CONNECTICUT DEPARTMENT OF TRANSPORTATION

CRCOG CAPITOL REGION COUNCIL OF GOVERNMENTS
Working together for a better region.

Adopted by CRCOG Policy Board
March 4, 2015

Capitol Region
Intelligent Transportation Systems (ITS) Strategic Plan

Contents

Acknowledgments

ACRONYM LIST

ATMS – Advanced Traffic Management System(s)

CCRPA – Central Connecticut Regional Planning Agency

CCTV – Closed Circuit Television

CRCOG – Capitol Region Council of Governments

CSF – Critical Success Factor

CTDOT – Connecticut Department of Transportation

DMS – Dynamic Message Sign

FHWA – Federal Highway Administration

FTA – Federal Transit Authority

HAR – Highway Advisory Radio

ICM – Integrated Corridor Management

IMSA – International Municipal Signal Association

ITS – Intelligent Transportation System(s)

RiverCOG – Lower Connecticut River Valley Council of Governments

ROM – Reasonable Order of Magnitude

RWIS – Roadway Weather Information System

TIM – Traffic Incident Management

TMC – Traffic Management Center

USDOT – United States Department of Transportation

Preface

It can be argued that nothing impacts the quality of life that Americans enjoy more than the surface transportation system. Consider the seven components of quality of life below:

Wealth

The surface transportation system influences the ability to grow both personal (micro) and societal (macro) wealth. In many cases, growth in personal wealth depends on personal mobility such as the ability to access employment or the point of sale for both essential goods and impulse purchases. However, even if micro growth in wealth does not depend on personal mobility, it is likely that the efficiency of the system is paramount. From a societal perspective, the majority of freight in the nation moves through the surface transportation system. Without reliable travel conditions, the supply chain is impacted – driving up costs at the point of sale that cause a reduction in both micro and macro wealth.

Built Environment

Perceptions of the transportation system with respect to the built environment often conflict.   On one hand, sufficient transportation infrastructure capacity must exist. On the other hand, the goal of minimizing the transportation infrastructure footprint allows for more green space for neighborhoods, cultural activities, and environmental sustainability. Balancing these priorities is a core application of roadway technology. Using intelligent transportation systems as described in this strategic plan will help Connecticut take significant steps towards the balance sought by citizens.

Employment

Most Americans and most Connecticut citizens use the transportation system to get to and from work each day. According to the U.S. Census Bureau the average commute time in Connecticut is 24.8 minutes.[1] With just over 2.1 million people in the workforce, Connecticut residents spend 405 million hours per year commuting.

Average Combined Daily Commute in Connecticut	Population of Connecticut Workforce*	Average Number of Work Days**	Annual Number of Hours spent commuting in Connecticut
49 minutes	2.1 million	236	405 million

Projected population of Connecticut between the ages of 18 and 65 according to quickfacts.census.gov is 2,265,530. According to the U.S. Bureau of Labor Statistics the unemployment rate in Connecticut was 6.6 percent in August 2014.

**The widely accepted number of work days in a year is 250 excluding holidays and weekends. Assuming two weeks of vacation annually, yields 236 work days each year.*

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[1] http://quickfacts.census.gov/qfd/states/09000.html

405 million hours is startling and makes it clear that effective and proactive management of transportation reliability relates to job security and workforce productivity in Connecticut.

Physical Health

In 2012, there were over 960,000 emergency room visits in Connecticut[2]. Intelligent transportation systems that improve detection and verification of incidents contribute to a dependable, coordinated trauma system. Having a dependable coordinated trauma system is particularly important for rural areas because response takes longer. Studies about the "golden hour" of emergency medical services have found that response time has a direct relationship to survivability. Intelligent transportation systems such as integrated traffic management centers, commercial vehicle information systems, road weather information, weather responsive traffic management, traveler information, traffic incident management programs, and established alternate routes play a major role in access to health care.

960,000 ER Visits in 2012

Education

The nation continues to train a work force that can compete in a global environment. It is up to the transportation industry to make sure our developing workforce can access education in a dependable way. In 2013, there were an estimated 604,000 school aged children in Connecticut and nearly 500,000 of them used school buses[3]. Improving the operation of traffic signal systems and the implementation of intelligent transportation systems on arterial highways will help keep these children safer.

500,000 students ride school buses

Recreation and Leisure Time

Most welcome the opportunity to spend a little extra time with family and friends. With nearly 150 state parks and forests alone, the beauty of Connecticut is important to the culture and way of life. Effective transportation management can help get commuters home on time, help families spend more time together, help manage parking in downtown areas, and reduce the amount of pollution.

Social Belonging

Social change such as personal priorities, gentrification, technology, and environmental awareness drive changes in the business world, and they also go a long way towards establishing the culture that leads to self-identifying with social groups. Transportation technology can help support social belonging by emphasizing the destination more than the task of making the journey.

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[2] 458 visits per 1,000 in population as described by the Henry J. Kaiser Family Foundation at http://kff.org/other/state-indicator/emergency-room-visits-by-ownership/
[3] http://ctschoolbus.com

So Where Do We Go From Here?
Transportation technology is quickly evolving and with it, the way people think about transportation. "Customer driven", "responsive" and "timely" are all buzzwords that surround the idea of merging technology with journeys. Overall, customers want a safe and reliable transportation experience every time they travel. Technology and supporting institutional policies can help deliver the promise of safe reliable travel, but wise funds investment is crucial.

Merging transportation technology investment with quality of life issues is at the heart of what the Capitol Region Council of Governments does, and this strategic plan is an example. Through the coordinated effort of stakeholder engagement, needs assessment, defined project execution, and measured results our region will remain sustainable for the foreseeable future.

Just as the ITS Strategic Plan from 1997, this strategic plan lays the groundwork for a new generation of transportation excellence for this region of Connecticut and a safe, reliable quality of life.

Summary

In 1997, CTDOT and other regional partners developed the original ITS Strategic Plan. This document constitutes an update to the original strategic plan, which has served the region effectively throughout its intended lifecycle. The update of the ITS Strategic Plan for the Capitol Region harnessed the experience and energy of stakeholders from planning, design, and operational arenas, to result in a plan that is specific, measurable, action-oriented, realistic, and timely.

Stakeholders were sought out from among those originally invested in the plan from 1997 and, though led by the Connecticut Department of Transportation (CTDOT) and the Capitol Region Council of Governments (CRCOG), this plan is the result of a synergistic approach that focused on achievable results vetted by those most likely to be involved in the implementation of the proposed strategies.

Goal 1: Reduce Congestion and Stimulate Economic Growth by Moving Traffic More Safely and Efficiently
- Replace Aged ITS Investments
- Improve Incident Identification and Verification Capabilities
- Expand Traveler Information Accessibility
- Integrate Third Party Detection Data

Goal 2: Stimulate Growth of Public Transportation Ridership by Enhancing the Users' Experience
- Build on the Success of CT*fastrak*
- Enhance the Seamlessness of the Public Transportation Network
- Increase User Friendliness of the Public Transportation System

Goal 3: Improve Traffic Signal Management, Operations and Maintenance by Developing a Sustainable Computerized Traffic Signal System Program
- Strengthen Existing Practices (Stage 1)

- Create Collaborative Regional Group for Computerized Signal Systems (State 2)
- Leverage Advanced Signal Systems to Benefit the Region (Stage 3)

Goal 4: Achieve Sustainable Transportation Operations through the Use of Technology
- Implement Technology to Reduce Impacts of the Roadway Network on the Environment
- Enhance the Sustainability of ITS Deployments

Goal 5: Enhance Roadway Safety through the Use of Technology
- Expand Roadway Weather Situational Awareness Capabilities
- Enhance Coordination of and Access to Roadway Incident, Emergency, and Weather Event Information Among First Response Stakeholders
- Reduce Secondary Incidents and Increase the Safety of First Responders in the Field

ITS: Uses, Needs, and the Strategic Plan

What is ITS?

Intelligent Transportation Systems (ITS) are transportation technologies, systems, and applications that are used to effectively manage, operate, maintain, and sustain our transportation network. ITS can be used to achieve many objectives, including:

- Actively managing recurring congestion
- Enhancing incident and emergency response
- Increasing situational awareness among all transportation stakeholders
- Improving user experience
- Providing traveler information before and during trips

While ITS applications transcend various modes, uses, objectives, and goals, the systems are typically comprised of the following components:

- **Field Technology** – Equipment or systems actually on the transportation network that provide data for use in the ITS applications, or provide traveler information to users of the network.
- **Communications Systems** – Mediums such as fiber optics, wireless, or copper communications that enable the exchange of data from field technology to central systems.
- **Centers** – Typically referred to as operations or management centers, these locations are hubs for collecting ITS data from field technology. Centers can be management centers with operators to react to the incoming data, or they can be unmanned nerve-systems that collect the data and process it using automated systems or processes. Regardless of type, centers always collect, process, and store ITS data.
- **User Interface** – Users of the transportation network access ITS data, in particular traveler information data, through user interfaces. These interfaces can be web interfaces, field traveler information interfaces, or mobile interfaces, to name some.

Need for Strategic Planning

The 1997 ITS Strategic Plan and This Update

The 1997 ITS Strategic Plan created through the efforts of CRCOG and CTDOT focused on four specific areas, and sub-priorities within those areas:

- **Traveler Information Systems**
  - Improve information dissemination to travelers pre-route and en-route
    - Internet presence
    - Toll-free number
    - Free-standing kiosks
    - Dynamic Message Signs (DMS)
    - Highway Advisory Radio (HAR)
  - Improve information sharing among agencies responsible for management of the systems
    - Automated Vehicle Location (AVL)

- Full coverage of freeways in core area by Closed Circuit Television (CCTV)
- Establish traffic flow monitors
- Share video among agencies

- **Transit & Rideshare Systems**
  - Improve operator efficiency by looking to employ technology in new ways
    - Video cameras on buses
    - Electronic fare collection
    - Ride matching, dispatch, and routing
    - Weather and road condition forecasts
  - Improve availability & quality of Transit Information
    - Customer and traveler information enhancements

- **Highway Management Systems**
  - Reduce congestion on freeways due to incidents
    - Ramp metering
  - Improve traffic flow on arterial streets
    - Upgrade computerized traffic signal systems
    - Consider lane control signs

- **Incident Management Systems**
  - Sustain an incident management task force that creates response guidelines and traffic diversion plans
  - Create a regional radio system
  - Consider expanding expressway service patrol

The expansion of ITS capabilities to support these areas was seen as a strategy for improving the efficiency of the Region's existing highway and transit systems.

It laid out a plan in three time phases:
1. Phase 1 covered Years 1995-1999 and focused on the core region around Hartford.
2. Phase 2 covered 2000-2004 and focused on lower priority items outside the core area.
3. Phase 3 covered 2005-2014 and was more of a wish list of items that had no immediate need, were not cost effective at the time the plan was created, or depended upon unproven technologies.

The investment projected for Phases 1 and 2 was more than $38.3 million.

The original Strategic Plan contained a variety of ITS projects and initiatives, many of which have been implemented. The plan served the region effectively, but is now no longer relevant, as many of the projects have been implemented.

This Strategic Plan constitutes an update to the original strategic plan. This new plan builds on the successes of the original document, expands on the original document's goals and objectives, and is tailored to the evolving needs of the Capitol Region.

Existing Needs Statement

CTDOT reviewed existing Advanced Traffic Management System (ATMS) infrastructure and elements statewide to develop an overall assessment of needs in 2012 and 2013. The intent of the ATMS program in the Hartford region and the state is to perform incident detection, management, and response, and to disseminate traveler information to motorists. The ATMS program is operated out of Highway Operations Centers across the state, including the Newington Traffic Management Center. The center takes in information about the transportation network from a variety of sources, dispatches responders to address significant events, and finally disseminates information to roadway network users.
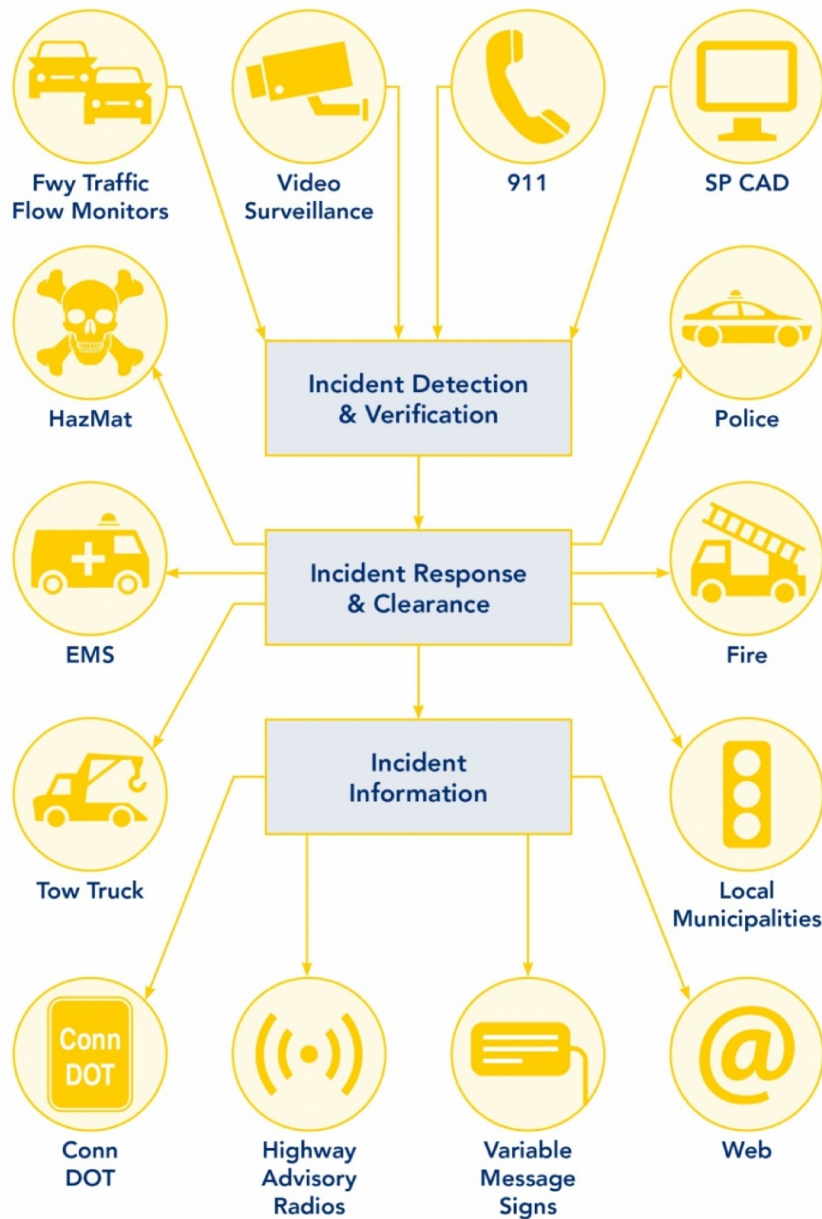
Figure 1: Traffic Incident Management Process

Upon reviewing the ATMS program, CTDOT produced a Statewide ATMS Plan for Limited Access Highways Needs Assessment. This review process included background research on existing and proposed systems, as well as a series of needs assessment meetings and workshops with both CTDOT highway operations staff and ATMS operators at the Newington and Bridgeport Operations Centers. These needs assessment meetings provided operators the opportunity to list their perceived system needs based on their day-to-day operational experience.

