

Transportation Asset Management Webinar Series

Webinar 1: Asset Management and Safety

Sponsored by FHWA and AASHTO

Webinar 1 — December 5, 2012

FHWA-AASHTO Asset Management Webinar Series

- Sharing of knowledge is a critical component of advancing asset management practice
- This is the first of a 12 part webinar series that will be held over the next two years
- Webinars will be held every two months with topics such as AM and performance, risk-based AM, GIS application in AM, etc.
- Welcome ideas for future webinar topics and presentations

Why is AM and Safety Important?

- Which assets are most critical to maintaining safety?
- Which assets, if they fail, will result in severe safety related consequences?
- What level of degradation or deterioration becomes unacceptable, as opposed to undesirable?
- Which assets give the greatest return on investment for safety?

from AM-Safety Peer Exchange Cheyenne, WY 2011

Why is AM and Safety Important?

- Safety is the #1 priority of every state DOT
- Properly functioning safety related assets are critical to maintaining and lowering crash rates
- Using the approach contained in the “AASHTO Transportation Asset Management Guide,” a strategic approach to managing safety-related assets can ensure maximum return on investment in meeting safety goals

from AM-Safety Peer Exchange Cheyenne, WY 2011

AM and Safety Webinar Purpose

- Share how to structure policies and incentives to reflect best practices in asset management and safety.
- Present approaches to better incorporate asset management objectives into a safety programs.
- Share lessons learned and best practices in managing safety assets.
- **SHARE LESSONS LEARNED, IDEAS, KNOWLEDGE!!!**

Webinar Agenda

- 2:00 Webinar introduction and overview**
Matt Hardy, AASHTO, Steve Gaj, FHWA, and Hyun-A Park, Spy Pond Partners, LLC
- 2:20 Oregon DOT Asset Management Efforts: Building Capacity and Opportunities, Steps Toward a Vision**
Steve Lindland and Laura Wipper (Oregon DOT)
- 2:35 Utah DOT's Asset Management and Safety Initiatives**
Stan Burns and Robert Hull (Utah DOT)
- 2:50 DOT Sign Inventory & Retroreflectivity Program**
Scott Zainhofsky (North Dakota DOT)
- 3:05 Tying Crash Types to Asset Priorities**
Martin Kidner (Wyoming DOT)
- 3:20 Q&A and wrap up**



ODOT Asset Management Efforts

Building Capacity and Opportunities
Steps Toward a Vision

Steven Lindland, Roadway Engineering Manager
Laura Wipper, Asset Management Integration Manager



Search for Best Practices

What we did:

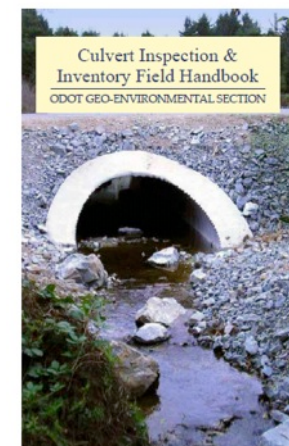
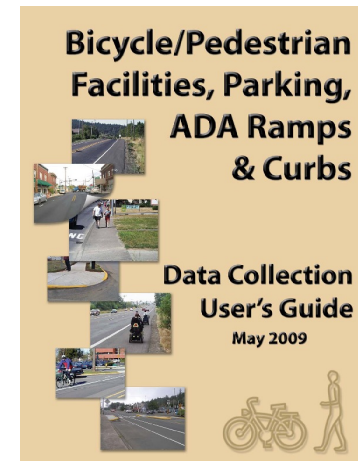
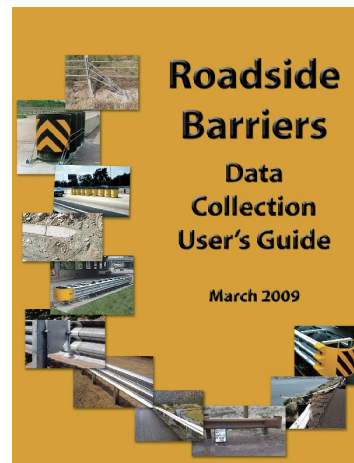
- Looking to Others - Research
- Trying it Ourselves - 2006 Asset Management Pilot Project
- Half-Life of Data - Performance Measure to State Legislature
- FACS-STIP Tool - Data Sharing
- 1R Paving Program - Using the Data

What we learned:

- Experiences of Others - Asset Strategic Plan
- Experiences of Ourselves -
 - Less is More, Basic Inventory
 - Collect Once, Use Many Times
 - Value of Documentation & Manuals
- Data Maintenance Critical
- Need to Make the Data Available
- Data Used for Program Decisions



Oregon Department of Transportation





Progress!

Asset	Statewide data available in 2005?	Statewide data available now?	Included in 1R Roadside Inventory
Bridges	X	X	X
Tunnels		X	
ITS	X	X	
Pavement	X	X	
Right of Way	X	X	
Signs		X	X
Traffic Barriers		X	X
Sidewalks		X	X
ADA Ramps		X	X
Bike Facilities		X	X
Culverts 6ft and over	<i>NBI</i>	<i>in progress</i>	X
Culverts under 6ft		<i>in progress</i>	X
WIM Sites		X	
Sound Barriers		X	
Wetland Mitigation Sites		X	
Material Sources		X	
Signals and Beacons	<i>Tri-color only</i>	<i>Tri-color only</i>	
Retaining Walls		<i>in progress</i>	
Unstable Slopes		<i>in progress</i>	
Approaches		<i>in progress</i>	
Major Traffic Support		<i>just starting</i>	
Storm Water Facilities		<i>just starting</i>	
Illumination			



Sharing the Data

Map Tool & "Data2Go"



FACS-STIP: Mapping Tool

The screenshot displays the FACS-STIP Mapping Tool V3.0 web application. The browser window title is "The FACS-STIP Mapping tool V3.0 - Windows Internet Explorer provided by Oregon Dept. of Transportation". The address bar shows the URL "http://204.227.14.61/facs-stip/map.aspx". The page header includes the Oregon Department of Transportation logo and the title "The FACS-STIP Mapping Tool". The main content area features a map of Sisters, Oregon, with various map layers and navigation tools. A "Map Legend" panel on the left lists layers like Roadbed, Structures, Roadside, and Navigation. A "Switch Basemap" panel on the right offers options like Imagery, Streets, Topo, and Light Gray. The bottom status bar shows the URL "http://204.227.14.61/facs-stip/map.aspx#" and the Windows taskbar with the time "10:48 AM".



FACS-STIP: Data to Go

FACS-STIP Data To Go - Windows Internet Explorer provided by Oregon Dept. of Transportation

http://204.227.14.61/facs-stip/DataToGo.aspx

File Edit View Favorites Tools Help

Favorites ODOT ODOT Computer Support Desk Oregon Online Oregon.Gov Bing Computer Support Desk Cull Google iLinc Suggested Sites TripCheck Get More Add-ons ODOT Intranet

FACS-STIP Data To Go

Oregon Department of Transportation FACS-STIP Data To Go User: odot | Home | Map Tools | Contact Us | Logout

Home

Map Tools

Contact Us

ODOT Home

STIP Home

2010-2013 STIP

2012-2015 Draft STIP

Asset Management

ORS 366.215 Highways

Freight Rail Map

MCTD Truck Route Maps

TPOD

DVL Home Page

Bridge Log

Bridge Inspection Reports

FileNet

1. Define Area of Interest (hide)

Enter Highway Number [Find highway number](#)
(5 characters)

Select Roadway ID

Enter Single Milepoint (valid mile points: xx.xx - xx.xx)

Enter Milepoint Range From To

Select Buffer Distance (miles)

View thumbnail image of defined area of interest ([hide](#))

[Get Thumbnail Image](#)

2. Select Asset Filter (hide)

Select Asset Filter: Include all assets
 Include only known unsatisfactory assets

3. Get Data To Go (hide)

Done

Internet 100%

start Windows Task M... Microsoft Offi... SustainedResour... 2012_Timesheet... 5 Microsoft Offi... 4 Microsoft Offi... FACS-STIP Data ... 11:13 AM



FACS-STIP: Available Data

Asset Data

Roadbed:

- Pavement Conditions
- Number of Lanes
- Right Shoulder Pavement
- Left Shoulder Pavement
- Roadway Composition

Structures:

- Bridges
- Weight Restricted Bridges
- Retaining Walls
- Major Traffic Structures
- Tunnels

Roadside:

- Sidewalks
- Bicycle Facilities
- ADA Ramps
- Approaches
- Traffic Barriers
- Sound Barriers

Drainage:

- Culverts

Highway Equipment:

- Signs
- Signals
- Intelligent Transportation
- Weigh In Motion
- Automated Traffic Recorders

Land & Environment:

- Aggregate Sites
- Fish Passage
- Fish Barriers
- Unstable Slopes
- Wetlands
- Township, Range & Section (PLSS)

Highway System Data

Functional Class:

- Functional Class
- Non Functional Class

Highway System Class:

- Expressways
- Highway Class
- NHS

Traffic Data:

- Average Annual Daily Traffic (AADT)
- Projected AADT (20 years)
- Posted Speed
- Traffic Flow
- Truck Flow

Crashes:

- Prior Three Years Crashes
- Safety Priority Index System (SPIS) Sites
- Crash Rates

Other Available Data

Boundaries:

- City Limits
- ODOT Districts
- ODOT Regions
- Political Boundaries:
- Congressional Districts
- House Districts
- Senate Districts

Projects & Needs:

- Bridge Needs
- Pavement Needs
- Safety Needs
- Bicycle Facility Needs
- Sidewalk Needs
- STIP Projects



FACS-STIP: Exported Data

- View Asset Reports**
- ADA Ramps View Export
 - Approaches View Export
 - ATR Sites View Export
 - Bicycle Facilities View Export
 - Bicycle Facility Needs View Export
 - Bridges View Export
 - Culverts-DFMS View Export
 - Culverts-District View Export
 - Culverts-MS4 Permits View Export
 - Fish Barriers-ODFW View Export
 - Fish Passage-DSL View Export
 - Intel. Trans. Sys. (ITS) View Export
 - Pavement View Export
 - Retaining Walls View Export
 - Safety-Crashes View Export
 - Safety-SPIS View Export
 - Safety-Crash Rates 09 View Export
 - Sidewalks View Export
 - Sidewalk-Needs View Export
 - Sound Barriers View Export
 - Traffic-AADT View Export
 - Traffic Barriers View Export
 - Traffic-Posted Speed View Export
 - Traffic Signals View Export
 - Traffic Support-Signs View Export
 - Tunnels View Export
 - Unstable Slopes View Export

Reports Generated Use the Following Criteria:
 Start Milepoint: 7.32
 End Milepoint: 13.03
 Highway Name: LOWER COLUMBIA RIVER (092)
 Highway Suffix: 00
 Roadway Number: 1
 Buffer Distance: 0.5
 Asset Filter Type: All Assets
 Note: Any field shown in green indicates a 1R-required field.

