Transportation Management Plan
for
I-93 Improvements ~ Salem to Manchester

October 25, 2010

Mission Statement

The New Hampshire Department of Transportation intends to manage the work zone impacts from the I-93 Improvements Project by implementing a Transportation Management Plan that includes the following components:

1. Traffic Control Plans (TCP)
2. Transportation Operations (TO)
3. Public Outreach Campaign (POC)
# Table of Contents

List of Acronyms ................................................................................................................................. 2  
I. Executive Summary .............................................................................................................................. 3  
II. TMP Development and Implementation .............................................................................................. 4  
   TMP Development ................................................................................................................................. 4  
   TMP Approval Process ........................................................................................................................... 5  
   TMP Implementation and Costs ............................................................................................................. 5  
III. TMP Roles and Responsibilities ......................................................................................................... 6  
IV. Project Description ............................................................................................................................. 7  
   Background / Type / Area / Corridor ....................................................................................................... 7  
   Discussion of Phasing & Staging Approach .......................................................................................... 8  
   General Schedule and Timeline ............................................................................................................ 9  
   Existing and Future Conditions ........................................................................................................... 10  
      1. Existing Roadway Characteristics ................................................................................................. 10  
      2. Existing Traffic Data .................................................................................................................. 11  
      3. Incident Data ............................................................................................................................. 11  
      4. Local Community Issues / Concerns .......................................................................................... 12  
      5. Traffic Growth Rates .................................................................................................................. 13  
      6. Traffic Predictions during Construction ...................................................................................... 13  
V. Selected Work Zone Management Strategies ..................................................................................... 13  
   Traffic Control Plans (TCP) .................................................................................................................. 14  
      1. Control Strategies ....................................................................................................................... 14  
      2. Traffic Control Devices .............................................................................................................. 15  
      3. Project Coordination, Contracting, and Innovative Construction Strategies ............................... 16  
   Public Outreach Campaign (POC) ........................................................................................................ 16  
      Outreach Tools ............................................................................................................................... 18  
   Transportation Operations (TO) ........................................................................................................... 20  
      1. Travel Demand Management (TDM) Strategies ........................................................................... 20  
      2. Corridor/Network Management Strategies ............................................................................... 21  
      3. Work Zone Safety Management Strategies ................................................................................. 23  
      4. Traffic/Incident Management and Enforcement Strategies ....................................................... 25  
VI. TMP Monitoring ............................................................................................................................... 30  
VII. Contingency Plans ........................................................................................................................... 30  

Appendix A: Construction Contract Breakouts  
Appendix B: Construction Schedule  
Appendix C: Minutes for TMC Group Meetings and TCC Group Meetings
List of Acronyms

CA – Contract Administrator
CCS – Corridor Construction Supervisor
DCE – District Construction Engineer
DEIS – Draft Environmental Impact Statement
DMS – Dynamic Message Sign
FEIS – Final Environmental Impact Statement
FHWA – Federal Highway Administration
HAR – Highway Advisory Radio
IM – Incident Management
ITS – Intelligent Transportation System(s)
MUTCD – Manual on Uniform Traffic Control Devices
NB – Northbound
NHDOT – New Hampshire Department of Transportation
POC – Public Outreach Campaign
ROD – Record of Decision
SB – Southbound
TCC – Traffic Control Committee
TCP – Traffic Control Plan
TMA – Transportation Management Area
TMC – Traffic Management Center
TMDL – Total Maximum Daily Load
TIMP – Traffic Incident Management Plan
TMP – Transportation Management Plan
TO – Transportation Operations
TSC – Technical Steering Committee
I. Executive Summary

The I-93 Improvements Project is a critical infrastructure upgrade which will modernize the facility to allow for the State’s economic development while improving the safety and mobility of the travelling public. The travel demands for I-93 between Salem and Manchester have exceeded the capacity of the existing four-lane facility for a number of years. This project, once complete, will improve the infrastructure and functional capacity of the facility to the level of service and safety for which it was originally intended.

The I-93 Improvements Project 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 in Manchester. This project reconstructs and widens the interstate to four lanes in each direction, reconstructs and reconfigures five interchanges and completes work on 43 bridges, including 18 bridges on the state’s “Red List”. This work is done while preserving the option to add alternative transit opportunities in the median at a future date. The project passes through five communities - Salem, Windham, Derry, Londonderry, and Manchester, which are accessed via Exits 1 through 5. The project corridor also includes sections of NH Route 97, 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 communities throughout southern New Hampshire.

The goal of this Transportation Management Plan (TMP) is to provide a toolbox of viable solutions to mitigate deviations in the normal range of safety, access and mobility for the corridor during construction. Work zone safety and maintenance of traffic flow will both be high priorities during this project. To this end, NHDOT is committed to a three-pronged approach as outlined in this Transportation Management Plan.

1. Traffic Control Plans (TCP) provide detailed, contract-specific construction sequencing as well as illustrate measures that will be used to help guide and direct road users through a work zone. The TCP will assure that work zones provide two lanes of traffic during high volume traffic periods, while reducing conflicts between construction crews and traffic.

2. Transportation Operations (TO) plans identify strategies that mitigate impacts of the work zones on the I-93 Corridor. Strategies include Intelligent Transportation Systems (ITS), Work Zone ITS, Incident Management (IM), and coordination with the Traffic Management Center (TMC).

3. The Public Outreach Campaign (POC) will aid in relieving traffic congestion by providing ample information to the travelling public, affected communities, and area businesses regarding work zone conditions.
II. TMP Development and Implementation

Development of a TMP for the I-93 Improvements Project is mandated per FHWA’s *Work Zone Safety and Mobility Rule* and NHDOT’s Policy #601.01. The project will have significant impacts on the state’s main interstate artery, and therefore requires the development of a TMP containing all three strategy components (TCP, TO, and POC).

The I-93 Improvements Project is comprised of 23 separate construction contracts spanning nearly 20 miles of roadway over a timeframe of 10 years or more. See Appendix A for Construction Contract Breakouts. As such, the TMP must be a living document that provides the necessary tools to:

1. Mitigate deviations in the normal range of safety, access and mobility for each contract during construction, and
2. Coordinate and organize the individual contract-level efforts into an overall, corridor-wide management plan.

**TMP Development**

Various components of the TMP have already been developed during the early stages of the design process. TCPs are routinely developed as part of the highway design process, aspects of TO are currently being implemented through construction of Park-and-Rides, and POC initiatives were started as part of the FEIS process and continue to be underway.

The TMP will be a living document that provides guidance on the integration of each contract’s TCP into the larger corridor-wide TO and POC efforts.

NHDOT’s *Guidelines for Implementation of the Work Zone Safety and Mobility Policy* (Policy #601.01) dated October 12, 2007, outlines steps for development and implementation of a Transportation Management Plan. Although development of certain components of the I-93 TMP began prior to formal adoption of Policy #601.01, the I-93 TMP will follow the policy guidelines as closely as possible. Because of the size and scope of the I-93 project the NHDOT has formed an I-93 TMP Work Group to oversee the development of the I-93 TMP.
**TMP Approval Process**

Formal approval of the TMP document will be done through the following process:

1. Development of Draft TMP
2. Develop Plan costs for specific items/strategies as needed
3. Review and comment by I-93 TMP Work Group
4. Review and approval by NHDOT Traffic Control Committee (TCC)
5. NHDOT Executive Office review / approval

As components of the TMP are being refined for implementation, details for each will be approved, as needed, on a case-by-case basis. It should be noted that many of the topics discussed in this document are currently standard NHDOT practices (e.g. individual project TCP), while other strategies are being implemented for the first time (e.g. IM Service Patrols, Work Zone ITS, etc.).

**TMP Implementation and Costs**

NHDOT acknowledges that there are development and management costs associated with the TMP. However, these costs are minor and can be intangible compared with the construction and implementations costs. Therefore, NHDOT will focus on budgeting and tracking cost associated with the following TMP strategies:

1. TCP Costs: Itemized costs of TCP elements based on final bid prices from individual construction projects. Note that this not only includes standard TCP items but also includes the cost of Work Zone ITS, ITS and IM.
2. TO and POC Costs: Costs not covered under TCP items, but associated with additional efforts put forth by NHDOT. Such efforts are associated with the individual components / strategies that are implemented (e.g. cost of emergency route signing as part of Incident Management strategies; cost of Service Patrol implementation).

