Embedded Links and Cost References

For your reference, here is a list of the full web addresses for the resource links and references in the fact sheets.

CC1: Animal Warning Systems

Examples of Implementation Section

1. Minnesota's Experience with Deer Warning Systems, Passive Infrared Devices, http://www.dot.state.mn.us/trafficeng/signing/doc/deer-crossing-signs-informational-sheet.pdf and http://www.dot.state.mn.us/guidestar/2006_2010/deer_detection_and_warning_system.html
2. Roadside Animal Detection System (Florida), RADS, http://www.govtech.com/public-safety/Roadside-Systems-Detect-Wildlife-to-Prevent-Collisions.html
3. Wildlife Detection System (Colorado), sensors, http://www.govtech.com/public-safety/Roadside-Systems-Detect-Wildlife-to-Prevent-Collisions.html
4. Animal Detection & Driver Warning System; Durango and Bayfield, Colorado, not, https://www.codot.gov/programs/research/pdfs/2012/avc/view
5. Smartphone Application Helps to Protect Reindeer (Finland), Reindeer Bell, https://www.usnews.com/news/world/articles/2016-12-24/finnish-phone-app-finds-reindeer-helps-to-avoid-road-kill

Opportunities for Future Expansion Section

1. Volvo, https://www.wired.com/2017/01/volvos-cars-now-spot-moose-hit-brakes/

References for Cost Section(s)

1. Minnesota's Experience with Deer Warning Systems, http://www.dot.state.mn.us/guidestar/2006_2010/deer_detection_and_warning_system.html
2. Animal Detection System, https://www.ecologyandsociety.org/vol14/iss2/art15/

CC2: Automated Visibility Warning Systems

Examples of Implementation Section

1. Idaho Department of Transportation, I-84 Visibility Warning System, https://ops.fhwa.dot.gov/weather/Publications/Case%20Studies/08.pdf
2. Tennessee Department of Transportation, I-75 Fog Detection Warning System, https://ops.fhwa.dot.gov/publications/fhwahop12046/rwm24_tennessee1.htm
3. Arizona Department of Transportation, DUST Warning System, https://ops.fhwa.dot.gov/publications/fhwahop12046/rwm04_arizona.htm

References for Cost Section(s)

1. Maryland, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/D7E73D3356D8CD0185256FD4004A1104?OpenDocument&Query=Home

2. New Mexico, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/CAAC83EC885FD09585257CAC005B8DC4?OpenDocument&Query=Home

CC3: Bicycle Safety Systems

Examples of Implementation Section

1. Protected-Yet-Concurrent Phasing, http://docs.trb.org/prp/14-2197.pdf
2. Bicycle Tunnel Warning System, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/15601FCB13BA414785256DFA004A67DF?OpenDocument&Query=Home
3. Bridge Bicycle Warning System, https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/global_benchmarking/global_benchmarking.pdf
4. Northfield, Minnesota Bicycle Detection, http://www.govtech.com/fs/Bike-Detection-Sensors-Installed-in-Minnesota-Intersections.html
5. Pleasanton, California Radar Bicycle Detection, http://www.cityofpleasantonca.gov/gov/depts/cd/traffic/information/intersector.asp
6. Portland Springwater Corridor Trail, http://www.pedbikesafe.org/BIKESAFE/casestudies_detail.cfm?CM_NUM=36&CS_NUM=601
7. Bikescout, https://www.heijmans.nl/en/bikescout/

Opportunities for Future Expansion Section

1. Connected Bicycles, http://readwrite.com/2015/02/02/smart-cars-meet-smart-bikes-cyclist-detection-collision-avoidance/
2. Prototype Instrumented Bicycles, http://openaccess.city.ac.uk/6246/
3. How will New Technology Affect Bike Safety, http://bikeleague.org/content/how-will-new-technology-affect-bike-safety-congress-wants-know
4. Info Cycle, https://www.citylab.com/transportation/2015/07/ford-tries-to-figure-out-bicycles/397844/
5. Bike Sense, https://www.landrover.com/experiences/news/jlrs-bike-sense-research.html

References for Cost Section(s)

1. Pedestrian and Bicycle Information Center, http://www.pedbikeinfo.org/cms/downloads/Countermeasure%20Costs_Report_Nov2013.pdf
2. Pleasanton, California, http://www.cityofpleasantonca.gov/gov/depts/cd/traffic/information/intersector.asp
3. Tunnel Warning System, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/15601FCB13BA414785256DFA004A67DF?OpenDocument&Query=Home

CC4: Connected Vehicles

Examples of Implementation Section

1. I-80 Corridor Connected Vehicle Pilot, https://www.its.dot.gov/pilots/wave1.htm
2. Tampa-Hillsborough Expressway Authority (THEA) Pilot, https://www.its.dot.gov/pilots/pilots_thea.htm
3. Minnesota Department of Transportation Connected Vehicles Test, http://www.dot.state.mn.us/mileagebaseduserfee/pdf/EvaluationFinalReport.pdf

References for Cost Section(s)

