Updating a mature enterprise collection system GIS while business continues

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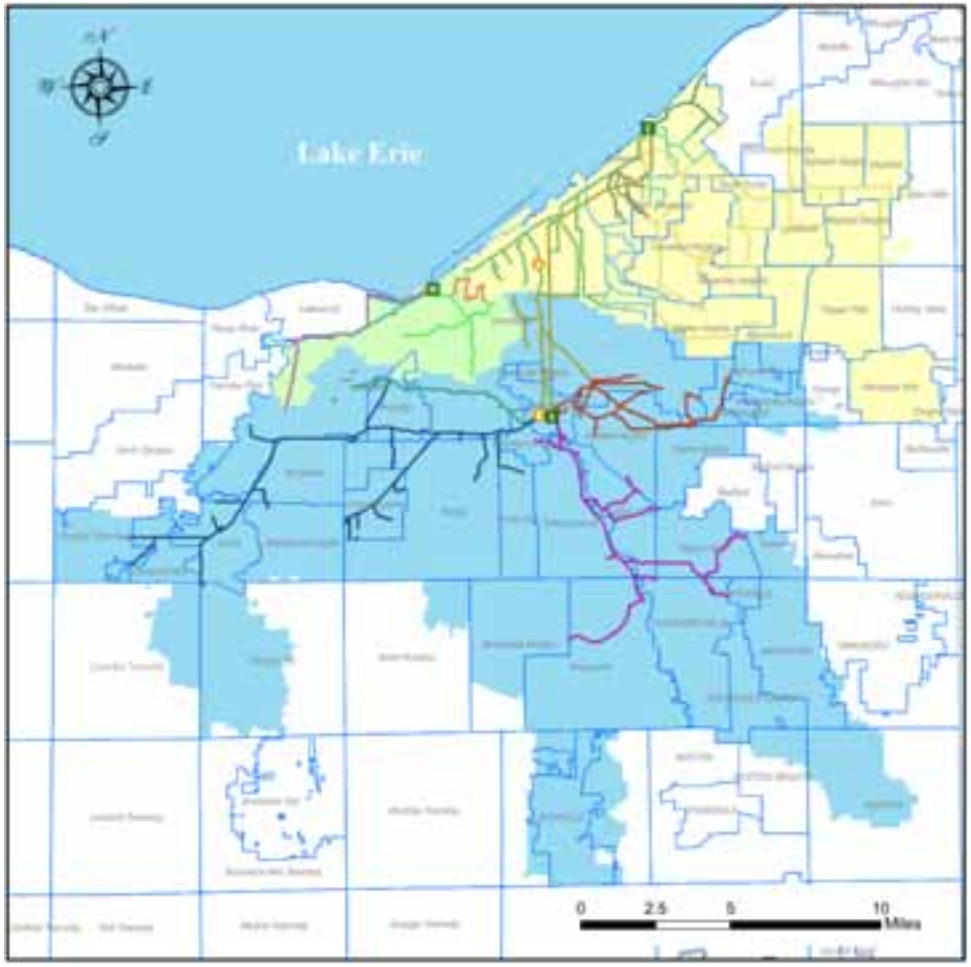
Brown AND Caldwell

Northeast Ohio Regional Sewer District

Protecting Your Health and Environment

NEORSD

- Formed in 1972
- Serves 62 communities in the Greater Cleveland Metropolitan Area
- 3 WWTP Facilities
- Over 250 miles of interceptor sewers
- 1+ million customers
- Do not own, operate or maintain local sewers - 4,800 miles of sanitary/combined sewer pipes



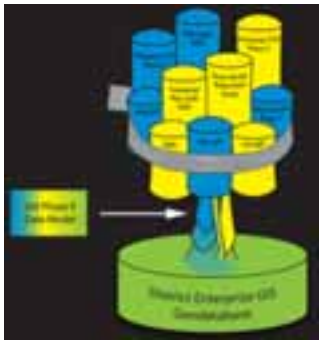
History of GIS at NEORSD

1996-2000

Project GIS datasets

1st ArcSDE geodatabase (shapefile container)

1st web GIS (ArcIMS)