As their primary functions, the operations centers are clearing houses for incident identification, verification, and response (Figure 1). To perform the duties of monitoring the roadways and responding to incidents, they rely heavily on ITS infrastructure in the field. To enhance their capabilities to identify and respond to traffic incidents, operators were encouraged to discuss major system gaps, areas with high traffic volumes, areas prone to crashes, and any other prominent system weakness observed. Based on these reviews, CTDOT staff reached consensus on highlighting future ATMS deployments.

CTDOT staff and ATMS operators identified general ATMS needs, as well as specific ATMS needs at that time for various regions throughout the State including the Hartford area.

General needs identified by CTDOT staff and ATMS operators include the following:
- Many devices, especially CCTV cameras and DMS, are approaching the end of their serviceable lives and require replacements and upgrades. In some cases, this will require installation of new support structures and infrastructure as well.
- There is a need for additional ATMS coverage along heavily- traveled routes currently lacking coverage, particularly those outside the I-95 corridor and the Hartford area.
- There exist some system gaps that challenge the ability of operators to provide up-to-date information about congestion and crashes along major routes.
- Expansion of the fiber network and moving devices off leased telecommunications lines may offer improved reliability and reduced ongoing operational costs.
- At this time, the current HAR system coverage is considered adequate for current needs.

Projects and improvement envisioned for the CRCOG area have been assimilated in this plan. The report summary is included as Appendix A.

Note: *This Strategic Plan specifically focuses on the mobility of people through the Capitol Region. ITS can also be a critical tool for managing other aspects of operations, such as commercial vehicle operations (CVO)- or, the movement of freight throughout the region. However, this Strategic Plan does not specifically address the ways in which ITS can support CVO. While CVO can benefit significantly from ITS strategies, CTDOT is currently in the process of updating its*

freight plan, which is an important precursor to developing CVO-specific ITS strategies. ITS strategies specific to commercial vehicles will be developed upon completion of the statewide Freight Plan and will be documented in a separate report, or added to this Strategic Plan as an addendum. CRCOG, for its part, will consider implementing and advocating for ITS elements in projects where freight and the traveling public would benefit from efficiencies in the network created by ITS strategies.

Framework for the Strategic Plan

Study Area

This ITS Strategic Plan is specific to the Hartford area, and builds on the ITS Strategic Plan that was adopted by CRCOG in 1997. Since then, the boundaries of the Capitol Region Council of Government were modified to include an additional nine towns, but the study area remains similar to the one that was addressed in the 1997 Plan.

Both plans were and are relevant to the Hartford urbanized area[4] and the Connecticut section of the Springfield urbanized area, see maps below. The Hartford urbanized area extends beyond the boundaries of the Capitol Region[5] and as such planners from the Central Connecticut Regional Planning Agency (CCRPA) and the Lower Connecticut River Valley Council of Governments (RiverCOG) were invited to participate in the development of this plan. Outreach was also made to municipal officials in both New Britain (now member of CRCOG, formerly member of CCRPA) and Middletown (member of RiverCOG).

Data Sources:
Census 2010
CRCOG Database

Legend
Hartford Urbanized Area
Springfield Urbanized Area
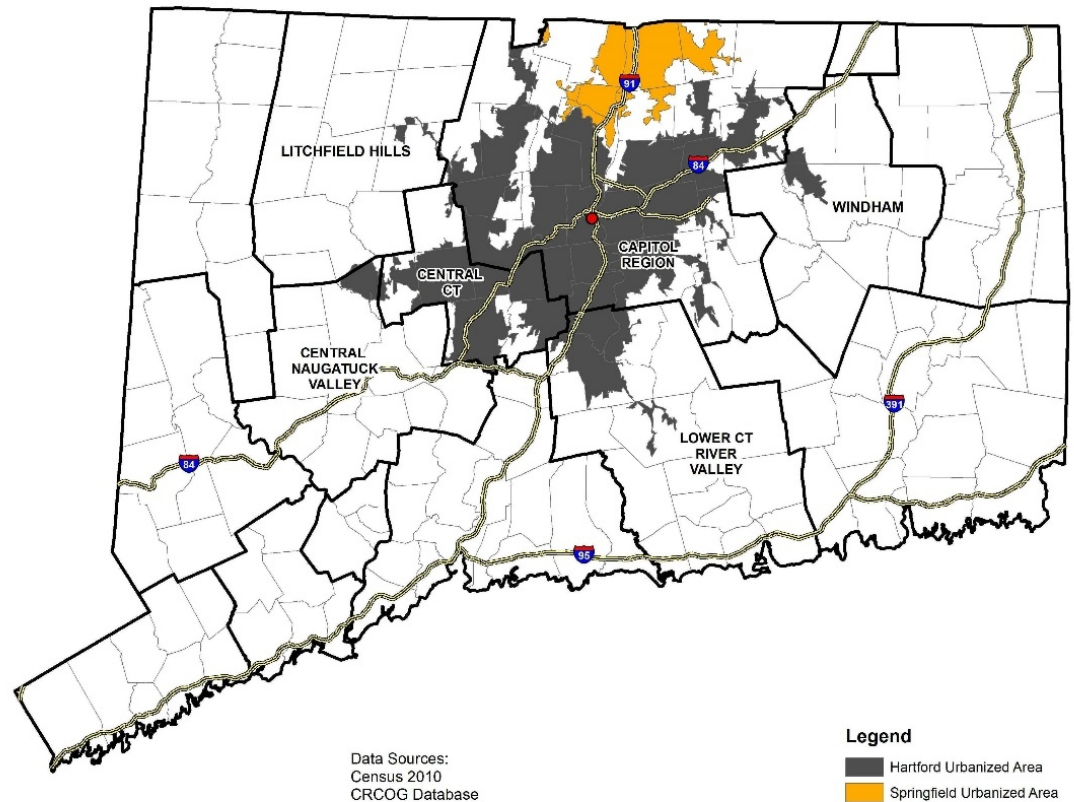
Figure 2: 2010 Urbanized Area and 2013 Planning Regions

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[4] Also referenced as the Hartford Transportation Metropolitan Area (TMA).
[5] At the beginning of this planning effort, the planning regions were essentially as shown in Figure 2. By the final adoption of the Plan, the planning regions were as shown in Figure 3.

Solid boundary – CRCOG

Dotted Boundary – Portion of RiverCOG
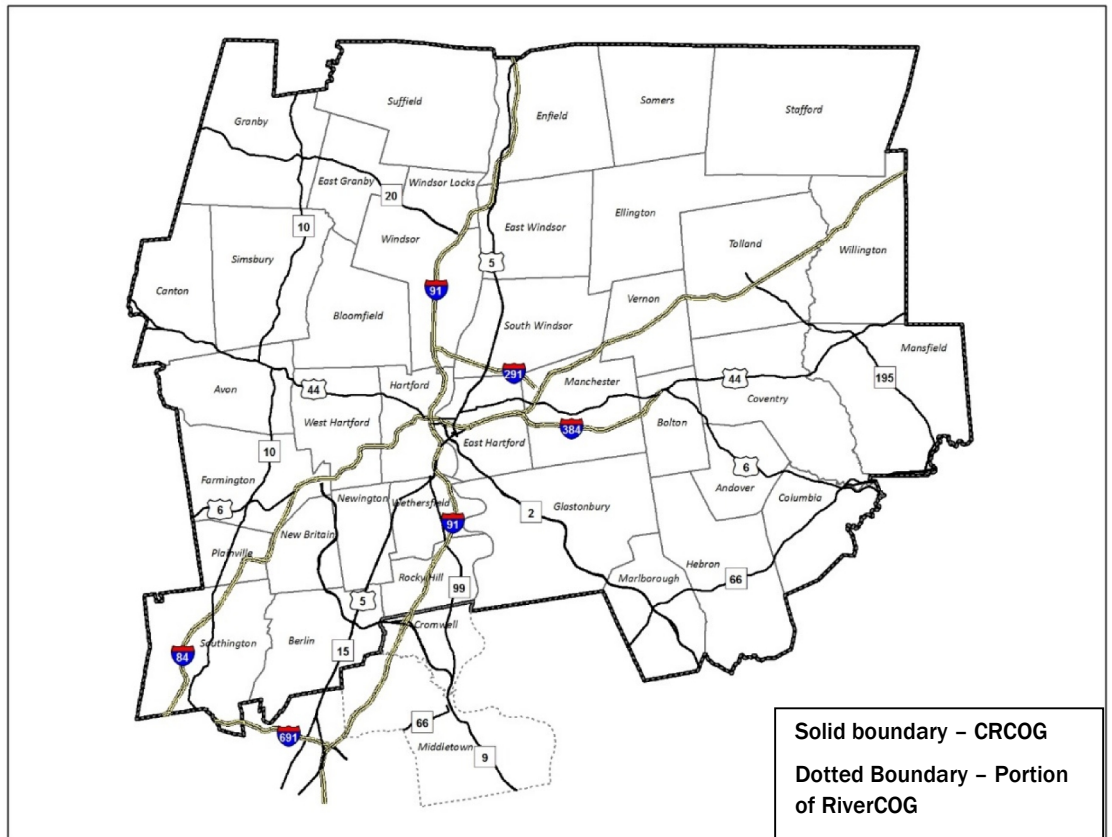
Figure 3: The Study Area

This ITS Strategic Plan acknowledges that the Study Area shown in Figure 3 must be looked at holistically as one unified area. ITS transcends jurisdictions and municipal boundaries and as such must be approached on a regional level and coordinated across political lines. Additionally, since this is primarily a "*strategic*" plan, the Goals, Objectives and Strategies can be adopted by any governmental entity at any time.

Stewardship Principles and Systems Engineering

Within the context of the Capitol Region, the development of any ITS project must follow the guidelines set forth in the Joint Stewardship and Oversight Agreement between the Connecticut Department of Transportation and Federal Highway Administration (Nov. 2010), specifically in the section entitled "*INTELLIGENT TRANSPORTATION SYSTEMS (ITS)/OPERATIONS PROCESS" (pages 36-41).* This applies to local and state projects.

The stewardship principles set forth in the agreement require that federally funded ITS initiatives adhere to the systems engineering process for ITS as established by the Federal Highway Administration (FHWA), see Figure 4. This Strategic Plan is the first step in the systems engineering process, as it identifies the needs and direction of the ITS program. However, at the action/projects level described above, the onus is on the project owner/primary

stakeholder to continue to adhere to systems engineering principles to satisfy the federal requirements. The stewardship agreement and the resulting activities it describes provides the basis for satisfying the systems engineering requirements for ITS.

Work Activity	CTDOT ACTION	FHWA ACTION	Documents/Product
SEAFORM and/or SEMP for Systems Engineering Analysis Process	Prepare and Submit	Review and Approve (14 Days) (If Required.)	Begin Preliminary Engineering
Copies of all project reports, quarterly progress reports, correspondence, meeting announcements and minutes	Prepare and Submit for FHWA Oversight Projects Only	Information	Reports and Updates
Update Regional ITS Architecture	Prepare and Submit	Review and Approve (14 Days)	Updated Regional ITS Architecture
ITS Design Project Submittals	*See Project Development and Project Construction Chapters*		
ITS Construction Project Submittals			

Figure 4: FHWA/CTDOT Stewardship Agreement Process Requirements

Standards in a Changing World

As part of the systems engineering process required by CTDOT's Stewardship Agreement with FHWA, ITS implementations must be thoroughly planned, and they must fit into the broader operational context of the region. While it is not required that all ITS devices and systems must be part of a singular network or operational platform, there should be minimal barriers to operating adjacent systems; ITS devices and systems must be interoperable and standardized to allow for efficient operation.

ITS applications require standards for interoperability among components, highly sophisticated communications networks, and active and proactive management in order to be effective. To further complicate ITS implementations, technologies that support the field, communications, center, and interface components are constantly evolving and changing. Due to these complexities, proper planning and coordination of ITS implementation is paramount to achieving success. The need to plan and coordinate is driven by the following factors:

- **Interoperability** – Given the variety of technologies that can be used to deliver transportation operations services, one ITS system does not necessarily communicate well with another; even if they are delivering the same service (Dynamic Message Signs (DMS) along the roadway, and DMS for Public Transit, for example), they cannot necessarily be controlled by the same platforms or display another agency's information. For a seamless user experience, ITS deployments must be coordinated and deployed in a manner that they are as standardized as possible, so that future complete interoperability is not precluded.
- **Scalability** – Often, a proprietary vendor or technology type is utilized to deliver a service. To expand these types of systems, similar proprietary equipment must be purchased. In many cases, the proprietary systems

become obsolete, become ineffective, or no longer are supported by the vendor after a certain number of years, leaving the system ineffective. A standards-based approach to ITS must be taken to ensure that the applications implemented can be expanded to meet the evolving needs of the region. The region must be careful to avoid proprietary vendor situations that constrain or restrict their ability to effectively expand or manage their assets. Proprietary technologies must follow accepted NTICP and IP protocols and standards.

