COLORADO
Department of Transportation

Region 4 ITS Plan

Update to the 2011 Plan

Prepared by:

NAVJOY
Trusted Navigators in Innovation & Technology

June 2020

ACRONYMS AND ABBREVIATIONS

BRT……..Bus Rapid Transit

CDOT…….Colorado Department of Transportation

CMV……..Commercial Motor Vehicle

COLT…….City of Loveland Transit

DMS……...……Dynamic Message Sign

DRCOG……Denver Regional Council of Governments

FHWA……...…..Federal Highway Administration

ITS……...……Intelligent Transportation Systems

MPO……..….Metropolitan Planning Organization

NFRMPO……...……...……North Front Range Metropolitan Planning Organization

RTD……Regional Transportation District

SMP……..Smart Mobility Plan

STP…...……..Statewide Transportation Plan

TPR……..…Transportation Planning Region

TSP……..……..Transit Signal Priority

Table of Contents

List of Appendices

List of Tables

List of Figures

1. Introduction

1.1. Background

The Region 4 Intelligent Transportation Systems (ITS) Plan (2011) (hereafter referred to as the Plan) was developed with the participation of federal and state agencies, North Front Range Metropolitan Planning Organization (NFR MPO) and Transportation Planning Regions (TPR), Cities, Counties, transit, law enforcement and emergency management, universities, and Rocky Mountain National Park. The Plan was a consolidation of all planned and desired ITS projects for the Region and provided a roadmap for ITS projects and implementations that could be incorporated into the transportation plans of all stakeholders.

The Plan provided stakeholders with the following information:

- A comprehensive list of critical transportation problems and Transportation Service Areas (TSA) for Region 4.
- Available ITS solutions to those problems.
- Inventory of ITS devices within the Region.
- ITS deployment strategies.
- ITS deployment costs.
- Potential sources of funding and strategies to overcome funding limitations.
- Identified two ITS champions in Region 4.

The Plan also adopted the Denver Regional Council of Governments (DRCOG) concept of Transportation Service Areas (TSA), which included the following nine:

1. Regional Traveler Information
2. Regional Operations and Management
3. Regional Traffic Incident Management
4. Regional Transit Operations and Management
5. Maintenance and Construction
6. Regional Parking Management
7. Regional Data Management
8. Regional Emergency Management
9. Commercial Vehicle Operations

Of these nine TSAs, six were consistently identified as priorities for Region 4 on a corridor-specific basis for 64 corridors (excluding only Regional Transit Operations and Management, Regional Parking Management, and Regional Data Management).

In 2018, CDOT initiated a project to update their Statewide and Regional ITS Architectures to reflect adjustments made by the Federal Highway Administration (FHWA) to the National ITS Architecture. CDOT also began development of regional Smart Mobility Plans (SMP) in conjunction with these efforts to identify opportunities for implementation of ITS solutions and other transportation applications in new or existing projects. Regional SMPs were to be rolled into a Statewide Smart Mobility Plan, which would then be evaluated and incorporated appropriately into the Statewide Transportation Plan (STP). The STP is currently in draft form and has been made available for a 60-day public review and comment period as of June 1. The update to the Statewide and Regional ITS Architectures is essentially complete, with no major revisions anticipated.

Navjoy reviewed the draft of the STP and determined that all recommendations made in the body of this document are consistent with the STP in its current draft form. The body of the STP does not focus very specifically on any aspects of ITS project planning, prioritization, or implementation.

The corridor profiles contained in Appendix E of the STP draw from information contained in the *2045 Regional Transportation Plan, September 2019* by the North Front Range MPO and *Upper Front Range 2045 Regional Transportation Plan Draft, May 2020*.

Projects identified in the North Front Range plan consist only of roadway capacity and transit/rail service projects. There is no mention of specific ITS related projects.

There are five ITS projects noted in the Upper Front Range Plan, all of which have been included within the STP and this Plan.

1. I-76 Intelligent Transportation Systems Infrastructure – Installation of fiber-optics and ITS devices between Hudson and State Line [Project ID 1021]

2. SH 14 ITS Infrastructure – Installation of fiber optics and ITS devices between Fort Collins and Sterling [Project ID 1024]

3. US 36 Community Drive to Mary's Lake Rd (Estes Park) – Digital signage and smart parking technology for congestion and air quality mitigation. [Project ID 1820]

4. SH 71 – Dynamic Curve Warning in Morgan County [Project ID 1422]

5. Various State Highways – Signal improvements and dilemma zone detection in Larimer County [Project ID 2274]

1.2. *Purpose of the Update*

Numerous changes to Region 4 have occurred since 2011. In 2013, CDOT changed the boundaries of the then six Transportation Regions, which resulted in restructuring to five Transportation Regions. The change to Region 4 added four counties, including additional major roadway segments of I-70, US 40, US 385, SH 59 and SH 71, and placed US 36 from Pecos Street to SH 7 in Region 1. This is noteworthy because these corridor segments and other roadways that were added were not part of Region 4 when the Plan was developed.

Additionally, ITS infrastructure in the Region has expanded dramatically. ITS technologies have also developed significantly in several key areas, such as traveler information services. The Plan's prescribed solutions to many problems may now have more direct or innovative solutions available than in the past.

The purpose of this update to the Plan is to provide stakeholders with a summary of the current state of ITS in Region 4 so that efforts to further integrate ITS technologies can be properly targeted and coordinated between stakeholders. Given the numerous developments in ITS technologies and in Region 4 that have occurred in the past nine years, the contents of the Plan must be adapted to these changes.

This document is not intended to replace the 2011 Plan, but to serve as an addendum. With the Plan as a foundation, this document serves to highlight high-priority gaps in implementation and the most relevant applications of the Plan moving forward. Stakeholders should use both documents to guide the development of ITS solutions in Region 4.

1.3. *Document Structure*

The remainder of this document is structured as follows:

- **Section 2** details the methodology used to construct this report.
- **Section 3** provides a summary of changes made to the original 31 Transportation Problems detailed in the Plan.
- **Section 4** summarizes ITS developments that have occurred since 2011.
- **Section 5** summarizes projects that are active or in the planning phase.
- **Section 6** outlines the methodology used to identify costs and priority levels of corridor-specific solutions in the Plan.
- **Section 7** summarizes next steps regarding synergies with the SMP, incorporating additional stakeholders, corridor prioritization, data sharing, and cost evaluation.