1. V2I at a signalized intersection, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/26D0D89DC2F1144185257BB40064D1B6?OpenDocument&Query=Home

CC5: Wrong Way Driver Detection & Warning System

Examples of Implementation Section

1. Doppler-Radar-Enhanced LED, http://www.thruway.ny.gov/oursystem/maintenance/innovation.html
2. Lonestar Software, http://sunguidesoftware.com/sunguidesoftware/documentlibrary/DragAndDropFTP/SunGuide_and_Lonestar_Review.pdf
3. SunGuide Software, http://sunguidesoftware.com/sunguidesoftware/documentlibrary/DragAndDropFTP/SunGuide_and_Lonestar_Review.pdf
4. Arizona, Wrong-Way Detection with Radar and LED Warning System, https://apps.azdot.gov/ADOTLibrary/publications/project_reports/PDF/az741.pdf
5. San Antonio, Radar & LED Warning Lights, http://www.itsbenefits.its.dot.gov/ITS/benecost.nsf/ID/C2479CAB281B3CCE85257D6B00656EE9?OpenDocument&Query=BApp
6. Rhode Island, Wrong-Way Detection & Warning System, http://wpri.com/2016/05/05/ridot-states-wrong-way-driving-detection-system-effective-in-stopping-crashes/ and http://boston.cbslocal.com/2016/02/26/i-team-massachusetts-prevent-wrong-way-crashes/

References for Cost Section(s)

1. Texas, https://static.tti.tamu.edu/conferences/tsc13/presentations/design/gianotti.pdf
2. Rhode Island, http://wpri.com/2016/05/05/ridot-states-wrong-way-driving-detection-system-effective-in-stopping-crashes/

CC6: Highway-Rail Crossing Safety Systems

Examples of Implementation Section

1. Low-Cost Highway-Rail Intersection Active Warning System Field Operational Test, http://www.dot.state.mn.us/guidestar/2001_2005/hri/HRI_Evaluation_Report_Final.pdf
2. Texas Department of Transportation Advanced Warning to Avoid Railway Delay (AWARD), https://ntl.bts.gov/lib/jpodocs/repts_te/13587.html
3. German Railways KOMPAS Project, http://ieeexplore.ieee.org/document/1212905/
4. Connecticut Department of Transportation Four-Quadrant Gates, https://www.fra.dot.gov/eLib/Details/L01587

References for Cost Section(s)

1. Texas Department of Transportation Advanced Warning to Avoid Railway Delay (AWARD), https://ntl.bts.gov/lib/jpodocs/repts_te/13587.html

CC7: Intersection Collision Warning System (ICWS)

Examples of Implementation Section

1. Minnesota Department of Transportation, http://www.dot.state.mn.us/trafficeng/signals/conflictwarning.html
2. M-44 & Ramsdell Drive; Michigan, http://www.its.umn.edu/Publications/ResearchReports/reportdetail.html?id=1078
3. Intersection Collision Warning System in Georgia, https://www.lrrb.org/media/reports/200728.pdf
4. Olmsted County, Minnesota, https://safety.fhwa.dot.gov/local_rural/training/fhwasa12017/

References for Cost Section(s)

1. Iowa, http://www.udot.utah.gov/main/uconowner.gf?n=26394030306426124
2. Minnesota Department of Transportation, http://www.dot.state.mn.us/trafficeng/signals/conflictwarning.html

CC8: Pedestrian Safety Systems

Examples of Implementation Section

1. Lumni Nation Haxton Way Pedestrian Path and Lighting Project, https://www.youtube.com/watch?v=ltR2oiQ3R9Q
2. Pedestrian Countdown Signals; Pinellas County, Florida, https://www.fhwa.dot.gov/publications/publicroads/12janfeb/03.cfm

CC9: Road Geometry Warning System

Useful Tips Section

1. Light Emitting Diodes, https://safety.fhwa.dot.gov/intersection/conventional/unsignalized/tech_sum/fhwasa09006/fhwasa09006.pdf

Examples of Implementation Section

1. Dynamic Curve Warning System, https://www.fhwa.dot.gov/hfl/partnerships/tapco/hif13040/chap04.cfm and https://ntl.bts.gov/lib/56000/56800/56826/15.15_Scan_Tour_of_Safety_Related_Intelligent_Transportation_Systems_Across_the_US.pdf
2. Truck Tip-Over Warning System, http://www.itsbenefits.its.dot.gov/its/benecost.nsf/ID/4BB9C5BC5DBE3190852573ED00506C4C?OpenDocument&Query=CApp
3. Overheight Warning System, http://www.syracuse.com/news/index.ssf/2011/10/state_department_of_transporta_2.html, http://www.syracuse.com/news/index.ssf/2016/07/state_meeting_tonight_on_onondaga_lake_parkway_improvements.html, and http://www.smtcmpo.org/LRTP2050/LRTP2050.asp
4. Narrows Oversize Vehicle Identification System, http://www.westerntransportationinstitute.org/research/4264542.aspx

References for Cost Section(s)