- **User Continuity** – Users of the transportation network do not acknowledge, nor should they, the political boundaries they cross along their journey. Similarly, the organizations that manage the network within a comprehensive region should present a seamless user experience, wherein the boundaries between operational regions are transparent to the user. ITS implementations must be coordinated across the region to present a logical, holistic traveler information message to users, regardless of mode or boundaries. The needs of the entire region must be considered and coordinated in any ITS deployment for its users.

- **Safety** – Incident and emergency response stakeholders are stratified across a large number of organizations, government bodies, and geographies. Incidents that occur on a roadway within the region may involve a number of stakeholders to effectively respond. The systems, processes, and procedures used to respond to incidents and emergencies must be coordinated across all stakeholders to ensure that everyone involved is aware of their resources, understand their roles and responsibilities, and know the appropriate response and action steps to resolve the incident/emergency.

Strategic Planning Process

The Strategic Plan was developed as a collaborative effort between stakeholders within the Capitol Region. While the Plan was considered an update of the original developed in 1997, the development process generally followed the industry standard practice of strategic planning illustrated in Figure 5.
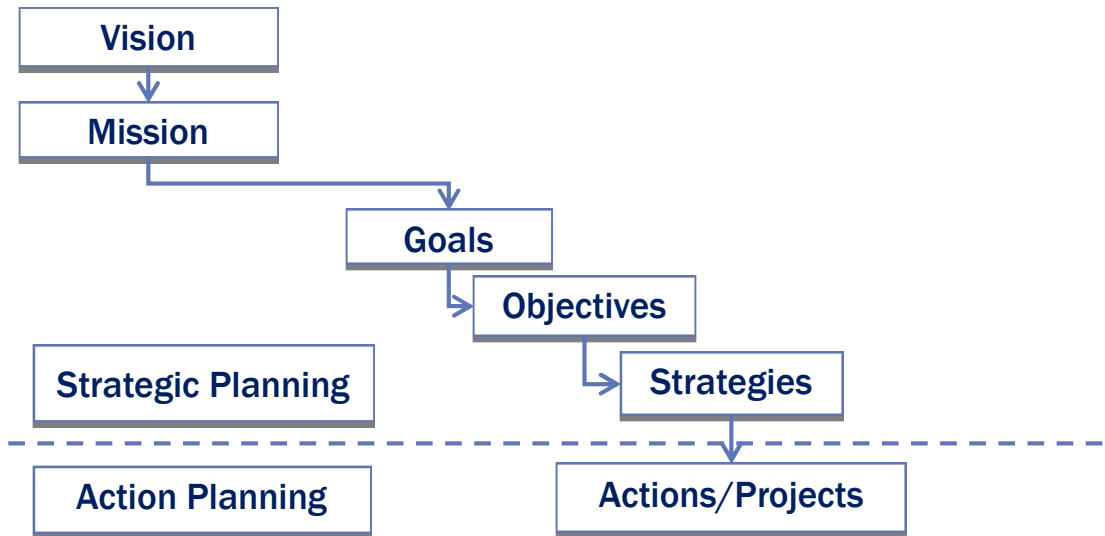
Figure 5: Strategic Planning Process

Vision and Mission

The vision and mission statements set the direction and tone of the overall effort. A vision is the outward facing message that the public can see. The vision should be easy to understand and establish a clear view of what the program should accomplish. The mission is the inward-facing message to drive the development of the Strategic Plan. The mission should be the basis for all of the initiatives developed in the planning process, and it should constantly be in the minds of the stakeholders developing the plan.

The vision and mission for CTDOT and CRCOG are the driving force behind the goals, objectives, and strategies.

The vision is a traffic operations system that maximizes the efficiency and safety of all travelers, moving travelers, and keeping them informed of real-time conditions. The mission is to design, deploy, and maintain ITS devices, through strategic selection of locations and functions, and to engage planners, transportation professionals, responders, and the public to maximize investment decisions.

Goals and Objectives

Goals translate the mission statement into tangible, achievable outcomes of the plan. The objectives are specific things that should be accomplished to achieve the parent goal. Goals and objectives are similar in that they translate the overarching vision and mission into understandable concepts that can be achieved by specific initiatives.

Strategies, Actions, and Projects

Strategies are specific to the objectives they serve and are the real-life initiatives that must be completed to further the objective and achieve the broader goal. Strategies can be viewed as "parent projects" that result in specific, measurable, attainable, realistic, and time-based projects. In the case of this Strategic Plan, strategies and projects are nearly synonymous. However,

the strategies identified here may be carved into smaller, more manageable projects that fit the funding, manpower, and immediate-need context of the implementing organizations. *Strategies should be included in the TIP in a manner consistent with the priorities of the region.*

Considering all of the stakeholder input and the ITS field equipment inventory information, strategies were developed for each of the objectives in the Strategic Plan. Each strategy has a champion stakeholder that will take ownership of the strategy and complete it within the context of their organization. (Strategies are included in Appendix A.)

Each strategy in the ITS Strategic Plan is captured in a Strategy Table where the following information is presented:
- Strategy title
- Champion stakeholder
- Estimated implementation timeframe
- Reasonable order of magnitude cost
- Strategy description

It is important to remember that any strategy should be considered and, as implemented, viewed as a potential model to be used in other areas. Each strategy, as developed, should be viewed as a starting point for discussion, and normal synergy is expected and should be examined and investigated both in terms of multi-agency, multi-disciplinary cooperation and coordination, as well as the potential for replication of best practices.

Phasing

The ITS Strategic Plan strategies are prioritized based on stakeholder input and general need as established by stakeholder input. Every strategy cannot be carried out simultaneously due to constraints on finances and manpower. As a result of the stakeholder sessions and an analysis of funding schedules, three phases were identified for implementation.

It is possible for some strategies to span two or all of the phases, depending on the level of complexity and the timeframe necessary to bring the project to fruition. In these cases, the cost of the project was spread out amongst the applicable phases of implementation.

Phase I: 1-2 Years

Phase I strategies are recommended to be implemented within the first two years of the ITS program addressed by this plan. Phase I includes a combination of the highest priority activities and the lowest hanging fruit – activities that take relatively little time to complete and are low cost, but will have significant impact. Given the immediate timeframe of Phase I, funding considerations drive the list of activities because it is unlikely to add projects to the TIP or the general program within this timeframe.

Phase II: 3-5 Years

Phase II encompasses years 3-5 of this Strategic Plan. During this phase, new investments in ITS equipment will be realized through programmatic means, including the TIP and other state programming. Nearly all of the investment in

this period would consist of equipment implementation to augment and support CTDOT's existing ITS program.

Phase III: 6-10 Years

Phase III encompasses years 6-10 and beyond of this Strategic Plan. Phase III generally includes very long-range projects that either have other earlier projects as dependencies, or that span several phases due to project size and complexity.

Cost Estimation

Cost estimations contained in this plan are considered reasonable orders of magnitude (ROMs) and are not detailed cost estimates. Costs are for programmatic purposes and are intended to assist CRCOG and CTDOT to plan for capital and operation financing of the ITS program on a broad scale over the coming years of the program.

Costs for ITS devices are based upon data gathered regarding similar implementations within Connecticut. Costs for strategies that include atypical installations were based upon a reasonable estimate by industry experts.

Goal 1: Reduce Congestion and Stimulate Economic Growth by Moving Traffic More Safely and Efficiently

Efficient movement of goods and services is the foundation of the economic prosperity and growth of a region, and the Capitol Region, or Greater Hartford, is no exception. The first goal of this Strategic Plan is to improve movement on the region's freeways and expressways through the use of field equipment and technologies.

Because the ITS program is already in place, active, and effective in the Capitol Region via the Traffic Management Centers (TMC) in Newington, CT, the objectives contained here generally describe expansions of existing capabilities of the TMC and the ITS program, with an eye on continuous improvement.

As discussed in the Needs Assessment section of this Strategic Plan, a parallel document was completed in 2012 to identify specific roadway ITS deployments that would supplement the existing regional program. The justification for the ITS deployments included high level evaluations of each corridor based on traffic volume, crash volume, and ease of implementation. These three factors drove the needs assessment and prioritized the projects generated from the exercise.

Congestion is often a good benchmark of the need for traffic management systems and processes. The 2013 Congestion Management Process Report published by the CRCOG, the most recent such document, identifies the limited access and critical arterial roadways of the region and reports on their performance, including identifying areas of high congestion. The maps displaying AM and PM peak hour congestion for both limited access roadways and arterials are displayed here as Figure 6, Figure 7, and Figure 8 to show where targeted ITS investments may have the greatest impacts. This type of congestion data was used to build CTDOT's existing ITS infrastructure and will be used throughout the expansion of its program. The data was considered and incorporated into all of the objectives and strategies described in Goal 1.

It should be noted that CTDOT's existing ATMS investments already provide coverage of many of the roadways with extensive congestion. This Strategic Plan and the 2012 Needs Assessment focus on expanding this coverage and making it more robust.
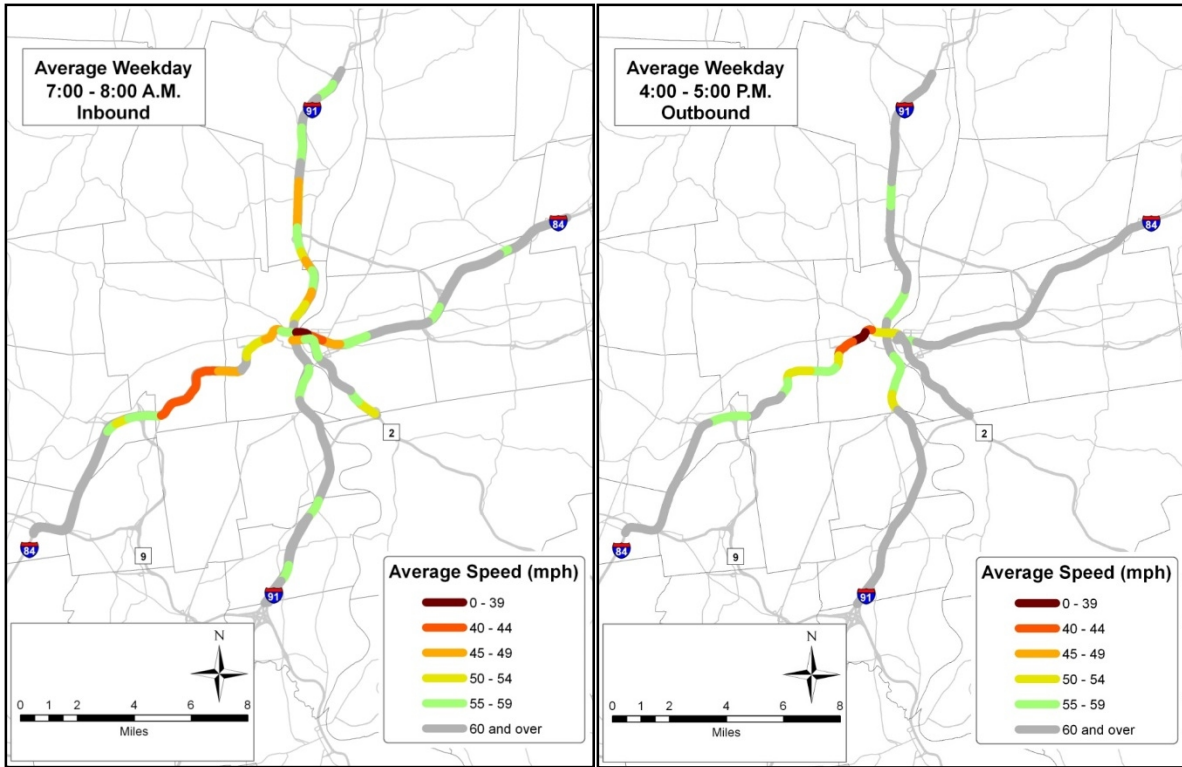
Figure 6: Hartford Metropolitan Area Limited Access Roadway Congestion Data
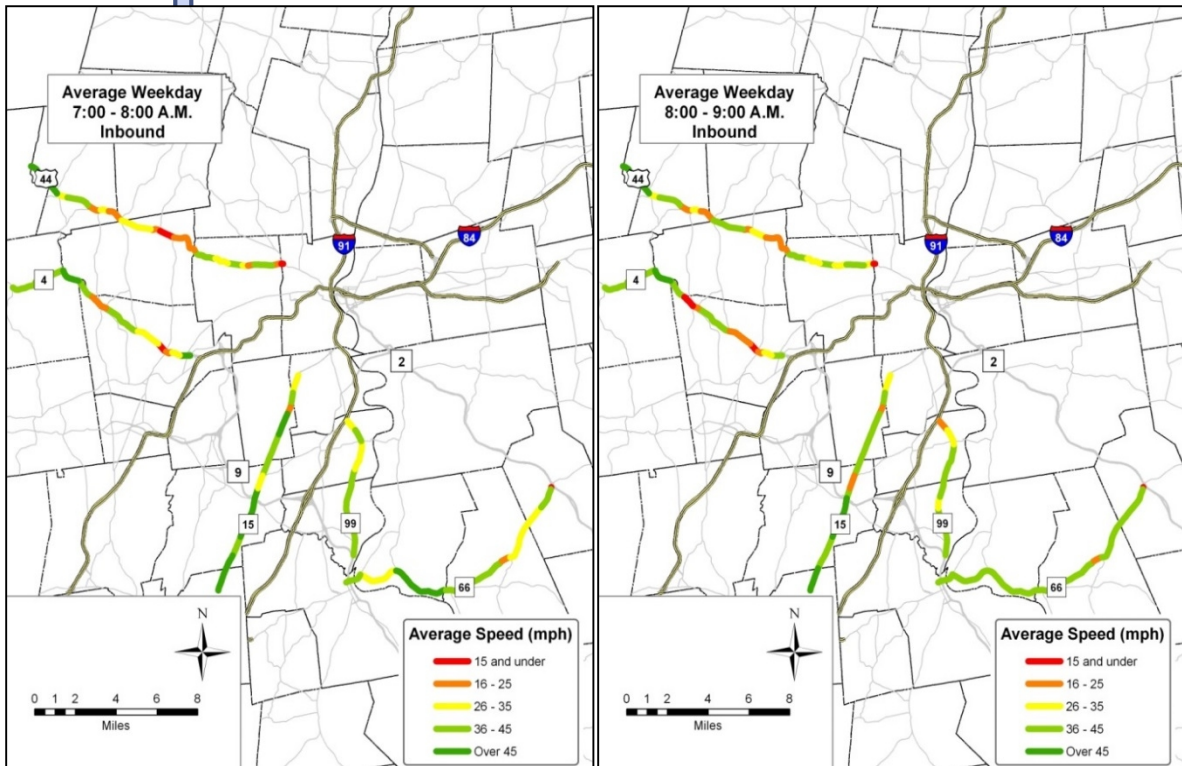
Figure 7: Hartford Metropolitan Area AM Peak Arterial Congestion Data
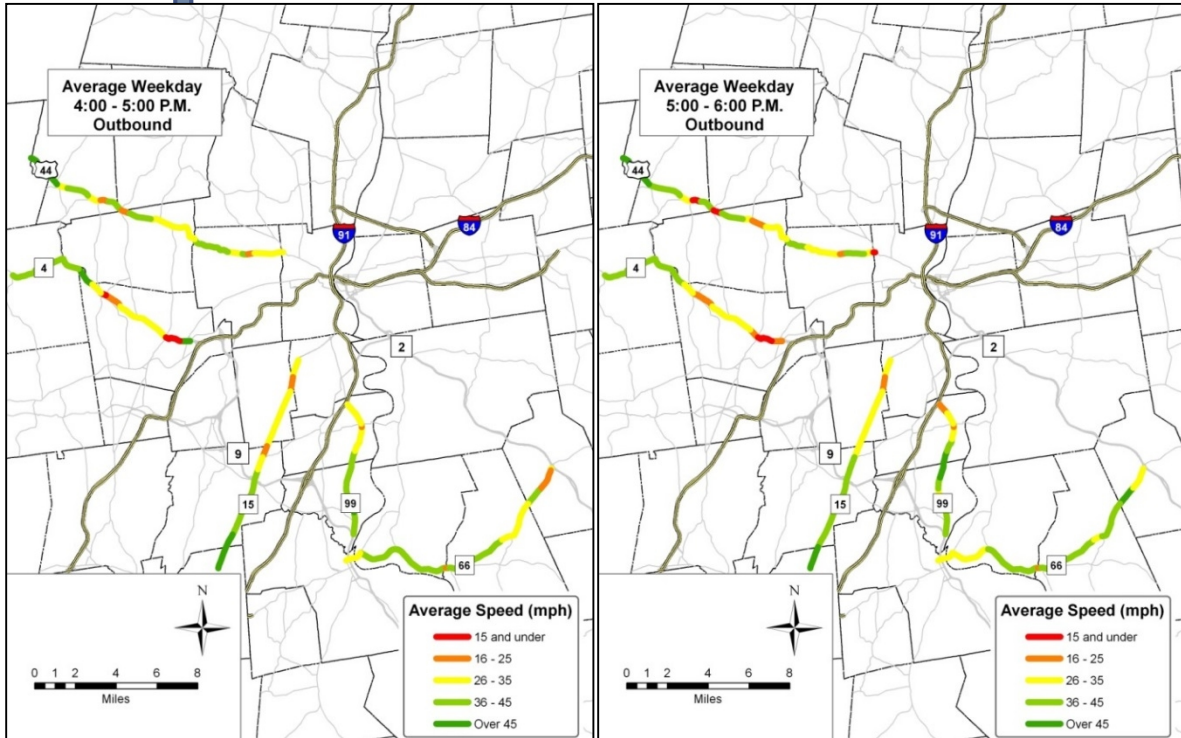
Figure 8: Hartford Metropolitan Area PM Peak Arterial Congestion Data

