

WSDOT Construction

The Headlight Inspection Tool Pilot Project

Derek Case, PE

Assistant State Construction Engineer – SR 520 Project, Construction Division

George White, Co Founder & CEO

Pavia Systems, Inc.

Lynn Peterson

Secretary of Transportation

About WSDOT

- Total lane miles: 18,689 (state-owned)
- Bridges: 3,765
- Ferries: 22 vessels on 10 routes (carried 22.8 million passengers last year)
- Passenger rail: 11 Amtrak Cascades trains daily, approx. 780,000 riders
- New \$16B funding package



Our Mission

The Washington State Department of Transportation provides and supports safe, reliable and cost-effective transportation options to improve livable communities and economic vitality for people and businesses.

Delivering Projects

As a public agency delivering transportation projects, WSDOT has a business need **to properly inspect, observe and document** the activities on our construction project sites



Why do we inspect?

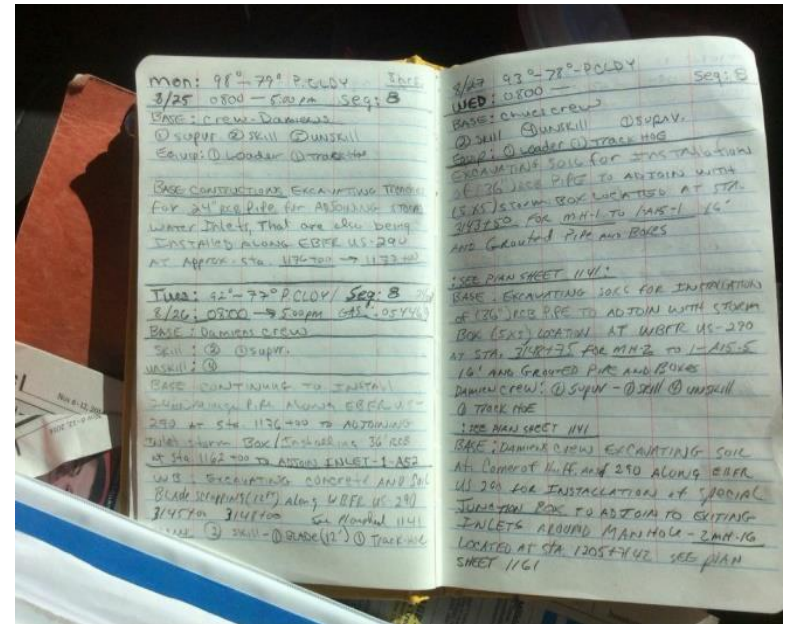
We do this to fulfill our own contract management purposes, as well to as to fulfill our obligations to our funding partners, other regulatory agencies and to the taxpayers

WSDOT Inspection Needs

- Verify quality
- Confirm proper location and installation
- Measure product for timely payment to contractors
- Fulfill other legal obligations, DBE, Apprenticeship, Environmental Permit compliance
- Document project incidents for legal purposes (traffic control, work zones, incidents, etc.)
- Preserve our permanent records for up to 75 years

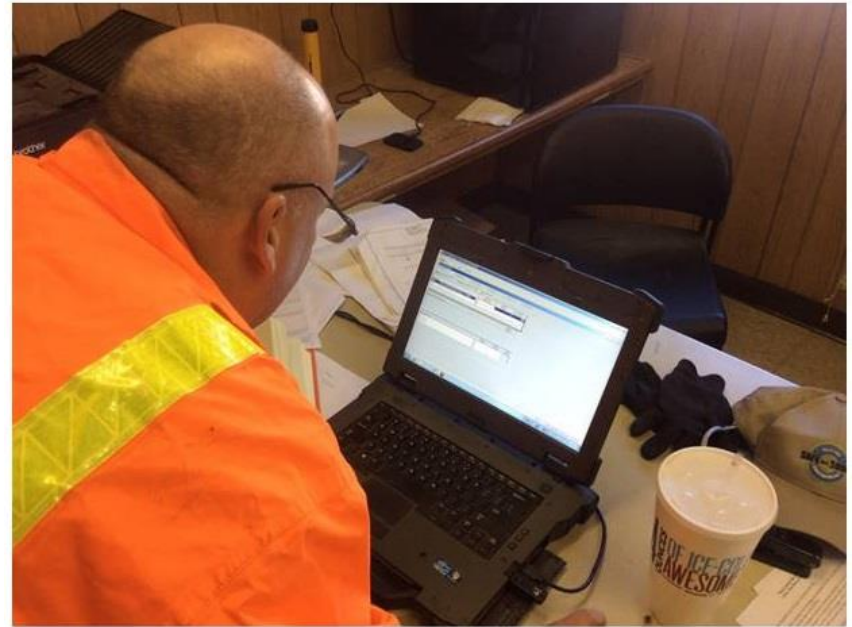
Old School Tool of Choice?

- Paper forms and documents
 - Inspectors Daily Reports
 - Field Note Records
 - Traffic Control Reports
 - Materials documentation
 - On and on.....



Challenges exist...

- Requires multiple entries of the same data in multiple locations
- Forms can't share data
- Opportunity for error
- Usually filled out at the end of shift = time away from the field (or overtime?)



Challenges exist...

- Only hand searchable
- Requires physical storage, security and archiving
- Requires the paper document to physically change locations as it moves through the process



Other current practices...

- Cell phones, lap tops and smart phones are already in use and familiar
- Some offices already using electronic forms, but printing and storage still needed
- Digital photographs in use, but no way to link or tag them
- Electronic forms that can't share data or aren't searchable is not enough



WSDOT Goals

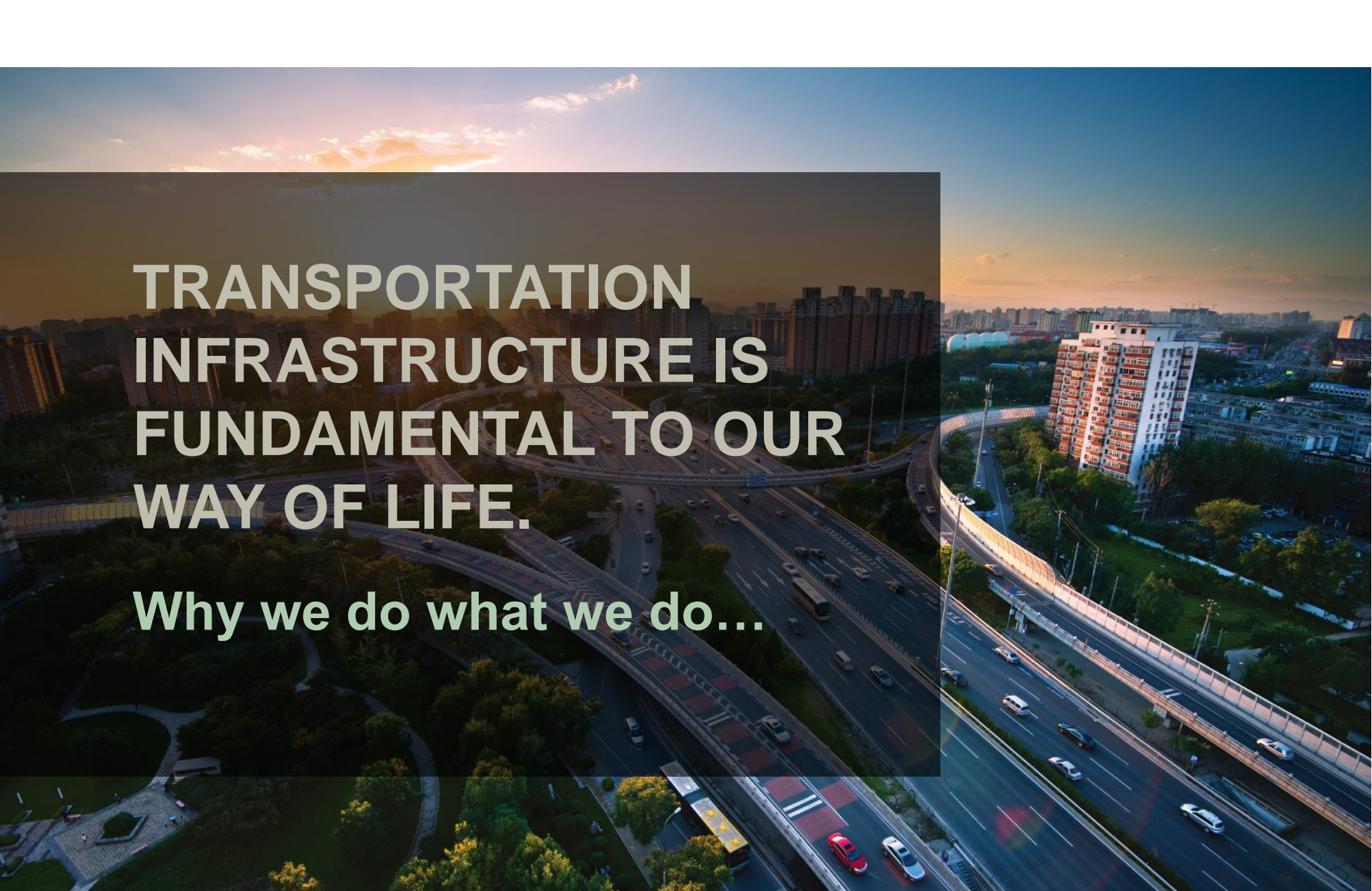
- Move to a paperless office – electronic forms instead of paper and carbons and boxes of records
- Data resides in a searchable location, where data is shared and tagged
- “Collect once, use many”
 - Reuse the data to populate many forms