ADA Ramps

Records Returned: 100

Highway Number	Highway Suffix Code	Roadway ID	Mileage Type	Intersection Milepoint	ADA Ramp Needed	Ramp Location	Ramp Corner	Ramp Type	Functional Condition	1R
092	00	1	0	6.78	N	092AF FRONTAGE RD. M.P. F6.78	4			
092	00	1	0	6.78	N	092AF FRONTAGE RD. M.P. F6.78	3			
092	00	1	0	6.78	N	092AF FRONTAGE RD. M.P. F6.78	2			
092	00	1	0	6.78	N	092AF FRONTAGE RD. M.P. F6.78	1			
092	00	1	0	6.83	N	ROAD	4			
092	00	1	0	6.83	N	ROAD	3			
092	00	1	0	6.83	N	ROAD	2			
092	00	1	0	6.83	N	ROAD	1			
092	00	1	0	7.11	N	092AG FRONTAGE RD. (KNAPPTON-GENERAL) M.P. F7.11	4			
092	00	1	0	7.11	N	092AG FRONTAGE RD. (KNAPPTON-GENERAL) M.P. F7.11	3			

1 2 3 4 5 6 7 8 9 10

3 Highway Name: LOWER COLUMBIA RIVER
 4 Highway Number: 092
 5 Highway Suffix: 00
 6 Roadway ID: 1
 7 Start Milepoint: 7.32
 8 End Milepoint: 13.03
 9 Buffer Distance: 0.5
 10 Filter: All Assets
 11 Records Returned: 100

ASSET: ADA RAMPS

-Column headers marked as "1R" are required

-Please update the Verified No Change column from No to Yes after field verifying that the data is correct

HIGHWAY	INTERSE	PHYSICAL	FUNCTION	RAMP TYPE	RAMP CORNER	RAMP LOCATION	ADA RAMP NEEDED	EFFECTIVE DATE	
1R	1R	1R	1R	1R	1R	1R	1R		
092		6.78			4	092AF FRONTAGE RD. M.P. F6.78	N	2010	
092		6.78			3	092AF FRONTAGE RD. M.P. F6.78	N	2010	
092		6.78			2	092AF FRONTAGE RD. M.P. F6.78	N	2010	
092		6.78			1	092AF FRONTAGE RD. M.P. F6.78	N	2010	
092		6.83			4	ROAD	N	2010	
092		6.83			3	ROAD	N	2010	
092		6.83			2	ROAD	N	2010	
092		6.83			1	ROAD	N	2010	
092		7.11			4	092AG FRONTAGE RD. (KNAPPTON-GENERAL) M.P. F7.11	N	2010	
092		7.11			3	092AG FRONTAGE RD. (KNAPPTON-GENERAL) M.P. F7.11	N	2010	
092		7.11			2	092AG FRONTAGE RD. (KNAPPTON-GENERAL) M.P. F7.11	N	2010	
092		7.11			1	092AG FRONTAGE RD. (KNAPPTON-GENERAL) M.P. F7.11	N	2010	
092		7.32	P	P	I	4A	HWY. 123 (Nw BRIDGE AVE.) M.P. (2)0.00	Y	2010
092		7.32				4	HWY. 123 (Nw BRIDGE AVE.) M.P. (2)0.00	N	2010
092		7.32	P	P	I	3A	HWY. 123 (Nw BRIDGE AVE.) M.P. (2)0.00	Y	2010
092		7.32				3	HWY. 123 (Nw BRIDGE AVE.) M.P. (2)0.00	N	2010
092		7.32				2	HWY. 123 (Nw BRIDGE AVE.) M.P. (2)0.00	N	2010
092		7.32				1	HWY. 123 (Nw BRIDGE AVE.) M.P. (2)0.00	N	2010
092		7.50	P	P	N	4	ROAD	Y	2010
092		7.50	P	P	N	3	ROAD	Y	2010
092		7.50				2	ROAD	N	2010
092		7.50				1	ROAD	N	2010



Demonstrating with Data

- FHWA & 1R paving program
- Traffic barrier inventory
- Statewide strategic asset management approach to safety features



1R Technical Bulletin

OREGON DEPARTMENT OF TRANSPORTATION		TECHNICAL SERVICES			
 Technical Services BULLETIN		FINAL NUMBER	EFFECTIVE DATE	VALIDATION DATE	SUPERSEDES or RESCINDS
		SUBJECT	TSB09-01(B)	02/01/2009	
1R Program		WEB LINK(S) http://egov.oregon.gov/ODOT/HWY/TECHSERV/techguidance.shtml			
TOPIC/PROGRAM		APPROVED SIGNATURE			
Highway Design Manual		 Catherine M. Nelson, P.E. Technical Services Manager/Chief Engineer			

PURPOSE

The 1R standard will apply to Preservation projects that are limited to a single lift non-structural overlay or inlay.

GUIDANCE

The ODOT 1R project standard will apply to Preservation projects that are limited to a single lift non-structural overlay or inlay. The 1R preservation program will address the pavement feature only. If in addressing this feature there is an adverse impact on a safety feature, then that impact would be mitigated to maintain status quo within the project, for example, raising a guardrail to accommodate an overlay. The intent is to address the pavement condition but not decrease the functionality of any existing safety feature, even if it is not at the current standard. When the safety feature programs are developed they will be looking at opportunities within the STIP to add funding to projects to address high priority safety features or create stand alone projects, as needed.

DEFINITIONS

Non-Structural Overlay or Inlay – A single lift overlay or inlay

BACKGROUND

ODOT has reached a tentative agreement on 1R standards with FHWA defined by a single lift non-structural overlay or inlay surface treatment.

Historically ODOT's Preservation program has focused on optimizing surface preservation treatments for the entire system of roads within ODOT's responsibility and addressing key safety features within the roadway corridors. The Pavement Management System is used to identify required annual mileage and pavement treatments necessary to achieve system targets of "Percent Fair or Better Pavement Conditions". Once a preservation project has been identified, all safety features within the project limits are inventoried and reviewed against the required 3R standards. Improvements are made where possible or exceptions requested where they are not achievable.



1R Program

- Can't make any safety features worse.
- Inventory identified \$76,000,000 of non-standard features.
- Statewide strategic approach to highway features normally upgraded by 3R projects.
- \$6M 1R Safety Fund for traffic barrier upgrades, a 10-year program.
- Roadside Inventories essential to maintain asset inventories for strategic planning.



Funding Priority of Traffic Barrier Features

1. Un-connected Transitions
2. Pre 230 Terminals
3. Pre 230 Transitions
4. Tongue & Groove Concrete Barrier
5. Pre 230 Type 1 and 1A Guardrail
6. Pre 230 Type 2 Guardrail
7. Pre 230 Impact Attenuators
8. Rebar Pin & Loop Concrete Barrier
9. 4 Loop Pin & Loop Barrier
10. 230 Transitions
11. 230 Impact Attenuators

High Priority Features are in RED and are to be done before those in BLACK



1R Priorities

- Upgrade features on highways in the following priorities:
 1. Interstate
 2. NHS
 3. Non-NHS



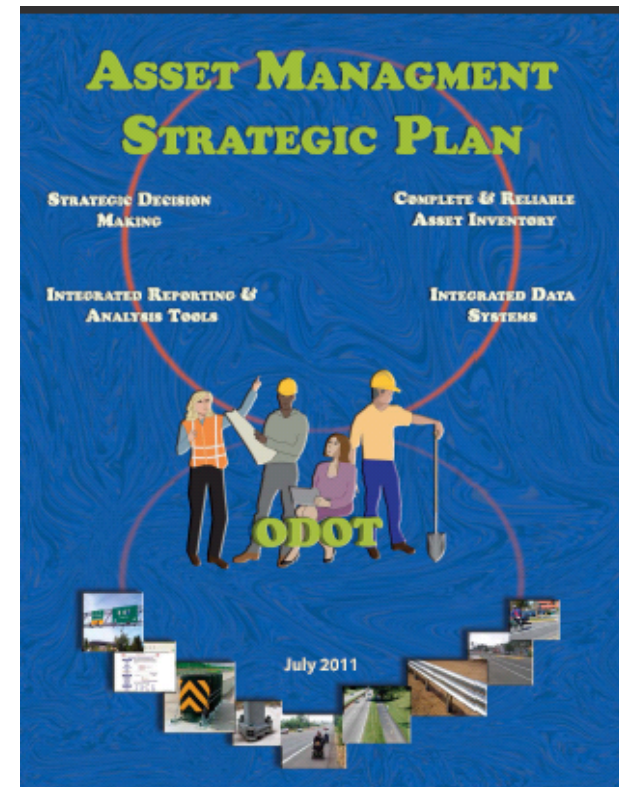
Other Programs We're Working On

- Addition to statutory 1% minimum for bicycle and pedestrian facilities:
 - \$1 million/year ADA Ramp Program
 - Based on statewide ADA ramp and needs inventory
- Expansion of Culvert Program
 - Additional \$6 million/year Culvert Program (tripling previous program)
 - Based on anticipated additional small culvert inventory in 2013 & 2014



We've Updated:

- Integrated Strategic Plan
 - Strategies
 - Implementation
 - Communication
 - Technology Strategy
- Asset list





Asset Prioritization

Asset/High-Level Attribute	Original Priority Asset?	Required for IR?	Statewide Data Available?	Efforts Already Underway	Hot Topic?	Asset Owner Recommendation	Criticality for:				Risk Management		Criticality of:		Sum	
							Asset Value	Highway Core	Operations	Accessibility / Other Mobility	Safety	Risk	Consequence	Stewardship		Attention to Status or Condition
							High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3	High, Med, Low = 1,2,3		High, Med, Low = 1,2,3
ADA Ramps	N	Y	Y			High									0	
Bike Facilities	N	Y	Y			High									0	
Bridges	Y	Y	Y			High									0	
ITS	N	N	Y												0	
Material Sources	Y	N	Y			High									0	
Pavement	Y	N	Y			High									0	
Right of Way	Y	N	Y												0	
Sidewalks	N	Y	Y			High										
Signs	Y	Y	Y			High										
Sound Barriers	N	N	Y			Not High										
Traffic Barriers	Y	Y	Y			High										
Tunnels	N	N	Y													
Wetland Mitigation Sites	Y	N	Y													
Weigh-in-Motion Sites	N	N	Y													
Efforts Underway But Not Complete																
Approaches	N	N	N	Y	Y											
Culverts	Y	Y	N	Y		High										
Retaining Walls	Y	N	N	Y		High										
Stormwater	N	N	N	Y	Y	High										
Traffic Structures	Y	N	N	Y		High										
Unstable Slopes	N	N	N	Y	Y	High										
Vertical Clearance	N	N	Y & N	Y	Y											
Other "Highs"																
Illumination						High										
Interchanges						High										
Traffic Signals			Tri-color			High										

