Tablets For Roadside Feature Inspections

- Culverts, Signs, Traffic Barriers

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Data Collection in the Field Supports Asset Management

What is Asset/Feature Management for the Field?

- Infrastructure Based Assets – Things you can see and touch in the field (roads, signs, bridges, etc.).
- Things that can impact the safety of the traveling public.
- Data collected about those features – design data, GPS data, business data such as physical attributes, condition, etc.

How does this support the DOT Data Life-Cycle?

Tablet Research

- Through a request from Maintenance field staff to reduce paper inspection and data inconsistency through a centralized process, in 2011 we embarked on a tablet research project which has set the stage for future tablet usage.
- Tablet requirements were defined (on next slide)
- More than two dozen tablets were tested (windows, iOS and Android)
- A research data collection application was developed and field tests ensued using an Android tablet.
- In early 2013 is was decided to go with the Gen4 IPad coupled with a portable mifi unit. Current testing of the Apple Air with a data plan is also underway.

Tablet Criteria

- Good screen visibility in outdoor situations (using adhesive anti-glare screens)
- Tablet form-factor in the 7” – 11” size range gives optimal trade-off of screen size and portability
- Reasonable first cost and life-cycle cost
- Compatible with the major operating system platforms (ie. iOS, Android, Windows)
- Compatible w/ Iowa DOT mobile device mgmt. solution (Airwatch)
- GPS enabled without a network connection
- Built in camera and microphone
- Touch enabled
- Long battery life (min. 6 hours)
- Wi-Fi enabled and/or mobile broadband enabled

