

Work Zone ITS Peer Exchange

May 22, 2013 Bettendorf, Iowa

New Technologies and Systems for ITS

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HDR



Introduction

- Why I'm here today.



ATSSA



- **ATSSA**

- (American Traffic Safety Services Association)
- Made up of: manufacturers; suppliers; federal, state, and local agencies; researchers, consultants and others
- Information Exchange; Government Relations
- Annual Trade Show – manufacturer and supplier displays, training sessions, committee meetings
- Midyear Meeting
- National Work Zone Memorial

ATSSA



ATSSA'S core purpose is to advance roadway safety. Road safety is our utmost commitment for all road users including teens, older drivers, pedestrians, work zone workers, and drivers on rural roads.

ATSSA ITS Council



- ITS Council is one of 9 Standing Groups
- Currently made up of:
 - Manufacturers (7)
 - Suppliers (3)
 - Federal and State Agency Representatives (5)
 - Researchers (1)
 - Consultants (3)
 - Others

ATSSA ITS Council



What have we done:

- Provide input to FHWA and others on policy
- Discuss implementation
- Lobby for safety legislation and safety funding
- Provide input on research
- Exchange research findings
- ITS Architecture
- Review agency requirements and identify technologies to help meet these

ATSSA ITS Council



Planning for:

- Inform others about WZ ITS (why I'm here)
- Website under development
 - Showcasing types of ITS technologies for various categories
 - Overview of System, Pictures, Typical Applications
 - Case Studies
 - FAQ's
 - Specification Samples

WZ ITS Categories



- **Travel Time Systems**
 - Bluetooth, Card Readers, Radar, Aggregate System
- **Incident Management Systems**
 - Video, Smart Video systems
- **Queue Detection**
 - Detection of slowdowns – post warnings to motorists and WZ operators
- **Speed Management / Variable Speed Limit Systems**
 - Portable Speed Posting Systems

WZ ITS Categories



- **Dynamic Merge Systems**
 - Speed Detection combined with PCMS or Arrow Boards
- **Conflict Warning Systems**
 - Presence Detection, PCMS
- **Ramp Metering**
 - Automated Signals, Detection Systems
- **Data Collection and Reporting** *(I added this)*
 - Speed and Volume Detection, Aggregation and Reporting Tools

What is new?



- **Applications**

- Performance Measures
- Dynamic Work Zones?

- **Technologies**

- Video comparison

- **Approaches**

- Texas – Consistent Methodology for Deployment of Queue Detection and Reporting
- Utah – Reduce Work Zone Queues and Delays for Paving
- OBDP

