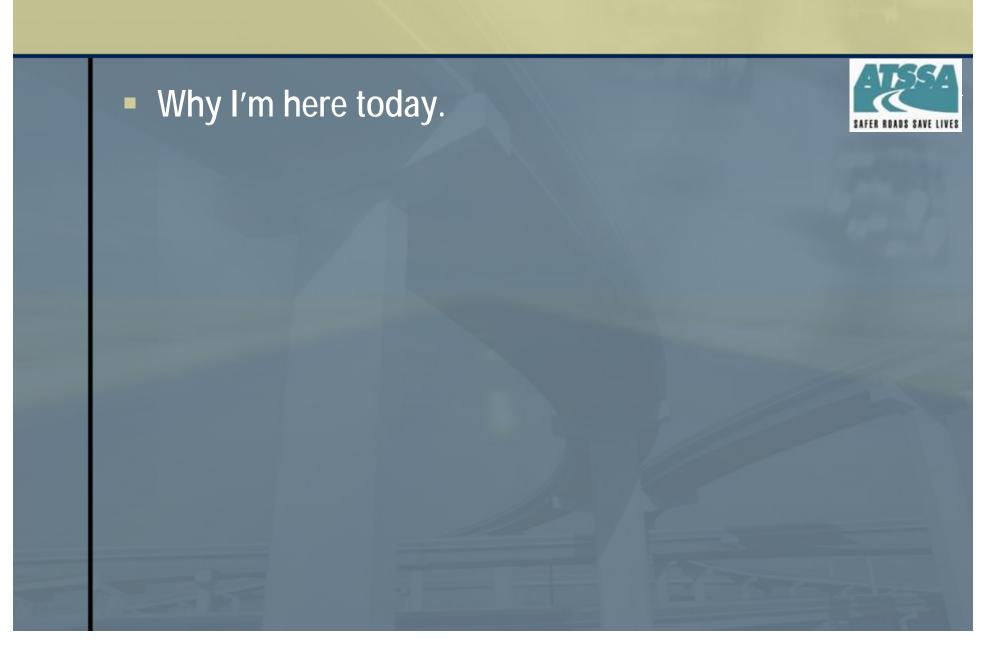


Introduction



ATSSA

ATSSA



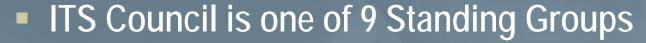
- (American Traffic Safety Services Association)
- Made up of: manufacturers; suppliers; federal, state, and local agencies; researchers, consultants and others
- Information Exchange; Government Relations
- Annual Trade Show manufacturer and supplier displays, training sessions, committee meetings
-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





- 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





- 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





- 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

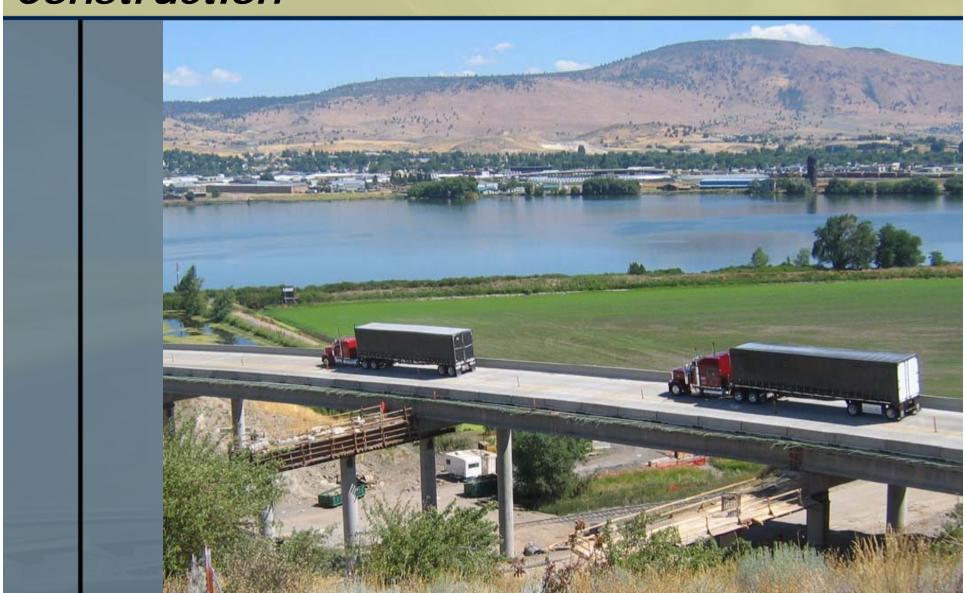
Video comparison

Approaches

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



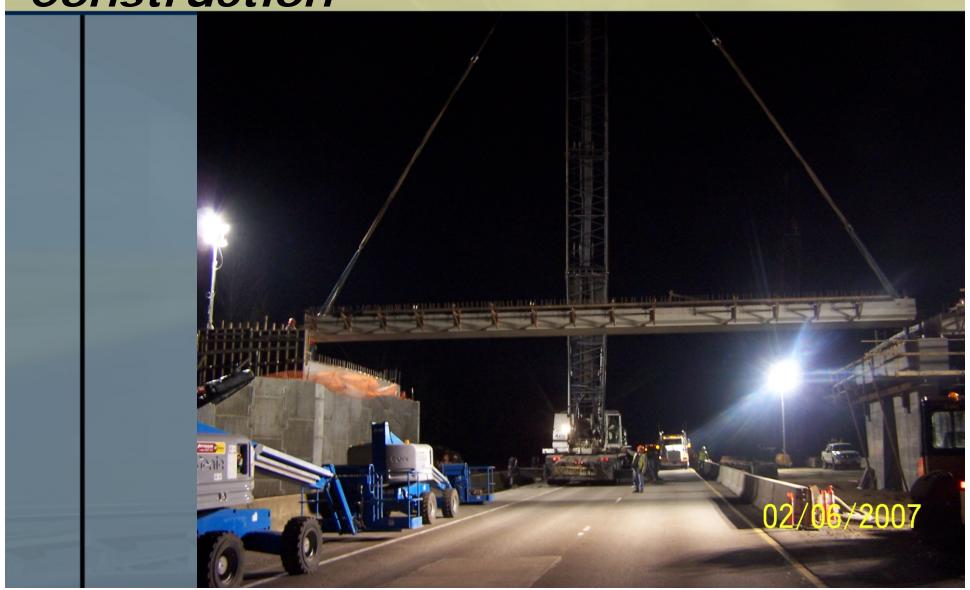
OTIA III Statewide Bridge Program – "Keep Traffic Moving During Construction"



OTIA III Statewide Bridge Program – "Keep Traffic Moving During Construction"



OTIA III Statewide Bridge Program – "Keep Traffic Moving During Construction"

