

Preparing to Meet FTA State of Good Repair Requirements

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Developing a General Program to Support Asset Inventory Management and Provide Decision Support Tools

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Key Requirements of 49 CFR 625

Managing State of Good Repair

1. FTA published Transit Asset Management Final Rule July 26, 2016
2. Effective October 1, 2016 – Full implementation over 2 years
3. Establishes a National Transit Asset Management (TAM) System
4. A Transit Asset Management System is “a strategic and systematic process of operating, maintaining, and improving public transportation capital assets effectively through the life cycle of such assets.”



Implementing a TAM Program

National Transit Asset Management System Elements

1. The definition of state of good repair
2. Performance measures for capital assets
3. Performance targets for improving the condition of capital assets
4. A requirement to develop and carry out a TAM plan
5. Requirement to report condition of assets
6. Analytical processes and decision support tools



Developing an Inventory and Decision Support Program

History of Development (Decision Support Program)

1. Federal Transit Administration (FTA) grant for development
2. December 2011: Proposal to Federal Transit Administration (FTA)
3. February 2012: Project Implementation Plan approved
4. March 2012: Development began
5. August 2013: Development completion



Development Goals

Key Features

1. **Standard formats for data**
2. **Web Based**
3. **Search and ranking**
4. **Log changes to data**
5. **Customizable and expandable**
6. **Security features**



System Features

Core Functions

1. **Asset Inventory Management (all assets)**
2. **Condition Assessment**
3. **Work Order Management**

Examples of asset inventory and assessment for track and bridges follows. Program is expandable to cover any asset category or class....



Asset Inventory-General

Asset Inventory Goals

1. Centralize information
2. Organize documents and media
3. Monitor asset condition
4. Integrate with Google Earth and System Maps



Bridge Inventory

Key Features

1. General information
2. Support documents
3. Asset Rating
4. Photo gallery

The screenshot shows the CTAMS web application interface for the Bridge San Francisco Creek. The page is titled "Bridge San Francisco Creek (Caltrain)" and includes navigation tabs for "Asset Info", "Attachments", "Assessments", "Asset Work Order", "Change Log", and "Capital Project".

Asset Info

Field	Value
Railroad	Caltrain
Asset Type	Bridge
Name	San Francisco Creek
Milepost	29.69
Bridge No.	29.69
Name	San Francisco Creek
No. of Spans	1
Span Length	100 ft
Total Length	104 ft
Bridge Type	TG TT
GoogleEarth	
Latitude	37.44727476
Longitude	-122.17039678
Year Built	1902
Year Reconstructed	

Photo Gallery

The photo gallery shows a main image of the bridge and a grid of smaller images. The main image is labeled "1" and "original".

Asset Rating

Latest Assessment: San Francisco Creek-assessment-2013-08-02.16.11.03
 Template: Bridge Form (manual)
 Status: Pending

Overall Rating: (4)

Rating Legend: 1 - Excellent 2 - Good 3 - Fair 4 - Improvement Needed 5 - Immediate Attention 0 - No data

General (3)

Item	rating	notes
Paint Yr.	(3)	
Action Under Trains	(3)	
Approach Track	(3)	
Track On Bridge	(3)	



Bridge Inventory, continued

General Information

1. Asset Description
2. Type
3. Year Built
4. Location
5. Key Dimensions

CTAMS 0.03 Home Assets Search Admin Quick Search lin | logout

Field	Value
Railroad	Caltrain
Asset Type	Bridge
Name	San Franciquito Creek
Milepost	29.69
Bridge No.	29.69
Name	San Franciquito Creek
No. of Spans	1
Span Length	100 ft
Total Length	104 ft
Bridge Type	TG TT
Year Built	1902
Year Reconstructed	
Latitude	37.44727476
Longitude	-122.17039678
GoogleEarth	

Stations - Equipment - Right of Way

edit more delete

5 - Immediate Attention 0 - No data

Panel Y: Action Under Trains (0) Approach-Track (2) Track On Bridge (2)