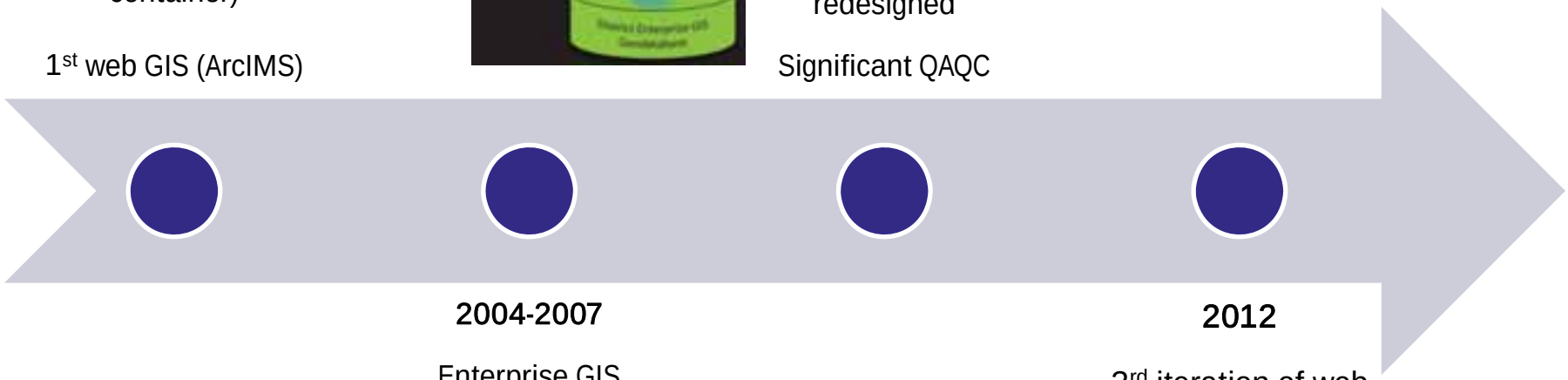


2007 – 2010

Evolution

Geodatabase redesigned

Significant QAQC



2004-2007

Enterprise GIS Implementation

1st designed geodatabase

2nd iteration of web GIS (ArcGIS Server Web ADF)

2012

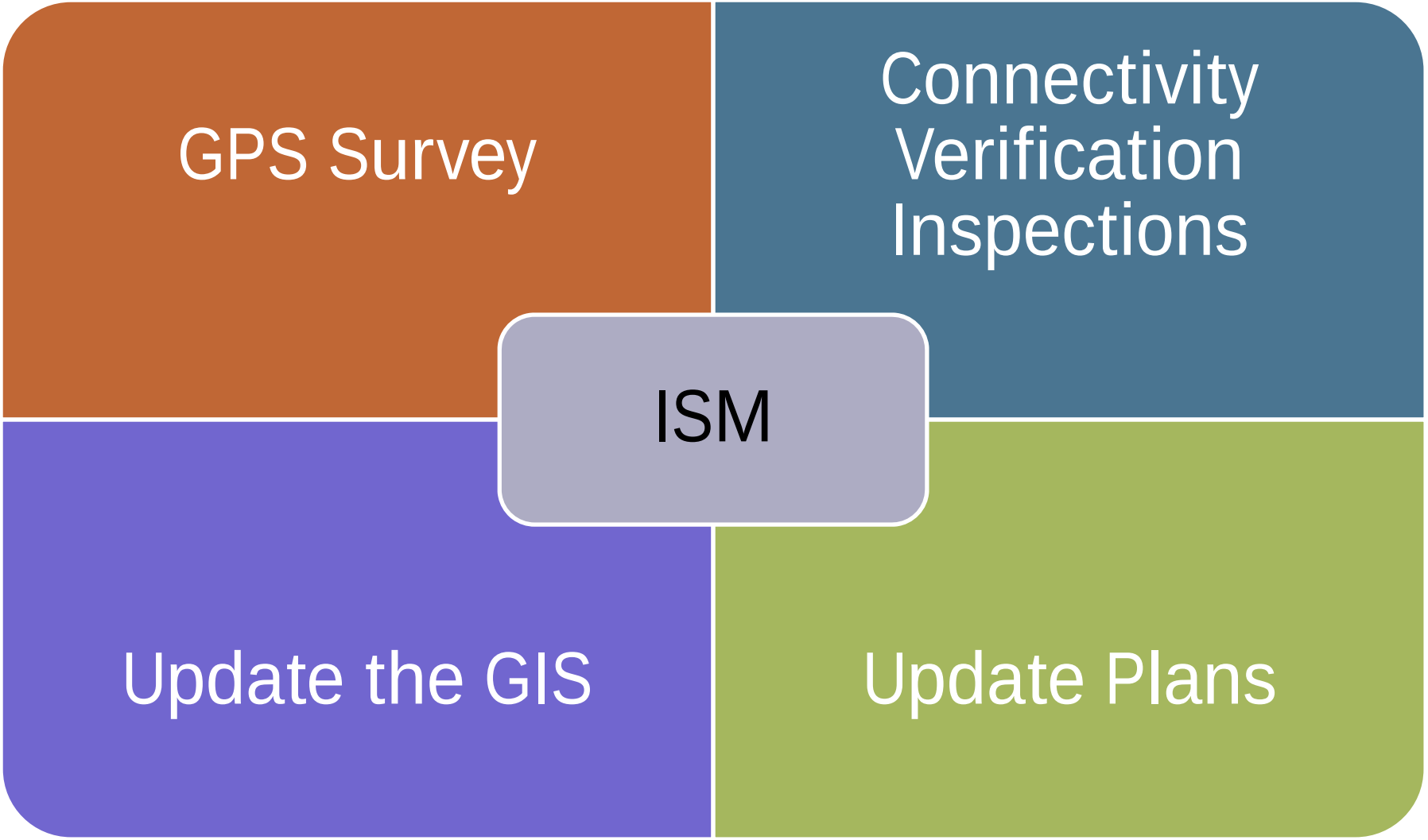
3rd iteration of web GIS (AGS & Geocortex Silverlight)

