

Performing Field Data Collection in Support of a Vulnerability Assessment to Determine Potential Impacts of Sea Level Rise on Transportation Infrastructure and Associated Assets

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Vulnerability Assessment

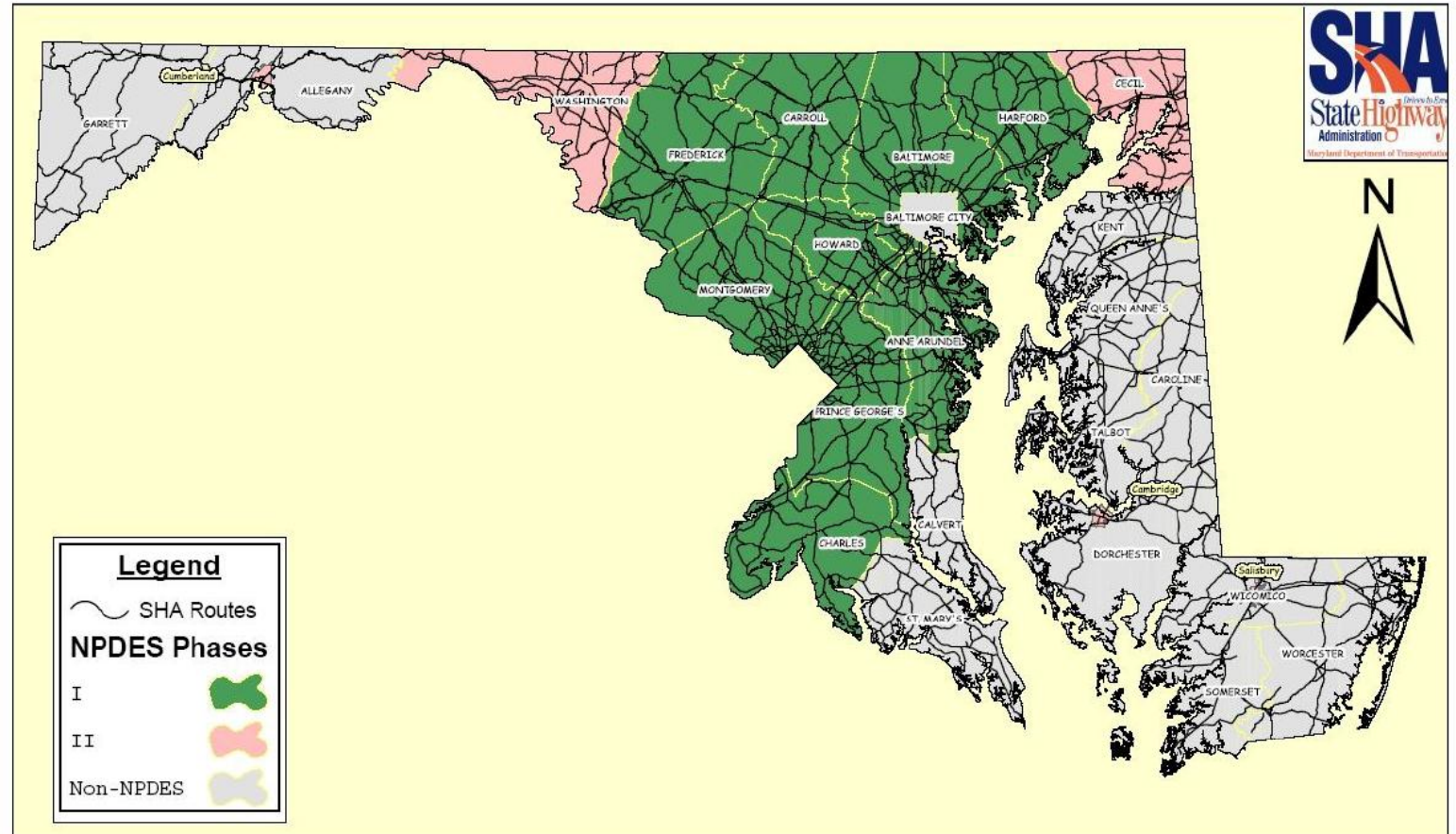
- Salisbury University tasked to develop a Climate Change Vulnerability Assessment for SHA
- Acquired field data will be use to determine potential impacts to SHA infrastructure due to sea level rise.
- GPS collected horizontal and vertical locations to be used in a model for roadway and stormwater infrastructure vulnerability due to climate change and sea level rise.



SHA Stormwater Data

- Initial effort included researching available datasets to be used as input to the analyses Salisbury was tasked to perform.

- SHA's National Pollution Discharge and Elimination System (NPDES) Program included stormwater Best Management Practice (BMPs) data, and associated drainage systems for all required MS4 counties (i.e. Areas shown in green on the map) only.

