

# Digital Project Delivery

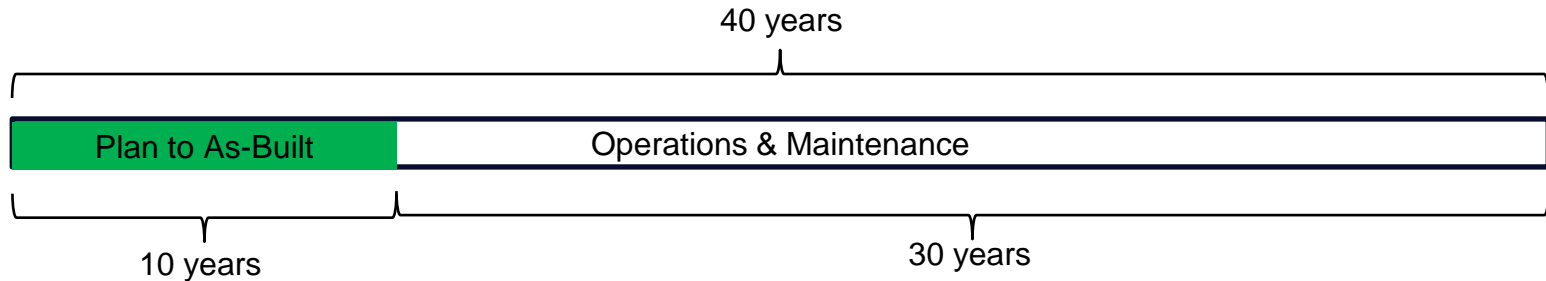
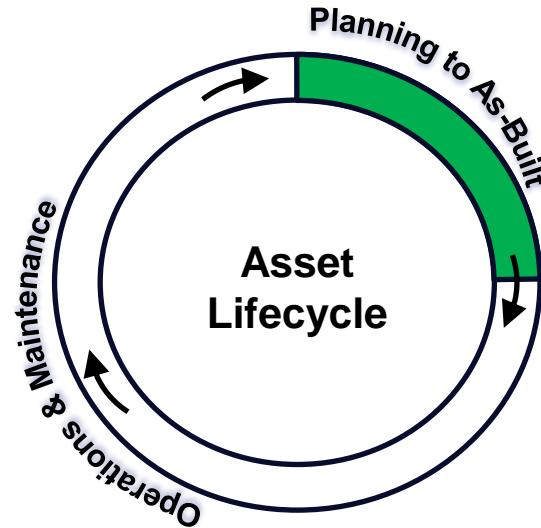
## GPS/GIS Enabled Construction Management/Inspection

TRB Geospatial and Geodetic Aspects of  
Building Informational Modeling Subcommittee, AKD70(2)

Joe Bima

2024 TRB AKD70 Summer Mtg

# Digital Project Delivery – Asset Centric Paradigm



# Existing Construction Inspection Workflows

## Inside DOT

- DOT Construction Inspectors
- AASHTOWare Project
- Infotech (Mobile Inspector)
- Various manual and dis-connected survey workflows

## Outside DOT

- LPAs
- Construction Services firms
- Infotech (Appia)
- Various manual and dis-connected survey workflows

# Digital Project Delivery (DPD) – Digital As-Built (DAB)

## **DPD paradigm demands digital construction inspection workflow into DAB**

- Remove paper processes (Field Books) ... Use smart devices
- Remove manual data entry ... Automate
- Remove manual measurement (Wheels, Steel Tapes) ... Use GNSS Rovers
- Remove paper/PDF plan sets in the field ... Use Plan/Model visualization in the field
- Digital access to project construction item list in the field ... Standardize
- Real time tracking of measured quantities against approved quantities
- Simple user interface ... Leverage existing field apps ... Provide options
- Digital field measurement/verification records re-purposed to DAB into asset mgmt.

