

**OREGON DEPARTMENT OF TRANSPORTATION
TRAFFIC CONTROL PLANS UNIT**

2010

CONSTRUCTION WORK ZONE TOUR



SUMMARY REPORT

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TO: ODOT Construction Project Managers, ODOT Consultant Project Managers, ODOT Safety Staff and Participants in the 2010 Work Zone Tours

DATE: February, 2011

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State Traffic Control Plans Engineer

BACKGROUND

Since 2002, ODOT has been conducting detailed work zone reviews in an effort to strengthen the quality, efficiency and safety of its highway construction work zones. The 'Work Zone Tours' serve as a key element within our quality control and quality assurance programs. The Tours allow designers, Safety staff, project coordinators and Construction personnel the opportunity to observe strengths and weaknesses within this unique and dynamic discipline.

Over the past decade, ODOT has experienced a significant increase in State Highway construction projects as a result of the OTIA III Bridge Replacement funding package. The rise in construction projects, accordingly, increased ODOT project design workloads to the point where the Department sought assistance through private design firms to develop these projects, including the necessary traffic control plans. The role of the Traffic Control Plans Unit in monitoring and maintaining statewide traffic control plan consistency and quality has become more pronounced, and thus, raised the importance of the annual Work Zone Tours.

The purpose of the Tours is four-fold:

- 1) Confirm ODOT Temporary Traffic Control Design Standards and Practices are being implemented in the field consistently and uniformly.
- 2) Confirm that the latest Standards and Practices are effective at providing a satisfactory level of safety for the traveling public and construction workers.
- 3) Reveal additional techniques or technologies needed to improve overall safety, traffic flow and construction efficiency.
- 4) Strengthen communication and working relationships between ODOT design and construction staff, consultants; and, contractor employees.

INTRODUCTION

As part of our commitment to our statewide Temporary Traffic Control Program, we conducted several, multi-day construction work zone tours across the State in July, 2010. Forty-two different highway construction work zones were reviewed and scored.

The 2010 construction season provided us with a wide variety of work zones. Projects ranged from multi-million dollar modernization projects on I-5 to smaller local agency projects on city or county roads. Projects also ranged in longevity from one or more years, to projects completed in a matter of weeks.

Participants of the Tours were asked to score the work zones, grading them on a wide array of performance measures. Scores and comments are used to focus on and heighten awareness of the many standards, practices and procedures used in the design and implementation of ODOT's Traffic Control Plans. This report provides feedback for statewide Traffic Control Plan Designers, ODOT engineering consultants and the Region Construction Project Management offices. ODOT has benefitted from this exercise and realized measurable improvements in the discipline of temporary traffic control.

STATEWIDE PROJECT LIST

REGION 1

OR 213: Milk Creek Br. - Mulino
 OR99E: MLK Jr. Viaduct (Grand O'xing
 I-5: Victory Blvd. - Lombard
 I-84: Sandy R. - Jordan Rd. (Bundle 210)
 I-84: Multnomah Falls - Cascade Locks Paving
 I-84: @ Exit 64 (Hood River)(Bundle 224)
 OR 202: Nehalem River (Banzer) Bridge

REGION 2

US 101 @ Columbia R. (Astoria-Megler) Bridge
 OR 53: Necanicum River Bridge
 OR 53: Region 2 Fish Passage (Bergsvik Cr.)
 US 101: 12th St. (Tillamook) - Farmer Creek Rd.
 I-5: Battlecreek Interchange - N. Jefferson
 OR99E: Chicago St. - SPRR
 OR99W: Locke Creek Bridge Replacement
 I-5: @ Beltline (Unit 1) & Gateway (Unit 2, Springfield)
 I-5: @ Willamette River Bridge
 OR 126: Knowles Cr. - Siuslaw R. (Bundle 508)
 US 20 Pioneer Mountain Loop (aka Simpson Cr. Curves)
 US 20: Pioneer Mountain To Eddyville

REGION 3

I-5: Elkhead Rd - Curtin (Bundle 508)
 I-5/OR 42: Winston - McLain Ave (Bundle 307)
 I-5: Shady Bridge
 I-5: Green Springs Hwy (Exit 14) (Bundle 316)
 OR 234: Rogue River (Rock Point) Bridge Rehab
 Hwy 199: Passing Lanes
 US 101: Panorama Dr. - Thomas Cr. Preservation
 US 101: Kobernik Slide Complex, Unit 1
 US 101: Coquille R. (Bullards) Bridge (Bandon)
 US 101: McCullough Bridge Rehab

STATEWIDE PROJECT LIST

REGION 4

I-84 @ Fifteen Mile Cr. (The Dalles)

OR 140: Beatty Curves Section

US 97: Modoc Point - Hagelstein Section

US 97: Lava Butte - S. Century Dr. (Sunriver)

US 20: Purcell - Arnold Ice Caves

US 20: 5th Street - O.B. Riley Rd. (Tumalo)

REGION 5

US 30: Court - Dorian (Pendleton)

OR 82: Imbler Stormwater & Ped Improvements

OR 82: Imbler - Joseph Chipseal

OR 82: Grand Ronde R. & INPRR (Bundle 462)

OR 82: Minam Viaduct & Willowa R. (Bundle 460)

US 395: McKay Cr. - Silvies (Camas Cr. - Bundle 414)

US 395: McKay Cr. - Silvies (John Day R. - Bundle 414)

WORK ZONE TOUR PARTICIPANT COMMENTS

Work zone tours were conducted over three separate trips in July 2010:

- Regions 1 and 2 (north) were covered over two days
- Regions 2 (south) and 3 were covered over three days
- Regions 4 and 5 were covered over four days

Evaluation Forms were collected from 42 different construction projects, visited by 16 Reviewers, resulting in over 25 pages of scores and comments.

On the Evaluation Forms, reviewers are asked to provide a score for each of the 31 different “performance measures” for each project visited. The Measures are meant to capture participants’ perspectives on device usage, quality and effectiveness. See *Work Zone Scoring*, below, for additional details.

