

# South Western Region ITS Strategic Plan

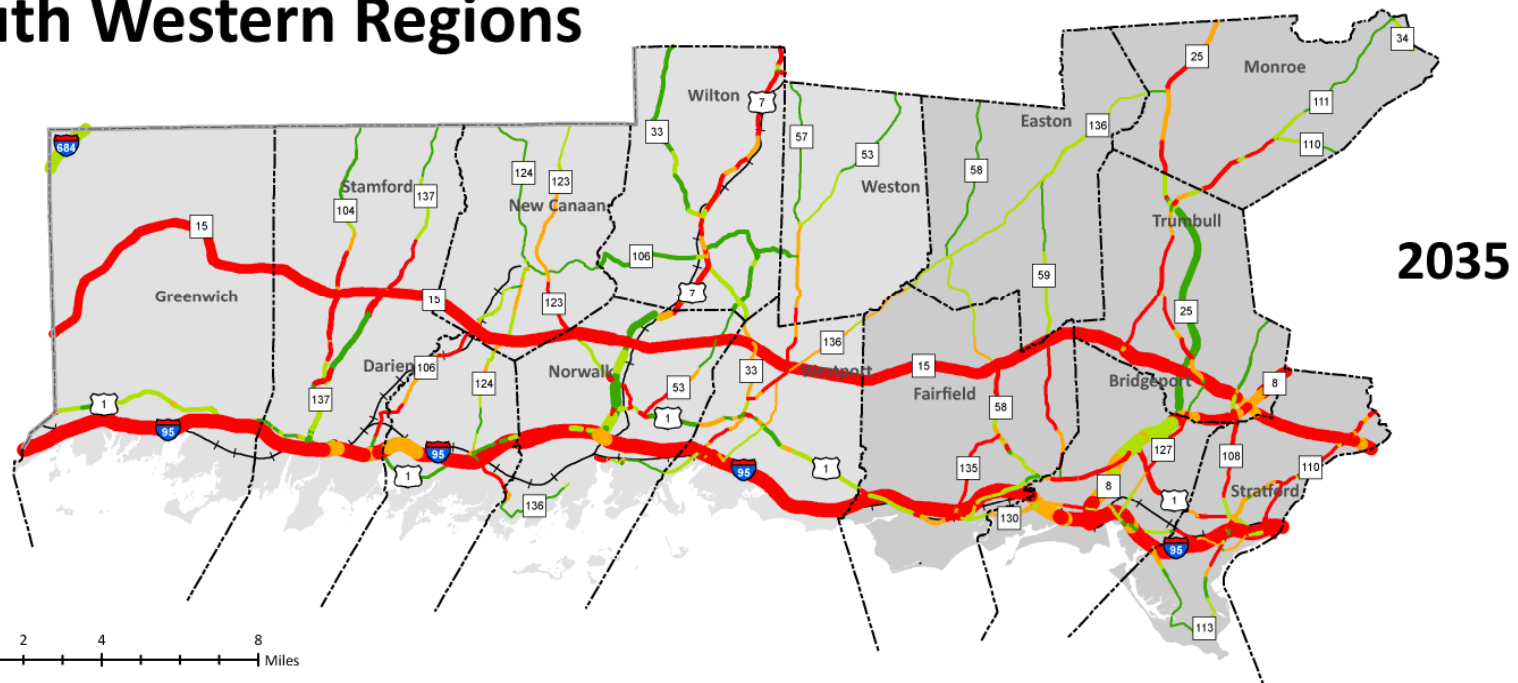
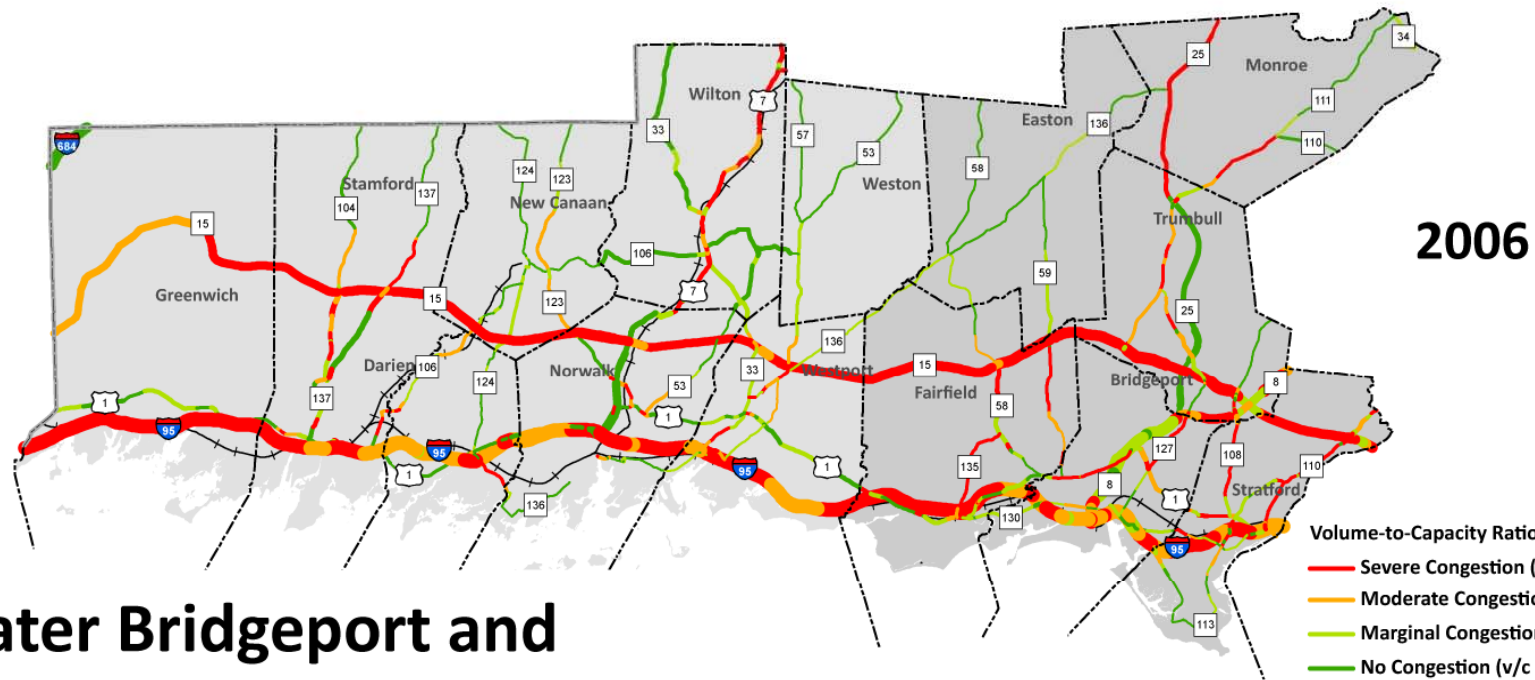


