

**Appendix B. An Assessment the Analysis Needs and Capabilities of Tools to Evaluate Potential ITS and Operaitons Improvements**

| Function                  | Component             | Operation                    | Spatial Analysis |          |          | Temporal Analysis |              |           | Potential Analysis Capabilities |                           |                            |                 |               | Performance Measures |        |                       |                   |                    |                   | Analysis Tool    |             |             |
|---------------------------|-----------------------|------------------------------|------------------|----------|----------|-------------------|--------------|-----------|---------------------------------|---------------------------|----------------------------|-----------------|---------------|----------------------|--------|-----------------------|-------------------|--------------------|-------------------|------------------|-------------|-------------|
|                           |                       |                              | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS        | DYNASMART   |
| Arterial Management       | Traffic Control       | Transit Signal Priority      | X                | X        | X        | X                 | X            |           | X                               |                           |                            |                 | X             |                      |        |                       | X                 | X                  | X                 | Yes              | No          | Partially   |
|                           |                       | Emergency Vehicle Preemption | X                | X        | X        | X                 | X            |           |                                 |                           |                            |                 |               | X                    | X      | X                     |                   |                    |                   | Yes              | No          | Yes         |
|                           |                       | Adaptive Signal Control      |                  | X        | X        |                   | X            | X         |                                 |                           |                            | X               |               | X                    | X      |                       | X                 | X                  | X                 | Partially        | No          | Yes         |
|                           |                       | Advanced Signal Systems      |                  | X        | X        |                   | X            | X         |                                 |                           |                            | X               |               | X                    | X      |                       | X                 | X                  | X                 | Yes              | Yes         | Yes         |
|                           |                       | Variable Speed Limits        | X                | X        |          |                   | X            |           |                                 |                           |                            | X               |               | X                    | X      |                       | X                 |                    |                   | No               | Yes         | Yes         |
|                           |                       | Bicycle & Pedestrian         | X                | X        |          |                   | X            | X         |                                 |                           |                            |                 |               |                      | X      | X                     |                   | X                  | X                 | No               | No          | Potentially |
|                           | Lane Management       | HOV Facilities               |                  | X        | X        |                   |              | X         | X                               | X                         | X                          | X               | X             | X                    | X      |                       | X                 | X                  | X                 | Potentially      | Yes         | Partially   |
|                           |                       | Reversible Flow Lanes        | X                | X        |          |                   | X            | X         |                                 |                           |                            | X               | X             | X                    | X      |                       | X                 | X                  | X                 | Potentially      | Potentially | No          |
|                           |                       | Congestion Pricing           |                  | X        | X        |                   | X            | X         | X                               |                           |                            | X               | X             | X                    |        | X                     | X                 | X                  |                   | No               | Yes         | No          |
|                           |                       | Lane Control                 | X                |          |          |                   | X            | X         |                                 |                           |                            |                 |               | X                    | X      |                       | X                 |                    |                   | No               | No          | No          |
|                           |                       | Variable Speed Limit         | X                |          |          |                   | X            | X         |                                 |                           |                            |                 |               | X                    | X      |                       | X                 |                    |                   | No               | No          | Yes         |
|                           | Emergency Evacuations |                              |                  | X        | X        |                   | X            | X         |                                 |                           |                            |                 | X             | X                    | X      |                       | X                 | X                  | X                 | No               | Potentially | Yes         |
|                           |                       |                              |                  |          |          |                   |              |           |                                 |                           |                            |                 |               |                      |        |                       |                   |                    |                   |                  |             |             |
|                           | Parking Management    | Data Collection              |                  | X        | X        |                   |              | X         |                                 |                           |                            |                 |               |                      |        | X                     | X                 |                    |                   | No               | No          | No          |
| Information Dissemination |                       |                              |                  | X        |          |                   | X            |           |                                 |                           | X                          | X               | X             |                      |        | X                     |                   |                    | No                | No               | No          |             |
| Information Dissemination | Dynamic Message Signs | X                            | X                |          |          | X                 | X            |           |                                 |                           |                            | X               |               |                      | X      |                       |                   |                    | Indirectly        | Yes              | No          |             |
|                           | In-Vehicle Systems    |                              |                  | X        |          |                   | X            | X         |                                 |                           | X                          | X               | X             |                      |        | X                     |                   |                    | Yes               | Yes              | No          |             |

