



I-94 Work Zone Performance Measures

Management Peer Exchange Workshop

Michigan DOT I-94 Corridor

Atlanta, GA - May 8, 2013

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Michigan Department of Transportation



I-94 Work Zone Performance Measures

Overview

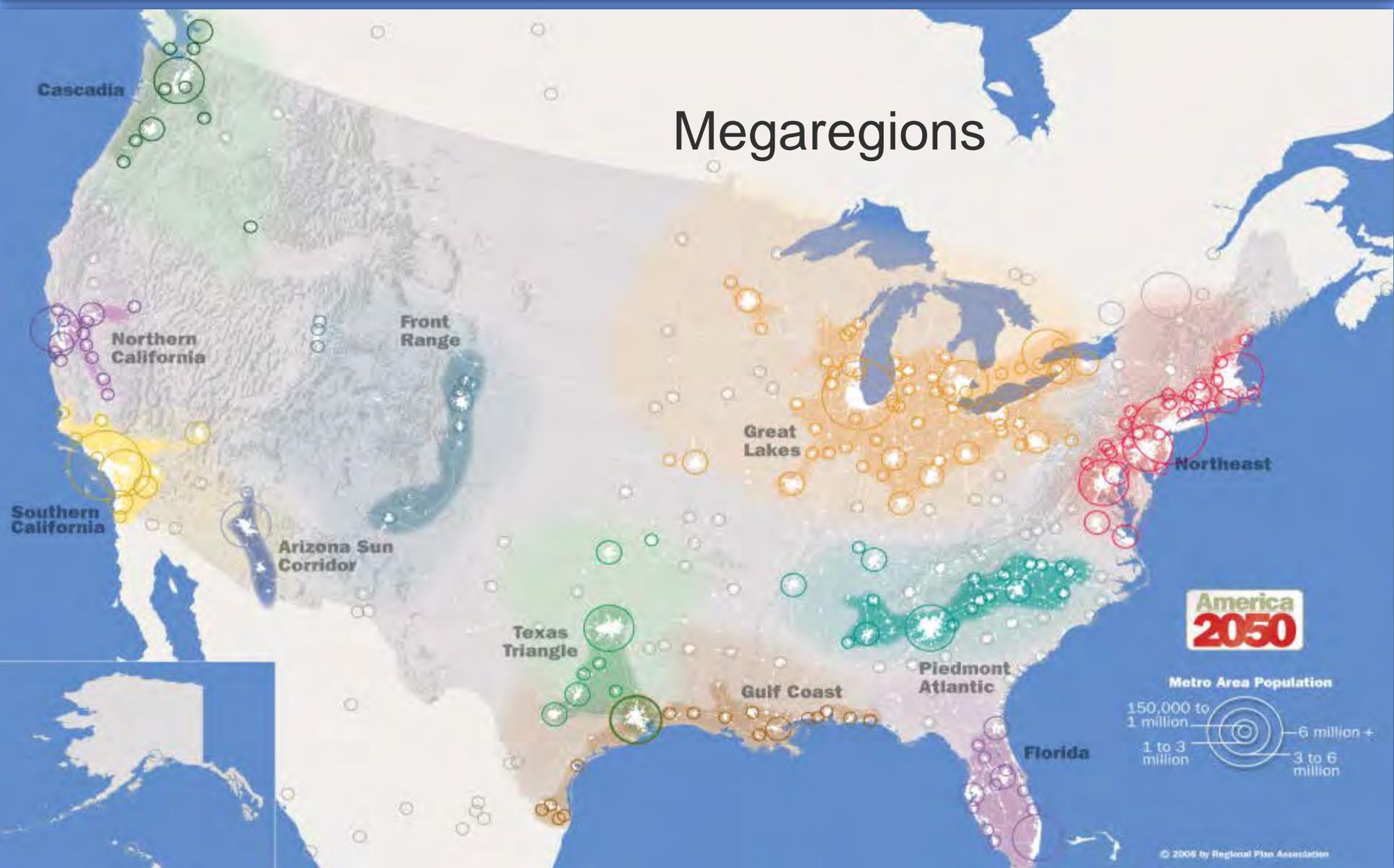
- Great Lakes Megaregion and GRLTOC
- I-94 Corridor Operations Partnership (COP)
- Travel Time and User Delay Cost (UDC)
- Performance Measures
- Technology, Resources, Data
- Lessons Learned
- Best Practices