2. Development of the Plan Update

Stakeholder meetings for urban and rural agencies were held on November 20, 2019. Representatives from the following agencies participated:

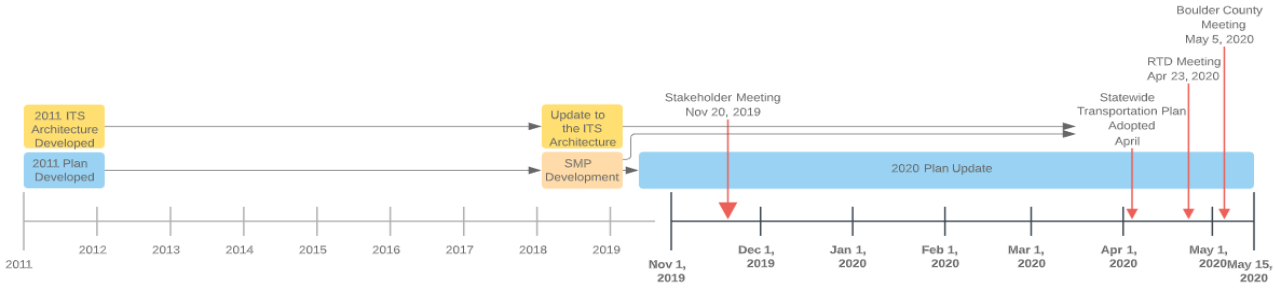
- CDOT
- Denver Regional Council of Governments
- Fort Collins
- Greeley
- Longmont
- Loveland
- North Front Range MPO

In the meeting, the group of primarily urban stakeholders discussed changes in the priority of the original 31 Regional transportation problems identified in 2011, proposing the removal of some that they determined had been addressed sufficiently, as well as the introduction of some new problems facing the Region. Stakeholders also presented ITS projects that had been completed by their agency or jurisdiction, as well as any projects that were planned or currently in progress. Stakeholders also received an ITS inventory survey prior to and following the meeting. The responses to this survey are summarized in **Appendix A**.

Additional discussions with Regional Transportation District (RTD) and Boulder County representatives were held on April 23 and May 5, 2020, respectively. Based on the feedback provided, the problems identified for the Regional Transit Operations and Management TSA were revised to better reflect the perspectives of these transit representatives. City of Loveland Transit (COLT) also provided feedback, though they did not identify any additional corridor-specific ITS projects.

Navjoy consolidated stakeholder feedback from these meetings, consulted with the CDOT project manager, reviewed the original Plan to identify additional elements in need of updates, and cross-referenced stakeholder projects with the ITS inventory. **Figure 1** provides the project timeline through May 2020.

Figure 1. Project timeline.



3. Transportation Problems in Region 4

Urban stakeholders proposed several changes to the original list of 31 regional transportation problems facing Region 4. Several problems were removed, either because they had been adequately addressed since 2011 (such as event traffic management and signal communication) or because they were outside the scope of the ITS Plan Update (such as: antiquated business systems). Four new problems were proposed, and have been included in **Table 1**, along with a justification for their inclusion thereby resulting in 26 problem areas identified in this Plan. Prioritization of the problems listed was also adjusted according to stakeholder feedback, and some problems have been restated to improve clarity. All problems in **Table 1** have been categorized into the most appropriate TSA.

RTD and Boulder County identified two future corridor projects in which they are both involved, which are in different stages in the planning processes (Planning and Environmental Linkages study, land use, zoning, etc.), that will implement Bus Rapid Transit (BRT) and Traffic Signal Priority (TSP). Additionally, Boulder County identified two other future corridor projects that will implement TSP and queue jumps at traffic signals.

A desire for more coordination between agencies, particularly regarding data sharing, was expressed for most TSAs. Third-party traveler information services were identified as a significant development in ITS since 2011 and could be leveraged to further improve corridor performance without the redundancy of agency-specific applications.

Access to corridor performance monitoring data are far more accessible today, though historic count data are still scattered and severely limited for pedestrians.

Table 1. Updated list of critical Regional transportation problems.

Transportation Service Area	Problem	Regional Ranking	Changes	Justification for Change in Priority or Inclusion
Regional Traveler Information	Not enough real-time information (traffic conditions, incidents, & construction) integration	High Priority	Updated phrasing (formerly “Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers)	Real-time information is readily available to travelers through a variety of sources and platforms. However, integration and sharing of these sources between agencies is lacking.
	Not enough collaboration with third-party traveler information services	High Priority	NEW	Third-party traveler information services (Google, Waze, etc.) have made significant progress since 2011, and they are an efficient alternative to developing jurisdiction-specific services.
	Not enough real-time weather and pavement data	High Priority		

Transportation Service Area	Problem	Regional Ranking	Changes	Justification for Change in Priority or Inclusion
Regional Traveler Information (Continued…)	No on-line trip planning services	High Priority		
	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium Priority	Increased Priority	While CCTV coverage in the region has increased dramatically since 2011, many resources are deployed in a redundant manner due to a lack of data sharing between jurisdictions.
Regional Operations and Management	Lack of mitigation for freeway/arterial congestion	High Priority	Updated phrasing (formerly "Freeway/Arterial congestion")	
	Lack of security measures for key infrastructure	High Priority	Increased Priority, updated phrasing (formerly "Security of key infrastructure")	As jurisdictions attempt to share data for the benefit of the region, network security will be critical. Physical security measures at cabinets and fiber access points are not adequate.
	Lack of communications infrastructure	High Priority		
	Insufficient sharing of tracking and data collection from maintenance vehicles	Low Priority	Updated phrasing (formerly "Tracking and data collection from maintenance vehicles")	
	Lack of synchronization of traffic signals and strategies beyond TOD plans	Low Priority		
Regional Traffic Incident Management	Lack of weather (high winds, flooding, icing) event mitigation	Medium Priority	Updated phrasing (formerly "Weather (high winds, flooding and icing)	
	Poorly managed highway rail crossings	Medium Priority	Updated phrasing (formerly "Highway-rail crossing")	
	Lack of speed enforcement	Medium Priority	Updated phrasing (formerly "Speeding")	
	Lack of central control for jurisdictional operation/management	Medium Priority	NEW	Maintaining a central operations data hub (i.e., TMC) would assist in traffic management, particularly across jurisdictional borders.

Transportation Service Area	Problem	Regional Ranking	Changes	Justification for Change in Priority or Inclusion
Regional Transit Operations and Management	Not enough coordination and integration between other travel modes	High Priority		
	Too many barriers to the development of access agreements between transit agencies, including lack of right-of-way available for Park-n-Ride facilities in terms of number of facilities needed at critical locations and facility size needs.	High Priority	NEW	Identified by RTD representatives as a significant issue impeding multimodal travel opportunities.
	No priority for transit vehicles at traffic signals	Medium Priority	Increased Priority	TSP was identified as a significant element of most projects discussed with RTD and Boulder County
Maintenance and Construction	Not enough coordination of ITS equipment/training of maintenance personnel	Medium Priority	Updated phrasing (formerly "Work zone management")	
Regional Parking Management	Lack of infrastructure for parking detection and electric vehicles	Low Priority	Decreased Priority, updated phrasing (formerly "Parking management")	ITS solutions besides automated detection are not widely used for parking management.
Regional Data Management	Not enough data sharing between agencies	Medium Priority	Higher priority, updated phrasing (formerly "Data sharing between agencies")	Historic traffic count data are scattered and inconsistent. Testing of new ITS devices should be handled collaboratively to increase efficiency.
	Not enough pedestrian count data	Medium Priority	NEW	Pedestrian detection and tracking are critical aspects of safety and can be achieved through a variety of ITS solutions.
	Not enough historic traffic count (volume data)	Low Priority		
	Lack of performance monitoring data	Low Priority	Decreased Priority	Performance monitoring data collection has improved dramatically since 2011.
Regional Emergency Management	Lack of access to MDSS and CDOT traveler information	Low Priority	Decreased Priority, updated phrasing (formerly "Access to MDSS and CDOT traveler information)	CDOT maintenance has gained access to MDSS. This issue can be further ameliorated using third-party services (mentioned above).