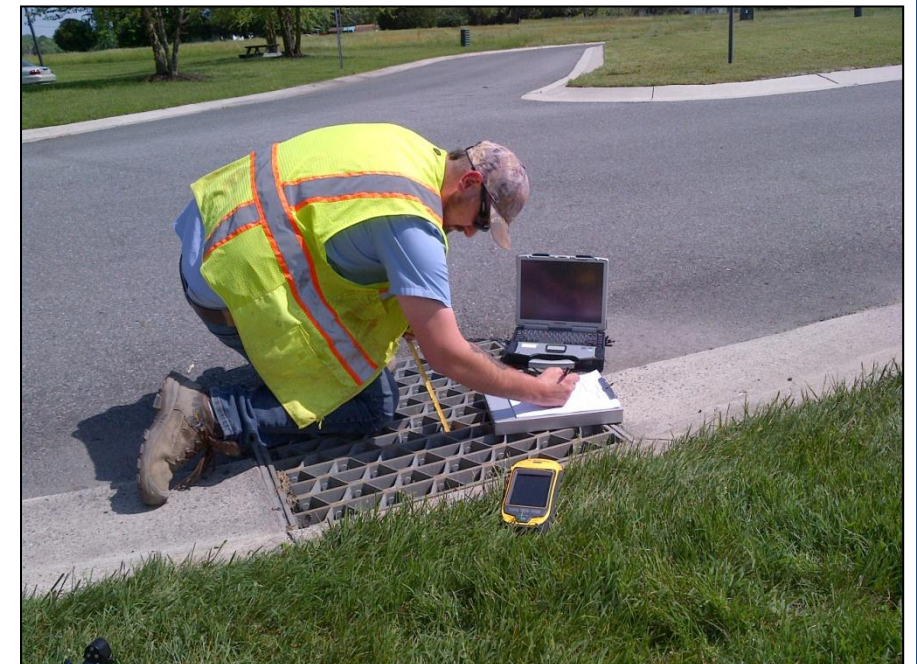


Field Data Collection

- The activities for this project are similar to SHA's NPDES Program, where stormwater Best Management Practices (BMPs) and drainage systems are inventoried and inspected; resulting in the completion of a drainage assets geo-database.
- Field data collection has been completed for Dorchester County and crews are currently collecting data in Somerset County.
- Data collection is to occur in non-Phase I counties across the State. These are counties that are not required to maintain a MS4 permit.