Objective: Replace Aged ITS Investments

Many of the DMS in the CRCOG region are nearing the end of their useful lifecycle. Because DMS are a primary tool for reducing congestion through traveler information, the signs should be kept in good repair. Wherever possible, the existing structures should be reused, as they have a significantly longer lifespan than the DMS technologies.

CCTV cameras provide surveillance capabilities in the region that are the first line of defense for incident detection. Much like the DMS technologies, CCTV cameras have a finite lifecycle, and the technology is continually improving, rendering the older cameras obsolete. CCTVs should be replaced as they reach the end of their lifecycle, and they should be replaced with newer, more capable cameras.

The strategies for this objective are directly linked to the following proposed project established in the Statewide ATMS Plan for Limited Access Highways Needs Assessment:

- Project A-1: Hartford Area DMS Replacement – Replace aging DMS infrastructure in the Hartford region.

Proposed Strategies:
- Hartford DMS Replacement
- Hartford CCTV Replacement

Objective: Improve Incident Identification and Verification Capabilities

Incident identification and verification are the first steps in effectively managing transportation operations on the roadway. Identifying an incident is the collective responsibility of transportation stakeholders, but is also one of the primary functions of the TMC.
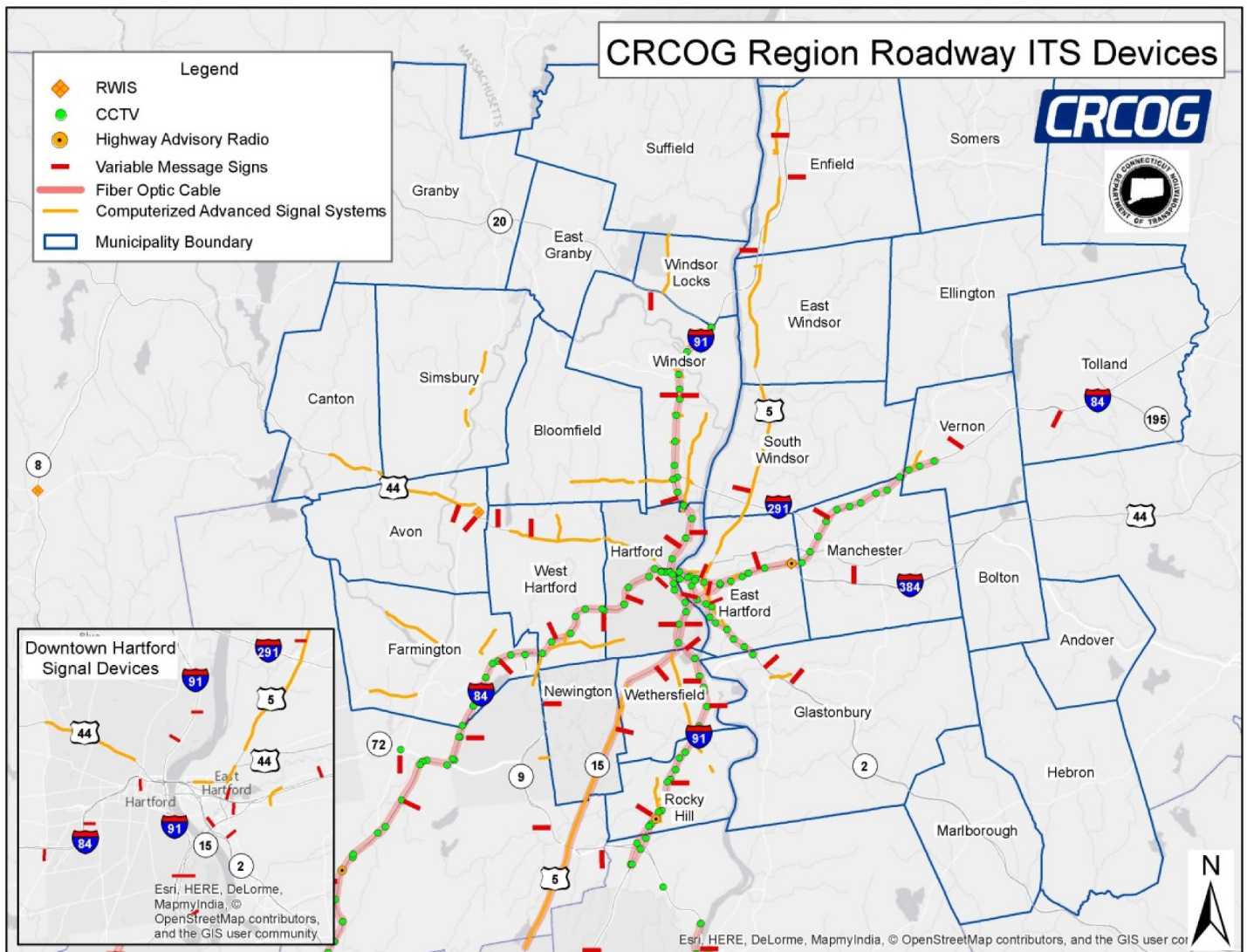
Figure 9: Hartford Area ITS Devices

In order to support the TMC in identifying incidents and initiating the response process, additional surveillance equipment is required on key roadways currently underserved by CCTV camera coverage. The map of the existing ATMS ITS roadway devices in Figure 9 (an enlarged version is attached as Appendix B), displays existing CCTV camera coverage of roadways, along with some of the gaps in coverage.

The strategy for this objective is directly linked to the following proposed projects established in the Statewide ATMS Plan for Limited Access Highways Needs Assessment:

- Project A-2: I-91/I-691 Southern Extension – Extend CCTV camera and fiber optic communications coverage on I-91 to the southern boundary of the CRCOG region. Connect fiber optics to proposed Project E-1. Additionally, add fiber optic cable along I-691 up until the interchange with I-84.
- Project A-3: CT-2 Extension/CT-3 Coverage – Extend CCTV camera and fiber optic communications coverage on CT-3 between Exit 25 and Exit 6, then extend coverage onto CT-2 until Exit 10.
- Project A-4: I-291 Coverage – Establish CCTV camera and fiber optic communications coverage on I-291 where no coverage currently exists between Exit 35 on I-91 and Exit 61 on I-84. Connect fiber optics to existing backbone on I-91.
- Project A-5: I-91 Northern Extension – Extend CCTV and fiber optic communications coverage from where it terminates at the I-91/CT-20 interchange to the Massachusetts state line.
- Project A-6: CT-9/CT-72 Coverage – Establish CCTV and fiber optic communications coverage on CT-9 from I-91 to I-84. Additionally, establish the same systems on CT-72 between CT-9 and CT-177.
- Project A-8: CT-20/CT-401 Coverage – Establish CCTV camera and fiber optic communications coverage on the limited access portions of CT-20/CT-401 from I-91 to Bradley International Airport.
- Project A-10: Various Hartford Area CCTV – Enhance CCTV camera coverage on I-84 between Exits 47 and 48 in the Hartford area. Additionally, enhance CCTV camera coverage on CT-15 between I-84 and I-91 in East Hartford, with a focus on the Exit 90 area.

Proposed strategy:
- Hartford CCTV Cameras

Objective: Expand Traveler Information Accessibility

As roads and transit become more congested, travelers are looking for more accurate, real-time information to use to make informed decisions regarding their travel choices. Within the Capitol Region, the CTDOT TMC offers traveler information in a variety of forms, including:
- Dynamic Message Signs (in-journey)
- Highway Advisory Radio (in-journey)
- CTDOT Website (pre-journey and in-journey for non-drivers)

The strategy for expanding DMS coverage in the CRCOG region under this objective is directly linked to the following proposed projects established in the Statewide ATMS Plan for Limited Access Highways Needs Assessment:

- Project A-1: Hartford Area DMS Replacement – This project emphasizes replacement of DMS; however, it has provisions to establish new DMS on CT-3, CT-2, and other locations in the Hartford region.
- Project A-2: I-91/I-691 Southern Extension – Establish new DMS on I-691 between I-91 and I-84.
- Project A-9: Various DMS Statewide – Establish new DMS in the following location:
  - CT-2 near Hartford in the vicinity of Exit 12.

To supplement information supplied by CTDOT, the media also supplies traffic reports based on caller feedback, third party data, and information provided by CTDOT. Media reports take the following forms:

- Radio Traffic Reports (pre-journey and in-journey)
- TV Traffic Reports (pre-journey)
- Mobile Applications (pre-journey and in-journey)

Additionally, transit organizations within the Capitol Region supply travelers with information regarding scheduling. Transit information is currently available through:

- Google Transit (pre-journey and in-journey)
- Google Map Application (pre-journey and in-journey)
- CT Transit Website (pre-journey and in-journey)
- Regional Transit Agency Websites (pre-journey and in-journey)

The focus of this objective is to expand and strengthen the capabilities of CTDOT to reach out to travelers who are in-journey. In-journey traveler information is critical to effective operation of the roadway under typical and incident conditions, as it allows operations staff to reach out to all motorists directly affected by disruptions on the roadway.

Proposed Strategy:
- Hartford DMS

Objective: Integrate Third Party Detection Data

As the traveler information market continues to mature, the private sector is making significant strides in the data collection arena. Acknowledging that the private sector can more easily undertake wide-scale efforts to collect data through probe and other types of systems, CTDOT and CRCOG are looking forward to engaging the private sector to leverage their efforts in data mining and compilation. Currently, CTDOT uses the free version of INRIX data, which combines data from an amalgam of vehicle probe fleets, to view traffic conditions within the state. However, there may be more effective ways to use third party data and integrate it into operational processes.

CTDOT and regional transportation stakeholders, over the lifespan of this Strategic Plan, will engage third party data providers to investigate how their data can be used to improve roadway management and performance.

Proposed Strategy:
- Third Party Incident Detection Study

Goal 2: Stimulate Growth of Public Transportation Ridership by Enhancing the Users' Experience

Connecticut is making significant investments in public transportation in order to diversify modal choice within the state and, specifically, in the CRCOG/greater Hartford region. CT*fastrak is a dedicated busway that provides transit priority between New Britain and Hartford and enhance transportation option flexibility. Projections are that 16,000 trips can be saved per day, a significant step toward improving mobility.* The routes of CT*fastrak* are displayed in Figure 10 and Figure 11.

