

INNOVATING SOLUTIONS



GEOTECH & TECHNOLOGY



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□ HNTB

TEAM Conference
March 9, 2018

Geotechnical Services

Subsurface Investigation
Site Characterization

Foundation Design:
Shallow Footings
Drilled Shafts
Piles
Micropiles



Ground Improvement
Landslide Evaluation
Slope Stabilization
Retaining Walls
Mine Remediation

Pavement Design
Pavement Management
Asset Management



Plan Preparation

Technical Specifications
Geotechnical Cost
Estimating

Construction Consulting
Construction Inspection
Instrumentation and
Monitoring



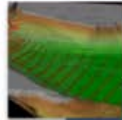
Technology Solutions Center

How Can We Help?



Program Delivery

- Program Portals
- Program Management Systems Implementation
- Document Management
- Cost and Schedule Management
- Quality and Audit Systems
- Public Involvement and Outreach Management
- Technology Strategic Planning
- Staff Augmentation



Geospatial Solutions

- Geospatial solutions
- Enterprise strategic planning
- Spatial Data Acquisition (LiDAR)
- Mobile solutions
- Geodatabase design and development
- BIM integration
- Augmented reality
- Multi-dimension modeling
- Spatial analysis and modeling
- Big data and cloud solutions



Business Solutions

- Rapid application development
- Database design, development
- Reporting and dashboard solutions
- Big data and cloud solutions
- Systems integration
- Legacy systems evaluation and documentation
- Software vendor analyses
- Implementation oversight



Enterprise Asset Management

- Strategic planning and needs analysis
- Program management
- Asset inventory/condition assessments
- Work management solutions
- Asset tracking strategies
- Maintenance strategies
- Training, mentoring and support
- ROI / ROA analysis
- EAM software implementation

Innovating Solutions

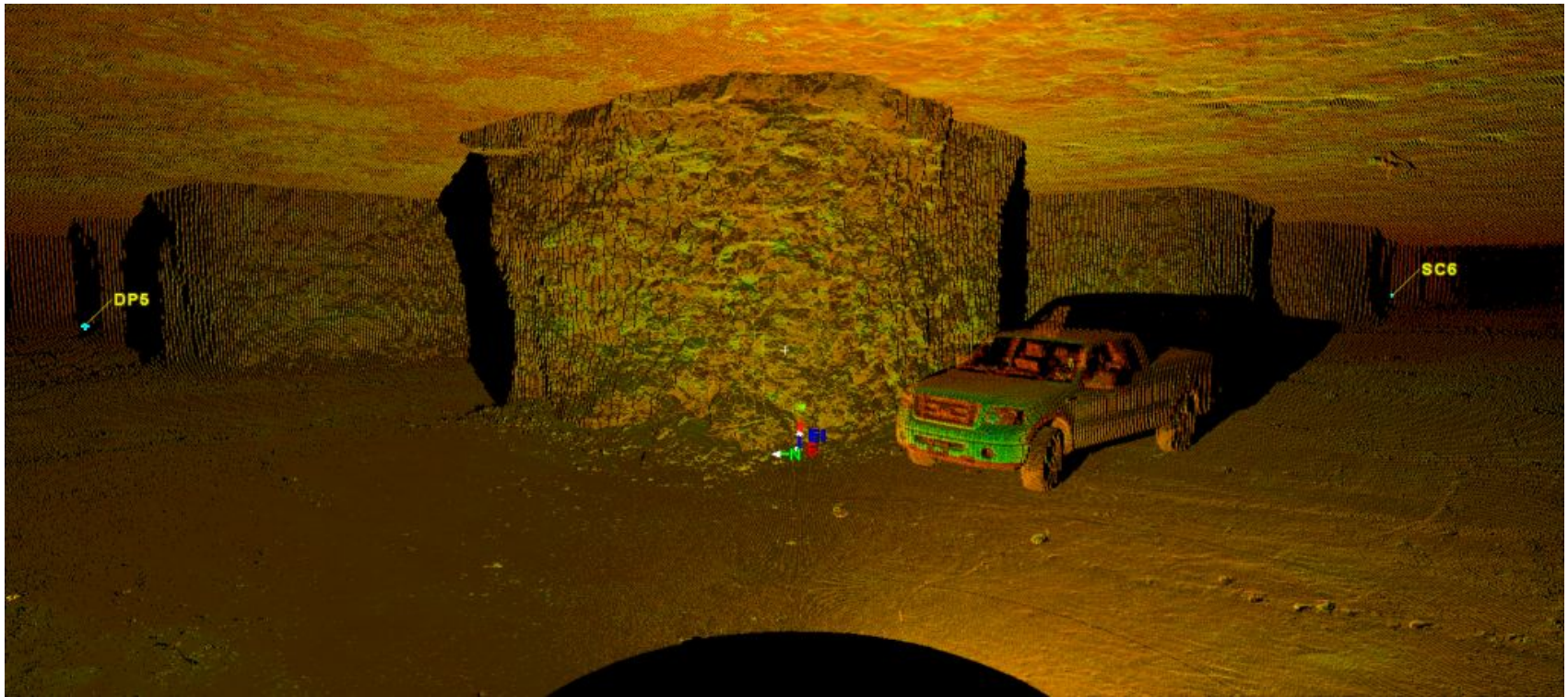
- Leverage Technology and Innovation through HNTB's Inter-Office Collaboration
- Collaboration allow for New Services
 - Asset Management
 - Pavement Management
 - Mobile Data Collection
 - Conditions Assessment
 - Advanced Data Acquisition

Project Locations

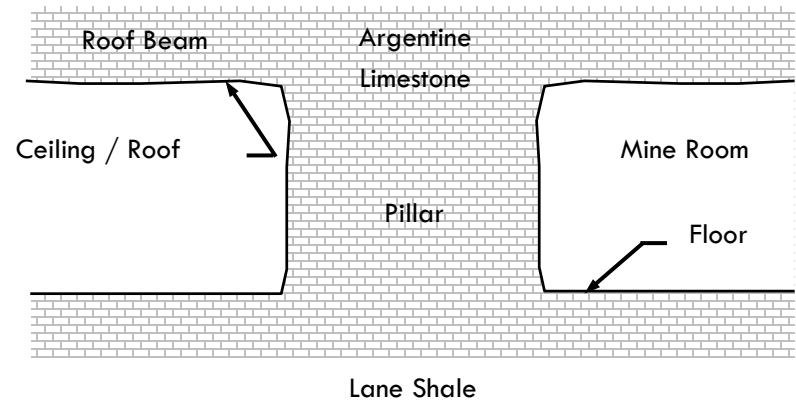
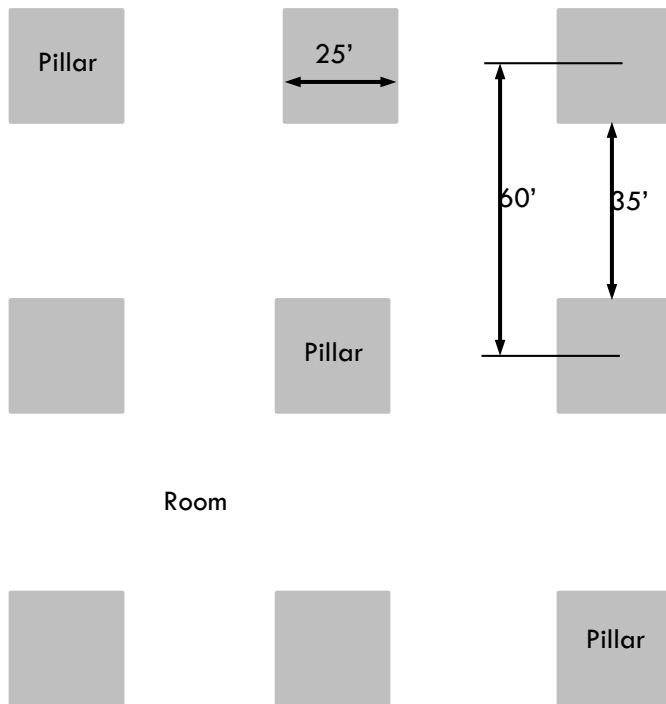
- Gateway Mine Remediation
- New Jersey Turnpike Pavement Management System
- Florida Weigh Station Asset Management
- Bridge Inspection Mobile Collection Devices