Transportation Service Area	Problem	Regional Ranking	Changes	Justification for Change in Priority or Inclusion
Commercial Vehicle Operations	Inadequate support infrastructure (pullout areas to perform size and weight enforcement on commercial vehicles)	High Priority	Updated phrasing (formerly "Inadequate support infrastructure")	
General[1]	Lack of adequate funding	High Priority		

Table 2 provides a summary of the priority and distribution of problems according to TSA (the General problem from **Table 1** is omitted). Transit Operations and Management and Regional Parking Management are not considered within the scope of this update.

Table 2. Distribution of regional problems by TSA and priority level.

Transportation Service Area	High Priority Problems	Medium Priority Problems	Low Priority Problems	Total
1. Regional Traveler Information	4	1	0	**5**
2. Regional Operations and Management	3	0	2	**5**
3. Regional Traffic Incident Management	0	4	0	**4**
4. Regional Transit Operations and Management	2	0	1	**3**
5. Maintenance and Construction	0	1	0	**1**
6. Regional Parking Management	0	0	1	**1**
7. Regional Data Management	0	2	2	**4**
8. Regional Emergency Management	0	0	1	**1**
9. Commercial Vehicle Operations	1	0	0	**1**
Total	**10**	**8**	**7**	**25**

[1] General is not a TSA; however, the identified problem pertains to all stakeholders and therefore are included for reference purposes.

4. Completed Projects

Table 3 provides a list of completed projects identified by stakeholders present for the meeting on November 20, 2019. Fiber infrastructure has expanded by at least 124 geographic miles, and real-time travel/speed coverage by roughly 30 miles. Roughly 70 miles of I-25 and 32 miles of US 85 have received CCTV coverage, and courtesy patrol services have been expanded to an additional 17 miles of I-25.

Table 3. ITS projects completed since 2011.

Project Type	Completed Projects
Communications Infrastructure	Fiber: I-25 from Region boundary to the CO/WY state line (70 miles)
	Fiber: US 85 from Region boundary to US 34 (30 miles)
	Fiber: US 34 from I-25 to US 85 (17 miles)
	Fiber: I-70 from Region boundary to CO/KS state line (118 miles) installed prior to plan and changes to the Region 4 boundary, upgraded in 2014
	Fiber: SH 93 from SH 128 to SH 7 (7 miles)
Traveler Information	Real-time travel/Speed coverage for I-25 from Region boundary to SH 119
	Real-time travel/Speed coverage for US 36 from Region boundary to Boulder
	Some road condition and road work on all highways in region
Closed-Circuit Television Cameras	I-25 from Region boundary to the CO/WY state line
	US 85 from US 34 extending North
Ramp Meters	I-25 at SH 392 and Harmony
Performance Monitoring	CDOT gained access to INRIX data in 2015
Courtesy Patrol/Tow Vehicles	I-25 from Johnstown to SH 14

As part of each corridor-related project (identified in Appendix J of the Plan), the Plan also identified certain ITS devices to be installed at specific locations on the corridor. The ITS Equipment Inventory[2], which identifies all statewide ITS devices, including pertinent device related information (type of device, location, date of installation, maintenance responsibility, etc.), was used to determine which project related ITS devices were installed. The ITS Equipment Inventory was filtered on ITS devices only in Region 4, then sorted by route and reference point to get a chronological listing of ITS devices by route/reference point. ITS devices installed prior to 2011 were excluded. Plan ITS devices were compared with the ITS Equipment Inventory to determine where a match showed that the ITS device was installed. The ITS device information was summarized by corridor project showing device type and number of devices, as displayed in **Table 4**. It should be noted that there were several ITS devices installed on the corridors that were not identified in the Plan. This may have resulted from additional project development after the Plan was developed, but prior to implementation of the ITS devices on the corridors.

Table 4. Devices prescribed by the Plan and devices added (2011-2018).

Corridor	TTI			CCTV			DMS			WS		
	2011 Count	Planned	Completed	2011 Count	Planned	Completed	2011 Count	Planned	Completed	2011 Count	Planned	Completed
9. I-25 (SH-7 to Wellington) Approx. 48.8 Miles	N/A	20	4	7	16	23	15	0	0	4	1	0
10. I-25 (Wellington North to Colorado/Wyoming State Line) Approx. 21.0 Miles	N/A	N/A	0	N/A	4	3	1	4	0	1	1	1
13. US-34 W (Loveland to East of Greeley) Approx. 21.4 Miles	N/A	10	0	1	9	1	N/A	1	0	1	1	0
16. US-36 W (Boulder to Wadsworth) Approx. 11.7 Miles	6	8	2	3	9	2	1	9	1	1	2	0

Of the 64 corridors listed in Appendix J of the Plan, the Equipment Inventory only records the addition of ITS devices to four corridors. **Table 4** lists the number of devices added to these four corridors, as well as the proposed number of devices as determined in the Plan. Only two of these corridors received the identified number of installations for any device type.

[2] CDOT SAP, Equipment Module, ITS inventory data as of December 2018.

5. Active and Planned Projects

Table 5 lists the planned projects identified by agency representatives present at the stakeholder meetings. The major focal points of current and future efforts toward ITS implementation include expanding fiber optic communications infrastructure, CCTV coverage, BRT, TSP, and improving performance monitoring. Also, smart mobility initiatives identified in the SMP are listed and shown as such.

Table 5. Planned ITS projects in Region 4.

Project Type	Planned Projects
Communications Infrastructure	US 36 from SH 66 (Lyons) to Estes Park (21 miles) – CDOT is currently working with Crown Castle to install fiber optic cable and other infrastructure.
	US 36 from SH 66 (Lyons) to I-25 (41 miles) – CDOT has partnered with Longmont to provide additional fiber optic cable coverage.
	Region 4 is building out the I-76 fiber network, VMS, and CCTV coverage. There are plans to continue coverage to the state line.
	Loveland has received partial funding for efforts to increase fiber redundancy.
	Greeley is issuing an RFP on a new ATMS system in January, and their TOC will be completed in January 2020.
	The BUILD grant for expanding the connected vehicle environment along I-25 is still under negotiation; emphasis on connected vehicles has been reduced, and efforts are more focused on fiber expansion. SMP Initiative.
Closed-Circuit Television Cameras	Greeley is actively expanding CCTV coverage.
	Longmont is adding more CCTV, travel time readers, and other data collection devices. They are also replacing/installing battery backups (UPS) in cabinets.
	Region 4 is starting an MS port/camera installation project.
Performance Monitoring	Fort Collins is planning to implement additional adaptive traffic signals. They currently have 18 adaptive signals deployed and hope to deploy 5 more by the end of the year.
	NFRMPO has funding for travel time detectors. Ongoing maintenance costs are a barrier to further expansion.
	Loveland has funding to deploy up to 20 permanent automated traffic recorders for speed and classification.
	Loveland has also procured funding for more travel time readers.
Regional Transit Operations and Management	BRT and TSP are planned for SH 119 (Boulder to Longmont).
	BRT and TSP are planned for US 287 (US 36 to SH 66).
	BRT and TSP are planned for SH 7 (Boulder to US 287).
	Queue jumps and possibly TSP are planned for SH 7 (Boulder to Brighton).
	TSP is planned for a portion of SH 93 connecting from US 36 in Boulder.