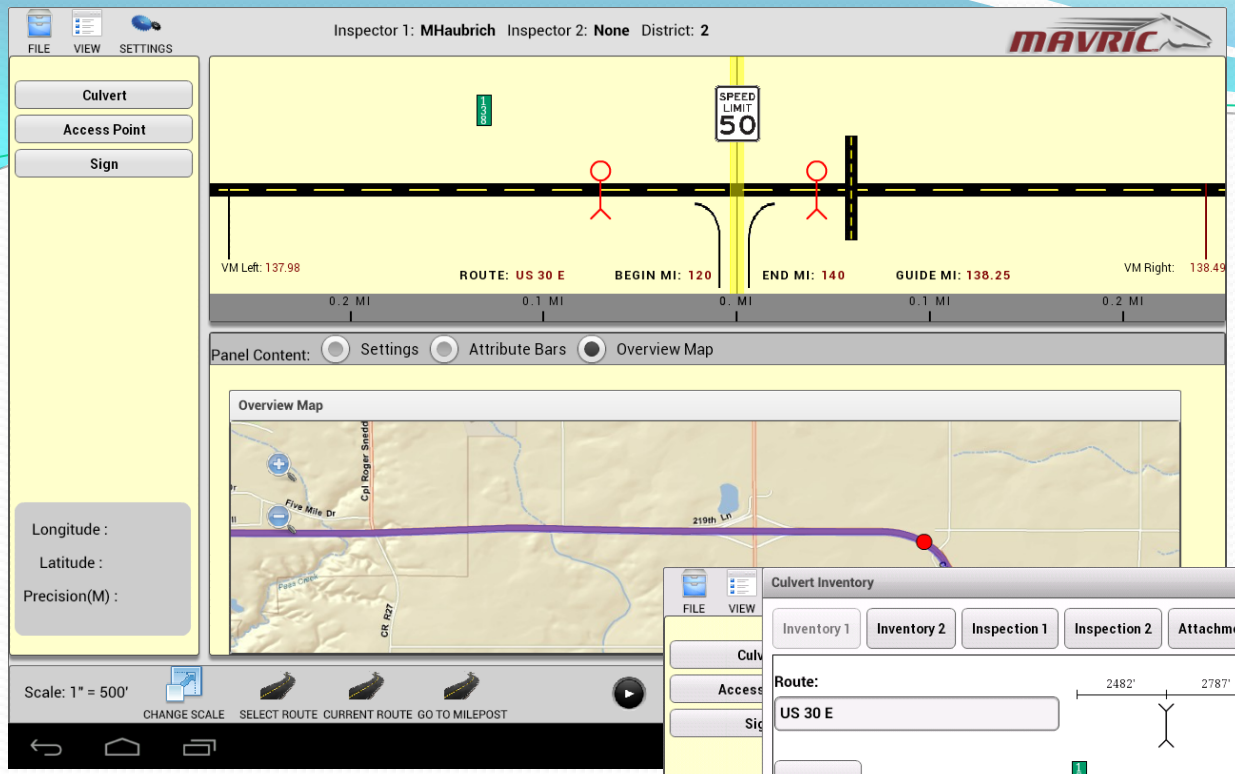
IPad Tablet Deployment

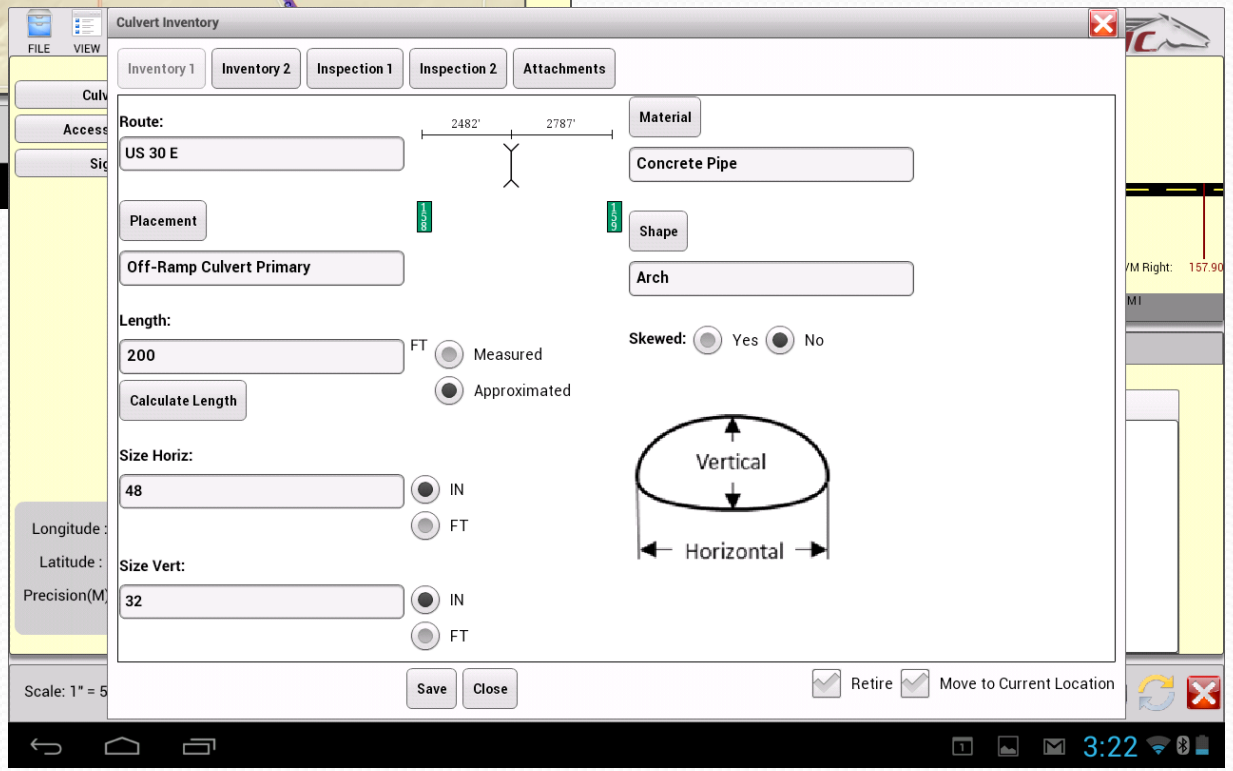
- Maintenance Tablets in the field = 127 - almost one in every garage (109), some garages have multiple tablets.
- Maintenance management at District level have IPads
- Every field supervisor circle is supposed to have at least two.
- Another 50 are coming later this year to go out to Maintenance field staff for data collection efforts.
- Building tablet usage to integrate into field maintenance processes.
- Construction staff have ~18 to do the paperless plans pilot projects.

What is driving technology/ workflow changes?

- Need to move away from paper based “data management”
- Need to locate and store our assets in an enterprise system
- Need to develop workflow processes to maintain condition and inventory information over time and collect once use many times.

