



Spaulding Turnpike Improvements Newington-Dover

NHS-027-1(37), 11238



Table of Contents

What's New	1
Contract M Fact Sheet.....	2
Unitil Relocation.....	3
Contracts / Schedule.....	4-5
Geological History.....	3, 6-7
Motorist Service Patrol.....	7
Frequently Asked Questions	8

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CONSTRUCTION INCREASES ALONG SPAULDING TURNPIKE

Over the past few years, the lone construction activity along this 3.5 mile stretch of the Spaulding Turnpike was Contract L, which includes the new Southbound Little Bay Bridge (LBB), the approach roadway work, the pedestrian bridge to access the General Sullivan Bridge and the roadway work along Wentworth Terrace. That contract continues and is joined by construction in Newington, via Contract M, which was awarded in the fall of 2012. Construction operations started shortly thereafter with a concentration of the work occurring near the future roundabout at the intersection of the Exit 3 Southbound ramps, Woodbury Avenue and Arboretum Drive. These contracts will run concurrently through the fall of 2013 when Contract L is completed and Contract M continues to the summer of 2015. The following provides an update to the progress to date, upcoming activities and interesting facts about the overall Newington-Dover project.



Erection of the Middle Span

CONTRACT L UPDATE

Contract L construction continues with the bridge and roadway improvements expected to meet the fall 2013 completion date. A major milestone in 2012 was the erection of the first phase center span structural steel. This event was attended by hundreds of on lookers as the structural steel was floated in on a barge before being lifted into place by four strand jacks before being bolted into and secured to the adjacent steel. This event required specific coordination with marine officials and timing with the slack tide to provide Cianbro Corporation with a short window of opportunity where the water is moving relatively slow between the tides rushing in and out.

Since that day, the concrete deck has been placed and cured. The deck will be utilized as a second work platform in conjunction with the temporary trestle that is at water level to construct the second half of the bridge. The bridge piers have been completed with the trestle being removed as the pier work is completed from the center span towards the shoreline and the trestle is no longer required. The remaining structural steel was erected recently and the precast deck forms are currently being placed in preparation of the final concrete placements.

The remaining work for the contract includes completing the bridge, the roadway work for Wentworth Terrace, the soundwall along the future proposed SB barrel, the Spaulding Turnpike approach roadway and the water quality basins on either side of the bridge. At the completion of the project in the fall of 2013 Wentworth Terrace will be opened to two-way traffic and the detour that has been in place for the past few years will be removed.

The Newington Construction Project

Contract M Project Fact Sheet

Contract Description:

This contract involves the widening and reconstruction of a segment of the Spaulding Turnpike (NH Route 16) in Newington and Dover. The contract begins approximately 800 feet south of the existing Exit 1 Northbound On Ramp nose in Newington, and continues 2.8 miles north to approximately 0.2 miles north of the Exit 5 Northbound On Ramp in Dover. The widening in Newington will occur primarily within the existing median and will provide a 6-lane section south of Exit 3, transitioning to an interim 7-lane section (including a northbound (NB) and southbound (SB) auxiliary lane) between Exit 3 and Exit 4. The interim section further transitions to a 4-lane approach at the south end of the new Little Bay Bridge (LBB). The NB and SB barrels will be separated by single slope concrete median barrier. The work in Dover involves Spaulding Turnpike improvements to construct an interim 4-lane section with median barrier, approximately 0.6 miles long, which transitions to the existing turnpike alignment north of the Exit 5 ramps. The completion of this project will provide the interim match to the new SB LBB, which consists of 2 lanes for both NB and SB on the new bridge. Contract Q will complete the 8-lane improvements from Exit 3 to Exit 6 in the future. Contract M also includes the following work:

- Woodbury Avenue pavement rehabilitation and westerly extension via a bridge over the Spaulding Turnpike
- Removal of the existing NB Spaulding Turnpike bridge over the existing Exit 3 SB Off Ramp
- Construction of a full access interchange at Exit 3 with a roundabout at the intersection of the Exit 3 SB On and Off Ramps, Woodbury Avenue, Arboretum Drive and Arboretum Drive (West)
- Construction of 5 wet extended detention ponds for water quality improvements and peak flow mitigation
- Pavement rehabilitation work on the Exit 1 NB On and SB Off Ramps
- Closure of the Exit 2 NB Ramps
- Reconstruction of the Exit 4 NB and SB Ramps and the extension of Mitchell Lane at Exit 4
- Widening of the Shattuck Way bridge
- Railway Brook stream restoration
- Test Embankment for the future Exit 6 SB On Ramp
- Construction of Intelligent Transportation Systems

Construction Data:

Construction Bid Price.....	\$43,155,392.45
Total Construction Cost (including Engineering)	\$49,454,073.85
Roadway Total.....	\$43,282,899.66
Bridge Total	\$6,171,174.19

Contractor: Alvin J. Coleman & Son, Inc., Conway, NH

NHDOT Construction Office: Intersection of Shattuck Way and Nimble Hill Road off of Exit 4

NHDOT Construction Office Telephone #: (603) 501-0303

Intermediate Completion Date #1 – November 16, 2012:

Completion of Phase 1 for the Test Embankment placement for the proposed Exit 6 SB on ramp.

Intermediate Completion Date #2 – January 18, 2013:

Completion of Phase 2 for the Test Embankment placement for the proposed Exit 6 SB on ramp.

Completion Date: July 17, 2015:

Final traffic shifts result in the NB and SB traffic being placed onto the new SB Little Bay Bridge and approach roadwork that was completed in Contract L.

Anticipated Roadway Closures:

Exit 1 SB Off Ramp and Exit 1 NB On Ramp:

These ramps may be closed one at a time to allow for the final paving operation. These closures are permitted Sunday through Thursday during overnight hours. Adequate signage will be placed to direct motorists to Exit 3 and the Portsmouth Traffic Circle.

Exit 2 NB Ramps and the Exit 3 SB Off Ramp:

The Exit 2 NB ramps and the existing Exit 3 SB off ramp will require closures to complete construction along the Spaulding Turnpike. The Exit 2 NB ramps, once closed, will be permanently discontinued to allow for the proposed cul-de-sac construction. The Exit 3 SB off ramp requires several closures during construction that will occur for up to 3 days, 14 days and 3 months in order to complete the necessary roadway construction operations. Adequate detour signage and advanced messaging will be deployed prior to the detours being activated to direct the motorists accordingly. The Exit 3 SB off ramp closures shall not be closed during the holiday shopping season from November 15th to January 5th.

Exit 5 Ramps:

The reconstruction of the ramps requires ramp closures. Wentworth Terrace will remain opened to two-way traffic to provide access to the Wentworth Terrace neighborhood, Spaulding Turnpike and other roadways via the US Route 4 signalized intersection at Boston Harbor Road. Adequate signage and advanced messaging will be deployed to direct motorists accordingly.

Hilton Park:

- The boat launch at Hilton Park will remain open during construction
- The sidewalk along Wentworth Terrace that connects Hilton Park beneath the General Sullivan and Little Bay Bridges will remain closed until Contract L opens the sidewalk. Contract M should maintain the sidewalk during construction following the completion of Contract L.

Environmental:

- Permits have been obtained and coordination efforts have occurred with EPA, USACOE, USF&G, USCG, NHDES, NHDHR, NHF&G and local conservation commissions during construction
- The contract has conditions that address Water Quality, Erosion Control, Sediment, Soils and Invasive Species Management

Unitil - Gas Line Relocation

Alongside the Little Bay Bridge expansion project, Unitil, a local natural gas and electric utility, has been hard at work on a highly technical gas pipe replacement effort. In order to make way for the new bridge being built, Unitil had to find a new way to cross the Piscataqua River in order to serve its natural gas customers in both New Hampshire and Maine. After reviewing all available options, Unitil decided the safest and most environmentally sound method for spanning the river was to drill underneath the rushing waters.