(9-12)	Orange	Tier 1 Priority
(13-17)	Yellow	Tier 2 Priority
(18-21)	Light Green	Tier 3 Priority
(22 & up)	Dark Green	Tier 4 Priority

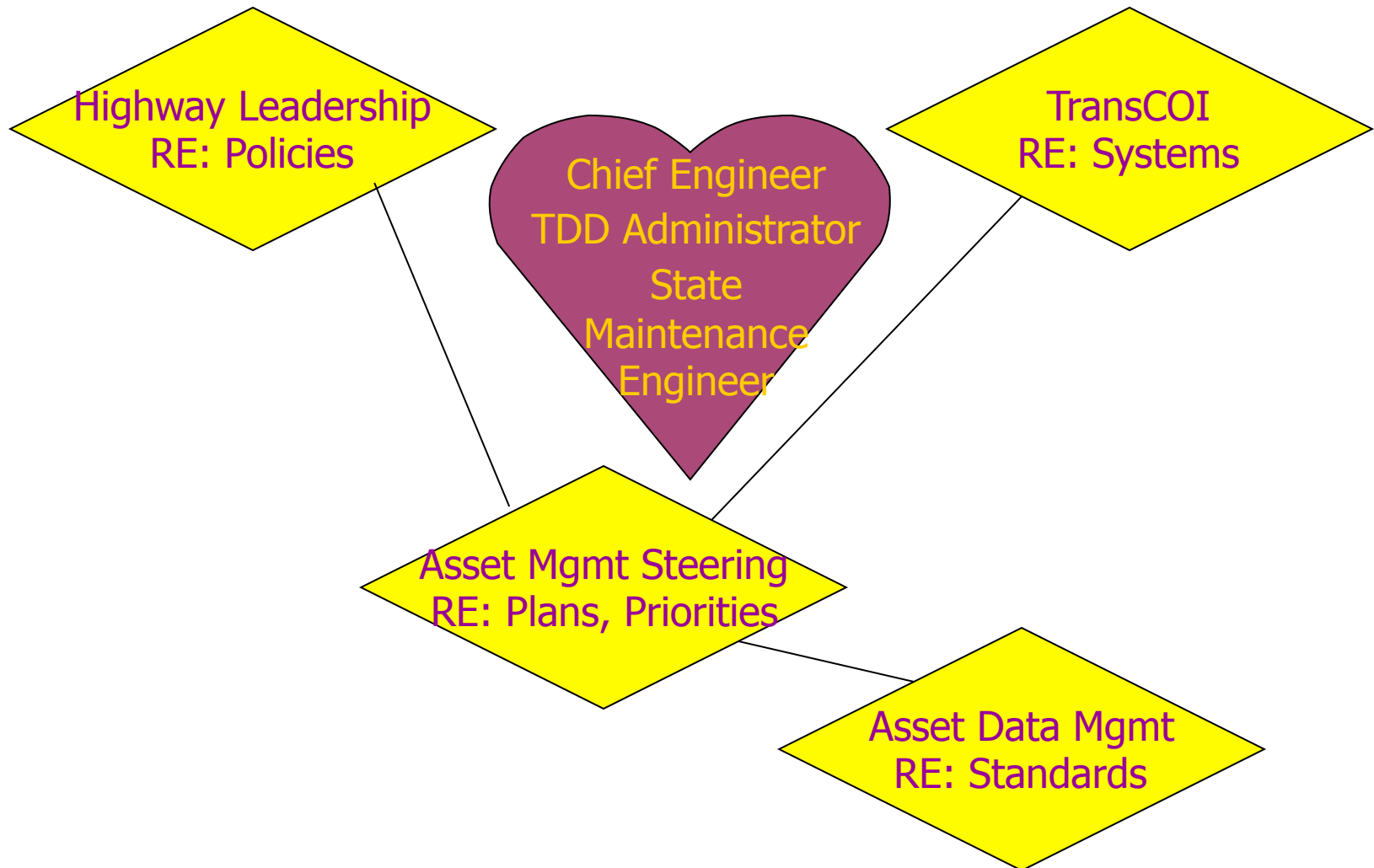
Definitions:

Foundational core for existence of system
 Degree of criticality for operations
 Degree of criticality for accessibility or other mobility
 Degree of criticality for safety
 Degree of risk associated with failure or unknowns
 Severity of potential consequences of failure or unknowns
 Level of expectations, mandates or requirements from others (legal, environmental, programmatic, legislative)
 Level of expectations of stewardship

Asset Priority Tiers		
Tier 1	Bridges	1R
	Culverts	1R
	Pavement	
	Tunnels	
	Traffic Signals	
Tier 2	Retaining Walls	
	Traffic Barriers	1R
	Vertical Clearance	
	Signs	1R
	Traffic Structures	
	Stormwater	
	Unstable Slopes	
	Right of Way	
Tier 3	Sidewalks	1R
	ADA Ramps	1R
	Bike Facilities	1R
	ITS	
Tier 4	Material Sources	
	Approaches	
	Illumination	
Tier 4	Wetland Mitigation Sites	
	Weigh-in-Motion Sites	
	Sound Barriers	



Governance Structure





Other Things We're Working On

- Mobile GPS applications
 - Culverts
 - Signs
 - Other 1R required inventories
 - Approaches
- QA/QC of asset inventories
- Statewide inventory initiatives:
 - Culverts
 - Approaches
- Data standards



Next Steps

- Plan and implement culvert inventory effort
- Continue efforts and development of
 - Processes for sustaining inventories
 - Enterprise data management
 - Data standards
 - Enterprise data storage systems
 - Integrating data into decisions
- Communicate, communicate, communicate

Capturing the Road of Tomorrow-UDOT's Transportation Asset and Highway Safety Data Program

Stan Burns & Robert Hull
Utah Department of Transportation

Today's Presentation

- Data Collection Project
- Asset Management
- Safety Management
- Future Direction



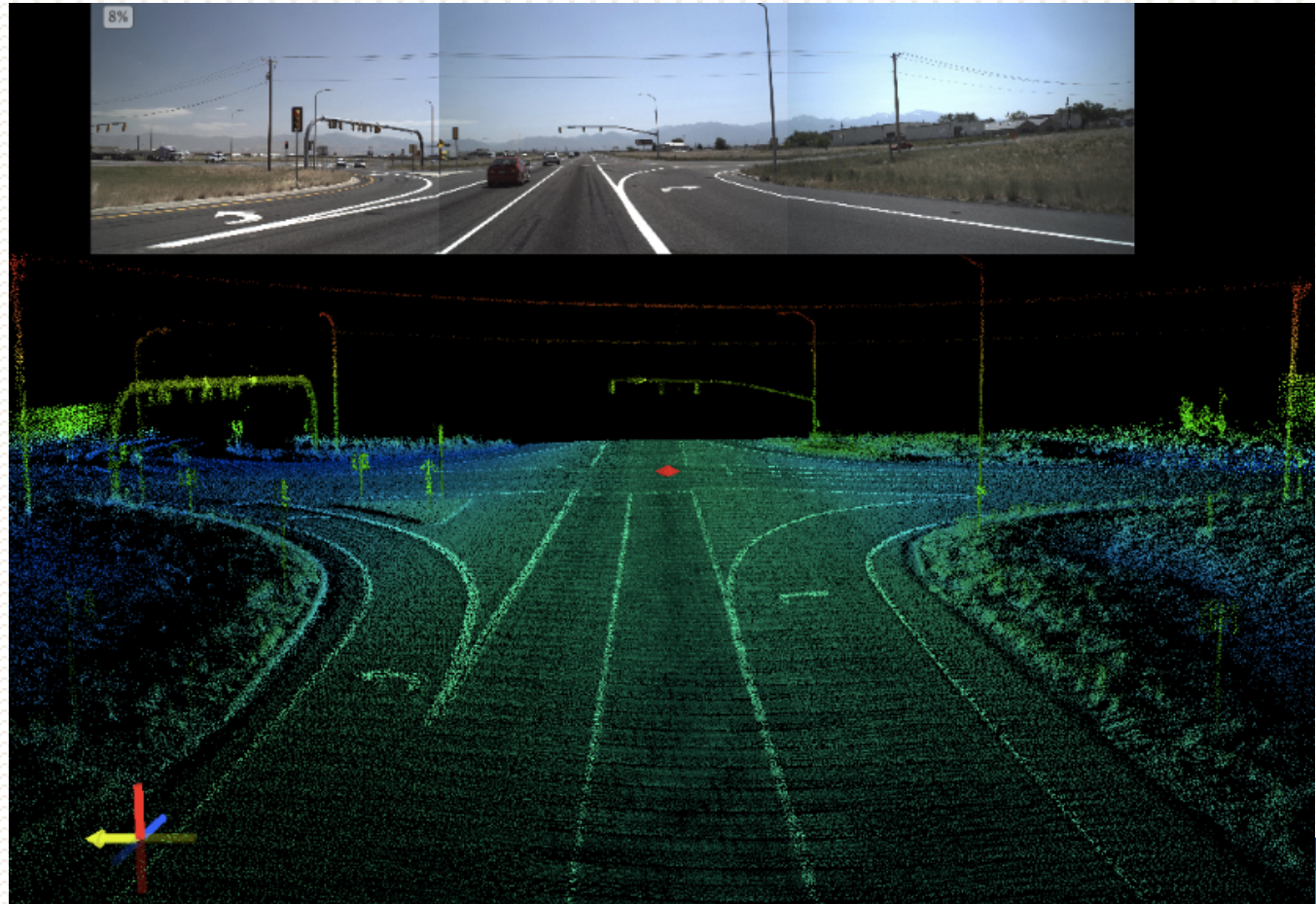
Utah Roadway Imaging/ Inventory Project

Unified Department Enterprise

Collect all above ground features,
geometries, conditions (limited)