# Defining the Problem

- What are the problems
  - Significant congestion
    - Recurring
    - Accidents
- What are the solutions
  - Vision 2020 (2003)
  - No magic bullet
  - Improve efficiency, operation, and management
    - Transit improvements
    - ITS
    - Capacity expansion
    - Pricing



# Greater Bridgeport and South Western Regions



# Study Overview

- Purpose:

- Strategic evaluation of new and/or enhanced deployments of ITS applications

- Focus on safety and mobility

- Objectives

- Establish policies that provide a framework for local and regional planning

- Recommend short, medium, and long-term ITS projects and policies

- Educate federal, state, and local policy makers about role of ITS, benefits from implementation

- Develop a Strategic ITS Plan

# Study Team

- SWR ITS Technical Advisory Committee
  - FHWA, CTDOT, Municipalities, Transit Agencies, Safety Agencies
- Study Team:
  - Cambridge Systematics
  - IBI Group
  - Howard/Stein Hudson

# Environmental Screen

- Identify and analyze ITS deployment among peers
  - Mercer County, NJ (Trenton-Philadelphia)
  - New Castle County, DE (Wilmington-Philadelphia)
  - Howard County, MD (Baltimore-Washington)
  - Lake County, IL (Chicago-Milwaukee)
  - San Mateo County, CA (San Francisco-San Jose)
- Lessons learned
  - Metro areas with good deployment records also had a local champion
  - Include ITS in all projects rather than as stand-alone projects
  - Hard for public to perceive benefits from ITS
  - Pre- and post-deployment data collection for evaluation