OTIA III Statewide Bridge Program – *“Keep Traffic Moving During Construction”*



OTIA III Statewide Bridge Program – *“Keep Traffic Moving During Construction”*

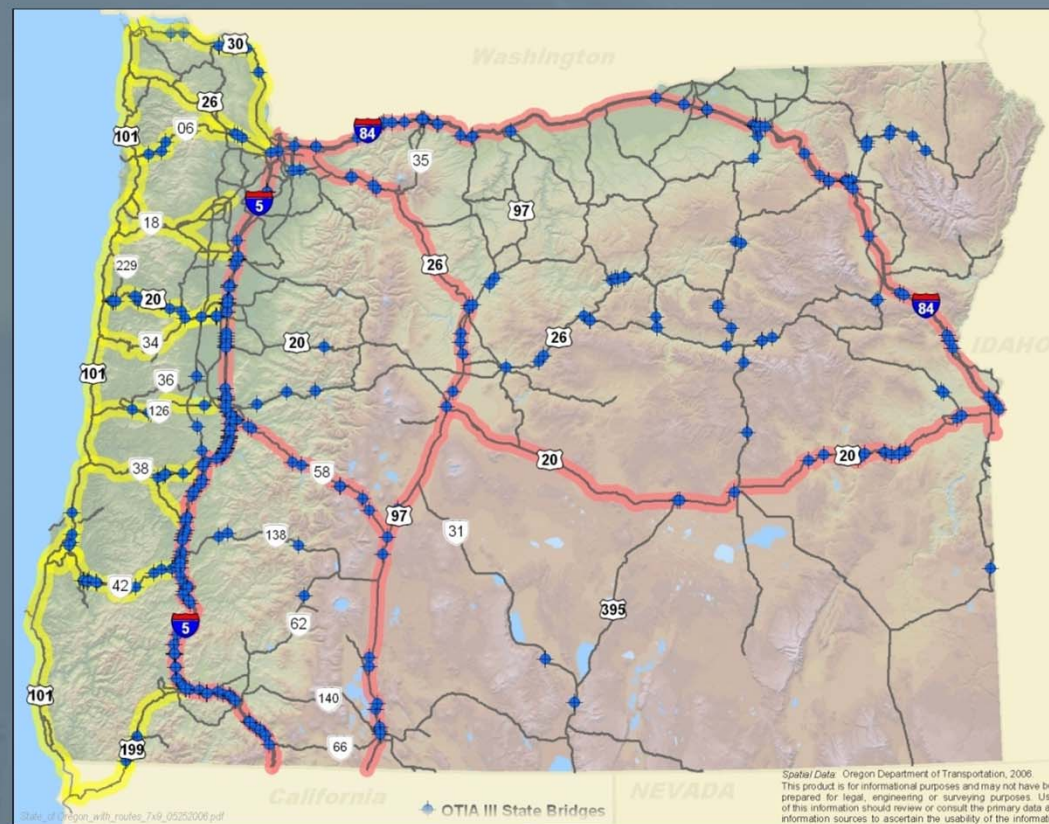


OTIA III Statewide Bridge Program – *“Keep Traffic Moving During Construction”*



“Impossible Job”: 365 Bridges in 8 years

- OTIA III Statewide Bridge Program
- OTIA III Bridge Locations



Safety and Mobility During Construction



- Minimize delays
 - Keep Freight and Traffic Moving – Legislative Goal #3 out of 5 for the Program
- Determine safe times for lane closures
 - Times when travel speeds are not significantly reduced
- Little to no problems
- Special cases
 - More data for better decisions