Bridge Inventory, continued

Support Documents

1. Asset Information
2. Attachments
3. Assessments
4. Work Orders
5. Change Log
6. Capital Projects

The screenshot shows the CTAMS web application interface. The top navigation bar includes 'Home', 'Assets', 'Search', and 'Admin'. The main content area is titled 'San Francisco Creek' and features a navigation menu with options: 'Asset Info', 'Attachments', 'Assessments', 'Asset Work Order', 'Change Log', and 'Capital Project'. Below the menu, the 'Asset Info' section displays the following details:

No. of Spans	1
Span Length	100 FT
Total Length	104 FT
Bridge Type	TG TT
GoogleEarth	
Latitude	37.44727476
Longitude	-122.17039670
Year Built	1902
Year	
Reconstructed	

To the right of the asset information, there is a gallery of images, with the first image labeled '1' and 'original'. Below the gallery, the 'Latest Assessment' section shows: 'San Francisco Creek-assessment-2013-08-02.16.11.03', 'Template: Bridge Form (manual)', and 'Status: Pending'. The 'Overall Rating' is (4). A 'Rating Legend' is provided: 1 - Excellent (blue), 2 - Good (green), 3 - Fair (yellow), 4 - Improvement Needed (orange), 5 - Immediate Attention (red), 0 - No data (grey). The 'General' section shows a rating of (3) and a table of assessment items:

Category	rating	notes
PAVE Yr.	(3)	
Action Under Trains	(3)	
Approach-Track	(3)	
Track On Bridge	(3)	



Bridge Inventory, continued

Photo Gallery

1. General views
2. Detail views
3. Adjacent views
4. Slide show

The screenshot displays the CTAMS (California Transit Asset Management System) interface. The top navigation bar includes 'Home', 'Assets', 'Search', and 'Admin'. The main content area shows a detailed view for a bridge asset named 'san-franciquito-1'. On the left, there is an 'Asset Info' table with the following data:

Field	Val
Railroad	CalP
Asset Type	Brld
Name	San
Milepost	29.4
Bridge No.	29.4
Name	San
No. of Spans	1
Span Length	100
Total Length	104
Bridge Type	TC
GoogleEarth	
Latitude	37.4
Longitude	-122
Year Built	190
Year Reconstructed	

Below the table, there are sections for 'Latest Assessment' (SI Template, SI Status, PI) and 'Overall Rating' (4). A 'General' section shows 3 items: 'Paint Yr.', 'Action Under Trains', and 'Approach/Track/Track On Bridge'. The main area features a 'slideshow' of photos, with the first photo showing a perspective view of the bridge tracks. To the right of the main photo is a grid of smaller thumbnail images. The interface also includes a 'Right of Way' section and a 'delete' button.



Bridge Inventory, concluded

Overall Rating

1. Structure rating
2. Paint
3. Approach ratings
4. Sub-Asset ratings
5. Stream conditions

CTAMS 0.03 Home Assets Search Admin Quick Search lin | logout

Communication Crossing Signals Stations Structures Track Train Stations Equipment Right of Way

Home > Structures > Bridges > San Francisco Creek

Bridge San Francisco Creek (Caltrain) edit more delete

Overall Rating: (5) ●

Rating Legend: 1 - Excellent ●

General (5) ●	rating	notes
Paint Yr.	(1) ●	
Clearance Signs	(1) ●	
Highway Minimum Clearance	(5) ●	
Insignia	(1) ●	
Load Limit Sign	(1) ●	
Fire Protection	(5) ●	
Action Under Trains	(5) ●	
Approach-Track	(1) ●	
Track On Bridge	(1) ●	
Painting on the side	(1) ●	

Stream Conditions (2) ●	rating	notes
Paving (through bridges)	(1) ●	
Sheet Piling	(1) ●	
Scour (Top of Rail to Streambed)	(2) ●	
Rip Rap	(2) ●	
Fender System	(2) ●	

Approach-Track (2) ●
Track on bridge (2) ●

4 - Improvement Needed 5 - Immediate Attention 0 - No data



Condition Assessment Overview

Key Features

1. Automated evaluation where possible
2. Electronic inspection forms for all assets
3. Online review and approval of inspections



Bridge Assessment

Bridge Module Data

1. Text and graphic data
2. Data entry via electronic tablet with forms
3. Online review and approval of inspections

The screenshot displays the RAMS v1.40 web application interface. The top navigation bar includes 'Home', 'Assets', 'Tool', 'Admin', and a 'Quick Search' field. The user is logged in as 'admin'. The main content area is divided into several sections:

- Bridge Info:** A table of details for BENT NUMBER: 2, including Alignment (Tangent), Painted (No Entry), Bridge No. (6.756), Clearance Measured, Clearance Posted, Span Length (41'), Cap Size, Observed Under Traffic (Road), Crossing (Atlantic Blvd), Guard Timber Size, and Deck Hardware (Concrete).
- Bridge Diagram:** A section containing a 'Sketch' of a bridge structure.
- Photos:** Two columns of photo thumbnails, each labeled 'photos' and containing six small images (1-6).
- Comment:** A section with a text input field containing 'a-span hit by a high load' and several empty comment rows.



Bridge Assessment, continued

Bridge Rating

1. Broken into Sub-Assets and components
2. Rating of 1 to 6 (based on FRA recommendation)
3. Lowest Rating of component is rating for bridge

The screenshot displays the RAMS v1.40 software interface. The top navigation bar includes 'Home', 'Assets', 'Tool', 'Admin', and a 'Quick Search' field. The main content area is a table with the following structure:

Overall Rating	Priority	Low	photos +					
Environment								
E01 Scour	1	2	3	4	5	6	n/a	
E02 Channel	1	2	3	4	5	6	n/a	
E03 Approach	1	2	3	4	5	6	n/a	
Deck (6)								
D01 Ties	1	2	3	4	5	6	n/a	
D02 Rail	1	2	3	4	5	6	n/a	
D03 Ballast	1	2	3	4	5	6	n/a	
D04 Footwalk	1	2	3	4	5	6	n/a	
D05 Handrail	1	2	3	4	5	6	n/a	
D06 Guard Rail	1	2	3	4	5	6	n/a	
D07 Ballast Retainer	1	2	3	4	5	6	n/a	
D08 Waterproof Membrane	1	2	3	4	5	6	n/a	
D09 Deck Drain	1	2	3	4	5	6	n/a	
Girders (5)								
S01 Girders	1	2	3	4	5	6	n/a	
S02 Bearing Pads	1	2	3	4	5	6	n/a	
S03	1	2	3	4	5	6	n/a	
S04	1	2	3	4	5	6	n/a	
S05	1	2	3	4	5	6	n/a	
S06	1	2	3	4	5	6	n/a	

Additional notes in the Girders section: span#2 right side hit by high load in 2 spots midspan.



