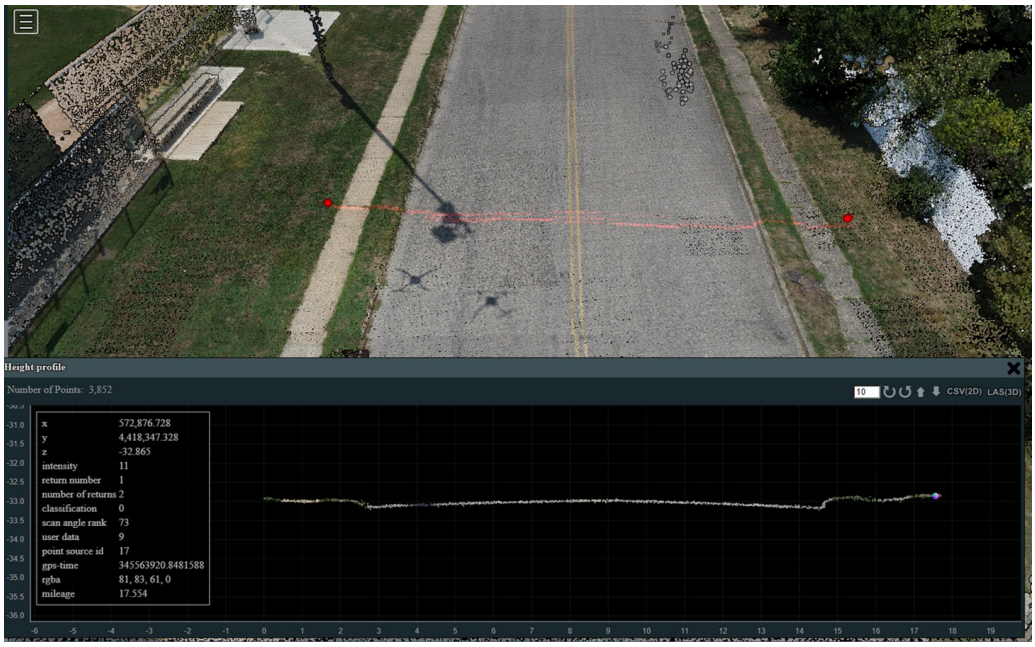
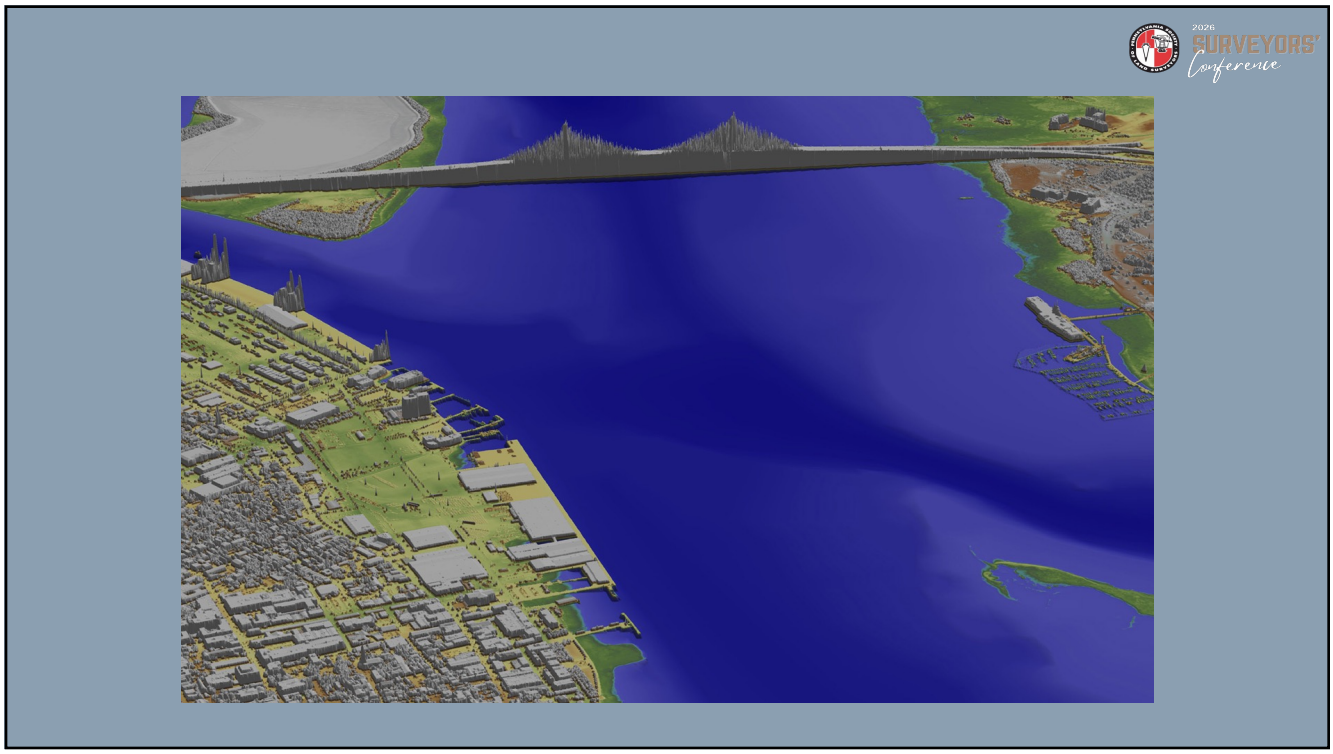