All comments were evaluated and sorted in several different ways:

- 1) Sorted by Region, then by performance measure, then by project
- 2) Sorted by Region, then by project, and then by measure
- 3) For measures that received a score of 8 or higher, sorted by Region, then:
 - a) By measure, then by project
 - b) By project, then by measure

This was done to help identify projects and measures that received higher scores.

- 4) For Measures that received a score of 5 or lower, sorted by Region, then:
 - a) By measure, then by project
 - b) By project, then by measure

This was done to help identify projects and measures that received low scores.

Not all 16 Reviewers we present for all 42 projects. On average, seven reviewers participated in each of the three work zone tours. An array of various reports can be generated from the same 25 pages of comments. If interested in any of these reports, please contact the Traffic Control Plans Unit in Salem.

WORK ZONE SCORING METHODS

On pages 8 and 9 is a copy of the *Work Zone Tour Evaluation Form (Figures 1 and 2)* used by Reviewers on the tours to record scores, notes and comments for each project visited.

Each reviewer was asked to evaluate the condition and effectiveness of a variety of devices used within the work zone. Over 30 different “measures” are scored for each project visited. Scores are based on a scale of 1 (low) to 10 (high). A score of 4 or less warrants contact with the ODOT Project Manager’s office or an on-site agency representative to discuss the issue and possible mitigation strategies.

Again this year, we benefitted by having a number of new participants on the Work Zone Tour from different backgrounds and with varying perspectives.

This year:

- 42 projects were evaluated spanning all 5 Regions.
- 16 Reviewers helped evaluate the projects, including representatives from:
 - ♦ ODOT Construction Project Management and Inspection
 - ♦ ODOT Traffic-Roadway Section
 - ♦ Region Tech Centers - Design

- ◆ ODOT Employee Safety
- ◆ Oregon Bridge Delivery Partners (OBDP) – Design, Construction Management
- ◆ ODOT Major Projects Branch
- ◆ Marion County Public Works
- ◆ Federal Highway Administration (FHWA)

Note: Measures are scored as applicable for each project. If a device or condition is not present on the project at the time of the visit, a score is not given for all applicable measures. For example, temporary concrete barrier may be included in the contract, but if not in use or located on the project site at the time of the visit, “Temporary Concrete Barrier” (and likely, “Temporary Impact Attenuators”) is not scored for that project.

Each project was evaluated using the following measures:

- Temporary Signing – Look for overall quality, visibility, spacing, legibility, design and compliance.
 - Condition
 - Placement
 - Spacing
- Channelization Devices – Look for overall quality, condition, placement and effectiveness.
 - Tubular Markers/Cones
 - Drums
 - Barricades
- Pavement Markings & Markers – Look for overall quality, visibility and removal (of conflicting).
 - Condition
 - Placement
- Temporary Concrete Barrier – Look for alignment, crashworthy installations and quality.
 - Condition
 - Placement
- Reflective Barrier Panels – Look for condition, cleanliness, effectiveness and placement.
- Temporary Impact Attenuators – Look for proper application, quality and maintenance.
 - Condition
 - Placement
- Portable Changeable Message Signs – Look primarily for good, effective messages.
 - Message
 - Placement
 - Condition
- Sequential Arrow Panels – Look for correct placement, application and quality of device.
 - Placement
 - Condition
- Temporary Traffic Signals – Look for proper installation, operation, efficiency, maintenance.
 - Set-up
 - Condition
- Bike/Ped/ADA Facilities – Look for compliance, details, signing, continuity and adequacy.
 - Signing
 - Continuous route
 - ADA compliance
- Look for similar details for Flaggers, Pilot Cars, Mobility and Worker safety apparel.

WORK ZONE TOUR EVALUATION FORM

PROJECT NAME:				DATE:					
HIGHWAY:				REVIEWED BY:					
PROJECT MANAGER:		OTHER CONTACTS:							
CONTRACTOR:									
GENERAL NOTES									
Only score Devices you witnessed on the Project. If a certain device was not present, do not score it.									
<u>Any score of 5 or less</u> - Notify the PM Office <u>before the end of the business day</u> .									
<u>Any score of 4 or below</u> - Immediately contact Project Inspector and/or Contractor Rep. Follow-up with PM Office.									
S C O R I N G									
Notify PM or Field Project Representative!				BELOW AVG.	AVERAGE	ABOVE AVG.	GOOD	VERY GOOD	EXCELLENT
1	2	3	4	5	6	7	8	9	10
C A T E G O R I E S				S C O R E	N O T E S				
TEMPORARY SIGNING <i>(Signs, Flags, Supports)</i>		QUALITY							
		PLACEMENT							
		SPACING							
CHANNELIZATION DEVICES <i>(Tubular Markers, Cones, Drums, Barricades)</i>		Tubes/Cones							
		DRUMS							
		BARRICADES							
PAVEMENT MARKINGS <i>(Paint, Tape, Reflective & Flexible Markers)</i>		CONDITION							
		PLACEMENT							
CONCRETE BARRIER <i>Reflective Barrier Panels? Y or N</i>		CONDITION							
		PLACEMENT							
		CONDITION							
IMPACT ATTENUATORS <i>(Drum Arrays, Narrow-Site & TMA)</i>		CONDITION							
		PLACEMENT							
PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)		MESSAGE						Capture message, if possible	
		PLACEMENT							
		CONDITION							
SEQUENTIAL ARROW PANEL <i>(Arrow Board)</i>		PLACEMENT							
		CONDITION							
TEMP. TRAFFIC SIGNALS		SET-UP							
		CONDITION							
BICYCLE, PEDESTRIAN & ADA FACILITIES <i>(Score if existing facilities affected by construction)</i>		SIGNING							
		Continuous Route?							
		ADA Compliance							
PAGE 1 TOTAL =									