Goelocate all assets

Purpose: Obtain data for use in
making safety, pavement and
roadway asset management
decisions



Data Collection Project

- **Continuous survey**

- Entire state highway system
- Both Directions
- 6,000 centerline miles/ 14,000 driven mile

- **Scope**

- Pavement Condition, Surface Areas
- Bridge Clearance, Enhanced Deck Surface
- Geometry – Horizontal, Vertical, Cross Slope
- Geolocate all Assets – Signs, Signals, Paint Lines, Markings, Intersections, Barrier, Guardrail, Rumble Strips, Retaining/Noise Walls, Billboards

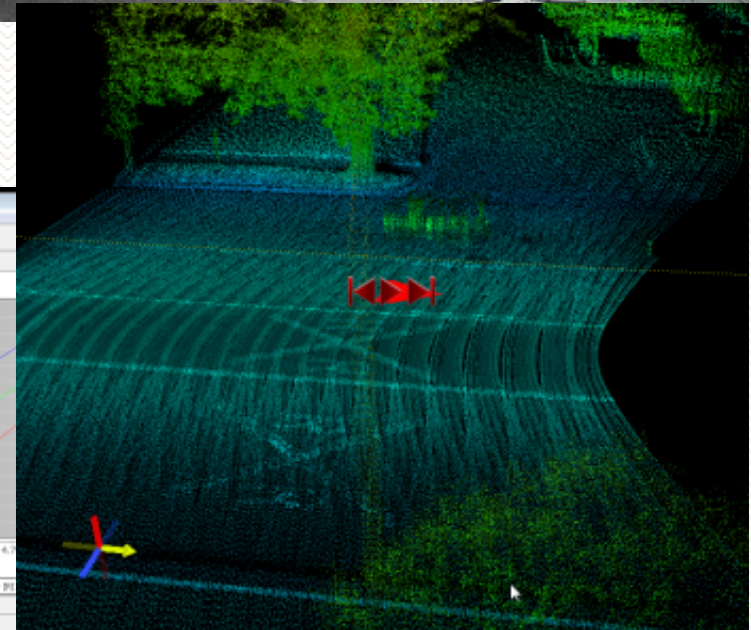
- **Semi Automated**

- Pavement Distress
- Assets



Work Products

- Right-of-Way Digital Imaging
- Workstation
- Mobile LiDAR



The screenshot displays the Roadview Workstation 2.2.8 interface with several key components:

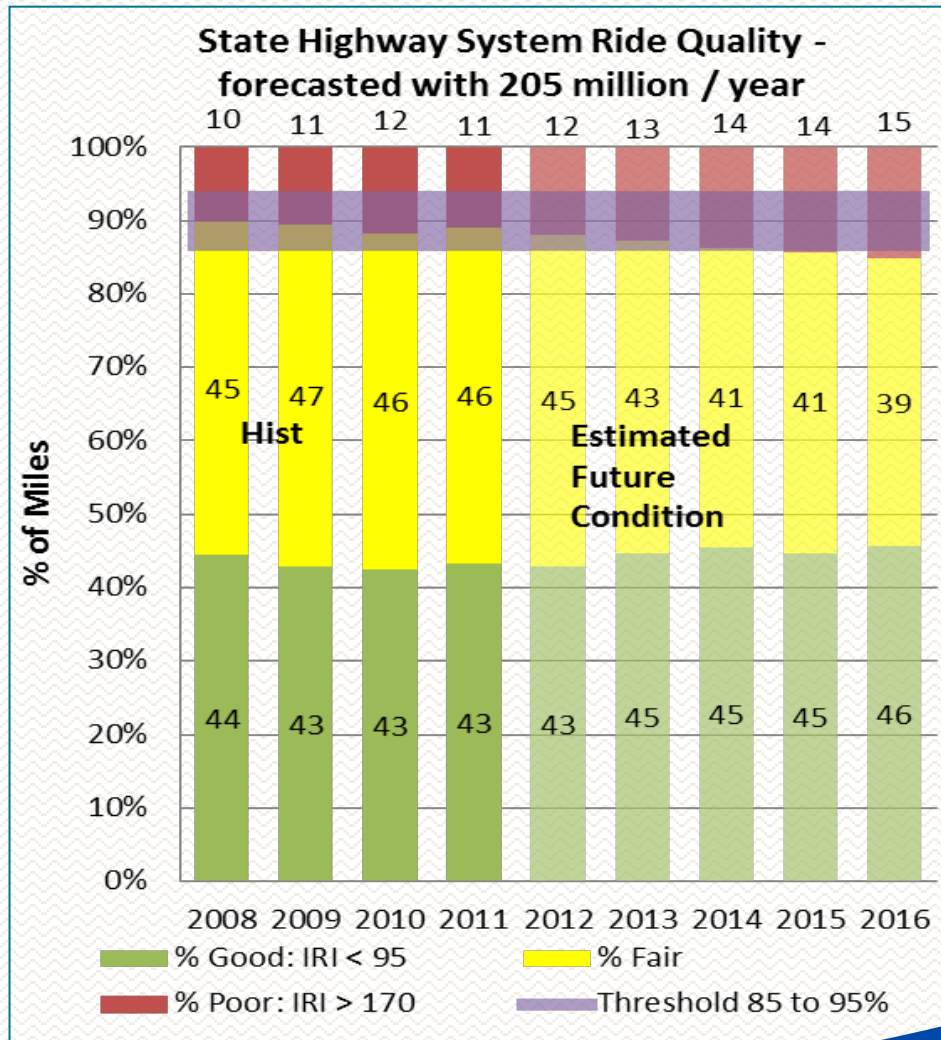
- Database Panel:** Lists road segments with columns for 'Begin 100ft Path Low', 'Begin 100ft Path Medium', and 'Begin 100ft Path High'. Values include 1278, 1279, 746.2, 362.03, 874.1, 216.26, 424.26, 415.92, 825.46, and 704.0.
- Map View:** Shows a top-down view of the road with lane markings and a red vehicle icon.
- Asset Table:** A table listing road segments with columns for ID, Begin Mile Point, End Mile Point, Begin Latitude, Begin Longitude, Begin Altitude, End Latitude, and End Longitude.

ID	Begin Mile Point	End Mile Point	Begin Latitude	Begin Longitude	Begin Altitude	End Latitude	End Longitude
405062	2.809863	2.809863	-86.416429	-111.767621	5465.064407	-86.416429	-111.767621
406403	3.155646	3.155646	-86.421153	-111.79652	5472.889581	-86.421153	-111.79652
403683	1.589867	1.589867	-86.399734	-111.794476	5457.267342	-86.399734	-111.794476
402864	1.86127	1.86127	-86.402287	-111.79227	5492.924662	-86.402287	-111.79227
404795	2.5116	2.5116	-86.412172	-111.798466	5457.442077	-86.412172	-111.798466
406353	3.42484	3.42484	-86.425246	-111.795826	5477.868734	-86.425246	-111.795826
408454	3.812677	3.812677	-86.4323	-111.788072	5479.829971	-86.4323	-111.788072
403495	4.507635	4.507635	-86.440662	-111.784375	5479.911984	-86.440662	-111.784375
403457	4.227951	4.227951	-86.436844	-111.784623	5480.581922	-86.436844	-111.784623
404618	2.158666	2.158666	-86.407129	-111.789859	5448.006987	-86.407129	-111.789859
406458	3.773617	3.773617	-86.43028	-111.786274	5460.283028	-86.43028	-111.786274
- Roadway Conditions Chart (IRI):** A line graph showing International Roughness Index (IRI) values in inches per mile. The x-axis is 'From MP' (5.00 to 4.7) and the y-axis is 'Inches/Mile' (0 to 150). Three lines (red, green, blue) represent different road conditions.
- Search Window:** A panel for filtering road segments by ID, Route, Region, Direction, From MP, and To MP.
- Photoblog Viewer:** A small window showing a street-level photograph of the road.

Project Funding

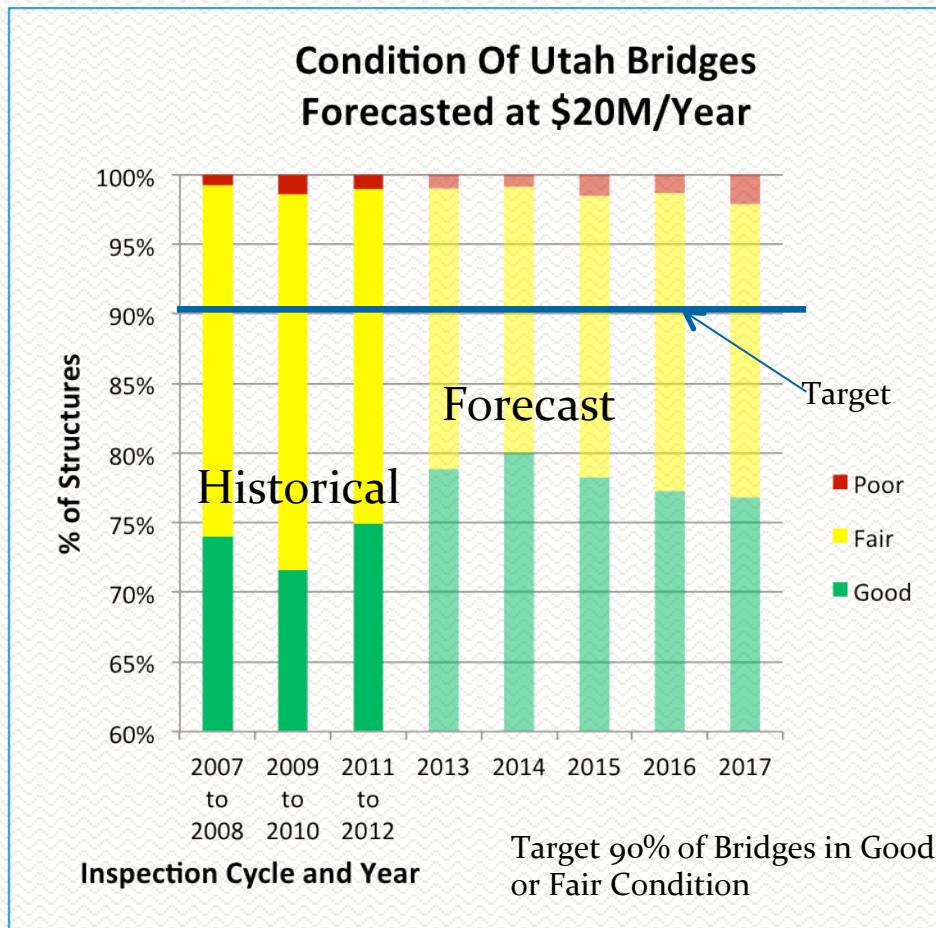
- Cost is being shared across UDOT Divisions; a majority of funding from:
 - Planning
 - Central Maintenance
 - Central Traffic & Safety
- \$2.5 Million initial cost