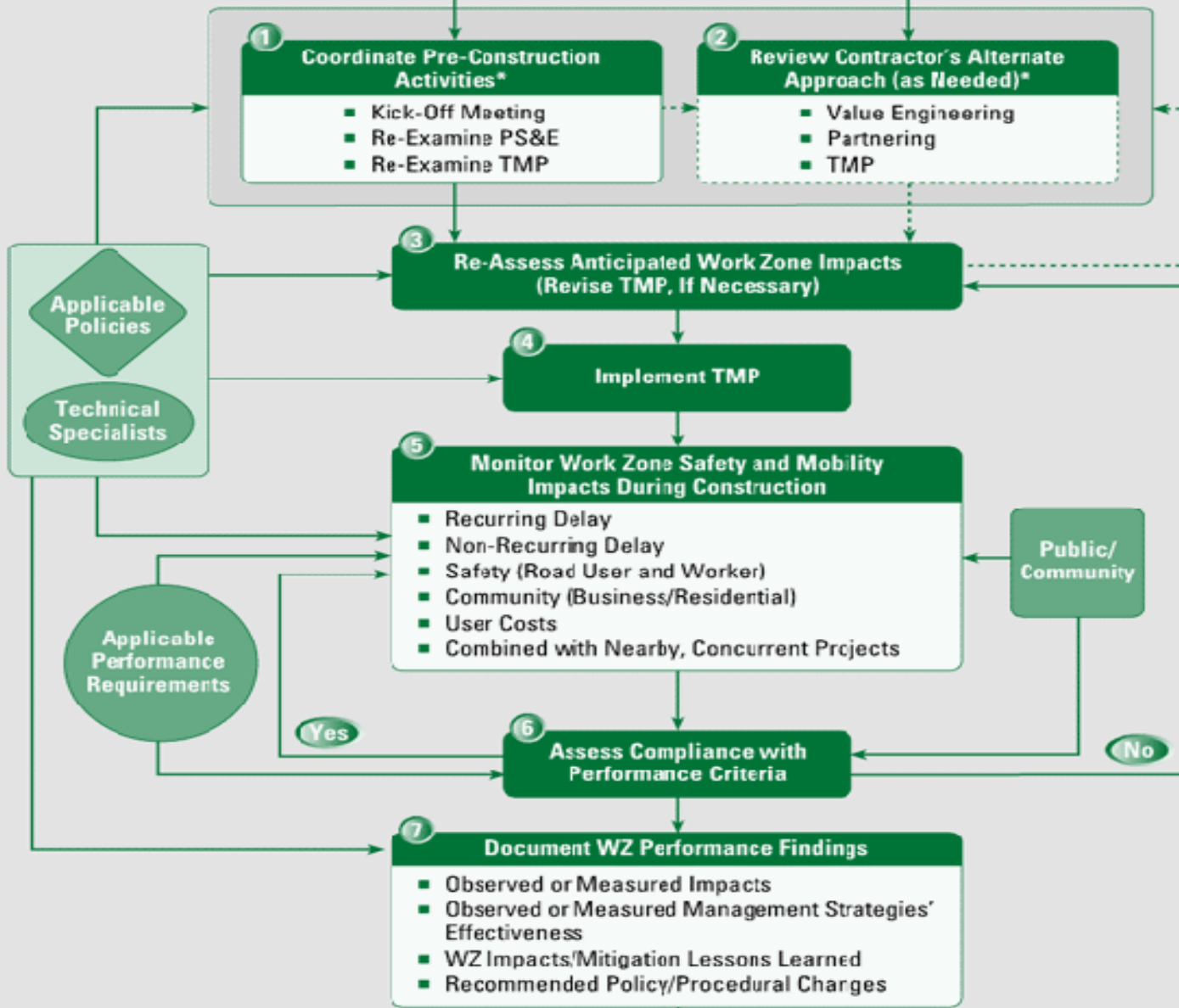


Smart Work Zone Elements

- Speed Detection (side-fire radar, detect select vehicles)
 - Monitor Queues
- Traffic Volumes (side-fire radar, lane sensors)
 - Count Vehicles
- Motorist Information
 - PCMS, Web, Smartphone
- Alert Agency / Contractors
- Observe (Video)



**Developed/Recommended
Final Construction Staging and TMP
(from Design)**



* Steps 1 and 2 are existing activities and are shown here solely for the sake of process continuity and integration.

Performance Assessment

Smart Work Zone Processes for Congestion Management



Plan



- Need to establish lane closures in planning/design process of project
- ODOT data-robust process – Work Zone Traffic Analysis

