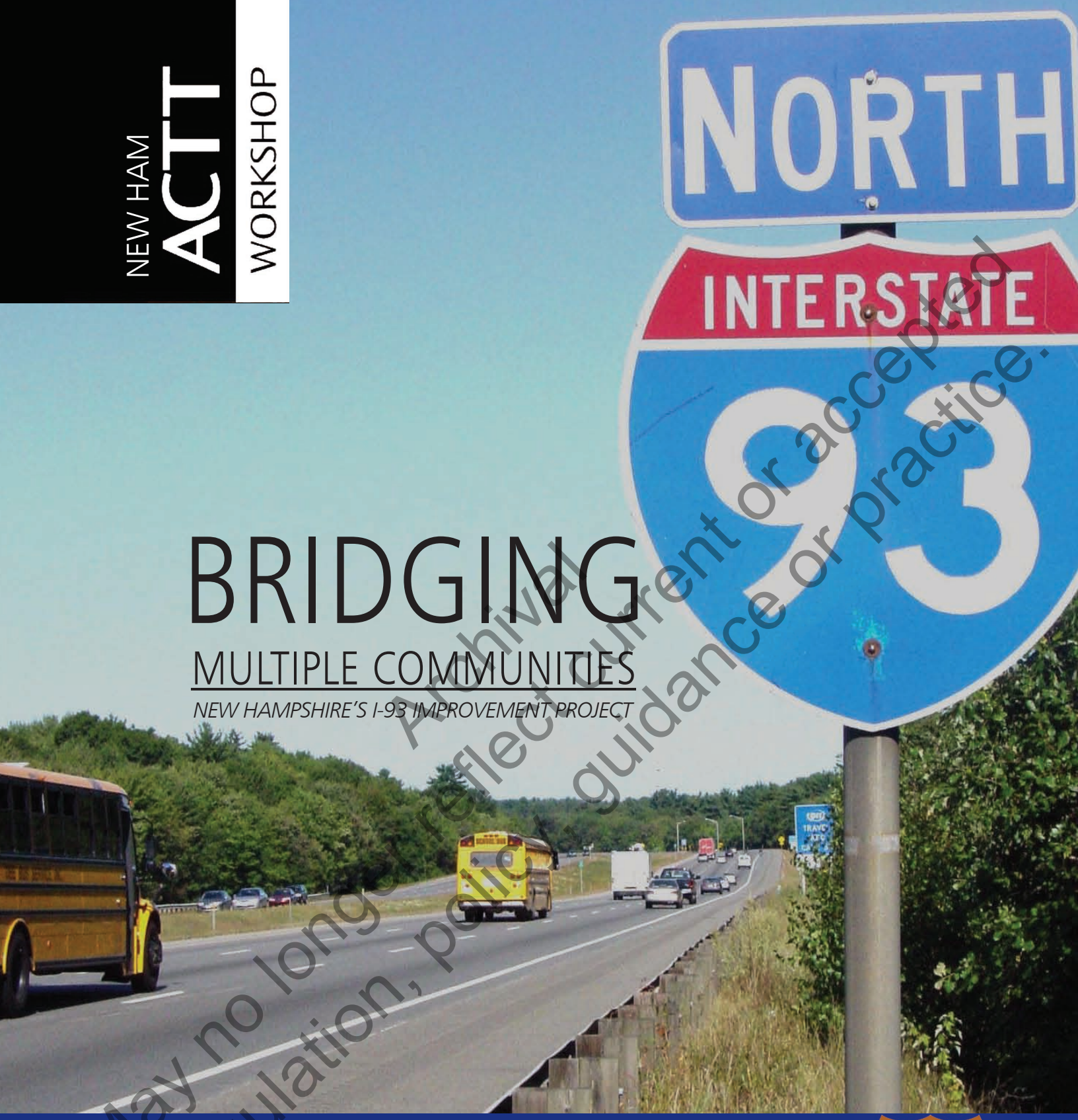
NEW HAM ACTT WORKSHOP



BRIDGING

MULTIPLE COMMUNITIES

NEW HAMPSHIRE'S I-93 IMPROVEMENT PROJECT

U.S. Department of Transportation
Federal Highway Administration

REBUILDING I-93 salem to manchester

ACTT
ACCELERATED CONSTRUCTION TECHNOLOGY TRANSFER
www.fhwa.dot.gov/construction/accelerated

- ACTT provides a fresh outlook by bringing national experts to your planning table.
- ACTT introduces innovations that have been tested elsewhere.
- ACTT saves time: according to FHWA's ACTT II report, published in March 2005, "most agencies have found ways to slice construction time by 30 percent or more."
- ACTT saves money: ACTT suggestions enabled New Jersey to reduce its budget for the Route 46 bridge project from $10 million to $7.2 million.
- ACTT works for you and your customer!

How do I ACTT?

- Select a corridor: ACTT is most helpful when applied during the project development phase.
- Make a workshop proposal to ACTT team members, and submit a copy of your proposal to the FHWA Division Office. Include details on the project corridor, timeline and goals.
- Hold a pre-workshop meeting with the ACTT management team.
- Select a meeting site, and coordinate workshop details with the FHWA Division Office.
- Host the workshop.
- Draft a report for submittal to FHWA.
- Incorporate ACTT into project operations.

WHY ACTT?

NEW HAMPSHIRE ACTT WORKSHOP

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THE STATE OF NEW HAMPSHIRE ★ DEPARTMENT OF TRANSPORTATION ★

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EXECUTIVE SUMMARY

> "As long as the Interstate is the highway supporting our society, economy, and national security, it will forever need to be the beneficiary of our attention and investment. The ribbon cuttings will never end!"
>
> *Dan McNichol*
> *The Roads That Built America:*
> *The Incredible Story of the U.S. Interstate System, 2003*

Like many of its counterparts, the State of New Hampshire is grappling with the fact that its Interstate is a vital infrastructure in urgent need of reconstruction.

One particular area of concern for New Hampshire is the stretch of I-93 beginning at the New Hampshire/Massachusetts State line and continuing north 19.8 miles to the I-93/I-293 interchange. The I-93 Improvements project, as the New Hampshire Department of Transportation (NHDOT) calls it, traverses five communities – Salem, Windham, Derry, Londonderry and Manchester – and serves as the primary commuter, tourism and commerce link for the State. With its heavy traffic volumes, regular backups and frequent accidents, this section of I-93 is in need of reconstruction but is constrained by a number of factors that require innovative thinking in order for the project to move forward in a timely manner.

And that's where the Accelerated Construction Technology Transfer (ACTT) process comes into play. NHDOT hosted the I-93 Improvements ACTT workshop in February 2006, structuring it to 1) evaluate innovative means of contracting and financing; 2) identify and expedite critical path tasks such as right-of-way (ROW) and utility relocations; 3) evaluate traffic control; 4) maintain safety; and 5) adhere to environmental commitments. NHDOT and the Federal Highway Administration (FHWA) utilized the following skill sets to accomplish these goals:

- Geotechnical/Materials/Long-life Pavement/Maintenance.
- Construction/Environment.
- Innovative Financing/Contracting.
- Structures/Roadway/Geometric Design.
- Traffic Management/Safety/ITS/Incident Management/Public Relations.
- Right-of-Way/Utilities.

The various skill set teams focused on how the ACTT process applied to their area of expertise, while the group as a whole searched for methods and measures to help NHDOT achieve its goals of 1) maximizing mobility and safety, and 2) reducing the construction timeframe for the $480 million project from 12 to six years.

In the days following the workshop, key NHDOT personnel reviewed the suggestions from the skill sets and developed the list of final recommendations found in chapter four. NHDOT plans on evaluating each proposal to determine which will be beneficial to the I-93 Improvements project. From there, the agency will develop an implementation plan for the final design and construction phases.

1.1. Opening Session

NHDOT hosted the I-93 Salem to Manchester (I-93 Improvements) ACTT workshop February 21-23, 2006 at the Grappone Conference Center in Concord, New Hampshire.

NHDOT Commissioner Carol Murray and NH FHWA Division Administrator Kathy Laffey provided opening remarks, after which the participants introduced themselves. NHDOT Assistant Director of Project Development William Cass provided a project overview. A bus tour of the I-93 corridor followed, with side trips at exits one and three. Peter Stamnas, NHDOT project manger for the I-93 Improvements project, narrated the tour, noting various points of interest. William Cass then provided an overview of the growth that is driving the expansion of I-93.

1.2. Workshop Process

On Wednesday morning, FHWA Pavement Management Engineer and Workshop Moderator Joe Huerta discussed "Why ACTT, Why Now" and provided some insight on the brainstorming process. Following his presentation, the skill sets broke into individual groups and came back together to present their initial findings prior to lunch. The teams spent Wednesday afternoon intermingling and developing their final recommendations, which skill set representatives presented to the group on Thursday morning.

1.3. Skill Set Goals

The project's primary goals are to improve safety and mobility throughout the corridor while preparing for anticipated regional growth. In addition, NHDOT wants to reduce the construction timeframe from 12 to six years. With these objectives in mind, the project team established the following goals for each skill set:

Geotechnical/Materials/Long-life Pavement/Maintenance

- Employ methods and materials that will accelerate construction without reducing quality.
- Review performance specification opportunities.
- Review winter maintenance considerations.
- Identify new material testing methods that will minimize the time involved or reduce personnel requirements.
- Recycle materials along the corridor.
- Optimize geotechnical evaluations and recommendations.
- Optimize the use of shallow foundations.
- Consider long-term maintenance requirements as well as preventative maintenance.