67

Advantages of LiDAR Technology

- Provides a highly accurate means of elevation model collection for 1’ or 2’ contours
- Acquisition can take place day or night… shadows that are problematic in mountainous areas are not an issue with LiDAR
- Unlike photography, acquisition can take place below cloud cover… cloud shadows no issue
- Very cost effective for larger projects
- Does not provide break lines, nor is it imagery

68



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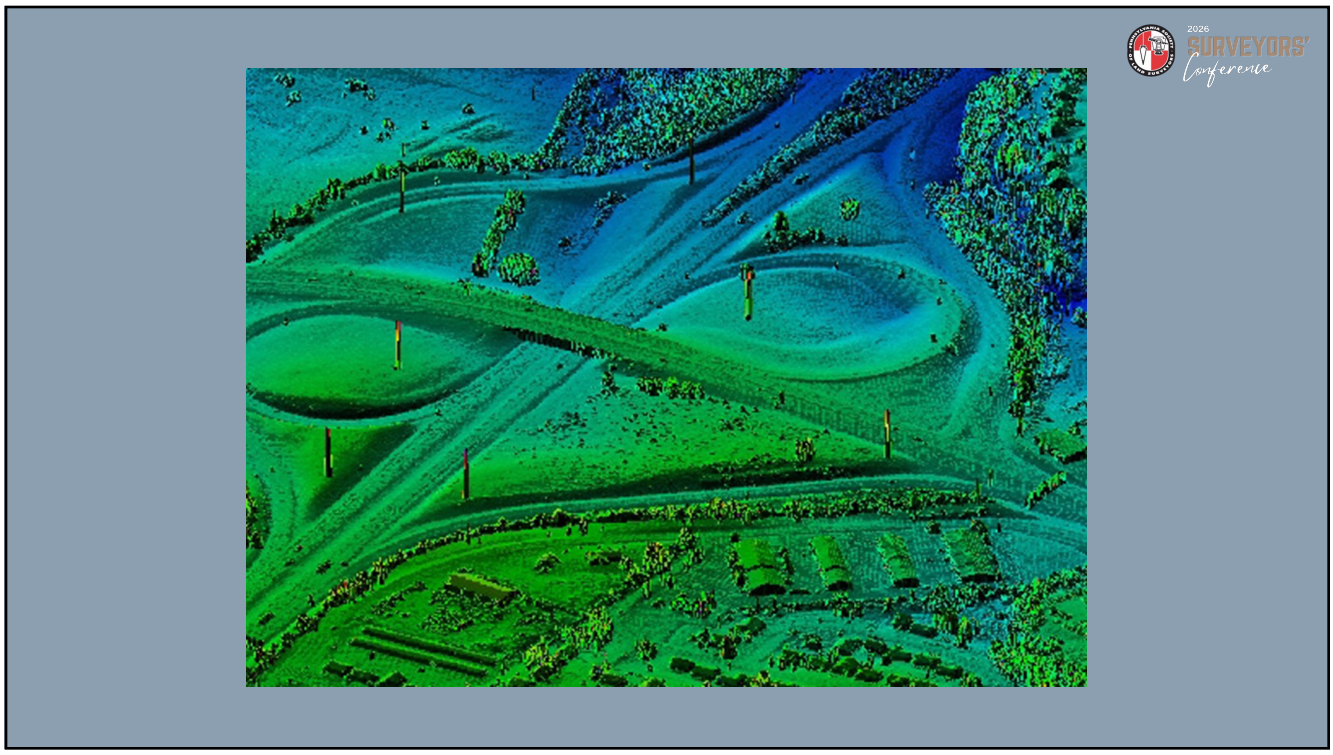