It should be noted the costs incurred in implementing the TMP are partially if not wholly offset by the reduced cost to the public based on reduced traffic delays, increased safety, and improved monitoring of corridor wide construction progress (i.e. reduced contractor delay claims). Furthermore, the improvement in public understanding of the project and public approval of NHDOT’s performance is immeasurable.

**Evaluation** - Construction and implementation costs for the TMP will be tracked and compared to original estimates where feasible. The tracking of costs will help to establish costs for similar efforts in the future.

1. TCP Costs: TCP costs are itemized in the DOT cost estimates and are tracked through bid prices and final construction costs. Final construction costs include any under runs/overruns in these items.
2. TO and POC Costs: Costs not covered under individual contract TCP items will be tracked on a case by case basis. The estimated costs, bid costs, and final construction costs will be tracked. These costs will be totaled to provide a total corridor wide cost.
III. TMP Roles and Responsibilities

The successful implementation of this TMP will require coordination between the many personnel involved in the design and construction of the project, as well as those essential to operations and maintenance. NHDOT has assigned a TMP Manager to oversee and coordinate the many activities identified in this document for the whole I-93 Improvements Project. The success of the TMP will be based on everyone, from the designer to the flagger, understanding that mitigating the impacts of the work zone on the traveling public is of utmost importance.

A TMP Work Group has been established to address efforts associated with the impacts of construction and to address areas of overlap with other TMP efforts such as Incident Management (IM), Intelligent Transportation Systems (ITS) and the Public Outreach Campaign (POC). This group will be comprised of core members with various ad-hoc members providing periodic feedback as needed. The core members will be made up of:

1) NHDOT TMP Manager  
   ♦ Dan Prehemo
2) NHDOT Project Management  
   ♦ Pete Stamnas; Peter Salo; Dan Prehemo
3) NHDOT Construction  
   ♦ Ted Kitsis; Paul Metcalf; Jay Levine;
4) Traffic Bureau  
   ♦ Subramanian Sharma; Peter Crouch
5) NHDOT Transportation Management Center  
   ♦ Denise Markow
6) NHDOT Operations  
   ♦ Mark Kirouac
7) NHDOT Maintenance District 5  
   ♦ Pamela Mitchell
8) CHA  
   ♦ William Ashford; Nicolás Bosonetto
9) FHWA  
   ♦ Marty Calawa

Ad hoc members may include, but are not limited to, the following:
1) NHDOT
2) I-93 Design Team Consultants
3) Local Government Representatives  
   a) Salem, Windham, Derry, Londonderry, and Manchester
4) Local Emergency & Enforcement Reps
5) Community Groups
6) Large Businesses
7) AGC
The TMC is involved in two of the three coordinated efforts being presented in the I-93 Transportation Management Plan – Transportation Operations (TO) and the Public Outreach Campaign (POC). The Center is envisioned to be a lead support for implementing the following management strategies that are a part of the Transportation Operations approach.

- Corridor/Network Management
- Work Zone Management
- Traffic Incident and Enforcement Management

IV. Project Description

**Background / Type / Area / Corridor**

I-93 is a major link in the Interstate System as well as the National Defense Highway System. It extends from Boston, Massachusetts to St. Johnsbury, Vermont. It is a principal arterial interstate highway and serves as an important transportation corridor between the greater Boston metropolitan area and the communities in south-central New Hampshire. It also provides access to the recreational areas of northern New Hampshire.

The segment of I-93 under consideration as part of this project is located in south-central New Hampshire. The corridor is a limited access freeway with access along the study area segment available only from the five interchanges spaced along the corridor, and is located within the five communities of Salem, Windham, Derry and Londonderry in Rockingham County, and Manchester in Hillsborough County. It is this segment of I-93 and the adjoining land area that comprise the primary

I-93 project area. Important natural features include a number of lakes and major stream systems; in particular, Canobie Lake and Cobbetts Pond, as well as the Spicket River, Beaver Brook, and Cohas Brook and their associated tributaries. The section of I-93 being improved is approximately 19.8 miles long extending from the Massachusetts State line in Salem to the junction of I-93 with I-293 in Manchester. I-93 is a limited (fully controlled) access highway originally constructed in the early
1960's. At present, it consists of four lanes (two lanes northbound, two lanes southbound). The north and southbound barrels follow independent vertical profiles. There are five interchanges (Exits 1-5) along this section of I-93. The roadway right-of-way generally varies from about 150 to 500 feet in width and both barrels are on independent horizontal profiles. The I-93 highway within the study area is fed by a network of state and local roadways. Major east-west roads include NH 101 and I-293, NH 102, NH 111, NH 111A, NH 97, and NH 38. Major north-south roads in proximity to I-93 include NH 28, NH 28 Bypass, and NH 128.

The subject project reconstructs and widens the interstate to four lanes in each direction, reconstructs and reconfigures five interchanges (Exits 1 to 5) and completes work on 43 bridges, including 18 bridges on the state’s “Red List”. This work is done while preserving the option to add a rail corridor in the median at a future date. Work will also include the construction of three new park-and-ride facilities, four bus terminals and a bus maintenance facility.

**Discussion of Phasing & Staging Approach**

The Record of Decision (ROD) Section 4.16 sets certain requirements which must be met during construction. The two primary mandates state that:

- **Maintain two lanes of traffic** - Per Section 4.16 part 4 of the ROD, a detailed TCP will be developed as part of the final design and instituted to reduce traffic-related short term impacts and minimize delays. The plan will include the requirement to maintain two lanes of traffic in both directions along the mainline for normal construction activities, and during high volume traffic periods. NHDOT is committed to preserving the following cross-section during construction: 4’ shoulder, 12’ lane, 12’ lane, and 8’ (or 10’) shoulder.

- **Limit night time work** - Per Section 4.16 part 3 of the ROD, construction work will be accomplished during daylight hours to minimize noise impacts, although some nighttime construction should be expected given the traffic volumes during daylight hours and the need to maintain traffic at these times.

In addition to the requirements in the ROD, design philosophy includes the use of the temporary lanes (Exit 2 Area) and the use of crossovers to shift traffic (Exit 3 Area and between Exits 4 and 5).

- **Exit 2 Area** - a temporary bridge will be constructed to allow temporary lanes to be constructed in the median between the existing NB and SB Barrels.

- **Exit 3 Area** - In this area the new NB barrel is to be constructed off line (out of traffic) and then utilized to detour SB traffic, allowing the new portion of SB to be constructed off line as well. Overall, this will allow four bridges and over four miles of highway to be constructed with minimal disturbance to traffic.
Exit 4 - NH Route102 Bridge - The new NH Route 102 bridge over mainline will be built south of the existing bridge. Once work is complete, traffic will be shifted to the new bridge and the old bridge will be demolished.

Exit 4 to Exit 5 - for approximately a two mile stretch between Exits 4 and 5, the existing NB barrel will be widened from two lanes to four lanes. The existing SB traffic will then be shifted to the NB barrel and NB and SB traffic will flow on just the NB barrel. This will allow the SB barrel to be constructed out of traffic, thus speeding construction and lessening the duration of traffic impact.

Exit 5 Ramps - Construction of three new ramps at Exit 5 will help to improve this interchange prior to construction of the mainline and NH Route 28. Construction will include building new ramps for SB on and off ramps, and NB on ramps as well as associated bridges and will be conducted off-line, providing temporary tie-ins as necessary. After all ramps are completed they will be placed into service and the old SB and NB ramps and bridges will be removed off-line.

Exit 5 Mainline and NH Route 28 – The I-93 SB bridges (over Route 28 and the Recreation Trail) will be constructed in two phases. The west side of the bridges will be constructed first, and then the SB traffic will be shifted to the newly constructed portion of the roadway. The remaining east side of the improvements will then be constructed along the SB barrel. During this timeframe, NB crossovers will be constructed to “borrow a barrel” in this area. The NB traffic will then be rerouted onto the east side of the SB barrel to allow construction of the I-93 NB barrel bridges outside of traffic. This will also require a temporary NB on-ramp crossover connector in this area. Once the bridge and roadway construction is done along the NB barrel, the NB traffic will be returned to the NB barrel and the SB traffic will be shifted to its ultimate location.