WSDOT Goals

- Data is easily collected by inspectors and easily used by office personnel
- Provide field access to project documents
- Use latest wireless and cellular technology to help our inspectors

Research

- The WSDOT Research Office began investigating opportunities for new inspection technologies
- WSDOT led a research project with two other state transportation agencies (Minnesota and Texas) to explore the use of wireless devices to increase productivity, data quality and data availability

An aerial photograph of a large, multi-level highway interchange in an urban setting during sunset. The sky is a mix of orange, yellow, and blue. The highway has multiple lanes with cars and a bus. There are green spaces and trees around the interchange. In the background, there are several high-rise apartment buildings.

TRANSPORTATION INFRASTRUCTURE IS FUNDAMENTAL TO OUR WAY OF LIFE.

Why we do what we do...

PAVIA'S MISSION

A close-up photograph of two hands, one from the left and one from the right, reaching towards each other to form a square frame. The hands are silhouetted against a bright, warm, yellowish light, possibly from a window or a lamp. The background is blurred, showing hints of a person's face and hair on the right side.

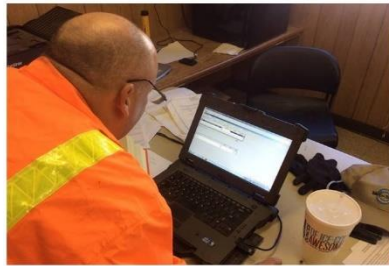
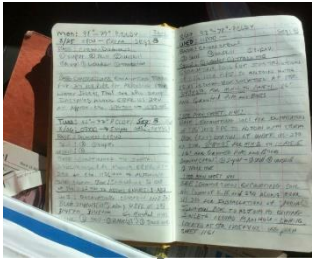
To **transform** the **capabilities** of organizations in the **transportation industry** through the practical use of remarkable technologies.



TECHNOLOGY IS MAKING US MORE EFFICIENT!

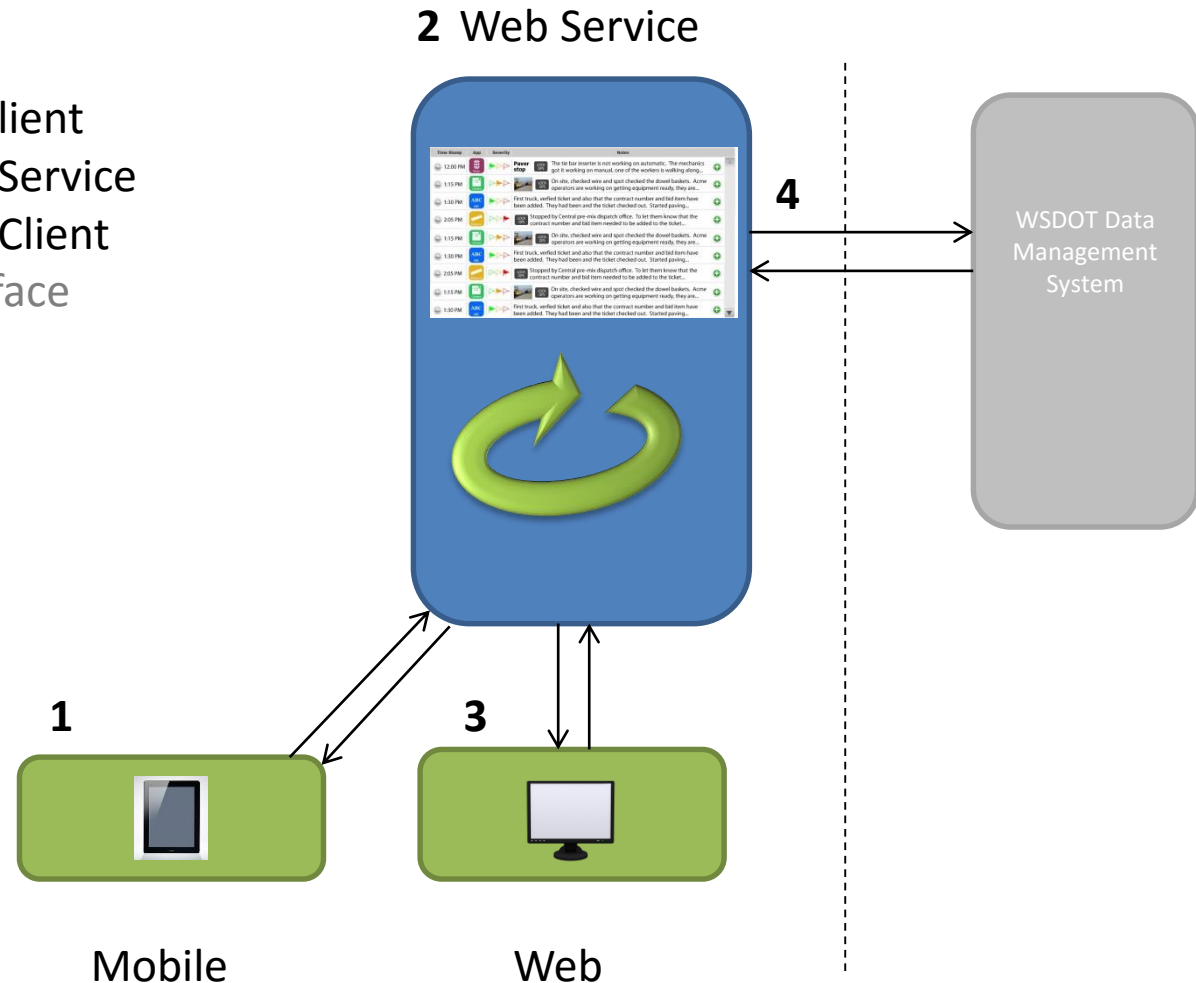
Imagine if someone took away your navigation systems and left you with only a paper map...