Project Type	Planned Projects
Transportation Operations and Management	Managed lanes along I-25 between Mead and Fort Collins are scheduled for completion in 2021. SMP Initiative.
	A Transportation Operations Center (TOC) is planned and in the design phase with some funding allocated. SMP Initiative.
	The STP recommends digital signage and smart parking technology for congestion and air quality mitigation for US 36 (Community Drive to Mary's Lake Rd)
	The STP proposes a Dynamic Curve Warning System for SH 71 in Morgan County.
	The STP identified the need for signal improvements and dilemma zone detection along various state highways in Larimer County.
Commercial Vehicle Operations	I-70 and I-76 truck parking, US 85 Commercial Vehicle Safety Plan including testing of freight priority at signals, and virtual Port-of-Entry on US 85 at Platteville. SMP Initiative.

6. Review of Corridor-Specific Needs and Projects

As mentioned above, the Plan identified 64 corridors within Region 4 for deployment of various ITS solutions. Of these, 11 were County or local roads, which were not analyzed for this update. In Appendices J and K of the 2011 Plan, each of the major corridors was associated with specific problems and TSAs, with specific ITS solutions identified for each corridor-specific problem. Of the nine TSAs originally identified, six were seen as having corridor-specific applications:

1. Regional Traveler Information
2. Regional Operations and Management
3. Regional Traffic Incident Management
4. Maintenance and Construction
5. Regional Emergency Management
6. Commercial Motor Vehicle (CMV) Operations

Regional Transit Operations and Management, Regional Parking Management, and Data Management entailed more regional than corridor specific approaches and were not considered in this section. However, regarding Regional Transit Operations and Management it is important to note the difference and scope of ITS applications between urban and rural transit agencies. RTD and Boulder County are focusing on BRT and TSP on urban corridors that require significant ITS infrastructure including fiber optic cable, DMS and CCTV, etc., while rural transit agencies are focusing on localized rural transit applications. ITS applications regarding BRT and STP on corridors as identified on **Table 5** above should be coordinated with the respective corridors identified on **Appendix B** to ensure synergy, interoperability and potential cost savings.

Only seven of the high-priority problems identified above fell within the six corridor-specific TSAs:

- Not enough real-time traveler information integration
- Not enough real-time weather and pavement data
- No on-line trip planning services
- Lack of means to mitigate freeway/arterial congestion
- Lack of security measures for key infrastructure
- Lack of communications infrastructure
- Inadequate CMV support infrastructure

Of these, the Plan addressed real-time traveler information, weather and pavement data, and gaps in communications structure in most cases. Freeway/Arterial congestion was only addressed for a single major corridor, and online trip planning, security measures, and CMV infrastructure were not addressed.

Of the original 64 corridors identified in the Plan, 49 Interstate and State Highway corridors were selected with specific ITS deployment recommendations and estimated costs (from Appendices J and K of the Plan). For each of these corridors, the problems addressed were cross-referenced with the proposed ITS solutions for high priority problems outlined in the Plan. These ITS solutions were then filtered to remove any completed or planned projects listed in **Tables 3**, **4**, and **5**. All costs were adjusted for inflation, with a total estimated cost of $162 million across all 49 corridors. The full list of corridors and proposed deployments can be found in **Appendix B**.

7. Recommended Next Steps

Recommended next steps have been identified within the following five fundamental areas based on review, evaluation, and the methodology applied to the Plan update process including stakeholder input. Focusing within these areas will ensure that the Plan incorporates foundational elements that result in cost-effective strategic and systematic ITS implementation and provide the greatest and highest-yield benefits to both Region 4 stakeholders and the traveling public.

Identify Synergies with the Statewide Transportation Plan

In 2018, CDOT began developing a Smart Mobility Plan with region-specific ITS and other transportation related goals. While the status and future of this document is unknown, it appears that elements will be incorporated into the Statewide Transportation Plan (STP), which is anticipated to be adopted in April 2020. The release of the STP will provide an opportunity to continue developing the Region's ITS Plan within the context of the state's broader goals as identified within the statewide planning process. Synergies between the regional problems discussed in this document and goals established in the STP may become apparent and could help shape future iterations of the Plan.

Engage Additional Stakeholders – Specifically Emergency Stakeholders

Efforts should be made to incorporate more stakeholders from Region 4 moving forward. While this update focused on the input of urban stakeholders and transit agencies, the Plan originally also consulted rural stakeholders, law enforcement and emergency management, and universities. Public safety agencies, in particular, should be consulted to develop a more robust analysis of changes regarding completed and proposed projects and problem areas over the past decade.

Focus on High-Yield Corridor Implementations to Fill Gaps

For corridor-specific projects, **Appendix B** identifies opportunities to target high-yield gaps in ITS infrastructure by considering corridors by the priority level of problems identified for the corridor and the cost of proposed ITS solutions. Strategies for ensuring the security of key infrastructure were not outlined on a corridor-specific basis in the Plan, though comprehensive plans for installing cable locks, cabinet locks, etc. could be considered in an expansion of this analysis. While not addressed in this document, local and County roads may have pressing ITS needs that are not addressed for State Highways and Interstates. The lack of pedestrian count data, for example, is a newly identified problem that can be addressed at the corridor level and would be more relevant along arterial streets.

Improve Data Sharing Pertaining to ITS Assets and Traveler Information Services

System-wide ITS solutions should also be considered. In particular, efforts to increase data sharing and operations across the Region could dramatically increase the usefulness of assets that are already deployed and increase the efficiency of efforts to develop further ITS infrastructure. Partnership with third-party traveler information services was identified as a key opportunity and could provide solutions for improvements to online trip planning including multimodal and coordination of CMV routes, both of which are high priority problems that have not been addressed extensively by the Plan.

Update Cost Estimates and Integrate ITS/Emerging Technology

Further efforts should update cost estimates for ITS strategies and evaluate the applicability of ITS solutions based on ITS/emerging technology changes over the past decade. This, in conjunction with a more comprehensive inventory of completed, current, and planned ITS projects in the Region, would provide an actionable foundation for discussion and coordination with a wider pool of stakeholders.

APPENDIX A: REGION 4 ITS INVENTORY SURVEY RESULTS

Survey Questions	Loveland	Fort Collins	Greeley	Longmont
Traffic Signals Owned and Operated	95	220	118	100
TSMS Used	Naztec ATMS.now	Econolite Centracs	QuicNet (McCain)	Econolite Centracs
Signal Operation Strategy Used	Semi-actuated	Semi-actuated	Semi-actuated	Semi-actuated
Traffic-adaptive control of signals	Yes	Yes	Yes	Yes
Percentage of signals operated on TSMS	87%	77%	100%	100%
Miles of fiber	31	40	40	N/A
Broadband provided	Yes	Yes	No	Yes
Percentage of signals with fiber communications	74%	68%	96%	85%
Signals with preemption	90	180	110	100
CCTV Cameras	55	48	40	5
Weather stations	6	14	10	4
Automated traffic recorders	2	0	0	0
Dynamic message signs	2	0	0	0
Highway Advisory Radio	1	0	0	0
Traveler information services provided	No	Yes	No	No
Traveler information service platform(s)	N/A	Web, Mobile	N/A	Web
Pedestrian counters	0	0	3	0
Bike detectors	0	200	3	0
Maintenance vehicles equipped with AVL/cameras	No	Yes	No	Yes
Bluetooth/Wi-Fi reader devices	24	40	20	13
Bluetooth/Wi-Fi vendor(s)	Acyclica Technology	TrafficCast (BlueTOAD)	Acyclica Technology	Acyclica Technology
Ramp meters	0	0	0	0
Coordination with other traffic agencies	Weather Impact, Wi-Fi Readers	Signal Timing	Acyclica information with Longmont & Loveland	Signal Timing, Event Management
Coordination with emergency management providers	Yes	Yes	Yes	Yes
Transportation management coordination with CTMC	Yes	No	No	No