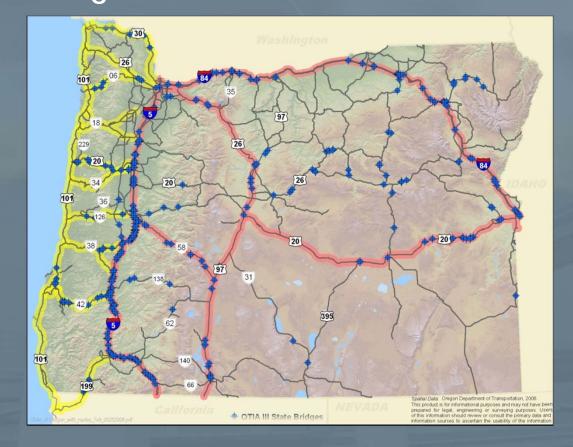


"Impossible Job": 365 Bridges in 8 years





OTIA III Bridge Locations



Safety and Mobility During Construction

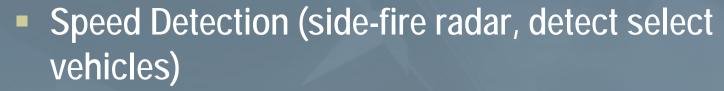
Minimize delays



- 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

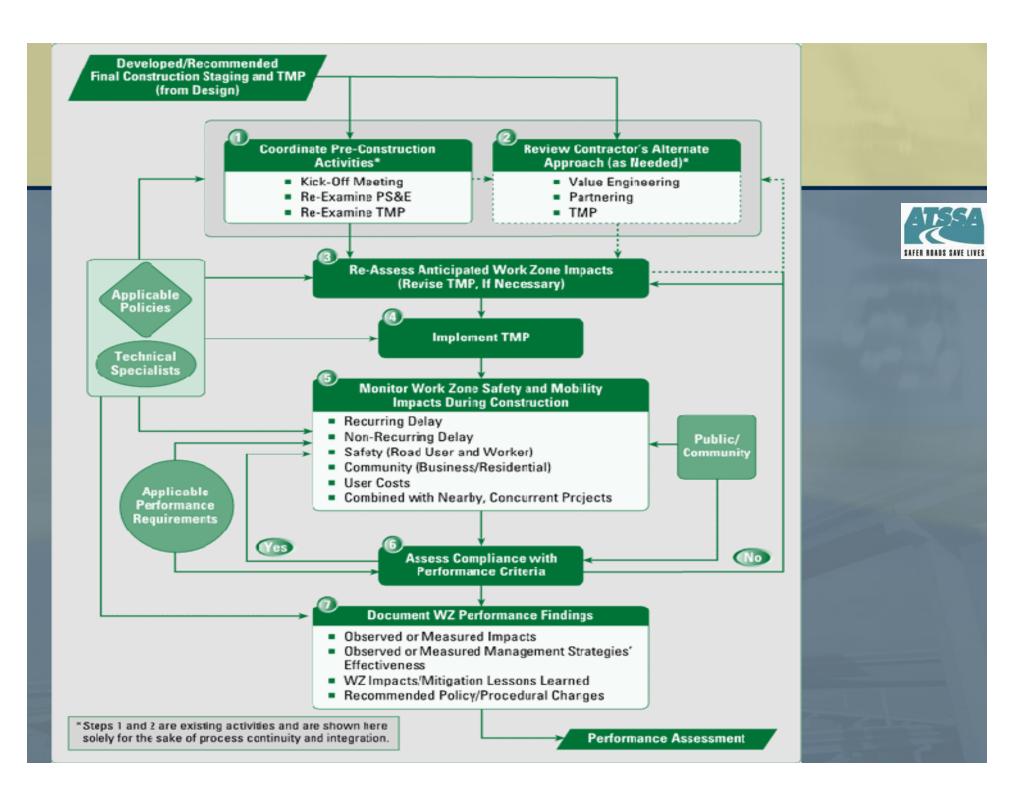


Smart Work Zone Elements

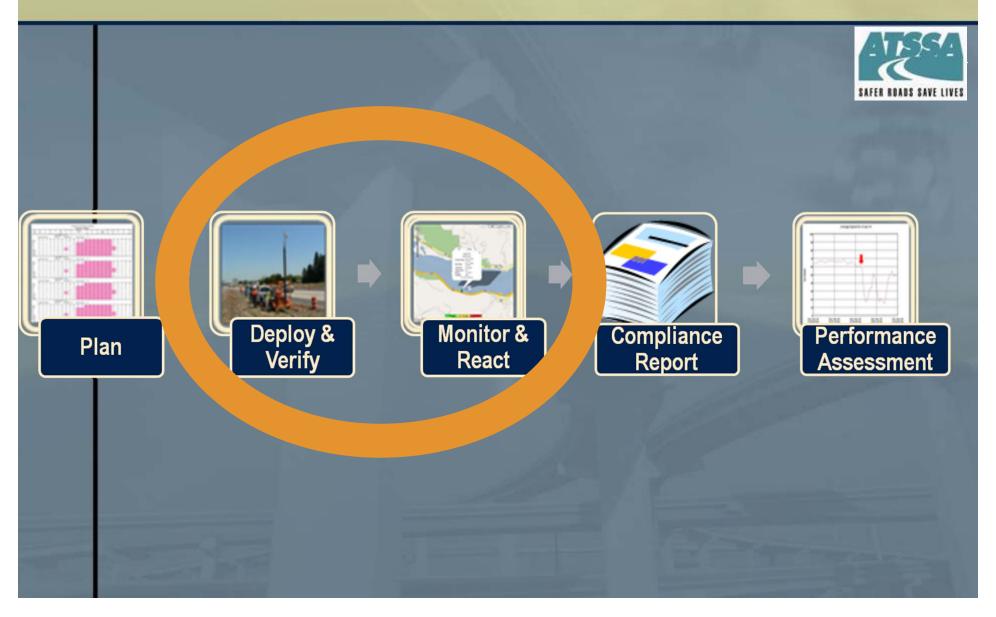




- Monitor Queues
- Traffic Volumes (side-fire radar, lane sensors)
 - Count Vehicles
- Motorist Information
 - PCMS, Web, Smartphone
- Alert Agency / Contractors
- Observe (Video)