Interceptor Surveying & Mapping Project (ISM)

Interceptor Surveying and Mapping (ISM) Project – Guiding Principles

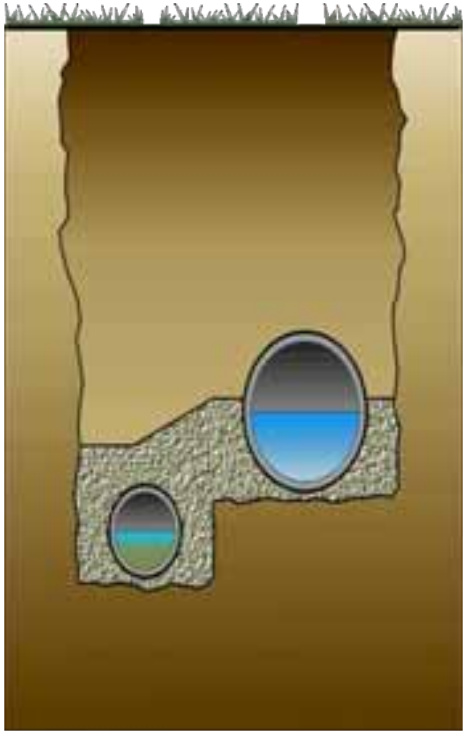
- Improve spatial accuracy of the GIS
- Correct network connectivity
- Engage NEORSD staff in resolving problems
- Keep GIS up & running
- No data merging hassles

ISM – The Work


GPS Survey
Connectivity Verification Inspections
ISM
Update the GIS
Update Plans

The Challenge – Complex Reality

- Unique Infrastructure – Common Trench/Dividing Wall Manholes
  - Present loops in the geometric network if drawn correctly.
  - Present viewing issues if drawn correctly.



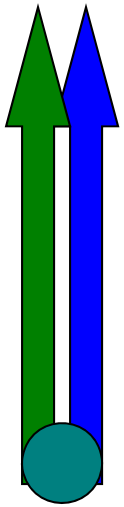
Sanitary / Storm
Two Separate Manholes

Sanitary / Storm
Dividing Wall Manhole

Storm Over /
Sanitary Under
Manhole

Complex Reality

- “Blind Junctions”
- Outside drops
- Doghouse drops
- Vortex drops



Field crews’ maps just show 2 dots and a line

ISM – The Technology

Android Tablets

- Connectivity Inspection data
- Photos

Internet Data Services

- SugarSync
- 4G WiFi Hot-Spot = tablet stays in field

Esri Geodatabase Replication

- Multiple editors at multiple agencies
- GIS stays up & running

Android Tablets

- Cheap ($250), easy to use hardware
  - Samsung Galaxy Tab 7.0 Plus tablets
- Digital inspection forms
- GPS-tagged photos
  - Location
  - Connectivity
  - Invert