I-5 Fairgrounds Interchange - Roseburg
Southbound - Weekday

Year of Analysis	Closure Type	Way #	Milepost	Region	Roadway Type	Traffic Type	Speed Limit	# Existing Lanes (# of Direction)	% Trucks	PCE Factor	Level	Level Grade/Rate	Analyst ADT	Monthly ADT	ATK Hwy #	ATK MP	Date Issued		
2008	Lane	001	123.00	S	5	5	65	3	16.52%	2.55	1.000	0.02%	46,252	10,005	001	126.71	4/24/2008		
Count Name/Number: m100_010L Count Milepost: 123.02 24hour Count Volume: 39,530																			
Average PCEs for Monday																			
January	126.16	126.26	126.36	126.46	126.56	126.66	126.76	126.86	126.96	127.06	127.16	127.26	127.36	127.46	127.56	127.66	127.76	127.86	
February	270	176	134	148	324	307	879	948	1124	1022	873	1704	1362	1022	2019	1712	1665	1381	1212
March	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
April	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
May	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
June	328	216	163	204	388	418	1216	1445	1328	1121	1742	1776	1965	2163	2384	2761	2821	2131	2045
July	343	225	173	214	388	418	1216	1445	1328	1121	1822	1857	2055	2196	2319	2689	2749	2105	2020
August	347	229	175	217	391	421	1230	1459	1342	1135	1847	1882	2080	2221	2344	2714	2774	2119	2034
September	310	204	154	195	382	412	1148	1366	1258	1050	1647	1679	1867	2007	2129	2498	2558	2023	1933
October	290	191	144	161	327	346	1078	1281	1178	966	1046	1078	1743	1865	2289	2475	2452	1867	1814
November	294	193	146	163	331	351	1082	1287	1181	957	1064	1094	1764	1886	2319	2506	2523	1931	1858
December	287	189	143	179	324	343	1067	1268	1164	964	1028	1058	1732	1845	2277	2466	2476	1886	1768
Count Name/Number: m100_010L Count Milepost: 123.02 24hour Count Volume: 39,530																			
Average PCEs for Tuesday																			
January	281	188	127	158	327	479	848	1124	1022	873	1704	1362	1022	2019	1712	1665	1381	1212	1102
February	270	176	134	148	324	307	879	948	1124	1022	873	1704	1362	1022	2019	1712	1665	1381	1212
March	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
April	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
May	328	216	163	204	388	418	1216	1445	1328	1121	1742	1776	1965	2163	2384	2761	2821	2131	2045
June	328	216	163	204	388	418	1216	1445	1328	1121	1742	1776	1965	2163	2384	2761	2821	2131	2045
July	343	225	173	214	388	418	1216	1445	1328	1121	1822	1857	2055	2196	2319	2689	2749	2105	2020
August	347	229	175	217	391	421	1230	1459	1342	1135	1847	1882	2080	2221	2344	2714	2774	2119	2034
September	310	204	154	195	382	412	1148	1366	1258	1050	1647	1679	1867	2007	2129	2498	2558	2023	1933
October	290	191	144	161	327	346	1078	1281	1178	966	1046	1078	1743	1865	2289	2475	2452	1867	1814
November	294	193	146	163	331	351	1082	1287	1181	957	1064	1094	1764	1886	2319	2506	2523	1931	1858
December	287	189	143	179	324	343	1067	1268	1164	964	1028	1058	1732	1845	2277	2466	2476	1886	1768
Count Name/Number: m100_010L Count Milepost: 123.02 24hour Count Volume: 39,530																			
Average PCEs for Wednesday																			
January	281	188	127	158	327	479	848	1124	1022	873	1704	1362	1022	2019	1712	1665	1381	1212	1102
February	270	176	134	148	324	307	879	948	1124	1022	873	1704	1362	1022	2019	1712	1665	1381	1212
March	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
April	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
May	328	216	163	204	388	418	1216	1445	1328	1121	1742	1776	1965	2163	2384	2761	2821	2131	2045
June	328	216	163	204	388	418	1216	1445	1328	1121	1742	1776	1965	2163	2384	2761	2821	2131	2045
July	343	225	173	214	388	418	1216	1445	1328	1121	1822	1857	2055	2196	2319	2689	2749	2105	2020
August	347	229	175	217	391	421	1230	1459	1342	1135	1847	1882	2080	2221	2344	2714	2774	2119	2034
September	310	204	154	195	382	412	1148	1366	1258	1050	1647	1679	1867	2007	2129	2498	2558	2023	1933
October	290	191	144	161	327	346	1078	1281	1178	966	1046	1078	1743	1865	2289	2475	2452	1867	1814
November	294	193	146	163	331	351	1082	1287	1181	957	1064	1094	1764	1886	2319	2506	2523	1931	1858
December	287	189	143	179	324	343	1067	1268	1164	964	1028	1058	1732	1845	2277	2466	2476	1886	1768
Count Name/Number: m100_010L Count Milepost: 123.02 24hour Count Volume: 39,530																			
Average PCEs for Thursday																			
January	281	188	127	158	327	479	848	1124	1022	873	1704	1362	1022	2019	1712	1665	1381	1212	1102
February	270	176	134	148	324	307	879	948	1124	1022	873	1704	1362	1022	2019	1712	1665	1381	1212
March	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
April	289	190	144	160	326	344	1074	1276	1171	960	1008	1068	1726	1857	2281	2485	2462	1886	1826
May	328	216	163	204	388	418	1216	1445	1328	1121	1742	1776	1965	2163	2384	2761	2821	2131	2045
June	328	216	163	204	388	418	1216	1445	1328	1121	1742	1776	1965	2163	2384	2761	2821	2131	2045
July	343	225	173	214	388	418	1216	1445	1328	1121	1822	1857	2055	2196	2319	2689	2749	2105	2020
August	347	229	175	217	391	421	1230	1459	1342	1135	1847	1882	2080	2221	2344	2714	2774	2119	2034
September	310	204	154	195	382	412	1148	1366	1258	1050	1647	1679	1867	2007	2129	2498	2558	2023	1933
October	290	191	144	161	327	346	1078	1281	1178	966	1046	1078	1743	1865	2289	2475	2452	1867	1814
November	294	193	146	163	331	351	1082	1287	1181	957	1064	1094	1764	1886	2319	2506	2523	1931	1858
December	287	189	143	179	324	343	1067	1268	1164	964	1028	1058	1732	1845	2277	2466	2476	1886	1768