Opportunities to evolve

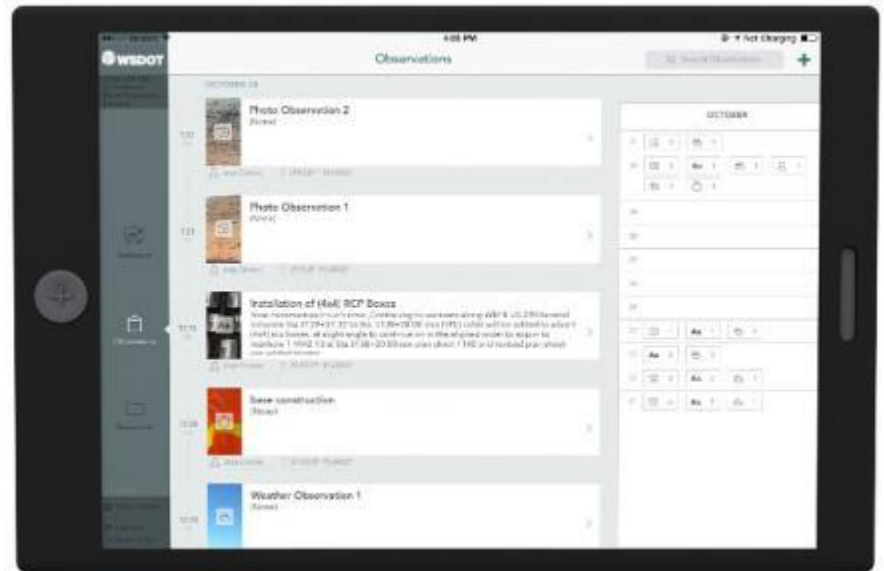


Headlight System Overview

1. iOS Client
2. Web Service
3. Web Client
4. Interface



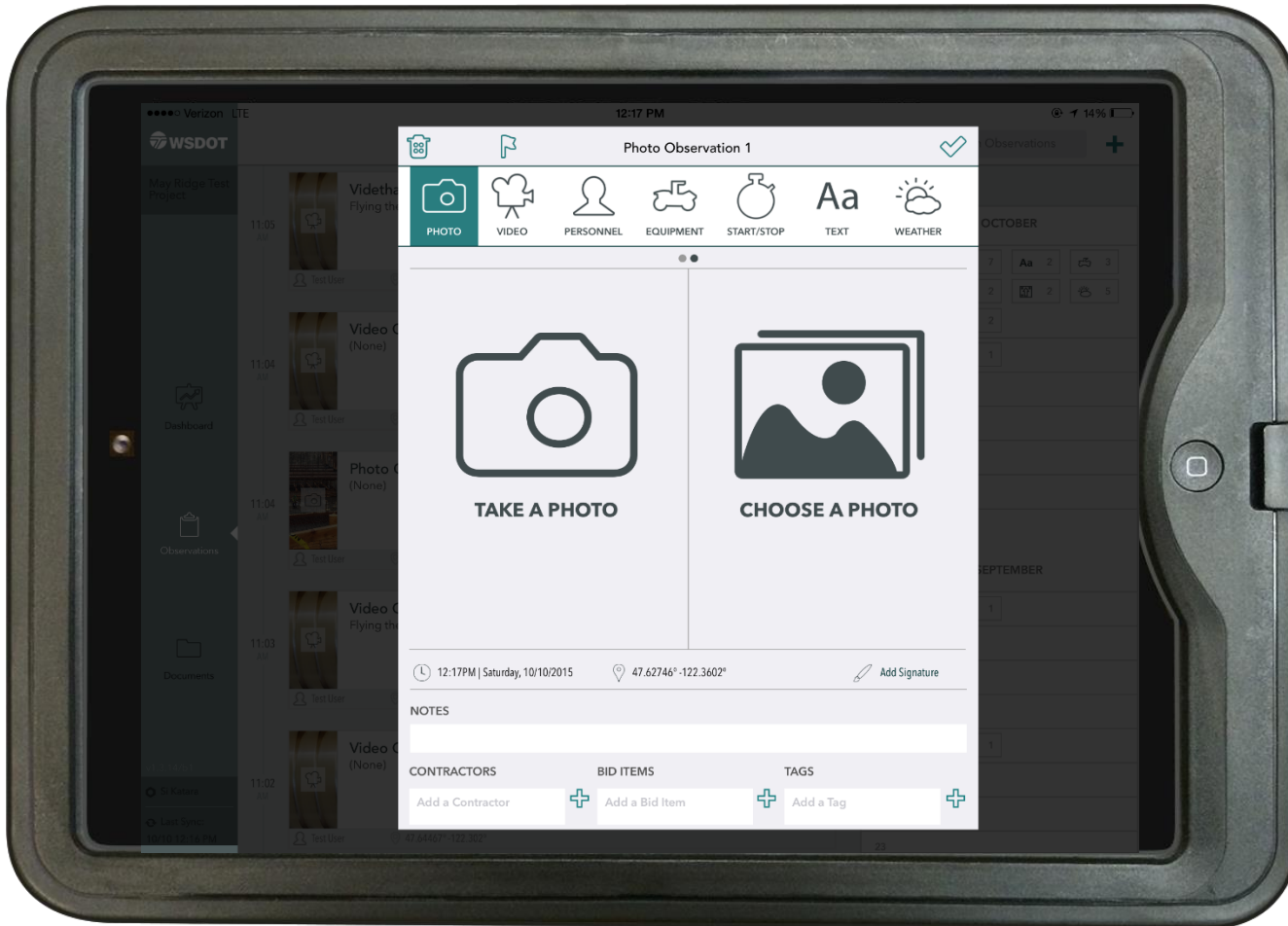
Headlight Inspection Units



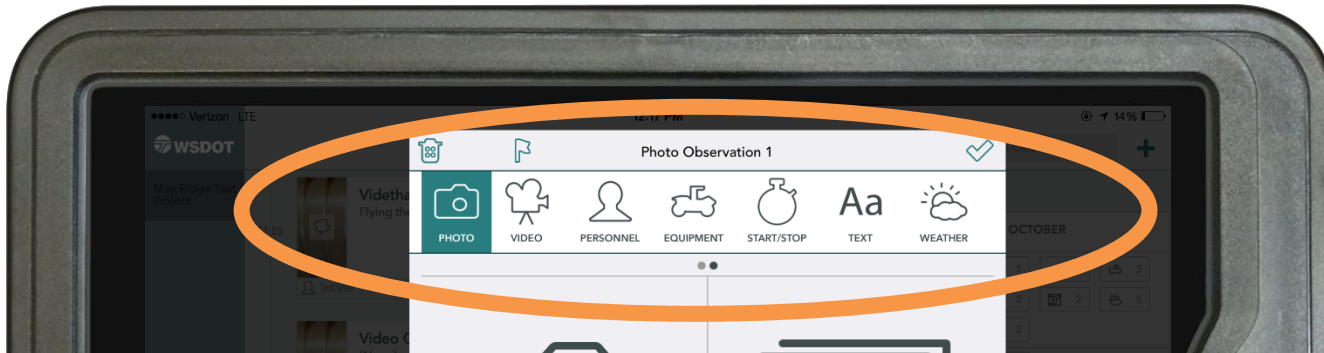
PILOT SYSTEM - HEADLIGHT



PILOT SYSTEM – FIELD NOTEBOOK

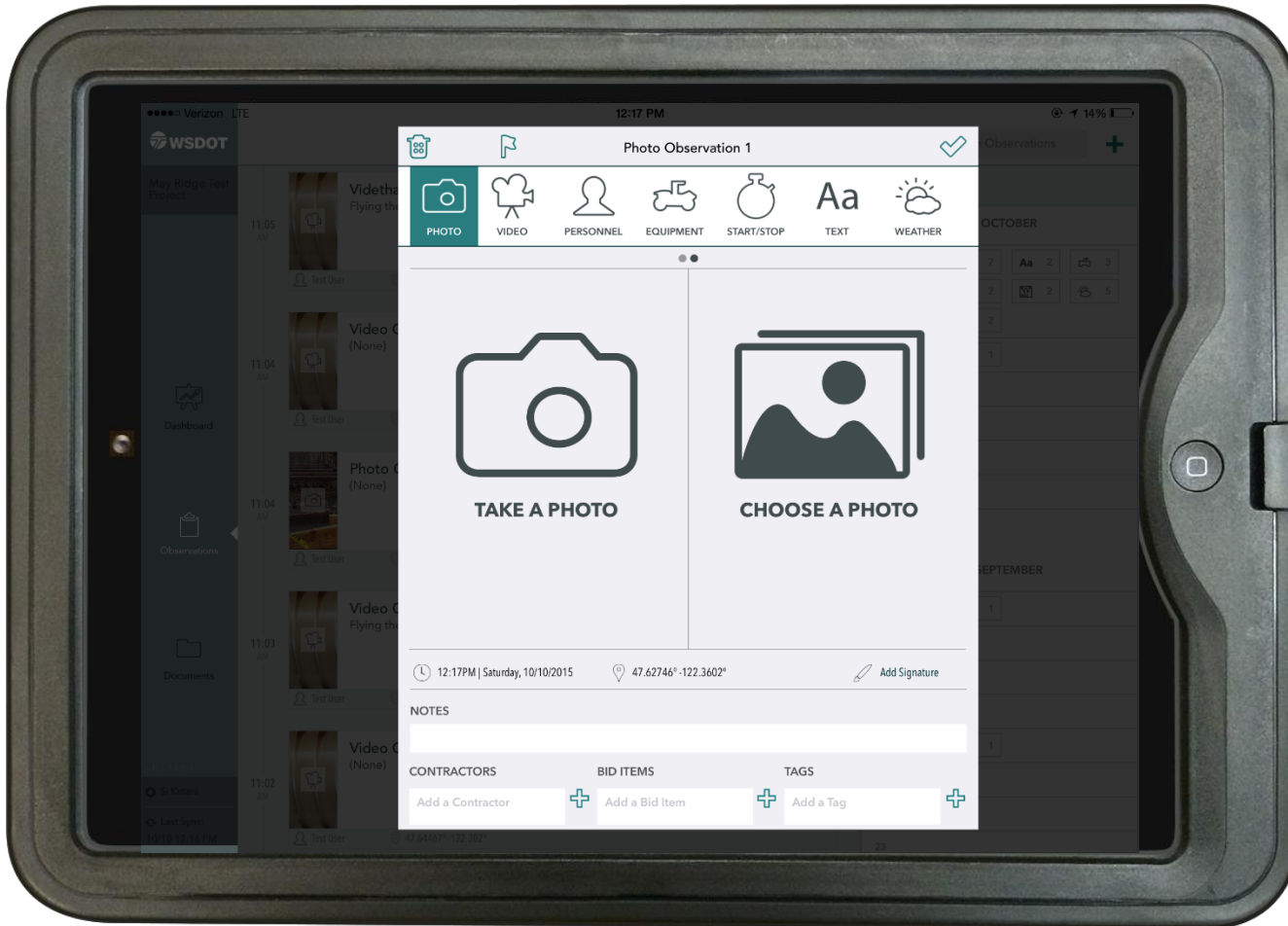


PILOT SYSTEM – FIELD NOTEBOOK



- Photo
- Video
- Audio
- Text
- Density Readings
- Equipment
- Personnel
- QR Codes (material tracking)
- Mat or Temperature Reading
- Weather
- Crew Start/Stop
- Material Quantity