As a result, Unitil and its contractor, Carson and Roberts, drilled 2,600 feet horizontally in February in order to lay a new, 10-inch natural gas pipeline underneath the river. During some of the coldest days of the year, crews were out on both sides of the river carefully monitoring the drill as it made its way underneath the river. Once through, gas technicians laid out the half-mile of steel pipe in its entirety on the Dover side, then threaded the pipe through the newly formed hole by pulling it all the way from the Newington river bank.

“From a technical engineering standpoint, this horizontal bore project was one of the largest and most complex undertaken in Unitil’s history,” Unitil media relations manager Alec O’Meara said. “Natural gas continues to grow in popularity in the region as a cheaper alternative to oil, and this new line not only replaces our old one across the bridge, but will allow us to continue to meet the rising demand in New England.”



Drill Enters the Casing

Unitil worked in tandem with the New Hampshire Departments of Transportation, Environmental Services, Fish and Game and the Division of Historic Resources as part of this process, as well as other local agencies.

Unitil is proud to be an environmentally responsible partner of the local communities involved with the Little Bay Bridge expansion, and we thank all who assisted with our small portion of this important state project.



Drilling Rig



Pilot hole, Dover Point

Geological History and Affects on the Project

A total of 209 subsurface explorations (test borings) were performed for the engineering design of the Newington-Dover 11238-Q project, which is situated primarily in Dover. The test borings were widely spaced, being about 200 feet apart, and they were drilled down to as much as 114 feet deep. The explorations revealed several soil deposit types and their layering throughout the project site. The general sequence of soil deposits, from the ground surface down to bedrock, included: Alluvium (Sand), Glacial Marine (Silt/Clay), Glacial Outwash (Sand), and Glacial Till (Sand w/ gravel). As indicated by the deposit names, all but the alluvium deposit were formed when glaciers covered the area and then receded in the last ice age. The alluvium deposit is a more recent deposit having been formed after the last ice age by flowing water courses that once existed in the area.

The soil in the glacial marine deposit presents a very difficult problem for the project, and it was found throughout most of the project limits. The deposit’s thickness varied greatly with the maximum observed thickness being 74 feet. The depth to the top of the deposit varied from near the ground surface to more than 20 feet below the ground surface and was typically encountered below the groundwater table. The soil in the upper portion (+/- 10 feet) of the glacial marine deposit tended to be stiffer than the soil in the lower portion of the deposit. The soil in the lower portion of the glacial marine deposit was very soft, having the consistency of flowing pudding. Continued on page 6.

Geological History and Affects on the Project, Con't

The natural water content of the glacial marine deposit samples were generally high and ranged from about 40% to 50% of their volume. The Lean Clay soil classification, in conjunction with the water content test results, forms the “underlying” soil problem for the project site. Lean Clay is a fine grained soil that has low permeability. Low permeability means that water has a difficult time flowing through or escaping the soil. The high water content reveals that the soil matrix contains a significant volume of water compared to the volume of solid soil particles. In fact, in terms of volume there is actually more water than solids comprising the glacial marine deposit. The high water content indicates the potential for ground settlement when water is forced out the deposit.