Research Application Main Screen 2012

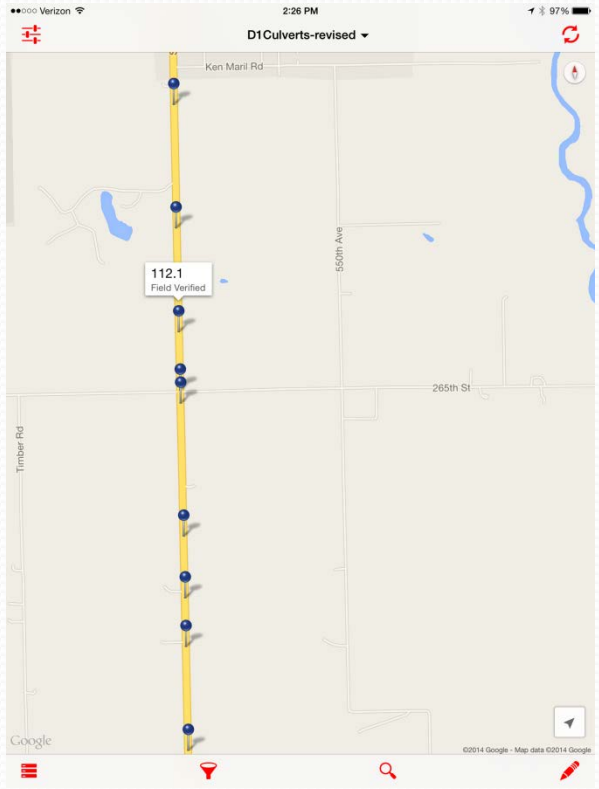


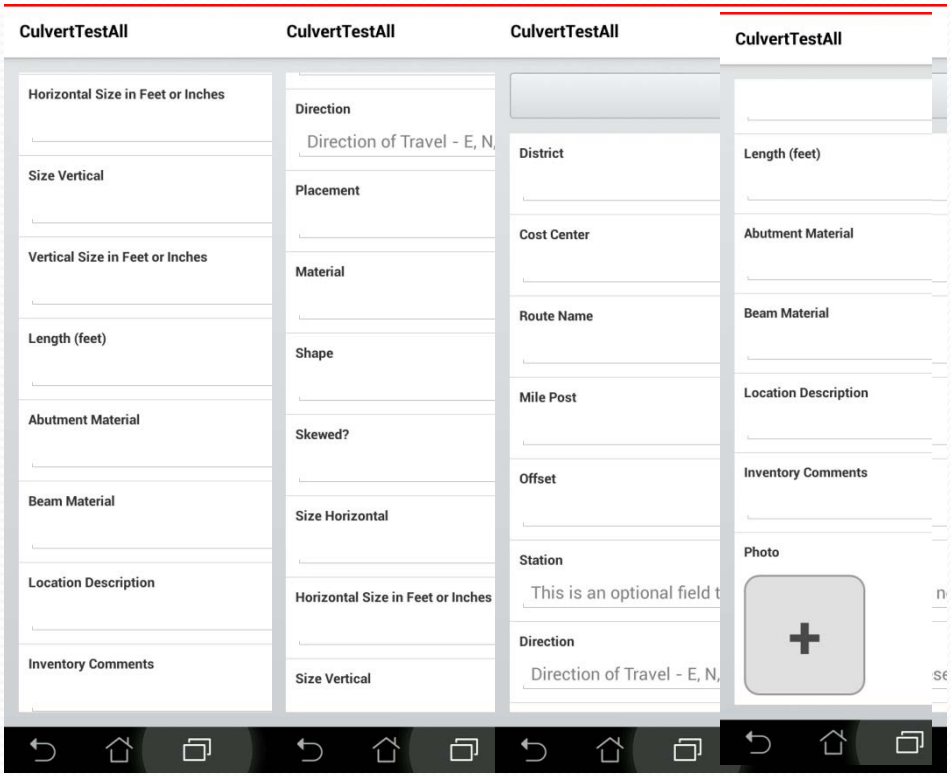


Splash screens from the research application developed by Transcend Spatial Solutions

Current Short-term Solution

- fulcrum mobile location leverage – For fall 2013 and spring 2014 data collection we have an app called Fulcrum being used to collect culvert data.





Field Data Inspections

Production Application Development

- Contracted with ElectData out of Idaho in March 2014 to develop a production series of ArcGIS Collector Tablet Applications which ties into our Oracle Spatial and ArcGIS Server infrastructure
- The phase one focus is on inspection of a series of roadside features: culverts, signs, guardrail/crash cushions. Phase two will cover fence, lighting, and additional features as identified.
- Tablet testing/support/training is being provided by the Office of Maintenance team and IT staff collaboratively.