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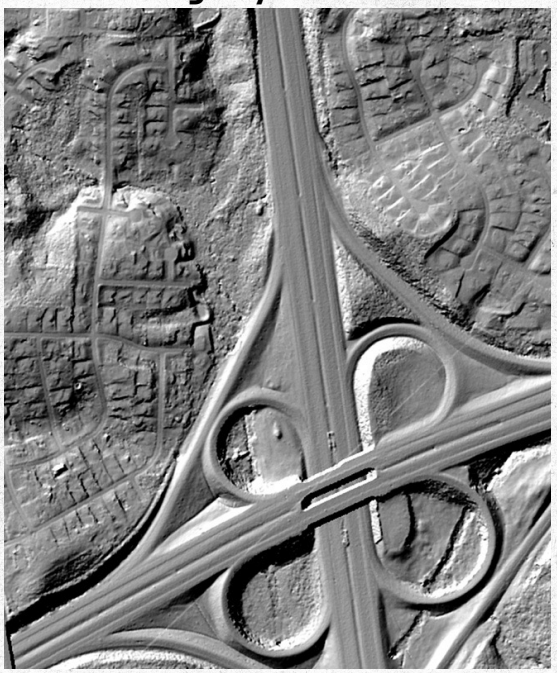
Shading by Elevation



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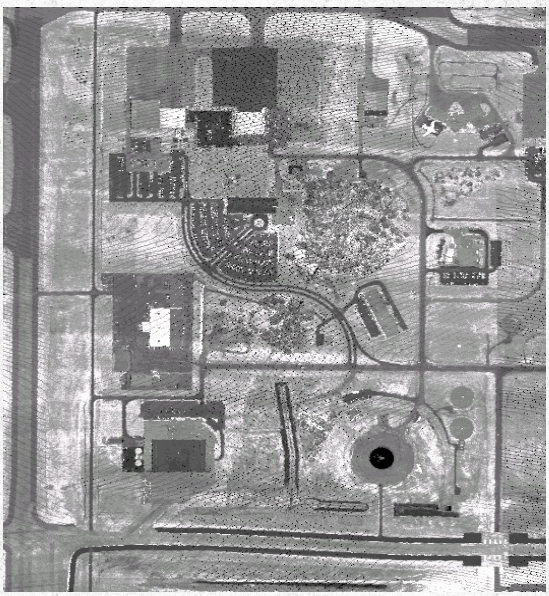
Aerial Photo