However, CT*fastrak* is just one of many transit services offered in the Capitol Region. This goal focuses not just on CT*fastrak*, but on the many public transit services offered within the Capitol Region:

- Local Bus Services operated by CT Transit, New Britain, and Middletown
- Commuter Bus Services operated by CT Transit
- Elderly and Disabled Transit services operated by Greater Hartford Transit District
- Passenger Rail service currently operated by Amtrak and expected to be significantly expanded in the near future
- Intercity buses operated by private operators (primarily Greyhound, Peter Pan, and Bonanza)

This goal seeks to build on the investments in public transportation and expand ridership on existing and future transit services. ITS data and infrastructure are critical components of both CT*fastrak* and other transit services in the region. It is important to use these tools to deliver efficient transit service and enhance the experience of existing and future public transit riders.

Objective: Build on the Success of CT*fastrak*

The CT*fastrak* is a significant step in expanding transit service in central Connecticut. The project includes the expansion of both express and local bus service, the implementation of segments of dedicated bus right of way, bus stations, and an ITS infrastructure that will feed traveler information services and improve bus operations. Additional ITS investment, in cooperation with the CT*fastrak* project, will benefit both transit and roadway operations by leveraging information from both systems.
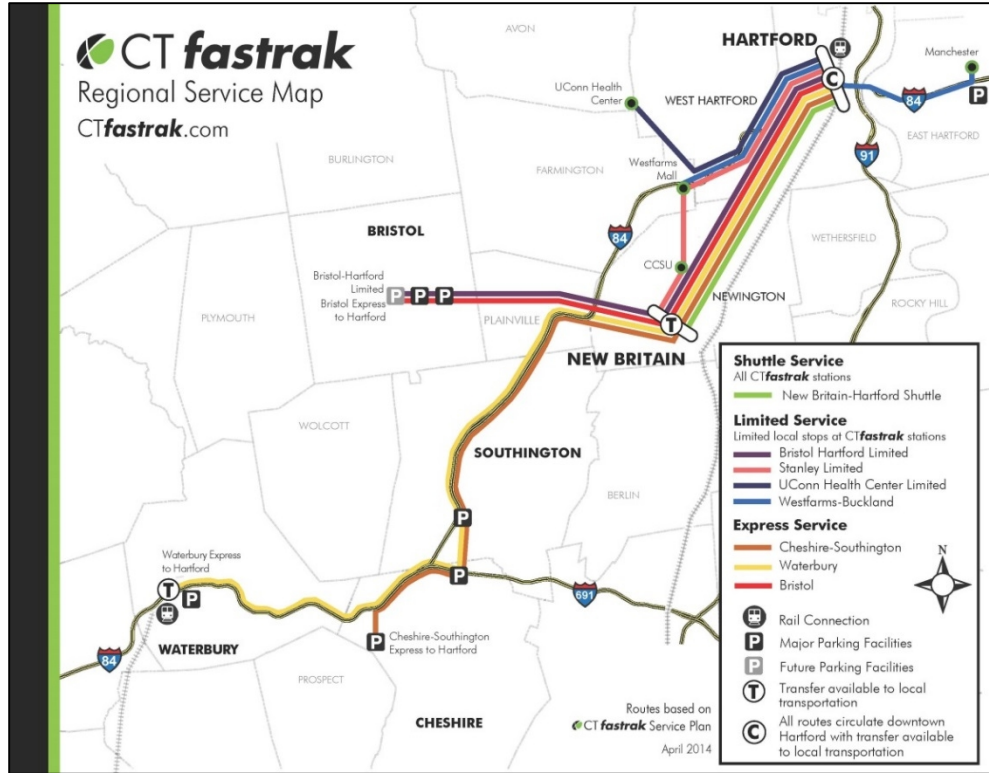
Figure 10: CT*fastrak* Regional Service Map
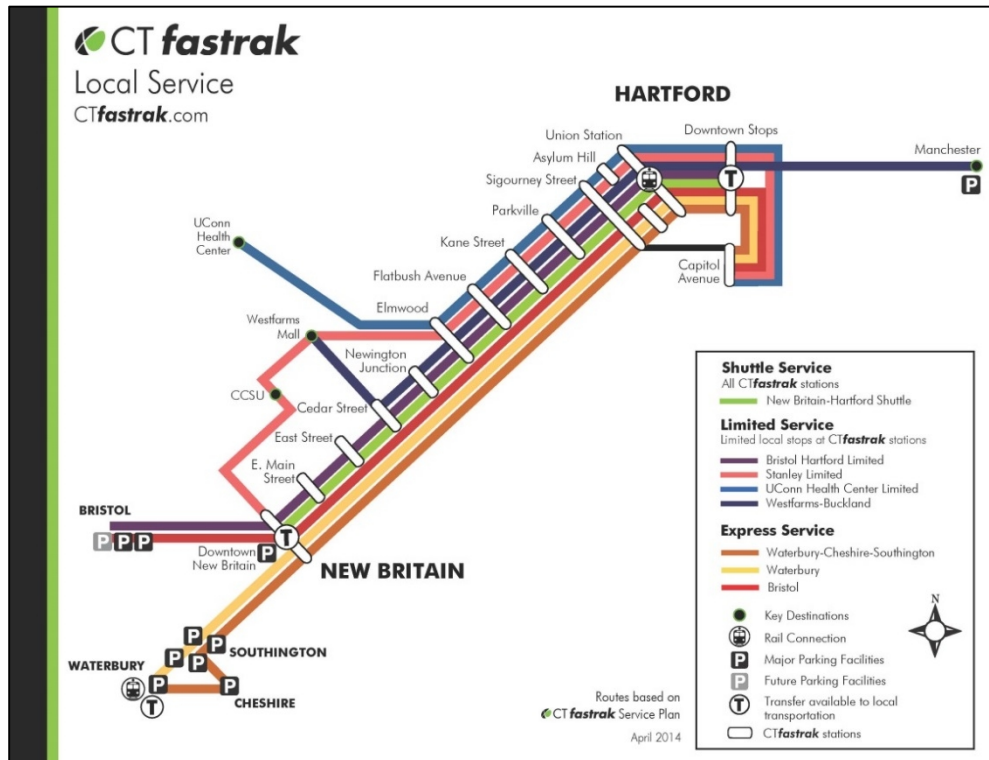
Figure 11: CT*fastrak* Local Service Map

Proposed Strategies:
- Capitol Region Transit Data Repository
- CT*fastrak* Traveler Information
- CT*fastrak* Integrated Corridor Management Study
- CT*fastrak* System Expansion Advancement Study
- CT*fastrak* Transit Signal Priority

Objective: Enhance the Seamlessness of the Public Transportation Network

Public transportation within Connecticut is unique in that it is operated by both private and public entities. Many of the public transportation services within the state are operated by CT Transit, a division of CTDOT. The remaining services are delivered by private operators under contract with the state or local municipalities. As a result of this structure, traveler services provided to transit riders vary significantly among operators, as there is not singular direction provided to all operators.

This objective of the Strategic Plan aims to establish consistency of public transit services across all operators by establishing a baseline of schedule information and fare payment for all. By enhancing these services, riders will have a more integrated, seamless experience when making journeys across jurisdictional boundaries and public transportation modes, including rail access. Collaboration must occur with private operators and Amtrak to reduce barriers to integration of services as much as is feasible. This would include coordination of schedule information to make it as easy as possible for a commuter to use one mode to link to another mode with as little wait time as possible.

Proposed Strategies:
- Transit Schedule Integration
- Integrated Fare Payment

Objective: Increase User Friendliness of the Public Transportation System

The Achilles' heel of many public transit networks in attracting ridership from those who choose it, as opposed to those that need to use it, is the user friendliness of the system. User friendliness spans many aspects of transit operations, from traveler information, to ease of use, to the user's in-journey experience. The quantity and type of traveler information and conveniences provided to public transit users across Connecticut varies depending on the sophistication of the systems put in place by the operators.

This objective of the Strategic Plan aims to enhance the user-friendly nature of public transit within the state by implementing systems that make riding public transit easier, more comfortable, more predictable, and more convenient.

Information on the "next bus" arrival time is particularly important to all travelers making a transfer, or when waiting to make an initial boarding or connect from another transit or highway mode.

Proposed Strategies:
- QR Code Implementation
- Reduced Dwell Time Payment System
- Bus Wi-Fi Implementation
- Next Bus Information System

Goal 3: Improve Traffic Signal Management, Operations and Maintenance by Developing a Sustainable Computerized Traffic Signal System Program

In Connecticut, while most traffic signal systems are owned by the State, several larger municipalities also own and operate traffic signal systems. Sometimes these systems intersect; many times they are on nearby roadways that could function better if they were integrated systems. The State and each municipality with traffic signal systems have their own unique approach to signal implementation, operation and maintenance. This varied approach to lifecycle management of computerized traffic signals provides a distinct opportunity to consolidate some aspects of signal operations and maintenance processes across the region. Some municipalities have thrived in an autonomous environment and have significant lessons learned and best practices to offer to the region. Other municipalities have struggled to retain the staff necessary to maintain their systems or drive their programs toward the future. A recent federal report identifies several areas in which the region can improve its approach to traffic signals. [6]

The study area already has several advanced traffic signal systems that are complex and difficult to maintain, as seen in Figure 12. As the computerized signal programs within the region mature, these types of advanced signal systems will become more common and will present economies of scale regarding their operations and maintenance.

A regional approach to traffic signal operations and management will be further explored and implemented throughout the region. As municipal advanced signal programs expand within the region, consolidation of operations, funding, maintenance procedures, and collaboration throughout the region is a long-term goal. Regionalizing the traffic signal program will increase fiscal and manpower efficiency, leverage the public expertise available, and enable the sharing of resources, thus allowing traffic signal implementers to "do more with less" in the current fiscal environment. The strategies within this goal advance the concept of a regionalized program in a multi-step, progressive approach that will limit disruptions to existing operations.

This goal of the Strategic Plan identifies the components of a comprehensive, sustainable traffic signal program within the region. This goal is intended to guide the region through a phased or staged approach to a collaborative program, acknowledging that a regional program will not materialize overnight. It is not the intent to immediately replace the programs and processes already established within the region for deploying and operating computerized signal systems. Rather, this objective pushes the region toward the horizon of a collaborative program, understanding that it is in everyone's best interest, including the area's citizens.

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[6] Local Agency Traffic Signal Operations and Maintenance Final Report, May 2012 Program Review, Federal Highway Administration Connecticut Division Office, Connecticut Department of Transportation

The staged nature of this goal makes it unique among other goals in this plan. The goal's objectives are intended to be implemented in succession chronologically or in parallel, depending on the level of regional buy-in achieved at the various implementation phases.

A regional program can assist municipalities by standardizing the following processes:

- Tracking and measuring the health of existing assets
- Strategically planning signal enhancements
- Identifying and procuring state and federal funding for signal upgrades
- Determining operational approaches to various signal systems
- Replacing obsolete and aging equipment
- Maintaining equipment
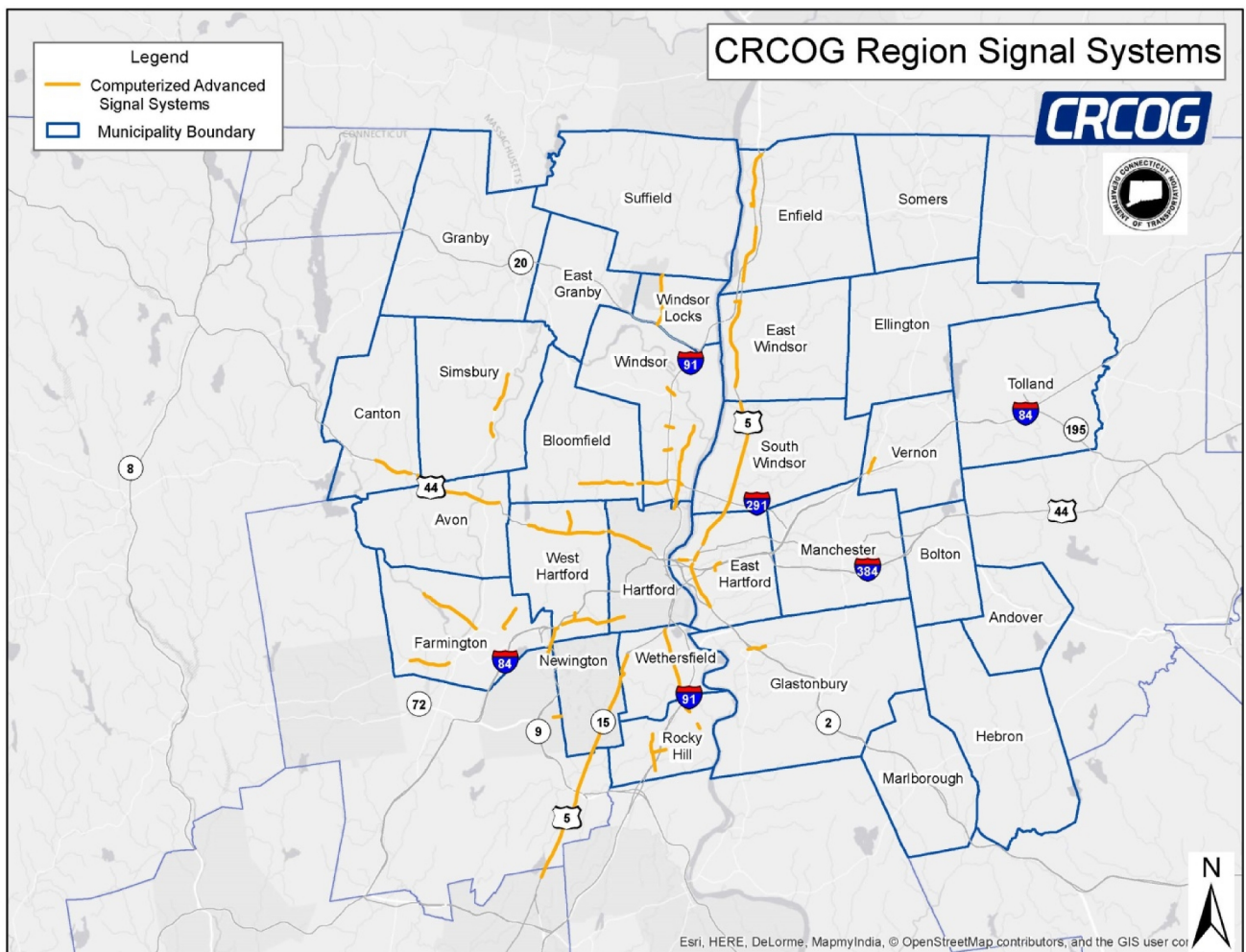
Figure 12: Hartford Area State-Owned Computerized Signal Systems

Objective: Strengthen Existing Practices (Stage 1)

As displayed in the Capitol Region computerized signal systems map (Figure 12), closed loop signal systems are utilized throughout the region.