Previous improvements to NH Route 28, done under the Park-and-Ride construction, will be expanded upon. NH Route 28 traffic will be shifted to the north and Route 28 will be widened to the south. Upon completion, traffic will be shifted to the south and Route 28 will be widened to the north. Ramp work will also be completed to tie into the previously constructed ramps project.

**General Schedule and Timeline**

The I-93 Improvements Project began in October 2005 with the construction of the Exit 4 bus terminal and is currently expected to run through the fall of 2020. Improvements to the overall corridor are broken into 23 different construction contracts. See Appendix B for schedule of construction.

Construction will be advanced in a prioritized fashion that provides meaningful progress. The work in the corridor is divided into three distinct parts; Early Action Projects, Mainline Construction Priorities and remaining Mainline Construction - Capacity Improvements.
Project Stages

Early Action Projects – These projects are standalone projects that have independent utility from mainline construction. This phase addresses seven “Red List” bridges and constructs park-and-ride facilities with full service bus terminals to support and improve commuter alternatives. Of the 10 projects listed in the 2008 financial plan as early action projects, 10418H is the only project remaining to be advertised for construction.

Mainline Construction Priorities – The projects in this stage will improve safety and infrastructure condition from Exit 1 to Exit 3 and at Exit 5, areas where general safety and infrastructure deficiencies are of most urgent concern. This group of projects will address the remaining 12 “Red List” bridges in the corridor and will reconstruct four of the five interchanges to improve safety and capacity and address principle traffic bottlenecks that currently exist. There are a total of nine projects included in this stage. Three are currently under construction.

Mainline Construction – Capacity Improvements – This stage includes the remaining work in the corridor and will address capacity improvements between Exit 3 and Exit 5 and north of Exit 5 to the project limits in Manchester and south of Exit 1 to the state border. There are a total of seven projects included in this stage.

Implementation Plan - The Department is proceeding with a prioritized implementation strategy that advances construction with an emphasis on the areas of most concern for safety, capacity and infrastructure condition. This strategy focuses first and most notably on accomplishing the work in the Exit 3 interchange area and the Exit 5 interchange area, followed by the lower tier of the corridor through the Exit 2 interchange area and the I-93 bridges over NH 38. The prioritized work is included in the Early Action and mainline Construction priority stages. This plan advances incremental improvements to an existing facility that lends itself to incremental implementation. It is important to note that all work completed on the corridor will be functional and will be used to manage traffic volumes as construction along the corridor advances.

Existing and Future Conditions

1. Existing Roadway Characteristics

As originally constructed in the early 1960’s, the four-lane capacity of I-93 was expected to carry 40,000 vehicles per day within its design life of 20 years. In 1997, traffic volumes were recorded in Salem (south of Exit 1) in excess of 100,000 vehicles per day, with the segments to the north carrying between 60,000 to 80,000 vehicles per day. Operating conditions during the peak hours of the day are currently poor with the segments of the corridor south of Exit 4 operating at level of service E or F. Each of the interchanges also exhibits poor levels of service.

The section of I-93 being improved is approximately 19.8 miles long extending from the Massachusetts border in Salem to the junction of I-93 with I-293 in Manchester. The present four lanes (two lanes northbound, two lanes southbound) will be widened to four lanes in each direction. The existing five
interchanges (Exits 1-5) will be reconstructed and reconfigured, and work on 43 bridges will be completed while preserving the option to add a rail corridor in the median at a future date. Work will also include the construction of three new park-and-ride facilities, four bus terminals, and a bus maintenance facility.

2. Existing Traffic Data

NHDOT collects traffic data in the corridor through the use of permanent counters imbedded into the I-93 pavement. From analysis of these traffic counts, it is evident that peak hour traffic (over 1,500 vehicles /lane/ hour) for weekday commuter traffic occurs between 6-8 AM southbound and between 3-6 PM northbound. Weekend recreational traffic sees a decisively different pattern with heavy traffic volumes on Fridays from 11AM – 8 PM northbound and Noon – 7 PM southbound on Sundays.

3. Incident Data

Incident data is being compiled and reviewed by the Incident Management Work Group. In an attempt to track the level of incidents along the Salem to Manchester I-93 Corridor, accident data is being compiled for each section of highway (per interchange) and presented as accidents per Million Vehicle Miles Travel (MVMT). Using the data from the Draft Environmental Impact Statement (DEIS) covering 1995 to 2000 and from the Final Environmental Impact Statement (FEIS) covering 1995 to 2002, a base line was established. Updated data from 2002 to 2007 was collected and compared to the base line. Initial findings indicate that there was a slight decrease in the number of accidents and an increase in the amount of traffic. Therefore there is a decrease in accidents per MVMT. Originally accident data was supplied by DOT’s Bureau of Planning and Community Assistance. More recently the TMC has acquired access to State Police Event Reports and local emergency responder incident logs. In addition to the data supplied by Planning, the State Police reports and local responder logs will be utilized as a possible source of data for evaluating crashes along I-93. Accident data will be compiled on a yearly basis and the TMC in coordination with the IM Work Group will continue to take the lead in monitoring and evaluating the available data.

Work Zone Traffic Crash Reports

Bureau of Construction will complete Work Zone Traffic Crash Reports, (reference Appendix E of NHDOT’s Guidelines for Implementation of the Work Zone Safety and Mobility Policy) for each work zone crash. These reports will be distributed to all appropriate personnel including the Bureau of Planning and Community Assistance for review and immediate corrective action.

The Bureau of Traffic will receive the original of each Work Zone Traffic Crash Report as part of the distribution discussed above and will be responsible for compiling and analyzing these reports through a record keeping process. This compilation of reports should be reviewed quarterly for trends such as crash type or common characteristics (month, time of day, location, etc.) and the results of this review presented to the TCC. The Bureau will submit a summary of the Work Zone Traffic Crash Reports on a quarterly basis to the TCC. The TCC will address any issues resulting from the review of Work Zone Traffic Crash Reports.
Evaluation – The TMC in coordination with the IM Work Group will compare accident rates during construction to baseline rates in an effort to quantify the effectiveness of each Work Zone Management Strategy (see Section V). Any significant change (increase or decrease) in accident rates will be investigated to determine the cause of the change. Causes for increases and best practices associated with decreases will be indentified and implemented to reduce future accident rates. After construction is completed, crash data will be compared to the baseline data in order to quantify how the geometric and safety improvements have affected crash rates in the corridor.

4. Local Community Issues / Concerns

Due to the nature and extent of the I-93 Improvements Project, there are many individual local issues. In an attempt to address these concerns related to interstate construction and traffic, they are categorized as follows.

a. Impact on Personnel and Business property - NHDOT recognizes that certain properties are going to be physically impacted and through the Department’s ROW Bureau is resolving these impacts on property owners on an individual basis.

b. Impact on local roadways due to construction activity - NHDOT is coordinating with local communities in order to minimize traffic disruption due to construction activities.

c. Impact on local businesses due to construction activity – NHDOT, through the POC, is attempting to notify local business of future plans for not only the interstate, but also the local roads.

d. Emergency responders/hospitals – NHDOT, through its IM effort, has formed the Technical Steering Committee (TSC) to address concerns of the local fire, police and public works departments.

In addition to addressing these concerns in a broad sense, NHDOT is addressing the individual concerns as part of design, public outreach and construction efforts.

Evaluation - Feedback on local issues will be collected through the “Contact Us” section and the Public Opinion Survey of the project website, www.RebuildingI93.com. The “Contact Us” section allows the public to contact the NHDOT I-93 Project Manager by phone, regular mail or email. The questions / feedback from this section provide qualitative insight as to whether NHDOT is providing the information the public needs. The online survey results allow a more quantitative measurement of how NHDOT is doing in providing information to the public. Both of these sources will be evaluated on a periodic basis.
5. Traffic Growth Rates

A review and analysis of traffic growth rates was originally prepared and presented in the Final Environmental Impact Statement (FEIS). State-of-the-art travel forecasting software was utilized to estimate future travel patterns and roadway traffic flow on a statewide basis. Traffic projections are based on historic trends and anticipated development/growth for specific locations. The Build (I-93 Widened to eight lanes) and No Build (I-93 not widened) scenarios were evaluated. The traffic analysis not only looked at the impacts to the interstate but also evaluated the State routes. Project based TCP plans are developed utilizing predicted traffic volumes at the time of construction.