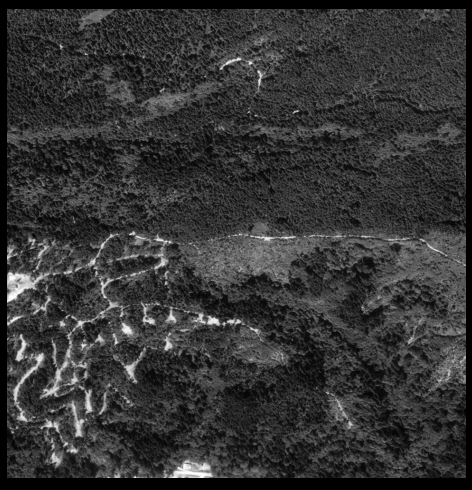
72

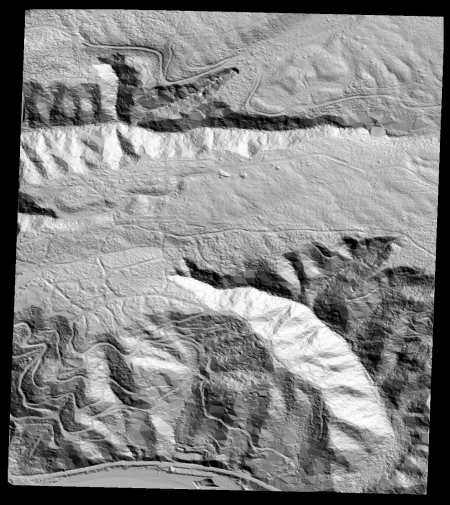
Intensity Plot



73

LiDAR Surfacing

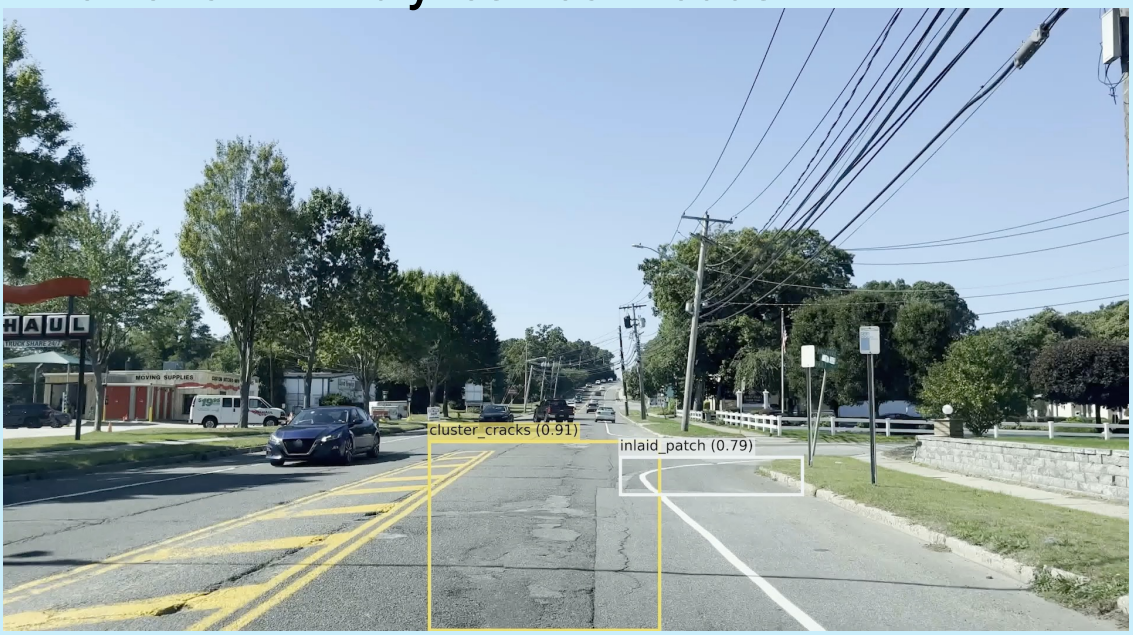




74

Powerful AI Analyzes Your Roads

vialytics



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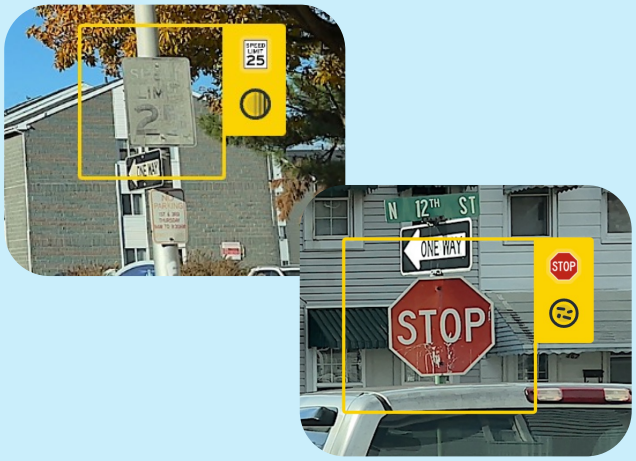
Asset Detection and Sign Inventory

- Identify & record damage to manholes, catch basins, and street signs
- Quickly create a response plan and delegate responsibilities



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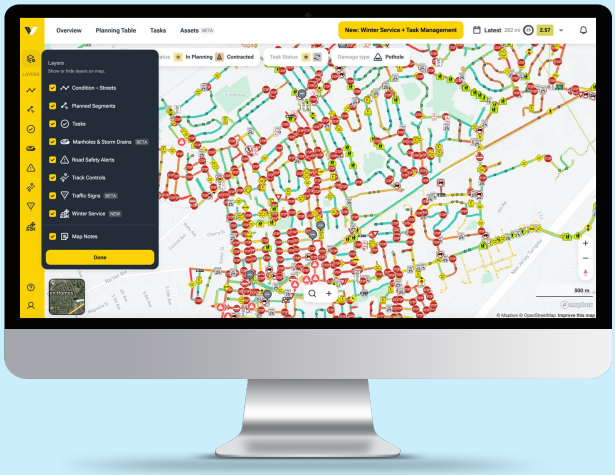
Dynamic Road Condition Assessments

- Automatic image recording every 10 ft.
- AI provides 15 categories of damage
- Analyze your roads as frequently as you want



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LiDAR Applications

