# Utah Transit Authority's
# New Transit Asset Management System

*Complete Inspection and Management Software*

# High-Level Current State of Affairs

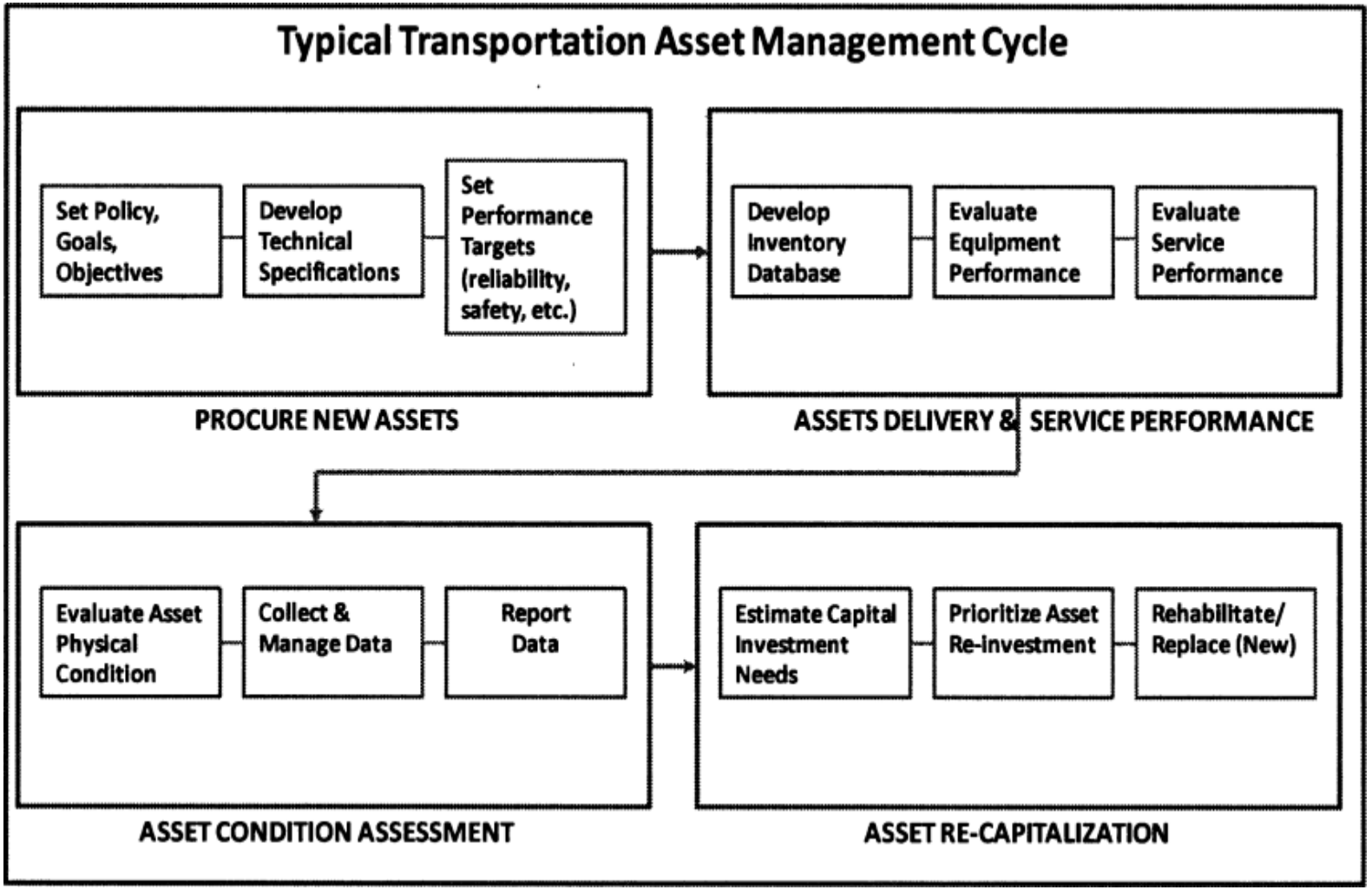
- New Regulations and greater oversight
- Scarcity of resources
- Aging Infrastructure
- High Construction and Maintenance Costs
- Data Overload on Owners

**Bigger Need + Fewer Resources = ?**

**No room for errors or wasted efforts**

# Overarching Purpose of TAM

- **To ensure a safe and reliable infrastructure for customers/users.**
- **To protect the investment into the infrastructure by detecting problems before they deteriorate to the point where they create unsafe conditions or threaten operations.**
- **Creating an optimized strategy to maintain assets in a state of good repair.**


Typical Transportation Asset Management Cycle
Set Policy, Goals, Objectives
Develop Technical Specifications
Set Performance Targets (reliability, safety, etc.)
PROCURE NEW ASSETS
Develop Inventory Database
Evaluate Equipment Performance
Evaluate Service Performance
ASSETS DELIVERY & SERVICE PERFORMANCE
Evaluate Asset Physical Condition
Collect & Manage Data
Report Data
ASSET CONDITION ASSESSMENT
Estimate Capital Investment Needs
Prioritize Asset Re-investment
Rehabilitate/ Replace (New)
ASSET RE-CAPITALIZATION

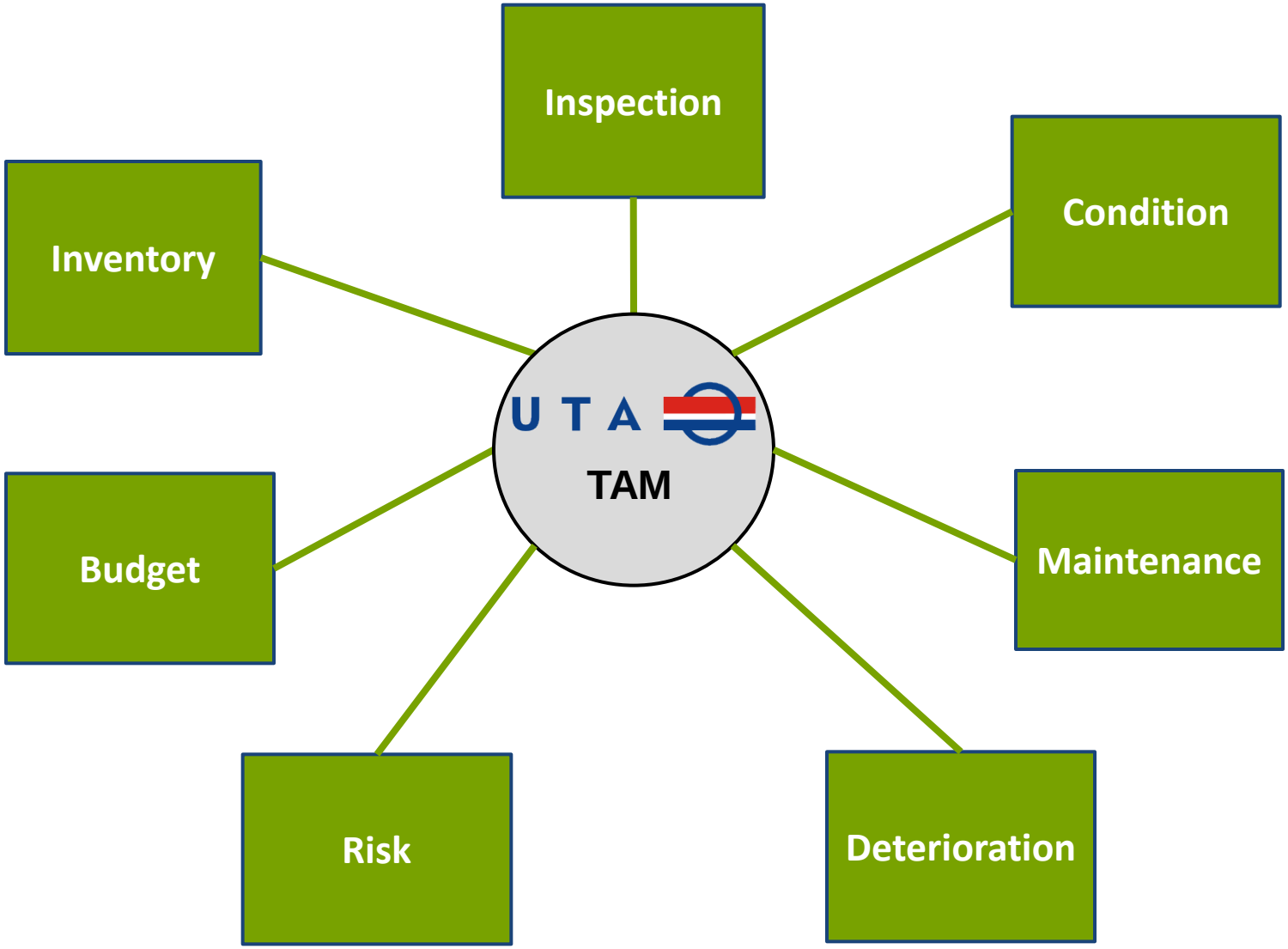
# Project Background


- Multi-modal public transportation system in the greater Salt Lake City area
- National TAM Pilot Software Grantee
- Building a new integrated TAM system primarily focused on rail and facility assets (track, signals, crossings, rolling stock, …)
- Adding onto the existing bridge inspection and management system

# Objective

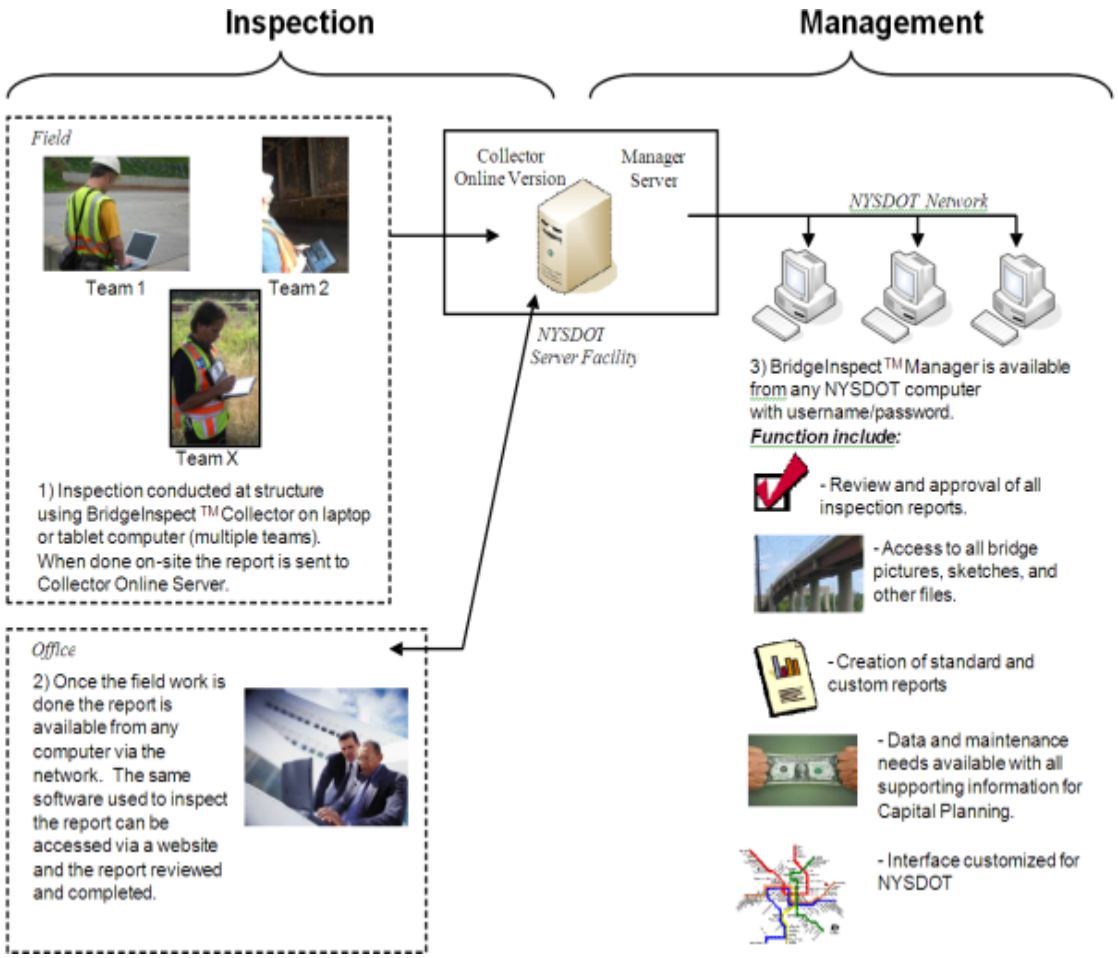
- **Implement an electronic TAM tool that:**
  - Supports critical decisions for safety, planning, and maintenance
  - Provides an overview of the complete asset inventory with its condition and properties
  - Quickly flags safety critical items for immediate repair
  - Provides a risk assessment and schedule of the most economical time to rehabilitate or replace an asset
  - Gives management a tool to set immediate and long term budgets based on the condition of the system as evaluated by the technical staff
  - (FRA Grant Objective) Develop systems and tools which can be easily shared with others interested in the development and/or improvement of the current asset management system