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|------------------------------|---------------------------|-------------------------------|------------------|----------|----------|-------------------|--------------|-----------|---------------------------------|---------------------------|----------------------------|-----------------|---------------|----------------------|--------|-----------------------|-------------------|--------------------|-------------------|------------------|-------------|-------------|
|                              |                           |                               | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS        | DYNAMSMART  |
| Arterial Management          | Information Dissemination | Highway Advisory Radio (HAR)  |                  | X        | X        | X                 | X            |           |                                 | X                         |                            |                 |               |                      | X      |                       |                   |                    |                   | Indirectly       | Potentially | No          |
|                              | Enforcement               | Speed Enforcement             | X                |          |          | X                 | X            | X         |                                 |                           |                            | X               |               | X                    |        | X                     |                   |                    |                   | No               | No          | No          |
|                              |                           | Stop / Yield Enforcement      | X                |          |          | X                 | X            | X         |                                 |                           |                            | X               |               | X                    |        | X                     |                   |                    |                   | No               | No          | No          |
|                              |                           | High Occupancy Vehicles (HOV) |                  | X        | X        | X                 | X            | X         | X                               | X                         | X                          |                 | X             |                      | X      |                       | X                 |                    |                   | No               | No          | No          |
|                              | Ramp Meter Enforcement    | X                             | X                |          | X        | X                 | X            |           |                                 |                           | X                          |                 | X             |                      | X      |                       |                   |                    | No                | No               | No          |             |
| Freeway Management           | Ramp Control              | Ramp Metering                 | X                | X        |          | X                 | X            | X         |                                 |                           | X                          | X               |               | X                    | X      |                       | X                 | X                  | X                 | Yes              | Partially   | Yes         |
|                              |                           | Ramp Closures                 | X                | X        |          | X                 | X            |           |                                 | X                         |                            |                 | X             |                      | X      |                       | X                 | X                  | X                 | Potentially      | Potentially | Yes         |
|                              |                           | Priority Access               | X                | X        |          |                   | X            |           |                                 | X                         |                            | X               |               | X                    |        | X                     | X                 | X                  | X                 | Potentially      | No          | Potentially |
|                              | Special Events Management | Occasional Events             |                  | X        |          | X                 | X            |           |                                 | X                         | X                          | X               | X             | X                    | X      |                       | X                 | X                  | X                 | No               | Yes         | Yes         |
|                              |                           | Frequent Events               |                  | X        | X        | X                 | X            |           |                                 | X                         | X                          | X               | X             | X                    | X      |                       | X                 | X                  | X                 | Potentially      | Yes         | Yes         |
|                              |                           | Other Events                  | X                | X        |          | X                 |              |           |                                 |                           |                            |                 | X             |                      | X      |                       | X                 | X                  | X                 | No               | Yes         | No          |
|                              |                           | Temporary TMCs                |                  |          | X        | X                 |              |           |                                 |                           |                            | X               |               |                      | X      | X                     |                   |                    |                   | No               | No          | No          |
|                              | Information Dissemination | Dynamic Message Signs (DMS)   | X                | X        |          | X                 | X            |           |                                 |                           | X                          |                 | X             |                      |        | X                     |                   |                    |                   | Yes              | Yes         | No          |
| In-Vehicle Systems (IVS)     |                           |                               |                  | X        |          | X                 | X            | X         | X                               | X                         | X                          |                 |               | X                    |        | X                     |                   |                    | Yes               | Yes              | No          |             |
| Highway Advisory Radio (HAR) |                           |                               | X                |          | X        | X                 |              |           |                                 |                           | X                          |                 |               | X                    |        |                       |                   |                    | Indirectly        | Potentially      | No          |             |