6. Traffic Predictions during Construction

Due to the aggressive I-93 corridor construction operations and dynamic interaction between the project’s traffic control/sequencing scenarios, effective management of traffic will be a vital element and needs to be addressed in the design of the improvements as well as construction. NHDOT will utilize Quickzone 2.0, a traffic modeling and analysis software package, to evaluate and analyze traffic related impacts.

This software package, developed by FHWA, includes the ability to perform the following functions:

- Evaluate alternating one lane operations,
- Evaluate traffic implications on projects with multiple work zones,
- Complete detour modeling (to include identifying impacts to travel times),
- Display the amount of delay in vehicle hours,
- Determine the maximum length of the anticipated queue,
- Identify the total costs per passenger car delay,
- Determine total travel time through work zones (in minutes), and
- Identify detour delay costs.

Evaluation - In order to evaluate the success of TCPs and the use of Quick Zone, NHDOT will utilize data collected from the Work Zone ITS devices during actual construction and compare that data against the predictions of the Quick Zone software.

V. Selected Work Zone Management Strategies

These strategies serve as a toolbox to be used during the I-93 design and construction. Where applicable, item numbers (e.g. IA1, IB4, etc.) are references to the FHWA - Developing and Implementing Transportation Management Plans for Work Zones, Appendix B. These strategies are broken out into three sections, the TCP, POC and TO.
Traffic Control Plans (TCP)

Traffic Control Plans are contract specific and are developed by the Consultant Design Teams with the oversight of NHDOT Consultant Design. They include plan drawings as well as a narrative description of sequencing of the project in order to understand how traffic flows will be maintained during construction. The TCPs will be developed in accordance with Chapter 11 of NHDOT’s Highway Design Manual, which references the FHWA MUTCD and NHDOT’s Work Zone Traffic Control Standard Plans.

1. Control Strategies

Construction Phasing / Staging (IA1) Due to the size and nature of the I-93 project, it has been broken out into 23 separate construction contracts. The scheduling of these contracts is being coordinated to facilitate construction operations and to diminish the impacts on the traveling public. Staging and phasing will be well marked in all TCPs submitted by the I-93 Consultant Design Teams. The NHDOT has developed a GIS database software program to assist in evaluation of TCP plans, specifically the effects that each TCP will have on adjacent projects. This program will be discussed more under Traffic Operations.

Lane Shifts, Closures, or Restrictions – Short Term (IA3)
Lane shifts, closures, or restrictions may last for varying durations of time and may be intermittent or continuous. The main purpose of this strategy is to keep traffic moving by shifting lanes onto shoulders, temporary widening, or new roadways in order to allow for construction on the existing roadway or to provide worker safety. This strategy will follow MUTCD standards and NHDOT’s Work Zone Traffic Control Standard Plans. The NHDOT has committed to keeping two lanes of traffic open during high volume traffic periods.

Two-way Traffic on One Side of Divided Facility (Crossover) (IA5)
This strategy involves closing one side of a divided facility to permit the work to proceed without traffic interference while both directions of traffic are accommodated on the opposing side of the roadway or on a temporary section of roadway.

Night Work (IA9)
Work is performed at night (end of evening peak period to beginning of morning peak period) to minimize work zone impacts on traffic and adjacent businesses. Night work will only be conducted when necessary to provide the contractor the opportunity to close lanes that cannot be closed during peak traffic volumes.

Work Hour Restrictions for Peak Travel (IA11)
This involves restricting work hours such that work that impacts traffic does not occur during periods of peak travel demand and congestion. NHDOT will follow its standard policies, restricting construction activities during holidays and special events.
2. Traffic Control Devices

**Temporary Signs (IB1)**
Several types of temporary signs will be used to provide information to road users to enable safe and efficient travel through the work zone or a detour. Temporary signs are an essential and integral part of temporary traffic control, and are used in nearly all work zones. Accepted practices for work zone signing are provided in the *MUTCD* and NHDOT’s *Work Zone Traffic Control Standard Plans*.

**Dynamic Message Signs (DMS) (IB2)**
Both fixed and portable dynamic message signs are highly effective in conveying work zone information to drivers, especially when that information is subject to frequent change or it addresses a short term or current situation or condition within the work zone. These signs provide real time information to drivers concerning specific work operations, traffic patterns, and other conditions in the work zone. These devices assist drivers in avoiding conflicts and potential crashes as they travel through the work zone. Use of DMS will be both in coordination with the use of Work Zone ITS and the TMC, as well as standalone applications, allowing the NHDOT to remotely control the sign messages and provide real time information to the traveling public.

**Arrow Panels (IB3)**
Also referred to as arrow boards, arrow panels operating in flashing or sequential mode are intended to aid motorists in navigating and merging through and around the work zone. Use of these devices will be per the *MUTCD* and NHDOT *Work Zone Traffic Control Standard Plans*.

**Channelizing Devices (IB4)**
Channelizing devices such as traffic cones, drums, barricades, or tubular markers are used to provide traffic control through the work zone. The purpose is to define the intended travel path through the work zone and delineate potential work zone hazards. Use of these devices will be per the *MUTCD* and NHDOT’s *Work Zone Traffic Control Standard Plans*.

**Temporary Pavement Markings (IB5)**
Various types of temporary markings on the pavement will be utilized to define travel lanes and provide guidance and information for the road user through the work zone.

**Flaggers and Uniformed Traffic Control Officers (IB6)**
Flaggers and police or traffic control officers are used to direct and control road user and pedestrian traffic in work zones.

**Temporary Traffic Signals (IB7)**
Fixed or portable temporary traffic signals may be used to improve traffic flow through and near the work zone and/or address safety concerns. Temporary signals may be utilized as part of individual contract TCP for secondary roads.
In addition to the aforementioned items, the use of Speed Reduction Message Signs and Temporary Traffic Barriers are discussed under the following section of this plan: Transportation Operations, Section 3 - Work Zone Safety Management Strategies.

3. Project Coordination, Contracting, and Innovative Construction Strategies

Project Coordination (IC1)
Due to the size and complexity of the I-93 Improvements Project, in addition to their standard practices the NHDOT has implemented the following:

Team Meetings – Intra-departmental “Team” meetings are held on a monthly basis, with NHDOT representatives from Highway and Bridge design, Right-of-Way, Design Services, Materials and Research, and Construction/Maintenance operations. These meetings are intended to keep all NHDOT personnel up to date with project issues and set priorities for the upcoming months.

Project Management Meetings - On a monthly basis, NHDOT meets with project managers from the consulting firms involved in the design of the improvements. These meetings review design and schedule issues and establish the design priorities for the upcoming months.

Project Management Tools - NHDOT has implemented a number of technology solutions in order to handle the information and data that affects the project progress and outcome. Some of the tools implemented include development and updating of a master project schedule, cost estimate spreadsheets, team status database, ROW status database/GIS, and Traffic Control Plan GIS database and standardized progress reporting.

Incentive / Disincentive clauses (IC2)
NHDOT Standard Specification Section 108 - Prosecution and Progress of Work details the establishment of contract time. Specifically, Section 108.08 Incentive/Disincentive for Early Completion and 108.09 Failure to Complete on Time address monetary bonuses or penalties relative to contract time. Special Provisions and Supplemental Specifications may modify these sections. NHDOT has also implemented, as needed, intermediate completion goals/dates.

Rapid Bridge Construction (IC3)
This strategy involves the use of special materials such as quick curing concrete or precast items (e.g. culverts, bridge deck slabs, MSE Walls, etc.) to minimize the duration of construction or maintenance activities where traffic restrictions need to be minimized, and when work activities need to be completed during night or weekend periods to allow reopening travel lanes for normal weekday travel.