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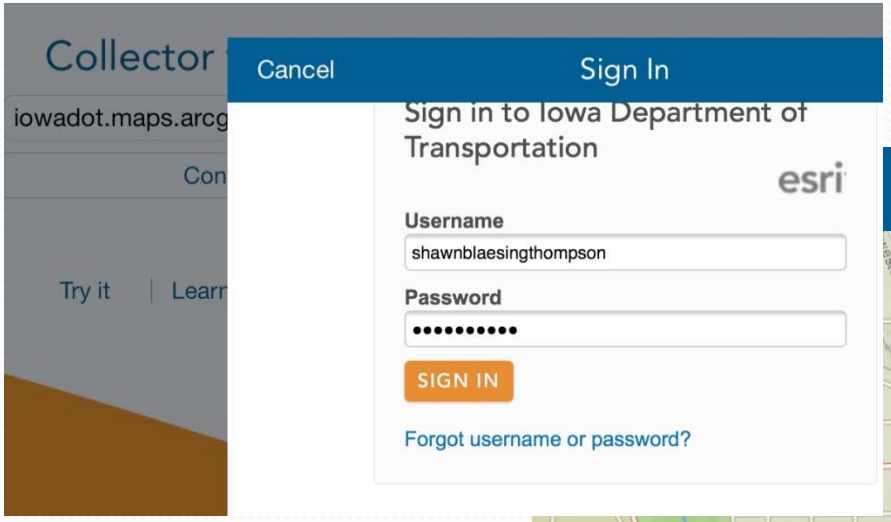
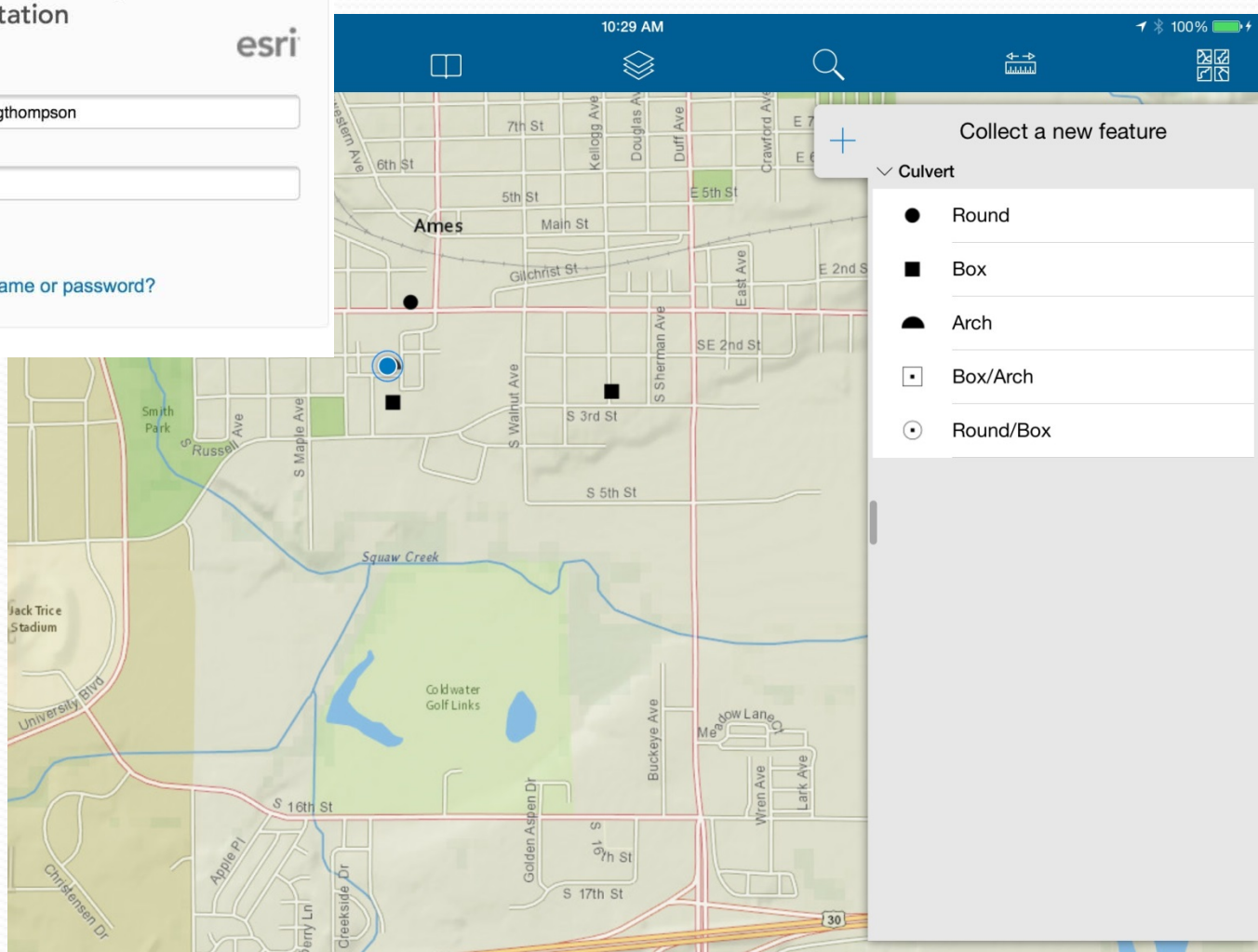
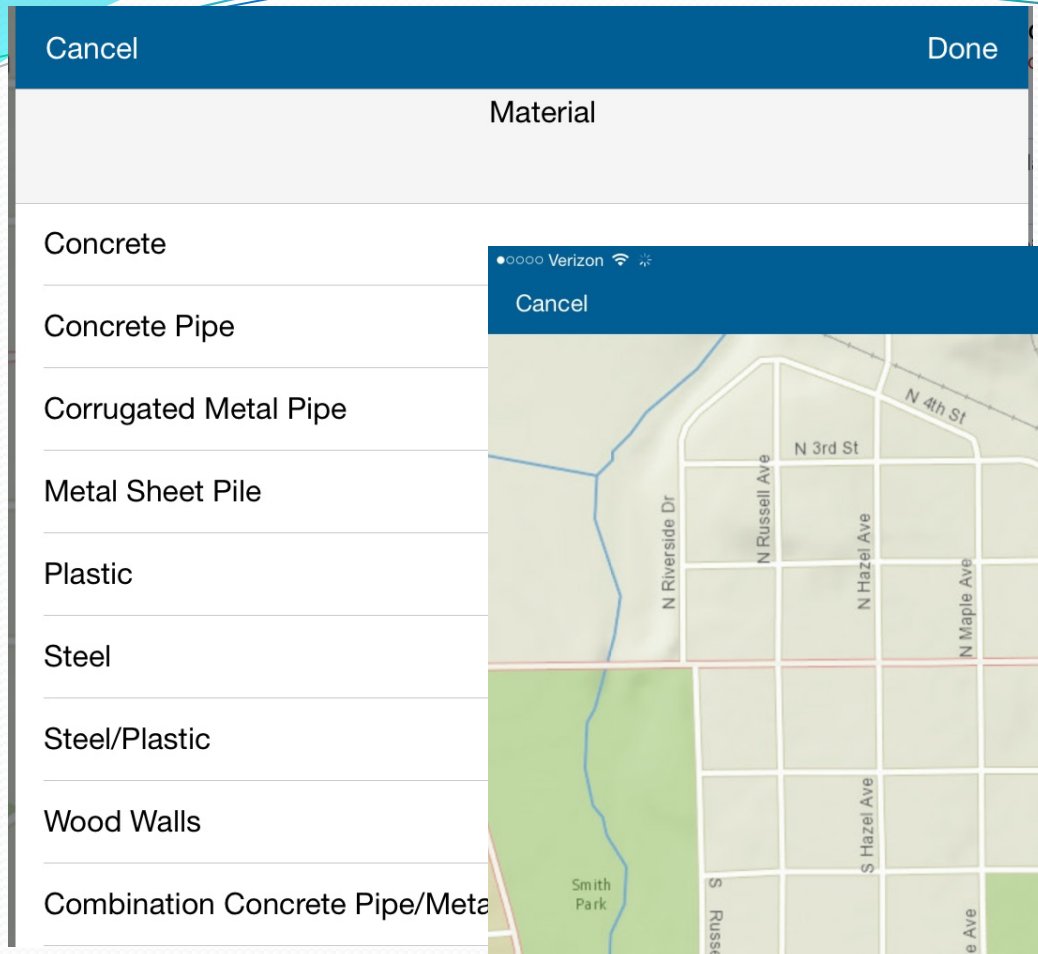
ArcGIS Collector Application