I-94 Work Zone Performance Measures

Great Lakes Megaregion





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Great Lakes Region Transportation Operations Coalition





I-94 Work Zone Performance Measures

MDOT I-94 Corridor Operation Partnership



I-94 Fast Facts

- Three Regions
- Nine TSC's
- Nine Counties
- 275 miles

I-94 Corridor in 2010

19 Projects with Three Regions' Focus

Southwest Region



University Region



Metro Region





I-94 Work Zone Performance Measures

MDOT I-94 Corridor Operation Partnership



I-94 Corridor Operation Partnership (COP)
Mission : "Improve traffic operations and system reliability along the I-94 corridor statewide."

I-94 COP Objectives

- Unification of the I-94 corridor with one focus
- Travel Reliability: 40 min delay max for entire corridor



2011 Predicted Performance



3 Projects	8 Projects	4 Projects
15.5 Miles of WZ	32.8 Miles of WZ	17.3 Miles of WZ
3.3 minutes TTD in Peak	13.0 minutes TTD in Peak	3.8 minutes TTD in Peak
6.9 min. TTD in Off-Peak	14.1 min. TTD in Off-Peak	12.2 min. TTD in Off-Peak





I-94 Work Zone Performance Measures

Travel Time Delay and User Delay Cost

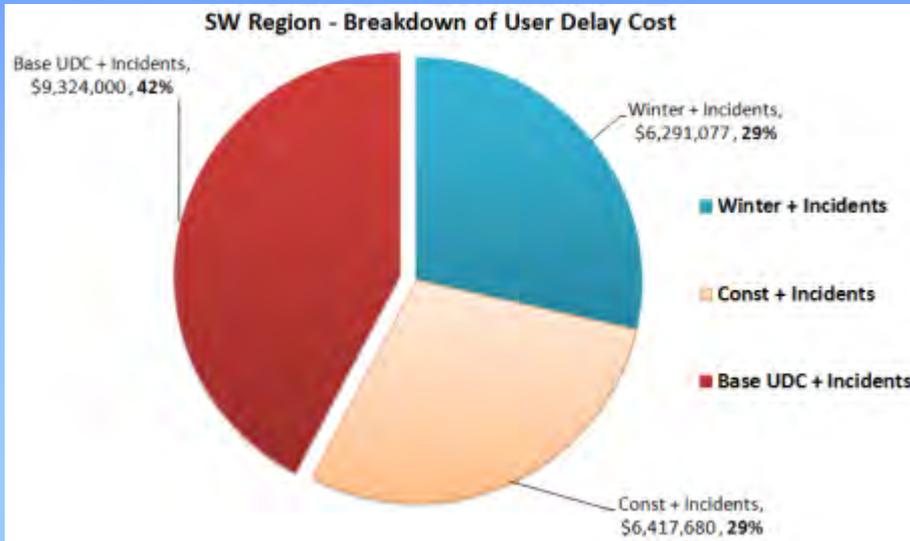
UDC is a fairly easily defined and comprehensible metric for transportation professionals as well as the public and other partners in highway operations.