Public Outreach Campaign (POC)
A Public Outreach Campaign (POC) is used to communicate with road users, the general public, area residents and businesses, and appropriate public entities about road construction projects and the safety and mobility effects of the work zone. The NHDOT is implementing a POC to help mitigate many of
these issues by warning drivers of upcoming work zones and providing information, such as potential delays and detours, to drivers prior to leaving for their destination as well as en route. This information allows drivers and other interested parties to make informed decisions about the route to take and when to travel.

As part of the I-93 Improvements Project, two target audiences have initially been identified, dictating different levels of outreach. The first, commuters, other travelers, trucking interests, businesses, environmental organizations, and nearby residents, would be the larger audiences concerned with any aspect of the overall project. The second audience, local communities, abutting residents, local business, and local travelers, would be those that have an interest in each specific construction project. Somewhat different methods may be utilized for each level of outreach.

NHDOT has formed an I-93 Public Outreach Work Group to address the initial start up of the public outreach campaign as well as to oversee efforts throughout the duration of construction. This group is comprised of core members and ad hoc members.

Core Members to include:

1. William Cass, NHDOT Project Director
2. Peter Stamnas, NHDOT Project Manager
3. William Boynton, NHDOT Public Affairs Officer
4. Ted Kitis & Jay Levine, NHDOT Construction
5. Pamela Mitchell, NHDOT District 5
6. Brigitte Mandel & Marty Calawa, FHWA
7. William Ashford & Sandy Holland - CHA

Core Members will:

1. Address outreach efforts associated with the impacts of construction.
2. Address areas of overlap with other outreach efforts associated with the Community Technical Assistance Program (CTAP), Transit Investment Study and the Total Maximum Daily Load Study.
3. Meet on a frequent basis.

Ad Hoc Members and associated efforts potentially include:

1. Design & Traffic Management Plan - Peter Salo/Dan Prehemo
2. CTAP - Ansel Sanborn (NHDOT)
3. Members of Regional Planning Commissions
4. Representatives of the NH Department of Resources and Economic Development, Division of Tourism
5. Transit Investment Study
6. Intelligent Transportation Systems - Denise Markow
7. Incident Management - Mark Kirouac
The I-93 POC has adopted the following mission statement:

_The I-93 Public Outreach Campaign will seek to maintain public trust, confidence and support for the project by providing timely, useful, and current information through a variety of targeted means and methods to each of the major stakeholder groups. This will be accomplished by communicating what NHDOT is doing and how it will impact the public, and providing alternatives to minimize those impacts._

The main “themes” to be communicated throughout the POC will be simple and consistent. The I-93 POC has adopted the following themes/messages:

- **Keep Safe** - keep the message of safety prevalent to help improve safety for the traveling public as well as construction workers.
- **Be Informed** - encourage the public to understand what is happening and how it will affect them.
- **Contact Us** - encourage the public to provide feedback to the NHDOT so that the NHDOT can continue to provide information that the public wants.

**Outreach Tools**

There are many potential strategies and tools available for communicating public outreach messages and obtaining public comment. The goal of the I-93 POC is to maximize the size of its audience for the dollar spent. It is important to use a variety of tools as different people take in information in different ways. The following list is a summary of the strategies being pursued by NHDOT.

- **Project Branding** helps convey a consistent message and makes project materials easily recognizable. Branding includes the following logos and sayings:

  - [I-93 logo]
  - [MOVING AHEAD logo]

- **Project website** includes both static and real-time (Work Zone ITS traffic data) information. The website (www.RebuildingI93.com) has also been a very effective tool in obtaining input from the public through the use of “contact us” emails and the online survey.
Email notifications generated from the website have provided updates on construction activities, anticipated lane closures and updates to the website. The notifications are sent regularly once a month or, if a situation dictates, an “instant update” is generated.

Free (“earned”) media, TV, radio and newspapers – large projects are typically considered newsworthy by local media outlets so it is relatively easy to get news coverage. Through the NHDOT’s press releases, project graphics (colorized plans), factsheets and newsletters have been provided to the media.

511 is accessible both pre-trip and en route and provides real-time traffic information. Information is provided to the public on a statewide basis through the 511 phone system or www.511NH.com.

Printed materials for public distribution such as newsletters, factsheets, project business cards and graphics have been generated and provided to the media, the general public and large employers. Factsheets, created and updated as needed, cover specific topics such as an individual contract, or environmental or IM issue. Newsletters, produced three to four times yearly, provide a more general overview of the whole project.

ITS and Work Zone ITS - web-connected traffic cameras and DMS allow for providing real-time information to pre-trip and en route travelers. The cameras and DMS are installed as part of individual Work Zone ITS and can be controlled by NHDOT’s TMC as well as by NHDOT project personnel.

DMS are being utilized to provide the en route traveling public real-time travel delay information as noted above.

Public meetings have provided the NHDOT an avenue for interaction with the public allowing the NHDOT to provide project information and the public to provide feedback on the project. Due to the nature of the 20-mile corridor, the NHDOT has found that conducting public meetings in each of the affected towns allows the NHDOT to give updates on the whole corridor while simultaneously addressing specific local concerns.

Information centers or kiosks - The NHDOT is in the process of establishing a project office that would be a useful strategy to disseminate information. Currently it is anticipated that the office will be in the Windham (Exit 3) area and is planned to be opened in the winter of 2009/2010. This office will be used as a central operations center for construction administration, public outreach and traffic operations.
Evaluation - Feedback on public outreach efforts will be collected through the “Contact Us” section and the Public Opinion Survey of the project website. The “Contact Us” section allows the public to contact the NHDOT I-93 Project manager by phone, regular mail or email. The questions / feedback from this section provides qualitative insight as to whether NHDOT is providing the information the public needs. The online survey results allow a more quantitative measurement of how NHDOT is doing in providing information to the public. Both of these sources will be evaluated on a periodic basis. Furthermore, on a monthly basis, a Web Status Report is generated. This report indicates which sections of the website are being viewed and allows NHDOT to focus public outreach efforts on the topics of the most interest to the public.

**Transportation Operations (TO)**

Transportation operations strategies mitigate work zone impacts on the traveling public. NHDOT will implement strategies dealing with demand management, corridor/network management, work zone safety management, and traffic incident management.

1. Travel Demand Management (TDM) Strategies

   **Transit Service Improvement (III/IA1)**
   
   As part of the overall improvement plan for the I-93 Salem to Manchester corridor, NHDOT will be constructing park-and-ride (PNR) facilities and expanding bus service. Details of the improvements are as follows:

   - **Exit 2** Construction of a new PNR and bus terminal (work completed: Fall 2008)
   - **Exit 3** Construction of new PNR and bus terminal (planned advertisement in 2012)
   - **Exit 4** Construction of a new bus terminal and improvement to existing PNR (work completed: May 2007).
   - **Exit 5** Construction of a new PNR (work completed: Fall 2008) and construction of a new bus terminal and bus maintenance facility (work completed: Fall 2008)

   Expanded Bus Program - NHDOT entered into an agreement with Boston Express to provide expanded bus service to Boston along the Salem to Manchester Corridor. The expanded bus service began operation on November 17, 2008, servicing the new facilities at Exits 5 and 4 in Londonderry and Exit 2 in Salem. The bus service operates seven days a week from Exits 5 and 2, and weekdays only from Exit 4, providing up to 22 roundtrips on weekdays and 18 roundtrips on weekends.

   The overall construction schedule for the I-93 Improvements Project identifies these as early action projects and calls for the construction of these facilities, with the exception of the Exit 3 PNR, to be in the first phase of construction, thus improving not only bus service, but also the ability to car pool. These improvements will decrease the amount of traffic utilizing the highway.
Ridesharing (III.A3)
In coordination with the aforementioned construction of PNR facilities, NHDOT operates a ride share program called Rideshare NH. NH Rideshare is a free commuter matching service provided by the NHDOT that is dedicated to finding an alternative way for commuters to travel to and from work. To help commuters cut costs and to reduce traffic congestion and air pollution, NH Rideshare uses Geographical Computer Matching to provide commuters with information and assistance about ridesharing and alternatives to the single occupancy vehicle including car pools, van pools, buses, and trains.