Hwy 047 - MP 58.0 Westbound - Weekend

Year of Analysis	Closure Type	Hwy #	Milepoint	Region	Roadway Type	Terrain Type	Speed Limit	# Existing Lanes (Per Direction)	% Trucks	PCE Factor	PCE Limit	Linear Growth Rate	Analysis ADT	Analysis ATR	ATR Hwy #	ATR MP	Date Issued
2008	Lane	047	58.00	1	Multilane	Level	55	2	10.05%	1.50	1,500	3.30%	35,225	34-001	00000	0.00	9/30/2008

		Count Name/Number: h3402_06WL																							
		Average PCEs for Friday						Count Hwy: 047						Count Milepoint: 58.50						24hour Count Volume: 44,407					
		12a-1a	1a-2a	2a-3a	3a-4a	4a-5a	5a-6a	6a-7a	7a-8a	8a-9a	9a-10a	10a-11a	11a-12p	12p-1p	1p-2p	2p-3p	3p-4p	4p-5p	5p-6p	6p-7p	7p-8p	8p-9p	9p-10p	10p-11p	11p-12a
January	---	---	---	---	---	---	---	295	515	836	1227	1618	1661	1446	1231	988	830	720	677	605	456	389	355	---	---
February	---	---	---	---	---	---	---	409	713	1159	1700	2241	2301	2004	1706	1368	1150	997	939	838	632	539	492	---	---
March	---	---	---	---	---	---	---	510	891	1447	2123	2799	2875	2503	2131	1709	1436	1246	1172	1047	790	673	615	---	---
April	---	---	---	---	---	---	---	430	750	1218	1787	2356	2419	2106	1793	1438	1209	1048	987	881	665	567	518	---	---
May	---	---	---	---	---	---	---	490	855	1389	2038	2687	2759	2402	2045	1641	1379	1196	1125	1005	758	646	590	---	---
June	---	---	---	---	---	---	---	586	1023	1662	2438	3215	3301	2874	2447	1963	1650	1431	1346	1203	907	773	706	---	---
July	---	---	---	---	---	---	---	732	1278	2076	3046	4015	4123	3590	3056	2452	2061	1787	1682	1502	1133	966	882	---	---
August	---	---	---	---	---	---	---	775	1353	2197	3223	4248	4363	3799	3234	2594	2181	1891	1780	1590	1199	1022	934	---	---
September	---	---	---	---	---	---	---	578	1010	1640	2405	3171	3257	2835	2414	1936	1628	1411	1328	1187	895	763	697	---	---
October	---	---	---	---	---	---	---	451	787	1278	1875	2472	2539	2211	1882	1510	1269	1100	1036	925	697	595	543	---	---
November	---	---	---	---	---	---	---	402	702	1140	1672	2204	2264	1971	1678	1346	1131	981	923	825	622	530	484	---	---
December	---	---	---	---	---	---	---	275	480	780	1145	1510	1550	1350	1149	922	775	672	632	565	426	363	332	---	---