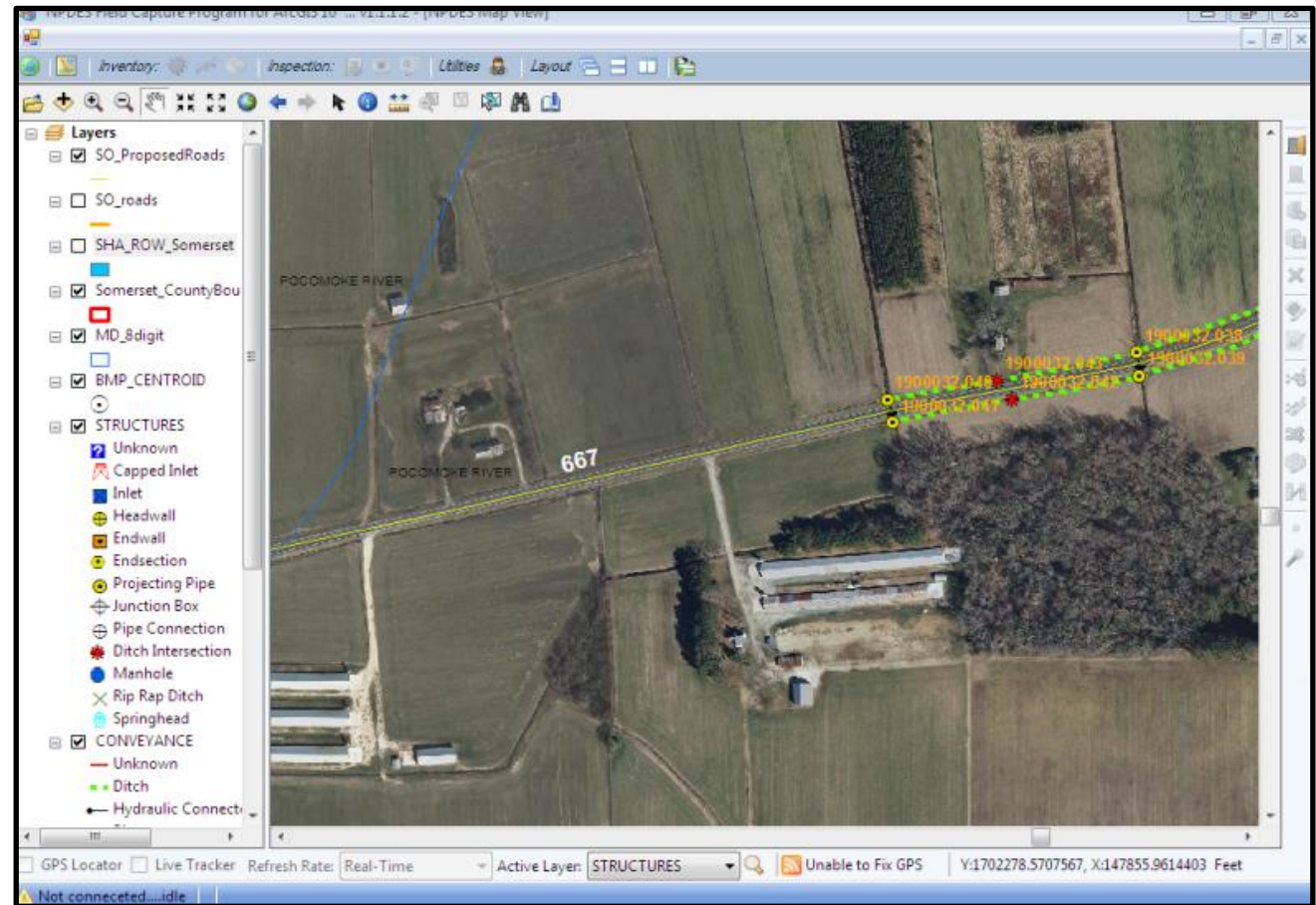
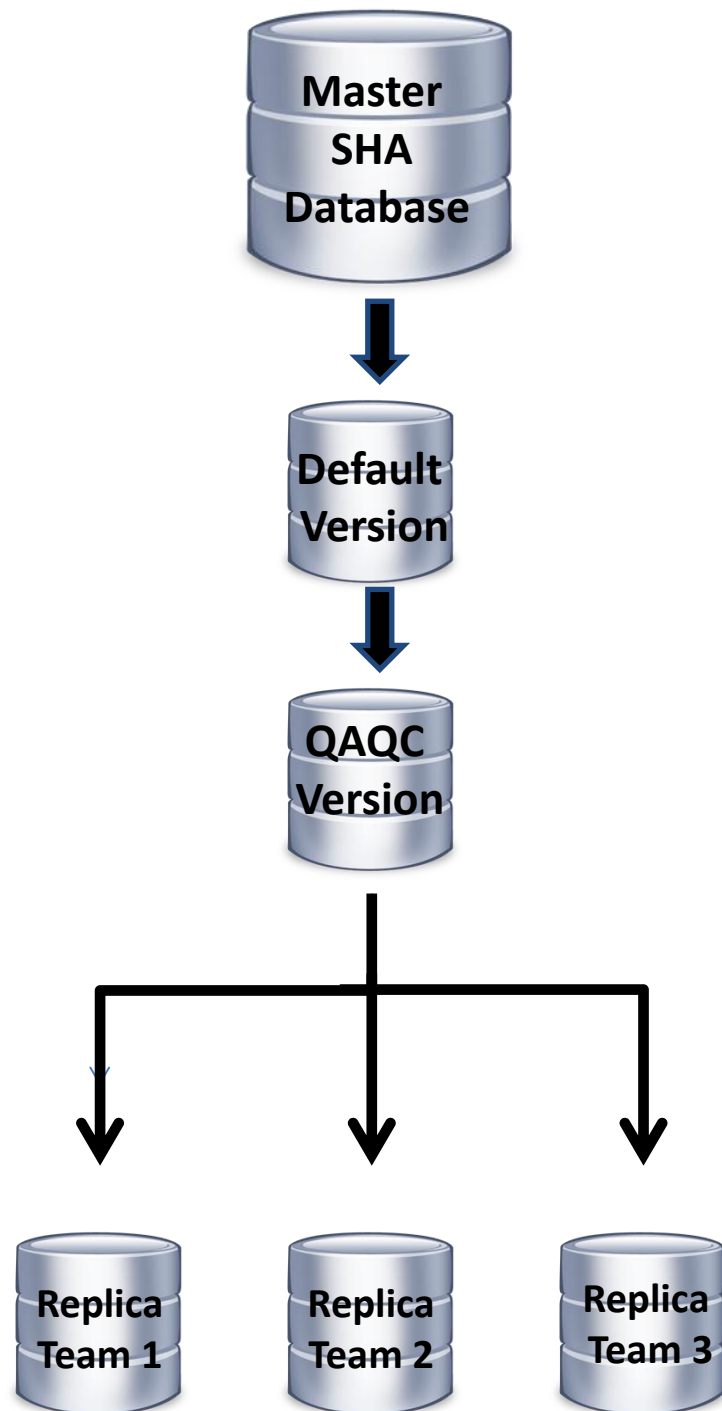
MES GIS Specialist staff collecting GPS coordinate information for a stormwater pipe in Somerset County.



MES Environmental Specialist staff performing maintenance inspection on a storm drain inlet and recording the information in hard and in electronic copy.