Durability of Android Tablets

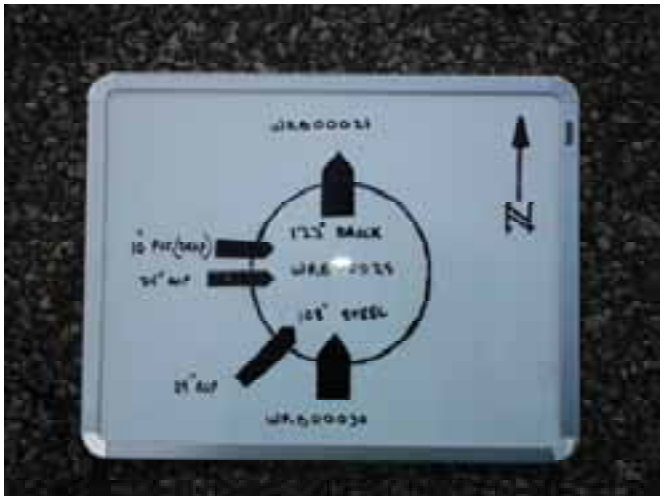
- Same basic hardware and operating system used in millions of cell phone handsets
- Waterproof pouch that fits around the neck
  - Virtually eliminates exposure to moisture
  - Minimizes likelihood of being dropped
  - Touch screen still works well behind plastic

It passed the 5 year-old daughter durability test

Waterproof pouch with neck strap provides protection in the field

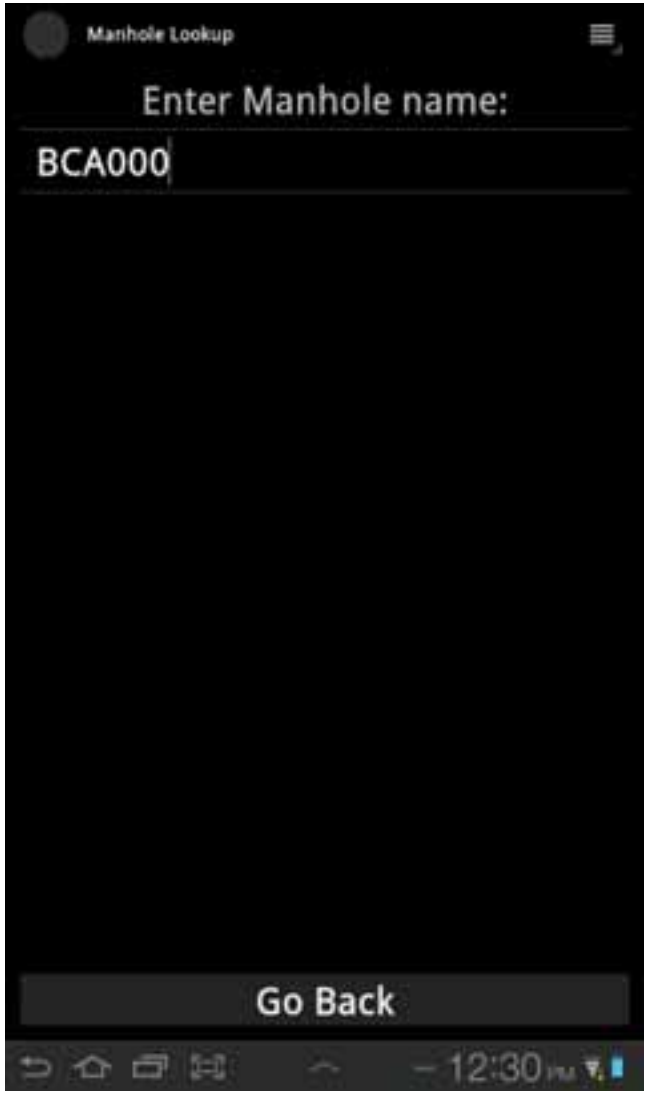
Field Data


Pipe Connection
Clock Position* 3
Direction* In
Shape* Circular
Height (in.)* 24
Width (in.)
Material* Reinforced Concr
Flow Type* COMBINED
Pipe Type* GRAVITY
Rim To Invert (ft.)* 21.4
Upstream MH ID* BCA00330
Done
12:32