FIGURE 1 – Work Zone Evaluation Form, Page 1 of 2

WORK ZONE TOUR EVALUATION FORM

PROJECT NAME:					DATE:				
HIGHWAY:				REVIEWED BY:					
PROJECT MANAGER:			OTHER CONTACTS:						
S C O R I N G									
<i>Notify PM or Field Project Representative!</i>				BELOW AVG.	AVERAGE	ABOVE AVG.	GOOD	VERY GOOD	EXCELLENT
1	2	3	4	5	6	7	8	9	10
CATEGORIES				SCORE	NOTES				
FLAGGERS			VISIBILITY						
			Performance						
PILOT CARS			Equipment						
			Performance						
MOBILITY			Overall Flow						
			Time Stopped At Flagger or Signal (if applicable)	min					
WORKER GARMENTS & EQUIPMENT			GARMENTS						
			EQUIPMENT						
SITE HOUSEKEEPING			CLEAN, ORDERLY						
			ON-SITE?	Y or N					
POLICE ENFORCEMENT			PAYING OT?	Y or N					
			Ease of Navigation						
DRIVER-FRIENDLY WORK ZONE			Consistency		This category for information only. Do not include in Page Total.				
			TRAFFIC CONTROL SUPERVISOR (TCS) part of Contract?	YES or NO					
PAGE 2 TOTAL =									
PAGE 1 TOTAL =									
GRAND SUBTOTAL =				=	N*	=	FINAL SCORE		
=				÷		=	=		

* N = The Number of Scored Categories

FIGURE 2 – Work Zone Evaluation Form, Page 2 of 2

SCORING RESULTS

In the statistics that follow, over 6,000 scores from the 16 different participants were tabulated for the 42 projects. Project scores were combined and averaged based on the number of participants submitting an Evaluation Form. Overall average project scores were calculated for each Region and are compared to scores collected since 2002 (*Figures 4 through 6*). Average scores for individual projects were ranked in order of highest to lowest (see *Pages 13-17*).

WORK ZONE MEASURE SCORING SUMMARY

Figure 3 (right) shows the statewide average score for each work zone performance measure. Figure 3 can be used to identify measures (devices, practices) needing additional attention at the design and/or implementation phase of the project. It also identifies measures that are meeting or exceeding our expectations as road users.

Of the 31 measures, all but six received an average score above 6.45. Two of the measures received average scores above 7.00.

The six measures that consistently received the lowest average scores for 2010 were:

- Bicycle, Pedestrian & ADA Facilities – ADA Compliance, **5.88**
- Bicycle, Pedestrian & ADA Facilities – Continuous Route, **6.20**
- Bicycle, Pedestrian and ADA Facilities – Temp. Signing, **6.36**
- Flaggers – Performance, **6.37**
- Portable Changeable Message Sign – Message, **6.40**
- Sequential Arrow Panel - Condition, **6.41**

The two measures that consistently received the highest average scores for 2010 were:

- Mobility – Overall Flow, **7.11**
- Concrete Barrier – Reflective Barrier Panels – Placement, **7.00**

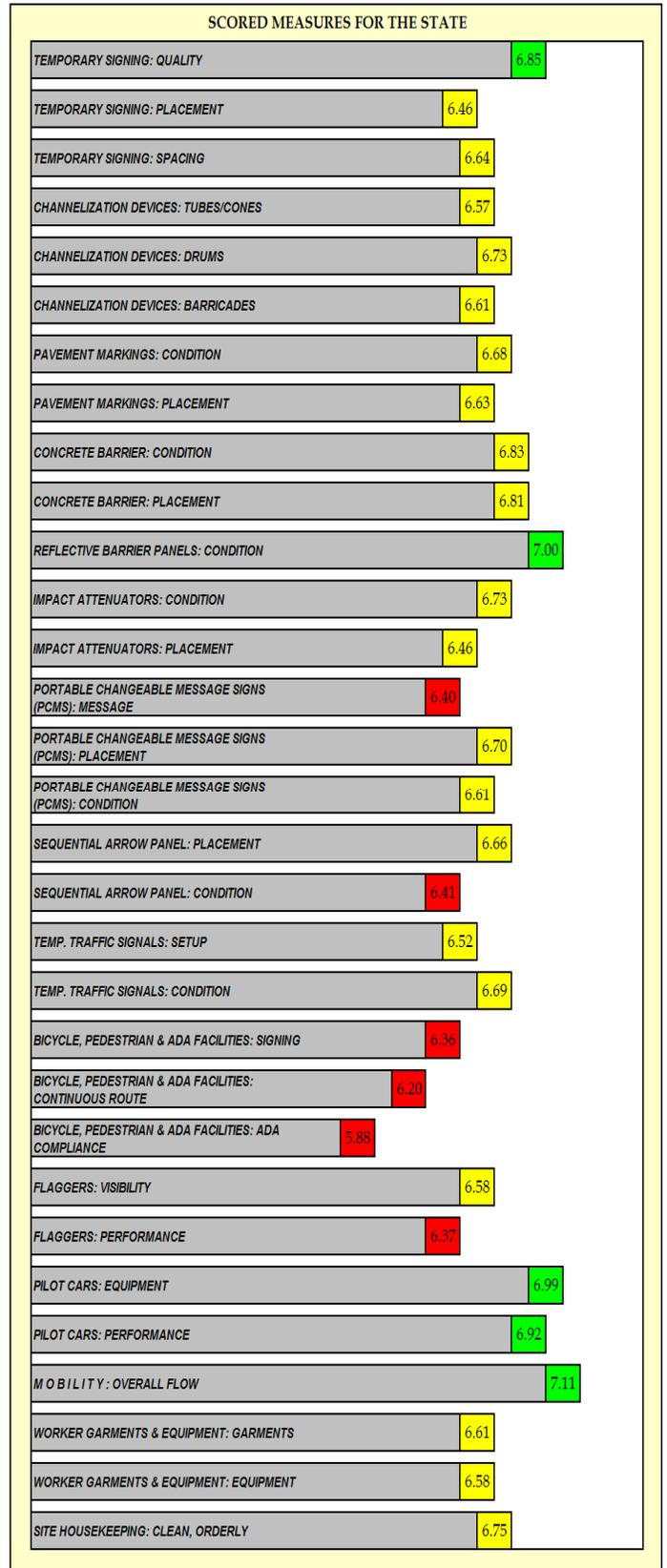


FIGURE 3 – Average Scores for Measures

STATEWIDE SCORING SUMMARY

The 2010 Work Zone Tours reviewed far fewer projects this year – the lowest since 2007. The statewide average project score decreased in 2010, as well – dropping to 67 – the lowest score since formal scoring began in 2002.