Gateway Mine Remediation

- Underground limestone mines
- Preliminary design included mine structure evaluation and recommendations



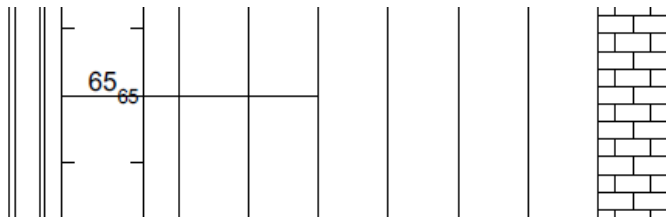
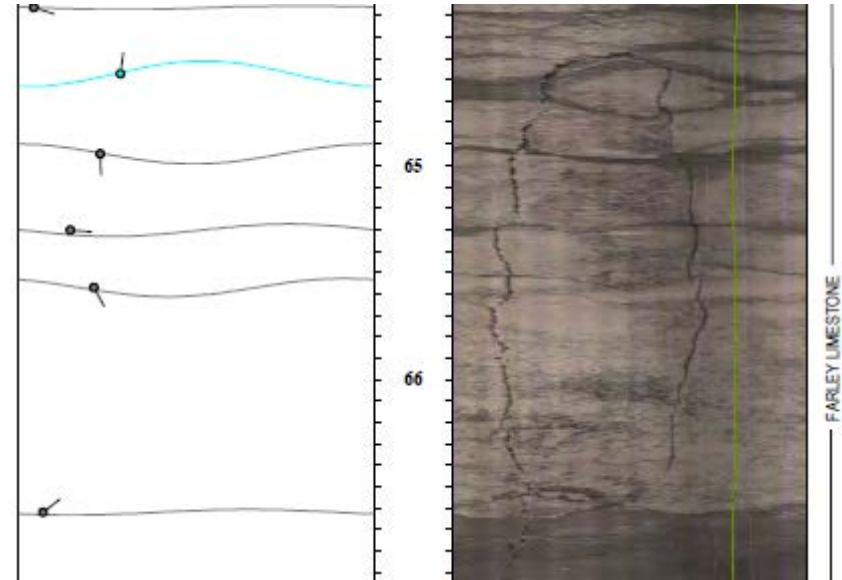
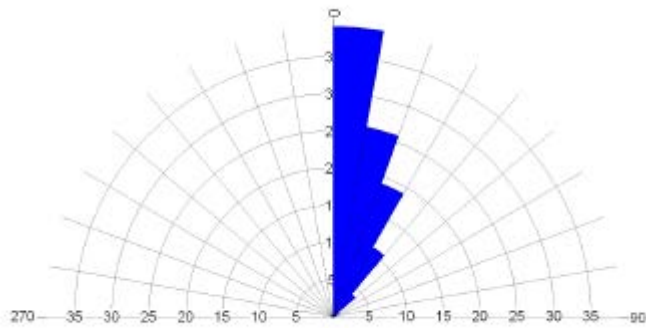
Gateway - General Mine Geometry



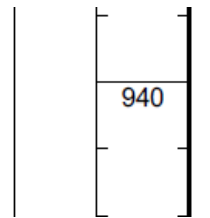
Gateway - Site and Subsurface Investigation



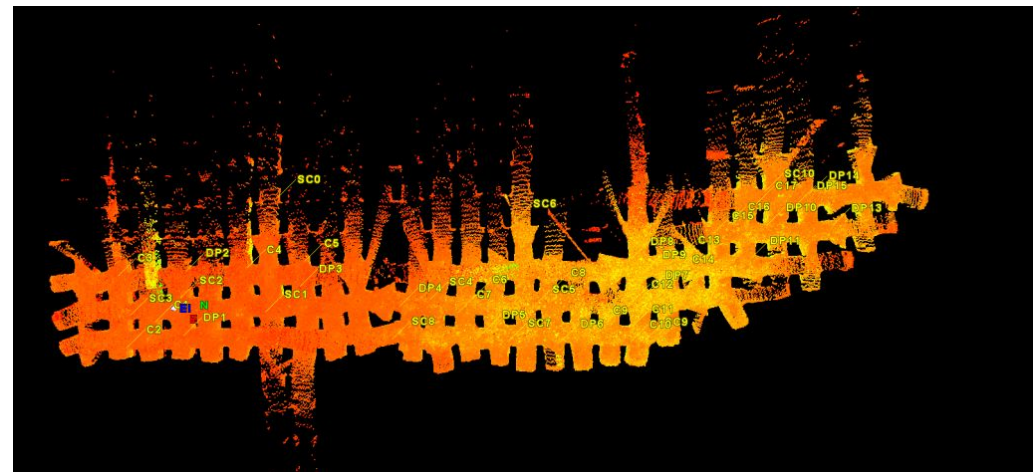
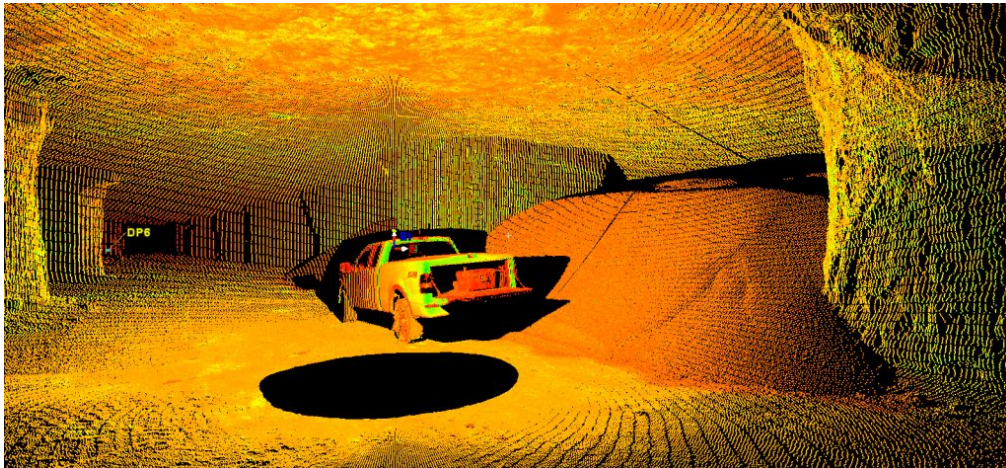
Gateway - Optical Corehole Survey



Vertical Joint from 65.0' - 67.0'