1. Overheight Warning System, https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C_07_10_final%20report.pdf
2. Michigan DOT, http://www.itscosts.its.dot.gov/its/benecost.nsf/SummID/SC2008-00139
3. Maryland State Highway Administration, http://www.itsbenefits.its.dot.gov/ITS/benecost.nsf/ID/98236BA2575978D9852578E300609565?OpenDocument&Query=BApp
4. NY State DOT, http://www.syracuse.com/news/index.ssf/2011/10/state_department_of_transporta_2.html
5. Colorado Truck Tip-Over Warning System, http://www.itsbenefits.its.dot.gov/its/benecost.nsf/ID/4BB9C5BC5DBE3190852573ED00506C4C?OpenDocument&Query=CApp
6. Overheight Vehicle Detection System, https://ntl.bts.gov/lib/61000/61000/61065/15-21.pdf

CC10: Smart Trucks

Examples of Implementation Section

1. Smart Truck Parking, http://tsrc.berkeley.edu/sites/default/files/Truck%20Parking%20Estimation%20and%20Forecasting%20v5.pdf
2. Drowsy Driver Warning System, https://www-nrd.nhtsa.dot.gov/pdf/esv/esv19/05-0192-W.pdf
3. Blind Spot Assistance, https://www.daimler.com/innovation/safety/special/leaving-lane-safely.html
4. Texas Two-Truck Automated Platoon Testing, https://tti.tamu.edu/2016/12/01/follow-the-leader-two-truck-automated-platoon-test-is-a-winner-2/

References for Cost Section(s)

1. DRSC, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/26D0D89DC2F1144185257BB40064D1B6?OpenDocument&Query=Home
2. Safety System for HAZMAT, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/1ECB8913DD1DD4D98525717F006727CD?OpenDocument&Query=Home
3. Infrared Camera and Image Processing System, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/EACB429BED05AB8D85257B11005DA20B?OpenDocument&Query=Home

CC11: Speed Warning Systems

Examples of Implementation Section

1. Speed Warning Systems to Assist Buses in Rural School Zones, http://www.udot.utah.gov/main/uconowner.gf?n=26394030306426124
2. Sequential Dynamic Curve Warning System, http://www.ctre.iastate.edu/research/detail.cfm?projectID=565344024
3. Oregon's Dynamic Advanced Curve Warning System, https://www.researchgate.net/publication/229052180_Measuring_the_Impacts_of_Speed_Reduction_Technologies_A_Dynamic_Advanced_Curve_Warning_System_Evaluation

Opportunities for Future Expansion Section

1. Investigation of the Use of an Feasibility of Speed Warning Systems, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/811997-investusefeasspeedwarnsystt.pdf
2. Investigation of the Use and Feasibility of Speed Warning Systems, https://www.nhtsa.gov/sites/nhtsa.dot.gov/files/811996-investusefeasspeedwarnsys.pdf

References for Cost Section(s)

1. Dynamic Speed Warning Feedback Signs, https://www.fhwa.dot.gov/publications/publicroads/16marapr/04.cfm
2. LEDs, https://safety.fhwa.dot.gov/intersection/conventional/unsignalized/tech_sum/fhwasa09006/fhwasa09006.pdf

CC12: Work Zone Safety Systems

Examples of Implementation Section

1. Michigan Department of Transportation, https://safety.fhwa.dot.gov/speedmgt/vslimits/docs/michiganvsl.pdf
2. New Hampshire Department of Transportation, http://rebuildingi93.com/
3. Illinois Department of Transportation, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/SummID/SC2007-00126
4. Pennsylvania Department of Transportation, https://www.roadsbridges.com/case-fire

Opportunities for Future Expansion Section

1. Netherlands, http://www.mercurynews.com/2016/12/28/video-shows-teslas-new-radar-detect-accident-and-avoid-it/

References for Implementation and Cost Section(s)

1. Increase Motorist Safety, http://itstexas.org/sites/itstexas.org/files/presentations/2%20Ver-Mac%202015%20ITS%20Texas%20ITS%20Technology%20ToolBox.pdf
2. Ohio Department of Transportation, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/E1EAADABA5346DDD85256E00004811EF?OpenDocument&Query=Home
3. Utah Department of Transportation, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/E6936952DD735F8385257D9A006E2792?OpenDocument&Query=Home
4. Michigan, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/7BCF6AF201D9034185257C290071C972?OpenDocument&Query=Home
5. North Carolina Department of Transportation, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/18C3C80CE95F9F1D85257253005B7D38?OpenDocument&Query=Home
6. Aurora Program, http://www.aurora-program.org/participation.cfm

TM1: Access Control Gates

Examples of Implementation Section

1. WY-22 Teton Pass Closure Gates, http://trrjournalonline.trb.org/doi/pdf/10.3141/1819a-37
2. Minnesota Department of Transportation Automated Gate Testing, https://ops.fhwa.dot.gov/Weather/best_practices/1024x768/transform_param2.asp?xslname=pub.xsl&xmlname=publications.xml&keyname=146
3. Rocky Mountain National Park Entrance Gates, https://www.nps.gov/transportation/pdfs/NP_Entrance_Stations_Study.pdf
4. Iowa Department of Transportation Interstate Closure Gates, http://www.news.iowadot.gov/newsandinfo/2010/10/new-mainline-interstate-closure-gates-to-be-tested-this-winter-.html