Bridge Assessment, concluded

Bridge Roll-up

1. Ratings roll up to overview page
2. Sort or filter by all columns
3. Links back to all data

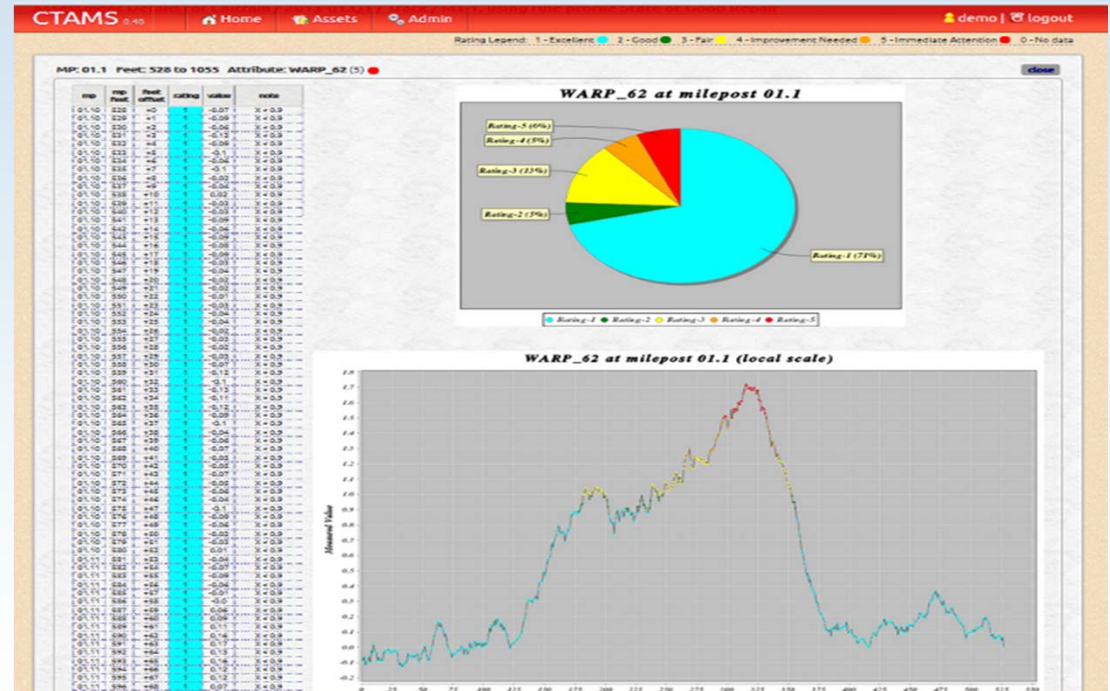
#	Bridge No	Bridge Name	Bridge Type	Year Built	Inspection Status	Last Inspection	Next Inspection	Work Priority	Work Completion	OV Rating	LO Rating
1	4.590	I-10W To Campus	Poured in Place Concrete	1973	Approved	05/14/2016	05/14/2017			6	6
2	4.820	710 SB to 10 WB Ramp	POURED IN PLACE CONCRETE	1973	Approved	05/14/2016	05/14/2017			6	6
3	4.841	I 710 N & S	Poured in place concrete	1972	Approved	05/14/2016	05/14/2017			6	6
4	4.991	I-10	Poured in Place Concrete	1973	Approved	05/14/2016	05/14/2017			6	6
5	5.775	South Fremont Avenue	Prestressed Concrete	1973	Completed	05/05/2017	05/14/2017			6	6
6	6.756	Atlantic Blvd	Prestressed Concrete	1973	Completed	05/05/2017	05/14/2017			6	5
7	7.081	Sixth Street	Prestressed Concrete	1973	Approved	05/14/2016	05/14/2017			6	6
8	7.415	Garfield Avenue	Prestressed Concrete	1973	Approved	05/02/2017	05/14/2017			6	5
9	8.260	New Ave Up	Prestressed Concrete	1973	Approved	05/02/2017	05/14/2017			6	5
10	8.757	Del Mar Up	Prestressed Concrete	1973	Approved	05/02/2017	05/14/2017			6	5
11	8.923	Alhambra Wash	Prestressed Concrete	1973	Approved	05/02/2017	06/23/2017			6	5
12	9.267	San Gabriel Blvd	Prestressed Concrete	1973	Approved	04/28/2017	06/23/2017			6	6
13	9.770	Walnut Grove	Prestressed Concrete	1973	Approved	04/28/2017	06/23/2017			6	6
14	10.145	Rubio Wash	Prestressed Concrete	1973	Approved	04/28/2017	06/23/2017			6	6
15	10.269	Rosemead Blvd	Prestressed Concrete	1973	Approved	04/28/2017	06/23/2017			6	6
16	11.261	Eaton Wash	Prestressed Concrete	1973	Approved	04/27/2017	06/23/2017			6	6
17	11.393	Baldwin Ave	Prestressed Concrete	1973	Approved	04/27/2017	06/23/2017			6	6
18	11.674	West Bound Bus Way	Thru Plate Girder	1956	Approved	04/21/2017	05/14/2017			5	5
19	11.774	Rio Hondo River	Prestressed Concrete (Beams)	1973	Approved	04/18/2017	05/14/2017			6	5
20	13.020	Ramona Blvd.	Prestressed Concrete	2007	Approved	04/06/2017	06/11/2017			6	4
21	13.297	Peck Rd.	I Beam / Concrete Deck	1992	Approved	04/12/2017	06/11/2017			6	6
22	14.094	Garvey Ave I-710 NS	Thru Plate Girder	1992	Approved	04/11/2017	06/11/2017	B		6	5
23	14.164	San Gabriel River	Post Stressed Concrete	1992	Approved	04/17/2017	06/11/2017	B		6	4
24	16.738	Walnut Creek (L.A.C.F.C.)	Deck Plate Girder (Open Deck)	1957	Approved	04/10/2017	06/29/2017	B		4	4
25	19.794	Big Dalton Wash	Thru Plate Girder	1959	Approved	04/10/2017	06/29/2017	B		5	5