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| Function                  | Component                        | Operation                    | Spatial Analysis |          |          | Temporal Analysis |              |           | Potential Analysis Capabilities |                           |                            |                 |               | Performance Measures |        |                       |                   |                    |                   | Analysis Tool    |      |             |                        |
|---------------------------|----------------------------------|------------------------------|------------------|----------|----------|-------------------|--------------|-----------|---------------------------------|---------------------------|----------------------------|-----------------|---------------|----------------------|--------|-----------------------|-------------------|--------------------|-------------------|------------------|------|-------------|------------------------|
|                           |                                  |                              | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS | DYNASMART   | Microscopic Simulation |
| Transit Management        | Safety & Security                | In-Vehicle Surveillance      |                  |          | X        |                   | X            | X         | X                               |                           |                            |                 |               | X                    | X      |                       |                   |                    |                   | Yes              | No   | No          |                        |
|                           |                                  | Facility Surveillance        |                  | X        | X        | X                 | X            | X         | X                               |                           |                            |                 |               | X                    | X      |                       |                   |                    |                   | No               | No   | No          |                        |
|                           |                                  | Employee Credentialing       |                  |          | X        |                   |              |           | X                               |                           |                            |                 |               |                      |        | X                     |                   |                    |                   | No               | No   | NO          |                        |
|                           |                                  | Remote Disabling System      |                  |          | X        |                   |              | X         | X                               |                           |                            |                 | X             | X                    |        | X                     |                   |                    |                   | No               | No   | No          |                        |
|                           | Transportation Demand Management | Ride Sharing / Matching      |                  | X        | X        | X                 | X            |           | X                               | X                         |                            |                 |               | X                    |        | X                     |                   | X                  | X                 | X                | No   | No          | No                     |
|                           |                                  | Dynamic Routing / Scheduling |                  |          | X        |                   |              | X         |                                 | X                         | X                          |                 | X             |                      |        | X                     | X                 | X                  | X                 | X                | Yes  | Yes         | No                     |
|                           |                                  | Service Coordination         | X                | X        |          | X                 | X            |           |                                 |                           |                            |                 |               |                      |        | X                     |                   | X                  |                   | No               | No   | Potentially |                        |
|                           | Fleet Management                 | AVL / CAD                    |                  |          | X        | X                 | X            | X         | X                               |                           |                            |                 |               |                      |        |                       | X                 |                    |                   | Yes              | No   | No          |                        |
|                           |                                  | Maintenance                  |                  |          | X        |                   | X            | X         | X                               |                           |                            |                 |               |                      |        |                       | X                 |                    |                   | No               | No   | No          |                        |
| Planning                  |                                  |                              |                  | X        |          |                   | X            |           | X                               |                           |                            |                 |               |                      |        | X                     |                   |                    | No                | No               | No   |             |                        |
| Information Dissemination | In-Vehicle Systems               |                              |                  | X        |          | X                 |              | X         |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    | Indirectly        | Yes              | No   |             |                        |
|                           | In-Terminal / Wayside            | X                            | X                |          | X        | X                 |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    | No                |                  | No   |             |                        |
|                           | Internet / Wireless / Phone      |                              |                  | X        | X        | X                 |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    | Indirectly        |                  | No   |             |                        |
| Incident Management       | Surveillance & Detection         | Detectors                    | X                |          |          | X                 | X            | X         |                                 | X                         | X                          | X               | X             | X                    |        | X                     |                   |                    |                   | Indirectly       | No   | Potentially |                        |
|                           |                                  | Imaging / Video              | X                | X        |          | X                 | X            | X         |                                 | X                         | X                          | X               | X             |                      |        | X                     |                   |                    |                   | No               | No   | No          |                        |
|                           |                                  | Wireless E911                |                  |          | X        |                   | X            | X         |                                 | X                         | X                          | X               |               |                      | X      | X                     |                   |                    |                   | No               | No   | No          |                        |
|                           |                                  | Mayday / CAN                 |                  |          | X        |                   |              | X         |                                 | X                         | X                          | X               |               |                      | X      | X                     |                   |                    |                   | Indirectly       | No   | No          |                        |
|                           |                                  | Call Boxes                   | X                | X        |          | X                 |              |           |                                 | X                         | X                          | X               |               |                      | X      | X                     |                   |                    |                   | No               | No   | No          |                        |

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|                      |                                |                              | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS       | DYNASMART   | Microscopic Simulation |
| Incident Management  | Surveillance & Detection       | Traveler Reported            |                  |          | X        | X                 | X            | X         | X                               | X                         |                            |                 |               |                      |        | X                     |                   |                    |                   |                  | Indirectly | No          | No                     |
|                      | Mobilization & Response        | AVL / CAD                    |                  |          | X        |                   | X            |           |                                 |                           |                            |                 |               | X                    |        |                       | X                 | X                  |                   |                  | No         | No          | No                     |
|                      |                                | Response Routing             |                  |          | X        | X                 | X            |           |                                 | X                         | X                          | X               |               | X                    | X      |                       | X                 | X                  |                   |                  | No         | Yes         | No                     |
|                      |                                | Motorist Assistance Patrol   |                  |          | X        | X                 | X            |           |                                 | X                         | X                          | X               |               | X                    | X      |                       | X                 | X                  |                   |                  | No         | No          | No                     |
|                      | Information Dissemination      | Dynamic Message Signs (DMS)  | X                | X        |          | X                 | X            | X         |                                 | X                         | X                          |                 | X             |                      |        | X                     |                   |                    |                   |                  | Indirectly | Yes         | No                     |
|                      |                                | Highway Advisory Radio (HAR) |                  | X        |          | X                 | X            |           |                                 | X                         | X                          |                 | X             |                      |        | X                     |                   |                    |                   |                  | Indirectly | Potentially | No                     |
| Clearance & Recovery | Investigation                  | X                            | X                | X        | X        | X                 | X            | X         |                                 | X                         | X                          | X               | X             |                      |        | X                     |                   |                    |                   | Potentially      | No         | Indirectly  |                        |
|                      | Video                          | X                            |                  |          | X        | X                 |              |           |                                 |                           |                            |                 |               |                      |        | X                     |                   |                    |                   | No               | No         | No          |                        |
|                      | Temporary Traffic Control      | X                            |                  |          | X        |                   |              |           |                                 | X                         | X                          | X               | X             |                      |        | X                     |                   |                    |                   | No               | Yes        | No          |                        |
| Emergency Management | Hazardous Materials Management | Tracking                     |                  |          | X        |                   | X            | X         |                                 |                           |                            |                 |               |                      | X      | X                     | X                 |                    |                   | No               | No         | No          |                        |
|                      |                                | Detection                    |                  | X        |          |                   | X            | X         |                                 |                           |                            |                 |               |                      | X      | X                     | X                 |                    |                   | No               | No         | No          |                        |
|                      |                                | Driver Authentication        |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   | No               | No         | No          |                        |
|                      |                                | Route Planning               |                  |          | X        |                   | X            | X         |                                 | X                         | X                          | X               | X             | X                    |        | X                     |                   | X                  | X                 | Yes              | Yes        | No          |                        |
|                      | Emergency Medical Services     | Advance CAN                  |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    |                   | No               | No         | No          |                        |
|                      |                                | Telemedicine                 |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    |                   | No               | No         | No          |                        |
| Response & Recovery  | Early Warning System           |                              |                  | X        |          | X                 | X            |           | X                               | X                         | X                          | X               |               | X                    |        | X                     |                   |                    |                   | No               | No         | No          |                        |
|                      | Response Management            |                              |                  | X        | X        | X                 | X            |           | X                               | X                         | X                          | X               |               |                      |        | X                     |                   |                    |                   | Yes              | Yes        | No          |                        |