User Delay Cost	Travel Time Reliability
Tangible, Relatable Unit of Measure	More Complex "Index"
Real Time, Up to the Minute	Good for Long Term Trends, but Loses Meaning at Hourly Increments
Accounts Well for Variation in Volume, Location & Time of Day Impacts	Not as Reflective of Volume, Location, and Time of Day Impacts
Actionable: Allows for Proactive & Active Management that Connect to Results	Difficult to Tie Actions to Outcomes



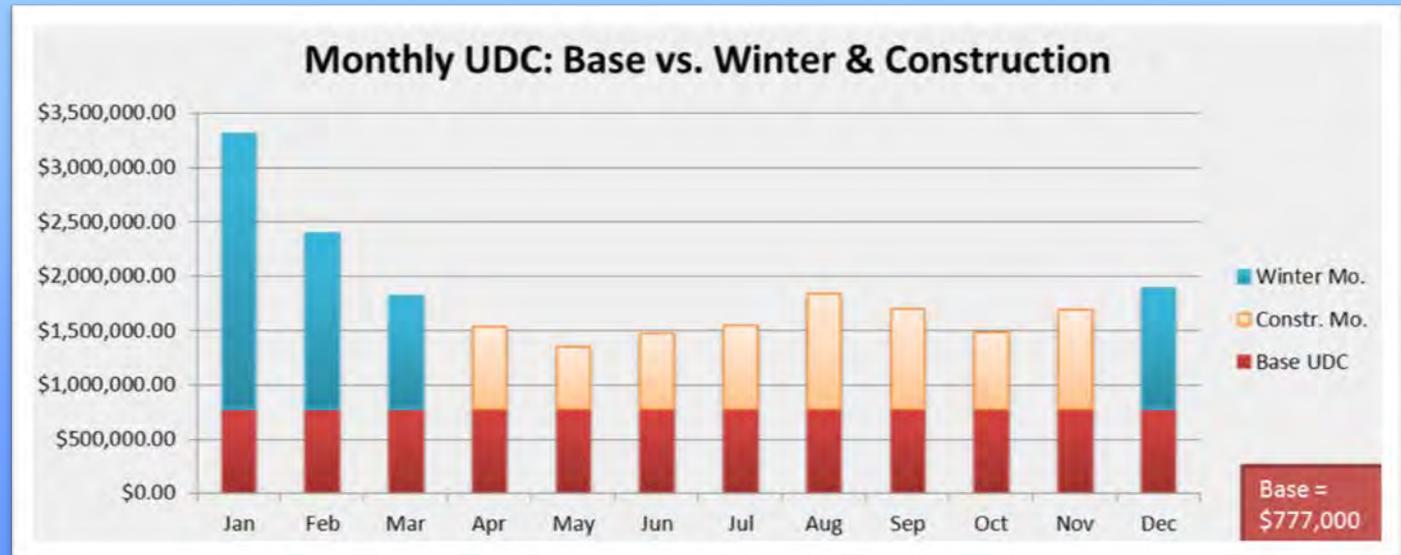
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User Delay Cost Breakdown – MDOT Southwest Region



Recurring Vs. Non-recurring Delay

- Recurring congestion is the baseline.
- Non-recurring are above the baseline; examples, winter, work zones and traffic incidents.



Breakdown is based on three year average provided by RITIS.



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MDOT Southwest Region I-94 Performance Measures

Evolution of work zone performance measures

- 2010 – Time (project level)
- 2011 – Time (corridor level), Speed and MOT
- 2012 – Speed and MOT
- 2013 – Time (predicted versus actual), Cost and Communication

Performance Measurement Elements

Cost due to delay in work zone

Time (Project and Corridor level)