Statewide Pavement Management



- Condition
 - International Roughness Index
- Historical
- Forecast
 - Trends vs. Specific Budget
 - Specific Projects
- Thresholds
 - Upper and Lower

Statewide Bridge Management



- Overall Condition Index
- Historical
- Forecast
 - Trends vs. Specific Budget
 - Recommended Projects
 - Targets

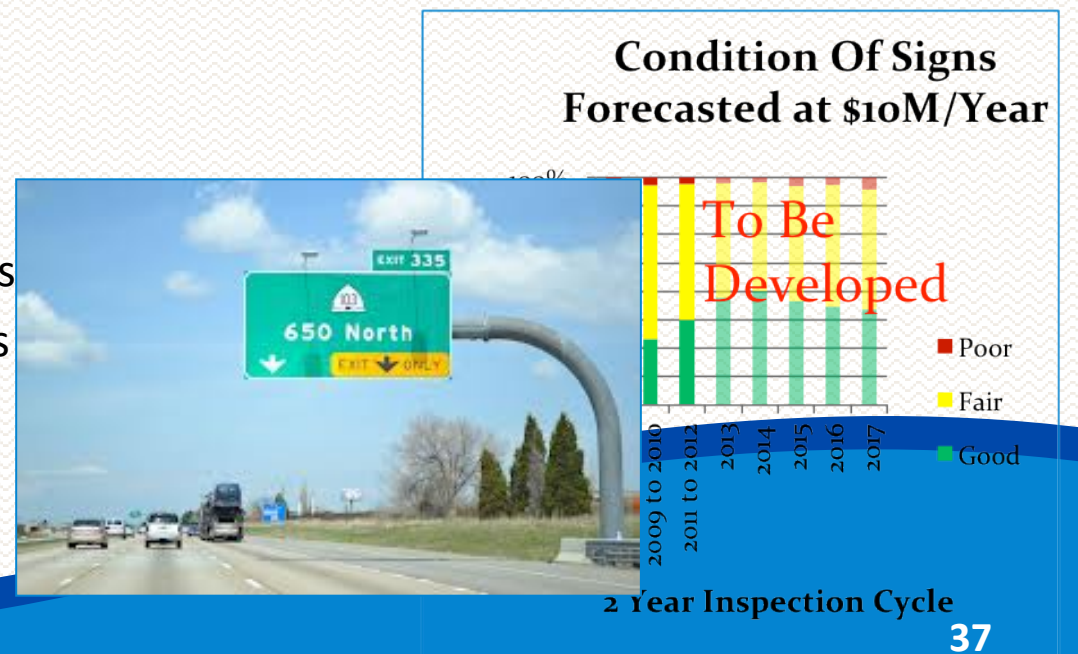
Statewide Sign Management

Data Collection

- Scope
 - Geolocate all 140,000 signs
 - ID – MUTCD Code
 - Size – width by length
- Condition
 - Visual Scale 1 – 7
 - Retroreflectivity
 - 1,000 Interstate guide signs
 - 1,800 Secondary road signs

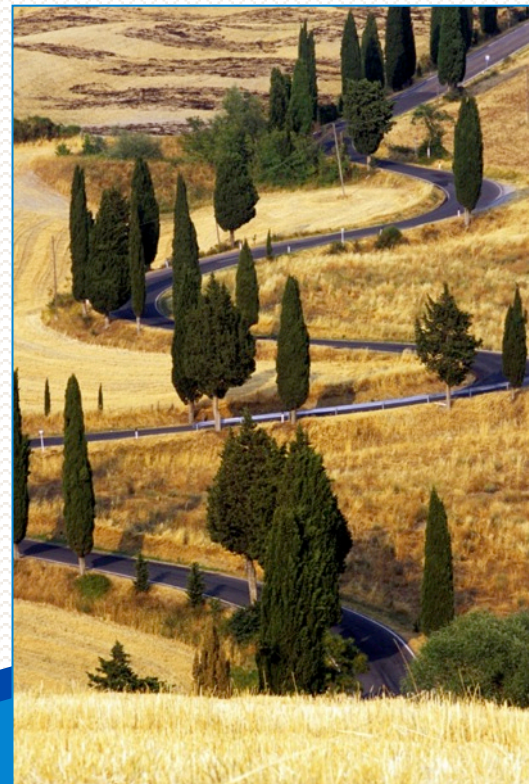
Program/Project Development

- Develop Historical Trends
- Forecast
 - Specific Program & Budget
 - Specific Projects



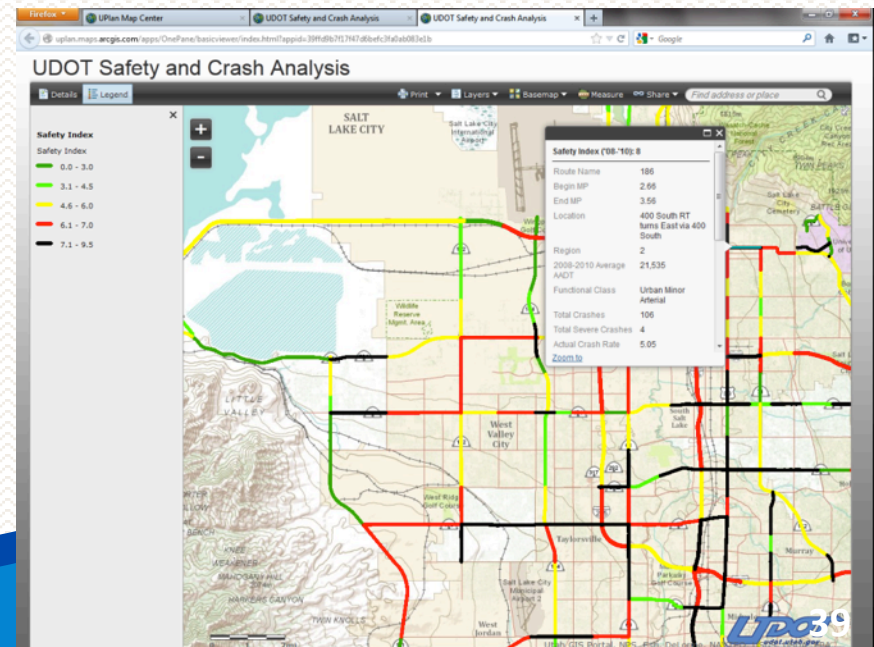
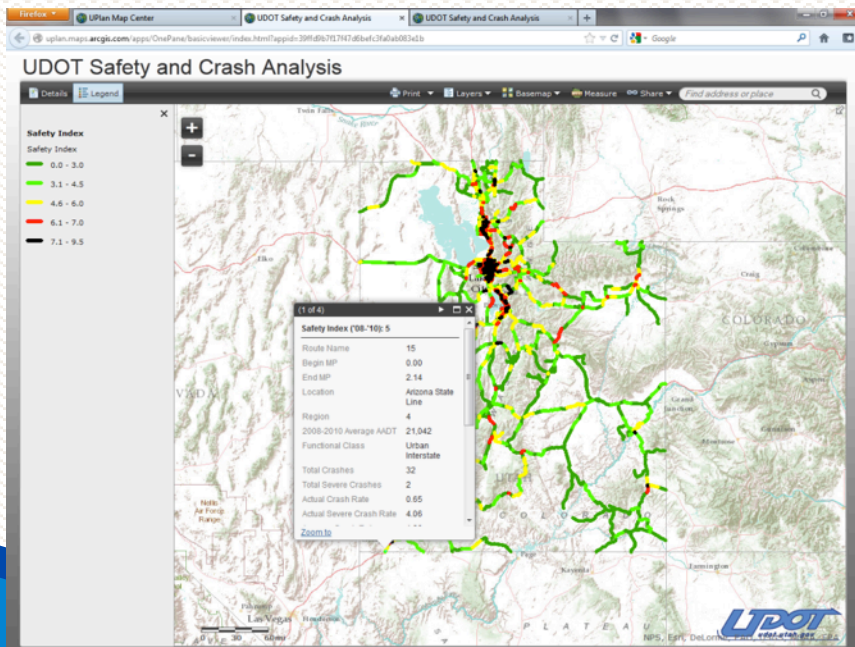
Safety Management System