However, in accounting for this sharp decline, it must be noted that several of the Reviewers participating this year were new to the process and may have scored projects more aggressively than past Reviewers. It should also be noted that making comparisons of this overall statewide score from one year to the next, may not accurately reflect the quality of individual projects or individual performance measures. More detailed examination of the scores given to projects and measures should be made to better understand ODOT’s overall progress in its temporary traffic control practices. See Figures 4 through 6 for additional comparisons.

2010 WORK ZONE TOUR SUMMARY REPORT		SCORING STATISTICS by YEARS								
	2002	2003	2004	2005	2006	2007	2008	2009	2010	
TOTAL PROJECTS REVIEWED	22	29	46	54	43	38	43	60	42	
HIGH SCORE	89	82	87	82	81	81	94	88	74	
AVERAGE SCORE	72	73	73	71	71	75	77	76	67	
LOW SCORE	54	63	53	51	59	63	68	62	53	

Figure 4 – Annual Scores

REGIONAL SCORING SUMMARY

All Regions experienced decreases in overall average project scores. Compared to 2009, Regions 1 and 4 experienced the least drop in average projects scores (~ 6%), with Region 2 seeing the largest decrease in overall project scoring (~ 11%).

2010 WORK ZONE TOUR SUMMARY REPORT						
REGIONAL YEARLY AVERAGE SCORING						
	AVERAGE SCORE					YEARLY AVERAGE
	REG 1	REG 2	REG 3	REG 4	REG 5	
2002	69.3	61.3	75.5	76.3	76.2	71.7
2003	77.7	72.5	72.8	74.0	70.4	73.5
2004	72.8	72.0	72.3	74.5	75.7	73.5
2005	73.9	70.9	70.0	69.9	72.0	71.3
2006	75.6	68.1	70.3	66.7	71.9	70.5
2007	76.7	74.8	72.8	74.8	73.5	74.5
2008	82.0	74.0	75.0	78.0	77.0	77.2
2009	74.3	78.4	75.7	73.8	73.6	75.6
2010	68.1	67.2	66.1	68.4	64.6	66.8

Figure 5 – Annual Scores by Region

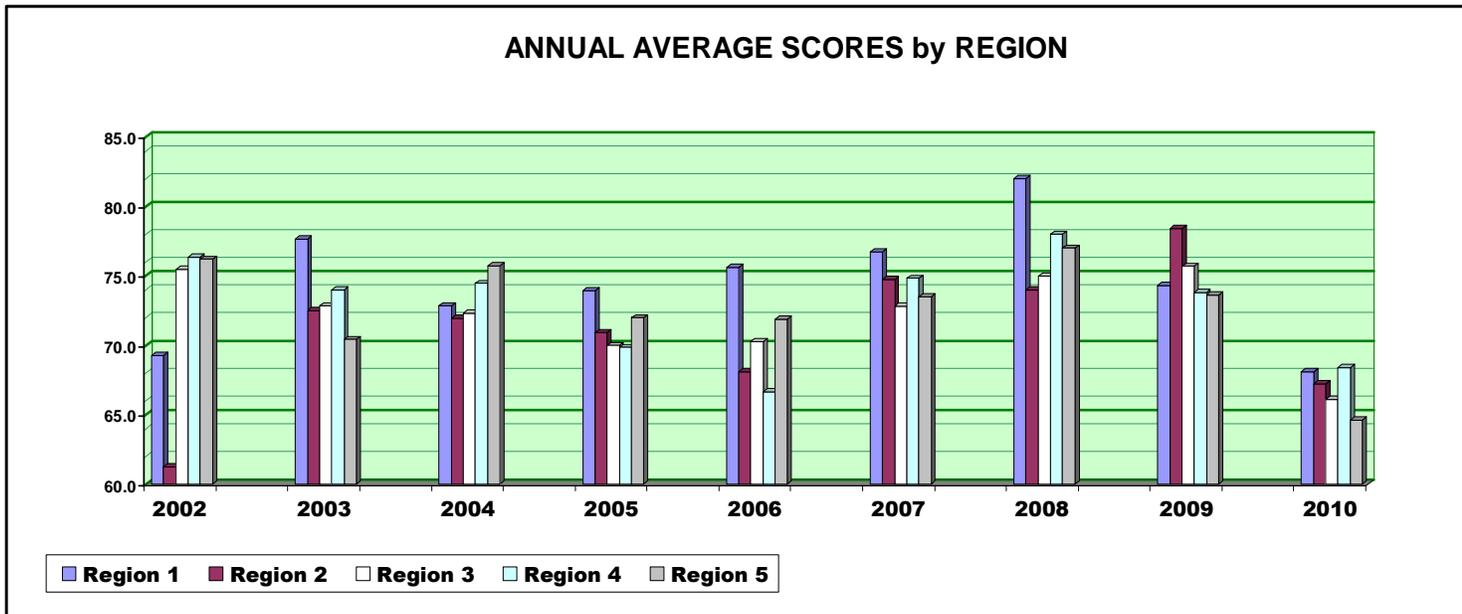


Figure 6 – Annual Scores by Region (graph)

Again, if looking at the scores within each Region and how they compared against one another for 2010, the scoring is consistent. There were few cases where scores fell below 6 (“Average”), yet overall, projects were given a score of “Average” or better.

For 2010, average Region scores were closely grouped – varying between a low of 6.46 to a high score of 6.84 from Region 4. See Figure 7, below.

REGION	# of PROJECTS REVIEWED	AVG. SCORE
1	7	6.81
2	12	6.72
3	10	6.61
4	6	6.84
5	7	6.46

Figure 7 – Average Region Scores

Figures 8 through 12, below, show individual Region Project scores sorted highest to lowest.