		Count Name/Number: h3402_06WL																							
		Average PCEs for Saturday						Count Hwy: 047						Count Milepoint: 58.50						24hour Count Volume: 44,407					
		12a-1a	1a-2a	2a-3a	3a-4a	4a-5a	5a-6a	6a-7a	7a-8a	8a-9a	9a-10a	10a-11a	11a-12p	12p-1p	1p-2p	2p-3p	3p-4p	4p-5p	5p-6p	6p-7p	7p-8p	8p-9p	9p-10p	10p-11p	11p-12a
January	---	---	---	---	---	---	---	295	515	836	1227	1618	1661	1446	1231	988	830	720	677	605	456	389	355	---	---
February	---	---	---	---	---	---	---	409	713	1159	1700	2241	2301	2004	1706	1368	1150	997	939	838	632	539	492	---	---
March	---	---	---	---	---	---	---	510	891	1447	2123	2799	2875	2503	2131	1709	1436	1246	1172	1047	790	673	615	---	---
April	---	---	---	---	---	---	---	430	750	1218	1787	2356	2419	2106	1793	1438	1209	1048	987	881	665	567	518	---	---
May	---	---	---	---	---	---	---	490	855	1389	2038	2687	2759	2402	2045	1641	1379	1196	1125	1005	758	646	590	---	---
June	---	---	---	---	---	---	---	586	1023	1662	2438	3215	3301	2874	2447	1963	1650	1431	1346	1203	907	773	706	---	---
July	---	---	---	---	---	---	---	732	1278	2076	3046	4015	4123	3590	3056	2452	2061	1787	1682	1502	1133	966	882	---	---
August	---	---	---	---	---	---	---	775	1353	2197	3223	4248	4363	3799	3234	2594	2181	1891	1780	1590	1199	1022	934	---	---
September	---	---	---	---	---	---	---	578	1010	1640	2405	3171	3257	2835	2414	1936	1628	1411	1328	1187	895	763	697	---	---
October	---	---	---	---	---	---	---	451	787	1278	1875	2472	2539	2211	1882	1510	1269	1100	1036	925	697	595	543	---	---
November	---	---	---	---	---	---	---	402	702	1140	1672	2204	2264	1971	1678	1346	1131	981	923	825	622	530	484	---	---
December	---	---	---	---	---	---	---	275	480	780	1145	1510	1550	1350	1149	922	775	672	632	565	426	363	332	---	---

		Count Name/Number: h3402_06WL																							
		Average PCEs for Sunday						Count Hwy: 047						Count Milepoint: 58.50						24hour Count Volume: 44,407					
		12a-1a	1a-2a	2a-3a	3a-4a	4a-5a	5a-6a	6a-7a	7a-8a	8a-9a	9a-10a	10a-11a	11a-12p	12p-1p	1p-2p	2p-3p	3p-4p	4p-5p	5p-6p	6p-7p	7p-8p	8p-9p	9p-10p	10p-11p	11p-12a
January	---	---	---	---	---	---	---	295	515	836	1227	1618	1661	1446	1231	988	830	720	677	605	456	389	355	---	---
February	---	---	---	---	---	---	---	409	713	1159	1700	2241	2301	2004	1706	1368	1150	997	939	838	632	539	492	---	---
March	---	---	---	---	---	---	---	510	891	1447	2123	2799	2875	2503	2131	1709	1436	1246	1172	1047	790	673	615	---	---
April	---	---	---	---	---	---	---	430	750	1218	1787	2356	2419	2106	1793	1438	1209	1048	987	881	665	567	518	---	---
May	---	---	---	---	---	---	---	490	855	1389	2038	2687	2759	2402	2045	1641	1379	1196	1125	1005	758	646	590	---	---
June	---	---	---	---	---	---	---	586	1023	1662	2438	3215	3301	2874	2447	1963	1650	1431	1346	1203	907	773	706	---	---
July	---	---	---	---	---	---	---	732	1278	2076	3046	4015	4123	3590	3056	2452	2061	1787	1682	1502	1133	966	882	---	---
August	---	---	---	---	---	---	---	775	1353	2197	3223	4248	4363	3799	3234	2594	2181	1891	1780	1590	1199	1022	934	---	---
September	---	---	---	---	---	---	---	578	1010	1640	2405	3171	3257	2835	2414	1936	1628	1411	1328	1187	895	763	697	---	---
October	---	---	---	---	---	---	---	451	787	1278	1875	2472	2539	2211	1882	1510	1269	1100	1036	925	697	595	543	---	---
November	---	---	---	---	---	---	---	402	702	1140	1672	2204	2264	1971	1678	1346	1131	981	923	825	622	530	484	---	---
December	---	---	---	---	---	---	---	275	480	780	1145	1510	1550	1350	1149	922	775	672	632	565	426	363	332	---	---

Deploy and Verify



- Potentially inaccurate staging based on flawed traffic volume assumptions
- Time between staging design and construction could be several years
- Hand counts and calculations vs. automated data
 - Near real-time traffic volumes (side fire, pucks)
 - Historic data
- I-5 Salem preparation for overnight paving closure