- Crashes
- Roadway geometry
- Safety assets



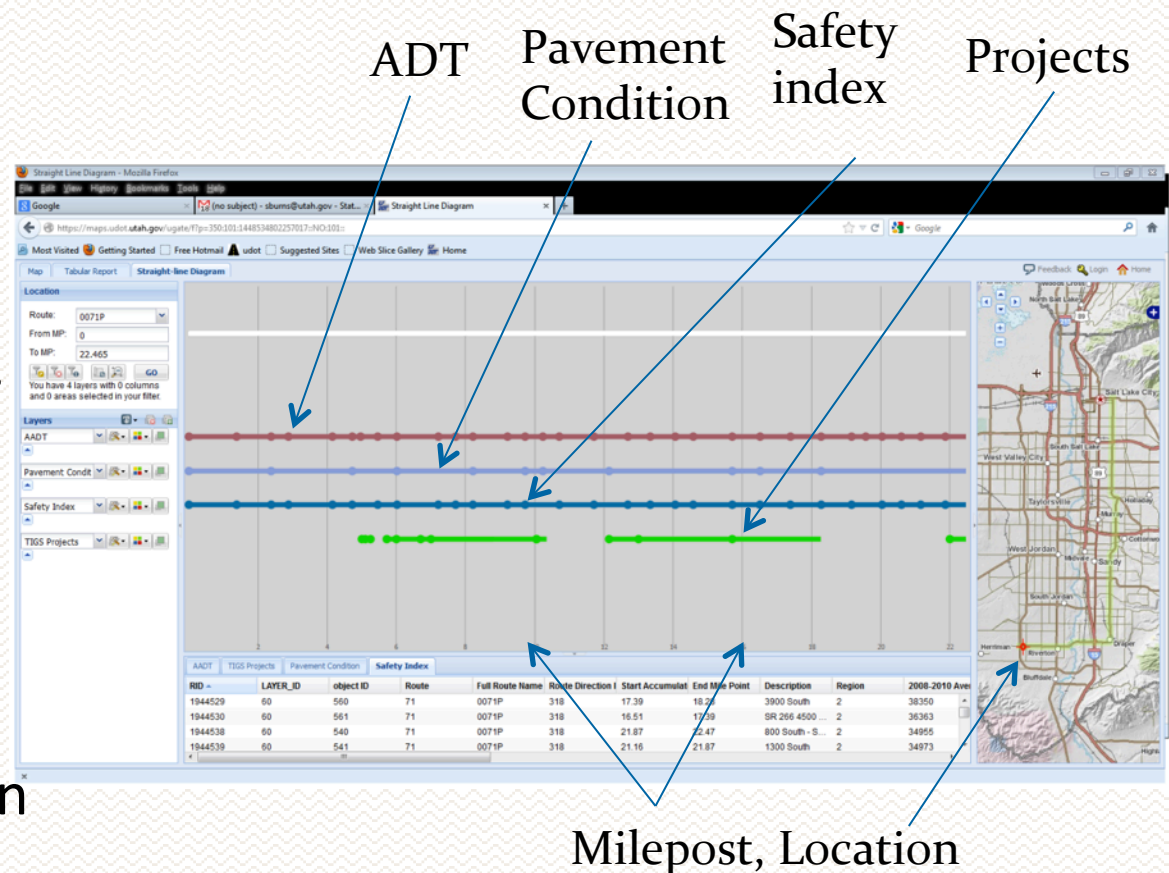
Safety Program

- UDOT/Industry continues to enhance the safety program(s): Esri, AAA, UDOT
- Geo-located data
- Analysis – Statewide, corridor, spot
- Prioritization – Limited \$'s to the right locations



UGate – Central Collection of All Data

- Online GIS – maps/spatial data
- Tool to bring datasets together
 - Assets, projects, safety, etc.
- Flexible environment to share data
- Datasets are managed by different functional areas
- Great way for users to gain access to many different institutional datasets

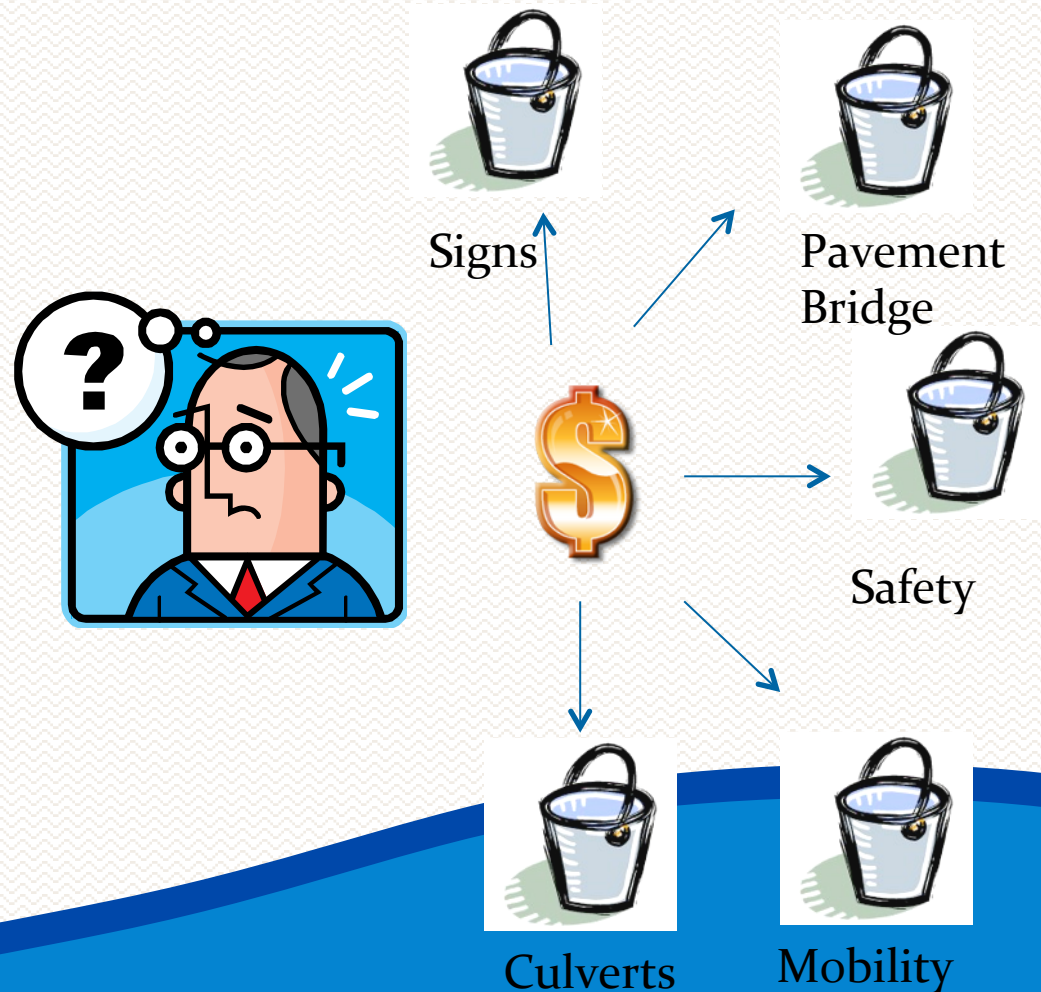


Looking Forward

- Further develop:
 - Culvert Management System
 - Sign Management System
 - Enhancements to UDOT Safety Management System
- Industry Collaboration with data collection and asset analysis companies
 - Model for MAP-21 implementation
 - Model for the other Departments of Transportation
 - ESRI, Oracle, Bentley, Mandli, Deighton, Agile Assets, Virtual Geomatics, AAA, usRAP, Utah State University, UDOT
 - Prototypes - Safety, Roadway Design, Integration, Asset Analysis

Allocating Appropriately?

- Silos -Develop asset analysis
- Determine program funding across silos
- Perhaps NCHRP 08-91 can help
 - Cross-Asset Resource Allocation and the Impact on System Performance



Questions?

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NDDOT's Sign Management Program (Inventory & Retroreflectivity)

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December 05, 2012

Objectives

- Roadway Information Management System (RIMS)
- Signs in RIMS
- How RIMS drives other products within the NDDOT
- MUTCD – Maintaining Minimum Retroreflectivity
- Current status of NDDOT's sign management implementation

Roadway Information Management System (RIMS)

```
Mainframe - RUMBA Mainframe Display
File Edit View Connection Transfer Options Tools Help
DT3000 ***** NDDOT RIMS HIGHWAY PROJECTS ***** DT3000M1
Jul 22,11 - MAIN MENU - 10:49 AM
PCN

A PROJECT MASTER PF13
B MILESTONE PF14
C BID OPENING SCHEDULE PF15
D COST ESTIMATES PF16
G FEDERAL AID PF19
H CONSTRUCTION HISTORY PF20
I HIGHWAY COMPONENTS PF21
J PROJECT RECORDS PF22
K RIMS INVENTORY PF23
L MISCELLANEOUS PF24

CODE: _ *JUMP

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---
help retrn quit flip main
```

DT2520

***** NDDOT ROADWAY INVENTORY *****

DT2520M1

Nov 28, 12

- SIGN ASSEMBLY/SIGNS -

1 more >

*JUMP

ENGLISH

(METRIC ->)

ACTION (A,B,C,D,M,N,P)

ASSEMBLY

HWY: 18 SUF: DIR: N INTRCHG ID: REF POINT: 3.000 OFFSET: 0.0700

POSITION CODE: R ASSOCIATIVE LOCATION: S PLACEMENT HEIGHT: 5

DISTANCE FROM CENTERLINE: 51.0 NO OF POSTS: 1 POST TYPE: 5 PERF

POST SIZE: 2.00 IN VIOLATION: N LAT: LONG:

ASSOC. LOC. SEQ: 1 (used with associative locations only)

SIGNS

1 1 ASSEM POS: 1 SIGN NO: RR001 STOP SIGN FDN: R1-1

1 WIDTH: 30 HEIGHT: 30 LEGEND SIZE: 10 BACK MAT: 2 REFLE:

SPEED: MAINTENANCE RESPONSIBILITY: 1 DATE INSTALLED: 11 13 2001

DIRECTION FACING: E (FOLLOWING FIELDS WILL DEFAULT IF NOT ENTERED)

FACE MATRL: H LEGEND MATRL: H LEGEND CLR: WH BACKGROUND CLR: RE

LEGEND:

MAINTENANCE

1 1 CODE: 10 DATE: 9 7 2012 2 CODE: 1 DATE: 11 13 2001

3

Enter-PF1---PF2---PF3---PF4---PF5---PF6---PF7---PF8---PF9---PF10--PF11--PF12---

confm help retrn quit flip pref bkwrd frwr left right main

SCROLLING PERFORMED.

GIS Video Log

NDDOT OnRAMP Home | GIS | Help
 Online Roadway Analysis & Mapping Portal

Legend

- 3 DESTINATION ARROWS
- RIMS Info
- Project Master
- Pvmt Info

Video Log

SurveyDate: 10/19/2010 Heading: 268.449
 SurveyTime: 4:39:00 PM Latitude: 47.9278
 District: 6 Longitude: -97.09336
 RoadName: 0029 Ref Pt: 140
 Direction: N Ref Pt Offset: 0.8454
 InAvg: 103.5 Route Set ID: 895
 RutAvg: 0.0785 Measure Change: 1
 FauAvg: 0.064 Background Transparency:
 RouteID: 13

Skip Interval: 2

Identify Panel

Signs: 8THAVE N

Clear Results

ID	SIGN_LEGEND_TEXT	MAINT_RESP_CODE	DATE_INST
EXIT 141	8THAVE N	1	7/1/1995
CUTOUT	US 2 GATEWAY DRIVE UP RT. ARROW	1	7/1/1995

Map features include: LIGHT STANDARD, MILLED, WRONG WAY, TOWER LIGHTING, DO NOT ENTER, ADVANCE PED. CROSSING, TOURIST INFORMATION, STAMART, IRON GATE CT N, SILVERGATE DR, WOVEN WIRE FENCE, STAMPED, EXIT 000, 1 DESTINATION AR, 1 NAME DESTINATION SIGN, TWO NAME DISTANCE SIGN, EXIT 000 (NOTE:), EXIT 00 GAS FOOD LODGING, SPEED LIMIT 00, COLLEGES/SCHOOLS, 8THAVE N, 6THAVE N, 4THAVE N, 2ND ST N, 48TH ST N, 46TH ST N, 44TH ST N, 42ND ST N, 40TH ST N, 38TH ST N, 36TH ST N, 34TH ST N, 32ND ST N, 30TH ST N, 28TH ST N, 26TH ST N, 24TH ST N, 22ND ST N, 20TH ST N, 18TH ST N, 16TH ST N, 14TH ST N, 12TH ST N, 10TH ST N, 8TH ST N, 6TH ST N, 4TH ST N, 2ND ST N, 0TH ST N.