# System Modules

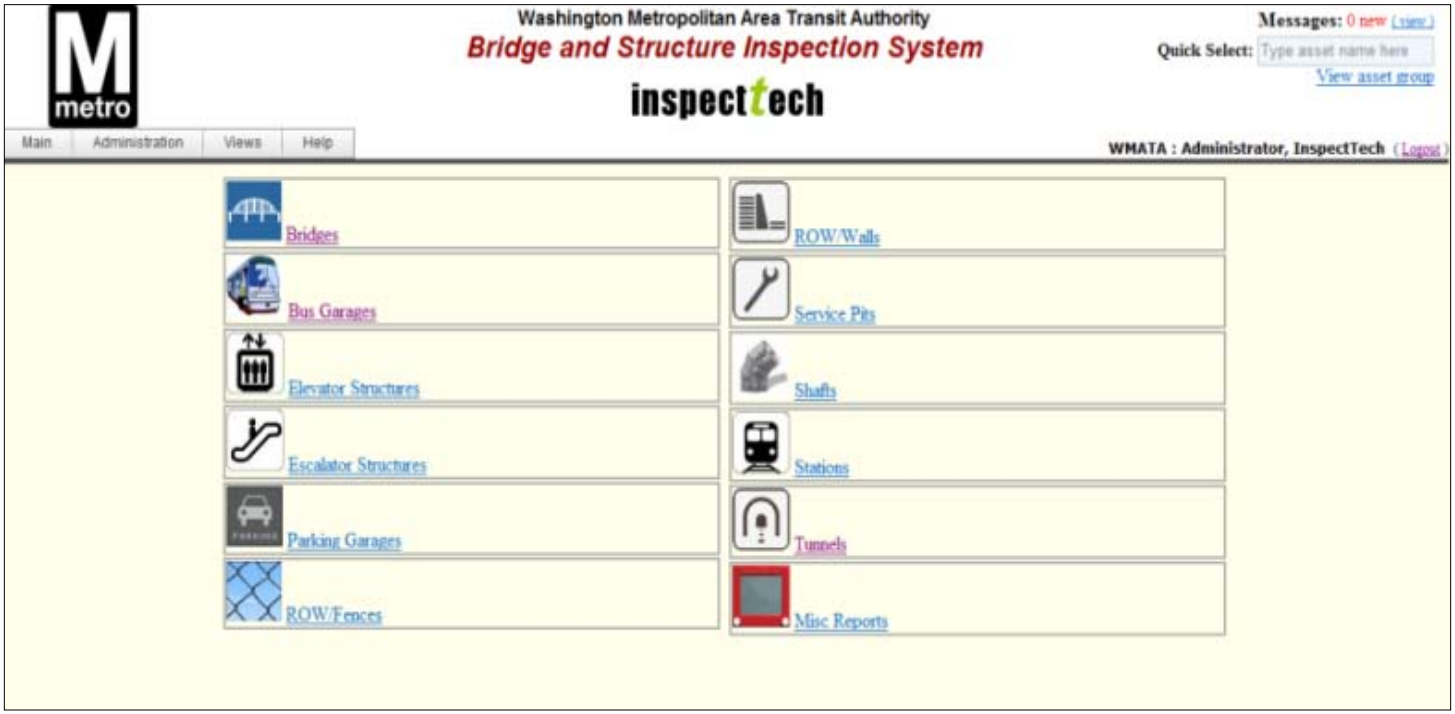


# Integration – Connected/Disconnected

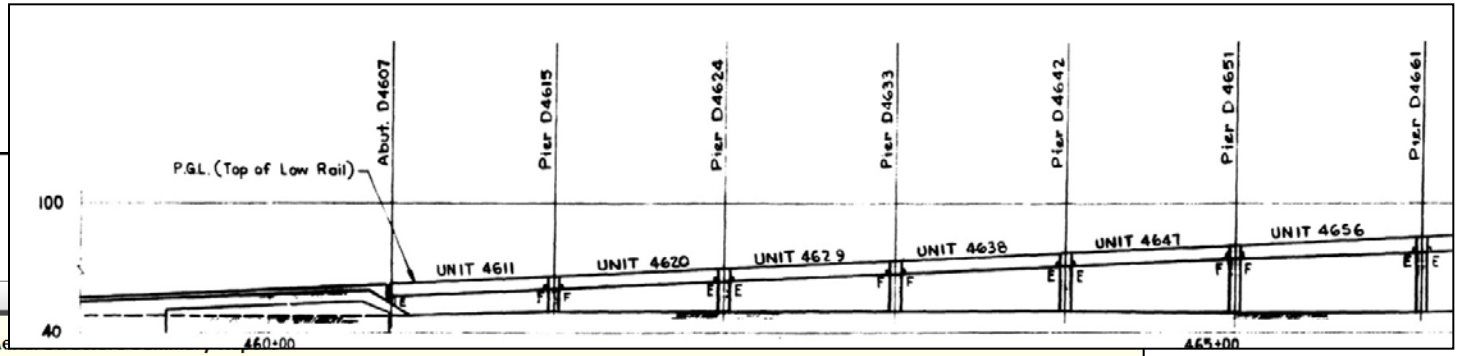
- Start inspection on laptop/tablet
- Submitted to Web-Server when in office
- Report continued from any computer
- Submitted for review
- Reviewed and approved online
- Able to run reporting and searching on data



# Core System used on Multiple Asset Types




# Extensive Structure Details




metro

Main | Administration

**Minnesota Avenue Ae**

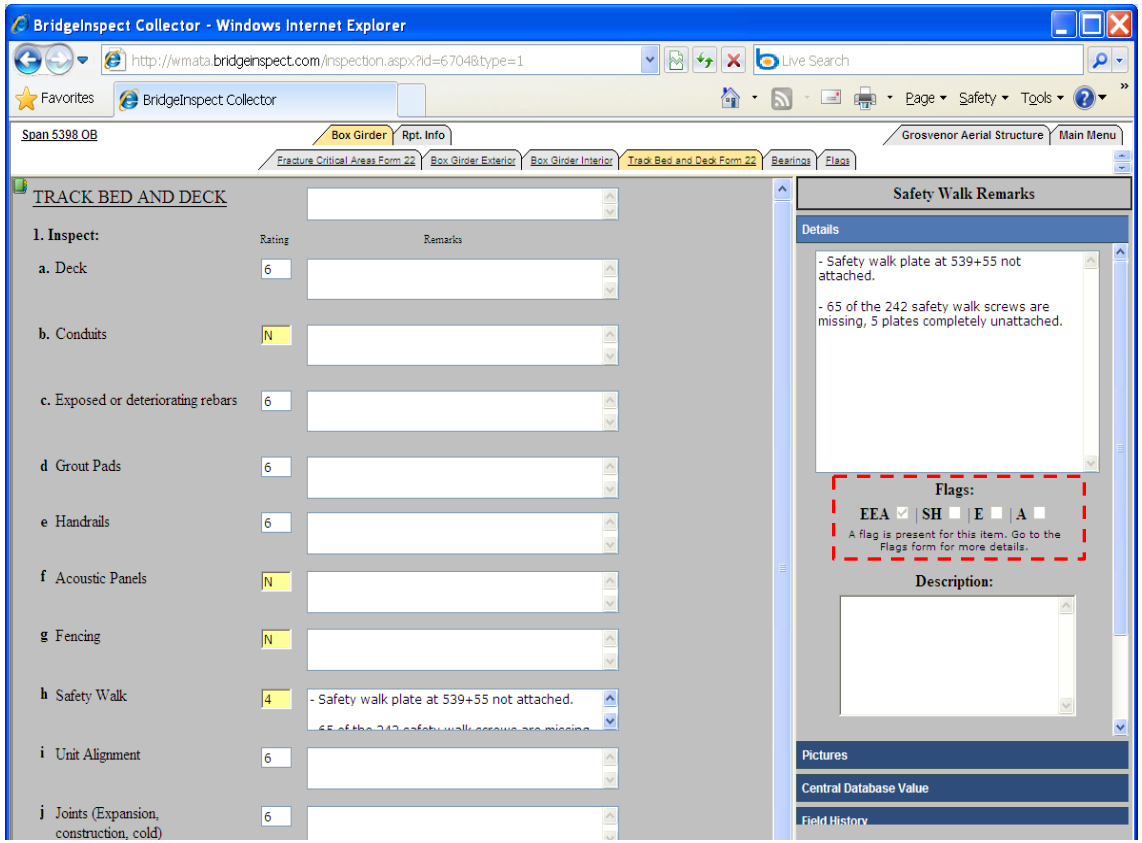
| Inspection Date | Asset Code | Asset Name | Owner | Asset Type | Submitted To | Status | | |
|---|---|---|---|---|---|---|---|---|
| 12/08/2009 | Minnesota Avenue Aerial Structure | Minnesota Avenue Aerial Structure | Webb, Gerald | Bridge | | Approved on 6/24/2010 | | |

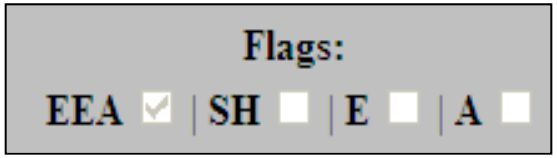
**Minnesota Avenue Aerial Structure Sub-Assets:**

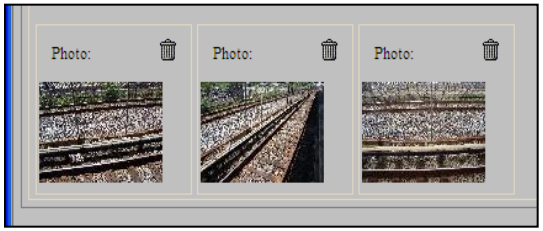
Show Assets in Minnesota Avenue Aerial Structure by [All Assets] Filter Displayed Inspection Type: Routine

| Inspection Date | Asset Code | Asset Name | Sub-Assets | Owner | Asset Type | Submitted To | Status | | |
|---|---|---|---|---|---|---|---|---|---|
| 12/08/2009 | 1116600 | Abutment 2432 IB&OB | None | Webb, Gerald | Bridge | | Approved on 6/24/2010 | | |
| 12/08/2009 | 1116700 | Span 2437 IB | None | Webb, Gerald | Bridge | | Approved on 6/24/2010 | | |
| 12/03/2009 | 1116800 | Span 2437 OB | None | Limones, Jose | Bridge | | Approved on 6/24/2010 | | |
| 12/03/2009 | 1116900 | Crossbox/Pier 2442 IB&OB | None | Limones, Jose | Bridge | | Approved on 6/24/2010 | | |
| 12/08/2009 | 1117000 | Span 2447 IB | None | Webb, Gerald | Bridge | | Approved on 6/24/2010 | | |
| 12/03/2009 | 1117100 | Span 2447 OB | None | Limones, Jose | Bridge | | Approved on 6/24/2010 | | |
| 12/03/2009 | 1117200 | Crossbox/Pier 2452 IB&OB | None | Limones, Jose | Bridge | | Approved on 6/24/2010 | | |
| 12/08/2009 | 1117300 | Span 2457 IB | None | Webb, Gerald | Bridge | | Approved on 6/24/2010 | | |
| 12/03/2009 | 1117400 | Span 2457 OB | None | Limones, Jose | Bridge | | Approved on 6/24/2010 | | |
| 02/04/2010 | 1117500 | Crossbox/Pier 2462 IB&OB | None | Webb, Gerald | Bridge | | Approved on 6/24/2010 | | |
| 02/04/2010 | 1117600 | Span 2467 IB | None | Webb, Gerald | Bridge | | Approved on 6/24/2010 | | |
| 12/07/2009 | 1117700 | Span 2467 OB | None | Limones, Jose | Bridge | | Approved on 6/24/2010 | | |