# Overview

- 8 ITS strategies evaluated using IDAS
- ITS strategies based upon:
  - Matrix Analysis
    - Screening tool, first step in evaluation process
    - Identify:
      - Regional needs
      - ITS market packages
    - Rank and sort market packages based on needs
  - Input from SWRPA ITS TAC
    - Review matrix analysis
    - Suggest important projects
      - Meet important needs

# Overview

- ITS Strategies - Highway
  - **ICM-1:** Integrated Corridor Management along CT-15
  - **ICM-2:** Integrated Corridor Management along US-1
  - **AM-1:** Stamford Real-time Traveler Information
  - **IM-1:** Norwalk Incident Management System
- ITS Strategies - Transit
  - **AVL-1:** Norwalk Transit District Automated Vehicle Location
  - **AVL-2:** CTTransit-Stamford Automated Vehicle Location
  - **TSP-1:** US 1 Transit Signal Priority
  - **TSP-2:** City of Stamford Transit Signal Priority

# ICM-1: Integrated Corridor Management along CT-15

<b>Components</b>	<ul style="list-style-type: none"> <li>•Changeable Message Signs (5)</li> <li>•Traffic Cameras (8)</li> <li>•Traffic Flow Detection Equipment (20)</li> </ul>
<b>Planning Budget Estimate</b>	<ul style="list-style-type: none"> <li>•Capital Cost: \$2.47 million</li> <li>•O&amp;M Cost: \$500,000</li> </ul>
<b>Project Location(s)</b>	Strategic locations along CT 15
<b>Lead Agency</b>	ConnDOT
<b>Project Participants</b>	FHWA, Connecticut Department of Public Safety, NYSDOT, Greenwich, Stamford, New Canaan, Norwalk, Westport, SWRPA
<b>Expected Benefits</b>	<ul style="list-style-type: none"> <li>•Improved integrated corridor management of CT 15, U.S. 1, and I-95</li> <li>•Improved surveillance capabilities</li> <li>•More rapid detection of incidents and reduced response times</li> <li>•Improved traveler information to assist in incident management and informed traveler decision-making</li> </ul>
<b>Integration with other projects</b>	This project would leverage ConnDOT’s existing ITS investments in the region including headend systems and instrumentation of parallel corridors. Incident management strategies along CT 15 would be coordinated with I-95 traffic management and the proposed U.S. 1 project to allow for integrated corridor management of the principal travel corridors in southwestern Connecticut.

## ICM-2: Integrated Corridor Management along US-1

<b>Components</b>	<ul style="list-style-type: none"> <li>•Changeable Message Signs (10)</li> <li>•Traffic Cameras (8)</li> <li>•Traffic Flow Detection Equipment (20)</li> </ul>
<b>Planning Budget Estimate</b>	<ul style="list-style-type: none"> <li>•Capital Cost: \$2.12 million</li> <li>•O&amp;M Cost: \$500,000</li> </ul>
<b>Project Location(s)</b>	Strategic locations along US 1
<b>Lead Agencies</b>	Greenwich, Norwalk, and Stamford within their respective communities and ConnDOT within Darien and Westport
<b>Project Participants</b>	FHWA, Connecticut Department of Public Safety, NYSDOT, Darien, Westport, SWRPA
<b>Expected Benefits</b>	<ul style="list-style-type: none"> <li>•Improved integrated corridor management of CT 15, U.S. 1, and I-95</li> <li>•Improved surveillance capabilities</li> <li>•More rapid detection of incidents and reduced response times</li> <li>•Improved traveler information to assist in incident management and informed traveler decision-making</li> </ul>
<b>Integration with other projects</b>	This project would leverage ConnDOT's existing ITS investments in the region. Incident management strategies along US 1 would be coordinated with I-95 traffic management to allow for an integrated corridor management system.