Construction/Environment

- Optimize construction sequencing, management and the number/size of contracts to complete construction in six versus 10 to 12 years (financially constrained).
- Optimize contractor scheduling specifications.
- Employ innovative contracting methods to encourage the contractor to accelerate construction.
- Complete all segments during the construction season.
- Fulfill environmental commitments.
- Minimize impact to the following:
  - Water quality.
  - Cultural/historical sites.
  - Wetlands.
  - Wildlife.
  - Air quality (construction vehicles).
  - Motorists.
- Provide for noise abatement, both permanently and during construction.

Innovative Financing/Contracting

- Review anticipated cash flow and the programmed budget with project management.
- Minimize and contain costs.
- Sustain the local construction industry with respect to contract size and construction scheduling.
- Addressing unique corridor characteristics, develop and employ innovative contracting methods that will accelerate construction.
- Coordinate construction phasing/contract sequencing.

Structures/Roadway/Geometric Design

- Reduce the construction timeframe, minimize cost and maintain the quality of all structures.
- Develop innovative contract delivery concepts to encourage precasting/prefabrication/preassembly and the use of standardized elements.
- Evaluate various erection/construction methods to accelerate construction.
- Evaluate/review roadway geometry related to constructability and traffic control.
- Minimize the negative impact of live lane construction practices (i.e., deck pours).

Traffic Management/Safety/ITS/Incident Management/Public Relations

- Provide two lanes of traffic in both directions during construction.
- Develop a consistent and fair approach to traffic mitigation.
- Minimize work zone congestion.
- Minimize interchange closures, out-of-direction travel and overall motorist inconvenience.
- Provide and promote ride share/commuter opportunities.
- Maintain project site safety.
- Provide reliable information about traffic impacts to the public.
- Ensure a public message that is consistent, comprehensive and proactive.
- Avoid/minimize disruption to the tourist industry and the local economy.
- Employ Intelligent Transportation Systems (ITS) or other technologies to reduce traffic congestion along the entire corridor.
- Develop incident management strategies.

Right-of-Way/Utilities

- Minimize the number of utility relocations, and accelerate utility relocations to meet the project schedule (advance contracts).
- Identify workable options to prevent utility delays.
- Minimize ROW impacts and complete ROW acquisition to meet the accelerated project schedule.
- Minimize design plan changes after ROW parameters are established in order to minimize or eliminate reappraisals/ renegotiations, etc.
- Provide early and accurate real estate appraisals.
- Complete fair and equitable settlements in a timely manner.

2.1. Corridor Description

I-93 constitutes a major link in the Northeast's Interstate system, extending from Boston, Massachusetts, to St. Johnsbury, Vermont, just west of the Vermont/New Hampshire border. This link is vital not only to commuters, but also to State commerce and tourism. Therefore, it is an integral component of the State's economy.

The I-93 Improvements corridor begins at the New Hampshire/ Massachusetts State line in the town of Salem and continues north 19.8 miles to the I-93/I-293 interchange. The project passes through five communities – Salem, Windham, Derry, Londonderry and Manchester – which are accessed via exits one through five, respectively. The project corridor also includes sections of NH Route 97 (Pelham Road), NH Route 111, NH Route 111A, NH Route 102 and NH Route 28, as well as several other municipally-owned and maintained roadways. These roads provide crucial east-west access to dozens of secondary communities throughout southern New Hampshire. Forty-three bridges will be replaced, rehabilitated or widened as part of the I-93 Improvements project.

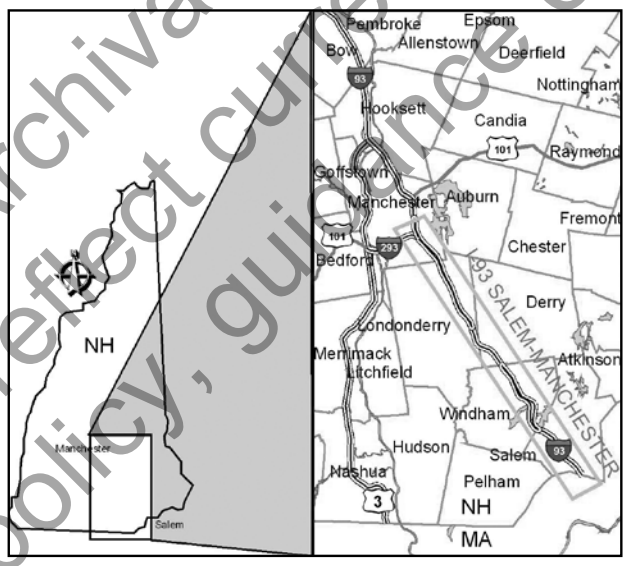

Figure 1: Project Location Map

I-93 was constructed in the early 1960s and provides two lanes each in the northbound and southbound barrels. Recent traffic volumes throughout the corridor have exceeded 100,000 vehicles per day (VPD), which far surpasses the 60,000 to 70,000 VPD that the roadway was designed to accommodate. Because the existing two-lane facility lacks the capacity and width to accommodate this level of traffic, motorists encounter regular congestion and backups, and numerous accidents occur, many involving multiple vehicles. Current level of service (LOS) through the corridor ranges from a LOS E from the Massachusetts State line through Exit 3 to a LOS D from Exit 3 to Exit 5. Traffic volumes have been projected to increase to over

140,000 VPD by 2020, which will only further exacerbate the capacity and safety concerns throughout the corridor. Safety and congestion are further compromised by substandard ramp and highway geometry at most of the interchanges. This substandard geometry includes inadequate acceleration and deceleration lanes and lengths, as well as insufficient vehicle storage at the off-ramp locations. These lead to frequent backups at the interchange areas.

2.2. Project Overview

After evaluating various improvement strategies through the preliminary engineering and environmental impact statement (EIS) process, a selected alternative was chosen. Primary features of the selected alternative include widening the existing facility to include four lanes in each direction and improving the capacity and geometric deficiencies at the five project interchanges.

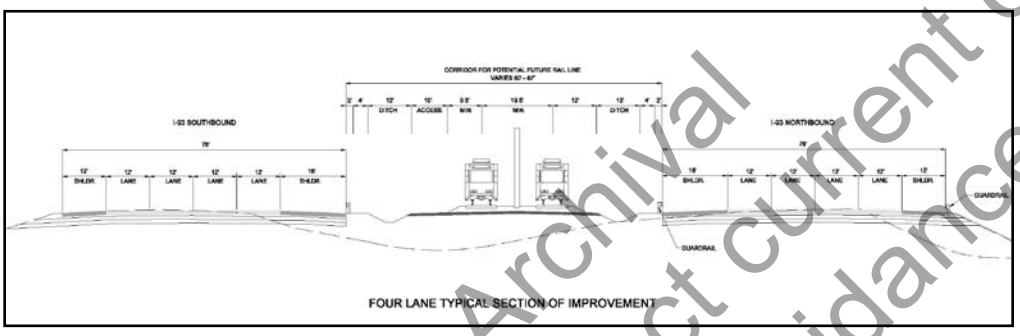

Figure 2: Four Lane Typical Section of Improvement

NHDOT has also incorporated project elements that will enhance alternate modes of transportation. These include the construction of Park and Ride facilities at exits two through five, with a new bus maintenance garage at the Exit 5 facility. In addition, the center median is being designed to accommodate a future light rail system. The project also includes numerous mitigation measures such as noise reduction (sound walls) as well as wetland and water quality initiatives. Specific design elements include the following:

- At the Exit 1 interchange, the existing Cross Street Bridge will be replaced with a new structure located just to the north of its existing location. The existing interchange will be reconstructed to improve the substandard ramp geometry.
- At Exit 2, the existing interchange will be upgraded to a diamond-type configuration, and Pelham Road will be widened from Policy Road to Stiles Road. Just north of Exit 2, the Brookdale Road Bridge will be replaced offline, utilizing the existing bridge for maintenance of traffic during construction.

- At Exit 3, both the northbound and southbound barrels of I-93 will be relocated into the median area. The interchange ramps will be reconfigured with a diamond interchange design. NH 111 and NH 111A will be relocated, reconstructed and widened.
- At Exit 4, I-93 will be widened to the east, retaining the existing layout for the southbound ramps. The northbound ramps will be reconstructed to provide longer access ramps. NH 102 will be reconstructed and widened from Londonderry Road to the southbound ramps. The NH 102 Bridge over I-93 will be replaced with a new structure built directly south of the existing bridge. The Ash Street/Pillsbury Road Bridge will be reconstructed online, utilizing a temporary overpass for maintenance of traffic during construction.
- At Exit 5, NH 28 will be widened and reconstructed from Symmes Drive to Liberty Drive. This will include reconstruction of the Perkins Road, Vista Ridge and Symmes Drive approaches, as well as the rebuilding of a portion of both Liberty and Independence Drives. The existing diamond interchange will be reconstructed and modernized.

2.3. Project Challenges

As with any major transportation project, the I-93 Improvements project faces many challenges. While many of these issues have been identified and mitigated during the draft environmental impact statement (DEIS) and final environmental impact statement (FEIS) phases, several concerns still need to be addressed through the final design and construction phases. They can be broken into four major groups: financial, socio-economic, environmental and construction.

Financial Challenges. The overall cost of the I-93 Improvements project is estimated at $480 million. Based on the State's traditional expenditures through their ten year plan (including Federal matching funds), construction of the project would need to be extended over 12 years. After much discussion, the State has proposed using Grant Anticipation Revenue Vehicle (GARVEE) Bonds to fund New Hampshire's share of the project. If GARVEE Bonds are used, the project would no longer be financially constrained, and NHDOT could pursue a much more aggressive six-year construction schedule.