Data Management



- SQL Server supporting a versioned SDE distributed geodatabase.
- QAQC version of master database
- Version controlled replicas for each team checked in and out on a weekly basis and QAQCed

Office Inventory Tool

- Net Framework 2+
- Net Support option for ArcGIS
- Versioned 10.0
- ArcEditor+



Field Equipment

- Pole mounted handheld Trimble GeoX7 with H Star and Floodlight technology.
- Units use mobile WIFI hotspots from Verizon Blackberry to access VRS network.
- In ideal conditions, unit specs yield +/-10cm accuracy.
- Units are set to not collect a point unless this level of accuracy is achieved.
- Pathfinder Office version 5.6 is used to calculate DOP values.
- Data collected using VRS network is not post processed.
- Maryland State Plane Feet
- Geoid12A – NAVD88



- MES GIS Specialist and Environmental Specialist staff collecting control points at a National Geodetic Survey monument to ensure accuracy.
- Control points are collected several times a day.



Field Editor Tool (FET) –The Field Tool requires the following components to operate correctly:

- .Net Framework 2+
- ArcEngine Runtime 10.0
- Valid ArcEngine 10.0 license



Personal Safety

- Appropriate safety vest or reflective t-shirt, clothing and boots should be worn during data collection.
- Short pants are not appropriate.
- Safety vests or Reflective T-Shirts are very important as they make the team member highly visible to motorist.
- Never enter confined spaces unless properly trained, equipped, and permitted (if applicable).
- Each quarter the field teams should meet with the MES Safety Officer to go over personal safety for the next several months in the field.
- In warm weather or hot weather drink more fluids regardless of your activity level.
Don't drink liquids that contain caffeine, alcohol, or large amounts of sugar
- Visit or contact other team members at least twice a day and closely watch them for signs of:

Heatstroke

Heat Exhaustion

Heat Cramps

Hypothermia

Frostbite

Use insect and poison ivy repellants



Roadside Safety

- Inspectors should plan for and be aware of vehicular traffic and road conditions during field investigations.
- When at the site each team member should always have an eye on the traffic and be ready to alert the other team member.
- Field personnel must wear orange safety vests and carry work ID, driver's license.
- A flashing amber warning light on the field vehicle is required at all times.
- Where possible use several safety cones to alert oncoming traffic of a stopped inspection vehicle should be used.
- Use care when parking along the roadway – ideal location is at least 30 feet from the edge of pavement.
- When leaving the highway the vehicle warning lights must be operating (roof top and vehicle hazard lights).
- Once the vehicle is safely parked one of the team members should place a traffic cone(s) just to the rear of the vehicle between the vehicle and the shoulder.



Field Data Collection Workflow



- At the beginning of the day each unit is verified against a NGS monument for accuracy.

- Teams then travel to designated routes and locate stormwater features.
- Features are collected for both routes with and without contract plans.