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

| | | | | | | | | | | | Southbo | ound - W | leekday | 1 | 2.5 | | | | | | | | | |
|--------------------------|---------------|-------------|-------------|--------------|--------------|-------------|-----------------|--------------|---------------|---------------|---------------------------|-------------|------------------|----------------|--------------|----------------------|-----------------------|---------------|---------------|---------------|--------------|----------------|----------------|------------|
| Year of Analysis | Closure | . 14 | ny # | Mapoint | Region | | othicsy Type | Terrain Type | Speed 5 | indt | # Eviding L (Per Deed) | | % Trucks | POE | Factor | PCE Livel | Linear Growth Russ | Analysis | TOA | Ready ATR | ATRINOPE | ATR | | Date Issue |
| 2006 | Lone | 0 | 01 | 123.00 | 3 | Fre | binvity . | Level | 65 | | 3 | | 16.52% | 2 | 50 | 1,500 | 0.03% | 46.2 | 62 | 10-005 | 001 | 129 | 75 | 4/24/200 |
| | | | | | | | | 1001_015L | | | | | | | | | | | | | | | | |
| | Average I | PCEs for | | | Count | Hwy: 00 | | Count Milepo | pint; 123. | | | unt Volume: | 39,530 | | | | | | | | | | | |
| | 12a-14 200 | 38.28 | 2a.3a | 26.68 129 | 4a.0s | Dede 479 | 5a,7a | Zada 1124 | Be/89 1002 | 39:33e 573 | 50e.55a | 15k-12k | Sile-for 1509 | Section 1 | 2019 | 2112 | 51-St | Seda 1804 | 5e,7a | 26/80 1210 | Stedan | Se.33k- | 55e.53a 556 | 139.52 |
| January Petersery | 230 | 178 | 134 | 168 | 334 | 507 | 1902 | 1190 | 1062 | 924 | 1436 | 1962 | 1679 | 1732 | 2137 | 2266 | 2304 | 1004 | 1685 | 1290 | 1036 | 717 | 500 | 367 |
| March | 289 | 190 | 144 | 180 | 329 | 244 | 1074 | 1276 | 1171 | 990 | 1539 | 1509 | 1735 | HHST | 2291 | 2401 2405 2506 | 2402 | 1000 | 1904 | 1373 | 1109 | 766 | 630 | 415 |
| April | 289 | 190 | 146 | 180 | .326 | 544 | 1074 | 1276 | 1171 | 990 | 1539 | 1569 | 1735 | 1657 | 2291 | 2465 | 2402 2364 | 1009 | 1806 | 1373 | 1109 | 798 | 830 | 415 |
| Hay | 299 | 196 218 | 148 | 196. | 326 | 558 | 1100 | 1313 | 1306 | 1019 | 1985 | 1914 | 1766 1965 | 2103 | 2387 | 2536 | 2964 | 2104 | 1958 2945 | 1413 | 1141 | 791 870 | 640 713 | 427 470 |
| Aune July | 140 | 218 | 170 | 214 | 300 | 244 | 1210 | 1442 | 1326 | 1121 | 1972 | 1976 | 2005 | 2100 | 2594 | 2761 | 2821 | 2040 | 2138 | 1606 | 1256 | 810 | 713 | 470 |
| hamed | 247 | 228 | 173 | 217 | 301 | 653 | 1289 | 1830 | 1406 | 1100 | 1847 | 1963 | 2003 | 2226 | 2250 | 2969 | 2861 | 1281 | 2100 | 1949 | 1392 | 923 | 796 | 400 |
| Depterder | 290 | 294 | 194 | 190 | 340 | 560 | 1140 | 1306 | 1254 | 1000 | 7647 | 1676 | HET | HIST. | 2452 | 2830 | 2007 | 3000 | 1903 | 1470 | 9187 | 823 | 674 | 444 |
| October | 290 | 191 | 146 | 180 | 327 | 546 | 1002 | 1281 | 1176 | 995 | 1545 | 1575 | 1740 | 1005 | 2300 | 3472 | 2500 | 1907 | 1614 | 1379 | 91114 | 791 | 610 | 417 |
| November December | 264 | 193 | 143 | 180 | 331 | 540 | 1002 1007 | 1265 | 1101 | 1007 | 1504 | 1559 | 1705 | 1005 | 2309 | 2906 | 2676 | 1001 | 1106 | 1366 | 1127 | 791 | 640 | 413 |
| - | 201 | 1,56 | .42 | 1.78 | | | | 1001_018L | 1100 | - Sile | 1000 | | 1777 | 1000 | | 780 | - 100 | | - 100 | 1,910 | 1,66 | 100 | -00 | - 613 |
| | Average i | tore and | Your day | | | Harris 00 | | Count Milepi | | 02 | Marine Co. | unt Volume: | 39.530 | | | | | | | | | | | |
| | 12a-is | lala. | la-la | 2a-br | 30-52 | tade | ta-la | Za-Ba | della | In-12s | Site-Fits | 15s-12s | | tech | 76-76 | 20.00 | 4.5 | Suite | Sin, Te | Zada | da-ba | 20-100 | tin-tia | 130-0 |
| January . | 266 | 168 | 127 | 150 | 267 | 479 | 940 | 1124 | 1992 | 613 | 1300 | 1362 | 13a-1a 1100 | 1636 | 2019 | 3172 | 30-78 2106 | Social MEN | 59-74 1581 | 1210 | 6/77 | 477 | 105 | 366 |
| Pelkinsery | 270 | 178 | 134 | 168 | 304 | 507 | 1002 | 1190 | 1093 | 934 | 1436 | 1402 | 1610 | 1752 | 2137 | 2299 | 2304 | 1772 | vies | 1281 | 1035 | 757 | 500 | 387 |
| Barch | 289 | 190 | 166 | 185 | 326 | 544 | 1074 | 1276 | 1171 | 990 990 | 1539 | 1509 | 1735 | 1657 | 2291 2291 | 2465 2465 | 2402 | 1000 | 1606 | 1373 | 1109 | 766 | 630 | 415 |
| Mar | 296 | 196 | 140 | 180 | 236 | 100 | 1105 | 1216 | 1206 | 1213 | 1980 | 1014 | 1786 | 1981 | 2387 | 2539 | 27004 | 1004 | 1858 | 1413 | 1141 | 791 | 640 | 427 |
| lune | 336 | 216 | 163 | 304 | 309 | 816 | 1210 | 1445 | 1226 | 1121 | 1740 | 1776 | 1905 | 2103 | 2594 | 2761 | 2621 | 2101 | 2041 | 1966 | 1256 | 670 | 710 | 479 |
| indy | 543 | 228 | 179 | 214 | 366 | 944 | 1371 | 1011 | 1387 | 1173 | 1800 | 1907 | 2005 | 2108 | 2/12 | 2019 | 2960 | 2249 | 2138 | 1636 | 1313 | 810 | 746 | 492 |