References for Cost Section(s)

1. Minnesota Department of Transportation, here, http://www.dot.state.mn.us/guidestar/1996_2000/i90_i94_gate_operations/gatejackson01.pdf
2. South Dakota Department of Transportation, here, http://www.sddot.com/business/research/projects/docs/SD2001_08_Final_Report.pdf

TM2: Variable Speed Limit

Examples of Implementation Section

1. Elk Mountain Corridor, I-80, Wyoming, http://www.dot.state.wy.us/home/planning_projects/research-center/final-projects-fy2009-to-fy2013.html
2. Fog, I-10; Mobile, Alabama, https://ops.fhwa.dot.gov/weather/best_practices/casestudies/001.pdf
3. Greenville County; South Carolina, US25, https://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa12022/
4. Snoqualmie Mountain Pass, I-90, https://safety.fhwa.dot.gov/speedmgt/ref_mats/fhwasa12022/

References for the Cost and Implementation Section(s)

1. Annual Safety Benefit, https://trid.trb.org/view.aspx?id=1288248
2. Utah, https://www.udot.utah.gov/main/uconowner.gf?n=7828313631638132
3. Snoqualmie Pass, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/ID/C2F9983AD6C6E78E85256DB100458933?OpenDocument&Query=CApp

TM3: Geographic Information Systems (GIS)

Useful Tips Section

1. Free and Open-source GIS options, click here, http://www.giscorps.org/index.php?option=com_content&task=view&id=13&Itemid=48

Examples of Implementation Section

1. GIS Mapping to Match Workers with Transit and Jobs (Maryland), http://www.trb.org/Main/Blurbs/153788.aspx
2. Alabama Department of Transportation Rural Transit Asset Management System, https://ntl.bts.gov/lib/24000/24900/24948/04401fnl.pdf
3. Effects of Roadway Characteristics on Farm Equipment Crashes: A GIS Approach, http://ir.uiowa.edu/cgi/viewcontent.cgi?article=5536&context=etd
4. Delaware Valley Regional Planning Commission, GIS Incorporated Safety Assessment, http://www.dvrpc.org/reports/09020.pdf
5. Idaho Transportation Department, IPLAN, https://www.gis.fhwa.dot.gov/documents/Cloud_Technologies_for_GIS.htm#idaho and http://data-iplan.opendata.arcgis.com/

TM4: Interconnected Signal System

Examples of Implementation Section

1. Green Light-Go: Pennsylvania's Municipal Signal Partnership, http://www.dot.state.pa.us/Portal%20Information/Traffic%20Signal%20Portal/FUNDGLG.html
2. Mountain View (SR-85) and Daybreak Parkway, http://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1027&context=atspmw

References for Cost Section(s)

1. Signal System Upgrade, http://www.dot.state.mn.us/guidestar/2001_2005/its_scoping_studies/d4/D4ITSScoping%20Report_final_April_2004.pdf
2. Interconnected Signal System Operation and Maintenance Costs, http://www.dot.state.mn.us/guidestar/2001_2005/its_scoping_studies/d4/D4ITSScoping%20Report_final_April_2004.pdf

TM5: Vehicle Detection

Examples of Implementation Section

1. Arizona Department of Transportation Wrong Way Detection, https://apps.azdot.gov/ADOTLibrary/publications/project_reports/PDF/AZ741.pdf
2. Texas Department of Transportation Advanced Dilemma-Zone Detection System, https://safety.fhwa.dot.gov/intersection/conventional/signalized/tech_sum/fhwasa09008/fhwasa09008.pdf
3. Low-Cost Portable Video-Based Queue Detection for Work-Zone Safety, http://www.cts.umn.edu/Publications/ResearchReports/reportdetail.html?id=1994
4. Rhode Island Wrong Way Driving Detection, https://www.roadsbridges.com/traffic-safety-wrong-way-driving-detection-system-effective-stopping-crashes-rhode-island
5. I-35 Corridor Management, http://www.marc.org/Transportation/Plans-Studies/Transportation-Plans-and-Studies/Special-studies-and-projects/special-studies-pdfs/I-35-ICM_system-overview_20161206.aspx

References for Implementation Consideration and Cost Section(s)

1. A Summary of Vehicle Detection and Surveillance Technologies Use in Intelligent Transportation Systems, https://www.fhwa.dot.gov/policyinformation/pubs/vdstits2007/index.cfm
2. Microwave detector, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/82C7681AA5B85AD085257B1E005E1360?OpenDocument&Query=Home
3. Video detector, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/D1839379FED7E96A85257B1E005DFC5F?OpenDocument&Query=Home
4. Infrared detector, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/AEEA0B5614C83AFF85257B1E0052E433?OpenDocument&Query=Home