Strengthening the program begins with caring for the existing computerized signal systems. Part of this is to fully understand what assets exist, what their capabilities are, and the condition they and their components are in. An asset management system will enable all participants to track their existing signal systems and their characteristics. It will provide a one-stop-shop where signal proprietors can store information, monitor the health of signals, and plan for maintenance.

Enhancing the existing computerized signal systems continues with increasing the effectiveness of operation. Under the existing environment, signal professionals do things differently in municipalities and each professional has specific skill sets. The region will benefit from a standardized approach to continual education for signal administrators. Making certain that signal administrators have the same level of competency in various areas of signal expertise would provide an advantage to all municipalities in the region. Through such a program, signal administrators and experts would have consistent, thorough knowledge of the following processes:
- Successfully applying for federal and local funding
- Maintaining signals of varying complexities and generations
- Establishing signal retiming programs
- Retiming various types of signals
- Complementing signals with ITS to improve traffic flow and regional situational awareness

Proposed Strategies:
- Traffic Signal Asset Management System
- Advanced Traffic Signal Training Program

Objective: Create Collaborative Regional Group for Computerized Signal Systems (Stage 2)

The formation of a collaborative regional group is essential for the development of a regional program. The group will act as a steering committee or planning clearinghouse for working out the details of the regional initiatives and it will also develop the governance guidelines for the final program. The collaboration group will have the discretion to drive the various components of the regional signal program, including studies of national best practices, studies for a consolidated regional operations center, and studies to establish the framework of a resource sharing program.

Proposed Strategies:

- Traffic Signal Systems Collaboration Group
- Regional Traffic Operations Center Study and Concept of Operations

Objective: Leverage Advanced Signal Systems to Benefit the Region (Stage 3)

This objective implements the initiatives to be developed, designed, and programmed in Stage 2. The strategies contained here are a result of the needs and desires identified by regional partners during the planning process. This objective is not limited to the strategies identified herein; rather, it should be considered a starting point for the regional collaborative program.

A common theme among the municipalities in the region is that they must keep up with the replacement of aging and antiquated technologies and bring their systems into the next generation of signals. As signals are replaced, they should be updated to the newest and best possible technology.

This objective emphasizes the need for new systems and the need to coordinate these new signals across jurisdictional boundaries to enhance operations. As they are replaced, and as signal systems grow, these efforts should consider newly desired capabilities within the region, such as the implementation of transit signal priority, the use of coordinated loop systems across jurisdictional boundaries, and actively controlling signals to react to changes in traffic.

Technologies to enhance the pedestrian experience and create safe crossings should also be considered. The use and education of High-Intensity Activated Crosswalk beacons (HAWK) or Rectangular Rapid Flashing Beacons (RRFB) should be further explored within the region.

One of the significant efficiencies that can be realized within the region is in the streamlining of maintenance funding and establishing clear, shared procedures. By consolidating maintenance funding and procedures, the region will expand the capability to maintain signals on a broad basis. It will also enable the region to effectively target funding where the need is greatest. Additionally, using pooled, formalized, standardized maintenance contracts, the region can make certain to procure professional traffic signal maintenance firms to execute signal tasks of varying complexities. It will also allow for scalability in maintenance staff, making certain through contractual language, that the depth of staffing expertise exists to address signal issues during large-scale outages or crises.

This long-term goal envisions progress from individual municipalities operating and maintaining their traffic signal systems, to a coordinated and regional traffic signal operations center, to the eventual possibility of a regional transportation center housed in one location, wherein roadway operations, transit operations, incident response operations and emergency response operations are all managed. Details will emerge over time as various stakeholders work collaboratively to develop this vision.

Proposed Strategies:
- Regional Traffic Operations Center / Regional Transportation Operations Center
- Advanced Traffic Management System
- Fiber Optic Communications Upgrade Program
- Traffic Signal Controller Upgrade Program

- Advanced Signal Systems Maintenance Program
- Preventative Signal Maintenance Program

Goal 4: Achieve Sustainable Transportation Operations through the Use of Technology

Sustainability in the transportation world is the implementation of assets that have long lifespans, are easily and readily maintainable, have as little impact on the surrounding environment as possible, are the right size for the job, and have as little financial burden as possible. Sustainability applies to ITS implementations as well. Sustainability is applicable to ITS in two ways: ITS systems can help improve the sustainability of existing transportation infrastructure, and sustainable processes should be followed when implementing ITS technologies.

Objective: Implement Technology to Reduce Impacts of the Roadway Network on the Environment

ITS relieves congestion by reducing incident response times and managing traffic. ITS can be implemented strategically to reduce congestion in specific areas of recurring congestion. CCTV cameras, Variable Speed Limit signs, and Dynamic Message Signage for rerouting traffic are all ITS tools that can be utilized to reduce congestion. Reducing congestion directly reduces vehicle emissions and reduces noise pollution for those adjacent to the corridor. The proposed strategies will reduce congestion and will monitor the environmental impacts associated with the improvement.

Proposed Strategies:
- Environmental Sensor Deployment
- Implement Environmental ITS Management Systems at Heavy Traffic Areas

Objective: Enhance the Sustainability of ITS Deployments

ITS deployments have finite shelf lives. As technology progresses and evolves, previous implementations become obsolete and need to be replaced. The full lifecycle of ITS projects must be considered when implementing new deployments, including the shelf-life, maintenance costs, return on investment, and interoperability of the ITS systems.

Proposed Strategy:
- Establish Lifecycle ITS Planning Process

Goal 5: Enhance Roadway Safety through the Use of Technology

Traffic and Incident/Emergency Management is a primary role of the TMC. The Traffic Operations Centers throughout the state act as clearinghouses for incident detection and serve as a primary implementer of first response activities. ITS present a unique opportunity to use technology to enhance safety on the transportation network by enhancing the traffic incident /emergency management capabilities of the operations centers.

Technology can enhance safety of both motorists and first response personnel in many ways, from enhancing situational awareness across all operations personnel, to providing specific field tools to help first response personnel do their jobs more efficiently and effectively, to collecting and disseminating weather data during extreme weather events.

Technology can also be used by the State and municipalities to gather information about emergency situations and to disseminate information to the public.

Objective: Expand Roadway Weather Situational Awareness Capabilities

Situational awareness is a critical element to effective responses to incidents, emergencies, and disruptions to the roadway network. Awareness of current and prospective weather conditions is paramount when responding to anomalies of nature. Conditions of the roadway itself provide the most telling picture of how weather is affecting operations, so this objective focuses on gathering and sharing weather information related specifically to the roadways.

Proposed Strategies:
- Expand Road Weather Information Systems and Weather Data Collection
- Snow Plow Management

Objective: Enhance Coordination of and Access to Roadway Incident, Emergency, and Weather Event Information among First Response Stakeholders

Situational awareness is the single most important element of responding to incidents, emergencies, and disruptions to the roadway network. Situational awareness requires a methodology of sharing information across all key transportation operations personnel. Video, traffic conditions, weather information, location of response personnel, and processes and standard operating procedures are among the valuable data that should be shared during response activities. This objective aims to establish systems and processes by which to share this critical information.

Proposed Strategies:
- Traffic Condition Information Sharing System
- Expand Video Sharing

Objective: Reduce Secondary Incidents and Increase the Safety of First Responders in the Field

The leading cause of injury during a roadway incident is the secondary incident phenomenon. Secondary incidents occur as a result of a backup caused by a primary incident. These incidents can be avoided when motorists are provided with proper advanced warning so they know to slow down and look for an incident-related backup.

Proposed Strategies:
- Secondary Incident Signage
- Variable Speed Limit Signage
- Support Region 3 TIM Coalition

Cost Summary

The strategies generated as part of this effort are categorized into various phases of implementation, and their costs were estimated to reasonable orders of magnitude. Costs were estimated based on comparable projects or efforts undertaken by CTDOT or other regional public organizations. Estimates are intended to be used for programmatic purposes only and should not be considered engineers' estimates.

For field implementations, all costs include procurement, construction, and engineering. For organizational, process, and collaborative strategies, costs were calculated based on man-hours estimates for implementing the strategy. All costs are based on comparable projects undertaken within the state and the region.

The programmatic costs of all Phases are estimated in Table 1.

Table 1: Programmatic Costs by Phase

Phase	Total Cost
I (1-2 Years)	$12,331,600
II (3-5 Years)	$22,446,200
III (6-10 Years)	$3,299,600
Total:	$38,077,400

The programmatic costs by Goal and Phase are listed in Table 2.

Table 2: Programmatic Costs by Goal and Phase

Goal	Phase I Cost	Phase II Cost	Phase III Cost	Total Cost
1	$9,499,600	$6,271,200	$2,049,600	$17,820,400
2	$1,747,000	$11,520,000	$200,000	$13,467,000
3	$345,000	$2,500,000	$650,000	$3,495,000
4	$40,000	$1,180,000	$0	$1,220,000
5	$700,000	$975,000	$400,000	$2,075,000
Total Cost:	$12,331,600	$22,446,200	$3,299,600	$38,077,400

Phasing of the strategies incorporated prioritization of the strategy within **CTDOT** and **CRCOG**, the level of need of the primary stakeholder, cost, and scheduling considerations.

Goal 1 is comprised of a number of ITS field deployments. While these deployments are contained in several strategies, the strategies contain a number of "project packages," which will be implemented in various phases. The breakdown of the ITS field deployment costs are displayed in Table 3. Many of the field implementations include a combination of CCTV, DMS, and Fiber Optics. The significant costs of fiber alone are separated from the field device costs wherever appropriate in order to add another layer of granularity to the cost estimate.

Table 3: ITS Field Implementation Costs

Phase I	**$9,449,600**
Hartford CCTV Replacement	$500,000
Hartford DMS Replacement	$6,500,000
A-10: Hartford Area Various CCTV	$400,000
A-3 Fiber	$211,200
A-3: CT-2 Extension/CT-3 Coverage	$960,000
A-4 Fiber	$158,400
A-4: I-291 Coverage	$720,000
Phase II	**$6,271,200**
Hartford CCTV Cameras	
Hartford DMS	$120,000
Variable Speed Limit Signage	$0
A-2 Fiber	$396,000
A-2: I-91/I-691 Southern Extension	$720,000
A-6 Fiber	$475,200
A-6: CT-9 Coverage (West of I-91)	$2,160,000
A-9: Various DMS Statewide	$2,400,000
Phase III	**$2,049,600**
A-5 Fiber	$264,000
A-5: I-91 Northern Extension	$1,200,000
A-8 Fiber	$105,600
A-8: CT-20/CT-401 Coverage	$480,000
Grand Total	**$17,770,400**

Appendix A: Strategies

Goal 1: Reduce Congestion and Stimulate Economic Growth by Moving Traffic More Safely and Efficiently

Objective: Replace Aged ITS Investments

Strategy: Maintain Existing Dynamic Message Sign Capabilities by Sunsetting Old Equipment and Replacing It

Strategy Name:	Hartford DMS Replacement
Champion:	CTDOT
Timeframe:	Phase I
Est. Cost:	$6.5M
Description: Replace DMS in the region that have reached the end of their service life and are no longer supported by the manufacturer. This strategy advances project A-1 in the Statewide ATMS Plan for Limited Access Highways Needs Assessment.	

Strategy: Maintain Existing CCTV Camera Coverage by Sunsetting Old Equipment and Replacing It

Strategy Name:	Hartford CCTV Replacement
Champion:	CTDOT
Timeframe:	Phase I
Est. Cost:	$500,000
Description: Replace CCTV in the region that have reached the end of their service life and are no longer supported by the manufacturer. This strategy is not specifically advanced by a project in the Statewide ATMS Plan for Limited Access Highways Needs Assessment. The strategy must start with an evaluation of existing CCTV camera equipment and a prioritized list of replacements.	

Objective: Improve Incident Identification and Verification Capabilities

Strategy: Enhance CCTV camera coverage on key roadways

Strategy Name:	Hartford CCTV Cameras
Champion:	CTDOT
Timeframe:	Phases I, II, and III
Est. Cost:	$8.25M
Description: Expand CCTV camera coverage of corridors that currently have little to no coverage, or on corridors with significant gaps. This strategy advances projects A-2, A-3, A-4, A-5, A-6, A-8, and A-10 in the Statewide ATMS Plan for Limited Access Highways Needs Assessment. Corridors covered within these projects include: • Project A-2: I-91/I-691 Southern Extension – Extend CCTV camera and fiber optic communications coverage on I-91 to the southern boundary of the CRCOG region. Connect fiber optics to proposed Project E-1. Additionally, add fiber optic cable along I-691 up until the interchange with I-84. • Project A-3: CT-2 Extension/CT-3 Coverage – Extend CCTV camera and fiber optic communications coverage on CT-3 between Exit 25 and Exit 6, then	

- extend coverage onto CT-2 until Exit 10.
- Project A-4: I-291 Coverage – Establish CCTV camera and fiber optic communications coverage on I-291 where no coverage currently exists between Exit 35 on I-91 and Exit 61 on I-84. Connect fiber optics to existing backbone on I-91.
- Project A-5: I-91 Northern Extension – Extend CCTV and fiber optic communications coverage from where it terminates at the I-91/CT-20 interchange to the Massachusetts state line.
- Project A-6: CT-9/CT-72 Coverage – Establish CCTV and fiber optic communications coverage on CT-9 from I-91 to I-84. Additionally, establish the same systems on CT-72 between CT-9 and CT-177
- Project A-8: CT-20/CT-401 Coverage – Establish CCTV camera and fiber optic communications coverage on the limited access portions of CT-20/CT-401 from I-91 to Bradley International Airport
- Project A-10: Various Hartford Area CCTV – Enhance CCTV camera coverage on I-84 between Exits 47 and 48 in the Hartford area. Additionally, enhance CCTV camera coverage on CT-15 between I-84 and I-91 in East Hartford, with a focus on the Exit 90 area.