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|                            |                      |                                    | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS       | DYNASMART  | Microscopic Simulation |
| Emergency Management       | Response & Recovery  | Evacuation and Re-Entry Management | X                | X        | X        | X                 | X            |           | X                               | X                         | X                          | X               | X             | X                    | X      |                       |                   | X                  | X                 | X                | Yes        | Yes        | No                     |
|                            |                      | Emergency Traveler Information     |                  |          |          | X                 | X            | X         |                                 |                           |                            |                 |               |                      |        | X                     |                   | X                  |                   |                  | No         | Yes        | No                     |
| Electronic Payment Systems | Toll Collection      |                                    | X                | X        | X        | X                 | X            | X         | X                               | X                         |                            |                 | X             |                      | X      | X                     | X                 |                    |                   | Yes              |            | Yes        |                        |
|                            | Transit Fare Payment |                                    |                  | X        | X        | X                 | X            | X         | X                               | X                         |                            |                 |               |                      | X      | X                     | X                 |                    |                   | Yes              |            | No         |                        |
|                            | Parking Fee Payment  |                                    | X                | X        | X        |                   |              |           | X                               | X                         |                            |                 |               |                      | X      | X                     | X                 |                    |                   | No               | No         | No         |                        |
|                            | Multi-Use Payment    |                                    |                  |          | X        |                   |              | X         | X                               | X                         |                            |                 |               |                      | X      | X                     | X                 |                    |                   | No               | No         | No         |                        |
| Traveler Information       | Pre-Trip Information | Internet/Wireless                  |                  |          | X        | X                 | X            | X         | X                               |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   | Yes              | Indirectly | No         |                        |
|                            |                      | 511                                |                  |          | X        | X                 | X            | X         | X                               |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   | Yes              | Indirectly | No         |                        |
|                            |                      | Other Telephone                    |                  |          | X        | X                 |              |           | X                               | X                         |                            |                 |               |                      | X      |                       | X                 |                    |                   | No               | Indirectly | No         |                        |
|                            |                      | TV / Radio                         |                  |          | X        | X                 | X            | X         | X                               |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   | No               | Indirectly | No         |                        |
|                            | Kiosks               | X                                  | X                |          | X        |                   |              | X         | X                               |                           |                            |                 |               | X                    |        | X                     |                   |                    | Yes               | No               | No         |            |                        |
|                            | En-Route Information | Wireless                           |                  |          | X        | X                 | X            | X         | X                               | X                         | X                          |                 |               | X                    |        | X                     |                   | X                  |                   |                  | Yes        | Indirectly | No                     |
|                            |                      | 511                                |                  |          | X        | X                 | X            | X         | X                               | X                         |                            |                 |               | X                    |        | X                     |                   | X                  |                   |                  | Yes        | Indirectly | No                     |
|                            |                      | Other Telephone                    |                  |          | X        | X                 |              |           | X                               | X                         | X                          |                 |               |                      | X      |                       | X                 |                    |                   |                  | Yes        | Indirectly | No                     |
|                            |                      | Radio                              |                  |          | X        | X                 |              |           | X                               | X                         | X                          |                 |               |                      | X      |                       | X                 |                    |                   |                  | No         | Indirectly | No                     |
|                            | In-Vehicle Systems   |                                    |                  | X        |          | X                 | X            | X         | X                               | X                         |                            |                 | X             |                      | X      |                       | X                 |                    |                   | No               | Indirectly | No         |                        |
| Tourism & Events           | Travel Services      |                                    |                  | X        |          |                   | X            | X         | X                               |                           |                            |                 |               |                      | X      | X                     |                   |                    |                   | Yes              | No         | No         |                        |
|                            | Advance Parking      |                                    |                  | X        |          |                   | X            | X         | X                               |                           |                            |                 |               |                      | X      | X                     |                   |                    |                   | No               | No         | No         |                        |
|                            | Electronic Payment   |                                    |                  | X        |          |                   | X            | X         | X                               |                           |                            |                 |               |                      | X      | X                     |                   |                    |                   | No               | No         | No         |                        |