# AM-1: Stamford Real-time Traveler Information

<b>Components</b>	<ul style="list-style-type: none"><li>• Modifications to Field Detectors and Signal Controllers (190)</li><li>• Website</li><li>• Software</li></ul>
<b>Planning Budget Estimate</b>	<ul style="list-style-type: none"><li>• Capital Cost: \$945,000</li><li>• O&amp;M Cost: \$200,000</li></ul>
<b>Project Location(s)</b>	City of Stamford
<b>Lead Agency</b>	City of Stamford
<b>Project Participants</b>	ConnDOT, SWRPA
<b>Expected Benefits</b>	<ul style="list-style-type: none"><li>• Improved arterial management within Stamford.</li><li>• Improved communication with the general public.</li></ul>
<b>Integration with other projects</b>	This project should be coordinated with other Stamford ITS deployment efforts, as well as Statewide ATIS efforts, such as ConnDOT's future 511 website.

# IM-1: Norwalk Incident Management System

<b>Components</b>	<ul style="list-style-type: none"><li>•Electronic Blankout Signs (50)</li></ul>
<b>Planning Budget Estimate</b>	<ul style="list-style-type: none"><li>•Capital Cost: \$2.31 million</li><li>•O&amp;M Cost: \$245,000</li></ul>
<b>Project Location(s)</b>	City of Norwalk
<b>Lead Agency</b>	City of Norwalk
<b>Project Participants</b>	ConnDOT, Connecticut Department of Public Safety, SWRPA
<b>Expected Benefits</b>	<ul style="list-style-type: none"><li>•Improved incident and emergency management</li><li>•Improved communication of incident and emergency management information to the general public</li></ul>
<b>Integration with other projects</b>	This project should be coordinated with the City's other ITS investments, the State's incident/emergency management efforts, and the State's 511 efforts.

# AVL-1: Norwalk Transit District Automated Vehicle Location

<b>Components</b>	<ul style="list-style-type: none"> <li>• On-Board Fixed Route Bus GPS Unit (40)</li> <li>• On-Board Demand Responsive Bus GPS Unit (25)</li> <li>• AVL Software</li> <li>• Radio System Upgrade for Mobile Data Communication</li> </ul>
<b>Planning Budget Estimate</b>	<ul style="list-style-type: none"> <li>• Capital Cost: \$1.37 million</li> <li>• O&amp;M Cost: \$130,000</li> </ul>
<b>Project Location(s)</b>	Norwalk Transit District vehicles
<b>Lead Agency</b>	Norwalk Transit District
<b>Project Participants</b>	FTA, Norwalk, SWRPA, CT Transit, ConnDOT
<b>Expected Benefits</b>	<ul style="list-style-type: none"> <li>• Improved operational efficiency by providing dispatchers with real-time location of transit vehicles</li> <li>• Improved data accuracy and data collection for planning, operations research, and reporting requirements</li> </ul>
<b>Integration with other projects</b>	This project should be coordinated with Norwalk Transit District's other transit ITS procurements to ensure interoperability. Norwalk Transit District should also coordinate with CT Transit – Stamford's AVL system procurement to take advantage of any economies of scale or system interoperability opportunities.

# AVL-2: CTTransit

## Automated Vehicle Location

<b>Components</b>	<ul style="list-style-type: none"> <li>• On-Board Fixed Route Bus GPS Unit (46)</li> <li>• CAD/AVL Software</li> <li>• Radio System Upgrade for Mobile Data Communication</li> </ul>
<b>Planning Budget Estimate</b>	<ul style="list-style-type: none"> <li>• Capital Cost: \$1.21 million</li> <li>• O&amp;M Cost: \$110,000</li> </ul>
<b>Project Location(s)</b>	CTTransit – Stamford Vehicles
<b>Lead Agency</b>	CTTransit - Stamford
<b>Project Participants</b>	FTA, Stamford, SWRPA, Norwalk Transit District, ConnDOT
<b>Expected Benefits</b>	<ul style="list-style-type: none"> <li>• Improved operational efficiency by providing dispatchers with real-time location of transit vehicles</li> <li>• Improved data accuracy and data collection for planning, operations research, and reporting requirements</li> </ul>
<b>Integration with other projects</b>	<p>City of Stamford is in the midst of procuring CAD/AVL as part of its Stamford Urban Transitway project. The ITS components for this project include not just CAD/AVL, but also automatic passenger counters, on-board cameras, vehicle diagnostics, stop callers, VMS, parking guidance, outdoor digital signage, wireless LAN networks, fiber-optic communications, etc. It is also intended that this procurement will include a Central Traffic Control System Interface to provide transit signal priority functionality, which was estimated separately as part of this effort. The City estimates that the overall cost for the ITS elements will be between \$3.5 million and \$6.5 million. The preliminary budget estimate developed here is only in regards to the AVL portion of this larger procurement.</p>