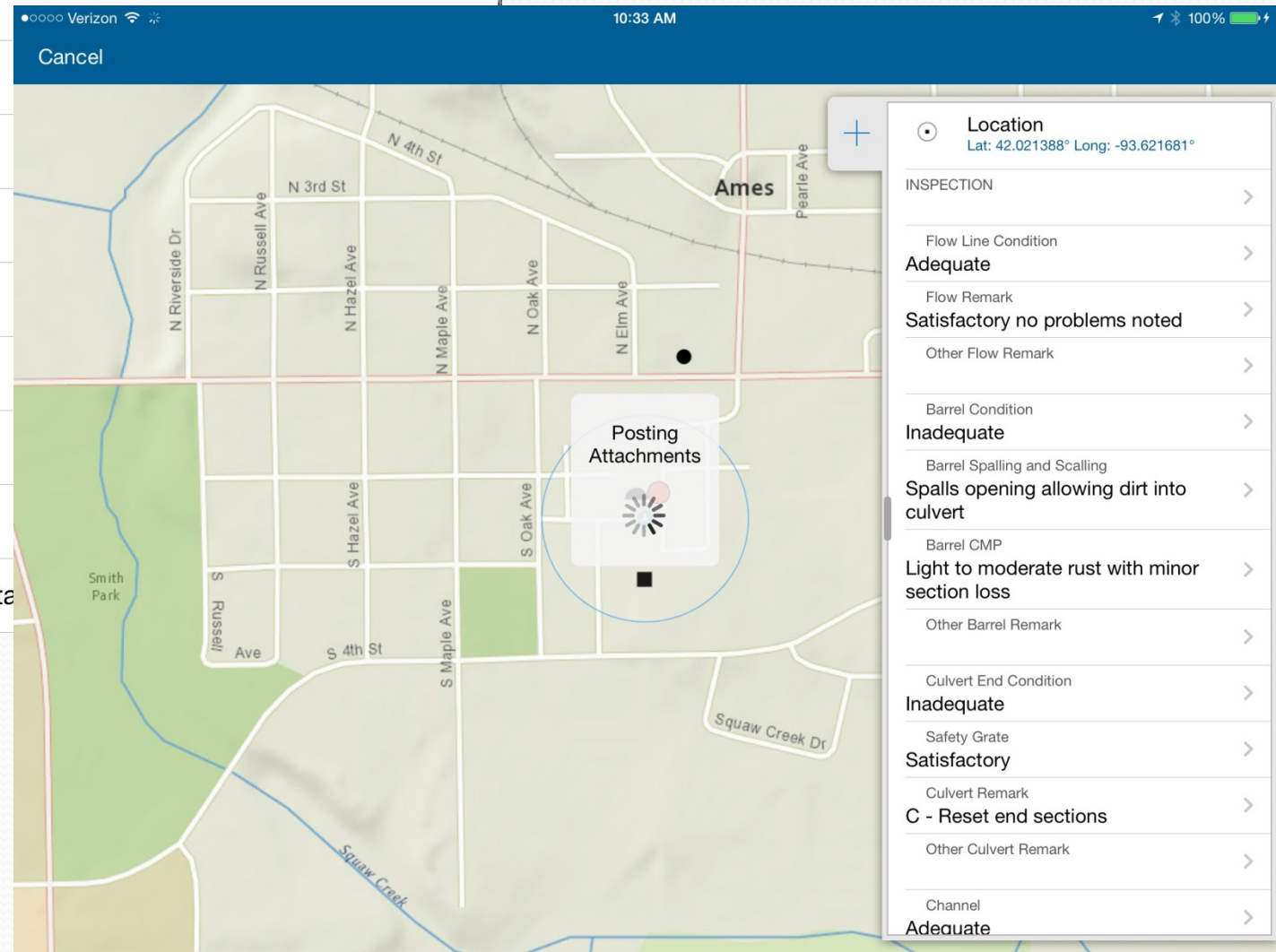
Login to DOT ArcGIS Online Account

View of Culvert Application Start Menu