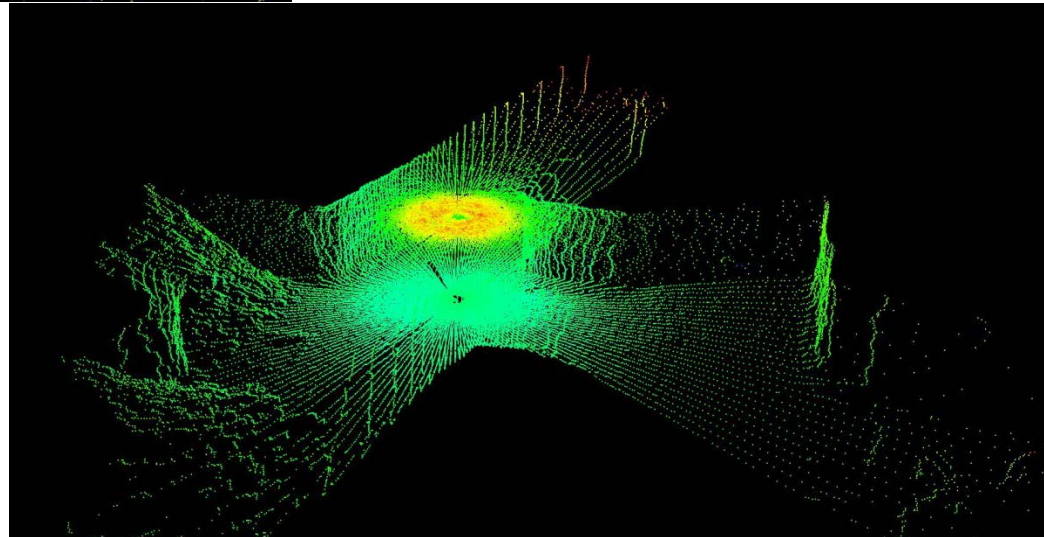
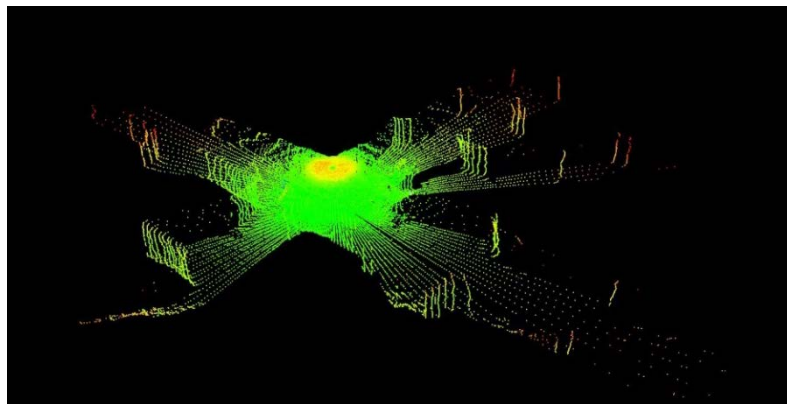
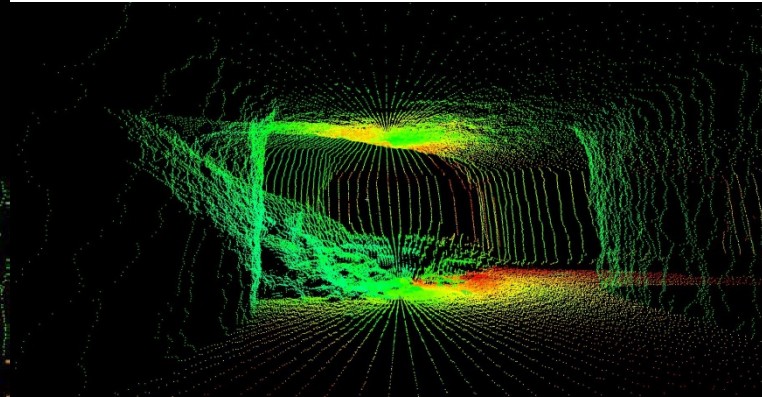
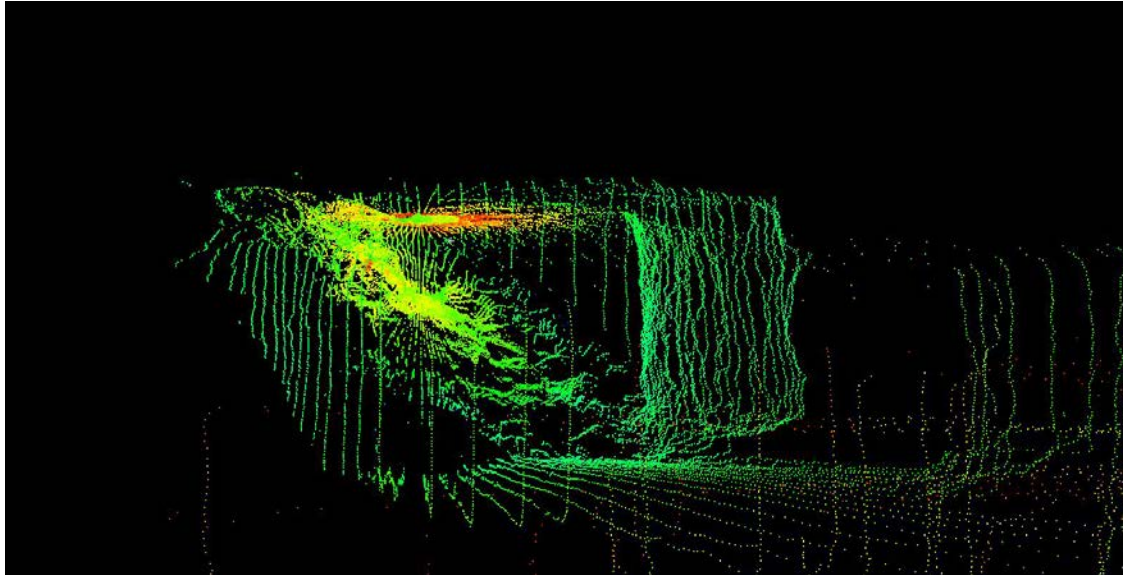
Gateway - 3D Survey



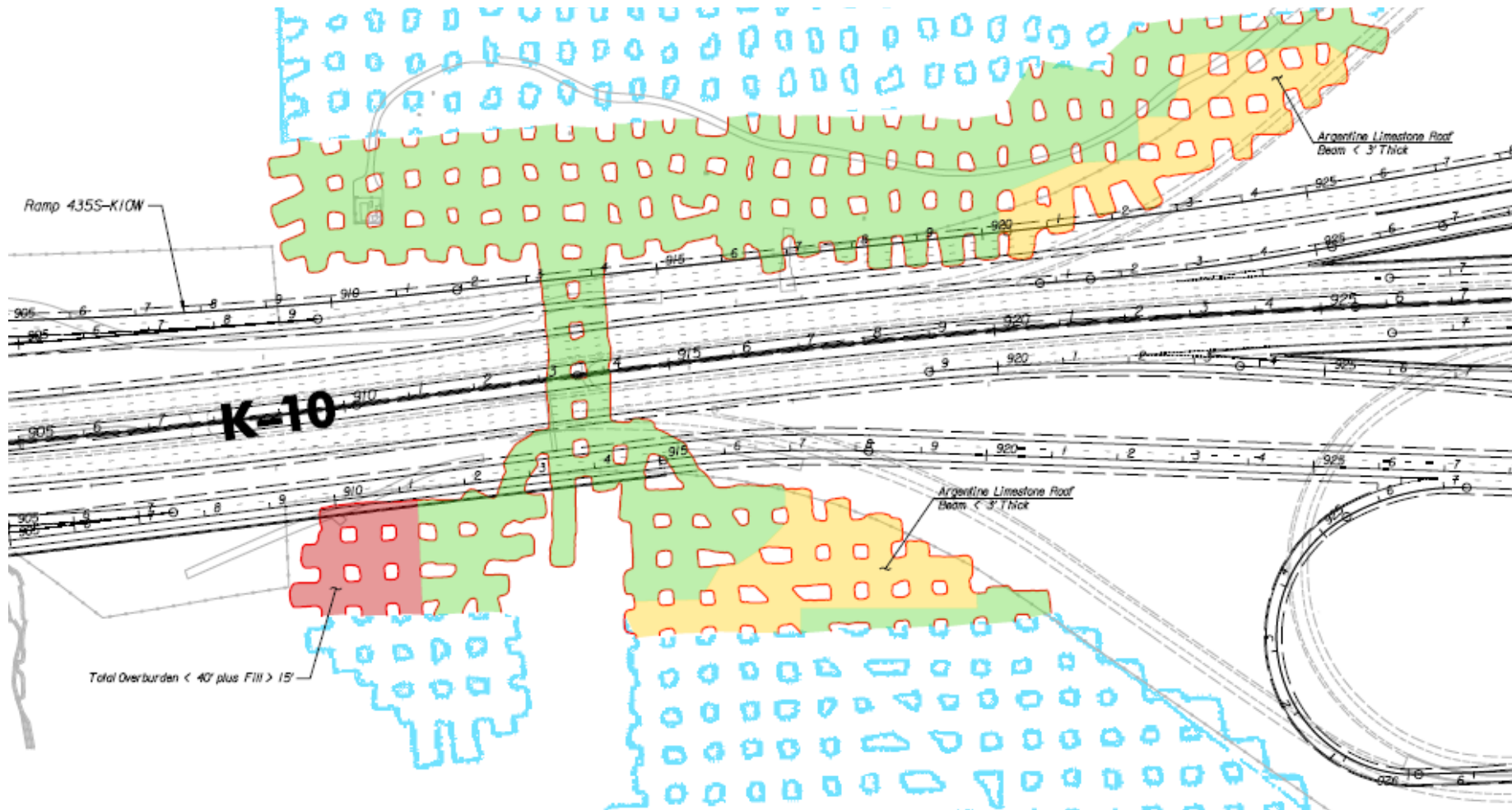
Gateway - Downhole Laser Survey



Gateway -Downhole Laser Survey



Gateway - Stability/Risk Map



Gateway - Conclusions

- Mine evaluation study and remediation design completed during preliminary design
- Geotechnical engineers did not have background to evaluate the geospatial data.
- Technology group helped Geotechnical section identify locations of necessary remediation.
- Roadway alignment “fixed” in the area of the mines
- Mine remediation complete 2013