ESRI | Local Intranet

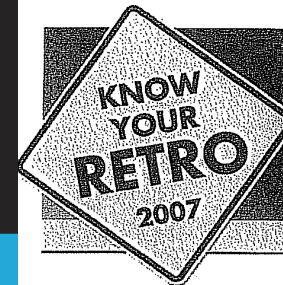
Manual on Uniform Traffic Control Devices

for Streets and Highways

2009 Edition



U.S. Department of Transportation
Federal Highway Administration



NEW MUTCD SIGN RETROREFLECTIVITY REQUIREMENTS

U.S. Department of Transportation
Federal Highway Administration

Maintaining Traffic Sign Retroreflectivity

FHWA-SA-07-020

Traffic signs provide important information to drivers at all times, both day and night. To be effective, their visibility must be maintained. The 2003 *Manual on Uniform Traffic Control Devices* (MUTCD) addresses sign visibility in several places, including Sections 1A.03, 1A.04, 1A.05, 2A.06, 2A.08, and 2A.22. These sections address factors such as uniformity, design, placement, operation, and maintenance. Previously, the MUTCD did not specify minimum retroreflectivity levels.

The second revision of the 2003 MUTCD introduces new language establishing minimum retroreflectivity levels that must be maintained for traffic signs. **Agencies have until January 2012, to establish and implement a sign assessment or management method to maintain minimum levels of sign retroreflectivity.** The compliance date for regulatory, warning, and ground-mounted guide signs is January 2015. For overhead guide signs and street name signs, the compliance date is January 2018. The new MUTCD language is shown on page 2 and 3 of this document.

The new standard in Section 2A.09 requires that agencies maintain traffic signs to a minimum level of retroreflectivity outlined in Table 2A-3 of the MUTCD. The Federal Highway Administration (FHWA) believes that this proposed change will promote safety while providing sufficient flexibility for agencies to choose a maintenance method that best matches their specific conditions.

Including Table 2A-3 in the MUTCD does not imply that an agency must measure the retroreflectivity of every sign. Rather, the new MUTCD language describes five methods that agencies can use to maintain traffic sign retroreflectivity at or above the minimum levels. Agencies can choose from these methods or combine them. Agencies are allowed to develop other appropriate methods based on engineering studies. However, agencies should adopt a consistent method that produces results that correspond to the values in Table 2A-3.

The new MUTCD language recognizes that there may be some

individual signs that do not meet the minimum retroreflectivity levels at a particular point in time. As long as the agency with jurisdiction is maintaining signs in accordance with Section 2A.09 of the MUTCD, the agency will be considered to be in compliance. This document describes methods that can be used to maintain sign retroreflectivity at or above the MUTCD's minimum maintained retroreflectivity levels.

RETROREFLECTIVITY MAINTENANCE

The MUTCD describes two basic types of methods that agencies can use to maintain sign retroreflectivity at or above the MUTCD minimum maintained retroreflectivity levels — assessment methods and management methods. The FHWA has identified and listed assessment and management methods for maintaining sign retroreflectivity in accordance with Section 2A.09. These methods are described on page four. A full report on these methods can be found at www.fhwa.dot.gov/retro.

NDDOT Implemented Visual Nighttime Inspection Method

- Decision Document signed in December 2010 with inspections to begin in 2012.
- North Dakota has approximately 65,000 signs on inventory.
- Estimated that 10% of all signs would fail inspection on a yearly basis.
- NDDOT programmed projects to replace all signs out of compliance, beginning in 2013.

ATTACHMENT "A"

New MUTCD Minimum Retroreflectivity Compliance Periods

- Four years for implementation and continued use of an assessment or management method that is designed to maintain traffic sign retroreflectivity at or above the established minimum levels;
- Seven years for replacement of regulatory, warning, and ground-mounted guide (except street name) signs that are identified using the assessment or management methods as failing to meet the established minimum levels; and
- Ten years for replacement of street name signs and overhead guide signs that are identified using the assessment or management method as failing to meet the established minimum levels.

New MUTCD Section 2A.09 Maintaining Minimum Retroreflectivity

Support:

Retroreflectivity is one of several factors associated with maintaining nighttime sign visibility (see Section 2A.22).

Standard:

Public agencies or officials having jurisdiction shall use an assessment or management method that is designed to maintain sign retroreflectivity at or above the minimum levels in Table 2A-3.

Support:

Compliance with the above Standard is achieved by having a method in place and using the method to maintain the minimum levels established in Table 2A-3. Provided that an assessment or management method is being used, an agency or official having jurisdiction would be in compliance with the above Standard even if there are some individual signs that do not meet the minimum retroreflectivity levels at a particular point in time.

Guidance:

Except for those signs specifically identified in the Option portion of this Section, one or more of the following assessment or management methods should be used to maintain sign retroreflectivity:

- Visual Nighttime Inspection** – The retroreflectivity of an existing sign is assessed by a trained sign inspector conducting a visual inspection from a moving vehicle during nighttime conditions. Signs that are visually identified by the inspector to have retroreflectivity below the minimum levels should be replaced.
- Measured Sign Retroreflectivity** – Retroreflectivity is measured using a retroreflectometer. Signs with retroreflectivity below the minimum levels should be replaced.
- Expected Sign Life** – When signs are installed, the installation date is labeled or recorded so that the age of a sign is known. The age of the sign is compared to the expected sign life. The expected sign life is based on the experience of sign retroreflectivity degradation in a geographic area compared to the minimum levels. Signs older than the expected life should be replaced.

D. Blanket Replacement – All signs in an area/corridor, or of a given type, should be replaced at specified intervals. This eliminates the need to assess retroreflectivity or track the life of individual signs. The replacement interval is based on the expected sign life, compared to the minimum levels, for the shortest-life material used on the affected signs.

E. Control Signs – Replacement of signs in the field is based on the performance of a sample of control signs. The control signs might be a small sample located in a maintenance yard or a sample of signs in the field. The control signs are monitored to determine the end of retroreflective life for the associated signs. All field signs represented by the control sample should be replaced before the retroreflectivity levels of the control sample reach the minimum levels.

F. Other Methods – Other methods developed based on engineering studies can be used.

Support:

Additional information about these methods is contained in the 2007 Edition of FHWA's "Maintaining Traffic Sign Retroreflectivity" (see Section 1A.11).

Options:

Highway agencies may exclude the following signs from the retroreflectivity maintenance guidelines described in this Section:

- Parking, Standing, and Stopping signs** (R7 and R8 series)
- Walking/Hitchhiking/Crossing signs** (R9 series, R10-1 through R10-4b)
- Adopt-A-Highway signs**
- All signs with blue or brown backgrounds**
- Bikeway signs that are intended for exclusive use by bicyclists or pedestrians**

Visual Nighttime Inspection – The retroreflectivity of an existing sign is assessed by a trained sign inspector conducting a visual inspection from a moving vehicle during nighttime conditions. Signs that are visually identified by the inspector to have retroreflectivity below the minimum levels should be replaced.

Retro Reflectometer



Current Status: Sign-Management Implementation

- 5 out of 8 districts have complete surveys.
- 4,869 out of 40,153 signs are currently out of compliance in these five districts.
- Averages out to 12% of signs being out of compliance currently.
- Maintenance forces replace non-compliant regulatory and warning signs before projects, whenever possible.

HWY	S	D	INTRCHG	REF	PS	P	NO	POST	FT/FM	PL	D	IN	ALOC	AS	SIGN	WID	HGHT	SZ	BACK	MNTC	BK	LEG	FAC	LEG	M			
				PT															OFFSET							CD	T	PT
20	N		0.000	141.195	0.0030	L	5	1	2.00	28.0	6	E	N		4	RM018	21	15	0	2	0	1	WH	BLK	H	C	1995-07-01	10
20	N		0.000	141.195	0.0060	L	5	1	2.00	28.0	6	N	N		1	RM006	24	24	12	2	0	1	WH	BLK	H	C	1996-10-01	10
20	N		0.000	141.195	0.0060	L	5	1	2.00	28.0	6	N	N		2	RM006	24	24	12	2	0	1	WH	BLK	H	C	1996-10-01	10
20	N		0.000	141.195	0.0060	L	5	1	2.00	28.0	6	N	N		3	RM017	21	15	0	2	0	1	WH	BLK	H	C	1996-10-01	10
20	N		0.000	141.195	0.0060	L	5	1	2.00	28.0	6	N	N		4	RM021	21	15	0	2	0	1	WH	BLK	H	C	1996-10-01	10
20	N		0.000	141.195	0.0420	R	5	1	2.00	28.0	6	S	N		1	RM006	24	24	12	2	0	1	WH	BLK	H	C	1996-10-01	10
20	N		0.000	141.195	0.0420	R	5	1	2.00	28.0	6	S	N		2	RM006	24	24	12	2	0	1	WH	BLK	H	C	1996-10-01	10
20	N		0.000	141.195	0.0420	R	5	1	2.00	28.0	6	S	N		3	RM017	21	15	0	2	0	1	WH	BLK	H	C	1996-10-01	10
20	N		0.000	141.195	0.0420	R	5	1	2.00	28.0	6	S	N		4	RM021	21	15	0	2	0	1	WH	BLK	H	C	1996-10-01	10
20	N		0.000	141.195	0.0510	R	5	2	2.00	74.0	5	W	N		1	RW014	96	48	0	2	0	1	YE	BLK	H	C	1995-07-01	10
FRAME																												
20	N		0.000	141.255	0.0920	L	5	2	2.00	28.0	5	N	N		1	RM042	108	42	6	2	0	1	GR	WH	E	H	1998-10-01	10
ARROW STARKWEATHER 15 LT ARROWALSEN 6 CALIO 4 RT ARROW A FRAME A FRAME																												

TOTAL SIGNS 39

TOTAL SQUARE FOOTAGE OF HIGHWAY 20 SIGNS IS 262.4

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December 05, 2012

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Wyoming State Planning Engineer
Joe McCarthy
JDI Consulting