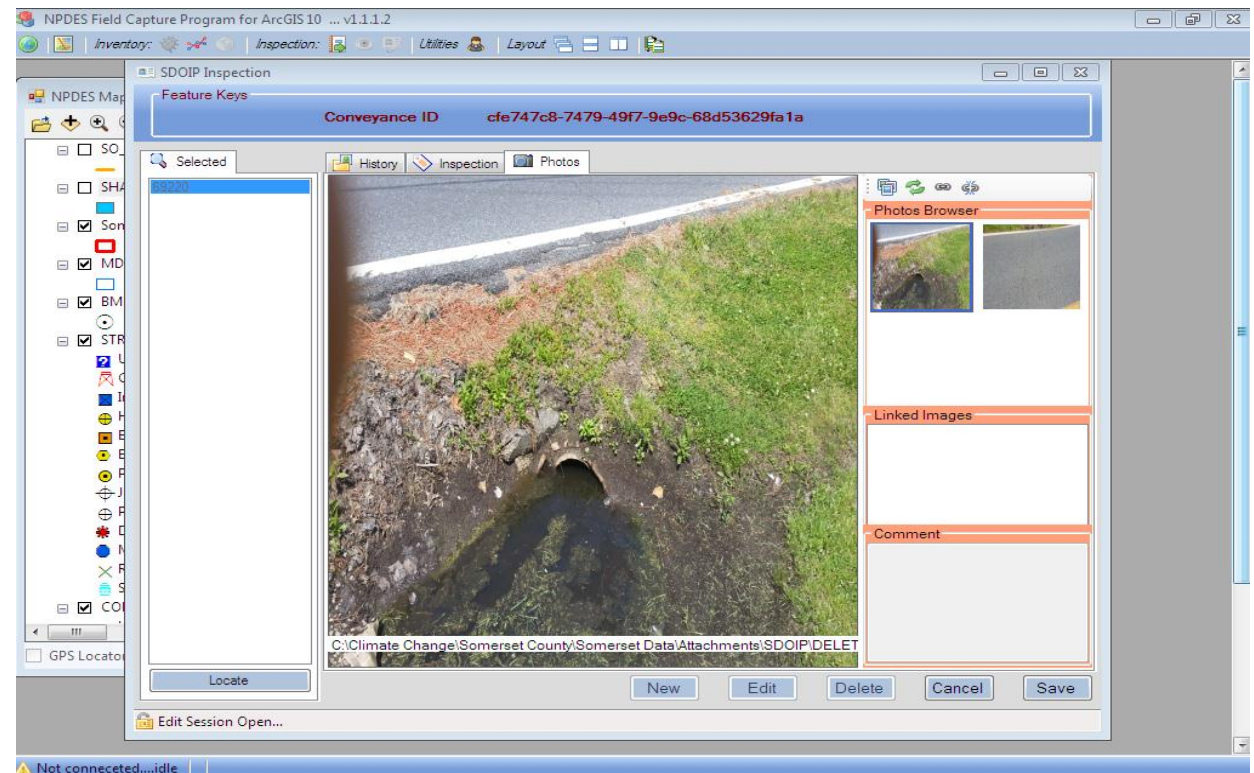


Field Data Collection Workflow

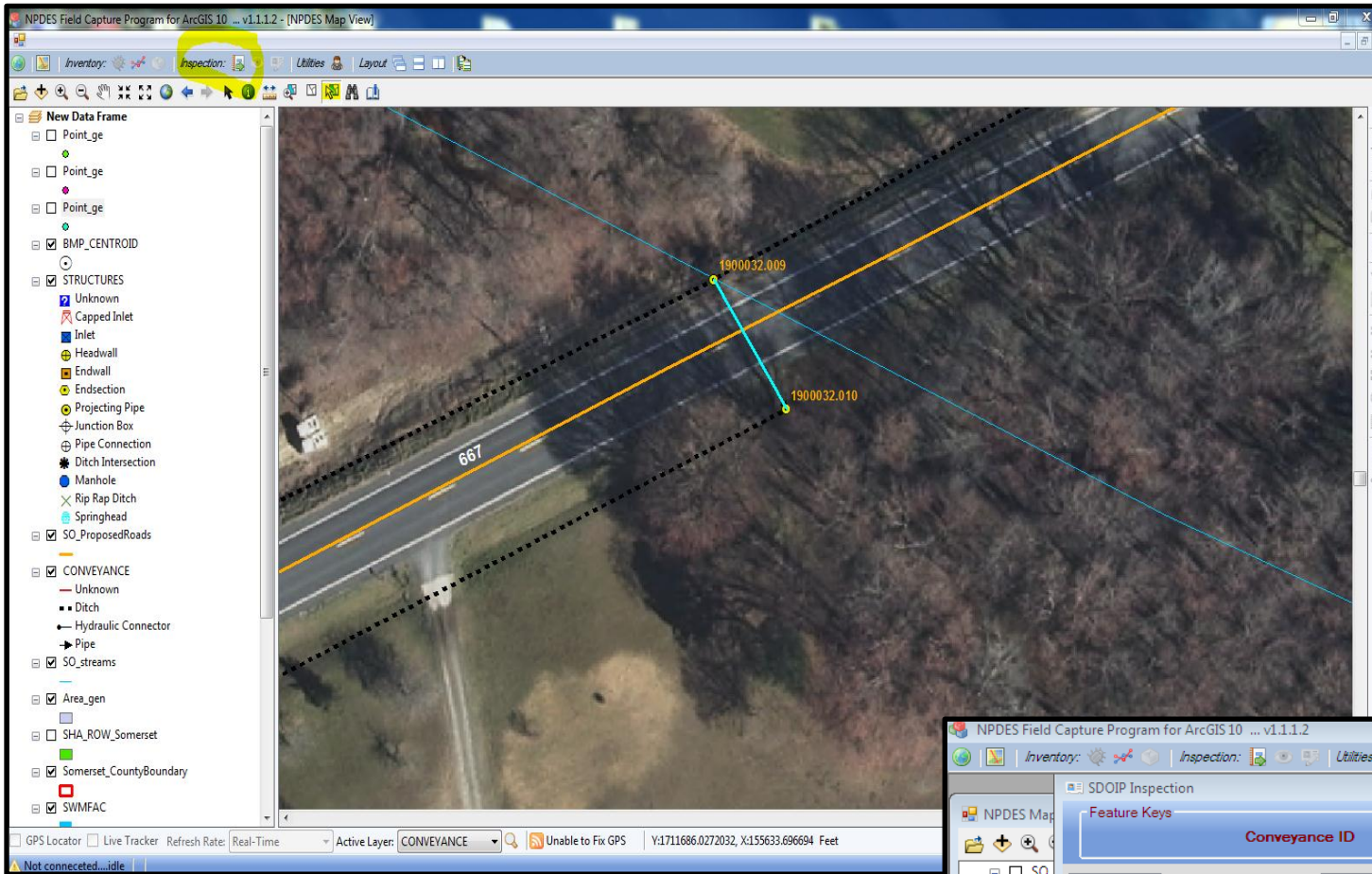


- When collecting data, field crews wait for the Trimble unit to reach 10 cm vertical and horizontal accuracy before creating a point.