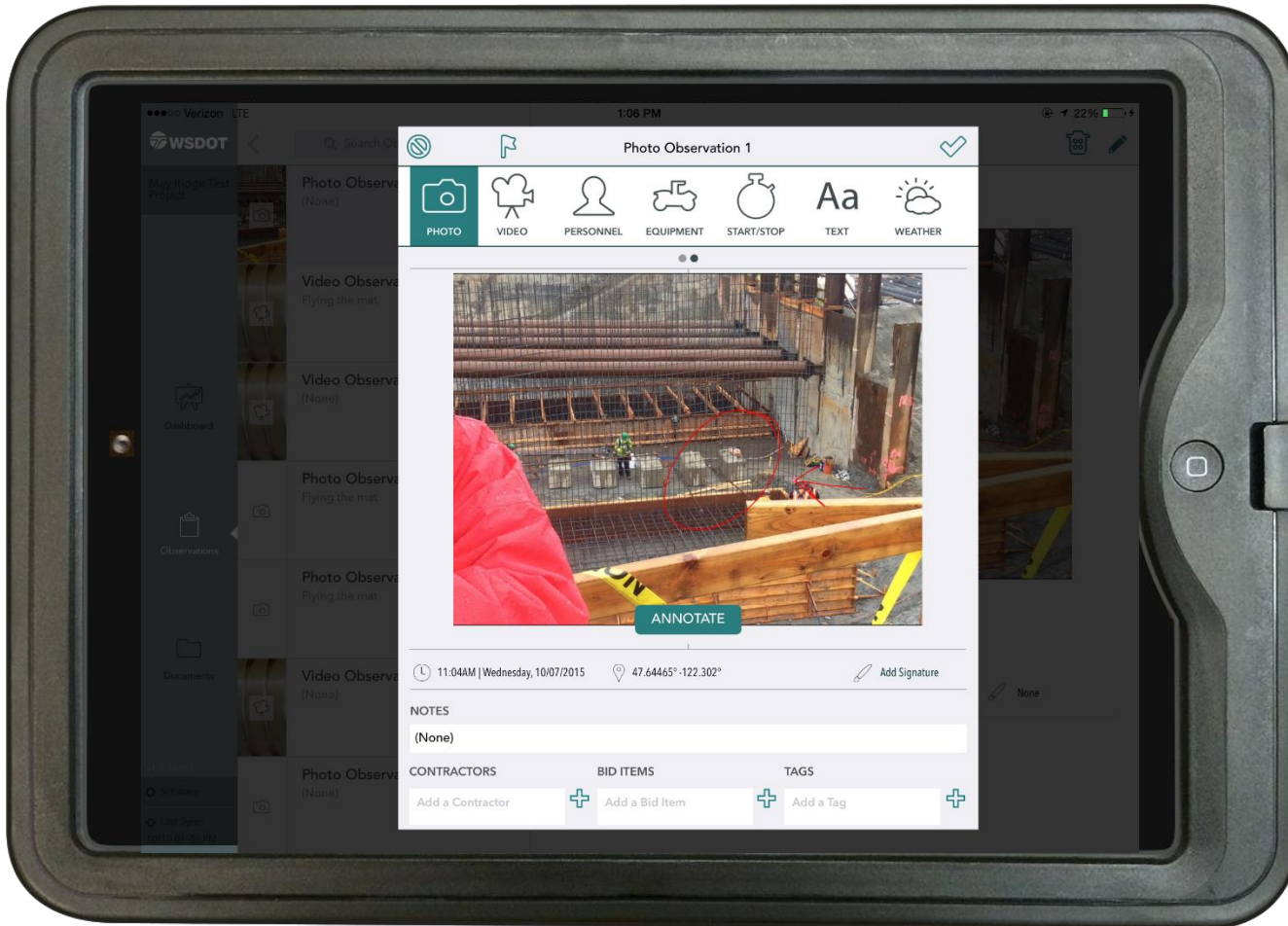
PILOT SYSTEM – FIELD NOTEBOOK



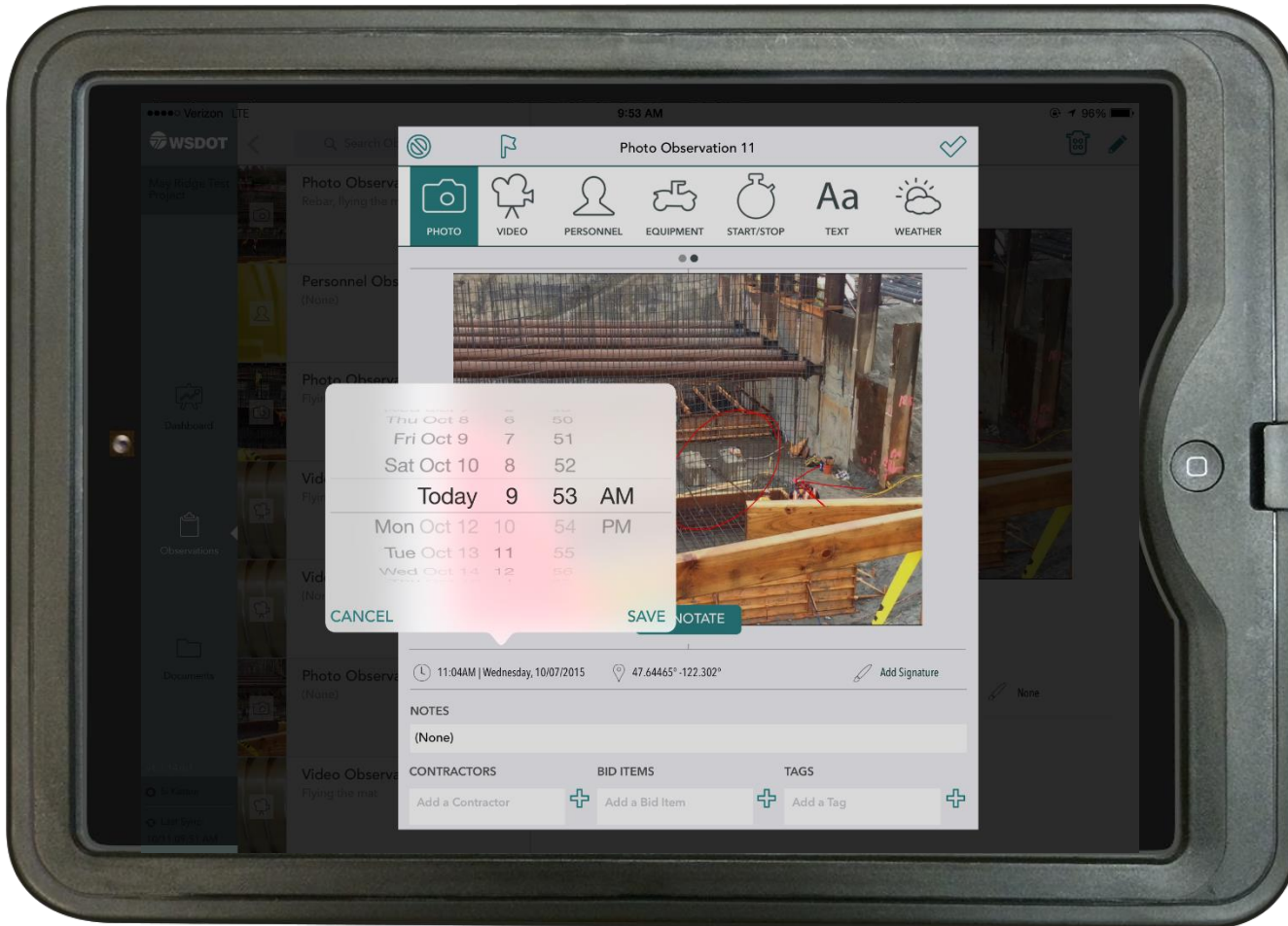
PILOT SYSTEM – FIELD NOTEBOOK



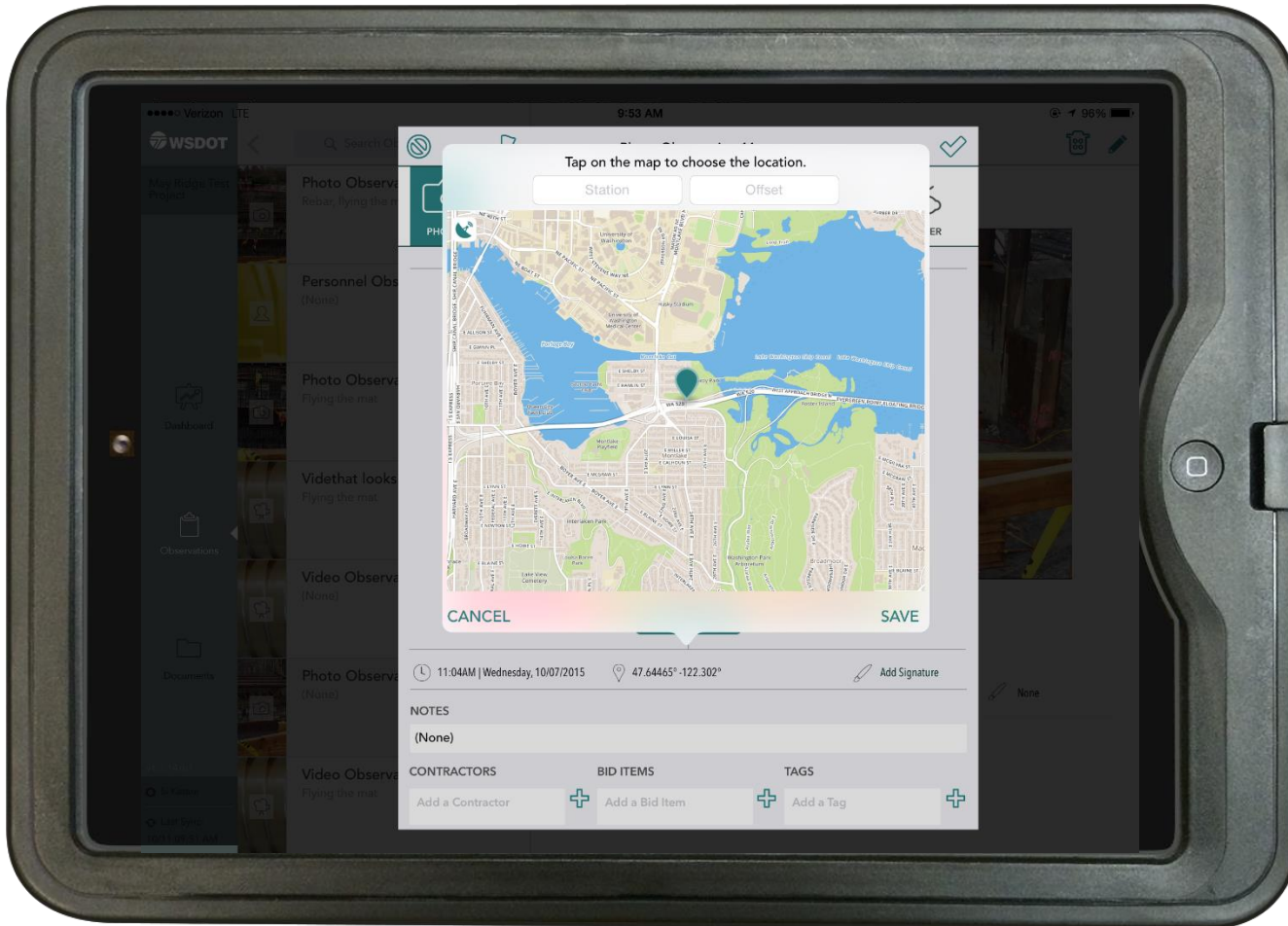
PILOT SYSTEM – FIELD NOTEBOOK



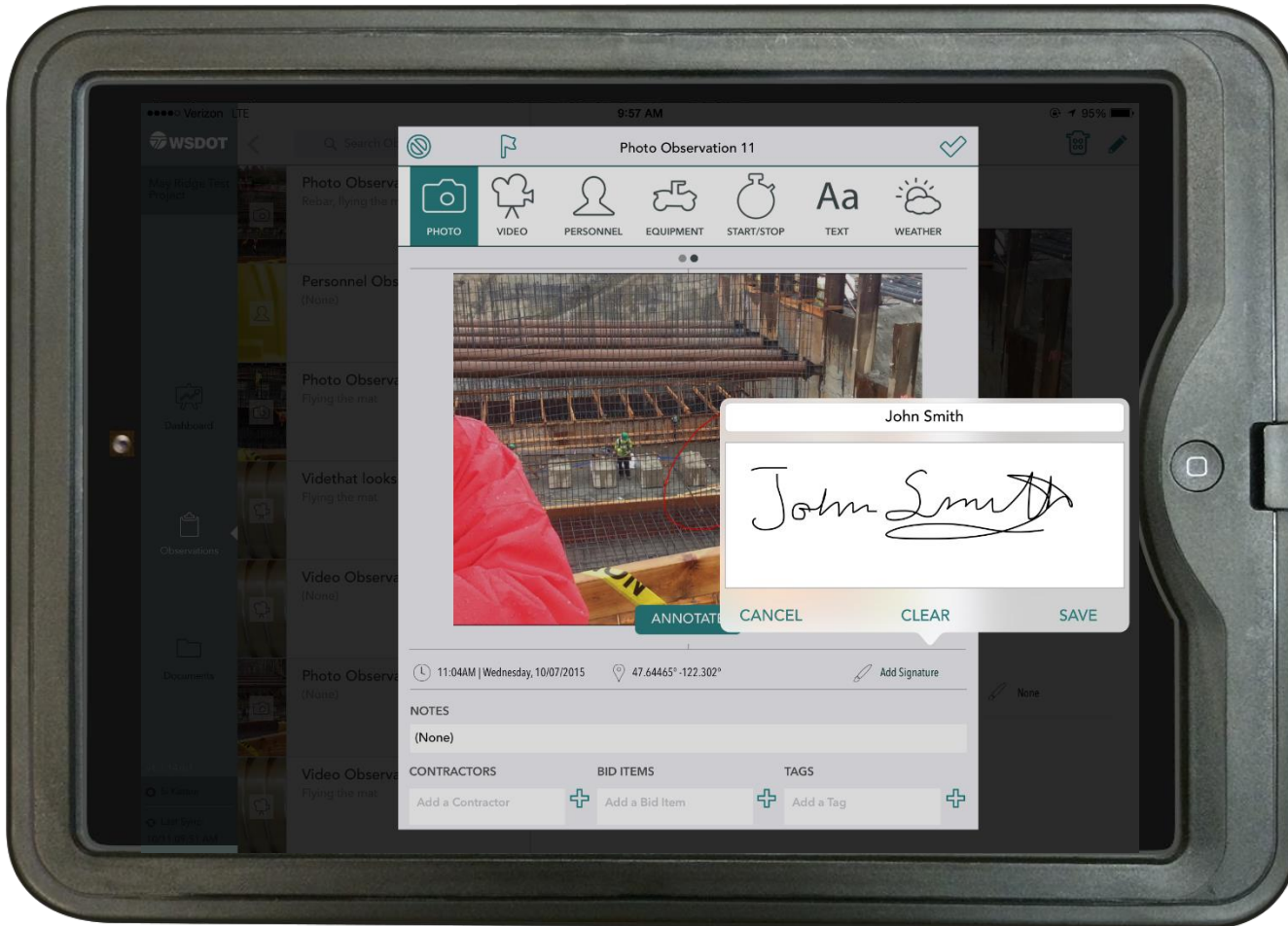
PILOT SYSTEM – FIELD NOTEBOOK



PILOT SYSTEM – FIELD NOTEBOOK



PILOT SYSTEM – FIELD NOTEBOOK



PILOT SYSTEM – OFFICE VIEW

The screenshot displays the 'HeadLight - Project 7999' web application. The browser address bar shows the URL: <https://headlight.paviasystems.com/#Observationlist/90/20/20>. The main content area is titled 'Photo Observation 17' and includes the following details:

- Author:** Robert Harris
- Date:** Tuesday, May 19, 2015 12:37 PM
- Priority:** 0

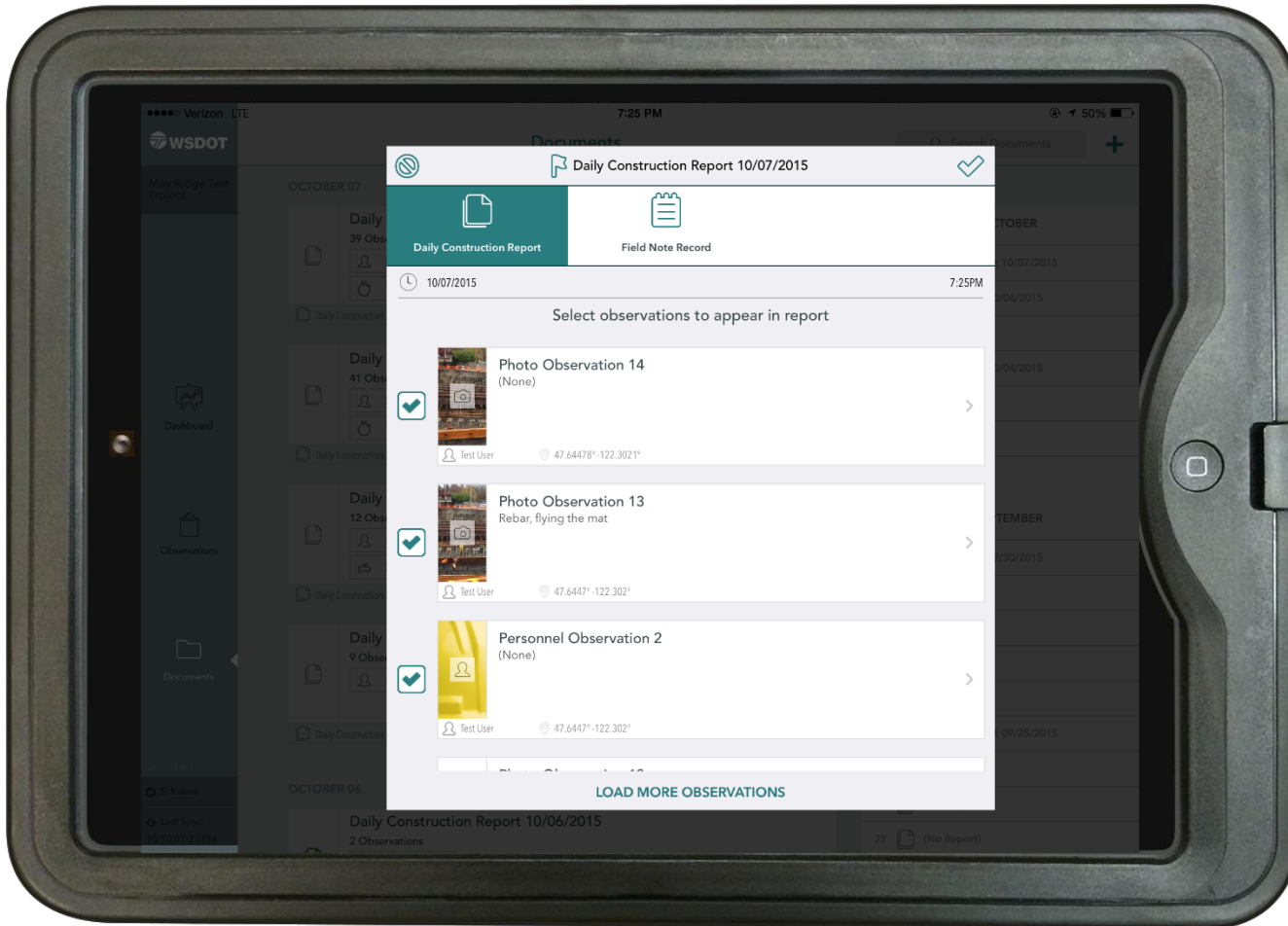
The central image shows a construction site with scaffolding, workers, and heavy machinery. Below the image is a 'Description' box containing the text: "STP performing misc chipping at west exterior wall and setting false work for deck. Johnson Western Gunite shotcrete east exterior wall at NB pour areas 1 & 2. Wet cure is ongoing for previously poured NB decks."

Below the description, there are sections for 'Contractor' (Seattle Tunnel Partners), 'Bid Items' (Cutoff Wall 1 to 3), and 'Tags'. A 'Location' field at the bottom right shows the coordinates 47.59336, -122.3359.

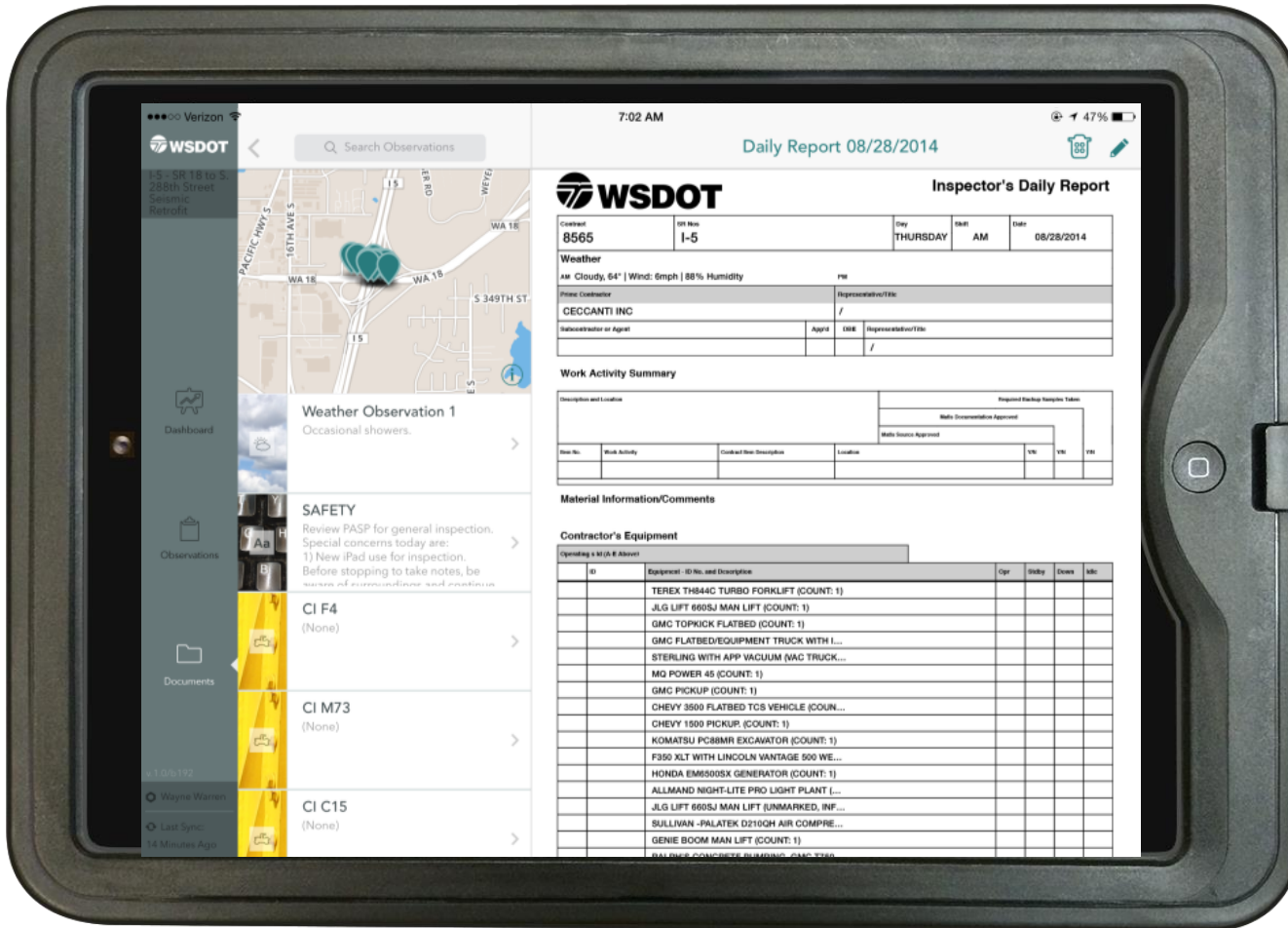
On the left side, a sidebar lists 'Project 7999' and a list of 'Observations' with 'Photo' and 'Priority' columns. A navigation bar at the bottom of the sidebar shows page numbers 1, 2, 3, and 7, with '2' being the active page.