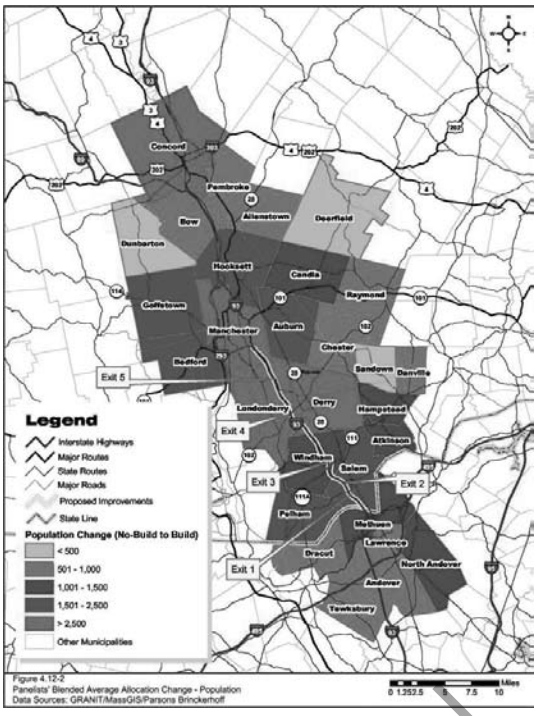

Figure 3: Population Growth

Socio-economic Challenges. Throughout the EIS process, members of the public expressed concern over the impacts that the I-93 Improvements project would have on "secondary communities" – those towns that do not fall within the project corridor but that would be influenced by the additional highway capacity and resulting regional growth. These communities are typically small, rural towns that do not have the staff resources or funds to prepare for or address issues that are associated with this type of growth. In response to these concerns, NHDOT and the State Office of Energy and Planning have developed the I-93 Community Technical Assistance Program (CTAP) and allocated $3.5 million to assist these communities. Through CTAP, a steering committee has been charged with identifying issues, prioritizing community assistance projects and allocating funding to maximize the benefit of the $3.5 million CTAP allocation.

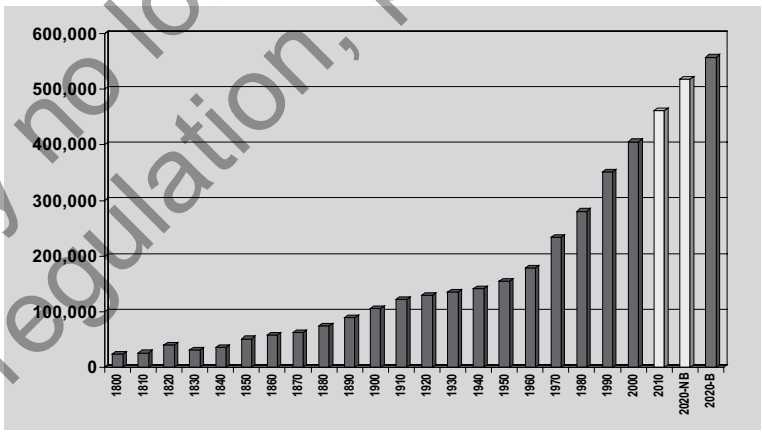

Figure 4: Population Growth in CTAP Communities

Environmental Challenges. As with any major highway expansion, the I-93 Improvements project will result in several environmental impacts that could affect endangered species, sensitive habitats, wetlands, historically significant properties/structures, hazardous materials, and noise and water quality.

Through the refinement of the preliminary and final design, NHDOT has successfully addressed and mitigated many of these impacts. Mitigation measures include the addition of sound walls; the creation of wetland sites; the inclusion of special provisions in contract documents that identify and describe specific means and methods for handling hazardous materials, endangered species and sensitive habitats; the documentation, preservation and/or relocation of historically significant properties or structures; and the use of traditional and advanced best management practices to address water quality issues.

Of special concern within the corridor is the current chloride loading in the water courses and the use of salt for snow removal and deicing. While the existing chloride levels are not solely the result of the State's deicing operations (municipal winter maintenance procedures and facilities also play a factor), the addition – and subsequent deicing – of four lanes throughout the corridor could further increase these levels. Because of these potential impacts, the record of decision (ROD) issued by the FHWA only allows the addition of one lane in each direction unless NHDOT can develop specific and measurable means for not increasing existing chloride levels within the corridor. To date, NHDOT has investigated and proposed several means to accomplish this goal:

The quantity of salt used on the improved roadway will be consistent with the Section 401 Water Quality Certification through a number of new and more effective/efficient application methods, applied technology, improved equipment and training. These include the use of salt brine solution in lieu of solid rock salt, a practice already underway in the corridor and successfully used by some other States. In addition, NHDOT will be developing a salt management plan for the I-93 corridor to document reductions in salt usage and to establish an ongoing process for monitoring and documenting the effectiveness of these efforts.

NHDOT will also incorporate roadway weather information system (RWIS) technology to provide maintenance staff with real-time pavement temperature and moisture data. This will help maximize the efficiency of winter maintenance operations and reduce salt usage by providing for more effective timing of materials application. Upgraded equipment will also increase the efficiency of salt usage. Further, as the maintenance fleet is replaced and refurbished, NHDOT will

incorporate improvements such as infrared sensors and underbody scraper plows into the new vehicles.

Maintenance personnel assigned to the I-93 corridor will receive frequent and systematic training by NHDOT on salt management reduction techniques and on the location of environmentally sensitive areas along I-93. The State will continue to explore the effectiveness and practicality of alternative deicers for use in environmentally sensitive areas through limited pilot studies and experiments throughout the State.

Finally, NHDOT has agreed to support the New Hampshire Department of Environmental Services in conducting a total maximum daily loading (TMDL) study for water bodies in the corridor designated as impaired for chloride by 1) providing information on NHDOT deicer usage and deicing practices; 2) applying NHDOT data loggers to further data collection and monitoring efforts; and 3) serving as a technical resource on best management practices for salt usage and application. The State has offered to cover part of the cost for a water-body-specific TMDL.

Construction Challenges. The primary challenge of the I-93 Improvements project will be to develop and maintain effective traffic control plans and phasing throughout construction. As noted above, current daily traffic volumes are in excess of 100,000 VPD, and any lane reductions would have an immediate effect on the mobility of the traveling public. Because of this, NHDOT is committed to providing two lanes of traffic in each direction throughout construction.

A further challenge during construction will be the execution and administration of the 25 proposed construction contracts. State guidelines limit the maximum contract value of construction contracts to encourage moderately-sized local and regional construction companies to bid on projects. Under the current proposal, traffic control and coordination will be a significant challenge.

3.1. Geotechnical/Materials/Long-life Pavement/ Maintenance

The geotechnical/materials/long-life pavement/maintenance team focused on reducing future maintenance and promoting the **"Get In, Stay In** (and get it done right)**, Get Out** and **Stay Out"** philosophy, recognizing that this approach sometimes conflicts with NHDOT's goal of accelerating construction. The team's recommendations are as follows:

Construction

- Reclaim pavement in place.
- Consider consolidation of construction contracts.
  - Consider things such as balancing earthwork, maintenance and protection of traffic, etc.
- Consider breaking out the final paving contract.
  - Allow a few contracts for placement of the final surface.
- Build out of traffic.
  - Evaluate the following options: 1) all four lanes in one barrel, or 2) three lanes in one barrel, with a moveable barrier accommodating directional traffic.
  - Utilize the shoulders as travel lanes during construction.
- Allow an onsite hot mix asphalt (HMA) plant, drum plant, crusher or concrete plant.
- Consider purchasing ROW for onsite aggregate.

Pavements

- Utilize perpetual pavements, thicker materials that are designed to minimize any stress to the bottom layers of pavement and keep future repairs to the top few inches. NHDOT would need to use an empirical design method for pavement.
  - Go with a three-quarter-inch mix for the first layer to achieve the desired density; then back up to a one-inch mix.
- Use modified (polymer) asphalts.
- Consider a long-life surface that is not porous, i.e., stone matrix asphalt (SMA). (SMA is used primarily as a surface mix.)
- Use intelligent compaction systems.
- Consider placement of thicker lifts of mixes.
- Prevent joint cracking.
  - Pave in tandem to minimize cold joints.
  - Cut back the edge of the pavement joint prior to paving.
  - Use joint adhesive.
- Look at the maximum allowable amount of reclaimed asphalt pavement (RAP) in mixes.
  - Consider increasing the amount RAP allowed in base and binder mixes.

Drainage

- Consider using underdrains. Could place an underdrain down the center of the road as well as along the edge of the roadway.
- Move away from metal pipe.
  - Use only concrete pipe under the roadway.
- Move towards plastic pipe.
  - Use only concrete pipe under the roadway.

Maintenance

- Eliminate granite curbing on the bridges.
- Consider a concrete bridge rail.
- Flatten slopes to eliminate guard rail where possible.
- Set the guard rail farther back off of the road when possible.
- Replace wood guard rail posts with steel.
- Eliminate the seeding of rock fill slopes: seeding them creates a maintenance problem.
  - Place geotextiles to eliminate plant growth, and leave only the stone slope.
- Implement the use of alternate materials (plastic, concrete, etc.) for sound walls.
  - Need to eliminate the use of timber walls because of their chromated copper arsenate (CCA) treatment. Wood also becomes a maintenance issue.