| August September | 247 | 226 | 173 | 217 | 361 | 953 562 | 1100 | 1902 | 1406 | 1100 | 384T. 1647 | 1679 | 2083 1887 | 222W | 2750 | 2019 | 2841 | 2011 | 2108 | 1670 | 1982 | 823 823 | 758 674 | 444 |
| Definition Definition | 290 | 191 | 166 | 181 | 327 | 546 | 1178 | 1201 | 1176 | 996 | 1545 | 1575 | 170 | 1905 | 2300 | 2675 | 2902 | 1907 | 1914 | 1379 | 1114 | 172 | 630 | 417 |
| Bironther | 254 | 192 | 145 | 185 | 331 | 553 | 1092 | 1297 | 1191 | 1007 | 1504 | 1554 | 1784 | 1000 | 2329 | 2506 | 2533 | 1001 | 1896 | 1390 | 1127 | fee | 640 | 422 |
| December | 287 | 186 | 143 | 179 | 324 | 540 | 1967 | 1268 | 1164 | 984 | 1629 | 1999 | 6725 | 1845 | 2257 | 2448 | 2478 | SAME | X796 | 1368 | 1102 | 794 | 100 | 413 |
| | | | | | | | | 1001_01SL | | | | | | | | | | | | | | | | |
| | Average I | | | | | Hwy: 00 | | Count Milep | | | | unt Volume: | 39,530 | | | | | | | | | | | |
| Zenesary - | 52a.5a 266 | 2m2z 168 | 2m3n 127 | 26-da 159 | 20.54 207 | Sada 479 | Sa.7a | Jada 1124 | Ba-99 1892 | 39-10s 873 | 10a-11a | 1362 | 12a.fo | 1606 | 2019 | 30-50 2172 | 6x5s 2166 | 50:50 1674 | 1981 | 2m/m 1210 | 80-50 877 | Smiller ATT | 556.11p | 15a.C |
| Petersery | 270 | 170 | 134 | 168 | 304 | 507 | 1002 | 1190 | 1003 | 924 | 1436 | 1403 | 1610 | 1732 | 2137 | 2298 | 2324 | 1772 | 1685 | 1281 | 1035 | THT | 500 | 367 |
| Harch | 269 | 190 | 144 | 160 | 336 | 544 | 1074 | 1276 | 1171 | 990 | 1339 | 1969 | 1735 | 1857 | 2291 | 2465 | 2402 | 1009 | 1806 | 1373 | 1109 | 768. | 100 | 415 |
| April | 289 298 | 190 | 148 | 180 | 326 335 | 544 | 1100 | 1276 | 1171 | 1010 | 1500 | 1900 | 1795 | 1057 | 2281 | 2465 2536 | 260 | 1000 | 1806 | 1373 | 9100 | 790 791 | 690 | 415 427 |
| itore | 236 | 216 | 165 | 254 | 300 | 816 | 1216 | 1445 | 1326 | 1121 | 1142 | 1776 | 1965 | 7100 | 2984 | 2791 | 2821 | 2101 | 7545 | 1915 | 1296 | 870 | 713 | 427 |
| Afte | 243 | 228 | 170 | 214 | 266 | 044 | 1271 | 1911 | 1387 | 1173 | 1822 | 1887 | 2000 | 2100 | 2712 | 2918 | 2990 | 2249 | 2136 | 1406 | 1313 | 810 | 746 | 400 |
| Augint | 247 | 229 | 173 | 217 | 201 | 653 | 1200 | 1932 | 1406 | 1100 | 1947 | 1802 | 2003 | 2229 | 2790 | 2909 | 2001 | 2280 | 2108 | 1548 | 1332 | 903 | 756 | 409 |
| September October | 210 250 | 294 | 154 | 190 | 327 | 540 | 1149 | 1386 | 1154 | 1060 | 1647. | 1679 | 1763 | 1967 | 2452 2300 | 3636 2475 | 2002 | 2010 | 1903 | 1470 | 1167 | 823 172 | 674 | 417 |
| October November | 294 | 191 | 146 | 183 | 337 | 553 | 1012 | 1297 | 1191 | 1007 | 1964 | 1594 | 1765 | 1665 | 2329 | 2000 | 2523 | 1931 | 1836 | 1376 | 1127 | 781 | 540 | 422 |
| December | 287 | 189 | 143 | 179 | 334 | 540 | 1067 | 1268 | 1104 | 984 | 152N | 1556 | 105 | 1845 | 2277 | 2445 | 34W | 1006 | 1795 | 1365 | 1100 | 794 | 406 | 413 |
| | | | 1 - / 1 | | Count | Name/N | umber: 1 | 1001_015L | | | | | | | | | | | | | | | | |
| | Average I | PCEs for | Thursday | | | | | | | | 24hour Co | unt Volume: | 39,530 | | | | | | | | | | | |
| | 12a,5a | 31,21 | 21,21 | Dayle: | deda | Sude. | tada. | Zada | tels | India | 10a,11a | 336,52e | Shile | 10-Jin 1606 | 2019 | 26.60 2172 | An.Se 2100 | Sede : | Seda 1581 | Zede | Rede | SedSe | 100,010 | 330,57 |
| Televary | 290 270 | 100 | 134 | 166 | 367 | 479 507 | 946 | 1194 | 1002 | 924 | 1300 | 1362 | 1520 | 1732 | 2117 | 2172 2299 | 2100 | 1874 1772 | 1581 | 1210 | 1025 | 677 717 | 506 | 360 |
| Netrusary March | 200 | 190 | 194 | 160 | 329 | 544 | 1074 | 1190 | 1171 | 994 | 1436 | 1963 | 1735 | 1857 | 2137 | 2299 2465 | 2304 | 1000 | 1806 | 1373 | 1109 | 798 | 100 | 415 |
| lipid . | 200 | 190 | 144 | 180 | 326 | 544 | 1074 | 1276 | 1171 | 990 | 1339 | 1969 | 1736 | 1007 | 2291 | 3400 | 2402 | 1000 | 1806 | 1273 | 9109 | 768 | 630 | 419 |
| Hay | 296 | 190 | 146 | 190 | 339 | 750 | 1105 | 1313 | 1206 | 1019 | 1909 | 1014 | 1700 | 3801 | 2397 | 2530 | 2364 | 1004 | 1806 | 1412 | 1141 | 791 | 640 | 427 |
| Aire | 108 242 | 218 | 199 | 254 214 | 366 | 010 | 1216 | 1445 | 1308 | 1121 | 1900 | 1776 | 1900 | 2106 | 2594 | 2791 | 2801 | 21111 2240 | 2136 | 1656 | 1258 | 870 810 | 713 | 470 400 |
| July August | 347 | 129 | 179 | 217 | 390 | 683 | 1271 | 1577 | 1307 | 1100 | 1947 | 1887 | 2000 | 2108 | 2712 | 2918 | 2990 | 2260 | 2130 2168 | 1649 | 1513 | 910 | 796 | 400 |
| legismise: | 210 | 294 | 194 | 100 | 340 | 582 | 1149 | 1306 | 1254 | 1060 | 1647 | 1676 | 1857 | YOUT | 2452 | 2636 | 2007 | 2033 | 1933 | 1470 | 1167 | A23 | 674 | 444 |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| October Severator | 290 | 191 | 144 | 188 | 327 | 946 | 1076 1011 | 1281 | 1176 | 505 1007 | 1545 | 1575 | 1743 | 1665 | 2300 | 3475 2508 | 2502 | 1907 | 1814 | 1379 | 9114 | 772 | 833 | 417 |