Track Assessment

Geometry Channels

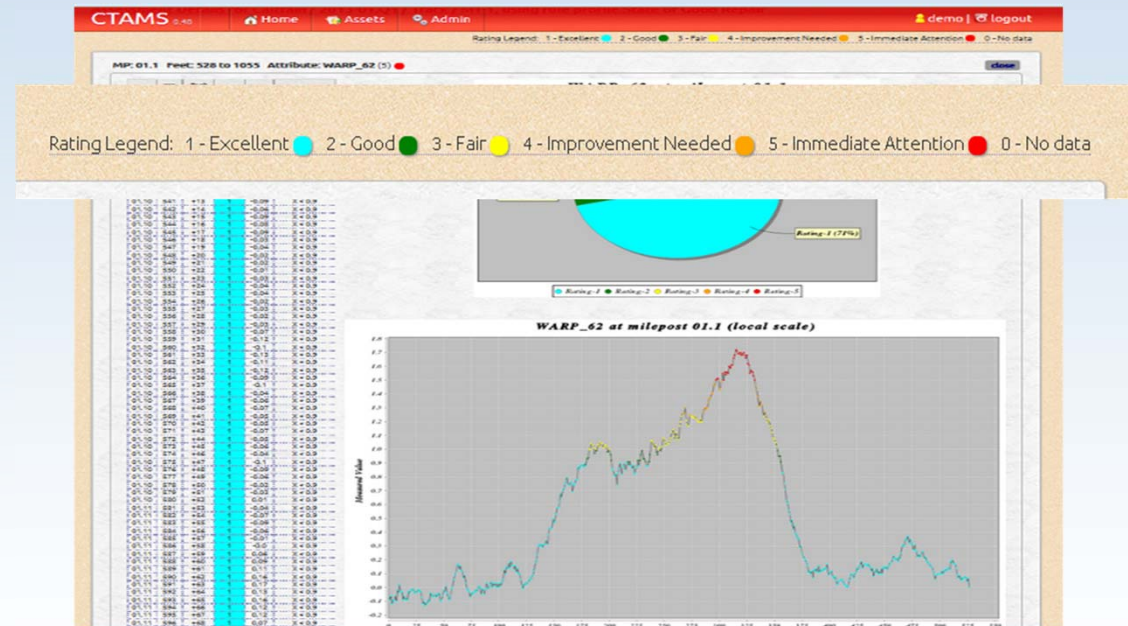
1. Segmented by 1/10 m
2. Detailed data by foot of track
3. Breakdown of rating by foot over 1/10 mile
4. Graph by 1/10 mile
5. Five point rating scale