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|                                  |                                 |                                | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS      | DYNASMART | Microscopic Simulation |
| Information Management           | Data Archiving                  |                                | X                | X        | X        |                   | X            | X         |                                 |                           |                            |                 |               |                      |        | X                     |                   |                    |                   |                  | No        | No        | No                     |
| Crash Prevention & Safety        | Roadway Geometry Warning System | Ramp Rollover                  | X                |          |          | X                 | X            |           |                                 |                           | X                          | X               |               |                      | X      |                       |                   |                    |                   |                  | Yes       | No        | No                     |
|                                  |                                 | Curve Speed Warning            | X                |          |          | X                 | X            |           |                                 |                           | X                          | X               |               |                      | X      |                       |                   |                    |                   |                  | No        | No        | No                     |
|                                  |                                 | Downhill Speed Warning         | X                |          |          | X                 | X            |           |                                 |                           | X                          | X               |               |                      | X      |                       |                   |                    |                   |                  | Yes       | No        | No                     |
|                                  |                                 | Overheight / Overwidth Warning | X                |          |          | X                 |              |           |                                 |                           | X                          | X               |               |                      | X      |                       | X                 |                    |                   |                  | No        | No        | No                     |
|                                  | Highway-Rail Crossing System    |                                | X                |          |          |                   | X            |           |                                 |                           | X                          | X               | X             |                      | X      |                       |                   |                    |                   |                  | Yes       | No        | Potentially            |
|                                  | Intersection Collision Warning  |                                | X                | X        |          |                   |              |           |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    |                   |                  | Yes       | No        | No                     |
|                                  | Pedestrian Safety               |                                | X                |          |          | X                 | X            | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   |                  | No        | No        | No                     |
|                                  | Bicycle Warning Systems         |                                | X                |          |          | X                 | X            | X         |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    |                   |                  | No        | No        | No                     |
| Animal Warning Systems           |                                 |                                | X                | X        |          | X                 | X            |           |                                 |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | No               | No        | No        |                        |
| Roadway Operations & Maintenance | Information Dissemination       | Portable DMS                   | X                | X        |          | X                 |              |           |                                 |                           | X                          | X               | X             | X                    | X      |                       |                   |                    |                   |                  | No        | Yes       | No                     |
|                                  |                                 | Highway Advisory Radio (HAR)   |                  | X        |          | X                 | X            |           |                                 |                           |                            | X               | X             | X                    | X      |                       |                   | X                  |                   |                  | Partially | Yes       | No                     |
|                                  |                                 | Internet / Wireless / Phone    |                  |          | X        | X                 | X            |           |                                 | X                         |                            | X               | X             |                      |        |                       | X                 |                    |                   |                  | Partially | Yes       | No                     |
|                                  | Asset Management                | Fleet Management               |                  |          | X        |                   |              |           | X                               |                           |                            |                 |               |                      | X      | X                     | X                 |                    | X                 | X                | No        | No        | No                     |
|                                  |                                 | Infrastructure Management      |                  |          | X        |                   |              |           | X                               |                           |                            |                 |               |                      | X      | X                     | X                 |                    | X                 | X                | No        | No        | Potentially            |

**Appendix B. An Assessment the Analysis Needs and Capabilities of Tools to Evaluate Potential ITS and Operaitons Improvements**