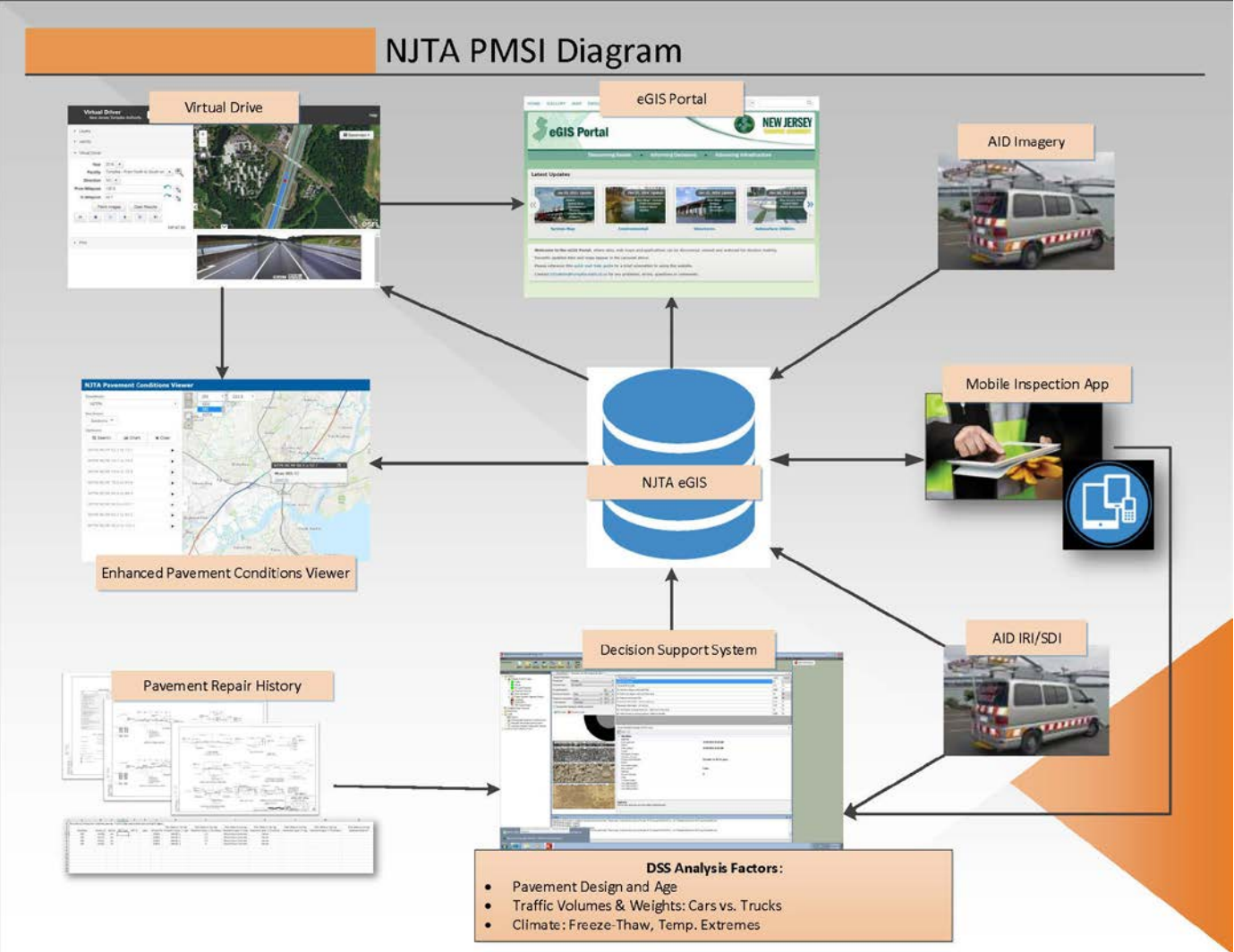
New Jersey Turnpike Authority Pavement Management System

Pavement Management System Components

- An interactive Pavement Viewer Module
- A mobile application for annual inspection rating collection
- A Virtual Drive created from photo images
- Pavement repair data base from as-built records
- Decision Support System



Enterprise Pavement Management System



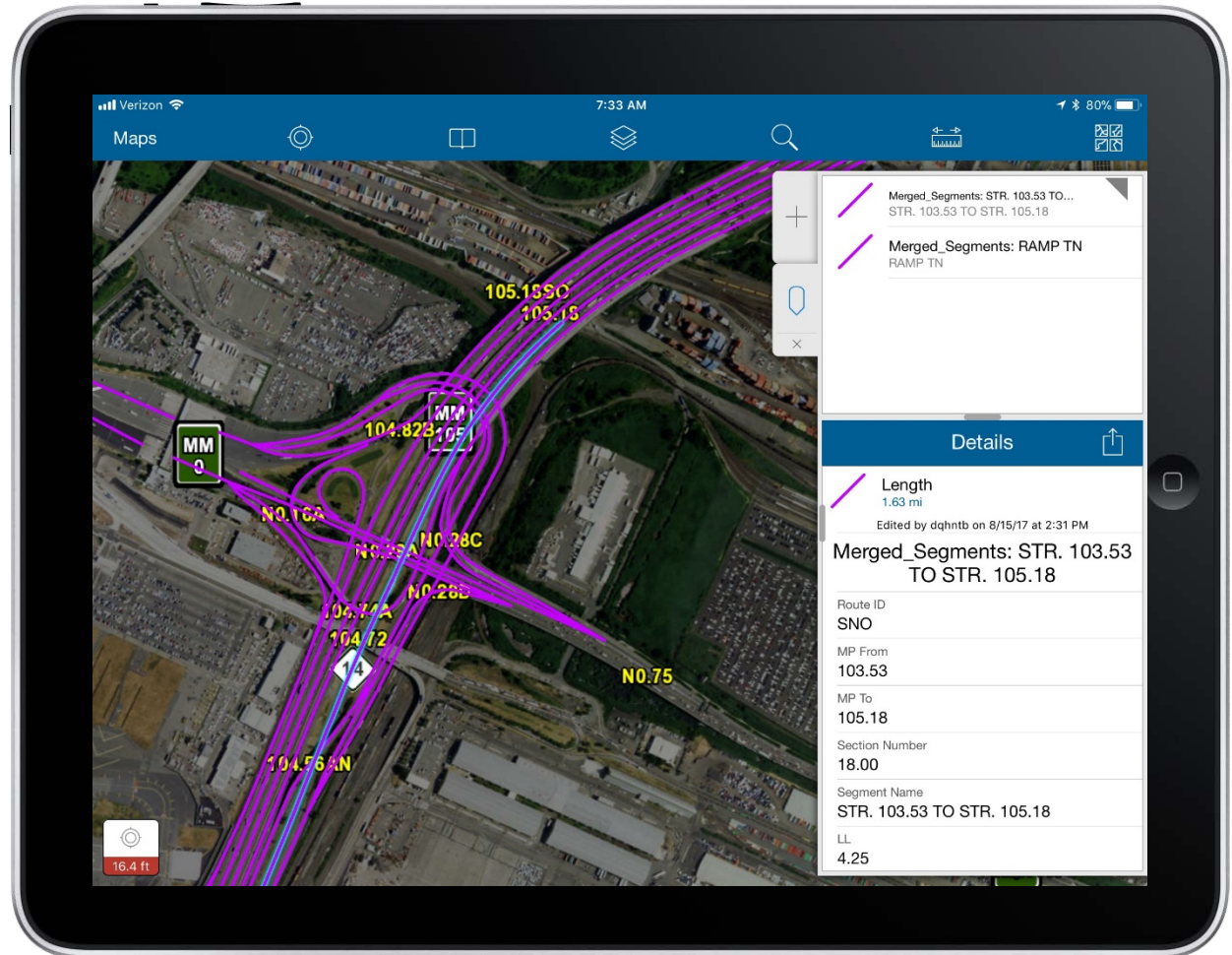
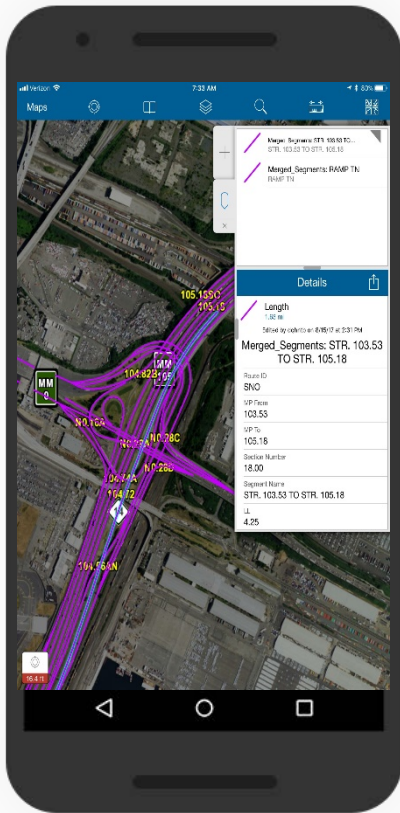
NJTA - Pavement Condition Assessment

□ Advanced Infrastructure Design (AID) Subcontractor



- Data obtained through sensors and visual observation while driving
- Collected rutting, cracking, and IRI data on all lanes 2013. Lane 2 only collected 2014-2017.
- Panoramic images collected 2016 and 2017.