# TSP-1: US 1 Transit Signal Priority

<b>Components</b>	<ul style="list-style-type: none"><li>• On-Bard TSP Emitter/Processor Unit (40)</li><li>• Signal Controller Upgrade (80)</li><li>• TSP Receiver (2 per intersection) (80)</li></ul>
<b>Planning Budget Estimate</b>	<ul style="list-style-type: none"><li>• Capital Cost: \$4.33 million</li><li>• O&amp;M Cost: \$350,000</li></ul>
<b>Project Location(s)</b>	US 1, Greenwich - Norwalk
<b>Lead Agency</b>	Greenwich, Norwalk, and Stamford within their respective communities and ConnDOT within Darien and Westport
<b>Project Participants</b>	FHWA, SWRPA, Norwalk Transit District, CT Transit, Darien, Westport
<b>Expected Benefits</b>	<ul style="list-style-type: none"><li>• Improved bus schedule adherence</li><li>• Reduced transit travel times</li><li>• Improved transit travel time reliability</li></ul>
<b>Integration with other projects</b>	This effort should be coordinated with traffic signal improvements along the corridor, as well as any ITS instrumentation along the corridor (ICM-2).

# TSP-2: City of Stamford Transit Signal Priority

<b>Components</b>	<ul style="list-style-type: none"> <li>• On-Board TSP Emitter/Processor Unit (46)</li> <li>• Software Expansion and Hardware Upgrade</li> </ul>
<b>Planning Budget Estimate</b>	<ul style="list-style-type: none"> <li>• Capital Cost: \$660,000</li> <li>• O&amp;M Cost: \$500,000</li> </ul>
<b>Project Location(s)</b>	City of Stamford
<b>Lead Agency</b>	City of Stamford
<b>Project Participants</b>	ConnDOT, FTA, CTTransit, SWRPA
<b>Expected Benefits</b>	<ul style="list-style-type: none"> <li>• Improved bus schedule adherence</li> <li>• Reduced transit travel times</li> <li>• Improved transit travel time reliability</li> </ul>
<b>Integration with other projects</b>	This effort should be coordinated with traffic signal improvements by the City, as well as the Stamford Urban Transitway project.

# Evaluation of ITS Strategies

## *Regional ITS Strategic Plan*

*presented to*

## **ITS-Connecticut Annual Meeting**

*presented by*

**Cambridge Systematics, Inc.**

**IBI Group**

**Howard-Stein/Hudson**

September 27, 2010



Transportation leadership you can trust.



# Objectives of the Project

- Evaluate detailed alternatives using criteria such as:
  - » Impacts on recurring and non-recurring congestion
    - Mobility savings and travel time reliability savings
  - » Safety
    - Accident reduction
    - Operating costs
    - Fuel and operating savings
  - » Emissions reductions and other environmental impacts
  - » Life-cycle costs
    - Capital and O&M costs for both public and private sectors
- Identify the most cost-effective ITS investments

# Intelligent Transportation Systems Deployment Analysis System



**IDAS**

# IDAS Overview

- Developed for the FHWA
- Sketch-planning tool to estimate ITS benefit and cost impacts
  - » Over 60 types of ITS investments
- Assists public agencies with integrating the deployment of ITS into the transportation planning process
- Relies on traditional MPO Travel Demand Model outputs to construct data inputs

# Sample IDAS Deployment of ITS Improvement

**Option: Scenario B - IM**

**Incident Management Systems | Incident Detection/Verification**

**Deployment Impacts Values**

Link From Node: 12516 To: 22509

Facility Type: freeway

No. of Lanes: 3 Distance (mi): 0.33

Input Speed (mph): 59 Input Capacity (veh/lane): 16,900.0

Speed Change (%): 0.0 Capacity Change (%): 0.0

Incident Duration Reduction (%): 1.0

Fuel Consumption Reduction (%): 1.0

Accident Rate Reductions (%):

Fatality: 1.0

Injury: 0.0

Property Damage: 0.0

Emissions Rate Reductions (%):

CO: 1.0

HC/ROG: 1.0

NOX: 1.0

PM: 1.0

Apply To All

Link from node 12516 to 22509 selected (Name: US HWY 41 NORTHBOUND, facility type = 2, district = 4, volume = 3221).