- An inspection, including photographs, is then completed at each structure using the Field Editing Tool software using the Toughbook computers.

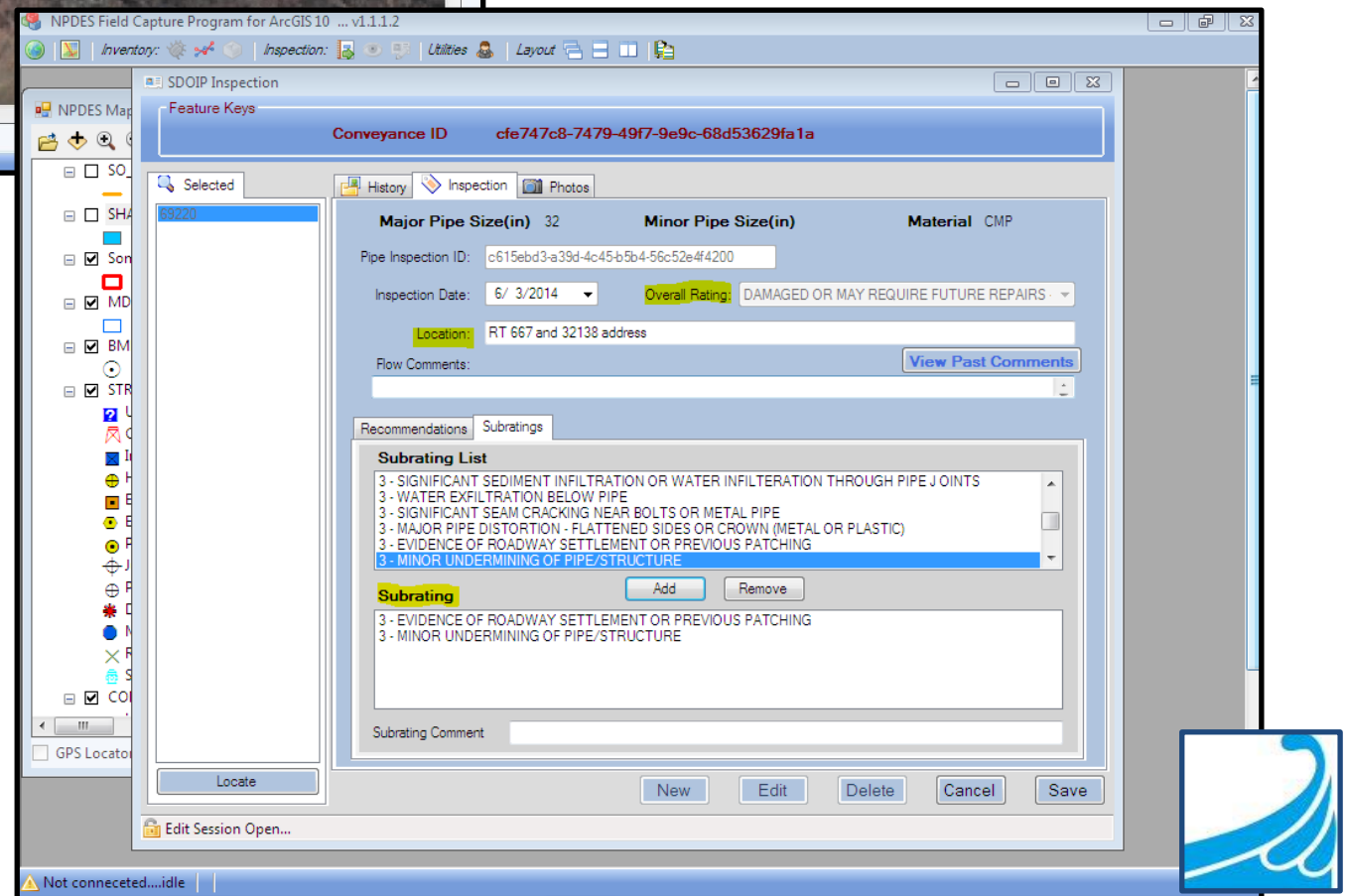


Field Data Collection Workflow

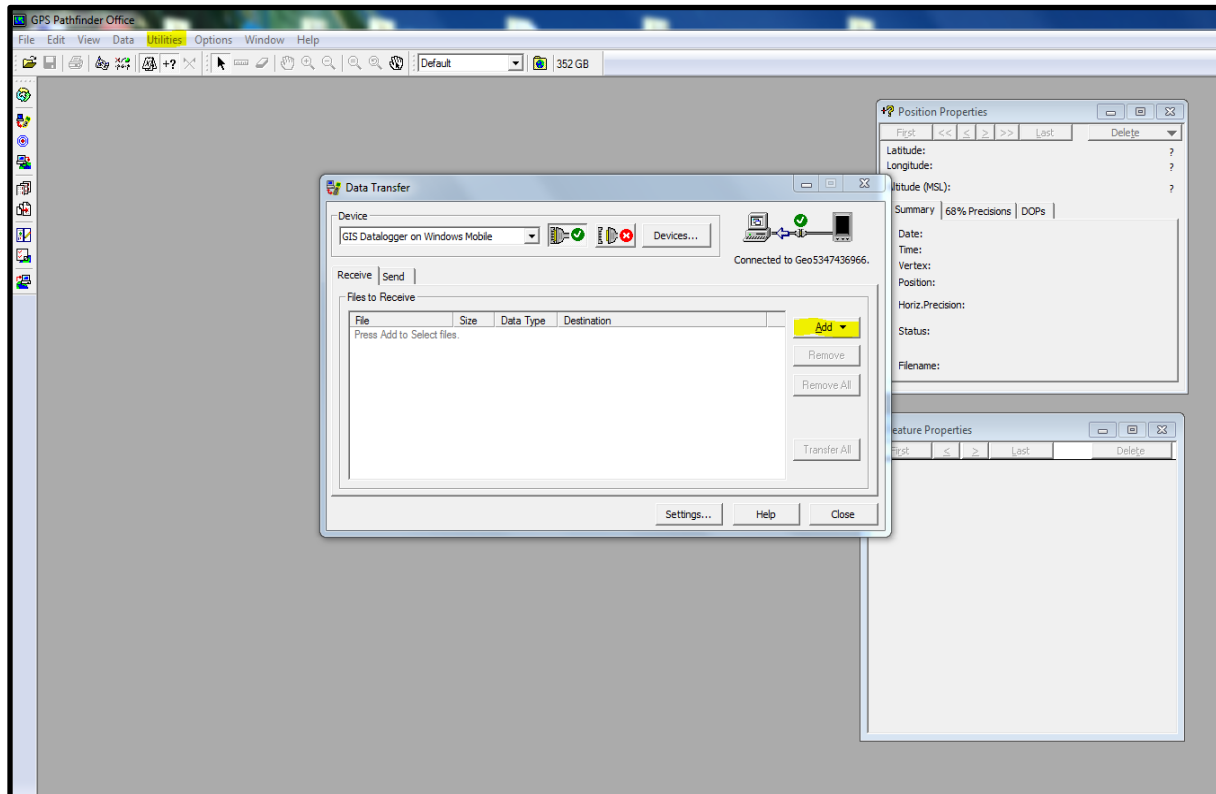