# Example of Inspection Forms



# Critical Parts of Inventory/Inspection

- **Inventory of all Assets**
  - Need to know what is there and basic properties
  - Geometric data, material information
  - Drawings/Plans (with all repairs/rehabs)
- **Condition data on all Assets**
  - Current information
  - Past information

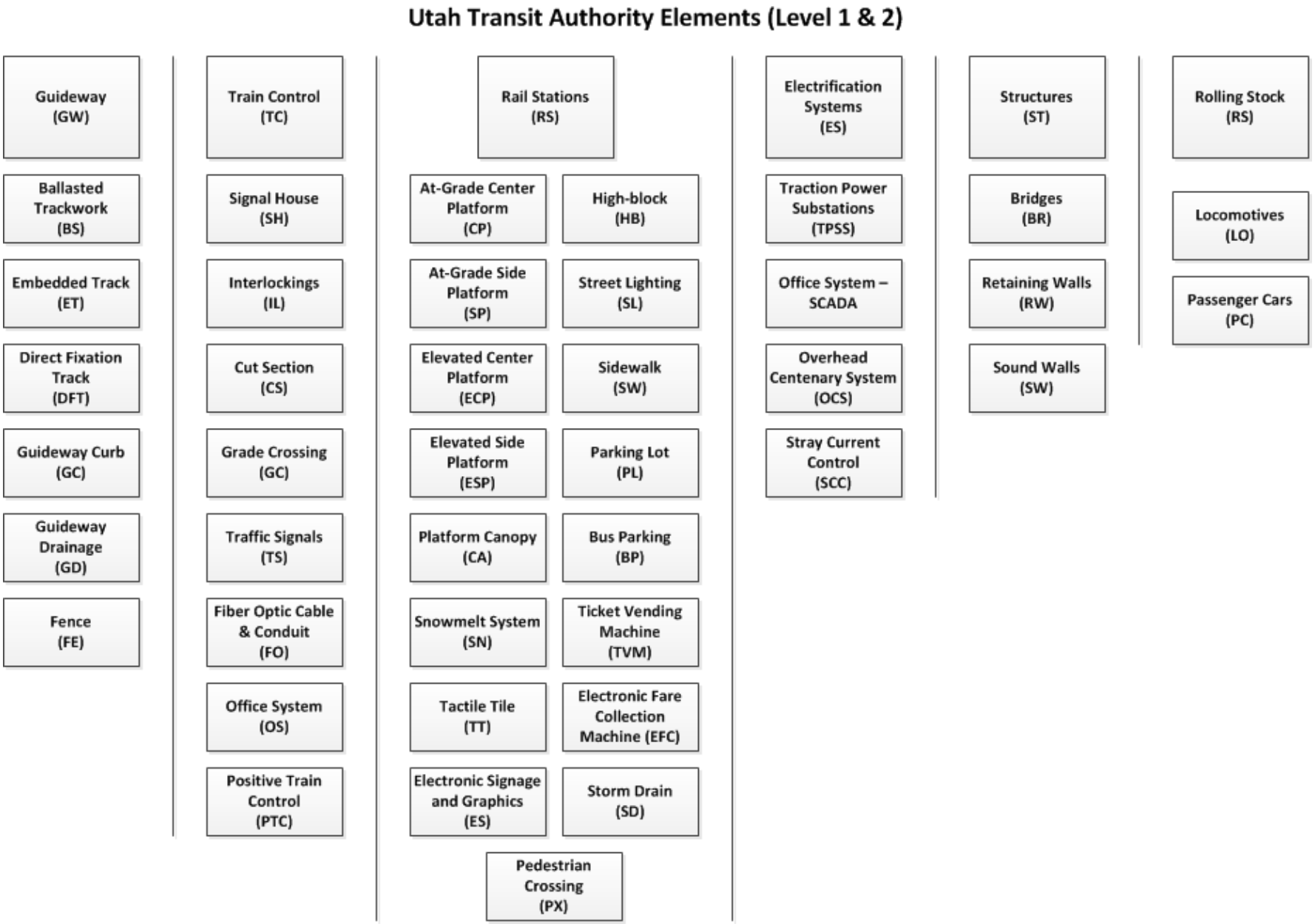
# Inspection Condition Data

- **Quantification via a Rating Scale**
  - Need to be able to compare relative conditions within an asset and between assets
- **Subjective results via Narrative Text**
  - Need to be able to have descriptions indicating the scope and nature of the condition

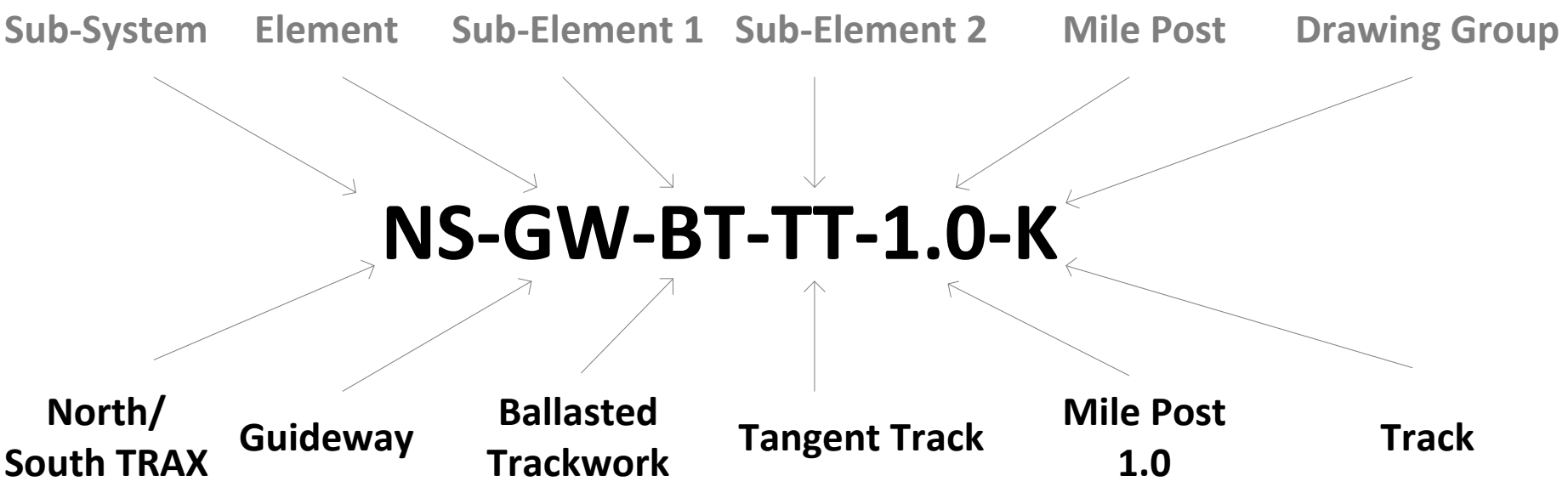
# Supporting Information

- **Pictures**
  - Digital pictures for overall inventory and every deficiency
- **Videos**
  - Can be appropriate to show time based effects of live loads or multiple angles
- **Sketches/Drawings**
- **Test/Sensor Results**
  - Boring information, Stress readings