| Function                         | Component                              | Operation                    | Spatial Analysis |          |          | Temporal Analysis |              |           | Potential Analysis Capabilities |                           |                            |                 |               | Performance Measures |        |                       |                   |                    |                   | Analysis Tool    |             |           |
|----------------------------------|--|------------------------------|------------------|----------|----------|-------------------|--------------|-----------|---------------------------------|---------------------------|----------------------------|-----------------|---------------|----------------------|--------|-----------------------|-------------------|--------------------|-------------------|------------------|-------------|-----------|
|                                  |  |                              | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS        | DYNASMART |
| Roadway Operations & Maintenance | Work Zone Management                   | Temporary Traffic Management | X                | X        |          | X                 |              |           |                                 | X                         | X                          | X               | X             | X                    | X      |                       | X                 | X                  | X                 | No               | Yes         | Yes       |
|                                  |  | Temporary Incident Mangement | X                | X        |          | X                 |              |           |                                 | X                         | X                          | X               | X             | X                    | X      |                       |                   | X                  | X                 | No               | Yes         | Yes       |
|                                  |  | Lane Control                 | X                |          |          | X                 |              |           |                                 |                           | X                          | X               | X             |                      |        |                       | X                 |                    |                   | No               | Yes         | No        |
|                                  |  | Variable Speed Limit         | X                |          |          | X                 |              |           |                                 |                           | X                          | X               | X             | X                    |        |                       | X                 |                    |                   | No               | Potentially | Yes       |
|                                  |  | Speed Enforcement            | X                |          |          | X                 |              |           |                                 |                           |                            | X               | X             | X                    |        | X                     |                   |                    |                   | No               | No          | No        |
|                                  |  | Intrusion Detection          | X                |          |          |                   |              | X         |                                 |                           |                            |                 |               |                      |        | X                     |                   |                    |                   | No               | No          | No        |
|                                  | Road Closure Management                |                              |                  | X        |          |                   | X            |           |                                 |                           |                            |                 |               | X                    |        | X                     |                   | X                  | No                | Yes              | No          |           |
| Road Weather Management          | Surveillance, Monitoring, & Prediction | Pavement Condition           | X                | X        | X        | X                 | X            | X         |                                 |                           | X                          | X               | X             | X                    | X      | X                     | X                 | X                  |                   | No               | No          | No        |
|                                  |  | Atmospheric Condition        |                  | X        | X        | X                 | X            | X         |                                 |                           | X                          | X               | X             | X                    | X      | X                     | X                 | X                  |                   | No               | No          | No        |
|                                  |  | Water Level                  | X                | X        |          | X                 | X            | X         |                                 |                           | X                          | X               | X             | X                    | X      | X                     | X                 | X                  |                   | No               | No          | No        |
|                                  | Information Dissemination              | Dynamic Message Signs (DMS)  | X                | X        |          | X                 | X            |           |                                 |                           |                            | X               |               |                      |        | X                     |                   |                    |                   | Indirectly       | Yes         | No        |
|                                  |  | Internet / Wireless / Phone  |                  |          |          | X                 | X            | X         |                                 |                           |                            |                 |               |                      |        | X                     |                   |                    |                   | Indirectly       | Yes         | No        |
|                                  |  | Highway Advisory Radio (HAR) |                  | X        |          | X                 | X            |           |                                 |                           |                            |                 |               |                      |        | X                     |                   |                    |                   | Indirectly       | Yes         | No        |

**Appendix B. An Assessment the Analysis Needs and Capabilities of Tools to Evaluate Potential ITS and Operaitons Improvements**

| Function                      | Component                  | Operation                         | Spatial Analysis |          |          | Temporal Analysis |              |           | Potential Analysis Capabilities |                           |                            |                 |               | Performance Measures |        |                       |                   |                    | Analysis Tool     |                  |             |           |
|-------------------------------|----------------------------|-----------------------------------|------------------|----------|----------|-------------------|--------------|-----------|---------------------------------|---------------------------|----------------------------|-----------------|---------------|----------------------|--------|-----------------------|-------------------|--------------------|-------------------|------------------|-------------|-----------|
|                               |                            |                                   | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS        | DYNASMART |
| Road Weather Management       | Traffic Control            | Variable Speed Limit              | X                |          |          | X                 |              |           |                                 | X                         |                            |                 | X             |                      |        | X                     |                   |                    |                   | No               | Potentially | Yes       |
|                               |                            | Traffic Signal Control            | X                |          |          |                   | X            |           |                                 |                           |                            | X               |               |                      | X      |                       |                   |                    |                   | No               | Potentially | Yes       |
|                               |                            | Lane Use / Road Closure           | X                | X        |          |                   | X            |           |                                 | X                         | X                          | X               | X             |                      |        | X                     |                   |                    |                   | No               | Potentially | Yes       |
|                               |                            | Vehicle Restriction               | X                |          |          |                   |              |           |                                 |                           |                            | X               |               | X                    |        | X                     |                   |                    |                   | No               | No          | No        |
|                               | Response & Treatment       | Fixed Winter Maintenance          |                  | X        | X        |                   | X            | X         |                                 | X                         | X                          |                 | X             |                      |        | X                     |                   |                    |                   | No               | No          | No        |
|                               |                            | Mobile Winter Maintenance         |                  | X        | X        |                   | X            | X         |                                 | X                         | X                          |                 | X             |                      |        | X                     |                   |                    |                   | No               | No          | No        |
| Commercial Vehicle Operations | Credentials Administration | Electronic Funds                  |                  |          | X        |                   |              |           |                                 | X                         |                            |                 |               |                      | X      | X                     |                   |                    | No                | No               | No          |           |
|                               |                            | Electronic Registration / Permits |                  |          | X        |                   |              |           |                                 | X                         |                            |                 |               |                      | X      | X                     |                   |                    | Yes               | No               | No          |           |
|                               | Safety Assurance           | Safety Information Exchange       |                  |          | X        |                   |              |           |                                 |                           |                            |                 |               | X                    | X      |                       | X                 |                    | Yes               | No               | No          |           |
|                               |                            | Automated Inspection              |                  |          | X        |                   |              |           |                                 |                           |                            |                 |               | X                    |        | X                     |                   |                    | Yes               | No               | No          |           |
|                               | Electronic Screening       | Safety Screening                  |                  |          | X        |                   |              |           |                                 |                           |                            |                 |               | X                    |        | X                     |                   |                    | Yes               | No               | No          |           |
|                               |                            | Border Clearance                  | X                |          |          |                   | X            | X         |                                 |                           |                            |                 |               |                      |        | X                     | X                 |                    | Potentially       | No               | No          |           |
|                               |                            | Weight Screening                  |                  | X        | X        |                   | X            | X         |                                 |                           |                            |                 |               | X                    |        | X                     | X                 |                    | Yes               | No               | No          |           |
| Credential Checking           |                            |                                   |                  | X        |          |                   | X            | X         |                                 |                           |                            |                 | X             |                      | X      | X                     |                   | Potentially        | No                | No               |             |           |