CCTV Camera coverage on these roadways is assumed to require approximately 1.5 cameras per mile to provide full coverage of the roadway.

Objective: Expand Traveler Information Accessibility

Strategy: Expand Dynamic Message Sign (DMS) Coverage within the Hartford region

Strategy Name:	Hartford DMS
Champion:	CTDOT
Timeframe:	Phase II
Est. Cost:	$2.52M

Description:
Expand DMS coverage of corridors that currently have little to no coverage, or on corridors with significant gaps. This strategy advances projects A-1, A-2, and A-9 in the Statewide ATMS Plan for Limited Access Highways Needs Assessment. Corridors covered within these projects include: • Project A-1: Hartford Area DMS Replacement – This project emphasizes replacement of DMS, however, it has provisions to establish new DMS on CT-3, CT-2, and other locations in the Hartford region. • Project A-2: I-91/I-691 Southern Extension – Establish new DMS on I-691 between I-91 and I-84 • Project A-9: Various DMS Statewide – Establish new DMS in the following location: o CT-2 near Hartford in the vicinity of Exit 12

Objective: Integrate Third Party Detection Data

Strategy: Utilize Third Party Data to Enhance Incident Detection

Strategy Name:	Third Party Incident Detection Study

Champion:	CTDOT, EMS, Fire, Police
Timeframe:	Phase I
Est. Cost:	$50,000

Description:
Conduct study to explore opportunities to incorporate 3rd party sources into incident detection monitoring. Identify the benefits of collaborating with 3rd parties and evaluate which is the optimal fit for incident detection and other applications. Wherever possible, leverage research and experience conducted by other DOTs and public organizations. Possible 3rd party services include: • Waze • Twitter • INRIX XD Traffic • Google Maps

Goal 2: Stimulate Growth of Public Transportation Ridership by Enhancing the Users' Experience

Objective: Build on the Success of CT*fastrak*

Strategy: Establish centralized transit information database for regional sharing

Strategy Name:	Capitol Region Transit Data Repository
Champion:	CT Transit
Timeframe:	Phase I
Est. Cost:	$100,000

Description:
Identify data sources that will be generated by CT*fastrak*, and upcoming bus fleet conversions, including schedule, schedule adherence, surveillance, and ridership data to integrate into a centralized database to enable broad sharing capabilities. A Transit Data Repository project (managed by CRCOG) will be initiated in September 2014. This strategy advances that transit data repository project and encourages its completeness and robustness.

Strategy: Integrate CT*fastrak* and other available bus traveler information with external resource sites and across the regional transit systems

Strategy Name:	CT*fastrak* Traveler Information
Champion:	CT Transit
Timeframe:	Phase II
Est. Cost:	$50,000

Description:
Identify data sources that will be generated by CT*fastrak*, and upcoming bus fleet conversions, including schedule, schedule adherence, surveillance, and ridership data that could be useful to other stakeholder organizations within the Region. Where appropriate, integrate or share data streams with these stakeholders to leverage the CT*fastrak* and transit investments. A Transit Data Repository project (managed by CRCOG) will be initiated in late 2014, which will assist in providing open sources data and longer term data to assist in the development of transit performance metrics. This strategy leverages the transit data repository by proposing actual uses of the data within the repository.

Strategy: Conduct Study to evaluate the efficacy of Integrated Corridor Management on the CTfastrak corridor and surrounding transportation network

Strategy Name:	CT*fastrak* ICM Study
Champion:	CT Transit
Timeframe:	Phase I
Est. Cost:	$300,000

Description:

Conduct study to evaluate the use of CT*fastrak* investments in a broader effort to manage congestion and throughput in the corridor. ICM would bring public and private stakeholders to the table to discuss how to better manage travelers through the corridor and encourage the general public to balance the use of public transport and personal vehicle usage. The study would contain recommendations for various initiatives to implement to more effectively utilize transportation resources in the corridor. Strategies for ICM could include:

- Advanced signal systems
- Transit signal priority
- Hard shoulder running along interstate and limited access roadways
- Modal shift incentives
- Public Private Partnerships to effectively convey options and information to travelers

Strategy: Include ITS capabilities in any expansion of the CT*fastrak* system

Strategy Name:	CT*fastrak* System Expansion Advancement Study
Champion:	CT DOT and CT Transit
Timeframe:	Phase III
Est. Cost:	$200,000

Description:

Based on operating experience of CT*fastrak*, evaluate existing feasibility studies for expanding the service to new locations; and recommend additional studies if necessary, for example, consider expanding the proposed busway east to the Manchester Park and Ride Lot in the Buckland Hills area and out to the Mansfield Nash-Zimmer Transportation Center in Storrs. While other preliminary studies may have already been completed, this strategy advances the process of initiating a new expansion project, and makes ITS a prioritized component of planning for expansion of the system.

Strategy: Implement transit signal priority for CT*fastrak* signals at congested intersections

Strategy Name:	CT*fastrak* Transit Signal Priority
Champion:	CT Transit and Hartford
Timeframe:	Phase II
Est. Cost:	$300,000

Description:

Upgrade and coordinate traffic signals within Hartford. Consider implementation of transit priority strategies at signalized intersections, if and when warranted. Transit priority strategies include:

- Creating signal timing plans that favor progression for transit (passive priority)
- Extending the green time when a transit vehicle approaches the intersection (green extension)

- Shortening the green time of preceding phases when the signal is red for transit (early green)
- Creating lanes for transit vehicles to pull ahead of traffic queued at an intersection (queue jump) outside the current CT*fastrak* system

Signal upgrades are required at 5 at-grade intersections within the guideway, in addition to approximately 10 signals on the streets of Hartford to facilitate this strategy.

Objective: Enhance the Seamlessness of the Public Transportation Network

Strategy: Integrate all transit schedules into Google Transit

Strategy Name:	Transit Schedule Integration
Champion:	CT Transit
Timeframe:	Phase I
Est. Cost:	$50,000
Description:	
Integrate all transit schedules into Google Transit and on CT Transit's website. Some regional transit operators do not currently integrate with Google Transit, which is an effective way to reach potential users of the network. Google has operated as a consolidator of transit information within the region and all operators should integrate with it in order to maintain consistency and user friendliness.	
It is assumed that approximately five operators within the region do not currently provide their data in GTFS format for use in Google Maps.	

Strategy: Implement integrated fare payment system on transit systems within the State

Strategy Name:	Integrated Fare Payment
Champion:	CT Transit
Timeframe:	Phase II
Est. Cost:	$7.2M
Description:	
Introduce a universal form of payment for all public transit systems within the State. This form of payment may not replace all other fare payment forms, but will enable a rider to pay once for a journey that traverses several public transit operators. An integrated fare payment system is currently being planned at CTDOT – this strategy advances that project.	
CT Transit operates 30 local and 12 express routes within the Hartford region. In order to estimate the costs for this strategy, it was assumed that 10 buses per local route and 5 buses per express bus route would need to be equipped with the new technology.	

Objective: Increase User Friendliness of the Public Transportation System

Strategy: Implement QR codes at bus stations

Strategy Name:	QR Code Implementation
Champion:	CT Transit
Timeframe:	Phase I

Est. Cost:	$397,000

Description:
Add QR codes to bus stops so that smart phone users can scan the code and view real-time bus location and schedule information. Coordinate QR code application with parallel System Portals and Bus Shelters initiatives.

There are approximately 800 bus stops serviced by the 30 local and 12 express routes within the greater Hartford area. The cost for this strategy was developed based on equipping each of these stops with a QR code.

Strategy: Reduce dwell times by separating ride payment systems from public transportation vehicles on heavily used corridors

Strategy Name:	Reduced Dwell Time Payment Systems
Champion:	CT Transit
Timeframe:	Phase II
Est. Cost:	$0

Description:
Utilize advanced fare payment systems to allow transit users to board vehicles without accessing the fare box, or by significantly reducing fare box processing time. This strategy should be advanced in close collaboration with the integrated fare payment system, or should be wholly contained within that project's technical solution.

Strategy: Implement Wi-Fi on highly-utilized Bus Routes

Strategy Name:	Bus Wi-Fi Implementation
Champion:	CT Transit
Timeframe:	Phase I
Est. Cost:	$900,000

Description:
Add Wi-Fi service to buses to improve existing customer comfort and provide an opportunity to attract new customers. Enhancing the rider experience is a significant method to attract new riders and retain riders opting to take transit. Wi-Fi is becoming an expectation for public spaces and an anticipated service for long-haul transportation methods. Wi-Fi will provide public transportation with a competitive edge against personal vehicles.

It is assumed that all the buses in the Hartford region operated by CT Transit do not currently have Wi-Fi capabilities. Approximately 360 buses would need to be equipped in this strategy, based on the assumed number of buses per route for the 42 bus routes.

Strategy: Implement Next Bus arrival signs at all major transfer points in Hartford and the surrounding region.

Strategy Name:	Next Bus Information System
Champion:	CT Transit
Timeframe:	Phase II
Est. Cost:	$3.97M

Description:
Enhance the user friendly nature of transfer points and park and ride facilities of regional transit networks by implementing Next Bus traveler information systems

and security enhancements. This strategy should have two components – field signs and virtual systems for mobile devices. Next Bus system should display the approximate arrival time of the various bus lines that service the facility.

Consider also implementing "connection time" capabilities that display not only the bus arrival time, but connecting service times of other bus lines at upcoming destinations. This information will allow users to better plan their arrival time at their destination.

There are approximately 800 stations serviced by the 30 local and 12 express routes within Hartford. The cost for this strategy was developed based on equipping each of these shelters with a Next Bus Arrival sign.

Goal 3: Improve Traffic Signal Management, Operations and Maintenance by Developing a Sustainable Computerized Traffic Signal System Program

Objective: Strengthen Existing Practices (Stage 1)

Strategy: Implement centralized asset management system for municipalities to track the quantity and state of their field assets

Strategy Name:	Traffic Signal Asset Management System
Champion:	CRCOG and municipalities
Timeframe:	Phase I
Est. Cost:	$150,000
Description: Create an asset management system to keep track of traffic signals, their components and the condition of each component. The asset management system should be available to all municipalities that wish to participate in order to realize economies of scale. This effort should be coordinated with CTDOT's recent Asset Management initiative.	

Strategy: Establish a formal traffic signal training course as a resource for personnel within CTDOT and at the municipal level

Strategy Name:	Advance Traffic Signal Training Program
Champion:	CTDOT, UConn, CRCOG and municipalities
Timeframe:	Phase I
Est. Cost:	$125,000
Description: Team with CTDOT and the Technology Transfer Center at the University of Connecticut to examine current training and provide new training opportunities for municipalities. Possible curricula can include the following, but generally should supplement the existing efforts by the Transfer Center: • Traffic engineering principles • ITS • Traffic signal control systems and communications • Systems engineering • Completing the SEAFORM	

The cost of this strategy includes initiation and five years of operation, but does not include the funding itself, which would need to be determined by the municipalities contributing to the fund and the program.

Objective: Create Collaborative Regional Group for Computerized Signal Systems (Stage 2)

Strategy: Implement program to coordinate advanced signal implementations across municipal boundaries

Strategy Name:	Traffic Signal Systems Collaboration Group
Champion:	CRCOG and municipalities
Timeframe:	Phase I
Est. Cost:	$120,000
Description:	

Signal systems are typically implemented on corridors that transcend municipal boundaries. Systems that provide benefits to motorists should not stop at borders due to jurisdictional issues. Implement program to increase collaboration between adjacent municipalities when upgrading or installing traffic signals. A collaborative committee or ongoing periodic workshop would effectively communicate needs and issues across municipal boundaries.

The costs for this strategy assume startup costs and operating costs to facilitate coordination, meetings, etc. over a five year period.

Strategy: Complete a concept of operations and framework for a regional computerized traffic signal system operations center

Strategy Name:	Regional Traffic Operations Center Concept of Operations
Champion:	CRCOG and municipalities
Timeframe:	Phase II
Est. Cost:	$100,000
Description:	

Develop a regional traffic operations center ConOps for creating a consolidated computerized signal system center. The operations center would be a singular location where municipalities throughout the region could effectively monitor and operate their advanced signal systems while minimizing operational effort by spreading responsibilities across pooled operators.

The ConOps will clearly identify stakeholders, their roles and responsibilities, the funding and programmatic details of the center. The document will set the direction for the center's operations and maintenance policies and procedures.

Objective: Leverage Advanced Signal Systems to Benefit the Region (Stage 3)

Strategy: Build a Regional Traffic Operations Center for use by regional municipalities to centralize control of signals and share the operational burden

Strategy Name:	Regional Traffic Operations Center / Regional Transportation Operations Center
Champion:	CRCOG and municipalities
Timeframe:	Phase III
Est. Cost:	$500,000 / TBD
Description:	

Create a regional traffic operations center so municipalities can centralize signal system monitoring and control and share resources. The operations center would be a singular location where municipalities throughout the region could effectively monitor and operate their advanced signal systems while minimizing operational effort by spreading responsibilities across pooled operators. The operations center is assumed to have a video wall, three operator workstations, and will occupy an existing facility such as a municipal or CTDOT office.

The long-term goal would be to work toward a regional transportation center wherein all transportation operations are managed.