Bridges

- Build bridges in a single phase.
  - Shift traffic to allow bridges to be built in a single phase. The goal should be at least 50 percent of bridges in a single phase.
- Build bridges with bare decks.
  - Use stainless, stainless clad or concrete with corrosion inhibitor and epoxy coated rebar in the decks.
- Place thicker lifts of pavement where the bridge decks are paved.
- Replace all existing bridge steel.

Materials Testing

- Provide access to NHDOT's laboratory information management systems (LIMS).
  - Provide access through the use of a web-based system. Provide this access to NHDOT field and construction personnel as well as contractors. First, allow individuals to view the data. Second, allow field personnel to enter data.
- Require performance warranties.
  - Utilize performance warranties with bonding to ensure performance of materials.
- Implement a quality assurance (QA) specification for soils/ aggregates.

3.2. Construction/Environment

The construction/environment group discussed a number of key issues and made the following recommendations:

Sequencing

- Combine smaller contracts into larger contracts by looking at what makes sense from a construction standpoint. NHDOT should not be limited by contract dollar amount.
  - Lump bridges together.
  - Combine similar work, either by interchanges or roadway segments.
  - Widen four lanes on one barrel, open it to both directions and close the other barrel.
  - Coordinate with local municipalities regarding upcoming projects.
  - Coordinate with other DOT work (NHDOT/MassHighway).

Contract Size

- Encourage smaller contractors to join together through joint ventures.
- Eliminate the current $25 million cap.

Incentives/Disincentives

- Consider incentives/disincentives, such as:
  - Time-specific rewards.
  - Lane rentals.
  - A-plus-B contracts.
  - Holidays.
  - A five-day work week.
  - Weather days.

Soil/Erosion Control

- Require the contractor to subcontract this work.
- Space the payment by performance.
- Hire a corridor-monitoring coordinator.
- Develop a corridor-wide soil and erosion control plan.
- Establish an erosion control advisory team.
- Establish minimum bid prices, which will provide a larger pool of money.
- Conduct regular audits.
- Utilize a programmatic approach.

Culverts

- Show commitment to the environment by having a Fish and Game specialist onsite to advise on issues such as:
  - Wildlife passages.
  - Fish passages.
  - Sediments/washouts.

Additional Recommendations

- Require the contractor to subcontract landscaping work.
- Develop a hazardous materials (HAZMAT) risk management plan. It is vital to remain responsive to the environmental sensitivity of the area.
- Develop a multi-agency technical review team that will be proactive regarding environmental issues such as endangered species.
- Establish and enforce dust control performance measures.
- Follow the recommendations in the ROD regarding blasting wells. This will demonstrate NHDOT's adherence to its commitment.
- Establish the baseline turbidity of water courses to account for natural seasonal fluctuations, which will enable NHDOT to better defend itself should any water quality issues arise.
- Secure the water supply for landscaping, hygiene and dust control via artesian wells.
- Limit design-build (D-B) to the smaller bridges to meet current legislative requirements.
- Consider a corridor-wide traffic control plan/manager, and optimize sequencing based on critical path method (CPM).
- Finalize the TMDL/chloride issues for an eight-lane section by the end of 2007.

3.3. Innovative Financing/Contracting

The innovative financing/contracting skill set discussed a variety of methods to minimize financial constraints and accelerate construction:

GARVEE Bonds

- Use to supplement NHDOT's 10-year-plan funds. Bonds are legislated for use on this project and backed by the entire program.
- Lock in long-term rates to save money.
- Retain flexibility in the bonding structure.
- Put a short-term borrowing mechanism in place.

Local Participation

- Utilize transportation mitigation fees that will be paid by the developers.

Gas Tax

- Increase the current gas tax. Index it as a percentage of the cost per gallon.

Utility Leasing Revenues

- Charge for the use of ROW or lease the conduit.

HOV/HOT

- Generate revenue through a high occupancy vehicle/high occupancy toll (HOV/HOT) lane.

Tolls

- Establish a pilot program for maintenance on the new lanes.

Public/Private Participation

- Market commercial use of real estate, and consider leasing the entire corridor.

Delivery Options

- Pre-purchase materials.
- Designate an agency program manager.
- Incorporate the benefits of D-B into the current process.
- Consider corridor-wide contracts.

Contract Packaging

- Encourage larger contracts through the use of a subcontracting program.
- Explore shifting traffic to allow constructing one side and then the other.

Bidding Options

- Consider contract options such as A-plus-B bidding, lane rentals and tied bidding, where contractors can bid combined contracts with the right to select individual packages.
- Utilize incentive-based contracting.
  - Provide both incentives and disincentives.
  - Utilize active management payment method (AMPM).
- Use CPM scheduling.
  - Use integrated cost loaded schedules.
  - Tie design, ROW, utilities and construction together.
- Establish master utility agreements. Cost-share utility relocations and potential fines for noncompliance.
- Do constructability reviews. Provide for a 90 percent plan review by contractors and the construction bureau.
- Establish performance specifications.
  - Require contractor quality assurance/quality control (QA/QC).
- Change the existing management committee/dispute review board.
  - Streamline the change order process and resolve disputes more efficiently.

3.4. Structures/Roadway/Geometric Design

The structures/roadway/geometric design team offered a number of suggestions on ways to expedite construction and streamline the project budget:

- Utilize stay-in-place (SIP) steel/concrete deck forms.
  - Would expedite forming during construction.
- Use steel bridge girders where structure depth is a control.
  - Need six to12 inches of additional depth for additional span length. The limited vertical clearance prohibits the use of precast structures.
- Consider Epping rapid bridge construction. This provides a good example of total bridge fabrication.
- Give the contractor options for bridge construction, i.e., precast vs. traditional. Provide the project timeframe, and let the price determine which option is most feasible.
- Consider opportunities within the "Buy America" provisions.
  - What about fabrication in Canada?
- Skid the bridges into place.
  - Build the new bridge alongside the existing bridge, and jack it horizontally into place. A 30-foot shift is possible in one night. Would require close interaction with public relations (PR) and the use of advanced signage. Would need to close the Interstate between interchanges and detour traffic to Route 3.
- Utilize temporary bridges to offset additional precast costs.
  - Could realize savings by combining rapid construction techniques with short detours.
- Consider short-term overpass bridge closures.
  - Use rapid construction techniques to expedite construction.
- Use manufactured fill for embankment material, expediting fill placement.
- Utilize balanced earthwork contracts.
  - Attempt to let contracts that have balanced cuts and fills.
- Relocate utilities off of the bridges, either temporarily or permanently.
- Remove the historical grasshopper bridge, and display it at a location to be determined.
- Pre-bid the structural steel and precast elements as a separate contract, expediting onsite construction.
- Consider intent-to-build plans versus shop drawing plans.
  - Reduce the volume of shop drawings to expedite the review periods.
- Establish procedures for paperless construction management (electronic shop drawings, requests for information (RFIs) and correspondence).
- Consider a full-scale crossover from northbound to southbound, or vice versa.
  - Build one side with staged construction, move both barrels onto the completed side and construct the other barrel outside traffic.

- Utilize a roundabout/single point diamond interchange (SPDI) design at ramp termini. This would help minimize the roadway width under the bridges.
- Consider reimbursement for utility relocations, expediting relocation delays.
- Investigate supplier capacity: there is concern over the volume of work and the ability of fabricators to meet these demands.
- Utilize steel and concrete bridges as appropriate by site. Concern over material uniformity is secondary.
- Use high performance steel, concrete beams and epoxy-coated rebar for long-term durability of structures.
- Use membrane and overlay on most decks, but consider a bare concrete deck where pavement shoving is a concern.
- Use pre-fabricated retaining walls to expedite construction.
- Detour the Exit 1 northbound off-ramp to Exit 2 to expedite bridge and roadway construction at South Policy Street.
- Construct temporary abutments/bents at the Brookdale Road Bridge. Move the existing deck onto a temporary structure, and construct the new bridge in the existing location.
- Consider reducing the number of intersections east of the interchange along Route 111.
  - Eliminate the existing Route 111-A/111 intersection near McDonalds.
  - Look at redundant roadways moving away from Route 111.
- Investigate the feasibility of recycling the existing pavement.
- Consider winter construction restrictions.
  - Relax limitations on roadway closures.

3.5. Traffic Management/Safety/ITS/Incident Management/Public Relations

The traffic management/safety/ITS/incident management/public relations group made the following recommendations:

Public Relations

- Consider hiring a full-time PR/marketing firm to develop the message, theme, etc., for the project.
  - Keep the public informed. Focus is needed on helping the public understand the inconveniences of construction.
  - Promote the project.
- Use the media to help with PR. Consider a public naming of the project: this would help develop pride in the project.
  - Consider focus group surveys.
  - Work with Channel 9 to interview users.
  - Focus on how the project is being done in a small State with substantial growth potential.
- Consider a booth at fairs to educate users of the project.

Traffic Management/ITS/IM

- Designate a corridor-wide central authority/oversight for traffic management, incident management and liaison work. He/she would be the central point of contact for all traffic management and incident management (IM) issues.
- Consider full-time onsite expertise to deal with traffic control and incident management events (i.e., a local emergency traffic management center). Could be contracted out as a separate item. This would provide centralized control over communication and operations capabilities.
- Develop a work zone safety campaign. Utilize public service announcements (PSAs) and real-time traffic information that would be available on a project web site.
- Consider smart work zones that would be controlled by the contractors.
  - Identify where to use them, how the information would be disseminated, etc.
  - Use highway advisory signs, traffic sensors, etc.
- Consider weekend construction.
- Encourage use of Route 3 through reduced/eliminated tolls, possibly during major incidents only.
- Establish a command post to coordinate and respond during emergencies: radio communications between agencies has been a problem in the past.
  - Consider using police-use camera phones to record and send information on traffic conditions/incidents.
- Improve NHDOT's ability to respond to emergency incidents, and consider additional means of access to respond to emergency incidents during and after construction.
  - Must get up to speed before the project is started.
  - Need to be able to locate, verify and respond to all incidents.
  - Provide advanced and continuous training to assist with incident response.
- Install cameras: they would be helpful in identifying HAZMAT incidents.
- Consider discounts to encourage increased use of Park and Ride facilities.