# UTA TAM Inventory



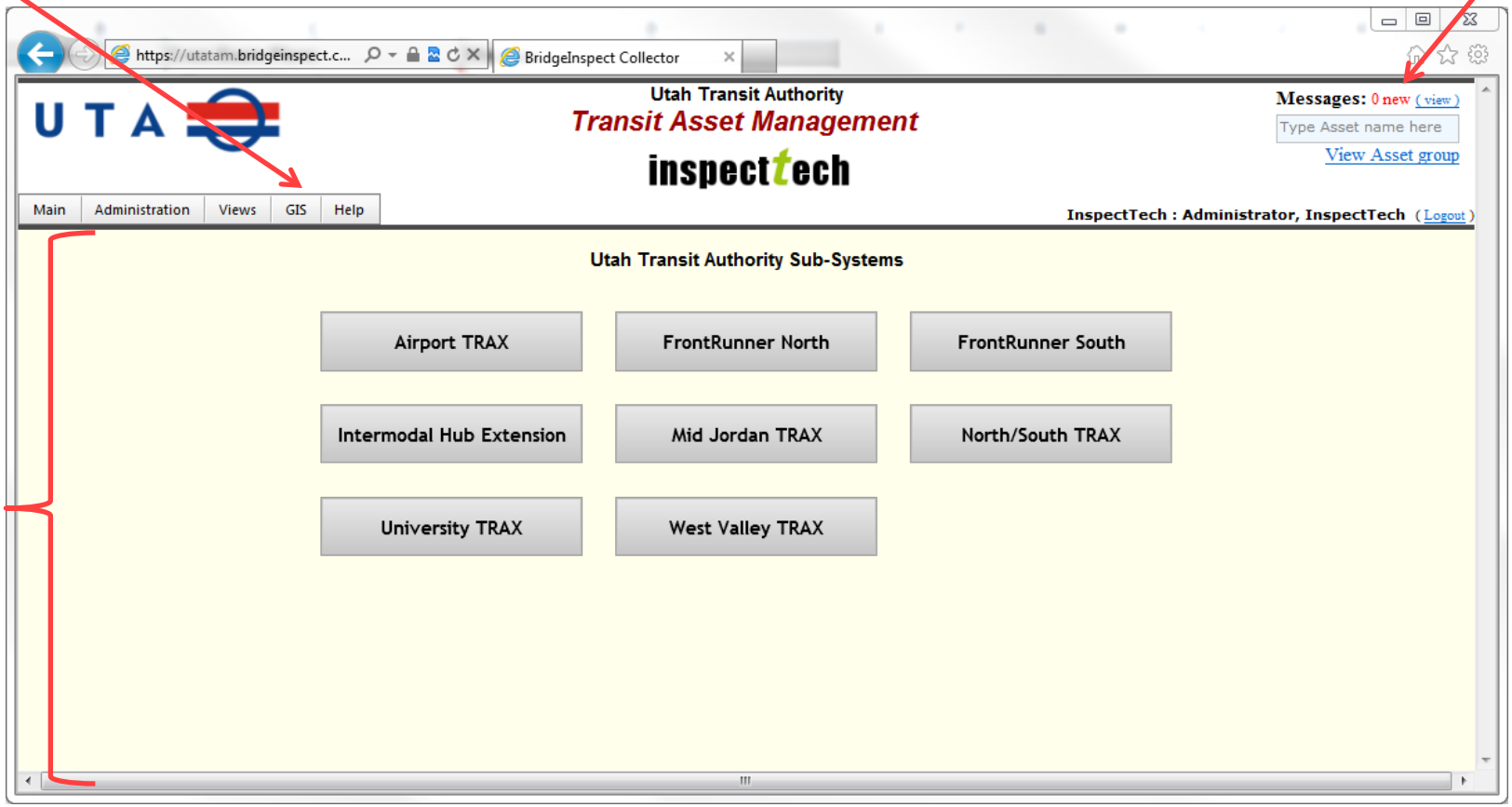
# Asset Naming Convention



# Main Screen – Asset Search

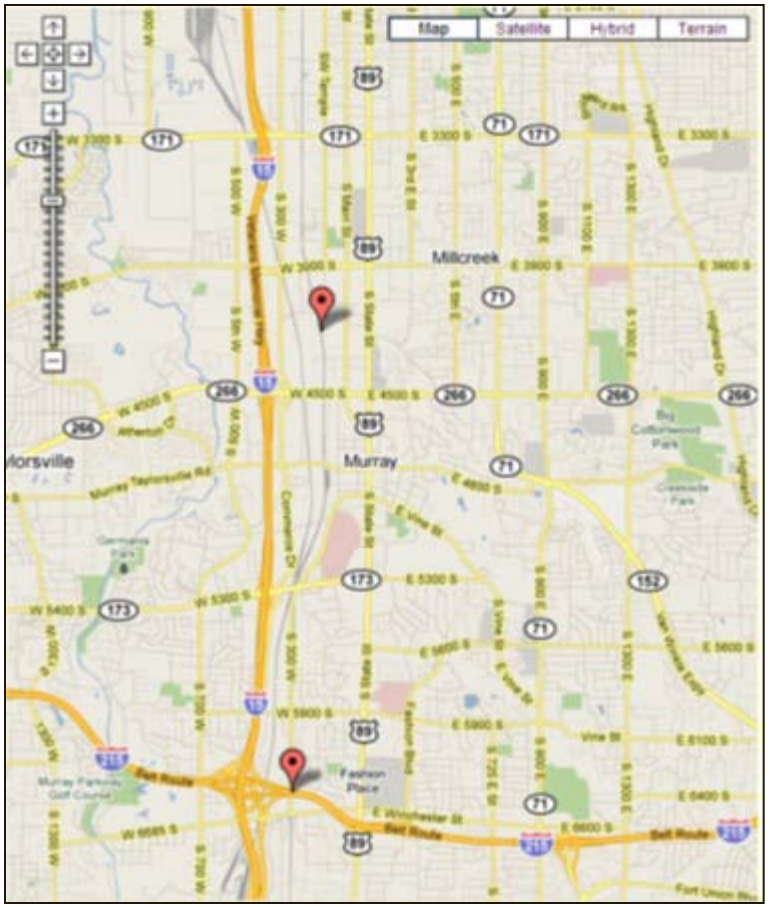
Search by Map

Search by Asset ID




Search by Line

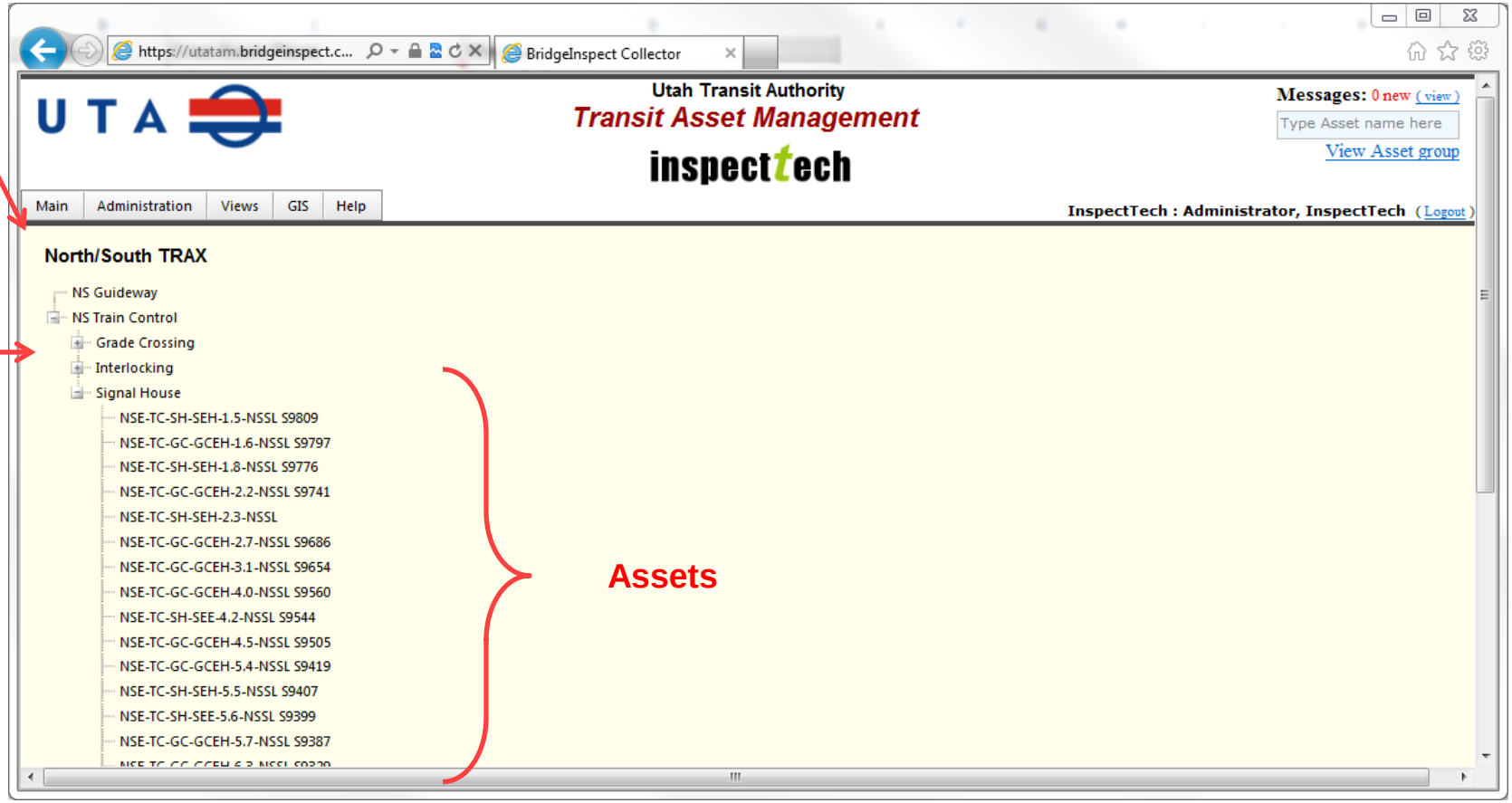
# Visualization (Mapping)

# Asset Type Search – Asset Tree

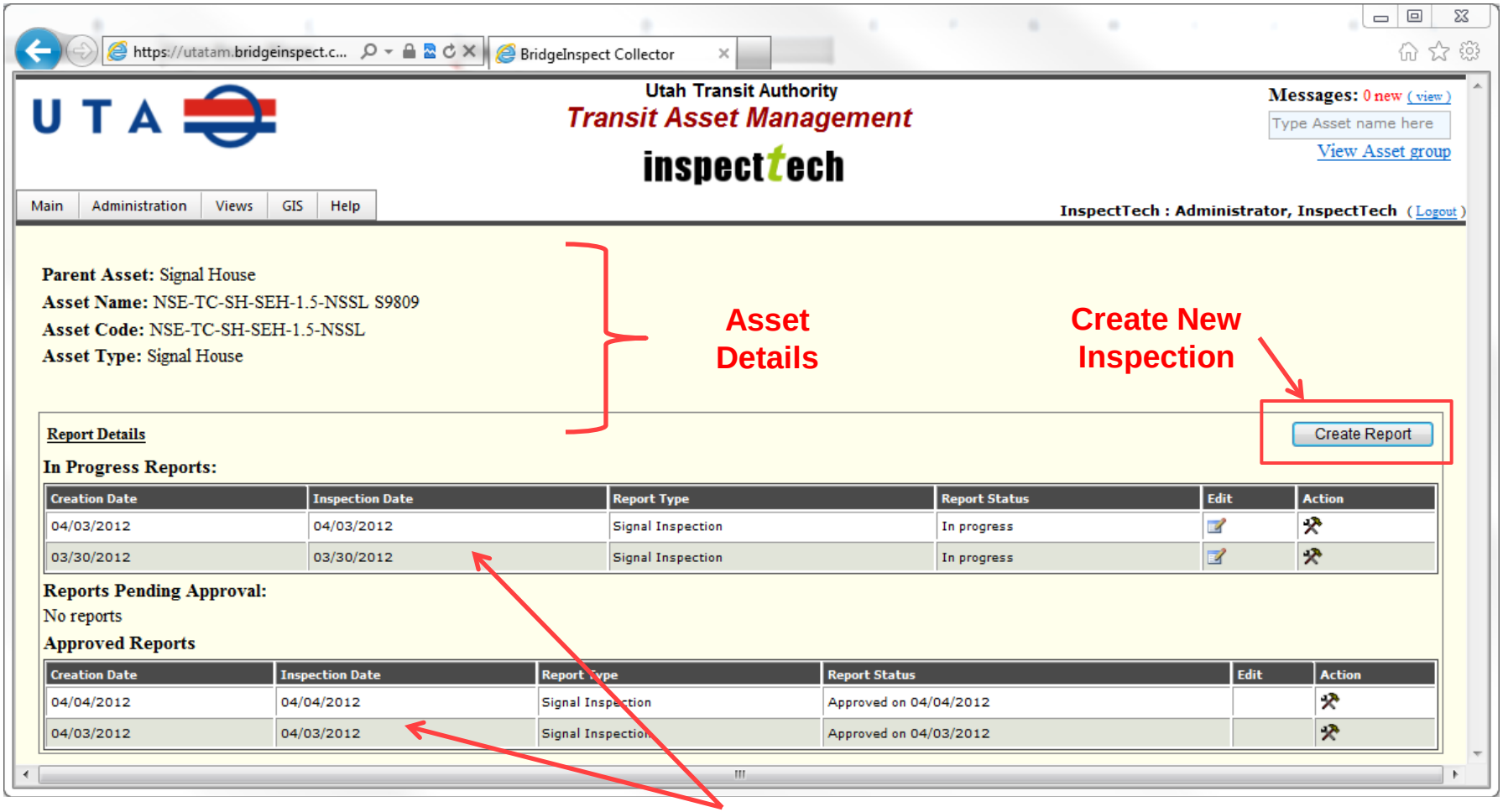
Line

Asset Types




Assets

# Asset Details



# Guideway Inspections

| Guideway Inspection | Frequency | |
|---|---|---|
| Hi-Rail Truck Inspection and/or Walking Inspection | Weekly | Identify FRA Defects for all Guideway Sub-Elements |
| Switch Inspection | Monthly | Identify FRA Switch Defects for all Guideway Crossover and Turnout Sub-Elements |
| Mechanized Cross-tie Inspection | Annual | Identify FRA Defects for all Guideway Sub-Elements based on Mechanized Cross-tie Inspection |
| Ultrasound Inspection | Annual | Identify FRA Defects for all Guideway Sub-Elements based on Ultrasound Inspection |
| Geometry Car Test Inspection | Annual | Identify FRA Defects for all Guideway Sub-Elements based on Geometry Car Test |
| Joint Bar Inspection | Biannual | Identify FRA **Joint Bar** Defects for all Guideway Trackwork (Ballasted, Embedded, Direct Fixaction) Sub-Elements |
| Special | As Needed | Identify FRA Defects for all Guideway Sub-Elements when needed outside of normal inspection schedule |

# Current Guideway Inspection Form

Report # _____ UTA Track Inspection Report Date _____

**FrontRunner North**

Inspector Name _____

Employee Number _____

| Track Traversed N/B S/B | Location or Mile Post | FRA Defect Found | Remedial Action Taken | Date of Repair |
|---|---|---|---|---|
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Comments:

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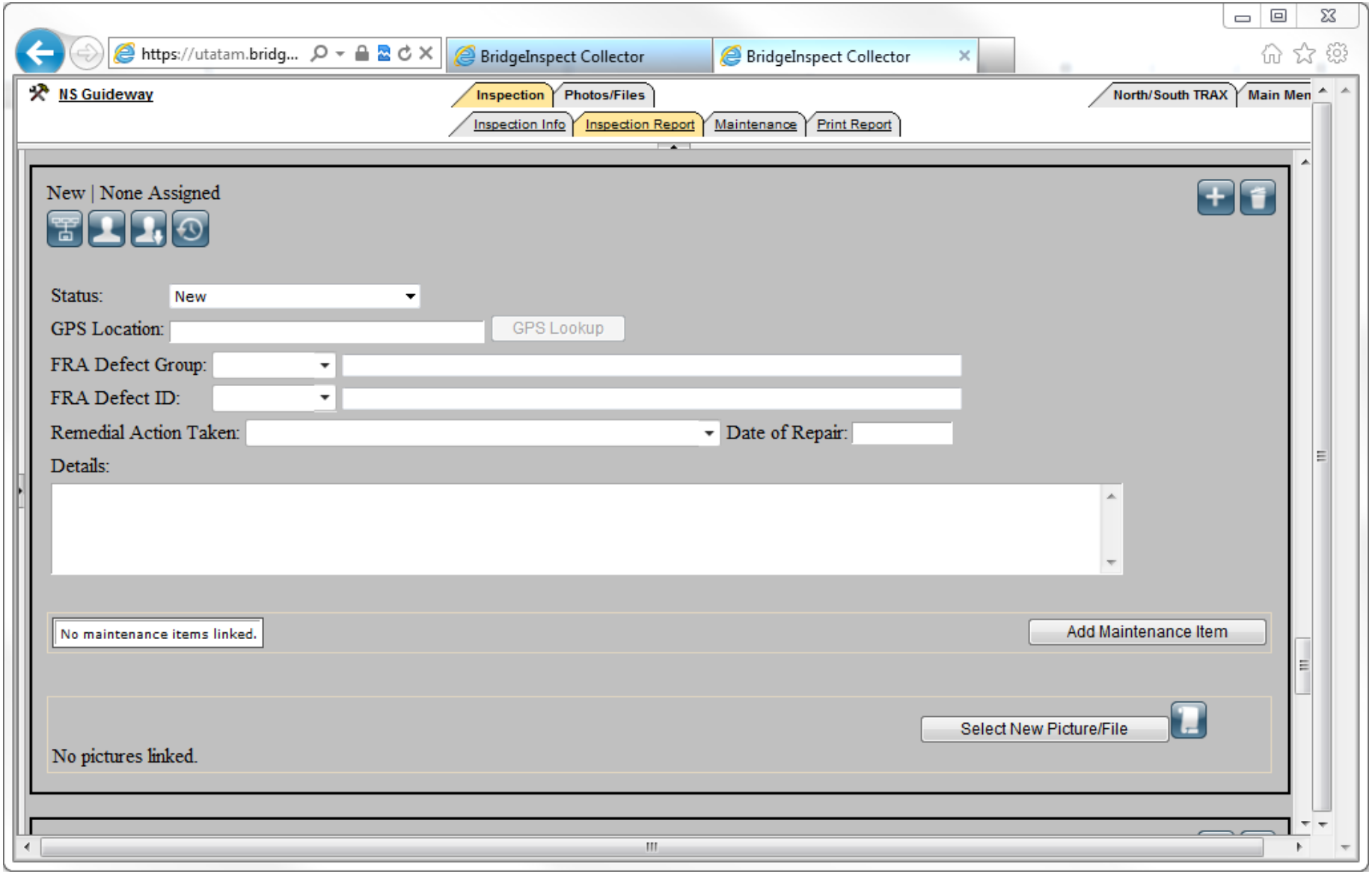
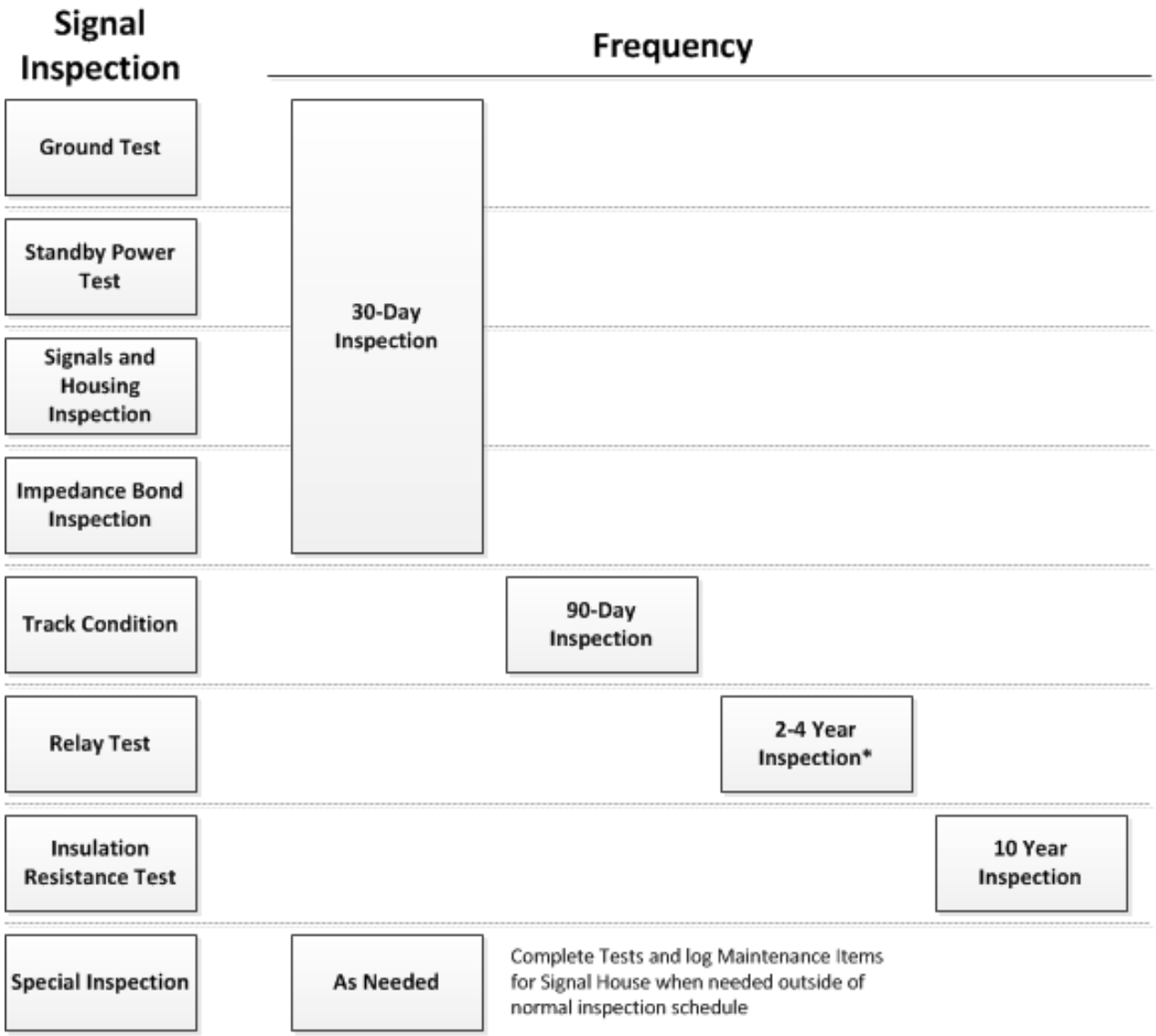
Sign: _____

# Guideway FRA Defect Tracking Form



# Signal House Inspectons




* Each relay, the functioning of which affects the safety of train operations or that affects the proper operation of a crossig warning system shall be tested at least once every four years. Alternating current vane type relays shall be tested once every two years.

# Current Signal House Inspection Form

## SIGNAL INSPECTION

SIGNAL HOUSE # _____

| | MONTHLY | | | | 3 MONTHS | |
|---|---|---|---|---|---|---|
| TEST DATE | GROUND 236.2 | STANDBY POWER | SIGNAL & HOUSINGS | IMPEDANCE BONDS | TRACK CONDITION | SIGNATURE |
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C- Test complete. Equipment in satisfactory condition.
*R- Repairs or replacement needed.
*A- Adjustment made and test complete. Equipment in satisfactory condition.
*N- Does not apply.
* Explain on back of form.

# Current Signal House Inspection Form

Relay Test

FRA 236.106

Railroad: _____ Division: _____

| Date Of Test | Location & MP | Relay Name | Manuf & Type | Coil Ohms | No. of Contacts | Serial Number | Drop Away | Pick Up | Working | Condition Left * |
|---|---|---|---|---|---|---|---|---|---|---|
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* C= test complete equipment in satisfactory condition
R= repair or replacement required

A = adjustment made & test complete equipment in satisfactory condition
S= repair or replacement complete equipment in satisfactory condition