# Digital Construction Inspection Workflows

## Inside DOT

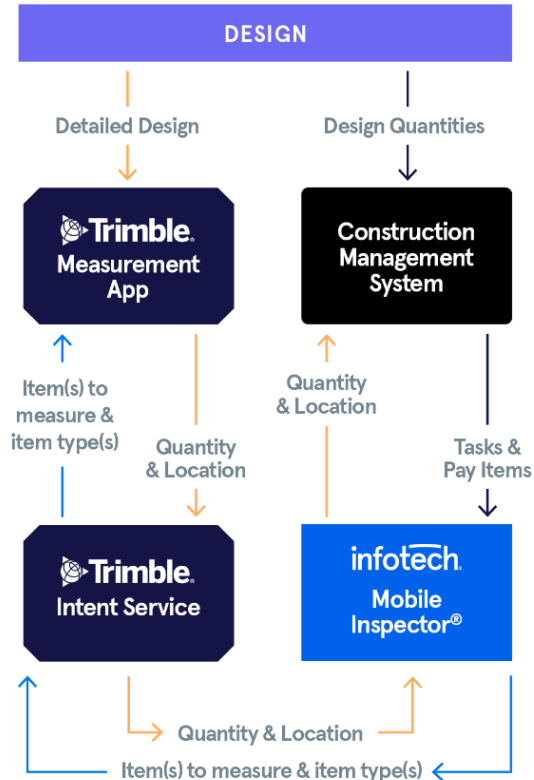
- AASHTOWare Project
- Infotech (Mobile Inspector)
- Trimble (Access Mobile Inspector Measurement Service)
- Trimble GNSS receivers

## Outside DOT

- LPAs
- Construction Services firms
- Infotech (Appia)
- Seiler (GeoBridge)
- Esri (ArcGIS)
- GNSS receiver vendors

# Digital Construction Inspection Solutions

## Survey app based



## GIS app based

### Infinately Connected.

#### Appia®

Manage your construction contract data.

- Document daily work
- Make payments + track funding
- Issue change orders
- Verify items and materials

SEILER  
GEOSPATIAL



#### GeoBridge

Connect your field data.

- Connect project items to GIS features
- Support project reporting for field measured project items
- Link GIS features to project digital as-built objectives
- Associate change orders to field workflows



#### ArcGIS® Field Maps

Collect your construction contract data.

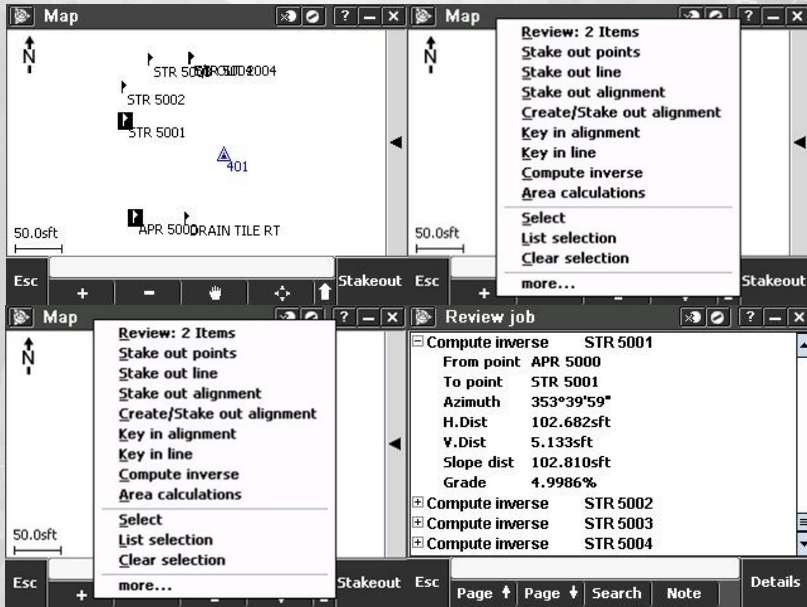
- Validate and measure item quantities via GPS
- Record auditable, digital as-built project items
- Establish shapes + quantities