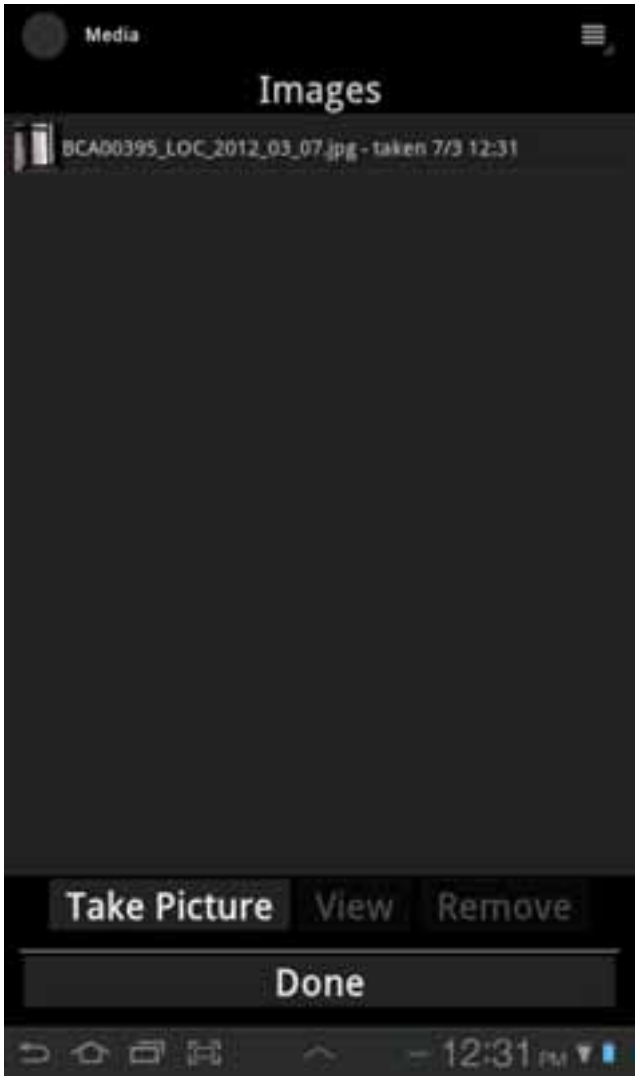
Inspection app – main screen

Choosing a manhole (auto-completes)