Explain A, R, S on back

Instrument Used: _____ Calibration Due Date: _____

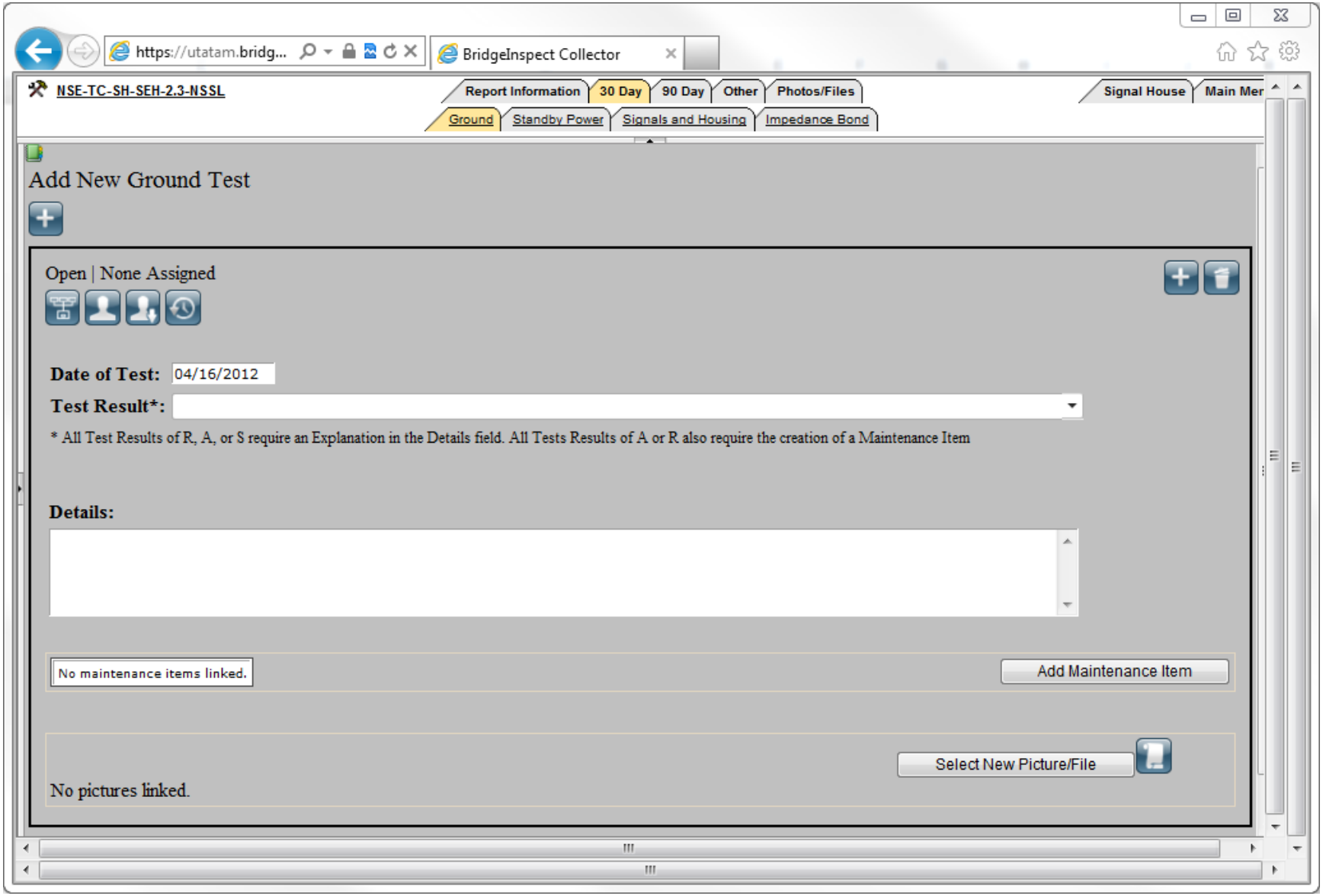
Performed By: _____ Date: _____

UTA 005
02/07/07

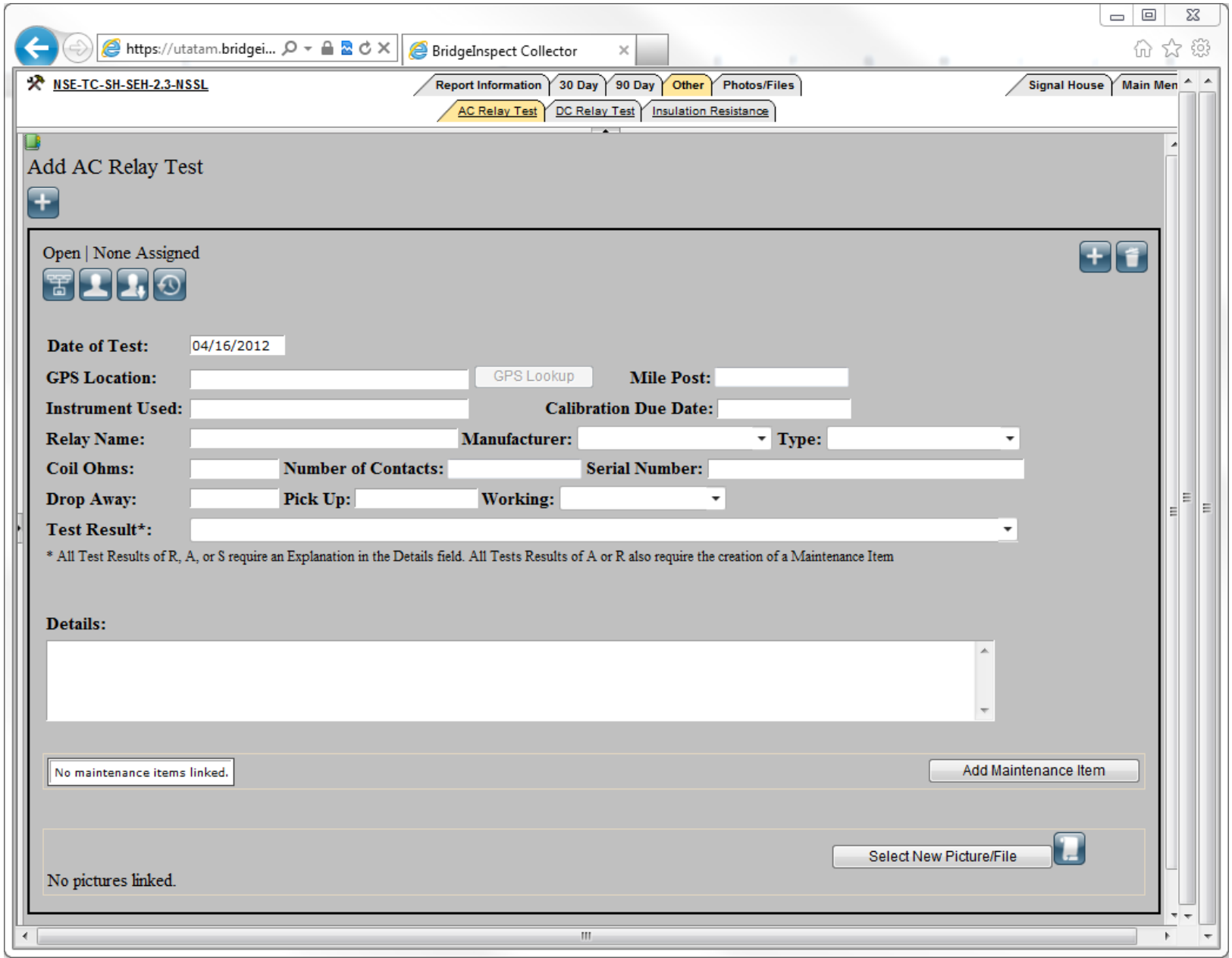


Revised 06/18/09

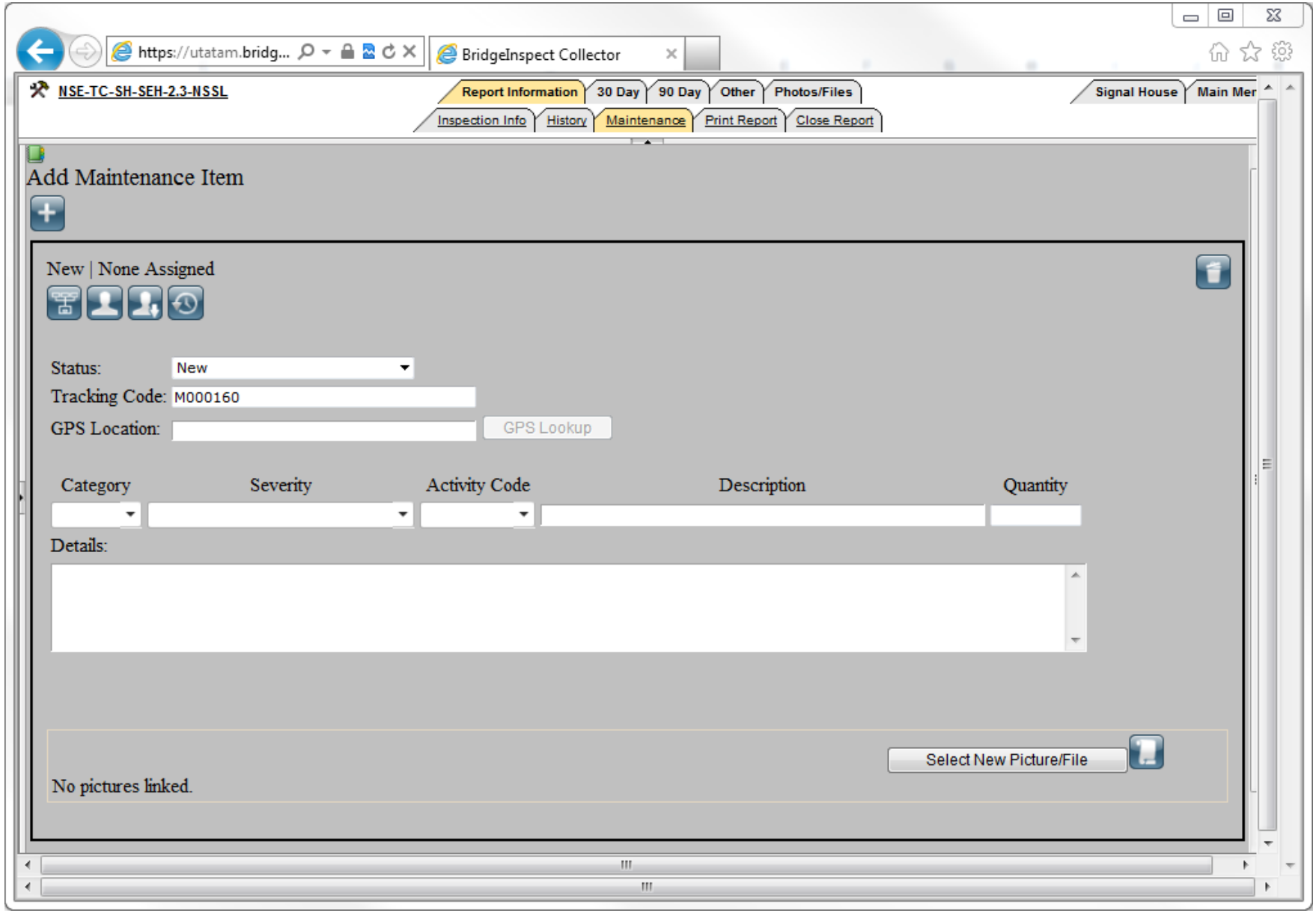
# Signal House Test Tracking Form



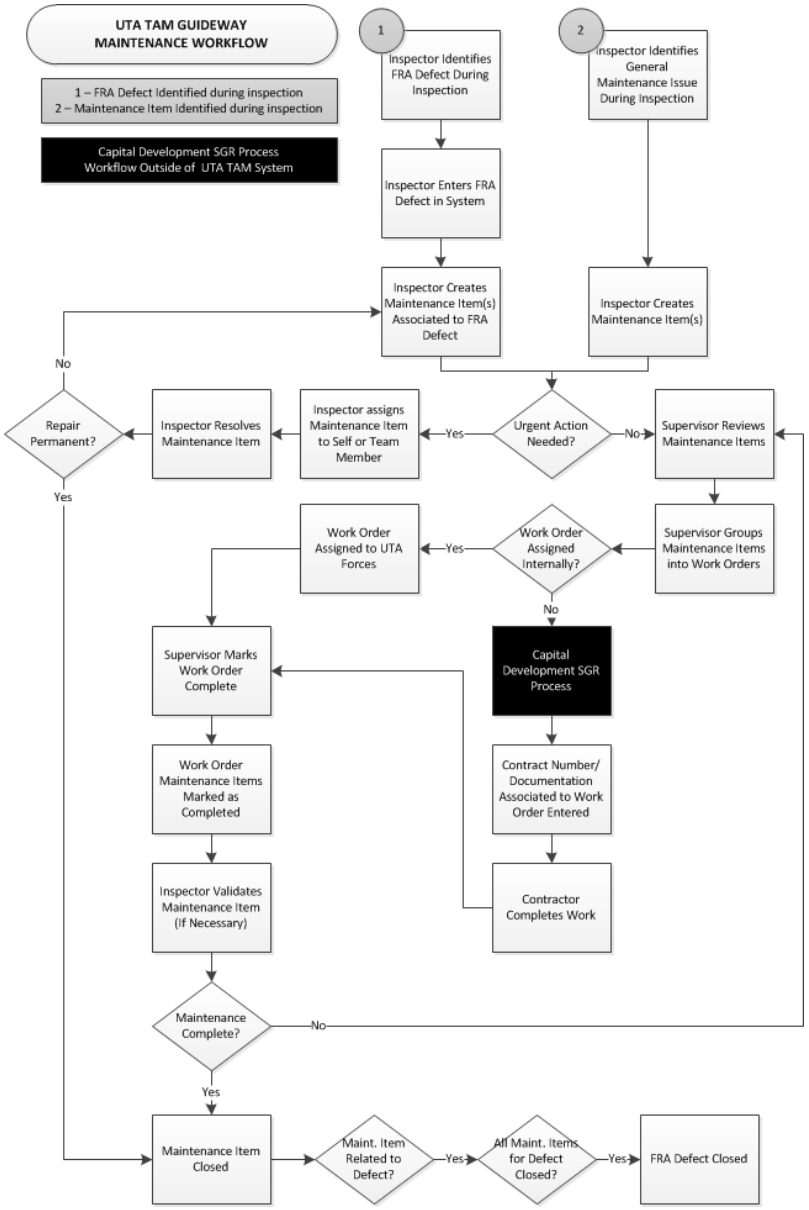
# Signal House AC Relay Test Form



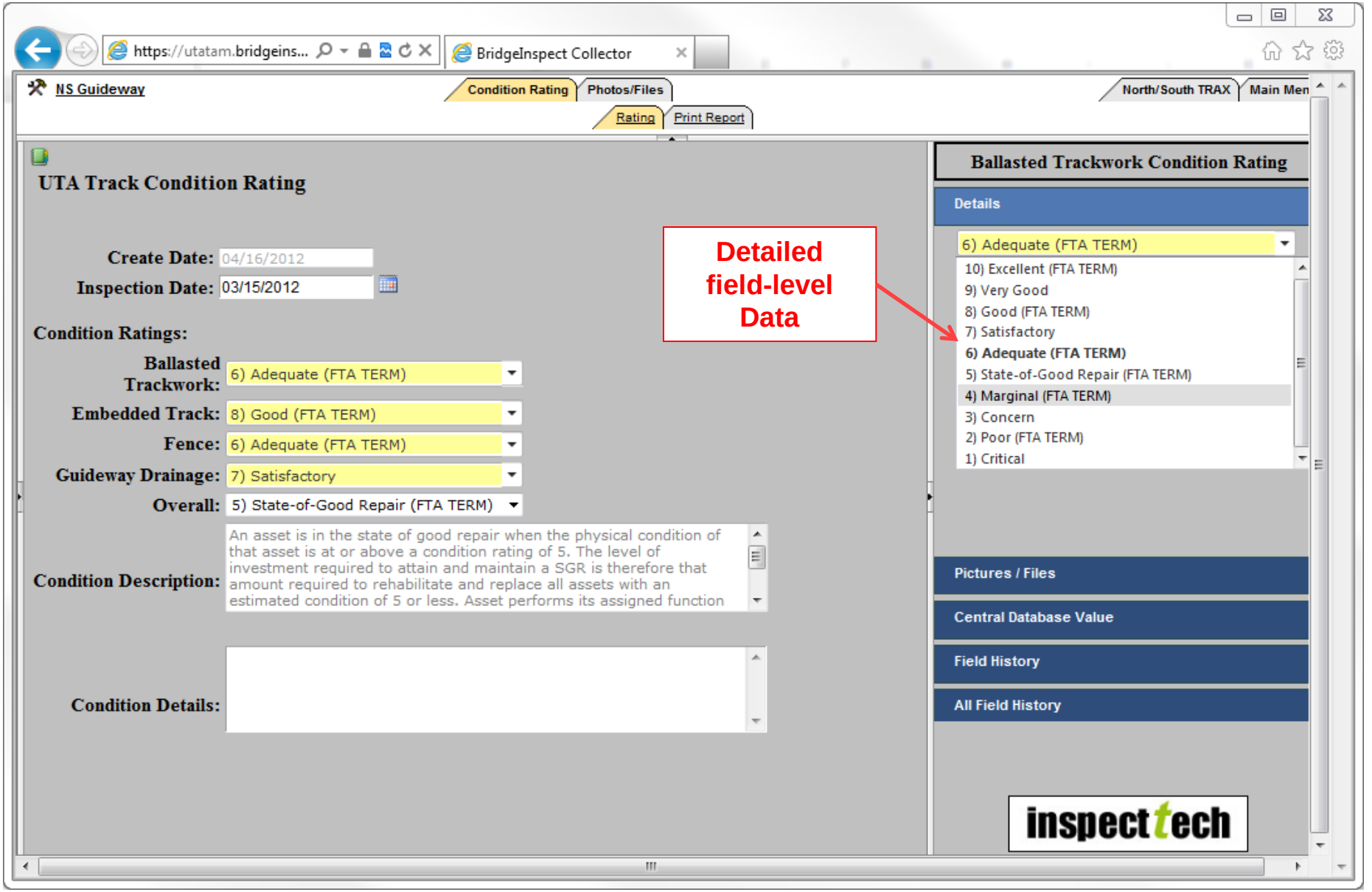
# Signal House Maintenance Form



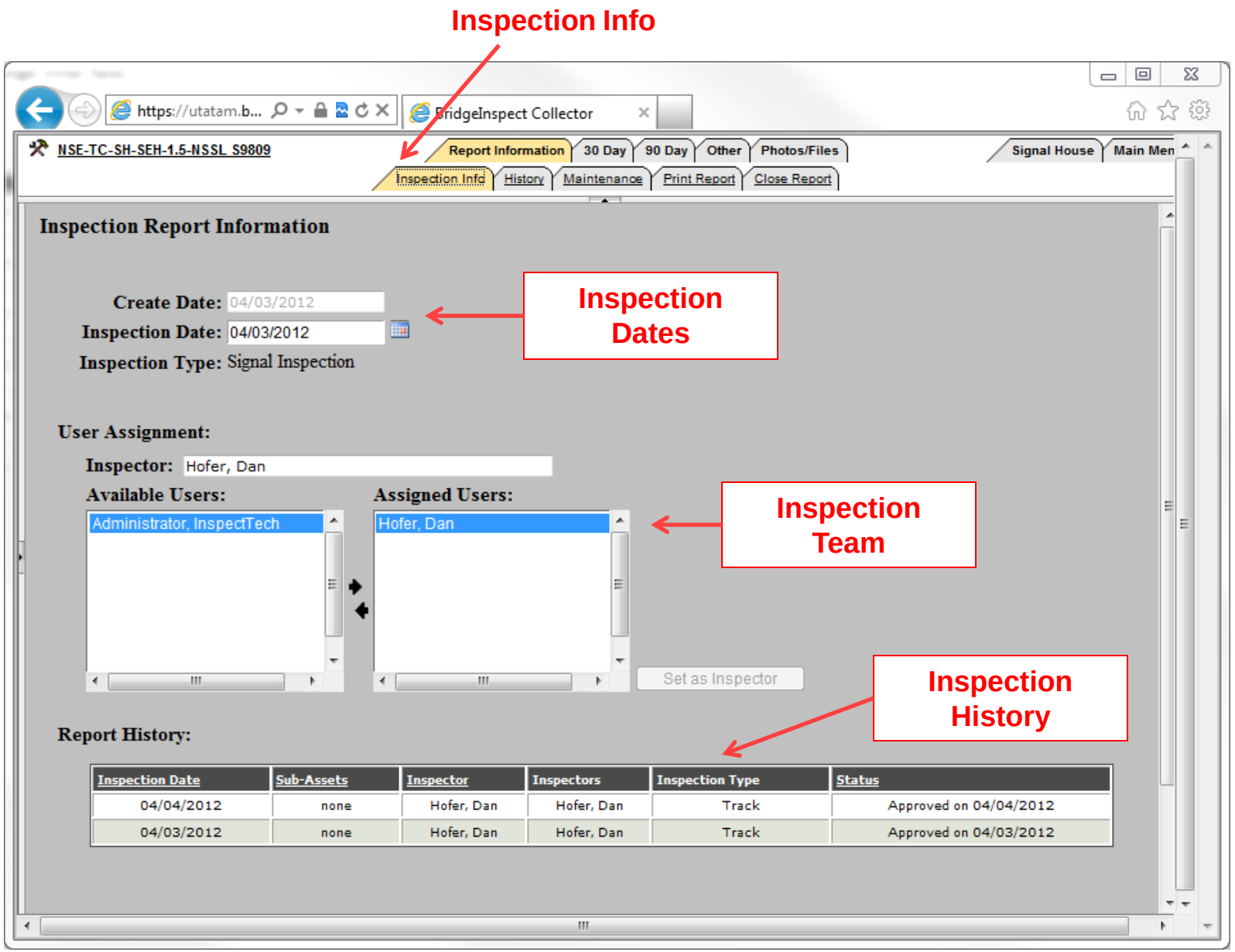
# Maintenance Workflow



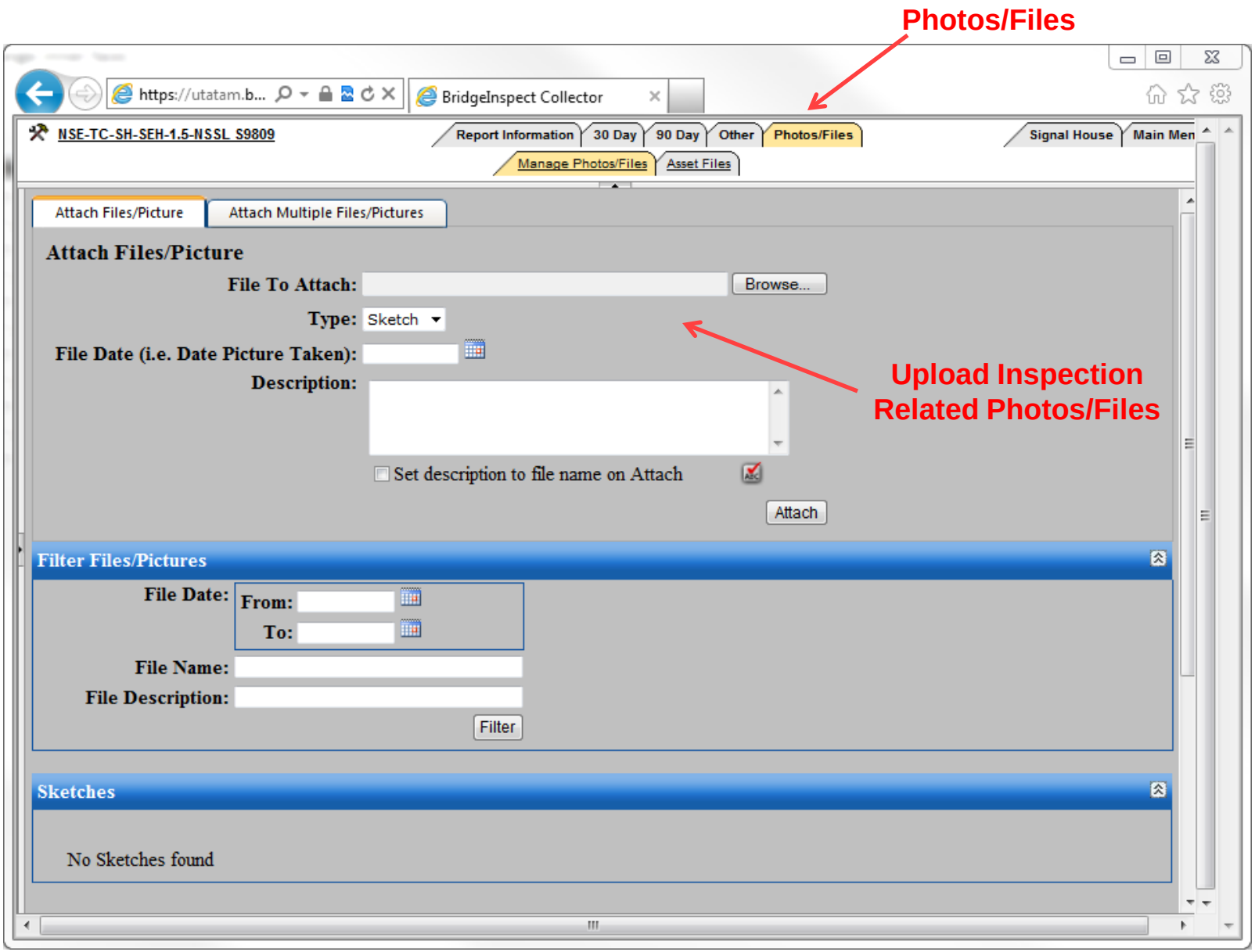
# Condition Rating Form



# Inspection Input Forms

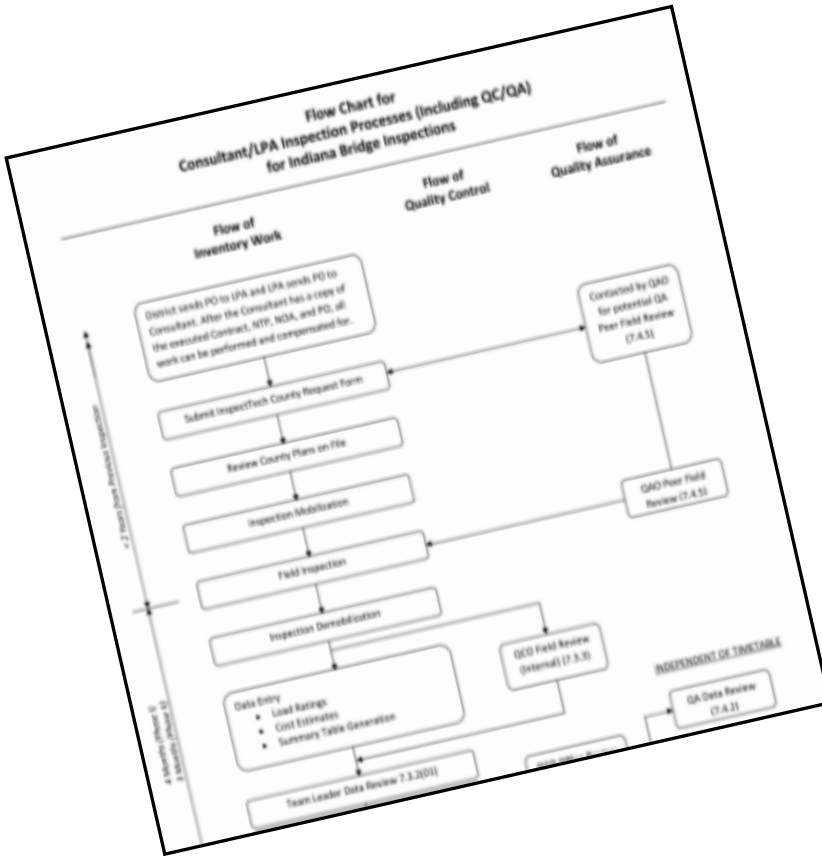


# Photos/Files Upload

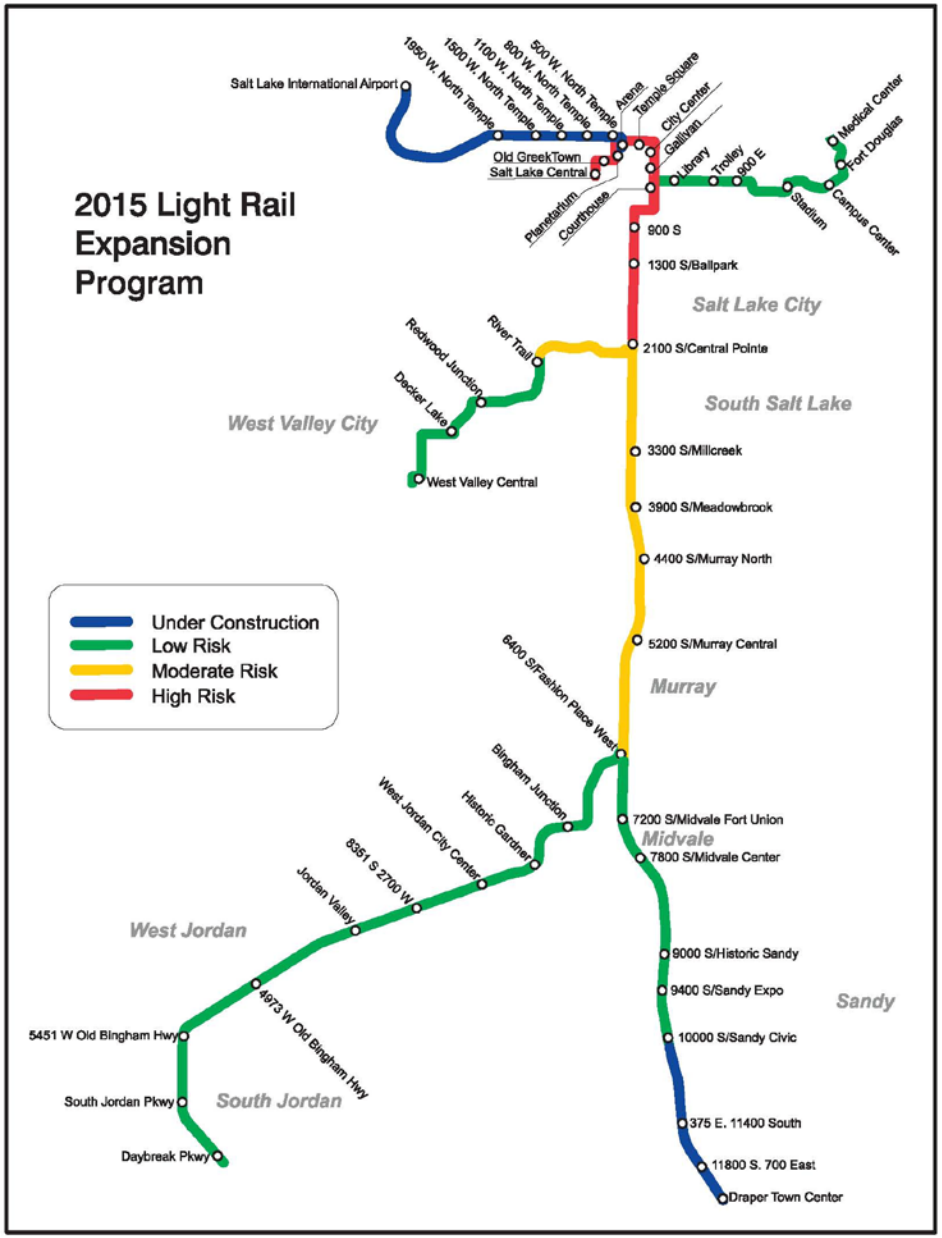


# Report Review/Approval

- Reports have full lifecycle and accountability
- Tabs clearly show status of reports
- Clearly documented who did the inspection
- What changes were made
- Who reviewed and when
- Ability to set approval chain based on asset
- Information not entered into official database until it is approved
- Auto-flag certain assets for review

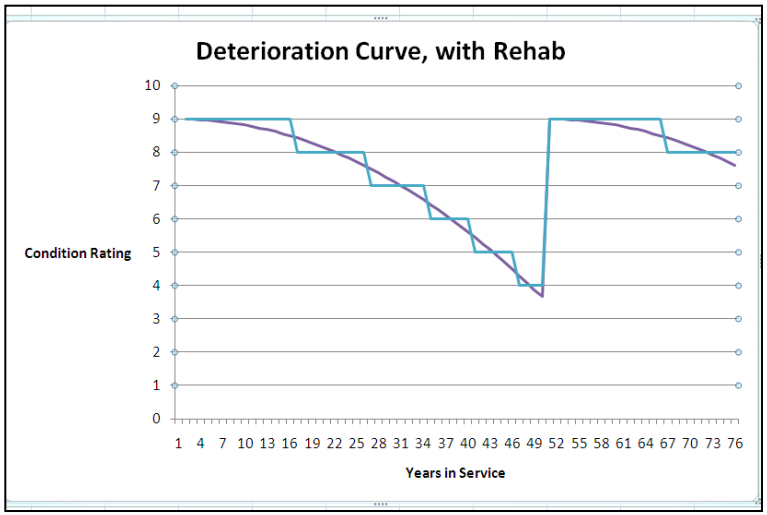


# Risk Management – Location Risk Areas



# Deterioration Model – Actual vs. Expected

- Utilize manufacturer estimates for expected life/mean time to failure