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- LIDAR has significant fixed cost… but can be very cost effective for large projects
- Appropriate for a wide range of projects including forestry, corridor studies, obstruction mapping, flood studies, city/county mapping, and transportation projects
- Required accuracy must be carefully evaluated

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Other GIS Data Layers

Based on available GIS Resources for State, Local & County data

- Wetlands delineations
- Floodprone (FEMA) areas
- Aerial photography
- Zoning Designations
- Soil classifications
- Road Network
- Topography
- Election districts / Polling places
- Water (multiple layers)
- Sewer (multiple layers)
- Storm (multiple layers)
- Places of interest/landmarks

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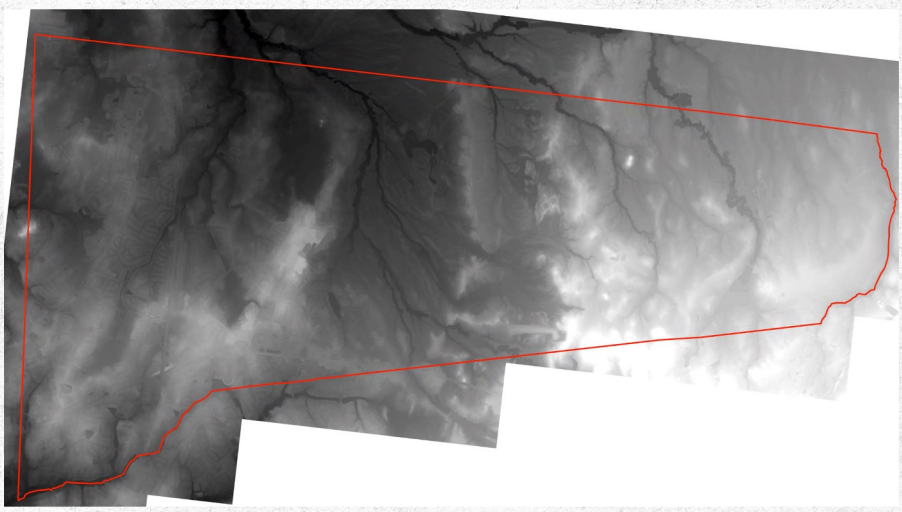
- Digital Elevation Model (1M resolution)