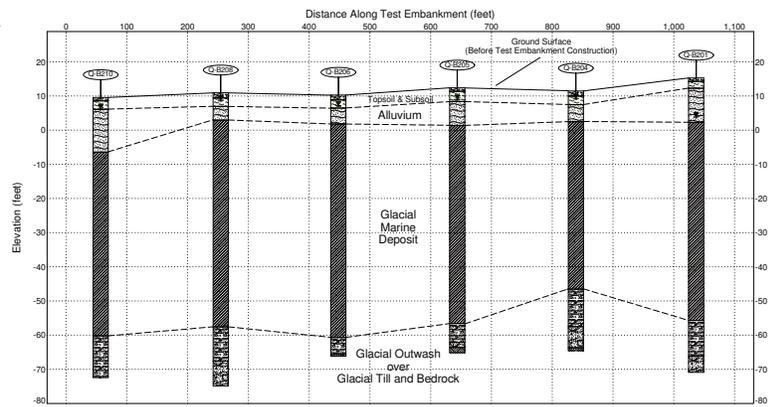
A simple comparison can be made between the glacial marine deposit and a saturated sponge in order to demonstrate the settlement problem. A sponge is composed of solid parts and open pores throughout. When the sponge is saturated, all of the open pores of the sponge are filled with water. This is similar to the glacial marine deposit soil matrix found below the groundwater table, in which there are solid soil particles with voids between them filled with water. A saturated sponge appears stable and maintains its size and shape when left undisturbed. However, when downward pressure is applied to a sponge, water is squeezed out, its volume is reduced. The volume reduction is akin to settlement. Unlike a sponge however, once the water gets squeezed out of the glacial marine deposit, water will not reenter the deposit, and it will not rebound to its original size.

The 11238-Q project will construct roadway embankments in Dover to realign the Turnpike with the newly widened Little Bay Bridge. The proposed roadway embankments will impart a downward pressure on the glacial marine deposit. Some of the water in the glacial marine deposit will be squeezed out of the soil matrix and settlement will occur. The escaping water will travel either upwards or downwards (whichever path is shortest) towards the more permeable soil deposits found above and below the glacial marine deposit. Eventually, the water will also travel laterally away from the area. The settlement won't occur instantaneously. The glacial marine deposit soils have low permeability and the settlement will occur very slowly as water leaves the soil matrix. This type of settlement is known as consolidation settlement and is time dependent.

There are many factors that impact theoretical predictions of settlement of this deposit and these include: properties of the soil both in the vertical and horizontal directions; the deposit thickness, depth from the surface, and loading history; the embankment fill height and geometry; and the permeability of the soil deposits immediately above



Fill Height and Settlement Over Time - Figure 1



Example of Subsurface Soil Profile

and below the glacial marine deposit. The predictions are complicated even further because all of these aspects are variable throughout the project site. In some areas of the project, one to two feet of ground settlement is anticipated where large roadway embankment fill heights are proposed.

The time it will take for full settlement to occur in the glacial marine deposit when the embankment loads are applied is estimated to be many years, possibly up to a decade. This length of time is obviously unacceptable given the project goals for its quicker completion and the desire for an efficient construction schedule. To achieve the project goals an engineering alternative is required to accelerate the settlement within the glacial marine deposit. Prefabricated Vertical Drains (PV-Drains) are proposed to be installed from the ground surface down through the entire thickness of the glacial marine deposit. PV-Drains are 4 inch wide by 1/8 inch thick ribbons of plastic covered by a thin textile fabric. They work by providing a consistent and much shorter drainage path for water to leave the soil matrix as embankment loads squeeze the glacial marine deposit.

To provide engineering design information to optimize the PV-Drain installation a full scale test embankment has been constructed at the location of the future Exit 6 Southbound On-Ramp. The information gathered from the test embankment effort will provide the basis for more accurate estimates of settlement for the 11238-Q project and to establish an efficient spacing of PV-Drains to accelerate settlement. Given the large footprint of the project, a small change in PV-Drain spacing will have a large impact on costs. The test embankment data will help find the balance between achieving acceptable settlement times in the most cost effective manner.

The test embankment has been extensively instrumented to record vertical deformation during and after the embankment fill placement and to record vertical and lateral deformations adjacent to the embankment. Instrumentation, collectively called geotechnical

instrumentation, includes inclinometers,

piezometers, settlement platforms, and deformation monitoring points. Some of the instrumentation devices are electronic based while others are based on traditional survey methods.