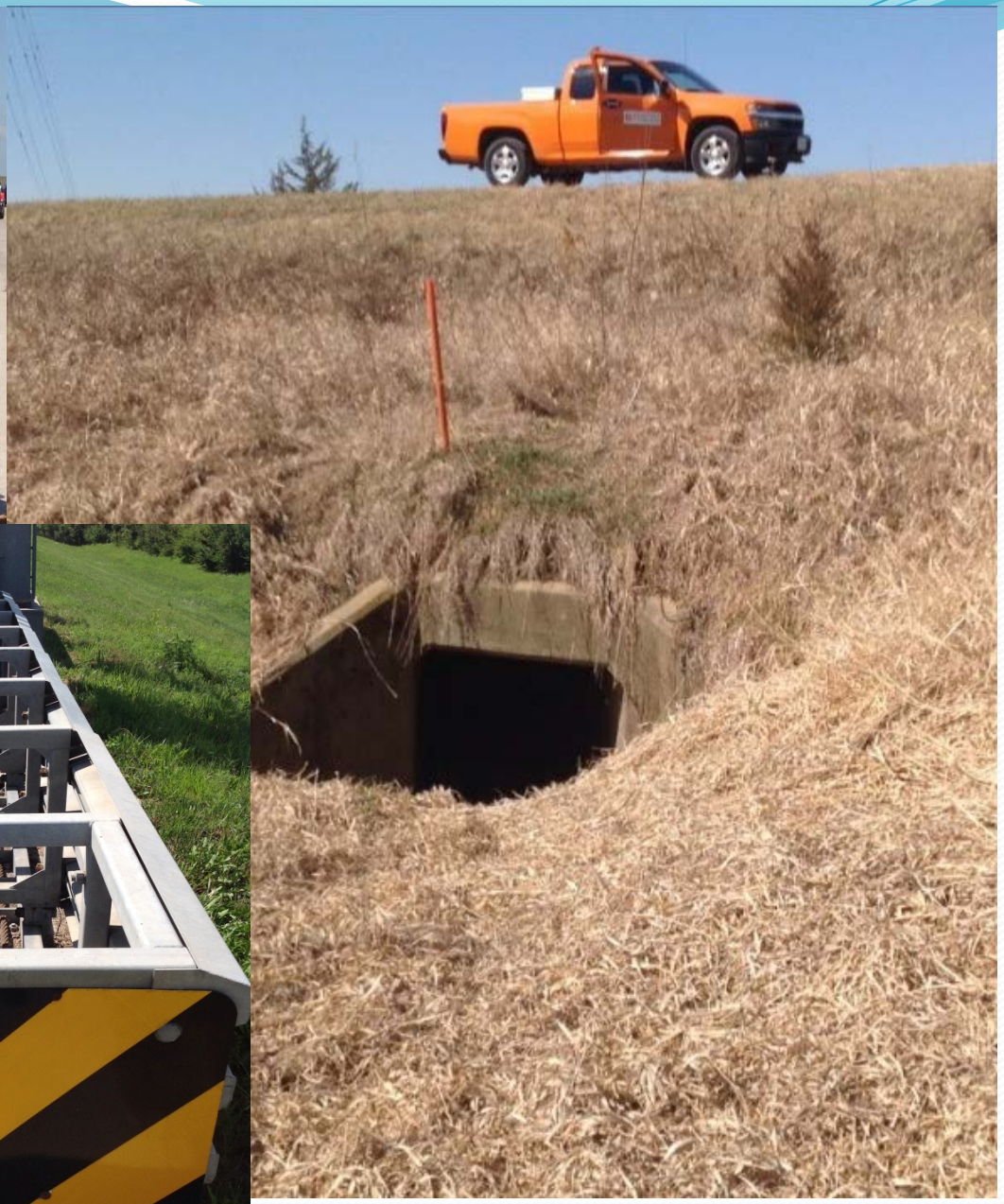




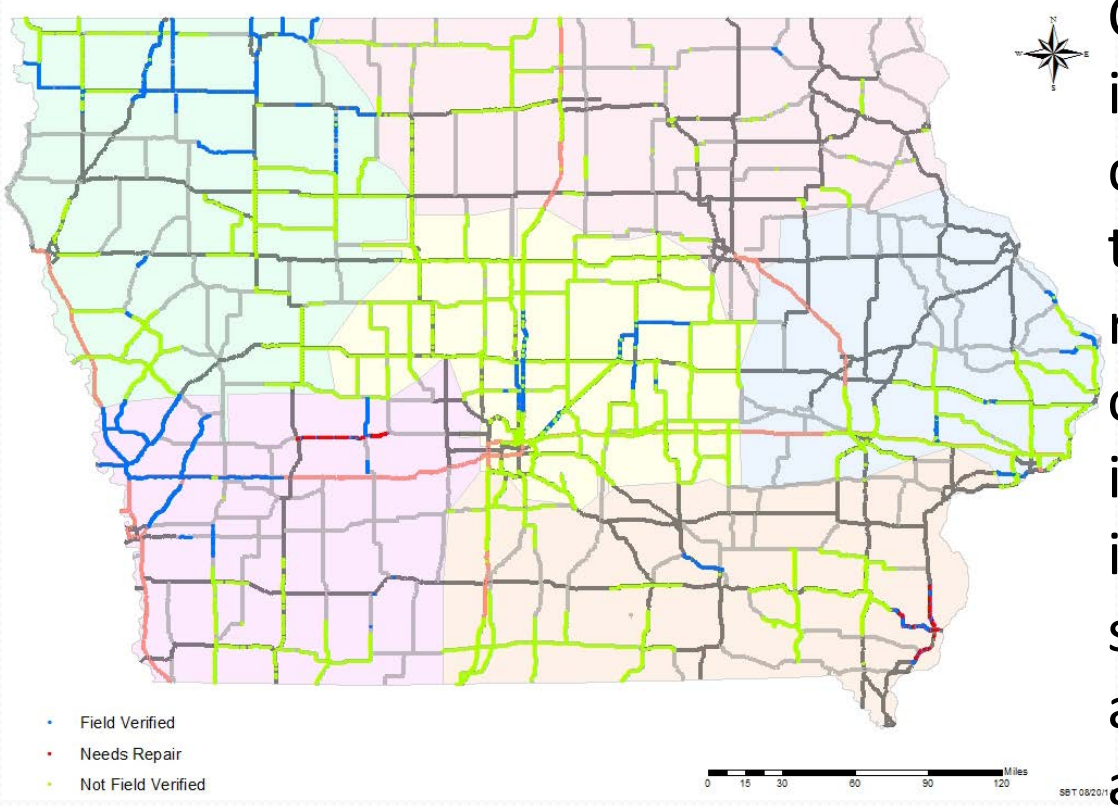
To collect a culvert, a menu provides data driven forms