Safety

- Increase the safety of motorists and workers during construction by using techniques such as:
  - Installing temporary/moveable barriers.
  - Shifting traffic to one barrel.
  - Providing emergency pull-offs (shoulders) during construction.
  - Having contractors provide for emergency access at choke points.

3.6. Right-of-Way/Utilities

The ROW/utilities skill set discussed ways to expedite ROW acquisition and utility relocations. They made the following recommendations:

ROW

- Provide for early ROW definition.
  - Identify and exclude locations subject to change, such as drainage outfalls and storm water treatment areas. In all other areas, set ROW limits early based on preliminary design approval. Do not wait for approval of slope and drain submission.
- Simplify the ROW plan process.
  - Look at the revisions NHDOT is making. This may be the time to implement them.
  - Do abstracting updates sooner based on the construction schedule.
- Establish a dedicated ROW coordinator.
  - Assign a dedicated ROW coordinator to 1) ensure timely project delivery, and 2) provide QA/QC. This could be someone from NHDOT or a subcontractor.
- Review the Corridor Preservation Statute, and evaluate the benefits of using this statute for the I-93 project.
- Use incentives to acquire property more expeditiously.
- Provide stockpiling, staging and construction access. Identify access areas where ROW acquisitions may be required.

Utilities

- Begin the process of utility coordination early to identify impacts, relocations, etc., and begin looking at solutions and alternatives.
- Provide for early relocation of reimbursable utilities with property rights, i.e., water, sewer, power transmission, etc. Identify utility relocations that will require ROW acquisitions.
- Identify unique or long lead materials so they don't delay construction.
- Utilize subsurface utility engineering (SUE) to accurately identify utilities at all road crossings and interchanges throughout the corridor.
- Establish a dedicated utility coordinator.
- Consider utility construction incentives.
- Identify specific utility corridors adjacent to crossing roadways and interchanges outside of conflict areas.

4.1. Next Steps

In the days following the I-93 Improvements workshop, NHDOT asked various skill set members to prioritize each idea on a scale of 1 to 10, ranking its potential to accelerate construction. Key NHDOT personnel then reviewed these rankings and compiled the following set of final recommendations.

In addition to bringing forth numerous innovative ideas, the workshop affirmed many of the ideas/strategies that NHDOT was considering for use on the project. Some of these ideas would normally be outside of the department's standard procedure or practices, but NHDOT administration believes that it would be beneficial to utilize them on a project of this magnitude.

The workshop provided the opportunity for NHDOT personnel to discuss a plethora of innovative ideas with experts from across the country. NHDOT plans on evaluating each of the final recommendations and developing a plan for implementation during the remainder of the design and construction phases.

Once again, the ACTT process has proven to be a valuable tool in project planning, innovation and success.

4.2. Final Recommendations

Geotechnical/Materials/Long-life Pavement/Maintenance

- Consider breaking out the final paving contract.
- Consider onsite HMA drum/crusher/concrete/precast plants.
- Consider utilizing a perpetual pavement design.
- Include joint cracking prevention in the pavement program.
- Use underdrains versus additional sand in the typical section.
- Provide web access to LIMS and other materials databases.
- Reclaim pavements when possible and appropriate.

Construction/Environment

Construction

- Complete constructability reviews and evaluate material hauling routes outside of the mainline.
- Optimize construction sequencing by utilizing corridor-wide CPM scheduling.
- Assign a corridor-wide traffic control manager.
- Assign a corridor-wide construction management team.
- Develop contracts to establish corridor-wide monitors for environmental, water quality and erosion control efforts.

Environment

- Finalize TMDL issues for the eight-lane section by the end of 2007.
- Develop a multi-agency technical advisory team.
- Develop a risk management plan for resource protection.
- Secure a water source.

Innovative Financing/Contracting

- Evaluate larger contracts.
  - Consider total cost, schedule, traffic control and constructability issues.
- Utilize time-based contracting strategies when appropriate, such as:
  - A-plus-B bidding.
  - Incentives/disincentives.
  - AMPM.
  - Tied bidding.
- Complete reviews on constructability and contract packaging with industry.

Structures/Roadway/Geometric Design

Structures

- Minimize phased construction.
- Utilize NHDOT's existing partial-depth precast concrete deck panel substitution option at all bridge locations; full-depth precast post-tensioned concrete deck panels may be considered on bridges that require rapid construction.
- Consider stub abutments on piles (piles are required due to seismic) behind mechanically stabilized earth (MSE) walls first. Prefabrication of bridge substructures, including precast stub abutments, could be used to accelerate construction when appropriate.
- Skid bridges using self-propelled modular transporters (SPMTs) and other means.
- Consider relocating utilities off bridges.
- Advertise an early contract for fabrication of structural steel and precast elements to expedite construction and to increase supplier capacity.
- Consider acceptance of intent-to-build shop drawing plans to expedite review time.
- Consider acceptance of electronic shop drawings to expedite review time.
- Consider bare decks where pavement shoving is a concern.
- Use prefabricated retaining walls.
- Consider relaxing winter construction restrictions.

Roadway/Geometric Design

- Balance earthwork contracts.
- Investigate full-scale crossover from northbound to southbound or vice versa.
- Consider reimbursement for utility relocations.

Traffic Management/Safety/ITS/Incident Management/Public Relations

Traffic Management

- Establish a corridor-wide traffic control manager.
- Establish a local operations center.
- Utilize smart work zone technology.
- Institute a courtesy vehicle program.
- Improve emergency access.

Public Relations

- Develop a detailed PR plan to keep users informed.
- Consider hiring a full-time PR firm to develop the plan.
- Consider establishing a full-time PR position to manage the plan.

Right-of-Way/Utilities

ROW

- Establish a dedicated ROW coordinator for the corridor.
- Complete early ROW definitions and advance acquisitions when possible.
- Simplify the ROW plan process.
- Utilize incentives to accelerate ROW acquisition.

Utilities

- Identify early utility relocations in the critical path.
- Continue use of the SUE program.
- Establish a dedicated utility coordinator.
- Consider partnering with utilities to share cost when appropriate.

LIST OF ACRONYMS

ACRONYM	FULL NAME
AASHTO	American Association of State Highway and Transportation Officials
ACTT	Accelerated Construction Technology Transfer
AGC	Associated General Contractors of America
AMPM	Active Management Payment Method
CCA	Chromated Copper Arsenate
CPM	Critical Path Method
CTAP	Community Technical Assistance Program
D-B	Design-Build
DEIS	Draft Environmental Impact Statement
DOT	Department of Transportation
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
GARVEE	Grant Anticipation Revenue Vehicle
HAZMAT	Hazardous Materials
HMA	Hot Mix Asphalt
HOV/HOT	High Occupancy Vehicle/High Occupancy Toll
IM	Incident Management
IT/ITS	Intelligent Transportation/Intelligent Transportation Systems
LIMS	Laboratory Information Management System
LOS	Level of Service
MSE	Mechanically Stabilized Earth
NHDOT	New Hampshire Department of Transportation
PR	Public Relations
PSAs	Public Service Announcements
QA/QC	Quality Assurance/Quality Control
RAP	Reclaimed Asphalt Pavements
RFI	Request for Information
ROD	Record of Decision
ROW	Right-of-Way
RWIS	Roadway Weather Information System
SIP Forms	Stay-in-place Forms
SMA	Stone Matrix Asphalt
SPDI	Single Point Diamond Interchange
SPMTs	Self-propelled Modular Transporters
SUE	Subsurface Utility Engineering
TIG	Technology Implementation Group
TMDL	Total Maximum Daily Loading
TRB	Transportation Research Board
VPD	Vehicles Per Day

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SKILL SET RECORDING FORMS

Skill Sets:

- **Geotechnical/Materials/Long-life Pavement/Maintenance**
- **Construction/Environment**
- **Innovative Financing/Contracting**
- **Structures/Roadway/Geometric Design**
- **Traffic Management/Safety/ITS/Incident Management/Public Relations**
- **ROW/Utilities**

Geotechnical/Materials/Long-life Pavement/Maintenance

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Geotechnical/Materials/Long-life Pavement/Maintenance Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
CONSTRUCTION		
Pavement	Reclaim pavement in place.	Advantages: reduces cost, time and inconvenience to surrounding communities (no hauling). Environmentally friendly: reusing material. Barriers: have to deal with the existing roadway box and the change in profile. Requires full depth reconstruction in some areas.
Consolidation of contracts	Consider consolidation of construction contracts to move away from 20-plus contracts and towards fewer projects. Look at things such as balancing earthwork, maintenance and protection of traffic, etc.	Advantages: offers time and cost savings, increases quality of work. Barriers: faces concerns over cost: the dollar value of individual contracts would exceed current NHDOT guidelines.
Final paving contract	Consider breaking out the final paving contract. Allow a few contracts for placement of the final surface.	Advantages: would provide a better final surface, especially if SMA is used. Barriers: requires coordination with other construction projects.
Building out of traffic	Options include the following: 1) all four lanes in one barrel, or 2) three lanes in one barrel, with the use of moveable barrier to accommodate directional traffic. Could utilize shoulders as travel lanes during construction.	Advantages: allows faster, better and safer construction (for workers and the public). Provides cost savings. Barriers: requires construction of cross-overs; issues with getting traffic to exits.