On the right side, a 'Project' section includes a map showing the location on S Main St and S Jackson St, with nearby landmarks like 'Altstadt Bierhalle & Brauhaus' and 'Pioneer Smoke Shop'.

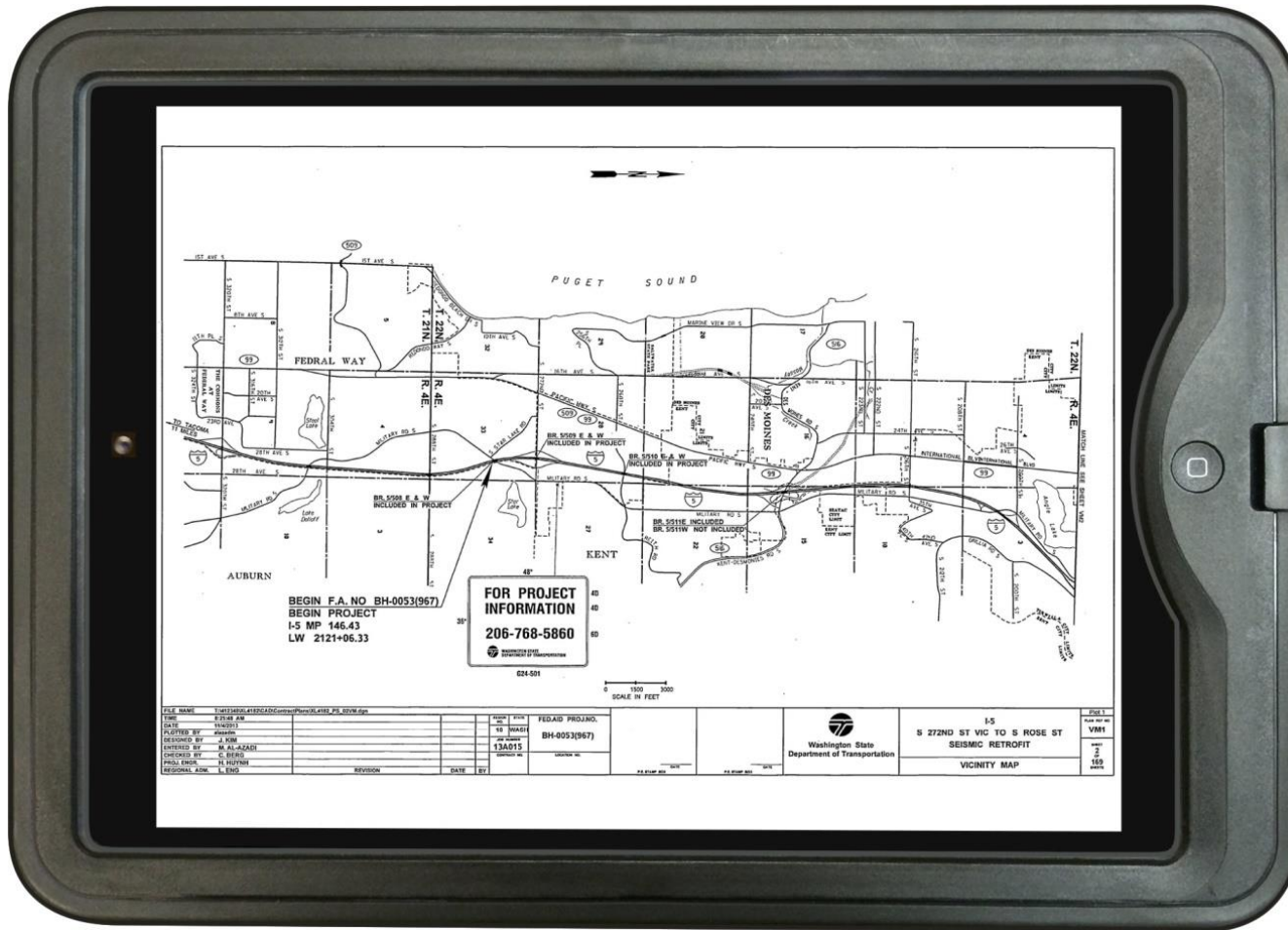
PILOT SYSTEM – DOCUMENTATION



PILOT SYSTEM – DOCUMENTATION






PILOT SYSTEM - REFERENCES



REAL WORLD PROJECTS

Used on 31 projects
totaling approximately
\$800,000,000

AGENCY	PROJECT COUNT	PROJECT BUDGETS
	7	\$24,676,814
	17	\$273,899,096
	7	\$501,055,413

Pilot Results

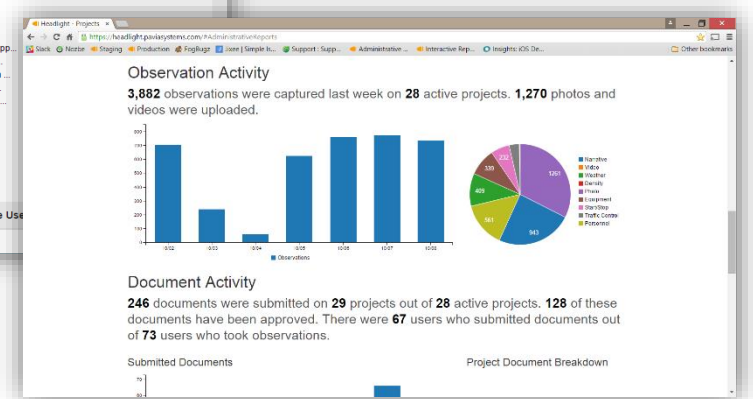
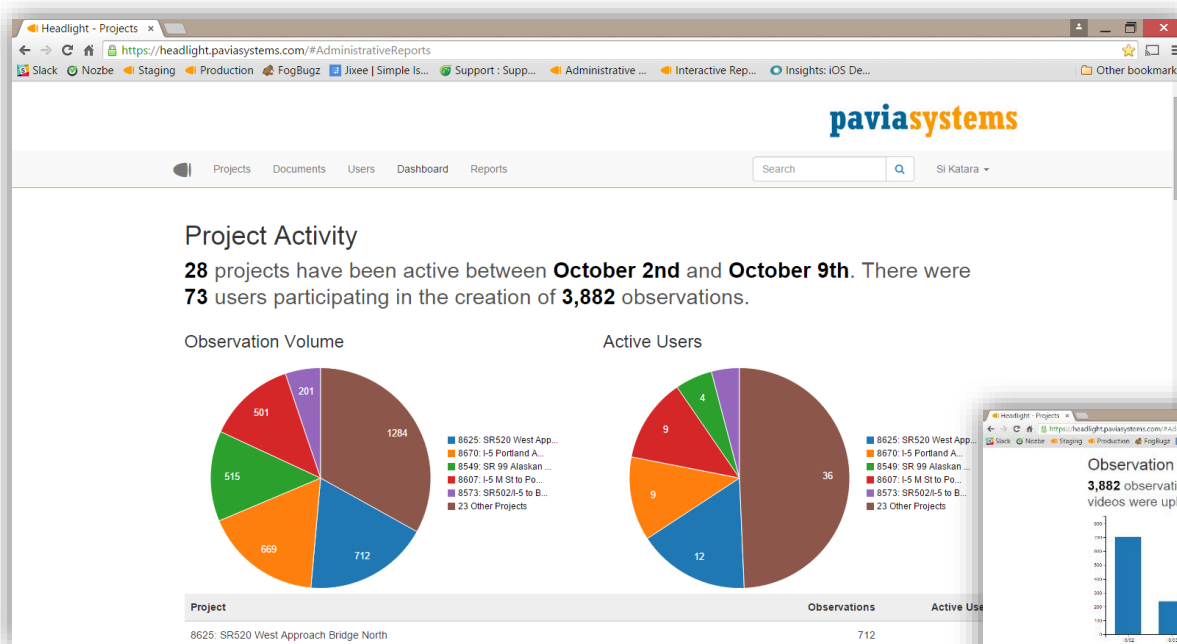
Pilot showed that mobile devices with corresponding software makes inspectors more efficient and their jobs easier