**Appendix B. An Assessment the Analysis Needs and Capabilities of Tools to Evaluate Potential ITS and Operaitons Improvements**

| Function                       | Component                             | Operation               | Spatial Analysis |          |          | Temporal Analysis |              |           | Potential Analysis Capabilities |                           |                            |                 |               | Performance Measures |        |                       |                   |                    |                   | Analysis Tool    |            |             |                        |
|--------------------------------|---------------------------------------|-------------------------|------------------|----------|----------|-------------------|--------------|-----------|---------------------------------|---------------------------|----------------------------|-----------------|---------------|----------------------|--------|-----------------------|-------------------|--------------------|-------------------|------------------|------------|-------------|------------------------|
|                                |                                       |                         | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS       | DYNASMART   | Microscopic Simulation |
| Commercial Vehicle Operations  | Carrier Operations & Fleet Management | AVL / CAD               |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    |                   |                  | No         | No          | No                     |
|                                |                                       | On-Board Monitoring     |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   |                  | Yes        | No          | No                     |
|                                |                                       | Traveler Information    |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   |                  | Indirectly | Potentially | No                     |
|                                | Security Operations                   | Asset Tracking          |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               | X                    |        | X                     |                   |                    |                   | No               | No         | No          |                        |
|                                |                                       | Remote Disabling System |                  |          | X        |                   |              | X         |                                 |                           |                            |                 | X             | X                    |        |                       |                   |                    |                   | No               | No         | No          |                        |
| Intermodal Freight             | Freight Tracking                      |                         |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   | No               | No         | No          |                        |
|                                | Asset Tracking                        |                         |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   | No               | No         | No          |                        |
|                                | Freight Terminal Processes            |                         | X                |          |          |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   | No               | No         | No          |                        |
|                                | Drayage Operations                    |                         | X                |          |          |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    |                   | No               | No         | No          |                        |
|                                | Freight-Highway Connector System      |                         |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    |                   | No               | No         | No          |                        |
|                                | International Border Crossing         |                         | X                |          |          |                   |              | X         |                                 |                           |                            |                 |               |                      | X      |                       |                   |                    |                   | No               | No         | No          |                        |
| Collision Avoidance Systems    | Intersection Collision Warning        |                         | X                | X        | X        |                   |              | X         | X                               |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | Yes              | No         | No          |                        |
|                                | Obstacle Detection                    |                         | X                | X        | X        |                   |              | X         | X                               |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | No               | No         | No          |                        |
|                                | Lane Change Assistance                |                         | X                | X        | X        |                   |              | X         | X                               |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | Potentially      | No         | No          |                        |
|                                | Lane Departure Warning                |                         | X                | X        | X        |                   |              | X         | X                               |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | Potentially      | No         | No          |                        |
|                                | Rollover Warning                      |                         | X                |          |          |                   | X            | X         | X                               |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | No               | No         | No          |                        |
|                                | Road Departure Warning                |                         | X                | X        | X        |                   |              | X         | X                               |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | Potentially      | No         | No          |                        |
|                                | Forward Collision Warning             |                         | X                | X        | X        |                   |              | X         |                                 |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | Potentially      | No         | No          |                        |
|                                | Rear Impact Warning                   |                         | X                | X        | X        |                   |              | X         |                                 |                           |                            |                 |               | X                    |        |                       |                   |                    |                   | Potentially      | No         | No          |                        |
| Collision Notification Systems | Mayday / ACN                          |                         |                  |          | X        | X                 | X            |           |                                 |                           |                            |                 | X             |                      |        |                       |                   |                    | Yes               | No               | No         |             |                        |
|                                | Advance CAN                           |                         |                  |          | X        |                   | X            | X         |                                 |                           |                            |                 | X             |                      |        |                       |                   |                    |                   | No               | No         | No          |                        |