Mobile Inspection Application



Decision Support System

- Surface Conditions Analyzed with respect to various rating systems
- ME Design software develop pavement performance predictions
 - ▣ Traffic (Number of Trucks, truck type and distribution, growth, number of lanes, traffic speed)
 - ▣ Last Mill and Overlay
 - ▣ Existing Pavement Condition
 - ▣ Existing Pavement Thickness and Material Types

Virtual Drive

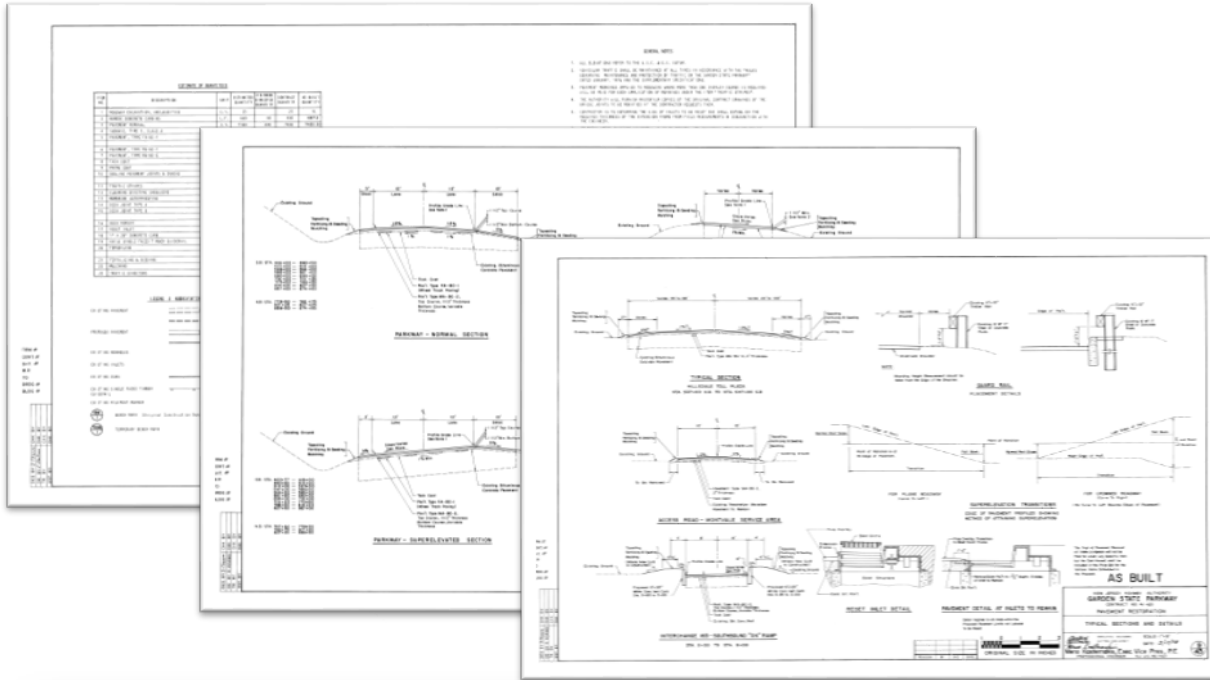
The screenshot displays the Virtual Drive application interface. At the top, a browser window shows the URL <https://apps.turnpike.iway.virtualdriver/>. Below the browser, the application header includes the title "Virtual Driver" and the New Jersey Turnpike Authority logo. A search bar prompts the user to "Enter an address or place".

The main content area features a map of a roadway with several green markers indicating mileposts (57.2, 57.3, 57.4, 57.5, 57.6, 57.7, 57.8, 57.9). A scale bar indicates 200m. The bottom left contains a control panel with the following fields and buttons:

- Year: 2017
- Facility: TPK - From South to North on Out
- From Milepost: 57.40
- To Milepost: 105.7
- Buttons: Fetch Images, Clear Results, Print (Portrait), Print (Landscape)

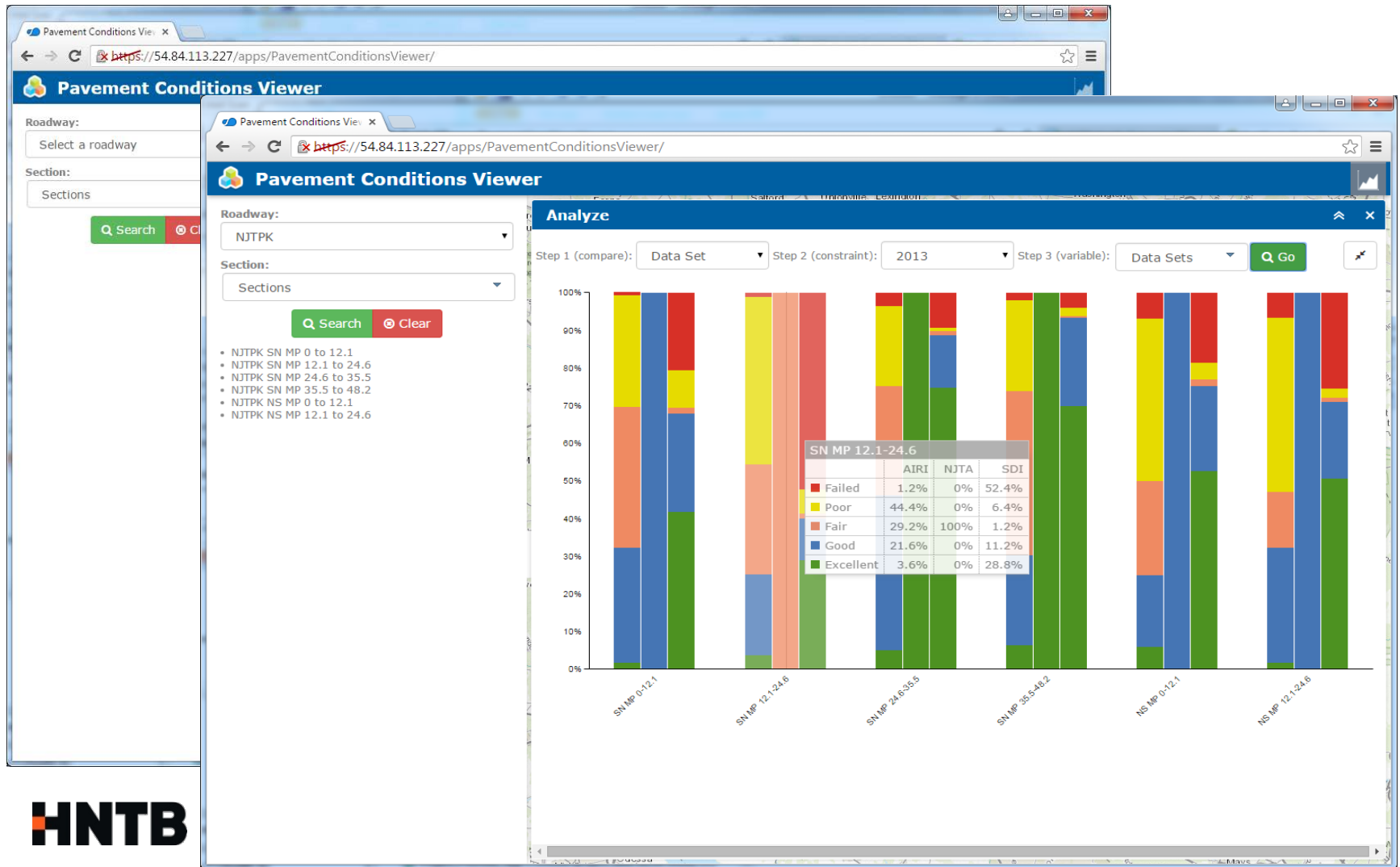
The bottom right of the interface shows a panoramic view of the roadway with navigation controls (back, forward, stop, play) and a label "MP 57.44". The Esri logo is visible in the bottom right corner of the map area.