Strategy: Implement ATMS platform for signal control

Strategy Name:	Advanced Traffic Management System
Champion:	CRCOG and municipalities
Timeframe:	Phase III
Est. Cost:	$150,000
Description:	

Create an advanced traffic management system at the regional traffic operations center to monitor traffic and adjust traffic signal timings, as needed. The ATMS platform would be able to operate all advanced signal systems in the region, providing alternate timing plans, surveillance capabilities, and system health reports in a consolidated manner. It is assumed that this type of system can be purchased primarily off the shelf, with some custom tailoring to the region's needs.

Strategy: Upgrade fiber optic communications to advanced signal systems

Strategy Name:	Fiber Optic Communications Upgrade Program
Champion:	CRCOG and municipalities
Timeframe:	Phase II
Est. Cost:	$1.025M
Description:	

Upgrade traffic signal communications by installing fiber optic lines to the signals that utilize advanced and urban traffic control systems. Survey municipalities within the region to identify corridors in most need of remote communications and operations. This program would leverage the regionalization committee established under a different strategy. Municipalities that participate in the regional program can vie for funding on an annual basis to cover the cost of upgrading critical signals to newer communications. $200k per year would be made available for municipalities to apply for funds. The cost of the program includes 5 years of operation.

Strategy: Upgrade signal controllers at critical intersections throughout the region

Strategy Name:	Traffic Signal Controller Upgrade Program
Champion:	CRCOG and municipalities
Timeframe:	Phase II
Est. Cost:	$1.025M
Description:	

Upgrade old signal controllers on critical corridors in order to implement advanced signal systems. Survey municipalities to identify intersections in most need of replacement. Coordinate with municipalities to identify cost sharing

mechanism where signals are locally owned. Prioritize signal controllers that utilize proprietary protocols or technology, such as ACTRA. This program would leverage the regionalization committee established under a different strategy. Consider inclusion of safe crossings technology such as High-Intensity Activated Crosswalk beacons (HAWK) or Rectangular Rapid Flashing Beacons (RRFB). Municipalities that participate in the regional program can vie for funding on an annual basis to cover the cost of upgrading critical signals to newer communications. $200k per year would be made available for municipalities to apply for funds. The cost of the program includes 5 years of operation.

Strategy: Pool resources across municipalities to implement centralized contracts for maintenance of closed loop and advanced signal systems

Strategy Name:	Advanced Signal Systems Maintenance Program
Champion:	CRCOG and municipalities
Timeframe:	Phase II
Est. Cost:	$175,000

Description:
Municipalities within the Capitol Region should investigate resource sharing and procure centralized maintenance contracts to maintain advanced signal systems. The contractor(s) should be IMSA certified in order to perform emergency maintenance tasks. The cost of this strategy includes initiation and five years of operation, but does not include the funding itself, which would need to be determined by the municipalities contributing to the fund and the program.

Strategy: Pool resources to implement centralized contracts for maintenance of simple traffic signal systems

Strategy Name:	Preventive Signal Maintenance Program
Champion:	CRCOG and municipalities
Timeframe:	Phase II
Est. Cost:	$175,000

Description:
Municipalities should pool resources and procure centralized contracts or signal technicians for routine preventive maintenance on traffic signals within the CRCOG region. Evaluate whether coordinating this effort with the Traffic Signal Circuit Rider program would streamline the process of establishing pooled resource group. The cost of this strategy includes initiation and five years of operation, but does not include the funding itself, which would need to be determined by the municipalities contributing to the fund and the program.

Goal 4: Achieve Sustainable Transportation Operations through the Use of Technology

Objective: Implement Technology to Reduce Impacts of the Roadway Network on the Environment

Strategy: Deploy environmental sensors to detect emissions levels in heavily congested areas

Strategy Name:	Environmental Sensor Deployment
Champion:	CTDOT
Timeframe:	Phase II

Est. Cost:	$180,000

Description:
Deploy environmental sensors in heavily congested areas to measure baseline emissions and future emissions reductions. Environmental sensors are only needed at heavily congested locations, such as bottlenecks and corridors that experience significant recurring congestion in the AM or PM peak period. Based on the congestion mapping displayed in the CMP and earlier in this document, environmental sensors could be deployed on I-84 west of Hartford, I-91 north of Hartford, and I-84 in East Hartford.

Strategy: Deploy traffic management systems at heavily congested areas and bottlenecks to reduce emissions

Strategy Name:	Implement Environmental ITS Management Systems at Heavy Traffic Areas
Champion:	CTDOT
Timeframe:	Phase II
Est. Cost:	$1M

Description:
Deploy active and passive management systems at congested areas to reduce congestion and emissions. An example would be the use of variable speed limit signs. Variable Speed Limit signs are already incorporated in a previous strategy and any effort to implement them should be coordinated across all relevant strategies. The costs for this strategy are generated by assuming that I-91 and I-84 would both be outfitted with VSL signs for ten miles each, at a spacing of one sign per mile.

Objective: Enhance the Sustainability of ITS Deployments

Strategy: Establish processes during the planning and design phase to consider lifecycle costs of ITS deployments

Strategy Name:	Establish Lifecycle ITS Planning Process
Champion:	CTDOT
Timeframe:	Phase I
Est. Cost:	$40,000

Description:
Establish a template to evaluate the sustainability of planned ITS initiatives, including the following attributes: • Anticipated lifespan   • Maintenance and operations costs   • Projected benefits   The outcomes of this strategy would be guidance documentation and templates for use by ITS deployers to analyze the benefits and costs of their investments.

Goal 5: Enhance Roadway Safety through the Use of Technology

Objective: Expand Roadway Weather Situational Awareness Capabilities

Strategy: Implement roadway weather information systems on key roadways

Strategy Name:	Expand Road Weather Information System (RWIS) and Weather Data Collection
Champion:	CTDOT and municipalities
Timeframe:	Phase II
Est. Cost:	$875,000

Description:
Expand the RWIS system to roadways typically influenced by poor weather, including prioritization by category of influence, based on history of weather-related crashes and disruptions. Specifically address concerns and interest at Buckland Hills Mall in Manchester.

Strategy: Implement processes and systems to inform municipalities of when CTDOT snow plows are deployed. Consider applicability of system to individual municipalities.

Strategy Name:	Snow Plow Management
Champion:	CTDOT and municipalities
Timeframe:	Phase II
Est. Cost:	$100,000

Description:
Develop an automated system to combine AVL and GIS data to clearly display when snow plows have been activated, where they are routed to, and what their route progress is. Assure that this system is accessible by municipal officials.

Objective: Enhance Coordination of and Access to Roadway Incident, Emergency, and Weather Event Information Among First Response Stakeholders

Strategy: Implement single-point, GIS-based system that will share traffic conditions, response activity, incident and roadway weather data across first response organizations

Strategy Name:	Traffic Condition Information Sharing System
Champion:	CTDOT and municipalities, supported by all first response organizations
Timeframe:	Phase III
Est. Cost:	$400,000

Description:
Implement a singular system whereby all incident, traffic conditions, weather, and response activity data can be shared across all response personnel. Each response organization will be provided with varying levels of access credentials by which to view or edit the information displayed. The platform will be GIS-based to enhance precision of the information. There is potential for inclusion in the WebEOC emergency management system. The State, region and individual municipalities may share appropriate information with the public through websites, email blasts, and telephone robocalls.

Strategy: Expand video sharing capabilities to regional fire departments & other first responding agencies

Strategy Name:	Expand Video Sharing
Champion:	CTDOT and first response agencies
Timeframe:	Phase I
Est. Cost:	$75,000

Description:
Currently, CTDOT shares video with various transportation stakeholders in the Capitol Region from their Newington Highway Operations Center. Access to live video could significantly improve first responder capabilities to identify and appropriately respond to incidents on the roadway network. Provide interested first response organizations with access to video streams in the event of an incident, emergency, or disruption to the roadway network. This strategy could be facilitated by converting existing video streams to format transmissible over the internet and sharing the streams via web-based login.

Objective: Reduce Secondary Incidents and Increase the Safety of First Responders in the Field

Strategy: Procure portable DMS or DMS vehicles that can be used by first responders to warn motorists of incidents ahead

Strategy Name:	Secondary Incident Signage
Champion:	CTDOT
Timeframe:	Phase 1
Est. Cost:	$500,000

Description:
Portability of advance warning devices (signs or vehicle-mounted signs) is a major factor in the ability to deliver information to the motorist who is not attentive to other traveler information channels. Signage could be deployed in advance of incidents by first responders to enhance awareness of incidents and congestion.

Strategy: Implement Variable Speed Limit Signs in Corridors with High Accident Rates

Strategy Name:	Variable Speed Limit Signage
Champion:	CTDOT
Timeframe:	Phase II
Est. Cost:	$0

Description:
Secondary incidents frequently occur due to vehicles colliding with other vehicles in an area where congestion is atypical but a backup exists. Incidents are very frequently the causes of these backups. Lowering the speed limit dynamically in advance of an incident is an effective means of reducing the risk of secondary incidents. The costs for this strategy are generated by assuming that I-91 and I-84 would both be outfitted with VSL signs for ten miles each, at a spacing of one sign per mile. The costs of this strategy are already incorporated in other VSL strategies within this plan.

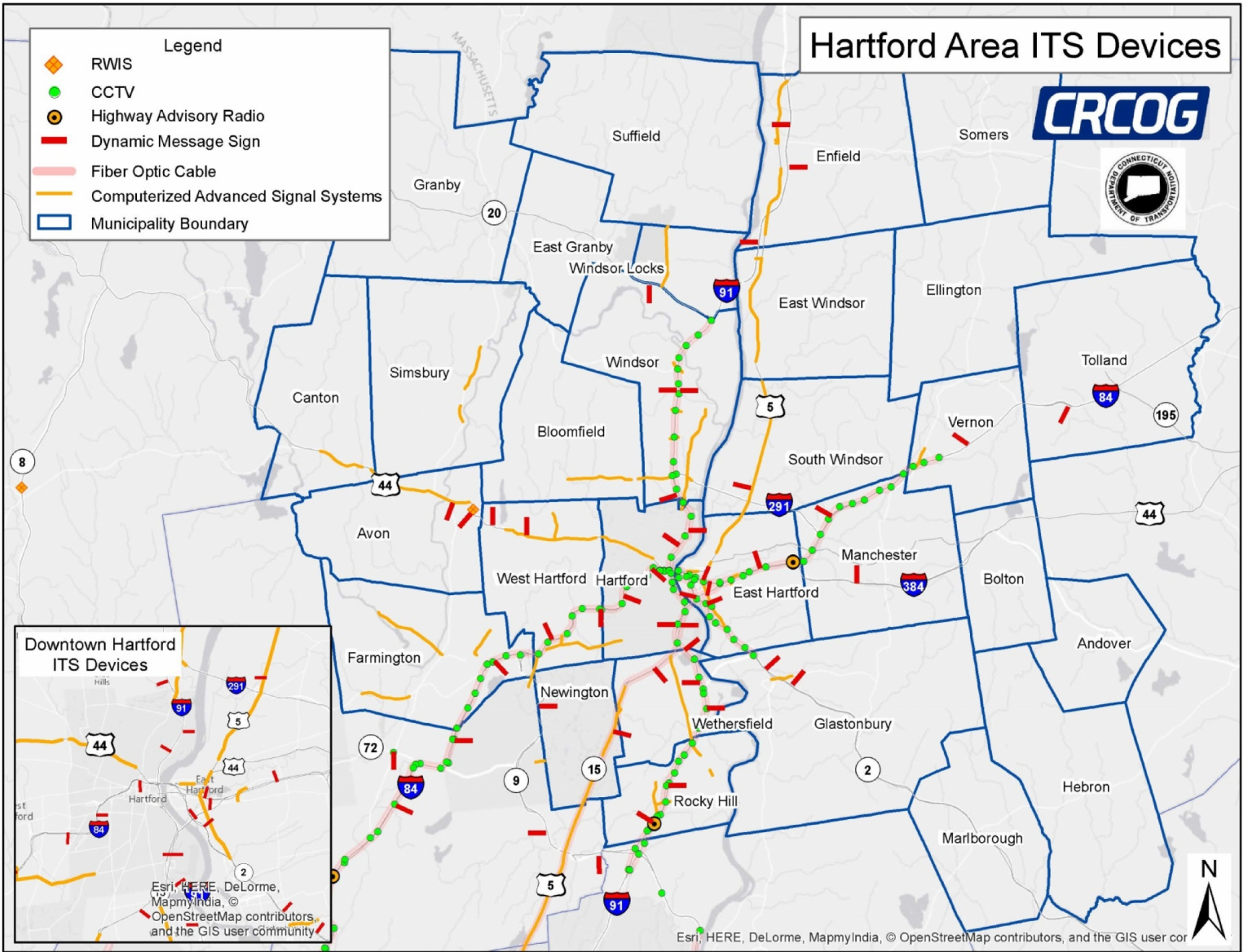Strategy: Support Region 3 TIM Coalition and communicate actions of Region 3 TIM Coalition statewide

Strategy Name:	Support Region 3 TIM Coalition
Champion:	CRCOG
Timeframe:	Phase I
Est. Cost:	$125,000

Description:
There is a growing interest in creating strong relationships among members of various responder communities in response to the need for multi-disciplinary, multi-agency TIM responses. The creation of the Region 3 TIM Coalition is an

example of the linkage and synergy that can be derived when individuals and agencies convene regularly to focus on successes and opportunities to keep traffic moving safely when operations are compromised in the wake of incidents and events on Connecticut's municipal and state roadways. Identify and create a communications plan that leverages Region 3 TIM Coalition lessons learned for the statewide TIM community, and encourage sharing of information among all TIM and TIM-related constituencies. The cost of this strategy includes initiation and five years of operation.

Appendix B: Hartford Area ITS Devices

Hartford Area ITS Devices

CRCOG

Legend
- ◆ RWIS
- ● CCTV
- ◉ Highway Advisory Radio
- ▬ Dynamic Message Sign
- Fiber Optic Cable
- Computerized Advanced Signal Systems
- □ Municipality Boundary

Downtown Hartford ITS Devices

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Appendix C: Hartford Area Computerized Signal Systems