Geotechnical/Materials/Long-life Pavement/Maintenance Skill Set		
Idea Name	***Detailed Description***	***Implementation Details*** ***(barriers, skills set coordination, etc.)***
Onsite plants	Allow onsite HMA drum plant, crusher or concrete plant.	Advantages: saves time and money and reduces hauling (reduced impact to local road and reduced emissions). Barriers: need space onsite. There are potential noise issues with local residents. Environmental permits would be required.
Onsite aggregate	Consider purchasing ROW for onsite aggregate.	Advantages: provides cost savings, a reduction in hauling and reduced environmental impact (reduced impact to local road and reduced emissions). Barriers: incurs the extra cost of purchasing the land as well as potential (extra) environmental impacts.
PAVEMENTS		
Perpetual pavements	Go with a three-quarter-inch mix for the first layer to get good density; then back up to a one-inch mix. This thicker pavement is designed to minimize any stress in the bottom layers of pavement and therefore require future repairs of only the top few inches. Would need to use a mechanistic empirical design method for pavement.	Advantages: would minimize future repairs to a mill and replace, eliminating the need to reset basins and guard rail. Would eliminate the need for full depth replacement in the future. Barriers: has the extra initial cost of placing four more inches of pavement; the concept of perpetual pavements considers loading from top (traffic) and not necessarily loading due to frost on the bottom of the pavement.
Modified asphalts (polymers)	Use modified asphalts (polymers).	Advantages: are more rut-resistant and more durable. There is less maintenance because they are a long-life pavement. Barriers: have a higher initial cost.

Geotechnical/Materials/Long-life Pavement/Maintenance Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Long-life nonporous surface	Consider SMA surface pavement.	Advantages: is nonporous, doesn't age quickly and is resistant to rutting. It's potentially a noise reducing pavement. Previous use shows that there is not a problem with segregation of mix. Barriers: has not been used before in NH. Need some pilot projects prior to using on I-93. The potential learning curve is 10,000 tons for mix and placement.
Intelligent compaction systems		Advantages: allows continuous monitoring of pavement compaction during rolling operation. Barriers: need new equipment at a cost of $25,000 to $100,000. Bomag has offered the equipment.
Thicker lifts	Consider placement of thicker lifts of mixes.	Advantages: increases NHDOT's ability to achieve density, reduces the number of paving lifts and the resulting construction timeframe. Barriers: none.
Prevention of joint cracking	Pave in tandem to minimize cold joints. Cut back the edge of the pavement joint prior to paving. Use joint adhesive.	Advantages: eliminates cold joints. Barriers: is not always possible based on phasing of construction. Advantages: removes low density material on the unsupported edge of the pavement. Barriers: increases construction time and initial cost. Advantages: seals pavement joints; prevents raveling. Barriers: increases initial cost.

Geotechnical/Materials/Long-life Pavement/Maintenance Skill Set		
Idea Name	***Detailed Description***	***Implementation Details*** ***(barriers, skills set coordination, etc.)***
Maximum allowable amount of RAP	Look at the maximum allowable amount of RAP in mixes. Consider increasing the amount of RAP allowed in base and binder mixes.	Advantages: uses up millings and reduces cost; minimizes environmental impact by maximizing recycling. Barriers: need to address gradation control; current NHDOT specifications call for maximum of 30 percent in a drum plant and 20 percent in a batch plant for base and binder. The maximum allowed in surface mix is 15 percent.
DRAINAGE		
Underdrains	Consider placing an underdrain down the center of the road as well as along the edge of the roadway.	Advantages: addresses potential water problems. Center line underdrain would address the potential problem with matching of the new box with the existing box. Barriers: has an ongoing maintenance issue: it would need to be flushed. Might need to modify detail for backfilling of underdrain and move away from using sand. Also faces additional cost.
Moving away from metal pipe	Only concrete pipe should still be used under the roadway.	Advantages: reduces maintenance. Barriers: may still be applications in which metal pipe is the best solution.
Moving towards plastic pipe	Only concrete pipe should be used under the roadway.	Advantages: provides a better long-term pipe. Barriers: may need to "tie down" pipe: in wet areas, plastic pipe tends to float. The current NHDOT maximum size allowable is 36 inches.

Geotechnical/Materials/Long-life Pavement/Maintenance Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
MAINTENANCE		
Granite curbing on bridges	Eliminate granite curbing on bridges.	Advantages: reduces maintenance and dislodging of curb. Lowers construction costs. Barriers: is a change from traditional design.
Concrete bridge rail	Utilize concrete bridge rail instead of metal.	Advantages: reduces maintenance on metal bridge rails damaged by plowing. Provides potential cost savings. Barriers: requires redesign of exterior girders for existing bridges and potential modifications to these bridges. Potential issue with FHWA approval: need crash testing.
Elimination of guard rail	Flatten slopes to eliminate guard rail, where possible.	Advantages: improves safety. Elimination of guard rail would reduce cost and future maintenance. Could utilize waste material and eliminate disposal cost. Barriers: has greater environmental impact and potential need for more material.
Guard rail back off of road	If possible, place guard rail farther off of the road and not on the edge of the pavement.	Advantages: reduces damage and therefore reduces maintenance. Barriers: none.
Steel guard rail posts	Replace wood guard rail posts with steel.	Advantages: provides for easier repairs after damage; when replaced, the metal rail can be recycled. Barriers: is a change from traditional design.
Geotextiles	Eliminate placement of soil and seeding of rock fill slopes. Seeding of rock fill slopes creates a maintenance problem. Instead, place a geotextile to eliminate growth and just leave the stone slope.	Advantages: eliminates mowing of slopes. Barriers: is not as aesthetically pleasing as a grass slope.

Geotechnical/Materials/Long-life Pavement/Maintenance Skill Set		
Idea Name	***Detailed Description***	***Implementation Details*** ***(barriers, skills set coordination, etc.)***
Alternate material sound walls	Implement the use of alternate material (plastic, concrete, etc.) sound walls. Look to eliminate the use of timber walls due to CCA treatment. Wood also becomes a maintenance issue.	Advantages: reduces maintenance (plastic). Concrete offers a variety of facial treatments that are potentially more aesthetically pleasing. Barriers: are subject to ultraviolet (UV) degradation/ fading (plastic). Concrete sound walls are potentially a maintenance issue because they require replacement when damaged.
BRIDGE		
Single phase bridge construction	Shift traffic to allow building of bridges in a single phase. Goal should be at least 50 percent of bridges constructed in one phase.	Advantages: can eliminate joints in bridge decks, speed up construction time and save cost. Construction offline reduces the need for temporary structures. Barriers: requires putting traffic offline.
Bare deck bridges	Build bridges with bare decks. Could possibly use stainless, stainless clad or epoxy with corrosion inhibitor rebar on decks.	Advantages: reduces maintenance; is easier/cheaper to build. Barriers: lack local experience with finishing bare decks: could lead to a less than optimal deck finish and a possible need to go back and grind the deck.
Thicker lifts	Where bridge decks are paved, place thicker lifts of pavement. Need to cross check with bridge skill set.	Advantages: allows for future milling operations without worrying about milling into the deck or membrane. Barriers: have the design issue of extra weight to address.
Existing bridge steel	Replace existing bridge steel. Need to cross check with bridge skill set.	Advantages: eliminates future painting and lead paint issues. Barriers: costs more and requires more time.

Geotechnical/Materials/Long-life Pavement/Maintenance Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
MATERIALS TESTING		
LIMS data	Provide access through the use of a web-based system. Allow access to NHDOT field/ construction personnel and contractors. The first step is to allow viewing of the data; the second, to allow entering of data by field personnel.	Advantages: provides for quick dissemination of information. Barriers: need to develop web-based system: the current LIMS is not web-based. Cost and available internal resources (other priorities) are also issues.
Performance warranties	Implement performance warranties with bonding to ensure performance of materials. This was primarily a discussion about pavement.	Advantages: provides means for keeping the quality of the pavement at a certain level. Barriers: is difficult to define warranty criteria; bonding to ensure the warranty is also a challenge.
QA specification for soils/aggregates		Advantages: guarantees higher quality products. Barriers: may require a reallocation of NHDOT staff, not necessarily an increase in staff. Contractors may have to add QC staff, which could increase the overall cost.

Construction/Environment

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Construction/Environment Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Sequencing	Look to combine smaller contracts into larger contracts by looking at what makes sense from a construction standpoint. Should not be limited by contract dollar amount. Possibilities include lumping bridges together; combining similar work; grouping by interchanges or roadway segments; widening four lanes on one barrel, opening to both directions and closing the other barrel; coordinating with local municipalities for their projects; and coordinating with other DOT work (NHDOT/MassHighway).	
Contract size	Encourage smaller contractors to join together (joint ventures). Extend beyond the $25 million maximum.	
Incentives/disincentives	Consider time-based incentives, lane rentals, A-plus-B contracts, holidays, a five-day work week, weekends and weather days/construction season.	Would need to more closely evaluate schedule requirements.
Soil/erosion control	Require the contractor to sub this out. Space payments by performance. Hire a corridor-monitoring coordinator. Develop a corridor-wide E & S plan. Establish an erosion control advisory team. Set minimum bid prices. Conduct regular audits. Take a programmatic approach to the corridor.	
Landscaping	Require the contractor to sub this out.	
HAZMAT spill response	Look at developing a risk management plan to remain responsive to the environmental sensitivity of the area.	
Endangered species	Develop a multi agency technical review team to be proactive and responsive to environmental issues.	