- 30 Square Mile Township

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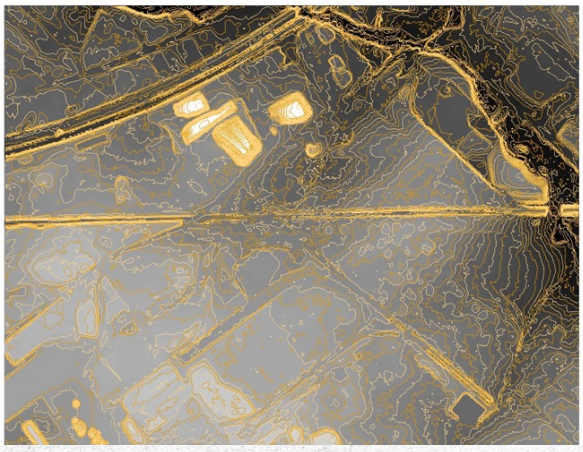
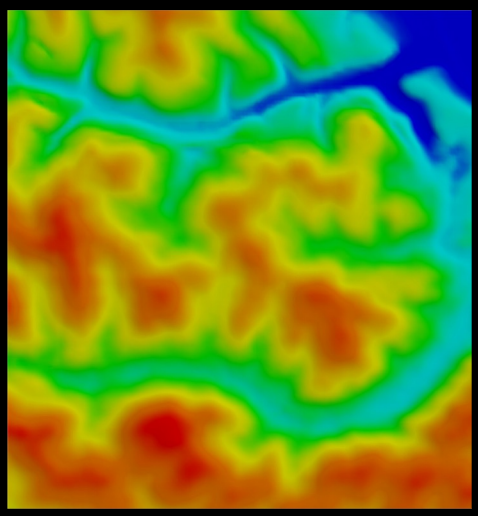
Raster Processing