Pavement Repair History



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Exclude toll plaza/non-roadway paving. From bridge approaches (excluding bridges).													
2														
3	Roadway	Route_ID	Section	MP From	MP To	Lane	Contract No.	Plan Data or Coring	Plan Data or Coring	Plan Data or Coring	Plan Data or Coring	Plan Data or Coring	Plan Data or Coring	Plan Data or Coring
4	GSP	Int156	14				C0601	MA-BC-1	1.5	Bituminous Concrete	Varies	Pavement Layer 3 Type	Pavement Layer 3 Thickness	Subbase Material
5	GSP	Int157	14				C0601	MA-BC-1	1.5	Bituminous Concrete	Varies			
6	GSP	Int161	14				C0601	MA-BC-1	1.5	Bituminous Concrete	Varies			
7	GSP	Int163	15				C0601	MA-BC-2	3	Bituminous Concrete	Varies			
8														
9														
10														
11														
12														
13														
14														
15														

Pavement Conditions Viewer












Decision Support System



Climate Station	
Elevation (ft)	<input checked="" type="checkbox"/> 7
Climate station	<input checked="" type="checkbox"/> TETERBORO,NJ (94741)
Latitude (decimals degrees)	<input checked="" type="checkbox"/> 40.85
Longitude (decimal degrees)	<input checked="" type="checkbox"/> -74.061
Depth of water table (ft)	<input checked="" type="checkbox"/> Annual(10)

AADTT	
Two-way AADTT	<input checked="" type="checkbox"/> 14435
Number of lanes	<input checked="" type="checkbox"/> 6
Percent trucks in design dir	<input checked="" type="checkbox"/> 51
Percent trucks in design lan	<input checked="" type="checkbox"/> 65
Operational speed (mph)	<input checked="" type="checkbox"/> 65
Traffic Capacity	
Traffic Capacity Cap	<input checked="" type="checkbox"/> Not enforced
Axle Configuration	
Average axle width (ft)	<input checked="" type="checkbox"/> 8.5
Tandem axle spacing (in)	<input checked="" type="checkbox"/> 51.6
Dual tire spacing (in)	<input checked="" type="checkbox"/> 12
Quad axle spacing (in)	<input checked="" type="checkbox"/> 49.2
Tire pressure (psi)	<input checked="" type="checkbox"/> 120
Tridem axle spacing (in)	<input checked="" type="checkbox"/> 49.2
Lateral Wander	
Design lane width (ft)	<input checked="" type="checkbox"/> 12
Mean wheel location (in)	<input checked="" type="checkbox"/> 18
Traffic wander standard dev	<input checked="" type="checkbox"/> 10
Wheelbase	
Average spacing of long axl	<input checked="" type="checkbox"/> 18
Average spacing of medium	<input checked="" type="checkbox"/> 15
Percent trucks with long axl	<input checked="" type="checkbox"/> 61
Percent trucks with medium	<input checked="" type="checkbox"/> 22
Percent trucks with short ax	<input checked="" type="checkbox"/> 17
Average spacing of short ax	<input checked="" type="checkbox"/> 12

Vehicle Class	Distribution (%)	Growth Rate (%)	Growth Function	
Class 4	2	2.3	Linear	
Class 5	25	2.3	Linear	
Class 6	8	2.3	Linear	
Class 7	4	2.3	Linear	
Class 8	4	2.3	Linear	
Class 9	55	2.3	Linear	
Class 10	2	2.3	Linear	
Class 11	0	0	Linear	
Class 12	0	0	Linear	

TPK Section 23-calibra...Project TPK Section 23-cali

General Information

Design type:

Pavement type:

Design life (years):

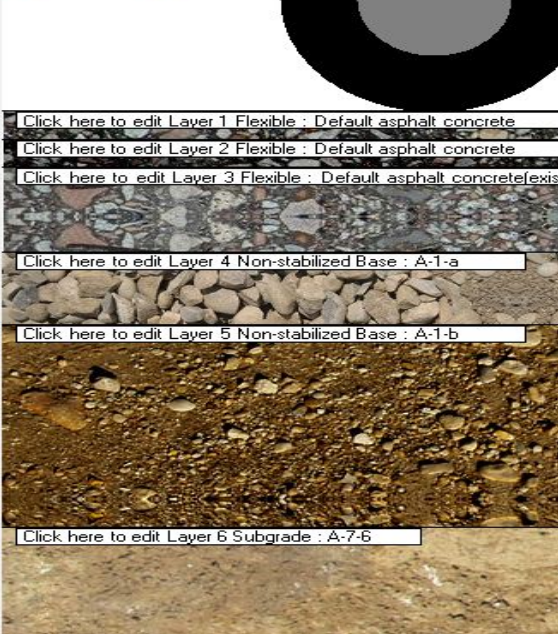
Existing construction:

Pavement construction:

Traffic opening:

Special traffic loading for flexible pavements

Add Layer Remove Layer



Click here to edit Layer 1 Flexible : Default asphalt concrete

Click here to edit Layer 2 Flexible : Default asphalt concrete

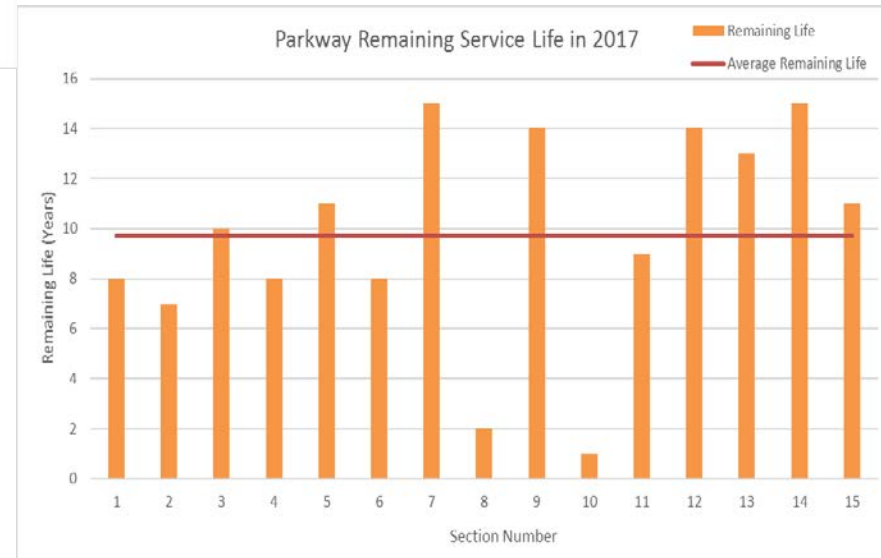
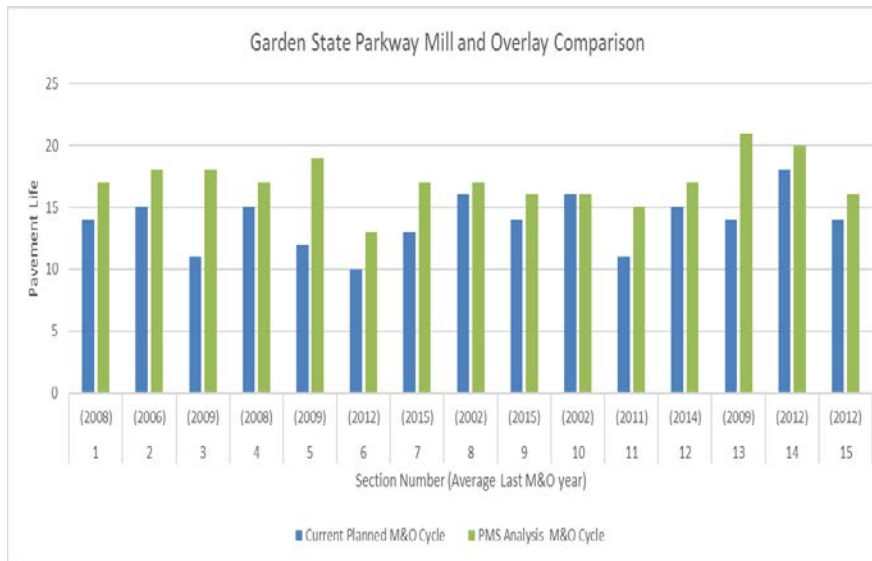
Click here to edit Layer 3 Flexible : Default asphalt concrete