- Contract
- Owner
- Condition
- Material
- Size
- Elevation
- Flow direction
- Overall Rating

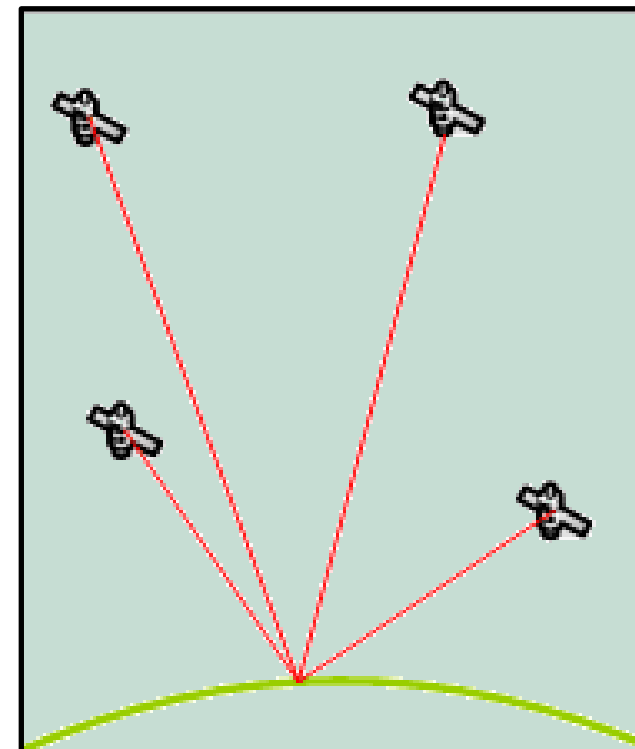
•Detailed inspection data is collected at each structure and BMP and are entered into the database.