I-5 Fairgrounds Interchange - Roseburg Southbound - Weekday

| Year of | Cloude Huy # | | log # | Mapoint | Region | | | Terrain Type | Rpend Lin | alt . | # Existing L | | % Trucks | PCE Factor | | PCE Line | Linear Growth Rate | Analysis ACT | Rearby ATR | ATR Hey # | # ATR MP | | Date Issued |
|---------------------|----------------|----------|----------|--------------|--------------|--------------|----------------|--------------|-------------|-------------|---------------------|-------------------|--------------|------------|----------|--------------|-----------------------|--|----------------------|----------------|------------|------------|-------------|
| 2006 | Lone | - | 101 | 123.00 | 3 | | Type merydy | Level | 65 | | (Per Direct | toni | 16.52% | - 2 | 50 | 1.500 | 0.03% | 46.262 | 10-005 | 001 | 126 | 75 | 4/24/200 |
| | | | | | Count | | _ | 1001_01SL | | | | | 100000 | | | | | | 10.000 | | | | 10000 |
| | Average F | PCEs for | Monday | | | Hwy: 0 | | Count Milepo | Sint: 123.0 | 2 | 24hour Count Volume | | 39.530 | ė. | | | | | | | | | |
| | 12m1a | 38.08 | 26.26 | 26.68 | de De | Defe | 56.78 | Zede | De.De | 29.524 | SSe.53a | 11e/2a | 12n/te | tin Dr | Ze:Dr | Jie/ki | de Str | Seds 6 | Za Ziefe | De Da | Se.Uk | (Settle | 236,524 |
| innery. | 290 | 198 | 127 | 159 | 367 | 479 | 946 | 1124 | 1002 | 673 | 1306 | 1362 | 1529 | 1636 | 2010 | 3173 | 2196 | 1004 :10 | 1210 | 977 | 677 | 555 | 306 |
| Petersarry | 270 | 178 | 134 | 168 | 304 | 507 | 1002 | 1190 | 1003 | 934 | 1436 | 1462 | 1619 | 1774 | 2137 | 3299 | 3304 | | 1201 | 1036 | THE | 566 | 367 |
| March | 289 | 190 | 144 | 180 | 329 | 544 | 1074 | 1276 | 9174 | 990 | 1539 | 1909 | 9736 | 1857 | 2291 | 2465 | 240 | | 1373 | 1109 | 766 | 600 | 415 415 |
| Apoli | 299 | 190 | 148 | 100 | 326 326 | 508 | 1105 | 1216 | 1006 | 990 1019 | 1539 | 1500 | 1735 1786 | 1857 | 2987 | 2465 2536 | 2402 2564 | | 68 1973 58 1413 | 1100 | 766 791 | 646 | 427 |
| Aure . | 100 | 216 | 160 | 204 | 300 | 816 | 1210 | 1440 | 1326 | 1121 | 1742 | 1776 | 1905 | 2103 | 2394 | 2791 | 2821 | | AS 1886 | 1256 | 870 | 713 | 470 |
| hely | 543 | 329 | 170 | 214 | 386 | 544 | 1271 | 1211 | 1387 | 1173 | 1822 | 1857 | 2006 | 2100 | 2110 | 2919 | 2990 | | 38 1606 | 1212 | 810 | 746 | 402 |
| August | 347 | 329 | 173 | 217 | 301 | 913 | (389 | 1830 | 1406 | 1100 | 3847 | 1863 | 2003 | 3329 | 2750 | 2969 | 2801 | | 1949 | (330) | 923 | 798 | 406 |
| Depterdur | 2110 | 204 | 154 | 190 | 340 | 560 | 1140 | 1366 | 1254 | 1000 | 1997 | 1676 | 1907 | 1987 | 2452 | 2856 | 2007 | | 03 1470 | 9167 | 823 | 674 | 444 |
| October | 290 | 191 | 144 | 180 | 327 | 546 | 1016 | 1281 | 1176 | 196 | 1545 | 1575 | (740 | 1995 | 2300 | 3475 | 2902 | | 1379 | 9194 | 772 | 630 | 417 |
| November | 294 | 193 | 146 | 180 | 301 | 963 | 1002 | 1397 | 1101 | 1007 | 1904 | 1994 | 1764 | 1005 | 2329 | 2906 | 2533 | | 1396 | 1127 | 781 | 640 | 422 |
| December | 267 | 189 | 143 | 179 | 324 | 540 | 1907 | 1266 | 1164 | 354 | 1529 | 1959 | 1775 | 1645 | 2077 | 346 | 2476 | 1000 1 | WS 1365 | 1102 | 764 | 636 | 413 |
| | | | | | Count | Name/N | Number: r | 1001_018L | | | | | | | | | | | | | | | |
| | Average F | CEs for | Tuesday | | Count | Hwy: 0 | 01 | Count Mileps | 2 | 24hour Co | unt Volume: | 39.530 | | | | | | | | | | | |
| | 12a-ta | lada | 26-Dr | Za-da | dada | Sedie. | ta-Za | Ziela | deds | 18:124 | 224-114 | 13a-12a | 12n-te | tale | lisht | 20172 | deSt | Sodo Si | Ja Jada | dade | 2e-10e | tin-tia | 139-13 |
| Jeruary | 266 | 160 | 137 | 150 | 267 | 479 | 946 | 1124 | 1992 | 973 | 1300 | 1362 | 1509 | 1606 | 2019 | | 2196 | | 1210 | 617 | 677 | 100 | 366 |
| Felicuscy March | 270 | 176 | 194 | 168 | 304 | 507 544 | 1000 | 1100 1276 | 1000 | 924 | 1539 | 1903 | 1910 | 1752 | 2137 | 2299 2465 | 2304 2462 | | 06 1375 | 109 | 717 | 588 630 | 387 |
| April | 289 | 110 | 144 | 180 | 326 | 544 | 1074 | 1276 | 1171 | HIG | 1539 | 1969 | 1735 | 1857 | 2391 | 246 | 2402 | | DB 1373 | 1109 | 766 | 630 | 415 |
| Hay | 296 | 196 | 148 | 186 | 200 | 100 | 1105 | 1313 | 1208 | 1019 | 1980 | 1014 | 1700 | 1911 | 2387 | 2539 | 2504 | | 1913 | 1141 | 791 | 640 | 407 |
| June | 206 | 216 | 163 | 304 | 309 | 816 | 1210 | 1445 | 1226 | 1121 | 1710 | 1776 | 1965 | 2103 | 2594 | 2791 | 2621 | | NE 1965 | 1296 | 870 | 710 | 479 |
| ibdy | 543 | 226 | 179 | 214 | 366 | 644 | 1271 | 1011 | 1387 | 1173 | 1823 | 1807 | 2005 | 2108 | 2112 | 269 | 2960 | 3340 2 | 38 1636 | 1313 | 810 | 746 | 492 |
| August | 247 | 228 | 173 | 217 | 201 | 653 | 1399 | 1932 | 1406 | 1100 | 384T | 1883 | 2080 | 200W | 2190 | 2993 | 2991 | | 1049 | 1352 | 823 | 750 | 400 |
| Septenden | 310 | 294 | 154 | 180 | 349 | 560 | 1149 | 1366 | 1254 | 1060 | 1547 | 1676 | 1887 | 1905 | 2452 | 2638 | 2007 | | (33 1470 114 1379 | 1187 | 823 | 674 | 444 |