APPENDIX B: PROPOSED ITS SOLUTIONS AND COSTS BY CORRIDOR

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
1. SH-1 (US-287/N College Ave in Fort Collins North of Wellington) Approx. 9.7 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 5 radars and 2 DMS with wireless communications at major intersections and state highways	Radar	$15,000.00	5	$75,000.00
					Arterial DMS	$159,000.00	2	$318,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 5 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure	High	Install fiber since it is between US-287 and US-85	Fiber	$235,000.00	9.7	$2,280,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 2 cameras at major intersections and state highways	CCTV	$24,000.00	2	$48,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system (gates exist)	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$2,961,000.00
2. US-6 (Brush North to Colorado/Nebraska State Line) Approx. 98.1 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 5 point devices and 5 DMS at intersecting state highways	Radar	$15,000.00	5	$75,000.00
					Arterial DMS	$159,000.00	5	$795,000.00
	2	Not enough real-time weather and pavement data	High	Install 10 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	10	$800,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 5 CCTV at intersecting state highways with wireless communications	CCTV	$24,000.00	5	$120,000.00
							Corridor Total:	$1,790,000.00
3. SH-7 W (Estes Park to Lyons) Approx. 14.2 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 3 TTI and 3 DMS at major intersections and state highways with wireless communications, install ATR on US-36 (Estes Park)	TTI	$11,000.00	3	$33,000.00
					Arterial DMS	$159,000.00	3	$477,000.00
					ATR	$15,000.00	1	$15,000.00
	2	Not enough real-time weather and pavement data	High	Install 3 weather stations, one every 5 miles with wireless communications	Weather Station	$80,000.00	3	$240,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 3 CCTV cameras and 3 DMS at major intersections and state highways with wireless communications	CCTV	$24,000.00	3	$72,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Flood Warning System between MP 55.8 and MP 56.5	Flood Warning System	$159,000.00	1	$159,000.00
							Corridor Total:	$996,000.00
4. SH-7 E (US-36 in Boulder East to US-287) Approx. 8.9 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 6 TTI and 6 DMS on fiber at every major signal or state highway, and 1 ATR	TTI	$11,000.00	6	$66,000.00
					Arterial DMS	$159,000.00	6	$954,000.00
					ATR	$15,000.00	1	$15,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 5 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	6	Lack of means to mitigate freeway/arterial congestion	High	Install signals on fiber and TRC (No specific deployment identified)	Interconnect	$15,000.00	17	$255,000.00
	9	Lack of communications infrastructure	High	Install fiber along the corridor	Fiber	$235,000.00	8.9	$2,092,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 6 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	6	$144,000.00
							Corridor Total:	$3,686,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
5. SH-14 W (Jackson/Larimer County Line to Fort Collins) Approx. 75.5 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 5 radars and 6 DMS at major intersections and state highways with wireless communications	Radar	$15,000.00	5	$75,000.00
					Arterial DMS	$159,000.00	6	$954,000.00
	2	Not enough real-time weather and pavement data	High	Install 8 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	8	$640,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 5 CCTV cameras at major intersections and state highways with wireless communications	CCTV	$24,000.00	5	$120,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Flood Warning System at MP 106.5	Flood Warning System	$159,000.00	1	$159,000.00
	14	Poorly managed highway rail crossings	Medium	Install 3 Highway-Rail safety systems.	Highway-Rail Safety System	$80,000.00	3	$240,000.00
							Corridor Total:	$2,188,000.00
6. SH-14 E (Fort Collins to Sterling) Approx. 101 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 6 radar with fiber communications and 5 with wireless communications at major intersections and state highways and 10 DMS	Radar	$15,000.00	11	$165,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations with fiber communications and 7 weather stations with wireless communications (one every 10 miles)	Weather Station	$80,000.00	9	$720,000.00
	9	Lack of communications infrastructure	High	Install fiber from US-287 to US-85	Fiber	$235,000.00	18.1	$4,254,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 11 CCTV cameras at major intersections and State Highways and 10 DMS	CCTV	$24,000.00	11	$264,000.00
					Arterial DMS	$159,000.00	10	$1,590,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Flood Warning System at I-25	Flood Warning System	$159,000.00	1	$159,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$7,232,000.00
7. SH-23 (Holyoke to Colorado/Nebraska State Line) Approx. 17.4 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 1 radar and 1 DMS at major intersections with wireless communications	Radar	$15,000.00	1	$15,000.00
					Arterial DMS	$159,000.00	1	$159,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 20 miles with wireless communications	Weather Station	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV camera at major intersections with wireless communications	CCTV	$24,000.00	1	$24,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$358,000.00
8. I-25 (SH-7 to Wellington) Approx 48.8 Miles	1	Not enough real-time traveler information	High	Install 16 TTI's, for every exit with fiber comms	TTI	$11,000.00	16	$176,000.00
	2	Not enough real-time weather and pavement data	High	1 weather station, one every 10 miles with fiber communications	Weather Station	$80,000.00	1	$80,000.00
	6	Lack of means to mitigate freeway/arterial congestion	High	No deployment identified				
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Flood Warning System at MP 256.75 and between MP 247 and MP 250	Flood Warning System	$159,000.00	1	$159,000.00
							Corridor Total:	$415,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
9. I-25 (Wellington North to Colorado/Wyoming State Line) Approx. 21.0 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 1 ATR and 4 DMS with fiber communication, install 4 TTI	ATR	$15,000.00	1	$15,000.00
					Freeway DMS	$398,000.00	4	$1,592,000.00
					TTI	$11,000.00	4	$44,000.00
	9	Lack of communications infrastructure	High	Install fiber from Wellington to Wyoming state line	Fiber	$235,000.00	21	$4,935,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV camera with fiber communications	CCTV	$24,000.00	1	$24,000.00
							Corridor Total:	$6,610,000.00
10. US-34 E (Brush to Colorado/Nebraska State Line) Approx. 87.0 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 5 radars, 5 ATR, and 5 DMS at major towns and intersecting state highways with wireless communications	Radar	$15,000.00	5	$75,000.00
					ATR	$15,000.00	5	$75,000.00
					Arterial DMS	$159,000.00	5	$795,000.00
	2	Not enough real-time weather and pavement data	High	Install 5 weather stations, one every 20 miles with wireless communications	Weather Station	$80,000.00	5	$400,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 5 CCTV cameras at major towns and intersecting state highways with wireless communications	CCTV	$24,000.00	5	$120,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system (No siglas close to rail crossing)	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$1,545,000.00
11. US-34 W (RMNP to Loveland) Approx. 57.8 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 7 radars at major intersections and state highways with fiber communications	Radar	$15,000.00	7	$105,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 20 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure/Arterial congestion	High	Install fiber from RMNP to Loveland	Fiber	$235,000.00	57.8	$13,583,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 7 CCTV cameras at major intersections and State Highways with fiber communications	CCTV	$24,000.00	7	$168,000.00
	7	Lack of synchronization of traffic signals and strategies beyond TOD plans	Low	Develop IMP's from RMNP to Loveland	IMP	$11,000.00	57.8	$636,000.00
							Corridor Total:	$14,652,000.00
12. US-34 W (Loveland to East of Greeley) Approx. 21.4 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 10 radars and 1 DMS at major intersections and state highways with fiber communications	Radar	15000	10	150000
					Arterial DMS	$159,000.00	1	$159,000.00
	2	Not enough real-time weather and pavement data	High	1 weather station, one every 10 miles with fiber communications	Weather Station	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 8 CCTV cameras at major intersections and State Highways with fiber communications	CCTV	$24,000.00	8	$192,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Ice Warning System -- At MP 0.5 and MP 39.10	Ice Warning System	$111,000.00	2	$222,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$883,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
13. US-34 W (East of greeley to Brush) Approx. 57.8 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	No deployment identified				
	2	Not enough real-time weather and pavement data	High	Install 5 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	5	$400,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	No deployment identified				
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$480,000.00
14. US-36 W (RMNP to Boulder) Approx 27.6 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 1 radar and 10 DMS with fiber communications	Radar	$15,000.00	1	$15,000.00
					Arterial DMS	$159,000.00	10	$1,590,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 10 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure	High	Install fiber from RMNP to Boulder	Fiber	$235,000.00	27.6	$6,486,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV camera at major intersections and state highways with fiber communications	CCTV	$24,000.00	1	$24,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Flood Warning Systems at Baseline Rd. and between MP 41 and MP 43	Flood Warning System	$159,000.00	2	$318,000.00
							Corridor Total:	$8,593,000.00
15. US-36 W (Boulder to Wadsworth) Approx 11.7 Miles	1	Not enough real-time traveler information	High	Install 6 radar, 2 ATR, and 7 DMS at major intersections and every exit with fiber comms	Radar	$15,000.00	6	$90,000.00