Field Data Collection Workflow



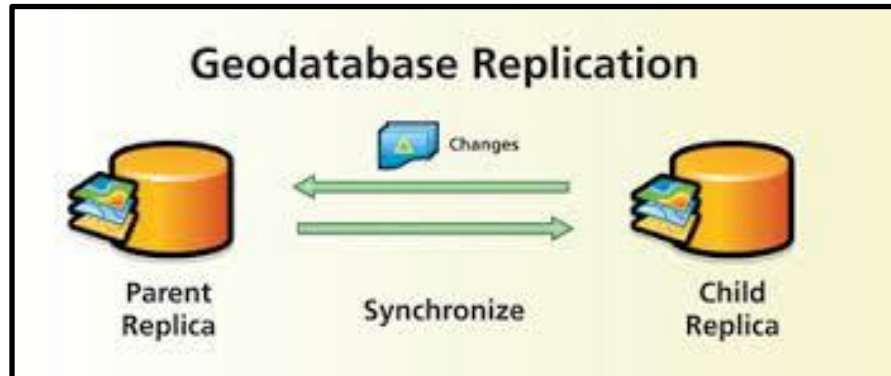
- At the end of each workday, data is projected and transferred to a shapefile using Pathfinder Office.
- Field crews then post process the data and perform QAQC.
- Photos of BMPs and structures are uploaded and linked to inspections.



- GPS data is checked for DOP values and accuracy

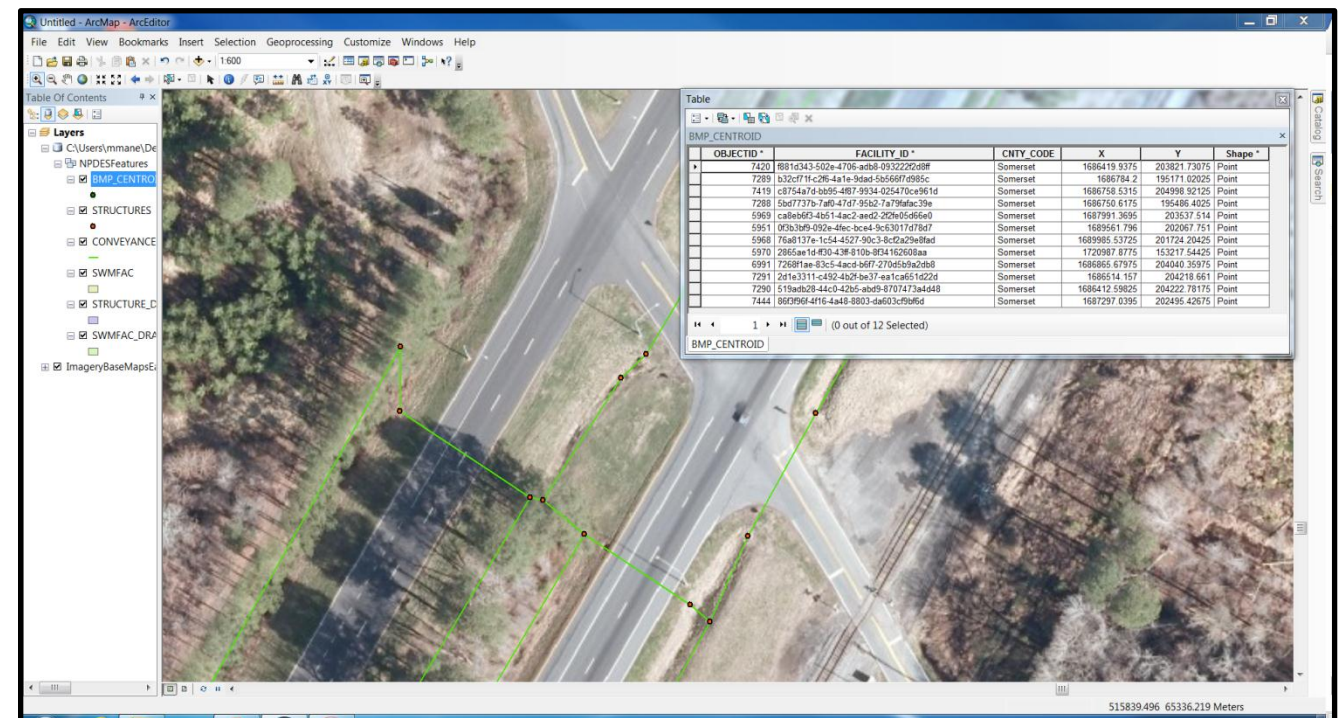


Data Management



- Completed replicas are submitted at the end of each week and checked into the versioned QAQC database.
- Edits are synchronized, reconciled and posted to Production database.
- New replicas are created which contain the data from each child replica from the week before.
- Data is then QAQCed by the database administrator.

- Data is checked for:
 - Completeness
 - Accuracy
 - Topology
 - Flow Direction
 - Linked photographs
 - Consistency



Lessons Learned

- Addressing accuracy issues when VRS is not available
- Addressing canopy issues
- Addressing issues with wifi hotspot connectivity between units and phones
- Determining the best GPS setting for this particular data collection effort
- Addressing Bluetooth connection issues between Trimble unit and Toughbooks
- Compatibility issues between Geo7 and older versions of Pathfinder
- Determining best field data collection computer



Questions/Open Discussion

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