The NHDOT has involved the UNH Department of Civil Engineering to characterize the soils at the site more completely by performing various in-place soil testing methods known as in situ tests. UNH will also perform finite

element analysis (FEA). The FEA creates a computer model of the test embankment and underlying soils using a very large number of elastic and elastic-plastic parts (or elements). Soil properties are assigned to the elements of the model. These properties are varied until the response of the computer model closely matches the time dependent settlement and lateral movement actually observed during and following the test embankment construction. Comparisons will be made between the soil properties of the finalized FEA model and the soil properties that were determined through field testing methods to validate their results.

The test embankment program is progressing well. UNH performed the in situ testing in July, 2012, to characterize the site. The geotechnical instrumentation was installed before embankment fill placement began. The PV-Drains were installed in September, 2012. The test embankment was divided into five, 200 foot long segments with four segments having approximately 12 feet of embankment fill and one segment (#4) being filled to approximately 18 feet. Fill placement was completed in January, 2013. The collection of data from the geotechnical instrumentation is ongoing.

The accompanying figures present instrumentation and survey data from Segment 1 of the test embankment collected from early October 2012 to early February, 2013. Figure 1 depicts the test embankment's constructed fill height over time. The test embankment took about a month to construct to its full height of approximately 12 feet, and it was completed mid-November 2012. Figure 1 also shows the measured settlement over time at the test embankment centerline. As of February 4, 2013, approximately 9.5 inches of settlement has been observed since fill placement began, and additional settlement is anticipated because the pore water pressure has not returned to pre-filling readings. The pore water pressure change over time (measured at the middle of the glacial marine deposit layer with piezometers). The elevated readings of pore water pressure indicate that water is still trying to leave the glacial marine deposit soil matrix, so additional settlement is expected to occur. It is estimated that settlement at the test embankment will be completed in the next several months and not years, which is the objective of the proposed PV-Drain treatment.



Installation of Prefab. Vertical Drains



Welder Preparing for Installation of Drains

Like a Good Neighbor, The Motorist Service Patrol is There

Motorists traveling on the I-95 and lower Spaulding Turnpike corridors can look forward to possible assistance from the Turnpikes Bureau's Motorist Service Patrol (MSP) for at least the next three years. Thanks to a new sponsorship by State Farm Insurance, the service patrol will continue to be there when needed for everything from a dead battery and a small amount of fuel, to debris in the highway and calling in emergency responder help for roadway incidents.

A newly wrapped NHDOT service patrol vehicle featuring the State Farm logo was unveiled at a November 20th media event at the Hampton Tolls that announced the sponsorship.

"This is great news for motorists who drive on I-95 and the Spaulding Turnpike in New Hampshire," said NHDOT Commissioner Chris Clement. "This public-private partnership with State Farm will ensure an additional level of safety for the traveling public for several years."

Launched as a pilot program in May of 2011, the Turnpikes Motorist Service Patrol has been busy, responding to approximately 250 highway incidents a month. That includes patrolling the 16 miles of I-95 (Blue Star Turnpike) year round and another 14 miles of the Spaulding Turnpike during winter months. Turnpikes Highway Maintainer Arvid Bacon recalled an MSP response to a motorist with a flat tire through the high-speed Open Road Tolling lanes at the Hampton Tolls in an interview with the Manchester Union Leader, "She was scared to death being stuck out there with cars zipping by her at 65 mph. There's just barely a full breakdown land and you're stuck in there by jersey walls," Bacon said.



Bacon said he notified the NHDOT's Transportation Management Center, which then dispatched state police. As soon as police arrived, Bacon changed the tire and the thankful motorist resumed her trip.

The State Farm sponsorship totals \$145,000 for three years, with the option of two addition two-year renewals. The underwriting will allow the service patrol to continue and possibly expand.

State Farm sponsors motorist assist patrols in eight other states: New York, New Jersey, Pennsylvania, Maryland, Georgia, Florida, Indiana and Kansas.