TM6: Monitoring Travel Times and Speeds

Examples of Implementation Section

1. Anonymous Wireless Address Matching; College Station, Texas, http://ttihouston.tamu.edu/bluetooth/projects.aspx
2. Real-Time Travel Times During Construction, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf
3. Sidefire Microwave Detectors in Wisconsin, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf
4. Hurricane Evaluation Route in Texas, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf
5. State Route 520 in Orange County, Florida, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf
6. Snoqualmie Pass, Washington State, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf
7. Real Time Modification of Variable Speed Limits in Maine, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf
8. Automatic License Plate Reader, Arizona DOT, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf

References for Implementation and Cost Section(s)

1. Rural Data Collection Technology, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf
2. iFlorida, https://ops.fhwa.dot.gov/publications/fhwahop13029/fhwahop13029.pdf

TM7: Parking Management Systems

Examples of Implementation Section

1. Commercial Truck Parking Detection Study, http://www.fdot.gov/research/Completed_Proj/Summary_TE/FDOT-BDV31-977-56-rpt.pdf
2. Michigan Department of Transportation Smart Truck Parking, http://www.michigan.gov/mdot/0,4616,7-151--336551--,00.html
3. Billings, MT Parking Meter Upgrades, http://www.ktvq.com/story/32775379/billings-to-increase-parking-rates-to-install-new-smart-meters
4. Yosemite National Park Day-Use Parking Reservation System, https://www.nps.gov/yose/learn/news/yosemite-national-park-announces-pilot-program-for-day-use-parking-reservations.htm
5. Mid America Association of State Transportation Officials (MAASTO) Truck Parking Information Management System, https://trucksparkhere.com/

TM8: Planned Special Event Management

Examples of Implementation Section

1. Sturgis Motorcycle Rally Traveler Information Coordination, https://www.nwpassage.info/projects/phase6/downloads/event_summary_sturgis.pdf
2. Montana State University Football Game Traffic, http://trrjournalonline.trb.org/doi/abs/10.3141/2099-10
3. Purdue Football Commercial Cloud Navigation and Maps, http://docs.lib.purdue.edu/roadschool/2015/posters/1/
4. Washington State Fair, http://www.thenewstribune.com/news/local/article25882570.html

References for Cost Section(s)

1. Portable CCTV cameras, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/8611CCDEEF00F01985257C710054FB6F?OpenDocument&Query=Home

TM9: Rural Traffic Management Center (TMC)/Traffic Operations Center (TOC)

Examples of Implementation Section

1. Traffic Management Center for Snoqualmie Pass; Washington State, https://www.wsdot.wa.gov/Operations/Traffic/tmc.htm
2. New Hampshire Traffic Management Center, https://ops.fhwa.dot.gov/Publications/fhwahop14016/fhwahop14016.pdf
3. District 2, Caltrans, http://westernstatesforum.org/Documents/2012/presentations/CaltransD2_Turnbull_FINAL_FEN-TMCPrequel.pdf

References for Cost Section(s)

1. Small Area Capital Costs, http://www.itscosts.its.dot.gov/its/benecost.nsf/SubsystemCosts?ReadForm&Subsystem=Transportation+Management+Center+(TM)

TM10: Adaptive Signal Control Technologies (ASCT)

Examples of Implementation Section

1. Michigan Department of Transportation (MDOT), http://www.michigan.gov/mdot/0,4616,7-151-9623_61313-284409--,00.html
2. Virginia Department of Transportation (VDOT), http://www.virginiadot.org/vtrc/main/online_reports/pdf/15-r24.pdf
3. Colorado Department of Transportation (CDOT), https://www.codot.gov/programs/research/pdfs/2012/adaptivesignaltiming.pdf

References for Implementation and Cost Section(s)

1. Signal System Upgrade, https://www.fhwa.dot.gov/innovation/everydaycounts/edc-1/pdf/asct_brochure.pdf
2. ASCT Costs, https://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/0D2A574BFB65316985257ABB00495C44?OpenDocument&Query=Home

OM1: Weigh-in-Motion (WIM) Systems

Examples of Implementation Section

1. Indiana Department of Transportation's Virtual Weigh-in-Motion, https://www.in.gov/indot/files/Virtual_Weigh_Station_Presentation_-_AASHTO.pdf
2. New York Department of Transportation Thruway Authority, http://www.thruway.ny.gov/oursystem/maintenance/innovation.html
3. Florida's Virtual Weigh Station, https://www.in.gov/indot/files/Virtual_Weigh_Station_Presentation_-_AASHTO.pdf
4. Arkansas, US 64, Virtual Weigh Station, http://www.overdriveonline.com/ark-installing-virtual-weigh-station-on-u-s-64/
5. Caltrans' Virtual Weigh Station, https://www.in.gov/indot/files/Virtual_Weigh_Station_Presentation_-_AASHTO.pdf

References for Cost Section(s)

1. Montana 2-lane and 4-lane Weigh-in-motion Systems, http://www.mdt.mt.gov/research/projects/planning/wim.shtml
2. North Dakota Virtual Weigh-in-motion, https://www.in.gov/indot/files/Virtual_Weigh_Station_Presentation_-_AASHTO.pdf