infotech

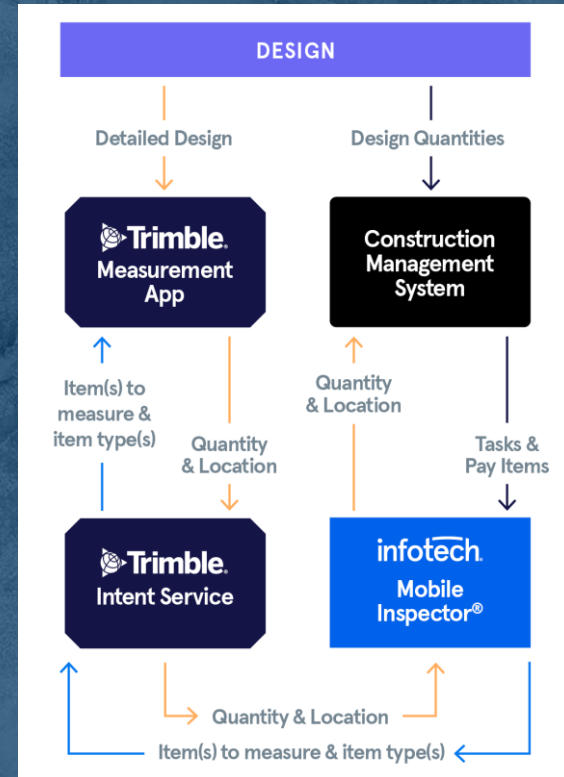
# Survey App Based

# Old vs. New Workflow

## Old Workflow




## New Workflow






# Infotech Mobile Inspector direct connection to Trimble Mobile Inspector

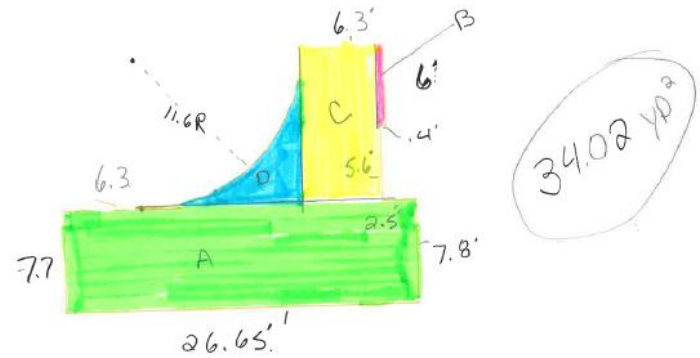


**Mi**  
Mobile Inspector®  
**infotech**

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**Mobile  
Inspector**



34.02 yd<sup>2</sup>

**A**  $\frac{(7.7+7.8)}{2} \times 26.65 = 206.5 \text{ Ft}^2$

**B**  $.4' \times 6' = 2.4 \text{ Ft}^2$

**C**  $(6.3-.4) \times (5.6+6) = 68.4 \text{ Ft}^2$   
 $5.9 \times 11.6 = 68.4 \text{ Ft}^2$

**D**  $11.6' \times 11.6' = 134.6 \text{ Ft}^2$   
 RADIUS  $3.14 \times 11.6^2 = 422.6 \times .25 = 105.7 \text{ Ft}^2$   
 $134.6 \text{ Ft}^2 - 105.7 \text{ Ft}^2 = 28.9 \text{ Ft}^2$

206.5  
 2.4  
 68.4  
 28.9  
 ---  
 306.2 ÷ 9 = 34.02 yd<sup>2</sup>

# Area of Sidewalk

# Trimble Access Mobile Inspector (Selecting a Square measurement)

The screenshot displays the Trimble Access Mobile Inspector application interface. At the top, there is a status bar with a menu icon, a scale bar, the time 10:34 and battery level 2/6, and a lightbulb icon. Below this is a navigation bar with a mouse cursor icon, a selection tool icon (highlighted in yellow), and zoom controls (plus, minus, and a circular arrow). The main workspace shows a site plan with 16 survey points labeled SW1 through SW16. A pink hatched square area is drawn around points SW1 through SW7. A north arrow and a 10ft scale bar are also present. On the right, a 'Measurement request result' panel displays the following data:

Measurement request result	
Selection	SW1,SW2,SW3,SW4,SW5,SW6,SW7,SW
Sloped Area	313.853S F
Plan Area	313.361S F
Perimeter	86.666sft

At the bottom of the screen, there is a dark navigation bar with buttons for 'Esc', '+', and 'Share'.