					ATR	$15,000.00	2	$30,000.00
					Freeway DMS	$398,000.00	7	$2,786,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 5 miles with fiber comms	Weather Station	$80,000.00	2	$160,000.00
	6	Lack of means to mitigate freeway/arterial congestion	High	Ramp meter at every exit	Ramp Meter	$191,000.00	11	$2,101,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 7 CCTV cameras at major intersections and State Highways with fiber communications	CCTV	$24,000.00	7	$168,000.00
							Corridor Total:	$5,335,000.00
16. US-36 E (SH-71 to Colorado/Nebraska State Line) Approx. 88.9 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 7 DMS and 7 radar at major intersections and state highways with wireless communications	Arterial DMS	$159,000.00	7	$1,113,000.00
					Radar	$15,000.00	7	$105,000.00
	2	Not enough real-time weather and pavement data	High	Install 9 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	9	$720,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 7 CCTV cameras at major intersections and state highways with wireless communications	CCTV	$24,000.00	7	$168,000.00
							Corridor Total:	$2,106,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
17. SH-39 (I-76 Wiggins North to SH-144) Approx. 7.2 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 1 radar at intersecting state highways with wireless communications	Radar	$15,000.00	1	$15,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 20 miles with wireless communications	Weather Station	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV camera at intersecting state highways with wireless communications	CCTV	$24,000.00	1	$24,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$199,000.00
18. SH-42 (SH-7 (Arapahoe Rd) South and East to US-287) Approx. 5.1 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 5 radars and 5 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	5	$75,000.00
					Arterial DMS	$159,000.00	5	$795,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 5 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure	High	Install fiber since it is an urban corridor	Fiber	$235,000.00	5.1	$1,199,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 5 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	5	$120,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Flood Warning System at Baseline intersection	Flood Warning System	$159,000.00	1	$159,000.00
							Corridor Total:	$2,508,000.00
19. SH-52 W (SH-119 to US-85) Approx. 19.9 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 4 radar and 4 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	4	$60,000.00
					Arterial DMS	$159,000.00	4	$636,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 20 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure	High	Install fiber from SH-119 to US-85, since it is between US-287 and US-85	Fiber	$235,000.00	19.9	$4,677,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 4 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	4	$96,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$5,709,000.00
20. SH-52 E (US-85 to Wiggins) Approx. 52.2 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 5 radar at major intersections and state highways with wireless communications	Radar	$15,000.00	5	$75,000.00
	2	Not enough real-time weather and pavement data	High	Install 5 weather stations, one every 5 miles with wireless communications	Weather Station	$80,000.00	5	$400,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 2 CCTV cameras at major intersections and state highways with wireless communications	CCTV	$24,000.00	2	$48,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Ice Warning System between MP 1 and MP 3	Ice Warning System	$111,000.00	1	$111,000.00
	14	Poorly managed highway rail crossings	Medium	Install 2 Highway-Rail safety systems	Highway-Rail Safety System	$80,000.00	2	$160,000.00
							Corridor Total:	$794,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
21. SH-52 N (Fort Morgan North to SH-14 East of New Raymer) Approx. 25.1 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 3 radar and 1 DMS at major intersections and state highways with wireless communications	Radar	$15,000.00	3	$45,000.00
					Arterial DMS	$159,000.00	1	$159,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 20 miles with wireless communications	Weather Station	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV camera at major intersections and state highways with wireless communications	CCTV	$24,000.00	1	$24,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Flood Warning System at MP 43	Flood Warning System	$159,000.00	1	$159,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$547,000.00
22. SH-55 (I-76 to Crook) Approx. 2.7 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 1 radar device at major intersections and state highways with wireless communications	Radar	$15,000.00	1	$15,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 5 miles with wireless communications	Weather Station	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV camera at major intersections and state highways with wireless communications	CCTV	$24,000.00	1	$24,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$199,000.00
23. SH-56 (US-287 Bypass in Berthoud to I-25) Approx. 6.6 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 4 radar, 1 ATR, and 1 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	4	$60,000.00
					ATR	$15,000.00	1	$15,000.00
					Arterial DMS	$159,000.00	1	$159,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 5 miles with fiber communications	Weather Station	$80,000.00	1	$80,000.00
	9	Lack of communications infrastructure	High	Install fiber from US-287 to I-25 since it is between US-287 and US-85	Fiber	$235,000.00	6.6	$1,551,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 2 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	2	$48,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$1,993,000.00
24. SH-59 (US-36 to Sedgwick) Approx. 98.6 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 3 radar and 3 DMS at major intersections and state highways with wireless communications	Radar	$15,000.00	3	$45,000.00
					Arterial DMS	$159,000.00	3	$477,000.00
	2	Not enough real-time weather and pavement data	High	Install 3 weather stations, one every 20 miles with wireless communications	Weather Station	$80,000.00	3	$240,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 3 CCTV at major intersections and state highways with wireless communications	CCTV	$24,000.00	3	$72,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 2 Flood Warning Systems and 2 Ice Warning Systems	Flood Warning System	$159,000.00	2	$318,000.00
					Ice Warning System	$111,000.00	2	$222,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$1,454,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
25. SH-60 W (US-287 in Loveland East to I-25) Approx. 5.9 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 2 radar and 2 ATR at major intersections and state highways with fiber communications	Radar	$15,000.00	2	$30,000.00
					ATR	$15,000.00	2	$30,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 5 miles with fiber communications	Weather Station	$80,000.00	1	$80,000.00
	9	Lack of communications infrastructure	High	Install fiber from US-287 to I-25	Fiber	$235,000.00	5.9	$1,387,000.00
							Corridor Total:	$1,527,000.00
26. SH-60 E (I-25 at Johnstown Exit East to US-85) Approx. 14.2 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 4 radar, 4 ATR, and 1 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	4	$60,000.00
					ATR	$15,000.00	4	$60,000.00
					Arterial DMS	$159,000.00	1	$159,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 10 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure	High	Install fiber from I-25 to US-85 since it is between US-287 and US-85	Fiber	$235,000.00	14.2	$3,337,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 3 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	3	$72,000.00
	14	Poorly managed highway rail crossings	Medium	Install 2 Highway-Rail safety systems	Highway-Rail Safety System	$80,000.00	2	$160,000.00
							Corridor Total:	$4,008,000.00
27. SH-61 (Otis to Sterling) Approx. 40.7 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 2 radar with wireless communications	Radar	$15,000.00	2	$30,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 20 miles with wireless communications	Weather Station	$80,000.00	1	$80,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$190,000.00
28. SH-63 (US-36 North to Atwood) Approx. 56.6 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 3 radar and 2 DMS at major intersections and state highways with wireless communications	Radar	$15,000.00	3	$45,000.00
					Arterial DMS	$159,000.00	2	$318,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 20 miles with wireless communications	Weather Station	$80,000.00	2	$160,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$603,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
29. SH-66 (Lyons to Platteville) Approx. 23.4 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 4 radar, 4 ATR, and 3 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	4	$60,000.00
					ATR	$15,000.00	4	$60,000.00
					Arterial DMS	$159,000.00	3	$477,000.00
	2	Not enough real-time weather and pavement data	High	Install 3 weather stations, one every 10 miles with fiber communications	Weather Station	$80,000.00	3	$240,000.00
	9	Lack of communications infrastructure	High	Install fiber from Lyons to Platteville as it is between US-287 and US-85	Fiber	$235,000.00	23.4	$5,499,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 3 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	3	$72,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 1 Flood Warning System	Flood Warning System	$159,000.00	1	$159,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$6,647,000.00
30. SH-71 S (Lincoln/Morgan County Line North to Brush) Approx. 48.5 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 1 radar at major intersections and state highways with wireless communications	Radar	$15,000.00	1	$15,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 20 miles with wireless communications	Weather Station	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV at major intersections and state highways with wireless communications	CCTV	$24,000.00	1	$24,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 1 DMS	Arterial DMS	$159,000.00	1	$159,000.00
							Corridor Total:	$358,000.00