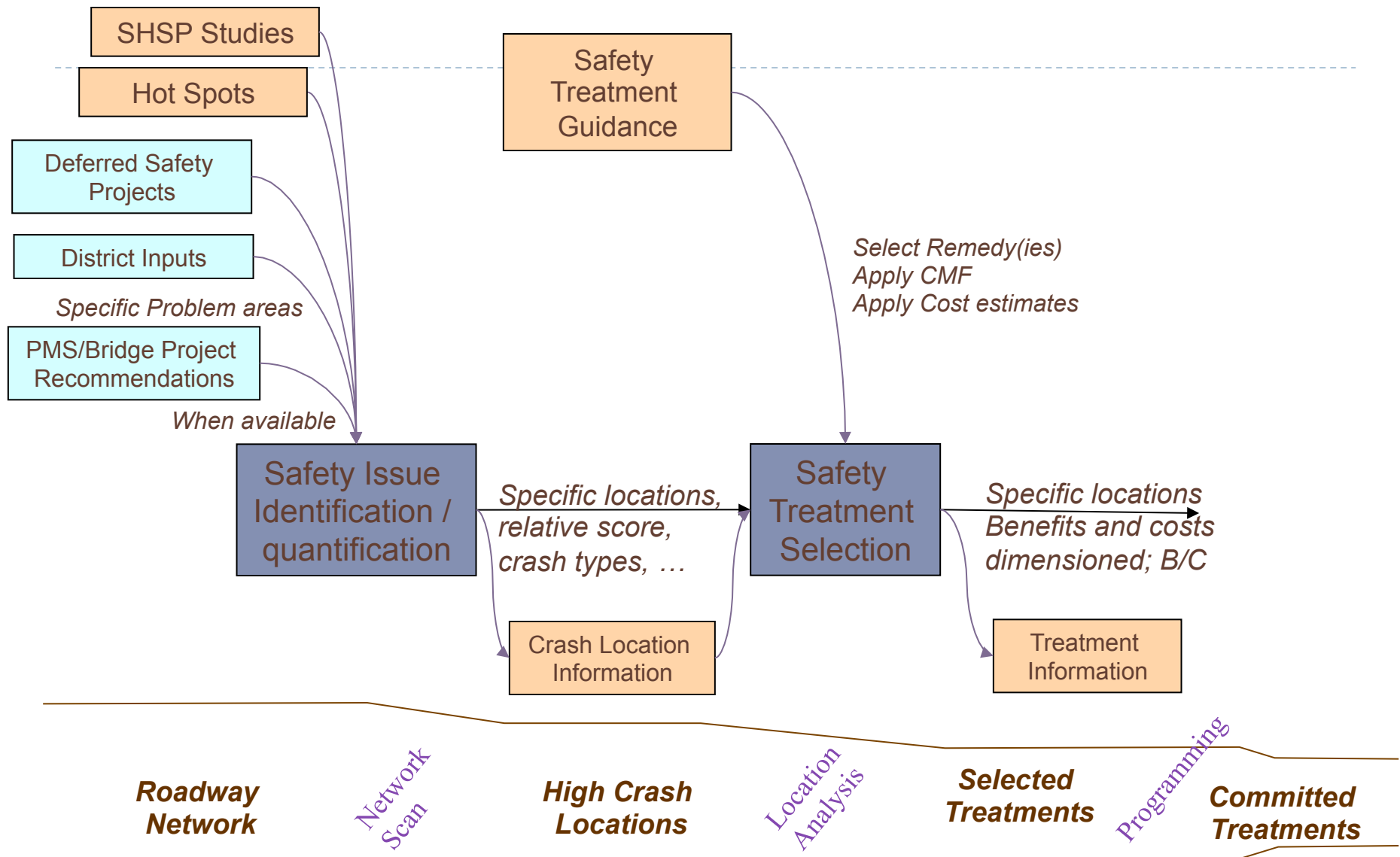
Tying Crash Types to Asset Priorities

**Absolute
Safety**

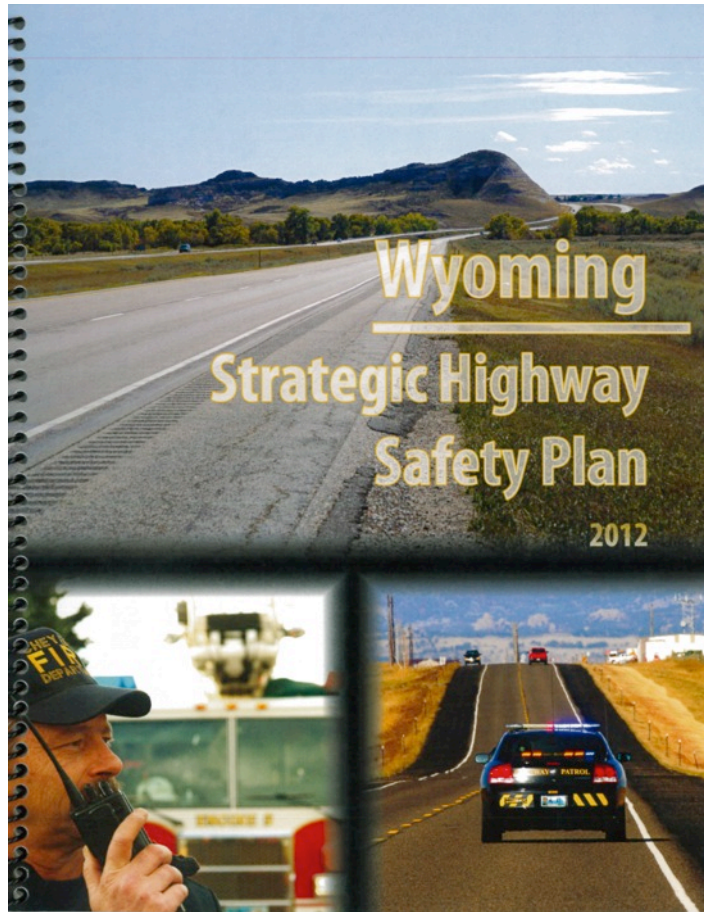
VS

**Crash
Reduction**

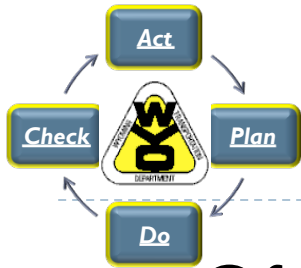
Safety Issue Analysis / Project Definition Overview



SHSP Provides Focus

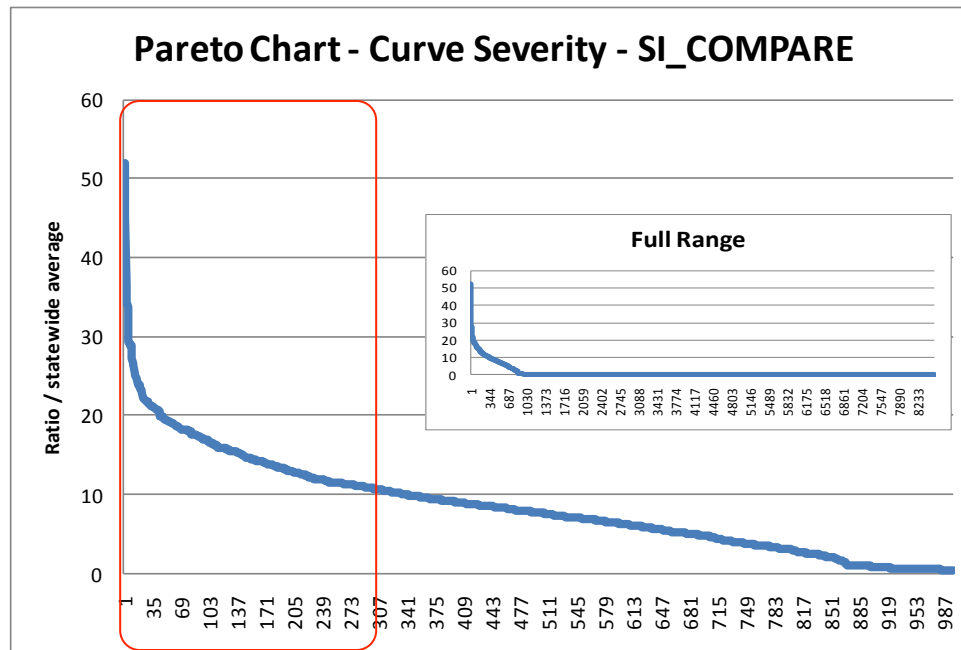


- ▶ Defines Theme Studies
 - ▶ Run off the Road,
 - ▶ Curves,
 - ▶ Intersections, etc.
- ▶ Facilitates Defining Causal Factors
- ▶ Facilitates Prioritizing Data Gathering
 - ▶ Roadway Features
 - ▶ Safety hardware



Theme Example

- ▶ Of the 8000+ curves in the state, 300 had crash frequency/severity 10x the average
- ▶ These curves were selected for first round of focus; for treatment in next 1-3 years





Remedy Pareto

- ▶ There are many remedies that could be applicable to curves
- ▶ Before review of the curves, the initial expectation was that about 24 would be widely recommended to address the first round set of curves
- ▶ After the initial review of each first round curve, the recommended remedies were limited to six different ones
 - ▶ A basic decision tree could be applied for many cases
- ▶ Advantage
 - ▶ Consistency in recommendations
 - ▶ Consistency in expectations



B/C Convergence

- ▶ WYDOT has been selecting a single CMF value per remedy
 - ▶ Taken from CMF Warehouse / HSM
 - ▶ Will be reviewed/refined over time
- ▶ **Assigned Life Cycle Cost**
 - ▶ No tweaking to favor / penalize a possible remedy
 - ▶ Maintenance plus deployment costs
- ▶ **Focus on Priorities**
- ▶ **Results in a stack of prioritized safety projects**



Qualification of Corridor Context

- Elements or resources that may impact project cost
- Evaluates Investment Required



Performance Defined Needs

- Indicators define relative needs by investment type
- Qualifiers define specific needs
- Itemization of Needs by Corridor



Solution Sets

- Preferred Strategies for addressing needs
- Alternatives defined by funding scenarios



Program Recommendations

- Priority Tiered recommendations
- Matrixed with funding scenarios



Summary

- ▶ Network System analysis coupled with determined priorities (SHSP) drive highest potential reduction crashes.
- ▶ Recommended set treatments and locations allow for “common” assets to install or upgrade
- ▶ Costs and CMF commonality allows for early prioritization
- ▶ Stack of prioritized safety treatments provide planning and programming interface