Track Assessment, continued

Rating Legend

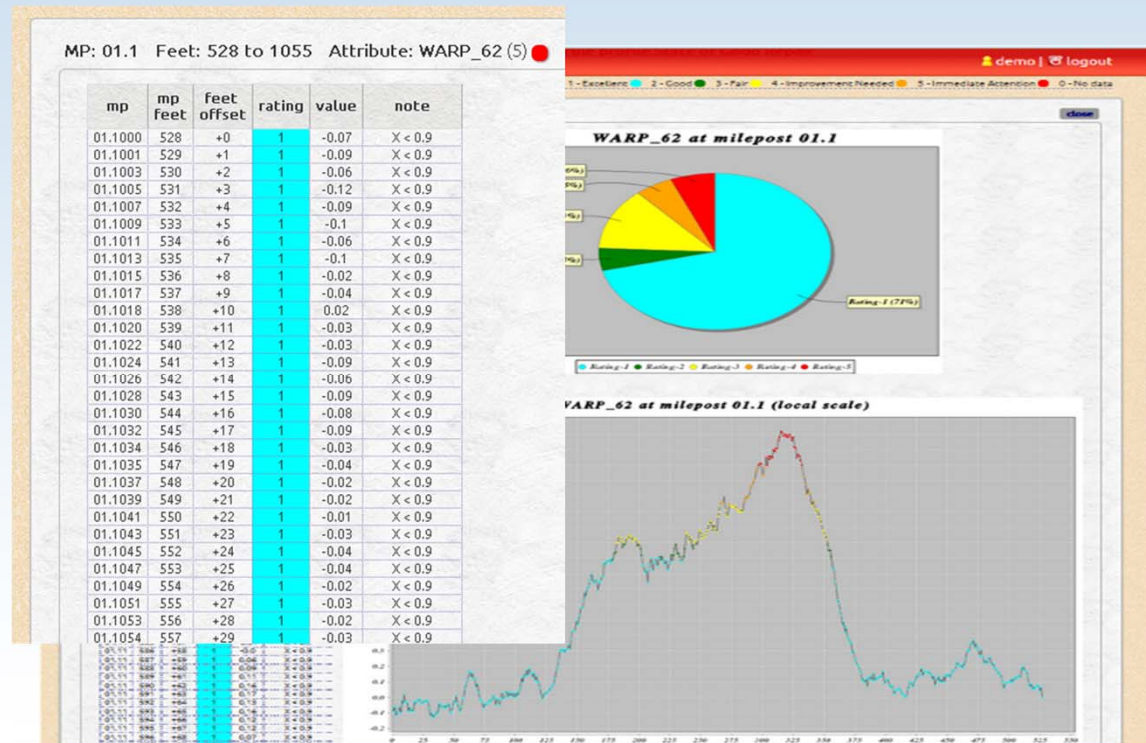
1. Excellent
2. Good
3. Fair
4. Improvement needed
5. Immediate attention
6. No data



Track Assessment, continued

Tabular Data

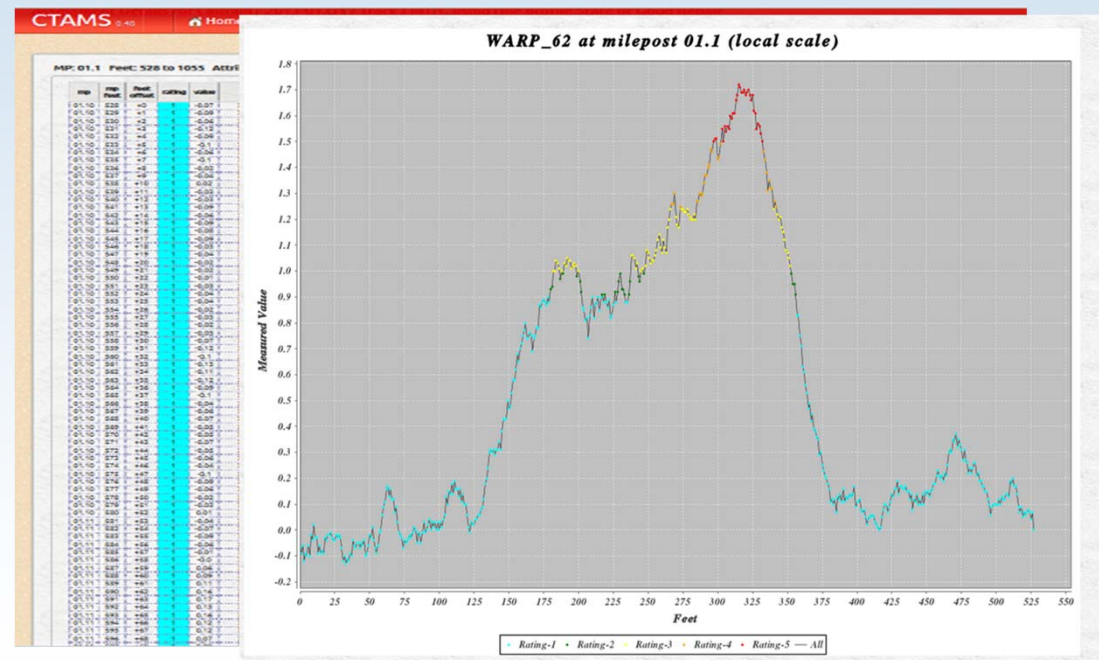
1. Channel
2. Milepost
3. Chainage
4. MP + feet
5. Rating
6. Measured value