OM2: Site Management During Avalanches

Examples of Implementation Section

1. Wyoming Department of Transportation Avalanche Warning System, https://ops.fhwa.dot.gov/weather/Publications/Case%20Studies/25.pdf
2. Avalanche Monitoring System, https://www.udot.utah.gov/main/uconowner.gf?n=7747228490333964
3. WY-22 Teton Pass Closure Gates, http://trrjournalonline.trb.org/doi/pdf/10.3141/1819a-37
4. Colorado Department of Transportation Avalanche Control, https://www.codot.gov/travel/winter-driving/AvControl.html

References for Cost Section(s)

1. European, http://trrjournalonline.trb.org/doi/pdf/10.3141/1700-04
2. Colorado DOT, http://www.denverpost.com/2015/09/18/colorado-mountain-passes-get-remote-controlled-gas-avalanche-control-finally/

OM3: Global Positioning System (GPS) Data

Description Section

1. Third party GPS data, https://www.nap.edu/read/23436/chapter/5

Examples of Implementation Section

1. Roadkill Observation Collection System – Montana, http://www.deercrash.org/DVC%20ROCS.pdf
2. Iowa Department of Transportation's Real-Time Traffic Conditions, http://inrix.com/case-studies/iowa-dot/
3. Drive Safe Pennsylvania, http://www.penndot.gov/TravelInPA/Documents/2009%20PA%20SHSP.pdf

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2. Mariposa Association of Governments, https://www.azmag.gov/Documents/ITS_2011-10-27_Private-Probe-Vehicle-Data-for-RealTime-Applications-Final-Report.pdf

OM4: Fixed Automated Spray Technology (FAST)

Examples of Implementation Section

1. Buxton Bridge, North Dakota, http://www.ugpti.org/pubs/pdf/DP219.pdf
2. I-90, Washington State, https://www.codot.gov/programs/research/pdfs/2014/benefit-cost-analysis-of-cdot-fixed-automated-spray-technology-fast-systems/view
3. I-80, Nebraska, http://www.nationalruralitsconference.org/wp-content/uploads/2016/10/G5_Cottone.pdf
4. I-215, Utah, https://www.codot.gov/programs/research/pdfs/2014/benefit-cost-analysis-of-cdot-fixed-automated-spray-technology-fast-systems/view
5. I-80; Clearfield County, Pennsylvania https://www.codot.gov/programs/research/pdfs/2014/benefit-cost-analysis-of-cdot-fixed-automated-spray-technology-fast-systems/view

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ES1: Next Generation 911

Description Section

1. States that have implemented NG911, http://www.nena.org/?page=NG911_StateActivity

Examples of Implementation Section

2. Rural Illinois NG911, http://www.rrmediagroup.com/Features/FeaturesDetails/FID/385
3. Hardin County, Tennessee NG911, https://www.corp.att.com/stateandlocal/docs/hardin_county.pdf
4. Indiana Text-to-911, http://www.govtech.com/em/safety/All-Indiana-Counties-Accept-Text-911.html

References for Cost Section(s)

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ES2: Smartphone Applications for First Responders

Examples of Implementation Section

1. FirstNet, http://www.nationalruralitsconference.org/wp-content/uploads/2015/08/McGinnis_S2.pdf
2. CrashHelp, http://www.cts.umn.edu/sites/default/files/files/sessions/16horan.pdf
3. Life Source Health, https://lifesourcehealthinc.com/

ES3: Crash Reporting

Examples of Implementation Section

1. Illinois Mobile Capture and Reporting (MCR) System, http://www.trb.org/Publications/Blurbs/159135.aspx
2. North Carolina State Highway Patrol, GPS Tracking and Event Capture to Document Enforcement Activities, http://www.trb.org/Publications/Blurbs/159135.aspx
3. ReportWISE (Ohio), http://www.noris.org/law-enforcement/fieldin-car-reporting/

References for Cost Section(s)

1. Illinois Mobile Capture and Reporting (MCR) System, http://www.trb.org/Publications/Blurbs/159135.aspx

ES4: Automatic Crash Notification System

Examples of Implementation Section

1. SOSMART Smartphone Application, http://www.sosmartapp.com/
2. Minnesota Department of Transportation, Mayday Plus, http://www.dot.state.mn.us/guidestar/1996_2000/mayday_plus.html
3. Erie County, NY, http://www.itsbenefits.its.dot.gov/ITS/benecost.nsf/ID/7A0A47F40911538E85256CB40057579D?OpenDocument&Query=Home

References for the Cost Section(s)

1. Automatic Crash Notification System Cost, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/596A52267158CAB585257B11005DA7DE?OpenDocument&Query=Home
2. Aftermarket Automatic Crash Notification System Cost, http://www.itscosts.its.dot.gov/its/benecost.nsf/ID/77CCD7BBA14039BC852573EC004F8DD5?OpenDocument&Query=Home