31. SH-71 N (Brush North to Colorado/Nebraska State Line) Approx. 57.4 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 2 radar at major intersections and state highways with wireless communications	Radar	$15,000.00	2	$30,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 20 miles with wireless communications	Weather Station	$80,000.00	2	$160,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV camera at major intersections and state highways with wireless communications	CCTV	$24,000.00	1	$24,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 4 Flood Warning Systems and 1 DMS at a major intersection with wireless communications	Flood Warning System	$159,000.00	4	$636,000.00
					Arterial DMS	$159,000.00	1	$159,000.00
							Corridor Total:	$1,009,000.00
32. SH-72 (SH-7 to Peak to Peak Highway/Nederland to Estes Park) Approx. 21.5 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 2 radar and 2 DMS at major intersections and state highways with wireless communications	Radar	$15,000.00	2	$30,000.00
					Arterial DMS	$159,000.00	2	$318,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	2	$160,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 2 CCTV cameras at major intersections and state highways with wireless communications	CCTV	$24,000.00	2	$48,000.00
							Corridor Total:	$556,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
33. I-76 (Adams/Weld County Line East of Colorado/Kansas State Line) Approx. 73.8 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 4 radar and 4 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	4	$60,000.00
					Freeway DMS	$398,000.00	4	$1,592,000.00
	2	Not enough real-time weather and pavement data	High	Install 4 weather stations, one every 20 miles with fiber communications	Weather Station	$80,000.00	4	$320,000.00
	9	Lack of communications infrastructure	High	Install fiber since it is a freeway	Fiber	$235,000.00	73.8	$17,343,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 4 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	4	$96,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 1 Flood Warning System and DMS at major highway stations	Flood Warning System	$159,000.00	1	$159,000.00
							Corridor Total:	$19,570,000.00
34. US-85 (Region 4 Boundary to Fort Lupton) Approx. 6.5 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 2 radar and 1 ATR at major intersections and state highways with fiber communications	Radar	$15,000.00	2	$30,000.00
					ATR	$15,000.00	1	$15,000.00
	2	Not enough real-time weather and pavement data	High	Install 1 weather station, one every 5 miles with fiber communications	Weather Station	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 2 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	2	$48,000.00
	7	Lack of synchronization of traffic signals and strategies beyond TOD plans	Low	No deployment identified				
							Corridor Total:	$173,000.00
35. US-85 (Fort Lupton to Greeley) Approx. 23.6 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 11 radar and 4 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	11	$165,000.00
					Arterial DMS	$159,000.00	4	$636,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 5 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure	High	Install fiber from Ft. Lupton	Fiber	$235,000.00	23.6	$5,546,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 8 CCTV cameras at major intersections and State Highways with fiber communications	CCTV	$24,000.00	8	$192,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
	7	Lack of synchronization of traffic signals and strategies beyond TOD plans	Low	Develop IMP from Ft. Lupton to Greeley	IMP	$11,000.00	23.6	$260,000.00
							Corridor Total:	$7,039,000.00
36. US-85 (Greeley to Colorado/Wyoming State Line) Approx. 44.3 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 3 radar and 1 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	3	$45,000.00
					Arterial DMS	$159,000.00	1	$159,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 20 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure	High	Install fiber from Greeley to Wyoming State Line	Fiber	$235,000.00	44.3	$10,411,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 3 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	3	$72,000.00
							Corridor Total:	$10,927,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
37. SH-113 (US-138 North to Colorado/Nebraska State Line) Approx. 18.8 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 1 radar at major intersections and state highways with wireless communications	Radar	$15,000.00	1	$15,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	2	$160,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV at major intersections and state highways with wireless communications	CCTV	$24,000.00	1	$24,000.00
							Corridor Total:	$279,000.00
38. SH-119 (Nederland East to Boulder) Approx. 17.2 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 3 radar at major intersections and state highways with wireless communications	Radar	$15,000.00	3	$45,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	2	$160,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 2 CCTV cameras at major intersections and state highways with wireless communications	CCTV	$24,000.00	2	$48,000.00
							Corridor Total:	$253,000.00
39. SH-119 E (Foothills Parkway in Boulder to I-25 in Longmont) Approx. 17.9 Miles	1	Not enough real-time traveler information	High	Install 6 radar, 4 ATR, and 6 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	6	$90,000.00
					ATR	$15,000.00	4	$60,000.00
					Arterial DMS	$159,000.00	6	$954,000.00
	2	Not enough real-time weather and pavement data	High	Install 6 weather stations, one every 5 miles with fiber communications	Weather Station	$80,000.00	6	$480,000.00
	6	Lack of means to mitigate freeway/arterial congestion	High	Install signals on fiber and TRC	Interconnect	$15,000.00	28	$420,000.00
	9	Lack of communications infrastructure	High	Install fiber from Foothills Parkway to I-25	Fiber	$235,000.00	17.9	$4,207,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 6 CCTV cameras at major intersections and State Highways with fiber communications	CCTV	$24,000.00	6	$144,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 1 Flood Warning System	Flood Warning System	$159,000.00	1	$159,000.00
							Corridor Total:	$6,514,000.00
40. US-138 (Sterling East to Colorado/Nebraska State Line) Approx. 61.8 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 5 radars at major intersections and state highways with wireless communications	Radar	$15,000.00	5	$75,000.00
	2	Not enough real-time weather and pavement data	High	Install 5 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	5	$400,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 5 CCTV cameras at major intersections and state highways with wireless communications	CCTV	$24,000.00	5	$120,000.00
	14	Poorly managed highway rail crossings	Medium	Install 4 Highway-Rail safety systems	Highway-Rail Safety System	$80,000.00	4	$320,000.00
							Corridor Total:	$915,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
41. SH-144 (I-76 near Wiggins North to Log Lane Village) Approx. 27.2 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 3 radar at major intersections and state highways with wireless communications	Radar	$15,000.00	3	$45,000.00
	2	Not enough real-time weather and pavement data	High	Install 3 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	3	$240,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 3 CCTV cameras at major intersections and state highways with wireless communications	CCTV	$24,000.00	3	$72,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 1 Flood Warning System	Flood Warning System	$159,000.00	1	$159,000.00
							Corridor Total:	$596,000.00
42. SH-157 (Foothills Parkway from US-36 Turnpike to SH-119) Approx. 3.7 Miles	1	Not enough real-time traveler information	High	Install 2 radar, 2 ATR, and 2 VMS at major intersections and state highways with fiber communications	Radar	$15,000.00	2	$30,000.00
					ATR	$15,000.00	2	$30,000.00
					Arterial DMS	$159,000.00	2	$318,000.00
	2	Not enough real-time weather and pavement data	High	Install 2 weather stations, one every 5 miles with fiber communications	Weather Station	$80,000.00	2	$160,000.00
	9	Lack of communications infrastructure	High	Install Fiber from US-36 to SH-119	Fiber	$235,000.00	3.7	$870,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 2 CCTV cameras at major intersections and State Highways with fiber communications	CCTV	$24,000.00	2	$48,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 1 Flood Warning System	Flood Warning System	$159,000.00	1	$159,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$1,695,000.00
43. SH-257 (SH-60 in Milliken to SH-14 of North Windsor) Approx. 18.4 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 4 radar at major intersections and state highways with fiber communications	Radar	$15,000.00	4	$60,000.00
	2	Not enough real-time weather and pavement data	High	Install 4 weather stations, one every 5 miles with fiber communications	Weather Station	$80,000.00	4	$320,000.00
	9	Lack of communications infrastructure	High	Install fiber since it is between US-287 and US-85	Fiber	$235,000.00	18.4	$4,324,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 4 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	4	$96,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 1 Flood Warning System	Flood Warning System	$159,000.00	1	$159,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$5,039,000.00
44. US-287 (Region 4 Boundary to Fort Collins) Approx. 41.8 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 34 radar, 3 ATR, and 5 DMS at major intersections and State Highways with fiber communications	Radar	$15,000.00	34	$510,000.00
					ATR	$15,000.00	3	$45,000.00
					Arterial DMS	$159,000.00	5	$795,000.00
	2	Not enough real-time weather and pavement data	High	Install 5 weather stations, one every 10 miles with fiber communications	Weather Station	$80,000.00	5	$400,000.00
	9	Lack of communications infrastructure	High	Install fiber from Region 4 boundary to Ft. Collins	Fiber	$235,000.00	41.8	$9,823,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 33 CCTV cameras at major intersections and State Highways with fiber communications.	CCTV	$24,000.00	33	$792,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install 2 Ice Warning Systems	Ice Warning System	$111,000.00	2	$222,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
	7	Lack of synchronization of traffic signals and strategies beyond TOD plans	Low	No deployment identified				
							Corridor Total:	$12,667,000.00