REGION 1 PROJECTS RANKED BY SCORE	
I-5: Victory Blvd. - Lombard St.	7.29
OR 99E MLK Jr. Viaduct (/Grand O'xing)	7.25
I-84: Sandy R. - Jordan Rd. (Bundle 210)	6.49
OR 213: Milk Creek Br. - Mulino	6.44
I-84: Multnomah Falls - Cascade Locks paving	6.43
I-84 @ Exit 64 (Hood River) (Bundle 224)	6.42

Figure 8 – Region 1 Project Scores



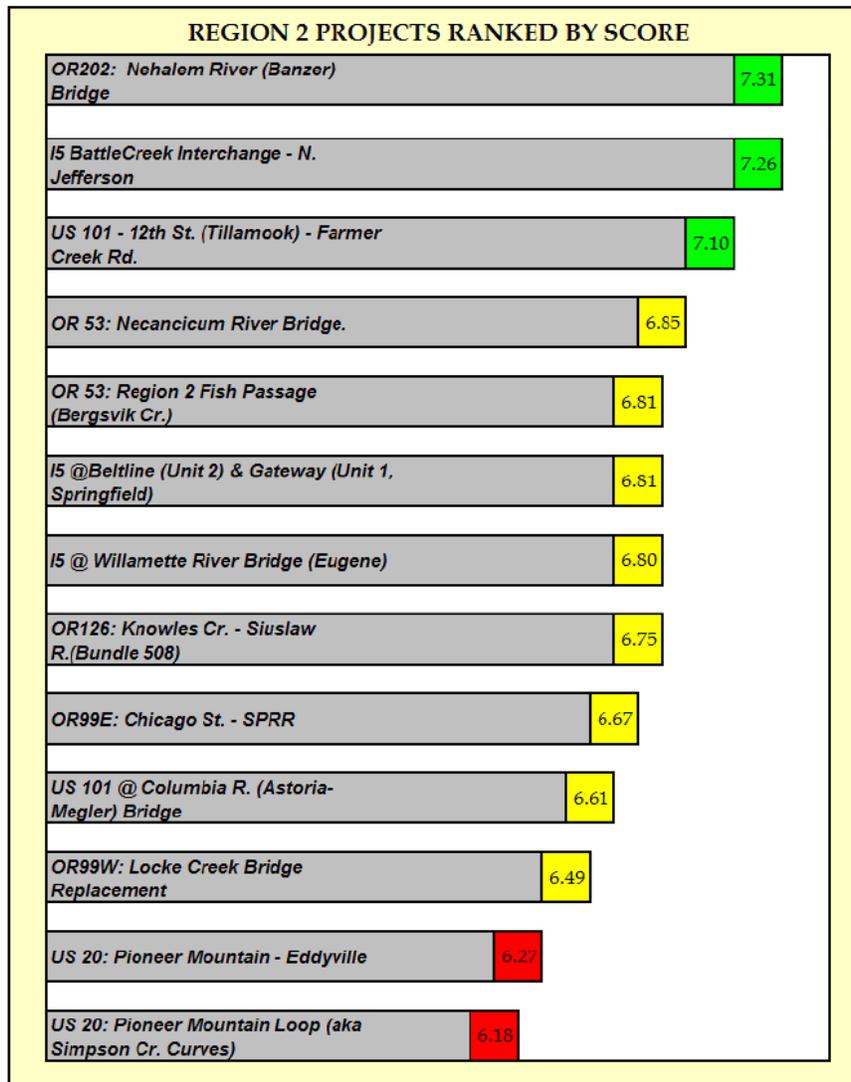


Figure 9 – Region 2 Project Scores



REGION 3 PROJECTS RANKED BY SCORE	
US 101: McCullough Bridge Rehab	6.82
I5: Green Springs Hwy (Exit 14) - Bundle 316	6.80
US 101 Coquille R. (Bullards) Bridge (Bandon)	6.72
I5: Elkhead Rd - Curtin (Bundle 508)	6.62
I5/OR42 Winston - McLain Ave (Bundle 307)	6.62
I5: Shady Bridge	6.62
Hwy 199 Passing Lanes	6.53
US 101: Panorama Dr. - Thomas Cr. Preservation	6.51
OR234: Rogue River (Rock Point) Bridge Rehab	6.44
US 101: Kobermik Slide Complex, Unit 1	6.38

Figure 10 – Region 3 Project Scores



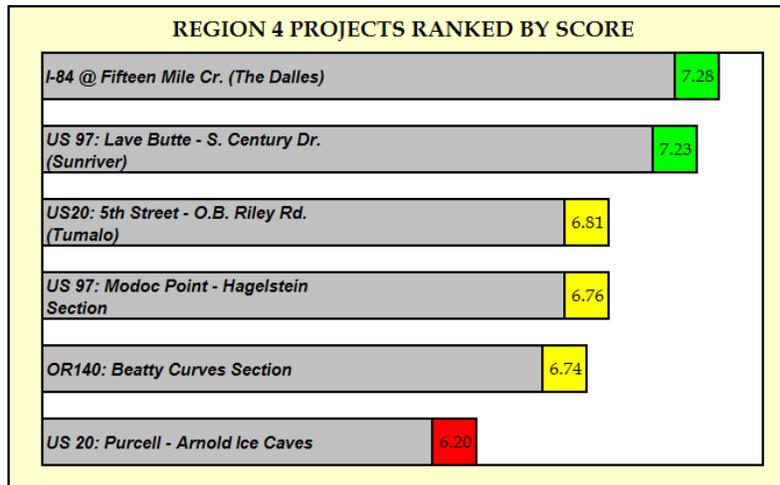


Figure 11 – Region 4 Project Scores



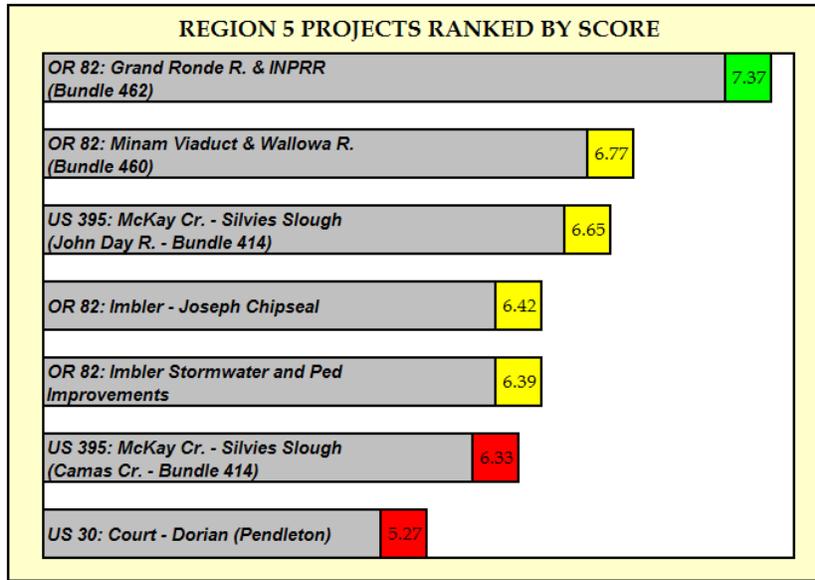


Figure 12 – Region 5 Project Scores



PERFORMANCE MEASURE SCORES vs. TRAFFIC CONTROL SUPERVISOR (TCS)

For 2010, evaluation scores were examined to determine if a performance measure’s average score was higher if a TCS was included in the contract.