Speed

Maintenance of Traffic (MOT) Implementation

Communication

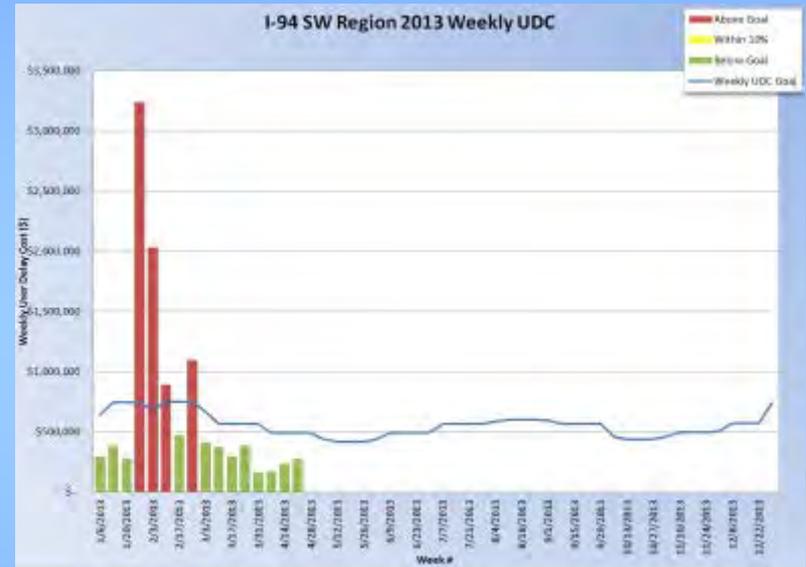


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Cost Performance Measurements

Cost Performance Measure:
Limit the 2013 user delay cost on the I-94 corridor to \$108 million.



Yearly UDC vs Goal

Kalamazoo I-94		# Hours 2x the Avg: 10				# Days 2x the Avg: 0																				
	12:00 AM	1:00 AM	2:00 AM	3:00 AM	4:00 AM	5:00 AM	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	5:00 PM	6:00 PM	7:00 PM	8:00 PM	9:00 PM	10:00 PM	11:00 PM	Daily Totals	
4/15/2013	274	81	9	0	3	775	861	378	404	305	41	66	256	305	204	138	362	128	646	587	188	1305	301	287	7521	
4/16/2013	199	156	153	142	56	111	317	143	408	295	242	91	130	964	178	272	3	286	485	915	252	320	106		5332	
4/17/2013	155	162	220	80	119	197	758	553	219	257	425	200	41	240	31	56	652	196	648	1075	254	158	769	437	5588	
4/18/2013	199	143	125	211	353	180	767	94	246	8	130	267	369	213	475	137	277	263	770	88	186	349	631	1013	7337	
4/19/2013	186	224	210	209	74	367	593	236	337	33	97	91	312	212	79	144	344	280	9	96	571	1568	977	699	18674	
4/20/2013	13	80	37	26	141	123	111	56	487	447	141	100	9	86	432	36	387	130	235	345	342	171	87	3	1861	
4/21/2013	18	8	8	28	0	0	0	0	0	0	0	0	115	27	0	101	209	0	39	0	484	694	232	248	334	2579
Hourly Totals	1002	779	742	743	779	5482	8707	1517	2607	1205	1292	926	775	420	2466	784	2420	1194	2617	3021	9108	7625	6423	5444	46389	
Annual Hourly Avg	120	124	100	74	70	204	813	310	118	342	794	705	708	375	340	376	1440	1263	702	536	303	643	368	368	1638	\$
2x the Avg	401	242	111	142	104	601	1705	2316	234	1024	2561	1330	1119	1206	1246	2775	2401	1124	2401	1124	1124	1124	1124	1124	1124	\$108M