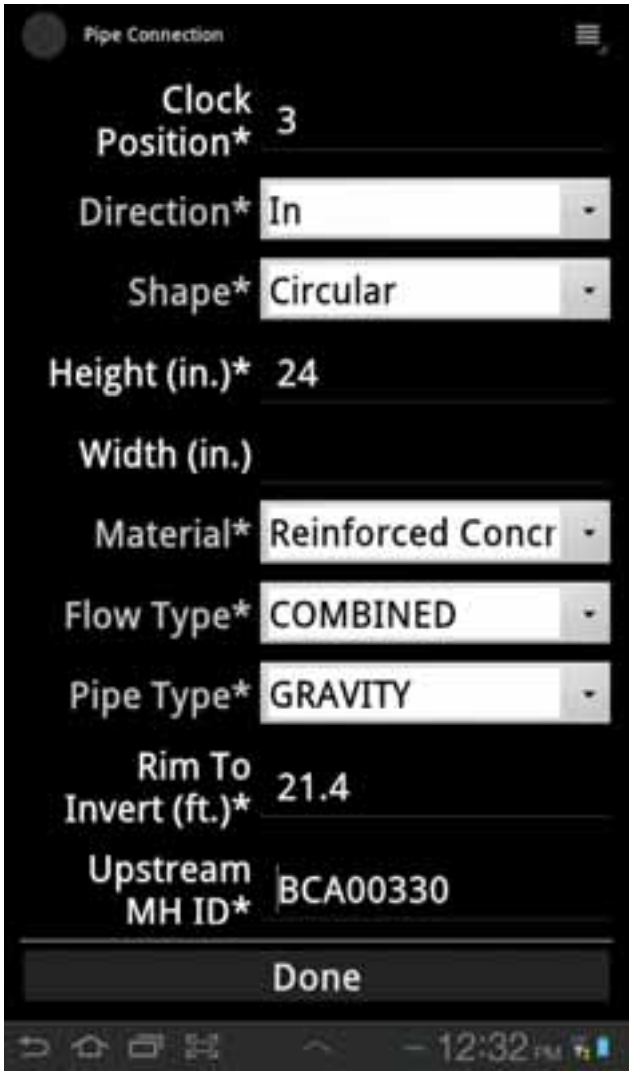


Manhole / Inspection details

Taking photos (auto-named to include Asset ID and photo type)