Click here to edit Layer 4 Non-stabilized Base : A-1-a

Click here to edit Layer 5 Non-stabilized Base : A-1-b

Click here to edit Layer 6 Subgrade : A-7-6

Decision Support System Examples



eGIS Portal

HOME GALLERY MAP GROUPS MY CONTENT MY ORGANIZATION

GIS



NEW JERSEY
TURNPIKE AUTHORITY

Discovering Assets • Informing Decisions • Advancing Infrastructure

Latest Updates

Jan 19, 2015 Update

Added:

- Speed Limit
- Maintenance Districts
- Capital Improvment. Projects

System Map

Dec 31, 2014 Update

New Map! Includes:

- FEMA Floodplain
- Surface Water Quality

Environmental

Dec 31, 2014 Update

New Map! Includes:

- Bridges
- Drainage Structures

Structures

Dec 30, 2014 Update

New Service Area:

- Forked River
- Media Attachmen

Subsurface Utilities

Welcome to the eGIS Portal, where data, web maps and applications can be discovered, viewed and analyzed for decision making.

Recently updated data and maps appear in the carousel above.

Please reference this [quick start help guide](#) for a brief orientation to using this website.

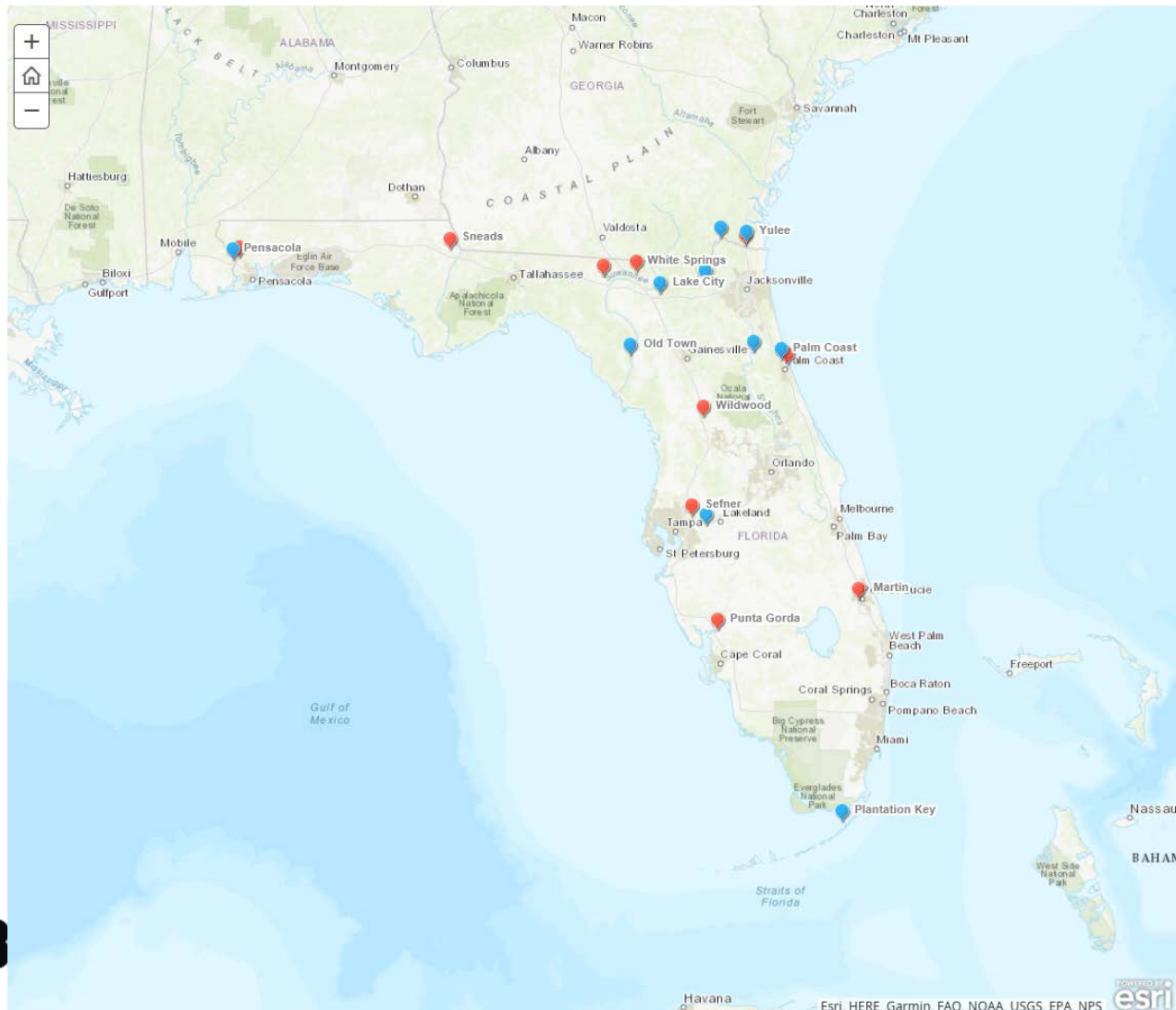
Contact GISadmin@turnpike.state.nj.us for any problems, errors, questions or comments.

NJTA Pavement Management System

Conclusions

- Show projections of pavement behavior within Enhanced Reporting Version 2.0
- Set Dollar Values to Repair Options
- Update results with 2017 NJTA Condition Ratings
- Update results with 2018 AID data with new objective instrument surface condition readings
- Generate reports and M&O priorities based on selected LOS

MCSAW – Project Locations



MCSAW- Condition Assessment Training

- HNTB Trained Subconsultant in iPad use
- Assets rated on a 5-point scale:
 - ▣ Excellent
 - ▣ Good
 - ▣ Fair
 - ▣ Poor
 - ▣ Critical/Failed