Based on Figure 13 (right), it is marginally conclusive that the inclusion of a TCS results in higher performance measure scores.

For key measures involving traffic control devices, the results shown in Figure 13 were extracted from the results of the Evaluation Forms and the participants’ scores.

This comparison was made in 2009 and yielded some surprising results. It was noted that the more critical safety appurtenances - Temporary Signing, Channelization Devices and Flaggers received slightly lower scores in projects that included a TCS as a pay item.

The results for 2010 did not indicate the inconsistencies found in 2009. While scores for the critical devices identified last year improved for TCS projects, a slightly different group of devices appeared. Most noteworthy is the attention given to the accommodation of bicycles, pedestrian and ADA roadway users.

Additional efforts are underway to include more guidance and design details for bicycle, pedestrian and ADA facilities in our TCPs. ODOT will continue to monitor the progress of these efforts as the practices are introduced into future projects.

TCS PRESENCE IMPROVE MEASURE SCORE	
TEMPORARY SIGNING: QUALITY	Y
TEMPORARY SIGNING: PLACEMENT	Y
TEMPORARY SIGNING: SPACING	Y
CHANNELIZATION DEVICES: TUBES/CONES	Y
CHANNELIZATION DEVICES: DRUMS	Y
CHANNELIZATION DEVICES: BARRICADES	Y
PAVEMENT MARKINGS: CONDITION	Y
PAVEMENT MARKINGS: PLACEMENT	N
CONCRETE BARRIER: CONDITION	Y
CONCRETE BARRIER: PLACEMENT	Y
REFLECTIVE BARRIER PANELS: CONDITION	Y
IMPACT ATTENUATORS: CONDITION	Y
IMPACT ATTENUATORS: PLACEMENT	Y
PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS): MESSAGE	Y
PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS): PLACEMENT	Y
PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS): CONDITION	Y
SEQUENTIAL ARROW PANEL: PLACEMENT	Y
SEQUENTIAL ARROW PANEL: CONDITION	Y
TEMP. TRAFFIC SIGNALS: SETUP	Y
TEMP. TRAFFIC SIGNALS: CONDITION	N
BICYCLE, PEDESTRIAN & ADA FACILITIES: SIGNING	Y
BICYCLE, PEDESTRIAN & ADA FACILITIES: CONTINUOUS ROUTE	N
BICYCLE, PEDESTRIAN & ADA FACILITIES: ADA COMPLIANCE	N
FLAGGERS: VISIBILITY	Y
FLAGGERS: PERFORMANCE	Y
PILOT CARS: EQUIPMENT	Y
PILOT CARS: PERFORMANCE	Y
M O B I L I T Y : OVERALL FLOW	Y
WORKER GARMENTS & EQUIPMENT: GARMENTS	N
WORKER GARMENTS & EQUIPMENT: EQUIPMENT	Y
SITE HOUSEKEEPING: CLEAN, ORDERLY	Y

Figure 13 – TCS Comparison per Measure

SUMMARY

For 2010, all Regions experienced a significant decrease in their overall average project score compared to 2009. From a statewide perspective, 2010 scores reflect a moderate decrease in work zone quality and attention to details within the TCP and Specifications. The average score awarded by our 16 different Reviewers was 6.8, equating to scores between “average” and “above average”.

During the Tours, a few isolated projects needed immediate attention to the traffic control plan. On-site Project Management and Inspection staff was prompt and cooperative in responding to needed or recommended improvements.

A significant increase in the number of Work Zone Reviewers was a welcomed benefit. The participation by Region staff across Region borders was critical in helping reach a major goal set for this year. It was our hope to better “normalize” work zone scores by reducing the potential for Regional bias that can occur when participants review projects only from within their Region. Special thanks to those participants who dedicated their time and energy to helping us realize this goal.

After processing over 6,000 individual scores for the 42 projects visited this year, the Measures scored during the tours were averaged and ranked – both statewide and for each Region:

STATEWIDE MEASURE SCORES		REGION 1 MEASURE SCORES		REGION 2 MEASURE SCORES	
MOBILITY	7.11	MOBILITY	7.43	SITE HOUSEKEEPING	7.21
PILOT CARS	6.95	SEQUENTIAL ARROW PANEL	6.98	MOBILITY	7.16
CONCRETE BARRIER	6.82	TEMPORARY SIGNING	6.88	SEQUENTIAL ARROW PANEL	7.07
SITE HOUSEKEEPING	6.75	CONCRETE BARRIER	6.82	CONCRETE BARRIER	6.87
PAVEMENT MARKINGS	6.65	WORKER GARMENTS & EQUIPMENT	6.74	PILOT CARS	6.83
TEMPORARY SIGNING	6.65	PAVEMENT MARKINGS	6.73	IMPACT ATTENUATORS	6.69
CHANNELIZATION DEVICES	6.64	BICYCLE, PEDESTRIAN & ADA FACILITIES	6.72	PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)	6.66
TEMP. TRAFFIC SIGNALS	6.60	PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)	6.71	PAVEMENT MARKINGS	6.63
IMPACT ATTENUATORS	6.59	CHANNELIZATION DEVICES	6.70	WORKER GARMENTS & EQUIPMENT	6.63
WORKER GARMENTS & EQUIPMENT	6.59	SITE HOUSEKEEPING	6.65	TEMPORARY SIGNING	6.58
PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)	6.58	IMPACT ATTENUATORS	6.39	CHANNELIZATION DEVICES	6.57
SEQUENTIAL ARROW PANEL	6.53	FLAGGERS	6.36	TEMP. TRAFFIC SIGNALS	6.34
FLAGGERS	6.48	TEMP. TRAFFIC SIGNALS	6.00	FLAGGERS	6.33
BICYCLE, PEDESTRIAN & ADA FACILITIES	6.18	PILOT CARS (NA)	--	BICYCLE, PEDESTRIAN & ADA FACILITIES	6.26