**Appendix B. An Assessment the Analysis Needs and Capabilities of Tools to Evaluate Potential ITS and Operaitons Improvements**

| Function                  | Component                    | Operation               | Spatial Analysis |          |          | Temporal Analysis |              |           | Potential Analysis Capabilities |                           |                            |                 |               | Performance Measures |        |                       |                   |                    |                   | Analysis Tool    |      |           |
|---------------------------|------------------------------|-------------------------|------------------|----------|----------|-------------------|--------------|-----------|---------------------------------|---------------------------|----------------------------|-----------------|---------------|----------------------|--------|-----------------------|-------------------|--------------------|-------------------|------------------|------|-----------|
|                           |                              |                         | Facility         | Corridor | Regional | Present Day       | Intermediate | Long-term | Mode Split                      | Induced / Foregone Demand | Dynamic Traffic Assignment | Modify Capacity | Variable Time | System Operations    | Safety | Customer Satisfaction | Agency Efficiency | Travel Reliability | Vehicle Emissions | Fuel Consumption | IDAS | DYNASMART |
| Driver Assistance Systems | Navigation / Route Guidance  |                         |                  |          | X        | X                 | X            | X         | X                               | X                         |                            |                 | X             | X                    |        | X                     | X                 | X                  | Yes               | Yes              | No   |           |
|                           | Driver Communication         | With Other Drivers      |                  |          | X        |                   |              | X         | X                               | X                         |                            |                 |               | X                    |        |                       |                   |                    | No                | No               | No   |           |
|                           | Driver Communication         | With Carrier / Dispatch |                  |          | X        |                   |              | X         |                                 |                           |                            |                 |               | X                    |        |                       |                   |                    | No                | No               | No   |           |
| Driver Assistance Systems | Vision Enhancement           |                         |                  |          | X        |                   | X            | X         |                                 |                           |                            |                 | X             |                      |        |                       |                   |                    | Yes               | No               | No   |           |
|                           | Object Detection             |                         |                  |          | X        |                   | X            | X         |                                 |                           |                            |                 | X             |                      |        |                       |                   |                    | No                | No               | No   |           |
|                           | Adaptive Cruise Control      |                         |                  |          | X        |                   | X            |           |                                 |                           |                            |                 | X             | X                    |        | X                     | X                 | X                  | No                | No               | No   |           |
|                           | Intelligent Speed Control    |                         |                  |          | X        |                   | X            |           |                                 |                           |                            |                 | X             | X                    |        | X                     | X                 | X                  | No                | No               | No   |           |
|                           | Lane Keeping Assistance      |                         |                  |          | X        |                   |              |           | X                               |                           |                            |                 | X             |                      |        |                       |                   |                    | No                | No               | No   |           |
|                           | Roll Stability Control       |                         |                  |          | X        |                   | X            | X         |                                 |                           |                            |                 | X             |                      |        |                       |                   |                    | No                | No               | No   |           |
|                           | Drowsy Driver Warning System |                         |                  |          | X        |                   |              | X         |                                 |                           |                            |                 | X             |                      |        |                       |                   |                    | No                | No               | No   |           |
|                           | Precision Docking            |                         |                  | X        | X        |                   |              |           | X                               |                           |                            |                 |               | X                    |        |                       |                   |                    | No                | No               | No   |           |
|                           | Coupling / Decoupling        |                         |                  | X        |          |                   |              |           | X                               |                           |                            |                 | X             | X                    |        | X                     | X                 |                    | No                | No               | No   |           |
|                           | On-Board Monitoring          | Cargo Condition         |                  |          |          | X                 |              | X         |                                 |                           |                            |                 |               |                      | X      |                       | X                 |                    |                   | No               | No   | No        |
|                           |                              | Safety & Security       |                  |          |          | X                 |              | X         | X                               |                           |                            |                 |               |                      | X      |                       |                   |                    |                   | No               | No   | No        |
| Vehicle Diagnostics       |                              |                         |                  | X        |          | X                 | X            |           |                                 |                           |                            |                 | X             |                      | X      |                       |                   | No                 | No                | No               |      |           |
| Event Data Recorder       |                              |                         |                  | X        |          | X                 | X            |           |                                 |                           |                            |                 | X             |                      |        |                       |                   | No                 | No                | No               |      |           |