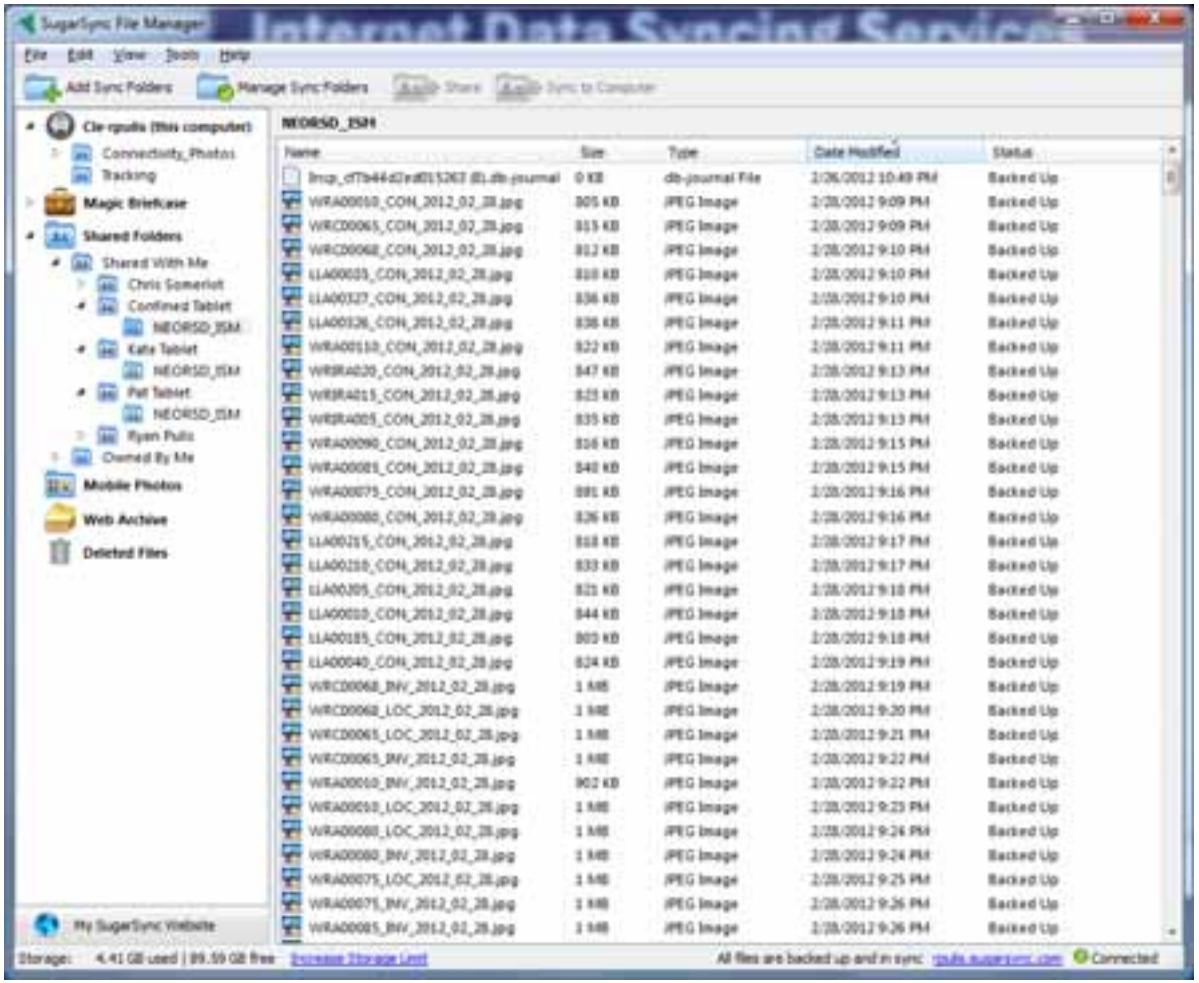


Entering pipe connection details



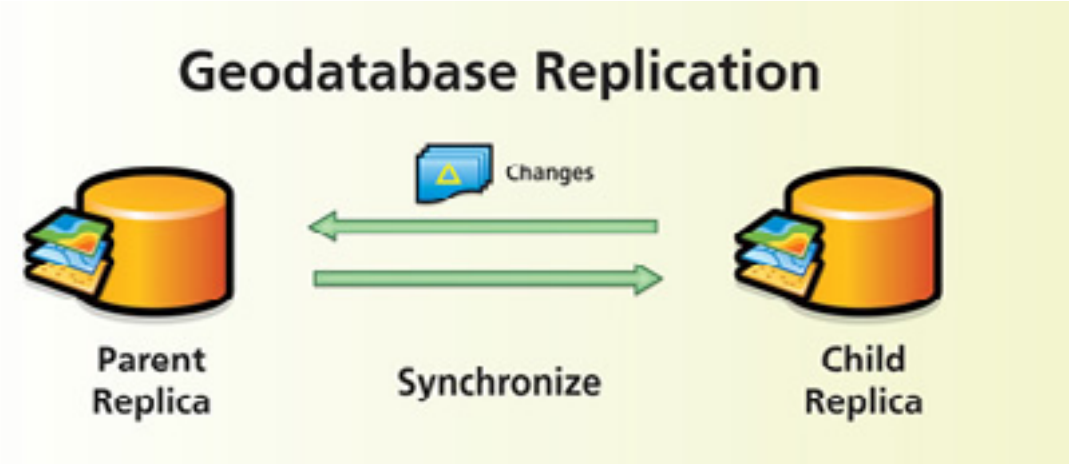
Internet Data Syncing Services

- SugarSync.com
  - Cheap - $10/user/month
  - Native app
  - 2-way auto-sync
- Data comes to the data manager
- With 4G Wi-Fi hotspot, tablets stay in the field



Esri Geodatabase Replication

- NEORSD's GIS has 50+ daily users
- GIS needs to stay ir service
- GIS is edited daily
- ISM Team's edits needed ASAP