Add a photo to record and submit



Historical and New Culvert Data

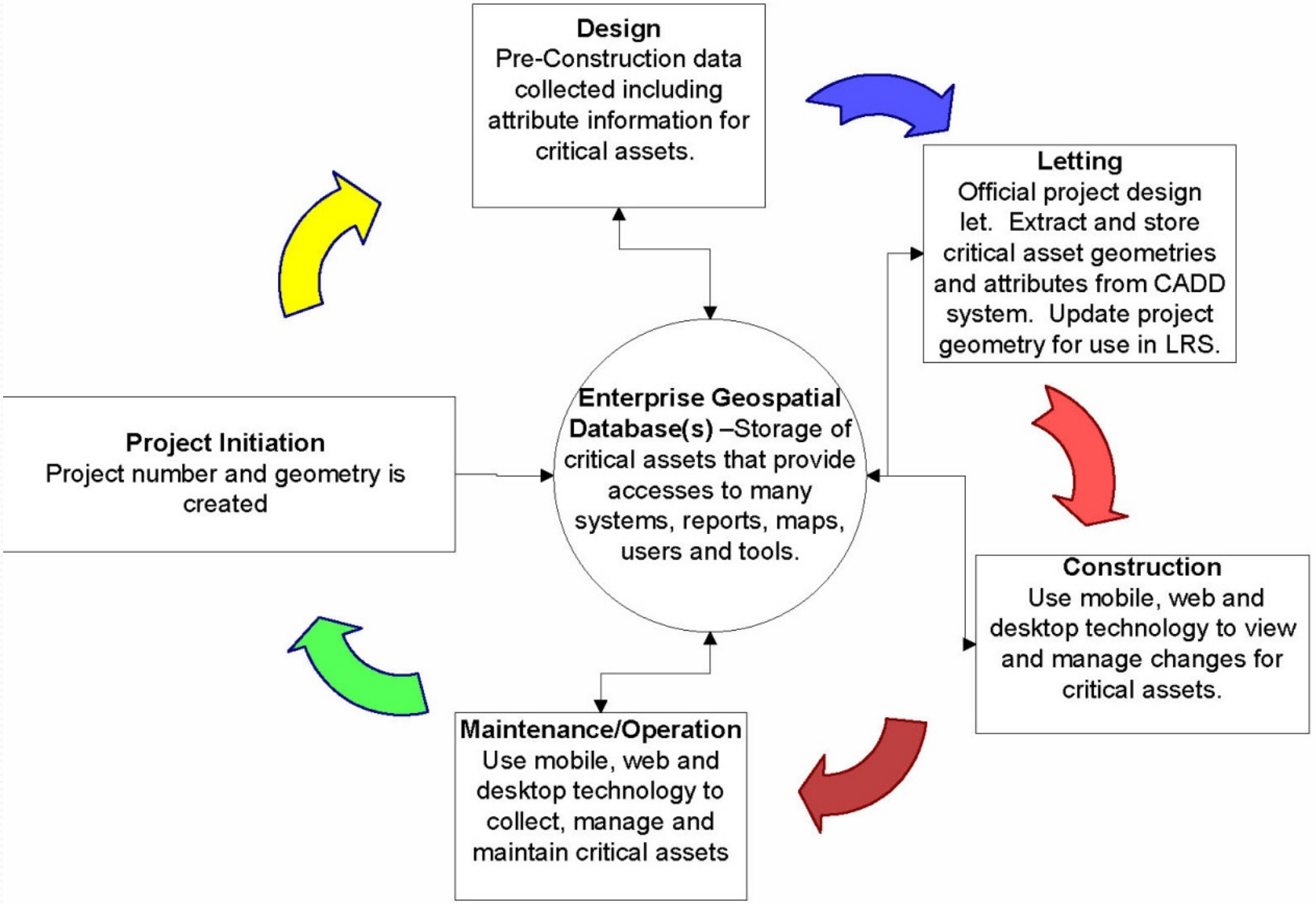


Collection of this information in a database allows one to generate deficiency reports, do spatial correlations, see issues over time to identify design specification changes, and in the future feed a work ticket system.