Frequently Asked Questions

- Q. Property Acquisition – When during the project development process can I expect to have the Bureau of Right-of-Way contact me on the impacts to my property?**
- A. The final design for the highway and bridge designs need to advance to approximately the 60% design stage, where the highway grading, drainage requirements, and slope impacts can be confidently defined. At that time, the Bureau of Right-of-Way (ROW) initiates the appraisal process to identify a value of the impacts on each individual property. The property for Contract M has been acquired and the property necessary for Contract Q is in process currently. Owners of properties impacted by the project will be contacted during the appraisal process.
- Q. Funding – Why isn't the proposed construction of the Dover portion of the project and the General Sullivan Bridge funded and do you expect it to be funded?**
- A. The Dover portion of the project was not included in the approved Ten Year Transportation Improvement Plan 2013-2022 (TYP) due to financial constraints with a commitment that funding be identified for the unfunded portions in subsequent Ten Year Plan processes. The Department is presently evaluating various bonding and financial scenarios to fully fund the entire project's construction.
- Q. Traffic Operations - When will the ramps at Exits 2 and 5 be closed?**
- A. Based on the review of the current construction sequencing, the Exit 2 ramps will remain open until the eastern portion of the proposed NB barrel is being constructed. Based on the current construction schedule, the ramps are anticipated to be closed in 2015. The Exit 5 ramps and the Cote Drive NB on ramp will be closed when the Exit 6 NB ramps are opened so that the NB movements onto and off of the Spaulding Turnpike can be retained. The current construction schedule anticipates these ramps to be discontinued in 2016.
- Q. Traffic Operations - When will the interchange at Exit 3 be fully operational?**
- A. Based on the review of the construction sequencing, the Exit 3 interchange will be fully operational in 2015. The realignment of the Spaulding Turnpike, the construction of the Woodbury Avenue bridge over the Spaulding Turnpike, the removal of the existing left hand SB off ramp and the construction of all the ramps at Exit 3 must be completed prior to the interchange being fully operational.
- Q. Traffic Operations - When will Wentworth Terrace be opened to 2 way traffic?**
- A. Wentworth Terrace is being constructed in Contract L. The construction of the Wentworth Terrace and the new Little Bay Bridge is constrained by an extremely tight construction zone which requires Wentworth Terrace to be closed from Fall 2010 to Fall 2013. Therefore, it is envisioned that the Wentworth Terrace will be opened to two-way traffic at the end of the L-contract's construction, which is currently scheduled to be Fall 2013.
- Q. Soundwalls - When will the soundwall meetings with the various neighborhoods be held and will they be constructed early in the project?**
- A. The NHDOT held a neighborhood meeting for the soundwalls south of Exit 6 in the spring of 2010 and will hold a meeting for the neighborhoods located north of Exit 6 in 2013. The Department and Consultant Team are evaluating the advanced construction of the soundwalls to determine if the construction of the soundwalls can be cost effectively constructed early in Contract Q without further complicating construction of the remainder of the contract.
- Q. What is the status of the General Sullivan Bridge contract?**
- A. The NHDOT will be conducting additional inspections of the General Sullivan Bridge in 2013/2014 to determine the current condition of the bridge and the amount of deterioration that has occurred since the last inspection. Past inspections and further analysis have resulted in a narrowing of the bridge in one span with signage for users. This bridge contract is anticipated to begin construction in 2017. Design of the rehabilitation will advance after the next round of inspection occurs.
- Q. Traffic Operations - When will the interchange at Exit 6 be fully operational?**
- A. Based on the preliminary review of the construction sequencing and construction schedule, we anticipate the full interchange will be operational in 2016. At that time, the NB ramps at Exit 5 and Cote Drive will be discontinued permanently. There are significant geotechnical challenges relative to soft compressible soils in Dover that the NHDOT is currently reviewing to better define the overall construction sequencing and schedule.