Selected Links

- 2707->2708
- 2708->14219
- 2709->13815
- 2710->2709
- 2711->2712
- 2712->13560
- 2713->2727
- 2715->2713
- 2724->2725

# Use of IDAS in the SWRPA ITS Strategic Plan

- Code each strategy into the IDAS network
- Test 2-3 initial strategies and refine parameters with TAC
- Run the full set of ITS strategies
- Summarize the findings
- Refine/develop set of 3-4 alternatives for additional analysis

# IDAS Cost Module Outputs

- Inventory of ITS equipment on the transportation network
- Costs by year – Expenditure stream (life cycle)
  - » Public and private sectors
  - » Capital and O&M costs
- Estimate of average annual cost

# IDAS Benefits Module Outputs

- Performance measures including
  - » Travel time
  - » Travel time reliability
  - » Accidents (fatality, injury, property damage)
  - » Emissions (HC, CO, NO<sub>x</sub>, PM10)
  - » Fuel use
  - » Agency efficiency

# IDAS Economic Parameters

General Parameters	Value
Number of travel days in a year	247
Year of \$ values	2010
Inflation Rate	3%
Value of Time (\$/hour)	Value
Value of In-vehicle time	\$15.00
Value of In-vehicle time (commercial)	\$26.42
Value of Out-vehicle time (commercial)	\$26.49
Value of time multiplier for Emergency Vehicle	30.0
Value of Out-vehicle time	\$ 26.49
Value of reduced delay time	\$45.03

# IDAS Economic Parameters (cont.)

<b>Emission Cost (\$/ton)</b>	
HC/ROG	\$2,763.83
NOX	\$5,812.78
CO	\$6,058.94
PM10	\$17,240.47
CO2	\$5.55
SO2	\$5.55
GW	\$0.00
<b>Accident Cost (\$/accident)</b>	
Fatality	\$3,610,430.58
Injury	\$79,082.43
Property damage	\$4,399.70
<b>Operating Costs</b>	
Fuel costs (gallon)	\$3.70
Non-Fuel operating costs (\$/mile)	\$0.10
Noise damage costs (\$/mile)	\$0.0011

# Plan Summary

## Benefit Cost Comparison

	Total Benefits	Annualized Cost	Benefit-Cost Ratio	Net Benefits	Capital Cost	Annual O&M
ICM-1 Merritt ITS	\$3,818,000	\$833,000	4.58	\$2,985,000	\$2,470,000	\$500,000
ICM-2 U.S. 1 ITS	\$369,000	\$842,000	0.44	(\$473,000)	\$2,120,000	\$590,000
AM-1 Stamford Information	\$3,040,000	\$308,000	9.87	\$2,732,000	\$945,000	\$200,000
IM-1 Norwalk IM	\$2,909,000	\$460,000	6.32	\$2,449,000	\$2,310,000	\$245,000
AVL-1 Norwalk	\$1,177,000	\$295,000	3.99	\$882,000	\$1,370,000	\$130,000
AVL-2 Stamford	\$1,162,000	\$263,000	4.42	\$899,000	\$1,210,000	\$110,000
TSP-1 U.S. 1	\$705,000	\$850,000	0.83	(\$145,000)	\$4,355,000	\$355,000
TSP-2 Stamford	\$618,000	\$179,000	3.45	\$439,000	\$660,000	\$95,000
<b>Total Program</b>	<b>\$13,798,000</b>	<b>\$4,030,000</b>	<b>3.42</b>	<b>\$9,768,000</b>	<b>\$15,440,000</b>	<b>\$2,225,000</b>

# Comments Received

- ICM-I: CT 15
  - » Historic preservation
  - » Tree cover, poor sightlines
  - » Lack of communication lines
  - » Maintaining I-95 ITS is priority
- IM- I: Norwalk Incident Management
  - » Maintenance cost/commitment
- TSP: US I/Stamford
  - » Claim: Not permitted under state statutes
  - » Reality: allowed per CGS §14-299a

# Next Steps

- Update Long Range Transportation Plan
- Support stakeholders' efforts
- Advocate for long-term improvements
- Promote data sharing between agencies