Beyond Inspections

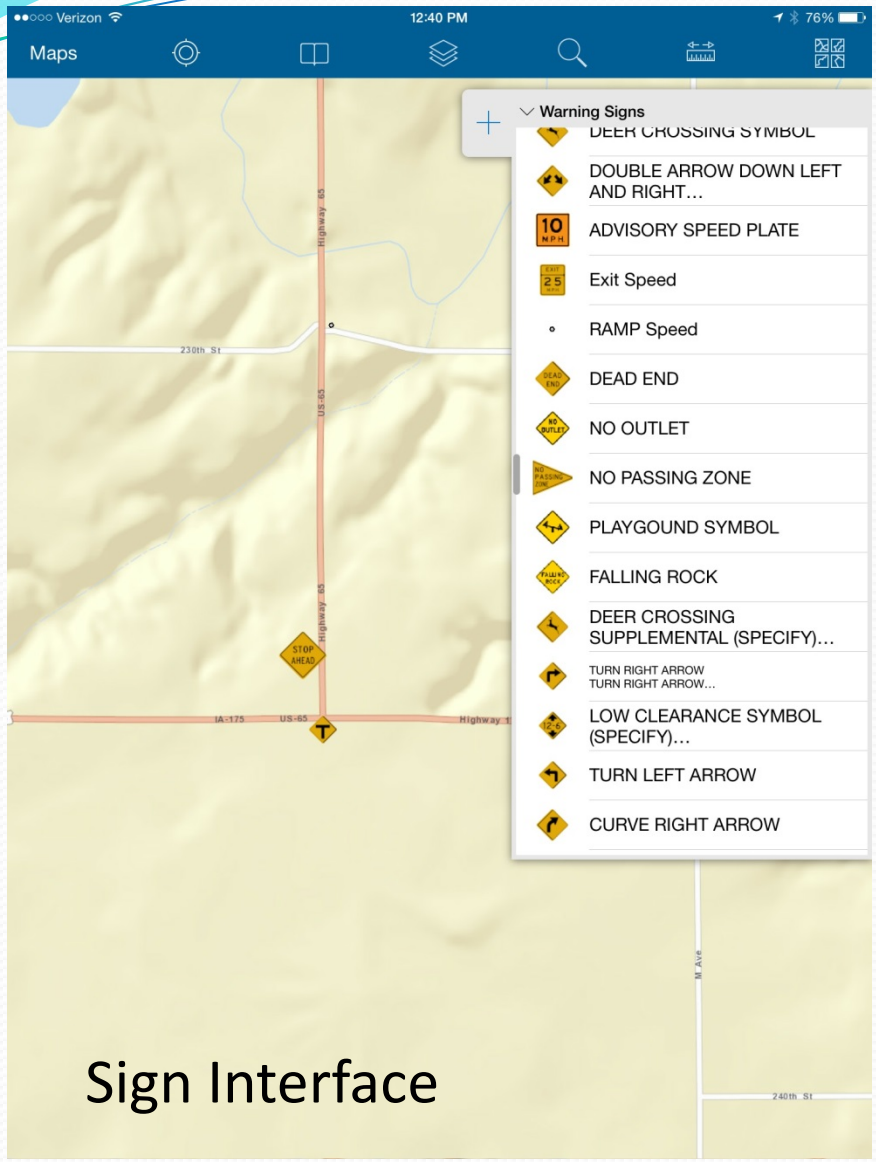
- Databases are being developed which allow information to be consumed at other points in the data life-cycle.
- It is also expected in the future to be able to leverage inventory information stored during design tabulation at letting as well as from as-built updates in the field.
- The hope is that the Collector Apps being built for inspections can be spun off for use by Construction in their As-built process for the 2015 construction season.

Geospatial Data Lifecycle – Future Data Inputs and Processes



Other Information Gathered by Maintenance and Construction Staff

- Culvert Data within ROW (60% collected)
- Guardrail, Crash Cushions (20% collected)
- Signs (Statewide)
- Interstate Crossovers
- Roadway Closure Gates
- Access Locations (50% collected)
- Deer Kill Data (ten years)



Sign Interface

Guardrail and Crash Cushions Interface

Paperless projects

- There are several pilot projects focused on the elimination of paper in the field.
- The idea is to not provide paper plans at letting but rather digital plans in PDF format.
- The DOT construction staff will then use an IPad out in the field to do redlining with PDF Expert, and digital signatures with File Manager
- This is a first step towards an intelligent plans process rather than just being digital.

Benefits of Change

- Evolving our processes
- Integration and centralization of data
- Updating our workflows
- Better understanding of processes from office to office.
- Efficiencies
- Able to embrace new technologies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QUESTIONS?

Thank you!

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Abstract for conference -

Iowa Department of Transportation (IA DOT) recently finished research to streamline field inventory/inspection of culverts by Maintenance and Construction staff while maximizing the use of tablet technologies. The project began in 2011 to develop some new best practices for field staff to assist in the inventory, inspection and maintenance of assets along the roadway. The team has spent the past year working through the trials and tribulations related to identifying the most appropriate tablet hardware. A small scale deployment of tablets occurred in spring of 2013 to collect several safety related assets (signs, culverts, and incidents). Data can be collected in disconnected or connected modes and there is an associated desktop environment where data can be viewed and queried upon being synched. The developed of a production deployment plan and workflow processes is underway, which will eventually feed information into IA DOTs larger asset management system and make the information available for decision making. The team is also working with Design Office on Computer Aided Drafting (CAD) data processing, and Construction office with a new digital As-Built process to leverage the complete data life-cycle process so information can be developed once and leveraged by the Maintenance staff farther along in the process.