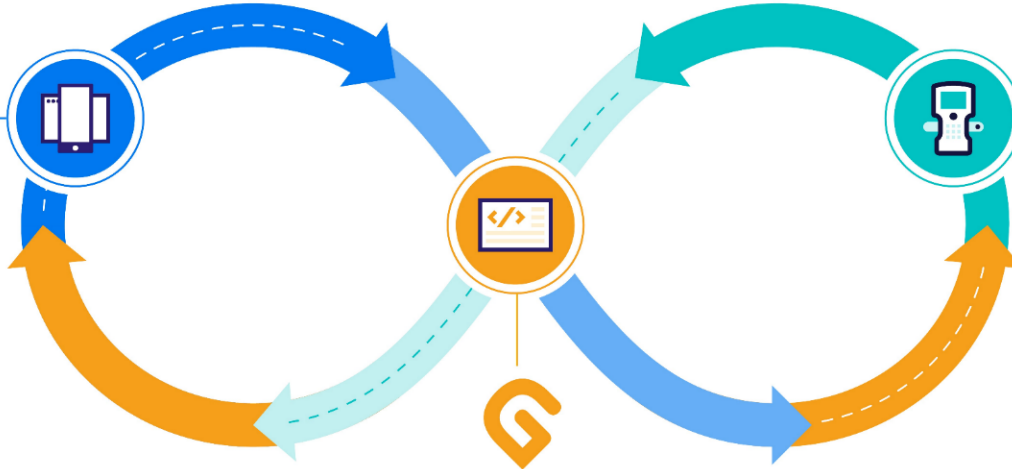
# GIS App Based

# Infinitely Connected.

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**SEILER**  
GEOSPATIAL

**infotech**

# What is Appia?

- SaaS construction administration and inspection solution
- Automated field data collection
  - Daily Work Reports
- Payments
- Change orders
- Collaborative environment
- Standardized reporting
- GIS-enabled

# Traditional Methods

Manual measurement techniques  
Redundant data entry



# Digital Methods

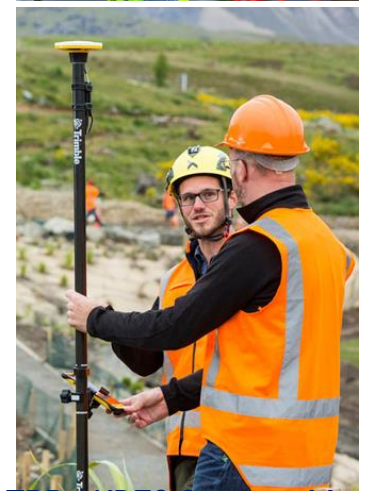
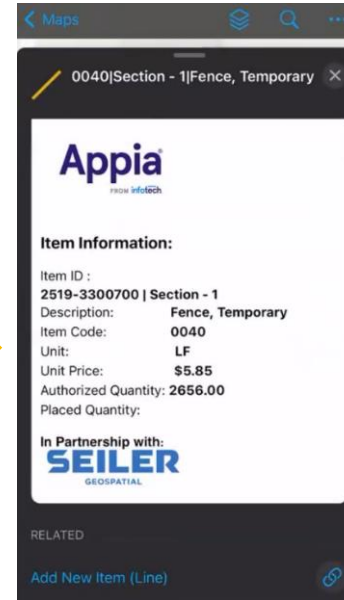
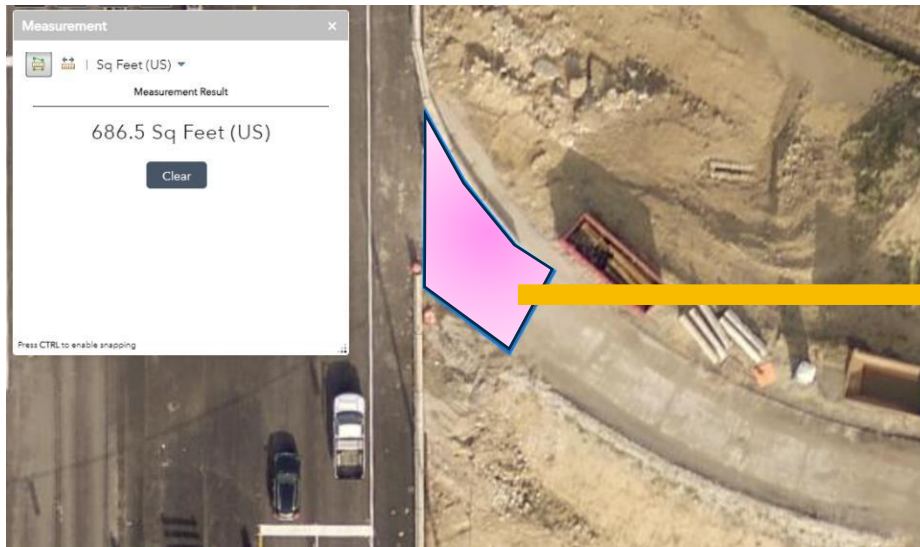
High-accuracy GNSS  
Esri ArcGIS online feature storage  
Familiar data collection application  
Affordable solutions