UDC Weekly Summary

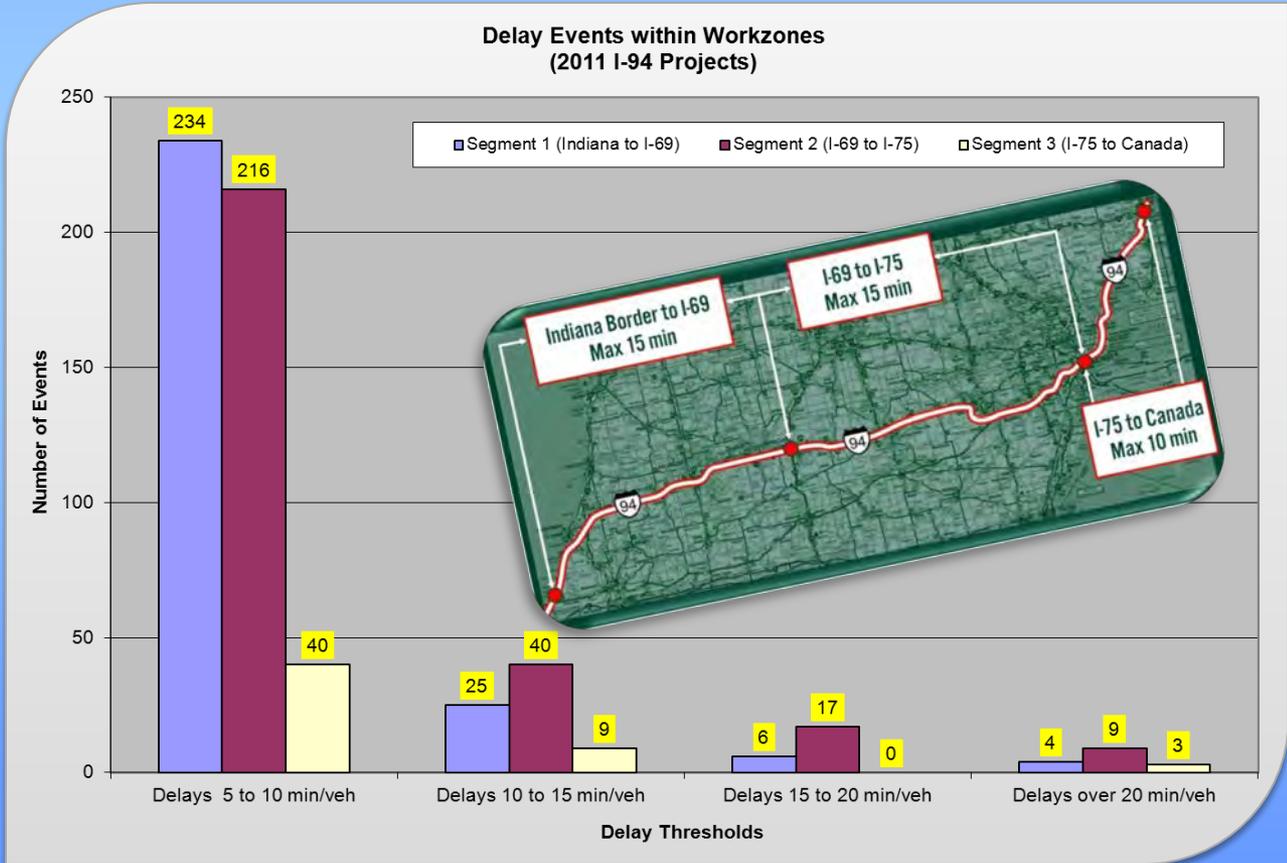


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Time Performance Measurements

Travel Time Delay:
Maintain a maximum of 40 minutes travel time delay for the I-94 corridor