| Getober November | 290 294 | 191 | 146 | 181 | 327 | 546 | 1079 | 1261 | 1176 | 1007 | 1504 | 1504 | 1749 | 1000 | 2300 | 2100 | 2503 | 100 | H4 1379 136 1390 | 1114 | 172 | 610 | 417 |
| December | 287 | 189 | 140 | 179 | 324 | 540 | 1007 | 1268 | 1164 | 984 | 1529 | 1009 | 1725 | 1945 | 2257 | 248 | 2478 | | 98 1365 | 1102 | 794 | 626 | 413 |
| | | | | | Count | | | 1001 01SL | 11111 | | | | | | - | - 1000 | 44.0 | | | | | | |
| | Average F | ite. | | Hwy: 0 | | Count Milepo | | Mileson Co | unt Volume: | 39,530 | | | | | | | | | | | | | |
| | -0.00 A CO. | | | 7 | | 0.00 | | | | | 70.00000000 | | | | Sec. No. | | | Section 100 | | | de ste | 400.044 | 156.52 |
| January | 52a.1a. 266 | 188 | 2a.3a | 26:48 159 | #8-54 297 | 5a:5a 479 | 5140 | Teda 1124 | Bads 1992 | 8112 ATT | 30a-13a 1364 | 11in 12is 1362 | 1506 | 1000 | 2019 | 2177 | 6x5x 2166 | | 70 Zndu 1210 | Sta-Sta 977 | Sec.132: | 10e-11p | 306 |
| Petersary | 270 | 170 | 134 | 168 | 304 | 507 | 1002 | 1190 | 1003 | 924 | 1436 | 1403 | 1010 | 1732 | 2137 | 2298 | 2324 | | MES 1281 | 1035 | THT | 500 | 367 |
| Blanch | 269 | 190 | 144 | 180 | 326 | 544 | 1074 | 1276 | 1171 | 990 | 1339 | 1969 | 1735 | 1867 | 2291 | 2485 | 2492 | 1800 11 | OK 1379 | 1109 | 768 | 100 | 415 |
| April | 289 | 190 | 144 | 180 | 326 | 544 | 1074 | 1278 | STEE | 990 | 1500 | 1966 | 1795 | 1957 | 220 | 246 | 2460 | | 1973 | 9109 | 798 | 400 | 415 |
| May | 296 | 190 | 148 | 100 | 300 | 200 | 1100 | 1313 | 1208 | 1019 | 1503 | 1614 | 1706 | 3001 | 2367 | 2030 | 2964 | | 56 1413 | 1141 | 791 | 940 | 407 |
| June | 208 | 218 | 163 | 394 | 369 | 044 | 1216 | 1445 | 1326 | 1173 | 1942 | 1776 | 1965 | Z103 | 2594 | 291 | 2021 | | H5 1996 SK HDE | 1296 | 810 | 713 | 470 |
| Ady August | 343 347 | 229 | 170 | 214 | 201 | 653 | 1271 | 1992 | 1406 | 1100 | 1947 | 1887 | 2065 | 2100 | 2190 | 2919 | 286 | | 08 154E | 1302 | 803 | 796 | 400 |
| September | 210 | 794 | 154 | 190 | 140 | 582 | 1149 | 1366 | 1254 | 1060 | 1647 | 1679 | 1807 | 1967 | 2402 | 2636 | 2667 | | EES 1470 | 1167 | 822 | 674 | 444 |
| October | 290 | 191 | 144 | 181 | 307 | 540 | 1078 | 1381 | 1176 | 916. | 1545 | 1676 | 1741 | 1865 | 2300 | 2479 | 2902 | | 1579 | 1114 | 172 | 630 | 417 |
| Hovember | 294 | 193 | 146 | 183 | 201 | 510 | 1092 | 1287 | 1191 | 1007 | 1984 | 1594 | 1784 | 1888 | 2329 | 2500 | 2523 | | 136 | 1127 | 781 | 540 | 422 |
| December | 287 | 189 | 143 | 179 | 334 | 540 | 3007 | 1268 | 1104 | 984 | 152H | 1559 | 108 | 1945 | 2277 | 2445 | 34% | 1000 1 | 95 1905 | 1102 | 764 | 436 | 413 |
| tellulla. | 2.71 | 1501. | 0.00 | 1111111 | Count | Name? | Vumber: 1 | 1001_01SL | - 1-9.50 | 200 | 41.171.5 | . 200 | | | | | | | | | . 17 | 111 | |
| | Average f | PCEs for | Thursday | , | | Hery: 0 | | Count Milepo | rint: 123.9 | 2 | 24hour Co | unt Volume: | 39,530 | | | | | | | | | | |
| | Made | 312 | 21.21 | Dicht . | deda | Sede | Sala | Zada | dada | India. | 10a.11a | 11a.12a | Slede | tede | 26/20 | 26/8 | AuGe | Sede N | de Jade | State | Section. | 10x11x | 13m5 |
| January . | 250 | 168 | 127 | 100 | 267 | 479 | 946 | 1124 | 1002 | 873 | 1300 | 1362 | 1529 | 1600 | 2019 | 202 | 2196 | 1674 11 | 1510 | 977 | 677 | 600 | 366 |
| Petrusry | 270 | 178 | 134 | 168 | 304 | 307 | 9002 | 1190 | 1093 | 924 | 1436 | 1463 | 1616 | 1732 | 2137 | 2299 | 2304 | | 1281 | 1025 | 737 | 586 | 387 |
| March | 289 | 190 | 144 | 180 | 326 | 544 | 1074 | 1276 | 9171 | 160 | 1539 | 1506 | 1795 | 1857 | 2291 | 2465 | 2402 | | 1379 | 7100 | 798 | 400 | 415 |
| April | 200 | 190 | 144 | 180 | 336 | 544 | 1074 | 1276 | 1171 | 900 | 1939 | 1009 | 1736 | 1007 | 2291 | 2400 | 2402 | | 06 1973 | 1109 | 768 | 630 | 415 |
| rikey dutre | 296 | 218 | 146 | 190 | 339 | 110 | 1105 | 1913 | 1206 | 1121 | 1765 | 1014 | 1900 | 2100 | 2917 | 2500 2791 | 2964 | | 08 1412 145 1556 | 1145 | 791 870 | 548 713 | 427 |
| July . | 140 | 218 | 179 | 214 | 366 | 044 | 1271 | 1911 | 1367 | 1173 | 1900 | 1807 | 2000 | 2106 | 2712 | 2918 | 2890 | - | 36 1626 | 1213 | 810 | 746 | 400 |
| August | 347 | 129 | 175 | 217 | 301 | 653 | 1289 | 1932 | 1400 | 1380 | 1547 | 1662 | 2000 | 1329 | 2750 | 2909 | 2801 | | 68 1649 | 1532 | 925 | 756 | 49 |
| September | 310 | 294 | 194 | 100 | 340 | 582 | 1149 | 1306 | 1254 | 1060 | 1647 | 1670 | 1857 | TOST | 2462 | 2636 | 2007 | | 1470 | 1167 | 823 | 674 | 446 |
| October | 290 | 191 | 144 | 181 | 327 | 546 | 1076 | 1281 | 1176 | 505 | 1545 | 1575 | 1740 | 1865 | 2200 | 2475 | 2802 | A STATE OF THE PARTY OF THE PAR | 1379 | 1314 | 772 | 830 | 417 |
| November | 254 | 193 | 146 | 183 | 301 | 953 | 1062 | 1297 | 1191 | 1007 | 1504 | 1594 | 3264 | 1555 | 2309 | 2506 | 2528 | | 1396 | 9127 | 781 | 640 | 400 |
| December | 287 | 188 | 143 | 179 | 304 | 540 | 1007 | 1266 | 1104 | 304 | 1926 | 1996 | 1726 | 1646 | 2277 | 2449 | 2476 | 1000 11 | 9901 990 | 1102 | 704 | 626 | 413 |