- Compare expected condition to observed condition
- Adjust actual curves to expected curves
- Allow for usage to be integrated and specific asset properties to be integrated to obtain more accurate results
- Different curves for different assets



# Budget/Reporting Features

## Customized Reports, Dashboards and Query's

**Report Query**

Copy Query | Clear Query | Run Query

- Enter Query Criteria
- Additional Filters
- Select Display Columns
- Save Query
- Load Existing Query

Add Criteria Field to Displayed Columns

Return results that match All of the following:

Click to add a new criteria

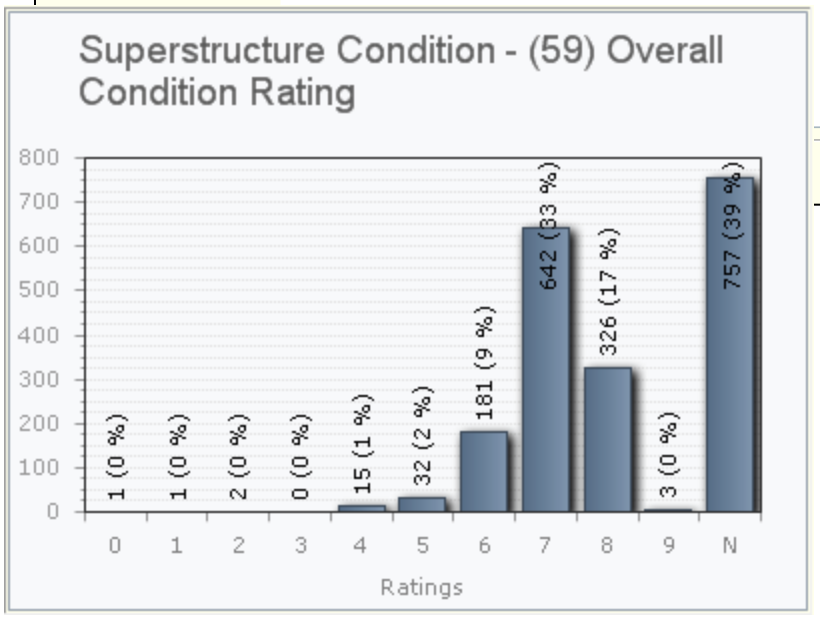
**System Reports**

Parent Asset: All Assets

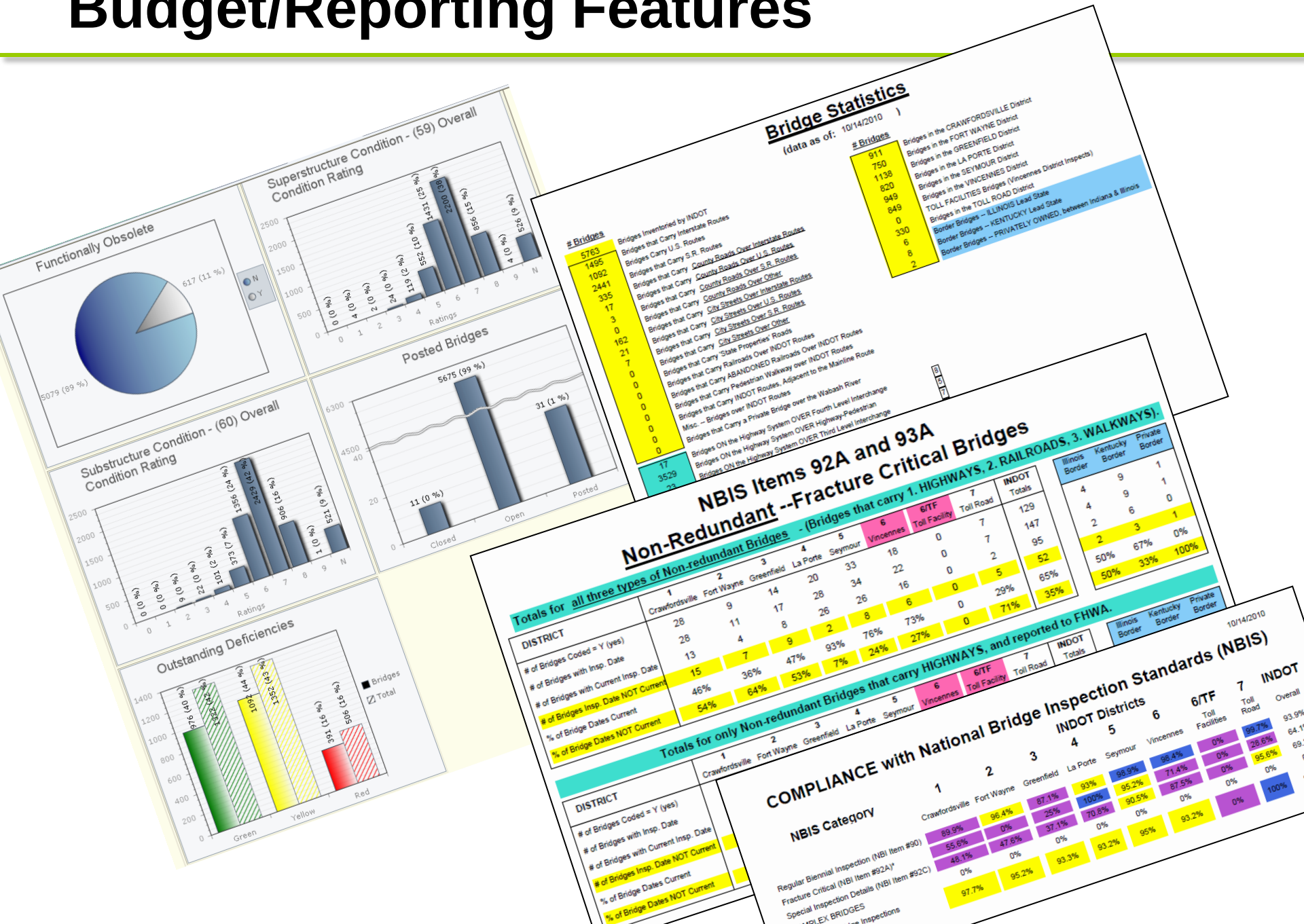
Output Type: PDF

Report:

| Report | Description | |
|---|---|---|
| Next Scheduled Inspection - All Reports | Lists the next scheduled inspection (Routine or any Critical Feature) | run report |
| Next Scheduled Inspection - Routine | Lists the next scheduled inspection (Routine only) | run report |
| Next Scheduled Inspection - Fracture Critical | Lists the next scheduled inspection (Fracture Critical only) | run report |
| Next Scheduled Inspection - Underwater | Lists the next scheduled inspection (Underwater only) | run report |
| Next Scheduled Inspection - Other Special | Lists the next scheduled inspection (Other Special only) | run report |
| Next Scheduled Inspection - Access Required | Lists the next scheduled inspection (Access Required only) | run report |
| Next 3 Months - All | Shows all Inspections due in the next 3 months | run report |
| Next 3 Months - Routine | Shows all Routine Inspections due in the next 3 months | run report |
| Next 3 Months - Fracture Critical | Shows all Fracture Critical Inspections due in the next 3 months | run report |
| Next 3 Months - Underwater | Shows all Underwater Inspections due in the next 3 months | run report |
| Next 3 Months - Other/Special | Shows all Other/Special Inspections due in the next 3 months | run report |



# Budget/Reporting Features



# Goals of the New TAM Software

- Better identify cost-effective approaches for asset repair and replacement
- Prevent poor conditions through proactive management and well-timed system investments
- Utilize criteria such as risk to provide better performance for all stakeholders
- Enhance and promote a State of Good Repair wherever possible

# Questions

inspecttech