ES5: Emergency Vehicle Traffic Signal Preemption

Examples of Implementation Section

1. City of Savannah, Georgia, http://www.itsbenefits.its.dot.gov/ITS/benecost.nsf/ID/683105242E3289FB852578F400682B86?OpenDocument&Query=BMeasure
2. City of Bismarck, North Dakota, http://bismarcktribune.com/news/local/govt-and-politics/snow-plow-drivers-to-be-allowed-to-control-traffic-signals/article_bf41e430-54b9-11e4-a6d0-3bbb76ce0926.html

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1. Detector, Phase Selector and System Software, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/ID/3BE481F9DA1253CB8525771F0060B819?OpenDocument
2. Signal Preemption Emitter, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/71861BA0698DD3F285257AD0007B0D4D?OpenDocument&Query=Home

ES6: Unmanned Aerial Systems (UAS)

Examples of Implementation Section

1. Lancashire Fire and Rescue, https://www.2br.co.uk/news/local-news/2037545/video-lancashires-new-life-saving-drone-in-action/
2. Healthcare Integrated Rescue Operations (HiRO), https://www.wmcarey.edu/news/carey-medical-college-develops-fully-equipped-telemedical-drone
3. Ambulance Drones, https://www.tudelft.nl/en/ide/research/research-labs/applied-labs/ambulance-drone/
4. Michigan Tech Research Institute (MTRI) UAS Study, http://www.mtu.edu/news/stories/2014/january/michigan-tech-researches-feasibility-drone-use-transportation.html
5. Norwegian Public Roads Administration (NPRA) Winter Maintenance Study, http://nordicroads.com/unmanned-aircraft-for-roadside-avalanche-monitoring/

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2. Montgomery County, TX, http://www.governing.com/topics/public-justice-safety/gov-rise-and-fall-of-drones.html

STW1: Integrated Weather Monitoring/Prediction Systems

Examples of Implementation Section

1. Clarus Initiative, http://www.its.dot.gov/research_archives/clarus/index.htm
2. Idaho Department of Transportation (IDT) Winter Maintenance, http://www.ops.fhwa.dot.gov/publications/fhwahop12046/rwm10_idaho1.htm
3. Minnesota Department of Transportation, http://denethor.wlu.ca/pc300/projects/library/anti_icing10.pdf
4. Iowa Department of Transportation, http://www.udot.utah.gov/main/uconowner.gf?n=26394030306426124

Useful Tips

1. Integrating Mobile Observations, https://collaboration.fhwa.dot.gov/dot/fhwa/RWMX/SiteAssets/Weather%20Savvy%20Roads.aspx

References for Cost Section(s)

1. Abilene, TX, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/D27480A34665479585256E0B004B3CE7?OpenDocument&Query=Home
2. Anchorage, AK, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/D88CAD0E224F8DD685257693007544F3?OpenDocument&Query=Home

RTM1: Coordinated Rural Transit Service

Examples of Implementation Section

1. Liberty, https://www.citylab.com/navigator/2016/07/how-an-uber-copycat-can-fill-the-transportation-gap-in-rural-nebraska/490769/
2. Via and RTD (Colorado), http://web1.ctaa.org/webmodules/webarticles/articlefiles/2013ViaRTDLongmontCoordinationND.pdf
3. Menominee Regional Public Transit, http://www.ribtcadmin.org/~ribtc/cgi-bin/trbconference22/TRB22powerpoints/ST5-MRPT%20Presentation.pdf
4. Capital Area Rural Transportation System (CARTS), http://www.ridecarts.com/
5. Lower Savannah Aging, Disability & Transportation Resource Center (Aiken, South Carolina), https://www.transit.dot.gov/sites/fta.dot.gov/files/FTA_Report_No._0065.pdf

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1. CRAAFT and VIA/RTD Systems, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/D1A44F2A6EC0D4D985256EA10067D9D2?OpenDocument&Query=Home

RTM2: Automated Stop Announcement Systems

Examples of Implementation Section

1. Island Explorer Shuttle, https://ntl.bts.gov/lib/jpodocs/repts_te/13834.html

2. Halifax Transit, http://www.halifax.ca/transit/StopAnnouncements/index.php
3. Metro Transit, https://www.metrotransit.org/bus-location-audio-notification

References for Cost Section(s)

2. Transport of Rockland, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/0C58FBEAB8A6B30085256DD7005136A7?OpenDocument&Query=Home

RTM3: Automatic Vehicle Location (AVL) on Agency and Public Vehicles

Examples of Implementation Section

1. METropolitan Special Transit, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/ID/5B58808168DD787E852573E9005C7F3F?OpenDocument&Query=CApp
2. Pennsylvania Department of Transportation, http://www.penndot.gov/TravelInPA/Documents/Automated%20Vehicle%20Location%20System_October%20kickoff%20press%20event.pdf

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TTI1: Highway Advisory Radio (HAR)

Useful Tips Section

1. NHTSA's Safety Weeks, https://www.trafficsafetymarketing.gov/sites/tsm.nhtsa.dot.gov/files/2017-safety-events-calendar.pdf