REGION 3 MEASURE SCORES		REGION 4 MEASURE SCORES		REGION 5 MEASURE SCORES	
MOBILITY	7.07	CONCRETE BARRIER	7.21	IMPACT ATTENUATORS	6.97
PILOT CARS	7.07	IMPACT ATTENUATORS	7.16	CONCRETE BARRIER	6.91
FLAGGERS	7.03	CHANNELIZATION DEVICES	7.14	MOBILITY	6.85
SEQUENTIAL ARROW PANEL	6.86	SEQUENTIAL ARROW PANEL	7.12	TEMP. TRAFFIC SIGNALS	6.78
SITE HOUSEKEEPING	6.68	MOBILITY	7.00	PAVEMENT MARKINGS	6.61
PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)	6.65	PAVEMENT MARKINGS	6.96	TEMPORARY SIGNING	6.40
CHANNELIZATION DEVICES	6.54	WORKER GARMENTS & EQUIPMENT	6.95	CHANNELIZATION DEVICES	6.36
CONCRETE BARRIER	6.53	SITE HOUSEKEEPING	6.93	FLAGGERS	6.30
TEMPORARY SIGNING	6.50	TEMP. TRAFFIC SIGNALS	6.90	SITE HOUSEKEEPING	6.28
WORKER GARMENTS & EQUIPMENT	6.48	TEMPORARY SIGNING	6.82	PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)	6.27
PAVEMENT MARKINGS	6.47	PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)	6.37	WORKER GARMENTS & EQUIPMENT	6.26
BICYCLE, PEDESTRIAN & ADA FACILITIES	6.40	BICYCLE, PEDESTRIAN & ADA FACILITIES	6.16	BICYCLE, PEDESTRIAN & ADA FACILITIES	4.92
IMPACT ATTENUATORS	6.09	FLAGGERS	5.89	SEQUENTIAL ARROW PANEL	1.63
TEMP. TRAFFIC SIGNALS (NA)	--	PILOT CARS (NA)	--	PILOT CARS (NA)	--

Figure 14 – Measures Ranked by Region

The annual Work Zone Tours again revealed a number of consistencies, improvements and positive comments. However, substandard quality control issues were also witnessed – some new, some recurring. In comparing the rankings for the Performance Measures from 2009 with those in 2010, Figure 15 can be used to identify this year’s strengths and weaknesses.

MEASURE	Statewide Ranking			
	2009	2010		
Pilot Cars	1	2	-	Minor drop. Still looking, performing well.
Temporary Signals	2	8	-	Layout, design or operation issues.
Mobility	3	1	+	Delay through work zones minimal.
Sequential Arrows	4	12	-	Placement, maintenance, delineation issues.
Flaggers	5	13	-	Equipment, clothing and performance issues.
Concrete Barrier	6	3	+	Better placement & condition.
Signing	7	6	+	Slight improvement. Given their quantity & function, could be higher.
Apparel	8	10	-	With increased standard (Class 2), hoping for higher scores in 2011.
PCMS	9	11	-	Poor maintenance, placement and message choices.
Housekeeping	10	4	+	Less cluttered, safer work spaces for workers.
Impact Attenuators	11	9	+	Improvement over last year.
Channelizing Devices	12	7	+	Cleaner, neater, better placement.
Pavement Markings	13	5	+	Much, much improved. Fresher, visible
Bicycle/Ped/ADA	14	14	-	Still last place. New design/spec improvements on horizon.

Figure 15 – Measure Ranking Comparison

From Figure 15, the following practices, devices or traffic control measures that need attention for 2011 can be summarized.

WORK ZONE TRAFFIC CONTROL “WEAKNESSES”

1) **Bicycle/Pedestrian/ADA Facilities** – For the third year running, the quality and commitment within our TCPs regarding non-motorized user facilities has been ranked last amongst the work zone measures. Issues that need attention at both the design and implementation phase of the TCP include:

- Consistent and complete advance warning and detour signing for bicycles and pedestrians
- Improved positive guidance (channelization) for bicycle and pedestrian movement
- Consistent and continuous (ADA-compliant, where applicable) pathways for pedestrians
- When applicable, ADA-compliant (including visually impaired) accommodations – particularly in (sub)urban areas



2) Portable Changeable Message Signs (PCMS) – Reviewers commented on the number of PCMS messages that displayed, “ROAD WORK AHEAD” in lieu of a more specific or descriptive message.

2010 marks a turning point in the use of “ROAD WORK AHEAD” messages on our PCMS. Due to the legal definition for the limits of a “work zone” – both addressed in Oregon Revised Statutes, and the MUTCD, the installation of a PCMS with “ROAD WORK AHEAD” displayed is in conflict with any post or ground-mounted initial advance warning sign reading, “ROAD WORK AHEAD”, “BRIDGE WORK AHEAD”, “UTILITY WORK AHEAD”, etc.

Oregon’s “Double Fines” law permitting the increase of traffic violation fines if issued within a work zone is tied directly to the limits of the work zone. Law Enforcement agencies are trained that the work zone begins at the initial “ROAD WORK AHEAD” sign and ends at the “END ROAD WORK” sign (or last device). Therefore, ODOT cannot install a PCMS in advance of the initial “ROAD WORK AHEAD” sign displaying this same message. The “ROAD WORK AHEAD” message should be avoided on PCMS altogether, as more informative messages can be used for these devices.



Additionally, a number of PCMS displayed messages (panels) considered as ‘fragments’ – requiring the driver to read both panels to receive the complete message.