Track Assessment, continued

Graph of Segment

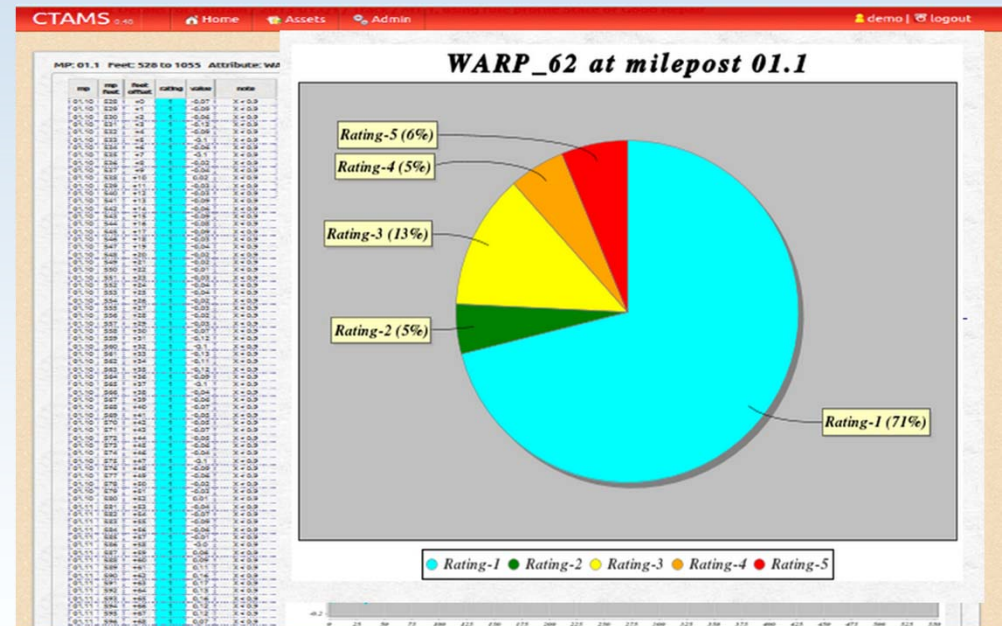
1. Graph detail by channel
2. Measured Value by foot over 1/10 mile segment
3. Rating based on measurement



Track Assessment, continued

Distribution within Segment

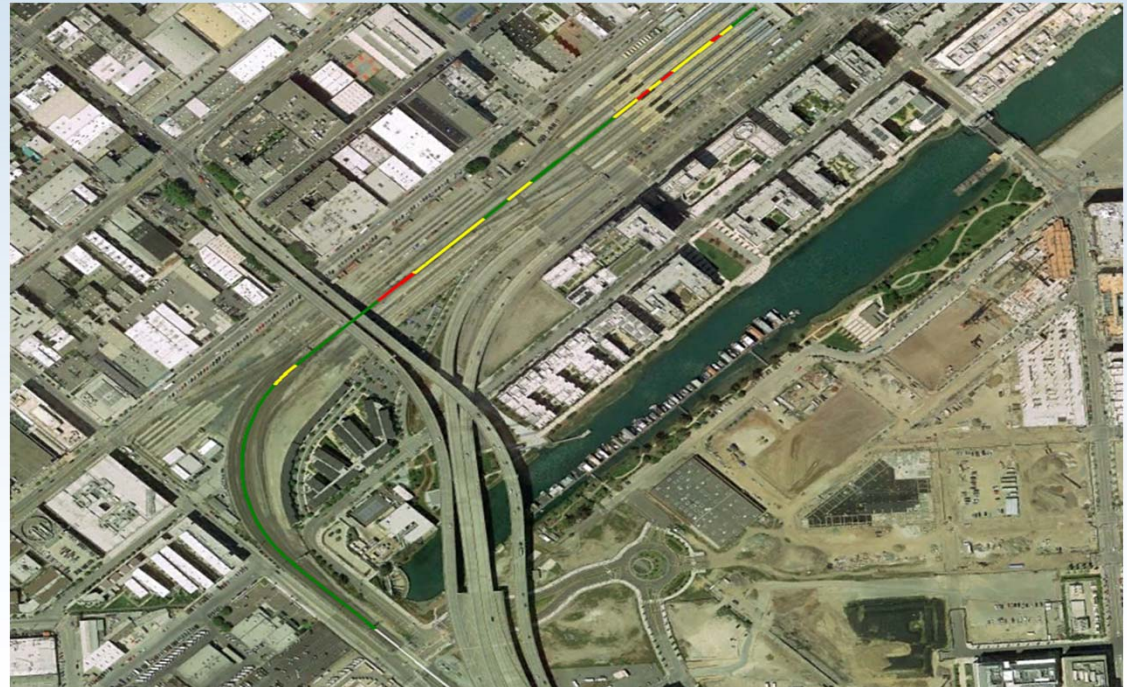
1. Smoothing function to eliminate outliers
2. Worst rating is rating for segment
3. Guide for spot maintenance or consideration for program