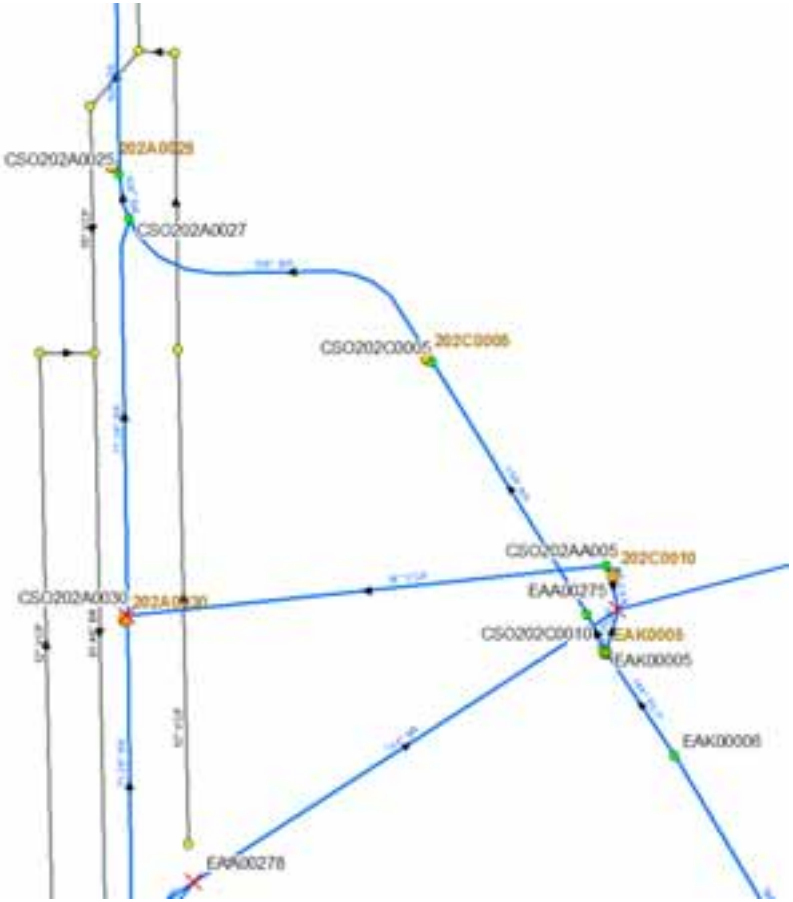


Geodatabase replication is the key

Complex Research – Many Sources

- Current GIS
- Plans
- Current inspections
- Past pipe inspections – CCTV lengths
- Past manhole inspections
- Location photos vs. orthos
- Current vs. historic GPS survey

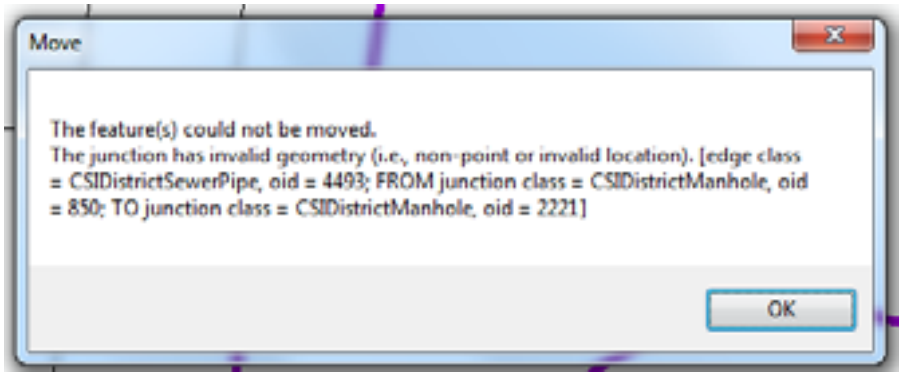
Cross-Referencing Sources

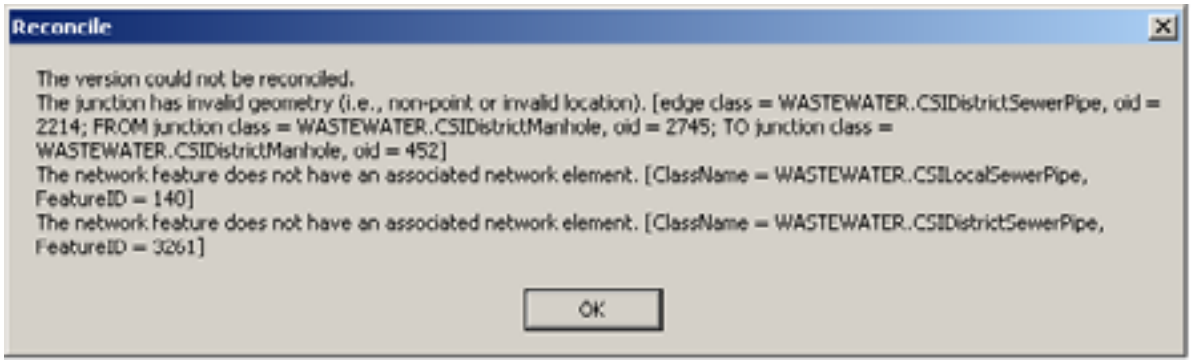


How do you teach new people about this 120-year old system and the history of its data?

ISM – The Challenges

- Geometric network errors
  - Lurking hidden errors prevent synchronization and reconcile/post
- Negates the advantages of replication
- Get your network in order!





ISM – The pay-off

GIS accuracy improved in only 9 months

Eliminated paper-to-digital data conversion

Drastically reduced traditional hardware costs

NEORSD GIS staff engaged throughout

No file exchange/versioning mayhem

NEORSD Enterprise GIS stays up & running


Any questions?