# ArcGIS Field Maps for field data collection

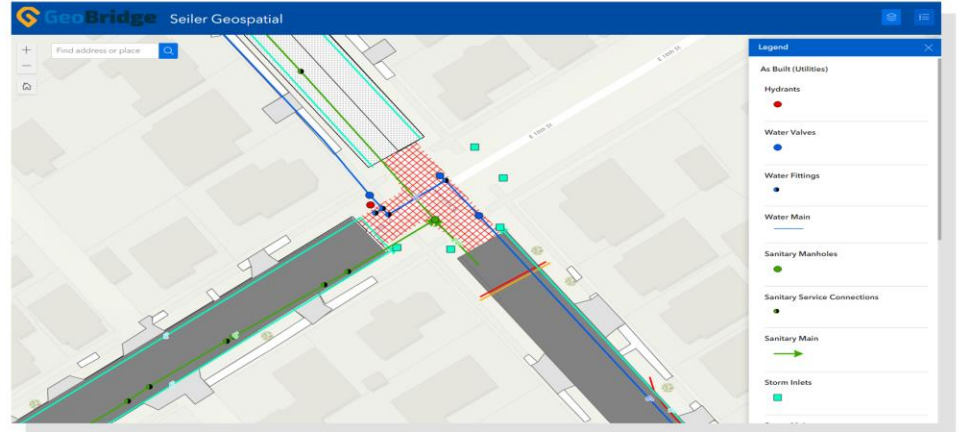
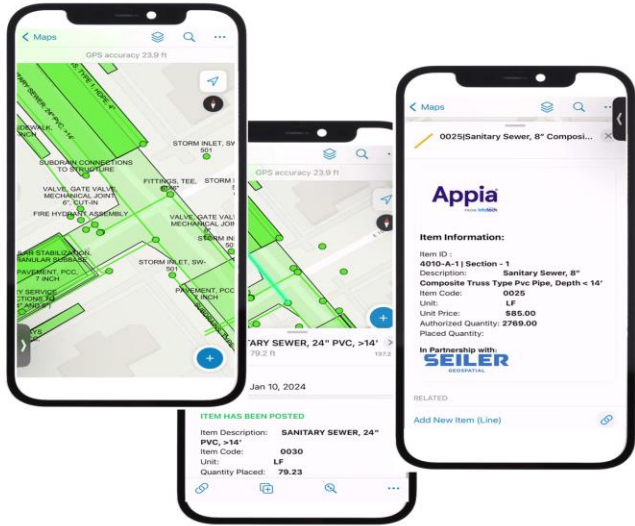
## Measure Materials Used During Construction:

- Area – Pavement, sodding, removals
- Linear – Guardrail, fencing, piping
- Point Locations – Hydrants, valves, manholes