- Average time savings of 1.78 hours
- Inspectors collected 275 % more data
- On time document submission increased by 51%

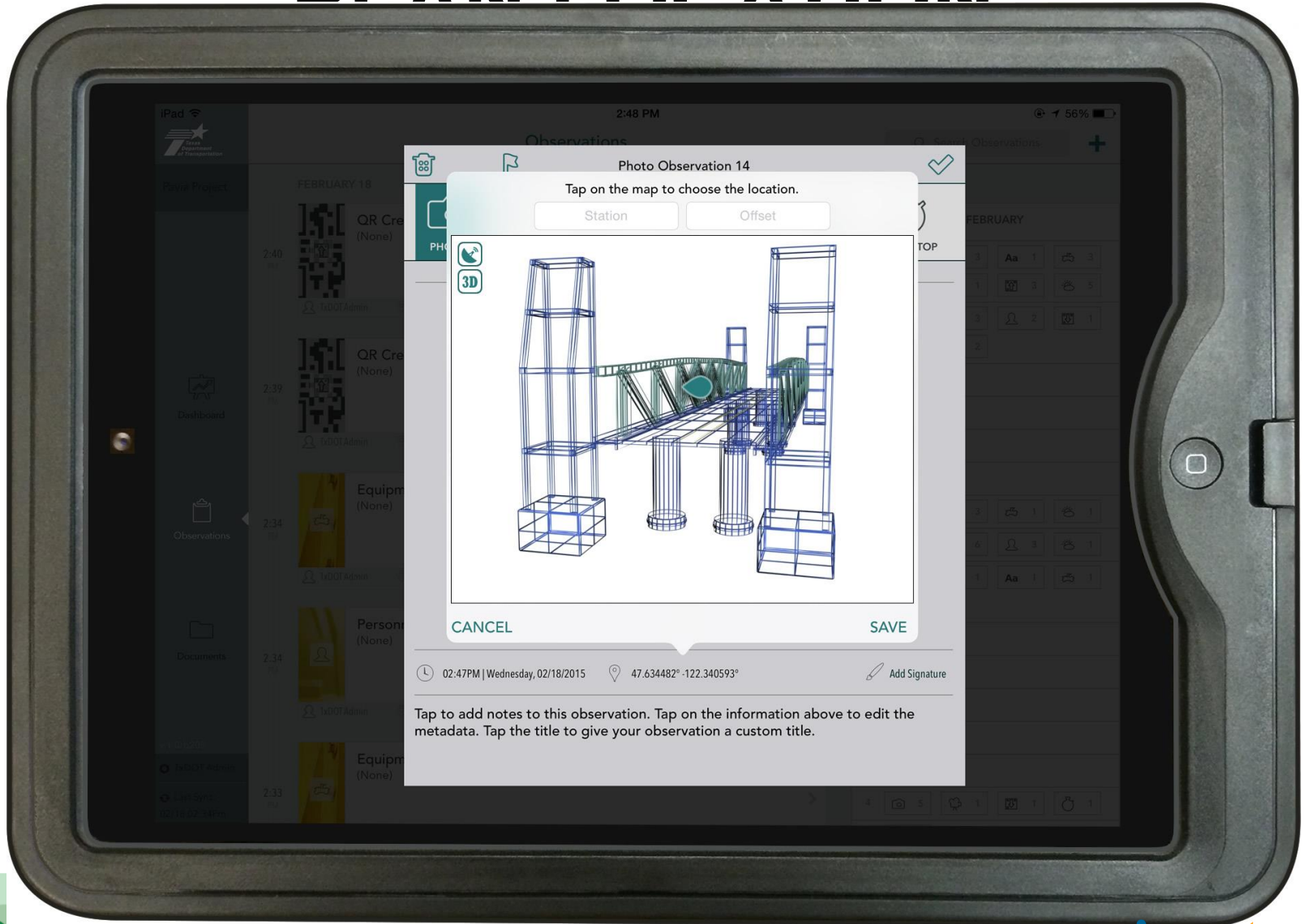
A more effective workforce



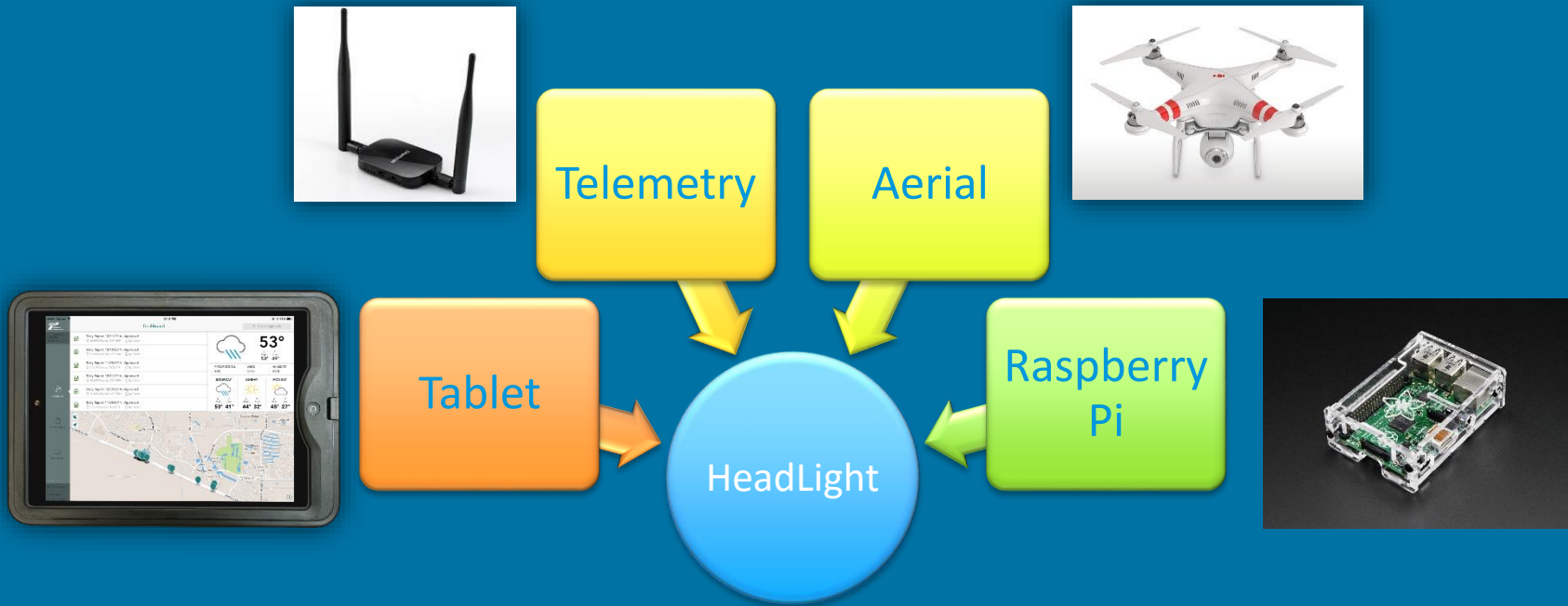
ANALYTICS



DIAGNOSTIC LOCATION



Platform approach



Current deployment...

- Approximately 100 different Headlight units deployed in 18 different project offices across the state for one year
- A variety of different project types, sizes and locations
- A second phase of research is funding further development of broader functions (more inspection forms)

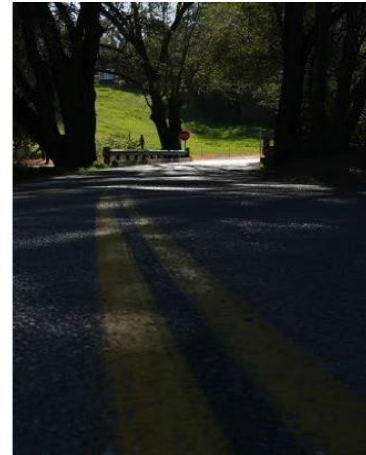
Obstacles we are tackling...

- Change – it comes easier for some
- Familiarity with the old ways
- Attempting to duplicate the flow of documents through our system as much as possible
 - Same review process
 - Opportunity to correct, comment & approve
- Maintain data security (WSDOT firewall)

Obstacles we are tackling...

- Tagging and metadata to enable best possible searching
- Adapting to field inspectors preferences
- Creating use and application guides for how the device is used in each office and statewide
- Determining what type of connectivity is needed

To achieve the mission





Questions?

Derek Case, PE

Assistant State Construction Engineer – SR 520 Project, Construction Division

George White, Co Founder & CEO

Pavia Systems, Inc.