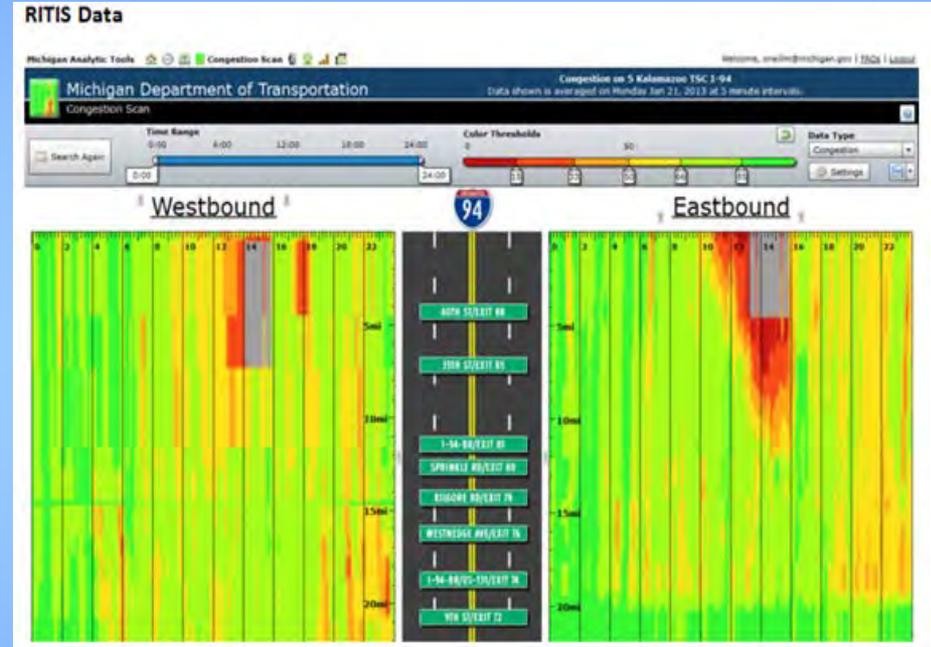
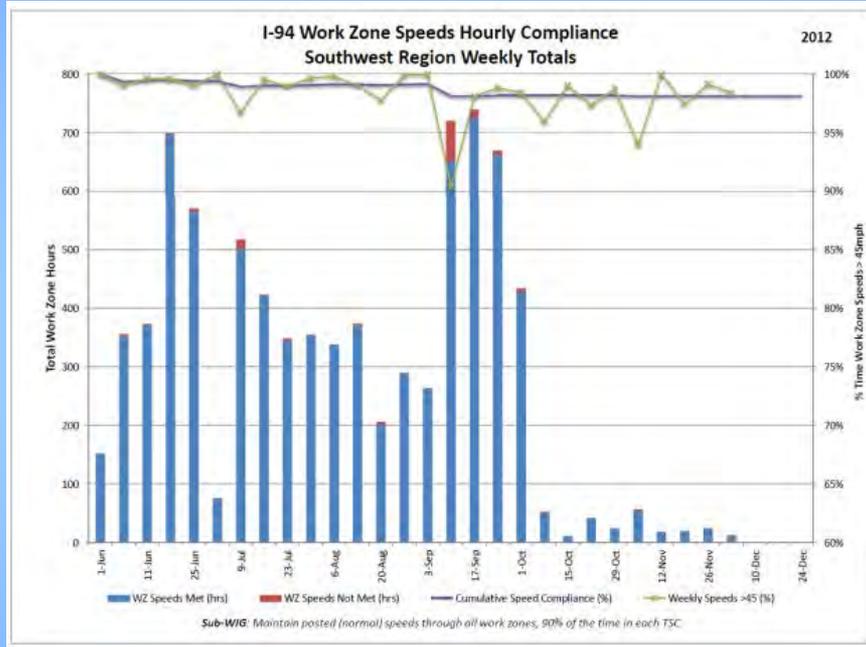
Travel Time Results by Segment



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Speed Performance Measurements



RITIS Heat Map

Work Zone Speed Compliance:
Maintain posted (normal) speeds through all work zones, 90% of the time in each TSC.