Details of the program can be found at:
www.rideshare.nh.gov

Park & Ride (PNR) (III.A5)
NHDOT is constructing three new PNR facilities to improve bus service and car pooling in the southern I-93 corridor.

Evaluation - Once the PNR facilities are constructed and the expanded bus service is in place, the NHDOT Rail and Transit Bureau will utilize ridership numbers and utilization of the PNRs to evaluate the success of the transit strategy.

2. Corridor/Network Management Strategies

Coordination with adjacent construction projects (III.B15)
Due to the size and nature of the I-93 Improvements Project, the construction will be broken into 23 separate contracts. NHDOT recognizes the importance of proper coordination of these individual projects to minimizing the impacts one project may have on adjacent projects. Potential impacts fall into two major categories: direct impact on traveling public and impact on construction timeframe.

Direct impact on traveling public - NHDOT recognizes that multiple construction projects within a short distance of each other will have a cumulative affect on traffic delays. Traffic Control Plans for individual projects will be reviewed in coordination with plans from other projects in the surrounding areas in order to minimize the impact on traffic. To assist in the review, NHDOT has implemented the use of GIS-based software (see discussion below).

The continued pursuit of an I-93 ITS deployment will greatly enhance the ability to provide effective corridor/network management. This project is scheduled for a summer 2010 deployment. It is being redefined to construct a corridor wide communications network along with targeted devices that will a) bring real-time traffic information and, b) improve the cumulative effect of traffic delays through the corridor. The TMC is the main point of contact for this deployment. Once construction of this ITS plan is complete, the TMC will play a major role in the management of the corridor. During the construction process, however, it will be a support agency that will provide as much real time information along the corridor as possible.
Impact on construction timeframe - NHDOT recognizes that the construction sequencing and Traffic Control Plans for individual projects can have a large impact on surrounding projects. Furthermore, changes in construction schedules, both delays and accelerations, may have large impacts not only on adjacent projects, but subsequent projects, i.e. a delay in one project could have a cascading effect on projects that are scheduled years later. NHDOT recognizes how this could have a serious impact on delaying construction, impacting traffic and increasing project costs.

In order to assist in the evaluation of both TCP and construction phasing/scheduling on a corridor wide basis, NHDOT has developed a GIS-based software program. TCP information is entered into the database and GIS-based graphics are generated, thus facilitating the review of TCP impacts.

The GIS / database application is designed to show contract information in four views:

- **Contract Limits (Breakouts)** - view of which ramps, exits, and lanes are within each contract
- **Contract Ad Dates** (subset of Contract Limit view) - view of Contract Limits color coded by contract ad date
- **Contract Construction** - view of active construction on a project wide basis depending on user chosen date
- **TCP Phasing** - color coded view of individual lane status based on user chosen date

The following sequence will be followed by NHDOT to evaluate individual project and corridor wide impacts.

1. TCPs will be developed on a project specific basis. Consultant Design Teams will submit full TCPs to NHDOT.
2. TCP information will be entered into the GIS database for integration into the corridor wide system.
3. Information and visualizations will be generated and utilized to evaluate the individual TCP and the overall corridor.
4. During construction, schedule information will be kept up to date in the GIS database to assist in evaluation of effects on adjacent and future projects.

In addition to use of the GIS database to evaluate the TCPs, the NHDOT is requiring that for each individual construction contract the contractor submit a detailed Critical Path Method (CPM) schedule. This schedule is to be submitted in both hard copy and electronic format (Primavera Systems P6). NHDOT will evaluate how well the contractor did in meeting CPM. During the progress of work the contractor is to provide regular updates to the schedule as required. These schedules will be utilized to identify potential conflicts and reduce traffic delays and claims.

3. Work Zone Safety Management Strategies

NHDOT will implement the strategies outlined in its *Guidelines for Implementation of the Work Zone Safety and Mobility Policy*, which detail many of the activities listed below. Due to the size and scope of the I-93 project, the Department has designated the position of Corridor Construction Supervisor (CCS) to oversee all construction activities within the corridor. The CCS will for the most part take on the responsibilities typically assigned to the District Construction Engineer (DCE). Some or all of the following strategies will pertain to individual contracts.

**Speed Reduction Message Signs (IIIIC1)**
A reduced speed limit may improve traffic safety in a work zone and help protect workers. Speed limit reductions may be implemented through an entire work zone or only in active work areas or adjacent to workers. Reduced speed limits may also be appropriate on detours where traffic volumes and conflicts are increased.

**Temporary Traffic Barrier (IIIIC3)**
NHDOT will utilize temporary concrete barrier as needed to protect both the construction operations as well as the traveling public. Use of barrier will be per NHDOT standards plans and specifications.

**TMP Monitor / Inspection Team (IIIIC13)**
The inspections will pertain to the placement of traffic control devices, traffic flow through and around the work zone, indications of safety problems, as well as overall work zone operations. The intent of the inspections is to communicate and document issues and experiences as well as to identify that NHDOT and the contractor are properly managing the work zone or identifying where improvements are needed. Inspections should be completed by the Contract Administrator (CA) in conjunction with the Contractor’s Traffic Management Coordinator, utilizing the Traffic Control Checklist provided in Appendix D of NHDOT’s *Guidelines for Implementation of the Work Zone Safety and Mobility Policy*. Oversight of the inspections will be provided by the I-93 Corridor Construction Supervisor.
Additionally the CA will prepare and submit to the CCS, at the completion of each project, a TMP Evaluation Report as discussed in Section 2.b.iv. Developing and Implementing Transportation Management Plans, Step 12, of NHDOT’s Guidelines for Implementation of the Work Zone Safety and Mobility Policy. The CCS will compile and examine these documents to identify areas of common concern. These areas should be brought to the attention of all DCEs as well as the Bureau of Construction Administrator during their scheduled meetings. Assessment will also be provided to the TMP Work Group.

Furthermore, as previously discussed, the I-93 TMP Work Group will continue to oversee the implementation of the TMP on a corridor wide basis.

Team Meetings (IIIC14)
As previously discussed NHDOT conducts monthly team meetings where all aspects of design and construction are discussed. Any issues that are observed by the CAs or the CCS will be brought forward at these meetings.

Windshield Surveys (IIIC17)
The CCS will conduct random windshield surveys of projects to reinforce and verify the Traffic Control Checklists supplied by the CA.

Traffic Management Coordinator
As work progresses and there are multiple concurrent construction contracts that increase the impact on the traveling public, the Contractor(s) will be required to designate a Traffic Management Coordinator. This person will be responsible for scheduling and informing Department personnel of work efforts with direct traffic impacts (e.g. lane or shoulder closers). The contractors will be required to submit work schedules on a regular basis and the Department will review individual construction contract schedules to evaluate the overall impact on the entire corridor.

ITS and Work Zone ITS - NHDOT is in the process of installing permanent ITS devices as well as currently including Work Zone ITS in individual construction contracts. The intention of utilizing ITS and Work Zone ITS devices, such as cameras, traffic sensors and DMS is to provide real-time information to the traveling public. These devices provide direct feedback to the public, letting them know of slowed traffic ahead, anticipated travel times and of upcoming work events. Additionally the information gathered by these devices can provide vital information to emergency responders, improving the timing and level of response. The ITS and Work Zone ITS devices are controlled by NHDOT’s TMC as well as by NHDOT construction project personnel.

The development of Work Zone ITS is one of the current methods being deployed to move traffic safely through a construction zone. The TCC ultimately makes the decision for Work Zone ITS deployment and the Traffic Control Plan drives this decision. TMC staff will go into the field and place the device locations. Once the system is deployed, the TMC is a gatekeeper
for this system – to set up, monitor and provide information to the traveling public, incident response to the first responders and data to the design people. The TMC can also evaluate the effectiveness of Work Zone ITS in a given location.

4. Traffic/Incident Management and Enforcement Strategies

NHDOT in cooperation with the FHWA, the New Hampshire Department of Safety (NHDOS) and local emergency responders, initiated an effort to address more effectively the mobility and safety implications of traffic incidents on the I-93 corridor from the Massachusetts state line to the City of Manchester before, during and after the reconstruction project planned for this corridor. NHDOT has established an internal I-93 Incident Management Work Group and an external I-93 Technical Steering Committee (TSC) to evaluate, develop and implement all strategies related to Incident Management.