Hwy 047 - MP 58.0

Westbound - Weekend

| Year of Analysis | Closure Type | Hw | ry # | Milepoint | Region | | adway Type | Terrain Type | Speed Lin | nt | # Existing L (Per Direct | | % Trucks | PCE | Factor | PCE Limit | Linear Growth Rate | Analysis Al | T Ana | iyele ATR | ATR Hwy # | ATR | MP | Date Issued |
|---|-------------------------------|--------------|----------|------------------|--------------|--------------|---------------------|---------------------|---------------------|-----------------------|-----------------------------|-----------------|----------------|----------------------|---------------------|---------------------|-----------------------|---------------------|--------------|---------------------|---------------------|----------------------|---------|-------------|
| 2008 | Lane | 04 | 47 | 58.00 | 1 | | ltilane | Level | 55 | | 2 | • | 10.05% | 1 | 1.50 | 1,500 | 3.30% | 35,225 | 3 | 4-001 | 00000 | 0.0 | 0 | 9/30/2008 |
| | | | | | | | | 3402_06WL | | | | | | | | | | | | | | | | |
| | Average F | PCEs for F | Friday | | Count | Hwy: 04 | 7 | Count Milepo | oint: 58.50 | | 24hour Co | unt Volume: | 44,407 | | | | | | | | | | | |
| | 12a-1a | <u>1a-2a</u> | 2a-3a | 38-48 | <u>4a-5a</u> | 5a-6a | <u>6a-7a</u> 295 | <u>7a-8a</u> 515 | <u>8a-9a</u> 836 | <u>9a-10a</u> 1227 | 10a-11a 1618 | 11a-12p 1661 | 120-10 1445 | <u>10-20</u> 1231 | <u>20-30</u> 988 | <u>30-40</u> 830 | <u>40-50</u> 720 | <u>50-60</u> 677 | 60-70 605 | <u>70-80</u> 456 | <u>8p-9p</u> 389 | 90-100 355 | 100-110 | 110-12a |
| January 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 | | 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 | | 1005 | 758 | 646 | 590 | | |
| June July | - | | - | | | | 586 732 | 1023 1278 | 1662 2076 | 2438 3046 | 3215 4015 | 3301 4123 | 2874 3590 | 2447 3056 | 1963 2452 | 1650 2061 | 1431 | 1346 1682 | 1203 | 907 1133 | 773 966 | 706 882 | | |
| August | _ | | | | | | 775 | 1353 | 2197 | 3223 | 4249 | 4363 | 3799 | 3234 | 2594 | 2181 | 1891 | | 1590 | 1199 | 1022 | 934 | | |
| September | | | | | | | 578 | 1010 | 1640 | 2405 | 3171 | 3257 | 2835 | 2414 | 1936 | 1628 | 1411 | | 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 | | | | | | | | | | | | | | | | | | | | | | | | |
| | Average F | PCEs for 9 | Saturday | | Count | Hwy: 04 | 7 | Count Milepo | oint: 58.50 | | 24hour Co | unt Volume: | 44,407 | , | | | | | | | | | | |
| | 12a-1a | <u>1a-2a</u> | 2a-3a | 3a-4a | | <u>5a-6a</u> | 6a-7a | <u>7a-8a</u> | 8a-9a | 9a-10a | 10a-11a | 11a-12p | 12p-1p | 1p-2p | 2p-3p | <u>3p-4p</u> | 4p-5p | | 6p-7p | 7p-8p | 8p-9p | 9p-10p | 10p-11p | 11p-12a |
| January February | _ | | - | - | _ | | 295 409 | 515 713 | 836 1159 | 1227 1700 | 1618 2241 | 1661 2301 | 1445 | 1231 | 988 1368 | 830 1150 | 720 997 | 677 939 | 605 838 | 456 632 | 389 539 | 355 492 | | |
| March | | | | | | | 510 | 891 | 1447 | 2123 | 2799 | 2875 | 2503 | 2131 | 1709 | 1436 | 1246 | | 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 | | 1203 | 907 | 773 | 706 | | |
| July | _ | | - | | _ | | 732 775 | 1278 1353 | 2076 2197 | 3046 3223 | 4015 4249 | 4123 4363 | 3590 3799 | 3056 3234 | 2452 2594 | 2061 2181 | 1787 1891 | | 1502 1590 | 1133 1199 | 966 1022 | 882 934 | | |
| August September | _ | | | | | | 578 | 1010 | 1640 | 2405 | 3171 | 3257 | 2835 | 2414 | 1936 | 1628 | 1411 | | 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 F | | Hwy: 04 | | Count Milepo | | | | unt Volume: | | | | | | | | | | | | | | | |
| January | 12a-1a | <u>1a-2a</u> | 2a-3a | <u>3a-4a</u> | <u>4a-5a</u> | 5a-6a | <u>6a-7a</u> 295 | <u>7a-8a</u> 515 | <u>8a-9a</u> 836 | <u>9a-10a</u> 1227 | 10a-11a 1618 | 11a-12b 1661 | 120-10 1445 | <u>10-20</u> 1231 | <u>20-30</u> 988 | <u>30-40</u> 830 | <u>4p-5p</u> 720 | <u>50-60</u> 677 | 60-70 605 | <u>70-80</u> 456 | <u>80-90</u> 389 | <u>90-100</u> 355 | 100-110 | 110-12a |
| 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 | | 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 | | 1005 | 758 | 646 | 590 | | |
| June | - | | - | | _ | | 586 | 1023 | 1662 | 2438 | 3215 | 3301 | 2874 | 2447 | 1963 | 1650 | 1431 | | 1203 | 907 | 773 | 706 | | |
| July August | | | | | _ | | 732 775 | 1278 1353 | 2076 2197 | 3046 3223 | 4015 4249 | 4123 4363 | 3590 3799 | 3056 3234 | 2452 2594 | 2061 2181 | 1787 1891 | | 1502 1590 | 1133 1199 | 966 1022 | 882 934 | | |
| September | | | | | | | 578 | 1010 | 1640 | 2405 | 3171 | 3257 | 2835 | 2414 | 1936 | 1628 | 1411 | | 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