Deploy and Verify



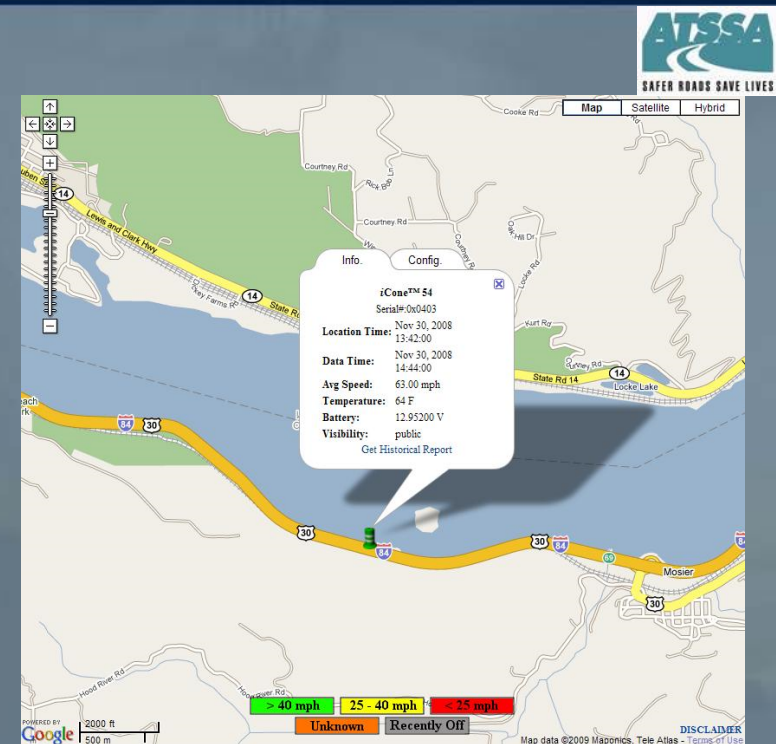
Deploy and Verify



Web-Based Reporting



- Turn-Key Service
- GPS located on devices
- Interactive Google maps interface
- Color coded for quick verification of traffic flow
- Download historic traffic data
 - User defined reporting period
 - CSV or Graph



Monitor and React



- Real-Time & Near Real-Time
- Automated notices to Agency / Contractor
- Call Correct Start Time for Lane Closure
 - I-5 Three-Lane paving – Closure start times
 - Mother's Day ?– who knew?
- Construction activities often require adjustments to contractor work hours
 - Gain time for Contractor to increase production



Compliance Report



- Performance Specifications
 - Speeds
 - Volumes
 - For Design-Build Projects where Contractor is responsible to “Keep Traffic Moving”
- Automate process to meet needs of Agency
- Accelerate report development so Agency / Contractor can make adjustments to work zone processes



Performance Assessment



- Lessons learned in luxury
- Thanksgivings – 3 spent watching traffic?
- Test new work zone practices
- Note how surrounding activities can affect project work zone



Conclusions

- Dynamic work zone projects often call for the dynamic ability to respond
 - Not for every project, but for the more complex, high risk projects
- Data collection useful for making decisions during construction for comparison to original plans
- Benefits
 - Congestion and Safety – Pick best start time
 - Potential Schedule Improvements for Contractor
 - Information for Better Decision-Making



Where is WZ ITS going?



- In-vehicle technology
- Cell phone and other data sources
- Data-rich to data smart
- Little system handling – results only
- Technology ages rapidly
- Open platforms or those that meet national protocols
- Portability / Flexibility
- More collaboration - discussions on what you after, your challenges, then how to specify



Questions?

Questions for the Audience (YOU!)



- Who is deploying your WZ ITS? You, contractor, ITS expert?
- Do you want to own equipment or just want results?
- QPL (Qualified Products List)?
- Real time data for posting or for decisions?

Questions for the Audience (YOU!)



- Percentage of overall project cost?
- What is most important WZ ITS category to you?
Incident management, queue detection, etc.?
- Where do you go to find information about systems?
Is there something more or different you would like to see?
- Battery life? Power Supplies?

ATSSA Website:



www.atssa.com



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