Track Assessment, concluded

Location

1. Google Earth
2. Rating by segment
3. Rapid assessment potential work areas



Work Order Management

Key Features

1. Create Work Orders
2. Track Progress
3. Review Work History



Work Orders, continued

Work Order Details

1. Defect description
2. Description of work
3. Work order status

The screenshot displays the CTAMS interface for a specific work order. The breadcrumb trail is: Home » Structures » Bridges » 22nd street » Work Order » Work Order Detail. The work order title is 'Work Order Bridge-22nd street-2013-10-23.1 of type Bridge Repairs'. A table lists the following details:

Work Order Id	Bridge-22nd street-2013-10-23.1
Work Order Number	123
Work Order Type	Bridge Repairs
Status	In-Process
Priority	Medium
Track	Both
Assessment	22nd street-assessment-2013-10-23.13.24.21
Asset	Bridge, 22nd street, Caltrain
Created By	admin
Created Date	Wed 10 23 2013 01:49PM
Last Updated	Wed 10 23 2013 01:50PM

Below the table are three text areas:

- Problem Description:** Need new paint.
- Work Description:** Out source to outside vendors.
- Note:** Don't put on blue paint.

At the bottom, an 'Attachments' table shows one attachment:

Attachment	Type	Size	Modified Time
CTAM_security	doc	112.5 KB	Wed Oct 23 2013 01:50pm



Work Orders, concluded

Work Order Status

1. Asset Description
2. Work Order ID
3. Work Order Type
4. Latest Assessment
5. Date Created
6. Last update

The screenshot shows the CTAMS web application interface. The top navigation bar includes 'Home', 'Assets', 'Search', and 'Admin'. The main content area displays the following work order details:

Work Order Id	Bridge-San Franciquito Creek-2013-12-05
Work Order Number	12345
Work Order Type	Bridge Repairs
Status	New
Priority	High
Track	Both
Assessment	San Franciquito Creek-assessment-2013-12-03.21.31.37
Asset	Bridge, San Franciquito Creek, Caltrain
Created By	lin
Created Date	Thu 12 05 2013 07:14AM
Last Updated	Thu 12 05 2013 07:14AM

Below the details, there is an 'Attachments' section with the following table:

Attachment	Type	Size	Modified Time
CTAM_security	doc	112.5 KB	Wed Oct 23 2013 01:50pm



Development Process

Iterative Development Process

1. Discuss requirements with end users
2. Define features and functions
3. Preliminary design
4. Preliminary development
5. Review and test
6. Refine



General Approach

Write Specifications

1. Review existing assessment process and data records
2. Define requirements
3. Evaluate technology available for measurement and assessment
4. Review applications

Implementation

1. Build on expandable framework
2. Implement specific features
3. Test and launch application
4. Migrate data



Implementation

Considerations

1. **Data migration format and transfer requirements**
2. **Training for transition from manual or other systems**
3. **Multiple data streams**
4. **Expansion of modules**
5. **Addition of features**
6. **System maintenance and improvement**



Lessons Learned

What worked

1. Supervisors and engineers work closely with developer
2. Small, diverse, and stable core project team
3. Iterative development approach
4. Weekly working sessions with specific deliverables
5. Open to new ideas



Lessons Learned, concluded

What could be better...

1. Less aggressive schedule coupled with phased development
2. Involvement of other departments for wider application
3. User interface design



Future Development

Key Features

1. Cost tracking
2. Automated trending and forecasting
3. Life cycle analysis
4. Defect alerts
5. Module Expansion



Questions?



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