# Data Capture Visualization in GIS Environment



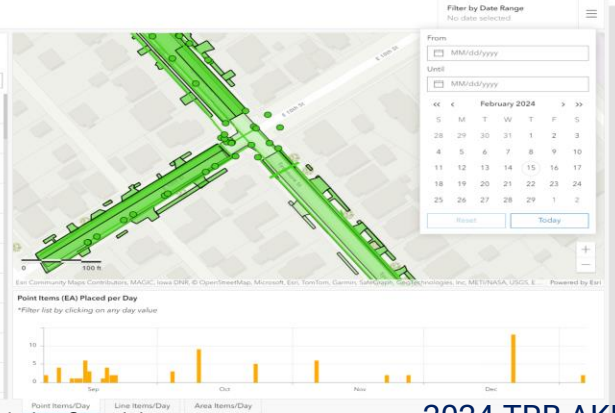
## Inspector Dashboard Example

### List of Point Items

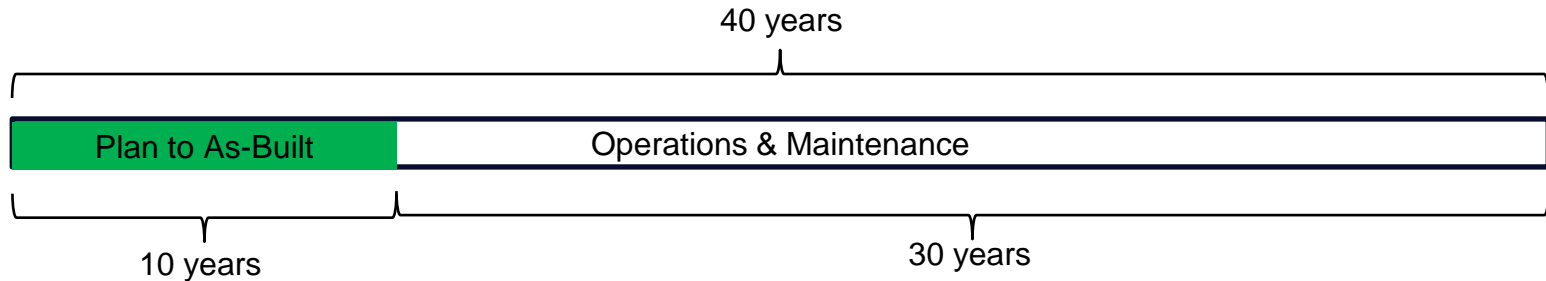
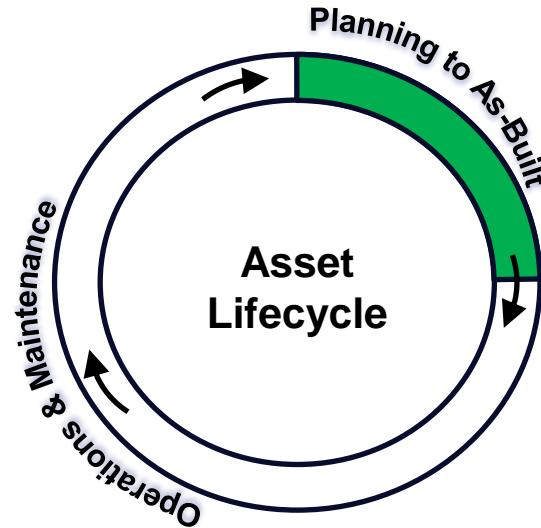
\*Click on Item to select on map

Search: \_\_\_\_\_

- SUBDRAIN CONNECTIONS TO STRUCTURE**  
Quantity Placed: 1.00 EA  
Date: 1/6/2024, 3:01 PM
- SUBDRAIN CONNECTIONS TO STRUCTURE**  
Quantity Placed: 1.00 EA  
Date: 1/6/2024, 3:01 PM
- SANITARY SERVICE CONNECTIONS TO MAIN (4" AND 6")**  
Quantity Placed: 1.00 EA  
Date: 12/21/2023, 3:01 PM
- SANITARY SERVICE CONNECTIONS TO MAIN (4" AND 6")**  
Quantity Placed: 1.00 EA  
Date: 12/21/2023, 3:01 PM
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- SANITARY SERVICE CONNECTIONS TO MAIN (4" AND 6")**  
Quantity Placed: 1.00 EA  
Date: 12/21/2023, 3:01 PM
- SANITARY INTERNAL DROP CONNECTION**  
Quantity Placed: 1.00 EA  
Date: 12/21/2023, 3:01 PM



# Digital Project Delivery – Asset Centric Paradigm





# Thank You !

Joe Bima