Designers are asked to include recommended messages in the TCP. Staff is encouraged to contact the TCP Unit in Salem for assistance in developing appropriate PCMS messages.

PCMS messages should be providing additional warnings, guidance or work zone details that rigid signs in the vicinity do not already provide or that may conflict with other standard practices or policies.

Additional comments regarding the quality of PCMS use include:

- Blocking other temporary and existing signing
- Maintenance needed – Burned out LED bulbs distort or detract from the message
- Misaligned PCMS – Hard to read at the installed angle

3) Sequential Arrows – Fewer devices reviewed this year, but overall quality of devices has dropped.

- Burned out bulbs
- Not included as part of a standard lane closure



4) Temporary Signing – Reviewers commented on the inconsistency in the design, placement and crashworthiness of our temporary signs:

- Poor design
- Regulatory messages on warning signs
- Poor sign spacing (amongst temporary and permanent signs)
- Blocking existing signing
- Overloading drivers with information
- Improper sign installations and supports



5) Channelization Devices (tubular markers, drums, barricades) – In contrast to the positive comments from above, Reviewers also noted the following on several projects:

- Lane closure and shifting tapers were too short
- Devices were poorly aligned
- Devices were poorly spaced (typically, too far apart)
- Devices were in poor condition (damaged, dirty)

6) Temporary Concrete Barrier – Again, several quality and safety issues were commented on that have been reported in years past:

- Using sloped end terminal on section with posted speed > 30 mph.
- Multiple incidents of unprotected blunt ends
- Barrier in poor condition and/or alignment (suspected from traffic/contractor strikes)
- Longer runs needed to adequately contain work area and contractor access points
- Barrier placed at > 25 degrees to traffic flow, rendering non-crashworthy
- Reflective Barrier Panels not being maintained or replaced when damaged



7) Mobility – Comments received from participants were favorable regarding the flow of traffic through the 42 different work zones visited this year. A number of comments point to the general construction activities, staging environment and the normal behaviors of both contractor and public traffic.

- Gawking caused traffic to slow down
- Tricky traffic merge caused some slowing
- Confusing detour (signing?)
- Contractor oversight caused temporary ramp closure
- Poor choice for staged surfacing [gravel] created very slow traffic
- Stop/go through work zone due to flagging operations

Statewide, within work zones under Flagger control, we experienced a maximum wait time of 11 minutes, and waited an average of 2.6 minutes. Regionally, wait times break down as follows:

REGION	1	2	3	4	5
Avg. Wait Time (min.)	4.4	3.3	2.0	6.1	1.3
Avg. Travel Speed thru Workzone (mph)	49	40	42	42	25

WORK ZONE TRAFFIC CONTROL “STRENGTHS”

1) **Temporary Signing** – While the design and placement of signs needs improvement, reviewers commented on the quality of the signs themselves. Temporary signs were bright, clean and showed little instance of damage or wear-and-tear.



Noteworthy: Since “clipped signs” were disallowed over a year ago and replaced with the smaller 36” signs for narrow medians (and due to load limits on the barrier-mounted sign support), compliance is near 100%.

2) **Channelization Devices, Drums** – Reviewers made repeated comments regarding the quality, placement and maintenance of temporary plastic drums. Temporary barricades scored only marginally lower scores. Tubular markers showed similarly lower scores – an additional consideration for improvement in 2011. Comments included:

- Devices were clean, bright and spaced correctly based on the posted speed
- Tapers were neat and lengths looked correct



3) Temporary Concrete Barrier – Comments collected by Reviewers include:

- Clean, well maintained
- Minimal amounts of cracks, chips and spalls
- Barrier pinned where required
- In good linear and curvilinear alignments
- Liked continued use of protective traffic screening installed on top of barrier to minimize the “gawk effect” and maintain consistent speeds through the work zone
- Use of Reflective Barrier Panels continues to help with visibility of barrier



4) Pavement Markings – Noteworthy improvements were made in the overall quality and application of this device for 2010. Comments made by Reviewers include:

- Clean, fresh and bright striping in daytime and nighttime
- Temporary alignments much better this year
- Thorough removal of existing striping or markings from previous stage
- Reflective and Flexible Pavement Markers well maintained





5) Mobility – Again for 2010, the amount of delay experienced over the course of the work zone tours was minimal. No abnormal or unanticipated queuing or delays were felt that Reviewers would not normally expect when encountering a highway construction work zone.

Travel speeds through the majority of the work zones were near posted speeds. Delays that were encountered were due to situations or conditions such as:

- Merge areas or temporary alignments
- Too much or confusing temporary signing
- Rougher than usual roadway surfaces
- Flagging or temporary traffic signals
- Traffic affected by the “gawk effect” of curious drivers

For flagging operations, statewide, we experienced a maximum stop of 9 minutes, with an average of 2 minutes. For temporary traffic signals, we experienced an average stop of 1.5 minutes.

C O N C L U S I O N

The 2010 Work Zone Tours were very successful! We were fortunate to have visited and reviewed 42 different construction sites. In addition, we welcomed over 16 different Reviewers who helped us score the projects and collect over 6,000 pieces of information regarding the safety and quality of our work zones.

We accomplished a major goal this year by having every Reviewer who participated in our multi-day tours score projects from multiple Regions. This effort helped us normalize the collected data and give us an unbiased look at the work zones. We will continue this practice in subsequent annual tours. I would personally like to thank each of the Reviewers who helped us with this monumental task – especially as our time is so precious. Thank you.

Overall, we witnessed a mild decline in the work zone tour scores. Some Region scores made significant advances, while others have created some work for themselves for next year. Of importance are the recurring “Weaknesses”, identified above, that can be analyzed more closely for solutions to make improvements in the design and implementation of our work zone traffic control plans.

Despite the scores, I remain convinced that safety for the travelling public and our workers is ODOT’s first priority. While we have some isolated issues to address to improve our traffic control plans, it is clear that our employees want to do the right thing and optimize the safety and efficiency of our construction work zones.

On behalf of all the participants, thank you for your help, participation and patience in our efforts. We look forward to our tours in 2011!

Sincerely,



Scott M. McCanna, P.E.
State Traffic Control Plans Engineer
and the
The ODOT Traffic Control Plans Unit