I-93 Incident Management Work Group - The NHDOT’s internal work group is comprised of representatives from the various departments involved in the design and construction of the I-93 improvements. The following personnel make up the I-93 Incident Management Work Group:

1. Peter Stamnas - NHDOT Project Manager
2. Mark Kirouac - NHDOT Operations
3. Dan Prehemo - NHDOT Consultant Design
4. Denise Markow - NHDOT ITS/Traffic Management Center
5. Pamela Mitchell - NHDOT District 5
6. Jay Levine - NHDOT Construction
7. Lennart Suther - NHDOT Utilities
8. Marty Calawa - FHWA
9. William Ashford - CHA

I-93 Technical Steering Committee (TSC) - The TSC is a committee comprised of local representatives and functions as a steering committee to help guide IM initiatives. The committee is led by the local communities with the NHDOT providing technical support to the committee. Having a steering committee that is locally led is critical to ensure local support and long-term sustainability. In addition to NHDOT representatives from the IM Work Group, members of the TSC include:

- Fire Department, Police Department and Department of Public Works representatives from:
  - City of Manchester:
  - Town of Londonderry:
  - Town of Derry:
  - Town of Windham:
  - Town of Salem:
  - City of Methuen, MA
- NH State Police, Troop B
- MA State Police, Troop A
- Massachusetts Highway Department
The IM Work Group, in conjunction with the TSC, drafted and adopted an I-93 Traffic Incident Management Plan (TIMP). This plan established the following goals:

- Goal #1: Minimize the impacts of incidents on travel
- Goal #2: Improve safety at the incident scene
- Goal #3: Reduce the probability of secondary incidents
- Goal #4: Foster inter-agency cooperation
- Goal #5: Establish a sustainable traffic incident management program

The I-93 TIMP outlined the following strategies to achieve these goals:

The DOT, District 5, operates the following vehicles in the I-93 corridor:

**Strategy 1.1a: Service Patrols**
In an effort to mitigate the impact of minor incidents Service Patrols are to be implemented on the I-93 Corridor, providing assistance with flat tires, vehicles out of gas, overheating, and clearing of simple debris in the roadway. Additionally the Service Patrols will provide assistance in traffic control operations during major incidents. During the summer of 2008 NHDOT implemented a 6-month pilot Service Patrol in order to facilitate the development of a full time program. The overwhelming success of the pilot led to full implementation of the patrol.

**Strategy 1.1b: Rapid Response Vehicle**
This vehicle (pickup truck) is equipped with a plow and sander and can be used for response to specific incidents where plowing/sand or removal of stuck cars is needed. The smaller size of the pickup, versus a full-sized plow, will allow the vehicle to negotiate through backed up traffic and get to the scene of an incident faster. The “Rapid Response” vehicle will be deployed during storms to help clear crossovers. During non-winter months, the vehicle will be equipped with additional supplies to help support the Service Patrol and the Incident Response Vehicle. This vehicle is in addition to and not a substitute for the regular Service Patrol vehicle, and therefore will only be called out as needed.
Strategy 1.1c: Incident Response Vehicle
This vehicle will be used by DOT to respond to significant incidents where traffic control or other assistance is needed. It is outfitted with a sufficient quantity of traffic control devices (signs, cones, etc.) to establish traffic lane closures for major incidents. This vehicle is not a replacement for the Service Patrol vehicle, but is intended to supplement the traffic control provided by the Service Patrol vehicle, or respond when the Service Patrol is not active.

Strategy 1.2: Intelligent Transportation System (ITS) Devices
To effectively respond to an incident on the highway you must have timely and accurate information regarding the situation. ITS devices, such as cameras and traffic sensors, will be used to verify that an incident exists, determine the exact location of the incident, quantify the magnitude of the incident, and determine the resulting effect on traffic. Devices such as dynamic message signs (DMS), Highway Advisory Radio (HAR), and 511 traveler information can then be used to inform the public in an effort to minimize delays and reduce secondary incidents. These systems are monitored and operated through the TMC, which then relays the real-time information to the State Police and other emergency responders.

Additionally, knowing the ever-changing weather and pavement conditions on the highways over the winter months can assist the NHDOT, and possibly local authorities, in knowing when and how much roadway treatment is necessary, as well as the effect of such treatments on the pavement. ITS devices such as road weather information systems (RWIS) assist in determining how to respond to weather incidents.

Currently, the use of Work Zone ITS cameras provides the means to view segments of New Hampshire roadways. Traffic incidents, long queues on the roadway due to accidents or construction phasing can be seen. The TMC monitors these cameras and provides incident information to the NH State Police and other emergency responders.

Lastly, the TMC is involved with the Public Outreach Campaign that is being implemented through the I-93 Transportation Management Plan. The outreach tools managed by the TMC include the 511 Traveler Information System, which is both a web-based and audio phone system, as well as permanent Dynamic Message Board signing, Work Zone ITS signage and Highway Advisory Radio messaging. The focus is to communicate with travelers apprising them of roadway projects and lane closures or incidents leading to delays.

Strategy 1.3 Communications Protocols
It has been shown that a coordinated response to incidents is dependent on timely and accurate information. The implementation of ITS technologies, improved radio communications and influx of cell phones provide governmental agencies the methods to communicate traffic incident information between agencies and to motorists, thus reducing congestion and delays. Coordination of the various forms of communications will enhance the response to and the mitigation of incidents. NHDOT is working with the Technical Steering Committee (TSC) to
outline communication protocols, defining what, when, how and to whom information is disseminated.

**Strategy 1.4: Emergency Detour Routes**
NHDOT has worked with the TSC to establish Emergency routes to be used when and if I-93 needs to be shut down. These routes are preplanned and pre-signed and will help to minimize back-up of traffic on the interstate and to facilitate the flow of traffic on secondary roads, thus reducing the probability of secondary incidents. The signing for the preplanned routes will be installed by September 2008.

**Strategy 1.5: Individual Work Zone Traffic Incident Management Plans**
Depending on the sequence of construction, schedule of work and other factors related to an individual work site, specific traffic incident management measures should be planned and implemented ahead of and during construction. Depending on the individual project’s details, items that may be addressed in the individual work zone plans may include allowing for temporary emergency vehicle access, providing of towing services and/or temporary emergency route signing.

**Strategy 1.6: Emergency Responder Support Infrastructure**
From the onset of incident management planning for the I-93 corridor, there have been discussions with the local communities about improving the ability of emergency responders to handle incidents that occur within the right-of-way. The primary concerns of local emergency responders were access to the highway and access to a water source. NHDOT has worked with the TSC in planning locations for standpipes on bridges, establishing emergency access points, establishing water access points through right-of-way fencing and sound walls for fire hose and maintaining highway median turn-arounds. As individual construction contracts are designed the appropriate support infrastructure will be incorporated into the plans.

**Strategy 1.7: Memorandums of Agreement (MOA)**
Effective incident management throughout the I-93 corridor will require a cooperative effort between state agencies, local communities, and private entities. Execution of Memorandums of Agreement (and Mutual Aid Agreements) will provide the means for one jurisdiction to provide resources or support to another jurisdiction, and to facilitate the timely delivery of assistance during incidents. Examples of specific Memorandums of Agreement may include the following:

- Standardization/Interoperability of Radio Communications
- Traffic Signal Operations and Maintenance
- Video and Data Sharing
- Utility (Fire Access and Standpipe) Maintenance
- Towing Services
- TSC Organization
Strategy 1.8: Public Education and Awareness
The intention of implementing a TIMP is to improve response to incidents and to improve safety for emergency responders and the general public. It is important to elicit public participation in order to improve upon the other strategies outlined in the TIMP. This will be done through an organized Public Outreach Campaign (POC). The intention of the POC is to be proactive in informing the public of upcoming construction activities, to disseminate information about TIMP strategies and to provide information regarding traffic conditions.

Strategy 1.9: Technical Steering Committee (TSC)
NHDOT established the TSC to assist in the development and implementation of the TIMP. Details of the TSC were previously discussed.