Construction/Environment Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Culverts	Have a Fish and Game specialist onsite to monitor/advise on wildlife passages, fish passages, and sediments and washouts. Will show NHDOT's commitment.	
Dust	Establish performance measures.	Consider water availability: it is an issue. Note that calcium chloride is probably a bad idea: need to find alternate means of dust control.
Blasting/wells	Follow the recommendations in the ROD. This will demonstrate an adherence to commitment.	
Stream monitoring	Establish baseline turbidity of water courses to account for natural seasonal fluctuations. Will protect/allow NHDOT to better defend itself in court.	
Water sources	Need to secure water supply via artesian wells for landscaping, hygiene, dust control.	
D-B	Limit D-B to smaller bridges to meet current legislative requirements.	
Corridor-wide CPM	Look at a corridor-wide traffic control plan and manager, and optimize sequencing based on CPM.	
TMDL	Finalize the TMDL/chloride issues for an eight lane section by the end of 2007.	

Innovative Financing/Contracting

SKILL SET ROSTER:

Facilitator: Sid Scott, Trauner Consulting Services
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Frank Bauer, NHDOT, District Construction Engineer
Mark Charbonneau, Continental Paving
David Giardino, Plexus Corp.
Jim Hatter, FHWA, Innovative Finance Manager
Terri Marcelli, FHWA, Financial Specialist
Tom Martin, NHDOT, Director of Finance

Innovative Financing/Contracting Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
GARVEE bonds	Use to supplement 10-year-plan funds. Bonds are legislated for use on this project and backed by the entire program. Lock in long-term rates to save money. Retain flexibility in the bonding structure. Put short-term borrowing mechanism in place.	Need to rate bonds, look at the whole program vs. I-93, cover the cost to finance, plan for finance contingencies, manage monthly cash flow, create a more detailed financial plan, and structure the bond with flexibility. Timing is critical.
Local participation/developers	Consider transportation mitigation fees paid by developers.	Consider a fee system driven by local governments/ multiple communities along corridor. Institute a State impact fee system.
Gas tax	Increase current gas tax. Should be indexed as a percentage of the cost per gallon.	Note that NH's gas tax is lower than the surrounding States. Legislative action would be required. Indexing is an issue.
Utility leasing revenues	Charge for use of ROW or lease the conduit.	Assess marketability and NHDOT's rights to do this.
HOV/HOT	Utilize revenue generated from the HOT lane.	Would require transponders. Marketability is an issue.
Tolls	Institute a pilot program for maintenance or new lanes.	Would have political ramifications.
Public/private participation	Market commercial use of the real estate, and lease the entire corridor for opportunities.	Would require legislation and would face local opposition.
Delivery options	Pre-buy materials. Designate an agency program manager. Incorporate benefits of D-B into current process. Utilize corridor-wide contracts.	Would require contract coordination: it's a new concept. Would require DOT/consultant collaboration. (The concept is in place.) Necessitates overall coordination of contracts, master scheduling, lump sum bidding, fast-tracking of design and construction, and early contractor involvement for constructability reviews. Consider for utility coordination, incident management, and traffic, environmental and safety management.

Innovative Financing/Contracting Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Contract packaging	Consider larger contracts with subcontracting program. Explore shifting traffic to allow constructing one side and then the other.	Look at the fact that smaller projects ($25 million) are more typical. There is a six-year overall program management plan. Larger contracts would streamline all aspects. Can structure smaller contracts as well.
Bidding options	Utilize A-plus-B bidding, lane rentals and/or tied bidding, where the contractors bid a combined contract with the right to select individual packages.	Consider impacts of adjacent projects on schedule. These are new concepts; NHDOT has limited experience with them.
Incentive based contracting	Utilize incentives and disincentives. Consider AMPM.	Provide contract incentives/disincentives for major milestones. Justification of disincentives could be an issue, as could conflicts with adjacent contracts. Incentives for reducing travel time are a new concept.
CPM scheduling	Consider integrated cost loaded schedules that are tied to design, ROW, utilities and construction.	Need adequate education and training. There are multiple tier requirements.
Master utility agreements	Cost share utility relocations and incorporate fines for non-compliance.	Requires legislation and enforcement.
Constructability reviews	Have a 90 percent plan review by the industry and the construction bureau.	Even though contractors may not show ALL their ideas, could result in a lower bid.
Performance specifications	Require contractor QA/QC.	Might necessitate pay adjustments.
Management committee/dispute review board	Streamline the change order process to resolve disputes more quickly.	Need to avoid disputes/resolve them more quickly to lessen financial impacts.

Structures/Roadway/Geometric Design

SKILL SET ROSTER:

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Dan Prehemo, NHDOT, I-93 Design Team
Nils Skorve, Evroks Corp.

Structures/Roadway/Geometric Design Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
SIP steel/concrete deck forms	Use to expedite forming during construction.	Could see leakage and inspection concerns with steel, cracking with precast panels.
Membrane system	No good membrane system has been found.	Faces deck issues from water.
Steel bridge girders	Use steel bridge girders where structure depth is a control. Six to 12 inches of additional depth is required for additional span length: the limited vertical clearance prohibits precast.	
Epping rapid bridge construction	This provides a good example of total bridge fabrication.	Is 2.2 times the cost of traditional construction. The larger volume should reduce the cost to a 0-25 percent increase. The biggest benefit is the reduction in time, as bridges are typically the critical path for the construction schedule.
Options for bridge construction types	Give the contractor options, i.e., precast versus traditional. Provide the timeframe for the project and let the price determine the winning bid.	Aren't many precasters in New Hampshire.
Opportunities within Buy America provisions	Determine if NHDOT could allow fabrication in Canada.	Need to investigate FHWA regulations.
Skidding of bridges	Build new bridge alongside the existing bridge and jack horizontally into place. A 30-foot shift is possible in a night.	Requires extensive PR and advanced signage. Would need to close the Interstate between interchanges and detour traffic to Route 3. Cost is an issue.
Temporary bridge costs	Temporary bridge costs could offset additional precast costs. Need to combine rapid construction techniques combined with short detours.	Could face public resistance.
Short-term overpass bridge closures	Use rapid construction techniques to expedite construction.	Need to address emergency response concerns.

Structures/Roadway/Geometric Design Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Manufactured fill for embankment material	Expedite fill placement.	Could be cost prohibitive.
Balanced earthwork contracts	Attempt to let contracts that have balanced cuts and fills.	May not be cost effective.
Utility relocations	Relocate utilities off bridges, either temporarily or permanently, to accelerate construction.	Need to make sure timing is right.
Historical bridge yard	Remove grasshopper bridge and display at a location not yet determined.	Would be costly. ROW is a concern.
Pre-bid structural steel and precast elements	Bid these items as a separate contract to expedite onsite construction.	Include storage and duration costs in the bid. Would minimize coordination between the general contractor and the fabricator. (Currently, it takes six to nine months from shop drawing to delivery, according to Dan Dorgan of MNDOT.)
Intent-to-build plans versus shop drawing plans	Reduce the volume of shop drawings to expedite the review period.	Review engineer control concerns (60 sheets versus 15 sheets). High steel structures is a contact for this idea.
Electronic shop drawing submissions, RFIs and correspondence	Establish procedures for paperless construction management.	Offers real time and cost savings: RFI turnaround is three days versus three weeks. Allow direct submittal from the fabricator to the review engineer (consultant) and cc other stakeholders (i.e., the general contractor, construction, bridge, etc.). Need to consider electronic seals and stamps. They could be completed once the reviews and final plans are complete.
Full scale crossover from northbound to southbound or vice versa	Build one side with staged construction, move both barrels onto the completed side and construct the other barrel outside of traffic.	Look at interchange connections and environmental constraints.
Roundabout/SPDI design at ramp termini	The intent is to minimize roadway width under the bridges.	Look at traffic, topography and ROW.
Reimbursement for utility relocations	Use to expedite relocation delays.	Address concerns with State laws.

Structures/Roadway/Geometric Design Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Supplier capacity	Investigate concern over the volume of work and the ability of fabricators to meet these demands.	Use pre-bidding to alleviate this concern.
Steel and concrete bridges	Bridge selection should be site-based; material uniformity should not be the driving factor.	Would not provide conformity throughout the corridor.
Long-term durability of structures	Use high performance steel and concrete beams.	
Rebar	Use epoxy-coated rebar.	Provides corrosion protection.
Deck protection	Use membrane and overlay on most decks, but consider bare concrete deck where pavement shoving is a concern.	
Retaining walls	Use pre-fabricated walls to expedite construction.	Consider TWall or doublewall (gravity walls).
Exit 1 northbound off-ramp	Detour the Exit 1 northbound off-ramp to Exit 2: this will expedite bridge and roadway construction at South Policy Street.	Look at detour costs, traffic implications and time savings.
Brookdale Road Bridge	Construct temporary abutments/bents, move the existing deck onto the temporary and construct the new bridge in the existing location.	Need to look at cost. Would require closing I-93 for a night.
Number of intersections east of interchange, along 111	Consider reducing the number of intersections east of the interchange, along 111. Eliminate existing Route 111-A/111 intersection near McDonalds.	Could encounter public resistance.
Recycling of existing pavement	Investigate recycling of existing pavement.	Recommended to pavement and geotechnical skill sets.
Winter construction restrictions	Relax the limitations on roadway closures.	Need to address NHDOT policy and maintenance concerns.