Examples of Implementation Section

1. Rocky Mountain National Park (Colorado) Operations Plan, http://www.westerntransportationinstitute.org/documents/reports/4w3467_romo_ops_plan.pdf
2. Rocky Mountain National Park (Colorado) Evaluation Plan, http://www.westerntransportationinstitute.org/documents/reports/4w3467_romo_eval_plan.pdf
3. Rocky Mountain National Park (Colorado) Evaluation Report, http://www.fedlandsinstitute.org/Documents/RepositoryDocuments/ROMO_Eval_ReportCOMB.pdf
4. Gallatin County (Montana), http://www.theradiosource.com/articles/case-study-gallatin-county-mt.htm
5. Florida Department of Transportation, http://www.fdot.gov/traffic/ITS/Projects_Telecom/HAR.shtm
6. Oregon Department of Transportation, https://www.oregon.gov/ODOT/HWY/TRAFFIC-ROADWAY/docs/pdf/Guidelines_for_the_Operation_of_Highway_Advisory_Radio_on_State_Highways.pdf

7. Virginia Department of Transportation, http://www.virginiadot.org/travel/highway_advisory_radio.asp
8. Ohio Department of Transportation, https://www.dot.state.oh.us/Divisions/Operations/Traffic/FAQs/Pages/HAR.aspx

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3. Florida Department of Transportation, http://www.fdot.gov/research/Completed_Proj/Summary_TPK/FDOT-BDV24-977-11-rpt.pdf

TTI2: Crowdsourced Data

Examples of Implementation Section

1. Iowa Department of Transportation Waze Connect Citizen Program, http://www.news.iowadot.gov/newsandinfo/2015/08/iowa-dot-joins-waze-connected-citizens-program-to-give-motorists-in-iowa-access-to-more-real-time-tr-1.html
2. Citizen Reporting Programs for Winter Weather, https://ops.fhwa.dot.gov/weather/best_practices/citizenreportingcrc/index.htm
3. Idaho Transportation Department Citizen Reporting, http://511.idaho.gov/
4. California Roadkill Observation System (CROS), http://www.wildlifecrossing.net/california/
5. Safe Routes Portland App, https://saferoutespdx.org/
6. Crowdsourced Bicycle Data, http://ppms.trec.pdx.edu/media/project_files/NITCN-RR-857_Final_Report.pdf

References for Cost Section(s)

1. FHWA Pooled Fund North/West Passage project, https://www.nwpassage.info/projects/phase10/downloads/10-3-citizen-reporting-final-summary-report.pdf

TTI3: Dynamic Message Signs (DMS)

Useful Tips Section

1. Public Opinions of DMS Safety Messages, https://ruralsafetycenter.org/wp-content/uploads/2016/10/fhwahop16048.pdf

Examples of Implementation Section

1. Colorado Department of Transportation, https://www.codot.gov/news/2014-news-releases/10-2014/improving-traveler-information-cdot-upgrading-variable-message-signs
2. Kansas DOT, http://www.kandrive.org/kandrive
3. Grand Canyon National Park (Arizona), http://www.westerntransportationinstitute.org/documents/reports/4W2106_Ops_Plan_Final.pdf

4. Advanced Transportation Management (New Hampshire), https://www.nh.gov/dot/media/nr2011/nr062111i93corridor.htm
5. Clark County, Washington and Washington State DOT Coordination, https://www.roadsbridges.com/its-washington-dot-pilot-program-test-local-control-dynamic-message-signs

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2. Clark County, Washington and Washington State DOT Coordination, https://www.roadsbridges.com/its-washington-dot-pilot-program-test-local-control-dynamic-message-signs

TTI4: Integrated Traveler Information Systems

Examples of Implementation Section

1. One Stop Shop, http://oss.weathershare.org/
2. Regional Integrated Traveler Information System, http://i95coalition.org/projects/regional-integrated-transportation-information-system-ritis/
3. I-95 Corridor Coalition Traveler Information, http://i95coalition.org/511-travel-information/

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3. 511 Annual Cost Examples, http://www.itscosts.its.dot.gov/its/benecost.nsf/ID/DE036516C6B910C3852572DD0064D08C?OpenDocument&Query=Home

TTI5: Social Media

Description Section

1. Social Norming in Montana, https://www.ncbi.nlm.nih.gov/pubmed/20619177

Examples of Implementation Section

1. North Central Regional Transit District – New Mexico Facebook, https://www.facebook.com/ridethebluebus/
2. North Central Regional Transit District – New Mexico Twitter, https://twitter.com/Ride_TheBlueBus
3. Montana Department of Transportation Facebook, https://www.facebook.com/montanadot/
4. Montana Department of Transportation Twitter, https://twitter.com/mdtroadreport

5. Alaska Department of Transportation, https://www.instagram.com/alaska_dotpf/

TTI6: Public Transportation Trip Planner

Examples of Implementation Section

1. Mountain Line Bus – Missoula, Montana, http://www.mountainline.com/rider-services/trip-planner/
2. Transit and Trails, www.transitandtrails.org

References for Cost Section(s)

1. Custom Software, http://www.itscosts.its.dot.gov/ITS/benecost.nsf/0/DDD081474191C87C852578CD00622144?OpenDocument&Query=Home
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