Strategy 1.10: Post Incident Review Procedure
There has been some collaborative traffic incident management training with all of the different agencies and private entities that respond to incidents in the I-93 corridor. However, the training does not always provide the same insight as to operations, or cover all the types of actions that may occur during a real incident. One of the best means to improve operations is to review actual incident responses soon after they have occurred. These types of reviews will help to identify operations that worked well as well as those that didn’t and how they could be improved. NHDOT will work to establishing a formal post incident review procedure to encourage this practice and provide a systematic way to ensure that it is done effectively.

Strategy 1.11: Enhanced Reference Location Signs
Incident location identification is perhaps one of the most important components of responding to an emergency incident. Correct location information reduces the response time of emergency responders, thereby increasing the survivability of those involved in an incident. Further, correct location identification enables responding units to access the highway from the correct on-ramp, in the correct direction. This decreases instances of multiple units traveling in different directions, looking for the incident. It also decreases the use of crossovers. A highway location identification system (mile marker system) is currently in place, but it has not been upgraded to the current MUTCD standards. Signs identifying the mile markers in 2/10th increments, as well as bridge signs will be installed. In an effort to expedite the updating of the system, the mile marker signs for the entire corridor will be installed as part of one of the early construction contracts (completed in the summer of 2009). Bridge mounted street name identification signs will also be installed at each bridge overpass location.

For more details on these goals and strategies please refer to the TIMP dated March 26, 2008.

Evaluation - Each one of the Incident Management Strategies has a defined performance measure(s). These performance measures are being evaluated by the Incident Management Working Group.
VI. TMP Monitoring

In an effort to maximize the effectiveness of the TMP, the NHDOT TMP Workgroup will monitor and track the performance of certain aspects of the TMP and periodically update the TCC. The TMP Workgroup will meet on a monthly basis until the TMP implementation details are worked out and will then meet quarterly to review implementation progress. Throughout the body of this document, details have been provided as to how certain aspects will be implemented. In addition to evaluating the individual section of the I-93 TMP, the TMP Work Group will periodically review the document and implementation details as a whole and present the refinements to the TCC. This will be done in an attempt to identify the overall effectiveness of the TMP and to identify areas that need improvement.

TMP Implementation and Costs (as detailed in Section II)

Construction and implementation costs for the TMP will be tracked and compared to original estimates where feasible. The tracking of costs will help to establish costs for similar efforts in the future.

TCP Costs (reference page 5)
TCP costs are itemized in the DOT cost estimates and are tracked through bid prices and final construction costs. Consultant Design will compile an initial listing of items and Construction will update the list based on final construction quantities/costs including any under runs/overruns in these items. Tracking of costs will be updated on an annual basis.

TO and POC Costs (reference page 5)
Costs not covered under individual contract TCP items will be tracked on a case by case basis. The estimated costs, bid costs, and final construction costs will be tracked. These costs will be totaled to provide a total corridor wide cost.

Existing and Future Conditions (as detailed in Section IV)

Incident Data (reference page 11)
Accident rates during construction will be compared to baseline rates in an effort to quantify the effectiveness of each Work Zone Management Strategy (see Section V). Any significant change (increase or decrease) in accident rates will be investigated to determine the cause of the change. Causes for increases and best practices associated with decreases will be indentified and implemented to reduce future accident rates. After construction is completed, crash data will be compared to the baseline data in order to quantify how the geometric and safety improvements have affected crash rates in the corridor. Originally accident data was supplied by DOT’s Bureau of Planning and Community Assistance. More recently the TMC has acquired access to State Police Event Reports and should be gaining access to reports from local emergency responders. In addition to the data supplied by Planning, the State Police and local responder reports will be utilized as a possible source of data for evaluating crashes along I-93. Accident data will be compiled on a yearly basis and the TMC in coordination with the IM Work Group will continue to take the lead in monitoring and evaluating the available data.
Local Community Issues / Concerns (reference page 12)
Feedback on local issues will be collected through the “Contact Us” section and the Public Opinion Survey of the project website, www.RebuildingI93.com. The “Contact Us” section allows the public to contact the NHDOT I-93 Project Manager by phone, regular mail or email. The questions / feedback from this section provide qualitative insight as to whether NHDOT is providing the information the public needs. The online survey results allow a more quantitative measurement of how NHDOT is doing in providing information to the public. Both of these sources will be evaluated on a periodic basis. The I-93 Project Manager will be responsible for follow through on evaluation of Public Outreach efforts. Feedback from the Public Outreach efforts will be summarized every six months.

Traffic Predictions during Construction (reference page 13)
In order to evaluate the success of TCPs and the use of Quick Zone, NHDOT will utilize data collected from Work Zone ITS devices during actual construction and compare that data against the predictions of the Quick Zone software. Consultant Design will be responsible for initial traffic predictions utilizing Quick Zone and the TMC will follow up with post analysis based on Work Zone ITS data.

Public Outreach Campaign (POC) (as detailed in Section V) (reference page 16)
Feedback on public outreach efforts will be collected through the “Contact Us” section and the Public Opinion Survey of the project website. The “Contact Us” section allows the public to contact the NHDOT I-93 Project manager by phone, regular mail or email. The questions / feedback from this section provides qualitative insight as to whether NHDOT is providing the information the public needs. The online survey results allow a more quantitative measurement of how NHDOT is doing in providing information to the public. Both of these sources will be evaluated on a periodic basis. Furthermore, on a monthly basis, a Web Status Report is generated. This report indicates which sections of the website are being viewed and allows NHDOT to focus public outreach efforts on the topics of the most interest to the public. The I-93 Project Manager will be responsible for follow through on evaluation of Public Outreach efforts.

Transportation Operations (TO) (as detailed in Section V)
Travel Demand Management (TDM) Strategies (reference page 20)
Now that the PNR facilities are constructed and the expanded bus service is in place the NHDOT Bureau of Rail and Transit will utilize ridership numbers and utilization of the PNRs to evaluate the success of the transit strategy. The I-93 Project Manager will be responsible for follow up with the Bureau of Rail and Transit to obtain updated utilization numbers on a semi-annual basis.

Corridor/Network Management Strategies (reference page 21) & Work Zone Safety Management Strategies (reference page 23)
The CCS in coordination with the TMC will evaluate all of the network and safety management strategies implemented as part construction. Evaluation will be conducted on a semi-annual basis or upon completion of individual construction projects.
Traffic/Incident Management and Enforcement Strategies (reference page 25)
Each one of the Incident Management Strategies has a defined performance measure(s). These performance measures are being evaluated by the Incident Management Working Group in coordination with the TSC. Feedback from the TSC group will be evaluated by the TMP Work Group on a quarterly basis.

**VII. Contingency Plans**

Contingency plans are developed to minimize traffic impacts when unexpected events occur. In order to minimize impacts of unanticipated factors, the NHDOT has put the following entities/plans in place:

**Traffic Management Center (TMC)** - The TMC monitors state roadways to provide NHDOT real-time information and enhance the Department’s ability to react to traffic and other roadway conditions, thus improving the flow of traffic. The TMC has direct lines of communication with the State Police and other emergency responders, facilitating response to accidents or other situations that affect the state’s roads. The TMC is a vital component in the Transportation Operations (TO) and the Public Outreach Campaign (POC) strategies.

**Emergency Operations Center (EOC)** - The EOC is responsible for coordinating the state’s response to major disasters. This includes natural disasters such as hurricanes, floods and severe winter storms, and human-caused disasters. The EOC is collocated with the TMC.

**Traffic Incident Management Plan (TIMP)** - NHDOT has worked with state and local representatives to establish an incident management plan for the I-93 Salem to Manchester corridor. The details of this plan were previously discussed in this document and are detailed in the TIMP dated March 26, 2008.

**NHDOT District 5 Maintenance Forces** - The NHDOT is structured by dividing the state into districts. The I-93 Salem to Manchester corridor falls within District 5. District staff are responsible for highway maintenance as well as emergency response as needed.

Each of the entities/plans listed above has its own procedures and processes that define triggering points and outline decision making/authority responsibilities. NHDOT will utilize any or all of these resources as needed to minimize the impacts of unforeseen developments on the traveling public.
To be updated with Financial Plan
Appendix C

Insert meeting minutes