- 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

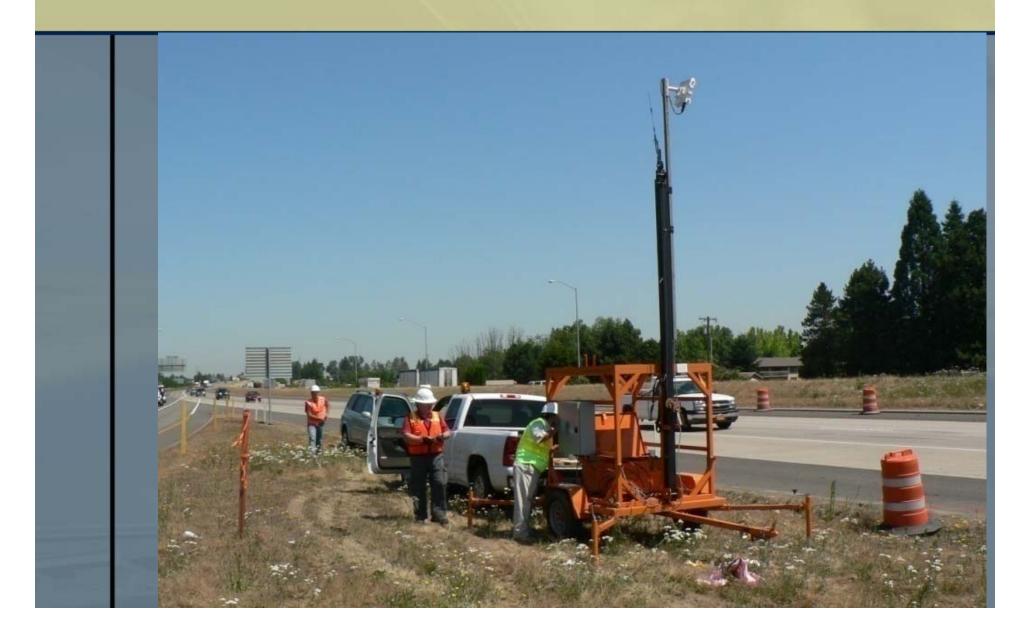












Deploy and Verify













Web-Based Reporting



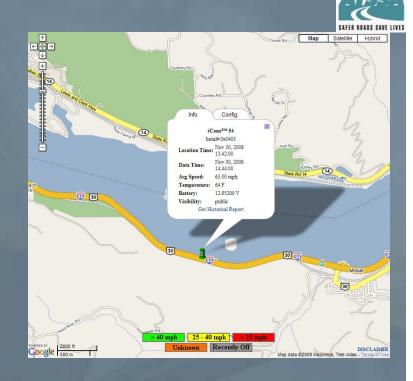








- Turn-Key Service
- GPS located on devices
- Interactive Google maps interface
- Color coded for quick verification of traffic flow
- Download historic traffic data
 - User defined reporting period
 - CSV or Graph



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

- ATSSA SAFER RDADS SAVE LIVES
- Thanksgivings 3 spent watching traffic?
- Test new work zone practices
- Note how surrounding activities can affect project work zone

Conclusions





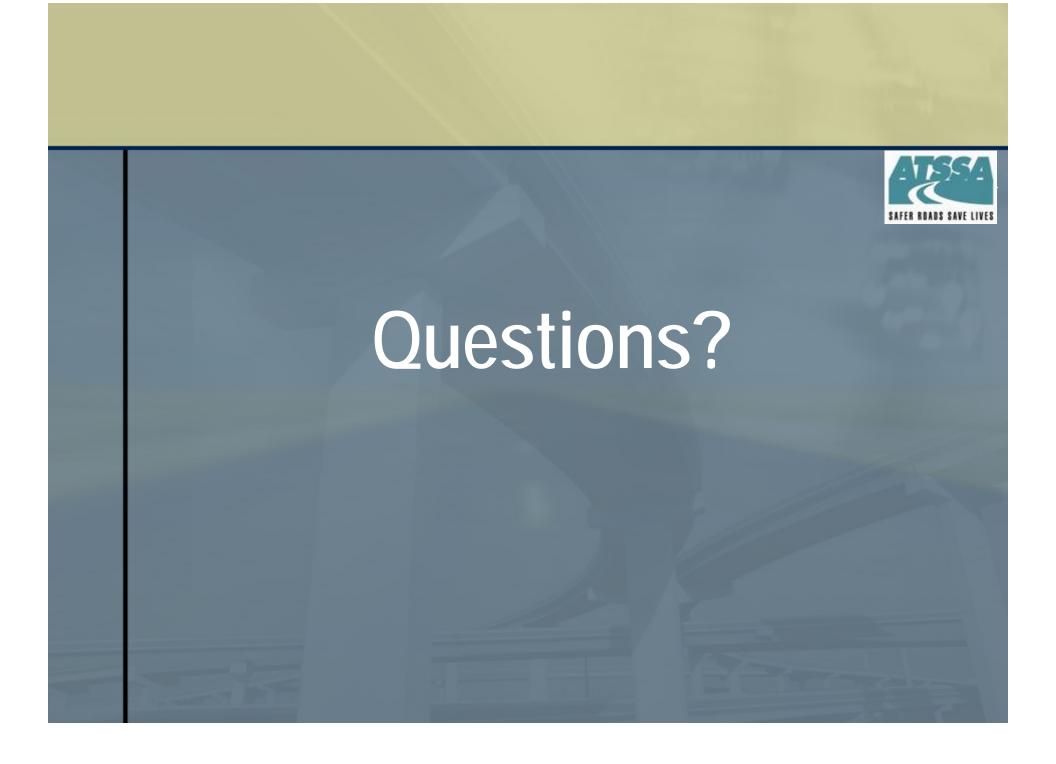
- Not for every project, but for the more complex, high risk projects
- Data collection useful for making decisions during construction for comparison to original plans
- Benefits
 - Congestion and Safety Pick best start time
 - Potential Schedule Improvements for Contractor
 - Information for Better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

Where is WZ ITS going?





- 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 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 <u>posting</u> or for <u>decisions</u>?

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



W. D. Baldwin, P.E.

Mobility Manager / NW Area Traffic Leader

HDR Engineering, Inc.

WD.Baldwin@hdrinc.com