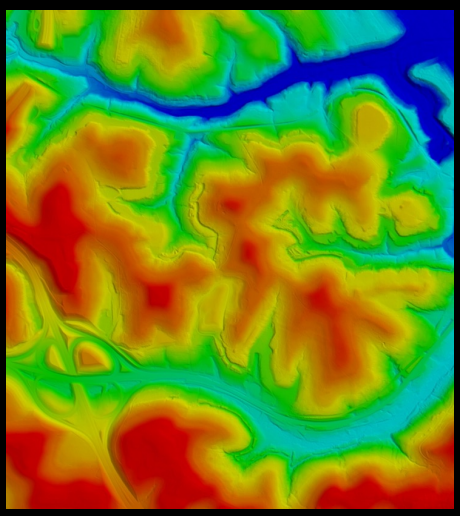
- Contour Generation at set Intervals

81

USGS 30M DEM



Lidar 10ft DEM



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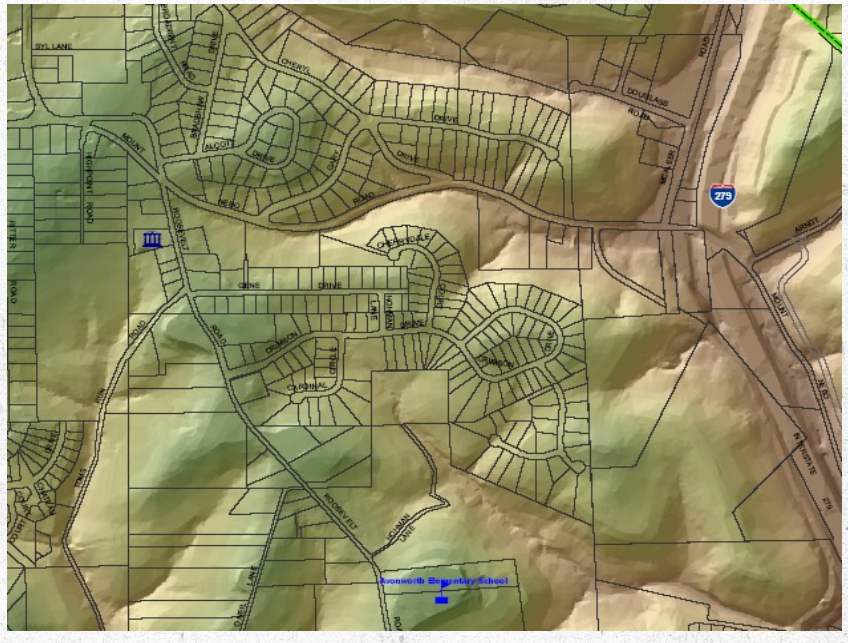
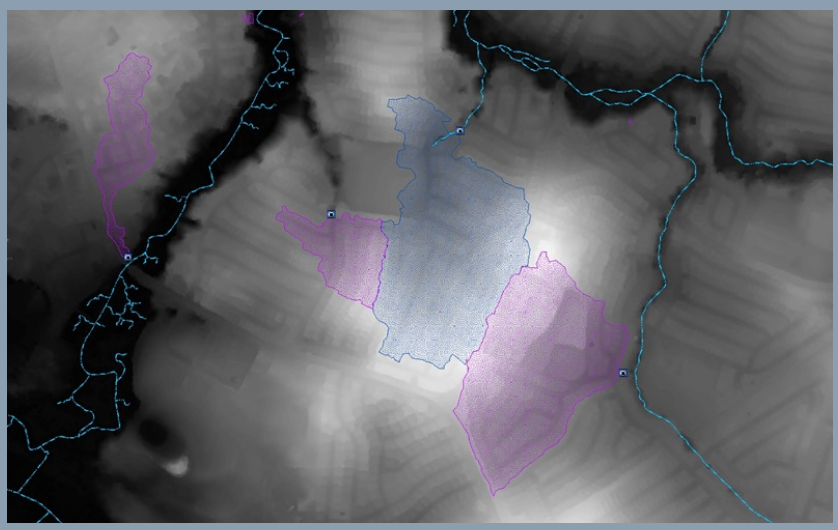


83

Advanced Analytics

- **Watershed Analysis**
  - **Drainage Basin Calculation for Discharge**



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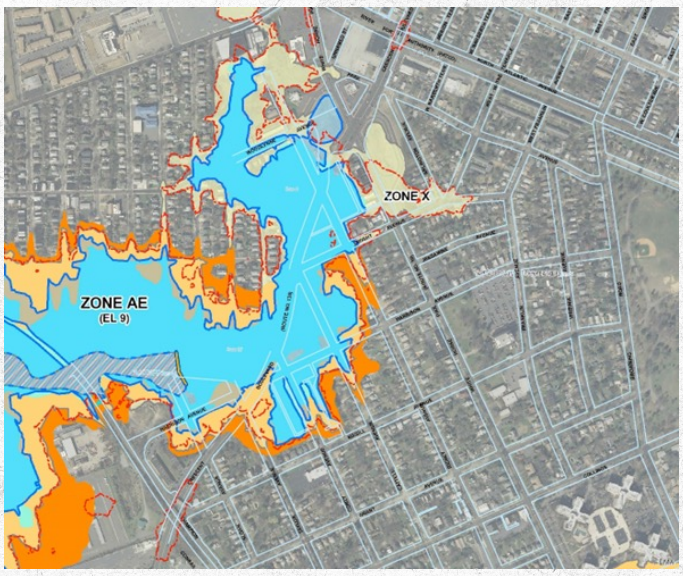
- FEMA