Traffic Management/Safety/ITS/Incident Management/Public Relations

SKILL SET ROSTER:

Facilitator: Greg Jones, FHWA, Traffic Management & Operations
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Traffic Management/Safety/ITS/IM/PR Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Public Relations Idea #1 Full-time PR/marketing firm	Consider hiring a full-time PR/marketing firm to identify message, theme, etc., for the project. A PR campaign is needed to keep people informed. The focus needs to be on making the public understand the inconveniences of construction.	Historically, have not marketed in New Hampshire.
Promoting the project	NHDOT needs to promote the project.	Get away from the term "widening" and use "rebuilding."
Public Relations Idea #2 The media and PR	Use the media to help with public relations. Consider public naming of the project – would increase public pride. Consider focus group surveys. Work with Channel 9 to interview users.	Need to help people understand and accept the project. The project is being done in a small State with substantial growth potential.
Public Relations Idea #3 Fair booths	Consider a booth at area fairs to educate users about the project.	
Traffic Management/ITS/IM Idea #1 Corridor-wide "CEO" oversight	Designate corridor-wide "CEO" oversight for traffic management, incident management and liaison work. Individual would be the central point of contact for all traffic management and incident management issues.	
Traffic Management/ITS/IM Idea #2 Full-time onsite expertise for traffic control and incident management events	For quick response, consider full-time onsite expertise to deal with traffic control and incident management events (i.e., a local emergency traffic management center). Could be contracted out as a separate contract. Would provide centralized control over communication and operations capabilities.	Need to provide TV/media with easy access to identify where traffic jams are, etc.
Traffic Management/ITS/IM Idea #3 Work zone safety PSAs	Consider making real-time traffic conditions available on the web site.	Consider using radio/traffic reports.
Traffic Management/ITS/IM Idea #4 Contractor-controlled smart work zones	Use highway advisory signs, traffic sensors, etc.	Need to identify where we are going to use them, how information will be disseminated, etc.

Traffic Management/Safety/ITS/IM/PR Skill Set		
Idea Name	***Detailed Description***	***Implementation Details*** ***(barriers, skills set coordination, etc.)***
Traffic Management/ITS/IM Idea #5 Weekend construction	Consider weekend construction to minimize impacts.	
Traffic Management/ITS/IM Idea #6 Use of Route 3	Encourage use of Route 3 through reduced/ eliminated tolls, possibly during major incidents only.	Would be difficult to implement toll options.
Traffic Management/ITS/IM Idea #7 Command post	Consider establishing a command post to coordinate and respond during emergencies: radio communication between agencies has been a problem in the past. Consider using police camera phones to record and send information on traffic conditions or incidents.	
Traffic Management/ITS/IM Idea #8 Improving emergency response time	Consider additional means of access to the highway during and after construction. NHDOT needs to address this before the project is started.	Consider median crossovers at either end of the exits.
Responding to incidents	Need to locate, verify and respond to all incidents.	Need to look at emergency access south of Exit 1 in New Hampshire.
Additional training	Need to provide advanced and continuous training to assist with responding to incidents.	Need to consider whether this effort would be completed using State employees or contract staff.
Service patrols		Consider areas for helicopter landings.
Traffic Management/ITS/IM Idea #9 Responding to HAZMAT incidents	Cameras would be helpful in identifying HAZMAT incidents. New Hampshire already has legislation to use cameras for EASY Pass enforcement.	Need to look at traffic component – who will be monitoring traffic cameras. Also need to address public concerns about video taping.
Traffic Management/ITS/IM Idea #10 Promoting Park and Ride	Consider discounts to encourage increased bus use.	
Safety Idea #1 Motorist and worker safety	Use temporary/moveable barriers.	Provide barriers between laborers and drivers on the mainline.
	Shift traffic to one barrel.	Need to work out details at interchanges.
	Provide pull-offs (shoulders) during construction.	
	Require contractor to provide emergency access at choke points.	

ROW/Utilities

SKILL SET ROSTER:

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Steven Swana, NHDOT, I-93 Design Team
Dean Wilson, NHDOT, Contract Administrator

ROW/Utilities Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Early ROW definition	Identify and exclude locations subject to change, such as drainage outfalls and stormwater treatment areas. In all other areas, set ROW limits early based on preliminary design approval. Do not wait for approval of slope and drain submission.	Could acquire a significant number of the partial takings early on. Need direction from management to move forward with ROW plans prior to slope and drain approval. Need better coordination and communication between design, ROW and consultants to expedite plan preparation.
Simplifying ROW plan process	Note: NHDOT is revising the plan development process and this may be the time to implement it. Do abstracting updates sooner based on the construction schedule.	Coordinate with attorney general's office pertaining to condemnation and eminent domain. Existing procedures would have to be coordinated with the design consultants.
Dedicated ROW coordinator	Assign a dedicated ROW coordinator to ensure timely project delivery and provide QA/QC (NHDOT or subcontractor).	This is justified given the scope and magnitude of the ROW requirements.
Corridor Preservation Statute	Evaluate the benefits of using this statute for the I-93 project.	Coordinate with attorney general's office.
ROW incentives	Use ROW incentives to acquire property more expeditiously.	Use either a percentage-based scale, a sliding scale based on value or defined timeframes for acceptance of offers.
Stockpiling, staging and construction access	Identify stockpiling, staging and construction access areas where ROW acquisitions may be required.	Have design/construction identify these areas. ROW can check the inventory of surplus lands for possible use for this purpose. Need to coordinate with environmental agencies for issues identification.

ROW/Utilities Skill Set

Idea Name	*Detailed Description*	*Implementation Details (barriers, skills set coordination, etc.)*
Early utility relocation	Require early relocation of reimbursable utilities with property rights such as water, sewer, power transmission, etc. Identify utility relocations that will require ROW acquisitions.	Provide early coordination and ROW acquisition as needed.
Purchasing materials	Identify unique or long-lead materials so they don't delay construction.	Requires close coordination and scheduling with utilities.
Early coordination	Begin the process of utility coordination early to identify impacts, relocations, etc., and begin looking at solutions and alternatives.	Requires early identification of construction constraints. Need to hold frequent meetings with utilities, design and construction staff. Will require refined design plans.
SUE	Utilize SUE to accurately identify utilities at all road crossings and interchanges throughout the corridor.	Will provide definitive locations for all underground utilities. Using this process may avoid and/ or minimize potential design conflicts and construction delays.
Dedicated utility coordinator	Maintain a dedicated utility coordinator.	Need to allocate resources accordingly.
Utility incentives	Consider utility construction incentives.	Explore the possibility of using this process. Incentives could be project specific or time sensitive.
Utility corridor	Identify specific utility corridors adjacent to the crossing roadways and interchanges and outside of conflict areas.	Need to coordinate with utilities, design, ROW and construction.

Innovative Financing. The team's primary goals are to align potential financing options with project goals; match anticipated cash flow with project management; and provide options for managing competing priorities for existing resources.

ROW/Utilities/Railroad Coordination. The ROW group's primary role is to ensure that ROW, utilities and railroad work comply with state laws and procedures. They must also consider the numbers and types of businesses and residences impacted by a project and evaluate the ready availability of additional right-of-way.

Geotechnical/Materials/Accelerated Testing. The geotechnical team explores subsurface conditions to determine their impact on the project; pursues options for expediting materials acceptance and contractor payment; and evaluates the use of innovative materials in accordance with project performance goals and objectives.

Traffic Engineering/Safety/ITS. The traffic engineering team strives to enhance safety; improve traffic management; and explore technologies, including ITS systems, that will communicate real-time construction information to the public.

Structures (Bridges, Retaining Walls, Culverts, Miscellaneous). The structures skill set focuses on accelerating the construction of structures. Their task is to identify the most accommodating types of structures and materials that will meet design requirements and minimize adverse project impacts.

Innovative Contracting. The innovative contracting group explores state-of-the art contracting practices and strives to match them with the specific needs of the project.

Roadway/Geometric Design. The roadway team evaluates proposed geometrics and identifies the most accommodating product with the minimum number of adverse impacts.

Long Life Pavements/Maintenance. The maintenance skill set identifies pavement performance goals and objectives and explores future maintenance issues for the project corridor, including winter service, traffic operations and preventative maintenance.

Construction (Techniques, Automation and Constructability). The construction crew explores techniques that will encourage the contractor to deliver a quality product within a specific timeframe while maintaining traffic.

Environment. The environment team ensures that the scope of work and construction activities reflect local environmental concerns. Their goal is to provide the most accommodating and cost effective product while minimizing natural and socio-economic impacts.

Public Relations. The public relations skill set discusses ways to partner with local entities and effectively inform both local communities and the traveling public about the project before, during and after construction. Their role is to put a positive spin on the project.

Background of ACTT

ACTT is a process that brings together public-and private-sector experts from across the country in a setting that encourages flexibility and innovation. The goal is to recommend technologies that will accelerate construction time while reducing user delay and community disruption. This necessitates a thorough examination of all facets of a highway corridor with the objective of improving safety and cost effectiveness while minimizing adverse impacts to the traveling public.

The actt concept was originated by the Transportation Research Board (TRB) in conjunction with fhwa and the Technology Implementation Group (TIG) of the American Association of State Highway and Transportation Officials (AASHTO). Following the completion of two pilot workshops, one in Indiana and one in Pennsylvania, the originating task force, a5t60, passed the concept off to FHWA and TIG to continue the effort. They have done so by coordinating a series of ACTT workshops around the country, with several more pending in 2006.

More information on the ACTT program is available online at:

http://www.fhwa.dot.gov/construction/accelerated/index.htm.

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