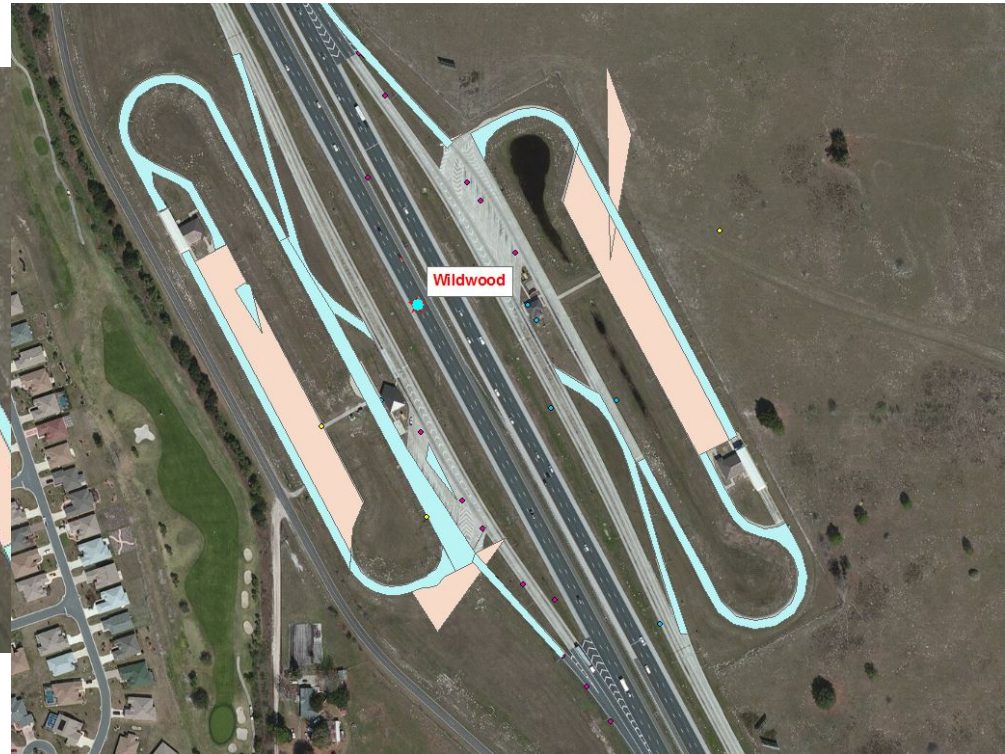
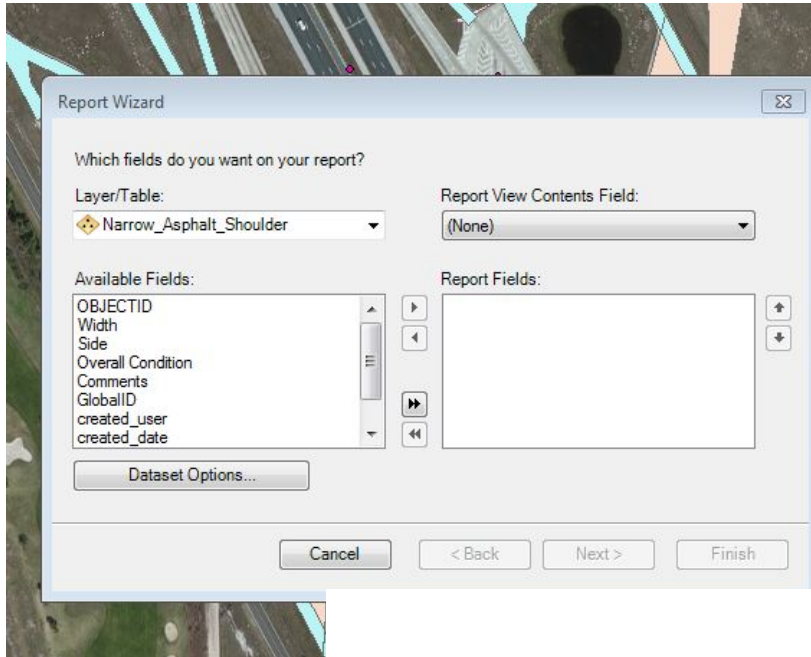


MCSAW Asset Collection

- Training the Client
- Multiple office, people, geographical locations involved
- Hurricane Irma
- Size of ramps



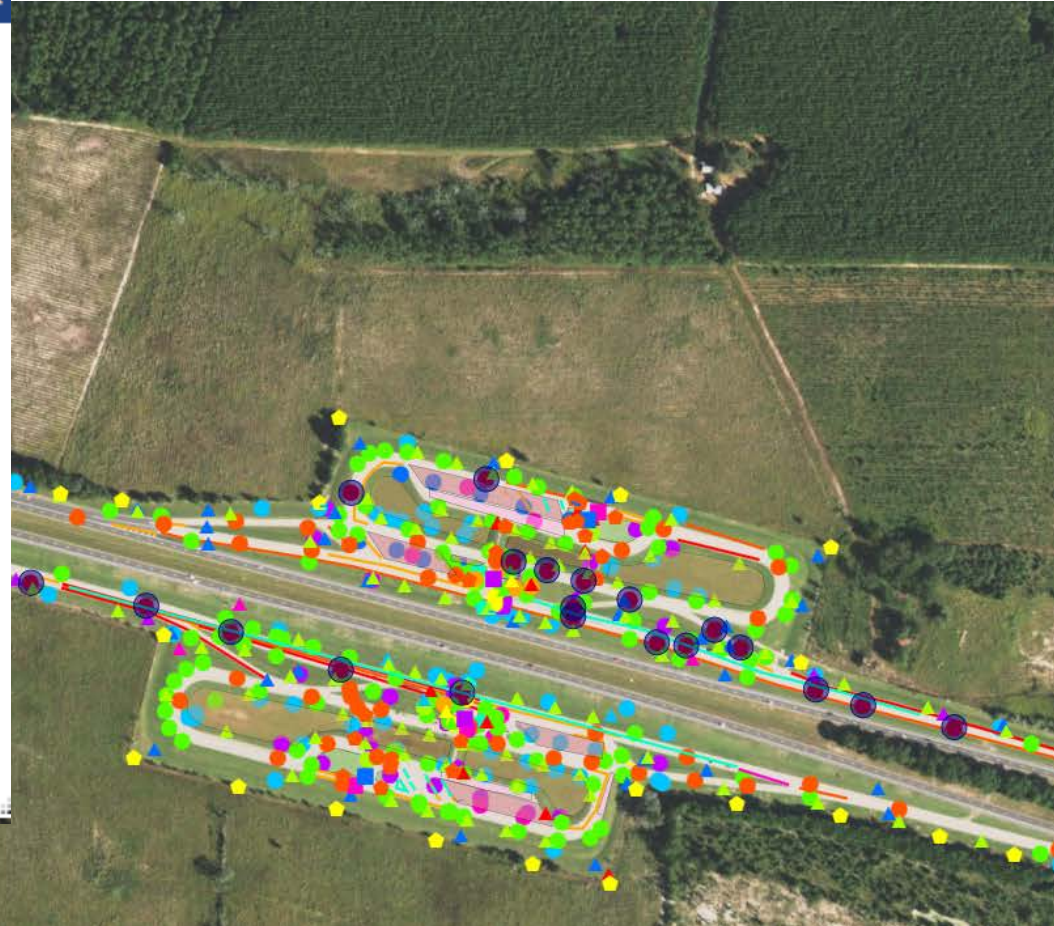
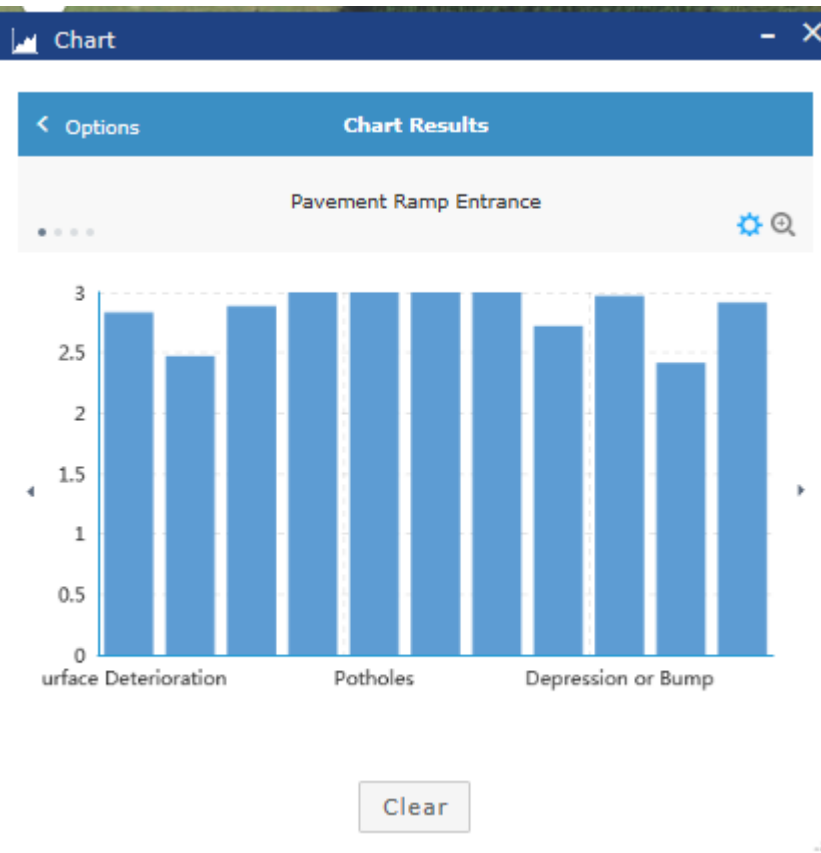
MCSAW – Asset Collection



Pavement_Deficiency_Point

DeficiencyType	Comments
0	<null>
0	Cracks and concrete missing
0	Concrete ramp cracked and spalling

MCSAW - Rating Schema Developed



Other Technology Applications

- Penn Station, New York
 - Advanced Data Acquisition Approach
 - Land
 - Sea
 - Air



Innovating Solutions

- Collaboration allowed new and innovative services
 - Asset Management
 - Pavement Management
 - Mobile Data Collection
 - Conditions Assessment
 - Advanced Data Acquisition

QUESTIONS