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MDOT Southwest Region I-94 Performance Measures

Maintenance of Traffic Performance Measurements

Michigan Department Of Transportation 0397 (08/10)

WORK ZONE AUDIT REPORT

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REVIEWED BY: Brian Barnes & Kerry DenBraber DATE/TIME: _____

ROUTE AND LOCATION: _____ JOB #: _____ REGION/TSC: SW Region / Kalamazoo TSC FOLLOW UP DATE: _____

WORK ZONE TYPE: (Mobile, Shoulder Closure, Full Closure, Lane closure, Other) PERMIT CONSTRUCTION MAINTENANCE LOCAL AGENCY PROJECT

EXISTING SPEED LIMIT: _____ POSTED WZ SPEED LIMIT: _____ DELIVERY ENGINEER: _____ CONTRACTOR: _____

ACTUAL SPEED: _____ POLICE ENFORCEMENT PRESENT: YES NO

NO.	CHECKLIST	RATING	COMMENTS
A = Acceptable, S = Satisfactory, M = Marginal, U = Unacceptable, ICR = Immediate Changes Required			
1	Mobility:		
	Approximate back up (miles)		
	Time through back up in minutes (from initial slow down to work zone begins sign)		
	Time through work zone (between work zone begins and work zone ends)		
2	Driverability:		
	Maneuvers: traffic shifts, tapers, lane merge, entrance/exit ramps		
	Lane widths, edge drops, buffer space		
	Hazards: Adequate warning/signing, evidence of accidents		
3	Contractor Behavior:		
	Personal Protection Equipment (PPE), beacons, strobes, worker visibility		
	Traffic Regulators: operating correctly, properly positioned and signed, adequate escape path		
	Ingress/Egress (Workers/equipment interfering with traffic operation?)		
	Pilot cars and shadow vehicles used and signed correctly		
	Equipment/Material Storage		

Work Zone Set-Up Compliance:
Perform two work zone reviews per week at each project set-up and stage change 90% of the time.

Work Zone Set Up Review Report

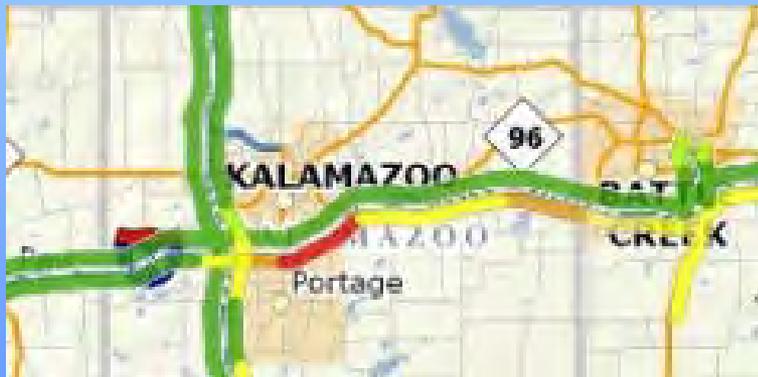


I-94 Work Zone Performance Measures

MDOT Southwest Region Resources, Technology and Data

Resources, Technology and Data

- Operation focus shift
- ITS infrastructure
- Vehicle speed probe data
- Manual calculation of delay
- Auto calculation of delay



Michigan Department of Transportation
Analytic Tools

-  **Michigan System Monitoring Dashboard**
Explore the impacts of and relationships between bottlenecks and traffic events in real-time and at previous points in the past.
-  **Massive Raw Data Downloader**
Download raw probe data from our archive.
-  **Congestion Scan**
Explore the rise and fall of congested conditions on a stretch of road.
-  **Historic Probe Data Explorer**
View aggregated data from previous points in time.
-  **Bottleneck Ranking**
Rank bottlenecks and discover which ones have the greatest impact.
-  **Speed Threshold Breakdown**
Determine how well or how poorly a road performed between two dates.
-  **User Delay Cost Analysis**
Put a dollar amount on how much a road's performance impacts its users.

Regional Integrated Transportation Information System (RITIS)



I-94 Work Zone Performance Measures

MDOT Southwest Region Lessons Learned

Lessons Learned

- Change in behavior/culture
- Speed has the most influence to the goal
- Project development is key to success
 - Applying experience helped us to refine lane restrictions and work operations
- Testing cultural change to measure communication



Mission: Improve traffic operations and system reliability along the I-94 corridor statewide



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Questions?

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