85

- FEMA



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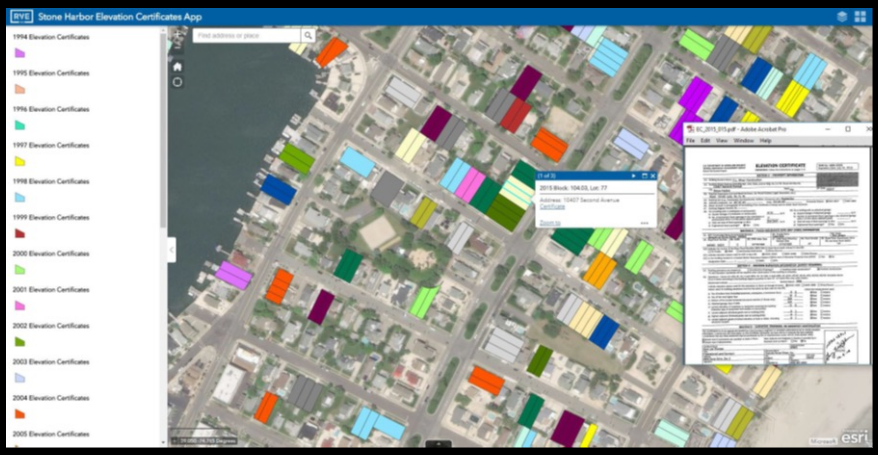
Environmental Map Applications



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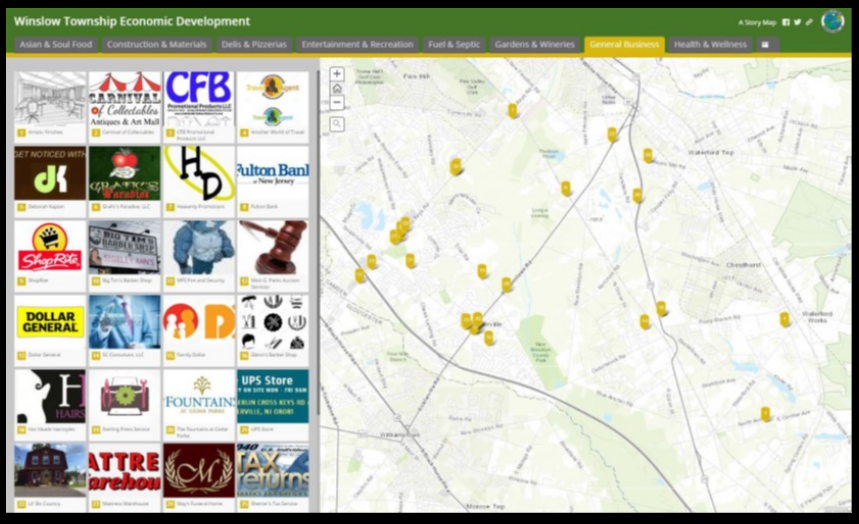
Economic Development Applications



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What is Metadata?

- **Metadata describes…**
- Content, quality, condition and other characteristics about data
- Who, what, where, why and how of a data set

- **Metadata includes information you need to…**
- Determine which data exist for a geographic location
- Determine if a set meets your need
- Acquire the set you identified
- Process and use the set

- **Metadata answers questions…**
- Who created and maintains the data?
- Why were the data created?
- What is the content and structure of the data?
- When collected? When published?
- Where's the geographic location?
- How were the data produced?

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Conclusion

Five key elements for a successful GIS
GIS data are becoming more prevalent, accessible, accurate and integral to all aspects of mapping

Using as much available resource data as possible from municipal, State, County and regional sources

GIS data can be imported to CAD (and vice-versa) depending on your needs

QA/QC of field collected survey data and implemented into GIS mapping

If you understand the quality and source of your GIS data you can make better decisions in utilizing these data in your mapping projects

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Thank you!

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SESSION EVALUATION

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