Corridor	Problem Number (2011)	Problems (Appendix J)	Regional Problem Priority	ITS Solutions (Appendix K)	Device Type	Unit Cost	Unit Count	Total Cost
45. US-287 (Fort Collins North to Colorado/Wyoming State Line) Approx. 39.1 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	No deployment indentified				
							Corridor Total:	$0.00
46. SH-385 (Region 4 Boundary to Colorado/Wyoming State Line) Approx. 106.1 Miles	2	Not enough real-time weather and pavement data	High	No deployment identified (2 existing weather stations)				
	9	Lack of communications infrastructure	High	No deployment identified				
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV camera at major intersections and state highways with wireless communications	CCTV	$24,000.00	1	$24,000.00
							Corridor Total:	$24,000.00
47. SH-392 (US-287 to US-85) Approx. 20.2 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 8 radar, 3 ATR, and 4 DMS at major intersections and state highways with fiber communications	Radar	$15,000.00	8	$120,000.00
					ATR	$15,000.00	3	$45,000.00
					Arterial DMS	$159,000.00	4	$636,000.00
	2	Not enough real-time weather and pavement data	High	Install 3 weather stations, one every 5 miles with fiber communications	Weather Station	$80,000.00	3	$240,000.00
	9	Lack of communications infrastructure	High	Install fiber from US-287 to US-85	Fiber	$235,000.00	20.2	$4,747,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 8 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	8	$192,000.00
							Corridor Total:	$5,980,000.00
48. SH-392 (US-85 to Briggsdale) Approx. 26.4 Miles	1	Not enough real-time information (traffic conditions, incidents, & construction) provided to travelers	High	Install 8 radar, 3 ATR, and 4 DMS at major intersections and state highways with wireless communications	Radar	$15,000.00	8	$120,000.00
					ATR	$15,000.00	3	$45,000.00
					Arterial DMS	$159,000.00	4	$636,000.00
	2	Not enough real-time weather and pavement data	High	Install 3 weather stations, one every 10 miles with wireless communications	Weather Station	$80,000.00	3	$240,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 8 CCTV cameras at major intersections and state highways with fiber communications	CCTV	$24,000.00	8	$192,000.00
	13	Lack of weather (high winds, flooding, icing) event mitigation	Medium	Install Flood Warning System	Flood Warning System	$159,000.00	1	$159,000.00
	14	Poorly managed highway rail crossings	Medium	Install 1 Highway-Rail safety system	Highway-Rail Safety System	$80,000.00	1	$80,000.00
							Corridor Total:	$1,472,000.00
49. SH-402 (US-287 in Loveland East to I-25) Approx. 4.2 Miles	2	Not enough real-time weather and pavement data	High	Install 2 radar, 4 ATR, and DMS at major intersections and state highways with wireless communications	Radar	$15,000.00	2	$30,000.00
					ATR	$15,000.00	4	$60,000.00
					Arterial DMS	$159,000.00	1	$159,000.00
	5	Not enough video surveillance to monitor traffic conditions, incidents, and construction activities	Medium	Install 1 CCTV at major intersections and state highways with wireless communications	CCTV	$24,000.00	1	$24,000.00
							Corridor Total:	$273,000.00